

# 2:1 Multiplexer/Demultiplexer Bus Switch

## NC7SB3257

### 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 5.5 V  $V_{CC}$  operating range.

The control input tolerates voltages up to 5.5 V independent of the  $V_{CC}$  operating range.

### Features

- Space Saving SC70 6-Lead Surface Mount Package
- Typical 3  $\Omega$  Switch Resistance at 5.0 V  $V_{CC}$
- Minimal Propagation Delay through the Switch
- Power-Down High Impedance Control Input
- Zero Bounce in Flow through Mode
- TTL Compatible Control Input
- Over-Voltage Tolerance of Control Input to 7.0 V
- Break-before-Make Enable Circuitry
- This Device is Pb-Free and Halide Free

### Logic Symbol

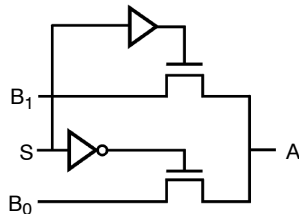
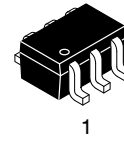
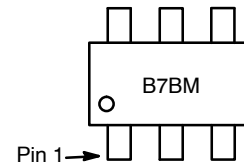


Figure 1. Logic Symbol



SC-88 (SC-70 6 Lead),  
1.25 x 2  
CASE 419AD

### MARKING DIAGRAM



B7B = Specific Device Code  
M = Assembly Operation Month

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
NC7SB3257P6X	SC-88 (SC-70 6 Lead)	3000 / 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 Specification Brochure, [BRD8011/D](#).

# NC7SB3257

## Pin Configurations

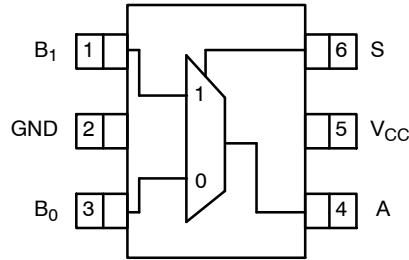


Figure 2. SC70 (Top View)

### PIN DEFINITIONS

Pin #	Name	Description
1	B <sub>1</sub>	Data Ports
2	GND	Ground
3	B <sub>0</sub>	Data Ports
4	A	Data Ports
5	V <sub>CC</sub>	Supply Voltage
6	S	Control Input

### FUNCTION TABLE

Inputs	Function
L	B <sub>0</sub> Connected to A
H	B <sub>1</sub> Connected to A

NOTE: H = HIGH Logic Level.  
L = LOW Logic Level.

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	Supply Voltage	-0.5	7.0	V
V <sub>S</sub>	DC Switch Voltage	-0.5	7.0	V
V <sub>IN</sub>	DC Input Voltage (Note 1)	-0.5	7.0	V
I <sub>IK</sub>	DC Input Diode Current at V <sub>IN</sub> < 0 V	-	-50	mA
I <sub>OUT</sub>	DC Output Current	-	128	mA
I <sub>CC</sub> /I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current	-	±100	mA
T <sub>STG</sub>	Storage Temperature Range	-65	+150	°C
T <sub>J</sub>	Junction Lead Temperature under Bias	-	+150	°C
T <sub>L</sub>	Lead Temperature (Soldering, 10 seconds)	-	+260	°C
P <sub>D</sub>	Power Dissipation at +85°C	-	180	mW

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

### RECOMMENDED OPERATING CONDITIONS (Note 2)

Symbol	Parameter	Min	Max	Unit
V <sub>CC</sub>	Supply Voltage Operating	4.0	5.5	V
V <sub>IN</sub>	Control Input Voltage	0	V <sub>CC</sub>	V
	Switch Input Voltage	0	V <sub>CC</sub>	V
V <sub>OUT</sub>	Output Voltage	0	V <sub>CC</sub>	V
T <sub>A</sub>	Operating Temperature	-40	+85	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time	Control Input V <sub>CC</sub> = 4.0 V to 5.5 V		ns/V
θ <sub>JA</sub>	Thermal Resistance	-	350	°C/W

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.

