# **Quad 2-Channel Multiplexer** with 3-State Outputs

The MC74VHCT257A is an advanced high speed CMOS quad 2-channel multiplexer fabricated with silicon gate CMOS technology. It achieves high speed operation similar to equivalent Bipolar Schottky TTL while maintaining CMOS low power dissipation.

It consists of four 2-input digital multiplexers with common select (S) and enable  $(\overline{OE})$  inputs. When  $(\overline{OE})$  is held High, selection of data is inhibited and all the outputs go Low.

The select decoding determines whether the A or B inputs get routed to the corresponding Y outputs.

The VHCT inputs are compatible with TTL levels. This device can be used as a level converter for interfacing 3.3 V to 5.0 V because it has full 5.0 V CMOS level output swings.

The VHCT257A input structures provide protection when voltages between 0 V and 5.5 V are applied, regardless of the supply voltage. The output structures also provide protection when  $V_{CC}=0$  V. These input and output structures help prevent device destruction caused by supply voltage—input/output voltage mismatch, battery backup, hot insertion, etc.

The internal circuit is composed of three stages, including a buffered output which provides high noise immunity and stable output. The inputs tolerate voltages up to 7.0 V, allowing the interface of 5.0 V systems to 3.0 V systems.

#### **Features**

- High Speed:  $t_{PD} = 4.1 \text{ ns (Typ)}$  at  $V_{CC} = 5.0 \text{ V}$
- Low Power Dissipation:  $I_{CC} = 4.0 \mu A$  (Max) at  $T_A = 25^{\circ}C$
- TTL-Compatible Inputs:  $V_{IL} = 0.8 \text{ V}$ ;  $V_{IH} = 2.0 \text{ V}$
- Power Down Protection Provided on Inputs and Outputs
- Balanced Propagation Delays
- Designed for 2.0 V to 5.5 V Operating Range
- Low Noise:  $V_{OLP} = 0.8 \text{ V (Max)}$
- Pin and Function Compatible with Other Standard Logic Families
- Latchup Performance Exceeds 300 mA
- ESD Performance:

Human Body Model > 2000 V; Machine Model > 200 V

• Pb-Free Packages are Available\*



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MARKING DIAGRAMS



SOIC-16 D SUFFIX CASE 751B



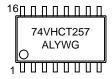


TSSOP-16 DT SUFFIX CASE 948F





SOEIAJ-16 M SUFFIX CASE 966



A = Assembly Location

WL, L = Wafer Lot Y = Year WW, W = Work Week G or ■ = Pb–Free Package

(Note: Microdot may be in either location)

#### **FUNCTION TABLE**

| Inp | Outputs |         |
|-----|---------|---------|
| ŌĒ  | s       | Y0 – Y3 |
| Н   | Х       | Z       |
| L   | L       | A0-A3   |
| L   | Н       | B0-B3   |

A0 - A3, B0 - B3 = the levels of the respective Data–Word Inputs.

# ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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

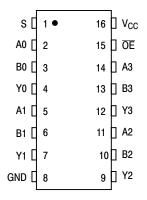


Figure 1. Pin Assignment

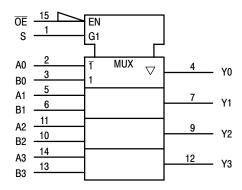


Figure 2. IEC Logic Symbol

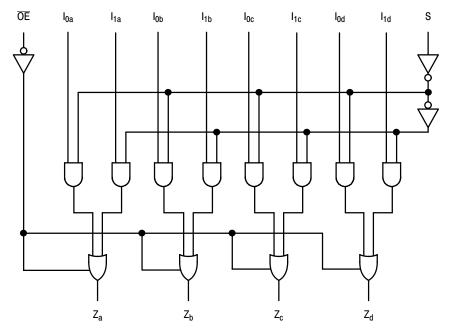


Figure 3. Expanded Logic Diagram

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,  $V_{in}$  and  $V_{out}$  should be constrained to the range GND  $\leq$  ( $V_{in}$  or  $V_{out}$ )  $\leq$   $V_{CC}$ .

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or  $V_{CC}$ ). Unused outputs must be left open.

