

NC7SB3257

2:1 Multiplexer/Demultiplexer Bus Switch

General Description

The NC7SB3257 is a high performance, 2:1 NMOS passgate multiplexer/demultiplexer. The device is fabricated with advanced sub-micron CMOS technology to achieve high speed enable and disable times and low On Resistance. The device is specified to operate over the 4.0 to 5.5V V_{CC} operating range. The control input tolerates voltages up to 5.5V independent of the V_{CC} operating range.

Features

- Space saving SC70 6-lead surface mount package
- Ultra small MicroPak™ leadless package
- Typical 3Ω switch resistance @ 5.0V V_{CC}
- Minimal propagation delay through the switch
- Power down high impedance control input
- Zero bounce in flow through mode
- TTL compatible control input
- Overvoltage tolerance of control input to 7.0V
- Break before make enable circuitry

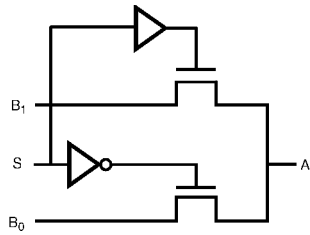
Ordering Code:

| Order Number | Package Number | Product Code Top Mark | Package Description | Supplied As |
|--------------|----------------|-----------------------|-------------------------------------|---------------------------|
| NC7SB3257P6X | MAA06A | B7B | 6-Lead SC70, EIAJ SC88, 1.25mm Wide | 3k Units on Tape and Reel |
| NC7SB3257L6X | MAC06A | B7 | Pb-Free 6-Lead MicroPak, 1.0mm Wide | 5k Units on Tape and Reel |

Pb-Free package per JEDEC J-STD-020B.

MicroPak™ is a trademark of Fairchild Semiconductor Corporation.

Logic Symbol



Pin Descriptions

| Pin Names | Description |
|------------------------------------|---------------|
| A, B ₀ , B ₁ | Data Ports |
| S | Control Input |

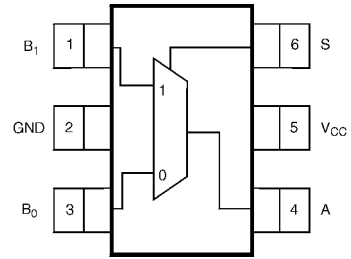
Function Table

| Input (S) | Function |
|-----------|-------------------------------|
| L | B ₀ Connected to A |
| H | B ₁ Connected to A |

H = HIGH Logic Level
L = LOW Logic Level

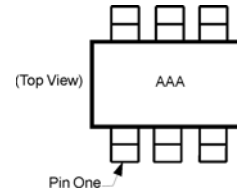
Connection Diagrams

Pin Assignments for SC70



(Top View)

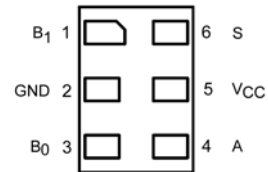
Pin One Orientation Diagram



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).

Pad Assignments for MicroPak



(Top Through View)

Absolute Maximum Ratings (Note 1)

| | |
|--|-----------------|
| Supply Voltage (V_{CC}) | -0.5V to +7.0V |
| DC Switch Voltage (V_S) | -0.5V to +7.0V |
| DC Output Voltage (V_{IN}) <small>(Note 3)</small> | -0.5V to +7.0V |
| DC Input Diode Current (I_{IK}) | |
| @ (I_{IK}) $V_{IN} < 0V$ | -50 mA |
| DC Output Current (I_{OUT}) | 128 mA |
| DC V_{CC} or Ground Current (I_{CC}/I_{GND}) | ± 100 mA |
| Storage Temperature Range (T_{STG}) | -65°C to +150°C |
| Junction Lead Temperature under Bias (T_J) | +150°C |
| 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}) | 4.0V to 5.5V |
| Control Input Voltage (V_{IN}) | 0V to V_{CC} |
| Switch Input Voltage (V_{IN}) | 0V to V_{CC} |
| 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) | |
| Control Input $V_{CC} = 4.0V$ to $5.5V$ | 0 ns/V to 5 ns/V |
| 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: Control input must be held HIGH or LOW, it must not float.

