

# MC74HC365A

## Hex 3-State Noninverting Buffer with Common Enables

### High-Performance Silicon-Gate CMOS

The MC74HC365A is identical in pinout to the LS365. The device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LSTTL outputs.

This device is a high-speed hex buffer with 3-state outputs and two common active-low Output Enables. When either of the enables is high, the buffer outputs are placed into high-impedance states. The HC365A has noninverting outputs.

#### Features

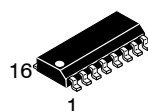
- Output Drive Capability: 15 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1.0  $\mu$ A
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance with the Requirements Defined by JEDEC Standard No. 7A
- Chip Complexity: 90 FETs or 22.5 Equivalent Gates
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant



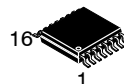
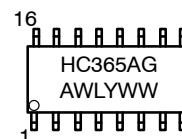
ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

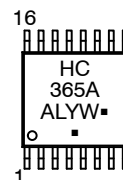
#### MARKING DIAGRAMS



SOIC-16  
D SUFFIX  
CASE 751B



TSSOP-16  
DT SUFFIX  
CASE 948F



A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week  
G or ■ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

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

# MC74HC365A

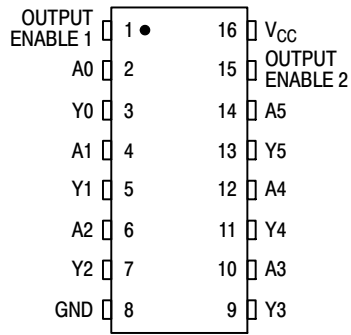


Figure 1. Pin Assignment

FUNCTION TABLE

| Inputs   |          |   | Output |
|----------|----------|---|--------|
| Enable 1 | Enable 2 | A | Y      |
| L        | L        | L | L      |
| L        | L        | H | H      |
| H        | X        | X | Z      |
| X        | H        | X | Z      |

X = don't care

Z = high impedance

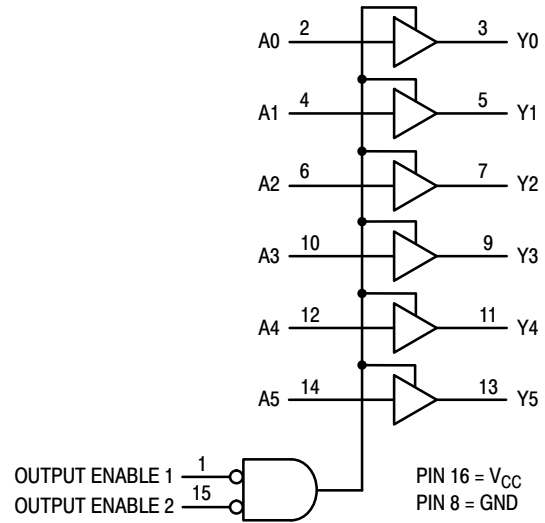


Figure 2. Logic Diagram

## ORDERING INFORMATION

| Device            | Package               | Shipping <sup>†</sup>    |
|-------------------|-----------------------|--------------------------|
| MC74HC365ADG      | SOIC-16<br>(Pb-Free)  | 48 Units / Rail          |
| MC74HC365ADR2G    | SOIC-16<br>(Pb-Free)  | 2500 Units / Tape & Reel |
| MC74HC365ADTR2G   | TSSOP-16<br>(Pb-Free) | 2500 Units / Tape & Reel |
| NLV74HC365ADTR2G* | TSSOP-16<br>(Pb-Free) | 2500 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.

