

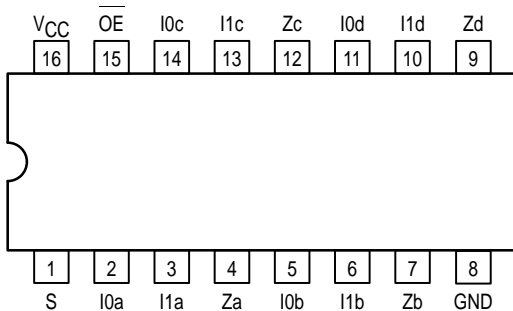
*Product Preview*  
**Low-Voltage CMOS Quad  
2-Input Multiplexer  
With 5V-Tolerant Inputs and Outputs  
(3-State, Non-Inverting)**

The MC74LCX257 is a high performance, quad 2-input multiplexer with 3-state outputs operating from a 2.7 to 3.6V supply. High impedance TTL compatible inputs significantly reduce current loading to input drivers while TTL compatible outputs offer improved switching noise performance. A  $V_I$  specification of 5.5V allows MC74LCX257 inputs to be safely driven from 5V devices.

Four bits of data from two sources can be selected using the Select input. The four outputs present the selected data in the true (non-inverted) form. The outputs may be switched to a high impedance state by placing a logic HIGH on the Output Enable (OE) input. Current drive capability is 24mA at the outputs.

- Designed for 2.7 to 3.6V  $V_{CC}$  Operation
- 5V Tolerant — Interface Capability With 5V TTL Logic
- Supports Live Insertion and Withdrawal
- I<sub>OFF</sub> Specification Guarantees High Impedance When  $V_{CC} = 0V$
- LVTTTL Compatible
- LVC MOS Compatible
- 24mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current in All Three Logic States (10µA)  
Substantially Reduces System Power Requirements
- Latchup Performance Exceeds 500mA
- ESD Performance: Human Body Model >2000V; Machine Model >200V

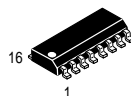
**Pinout: 16-Lead Plastic Package**  
(Top View)



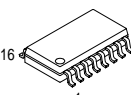
**MC74LCX257**

**LCX**

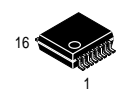
**LOW-VOLTAGE CMOS  
QUAD 2-INPUT MULTIPLEXER**



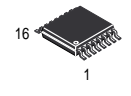
**D SUFFIX**  
PLASTIC SOIC  
CASE 751B-05



**M SUFFIX**  
PLASTIC SOIC EIAJ  
CASE 966-01



**SD SUFFIX**  
PLASTIC SSOP  
CASE 940B-03



**DT SUFFIX**  
PLASTIC TSSOP  
CASE 948F-01

**PIN NAMES**

Pins	Function
I0n	Source 0 Data Inputs
I1n	Source 1 Data Inputs
OE	Output Enable Input
S	Select Input
Zn	Outputs

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.





**ABSOLUTE MAXIMUM RATINGS\***

Symbol	Parameter	Value	Condition	Unit
V <sub>CC</sub>	DC Supply Voltage	-0.5 to +7.0		V
V <sub>I</sub>	DC Input Voltage	-0.5 ≤ V <sub>I</sub> ≤ +7.0		V
V <sub>O</sub>	DC Output Voltage	-0.5 ≤ V <sub>O</sub> ≤ +7.0	Output in 3-State	V
		-0.5 ≤ V <sub>O</sub> ≤ V <sub>CC</sub> + 0.5	Note 1.	V
I <sub>IK</sub>	DC Input Diode Current	-50	V <sub>I</sub> < GND	mA
I <sub>OK</sub>	DC Output Diode Current	-50	V <sub>O</sub> < GND	mA
		+50	V <sub>O</sub> > V <sub>CC</sub>	mA
I <sub>O</sub>	DC Output Source/Sink Current	±50		mA
I <sub>CC</sub>	DC Supply Current Per Supply Pin	±100		mA
I <sub>GND</sub>	DC Ground Current Per Ground Pin	±100		mA
T <sub>STG</sub>	Storage Temperature Range	-65 to +150		°C

\* Absolute maximum continuous ratings are those values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation under absolute-maximum-rated conditions is not implied.

