

TinyLogic ULP-A Dual Buffer with Schmitt-Trigger Input

NC7WV17

The NC7WV17 is a dual buffer with Schmitt-trigger input in tiny footprint packages. The device is designed to operate for $V_{CC} = 0.9\text{ V}$ to 3.6 V .

Features

- Designed for 0.9 V to 3.6 V V_{CC} Operation
- 2.2 ns t_{PD} at 3.3 V (Typ)
- Inputs/Outputs Over-Voltage Tolerant up to 3.6 V
- I_{OFF} Supports Partial Power Down Protection
- Source/Sink 24 mA at 3.3 V
- Available in SC-88A and MicroPak™ Packages
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

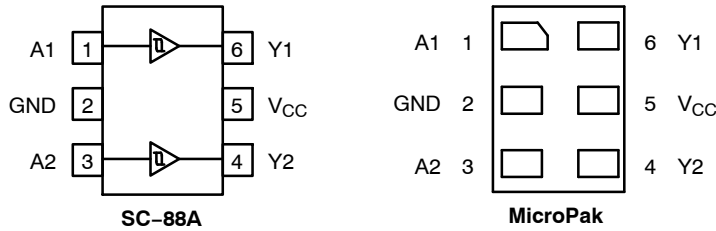


Figure 1. Pinout Diagrams (Top Views)

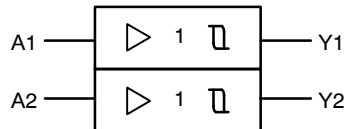
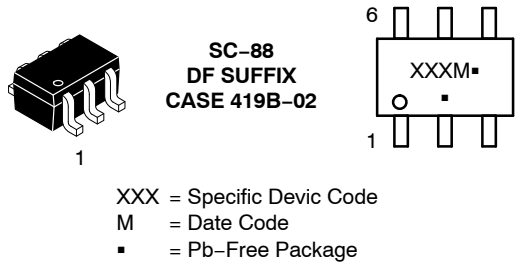
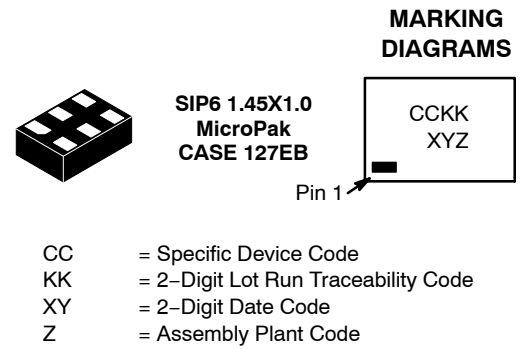


Figure 2. Logic Symbol

PIN ASSIGNMENT

| Pin | Function |
|-----|----------|
| 1 | A1 |
| 2 | GND |
| 3 | A2 |
| 4 | Y2 |
| 5 | V_{CC} |
| 6 | Y1 |



(Note: Microdot may be in either location)

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

ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 7 of this data sheet.

