

NC7SZ157

TinyLogic® UHS 2-Input Non-Inverting Multiplexer

General Description

The NC7SZ157 is a single, high performance, 2 to 1 CMOS non-inverting multiplexer from Fairchild's Ultra High Speed Series of TinyLogic®. 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 broad V_{CC} operating range. The device is specified to operate over the 1.65V to 5.5V V_{CC} operating range. The inputs and outputs are high impedance when V_{CC} is 0V. Inputs tolerate voltages up to 5.5V independent of V_{CC} operating range.

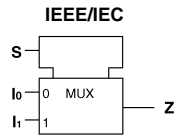
Features

- Space saving SC70-6 lead surface mount package
- Ultra Small MicroPak™ leadless package
- Ultra High Speed
- Broad V_{CC} operating range: 1.65V to 5.5V
- Power down high impedance input/output
- Overvoltage tolerant inputs facilitate 5V to 3V translation
- Patented noise/EMI reduction circuitry implemented

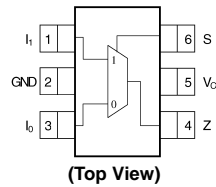
Ordering Code:

| Order Number | Package Number | Package Top Mark | Package Description | Supplied As |
|--------------|----------------|------------------|-------------------------------------|---------------------------|
| NC7SZ157P6X | MAA06A | ZF7 | 6-Lead SC70, EIAJ SC88, 1.25mm Wide | 3k Units on Tape and Reel |
| NC7SZ157L6X | MAC06A | B9 | 6-Lead MicroPak, 1.0mm Wide | 5k Units on Tape and Reel |

Logic Symbol



Connection Diagram

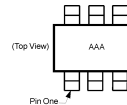


Function Table

| Inputs | | | Output |
|--------|----------------|----------------|---|
| S | I ₁ | I ₀ | Z = (I ₀)•(S)+(I ₁)•(S) |
| L | X | L | L |
| L | X | H | H |
| H | L | X | L |
| H | H | X | H |

H = HIGH Logic Level L = LOW Logic Level

Pin One Orientation Diagram



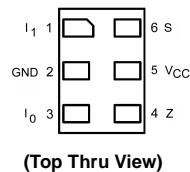
AAA = Product Code Top Mark - see ordering code

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).

Pin Descriptions

| Pin Name | Description |
|---------------------------------|---------------|
| I ₀ , I ₁ | Data Inputs |
| S | Control Input |
| Z | Output |

Pad Assignments for MicroPak



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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}) @ $V_{IN} \leq 0.5V$ | -50 mA |
| DC Output Diode Current (I_{OK}) @ $V_{IN} \leq -0.5V$ | -50 mA |
| DC Output Source/Sink Current (I_{OUT}) | ± 50 mA |
| DC V_{CC} or Ground Current (I_{CC} / I_{GND}) | ± 50 mA |
| Storage Temperature Range (T_{STG}) | -65°C to +150°C |
| Max Junction Temperature under Bias (T_J) | 150°C |
| Lead Temperature (T_L) (Soldering, 10 seconds) | 260°C |
| Power Dissipation (P_D) @+85°C SC70-6 | 180 mW |

Recommended Operating Conditions

| | |
|---|-------------------|
| Supply Voltage Operating (V_{CC}) | 1.65V to 5.5V |
| Supply Voltage Data Retention (V_{CC}) | 1.5V to 5.5V |
| Input Voltage (V_{IN}) | 0V to 5.5V |
| Output Voltage (V_{OUT}) | 0V to V_{CC} |
| Operating Temperature (T_A) | -40°C to +85°C |
| Input Rise and Fall Time (t_r, t_f) V_{CC} @ 1.8V \pm 0.15V, 2.5V \pm 0.2V | 0 ns/V to 20 ns/V |
| V_{CC} @ 3.3V \pm 0.3V | 0 ns/V to 10 ns/V |
| V_{CC} @ 5.0V \pm 0.5V | 0 ns/V to 5 ns/V |
| Thermal Resistance (θ_{JA}) SC70-6 | 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.

