

NC7WZ16 TinyLogic® UHS Dual Buffer

General Description

The NC7WZ16 is a dual buffer from Fairchild's Ultra High Speed Series of TinyLogic® in the space saving SC70 6-lead package. The device is fabricated with advanced CMOS technology to achieve ultra high speed with high output drive while maintaining low static power dissipation over a very broad V_{CC} operating range. The device is specified to operate over the 1.65V to 5.5V V_{CC} range. The inputs and outputs are high impedance when V_{CC} is 0V. Inputs tolerate voltages up to 7V independent of V_{CC} operating voltage.

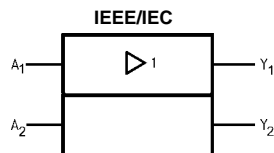
Features

- Space saving SC70 6-lead package
- Ultra small MicroPak™ leadless package
- Ultra High Speed: t_{PD} 2.4 ns Typ into 50 pF at 5V V_{CC}
- High Output Drive: ± 24 mA at 3V V_{CC}
- Broad V_{CC} Operating Range: 1.65V to 5.5V
- Matches the performance of LCX when operated at 3.3V V_{CC}
- Power down high impedance inputs/outputs
- Overvoltage tolerant inputs facilitate 5V to 3V translation
- Patented noise/EMI reduction circuitry implemented

Ordering Code:

| Order Number | Package Number | Product Code Top Mark | Package Description | Supplied As |
|--------------|----------------|-----------------------|-------------------------------------|---------------------------|
| NC7WZ16P6X | MAA06A | Z16 | 6-Lead SC70, EIAJ SC88, 1.25mm Wide | 3k Units on Tape and Reel |
| NC7WZ16L6X | MAC06A | C7 | 6-Lead MicroPak, 1.0mm Wide | 5k Units on Tape and Reel |

Logic Symbol



Pin Descriptions

| Pin Names | Description |
|------------|-------------|
| A_1, A_2 | Data Inputs |
| Y_1, Y_2 | Output |

Function Table

$$Y = A$$

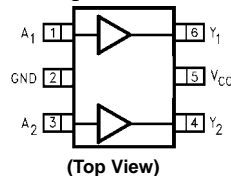
| Input | Output |
|-------|--------|
| A | Y |
| L | L |
| H | H |

H = HIGH Logic Level
L = LOW Logic Level

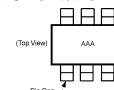
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Connection Diagrams

Pin Assignments for SC70



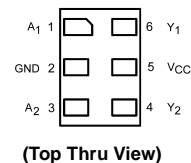
Pin One Orientation Diagram



AAA represents Product Code Top Mark - see ordering code

Note: Orientation of Top Mark determines Pin One location. Read the top product code mark left to right, Pin One is the lower left pin (see diagram).

Pad Assignments for MicroPak



Absolute Maximum Ratings (Note 1)

| | |
|--|-----------------|
| Supply Voltage (V_{CC}) | −0.5V to +7.0V |
| DC Input Voltage (V_{IN}) | −0.5V to +7.0V |
| DC Output Voltage (V_{OUT}) | −0.5V to +7.0V |
| DC Input Diode Current (I_{IK}) | |
| $V_{IN} < 0V$ | −50 mA |
| DC Output Diode Current (I_{OK}) | |
| $V_{OUT} < 0V$ | −50 mA |
| DC Output Source/Sink Current (I_{OUT}) | ±50 mA |
| DC V_{CC}/GND Current (I_{CC}/I_{GND}) | ±100 mA |
| Storage Temperature (T_{STG}) | −65°C to +150°C |
| Junction Temperature under Bias (T_J) | 150°C |
| Junction Lead Temperature (T_L) | |
| (Soldering, 10 seconds) | 260°C |
| Power Dissipation (P_D) @ +85°C | 180 mW |

Recommended Operating Conditions (Note 2)

| | |
|---|----------------|
| Supply Voltage | |
| Operating (V_{CC}) | 1.65V to 5.5V |
| Data Retention | 1.5V to 5.5V |
| Input Voltage (V_{IN}) | 0V to 5.5V |
| Output Voltage (V_{OUT}) | 0V to V_{CC} |
| Input Rise and Fall Time (t_r, t_f) | |
| $V_{CC} = 1.8V, 2.5V \pm 0.2V$ | 0 to 20 ns/V |
| $V_{CC} = 3.3V \pm 0.3V$ | 0 to 10 ns/V |
| $V_{CC} = 5.5V \pm 0.5V$ | 0 to 5 ns/V |
| Operating Temperature (T_A) | −40°C to +85°C |
| Thermal Resistance (θ_{JA}) | 350°C/W |

Note 1: Absolute maximum ratings are DC values beyond which the device may be damaged or have its useful life impaired. The datasheet specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation outside datasheet specifications.

