

# CMOS MSI

## Quad R-S Latches

### MC14043B, MC14044B

The MC14043B and MC14044B quad R-S latches are constructed with MOS P-Channel and N-Channel enhancement mode devices in a single monolithic structure. Each latch has an independent Q output and set and reset inputs. The Q outputs are gated through three-state buffers having a common enable input. The outputs are enabled with a logical “1” or high on the enable input; a logical “0” or low disconnects the latch from the Q outputs, resulting in an open circuit at the Q outputs.

#### Features

- Double Diode Input Protection
- Three-State Outputs with Common Enable
- Outputs Capable of Driving Two Low-power TTL Loads or One Low-Power Schottky TTL Load Over the Rated Temperature Range
- Supply Voltage Range = 3.0 Vdc to 18 Vdc
- 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 and are RoHS Compliant

#### MAXIMUM RATINGS (Voltages Referenced to $V_{SS}$ )

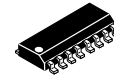
| Symbol            | Parameter                                         | Value                  | Unit |
|-------------------|---------------------------------------------------|------------------------|------|
| $V_{DD}$          | DC Supply Voltage Range                           | -0.5 to +18.0          | V    |
| $V_{in}, V_{out}$ | Input or Output Voltage Range (DC or Transient)   | -0.5 to $V_{DD} + 0.5$ | V    |
| $I_{in}, I_{out}$ | Input or Output Current (DC or Transient) per Pin | $\pm 10$               | mA   |
| $P_D$             | Power Dissipation, per Package (Note 1)           | 500                    | mW   |
| $T_A$             | Ambient Temperature Range                         | -55 to +125            | °C   |
| $T_{stg}$         | Storage Temperature Range                         | -65 to +150            | °C   |
| $T_L$             | Lead Temperature (8-Second Soldering)             | 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. Temperature Derating: “D/DW” Packages: -7.0 mW/°C From 65°C To 125°C

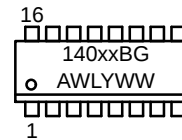
This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation,  $V_{in}$  and  $V_{out}$  should be constrained to the range  $V_{SS} \leq (V_{in} \text{ or } V_{out}) \leq V_{DD}$ .

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



SOIC-16  
D SUFFIX  
CASE 751B

#### MARKING DIAGRAM



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

#### ORDERING INFORMATION

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

# MC14043B, MC14044B

## PIN ASSIGNMENT



NC = NO CONNECTION

Figure 1.

