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# TinyLogic ULP-A Universal Configurable Logic Gates

## NC7SP57, NC7SP58

The NC7SP57 and NC7SP58 are universal configurable logic gates in tiny footprint packages. The devices are designed to operate for  $V_{CC} = 0.9\text{ V}$  to  $3.6\text{ V}$ .

### Features

- Designed for  $0.9\text{ V}$  to  $3.6\text{ V}$   $V_{CC}$  Operation
- $3.4\text{ ns}$   $t_{PD}$  at  $3.3\text{ V}$  (Typ)
- Inputs/Outputs Over-Voltage Tolerant up to  $3.6\text{ V}$
- $I_{OFF}$  Supports Partial Power Down Protection
- Source/Sink  $2.6\text{ mA}$  at  $3.3\text{ V}$
- Available in SC-88 and MicroPak™ Packages
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

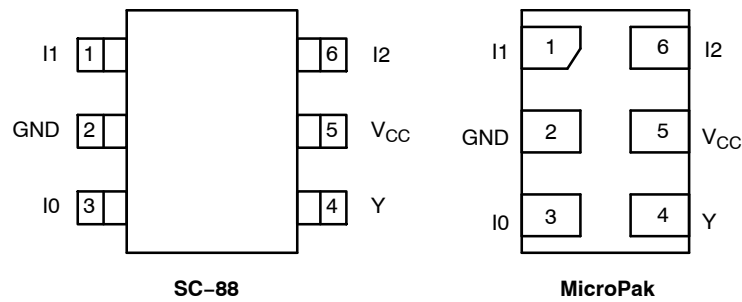


Figure 1. Pinout Diagrams (Top Views)

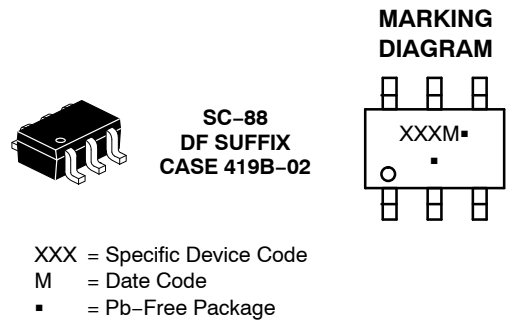
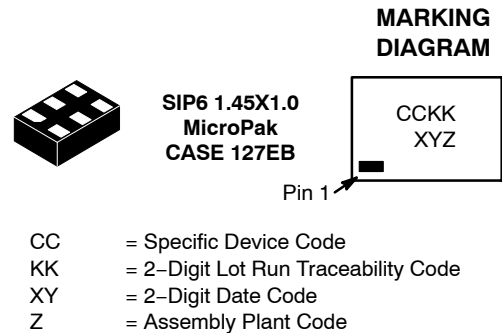
### PIN ASSIGNMENT

| Pin | SC-88    | MicroPak |
|-----|----------|----------|
| 1   | I1       | I1       |
| 2   | GND      | GND      |
| 3   | I0       | I0       |
| 4   | Y        | Y        |
| 5   | $V_{CC}$ | $V_{CC}$ |
| 6   | I2       | I2       |



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### ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 9 of this data sheet.

## NC7SP57, NC7SP58

**FUNCTION TABLE**

| Inputs |    |    | NC7SP57   | NC7SP58   |
|--------|----|----|---|---|
| I2     | I1 | I0 | $Y = (\overline{I0}) \cdot (\overline{I2}) + (I1) \cdot (I2)$ | $Y = (I0) \cdot (\overline{I2}) + (\overline{I1}) \cdot (I2)$ |
| L      | L  | L  | H   | L   |
| L      | L  | H  | L   | H   |
| L      | H  | L  | H   | L   |
| L      | H  | H  | L   | H   |
| H      | L  | L  | L   | H   |
| H      | L  | H  | L   | H   |
| H      | H  | L  | H   | L   |
| H      | H  | H  | H   | L   |

**FUNCTION SELECTION TABLE**

| 2-Input Logic Function                 | Device Selection | Connection Configuration |
|--|------------------|--------------------------|
| 2-Input AND                            | NC7SP57          | Figure 2                 |
| 2-Input AND with inverted input        | NC7SP58          | Figure 8, 9              |
| 2-Input AND with both inputs inverted  | NC7SP57          | Figure 5                 |
| 2-Input NAND                           | NC7SP58          | Figure 7                 |
| 2-Input NAND with inverted input       | NC7SP57          | Figure 3, 4              |
| 2-Input NAND with both inputs inverted | NC7SP58          | Figure 10                |
| 2-Input OR                             | NC7SP58          | Figure 10                |
| 2-Input OR with inverted input         | NC7SP57          | Figure 3, 4              |
| 2-Input OR with both inputs inverted   | NC7SP58          | Figure 7                 |
| 2-Input NOR                            | NC7SP57          | Figure 5                 |
| 2-Input NOR with inverted input        | NC7SP58          | Figure 8, 9              |
| 2-Input NOR with both inputs inverted  | NC7SP57          | Figure 2                 |
| 2-Input XOR                            | NC7SP58          | Figure 11                |
| 2-Input XNOR                           | NC7SP57          | Figure 6                 |

