

TinyLogic ULP-A 2-Input Non-Inverting Multiplexer

NC7SV157

The NC7SV157 is a single 2–input non–inverting multiplexer in tiny footprint packages. The device is designed to operate for $V_{\rm CC}$ = 0.9 V to 3.6 V.

Features

- Designed for 0.9 V to 3.6 V V_{CC} Operation
- 1.9 ns t_{PD} at 3.3 V (Typ)
- Inputs/Outputs Over-Voltage Tolerant up to 3.6 V
- I_{OFF} Supports Partial Power Down Protection
- Source/Sink 24 mA at 3.3 V
- Available in SC−88A and MicroPak[™] Packages
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

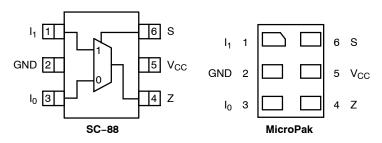


Figure 1. Pinout Diagrams (Top Views)

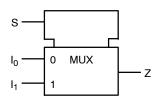


Figure 2. Logic Symbol

MARKING DIAGRAMS



ΚK

SIP6 1.45X1.0 MicroPak CASE 127EB



CC = Specific Device Code

= 2-Digit Lot Run Traceability Code

XY = 2-Digit Date Code Z = Assembly Plant Code



SC-88 CASE 419B-02



XXX = Specific Device Code

M = Date Code

= Pb-Free Package

ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 6 of this data sheet.

PIN ASSIGNMENT

Pin	Function
1	l1
2	GND
3	10
4	Z
5	V _{CC}
6	S

FUNCTION TABLE

	Inputs	Output		
S	S I ₁ I ₀		$Z = (I_0) \cdot (\overline{S}) + (I_1) \cdot (S)$	
L	Х	L	L	
L	Х	Н	Н	
Н	L	X	L	
Н	Н	X	Н	

H = HIGH Logic Level

L = LOW Logic Level

X = Don't Care

1

MAXIMUM RATINGS

Symbol	Characteristics		Value	Unit
V _{CC}	DC Supply Voltage		-0.5 to +4.3	V
V _{IN}	DC Input Voltage		-0.5 to +4.3	V
V _{OUT}		-Mode (High or Low State) Tri-State Mode (Note 1) r-Down Mode (V _{CC} = 0 V)	-0.5 to V _{CC} + 0.5 -0.5 to +4.3 -0.5 to +4.3	V
I _{IK}	DC Input Diode Current	V _{IN} < GND	-50	mA
I _{OK}	DC Output Diode Current	V _{OUT} < GND	-50	mA
l _{OUT}	DC Output Source/Sink Current		±50	mA
I _{CC} or I _{GND}	DC Supply Current per Supply Pin or Ground Pin		±50	mA
T _{STG}	Storage Temperature Range	-65 to +150	°C	
TL	Lead Temperature, 1 mm from Case for 10 Seconds		260	°C
TJ	Junction Temperature Under Bias		+150	°C
θЈА	Thermal Resistance (Note 2)	SC-88A MicroPak	377 154	°C/W
P _D	Power Dissipation in Still Air	SC-88A MicroPak	332 812	mW
MSL	Moisture Sensitivity		Level 1	-
F _R	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	-
V _{ESD}	ESD Withstand Voltage (Note 3)	Human Body Model Charged Device Model	2000 1000	V
I _{Latchup}	Latchup Performance (Note 4)		±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality

- Stresses exceeding those listed in the Maximum Hatings 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. Applicable to devices with outputs that may be tri-stated.

 2. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow per JESD51-7.

 3. HBM tested to EIA / JESD22-A114-A. CDM tested to JESD22-C101-A. JEDEC recommends that ESD qualification to EIA/JESD22-A115A (Machine Model) be discontinued.

 4. Tested to EIA/JESD78 Class II.

RECOMMENDED OPERATING CONDITIONS

Symbol	Paran	Min	Max	Unit	
V _{CC}	Positive DC Supply Voltage		0.9	3.6	V
V _{IN}	DC Input Voltage		0	3.6	V
V _{OUT}	DC Output Voltage	Active–Mode (High or Low State) Tri–State Mode (Note 1) $Power$ –Down Mode (V_{CC} = 0 V)	0 0 0	V _{CC} 3.6 3.6	
T _A	Operating Temperature Range		-40	+85	°C
t _r , t _f	Input Transition Rise and Fall Time	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$	0	10	ns/V

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.

