

# MC14584B

## Hex Schmitt Trigger

The MC14584B Hex Schmitt Trigger is constructed with MOS P-channel and N-channel enhancement mode devices in a single monolithic structure. These devices find primary use where low power dissipation and/or high noise immunity is desired. The MC14584B may be used in place of the MC14069UB hex inverter for enhanced noise immunity to “square up” slowly changing waveforms.

### Features

- Supply Voltage Range = 3.0 Vdc to 18 Vdc
- Capable of Driving Two Low-power TTL Loads or One Low-power Schottky TTL Load over the Rated Temperature Range
- Double Diode Protection on All Inputs
- Can Be Used to Replace MC14069UB
- For Greater Hysteresis, Use MC14106B which is Pin-for-Pin Replacement for CD40106B and MM74C14
- Pb-Free Packages are Available\*

### MAXIMUM RATINGS (Voltages Referenced to V<sub>SS</sub>)

Symbol	Parameter	Value	Unit
V <sub>DD</sub>	DC Supply Voltage Range	-0.5 to +18.0	V
V <sub>in</sub> , V <sub>out</sub>	Input or Output Voltage Range (DC or Transient)	-0.5 to V <sub>DD</sub> + 0.5	V
I <sub>in</sub> , I <sub>out</sub>	Input or Output Current (DC or Transient) per Pin	±10	mA
P <sub>D</sub>	Power Dissipation, per Package (Note 1)	500	mW
T <sub>A</sub>	Ambient Temperature Range	-55 to +125	°C
T <sub>stg</sub>	Storage Temperature Range	-65 to +150	°C
T <sub>L</sub>	Lead Temperature (8-Second Soldering)	260	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

#### 1. Temperature Derating:

Plastic “P and D/DW” Packages: - 7.0 mW/°C From 65°C To 125°C

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V<sub>in</sub> and V<sub>out</sub> should be constrained to the range V<sub>SS</sub> ≤ (V<sub>in</sub> or V<sub>out</sub>) ≤ V<sub>DD</sub>.

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.

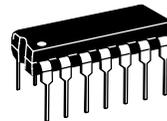
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



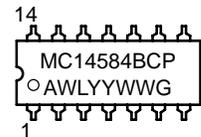
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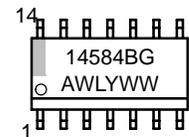
### MARKING DIAGRAMS



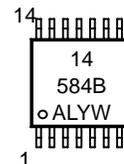
PDIP-14  
P SUFFIX  
CASE 646



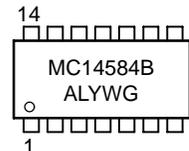
SOIC-14  
D SUFFIX  
CASE 751A



TSSOP-14  
DT SUFFIX  
CASE 948G



SOEIAJ-14  
F SUFFIX  
CASE 965



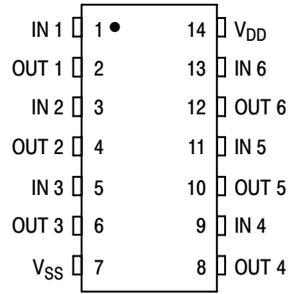
A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week  
G = Pb-Free Indicator

### ORDERING INFORMATION

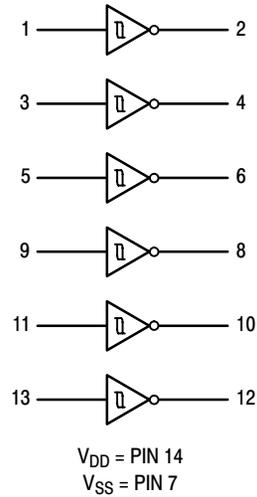
See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

# MC14584B

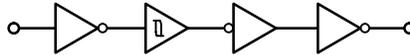
## PIN ASSIGNMENT



## LOGIC DIAGRAM



## EQUIVALENT CIRCUIT SCHEMATIC (1/6 OF CIRCUIT SHOWN)



## ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
MC14584BCP	PDIP-14	500 Units / Rail
MC14584BCPG	PDIP-14 (Pb-Free)	500 Units / Rail
MC14584BD	SOIC-14	55 Units / Rail
MC14584BDG	SOIC-14 (Pb-Free)	55 Units / Rail
MC14584BDR2	SOIC-14	2500 Units / Tape & Reel
MC14584BDR2G	SOIC-14 (Pb-Free)	2500 Units / Tape & Reel
MC14584BDTR2	TSSOP-14*	2500 Units / Tape & Reel
MC14584BF	SOEIAJ-14	50 Units / Rail
MC14584BFEL	SOEIAJ-14	2000 Units / Tape & Reel
MC14584BFELG	SOEIAJ-14 (Pb-Free)	2000 Units / Tape & Reel

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*This package is inherently Pb-Free.