#### **MAXIMUM RATINGS**

| Symbol               |  | Parameter  | Value  | Unit |
|----------------------|--|--|--|------|
| V <sub>CC</sub>      | Positive DC Supply Voltage                     |  | -0.5 to +7.0                                 | V    |
| V <sub>IN</sub>      | Digital Input Voltage                          |  | -0.5 to +7.0                                 | V    |
| V <sub>OUT</sub>     | DC Output Voltage                              | Output in 3–State<br>High or Low State   | -0.5 to +7.0<br>-0.5 to V <sub>CC</sub> +0.5 | V    |
| I <sub>IK</sub>      | Input Diode Current                            |  | -20  | mA   |
| I <sub>OK</sub>      | Output Diode Current                           |  | ±20  | mA   |
| I <sub>OUT</sub>     | DC Output Current, per Pin                     |  | ± 25   | mA   |
| I <sub>CC</sub>      | DC Supply Current, V <sub>CC</sub> and GND Pin | ns   | ±75  | mA   |
| $P_D$                | Power Dissipation in Still Air                 | SOIC Package<br>TSSOP  | 200<br>180                                   | mW   |
| T <sub>STG</sub>     | Storage Temperature Range                      |  | -65 to +150                                  | °C   |
| V <sub>ESD</sub>     | ESD Withstand Voltage                          | Human Body Model (Note 1)<br>Machine Model (Note 2)<br>Charged Device Model (Note 3) | >2000<br>>200<br>>200                        | V    |
| I <sub>LATCHUP</sub> | Latchup Performance                            | Above V <sub>CC</sub> and Below GND at 125°C (Note 4)                                | ±300   | mA   |
| $\theta_{\sf JA}$    | Thermal Resistance, Junction-to-Am             | bient SOIC Package TSSOP   | 143<br>164                                   | °C/W |

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. Tested to EIA/JESD22-A114-A
- Tested to EIA/JESD22-A115-A
- Tested to JESD22-C101-A
- 4. Tested to EIA/JESD78

#### RECOMMENDED OPERATING CONDITIONS

| Symbol                          | Characteristics                                |  | Min | Max | Unit |
|---------------------------------|--|--|-----|-----|------|
| V <sub>CC</sub>                 | DC Supply Voltage                              |  | 4.5 | 5.5 | V    |
| V <sub>IN</sub>                 | DC Input Voltage                               |  | 0   | 5.5 | V    |
| V <sub>OUT</sub>                | DC Output Voltage                              |  | 0   | 5.5 | V    |
| T <sub>A</sub>                  | Operating Temperature Range, all Package Types |  | -55 | 125 | °C   |
| t <sub>r</sub> , t <sub>f</sub> | Input Rise or Fall Time                        | V <sub>CC</sub> = 5.0 V <u>+</u> 0.5 V | 0   | 20  | ns/V |

#### **DEVICE JUNCTION TEMPERATURE VERSUS TIME TO** 0.1% BOND FAILURES

| Junction       |             |             |
|----------------|-------------|-------------|
| Temperature °C | Time, Hours | Time, Years |
| 80             | 1,032,200   | 117.8       |
| 90             | 419,300     | 47.9        |
| 100            | 178,700     | 20.4        |
| 110            | 79,600      | 9.4         |
| 120            | 37,000      | 4.2         |
| 130            | 17,800      | 2.0         |
| 140            | 8,900       | 1.0         |

