



# Bi-Quinary Counter

**ELECTRICALLY TESTED PER:**  
**MPG 1678 (-30°C to +85°C)**

The 1678 is a 4-bit counter capable of divide-by-two, divide-by-five, or divide-by-10 function. When used independently, the divide-by-two section will toggle at 350 MHz typically, while the divide-by-five section will toggle at 325 MHz typically. Clock inputs trigger on the positive going edge of the clock pulse.

Set and Reset inputs override the clock, allowing asynchronous "set" or "clear". Individual Set and common Reset inputs are provided, as well as complementary outputs for the first and fourth bits. True outputs are available at all bits.

- DC Input Factor
 

R	2.40
Cik	0.77
C2	1.23
S	1.00
- Power Dissipation = 750 mW typ
- $f_{Tog}$  = 350 MHz typ

ABSOLUTE MAXIMUM RATINGS:	Symbol	Min	Max	Unit
Power Supply Voltage ( $V_{CC} = 0$ )	$V_{CC}$	-8.0	0	Vdc
Base Input Voltage ( $V_{CC} = 0$ )	$V_{IN}$	0	VEE	Vdc
Storage Temperature Range	$T_{stg}$	-55	+125	°C
Operating Temperature Range	$T_A$	-30	+85	°C

### PIN ASSIGNMENTS

FUNCTION	DIL	BURN-IN (CONDITION C)
$V_{CC1}$	1	GND
C2	2	OPEN
$S_2$	3	GND
$Q_2$	4	51 $\Omega$ to $V_{TT}$
$\overline{Q_3}$	5	51 $\Omega$ to $V_{TT}$
$Q_3$	6	51 $\Omega$ to $V_{TT}$
$S_3$	7	GND
VEE	8	VEE
Reset	9	OPEN
$S_1$	10	GND
$Q_1$	11	51 $\Omega$ to $V_{TT}$
$Q_0$	12	51 $\Omega$ to $V_{TT}$
$\overline{Q_0}$	13	51 $\Omega$ to $V_{TT}$
$S_0$	14	GND
Clock	15	OPEN
$V_{CC2}$	16	GND

**BURN - IN CONDITIONS:**  
 $V_{TT} = -2.0 \text{ V MAX} / -2.2 \text{ V MIN}$   
 $VEE = -5.7 \text{ V MAX} / -5.2 \text{ V MIN}$

## Military 1678

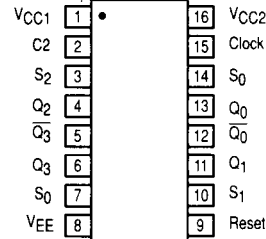


### AVAILABLE AS

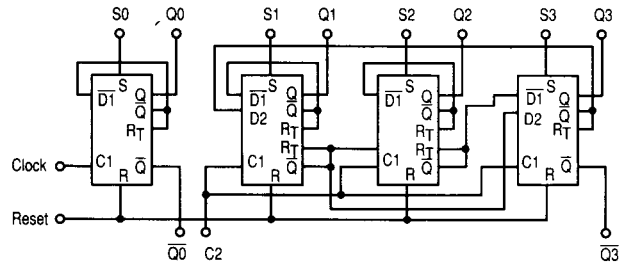
- 1) JAN: N/A
  - 2) SMD: N/A
  - 3) 883: N/A
  - 4) 1678/BXA \*
- X = CASE OUTLINE AS FOLLOWS:

PACKAGE: Cerdip: E

\* 883 Processing (Non-Compliant)



### LOGIC DIAGRAM



TRUTH TABLE

$\bar{D}$	C	S	R	Q	$\bar{Q}$
0	0	0	0	$Q_{n+1}$	$\bar{Q}_{n+1}$
0	0	0	1	0	1
0	0	1	0	1	0
0	0	1	1	•	•
0	1	0	0	1	0
0	1	0	1	0	1
0	1	1	0	1	0
0	1	1	1	•	•
1	0	0	0	$Q_{n+1}$	$\bar{Q}_{n+1}$
1	0	0	1	0	1
1	0	1	0	1	0
1	0	1	1	•	•
1	1	0	0	0	1
1	1	0	1	0	1
1	1	1	0	1	0
1	1	1	1	•	•

