

NL17SZ86

Single 2-Input Exclusive-OR Gate

The NL17SZ86 is a high performance single 2-input Exclusive-OR Gate operating from a 2.3 V to 5.5 V supply.

Features

- Extremely High Speed: t_{PD} 2.4 ns (typical) at $V_{CC} = 5.0$ V
- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Over Voltage Tolerant Inputs
- V_{TTL} Compatible – Interface Capability with 5.0 V TTL Logic with $V_{CC} = 3$ V
- LVCMOS Compatible
- 24 mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Replacement for NC7SZ86
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

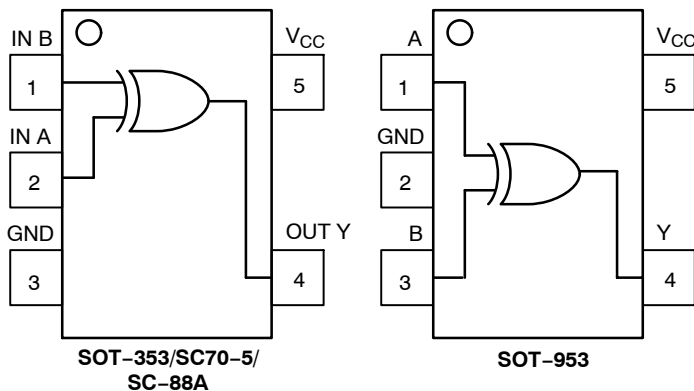


Figure 1. Pinout (Top View)

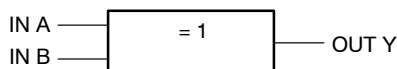


Figure 2. Logic Symbol



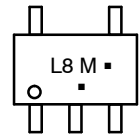
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SC-88A / SOT-353 / SC-70
DF SUFFIX
CASE 419A

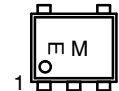
MARKING DIAGRAMS



M = Date Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb-Free Package
(Note: Microdot may be in either location)



SOT-953
CASE 527AE



E = Specific Device Code
(E with 90 degree clockwise rotation)
M = Month Code

ORDERING INFORMATION

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

NL17SZ86

PIN ASSIGNMENT (SOT-353/SC70-5/SC-88A)

Pin	Function
1	IN B
2	IN A
3	GND
4	OUT Y
5	V _{CC}

PIN ASSIGNMENT (SOT-953)

Pin	Function
1	IN A
2	GND
3	IN B
4	OUT Y
5	V _{CC}

FUNCTION TABLE

Input		Output
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CC}	DC Supply Voltage	-0.5 to +7.0	V
V _I	DC Input Voltage	-0.5 V ≤ V _I ≤ +7.0 V	V
V _O	DC Output Voltage, Output in High or Low State (Note 1) (SOT-353/SC70-5/SC-88A Packages)	-0.5 V to V _{CC} + 0.5	V
V _O	DC Output Voltage, Output in High or Low State (Note 1) (SOT-953 Package) Power-Down Mode (V _{CC} = 0 V)	-0.5 to V _{CC} + 0.5 -0.5 to +0.5	V
I _{IK}	DC Input Diode Current V _I < GND	-50	mA
I _{OK}	DC Output Diode Current (SOT-353/SC70-5/SC-88A Packages) V _{OUT} < GND, V _{OUT} > V _{CC}	±50	mA
I _{OK}	DC Output Diode Current (SOT-953 Package) V _{OUT} < 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	°C
T _L	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T _J	Junction Temperature under Bias	+150	°C
θ _{JA}	Thermal Resistance (Note 2)	350	°C/W
P _D	Power Dissipation in Still Air at 85°C	150	mW
MSL	Moisture Sensitivity	Level 1	
F _R	Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	
ESD	ESD Classification Human Body Model (Note 4) Machine Model (Note 5) Charge Device Model (Note 6)	Class 1B Class B N/A	
I _{LATCHUP}	Latchup Performance Above V _{CC} and Below GND at 85°C (Note 3)	±500	mA

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. I_O absolute maximum rating must be observed.
2. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2-ounce copper trace with no air flow.
3. Tested to EIA/JESD78
4. Tested to EIA/JESD22-A114-A, rated to EIA/JESD22-A114-B.
5. Tested to EIA/JESD22-A115-A, rated to EIA/JESD22-A115-B.
6. Tested to JESD22-C101-A.