1. Output in HIGH or LOW State. I<sub>O</sub> absolute maximum rating must be observed.

**RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Min	Typ	Max	Unit	
V <sub>CC</sub>	Supply Voltage	Operating	2.0	3.3	3.6	V
		Data Retention Only	1.5	3.3	3.6	
V <sub>I</sub>	Input Voltage	0		5.5	V	
V <sub>O</sub>	Output Voltage (HIGH or LOW State) (3-State)	0		V <sub>CC</sub>	V	
		0		5.5		
I <sub>OH</sub>	HIGH Level Output Current, V <sub>CC</sub> = 3.0V – 3.6V			-24	mA	
I <sub>OL</sub>	LOW Level Output Current, V <sub>CC</sub> = 3.0V – 3.6V			24	mA	
I <sub>OH</sub>	HIGH Level Output Current, V <sub>CC</sub> = 2.7V – 3.0V			-12	mA	
I <sub>OL</sub>	LOW Level Output Current, V <sub>CC</sub> = 2.7V – 3.0V			12	mA	
T <sub>A</sub>	Operating Free-Air Temperature	-40		+85	°C	
Δt/ΔV	Input Transition Rise or Fall Rate, V <sub>IN</sub> from 0.8V to 2.0V, V <sub>CC</sub> = 3.0V	0		10	ns/V	

**DC ELECTRICAL CHARACTERISTICS**

Symbol	Characteristic	Condition	T <sub>A</sub> = -40°C to +85°C		Unit
			Min	Max	
V <sub>IH</sub>	HIGH Level Input Voltage (Note 2.)	2.7V ≤ V <sub>CC</sub> ≤ 3.6V	2.0		V
V <sub>IL</sub>	LOW Level Input Voltage (Note 2.)	2.7V ≤ V <sub>CC</sub> ≤ 3.6V		0.8	V
V <sub>OH</sub>	HIGH Level Output Voltage	2.7V ≤ V <sub>CC</sub> ≤ 3.6V; I <sub>OH</sub> = -100μA	V <sub>CC</sub> - 0.2		V
		V <sub>CC</sub> = 2.7V; I <sub>OH</sub> = -12mA	2.2		
		V <sub>CC</sub> = 3.0V; I <sub>OH</sub> = -18mA	2.4		
		V <sub>CC</sub> = 3.0V; I <sub>OH</sub> = -24mA	2.2		
V <sub>OL</sub>	LOW Level Output Voltage	2.7V ≤ V <sub>CC</sub> ≤ 3.6V; I <sub>OL</sub> = 100μA		0.2	V
		V <sub>CC</sub> = 2.7V; I <sub>OL</sub> = 12mA		0.4	
		V <sub>CC</sub> = 3.0V; I <sub>OL</sub> = 16mA		0.4	
		V <sub>CC</sub> = 3.0V; I <sub>OL</sub> = 24mA		0.55	

2. These values of V<sub>I</sub> are used to test DC electrical characteristics only.

**DC ELECTRICAL CHARACTERISTICS** (continued)

Symbol	Characteristic	Condition	$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		Unit
			Min	Max	
$I_I$	Input Leakage Current	$2.7\text{V} \leq V_{CC} \leq 3.6\text{V}; 0\text{V} \leq V_I \leq 5.5\text{V}$		$\pm 5.0$	$\mu\text{A}$
$I_{OZ}$	3-State Output Current	$2.7 \leq V_{CC} \leq 3.6\text{V}; 0\text{V} \leq V_O \leq 5.5\text{V}; V_I = V_{IH} \text{ or } V_{IL}$		$\pm 5.0$	$\mu\text{A}$
$I_{OFF}$	Power-Off Leakage Current	$V_{CC} = 0\text{V}; V_I \text{ or } V_O = 5.5\text{V}$		10	$\mu\text{A}$
$I_{CC}$	Quiescent Supply Current	$2.7 \leq V_{CC} \leq 3.6\text{V}; V_I = \text{GND or } V_{CC}$		10	$\mu\text{A}$
		$2.7 \leq V_{CC} \leq 3.6\text{V}; 3.6 \leq V_I \text{ or } V_O \leq 5.5\text{V}$		$\pm 10$	$\mu\text{A}$
$\Delta I_{CC}$	Increase in $I_{CC}$ per Input	$2.7 \leq V_{CC} \leq 3.6\text{V}; V_{IH} = V_{CC} - 0.6\text{V}$		500	$\mu\text{A}$