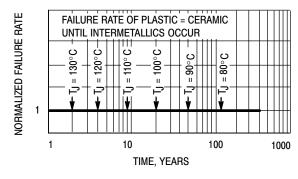


Figure 4. Failure Rate vs. Time Junction Temperature

# DC CHARACTERISTICS (Voltages Referenced to GND)

|                  |  |   | V <sub>CC</sub> | T    | <sub>A</sub> = 25° | С         | $T_A \le$ | 85°C | -55°C ≤ T | <sub>A</sub> ≤ 125°C |      |
|------------------|--|---|-----------------|------|--------------------|-----------|-----------|------|-----------|----------------------|------|
| Symbol           | Parameter  | Condition   | (V)             | Min  | Тур                | Max       | Min       | Max  | Min       | Max                  | Unit |
| V <sub>IH</sub>  | Minimum High-Level<br>Input Voltage              |   | 4.5 to 5.5      | 2    |                    |           | 2         |      | 2         |                      | V    |
| V <sub>IL</sub>  | Maximum Low-Level Input Voltage                  |   | 4.5 to 5.5      |      |                    | 0.8       |           | 0.8  |           | 0.8                  | V    |
| V <sub>OH</sub>  | Maximum High-Level<br>Output Voltage             | $V_{IN} = V_{IH} \text{ or } V_{IL}$<br>$I_{OH} = -50 \mu A$              | 4.5             | 3.94 |                    |           | 3.8       |      | 3.66      |                      | V    |
|                  |  | $V_{IN} = V_{IH} \text{ or } V_{IL}$<br>$I_{OH} = -8 \text{ mA}$          | 4.5             | 3.94 |                    |           | 3.8       |      | 3.66      |                      |      |
| V <sub>OL</sub>  | Maximum Low-Level<br>Output Voltage              | $V_{IN} = V_{IH} \text{ or } V_{IL}$<br>$I_{OL} = 50 \mu A$               | 4.5             |      | 0                  | 0.1       |           | 0.1  |           | 0.1                  | V    |
|                  |  | $V_{IN} = V_{IH} \text{ or } V_{IL}$<br>$I_{OH} = 8 \text{ mA}$           | 4.5             |      |                    | 0.36      |           | 0.44 |           | 0.52                 |      |
| I <sub>IN</sub>  | Input Leakage Current                            | $V_{IN} = 5.5 \text{ V or GND}$   | 0 to 5.5        |      |                    | ±0.1      |           | ±1.0 |           | ±1.0                 | μΑ   |
| l <sub>OZ</sub>  | Maximum 3–State<br>Leakage Current               | $V_{IN} = V_{IH} \text{ or } V_{IL}$<br>$V_{OUT} = V_{CC} \text{ or GND}$ | 5.5             |      |                    | ±0.2<br>5 |           | ±2.5 |           | ±2.5                 | μΑ   |
| Ісст             | Maximum Quiescent<br>Supply Current              | $V_{IN} = V_{CC}$ or GND  | 5.5             |      |                    | 1.35      |           | 1.5  |           | 1.65                 | mA   |
| I <sub>CC</sub>  | Additional Quiescent<br>Supply Current (per pin) | $V_{IN} = V_{CC}$ or GND  | 5.5             |      |                    | 4.0       |           | 40   |           | 40                   | μΑ   |
| I <sub>OPD</sub> | Output Leakage Current                           | V <sub>OUT</sub> = 5.5 V  | 0               |      |                    | 0.5       |           | 5    |           | 5                    | μА   |

# AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3.0 \text{ns}$ )

|  |   |   |  | T   | A = 25°    | С            | <b>T</b> <sub>A</sub> = ≤ 85°C |              | -55°C ≤ T <sub>A</sub> ≤ 125°C |              |      |
|--|---|---|--|-----|------------|--------------|--------------------------------|--------------|--------------------------------|--------------|------|
| Symbol                                 | Parameter                                 | Test Condi  | tions  | Min | Тур        | Max          | Min                            | Max          | Min                            | Max          | Unit |
| t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | Maximum Propagation<br>Delay, A or B to Y | $V_{CC} = 3.3 \pm 0.3 \text{ V}$  | $C_L = 15 pF$<br>$C_L = 50 pF$                 |     | 5.8<br>8.3 | 9.3<br>12.8  | 1.0<br>1.0                     | 11.0<br>14.5 | 1.0<br>1.0                     | 11.0<br>14.5 | ns   |
|  |   | $V_{CC} = 5.0 \pm 0.5 \text{ V}$  | $C_L = 15 \text{ pF}$<br>$C_L = 50 \text{ pF}$ |     | 3.6<br>5.1 | 5.9<br>7.9   | 1.0<br>1.0                     | 7.0<br>9.0   | 1.0<br>1.0                     | 7.0<br>9.0   |      |
| t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | Maximum Propagation<br>Delay, S to Y      | $V_{CC} = 3.3 \pm 0.3 \text{ V}$  | $C_L = 15 \text{ pF}$<br>$C_L = 50 \text{ pF}$ |     | 7.0<br>9.5 | 11.0<br>14.5 | 1.0<br>1.0                     | 13.0<br>16.5 | 1.0<br>1.0                     | 13.0<br>16.5 | ns   |
|  |   | $V_{CC} = 5.0 \pm 0.5 \text{ V}$  | $C_L = 15 \text{ pF}$<br>$C_L = 50 \text{ pF}$ |     | 4.0<br>5.5 | 6.8<br>8.8   | 1.0<br>1.0                     | 8.0<br>10.0  | 1.0<br>1.0                     | 8.0<br>10.0  |      |
| t <sub>PZL</sub> ,<br>t <sub>PZH</sub> | Maximum Output Enable,<br>Time, OE to Y   | $\begin{aligned} &V_{CC} = 3.3 \pm 0.3 \text{ V} \\ &R_L = 1 \text{ k}\Omega \end{aligned}$                               | $C_L = 15 \text{ pF}$<br>$C_L = 50 \text{ pF}$ |     | 6.7<br>9.2 | 10.5<br>14.0 | 1.0<br>1.0                     | 12.5<br>16.0 | 1.0<br>1.0                     | 12.5<br>16.0 | ns   |
|  |   | $V_{CC} = 5.0 \pm 0.5 \text{ V}$ $R_L = 1 \text{ k}\Omega$  |  |     | 3.6<br>5.1 | 6.8<br>11.0  | 1.0<br>12.0                    | 8.0<br>10.0  | 1.0<br>1.0                     | 8.0<br>12.0  |      |
| t <sub>PLZ</sub> ,<br>t <sub>PHZ</sub> | Maximum Output Disable, Time, OE to Y     | $\begin{aligned} &V_{CC} = 3.3 \pm 0.3 \text{ V} \\ &R_L = 1 \text{ k}\Omega \end{aligned}$                               | C <sub>L</sub> = 50 pF                         |     | 10.5       | 14.0         | 1.0                            | 15.0         | 1.0                            | 15.0         | ns   |
|  |   | $\begin{aligned} \text{V}_{\text{CC}} &= 5.0 \pm 0.5 \text{ V} \\ \text{R}_{\text{L}} &= 1 \text{ k}\Omega \end{aligned}$ | C <sub>L</sub> = 50 pF                         |     | 9.5        | 12.0         | 1.0                            | 13.0         | 1.0                            | 13.0         |      |
| C <sub>IN</sub>                        | Maximum Input Capacitance                 |   |  |     | 4          | 10           |                                | 10           |                                | 10           | pF   |
|  |   |   |  |     |            | Typica       | I @ 25º                        | C. Vcc       | = 5.0 V                        |              |      |

|   |          |   | Typical @ 25°C, V <sub>CC</sub> = 5.0 V  |    |
|---|----------|---|--|----|
|   | $C_{PD}$ | Power Dissipation Capacitance (Note 5)                              | 20   | pF |
| , | - 0 :-   | defined as the value of the Sateman and Salest assessing the Salest | The section of the se |    |

C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I<sub>CC(OPR)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>in</sub> + I<sub>CC</sub>. C<sub>PD</sub> is used to determine the no–load dynamic power consumption; P<sub>D</sub> = C<sub>PD</sub> • V<sub>CC</sub><sup>2</sup> • f<sub>in</sub> + I<sub>CC</sub> • V<sub>CC</sub>.

# **NOISE CHARACTERISTICS** (Input $t_r = t_f = 3.0$ ns, $C_L = 50$ pF, $V_{CC} = 5.0$ V)

|                  |  | T <sub>A</sub> = 1 | 25°C  |      |
|------------------|--|--------------------|-------|------|
| Symbol           | Characteristic                               | Тур                | Max   | Unit |
| V <sub>OLP</sub> | Quiet Output Maximum Dynamic V <sub>OL</sub> | 0.3                | 0.8   | V    |
| $V_{OLV}$        | Quiet Output Minimum Dynamic V <sub>OL</sub> | - 0.3              | - 0.8 | V    |
| $V_{IHD}$        | Minimum High Level Dynamic Input Voltage     |                    | 2.0   | V    |
| $V_{ILD}$        | Maximum Low Level Dynamic Input Voltage      |                    | 0.8   | V    |

