

T-43-21



**MC14049UB**  
**MC14050B**

**HEX BUFFERS**

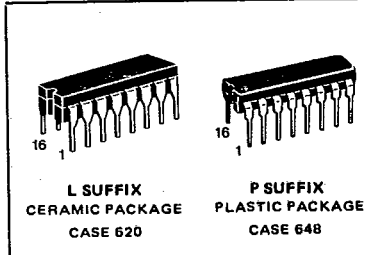
The MC14049UB hex inverter/buffer and MC14050B non-inverting hex buffer are constructed with MOS P-channel and N-channel enhancement mode devices in a single monolithic structure. These complementary MOS devices find primary use where low power dissipation and/or high noise immunity is desired. These devices provide logic-level conversion using only one supply voltage,  $V_{DD}$ . The input-signal high level ( $V_{IH}$ ) can exceed the  $V_{DD}$  supply voltage for logic-level conversions. Two TTL/DTL Loads can be driven when the devices are used as CMOS-to-TTL/DTL converters ( $V_{DD} = 5.0\text{ V}$ ,  $V_{OL} \leq 0.4\text{ V}$ ,  $I_{OL} \geq 3.2\text{ mA}$ ). Note that pins 13 and 16 are not connected internally on these devices; consequently connections to these terminals will not affect circuit operation.

- High Source and Sink Currents
- High-to-Low Level Converter
- Supply Voltage Range = 3.0 V to 18 V
- Meets JEDEC UB Specifications—MC14049UB
- Meets JEDEC B Specification—MC14050B
- $V_{IN}$  can exceed  $V_{DD}$

**CMOS SSI**  
(LOW-POWER COMPLEMENTARY MOS)

**HEX BUFFERS**

Inverting — MC14049UB  
Noninverting — MC14050B



**ORDERING INFORMATION**

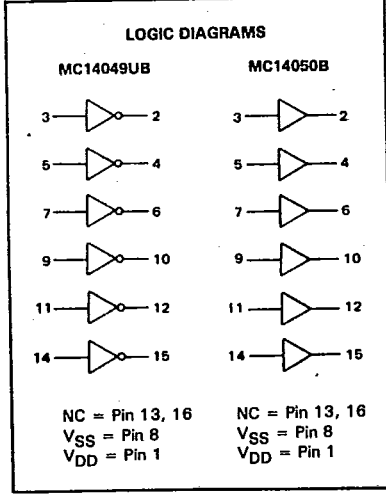
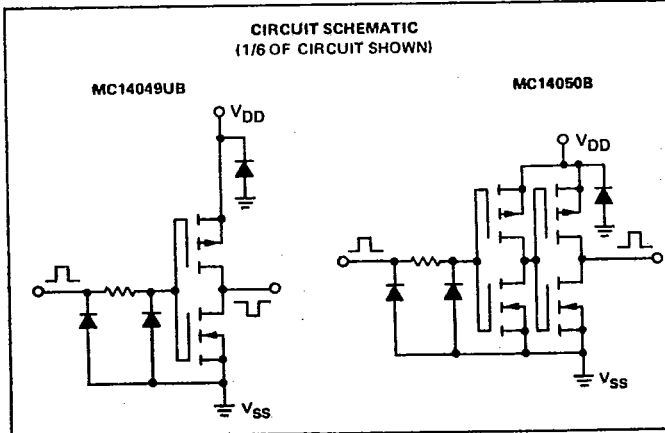
A Series: -55°C to +125°C  
MC14XXXBAL or UBAL (Ceramic Package Only)

C Series: -40°C to +85°C  
MC14XXXBCP or UBCEP (Plastic Package)  
MC14XXXBCL or UBCL (Ceramic Package)

**MAXIMUM RATINGS\*** (Voltages Referenced to  $V_{SS}$ )

Symbol	Parameter	Value	Unit
$V_{DD}$	DC Supply Voltage	-0.5 to +18.0	V
$V_{in}$	Input Voltage (DC or Transient)	-0.5 to +18.0	V
$V_{out}$	Output Voltage (DC or Transient)	-0.5 to $V_{DD} + 0.5$	V
$I_{in}$	Input Current (DC or Transient), per Pin	±10	mA
$I_{out}$	Output Current (DC or Transient), per Pin	+45	mA
$T_{stg}$	Storage Temperature	-65 to +150	°C
$T_L$	Lead Temperature (8-Second Soldering)	260	°C

\*Maximum Ratings are those values beyond which damage to the device may occur.