DC Electrical Characteristics

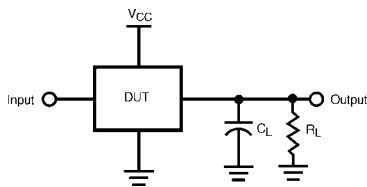
| Symbol | Parameter | V_{CC} (V) | $T_A = +25^\circ C$ | | | $T_A = -40^\circ C$ to $+85^\circ C$ | | Units | Conditions | |
|-----------|---------------------------|----------------------|-------------------------------|------|------|--------------------------------------|-----|------------------------------------|---|----------------------|
| | | | Min | Typ | Max | Min | Max | | | |
| V_{IH} | HIGH Level Input Voltage | 1.65-1.95 2.3-5.5 | 0.75 V_{CC} 0.7 V_{CC} | | | 0.75 V_{CC} 0.7 V_{CC} | | V | | |
| V_{IL} | LOW Level Input Voltage | 1.65-1.95 2.3-5.5 | 0.25 V_{CC} 0.3 V_{CC} | | | 0.25 V_{CC} 0.3 V_{CC} | | V | | |
| V_{OH} | HIGH Level Output Voltage | 1.65 | 1.55 | 1.65 | 1.55 | | V | $V_{IN} = V_{IL}$ or = V_{IH} | $I_{OH} = -100 \mu A$ | |
| | | 2.3 | 2.2 | 2.3 | 2.2 | | | | | |
| V_{OH} | HIGH Level Output Voltage | 3.0 | 2.9 | 3.0 | 2.9 | | V | $V_{IN} = V_{IL}$ or = V_{IH} | $I_{OH} = -4$ mA $I_{OH} = -8$ mA $I_{OH} = -16$ mA $I_{OH} = -24$ mA $I_{OH} = -32$ mA | |
| | | 4.5 | 4.4 | 4.5 | 4.4 | | | | | |
| V_{OH} | HIGH Level Output Voltage | 1.65 | 1.29 | 1.52 | 1.29 | | V | $V_{IN} = V_{IL}$ or = V_{IH} | $I_{OH} = -4$ mA $I_{OH} = -8$ mA $I_{OH} = -16$ mA $I_{OH} = -24$ mA $I_{OH} = -32$ mA | |
| | | 2.3 | 1.9 | 2.15 | 1.9 | | | | | |
| V_{OH} | HIGH Level Output Voltage | 3.0 | 2.4 | 2.80 | 2.4 | | V | $V_{IN} = V_{IL}$ or = V_{IH} | $I_{OH} = -4$ mA $I_{OH} = -8$ mA $I_{OH} = -16$ mA $I_{OH} = -24$ mA $I_{OH} = -32$ mA | |
| | | 4.5 | 3.9 | 4.20 | 3.8 | | | | | |
| V_{OL} | LOW Level Output Voltage | 1.65 | 0.0 | | | 0.10 | | V | $V_{IN} = V_{IL}$ or = V_{IH} | $I_{OL} = 100 \mu A$ |
| | | 2.3 | 0.0 | | | 0.10 | | | | |
| V_{OL} | LOW Level Output Voltage | 3.0 | 0.0 | | | 0.10 | | V | $V_{IN} = V_{IL}$ or = V_{IH} | $I_{OL} = 100 \mu A$ |
| | | 4.5 | 0.0 | | | 0.10 | | | | |
| V_{OL} | LOW Level Output Voltage | 1.65 | 0.08 | 0.24 | 0.24 | | V | $V_{IN} = V_{IL}$ or = V_{IH} | $I_{OL} = 4$ mA $I_{OL} = 8$ mA $I_{OL} = 16$ mA $I_{OL} = 24$ mA $I_{OL} = 32$ mA | |
