HIGH VOLTAGE CERAMIC CHIP CAPACITOR-SMD

Suntan®

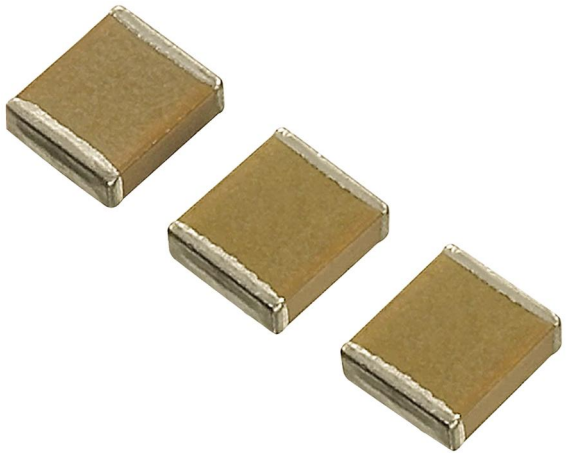
TS18H

FEATURES

- Small size
- Excellent Break down voltage, low DF
- Suit to re-flow soldering, wave soldering, hand soldering

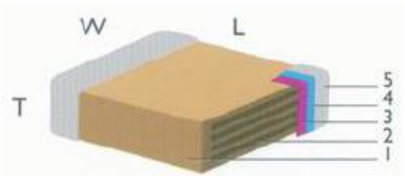
APPLICATIONS

- TS18H SMD is widely used in Analog & Digital Modems, LAN/WAN Interface, Lighting Ballast Circuits, Voltage Multipliers, DC-DC Converter, Back-lighting Inverters.

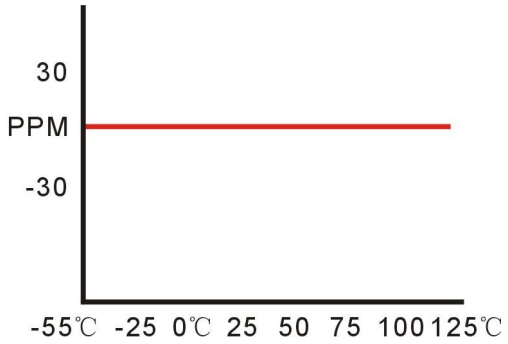
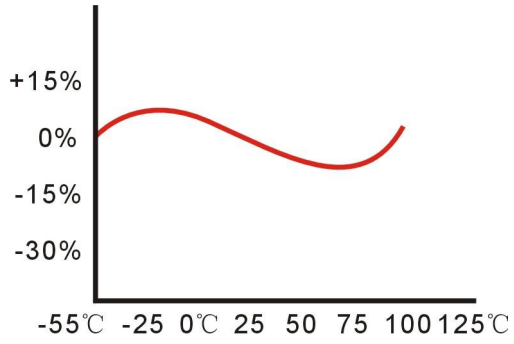


◆ OUTSIDE DIMENSION

Type		Dimension (mm)			
British expression	**Metric expression**	L (mm)	W (mm)	T max (mm)	
0603	1608	1.52 ± 0.25	0.76 ± 0.25	1.01	
0805	2012	2.00 ± 0.25	1.25 ± 0.25	1.45	
1206	3216	3.20 ± 0.30	1.60 ± 0.30	1.90	
1210	3225	3.20 ± 0.40	2.50 ± 0.30	2.80	
1808	4520	4.50 ± 0.40	2.00 ± 0.25	2.80	
1812	4532	4.50 ± 0.40	3.20 ± 0.40	3.10	
2220	5750	5.70 ± 0.40	5.00 ± 0.40	3.00	
2225	5763	5.70 ± 0.50	6.30 ± 0.50	6.20	



Coefficient

Parameter	NPO Temperature Wave	X7R Temperature Wave
Temperature Coefficient		
Dissipation Factor	DF≤0.15%	DF≤2.50%
Aging	None	≤2.5% decade hour
Insulation Resistance	≥100GΩ	≥500ΩF OR 50 GΩ
Dielectric Strength		

Rated Voltage	Test Voltage	Time
Ur=100V	2.5Ur	60 ± 5S
200V≤Ur≤1000V	1.5Ur	60 ± 5S
Ur>1000V	1.2Ur	60 ± 5S