# NC7SP57, NC7SP58

## Logic Configurations NC7SP57

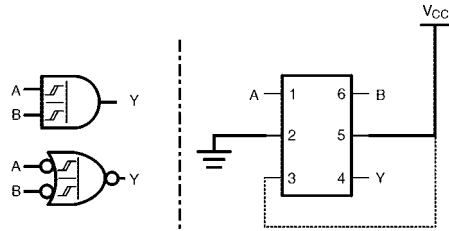


Figure 2. 2-Input AND Gate

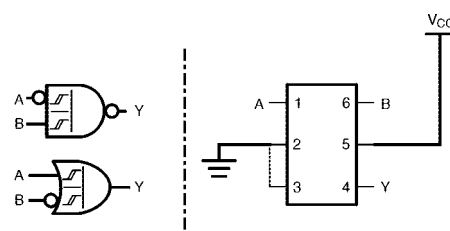


Figure 3. 2-Input NAND with Inverted A Input

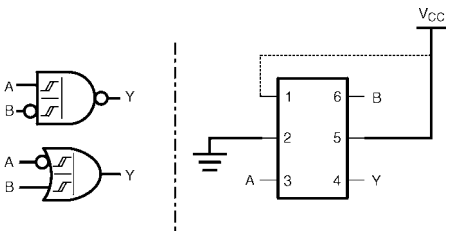


Figure 4. 2-Input NAND with Inverted B Input

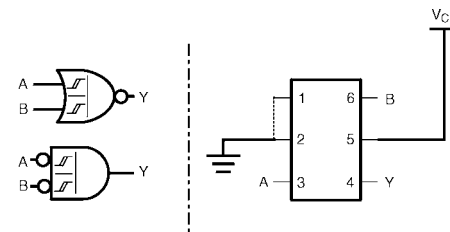


Figure 5. 2-Input NOR Gate

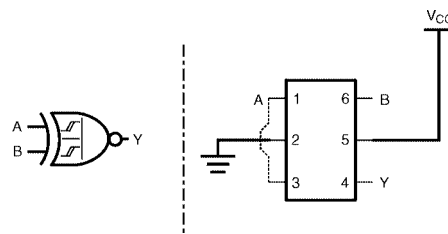


Figure 6. 2-Input XNOR Gate

NOTE: Figure 2 through Figure 6 show the logical functions that can be implemented using the NC7SP57. The diagrams show the DeMorgan's equivalent logic duals for a given 2-input function. Next to the logical implementation is the board level physical implementation of how the pins of the function should be connected.

# NC7SP57, NC7SP58

## Logic Configurations NC7SP58

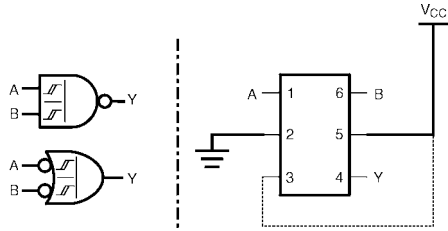


Figure 7. 2-Input NAND Gate

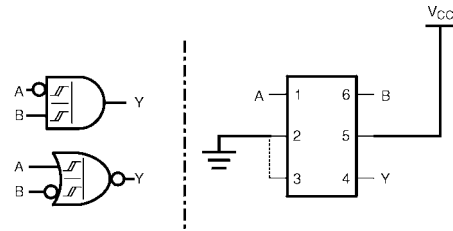


Figure 8. 2-Input AND with Inverted A Input

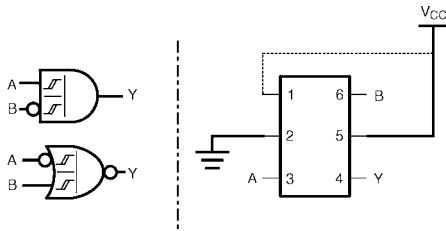


Figure 9. 2-Input AND with Inverted B Input

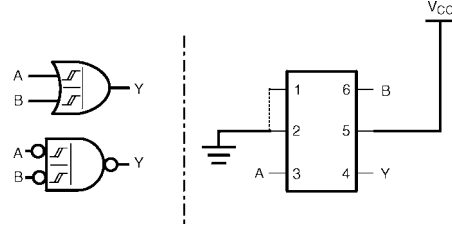


Figure 10. 2-Input OR Gate

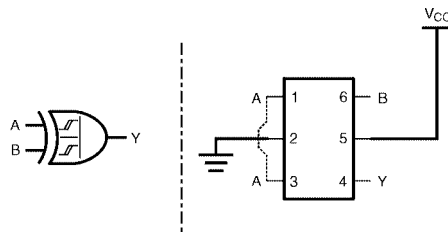


Figure 11. 2-Input XOR Gate

NOTE: Figure 7 through Figure 11 show the logical functions that can be implemented using the NC7SP58. The diagrams show the DeMorgan's equivalent logic duals for a given 2-input function. Next to the logical implementation is the board level physical implementation of how the pins of the function should be connected.