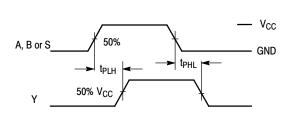


Figure 5. Switching Waveform

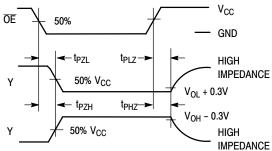
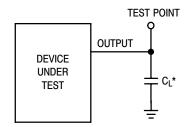
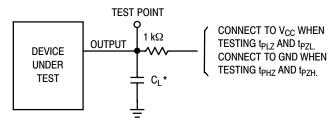


Figure 6. Switching Waveform



\*Includes all probe and jig capacitance Figure 7. Test Circuit



\*Includes all probe and jig capacitance

Figure 8. Test Circuit

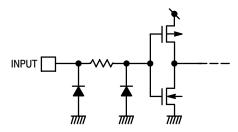


Figure 9. Input Equivalent Circuit

# **ORDERING INFORMATION**

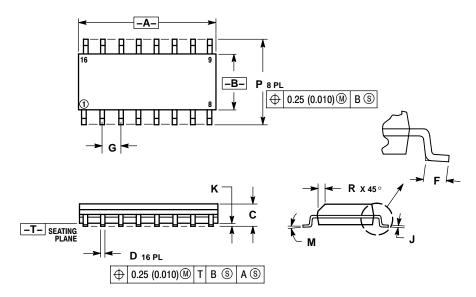
| Device           | Package                | Shipping <sup>†</sup> |
|------------------|------------------------|-----------------------|
| MC74VHCT257AD    | SOIC-16                | 48 Units / Rail       |
| MC74VHCT257ADG   | SOIC-16<br>(Pb-Free)   | 48 Units / Rail       |
| MC74VHCT257ADR2  | SOIC-16                | 2500 Tape & Reel      |
| MC74VHCT257ADR2G | SOIC-16<br>(Pb-Free)   | 2500 Tape & Reel      |
| MC74VHCT257ADT   | TSSOP-16*              | 96 Units / Rail       |
| MC74VHCT257ADTG  | TSSOP-16*              | 96 Units / Rail       |
| MC74VHCT257ADTR2 | TSSOP-16*              | 2500 Tape & Reel      |
| MC74VHCT257ADTRG | TSSOP-16*              | 2500 Tape & Reel      |
| MC74VHCT257AM    | SOEIAJ-16              | 50 Units / Rail       |
| MC74VHCT257AMG   | SOEIAJ-16<br>(Pb-Free) | 50 Units / Rail       |
| MC74VHCT257AMEL  | SOEIAJ-16              | 2000 Tape & Reel      |
| MC74VHCT257AMELG | SOEIAJ-16<br>(Pb-Free) | 2000 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.

<sup>\*</sup>This package is inherently Pb-Free.

#### PACKAGE DIMENSIONS

#### SOIC-16 **D SUFFIX** CASE 751B-05 **ISSUE J**

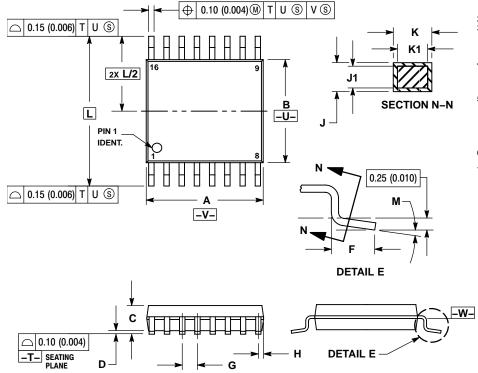


#### NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
  DIMENSIONS A AND B DO NOT INCLUDE
- MOLD PROTRUSION.
  MAXIMUM MOLD PROTRUSION 0.15 (0.006)
- MAXIMUM MOLD PHOLIUSION 0.15 (0.006)
  PER SIDE.
  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.

|     | MILLIN | IETERS   | INC   | HES   |
|-----|--------|----------|-------|-------|
| DIM | MIN    | MAX      | MIN   | MAX   |
| Α   | 9.80   | 10.00    | 0.386 | 0.393 |
| В   | 3.80   | 4.00     | 0.150 | 0.157 |
| С   | 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   | 1.27 BSC |       | BSC   |
| J   | 0.19   | 0.25     | 0.008 | 0.009 |
| K   | 0.10   | 0.25     | 0.004 | 0.009 |
| M   | 0°     | 7°       | 0°    | 7°    |
| Р   | 5.80   | 6.20     | 0.229 | 0.244 |
| R   | 0.25   | 0.50     | 0.010 | 0.019 |