• Output State Undefined

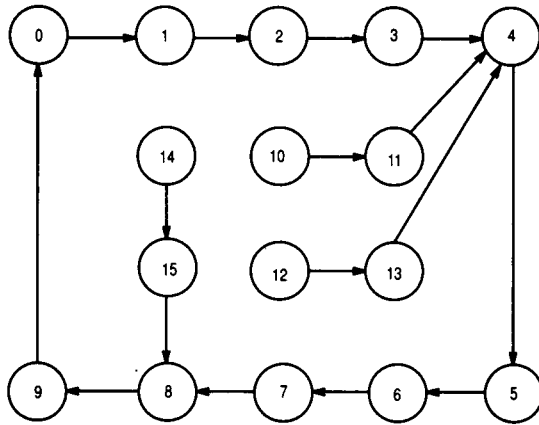
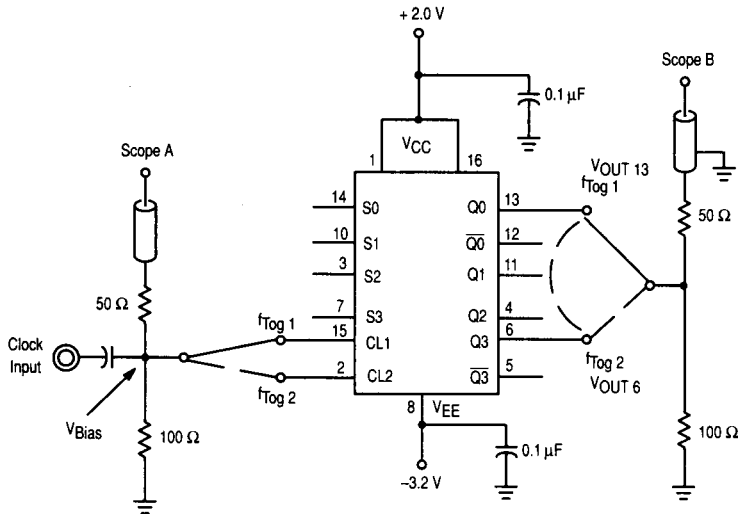


Figure 1. State Diagram



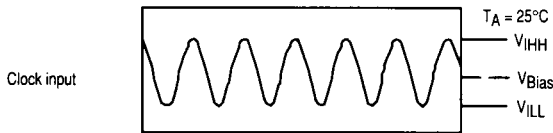
**NOTES**

1. Sine Wave generator AC coupled HP3200B or equivalent.
2.  $V_{OUT} = 600$  mV min. peak to peak. Output at scope will be  $\frac{1}{2}$  actual at  $V_{IN}$ .
3. CP = Sine Wave

**Figure 2. Toggle Frequency Test Circuit**

Temp.	25°C	85°C	-30°C
V <sub>OUT 13</sub>	150	135	135
V <sub>OUT 6</sub>	55	50	50

All in MHz min.



**Figure 3. Toggle Frequency Waveform**

Temp.	25°C	85°C	-30°C
V <sub>IHH</sub>	1.11 V	1.185 V	1.041 V
V <sub>I LL</sub>	0.31 V	0.337 V	0.285 V
V <sub>BIAS</sub>	0.70 V	0.76 V	0.65 V