\*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

# MC74HC365A

## MAXIMUM RATINGS\*

| Symbol    | Parameter                                                                | Value                   | Unit |
|-----------|--------------------------------------------------------------------------|-------------------------|------|
| $V_{CC}$  | DC Supply Voltage (Referenced to GND)                                    | – 0.5 to + 7.0          | V    |
| $V_{in}$  | DC Input Voltage (Referenced to GND)                                     | – 0.5 to $V_{CC} + 0.5$ | V    |
| $V_{out}$ | DC Output Voltage (Referenced to GND)                                    | – 0.5 to $V_{CC} + 0.5$ | V    |
| $I_{in}$  | DC Input Current, per Pin                                                | $\pm 20$                | mA   |
| $I_{out}$ | DC Output Current, per Pin                                               | $\pm 25$                | mA   |
| $I_{CC}$  | DC Supply Current, $V_{CC}$ and GND Pins                                 | $\pm 50$                | mA   |
| $P_D$     | Power Dissipation in Still Air,<br>SOIC Package†<br>TSSOP Package†       | 500<br>450              | mW   |
| $T_{stg}$ | Storage Temperature                                                      | – 65 to + 150           | °C   |
| $T_L$     | Lead Temperature, 1 mm from Case for 10 Seconds<br>SOIC or TSSOP Package | 260                     | °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,  $V_{in}$  and  $V_{out}$  should be constrained to the range  $GND \leq (V_{in} \text{ or } V_{out}) \leq V_{CC}$ . 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.

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

†Derating — SOIC Package: – 7 mW/°C from 65° to 125°C  
TSSOP Package: – 6.1 mW/°C from 65° to 125°C

## RECOMMENDED OPERATING CONDITIONS

| Symbol            | Parameter                                            | Min                                                                                                                              | Max                       | Unit |
|-------------------|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------|------|
| $V_{CC}$          | DC Supply Voltage (Referenced to GND)                | 2.0                                                                                                                              | 6.0                       | V    |
| $V_{in}, V_{out}$ | DC Input Voltage, Output Voltage (Referenced to GND) | 0                                                                                                                                | $V_{CC}$                  | V    |
| $T_A$             | Operating Temperature, All Package Types             | – 55                                                                                                                             | + 125                     | °C   |
| $t_r, t_f$        | Input Rise and Fall Time<br>(Figure 1)               | $V_{CC} = 2.0 \text{ V}$<br>0<br>$V_{CC} = 3.0 \text{ V}$<br>0<br>$V_{CC} = 4.5 \text{ V}$<br>0<br>$V_{CC} = 6.0 \text{ V}$<br>0 | 1000<br>600<br>500<br>400 | ns   |

## DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

| Symbol   | Parameter                         | Test Conditions                                                       | $V_{CC}$<br>V            | Guaranteed Limit             |                              |                              | Unit |
|----------|-----------------------------------|-----------------------------------------------------------------------|--------------------------|------------------------------|------------------------------|------------------------------|------|
|          |                                   |                                                                       |                          | – 55 to<br>25°C              | ≤ 85°C                       | ≤ 125°C                      |      |
| $V_{IH}$ | Minimum High-Level Input Voltage  | $V_{out} = V_{CC} - 0.1 \text{ V}$<br>$ I_{out}  \leq 20 \mu\text{A}$ | 2.0<br>3.0<br>4.5<br>6.0 | 1.5<br>2.1<br>3.15<br>4.2    | 1.5<br>2.1<br>3.15<br>4.2    | 1.5<br>2.1<br>3.15<br>4.2    | V    |
| $V_{IL}$ | Maximum Low-Level Input Voltage   | $V_{out} = 0.1 \text{ V}$<br>$ I_{out}  \leq 20 \mu\text{A}$          | 2.0<br>3.0<br>4.5<br>6.0 | 0.50<br>0.90<br>1.35<br>1.80 | 0.50<br>0.90<br>1.35<br>1.80 | 0.50<br>0.90<br>1.35<br>1.80 | V    |
| $V_{OH}$ | Minimum High-Level Output Voltage | $V_{in} = V_{IH}$<br>$ I_{out}  \leq 20 \mu\text{A}$                  | 2.0<br>4.5<br>6.0        | 1.9<br>4.4<br>5.9            | 1.9<br>4.4<br>5.9            | 1.9<br>4.4<br>5.9            | V    |
|          |                                   | $V_{in} = V_{IH}$ $ I_{out}  \leq 3.6 \text{ mA}$                     | 3.0                      | 2.48                         | 2.34                         | 2.20                         |      |
|          |                                   | $ I_{out}  \leq 6.0 \text{ mA}$                                       | 4.5                      | 3.98                         | 3.84                         | 3.70                         |      |
|          |                                   | $ I_{out}  \leq 7.8 \text{ mA}$                                       | 6.0                      | 5.48                         | 5.34                         | 5.20                         |      |
| $V_{OL}$ | Maximum Low-Level Output Voltage  | $V_{in} = V_{IL}$<br>$ I_{out}  \leq 20 \mu\text{A}$                  | 2.0<br>4.5<br>6.0        | 0.1<br>0.1<br>0.1            | 0.1<br>0.1<br>0.1            | 0.1<br>0.1<br>0.1            | V    |
|          |                                   | $V_{in} = V_{IL}$ $ I_{out}  \leq 3.6 \text{ mA}$                     | 3.0                      | 0.26                         | 0.33                         | 0.40                         |      |
|          |                                   | $ I_{out}  \leq 6.0 \text{ mA}$                                       | 4.5                      | 0.26                         | 0.33                         | 0.40                         |      |
|          |                                   | $ I_{out}  \leq 7.8 \text{ mA}$                                       | 6.0                      | 0.26                         | 0.33                         | 0.40                         |      |

