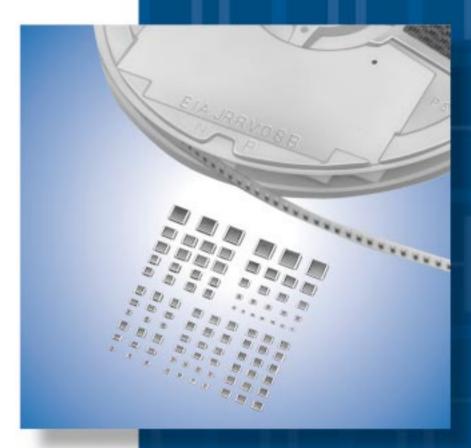
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Chip Monolithic Ceramic Capacitors





Innovator in Electronics

Murata Manufacturing Co., Ltd.

Cat.No.C02E-15

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• Please refer to "Specifications and Test Methods" at the end of each chapter of 9 - 14 .

for EU RoHS Compliant

- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment".
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (http://www.murata.com/info/rohs.html).

Please check MURATA home page (http://www.murata.com/index.html) in case you can not find the part number on the catalog.



Part Numbering							
Chip Monolithic	c Ceramic Ca	pacitors					
(Part Number)	GR M	18 8 B1 1H 102 K A01 D 3 3 5 6 7 6 9 0					
Product ID							
2 Series							
Product ID	Code	Series					
	м	Tin Plated Layer					
GR	4	Only for Information Devices / Tip & Ring					
	7	Only for Camera Flash Circuit					
ER	В	High Frequency Type					
GQ	М	High Frequency for Flow/Reflow Soldering					
GM	Α	Monolithic Microchip					
GIVI	D	for Bonding					
GN	м	Capacitor Array					
	L	Low ESL Wide Width Type					
LL	Α	Eight-termination Low ESL Type					
	м	Ten-termination Low ESL Type					
GJ	м	High Frequency Low Loss Type					
GA	2	for AC250V (r.m.s.)					
GA	3	Safety Standard Certified Type					

3Dimension (LXW)

Code	Dimension (L×W)	EIA
02	0.4×0.2mm	01005
03	0.6×0.3mm	0201
05	0.5×0.5mm	0202
08	0.8×0.8mm	0303
0D	0.38×0.38mm	015015
OM	0.9×0.6mm	0302
11	1.25×1.0mm	0504
15	1.0×0.5mm	0402
18	1.6×0.8mm	0603
1M	1.37×1.0mm	0504
21	2.0×1.25mm	0805
22	2.8×2.8mm	1111
31	3.2×1.6mm	1206
32	3.2×2.5mm	1210
42	4.5×2.0mm	1808
43	4.5×3.2mm	1812
52	5.7×2.8mm	2211
55	5.7×5.0mm	2220

Code	Dimension (T)
2	0.2mm
2	2-elements (Array Type)
3	0.3mm
4	4-elements (Array Type)
5	0.5mm
6	0.6mm
7	0.7mm
8	0.8mm
9	0.85mm
Α	1.0mm
В	1.25mm
С	1.6mm
D	2.0mm
E	2.5mm
F	3.2mm
м	1.15mm
N	1.35mm
Q	1.5mm
R	1.8mm
S	2.8mm
X	Depends on individual standards.

With the array type GNM series, "Dimension(T)" indicates the number of elements.

Continued on the following page.



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Temperatur	e Characteristic C	odes		Temperature C	haracteristics	
Code	Public STD	Code	Reference Temperature	Temperature Range	Capacitance Change or Temperature Coefficient	Operating Temperature Range
1X	SL *1	JIS	20°C	20 to 85°C	+350 to -1000ppm/°C	-55 to 125°C
2C	CH *1	JIS	20°C	20 to 125°C	0±60ppm/°C	-55 to 125°C
2P	PH *1	JIS	20°C	20 to 85°C	-150±60ppm/°C	-25 to 85°C
2R	RH *1	JIS	20°C	20 to 85°C	-220±60ppm/°C	-25 to 85°C
2S	SH *1	JIS	20°C	20 to 85°C	-330±60ppm/°C	-25 to 85°C
2T	TH *1	JIS	20°C	20 to 85°C	-470±60ppm/°C	-25 to 85°C
3C	CJ *1	JIS	20°C	20 to 125°C	0±120ppm/°C	-55 to 125°C
3P	PJ *1	JIS	20°C	20 to 85°C	-150±120ppm/°C	-25 to 85°C
3R	RJ *1	JIS	20°C	20 to 85°C	-220±120ppm/°C	-25 to 85°C
3S	SJ *1	JIS	20°C	20 to 85°C	-330±120ppm/°C	-25 to 85°C
3T	TJ *1	JIS	20°C	20 to 85°C	-470±120ppm/°C	-25 to 85°C
3U	UJ *1	JIS	20°C	20 to 85°C	-750±120ppm/°C	-25 to 85°C
4C	CK *1	JIS	20°C	20 to 125°C	0±250ppm/°C	-55 to 125°C

50	051	515	20 0	2010050		-23 10 03 0
4C	CK *1	JIS	20°C	20 to 125°C	0±250ppm/°C	-55 to 125°C
5C	C0G *1	EIA	25°C	25 to 125°C	0±30ppm/°C	-55 to 125°C
5G	X8G *1	EIA	25°C	25 to 150°C	0±30ppm/°C	-55 to 150°C
6C	C0H *1	EIA	25°C	25 to 125°C	0±60ppm/°C	-55 to 125°C
6P	P2H *1	EIA	25°C	25 to 85°C	-150±60ppm/°C	-55 to 125°C
6R	R2H *1	EIA	25°C	25 to 85°C	-220±60ppm/°C -55 t	
6S	S2H *1	EIA	25°C	25 to 85°C	-330±60ppm/°C	-55 to 125°C
6Т	T2H *1	EIA	25°C	25 to 85°C	-470±60ppm/°C	-55 to 125°C
7U	U2J *1	EIA	25°C	25 to 125°C *6	-750±120ppm/°C	-55 to 125°C
B1	B *2	JIS	20°C	-25 to 85°C	±10% -25	
B3	В	JIS	20°C	-25 to 85°C	±10%	-25 to 85°C
C7	X7S	EIA	25°C	-55 to 125°C	±22%	-55 to 125°C
C8	X6S	EIA	25°C	-55 to 105°C	±22%	-55 to 105°C
D7	X7T	EIA	25°C	-55 to 125°C	+22, -33%	-55 to 125°C
D8	X6T	EIA	25°C	-55 to 105°C	+22, -33%	-55 to 105°C
E7	X7U	EIA	25°C	-55 to 125°C	+22, -56%	-55 to 125°C
F1	F *2	JIS	20°C	-25 to 85°C	+30, -80%	-25 to 85°C
F5	Y5V	EIA	25°C	-30 to 85°C	+22, -82%	-30 to 85°C
L8	X8L	*3	25°C	-55 to 150°C	+15, -40%	-55 to 150°C
R1	R *2	JIS	20°C	-55 to 125°C	±15%	-55 to 125°C
R3	R	JIS	20°C	-55 to 125°C	±15%	-55 to 125°C
R6	X5R	EIA	25°C	-55 to 85°C	±15% -55 to 8	
R7	X7R	EIA	25°C	-55 to 125°C	±15%	-55 to 125°C
R9	X8R	EIA	25°C	-55 to 150°C	±15%	-55 to 150°C
14/0			2500	FF to 12500	±10% *4	FE to 12500
W0	-	-	25°C	-55 to 125°C	+22, -33% *5	-55 to 125°C

*1 Please refer to table for Capacitance Change under reference temperature.

*2 Capacitance change is specified with 50% rated voltage applied.

*3 Murata Temperature Characteristic Code.

*4 Apply DC350V bias.

*5 No DC bias.

*6 Rated Voltage 100Vdc max : 25 to 85°C

Continued on the following page.



Continued from the preceding page.

•Capacitance Change from each temperature

JIS Code

	Capacitance Change from 20°C (%)							
Murata Code	-5!	5°C	-2!	5°C	–10°C			
	Max.	Min.	Max.	Min.	Max.	Min.		
1X	-	-	-	-	-	-		
2C	0.82	-0.45	0.49	-0.27	0.33	-0.18		
2P	-	-	1.32	0.41	0.88	0.27		
2R	-	-	1.70	0.72	1.13	0.48		
2\$	-	-	2.30	1.22	1.54	0.81		
2T	-	-	3.07	1.85	2.05	1.23		
3C	1.37	-0.90	0.82	-0.54	0.55	-0.36		
3P	-	-	1.65	0.14	1.10	0.09		
3R	-	_	2.03	0.45	1.35	0.30		
3S	-	_	2.63	0.95	1.76	0.63		
3Т	-	_	3.40	1.58	2.27	1.05		
3U	-	_	4.94	2.84	3.29	1.89		
4C	2.56	-1.88	1.54	-1.13	1.02	-0.75		

EIA Code

	Capacitance Change from 25°C (%)							
Murata Code	–55°C		-30°C		-10°C			
	Max.	Min.	Max.	Min.	Max.	Min.		
5C/5G	0.58	-0.24	0.40	-0.17	0.25	-0.11		
6C	0.87	-0.48	0.59	-0.33	0.38	-0.21		
6P	2.33	0.72	1.61	0.50	1.02	0.32		
6R	3.02	1.28	2.08	0.88	1.32	0.56		
6S	4.09	2.16	2.81	1.49	1.79	0.95		
6Т	5.46	3.28	3.75	2.26	2.39	1.44		
7U	8.78	5.04	6.04	3.47	3.84	2.21		

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Continued from the preceding page.
6 Rated Voltage

Code	Rated Voltage
0E	DC2.5V
0G	DC4V
0J	DC6.3V
1A	DC10V
1C	DC16V
1E	DC25V
YA	DC35V
1H	DC50V
2A	DC100V
2D	DC200V
2E	DC250V
YD	DC300V
2H	DC500V
2J	DC630V
3A	DC1kV
3D	DC2kV
3F	DC3.15kV
BB	DC350V (for Camera Flash Circuit)
E2	AC250V
GB	X2; AC250V (Safety Standard Certified Type GB)
GC	X1/Y2; AC250V (Safety Standard Certified Type GC)
GD	Y3; AC250V (Safety Standard Certified Type GD)
GF	Y2, X1/Y2; AC250V (Safety Standard Certified Type GF)

Capacitance

Expressed by three-digit alphanumerics. The unit is pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two numbers. If there is a decimal point, it is expressed by the capital letter "R". In this case, all figures are significant digits.

Ex.)	Code	Capacitance
	R50	0.5pF
	1R0	1.0pF
	100	10pF
	103	10000pF

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Code	Capacitance Tolerance	TC	Series	Ca	pacitance Step
w	±0.05pF	СΔ	GRM/GJM	≦9.9pF	0.1pF
			GRM/GJM	≦9.9pF	0.1pF
в	+0.1pF	СΔ	GQM	≦1pF	0.1pF
Б	±0.1pF		GQIVI	1.1 to 9.9pF	1pF Step and E24 Serie
			ERB	≦9.9pF	1pF Step and E24 Serie
		СΔ	GRM/GJM	≦9.9pF	0.1pF
		except C∆	GRM	≦5pF	* 1pF
С	±0.25pF		ERB	≦9.9pF	1pF Step and E24 Serie
		СΔ	GQM	≦1pF	0.1pF
			GQIM	1.1 to 9.9pF	1pF Step and E24 Serie
		СΔ	GRM/GJM	5.1 to 9.9pF	0.1pF
D	±0.5pF	except C∆	GRM	5.1 to 9.9pF	* 1pF
		СΔ	ERB/GQM	5.1 to 9.9pF	1pF Step and E24 Serie
G	±2%	СΔ	GJM	≧10pF	E12 Series
G	±2%	СΔ	GQM/ERB	≧10pF	E24 Series
J	±5%	CA-SL	GRM/GA3	≧10pF	E12 Series
J	T3 %	СΔ	ERB/GQM/GJM	≧10pF	E24 Series
		B, R, X7R, X5R, ZLM	GRM/GR7/GA3		E6 Series
к	±10%	COG	GNM		E6 Series
		B, R, X7R, X5R, ZLM	GR4, GMD		E12 Series
		B, R, X7R, X7S	GRM/GMA		E6 Series
м	±20%	X5R, X7R, X7S	GNM		E3 Series
IVI	±20%	X7R	GA2		E3 Series
		X5R, X7R, X7S, X6S	LLL/LLA/LLM		E3 Series
Z	+80%, -20%	F, Y5V	GRM		E3 Series
R		Depends	on individual standards.		

* E24 series is also available.

Individual Specification Code Expressed by three figures.

Packaging

Code	Packaging
L	ø180mm Embossed Taping
D	ø180mm Paper Taping
E	ø180mm Paper Taping (LLL15)
К	ø330mm Embossed Taping
J	ø330mm Paper Taping
F	ø330mm Paper Taping (LLL15)
В	Bulk
С	Bulk Case
т	Bulk Tray



Selection Guide of Chip Monolithic Ceramic Capacitors

	Function)	Туре		Series
_			High Capacitance	-	GRM (X5R, X7R, Y5V etc.) 68pF-100µF
	Decoupling, Smoothing		Array (2 or 4 Elements)		GNM 10pF–2.2μF
	Frequency Control/Tuning,		Class 1 TClas		GRM (C0G) 0.1pF–0.1μF
	Impedance Matching		Class1 TC's;	-	GRM (U2J etc.)
			Low Inductance (Reverse Geometry)		LLL 2200pF–10μF
	High Speed Decoupling		Low Inductance (Multi Termination)		LLA/LLM (From 1GHz) 0.01µF–4.7µF
			Low ESR (50V to 500V)		ERB (1MHz to 1GHz) 0.5pF-1000pF
	High Frequency	÷	Low ESR, Ultra Small		GJM (500MHz to 10GHz) 0.1pF-33pF
			Lowest ESR		GQM (500MHz to 10GHz) 0.1pF-100pF
Start —	Optical Communications		Wire-Die-Bonding	-	GMA 100pF–0.47μF GMD 100pF–1μF
	Medium Voltage High Frequency Snubber		250V/630V/1kV/2kV/3.15kV Low Dissipation		GRM (U2J) 10pF–10000pF
- 1	Medium Voltage LCD Backlight Inverter		3.15kV Low Dissipation		GRM (C0G) 5pF–47pF
- 1	Medium Voltage Decoupling, Smoothing		250V/630V/1kV High Capacitance		GRM (X7R) 220pF–1μF
- 1	Medium Voltage Only for Camera Flash Circuit		350V High Capacitance		GR7 10000pF–47000pF
	Medium Voltage Only for		2kV High Capacitance		GR4 100pF–10000pF
	Information Devices /Tip & Ring		Safety Standard Certified		Type GD 10pF–4700pF Type GF 10pF–4700pF
	AC Lines Noise Removal		Safety Standard Certified		Type GC 100pF–330pF Type GF 470pF–4700pF Type GB 10000pF–33000pF
	AC LINES NOISE REINOVAL		AC250V which meet Japanese Law		GA2 470pF–0.1μF
I	Automotive (Power train		High Capacitance		GCM (X7R etc.) 100pF-47μF
I	(Power-train, Safety Equipment)		Class1 TC's;		GCM (C0G etc.) 1.0pF–0.1μF
	Medium Voltage for Automotive (Power-train, Safety Equipment)		250V/630V Low Dissipation		GCM (U2J) 10pF–10000pF



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1

Chip Monolithic Ceramic Capacitors



for General Purpose GRM Series

- Features
- Higher resistance of solder-leaching due to the Ni-barriered termination, applicable for reflow-soldering, and flow-soldering (GRM18/21/31 type only).
- 2. The GRM series is lead free product.
- 3. Smaller size and higher capacitance value.
- 4. High reliability and no polarity.
- 5. Excellent pulse responsibility and noise reduction due to the low impedance at high frequency.
- The GRM series is available in paper or embossed tape and reel packaging for automatic placement. Bulk case packaging is also available for GRM15/ 18/21(T=0.6,1.25).
- 7. Ta replacement.

Applications

General electronic equipment

Part Number		Din	nensions	(mm)		
Fait Number	L	W	Т	е	g min.	
GRM022	0.4 ±0.02	0.2 ±0.02	0.2 ±0.02	0.07 to 0.14	0.13	
GRM033	0.6 ±0.03	0.3 ±0.03	0.3 ±0.03	0.1 to 0.2	0.2	
GRM15X			0.25 ±0.05	0.1 to 0.3	0.4	-
GRM153	1.0 ±0.05	0.5 ±0.05	0.3 ±0.03	0.1 10 0.5		
GRM155			0.5 ±0.05	0.15 to 0.35	0.3	
GRM185	1.6 ±0.1	0.8 ±0.1	0.5 +0/-0.1	0.2 to 0.5	0.5	
GRM188*			0.8 ±0.1			
GRM216			0.6 ±0.1			
GRM219	2.0 ±0.1	1.25 ±0.1	0.85 ±0.1	0.2 to 0.7	0.7	
GRM21A	210 2011	1.20 2011	1.0 +0/-0.2	0.2 10 0.7	0.7	•
GRM21B			1.25 ±0.1			
GRM316			0.6 ±0.1			
GRM319	3.2 ±0.15	1.6 ±0.15		0.3 to 0.8	1.5	
GRM31M			1.15 ±0.1	0.0 10 0.0	1.0	e g e
GRM31C	3.2 ±0.2	1.6 ±0.2	1.6 ±0.2			
GRM329			0.85 +0.15/-0.05			
GRM32A			1.0 +0/-0.2			
GRM32M			1.15 ±0.1			
GRM32N	3.2 ±0.3	2.5 ±0.2	1.35 ±0.15	0.3 min.	1.0	
GRM32C	J.Z <u>1</u> 0.J	2.3 ±0.2	1.6 ±0.2	0.5 11111.	1.0	
GRM32R			1.8 ±0.2			L H M M
GRM32D			2.0 ±0.2			
GRM32E			2.5 ±0.2			

* Bulk Case: 1.6 ±0.07(L)×0.8 ±0.07(W)×0.8 ±0.07(T) * The figure indicates typical Specification.



Capacitance Table

Temperature Compensating Type C0G(5C),U2J(7U) Characteristics

6	ex.6: T	Dimen	sion (n	nmj			_	_		_		_			_			_		_	_
\bigwedge	TC						0G(5										J2J(7				
	LxW [mm]		.4x0. (02) 0100		0.6x0.3 (03) <0201>	(15)	1.6) (1 <06>	8)	2.0x (2 <08	1)	3.2x (3 <12	1)	(0	x0.3 3) 201>	(1	x0.5 5) 02>	(1	(0.8 8) (03>	2.0x (2 <08	1)	3.2x1.6 (31) <1206>
Capacitance	ated Voltage [Vdc]	16 (1C)	10 (1A)	6.3 (0J)	50 (1H)	50 (1H)	100 (1E)	50 (1H)	100 (1E)		100 (1E)	50 (1H)	50 (1H)	25 (1E)	50 (1H)	10 (1A)	50 (1H)	10 (1A)	50 (1H)	10 (1A)	50 (1H)
	0.1pF(R10)				3	3, 5							1		1						1
	0.2pF(R20)	2			3	3, 5									1						
	0.3pF(R30)	2			3	3, 5									 		l.				
	0.4pF(R40)	2			3	3, 5			1 1 1				 		 		-				
	0.5pF(R50)	2			3	3, 5							 		 						
	0.6pF(R60)	2			3	3, 5							1 1 1		1 						, , ,
-	0.7pF(R70)	2			3	3, 5									 		i.				
	0.8pF(R80)	2			3	3, 5							1		1 1 1				1		1
	0.9pF(R90)	2			3	3, 5							:	r							
-	1.0pF(1R0)	2	-		3	3, 5							3		5						1
	1.1pF(1R1)	2			3	3, 5							1								, , ,
	1.2pF(1R2)	2	-		3	3, 5											i.				
	1.3pF(1R3)	2	-		3	3, 5							1		 		1		-		1 1 1
	1.4pF(1R4)	2			3	3, 5			1				1		1 1 1				1		
	1.5pF(1R5)	2			3	3, 5							1		 						1
	1.6pF(1R6)	2			3	3, 5							1		1						
	1.7pF(1R7)	2			3	3, 5							, , ,		, 1 1						, , ,
	1.8pF(1R8)	2			3	3, 5									 		i.				
	1.9pF(1R9)	2			3	3,5			 				•	г	-						
	2.0pF(2R0)	2			3	3,5			1				3		5				1		1 1 1
	2.1pF(2R1)	2			3	3,5							1		 						
	2.2pF(2R2)	2			3	3,5							1				l				
	2.3pF(2R3) 2.4pF(2R4)	2			3	3,5							1		 						
	2.5pF(2R5)	2			3	3, 5 3, 5			1 1 1				1		1 1 1						1 1 1
	2.6pF(2R6)	2			3	3, 5							1		 						1 1 1
	2.7pF(2R7)	2			3	3, 5							1		 						
	2.8pF(2R8)	2			3	3, 5															
-	2.9pF(2R9)	2			3	3, 5							1		 		1		-		1 1 1
	3.0pF(3R0)	2			3	3, 5			' '		L		3	F	5	1	<u>+</u>				
	3.1pF(3R1)	2			3	3, 5			1					1		J					1
	3.2pF(3R2)	2			3	3, 5							1		1						
	3.3pF(3R3)	2	İ		3	3, 5															
	3.4pF(3R4)	2	1		3	3, 5							1				1		-		
	3.5pF(3R5)	2	İ		3	3, 5															
	3.6pF(3R6)	2	1		3	3, 5									1						1
	3.7pF(3R7)	2	1		3	3, 5							 		 						
	3.8pF(3R8)	2	1		3	3, 5											Ì				
	3.9pF(3R9)	2			3	3, 5							1		 						1
	4.0pF(4R0)	2			3	3, 5							3	[5				;		
	4.1pF(4R1)	2			3	3, 5															
	4.2pF(4R2)	2			3	3, 5							1								, , ,
	4.3pF(4R3)	2			3	3, 5							1				-				1 1 1
	4.4pF(4R4)	2			3	3, 5			 				 		 				-		
	4.5pF(4R5)	2			3	3, 5			1 1 1				1		 		-				
	4.6pF(4R6)	2			3	3, 5							1								
	4.7pF(4R7)	2			3	3, 5							1 1 1								
	4.8pF(4R8)	2			3	3, 5							, , ,		, , ,						, 1 1
	4.9pF(4R9)	2			3	3, 5			1						1		1		1		1

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Capacitance Table

1

Continued from the preceding page.

6 ex.6: T Dimension [mm]

	-	ision (mi	mj																	
TC		2 4 0 0		0.0.00		0G(5		0.0	4.05	0.0	1.0	0.0		1.0		2J(7	<u> </u>	0.0	4.05	0.0.4.0
LxW		0.4x0.2 (02)	2	0.6x0.3 (03)	1.0x0.5 (15)		x0.8 8)	2.0x (2		3.2x (3		0.6> (0)		1.02 1)	x0.5 5)		x0.8 8)	2.0x (2	1.25 1)	3.2x1.6 (31)
[mm]	<	01005	>	<0201>				<08		<12	06>	<02	01>	<04	02>	<06	03>	<08		<1206>
Rated Voltage		10	6.3	50	50	100		100	50	100	50	50	25	50	10	50	10	50	10	50
-	(1C)	(1 A)	(0 J)	(1H)	(1H)	(1E)	(1H)	(1E)	(1H)	(1E)	(1H)	(1H)	(1E)	(1H)	(1 A)	(1H)	(1 A)	(1H)	(1A)	(1H)
5.0pF(5R0)	2			3	3, 5			1		1		3		5				1		
5.1pF(5R1)	2			3	3, 5			1		1		1						1		
5.2pF(5R2)	2			3	3, 5			1		1 1 1		1		1 1 1				1		
5.3pF(5R3)	2			3	3, 5			1		1 1 1		1		 		1		1		
5.4pF(5R4)	2			3	3, 5					1								1		
5.5pF(5R5)	2			3	3, 5					1		1		1				1		
5.6pF(5R6)	2			3	3, 5															
5.7pF(5R7)	2			3	3, 5							1						1		
5.8pF(5R8)	2			3	3, 5					1		1		 				1		
5.9pF(5R9)	2			3	3, 5			 		। ⊨								 		
6.0pF(6R0)	2			3	3, 5			1		1 1 1		3		5				1		
6.1pF(6R1)	2			3	3, 5			1		1		1		 		1		1		
6.2pF(6R2)	2			3	3, 5			1		1		1		 		1		1		
6.3pF(6R3)	2			3	3, 5			1		1		1		1				1		
6.4pF(6R4)	2			3	3, 5			1		1		1		1				1		
6.5pF(6R5)	2			3	3, 5													1		
6.6pF(6R6)	2			3	3, 5															
6.7pF(6R7)	2			3	3, 5					I I								1		
6.8pF(6R8)	2			3	3, 5			1		1		1		1				1		
6.9pF(6R9)	2			3	3, 5			 				 		 				 		
7.0pF(7R0)	2			3	3, 5			1		1 1 1		3		5				1		
7.1pF(7R1)	2			3	3, 5			1		1 1 1		1		1 1 1				1		
7.2pF(7R2)	2			3	3, 5			1		1		1		 		 		1		
7.3pF(7R3)	2			3	3, 5					1		1		 		1		1		
7.4pF(7R4)	2			3	3, 5					1		1		1				1		
7.5pF(7R5)	2			3	3, 5															
7.6pF(7R6)	2			3	3, 5					I I				1 1				1		
7.7pF(7R7)	2			3	3, 5			1		1		1		1		1		1		
7.8pF(7R8)	2			3	3, 5			1		1		1		1 1 1				1		
7.9pF(7R9)	2			3	3, 5			I I I		I I L		1 1 1		1 1 1				1 1 1		
8.0pF(8R0)	2			3	3, 5			1		r I I		3		5		 		1 1 1		
8.1pF(8R1)	2			3	3, 5					1								1		
8.2pF(8R2)	2			3	3, 5									1 						
8.3pF(8R3)	2			3	3, 5							 		 				 		
8.4pF(8R4)	2			3	3, 5					1		1						1		
8.5pF(8R5)	2			3	3, 5			1		1		1		 				1		
8.6pF(8R6)	2			3	3, 5			1		1		1						1		
8.7pF(8R7)	2			3	3, 5							1		1				1		
8.8pF(8R8)	2			3	3, 5															
8.9pF(8R9)	2	l		3	3, 5					, , , ,						, , ,		, , ,		
9.0pF(9R0)	2			3	3, 5		-				-	3		5		_	-		-	_
9.1pF(9R1)	2			3	3, 5			 		 								 		
9.2pF(9R2)	2			3	3, 5			1		1		1						1		
9.3pF(9R3)	2			3	3, 5			1				1		 				1		
9.4pF(9R4)	2			3	3, 5			1		1		 		 				1		
9.5pF(9R5)	2			3	3, 5			1		1		1						1		
9.6pF(9R6)	2			3	3, 5							1		1				1		
9.7pF(9R7)	2			3	3, 5							1		1				1		
9.8pF(9R8)	2			3	3, 5							1		1 						
9.9pF(9R9)	2			3	3, 5															

The part number code is shown in () and Unit is shown in []. $\hfill <>:$ EIA [inch] Code



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Capacitance Table

1

6 ex.6: T	Dimen	sion [m	nm]																	
TC						0G(5										2J(7 L	<u> </u>			
LxW	0).4x0.	2	0.6x0.3	1.0x0.5				1.25	3.2		0.6		1.0x (1		1.6>		-	1.25	
[mm]	<	(02) 01005	5>	(03) <0201>	(15) <0402>	<06	8) 03>	<08	2 1) 805>	<12	1) 06>	(0 <02	3) 01>	<04	02>	(1 <06	6) 603>	<08	1) 05>	(31) <1206>
Rated Voltage	16	10	6.3	50	50	100	50	100	50	100	50	50	25	50	10	50	10	50	10	50
Capacitance [Vdc]	(1C)	(1A)	(0J)	(1H)	(1H)	(1E)	(1H)	(1E)	(1H)	(1E)	(1H)	(1H)	(1E)	(1H)	(1 A)	(1H)	(1 A)	(1H)	(1 A)	(1H)
10pF(100)	2			3	3, 5	8	8			1		3		5				1		1
12pF(120)	2			3	3, 5	8	8					3		5						1
15pF(150)	2			3	3, 5	8	8					3		5						
18pF(180)	2			3	3, 5	8	8						3	5						
22pF(220)	2			3	3, 5	8	8			1		1	3	5		i 1				1
27pF(270)	2			3	3, 5	8	8			1		1 1 1	3	5		1				1 1 1
33pF(330)	2			3	3, 5	8	8			1			3	5		1				
39pF(390)	2			3	3, 5	8	8			1		1	3	5						1
47pF(470)	2			3	3, 5	8	8					1	3	5						
56pF(560)		2	2	3	3, 5	8	8						3	5						
68pF(680)		2	2	3	3, 5	8	8						3	5						
82pF(820)]	2	2	3	3, 5	8	8						3	5						
100pF(101)]	2	2	3	3, 5	8	8	6					3	5		,				
120pF(121)				1	3, 5	8	8	6		1		1		5		1				
150pF(151)				1 1 1	3, 5	8	8	6		1		 		5) 				1 1 1
180pF(181)				1	3, 5	8	8	6		1		 		5		1		1		
220pF(221)	1			1	3, 5	8	8	6		1		 		1		1				
270pF(271)				1	3, 5	8	8	6		1		1				1				1
330pF(331)	1			1	3, 5	8	8	6	1			1								1
390pF(391)	1			1	3, 5	8	8	6	1	1		1		1						1
470pF(471)					3, 5	8	8	6	1											
560pF(561)	1			1	3, 5	8	8	6	1											
680pF(681)	1			1	3, 5	8	8	6	1	1		1		1		1				1
820pF(821)	1			1	5	8	8	6	1	1		 		1		1 1 1		1		
1000pF(102)	1			1	5	8	8	6	1	1		 		 		8		1		
1200pF(122)	1			1 1 1		8	8	6	6	1		1 1 1		1 1 1	5	8		1		1 1 1
1500pF(152)	1			1	 	8	8	6	6	1		 		1	5	8		1		
1800pF(182)	1			1	 		8	6	6	9		 		1	5	8				
2200pF(222)				1	1		8	6	6	9		1		1	5	5, 8				
2700pF(272)	1			1	1		8	6	6	9		, , ,		1	5	5, 8				
3300pF(332)	1			, , ,			8	6	6	9					5	5, 8				
3900pF(392)	1						8		6	9					5	5, 8				, , , ,
4700pF(472)	1			1	1			1	6	9	9			1	5	5, 8		i 1 1		1
5600pF(562)	1			1	1 1 1				9	9	9			1 1 1		8	5			
6800pF(682)				1	 				9	9	9			1		8	5	1		1 1 1
8200pF(822)	1			1					9	9	9					8	5			
10000pF(103)	+			L	' '				9	9	9			! ! !		8	5	6	[! ! !
12000pF(123)				1					9		9			1			8	6		
15000pF(153)	1								9	1	9						8	6		
18000pF(183)	1								в	1	9						8	6		
22000pF(223)	1			1	1				в	1	9			1			8	9		
27000pF(273)	1			1	 			1		4 1	9			1 1 1				9	1	
33000pF(333)	1			1	 			1			9			1				Α	1	
39000pF(393)	1			1	1					1	9							в		1
47000pF(473)	1										M							В		
56000pF(563)	1			1 						- - -	M			1 					9	9
68000pF(683)	1										С								В	M
82000pF(823)	1				 						C								В	M
0.1μF(104)	1			 	 					 	c			 					В	M
				<u>.</u>				: 				1						·		

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Continued on the following page.



Capacitance Table

1

Continued from the preceding page.

Temperature Compensating Type P2H(6P),R2H(6R),S2H(6S),T2H(6T) Characteristics

6 ex.6: T Dimension [mm]

U	EX.U. 1 1	Dimens						
	тс	P2H (6P)		2H R)	S2 (6	2H S)	T2 (6	2H T)
	LxW [mm]	(15)	(03)	1.0x0.5 (15) <0402>	(03)	(15)	(03)	(15)
	/oltage [Vdc]	50 (1H)	25 (1E)	50 (1H)	25 (1E)	50 (1H)	25 (1E)	50 (1H)
•	(1R0)	5	3	5	3	5	3	5
·	(110) F(2R0)	5	3	5	3	5	3	5
·	(3R0)	5	3	5	3	5	3	5
·	(4R0)	5	3	5	3	5	3	5
· · ·	(110) F(5R0)	5	3	5	3	5	3	5
·	(6R0)	5	3	5	3	5	3	5
· · ·	(7R0)	5	3	5	3	5	3	5
· · · ·	(8R0)	5	3	5	3	5	3	5
· ·	(9R0)	5	3	5	3	5	3	5
· · · · ·	=(100)	5	3	5	3	5	3	5
· · · · ·	=(120)	5	3	5	3	5	3	5
· ·	-(150)	5	3	5	3	5	3	5
· ·	=(180)	5	3	5	3	5	3	5
·	=(220)	5	3	5	3	5	3	5
· · · · ·	=(270)	5	3	5	3	5	3	5
	=(330)		3	5	3	5	3	5
·	=(390)		3		3	5	3	5
· · · · · ·	=(470)	1	3		3		3	5
 56pl	-(560)	1	3		3		3	5
	-(680)	1	3		3		3	5
82pl	-(820)	1	3		3		3	5
100pl	=(101)		3		3		3	5

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Capacitance Table

Continued from the preceding page.

High Dielectric Constant Type X7R(R7)/X7S(C7)/X7T(D7)/X7U(E7) Characteristics

5 ex.5: T Dimension [mm]

3 ex.5. 1		•																					
LxW [mm]	0.4x0.2 (02) <01005>	<).6x0. (03) :0201	3			.0x0. (15) 0402					1	.6x0. (18) :0603	8						.0x1.2 (21) :0805			
Rated Voltage		25	16	10	100	50	25	16	10	100	50	25	16	10	6.3	4	100	50	25	16	10	6.3	4
						(1H)										(0G)					(1A)		(0G)
68pF(680)	2				1												1					1	
100pF(101)	2	3																					
150pF(151)	2	3	1		 					1							1						
220pF(221)	2	3	1		5	X, 5				8	8						1						
330pF(331)	2	3	1		5	X, 5				8	8	1					1						
470pF(471)	2	3	1		5	X, 5				8	8	1					1						
680pF(681)		3	1		5	X, 5				8	8	1					1						
1000pF(102)	1	3	1		5	X, 5				8	8	1					1						
1500pF(152)]	3			5	X, 5				8	8						1 1 1						
2200pF(222)]	1	3		5	5	Х			8	8						1 1 1						
3300pF(332)]	1	3		5	5		Х		8	8						1 1 1						
4700pF(472)]	1		3	5	5	5	Х		8	8						1 1 1						
6800pF(682)]	1		3		5	5	Х		8	8						9						
10000pF(103)	1			3		5	5	Х		8	8	8	[в						
15000pF(153)	1	1			1 1 1	5	5	5		1	8	8	1				в	1					
22000pF(223)	1	1			 	5	5	5		1	8	8	1				в	1					
33000pF(333)	1	1			 		5	5		1	8	8	1				в	9					
47000pF(473)	1	1			 		5	5		1	8	8	1				в	в					
68000pF(683)	1	1			 			5	5		8	8	1				 	в	9				
0.10μF(104)	†				, , ,			5	5	8	8	8						в	В				
0.15μF(154)	1	1			 					1		8	8				1 1 1	в	в				
0.22μF(224)	1	1			 					1		8	8	1			Α	в	в				
0.33μF(334)]	1			1 1 1								8	8			Α	9	в				
0.47µF(474)]	1			1 1 1					1		8	8	8			в	в	9				
0.68µF(684)]	1			1 1 1					1				8					9	9			
1.0μF(105)	Τ	 			 							8	8	5, 8			 	В	9, B	В			
2.2μF(225)]	1			 					1				8	8	8			в	В	в]	
4.7μF(475)	1	1			 					1							1			в	В	1	
10μF(106)	†	 			 					 							 				В	В	
22µF(226)	1	1			 					1							1						В
,																							

LxW [mm]			-	3.2x1. (31) :1206	-					-	3.2x2. (32) :1210	-		
Rated Voltage	100	50	25	16	10	6.3	4	100	50	35	25	16	10	6.3
Capacitance [Vdc]	(2A)	(1H)	(1E)	(1C)	(1 A)	(0 J)	(0G)	(2A)	(1H)	(YA)	(1E)	(1C)	(1 A)	(0 J)
15000pF(153)	9													
22000pF(223)	М													
33000pF(333)	М													
47000pF(473)	М													
68000pF(683)	М													
0.10μF(104)	9													
0.15μF(154)	М	М												
0.22μF(224)	М	М												
0.33μF(334)		9												
0.47μF(474)	М	М								_				
0.68µF(684)	М	М						С	Ν					
1.0μF(105)	С	М		-				С						
2.2μF(225)		С	М	М				Е						
4.7μF(475)		С	С	С					Е					
10μF(106)			С	С	С					Е	D		·	
22μF(226)					С	С					Е	Е		
47μF(476)							С						Е	Е

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



Capacitance Table

Continued from the preceding page.

1

High Dielectric Constant Type X6S(C8)/X6T(D8) Characteristics

5 ex.5: T Dimension [mm]

	CX.0. 1	Dimon	51011 [11																			
	LxW [mm]	0.6x0.3 (03) <0201>		.0x0. (15) :0402			1.6× 1) 06>	(0.8 8) 03>			2.	.0x1.2 (21) :0805	25 >				3.2x1. (31) :1206				.2x2. (32) 1210	
Rated	Voltage	6.3	25	6.3	4	10	6.3	4	2.5	25	16	10	6.3	4	25	16	10	6.3	4	25	10	6.3
Capacitance	[Vdc]	(0J)	(1E)	(0 J)	(0G)	(1A)	(0 J)	(0G)	(0E)	(1E)	(1C)	(1A)	(0J)	(0G)	(1E)	(1C)	(1A)	(0J)	(0G)	(1E)	(1A)	(0 J)
15000p	F(153)	3				1				 					1							
22000p	F(223)	3				1																
33000p	F(333)	3																				
47000p	F(473)	3		_		1				1					1							
68000p	F(683)		5																			
0.10µ	F(104)		5							1												
0.15µ	F(154)			5	5																	
0.22µ	F(224)]		5	5]																
0.33µ	F(334)]		5	5]				1												
0.47µ	F(474)]		5	5					1												
0.68µ	F(684)]			5					1					1							
1.0µ	F(105)					5	5	8	[6											
2.2µ	F(225)					8	8		-		9					6						
4.7μ	F(475)	1				1		8]	в	в	9	9			9						
10µ	F(106)								8			в	9, B	9	С					D		
22µ	F(226)	1				1				1 1 1				в			С	С		Е		
47μ	F(476)	1																С	С		Е	Е
100µ	.F(107)																		С			

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Continued on the following page.



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Capacitance Table

1

Continued from the preceding page.

High Dielectric Constant Type X5R(R6) Characteristics

: Please refer to X7R(R7) etc Characteristics.

5 ex.5: 1	Dimen	sion [m					. F	lease	elei lu		(<i>i</i>) eic	, Chara	acterist	165.						
LxW [mm]	0.4) (0 <010	x0.2 (2) 205>		0.6) (0 <02	(0.3 3) (01>					.0x0. (15) :0402							.6x0. (18) :0603			
Rated Voltage	10	6.3	25	16	10	6.3			25	16	10	6.3	4	100	50	25	16	10	6.3	4
Capacitance [Vdc]	(1 A)	(0J)	(1E)	(1C)	(1 A)	(0 J)	(2A)	(1H)	(1E)	(1C)	(1 A)	(0J)	(0G)	(2A)	(1H)	(1E)	(1C)	(1 A)	(0J)	(0G)
68pF(680)	2		1 1 1				1							1						
100pF(101)	2						r ! !							, , ,						
150pF(151)	2						1	-								_				
220pF(221)	2																			
330pF(331)	2																			
470pF(471)	2																			
680pF(681)		2																		
1000pF(102)		2						5							8					
1500pF(152)		2			3															
2200pF(222)		2			3			5							8					
3300pF(332)		2			3															
4700pF(472)		2			3			5							8					
6800pF(682)		2			3		 													
10000pF(103)		2			3										8					
15000pF(153)			 			3														
22000pF(223)						3				5					8					
33000pF(333)			1			3				5	5									
47000pF(473)			1 1 1			3				5	5			1						
68000pF(683)			! ! !				 		5	5	5									
0.10μF(104)			1 1 1				1		5	5	5		_			8	8			
0.15μF(154)			1 1 1				1				5	5						8		
0.22μF(224)			1 1				1				5	5		1		8	8	8		
0.33μF(334)			1				1				5	5		1						
0.47µF(474)											5	5				8	8	8		
0.68µF(684)	L										5	5	l							
1.0μF(105)							1				5					8	5, 8	5		_
2.2μF(225)			1 1 1				1 1							1			8	8		
4.7μF(475)	L		 				 						5						8	
10μF(106)						_			_						_				8	8

LxW [mm]			2.	.0x1.2 (21) :0805	25 >					3	3.2x1. (31) :1206	6 >						3.2x2. (32) :1210			
Rated Voltage			25	16	10	6.3	4	100	50	25	16	10	6.3	4	100	50	35	25	16	10	6.3
Capacitance [Vdc]	(2A)	(1H)	(1E)	(1C)	(1 A)	(0 J)	(0G)	(2A)	(1H)	(1E)	(1C)	(1A)	(0 J)	(0G)	(2A)	(1H)	(YA)	(1E)	(1 C)	(1A)	(0 J)
6800pF(682)																					
10000pF(103)								r I I													
15000pF(153)																					
22000pF(223)																					
33000pF(333)																					
47000pF(473)																					
68000pF(683)																					
0.10μF(104)																					
0.15μF(154)	1														1						
0.22μF(224)																					
0.33μF(334)				В																	
0.47μF(474)				В																	
0.68μF(684)																					
1.0μF(105)			6	В																	
2.2μF(225)	1		9, B	9, B	В				С	6											
4.7μF(475)]		в	9, B	9					9,C	9,C										
10μF(106)				В	9, B	9				С	9, C	9					Е	D			
22μF(226)	1					В	9				С	С	С					Е			
47μF(476)	1												С						Е	Е	
100μF(107)													С	С							

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



1

Temperature Compensating Type C0G(5C) Characteristics

LxW [mm]		0.4x0.2(02)<01005>	0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]	16(1C)	50(1H)	50(1H)
Capacitance	Tolerance		Part Number	
0.1pF(R10)	±0.05pF(W)		GRM0335C1HR10WD01D	GRM1555C1HR10WA01
	±0.1pF(B)		GRM0335C1HR10BD01D	GRM1555C1HR10BA01I
0.2pF(R20)	±0.05pF(W)	GRM0225C1CR20WD05L	GRM0335C1HR20WD01D	GRM1555C1HR20WA01
	±0.1pF(B)	GRM0225C1CR20BD05L	GRM0335C1HR20BD01D	GRM1555C1HR20BA01I
0.3pF(R30)	±0.05pF(W)	GRM0225C1CR30WD05L	GRM0335C1HR30WD01D	GRM1555C1HR30WA01
	±0.1pF(B)	GRM0225C1CR30BD05L	GRM0335C1HR30BD01D	GRM1555C1HR30BA011
0.4pF(R40)	±0.05pF(W)	GRM0225C1CR40WD05L	GRM0335C1HR40WD01D	GRM1555C1HR40WA01
	±0.1pF(B)	GRM0225C1CR40BD05L	GRM0335C1HR40BD01D	GRM1555C1HR40BA01I
0.5pF(R50)	±0.05pF(W)	GRM0225C1CR50WD05L	GRM0335C1HR50WD01D	GRM1555C1HR50WA01
	±0.1pF(B)	GRM0225C1CR50BD05L	GRM0335C1HR50BD01D	GRM1555C1HR50BA01
0.6pF(R60)	±0.05pF(W)	GRM0225C1CR60WD05L	GRM0335C1HR60WD01D	GRM1555C1HR60WA01
	±0.1pF(B)	GRM0225C1CR60BD05L	GRM0335C1HR60BD01D	GRM1555C1HR60BA01
0.7pF(R70)	±0.05pF(W)	GRM0225C1CR70WD05L	GRM0335C1HR70WD01D	GRM1555C1HR70WA01
	±0.1pF(B)	GRM0225C1CR70BD05L	GRM0335C1HR70BD01D	GRM1555C1HR70BA01
0.8pF(R80)	±0.05pF(W)	GRM0225C1CR80WD05L	GRM0335C1HR80WD01D	GRM1555C1HR80WA01
,	±0.1pF(B)	GRM0225C1CR80BD05L	GRM0335C1HR80BD01D	GRM1555C1HR80BA01
0.9pF(R90)	±0.05pF(W)	GRM0225C1CR90WD05L	GRM0335C1HR90WD01D	GRM1555C1HR90WA01
	±0.1pF(B)	GRM0225C1CR90BD05L	GRM0335C1HR90BD01D	GRM1555C1HR90BA01
1.0pF(1R0)	±0.05pF(W)	GRM0225C1C1R0WD05L	GRM0335C1H1R0WD01D	GRM1555C1H1R0WA01
	±0.1pF(B)	GRM0225C1C1R0BD05L	GRM0335C1H1R0BD01D	GRM1555C1H1R0BA01
	±0.25pF(C)	GRM0225C1C1R0CD05L	GRM0335C1H1R0CD01D	GRM1555C1H1R0CA01
1.1pF(1R1)	±0.05pF(W)	GRM0225C1C1R1WD05L	GRM0335C1H1R1WD01D	GRM1555C1H1R1WA01
p. ()	±0.1pF(B)	GRM0225C1C1R1BD05L	GRM0335C1H1R1BD01D	GRM1555C1H1R1BA01
	±0.25pF(C)	GRM0225C1C1R1CD05L	GRM0335C1H1R1CD01D	GRM1555C1H1R1CA01
1.2pF(1R2)	±0.05pF(W)	GRM0225C1C1R2WD05L	GRM0335C1H1R2WD01D	GRM1555C1H1R2WA01
1.2pr (11.2)	±0.1pF(B)	GRM0225C1C1R2BD05L	GRM0335C1H1R2BD01D	GRM1555C1H1R2BA01
	±0.25pF(C)	GRM0225C1C1R2CD05L	GRM0335C1H1R2CD01D	GRM1555C1H1R2CA01
1.3pF(1R3)	±0.25pF(W)	GRM0225C1C1R3WD05L	GRM0335C1H1R3WD01D	GRM1555C1H1R3WA01
1.5pr (1K5)		GRM0225C1C1R3BD05L	GRM0335C1H1R3BD01D	GRM1555C1H1R3BA01
	±0.1pF(B)	GRM0225C1C1R3CD05L		
1 4pF(1DA)	±0.25pF(C)	GRM0225C1C1R4WD05L	GRM0335C1H1R3CD01D	GRM1555C1H1R3CA01 GRM1555C1H1R4WA01
1.4pF(1R4)	±0.05pF(W)		GRM0335C1H1R4WD01D	
	±0.1pF(B)	GRM0225C1C1R4BD05L	GRM0335C1H1R4BD01D	GRM1555C1H1R4BA01
	±0.25pF(C)	GRM0225C1C1R4CD05L	GRM0335C1H1R4CD01D	GRM1555C1H1R4CA01
1.5pF(1R5)	±0.05pF(W)	GRM0225C1C1R5WD05L	GRM0335C1H1R5WD01D	GRM1555C1H1R5WA01
	±0.1pF(B)	GRM0225C1C1R5BD05L	GRM0335C1H1R5BD01D	GRM1555C1H1R5BA01
4 (5(400)	±0.25pF(C)	GRM0225C1C1R5CD05L	GRM0335C1H1R5CD01D	GRM1555C1H1R5CA01
1.6pF(1R6)	±0.05pF(W)	GRM0225C1C1R6WD05L	GRM0335C1H1R6WD01D	GRM1555C1H1R6WA01
	±0.1pF(B)	GRM0225C1C1R6BD05L	GRM0335C1H1R6BD01D	GRM1555C1H1R6BA01
	±0.25pF(C)	GRM0225C1C1R6CD05L	GRM0335C1H1R6CD01D	GRM1555C1H1R6CA01
1.7pF(1R7)	±0.05pF(W)	GRM0225C1C1R7WD05L	GRM0335C1H1R7WD01D	GRM1555C1H1R7WA01
	±0.1pF(B)	GRM0225C1C1R7BD05L	GRM0335C1H1R7BD01D	GRM1555C1H1R7BA01
	±0.25pF(C)	GRM0225C1C1R7CD05L	GRM0335C1H1R7CD01D	GRM1555C1H1R7CA01
1.8pF(1R8)	±0.05pF(W)	GRM0225C1C1R8WD05L	GRM0335C1H1R8WD01D	GRM1555C1H1R8WA01
	±0.1pF(B)	GRM0225C1C1R8BD05L	GRM0335C1H1R8BD01D	GRM1555C1H1R8BA01
	±0.25pF(C)	GRM0225C1C1R8CD05L	GRM0335C1H1R8CD01D	GRM1555C1H1R8CA01
1.9pF(1R9)	±0.05pF(W)	GRM0225C1C1R9WD05L	GRM0335C1H1R9WD01D	GRM1555C1H1R9WA01
	±0.1pF(B)	GRM0225C1C1R9BD05L	GRM0335C1H1R9BD01D	GRM1555C1H1R9BA01
	±0.25pF(C)	GRM0225C1C1R9CD05L	GRM0335C1H1R9CD01D	GRM1555C1H1R9CA01
2.0pF(2R0)	±0.05pF(W)	GRM0225C1C2R0WD05L	GRM0335C1H2R0WD01D	GRM1555C1H2R0WA01
	±0.1pF(B)	GRM0225C1C2R0BD05L	GRM0335C1H2R0BD01D	GRM1555C1H2R0BA01I
	±0.25pF(C)	GRM0225C1C2R0CD05L	GRM0335C1H2R0CD01D	GRM1555C1H2R0CA01

The part number code is shown in () and Unit is shown in []. (Part Number) GR M 02 2 5C 1C R20 W D05 L

< >: EIA [inch] Code

Product ID 2Series **5**Temperature Characteristics 8 Capacitance Tolerance

3Dimension (LxW) ③Rated Voltage
④Individual Specification Code
④Packaging*

4 Dimension (T) *GRM022: D is applicable.

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

0 2 3 4 5 6 7 8 9 0



LxW [mm]		0.4x0.2(02)<01005>	0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc	-	16(1C)	50(1H)	50(1H)
Capacitance	Tolerance		Part Number	
2.1pF(2R1)	±0.05pF(W)	GRM0225C1C2R1WD05L	GRM0335C1H2R1WD01D	GRM1555C1H2R1WA01I
	±0.1pF(B)	GRM0225C1C2R1BD05L	GRM0335C1H2R1BD01D	GRM1555C1H2R1BA01[
	±0.25pF(C)	GRM0225C1C2R1CD05L	GRM0335C1H2R1CD01D	GRM1555C1H2R1CA01
2.2pF(2R2)	±0.05pF(W)	GRM0225C1C2R2WD05L	GRM0335C1H2R2WD01D	GRM1555C1H2R2WA01
	±0.1pF(B)	GRM0225C1C2R2BD05L	GRM0335C1H2R2BD01D	GRM1555C1H2R2BA01I
	±0.25pF(C)	GRM0225C1C2R2CD05L	GRM0335C1H2R2CD01D	GRM1555C1H2R2CA01I
2.3pF(2R3)	±0.05pF(W)	GRM0225C1C2R3WD05L	GRM0335C1H2R3WD01D	GRM1555C1H2R3WA01
	±0.1pF(B)	GRM0225C1C2R3BD05L	GRM0335C1H2R3BD01D	GRM1555C1H2R3BA01I
	±0.25pF(C)	GRM0225C1C2R3CD05L	GRM0335C1H2R3CD01D	GRM1555C1H2R3CA011
2.4pF(2R4)	±0.05pF(W)	GRM0225C1C2R4WD05L	GRM0335C1H2R4WD01D	GRM1555C1H2R4WA01
	±0.1pF(B)	GRM0225C1C2R4BD05L	GRM0335C1H2R4BD01D	GRM1555C1H2R4BA01I
	±0.25pF(C)	GRM0225C1C2R4CD05L	GRM0335C1H2R4CD01D	GRM1555C1H2R4CA01I
2.5pF(2R5)	±0.05pF(W)	GRM0225C1C2R5WD05L	GRM0335C1H2R5WD01D	GRM1555C1H2R5WA01
	±0.1pF(B)	GRM0225C1C2R5BD05L	GRM0335C1H2R5BD01D	GRM1555C1H2R5BA01I
	±0.25pF(C)	GRM0225C1C2R5CD05L	GRM0335C1H2R5CD01D	GRM1555C1H2R5CA01I
2.6pF(2R6)	±0.05pF(W)	GRM0225C1C2R6WD05L	GRM0335C1H2R6WD01D	GRM1555C1H2R6WA01
	±0.1pF(B)	GRM0225C1C2R6BD05L	GRM0335C1H2R6BD01D	GRM1555C1H2R6BA01I
	±0.25pF(C)	GRM0225C1C2R6CD05L	GRM0335C1H2R6CD01D	GRM1555C1H2R6CA01I
2.7pF(2R7)	±0.05pF(W)	GRM0225C1C2R7WD05L	GRM0335C1H2R7WD01D	GRM1555C1H2R7WA01
2.761(=111)	±0.1pF(B)	GRM0225C1C2R7BD05L	GRM0335C1H2R7BD01D	GRM1555C1H2R7BA01I
	±0.25pF(C)	GRM0225C1C2R7CD05L	GRM0335C1H2R7CD01D	GRM1555C1H2R7CA01I
2.8pF(2R8)	±0.05pF(W)	GRM0225C1C2R8WD05L	GRM0335C1H2R8WD01D	GRM1555C1H2R8WA01
2.0pt (2KO)		GRM0225C1C2R8BD05L	GRM0335C1H2R8BD01D	GRM1555C1H2R8BA01I
	±0.1pF(B)			GRM1555C1H2R8CA011
2 0m E(2 D 0)	±0.25pF(C)	GRM0225C1C2R8CD05L	GRM0335C1H2R8CD01D	
2.9pF(2R9)	±0.05pF(W)	GRM0225C1C2R9WD05L	GRM0335C1H2R9WD01D	GRM1555C1H2R9WA01
	±0.1pF(B)	GRM0225C1C2R9BD05L	GRM0335C1H2R9BD01D	GRM1555C1H2R9BA01I
	±0.25pF(C)	GRM0225C1C2R9CD05L	GRM0335C1H2R9CD01D	GRM1555C1H2R9CA01
3.0pF(3R0)	±0.05pF(W)	GRM0225C1C3R0WD05L	GRM0335C1H3R0WD01D	GRM1555C1H3R0WA01
	±0.1pF(B)	GRM0225C1C3R0BD05L	GRM0335C1H3R0BD01D	GRM1555C1H3R0BA01I
	±0.25pF(C)	GRM0225C1C3R0CD05L	GRM0335C1H3R0CD01D	GRM1555C1H3R0CA01
3.1pF(3R1)	±0.05pF(W)	GRM0225C1C3R1WD05L	GRM0335C1H3R1WD01D	GRM1555C1H3R1WA01
	±0.1pF(B)	GRM0225C1C3R1BD05L	GRM0335C1H3R1BD01D	GRM1555C1H3R1BA01I
	±0.25pF(C)	GRM0225C1C3R1CD05L	GRM0335C1H3R1CD01D	GRM1555C1H3R1CA01
3.2pF(3R2)	±0.05pF(W)	GRM0225C1C3R2WD05L	GRM0335C1H3R2WD01D	GRM1555C1H3R2WA01
	±0.1pF(B)	GRM0225C1C3R2BD05L	GRM0335C1H3R2BD01D	GRM1555C1H3R2BA01I
	±0.25pF(C)	GRM0225C1C3R2CD05L	GRM0335C1H3R2CD01D	GRM1555C1H3R2CA01
3.3pF(3R3)	±0.05pF(W)	GRM0225C1C3R3WD05L	GRM0335C1H3R3WD01D	GRM1555C1H3R3WA01
	±0.1pF(B)	GRM0225C1C3R3BD05L	GRM0335C1H3R3BD01D	GRM1555C1H3R3BA01I
	±0.25pF(C)	GRM0225C1C3R3CD05L	GRM0335C1H3R3CD01D	GRM1555C1H3R3CA01
3.4pF(3R4)	±0.05pF(W)	GRM0225C1C3R4WD05L	GRM0335C1H3R4WD01D	GRM1555C1H3R4WA01
	±0.1pF(B)	GRM0225C1C3R4BD05L	GRM0335C1H3R4BD01D	GRM1555C1H3R4BA01I
	±0.25pF(C)	GRM0225C1C3R4CD05L	GRM0335C1H3R4CD01D	GRM1555C1H3R4CA01I
3.5pF(3R5)	±0.05pF(W)	GRM0225C1C3R5WD05L	GRM0335C1H3R5WD01D	GRM1555C1H3R5WA01
	±0.1pF(B)	GRM0225C1C3R5BD05L	GRM0335C1H3R5BD01D	GRM1555C1H3R5BA01I
	±0.25pF(C)	GRM0225C1C3R5CD05L	GRM0335C1H3R5CD01D	GRM1555C1H3R5CA01I
3.6pF(3R6)	±0.05pF(W)	GRM0225C1C3R6WD05L	GRM0335C1H3R6WD01D	GRM1555C1H3R6WA01
,	±0.1pF(B)	GRM0225C1C3R6BD05L	GRM0335C1H3R6BD01D	GRM1555C1H3R6BA01
	±0.25pF(C)	GRM0225C1C3R6CD05L	GRM0335C1H3R6CD01D	GRM1555C1H3R6CA01I
3.7pF(3R7)	±0.05pF(W)	GRM0225C1C3R7WD05L	GRM0335C1H3R7WD01D	GRM1555C1H3R7WA01
	±0.1pF(B)	GRM0225C1C3R7BD05L	GRM0335C1H3R7BD01D	GRM1555C1H3R7BA01I
	(_)			

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



muRata

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Temperature Compensating Type C0G(5C) Characteristics

LxW [mm]		0.4x0.2(02)<01005>	0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]	16(1C)	50(1H)	50(1H)
Capacitance	Tolerance		Part Number	
3.8pF(3R8)	±0.05pF(W)	GRM0225C1C3R8WD05L	GRM0335C1H3R8WD01D	GRM1555C1H3R8WA01
	±0.1pF(B)	GRM0225C1C3R8BD05L	GRM0335C1H3R8BD01D	GRM1555C1H3R8BA01I
	±0.25pF(C)	GRM0225C1C3R8CD05L	GRM0335C1H3R8CD01D	GRM1555C1H3R8CA01I
3.9pF(3R9)	±0.05pF(W)	GRM0225C1C3R9WD05L	GRM0335C1H3R9WD01D	GRM1555C1H3R9WA01
	±0.1pF(B)	GRM0225C1C3R9BD05L	GRM0335C1H3R9BD01D	GRM1555C1H3R9BA01I
	±0.25pF(C)	GRM0225C1C3R9CD05L	GRM0335C1H3R9CD01D	GRM1555C1H3R9CA01I
4.0pF(4R0)	±0.05pF(W)	GRM0225C1C4R0WD05L	GRM0335C1H4R0WD01D	GRM1555C1H4R0WA01
	±0.1pF(B)	GRM0225C1C4R0BD05L	GRM0335C1H4R0BD01D	GRM1555C1H4R0BA01
	±0.25pF(C)	GRM0225C1C4R0CD05L	GRM0335C1H4R0CD01D	GRM1555C1H4R0CA01
4.1pF(4R1)	±0.05pF(W)	GRM0225C1C4R1WD05L	GRM0335C1H4R1WD01D	GRM1555C1H4R1WA01
	±0.1pF(B)	GRM0225C1C4R1BD05L	GRM0335C1H4R1BD01D	GRM1555C1H4R1BA01
	±0.25pF(C)	GRM0225C1C4R1CD05L	GRM0335C1H4R1CD01D	GRM1555C1H4R1CA01
4.2pF(4R2)	±0.05pF(W)	GRM0225C1C4R2WD05L	GRM0335C1H4R2WD01D	GRM1555C1H4R2WA01
1.2pt (-112)	±0.1pF(B)	GRM0225C1C4R2BD05L	GRM0335C1H4R2BD01D	GRM1555C1H4R2BA01
	±0.25pF(C)	GRM0225C1C4R2CD05L	GRM0335C1H4R2CD01D	GRM1555C1H4R2CA01
4.3pF(4R3)		GRM0225C1C4R3WD05L	GRM0335C1H4R3WD01D	GRM1555C1H4R3WA01
4.3pr(4K3)	±0.05pF(W)		GRM0335C1H4R3BD01D	
	±0.1pF(B)	GRM0225C1C4R3BD05L		GRM1555C1H4R3BA01
	±0.25pF(C)	GRM0225C1C4R3CD05L	GRM0335C1H4R3CD01D	GRM1555C1H4R3CA01
4.4pF(4R4)	±0.05pF(W)	GRM0225C1C4R4WD05L	GRM0335C1H4R4WD01D	GRM1555C1H4R4WA01
	±0.1pF(B)	GRM0225C1C4R4BD05L	GRM0335C1H4R4BD01D	GRM1555C1H4R4BA01
	±0.25pF(C)	GRM0225C1C4R4CD05L	GRM0335C1H4R4CD01D	GRM1555C1H4R4CA01
4.5pF(4R5)	±0.05pF(W)	GRM0225C1C4R5WD05L	GRM0335C1H4R5WD01D	GRM1555C1H4R5WA01
	±0.1pF(B)	GRM0225C1C4R5BD05L	GRM0335C1H4R5BD01D	GRM1555C1H4R5BA01
	±0.25pF(C)	GRM0225C1C4R5CD05L	GRM0335C1H4R5CD01D	GRM1555C1H4R5CA01
4.6pF(4R6)	±0.05pF(W)	GRM0225C1C4R6WD05L	GRM0335C1H4R6WD01D	GRM1555C1H4R6WA01
	±0.1pF(B)	GRM0225C1C4R6BD05L	GRM0335C1H4R6BD01D	GRM1555C1H4R6BA01
	±0.25pF(C)	GRM0225C1C4R6CD05L	GRM0335C1H4R6CD01D	GRM1555C1H4R6CA01
4.7pF(4R7)	±0.05pF(W)	GRM0225C1C4R7WD05L	GRM0335C1H4R7WD01D	GRM1555C1H4R7WA01
	±0.1pF(B)	GRM0225C1C4R7BD05L	GRM0335C1H4R7BD01D	GRM1555C1H4R7BA01
	±0.25pF(C)	GRM0225C1C4R7CD05L	GRM0335C1H4R7CD01D	GRM1555C1H4R7CA01
4.8pF(4R8)	±0.05pF(W)	GRM0225C1C4R8WD05L	GRM0335C1H4R8WD01D	GRM1555C1H4R8WA01
	±0.1pF(B)	GRM0225C1C4R8BD05L	GRM0335C1H4R8BD01D	GRM1555C1H4R8BA01
	±0.25pF(C)	GRM0225C1C4R8CD05L	GRM0335C1H4R8CD01D	GRM1555C1H4R8CA01
4.9pF(4R9)	±0.05pF(W)	GRM0225C1C4R9WD05L	GRM0335C1H4R9WD01D	GRM1555C1H4R9WA01
,	±0.1pF(B)	GRM0225C1C4R9BD05L	GRM0335C1H4R9BD01D	GRM1555C1H4R9BA01
	±0.25pF(C)	GRM0225C1C4R9CD05L	GRM0335C1H4R9CD01D	GRM1555C1H4R9CA01
5.0pF(5R0)	±0.05pF(W)	GRM0225C1C5R0WD05L	GRM0335C1H5R0WD01D	GRM1555C1H5R0WA01
· · (•··••)	±0.1pF(B)	GRM0225C1C5R0BD05L	GRM0335C1H5R0BD01D	GRM1555C1H5R0BA01
	±0.25pF(C)	GRM0225C1C5R0CD05L	GRM0335C1H5R0CD01D	GRM1555C1H5R0CA01
5.1pF(5R1)	±0.05pF(W)	GRM0225C1C5R1WD05L	GRM0335C1H5R1WD01D	GRM1555C1H5R1WA01
	±0.1pF(B)	GRM0225C1C5R1BD05L	GRM0335C1H5R1BD01D	GRM1555C1H5R1BA01
		GRM0225C1C5R1CD05L	GRM0335C1H5R1CD01D	GRM1555C1H5R1CA01
	±0.25pF(C) ±0.5pF(D)			
	±0.5pF(D)	GRM0225C1C5R1DD05L	GRM0335C1H5R1DD01D	GRM1555C1H5R1DA01
5.2pF(5R2)	±0.05pF(W)	GRM0225C1C5R2WD05L	GRM0335C1H5R2WD01D	GRM1555C1H5R2WA01
	±0.1pF(B)	GRM0225C1C5R2BD05L	GRM0335C1H5R2BD01D	GRM1555C1H5R2BA01
	±0.25pF(C)	GRM0225C1C5R2CD05L	GRM0335C1H5R2CD01D	GRM1555C1H5R2CA01
	±0.5pF(D)	GRM0225C1C5R2DD05L	GRM0335C1H5R2DD01D	GRM1555C1H5R2DA01

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Product ID
Series
Temperature Characteristics
Capacitance Tolerance

SDimension (LxW)Dimension (T)Stated VoltageCapacitanceIndividual Specification CodePackaging**GRM022: D is applicable.

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



LxW [mm] Rated Volt. [Vdc	1	0.4x0.2(02)<01005> 16(1C)	0.6x0.3(03)<0201> 50(1H)	1.0x0.5(15)<0402> 50(1H)
-	-	10(10)	. ,	50(1H)
Capacitance	Tolerance	GRM0225C1C5R3WD05L	Part Number	GRM1555C1H5R3WA01I
5.3pF(5R3)	±0.05pF(W)		GRM0335C1H5R3WD01D	
	±0.1pF(B)	GRM0225C1C5R3BD05L	GRM0335C1H5R3BD01D	GRM1555C1H5R3BA01E
	±0.25pF(C)	GRM0225C1C5R3CD05L	GRM0335C1H5R3CD01D	GRM1555C1H5R3CA01I
	±0.5pF(D)	GRM0225C1C5R3DD05L	GRM0335C1H5R3DD01D	GRM1555C1H5R3DA01
5.4pF(5R4)	±0.05pF(W)	GRM0225C1C5R4WD05L	GRM0335C1H5R4WD01D	GRM1555C1H5R4WA01
	±0.1pF(B)	GRM0225C1C5R4BD05L	GRM0335C1H5R4BD01D	GRM1555C1H5R4BA01I
	±0.25pF(C)	GRM0225C1C5R4CD05L	GRM0335C1H5R4CD01D	GRM1555C1H5R4CA01I
	±0.5pF(D)	GRM0225C1C5R4DD05L	GRM0335C1H5R4DD01D	GRM1555C1H5R4DA01
5.5pF(5R5)	±0.05pF(W)	GRM0225C1C5R5WD05L	GRM0335C1H5R5WD01D	GRM1555C1H5R5WA01
	±0.1pF(B)	GRM0225C1C5R5BD05L	GRM0335C1H5R5BD01D	GRM1555C1H5R5BA01
	±0.25pF(C)	GRM0225C1C5R5CD05L	GRM0335C1H5R5CD01D	GRM1555C1H5R5CA01
	±0.5pF(D)	GRM0225C1C5R5DD05L	GRM0335C1H5R5DD01D	GRM1555C1H5R5DA01
5.6pF(5R6)	±0.05pF(W)	GRM0225C1C5R6WD05L	GRM0335C1H5R6WD01D	GRM1555C1H5R6WA01
	±0.1pF(B)	GRM0225C1C5R6BD05L	GRM0335C1H5R6BD01D	GRM1555C1H5R6BA01I
	±0.25pF(C)	GRM0225C1C5R6CD05L	GRM0335C1H5R6CD01D	GRM1555C1H5R6CA01
	±0.5pF(D)	GRM0225C1C5R6DD05L	GRM0335C1H5R6DD01D	GRM1555C1H5R6DA01
5.7pF(5R7)	±0.05pF(W)	GRM0225C1C5R7WD05L	GRM0335C1H5R7WD01D	GRM1555C1H5R7WA01
	±0.1pF(B)	GRM0225C1C5R7BD05L	GRM0335C1H5R7BD01D	GRM1555C1H5R7BA01I
	±0.25pF(C)	GRM0225C1C5R7CD05L	GRM0335C1H5R7CD01D	GRM1555C1H5R7CA01
	±0.5pF(D)	GRM0225C1C5R7DD05L	GRM0335C1H5R7DD01D	GRM1555C1H5R7DA01
5.8pF(5R8)	±0.05pF(W)	GRM0225C1C5R8WD05L	GRM0335C1H5R8WD01D	GRM1555C1H5R8WA01
5.6pr (5R6)				
	±0.1pF(B)	GRM0225C1C5R8BD05L	GRM0335C1H5R8BD01D	GRM1555C1H5R8BA01I
	±0.25pF(C)	GRM0225C1C5R8CD05L	GRM0335C1H5R8CD01D	GRM1555C1H5R8CA01I
	±0.5pF(D)	GRM0225C1C5R8DD05L	GRM0335C1H5R8DD01D	GRM1555C1H5R8DA01
5.9pF(5R9)	±0.05pF(W)	GRM0225C1C5R9WD05L	GRM0335C1H5R9WD01D	GRM1555C1H5R9WA01
	±0.1pF(B)	GRM0225C1C5R9BD05L	GRM0335C1H5R9BD01D	GRM1555C1H5R9BA01
	±0.25pF(C)	GRM0225C1C5R9CD05L	GRM0335C1H5R9CD01D	GRM1555C1H5R9CA01
	±0.5pF(D)	GRM0225C1C5R9DD05L	GRM0335C1H5R9DD01D	GRM1555C1H5R9DA01
6.0pF(6R0)	±0.05pF(W)	GRM0225C1C6R0WD05L	GRM0335C1H6R0WD01D	GRM1555C1H6R0WA01
	±0.1pF(B)	GRM0225C1C6R0BD05L	GRM0335C1H6R0BD01D	GRM1555C1H6R0BA01
	±0.25pF(C)	GRM0225C1C6R0CD05L	GRM0335C1H6R0CD01D	GRM1555C1H6R0CA01
	±0.5pF(D)	GRM0225C1C6R0DD05L	GRM0335C1H6R0DD01D	GRM1555C1H6R0DA01
6.1pF(6R1)	±0.05pF(W)	GRM0225C1C6R1WD05L	GRM0335C1H6R1WD01D	GRM1555C1H6R1WA01
	±0.1pF(B)	GRM0225C1C6R1BD05L	GRM0335C1H6R1BD01D	GRM1555C1H6R1BA01
	±0.25pF(C)	GRM0225C1C6R1CD05L	GRM0335C1H6R1CD01D	GRM1555C1H6R1CA01
	±0.5pF(D)	GRM0225C1C6R1DD05L	GRM0335C1H6R1DD01D	GRM1555C1H6R1DA01
6.2pF(6R2)	±0.05pF(W)	GRM0225C1C6R2WD05L	GRM0335C1H6R2WD01D	GRM1555C1H6R2WA01
	±0.1pF(B)	GRM0225C1C6R2BD05L	GRM0335C1H6R2BD01D	GRM1555C1H6R2BA01I
	±0.25pF(C)	GRM0225C1C6R2CD05L	GRM0335C1H6R2CD01D	GRM1555C1H6R2CA01
	±0.5pF(D)	GRM0225C1C6R2DD05L	GRM0335C1H6R2DD01D	GRM1555C1H6R2DA01
6.3pF(6R3)	±0.05pF(W)	GRM0225C1C6R3WD05L	GRM0335C1H6R3WD01D	GRM1555C1H6R3WA01
	±0.1pF(B)	GRM0225C1C6R3BD05L	GRM0335C1H6R3BD01D	GRM1555C1H6R3BA01
	±0.25pF(C)	GRM0225C1C6R3CD05L	GRM0335C1H6R3CD01D	GRM1555C1H6R3CA01
	±0.5pF(D)	GRM0225C1C6R3DD05L	GRM0335C1H6R3DD01D	GRM1555C1H6R3DA01
6.4pF(6R4)				
0.4μr(οκ4)	±0.05pF(W)	GRM0225C1C6R4WD05L	GRM0335C1H6R4WD01D	GRM1555C1H6R4WA01
	±0.1pF(B)	GRM0225C1C6R4BD05L	GRM0335C1H6R4BD01D	GRM1555C1H6R4BA01
	±0.25pF(C)	GRM0225C1C6R4CD05L	GRM0335C1H6R4CD01D	GRM1555C1H6R4CA01
	±0.5pF(D)	GRM0225C1C6R4DD05L	GRM0335C1H6R4DD01D	GRM1555C1H6R4DA01
6.5pF(6R5)	±0.05pF(W)	GRM0225C1C6R5WD05L	GRM0335C1H6R5WD01D	GRM1555C1H6R5WA01
	±0.1pF(B)	GRM0225C1C6R5BD05L	GRM0335C1H6R5BD01D	GRM1555C1H6R5BA01
	±0.25pF(C)	GRM0225C1C6R5CD05L	GRM0335C1H6R5CD01D	GRM1555C1H6R5CA01I
	±0.5pF(D)	GRM0225C1C6R5DD05L	GRM0335C1H6R5DD01D	GRM1555C1H6R5DA01

The part number code is shown in () and Unit is shown in []. $\hfill <>:$ EIA [inch] Code



LxW [mm]		0.4x0.2(02)<01005>	0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc	-	16(1C)	50(1H)	50(1H)
Capacitance	Tolerance		Part N	umber
6.6pF(6R6)	±0.05pF(W)	GRM0225C1C6R6WD05L	GRM0335C1H6R6WD01D	GRM1555C1H6R6WA01
	±0.1pF(B)	GRM0225C1C6R6BD05L	GRM0335C1H6R6BD01D	GRM1555C1H6R6BA01I
	±0.25pF(C)	GRM0225C1C6R6CD05L	GRM0335C1H6R6CD01D	GRM1555C1H6R6CA01I
	±0.5pF(D)	GRM0225C1C6R6DD05L	GRM0335C1H6R6DD01D	GRM1555C1H6R6DA01
6.7pF(6R7)	±0.05pF(W)	GRM0225C1C6R7WD05L	GRM0335C1H6R7WD01D	GRM1555C1H6R7WA01
	±0.1pF(B)	GRM0225C1C6R7BD05L	GRM0335C1H6R7BD01D	GRM1555C1H6R7BA01I
	±0.25pF(C)	GRM0225C1C6R7CD05L	GRM0335C1H6R7CD01D	GRM1555C1H6R7CA01I
	±0.5pF(D)	GRM0225C1C6R7DD05L	GRM0335C1H6R7DD01D	GRM1555C1H6R7DA01
6.8pF(6R8)	±0.05pF(W)	GRM0225C1C6R8WD05L	GRM0335C1H6R8WD01D	GRM1555C1H6R8WA01
	±0.1pF(B)	GRM0225C1C6R8BD05L	GRM0335C1H6R8BD01D	GRM1555C1H6R8BA01
	±0.25pF(C)	GRM0225C1C6R8CD05L	GRM0335C1H6R8CD01D	GRM1555C1H6R8CA01
	±0.5pF(D)	GRM0225C1C6R8DD05L	GRM0335C1H6R8DD01D	GRM1555C1H6R8DA01
6.9pF(6R9)	±0.05pF(W)	GRM0225C1C6R9WD05L	GRM0335C1H6R9WD01D	GRM1555C1H6R9WA01
	±0.1pF(B)	GRM0225C1C6R9BD05L	GRM0335C1H6R9BD01D	GRM1555C1H6R9BA01
	±0.25pF(C)	GRM0225C1C6R9CD05L	GRM0335C1H6R9CD01D	GRM1555C1H6R9CA01
	±0.5pF(D)	GRM0225C1C6R9DD05L	GRM0335C1H6R9DD01D	GRM1555C1H6R9DA01
7.0pF(7R0)	±0.05pF(W)	GRM0225C1C7R0WD05L	GRM0335C1H7R0WD01D	GRM1555C1H7R0WA01
	±0.1pF(B)	GRM0225C1C7R0BD05L	GRM0335C1H7R0BD01D	GRM1555C1H7R0BA01
	±0.25pF(C)	GRM0225C1C7R0CD05L	GRM0335C1H7R0CD01D	GRM1555C1H7R0CA01
	±0.5pF(D)	GRM0225C1C7R0DD05L	GRM0335C1H7R0DD01D	GRM1555C1H7R0DA01
7.1pF(7R1)	±0.05pF(W)	GRM0225C1C7R1WD05L	GRM0335C1H7R1WD01D	GRM1555C1H7R1WA01
	±0.1pF(B)	GRM0225C1C7R1BD05L	GRM0335C1H7R1BD01D	GRM1555C1H7R1BA01
	±0.25pF(C)	GRM0225C1C7R1CD05L	GRM0335C1H7R1CD01D	GRM1555C1H7R1CA01
	±0.5pF(D)	GRM0225C1C7R1DD05L	GRM0335C1H7R1DD01D	GRM1555C1H7R1DA01
7.2pF(7R2)	±0.05pF(W)	GRM0225C1C7R2WD05L	GRM0335C1H7R2WD01D	GRM1555C1H7R2WA01
,.2pt (112)	±0.1pF(B)	GRM0225C1C7R2BD05L	GRM0335C1H7R2BD01D	GRM1555C1H7R2BA01
	±0.25pF(C)	GRM0225C1C7R2CD05L	GRM0335C1H7R2CD01D	GRM1555C1H7R2CA01
	±0.5pF(D)	GRM0225C1C7R2DD05L	GRM0335C1H7R2DD01D	GRM1555C1H7R2DA01
7.2p[777]				
7.3pF(7R3)	±0.05pF(W)	GRM0225C1C7R3WD05L	GRM0335C1H7R3WD01D	GRM1555C1H7R3WA01
	±0.1pF(B)	GRM0225C1C7R3BD05L	GRM0335C1H7R3BD01D	GRM1555C1H7R3BA01
	±0.25pF(C)	GRM0225C1C7R3CD05L	GRM0335C1H7R3CD01D	GRM1555C1H7R3CA01
	±0.5pF(D)	GRM0225C1C7R3DD05L	GRM0335C1H7R3DD01D	GRM1555C1H7R3DA01
7.4pF(7R4)	±0.05pF(W)	GRM0225C1C7R4WD05L	GRM0335C1H7R4WD01D	GRM1555C1H7R4WA01
	±0.1pF(B)	GRM0225C1C7R4BD05L	GRM0335C1H7R4BD01D	GRM1555C1H7R4BA01
	±0.25pF(C)	GRM0225C1C7R4CD05L	GRM0335C1H7R4CD01D	GRM1555C1H7R4CA01
	±0.5pF(D)	GRM0225C1C7R4DD05L	GRM0335C1H7R4DD01D	GRM1555C1H7R4DA01
7.5pF(7R5)	±0.05pF(W)	GRM0225C1C7R5WD05L	GRM0335C1H7R5WD01D	GRM1555C1H7R5WA01
	±0.1pF(B)	GRM0225C1C7R5BD05L	GRM0335C1H7R5BD01D	GRM1555C1H7R5BA01
	±0.25pF(C)	GRM0225C1C7R5CD05L	GRM0335C1H7R5CD01D	GRM1555C1H7R5CA01
	±0.5pF(D)	GRM0225C1C7R5DD05L	GRM0335C1H7R5DD01D	GRM1555C1H7R5DA01
7.6pF(7R6)	±0.05pF(W)	GRM0225C1C7R6WD05L	GRM0335C1H7R6WD01D	GRM1555C1H7R6WA01
	±0.1pF(B)	GRM0225C1C7R6BD05L	GRM0335C1H7R6BD01D	GRM1555C1H7R6BA01
	±0.25pF(C)	GRM0225C1C7R6CD05L	GRM0335C1H7R6CD01D	GRM1555C1H7R6CA01
	±0.5pF(D)	GRM0225C1C7R6DD05L	GRM0335C1H7R6DD01D	GRM1555C1H7R6DA01
7.7pF(7R7)	±0.05pF(W)	GRM0225C1C7R7WD05L	GRM0335C1H7R7WD01D	GRM1555C1H7R7WA01
	±0.1pF(B)	GRM0225C1C7R7BD05L	GRM0335C1H7R7BD01D	GRM1555C1H7R7BA01
	±0.25pF(C)	GRM0225C1C7R7CD05L	GRM0335C1H7R7CD01D	GRM1555C1H7R7CA01
	±0.5pF(D)	GRM0225C1C7R7DD05L	GRM0335C1H7R7DD01D	GRM1555C1H7R7DA01

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

S Dimension (LxW)4 Dimension (T)G Rated VoltageImage: CapacitanceIndividual Specification CodePackaging**GRM022: D is applicable.