FUNCTION TABLE

| Input | Output |
|-------|--------|
| L | L |
| H | H |

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MAXIMUM RATINGS

| Symbol | Characteristics | Value | Unit |
|-----------------------|--|--|---------------|
| V_{CC} | DC Supply Voltage | -0.5 to +4.3 | V |
| V_{IN} | DC Input Voltage | -0.5 to +4.3 | V |
| V_{OUT} | DC Output Voltage Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode ($V_{CC} = 0$ V) | -0.5 to $V_{CC} + 0.5$ -0.5 to +4.3 -0.5 to +4.3 | V |
| I_{IK} | DC Input Diode Current $V_{IN} < GND$ | -50 | mA |
| I_{OK} | DC Output Diode Current $V_{OUT} < GND$ | -50 | mA |
| I_{OUT} | DC Output Source/Sink Current | ± 50 | mA |
| I_{CC} or I_{GND} | DC Supply Current per Supply Pin or Ground Pin | ± 50 | mA |
| T_{STG} | Storage Temperature Range | -65 to +150 | $^{\circ}C$ |
| T_L | Lead Temperature, 1 mm from Case for 10 Seconds | 260 | $^{\circ}C$ |
| T_J | Junction Temperature Under Bias | +150 | $^{\circ}C$ |
| θ_{JA} | Thermal Resistance (Note 2) | SC-88A MicroPak 377 154 | $^{\circ}C/W$ |
| P_D | Power Dissipation in Still Air | SC-88A MicroPak 332 812 | mW |
| MSL | Moisture Sensitivity | Level 1 | - |
| F_R | Flammability Rating Oxygen Index: 28 to 34 | UL 94 V-0 @ 0.125 in | - |
| V_{ESD} | ESD Withstand Voltage (Note 3) Human Body Mode Charged Device Mode | 2000 1000 | mW |
| $I_{Latchup}$ | 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.

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RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
|---------------------------------|--|-----|-----------------|------|
| V _{CC} | Positive DC Supply Voltage | 0.9 | 3.6 | V |
| V _{IN} | DC Input Voltage | 0 | 3.6 | V |
| V _{OUT} | DC Output Voltage Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode (V _{CC} = 0 V) | 0 | V _{CC} | |
| | | 0 | 3.6 | |
| | | 0 | 3.6 | |
| T _A | Operating Temperature Range | -40 | +85 | °C |
| t _r , t _f | 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.

DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Condition | V _{CC} (V) | T _A = 25°C | | | T _A = -40°C to +85°C | | Unit |
|----------------|----------------------------|-----------|---------------------|-----------------------|------|------|---------------------------------|------|------|
| | | | | Min | Typ | Max | Min | Max | |
| V _P | Positive Threshold Voltage | | 0.9 | - | 0.62 | - | - | - | V |
| | | | 1.1 | - | - | 1.0 | - | 1.0 | |
| | | | 1.4 | - | - | 1.25 | - | 1.25 | |
| | | | 1.65 | - | - | 1.5 | - | 1.5 | |
| | | | 2.3 | - | - | 1.8 | - | 1.8 | |
| | | | 2.7 | - | - | 2.2 | - | 2.2 | |
| V _N | 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 | - | |
| | | | 2.7 | 0.6 | - | - | 0.6 | - | |
| V _H | 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 | 0.15 | - | 1.0 | 0.15 | 1.0 | |
| | | | 2.3 | 0.25 | - | 1.1 | 0.25 | 1.1 | |
| | | | 2.7 | 0.6 | - | 1.2 | 0.6 | 1.2 | |

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DC ELECTRICAL CHARACTERISTICS (continued)