# MC74HC365A

## DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

| Symbol          | Parameter                                      | Test Conditions                                                                                                                     | V <sub>CC</sub><br>V | Guaranteed Limit |        |         | Unit |
|-----------------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------|--------|---------|------|
|                 |                                                |                                                                                                                                     |                      | - 55 to<br>25°C  | ≤ 85°C | ≤ 125°C |      |
| I <sub>in</sub> | Maximum Input Leakage Current                  | V <sub>in</sub> = V <sub>CC</sub> or GND                                                                                            | 6.0                  | ± 0.1            | ± 1.0  | ± 1.0   | μA   |
| I <sub>OZ</sub> | Maximum Three-State Leakage Current            | Output in High-Impedance State<br>V <sub>in</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>V <sub>out</sub> = V <sub>CC</sub> or GND | 6.0                  | ± 0.5            | ± 5.0  | ± 10    | μA   |
| I <sub>CC</sub> | Maximum Quiescent Supply Current (per Package) | V <sub>in</sub> = V <sub>CC</sub> or GND<br>I <sub>out</sub> = 0 μA                                                                 | 6.0                  | 4                | 40     | 160     | μA   |

## AC ELECTRICAL CHARACTERISTICS (C<sub>L</sub> = 50 pF, Input t<sub>r</sub> = t<sub>f</sub> = 6 ns)

| Symbol                                 | Parameter                                                                  | V <sub>CC</sub><br>V                    | Guaranteed Limit |        |         | Unit |
|----------------------------------------|----------------------------------------------------------------------------|-----------------------------------------|------------------|--------|---------|------|
|                                        |                                                                            |                                         | – 55 to<br>25°C  | ≤ 85°C | ≤ 125°C |      |
| t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | Maximum Propagation Delay, Input A to Output Y<br>(Figures 1 and 3)        | 2.0                                     | 120              | 150    | 180     | ns   |
|                                        |                                                                            | 3.0                                     | 60               | 75     | 90      |      |
|                                        |                                                                            | 4.5                                     | 24               | 30     | 36      |      |
|                                        |                                                                            | 6.0                                     | 20               | 26     | 31      |      |
| t <sub>PLZ</sub> ,<br>t <sub>PHZ</sub> | Maximum Propagation Delay, Output Enable to Output Y<br>(Figures 2 and 4)  | 2.0                                     | 220              | 275    | 330     | ns   |
|                                        |                                                                            | 3.0                                     | 110              | 140    | 170     |      |
|                                        |                                                                            | 4.5                                     | 44               | 55     | 66      |      |
|                                        |                                                                            | 6.0                                     | 37               | 47     | 56      |      |
| t <sub>PZL</sub> ,<br>t <sub>PZH</sub> | Maximum Propagation Delay, Output Enable to Output Y<br>(Figures 2 and 4)  | 2.0                                     | 220              | 275    | 330     | ns   |
|                                        |                                                                            | 3.0                                     | 110              | 140    | 170     |      |
|                                        |                                                                            | 4.5                                     | 44               | 55     | 66      |      |
|                                        |                                                                            | 6.0                                     | 37               | 47     | 56      |      |
| t <sub>TLH</sub> ,<br>t <sub>THL</sub> | Maximum Output Transition Time, Any Output<br>(Figures 1 and 3)            | 2.0                                     | 60               | 75     | 90      | ns   |
|                                        |                                                                            | 3.0                                     | 22               | 28     | 34      |      |
|                                        |                                                                            | 4.5                                     | 12               | 15     | 18      |      |
|                                        |                                                                            | 6.0                                     | 10               | 13     | 15      |      |
| C <sub>in</sub>                        | Maximum Input Capacitance                                                  | —                                       | 10               | 10     | 10      | pF   |
| C <sub>out</sub>                       | Maximum Three-State Output Capacitance<br>(Output in High-Impedance State) | —                                       | 15               | 15     | 15      | pF   |
| C <sub>PD</sub>                        | Power Dissipation Capacitance (Per Buffer)*                                | Typical @ 25°C, V <sub>CC</sub> = 5.0 V |                  |        |         | pF   |
|                                        |                                                                            | 60                                      |                  |        |         |      |