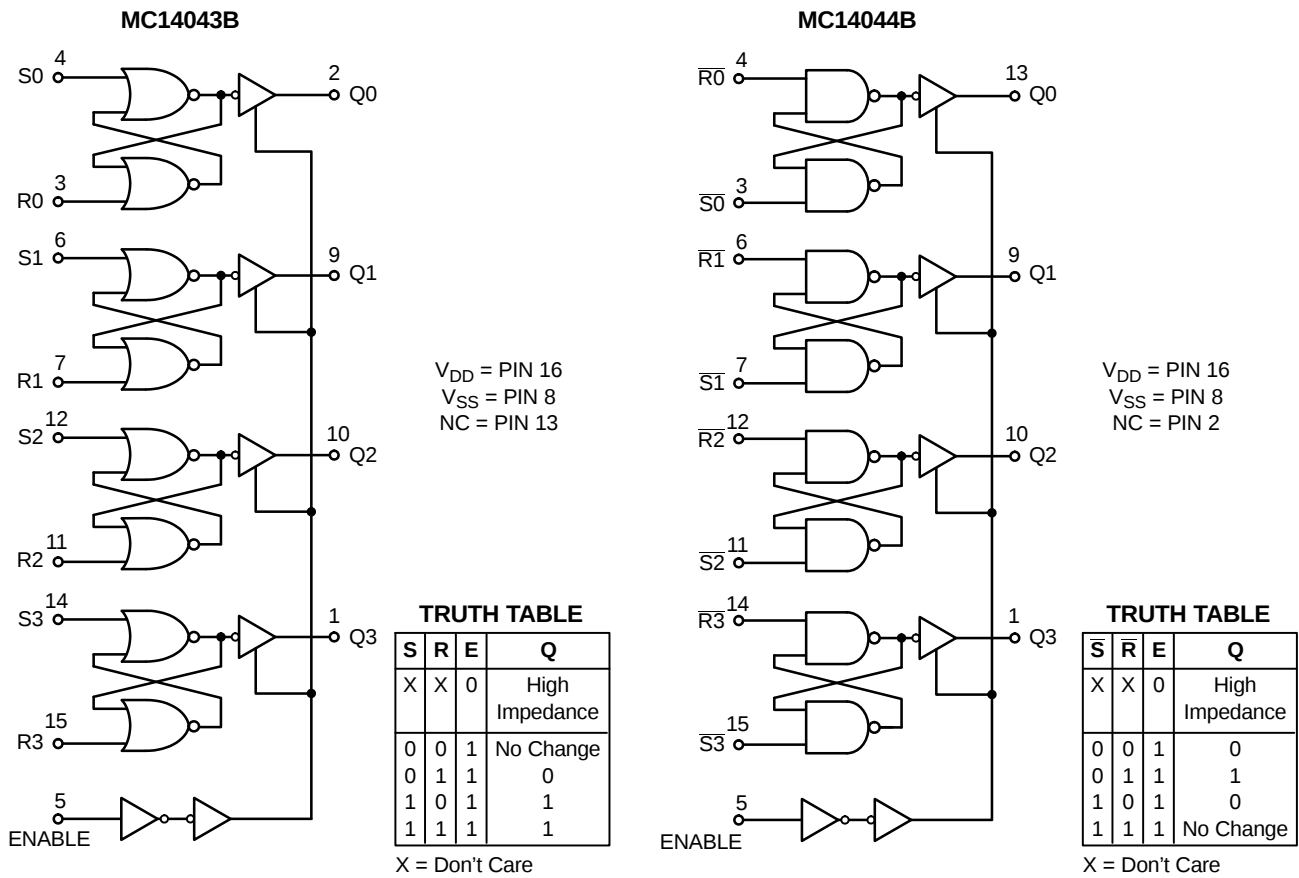


Figure 2.

