FAIRCHILD

SEMICONDUCTOR™

NC7SZ66
TinyLogic™ UHS 1-Bit Low Power Digital Switch

General Description

The NC7SZ66 is a single-bit, ultra high-speed CMOS compatible digital switch. The LOW on resistance of the switch allows inputs to be connected to outputs with minimal propagation delay and without generating additional ground bounce noise. The device is organized as a 1-bit switch with a switch enable (SE) signal. When SE is HIGH, the switch is on and Port A is connected to Port B. When SE is LOW, the switch is open and a high-impedance state exists between the two ports.

Features

- Space saving SOT23 or SC70 5-lead package
- Broad V_{CC} Operating Range 2.3V–5.5V
- 5Ω switch connection between two ports
- Minimal propagation delay through the switch
- Low I_{CC}
- Zero bounce in flow-through mode
- Control input compatible with CMOS input levels

Ordering Code:

Order Number	Package Number	Package Top Mark	Package Description	Supplied As
NC7SZ66M5	MA05B	7Z66	5-Lead SOT23, JEDEC MO-178, 1.6mm	250 Units on Tape and Reel
NC7SZ66M5X	MA05B	7Z66	5-Lead SOT23, JEDEC MO-178, 1.6mm	3k Units on Tape and Reel
NC7SZ66P5	MAA05A	Z66	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	250 Units on Tape and Reel
NC7SZ66P5X	MAA05A	Z66	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3k Units on Tape and Reel

Logic Symbol
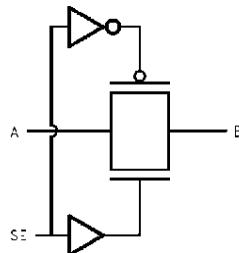
Connection Diagram
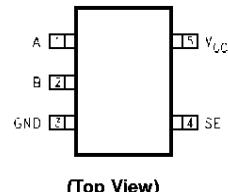
(Top View)

Pin Descriptions

Pin Names	Description
SE	Switch Enable Input
A	Bus A I/O
B	Bus B I/O

Function Table

SE	B_0	Function
L	HIGH-Z State	Disconnect
H	A_0	Connect

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Absolute Maximum Ratings(Note 1)

Supply Voltage (V_{CC})	0.5V to +7.0V
DC Switch Voltage (V_S)	−0.5V to V_{CC} +0.5V
DC Input Voltage (V_{IN}) (Note 2)	−0.5V to +7.0V
DC Input Diode Current	
(I_{IK}) V_{IN} < 0V	−50 mA
DC Output (I_{OUT}) Sink Current	128 mA
DC V_{CC}/GND 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
Junction Lead Temperature (T_L)	
(Soldering, 10 Seconds)	+260°C
Power Dissipation (P_D) @ +85°C	
SOT23-5	200 mW
SC70-5	150 mW

Recommended Operating Conditions

Power Supply Operating (V_{CC})	2.3V to 5.5V
Control Input Voltage (V_{IN})	0V to 5.5V
Switch Input Voltage (V_{IN})	0V to V_{CC}
Switch Output Voltage (V_{OUT})	0V to V_{CC}
Input Rise and Fall Time (t_r, t_f)	
Control Input; V_{CC} = 2.3V–3.6V	0 ns/V to 10 ns
Control Input; V_{CC} = 4.5–5.5V	0 ns/V to 5 ns
Switch I/O	0 ns/V to DC
Operating Temperature (T_A)	−40°C to +85°C
Thermal Resistance (θ_{JA})	
SOT23-5	300°C/Watt
SC70-5	425°C/Watt

Note 1: The 'Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The 'Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 2: 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°C to +85°C			Units	Conditions
			Min	Typ (Note 4)	Max		
V_{IH}	HIGH Level Input Voltage	2.3–5.5	0.7 V_{CC}			V	
V_{IL}	LOW Level Input Voltage	2.3–5.5			0.3 V_{CC}	V	
I_{IN}	Ctrl Input Leakage Current	0–5.5			±1.0	µA	0 ≤ V_{IN} ≤ 5.5V
I_{OFF}	OFF Leakage Current	2.3–5.5			±10.0	µA	0 ≤ A, B ≤ V_{CC}
R_{ON}	Switch On Resistance (Note 3)	4.5		3	7	Ω	V_{IN} = 0V, I_{IN} = 30 mA
				5	12	Ω	V_{IN} = 2.4V, I_{IN} = 15 mA
				7	15	Ω	V_{IN} = 4.5V, I_{IN} = 30 mA
		3.0		4	9	Ω	V_{IN} = 0V, I_{IN} = 24 mA
				10	20	Ω	V_{IN} = 3V, I_{IN} = 24 mA
		2.3		5	12	Ω	V_{IN} = 0V, I_{IN} = 8 mA
				13	30	Ω	V_{IN} = 2.3V, I_{IN} = 8 mA
I_{CC}	Quiescent Supply Current	5.5			10	µA	V_{IN} = V_{CC} or GND, I_{OUT} = 0

Note 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) pins.