6367252 MOTOROLA SC (LOGIC)

98D 79550 D

MC14049UB•MC14050B

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ELECTRICAL CHARACTERISTICS (Voltages Referenced to V<sub>SS</sub>)

Characteristic	Symbol	V <sub>DD</sub> Vdc	T <sub>low</sub> *		25°C			T <sub>high</sub> *		Unit
			Min	Max	Min	Typ #	Max	Min	Max	
Output Voltage V <sub>in</sub> = V <sub>DD</sub> or 0  V <sub>in</sub> = 0 or V <sub>DD</sub>	"0" Level V <sub>OL</sub>	5.0	—	0.05	—	0	0.05	—	0.05	Vdc
		10	—	0.05	—	0	0.05	—	0.05	
		15	—	0.05	—	0	0.05	—	0.05	
	"1" Level V <sub>OH</sub>	5.0	4.95	—	4.95	5.0	—	4.95	—	Vdc
		10	9.95	—	9.95	10	—	9.95	—	
		15	14.95	—	14.95	15	—	14.95	—	
Input Voltage MC14049UB (V <sub>O</sub> = 4.5 Vdc) (V <sub>O</sub> = 9.0 Vdc) (V <sub>O</sub> = 13.5 Vdc)  (V <sub>O</sub> = 0.5 Vdc) (V <sub>O</sub> = 1.0 Vdc) (V <sub>O</sub> = 1.5 Vdc)	"0" Level V <sub>IL</sub>	5.0	—	1.0	—	2.25	1.0	—	1.0	Vdc
		10	—	2.0	—	4.50	2.0	—	2.0	
		15	—	2.5	—	6.75	2.5	—	2.5	
	"1" Level V <sub>IH</sub>	5.0	4.0	—	4.0	2.75	—	4.0	—	Vdc
		10	8.0	—	8.0	5.50	—	8.0	—	
		15	12.5	—	12.5	8.25	—	12.5	—	
Input Voltage MC14050B (V <sub>O</sub> = 0.5 Vdc) (V <sub>O</sub> = 1.0 Vdc) (V <sub>O</sub> = 1.5 Vdc)  (V <sub>O</sub> = 4.5 Vdc) (V <sub>O</sub> = 9.0 Vdc) (V <sub>O</sub> = 13.5 Vdc)	"0" Level V <sub>IL</sub>	5.0	—	1.5	—	2.25	1.5	—	1.5	Vdc
		10	—	3.0	—	4.50	3.0	—	3.0	
		15	—	4.0	—	6.75	4.0	—	4.0	
	"1" Level V <sub>IH</sub>	5.0	3.5	—	3.5	2.75	—	3.5	—	Vdc
		10	7.0	—	7.0	5.50	—	7.0	—	
		15	11	—	11	8.25	—	11	—	
Output Drive Current (AL Device) (V <sub>OH</sub> = 2.5 Vdc) (V <sub>OH</sub> = 9.5 Vdc) (V <sub>OH</sub> = 13.5 Vdc) (V <sub>OL</sub> = 0.4 Vdc) (V <sub>OL</sub> = 0.5 Vdc) (V <sub>OL</sub> = 1.5 Vdc)	Source I <sub>OH</sub>	5.0	-1.6	—	-1.25	-2.5	—	-0.9	—	mA <sub>dc</sub>
		10	-1.6	—	-1.3	-2.6	—	-0.9	—	
		15	-4.7	—	-3.75	-10	—	-2.7	—	
	Sink I <sub>OL</sub>	5.0	3.75	—	3.2	6.0	—	2.2	—	mA <sub>dc</sub>
		10	10	—	8.0	16	—	5.6	—	
		15	30	—	24	40	—	17.0	—	
Output Drive Current (CL/CP Device) (V <sub>OH</sub> = 2.5 Vdc) (V <sub>OH</sub> = 9.5 Vdc) (V <sub>OH</sub> = 13.5 Vdc) (V <sub>OL</sub> = 0.4 Vdc) (V <sub>OL</sub> = 0.5 Vdc) (V <sub>OL</sub> = 1.5 Vdc)	Source I <sub>OH</sub>	5.0	-1.5	—	-1.25	-2.5	—	-1.0	—	mA <sub>dc</sub>
		10	-1.5	—	-1.3	-2.6	—	-1.0	—	
		15	-4.5	—	-3.75	-10	—	-3.0	—	
	Sink I <sub>OL</sub>	5.0	3.6	—	3.2	6.0	—	2.6	—	mA <sub>dc</sub>
		10	9.6	—	8.0	16	—	6.6	—	
		15	28	—	24	40	—	19	—	
Input Current (AL Device)	I <sub>in</sub>	15	—	±0.1	—	±0.00001	±0.1	—	±1.0	μA <sub>dc</sub>
Input Current (CL/CP Device)	I <sub>in</sub>	15	—	±0.3	—	±0.00001	±0.3	—	±1.0	μA <sub>dc</sub>
Input Capacitance (V <sub>in</sub> = 0)	C <sub>in</sub>	—	—	—	—	10	20	—	—	pF
Quiescent Current (AL Device) (Per Package)	I <sub>DD</sub>	5.0	—	1.0	—	0.002	1.0	—	30	μA <sub>dc</sub>
		10	—	2.0	—	0.004	2.0	—	60	
		15	—	4.0	—	0.006	4.0	—	120	
Quiescent Current (CL/CP Device) (Per Package)	I <sub>DD</sub>	5.0	—	4.0	—	0.002	4.0	—	30	μA <sub>dc</sub>
		10	—	8.0	—	0.004	8.0	—	60	
		15	—	16	—	0.006	16	—	120	
Total Supply Current**† (Dynamic plus Quiescent, Per Package) (C <sub>L</sub> 50 pF on all outputs, all buffers switching)	I <sub>T</sub>	5.0	I <sub>T</sub> = (1.8 μA/kHz)f + I <sub>DD</sub>							μA <sub>dc</sub>
		10	I <sub>T</sub> = (3.5 μA/kHz)f + I <sub>DD</sub>							
		15	I <sub>T</sub> = (5.3 μA/kHz)f + I <sub>DD</sub>							