# NC7SP57, NC7SP58

## MAXIMUM RATINGS

| Symbol                              | Characteristics   | Value   | Unit |
|-------------------------------------|---|---|------|
| V <sub>CC</sub>                     | DC Supply Voltage   | -0.5 to +4.3  | V    |
| V <sub>IN</sub>                     | DC Input Voltage  | -0.5 to +4.3  | V    |
| V <sub>OUT</sub>                    | DC Output Voltage<br>Active-Mode (High or Low State)<br>Tri-State Mode (Note 11)<br>Power-Down Mode (V <sub>CC</sub> = 0 V) | -0.5 to V <sub>CC</sub> + 0.5<br>-0.5 to +4.3<br>-0.5 to +4.3 | V    |
| I <sub>IK</sub>                     | DC Input Diode Current<br>V <sub>IN</sub> < GND   | -50   | mA   |
| I <sub>OK</sub>                     | DC Output Diode Current<br>V <sub>OUT</sub> < GND   | -50   | mA   |
| I <sub>OUT</sub>                    | DC Output Source/Sink Current   | ±50   | mA   |
| I <sub>CC</sub> or I <sub>GND</sub> | DC Supply Current per Supply Pin or Ground Pin  | ±50   | mA   |
| T <sub>STG</sub>                    | Storage Temperature Range   | -65 to +150   | °C   |
| T <sub>L</sub>                      | Lead Temperature, 1 mm from Case for 10 Seconds   | 260   | °C   |
| T <sub>J</sub>                      | Junction Temperature Under Bias   | +150  | °C   |
| θ <sub>JA</sub>                     | Thermal Resistance (Note 12)<br>SC-88<br>MicroPak   | 377<br>154  | °C/W |
| P <sub>D</sub>                      | Power Dissipation in Still Air<br>SC-88<br>MicroPak   | 332<br>812  | mW   |
| MSL                                 | Moisture Sensitivity  | Level 1   | -    |
| F <sub>R</sub>                      | Flammability Rating<br>Oxygen Index: 28 to 34   | UL 94 V-0 @ 0.125 in  | -    |
| V <sub>ESD</sub>                    | ESD Withstand Voltage (Note 3)<br>Human Body Model<br>Charged Device Model  | 2000<br>1000  | V    |
| I <sub>Latchup</sub>                | Latchup Performance (Note 4)  | ±100  | mA   |

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. Applicable to devices with outputs that may be tri-stated.
2. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow per JESD51-7.
3. HBM tested to EIA / JESD22-A114-A. CDM tested to JESD22-C101-A. JEDEC recommends that ESD qualification to EIA/JESD22-A115A (Machine Model) be discontinued.
4. Tested to EIA/JESD78 Class II.

## RECOMMENDED OPERATING CONDITIONS

| Symbol                          | Parameter   | Min         | Max                           | Unit |
|---------------------------------|---|-------------|-------------------------------|------|
| V <sub>CC</sub>                 | Positive DC Supply Voltage  | 0.9         | 3.6                           | V    |
| V <sub>IN</sub>                 | DC Input Voltage  | 0           | 3.6                           | V    |
| V <sub>OUT</sub>                | DC Output Voltage<br>Active-Mode (High or Low State)<br>Tri-State Mode (Note 11)<br>Power-Down Mode (V <sub>CC</sub> = 0 V) | 0<br>0<br>0 | V <sub>CC</sub><br>3.6<br>3.6 | V    |
| T <sub>A</sub>                  | Operating Temperature Range   | -40         | +85                           | °C   |
| t <sub>r</sub> , t <sub>f</sub> | Input Transition Rise and Fall Time   | 0           | No Limit                      | ns/V |

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.