Note 2: Unused inputs must be held HIGH or LOW. They may not float.

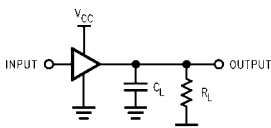
DC Electrical Characteristics

| Symbol | Parameter | V _{CC} (V) | T _A = +25°C | | | T _A = −40°C to +85°C | | Units | Conditions | |
|------------------|--------------------------------------|----------------------------|---|------|------|---|-----|-----------------------------------|--|--------------------------|
| | | | Min | Typ | Max | Min | Max | | | |
| V _{IH} | HIGH Level Control Input Voltage | 1.65 to 1.95 2.3 to 5.5 | 0.75 V _{CC} 0.7 V _{CC} | | | 0.75 V _{CC} 0.7 V _{CC} | | V | | |
| V _{IL} | LOW Level Control Input Voltage | 1.65 to 1.95 2.3 to 5.5 | 0.25 V _{CC} 0.3 V _{CC} | | | 0.25 V _{CC} 0.3 V _{CC} | | V | | |
| V _{OH} | HIGH Level Control Output Voltage | 1.65 | 1.55 | 1.65 | 1.55 | | V | V _{IN} = V _{IH} | I _{OH} = −100 μA | |
| | | 1.8 | 1.7 | 1.8 | 1.7 | | | | | |
| | | 2.3 | 2.2 | 2.3 | 2.2 | | | | | |
| | | 3.0 | 2.9 | 3.0 | 2.9 | | | | | |
| | | 4.5 | 4.4 | 4.5 | 4.4 | | | | | |
| | | 1.65 | 1.29 | 1.52 | 1.21 | | | | | |
| | | 2.3 | 1.9 | 2.14 | 1.9 | | | | | |
| | | 3.0 | 2.4 | 2.75 | 2.4 | | | | | |
| | | 3.0 | 2.3 | 2.62 | 2.3 | | | | | |
| | | 4.5 | 3.8 | 4.13 | 3.8 | | | | | |
| V _{OL} | LOW Level Control Output Voltage | 1.65 | 0.0 | | 0.1 | 0.1 | | V | V _{IN} = V _{IL} | I _{OL} = 100 μA |
| | | 1.8 | 0.0 | | 0.1 | 0.1 | | | | |
| | | 2.3 | 0.0 | | 0.1 | 0.1 | | | | |
| | | 3.0 | 0.0 | | 0.1 | 0.1 | | | | |
| | | 4.5 | 0.0 | | 0.1 | 0.1 | | | | |
| | | 1.65 | 0.08 | | 0.24 | 0.24 | | | | |
| | | 2.3 | 0.10 | | 0.3 | 0.3 | | | | |
| | | 3.0 | 0.16 | | 0.4 | 0.4 | | | | |
| | | 3.0 | 0.24 | | 0.55 | 0.55 | | | | |
| | | 4.5 | 0.25 | | 0.55 | 0.55 | | | | |
| I _{IN} | Input Leakage Current | 0 to 5.5 | ±0.1 | | | ±1.0 | | μA | 0 ≤ V _{IN} ≤ 5.5V | |
| I _{OFF} | Power Off Leakage Current | 0.0 | 1.0 | | | 10 | | μA | V _{IN} or V _{OUT} = 5.5V | |
| I _{CC} | Quiescent Supply Current | 1.65 to 5.5 | 1.0 | | | 10 | | μA | V _{IN} = 5.5V, GND | |