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\*T<sub>low</sub> = -55°C for AL Device, -40°C for CL/CP Device.  
T<sub>high</sub> = +125°C for AL Device, +85°C for CL/CP Device.

†To calculate total supply current at loads other than 50 pF:

$$I_T(C_L) = I_T(50 \text{ pF}) + (C_L - 50) V/k$$

\*Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.

where: I<sub>T</sub> is in μA (per package), C<sub>L</sub> in pF, V = (V<sub>DD</sub> - V<sub>SS</sub>) in volts, f in kHz is input frequency, and k = 0.002.

\*\*The formulas given are for the typical characteristics only at 25°C.

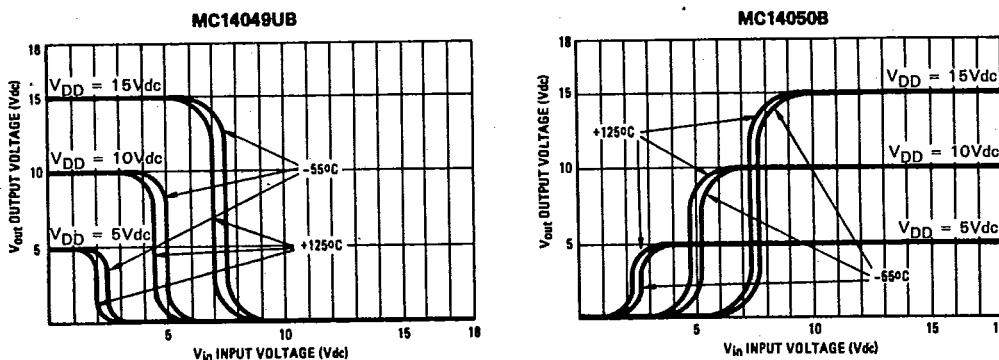
SWITCHING CHARACTERISTICS\* (C<sub>L</sub> = 50 pF, T<sub>A</sub> = 25°C)