DC ELECTRICAL CHARACTERISTICS

				Т	A = 25°	С	T _A = -40°0	C to +85°C	
Symbol	Parameter	Condition	V _{CC} (V)	Min	Тур	Max	Min	Max	Unit
V _{IH}	High-Level Input		0.9	-	0.5	-	-	-	V
	Voltage		1.1 to 1.3	0.65 x V _{CC}	-	-	0.65 x V _{CC}	-	
			1.4 to 1.6	0.65 x V _{CC}	-	-	0.65 x V _{CC}	-	
			1.65 to 1.95	0.65 x V _{CC}	-	-	0.65 x V _{CC}	_	
			2.3 to <2.7	1.6	-	-	1.6	_	
			2.7 to 3.6	2.0	-	-	2.0	_	
V _{IL}	Low-Level Input		0.9	-	0.5	-	-	-	V
	Voltage		1.1 to 1.3	-	-	0.35 x V _{CC}	_	0.35 x V _{CC}	
			1.4 to 1.6	-	-	0.35 x V _{CC}	-	0.35 x V _{CC}	
			1.65 to 1.95	-	-	0.35 x V _{CC}	_	0.35 x V _{CC}	
			2.3 to <2.7	-	-	0.7	-	0.7	
			2.7 to 3.6	-	-	0.8	-	0.8	
V _{OH}	High-Level Output	$V_{IN} = V_{IH}$ or V_{IL}							V
	Voltage	I _{OH} = -100 μA	0.9	_	V _{CC} – 0.1	_	-	-	
			1.1 to 1.3	V _{CC} – 0.1	_	-	V _{CC} – 0.1	-	
			1.4 to 1.6	V _{CC} - 0.1	-	-	V _{CC} – 0.1	-	
			1.65 to 1.95	V _{CC} – 0.2	-	-	V _{CC} – 0.2	_	
		2.3	2.3 to <2.7	$V_{CC}-0.2$	-	-	$V_{CC}-0.2$	-	
			2.7 to 3.6	V _{CC} – 0.2	-	-	V _{CC} – 0.2	_	
		$I_{OH} = -2 \text{ mA}$	1.1 o 1.3	$0.75 \times V_{CC}$	-	-	0.75 x V _{CC}	-	
		$I_{OH} = -4 \text{ mA}$	1.4 to 1.6	$0.75 \times V_{CC}$	-	-	0.75 x V _{CC}	_	
		$I_{OH} = -6 \text{ mA}$	1.65 to 1.95	1.25	-	-	1.25	-	
			2.3 to <2.7	2.0	_	-	2.0	_	
		$I_{OH} = -12 \text{ mA}$	2.3 to <2.7	1.8	-	-	1.8	-	
			2.7 to 3.6	2.2	-	-	2.2	_	
		$I_{OH} = -18 \text{ mA}$	2.3 to <2.7	1.7	-	-	1.7	_	
			2.7 to 3.6	2.4	-	-	2.4	_	
		$I_{OH} = -24 \text{ mA}$	2.7 to 3.6	2.2	-	-	2.2	-	

DC ELECTRICAL CHARACTERISTICS (continued)

				7	Γ _A = 25°	С	T _A = -40°	C to +85°C	
Symbol	Parameter	Condition	V _{CC} (V)	Min	Тур	Max	Min	Max	Unit
V _{OL}	Low-Level	$V_{IN} = V_{IH}$ or V_{IL}							٧
	Output Voltage	I _{OL} = 100 μA	0.9	-	0.1	_	-	-	
			1.1 to 1.3	-	-	0.1	-	0.1	
			1.4 to 1.6	-	-	0.1	-	0.1	
			1.65 to 1.95	-	-	0.2	-	0.2	
			2.3 to < 2.7	-	-	0.2	-	0.2	
			2.7 to 3.6	-	-	0.2	-	0.2	
		I _{OL} = 2 mA	1.1 o 1.3	-	-	0.25 x V _{CC}	-	0.25 x V _{CC}	
		I _{OL} = 4 mA	1.4 to 1.6	-	-	0.25 x V _{CC}	-	0.25 x V _{CC}	
		I _{OL} = 6 mA	1.65 to 1.95	-	-	0.3	-	0.3	
		I _{OL} = 12 mA	2.3 to <2.7	-	-	0.4	-	0.4	
			2.7 to 3.6	-	-	0.4	-	0.4	
		I _{OL} = 18 mA	2.3 to <2.7	-	-	0.6	-	0.6	
			2.7 to 3.6	-	-	0.4	-	0.4	
		I _{OL} = 24 mA	2.7 to 3.6	-	-	0.55	-	0.55	
I _{IN}	Input Leakage Current	V _{IN} = 0 V to 3.6 V	0.9 to 3.6	_	-	±0.1	_	±0.5	μΑ
I _{OFF}	Power Off Leakage Current	V _{IN} = 0 V to 3.6 V or V _{OUT} = 0 V to 3.6 V	0	ı	-	0.5	ı	0.5	μΑ
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	0.9 to 3.6	1	-	0.9	1	0.9	μΑ