# MC14043B, MC14044B

## ELECTRICAL CHARACTERISTICS (Voltages Referenced to V<sub>SS</sub>)

| Characteristic                                                                                                                                                                                                                                     | Symbol                       | V <sub>DD</sub><br>Vdc | - 55°C                                                                                                                                                         |      | 25°C  |                 |      | 125°C |      | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|-----------------|------|-------|------|------|
|                                                                                                                                                                                                                                                    |                              |                        | Min                                                                                                                                                            | Max  | Min   | Typ<br>(Note 2) | Max  | Min   | Max  |      |
| Output Voltage<br>V <sub>in</sub> = V <sub>DD</sub> or 0                                                                                                                                                                                           | "0" Level<br>V <sub>OL</sub> | 5.0                    | –                                                                                                                                                              | 0.05 | –     | 0               | 0.05 | –     | 0.05 | Vdc  |
|                                                                                                                                                                                                                                                    |                              | 10                     | –                                                                                                                                                              | 0.05 | –     | 0               | 0.05 | –     | 0.05 |      |
|                                                                                                                                                                                                                                                    |                              | 15                     | –                                                                                                                                                              | 0.05 | –     | 0               | 0.05 | –     | 0.05 |      |
|                                                                                                                                                                                                                                                    | "1" Level<br>V <sub>OH</sub> | 5.0                    | 4.95                                                                                                                                                           | –    | 4.95  | 5.0             | –    | 4.95  | –    | Vdc  |
|                                                                                                                                                                                                                                                    |                              | 10                     | 9.95                                                                                                                                                           | –    | 9.95  | 10              | –    | 9.95  | –    |      |
|                                                                                                                                                                                                                                                    |                              | 15                     | 14.95                                                                                                                                                          | –    | 14.95 | 15              | –    | 14.95 | –    |      |
| Input Voltage<br>(V <sub>O</sub> = 4.5 or 0.5 Vdc)<br>(V <sub>O</sub> = 9.0 or 1.0 Vdc)<br>(V <sub>O</sub> = 13.5 or 1.5 Vdc)                                                                                                                      | "0" Level<br>V <sub>IL</sub> | 5.0                    | –                                                                                                                                                              | 1.5  | –     | 2.25            | 1.5  | –     | 1.5  | Vdc  |
|                                                                                                                                                                                                                                                    |                              | 10                     | –                                                                                                                                                              | 3.0  | –     | 4.50            | 3.0  | –     | 3.0  |      |
|                                                                                                                                                                                                                                                    |                              | 15                     | –                                                                                                                                                              | 4.0  | –     | 6.75            | 4.0  | –     | 4.0  |      |
|                                                                                                                                                                                                                                                    | "1" Level<br>V <sub>IH</sub> | 5.0                    | 3.5                                                                                                                                                            | –    | 3.5   | 2.75            | –    | 3.5   | –    | Vdc  |
|                                                                                                                                                                                                                                                    |                              | 10                     | 7.0                                                                                                                                                            | –    | 7.0   | 5.50            | –    | 7.0   | –    |      |
|                                                                                                                                                                                                                                                    |                              | 15                     | 11                                                                                                                                                             | –    | 11    | 8.25            | –    | 11    | –    |      |
| Output Drive Current<br>(V <sub>OH</sub> = 2.5 Vdc)<br>(V <sub>OH</sub> = 4.6 Vdc)<br>(V <sub>OH</sub> = 9.5 Vdc)<br>(V <sub>OH</sub> = 13.5 Vdc)<br><br>(V <sub>OL</sub> = 0.4 Vdc)<br>(V <sub>OL</sub> = 0.5 Vdc)<br>(V <sub>OL</sub> = 1.5 Vdc) | Source<br>I <sub>OH</sub>    | 5.0                    | –3.0                                                                                                                                                           | –    | –2.4  | –4.2            | –    | –1.7  | –    | mAdc |
|                                                                                                                                                                                                                                                    |                              | 5.0                    | –0.64                                                                                                                                                          | –    | –0.51 | –0.88           | –    | –0.36 | –    |      |
|                                                                                                                                                                                                                                                    |                              | 10                     | –1.6                                                                                                                                                           | –    | –1.3  | –2.25           | –    | –0.9  | –    |      |
|                                                                                                                                                                                                                                                    |                              | 15                     | –4.2                                                                                                                                                           | –    | –3.4  | –8.8            | –    | –2.4  | –    |      |
|                                                                                                                                                                                                                                                    | Sink<br>I <sub>OL</sub>      | 5.0                    | 0.64                                                                                                                                                           | –    | 0.51  | 0.88            | –    | 0.36  | –    | mAdc |
|                                                                                                                                                                                                                                                    |                              | 10                     | 1.6                                                                                                                                                            | –    | 1.3   | 2.25            | –    | 0.9   | –    |      |
|                                                                                                                                                                                                                                                    |                              | 15                     | 4.2                                                                                                                                                            | –    | 3.4   | 8.8             | –    | 2.4   | –    |      |
| Input Current                                                                                                                                                                                                                                      | I <sub>in</sub>              | 15                     | –                                                                                                                                                              | ±0.1 | –     | ±0.00001        | ±0.1 | –     | ±1.0 | μAdc |
| Input Capacitance<br>(V <sub>in</sub> = 0)                                                                                                                                                                                                         | C <sub>in</sub>              | –                      | –                                                                                                                                                              | –    | –     | 5.0             | 7.5  | –     | –    | pF   |
| Quiescent Current<br>(Per Package)                                                                                                                                                                                                                 | I <sub>DD</sub>              | 5.0                    | –                                                                                                                                                              | 1.0  | –     | 0.002           | 1.0  | –     | 30   | μAdc |
|                                                                                                                                                                                                                                                    |                              | 10                     | –                                                                                                                                                              | 2.0  | –     | 0.004           | 2.0  | –     | 60   |      |
|                                                                                                                                                                                                                                                    |                              | 15                     | –                                                                                                                                                              | 4.0  | –     | 0.006           | 4.0  | –     | 120  |      |
| Total Supply Current (Notes 3 & 4)<br>(Dynamic plus Quiescent,<br>Per Package)<br>(C <sub>L</sub> = 50 pF on all outputs all<br>buffers switching)                                                                                                 | I <sub>T</sub>               | 5.0<br>10<br>15        | I <sub>T</sub> = (0.58 μA/kHz) f + I <sub>DD</sub><br>I <sub>T</sub> = (1.15 μA/kHz) f + I <sub>DD</sub><br>I <sub>T</sub> = (1.73 μA/kHz) f + I <sub>DD</sub> |      |       |                 |      |       |      | μAdc |
| Three-State Output Leakage<br>Current                                                                                                                                                                                                              | I <sub>TL</sub>              | 15                     | –                                                                                                                                                              | ±0.1 | –     | ±0.0001         | ±0.1 | –     | ±3.0 | μAdc |