| AC Electrical Characteristics | | | | | | | | | | |
|--------------------------------------|-------------------------------|------------------------|------------------------|-----|-----|---------------------------------|------|-------|--|---------------|
| Symbol | Parameter | V _{CC} (V) | T _A = +25°C | | | T _A = -40°C to +85°C | | Units | Conditions | Figure Number |
| | | | Min | Typ | Max | Min | Max | | | |
| t _{PLH} t _{PHL} | Propagation Delay | 1.65 | 1.8 | 5.5 | 9.6 | 1.8 | 10.6 | ns | C _L = 15 pF, R _L = 1 MΩ | Figures 1, 3 |
| | | 1.8 | 1.8 | 4.6 | 8.0 | 1.8 | 8.8 | | | |
| | | 2.5 ± 0.2 | 1.0 | 3.0 | 5.2 | 1.0 | 5.8 | | | |
| | | 3.3 ± 0.3 | 0.8 | 2.3 | 3.6 | 0.8 | 4.0 | | | |
| | 5.0 ± 0.5 | 0.5 | 1.8 | 2.9 | 0.5 | 3.2 | | | | |
| t _{PLH} t _{PHL} | Propagation Delay | 3.3 ± 0.3 | 1.2 | 3.0 | 4.6 | 1.2 | 5.1 | ns | C _L = 50 pF, R _L = 500Ω | Figures 1, 3 |
| | | 5.0 ± 0.5 | 0.8 | 2.4 | 3.8 | 0.8 | 4.2 | | | |
| C _{IN} | Input Capacitance | 0 | 2.5 | | | | | pF | | |
| C _{PD} | Power Dissipation Capacitance | 3.3 | 10 | | | | | pF | (Note 3) | Figure 2 |
| | | 5.0 | 12 | | | | | | | |

Note 3: C_{PD} is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I_{CCD}) at no output loading and operating at 50% duty cycle. (See Figure 2.) C_{PD} is related to I_{CCD} dynamic operating current by the expression:
I_{CCD} = (C_{PD})(V_{CC})(f_{IN}) + (I_{CC}static).

AC Loading and Waveforms



C_L includes load and stray capacitance
Input PRR = 1.0 MHz; t_W = 500 ns

FIGURE 1. AC Test Circuit

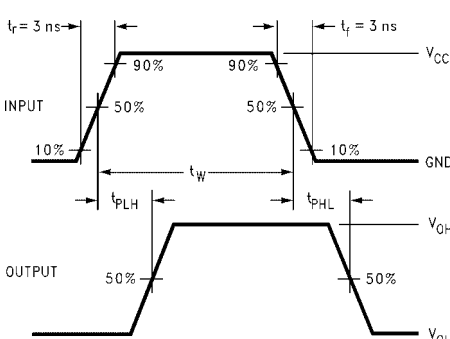
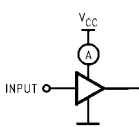