Note 4: All typical values are at the specified V_{CC} and T_A = 25°C.

AC Electrical Characteristics

| Symbol	Parameter	V_{CC} (V)	T_A= −40°C to +85°C, C_L= 50 pF, RU = RD = 500Ω			Units	Conditions	Fig. No.
			Min	Typ (Note 5)	Max			
t_{PHL}, t_{PLH}	Prop Delay Bus to Bus (Note 6)	2.3–2.7			1.2	ns	V_{IN} = open	Figure 1
		3.0–3.6			0.8	ns		Figure 2
		4.5–5.5			0.3	ns		
t_{PZL}, t_{PZH}	Output Enable Time	2.3–2.7	1.5	3.3	7.0	ns	V_{IN} = 2 x V_{CC} for t_{PZL}	Figure 1
		3.0–3.6	1.5	2.4	5.5	ns	V_{IN} = 0V for t_{PZH}	Figure 2
		4.5–5.5	1.5	2.0	4.5	ns		
t_{PLZ}, t_{PHZ}	Output Disable Time	2.3–2.7	1.5	5.3	9.0	ns	V_{IN}= 2 x V_{CC} for t_{PLZ}	Figure 1
		3.0–3.6	1.5	4.0	7.0	ns	V_{IN} = 0V for t_{PHZ}	Figure 2
		4.5–5.5	1.5	2.7	5.0	ns		

Note 5: All typical values are at the specified V_{CC} and T_A = 25°C

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

Capacitance

| Symbol	Parameter	Typ	Max	Units	Conditions
C_{IN}	Control Pin Input Capacitance	2		pF	V_{CC} = 0V
$C_{I/O}$	Input/Output Capacitance	6		pF	V_{CC} = 5.0V

AC Loading and Waveforms
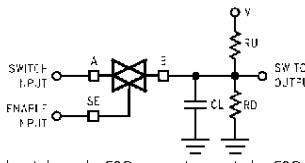
Input driven by 50Ω source terminated in 50Ω

C_L includes load and stray capacitance

Input PRR = 1 0 MHz, t_w = 500 ns

FIGURE 1. AC Test Circuit
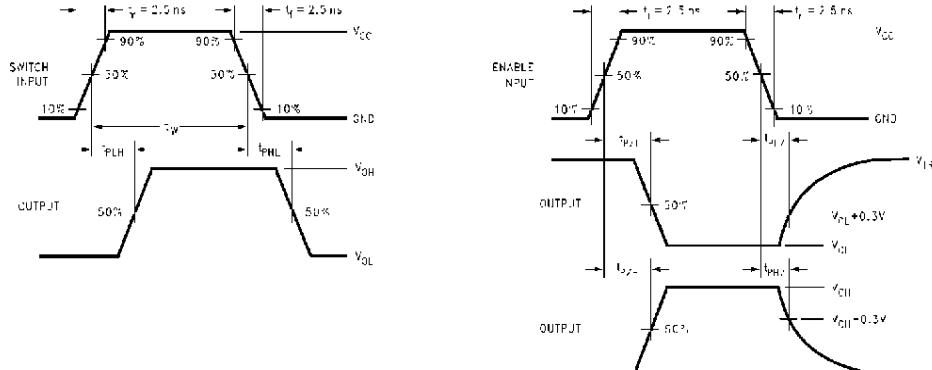
FIGURE 2. AC Waveforms

Tape and Reel Specification

TAPE FORMAT

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
M5, P5	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	250	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed
M5X, P5X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