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## ELECTRICAL CHARACTERISTICS (Voltages Referenced to $V_{SS}$ )

Characteristic	Symbol	$V_{DD}$ Vdc	- 55°C		25°C			125°C		Unit	
			Min	Max	Min	Typ <sup>(2)</sup>	Max	Min	Max		
Output Voltage $V_{in} = V_{DD}$  $V_{in} = 0$	"0" Level $V_{OL}$	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 $V_{OH}$	5.0	4.95	-	4.95	5.0	-	4.95	-		
		10	9.95	-	9.95	10	-	9.95	-		
		15	14.95	-	14.95	15	-	14.95	-		
Output Drive Current ( $V_{OH} = 2.5$ Vdc) ( $V_{OH} = 4.6$ Vdc) ( $V_{OH} = 9.5$ Vdc) ( $V_{OH} = 13.5$ Vdc)  ( $V_{OL} = 0.4$ Vdc) ( $V_{OL} = 0.5$ Vdc) ( $V_{OL} = 1.5$ Vdc)	Source $I_{OH}$	5.0	- 3.0	-	- 2.4	- 4.2	-	- 1.7	-	mAdc	
		5.0	- 0.64	-	- 0.51	- 0.88	-	- 0.36	-		
		10	- 1.6	-	- 1.3	- 2.25	-	- 0.9	-		
		15	- 4.2	-	- 3.4	- 8.8	-	- 2.4	-		
	Sink $I_{OL}$	5.0	0.64	-	0.51	0.88	-	0.36	-		mAdc
		10	1.6	-	1.3	2.25	-	0.9	-		
15	4.2	-	3.4	8.8	-	2.4	-	-			
Input Current	$I_{in}$	15	-	$\pm 0.1$	-	$\pm 0.00001$	$\pm 0.1$	-	$\pm 1.0$	$\mu$ Adc	
Input Capacitance ( $V_{in} = 0$ )	$C_{in}$	-	-	-	-	5.0	7.5	-	-	pF	
Quiescent Current (Per Package)	$I_{DD}$	5.0	-	0.25	-	0.0005	0.25	-	7.5	$\mu$ Adc	
		10	-	0.5	-	0.0010	0.5	-	15		
		15	-	1.0	-	0.0015	1.0	-	30		
Total Supply Current <sup>(3) (4)</sup> (Dynamic plus Quiescent, Per Package) ( $C_L = 50$ pF on all outputs, all buffers switching)	$I_T$	5.0	$I_T = (1.8 \mu\text{A/kHz}) f + I_{DD}$							$\mu$ Adc	
		10	$I_T = (3.6 \mu\text{A/kHz}) f + I_{DD}$								
		15	$I_T = (5.4 \mu\text{A/kHz}) f + I_{DD}$								
Hysteresis Voltage	$V_H^{(5)}$	5.0	0.27	1.0	0.25	0.6	1.0	0.21	1.0	Vdc	
		10	0.36	1.3	0.3	0.7	1.2	0.25	1.2		
		15	0.77	1.7	0.6	1.1	1.5	0.50	1.4		
Threshold Voltage Positive-Going  Negative-Going	$V_{T+}$	5.0	1.9	3.5	1.8	2.7	3.4	1.7	3.4	Vdc	
		10	3.4	7.0	3.3	5.3	6.9	3.2	6.9		
		15	5.2	10.6	5.2	8.0	10.5	5.2	10.5		
	$V_{T-}$	5.0	1.6	3.3	1.6	2.1	3.2	1.5	3.2		
		10	3.0	6.7	3.0	4.6	6.7	3.0	6.7		
		15	4.5	9.7	4.6	6.9	9.8	4.7	9.9		

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

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

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

$$I_T(C_L) = I_T(50 \text{ pF}) + (C_L - 50) \text{ Vfk}$$

where:  $I_T$  is in  $\mu\text{A}$  (per package),  $C_L$  in pF,  $V = (V_{DD} - V_{SS})$  in volts,  $f$  in kHz is input frequency, and  $k = 0.001$ .