| Symbol | Parameter | Condition | V _{CC} (V) | T _A = 25°C | | | T _A = -40°C to +85°C | | Unit | |
|--------------------------|---------------------------|---|---------------------|------------------------|-----------------------|------------------------|---------------------------------|------------------------|------|---|
| | | | | Min | Typ | Max | Min | Max | | |
| V _{OH} | High-Level Output Voltage | V _{IN} = V _{IH} or V _{IL} | | | | | | | V | |
| | | I _{OH} = -100 μA | 0.9 | - | V _{CC} - 0.1 | - | - | - | | - |
| | | | 1.1 to 1.3 | V _{CC} - 0.1 | - | - | V _{CC} - 0.1 | - | | - |
| | | | 1.4 to 1.6 | V _{CC} - 0.1 | - | - | V _{CC} - 0.1 | - | | - |
| | | | 1.65 to 1.95 | V _{CC} - 0.2 | - | - | V _{CC} - 0.2 | - | | - |
| | | | 2.3 to <2.7 | V _{CC} - 0.2 | - | - | V _{CC} - 0.2 | - | | - |
| | | | 2.7 to 3.6 | V _{CC} - 0.2 | - | - | V _{CC} - 0.2 | - | | - |
| | | I _{OH} = -2 mA | 1.1 to 1.3 | 0.75 x V _{CC} | - | - | 0.75 x V _{CC} | - | | - |
| | | I _{OH} = -4 mA | 1.4 to 1.6 | 0.75 x V _{CC} | - | - | 0.75 x V _{CC} | - | | - |
| | | I _{OH} = -6 mA | 1.65 to 1.95 | 1.25 | - | - | 1.25 | - | | - |
| | | | 2.3 to <2.7 | 2.0 | - | - | 2.0 | - | | - |
| | | I _{OH} = -12 mA | 2.3 to <2.7 | 1.8 | - | - | 1.8 | - | | - |
| | | | 2.7 to 3.6 | 2.2 | - | - | 2.2 | - | | - |
| | | I _{OH} = -18 mA | 2.3 to <2.7 | 1.7 | - | - | 1.7 | - | | - |
| | | | 2.7 to 3.6 | 2.4 | - | - | 2.4 | - | | - |
| I _{OH} = -24 mA | 2.7 to 3.6 | 2.2 | - | - | 2.2 | - | - | | | |
| V _{OL} | Low-Level Output Voltage | V _{IN} = V _{IH} or V _{IL} | | | | | | | V | |
| | | I _{OL} = 100 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 | - | - | 0.2 | - | 0.2 | | - |
| | | | 2.3 to < 2.7 | - | - | 0.2 | - | 0.2 | | - |
| | | | 2.7 to 3.6 | - | - | 0.2 | - | 0.2 | | - |
| | | I _{OL} = 2 mA | 1.1 to 1.3 | - | - | 0.25 x V _{CC} | - | 0.25 x V _{CC} | | - |
| | | I _{OL} = 4 mA | 1.4 to 1.6 | - | - | 0.25 x V _{CC} | - | 0.25 x V _{CC} | | - |
| | | I _{OL} = 6 mA | 1.65 to 1.95 | - | - | 0.3 | - | 0.3 | | - |
| | | I _{OL} = 12 mA | 2.3 to <2.7 | - | - | 0.4 | - | 0.4 | | - |
| | | | 2.7 to 3.6 | - | - | 0.4 | - | 0.4 | | - |
| | | I _{OL} = 18 mA | 2.3 to <2.7 | - | - | 0.6 | - | 0.6 | | - |
| | | | 2.7 to 3.6 | - | - | 0.4 | - | 0.4 | | - |
| | | I _{OL} = 24 mA | 2.7 to 3.6 | - | - | 0.55 | - | 0.55 | | - |
| I _{IN} | Input Leakage Current | V _{IN} = 0 V to 3.6 V | 0.9 to 3.6 | - | - | ±0.1 | - | ±0.5 | μA | |
| I _{OFF} | Power Off Leakage Current | V _{IN} = 0 V to 3.6 V or V _{OUT} = 0 V to 3.6 V | 0 | - | - | 0.5 | - | 0.5 | μA | |
| I _{CC} | Quiescent Supply Current | V _{IN} = V _{CC} 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.

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AC ELECTRICAL CHARACTERISTICS