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

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

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

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

where: I<sub>T</sub> is in μA (per package), C<sub>L</sub> in pF, V = (V<sub>DD</sub> – V<sub>SS</sub>) in volts, f in kHz is input frequency, and k = 0.004.

# MC14043B, MC14044B

## SWITCHING CHARACTERISTICS (Note 5) ( $C_L = 50 \text{ pF}$ , $T_A = 25^\circ\text{C}$ )

| Characteristic                                                                                                                                                                                                                                                                                                                                                           | Symbol                                                 | $V_{DD}$<br>Vdc                    | Min                        | Typ<br>(Note 6)                    | Max                                    | Unit     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------------------------------|----------------------------|------------------------------------|----------------------------------------|----------|
| Output Rise Time<br>$t_{TLH} = (1.35 \text{ ns/pF}) C_L + 32.5 \text{ ns}$<br>$t_{TLH} = (0.60 \text{ ns/pF}) C_L + 20 \text{ ns}$<br>$t_{TLH} = (0.40 \text{ ns/pF}) C_L + 20 \text{ ns}$                                                                                                                                                                               | $t_{TLH}$                                              | 5.0<br>10<br>15                    | –<br>–<br>–                | 100<br>50<br>40                    | 200<br>100<br>80                       | ns       |
| Output Fall Time<br>$t_{THL} = (1.35 \text{ ns/pF}) C_L + 32.5 \text{ ns}$<br>$t_{THL} = (0.60 \text{ ns/pF}) C_L + 20 \text{ ns}$<br>$t_{THL} = (0.40 \text{ ns/pF}) C_L + 20 \text{ ns}$                                                                                                                                                                               | $t_{THL}$                                              | 5.0<br>10<br>15                    | –<br>–<br>–                | 100<br>50<br>40                    | 200<br>100<br>80                       | ns       |
| Propagation Delay Time<br>$t_{PLH} = (0.90 \text{ ns/pF}) C_L + 130 \text{ ns}$<br>$t_{PLH} = (0.36 \text{ ns/pF}) C_L + 57 \text{ ns}$<br>$t_{PLH} = (0.26 \text{ ns/pF}) C_L + 47 \text{ ns}$<br>$t_{PHL} = (0.90 \text{ ns/pF}) C_L + 130 \text{ ns}$<br>$t_{PHL} = (0.90 \text{ ns/pF}) C_L + 57 \text{ ns}$<br>$t_{PHL} = (0.26 \text{ ns/pF}) C_L + 47 \text{ ns}$ | $t_{PLH}$<br>$t_{PHL}$                                 | 5.0<br>10<br>15<br>5.0<br>10<br>15 | –<br>–<br>–<br>–<br>–<br>– | 175<br>75<br>60<br>175<br>75<br>60 | 350<br>175<br>120<br>350<br>175<br>120 | ns<br>ns |
| Set, $\overline{\text{Set}}$ Pulse Width                                                                                                                                                                                                                                                                                                                                 | $t_W$                                                  | 5.0<br>10<br>15                    | 200<br>100<br>70           | 80<br>40<br>30                     | –<br>–<br>–                            | ns       |
| Reset, $\overline{\text{Reset}}$ Pulse Width                                                                                                                                                                                                                                                                                                                             | $t_W$                                                  | 5.0<br>10<br>15                    | 200<br>100<br>70           | 80<br>40<br>30                     | –<br>–<br>–                            | ns       |
| Three-State Enable/Disable Delay                                                                                                                                                                                                                                                                                                                                         | $t_{PLZ}$ ,<br>$t_{PHZ}$ ,<br>$t_{PZL}$ ,<br>$t_{PZH}$ | 5.0<br>10<br>15                    | –<br>–<br>–                | 150<br>80<br>55                    | 300<br>160<br>110                      | ns       |