# NC7SP57, NC7SP58

## DC ELECTRICAL CHARACTERISTICS

| Symbol          | Parameter                  | Condition  | V <sub>CC</sub> (V)       | T <sub>A</sub> = 25°C |                        |      | T <sub>A</sub> = -40°C to +85°C |                        | Unit |                       |
|-----------------|----------------------------|--|---------------------------|-----------------------|------------------------|------|---------------------------------|------------------------|------|-----------------------|
|                 |                            |  |                           | Min                   | Typ                    | Max  | Min                             | Max                    |      |                       |
| V <sub>P</sub>  | Positive Threshold Voltage |  | 0.9                       | -                     | 0.62                   | -    | -                               | -                      | V    |                       |
|                 |                            |  | 1.1                       | -                     | -                      | 1.0  | -                               | 1.0                    |      |                       |
|                 |                            |  | 1.4                       | -                     | -                      | 1.2  | -                               | 1.2                    |      |                       |
|                 |                            |  | 1.65                      | -                     | -                      | 1.5  | -                               | 1.5                    |      |                       |
|                 |                            |  | 3.0                       | -                     | -                      | 1.9  | -                               | 1.9                    |      |                       |
|                 |                            |  | 3.0 to 3.6                | -                     | -                      | 2.6  | -                               | 2.6                    |      |                       |
| V <sub>N</sub>  | Negative Threshold Voltage |  | 0.9                       | -                     | 0.34                   | -    | -                               | -                      | V    |                       |
|                 |                            |  | 1.1                       | 0.15                  | -                      | -    | 0.15                            | -                      |      |                       |
|                 |                            |  | 1.4                       | 0.2                   | -                      | -    | 0.2                             | -                      |      |                       |
|                 |                            |  | 1.65                      | 0.25                  | -                      | -    | 0.25                            | -                      |      |                       |
|                 |                            |  | 2.3                       | 0.4                   | -                      | -    | 0.4                             | -                      |      |                       |
|                 |                            |  | 3.0                       | 0.6                   | -                      | -    | 0.6                             | -                      |      |                       |
| V <sub>H</sub>  | Hysteresis Voltage         |  | 0.9                       | -                     | 0.29                   | -    | -                               | -                      | V    |                       |
|                 |                            |  | 1.1                       | 0.08                  | -                      | 0.6  | 0.08                            | 0.6                    |      |                       |
|                 |                            |  | 1.4                       | 0.09                  | -                      | 0.8  | 0.09                            | 0.8                    |      |                       |
|                 |                            |  | 1.65                      | 0.1                   | -                      | 1.0  | 0.1                             | 1.0                    |      |                       |
|                 |                            |  | 2.3                       | 0.25                  | -                      | 1.1  | 0.25                            | 1.1                    |      |                       |
|                 |                            |  | 3.0                       | 0.6                   | -                      | 1.8  | 0.6                             | 1.8                    |      |                       |
| V <sub>OH</sub> | High-Level Output Voltage  | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> |                           |                       |                        |      |                                 |                        | V    |                       |
|                 |                            | I <sub>OH</sub> = -20 μA                             | 0.9                       | -                     | V <sub>CC</sub> - 0.1  | -    | -                               | -                      |      |                       |
|                 |                            |  | 1.1 to 1.3                | V <sub>CC</sub> - 0.1 | -                      | -    | V <sub>CC</sub> - 0.1           | -                      |      |                       |
|                 |                            |  | 1.4 to 1.6                | V <sub>CC</sub> - 0.1 | -                      | -    | V <sub>CC</sub> - 0.1           | -                      |      |                       |
|                 |                            |  | 1.65 to 1.95              | V <sub>CC</sub> - 0.1 | -                      | -    | V <sub>CC</sub> - 0.1           | -                      |      |                       |
|                 |                            |  | 2.3 to 2.7                | V <sub>CC</sub> - 0.1 | -                      | -    | V <sub>CC</sub> - 0.1           | -                      |      |                       |
|                 |                            |  | 3.0 to 3.6                | V <sub>CC</sub> - 0.1 | -                      | -    | V <sub>CC</sub> - 0.1           | -                      |      |                       |
|                 |                            |  | I <sub>OH</sub> = -0.5 mA | 1.1 to 1.3            | 0.75 x V <sub>CC</sub> | -    | -                               | 0.70 x V <sub>CC</sub> |      | -                     |
|                 |                            |  | I <sub>OH</sub> = -1 mA   | 1.4 to 1.6            | 1.07                   | -    | -                               | 0.99                   |      | -                     |
|                 |                            |  | I <sub>OH</sub> = -1.5 mA | 1.65 to 1.95          | 1.24                   | -    | -                               | 1.22                   |      | -                     |
|                 |                            |  | I <sub>OH</sub> = -2.1 mA | 2.3 to 2.7            | 1.95                   | -    | -                               | 1.87                   |      | -                     |
|                 | I <sub>OH</sub> = -2.6 mA  | 3.0 to 3.6   | 2.61                      | -                     | -                      | 2.55 | -                               |                        |      |                       |
| V <sub>OL</sub> | Low-Level Output Voltage   | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> |                           |                       |                        |      |                                 |                        | V    |                       |
|                 |                            | I <sub>OL</sub> = 20 μA                              | 0.9                       | -                     | 0.1                    | -    | -                               | -                      |      |                       |
|                 |                            |  | 1.1 to 1.3                | -                     | -                      | 0.1  | -                               | 0.1                    |      |                       |
|                 |                            |  | 1.4 to 1.6                | -                     | -                      | 0.1  | -                               | 0.1                    |      |                       |
|                 |                            |  | 1.65 to 1.95              | -                     | -                      | 0.1  | -                               | 0.1                    |      |                       |
|                 |                            |  | 2.3 to 2.7                | -                     | -                      | 0.1  | -                               | 0.1                    |      |                       |
|                 |                            |  | 3.0 to 3.6                | -                     | -                      | 0.1  | -                               | 0.1                    |      |                       |
|                 |                            |  | I <sub>OL</sub> = 0.5 mA  | 1.1 to 1.3            | -                      | -    | 0.3 x V <sub>CC</sub>           | -                      |      | 0.3 x V <sub>CC</sub> |
|                 |                            |  | I <sub>OL</sub> = 1 mA    | 1.4 to 1.6            | -                      | -    | 0.31                            | -                      |      | 0.37                  |
|                 |                            |  | I <sub>OL</sub> = 1.5 mA  | 1.65 to 1.95          | -                      | -    | 0.31                            | -                      |      | 0.35                  |
|                 |                            |  | I <sub>OL</sub> = 2.1 mA  | 2.3 to 2.7            | -                      | -    | 0.31                            | -                      |      | 0.33                  |
|                 | I <sub>OL</sub> = 2.6 mA   | 3.0 to 3.6   | -                         | -                     | 0.31                   | -    | 0.33                            |                        |      |                       |

# NC7SP57, NC7SP58

## DC ELECTRICAL CHARACTERISTICS (continued)

| Symbol           | Parameter                 | Condition   | V <sub>CC</sub> (V) | T <sub>A</sub> = 25°C |     |      | T <sub>A</sub> = -40°C to +85°C |      | Unit |
|------------------|---------------------------|---|---------------------|-----------------------|-----|------|---------------------------------|------|------|
|                  |                           |   |                     | Min                   | Typ | Max  | Min                             | Max  |      |
| I <sub>IN</sub>  | Input Leakage Current     | V <sub>IN</sub> = 0 V to 3.6 V                                    | 0.9 to 3.6          | -                     | -   | ±0.1 | -                               | ±0.5 | μA   |
| I <sub>OFF</sub> | Power Off Leakage Current | V <sub>IN</sub> = 0 V to 3.6 V or V <sub>OUT</sub> = 0 V to 3.6 V | 0                   | -                     | -   | 0.5  | -                               | 0.5  | μA   |
| I <sub>CC</sub>  | Quiescent Supply Current  | V <sub>IN</sub> = V <sub>CC</sub> or GND                          | 0.9 to 3.6          | -                     | -   | 0.9  | -                               | 0.9  | 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.