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.

AC ELECTRICAL CHARACTERISTICS

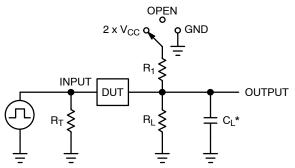
				T _A = 25°C		T _A = -40°C to +85°C			
Symbol	Parameter	Condition	V _{CC} (V)	Min	Тур	Max	Min	Max	Unit
t _{PLH} ,	t _{PLH} , t _{PHL} Propagation Delay, (S or I ₀ or I ₁) to Z (Figures 3 and 4)	$R_L = 1 \text{ M}\Omega$, $C_L = 15 \text{ pF}$	0.9	-	19.1	-	-	-	ns
t _{PHL}		$R_L = 2 \text{ k}\Omega$, $C_L = 15 \text{ pF}$	1.1 to 1.3	-	6.3	15.5	-	18.8	
			1.4 to 1.6	-	3.8	8.5	-	9.5	
		$R_L = 500 \Omega, C_L = 30 pF$	1.65 to 1.95	-	3.1	6.7	-	7.5	
			2.3 to 2.7	-	2.2	4.1	-	4.4	
			2.7 to 3.6	-	1.9	3.4	-	3.6	

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.

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition	Typical (T _A = 25°C)	Unit
C _{IN}	Input Capacitance	V _{CC} = 0 V	2.0	pF
C _{OUT}	Output Capacitance	V _{CC} = 0 V	4.5	pF
C _{PD}	Power Dissipation Capacitance (Note 5)	$f = 10 \text{ MHz}$, $V_{CC} = 0.9 \text{ to } 3.6 \text{ V}$, $V_{IN} = 0 \text{ V or } V_{CC}$	10.0	pF

^{5.} C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation I_{CC(OPR)} = C_{PD} • V_{CC} • f_{in} + I_{CC}. C_{PD} is used to determine the no–load dynamic power consumption: P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.

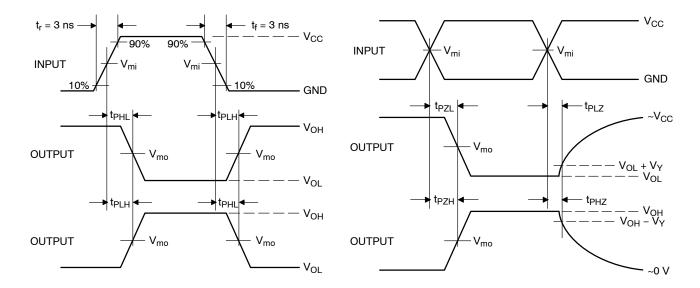


Test	Switch Position
t _{PLH} / t _{PHL}	Open
t _{PLZ} / t _{PZL}	2 x V _{CC}
t _{PHZ} / t _{PZH}	GND

C_L includes probe and jig capacitance

 R_T is Z_{OUT} of pulse generator (typically 50 Ω) f=1 MHz

Figure 3. Test Circuit



V _{CC} , V	V _{mi} , V	V _{mo} , V	V _Y , V
0.9	V _{CC} / 2	V _{CC} / 2	0.1
1.1 to 1.3	V _{CC} /2	V _{CC} /2	0.1
1.4 to 1.6	V _{CC} / 2	V _{CC} / 2	0.1
1.65 to 1.95	V _{CC} / 2	V _{CC} / 2	0.15
2.3 to 2.7	V _{CC} / 2	V _{CC} / 2	0.15
3.0 to 3.6	1.5	1.5	0.3

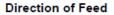
Figure 4. Switching Waveforms

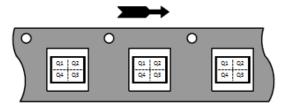
ORDERING INFORMATION

Device	Package	Marking	Pin 1 Orientation (See below)	Shipping [†]
NC7SV157P6X	SC-88A	VF7	Q4	3000 / Tape & Reel
NC7SV157L6X	MicroPak	H9	Q4	5000 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

Pin 1 Orientation in Tape and Reel

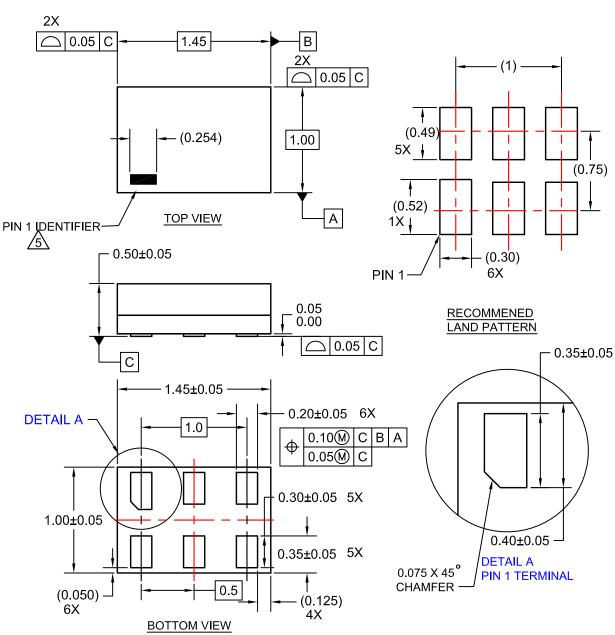




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PACKAGE DIMENSIONS

SIP6 1.45X1.0 CASE 127EB ISSUE O

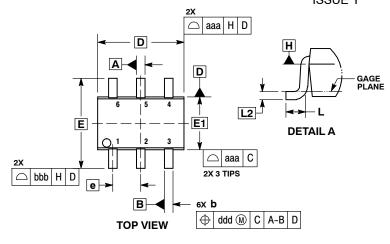


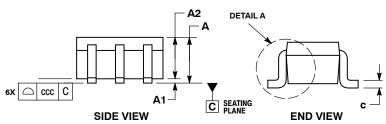
- NOTES:
- 1. CONFORMS TO JEDEC STANDARD MO-252 VARIATION UAAD
- 2. DIMENSIONS ARE IN MILLIMETERS
- 3. DRAWING CONFORMS TO ASME Y14.5M-2009
- 4. PIN ONE IDENTIFIER IS 2X LENGTH OF ANY
 - OTHER LINE IN THE MARK CODE LAYOUT.

PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363

CASE 419B-02 **ISSUE Y**



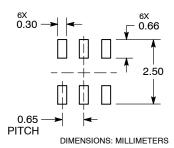


- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994. CONTROLLING DIMENSION: MILLIMETERS.
- CONTROLLING DIMENSION: MILLIMETERS.

 DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH,
 PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
 DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF
- THE PLASTIC BODY AND DATUM H.
 DATUMS A AND B ARE DETERMINED AT DATUM H.
- DIMENSIONS 6 AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.
- DIMENSION 6 DOES NOT INCLUDE DAMBAR PROTRUSION.
 ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDI TION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
Α			1.10			0.043
A1	0.00		0.10	0.000		0.004
A2	0.70	0.90	1.00	0.027	0.035	0.039
b	0.15	0.20	0.25	0.006	0.008	0.010
С	0.08	0.15	0.22	0.003	0.006	0.009
D	1.80	2.00	2.20	0.070	0.078	0.086
E	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.049	0.053
е		0.65 BS	С	0.026 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
L2		0.15 BS	SC .	0.006 BSC		
aaa		0.15			0.006	
bbb	0.30			0.012		
ccc	0.10			0.004		
ddd		0.10			0.004	

RECOMMENDED **SOLDERING FOOTPRINT***



*For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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