2. Control input must be held HIGH or LOW; it must not float.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V <sub>CC</sub>	T <sub>A</sub> = -40 to +85°C			Unit
				Min	Typ	Max	
V <sub>IK</sub>	Clamp Diode Voltage	I <sub>IN</sub> = -18 mA	4.5	-	-	-1.2	V
V <sub>IH</sub>	HIGH Level Input Voltage		4.5-5.5	2.0	-	-	V
V <sub>IL</sub>	LOW Level Input Voltage		4.5-5.5	-	-	0.8	V
I <sub>IN</sub>	Input Leakage Current	0 ≤ V <sub>IN</sub> ≤ 5.5 V	5.5	-	-	±1.0	μA
I <sub>OFF</sub>	OFF State Leakage Current	0 ≤ A, B ≤ V <sub>CC</sub>	5.5	-	-	±1.0	μA
R <sub>ON</sub>	Switch On Resistance (Note 3)	V <sub>IN</sub> = 0 V, I <sub>IN</sub> = 64 mA	4.5	-	3.0	7.0	Ω
		V <sub>IN</sub> = 0 V, I <sub>IN</sub> = 30 mA	4.5	-	3.0	7.0	
		V <sub>IN</sub> = 2.4 V, I <sub>IN</sub> = 15 mA	4.5	-	6.0	15.0	
		V <sub>IN</sub> = 2.4 V, I <sub>IN</sub> = 15 mA	4.0	-	10.0	20.0	
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND I <sub>OUT</sub> = 0	5.5	-	-	10.0	μA
ΔI <sub>CC</sub>	Increase in ICC per Input (Note 4)	V <sub>IN</sub> = 3.4 V, I <sub>O</sub> = 0 Control input only	5.5	-	0.9	2.5	mA

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.

3. 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).
4. Per TTL driven Input (V<sub>IN</sub> = 3.4 V, Control input only). A and B pins do not contribute to I<sub>CC</sub>.

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> = -40°C to +85°C, CL = 50 pF, RU = RD = 500 Ω			Unit
				Min	Typ	Max	
t <sub>PHL</sub> , t <sub>PLH</sub>	Propagation Delay Bus-to-Bus (Note 5)	V <sub>I</sub> = OPEN	4.0-5.5	-	-	0.25	ns
t <sub>PZL</sub> , t <sub>PZH</sub>	Output Enable Time	V <sub>I</sub> = 7 V for t <sub>PZL</sub> V <sub>I</sub> = 0 V for t <sub>PZH</sub>	4.0-5.5	1.8	-	6.5	ns
			4.0	1.8	-	7.3	
t <sub>PLZ</sub> , t <sub>PHZ</sub>	Output Disable Time	V <sub>I</sub> = 7 V for t <sub>PLZ</sub> V <sub>I</sub> = 0 V for t <sub>PHZ</sub>	4.5-5.5	0.8	-	4.7	ns
			4.0	0.8	-	5.3	
t <sub>B-M</sub>	Break-before-Make Time (Note 6)		4.5-5.5	0.5	-	-	ns
			4.0	0.5	-	-	

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.

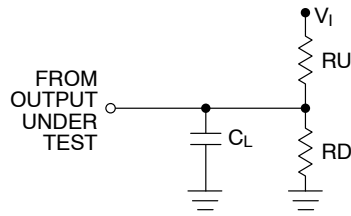
5. This parameter is guaranteed by design but not tested. The bus switch contributes no propagation delay other than the RC delay of the on resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance).
6. Guaranteed by design.

CAPACITANCE (Note 7)

Symbol	Parameter	Conditions	Typ	Unit
C <sub>IN</sub>	Control Pin Input Capacitance	V <sub>CC</sub> = 0.0 V	2.3	pF
C <sub>IO-B</sub>	B Port OFF Capacitance	V <sub>CC</sub> = 5.0 V	5.7	pF
C <sub>IO-A</sub>	A Port ON Capacitance	V <sub>CC</sub> = 5.0 V	16.0	pF