Characteristic	Symbol	V <sub>DD</sub> V <sub>dc</sub>	Min	Typ #	Max	Unit
<b>MC14049UB</b>						
Output Rise Time t <sub>TLH</sub> = (0.8 ns/pF) C <sub>L</sub> + 60 ns t <sub>TLH</sub> = (0.3 ns/pF) C <sub>L</sub> + 35 ns t <sub>TLH</sub> = (0.27 ns/pF) C <sub>L</sub> + 26.5 ns	t <sub>TLH</sub>	5.0 10 15	— — —	100 50 40	160 100 80	ns
Output Fall Time t <sub>THL</sub> = (0.3 ns/pF) C <sub>L</sub> + 25 ns t <sub>THL</sub> = (0.12 ns/pF) C <sub>L</sub> + 14 ns t <sub>THL</sub> = (0.1 ns/pF) C <sub>L</sub> + 10 ns	t <sub>THL</sub>	5.0 10 15	— — —	40 20 15	60 40 30	ns
Propagation Delay Time t <sub>PLH</sub> = (0.38 ns/pF) C <sub>L</sub> + 61 ns t <sub>PLH</sub> = (0.20 ns/pF) C <sub>L</sub> + 30 ns t <sub>PLH</sub> = (0.11 ns/pF) C <sub>L</sub> + 24.5 ns	t <sub>PLH</sub>	5.0 10 15	— — —	80 40 30	120 65 60	ns
Propagation Delay Time t <sub>PHL</sub> = (0.38 ns/pF) C <sub>L</sub> + 11 ns t <sub>PHL</sub> = (0.12 ns/pF) C <sub>L</sub> + 9 ns t <sub>PHL</sub> = (0.11 ns/pF) C <sub>L</sub> + 4.5 ns	t <sub>PHL</sub>	5.0 10 15	— — —	30 15 10	60 30 20	ns
<b>MC14050B</b>						
Output Rise Time t <sub>TLH</sub> = (0.7 ns/pF) C <sub>L</sub> + 65 ns t <sub>TLH</sub> = (0.25 ns/pF) C <sub>L</sub> + 37.5 ns t <sub>TLH</sub> = (0.2 ns/pF) C <sub>L</sub> + 30 ns	t <sub>TLH</sub>	5.0 10 15	— — —	100 50 40	160 80 60	ns
Output Fall Time t <sub>THL</sub> = (0.2 ns/pF) C <sub>L</sub> + 30 ns t <sub>THL</sub> = (0.06 ns/pF) C <sub>L</sub> + 17 ns t <sub>THL</sub> = (0.04 ns/pF) C <sub>L</sub> + 13 ns	t <sub>THL</sub>	5.0 10 15	— — —	40 20 15	60 40 30	ns
Propagation Delay Time t <sub>PLH</sub> = (0.33 ns/pF) C <sub>L</sub> + 63.5 ns t <sub>PLH</sub> = (0.19 ns/pF) C <sub>L</sub> + 30.5 ns t <sub>PLH</sub> = (0.06 ns/pF) C <sub>L</sub> + 27 ns	t <sub>PLH</sub>	5.0 10 15	— — —	80 40 30	140 80 60	ns
Propagation Delay Time t <sub>PHL</sub> = (0.2 ns/pF) C <sub>L</sub> + 30 ns t <sub>PHL</sub> = (0.1 ns/pF) C <sub>L</sub> + 15 ns t <sub>PHL</sub> = (0.05 ns/pF) C <sub>L</sub> + 12.5 ns	t <sub>PHL</sub>	5.0 10 15	— — —	40 20 15	80 40 30	ns

\*The formulas given are for the typical characteristics only at 25°C.  
#Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.

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FIGURE 1 — TYPICAL VOLTAGE TRANSFER CHARACTERISTICS versus TEMPERATURE