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



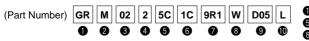
LxW [mm]		0.4x0.2(02)<01005>	0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc	-	16(1C)	50(1H)	50(1H)
Capacitance	Tolerance		Part Number	
7.8pF(7R8)	±0.05pF(W)	GRM0225C1C7R8WD05L	GRM0335C1H7R8WD01D	GRM1555C1H7R8WA01I
	±0.1pF(B)	GRM0225C1C7R8BD05L	GRM0335C1H7R8BD01D	GRM1555C1H7R8BA01E
	±0.25pF(C)	GRM0225C1C7R8CD05L	GRM0335C1H7R8CD01D	GRM1555C1H7R8CA01E
	±0.5pF(D)	GRM0225C1C7R8DD05L	GRM0335C1H7R8DD01D	GRM1555C1H7R8DA01E
7.9pF(7R9)	±0.05pF(W)	GRM0225C1C7R9WD05L	GRM0335C1H7R9WD01D	GRM1555C1H7R9WA01I
	±0.1pF(B)	GRM0225C1C7R9BD05L	GRM0335C1H7R9BD01D	GRM1555C1H7R9BA01[
	±0.25pF(C)	GRM0225C1C7R9CD05L	GRM0335C1H7R9CD01D	GRM1555C1H7R9CA01I
	±0.5pF(D)	GRM0225C1C7R9DD05L	GRM0335C1H7R9DD01D	GRM1555C1H7R9DA011
8.0pF(8R0)	±0.05pF(W)	GRM0225C1C8R0WD05L	GRM0335C1H8R0WD01D	GRM1555C1H8R0WA01
	±0.1pF(B)	GRM0225C1C8R0BD05L	GRM0335C1H8R0BD01D	GRM1555C1H8R0BA01
	±0.25pF(C)	GRM0225C1C8R0CD05L	GRM0335C1H8R0CD01D	GRM1555C1H8R0CA01
	±0.5pF(D)	GRM0225C1C8R0DD05L	GRM0335C1H8R0DD01D	GRM1555C1H8R0DA01
8.1pF(8R1)	±0.05pF(W)	GRM0225C1C8R1WD05L	GRM0335C1H8R1WD01D	GRM1555C1H8R1WA01
	±0.1pF(B)	GRM0225C1C8R1BD05L	GRM0335C1H8R1BD01D	GRM1555C1H8R1BA01
	±0.25pF(C)	GRM0225C1C8R1CD05L	GRM0335C1H8R1CD01D	GRM1555C1H8R1CA01
	±0.5pF(D)	GRM0225C1C8R1DD05L	GRM0335C1H8R1DD01D	GRM1555C1H8R1DA01
8.2pF(8R2)	±0.05pF(W)	GRM0225C1C8R2WD05L	GRM0335C1H8R2WD01D	GRM1555C1H8R2WA01
	±0.1pF(B)	GRM0225C1C8R2BD05L	GRM0335C1H8R2BD01D	GRM1555C1H8R2BA01
	±0.25pF(C)	GRM0225C1C8R2CD05L	GRM0335C1H8R2CD01D	GRM1555C1H8R2CA01
	±0.5pF(D)	GRM0225C1C8R2DD05L	GRM0335C1H8R2DD01D	GRM1555C1H8R2DA01
8.3pF(8R3)	±0.05pF(W)	GRM0225C1C8R3WD05L	GRM0335C1H8R3WD01D	GRM1555C1H8R3WA01
	±0.1pF(B)	GRM0225C1C8R3BD05L	GRM0335C1H8R3BD01D	GRM1555C1H8R3BA01
	±0.25pF(C)	GRM0225C1C8R3CD05L	GRM0335C1H8R3CD01D	GRM1555C1H8R3CA01
	±0.5pF(D)	GRM0225C1C8R3DD05L	GRM0335C1H8R3DD01D	GRM1555C1H8R3DA01
8.4pF(8R4)	±0.05pF(W)	GRM0225C1C8R4WD05L	GRM0335C1H8R4WD01D	GRM1555C1H8R4WA01
	±0.1pF(B)	GRM0225C1C8R4BD05L	GRM0335C1H8R4BD01D	GRM1555C1H8R4BA01
	±0.25pF(C)	GRM0225C1C8R4CD05L	GRM0335C1H8R4CD01D	GRM1555C1H8R4CA01
	±0.5pF(D)	GRM0225C1C8R4DD05L	GRM0335C1H8R4DD01D	GRM1555C1H8R4DA01
8.5pF(8R5)	±0.05pF(W)	GRM0225C1C8R5WD05L	GRM0335C1H8R5WD01D	GRM1555C1H8R5WA01
	±0.1pF(B)	GRM0225C1C8R5BD05L	GRM0335C1H8R5BD01D	GRM1555C1H8R5BA01
	±0.25pF(C)	GRM0225C1C8R5CD05L	GRM0335C1H8R5CD01D	GRM1555C1H8R5CA01
	±0.5pF(D)	GRM0225C1C8R5DD05L	GRM0335C1H8R5DD01D	GRM1555C1H8R5DA01
8.6pF(8R6)	±0.05pF(W)	GRM0225C1C8R6WD05L	GRM0335C1H8R6WD01D	GRM1555C1H8R6WA01
	±0.1pF(B)	GRM0225C1C8R6BD05L	GRM0335C1H8R6BD01D	GRM1555C1H8R6BA01
	±0.25pF(C)	GRM0225C1C8R6CD05L	GRM0335C1H8R6CD01D	GRM1555C1H8R6CA01
	±0.5pF(D)	GRM0225C1C8R6DD05L	GRM0335C1H8R6DD01D	GRM1555C1H8R6DA01
8.7pF(8R7)	±0.05pF(W)	GRM0225C1C8R7WD05L	GRM0335C1H8R7WD01D	GRM1555C1H8R7WA01
on pr (o nn)	±0.1pF(B)	GRM0225C1C8R7BD05L	GRM0335C1H8R7BD01D	GRM1555C1H8R7BA01
	±0.25pF(C)	GRM0225C1C8R7CD05L	GRM0335C1H8R7CD01D	GRM1555C1H8R7CA01
	±0.5pF(D)	GRM0225C1C8R7DD05L	GRM0335C1H8R7DD01D	GRM1555C1H8R7DA01
8.8pF(8R8)	±0.05pF(W)	GRM0225C1C8R8WD05L	GRM0335C1H8R8WD01D	GRM1555C1H8R8WA01
0.0p. (0.10)	±0.1pF(B)	GRM0225C1C8R8BD05L	GRM0335C1H8R8BD01D	GRM1555C1H8R8BA01
	±0.25pF(C)	GRM0225C1C8R8CD05L	GRM0335C1H8R8CD01D	GRM1555C1H8R8CA01
	±0.5pF(D)	GRM0225C1C8R8DD05L	GRM0335C1H8R8DD01D	GRM1555C1H8R8DA01
8.9pF(8R9)	±0.05pF(W)	GRM0225C1C8R9WD05L	GRM0335C1H8R9WD01D	GRM1555C1H8R9WA01
0.7pr (01.3)	±0.1pF(B)	GRM0225C1C8R9BD05L	GRM0335C1H8R9BD01D	GRM1555C1H8R9BA01
		GRM0225C1C8R9BD05L	GRM0335C1H8R9CD01D	GRM1555C1H8R9CA01
	±0.25pF(C) +0.5pF(D)			GRM1555C1H8R9DA01
0 0nE/000	±0.5pF(D)	GRM0225C1C8R9DD05L	GRM0335C1H8R9DD01D	
9.0pF(9R0)	±0.05pF(W)	GRM0225C1C9R0WD05L	GRM0335C1H9R0WD01D	GRM1555C1H9R0WA01
	±0.1pF(B)	GRM0225C1C9R0BD05L	GRM0335C1H9R0BD01D	GRM1555C1H9R0BA01I
	±0.25pF(C)	GRM0225C1C9R0CD05L	GRM0335C1H9R0CD01D	GRM1555C1H9R0CA01I
	±0.5pF(D)	GRM0225C1C9R0DD05L	GRM0335C1H9R0DD01D	GRM1555C1H9R0DA01

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



LxW [mm]		0.4x0.2(02)<01005>	0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]]	16(1C)	50(1H)	50(1H)
Capacitance	Tolerance		Part Number	
9.1pF(9R1)	±0.05pF(W)	GRM0225C1C9R1WD05L	GRM0335C1H9R1WD01D	GRM1555C1H9R1WA01
	±0.1pF(B)	GRM0225C1C9R1BD05L	GRM0335C1H9R1BD01D	GRM1555C1H9R1BA01
	±0.25pF(C)	GRM0225C1C9R1CD05L	GRM0335C1H9R1CD01D	GRM1555C1H9R1CA01
	±0.5pF(D)	GRM0225C1C9R1DD05L	GRM0335C1H9R1DD01D	GRM1555C1H9R1DA011
9.2pF(9R2)	±0.05pF(W)	GRM0225C1C9R2WD05L	GRM0335C1H9R2WD01D	GRM1555C1H9R2WA01
	±0.1pF(B)	GRM0225C1C9R2BD05L	GRM0335C1H9R2BD01D	GRM1555C1H9R2BA01I
	±0.25pF(C)	GRM0225C1C9R2CD05L	GRM0335C1H9R2CD01D	GRM1555C1H9R2CA01I
	±0.5pF(D)	GRM0225C1C9R2DD05L	GRM0335C1H9R2DD01D	GRM1555C1H9R2DA01I
9.3pF(9R3)	±0.05pF(W)	GRM0225C1C9R3WD05L	GRM0335C1H9R3WD01D	GRM1555C1H9R3WA01
	±0.1pF(B)	GRM0225C1C9R3BD05L	GRM0335C1H9R3BD01D	GRM1555C1H9R3BA01I
	±0.25pF(C)	GRM0225C1C9R3CD05L	GRM0335C1H9R3CD01D	GRM1555C1H9R3CA01I
	±0.5pF(D)	GRM0225C1C9R3DD05L	GRM0335C1H9R3DD01D	GRM1555C1H9R3DA01I
9.4pF(9R4)	±0.05pF(W)	GRM0225C1C9R4WD05L	GRM0335C1H9R4WD01D	GRM1555C1H9R4WA01
-	±0.1pF(B)	GRM0225C1C9R4BD05L	GRM0335C1H9R4BD01D	GRM1555C1H9R4BA01I
	±0.25pF(C)	GRM0225C1C9R4CD05L	GRM0335C1H9R4CD01D	GRM1555C1H9R4CA01I
	±0.5pF(D)	GRM0225C1C9R4DD05L	GRM0335C1H9R4DD01D	GRM1555C1H9R4DA01I
9.5pF(9R5)	±0.05pF(W)	GRM0225C1C9R5WD05L	GRM0335C1H9R5WD01D	GRM1555C1H9R5WA01
• • •	±0.1pF(B)	GRM0225C1C9R5BD05L	GRM0335C1H9R5BD01D	GRM1555C1H9R5BA01
	±0.25pF(C)	GRM0225C1C9R5CD05L	GRM0335C1H9R5CD01D	GRM1555C1H9R5CA01I
	±0.5pF(D)	GRM0225C1C9R5DD05L	GRM0335C1H9R5DD01D	GRM1555C1H9R5DA01I
9.6pF(9R6)	±0.05pF(W)	GRM0225C1C9R6WD05L	GRM0335C1H9R6WD01D	GRM1555C1H9R6WA01
,	±0.1pF(B)	GRM0225C1C9R6BD05L	GRM0335C1H9R6BD01D	GRM1555C1H9R6BA01I
	±0.25pF(C)	GRM0225C1C9R6CD05L	GRM0335C1H9R6CD01D	GRM1555C1H9R6CA01I
	±0.5pF(D)	GRM0225C1C9R6DD05L	GRM0335C1H9R6DD01D	GRM1555C1H9R6DA01I
9.7pF(9R7)	±0.05pF(W)	GRM0225C1C9R7WD05L	GRM0335C1H9R7WD01D	GRM1555C1H9R7WA01
/	±0.1pF(B)	GRM0225C1C9R7BD05L	GRM0335C1H9R7BD01D	GRM1555C1H9R7BA01I
	±0.25pF(C)	GRM0225C1C9R7CD05L	GRM0335C1H9R7CD01D	GRM1555C1H9R7CA01I
	±0.5pF(D)	GRM0225C1C9R7DD05L	GRM0335C1H9R7DD01D	GRM1555C1H9R7DA01I
9.8pF(9R8)	±0.05pF(W)	GRM0225C1C9R8WD05L	GRM0335C1H9R8WD01D	GRM1555C1H9R8WA01
, (<u> </u>	±0.1pF(B)	GRM0225C1C9R8BD05L	GRM0335C1H9R8BD01D	GRM1555C1H9R8BA01I
	±0.25pF(C)	GRM0225C1C9R8CD05L	GRM0335C1H9R8CD01D	GRM1555C1H9R8CA01I
	±0.5pF(D)	GRM0225C1C9R8DD05L	GRM0335C1H9R8DD01D	GRM1555C1H9R8DA01I
9.9pF(9R9)	±0.05pF(W)	GRM0225C1C9R9WD05L	GRM0335C1H9R9WD01D	GRM1555C1H9R9WA01
[·· ()	±0.1pF(B)	GRM0225C1C9R9BD05L	GRM0335C1H9R9BD01D	GRM1555C1H9R9BA01I
	±0.25pF(C)	GRM0225C1C9R9CD05L	GRM0335C1H9R9CD01D	GRM1555C1H9R9CA01I
	±0.5pF(D)	GRM0225C1C9R9DD05L	GRM0335C1H9R9DD01D	GRM1555C1H9R9DA01E

The part number code is shown in () and Unit is shown in []. $\hfill <>:$ EIA [inch] Code



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)
 Rated Voltage
 Individual Specification Code
 Packaging*
 *GRM022: D is applicable.



LxW [mm]			0.4x0.2(02)<01005>		0.6x0.3(03)<0201>
Rated Volt. [Vdc]	16(1C)	10(1A)	6.3 (0J)	50(1H)
Capacitance	Tolerance		Part N	umber	
10pF(100)	±2%(G)	GRM0225C1C100GD05L			GRM0335C1H100GD01
	±5%(J)	GRM0225C1C100JD05L			GRM0335C1H100JD01E
12pF(120)	±2%(G)	GRM0225C1C120GD05L			GRM0335C1H120GD01
	±5%(J)	GRM0225C1C120JD05L			GRM0335C1H120JD01E
15pF(150)	±2%(G)	GRM0225C1C150GD05L			GRM0335C1H150GD01I
	±5%(J)	GRM0225C1C150JD05L			GRM0335C1H150JD01[
18pF(180)	±2%(G)	GRM0225C1C180GD05L			GRM0335C1H180GD01I
	±5%(J)	GRM0225C1C180JD05L			GRM0335C1H180JD01I
22pF(220)	±2%(G)	GRM0225C1C220GD05L			GRM0335C1H220GD01I
	±5%(J)	GRM0225C1C220JD05L			GRM0335C1H220JD01I
27pF(270)	±2%(G)	GRM0225C1C270GD05L			GRM0335C1H270GD01
	±5%(J)	GRM0225C1C270JD05L			GRM0335C1H270JD01I
33pF(330)	±2%(G)	GRM0225C1C330GD05L			GRM0335C1H330GD01
	±5%(J)	GRM0225C1C330JD05L			GRM0335C1H330JD01I
39pF(390)	±2%(G)	GRM0225C1C390GD05L			GRM0335C1H390GD01
	±5%(J)	GRM0225C1C390JD05L			GRM0335C1H390JD01I
47pF(470)	±2%(G)	GRM0225C1C470GD05L			GRM0335C1H470GD01
	±5%(J)	GRM0225C1C470JD05L			GRM0335C1H470JD01I
56pF(560)	±2%(G)		GRM0225C1A560GD05L	GRM0225C0J560GD05L	GRM0335C1H560GD01
	±5%(J)		GRM0225C1A560JD05L	GRM0225C0J560JD05L	GRM0335C1H560JD011
68pF(680)	±2%(G)		GRM0225C1A680GD05L	GRM0225C0J680GD05L	GRM0335C1H680GD01
	±5%(J)		GRM0225C1A680JD05L	GRM0225C0J680JD05L	GRM0335C1H680JD01I
82pF(820)	±2%(G)		GRM0225C1A820GD05L	GRM0225C0J820GD05L	GRM0335C1H820GD01
	±5%(J)		GRM0225C1A820JD05L	GRM0225C0J820JD05L	GRM0335C1H820JD011
100pF(101)	±2%(G)		GRM0225C1A101GD05L	GRM0225C0J101GD05L	GRM0335C1H101GD01
	±5%(J)]	GRM0225C1A101JD05L	GRM0225C0J101JD05L	GRM0335C1H101JD01[

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



1

LxW [mm]		1.0x0.5(15)<0402>
Rated Volt. [Vdc]		50(1H)
TC		C0G(5C)
Capacitance	Tolerance	Part Number
10pF(100)	±2%(G)	GRM1555C1H100GA01D
	±5%(J)	GRM1555C1H100JA01D
12pF(120)	±2%(G)	GRM1555C1H120GA01D
	±5%(J)	GRM1555C1H120JA01D
15pF(150)	±2%(G)	GRM1555C1H150GA01D
	±5%(J)	GRM1555C1H150JA01D
18pF(180)	±2%(G)	GRM1555C1H180GA01D
	±5%(J)	GRM1555C1H180JA01D
22pF(220)	±2%(G)	GRM1555C1H220GA01D
	±5%(J)	GRM1555C1H220JA01D
27pF(270)	±2%(G)	GRM1555C1H270GA01D
	±5%(J)	GRM1555C1H270JA01D
33pF(330)	±2%(G)	GRM1555C1H330GA01D
	±5%(J)	GRM1555C1H330JA01D
39pF(390)	±2%(G)	GRM1555C1H390GA01D
	±5%(J)	GRM1555C1H390JA01D
47pF(470)	±2%(G)	GRM1555C1H470GA01D
	±5%(J)	GRM1555C1H470JA01D
56pF(560)	±2%(G)	GRM1555C1H560GA01D
	±5%(J)	GRM1555C1H560JA01D
68pF(680)	±2%(G)	GRM1555C1H680GA01D
	±5%(J)	GRM1555C1H680JA01D
82pF(820)	±2%(G)	GRM1555C1H820GA01D
	±5%(J)	GRM1555C1H820JA01D
100pF(101)	±2%(G)	GRM1555C1H101GA01D
	±5%(J)	GRM1555C1H101JA01D
120pF(121)	±2%(G)	GRM1555C1H121GA01D
	±5%(J)	GRM1555C1H121JA01D
150pF(151)	±2%(G)	GRM1555C1H151GA01D
	±5%(J)	GRM1555C1H151JA01D
180pF(181)	±2%(G)	GRM1555C1H181GA01D
	±5%(J)	GRM1555C1H181JA01D
220pF(221)	±2%(G)	GRM1555C1H221GA01D
	±5%(J)	GRM1555C1H221JA01D
270pF(271)	±2%(G)	GRM1555C1H271GA01D
	±5%(J)	GRM1555C1H271JA01D
330pF(331)	±2%(G)	GRM1555C1H331GA01D
	±5%(J)	GRM1555C1H331JA01D
390pF(391)	±2%(G)	GRM1555C1H391GA01D
	±5%(J)	GRM1555C1H391JA01D
470pF(471)	±2%(G)	GRM1555C1H471GA01D
	±5%(J)	GRM1555C1H471JA01D
560pF(561)	±2%(G)	GRM1555C1H561GA01D
	±5%(J)	GRM1555C1H561JA01D
680pF(681)	±2%(G)	GRM1555C1H681GA01D
	±5%(J)	GRM1555C1H681JA01D
820pF(821)	±2%(G)	GRM1555C1H821GA01D
	±5%(J)	GRM1555C1H821JA01D
1000pF(102)	±2%(G)	GRM1555C1H102GA01D

The part number code is shown in () and Unit is shown in []. \$<>: EIA [inch] Code

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Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

 (Part Number)
 GR
 M
 15
 5
 5C
 1H
 100
 G
 Z01
 D

0 0 0 0 0 0



LxW [mm]		1.6x0.8(1	8)<0603>
Rated Volt. [Vdc]	100(2A)	50(1H)
Capacitance	Tolerance	Part N	lumber
10pF(100)	±5%(J)	GRM1885C2A100JA01D	GRM1885C1H100JA01D
12pF(120)	±5%(J)	GRM1885C2A120JA01D	GRM1885C1H120JA01D
15pF(150)	±5%(J)	GRM1885C2A150JA01D	GRM1885C1H150JA01D
18pF(180)	±5%(J)	GRM1885C2A180JA01D	GRM1885C1H180JA01D
22pF(220)	±5%(J)	GRM1885C2A220JA01D	GRM1885C1H220JA01D
27pF(270)	±5%(J)	GRM1885C2A270JA01D	GRM1885C1H270JA01D
33pF(330)	±5%(J)	GRM1885C2A330JA01D	GRM1885C1H330JA01D
39pF(390)	±5%(J)	GRM1885C2A390JA01D	GRM1885C1H390JA01D
47pF(470)	±5%(J)	GRM1885C2A470JA01D	GRM1885C1H470JA01D
56pF(560)	±5%(J)	GRM1885C2A560JA01D	GRM1885C1H560JA01D
68pF(680)	±5%(J)	GRM1885C2A680JA01D	GRM1885C1H680JA01D
82pF(820)	±5%(J)	GRM1885C2A820JA01D	GRM1885C1H820JA01D
100pF(101)	±5%(J)	GRM1885C2A101JA01D	GRM1885C1H101JA01D
120pF(121)	±5%(J)	GRM1885C2A121JA01D	GRM1885C1H121JA01D
150pF(151)	±5%(J)	GRM1885C2A151JA01D	GRM1885C1H151JA01D
180pF(181)	±5%(J)	GRM1885C2A181JA01D	GRM1885C1H181JA01D
220pF(221)	±5%(J)	GRM1885C2A221JA01D	GRM1885C1H221JA01D
270pF(271)	±5%(J)	GRM1885C2A271JA01D	GRM1885C1H271JA01D
330pF(331)	±5%(J)	GRM1885C2A331JA01D	GRM1885C1H331JA01D
390pF(391)	±5%(J)	GRM1885C2A391JA01D	GRM1885C1H391JA01D
470pF(471)	±5%(J)	GRM1885C2A471JA01D	GRM1885C1H471JA01D
560pF(561)	±5%(J)	GRM1885C2A561JA01D	GRM1885C1H561JA01D
680pF(681)	±5%(J)	GRM1885C2A681JA01D	GRM1885C1H681JA01D
820pF(821)	±5%(J)	GRM1885C2A821JA01D	GRM1885C1H821JA01D
1000pF(102)	±5%(J)	GRM1885C2A102JA01D	GRM1885C1H102JA01D
1200pF(122)	±5%(J)	GRM1885C2A122JA01D	GRM1885C1H122JA01D
1500pF(152)	±5%(J)	GRM1885C2A152JA01D	GRM1885C1H152JA01D
1800pF(182)	±5%(J)		GRM1885C1H182JA01D
2200pF(222)	±5%(J)		GRM1885C1H222JA01D
2700pF(272)	±5%(J)		GRM1885C1H272JA01D
3300pF(332)	±5%(J)		GRM1885C1H332JA01D
3900pF(392)	±5%(J)		GRM1885C1H392JA01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



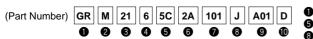
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Temperature Compensating Type C0G(5C) Characteristics

LxW [mm]		2.0x1.25(21)<0805>	3.2x1.6(31)<1206>		
Rated Volt. [Vdc]	100(2A)	50(1H)	100(2A)	50(1H)	
Capacitance	Tolerance		Part N	lumber		
100pF(101)	±5%(J)	GRM2165C2A101JA01D				
120pF(121)	±5%(J)	GRM2165C2A121JA01D				
150pF(151)	±5%(J)	GRM2165C2A151JA01D				
180pF(181)	±5%(J)	GRM2165C2A181JA01D				
220pF(221)	±5%(J)	GRM2165C2A221JA01D				
270pF(271)	±5%(J)	GRM2165C2A271JA01D				
330pF(331)	±5%(J)	GRM2165C2A331JA01D				
390pF(391)	±5%(J)	GRM2165C2A391JA01D				
470pF(471)	±5%(J)	GRM2165C2A471JA01D				
560pF(561)	±5%(J)	GRM2165C2A561JA01D				
680pF(681)	±5%(J)	GRM2165C2A681JA01D				
820pF(821)	±5%(J)	GRM2165C2A821JA01D				
1000pF(102)	±5%(J)	GRM2165C2A102JA01D				
1200pF(122)	±5%(J)	GRM2165C2A122JA01D	GRM2165C1H122JA01D			
1500pF(152)	±5%(J)	GRM2165C2A152JA01D	GRM2165C1H152JA01D			
1800pF(182)	±5%(J)	GRM2165C2A182JA01D	GRM2165C1H182JA01D	GRM3195C2A182JA01D		
2200pF(222)	±5%(J)	GRM2165C2A222JA01D	GRM2165C1H222JA01D	GRM3195C2A222JA01D		
2700pF(272)	±5%(J)	GRM2165C2A272JA01D	GRM2165C1H272JA01D	GRM3195C2A272JA01D		
3300pF(332)	±5%(J)	GRM2165C2A332JA01D	GRM2165C1H332JA01D	GRM3195C2A332JA01D		
3900pF(392)	±5%(J)		GRM2165C1H392JA01D	GRM3195C2A392JA01D		
4700pF(472)	±5%(J)		GRM2165C1H472JA01D	GRM3195C2A472JA01D	GRM3195C1H472JA01[
5600pF(562)	±5%(J)		GRM2195C1H562JA01D	GRM3195C2A562JA01D	GRM3195C1H562JA01[
6800pF(682)	±5%(J)		GRM2195C1H682JA01D	GRM3195C2A682JA01D	GRM3195C1H682JA01[
8200pF(822)	±5%(J)		GRM2195C1H822JA01D	GRM3195C2A822JA01D	GRM3195C1H822JA01[
10000pF(103)	±5%(J)		GRM2195C1H103JA01D	GRM3195C2A103JA01D	GRM3195C1H103JA01I	
12000pF(123)	±5%(J)		GRM2195C1H123JA01D		GRM3195C1H123JA01[
15000pF(153)	±5%(J)		GRM2195C1H153JA01D		GRM3195C1H153JA01I	
18000pF(183)	±5%(J)		GRM21B5C1H183JA01L		GRM3195C1H183JA01E	
22000pF(223)	±5%(J)		GRM21B5C1H223JA01L		GRM3195C1H223JA01I	
27000pF(273)	±5%(J)				GRM3195C1H273JA01I	
33000pF(333)	±5%(J)				GRM3195C1H333JA01I	
39000pF(393)	±5%(J)				GRM3195C1H393JA01I	
47000pF(473)	±5%(J)				GRM31M5C1H473JA01	
56000pF(563)	±5%(J)				GRM31M5C1H563JA01	
68000pF(683)	±5%(J)				GRM31C5C1H683JA01	
82000pF(823)	±5%(J)				GRM31C5C1H823JA01	
100000pF(104)	±5%(J)				GRM31C5C1H104JA01	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



Temperature Compensating Type C0G(5C) Characteristics Low Profile

LxW [mm]		1.0x0.5(15)<0402>	LxW [mm]		1.0x0.5(15)<0402>
Rated Volt. [Vdc]		50(1H)	Rated Volt. [Vdc]]	50(1H)
Capacitance	Tolerance	Part Number	Capacitance	Tolerance	Part Number
0.1pF(R10)	±0.1pF(B)	GRM1535C1HR10BDD5D	5.1pF(5R1)	±0.5pF(D)	GRM1535C1H5R1DDD5D
0.2pF(R20)	±0.1pF(B)	GRM1535C1HR20BDD5D	5.2pF(5R2)	±0.5pF(D)	GRM1535C1H5R2DDD5D
0.3pF(R30)	±0.1pF(B)	GRM1535C1HR30BDD5D	5.3pF(5R3)	±0.5pF(D)	GRM1535C1H5R3DDD5D
0.4pF(R40)	±0.1pF(B)	GRM1535C1HR40BDD5D	5.4pF(5R4)	±0.5pF(D)	GRM1535C1H5R4DDD5D
0.5pF(R50)	±0.1pF(B)	GRM1535C1HR50BDD5D	5.5pF(5R5)	±0.5pF(D)	GRM1535C1H5R5DDD5D
0.6pF(R60)	±0.1pF(B)	GRM1535C1HR60BDD5D	5.6pF(5R6)	±0.5pF(D)	GRM1535C1H5R6DDD5D
0.7pF(R70)	±0.1pF(B)	GRM1535C1HR70BDD5D	5.7pF(5R7)	±0.5pF(D)	GRM1535C1H5R7DDD5D
0.8pF(R80)	±0.1pF(B)	GRM1535C1HR80BDD5D	5.8pF(5R8)	±0.5pF(D)	GRM1535C1H5R8DDD5D
0.9pF(R90)	±0.1pF(B)	GRM1535C1HR90BDD5D	5.9pF(5R9)	±0.5pF(D)	GRM1535C1H5R9DDD5D
1.0pF(1R0)	±0.25pF(C)	GRM1535C1H1R0CDD5D	6.0pF(6R0)	±0.5pF(D)	GRM1535C1H6R0DDD5D
1.1pF(1R1)	±0.25pF(C)	GRM1535C1H1R1CDD5D	6.1pF(6R1)	±0.5pF(D)	GRM1535C1H6R1DDD5D
1.2pF(1R2)	±0.25pF(C)	GRM1535C1H1R2CDD5D	6.2pF(6R2)	±0.5pF(D)	GRM1535C1H6R2DDD5D
1.3pF(1R3)	±0.25pF(C)	GRM1535C1H1R3CDD5D	6.3pF(6R3)	±0.5pF(D)	GRM1535C1H6R3DDD5D
1.4pF(1R4)	±0.25pF(C)	GRM1535C1H1R4CDD5D	6.4pF(6R4)	±0.5pF(D)	GRM1535C1H6R4DDD5D
1.5pF(1R5)	±0.25pF(C)	GRM1535C1H1R5CDD5D	6.5pF(6R5)	±0.5pF(D)	GRM1535C1H6R5DDD5D
1.6pF(1R6)	±0.25pF(C)	GRM1535C1H1R6CDD5D	6.6pF(6R6)	±0.5pF(D)	GRM1535C1H6R6DDD5D
1.7pF(1R7)	±0.25pF(C)	GRM1535C1H1R7CDD5D	6.7pF(6R7)	±0.5pF(D)	GRM1535C1H6R7DDD5D
1.8pF(1R8)	±0.25pF(C)	GRM1535C1H1R8CDD5D	6.8pF(6R8)	±0.5pF(D)	GRM1535C1H6R8DDD5D
1.9pF(1R9)	±0.25pF(C)	GRM1535C1H1R9CDD5D	6.9pF(6R9)	±0.5pF(D)	GRM1535C1H6R9DDD5D
2.0pF(2R0)	±0.25pF(C)	GRM1535C1H2R0CDD5D	7.0pF(7R0)	±0.5pF(D)	GRM1535C1H7R0DDD5D
2.1pF(2R1)	±0.25pF(C)	GRM1535C1H2R1CDD5D	7.1pF(7R1)	±0.5pF(D)	GRM1535C1H7R1DDD5D
2.2pF(2R2)	±0.25pF(C)	GRM1535C1H2R2CDD5D	7.2pF(7R2)	±0.5pF(D)	GRM1535C1H7R2DDD5D
2.3pF(2R3)	±0.25pF(C)	GRM1535C1H2R3CDD5D	7.3pF(7R3)	±0.5pF(D)	GRM1535C1H7R3DDD5D
2.4pF(2R4)	±0.25pF(C)	GRM1535C1H2R4CDD5D	7.4pF(7R4)	±0.5pF(D)	GRM1535C1H7R4DDD5D
2.5pF(2R5)	±0.25pF(C)	GRM1535C1H2R5CDD5D	7.5pF(7R5)	±0.5pF(D)	GRM1535C1H7R5DDD5D
2.6pF(2R6)	±0.25pF(C)	GRM1535C1H2R6CDD5D	7.6pF(7R6)	±0.5pF(D)	GRM1535C1H7R6DDD5D
2.7pF(2R7)	±0.25pF(C)	GRM1535C1H2R7CDD5D	7.7pF(7R7)	±0.5pF(D)	GRM1535C1H7R7DDD5D
2.8pF(2R8)	±0.25pF(C)	GRM1535C1H2R8CDD5D	7.8pF(7R8)	±0.5pF(D)	GRM1535C1H7R8DDD5D
2.9pF(2R9)	±0.25pF(C)	GRM1535C1H2R9CDD5D	7.9pF(7R9)	±0.5pF(D)	GRM1535C1H7R9DDD5D
3.0pF(3R0)	±0.25pF(C)	GRM1535C1H3R0CDD5D	8.0pF(8R0)	±0.5pF(D)	GRM1535C1H8R0DDD5D
3.1pF(3R1)	±0.25pF(C)	GRM1535C1H3R1CDD5D	8.1pF(8R1)	±0.5pF(D)	GRM1535C1H8R1DDD5D
3.2pF(3R2)	±0.25pF(C)	GRM1535C1H3R2CDD5D	8.2pF(8R2)	±0.5pF(D)	GRM1535C1H8R2DDD5D
3.3pF(3R3)	±0.25pF(C)	GRM1535C1H3R3CDD5D	8.3pF(8R3)	±0.5pF(D)	GRM1535C1H8R3DDD5D
3.4pF(3R4)	±0.25pF(C)	GRM1535C1H3R4CDD5D	8.4pF(8R4)	±0.5pF(D)	GRM1535C1H8R4DDD5D
3.5pF(3R5)	±0.25pF(C)	GRM1535C1H3R5CDD5D	8.5pF(8R5)	±0.5pF(D)	GRM1535C1H8R5DDD5D
3.6pF(3R6)	±0.25pF(C)	GRM1535C1H3R6CDD5D	8.6pF(8R6)	±0.5pF(D)	GRM1535C1H8R6DDD5D
3.7pF(3R7)	±0.25pF(C)	GRM1535C1H3R7CDD5D	8.7pF(8R7)	±0.5pF(D)	GRM1535C1H8R7DDD5D
3.8pF(3R8)	±0.25pF(C)	GRM1535C1H3R8CDD5D	8.8pF(8R8)	±0.5pF(D)	GRM1535C1H8R8DDD5D
3.9pF(3R9)	±0.25pF(C)	GRM1535C1H3R9CDD5D	8.9pF(8R9)	±0.5pF(D)	GRM1535C1H8R9DDD5D
4.0pF(4R0)	±0.25pF(C)	GRM1535C1H4R0CDD5D	9.0pF(9R0)	±0.5pF(D)	GRM1535C1H9R0DDD5D
4.1pF(4R1)	±0.25pF(C)	GRM1535C1H4R1CDD5D	9.1pF(9R1)	±0.5pF(D)	GRM1535C1H9R1DDD5D
4.2pF(4R2)	±0.25pF(C)	GRM1535C1H4R2CDD5D	9.2pF(9R2)	±0.5pF(D)	GRM1535C1H9R2DDD5D
4.3pF(4R3)	±0.25pF(C)	GRM1535C1H4R3CDD5D	9.3pF(9R3)	±0.5pF(D)	GRM1535C1H9R3DDD5D
4.4pF(4R4)	±0.25pF(C)	GRM1535C1H4R4CDD5D	9.4pF(9R4)	±0.5pF(D)	GRM1535C1H9R4DDD5D
4.5pF(4R5)	±0.25pF(C)	GRM1535C1H4R5CDD5D	9.5pF(9R5)	±0.5pF(D)	GRM1535C1H9R5DDD5D
4.6pF(4R6)	±0.25pF(C)	GRM1535C1H4R6CDD5D	9.6pF(9R6)	±0.5pF(D)	GRM1535C1H9R6DDD5D
4.7pF(4R7)	±0.25pF(C)	GRM1535C1H4R7CDD5D	9.7pF(9R7)	±0.5pF(D)	GRM1535C1H9R7DDD5D
4.8pF(4R8)	±0.25pF(C)	GRM1535C1H4R8CDD5D	9.8pF(9R8)	±0.5pF(D)	GRM1535C1H9R8DDD5D
4.9pF(4R9)	±0.25pF(C)	GRM1535C1H4R9CDD5D	9.9pF(9R9)	±0.5pF(D)	GRM1535C1H9R9DDD5D

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The part number code is shown in () and Unit is shown in []. $\hfill <>:$ EIA [inch] Code



Temperature Compensating Type C0G(5C) Characteristics Low Profile

LxW [mm]		1.0x0.5(15)<0402>
Rated Volt. [Vdc]	50(1H)
Capacitance	Tolerance	Part Number
10pF(100)	±5%(J)	GRM1535C1H100JDD5D
12pF(120)	±5%(J)	GRM1535C1H120JDD5D
15pF(150)	±5%(J)	GRM1535C1H150JDD5D
18pF(180)	±5%(J)	GRM1535C1H180JDD5D
22pF(220)	±5%(J)	GRM1535C1H220JDD5D
27pF(270)	±5%(J)	GRM1535C1H270JDD5D
33pF(330)	±5%(J)	GRM1535C1H330JDD5D
39pF(390)	±5%(J)	GRM1535C1H390JDD5D
47pF(470)	±5%(J)	GRM1535C1H470JDD5D
56pF(560)	±5%(J)	GRM1535C1H560JDD5D
68pF(680)	±5%(J)	GRM1535C1H680JDD5D
82pF(820)	±5%(J)	GRM1535C1H820JDD5D
100pF(101)	±5%(J)	GRM1535C1H101JDD5D
120pF(121)	±5%(J)	GRM1535C1H121JDD5D
150pF(151)	±5%(J)	GRM1535C1H151JDD5D
180pF(181)	±5%(J)	GRM1535C1H181JDD5D
220pF(221)	±5%(J)	GRM1535C1H221JDD5D
270pF(271)	±5%(J)	GRM1535C1H271JDD5D
330pF(331)	±5%(J)	GRM1535C1H331JDD5D
390pF(391)	±5%(J)	GRM1535C1H391JDD5D
470pF(471)	±5%(J)	GRM1535C1H471JDD5D
560pF(561)	±5%(J)	GRM1535C1H561JDD5D
680pF(681)	±5%(J)	GRM1535C1H681JDD5D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

(Part Number) **GR M 15 3 5C 1H 100 J DD5 D** Product ID **5**Temperature Characteristics 000000 000 Capacitance Tolerance

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

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2Series

3Dimension (LxW) 6 Rated Voltage Individual Specification Code

4 Dimension (T) Packaging

Temperature Compensating Type C0G(5C) Characteristics Low Profile

LxW [mm]		2.0x1.25(21)<0805>	3.2x1.6 (3	1)<1206>
Rated Volt. [Vdc]	100(2A)	50(1H)	100(2A)	50(1H)
Capacitance	Tolerance		Part N	umber	
100pF(101)	±5%(J)	GRM2165C2A101JA01D			
120pF(121)	±5%(J)	GRM2165C2A121JA01D			
150pF(151)	±5%(J)	GRM2165C2A151JA01D			
180pF(181)	±5%(J)	GRM2165C2A181JA01D			
220pF(221)	±5%(J)	GRM2165C2A221JA01D			
270pF(271)	±5%(J)	GRM2165C2A271JA01D			
330pF(331)	±5%(J)	GRM2165C2A331JA01D			
390pF(391)	±5%(J)	GRM2165C2A391JA01D			
470pF(471)	±5%(J)	GRM2165C2A471JA01D			
560pF(561)	±5%(J)	GRM2165C2A561JA01D			
680pF(681)	±5%(J)	GRM2165C2A681JA01D			
820pF(821)	±5%(J)	GRM2165C2A821JA01D			
1000pF(102)	±5%(J)	GRM2165C2A102JA01D			
1200pF(122)	±5%(J)	GRM2165C2A122JA01D	GRM2165C1H122JA01D		
1500pF(152)	±5%(J)	GRM2165C2A152JA01D	GRM2165C1H152JA01D		
1800pF(182)	±5%(J)	GRM2165C2A182JA01D	GRM2165C1H182JA01D	GRM3195C2A182JA01D	
2200pF(222)	±5%(J)	GRM2165C2A222JA01D	GRM2165C1H222JA01D	GRM3195C2A222JA01D	
2700pF(272)	±5%(J)	GRM2165C2A272JA01D	GRM2165C1H272JA01D	GRM3195C2A272JA01D	
3300pF(332)	±5%(J)	GRM2165C2A332JA01D	GRM2165C1H332JA01D	GRM3195C2A332JA01D	
3900pF(392)	±5%(J)		GRM2165C1H392JA01D	GRM3195C2A392JA01D	
4700pF(472)	±5%(J)		GRM2165C1H472JA01D	GRM3195C2A472JA01D	GRM3195C1H472JA01I
5600pF(562)	±5%(J)		GRM2195C1H562JA01D	GRM3195C2A562JA01D	GRM3195C1H562JA01I
6800pF(682)	±5%(J)		GRM2195C1H682JA01D	GRM3195C2A682JA01D	GRM3195C1H682JA01I
8200pF(822)	±5%(J)		GRM2195C1H822JA01D	GRM3195C2A822JA01D	GRM3195C1H822JA01I
10000pF(103)	±5%(J)		GRM2195C1H103JA01D	GRM3195C2A103JA01D	GRM3195C1H103JA01I
12000pF(123)	±5%(J)		GRM2195C1H123JA01D		GRM3195C1H123JA01I
15000pF(153)	±5%(J)		GRM2195C1H153JA01D		GRM3195C1H153JA01
18000pF(183)	±5%(J)				GRM3195C1H183JA01
22000pF(223)	±5%(J)				GRM3195C1H223JA01
27000pF(273)	±5%(J)				GRM3195C1H273JA01I
33000pF(333)	±5%(J)				GRM3195C1H333JA01I
39000pF(393)	±5%(J)				GRM3195C1H393JA01I
47000pF(473)	±5%(J)				GRM31M5C1H473JA01
56000pF(563)	±5%(J)				GRM31M5C1H563JA01

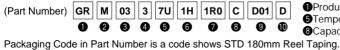
The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



LxW [mm]		0.6x0.3(0	3)<0201>	1.0x0.5(1	5)<0402>
Rated Volt. [Vdc]]	50(1H)	25(1E)	50(1H)	10(1A)
Capacitance	Tolerance	Part N		lumber	
1.0pF(1R0)	±0.25pF(C)	GRM0337U1H1R0CD01D		GRM1557U1H1R0CZ01D	
2.0pF(2R0)	±0.25pF(C)	GRM0337U1H2R0CD01D		GRM1557U1H2R0CZ01D	
3.0pF(3R0)	±0.25pF(C)	GRM0337U1H3R0CD01D		GRM1557U1H3R0CZ01D	
4.0pF(4R0)	±0.25pF(C)	GRM0337U1H4R0CD01D		GRM1557U1H4R0CZ01D	
5.0pF(5R0)	±0.25pF(C)	GRM0337U1H5R0CD01D		GRM1557U1H5R0CZ01D	
6.0pF(6R0)	±0.5pF(D)	GRM0337U1H6R0DD01D		GRM1557U1H6R0DZ01D	
7.0pF(7R0)	±0.5pF(D)	GRM0337U1H7R0DD01D		GRM1557U1H7R0DZ01D	
8.0pF(8R0)	±0.5pF(D)	GRM0337U1H8R0DD01D		GRM1557U1H8R0DZ01D	
9.0pF(9R0)	±0.5pF(D)	GRM0337U1H9R0DD01D		GRM1557U1H9R0DZ01D	
10pF(100)	±5%(J)	GRM0337U1H100JD01D		GRM1557U1H100JZ01D	
12pF(120)	±5%(J)	GRM0337U1H120JD01D		GRM1557U1H120JZ01D	
15pF(150)	±5%(J)	GRM0337U1H150JD01D		GRM1557U1H150JZ01D	
18pF(180)	±5%(J)		GRM0337U1E180JD01D	GRM1557U1H180JZ01D	
22pF(220)	±5%(J)		GRM0337U1E220JD01D	GRM1557U1H220JZ01D	
27pF(270)	±5%(J)		GRM0337U1E270JD01D	GRM1557U1H270JZ01D	
33pF(330)	±5%(J)		GRM0337U1E330JD01D	GRM1557U1H330JZ01D	
39pF(390)	±5%(J)		GRM0337U1E390JD01D	GRM1557U1H390JZ01D	
47pF(470)	±5%(J)		GRM0337U1E470JD01D	GRM1557U1H470JZ01D	
56pF(560)	±5%(J)		GRM0337U1E560JD01D	GRM1557U1H560JZ01D	
68pF(680)	±5%(J)		GRM0337U1E680JD01D	GRM1557U1H680JZ01D	
82pF(820)	±5%(J)		GRM0337U1E820JD01D	GRM1557U1H820JZ01D	
100pF(101)	±5%(J)		GRM0337U1E101JD01D	GRM1557U1H101JZ01D	
120pF(121)	±5%(J)			GRM1557U1H121JZ01D	
150pF(151)	±5%(J)			GRM1557U1H151JZ01D	
180pF(181)	±5%(J)			GRM1557U1H181JZ01D	
1200pF(122)	±5%(J)				GRM1557U1A122JA01D
1500pF(152)	±5%(J)				GRM1557U1A152JA01D
1800pF(182)	±5%(J)				GRM1557U1A182JA01D
2200pF(222)	±5%(J)				GRM1557U1A222JA01D
2700pF(272)	±5%(J)				GRM1557U1A272JA01D
3300pF(332)	±5%(J)				GRM1557U1A332JA01D
3900pF(392)	±5%(J)				GRM1557U1A392JA01D
4700pF(472)	±5%(J)				GRM1557U1A472JA01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

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Product ID Oseries
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging



LxW [mm]		1.6x0.8(1	8)<0603>
Rated Volt. [Vdc]		50(1H)	10(1A)
Capacitance	Tolerance	Part N	lumber
1000pF(102)	±5%(J)	GRM1887U1H102JA01D	
1200pF(122)	±5%(J)	GRM1887U1H122JA01D	
1500pF(152)	±5%(J)	GRM1887U1H152JA01D	
1800pF(182)	±5%(J)	GRM1887U1H182JA01D	
2200pF(222)	±5%(J)	GRM1887U1H222JA01D	
2700pF(272)	±5%(J)	GRM1887U1H272JA01D	
3300pF(332)	±5%(J)	GRM1887U1H332JA01D	
3900pF(392)	±5%(J)	GRM1887U1H392JA01D	
4700pF(472)	±5%(J)	GRM1887U1H472JA01D	
5600pF(562)	±5%(J)	GRM1887U1H562JA01D	
6800pF(682)	±5%(J)	GRM1887U1H682JA01D	
8200pF(822)	±5%(J)	GRM1887U1H822JA01D	
10000pF(103)	±5%(J)	GRM1887U1H103JA01D	
12000pF(123)	±5%(J)		GRM1887U1A123JA01D
15000pF(153)	±5%(J)		GRM1887U1A153JA01D
18000pF(183)	±5%(J)		GRM1887U1A183JA01D
22000pF(223)	±5%(J)		GRM1887U1A223JA01D

LxW [mm]		2.0x1.25(2	21)<0805>	3.2x1.6(31)<1206>
Rated Volt. [Vdc]		50(1H)	10(1A)	50(1H)
Capacitance	Tolerance		Part Number	
10000pF(103)	±5%(J)	GRM2167U1H103JA01D		
12000pF(123)	±5%(J)	GRM2167U1H123JA01D		
15000pF(153)	±5%(J)	GRM2167U1H153JA01D		
18000pF(183)	±5%(J)	GRM2167U1H183JA01D		
22000pF(223)	±5%(J)	GRM2197U1H223JA01D		
27000pF(273)	±5%(J)	GRM2197U1H273JA01D		
33000pF(333)	±5%(J)	GRM21A7U1H333JA39L		
39000pF(393)	±5%(J)	GRM21B7U1H393JA01L		
47000pF(473)	±5%(J)	GRM21B7U1H473JA01L		
56000pF(563)	±5%(J)		GRM2197U1A563JA01D	GRM3197U1H563JA01D
68000pF(683)	±5%(J)		GRM21B7U1A683JA01L	GRM31M7U1H683JA01L
82000pF(823)	±5%(J)		GRM21B7U1A823JA01L	GRM31M7U1H823JA01L
100000pF(104)	±5%(J)		GRM21B7U1A104JA01L	GRM31M7U1H104JA01L

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



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1

Temperature Compensating Type U2J(7U) Characteristics Low Profile

LxW [mm]		1.6x0.8(18)<0603>	
Rated Volt. [Vdc]		50(1H)	10(1A)
Capacitance	Tolerance	Part Number	
2200pF(222)	±5%(J)	GRM1857U1H222JA44D	
2700pF(272)	±5%(J)	GRM1857U1H272JA44D	
3300pF(332)	±5%(J)	GRM1857U1H332JA44D	
3900pF(392)	±5%(J)	GRM1857U1H392JA44D	
4700pF(472)	±5%(J)	GRM1857U1H472JA44D	
5600pF(562)	±5%(J)		GRM1857U1A562JA44D
6800pF(682)	±5%(J)		GRM1857U1A682JA44D
8200pF(822)	±5%(J)		GRM1857U1A822JA44D
10000pF(103)	±5%(J)		GRM1857U1A103JA44D

LxW [mm]		2.0x1.25(2	2.0x1.25(21)<0805>	
Rated Volt. [Vdc]		50(1H)	10(1A)	50(1H)
Capacitance	Tolerance		Part Number	
10000pF(103)	±5%(J)	GRM2167U1H103JA01D		
12000pF(123)	±5%(J)	GRM2167U1H123JA01D		
15000pF(153)	±5%(J)	GRM2167U1H153JA01D		
18000pF(183)	±5%(J)	GRM2167U1H183JA01D		
22000pF(223)	±5%(J)	GRM2197U1H223JA01D		
27000pF(273)	±5%(J)	GRM2197U1H273JA01D		
33000pF(333)	±5%(J)	GRM21A7U1H333JA39L		
56000pF(563)	±5%(J)		GRM2197U1A563JA01D	GRM3197U1H563JA01D
68000pF(683)	±5%(J)			GRM31M7U1H683JA01L
82000pF(823)	±5%(J)			GRM31M7U1H823JA01L
100000pF(104)	±5%(J)			GRM31M7U1H104JA01L

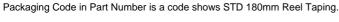
The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

(Part Number) GR M 18 5 7U 1H 222 J A44 D • 2 6 6 6 6 7 6 9 0 0

Product ID Oseries
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging





LxW [mm]		1.0x0.5(15)<0402>
Rated Volt. [Vdc]	50(1H)
Capacitance	Tolerance	
1.0pF(1R0)	±0.25pF(C)	GRM1556P1H1R0CZ01D
2.0pF(2R0)	±0.25pF(C)	GRM1556P1H2R0CZ01D
3.0pF(3R0)	±0.25pF(C)	GRM1556P1H3R0CZ01D
4.0pF(4R0)	±0.25pF(C)	GRM1556P1H4R0CZ01D
5.0pF(5R0)	±0.25pF(C)	GRM1556P1H5R0CZ01D
6.0pF(6R0)	±0.5pF(D)	GRM1556P1H6R0DZ01D
7.0pF(7R0)	±0.5pF(D)	GRM1556P1H7R0DZ01D
8.0pF(8R0)	±0.5pF(D)	GRM1556P1H8R0DZ01D
9.0pF(9R0)	±0.5pF(D)	GRM1556P1H9R0DZ01D
10pF(100)	±5%(J)	GRM1556P1H100JZ01D
12pF(120)	±5%(J)	GRM1556P1H120JZ01D
15pF(150)	±5%(J)	GRM1556P1H150JZ01D
18pF(180)	±5%(J)	GRM1556P1H180JZ01D
22pF(220)	±5%(J)	GRM1556P1H220JZ01D
27pF(270)	±5%(J)	GRM1556P1H270JZ01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Temperature Compensating Type R2H(6R) Characteristics

LxW [mm]		0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]		25(1E)	50(1H)
Capacitance	Tolerance	Part N	umber
1.0pF(1R0)	±0.25pF(C)	GRM0336R1E1R0CD01D	GRM1556R1H1R0CD01D
2.0pF(2R0)	±0.25pF(C)	GRM0336R1E2R0CD01D	GRM1556R1H2R0CZ01D
3.0pF(3R0)	±0.25pF(C)	GRM0336R1E3R0CD01D	GRM1556R1H3R0CZ01D
4.0pF(4R0)	±0.25pF(C)	GRM0336R1E4R0CD01D	GRM1556R1H4R0CZ01D
5.0pF(5R0)	±0.25pF(C)	GRM0336R1E5R0CD01D	GRM1556R1H5R0CZ01D
6.0pF(6R0)	±0.5pF(D)	GRM0336R1E6R0DD01D	GRM1556R1H6R0DZ01D
7.0pF(7R0)	±0.5pF(D)	GRM0336R1E7R0DD01D	GRM1556R1H7R0DZ01D
8.0pF(8R0)	±0.5pF(D)	GRM0336R1E8R0DD01D	GRM1556R1H8R0DZ01D
9.0pF(9R0)	±0.5pF(D)	GRM0336R1E9R0DD01D	GRM1556R1H9R0DZ01D
10pF(100)	±5%(J)	GRM0336R1E100JD01D	GRM1556R1H100JZ01D
12pF(120)	±5%(J)	GRM0336R1E120JD01D	GRM1556R1H120JZ01D
15pF(150)	±5%(J)	GRM0336R1E150JD01D	GRM1556R1H150JZ01D
18pF(180)	±5%(J)	GRM0336R1E180JD01D	GRM1556R1H180JZ01D
22pF(220)	±5%(J)	GRM0336R1E220JD01D	GRM1556R1H220JZ01D
27pF(270)	±5%(J)	GRM0336R1E270JD01D	GRM1556R1H270JZ01D
33pF(330)	±5%(J)	GRM0336R1E330JD01D	GRM1556R1H330JZ01D
39pF(390)	±5%(J)	GRM0336R1E390JD01D	
47pF(470)	±5%(J)	GRM0336R1E470JD01D	
56pF(560)	±5%(J)	GRM0336R1E560JD01D	
68pF(680)	±5%(J)	GRM0336R1E680JD01D	
82pF(820)	±5%(J)	GRM0336R1E820JD01D	
100pF(101)	±5%(J)	GRM0336R1E101JD01D	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



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Temperature Compensating Type S2H(6S) Characteristics

LxW [mm]		0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]		25(1E)	50(1H)
Capacitance	Tolerance	Part N	umber
1.0pF(1R0)	±0.25pF(C)	GRM0336S1E1R0CD01D	GRM1556S1H1R0CD01D
2.0pF(2R0)	±0.25pF(C)	GRM0336S1E2R0CD01D	GRM1556S1H2R0CZ01D
3.0pF(3R0)	±0.25pF(C)	GRM0336S1E3R0CD01D	GRM1556S1H3R0CZ01D
4.0pF(4R0)	±0.25pF(C)	GRM0336S1E4R0CD01D	GRM1556S1H4R0CZ01D
5.0pF(5R0)	±0.25pF(C)	GRM0336S1E5R0CD01D	GRM1556S1H5R0CZ01D
6.0pF(6R0)	±0.5pF(D)	GRM0336S1E6R0DD01D	GRM1556S1H6R0DZ01D
7.0pF(7R0)	±0.5pF(D)	GRM0336S1E7R0DD01D	GRM1556S1H7R0DZ01D
8.0pF(8R0)	±0.5pF(D)	GRM0336S1E8R0DD01D	GRM1556S1H8R0DZ01D
9.0pF(9R0)	±0.5pF(D)	GRM0336S1E9R0DD01D	GRM1556S1H9R0DZ01D
10pF(100)	±5%(J)	GRM0336S1E100JD01D	GRM1556S1H100JZ01D
12pF(120)	±5%(J)	GRM0336S1E120JD01D	GRM1556S1H120JZ01D
15pF(150)	±5%(J)	GRM0336S1E150JD01D	GRM1556S1H150JZ01D
18pF(180)	±5%(J)	GRM0336S1E180JD01D	GRM1556S1H180JZ01D
22pF(220)	±5%(J)	GRM0336S1E220JD01D	GRM1556S1H220JZ01D
27pF(270)	±5%(J)	GRM0336S1E270JD01D	GRM1556S1H270JZ01D
33pF(330)	±5%(J)	GRM0336S1E330JD01D	GRM1556S1H330JZ01D
39pF(390)	±5%(J)	GRM0336S1E390JD01D	GRM1556S1H390JZ01D
47pF(470)	±5%(J)	GRM0336S1E470JD01D	
56pF(560)	±5%(J)	GRM0336S1E560JD01D	
68pF(680)	±5%(J)	GRM0336S1E680JD01D	
82pF(820)	±5%(J)	GRM0336S1E820JD01D	
100pF(101)	±5%(J)	GRM0336S1E101JD01D	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

(Part Number) **GR M 03 3 6S 1E 1R0 C D01 D** Product ID **5**Temperature Characteristics 0 0 0 0 0 0 0 0 0 Capacitance Tolerance

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

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2Series

3Dimension (LxW) 6 Rated Voltage Individual Specification Code

4 Dimension (T) Capacitance Packaging

Temperature Compensating Type T2H(6T) Characteristics

LxW [mm]		0.6x0.3(03)<0201>	1.0x0.5(15)<0402>	
Rated Volt. [Vdc]	25(1E)	50(1H)	
Capacitance	Tolerance	Part N	umber	
1.0pF(1R0)	±0.25pF(C)	GRM0336T1E1R0CD01D	GRM1556T1H1R0CD01D	
2.0pF(2R0)	±0.25pF(C)	GRM0336T1E2R0CD01D	GRM1556T1H2R0CD01D	
3.0pF(3R0)	±0.25pF(C)	GRM0336T1E3R0CD01D	GRM1556T1H3R0CD01D	
4.0pF(4R0)	±0.25pF(C)	GRM0336T1E4R0CD01D	GRM1556T1H4R0CD01D	
5.0pF(5R0)	±0.25pF(C)	GRM0336T1E5R0CD01D	GRM1556T1H5R0CD01D	
6.0pF(6R0)	±0.5pF(D)	GRM0336T1E6R0DD01D	GRM1556T1H6R0DD01D	
7.0pF(7R0)	±0.5pF(D)	GRM0336T1E7R0DD01D	GRM1556T1H7R0DD01D	
8.0pF(8R0)	±0.5pF(D)	GRM0336T1E8R0DD01D	GRM1556T1H8R0DD01D	
9.0pF(9R0)	±0.5pF(D)	GRM0336T1E9R0DD01D	GRM1556T1H9R0DD01D	
10pF(100)	±5%(J)	GRM0336T1E100JD01D	GRM1556T1H100JD01D	
12pF(120)	±5%(J)	GRM0336T1E120JD01D	GRM1556T1H120JD01D	
15pF(150)	±5%(J)	GRM0336T1E150JD01D	GRM1556T1H150JD01D	
18pF(180)	±5%(J)	GRM0336T1E180JD01D	GRM1556T1H180JD01D	
22pF(220)	±5%(J)	GRM0336T1E220JD01D	GRM1556T1H220JD01D	
27pF(270)	±5%(J)	GRM0336T1E270JD01D	GRM1556T1H270JD01D	
33pF(330)	±5%(J)	GRM0336T1E330JD01D	GRM1556T1H330JD01D	
39pF(390)	±5%(J)	GRM0336T1E390JD01D	GRM1556T1H390JD01D	
47pF(470)	±5%(J)	GRM0336T1E470JD01D	GRM1556T1H470JD01D	
56pF(560)	±5%(J)	GRM0336T1E560JD01D	GRM1556T1H560JD01D	
68pF(680)	±5%(J)	GRM0336T1E680JD01D	GRM1556T1H680JD01D	
82pF(820)	±5%(J)	GRM0336T1E820JD01D	GRM1556T1H820JD01D	
100pF(101)	±5%(J)	GRM0336T1E101JD01D	GRM1556T1H101JD01D	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

muRata

LxW [mm]		0.4x0.2(02)<01005>
Rated Volt. [Vdc]	10(1A)
Capacitance Tolerance		Part Number
68pF(680)	±10%(K)	GRM022R71A680KA01L
100pF(101)	±10%(K)	GRM022R71A101KA01L
150pF(151)	±10%(K)	GRM022R71A151KA01L
220pF(221)	±10%(K)	GRM022R71A221KA01L
330pF(331)	±10%(K)	GRM022R71A331KA01L
470pF(471)	±10%(K)	GRM022R71A471KA01L

1

LxW [mm]	_xW [mm] 0.6x0.3(03)<02015			
Rated Volt. [Vdc]	25(1E)	16(1C)	10(1A)
Capacitance	Tolerance		Part Number	
100pF(101)	±10%(K)	GRM033R71E101KA01D		
150pF(151)	±10%(K)	GRM033R71E151KA01D		
220pF(221)	±10%(K)	GRM033R71E221KA01D		
330pF(331)	±10%(K)	GRM033R71E331KA01D		
470pF(471)	±10%(K)	GRM033R71E471KA01D		
680pF(681)	±10%(K)	GRM033R71E681KA01D		
1000pF(102)	±10%(K)	GRM033R71E102KA01D		
1500pF(152)	±10%(K)	GRM033R71E152KA01D		
2200pF(222)	±10%(K)		GRM033R71C222KA88D	
3300pF(332)	±10%(K)		GRM033R71C332KA88D	
4700pF(472)	±10%(K)			GRM033R71A472KA01D
6800pF(682)	±10%(K)			GRM033R71A682KA01D
10000pF(103)	±10%(K)			GRM033R71A103KA01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

(Part Number) GR M 02 2 R7 1A 680 K A01 L Product ID **5**Temperature Characteristics 000000 000

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

8 Capacitance Tolerance

2Series

3Dimension (LxW) **4**Dimension (T) ③Rated Voltage
④Individual Specification Code
④Packaging* *GRM022: D is applicable.



LxW [mm]			1.0x0.5(1	5)<0402>	
Rated Volt. [Vdc]	100(2A) 50(1H) 25(1E) 16(1C)			
Capacitance	Tolerance		Part N	umber	1
220pF(221)	±10%(K)	GRM155R72A221KA01D	GRM155R71H221KA01D		
330pF(331)	±10%(K)	GRM155R72A331KA01D	GRM155R71H331KA01D		
470pF(471)	±10%(K)	GRM155R72A471KA01D	GRM155R71H471KA01D		
680pF(681)	±10%(K)	GRM155R72A681KA01D	GRM155R71H681KA01D		
1000pF(102)	±10%(K)	GRM155R72A102KA01D	GRM155R71H102KA01D		
1500pF(152)	±10%(K)	GRM155R72A152KA01D	GRM155R71H152KA01D		
2200pF(222)	±10%(K)	GRM155R72A222KA01D	GRM155R71H222KA01D		
3300pF(332)	±10%(K)	GRM155R72A332KA01D	GRM155R71H332KA01D		
4700pF(472)	±10%(K)	GRM155R72A472KA01D	GRM155R71H472KA01D	GRM155R71E472KA01D	
6800pF(682)	±10%(K)		GRM155R71H682KA88D	GRM155R71E682KA01D	
10000pF(103)	±10%(K)		GRM155R71H103KA88D	GRM155R71E103KA01D	
15000pF(153)	±10%(K)		GRM155R71H153KA12D	GRM155R71E153KA61D	GRM155R71C153KA01D
22000pF(223)	±10%(K)		GRM155R71H223KA12D	GRM155R71E223KA61D	GRM155R71C223KA01D
33000pF(333)	±10%(K)			GRM155R71E333KA88D	GRM155R71C333KA01D
47000pF(473)	±10%(K)			GRM155R71E473KA88D	GRM155R71C473KA01D
68000pF(683)	±10%(K)				GRM155R71C683KA88D
0.10μF(104)	±10%(K)				GRM155R71C104KA88D

LxW [mm]		1.0x0.5(15)<0402>	
Rated Volt. [Vdc]	10(1A)	
Capacitance Tolerance		Part Number	
68000pF(683)	±10%(K)	GRM155R71A683KA01D	
0.10μF(104)	±10%(K)	GRM155R71A104KA01D	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code





High Dielectric Constant Type X7R(R7)/X7S(C7) Characteristics

LxW [mm]			1.6x0.8(1	8)<0603>	
Rated Volt. [Vdc]	100(2A)	50(1H)	25(1E)	16(1C)
Capacitance	Tolerance		Part N	umber	1
220pF(221)	±10%(K)	GRM188R72A221KA01D	GRM188R71H221KA01D		
330pF(331)	±10%(K)	GRM188R72A331KA01D	GRM188R71H331KA01D		
470pF(471)	±10%(K)	GRM188R72A471KA01D	GRM188R71H471KA01D		
680pF(681)	±10%(K)	GRM188R72A681KA01D	GRM188R71H681KA01D		
1000pF(102)	±10%(K)	GRM188R72A102KA01D	GRM188R71H102KA01D		
1500pF(152)	±10%(K)	GRM188R72A152KA01D	GRM188R71H152KA01D		
2200pF(222)	±10%(K)	GRM188R72A222KA01D	GRM188R71H222KA01D		
3300pF(332)	±10%(K)	GRM188R72A332KA01D	GRM188R71H332KA01D		
4700pF(472)	±10%(K)	GRM188R72A472KA01D	GRM188R71H472KA01D		
6800pF(682)	±10%(K)	GRM188R72A682KA01D	GRM188R71H682KA01D		
10000pF(103)	±10%(K)	GRM188R72A103KA01D	GRM188R71H103KA01D	GRM188R71E103KA01D	
15000pF(153)	±10%(K)		GRM188R71H153KA01D	GRM188R71E153KA01D	
22000pF(223)	±10%(K)		GRM188R71H223KA01D	GRM188R71E223KA01D	
33000pF(333)	±10%(K)		GRM188R71H333KA61D	GRM188R71E333KA01D	
47000pF(473)	±10%(K)		GRM188R71H473KA61D	GRM188R71E473KA01D	
68000pF(683)	±10%(K)		GRM188R71H683KA93D	GRM188R71E683KA01D	
0.10μF(104)	±10%(K)	GRM188R72A104KA35D	GRM188R71H104KA93D	GRM188R71E104KA01D	
0.15µF(154)	±10%(K)			GRM188R71E154KA01D	GRM188R71C154KA01D
0.22µF(224)	±10%(K)			GRM188R71E224KA88D	GRM188R71C224KA01D
0.33µF(334)	±10%(K)				GRM188R71C334KA01D
0.47µF(474)	±10%(K)			GRM188R71E474KA12D*	GRM188R71C474KA88D
1.0μF(105)	±10%(K)			GRM188R71E105KA12D*	GRM188R71C105KA12D*

LxW [mm]		1.6x0.8(18)<0603>			
Rated Volt. [Vdc]	10(1A)	10(1A) 6.3(0J)		
Capacitance	Tolerance	Part Number			
0.33µF(334)	±10%(K)	GRM188R71A334KA61D			
0.47µF(474)	±10%(K)	GRM188R71A474KA61D			
0.68µF(684)	±10%(K)	GRM188R71A684KA61D			
1.0μF(105)	±10%(K)	GRM188R71A105KA61D*			
2.2μF(225)	±10%(K)	GRM188R71A225KE15D*	GRM188C70J225KE20D*	GRM188C70G225KE20D*	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to GRM Series Specifications and Test Method(2).

(Part Number) **GR M 18 8 R7 2A 221 K A01 D** Product ID **5**Temperature Characteristics 0 0 0 0 0 0 0 0 0 8 Capacitance Tolerance

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

1



2Series

High Dielectric Constant Type X7R(R7)/X7U(E7) Characteristics

LxW [mm]			2.0x1.25(21)<0805>	
Rated Volt. [Vdc]	100(2A) 50(1H) 25(1E) 16(1C			
Capacitance	Tolerance		Part N	umber	1
6800pF(682)	±10%(K)	GRM219R72A682KA01D			
10000pF(103)	±10%(K)	GRM21BR72A103KA01L			
15000pF(153)	±10%(K)	GRM21BR72A153KA01L			
22000pF(223)	±10%(K)	GRM21BR72A223KA01L			
33000pF(333)	±10%(K)	GRM21BR72A333KA01L	GRM219R71H333KA01D		
47000pF(473)	±10%(K)	GRM21BR72A473KA01L	GRM21BR71H473KA01L		
68000pF(683)	±10%(K)		GRM21BR71H683KA01L	GRM219R71E683KA01D	
0.10μF(104)	±10%(K)		GRM21BR71H104KA01L	GRM21BR71E104KA01L	
0.15µF(154)	±10%(K)		GRM21BR71H154KA01L	GRM21BR71E154KA01L	
0.22µF(224)	±10%(K)	GRM21AR72A224KAC5L	GRM21BR71H224KA01L	GRM21BR71E224KA01L	
0.33µF(334)	±10%(K)	GRM21AR72A334KAC5L	GRM219R71H334KA88D	GRM21BR71E334KA01L	
0.47µF(474)	±10%(K)	GRM21BR72A474KA73L	GRM21BR71H474KA88L	GRM219R71E474KA88D	
0.68µF(684)	±10%(K)			GRM219R71E684KA88D	GRM219R71C684KA01D
1.0μF(105)	±10%(K)		GRM21BR71H105KA12L	GRM21BR71E105KA99L	GRM21BR71C105KA01L
				GRM219R71E105KA88D	[
2.2µF(225)	±10%(K)			GRM21BR71E225KA73L*	GRM21BR71C225KA12L
4.7μF(475)	±10%(K)				GRM21BR71C475KA73L*

LxW [mm]			2.0x1.25(21)<0805>		
Rated Volt. [Vdc]	10(1A)	4(0G)		
Capacitance	Tolerance	Part Number			
2.2μF(225)	±10%(K)	GRM21BR71A225KA01L	GRM21BR71A225KA01L		
4.7μF(475)	±10%(K)	GRM21BR71A475KA73L*			
10μF(106)	±10%(K)	GRM21BR71A106KE51L*	GRM21BR70J106KE76L*		
22μF(226)	±20%(M)			GRM21BE70G226ME51L*	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to GRM Series Specifications and Test Method(2).





High Dielectric Constant Type X7R(R7)/X7U(E7) Characteristics

LxW [mm]		3.2x1.6(31)<1206>			
Rated Volt. [Vdc]	100(2A) 50(1H) 25(1E) 16(1C)			
Capacitance	Tolerance		Part N	umber	•
15000pF(153)	±10%(K)	GRM319R72A153KA01L			
22000pF(223)	±10%(K)	GRM31MR72A223KA01L			
33000pF(333)	±10%(K)	GRM31MR72A333KA01L			
47000pF(473)	±10%(K)	GRM31MR72A473KA01L			
68000pF(683)	±10%(K)	GRM31MR72A683KA01L			
0.10μF(104)	±10%(K)	GRM319R72A104KA01D			
0.15μF(154)	±10%(K)	GRM31MR72A154KA01L	GRM31MR71H154KA01L		
0.22µF(224)	±10%(K)	GRM31MR72A224KA01L	GRM31MR71H224KA01L		
0.33µF(334)	±10%(K)		GRM319R71H334KA01D		
0.47µF(474)	±10%(K)	GRM31MR72A474KA35L	GRM31MR71H474KA01L		
0.68µF(684)	±10%(K)	GRM31MR72A684KA35L	GRM31MR71H684KA88L		
1.0μF(105)	±10%(K)	GRM31CR72A105KA01L	GRM31MR71H105KA88L		
2.2µF(225)	±10%(K)		GRM31CR71H225KA88L	GRM31MR71E225KA93L	GRM31MR71C225KA35L
4.7μF(475)	±10%(K)		GRM31CR71H475KA12L	GRM31CR71E475KA88L	GRM31CR71C475KA01L
10μF(106)	±10%(K)			GRM31CR71E106KA12L*	GRM31CR71C106KAC7L*

LxW [mm]							
Rated Volt. [Vdc]	10(1A)	4(0G)				
Capacitance	Tolerance		Part Number			Part Number	
10μF(106)	±10%(K)	GRM31CR71A106KA01L					
22μF(226)	±20%(M)	GRM31CR71A226ME15L*	GRM31CR70J226ME19L*				
47μF(476)	±20%(M)			GRM31CE70G476ME15L*			

LxW [mm]		3.2x2.5(32)<1210>				
Rated Volt. [Vdc]		100(2A) 50(1H) 35(YA) 25(1E)				
Capacitance	Tolerance	Part Number			•	
0.68µF(684)	±10%(K)	GRM32CR72A684KA01L	GRM32NR71H684KA01L			
1.0μF(105)	±10%(K)	GRM32CR72A105KA35L				
2.2μF(225)	±10%(K)	GRM32ER72A225KA35L				
4.7μF(475)	±10%(K)		GRM32ER71H475KA88L			
10μF(106)	±10%(K)			GRM32ER7YA106KA12L	GRM32DR71E106KA12L	
22μF(226)	±20%(M)				GRM32ER71E226ME15L*	

LxW [mm]			3.2x2.5(32)<1210>	3.2x2.5(32)<1210>		
Rated Volt. [Vdc	olt. [Vdc] 16(10		16(1C) 10(1A) 6.3(0J)			
Capacitance	Tolerance	Part Number				
22µF(226)	±20%(M)	GRM32ER71C226ME18L*				
47μF(476)	±20%(M)	GRM32ER71A476ME15L* GRM32ER70J476ME2				

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to GRM Series Specifications and Test Method(2).

(Part Number) **GR M 31 9 R7 2A 153 K A01 L** Product ID **5**Temperature Characteristics 000000 000

8 Capacitance Tolerance Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



2Series

3Dimension (LxW) 6 Rated Voltage Individual Specification Code

4 Dimension (T) Packaging

High Dielectric Constant Type X7R(R7)/X7T(D7) Characteristics Low Profile

LxW [mm]	1.0x0.5(15)<			
Rated Volt. [Vdc]	50(1H)	25(1E)	16(1C)
Capacitance	Tolerance		Part Number	
220pF(221)	±10%(K)	GRM15XR71H221KA86D		
330pF(331)	±10%(K)	GRM15XR71H331KA86D		
470pF(471)	±10%(K)	GRM15XR71H471KA86D		
680pF(681)	±10%(K)	GRM15XR71H681KA86D		
1000pF(102)	±10%(K)	GRM15XR71H102KA86D		
1500pF(152)	±10%(K)	GRM15XR71H152KA86D		
2200pF(222)	±10%(K)		GRM15XR71E222KA86D	
3300pF(332)	±10%(K)			GRM15XR71C332KA86D
4700pF(472)	±10%(K)			GRM15XR71C472KA86D
6800pF(682)	±10%(K)			GRM15XR71C682KA86D
10000pF(103)	±10%(K)			GRM15XR71C103KA86D

LxW [mm]		1.6x0.8(18)<0603>	
Rated Volt. [Vdc]		10(1A)	
Capacitance	Tolerance	Part Number	
1.0μF(105)	±10%(K)	GRM185D71A105KE36D*	

LxW [mm]			2.0x1.25(21)<0805>				
Rated Volt. [Vdc	:]	100(2A)	100(2A) 50(1H) 25(1E) 16(1C)				
Capacitance	Tolerance		Part N	umber			
6800pF(682)	±10%(K)	GRM219R72A682KA01D					
33000pF(333)	±10%(K)		GRM219R71H333KA01D				
68000pF(683)	±10%(K)			GRM219R71E683KA01D			
0.22μF(224)	±10%(K)	GRM21AR72A224KAC5L					
0.33μF(334)	±10%(K)	GRM21AR72A334KAC5L	GRM219R71H334KA88D				
0.47μF(474)	±10%(K)			GRM219R71E474KA88D			
0.68µF(684)	±10%(K)			GRM219R71E684KA88D	GRM219R71C684KA01D		
1.0μF(105)	±10%(K)			GRM219R71E105KA88D			

The part number code is shown in () and Unit is shown in []. $\ \ <>:$ EIA [inch] Code

*: Please refer to GRM Series Specifications and Test Method(2).