5.  $V_H = V_{T+} - V_{T-}$  (But maximum variation of  $V_H$  is specified as less than  $V_{T+ \text{ max}} - V_{T- \text{ min}}$ ).

## SWITCHING CHARACTERISTICS ( $C_L = 50$ pF, $T_A = 25^\circ\text{C}$ )

Characteristic	Symbol	$V_{DD}$ Vdc	Min	Typ <sup>(6)</sup>	Max	Unit
Output Rise Time	$t_{TLH}$	5.0	-	100	200	ns
		10	-	50	100	
		15	-	40	80	
Output Fall Time	$t_{THL}$	5.0	-	100	200	ns
		10	-	50	100	
		15	-	40	80	
Propagation Delay Time	$t_{PLH}, t_{PHL}$	5.0	-	125	250	ns
		10	-	50	100	
		15	-	40	80	

6. 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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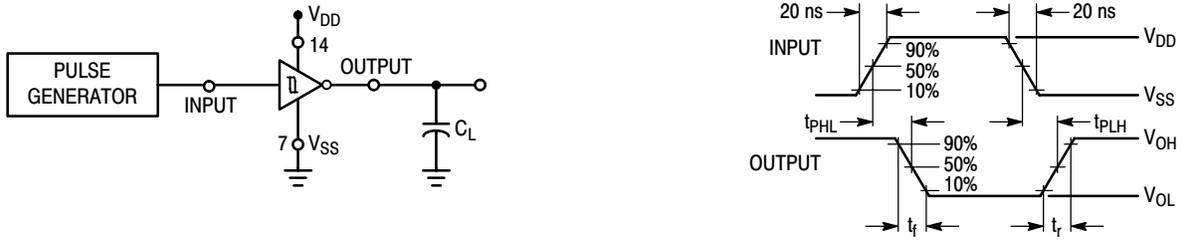
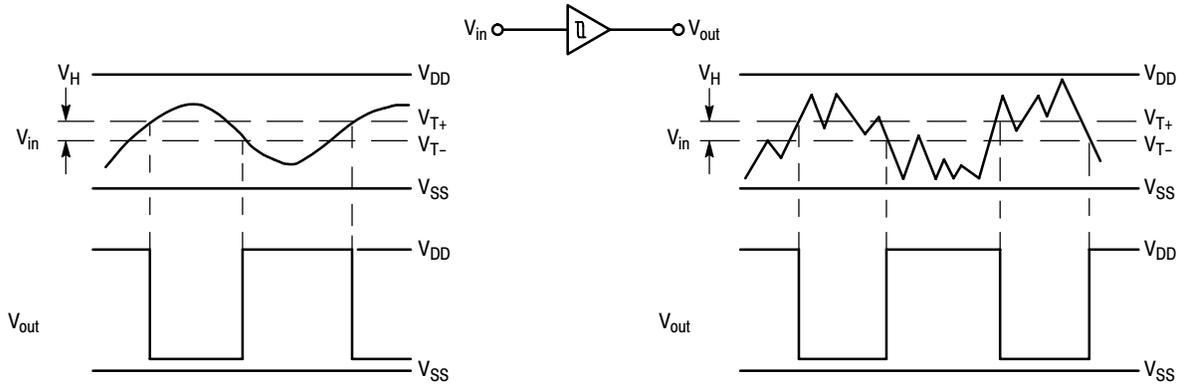


Figure 1. Switching Time Test Circuit and Waveforms



(a) Schmitt Triggers will square up inputs with slow rise and fall times.

(b) A Schmitt trigger offers maximum noise immunity in gate applications.

