

NL17SZ14

Single Inverter with Schmitt Trigger

The NL17SZ14 is a single inverter with Schmitt trigger in a tiny footprint package. The SC-70/SC-88A occupies a very small board area. The device performs much as LCX multi-gate products in speed and drive.

- Tiny SC-70/SC-88A Package
- 2.7 ns T_{PD} 9.0 + 5.0 V (typ)
- Source/Sink 24 mA at 3.0 V
- Over-Voltage Tolerant Inputs and Outputs
- Pin For Pin with NC7SZ14
- Designed for 1.65 V to 5.5 V V_{CC} Operation

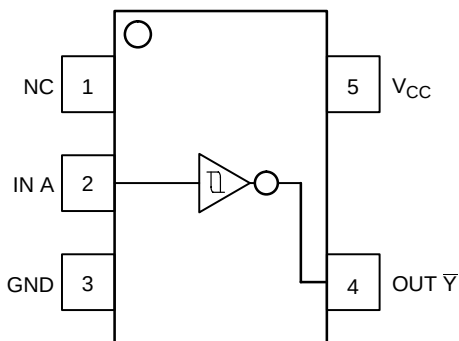


Figure 1. Pinout

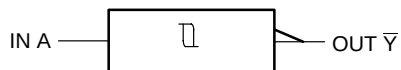


Figure 2. Logic Symbol



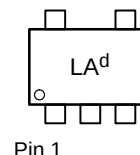
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MARKING DIAGRAM



SC70-5/SC-88A/SOT-353
DF SUFFIX
CASE 419A



d = Date Code

PIN ASSIGNMENT

Pin	Assignment
1	NC
2	IN A
3	GND
4	OUT $\bar{Y}$
5	V_{CC}

A Input	$\bar{Y}$ Output
L	H
H	L

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

MAXIMUM RATINGS

Symbol	Characteristics	Value	Unit
V_{CC}	DC Supply Voltage	-0.5 to $+7.0$	V
V_I	DC Input Voltage	$-0.5 \leq V_I \leq +7.0$	V
V_O	DC Output Voltage Output in High or LOW State (Note 1)	$-0.5 \leq V_O \leq 7.0$	V
I_{IK}	DC Input Diode Current $V_I < \text{GND}$	-50	mA
I_{OK}	DC Output Diode Current $V_O < \text{GND}$	-50	mA
I_O	DC Output Sink Current	± 50	mA
I_{CC}	DC Supply Current per Supply Pin	± 100	mA
I_{GND}	DC Ground Current per Ground Pin	± 100	mA
T_{STG}	Storage Temperature Range	-65 to $+150$	$^{\circ}\text{C}$
P_D	Power Dissipation in Still Air SC-88A	200	mW
θ_{JA}	Thermal Resistance SC-88A	333	$^{\circ}\text{C}/\text{W}$
T_L	Lead Temperature, 1 mm from case for 10 s	260	$^{\circ}\text{C}$
T_J	Junction Temperature under Bias	$+150$	$^{\circ}\text{C}$

Maximum Ratings are those values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation under absolute maximum-rated conditions is not implied. Functional operation should be restricted to the Recommended Operating Conditions.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2-ounce copper trace with no air flow.
2. Tested to EIA/JESD22-A114-A.
3. Tested to EIA/JESD22-A115-A.
4. Tested to JESD22-C101-A.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage Operating Data Retention Only	1.65 1.5	5.5 5.5	V
V_I	Input Voltage	0	5.5	V
V_O	Output Voltage (High or LOW State)	0	5.5	V
T_A	Operating Free-Air Temperature	-40	$+85$	$^{\circ}\text{C}$
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate $V_{CC} = 2.5 \text{ V} \pm 0.2 \text{ V}$ $V_{CC} = 3.0 \text{ V} \pm 0.3 \text{ V}$ $V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	0 0 0	20 10 5	ns/V

DEVICE JUNCTION TEMPERATURE VERSUS TIME TO 0.1% BOND FAILURES

Junction Temperature $^{\circ}\text{C}$	Time, Hours	Time, Years
80	1,032,200	117.8
90	419,300	47.9
100	178,700	20.4
110	79,600	9.4
120	37,000	4.2
130	17,800	2.0
140	8,900	1.0