## AC ELECTRICAL CHARACTERISTICS

| Symbol                              | Parameter  | Condition                                     | V <sub>CC</sub> (V) | T <sub>A</sub> = 25°C |      |      | T <sub>A</sub> = -40°C to +85°C |      | Unit |
|-------------------------------------|--|---|---------------------|-----------------------|------|------|---------------------------------|------|------|
|                                     |  |   |                     | Min                   | Typ  | Max  | Min                             | Max  |      |
| t <sub>PLH</sub> , t <sub>PHL</sub> | Propagation Delay, (I0 or I1 or I2) to Y (Figures 12 and 13) | R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 10 pF | 0.9                 | -                     | 54.3 | -    | -                               | -    | ns   |
|                                     |  |   | 1.10 to 1.30        | -                     | 15.1 | 30.8 | -                               | 51.0 |      |
|                                     |  |   | 1.40 to 1.60        | -                     | 8.2  | 17.0 | -                               | 21.0 |      |
|                                     |  |   | 1.65 to 1.95        | -                     | 5.9  | 14.0 | -                               | 17.0 |      |
|                                     |  |   | 2.3 to 2.7          | -                     | 4.0  | 10.0 | -                               | 13.0 |      |
|                                     |  |   | 3.0 to 3.6          | -                     | 3.4  | 8.0  | -                               | 12.0 |      |
| t <sub>PLH</sub> , t <sub>PHL</sub> | Propagation Delay, (I0 or I1 or I2) to Y (Figures 12 and 13) | R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 15 pF | 0.9                 | -                     | 55.8 | -    | -                               | -    | ns   |
|                                     |  |   | 1.10 to 1.30        | -                     | 15.6 | 32.1 | -                               | 52.0 |      |
|                                     |  |   | 1.40 to 1.60        | -                     | 8.6  | 18.0 | -                               | 22.0 |      |
|                                     |  |   | 1.65 to 1.95        | -                     | 6.3  | 15.0 | -                               | 18.0 |      |
|                                     |  |   | 2.3 to 2.7          | -                     | 4.2  | 11.0 | -                               | 14.0 |      |
|                                     |  |   | 3.0 to 3.6          | -                     | 3.6  | 9.0  | -                               | 12.0 |      |
| t <sub>PLH</sub> , t <sub>PHL</sub> | Propagation Delay, (I0 or I1 or I2) to Y (Figures 12 and 13) | R <sub>L</sub> = 1 MΩ, C <sub>L</sub> = 30 pF | 0.9                 | -                     | 60.2 | -    | -                               | -    | ns   |
|                                     |  |   | 1.10 to 1.30        | -                     | 17.2 | 33.6 | -                               | 55.0 |      |
|                                     |  |   | 1.40 to 1.60        | -                     | 9.9  | 20.0 | -                               | 24.0 |      |
|                                     |  |   | 1.65 to 1.95        | -                     | 7.4  | 17.0 | -                               | 20.0 |      |
|                                     |  |   | 2.3 to 2.7          | -                     | 5.0  | 12.0 | -                               | 15.0 |      |
|                                     |  |   | 3.0 to 3.6          | -                     | 4.1  | 11.0 | -                               | 14.0 |      |

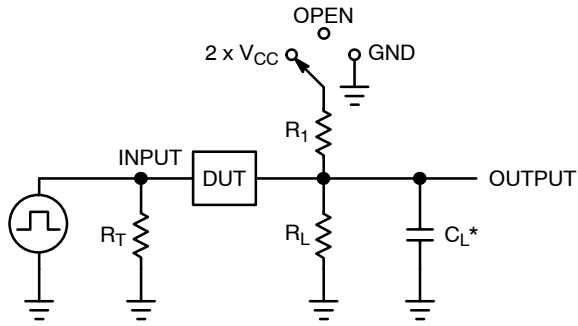
## CAPACITIVE CHARACTERISTICS

| Symbol           | Parameter                              | Test Condition   | Typical (T <sub>A</sub> = 25°C) | Unit |
|------------------|--|--|---------------------------------|------|
| C <sub>IN</sub>  | Input Capacitance                      | V <sub>CC</sub> = 0 V  | 2.0                             | pF   |
| C <sub>OUT</sub> | Output Capacitance                     | V <sub>CC</sub> = 0 V  | 4.0                             | pF   |
| C <sub>PD</sub>  | Power Dissipation Capacitance (Note 5) | f = 10 MHz, V <sub>CC</sub> = 0.9 to 3.6 V, V <sub>IN</sub> = 0 V or V <sub>CC</sub> | 8.0                             | pF   |