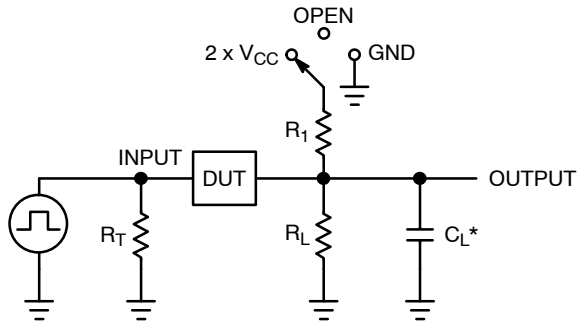
| Symbol | Parameter | Condition | V _{CC} (V) | T _A = 25°C | | | T _A = -40°C to +85°C | | Unit |
|--|--|--|---------------------|-----------------------|------|------|---------------------------------|------|------|
| | | | | Min | Typ | Max | Min | Max | |
| t _{PLH} , t _{PHL} | Propagation Delay, A to Y (Figures 3 and 4) | R _L = 1 MΩ, C _L = 15 pF | 0.9 | - | 17.4 | - | - | - | ns |
| | | R _L = 2 kΩ, C _L = 15 pF | 1.1 to 1.3 | - | 6.1 | 14.5 | - | 19.9 | |
| | | | 1.4 to 1.6 | - | 3.9 | 7.0 | - | 7.5 | |
| | | R _L = 500 Ω, C _L = 30 pF | 1.65 to 1.95 | - | 3.3 | 5.2 | - | 6.2 | |
| | | | 2.3 to 2.7 | - | 2.6 | 3.9 | - | 4.9 | |
| | | | 2.7 to 3.6 | - | 2.2 | 3.8 | - | 4.2 | |

CAPACITIVE CHARACTERISTICS

| Symbol | Parameter | Test Condition | Typical (T _A = 25°C) | Unit |
|------------------|--|--|---------------------------------|------|
| C _{IN} | Input Capacitance | V _{CC} = 0 V | 2.0 | pF |
| C _{OUT} | Output Capacitance | V _{CC} = 0 V | 4.5 | pF |
| C _{PD} | Power Dissipation Capacitance (Note 5) | f = 10 MHz, V _{CC} = 0.9 to 3.6 V, V _{IN} = 0 V or V _{CC} | 14 | pF |

5. C_{PD} 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 $I_{CC(OPR)} = C_{PD} \cdot V_{CC} \cdot f_{in} + I_{CC}$. C_{PD} is used to determine the no-load dynamic power consumption: $P_D = C_{PD} \cdot V_{CC}^2 \cdot f_{in} + I_{CC} \cdot V_{CC}$.

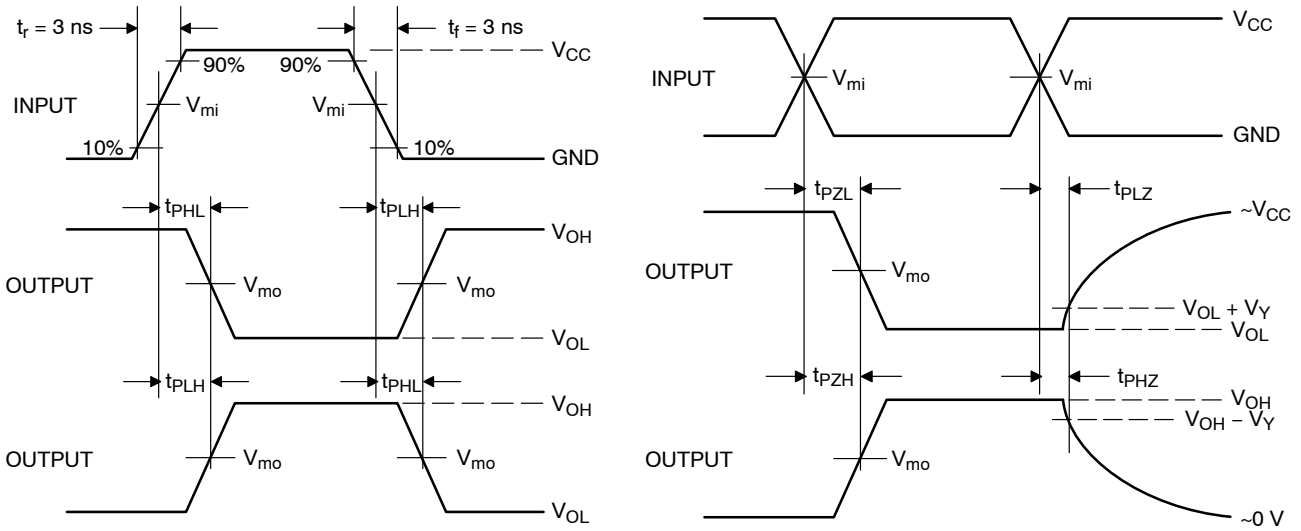
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C_L includes probe and jig capacitance
 R_T is Z_{OUT} of pulse generator (typically 50 Ω)
 $f = 1$ MHz