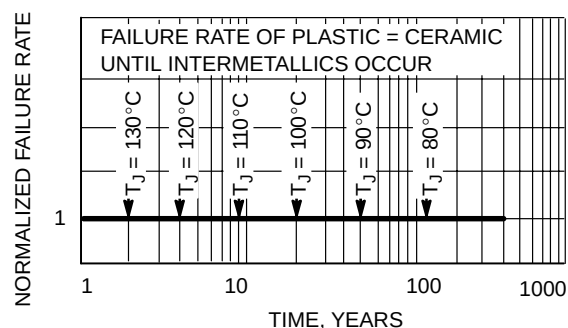


Figure 3. Failure Rate vs. Time Junction Temperature

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DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			−40°C ≤ T _A ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
V _{T+}	Positive Input Threshold Voltage		1.65	0.6	1.0	1.4	0.6	1.4	V
			2.3	1.0	1.5	1.8	1.0	1.8	
			2.7	1.2	1.7	2.0	1.2	2.0	
			3.0	1.3	1.9	2.2	1.3	2.2	
			4.5	1.9	2.7	3.1	1.9	3.1	
			5.5	2.2	3.3	3.6	2.2	3.6	
V _{T−}	Negative Input Threshold Voltage		1.65	0.2	0.5	0.8	0.2	0.8	V
			2.3	0.4	0.75	1.15	0.4	1.15	
			2.7	0.5	0.87	1.4	0.5	1.4	
			3.0	0.6	1.0	1.5	0.6	1.5	
			4.5	1.0	1.5	2.0	1.0	2.0	
			5.5	1.2	1.9	2.3	1.2	2.3	
V _H	Input Hysteresis Voltage		1.65	0.1	0.48	0.9	0.1	0.9	V
			2.3	0.25	0.75	1.1	1.25	1.1	
			2.7	0.3	0.83	1.15	0.3	1.15	
			3.0	0.4	0.93	1.2	0.4	1.2	
			4.5	0.6	1.2	1.5	0.6	1.5	
			5.5	0.7	1.4	1.7	0.7	1.7	
V _{OH}	High-Level Output Voltage V _{IN} = V _{IH} or V _{IL}	I _{OH} = −100 μA	1.65 to 5.5	V _{CC} − 0.1	V _{CC}		V _{CC} − 0.1		V
		I _{OH} = 100 μA							
		I _{OH} = −3 mA	1.65	1.29	1.52		1.29		
		I _{OH} = −8 mA	2.3	1.9	2.1		1.9		
		I _{OH} = −12 mA	2.7	2.2	2.4		2.2		
		I _{OH} = −16 mA	3.0	2.4	2.7		2.4		
		I _{OH} = −24 mA	3.0	2.3	2.5		2.3		
		I _{OH} = −32 mA	4.5	3.8	4.0		3.8		
V _{OL}	Low-Level Output Voltage V _{IN} = V _{IH} or V _{IL}	I _{OL} = 100 μA	1.65 to 5.5		0.0	0.1		0.1	V
		I _{OL} = 4 mA	1.65		0.08	0.24		0.24	
		I _{OL} = 8 mA	2.3		0.2	0.3		0.3	
		I _{OL} = 12 mA	2.7		0.22	0.4		0.4	
		I _{OL} = 16 mA	3.0		0.28	0.4		0.4	
		I _{OL} = 24 mA	3.0		0.38	0.55		0.55	
		I _{OL} = 32 mA	4.5		0.42	0.55		0.55	
I _{IN}	Input Leakage Current	V _{IN} or V _{OUT} = V _{CC} or GND	0 to 5.5			±0.1		±1.0	μA
I _{OFF}	Power Off-Output Leakage Current	V _{OUT} = 5.5 V	0			1		10	μA
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5			1		10	μA

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AC ELECTRICAL CHARACTERISTICS $t_R = t_F = 3.0$ ns