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



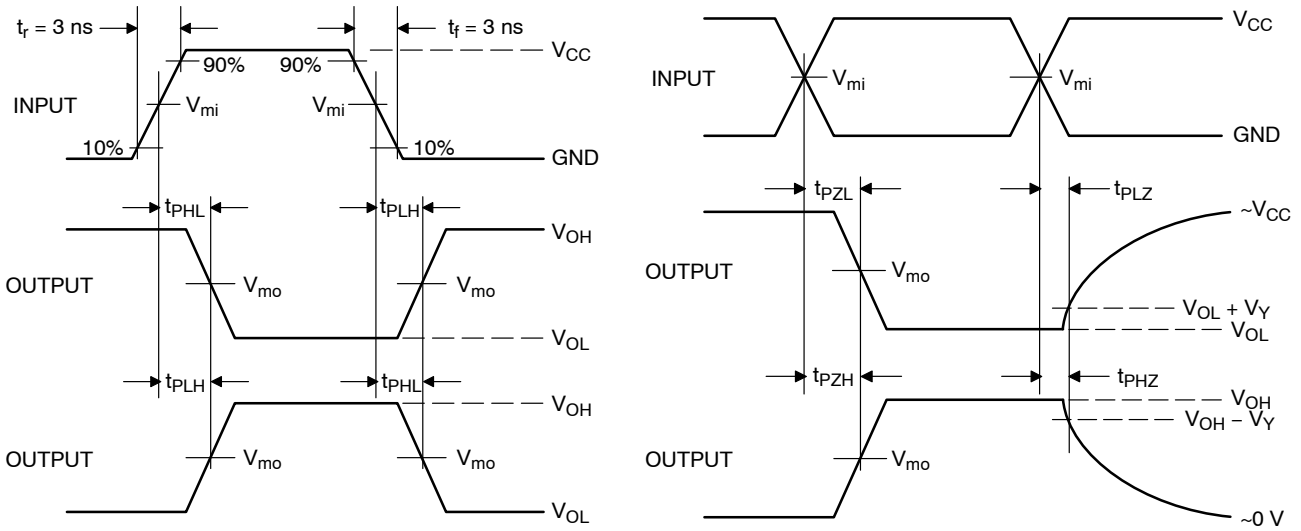
# NC7SP57, NC7SP58



$C_L$  includes probe and jig capacitance  
 $R_T$  is  $Z_{OUT}$  of pulse generator (typically 50  $\Omega$ )  
 $f = 1$  MHz

| Test                | Switch Position   |
|---------------------|-------------------|
| $t_{PLH} / t_{PHL}$ | Open              |
| $t_{PLZ} / t_{PZL}$ | $2 \times V_{CC}$ |
| $t_{PHZ} / t_{PZH}$ | GND               |

Figure 12. Test Circuit



| $V_{CC}, V$  | $V_{mi}, V$  | $V_{mo}, V$  | $V_Y, V$ |
|--------------|--------------|--------------|----------|
| 0.9          | $V_{CC} / 2$ | $V_{CC} / 2$ | 0.1      |
| 1.1 to 1.3   | $V_{CC} / 2$ | $V_{CC} / 2$ | 0.1      |
| 1.4 to 1.6   | $V_{CC} / 2$ | $V_{CC} / 2$ | 0.1      |
| 1.65 to 1.95 | $V_{CC} / 2$ | $V_{CC} / 2$ | 0.15     |
| 2.3 to 2.7   | $V_{CC} / 2$ | $V_{CC} / 2$ | 0.15     |
| 3.0 to 3.6   | 1.5          | 1.5          | 0.3      |

Figure 13. Switching Waveforms

# NC7SP57, NC7SP58

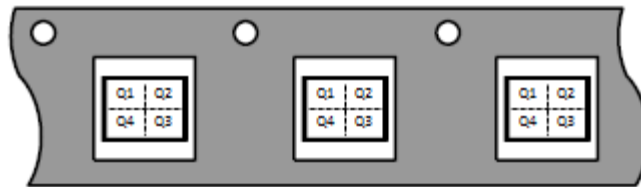
## ORDERING INFORMATION

| Device     | Package  | Marking | Pin 1 Orientation<br>(See below) | Shipping <sup>†</sup> |
|------------|----------|---------|----------------------------------|-----------------------|
| NC7SP57P6X | SC-88    | P57     | Q4                               | 3000 / Tape & Reel    |
| NC7SP57L6X | MicroPak | K9      | Q4                               | 5000 / Tape & Reel    |
| NC7SP58P6X | SC-88    | P58     | Q4                               | 3000 / Tape & Reel    |
| NC7SP58L6X | MicroPak | L3      | Q4                               | 5000 / 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.