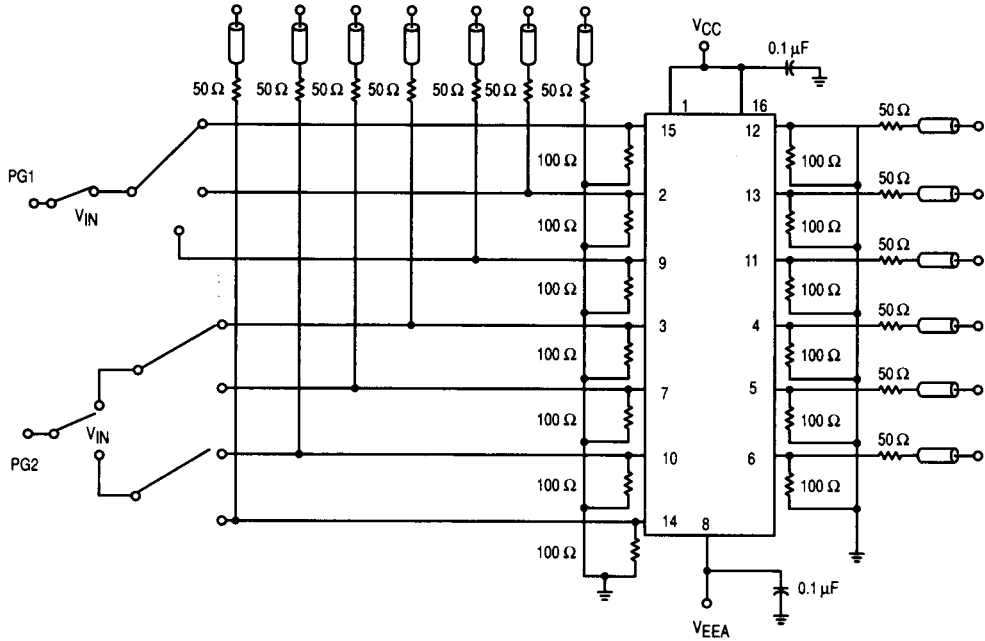
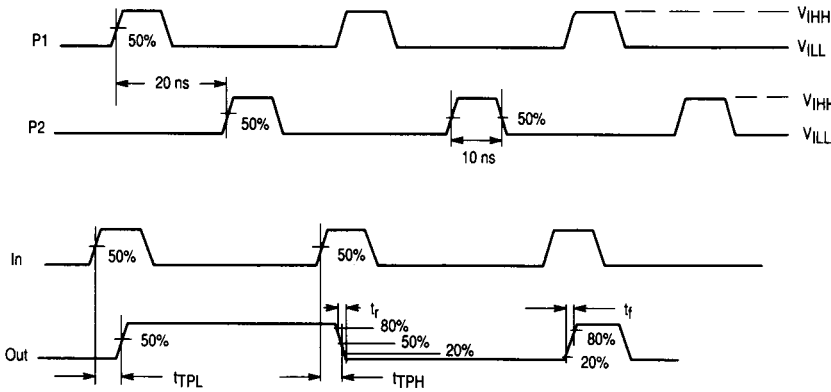


Figure 4. Switching Test Circuit



**NOTES**

1.  $t_r = t_f = 1.5 \text{ ns} \pm 0.2 \text{ ns}$ .
2.  $f_{\text{req}} = 25 \text{ MHz}$ .

Figure 5. Setup and Hold Waveforms

Temp.	25°C	85°C	-30°C
$V_{\text{IHH}}$	1.11 V	1.185 V	1.04 1V
$V_{\text{ILL}}$	0.31 V	0.337 V	0.285 V

# 1678 QUIESCENT LIMIT TABLE

Test Temperature	Test Voltage Values (Volts)					
	V <sub>IH</sub>	V <sub>IL</sub>	V <sub>IHA</sub>	V <sub>ILA</sub>	VEE	VEEA
T <sub>A</sub> = 25 °C	-0.81	-1.85	-1.095	-1.485	-5.2	-3.2
T <sub>A</sub> = 85 °C	-0.70	-1.83	-1.025	-1.440	-5.2	-3.2
T <sub>A</sub> = -30 °C	-0.875	-1.89	-1.180	-1.515	-5.2	-3.2

Symbol	Parameter	Limits						Units	TEST VOLTAGE APPLIED TO PINS BELOW								
		+ 25 °C		+ 85 °C		- 30 °C			Pinouts referenced are for DIL package, check Pin Assignments V <sub>CC</sub> = 0.0 V, Output Load = 50 Ω to - 2.0 V								
		Subgroup 1		Subgroup 2		Subgroup 3			V <sub>IH</sub>	V <sub>IL</sub>	V <sub>IHA</sub>	V <sub>ILA</sub>	V <sub>R</sub>	V <sub>CC</sub>	V <sub>EE</sub>	P.U.T.	
VOH	High Output Voltage	-0.96	-0.81	-0.89	-0.7	-1.045	-0.875	V	3, 7, 9, 10, 14				4 - 6, 11 - 13	1, 16	8	8	4 - 6, 11 - 13
VOL	Low Output Voltage	-1.85	-1.62	-1.83	-1.575	-1.89	-1.65	V	7, 9, 10, 14				4 - 6, 11 - 13	1, 16	8	8	4 - 6, 11 - 13
VOHA	High Output Voltage	-0.98	-0.81	-0.91	-0.7	-1.065	-0.875	V	10	3, 7, 9, 10, 14		7, 9, 14	4 - 6, 11 - 13	1, 16	8	8	4 - 6, 11 - 13
VOLA	Low Output Voltage	-1.85	-1.60	-1.83	-1.555	-1.89	-1.63	V	10	7, 9, 14		3, 7, 9, 10, 14	4 - 6	1, 16	8	8	4 - 6
I <sub>EE</sub>	Power Supply Drain Current	-200						mA	2, 3, 7, 9, 10, 14, 15					1, 16	8	8	8
I <sub>INH1</sub>	Input Current High		450					μA	3, 7, 10, 14, 15					1, 16	8	8	3, 7, 9, 10, 14, 15
I <sub>INH2</sub>	Input Current High		700					μA	2					1, 16	8	8	2
I <sub>INH3</sub>	Input Current High		1.0					mA	9					1, 16	8	8	9
I <sub>INL</sub>	Input Current Low	0.5						μA	2, 3, 7, 9, 10, 14, 15					1, 16	8	8	2, 3, 7, 9, 10, 14, 15