LxW [mm]		3.2x1.6(31)<1206>			
Rated Volt. [Vdc]	100(2A)	100(2A) 50(1H) 25(1E) 16(1C)		
Capacitance	Tolerance		Part N	umber	
15000pF(153)	±10%(K)	GRM319R72A153KA01L			
22000pF(223)	±10%(K)	GRM31MR72A223KA01L			
33000pF(333)	±10%(K)	GRM31MR72A333KA01L			
47000pF(473)	±10%(K)	GRM31MR72A473KA01L			
68000pF(683)	±10%(K)	GRM31MR72A683KA01L			
0.10μF(104)	±10%(K)	GRM319R72A104KA01D			
0.15μF(154)	±10%(K)	GRM31MR72A154KA01L	GRM31MR71H154KA01L		
0.22μF(224)	±10%(K)	GRM31MR72A224KA01L	GRM31MR71H224KA01L		
0.33µF(334)	±10%(K)		GRM319R71H334KA01D		
0.47μF(474)	±10%(K)	GRM31MR72A474KA35L	GRM31MR71H474KA01L		
0.68μF(684)	±10%(K)	GRM31MR72A684KA35L	GRM31MR71H684KA88L		
1.0μF(105)	±10%(K)		GRM31MR71H105KA88L		
2.2µF(225)	±10%(K)			GRM31MR71E225KA93L	GRM31MR71C225KA35L

LxW [mm]		3.2x2.5 (32)<1210>		
Rated Volt. [Vdc]	100(2A)	50(1H)	
Capacitance	Tolerance	Part Number		
0.68μF(684)	±10%(K)	GRM32CR72A684KA01L	GRM32NR71H684KA01L	
1.0μF(105)	±10%(K)	GRM32CR72A105KA35L		

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



LxW [mm] 0.6x0.3(03)<0201>			3)<0201>
Rated Volt. [Vdc]	6.3 (0J)	2.5(0E)
Capacitance	Tolerance	Part N	umber
15000pF(153)	±10%(K)	GRM033C80J153KE01D*	
22000pF(223)	±10%(K)	GRM033C80J223KE01D*	
33000pF(333)	±10%(K)	GRM033C80J333KE01D*	
47000pF(473)	±10%(K)	GRM033C80J473KE19D*	
0.10μF(104)	±10%(K)	GRM033C80J104KE84D*	
0.22µF(224)	±10%(K)		GRM033C80E224ME15D*

LxW [mm]		1.0x0.5(15)<0402>			
Rated Volt. [Vdc]	25(1E)	6.3 (0J)	4(0G)	
Capacitance	Tolerance		Part Number		
68000pF(683)	±10%(K)	GRM155C81E683KA12D			
0.10μF(104)	±10%(K)	GRM155C81E104KA12D			
0.15μF(154)	±10%(K)		GRM155C80J154KE01D*	GRM155C80G154KE01D*	
0.22µF(224)	±10%(K)		GRM155C80J224KE01D*	GRM155C80G224KE01D*	
0.33µF(334)	±10%(K)		GRM155C80J334KE01D*	GRM155C80G334KE01D*	
0.47µF(474)	±10%(K)		GRM155C80J474KE19D*	GRM155C80G474KE01D*	
0.68µF(684)	±10%(K)			GRM155C80G684KE19D*	

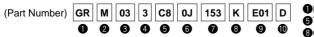
LxW [mm]		1.6x0.8(18)<0603>				
Rated Volt. [Vdc]		10(1A) 6.3(0J) 4(0G) 2.5(0E)				
Capacitance	Tolerance	Part Number				
1.0μF(105)	±10%(K)			GRM188C80G105MA01D		
2.2μF(225)	±10%(K)	GRM188C81A225KE34D*	GRM188C80J225KE19D*			
4.7μF(475)	±10%(K)			GRM188C80G475KE19D*		
10μF(106)	±20%(M)				GRM188C80E106ME47D*	

LxW [mm]		2.0x1.25(21)<0805>				
Rated Volt. [Vdc]		25(1E) 16(1C) 10(1A) 6.3(0J)			6.3(0J)	
Capacitance	Tolerance	Part Number				
1.0μF(105)	±10%(K)		GRM216C81C105KA12D*			
2.2μF(225)	±10%(K)		GRM219C81C225KA12D*			
4.7μF(475)	±10%(K)	GRM21BC81E475KA12L*	GRM21BC81C475KA88L*	GRM219C81A475KE34D*	GRM219C80J475KE19D*	
10μF(106)	±10%(K)			GRM21BC81A106KE18L*	GRM21BC80J106KE19L*	
					GRM219C80J106KE39D*	

LxW [mm]		2.0x1.25(21)<0805>
Rated Volt. [Vdc]	4(0G)
Capacitance	Tolerance	Part Number
10μF(106)	±10%(K)	GRM219C80G106KE19D*
22μF(226)	±20%(M)	GRM21BC80G226ME39L*

The part number code is shown in () and Unit is shown in []. $\hfill <>:$ EIA [inch] Code

 $^{\star:}$ Please refer to GRM Series Specifications and Test Method(2).



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



High Dielectric Constant Type X6S(C8)/X6T(D8) Characteristics

LxW [mm]		3.2x1.6(31)<1206>			
Rated Volt. [Vdc]	25(1E) 16(1C) 10(1A) 6.3(0J)			6.3(0J)
Capacitance	Tolerance	Part Number			
2.2μF(225)	±10%(K)		GRM316C81C225KA12D*		
4.7μF(475)	±10%(K)		GRM319C81C475KA12D*		
10μF(106)	±10%(K)	GRM31CC81E106KE15L*			
22μF(226)	±20%(M)			GRM31CC81A226ME19L*	GRM31CC80J226ME19L*
47μF(476)	±20%(M)				GRM31CC80J476ME18L*

LxW [mm]		3.2x1.6(31)<1206>	
Rated Volt. [Vdc]	4(0G)	
Capacitance Tolerance		Part Number	
47μF(476)	±20%(M)	GRM31CC80G476ME19L*	
100μF(107) ±20%(M)		GRM31CD80G107ME39L*	

LxW [mm]		3.2x2.5(32)<1210>			
Rated Volt. [Vdc]		25(1E) 10(1A) 6.3(0 J)			
Capacitance	Tolerance	Part Number			
10μF(106)	±10%(K)	GRM32DC81E106KA12L	GRM32DC81E106KA12L		
22μF(226)	±20%(M)	GRM32EC81E226ME15L*			
47μF(476)	±20%(M)	GRM32EC81A476ME19L* GRM32EC80J476ME64L			

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to GRM Series Specifications and Test Method(2).

High Dielectric Constant Type X6S(C8) Characteristics Low Profile

LxW [mm]		1.6x0.8(18)<0603>		
Rated Volt. [Vdc]		10(1A) 6.3(0J)		
Capacitance	Tolerance	Part Number		
1.0μF(105)	±10%(K)	GRM185C81A105KE36D*	GRM185C80J105KE26D*	

LxW [mm]		2.0x1.25(21)<0805>			
Rated Volt. [Vdc]		16(1C) 10(1A) 6.3(0J) 4(0G)			
Capacitance	Tolerance	Part Number			
1.0μF(105)	±10%(K)	GRM216C81C105KA12D*			
2.2μF(225)	±10%(K)	GRM219C81C225KA12D*			
4.7μF(475)	±10%(K)		GRM219C81A475KE34D*	GRM219C80J475KE19D*	
10μF(106)	±10%(K)			GRM219C80J106KE39D*	GRM219C80G106KE19D*

LxW [mm]		3.2x1.6(31)<1206>	
Rated Volt. [Vdc	c] 16(1C)		
Capacitance Tolerance		Part Number	
2.2μF(225)	±10%(K)	GRM316C81C225KA12D*	
4.7μF(475) ±10%(K)		GRM319C81C475KA12D*	

LxW [mm]		3.2x2.5(32)<1210>
Rated Volt. [Vdc]		25(1E)
Capacitance Tolerance		Part Number
10μF(106) ±10%(K)		GRM32DC81E106KA12L

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to GRM Series Specifications and Test Method(2).

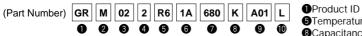
LxW [mm]		0.4x0.2(02)<01005>	
Rated Volt. [Vdc]		10(1A)	6.3 (0J)
Capacitance	Tolerance	Part Number	
68pF(680)	±10%(K)	GRM022R61A680KA01L	
100pF(101)	±10%(K)	GRM022R61A101KA01L	
150pF(151)	±10%(K)	GRM022R61A151KA01L	
220pF(221)	±10%(K)	GRM022R61A221KA01L	
330pF(331)	±10%(K)	GRM022R61A331KA01L	
470pF(471)	±10%(K)	GRM022R61A471KA01L	
680pF(681)	±10%(K)		GRM022R60J681KE19L*
1000pF(102)	±10%(K)		GRM022R60J102KE19L*
1500pF(152)	±10%(K)		GRM022R60J152KE19L*
2200pF(222)	±10%(K)		GRM022R60J222KE19L*
3300pF(332)	±10%(K)		GRM022R60J332KE19L*
4700pF(472)	±10%(K)		GRM022R60J472KE19L*
6800pF(682)	±10%(K)		GRM022R60J682KE19L*
10000pF(103)	±10%(K)		GRM022R60J103KE19L*

LxW [mm]		0.6x0.3(03)<0201>			
Rated Volt. [Vdc]		25(1E)	16(1C)	10(1A)	6.3(0J)
Capacitance	Tolerance		Pa	rt Number	
100pF(101)	±10%(K)				
150pF(151)	±10%(K)				
220pF(221)	±10%(K)				
330pF(331)	±10%(K)				
470pF(471)	±10%(K)				
680pF(681)	±10%(K)				
1000pF(102)	±10%(K)				
1500pF(152)	±10%(K)			GRM033R61A152KA01D	
2200pF(222)	±10%(K)			GRM033R61A222KA01D	
3300pF(332)	±10%(K)			GRM033R61A332KA01D	
4700pF(472)	±10%(K)			GRM033R61A472KA01D	
6800pF(682)	±10%(K)			GRM033R61A682KA01D	
10000pF(103)	±10%(K)			GRM033R61A103KA01D	
15000pF(153)	±10%(K)				GRM033R60J153KE01D*
22000pF(223)	±10%(K)				GRM033R60J223KE01D*
33000pF(333)	±10%(K)				GRM033R60J333KE01D*
47000pF(473)	±10%(K)				GRM033R60J473KE19D*
0.10μF(104)	±10%(K)			GRM033R61A104KE84D*	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

: Please refer to X7R(R7) etc Characteristics.

*: Please refer to GRM Series Specifications and Test Method(2).



Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

Product ID 2 Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)
 Rated Voltage
 Individual Specification Code
 *GRM022: D is applicable.



LxW [mm]		1.0x0.5(15)<0402>			
Rated Volt. [Vdc]	100(2A) 50(1H) 25(1E)			16(1C)
Capacitance	Tolerance		Part N	umber	
220pF(221)	±10%(K)				
330pF(331)	±10%(K)				
470pF(471)	±10%(K)				
680pF(681)	±10%(K)				
1000pF(102)	±10%(K)		GRM155R61H102KA01D		
1500pF(152)	±10%(K)				
2200pF(222)	±10%(K)		GRM155R61H222KA01D		
3300pF(332)	±10%(K)				
4700pF(472)	±10%(K)		GRM155R61H472KA01D		
6800pF(682)	±10%(K)				
10000pF(103)	±10%(K)				
15000pF(153)	±10%(K)				
22000pF(223)	±10%(K)				GRM155R61C223KA01D
33000pF(333)	±10%(K)				GRM155R61C333KA01D
47000pF(473)	±10%(K)				GRM155R61C473KA01D
68000pF(683)	±10%(K)			GRM155R61E683KA87D	GRM155R61C683KA88D
0.10μF(104)	±10%(K)			GRM155R61E104KA87D	GRM155R61C104KA88D

LxW [mm]		1.0x0.5(15)<0402>			
Rated Volt. [Vdc]		10(1A)	6.3 (0J)	4(0G)	
Capacitance	Tolerance		Part Number		
33000pF(333)	±10%(K)	GRM155R61A333KA01D			
47000pF(473)	±10%(K)	GRM155R61A473KA01D			
68000pF(683)	±10%(K)	GRM155R61A683KA01D			
0.10μF(104)	±10%(K)	GRM155R61A104KA01D			
0.15μF(154)	±10%(K)	GRM155R61A154KE19D*	GRM155R60J154KE01D*		
0.22μF(224)	±10%(K)	GRM155R61A224KE19D*	GRM155R60J224KE01D*		
0.33µF(334)	±10%(K)	GRM155R61A334KE15D*	GRM155R60J334KE01D*		
0.47µF(474)	±10%(K)	GRM155R61A474KE15D*	GRM155R60J474KE19D*		
0.68µF(684)	±10%(K)	GRM155R61A684KE15D*	GRM155R60J684KE19D*		
1.0μF(105)	±10%(K)	GRM155R61A105KE15D*			
4.7μF(475)	±20%(M)			GRM155R60G475ME87D*	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

: Please refer to X7R(R7) etc Characteristics.

: Please refer to גומא Specifications and Test Method(2).



LxW [mm]		1.6x0.8(18)<0603>				
Rated Volt. [Vdc]	100(2A)	100(2A) 50(1H) 25(1E) 16(1			
Capacitance	Tolerance		Part N	lumber	1	
220pF(221)	±10%(K)					
330pF(331)	±10%(K)					
470pF(471)	±10%(K)					
680pF(681)	±10%(K)					
1000pF(102)	±10%(K)		GRM188R61H102KA01D			
1500pF(152)	±10%(K)					
2200pF(222)	±10%(K)		GRM188R61H222KA01D			
3300pF(332)	±10%(K)					
4700pF(472)	±10%(K)		GRM188R61H472KA01D			
6800pF(682)	±10%(K)					
10000pF(103)	±10%(K)		GRM188R61H103KA01D			
15000pF(153)	±10%(K)					
22000pF(223)	±10%(K)		GRM188R61H223KA01D			
33000pF(333)	±10%(K)					
47000pF(473)	±10%(K)					
68000pF(683)	±10%(K)					
0.10μF(104)	±10%(K)			GRM188R61E104KA01D	GRM188R61C104KA01D	
0.15µF(154)	±10%(K)					
0.22μF(224)	±10%(K)			GRM188R61E224KA88D	GRM188R61C224KA88D	
0.33µF(334)	±10%(K)					
0.47µF(474)	±10%(K)			GRM188R61E474KA12D*	GRM188R61C474KA93D*	
1.0μF(105)	±10%(K)			GRM188R61E105KA12D*	GRM188R61C105KA93D*	
2.2µF(225)	±10%(K)				GRM188R61C225KE15D*	

LxW [mm]		1.6x0.8(18)<0603>			
Rated Volt. [Vdc]	10(1A) 6.3(0 J) 4(0 G)			
Capacitance	Tolerance		Part Number		
0.15µF(154)	±10%(K)	GRM188R61A154KA01D			
0.22µF(224)	±10%(K)	GRM188R61A224KA01D			
0.33µF(334)	±10%(K)				
0.47µF(474)	±10%(K)	GRM188R61A474KA61D	GRM188R61A474KA61D		
0.68µF(684)	±10%(K)				
2.2μF(225)	±10%(K)	GRM188R61A225KE34D*			
4.7μF(475)	±10%(K)		GRM188R60J475KE19D*		
10μF(106)	±20%(M)		GRM188R60J106ME47D*	GRM188R60G106ME47D*	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

: Please refer to X7R(R7) etc Characteristics.

*: Please refer to GRM Series Specifications and Test Method(2).



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



LxW [mm]			2.0x1.25	(21)<0805>	
Rated Volt. [Vdc]		100(2A)	50(1H)	25(1E)	16(1C)
Capacitance	Tolerance		Part	Number	
6800pF(682)	±10%(K)				
10000pF(103)	±10%(K)				
15000pF(153)	±10%(K)				
22000pF(223)	±10%(K)				
33000pF(333)	±10%(K)				
47000pF(473)	±10%(K)				
68000pF(683)	±10%(K)				
0.10μF(104)	±10%(K)				
0.15μF(154)	±10%(K)				
0.22μF(224)	±10%(K)				
0.33μF(334)	±10%(K)				GRM21BR61C334KA01L
0.47μF(474)	±10%(K)				GRM21BR61C474KA01L
0.68μF(684)	±10%(K)				
1.0μF(105)	±10%(K)			GRM216R61E105KA12D	GRM21BR61C105KA01L
2.2μF(225)	±10%(K)			GRM21BR61E225KA12L	GRM21BR61C225KA88L*
		[GRM219R61E225KA12D*	GRM219R61C225KA88D*
4.7μF(475)	±10%(K)			GRM21BR61E475KA12L*	GRM21BR61C475KA88L*
					GRM219R61C475KE15D*
10μF(106)	±10%(K)				GRM21BR61C106KE15L*

LxW [mm]		2.0x1.25(21)<0805>			
Rated Volt. [Vdc]	10(1A)	6.3(0J)	4(0G)	
Capacitance	Tolerance	Part Number			
2.2μF(225)	±10%(K)	GRM21BR61A225KA01L			
4.7μF(475)	±10%(K)	GRM219R61A475KE34D*			
10μF(106)	±10%(K)	GRM21BR61A106KE19L*	GRM219R60J106KE19D*		
		GRM219R61A106KE44D*			
22μF(226)	±20%(M)		GRM21BR60J226ME39L*	GRM219R60G226ME66D*	

The part number code is shown in $% \left({\left. {\right.} \right\}_{i=1}^{k-1}} \right)$) and Unit is shown in []. <>: EIA [inch] Code

: Please refer to X7R(R7) etc Characteristics.

Please refer to X/K(K/) etc Unaracteristico.
 Please refer to GRM Series Specifications and Test Method(2).



LxW [mm]		3.2x1.6(31)<1206>				
Rated Volt. [Vdc]	100(2A)	100(2A) 50(1H) 25(1E)			
Capacitance	Tolerance		Part N	umber		
15000pF(153)	±10%(K)					
22000pF(223)	±10%(K)					
33000pF(333)	±10%(K)					
47000pF(473)	±10%(K)					
68000pF(683)	±10%(K)					
0.10μF(104)	±10%(K)					
0.15μF(154)	±10%(K)					
0.22μF(224)	±10%(K)					
0.33μF(334)	±10%(K)					
0.47µF(474)	±10%(K)					
0.68μF(684)	±10%(K)					
1.0μF(105)	±10%(K)					
2.2μF(225)	±10%(K)		GRM31CR61H225KA88L	GRM316R61E225KA12D*		
4.7μF(475)	±10%(K)			GRM31CR61E475KA88L	GRM31CR61C475KA01L	
				GRM319R61E475KA12D*	GRM319R61C475KA88D*	
10μF(106)	±10%(K)			GRM31CR61E106KA12L*	GRM31CR61C106KA88L	
					GRM319R61C106KE15D*	
22μF(226)	±20%(M)				GRM31CR61C226ME15L*	

LxW [mm]		3.2x1.6(31)<1206>			
Rated Volt. [Vdc]]	10(1A) 6.3(0J) 4(0G)			
Capacitance	Tolerance	Part Number			
10μF(106)	±10%(K)	GRM319R61A106KE19L*			
22μF(226)	±20%(M)	GRM31CR61A226ME19L*	GRM31CR60J226ME19L*		
47μF(476)	±20%(M)		GRM31CR60J476ME19L*		
100μF(107)	±20%(M)		GRM31CR60J107ME39L*	GRM31CR60G107ME39L*	

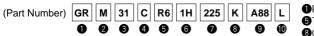
LxW [mm] 3.2x2.5(32)<1210>					
Rated Volt. [Vdc]	100(2A)	50(1H)	35(YA)	25(1E)
Capacitance	Tolerance		Part Number		1
0.68μF(684)	±10%(K)				
1.0μF(105)	±10%(K)				
2.2μF(225)	±10%(K)				
4.7μF(475)	±10%(K)				
10μF(106)	±10%(K)			GRM32ER6YA106KA12L	GRM32DR61E106KA12L
22μF(226)	±20%(M)				GRM32ER61E226ME15L*

LxW [mm]		3.2x2.5(32)<1210>				
Rated Volt. [Vdc]		16(1C) 10(1A) 6.3(0J)				
Capacitance	Tolerance	Part Number				
22µF(226)	±20%(M)					
47μF(476)	±20%(M)	GRM32ER61C476ME15L* GRM32ER61A476ME20L*				

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

: Please refer to X7R(R7) etc Characteristics.

*: Please refer to GRM Series Specifications and Test Method(2).



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



High Dielectric Constant Type X5R(R6) Characteristics Low Profile

LxW [mm]			1.0x0.5(15)<0402>	
Rated Volt. [Vdc]	16(1C)	25(1E)	16(1C)
Capacitance	Tolerance		Part Number	
220pF(221)	±10%(K)			
330pF(331)	±10%(K)			
470pF(471)	±10%(K)			
680pF(681)	±10%(K)			
1000pF(102)	±10%(K)			
1500pF(152)	±10%(K)			
2200pF(222)	±10%(K)			
3300pF(332)	±10%(K)			
4700pF(472)	±10%(K)			
6800pF(682)	±10%(K)			
10000pF(103)	±10%(K)			

LxW [mm]		1.6x0.8(18)<0603>	
Rated Volt. [Vdc]		16(1C) 10(1A)	
Capacitance	Tolerance	Part Number	
1.0μF(105)	±10%(K)	GRM185R61C105KE44D*	GRM185R61A105KE36D*

LxW [mm]			2.0x1.25(21)<0805>	
Rated Volt. [Vdc]	100(2A)	50(1H)	25(1E)	16(1C)
Capacitance	Tolerance		Part N	lumber	
6800pF(682)	±10%(K)				
33000pF(333)	±10%(K)				
68000pF(683)	±10%(K)				
0.22µF(224)	±10%(K)				
0.33µF(334)	±10%(K)				
0.47µF(474)	±10%(K)				
0.68µF(684)	±10%(K)				
1.0μF(105)	±10%(K)			GRM216R61E105KA12D	
2.2μF(225)	±10%(K)			GRM219R61E225KA12D*	GRM219R61C225KA88D*
4.7μF(475)	±10%(K)				GRM219R61C475KE15D*

LxW [mm]		2.0x1.25(21)<0805>			
Rated Volt. [Vdc]	10(1A) 6.3(0J) 4(0G)			
Capacitance	Tolerance	Part Number			
4.7μF(475)	±10%(K)	GRM219R61A475KE34D*			
10μF(106)	±10%(K)	GRM219R61A106KE44D*	GRM219R60J106KE19D*		
22μF(226)	±20%(M)			GRM219R60G226ME66D*	

The part number code is shown in () and Unit is shown in []. $\hfill <>:$ EIA [inch] Code

: Please refer to X7R(R7) etc Characteristics.

*: Please refer to GRM Series Specifications and Test Method(2).





High Dielectric Constant Type X5R(R6) Characteristics Low Profile

LxW [mm] 3.2x1.6(31)<1206>			1)<1206>		
Rated Volt. [Vdc]	100(2A) 50(1H) 25(1E) 16(1			
Capacitance	Tolerance		Part N	lumber	
15000pF(153)	±10%(K)				
22000pF(223)	±10%(K)				
33000pF(333)	±10%(K)				
47000pF(473)	±10%(K)				
68000pF(683)	±10%(K)				
0.10μF(104)	±10%(K)				
0.15μF(154)	±10%(K)				
0.22µF(224)	±10%(K)				
0.33μF(334)	±10%(K)				
0.47μF(474)	±10%(K)				
0.68µF(684)	±10%(K)				
1.0μF(105)	±10%(K)				
2.2µF(225)	±10%(K)			GRM316R61E225KA12D*	
4.7μF(475)	±10%(K)			GRM319R61E475KA12D*	GRM319R61C475KA88D*
10μF(106)	±10%(K)				GRM319R61C106KE15D*

LxW [mm]		3.2x1.6(31)<1206>
Rated Volt. [Vdc]	10(1A)
Capacitance	Tolerance	Part Number
10μF(106)	±10%(K)	GRM319R61A106KE19D*

LxW [mm]		3.2x2.5(32)<1210>				
Rated Volt. [Vdc]	100(2A)	50(1H)	25(1E)		
Capacitance	Tolerance	Part Number				
0.68µF(684)	±10%(K)					
1.0μF(105)	±10%(K)					
10μF(106) ±10%(K)				GRM32DR61E106KA12L		

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

: Please refer to X7R(R7) etc Characteristics.

*: Please refer to GRM Series Specifications and Test Method(2).

(Part Number) **GR M 31 6 R6 1E 225 K A12 D** Product ID **5**Temperature Characteristics 000000000000 8 Capacitance Tolerance

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



2Series

3Dimension (LxW) 6 Rated Voltage Individual Specification Code

4 Dimension (T) Packaging

(Note1) This Specifications and Test Methods indicates typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). In case Non "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

		Specif	ications				
No.	Item	Temperature Compensating Type	High Dielectric Type	Test Method			
1	Operating Temperature Range	–55 to +125°C (2P/R/S/T, 3P/R/S/T/U, 4P/R/S/T/U: –25 to +85°C)	B1, B3, F1: -25 to +85°C R1, R7: -55 to +125°C R6: -55 to +85°C C8: -55 to +105°C E4: +10 to +85°C F5: -30 to +85°C	Reference temperature: 25° C (2 Δ , 3 Δ , 4 Δ , B1, B3, F1, R1: 20°C)			
2	Rated Voltage	See the previous pages.		The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^{O-P} , whichever is larger, should be maintained within the rated voltage range.			
3	Appearance	No defects or abnormalities		Visual inspection			
4	Dimensions	Within the specified dimensions	3	Using calipers (GRM02 size is based on Microscope)			
5	Dielectric Strength	No defects or abnormalities		No failure should be observed when 300%* of the rated voltage (temperature compensating type) or 250% of the rated voltage (high dielectric constant type) is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. *200% for 500V			
6	Insulation Resistance	C≦0.047μF: More than 10,000M C>0.047μF: More than 500Ω · I		The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 20/25°C and 75%RH max. and within 2 minutes of charging, provided the charge/ discharge current is less than 50mA.			
7	Capacitance	Within the specified tolerance					
8	Q/ Dissipation Factor (D.F.)	30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF)	$\label{eq:response} \begin{bmatrix} [R6, R7, C8] \\ W.V.: 100V \\ : 0.025 max. (C<0.068 \mu F) \\ : 0.05 max. (C\geq0.068 \mu F) \\ W.V.: 50/35/25V: \\ : 0.025 max.* \\ ^*GRM32D R7/R6/C8 1E106: 0.035 max. \\ W.V.: 16/10V: 0.035 max. \\ W.V.: 16/10V: 0.035 max. \\ W.V.: 6.3/4V \\ : 0.05 max. (C<3.3 \mu F) \\ : 0.1 max. (C\geq3.3 \mu F) \\ : 0.1 max. (C\geq3.3 \mu F) \\ [E4] \\ W.V.: 25V min. \\ : 0.05 max. (C<0.1 \mu F) \\ : 0.09 max. (C\geq0.1 \mu F) \\ W.V.: 16/10V: 0.125 max. \\ W.V.: 6.3V: 0.15 max. \\ W.V.: 6.3V: 0.15 max. \\ \end{bmatrix}$	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$			

Continued on the following page.



(Note1) This Specifications and Test Methods indicates typical inspection.

Continued from the preceding page.

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Please refer to individual specifications (our product specifications or the approval sheet). In case Non "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

No.	lte	em	Temperature	High Dielectric Type	-	Test Me	ethod	
9	Capacitance Temperature Characteristics	No bias	Vithin the specified tolerance (Table A-1) Within ±0.2% or ±0.05pF (Whichever is larger.) *Do not apply to 1X/25V	High Dielectric Type B1, B3: Within ±10% (-25 to +85°C) R1, R7: Within ±15% (-55 to +125°C) R6: Within ±15% (-55 to +125°C) E4: Within ±22/-56% (+10 to +85°C) F1: Within +22/-82% (-25 to +85°C) F5: Within ±22/-82% (-30 to +85°C) C8: Within ±22/-82% (-30 to +85°C) C8: Within ±10/-30% R1: Within ±10/-30% R1: Within ±15/-40% F1: Within ±30/-95% *Initial measurement for high dielectric constant type Perform a heat treatment at 150+0/-10°C for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement.	5 (5C: +25 to +125 +25 to +85°C/+20 the specified tolera capacitance chang The capacitance d between the maxin step 1, 3 and 5 by $\begin{array}{r} \underline{Step} \\ 1 \\ 2 \\ \hline 3 \\ 4 \\ \hline 5 \\ \hline (2) High DielectricThe ranges of capaReference Tempershown in the tableIn case of applyingmeasured after 1 nequilibration of eac\begin{array}{r} \underline{Step} \\ 1 \\ \hline 1 \\ -55\pm 2 \\ 2 \\ -30\pm 3 \\ \hline 3 \\ \hline 5 \\ \hline 1 \\ 1 \\ -55\pm 2 \\ 2 \\ -30\pm 3 \\ \hline 5 \\ \hline 5 \\ \hline 8 \\ \hline 6 \\ \hline 7 \\ \hline 8 \\ \hline \end{array}$	hange should b p. stage. popensating Ty oefficient is det ured in step 3 a emperature see (°C/ΔC: +20 to to +85°C) the c nace for the ten the cas Table A-1 rift is calculated num and minim the cap. value Te Refere 125±3 (fr -35±3 (fr -3	be measure ype termined us as a reference quentially +125°C: c capacitance nperature d by dividi num meass in step 3. emperature or ΔC to 7 (for F5), 11 5±3 (for other ance Temperature or ΔC to 7 (for F5), 11 5±3 (for other ance Temperature c ΔC (r), 12 5±3 (for other ance Temperature c ΔC (r), 12 5±3 (for other ance Temperature (for F5), 12 5±3 (for other ance Temperature (for F4) (for F4)	using the ence. from step 1 through other temp. coeffs.: ∞ e should be within coefficient and ng the differences sured values in the re (°C) (V/R6/R7/C8) 0 ± 3 (for E4) her TC) ∞ perature ±2 105 ± 3 (for C8) her TC) ∞ perature ±2 105 ± 3 (for C8) her TC) ∞ perature ±2 105 ± 4 (for C8) her TC) ∞ perature ±2 105 ± 3 (for C8) her TC) ∞ perature ±2 ∞
10	Adhesive of Termin	Strength		or other defect should occur.	Solder the capacit Fig. 1a using an eu parallel with the te: The soldering shou reflow method and soldering is uniforr *1N (GRM02), 2N Type GRM02 GRM03 GRM15 GRM18 GRM15 GRM18 GRM21 GRM31 GRM31 GRM32 GRM43 GRM55	utectic solder. T st jig for 10±1 s uld be done eith should be con n and free of de	Then apply sec. her with and ducted wi efects suc	n iron or using the th care so that the h as heat shock.



(Note1) This Specifications and Test Methods indicates typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). In case Non "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

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Specifications Temperature Test Method No Item **High Dielectric Type** Compensating Type No defects or abnormalities Appearance Capacitance Within the specified tolerance [B1, B3, R6, R7, C8] W.V.: 100V : 0.025 max. (C<0.068µF) : 0.05 max. (C≧0.068µF) Solder the capacitor on the test jig (glass epoxy board) in the W.V.: 50/35/25V: same manner and under the same conditions as (10). : 0.025 max.* The capacitor should be subjected to a simple harmonic motion *GRM32D R7/R6/C8 1E106: 0.035 max having a total amplitude of 1.5mm, the frequency being varied Vibration 30pF and over: Q≥1000 W.V.: 16/10V: 0.035 max. 11 uniformly between the approximate limits of 10 and 55Hz. The Resistance 30pF and below: W.V.: 6.3/4V frequency range, from 10 to 55Hz and return to 10Hz, should Q/D.F. Q≧400+20C : 0.05 max. (C<3.3µF) be traversed in approximately 1 minute. This motion should be : 0.1 max. (C≥3.3µF) applied for a period of 2 hours in each of 3 mutually C: Nominal Capacitance (pF) [E4] perpendicular directions (total of 6 hours). W.V.: 25Vmin: 0.025 max. [F1, F5] W.V.: 25V min. : 0.05 max. (C<0.1µF) : 0.09 max. (C≧0.1µF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max. Appearance No marking defects Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 2a using an eutectic solder. Then apply a force in the Capacitance Within ±5% or ±0.5pF Within ±10% direction shown in Fig. 3a for 5±1 sec. The soldering should be (Whichever is larger) Change done by the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock 50 Pressurizing speed : 1.0mm/sec. Pressurize 100 R230. Deflection 12 Fig. 2a t: 1.6mm (GRM02/03/15: t: 0.8mm) Flexure : ≦1 Type а b С GRM02 0.2 0.56 0.23 Capa nce mete GRM03 0.3 0.9 0.3 45 45 GRM15 0.4 1.5 0.5 GRM18 1.0 3.0 1.2 Fig. 3a GRM21 1.2 4.0 1.65 GRM31 2.2 5.0 2.0 GRM32 2.2 5.0 2.9 GRM43 3.5 7.0 3.7 GRM55 4.5 8.0 5.6 (in mm) Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Solderability of Preheat at 80 to 120°C for 10 to 30 seconds. 75% of the terminations are to be soldered evenly and 13 Termination After preheating, immerse in an eutectic solder solution for continuously. 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.





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lo.	Ite	em	Temperature Compensating Type	ications High Dielectric Type	-	Test	Method	I	
			The measured and observed ch specifications in the following ta						
		Appearance	No defects or abnormalities		-				
		Capacitance Change	Within ±2.5% or ±0.25pF (Whichever is larger)	B1, B3, R1, R6, R7, C8 : Within ±7.5% F1, F5, E4: Within ±20%	-				
4	Resistance to Soldering Heat	Q/D.F.	30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF)	$ \begin{array}{l} [B1, B3, R6, R7, C8] \\ W.V.: 100V \\ &: 0.025 \mbox{ max. } (C {<} 0.068 \mu F) \\ &: 0.05 \mbox{ max. } (C {\geq} 0.068 \mu F) \\ W.V.: 50/35/25V: \\ &: 0.025 \mbox{ max. } \\ &: 0.025 \mbox{ max. } \\ &: 0.025 \mbox{ max. } \\ W.V.: 16/10V: 0.035 \mbox{ max. } \\ W.V.: 16/10V: 0.035 \mbox{ max. } \\ W.V.: 16/10V: 0.035 \mbox{ max. } \\ W.V.: 6.3/4V \\ &: 0.05 \mbox{ max. } (C {<} 3.3 \mu F) \\ [E4] \\ W.V.: 25V \mbox{ min. } \\ &: 0.05 \mbox{ max. } (C {<} 0.1 \mu F) \\ &: 0.09 \mbox{ max. } (C {\geq} 0.1 \mu F) \\ W.V.: 16/10V: 0.125 \mbox{ max. } \\ W.V.: 6.3V: 0.15 \mbox{ max. } \\ \end{array} $	Immerse the c solder solution temperature fo •Initial measur Perform a hear then set at roo Perform the ini	pacitor at 120 to apacitor in an eu at 270±5°C for r 24±2 hours, the ement for high d treatment at 15 m temperature for tial measuremen GRM32/43/55 Temperai 100 to 12 170 to 20	tectic since the second secon	older or Sn-3.0 seconds. Set a sure. constant type 0°C for one hou	t room ur and e n.
		I.R.	More than 10,000M Ω or 500 Ω ·	F (Whichever is smaller)	-				
		Dielectric Strength	No defects						
			The measured and observed ch specifications in the following ta	•					
		Appearance	No defects or abnormalities						
		Capacitance Change	Within ±2.5% or ±0.25pF (Whichever is larger)	B1, B3, R1, R6, R7, C8 : Within ±7.5% F1, F5, E4: Within ±20%					
15	Temperature Cycle	Q/D.F.	30pF and over: Q≧1000 30pF and below: Q≧400+20C C: Nominal Capacitance (pF)	$ \begin{array}{l} [B1, B3, R6, R7, C8] \\ W.V.: 100V \\ &: 0.025 \mbox{ max. } (C {<} 0.068 \mu F) \\ &: 0.05 \mbox{ max. } (C {\geq} 0.068 \mu F) \\ W.V.: 50/35/25V: \\ &: 0.025 \mbox{ max. } \\ ^* GRM32D \mbox{ R7/R6/C8 1E106: } 0.035 \mbox{ max. } \\ W.V.: 16/10V: 0.035 \mbox{ max. } \\ W.V.: 16/10V: 0.035 \mbox{ max. } \\ W.V.: 6.3/4V \\ &: 0.05 \mbox{ max. } (C {<} 3.3 \mu F) \\ &: 0.1 \mbox{ max. } (C {\geq} 3.3 \mu F) \\ [E4] \\ W.V.: 25V \mbox{ min: } 0.05 \mbox{ max. } \\ [F1, F5] \end{array} $	 F) Solution in the following table. Set for 24±2 hours at room temperature, then max. Set for 24±2 hours at room temperature, then Temp. (°C) Operating Temp. +0/-3 Pointial measurement for high dielectric consta Perform a heat treatment at 150+0/-10°C for then set at room temperature for 24±2 hours. Perform the initial measurement. 		s as (10). the four heat treat re, then measure 3 Max. Operating Temp. +3/-0 30±3 c constant type 0°C for one hou	re. 4 Room Temp. 2 to 3	
				W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≧0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max.	Perform the ini	tial measuremer	π.		
		I.R.	More than 10,000M Ω or 500 Ω ·	W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≧0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max.	Perform the ini	tial measuremer	π.		



(Note1) This Specifications and Test Methods indicates typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). In case Non "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

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			Specifi	cations			
No.	Ite	em	Temperature Compensating Type	High Dielectric Type	Test Method		
			The measured and observed ch specifications in the following ta				
		Appearance	No defects or abnormalities				
		Capacitance Change	Within ±5% or ±0.5pF (Whichever is larger)	B1, B3, R1, R6, R7, C8 : Within ±12.5% F1, F5, E4: Within ±30%			
16	Humidity (Steady State)	$Q/D.F.$ $30pF$ and over: $Q \ge 350$ $10pF$ and over $30pF$ and below: $Q \ge 275+2.5C$ $10pF$ and below: $Q \ge 200+10C$ $C:$ Nominal Capacitance (pF)I.R.More than $1,000M\Omega$ or $50\Omega \cdot F$		[R6, R7, C8] W.V.: 100V : 0.05 max. (C<0.068μF) : 0.075 max. (C≥0.068μF) W.V.: 50/35/25/16/10V : 0.05 max. W.V.: 6.3/4V : 0.075 max. (C<3.3μF) : 0.125 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5] W.V.: 25V min. : 0.075 max. (C<0.1μF) : 0.125 max. (C≥0.1μF) W.V.: 16/10V: 0.15 max. W.V.: 6.3V: 0.2 max. (Whichever is smaller)	 F) Set the capacitor at 40±2°C and in 90 to 95% humidity for 500±12 hours. Remove and set for 24±2 hours at room temperature, then measure. F) 		
		1.1.	The measured and observed ch	,			
			specifications in the following table.				
		Appearance	No defects or abnormalities				
		Capacitance Change	Within ±7.5% or ±0.75pF (Whichever is larger)	B1, B3, R1, R6, R7, C8 : Within ±12.5% F1, F5, E4: Within ±30% [W.V.: 10V max.] F1, F5: Within +30/-40%			
17	Humidity Load	Q/D.F.	30pF and over: Q≧200 30pF and below: Q≧100+10C/3 C: Nominal Capacitance (pF)	$\begin{array}{l} [B1, B3, R6, R7, C8] \\ W.V.: 100V \\ : 0.05 max. (C<0.068 \mu F) \\ : 0.075 max. (C \geq 0.068 \mu F) \\ W.V.: 50/35/25/16/10V \\ : 0.05 max. \\ W.V.: 6.3/4V \\ : 0.075 max. (C \geq 3.3 \mu F) \\ : 0.125 max. (C \geq 3.3 \mu F) \\ [E4] \\ W.V.: 25V min: 0.05 max. \\ [F1, F5] \\ W.V.: 25V min. \\ : 0.075 max. (C < 0.1 \mu F) \\ : 0.125 max. (C \geq 0.1 \mu F) \\ W.V.: 16/10V: 0.15 max. \\ W.V.: 6.3V: 0.2 max. \\ \end{array}$	Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. Remove and set for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. •Initial measurement for F1, F5/10V max. Apply the rated DC voltage for 1 hour at 40±2°C. Remove and set for 24±2 hours at room temperature. Perform initial measurement.		
		I.R.	More than 500M Ω or 25 $\Omega \cdot$ F (V	Vhichever is smaller)			

(Note1) This Specifications and Test Methods indicates typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). In case Non "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

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			Specif	ications	
No.	. Ite	em	Temperature Compensating Type	High Dielectric Type	Test Method
			The measured and observed ch specifications in the following ta	, j	
		Appearance	No defects or abnormalities		
		Capacitance Change	Within ±3% or ±0.3pF (Whichever is larger)	B1, B3, R1, R6, R7, C8 : Within ±12.5% F1, F5, E4: Within ±30% [Except 10V max. and. C≧1.0μF] F1, F5: Within +30/–40% [10V max. and C≧1.0μF]	Apply 200%* of the rated voltage at the maximum operating temperature ±3°C for 1000±12 hours. Set for 24±2 hours at room temperature, then measure.
18	High Temperature Load	Q/D.F.	30pF and over: Q≥350 10pF and over 30pF and below: Q≥275+2.5C 10pF and below: Q≥200+10C C: Nominal Capacitance (pF)	$ \begin{array}{l} [B1, B3, R6, R7, C8] \\ W.V.: 100V \\ &: 0.05 \mbox{ max. } (C{<}0.068 \mu F) \\ &: 0.075 \mbox{ max. } (C{\geq}0.068 \mu F) \\ W.V.: 50/35/25/16/10V \\ &: 0.05 \mbox{ max. } \\ W.V.: 6.3/4V \\ &: 0.075 \mbox{ max. } (C{<}3.3 \mu F) \\ &: 0.125 \mbox{ max. } (C{<}3.3 \mu F) \\ &: 0.125 \mbox{ max. } (C{<}3.3 \mu F) \\ [E4] \\ W.V.: 25V \mbox{ min. } \\ &: 0.075 \mbox{ max. } (C{<}0.1 \mu F) \\ &: 0.125 \mbox{ max. } (C{<}0.1 \mu F) \\ &: 0.125 \mbox{ max. } (C{<}0.1 \mu F) \\ &: 0.125 \mbox{ max. } (C{<}0.1 \mu F) \\ &: 0.125 \mbox{ max. } (C{<}0.1 \mu F) \\ W.V.: 16/10V: 0.15 \mbox{ max. } \\ W.V.: 6.3V: 0.2 \mbox{ max. } \end{array} $	The charge/discharge current is less than 50mA. •Initial measurement for high dielectric constant type. Apply 200% of the rated voltage* at the maximum operating temperature ±3°C for one hour. Remove and set for 24±2 hours at room temperature. Perform initial measurement. *GRM155C81E 683/104, GRM21BR71H105, GRM21BR72A474, GRM21BR71C225, GRM31CR71H475, GRM32E R6/R7 YA106, GRM32D R7/R6/C8 1E106: 150% of the rated voltage.
		I.R.	More than 1,000M Ω or 50 $\Omega\cdot F$	(Whichever is smaller)	

Table A-1

(1)

			(Capacitance Cha	nge from 25°C (%	б)	
Char.	Nominal Values (ppm/°C)*1	-55		-30		-10	
		Max.	Min.	Max.	Min.	Max.	Min.
5C	0± 30	0.58	-0.24	0.40	-0.17	0.25	-0.11
6C	0± 60	0.87	-0.48	0.59	-0.33	0.38	-0.21
6P	-150± 60	2.33	0.72	1.61	0.50	1.02	0.32
6R	-220± 60	3.02	1.28	2.08	0.88	1.32	0.56
6S	-330± 60	4.09	2.16	2.81	1.49	1.79	0.95
6T	-470± 60	5.46	3.28	3.75	2.26	2.39	1.44
7U	-750±120	8.78	5.04	6.04	3.47	3.84	2.21
1X	+350 to -1000	-	_	_	-	-	_

*1: Nominal values denote the temperature coefficient within a range of 25°C to 125°C (for ΔC)/85°C (for other TC).

(2)

			(Capacitance Char	nge from 20°C (%	5)	
Char.	Nominal Values (ppm/°C)*2		55	-2	25	-10	
		Max.	Min.	Max.	Min.	Max.	Min.
2C	0± 60	0.82	-0.45	0.49	-0.27	0.33	-0.18
3C	0±120	1.37	-0.90	0.82	-0.54	0.55	-0.36
4C	0±250	2.56	-1.88	1.54	-1.13	1.02	-0.75
2P	-150± 60	-	-	1.32	0.41	0.88	0.27
3P	-150±120	-	-	1.65	0.14	1.10	0.09
4P	-150±250	-	-	2.36	-0.45	1.57	-0.30
2R	-220± 60	-	-	1.70	0.72	1.13	0.48
3R	-220±120	-	-	2.03	0.45	1.35	0.30
4R	-220±250	-	-	2.74	-0.14	1.83	-0.09
2S	-330± 60	-	-	2.30	1.22	1.54	0.81
3S	-330±120	-	-	2.63	0.95	1.76	0.63
4S	-330±250	-	-	3.35	0.36	2.23	0.24
2T	-470± 60	-	-	3.07	1.85	2.05	1.23
3T	-470±120	-	-	3.40	1.58	2.27	1.05
4T	-470±250	-	-	4.12	0.99	2.74	0.66
3U	-750±120	-	-	4.94	2.84	3.29	1.89
4U	-750±250	-	-	5.65	2.25	3.77	1.50

*2: Nominal values denote the temperature coefficient within a range of 20°C to 125°C (for ∆C)/85°C (for other TC).

(Note1) This Specifications and Test Methods indicates typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). In case Non "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

No.	Item	า	Specifications	Test Method		
1	Operating Temperatur Range	re	B1, B3, F1: -25 to +85°C R1, R7, C7, D7, E7: -55 to +125°C C6, R6: -55 to +85°C F5: -30 to +85°C C8, D8: -55 to +105°C,	Reference temperature: 25°C (B1, B3, R1, F1: 20°C)		
2	Rated Volta	age	See the previous pages.	The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{p.p} or V ^{O.P} , whichever is larger, should be maintained within the rated voltage range.		
3	Appearance	е	No defects or abnormalities	Visual inspection		
4	Dimensions	S	Within the specified dimensions	Using calipers (GRM02 size is based on Microscope)		
5	5 Dielectric Strength No defects or abnormalities		No defects or abnormalities	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.		
6	Insulation Resistance		More than $50\Omega \cdot F$	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at reference temperature and 75%RH max. and within 1 minutes of charging, provided the charge/discharge current is less than 50mA.		
7	Capacitanc	ce	Within the specified tolerance *Table 1 GRM155 B3/R6 1A 124 to 105 GRM185 B3/R6 1C/1A 105 GRM185 C8/D7 1A 105 GRM185 C8/D7 1A 105 GRM188 B3/R6 1C/1A 225 GRM188 B3/R6 1A 335 GRM219 B3/R6 1C/1A 475, 106 GRM219 C8 1A 475 GRM21B B3/R6 1C/1A 106 GRM21B R7/C8 1A 106 GRM319 B3/R6 1C/1A 106	The capacitance/D.F. should be measured at reference temperature at the measuring frequency and voltage shown in the table. 1000000000000000000000000000000000000		
8	Dissipation (D.F.)	Factor	B1, B3, R1, R6*, R7*, C7, C8, E7, D7: 0.1 max. C6: 0.125 max. D8: 0.15 max. F1, F5: 0.2 max. *GRM31CR71E106: 0.125 max. GRM31CR6 0J/0G 107: 0.15 max.	 GRM188C80E106: Perform a heat treatment at 150+0/-10°C for one hour and then set for 24±2 hours at room temperature. 		
	7	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		The capacitance change should be measured after 5 min. at each specified temp. stage. The ranges of capacitance change compared with the reference temperature value over the temperature ranges shown in the table should be within the specified ranges.* In case of applying voltage, the capacitance change should be measured after 1 more min. with applying voltage in equilibration of each temp. stage. *GRM32DR60J226, GRM43 B1/B3/R6 0J/1A 336/476 only: 1.0±0.2Vrms Step Temperature (°C)		
9	t	50% of the Rated Voltage	B1: Within +10/–30% R1: Within +15/–40% F1: Within +30/–95%	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		



(Note1) This Specifications and Test Methods indicates typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). In case Non "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

1

No.	Ite		Specifications		Test Me			
			No removal of the terminations or other defects should occur.	Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 1a using an eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. *1N: GRM02, 2N: GRM03, 5N: GRM15/GRM18				
10	Adhesive of Termin	-	Solder resist Baked electrode or copper foil Fig. 1a	Type GRM02 GRM15 GRM15 GRM21 GRM31 GRM32 GRM43 GRM55	a 0.2 0.3 0.4 1.0 1.2 2.2 2.2 2.2 3.5 4.5	b 0.56 0.9 1.5 3.0 4.0 5.0 5.0 7.0 8.0	c 0.23 0.5 1.2 1.65 2.0 2.9 3.7 5.6	
		Appearance	No defects or abnormalities	Solder the capacito				
		Capacitance	Within the specified tolerance	same manner and			. ,	
11	Vibration	D.F.	B1, B3, R1, R6*, R7*, C7, C8, E7, D7: 0.1 max. C6: 0.125 max. D8: 0.15 max. F1, F5: 0.2 max. *GRM31CR71E106: 0.125 max. GRM31CR6 0J/0G 107: 0.15 max.	The capacitor should be subjected to a simple harmonic moti having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. Th frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should b applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).				
		Appearance	No marking defects	Solder the capacito	or on the test ji	g (glass epoxy	board) shown	
		Capacitance Change	Within ±10%	in Fig. 2a using an direction shown in done by the reflow so that the solderin shock.	Fig. 3a for 5±1 method and sl ig is uniform ar	sec. The sold nould be condi- nd free of defe	ering should be ucted with care	
12	Deflection	า	R230_C		Fig. 2		t: 1.6mm	
			Flexure : ≦1		-	(GRM0	2/03/15: t: 0.8mm)	
			Capacitance meter	Туре	а	b	С	
				GRM02 GRM03	0.2	0.56	0.23	
				GRM15	0.3	1.5	0.5	
			Fig.3a	GRM18	1.0	3.0	1.2	
				GRM21	1.2	4.0	1.65	
				GRM31	2.2	5.0	2.0	
				GRM32	2.2	5.0	2.9	
				GRM43	3.5	7.0	3.7	
				GRM55	4.5	8.0	5.6 (in mm)	
13	Solderabi Terminati		75% of the terminations is to be soldered evenly and continuously.	(in mm Immerse the capacitor in a solution of ethanol (JIS-K-8101) a rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in an eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.			JIS-K-8101) and ion).	



Continued from the preceding page.

(Note1) This Specifications and Test Methods indicates typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). In case Non "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

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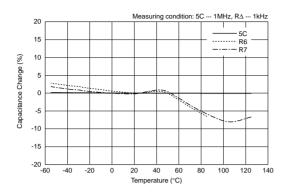
No.	Ite	em	Specifications		Test	t Method	I	
		Appearance Capacitance	No defects or abnormalities B1, B3, R1, R6*, R7, C6, C7, C8*, E7, D7, D8: Within ±7.5% F1, F5: Within ±20%	Preheat the cap Immerse the ca solder solution	pacitor in an e	eutectic s	older* or Sn-3.	
		Change	*GRM188R6 0J/0G 106, GRM188C80E106, GRM219R60G226: within ±12.5% GRM155R60G475: Within ±15%	temperature for *Do not apply to	24±2 hours, t			it room
14	Resistance to Soldering Heat	dering D.F. C6: 0.125 max. D8: 0.15 max.		 Initial measurement for high dielectric constant type Perform a heat treatment at 150+0/–10°C for one hour and then set at room temperature for 24±2 hours. Perform the initial measurement. *Preheating for GRM32/43/55 				
		I.R.	More than $50\Omega \cdot F$	Step	Temper		Tim	
		Dielectric Strength	No defects	<u> </u>	100 to 1 170 to 2		1 m 1 m	
		Appearance	No defects or abnormalities	Fix the capacito	or to the suppo	orting jig i	n the same ma	anner and
		Capacitance Change B1, B3, R1, R6, R7, C6, C7, C8, D7, D8: Within ±7.5% F1, F5: Within ±30% F1, F5: Within ±20%		under the same Perform the five shown in the fo Set for 24±2 ho	e conditions as e cycles accord llowing table.	(10). ding to th	e four heat tre	atments
			B1, B3, R1, R6*, R7*, C7, C8, E7, D7: 0.1 max.	Step	1	2	3	4
15	Temperature Sudden	D.F.	C6: 0.125 max. D8: 0.15 max. F1, F5: 0.2 max.	Temp. (°C)	Min. Operating Temp. +0/–3	Room Temp.	Max. Operating Temp. +3/–0	Room Temp.
	Change		*GRM31CR71E106: 0.125 max. GRM31CR6 0J/0G 107: 0.15 max.	Time (min.)	30±3	2 to 3	30±3	2 to 3
		I.R.	More than $50\Omega \cdot F$	•Initial measure				
		Dielectric Strength	No defects	then set at roor Perform the init GRM188R60J1	Perform a heat treatment at 150+0/–10°C for one hour at then set at room temperature for 24±2 hours. Perform the initial measurement. GRM188R60J106 only Measurement after test Perform a treatment and then let sit for 24±2 hours at room temperat then measure.			orm a heat
		Appearance	No defects or abnormalities	Apply the rated	voltage at 40	±2°C and	90 to 95% hu	midity for
	High	Capacitance Change	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: Within ±12.5% F1, F5: Within ±30%	500±12 hours. •Initial measure	ment	-		
16	Temperature High Humidity	D.F.	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: 0.2 max. F1, F5: 0.4 max.	Perform a heat then let sit for 2 initial measurer	4±2 hours at r			
	(Steady)	I.R.	More than 12.5Ω · F	•Measurement Perform a heat then let sit for 2	treatment at 1			
		Appearance	No defects or abnormalities	Apply 150% of	the rated volte	an for 10	00+12 hours s	t the
		Capacitance Change	B1, B3, R1, R6*, R7, C6, C7, C8*, E7, D7, D8: Within ±12.5% F1, F5: Within ±30% *GRM188C80E106, GRM219R60G226: within ±15%	Apply 150% of maximum oper room temperation The charge/dise	ating temperat ure, then meas	ure ±3°C sure.	. Let sit for 24	
17	Durability	D.F.	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: 0.2 max. F1, F5: 0.4 max.	•Initial measure Perform a heat then let sit for 2	treatment at 1			
		I.R.	More than $25\Omega \cdot F$	initial measurer •Measurement Perform a heat then let sit for 2	after test treatment at 1			



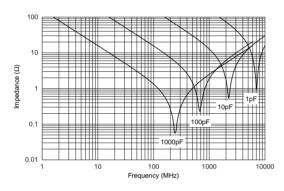
GRM Series Data

1

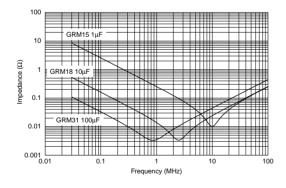
■ Capacitance - Temperature Characteristics



■ Impedance - Frequency Characteristics 5C: GRM15

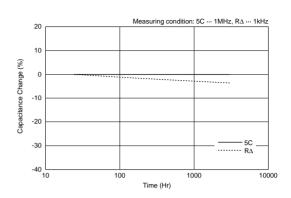




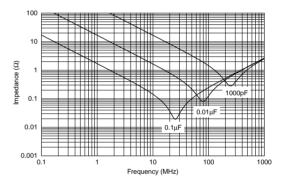


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■ Capacitance Change - Aging



R∆: GRM15



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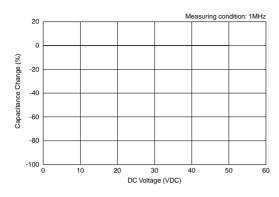
GRM Series Data

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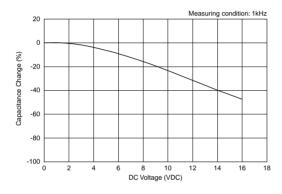
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■ Capacitance - DC Voltage Characteristics

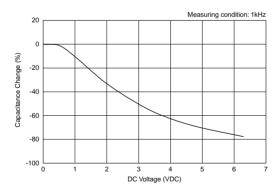
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High Dielectric Constant Type: GRM155R71C104KA88



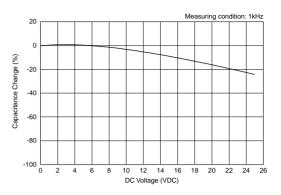
High Dielectric Constant Type: GRM188R60J106ME47



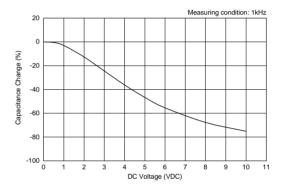
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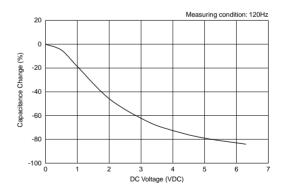




High Dielectric Constant Type: GRM155R61A105KE15



High Dielectric Constant Type: GRM31CR60J107ME39



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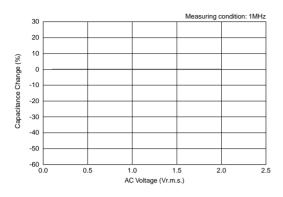
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GRM Series Data

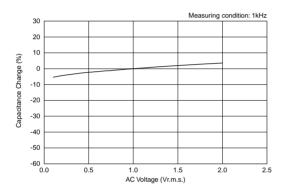
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■ Capacitance - AC Voltage Characteristics

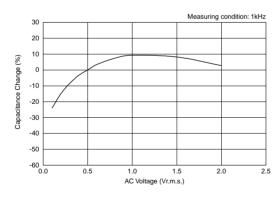
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High Dielectric Constant Type: GRM155R71C104KA88



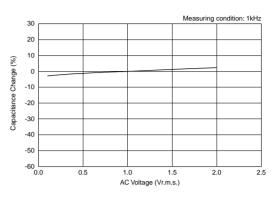
High Dielectric Constant Type: GRM188R60J106ME47



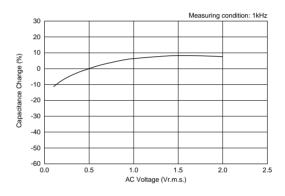
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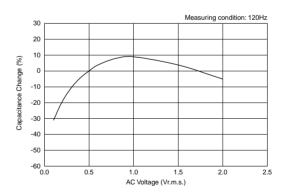
High Dielectric Constant Type: GRM155R71E103KA01



High Dielectric Constant Type: GRM155R61A105KE15



High Dielectric Constant Type: GRM31CR60J107ME39





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Chip Monolithic Ceramic Capacitors



Capacitor Array GNM Series

Features

- 1. High density mounting due to mounting space saving
- 2. Mounting cost saving

Applications

General electronic equipment

189 . 17 .	en en					
Part Number	Dimensions (mm)					
Part Number	L	W	Т	Р		
GNM0M2	0.9 ±0.05	0.6 ±0.05	0.45 ±0.05	0.45 ±0.05		
			0.5 +0.05/-0.10			
GNM1M2	1.37 ±0.15	1.0 ±0.15	0.6 ±0.1	0.64 ±0.05		
			0.8 +0/-0.15			
GNM212	2.0 +0.15	1.25 +0.15	0.6 ±0.1	1.0 ±0.1		
GINIVIZIZ	2.0 ±0.15	1.25 ±0.15	0.85 ±0.1	1.0 ±0.1		

	113 113 113 113							
Part Number		Dimensions (mm)						
Part Number	L	W	Т	Р				
			0.5 +0.05/-0.1					
GNM214	2.0 ±0.15	1.25 ±0.15	0.6 ±0.1	0.5 ±0.05				
			0.85 ±0.1					
			0.8 ±0.1					
GNM314	3.2 ±0.15	1.6 ±0.15	0.85 ±0.1	0.8 ±0.1				
GINIVIS14	3.2 ±0.15	1.0 ±0.15	1.0 ±0.1	0.6 ±0.1				

Capacitance Table

Temperature Compensating Type C0G(5C) Characteristics

0.6	ex.0.6:	Γ Dimensi	ion [mm]		
	1.37x1.0 (1M) <0504>	2.0x1.25 (21) <0805>	(3	(1.6 1) 06>	
Number of	Elements	2(2)		4(4)	
Rated Capacitance	/oltage [Vdc]	50 (1H)	50 (1H)	100 (2A)	50 (1H)
10p	F(100)	0.6	0.6	0.8	0.8
15p	F(150)	0.6	0.6	0.8	0.8
22p	F(220)	0.6	0.6	0.8	0.8
33p	F(330)	0.6	0.6	0.8	0.8
47p	F(470)	0.6	0.6	0.8	0.8
68p	F(680)	0.6	0.6	0.8	0.8
100p	F(101)	0.6	0.6	0.8	0.8
150p	F(151)	0.6	0.6	0.8	0.8
220p	F(221)	0.6	0.6		0.8
330p	F(331)				0.8

The part number code is shown in () and Unit is shown in [].

< >: EIA [inch] Code

Continued on the following page.



 1.15 ± 0.1



Capacitance Table

Continued from the preceding page.

High Dielectric Constant Type X7R(R7)/X7S(C7) Characteristics

0.6 ex.0.6: T Dimension [mm]

LxW [mm]		1.37x1.0 (1M) <0504>					2.0x1.25 (21) <0805>		3.2x1.6 (31) <1206>			
Number of Elements			2(2)						4(4)			
Rated Voltage [Vdc]	50 (1H)	25 (1E)	16 (1C)		0 A)	50 (1H)	25 (1E)	16 (1C)	50 (1H)	25 (1E)	16 (1C)	6.3 (0J)
Capacitance	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7S (C7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)
470pF(471)						0.6						
1000pF(102)	0.6					0.6						
2200pF(222)		0.6				 	0.6					
4700pF(472)		0.6				 	0.6		 			
10000pF(103)		0.6				 	0.6					
22000pF(223)			0.6	0.6		 		0.85				
47000pF(473)			0.6	0.6				0.85	0.85		1.0	
0.10μF(104)			0.6		0.6			0.85	0.85	0.85	1.0	
1.0μF(105)						·						1.15

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

High Dielectric Constant Type X5R(R6) Characteristics

0.6 ex.0.6: T Dimension [mm]

0.6 ex.0.6.	Billiono	a[]			-											
LxW [mm]		(0	k0.6 M) 02>				1.37x1.((1M) <0504>				2.0x1.2 (21) <0805>		(2	1.25 1) 05>	(3	x1.6 8 1) 206>
Number of Elements						2((2)							4((4)	
Rated Voltage [Vdc]	16 (1C)	10 (1A)	6.3 (0J)	4 (0G)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	16 (1C)	10 (1A)	6.3 (0J)	10 (1A)	6.3 (0J)	16 (1C)	10 (1A)
Capacitance	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)
1000pF(102)					0.6										1	
2200pF(222)						0.6									 	
4700pF(472)						0.6										
10000pF(103)	0.45	0.45	0.45		 	0.6				 			 		 	
22000pF(223)	0.45	0.45	0.45		1 1 1		0.6	0.6		 			 		 	
47000pF(473)	0.45	0.45	0.45				0.6	0.6							 	
0.10μF(104)	0.45	0.45	0.45		 			0.6							 ! !	
0.22μF(224)							0.8								, , ,	
0.47µF(474)					 			-		0.85					i i i	
1.0μF(105)				0.45			0.8	0.8	0.8	0.85	0.85		0.85	0.85	0.85	0.85
2.2μF(225)					ן ו ו			0.8	0.8		0.85	0.85		0.85		

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

High Dielectric Constant Type X7R(R7) Characteristics Low Profile

0.5 ex.0.5:	T Dimens	
LxW [mm]	(1M)	2.0x1.25 (21) <0805>
Number of Elements	2(2)	4(4)
Rated Voltage		16 (1C)
Capacitance	X7R (R7)	X7R (R7)
0.10μF(104)	0.5	0.5

64

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

High Dielectric Constant Type X5R(R6) Characteristics Low Profile

0.5 ex.0.5): I	Dimensi	ion [mm]	
LxV [mm		1.37 (1 <05	M)	2.0x1.25 (21) <0805>
Number of Elemen	ts	2(2)	4(4)
Rated Voltag	· 1	16 (1C)	10 (1A)	16 (1C)
Capacitance	с	X5R (R6)	X5R (R6)	X5R (R6)
1.0μF(105)	0.5	0.5	0.5

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code



Temperature Compensating Type C0G(5C) Characteristics

LxW [mm]		1.37x1.0(1M)<0504>	2.0x1.25(21)<0805> 3.2x1.6(31)<1206>				
Rated Volt. [Vdc	:]	50(1H)	50(1H) 100(2A) 50(1H)				
Capacitance	Tolerance		Part Number				
10pF(100)	±10%(K)	GNM1M25C1H100KD01D	GNM2145C1H100KD01D	GNM3145C2A100KD01D	GNM3145C1H100KD01D		
15pF(150)	±10%(K)	GNM1M25C1H150KD01D	GNM2145C1H150KD01D	GNM3145C2A150KD01D	GNM3145C1H150KD01D		
22pF(220)	±10%(K)	GNM1M25C1H220KD01D	GNM2145C1H220KD01D	GNM3145C2A220KD01D	GNM3145C1H220KD01D		
33pF(330)	±10%(K)	GNM1M25C1H330KD01D	GNM2145C1H330KD01D	GNM3145C2A330KD01D	GNM3145C1H330KD01D		
47pF(470)	±10%(K)	GNM1M25C1H470KD01D	GNM2145C1H470KD01D	GNM3145C2A470KD01D	GNM3145C1H470KD01D		
68pF(680)	±10%(K)	GNM1M25C1H680KD01D	GNM2145C1H680KD01D	GNM3145C2A680KD01D	GNM3145C1H680KD01D		
100pF(101)	±10%(K)	GNM1M25C1H101KD01D	GNM2145C1H101KD01D	GNM3145C2A101KD01D	GNM3145C1H101KD01D		
150pF(151)	±10%(K)	GNM1M25C1H151KD01D	GNM2145C1H151KD01D	GNM3145C2A151KD01D	GNM3145C1H151KD01D		
220pF(221)	±10%(K)	GNM1M25C1H221KD01D	GNM2145C1H221KD01D		GNM3145C1H221KD01D		
330pF(331)	±10%(K)				GNM3145C1H331KD01D		

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

High Dielectric Constant Type X7R(R7)/X7S(C7) Characteristics

LxW [mm]			1.37x1.0(1M)<0504>					
Number of Elem	ents		2(2)					
Rated Volt. [Vdc]	50(1H)	50(1H) 25(1E) 16(1C) 10(1A)					
Capacitance	Tolerance		Part Number					
1000pF(102)	±20%(M)	GNM1M2R71H102MA01D						
2200pF(222)	±20%(M)		GNM1M2R71E222MA01D					
4700pF(472)	±20%(M)		GNM1M2R71E472MA01D					
10000pF(103)	±20%(M)		GNM1M2R71E103MA01D					
22000pF(223)	±20%(M)			GNM1M2R71C223MA01D	GNM1M2R71A223MA01D			
47000pF(473)	±20%(M)			GNM1M2R71C473MA01D	GNM1M2R71A473MA01D			
0.10μF(104)	±20%(M)			GNM1M2R71C104MA01D	GNM1M2C71A104MA01D			

LxW [mm]			2.0x1.25(21)<0805>	
Number of Elem	ents			
Rated Volt. [Vdc]	50(1H)	16(1C)	
Capacitance	Tolerance			
470pF(471)	±20%(M)	GNM214R71H471MA01D		
1000pF(102)	±20%(M)	GNM214R71H102MA01D		
2200pF(222)	±20%(M)		GNM214R71E222MA01D	
4700pF(472)	±20%(M)		GNM214R71E472MA01D	
10000pF(103)	±20%(M)		GNM214R71E103MA01D	
22000pF(223)	±20%(M)			GNM214R71C223MA01D
47000pF(473)	±20%(M)			GNM214R71C473MA01D
0.10μF(104)	±20%(M)			GNM214R71C104MA01D

LxW [mm]		3.2x1.6 (31)<1206>						
Number of Elements		4(4)						
Rated Volt. [Vdc]	50(1H)	50(1H) 25(1E) 16(1C) 6.3(0J)					
Capacitance	Tolerance		Part Number					
47000pF(473)	±20%(M)	GNM314R71H473MA11D		GNM314R71C473MA01L				
0.10μF(104)	±20%(M)	GNM314R71H104MA11D	GNM314R71E104MA11D	GNM314R71C104MA01L				
1.0μF(105)	±20%(M)				GNM314R70J105MA01L			

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to GNM series Specifications and Test Method(2).



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)
 Number of Elements
 Rated Voltage
 Capacitance
 Individual Specification Code
 Packaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



LxW [mm]			0.9x0.6(OM)<0302>					
Number of Elements			2(2)					
Rated Volt. [Vdc]	16(1C)	16(1C) 10(1A) 6.3(0 J) 4(0G)					
Capacitance	Tolerance		Part Number					
10000pF(103)	±20%(M)	GNM0M2R61C103ME18D*	GNM0M2R61A103ME17D*	GNM0M2R60J103ME17D*				
22000pF(223)	±20%(M)	GNM0M2R61C223ME18D*	GNM0M2R61A223ME17D*	GNM0M2R60J223ME17D*				
47000pF(473)	±20%(M)	GNM0M2R61C473ME18D*	GNM0M2R61A473ME17D*	GNM0M2R60J473ME17D*				
0.10μF(104)	±20%(M)	GNM0M2R61C104ME18D*	GNM0M2R61A104ME17D*	GNM0M2R60J104ME17D*				
1.0μF(105)	±20%(M)				GNM0M2R60G105ME17D*			

LxW [mm]			1.37x1.0(1M)<0504>	
Number of Elem	ents			
Rated Volt. [Vdc]	50(1H)	16(1C)	
Capacitance	Tolerance			
1000pF(102)	±20%(M)	GNM1M2R61H102MA01D		
2200pF(222)	±20%(M)		GNM1M2R61E222MA01D	
4700pF(472)	±20%(M)		GNM1M2R61E472MA01D	
10000pF(103)	±20%(M)		GNM1M2R61E103MA01D	
22000pF(223)	±20%(M)			GNM1M2R61C223MA01D
47000pF(473)	±20%(M)			GNM1M2R61C473MA01D
0.22µF(224)	±20%(M)			GNM1M2R61C224ME18D*
1.0μF(105)	±20%(M)			GNM1M2R61C105ME18D*

LxW [mm]		1.37x1.0(1M)<0504>	
Number of Elements		2(2)	
Rated Volt. [Vdc]		10(1A)	6.3(0J)
Capacitance Tolerance		Part Number	
22000pF(223)	±20%(M)	GNM1M2R61A223MA01D	
47000pF(473)	±20%(M)	GNM1M2R61A473MA01D	
0.10μF(104)	±20%(M)	GNM1M2R61A104MA01D	
1.0μF(105)	±20%(M)	GNM1M2R61A105ME17D*	GNM1M2R60J105ME12D*
2.2µF(225)	±20%(M)	GNM1M2R61A225ME18D*	GNM1M2R60J225ME18D*

LxW [mm]		2.0x1.25(21)<0805>			
Number of Elements		2(2)			
Rated Volt. [Vdc]		16(1C)	10(1A)	6.3(0J)	
Capacitance Tolerance		Part Number			
0.47μF(474)	±20%(M)	GNM212R61C474MA16D			
1.0μF(105)	±20%(M)	GNM212R61C105MA16D	GNM212R61A105MA13D		
2.2µF(225)	±20%(M)		GNM212R61A225ME16D*	GNM212R60J225ME16D*	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to GNM series Specifications and Test Method(2).



Packaging Code in Part Number is a code shows STD Tray.

Product ID
Series
Temperature Characteristics
Capacitance Tolerance

SDimension (LxW)Number of ElementsRated VoltageCapacitanceIndividual Specification CodePackaging



LxW [mm]		2.0x1.25(21)<0805>	
Number of Elements		4(4)	
Rated Volt. [Vdc]		10(1A)	6.3(0J)
Capacitance Tolerance		Part Number	
1.0μF(105)	±20%(M)	GNM214R61A105ME17D*	GNM214R60J105ME17D*
2.2µF(225) ±20%(M)			GNM214R60J225ME18D*
LxW [mm]		3.2x1.6(3	1)<1206>

LXVV [mm]		3.2X1.6(31)<1206>		
Number of Elements		4(4)		
Rated Volt. [Vdc]		16(1C)	10(1A)	
Capacitance Tolerance		Part N	umber	
1.0μF(105) ±20%(M)		GNM314R61C105MA15D	GNM314R61A105MA13D	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to GNM series Specifications and Test Method(2).

High Dielectric Constant Type X7R(R7) Characteristics Low Profile

LxW [mm]		1.37x1.0(1M)<0504>	2.0x1.25(21)<0805>
Number of Elements		2(2)	4(4)
Rated Volt. [Vdc]		16(1C)	16(1C)
Capacitance Tolerance		Part N	umber
0.10μF(104) ±20%(M)		GNM1M2R71C104MAA1D	GNM214R71C104MAA1D

High Dielectric Constant Type X5R(R6) Characteristics Low Profile

LxW [mm]		1.37x1.0(1M)<0504>	
Number of Elements		2(2)	
Rated Volt. [Vdc]		16(1C)	10(1A)
Capacitance Tolerance		Part N	umber
1.0μF(105) ±20%(M)		GNM1M2R61C105MEA2D*	GNM1M2R61A105MEA4D*

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to GNM series Specifications and Test Method(2).



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GNM Series Specifications and Test Methods (1)

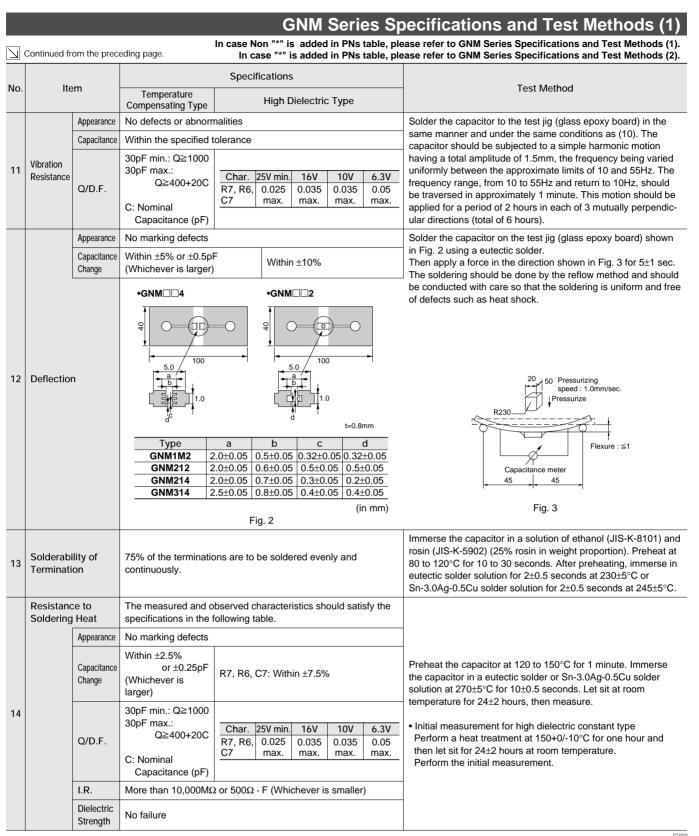
In case Non "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).

2

				Specifications		
No.	lte	em	Temperature Compensating Type	High Dielectric Type	Test Method	
1	Operating Temperat Range		5C: -55 to +125°C	R7, C7: -55 to +125°C R6: -55 to +85°C		
2	Rated Vo	ltage	See the previous pag	ges.	The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^C whichever is larger, should be maintained within the rated voltage range.	
3	Appearar	ice	No defects or abnorn	nalities	Visual inspection	
4	Dimensio	ns	Within the specified of	dimensions	Using calipers	
5			No defects or abnorn	nalities	No failure should be observed when 300% of the rated voltage (5C) or 250% of the rated voltage (R7) is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.	
6	Insulation Resistance More than 10,000MΩ or 500Ω · F (Whichever is smaller)			The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 2 minutes of charging.		
7	Capacita	nce	Within the specified t	olerance	The capacitance/Q/D.F. should be measured at 25°C at the	
			30pF min.: Q≧1000		frequency and voltage shown in the table.	
	Q/		30pF max.: Q≧400+20C	Char. 25V min. 16V 10V 6.3		
8	Dissipation Factor (D.F.)		C: Nominal Capacitance (pF)	R7, R6, 0.025 0.035 0.035 0.05 C7 max. max. max. max. max		
9	Capacitance Temperature Characteristics	Capacitance Change Temperature Coefficient Capacitance Drift	Within the specified tolerance (Table A) Within the specified tolerance (Table A) Within ±0.2% or ±0.05pF (Whichever is larger.)	Char. Temp. Range Reference Temp. Change Change R7 -55°C to +125°C 25°C Within ±15% C7 -55°C to +125°C 25°C Within ±22%	 (1) Temperature Compensating Type The temperature coefficient is determined using the capacitance tance measured in step 3 as a reference. When cycling the temperature sequentially from step1 through 5, the capacitance should be within the specified tolerance for the temperature coefficient and capacitance change as Table A. The capacitance drift is calculated by dividing the differences between the maximum and minimum measured values in the steps 1, 3 and 5 by the cap. value in step 3. Step Temperature (°C) 1 25±2 2 -55±3 (for 5C/R7/C7), -30±3 (for F5) 3 25±2 4 125±3 (for 5C/R7/C7), 85±3 (for F5) 5 25±2 (2) High Dielectric Constant Type The ranges of capacitance change compared with the above 25°C value over the temperature ranges shown in the table should be within the specified ranges. Initial measurement for high dielectric constant type. Perform a heat treatment at 150+0/-10°C for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement.	
10	Adhesive of Termin	Strength ation	GNM		Solder the capacitor to the test jig (glass epoxy board) shown Fig.1 using a eutectic solder. Then apply 5N force in parallel wit the test jig for 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. Type a b c d GNM1M2 0.5 1.6 0.32 0.32 GNM212 0.6 1.8 0.5 0.5 GNM214 0.6 2.0 0.25 0.25 GNM314 0.8 2.5 0.4 0.4 (in mm) Fig. 1	



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GNM Series Specifications and Test Methods (1)

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\geq	Continued fr	om the prece			ease refer to GNM Series Specifications and Test Methods (1). ease refer to GNM Series Specifications and Test Methods (2).	
No	b. Item		Specifications		Test Method	
No.	ne		Temperature Compensating Type	High Dielectric Type	Test Method	
	Temperat Cycle	ure	The measured and or specifications in the	bserved characteristics should satisfy the following table.	Fix the capacitor to the supporting jig in the same manner and	
		Appearance	No marking defects Within ±2.5%		under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24 ± 2 hours (temperature compensating type)	
		Capacitance Change	or ±0.25pF (Whichever is larger)	R7, R6, C7: Within ±7.5%	or 48±4 hours (high dielectric constant type) at room temperature, then measure.	
15		Q/D.F.	30pF min.: Q≥1000 30pF max.: Q≥400+20C C:Nominal Capacitance (pF)	Char. 25V min. 16V 10V 6.3V R7, R6, 0.025 0.035 0.035 0.05 C7 max. max. max. max.	Step 1 2 3 4 Temp. (°C) Min. Operating Temp.+0/-3 Room Temp. Temp. Max. Operating Temp.+3/-0 Room Temp. Time (min.) 30±3 2 to 3 30±3 2 to 3 • Initial measurement for high dielectric constant type	
		I.R.		Ω or 500Ω · F (Whichever is smaller)	Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature.	
		Dielectric Strength	No failure		Perform the initial measurement.	
	Humidity State	Steady	The measured and o specifications in the	bserved characteristics should satisfy the following table.		
16		Appearance	No marking defects			
		Capacitance Change	Within ±5% or ±0.5pF (Whichever is larger)	R7, R6, C7: Within ±12.5%	Sit the capacitor at $40\pm2^{\circ}$ C and 90 to 95% humidity for 500±12	
		Q/D.F.	30pF and over: $Q \ge 350$ 10pF and over, 30pF and below: $Q \ge 275+5C/2$ 10pF and below: $Q \ge 200+10C$ C: Nominal Capacitance (pF)	Char. 25V min. 16V 10V/6.3V R7, R6, 0.05 0.05 0.05 C7 max. max. max.	hours. Remove and let sit for 24±2 hours at room temperature, then measure.	
		I.R.	More than 1,000M Ω	or $50\Omega \cdot F$ (Whichever is smaller)		
	Humidity	midity Load The measured and observed characteristics should satisfy the specifications in the following table.				
		Appearance	No marking defects			
		Capacitance Change	Within ±7.5% or ±0.75pF (Whichever is larger)	R7, R6, C7: Within ±12.5%	Apply the rated voltage at $40\pm2^{\circ}$ C and 90 to 95% humidity for 500±12 hours.	
17		Q/D.F.	30pF and over: Q≧200 30pF and below: Q≧100+10C/3 C: Nominal Capacitance (pF)	Char. 25V min. 16V 10V/6.3V R7, R6, 0.05 0.05 0.05 C7 max. max. max.	Remove and let sit for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.	
		I.R.	More than 500M Ω or	$^{2}25\Omega \cdot F$ (Whichever is smaller)		



GNM Series Specifications and Test Methods (1)

In case Non "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).