### Pin 1 Orientation in Tape and Reel

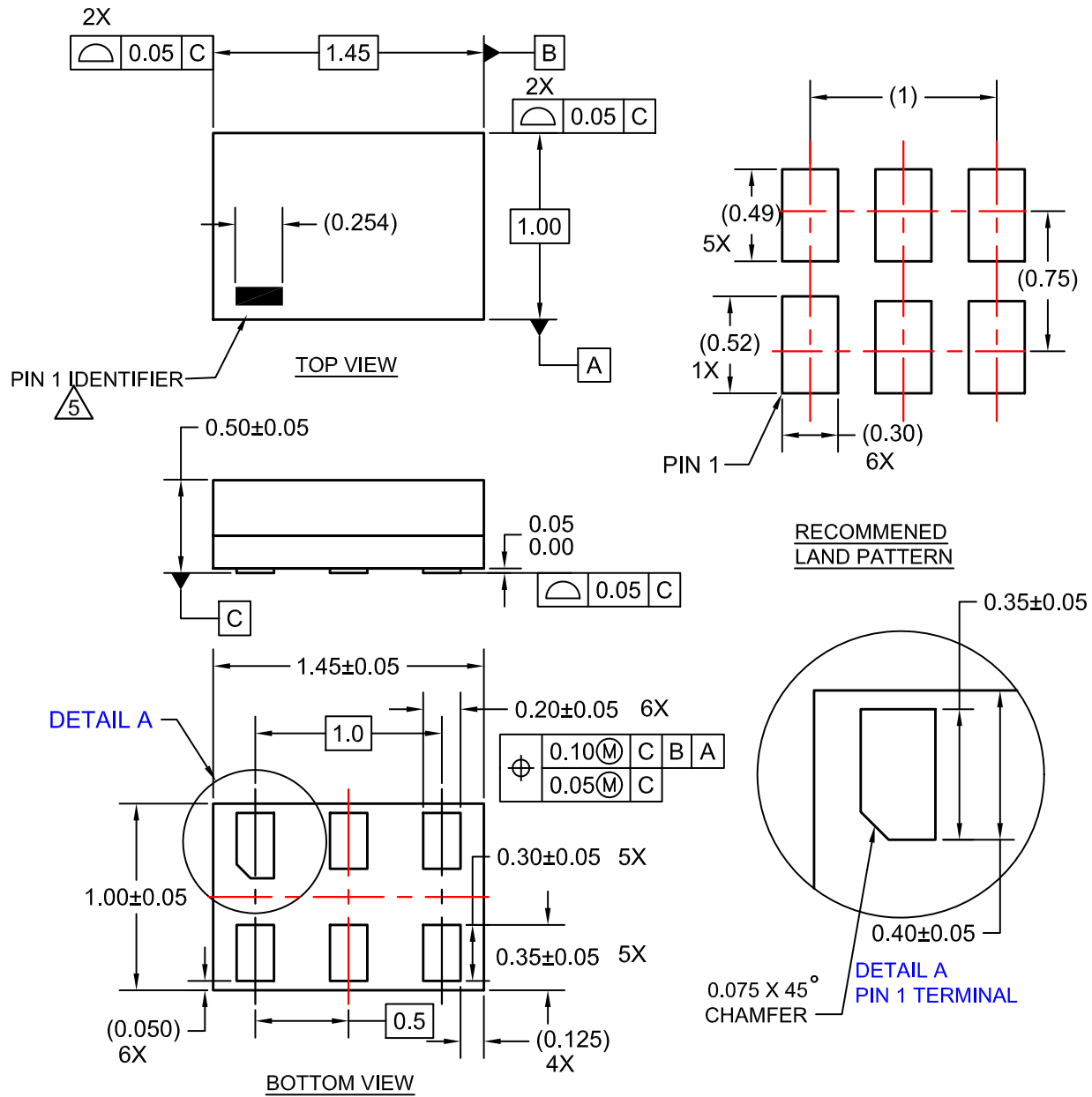
Direction of Feed



# NC7SP57, NC7SP58

## PACKAGE DIMENSIONS

SIP6 1.45X1.0  
CASE 127EB  
ISSUE O



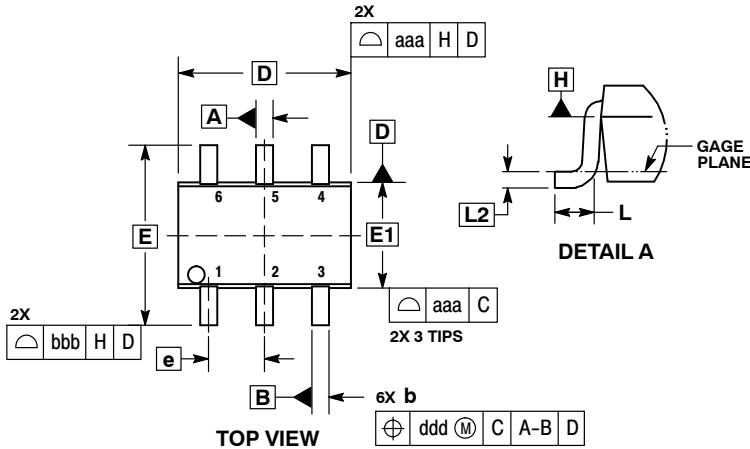
**NOTES:**

1. CONFORMS TO JEDEC STANDARD MO-252 VARIATION UAAD
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-2009
4. PIN ONE IDENTIFIER IS 2X LENGTH OF ANY OTHER LINE IN THE MARK CODE LAYOUT.

# NC7SP57, NC7SP58

## PACKAGE DIMENSIONS

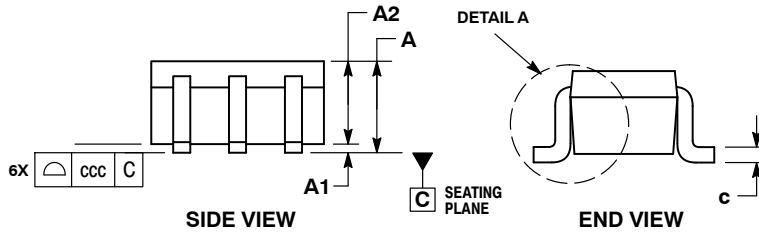
SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE Y



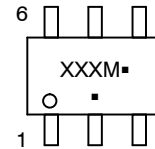
**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
4. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
5. DATUMS A AND B ARE DETERMINED AT DATUM H.
6. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.
7. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| A   | ---         | ---  | 1.10 | ---       | ---   | 0.043 |
| A1  | 0.00        | ---  | 0.10 | 0.000     | ---   | 0.004 |
| A2  | 0.70        | 0.90 | 1.00 | 0.027     | 0.035 | 0.039 |
| b   | 0.15        | 0.20 | 0.25 | 0.006     | 0.008 | 0.010 |
| C   | 0.08        | 0.15 | 0.22 | 0.003     | 0.006 | 0.009 |
| D   | 1.80        | 2.00 | 2.20 | 0.070     | 0.078 | 0.086 |
| E   | 2.00        | 2.10 | 2.20 | 0.078     | 0.082 | 0.086 |
| E1  | 1.15        | 1.25 | 1.35 | 0.045     | 0.049 | 0.053 |
| e   | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| L   | 0.26        | 0.36 | 0.46 | 0.010     | 0.014 | 0.018 |
| L2  | 0.15 BSC    |      |      | 0.006 BSC |       |       |
| aaa | 0.15        |      |      | 0.006     |       |       |
| bbb | 0.30        |      |      | 0.012     |       |       |
| ccc | 0.10        |      |      | 0.004     |       |       |
| ddd | 0.10        |      |      | 0.004     |       |       |



### GENERIC MARKING DIAGRAM\*



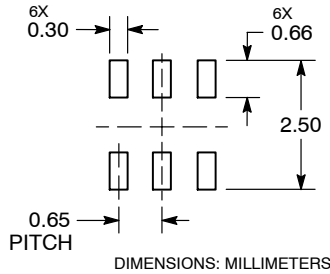
XXX = Specific Device Code  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or position may vary depending upon manufacturing location.