| | | 2.3 | 0.10 | 0.3 | 0.3 | | | | | |
| V_{OL} | LOW Level Output Voltage | 3.0 | 0.15 | 0.4 | 0.4 | | V | $V_{IN} = V_{IL}$ or = V_{IH} | $I_{OL} = 4$ mA $I_{OL} = 8$ mA $I_{OL} = 16$ mA $I_{OL} = 24$ mA $I_{OL} = 32$ mA | |
| | | 4.5 | 0.22 | 0.55 | 0.55 | | | | | |
| I_{IN} | Input Leakage Current | 0-5.5 | ± 0.1 | | | ± 1 | | μA | $V_{IN} = 5.5V, GND$ | |
| I_{OFF} | Power Off Leakage Current | 0.0 | 1 | | | 10 | | μA | V_{IN} or $V_{OUT} = 5.5V$ | |
| I_{CC} | Quiescent Supply Current | 1.65-5.5 | | | | 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 | Fig. No. |
|--------------------------------------|---------------------------------------|------------------------|------------------------|-----|------|---------------------------------|------|-------|---|--------------|
| | | | Min | Typ | Max | Min | Max | | | |
| t _{PLH} t _{PHL} | Propagation Delay S to Z | 1.8 ± 0.15 | 2.5 | 6.0 | 11.5 | 2.5 | 12 | ns | C _L = 15 pF R _L = 1 MΩ | Figures 1, 3 |
| | | 2.5 ± 0.2 | 1.2 | 3.5 | 6.1 | 1.2 | 6.5 | | | |
| | | 3.3 ± 0.3 | 0.8 | 2.6 | 4.1 | 0.8 | 4.5 | | | |
| | | 5.0 ± 0.5 | 0.5 | 1.9 | 3.2 | 0.5 | 3.5 | | | |
| t _{PLH} t _{PHL} | Propagation Delay I _H to Z | 1.8 ± 0.15 | 2.5 | 5.9 | 10 | 2.5 | 10.5 | ns | C _L = 15 pF R _L = 1 MΩ | Figures 1, 3 |
| | | 5.0 ± 0.5 | 1.2 | 3.5 | 5.8 | 1.2 | 6.1 | | | |
| | | 3.3 ± 0.3 | 0.8 | 2.6 | 3.9 | 0.8 | 4.2 | | | |
| | | 5.0 ± 0.5 | 0.5 | 1.9 | 3.1 | 0.5 | 3.3 | | | |
| t _{PLH} t _{PHL} | Propagation Delay S to Z | 3.3 ± 0.3 | 1.2 | 3.2 | 4.8 | 1.2 | 5.2 | ns | C _L = 50 pF R _L = 500Ω | Figures 1, 3 |
| | | 5.0 ± 0.5 | 0.8 | 2.4 | 3.8 | 0.8 | 4.1 | | | |
| t _{PLH} t _{PHL} | Propagation Delay I _H to Z | 3.3 ± 0.3 | 1.2 | 3.2 | 4.6 | 1.2 | 5.0 | ns | C _L = 50 pF R _L = 500Ω | Figures 1, 3 |
| | | 5.0 ± 0.5 | 0.8 | 2.4 | 3.7 | 0.8 | 4.0 | | | |
| C _{IN} | Input Capacitance | 0 | 2 | | | | | μF | | |
| C _{PD} | Power Dissipation Capacitance | 3.3 5.0 | 14 17 | | | | | μF | (Note 2) | Figure 2 |

