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May 2016

NC7SB3257
2:1 Multiplexer/Demultiplexer Bus Switch

Features

- Space Saving SC70 6-Lead Surface Mount Package
- Typical 3 Ω 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

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.

Ordering Information

Part Number	Top Mark	Package	Packing Method
NC7SB3257P6X	B7B	6-Lead SC70, EIAJ SC88, 1.25 mm Wide	3000 Units on Tape & Reel

Logic Symbol

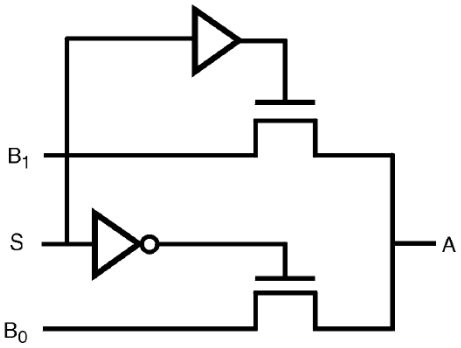


Figure 1. Logic Symbol

Pin Configurations

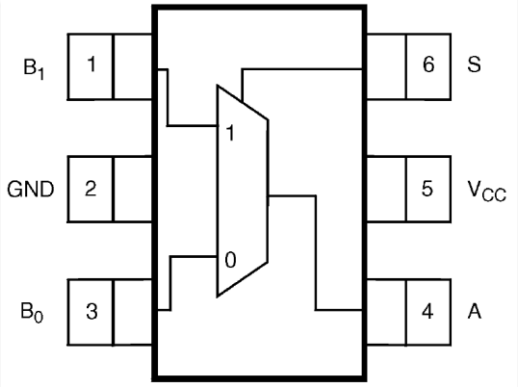


Figure 2. SC70 (Top View)

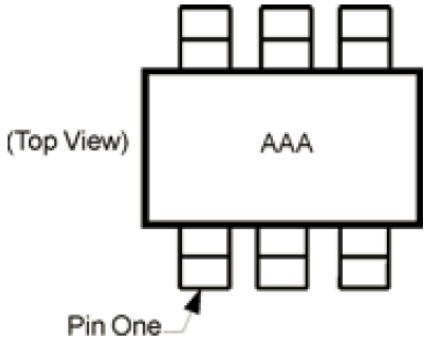


Figure 3. Pin One Orientation Diagram[1, 2]

Notes:
1. Orientation of Top Mark determines Pin One location. Read the top product code mark left to right, Pin One is the lower left pin.
2. AAA - Product Code Top Mark - see ordering code.

Pin Definitions

Pin #	Name	Description
1	B_1	Data Ports
2	GND	Ground
3	B_0	Data Ports
4	A	Data Ports
6	V_{CC}	Supply Voltage
5	S	Control Input

Function Table

Inputs	Functions
L	B_0 Connected to A
H	B_1 Connected to A

H = HIGH Logic Level.

L = LOW Logic Level.

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter		Min.	Max.	Unit
V_{CC}	Supply Voltage		-0.5	7.0	V
V_S	DC Switch Voltage		-0.5	7.0	V
V_{IN}	DC Input Voltage[3]		-0.5	7.0	V
I_{IK}	DC Input Diode Current	V_{IN} < 0 V		-50	mA
I_{OUT}	DC Output Current			128	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current			±100	mA
T_{STG}	Storage Temperature Range		-65	+150	°C
T_J	Junction Lead Temperature under Bias			+150	°C
T_L	Lead Temperature (Soldering, 10 Seconds)			+260	°C
P_D	Power Dissipation at +85°C			180	mW

Note:

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

Recommended Operating Conditions[4]

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Conditions	Min.	Max.	Unit
V_{CC}	Supply Voltage Operating		4.0	5.5	V
V_{IN}	Control Input Voltage		0	V_{CC}	V
	Switch Input Voltage		0	V_{CC}	V
V_{OUT}	Output Voltage		0	V_{CC}	V
T_A	Operating Temperature		-40	+85	°C
t_r, t_f	Input Rise and Fall Times	Control Input V_{CC} = 4.0 V to 5.5 V	0	5	ns/V
θ_{JA}	Thermal Resistance			350	°C/W

Note:

4. Control input must be held HIGH or LOW, it must not float.

DC Electrical Characteristics

Symbol	Parameter	Conditions	V_{CC}	T_A=-40 to +85°C			Unit
				Min.	Typ.	Max.	
V_{IK}	Clamp Diode Voltage	I_{IN}= -18 mA	4.5			-1.2	V
V_{IH}	HIGH Level Input Voltage		4.5 to 5.5	2.0			V
V_{IL}	LOW Level Input Voltage		4.5 to 5.5			0.8	V
I_{IN}	Input Leakage Current	$0 \le V_{IN} \le 5.5$ V	5.5			±1.0	µA
I_{OFF}	OFF State Leakage Current	$0 \le A, B \le V_{CC}$	5.5			±1.0	µA
R_{ON}	Switch On Resistance(5)	V_{IN}= 0 V, I_{IN} = 64 mA	4.5		3.0	7.0	Ω
		V_{IN} = 0 V, I_{IN} = 30 mA	4.5		3.0	7.0	
		V_{IN} = 2.4 V, I_{IN} = 15 mA	4.5		6.0	15.0	
		V_{IN} = 2.4 V, I_{IN} = 15 mA	4.0		10.0	20.0	
I_{CC}	Quiescent Supply Current	V_{IN} = V_{CC} or GND I_{OUT} = 0	5.5			10.0	µA
ΔI_{CC}	Increase in ICC per Input(6)	V_{IN} = 3.4 V, I_O = 0 Control Input Only	5.5		0.9	2.5	mA