\*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.

### RECOMMENDED SOLDERING FOOTPRINT\*



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

### STYLES ON PAGE 2

# NC7SP57, NC7SP58


SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE Y

DATE 11 DEC 2012

|  |  |   |   |   |   |
|--|--|---|---|---|---|
| STYLE 1:<br>PIN 1. EMITTER 2<br>2. BASE 2<br>3. COLLECTOR 1<br>4. EMITTER 1<br>5. BASE 1<br>6. COLLECTOR 2 | STYLE 2:<br>CANCELLED  | STYLE 3:<br>CANCELLED   | STYLE 4:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. COLLECTOR<br>4. EMITTER<br>5. BASE<br>6. ANODE               | STYLE 5:<br>PIN 1. ANODE<br>2. ANODE<br>3. COLLECTOR<br>4. EMITTER<br>5. BASE<br>6. CATHODE                 | STYLE 6:<br>PIN 1. ANODE 2<br>2. N/C<br>3. CATHODE 1<br>4. ANODE 1<br>5. N/C<br>6. CATHODE 2          |
| STYLE 7:<br>PIN 1. SOURCE 2<br>2. DRAIN 2<br>3. GATE 1<br>4. SOURCE 1<br>5. DRAIN 1<br>6. GATE 2           | STYLE 8:<br>CANCELLED  | STYLE 9:<br>PIN 1. EMITTER 2<br>2. EMITTER 1<br>3. COLLECTOR 1<br>4. BASE 1<br>5. BASE 2<br>6. COLLECTOR 2  | STYLE 10:<br>PIN 1. SOURCE 2<br>2. SOURCE 1<br>3. GATE 1<br>4. DRAIN 1<br>5. DRAIN 2<br>6. GATE 2           | STYLE 11:<br>PIN 1. CATHODE 2<br>2. CATHODE 2<br>3. ANODE 1<br>4. CATHODE 1<br>5. CATHODE 1<br>6. ANODE 2   | STYLE 12:<br>PIN 1. ANODE 2<br>2. ANODE 2<br>3. CATHODE 1<br>4. ANODE 1<br>5. ANODE 1<br>6. CATHODE 2 |
| STYLE 13:<br>PIN 1. ANODE<br>2. N/C<br>3. COLLECTOR<br>4. EMITTER<br>5. BASE<br>6. CATHODE                 | STYLE 14:<br>PIN 1. VREF<br>2. GND<br>3. GND<br>4. IOUT<br>5. VEN<br>6. VCC                            | STYLE 15:<br>PIN 1. ANODE 1<br>2. ANODE 2<br>3. ANODE 3<br>4. CATHODE 3<br>5. CATHODE 2<br>6. CATHODE 1     | STYLE 16:<br>PIN 1. BASE 1<br>2. EMITTER 2<br>3. COLLECTOR 2<br>4. BASE 2<br>5. EMITTER 1<br>6. COLLECTOR 1 | STYLE 17:<br>PIN 1. BASE 1<br>2. EMITTER 1<br>3. COLLECTOR 2<br>4. BASE 2<br>5. EMITTER 2<br>6. COLLECTOR 1 | STYLE 18:<br>PIN 1. VIN1<br>2. VCC<br>3. VOUT2<br>4. VIN2<br>5. GND<br>6. VOUT1                       |
| STYLE 19:<br>PIN 1. I OUT<br>2. GND<br>3. GND<br>4. V CC<br>5. V EN<br>6. V REF                            | STYLE 20:<br>PIN 1. COLLECTOR<br>2. COLLECTOR<br>3. BASE<br>4. EMITTER<br>5. COLLECTOR<br>6. COLLECTOR | STYLE 21:<br>PIN 1. ANODE 1<br>2. N/C<br>3. ANODE 2<br>4. CATHODE 2<br>5. N/C<br>6. CATHODE 1               | STYLE 22:<br>PIN 1. D1 (i)<br>2. GND<br>3. D2 (i)<br>4. D2 (c)<br>5. VBUS<br>6. D1 (c)                      | STYLE 23:<br>PIN 1. Vn<br>2. CH1<br>3. Vp<br>4. N/C<br>5. CH2<br>6. N/C                                     | STYLE 24:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE<br>4. CATHODE<br>5. CATHODE<br>6. CATHODE       |
| STYLE 25:<br>PIN 1. BASE 1<br>2. CATHODE<br>3. COLLECTOR 2<br>4. BASE 2<br>5. EMITTER<br>6. COLLECTOR 1    | STYLE 26:<br>PIN 1. SOURCE 1<br>2. GATE 1<br>3. DRAIN 2<br>4. SOURCE 2<br>5. GATE 2<br>6. DRAIN 1      | STYLE 27:<br>PIN 1. BASE 2<br>2. BASE 1<br>3. COLLECTOR 1<br>4. EMITTER 1<br>5. EMITTER 2<br>6. COLLECTOR 2 | STYLE 28:<br>PIN 1. DRAIN<br>2. DRAIN<br>3. GATE<br>4. SOURCE<br>5. DRAIN<br>6. DRAIN                       | STYLE 29:<br>PIN 1. ANODE<br>2. ANODE<br>3. COLLECTOR<br>4. EMITTER<br>5. BASE/ANODE<br>6. CATHODE          | STYLE 30:<br>PIN 1. SOURCE 1<br>2. DRAIN 2<br>3. DRAIN 2<br>4. SOURCE 2<br>5. GATE 1<br>6. DRAIN 1    |

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

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