5. The formulas given are for the typical characteristics only at  $25^\circ\text{C}$ .

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

## AC WAVEFORMS

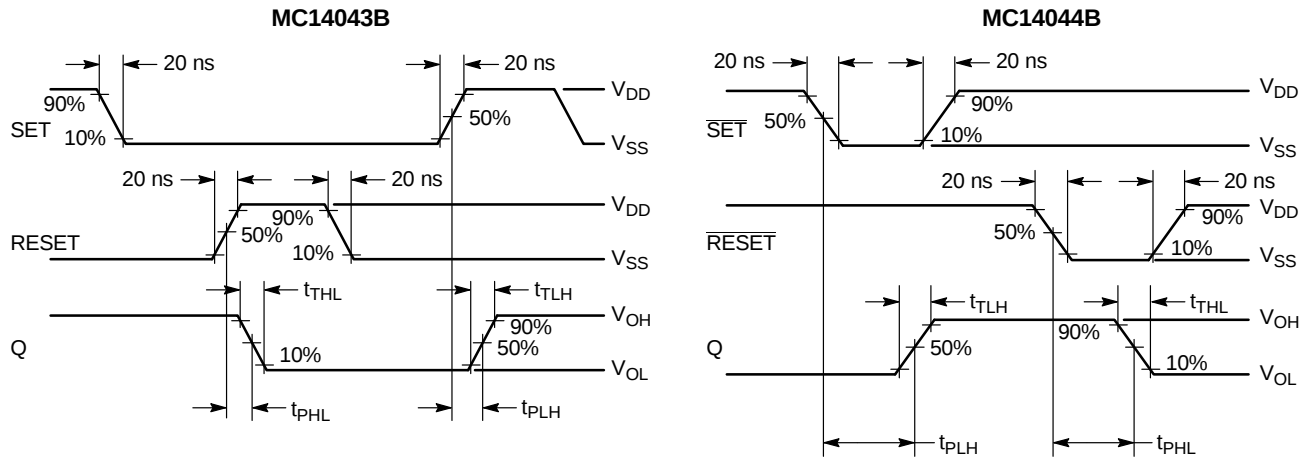


Figure 3.

# MC14043B, MC14044B

## THREE-STATE ENABLE/DISABLE DELAYS

### Set, Reset, Enable, and Switch Conditions for 3-State Tests

| Test      | Enable | S1     | S2     | Q | MC14043B |          | MC14044B  |           |
|-----------|--------|--------|--------|---|----------|----------|-----------|-----------|
|           |        |        |        |   | S        | R        | $\bar{S}$ | $\bar{R}$ |
| $t_{PZH}$ |        | Open   | Closed | A | $V_{DD}$ | $V_{SS}$ | $V_{SS}$  | $V_{DD}$  |
| $t_{PZL}$ |        | Closed | Open   | B | $V_{SS}$ | $V_{DD}$ | $V_{DD}$  | $V_{SS}$  |
| $t_{PHZ}$ |        | Open   | Closed | A | $V_{DD}$ | $V_{SS}$ | $V_{SS}$  | $V_{DD}$  |
| $t_{PLZ}$ |        | Closed | Open   | B | $V_{SS}$ | $V_{DD}$ | $V_{DD}$  | $V_{SS}$  |