FIGURE 3. AC Waveforms



Input = AC Waveform; t_r = t_f = 1.8 ns;
PRR = 10 MHz; Duty Cycle = 50%

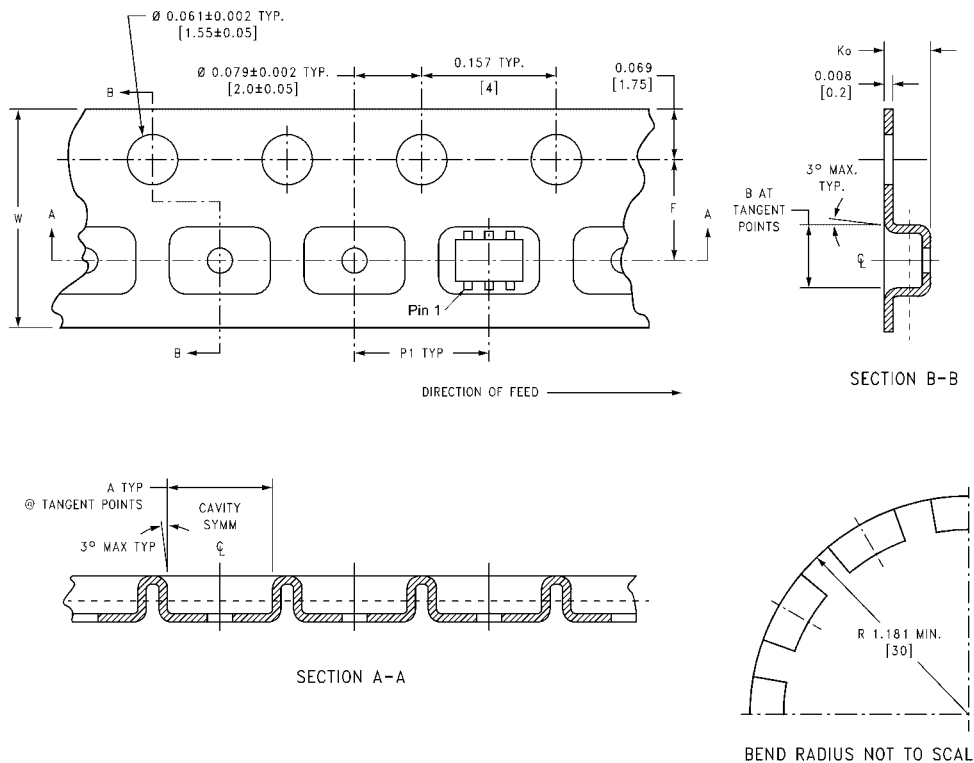
FIGURE 2. I_{CCD} Test Circuit

Tape and Reel Specification

TAPE FORMAT for SC70

| Package Designator | Tape Section | Number Cavities | Cavity Status | Cover Tape Status |
|--------------------|--------------------|-----------------|---------------|-------------------|
| P6X | Leader (Start End) | 125 (typ) | Empty | Sealed |
| | Carrier | 3000 | Filled | Sealed |
| | Trailer (Hub End) | 75 (typ) | Empty | Sealed |

TAPE DIMENSIONS inches (millimeters)

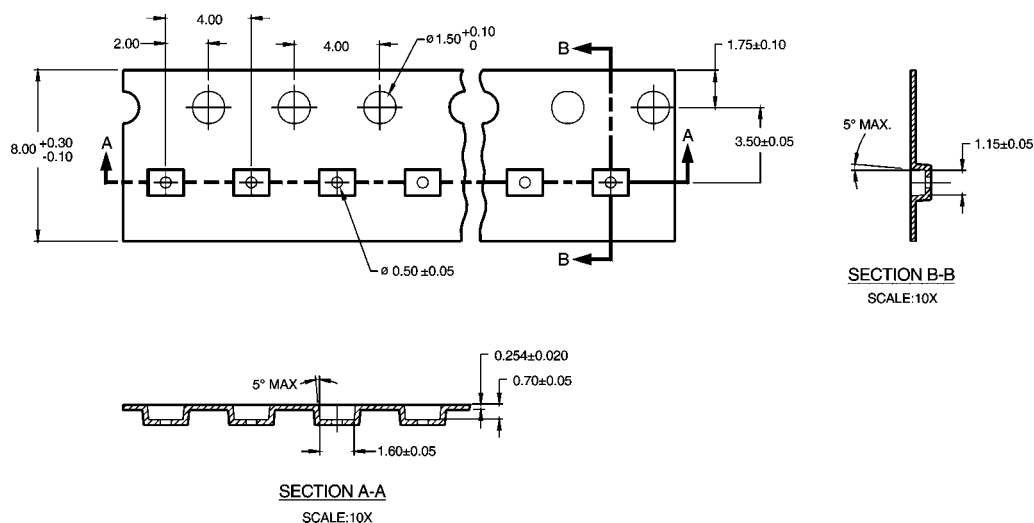


| Package | Tape Size | DIM A | DIM B | DIM F | DIM K_0 | DIM P1 | DIM W |
|---------|-----------|-----------------|-----------------|---------------------------------------|--|--------------|------------------------------------|
| SC70-6 | 8 mm | 0.093 (2.35) | 0.096 (2.45) | 0.138 ± 0.004 (3.5 \pm 0.10) | 0.053 ± 0.004 (1.35 \pm 0.10) | 0.157 (4) | 0.315 ± 0.004 (8 \pm 0.1) |