**AC CHARACTERISTICS** ( $t_R = t_F = 2.5\text{ns}; C_L = 50\text{pF}; R_L = 500\Omega$ )

Symbol	Parameter	Waveform	Limits			Unit
			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$			
			$V_{CC} = 3.0\text{V to } 3.6\text{V}$		$V_{CC} = 2.7\text{V}$	
			Min	Max	Max	
$t_{PLH}$ $t_{PHL}$	Propagation Delay In to Zn	1	1.5 1.5	6.0 6.0	6.5 6.5	ns
$t_{PLH}$ $t_{PHL}$	Propagation Delay S to Zn	1,2	1.5 1.5	7.0 7.0	8.5 8.5	ns
$t_{PZH}$ $t_{PZL}$	Output Enable Time to HIGH and LOW Level	3	1.5 1.5	7.0 7.0	8.5 8.5	ns
$t_{PHZ}$ $t_{PLZ}$	Output Disable Time from HIGH and LOW Level	3	1.5 1.5	5.5 5.5	6.0 6.0	ns
$t_{OSHL}$ $t_{OSLH}$	Output-to-Output Skew (Note 3.)			1.0 1.0		ns

3. Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH-to-LOW ( $t_{OSHL}$ ) or LOW-to-HIGH ( $t_{OSLH}$ ); parameter guaranteed by design.

**DYNAMIC SWITCHING CHARACTERISTICS**

Symbol	Characteristic	Condition	$T_A = +25^\circ\text{C}$			Unit
			Min	Typ	Max	
$V_{OLP}$	Dynamic LOW Peak Voltage (Note 4.)	$V_{CC} = 3.3\text{V}, C_L = 50\text{pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$		0.8		V
$V_{OLV}$	Dynamic LOW Valley Voltage (Note 4.)	$V_{CC} = 3.3\text{V}, C_L = 50\text{pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$		0.8		V

4. Number of outputs defined as "n". Measured with "n-1" outputs switching from HIGH-to-LOW or LOW-to-HIGH. The remaining output is measured in the LOW state.

**CAPACITIVE CHARACTERISTICS**

Symbol	Parameter	Condition	Typical	Unit
$C_{IN}$	Input Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}$	7	pF
$C_{OUT}$	Output Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}$	8	pF
$C_{PD}$	Power Dissipation Capacitance	10MHz, $V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}$	25	pF