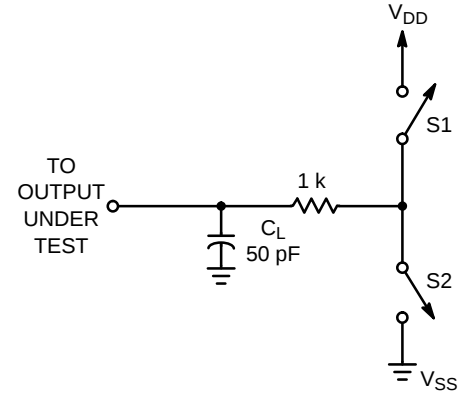


Figure 4.

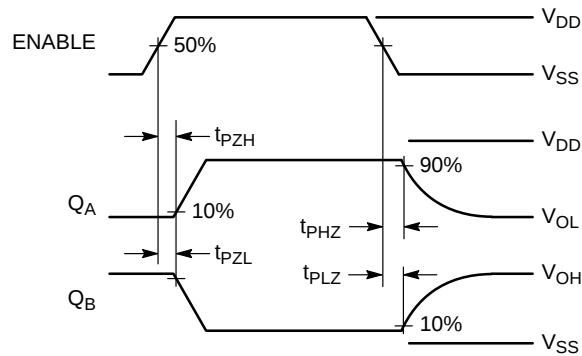


Figure 5.

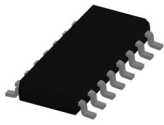
### ORDERING INFORMATION

| Device         | Package           | Shipping <sup>†</sup>    |
|----------------|-------------------|--------------------------|
| MC14043BDG     | SOIC-16 (Pb-Free) | 48 Units / Rail          |
| NLV14043BDG*   | SOIC-16 (Pb-Free) | 48 Units / Rail          |
| MC14043BDR2G   | SOIC-16 (Pb-Free) | 2500 Units / Tape & Reel |
| NLV14043BDR2G* | SOIC-16 (Pb-Free) | 2500 Units / Tape & Reel |

|                |                   |                          |
|----------------|-------------------|--------------------------|
| MC14044BDG     | SOIC-16 (Pb-Free) | 48 Units / Rail          |
| MC14044BDR2G   | SOIC-16 (Pb-Free) | 2500 Units / Tape & Reel |
| NLV14044BDR2G* | SOIC-16 (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.

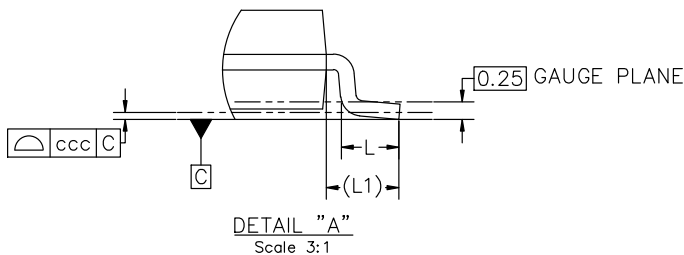
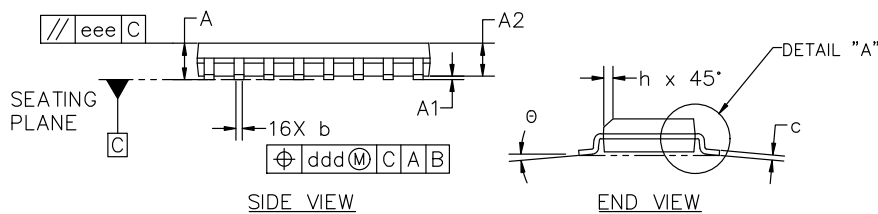
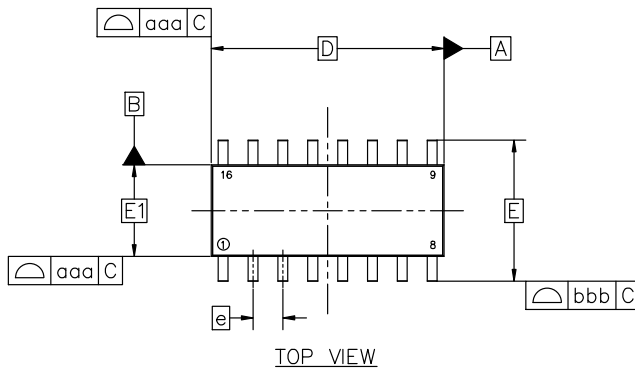