\* Used to determine the no-load dynamic power consumption:  $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$ .

## SWITCHING WAVEFORMS

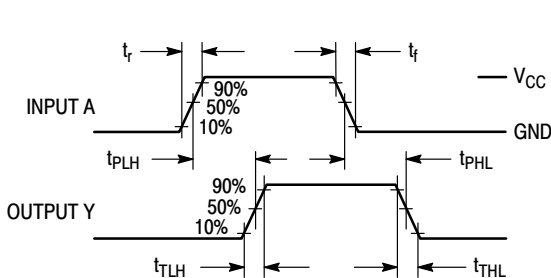


Figure 1.

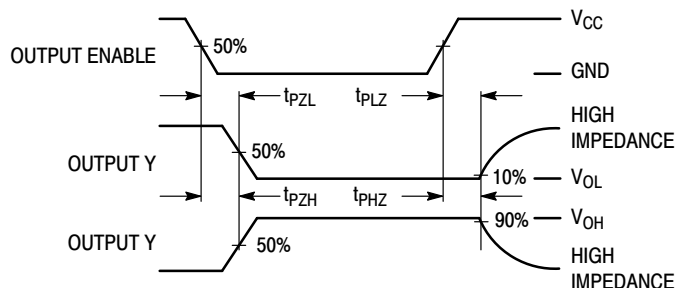


Figure 2.