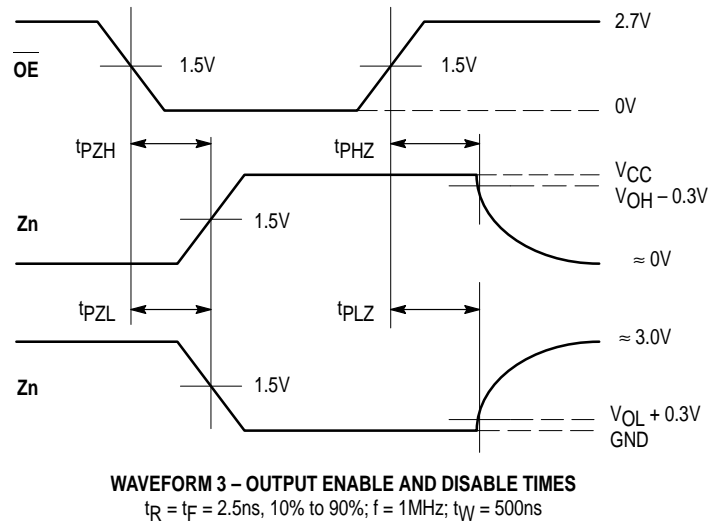
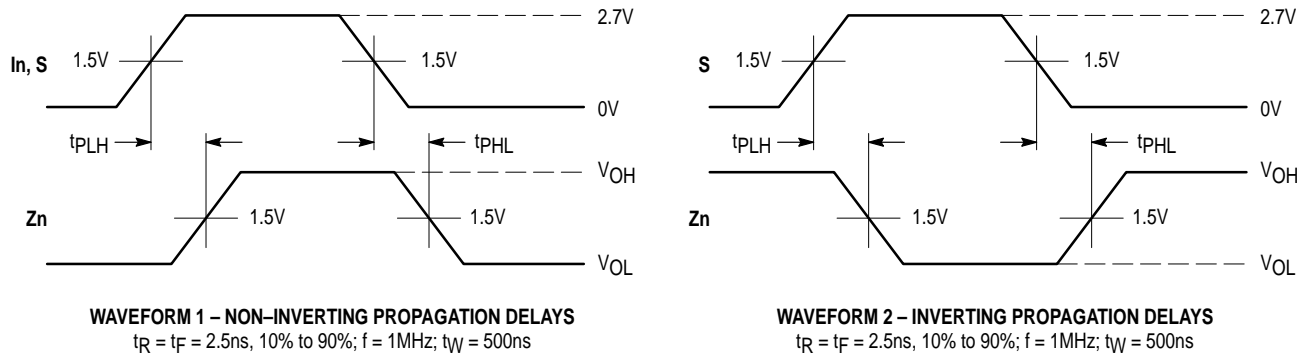
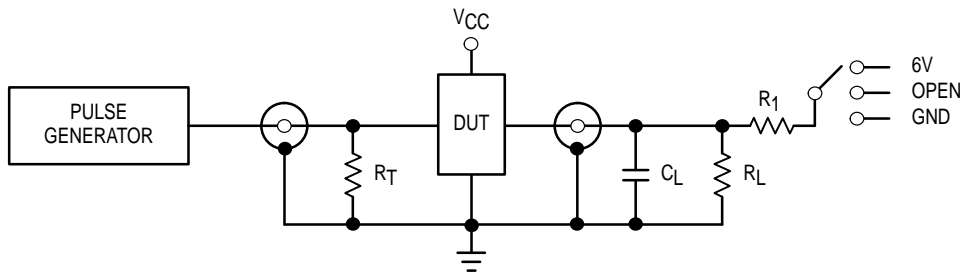


Figure 1. AC Waveforms



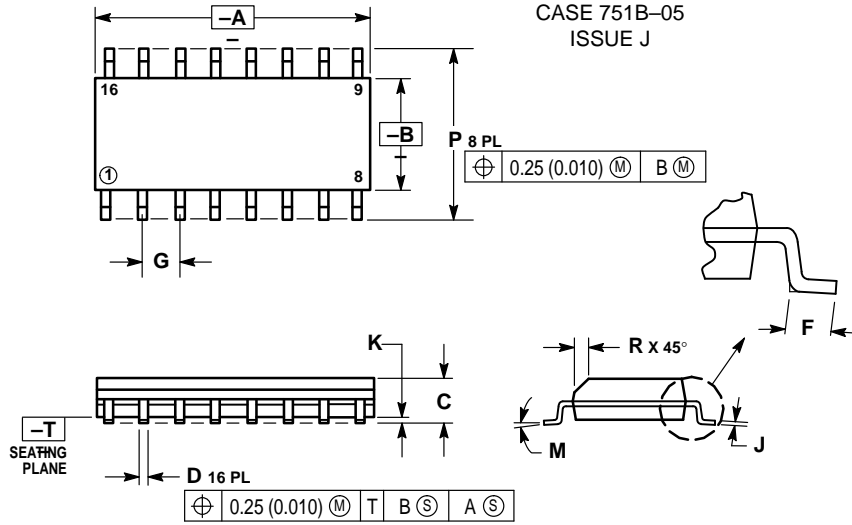
TEST	SWITCH
$t_{PLH}$ , $t_{PHL}$	Open
$t_{PZL}$ , $t_{PLZ}$	6V
Open Collector/Drain $t_{PLH}$ and $t_{PHL}$	6V
$t_{PZH}$ , $t_{PHZ}$	GND