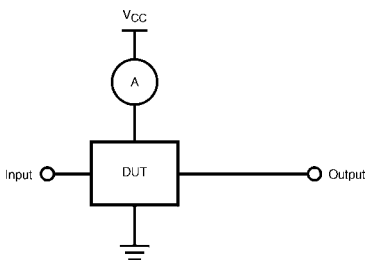
Note 2: C_{PD} is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I_{CCD}) at no output loading and operating at 50% duty cycle. (See Figure 2) C_{PD} is related to I_{CCD} dynamic operating current by the expression:
 $I_{CCD}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

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



Input = AC Waveforms
 PRR = Variable; Duty Cycle = 50%

FIGURE 2. I_{CCD} Test Circuit

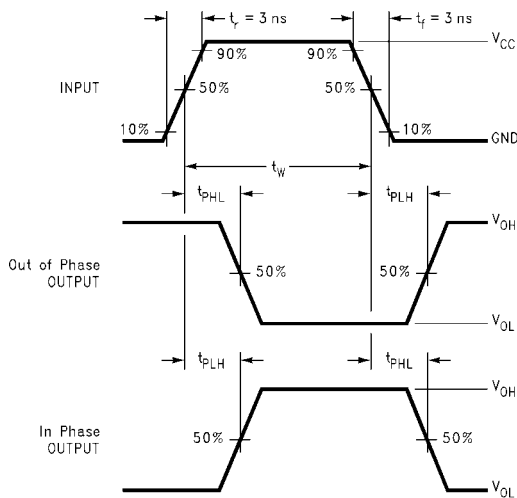


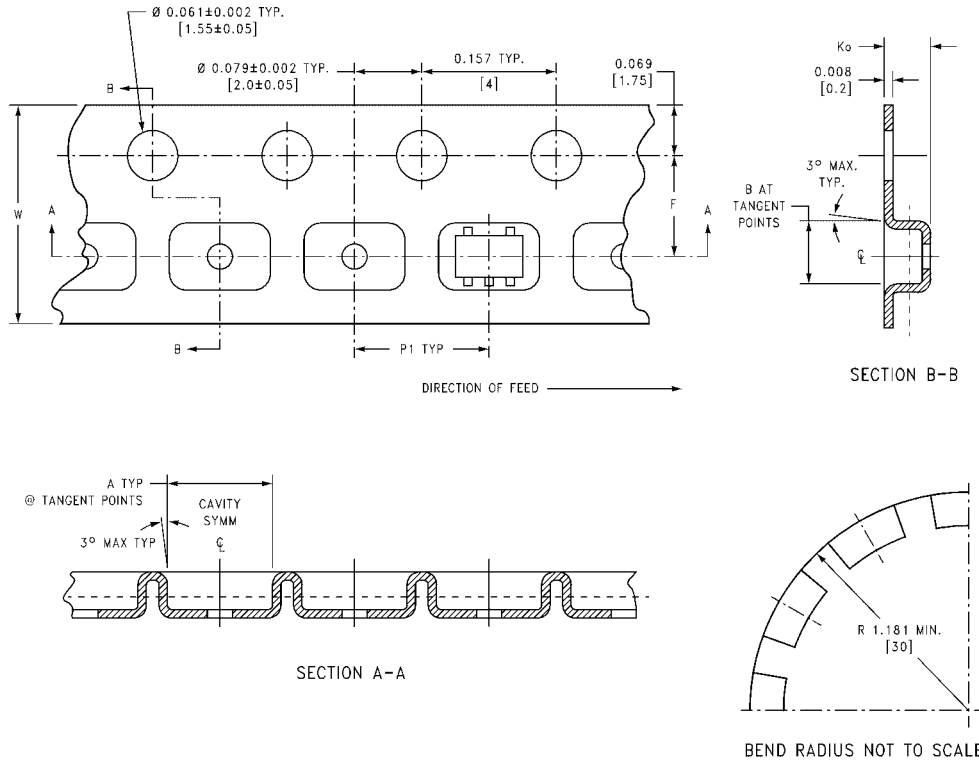
FIGURE 3. AC Waveforms

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 Ko | DIM P1 | DIM W |
|---------|-----------|-----------------|-----------------|-------------------------------|--------------------------------|--------------|----------------------------|
| SC70-6 | 8 mm | 0.093 (2.35) | 0.096 (2.45) | 0.138 ± 0.004 (3.5 ± 0.10) | 0.053 ± 0.004 (1.35 ± 0.10) | 0.157 (4) | 0.315 ± 0.004 (8 ± 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 | | | |