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Item	Specifications		Test Method				
Operating Temperature Range	Class I	NPO: -55 ~ +125℃					
	Class II	X7R: -55 ~ +125℃					
		X5R: -55 ~ +85℃					
		Y5V: -30 ~ +85℃					
		Z5U: +10 ~ +85℃					
Tolerance	±5%, ±10% ±20%						
Appearance	No visual defects		Visual inspection				
Capacitance	Class I	Should be within the specified tolerance	Capacitance	Test Frequency	Test Voltage	Temperature	
			≤1000pF	1MHz±10%	1.0±0.2Vrms	25±2℃	
			>1000pF	1KHz±10%			
	Class II	Should be within the specified tolerance	≤10μF	1KHz±10%	1.0±0.2Vrms		
			>10μF	120±24Hz	0.5±0.1Vrms		
			Z5U	1.0±0.1KHz	0.5±0.05Vrms		
Dissipation Factor （D.F.）	Class I	≤0.15%			Test Method: The same as "Capacitance"		
	Class II	X7R X5R ≥50V	25V	16V			
		X7R X5R ≤2.5%	≤.35%	≤3.5%			
		Y5V Z5U ≤7.0% (C<1.0μF) ≤9.0% (C≥1.0μF)	≤12.5%	≤12.5%			
Insulation Resistance （I.R.）	Class I	C≤10nF，Ri≥50000MΩ C>10nF，Ri*C_R≥500ΩF	Rated Voltage	Tes Voltage	Duration	Charge/Discharge Current	Temperature:25±2℃ Humidity:<75%
	Class II	X7R C≤25nF，Ri≥10000MΩ	Ur<500V	Ur	60 ± 5 sec	≤50 mA	
		X5R C>25nF，Ri*C_R>100ΩF					
		Y5V C≤25nF，Ri≥4000MΩ	Ur<500V	500V	60 ± 5 sec	≤50 mA	
		Z5U C>25nF，Ri*C_R>100ΩF					

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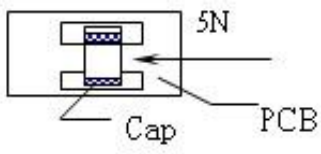
<table>
<tr><td>Item</td><td colspan="2">Specifications</td><td colspan="4">Test Method</td></tr>
<tr><td rowspan="5">Dielectric Withstanding Voltage（D.W.V.）</td><td rowspan="5">No breakdown or visual defects</td><td rowspan="5"></td><td>Rated Voltage</td><td>Test Voltage</td><td>Duration</td><td>Charge/Discharge Current</td></tr>
<tr><td>Ur<200V</td><td>2.5Ur</td><td>1~5sec.</td><td rowspan="3">≤50mA</td></tr>
<tr><td>200V≤Ur ≤ 1000V</td><td>1.5Ur</td><td>1~5sec.</td></tr>
<tr><td>Ur＞ 1000V</td><td>1.2Ur</td><td>1~5sec.</td></tr>
<tr><td colspan="4">Dielectric withstanding voltage testing may requires immersion of the capacitor in a isolation fluid,at test voltage over 2000Vdc.</td></tr>
<tr><td rowspan="7">Capacitance Temperature Characteristic / Coefficient</td><td rowspan="2">Class I</td><td rowspan="2">NPO:0±30ppm/℃</td><td colspan="4">Perform a heat temperature at 150+0/-10℃ for 1hrs,then place room temp. for 24±2hrs.</td></tr>
<tr><td colspan="4">According to the following sequence, measure the capacitance after temperature stabilize for 30min .（△C based on T3）</td></tr>
<tr><td rowspan="5">Class II</td><td>X7R:≤±15%</td><td>Step</td><td colspan="3">Temperature（℃）</td></tr>
<tr><td>X5R:≤±15%</td><td>T1</td><td colspan="3">25±2</td></tr>
<tr><td>Y5V:+22%～-82%</td><td>T2</td><td colspan="3">Low-category temp.</td></tr>
<tr><td>Z5U:+22%～-56%</td><td>T3</td><td colspan="3">25±2</td></tr>
<tr><td></td><td>T4</td><td colspan="3">High-category temp.</td></tr>
<tr><td>Solderability</td><td colspan="2">No defects,≥90% of each terminal should be covered with fresh solder</td><td colspan="4">T1 25±2
Preheating Conditions:80~120℃;10～30sec.
Solder Temperature ： 245±5℃ Immersing Speed:25±0.25mm/s
Duration： 2±0.5sec.</td></tr>
<tr><td>Adhesive Strength of Termination</td><td colspan="2">Appearance: No visible damage.</td><td colspan="4">Applied Force:5N
Duration:10±1sec.
Speed:1mm/sec
 