$C_L = 50\text{pF}$  or equivalent (Includes jig and probe capacitance)  
 $R_L = R_1 = 500\Omega$  or equivalent  
 $R_T = Z_{OUT}$  of pulse generator (typically  $50\Omega$ )

Figure 2. Test Circuit

OUTLINE DIMENSIONS

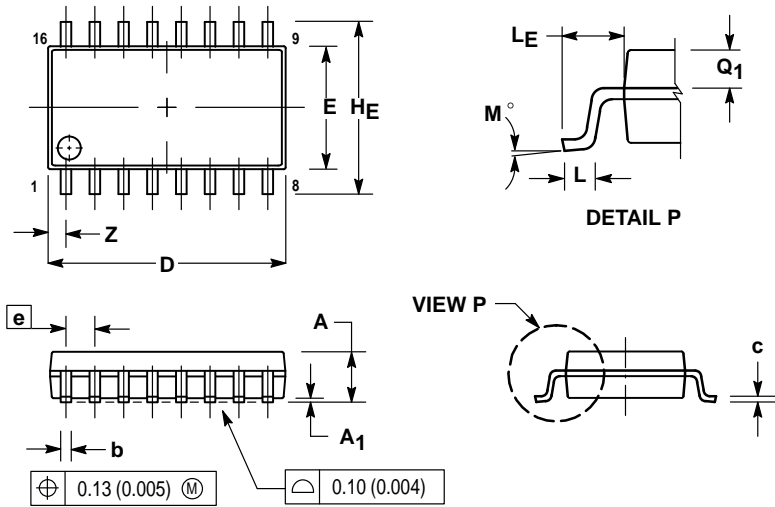
D SUFFIX  
PLASTIC SOIC PACKAGE  
CASE 751B-05  
ISSUE J



- 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	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

M SUFFIX  
PLASTIC SOIC EIAJ PACKAGE  
CASE 966-01  
ISSUE O

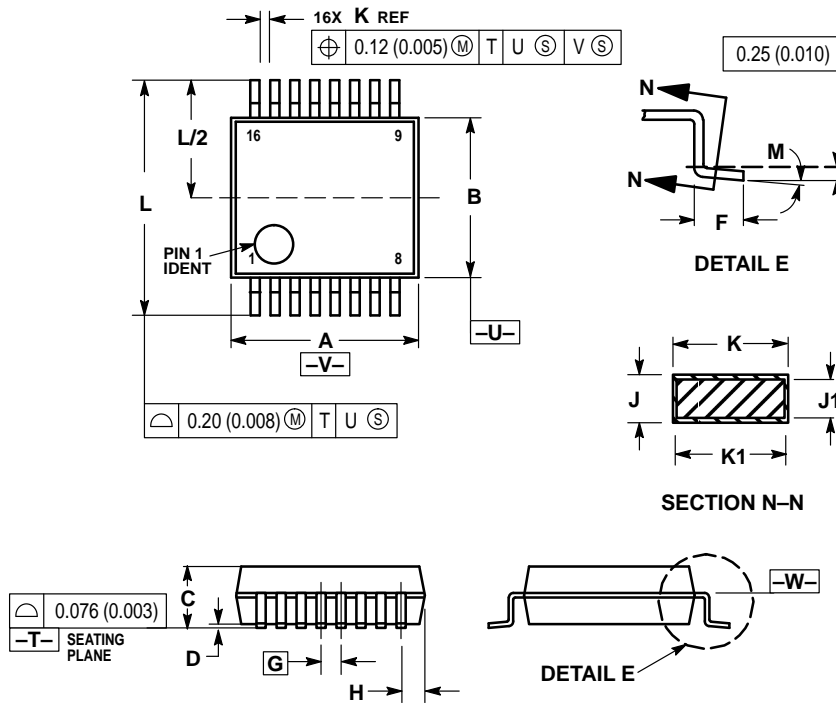


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
  4. TERMINAL NUMBERS ARE SHOWN 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	
HE	7.40	8.20	0.291	0.323
L	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	---	0.78	---	0.031