SOIC-16 9.90x3.90x1.50 1.27P  
CASE 751B  
ISSUE L

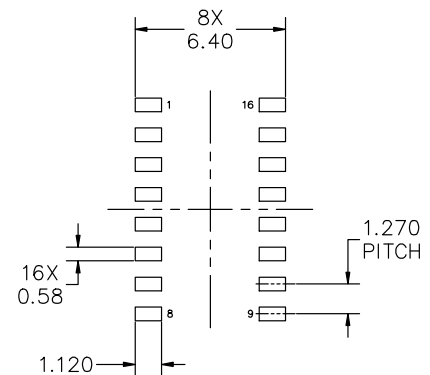
DATE 29 MAY 2024

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. DIMENSION IN MILLIMETERS. ANGLE IN DEGREES.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15mm PER SIDE.
5. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127mm TOTAL IN EXCESS OF THE b DIMENSION AT MAXIMUM MATERIAL CONDITION.



| MILLIMETERS                    |          |      |      |
|--------------------------------|----------|------|------|
| DIM                            | MIN      | NOM  | MAX  |
| A                              | 1.35     | 1.55 | 1.75 |
| A1                             | 0.00     | 0.05 | 0.10 |
| A2                             | 1.35     | 1.50 | 1.65 |
| b                              | 0.35     | 0.42 | 0.49 |
| c                              | 0.19     | 0.22 | 0.25 |
| D                              | 9.90 BSC |      |      |
| E                              | 6.00 BSC |      |      |
| E1                             | 3.90 BSC |      |      |
| e                              | 1.27 BSC |      |      |
| h                              | 0.25     | ---  | 0.50 |
| L                              | 0.40     | 0.83 | 1.25 |
| L1                             | 1.05 REF |      |      |
| θ                              | 0°       | ---  | 7°   |
| TOLERANCE OF FORM AND POSITION |          |      |      |
| aaa                            | 0.10     |      |      |
| bbb                            | 0.20     |      |      |
| ccc                            | 0.10     |      |      |
| ddd                            | 0.25     |      |      |
| eee                            | 0.10     |      |      |



RECOMMENDED MOUNTING FOOTPRINT

\*FOR ADDITIONAL INFORMATION ON OUR  
PB-FREE STRATEGY AND SOLDERING DETAILS,  
PLEASE DOWNLOAD THE onsemi SOLDERING  
AND MOUNTING TECHNIQUES REFERENCE  
MANUAL, SOLDERRM/D

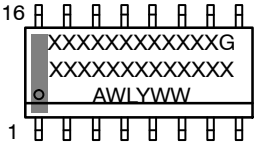
|                  |                              |                                                                                                                                                                                     |
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| DESCRIPTION:     | SOIC-16 9.90X3.90X1.50 1.27P | PAGE 1 OF 2                                                                                                                                                                         |

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SOIC-16 9.90x3.90x1.50 1.27P  
CASE 751B  
ISSUE L

DATE 29 MAY 2024

GENERIC  
MARKING DIAGRAM\*



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

\*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.