Figure 2. Typical Schmitt Trigger Applications

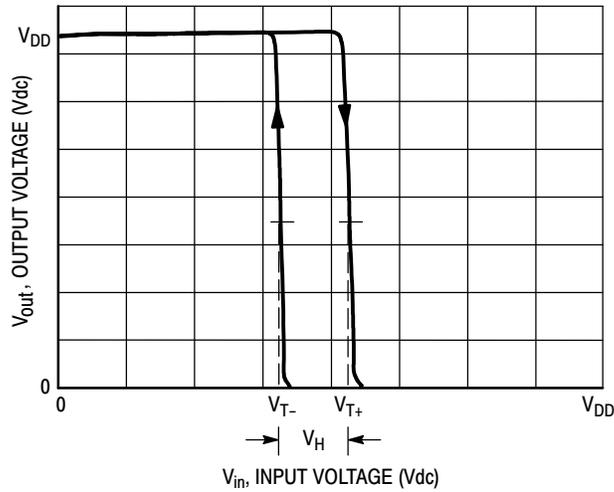
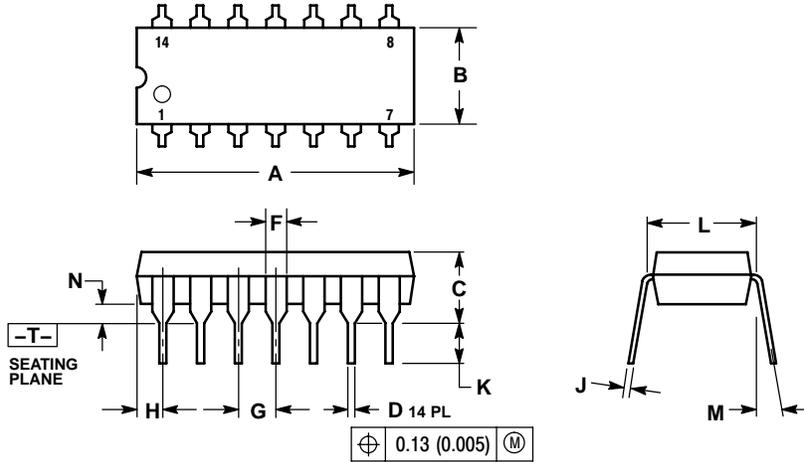


Figure 3. Typical Transfer Characteristics

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## PACKAGE DIMENSIONS

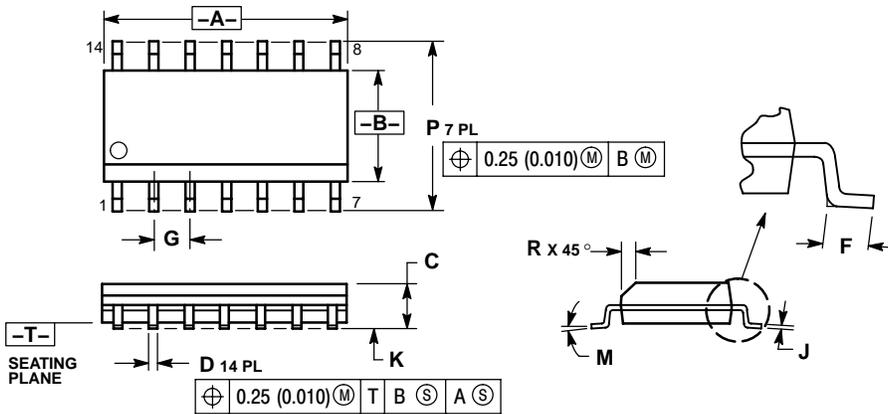
PDIP-14  
P SUFFIX  
CASE 646-06  
ISSUE N



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
  5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.715	0.770	18.16	18.80
B	0.240	0.260	6.10	6.60
C	0.145	0.185	3.69	4.69
D	0.015	0.021	0.38	0.53
F	0.040	0.070	1.02	1.78
G	0.100 BSC		2.54 BSC	
H	0.052	0.095	1.32	2.41
J	0.008	0.015	0.20	0.38
K	0.115	0.135	2.92	3.43
L	0.290	0.310	7.37	7.87
M	---	10°	---	10°
N	0.015	0.039	0.38	1.01