SECTION A-A
SCALE: 10X

SECTION B-B
SCALE: 10X

SECTION A-A
SCALE: 10X

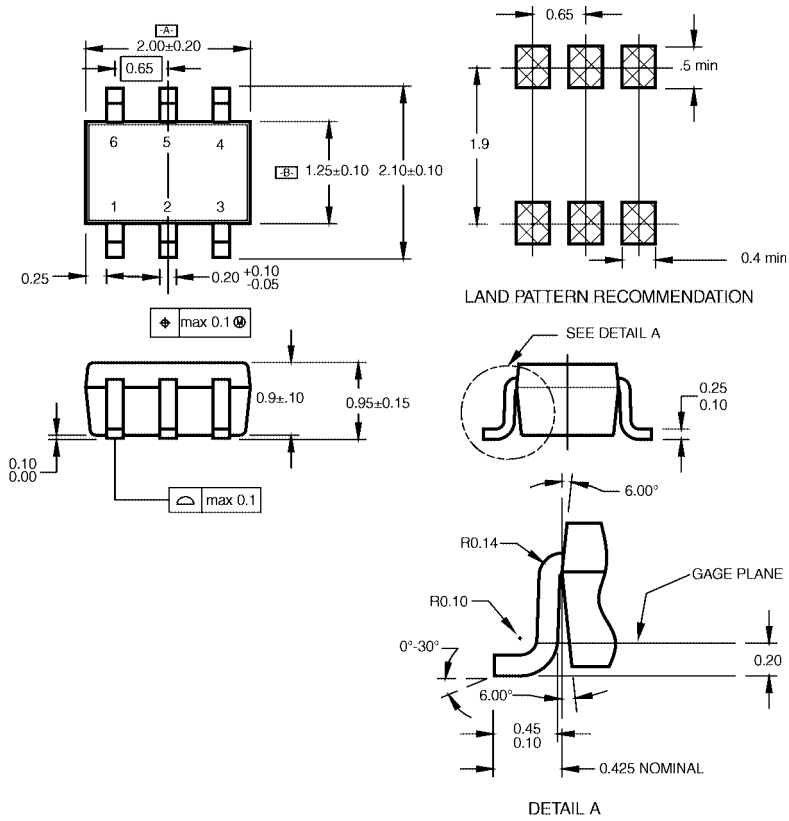
REEL DIMENSIONS inches (millimeters)

DETAIL X

DETAIL X
SCALE: 3X

| 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) |

Physical Dimensions inches (millimeters) unless otherwise noted



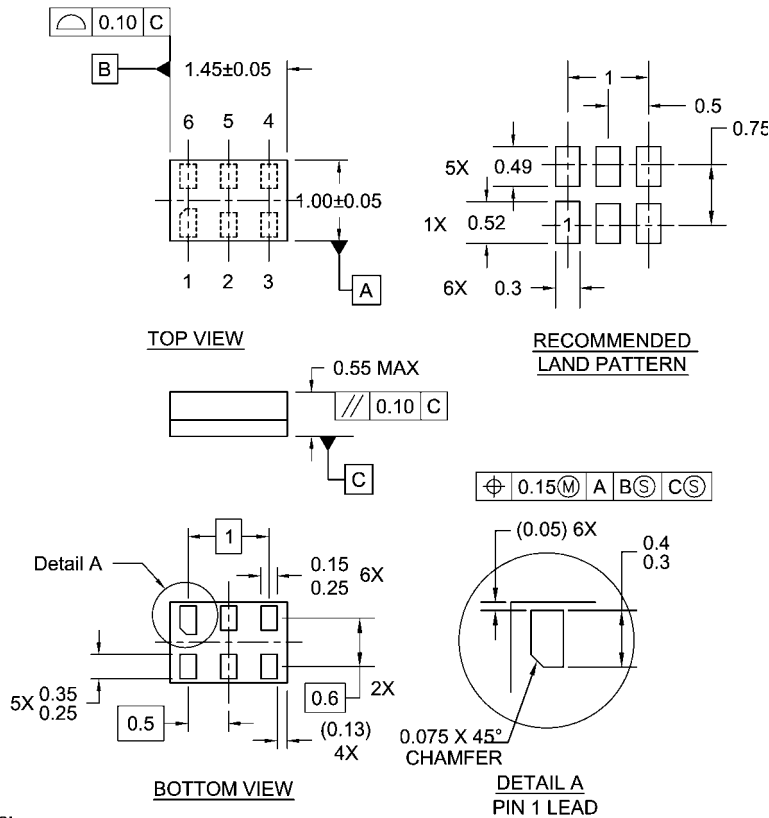
NOTES:

- 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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