Note 3: The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

DC Electrical Characteristics

| Symbol | Parameter | V_{CC} (V) | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | | Units | Conditions |
|-----------------|--|-----------------|---|------|-----------|---------------|--|
| | | | Min | Typ | Max | | |
| V_{IK} | Clamp Diode Voltage | 4.5 | | -1.2 | | V | $I_{IN} = -18$ mA |
| V_{IH} | HIGH Level Input Voltage | 4.5 – 5.5 | 2.0 | | | V | |
| V_{IL} | LOW Level Input Voltage | 4.5 – 5.5 | | | 0.8 | | |
| I_{IN} | Input Leakage Current | 5.5 | | | ± 1.0 | μA | $0 \leq V_{IN} \leq 5.5V$ |
| I_{OFF} | OFF State Leakage Current | 5.5 | | | ± 1.0 | μA | $0 \leq A, B \leq V_{CC}$ |
| R_{ON} | Switch On Resistance <small>(Note 4)</small> | 4.5 | | 3.0 | 7.0 | Ω | $V_{IN} = 0V, I_{IN} = 64$ mA |
| | | 4.5 | | 3.0 | 7.0 | Ω | $V_{IN} = 0V, I_{IN} = 30$ mA |
| | | 4.5 | | 6.0 | 15.0 | Ω | $V_{IN} = 2.4V, I_{IN} = 15$ mA |
| | | 4.0 | | 10.0 | 20.0 | Ω | $V_{IN} = 2.4V, I_{IN} = 15$ mA |
| I_{CC} | Quiescent Supply Current | 5.5 | | | 10.0 | μA | $V_{IN} = V_{CC}$ or GND $I_{OUT} = 0$ |
| ΔI_{CC} | Increase in I_{CC} Per Input <small>(Note 5)</small> | 5.5 | | 0.9 | 2.5 | mA | $V_{IN} = 3.4V, I_O = 0$ Control Input Only |

Note 4: Measured by the voltage drop between A and B pins at the indicated current through the switch. On Resistance is determined by the lower of the voltages on the two (A or B Ports).

Note 5: Per TTL driven Input ($V_{IN} = 3.4V$, Control input only). A and B pins do not contribute to I_{CC} .

AC Electrical Characteristics

| Symbol | Parameter | V _{CC} (V) | T _A = -40°C to +85°C C _L = 50 pF, R _U = R _D = 500Ω | | | Units | Conditions | Figure Number |
|--------------------------------------|--|------------------------|---|------|-----|-------|--|------------------|
| | | | Min | Typ | Max | | | |
| t _{PHL} t _{PLH} | Propagation Delay Bus to Bus (Note 6) | 4.0 – 55 | | 0.25 | | ns | V _I = OPEN | Figures 1, 2 |
| t _{PZL} t _{PZH} | Output Enable Time | 4.5 – 5.5 | 1.8 | 6.5 | | ns | V _I = 7V for t _{PZL} V _I = 0V for t _{PZH} | Figures 1, 2 |
| | | 4.0 | 1.8 | 7.3 | | | | |
| t _{PLZ} t _{PHZ} | Output Disable Time | 4.5 – 5.5 | 0.8 | 4.7 | | ns | V _I = 7V for t _{PLZ} V _I = 0V for t _{PHZ} | Figures 1, 2 |
| | | 4.0 | 0.8 | 5.3 | | | | |
| t _{B-M} | Break Before Make Time (Note 7) | 4.5 – 5.5 | 0.5 | | | ns | | Figure 3 |
| | | 4.0 | 0.5 | | | | | |

Note 6: This parameter is guaranteed by design but not tested. The bus switch contributes no propagation delay other than the RC delay of the On Resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance).

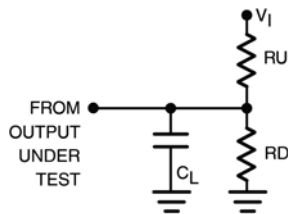
Note 7: Guaranteed by design.

Capacitance (Note 8)

| Symbol | Parameter | Typ | Max | Units | Conditions |
|-------------------|-------------------------------|------|-----|-------|------------------------|
| C _{IN} | Control Pin Input Capacitance | 2.3 | | pF | V _{CC} = 0V |
| C _{IO-B} | B Port OFF Capacitance | 5.7 | | pF | V _{CC} = 5.0V |
| C _{IO-A} | A Port ON Capacitance | 16.0 | | pF | V _{CC} = 5.0V |

Note 8: Capacitance is characterized but not tested.