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

AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	Conditions	T_A=-40°C to +85°C, C_L = 50 pF, RU=RD=_500 Ω			Unit
				Min.	Typ.	Max.	
t_{PHL}, t_{PLH}	Propagation Delay Bus-to-Bus(7)	4.0-5.5	V_I = OPEN			0.25	ns
t_{PZL}, t_{PZH}	Output Enable Time	4.0-5.5	V_I = 7 V for t_{PZL} V_I = 0 V for t_{PZH}	1.8		6.5	ns
		4.0		1.8		7.3	
t_{PLZ}, t_{PHZ}	Output Disable Time	4.5-5.5	V_I= 7 V for t_{PLZ} V_I = 0 V for t_{PHZ}	0.8		4.7	ns
		4.0		0.8		5.3	
t_{B-M}	Break-before-Make Time(8)	4.5-5.5		0.5			ns
		4.0		0.5			

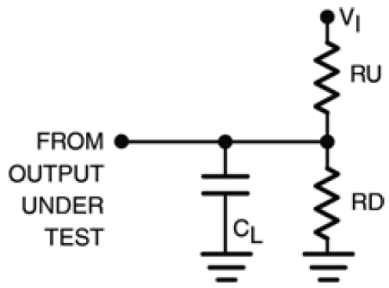
Notes:
7. This parameter is guaranteed by design but not tested. The bus switch contributes no propagation delay other than the RC delay of the On Resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance).
8. Guaranteed by design.

Capacitance(9)

Symbol	Parameter	Conditions	Typ.	Unit
C_{IN}	Control Pin Input Capacitance	V_{CC} = 0.0 V	2.3	pF
C_{IO-B}	B Port OFF Capacitance	V_{CC} = 5.0 V	5.7	pF
C_{IO-A}	A Port ON Capacitance	V_{CC} = 5.0 V	16.0	pF

Note:
9. Capacitance is characterized but not tested.

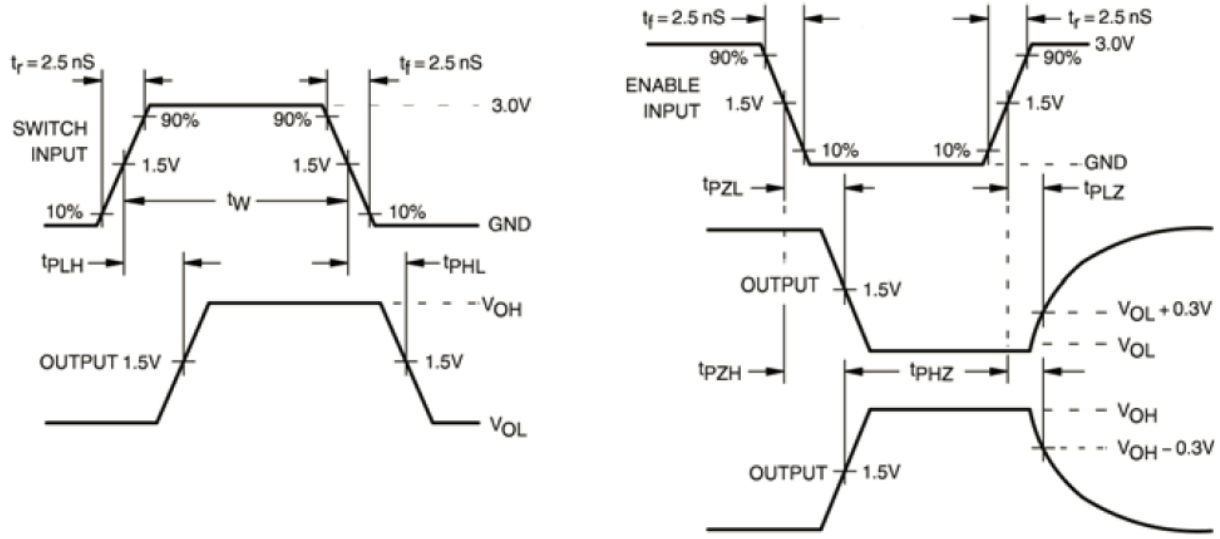
AC Loading and Waveforms



Note:

Input Driven by 50 Ω source terminated in 50 Ω.
C_L includes load and stray capacitance.
Input PRR=10 MHz; t_W=500 ns.

Figure 4. AC Test Circuit



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

Figure 5. AC Waveforms

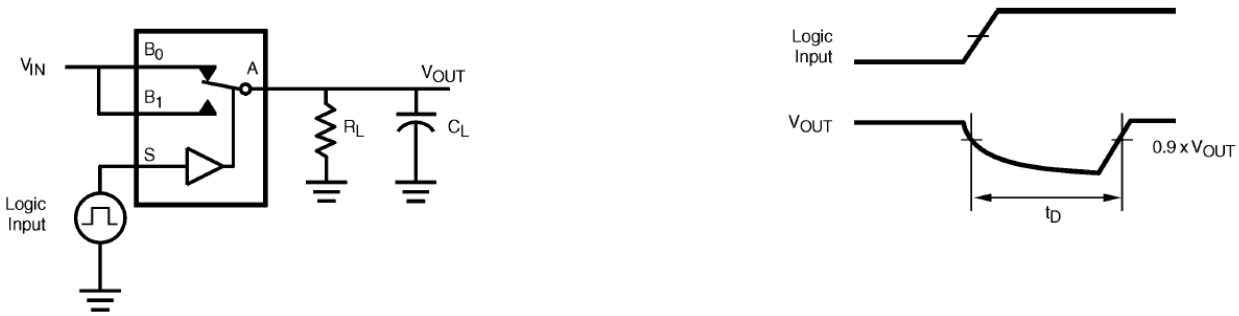


Figure 6. Break-Before-Make Interval Timing

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