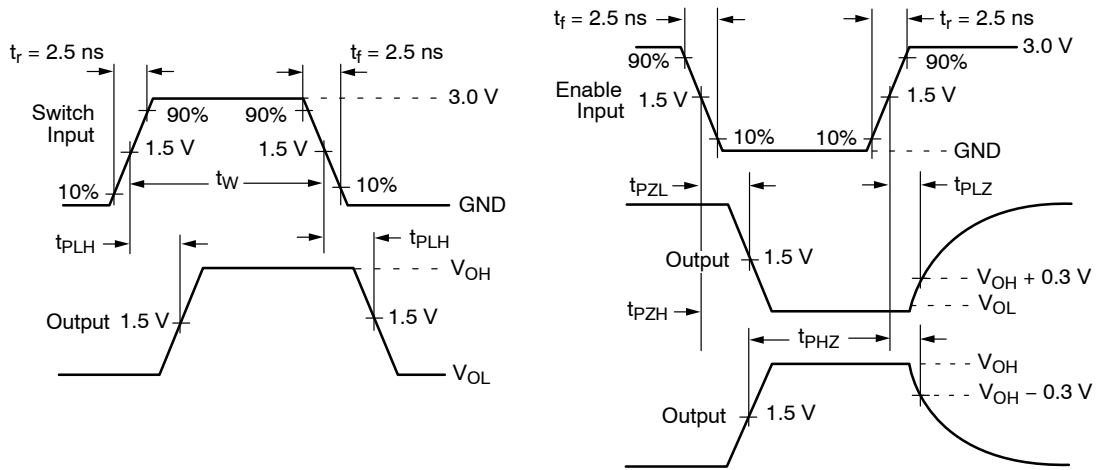
7. Capacitance is characterized but not tested.

AC LOADING AND WAVEFORMS



NOTE: Input driven by  $50\ \Omega$  source terminated in  $50\ \Omega$   
 $C_L$  includes load and stray capacitance.  
 Input PRR = 10 MHz,  $t_w = 500$  ns.

Figure 3. AC Test Circuit



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

Figure 4. AC Waveforms

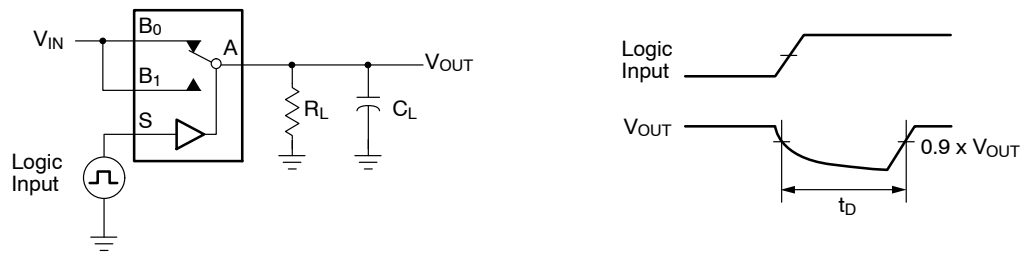
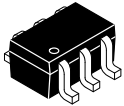


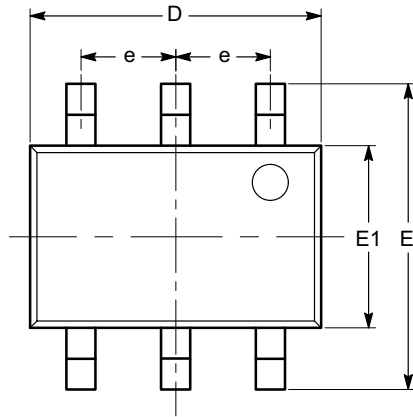
Figure 5. Break-Before-Make Interval Timing



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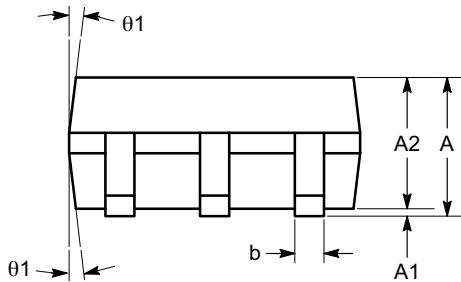
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ISSUE A

DATE 07 JUL 2010

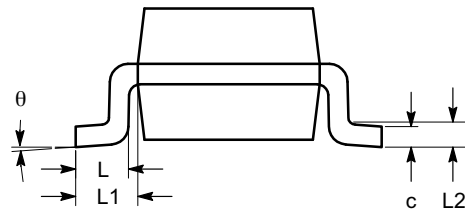


TOP VIEW

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		
$\theta$	0°		8°
$\theta_1$	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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