AC Loading and Waveforms

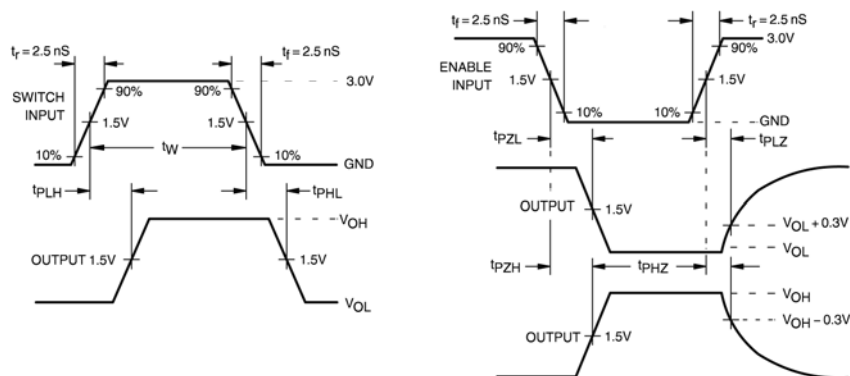


Note: Input Driven by 50Ω source terminated in 50Ω

Note: C_L includes load and stray capacitance

Note: Input PRR = 1.0 MHz; t_W = 500 ns

FIGURE 1. AC Test Circuit



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

FIGURE 2. AC Waveforms

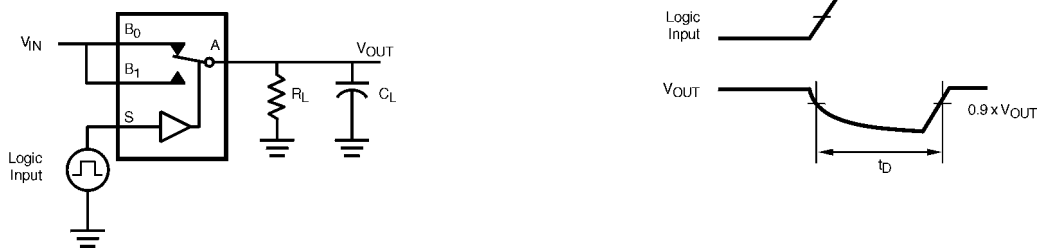


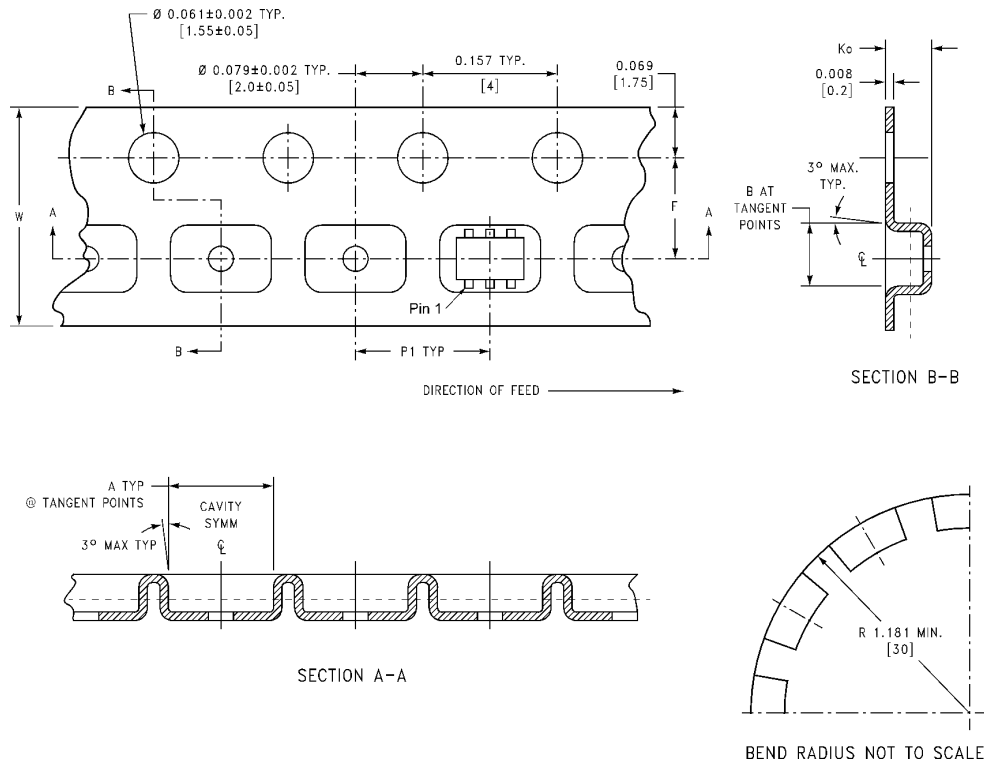
FIGURE 3. Break Before Make Interval Timing