N -				Specifications			TestMaked
No.	Ite	Item Temperature Compensating Type High Dielectric Type				Test Method	
	High Tem Load	High Temperature The measured and observed characteristics should satisfy t Load specifications in the following table.		ld satisfy the			
		Appearance	No marking defects				
		Capacitance Change	e Within ±3% or ±0.3pF (Whichever is larger) R7, R6, C7: Within ±12.5%			Apply 200% of the rated voltage for 1000±12 hours at the maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.	
18		Q/D.F.	30pF and over: Q≥350 10pF and over, 30pF and below: Q≥275+5C/2 10pF and below: Q≥200+10C C: Nominal Capacitance (pF)	Char. 25V min. R7, R6, 0.04 C7 max.	R6, 0.04 0.05 0.05		 Initial measurement for high dielectric constant type. Apply 200% of the rated DC voltage for one hour at the maximum operating temperature ±3°C. Remove and let sit for 24±2 hours at room temperature. Perform initial measurement.
		I.R.	More than 1,000M Ω	or 50 $\Omega \cdot F$ (Whichever is smaller)			

Table A

Continued from the preceding page.

Nominal Values	Capacitance Change from 25°C (%)								
(ppm/°C) Note 1	-5	5°C	-30	0°C	–10°C				
	Max.	Min.	Max.	Min.	Max.	Min.			
0±30	0.58	-0.24	0.40	-0.17	0.25	-0.11			
		(ppm/°C) Note 1 Max.	(ppm/°C) Note 1Max. Min.	(ppm/°C) Note 1 Max. Min. Max.	(ppm/°C) Note 1 Max. Min. Max. Min.	(ppm/°C) Note 1 Max. Min. Max. Min. Max.			

Note 1: Nominal values denote the temperature coefficient within a range of 25 to 125°C.



GNM Series Specifications and Test Methods (2)

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-

No.	Item	Specifications	Test Method				
NO.		Specifications					
1	Operating Temperature Range	R6: -55°C to +85°C					
2	Rated Voltage	See the previous pages.	The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{p.p} or V ^{0.f} whichever is larger, should be maintained within the rated voltage range.				
3	Appearance	No defects or abnormalities	Visual inspection				
4	Dimensions	Within the specified dimension	Using calipers				
5	Dielectric Strength	No defects or abnormalities	No failure should be observed when 250% of the rated voltag is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.				
6	Insulation Resistance	50Ω · F min.	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 1 minute of charging.				
7	Capacitance	Within the specified tolerance	The capacitance/D.F. should be measured at 25°C at the				
8	Dissipation Factor (D.F.)	0.1 max.*3 Table 3 GNM0M2 R6 103/223/473/104 GNM1M2 R6 0J 105/225 GNM1M2 R6 1A 225 GNM212 R6 0J 225 GNM214 R6 0J 225 *3 However 0.125 max. about Table 3 items.	$\begin{tabular}{ c c c c c c } \hline frequency and voltage shown in the table. \\ \hline \hline Nominal Capacitance Measuring Frequency Measuring Voltage $$C \leq 10 \mu F^{*1} (10 V min.)$$ 1 \pm 0.1 kHz $$1.0 \pm 0.2 V rms$$$C \leq 10 \mu F^{*2} (6.3 V max.)$ 1 \pm 0.1 kHz $$0.5 \pm 0.1 V rms$$$$ $$C \leq 10 \mu F^{*2} (6.3 V max.)$ 1 \pm 0.1 kHz $$0.5 \pm 0.1 V rms$$$$$ $$`For items in Table1$$ 1 \pm 0.1 kHz $$0.5 \pm 0.1 V rms$$$$$$$$$$$ $$`For items in Table2$$ 1 \pm 0.1 kHz $$1.0 \pm 0.1 V rms$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$				
9	Capacitance Temperature Characteristics	Char.Temp. RangeReference Temp.Cap. ChangeR6-55 to +85°C25°CWithin ±15%	Step Temperature (°C) 1 25±2 2 -55±3 3 25±2 4 85±3 5 25±2 The ranges of capacitance change compared with the 25°C value over the temperature ranges shown in the table should l within the specified ranges. • Initial measurement for high dielectric constant type. Perform a heat treatment at 150+0/-10°C for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement.				
		No removal of the terminations or other defects should occur.	 Solder the capacitor to the test jig (glass epoxy board) shown Fig. 1 using a eutectic solder. Then apply 5N (GNM0M2: 2N) force in parallel with the test jig 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so the soldering is uniform and free of defects such as heat shown 				
10	Adhesive Strength of Termination	Solder resist Copper foil	Type a b c d GNM0M2 0.2 0.96 0.25 0.2 GNM1M2 0.5 1.6 0.32 0.32 GNM212 0.6 1.8 0.5 0.5 GNM214 0.6 2.0 0.25 0.25 GNM314 0.8 2.5 0.4 0.4				
		Fig. 1	(in mm)				
11	Vibration D.F.		Solder the capacitor to the test jig (glass epoxy board) in the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motio having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).				



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GNM Series Specifications and Test Methods In case Non "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1). Continued from the preceding page In case "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2). \searrow No Item Specifications Test Method No marking defects Solder the capacitor to the test jig (glass epoxy board) shown in Appearance Fig. 2 using a eutectic solder. Then apply a force in the Capacitance direction shown in Fig. 3. The soldering should be done by the Within ±10% Change reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. •GNM 50 Pressurizing 100 speed : 1.0mm/sec. Pressurize 12 Deflection R230 rC Thickness: 0.8mm Flexure : ≤1 b d Туре а С GNM0M2 2.0+0.05 0.2±0.05 0.2±0.05 0.25+0.05 Capa ice mete GNM1M2 2.0±0.05 0.5±0.05 0.32±0.05 0.32±0.05 45 45 **GNM212** 2.0±0.05 0.6±0.05 0.5±0.05 0.5±0.05 **GNM214** 2.0±0.05 0.7±0.05 0.3±0.05 0.2±0.05 Fig. 3 **GNM314** 2.5±0.05 0.8±0.05 0.4±0.05 0.4±0.05 (in mm) Fig. 2 Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at Solderability of 75% of the terminations are to be soldered evenly 80 to 120°C for 10 to 30 seconds. After preheating, immerse in 13 Termination and continuously. eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C. Appearance No marking defects Preheat the capacitor at 120 to 150°C for 1 minute. Immerse Capacitance R6^{*4}: Within +7.5% the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder *4 GNM0M2R60E105: Within +15/-7.5% Change solution at 270±5°C for 10±0.5 seconds. Resistance Let sit at room temperature for 24±2 hours, then measure. 0.1 max * to Soldering D.F. 14 *3 However 0.125 max. about Table 3 items Initial measurement Heat Perform a heat treatment at 150 +0/-10°C for one hour and LR 50Q · F min then let sit for 24±2 hours at room temperature. Perform Dielectric the initial measurement. No failure Strength Fix the capacitor to the supporting jig in the same manner and Appearance No marking defects under the same conditions as (10). Capacitance R6*5: Within ±12.5% Perform the five cycles according to the four heat treatments *⁵GNM0M2R60E105: Within ±15% Change listed in the following table. 0.1 max. * Let sit for 24±2 hours at room temperature, then measure. D.F. *3 However 0.125 max. about Table 3 items. Step 4 Temperature Min. Operating Temp. Temp. (°C) Min. Operating 15 $50\Omega \cdot F$ min. Room Room I R Cycle Temp. Temp. Temp. 30±3 30±3 Time (min.) 2 to 3 2 to 3 Initial measurement Dielectric No failure Perform a heat treatment at 150 +0/-10 °C for one hour and Strength then let sit for 24±2 hours at room temperature. Perform the initial measurement. No marking defects Apply the rated voltage at 40±2°C and 90 to 95% humidity for Appearance 500±12 hours. The charge/discharge current is less than 50mA. Capacitance R6: Within ±12.5% Initial measurement High Change Perform a heat treatment at 150 +0/-10°C for one hour Temperature and then let sit for 24±2 hours at room temperature. D.F 0.2 max 16 High Perform the initial measurement. Humidity Measurement after test (Steady) Perform a heat treatment at 150 +0/-10°C for one hour I.R. 12.5Ω · F min. and then let sit for 24±2 hours at room temperature, then measure. Apply 150% (GNM1M2R61A225/1C105: 125% of the rated Appearance No marking defects voltage) of the rated voltage for 1000±12 hours at the Capacitance R6: Within ±12.5% maximum operating temperature ±3°C. Let sit for 24±2 hours Change at room temperature, then measure. D.F. 0.2 max. The charge/discharge current is less than 50mA. Initial measurement 17 Durability Perform a heat treatment at 150 +0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. I.R. $25\Omega \cdot F min.$ Measurement after test Perform a heat treatment at 150 +0/-10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.



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 09.9.18

Chip Monolithic Ceramic Capacitors



Low ESL LLL/LLA/LLM Series

Reversed Geometry Low ESL Type

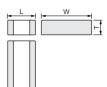
Features

- 1. Low ESL, good for noise reduction for high frequency
- 2. Small, high cap

Applications

- 1. High speed micro processor
- 2. High frequency digital equipment





Part Number	Dimensions (mm)							
Fait Number	L	W	Т					
LLL153	0.5 ±0.05	1.0 ±0.05	0.3 ±0.05					
LLL185	0.8 ±0.1	1.6 ±0.1	0.6 max.					
LLL215			0.5 +0/-0.15					
LLL216	1.25 ±0.1	2.0 ±0.1	0.6 ±0.1					
LLL219			0.85 ±0.1					
LLL315			0.5 +0/-0.15					
LLL317	1.6 ±0.15	3.2 ±0.15	0.7 ±0.1					
LLL31M			1.15 ±0.1					

Eight Terminals Low ESL Type

Features

- 1. Low ESL (100pH), suitable to decoupling capacitor for 1GHz clock speed IC.
- 2. Small, large cap

Applications

- 1. High speed micro processor
- 2. High frequency digital equipment

Ten Terminals Low ESL Type

Features

- 1. Low ESL (45pH), suitable to decoupling capacitor for 2GHz clock speed IC.
- 2. Small, large cap

Applications

- 1. High speed micro processor
- 2. High frequency digital equipment







Part Number	Dimensions (mm)							
Part Number	L	W	Т	Р				
LLA185	1.6 ±0.1	0.8 ±0.1	0.5 +0.05/-0.1	0.4 ±0.1				
LLA215	2.0 ±0.1	1.25 ±0.1	0.5 +0.05/-0.1	0.5 ±0.05				
LLA219	2.0 ±0.1	1.25 ±0.1	0.85 ±0.1	0.5 ±0.05				
LLA315	3.2 ±0.15	1.6 ±0.15	0.5 +0.05/-0.1	0.8 ±0.1				
LLA319	3.2 ±0.15	1.6 ±0.15	0.85 ±0.1	0.8 ±0.1				
LLA31M	3.2 ±0.15	1.6 ±0.15	1.15 ±0.1	0.8 ±0.1				

ΡĢ







Equivalent Circuit



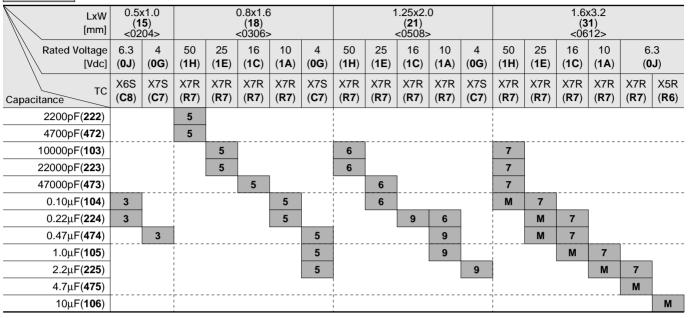
Dort Number	Dimensions (mm)								
Part Number	L	W	Т	Р					
LLM215	2.0 ±0.1	1.25 ±0.1	0.5 +0.05/-0.1	0.5 ±0.05					
LLM315	3.2 ±0.15	1.6 ±0.15	0.5 +0.05/-0.1	0.8 ±0.1					



Capacitance Table

Reversed Geometry Low ESL Type X7R(R7)/X7S(C7)/X6S(C8)/X5R(R6) Characteristics

5 ex.5: T Dimension [mm]



The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

Reversed Geometry Low ESL Type X7R(R7)/X7S(C7) Characteristics Low Profile

5 ex.5: T	Dimensio	on [mm]												
LxW [mm]		(1	<1.6 8) 06>				(2	x2.0 1) 08>				(3	x3.2 1) 12>	
Rated Voltage [Vdc]		16 (1C)	10 (1A)	4 (0G)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	4 (0G)	50 (1H)	25 (1E)	16 (1C)	10 (1A)
Capacitance	X7R (R7)	X7R (R7)	X7R (R7)	X7S (C7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7S (C7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)
10000pF(103)	5				5						5			
22000pF(223)		5				5					5			
47000pF(473)		5					5					5		
0.10μF(104)			5		 		5				 	5		
0.22μF(224)	1			5				5			 		5	
0.47µF(474)	1				1 1 1				5		1 1 1			5
1.0μF(105)										5				
T I 1 1 1 1														

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

Continued on the following page.

Capacitance Table

Continued from the preceding page.

Eight Terminals Low ESL Type X7S(C7)/X7R(R7) Characteristics

5 ex.5: T Dimension [mm]

LxW [mm]	1.6x0.8 (18) <0603>			2.0x1.2 (21) <0805>				3.2x1.6 (31) <1206>	
Rated Voltage [Vdc]	4 (0G)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	4 (0G)	16 (1C)	10 (1A)	4 (0G)
Capacitance	X7S (C7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7S (C7)	X7R (R7)	X7R (R7)	X7R (R7)
10000pF(103)		9					 		
22000pF(223)		9							
47000pF(473)		9							
0.10μF(104)	5		9				9		
0.22μF(224)	5		9				9		
0.47μF(474)	5			9			9		
1.0μF(105)	5				9		м	9	
2.2μF(225)	5					9		м	9
4.7μF(475)						9			

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

istics Low Profile

Eight Terminals L			vpe X	7R(R7	7)/X7S	S(C7)	Char	acteri
LxW [mm]			2.0x1.2 (21) <0805>				3.2x1.6 (31) <1206>	
Rated Voltage [Vdc]	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	4 (0G)	16 (1C)	10 (1A)	6.3 (0J)
Capacitance	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7S (C7)	X7R (R7)	X7R (R7)	X7R (R7)
10000pF(103)	5							
22000pF(223)	5							
47000pF(473)		5						
0.10μF(104)		5						
0.22μF(224)			5			5		
0.47μF(474)				5		1	5	
1.0μF(105)					5			5
2.2μF(225)					5			5
4.7μF(475)					5			

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Ten Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics Low Profile

5 ex.5:	T Dimensi	on [mm]					
Lx\ [mn		(2	1.25 1) 05>	3.2x1.6 (31) <1206>			
Rated Voltag		16 (1C)	6.3 (0J)	4 (0G)	16 (1C)	10 (1A)	6.3 (0J)
Capacitance	C X7R (R7)	X7R (R7)	X7R (R7)	X7S (C7)	X7R (R7)	X7R (R7)	X7R (R7)
10000pF(103) 5						
22000pF(223) 5						
47000pF(473)	5					
0.10μF(104)	5			5		
0.22μF(224)		5		5		
0.47μF(474)		5			5	
1.0μF(105)			5			
2.2μF(225)			5			5
The part number and i	a ahawa ir	() and	L Init in a	hourn in			ahl Code

The part number code is shown in () and Unit is shown in []. $\hfill <>:$ EIA [inch] Code



Reversed Geometry Low ESL Type X7R(R7)/X7S(C7)/X6S(C8) Characteristics

LxW [mm]		0.5x1.0(15)<0204>			
Rated Volt. [Vdc]	6.3 (0J)	4(0G)		
Capacitance	Tolerance	Part Number			
0.10μF(104)	±20%(M)	LLL153C80J104ME01E*			
0.22µF(224)	±20%(M)	LLL153C80J224ME14E*			
0.47µF(474)	±20%(M)		LLL153C70G474ME17E*		

LLL153 Series 4V/0.47µF(L: 0.5+0.07/-0.03mm)

LxW [mm]		0.8x1.6(18)<0306>			
Rated Volt. [Vdc]		50(1H)	25(1E)	16(1C)	10(1A)
Capacitance	Tolerance		Part Number		
2200pF(222)	±20%(M)	LLL185R71H222MA01L			
4700pF(472)	±20%(M)	LLL185R71H472MA01L			
10000pF(103)	±20%(M)		LLL185R71E103MA01L		
22000pF(223)	±20%(M)		LLL185R71E223MA01L		
47000pF(473)	±20%(M)			LLL185R71C473MA01L	
0.10μF(104)	±20%(M)				LLL185R71A104MA01L
0.22µF(224)	±20%(M)				LLL185R71A224MA01L

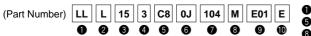
LxW [mm]		0.8x1.6(18)<0306>
Rated Volt. [Vdc]	4(0G)
Capacitance	Tolerance	Part Number
0.47μF(474) ±20%(M)		LLL185C70G474MA01L
1.0μF(105)	±20%(M)	LLL185C70G105ME02L*
2.2µF(225)	±20%(M)	LLL185C70G225ME01L*

LxW [mm]			1.25x2.0(2	21)<0508>	
Rated Volt. [Vdc]		50(1H)	25(1E)	16(1C)	10(1A)
Capacitance	Tolerance		Part Number		
10000pF(103)	±20%(M)	LLL216R71H103MA01L			
22000pF(223)	±20%(M)	LLL216R71H223MA01L			
47000pF(473)	±20%(M)		LLL216R71E473MA01L		
0.10μF(104)	±20%(M)		LLL216R71E104MA01L		
0.22µF(224)	±20%(M)			LLL219R71C224MA01L	LLL216R71A224MA01L
0.47µF(474)	±20%(M)				LLL219R71A474MA01L
1.0μF(105)	±20%(M)				LLL219R71A105MA01L

LxW [mm]		1.25x2.0(21)<0508>
Rated Volt. [Vdc]	4(0G)
Capacitance	Tolerance	Part Number
2.2µF(225)	±20%(M)	LLL219C70G225MA01L

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to LLL/LLA/LLM Series Specifications and Test Method(2).



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

muRata

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

77

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

Reversed Geometry Low ESL Type X7R(R7)/X5R(R6) Characteristics

LxW [mm]		1.6x3.2(31)<0612>			
Rated Volt. [Vdc]		50(1H)	25(1E)	16(1C)	10(1A)
Capacitance	Tolerance		Part Number		
10000pF(103)	±20%(M)	LLL317R71H103MA01L			
22000pF(223)	±20%(M)	LLL317R71H223MA01L			
47000pF(473)	±20%(M)	LLL317R71H473MA01L			
0.10μF(104)	±20%(M)	LLL31MR71H104MA01L	LLL317R71E104MA01L		
0.22µF(224)	±20%(M)		LLL31MR71E224MA01L	LLL317R71C224MA01L	
0.47µF(474)	±20%(M)		LLL31MR71E474MA01L	LLL317R71C474MA01L	
1.0μF(105)	±20%(M)			LLL31MR71C105MA01L	LLL317R71A105MA01L
2.2μF(225)	±20%(M)				LLL31MR71A225MA01L

LxW [mm]		1.6x3.2(31)<0612>
Rated Volt. [Vdc]	6.3(0J)
Capacitance	Tolerance	Part Number
2.2μF(225)	±20%(M)	LLL317R70J225MA01L
4.7μF(475)	±20%(M)	LLL31MR70J475MA01L
10μF(106)	±20%(M)	LLL31MR60J106ME01L*

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code *: Please refer to LLL/LLA/LLM Series Specifications and Test Method(2).

Reversed Geometry Low ESL Type X7R(R7)/X7S(C7) Characteristics Low Profile

LxW [mm]		0.8x1.6(18)<0306>			
Rated Volt. [Vdc]		25(1E)	16(1C)	10(1A)	4(0G)
Capacitance	Tolerance	Part Number			
10000pF(103)	±20%(M)	LLL185R71E103MA11L			
22000pF(223)	±20%(M)		LLL185R71C223MA11L		
47000pF(473)	±20%(M)		LLL185R71C473MA11L		
0.10μF(104)	±20%(M)			LLL185R71A104MA11L	
0.22μF(224)	±20%(M)				LLL185C70G224MA11L

LxW [mm]		1.25x2.0(21)<0508>			
Rated Volt. [Vdc]		50(1H)	25(1E)	16(1C)	10(1A)
Capacitance	Tolerance		Part Number		
10000pF(103)	±20%(M)	LLL215R71H103MA11L			
22000pF(223)	±20%(M)		LLL215R71E223MA11L		
47000pF(473)	±20%(M)			LLL215R71C473MA11L	
0.10μF(104)	±20%(M)			LLL215R71C104MA11L	
0.22µF(224)	±20%(M)				LLL215R71A224MA11L

LxW [mm]		1.25x2.0(21)<0508>		
Rated Volt. [Vdc]		6.3(0 J) 4(0 G)		
Capacitance	Tolerance	Part Number		
0.47μF(474)	±20%(M)	LLL215R70J474MA11L		
1.0μF(105)	±20%(M)		LLL215C70G105MA11L	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to LLL/LLA/LLM Series Specifications and Test Method(2).



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



Reversed Geometry Low ESL Type X7R(R7) Characteristics Low Profile

LxW [mm]		1.6x3.2(31)<0612>			
Rated Volt. [Vdc	:]	50(1H)	25(1E)	16(1C)	10(1A)
Capacitance	Tolerance	Part Number			
10000pF(103)	±20%(M)	LLL315R71H103MA11L			
22000pF(223)	±20%(M)	LLL315R71H223MA11L			
47000pF(473)	±20%(M)		LLL315R71E473MA11L		
0.10μF(104)	±20%(M)		LLL315R71E104MA11L		
0.22µF(224)	±20%(M)			LLL315R71C224MA11L	
0.47µF(474)	±20%(M)				LLL315R71A474MA11L

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to LLL/LLA/LLM Series Specifications and Test Method(2).

Eight Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics

	1.6x0.8(18)<0603>
]	4(0G)
Tolerance	Part Number
±20%(M)	LLA185C70G104MA01L
±20%(M)	LLA185C70G224MA01L
±20%(M)	LLA185C70G474MA01L
±20%(M)	LLA185C70G105ME01L*
±20%(M)	LLA185C70G225ME16L*
	±20%(M) ±20%(M) ±20%(M) ±20%(M)

LxW [mm] 2.0x1.25(21)<0805>			21)<0805>		
Rated Volt. [Vdc]		25(1E)	16(1C)	10(1A)	6.3(0J)
Capacitance	Tolerance		Part Number		
10000pF(103)	±20%(M)	LLA219R71E103MA01L			
22000pF(223)	±20%(M)	LLA219R71E223MA01L			
47000pF(473)	±20%(M)	LLA219R71E473MA01L			
0.10μF(104)	±20%(M)		LLA219R71C104MA01L		
0.22µF(224)	±20%(M)		LLA219R71C224MA01L		
0.47µF(474)	±20%(M)			LLA219R71A474MA01L	
1.0μF(105)	±20%(M)				LLA219R70J105MA01L

LxW [mm]		2.0x1.25(21)<0805>
Rated Volt. [Vdc]	4(0G)
Capacitance	Tolerance	Part Number
2.2μF(225)	±20%(M)	LLA219C70G225MA01L
4.7μF(475)	±20%(M)	LLA219C70G475ME01L*

LxW [mm]		3.2x1.6(31)<1206>				
Rated Volt. [Vdc]	16(1C)	4(0G)			
Capacitance	Tolerance	Part Number				
0.10μF(104)	±20%(M)	LLA319R71C104MA01L				
0.22µF(224)	±20%(M)	LLA319R71C224MA01L				
0.47µF(474)	±20%(M)	LLA319R71C474MA01L				
1.0μF(105)	±20%(M)	LLA31MR71C105MA01L	LLA319R71A105MA01L			
2.2µF(225)	±20%(M)		LLA31MR71A225MA01L	LLA319R70G225MA01L		

The part number code is shown in () and Unit is shown in []. $\hfill <>:$ EIA [inch] Code

*: Please refer to LLL/LLA/LLM Series Specifications and Test Method(2).

Eight Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics Low Profile

LxW [mm]		2.0x1.25(21)<0805>						
Rated Volt. [Vdc]	25(1E)	6.3(0J)					
Capacitance	Tolerance	Part Number						
10000pF(103)	±20%(M)	LLA215R71E103MA14L						
22000pF(223)	±20%(M)	LLA215R71E223MA14L						
47000pF(473)	±20%(M)		LLA215R71C473MA14L					
0.10μF(104)	±20%(M)		LLA215R71C104MA14L					
0.22μF(224)	±20%(M)			LLA215R71A224MA14L				
0.47µF(474)	±20%(M)				LLA215R70J474MA14L			

LxW [mm]		2.0x1.25(21)<0805>
Rated Volt. [Vdc]	4(0G)
Capacitance	Tolerance	Part Number
1.0μF(105)	±20%(M)	LLA215C70G105MA14L
2.2µF(225)	±20%(M)	LLA215C70G225ME11L*
4.7μF(475)	±20%(M)	LLA215C70G475ME19L*

LxW [mm]		3.2x1.6(31)<1206>					
Rated Volt. [Vdc]	16(1C) 10(1A) 6.3(0J)					
Capacitance	Tolerance						
0.22µF(224)	±20%(M)	LLA315R71C224MA14L					
0.47μF(474)	±20%(M)		LLA315R71A474MA14L				
1.0μF(105)	±20%(M)			LLA315R70J105MA14L			
2.2μF(225)	±20%(M)			LLA315R70J225MA14L			

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to LLL/LLA/LLM Series Specifications and Test Method(2).

Ten Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics Low Profile

LxW [mm]		2.0x1.25(21)<0805>						
Rated Volt. [Vdc	:]	25(1E) 16(1C) 6.3(0J) 4(0G						
Capacitance	Tolerance		•					
10000pF(103)	±20%(M)	LLM215R71E103MA11L						
22000pF(223)	±20%(M)	LLM215R71E223MA11L						
47000pF(473)	±20%(M)		LLM215R71C473MA11L					
0.10μF(104)	±20%(M)		LLM215R71C104MA11L					
0.22μF(224)	±20%(M)			LLM215R70J224MA11L				
0.47µF(474)	±20%(M)			LLM215R70J474MA11L				
1.0μF(105)	±20%(M)				LLM215C70G105MA11L			
2.2μF(225)	±20%(M)				LLM215C70G225ME11L*			

LxW [mm]		3.2x1.6(31)<1206>				
Rated Volt. [Vdc]	16(1C)	6.3(0J)			
Capacitance	Tolerance					
0.10μF(104)	±20%(M)	LLM315R71C104MA11L				
0.22µF(224)	±20%(M)	LLM315R71C224MA11L				
0.47µF(474)	±20%(M)		LLM315R71A474MA11L			
2.2μF(225)	±20%(M)			LLM315R70J225MA11L		

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to LLL/LLA/LLM Series Specifications and Test Method(2).

(Part Number)	LL	Α	21	5	R7	1E	103	М	A14	L	Product IDTemperature
	0	2	8	4	6	6	0	8	9	O	

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

Product IDØSeriesØDimension (LxW)Temperature CharacteristicsØRated VoltageCapacitance ToleranceØIndividual Specification Code



LLL/LLA/LLM Series Specifications and Test Methods (1)

In case Non "*" is added in PNs table, please refer to LLL/LLA/LLM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to LLL/LLA/LLM Series Specifications and Test Methods (2).

			in case is added in Firstable, please fele	to LLL/LLA/LLM Series Specifications and Test Methods (2).			
No.	lte	em	Specifications	Test Method			
1	Operating Temperat Range	-	R7, C7: -55 to +125°C				
2	Rated Vo	ltage	See the previous pages.	The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P,P} or V ^{O,P} , whichever is larger, should be maintained within the rated voltage range.			
3	Appearar	nce	No defects or abnormalities	Visual inspection			
4	Dimensio	ns	Within the specified dimension	Using calipers			
5	Dielectric	: Strength	No defects or abnormalities	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.			
6	Insulatior Resistanc		C≦0.047μF: More than 10,000MΩ C>0.047μF: More than 500Ω · F C: Normal Capacitance	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 2 minutes of charging.			
7	Capacita	nce	Within the specified tolerance	The capacitance/D.F. should be measured at 25°C at the			
8	Dissipatio (D.F.)	on Factor	W.V.: 25V min.; 0.025 max. W.V.: 16V/10V max.; 0.035 max. W.V.: 6.3V max.; 0.05 max.	frequency and voltage shown in the table. Frequency: 1±0.1kHz Voltage: 1±0.2Vrms *For LLA185C70G474, the capacitance should be measured unsing a voltage of 0.5±0.1Vrms.			
				The capacitance change should be measured after 5 min. at each specified temperature stage.			
				Step Temperature (°C)			
				$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			
		apacitance emperature	Temp. Range Reference	3 25±2			
9			Char. Temp. Range (°C) Reference Temp. Cap.Change R7 -55 to +125 25°C Within ±15%	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			
			<u>C7</u> —55 to +125 25°C Within ±22%	The ranges of capacitance change compared with the 25°C value over the temperature ranges shown in the table should be within the specified ranges. • Initial measurement. Perform a heat treatment at 150+0/-10°C for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement.			
10	Adhesive of Termin	Strength nation	No removal of the terminations or other defect should occur.	Solder the capacitor to the test jig (glass epoxy board) using a eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. *LLL18 and LLA/LLM Series: 5N			
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board) in			
		Capacitance	Within the specified tolerance	the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion			
11	Vibration Resistance	ation		having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).			
12	2 Solderability of Termination		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2 ± 0.5 seconds at $230\pm5^{\circ}$ C, or Sn-3.0Ag-0.5Cu solder solution for 2 ± 0.5 seconds at $245\pm5^{\circ}$ C.			
		Appearance	No marking defects				
		Capacitance Change	Within ±7.5%	Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder			
13	Resistance to Soldering Heat	D.F.	W.V.: 25V min.; 0.025 max. W.V.: 16V/10V max.; 0.035 max. W.V.: 6.3V max.; 0.05 max.	 solution at 270±5°C for 10±0.5 seconds. Let sit at room temperature for 24±2 hours, then measure. Initial measurement. 			
		I.R.	More than 10,000M Ω or 500 $\Omega \cdot F$ (Whichever is smaller)	Perform a heat treatment at 150^{+0}_{-10} °C for one hour and then			
		Dielectric Strength	No failure	 let sit for 24±2 hours at room temperature. Perform the initial measurement. 			
	Stren						



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LLL/LLA/LLM Series Specifications and Test Methods (1)

In case Non "*" is added in PNs table, please refer to LLL/LLA/LLM Series Specifications and Test Methods (1).

3

No.	Ite	em	Specifications		Tes	st Metho	d			
		Appearance No marking defects Capacitance Change Within ±7.5%		Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2 hours at room						
		D.F.	W.V.: 25V min.; 0.025 max. W.V.: 16V/10V max.; 0.035 max.	temperature, t	1	2	3	4		
14	Temperature		W.V.: 6.3V max.; 0.05 max.		Min. Operating		Max. Operating			
	Cycle	I.R.	More than 10,000M Ω or 500 $\Omega \cdot F$ (Whichever is smaller)	Temp. (°C)	Temp. ±3	Temp.	Temp. ±3	Temp.		
				Time (min.)	30±3	2 to 3	30±3	2 to 3		
		Dielectric Strength	No failure		eat treatment at 2 hours at roo		°C for one hou rature. Perform			
		Appearance	No marking defects							
	Humidity	Capacitance Change	Within ±12.5%				95% humidity			
15	(Steady State)	D.F.	W.V.: 10V min.; 0.05 max. W.V.: 6.3V max.; 0.075 max.	then measure		ours at room te	mperature			
		I.R.	More than 1,000M Ω or 50 $\Omega\cdot$ F (Whichever is smaller)							
		Appearance	No marking defects							
	the sector the sector	Capacitance Change	Within ±12.5%		Apply the rated voltage at $40\pm2^{\circ}$ C and 90 to 95% humid 500 ±12 hours. Remove and let sit for 24 ±2 hours at roo temperature, then measure. The charge/discharge curre					
6	Humidity Load	D.F.	W.V.: 10V min.; 0.05 max. W.V.: 6.3V max.; 0.075 max.							
10		I.R.	More than 500M\Omega or $25\Omega \cdot F$							
		I.K.	(Whichever is smaller)			Apply 200% of the rated voltage for 1000±12 hours at				
		Appearance	(Whichever is smaller) No marking defects							
				maximum ope at room tempe	erating tempera erature, then m	iture ±3°	000±12 hours C. Let sit for 24 The charge/disc	±2 hours		
17	High Temperature Load	Appearance Capacitance	No marking defects	 maximum ope at room tempe current is less Initial measure 	erating tempera erature, then m than 50mA. rement.	ture ±3° easure.	C. Let sit for 24	±2 hours charge		



LLL/LLA/LLM Series Specifications and Test Methods (2)

In case Non "*" is added in PNs table, please refer to LLL/LLA/LLM Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to LLL/LLA/LLM Series Specifications and Test Methods (2).

No.	Ite	em	Specifications	Test Method		
1	Operating Temperat Range		R6: -55 to +85°C R7, C7: -55 to +125°C C8: -55 to +105°C			
2	Rated Vol	ltage	See the previous pages.	The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, $V^{P,P}$ or $V^{O,P}$, whichever is larger, should be maintained within the rated voltage range.		
3	Appearan	nce	No defects or abnormalities	Visual inspection		
4	Dimensio	ns	Within the specified dimension	Using calipers		
5	Dielectric	Strength	No defects or abnormalities	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.		
6	Insulation Resistanc		50Ω · F min.	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 1 minute of charging.		
7	Capacitar	nce	Within the specified tolerance	The capacitance/D.F. should be measured at 25°C at the frequency and voltage shown in the table.		
8	Dissipatic (D.F.)	on Factor	R6, R7, C7, C8: 0.120 max.	$\begin{tabular}{ c c c c c c } \hline Capacitance & Frequency & Voltage \\ \hline C \le 10 \mu F (10V min.) & 1 \pm 0.1 \text{kHz} & 1.0 \pm 0.2 \text{Vrms} \\ \hline C \le 10 \mu F (6.3V max.) & 1 \pm 0.1 \text{kHz} & 0.5 \pm 0.1 \text{Vrms} \\ \hline C > 10 \mu F & 120 \pm 24 \text{Hz} & 0.5 \pm 0.1 \text{Vrms} \\ \hline \end{tabular}$		
9	Capacitance 9 Temperature Characteristics		Char. Temp. Range (°C) Reference Temp. Cap. Change R6 -55 to +85 Within ±15% R7 -55 to +125 25°C C7 -55 to +125 25°C C8 -55 to +105 Within ±22%	 The capacitance change should be measured after 5 min. at each specified temperature stage. The ranges of capacitance change compared with the 25°C value over the temperature ranges shown in the table should be within the specified ranges. Initial measurement. Perform a heat treatment at 150+0/-10°C for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement. 		
10	Adhesive of Termin	0	No removal of the terminations or other defect should occur.	Solder the capacitor to the test jig (glass epoxy board) using a eutectic solder. Then apply $10N^*$ force in parallel with the test jig for 10 ± 1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. *5N (LLL15, LLL18, LLA,LLM Series)		
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board) in		
		Capacitance	Within the specified tolerance	the same manner and under the same conditions as (10). The		
11	Vibration	D.F.	R6, R7, C7, C8: 0.120 max.	capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).		
12	2 Solderability of Termination 75% of the terminations are to be soldered evenly and continuously.		-	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2 ± 0.5 seconds at $230\pm5^{\circ}$ C, or Sn-3.0Ag-0.5Cu solder solution for 2 ± 0.5 seconds at $245\pm5^{\circ}$ C.		
		Appearance	No marking defects	Preheat the capacitor at 120 to 150°C for 1 minute. Immerse		
	Resistance	Capacitance Change	R6, R7, C7, C8: Within ±7.5%	the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder solution at 270±5°C for 10±0.5 seconds. Let sit at room temperature for 24±2 hours, then measure.		
13	to Soldering	D.F.	R6, R7, C7, C8: 0.120 max.			
	Heat	I.R. Dielectric	$50\Omega \cdot F$ min.	 Initial measurement. Perform a heat treatment at 150⁺₁₀°C for one hour and then let sit for 24+2 hours at room temperature. Perform the initial 		
		Strength	No failure	let sit for 24±2 hours at room temperature. Perform the initial measurement.		

Continued on the following page.



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LLL/LLA/LLM Series Specifications and Test Methods (2)

In case Non "*" is added in PNs table, please refer to LLL/LLA/LLM Series Specifications and Test Methods (1).

	Continued from the preceding page. In case "*" is added in PNs table, please refer to LLL/LLA/LLM Series Specifications and Test Methods (2).								
No.	Ite	m	Specifications	Test Method					
		Appearance Capacitance Change D.F.	No marking defects R6, R7, C7, C8: Within ±12.5% R6, R7, C7, C8: 0.120 max.	Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10).Perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2 hours at room temperature, then measure.					
	Temperature	I.R.	50Ω · F min.	Step 1 2 3 4					
14	Sudden Change	Dielectric Strength	No failure	$\label{eq:constraint} \begin{array}{ c c c c c }\hline \hline & \mbox{Min. Operating} & \mbox{Room} & \mbox{Min. Operating} & \mbox{Room} & \mbox{Temp. } \pm g & $					
		Appearance	No marking defects	Apply the rated voltage at 40±2°C and 90 to 95% humidity for					
		Capacitance Change	R6, R7, C7, C8: Within ±12.5%	500±12 hours. The charge/discharge current is less than 50mA. Apply the rated DC voltage.					
	High Temperature	D.F.	R6, R7, C7, C8: 0.2 max.						
15	High Humidity (Steady State)	I.R.	12.5Ω · F min.	 Initial measurement Perform a heat treatment at 150[±]0^o°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. Measurement after test Perform a heat treatment at 150[±]0^o°C for one hour and then let sit for 24±2 hours at room temperature, then measure. 					
		Appearance	No marking defects	Apply 150% of the rated voltage for 1000±12 hours at the					
		Capacitance Change	R6, R7, C7, C8: Within ±12.5% * LLL153C70G474: Within ±20%	maximum operating temperature ±3°C. The charge/discharge current is less than 50mA.					
		D.F.	R6, R7, C7, C8: 0.2 max.	•Initial measurement					
16	Durability	I.R.	25Ω · F min.	 Perform a heat treatment at 150[±]0°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. •Measurement after test Perform a heat treatment at 150[±]0°C for one hour and then let sit for 24±2 hours at room temperature, then measure. 					



Chip Monolithic Ceramic Capacitors



High-Q Type GJM Series

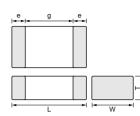
Features

- 1. Mobile Telecommunication and RF module, mainly
- 2. Quality improvement of telephone call, Low power Consumption, yield ratio improvement

Applications

VCO, PA, Mobile Telecommunication





Part Number	Dimensions (mm)				
Part Number	L	W	Т	е	g min.
GJM03	0.6 ±0.03	0.3 ±0.03	0.3 ±0.03	0.1 to 0.2	0.2
GJM15	1.0 ±0.05	0.5 ±0.05	0.5 ±0.05	0.15 to 0.3	0.4



Capacitance Table

Temperature Compensating Type C0G(5C)/C0H(6C) Characteristics

3 ex.3: T Dimension [mm]

1.0x0.5 (15) <0402>	LxW [mm]	0.6x (0 : <020	3)	1.0x0.5 (15) <0402>
50	Rated Voltage	25	6.3	50
(1H)	Capacitance [Vdc]	(1A)	(0 J)	(1H)
5	5.0pF(5R0)	3		5
5	5.1pF(5R1)	3		5
5	5.2pF(5R2)	3		5
5	5.3pF(5R3)	3		5
5	5.4pF(5R4)	3		5
5	5.5pF(5R5)	3		5
5	5.6pF(5R6)	3		5
5	5.7pF(5R7)	3		5
5	5.8pF(5R8)	3		5
5	5.9pF(5R9)	3		5
5	6.0pF(6R0)	3		5
5	6.1pF(6R1)	3		5
5	6.2pF(6R2)	3		5
5	6.3pF(6R3)	3		5
5 5	6.4pF(6R4)	3		5
5	6.5pF(6R5)	3 3		5 5
5	6.6pF(6R6)	3		5
5	6.7pF(6R7) 6.8pF(6R8)	3		5
5	6.9pF(6R9)	3		5
5	7.0pF(7R0)	3		5
5	7.1pF(7R1)	3		5
5	7.2pF(7R2)	3		5
5	7.3pF(7R3)	3		5
5	7.4pF(7R4)	3		5
5	7.5pF(7R5)	3		5
5	7.6pF(7R6)	3		5
5	7.7pF(7R7)	3		5
5	7.8pF(7R8)	3		5
5	7.9pF(7R9)	3		5
5	8.0pF(8R0)	3		5
5	8.1pF(8R1)	3		5
5	8.2pF(8R2)	3		5
5	8.3pF(8R3)	3		5
5	8.4pF(8R4)	3		5
5	8.5pF(8R5)	3		5
5	8.6pF(8R6)	3		5
5	8.7pF(8R7)	3		5
5	8.8pF(8R8)	3		5
5	8.9pF(8R9)	3		5
5	9.0pF(9R0)	3		5
5	9.1pF(9R1)	3		5
5	9.2pF(9R2)	3		5
5 5	9.3pF(9R3)	3		5 5
5 5	9.4pF(9R4) 9.5pF(9R5)	3		5 5
э 5	9.5pF(9R5) 9.6pF(9R6)	3		э 5
5	9.7pF(9R7)	3		5
5	9.8pF(9R8)	3		5
5	a.ohL(avg)	3		3

3	ex.3: T I	Dimensio	n [mm]	
	LxW [mm]	0.6) (0 <02	3)	1.0x0 (15) <0402
Rated	Voltage	25	6.3	50
Capacitance	[Vdc]	(1A)	(0 J)	(1H
0.1pl	F(R10)			5
0.2pl	F(R20)	3		5
0.3pl	F(R30)	3		5
0.4pl	F(R40)	3		5
0.5pl	F(R50)	3		5
0.6pl	F(R60)	3		5
0.7pl	F(R70)	3		5
0.8pl	F(R80)	3		5
· · ·	F(R90)	3		5
	F(1R0)	3		5
· · ·	F(1R1)	3		5
	F(1R2)	3		5
-	F(1R3)	3		5
· · · ·	F(1R4)	3		5
· · ·	F(1R5)	3		5
· · · · · ·	F(1R6)	3		5
	F(1R7)	3		5 5
	F(1R8)	3 3		5
	F(1R9) F(2R0)	3		5
	(2R0) F(2R1)	3		5
	-(2R2)	3		5
· · ·	-(2R3)	3		5
· · ·	-(2R4)	3		5
	-(2R5)	3		5
	-(2R6)	3		5
	-(2R7)	3		5
	-(2R8)	3		5
2.9pl	F(2R9)	3		5
3.0pl	F(3R0)	3		5
3.1pl	F(3R1)	3		5
3.2pl	F(3R2)	3		5
3.3pl	F(3R3)	3		5
3.4pl	F(3R4)	3		5
3.5pl	F(3R5)	3		5
3.6pl	F(3R6)	3		5
	F(3R7)	3		5
	-(3R8)	3		5
	=(3R9)	3		5
· · ·	F(4R0)	3		5
· · ·	F(4R1)	3		5
	F(4R2)	3		5
	F(4R3)	3		5
· · ·	F(4R4)	3		5
· · ·	F(4R5)	3		5
	F(4R6)	3		5
· · ·	F(4R7) F(4R8)	3 3		5 5
		3		5
4.9pi	F(4R9)	3		5

0.6x0.3 (**03**) <0201> LxW (**15**) <0402> [mm] Rated Voltage 25 6.3 50 (**1A**) (**0**J) (1H) [Vdc] Capacitance 9.9pF(**9R9**) 3 5 10pF(**100**) 3 5 11pF(**110**) 3 5 12pF(120) 3 5 5 13pF(130) 3 5 15pF(150) 3 16pF(160) 3 5 18pF(**180**) 3 5 20pF(200) 3 5 22pF(220) 3 24pF(240) 3 27pF(**270**) 3 30pF(300) 3 33pF(330) 3

1.0x0.5

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



86

LxW [mm]	-	0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]	25(1E)	50(1H)
Capacitance	Tolerance	Part N	umber
0.1pF(R10)	±0.05pF(W)		GJM1555C1HR10WB01[
	±0.1pF(B)		GJM1555C1HR10BB01D
0.2pF(R20)	±0.05pF(W)	GJM0335C1ER20WB01D	GJM1555C1HR20WB01I
	±0.1pF(B)	GJM0335C1ER20BB01D	GJM1555C1HR20BB01E
0.3pF(R30)	±0.05pF(W)	GJM0335C1ER30WB01D	GJM1555C1HR30WB011
	±0.1pF(B)	GJM0335C1ER30BB01D	GJM1555C1HR30BB010
0.4pF(R40)	±0.05pF(W)	GJM0335C1ER40WB01D	GJM1555C1HR40WB011
	±0.1pF(B)	GJM0335C1ER40BB01D	GJM1555C1HR40BB01[
0.5pF(R50)	±0.05pF(W)	GJM0335C1ER50WB01D	GJM1555C1HR50WB011
	±0.1pF(B)	GJM0335C1ER50BB01D	GJM1555C1HR50BB010
0.6pF(R60)	±0.05pF(W)	GJM0335C1ER60WB01D	GJM1555C1HR60WB011
	±0.1pF(B)	GJM0335C1ER60BB01D	GJM1555C1HR60BB01[
0.7pF(R70)	±0.05pF(W)	GJM0335C1ER70WB01D	GJM1555C1HR70WB011
,	±0.1pF(B)	GJM0335C1ER70BB01D	GJM1555C1HR70BB01E
0.8pF(R80)	±0.05pF(W)	GJM0335C1ER80WB01D	GJM1555C1HR80WB01I
	±0.1pF(B)	GJM0335C1ER80BB01D	GJM1555C1HR80BB01[
0.9pF(R90)	±0.05pF(W)	GJM0335C1ER90WB01D	GJM1555C1HR90WB011
	±0.1pF(B)	GJM0335C1ER90BB01D	GJM1555C1HR90BB01[
1.0pF(1R0)	±0.05pF(W)	GJM0335C1E1R0WB01D	GJM1555C1H1R0WB011
	±0.1pF(B)	GJM0335C1E1R0BB01D	GJM1555C1H1R0BB01E
	±0.25pF(C)	GJM0335C1E1R0CB01D	GJM1555C1H1R0CB01E
1.1pF(1R1)	±0.05pF(W)	GJM0335C1E1R1WB01D	GJM1555C1H1R1WB01I
1. ipi (iiii)	±0.1pF(B)	GJM0335C1E1R1BB01D	GJM1555C1H1R1BB01E
	±0.25pF(C)	GJM0335C1E1R1CB01D	GJM1555C1H1R1CB01E
1.2pF(1R2)		GJM0335C1E1R2WB01D	GJM1555C1H1R2WB01I
1.2μr(1κ2)	±0.05pF(W)	GJM0335C1E1R2BB01D	
	±0.1pF(B)	GJM0335C1E1R2CB01D	GJM1555C1H1R2BB01E
1.3pF(1R3)	±0.25pF(C)		GJM1555C1H1R2CB01E
т.эрг(ткэ)	±0.05pF(W)	GJM0335C1E1R3WB01D	GJM1555C1H1R3WB01I
	±0.1pF(B)	GJM0335C1E1R3BB01D	GJM1555C1H1R3BB01D
	±0.25pF(C)	GJM0335C1E1R3CB01D	GJM1555C1H1R3CB01D
1.4pF(1R4)	±0.05pF(W)	GJM0335C1E1R4WB01D	GJM1555C1H1R4WB01I
	±0.1pF(B)	GJM0335C1E1R4BB01D	GJM1555C1H1R4BB01D
	±0.25pF(C)	GJM0335C1E1R4CB01D	GJM1555C1H1R4CB01E
1.5pF(1R5)	±0.05pF(W)	GJM0335C1E1R5WB01D	GJM1555C1H1R5WB01I
	±0.1pF(B)	GJM0335C1E1R5BB01D	GJM1555C1H1R5BB01E
	±0.25pF(C)	GJM0335C1E1R5CB01D	GJM1555C1H1R5CB01[
1.6pF(1R6)	±0.05pF(W)	GJM0335C1E1R6WB01D	GJM1555C1H1R6WB01I
	±0.1pF(B)	GJM0335C1E1R6BB01D	GJM1555C1H1R6BB01E
	±0.25pF(C)	GJM0335C1E1R6CB01D	GJM1555C1H1R6CB01E
1.7pF(1R7)	±0.05pF(W)	GJM0335C1E1R7WB01D	GJM1555C1H1R7WB01I
	±0.1pF(B)	GJM0335C1E1R7BB01D	GJM1555C1H1R7BB01E
	±0.25pF(C)	GJM0335C1E1R7CB01D	GJM1555C1H1R7CB010
1.8pF(1R8)	±0.05pF(W)	GJM0335C1E1R8WB01D	GJM1555C1H1R8WB01I
	±0.1pF(B)	GJM0335C1E1R8BB01D	GJM1555C1H1R8BB01E
	±0.25pF(C)	GJM0335C1E1R8CB01D	GJM1555C1H1R8CB01E
1.9pF(1R9)	±0.05pF(W)	GJM0335C1E1R9WB01D	GJM1555C1H1R9WB01I
	±0.1pF(B)	GJM0335C1E1R9BB01D	GJM1555C1H1R9BB01D
	±0.25pF(C)	GJM0335C1E1R9CB01D	GJM1555C1H1R9CB01
2.0pF(2R0)	±0.05pF(W)	GJM0335C1E2R0WB01D	GJM1555C1H2R0WB01I
	±0.1pF(B)	GJM0335C1E2R0BB01D	GJM1555C1H2R0BB01E
	±0.25pF(C)	GJM0335C1E2R0CB01D	GJM1555C1H2R0CB01D
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 The part number code is shown in () and Unit is shown in [].
 <>: EIA [inch] Code

 (Part Number)
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Temperature Characteristics
 Capacitance Tolerance
 Taping

2Series

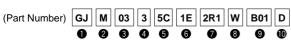
Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

LxW [mm]		0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]	-	25(1E)	50(1H)
Capacitance	Tolerance		umber
2.1pF(2R1)	±0.05pF(W)	GJM0335C1E2R1WB01D	GJM1555C1H2R1WB01D
	±0.1pF(B)	GJM0335C1E2R1BB01D	GJM1555C1H2R1BB01D
	±0.25pF(C)	GJM0335C1E2R1CB01D	GJM1555C1H2R1CB01D
2.2pF(2R2)	±0.05pF(W)	GJM0335C1E2R2WB01D	GJM1555C1H2R2WB01D
	±0.1pF(B)	GJM0335C1E2R2BB01D	GJM1555C1H2R2BB01D
	±0.25pF(C)	GJM0335C1E2R2CB01D	GJM1555C1H2R2CB01D
2.3pF(2R3)	±0.05pF(W)	GJM0335C1E2R3WB01D	GJM1555C1H2R3WB01D
	±0.1pF(B)	GJM0335C1E2R3BB01D	GJM1555C1H2R3BB01D
	±0.25pF(C)	GJM0335C1E2R3CB01D	GJM1555C1H2R3CB01D
2.4pF(2R4)	±0.05pF(W)	GJM0335C1E2R4WB01D	GJM1555C1H2R4WB01D
	±0.1pF(B)	GJM0335C1E2R4BB01D	GJM1555C1H2R4BB01D
	±0.25pF(C)	GJM0335C1E2R4CB01D	GJM1555C1H2R4CB01D
2.5pF(2R5)	±0.05pF(W)	GJM0335C1E2R5WB01D	GJM1555C1H2R5WB01D
	±0.1pF(B)	GJM0335C1E2R5BB01D	GJM1555C1H2R5BB01D
	±0.25pF(C)	GJM0335C1E2R5CB01D	GJM1555C1H2R5CB01D
2.6pF(2R6)	±0.05pF(W)	GJM0335C1E2R6WB01D	GJM1555C1H2R6WB01D
	±0.1pF(B)	GJM0335C1E2R6BB01D	GJM1555C1H2R6BB01D
	±0.25pF(C)	GJM0335C1E2R6CB01D	GJM1555C1H2R6CB01D
2.7pF(2R7)	±0.05pF(W)	GJM0335C1E2R7WB01D	GJM1555C1H2R7WB01D
	±0.1pF(B)	GJM0335C1E2R7BB01D	GJM1555C1H2R7BB01D
	±0.25pF(C)	GJM0335C1E2R7CB01D	GJM1555C1H2R7CB01D
2.8pF(2R8)	±0.05pF(W)	GJM0335C1E2R8WB01D	GJM1555C1H2R8WB01D
,	±0.1pF(B)	GJM0335C1E2R8BB01D	GJM1555C1H2R8BB01D
	±0.25pF(C)	GJM0335C1E2R8CB01D	GJM1555C1H2R8CB01D
2.9pF(2R9)	±0.05pF(W)	GJM0335C1E2R9WB01D	GJM1555C1H2R9WB01D
	±0.1pF(B)	GJM0335C1E2R9BB01D	GJM1555C1H2R9BB01D
	±0.25pF(C)	GJM0335C1E2R9CB01D	GJM1555C1H2R9CB01D
3.0pF(3R0)	±0.05pF(W)	GJM0335C1E3R0WB01D	GJM1555C1H3R0WB01D
	±0.1pF(B)	GJM0335C1E3R0BB01D	GJM1555C1H3R0BB01D
	±0.25pF(C)	GJM0335C1E3R0CB01D	GJM1555C1H3R0CB01D
3.1pF(3R1)	±0.05pF(W)	GJM0335C1E3R1WB01D	GJM1555C1H3R1WB01D
	±0.1pF(B)	GJM0335C1E3R1BB01D	GJM1555C1H3R1BB01D
	±0.25pF(C)	GJM0335C1E3R1CB01D	GJM1555C1H3R1CB01D
3.2pF(3R2)	±0.25pF(W)	GJM0335C1E3R2WB01D	GJM1555C1H3R2WB01D
5.2pt (6112)	±0.1pF(B)	GJM0335C1E3R2BB01D	GJM1555C1H3R2BB01D
	±0.25pF(C)	GJM0335C1E3R2CB01D	GJM1555C1H3R2CB01D
3.3pF(3R3)	±0.25pF(W)	GJM0335C1E3R3WB01D	GJM1555C1H3R3WB01D
5.5pr (51(5)	±0.1pF(B)	GJM0335C1E3R3BB01D	GJM1555C1H3R3BB01D
	±0.25pF(C)	GJM0335C1E3R3BB01D GJM0335C1E3R3CB01D	GJM1555C1H3R3CB01D
3.4pF(3R4)		GJM0335C1E3R3CB01D	GJM1555C1H3R4WB01D
ъ.4µг(э⊼4)	±0.05pF(W)		
	±0.1pF(B)	GJM0335C1E3R4BB01D	GJM1555C1H3R4BB01D
2 En [/205)	±0.25pF(C)	GJM0335C1E3R4CB01D	GJM1555C1H3R4CB01D
3.5pF(3R5)	±0.05pF(W)	GJM0335C1E3R5WB01D	GJM1555C1H3R5WB01D
	±0.1pF(B)	GJM0335C1E3R5BB01D	GJM1555C1H3R5BB01D
	±0.25pF(C)	GJM0335C1E3R5CB01D	GJM1555C1H3R5CB01D
3.6pF(3R6)	±0.05pF(W)	GJM0335C1E3R6WB01D	GJM1555C1H3R6WB01D
	±0.1pF(B)	GJM0335C1E3R6BB01D	GJM1555C1H3R6BB01D
	±0.25pF(C)	GJM0335C1E3R6CB01D	GJM1555C1H3R6CB01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



LxW [mm]		0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]	-	25(1E)	50(1H)
Capacitance	Tolerance	Part N	umber
3.7pF(3R7)	±0.05pF(W)	GJM0335C1E3R7WB01D	GJM1555C1H3R7WB01
	±0.1pF(B)	GJM0335C1E3R7BB01D	GJM1555C1H3R7BB01D
	±0.25pF(C)	GJM0335C1E3R7CB01D	GJM1555C1H3R7CB01E
3.8pF(3R8)	±0.05pF(W)	GJM0335C1E3R8WB01D	GJM1555C1H3R8WB01I
	±0.1pF(B)	GJM0335C1E3R8BB01D	GJM1555C1H3R8BB01E
	±0.25pF(C)	GJM0335C1E3R8CB01D	GJM1555C1H3R8CB01E
3.9pF(3R9)	±0.05pF(W)	GJM0335C1E3R9WB01D	GJM1555C1H3R9WB01I
	±0.1pF(B)	GJM0335C1E3R9BB01D	GJM1555C1H3R9BB01E
	±0.25pF(C)	GJM0335C1E3R9CB01D	GJM1555C1H3R9CB01E
4.0pF(4R0)	±0.05pF(W)	GJM0335C1E4R0WB01D	GJM1555C1H4R0WB01I
	±0.1pF(B)	GJM0335C1E4R0BB01D	GJM1555C1H4R0BB01
	±0.25pF(C)	GJM0335C1E4R0CB01D	GJM1555C1H4R0CB01[
4.1pF(4R1)	±0.05pF(W)	GJM0335C1E4R1WB01D	GJM1555C1H4R1WB01I
	±0.1pF(B)	GJM0335C1E4R1BB01D	GJM1555C1H4R1BB01E
	±0.25pF(C)	GJM0335C1E4R1CB01D	GJM1555C1H4R1CB01E
4.2pF(4R2)	±0.05pF(W)	GJM0335C1E4R2WB01D	GJM1555C1H4R2WB01I
	±0.1pF(B)	GJM0335C1E4R2BB01D	GJM1555C1H4R2BB01D
	±0.25pF(C)	GJM0335C1E4R2CB01D	GJM1555C1H4R2CB01E
4.3pF(4R3)	±0.05pF(W)	GJM0335C1E4R3WB01D	GJM1555C1H4R3WB01I
1.0p1 (11.0)	±0.1pF(B)	GJM0335C1E4R3BB01D	GJM1555C1H4R3BB01E
	±0.25pF(C)	GJM0335C1E4R3CB01D	GJM1555C1H4R3CB01E
4.4pF(4R4)	±0.05pF(W)	GJM0335C1E4R4WB01D	GJM1555C1H4R4WB01I
4.4pi (41(4)	±0.1pF(B)	GJM0335C1E4R4BB01D	GJM1555C1H4R4BB01E
4 Ep[(4DE)	±0.25pF(C)	GJM0335C1E4R4CB01D	GJM1555C1H4R4CB01E
4.5pF(4R5)	±0.05pF(W)	GJM0335C1E4R5WB01D	GJM1555C1H4R5WB01I
	±0.1pF(B)	GJM0335C1E4R5BB01D	GJM1555C1H4R5BB01D
	±0.25pF(C)	GJM0335C1E4R5CB01D	GJM1555C1H4R5CB01E
4.6pF(4R6)	±0.05pF(W)	GJM0335C1E4R6WB01D	GJM1555C1H4R6WB01I
	±0.1pF(B)	GJM0335C1E4R6BB01D	GJM1555C1H4R6BB01D
	±0.25pF(C)	GJM0335C1E4R6CB01D	GJM1555C1H4R6CB01
4.7pF(4R7)	±0.05pF(W)	GJM0335C1E4R7WB01D	GJM1555C1H4R7WB01I
	±0.1pF(B)	GJM0335C1E4R7BB01D	GJM1555C1H4R7BB01E
	±0.25pF(C)	GJM0335C1E4R7CB01D	GJM1555C1H4R7CB01[
4.8pF(4R8)	±0.05pF(W)	GJM0335C1E4R8WB01D	GJM1555C1H4R8WB01I
	±0.1pF(B)	GJM0335C1E4R8BB01D	GJM1555C1H4R8BB01D
	±0.25pF(C)	GJM0335C1E4R8CB01D	GJM1555C1H4R8CB01D
4.9pF(4R9)	±0.05pF(W)	GJM0335C1E4R9WB01D	GJM1555C1H4R9WB01I
	±0.1pF(B)	GJM0335C1E4R9BB01D	GJM1555C1H4R9BB01E
	±0.25pF(C)	GJM0335C1E4R9CB01D	GJM1555C1H4R9CB01E
5.0pF(5R0)	±0.05pF(W)	GJM0335C1E5R0WB01D	GJM1555C1H5R0WB011
	±0.1pF(B)	GJM0335C1E5R0BB01D	GJM1555C1H5R0BB01E
	±0.25pF(C)	GJM0335C1E5R0CB01D	GJM1555C1H5R0CB01D
5.1pF(5R1)	±0.05pF(W)	GJM0335C1E5R1WB01D	GJM1555C1H5R1WB01I
	±0.1pF(B)	GJM0335C1E5R1BB01D	GJM1555C1H5R1BB01E
	±0.25pF(C)	GJM0335C1E5R1CB01D	GJM1555C1H5R1CB01E
	±0.5pF(D)	GJM0335C1E5R1DB01D	GJM1555C1H5R1DB01E
5.2pF(5R2)	±0.05pF(W)	GJM0335C1E5R2WB01D	GJM1555C1H5R2WB01I
	±0.1pF(B)	GJM0335C1E5R2BB01D	GJM1555C1H5R2BB01E
	±0.25pF(C)	GJM0335C1E5R2CB01D	GJM1555C1H5R2CB01E
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The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



LxW [mm]		0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]		25(1E)	50(1H)
Capacitance	Tolerance	Part N	umber
5.3pF(5R3)	±0.05pF(W)	GJM0335C1E5R3WB01D	GJM1555C1H5R3WB01D
	±0.1pF(B)	GJM0335C1E5R3BB01D	GJM1555C1H5R3BB01D
	±0.25pF(C)	GJM0335C1E5R3CB01D	GJM1555C1H5R3CB01D
	±0.5pF(D)	GJM0335C1E5R3DB01D	GJM1555C1H5R3DB01D
5.4pF(5R4)	±0.05pF(W)	GJM0335C1E5R4WB01D	GJM1555C1H5R4WB01D
	±0.1pF(B)	GJM0335C1E5R4BB01D	GJM1555C1H5R4BB01D
	±0.25pF(C)	GJM0335C1E5R4CB01D	GJM1555C1H5R4CB01D
	±0.5pF(D)	GJM0335C1E5R4DB01D	GJM1555C1H5R4DB01D
5.5pF(5R5)	±0.05pF(W)	GJM0335C1E5R5WB01D	GJM1555C1H5R5WB01D
	±0.1pF(B)	GJM0335C1E5R5BB01D	GJM1555C1H5R5BB01D
	±0.25pF(C)	GJM0335C1E5R5CB01D	GJM1555C1H5R5CB01D
	±0.5pF(D)	GJM0335C1E5R5DB01D	GJM1555C1H5R5DB01D
5.6pF(5R6)	±0.05pF(W)	GJM0335C1E5R6WB01D	GJM1555C1H5R6WB01D
/	±0.1pF(B)	GJM0335C1E5R6BB01D	GJM1555C1H5R6BB01D
	±0.25pF(C)	GJM0335C1E5R6CB01D	GJM1555C1H5R6CB01D
	±0.5pF(D)	GJM0335C1E5R6DB01D	GJM1555C1H5R6DB01D
5.7pF(5R7)	±0.05pF(W)	GJM0335C1E5R7WB01D	GJM1555C1H5R7WB01D
	±0.1pF(B)	GJM0335C1E5R7BB01D	GJM1555C1H5R7BB01D
	±0.25pF(C)	GJM0335C1E5R7CB01D	GJM1555C1H5R7CB01D
	±0.5pF(D)	GJM0335C1E5R7DB01D	GJM1555C1H5R7DB01D
5.8pF(5R8)	±0.05pF(W)	GJM0335C1E5R8WB01D	GJM1555C1H5R8WB01D
0.0p1 (0110)	±0.1pF(B)	GJM0335C1E5R8BB01D	GJM1555C1H5R8BB01D
	±0.25pF(C)	GJM0335C1E5R8CB01D	GJM1555C1H5R8CB01D
	±0.5pF(D)	GJM0335C1E5R8DB01D	GJM1555C1H5R8DB01D
5.9pF(5R9)	±0.05pF(W)	GJM0335C1E5R9WB01D	GJM1555C1H5R9WB01D
5. /pr (513)	±0.1pF(B)	GJM0335C1E5R9BB01D	GJM1555C1H5R9BB01D
	±0.25pF(C)	GJM0335C1E5R9CB01D	GJM1555C1H5R9CB01D
		GJM0335C1E5R9DB01D	GJM1555C1H5R9DB01D
6 0pE(6P0)	±0.5pF(D)		
6.0pF(6R0)	±0.05pF(W)	GJM0335C1E6R0WB01D	GJM1555C1H6R0WB01D
	±0.1pF(B)	GJM0335C1E6R0BB01D	GJM1555C1H6R0BB01D
	±0.25pF(C)	GJM0335C1E6R0CB01D	GJM1555C1H6R0CB01D
	±0.5pF(D)	GJM0335C1E6R0DB01D	GJM1555C1H6R0DB01D
6.1pF(6R1)	±0.05pF(W)	GJM0335C1E6R1WB01D	GJM1555C1H6R1WB01D
	±0.1pF(B)	GJM0335C1E6R1BB01D	GJM1555C1H6R1BB01D
	±0.25pF(C)	GJM0335C1E6R1CB01D	GJM1555C1H6R1CB01D
1.0 5/55	±0.5pF(D)	GJM0335C1E6R1DB01D	GJM1555C1H6R1DB01D
6.2pF(6R2)	±0.05pF(W)	GJM0335C1E6R2WB01D	GJM1555C1H6R2WB01D
	±0.1pF(B)	GJM0335C1E6R2BB01D	GJM1555C1H6R2BB01D
	±0.25pF(C)	GJM0335C1E6R2CB01D	GJM1555C1H6R2CB01D
	±0.5pF(D)	GJM0335C1E6R2DB01D	GJM1555C1H6R2DB01D
6.3pF(6R3)	±0.05pF(W)	GJM0335C1E6R3WB01D	GJM1555C1H6R3WB01D
	±0.1pF(B)	GJM0335C1E6R3BB01D	GJM1555C1H6R3BB01D
	±0.25pF(C)	GJM0335C1E6R3CB01D	GJM1555C1H6R3CB01D
	±0.5pF(D)	GJM0335C1E6R3DB01D	GJM1555C1H6R3DB01D
6.4pF(6R4)	±0.05pF(W)	GJM0335C1E6R4WB01D	GJM1555C1H6R4WB01D
	±0.1pF(B)	GJM0335C1E6R4BB01D	GJM1555C1H6R4BB01D
	±0.25pF(C)	GJM0335C1E6R4CB01D	GJM1555C1H6R4CB01D
	±0.5pF(D)	GJM0335C1E6R4DB01D	GJM1555C1H6R4DB01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



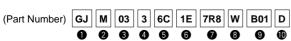
LxW [mm]		0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]]	25(1E)	50(1H)
Capacitance	Tolerance	Part N	umber
6.5pF(6R5)	±0.05pF(W)	GJM0335C1E6R5WB01D	GJM1555C1H6R5WB01I
	±0.1pF(B)	GJM0335C1E6R5BB01D	GJM1555C1H6R5BB01E
	±0.25pF(C)	GJM0335C1E6R5CB01D	GJM1555C1H6R5CB01E
	±0.5pF(D)	GJM0335C1E6R5DB01D	GJM1555C1H6R5DB01E
6.6pF(6R6)	±0.05pF(W)	GJM0335C1E6R6WB01D	GJM1555C1H6R6WB01I
	±0.1pF(B)	GJM0335C1E6R6BB01D	GJM1555C1H6R6BB01D
	±0.25pF(C)	GJM0335C1E6R6CB01D	GJM1555C1H6R6CB01E
	±0.5pF(D)	GJM0335C1E6R6DB01D	GJM1555C1H6R6DB01E
6.7pF(6R7)	±0.05pF(W)	GJM0335C1E6R7WB01D	GJM1555C1H6R7WB01I
	±0.1pF(B)	GJM0335C1E6R7BB01D	GJM1555C1H6R7BB01E
	±0.25pF(C)	GJM0335C1E6R7CB01D	GJM1555C1H6R7CB01E
	±0.5pF(D)	GJM0335C1E6R7DB01D	GJM1555C1H6R7DB01E
6.8pF(6R8)	±0.05pF(W)	GJM0335C1E6R8WB01D	GJM1555C1H6R8WB01[
	±0.1pF(B)	GJM0335C1E6R8BB01D	GJM1555C1H6R8BB01D
	±0.25pF(C)	GJM0335C1E6R8CB01D	GJM1555C1H6R8CB01D
	±0.5pF(D)	GJM0335C1E6R8DB01D	GJM1555C1H6R8DB01D
6.9pF(6R9)	±0.05pF(W)	GJM0336C1E6R9WB01D	GJM1555C1H6R9WB01I
	±0.1pF(B)	GJM0336C1E6R9BB01D	GJM1555C1H6R9BB01D
	±0.25pF(C)	GJM0336C1E6R9CB01D	GJM1555C1H6R9CB01D
	±0.5pF(D)	GJM0336C1E6R9DB01D	GJM1555C1H6R9DB01D
7.0pF(7R0)	±0.05pF(W)	GJM0336C1E7R0WB01D	GJM1555C1H7R0WB01
	±0.1pF(B)	GJM0336C1E7R0BB01D	GJM1555C1H7R0BB01D
	±0.25pF(C)	GJM0336C1E7R0CB01D	GJM1555C1H7R0CB01E
	±0.5pF(D)	GJM0336C1E7R0DB01D	GJM1555C1H7R0DB01D
7.1pF(7R1)	±0.05pF(W)	GJM0336C1E7R1WB01D	GJM1555C1H7R1WB01[
	±0.1pF(B)	GJM0336C1E7R1BB01D	GJM1555C1H7R1BB01D
	±0.25pF(C)	GJM0336C1E7R1CB01D	GJM1555C1H7R1CB01E
	±0.5pF(D)	GJM0336C1E7R1DB01D	GJM1555C1H7R1DB01E
7.2pF(7R2)	±0.05pF(W)	GJM0336C1E7R2WB01D	GJM1555C1H7R2WB01
	±0.1pF(B)	GJM0336C1E7R2BB01D	GJM1555C1H7R2BB01D
	±0.25pF(C)	GJM0336C1E7R2CB01D	GJM1555C1H7R2CB01E
	±0.5pF(D)	GJM0336C1E7R2DB01D	GJM1555C1H7R2DB01D
7.3pF(7R3)	±0.05pF(W)	GJM0336C1E7R3WB01D	GJM1555C1H7R3WB01
	±0.1pF(B)	GJM0336C1E7R3BB01D	GJM1555C1H7R3BB01D
	±0.25pF(C)	GJM0336C1E7R3CB01D	GJM1555C1H7R3CB01D
	±0.5pF(D)	GJM0336C1E7R3DB01D	GJM1555C1H7R3DB01D
7.4pF(7R4)	±0.05pF(W)	GJM0336C1E7R4WB01D	GJM1555C1H7R4WB010
	±0.1pF(B)	GJM0336C1E7R4BB01D	GJM1555C1H7R4BB01D
	±0.25pF(C)	GJM0336C1E7R4CB01D	GJM1555C1H7R4CB01D
	±0.5pF(D)	GJM0336C1E7R4DB01D	GJM1555C1H7R4DB01D
7.5pF(7R5)	±0.05pF(W)	GJM0336C1E7R5WB01D	GJM1555C1H7R5WB011
	±0.1pF(B)	GJM0336C1E7R5BB01D	GJM1555C1H7R5BB01D
	±0.25pF(C)	GJM0336C1E7R5CB01D	GJM1555C1H7R5CB01D
	±0.5pF(D)	GJM0336C1E7R5DB01D	GJM1555C1H7R5DB01D
7.6pF(7R6)	±0.05pF(W)	GJM0336C1E7R6WB01D	GJM1555C1H7R6WB01
	±0.1pF(B)	GJM0336C1E7R6BB01D	GJM1555C1H7R6BB01D
	±0.25pF(C)	GJM0336C1E7R6CB01D	GJM1555C1H7R6CB01E
	±0.5pF(D)	GJM0336C1E7R6DB01D	GJM1555C1H7R6DB01E
7.7pF(7R7)	±0.05pF(W)	GJM0336C1E7R7WB01D	GJM1555C1H7R7WB01[
	±0.1pF(B)	GJM0336C1E7R7BB01D	GJM1555C1H7R7BB01D
	±0.25pF(C)	GJM0336C1E7R7CB01D	GJM1555C1H7R7CB01E
	±0.5pF(D)	GJM0336C1E7R7DB01D	GJM1555C1H7R7DB01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

muRata

LxW [mm]		0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]	-	25(1E)	50(1H)
Capacitance	Tolerance	Part N	umber
7.8pF(7R8)	±0.05pF(W)	GJM0336C1E7R8WB01D	GJM1555C1H7R8WB01D
	±0.1pF(B)	GJM0336C1E7R8BB01D	GJM1555C1H7R8BB01D
	±0.25pF(C)	GJM0336C1E7R8CB01D	GJM1555C1H7R8CB01D
	±0.5pF(D)	GJM0336C1E7R8DB01D	GJM1555C1H7R8DB01D
7.9pF(7R9)	±0.05pF(W)	GJM0336C1E7R9WB01D	GJM1555C1H7R9WB01D
	±0.1pF(B)	GJM0336C1E7R9BB01D	GJM1555C1H7R9BB01D
	±0.25pF(C)	GJM0336C1E7R9CB01D	GJM1555C1H7R9CB01D
	±0.5pF(D)	GJM0336C1E7R9DB01D	GJM1555C1H7R9DB01D
8.0pF(8R0)	±0.05pF(W)	GJM0336C1E8R0WB01D	GJM1555C1H8R0WB01D
	±0.1pF(B)	GJM0336C1E8R0BB01D	GJM1555C1H8R0BB01D
	±0.25pF(C)	GJM0336C1E8R0CB01D	GJM1555C1H8R0CB01D
	±0.5pF(D)	GJM0336C1E8R0DB01D	GJM1555C1H8R0DB01D
8.1pF(8R1)	±0.05pF(W)	GJM0336C1E8R1WB01D	GJM1555C1H8R1WB01D
	±0.1pF(B)	GJM0336C1E8R1BB01D	GJM1555C1H8R1BB01D
	±0.25pF(C)	GJM0336C1E8R1CB01D	GJM1555C1H8R1CB01D
	±0.5pF(D)	GJM0336C1E8R1DB01D	GJM1555C1H8R1DB01D
8.2pF(8R2)	±0.05pF(W)	GJM0336C1E8R2WB01D	GJM1555C1H8R2WB01D
	±0.1pF(B)	GJM0336C1E8R2BB01D	GJM1555C1H8R2BB01D
	±0.25pF(C)	GJM0336C1E8R2CB01D	GJM1555C1H8R2CB01D
	±0.5pF(D)	GJM0336C1E8R2DB01D	GJM1555C1H8R2DB01D
8.3pF(8R3)	±0.05pF(W)	GJM0336C1E8R3WB01D	GJM1555C1H8R3WB01D
	±0.1pF(B)	GJM0336C1E8R3BB01D	GJM1555C1H8R3BB01D
	±0.25pF(C)	GJM0336C1E8R3CB01D	GJM1555C1H8R3CB01D
	±0.5pF(D)	GJM0336C1E8R3DB01D	GJM1555C1H8R3DB01D
8.4pF(8R4)	±0.05pF(W)	GJM0336C1E8R4WB01D	GJM1555C1H8R4WB01D
	±0.1pF(B)	GJM0336C1E8R4BB01D	GJM1555C1H8R4BB01D
	±0.25pF(C)	GJM0336C1E8R4CB01D	GJM1555C1H8R4CB01D
	±0.5pF(D)	GJM0336C1E8R4DB01D	GJM1555C1H8R4DB01D
8.5pF(8R5)	±0.05pF(W)	GJM0336C1E8R5WB01D	GJM1555C1H8R5WB01D
	±0.1pF(B)	GJM0336C1E8R5BB01D	GJM1555C1H8R5BB01D
	±0.25pF(C)	GJM0336C1E8R5CB01D	GJM1555C1H8R5CB01D
	±0.5pF(D)	GJM0336C1E8R5DB01D	GJM1555C1H8R5DB01D
8.6pF(8R6)	±0.05pF(W)	GJM0336C1E8R6WB01D	GJM1555C1H8R6WB01D
-	±0.1pF(B)	GJM0336C1E8R6BB01D	GJM1555C1H8R6BB01D
	±0.25pF(C)	GJM0336C1E8R6CB01D	GJM1555C1H8R6CB01D
	±0.5pF(D)	GJM0336C1E8R6DB01D	GJM1555C1H8R6DB01D
8.7pF(8R7)	±0.05pF(W)	GJM0336C1E8R7WB01D	GJM1555C1H8R7WB01D
	±0.1pF(B)	GJM0336C1E8R7BB01D	GJM1555C1H8R7BB01D
	±0.25pF(C)	GJM0336C1E8R7CB01D	GJM1555C1H8R7CB01D
	±0.5pF(D)	GJM0336C1E8R7DB01D	GJM1555C1H8R7DB01D
8.8pF(8R8)	±0.05pF(W)	GJM0336C1E8R8WB01D	GJM1555C1H8R8WB01D
/	±0.1pF(B)	GJM0336C1E8R8BB01D	GJM1555C1H8R8BB01D
	±0.25pF(C)	GJM0336C1E8R8CB01D	GJM1555C1H8R8CB01D
	±0.5pF(D)	GJM0336C1E8R8DB01D	GJM1555C1H8R8DB01D
8.9pF(8R9)	±0.05pF(W)	GJM0336C1E8R9WB01D	GJM1555C1H8R9WB01D
	±0.1pF(B)	GJM0336C1E8R9BB01D	GJM1555C1H8R9BB01D
	±0.25pF(C)	GJM0336C1E8R9CB01D	GJM1555C1H8R9CB01D
	p		20

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

4



LxW [mm]		0.6x0.3(03)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]	25(1E)	50(1H)
Capacitance	Tolerance	Part N	umber
9.0pF(9R0)	±0.05pF(W)	GJM0336C1E9R0WB01D	GJM1555C1H9R0WB01I
	±0.1pF(B)	GJM0336C1E9R0BB01D	GJM1555C1H9R0BB01D
	±0.25pF(C)	GJM0336C1E9R0CB01D	GJM1555C1H9R0CB01D
	±0.5pF(D)	GJM0336C1E9R0DB01D	GJM1555C1H9R0DB01D
9.1pF(9R1)	±0.05pF(W)	GJM0336C1E9R1WB01D	GJM1555C1H9R1WB01
	±0.1pF(B)	GJM0336C1E9R1BB01D	GJM1555C1H9R1BB01E
	±0.25pF(C)	GJM0336C1E9R1CB01D	GJM1555C1H9R1CB01E
	±0.5pF(D)	GJM0336C1E9R1DB01D	GJM1555C1H9R1DB01E
9.2pF(9R2)	±0.05pF(W)	GJM0336C1E9R2WB01D	GJM1555C1H9R2WB01I
	±0.1pF(B)	GJM0336C1E9R2BB01D	GJM1555C1H9R2BB01E
	±0.25pF(C)	GJM0336C1E9R2CB01D	GJM1555C1H9R2CB01E
	±0.5pF(D)	GJM0336C1E9R2DB01D	GJM1555C1H9R2DB01E
9.3pF(9R3)	±0.05pF(W)	GJM0336C1E9R3WB01D	GJM1555C1H9R3WB01I
	±0.1pF(B)	GJM0336C1E9R3BB01D	GJM1555C1H9R3BB01D
	±0.25pF(C)	GJM0336C1E9R3CB01D	GJM1555C1H9R3CB01E
	±0.5pF(D)	GJM0336C1E9R3DB01D	GJM1555C1H9R3DB01
9.4pF(9R4)	±0.05pF(W)	GJM0336C1E9R4WB01D	GJM1555C1H9R4WB01I
	±0.1pF(B)	GJM0336C1E9R4BB01D	GJM1555C1H9R4BB011
	±0.25pF(C)	GJM0336C1E9R4CB01D	GJM1555C1H9R4CB01
	±0.5pF(D)	GJM0336C1E9R4DB01D	GJM1555C1H9R4DB01
9.5pF(9R5)	±0.05pF(W)	GJM0336C1E9R5WB01D	GJM1555C1H9R5WB01I
	±0.1pF(B)	GJM0336C1E9R5BB01D	GJM1555C1H9R5BB01E
	±0.25pF(C)	GJM0336C1E9R5CB01D	GJM1555C1H9R5CB01E
	±0.5pF(D)	GJM0336C1E9R5DB01D	GJM1555C1H9R5DB01D
9.6pF(9R6)	±0.05pF(W)	GJM0336C1E9R6WB01D	GJM1555C1H9R6WB01I
	±0.1pF(B)	GJM0336C1E9R6BB01D	GJM1555C1H9R6BB01D
	±0.25pF(C)	GJM0336C1E9R6CB01D	GJM1555C1H9R6CB01D
	±0.5pF(D)	GJM0336C1E9R6DB01D	GJM1555C1H9R6DB01D
9.7pF(9R7)	±0.05pF(W)	GJM0336C1E9R7WB01D	GJM1555C1H9R7WB01I
	±0.1pF(B)	GJM0336C1E9R7BB01D	GJM1555C1H9R7BB01D
	±0.25pF(C)	GJM0336C1E9R7CB01D	GJM1555C1H9R7CB01D
	±0.5pF(D)	GJM0336C1E9R7DB01D	GJM1555C1H9R7DB01D
9.8pF(9R8)	±0.05pF(W)	GJM0336C1E9R8WB01D	GJM1555C1H9R8WB01
	±0.1pF(B)	GJM0336C1E9R8BB01D	GJM1555C1H9R8BB01D
	±0.25pF(C)	GJM0336C1E9R8CB01D	GJM1555C1H9R8CB01D
	±0.5pF(D)	GJM0336C1E9R8DB01D	GJM1555C1H9R8DB01D
9.9pF(9R9)	±0.05pF(W)	GJM0336C1E9R9WB01D	GJM1555C1H9R9WB01I
	±0.1pF(B)	GJM0336C1E9R9BB01D	GJM1555C1H9R9BB01D
	±0.25pF(C)	GJM0336C1E9R9CB01D	GJM1555C1H9R9CB01E
	±0.5pF(D)	GJM0336C1E9R9DB01D	GJM1555C1H9R9DB01E

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

4



LxW [mm]		0.6x0.3(0	3)<0201>	1.0x0.5(15)<0402>
Rated Volt. [Vdc]		25(1E)	6.3 (0J)	50(1H)
Capacitance	Tolerance		Part Number	
10pF(100)	±2%(G)	GJM0336C1E100GB01D		GJM1555C1H100GB01D
	±5%(J)	GJM0336C1E100JB01D		GJM1555C1H100JB01D
11pF(110)	±2%(G)	GJM0336C1E110GB01D		GJM1555C1H110GB01D
	±5%(J)	GJM0336C1E110JB01D		GJM1555C1H110JB01D
12pF(120)	±2%(G)	GJM0336C1E120GB01D		GJM1555C1H120GB01D
	±5%(J)	GJM0336C1E120JB01D		GJM1555C1H120JB01D
13pF(130)	±2%(G)	GJM0336C1E130GB01D		GJM1555C1H130GB01D
	±5%(J)	GJM0336C1E130JB01D		GJM1555C1H130JB01D
15pF(150)	±2%(G)	GJM0336C1E150GB01D		GJM1555C1H150GB01D
	±5%(J)	GJM0336C1E150JB01D		GJM1555C1H150JB01D
16pF(160)	±2%(G)	GJM0336C1E160GB01D		GJM1555C1H160GB01D
	±5%(J)	GJM0336C1E160JB01D		GJM1555C1H160JB01D
18pF(180)	±2%(G)	GJM0336C1E180GB01D		GJM1555C1H180GB01D
	±5%(J)	GJM0336C1E180JB01D		GJM1555C1H180JB01D
20pF(200)	±2%(G)	GJM0336C1E200GB01D		GJM1555C1H200GB01D
	±5%(J)	GJM0336C1E200JB01D		GJM1555C1H200JB01D
22pF(220)	±2%(G)		GJM0335C0J220GB01D	
	±5%(J)		GJM0335C0J220JB01D	
24pF(240)	±2%(G)		GJM0335C0J240GB01D	
	±5%(J)		GJM0335C0J240JB01D	
27pF(270)	±2%(G)		GJM0335C0J270GB01D	
	±5%(J)		GJM0335C0J270JB01D	
30pF(300)	±2%(G)		GJM0335C0J300GB01D	
/	±5%(J)		GJM0335C0J300JB01D	
33pF(330)	±2%(G)		GJM0335C0J330GB01D	
	±5%(J)		GJM0335C0J330JB01D	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

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Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

Temperature Characteristics
 Capacitance Tolerance
 Taping.