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FIGURE 2 - TYPICAL OUTPUT SOURCE CHARACTERISTICS

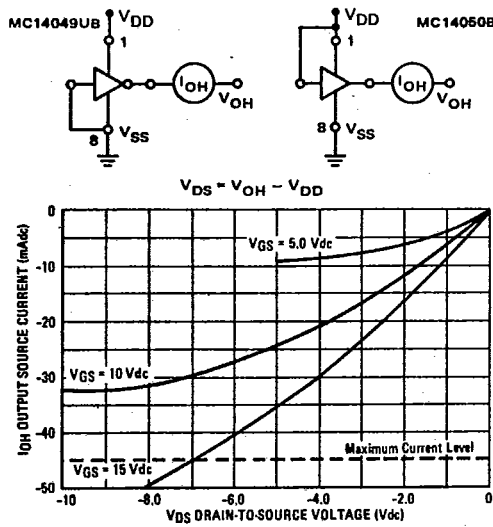


FIGURE 3 - TYPICAL OUTPUT SINK CHARACTERISTICS

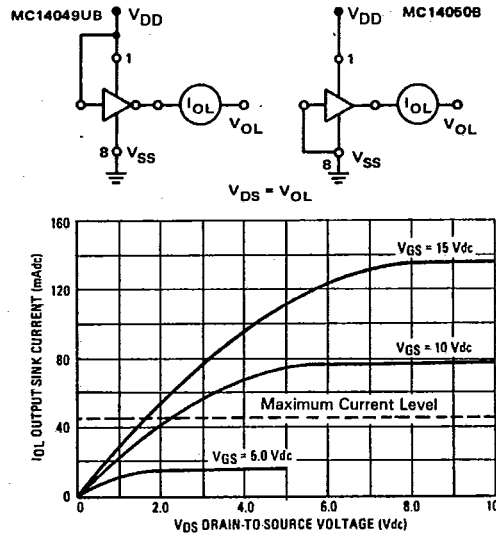


FIGURE 4 - AMBIENT TEMPERATURE POWER DERATING

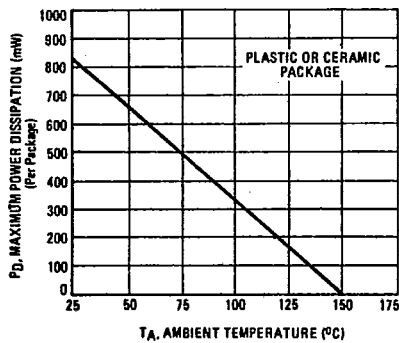
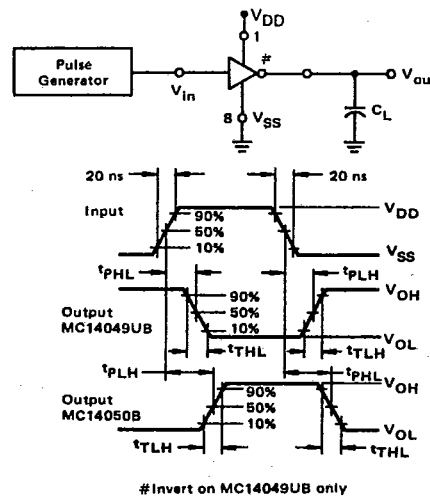
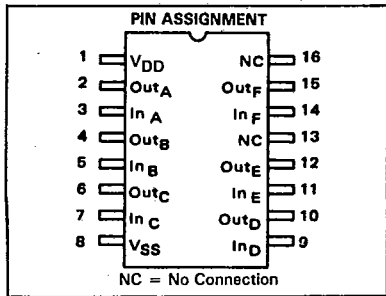


FIGURE 5 - SWITCHING TIME TEST CIRCUIT AND WAVEFORMS



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This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields **referenced to the V<sub>SS</sub> pin, only**. Extra precautions must be taken to avoid applications of any voltage higher than the maximum rated voltages to this high-impedance circuit. For proper operation, the ranges V<sub>SS</sub> ≤ V<sub>in</sub> ≤ 18 V and V<sub>SS</sub> ≤ V<sub>out</sub> ≤ V<sub>DD</sub> are recommended. Unused inputs must always be tied to an appropriate logic voltage level (e.g., either V<sub>SS</sub> or V<sub>DD</sub>). Unused outputs must be left open.



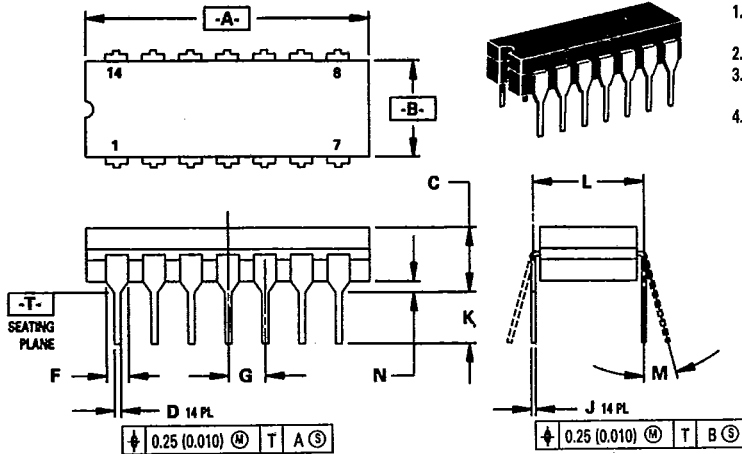
**PACKAGE DIMENSIONS**

T-90-20

The standard package availability for each device is indicated on the front page of the individual data sheets. Dimensions for the packages are given in this chapter. Surface mount packages may be special ordered by specifying the following suffixes: "D" (narrow SOIC), "DW" (wide SOIC), or "FN" (PLCC). For example, to order a quad NOR gate, use MC14001BD.

**14-PIN PACKAGE**

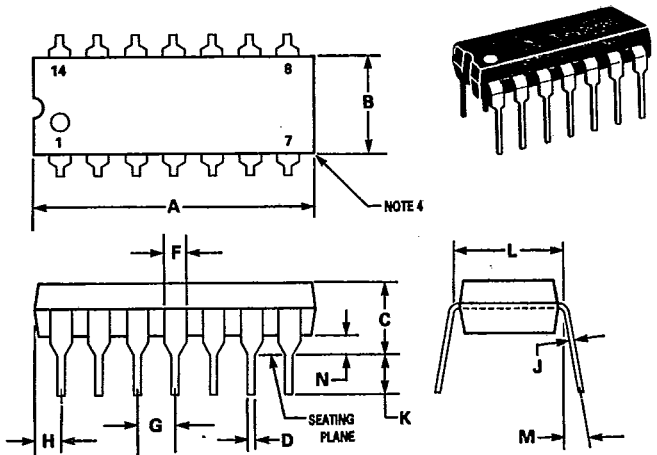
**CERAMIC PACKAGE  
CASE 632-08**



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
  4. DIM F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	19.05	19.94	0.750	0.785
B	6.23	7.11	0.245	0.280
C	3.94	5.08	0.155	0.200
D	0.39	0.50	0.015	0.020
F	1.40	1.65	0.055	0.065
G	2.54 BSC		0.100 BSC	
J	0.21	0.38	0.008	0.015
K	3.18	4.31	0.125	0.170
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.01	0.020	0.040