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25 °C			-40 °C ≤ T _A ≤ 85 °C		Unit
				Min	Typ	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation Delay (Figure 4 and 5)	R _L = 1 MΩ, C _L = 15 pF	1.65 1.8 2.5 ± 0.2 3.3 ± 0.3 5.0 ± 0.5	2.0 2.0 1.0 1.0 0.5	9.1 7.6 5.0 3.7 3.1	15 12.5 9.0 6.3 5.2	2.0 2.0 1.0 1.0 0.5	15.6 13 9.5 6.5 5.5	ns
		R _L = 500 Ω, C _L = 50 pF	3.3 ± 0.3 5.0 ± 0.5	1.5 0.8	4.4 3.7	7.2 5.9	1.5 0.8	7.5 6.2	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C _{IN}	Input Capacitance	V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	4.0	pF
C _{PD}	Power Dissipation Capacitance (Note 5)	10 MHz, V _{CC} = 3.3 V, V _I = 0 V or V _{CC} 10 MHz, V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	25 30	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: $I_{CC(OPR)} = C_{PD} \cdot V_{CC} \cdot f_{in} + I_{CC}$. C_{PD} is used to determine the no-load dynamic power consumption; $P_D = C_{PD} \cdot V_{CC}^2 \cdot f_{in} + I_{CC} \cdot V_{CC}$.

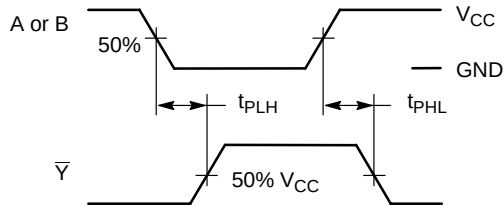
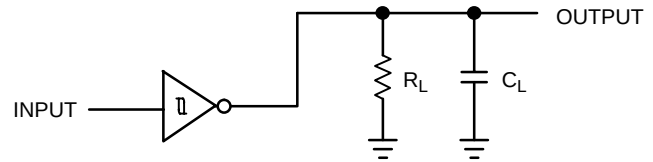


Figure 4. Switching Waveform



A 1-MHz square input wave is recommended for propagation delay tests.

Figure 5. Test Circuit

DEVICE ORDERING INFORMATION

Device Order Number	Device Nomenclature							Package Type	Tape and Reel Size
	Logic Circuit Indicator	No. of Gates per Package	Temp Range Identifier	Technology	Device Function	Package Suffix	Tape and Reel Suffix		
NL17SZ14DFT2	NL	1	7	SZ	14	DF	T2	SC-88A/ SOT-353/ SC70-5	178 mm, 3000 Unit

The diagram illustrates the layout of a tape reel. It shows a cross-section of the tape on the left, with labels for 'CAVITY TAPE' and 'TOP TAPE'. The main body of the reel is divided into three sections: a 'TAPE TRAILER (Connected to Reel Hub) NO COMPONENTS 160 mm MIN', a central section for 'COMPONENTS' with an arrow indicating the 'DIRECTION OF FEED', and a 'TAPE LEADER NO COMPONENTS 400 mm MIN'. The tape is shown with dashed lines representing component positions and solid lines representing the tape edges.

Figure 1: Dimensions of the tape. The diagram shows a top-down view of a rectangular tape with a width of 8.00 ± 0.30 mm. It features a series of six rectangular components spaced along its length. The first component is a square with a central circular hole of diameter Ø1.00 MIN. The second and third components are squares with a central circular hole and a small rectangular feature on the right side. The fourth component is a square with a central circular hole. The fifth component is a square with a central circular hole. The sixth component is a square with a central circular hole. The tape has a total length of 4.00 mm between the centers of the first and second components, and 4.00 mm between the centers of the second and third components. The distance from the left edge to the center of the first component is 2.00 mm. The distance from the center of the sixth component to the right edge is 1.75 mm. The tape has a thickness of 3.50 ± 0.50 mm. The direction of feed is indicated by an arrow pointing to the right.

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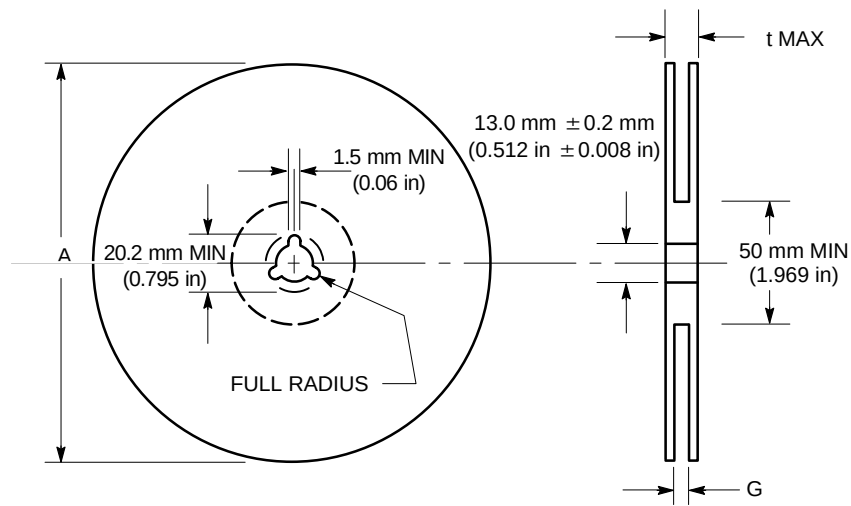