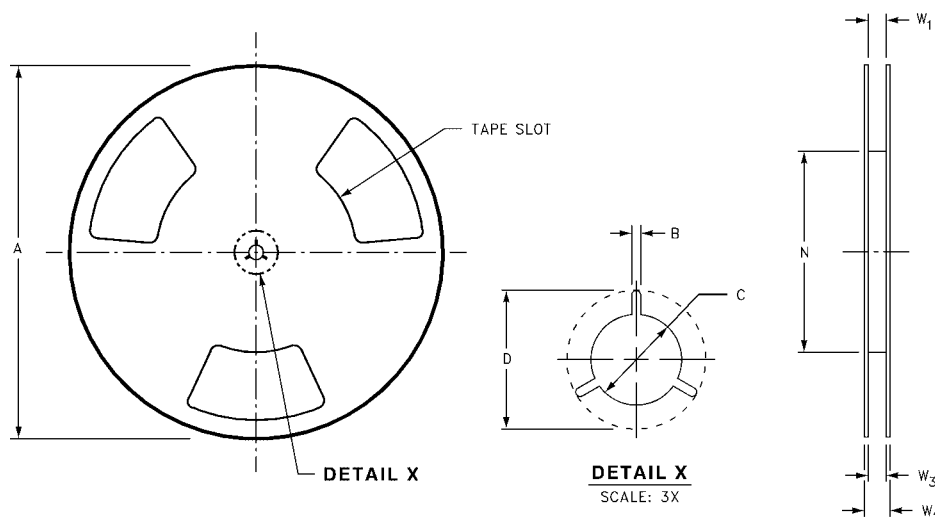
Tape and Reel Specification (Continued)

TAPE FORMAT for MicroPak

| Package Designator | Tape Section | Number Cavities | Cavity Status | Cover Tape Status |
|--------------------|--------------------|-----------------|---------------|-------------------|
| L6X | Leader (Start End) | 125 (typ) | Empty | Sealed |
| | Carrier | 5000 | Filled | Sealed |
| | Trailer (Hub End) | 75 (typ) | Empty | Sealed |



REEL DIMENSIONS inches (millimeters)



| Tape Size | A | B | C | D | N | W1 | W2 | W3 |
|-----------|----------------|-----------------|------------------|------------------|------------------|---|------------------|--|
| 8 mm | 7.0 (177.8) | 0.059 (1.50) | 0.512 (13.00) | 0.795 (20.20) | 2.165 (55.00) | 0.331 + 0.059/-0.000 (8.40 + 1.50/-0.00) | 0.567 (14.40) | W1 + 0.078/-0.039 (W1 + 2.00/-1.00) |

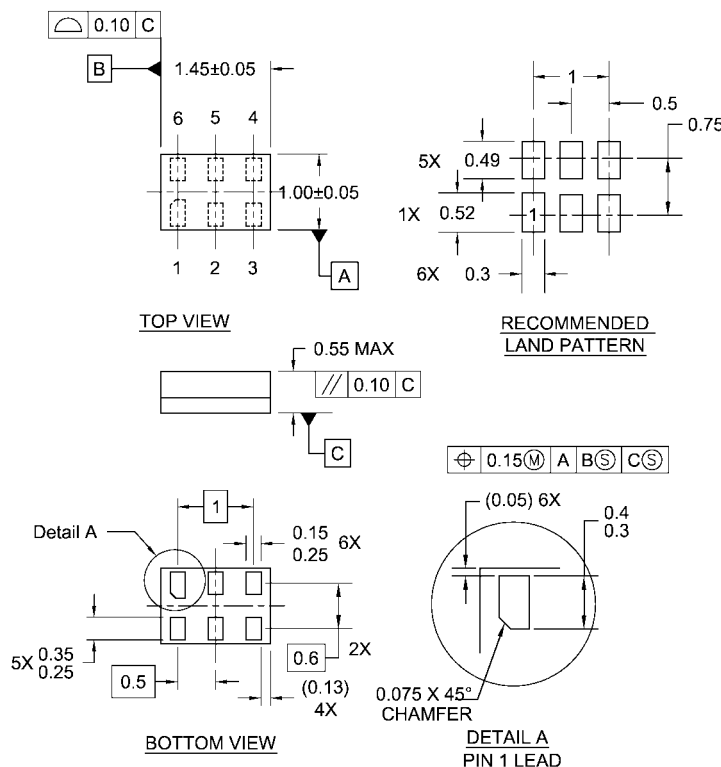


- A. CONFORMS TO EIAJ REGISTERED OUTLINE DRAWING SC88.
B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
C. DIMENSIONS ARE IN MILLIMETERS.

MAA06ARevC

**6-Lead SC70, EIAJ SC88, 1.25mm Wide
Package Number MAA06A**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



Notes:

1. JEDEC PACKAGE REGISTRATION IS ANTICIPATED
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-1994

MAC06ARevB

6-Lead MicroPak, 1.0mm Wide
Package Number MAC06A

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