**PLASTIC PACKAGE  
CASE 646-06**



- NOTES:
1. LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
  2. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
  3. DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
  4. ROUNDED CORNERS OPTIONAL.

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	0.39	1.01	0.015	0.039

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PACKAGE DIMENSIONS (Continued)

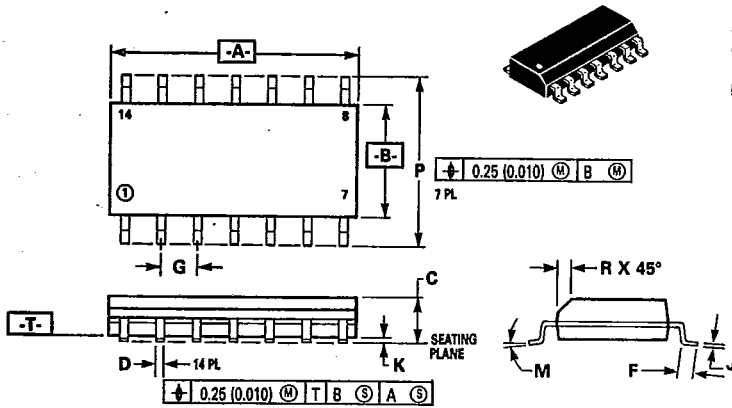
14-PIN PACKAGE

SOIC PACKAGE  
CASE 751A-02  
D SUFFIX

NOTES:

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

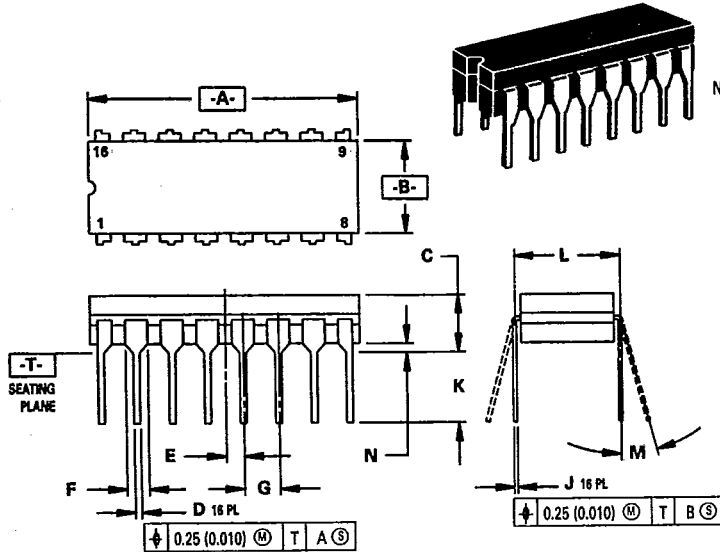
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019



PACKAGE DIMENSIONS (Continued)

16-PIN PACKAGE

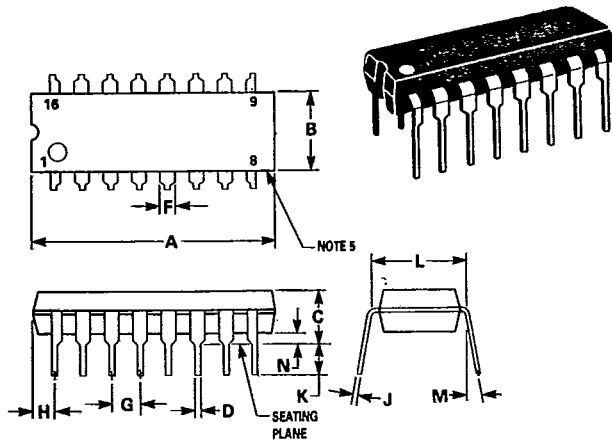
CERAMIC PACKAGE  
CASE 620-09



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
  4. DIM F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	19.05	19.55	0.750	0.770
B	6.10	7.36	0.240	0.290
C	—	4.19	—	0.165
D	0.39	0.53	0.015	0.021
E	1.27 BSC		0.050 BSC	
F	1.40	1.77	0.055	0.070
G	2.54 BSC		0.100 BSC	
J	0.23	0.27	0.009	0.011
K	—	5.08	—	0.200
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.39	0.88	0.015	0.035