#### TSSOP-16 **DT SUFFIX** CASE 948F-01 **ISSUE A**



16X **K** REF

- NOTES:

  1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

  2. CONTROLLING DIMENSION: MILLIMETER.

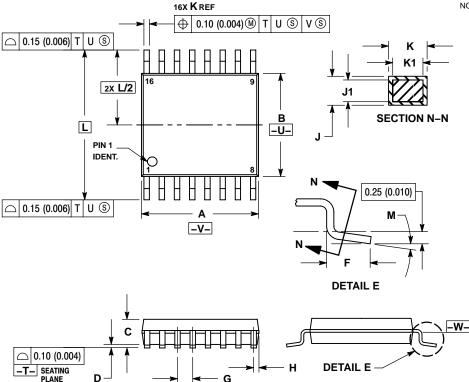
  3. DIMENSION A DOES NOT INCLUDE MOLD IN A DOES NOT INCLUDE MOLD IN A DOES NOT INCLUDE MOLD.
  - 3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT
  - EXCEED 0.15 (0.006) PER SIDE.

    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
  - 6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
    7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE –W–.

|     | MILLIN | IETERS   | INCHES |       |  |
|-----|--------|----------|--------|-------|--|
| DIM | MIN    | MAX      | MIN    | MAX   |  |
| Α   | 4.90   | 5.10     | 0.193  | 0.200 |  |
| В   | 4.30   | 4.50     | 0.169  | 0.177 |  |
| С   |        | 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   | 0.65 BSC |        | BSC   |  |
| Н   | 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   |          | 0.252  |       |  |
| М   | 0°     | 8°       | 0°     | 8°    |  |

#### PACKAGE DIMENSIONS

SOEIAJ-16 **M SUFFIX** CASE 966-01 **ISSUE A** 



- 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.
  - 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.

    5. TERMINAL NUMBERS ARE SHOWN FOR
  - REFERENCE ONLY.

    7. DIMENSION A AND B ARE TO BE
  - DETERMINED AT DATUM PLANE -W-

| MILLIN | IETERS  | INC   | HES   |  |
|--------|---|---|---|--|
| MIN    | MAX   | MIN   | MAX   |  |
| 4.90   | 5.10  | 0.193   | 0.200   |  |
| 4.30   | 4.50  | 0.169   | 0.177   |  |
|        | 1.20  |   | 0.047   |  |
| 0.05   | 0.15  | 0.002   | 0.006   |  |
| 0.50   | 0.75  | 0.020   | 0.030   |  |
| 0.65   | BSC   | 0.026   | BSC   |  |
| 0.18   | 0.28  | 0.007   | 0.011   |  |
| 0.09   | 0.20  | 0.004   | 0.008   |  |
| 0.09   | 0.16  | 0.004   | 0.006   |  |
| 0.19   | 0.30  | 0.007   | 0.012   |  |
| 0.19   | 0.25  | 0.007   | 0.010   |  |
| 6.40   |   | 0.252 BSC   |   |  |
| 0°     | 8°  | 0°  | 8 °   |  |
|        | MIN<br>4.90<br>4.30<br><br>0.05<br>0.65<br>0.18<br>0.09<br>0.09<br>0.19<br>0.19<br>6.40 | 4.90 5.10<br>4.30 4.50<br>1.20<br>0.05 0.15<br>0.50 0.75<br>0.65 BSC<br>0.18 0.28<br>0.09 0.20<br>0.09 0.16<br>0.19 0.30<br>0.19 0.25<br>6.40 BSC | MIN         MAX         MIN           4.90         5.10         0.193           4.30         4.50         0.169            1.20            0.05         0.15         0.002           0.50         0.75         0.020           0.18         0.28         0.007           0.09         0.20         0.004           0.09         0.16         0.004           0.19         0.30         0.007           0.19         0.25         0.007           6.40         BSC         0.252 |  |

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