

# 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

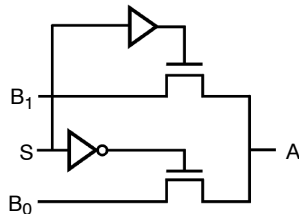
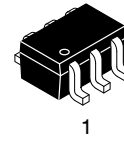
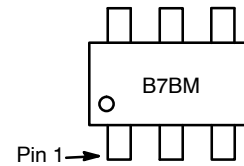


Figure 1. Logic Symbol



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†
NC7SB3257P6X	SC-88 (SC-70 6 Lead)	3000 / Tape & Reel

†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

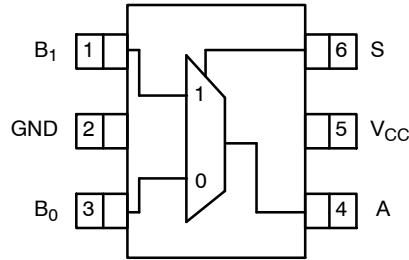


Figure 2. SC70 (Top View)

### 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.

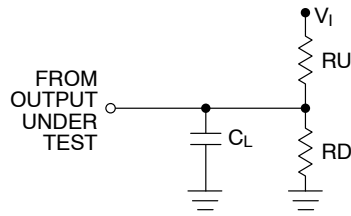
5. This parameter is guaranteed by design but not tested. The bus switch contributes no propagation delay other than the RC delay of the on resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance).
6. Guaranteed by design.

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

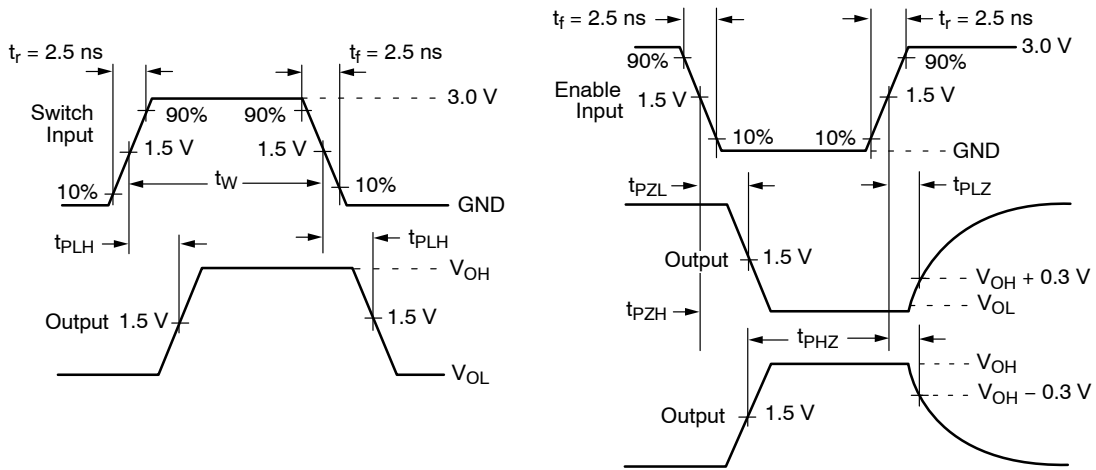
7. Capacitance is characterized but not tested.

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

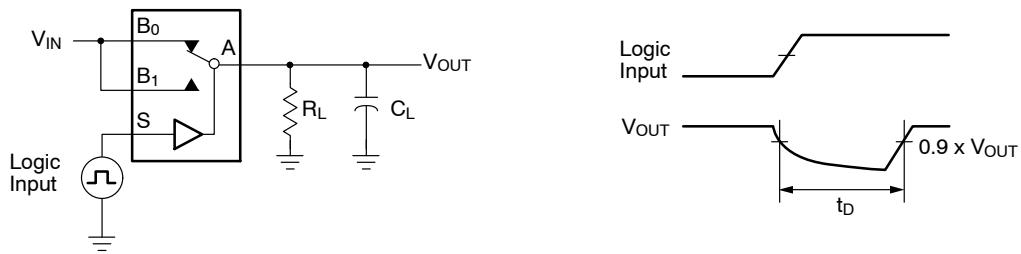
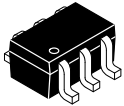


Figure 5. Break-Before-Make Interval Timing

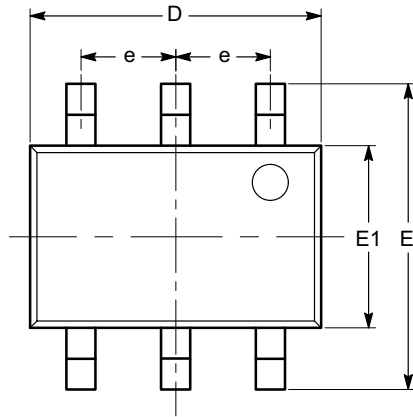
**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**



1

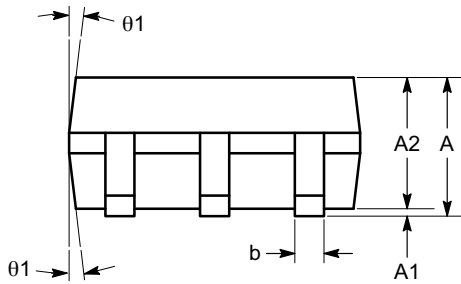
**SC-88 (SC-70 6 Lead), 1.25x2**  
**CASE 419AD**  
**ISSUE A**

DATE 07 JUL 2010

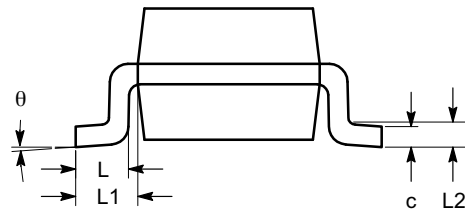


**TOP VIEW**

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.

<b>DOCUMENT NUMBER:</b>	<b>98AON34266E</b>	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
<b>DESCRIPTION:</b>	<b>SC-88 (SC-70 6 LEAD), 1.25X2</b>	<b>PAGE 1 OF 1</b>

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at [www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)