PLASTIC PACKAGE  
CASE 648-06



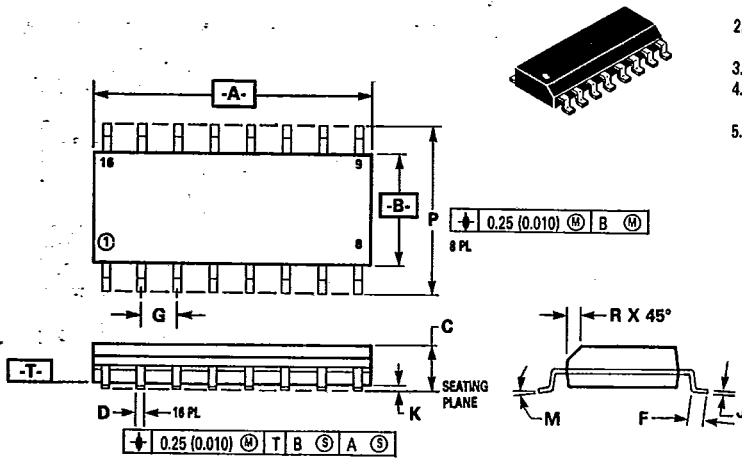
- NOTES:
1. LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
  2. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
  3. DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
  4. "F" DIMENSION IS FOR FULL LEADS.
  5. ROUNDED CORNERS OPTIONAL.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.80	21.34	0.740	0.840
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	0.38	2.41	0.015	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	0.39	1.01	0.015	0.040

PACKAGE DIMENSIONS (Continued)

16-PIN PACKAGE

SOIC PACKAGE  
CASE 751B-03  
D SUFFIX

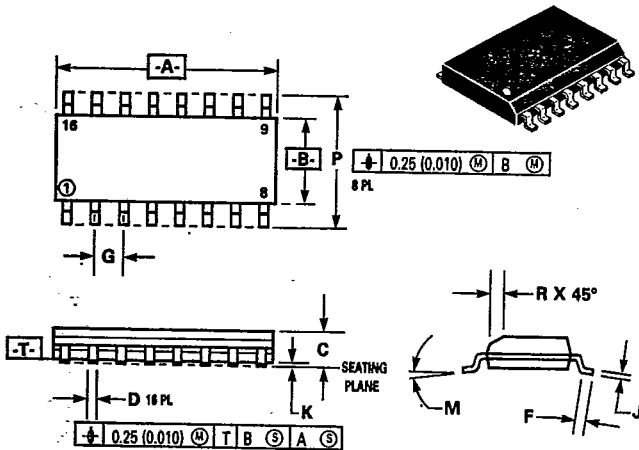


NOTES:

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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	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	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	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

SOIC PACKAGE  
CASE 751G-01  
DW SUFFIX



NOTES:

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

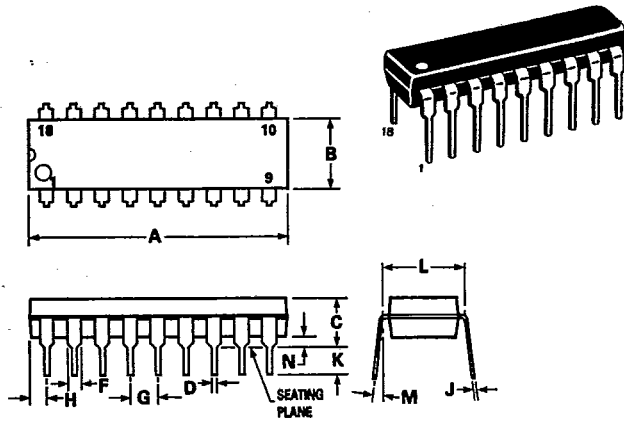
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.15	10.45	0.400	0.411
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
	0.25	0.75	0.010	0.029



PACKAGE DIMENSIONS (Continued)