**CAUTION:** This device dissipates 750 to 900 mW of power. Use heat sink if operating over 50 seconds at T<sub>A</sub> ≥ 25°C.

# 1678 QUIESCENT LIMIT TABLE

Test Temperature	Test Voltage Values (Volts)							
	V <sub>IH</sub>	V <sub>IL</sub>	V <sub>IHA</sub>	V <sub>ILA</sub>	V <sub>EE</sub>	V <sub>EEA</sub>	V <sub>CC</sub>	V <sub>CCA</sub>
T <sub>A</sub> = 25 °C	-0.81	-1.85	-1.095	-1.485	-5.2	-3.2	+5.0	+5.0
T <sub>A</sub> = 85 °C	-0.70	-1.83	-1.025	-1.440	-5.2	-3.2	+5.0	+5.0
T <sub>A</sub> = -30 °C	-0.875	-1.89	-1.180	-1.515	-5.2	-3.2	+5.0	+5.0

Symbol	Parameter	Limits						Units	TEST VOLTAGE APPLIED TO PINS BELOW					
		+ 25 °C		+ 85 °C		- 30 °C			Pinouts referenced are for DIL package, check Pin Assignments Output Load = 50 Ω to GND		Pinouts referenced are for DIL package, check Pin Assignments Output Load = 50 Ω to GND		Pinouts referenced are for DIL package, check Pin Assignments Output Load = 50 Ω to GND	
	Functional Parameters:	Subgroup 9 Min	Subgroup 9 Max	Subgroup 10 Min	Subgroup 10 Max	Subgroup 11 Min	Subgroup 11 Max		V <sub>IN</sub>	V <sub>OUT</sub>	V <sub>CC</sub>	V <sub>EEA</sub>	C <sub>P1-2</sub>	P.U.T.
t <sub>TLH</sub>	Rise Time		2.7		3.1		2.9	ns	14	12, 13	1, 16	8		12, 13
t <sub>THL</sub>	Fall Time		2.6		3.0		2.8	ns	14	12, 13	1, 16	8		12, 13
t <sub>pd</sub>	Propagation Delay C1 Limits		2.7		3.1		2.9	ns	14	12, 13	1, 16	8		12, 13
t <sub>pd</sub>	Propagation Delay C2 Limits		3.0		3.4		3.2	ns	2	4, 5, 6, 11	1, 16	8		4, 5, 6, 11
t <sub>Set</sub>	Set Limits		3.7		4.1		3.9	ns	3, 7, 9, 10, 14	4 - 6, 6 - 13	1, 16	8		4 - 6, 6 - 13
t <sub>Reset</sub>	Reset Limits		4.5		4.9		3.9	ns	3, 7, 9, 10, 14	4 - 6, 6 - 13	1, 16	8		4 - 6, 6 - 13
f <sub>Trog1</sub>	Toggle Frequency +by 2	300		270		260		MHZ					15	
f <sub>Trog2</sub>	Toggle Frequency +by 5	275		250		250		MHZ					3	

\* Temperature limits are guaranteed but not tested.



PACKAGE OUTLINE DIMENSIONS (continued)

**P SUFFIX  
PLASTIC PACKAGE  
CASE 646-06**

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.16	19.56	0.715	0.770
B	6.10	6.60	0.240	0.260
C	3.69	4.69	0.145	0.185
D	0.38	0.53	0.015	0.021
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	1.32	2.41	0.052	0.095
J	0.20	0.38	0.008	0.015
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	0°	10°	0°	10°
N	0.29	1.01	0.015	0.039

NOTE 4: LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.