OUTLINE DIMENSIONS

SD SUFFIX  
 PLASTIC SSOP PACKAGE  
 CASE 940B-03  
 ISSUE B

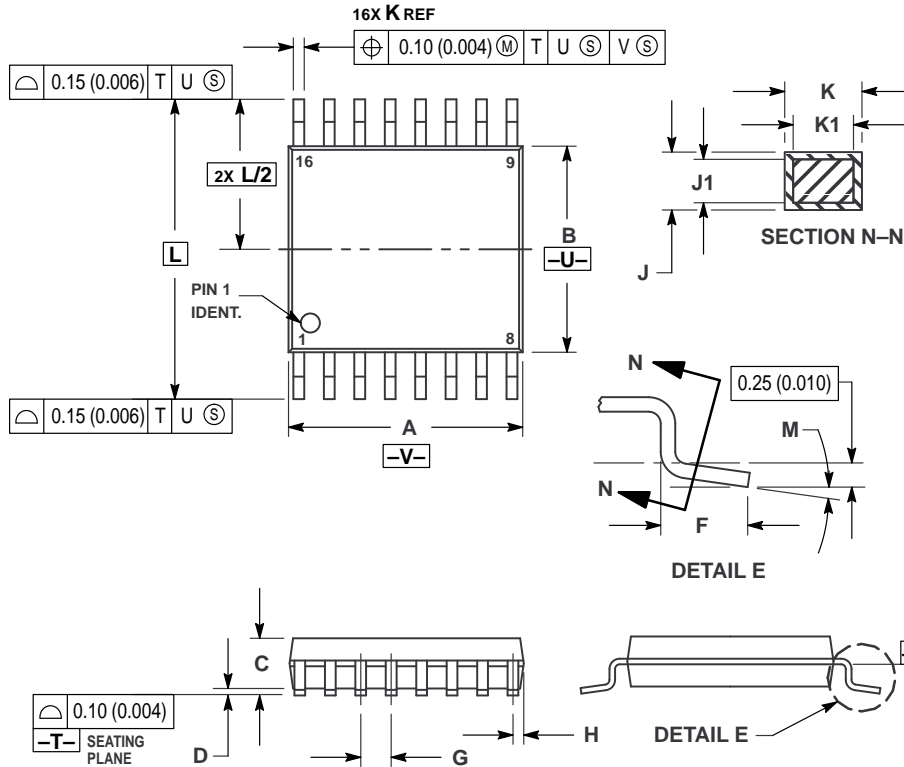


- NOTES:
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  - CONTROLLING DIMENSION: MILLIMETER.
  - DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
  - DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
  - DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION/INTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF K DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR INTRUSION SHALL NOT REDUCE DIMENSION K BY MORE THAN 0.07 (0.002) AT LEAST MATERIAL CONDITION.
  - TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
  - DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.07	6.33	0.238	0.249
B	5.20	5.38	0.205	0.212
C	1.73	1.99	0.068	0.078
D	0.05	0.21	0.002	0.008
F	0.63	0.95	0.024	0.037
G	0.65 BSC		0.026 BSC	
H	0.73	0.90	0.028	0.035
J	0.09	0.20	0.003	0.008
J1	0.09	0.16	0.003	0.006
K	0.25	0.38	0.010	0.015
K1	0.25	0.33	0.010	0.013
L	7.65	7.90	0.301	0.311
M	0°	8°	0°	8°

OUTLINE DIMENSIONS

DT SUFFIX  
 PLASTIC TSSOP PACKAGE  
 CASE 948F-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	0.85 BSC	—	0.026 BSC	—
H	0.18	0.28	0.007	0.011
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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