18-PIN PACKAGE

PLASTIC PACKAGE  
CASE 707-02

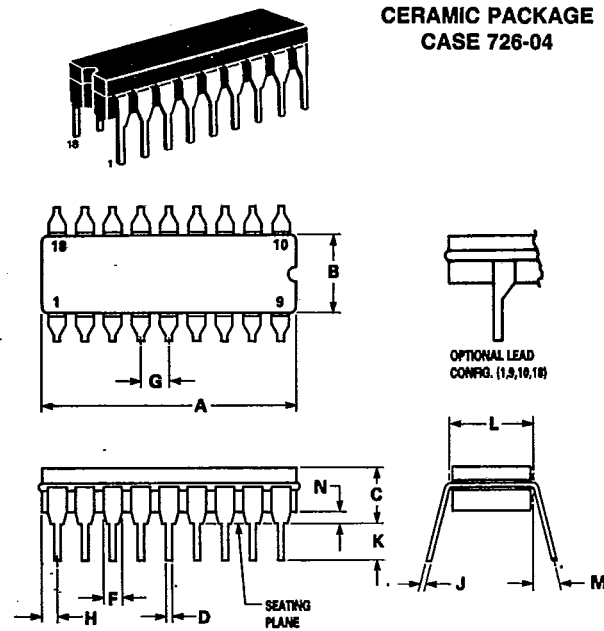


NOTES:

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.

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

CERAMIC PACKAGE  
CASE 726-04



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.

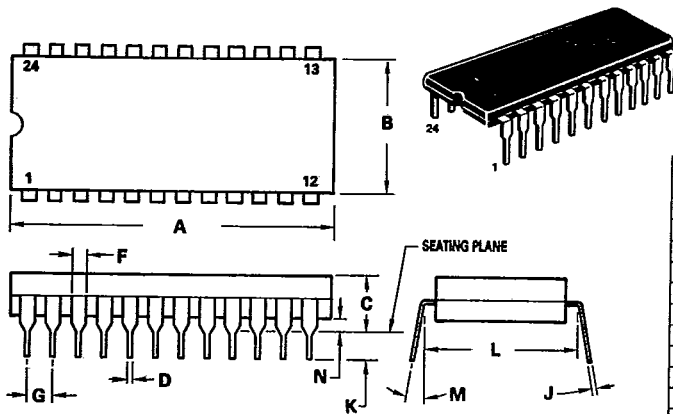
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	22.35	23.11	0.880	0.910
B	6.10	7.49	0.240	0.295
C	—	5.08	—	0.200
D	0.38	0.53	0.015	0.021
F	1.40	1.78	0.055	0.070
G	2.54 BSC		0.100 BSC	
H	0.51	1.14	0.020	0.045
J	0.20	0.30	0.008	0.012
K	3.18	4.32	0.125	0.170
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.02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

9

PACKAGE DIMENSIONS (Continued)

24-PIN PACKAGE

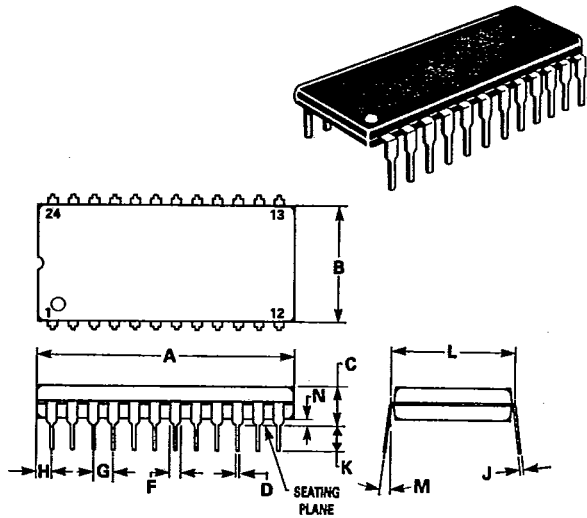
CERAMIC PACKAGE  
CASE 623-05



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	31.24	32.77	1.230	1.290
B	12.70	15.49	0.500	0.610
C	4.06	5.59	0.160	0.220
D	0.41	0.51	0.016	0.020
F	1.27	1.52	0.050	0.060
G	2.54 BSC		0.100 BSC	
J	0.20	0.30	0.008	0.012
K	3.18	4.06	0.125	0.160
L	15.24 BSC		0.600 BSC	
M	0°	15°	0°	15°
N	0.51	1.27	0.020	0.050

PLASTIC PACKAGE  
CASE 709-02



- NOTES:
1. POSITIONAL TOLERANCE OF LEADS (D), SHALL BE WITHIN 0.25 mm (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.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	31.37	32.13	1.235	1.265
B	13.72	14.22	0.540	0.560
C	3.94	5.08	0.155	0.200
D	0.36	0.56	0.014	0.022
F	1.02	1.52	0.040	0.060
G	2.54 BSC		0.100 BSC	
H	1.65	2.03	0.065	0.080
J	0.20	0.38	0.008	0.015
K	2.92	3.43	0.115	0.135
L	15.24 BSC		0.600 BSC	
M	0°	15°	0°	15°
N	0.51	1.02	0.020	0.040