2Series

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

GJM Series Specifications and Test Methods

N			Specifications		Test Mathed									
No.	Ite	em	Temperature Compensating Type		Test Method									
1	Operating Temperati		−55 to +125℃	Reference Temperature: 25°C (2C, 3C, 4C: 20°C)										
2	2 Rated Voltage		See the previous pages.	The rated voltage is defined as the maximum voltage wh may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P.P} o whichever is larger, should be maintained within the rate voltage range.										
3	Appearar	nce	No defects or abnormalities	Visual inspection										
4	Dimensio	ons	Within the specified dimensions	Using calipers										
5	Dielectric	c Strength	No defects or abnormalities	is applied between the	oserved when 300% of the rated voltage terminations for 1 to 5 seconds, scharge current is less than 50mA.									
6	Insulation (I.R.)	Resistance	10,000M Ω min. or 500 $\Omega\cdot$ F min. (Whichever is smaller)		ce should be measured with a DC the rated voltage at 25℃ and 75%RH utes of charging.									
7	Capacita	nce	Within the specified tolerance	The capacitance/Q sho frequency and voltage	buld be measured at 25℃ at the shown in the table.									
0		30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF)		Frequency	1±0.1MHz									
8	Q			Voltage	0.5 to 5Vrms									
	Temperature Coefficient		Within the specified tolerance (Table A)	The capacitance change each specified temperature Compensition										
9	Capacitance Temperature Characteristics	Capacitance Drift	Within ±0.2% or ±0.05pF (Whichever is larger.)	capacitance measured When cycling the temp 5, (5C: +25 to 125°C: c capacitance should be temperature coefficien The capacitance drift is between the maximum	icient is determined using the I in step 3 as a reference. berature sequentially from step 1 through other temp. coeffs.: +20 to 125°C) the within the specified tolerance for the t and capacitance change as Table A. s calculated by dividing the differences a and minimum measured values in steps citance value in step 3.									
						5								Step
				1	Reference Temp. ±2									
				2	-55±3									
				3 4	Reference Temp. ±2 125±3									
				5	Reference Temp. ±2									
				Fig. 1 using a eutectic s with the test jig for $10\pm$ with an iron or using the	the test jig (glass epoxy board) shown in solder. Then apply a 5N* force in parallel 1 sec. The soldering should be done either e reflow method and should be conducted Idering is uniform and free of defects such *2N (GJM03)									
10		Adhesive Strength of Termination No removal of the terminations or other defect should occur.	No removal of the terminations or other defect should occur.		a b c									
				GJM03	0.3 0.9 0.3									
				GJM15	0.4 1.5 0.5 (in mm) Fig. 1									
				<u> </u>	Fig. 1									

Continued on the following page.



GJM Series Specifications and Test Methods

Continued from the preceding page.

No.	lte	Item		- Test Method				
ч О .	lite		Temperature Compensating Type					
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board) in the				
11	Vibration Resistance	Capacitance	Within the specified tolerance 30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF)	 same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic mot having a total amplitude of 1.5mm, the frequency being varie uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutuall perpendicular directions (total of 6 hours). 				
		Appearance	No marking defects	Solder the capacitor to the test jig (glass epoxy boards) shown				
		Capacitance Change	Within ±5% or ±0.5pF (Whichever is larger)	 in Fig. 2 using a eutectic solder. Then apply a force in the direction shown in Fig. 3. The soldering should be done by the reflow method and shoul be conducted with care so that the soldering is uniform and free of defects such as heat shock. 				
12 Deflection		ı	Type a b c GJM03 0.3 0.9 0.3 GJM15 0.4 1.5 0.5 (in mm)	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1 Capacitance meter 45 45 (in mm) Fig. 3				
13	Solderability of Termination 75% of the terminations are to be soldered evenly and continuously.		-	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5° or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C				
			The measured and observed characteristics should satisfy the specifications in the following table.					
		Appearance	No marking defects					
14	Resistance to Soldering Heat	Capacitance Change	Within ±2.5% or ±0.25pF (Whichever is larger)	Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu				
14		Q	30pF and over: Q≧1000 30pF and below: Q≧400+20C C: Nominal Capacitance (pF)	solder solution at 270±5℃ for 10±0.5 seconds. Let sit at room temperature for 24±2 hours.				
		I.R.	More than 10,000M Ω or 500 $\Omega \cdot F$ (Whichever is smaller)	_				
		Dielectric Strength	No failure					
			The measured and observed characteristics should satisfy the specifications in the following table.	Fix the capacitor to the supporting jig in the same manner and				
		Appearance Capacitance	No marking defects Within ±2.5% or ±0.25pF	under the same conditions as (10). Perform the five cycles				
	Temperature	Change	(Whichever is larger)	according to the four heat treatments listed in the following table Let sit for 24±2 hours at room temperature, then measure.				
15	Cycle	Q	30pF and over: Q≧1000 30pF and below: Q≧400+20C	Step 1 2 3 4 Turne (m) Min. Operating Room Max. Operating Room				
		_	C: Nominal Capacitance (pF)	$\begin{array}{c c} \hline \text{Temp. (°C)} & \text{Temp. } \underline{+3} & \text{Temp.} & \text{Temp. } \underline{+3} & \text{Temp.} \\ \hline \end{array}$				
		I.R. Dielectric	More than 10,000M Ω or 500 Ω · F (Whichever is smaller)	<u>Time (min.)</u> 30±3 2 to 3 30±3 2 to 3				
_		Strength	No failure					
			The measured and observed characteristics should satisfy the specifications in the following table.	-				
		Appearance	No marking defects					
16	Humidity, Steady	Capacitance Change	Within ±5% or ±0.5pF (Whichever is larger)	Let the capacitor sit at $40\pm2^{\circ}$ and 90 to 95% humidity for 500 ± 12 hours.				
10	Steady – State	Q	30pF and below:Q≥35010pF and over, 30pF and below:Q≥275+ ½ C10pF and below:Q≥200+10CC: Nominal Capacitance (pF)	Remove and let sit for 24±2 hours (temperature compensation type) at room temperature, then measure.				
	I.R.		More than 10,000M Ω or 500 $\Omega \cdot F$ (Whichever is smaller)					



GJM Series Specifications and Test Methods

Continued from the preceding page.

Na	D. Item Temperature Compensating Type		Specifications	TestMathed		
No.			Temperature Compensating Type	- Test Method		
			The measured and observed characteristics should satisfy the specifications in the following table.			
		Appearance	No marking defects			
17	Humidity Load	Capacitance Change	Within $\pm 7.5\%$ or ± 0.75 pF (Whichever is larger)	Apply the rated voltage at 40±2℃ and 90 to 95% humidity for 500±12 hours. Remove and let sit for 24±2 hours at room temperature, then		
	Loud	٥	30pF and over: Q≥200 30pF and below: Q≥100+ ♀ C C: Nominal Capacitance (pF)	measure. The charge/discharge current is less than 50mA.		
	I.R. More than 500M Ω or 25 $\Omega \cdot F$ (Whichever is smaller)		More than 500M Ω or 25 Ω · F (Whichever is smaller)			
			The measured and observed characteristics should satisfy the specifications in the following table.			
		Appearance	No marking defects			
18	High Temperature	Capacitance Change	Within $\pm 3\%$ or ± 0.3 pF (Whichever is larger)	Apply 200% of the rated voltage for 1000±12 hours at the maximum operating temperature ±3℃. Let sit for 24±2 hours (temperature compensating type) at room temperature, then		
10	Load	Q	30pF and over:Q≥35010pF and over, 30pF and below:Q≥275+ 5 C10pF and below:Q≥200+10CC: Nominal Capacitance (pF)	The charge/discharge current is less than 50mA.		
		I.R.	More than 1,000M Ω or 50 $\Omega \cdot$ F (Whichever is smaller)			
19	19 ESR		0.1pF≦C≦1pF: $350m\Omega \cdot pF$ below 1pF <c≦5pf: <math="">300m\Omega below 5pF<c≦10pf: <math="">250m\Omega below</c≦10pf:></c≦5pf:>	The ESR should be measured at room temperature, and frequency 1 ± 0.2 GHz with the equivalent of BOONTON Model 34A.		
			10pF <c≦33pf: 400mω="" below<="" td=""><td>The ESR should be measured at room temperature, and frequency 500±50MHz with the equivalent of HP8753B.</td></c≦33pf:>	The ESR should be measured at room temperature, and frequency 500±50MHz with the equivalent of HP8753B.		

Table A

(1)

		Capacitance Change from 25°C Value (%)							
Char. Code	Temp. Coeff. (ppm/℃) *1	_55℃		−30°C		_10℃			
	(ppin/c) · i	Max.	Min.	Max.	Min.	Max.	Min.		
5C	0±30	0.58	-0.24	0.40	-0.17	0.25	-0.11		
6C	0±60	0.87	-0.48	0.60	-0.33	0.38	-0.21		

*1: Nominal values denote the temperature coefficient within a range of 25 to 125°C.

(2)

		Capacitance Change from 20°C Value (%)							
Char.	Nominal Values (ppm/℃) *2	−55°C		–25℃		−10°C			
	(ppm/c) · z	Max.	Min.	Max.	Min.	Max.	Min.		
2C	0±60	0.82	-0.45	0.49	-0.27	0.33	-0.18		
3C	0±120	1.37	-0.90	0.82	-0.54	0.55	-0.36		
4C	0±250	2.56	-1.88	1.54	-1.13	1.02	-0.75		

*2: Nominal values denote the temperature coefficient within a range of 20 to 125°C.



Chip Monolithic Ceramic Capacitors

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High Frequency GQM Series

Features

- 1. HiQ and low ESR at VHF, UHF, Microwave
- 2. Feature improvement, low power consumption for mobile telecommunication. (Base station, terminal, etc.)

Applications

High frequency circuit (Mobile telecommunication, etc.)



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Dort Number	Dimensions (mm)							
Part Number	L	W	Т	е	g min.			
GQM187	1.6 ±0.15	0.8 ±0.15	0.7 ±0.1	0.2 to 0.5	0.5			
GQM188	1.6 ±0.1	0.8 ±0.1	0.8 ±0.1	0.2 to 0.5	0.5			
GQM219 (50,100V)	2.0 ±0.1	1.25 ±0.1	0.85 ±0.1	0.2 to 0.7	0.7			
GQM219 (250V)	2.0 ±0.15	1.25 ±0.15	0.85 ±0.15	0.2 to 0.7	0.7			

Capacitance Table

Temperature Compensating Type C0G(5C) Characteristics

7 ex.7: T Dimension [mm]

тс			C0G	(5C)		
LxW [mm]		1.6x0.8 (18) <0603>		2	2.0x1.25 (21) <0805>	5
Rated Voltage Capacitance [Vdc]	250 (2E)	100 (2A)	50 (1H)	250 (2E)	100 (2A)	50 (1H)
0.10pF(R10)	7					
0.20pF(R20)	7					
0.30pF(R30)	7					
0.40pF(R40)	7					
0.50pF(R50)	7	8		9	9	
0.75pF(R75)	7	8		9	9	
1.0pF(1R0)	7	8		9	9	
1.1pF(1R1)	7	8		9	9	
1.2pF(1R2)	7	8		9	9	
1.3pF(1R3)	7	8		9	9	
1.5pF(1R5)	7	8		9	9	
1.6pF(1R6)	7	8		9	9	
1.8pF(1R8)	7	8		9	9	
2.0pF(2R0)	7	8		9	9	
2.2pF(2R2)	7	8		9	9	
2.4pF(2R4)	7	8		9	9	
2.7pF(2R7)	7	8		9	9	
3.0pF(3R0)	7	8		9	9	
3.3pF(3R3)	7	8		9	9	
3.6pF(3R6)	7	8		9	9	
3.9pF(3R9)	7	8		9	9	
4.0pF(4R0)	7	8		9	9	
4.3pF(4R3)	7	8		9	9	
4.7pF(4R7)	7	8		9	9	
5.0pF(5R0)	7	8		9	9	
5.1pF(5R1)	7	8		9	9	
5.6pF(5R6)	7	8		9	9	
6.0pF(6R0)	7	8		9	9	
6.2pF(6R2)	7	8		9	9	
6.8pF(6R8)	7	8		9	9	
7.0pF(7R0)	7		8	9	9	

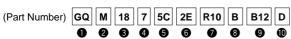
TC	C0G(5C)					
LxW [mm]		1.6x0.8 (18) <0603>			2.0x1.25 (21) <0805>	
Rated Voltage Capacitance [Vdc]	250 (2E)	100 (2A)	50 (1H)	250 (2E)	100 (2A)	50 (1H)
7.5pF(7R5)	7		8	9	9	
8.0pF(8R0)	7		8	9	9	
8.2pF(8R2)	7		8	9	9	
9.0pF(9R0)	7		8	9	9	
9.1pF(9R1)	7		8	9	9	
10pF(100)	7		8	9	9	
11pF(110)	7		8	9	9	
12pF(120)	7		8	9	9	
13pF(130)	7		8	9	9	
15pF(150)	7		8	9	9	
16pF(160)	7		8	9	9	
18pF(180)	7		8	9	9	
20pF(200)	7		8	9		9
22pF(220)	7		8	9		9
24pF(240)	7		8	9		9
27pF(270)	7		8	9		9
30pF(300)	7		8	9		9
33pF(330)	7		8	9		9
36pF(360)	7		8	9		9
39pF(390)	7		8	9		9
43pF(430)	7		8	9		9
47pF(470)	7		8	9		9
51pF(510)			8	9		9
56pF(560)			8	9		9
62pF(620)			8	9		9
68pF(680)	1		8	9		9
75pF(750)	1		8	9		9
82pF(820)	1		8	9		9
91pF(910)	1		8	9		9
100pF(101)			8	9		9

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



LxW [mm] Rated Volt. [Vdc]		1.6x0.8(1) 250(2E)	100(2A)
Capacitance	Tolerance	Part N	
0.10pF(R10)	±0.1pF(B)	GQM1875C2ER10BB12D	
0.20pF(R20)	±0.1pF(B)	GQM1875C2ER20BB12D	
0.20pF(R20)	±0.1pF(B)	GQM1875C2ER20BB12D	
0.30pr (1.30)	±0.25pF(C)	GQM1875C2ER30CB12D	
0.40pF(R40)	±0.1pF(B)	GQM1875C2ER40BB12D	
0.40pi (1140)	±0.25pF(C)	GQM1875C2ER40CB12D	
0.50pF(R50)	±0.1pF(B)	GQM1875C2ER50BB12D	GQM1885C2AR50BB01D
0.00p1 (100)	±0.25pF(C)	GQM1875C2ER50CB12D	GQM1885C2AR50CB01E
0.75pF(R75)	±0.1pF(B)	GQM1875C2ER75BB12D	GQM1885C2AR75BB01E
0.7 opt (11 0)	±0.25pF(C)	GQM1875C2ER75CB12D	GQM1885C2AR75CB01E
1.0pF(1R0)	±0.1pF(B)	GQM1875C2E1R0BB12D	GQM1885C2A1R0BB01E
1.0pt (11.0)	±0.25pF(C)	GQM1875C2E1R0CB12D	GQM1885C2A1R0CB01E
1.1pF(1R1)	±0.1pF(B)	GQM1875C2E1R1BB12D	GQM1885C2A1R1BB01E
1. ipi (iixi)	±0.25pF(C)	GQM1875C2E1R1CB12D	GQM1885C2A1R1CB01E
1.2pF(1R2)	±0.25pr (C) ±0.1pF(B)	GQM1875C2E1R2BB12D	GQM1885C2A1R16B01E
1.2pt (11.2)	±0.25pF(C)	GQM1875C2E1R2CB12D	GQM1885C2A1R2CB01E
1.3pF(1R3)	±0.1pF(B)	GQM1875C2E1R3BB12D	GQM1885C2A1R3BB01E
1.5pr (11.5)	±0.25pF(C)	GQM1875C2E1R3CB12D	GQM1885C2A1R3CB01E
1.5pF(1R5)	±0.1pF(B)	GQM1875C2E1R5BB12D	GQM1885C2A1R5BB01E
1.5pr (11.5)	±0.25pF(C)	GQM1875C2E1R5CB12D	GQM1885C2A1R5CB01E
1.6pF(1R6)	±0.1pF(B)	GQM1875C2E1R6BB12D	GQM1885C2A1R6BB01E
1.0pr (11.0)	±0.25pF(C)	GQM1875C2E1R6CB12D	GQM1885C2A1R6CB01E
1.8pF(1R8)	±0.25pr (C) ±0.1pF(B)	GQM1875C2E1R8BB12D	GQM1885C2A1R8BB01E
1.0pr (11.0)	±0.25pF(C)	GQM1875C2E1R8CB12D	GQM1885C2A1R8CB01E
2.0pF(2R0)	±0.25pr (C) ±0.1pF(B)	GQM1875C2E2R0BB12D	GQM1885C2A2R0BB01E
2.0pr (2100)	±0.25pF(C)	GQM1875C2E2R0CB12D	GQM1885C2A2R0BB01E
2.2pF(2R2)	±0.25pr (C) ±0.1pF(B)	GQM1875C2E2R2BB12D	GQM1885C2A2R08B01E
2.2pt (2112)	±0.25pF(C)	GQM1875C2E2R2CB12D	GQM1885C2A2R2BB01E
2.4pF(2R4)	±0.1pF(B)	GQM1875C2E2R4BB12D	GQM1885C2A2R28B01E
2.4pt (2114)	±0.25pF(C)	GQM1875C2E2R4CB12D	GQM1885C2A2R4BB01E
2.7pF(2R7)		GQM1875C2E2R7BB12D	GQM1885C2A2R4CB01E
2./μΓ(ΔΝΙ)	±0.1pF(B) ±0.25pF(C)	GQM1875C2E2R7BB12D	GQM1885C2A2R7BB01L
3.0pF(3R0)		GQM1875C2E2R7CB12D GQM1875C2E3R0BB12D	GQM1885C2A2R7CB01L GQM1885C2A3R0BB01L
5.0pr (51.0)	±0.1pF(B) ±0.25pF(C)	GQM1875C2E3R0BB12D	GQM1885C2A3R0BB01E
3.3pF(3R3)	±0.25pF(C) ±0.1pF(B)	GQM1875C2E3R0CB12D	GQM1885C2A3R0CB01E
5.5pr (51.5)	±0.25pF(C)	GQM1875C2E3R3CB12D	GQM1885C2A3R3BB01E
3.6pF(3R6)	±0.25pF(C) ±0.1pF(B)	GQM1875C2E3R6BB12D	GQM1885C2A3R5CB01E
0.0pr (01.0)	±0.25pF(C)	GQM1875C2E3R6CB12D	GQM1885C2A3R6BB01E
3.9pF(3R9)	±0.1pF(B)	GQM1875C2E3R9BB12D	GQM1885C2A3R9BB01E
3.7pr (6113)	±0.25pF(C)	GQM1875C2E3R9CB12D	GQM1885C2A3R9CB01E
4.0pF(4R0)	±0.25pr (C) ±0.1pF(B)	GQM1875C2E4R0BB12D	GQM1885C2A3R9CB01E
opi (-1.0)	±0.25pF(C)	GQM1875C2E4R0CB12D	GQM1885C2A4R0BB01E
4.3pF(4R3)	±0.25pr (C) ±0.1pF(B)	GQM1875C2E4R3BB12D	GQM1885C2A4R3BB01E
ч.эрі (4КЭ)		GQM1875C2E4R3BB12D	GQM1885C2A4R3BB01L
4.7pF(4R7)	±0.25pF(C) ±0.1pF(B)	GQM1875C2E4R3CB12D	GQM1885C2A4R3CB01E
ч./рі (41.1)	±0.25pF(C)	GQM1875C2E4R7BB12D	GQM1885C2A4R7CB01E
5 (nE(5DA)		GQM1875C2E5R0BB12D	GQM1885C2A4R7CB01E
5.0pF(5R0)	±0.1pF(B)	Semilor SOLLSINDDIZD	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

Rated Volt. [Vdc]]	250(2E)	100(2A)	50(1H)
Capacitance	Tolerance		Part Number	L
5.1pF(5R1)	±0.25pF(C)	GQM1875C2E5R1CB12D	GQM1885C2A5R1CB01D	
	±0.5pF(D)	GQM1875C2E5R1DB12D	GQM1885C2A5R1DB01D	
5.6pF(5R6)	±0.25pF(C)	GQM1875C2E5R6CB12D	GQM1885C2A5R6CB01D	
	±0.5pF(D)	GQM1875C2E5R6DB12D	GQM1885C2A5R6DB01D	
6.0pF(6R0)	±0.25pF(C)	GQM1875C2E6R0CB12D	GQM1885C2A6R0CB01D	
	±0.5pF(D)	GQM1875C2E6R0DB12D	GQM1885C2A6R0DB01D	
6.2pF(6R2)	±0.25pF(C)	GQM1875C2E6R2CB12D	GQM1885C2A6R2CB01D	
	±0.5pF(D)	GQM1875C2E6R2DB12D	GQM1885C2A6R2DB01D	
6.8pF(6R8)	±0.25pF(C)	GQM1875C2E6R8CB12D	GQM1885C2A6R8CB01D	
	±0.5pF(D)	GQM1875C2E6R8DB12D	GQM1885C2A6R8DB01D	
7.0pF(7R0)	±0.25pF(C)	GQM1875C2E7R0CB12D		GQM1885C1H7R0CB011
	±0.5pF(D)	GQM1875C2E7R0DB12D		GQM1885C1H7R0DB01I
7.5pF(7R5)	±0.25pF(C)	GQM1875C2E7R5CB12D		GQM1885C1H7R5CB01I
• • •	±0.5pF(D)	GQM1875C2E7R5DB12D		GQM1885C1H7R5DB01I
8.0pF(8R0)	±0.25pF(C)	GQM1875C2E8R0CB12D		GQM1885C1H8R0CB01I
,	±0.5pF(D)	GQM1875C2E8R0DB12D		GQM1885C1H8R0DB01I
8.2pF(8R2)	±0.25pF(C)	GQM1875C2E8R2CB12D		GQM1885C1H8R2CB01I
- F (-)	±0.5pF(D)	GQM1875C2E8R2DB12D		GQM1885C1H8R2DB01I
9.0pF(9R0)	±0.25pF(C)	GQM1875C2E9R0CB12D		GQM1885C1H9R0CB01I
- Tr (±0.5pF(D)	GQM1875C2E9R0DB12D		GQM1885C1H9R0DB01I
9.1pF(9R1)	±0.25pF(C)	GQM1875C2E9R1CB12D		GQM1885C1H9R1CB01I
	±0.5pF(D)	GQM1875C2E9R1DB12D		GQM1885C1H9R1DB01I
10pF(100)	±2%(G)	GQM1875C2E100GB12D		GQM1885C1H100GB01E
	±5%(J)	GQM1875C2E100JB12D		GQM1885C1H100JB01E
11pF(110)	±2%(G)	GQM1875C2E110GB12D		GQM1885C1H110GB01I
1 (-)	±5%(J)	GQM1875C2E110JB12D		GQM1885C1H110JB01E
12pF(120)	±2%(G)	GQM1875C2E120GB12D		GQM1885C1H120GB01I
1 (-)	±5%(J)	GQM1875C2E120JB12D		GQM1885C1H120JB01[
13pF(130)	±2%(G)	GQM1875C2E130GB12D		GQM1885C1H130GB01I
	±5%(J)	GQM1875C2E130JB12D		GQM1885C1H130JB01[
15pF(150)	±2%(G)	GQM1875C2E150GB12D		GQM1885C1H150GB01I
	±5%(J)	GQM1875C2E150JB12D		GQM1885C1H150JB01E
16pF(160)	±2%(G)	GQM1875C2E160GB12D		GQM1885C1H160GB01I
	±5%(J)	GQM1875C2E160JB12D		GQM1885C1H160JB01E
18pF(180)	±2%(G)	GQM1875C2E180GB12D		GQM1885C1H180GB01E
·	±5%(J)	GQM1875C2E180JB12D		GQM1885C1H180JB01E
20pF(200)	±2%(G)	GQM1875C2E200GB12D		GQM1885C1H200GB01I
	±5%(J)	GQM1875C2E200JB12D		GQM1885C1H200JB01E
22pF(220)	±2%(G)	GQM1875C2E220GB12D		GQM1885C1H220GB01E
p · (♥)	±5%(J)	GQM1875C2E220JB12D		GQM1885C1H220JB01E
24pF(240)	±2%(G)	GQM1875C2E240GB12D		GQM1885C1H240GB01I
- 'P' (- 'V)	±5%(J)	GQM1875C2E240JB12D		GQM1885C1H240JB01E
27pF(270)	±2%(G)	GQM1875C2E270GB12D		GQM1885C1H270GB01
2, pr (2, 0)	±5%(J)	GQM1875C2E270JB12D		GQM1885C1H270JB01E
30pF(300)	±3%(G)	GQM1875C2E300GB12D		GQM1885C1H300GB01E
50pi (500)	±5%(J)	GQM1875C2E300JB12D		GQM1885C1H300JB01E

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

(Part Number) **GQ M 18 7 5C 2E 5R1 C B12 D** 0 0 0 0 0 0 0 0 0

Product ID 2Series **5**Temperature Characteristics Capacitance Tolerance

3Dimension (LxW) 6 Rated Voltage Individual Specification Code

4 Dimension (T) Capacitance Packaging

5

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



LxW [mm]		1.6x0.8(1	8)<0603>
Rated Volt. [Vdc]	250(2E)	50(1H)
Capacitance	Tolerance	Part N	umber
33pF(330)	±2%(G)	GQM1875C2E330GB12D	GQM1885C1H330GB01D
	±5%(J)	GQM1875C2E330JB12D	GQM1885C1H330JB01D
36pF(360)	±2%(G)	GQM1875C2E360GB12D	GQM1885C1H360GB01D
	±5%(J)	GQM1875C2E360JB12D	GQM1885C1H360JB01D
39pF(390)	±2%(G)	GQM1875C2E390GB12D	GQM1885C1H390GB01D
	±5%(J)	GQM1875C2E390JB12D	GQM1885C1H390JB01D
43pF(430)	±2%(G)	GQM1875C2E430GB12D	GQM1885C1H430GB01D
	±5%(J)	GQM1875C2E430JB12D	GQM1885C1H430JB01D
47pF(470)	±2%(G)	GQM1875C2E470GB12D	GQM1885C1H470GB01D
	±5%(J)	GQM1875C2E470JB12D	GQM1885C1H470JB01D
51pF(510)	±2%(G)		GQM1885C1H510GB01D
	±5%(J)		GQM1885C1H510JB01D
56pF(560)	±2%(G)		GQM1885C1H560GB01D
	±5%(J)		GQM1885C1H560JB01D
62pF(620)	±2%(G)		GQM1885C1H620GB01D
	±5%(J)		GQM1885C1H620JB01D
68pF(680)	±2%(G)		GQM1885C1H680GB01D
	±5%(J)		GQM1885C1H680JB01D
75pF(750)	±2%(G)		GQM1885C1H750GB01D
	±5%(J)		GQM1885C1H750JB01D
82pF(820)	±2%(G)		GQM1885C1H820GB01D
	±5%(J)		GQM1885C1H820JB01D
91pF(910)	±2%(G)		GQM1885C1H910GB01D
	±5%(J)		GQM1885C1H910JB01D
100pF(101)	±2%(G)		GQM1885C1H101GB01D
	±5%(J)		GQM1885C1H101JB01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

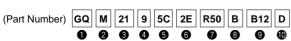




LxW [mm]		2.0x1.25(2	21)<0805>
Rated Volt. [Vdc]	250(2E)	100(2A)
Capacitance	Tolerance	Part N	umber
0.50pF(R50)	±0.1pF(B)	GQM2195C2ER50BB12D	GQM2195C2AR50BB01D
	±0.25pF(C)	GQM2195C2ER50CB12D	GQM2195C2AR50CB01E
0.75pF(R75)	±0.1pF(B)	GQM2195C2ER75BB12D	GQM2195C2AR75BB01D
	±0.25pF(C)	GQM2195C2ER75CB12D	GQM2195C2AR75CB01D
1.0pF(1R0)	±0.1pF(B)	GQM2195C2E1R0BB12D	GQM2195C2A1R0BB01D
	±0.25pF(C)	GQM2195C2E1R0CB12D	GQM2195C2A1R0CB01D
1.1pF(1R1)	±0.1pF(B)	GQM2195C2E1R1BB12D	GQM2195C2A1R1BB01E
	±0.25pF(C)	GQM2195C2E1R1CB12D	GQM2195C2A1R1CB01E
1.2pF(1R2)	±0.1pF(B)	GQM2195C2E1R2BB12D	GQM2195C2A1R2BB01D
,	±0.25pF(C)	GQM2195C2E1R2CB12D	GQM2195C2A1R2CB01D
1.3pF(1R3)	±0.1pF(B)	GQM2195C2E1R3BB12D	GQM2195C2A1R3BB01D
	±0.25pF(C)	GQM2195C2E1R3CB12D	GQM2195C2A1R3CB01D
1.5pF(1R5)	±0.1pF(B)	GQM2195C2E1R5BB12D	GQM2195C2A1R5BB01D
1.0pr (110)	±0.25pF(C)	GQM2195C2E1R5CB12D	GQM2195C2A1R5CB01E
1.6pF(1R6)	±0.1pF(B)	GQM2195C2E1R6BB12D	GQM2195C2A1R6BB01E
1.0pr (110)	±0.25pF(C)	GQM2195C2E1R6CB12D	GQM2195C2A1R6CB01E
1.8pF(1R8)		GQM2195C2E1R8BB12D	GQM2195C2A1R8BB01E
1.орг(1Ко)	±0.1pF(B)	GQM2195C2E1R8CB12D	
2.0 5(000)	±0.25pF(C)		GQM2195C2A1R8CB01D GQM2195C2A2R0BB01D
2.0pF(2R0)	±0.1pF(B)	GQM2195C2E2R0BB12D	
	±0.25pF(C)	GQM2195C2E2R0CB12D	GQM2195C2A2R0CB01E
2.2pF(2R2)	±0.1pF(B)	GQM2195C2E2R2BB12D	GQM2195C2A2R2BB01D
	±0.25pF(C)	GQM2195C2E2R2CB12D	GQM2195C2A2R2CB01D
2.4pF(2R4)	±0.1pF(B)	GQM2195C2E2R4BB12D	GQM2195C2A2R4BB01D
	±0.25pF(C)	GQM2195C2E2R4CB12D	GQM2195C2A2R4CB01D
2.7pF(2R7)	±0.1pF(B)	GQM2195C2E2R7BB12D	GQM2195C2A2R7BB01D
	±0.25pF(C)	GQM2195C2E2R7CB12D	GQM2195C2A2R7CB01D
3.0pF(3R0)	±0.1pF(B)	GQM2195C2E3R0BB12D	GQM2195C2A3R0BB01E
	±0.25pF(C)	GQM2195C2E3R0CB12D	GQM2195C2A3R0CB01E
3.3pF(3R3)	±0.1pF(B)	GQM2195C2E3R3BB12D	GQM2195C2A3R3BB01D
	±0.25pF(C)	GQM2195C2E3R3CB12D	GQM2195C2A3R3CB01D
3.6pF(3R6)	±0.1pF(B)	GQM2195C2E3R6BB12D	GQM2195C2A3R6BB01D
	±0.25pF(C)	GQM2195C2E3R6CB12D	GQM2195C2A3R6CB01E
3.9pF(3R9)	±0.1pF(B)	GQM2195C2E3R9BB12D	GQM2195C2A3R9BB01D
	±0.25pF(C)	GQM2195C2E3R9CB12D	GQM2195C2A3R9CB01E
4.0pF(4R0)	±0.1pF(B)	GQM2195C2E4R0BB12D	GQM2195C2A4R0BB01D
	±0.25pF(C)	GQM2195C2E4R0CB12D	GQM2195C2A4R0CB01D
4.3pF(4R3)	±0.1pF(B)	GQM2195C2E4R3BB12D	GQM2195C2A4R3BB01D
	±0.25pF(C)	GQM2195C2E4R3CB12D	GQM2195C2A4R3CB01D
4.7pF(4R7)	±0.1pF(B)	GQM2195C2E4R7BB12D	GQM2195C2A4R7BB01D
	±0.25pF(C)	GQM2195C2E4R7CB12D	GQM2195C2A4R7CB01D
5.0pF(5R0)	±0.1pF(B)	GQM2195C2E5R0BB12D	GQM2195C2A5R0BB01D
	±0.25pF(C)	GQM2195C2E5R0CB12D	GQM2195C2A5R0CB01D
5.1pF(5R1)	±0.25pF(C)	GQM2195C2E5R1CB12D	GQM2195C2A5R1CB01D
	±0.5pF(D)	GQM2195C2E5R1DB12D	GQM2195C2A5R1DB01E
5.6pF(5R6)	±0.25pF(C)	GQM2195C2E5R6CB12D	GQM2195C2A5R6CB01E
5.0pr(3rd)		GQM2195C2E5R6DB12D	GQM2195C2A5R6CB01L
6 0p [/600)	$\pm 0.5 pF(D)$		
6.0pF(6R0)	±0.25pF(C)	GQM2195C2E6R0CB12D	GQM2195C2A6R0CB01E
	±0.5pF(D)	GQM2195C2E6R0DB12D	GQM2195C2A6R0DB01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.



Product ID
Series
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging



Rated Volt. [Vdc]]	250(2E)	100(2A)	50(1H)
Capacitance	Tolerance		Part Number	1
6.2pF(6R2)	±0.25pF(C)	GQM2195C2E6R2CB12D	GQM2195C2A6R2CB01D	
	±0.5pF(D)	GQM2195C2E6R2DB12D	GQM2195C2A6R2DB01D	
6.8pF(6R8)	±0.25pF(C)	GQM2195C2E6R8CB12D	GQM2195C2A6R8CB01D	
	±0.5pF(D)	GQM2195C2E6R8DB12D	GQM2195C2A6R8DB01D	
7.0pF(7R0)	±0.25pF(C)	GQM2195C2E7R0CB12D	GQM2195C2A7R0CB01D	
	±0.5pF(D)	GQM2195C2E7R0DB12D	GQM2195C2A7R0DB01D	
7.5pF(7R5)	±0.25pF(C)	GQM2195C2E7R5CB12D	GQM2195C2A7R5CB01D	
	±0.5pF(D)	GQM2195C2E7R5DB12D	GQM2195C2A7R5DB01D	
8.0pF(8R0)	±0.25pF(C)	GQM2195C2E8R0CB12D	GQM2195C2A8R0CB01D	
	±0.5pF(D)	GQM2195C2E8R0DB12D	GQM2195C2A8R0DB01D	
8.2pF(8R2)	±0.25pF(C)	GQM2195C2E8R2CB12D	GQM2195C2A8R2CB01D	
	±0.5pF(D)	GQM2195C2E8R2DB12D	GQM2195C2A8R2DB01D	
9.0pF(9R0)	±0.25pF(C)	GQM2195C2E9R0CB12D	GQM2195C2A9R0CB01D	
	±0.5pF(D)	GQM2195C2E9R0DB12D	GQM2195C2A9R0DB01D	
9.1pF(9R1)	±0.25pF(C)	GQM2195C2E9R1CB12D	GQM2195C2A9R1CB01D	
,p. (e .c.)	±0.5pF(D)	GQM2195C2E9R1DB12D	GQM2195C2A9R1DB01D	
10pF(100)	±2%(G)	GQM2195C2E100GB12D	GQM2195C2A100GB01D	
10p1 (100)	±2 %(U)	GQM2195C2E100JB12D	GQM2195C2A100JB01D	
11pF(110)	±3%(G)	GQM2195C2E1005B12D	GQM2195C2A110GB01D	
11pi (110)	±5%(J)	GQM2195C2E110JB12D	GQM2195C2A110JB01D	
12pF(120)	±3%(G)	GQM2195C2E120GB12D	GQM2195C2A120GB01D	
12p1 (120)		GQM2195C2E120JB12D	GQM2195C2A120JB01D	
13pF(130)	±5%(J) ±2%(G)	GQM2195C2E1205B12D	GQM2195C2A1205B01D	
13pr(130)		GQM2195C2E130JB12D	GQM2195C2A130JB01D	
15pF(150)	±5%(J) ±2%(G)	GQM2195C2E1505B12D	GQM2195C2A1505B01D	
15pr(150)				
14pF(160)	±5%(J)	GQM2195C2E150JB12D	GQM2195C2A150JB01D	
16pF(160)	±2%(G)	GQM2195C2E160GB12D	GQM2195C2A160GB01D	
10m E(400)	±5%(J)	GQM2195C2E160JB12D	GQM2195C2A160JB01D	
18pF(180)	±2%(G)	GQM2195C2E180GB12D	GQM2195C2A180GB01D	
20 5(000)	±5%(J)	GQM2195C2E180JB12D	GQM2195C2A180JB01D	000000000000000000000000000000000000000
20pF(200)	±2%(G)	GQM2195C2E200GB12D		GQM2195C1H200GB01
	±5%(J)	GQM2195C2E200JB12D		GQM2195C1H200JB01
22pF(220)	±2%(G)	GQM2195C2E220GB12D		GQM2195C1H220GB01
24p [/040)	±5%(J)	GQM2195C2E220JB12D		GQM2195C1H220JB01
24pF(240)	±2%(G)	GQM2195C2E240GB12D		GQM2195C1H240GB01
07 E/070)	±5%(J)	GQM2195C2E240JB12D		GQM2195C1H240JB01
27pF(270)	±2%(G)	GQM2195C2E270GB12D		GQM2195C1H270GB01
00. F/00	±5%(J)	GQM2195C2E270JB12D		GQM2195C1H270JB01
30pF(300)	±2%(G)	GQM2195C2E300GB12D		GQM2195C1H300GB01
00 5/00	±5%(J)	GQM2195C2E300JB12D		GQM2195C1H300JB01
33pF(330)	±2%(G)	GQM2195C2E330GB12D		GQM2195C1H330GB01
	±5%(J)	GQM2195C2E330JB12D		GQM2195C1H330JB01
36pF(360)	±2%(G)	GQM2195C2E360GB12D		GQM2195C1H360GB01
	±5%(J)	GQM2195C2E360JB12D		GQM2195C1H360JB01
39pF(390)	±2%(G)	GQM2195C2E390GB12D		GQM2195C1H390GB01



LxW [mm]		2.0x1.25(21)<0805>		
Rated Volt. [Vdc]	250(2E)	50(1H)	
Capacitance Tolerance		Part Number		
43pF(430)	±2%(G)	GQM2195C2E430GB12D	GQM2195C1H430GB01D	
	±5%(J)	GQM2195C2E430JB12D	GQM2195C1H430JB01D	
47pF(470)	±2%(G)	GQM2195C2E470GB12D	GQM2195C1H470GB01D	
	±5%(J)	GQM2195C2E470JB12D	GQM2195C1H470JB01D	
51pF(510)	±2%(G)	GQM2195C2E510GB12D	GQM2195C1H510GB01D	
	±5%(J)	GQM2195C2E510JB12D	GQM2195C1H510JB01D	
56pF(560)	±2%(G)	GQM2195C2E560GB12D	GQM2195C1H560GB01D	
	±5%(J)	GQM2195C2E560JB12D	GQM2195C1H560JB01D	
62pF(620)	±2%(G)	GQM2195C2E620GB12D	GQM2195C1H620GB01D	
	±5%(J)	GQM2195C2E620JB12D	GQM2195C1H620JB01D	
68pF(680)	±2%(G)	GQM2195C2E680GB12D	GQM2195C1H680GB01D	
	±5%(J)	GQM2195C2E680JB12D	GQM2195C1H680JB01D	
75pF(750)	±2%(G)	GQM2195C2E750GB12D	GQM2195C1H750GB01D	
	±5%(J)	GQM2195C2E750JB12D	GQM2195C1H750JB01D	
82pF(820)	±2%(G)	GQM2195C2E820GB12D	GQM2195C1H820GB01D	
	±5%(J)	GQM2195C2E820JB12D	GQM2195C1H820JB01D	
91pF(910)	±2%(G)	GQM2195C2E910GB12D	GQM2195C1H910GB01D	
	±5%(J)	GQM2195C2E910JB12D	GQM2195C1H910JB01D	
100pF(101)	±2%(G)	GQM2195C2E101GB12D	GQM2195C1H101GB01D	
	±5%(J)	GQM2195C2E101JB12D	GQM2195C1H101JB01D	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

(Part Number) GQ M 21 9 5C 2E 430 G B12 D OProdu O 2 0 4 5 6 2 0 0 C Capac Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

Product ID Oseries
Temperature Characteristics
Capacitance Tolerance

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging



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 • This PDF catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.
 • O9.9.18

GQM Series Specifications and Test Methods

No.	lte	em	Specifications		Test Method	
1	Operating Temperatu			Reference Temperature: 25°C		
2			See the previous page.	The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, $V^{\text{p.p}}$ or $V^{\text{o.p}}$, whichever is larger, should be maintained within the rated voltage range.		
3	Appearar	nce	No defects or abnormalities	Visual inspection		
4	Dimensio	n	Within the specified dimensions	Using calipers		
5	Dielectric Strength		No defects or abnormalities	No failure should be observed when 300% [*] of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. *250V only 250%		
6	Insulation Resistance		More than 10,000MΩ	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 2 minutes of charging.		
7	Capacita	nce	Within the specified tolerance	The capacitance/Q sl	should be measured at 25°C at the	
			30pF min.: Q≧1400	frequency and voltage	ge shown in the table.	
8	Q		30pF max.: Q≧800+20C	Frequency	1±0.1MHz	
Ũ	_		C: Nominal Capacitance (pF)	Voltage	0.5 to 5Vrms	
		Capacitance Change	Within the specified tolerance (Table A)	measured in step 3 a		
	Temperature Coefficient		Within the specified tolerance (Table A)	When cycling the temperature sequentially from step 1 through the capacitance should be within the specified tolerance for the temperature coefficient and capacitance change as in Table A.		
9	Capacitance Temperature Characteristics	Capacitance Drift	Within ±0.2% or ±0.05pF (Whichever is larger)	between the maximum	t is calculated by dividing the differences im and minimum measured values in the he capacitance value in step 3. Temperature (°C) Reference Temp. ±2 -55±3 Reference Temp. ±2 125±3 Reference Temp. ±2	
			No removal of the terminations or other defect should occur.	Solder the capacitor to	o the test jig (glass epoxy board) shown in	
10	10 Adhesive Strength of Termination			Fig. 1 using a eutectic with the test jig for 10= The soldering should reflow method and should	c solder. Then apply 10N* force in parallel ± 1 sec. be done either with an iron or using the hould be conducted with care so that the ind free of defects such as heat shock. *5N (GQM188) a b c 1.0 3.0 1.2 1.2 4.0 1.65 (in mm)	
			copper foil		Fig. 1	
	Appearance Capacitance Vibration Resistance Q		No defects or abnormalities		to the test jig (glass epoxy board) in the	
11			Within the specified tolerance 30pF min.: Q≧1400 30pF max.: Q≧800+20C C: Nominal Capacitance (pF)	 same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours). 		

Continued on the following page.



GQM Series Specifications and Test Methods

Continued from the preceding page.

No.	Ite	em	Specifications	Test Method	
12	Appearance No marking defects			Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 2 using a eutectic solder.	
		Capacitance Change	Within ±5% or ±0.5pF (Whichever is larger)	Then apply a force in the direction shown in Fig. 3.	
	Deflection			The soldering should be done by the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.	
			a 100 → + 100 → t: 1.6mm		
			Type a b c GQM18 1.0 3.0 1.2 GQM21 1.2 4.0 1.65	Capacitance meter 45 45 45	
			(in mm) Fig. 2	Fig. 3	
13	Solderab Terminati		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.	
			The measured and observed characteristics should satisfy the specifications in the following table.		
		Appearance	No marking defects		
	Resistance to Soldering Heat	Capacitance Change	Within $\pm 2.5\%$ or ± 0.25 pF (Whichever is larger)	Preheat the capacitor at 120 to 150°C for 1 minute. Immers	
14		٥	30pF min.: Q≧1400 30pF max.: Q≧800+20C	capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder solution at $270\pm5^{\circ}$ C for 10 ± 0.5 seconds. Let sit at room temperature for 24 ± 2 hours.	
			C: Nominal Capacitance (pF)	_	
		I.R.	More than 10,000MΩ	_	
		Dielectric Strength	No failure		
			The measured and observed characteristics should satisfy the specifications in the following table.		
		Appearance	No marking defects	Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10).	
		Capacitance Change	Within ±2.5% or ±0.25pF (Whichever is larger)	Perform the five cycles according to the four heat treatments listed in the following table.	
15	Temperature		30pF min.: Q≧1400	Let sit for 24 ± 2 hours at room temperature, then measure.	
15	Cycle	Q	30pF max.: Q≥800+20C	Step 1 2 3 4 Temp. (°C) Min. Operating Temp. 10/ 2 Room Temp. 12/ 0 Temp. 12/ 0 Temp.	
			C: Nominal Capacitance (pF)	Temp. (C) Temp. +0/-3 Temp. Temp. +3/-0 Temp. Time (min.) 30±3 2 to 3 30±3 2 to 3	
	I.R. Dielectric Strength		More than 10,000MΩ No failure		
16	Appearance No marking defects			_	
			No marking defects		
	Humidity Steady State	Capacitance Change	Within ±5% or ±0.5pF (Whichever is larger)	Let the capacitor sit at 40±2℃ and 90 to 95% humidity for 500±12 hours.	
			30pF min.: Q≧350 10pF and over, 30pF and below: Q≧275+5C/2 10pF max.: Q≧200+10C	Remove and let sit for 24±2 hours (temperature compensating type) at room temperature, then measure.	
			C: Nominal Capacitance (pF)		
		I.R.	More than 1,000MΩ		

Continued on the following page. \square



GQM Series Specifications and Test Methods

Continued from the preceding page.

No.	Ite	em	Specifications	Test Method	
		The measured and observed characteristics should satisfy the specifications in the following table.			
		Appearance	No marking defects		
17	Humidity	Capacitance Change	Within $\pm 7.5\%$ or ± 0.75 pF (Whichever is larger)	Apply the rated voltage at $40\pm2^{\circ}$ C and 90 to 95% humidity for 500 ±12 hours. Remove and let sit for 24 ±2 hours at room	
.,	Load	Q	30pF min.: Q≥200 30pF max.: Q≥100+10C/3	temperature then measure. The charge/discharge current less than 50mA.	
			C: Nominal Capacitance (pF)		
		I.R.	More than 500MΩ		
		The measured and observed characteristics should satisfy the specifications in the following table.			
		Appearance	No marking defects		
	High	Capacitance Change	Within $\pm 3\%$ or ± 0.3 pF (Whichever is larger)	Apply 200% of the rated voltage for 1000 \pm 12 hours at the maximum operating temperature \pm 3°C.	
18	Temperature Load	Q	30pF min.: Q≧350 10pF and over, 30pF and below: Q≧275+5C/2 10pF max.: Q≧200+10C	Let sit for 24±2 hours (temperature compensating type) at room temperature, then measure. The charge/discharge current is less than 50mA.	
			C: Nominal Capacitance (pF)		
		I.R.	More than 1,000M Ω		

Table A

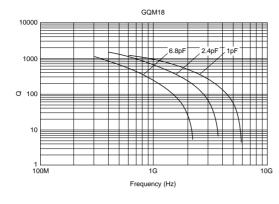
	Newsland Malana			Capacitance Cha	nge from 25℃ (%)	
Char.	Nominal Values (ppm/°C) *1	—55℃		−30°C		_10℃	
	(ppin/c) · i	Max.	Min.	Max.	Min.	Max.	Min.
5C	0±30	0.58	-0.24	0.40	-0.17	0.25	-0.11

*1: Nominal values denote the temperature coefficient within a range of 25 to 125°C.

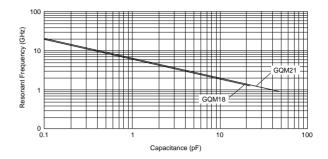


GQM Series Data

Q - Frequency Characteristics



■ Resonant Frequency - Capacitance





Chip Monolithic Ceramic Capacitors



High Frequency Type ERB Series

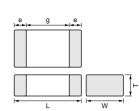
■ Features (ERB Series)

- 1. Negligible inductance is achieved by its monolithic structure so the series can be used at frequencies above 1GHz.
- 2. Nickel barriered terminations of ERB series improve solderability and decrease solder leaching.
- 3. ERB18/21 series are designed for both flow and reflow soldering and ERB32 series are designed for reflow soldering.

Applications

High frequency and high-power circuits





Part Number	Dimensions (mm)						
Part Number	L	W	T max.	e min.	g min.		
ERB188	1.6±0.1	0.8±0.1	0.9	0.2	0.5		
ERB21B	2.0±0.3	1.25±0.3	1.35	0.25	0.7		
ERB32Q	3.2±0.3	2.5±0.3	1.7	0.3	1.0		



Capacitance Table

Temperature Compensating Type C0G(5C) Characteristics

8 ex.8: T	Dimen	sion (n	nm]	71		- (-			
TC		C0G(5C)							
LxW	1.6x0.8	2.	0x1.2	25		3	.2x2.	5	
[mm]	(18) <0603>	<	(21) 0805	>		<	(32) 1210	>	
Rated Voltage	250	250	100	50	500	300	250	100	50
Capacitance [Vdc]	(2E)	(2E)		(1H)	(2H)				(1H)
0.50pF(R50)	8	в							
0.75pF(R75)	8	в			1 1 1				
1.0pF(1R0)	8	в			+				
1.1pF(1R1)	8	в			1				
1.2pF(1R2)	8	в			, , ,				
1.3pF(1R3)	8	в			1 1				
1.5pF(1R5)	8	в			1 1 1				
1.6pF(1R6)	8	в			1 1 1				
1.8pF(1R8)	8	в							
2.0pF(2R0)	8	в			<u> </u> 				
2.2pF(2R2)	8	в							
2.4pF(2R4)	8	в			1				
2.7pF(2R7)	8	в			 				
3.0pF(3R0)	8	в			L 				
3.3pF(3R3)	8	в			Q				
3.6pF(3R6)	8	в			Q				
3.9pF(3R9)	8	В			Q				
4.0pF(4R0)	8	В			Q				
4.3pF(4R3)	8	В			Q				
4.7pF(4R7)	8	В			Q				
5.0pF(5R0)	8	В			Q				
5.1pF(5R1)	8	B			Q				
5.6pF(5R6)	8	B			Q				
6.0pF(6R0)	8	В			Q				
6.2pF(6R2)	8	В			Q				
6.8pF(6R8)	8	B	-		Q				
7.0pF(7R0)	8	В			Q				
7.5pF(7R5)	8	В			Q				
8.0pF(8R0)	8	В			Q				
8.2pF(8R2)	8	В			Q				
9.0pF(9R0)	8	В			Q				
9.1pF(9R1)	8	В			Q				
10pF(100)	8	В			Q				
11pF(110)	8	В			Q				
12pF(120)	8	В			Q				
13pF(130)	8	В			Q				
15pF(150)	8	В			Q				
16pF(160)	8	B			Q				
18pF(180)	8	B			Q				
20pF(200)	8	B			Q				
22pF(220)	8	B			Q				
24pF(240)	8	B			Q				
27pF(270)	8	B			Q				
30pF(300)	8	В			Q				
33pF(330)	8	B			Q				
36pF(360)	8	В			Q				
39pF(390)	8	В			Q				
43pF(430)	8	В			Q				
			I		-	I			

TC	C0G(5C)								
LxW [mm]	1.6x0.8 (18) <0603>		0x1.2 (21) 0805				.2x2. (32) :1210		
Rated Voltage Capacitance [Vdc]	250 (2E)	250 (2E)	100 (2A)	50 (1H)	500 (2H)	300 (YD)	250 (2E)	100 (2A)	50 (1H)
47pF(470)	8	в			Q				
51pF(510)	8	в			Q				
56pF(560)	8	в			Q				
62pF(620)	8	В			Q				
68pF(680)	8	В			Q				
75pF(750)	8	В			Q				
82pF(820)	8	В			Q				
91pF(910)	8	В			Q				
100pF(101)	8	в			Q				
110pF(111)		1	В		Q				
120pF(121)			в		Q		_		
130pF(131)			В			Q			
150pF(151)				в		Q		_	
160pF(161)				В			Q		
180pF(181)					1 1 1		Q		
200pF(201)					1		Q		
220pF(221)					 		Q		
240pF(241)								Q	
270pF(271)					1			Q	
300pF(301)								Q	
330pF(331)								Q	
360pF(361)								Q	
390pF(391)					, , ,			Q	
430pF(431)					 			Q	
470pF(471)					1			Q	
510pF(511)					1 1 1				Q
560pF(561)					1				Q
620pF(621)									Q
680pF(681)									Q
750pF(751)					1				Q
820pF(821)					1				Q
910pF(911)					 				Q
1000pF(102)									Q

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

_xW [mm]		1.6x0.8(18)<0603>	2.0x1.25(21)<0805>
Rated Volt. [Vdc]		250(2E)	250(2E)
Capacitance	Tolerance	Part N	umber
0.50pF(R50)	±0.1pF(B)	ERB1885C2ER50BDX1D	ERB21B5C2ER50BDX1L
	±0.25pF(C)	ERB1885C2ER50CDX1D	ERB21B5C2ER50CDX1L
0.75pF(R75)	±0.1pF(B)	ERB1885C2ER75BDX1D	ERB21B5C2ER75BDX1L
	±0.25pF(C)	ERB1885C2ER75CDX1D	ERB21B5C2ER75CDX1L
1.0pF(1R0)	±0.1pF(B)	ERB1885C2E1R0BDX1D	ERB21B5C2E1R0BDX1L
-	±0.25pF(C)	ERB1885C2E1R0CDX1D	ERB21B5C2E1R0CDX1L
1.1pF(1R1)	±0.1pF(B)	ERB1885C2E1R1BDX1D	ERB21B5C2E1R1BDX1L
	±0.25pF(C)	ERB1885C2E1R1CDX1D	ERB21B5C2E1R1CDX1L
1.2pF(1R2)	±0.1pF(B)	ERB1885C2E1R2BDX1D	ERB21B5C2E1R2BDX1L
p. (<u>-</u>)	±0.25pF(C)	ERB1885C2E1R2CDX1D	ERB21B5C2E1R2CDX1L
1.3pF(1R3)	±0.1pF(B)	ERB1885C2E1R3BDX1D	ERB21B5C2E1R3BDX1L
1.5pr (110)		ERB1885C2E1R3CDX1D	ERB21B5C2E1R3CDX1L
1 EmE(4DE)	±0.25pF(C)		
1.5pF(1R5)	±0.1pF(B)	ERB1885C2E1R5BDX1D	ERB21B5C2E1R5BDX1L
	±0.25pF(C)	ERB1885C2E1R5CDX1D	ERB21B5C2E1R5CDX1L
1.6pF(1R6)	±0.1pF(B)	ERB1885C2E1R6BDX1D	ERB21B5C2E1R6BDX1L
	±0.25pF(C)	ERB1885C2E1R6CDX1D	ERB21B5C2E1R6CDX1L
1.8pF(1R8)	±0.1pF(B)	ERB1885C2E1R8BDX1D	ERB21B5C2E1R8BDX1L
	±0.25pF(C)	ERB1885C2E1R8CDX1D	ERB21B5C2E1R8CDX1L
2.0pF(2R0)	±0.1pF(B)	ERB1885C2E2R0BDX1D	ERB21B5C2E2R0BDX1L
	±0.25pF(C)	ERB1885C2E2R0CDX1D	ERB21B5C2E2R0CDX1L
2.2pF(2R2)	±0.1pF(B)	ERB1885C2E2R2BDX1D	ERB21B5C2E2R2BDX1L
	±0.25pF(C)	ERB1885C2E2R2CDX1D	ERB21B5C2E2R2CDX1L
2.4pF(2R4)	±0.1pF(B)	ERB1885C2E2R4BDX1D	ERB21B5C2E2R4BDX1L
	±0.25pF(C)	ERB1885C2E2R4CDX1D	ERB21B5C2E2R4CDX1L
2.7pF(2R7)	±0.1pF(B)	ERB1885C2E2R7BDX1D	ERB21B5C2E2R7BDX1L
p. (,	±0.25pF(C)	ERB1885C2E2R7CDX1D	ERB21B5C2E2R7CDX1L
3.0pF(3R0)	±0.1pF(B)	ERB1885C2E3R0BDX1D	ERB21B5C2E3R0BDX1L
5.0pr (61(6)	±0.25pF(C)	ERB1885C2E3R0CDX1D	ERB21B5C2E3R0CDX1L
2 2pF(2D2)			
3.3pF(3R3)	±0.1pF(B)	ERB1885C2E3R3BDX1D	ERB21B5C2E3R3BDX1L
	±0.25pF(C)	ERB1885C2E3R3CDX1D	ERB21B5C2E3R3CDX1L
3.6pF(3R6)	±0.1pF(B)	ERB1885C2E3R6BDX1D	ERB21B5C2E3R6BDX1L
	±0.25pF(C)	ERB1885C2E3R6CDX1D	ERB21B5C2E3R6CDX1L
3.9pF(3R9)	±0.1pF(B)	ERB1885C2E3R9BDX1D	ERB21B5C2E3R9BDX1L
	±0.25pF(C)	ERB1885C2E3R9CDX1D	ERB21B5C2E3R9CDX1L
4.0pF(4R0)	±0.1pF(B)	ERB1885C2E4R0BDX1D	ERB21B5C2E4R0BDX1L
	±0.25pF(C)	ERB1885C2E4R0CDX1D	ERB21B5C2E4R0CDX1L
4.3pF(4R3)	±0.1pF(B)	ERB1885C2E4R3BDX1D	ERB21B5C2E4R3BDX1L
	±0.25pF(C)	ERB1885C2E4R3CDX1D	ERB21B5C2E4R3CDX1L
4.7pF(4R7)	±0.1pF(B)	ERB1885C2E4R7BDX1D	ERB21B5C2E4R7BDX1L
	±0.25pF(C)	ERB1885C2E4R7CDX1D	ERB21B5C2E4R7CDX1L
5.0pF(5R0)	±0.1pF(B)	ERB1885C2E5R0BDX1D	ERB21B5C2E5R0BDX1L
	±0.25pF(C)	ERB1885C2E5R0CDX1D	ERB21B5C2E5R0CDX1L
5.1pF(5R1)	±0.1pF(B)	ERB1885C2E5R1BDX1D	ERB21B5C2E5R1BDX1L
5. ipi (51(1)	±0.25pF(C)		
		ERB1885C2E5R1CDX1D	ERB21B5C2E5R1CDX1L
	±0.5pF(D)	ERB1885C2E5R1DDX1D	ERB21B5C2E5R1DDX1L
5.6pF(5R6)	±0.1pF(B)	ERB1885C2E5R6BDX1D	ERB21B5C2E5R6BDX1L
	±0.25pF(C)	ERB1885C2E5R6CDX1D	ERB21B5C2E5R6CDX1L
	±0.5pF(D)	ERB1885C2E5R6DDX1D	ERB21B5C2E5R6DDX1L
6.0pF(6R0)	±0.1pF(B)	ERB1885C2E6R0BDX1D	ERB21B5C2E6R0BDX1L
	±0.25pF(C)	ERB1885C2E6R0CDX1D	ERB21B5C2E6R0CDX1L
	±0.5pF(D)	ERB1885C2E6R0DDX1D	ERB21B5C2E6R0DDX1L

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code (Part Number) **ER B 18 8 5C 2E R50 B DX1 D**

0 2 8 4 5 6 0 0 0

Product ID 2Series **5**Temperature Characteristics

8 Capacitance Tolerance Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

3Dimension (LxW) 6 Rated Voltage Individual Specification Code

4Dimension (T) Capacitance Packaging



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Temperature Compensating Type C0G(5C) Characteristics

LxW [mm]		1.6x0.8(18)<0603>	2.0x1.25(21)<0805>
Rated Volt. [Vdc		250(2E)	250(2E)
Capacitance	Tolerance	Part N	umber
6.2pF(6R2)	±0.1pF(B)	ERB1885C2E6R2BDX1D	ERB21B5C2E6R2BDX1L
	±0.25pF(C)	ERB1885C2E6R2CDX1D	ERB21B5C2E6R2CDX1L
	±0.5pF(D)	ERB1885C2E6R2DDX1D	ERB21B5C2E6R2DDX1L
6.8pF(6R8)	±0.1pF(B)	ERB1885C2E6R8BDX1D	ERB21B5C2E6R8BDX1L
	±0.25pF(C)	ERB1885C2E6R8CDX1D	ERB21B5C2E6R8CDX1L
	±0.5pF(D)	ERB1885C2E6R8DDX1D	ERB21B5C2E6R8DDX1L
7.0pF(7R0)	±0.1pF(B)	ERB1885C2E7R0BDX5D	ERB21B5C2E7R0BDX1L
	±0.25pF(C)	ERB1885C2E7R0CDX5D	ERB21B5C2E7R0CDX1L
	±0.5pF(D)	ERB1885C2E7R0DDX5D	ERB21B5C2E7R0DDX1L
7.5pF(7R5)	±0.1pF(B)	ERB1885C2E7R5BDX5D	ERB21B5C2E7R5BDX1L
• • •	±0.25pF(C)	ERB1885C2E7R5CDX5D	ERB21B5C2E7R5CDX1L
	±0.5pF(D)	ERB1885C2E7R5DDX5D	ERB21B5C2E7R5DDX1L
8.0pF(8R0)	±0.1pF(B)	ERB1885C2E8R0BDX5D	ERB21B5C2E8R0BDX1L
	±0.25pF(C)	ERB1885C2E8R0CDX5D	ERB21B5C2E8R0CDX1L
	±0.5pF(D)	ERB1885C2E8R0DDX5D	ERB21B5C2E8R0DDX1L
8.2pF(8R2)	±0.1pF(B)	ERB1885C2E8R2BDX5D	ERB21B5C2E8R2BDX1L
0.2pr (01(2)	±0.25pF(C)	ERB1885C2E8R2CDX5D	ERB21B5C2E8R2CDX1L
	±0.5pF(D)	ERB1885C2E8R2DDX5D	ERB21B5C2E8R2DDX1L
9.0pF(9R0)	• • •	ERB1885C2E9R0BDX5D	ERB21B5C2E9R0BDX1L
9.0pr(9KU)	±0.1pF(B)	ERB1885C2E9R0BDX5D	
	±0.25pF(C)		ERB21B5C2E9R0CDX1L
	±0.5pF(D)	ERB1885C2E9R0DDX5D	ERB21B5C2E9R0DDX1L
9.1pF(9R1)	±0.1pF(B)	ERB1885C2E9R1BDX5D	ERB21B5C2E9R1BDX1L
	±0.25pF(C)	ERB1885C2E9R1CDX5D	ERB21B5C2E9R1CDX1L
	±0.5pF(D)	ERB1885C2E9R1DDX5D	ERB21B5C2E9R1DDX1L
10pF(100)	±2%(G)	ERB1885C2E100GDX5D	ERB21B5C2E100GDX1L
	±5%(J)	ERB1885C2E100JDX5D	ERB21B5C2E100JDX1L
11pF(110)	±2%(G)	ERB1885C2E110GDX5D	ERB21B5C2E110GDX1L
	±5%(J)	ERB1885C2E110JDX5D	ERB21B5C2E110JDX1L
12pF(120)	±2%(G)	ERB1885C2E120GDX5D	ERB21B5C2E120GDX1L
	±5%(J)	ERB1885C2E120JDX5D	ERB21B5C2E120JDX1L
13pF(130)	±2%(G)	ERB1885C2E130GDX5D	ERB21B5C2E130GDX1L
	±5%(J)	ERB1885C2E130JDX5D	ERB21B5C2E130JDX1L
15pF(150)	±2%(G)	ERB1885C2E150GDX5D	ERB21B5C2E150GDX1L
	±5%(J)	ERB1885C2E150JDX5D	ERB21B5C2E150JDX1L
16pF(160)	±2%(G)	ERB1885C2E160GDX5D	ERB21B5C2E160GDX1L
	±5%(J)	ERB1885C2E160JDX5D	ERB21B5C2E160JDX1L
18pF(180)	±2%(G)	ERB1885C2E180GDX5D	ERB21B5C2E180GDX1L
	±5%(J)	ERB1885C2E180JDX5D	ERB21B5C2E180JDX1L
20pF(200)	±2%(G)	ERB1885C2E200GDX5D	ERB21B5C2E200GDX1L
• • •	±5%(J)	ERB1885C2E200JDX5D	ERB21B5C2E200JDX1L
22pF(220)	±2%(G)	ERB1885C2E220GDX5D	ERB21B5C2E220GDX1L
(- -)	±5%(J)	ERB1885C2E220JDX5D	ERB21B5C2E220JDX1L
24pF(240)	±2%(G)	ERB1885C2E240GDX5D	ERB21B5C2E240GDX1L
p. (0)	±5%(J)	ERB1885C2E240JDX5D	ERB21B5C2E240JDX1L
27pF(270)	±2%(G)	ERB1885C2E270GDX5D	ERB21B5C2E270GDX1L
27pr(210)			
20-55/200	±5%(J)	ERB1885C2E270JDX5D	ERB21B5C2E270JDX1L
30pF(300)	±2%(G)	ERB1885C2E300GDX5D	ERB21B5C2E300GDX1L
	±5%(J)	ERB1885C2E300JDX5D	ERB21B5C2E300JDX1L
33pF(330)	±2%(G)	ERB1885C2E330GDX5D	ERB21B5C2E330GDX1L
	±5%(J)	ERB1885C2E330JDX5D	ERB21B5C2E330JDX1L

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code (Part Number) ER B 18 8 5C 2E 6R2 B DX1 D Product ID **5**Temperature Characteristics

0 2 3 4 5 6 7 8 9 0

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

Capacitance Tolerance

2Series

3 Dimension (LxW) 6 Rated Voltage Individual Specification Code

4 Dimension (T) Capacitance Packaging



LxW [mm] Rated Volt. [Vdc]		1.6x0.8(18)<0603>		2.0x1.25(21)<0805>	
		250(2E)	250(2E)	100(2A)	50(1H)
Capacitance	Tolerance		Part N	lumber	
36pF(360)	±2%(G)	ERB1885C2E360GDX5D	ERB21B5C2E360GDX1L		
	±5%(J)	ERB1885C2E360JDX5D	ERB21B5C2E360JDX1L		
39pF(390)	±2%(G)	ERB1885C2E390GDX5D	ERB21B5C2E390GDX1L		
	±5%(J)	ERB1885C2E390JDX5D	ERB21B5C2E390JDX1L		
43pF(430)	±2%(G)	ERB1885C2E430GDX5D	ERB21B5C2E430GDX1L		
	±5%(J)	ERB1885C2E430JDX5D	ERB21B5C2E430JDX1L		
47pF(470)	±2%(G)	ERB1885C2E470GDX5D	ERB21B5C2E470GDX1L		
	±5%(J)	ERB1885C2E470JDX5D	ERB21B5C2E470JDX1L]
51pF(510)	±2%(G)	ERB1885C2E510GDX5D	ERB21B5C2E510GDX1L		
	±5%(J)	ERB1885C2E510JDX5D	ERB21B5C2E510JDX1L]
56pF(560)	±2%(G)	ERB1885C2E560GDX5D	ERB21B5C2E560GDX1L		
	±5%(J)	ERB1885C2E560JDX5D	ERB21B5C2E560JDX1L]
62pF(620)	±2%(G)	ERB1885C2E620GDX5D	ERB21B5C2E620GDX1L		
	±5%(J)	ERB1885C2E620JDX5D	ERB21B5C2E620JDX1L]
68pF(680)	±2%(G)	ERB1885C2E680GDX5D	ERB21B5C2E680GDX1L		
	±5%(J)	ERB1885C2E680JDX5D	ERB21B5C2E680JDX1L		
75pF(750)	±2%(G)	ERB1885C2E750GDX5D	ERB21B5C2E750GDX1L		
	±5%(J)	ERB1885C2E750JDX5D	ERB21B5C2E750JDX1L		
82pF(820)	±2%(G)	ERB1885C2E820GDX5D	ERB21B5C2E820GDX1L		
	±5%(J)	ERB1885C2E820JDX5D	ERB21B5C2E820JDX1L		
91pF(910)	±2%(G)	ERB1885C2E910GDX5D	ERB21B5C2E910GDX1L		
	±5%(J)	ERB1885C2E910JDX5D	ERB21B5C2E910JDX1L		
100pF(101)	±2%(G)	ERB1885C2E101GDX5D	ERB21B5C2E101GDX1L		
	±5%(J)	ERB1885C2E101JDX5D	ERB21B5C2E101JDX1L		
110pF(111)	±2%(G)			ERB21B5C2A111GDX1L	
	±5%(J)]		ERB21B5C2A111JDX1L]
120pF(121)	±2%(G)			ERB21B5C2A121GDX1L	
	±5%(J)]		ERB21B5C2A121JDX1L]
130pF(131)	±2%(G)			ERB21B5C2A131GDX1L	
	±5%(J)]		ERB21B5C2A131JDX1L]
150pF(151)	±2%(G)				ERB21B5C1H151GDX1
	±5%(J)]]]	ERB21B5C1H151JDX1I
160pF(161)	±2%(G)				ERB21B5C1H161GDX1
	±5%(J)	1			ERB21B5C1H161JDX1I

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

LxW [mm]		3.2x2.5 (32) <1210>
Rated Volt. [Vdc]]	500(2H)
Capacitance	Tolerance	Part Number
3.3pF(3R3)	±0.1pF(B)	ERB32Q5C2H3R3BDX1L
	±0.25pF(C)	ERB32Q5C2H3R3CDX1L
3.6pF(3R6)	±0.1pF(B)	ERB32Q5C2H3R6BDX1L
	±0.25pF(C)	ERB32Q5C2H3R6CDX1L
3.9pF(3R9)	±0.1pF(B)	ERB32Q5C2H3R9BDX1L
	±0.25pF(C)	ERB32Q5C2H3R9CDX1L
4.0pF(4R0)	±0.1pF(B)	ERB32Q5C2H4R0BDX1L
	±0.25pF(C)	ERB32Q5C2H4R0CDX1L
4.3pF(4R3)	±0.1pF(B)	ERB32Q5C2H4R3BDX1L
	±0.25pF(C)	ERB32Q5C2H4R3CDX1L
4.7pF(4R7)	±0.1pF(B)	ERB32Q5C2H4R7BDX1L
	±0.25pF(C)	ERB32Q5C2H4R7CDX1L
5.0pF(5R0)	±0.1pF(B)	ERB32Q5C2H5R0BDX1L
	±0.25pF(C)	ERB32Q5C2H5R0CDX1L
5.1pF(5R1)	±0.1pF(B)	ERB32Q5C2H5R1BDX1L
	±0.25pF(C)	ERB32Q5C2H5R1CDX1L
	±0.5pF(D)	ERB32Q5C2H5R1DDX1L
5.6pF(5R6)	±0.1pF(B)	ERB32Q5C2H5R6BDX1L
	±0.25pF(C)	ERB32Q5C2H5R6CDX1L
	±0.5pF(D)	ERB32Q5C2H5R6DDX1L
6.0pF(6R0)	±0.1pF(B)	ERB32Q5C2H6R0BDX1L
	±0.25pF(C)	ERB32Q5C2H6R0CDX1L
	±0.5pF(D)	ERB32Q5C2H6R0DDX1L
6.2pF(6R2)	±0.1pF(B)	ERB32Q5C2H6R2BDX1L
	±0.25pF(C)	ERB32Q5C2H6R2CDX1L
	±0.5pF(D)	ERB32Q5C2H6R2DDX1L
6.8pF(6R8)	±0.1pF(B)	ERB32Q5C2H6R8BDX1L
	±0.25pF(C)	ERB32Q5C2H6R8CDX1L
	±0.5pF(D)	ERB32Q5C2H6R8DDX1L
7.0pF(7R0)	±0.1pF(B)	ERB32Q5C2H7R0BDX1L
	±0.25pF(C)	ERB32Q5C2H7R0CDX1L
	±0.5pF(D)	ERB32Q5C2H7R0DDX1L
7.5pF(7R5)	±0.1pF(B)	ERB32Q5C2H7R5BDX1L
	±0.25pF(C)	ERB32Q5C2H7R5CDX1L
	±0.5pF(D)	ERB32Q5C2H7R5DDX1L
8.0pF(8R0)	±0.1pF(B)	ERB32Q5C2H8R0BDX1L
	±0.25pF(C)	ERB32Q5C2H8R0CDX1L
	±0.5pF(D)	ERB32Q5C2H8R0DDX1L
8.2pF(8R2)	±0.1pF(B)	ERB32Q5C2H8R2BDX1L
	±0.25pF(C)	ERB32Q5C2H8R2CDX1L
	±0.5pF(D)	ERB32Q5C2H8R2DDX1L
9.0pF(9R0)	±0.1pF(B)	ERB32Q5C2H9R0BDX1L
	±0.25pF(C)	ERB32Q5C2H9R0CDX1L
	±0.5pF(D)	ERB32Q5C2H9R0DDX1L
9.1pF(9R1)	±0.1pF(B)	ERB32Q5C2H9R1BDX1L
	±0.25pF(C)	ERB32Q5C2H9R1CDX1L
	±0.5pF(D)	ERB32Q5C2H9R1DDX1L
10pF(100)	±2%(G)	ERB32Q5C2H100GDX1L
	±5%(J)	ERB32Q5C2H100JDX1L

LxW [mm]		3.2x2.5(32)<1210>
	1	
Rated Volt. [Vdc	-	500(2H)
Capacitance	Tolerance	Part Number
11pF(110)	±2%(G)	ERB32Q5C2H110GDX1L
	±5%(J)	ERB32Q5C2H110JDX1L
12pF(120)	±2%(G)	ERB32Q5C2H120GDX1L
	±5%(J)	ERB32Q5C2H120JDX1L
13pF(130)	±2%(G)	ERB32Q5C2H130GDX1L
	±5%(J)	ERB32Q5C2H130JDX1L
15pF(150)	±2%(G)	ERB32Q5C2H150GDX1L
	±5%(J)	ERB32Q5C2H150JDX1L
16pF(160)	±2%(G)	ERB32Q5C2H160GDX1L
	±5%(J)	ERB32Q5C2H160JDX1L
18pF(180)	±2%(G)	ERB32Q5C2H180GDX1L
	±5%(J)	ERB32Q5C2H180JDX1L
20pF(200)	±2%(G)	ERB32Q5C2H200GDX1L
,	±5%(J)	ERB32Q5C2H200JDX1L
22pF(220)	±2%(G)	ERB32Q5C2H220GDX1L
p: (•)	±5%(J)	ERB32Q5C2H220JDX1L
24pF(240)	±3%(G)	ERB32Q5C2H240GDX1L
24pi (240)		ERB32Q5C2H240JDX1L
27mF(270)	±5%(J)	
27pF(270)	±2%(G)	ERB32Q5C2H270GDX1L
	±5%(J)	ERB32Q5C2H270JDX1L
30pF(300)	±2%(G)	ERB32Q5C2H300GDX1L
	±5%(J)	ERB32Q5C2H300JDX1L
33pF(330)	±2%(G)	ERB32Q5C2H330GDX1L
	±5%(J)	ERB32Q5C2H330JDX1L
36pF(360)	±2%(G)	ERB32Q5C2H360GDX1L
	±5%(J)	ERB32Q5C2H360JDX1L
39pF(390)	±2%(G)	ERB32Q5C2H390GDX1L
	±5%(J)	ERB32Q5C2H390JDX1L
43pF(430)	±2%(G)	ERB32Q5C2H430GDX1L
	±5%(J)	ERB32Q5C2H430JDX1L
47pF(470)	±2%(G)	ERB32Q5C2H470GDX1L
	±5%(J)	ERB32Q5C2H470JDX1L
51pF(510)	±2%(G)	ERB32Q5C2H510GDX1L
	±5%(J)	ERB32Q5C2H510JDX1L
56pF(560)	±2%(G)	ERB32Q5C2H560GDX1L
	±5%(J)	ERB32Q5C2H560JDX1L
62pF(620)	±2%(G)	ERB32Q5C2H620GDX1L
/	±5%(J)	ERB32Q5C2H620JDX1L
68pF(680)	±2%(G)	ERB32Q5C2H680GDX1L
	±5%(J)	ERB32Q5C2H680JDX1L
75pF(750)	±2%(G)	ERB32Q5C2H750GDX1L
, op. (100)	±5%(J)	ERB32Q5C2H750JDX1L
82pF(820)	±3 %(G)	ERB32Q5C2H820GDX1L
02pi (020)		ERB32Q5C2H820JDX1L
01~5/040	±5%(J)	
91pF(910)	±2%(G)	ERB32Q5C2H910GDX1L
	±5%(J)	ERB32Q5C2H910JDX1L
100pF(101)	±2%(G)	ERB32Q5C2H101GDX1L
	±5%(J)	ERB32Q5C2H101JDX1L

The part number code is shown in () and Unit is shown in []. $\hfill <>:$ EIA [inch] Code

0 8 9 0

Product ID
Series
Temperature Characteristics
Capacitance Tolerance

3 Dimension (LxW)6 Rated Voltage9 Individual Specification Code

Dimension (T)CapacitancePackaging

Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

(Part Number) **ER B 32 Q 5C 2H 3R3 B DX1 L**

0 0 0 0 0 0

6





LxW [mm]		3.2x2.5 (32) <1210>						
Rated Volt. [Vdc]	500(2H)	300(YD)	250(2E)	100(2A)			
Capacitance Tolerance			Part N	umber	1			
110pF(111)	±2%(G)	ERB32Q5C2H111GDX1L						
	±5%(J)	ERB32Q5C2H111JDX1L						
120pF(121)	±2%(G)	ERB32Q5C2H121GDX1L						
	±5%(J)	ERB32Q5C2H121JDX1L						
130pF(131)	±2%(G)		ERB32Q5CYD131GDX1L					
	±5%(J)		ERB32Q5CYD131JDX1L					
150pF(151)	±2%(G)		ERB32Q5CYD151GDX1L					
	±5%(J)		ERB32Q5CYD151JDX1L					
160pF(161)	±2%(G)			ERB32Q5C2E161GDX1L				
	±5%(J)			ERB32Q5C2E161JDX1L				
180pF(181)	±2%(G)			ERB32Q5C2E181GDX1L				
	±5%(J)			ERB32Q5C2E181JDX1L				
200pF(201)	±2%(G)			ERB32Q5C2E201GDX1L				
	±5%(J)			ERB32Q5C2E201JDX1L				
220pF(221)	±2%(G)			ERB32Q5C2E221GDX1L				
	±5%(J)			ERB32Q5C2E221JDX1L				
240pF(241)	±2%(G)				ERB32Q5C2A241GDX1			
	±5%(J)				ERB32Q5C2A241JDX1			
270pF(271)	±2%(G)				ERB32Q5C2A271GDX1			
	±5%(J)				ERB32Q5C2A271JDX1I			
300pF(301)	±2%(G)				ERB32Q5C2A301GDX1			
	±5%(J)				ERB32Q5C2A301JDX1I			
330pF(331)	±2%(G)				ERB32Q5C2A331GDX1			
	±5%(J)				ERB32Q5C2A331JDX1I			
360pF(361)	±2%(G)				ERB32Q5C2A361GDX1			
	±5%(J)				ERB32Q5C2A361JDX1			
390pF(391)	±2%(G)				ERB32Q5C2A391GDX1			
	±5%(J)				ERB32Q5C2A391JDX1			
430pF(431)	±2%(G)				ERB32Q5C2A431GDX1			
	±5%(J)				ERB32Q5C2A431JDX1			
470pF(471)	±2%(G)				ERB32Q5C2A471GDX1			
	±5%(J)	1			ERB32Q5C2A471JDX1L			

LxW [mm]		3.2x2.5(32)<1210>
Rated Volt. [Vdc]	50(1H)
Capacitance	Tolerance	Part Number
510pF(511)	±2%(G)	ERB32Q5C1H511GDX1L
	±5%(J)	ERB32Q5C1H511JDX1L
560pF(561)	±2%(G)	ERB32Q5C1H561GDX1L
	±5%(J)	ERB32Q5C1H561JDX1L
620pF(621)	±2%(G)	ERB32Q5C1H621GDX1L
	±5%(J)	ERB32Q5C1H621JDX1L
680pF(681)	±2%(G)	ERB32Q5C1H681GDX1L
	±5%(J)	ERB32Q5C1H681JDX1L
750pF(751)	±2%(G)	ERB32Q5C1H751GDX1L
	±5%(J)	ERB32Q5C1H751JDX1L
820pF(821)	±2%(G)	ERB32Q5C1H821GDX1L
	±5%(J)	ERB32Q5C1H821JDX1L
910pF(911)	±2%(G)	ERB32Q5C1H911GDX1L
	±5%(J)	ERB32Q5C1H911JDX1L
1000pF(102)	±2%(G)	ERB32Q5C1H102GDX1L
	±5%(J)	ERB32Q5C1H102JDX1L

The part number code is shown in () and Unit is shown in []. \$<>: EIA [inch] Code \$\$ ANote • This PDF catalog is downloaded from the website of Murata Manufacturing co., ltd. Therefore, it's specifications are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering.
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ERB Series Specifications and Test Methods

No.	lte	em	Specifications		Test Met	hod	
1	Operating Temperatu	ire Range	-55 to +125℃	Reference Temperatu	Reference Temperature: 25°C		
2	Rated Vo	Itage See the previous pages.		The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P,P} or V ^{O,P} , whichever is larger, should be maintained within the rated voltage range.			e, V ^{p.p} or V ^{o.p} ,
3	Appearar	nce	No defects or abnormalities	Visual inspection			
4	Dimensio	ns	Within the specified dimension	Using calipers			
5	Dielectric	Strength	No defects or abnormalities	No failure should be of age is applied betwee provided the charge/or (*) 300V: 250%, 500V	n the termina	ations for 1 to	5 seconds,
6	Insulation (I.R.)	Resistance	1,000,000MΩ min. (C≦470pF) 100,000MΩ min. (C>470pF)	The insulation resista voltage not exceeding humidity and within 2	the rated vo	ltage at 25℃ a	
7	Capacita	nce	Within the specified tolerance	The capacitance/Q sh			at the
8	Q		C≤ 220pF : Q≥10,000 220pF <c≤ 470pf="" 5,000<br="" :="" q≥="">470pF<c≤1,000pf 3,000<br="" :="" q≥="">C: Nominal Capacitance (pF)</c≤1,000pf></c≤>	frequency and voltage Frequency Voltage	e shown in th	e table. <u>1±0.1MHz</u> 1±0.2Vrms	
		Capacitance Change Temperature Coefficient	Within the specified tolerance (Table A-6) Within the specified tolerance (Table A-6)	The temperature coef capacitance measure the temperature sequ capacitance should be	d in step 3 as entially from e within the s	s a reference. step 1 through pecified tolera	When cycling 5, the nce for the
9	Capacitance Temperature Characteristics	Capacitance Drift	Within ±0.2% or ±0.05pF (Whichever is larger)	temperature coefficient The capacitance drift between the maximur 1, 3 and 5 by the capa <u>Step</u> 1 2 3 4 5	is calculated n and minimu acitance valu	by dividing the	e differences values in steps
			No removal of the terminations or other defects should occur.	Solder the capacitor of	on the test jig	(glass epoxy	board) shown
10	Adhesive Strength of Termination		Fig.1	in Fig. 1 using an eute Then apply 10N* force The soldering should reflow method and sh soldering is uniform a Type ERB18 ERB21 ERB32	e in parallel v be done eith ould be cond	er with an iron lucted with car fects such as l <u>b</u> 3.0 4.0 5.0	or using the e so that the

Continued on the following page.





ERB Series Specifications and Test Methods

Continued from the preceding page.

lo.	lte	em	5	Specifications	Test Method				
		Appearance	No defects or abnormaliti	es	Solder the capacitor to the test jig (glass epoxy board) in the same manner and under the same conditions as (10).				
		Capacitance	Within the specified tolera	ance					
1	Vibration Resistance	Q	Satisfies the initial value. C≦ 220pF : Q≧ 220pF <c≦ 470pf="" :="" q≧<br="">470pF<c≦1,000pf :="" q≧<br="">C: Nominal Capacitance</c≦1,000pf></c≦>	5,000 3,000	The capacitor should be subjected to a simple harmonic mo- having a total amplitude of 1.5mm, the frequency being vari- uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutua perpendicular directions (total of 6 hours).			ing varied 55Hz. 10Hz, motion	
		Appearance	No marking defects						
		Capacitance ChangeWithin ±5% or ±0.5pF (Whichever is larger)			in Fig. 2a usin	ig an eutectic	solder. T	lass epoxy boa hen apply a for	ce in the
2	Deflection		R230	: 1.0mm/sec.	the reflow me	thod and shou	ld be con	ering should be ducted with car efects such as l	e so that
2	Denection		5		Туре		а	b	С
					ERB		.0	3.0	1.2
				Flexure : ≤1	ERB2		.2	4.0	1.65
			Capacitance meter		ERB3	32 2	.2	5.0	2.9
			45 45 Fig.3a	+ 100 + t: 1.6mm Fig. 2a				(in	mm)
				r ig. 24				f isopropyl alco	hol and
3	Solderab Terminati		95% of the terminations ar continuously.	re to be soldered evenly and	rosin (25% ros Preheat at 80 After preheati	sin in weight p to 120℃ for 1 ng, immerse ir	roportion 0 to 30 se n an eute). econds.	
3			continuously.	re to be soldered evenly and	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-0 at 245±5°C.	sin in weight p to 120°C for 1 ng, immerse in 0.5Cu solder so	roportion 0 to 30 se n an euter olution for). econds. ctic solder	3
3			Continuously. The measured and obse specifications in the follow Item	e to be soldered evenly and rved characteristics should satisfy the wing table.	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-0 at 245±5°C.	sin in weight p to 120°C for 1 ng, immerse in 0.5Cu solder so rding to the co capacitor in an	noportion 0 to 30 set of an euter olution for nditions li eutectic). econds. ctic solder 5±0.5 seconds sted in the table solder or Sn-3.	s e below. DAg-0.5Ci
3			Continuously. The measured and obse specifications in the follow Item Appearance	e to be soldered evenly and rved characteristics should satisfy the wing table. Specifications No marked defect	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-0 at 245±5°C. Preheat account Immerse the of solder solution	sin in weight p to 120°C for 1 ng, immerse in 0.5Cu solder so rding to the co capacitor in an n at 270±5°C fo	nditions li eutectic or 10±0.5). econds. ctic solder 5±0.5 seconds sted in the table	s e below. DAg-0.5C
	Terminati	e	continuously. The measured and obse specifications in the follow Item Appearance Capacitance	e to be soldered evenly and rved characteristics should satisfy the wing table. Specifications No marked defect Within ±2.5% or ±0.25pF	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at 245±5°C.	sin in weight p to 120°C for 1 ng, immerse in 0.5Cu solder so rding to the co capacitor in an n at 270±5°C fo or 24±2 hours	roportion 0 to 30 set o an euter olution for nditions li eutectic or 10±0.5). ctic solder 5±0.5 seconds sted in the tabl solder or Sn-3.1 seconds. Let s	s e below. DAg-0.5C
	Terminati	e	Continuously. The measured and obse specifications in the follow Item Appearance	e to be soldered evenly and erved characteristics should satisfy the wing table. Specifications No marked defect Within ±2.5% or ±0.25pF (Whichever is larger)	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at 245±5°C. Preheat accou Immerse the o solder solution temperature fr	sin in weight p to 120°C for 1 ng, immerse in 0.5Cu solder so rding to the co capacitor in an n at 270±5°C fo or 24±2 hours ize	roportion 0 to 30 se an an euter blution for nditions li eutectic or 10±0.5 Preh). econds. ctic solder 5±0.5 seconds sted in the table solder or Sn-3.1 seconds. Let s eat Condition	e below. DAg-0.5C it at room
3	Terminati	e	continuously. The measured and obse specifications in the follow Item Appearance Capacitance	e to be soldered evenly and rved characteristics should satisfy the wing table. Specifications No marked defect Within ±2.5% or ±0.25pF	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at 245±5°C.	sin in weight p to 120°C for 1 ng, immerse in 0.5Cu solder so capacitor in an n at 270±5°C fo or 24±2 hours ize m max.	roportion 0 to 30 se a an euter oblution for nditions li eutectic or 10±0.5 Preh 1minute). ctic solder 5±0.5 seconds sted in the tabl solder or Sn-3.1 seconds. Let s	e below. DAg-0.5Cr it at room
	Terminati	e	continuously. The measured and obse specifications in the follow Item Appearance Capacitance Change	the to be soldered evenly and arrved characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 2.5\%$ or ± 0.25 pF (Whichever is larger) C ≤ 220 pF : Q $\geq 10,000$ 220pF <c <math="">\leq 470pF : Q $\geq 5,000$</c>	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at 245±5°C. Preheat accool Immerse the of solder solution temperature fr Chip S 2.0×1.25m	sin in weight p to 120°C for 1 ng, immerse in 0.5Cu solder so capacitor in an n at 270±5°C fo or 24±2 hours ize m max.	roportion 0 to 30 se a an euter oblution for nditions li eutectic or 10±0.5 Preh 1minute). econds. ctic solder 5±0.5 seconds sted in the table solder or Sn-3.1 seconds. Let s eat Condition a at 120 to 150°	e below. DAg-0.5C it at room
	Terminati	e	continuously. The measured and obse specifications in the follow Item Appearance Capacitance Change Q	te to be soldered evenly and rved characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 2.5\%$ or ± 0.25 pF (Whichever is larger) C ≤ 220 pF : Q $\geq 10,000$ 220 pF <c<math>\leq 470 pF : Q$\geq 5,000$ 470 pF <c<math>\leq 1,000 pF : Q$\geq 3,000$</c<math></c<math>	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at 245±5°C. Preheat accool Immerse the of solder solution temperature fr Chip S 2.0×1.25m	sin in weight p to 120°C for 1 ng, immerse in 0.5Cu solder so capacitor in an n at 270±5°C fo or 24±2 hours ize m max.	roportion 0 to 30 se a an euter oblution for nditions li eutectic or 10±0.5 Preh 1minute). econds. ctic solder 5±0.5 seconds sted in the table solder or Sn-3.1 seconds. Let s eat Condition a at 120 to 150°	e below. DAg-0.5C it at room
	Terminati	e	continuously. The measured and obse specifications in the follow Item Appearance Capacitance Change Q Dielectric Strength	the to be soldered evenly and reved characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 2.5\%$ or ± 0.25 pF (Whichever is larger) C ≤ 220 pF : Q $\geq 10,000$ 220pF <c<math>\leq 470pF : Q$\geq 5,000$ 470pF<c<math>\leq 1,000pF : Q$\geq 3,000$ No failure C: Nominal Capacitance (pF) reved characteristics should satisfy the</c<math></c<math>	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at 245±5°C. Preheat accool Immerse the of solder solution temperature for 2.0×1.25m 3.2×2.5mm	sin in weight p to 120°C for 1 ng, immerse in .5Cu solder so rding to the co capacitor in an n at 270±5°C fo or 24±2 hours ize m max. n Each 1	roportion 0 to 30 se a an euter olution for nditions li eutectic or 10±0.5 Preh 1minute at 10). econds. ctic solder 5±0.5 seconds sted in the table solder or Sn-3.1 seconds. Let s eat Condition a at 120 to 150°	e below. DAg-0.5C it at room C
	Terminati	e	continuously. The measured and obse specifications in the follow Item Appearance Capacitance Change Q Dielectric Strength The measured and obse	te to be soldered evenly and rved characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 2.5\%$ or $\pm 0.25pF$ (Whichever is larger) C $\leq 220pF : Q \geq 10,000$ $220pF < C \leq 470pF : Q \geq 5,000$ $470pF < C \leq 1,000pF : Q \geq 3,000$ No failure C: Nominal Capacitance (pF) rved characteristics should satisfy the wing table.	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at $245\pm5^{\circ}$ C. Preheat accool Immerse the of solder solution temperature fr <u>Chip S</u> 2.0×1.25m 3.2×2.5mm	sin in weight p to 120°C for 1 ng, immerse in .5Cu solder so rding to the co capacitor in an at 270±5°C fo or 24±2 hours ize m max. n Each 1 tor to the supp ne conditions a	roportion 0 to 30 set an an euterolution for onditions li eutectic for 10±0.5 Preh 1minute minute at 10 orting jig i s (10). Pr). econds. ctic solder 5±0.5 seconds solder or Sn-3.1 seconds. Let s eat Condition a at 120 to 150° 0 to 120°c and then n the same man erform the five of	e below. DAg-0.5C it at room <u>c</u> 170 to 200°c
	Terminati	e	continuously. The measured and obse specifications in the follow Item Appearance Capacitance Change Q Dielectric Strength The measured and obse	the to be soldered evenly and reved characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 2.5\%$ or ± 0.25 pF (Whichever is larger) C ≤ 220 pF : Q $\geq 10,000$ 220pF <c<math>\leq 470pF : Q$\geq 5,000$ 470pF<c<math>\leq 1,000pF : Q$\geq 3,000$ No failure C: Nominal Capacitance (pF) reved characteristics should satisfy the</c<math></c<math>	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at $245\pm5^{\circ}$ C. Preheat accool Immerse the of solder solution temperature fr <u>Chip S</u> 2.0×1.25m 3.2×2.5mm	sin in weight p to 120°C for 1 ng, immerse in 5.5Cu solder so capacitor in an at 270±5°C fo or 24±2 hours ize max. n Each 1 tor to the supp ne conditions a ne four heat tree	roportion 0 to 30 set an euterolution for oution for eutectic or 10±0.5 Preh 1minute at 10 orting jig is s (10). Pre-). aconds. ctic solder 5±0.5 seconds solder or Sn-3.1 seconds. Let s eat Condition a at 120 to 150° 0 to 120°c and then n the same man erform the five of isted in the follo	e below. DAg-0.5C it at room <u>c</u> 170 to 200°c
	Terminati	e	continuously. The measured and obse specifications in the follow Item Appearance Capacitance Change Q Dielectric Strength The measured and obse specifications in the follow Item	the to be soldered evenly and reved characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 2.5\%$ or ± 0.25 pF (Whichever is larger) C ≤ 220 pF : Q $\geq 10,000$ 220pF <c<math>\leq 470pF : Q$\geq 5,000$ 470pF<c<math>\leq 1,000pF : Q$\geq 3,000$ No failure C: Nominal Capacitance (pF) reved characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 5\%$ or ± 0.5pF</c<math></c<math>	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at $245\pm5^{\circ}$ C. Preheat accool Immerse the of solder solution temperature fr <u>Chip S</u> 2.0×1.25m 3.2×2.5mm	sin in weight p to 120°C for 1 ng, immerse in 5.5Cu solder so capacitor in an at 270±5°C fo or 24±2 hours ize max. n Each 1 tor to the supp ne conditions a ne four heat tree	roportion 0 to 30 set an euterolution for oution for eutectic or 10±0.5 Preh 1minute at 10 orting jig is s (10). Pre-). econds. ctic solder 5±0.5 seconds solder or Sn-3.1 seconds. Let s eat Condition a at 120 to 150° 0 to 120°c and then n the same man erform the five of	e below. DAg-0.5C it at room <u>c</u> 170 to 200°c
4	Terminati Resistanc to Solderi Temperal	e ng Heat	continuously. The measured and obse specifications in the follow Item Appearance Capacitance Change Q Dielectric Strength The measured and obse specifications in the follow Item Appearance	the to be soldered evenly and trived characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 2.5\%$ or ± 0.25 pF (Whichever is larger) $C \leq 220$ pF : Q $\geq 10,000$ 220 pF <c <math="">\leq 470pF : Q$\geq 5,000$ 470pF <c <math="">\leq 470pF : Q$\geq 5,000$ 470pF <c <math="">\leq 1,000pF : Q$\geq 3,000$ No failure C: Nominal Capacitance (pF) trived characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 5\%$ or ± 0.5pF (Whichever is larger)</c></c></c>	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at $245\pm5^{\circ}$ C. Preheat accool Immerse the of solder solution temperature fr <u>Chip S</u> 2.0×1.25m 3.2×2.5mm	sin in weight p to 120°C for 1 ng, immerse in 5.5Cu solder so capacitor in an at 270±5°C fo or 24±2 hours ize max. n Each 1 tor to the supp ne conditions a ne four heat tree	roportion 0 to 30 set an euterolution for oution for eutectic or 10±0.5 Preh 1minute at 10 orting jig is s (10). Pre-). aconds. ctic solder 5±0.5 seconds solder or Sn-3.1 seconds. Let s eat Condition a at 120 to 150° 0 to 120°c and then n the same man erform the five of isted in the follo	e below. DAg-0.5C it at room <u>c</u> 170 to 200°c
	Terminati Resistance to Solderi	e ng Heat	continuously. The measured and obse specifications in the follow Item Appearance Capacitance Change Q Dielectric Strength The measured and obse specifications in the follow Item Appearance Capacitance Capacitance	the to be soldered evenly and reved characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 2.5\%$ or ± 0.25 pF (Whichever is larger) C ≤ 220 pF : Q $\geq 10,000$ 220pF <c<math>\leq 470pF : Q$\geq 5,000$ 470pF<c<math>\leq 1,000pF : Q$\geq 3,000$ No failure C: Nominal Capacitance (pF) reved characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 5\%$ or ± 0.5pF</c<math></c<math>	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at 245±5°C. Preheat accool Immerse the of solder solution temperature for 2.0×1.25m 3.2×2.5mm Fix the capaci under the sam according to th Let sit for 24±	sin in weight p to 120°C for 1 ng, immerse in 0.5Cu solder so rding to the co capacitor in an n at 270±5°C fo or 24±2 hours ize	roportion 0 to 30 set n an euterolocition for oution for eutectic for 10±0.5 Preh 1minute minute at 10 orting jig i s (10). Pre- teatments in temper. 2 Room). econds. ctic solder 5±0.5 seconds sted in the table solder or Sn-3.1 seconds. Let s eat Condition e at 120 to 150° 0 to 120°c and then n the same man erform the five of isted in the follo ature, then mea 3 Max. Operating	e below. DAg-0.5C it at room C 170 to 200°C nner and cycles wing tabl sure.
4	Terminati Resistanc to Solderi Temperal	e ng Heat	continuously. The measured and obse specifications in the follow Item Appearance Capacitance Change Q Dielectric Strength The measured and obse specifications in the follow Item Appearance Capacitance Capacitance Change	e to be soldered evenly and rrved characteristics should satisfy the wing table. Specifications No marked defect Within $\pm 2.5\%$ or $\pm 0.25pF$ (Whichever is larger) C $\leq 220pF : Q \geq 10,000$ 220pF $470pF No failureC: Nominal Capacitance (pF)rrved characteristics should satisfy thewing table.SpecificationsNo marked defectWithin \pm 5\% or \pm 0.5pF(Whichever is larger)C \geq 30pF : Q \geq 35010pF \leq C < 30pF : Q \geq 275 + \frac{5}{2}C$	rosin (25% ros Preheat at 80 After preheati or Sn-3.0Ag-C at 245±5°C. Preheat accor Immerse the of solder solution temperature for <u>Chip S</u> 2.0×1.25m 3.2×2.5mm Fix the capaci under the sam according to tt Let sit for 24± <u>Step</u>	sin in weight p to 120°C for 1 ng, immerse in .5Cu solder so rding to the co capacitor in an at 270±5°C fo or 24±2 hours ize m max. n Each 1 tor to the supp ne conditions a ne four heat tree 2 hours at roor 1 Min.	roportion 0 to 30 set n an euterolocition for oution for eutectic for 10±0.5 Preh 1minute minute at 10 orting jig i s (10). Pre- teatments in temper. 2 Room). econds. ctic solder 5±0.5 seconds solder or Sn-3.0 seconds. Let s eat Condition a at 120 to 150° 0 to 120°c and then isted in the follo ature, then mean 3 Max.	e below. DAg-0.5C it at room c 170 to 200°C nner and cycles wing table sure. 4 Room

Continued on the following page.



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ERB Series Specifications and Test Methods

Continued from the preceding page.

No.	Item	5	Specifications	Test Method
16	Humidity	The measured and obse specifications in the follow Item Appearance Capacitance Change Q I.R.	rved characteristics should satisfy the ving table. Specifications No marked defect Within ±5% or ±0.5pF (Whichever is larger) C≧30pF : Q≧350 10pF≦C<30pF : Q≧275+ 5/2 C C<10pF : Q≧200+10C 1,000MΩ min. C: Nominal Capacitance (pF)	Apply the 24-hour heat (-10 to +65°C) and humidity (80 to 100%) treatment shown below, 10 consecutive times. Remove, let sit for 24±2 hours at room temperature, and measure.
17	High Temperature Load	The measured and observed specifications in the follow	rved characteristics should satisfy the ving table. Specifications No marked defect Within $\pm 3\%$ or $\pm 0.3pF$ (Whichever is larger) C $\geq 30pF : Q \geq 350$ $10pF \leq C < 30pF : Q \geq 275 + \frac{5}{2}C$ C $< 10pF : Q \geq 200 + 10C$ 1,000M Ω min. C: Nominal Capacitance (pF)	Apply 200% (500V only 150%) of the rated voltage for 1,000±12 hours at 125±3℃. Remove and let sit for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.

Table A-6

	Nominal Values (ppm/℃) Note 1			Capacitance Cha	nge from 25℃ (%)	
Char.		-55		-30		-10	
		Max.	Min.	Max.	Min.	Max.	Min.
5C	0±30	0.58	-0.24	0.40	-0.17	0.25	-0.11

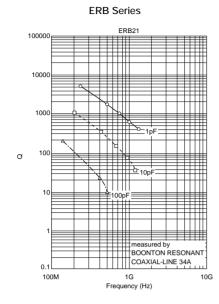
Note 1: Nominal values denote the temperature coefficient within a range of 25 to 125°C (for 5C)

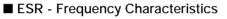
6

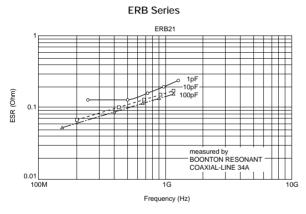


ERB Series Data

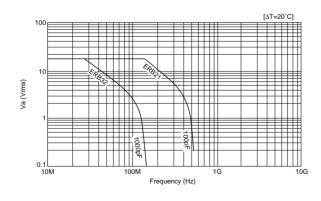
Q - Frequency Characteristics

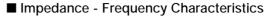


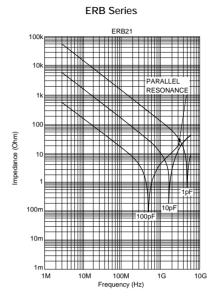


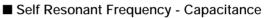




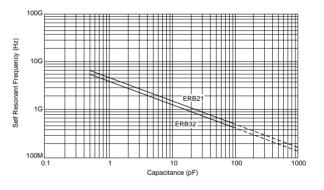




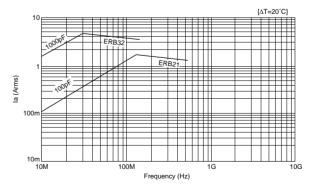




ERB Series



■ Allowable Current - Frequency



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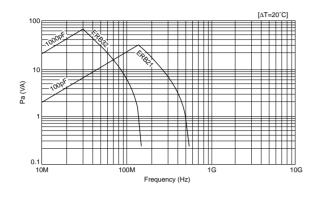


ERB Series Data

Continued from the preceding page.

■ Allowable Apparent Power - Frequency

■ Allowable Effective Power - Frequency



0 10 10 10 10 10 10 Frequency (Hz)



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Chip Monolithic Ceramic Capacitors

muRata

Monolithic Microchip GMA Series

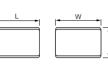
Features

- 1. Better micro wave characteristics
- 2. Suitable for by-passing
- 3. High density mounting

Applications

- 1. Optical device for telecommunication
- 2. IC, IC packaging built-in
- 3. Measuring equipment





Outer electrode: Au plated

Part Number		Dimensions (mm)	
Fait Number	L	W	Т
GMA0D3	0.38 ±0.05	0.38 ±0.05	0.3 ±0.05
GMA05X	0.5 ±0.05	0.5 ±0.05	0.35 ±0.05
GMA085	0.8 ±0.05	0.8 ±0.05	0.5 ±0.1

Capacitance Table

High Dielectric Constant Type X7R(R7)/X5R(R6) Characteristics

X ex.X: T Dimension [mm]

X	ex.x: I	Dimension [mm	ı]							
	LxW [mm]	0.38x0.38 (0D) <015015>		0.5× (0 <02	(0.5 5) 02>			0.8: (0 <03	x0.8 8) 03>	
Rated	Voltage [Vdc]	10 (1A)	100 (2A)	25 (1E)	10 (1A)	6.3 (0J)	100 (2A)	25 (1E)	10 (1A)	6.3 (0J)
Capacitance	тс	X7R (R7)		X7R (R7)		X5R (R6)		X7R (R7)		X5R (R6)
100p	F(101)		Х				1		I	
150p	F(151)		Х				1			
220p	F(221)		Х							
330p	F(331)		Х				 			
470p	F(471)		Х				 			
680p	F(681)		Х				 			
1000p	F(102)		Х							
1500p	F(152)			Х			5			
2200p	F(222)			Х			5			
3300p	F(332)			Х			5			
4700p	F(472)			Х			5			
6800p	F(682)				Х		5			
10000p		3			Х		 	5		
15000p	F(153)				Х		I I	5		
22000p	F(223)				Х			5		
33000p	F(333)								5	
47000p	F(473)						 		5	
68000p			 				 		5	
	F(104)					X			5	
0.47µ	F(474)						 			5

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



High Dielectric Constant Type X7R(R7)/X5R(R6) Characteristics

LxW [mm]		0.38x0.38(0D)<015015>
Rated Volt. [Vdc]	10(1A)
Capacitance	Tolerance	Part Number
10000pF(103)	±20%(M)	GMA0D3R71A103MA01T

LxW [mm]			0.5x0.5(05)<0202>					
Rated Volt. [Vdc]	100(2A)	25(1E)	10(1A)	6.3 (0J)			
Capacitance	Capacitance Tolerance Part Number							
100pF(101)	±20%(M)	GMA05XR72A101MA01T						
150pF(151)	±20%(M)	GMA05XR72A151MA01T						
220pF(221)	±20%(M)	GMA05XR72A221MA01T						
330pF(331)	±20%(M)	GMA05XR72A331MA01T						
470pF(471)	±20%(M)	GMA05XR72A471MA01T						
680pF(681)	±20%(M)	GMA05XR72A681MA01T						
1000pF(102)	±20%(M)	GMA05XR72A102MA01T						
1500pF(152)	±20%(M)		GMA05XR71E152MA11T					
2200pF(222)	±20%(M)		GMA05XR71E222MA11T					
3300pF(332)	±20%(M)		GMA05XR71E332MA11T					
4700pF(472)	±20%(M)		GMA05XR71E472MA11T					
6800pF(682)	±20%(M)			GMA05XR71A682MA01T				
10000pF(103)	±20%(M)			GMA05XR71A103MA01T				
15000pF(153)	±20%(M)			GMA05XR71A153MA01T				
22000pF(223)	±20%(M)			GMA05XR71A223MA01T				
33000pF(333)	±20%(M)							
47000pF(473)	±20%(M)							
68000pF(683)	±20%(M)							
0.10μF(104)	±20%(M)				GMA05XR60J104ME12T*			

LxW [mm]		0.8x0.8(08)<0303>					
Rated Volt. [Vdc]	100(2A)	25(1E)	10(1A)	6.3(0J)		
Capacitance	Tolerance		Part N	lumber			
1500pF(152)	±20%(M)	GMA085R72A152MA01T					
2200pF(222)	±20%(M)	GMA085R72A222MA01T					
3300pF(332)	±20%(M)	GMA085R72A332MA01T					
4700pF(472)	±20%(M)	GMA085R72A472MA01T					
6800pF(682)	±20%(M)	GMA085R72A682MA01T					
10000pF(103)	±20%(M)		GMA085R71E103MA11T				
15000pF(153)	±20%(M)		GMA085R71E153MA11T				
22000pF(223)	±20%(M)		GMA085R71E223MA11T				
33000pF(333)	±20%(M)			GMA085R71A333MA01T			
47000pF(473)	±20%(M)			GMA085R71A473MA01T			
68000pF(683)	±20%(M)			GMA085R71A683MA01T			
0.10μF(104)	±20%(M)			GMA085R71A104MA01T			
0.47µF(474)	±20%(M)				GMA085R60J474ME12T*		

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to GMA series Specifications and Test Method(2).



Packaging Code in Part Number is a code shows STD Tray.

Dimension (LxW)Rated VoltageIndividual Specification Code

Dimension (T)CapacitancePackaging

7

GMA Series Specifications and Test Methods(1)

In case Non "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (2).

No.	lte	em	Specifications	Test Method
1	Operating Temperat Range		R7: −55 to +125℃	Reference Temperature: 25°C
2	Rated Voltage		See the previous pages.	The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{p,p} or V ^{0,p} , whichever is larger, should be maintained within the rated voltage range.
3	Appearar	nce	No defects or abnormalities	Visual inspection
4	Dimensio	ns	Within the specified dimensions	Using calipers
5	Dielectric	: Strength	No defects or abnormalities	No failure should be observed when a voltage of 250% of the rated voltage is applied between the both terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.
6	Insulation	Resistance	More than 10,000M Ω or 500 Ω F (Whichever is smaller)	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 2 minutes of charging.
7	Capacita	nce	Within the specified tolerance	The capacitance/D.F. should be measured at reference
8	Dissipatio (D.F.)	on Factor	R7: W.V.: 25V min.; 0.025 max. W.V.: 16V/10V; 0.035 max.	temperature at the frequency and voltage shown in the table. Frequency 1±0.1kHz Voltage 1±0.2Vrms
9	Capacitance Temperature Characteristics	No bias	R7: Within +/–15% (–55 to +125°C)	The capacitance change should be measured after 5min. at each specified temp. stage. • The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.* $ \hline Step \ Temperature (°C) \ 1 \ 25\pm2 \ 2 \ -55\pm3 \ 3 \ 25\pm2 \ 4 \ 125\pm3 \ 3 \ 25\pm2 \ 4 \ 125\pm3 \ 3 \ 25\pm2 \ 4 \ 125\pm3 \ 3 \ 8 \ 1nitial measurement for high dielectric constant type Perform a heat treatment at 150 +0/-10°C for one hour andthen let sit for 24\pm2 hours at room temperature. $
10	Mechanical Strength	Bond Strength	Pull force: 0.03N min.	Perform the initial measurement. MIL-STD-883 Method 2011 Condition D Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20) and bond a 25µm (0.001 inch) gold wire to the capacitor terminal using an ultrasonic ball bond. Then, pull wire.
	Ĵ	Die Shear Strength	Die Shear force: 2N min.	MIL-STD-883 Method 2019 Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate.
		Appearance	No defects or abnormalities	Ramp frequency from 10 to 55Hz then return to 10Hz all within
11	Vibration	Capacitance	Within the specified tolerance	1 minute. Amplitude: 1.5 mm (0.06 inch) max. total excursion.
•••	Resistance	Resistance R7: W.V.: 25V min.; 0.025 max. W.V.: 16V/10V; 0.035 max.		Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours).
		Appearance	No defects or abnormalities	The capacitor should be set for 24±2 hours at room
		Capacitance Change	R7: Within ±7.5%	temperature after one hour heat of treatment at $150+0/-10^{\circ}$ C, then measure for the initial measurement. Fix the capacitor to
10	Temperature	D.F.	R7: W.V.: 25V min.; 0.025 max. W.V.: 16V/10V; 0.035 max.	the supporting jig in the same manner and under the same conditions as (11) and conduct the five cycles according to the temperatures and time shown in the following table. Set it for
12	Cycle	I.R.	More than 10,000M Ω or 500 Ω F	24±2 hours at room temperature, then measure.
		Dielectric	(Whichever is smaller)	Step 1 2 3 4 Temp. (°C) Min. Operating Temp. +0/-3 Room Temp. +3/-0 Max. Operating Temp. +3/-0 Room Temp. +3/-0
		Strength		Time (min.) 30±3 2 to 3 30±3 2 to 3

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No.11 to 15 are performed.

Continued on the following page. $\boxed{\circlel{A}}$

7



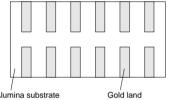
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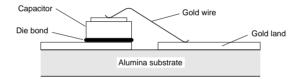
GMA Series Specifications and Test Methods(1)

In case Non "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (1).

No.	Ite	m	Specifications	Test Method	
		Appearance	No defects or abnormalities		
13	Humidity	Capacitance Change	R7: Within ±12.5%	Set the capacitor for 500±12 hours at 40±2℃, in 90 to 95% humidity.	
13	(Steady State)	D.F.	R7: W.V.: 10V min.; 0.05 max.	Take it out and set it for 24±2 hours at room temperature, then	
		I.R.	More than 1,000M Ω or 50 Ω F (Whichever is smaller)	measure.	
	Appearance		Appearance	No defects or abnormalities	
14	Humidity	Capacitance Change	R7: Within ±12.5%	Apply the rated voltage for 500 ± 12 hours at 40 ± 2 °C, in 90 to 95% humidity and set it for 24±2 hours at room	
14	Load	D.F.	R7: W.V.: 10V min.; 0.05 max.	temperature, then measure. The charge/discharge current is	
		I.R.	More than 500M Ω or 25 Ω F (Whichever is smaller)	ess than 50mA.	
		Appearance	No defects or abnormalities	A voltage treatment should be given to the capacitor, in which a	
	Capacitance Change	High	Capacitance Change	R7: Within ±12.5%	DC voltage of 200% the rated voltage is applied for one hour at the maximum operating temperature ±3℃ then it should be set for 24±2 hours at room temperature and the initial measurement
15		erature D.F. R7: W.V.: 1	R7: W.V.: 10V min.; 0.05 max.	should be conducted.	
	Load	I.R.	More than 1,000M Ω or 50 Ω F (Whichever is smaller)	Then apply the above mentioned voltage continuously for 1000±12 hours at the same temperature, remove it from the bath, and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.	

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No.11 to 15 are performed.





Alumina substrate



GMA Series Specifications and Test Methods(2)

In case Non "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (2).

No.	Ite	em	Specifications	Test Method	
1	Operating Temperat Range	,	R6 : –55°C to 85°C	Reference Temperature : 25°C	
2 Rated Voltage See the previous pages.		See the previous pages.	The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^{O-P} whichever is larger, should be maintained within the rated vol- age range.		
3	Appearar	nce	No defects or abnormalities.	Visual inspection.	
4	Dimensio	ns	Within the specified dimensions.	Using calipers.	
5	Dielectric	Strength	No defects or abnormalities.	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provid- ed the charge/discharge current is less than 50mA.	
6	Insulation Resistanc		More than $50\Omega \cdot F$	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 1 minutes of charging.	
7	Capacita	nce	Within the specified tolerance.	The capacitance/D.F. should be measured at reference temperature at the frequency and voltage shown in the table.	
8	Dissipatio Factor (D		R6 : 0.1 max.	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	
9	Capacitance Temperature Characteristics Mechanical	No bias Bond Strength	R6 : Within ±15% (–55°C to +85°C) Pull force : 0.03N min.	The capacitance change should be measured after 5min. at each specified temp. stage. The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.* \$tep\$ Temperature (°C)\$ 1 25±2 2 - 55±3 3 25±2 4 85±3 \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$	
	Strength	Die Shear Strength	Die Shear force : 2N min.	MIL-STD-883 Method 2019 Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate.	
		Appearance	No defects or abnormalities.		
	Vibration	Capacitance	Within the specified tolerance.	Ramp frequency from 10 to 55Hz then return to 10Hz all within 1 minute. Amplitude : 1.5 mm (0.06 inch) max. total excursion.	
11	Resistance	D.F.	R6 : 0.1 max.	Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours).	
		Appearance	No defects or abnormalities.	The capacitor should be set for 24±2 hours at room	
		Capacitance Change	R6 : Within ±7.5%	temperature after one hour heat of treatment at 150+0/–10°C, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same	
	Tomporature	D.F.	R6 : 0.1 max.	conditions as (11) and conduct the five cycles according to the	
12		I.R.	More than $50\Omega \cdot F$	temperatures and time shown in the following table. Set it for 48±4 hours at room temperature, then measure.	
	Change			Step 1 2 3 4	
		Dielectric Strength	No defects	Temp. (°C)Min. Operating Temp.+0/-3Room Temp.Max. Operating Temp. +3/-0Room Temp.	
				Time (min.) 30±3 2 to 3 30±3 2 to 3	

Mounting for testing : The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No.11 to 14 are performed.

Continued on the following page.

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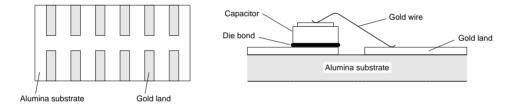


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GMA Series Specifications and Test Methods(2)

	Continued fr	om the prece		ease refer to GMA Series Specifications and Test Methods (1). ease refer to GMA Series Specifications and Test Methods (2).
No.	Ite	m	Specifications	Test Method
		Appearance	No defects or abnormalities.	Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to
		Capacitance Change	R6 : Within ±12.5%	95% humidity and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.
	High	D.F.	R6 : 0.2 max.	
13	Temperature High Humidity (Steady)	I.R.	More than 12.5Ω · F	 Initial measurement Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.
				• Measurement after test Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.
		Appearance	No defects or abnormalities.	Apply 150% of the rated voltage for 1000 \pm 12 hours at the
		Capacitance Change	R6 : Within ±12.5%	maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure. The charge/ discharge current is less than 50mA.
		D.F.	R6 : 0.2 max.	
14	Durability	I.R.	More than $25\Omega \cdot F$	 Initial measurement Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.
				• Measurement after test Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.

Mounting for testing : The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No.11 to 14 are performed.





Chip Monolithic Ceramic Capacitors



for Bonding GMD Series

Features

- 1. Small chip size (LxWxT: 0.6x0.3x0.3, 1.0x0.5x0.5mm)
- 2. Available for Wire/Die bonding due to Gold termination.
- 3. Suitable for Optical device for telecommunication, IC packaging built-in.

Applications

- 1. Optical device for telecommunication
- 2. IC, IC packaging built-in



Outer electrode: Au



Part Number	Dimensions (mm)							
Part Number	L	W	Т	е	g min.			
GMD033	0.6±0.03	0.3±0.03	0.3±0.03	0.12 to 0.22	0.16			
GMD155	1.0±0.05	0.5±0.05	0.5±0.05	0.15 to 0.35	0.3			

g



Capacitance Table

High Dielectric Constant Type X7R(R7)/X5R(R6) Characteristics

3 ex.3: T Dimension [mm]

3 ex.3: T [Dimension [mm	ן]							
LxW [mm]		0.6x0.3 (03) <0201>			1.0x0.5 (15) <0402>		0.6x0.3 (03) <0201>	1.0x (1 : <04	:0.5 5) 02>
Rated Voltage [Vdc]	25 (1E)	16 (1C)	10 (1A)	50 (1H)	25 (1E)	16 (1C)	6.3 (0J)	10 (1A)	6.3 (0J)
Capacitance		1		7R 2 7)	1			X5R (R6)	
100pF(101)	3			1 1 1					
120pF(121)	3	1		 			 		
150pF(151)	3	1		1					
180pF(181)	3	1		 			1		
220pF(221)	3	1		5			1		
270pF(271)	3	1		5	1		1 		
330pF(331)	3	1		5	1		1		
390pF(391)	3	1		5	1				
470pF(471)	3	1		5	1				
560pF(561)	3	1		5	1		 		
680pF(681)	3	1		5	1		 		
820pF(821)	3			5	1		1 1 1		
1000pF(102)	3			5			+		
1200pF(122)	3			5	1		1		
1500pF(152)	3			5	1				
1800pF(182)		3		5	1		1		
2200pF(222)		3		5	1		 		
2700pF(272)		3		5	1		1 1 1		
3300pF(332)		3		5	1		 		
3900pF(392)			3	5	1		1		
4700pF(472)			3	5	1		1		
5600pF(562)			3		5				
6800pF(682)			3		5		 		
8200pF(822)			3		5		1 1 1		
10000pF(103)			3		5		+		
12000pF(123)				1 1 1	5				
15000pF(153)				, , , ,	5				
18000pF(183)				, 1 1	5		1		
22000pF(223)				1 1 1	5		1		
27000pF(273)				1 1 1	5		 		
33000pF(333)					5		1		
39000pF(393)					5				
47000pF(473)				 	5				
56000pF(563)				 	-	5	3		
68000pF(683)				1 1 1		5	3		
82000pF(823)				 		5	3		
0.10μF(104)						5	3		
0.12μF(124)						-		5	
0.15μF(154)				1 1				5	
0.18μF(184)				1 1 1				5	
0.22μF(224)								5	
0.27μF(274)				1 				5	
0.33μF(334)				1 				5	
0.39µF(394)								5	
0.47μF(474)				1 1 1				5	
1.0μF(105)				L			+l	-	5
1.6µ1 (100)	I			1			1		

The part number code is shown in () and Unit is shown in []. $\ \ <>:$ EIA [inch] Code



High Dielectric Constant Type X7R(R7) Characteristics

LxW [mm]			0.6x0.3(03)<0201>					
Rated Volt. [Vdc]	25(1E)	16(1C)	10(1A)				
Capacitance	Tolerance	Part Number						
100pF(101)	±10%(K)	GMD033R71E101KA01D						
120pF(121)	±10%(K)	GMD033R71E121KA01D						
150pF(151)	±10%(K)	GMD033R71E151KA01D						
180pF(181)	±10%(K)	GMD033R71E181KA01D						
220pF(221)	±10%(K)	GMD033R71E221KA01D						
270pF(271)	±10%(K)	GMD033R71E271KA01D						
330pF(331)	±10%(K)	GMD033R71E331KA01D						
390pF(391)	±10%(K)	GMD033R71E391KA01D						
470pF(471)	±10%(K)	GMD033R71E471KA01D						
560pF(561)	±10%(K)	GMD033R71E561KA01D						
680pF(681)	±10%(K)	GMD033R71E681KA01D						
820pF(821)	±10%(K)	GMD033R71E821KA01D						
1000pF(102)	±10%(K)	GMD033R71E102KA01D						
1200pF(122)	±10%(K)	GMD033R71E122KA01D						
1500pF(152)	±10%(K)	GMD033R71E152KA01D						
1800pF(182)	±10%(K)		GMD033R71C182KA11D					
2200pF(222)	±10%(K)		GMD033R71C222KA11D					
2700pF(272)	±10%(K)		GMD033R71C272KA11D					
3300pF(332)	±10%(K)		GMD033R71C332KA11D					
3900pF(392)	±10%(K)			GMD033R71A392KA01D				
4700pF(472)	±10%(K)			GMD033R71A472KA01D				
5600pF(562)	±10%(K)			GMD033R71A562KA01D				
6800pF(682)	±10%(K)			GMD033R71A682KA01D				
8200pF(822)	±10%(K)			GMD033R71A822KA01D				
10000pF(103)	±10%(K)			GMD033R71A103KA01D				

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

8



High Dielectric Constant Type X7R(R7) Characteristics

LxW [mm]			1.0x0.5(15)<0402>	
Rated Volt. [Vdc]	50(1H)	25(1E)	16(1C)
Capacitance Tolerance			Part Number	
220pF(221)	±10%(K)	GMD155R71H221KA01D		
270pF(271)	±10%(K)	GMD155R71H271KA01D		
330pF(331)	±10%(K)	GMD155R71H331KA01D		
390pF(391)	±10%(K)	GMD155R71H391KA01D		
470pF(471)	±10%(K)	GMD155R71H471KA01D		
560pF(561)	±10%(K)	GMD155R71H561KA01D		
680pF(681)	±10%(K)	GMD155R71H681KA01D		
820pF(821)	±10%(K)	GMD155R71H821KA01D		
1000pF(102)	±10%(K)	GMD155R71H102KA01D		
1200pF(122)	±10%(K)	GMD155R71H122KA01D		
1500pF(152)	±10%(K)	GMD155R71H152KA01D		
1800pF(182)	±10%(K)	GMD155R71H182KA01D		
2200pF(222)	±10%(K)	GMD155R71H222KA01D		
2700pF(272)	±10%(K)	GMD155R71H272KA01D		
3300pF(332)	±10%(K)	GMD155R71H332KA01D		
3900pF(392)	±10%(K)	GMD155R71H392KA01D		
4700pF(472)	±10%(K)	GMD155R71H472KA01D		
5600pF(562)	±10%(K)		GMD155R71E562KA01D	
6800pF(682)	±10%(K)		GMD155R71E682KA01D	
8200pF(822)	±10%(K)		GMD155R71E822KA01D	
10000pF(103)	±10%(K)		GMD155R71E103KA01D	
12000pF(123)	±10%(K)		GMD155R71E123KA01D	
15000pF(153)	±10%(K)		GMD155R71E153KA01D	
18000pF(183)	±10%(K)		GMD155R71E183KA01D	
22000pF(223)	±10%(K)		GMD155R71E223KA01D	
27000pF(273)	±10%(K)		GMD155R71E273KA11D	
33000pF(333)	±10%(K)		GMD155R71E333KA11D	
39000pF(393)	±10%(K)		GMD155R71E393KA11D	
47000pF(473)	±10%(K)		GMD155R71E473KA11D	
56000pF(563)	±10%(K)			GMD155R71C563KA11D
68000pF(683)	±10%(K)			GMD155R71C683KA11D
82000pF(823)	±10%(K)			GMD155R71C823KA11D
0.10μF(104)	±10%(K)			GMD155R71C104KA11D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

(Part Number) **GM D 15 5 R7 1H 221 K A01 D** Product ID **5**Temperature Characteristics 000000 000

 Capacitance Tolerance Packaging Code in Part Number is a code shows STD 180mm Reel Taping.

130



2Series

3Dimension (LxW) 6 Rated Voltage Individual Specification Code

4 Dimension (T) Capacitance Packaging

High Dielectric Constant Type X5R(R6) Characteristics

LxW [mm]		0.6x0.3(03)<0201>	x0.3(03)<0201> 1.0x0.5(1)			
Rated Volt. [Vdc]	6.3 (0J)	10(1A)	6.3(0J)		
Capacitance	Tolerance	Part Number				
56000pF(563)	±10%(K)	GMD033R60J563KE11D*				
68000pF(683)	±10%(K)	GMD033R60J683KE11D*				
82000pF(823)	±10%(K)	GMD033R60J823KE11D*				
0.10μF(104)	±10%(K)	GMD033R60J104KE11D*				
0.12μF(124)	±10%(K)		GMD155R61A124KE12D*			
0.15μF(154)	±10%(K)		GMD155R61A154KE12D*			
0.18μF(184)	±10%(K)		GMD155R61A184KE12D*			
0.22μF(224)	±10%(K)		GMD155R61A224KE12D*			
0.27μF(274)	±10%(K)		GMD155R61A274KE11D*			
0.33µF(334)	±10%(K)		GMD155R61A334KE11D*			
0.39µF(394)	±10%(K)		GMD155R61A394KE11D*			
0.47µF(474)	±10%(K)		GMD155R61A474KE11D*			
1.0μF(105)	±10%(K)			GMD155R60J105KE11D*		

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

*: Please refer to GMD series Specifications and Test Method(2).



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 • O9.9.18

GMD Series Specifications and Test Methods (1)

In case Non "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (2).

No.	Ite	m	Specifications	Test Method
	Operating		Specifications	
1	Temperat Range		R7 : -55°C to 125°C	Reference Temperature : 25°C
2	Rated Voltage		See the previous pages.	The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^{O-P} , whichever is larger, should be maintained within the rated volt- age range.
3	Appearance		No defects or abnormalities.	Visual inspection.
4	Dimensio	ns	Within the specified dimensions.	Using calipers.
5	Dielectric	Strength	No defects or abnormality.	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provid- ed the charge/discharge current is less than 50mA.
6	Insulation Resistanc		More than 10,000M Ω or 500 $\Omega \cdot F$ (Whichever is smaller)	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 2 minutes of charging.
7	Capacitar	nce	Within the specified tolerance.	The capacitance/D.F. should be measured at reference
	Dissipatio	on	R7 :	temperature at the frequency and voltage shown in the table. Frequency 1±0.1kHz
8	Factor (D		W.V. 25Vmin. : 0.025 max. W.V. 16/10V : 0.035 max.	Prequency TEU.TKHZ Voltage 1±0.2Vrms
9	Capacitance Temperature Characteristics Mechanical Strength	No bias Bond Strength	R7 : Within ±15% (–55°C to +125°C) Pull force : 0.03N min.	The capacitance change should be measured after 5min. at each specified temp. stage. The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.* Step Temperature (°C) 1 25±2 2 -55±3 3 25±2 4 125±3 *Initial measurement for high dielectric constant type Perform a heat treatment at 150 +0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. MIL-STD-883 Method 2011 Condition D Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20) and bond a 25mm (0.001 inch) gold wire to the capacitor terminal using an ultrasonic ball bond. Then, pull wire. MIL-STD-883 Method 2019
		Die Shear Strength	Die Shear force : 2N min.	Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate.
		Appearance	No defects or abnormalities.	Ramp frequency from 10 to 55Hz then return to 10Hz all within
11	Vibration	Capacitance	Within the specified tolerance.	1 minute. Amplitude : 1.5 mm (0.06 inch) max. total excursion.
11	Resistance	D.F.	R7 : W.V. 25Vmin. : 0.025 max. W.V. 16/10V : 0.035 max.	Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours).
		Appearance	No defects or abnormalities.	The capacitor should be set for 24±2 hours at room
		Capacitance Change	R7 : Within ±7.5%	temperature after one hour heat of treatment at 150+0/–10°C, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same
12	Temperature Cycle	D.F.	R7 : W.V. 25Vmin. : 0.025 max. W.V. 16/10V : 0.035 max.	conditions as (11) and conduct the five cycles according to the temperatures and time shown in the following table. Set it for 24±2 hours at room temperature, then measure.
		I.R.	More than $10,000M\Omega$ or $500\Omega \cdot F$	Step 1 2 3 4 Min Min Max Max
		Dielectric	(Whichever is smaller)	Min. Room Temp. (°C) Operating Temp.+0/-3 Temp. +3/-0
		Strength		Time (min.) 30+/-3 2 to 3 30+/-3 2 to 3

Mounting for testing : The capacitors should be mounted on the substrate as shown below using die bonding. when tests No.11 to 15 are performed.

Continued on the following page.

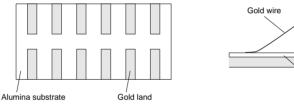
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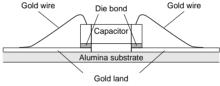
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GMD Series Specifications and Test Methods In case Non "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (1). \square Continued from the preceding page In case "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (2). No Item Specifications Test Method No defects or abnormalities. Appearance Capacitance R7 : Within ±12.5% Change Set the capacitor for 500±12 hours at 40±2°C, in 90 to 95% Humidity humidity. R7 · 13 (Steady State) Take it out and set it for 24±2 hours at room temperature, then D.F. W.V. 25Vmin. : 0.05 max. measure W.V. 16/10V : 0.05 max. More than 1,000M Ω or 50 $\Omega \cdot F$ I.R. (Whichever is smaller) No defects or abnormalities. Appearance Capacitance R7 : Within ±12.5% Change Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to Humidity 95% humidity and set it for 24±2 hours at room temperature, R7 · 14 Load then measure. The charge/discharge current is less than DF W.V. 25Vmin. : 0.05 max. 50mA. W.V. 16/10V : 0.05 max. More than 500M\Omega or 25 $\Omega \cdot F$ I.R. (Whichever is smaller) Appearance No defects or abnormalities. A voltage treatment should be given to the capacitor, in which a DC voltage of 200% the rated voltage is applied for one hour at Capacitance R7 : Within ±12.5% the maximum operating temperature ±3°C then it should be set Change High for 24±2 hours at room temperature and the initial measurement R7 · 15 Temperature should be conducted. D.F. W.V. 25Vmin. : 0.05 max. Then apply the above mentioned voltage continuously for Load W.V. 16/10V : 0.05 max. 1000±12 hours at the same temperature, remove it from the bath, and set it for 24±2 hours at room temperature, then More than 1,000M\Omega or 50 $\Omega \cdot F$ I.R. measure. The charge/discharge current is less than 50mA.

Mounting for testing : The capacitors should be mounted on the substrate as shown below using die bonding, when tests No.11 to 15 are performed.



(Whichever is smaller)





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GMD Series Specifications and Test Methods (2)

In case Non "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (1). In case "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (2).

No.	Ite	m	Specifications	Test Method
1	Operating Temperat Range		R6 : –55°C to 85°C	Reference Temperature : 25°C
2	Rated Voltage		See the previous pages.	The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^{O-P} , whichever is larger, should be maintained within the rated volt age range.
3	Appearance		No defects or abnormalities.	Visual inspection.
4	Dimensio	ns	Within the specified dimensions.	Using calipers.
5	Dielectric	Strength	No defects or abnormalities.	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provid- ed the charge/discharge current is less than 50mA.
6	Insulation Resistanc		More than $50\Omega \cdot F$	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 1 minutes of charging.
7	Capacitar	nce	Within the specified tolerance.	The capacitance/D.F. should be measured at reference
8	Dissipation Factor (D.F.)		R6 : 0.1 max.	$\label{eq:constraint} \begin{array}{ c c c c c } \hline temperature at the frequency and voltage shown in the table. \\ \hline \hline Capacitance & Frequency & Voltage \\ \hline C \leq 10 \mu F (10 V min.)^{*1} & 1 \pm 0.1 k Hz & 1.0 \pm 0.2 V rms \\ \hline C \leq 10 \mu F (6.3 V max.) & 1 \pm 0.1 k Hz & 0.5 \pm 0.1 V rms \\ \hline *1 \ GMD155 \ R6 \ 1A \ 124 \ to \ 224 \ are \ applied \ to \ 0.5 \pm 0.1 \ V rms. \end{array}$
9	Capacitance Temperature Characteristics	No bias R6 : Within $\pm 15\%$ (-55°C to +85°C)		The capacitance change should be measured after 5min. at each specified temp. stage. The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.* $\underbrace{\frac{\text{Step} \text{Temperature (°C)}}{1 25\pm 2} \\ \underline{2 -55\pm 3} \\ \underline{3 25\pm 2} \\ \underline{4 85\pm 3} \\ \text{*Initial measurement for high dielectric constant type} \\ \text{Perform a heat treatment at 150 +0/-10°C for one hour and then let sit for 24\pm 2 hours at room temperature.} \\ \text{Perform the initial measurement.} \\ \end{aligned}$
10	Mechanical	Bond Strength	Pull force : 0.03N min.	MIL-STD-883 Method 2011 Condition D Mount the capacitor on a gold metallized alumina substrate wi Au-Sn (80/20) and bond a 25μm (0.001 inch) gold wire to the capacitor terminal using an ultrasonic ball bond. Then, pull wir
	Strength	Die Shear Strength	Die Shear force : 2N min.	MIL-STD-883 Method 2019 Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate.
		Appearance	No defects or abnormalities.	
	Vibration	Capacitance	Within the specified tolerance.	Ramp frequency from 10 to 55Hz then return to 10Hz all within 1 minute. Amplitude : 1.5 mm (0.06 inch) max. total excursion.
11	Resistance	D.F.	R6 : 0.1 max.	Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours).
		Appearance	No defects or abnormalities.	The capacitor should be set for 24 ± 2 hours at room
		Capacitance Change	R6 : Within ±7.5%	temperature after one hour heat of treatment at 150+0/-10°C, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same
		D.F.	R6 : 0.1 max.	conditions as (11) and conduct the five cycles according to the
12	Temperature Sudden	I.R.	More than 50Ω · F	temperatures and time shown in the following table. Set it for
12	Change			24±2 hours at room temperature, then measure.
	Smarigo	Dielectric Strength	No defects	Step1234Temp. (°C)Min. Operating Temp.+0/-3Room Temp.Max. Operating Temp. +3/-0Room Temp.

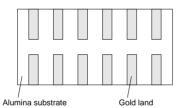
Mounting for testing : The capacitors should be mounted on the substrate as shown below using die bonding. when tests No.11 to 14 are performed.

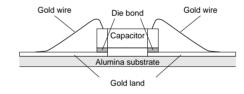


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			GMD Series Sp	pecifications and Test Methods (2)
	Continued fro	om the prece		ease refer to GMD Series Specifications and Test Methods (1). ease refer to GMD Series Specifications and Test Methods (2).
No.	Ite	m	Specifications	Test Method
		Appearance	No defects or abnormalities.	Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to
		Capacitance Change	R6 : Within ±12.5%	95% humidity and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.
	High	D.F.	R6 : 0.2 max.	
13	Temperature High Humidity (Steady)	I.R.	More than 12.5Ω · F	 Initial measurement Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.
				• Measurement after test Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.
		Appearance	No defects or abnormalities.	Apply $150\%^{*2}$ of the rated voltage for 1000 ± 12 hours at the
		Capacitance Change	R6 : Within ±12.5%	maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure. The charge/ discharge current is less than 50mA.
		D.F.	R6 : 0.2 max.	
14	Durability	I.R.	More than 25Ω · F	 *2 GMD155 R6 1A 274 to 474 are applied to 120%. Initial measurement Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. Measurement after test Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.

Mounting for testing : The capacitors should be mounted on the substrate as shown below using die bonding. when tests No.11 to 14 are performed.









Package

■ Minimum Quantity Guide

Part Nu	mber	Dim	ensions	(mm)	a190~	nm Reel		ty (pcs.) nm Reel		
Faitinu	IIIDEI	L	W	т	Paper Tape Embossed Tape		Paper Tape Embossed Tape		Bulk Case	Bulk Bag
Packaging Code				1	гарегтаре	Elliposseu Tape	• •	· · ·		Bulk : B
Packaging Code					D	L	J	к	С	Tray : T
	GRM02	0.4	0.2	0.2	20,000 1)	40,000 1)	-	-	-	1,000
	GRM03	0.6	0.3	0.3	15,000	-	50,000	-	-	1,000
			0.5	0.25/0.3	10,000	-	50,000	-	-	1,000
	GRM15	1.0	0.5	0.5	10,000	-	50,000	-	50,000	1,000
	CDM40	1.0	0.0	0.5	4,000	-	10,000	-	-	1,000
	GRM18	1.6	0.8	0.8	4,000	-	10,000	-	15,000 ²⁾	1,000
				0.6	4,000	-	10,000	-	10,000	1,000
	GRM21	2.0	1.25	0.85	4,000	-	10,000	-	-	1,000
		_		1.0/1.25	-	3,000	-	10,000	5,000 ²⁾	1,000
				0.6/0.85	4,000	-	10,000	-	-	1,000
	GRM31	3.2	1.6	1.15	-	3,000	-	10,000	-	1,000
For General				1.6	-	2,000	-	6,000	-	1,000
Purpose				0.85	4,000	-	10,000	-	-	1,000
				1.15	-	3,000	-	10,000	-	1,000
	GRM32	3.2	2.5	1.35	-	2,000	-	8,000	-	1,000
				1.6	-	2,000	-	6,000	-	1,000
				1.8/2.0 2.5	-	1,000	-	4,000	-	1,000
				1.15	-	1,000	-	5,000	-	1,000
	GRM43	4.5	3.2	1.35/1.6 1.8/2.0	-	1,000	-	4,000	-	1,000
	GINIH	4.5	3.2	2.5	-	500	-	2,000	-	1,000
				2.8	-	500	-	1,500	-	500
	GRM55	5.7		1.15	-	1,000	-	5,000	-	1,000
			5.0	1.35/1.6 1.8/2.0	-	1,000	-	4,000	-	1,000
				2.5	-	500	-	2,000	-	500
				3.2	-	300	-	1,500	-	500
ligh Dawon Tuma	GJM03	0.6	0.3	0.3	15,000	-	50,000	-	-	1,000
ligh Power Type	GJM15	1.0	0.5	0.5	10,000	-	50,000	-	50,000	1,000
	GQM18	1.6	0.8	0.7/0.8	4,000	-	10,000	-	-	1,000
	GQM21	2.0	1.25	0.85	4,000	-	10,000	-	-	1,000
ligh Frequency	ERB18	1.6	0.8	0.9 max.	4,000	-	10,000	-	-	1,000
	ERB21	2.0	1.25	1.35 max.	-	3,000	-	10,000	-	1,000
	ERB32	3.2	2.5	1.7 max.	-	2,000	-	8,000	-	1,000
	GMA0D	0.38	0.38	0.3	-	-	-	-	-	400 3)
	GMA05	0.5	0.5	0.35	-	-	-	-	-	400 3)
Microchip	GMA08	0.8	0.8	0.5	-	-	-	-	-	400 3)
	GMD03	0.6	0.3	0.3	15,000	-	50,000	-	-	1,000
	GMD15	1.0	0.5	0.5	10,000	-	50,000	-	-	1,000
	GNM0M	0.9	0.6	0.45	10,000	-	50,000	-	-	1,000
	GNM1M	1.37	1.0	0.5/0.6/0.8	4,000	-	10,000	-	-	1,000
Array	GNM21	2.0	1.25	0.5/0.6/0.85	4,000	-	10,000	-	-	1,000
	GNM24	2.2	1.6	0.8/0.85	4,000	-	10,000	-	-	1,000
	GNM31	3.2	1.0	1.0/1.15	-	3,000	-	10,000	-	1,000
	LLL15	0.5	1.0	0.3	10,000 4)	-	50,000 ⁴⁾	-	-	1,000
	LLL18	0.8	1.6	0.5	-	4,000	-	10,000	-	1,000
	111.24	1.05	20	0.5/0.6	-	4,000	-	10,000	-	1,000
	LLL21	1.25	2.0	0.85	-	3,000	-	10,000	-	1,000
	111.94	10	2.0	0.5/0.7	-	4,000	-	10,000	-	1,000
	LLL31	1.6	3.2	1.15	-	3,000	-	10,000	-	1,000
	LLA18	1.6	0.8	0.5	-	4,000		10,000	-	1,000
Low ESL			4.05	0.5	-	4,000	-	10,000	-	1,000
	LLA21	2.0	1.25	0.85	-	3,000	-	10,000	-	1,000
				0.5	-	4,000	-	10,000	-	1,000
	LLA31	3.2	1.6	0.85	-	3,000	-	10,000	-	1,000
			-	1.15	-	3,000	-	10,000	-	1,000
	LLM21	2.0	1.25	0.5	-	4,000	-	10,000	-	1,000
	LLM31	3.2	1.6	0.5		4,000	-	10,000		1,000

1) 8mm width 2mm pitch Paper Taping. 4mm width 1mm pitch Embossed Taping.

2) There are parts number without bulk case.

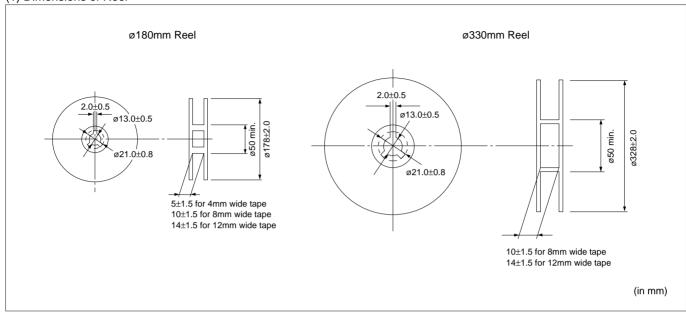
3) Tray

4) LLL15: ø180mm Reel Paper Taping Packaging Code: E, ø330mm Reel Paper Taping Packaging Code: F

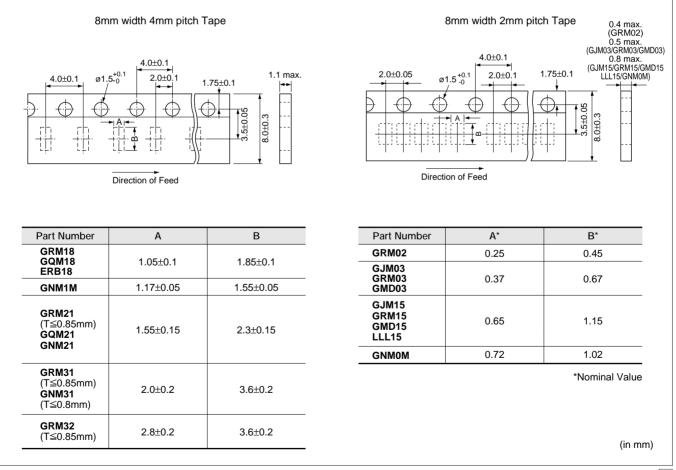


Package

❑ Continued from the preceding page. ■ Tape Carrier Packaging (1) Dimensions of Reel



(2) Dimensions of Paper Tape



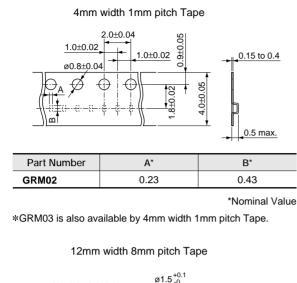
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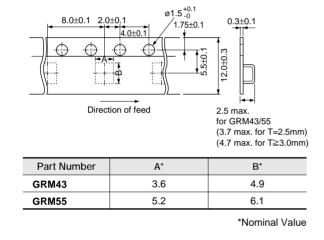


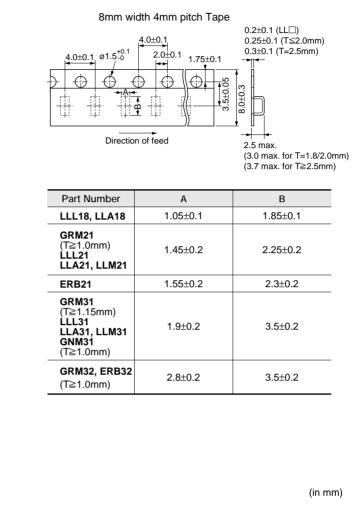
Package

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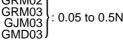
(3) Dimensions of Embossed Tape

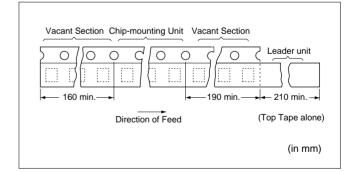






- (4) Taping Method
 - Tapes for capacitors are wound clockwise. The sprocket holes are to the right as the tape is pulled toward the user.
 - ② Part of the leader and part of the empty tape should be attached to the end of the tape as follows.
 - ③ The top tape and base tape are not attached at the end of the tape for a minimum of 5 pitches.
 - ④ Missing capacitors number within 0.1% of the number per reel or 1 pc, whichever is greater, and are not continuous.
 - (5) The top tape and bottom tape should not protrude beyond the edges of the tape and should not cover sprocket holes.
 - (6) Cumulative tolerance of sprocket holes, 10 pitches: ± 0.3 mm.
 - ⑦ Peeling off force: 0.1 to 0.6N* in the direction shown below. *GRM02)







Continued on the following page.



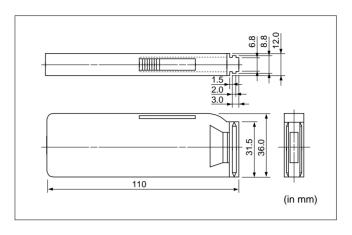
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 O9.9.18

Package

Continued from the preceding page.

Dimensions of Bulk Case Packaging

The bulk case uses antistatic materials. Please contact Murata for details.





■ Storage and Operation condition

- 1. The performance of chip monolithic ceramic capacitors may be affected by the storage conditions.
 - 1-1. Store capacitors in the following conditions: Temperature of +5°C to +40°C and a Relative Humidity of 20% to 70%.
 - Sunlight, dust, rapid temperature changes, corrosive gas atmosphere or high temperature and humidity conditions during storage may affect the solderability and the packaging performance. Please use product within six months of receipt.
 - (2) Please confirm solderability before using after six months. Store the capacitors without opening the original bag. Even if the storage period is short, do not exceed the specified atmospheric conditions.
- 1-2. Corrosive gas can react with the termination (external) electrodes or lead wires of capacitors, and result in poor solderability. Do not store the capacitors in an atmosphere consisting of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas, etc.).
- 1-3. Due to moisture condensation caused by rapid humidity changes, or the photochemical change caused by direct sunlight on the terminal electrodes and/or the resin/epoxy coatings, the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or in high humidity conditions.



Rating

- 1. Temperature Dependent Characteristics
- 1. The electrical characteristics of the capacitor can change with temperature.
 - 1-1. For capacitors having larger temperature dependency, the capacitance may change with

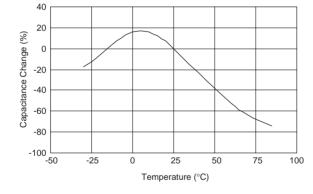
temperature changes. The following actions are recommended in order to

- insure suitable capacitance values.
- (1) Select a suitable capacitance for the operating temperature range.

Typical Temperature Characteristics Char. R6(X5R)

20 15 Capacitance Change (%) 10 5 0 -5 -10 -15 -20 -50 -25 25 100 -75 0 50 75 Temperature (°C)

Typical Temperature Characteristics Char. F5(Y5V)

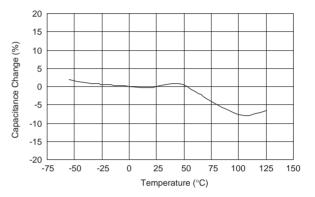


- 2. Measurement of Capacitance
- 1. Measure capacitance with the voltage and the frequency specified in the product specifications.
 - 1-1. The output voltage of the measuring equipment may decrease when capacitance is high occasionally.
 Please confirm whether a prescribed measured voltage is impressed to the capacitor.
 - 1-2. The capacitance values of high dielectric constant type capacitors change depending on the AC voltage applied. Please consider the AC voltage characteristics when selecting a capacitor to be used in a AC circuit.

(2) The capacitance may change within the rated temperature.

When you use a high dielectric constant type capacitors in a circuit that needs a tight (narrow) capacitance tolerance. Example: a time constant circuit., please carefully consider the characteristics of these capacitors, such as their aging, voltage, and temperature characteristics. And check capacitors using your actual appliances at the intended environment and operating conditions.

Typical Temperature Characteristics Char. R7(X7R)





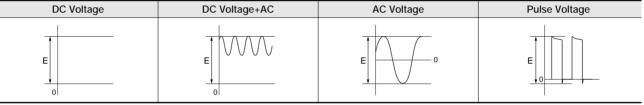
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- 3. Applied Voltage
- 1. Do not apply a voltage to the capacitor that exceeds the rated voltage as called-out in the specifications.
 - 1-1. Applied voltage between the terminals of a capacitor shall be less than or equal to the rated voltage.
 - (1) When AC voltage is superimposed on DC voltage, the zero-to-peak voltage shall not exceed the

rated DC voltage. When AC voltage or pulse voltage is applied, the peak-to-peak voltage shall not exceed the rated DC voltage.

(2) Abnormal voltages (surge voltage, static electricity, pulse voltage, etc.) shall not exceed the rated DC voltage.

Typical Voltage Applied to the DC Capacitor



(E: Maximum possible applied voltage.)

1-2. Influence of overvoltage

Overvoltage that is applied to the capacitor may result in an electrical short circuit caused by the breakdown of the internal dielectric layers . The time duration until breakdown depends on the applied voltage and the ambient temperature.

4. Applied Voltage and Self-heating Temperature

- 1. When the capacitor is used in a high-frequency voltage, pulse voltage, application, be sure to take into account self-heating may be caused by resistant factors of the capacitor.
 - 1-1. The load should be contained to the level such that when measuring at atomospheric temperature of 25°C, the product's self-heating remains below 20°C and surface temperature of the capacitor in the actual circuit remains wiyhin the maximum operating temperature.

Continued on the following page.



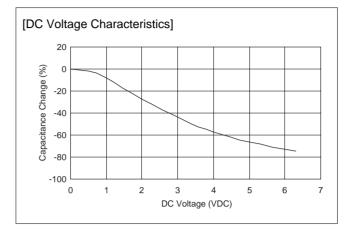
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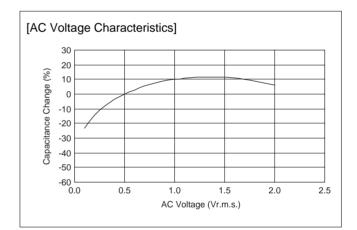
- 5. DC Voltage and AC Voltage Characteristic
- The capacitance value of a high dielectric constant type capacitor changes depending on the DC voltage applied. Please consider the DC voltage characteristics when a capacitor is selected for use in a DC circuit.
 - 1-1. The capacitance of ceramic capacitors may change sharply depending on the applied voltage. (See figure)

Please confirm the following in order to secure the capacitance.

- Whether the capacitance change caused by the applied voltage is within the range allowed or not.
- (2) In the DC voltage characteristics, the rate of capacitance change becomes larger as voltage increases. Even if the applied voltage is below the rated voltage. When a high dielectric constant type capacitor is in a circuit that needs a tight (narrow) capacitance tolerance. Example: a time constant circuit., please carefully consider the characteristics of these capacitors, such as their aging, voltage, and temperature characteristics. And check capacitors using your actual appliances at the intended environment and operating conditions.
- 2. The capacitance values of high dielectric constant type capacitors change depending on the AC voltage applied.

Please consider the AC voltage characteristics when selecting a capacitor to be used in a AC circuit.

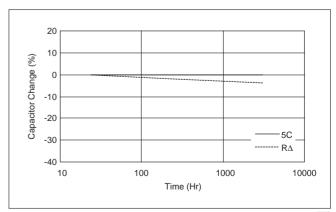




6. Capacitance Aging

1. The high dielectric constant type capacitors have the characteristic in which the capacitance value decreases with passage of time.

When you use a high dielectric constant type capacitors in a circuit that needs a tight (narrow) capacitance tolerance. Example: a time constant circuit., please carefully consider the characteristics of these capacitors, such as their aging, voltage, and temperature characteristics. And check capacitors using your actual appliances at the intended environment and operating conditions.