TAPE DIMENSIONS inches (millimeters)
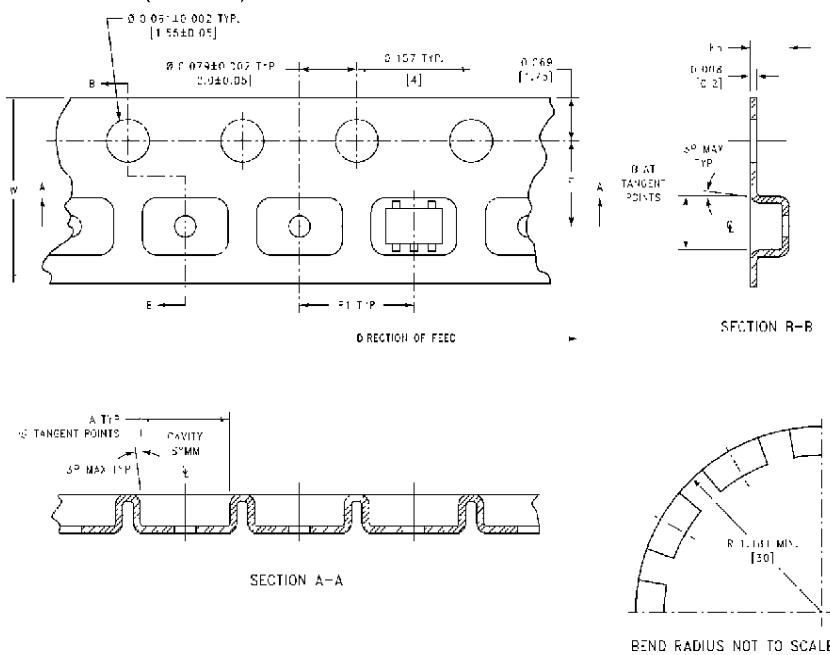
Package	Tape Size	DIM A	DIM B	DIM F	DIM K_o	DIM P1	DIM W
SC70-5	8 mm	0.093 (2.35)	0.096 (2.45)	0.138 ± 0.004 (3.5 ± 0.10)	0.053 ± 0.004 (1.35 ± 0.10)	0.157 (4)	0.315 ± 0.004 (8 ± 0.1)
SOT23-5	8 mm	0.130 (3.3)	0.130 (3.3)	0.138 ± 0.002 (3.5 ± 0.05)	0.055 ± 0.004 (1.4 ± 0.11)	0.157 (4)	0.315 ± 0.012 (8 ± 0.3)

REEL DIMENSIONS inches (millimeters)

TAPE SLOT

DETAIL X

A

DETAIL X
SCALE: 3X

B

C

D

N

W1

W2

W3
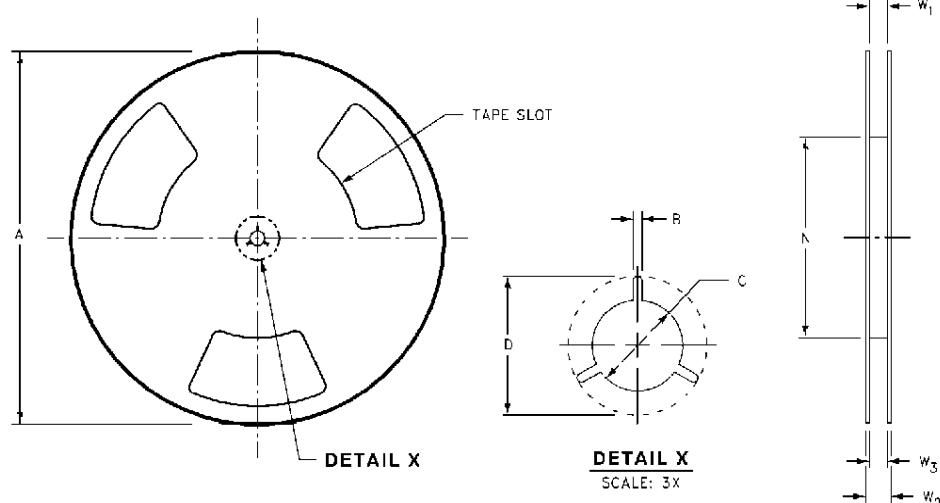
Tape Size	A	B	C	D	N	W1	W2	W3
8 mm	7.0 (177.8)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	2.165 (55.00)	0.331 + 0.059/−0.000 (8.40 + 1.50/−0.00)	0.567 (14.40)	W1 + 0.078/−0.039 (W1 + 2.00/−1.00)