## TEST CIRCUITS

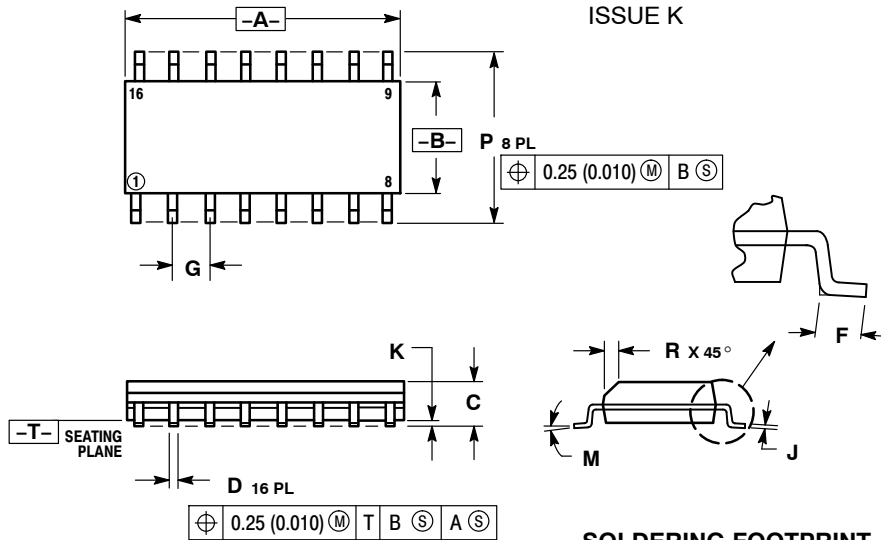


**www.onsemi.com**

# MC74HC365A

## PACKAGE DIMENSIONS

SOIC-16  
D SUFFIX  
CASE 751B-05  
ISSUE K

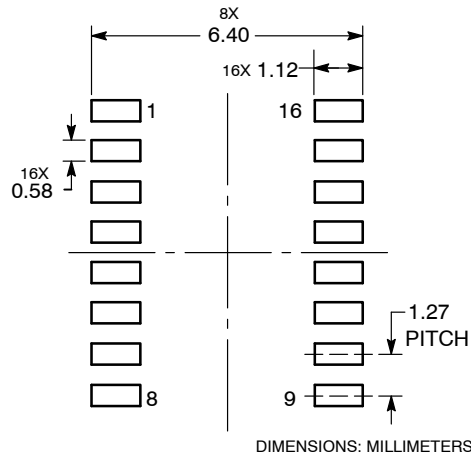


### NOTES:

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 |

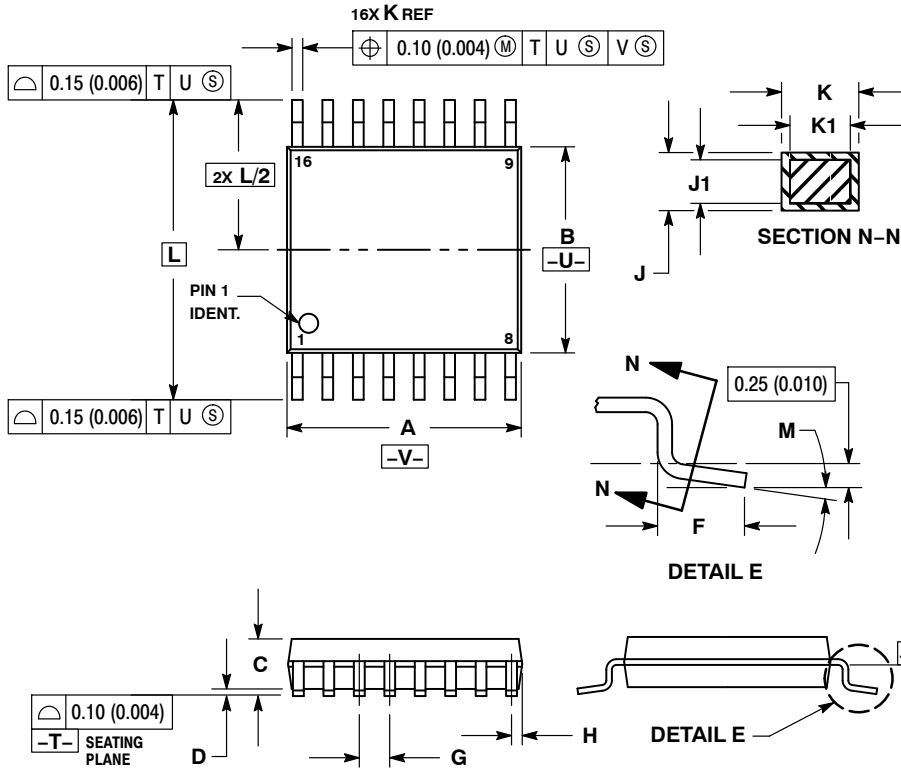
### SOLDERING FOOTPRINT



# MC74HC365A

## PACKAGE DIMENSIONS

TSSOP-16  
DT SUFFIX  
CASE 948F  
ISSUE B

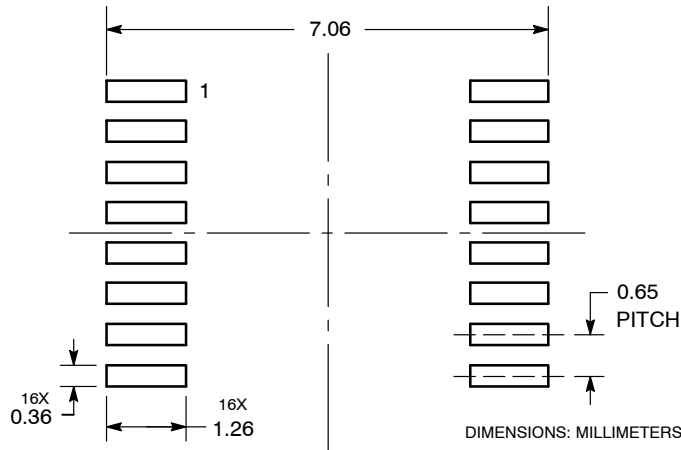


### NOTES:

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-.

|     | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
| DIM | 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   | 0.18        | 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 °   |

### SOLDERING FOOTPRINT



ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative