

# Inverting Octal 3-STATE Buffer, Octal 3-STATE Buffer

## MM74HC540, MM74HC541

### General Description

The MM74HC540 and MM74HC541 3-STATE buffers utilize advanced silicon-gate CMOS technology. They possess high drive current outputs which enable high speed operation even when driving large bus capacitances. These circuits achieve speeds comparable to low power Schottky devices, while retaining the advantage of CMOS circuitry, i.e., high noise immunity, and low power consumption. Both devices have a fanout of 15 LS-TTL equivalent inputs.

The MM74HC540 is an inverting buffer and the MM74HC541 is a non-inverting buffer. The 3-STATE control gate operates as a two-input NOR such that if either  $\overline{G1}$  or  $\overline{G2}$  are HIGH, all eight outputs are in the high-impedance state.

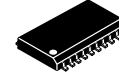
In order to enhance PC board layout, the MM74HC540 and MM74HC541 offers a pinout having inputs and outputs on opposite sides of the package. All inputs are protected from damage due to static discharge by diodes to  $V_{CC}$  and ground.

### Features

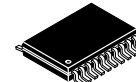
- Typical Propagation Delay: 12 ns
- 3-STATE Outputs for Connection to System Buses
- Wide Power Supply Range: 2–6 V
- Low Quiescent Current: 160  $\mu$ A Maximum (74HC Series)
- Output Current: 6 mA
- These are Pb-Free Devices



SOIC-20 WB  
CASE 751D-05



SOIC-20, 300 mils  
CASE 751BJ

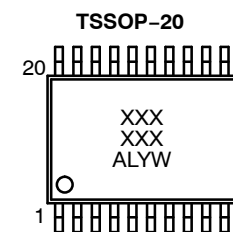
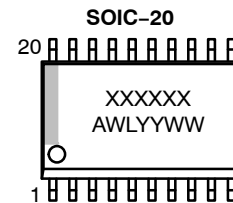


TSSOP-20 WB  
CASE 948E



TSSOP-20, 4.4x6.5  
CASE 948AQ

### MARKING DIAGRAMS



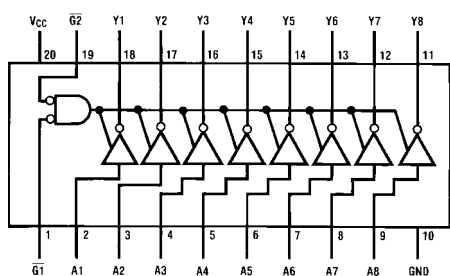
XXXXXX = Specific Device Code  
A = Assembly Location  
WL, L = Wafer Lot Number  
Y = Year  
WW, YW = Work Week

### ORDERING INFORMATION

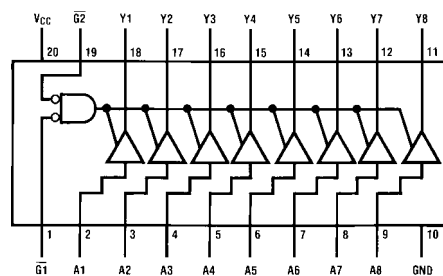
See detailed ordering and shipping information on page 5 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 5.

## MM74HC540, MM74HC541



MM74HC540 (Top View)



MM74HC541 (Top View)

**Figure 1. Connection Diagrams**  
(Pin Assignments for SOIC and TSSOP)

### ABSOLUTE MAXIMUM RATINGS (Note 1)

| Symbol    | Rating                                  | Value                        | Unit |
|-----------|-----------------------------------------|------------------------------|------|
| $V_{CC}$  | Supply Voltage                          | -0.5 to +6.5                 | V    |
| $V_{IN}$  | DC Input Voltage                        | -0.5 to $V_{CC} + 0.5$       | V    |
| $V_{OUT}$ | DC Output Voltage                       | -0.5 to $V_{CC} + 0.5$       | V    |
| $I_{CD}$  | Clamp Diode Current                     | $\pm 20$                     | mA   |
| $I_{OUT}$ | DC Output Current, per pin              | $\pm 35$                     | mA   |
| $I_{CC}$  | DC $V_{CC}$ or GND Current, per pin     | $\pm 70$                     | mA   |
| $T_{STG}$ | Storage Temperature Range               | -65 to +150                  | °C   |
| $P_D$     | Power Dissipation                       | SOIC<br>TSSOP<br>1302<br>833 | mW   |
| $T_L$     | Lead Temperature (Soldering 10 seconds) | 260                          | °C   |

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.

1. Unless otherwise specified all voltages are referenced to ground.

### RECOMMENDED OPERATING CONDITIONS

| Symbol            | Parameter                   | Min                     | Max      | Unit |
|-------------------|-----------------------------|-------------------------|----------|------|
| $V_{CC}$          | Supply Voltage              | 2                       | 6        | V    |
| $V_{IN}, V_{OUT}$ | DC Input or Output Voltage  | 0                       | $V_{CC}$ | V    |
| $T_A$             | Operating Temperature Range | -55                     | +125     | °C   |
| $t_r, t_f$        | Input Rise or Fall Times    | $V_{CC} = 2.0\text{ V}$ | 1000     | ns   |
|                   |                             | $V_{CC} = 4.5\text{ V}$ | 500      | ns   |
|                   |                             | $V_{CC} = 6.0\text{ V}$ | 400      | ns   |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

# MM74HC540, MM74HC541

## DC ELECTRICAL CHARACTERISTICS (Note 2)

| Symbol          | Parameter                              | Conditions                                                                                                                  | V <sub>CC</sub> | T <sub>A</sub> = 25°C |                   | T <sub>A</sub> = -40 to 85°C | T <sub>A</sub> = -55 to 125°C | Unit |
|-----------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|-------------------|------------------------------|-------------------------------|------|
|                 |                                        |                                                                                                                             |                 | Typ                   | Guaranteed Limits |                              |                               |      |
| V <sub>IH</sub> | Minimum HIGH Level Input Voltage       |                                                                                                                             | 2.0 V           |                       | 1.5               | 1.5                          | 1.5                           | V    |
|                 |                                        |                                                                                                                             | 4.5 V           |                       | 3.15              | 3.15                         | 3.15                          | V    |
|                 |                                        |                                                                                                                             | 6.0 V           |                       | 4.2               | 4.2                          | 4.2                           | V    |
| V <sub>IL</sub> | Maximum LOW Level Input Voltage        |                                                                                                                             | 2.0 V           |                       | 0.5               | 0.5                          | 0.5                           | V    |
|                 |                                        |                                                                                                                             | 4.5 V           |                       | 1.35              | 1.35                         | 1.35                          | V    |
|                 |                                        |                                                                                                                             | 6.0 V           |                       | 1.8               | 1.8                          | 1.8                           | V    |
| V <sub>OH</sub> | Minimum HIGH Level Output Voltage      | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 20 μA                                         | 2.0 V           | 2.0                   | 1.9               | 1.9                          | 1.9                           | V    |
|                 |                                        |                                                                                                                             | 4.5 V           | 4.5                   | 4.4               | 4.4                          | 4.4                           | V    |
|                 |                                        |                                                                                                                             | 6.0 V           | 6.0                   | 5.9               | 5.9                          | 5.9                           | V    |
|                 |                                        | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 6.0 mA<br> I <sub>OUT</sub>   ≤ 7.8 mA        | 4.5 V           | 4.2                   | 3.98              | 3.84                         | 3.7                           | V    |
|                 |                                        |                                                                                                                             | 6.0 V           | 5.7                   | 5.48              | 5.34                         | 5.2                           | V    |
|                 |                                        |                                                                                                                             |                 |                       |                   |                              |                               |      |
| V <sub>OL</sub> | Maximum LOW Level Output Voltage       | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 20 μA                                         | 2.0 V           | 0                     | 0.1               | 0.1                          | 0.1                           | V    |
|                 |                                        |                                                                                                                             | 4.5 V           | 0                     | 0.1               | 0.1                          | 0.1                           | V    |
|                 |                                        |                                                                                                                             | 6.0 V           | 0                     | 0.1               | 0.1                          | 0.1                           | V    |
|                 |                                        | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 6.0 mA<br> I <sub>OUT</sub>   ≤ 7.8 mA        | 4.5 V           | 0.2                   | 0.26              | 0.33                         | 0.4                           | V    |
|                 |                                        |                                                                                                                             | 6.0 V           | 0.2                   | 0.26              | 0.33                         | 0.4                           | V    |
|                 |                                        |                                                                                                                             |                 |                       |                   |                              |                               |      |
| I <sub>IN</sub> | Maximum Input Current                  | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                                                    | 6.0 V           |                       | ±0.1              | ±1.0                         | ±1.0                          | μA   |
| I <sub>OZ</sub> | Maximum 3-STATE Output Leakage Current | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> ,<br>G̅ = V <sub>IH</sub><br>V <sub>OUT</sub> = V <sub>CC</sub> or GND | 6.0 V           |                       | ±0.5              | ±5                           | ±10                           | μA   |
| I <sub>CC</sub> | Maximum Quiescent Supply Current       | V <sub>IN</sub> = V <sub>CC</sub> or GND<br>I <sub>OUT</sub> = 0 μA                                                         | 6.0 V           |                       | 8.0               | 80                           | 160                           | μA   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. For a power supply of 5 V ±10% the worst case output voltages (V<sub>OH</sub>, and V<sub>OL</sub>) occur for HC at 4.5 V. Thus the 4.5 V values should be used when designing with this supply. Worst case V<sub>IH</sub> and V<sub>IL</sub> occur at V<sub>CC</sub> = 5.5 V and 4.5 V respectively. (The V<sub>IH</sub> value at 5.5 V is 3.85 V.) The worst case leakage current (I<sub>IN</sub>, I<sub>CC</sub>, and I<sub>OZ</sub>) occur for CMOS at the higher voltage and so the 6.0 V values should be used.

## AC ELECTRICAL CHARACTERISTICS

(V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C, t<sub>r</sub> = t<sub>f</sub> = 6 ns)

| Symbol                              | Parameter                       | Conditions                                      | Typ | Guaranteed Limit | Unit |
|-------------------------------------|---------------------------------|-------------------------------------------------|-----|------------------|------|
| t <sub>PHL</sub> , t <sub>PLH</sub> | Maximum Propagation Delay (540) | C <sub>L</sub> = 45 pF                          | 12  | 18               | ns   |
| t <sub>PHL</sub> , t <sub>PLH</sub> | Maximum Propagation Delay (541) | C <sub>L</sub> = 45 pF                          | 14  | 20               | ns   |
| t <sub>PZH</sub> , t <sub>PZL</sub> | Maximum Output Enable Time      | R <sub>L</sub> = 1 kΩ<br>C <sub>L</sub> = 45 pF | 17  | 28               | ns   |
| t <sub>PHZ</sub> , t <sub>PLZ</sub> | Maximum Output Disable Time     | R <sub>L</sub> = 1 kΩ<br>C <sub>L</sub> = 5 pF  | 15  | 25               | ns   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

# MM74HC540, MM74HC541

## AC ELECTRICAL CHARACTERISTICS

( $V_{CC} = 2.0\text{ V}$  to  $6.0\text{ V}$ ,  $C_L = 50\text{ pF}$ ,  $t_r = t_f = 6\text{ ns}$ , unless otherwise specified)

| Symbol                              | Parameter                              | Conditions                                                           | V <sub>CC</sub>                 | T <sub>A</sub> = 25°C   |                   | T <sub>A</sub> = -40 to 85°C | T <sub>A</sub> = -55 to 125°C | Unit |     |    |
|-------------------------------------|----------------------------------------|----------------------------------------------------------------------|---------------------------------|-------------------------|-------------------|------------------------------|-------------------------------|------|-----|----|
|                                     |                                        |                                                                      |                                 | Typ                     | Guaranteed Limits |                              |                               |      |     |    |
| t <sub>PHL</sub> , t <sub>PLH</sub> | Maximum Propagation Delay (540)        | C <sub>L</sub> = 50 pF                                               | 2.0 V                           | 55                      | 100               | 126                          | 149                           | ns   |     |    |
|                                     |                                        | C <sub>L</sub> = 150 pF                                              | 2.0 V                           | 83                      | 150               | 190                          | 224                           | ns   |     |    |
|                                     |                                        | C <sub>L</sub> = 50 pF                                               | 4.5 V                           | 12                      | 20                | 25                           | 30                            | ns   |     |    |
|                                     |                                        | C <sub>L</sub> = 150 pF                                              | 4.5 V                           | 22                      | 30                | 38                           | 45                            | ns   |     |    |
|                                     |                                        | C <sub>L</sub> = 50 pF                                               | 6.0 V                           | 11                      | 17                | 21                           | 25                            | ns   |     |    |
|                                     |                                        | C <sub>L</sub> = 150 pF                                              | 6.0 V                           | 18                      | 26                | 32                           | 38                            | ns   |     |    |
|                                     |                                        | t <sub>PHL</sub> , t <sub>PLH</sub>                                  | Maximum Propagation Delay (541) | C <sub>L</sub> = 50 pF  | 2.0 V             | 58                           | 115                           | 145  | 171 | ns |
|                                     |                                        |                                                                      |                                 | C <sub>L</sub> = 150 pF | 2.0 V             | 83                           | 165                           | 208  | 246 | ns |
| C <sub>L</sub> = 50 pF              | 4.5 V                                  |                                                                      |                                 | 14                      | 23                | 29                           | 34                            | ns   |     |    |
| C <sub>L</sub> = 150 pF             | 4.5 V                                  |                                                                      |                                 | 17                      | 33                | 42                           | 49                            | ns   |     |    |
|                                     |                                        | C <sub>L</sub> = 50 pF                                               | 6.0 V                           | 11                      | 20                | 25                           | 29                            | ns   |     |    |
|                                     |                                        | C <sub>L</sub> = 150 pF                                              | 6.0 V                           | 14                      | 28                | 35                           | 42                            | ns   |     |    |
|                                     |                                        | t <sub>PZH</sub> , t <sub>PZL</sub>                                  | Maximum Output Enable Time      | R <sub>L</sub> = 1 kΩ   |                   |                              |                               |      |     | ns |
|                                     |                                        |                                                                      |                                 | C <sub>L</sub> = 50 pF  | 2.0 V             | 75                           | 150                           | 189  | 224 | ns |
| C <sub>L</sub> = 150 pF             | 4.5 V                                  |                                                                      |                                 | 100                     | 200               | 252                          | 298                           | ns   |     |    |
| C <sub>L</sub> = 50 pF              | 4.5 V                                  |                                                                      |                                 | 15                      | 30                | 38                           | 45                            | ns   |     |    |
| C <sub>L</sub> = 150 pF             | 4.5 V                                  | 30                                                                   | 40                              | 50                      | 60                | ns                           |                               |      |     |    |
|                                     |                                        | C <sub>L</sub> = 50 pF                                               | 6.0 V                           | 13                      | 26                | 32                           | 38                            | ns   |     |    |
|                                     |                                        | C <sub>L</sub> = 150 pF                                              | 6.0 V                           | 17                      | 34                | 43                           | 51                            | ns   |     |    |
|                                     |                                        | t <sub>PHZ</sub> , t <sub>PLZ</sub>                                  | Maximum Output Disable Time     | R <sub>L</sub> = 1 kΩ   | 2.0 V             | 75                           | 150                           | 189  | 224 | ns |
|                                     |                                        |                                                                      |                                 | C <sub>L</sub> = 50 pF  | 4.5 V             | 15                           | 30                            | 38   | 45  | ns |
| C <sub>L</sub> = 150 pF             | 6.0 V                                  |                                                                      |                                 | 13                      | 26                | 32                           | 38                            | ns   |     |    |
| t <sub>THL</sub> , t <sub>TLH</sub> | Maximum Output Rise and Fall Time      | C <sub>L</sub> = 50 pF                                               | 2.0 V                           | 25                      | 60                | 75                           | 90                            | ns   |     |    |
|                                     |                                        |                                                                      | 4.5 V                           | 7                       | 12                | 15                           | 18                            | ns   |     |    |
|                                     |                                        |                                                                      | 6.0 V                           | 6                       | 10                | 13                           | 15                            | ns   |     |    |
| C <sub>PD</sub>                     | Power Dissipation Capacitance (Note 3) | $\overline{G}$ = V <sub>IH</sub><br>$\overline{G}$ = V <sub>IL</sub> |                                 | 10<br>50                |                   |                              |                               | pF   |     |    |
| C <sub>IN</sub>                     | Maximum Input Capacitance              |                                                                      |                                 | 5                       | 10                | 10                           | 10                            | pF   |     |    |
| C <sub>OUT</sub>                    | Maximum Output Capacitance             |                                                                      |                                 | 15                      | 20                | 20                           | 20                            | pF   |     |    |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3.  $C_{PD}$  determines the no load dynamic power consumption,  $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$ , and the no load dynamic current consumption,  $I_S = C_{PD} V_{CC} f + I_{CC}$ .

## MM74HC540, MM74HC541

### ORDERING INFORMATION

| Device        | Marking    | Package                                        | Shipping <sup>†</sup> |
|---------------|------------|------------------------------------------------|-----------------------|
| MM74HC540WM   | HC540A     | SOIC–20 WB<br>(Pb–Free and Halide Free)        | 38 Units / Tube       |
| MM74HC540WMX  | HC540A     |                                                | 1000 / Tape & Reel    |
| MM74HC540MTCX | HC<br>540A | TSSOP–20 WB<br>(Pb–Free)                       | 2500 / Tape & Reel    |
| MM74HC541WM   | HC541A     | SOIC–20 WB<br>(Pb–Free and Halide Free)        | 38 Units / Tube       |
| MM74HC541WMX  | HC541A     | SOIC–20, 300 mils<br>(Pb–Free and Halide Free) | 1000 / Tape & Reel    |
| MM74HC541MTC  | HC<br>541A | TSSOP–20 WB<br>(Pb–Free)                       | 75 Units / Tube       |
| MM74HC541MTCX | HC<br>541A | TSSOP20, 4.4 × 6.5<br>(Pb–Free)                | 2500 / Tape & Reel    |

### DISCONTINUED (Note 4)

|              |            |                          |                 |
|--------------|------------|--------------------------|-----------------|
| MM74HC540MTC | HC<br>540A | TSSOP–20 WB<br>(Pb–Free) | 75 Units / Tube |
|--------------|------------|--------------------------|-----------------|

<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](#).

4. **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on [www.onsemi.com](http://www.onsemi.com).

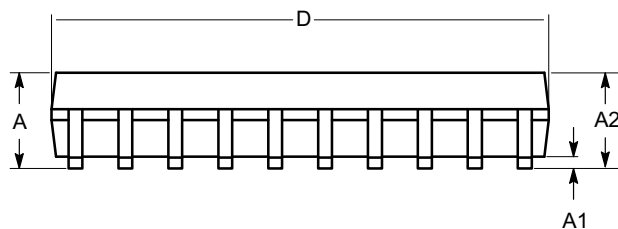
**SOIC-20, 300 mils**  
**CASE 751BJ**  
**ISSUE O**

DATE 19 DEC 2008

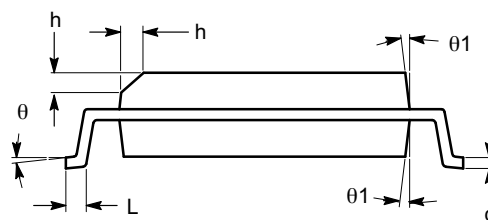


**TOP VIEW**

| SYMBOL     | MIN      | NOM   | MAX   |
|------------|----------|-------|-------|
| A          | 2.36     | 2.49  | 2.64  |
| A1         | 0.10     |       | 0.30  |
| A2         | 2.05     |       | 2.55  |
| b          | 0.31     | 0.41  | 0.51  |
| c          | 0.20     | 0.27  | 0.33  |
| D          | 12.60    | 12.80 | 13.00 |
| E          | 10.01    | 10.30 | 10.64 |
| E1         | 7.40     | 7.50  | 7.60  |
| e          | 1.27 BSC |       |       |
| h          | 0.25     |       | 0.75  |
| L          | 0.40     | 0.81  | 1.27  |
| $\theta$   | 0°       |       | 8°    |
| $\theta 1$ | 5°       |       | 15°   |



**SIDE VIEW**



**END VIEW**

**Notes:**

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MS-013.

|                         |                          |                                                                                                                                                                                     |
|-------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DOCUMENT NUMBER:</b> | <b>98AON34287E</b>       | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>SOIC-20, 300 MILS</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                                  |

**onsemi** and **onsemi** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** 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. **onsemi** does not convey any license under its patent rights nor the rights of others.



SCALE 1:1

SOIC-20 WB  
CASE 751D-05  
ISSUE H

DATE 22 APR 2015

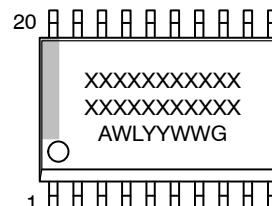


NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 2.35        | 2.65  |
| A1  | 0.10        | 0.25  |
| b   | 0.35        | 0.49  |
| c   | 0.23        | 0.32  |
| D   | 12.65       | 12.95 |
| E   | 7.40        | 7.60  |
| e   | 1.27 BSC    |       |
| H   | 10.05       | 10.55 |
| h   | 0.25        | 0.75  |
| L   | 0.50        | 0.90  |
| θ   | 0°          | 7°    |

GENERIC  
MARKING DIAGRAM\*



XXXXXX = Specific Device Code  
A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week  
G = Pb-Free Package

RECOMMENDED  
SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

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

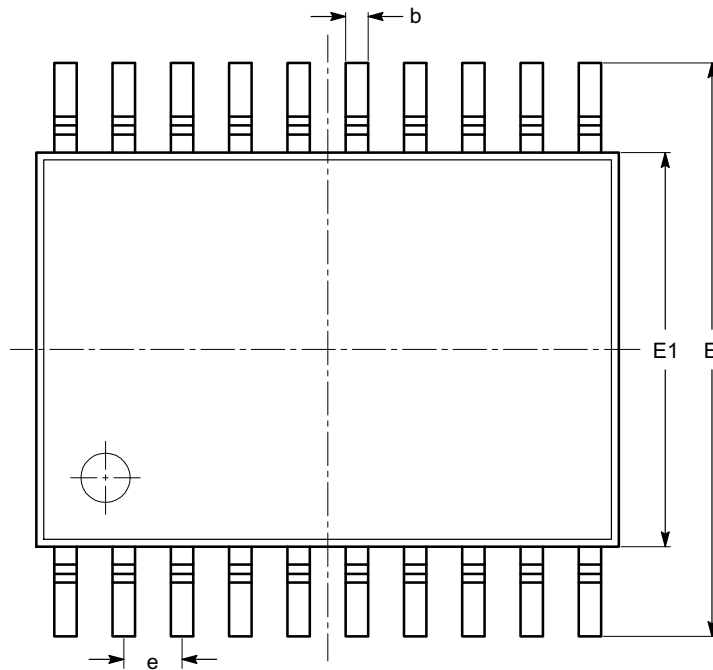
\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

|                  |             |                                                                                                                                                                                     |
|------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOCUMENT NUMBER: | 98ASB42343B | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| DESCRIPTION:     | SOIC-20 WB  | PAGE 1 OF 1                                                                                                                                                                         |

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi 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. onsemi does not convey any license under its patent rights nor the rights of others.

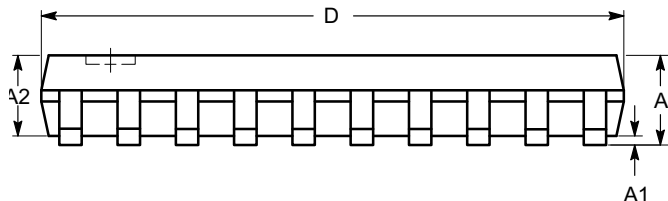
**TSSOP20, 4.4x6.5**  
**CASE 948AQ**  
**ISSUE A**

DATE 19 MAR 2009

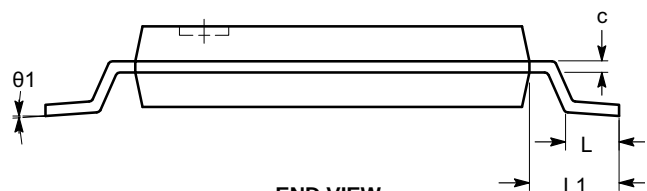


**TOP VIEW**

| SYMBOL | MIN      | NOM  | MAX  |
|--------|----------|------|------|
| A      |          |      | 1.20 |
| A1     | 0.05     |      | 0.15 |
| A2     | 0.80     |      | 1.05 |
| b      | 0.19     |      | 0.30 |
| c      | 0.09     |      | 0.20 |
| D      | 6.40     | 6.50 | 6.60 |
| E      | 6.30     | 6.40 | 6.50 |
| E1     | 4.30     | 4.40 | 4.50 |
| e      | 0.65 BSC |      |      |
| L      | 0.45     | 0.60 | 0.75 |
| L1     | 1.00 REF |      |      |
| θ      | 0°       |      | 8°   |



**SIDE VIEW**



**END VIEW**

**Notes:**

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MO-153.

|                         |                         |                                                                                                                                                                                     |
|-------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DOCUMENT NUMBER:</b> | <b>98AON34453E</b>      | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. |
| <b>DESCRIPTION:</b>     | <b>TSSOP20, 4.4X6.5</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                                  |

**onsemi** and **onsemi** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** 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. **onsemi** does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'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). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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 **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** 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 **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)