</td></tr>
</table>

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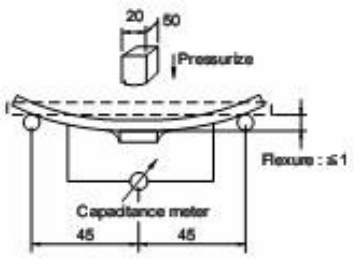
SPECIFICATIONS				
Resistance to Flexure Stresses	Appearance	No crack or marked defects should occur.	Solder the capacitor on the test jig,using a eutectic solder.Then apply a force in the direction. Deflection:1mm Speed: 1mm/sec	
	△C/C	Class I ： ≤±5%		
		Class II： ≤±10%		
Resistance to Soldering Heat	Appearance	No defects, ≥90% of each terminal should be covered with fresh solder	Preheat the capacitor at 100 to 200℃ for 10±2 minute.Immerse the capacitor in a eutectic solder at 265±5℃ for 5±1 seconds.Store at room temperature for 24±2 hours before measureing electric properties.	
	△C/C	Class I: ≤±0.5% or ±0.5pF （whichever is larger）		
		Class II: X7R X5R: -5~+10%		
		Y5V Z5U: -10～+20%		
	D.F.	Meets Initial Values (As Above)		
	I.R.	Meets Initial Values (As Above)		
Temperature Cycle	Appearance	No visual defect	Perform a heat temperature at 150+0/-10℃ for 1hrs,then place room temp. for 24±2hrs.	
	△C/C	Class I: ≤±1% or ±1pF （whichever is larger）	Fix the capacitor to the supporting jig,Perform the five cycles according to the four heat treatments listed in the following table.Store at room temperature for 24±2 hours before measureing electric properties.	
		Class II: X7R X5R ≤±10%	Step	Temperature（℃）	Time (min.)
		Z5U Y5V ≤±20%	1	Low-category temp.	30
	D.F.	Meets Initial Values (As Above)	2	25±2	3
			3	High-category temp.	30
	I.R.	Meets Initial Values (As Above)	4	25±2	3

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SPECIFICATIONS					
Humidity Steady State	Appearance	No visual defect	Let the capacitor sit at 40±2℃ and 90 to 95% humidity for 500+24/-0 hours.Remove and let sit for 48±2 hours at room temperature before measureing electric properties.		
	△C/C	Class I: ≤±2% or ±1pF （whichever is larger）			
		Class II: X7R X5R ≤±10%			
		Z5U Y5V ≤±30%			
	D.F.	≤Initial Values *2 (See Above)			
	I.R.	ClassI:Ri≥2500MΩor Ri*CR＞25ΩF			
		（whichever is smaller）			
		ClassII:Ri≥1000MΩor Ri*CR＞25ΩF			
		（whichever is smaller）			
Loading Life	Appearance	No visual defect	Rated Voltage	Applied Voltage	Charge/Discharge Current
	△C/C	Class I: ≤±2% or ±1pF （whichever is larger）	Ur<500V	2Ur	≤50mA
			500V≤Ur ≤ 1000V	1.5Ur	
		Class II: X7R X5R ≤±20% Z5U Y5V ≤±30%	Ur＞1000V	1.2Ur	
	D.F.	≤Initial Values *2 (See Above)			
	I.R.	ClassI:Ri≥4000MΩor Ri*CR＞40ΩF			
		（whichever is smaller）			
		ClassII:Ri≥2000MΩor Ri*CR＞50ΩF			
		（whichever is smaller）			

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Precautions on the use of MLCC:

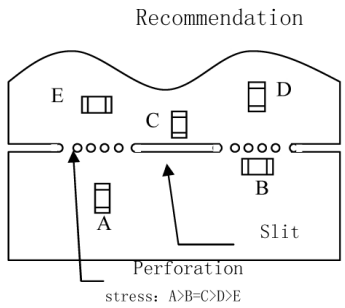
1.eneral Precautions On The Use Of MLCC:

The Multi-layer Ceramic Capacitors MLCC may fail when subjected to severe conditions of electrical environment and manchanical stress beyond the specified "rating" and specified condition in the specification.Following the precautions for satefy .

2. PCB Design

The amount of solder applied can affect the ability of chips to withstand mechanical stresses, which may lead to breaking or cracking. Therefore, when designing land-patterns it is necessary to consider the appropriate size and configuration of the solder pads, which determines the amount of solder necessary to form the fillets.

When designing the position of solder pads and SMD capacitors,it should be carefully performed to minimize stress.SMD capacitors should be located to minimize any possible mechanical stresses from board warp or deflection.