**P SUFFIX  
PLASTIC PACKAGE  
CASE 648-08**

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.80	19.55	0.740	0.770
B	6.35	6.85	0.250	0.270
C	3.69	4.44	0.145	0.175
D	0.39	0.53	0.015	0.021
F	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	1.27 BSC		0.050 BSC	
J	0.21	0.38	0.008	0.015
K	2.80	3.30	0.110	0.130
L	7.50	7.74	0.295	0.305
M	0°	10°	0°	10°
S	0.51	1.01	0.020	0.040

NOTE 4: LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.

**P SUFFIX  
PLASTIC PACKAGE  
CASE 649-03**

**(PW SUFFIX  
FOR MC10H181  
ONLY)**

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	31.50	32.13	1.240	1.265
B	13.21	13.72	0.520	0.540
C	4.70	5.21	0.185	0.205
D	0.38	0.51	0.015	0.020
F	1.02	1.52	0.040	0.060
G	2.54 BSC		0.100 BSC	
H	1.65	2.16	0.065	0.085
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	14.99	15.49	0.590	0.610
M	10°		10°	
N	0.51	1.02	0.020	0.040
P	0.13	0.38	0.005	0.015
Q	0.51	0.76	0.020	0.030

NOTE 4: LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.

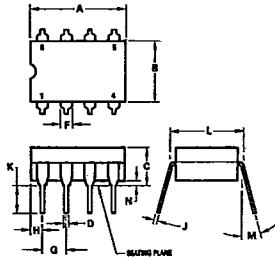
**F SUFFIX  
CERAMIC PACKAGE  
CASE 650-05**

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.40	9.90	0.370	0.390
B	6.73	6.80	0.265	0.269
C	1.53	2.15	0.060	0.085
D	0.38	0.48	0.014	0.019
G	1.27 BSC		0.050 BSC	
H	0.64	0.01	0.025	0.040
J	0.11	0.17	0.004	0.007
K	6.35	9.39	0.250	0.370
L	18.93	—	0.745	—
N	—	0.50	—	0.020

NOTE 4: LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.



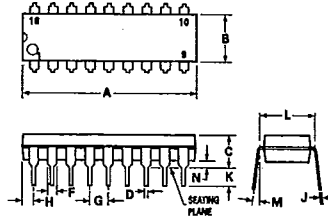
**L SUFFIX  
CERAMIC PACKAGE  
CASE 693-02**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.91	10.92	0.350	0.430
B	6.22	6.99	0.245	0.275
C	4.32	5.08	0.170	0.200
D	0.41	0.51	0.016	0.020
F	1.40	1.65	0.055	0.065
G	2.54 BSC		0.100 BSC	
H	1.14	1.65	0.045	0.065
J	0.20	0.30	0.008	0.012
K	2.18	4.08	0.125	0.160
L	7.37	7.87	0.290	0.310
M	—	15°	—	15°
N	0.51	1.02	0.020	0.040

- NOTES:  
 1. LEADS WITHIN 0.13 mm (0.005) RAD OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.  
 2. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.

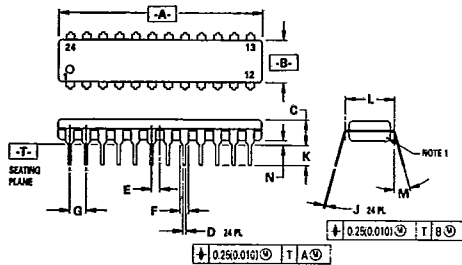
**P SUFFIX  
PLASTIC PACKAGE  
CASE 707-02**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	22.22	23.24	0.875	0.915
B	6.10	6.60	0.240	0.260
C	3.56	4.57	0.140	0.180
D	0.36	0.56	0.014	0.022
F	1.27	1.78	0.050	0.070
G	2.54 BSC		0.100 BSC	
H	1.02	1.52	0.040	0.060
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.02	0.020	0.040

- NOTES:  
 1. POSITIONAL TOLERANCE OF LEADS (D), SHALL BE WITHIN 0.25mm(0.010) AT MAXIMUM MATERIAL CONDITION, IN RELATION TO SEATING PLANE AND EACH OTHER.  
 2. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.  
 3. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