|                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>STYLE 1:</b><br>PIN 1. COLLECTOR<br>2. BASE<br>3. EMITTER<br>4. NO CONNECTION<br>5. EMITTER<br>6. BASE<br>7. COLLECTOR<br>8. COLLECTOR<br>9. BASE<br>10. EMITTER<br>11. NO CONNECTION<br>12. EMITTER<br>13. BASE<br>14. COLLECTOR<br>15. EMITTER<br>16. COLLECTOR                           | <b>STYLE 2:</b><br>PIN 1. CATHODE<br>2. ANODE<br>3. NO CONNECTION<br>4. CATHODE<br>5. CATHODE<br>6. NO CONNECTION<br>7. ANODE<br>8. CATHODE<br>9. CATHODE<br>10. ANODE<br>11. NO CONNECTION<br>12. CATHODE<br>13. CATHODE<br>14. NO CONNECTION<br>15. ANODE<br>16. CATHODE | <b>STYLE 3:</b><br>PIN 1. COLLECTOR, DYE #1<br>2. BASE, #1<br>3. EMITTER, #1<br>4. COLLECTOR, #1<br>5. COLLECTOR, #2<br>6. BASE, #2<br>7. EMITTER, #2<br>8. COLLECTOR, #2<br>9. COLLECTOR, #3<br>10. BASE, #3<br>11. EMITTER, #3<br>12. COLLECTOR, #3<br>13. COLLECTOR, #4<br>14. BASE, #4<br>15. EMITTER, #4<br>16. COLLECTOR, #4                                                                                         | <b>STYLE 4:</b><br>PIN 1. COLLECTOR, DYE #1<br>2. COLLECTOR, #1<br>3. COLLECTOR, #2<br>4. COLLECTOR, #2<br>5. COLLECTOR, #3<br>6. COLLECTOR, #3<br>7. COLLECTOR, #4<br>8. COLLECTOR, #4<br>9. BASE, #4<br>10. EMITTER, #4<br>11. BASE, #3<br>12. EMITTER, #3<br>13. BASE, #2<br>14. EMITTER, #2<br>15. BASE, #1<br>16. EMITTER, #1 |
| <b>STYLE 5:</b><br>PIN 1. DRAIN, DYE #1<br>2. DRAIN, #1<br>3. DRAIN, #2<br>4. DRAIN, #2<br>5. DRAIN, #3<br>6. DRAIN, #3<br>7. DRAIN, #4<br>8. DRAIN, #4<br>9. GATE, #4<br>10. SOURCE, #4<br>11. GATE, #3<br>12. SOURCE, #3<br>13. GATE, #2<br>14. SOURCE, #2<br>15. GATE, #1<br>16. SOURCE, #1 | <b>STYLE 6:</b><br>PIN 1. CATHODE<br>2. CATHODE<br>3. CATHODE<br>4. CATHODE<br>5. CATHODE<br>6. CATHODE<br>7. CATHODE<br>8. CATHODE<br>9. ANODE<br>10. ANODE<br>11. ANODE<br>12. ANODE<br>13. ANODE<br>14. ANODE<br>15. ANODE<br>16. ANODE                                 | <b>STYLE 7:</b><br>PIN 1. SOURCE N-CH<br>2. COMMON DRAIN (OUTPUT)<br>3. COMMON DRAIN (OUTPUT)<br>4. GATE P-CH<br>5. COMMON DRAIN (OUTPUT)<br>6. COMMON DRAIN (OUTPUT)<br>7. COMMON DRAIN (OUTPUT)<br>8. SOURCE P-CH<br>9. SOURCE P-CH<br>10. COMMON DRAIN (OUTPUT)<br>11. COMMON DRAIN (OUTPUT)<br>12. COMMON DRAIN (OUTPUT)<br>13. GATE N-CH<br>14. COMMON DRAIN (OUTPUT)<br>15. COMMON DRAIN (OUTPUT)<br>16. SOURCE N-CH |                                                                                                                                                                                                                                                                                                                                    |

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