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

Figure 3. 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 4. Switching Waveforms

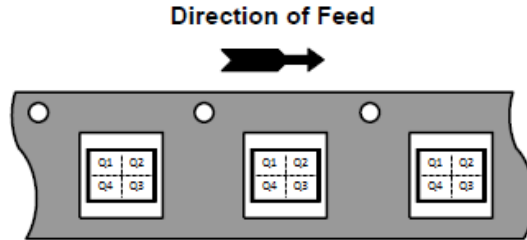
NC7WV17

ORDERING INFORMATION

| Device | Package | Marking | Pin 1 Orientation (See below) | Shipping† |
|------------|----------|---------|----------------------------------|--------------------|
| NC7WV17P6X | SC-88 | V17 | Q4 | 3000 / Tape & Reel |
| NC7WV17L6X | MicroPak | AX | Q4 | 5000 / Tape & Reel |

†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



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MECHANICAL CASE OUTLINE

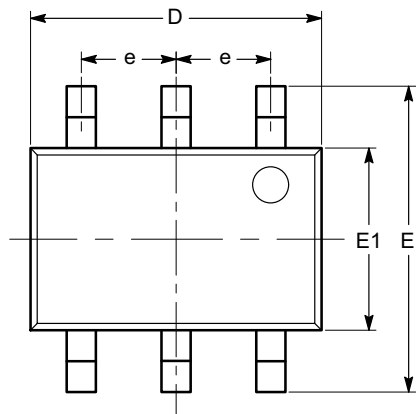
PACKAGE DIMENSIONS

ON Semiconductor®



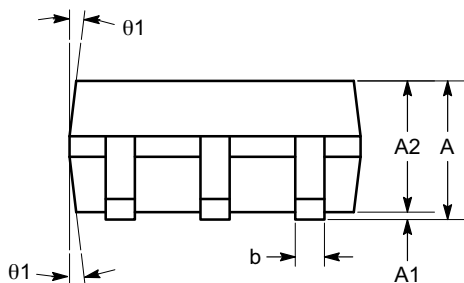
SC-88 (SC-70 6 Lead), 1.25x2
CASE 419AD-01
ISSUE A

DATE 07 JUL 2010

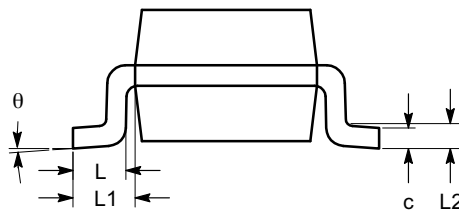


TOP VIEW

| SYMBOL | MIN | NOM | MAX |
|------------|----------|------|------|
| A | 0.80 | | 1.10 |
| A1 | 0.00 | | 0.10 |
| A2 | 0.80 | | 1.00 |
| b | 0.15 | | 0.30 |
| c | 0.10 | | 0.18 |
| D | 1.80 | 2.00 | 2.20 |
| E | 1.80 | 2.10 | 2.40 |
| E1 | 1.15 | 1.25 | 1.35 |
| e | 0.65 BSC | | |
| L | 0.26 | 0.36 | 0.46 |
| L1 | 0.42 REF | | |
| L2 | 0.15 BSC | | |
| θ | 0° | | 8° |
| θ_1 | 4° | | 10° |



SIDE VIEW



END VIEW

Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MO-203.

| | | |
|-------------------------|-------------------------------------|--|
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| DESCRIPTION: | SC-88 (SC-70 6 LEAD), 1.25X2 | PAGE 1 OF 1 |

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