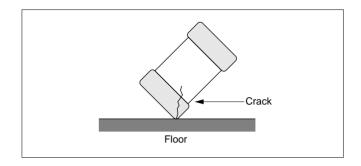
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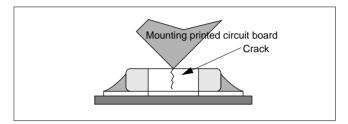


Caution

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- 7. Vibration and Shock
- The capacitors mechanical actress (vibration and shock) shall be specified for the use environment. Please confirm the kind of vibration and/or shock, its condition, and any generation of resonance. Please mount the capacitor so as not to generate resonance, and do not allow any impact on the terminals.
- Mechanical shock due to falling may cause damage or a crack in the dielectric material of the capacitor.
 Do not use a fallen capacitor because the quality and reliability may be deteriorated.
- 3. When printed circuit boards are piled up or handled, the corners of another printed circuit board should not be allowed to hit the capacitor in order to avoid a crack or other damage to the capacitor.







Soldering and Mounting

1. Mounting Position

- 1. Confirm the best mounting position and direction that minimizes the stress imposed on the capacitor during flexing or bending the printed circuit board.
 - 1-1. Choose a mounting position that minimizes the stress imposed on the chip during flexing or bending of the board.

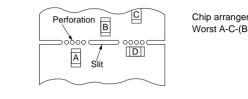
[Component Direction]

that were in long-term storage.

reliability of the MLCC.

Locate chip horizontal to the direction in which stress acts

[Chip Mounting Close to Board Separation Point]



5. Prior to use, confirm the Solderability for the capacitors

treatment for capacitors that were in long-term storage.

engineers on the use of Sn-Zn based solder in advance.

6. Prior to measuring capacitance, carry out a heat

7. The use of Sn-Zn based solder will deteriorate the

Please contact our sales representative or product

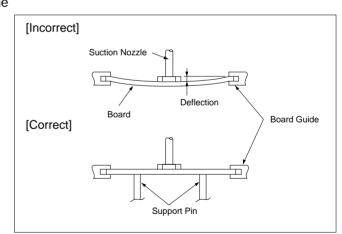
Chip arrangement Worst A-C-(B~D) Best

2. Information before Mounting

- 1. Do not re-use capacitors that were removed from the equipment.
- 2. Confirm capacitance characteristics under actual applied voltage.
- 3. Confirm the mechanical stress under actual process and equipment use.
- 4. Confirm the rated capacitance, rated voltage and other electrical characteristics before assembly.

3. Maintenance of the Mounting (pick and place) Machine

- 1. Make sure that the following excessive forces are not applied to the capacitors.
 - 1-1. In mounting the capacitors on the printed circuit board, any bending force against them shall be kept to a minimum to prevent them from any bending damage or cracking. Please take into account the following precautions and recommendations for use in your process.
 - (1) Adjust the lowest position of the pickup nozzle so as not to bend the printed circuit board.
 - (2) Adjust the nozzle pressure within a static load of 1N to 3N during mounting.
- 2. Dirt particles and dust accumulated between the suction nozzle and the cylinder inner wall prevent the nozzle from moving smoothly. This imposes greater force upon the chip during mounting, causing cracked chips. Also the locating claw, when worn out, imposes uneven forces on the chip when positioning, causing cracked chips. The suction nozzle and the locating claw must be maintained, checked and replaced periodically.





Continued from the preceding page.

4-1. Reflow Soldering

- 1. When sudden heat is applied to the components, the mechanical strength of the components will decrease because a sudden temperature change causes deformation inside the components. In order to prevent mechanical damage to the components, preheating is required for both the components and the PCB board. Preheating conditions are shown in table 1. It is required to keep the temperature differential between the solder and the components surface (Δ T) as small as possible.
- Solderability of Tin plating termination chips might be deteriorated when a low temperature soldering profile where the peak solder temperature is below the melting point of Tin is used. Please confirm the Solderability of Tin plated termination chips before use.
- When components are immersed in solvent after mounting, be sure to maintain the temperature difference (ΔT) between the component and the solvent within the range shown in the table 1.

Table	1
Tuble	

Part Number	Temperature Differential
GRM02/03/15/18/21/31	
GJM03/15	
LLL15/18/21/31	∆T≦190°C
ERB18/21	
GQM18/21	
GRM32/43/55	
LLA18/21/31	
LLM21/31	∆T≦130°C
GNM	
ERB32	

Recommended Conditions

	Pb-Sn S	Lead Free Solder	
	Infrared Reflow	Vapor Reflow	Lead Free Solder
Peak Temperature	230 to 250°C	230 to 240°C	240 to 260°C
Atmosphere	Air	Air	Air or N2

Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu

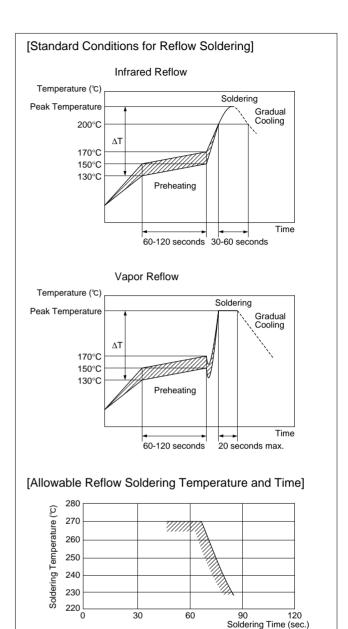
- 4. Optimum Solder Amount for Reflow Soldering
 - 4-1. Overly thick application of solder paste results in a excessive solder fillet height.

This makes the chip more susceptible to mechanical and thermal stress on the board and may cause the chips to crack.

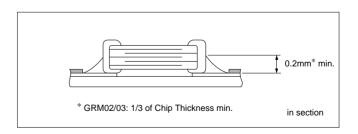
- 4-2. Too little solder paste results in a lack of adhesive strength on the outer electrode, which may result in chips breaking loose from the PCB.
- 4-3. Make sure the solder has been applied smoothly to the end surface to a height of 0.2mm* min.

Inverting the PCB

Make sure not to impose any abnormal mechanical shocks to the PCB.



In case of repeated soldering, the accumulated soldering time must be within the range shown above.





Caution

Continued from the preceding page.

4-2. Flow Soldering

 When sudden heat is applied to the components, the mechanical strength of the components will decrease because a sudden temperature change causes deformation inside the components. In order to prevent mechanical damage in the components, preheating should be required for both of the components and the PCB board.

Preheating conditions are shown in table 2. It is required to keep temperature differential between the solder and the components surface (ΔT) as small as possible.

- 2. Excessively long soldering time or high soldering temperature can result in leaching of the outer electrodes, causing poor adhesion or a reduction in capacitance value due to loss of contact between electrodes and end termination.
- When components are immersed in solvent after mounting, be sure to maintain the temperature difference (ΔT) between the component and solvent within the range shown in the table 2.
- 4. Do not apply flow soldering to chips not listed in table 2.

Table 2

Part Number	Temperature Differential
GRM18/21/31	
LLL21/31	AT-15000
ERB18/21	∆T≦150°C
GQM18/21	

Recommended Conditions

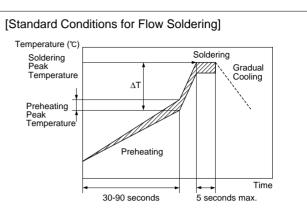
	Pb-Sn Solder	Lead Free Solder
Preheating Peak Temperature	90 to 110°C	100 to 120°C
Soldering Peak Temperature	240 to 250°C	250 to 260°C
Atmosphere	Air	N2

Pb-Sn Solder: Sn-37Pb

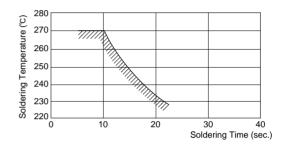
Lead Free Solder: Sn-3.0Ag-0.5Cu

5. Optimum Solder Amount for Flow Soldering

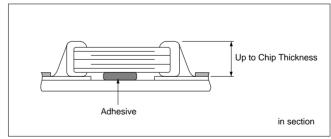
5-1. The top of the solder fillet should be lower than the thickness of components. If the solder amount is excessive, the risk of cracking is higher during board bending or any other stressful condition.



[Allowable Flow Soldering Temperature and Time]



In case of repeated soldering, the accumulated soldering time must be within the range shown above.





Continued from the preceding page.

4-3. Correction with a Soldering Iron

- 1. When sudden heat is applied to the components when using a soldering iron, the mechanical strength of the components will decrease because the extreme temperature change can cause deformations inside the components. In order to prevent mechanical damage to the components, preheating is required for both the components and the PCB board. Preheating conditions, (The "Temperature of the Soldering Iron Tip", "Preheating Temperature", "Temperature Differential" between the iron tip and the components and the PCB), should be within the conditions of table 3. It is required to keep the temperature differential between the soldering iron and the component surfaces (Δ T) as small as possible.
- After soldering, do not allow the component/PCB to rapidly cool down.
- 3. The operating time for the re-working should be as short as possible. When re-working time is too long, it may cause solder leaching, and that will cause a reduction in the adhesive strength of the terminations.
- 4. Optimum Solder amount when re-working with a Soldering Iron
 - 4-1. In case of sizes smaller than 0603, (GRM03/15/18, GJM03/15, GQM18, ERB18), the top of the solder fillet should be lower than 2/3's of the thickness of the component or 0.5mm whichever is smaller. In case of 0805 and larger sizes, (GRM21/31/32/43/55, GQM21, ERB21/32), the top of the solder fillet should be lower than 2/3's of the thickness of the component. If the solder amount is excessive, the risk of cracking is higher during board bending or under any other stressful condition.
 - 4-2. A soldering iron with a tip of ø3mm or smaller should be used. It is also necessary to keep the soldering iron from touching the components during the re-work.
 - 4-3. Solder wire with Ø0.5mm or smaller is required for soldering.

4-4. Leaded Component Insertion

 If the PCB is flexed when leaded components (such as transformers and ICs) are being mounted, chips may crack and solder joints may break.

Before mounting leaded components, support the PCB using backup pins or special jigs to prevent warping.

5. Washing

Excessive ultrasonic oscillation during cleaning can cause the PCBs to resonate, resulting in cracked chips or broken solder joints. Take note not to vibrate PCBs.

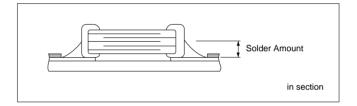
Table 3

Part Number	Temperature of Soldering Iron Tip	Preheating Temperature	Temperature Differential (∆T)	Atmosphere
GRM03/15/18/21/31 GJM03/15 GQM18/21 ERB18/21	350°C max.	150°C min.	∆T≦190°C	Air
GRM32/43/55 ERB32	280°C max.	150°C min.	∆T≦130°C	Air

*Applicable for both Pb-Sn and Lead Free Solder.

Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu





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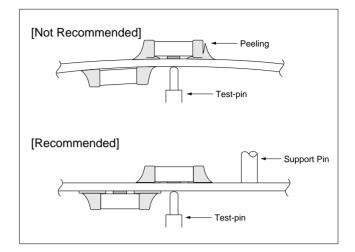
Caution

Continued from the preceding page.

- 6. Electrical Test on Printed Circuit Board
- Confirm position of the support pin or specific jig, when inspecting the electrical performance of a capacitor after mounting on the printed circuit board.
 - 1-1. Avoid bending printed circuit board by the pressure of a test pin, etc.The thrusting force of the test probe can flex the PCB, resulting in cracked chips or open solder joints.

Provide support pins on the back side of the PCB to prevent warping or flexing.

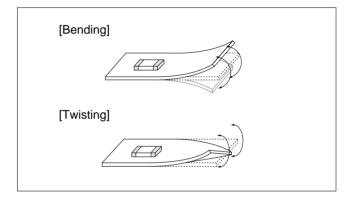
1-2. Avoid vibration of the board by shock when a test pin contacts a printed circuit board.



7. Printed Circuit Board Cropping

- 1. After mounting a capacitor on a printed circuit board, do not apply any stress to the capacitor that is caused by bending or twisting the board.
 - 1-1. In cropping the board, the stress as shown right may cause the capacitor to crack.

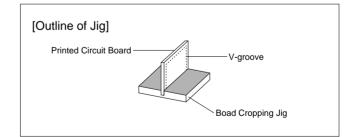
Try not to apply this type of stress to a capacitor.

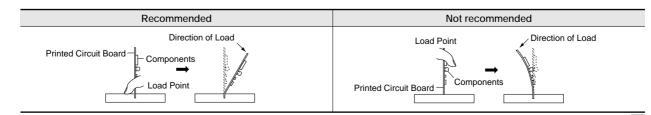


- 2. Check of the cropping method for the printed circuit board in advance.
 - 2-1. Printed circuit board cropping shall be carried out by using a jig or an apparatus to prevent the mechanical stress which can occur to the board.
 - (1) Example of a suitable jig

Recommended example: the board should be pushed as close to the near the cropping jig as possible and from the back side of board in order to minimize the compressive stress applied to capacitor.

Not recommended example* when the board is pushed at a point far from the cropping jig and from the front side of board as below, the capacitor may form a crack caused by the tensile stress applied to capacitor.





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(2) Example of a suitable machine An outline of a printed circuit board cropping machine is shown as follows. Along the lines with the V-grooves on printed circuit board, the top and bottom blades are aligned to one another when cropping the board.

The misalignment of the position between top and bottom blades may cause the capacitor to crack.

[Outline of Machine]
[Principle of Operation]
V-groove Bottom Blade
[Cross-section Diagram]
Printed Circuit Board
V-groove

Recommended		Not Recommended					
Recommended	Top-bottom Misalignment	b-bottom Misalignment Left-right Misalignment					
Top Blad	Top Blade	Top Blade	Top Blade				
Bottom Blad	Bottom Blade	Bottom Blade	Bottom Blade				



Caution

Others

- 1. Under Operation of Equipment
 - 1-1. Do not touch a capacitor directly with bare hands during operation in order to avoid the danger of a electric shock.
 - 1-2. Do not allow the terminals of a capacitor to come in contact with any conductive objects (short-circuit).Do not expose a capacitor to a conductive liquid, inducing any acid or alkali solutions.
 - 1-3. Confirm the environment in which the equipment will operation is under the specified conditions.Do not use the equipment under the following environment.
 - (1) Being spattered with water or oil.
 - (2) Being exposed to direct sunlight.
 - (3) Being exposed to Ozone, ultraviolet rays or radiation.
 - (4) Being exposed to toxic gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas, etc.)
 - (5) Any vibrations or mechanical shocks exceeding the specified limits.
 - (6) Moisture condensing environments.
 - 1-4. Use damp proof countermeasures if using under any conditions that can cause condensation.
- 2. Others
 - 2-1. In an Emergency
 - If the equipment should generate smoke, fire or smell, immediately turn off or unplug the equipment.

If the equipment is not turned off or unplugged, the hazards may be worsened by supplying continuous power.

- (2) In this type of situation, do not allow face and hands to come in contact with the capacitor or burns may be caused by the capacitors high temperature.
- 2-2. Disposal of Waste

When capacitors are disposed, they must be burned or buried by the industrial waste vender with the appropriate licenses.

2-3. Circuit Design

GRM, GCM, GMA/D, LLL/A/M, ERB, GQM, GJM, GNM Series capacitors in this catalog are not safety certified products.

2-4. Remarks

Failure to follow the cautions may result, worst case, in a short circuit and smoking when the product is used.

The above notices are for standard applications and conditions. Contact us when the products are used in special mounting conditions.

Select optimum conditions for operation as they determine the reliability of the product after assembly. The data herein are given in typical values, not guaranteed ratings.



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Notice

Rating

- 1. Operating Temperature
 - 1. The operating temperature limit depends on the capacitor.
 - 1-1. Do not apply temperatures exceeding the upper operating temperature.

It is necessary to select a capacitor with a suitable rated temperature which will cover the operating temperature range.

Also it is necessary to consider the temperature distribution in equipment and the seasonal temperature variable factor.

- 1-2. Consider the self-heating of the capacitor The surface temperature of the capacitor shall be the upper operating temperature or less when including the self-heating factors.
- 2. Atmosphere Surroundings (gaseous and liquid)
- 1. Restriction on the operating environment of capacitors.
 - 1-1. The capacitor, when used in the above, unsuitable, operating environments may deteriorate due to the corrosion of the terminations and the penetration of moisture into the capacitor.

- 1-2. The same phenomenon as the above may occur when the electrodes or terminals of the capacitor are subject to moisture condensation.
- 1-3. The deterioration of characteristics and insulation resistance due to the oxidization or corrosion of terminal electrodes may result in breakdown when the capacitor is exposed to corrosive or volatile gases or solvents for long periods of time.
- 3. Piezo-electric Phenomenon
 - When using high dielectric constant type capacitors in AC or pulse circuits, the capacitor itself vibrates at specific frequencies and noise may be generated. Moreover, when the mechanical vibration or shock is added to capacitor, noise may occur.



Notice

■ Soldering and Mounting

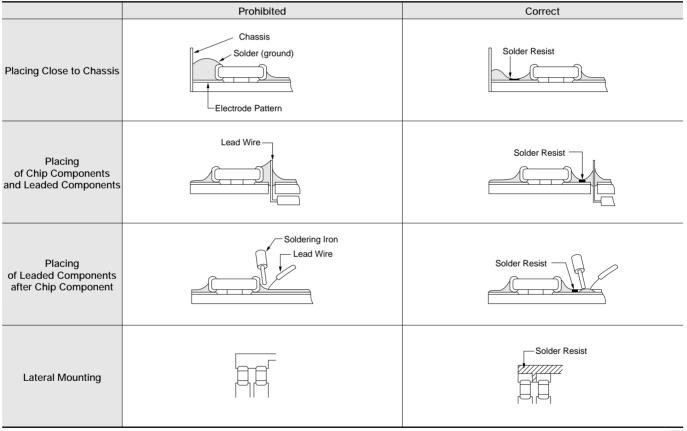
1. PCB Design

- 1. Notice for Pattern Forms
 - 1-1. Unlike leaded components, chip components are susceptible to flexing stresses since they are mounted directly on the substrate.They are also more sensitive to mechanical and thermal stresses than leaded components.

Excess solder fillet height can multiply these stresses and cause chip cracking. When designing substrates, take land patterns and dimensions into consideration to eliminate the possibility of excess solder fillet height.

1-2. It is possible for the chip to crack by the expansion and shrinkage of a metal board. Please contact us if you want to use our ceramic capacitors on a metal board such as Aluminum.

Pattern Forms



Continued on the following page. \square



Notice

Continued from the preceding page.

- 2. Land Dimensions
 - 2-1. Chip capacitor can be cracked due to the stress of PCB bending / etc if the land area is larger than needed and has an excess amount of solder.
 Please refer to the land dimensions in table 1 for flow soldering, table 2 for reflow soldering, table 3 for GNM & LLA, and table 4 for LLM.
 Please confirm the suitable land dimension by evaluating of the actual SET / PCB.

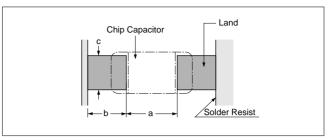


Table 1 Flow Soldering Method

Dimensions Part Number	Chip (L×W)	а	b	С
GRM18 GQM18	1.6×0.8	0.6 to 1.0	0.8 to 0.9	0.6 to 0.8
GRM21 GQM21	2.0×1.25	1.0 to 1.2	0.9 to 1.0	0.8 to 1.1
GRM31	3.2×1.6	2.2 to 2.6	1.0 to 1.1	1.0 to 1.4
LLL21	1.25×2.0	0.4 to 0.7	0.5 to 0.7	1.4 to 1.8
LLL31	1.6×3.2	0.6 to 1.0	0.8 to 0.9	2.6 to 2.8
ERB11	1.25×1.0	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
ERB21	2.0×1.25	1.0 to 1.2	0.9 to 1.0	0.8 to 1.0
ERF1D	1.4×1.4	0.5 to 0.8	0.8 to 0.9	1.0 to 1.2

(in mm)

Table 2 Reflow Soldering Method

Dimensions Part Number	Chip (L×W)	а	b	с
GRM02	0.4×0.2	0.16 to 0.2	0.12 to 0.18	0.2 to 0.23
GRM03 GJM03	0.6×0.3	0.2 to 0.3	0.2 to 0.35	0.2 to 0.4
GRM15 GJM15	1.0×0.5	0.3 to 0.5	0.35 to 0.45	0.4 to 0.6
GRM18 GQM18	1.6×0.8	0.6 to 0.8	0.6 to 0.7	0.6 to 0.8
GRM21 GQM21	2.0×1.25	1.0 to 1.2	0.6 to 0.7	0.8 to 1.1
GRM31	3.2×1.6	2.2 to 2.4	0.8 to 0.9	1.0 to 1.4
GRM32	3.2×2.5	2.0 to 2.4	1.0 to 1.2	1.8 to 2.3
GRM43	4.5×3.2	3.0 to 3.5	1.2 to 1.4	2.3 to 3.0
GRM55	5.7×5.0	4.0 to 4.6	1.4 to 1.6	3.5 to 4.8
LLL15	0.5×1.0	0.15 to 0.2	0.2 to 0.25	0.7 to 1.0
LLL18	0.8×1.6	0.2 to 0.3	0.3 to 0.4	1.4 to 1.6
LLL21	1.25×2.0	0.4 to 0.6	0.4 to 0.5	1.4 to 1.8
LLL31	1.6×3.2	0.6 to 0.8	0.6 to 0.7	2.6 to 2.8
ERB11	1.25×1.0	0.4 to 0.6	0.6 to 0.8	0.8 to 1.0
ERB21	2.0×1.25	1.0 to 1.2	0.6 to 0.8	0.8 to 1.0
ERB32	3.2×2.5	2.2 to 2.5	0.8 to 1.0	1.9 to 2.3
ERF1D	1.4×1.4	0.4 to 0.8	0.6 to 0.8	1.0 to 1.2
ERF22	2.8×2.8	1.8 to 2.1	0.7 to 0.9	2.2 to 2.6

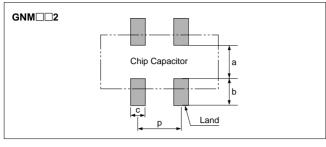
(in mm)



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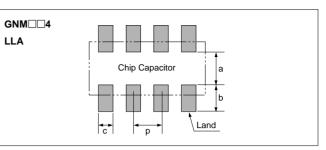


Table 3 GNM, LLA Series for Reflow Soldering Land Dimensions

Part Number	Dimensions (mm)					
	L	W	а	b	С	р
GNM0M2	0.9	0.6	0.12 to 0.20*	0.35 to 0.40*	0.3	0.45
GNM1M2	1.37	1.0	0.4 to 0.5	0.35 to 0.45	0.3 to 0.35	0.64
GNM212	2.0	1.25	0.6 to 0.7	0.5 to 0.7	0.4 to 0.5	1.0
GNM214	2.0	1.25	0.6 to 0.7	0.5 to 0.7	0.25 to 0.35	0.5
GNM314	3.2	1.6	0.8 to 1.0	0.7 to 0.9	0.3 to 0.4	0.8
LLA18	1.6	0.8	0.3 to 0.4	0.25 to 0.35	0.15 to 0.25	0.4
LLA21	2.0	1.25	0.5 to 0.7	0.35 to 0.6	0.2 to 0.3	0.5
LLA31	3.2	1.6	0.7 to 0.9	0.4 to 0.7	0.3 to 0.4	0.8



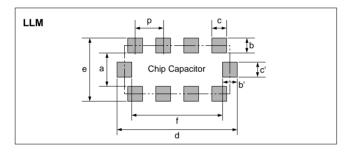


Table 4 LLM Series for Reflow Soldering Land Dimensions

	Dimensions (mm)						
Part Number	а	b, b'	C, C'	d	е	f	р
LLM21 (0.6 to 0.8	(0.3 to 0.5)	0.3	2.0 to 2.6	1.3 to 1.8	1.4 to 1.6	0.5
LLM31	1.0	(0.3 to 0.5)	0.4	3.2 to 3.6	1.6 to 2.0	2.6	0.8

b=(c-e)/2, b'=(d-f)/2

2. Adhesive Application

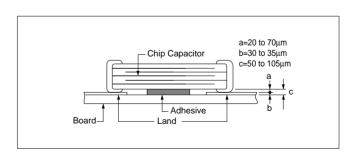
 Thin or insufficient adhesive can cause the chips to loosen or become disconnected during flow soldering. The amount of adhesive must be more than dimension c, shown in the drawing at right, to obtain the correct bonding strength.

The chip's electrode thickness and land thickness must also be taken into consideration.

- Low viscosity adhesive can cause chips to slip after mounting. The adhesive must have a viscosity of 5000Pa • s (500ps) min. (at 25°C).
- 3. Adhesive Coverage

Part Number	Adhesive Coverage*			
GRM18, GQM18	0.05mg min.			
GRM21, LLL21, GQM21	0.1mg min.			
GRM31, LLL31	0.15mg min.			
	*** * ***			

*Nominal Value





Notice

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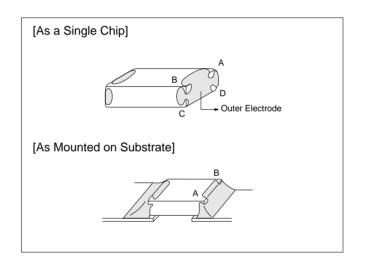
- 3. Adhesive Curing
- Insufficient curing of the adhesive can cause chips to disconnect during flow soldering and causes deterioration in the insulation resistance between the outer electrodes due to moisture absorption.

Control curing temperature and time in order to prevent insufficient hardening.

4. Flux Application

- An excessive amount of flux generates a large quantity of flux gas, which can cause a deterioration of Solderability. So apply flux thinly and evenly throughout. (A foaming system is generally used for flow soldering).
- 2. Flux containing too a high percentage of halide may cause corrosion of the outer electrodes unless there is sufficient cleaning. Use flux with a halide content of 0.2% max.
- 5. Flow Soldering
- Set temperature and time to ensure that leaching of the outer electrode does not exceed 25% of the chip end area as a single chip (full length of the edge A-B-C-D shown right) and 25% of the length A-B shown below as mounted on substrate.

- 3. Do not use strong acidic flux.
- 4. Do not use water-soluble flux.
 - (*Water-soluble flux can be defined as non rosin type flux including wash-type flux and non-wash-type flux.)



- 6. Washing
- 1. Please evaluate a capacitor by actual cleaning equipment and condition surely for confirming the quality and select the applicable solvent.
- 2. Unsuitable cleaning solvent may leave residual flux, other foreign substances, causing deterioration of electrical characteristics and the reliability of the capacitors.
- 3. Select the proper cleaning conditions.
 - 3-1. Improper cleaning conditions (excessive or insufficient) may result in the deterioration of the performance of the capacitors.



Continued from the preceding page.

7. Coating

1. A crack may be caused in the capacitor due to the stress of the thermal contraction of the resin during curing process.

The stress is affected by the amount of resin and curing contraction.

Select a resin with small curing contraction. The difference in the thermal expansion coefficient between a coating resin or a molding resin and capacitor may cause the destruction and deterioration of the capacitor such as a crack or peeling, and lead to the deterioration of insulation resistance or dielectric breakdown.

8. Die Bonding/Wire Bonding (GMA or GMD Series)

- 1. Die Bonding of Capacitors
 - Use the following materials for the Brazing alloys:
 - Au-Sn (80/20) 300 to 320 degree C in N₂ atmosphere Mounting
 - Control the temperature of the substrate so it matches the temperature of the brazing alloy.
 - (2) Place the brazing alloy on the substrate and place the capacitor on the alloy. Hold the capacitor and gently apply the load. Be sure to complete the operation within 1 minute.

Select a resin for which the thermal expansion coefficient is as close to that of capacitor as possible.

A silicone resin can be used as an under-coating to buffer against the stress.

2. Select a resin that is less hygroscopic.

Using hygroscopic resins under high humidity conditions may cause the deterioration of the insulation resistance of a capacitor.

An epoxy resin can be used as a less hygroscopic resin.

2. Wire Bonding

- Wire
 - Gold wire: 25 micro m (0.001 inch) diameter
- Bonding
 - (1) Thermo compression, ultrasonic ball bonding.
 - (2) Required stage temperature: 150 to 200 degree C
 - (3) Required wedge or capillary weight: 0.2N to 0.5N
 - (4) Bond the capacitor and base substrate or other devices with gold wire.



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Notice

Others

- 1. Transportation
 - 1. The performance of a capacitor may be affected by the conditions during transportation.
 - 1-1. The capacitors shall be protected against excessive temperature, humidity and mechanical force during transportation.
 - (1) Climatic condition
 - low air temperature: -40°C
 - change of temperature air/air: -25°C/+25°C
 - low air pressure: 30 kPa
 - change of air pressure: 6 kPa/min.
 - (2) Mechanical condition
 - Transportation shall be done in such a way that the boxes are not deformed and forces are not directly passed on to the inner packaging.

- 1-2. Do not apply excessive vibration, shock, and pressure to the capacitor.
 - When excessive mechanical shock or pressure is applied to a capacitor, chipping or cracking may occur in the ceramic body of the capacitor.
 - (2) When a sharp edge of an air driver, a soldering iron, tweezers, a chassis, etc. impacts strongly on the surface of capacitor, the capacitor may crack and short-circuit.
- 1-3. Do not use a capacitor to which excessive shock was applied by dropping, etc. The capacitor dropped accidentally during processing may be damaged.



(2) Test Samples

(4) Results

(3) Acceptance Criteria

Refer to Table 1.

GRM21 : Products for flow/reflow soldering.

With a 60-power optical microscope, measure the surface area of the outer electrode that is covered with solder.

Reference Data

1. Solderability

(1) Test Method

Subject the chip capacitor to the following conditions. Then apply flux (an ethanol solution of 25% rosin) to the chip and dip it in 230°C eutectic solder for 2 seconds. Conditions:

Expose prepared at room temperature (for 6 months and 12 months, respectively)

Prepared at high temperature (for 100 hours at 85°C) Prepared left at high humidity (for 100 hours under 90%RH to 95%RH at 40°C)

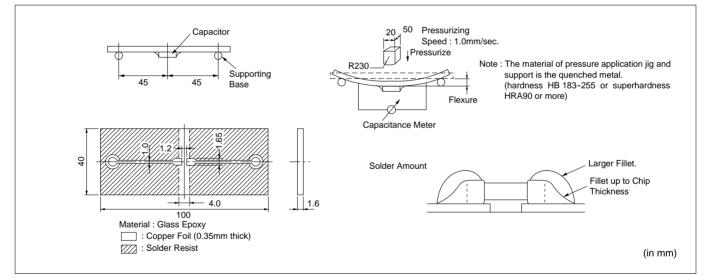
Table 1

	Sample	Initial State	Prepared at Room Temperature		Prepared at High Temperature for	Prepared at High Humidity for 100 Hours at 90 to	
	Sample		6 months	12 months	100 Hours at 85°C	95% RH and 40°C	
	GRM21 for flow/reflow soldering	95 to 100%	95 to 100%	95%	90 to 95%	95%	

2. Board Bending Strength for Solder Fillet Height

(1) Test Method

Solder the chip capacitor to the test PCB with the amount of solder paste necessary to achieve the fillet heights. Then bend the PCB using the method illustrated and measure capacitance.



(2) Test Samples

GRM21: 5C/R7/F5 Characteristics T=0.6mm

(3) Acceptance Criteria

Products should be determined to be defective if the change in capacitance has exceeded the values specified in Table 2.

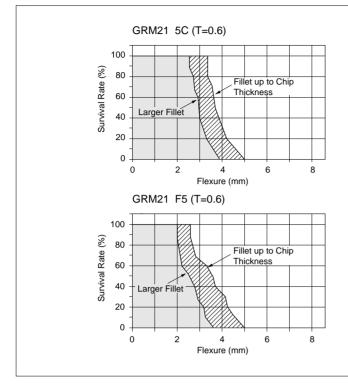
Table	2
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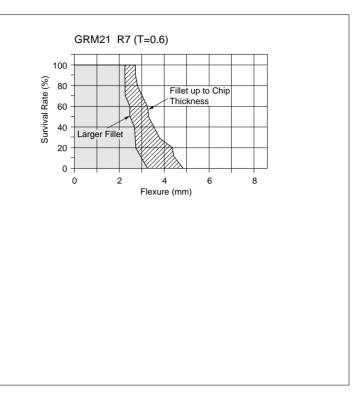
Characteristics	Change in Capacitance		
5C	Within $\pm 5\%$ or $\pm 0.5 \text{pF}$, whichever is greater		
R7	Within ±12.5%		
F5 Within ±20%			



Continued from the preceding page.

(4) Results

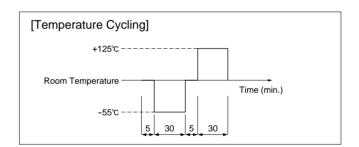


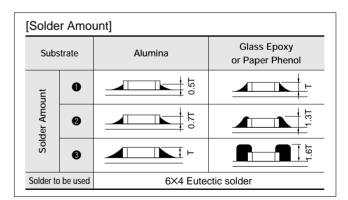


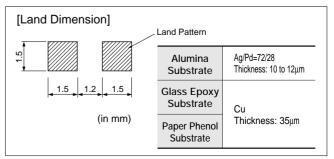
3. Temperature Cycling for Solder Fillet Height

(1) Test Method

Solder the chips to the substrate of various test fixtures using sufficient amounts of solder to achieve the required fillet height. Then subject the fixtures to the cycle illustrated below 200 times.







Solder Amount Alumina substrates are typically designed for reflow

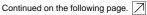
soldering.

Glass epoxy or paper phenol substrates are typically used for flow soldering.

② Material

Alumina	(Thickness: 0.64mm)
Glass epoxy	(Thickness: 1.64mm)
Paper phenol	(Thickness: 1.64mm)

③ Land Dimension





Continued from the preceding page.

(2) Test Samples

GRM21 5C/R7/F5 Characteristics T=0.6mm

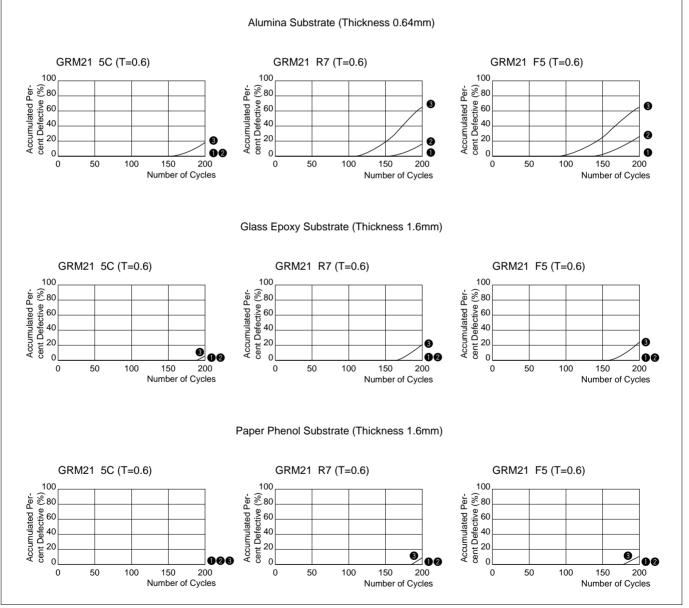
(3) Acceptance Criteria

Products are determined to be defective if the change in capacitance has exceeded the values specified in Table 3.

Table 3

Characteristics	Change in Capacitance
5C	Within $\pm 2.5\%$ or ± 0.25 pF, whichever is greater
R7	Within ±7.5%
F5	Within ±20%

(4) Results



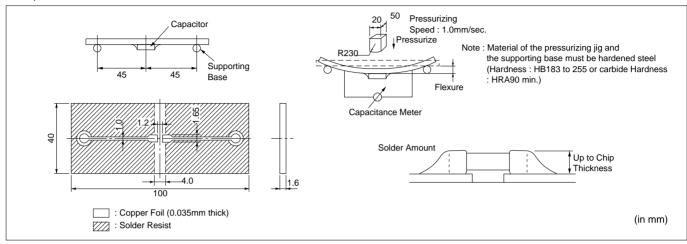


Continued from the preceding page.

4. Board Bending Strength for Board Material

(1) Test Method

Solder the chip to the test board. Then bend the board using the method illustrated below, to measure capacitance.



(2) Test Samples

GRM21 5C/R7/F5 Characteristics T=0.6mm typical

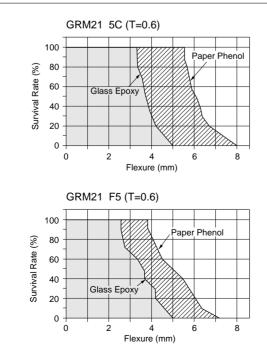
(3) Acceptance Criteria

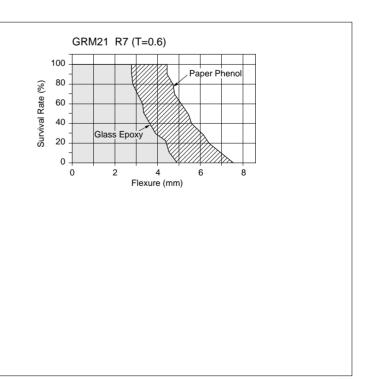
Products should be determined to be defective if the change in capacitance has exceeded the values specified in Table 4.

Table 4

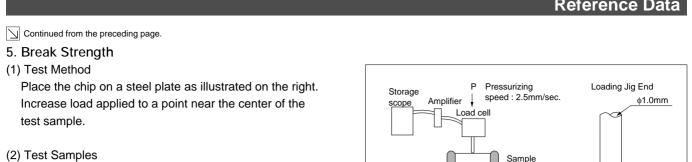
Characteristics	Change in Capacitance			
5C	Within \pm 5% or \pm 0.5pF, whichever is greater			
R7	Within $\pm 12.5\%$			
F5 Within ±20%				

(4) Results









GRM21 5C/R7/F5 Characteristics GRM31 5C/R7/F5 Characteristics

(3) Acceptance Criteria

Define the load that has caused the chip to break or crack, as the bending force.

(4) Explanation

Break strength, P, is proportionate to the square of the thickness of the ceramic element and is expressed as a curve of secondary degree.

F5

1.2

1.6

The formula is:

$$\mathsf{P}=\frac{2\gamma\mathsf{W}\mathsf{T}^2}{3\mathsf{L}}\quad(\mathsf{N})$$

140

120

100

80

60

40

20

0

Bending-break Strength (N)

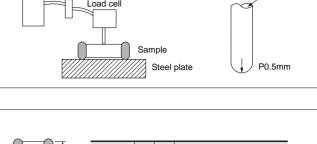
W : Width of ceramic element	(mm)
T : Thickness of element	(mm)

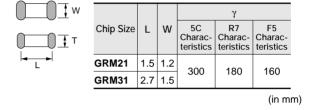
L : Distance between fulcrums (mm)

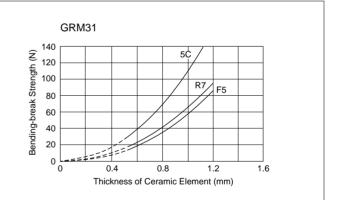
GRM21

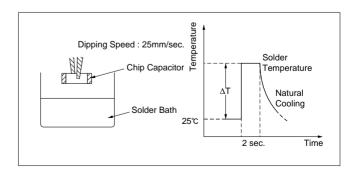
γ: Bending stress (N/mm^2)

(5) Results









6. Thermal Shock

(1) Test method

After applying flux (an ethanol solution of 25% rosin), dip the chip in a solder bath (6×4 eutectic solder) in accordance with the following conditions:

0.4

0.8

Thickness of Ceramic Element (mm)

(2) Test samples

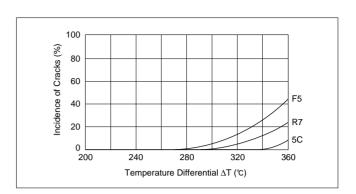
GRM21 5C/R7/F5 Characteristics T=0.6mm typical

(3) Acceptance criteria

Visually inspect the test sample with a 60-power optical microscope. Chips exhibiting breaks or cracks should be determined to be defective.



- Continued from the preceding page.
- (4) Results



After dipping the test sample with a pair of tweezers in

static solder (eutectic solder), check for leaching that

7. Solder Heat Resistance

(1) Test Method

1) Reflow soldering:

Apply about 300 µm of solder paste over the alumina substrate. After reflow soldering, remove the chip and check for leaching that may have occurred on the outer electrode.

2 Flow soldering:

After dipping the test sample with a pair of tweezers in wave solder (eutectic solder), check for leaching that may have occurred on the outer electrode.

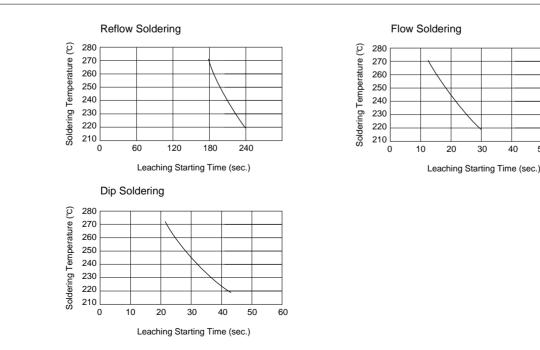
(2) Test samples

GRM21: For flow/reflow soldering T=0.6mm

(3) Acceptance criteria

The starting time of leaching should be defined as the time when the outer electrode has lost 25% of the total edge length of A-B-C-D as illustrated:

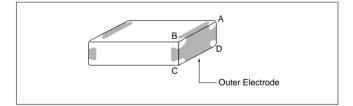
(4) Results



(4) Flux to be used: An ethanol solution of 25% rosin.

may have occurred on the outer electrode.

3 Dip soldering:



40

50

60



Continued from the preceding page.

8. Thermal Shock when Making Corrections with a Soldering Iron

(1) Test Method

Apply a soldering iron meeting the conditions below to the soldered joint of a chip that has been soldered to a paper phenol board, while supplying wire solder. (Note: the soldering iron tip should not directly touch the ceramic element of the chip.)

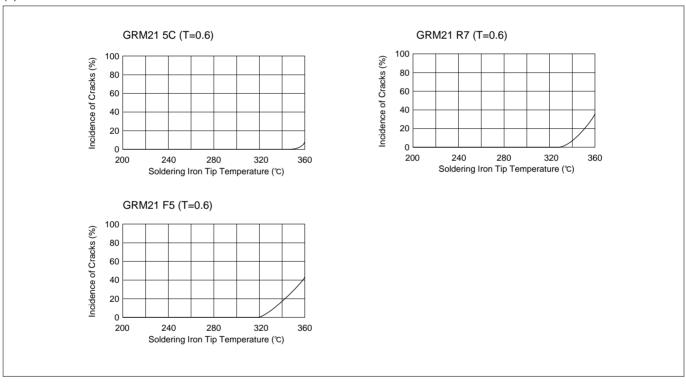
(2) Test Samples

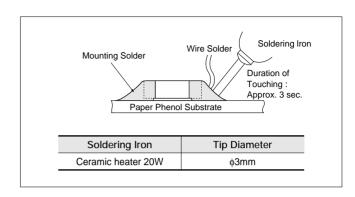
GRM21 5C/R7/F5 Characteristics T=0.6mm

(3) Acceptance Criteria for Defects

Observe the appearance of the test sample with a 60-power optical microscope. Those units displaying any breaks or cracks are determined to be defective.







Chip Monolithic Ceramic Capacitors

muRata

Medium Voltage Low Dissipation Factor

Features

- 1. Low-loss and suitable for high frequency circuits
- 2. Murata's original internal electrode structure realizes high flash-over voltage.
- 3. A new monolithic structure for small, surfacemountable devices capable of operating at high voltage levels
- 4. Sn-plated external electrodes realize good solderability.
- 5. Use the GRM21/31 type with flow or reflow soldering, and other types with reflow soldering only.

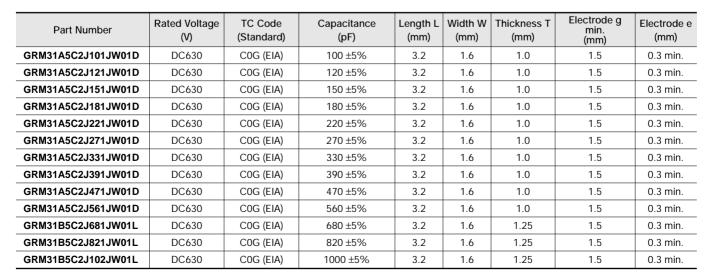
Applications

Ideal for use on high frequency pulse circuits such as snubber circuits for switching power supplies, DC-DC converters, ballasts (inverter fluorescent lamps), etc.

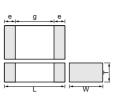
Do not use these products in any Automotive Power train or Safety equipment including Battery charger for Electric Vehicles and Plug-in Hybrid. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as Power train and Safety equipment.

*: In case of use C0G char., DC630V product with pulse voltage, be sure not to use with 10kHz and less pulse or ripple voltage condition. and these product are not suitable for commercial power line voltage application, such as AC filter. For those applications, be sure to use AC voltage rating product.(GA2/GA3 series)

COG Characteristics







Part Number		Dim	ensions (mm)	
Part Number	L	L W T		e min.	g min.
GRM21A	2.0 ±0.2	1.25 ±0.2	1.0 +0,-0.3		0.7
GRM31A	3.2 +0.2	1.6 +0.2	1.0 +0,-0.3		
GRM31B	3.2 ±0.2	1.6 ±0.2	1.25 +0,-0.3		1.5*
GRM32A	3.2 +0.2	2.5 +0.2	1.0 +0,-0.3	0.3	1.5
GRM32B	3.Z <u>1</u> 0.Z	2.5 ±0.2	1.25 +0,-0.3		
GRM42A	4.5 ±0.3	2.0 ±0.2	1.0 +0,-0.3		2.9

* GRM31A7U3D, GRM32A7U3D, GRM32B7U3D : 1.8mm min.



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U2J Characteristics

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GRM21A7U2E101JW31D	DC250	U2J (EIA)	100 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E121JW31D	DC250	U2J (EIA)	120 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E151JW31D	DC250	U2J (EIA)	150 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E181JW31D	DC250	U2J (EIA)	180 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E221JW31D	DC250	U2J (EIA)	220 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E271JW31D	DC250	U2J (EIA)	270 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E331JW31D	DC250	U2J (EIA)	330 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E391JW31D	DC250	U2J (EIA)	390 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E471JW31D	DC250	U2J (EIA)	470 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E561JW31D	DC250	U2J (EIA)	560 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E681JW31D	DC250	U2J (EIA)	680 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E821JW31D	DC250	U2J (EIA)	820 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E102JW31D	DC250	U2J (EIA)	1000 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E122JW31D	DC250	U2J (EIA)	1200 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E152JW31D	DC250	U2J (EIA)	1500 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E182JW31D	DC250	U2J (EIA)	1800 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E222JW31D	DC250	U2J (EIA)	2200 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM31A7U2E272JW31D	DC250	U2J (EIA)	2700 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2E332JW31D	DC250	U2J (EIA)	3300 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2E392JW31D	DC250	U2J (EIA)	3900 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2E472JW31D	DC250	U2J (EIA)	4700 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2E562JW31D	DC250	U2J (EIA)	5600 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31B7U2E682JW31L	DC250	U2J (EIA)	6800 ±5%	3.2	1.6	1.25	1.5	0.3 min.
GRM31B7U2E822JW31L	DC250	U2J (EIA)	8200 ±5%	3.2	1.6	1.25	1.5	0.3 min.
GRM31B7U2E103JW31L	DC250	U2J (EIA)	10000 ±5%	3.2	1.6	1.25	1.5	0.3 min.
GRM31A7U2J100JW31D	DC630	U2J (EIA)	10 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J120JW31D	DC630	U2J (EIA)	12 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J150JW31D	DC630	U2J (EIA)	15 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J180JW31D	DC630	U2J (EIA)	18 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J220JW31D	DC630	U2J (EIA)	22 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J270JW31D	DC630	U2J (EIA)	27 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J330JW31D	DC630	U2J (EIA)	33 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J390JW31D	DC630	U2J (EIA)	39 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J470JW31D	DC630	U2J (EIA)	47 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J560JW31D	DC630	U2J (EIA)	56 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J680JW31D	DC630	U2J (EIA)	68 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J820JW31D	DC630	U2J (EIA)	82 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J101JW31D	DC630	U2J (EIA)	100 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J121JW31D	DC630	U2J (EIA)	120 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J151JW31D	DC630	U2J (EIA)	150 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J181JW31D	DC630	U2J (EIA)	180 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J221JW31D	DC630	U2J (EIA)	220 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J271JW31D	DC630	U2J (EIA)	270 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J331JW31D	DC630	U2J (EIA)	330 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J391JW31D	DC630	U2J (EIA)	390 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J471JW31D	DC630	U2J (EIA)	470 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J561JW31D	DC630	U2J (EIA)	560 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J681JW31D	DC630	U2J (EIA)	680 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J821JW31D	DC630	U2J (EIA)	820 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A7U2J102JW31D	DC630	U2J (EIA)	1000 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM32A7U2J122JW31D	DC630	U2J (EIA)	1200 ±5%	3.2	2.5	1.0	1.5	0.3 min.
GRM32A7U2J152JW31D	DC630	U2J (EIA)	1500 ±5%	3.2	2.5	1.0	1.5	0.3 min.
GRM32A7U2J182JW31D	DC630	U2J (EIA)	1800 ±5%	3.2	2.5	1.0	1.5	0.3 min.
GRM32A7U2J222JW31D	DC630	U2J (EIA)	2200 ±5%	3.2	2.5	1.0	1.5	0.3 min.



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Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode (mm)
GRM31A7U3A100JW31D	DC1000	U2J (EIA)	10 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A120JW31D	DC1000	U2J (EIA)	12 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A150JW31D	DC1000	U2J (EIA)	15 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A180JW31D	DC1000	U2J (EIA)	18 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A220JW31D	DC1000	U2J (EIA)	22 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A270JW31D	DC1000	U2J (EIA)	27 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A330JW31D	DC1000	U2J (EIA)	33 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U3A390JW31D	DC1000	U2J (EIA)	39 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A470JW31D	DC1000	U2J (EIA)	47 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A560JW31D	DC1000	U2J (EIA)	56 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A680JW31D	DC1000	U2J (EIA)	68 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A820JW31D	DC1000	U2J (EIA)	82 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A101JW31D	DC1000	U2J (EIA)	100 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A121JW31D	DC1000	U2J (EIA)	120 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U3A151JW31D	DC1000	U2J (EIA)	150 ±5%	3.2	1.6	1.0	1.5	0.3 mir
GRM31A7U3A181JW31D	DC1000	U2J (EIA)	180 ±5%	3.2	1.6	1.0	1.5	0.3 mir
GRM31A7U3A221JW31D	DC1000	U2J (EIA)	220 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A271JW31D	DC1000	U2J (EIA)	270 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A331JW31D	DC1000	U2J (EIA)	330 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31B7U3A391JW31L	DC1000	U2J (EIA)	390 ±5%	3.2	1.6	1.25	1.5	0.3 mir
RM31B7U3A471JW31L	DC1000	U2J (EIA)	470 ±5%	3.2	1.6	1.25	1.5	0.3 mir
RM31A7U3D100JW31D	DC2000	U2J (EIA)	10 ±5%	3.2	1.6	1.0	1.8	0.3 mir
RM31A7U3D120JW31D	DC2000	U2J (EIA)	12 ±5%	3.2	1.6	1.0	1.8	0.3 mir
RM31A7U3D150JW31D	DC2000	U2J (EIA)	15 ±5%	3.2	1.6	1.0	1.8	0.3 mir
RM31A7U3D180JW31D	DC2000	U2J (EIA)	18 ±5%	3.2	1.6	1.0	1.8	0.3 mir
RM31A7U3D220JW31D	DC2000	U2J (EIA)	22 ±5%	3.2	1.6	1.0	1.8	0.3 mir
GRM31A7U3D270JW31D	DC2000	U2J (EIA)	27 ±5%	3.2	1.6	1.0	1.8	0.3 mir
GRM31A7U3D330JW31D	DC2000	U2J (EIA)	33 ±5%	3.2	1.6	1.0	1.8	0.3 min
RM31A7U3D390JW31D	DC2000	U2J (EIA)	39 ±5%	3.2	1.6	1.0	1.8	0.3 mir
RM31A7U3D470JW31D	DC2000	U2J (EIA)	47 ±5%	3.2	1.6	1.0	1.8	0.3 mir
RM31A7U3D560JW31D	DC2000	U2J (EIA)	56 ±5%	3.2	1.6	1.0	1.8	0.3 mir
GRM31A7U3D680JW31D	DC2000	U2J (EIA)	68 ±5%	3.2	1.6	1.0	1.8	0.3 mir
GRM32A7U3D820JW31D	DC2000	U2J (EIA)	82 ±5%	3.2	2.5	1.0	1.8	0.3 mir
GRM32A7U3D101JW31D	DC2000	U2J (EIA)	100 ±5%	3.2	2.5	1.0	1.8	0.3 min
GRM32A7U3D121JW31D	DC2000	U2J (EIA)	120 ±5%	3.2	2.5	1.0	1.8	0.3 mir
GRM32A7U3D151JW31D	DC2000	U2J (EIA)	150 ±5%	3.2	2.5	1.0	1.8	0.3 mir
RM32B7U3D181JW31L	DC2000	U2J (EIA)	180 ±5%	3.2	2.5	1.25	1.8	0.3 mir
RM32B7U3D221JW31L	DC2000	U2J (EIA)	220 ±5%	3.2	2.5	1.25	1.8	0.3 mir
RM42A7U3F270JW31L	DC3150	U2J (EIA)	27 ±5%	4.5	2.0	1.0	2.9	0.3 mir
RM42A7U3F330JW31L	DC3150	U2J (EIA)	33 ±5%	4.5	2.0	1.0	2.9	0.3 mir
GRM42A7U3F390JW31L	DC3150	U2J (EIA)	39 ±5%	4.5	2.0	1.0	2.9	0.3 min
GRM42A7U3F470JW31L	DC3150	U2J (EIA)	47 ±5%	4.5	2.0	1.0	2.9	0.3 mir
RM42A7U3F560JW31L	DC3150	U2J (EIA)	56 ±5%	4.5	2.0	1.0	2.9	0.3 min
GRM42A7U3F680JW31L	DC3150	U2J (EIA)	68 ±5%	4.5	2.0	1.0	2.9	0.3 min
RM42A7U3F820JW31L	DC3150	U2J (EIA)	82 ±5%	4.5	2.0	1.0	2.9	0.3 min
GRM42A7U3F101JW31L	DC3150	U2J (EIA)	100 ±5%	4.5	2.0	1.0	2.9	0.3 mir



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Specifications and Test Methods

No.	Ite	em	Specifications		Test Method				
1	Operating Temperatu	ire Range	−55 to +125℃		_				
2	Appearar	nce	No defects or abnormalities	Visual inspection					
3	Dimensio	ns	Within the specified dimension	Using calipers					
4	Dielectric	Strength	No defects or abnormalities	No failure should be observed when voltage in Table is applied between the terminations for 1 to 5 sec., provided the charge/ discharge current is less than 50mA. Rated Voltage DC250V 200% of the rated voltage DC630V 150% of the rated voltage DC1kV, DC2kV 120% of the rated voltage DC3.15kV DC4095V					
5	Insulation F (I.R.)	Resistance	More than 10,000MΩ	The insulation resistance s (DC250±25V in case of rase. of charging.					
6	Capacita	nce	Within the specified tolerance	The capacitance/Q should voltage shown as follows.	be measured a	the frequency and			
7	Q		1,000 min.	Capacitance C<1,000pF C≥1,000pF	Frequency 1±0.2MHz 1±0.2kHz	Voltage AC0.5 to 5V(r.m.s.) AC1±0.2V(r.m.s.)			
8	Capacitar Temperat Character	ure	Temp. Coefficient C0G char. : 0±30ppm/°C (Temp. Range : +25 to +125°C) 0+30, -72ppm/°C (Temp. Range : -55 to +25°C) U2J char. : -750±120ppm/°C (Temp. Range : +25 to +125°C) -750+120, -347ppm/°C (Temp. Range : -55 to +25°C)	The capacitance measurement should be made at each ster specified in Table. Step Temperature (°C) 1 25±2 2 Min. Operating Temp.±3 3 25±2 4 Max. Operating Temp.±2 5 25±2					
9	9 Adhesive Strength of Termination		No removal of the terminations or other defect should occur.	Solder the capacitor to the in Fig. 1. Then apply 10N force in th The soldering should be d should be conducted with and free of defects such a	the direction of the one using the recare so that the s heat shock.	e arrow. flow method and soldering is uniform			
		Appearance	No defects or abnormalities	Solder the capacitor to the	e test jig (glass e	boxy board).			
		Capacitance	Within the specified tolerance	The capacitor should be s having a total amplitude of					
10	Vibration Resistance Q	Q	1,000 min.	- having a total amplitude of uniformly between the app frequency range, from 10 traversed in approximately for a period of 2 hrs. in ea- directions (total of 6 hrs.).	f 10 and 55Hz. The Irn to 10Hz, should be ion should be applied				

9



Specifications and Test Methods

Continued from the preceding page.

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lo. It	em	Specifications	Test Method
1 Deflectio	'n	No cracking or marking defects should occur. $\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2. Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. $\underbrace{\begin{array}{c} 20 & 50 \\ Pressurize \\ Pressurize \\ Flexure=1 \\ 45 \\ (in mm) \end{array}}_{Fig. 3}$
2 Solderat Termina	-	75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder
	Appearance Capacitance Change	No marking defects Within ±2.5%	Preheat the capacitor at 120 to 150°C* for 1 min. Immerse the capacitor in solder solution at 260±5°C for 10±1 sec. Let sit at room condition* for 24±2 hrs., then measure.
Resistance	Q	1,000 min.	•Immersing speed: 25±2.5mm/s
3 to Soldering Heat	I.R.	More than 10,000M Ω	*Preheating for more than 3.2×2.5mm
	Dielectric Strength	In accordance with item No.4	Step Temperature Time 1 100 to 120°C 1 min. 2 170 to 200°C 1 min.
	Appearance	No marking defects	Fix the capacitor to the supporting jig (glass epoxy board) shown
	Capacitance Change	Within ±2.5%	in Fig. 4. Perform the 5 cycles according to the 4 heat treatments listed in the following table.
	Q	500 min.	Let sit for 24±2 hrs. at room condition*, then measure. Step Temperature (°C) Time (min.)
	I.R.	More than 10,000MΩ	1 Min. Operating Temp.±3 30±3
4 Temperature Cycle			2 Room Temp. 2 to 3 3 Max. Operating Temp.±2 30±3 4 Room Temp. 2 to 3
			Glass Epoxy Board Fig. 4
	Appearance	No marking defects	
Humidity	Capacitance Change	Within ±5.0%	Let the capacitor sit at $40\pm2^{\circ}$ and relative humidity of 90 to 95%
5 (Steady State)	Q I.R.	350 min. More than 1,000MΩ	for $500^{\pm 20}$ hrs. Remove and let sit for 24±2 hrs. at room condition*, then
Sidie)	Dielectric Strength	In accordance with item No.4	measure.
	Appearance	No marking defects	Apply voltage as Table for 1,000 - 48 hrs. at maximum operating
	Capacitance Change	Within ±3.0%	temperature ±3°C. Remove and let sit for 24±2 hrs. at room condition*, then measure.
6 Life	Q	350 min.	Rated Voltage Applied Voltage
	I.R. Dielectric	More than 1,000MΩ	DC250V 150% of the rated voltage DC630V, DC1kV, DC2kV, DC3.15kV 120% of the rated voltage
	Strength	In accordance with item No.4	The charge/discharge current is less than 50mA.

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



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Chip Monolithic Ceramic Capacitors

muRata

Medium Voltage High Capacitance for General Use

Features

- 1. A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
- 2. Sn-plated external electrodes realizes good solderability.
- 3. Use the GRM18/21/31 types with flow or reflow soldering, and other types with reflow soldering only.

Applications

- 1. Ideal for use on diode-snubber circuits for switching power supplies.
- 2. Ideal for use as primary-secondary coupling for DC-DC converter.
- 3. Ideal for use on line filters and ringer detectors for telephones, facsimiles and modems.

Do not use these products in any Automotive Power train or Safety equipment including Battery charger for Electric Vehicles and Plug-in Hybrid. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as Power train and Safety equipment.

Part Number		Din	nens
	L	W	
GRM188	1.6 ±0.1	0.8 ±0.1	0.
GRM21A	20402	1 25 +0 2	1.0

Part Number							
Fait Number	L	W	Т	е	g min.		
GRM188	1.6 ±0.1	0.8 ±0.1	0.8 ±0.1	0.2 to 0.5	0.4		
GRM21A	2.0 +0.2	1.25 ±0.2	1.0 +0,-0.3		0.7		
GRM21B	2.0 ±0.2	1.25 ±0.2	1.25 ±0.2		0.7		
GRM31B	3.2 ±0.2	1.6 ±0.2	1.25 +0,-0.3				
GRM31C	3.2 ±0.2	1.0 ±0.2	1.6 ±0.2		1.2		
GRM32Q	3.2 +0.3	2.5 +0.2	1.5 +0,-0.3	0.3 min.			
GRM32D	3.2 ±0.3	2.5 ±0.2	2.0 +0,-0.3				
GRM43Q	4.5 ±0.4	3.2 ±0.3	1.5 +0,-0.3		2.2		
GRM43D	4.5 ±0.4	3.2 ±0.3	2.0 +0,-0.3		2.2		
GRM55D	5.7 ±0.4	5.0 ±0.4	2.0 +0,-0.3		3.2		

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GRM188R72E221KW07D	DC250	X7R (EIA)	220pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM188R72E331KW07D	DC250	X7R (EIA)	330pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM188R72E471KW07D	DC250	X7R (EIA)	470pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM188R72E681KW07D	DC250	X7R (EIA)	680pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM188R72E102KW07D	DC250	X7R (EIA)	1000pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM21AR72E102KW01D	DC250	X7R (EIA)	1000pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM188R72E152KW07D	DC250	X7R (EIA)	1500pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM21AR72E152KW01D	DC250	X7R (EIA)	1500pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM188R72E222KW07D	DC250	X7R (EIA)	2200pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM21AR72E222KW01D	DC250	X7R (EIA)	2200pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM21AR72E332KW01D	DC250	X7R (EIA)	3300pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM21AR72E472KW01D	DC250	X7R (EIA)	4700pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM21AR72E682KW01D	DC250	X7R (EIA)	6800pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM21BR72E103KW03L	DC250	X7R (EIA)	10000pF ±10%	2.0	1.25	1.25	0.7	0.3 min.
GRM31BR72E153KW01L	DC250	X7R (EIA)	15000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRM31BR72E223KW01L	DC250	X7R (EIA)	22000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRM31CR72E333KW03L	DC250	X7R (EIA)	33000pF ±10%	3.2	1.6	1.6	1.2	0.3 min.
GRM31CR72E473KW03L	DC250	X7R (EIA)	47000pF ±10%	3.2	1.6	1.6	1.2	0.3 min.
GRM31BR72E683KW01L	DC250	X7R (EIA)	68000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRM32QR72E683KW01L	DC250	X7R (EIA)	68000pF ±10%	3.2	2.5	1.5	1.2	0.3 min.
GRM31CR72E104KW03L	DC250	X7R (EIA)	0.10μF ±10%	3.2	1.6	1.6	1.2	0.3 min.
GRM32DR72E104KW01L	DC250	X7R (EIA)	0.10μF ±10%	3.2	2.5	2.0	1.2	0.3 min.
GRM32QR72E154KW01L	DC250	X7R (EIA)	0.15μF ±10%	3.2	2.5	1.5	1.2	0.3 min.
GRM43QR72E154KW01L	DC250	X7R (EIA)	0.15μF ±10%	4.5	3.2	1.5	2.2	0.3 min.

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Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
RM32DR72E224KW01L	DC250	X7R (EIA)	0.22μF ±10%	3.2	2.5	2.0	1.2	0.3 min.
RM43DR72E224KW01L	DC250	X7R (EIA)	0.22μF ±10%	4.5	3.2	2.0	2.2	0.3 min.
RM43DR72E334KW01L	DC250	X7R (EIA)	0.33µF ±10%	4.5	3.2	2.0	2.2	0.3 min.
RM55DR72E334KW01L	DC250	X7R (EIA)	0.33µF ±10%	5.7	5.0	2.0	3.2	0.3 min.
RM43DR72E474KW01L	DC250	X7R (EIA)	0.47µF ±10%	4.5	3.2	2.0	2.2	0.3 min.
RM55DR72E474KW01L	DC250	X7R (EIA)	0.47µF ±10%	5.7	5.0	2.0	3.2	0.3 min.
RM55DR72E105KW01L	DC250	X7R (EIA)	1.0μF ±10%	5.7	5.0	2.0	3.2	0.3 min.
RM31BR72J102KW01L	DC630	X7R (EIA)	1000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31BR72J152KW01L	DC630	X7R (EIA)	1500pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31BR72J222KW01L	DC630	X7R (EIA)	2200pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31BR72J332KW01L	DC630	X7R (EIA)	3300pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31BR72J472KW01L	DC630	X7R (EIA)	4700pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31BR72J682KW01L	DC630	X7R (EIA)	6800pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31BR72J103KW01L	DC630	X7R (EIA)	10000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31CR72J153KW03L	DC630	X7R (EIA)	15000pF ±10%	3.2	1.6	1.6	1.2	0.3 min.
RM32QR72J223KW01L	DC630	X7R (EIA)	22000pF ±10%	3.2	2.5	1.5	1.2	0.3 min.
RM32DR72J333KW01L	DC630	X7R (EIA)	33000pF ±10%	3.2	2.5	2.0	1.2	0.3 min.
RM32DR72J473KW01L	DC630	X7R (EIA)	47000pF ±10%	3.2	2.5	2.0	1.2	0.3 min.
RM43QR72J683KW01L	DC630	X7R (EIA)	68000pF ±10%	4.5	3.2	1.5	2.2	0.3 min.
RM43DR72J104KW01L	DC630	X7R (EIA)	0.10µF ±10%	4.5	3.2	2.0	2.2	0.3 min.
RM55DR72J154KW01L	DC630	X7R (EIA)	0.15µF ±10%	5.7	5.0	2.0	3.2	0.3 min.
RM55DR72J224KW01L	DC630	X7R (EIA)	0.22µF ±10%	5.7	5.0	2.0	3.2	0.3 min.
RM31BR73A471KW01L	DC1000	X7R (EIA)	470pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31BR73A102KW01L	DC1000	X7R (EIA)	1000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31BR73A152KW01L	DC1000	X7R (EIA)	1500pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31BR73A222KW01L	DC1000	X7R (EIA)	2200pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31BR73A332KW01L	DC1000	X7R (EIA)	3300pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM31BR73A472KW01L	DC1000	X7R (EIA)	4700pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
RM32QR73A682KW01L	DC1000	X7R (EIA)	6800pF ±10%	3.2	2.5	1.5	1.2	0.3 min.
RM32QR73A103KW01L	DC1000	X7R (EIA)	10000pF ±10%	3.2	2.5	1.5	1.2	0.3 min.
RM32DR73A153KW01L	DC1000	X7R (EIA)	15000pF ±10%	3.2	2.5	2.0	1.2	0.3 min.
RM32DR73A223KW01L	DC1000	X7R (EIA)	22000pF ±10%	3.2	2.5	2.0	1.2	0.3 min.
RM43DR73A333KW01L	DC1000	X7R (EIA)	33000pF ±10%	4.5	3.2	2.0	2.2	0.3 min.
RM43DR73A473KW01L	DC1000	X7R (EIA)	47000pF ±10%	4.5	3.2	2.0	2.2	0.3 min.
RM55DR73A104KW01L	DC1000	X7R (EIA)	0.10μF ±10%	5.7	5.0	2.0	3.2	0.3 min.



Specifications and Test Methods

No.	lte	em	Specifications	Test Method		
1	Operating Temperatu	ure Range	-55 to +125℃	_		
2	Appearar	nce	No defects or abnormalities	Visual inspection		
3	Dimensio	ns	Within the specified dimensions	Using calipers		
4	Dielectric	: Strength	No defects or abnormalities	No failure should be observed when 150% of the rated voltage (200% of the rated voltage in case of rated voltage: DC250V, 120% of the rated voltage in case of rated voltage: DC1kV) is applied between the terminations for 1 to 5 sec., provided the charge/discharge current is less than 50mA.		
5	Insulation I (I.R.)	Resistance	C≧0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ	The insulation resistance should be measured with DC500 \pm 50V (DC250 \pm 25V in case of rated voltage: DC250V) and within 60 \pm 5 sec. of charging.		
6	Capacita	nce	Within the specified tolerance	The conscience/D E should be measured at a frequency of		
7	Dissipatio Factor (D		0.025 max.	The capacitance/D.F. should be measured at a frequency of 1±0.2kHz and a voltage of AC1±0.2V(r.m.s.)		
8	Capacitar Temperat Character	ure	Cap. Change Within ±15% (Temp. Range: −55 to +125℃)	The capacitance measurement should be made at each step specified in Table. Step Temperature (°C) 1 25±2 2 Min. Operating Temp.±3 3 25±2 4 Max. Operating Temp.±2 5 25±2 • Pretreatment Perform a heat treatment at $150 \pm 9_{0}$ °C for 60 ± 5 min. and then let sit for 24 ± 2 hrs. at room condition*. Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1. The apply 10N force in the direction of the arrow.		
9	Adhesive of Termin	-	No removal of the terminations or other defect should occur.	The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.		
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board).		
		Capacitance	Within the specified tolerance	The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied		
10	D Vibration Resistance D.F.		0.025 max.	uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).		

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



Specifications and Test Methods

Continued from the preceding page.

No.	Ite	m	Specifications	Test Method		
			No cracking or marking defects should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2.		
11	1 Deflection		$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. $\begin{array}{c} & & \\ &$		
			Fig. 2			
12	Solderabi Terminati		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder		
		Appearance	No marking defects	Preheat the capacitor at 120 to 150° for 1 min. Immerse the capacitor in solder solution at $260\pm5^{\circ}$ for 10 ± 1		
		Capacitance Change	Within ±10%	sec. Let sit at room condition* for 24±2 hrs., then measure. •Immersing speed: 25±2.5mm/s		
	Resistance	D.F.	0.025 max.	 Pretreatment Perform a heat treatment at 150⁺₋₁^o^o^o^c for 60±5 min. and then 		
13	to Soldering Heat	I.R.	C≧0.01µF: More than 100MΩ • µF C<0.01µF: More than 10,000MΩ	let sit for 24±2 hrs. at room condition*.		
		Dielectric Strength	In accordance with item No.4	*Preheating for more than 3.2×2.5mm Step Temperature Time 1 100 to 120°C 1 min. 2 170 to 200°C 1 min.		
		Appearance	No marking defects	Fix the capacitor to the supporting jig (glass epoxy board) showr		
		Capacitance Change	Within ±7.5%	 in Fig. 4. Perform the 5 cycles according to the 4 heat treatments listed in the following table. 		
		D.F.	0.025 max.	Let sit for 24 ± 2 hrs. at room condition*, then measure.		
		I.R.	C≧0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ	Step Temperature (°C) Time (min.) 1 Min. Operating Temp.±3 30±3 2 Room Temp. 2 to 3		
				3 Max. Operating Temp.±2 30±3		
14	Temperature Cycle	Dielectric Strength	In accordance with item No.4	A Room Temp. 2 to 3 Pretreatment Perform a heat treatment at 150 ± 18 °C for 60±5 min. and then let sit for 24±2 hrs. at room condition*.		
		Appearance	No marking defects	י צי י		
		Capacitance Change	Within ±15%	Let the capacitor sit at $40\pm2^{\circ}$ C and relative humidity of 90 to 95% for $500\pm2^{\circ}$ hrs.		
15	Humidity (Stoody	D.F.	0.05 max.	Remove and let sit for 24±2 hrs. at room condition*, then		
15	$\begin{array}{c} \text{(Steady}\\ \text{State)} \end{array} \begin{array}{c} \text{D.r.} & 0.05 \text{ max.} \\ \text{C} \geq 0.01 \mu \text{F} \text{: More than } 10 \text{M} \Omega \bullet \mu \text{F} \end{array}$		C≧0.01μF: More than 10MΩ ∙ μF	 measure. •Pretreatment Perform a heat treatment at 150[±]1[°]₁[°]₁ for 60±5 min. and then 		
			C<0.01 μ F: More than 1,000M Ω	Perform a heat treatment at 150 ± 18 °C for 60 ± 5 min. and then let sit for 24 ± 2 hrs. at room condition*.		

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



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Specifications and Test Methods

Continued from the preceding page.

No.	lte	em	Specifications	Test Method			
		Appearance	No marking defects	Apply 120% of the rated voltage (150% of the rated voltage in			
		Capacitance Change	Within ±15% (rated voltage: DC250V, DC630V) Within ±20% (rated voltage: DC1kV)	case of rated voltage: DC250V, 110% of the rated voltage in case of rated voltage: DC1kV) for $1,000 \pm \frac{48}{5}$ hrs. at maximum			
16	Life	D.F.	0.05 max.	operating temperature ±3°C. Remove and let sit for 24±2 hrs. at room condition*, then measure.			
10	Eno	I.R.	C≧0.01µF: More than $10M\Omega \bullet \mu F$ C<0.01µF: More than 1,000MΩ	The charge/discharge current is less than 50mA. •Pretreatment			
		Dielectric Strength	In accordance with item No.4	Apply test voltage for 60±5 min. at test temperature. Remove and let sit for 24±2 hrs. at room condition*.			
		Appearance	No marking defects				
	Humidity Loading	Capacitance Change	Within ±15%	Apply the rated voltage at $40\pm2^{\circ}$ and relative humidity of 90 to 95% for $500\pm^{20}$ hrs.			
17	(Application:	D.F.	0.05 max.	Remove and let sit for 24±2 hrs. at room condition*, then measure.			
.,	DC250V, DC630V item)	I.R.	C≧0.01μF: More than 10MΩ • μF C<0.01μF: More than 1,000MΩ	•Pretreatment Apply test voltage for 60±5 min. at test temperature.			
	neny	Dielectric Strength	In accordance with item No.4	Remove and let sit for 24±2 hrs. at room condition*.			

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





Chip Monolithic Ceramic Capacitors



Only for LCD Backlight Inverter Circuit

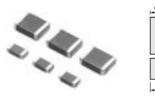
Features

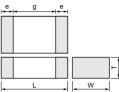
- 1. Low-loss and suitable for high frequency circuits
- 2. Murata's original internal electrode structure realizes high flash-over voltage.
- 3. A new monolithic structure for small, surfacemountable devices capable of operating at high voltage levels.
- 4. Sn-plated external electrodes realize good solderability.
- 5. Only for reflow soldering
- The capacitors less than 22pF can be applied maximum 4.0kV peak to peak at 100kHz or less only for the ballast or the resonance usage in the LCD backlight inverter circuit.

Applications

Ideal for use as the ballast in LCD backlight inverter.

Do not use these products in any Automotive Power train or Safety equipment including Battery charger for Electric Vehicles and Plug-in Hybrid. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as Power train and Safety equipment.





Part Number	Dimensions (mm)						
Fait Number	L	W	Т	e min.	g min.		
GRM42A	4.5 ±0.3	2.0 ±0.2	1.0 +0, -0.3	0.3	2.9		

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GRM42A5C3F050DW01L	DC3150	COG (EIA)	5.0 ±0.5pF	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F100JW01L	DC3150	COG (EIA)	10 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F120JW01L	DC3150	COG (EIA)	12 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F150JW01L	DC3150	COG (EIA)	15 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F180JW01L	DC3150	COG (EIA)	18 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F220JW01L	DC3150	COG (EIA)	22 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F270JW01L	DC3150	COG (EIA)	27 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F330JW01L	DC3150	COG (EIA)	33 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F390JW01L	DC3150	COG (EIA)	39 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F470JW01L	DC3150	COG (EIA)	47 ±5%	4.5	2.0	1.0	2.9	0.3 min.



Specifications and Test Methods

No.	Ite	m	Specifications	Test Method
1	Operating Temperatu	re Range	−55 to +125℃	_
2	Appearan	се	No defects or abnormalities	Visual inspection
3	Dimensio	าร	Within the specified dimension	Using calipers
4	Dielectric Strength		No defects or abnormalities	No failure should be observed when DC4095V is applied between the terminations for 1 to 5 sec., provided the charge/ discharge current is less than 50mA.
5	Insulation F (I.R.)	esistance	More than 10,000MΩ	The insulation resistance should be measured with DC500 \pm 50V and within 60 \pm 5 sec. of charging.
6	Capacitar	nce	Within the specified tolerance	The capacitance/Q should be measured at a frequency of
7	Q		1,000 min.	1±0.2MHz and a voltage of AC0.5 to 5V(r.m.s.)
8	Capacitan Temperati Character	ıre	Temp. Coefficient 0±30ppm/°c (Temp. Range: +25 to +125°c) 0+30, -72ppm/°c (Temp. Range: -55 to +25°c)	The capacitance measurement should be made at each step specified in Table. Step Temperature (°C) 1 25±2 2 Min. Operating Temp.±3 3 25±2 4 Max. Operating Temp.±2 5 25±2
9	Adhesive of Termin	-	No removal of the terminations or other defect should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1. Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board).
		Appearance Capacitance	Within the specified tolerance	The capacitor should be subjected to a simple harmonic motion
10	Vibration Resistance	Q	1,000 min.	having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).
			No cracking or marking defects should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown
11	Deflection		$\begin{array}{c c c c c c c c c c c c c c c c c c c $	in Fig. 2. Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. $\frac{20}{Pressurize} + \frac{50}{Pressurize} + \frac{20}{Pressurize} + \frac{1.0 \text{mm/s}}{Pressurize} + \frac{100 \text{mm/s}}{P$



Specifications and Test Methods

Continued from the preceding page.

١o.	o. Item		Specifications	Test Method
12	Solderability of Termination		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder
	Resistance to Soldering Heat	Appearance	No marking defects	Preheat the capacitor as table.
13		Capacitance Change	Within ±2.5%	Immerse the capacitor in solder solution at 260±5℃ for 10±1 sec. Let sit at room condition* for 24±2 hrs., then measure. •Immersing speed: 25±2.5mm/s
		Q	1,000 min.	•Inimersing speed. 25±2.3mm/s
		I.R.	More than 10,000MΩ	*Preheating
			In accordance with item No 4	Step Temperature Time
		Dielectric		1 100 to 120°C 1 min.
		Strength		2 170 to 200°C 1 min.
		Appearance	No marking defects	Fix the capacitor to the supporting jig (glass epoxy board) shown
	Temperature Cycle	Capacitance Change	Within ±2.5%	in Fig. 4. Perform the 5 cycles according to the 4 heat treatments listed in the following table.
		Q	1,000 min.	Let sit for 24 ± 2 hrs. at room condition [*] , then measure.
		I.R.	More than 10,000M Ω	Step Temperature (°C) Time (min.)
				1 Min. Operating Temp.±3 30±3
				2 Room Temp. 2 to 3
14			3 Max. Operating Temp.±2 30±3 4 Room Temp. 2 to 3	
		Dielectric Strength	In accordance with item No 4	Solder resist
15	Humidity (Steady State)	Appearance	No marking defects	
		Capacitance Change	Within ±5.0%	Let the capacitor sit at 40±2°C and relative humidity of 90 to 95% for 500 ^{±2} ° ₀ hrs. Remove and let sit for 24±2 hrs. at room condition*, then measure.
		Q	350 min.	
		I.R.	More than 1,000M Ω	
		Dielectric Strength	In accordance with item No.4	
	Life	Appearance	No marking defects	Apply 120% of the rated voltage for 1,000 ^{±48} ₀ hrs. at maximum operating temperature ±3°C. Remove and let sit for 24±2 hrs. at room condition*, then measure. The charge/discharge current is less than 50mA.
16		Capacitance Change	Within ±3.0%	
		Q	350 min.	
		I.R.	More than 1,000M Ω	
		Dielectric Strength	In accordance with item No.4	

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

11



Chip Monolithic Ceramic Capacitors

muRata

Only for Information Devices

Features

- These items are designed specifically for telecommunications devices (IEEE802.3) in Ethernet LAN and primary-secondary coupling for DC-DC converter.
- 2. A new monolithic structure for small, high capacitance capable of operating at high voltage levels
- 3. Sn-plated external electrodes realizes good solderability.
- 4. Only for reflow soldering
- 5. The low-profile type (thickness: 1.5mm max.) is available. Fit for use on thinner type equipment.