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 |

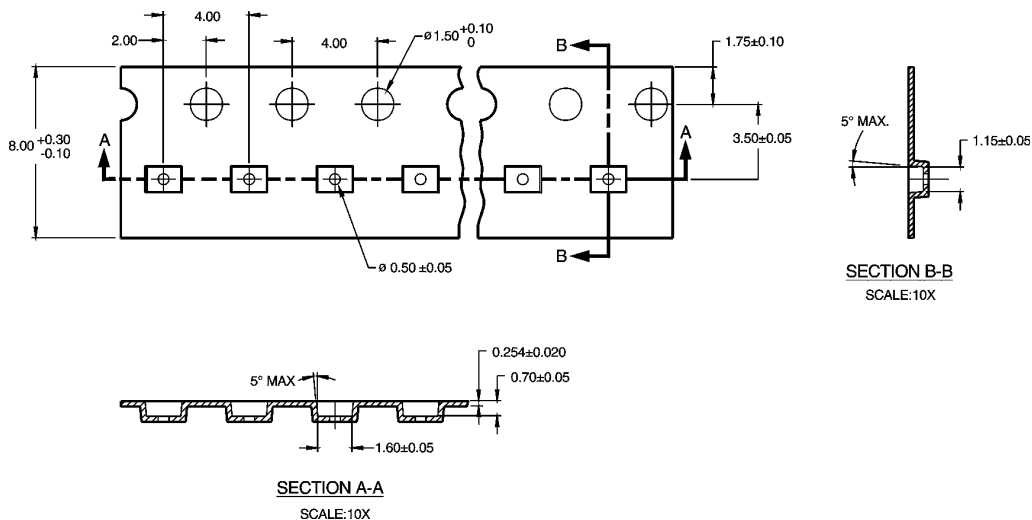
TAPE DIMENSIONS inches (millimeters)



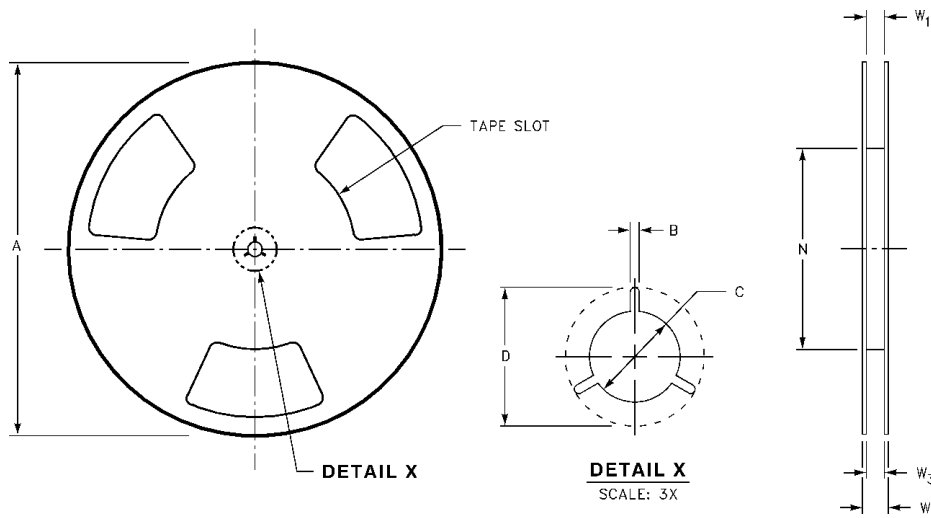
| Package | Tape Size | DIM A | DIM B | DIM F | DIM K ₀ | DIM P1 | DIM W |
|---------|-----------|-----------------|-----------------|-------------------------------|--------------------------------|--------------|----------------------------|
| SC70-6 | 8 mm | 0.093 (2.35) | 0.096 (2.45) | 0.138 ± 0.004 (3.5 ± 0.10) | 0.053 ± 0.004 (1.35 ± 0.10) | 0.157 (4) | 0.315 ± 0.004 (8 ± 0.1) |