Figure 8. Reel Dimensions

REEL DIMENSIONS

Tape Size	T and R Suffix	A Max	G	t Max
8 mm	T1, T2	178 mm (7 in)	8.4 mm, + 1.5 mm, -0.0 (0.33 in + 0.059 in, -0.00)	14.4 mm (0.56 in)

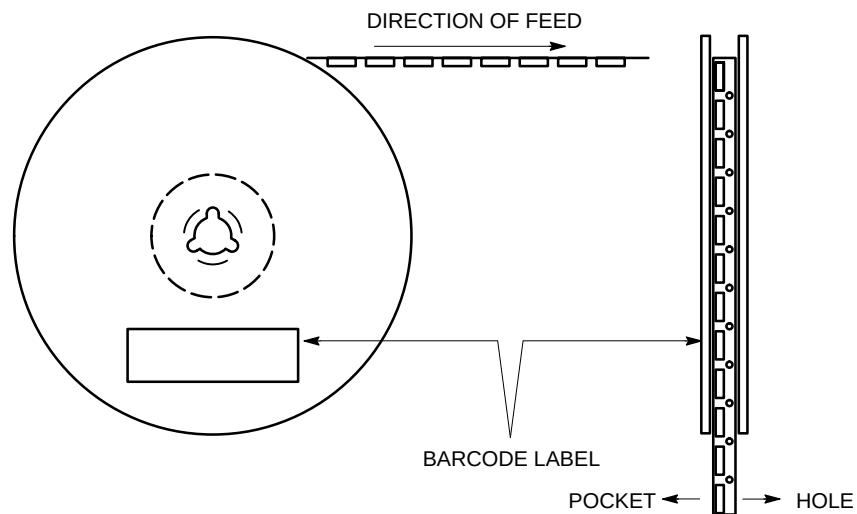
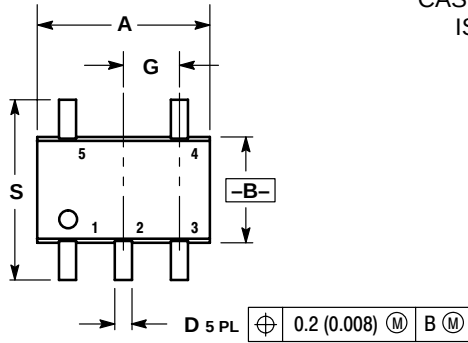


Figure 9. Reel Winding Direction

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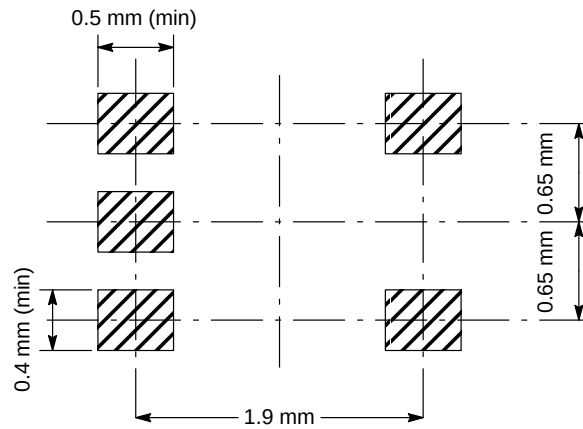
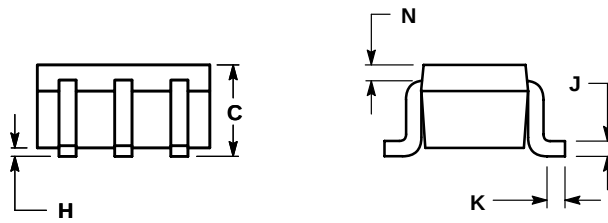
PACKAGE DIMENSIONS

SC70-5/SC-88A/SOT-353
DF SUFFIX
5-LEAD PACKAGE
CASE 419A-02
ISSUE F



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A-01 OBSOLETE. NEW STANDARD 419A-02.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20



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