Physical Dimensions inches (millimeters) unless otherwise noted

S1MM

3.00
2.80

5   4

3.00
2.60

1.70
1.50

1   2   3

0.95

0.50
0.30

1.90

⊕ 0.20 Ⓜ C A B

0.95   0.95

2.60

1.00

0.70
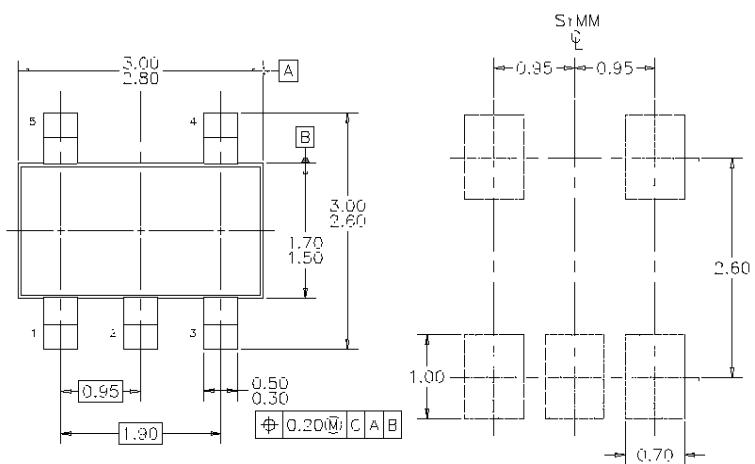
LAND PATTERN RECOMMENDATION

1.25
0.90

1.40
0.95

0.15
0.05

C

⌓ 0.10 C

SEE DETAIL A

0.20
0.08
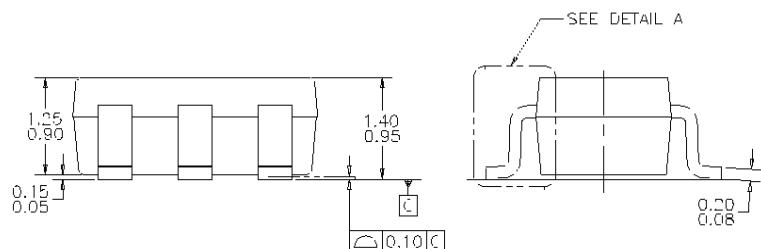
NOTES: UNLESS OTHEWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO JEDEC MO-178, ISSUE B, VARIATION AA, DATED JANUARY 1999.
B) ALL DIMENSIONS ARE IN MILLIMETERS.

GAGE PLANE

0.25

8°
0°

0.55
0.35

0.60 REF

SEATING PLANE
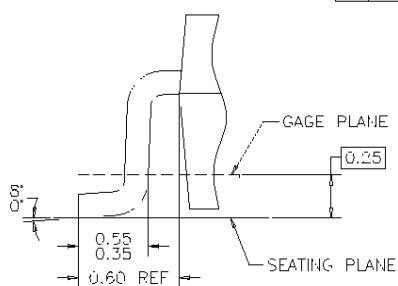
**5-Lead SOT23, JEDEC MO-178, 1.6mm
Package Number MA05B**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

NOTES:
A. CONFORMS TO EIAJ REGISTERED OUTLINE DRAWING SC88A
B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
C. DIMENSIONS ARE IN MILLIMETERS

DETAIL A
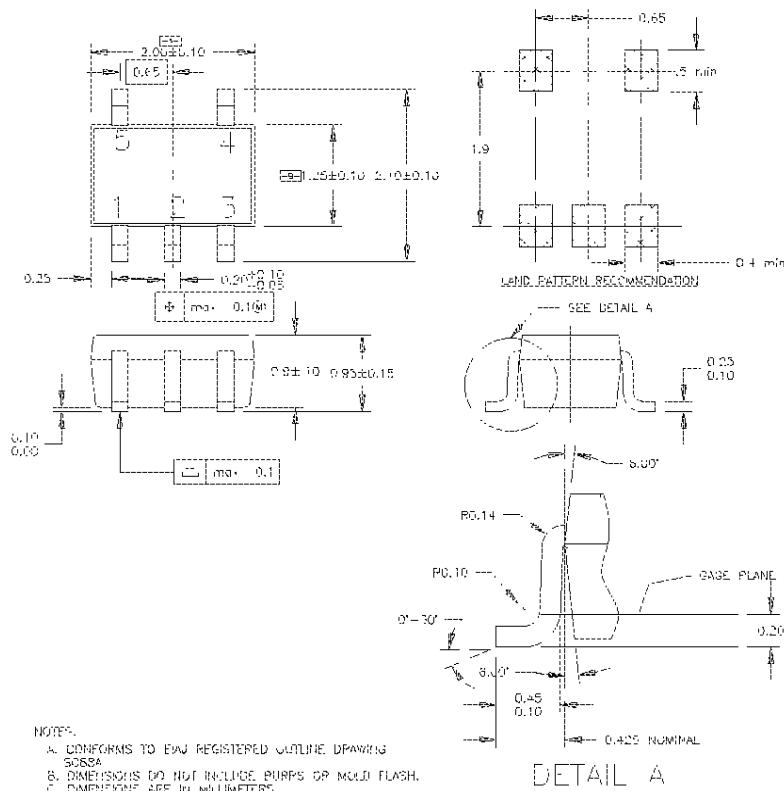
5-Lead SC70, EIAJ SC-88a, 1.25mm Wide
Package Number MAA05A

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74ALVC162244TX 74VHCT573AMTCX ESD9B5.0ST5G FGP20N6S2 MURD620CTT4G NC7SV02L6X
NC7SV57L6X 74ACT08SC MC79M15BDTRKG NC7SP04FHX NC7SZ86M5 FDB86563-F085 FOD073LR2
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