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 |

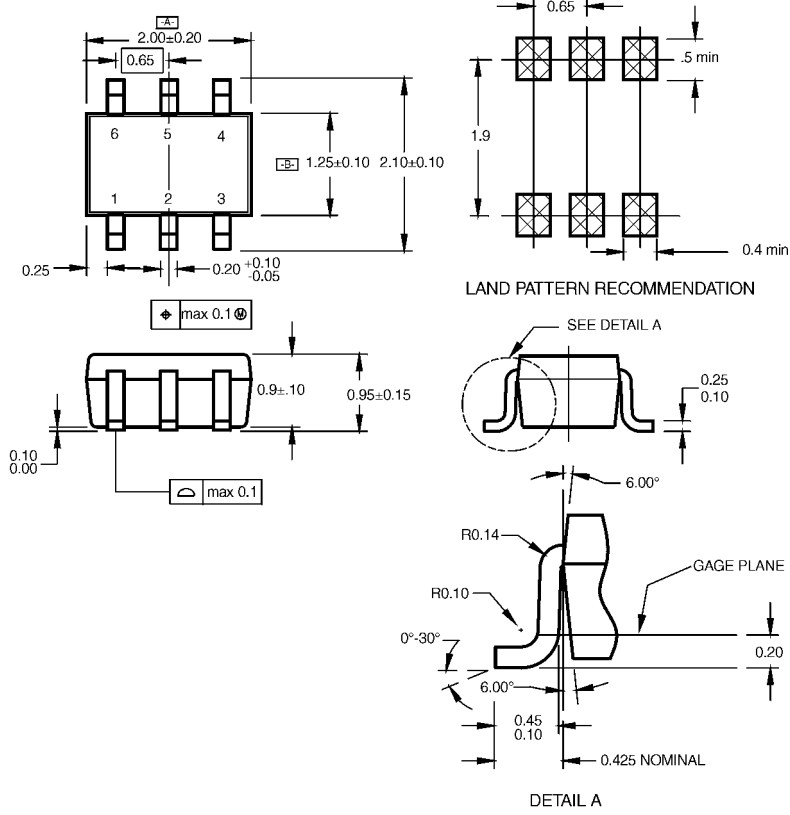


REEL DIMENSIONS inches (millimeters)



| 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) |

Physical Dimensions inches (millimeters) unless otherwise noted



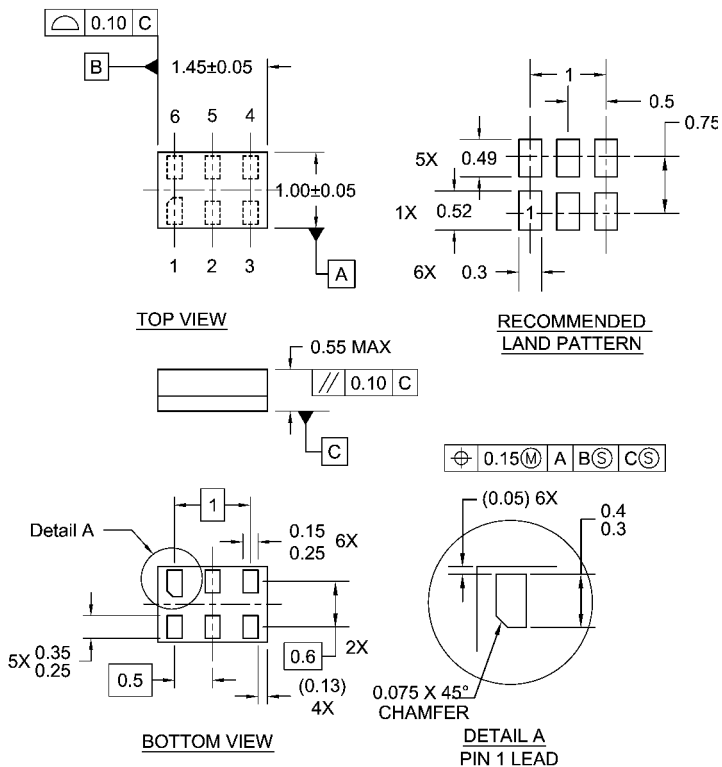
NOTES:

- 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

**Pb-Free 6-Lead MicroPak, 1.0mm Wide
Package Number MAC06A**

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provided in the labeling, can be reasonably expected to result in significant injury to the user.

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|--------------------------|------------------------|---|
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