Applications

- 1. Ideal for use on telecommunications devices in Ethernet LAN
- 2. Ideal for use as primary-secondary coupling for DC-DC converter

Do not use these products in any Automotive Power train or Safety equipment including Battery charger for Electric Vehicles and Plug-in Hybrid. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as Power train and Safety equipment.

	-		L	•	V	~	⊢ ↓	
l	Din	nens	sions	s (mm	ı)			
				_				

0.3 min

Dout Numeroon							
Part Number	L	W	Т	g min.			
GR442Q	4.5 ±0.3	2.0 ±0.2	1.5 +0, -0.3				
GR443D	4.5 ±0.4	3.2 ±0.3	2.0 +0, -0.3	2.5			
GR443Q	4.5 ±0.4	3.2 ±0.3	1.5 +0, -0.3				
GR455D	5.7 ±0.4	5.0 ±0.4	2.0 +0, -0.3	3.2			

0.3 min.

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GR442QR73D101KW01L	DC2000	X7R (EIA)	100 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D121KW01L	DC2000	X7R (EIA)	120 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D151KW01L	DC2000	X7R (EIA)	150 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D181KW01L	DC2000	X7R (EIA)	180 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D221KW01L	DC2000	X7R (EIA)	220 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D271KW01L	DC2000	X7R (EIA)	270 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D331KW01L	DC2000	X7R (EIA)	330 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D391KW01L	DC2000	X7R (EIA)	390 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D471KW01L	DC2000	X7R (EIA)	470 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D561KW01L	DC2000	X7R (EIA)	560 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D681KW01L	DC2000	X7R (EIA)	680 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D821KW01L	DC2000	X7R (EIA)	820 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D102KW01L	DC2000	X7R (EIA)	1000 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D122KW01L	DC2000	X7R (EIA)	1200 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D152KW01L	DC2000	X7R (EIA)	1500 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR443QR73D182KW01L	DC2000	X7R (EIA)	1800 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GR443QR73D222KW01L	DC2000	X7R (EIA)	2200 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GR443QR73D272KW01L	DC2000	X7R (EIA)	2700 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GR443QR73D332KW01L	DC2000	X7R (EIA)	3300 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GR443QR73D392KW01L	DC2000	X7R (EIA)	3900 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GR443DR73D472KW01L	DC2000	X7R (EIA)	4700 ±10%	4.5	3.2	2.0	2.5	0.3 min.
GR455DR73D103KW01L	DC2000	X7R (EIA)	10000 ±10%	5.7	5.0	2.0	3.2	0.3 min.



Specifications and Test Methods

No.	Ite	em	Specifications		Test Method		
1	Operating Temperatu	ire Range	−55 to +125℃	-			
2	Appearar	nce	No defects or abnormalities	Visual inspection			
3	Dimensio	ns	Within the specified dimensions	Using calipers			
4	Dielectric	Strength	No defects or abnormalities		observed when voltage in tat tions, provided the charge/dis	••	
4	Dielectric	Strength		Rated Voltage	Test Voltage	Time	
				DC2kV	120% of the rated voltage $AC1500V(rms)$	60±1 sec. 60±1 sec.	
5	Pulse Vol	tage	No self healing breakdowns or flash-overs have taken place in the capacitor.	AC1500V(r.m.s.) 60±1 s 10 impulse of alternating polarity is subjected.			
6	Insulation F (I.R.)	Resistance	More than 6,000MΩ	The insulation resist and within 60±5 sec	ance should be measured wit c. of charging.	h DC500±50V	
7	Capacita	nce	Within the specified tolerance	The conscitonos/D	should be measured at a fr		
8	Dissipatio Factor (D		0.025 max.	 The capacitance/D.F. should be measured at a frequency of 1±0.2kHz and a voltage of AC1±0.2V(r.m.s.) 			
				The capacitance measurement should be made at each step specified in Table.			
				Step	Temperature (°C	;)	
	Consoltar		Con Change		1 25±2 2 Min. Operating Temp.±3		
9	Capacitar Temperat		Cap. Change within ±15%	3	25±2		
	Characteristics		(Temp. Range: −55 to +125℃)	4 Max. Operating Temp.±2 5 25+2			
				5 25 ± 2 •PretreatmentPerform a heat treatment at $150 \pm 0^{\circ}$ °C for 60 ± 5 min. and then let sit for 24 ± 2 hrs. at room condition*.			
10	0 Adhesive Strength of Termination		No removal of the terminations or other defect should occur.	in Fig. 1. Then apply 10N forc The soldering should	to the testing jig (glass epoxy the in the direction of the arrow d be done using the reflow me d with care so that the solder such as heat shock.	thod and	
		Appearance	No defects or abnormalities	Solder the capacitor	to the test jig (glass epoxy bo	oard).	
		Capacitance	Within the specified tolerance	The capacitor should	d be subjected to a simple ha	rmonic motion	
11	Vibration Resistance	ibration		uniformly between th frequency range, fro traversed in approxii for a period of 2 hrs. directions (total of 6		d 55Hz. The OHz, should be ould be applied	
* "D			ersturs: 15 to 25%. Deletivo humiditu: 45 to 75%. Atmospheric pri		Solder resist		

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.



Specifications and Test Methods

lo.	lt∈	em	Specifications	Test Method			
12	2 Deflection		No cracking or marking defects should occur. $\begin{array}{c c} & & & & & & & & & & & & & & & & & & &$	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2. Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. $\frac{20^{50} \text{ Pressurizing}}{\text{speed : 1.0mm/s}} + \frac{1000 \text{ Pressurize}}{\text{Flexure=1}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Flexure=1}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Flexure=1}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Flexure=1}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Flexure=1}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Flexure=1}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Flexure=1}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Flexure=1}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Flexure=1}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Pressurize}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Pressurize}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Pressurize}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Pressurize}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + \frac{1000 \text{ Pressurize}}{\text{Pressurize}} + \frac{1000 \text{ Pressurize}}{\text{(in mm)}} + 1000$			
13	3 Solderability of Termination		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder			
		Appearance	No marking defects	Preheat the capacitor as table.			
		Capacitance Change	Within ±10%	 Immerse the capacitor in solder solution at 260±5°C for 10±1 sec. Let sit at room condition* for 24±2 hrs., then measure. Immersing speed: 25±2.5mm/s Pretreatment 			
		D.F.	0.025 max.				
14	Resistance to Soldering	I.R.	More than 1,000MΩ	Perform a heat treatment at 150 ± 18 ℃ for 60±5 min. and then let sit for 24±2 hrs. at room condition*.			
		Dielectric Strength	In accordance with item No.4	Step Temperature Time 1 100 to 120°C 1 min. 2 170 to 200°C 1 min.			
		Appearance	No marking defects	Fix the capacitor to the supporting jig (glass epoxy board) shown			
		Capacitance Change	Within ±15%	 In Fig. 4. Perform the 5 cycles according to the 4 heat treatments listed in the following table. 			
		D.F.	0.05 max.	Let sit for 24±2 hrs. at room condition*, then measure.			
		I.R.	More than 3,000MΩ	Step Temperature (°C) Time (min.) 1 Min. Operating Temp.±3 30±3			
				2 Room Temp. 2 to 3 3 Max. Operating Temp.±2 30±3			
	Tananakan			4 Room Temp. 2 to 3			
15	Temperature Cycle	Dielectric Strength	In accordance with item No.4	Pretreatment Perform a heat treatment at 150 [±] ₁ 8°c for 60±5 min. and then let sit for 24±2 hrs. at room condition*.			
		Appearance	No marking defects				
	Line and the	Capacitance Change	Within ±15%	Let the capacitor sit at $40\pm2^{\circ}$ cand relative humidity of 90 to 95% for $500\pm^{24}$ hrs.			
16 (S	Humidity (Steady	D.F.	0.05 max.	Remove and let sit for 24±2 hrs. at room condition*, then measure.			
				Pretreatment			
10	State)	I.R.	More than 1,000MΩ	Perform a heat treatment at $150 \pm 10^{\circ}$ °C for 60±5 min. and then			

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page. \square



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Specifications and Test Methods

\square	Continued fr	ontinued from the preceding page.							
No.	Item		Specifications	Test Method					
		Appearance	No marking defects						
		Capacitance Change	Within ±20%	Apply 110% of the rated voltage for $1,000 \pm 48$ hrs. at maximum operating temperature $\pm 3^{\circ}$ C. Remove and let sit for 24 ± 2 hrs. at room condition*, then measure.					
17	Life	D.F.	0.05 max.	The charge/discharge current is less than 50mA.					
		I.R.	More than 2,000M Ω	Pretreatment Apply test voltage for 60±5 min. at test temperature.					
		Dielectric Strength	In accordance with item No.4	Remove and let sit for 24 ± 2 hrs. at room condition*.					

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



Chip Monolithic Ceramic Capacitors



Only for Camera Flash Circuit

Features

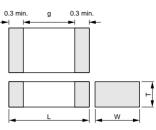
- 1. Suitable for the trigger of the flash circuit, because real capacitance is stable during operating voltage.
- 2. The thin type fit for thinner camera.
- 3. Sn-plated external electrodes realizes good solderability.
- 4. For flow and reflow soldering

Applications

For strobe circuit

Do not use these products in any Automotive Power train or Safety equipment including Battery charger for Electric Vehicles and Plug-in Hybrid. Only Murata products clearly stipulated as Ågfor Automotive useÅh on its catalog can be used for automobile applications such as Power train and Safety equipment.

|--|



Dort Number	Dimensions (mm)					
Part Number	L	W	Т	g min.		
GR731A			1.0 +0, -0.3			
GR731B	3.2 ±0.2	1.6 ±0.2	1.25 +0, -0.3	1.2		
GR731C			1.6 ±0.2			

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GR731AW0BB103KW01D	DC350	-	10000 ±10%	3.2	1.6	1.0	1.2	0.3 min.
GR731AW0BB153KW01D	DC350	-	15000 ±10%	3.2	1.6	1.0	1.2	0.3 min.
GR731BW0BB223KW01L	DC350	-	22000 ±10%	3.2	1.6	1.25	1.2	0.3 min.
GR731BW0BB333KW01L	DC350	-	33000 ±10%	3.2	1.6	1.25	1.2	0.3 min.
GR731CW0BB473KW03L	DC350	-	47000 ±10%	3.2	1.6	1.6	1.2	0.3 min.



Specifications and Test Methods

No.	Ite	Item Specifications		Test Method
1	Operating Temperatu	ire Range	_55 to +125℃	_
2	Appearan	ice	No defects or abnormalities	Visual inspection
3	Dimensio	ns	Within the specified dimensions	Using calipers
4	Dielectric	Strength	No defects or abnormalities	No failure should be observed when DC500V is applied between the terminations for 1 to 5 sec., provided the charge/discharge current is less than 50mA.
5	Insulation F (I.R.)	Resistance	C≧0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ	The insulation resistance should be measured with DC250 \pm 50V and within 60 \pm 5 sec. of charging.
6	Capacitar	nce	Within the specified tolerance	
7	Dissipatio Factor (D		0.025 max.	The capacitance/D.F. should be measured at a frequency of 1±0.2kHz and a voltage of AC1±0.2V(r.m.s.)
				The capacitance measurement should be made at each step specified in Table.
8	Capacitance Temperature Characteristics		Cap. Change Within ±10% (Apply DC350V bias) Within ±33% (No DC bias) (Temp. Range : −55 to +125℃)	StepTemperature (°C)1 25 ± 2 2Min. Operating Temp. ± 3 3 25 ± 2 4Max. Operating Temp. ± 2 5 25 ± 2 • PretreatmentPerform a heat treatment at $150 \pm 9_{O}$ °C for 60 ± 5 min. and thenlet sit for 24 ± 2 hrs. at room condition*.
9	Adhesive Strength of Termination		No removal of the terminations or other defect should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1. Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. $\qquad \qquad $
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board).
		Capacitance	Within the specified tolerance	The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied
10	Vibration Resistance	D.F.	0.025 max.	uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).

* "Room condition" Temperature: 15 to 35°c, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



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Specifications and Test Methods

lo.	Ite	em	Specifications	Test Method			
11	Deflection		No cracking or marking defects should occur. $\begin{array}{c c} & & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline & & & &$	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2. Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. $\underbrace{20_{50}}_{\text{Pressurize}} \underbrace{10 \text{ mm/s}}_{\text{pressurize}} \underbrace{10 \text{ mm/s}}_{\text{Flexure=1}} \underbrace{10 \text{ mm/s}}_{\text{(in mm)}}$ Fig. 3			
12	Solderabi Terminati	2	75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder			
		Appearance	No marking defects				
		Capacitance Change	Within ±10%	Preheat the capacitor at 120 to 150°C° for 1 min. Immerse the capacitor in solder solution at 260±5°C for 10±1			
13	Resistance to Soldering Heat	D.F.	0.025 max.	sec. Let sit at room condition* for 24±2 hrs., then measure. Immersing speed: 25±2.5mm/s			
		I.R.	C≧0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ	•Pretreatment Perform a heat treatment at 150 ± 18 °C for 60±5 min. and then let sit for 24±2 hrs. at room condition*.			
		Dielectric Strength	In accordance with item No.4				
		Appearance	No marking defects	Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig. 4.			
		Capacitance Change	Within ±7.5%	Perform the 5 cycles according to the 4 heat treatments listed in the following table.			
		D.F.	0.025 max.	Let sit for 24±2 hrs. at room condition*, then measure.			
		I.R.	C≧0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ	Step Temperature (°c) Time (min.) 1 Min. Operating Temp.±3 30±3			
				2 Room Temp. 2 to 3			
				3 Max. Operating Temp.±2 30±3 4 Room Temp. 2 to 3			
14	Temperature Cycle			A Room Temp. 2 to 3 Pretreatment Perform a heat treatment at 150 ± 18 °C for 60±5 min. and then let sit for 24±2 hrs. at room condition*.			
		Appearance	No marking defects				
		Capacitance Change	Within ±15%	Let the capacitor sit at $40\pm2^{\circ}$ C and relative humidity of 90 to 95% for $500\pm^{23}$ hrs.			
15	Humidity	D.F.	0.05 max.	Remove and let sit for 24±2 hrs. at room condition*, then			
15	(Steady State)	I.R.	C≧0.01μF: More than 10MΩ ∙ μF C<0.01μF: More than 1,000MΩ	 _ measure. •Pretreatment Perform a heat treatment at 150[±]₁⁰^o^c for 60±5 min. and then 			
		Dielectric Strength	In accordance with item No.4	let sit for 24 ± 2 hrs. at room condition*.			

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



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Specifications and Test Methods

Continued from the preceding page.

No.	. Item		Specifications	Test Method		
16		Appearance No marking defects				
		Capacitance Change	Within ±15%	Apply DC350V for 1,000 \pm ⁴⁸ hrs. at maximum operating temperature \pm 3°C. Remove and let sit for 24 \pm 2 hrs. at room		
	Life	D.F.	0.05 max.	condition*, then measure. The charge/discharge current is less than 50mA.		
	Life	I.R.	C≥0.01µF: More than 10MΩ • µF C<0.01µF: More than 1,000MΩ	•Pretreatment Apply test voltage for 60±5 min. at test temperature.		
		Dielectric Strength	In accordance with item No.4	Remove and let sit for 24±2 hrs. at room condition*.		
		Appearance	No marking defects			
		Capacitance Change	Within ±15%	Apply the rated voltage at $40\pm2^{\circ}$ and relative humidity of 90 to 95% for $500\pm^{24}$ hrs.		
17	Humidity	D.F.	0.05 max.	Remove and let sit for 24±2 hrs. at room condition*, then measure.		
17	Loading	I.R.	C≥0.01µF: More than 10MΩ • µF C<0.01µF: More than 1,000MΩ	Pretreatment Apply test voltage for 60±5 min. at test temperature.		
		Dielectric Strength	In accordance with item No.4	Remove and let sit for 24±2 hrs. at room condition*.		

* "Room condition" Temperature: 15 to 35°c, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



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Chip Monolithic Ceramic Capacitors



AC250V (r.m.s.) Type (Which Meet Japanese Law)

Features

- 1. Chip monolithic ceramic capacitor for AC lines.
- A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
- 3. Sn-plated external electrodes realizes good solderability.
- 4. Only for reflow soldering
- 5. Capacitance 0.01 to 0.1uF for connecting lines and 470 to 4700pF for connecting lines to earth.

Applications

Noise suppression filters for switching power supplies, telephones, facsimiles, modems.

Do not use these products in any Automotive Power train or Safety equipment including Battery charger for Electric Vehicles and Plug-in Hybrid. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as Power train and Safety equipment.

Reference Standard

GA2 series obtains no safety approval. This series is based on the standards of the electrical appliance and material safety law of Japan (separated table 4).





	Dime							
	Dime	Dimensions (mm)						
L	W	Т	e min.	g min.				
4.5 ±0.3	2.0 ±0.2	1.5 +0, -0.3						
4 5 +0 4	2 2 4 0 2	2.0 +0, -0.3	0.2	2.5				
4.5 ±0.4	3.2 ±0.3	1.5 +0, -0.3	0.3					
5.7 ±0.4	5.0 ±0.4	2.0 +0, -0.3		3.2				
	4.5 ±0.4	4.5 ±0.3 2.0 ±0.2 4.5 ±0.4 3.2 ±0.3	$\begin{array}{c} 4.5 \pm 0.3 \\ 4.5 \pm 0.4 \\ 3.2 \pm 0.3 \\ \hline \end{array} \begin{array}{c} 2.0 \pm 0.2 \\ 3.2 \pm 0.3 \\ \hline 1.5 \pm 0, -0.3 \\ \hline 1.5 \pm 0, -0.3 \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA242QR7E2471MW01L	AC250 (r.m.s.)	X7R (EIA)	470pF ±20%	4.5	2.0	1.5	2.5	0.3 min.
GA242QR7E2102MW01L	AC250 (r.m.s.)	X7R (EIA)	1000pF ±20%	4.5	2.0	1.5	2.5	0.3 min.
GA243QR7E2222MW01L	AC250 (r.m.s.)	X7R (EIA)	2200pF ±20%	4.5	3.2	1.5	2.5	0.3 min.
GA243QR7E2332MW01L	AC250 (r.m.s.)	X7R (EIA)	3300pF ±20%	4.5	3.2	1.5	2.5	0.3 min.
GA243DR7E2472MW01L	AC250 (r.m.s.)	X7R (EIA)	4700pF ±20%	4.5	3.2	2.0	2.5	0.3 min.
GA243QR7E2103MW01L	AC250 (r.m.s.)	X7R (EIA)	10000pF ±20%	4.5	3.2	1.5	2.5	0.3 min.
GA243QR7E2223MW01L	AC250 (r.m.s.)	X7R (EIA)	22000pF ±20%	4.5	3.2	1.5	2.5	0.3 min.
GA243DR7E2473MW01L	AC250 (r.m.s.)	X7R (EIA)	47000pF ±20%	4.5	3.2	2.0	2.5	0.3 min.
GA255DR7E2104MW01L	AC250 (r.m.s.)	X7R (EIA)	0.10μF ±20%	5.7	5.0	2.0	3.2	0.3 min.



Specifications and Test Methods

No.	Ite	m	Specifications	Test Method
1	Operating Temperatu	ure Range	_55 to +125℃	_
2	Appearar	nce	No defects or abnormalities	Visual inspection
3	Dimensio	ns	Within the specified dimensions	Using calipers
4	Dielectric Strength		No defects or abnormalities	No failure should be observed when voltage in table is applied between the terminations for 60±1 sec., provided the charge/discharge current is less than 50mA. Nominal Capacitance Test Voltage C≥10,000pF AC575V (r.m.s.) C<10,000pF
5	Insulation F (I.R.)	Resistance	More than 2,000MΩ	The insulation resistance should be measured with DC500±50V and within 60±5 sec. of charging.
6	Capacita	nce	Within the specified tolerance	
7	Dissipatio Factor (D	on	0.025 max.	The capacitance/D.F. should be measured at a frequency of 1 ± 0.2 kHz and a voltage of AC1 ± 0.2 V (r.m.s.)
8	Capacitance		Cap. Change Within ±15% (Temp. Range: −55 to +125℃)	The capacitance measurement should be made at each step specified in Table. Step Temperature (°C) 1 25±2 2 Min. Operating Temp.±3 3 25±2 4 Max. Operating Temp.±2 5 25±2
				•Pretreatment Perform a heat treatment at $150 \pm_{10}^{\circ}$ °C for 60±5 min. and then let sit for 24±2 hrs. at room condition*.
9	Discharge Test (Application: Nominal Capacitance C<10,000pF)	Test (Application: Nominal Capacitance		As in Fig., discharge is made 50 times at 5 sec. intervals from the capacitor (Cd) charged at DC voltage of specified. $\begin{array}{c} R3 \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline \\ $
10	0 Adhesive Strength of Termination		No removal of the terminations or other defects should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1. Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board).
		Capacitance	Within the specified tolerance	The capacitor should be subjected to a simple harmonic motion
11	Vibration Resistance	D.F.	0.025 max.	having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).
				E2 E2 E2 E2 E2 E2 E2 E2 F2 F2 F2 Cu Glass Epoxy Board Cu Glass Epoxy Board

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



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Specifications and Test Methods

			Test Method		
		No cracking or marking defects should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2. Then apply a force in the direction shown in Fig. 3. The solderin		
2 Deflection		$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	should be done using the reflow method and should be conducted with care so that the soldering is uniform and free defects such as heat shock. $\underbrace{\begin{array}{c} 20 & 50 \\ \text{Pressurizing} \\ \text{Pressurize} \\ \hline \\ 00 & 00 \\ \text{Capacitance meter} \\ 45 & (in mm) \\ \hline \\ \text{Fig. 3} \\ \end{array}}$		
			Immerse the capacitor in a solution of ethanol (JIS-K-8101) and		
3 Solderability of Termination		75% of the terminations are to be soldered evenly and continuously.	rosin (JIS-K-5922) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder		
	Appearance	No marking defects	_		
Humidity	Capacitance Change	Within ±15%	The capacitor should be subjected to 40±2℃, relative humidit		
Insulation	D.F.	0.05 max.	90 to 98% for 8 hrs., and then removed in room condition* for 16 hrs. until 5 cycles.		
		More than 1,000MΩ			
	Strength	In accordance with item No.4			
	Appearance	No marking defects	Preheat the capacitor as table. Immerse the capacitor in solder solution at 260±5°C for 10±1 sec. Let sit at room condition* for 24±2 hrs., then measure. •Immersing speed: 25±2.5mm/s		
	Capacitance Change	Within ±10%			
Resistance	D.F.	0.025 max.	Pretreatment		
to Soldering Heat	I.R.	More than 2,000MΩ	Perform a heat treatment at $150 \pm 18 ^{\circ}$ c for 60 ± 5 min. and then let sit for 24 ± 2 hrs. at room condition*. *Preheating		
	Dielectric	In accordance with item No.4	Step Temperature Time		
	Strength		1 100 to 120°C 1 min. 2 170 to 200°C 1 min.		
	Appearance	No marking defects	Fix the capacitor to the supporting jig (glass epoxy board) shown		
	Capacitance	Within ±15%	in Fig. 4. Perform the 5 cycles according to the 4 heat treatments listed in		
	D.F.	0.05 max.	the following table. Let sit for 24 ± 2 hrs. at room condition*, then measure.		
	I.R.	More than 2,000MΩ	Step Temperature (°C) Time (min.)		
			1 Min. Operating Temp.±3 30±3 2 Room Temp. 2 to 3		
			3 Max. Operating Temp.±2 30±3		
Temperature Cycle			4 Room Temp. 2 to 3 •Pretreatment Perform a heat treatment at 150 [±] ,1°,°C for 60±5 min. and then let sit for 24±2 hrs. at room condition*.		
	Terminati Humidity Insulation Resistance to Soldering Heat	Termination Appearance Capacitance Change D.F. I.R. Dielectric Strength Appearance Capacitance Change D.F. I.R. I.R. I.R. Dielectric Strength Appearance Capacitance Change D.F. I.R. I.R. I.R. IER ICAPACIANCE Change D.F. I.R. Dielectric Strength D.F. I.R. I.R. Dielectric D.F. I.R. I.R. I.R. I.R. I.R. I.R. I.R. I	Image: Solderability of Termination 5.7×5.0 4.5 8.0 5.6 Fig. 2 Solderability of Termination Appearance No marking defects Capacitance Within ±15% D.F. 0.05 max. IR More than 1,000MΩ Dielectric No marking defects Capacitance Within ±15% Dielectric In accordance with item No.4 Appearance No marking defects Capacitance Within ±10% D.F. 0.025 max. I.R More than 2,000MΩ Head Dielectric In accordance with item No.4 Dielectric D.F. 0.05 max. I.R More than 2,000MΩ Dielectric In accordance with item No.4 Dielectric D.05 max. <t< td=""></t<>		

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





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Specifications and Test Methods

Continued from the preceding page.

No.	Ite	Item Specifications		Test Method			
		Appearance No marking defects					
	Humidity	Capacitance Change	Within ±15%	Let the capacitor sit at 40±2℃ and relative humidity of 90 to 95% for 500 ^{±2} hrs. Remove and let sit for 24±2 hrs. at room condition*, then			
17	(Steady	D.F.	0.05 max.	measure.			
	State)	I.R.	More than 1,000MΩ	•Pretreatment Perform a heat treatment at 150^{+}_{-10} °C for 60±5 min. and then			
		Dielectric Strength	In accordance with item No.4	let sit for 24 ± 2 hrs. at room condition*.			
		Appearance	No marking defects	Apply voltage and time as Table at maximum operating temperature			
	Chi	Capacitance Change	Within ±20%	±3°C. Remove and let sit for 24±2 hrs. at room condition*, then measure. The charge / discharge current is less than 50mA.			
		D.F.	0.05 max.	Nominal Capacitance Test Time Test Voltage C≥10,000pF 1,000 ^{±4} 8 hrs. AC300V (r.m.s.)			
18	Life	I.R.	More than 1,000M Ω	C<10,000pF 1,500 ⁺⁴⁸ / ₀ hrs. AC500V (r.m.s.)*			
10	Life	Dielectric Strength In accordance with item No.4		 * Except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec. • Pretreatment Apply test voltage for 60±5 min. at test temperature. Remove and let sit for 24±2 hrs. at room condition*. 			
		Appearance	No marking defects				
		Capacitance Change	Within ±15%	Apply the rated voltage at 40±2°C and relative humidity of 90 to 95% for 500 ⁺² ⁰ / ₂ hrs. Remove and let sit for 24±2 hrs. at room condition*, then			
19	Humidity Loading	D.F.	0.05 max.	measure.			
	Loading	I.R.	More than 1,000MΩ	•Pretreatment Apply test voltage for 60±5 min. at test temperature.			
		Dielectric Strength	In accordance with item No.4	Remove and let sit for 24 ± 2 hrs. at room condition*.			

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



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Chip Monolithic Ceramic Capacitors



Safety Standard Certified Type GC (UL, IEC60384-14 Class X1/Y2)

Features

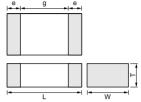
- 1. Chip monolithic ceramic capacitor (certified as conforming to safety standards) for AC lines.
- 2. A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
- Compared to lead type capacitors, this new capacitor is greatly downsized and low-profiled to 1/10 or less in volume, and 1/4 or less in height.
- 4. The type GC can be used as an X1-class and Y2-class capacitor, line-by-pass capacitor of UL1414.
- 5. +125 degree C guaranteed
- 6. Only for reflow soldering

Applications

- 1. Ideal for use as Y capacitor or X capacitor for various switching power supplies
- 2. Ideal for modem applications

Do not use these products in any Automotive Power train or Safety equipment including Battery charger for Electric Vehicles and Plug-in Hybrid. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as Power train and Safety equipment.





_	Part Number	Dimensions (mm)					
r		L	W	Т	e min.	g min.	
G	GA355D	5.7 ±0.4	5.0 ±0.4	2.0 ±0.3	0.3	4.0	

Standard Certification

	Standard No.	Class	Rated Voltage	
UL	UL1414	Line By-pass		
VDE	IEC 60384-14 EN 60384-14			
BSI	EN 60065 (14.2) IEC 60384-14 EN 60384-14	X1, Y2	AC250V (r.m.s.)	
SEMKO	IEC 60384-14 EN 60384-14			
ESTI	EN 60065 IEC 60384-14			

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA355DR7GC101KY02L	AC250 (r.m.s.)	X7R (EIA)	100 ±10%	5.7	5.0	2.0	4.0	0.3 min.
GA355DR7GC151KY02L	AC250 (r.m.s.)	X7R (EIA)	150 ±10%	5.7	5.0	2.0	4.0	0.3 min.
GA355DR7GC221KY02L	AC250 (r.m.s.)	X7R (EIA)	220 ±10%	5.7	5.0	2.0	4.0	0.3 min.
GA355DR7GC331KY02L	AC250 (r.m.s.)	X7R (EIA)	330 ±10%	5.7	5.0	2.0	4.0	0.3 min.



Chip Monolithic Ceramic Capacitors



Safety Standard Certified Type GD (IEC60384-14 Class Y3)

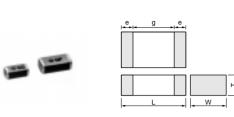
Features

- 1. Available for equipment based on IEC/EN60950 and UL1950
- 2. The type GD can be used as a Y3-class capacitor.
- 3. A new monolithic structure for small, high capacitance capable of operating at high voltage levels
- 4. +125 degree C guaranteed
- 5. Only for reflow soldering
- 6. The low-profile type (thickness: 1.5mm max.) is available. Fit for use on thinner type equipment.

Applications

- 1. Ideal for use on line filters and couplings for DAA modems without transformers
- 2. Ideal for use on line filters for information equipment

Do not use these products in any Automotive Power train or Safety equipment including Battery charger for Electric Vehicles and Plug-in Hybrid. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as Power train and Safety equipment.



Part Number	Dimensions (mm)					
Fait Number	L	W	Т	e min.	g min.	
GA342A			1.0 +0, -0.3			
GA342D	4.5 ±0.3	2.0 ±0.2	2.0 ±0.3			
GA342Q			1.5 +0, -0.3	0.3	2.5	
GA343D	4.5 ±0.4	3.2 ±0.3	2.0 +0, -0.3			
GA343Q	4.5 ±0.4	J.Z ±0.3	1.5 +0, -0.3			

Standard Certification

\backslash	Standard No.	Class	Rated Voltage	
UL	UL 60950-1			
SEMKO	IEC 60384-14 EN 60384-14	Y3	AC250V(r.m.s.)	

Applications

Size	Switching power supplies	Communication network devices such as a modem
4.5×3.2mm and under	_	O

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA342D1XGD100JY02L	AC250 (r.m.s.)	SL (JIS)	10 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGD120JY02L	AC250 (r.m.s.)	SL (JIS)	12 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGD150JY02L	AC250 (r.m.s.)	SL (JIS)	15 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGD180JY02L	AC250 (r.m.s.)	SL (JIS)	18 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGD220JY02L	AC250 (r.m.s.)	SL (JIS)	22 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342A1XGD270JW31L	AC250 (r.m.s.)	SL (JIS)	27 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD330JW31L	AC250 (r.m.s.)	SL (JIS)	33 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD390JW31L	AC250 (r.m.s.)	SL (JIS)	39 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD470JW31L	AC250 (r.m.s.)	SL (JIS)	47 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD560JW31L	AC250 (r.m.s.)	SL (JIS)	56 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD680JW31L	AC250 (r.m.s.)	SL (JIS)	68 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD820JW31L	AC250 (r.m.s.)	SL (JIS)	82 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342QR7GD101KW01L	AC250 (r.m.s.)	X7R (EIA)	100 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD151KW01L	AC250 (r.m.s.)	X7R (EIA)	150 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD221KW01L	AC250 (r.m.s.)	X7R (EIA)	220 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD331KW01L	AC250 (r.m.s.)	X7R (EIA)	330 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD471KW01L	AC250 (r.m.s.)	X7R (EIA)	470 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD681KW01L	AC250 (r.m.s.)	X7R (EIA)	680 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD102KW01L	AC250 (r.m.s.)	X7R (EIA)	1000 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD152KW01L	AC250 (r.m.s.)	X7R (EIA)	1500 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA343QR7GD182KW01L	AC250 (r.m.s.)	X7R (EIA)	1800 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GA343QR7GD222KW01L	AC250 (r.m.s.)	X7R (EIA)	2200 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GA343DR7GD472KW01L	AC250 (r.m.s.)	X7R (EIA)	4700 ±10%	4.5	3.2	2.0	2.5	0.3 min.





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Chip Monolithic Ceramic Capacitors



Safety Standard Certified Type GF (IEC60384-14 Class Y2, X1/Y2)

Features

- 1. Available for equipment based on IEC/EN60950 and UL1950. Besides, the GA352/355 types are available for equipment based on IEC/EN60065, UL1492, and UL6500
- 2. The type GF can be used as a Y2-class capacitor.
- A new monolithic structure for small, high capacitance capable of operating at high voltage levels
- 4. +125 degree C guaranteed
- 5. Only for reflow soldering
- 6. The low-profile type (thickness: 1.5mm max.) is available. Fit for use on thinner type equipment.

Applications

- 1. Ideal for use on line filters and couplings for DAA modems without transformers
- 2. Ideal for use on line filters for information equipment
- Ideal for use as Y capacitor or X capacitor for various switching power supplies (GA352/355 types only)

Do not use these products in any Automotive Power train or Safety equipment including Battery charger for Electric Vehicles and Plug-in Hybrid. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as Power train and Safety equipment.

Part Number		Dir	mensions (mm)		
Part Number	L	W	Т	e min.	g min.
GA342A			1.0 +0, -0.3		
GA342D	4.5 ±0.3	2.0 ±0.2	2.0 ±0.2*		2.5
GA342Q			1.5 +0, -0.3	0.3	
GA352Q		2.8 ±0.3	1.5 +0, -0.3	0.5	
GA355D	5.7 ±0.4	5.0 ±0.4	2.0 +0, -0.3		4.0
GA355Q		J.0 <u>1</u> 0.4	1.5 +0, -0.3		
* CA343D1V . 3	0100				

GA342D1X : 2.0±0.3

Standard Certification

$\overline{\ }$	Standard		Status of C	ertification	Rated
	No.	Class	Size : 4.5×2.0mm	Size : 5.7×2.8mm and over	Voltage
UL	UL1414	X1, Y2	_	0	
UL	UL 60950-1	—	0	-	AC250V
VDE	IEC 60384-14	X1, Y2	_	0	(r.m.s.)
SEMKO	EN 60384-14	Y2	0	0	

Applications

Size	Switching power supplies	Communication network devices such as a modem		
4.5×2.0mm	—	0		
5.7×2.8mm and over	O	0		

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA342D1XGF100JY02L	AC250 (r.m.s.)	SL (JIS)	10 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF120JY02L	AC250 (r.m.s.)	SL (JIS)	12 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF150JY02L	AC250 (r.m.s.)	SL (JIS)	15 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF180JY02L	AC250 (r.m.s.)	SL (JIS)	18 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF220JY02L	AC250 (r.m.s.)	SL (JIS)	22 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342A1XGF270JW31L	AC250 (r.m.s.)	SL (JIS)	27 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF330JW31L	AC250 (r.m.s.)	SL (JIS)	33 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF390JW31L	AC250 (r.m.s.)	SL (JIS)	39 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF470JW31L	AC250 (r.m.s.)	SL (JIS)	47 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF560JW31L	AC250 (r.m.s.)	SL (JIS)	56 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF680JW31L	AC250 (r.m.s.)	SL (JIS)	68 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF820JW31L	AC250 (r.m.s.)	SL (JIS)	82 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342QR7GF101KW01L	AC250 (r.m.s.)	X7R (EIA)	100 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GF151KW01L	AC250 (r.m.s.)	X7R (EIA)	150 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342DR7GF221KW02L	AC250 (r.m.s.)	X7R (EIA)	220 ±10%	4.5	2.0	2.0	2.5	0.3 min.
GA342DR7GF331KW02L	AC250 (r.m.s.)	X7R (EIA)	330 ±10%	4.5	2.0	2.0	2.5	0.3 min.
GA342QR7GF471KW01L	AC250 (r.m.s.)	X7R (EIA)	470 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA352QR7GF471KW01L	AC250 (r.m.s.)	X7R (EIA)	470 ±10%	5.7	2.8	1.5	4.0	0.3 min.
GA342QR7GF681KW01L	AC250 (r.m.s.)	X7R (EIA)	680 ±10%	4.5	2.0	1.5	2.5	0.3 min.



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 09.9.18

Continued from the preceding	Continued from the preceding page.							
Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA352QR7GF681KW01L	AC250 (r.m.s.)	X7R (EIA)	680 ±10%	5.7	2.8	1.5	4.0	0.3 min.
GA342DR7GF102KW02L	AC250 (r.m.s.)	X7R (EIA)	1000 ±10%	4.5	2.0	2.0	2.5	0.3 min.
GA352QR7GF102KW01L	AC250 (r.m.s.)	X7R (EIA)	1000 ±10%	5.7	2.8	1.5	4.0	0.3 min.
GA352QR7GF152KW01L	AC250 (r.m.s.)	X7R (EIA)	1500 ±10%	5.7	2.8	1.5	4.0	0.3 min.
GA355QR7GF182KW01L	AC250 (r.m.s.)	X7R (EIA)	1800 ±10%	5.7	5.0	1.5	4.0	0.3 min.
GA355QR7GF222KW01L	AC250 (r.m.s.)	X7R (EIA)	2200 ±10%	5.7	5.0	1.5	4.0	0.3 min.
GA355QR7GF332KW01L	AC250 (r.m.s.)	X7R (EIA)	3300 ±10%	5.7	5.0	1.5	4.0	0.3 min.
GA355DR7GF472KW01L	AC250 (r.m.s.)	X7R (EIA)	4700 ±10%	5.7	5.0	2.0	4.0	0.3 min.



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Chip Monolithic Ceramic Capacitors



Safety Standard Certified Type GB (IEC60384-14 Class X2)

Features

- 1. The type GB can be used as an X2-class capacitor.
- 2. Chip monolithic ceramic capacitor (certified as conforming to safety standards) for AC lines
- 3. A new monolithic structure for small, high capacitance capable of operating at high voltage levels
- 4. Compared to lead type capacitors, this new capacitor is greatly downsized and low-profiled to 1/10 or less in volume, and 1/4 or less in height.
- 5. +125 degree C guaranteed
- 6. Only for reflow soldering

Applications

Ideal for use as X capacitor for various switching power supplies

Do not use these products in any Automotive Power train or Safety equipment including Battery charger for Electric Vehicles and Plug-in Hybrid. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as Power train and Safety equipment.



e ++	<mark>∙ ^g ⊦</mark>	e +	
-			

			=				
Part Number	Dimensions (mm)						
Part Number	L	W	Т	e min.	g min.		
GA355Q			1.5 +0,-0.3				
GA355D	5.7 ±0.4	5.0 ±0.4	2.0 +0,-0.3	1 1 2	3.0		
GA355E	5.7 <u>±</u> 0.4		2.5 +0,-0.3				
GA355X			2.9 +0,-0.4				

Standard Certification

	Standard No.	Class	Rated Voltage
VDE			
SEMKO	IEC 60384-14 EN 60384-14	X2	AC250V (r.m.s.)
ESTI			

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA355QR7GB103KW01L	AC250 (r.m.s.)	X7R (EIA)	10000 ±10%	5.7	5.0	1.5	3.0	0.3 min.
GA355QR7GB153KW01L	AC250 (r.m.s.)	X7R (EIA)	15000 ±10%	5.7	5.0	1.5	3.0	0.3 min.
GA355DR7GB223KW01L	AC250 (r.m.s.)	X7R (EIA)	22000 ±10%	5.7	5.0	2.0	3.0	0.3 min.
GA355ER7GB333KW01L	AC250 (r.m.s.)	X7R (EIA)	33000 ±10%	5.7	5.0	2.5	3.0	0.3 min.
GA355ER7GB473KW01L	AC250 (r.m.s.)	X7R (EIA)	47000 ±10%	5.7	5.0	2.5	3.0	0.3 min.
GA355XR7GB563KW06L	AC250 (r.m.s.)	X7R (EIA)	56000 ±10%	5.7	5.0	2.9	3.0	0.3 min.



GA3 Series Specifications and Test Methods

No.	Ite	em	Specifications	Test Method
1	Operating Temperatu	ire Range	_55 to +125℃	_
2	Appearar	nce	No defects or abnormalities	Visual inspection
3	Dimensio	ns	Within the specified dimensions	Using calipers
4	Dielectric	Strength	No defects or abnormalities	No failure should be observed when voltage in table is applied between the terminations for 60±1 sec., provided the charge/discharge current is less than 50mA. Image: Comparison of the comparison of the charge/discharge current is less than 50mA. Image: Comparison of the c
5	Pulse Vol (Applicati GD/GF)		No self healing breakdowns or flash-overs have taken place in the capacitor.	10 impulse of alternating polarity is subjected. (5 impulse for each polarity) The interval between impulse is 60 sec. Applied Voltage: 2.5kV zero to peak
6	Insulation F (I.R.)	Resistance	More than $6,000M\Omega$	The insulation resistance should be measured with DC500 \pm 50V and within 60 \pm 5 sec. of charging.
7	Capacita	nce	Within the specified tolerance	
8	Dissipatio Factor (D Q		$\begin{tabular}{ c c c c c } \hline Char. & Specification \\ \hline X7R & D.F. \le 0.025 \\ \hline SL & Q \ge 400 + 20C^{*2} (C < 30 pF) \\ \hline Q \ge 1000 & (C \ge 30 pF) \\ \hline \end{tabular}$	The capacitance/Q/D.F. should be measured at a frequency of 1 ± 0.2 kHz (SL char.: 1 ± 0.2 MHz) and a voltage of AC1 ±0.2 V (r.m.s.)
9	Capacitance Temperature Characteristics		Char. Capacitance Change X7R Within ±15% Temperature characteristic guarantee is -55 to +125°C Char. Temperature Coefficient SL +350 to -1000ppm/°C Temperature characteristic guarantee is +20 to +85°C	The capacitance measurement should be made at each step specified in Table. Step Temperature (°C) 1 25±2 (20±2 for SL char.) 2 Min. Operating Temp.±3 3 25±2 (20±2 for SL char.) 4 Max. Operating Temp.±2 5 25±2 (20±2 for SL char.) SL char. : The capacitance should be measured at even 85°C between step 3 and step 4. •Pretreatment for X7R char. Perform a heat treatment at 150±18°C for 60±5 min. and then let sit for 24±2 hrs. at room condition*1.
		Appearance	No defects or abnormalities	As in Fig., discharge is made 50 times at 5 sec. intervals from
10	I.R. More than 1,000MΩ			the capacitor (Cd) charged at DC voltage of specified.
11	Adhesive of Termin	-	No removal of the terminations or other defect should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1. Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.

*1 "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

*2 "C" expresses nominal capacitance value (pF).



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GA3 Series Specifications and Test Methods

Continued from the preceding page.

lo.	Ite	em	Specifications	Test Method
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board). The capacitor should be subjected to a simple harmonic motion
12	Vibration Resistance	D.F. Q	Within the specified toleranceChar.SpecificationX7RD.F. ≤ 0.025 Q $\geq 400+20C^{*2}$ (C<30pF)	having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).
13	Deflection	n	No cracking or marking defects should occur. $\begin{array}{c c} & & & & & & & & & & & & & & & & & & &$	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2. Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. $\underbrace{\begin{array}{c}20 & 50 \\ Pressurize \\ Flexure=1 \\ (in mm) \\ Fig. 3\end{array}}$
14	Solderabi Terminati		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion).Immerse in solder solution for 2±0.5 sec.Immersing speed: 25±2.5mm/sTemp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder
		Appearance	No marking defects	Preheat the capacitor as table. Immerse the capacitor in solder
15	Resistance to Soldering Heat	Capacitance Change	Char. Capacitance Change X7R Within ±10% SL Within ±2.5% or ±0.25pF (Whichever is larger)	 solution at 260±5°C for 10±1 sec. Let sit at room condition*' for 24±2 hrs., then measure. Immersing speed: 25±2.5mm/s Pretreatment for X7R char. Perform a heat treatment at 150±18°C for 60±5 min. and then let sit for 24±2 hrs. at room condition*'.
	Ticut	I.R. Dielectric	More than 1,000MΩ	*Preheating Step Temperature Time
		Strength	In accordance with item No.4	1 100 to 120°C 1 min. 2 170 to 200°C 1 min.

*1 "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

*2 "C" expresses nominal capacitance value (pF).



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GA3 Series Specifications and Test Methods

Continued from the preceding page Specifications No Item Test Method Appearance No marking defects Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig. 4. Char Capacitance Change Perform the 5 cycles according to the 4 heat treatments listed in the following table. Capacitance X7R Within ±15% Change Within ±2.5% or ±0.25pF Let sit for 24±2 hrs. at room condition*1, then measure SI (Whichever is larger) Step Temperature (°C) Time (min.) Min. Operating Temp.±3 30±3 1 Char. 2 Room Temp. 2 to 3 Specification 3 Max. Operating Temp.±2 30±3 D.F. X7R D.F.≦0.05 4 Room Temp 2 to 3 Q≥400+20C*2 (C<30pF) Q Temperature SL 16 Q≧1000 (C≧30pF) Cycle Pretreatment for X7R char. Perform a heat treatment at 150⁺_{−10} °C for 60±5 min. and then I.R. More than 3.000MΩ let sit for 24±2 hrs. at room condition*1. <u>1</u>27 Dielectric Strength In accordance with item No.4 Solder resist - Cu Glass Epoxy Board Fig. 4 Appearance No marking defects Char Capacitance Change Before this test, the test shown in the following is performed. Capacitance X7R Within ±15% Item 11 Adhesive Strength of Termination (applied force is 5N) Within ±5.0% or ±0.5pF Change ·Item 13 Deflection SL (Whichever is larger) Let the capacitor sit at 40±2°C and relative humidity of 90 to 95% Humidity for 500^{+24}_{-20} hrs. (Steady Char Specification 17 State) D.F. X7R D.F.≦0.05 Remove and let sit for 24±2 hrs. at room condition*1, then Q≥275+5/2C*2 (C<30pF) 0 measure SL Q≧350 (C≧30pF) Pretreatment for X7R char. Perform a heat treatment at $150 \pm 18^{\circ}$ C for 60 ± 5 min, and then I.R. More than 3,000MΩ let sit for 24±2 hrs. at room condition*1. Dielectric In accordance with item No.4 Strenath Before this test, the test shown in the following is performed. Appearance No marking defects Item 11 Adhesive Strength of Termination (apply force is 5N) Item 13 Deflection Char. **Capacitance Change** Capacitance Within ±20% X7R Front time (T1)=1.2µs=1.67T Impulse Voltage Change Within ±3.0% or ±0.3pF Time to half-value (T2)=50us SI Each individual capacitor should (Whichever is larger) be subjected to a 2.5kV (Type 50 GC/GF: 5kV) Impulse (the Char. Specification 30 voltage value means zero to D.F. D.F.≦0.05 X7R peak) for three times. Then the Q≥275+5/2C*2 (C<30pF) Q T1 capacitors are applied to life test. SL T2 Q≧350 (C≧30pF) Apply voltage as Table for 1,000 hrs. at 125 ±2 ℃, relative Life 18 humidity 50% max. I.R. More than 3,000MΩ Туре Applied Voltage AC312.5V (r.m.s.), except that once each hour the GB voltage is increased to AC1,000V (r.m.s.) for 0.1 sec. GC AC425V (r.m.s.), except that once each hour the GD Dielectric voltage is increased to AC1,000V (r.m.s.) for 0.1 sec. In accordance with item No.4 GF Strength Let sit for 24±2 hrs. at room condition*1, then measure. Pretreatment for X7R char. Perform a heat treatment at 150[±]₁8℃ for 60±5 min. and then let sit for 24±2 hrs. at room condition*1.

*1 "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

*2 "C" expresses nominal capacitance value (pF).



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GA3 Series Specifications and Test Methods

	Continued from the preceding page.							
No.	lt∈	Item Specifications		Test Method				
		Appearance Capacitance Change	No marking defects Char. Capacitance Change X7R Within ±15% SL Within ±5.0% or ±0.5pF (Whichever is larger)	Before this test, the test shown in the following is performed. Item 11 Adhesive Strength of Termination (apply force is 5N) Item 13 Deflection				
19	Humidity Loading	D.F. Q	$\begin{tabular}{ c c c c c } \hline Char. & Specification \\ \hline X7R & D.F. \le 0.05 \\ \hline SL & $Q \ge 275 + 5/2C^{*2}$ (C < 30pF) \\ $Q \ge 350$ (C \ge 30pF) $ \end{tabular}$	Apply the rated voltage at $40\pm2^{\circ}$ C and relative humidity of 90 to 95% for $500\pm^{2}$ hrs. Remove and let sit for 24 ± 2 hrs. at room condition ^{*1} , then measure. •Pretreatment for X7R char. Perform a heat treatment at $150\pm_{10}^{10}$ C for 60 ± 5 min. and then				
		I.R.	More than 3,000MΩ	let sit for 24±2 hrs. at room condition*1.				
		Dielectric Strength	In accordance with item No.4					
20	20 Active Flammability		The cheesecloth should not be on fire.	The capacitor should be individually wrapped in at least one but not more than two complete layers of cheesecloth. The capacitor should be subjected to 20 discharges. The interval between successive discharges should be 5 sec. The UAC should be maintained for 2 min. after the last discharge. $I_1 + I_2 + I_1 + I_2$				
21	21 Passive Flammability		The burning time should not exceed 30 sec. The tissue paper should not ignite.	The capacitor under test should be held in the flame in the position which best promotes burning. Each specimen should only be exposed once to the flame. Time of exposure to flame: 30 sec. Length of flame : 12±1mm Gas burner : Length 35mm min. Inside Dia. 0.5±0.1mm Outside Dia. 0.9mm max. Gas : Butane gas Purity 95% min.				

*1 "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

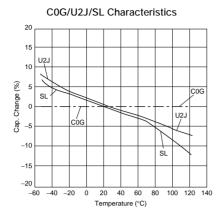
*2 "C" expresses nominal capacitance value (pF).



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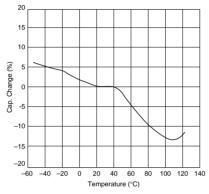
GRM/GR4/GR7/GA2/GA3 Series Data (Typical Example)

■ Capacitance - Temperature Characteristics

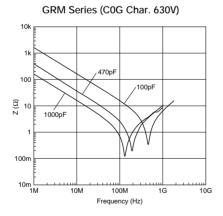


X7R Characteristics 30 20 X7R Char. Spec.(upper) 10 (%) . Change (Cap. -10 X7R Char. S -20 -30 -60 -40 -20 0 20 40 60 80 100 120 140 Temperature (°C)

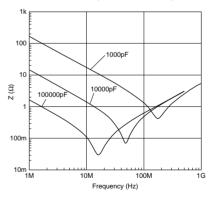




■ Impedance - Frequency Characteristics



GRM Series (X7R Char. 250V)



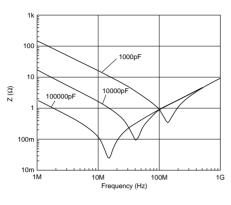


GRM/GR4/GR7/GA2/GA3 Series Data (Typical Example)

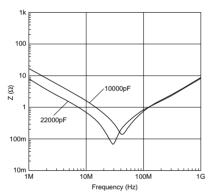
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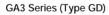
■ Impedance - Frequency Characteristics

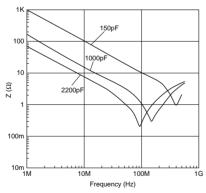
GRM Series (X7R Char. 630V)

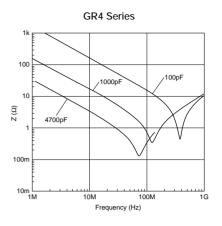




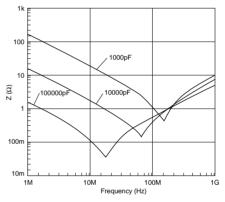




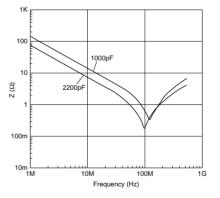








GA3 Series (Type GF)



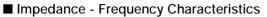
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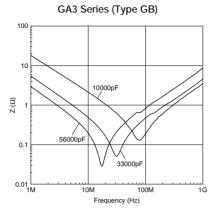


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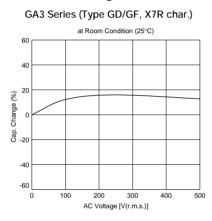
GRM/GR4/GR7/GA2/GA3 Series Data (Typical Example)

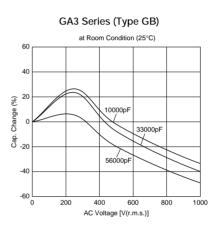
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■ Capacitance - AC Voltage Characteristics







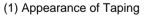
Package

Taping is standard packaging method.

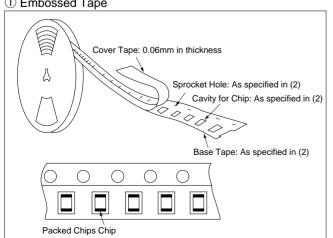
Minimum Quantity Guide

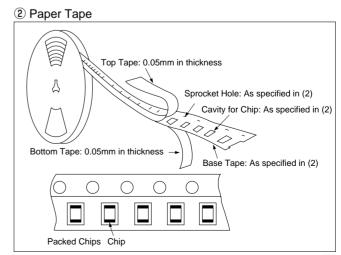
Dort Nu	Part Number		Dimensions (mm	ı)	Quantity (pcs.) ø180mm Reel		
Part Nu	mper		10/			1	
	0.000	L	W	T	Paper Tape	Embossed Tape	
	GRM18	1.6	0.8	0.8	4,000	-	
	GRM21	2.0	1.25	1.0	4,000	-	
				1.25	-	3,000	
	00000000000			1.0	4,000	-	
	GRM31/GR731	3.2	1.6	1.25	-	3,000	
				1.6	-	2,000	
				1.0	4,000	-	
	GRM32	3.2	2.5	1.25	-	3,000	
/ledium Voltage				1.5	-	2,000	
				2.0	-	1,000	
	000000000000		2.0	1.0	-	3,000	
	GRM42/GR442	4.5		1.5	-	2,000	
				2.0	-	2,000	
	GRM43/GR443	4.5	3.2	1.5	-	1,000	
				2.0	-	1,000	
				2.5	-	500	
	GRM55/GR455	5.7	5.0	2.0	-	1,000	
	GA242	4.5	2.0	1.5	-	2,000	
AC250V	GA243	4.5	3.2	1.5	-	1,000	
				2.0	-	1,000	
	GA255	5.7	5.0	2.0	-	1,000	
		4.5	2.0	1.0	-	3,000	
	GA342			1.5	-	2,000	
				2.0	-	2,000	
	GA343	4.5	3.2	1.5	-	1,000	
Safety Std.		т.5	0.2	2.0	-	1,000	
Certification	GA352	5.7	2.8	1.5	-	1,000	
2 St Milduron				1.5	-	1,000	
				2.0	-	1,000	
	GA355	5.7	5.0	2.5	-	500	
				2.7	-	500	
				2.9	-	500	

■ Tape Carrier Packaging



① Embossed Tape





203

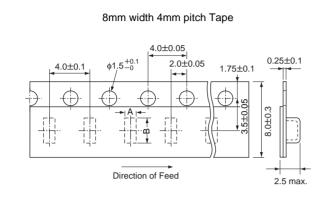


Package

Continued from the preceding page.

(2) Dimensions of Tape

① Embossed Tape



Part Number	A*	B*
GRM21 (T≧1.25mm)	1.45	2.25
GRM31/GR731 (T≧1.25mm)	2.0	3.6
GRM32 (T≧1.25mm)	2.9	3.6
		*Nominal Value

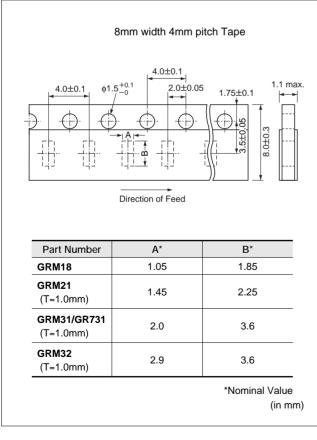
12mm width 8mm/4mm pitch Tape						
01.5 ^{+0.1} 01.5 ^{+0.1} 01.5 ^{+0.1} 01.5 ^{+0.1} 1.75±0.1 0 0 0 0 0 0 0 0 0 0 0 0 0	0.3±0.1					
Direction of Feed	→ 3.7 max.					

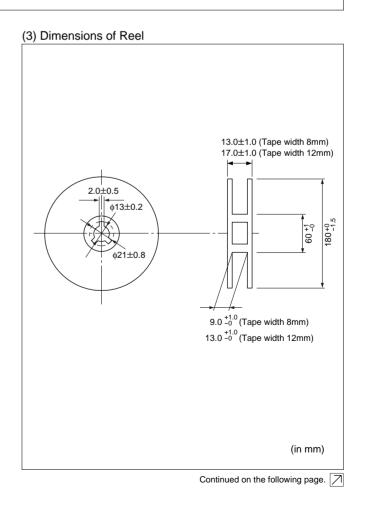
Part Number	A*	B*
GRM42/GR442/GA242/GA342	2.5	5.1
GRM43/GR443/GA243/GA343	3.6	4.9
GA352	3.2	6.1
GRM55/GR455/GA255/GA355	5.4	6.1

*1 4.0±0.1mm in case of GRM42/GR442/GA242/GA342 *Nominal Value

(in mm)



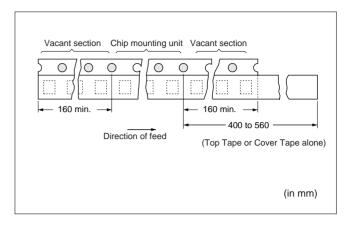


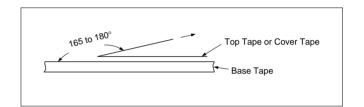




Package

- Continued from the preceding page.
- (4) Taping Method
 - Tapes for capacitors are wound clockwise. The sprocket holes are to the right as the tape is pulled toward the user.
 - ② Part of the leader and part of the empty tape should be attached to the end of the tape as shown at right.
 - ③ The top tape or cover tape and base tape are not attached at the end of the tape for a minimum of 5 pitches.
 - ④ Missing capacitors number within 0.1% of the number per reel or 1 pc, whichever is greater, and are not continuous.
 - (5) The top tape or cover tape and bottom tape should not protrude beyond the edges of the tape and should not cover sprocket holes.
 - (6) Cumulative tolerance of sprocket holes, 10 pitches: ± 0.3 mm.
 - $\ensuremath{\overline{\mathcal{O}}}$ Peeling off force: 0.1 to 0.6N in the direction shown at right.







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Caution

Storage and Operating Conditions

Operating and storage environment Do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture. Before cleaning, bonding or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment. Store the capacitors where the temperature and relative humidity do not exceed 5 to 40 degrees centigrade and 20 to 70%.

■ Handling

- 1. Vibration and impact
 - Do not expose a capacitor to excessive shock or vibration during use.
- 2. Do not directly touch the chip capacitor, especially the ceramic body. Residue from hands/fingers may create a short circuit environment.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED. Use capacitors within 6 months after delivered. Check the solderability after 6 months or more.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.



Caution

■ Caution (Rating)

1. Operating Voltage

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the Vp-p value of the applied voltage or the Vo-p which contains DC bias within the rated voltage range.

When the voltage is applied to the circuit, starting or stopping may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

When DC-rated capacitors are to be used in input circuits from commercial power source (AC filter), be sure to use Safety Certified Capacitors because various regulations on withstand voltage or impulse withstand established for each equipment should be taken into considerations.

Voltage	DC Voltage	DC+AC Voltage	AC Voltage	Pulse Voltage (1)	Pulse Voltage (2)
Positional Measurement	Vo-p	Vo-p	Vp-p	Vp-p	Vp-p

- Operating Temperature, Self-generated Heat, and Load Reduction at High-frequency Voltage Condition Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a highfrequency voltage, pulse voltage, it may self-generate heat due to dielectric loss.
- (1) In case of X7R char.

Applied voltage should be the load such as selfgenerated heat is within 20°C on the condition of atmosphere temperature 25°C. When measuring, use a thermocouple of small thermal capacity -K of ø0.1mm in conditions where the capacitor is not affected by radiant heat from other components or surrounding ambient fluctuations. Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)



Continued from the preceding page.

(2) In case of C0G, U2J char.

Due to the low self-heating characteristics of lowdissipation capacitors, the allowable electric power of these capacitors is generally much higher than that of X7R characteristic capacitors.

When a high frequency voltage which cause 20°C self heating to the capacitor is applied, it will exceed capacitor's allowable electric power.

The frequency of the applied sine wave voltage should be less than 500kHz (less than 100kHz in case of rated voltage: DC3.15kV). The applied voltage should be less than the value shown in figure below.

While, in case of non-sine wave which include a harmonic frequency, please contact our sales representatives or product engineers. Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

<C0G char., Rated Voltage: DC3.15kV>

The capacitors less than 22pF can be applied maximum 4.0kV peak to peak at 100kHz or less only for the ballast or the resonance usage in the LCD backlight inverter circuit.

<Capacitor Selection Tool>

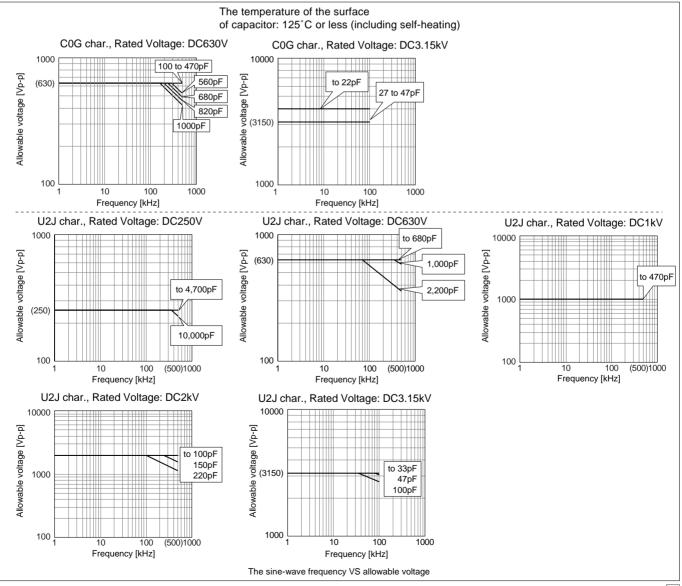
We are also offering free software the "capacitor selection tool: Murata Medium Voltage Capacitors Selection Tool by Voltage Form (*)" which will assist you in selecting a suitable capacitor.

The software can be downloaded from Murata's Internet Website.

(http://www.murata.com/designlib/mmcsv_e.html). By inputting capacitance values and applied voltage waveform of the specific capacitor series, this software will calculate the capacitor's power consumption and list suitable capacitors (non-sine wave is also available).

* Subject series are below.

· Temperature Characteristics C0G, U2J



Continued on the following page.



Continued from the preceding page.

3. Fail-safe

Failure of a capacitor may result in a short circuit. Be sure to provide an appropriate fail-safe function such as a fuse on your product to help eliminate possible electric shock, fire, or fumes.

Please consider using fuses on each AC line if the capacitors are used between the AC input lines and earth (line bypass capacitors), to prepare for the worst case, such as a short circuit.

4. Test Condition for AC Withstanding Voltage

(1) Test Equipment

Tests for AC withstanding voltage should be made with equipment capable of creating a wave similar to a 50/60 Hz sine wave.

If the distorted sine wave or overload exceeding the specified voltage value is applied, a defect may be caused.

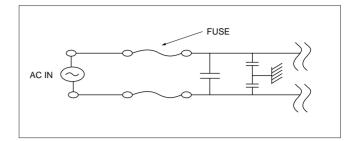
(2) Voltage Applied Method

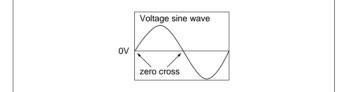
The capacitor's leads or terminals should be firmly connected to the output of the withstanding voltage test equipment, and then the voltage should be raised from near zero to the test voltage. If the test voltage is applied directly to the capacitor without raising it from near zero, it should be applied with the zero cross*. At the end of the test time, the test voltage should be reduced to near zero, and then the capacitor's leads or terminals should be taken off the output of the withstanding voltage test equipment. If the test voltage is applied directly to the capacitor without raising it from near zero, surge voltage may occur and cause a defect.

*ZERO CROSS is the point where voltage sine wave pass 0V.

- See the figure at right -

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.







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Caution (Soldering and Mounting)Vibration and Impact

Do not expose a capacitor to excessive shock or vibration during use.

 Circuit Board Material
 It is possible for the chip to crack by the expansion and shrinkage of a metal board.

 Please contact us if you want to use our ceramic capacitors on a metal board such as Aluminum.

3. Land Layout for Cropping PC Board

Choose a mounting position that minimizes the stress imposed on the chip during flexing or bending of the board. [Component Direction] [Chip Mounting Close to Board Separation Point] С Perforation Locate chip в Chip arrangement horizontal to the 0000 000 Worst A>C>B~D Best direction in which А stress acts. Slit <Example <Examples to be avoided> of improvements> \mathbb{Z} Continued on the following page.



Caution

Continued from the preceding page.

- 4. Reflow Soldering
- When sudden heat is given to the components, the mechanical strength of the components should go down because remarkable temperature change causes deformity of components inside. In order to prevent mechanical damage in the components, preheating should be required for both of the components and the PCB board. Preheating conditions are shown in Table 1. It is required to keep temperature differential between the soldering and the components surface (ΔT) as small as possible.
- Solderability of Tin plating termination chip might be deteriorated when low temperature soldering profile where peak solder temperature is below the Tin melting point is used. Please confirm the solderability of Tin plating termination chip before use.
- When components are immersed in solvent after mounting, be sure to maintain the temperature difference (ΔT) between the component and solvent within the range shown in the Table 1.

Table T

Part Number	Temperature Differential	
G18/21/31	∆T≦190℃	
G32/42/43/52/55	∆T≦130℃	

Recommended Conditions

	Pb-Sn S	Solder Lead Free So	
	Infrared Reflow	rared Reflow Vapor Reflow	
Peak Temperature	230-250°C	230-240°C	240-260°C
Atmosphere	Air	Air	Air or N2

Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu

Optimum Solder Amount for Reflow Soldering

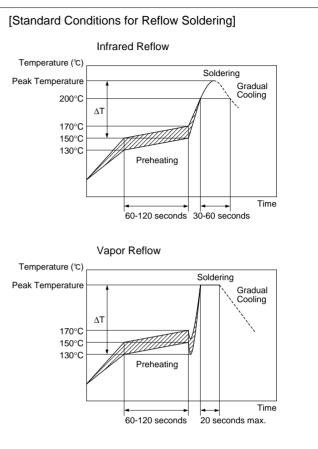
 Overly thick application of solder paste results in excessive fillet height solder.

This makes the chip more susceptible to mechanical and thermal stress on the board and may cause cracked chips.

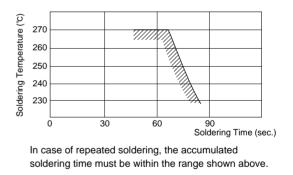
- Too little solder paste results in a lack of adhesive strength on the outer electrode, which may result in chips breaking loose from the PCB.
- Make sure the solder has been applied smoothly to the end surface to a height of 0.2mm min.

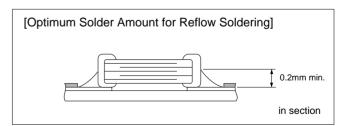
Inverting the PCB

Make sure not to impose an abnormal mechanical shock on the PCB.



[Allowable Soldering Temperature and Time]







Caution

Continued from the preceding page.

- 5. Flow Soldering
- When sudden heat is given to the components, the mechanical strength of the components should go down because remarkable temperature change causes deformity of components inside. And an excessively long soldering time or high soldering temperature results in leaching by the outer electrodes, causing poor adhesion or a reduction in capacitance value due to loss of contact between electrodes and end termination.
- In order to prevent mechanical damage in the components, preheating should be required for both of the components and the PCB board. Preheating conditions are shown in Table 2. It is required to keep temperature differential between the soldering and the components surface (ΔT) as small as possible.
- When components are immersed in solvent after mounting, be sure to maintain the temperature difference between the component and solvent within the range shown in Table 2.

Do not apply flow soldering to chips not listed in Table 2.

Table 2

Part Number	Temperature Differential	
G□□18/21/31	∆T≦150℃	

Recommended Conditions

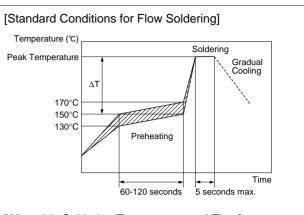
	Pb-Sn Solder	Lead Free Solder
Peak Temperature	240-250°C	250-260°C
Atmosphere	Air	N2

Pb-Sn Solder: Sn-37Pb

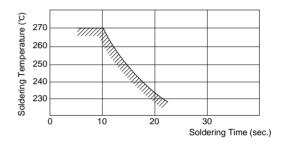
Lead Free Solder: Sn-3.0Ag-0.5Cu

Optimum Solder Amount for Flow Soldering

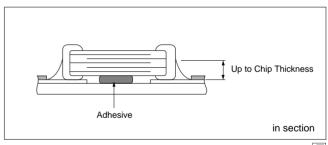
The top of the solder fillet should be lower than the thickness of components. If the solder amount is excessively big, the risk of cracking is higher during board bending or under any other stressful conditions.



[Allowable Soldering Temperature and Time]



In case of repeated soldering, the accumulated soldering time must be within the range shown above.





Continued from the preceding page.

6. Correction with a Soldering Iron

 When sudden heat is applied to the components by use of a soldering iron, the mechanical strength of the components will go down because the extreme temperature change causes deformations inside the components.

In order to prevent mechanical damage to the components, preheating is required for both the components and the PCB board.

Preheating conditions, (The "Temperature of the Soldering Iron Tip", "Preheating Temperature",

"Temperature Differential" between iron tip and the

Table 3

Part Number	Temperature of Soldering Iron tip	Preheating Temperature	Temperature Differential (∆T)	Atmosphere
G18/21/31	350°C max.	150°C min.	∆T≦190℃	air
G32/42/43/ 52/55	280°C max.	150°C min.	∆T≦130℃	air

*Applicable for both Pb-Sn and Lead Free Solder. Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu

Optimum Solder Amount when re-working Using a Soldering Iron

In case of smaller sizes than $G\square\square 18$, the top of the solder fillet should be lower than 2/3's of the thickness of the component or 0.5mm whichever is smaller.

In case of larger sizes than $G\square\square21$, the top of the solder fillet should be lower than 2/3's of the thickness of the component.

If the solder amount is excessive, the risk of cracking is higher during board bending or under any other stressful conditions.

A Soldering iron \emptyset 3mm or smaller should be used. It is also necessary to keep the soldering iron from touching the components during the re-work. Solder wire with \emptyset 0.5mm or smaller is required for soldering.

7. Washing

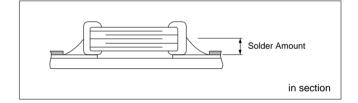
Excessive output of ultrasonic oscillation during cleaning causes PCBs to resonate, resulting in cracked chips or broken solder. Take note not to vibrate PCBs.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND FUMING WHEN THE PRODUCT IS USED. components and the PCB), should be within the conditions of table 3.

It is required to keep the temperature differential between the soldering Iron and the components surface (Δ T) as small as possible.

After soldering, do not allow the component/PCB to cool down rapidly.

The operating time for the re-working should be as short as possible. When re-working time is too long, it may cause solder leaching, and that will cause a reduction of the adhesive strength of the terminations.



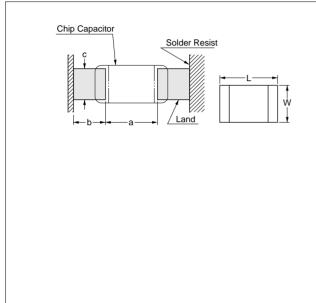


Notice

Notice (Soldering and Mounting)

 Construction of Board Pattern After installing chips, if solder is excessively applied to the circuit board, mechanical stress will cause destruction resistance characteristics to lower. To prevent this, be extremely careful in determining shape and dimension before designing the circuit board diagram.

Construction and Dimensions of Pattern (Example)



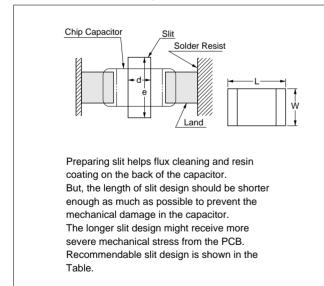
Flow Solder	ing		
L×W	а	b	с
1.6×0.8	0.6-1.0	0.8-0.9	0.6-0.8
2.0×1.25	1.0-1.2	0.9-1.0	0.8-1.1
3.2×1.6	2.2-2.6	1.0-1.1	1.0-1.4

Flow soldering : 3.2×1.6 or less available.

Reflow Soldering

	g		
L×W	а	b	с
1.6×0.8	0.6-0.8	0.6-0.7	0.6-0.8
2.0×1.25	1.0-1.2	0.6-0.7	0.8-1.1
3.2×1.6	2.2-2.4	0.8-0.9	1.0-1.4
3.2×2.5	2.0-2.4	1.0-1.2	1.8-2.3
4.5×2.0	2.8-3.4	1.2-1.4	1.4-1.8
4.5×3.2	2.8-3.4	1.2-1.4	2.3-3.0
5.7×2.8	4.0-4.6	1.4-1.6	2.1-2.6
5.7×5.0	4.0-4.6	1.4-1.6	3.5-4.8
			(in mm)

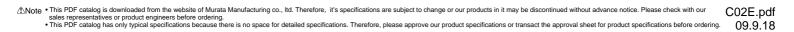
Dimensions of Slit (Example)



L×W	d	е
1.6×0.8	-	-
2.0×1.25	-	-
3.2×1.6	1.0-2.0	3.2-3.7
3.2×2.5	1.0-2.0	4.1-4.6
4.5×2.0	1.0-2.8	3.6-4.1
4.5×3.2	1.0-2.8	4.8-5.3
5.7×2.8	1.0-4.0	4.4-4.9
5.7×5.0	1.0-4.0	6.6-7.1
		(in mm

(in mm)

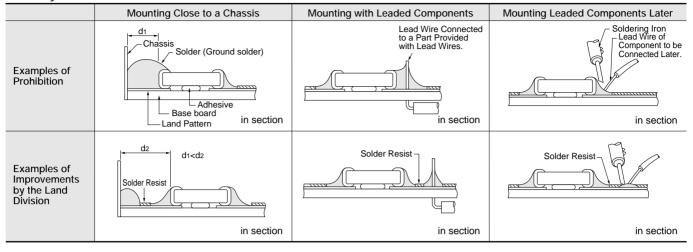




Notice

Continued from the preceding page.

Land Layout to Prevent Excessive Solder



- 2. Mounting of Chips
- Thickness of adhesives applied Keep thickness of adhesives applied (50-105µm or more) to reinforce the adhesive contact considering the
- thickness of the termination or capacitor (20-70 μ m) and the land pattern (30-35 μ m).
- Mechanical shock of the chip placer

When the positioning claws and pick-up nozzle are worn, the load is applied to the chip while positioning is concentrated in one position, thus causing cracks, breakage, faulty positioning accuracy, etc. Careful checking and maintenance are necessary to prevent unexpected trouble. An excessively low bottom dead point of the suction

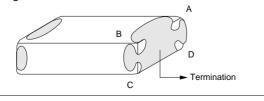
nozzle imposes great force on the chip during mounting, causing cracked chips. Please set the suction nozzle's bottom dead point on the upper surface of the board.

3. Soldering

(1) Limit of losing effective area of the terminations and conditions needed for soldering.

Depending on the conditions of the soldering temperature and/or immersion (melting time), effective areas may be lost in some part of the terminations.

To prevent this, be careful in soldering so that any possible loss of the effective area on the terminations will securely remain at a maximum of 25% on all edge length A-B-C-D-A of part with A, B, C, D, shown in the Figure below.



- (2) Flux Application
- An excessive amount of flux generates a large quantity of flux gas, causing deteriorated solderability. So apply flux thinly and evenly throughout. (A foaming system is generally used for flow soldering.)
- Flux containing too high percentage of halide may cause corrosion of the outer electrodes unless sufficient cleaning. Use flux with a halide content of 0.2% max.
- Do not use strong acidic flux.
- Do not use water-soluble flux*.
 (*Water-soluble flux can be defined as non rosin type flux including wash-type flux and non-wash-type flux.)



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Notice

Continued from the preceding page.

4. Cleaning

Please confirm there is no problem in the reliability of the product beforehand when cleaning it with the intended equipment.

The residue after cleaning it might cause the decrease in the surface resistance of the chip and the corrosion of the electrode part, etc. As a result it might cause reliability to deteriorate. Please confirm beforehand that there is no problem with the intended equipment in ultrasonic cleansing.

5. Resin Coating

Please use it after confirming there is no influence on the product with a intended equipment beforehand when the resin coating and molding.

A cracked chip might be caused at the cooling/heating cycle by the amount of resin spreading and/or bias thickness.

The resin for coating and molding must be selected as the stress is small when stiffening and the hygroscopic is low as possible.

Rating

1. Capacitance change of capacitor

(1) In case of X7R char.

Capacitors have an aging characteristic, whereby the capacitor continually decreases its capacitance slightly if the capacitor is left on for a long time. Moreover, capacitance might change greatly depending on the surrounding temperature or an applied voltage. So, it is not likely to be suitable for use in a time constant circuit.

Please contact us if you need detailed information. (2) In case of any char. except X7R

Capacitance might change a little depending on the surrounding temperature or an applied voltage. Please contact us if you intend to use this product in a strict time constant circuit. 2. Performance check by equipment Before using a capacitor, check that there is no

problem in the equipment's performance and the specifications. Generally speaking, CLASS 2 (X7R char.) ceramic

capacitors have voltage dependence characteristics and temperature dependence characteristics in capacitance. So, the capacitance value may change depending on the operating condition in the equipment. Therefore, be sure to confirm the apparatus performance of receiving influence in a capacitance value change of a capacitor, such as leakage current and noise suppression characteristics. Moreover, check the surge-proof ability of a capacitor in the equipment, if needed, because the surge voltage may exceed specific value by the inductance of the circuit.



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ISO 9001 Certifications

Qualified Standards

The products listed here have been produced by ISO 9001 certified factory.

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△Note:

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 - (1) Aircraft equipment
 - ③ Undersea equipment (5) Medical equipment (7) Traffic signal equipment
- (4) Power plant equipment (6) Transportation equipment (vehicles, trains, ships, etc.)

2 Aerospace equipment

- (8) Disaster prevention / crime prevention equipment
- 9 Data-processing equipment (D) Application of similar complexity and/or reliability requirements to the applications listed above
- 3. Product specifications in this catalog are as of Jul 2009. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.
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