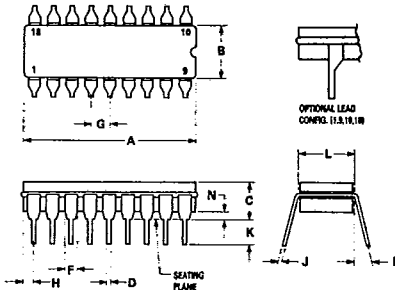
**P SUFFIX  
PLASTIC PACKAGE  
CASE 724-03**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	31.25	32.13	1.230	1.265
B	6.35	6.85	0.250	0.270
C	3.68	4.44	0.145	0.175
D	0.38	0.51	0.015	0.020
E	1.27 BSC		0.050 BSC	
F	1.02	1.52	0.040	0.060
G	2.54 BSC		0.100 BSC	
J	0.18	0.30	0.007	0.012
K	2.80	3.55	0.110	0.140
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.01	0.020	0.040

- NOTES:  
 1. CHAMFERED CONTOUR OPTIONAL.  
 2. DIM "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.  
 3. DIMENSIONS AND TOLERANCES PER ANSI Y14.34, 1982.  
 4. CONTROLLING DIMENSION: INCH.

**L SUFFIX  
CERAMIC PACKAGE  
CASE 726-04**



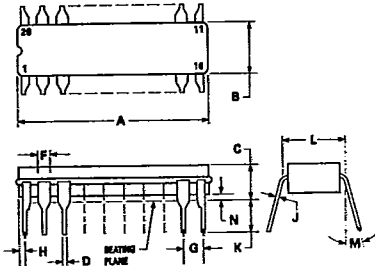
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	22.35	23.11	0.880	0.910
B	6.10	7.49	0.240	0.295
C	—	5.08	—	0.200
D	0.38	0.53	0.015	0.021
F	1.40	1.78	0.055	0.070
G	2.54 BSC		0.100 BSC	
H	0.51	1.14	0.020	0.045
J	0.20	0.30	0.008	0.012
K	3.18	4.32	0.125	0.170
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.02	0.020	0.040

- NOTES:  
 1. LEADS, TRUE POSITIONED WITHIN 0.25 mm (0.010) DIA. AT SEATING PLANE, AT MAXIMUM MATERIAL CONDITION.  
 2. DIM "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.  
 3. DIM "A" & "B" INCLUDES MENISCUS.  
 4. "F" DIMENSION IS FOR FULL LEADS. "HALF" LEADS ARE OPTIONAL AT LEAD POSITIONS 1, 9, 10, AND 18.

PACKAGE OUTLINE DIMENSIONS (continued)

1

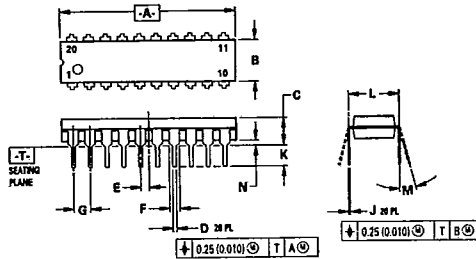
**L SUFFIX  
CERAMIC PACKAGE  
CASE 732-03**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	23.88	25.15	0.940	0.990
B	6.80	7.43	0.260	0.295
C	3.81	5.08	0.150	0.200
D	0.38	0.56	0.015	0.022
F	1.40	1.65	0.055	0.065
G	2.54 BSC		0.100 BSC	
H	0.51	1.27	0.020	0.050
J	0.20	0.30	0.008	0.012
K	3.18	4.06	0.125	0.160
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.25	1.02	0.010	0.040

- NOTES:
- LEADS WITHIN 0.25 mm (0.010) DIA., TRUE POSITION AT SEATING PLANE, AT MAXIMUM MATERIAL CONDITION.
  - DIM L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  - DIM A AND B INCLUDES MENISCUS.