3. Considerations For Automatic Placement

If the lower limit of the pick-up nozzle is low,too much force may be imposed on the capacitors, causing damage. To avoid this, the following points should be considered before lowering the pick-up nozzle:

The lower limit of the pick-up nozzle should be adjusted to the surface level of the PC board after correcting for deflection of the board.

The pick-up pressure should be adjusted between 1 and 3 N static loads.

To reduce the amount of deflection of the board caused by impact of the pick-up nozzle, supporting pins of back-up should be used the under PC board.

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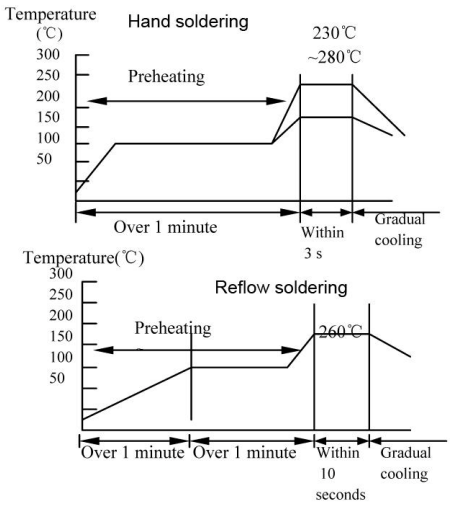
4. Soldering

The ceramic section and metal section combine to the MLCC. As the poor heat conductivity of the ceramic section ,ceramic chip capacitors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling, especialy for large s

When hand soldering,use a soldering iron with a maximum power of 25W and a maximum tip diameter of 1.0mm.The soldering iron should not touch the capacitor directly .



5.Cleaning

The temperature difference between the components and cleaning process should not be greater than 100℃.
In the case of ultrasonic cleaning, too much power output can cause excessive vibration of the PC board which may lead to the cracking of the capacitor or the soldered portion, or decrease the terminal electrodes' strength, thus the following condition
Ultrasonic output : Below20W/L
Ultrasonic frequency: Below 40KHZ
Ultrasonic washing period: 5min or less

6.Breakaway PC Boards

When splitting the PC board after mounting capacitors and other components, care is required so as not to give any stresses of twisting to board.1. Be careful not to subject the capacitors to excessive mechanical shocks.

Board separation should not be done manually, but by using the appropriate devices.

7. Storage Conditions

To maintain the solderability of terminal electrodes and to keep the packaging material in good condition,recommended conditions as the following:
Temperature: 5-40℃; Humidity: 20-70% RH

Even though MLCC are stored in a good condition ,the solderability of MLCC termimal electrodes will decrease as time goes by, so components should be used within 6 months from the time of delivery.

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Capacitance & Voltage

Size	Rated Voltage	Capacitance Range (pF)		Size	Rated Voltage	Capacitance Range (pF)	
		NPO	X7R			NPO	X7R
0603	100V	1 ~ 470	100~22 000	1812	100V	3.3~8 200	220~470 000
	200V	1~330	100~8 200		200V	3.3~6 800	220~180 000
0805	100V	1~1 000	100~56 000		500V	3.3~4 700	220~150 000
	200V	1~820	100~27 000		1000V	3.3~1 200	220~27 000
	500V	1~560	100~12 000		2000V	3.3~390	220~12 000
1206	100V	1.5~3 300	100~220 000		3000V	3.3~270	220~5 600
	200V	1.5~2 200	100~120 000		4000V	3.3~220	220~1 500
	500V	1.5~1 000	100~56 000	2225	100V	10~12 000	470~1000 000
	1000V	1.5~680	100~12 000		200V	10~8 200	470~1000 000
	1000V	1.5~10	100~5 600		500V	10~5 600	470~470 000
1210	100V	2~5 600	150~330 000		1000V	10~2 700	470~68 000
	200V	2~3 900	150~150 000		2000V	10~1 000	470~33 000
	500V	2~2 200	150~100 000		3000V	10~680	470~4 700
	1000V	2~820	150~15 000		4000V	10~560	470~3 900
	2000V	2~470	150~8 200	3035	100V	10~56 000	470~2200 000
1808	100V	2~3 900	150~390 000		200V	10~47 000	470~2200 000
	200V	2~3 000	150~180 000		500V	10~12 000	470~1000 000
	500V	2~1 800	150~120 000		1000V	10~10 000	470~390 000
	1000V	2~820	150~22 000		2000V	10~5 600	470~270 000
	3000V	2~150	150~2 700		3000V	10~3 900	470~8 200
	4000V	2~100	150~1 000		4000V	10~560	470~3 000

Note: Specification are subject to change without notice. For more detail and update, please visit our website.