SOIC-14  
D SUFFIX  
CASE 751A-03  
ISSUE G



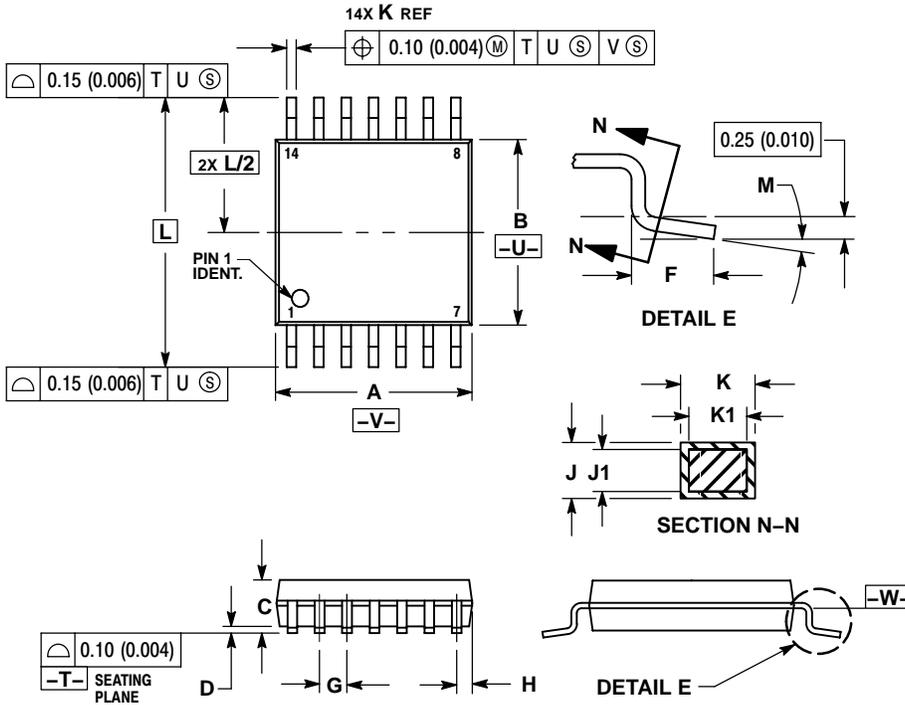
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

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	0.228	0.244
R	0.25	0.50	0.010	0.019

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## PACKAGE DIMENSIONS

TSSOP-14  
DT SUFFIX  
CASE 948G-01  
ISSUE O



### NOTES:

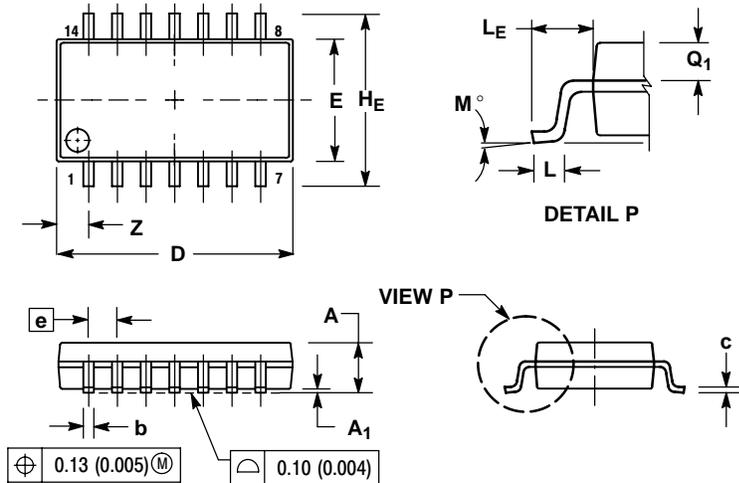
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.90	5.10	0.193	0.200
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.50	0.60	0.020	0.024
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

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## PACKAGE DIMENSIONS

SOEIAJ-14  
F SUFFIX  
CASE 965-01  
ISSUE O



**NOTES:**

- 1 DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- 2 CONTROLLING DIMENSION: MILLIMETER.
- 3 DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
- 4 TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
- 5 THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	---	2.05	---	0.081
A <sub>1</sub>	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.18	0.27	0.007	0.011
D	9.90	10.50	0.390	0.413
E	5.10	5.45	0.201	0.215
e	1.27 BSC		0.050 BSC	
H <sub>E</sub>	7.40	8.20	0.291	0.323
0.50	0.50	0.85	0.020	0.033
L <sub>E</sub>	1.10	1.50	0.043	0.059
M	0° 10°		0° 10°	
Q <sub>1</sub>	0.70	0.90	0.028	0.035
Z	---	1.42	---	0.056

# MC14584B

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