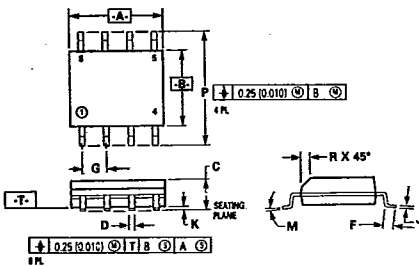
**P SUFFIX  
PLASTIC PACKAGE  
CASE 738-03**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	25.55	27.17	1.010	1.070
B	6.10	6.60	0.240	0.260
C	3.81	4.57	0.150	0.180
D	0.38	0.55	0.015	0.022
E	1.27 BSC		0.050 BSC	
F	1.27	1.77	0.050	0.070
G	2.54 BSC		0.100 BSC	
J	0.21	0.38	0.008	0.015
K	2.80	3.55	0.110	0.140
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.01	0.020	0.040

- NOTES:
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  - CONTROLLING DIMENSION: INCH.
  - DIMENSION "L" TO CENTER OF LEAD WHEN FORMED PARALLEL.
  - DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.

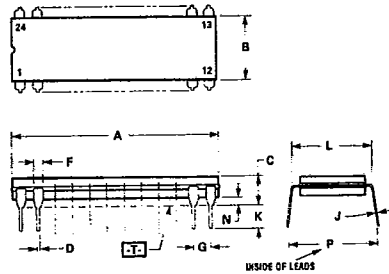
**D SUFFIX  
PLASTIC SOIC PACKAGE  
CASE 751-03**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.196
B	3.90	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.015	0.049
G	1.27 BSC		0.050 BSC	
J	0.18	0.25	0.007	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

- NOTES:
- DIMENSIONS "A" AND "B" ARE DATUMS AND "T" IS A DATUM SURFACE.
  - DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  - CONTROLLING DIM: MILLIMETER.
  - DIMENSION "A" AND "B" DO NOT INCLUDE MOLD PROTRUSION.
  - MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

**L SUFFIX  
CERAMIC PACKAGE  
CASE 758-01**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	31.50	32.64	1.240	1.285
B	7.24	7.75	0.285	0.305
C	3.68	4.44	0.145	0.175
D	0.38	0.53	0.015	0.021
F	1.14	1.97	0.045	0.062
G	2.54 BSC		0.100 BSC	
J	0.20	0.33	0.008	0.013
K	2.54	4.19	0.100	0.165
L	7.62	7.87	0.300	0.310
N	0.51	1.27	0.020	0.050
P	9.14	10.16	0.360	0.400

- NOTES:
- DIMENSION A IS DATUM.
  - POSITIONAL TOLERANCE FOR LEADS: 24 PLACES  $\pm 0.25 (0.010) \text{ T A } \text{M}$
  - T IS SEATING PLANE.
  - DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  - DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1973.

1

**FN SUFFIX  
PLASTIC PACKAGE  
CASE 775-02**

**NOTES:**

- DATUMS -L-, -M-, -N-, AND -P- DETERMINED WHERE TOP OF LEAD SHOULDER EXIT PLASTIC BODY AT MOLD PARTING LINE.
- DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIM R AND U DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.25 (0.010) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.78	10.03	0.385	0.395
B	9.78	10.03	0.385	0.395
C	4.20	4.57	0.165	0.180
E	2.29	2.79	0.090	0.110
F	0.33	0.48	0.013	0.019
G	1.27 BSC		0.050 BSC	
H	0.66	0.81	0.026	0.032
J	0.51	—	0.020	—
K	0.64	—	0.025	—
R	8.89	9.04	0.350	0.356
U	8.89	9.04	0.350	0.356
V	1.07	1.21	0.042	0.048
W	1.07	1.21	0.042	0.048
X	1.07	1.42	0.042	0.056
Y	—	0.50	—	0.020
Z	2°	10°	2°	10°
G1	7.88	8.38	0.310	0.330
K1	1.02	—	0.040	—
Z1	2°	10°	2°	10°

**FN SUFFIX  
PLASTIC PACKAGE  
CASE 776-02**

**NOTES:**

- DUE TO SPACE LIMITATION, CASE 776-02 SHALL BE REPRESENTED BY A GENERAL (SMALLER) CASE OUTLINE DRAWING RATHER THAN SHOWING ALL 28 LEADS.
- DATUMS -L-, -M-, -N-, AND -P- DETERMINED WHERE TOP OF LEAD SHOULDER EXIT PLASTIC BODY AT MOLD PARTING LINE.
- DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIM R AND U DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE MOLD PROTRUSION IS 0.25 (0.010) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.32	12.57	0.485	0.495
B	12.32	12.57	0.485	0.495
C	4.20	4.57	0.165	0.180
E	2.29	2.79	0.090	0.110
F	0.33	0.48	0.013	0.019
G	1.27 BSC		0.050 BSC	
H	0.66	0.81	0.026	0.032
J	0.51	—	0.020	—
K	0.64	—	0.025	—
R	11.43	11.58	0.450	0.456
U	11.43	11.58	0.450	0.456
V	1.07	1.21	0.042	0.048
W	1.07	1.21	0.042	0.048
X	1.07	1.42	0.042	0.056
Y	—	0.50	—	0.020
Z	2°	10°	2°	10°
G1	10.42	10.92	0.410	0.430
K1	1.02	—	0.040	—
Z1	2°	10°	2°	10°

## MECL Logic Surface Mount

### WHY SURFACE MOUNT?

Surface Mount Technology is now being utilized to offer answers to many problems that have been created in the use of insertion technology.

Limitations have been reached with insertion packages and PC board technology. Surface Mount Technology offers the opportunity to continue to advance the State-of-the-Art designs that cannot be accomplished with Insertion Technology.

Surface Mount Packages allow more optimum device performance with the smaller Surface Mount configuration. Internal lead lengths, parasitic capacitance and inductance that placed limitations on chip performance have been reduced.

The lower profile of Surface Mount Packages allows more boards to be utilized in a given amount of space. They are stacked closer together and utilize less total volume than insertion populated PC boards.

Printed circuit costs are lowered with the reduction of the number of board layers required. The elimination or reduction of the number of plated through holes in the board, contribute significantly to lower PC board prices.

Surface Mount assembly does not require the preparation of components that are common on insertion technology lines. Surface Mount components are sent directly to the assembly line, eliminating an intermediate step.

Automatic placement equipment is available that can place Surface Mount components at the rate of a few thousand per hour to hundreds of thousands of components per hour.

Surface Mount Technology is cost effective, allowing the manufacturer the opportunity to produce smaller units and offer increased functions with the same size product.

### MECL AVAILABILITY IN SURFACE MOUNT

Motorola is now offering MECL 10K and MECL 10KH in the PLCC (Plastic Leaded Chip Carrier) packages.

MECL in PLCC may be ordered in conventional plastic rails or on Tape and Reel. Refer to the Tape and Reel section for ordering details.

### TAPE AND REEL

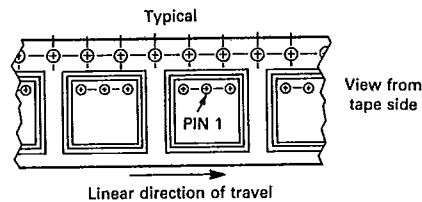
Motorola has now added the convenience of Tape and Reel packaging for our growing family of standard Integrated Circuit products. The packaging fully conforms to

the latest EIA RS-481A specification. The antistatic embossed tape provides a secure cavity sealed with a peel-back cover tape.

### GENERAL INFORMATION

- Reel Size 13 inch (330 mm) Suffix: R2
- Tape Width 16 mm
- Units/Reel 1000

### MECHANICAL POLARIZATION



### ORDERING INFORMATION

- Minimum Lot Size/Device Type = 3000 Pieces.
- No Partial Reel Counts Available.
- To order devices which are to be delivered in Tape and Reel, add the appropriate suffix to the device number being ordered.

#### EXAMPLE:

#### ORDERING CODE

MC10100FN  
 MC10100FNR2  
 MC10H100FN  
 MC10H100FNR2  
 MC12015D  
 MC12015DR2

#### SHIPMENT METHOD

Magazines (Rails)  
 13 inch Tape and Reel  
 Magazines (Rails)  
 13 inch Tape and Reel  
 Magazines (Rails)  
 13 inch Tape and Reel

### DUAL-IN-LINE PACKAGE TO PLCC PIN CONVERSION DATA

The following tables give the equivalent I/O pinouts of Dual-In-Line (DIL) packages and Plastic Leaded Chip Carrier (PLCC) packages.

#### Conversion Tables

16 PIN DIL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
20 PIN PLCC	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20

20 PIN DIL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
20 PIN PLCC	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

24 PIN DIL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
28 PIN PLCC	2	3	4	5	6	7	9	10	11	12	13	14	16	17	18	19	20	21	23	24	25	26	27	28