NL17SZ86

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit	
V _{CC}	Supply Voltage	Operating	1.65	5.5	V
		Data Retention Only	1.5	5.5	
V _I	Input Voltage (Note 7)	0	5.5	V	
V _O	Output Voltage (SOT-353/SC70-5/SC-88A Packages) (HIGH or LOW State)	0	5.5	V	
V _O	Output Voltage (SOT-953 Package) (HIGH or LOW State)	0	V _{CC}	V	
T _A	Operating Free-Air Temperature	-55	+125	°C	
Δt/ΔV	Input Transition Rise or Fall Rate	V _{CC} = 2.5 V ± 0.2 V	0	20	ns/V
		V _{CC} = 3.0 V ± 0.3 V	0	10	
		V _{CC} = 5.0 V ± 0.5 V	0	5	

7. Unused inputs may not be left open. All inputs must be tied to a high- or low-logic input voltage level.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-55°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
V _{IH}	High-Level Input Voltage		1.65 to 1.95 2.3 to 5.5	0.75 V _{CC} 0.7 V _{CC}			0.75 V _{CC} 0.7 V _{CC}		V
V _{IL}	Low-Level Input Voltage		1.65 to 1.95 2.3 to 5.5			0.25 V _{CC} 0.3 V _{CC}		0.25 V _{CC} 0.3 V _{CC}	V
V _{OH}	High-Level Output Voltage V _{IN} = V _{IL} or V _{IH}	I _{OH} = -100 μA	1.65 to 5.5	V _{CC} - 0.1	V _{CC}		V _{CC} - 0.1		V
		I _{OH} = -3 mA	1.65	1.29	1.8	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}	I _{OL} = 100 μA	1.65 to 5.5		0.08	0.1		0.1	V
		I _{OL} = 3 mA	1.65		0.24	0.24		0.24	
		I _{OL} = 8 mA	2.3		0.3	0.3		0.3	
		I _{OL} = 12 mA	2.7		0.4	0.4		0.4	
		I _{OL} = 16 mA	3.0		0.4	0.4		0.4	
		I _{OL} = 24 mA	3.0		0.55	0.55		0.55	
		I _{OL} = 32 mA	4.5		0.55	0.55		0.55	
I _{IN}	Input Leakage Current	V _{IN} = 5.5 V or GND	0 to 5.5			±0.1		±1.0	μA
I _{OFF}	Power Off Leakage Current (SOT-353/SC70-5/SC-88A Packages)	V _{IN} = 5.5 V or V _{OUT} = 5.5 V	0			1		10	μA
I _{CC}	Quiescent Supply Current	V _{IN} = 5.5 V or GND	5.5			1		10	μA

AC ELECTRICAL CHARACTERISTICS t_R = t_F = 3.0 ns

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-55°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation Delay (Figure 3 and 4)	R _L = 1 MΩ, C _L = 15 pF	1.65	2.0	6.9	13.8	2.0	14.5	ns
		R _L = 1 MΩ, C _L = 15 pF	1.8	2.0	5.7	11.5	2.0	12	
		R _L = 1 MΩ, C _L = 15 pF	2.5 ± 0.2	1.2	4.1	7.0	1.2	7.5	
		R _L = 1 MΩ, C _L = 15 pF R _L = 500 Ω, C _L = 50 pF	3.3 ± 0.3	0.8	3.0	4.8	0.8	5.2	
		R _L = 1 MΩ, C _L = 15 pF R _L = 500 Ω, C _L = 50 pF	5.0 ± 0.5	0.5	2.2	3.5	0.5	3.8	
				0.8	2.9	4.2	1.0	4.6	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C _{IN}	Input Capacitance	V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	7.0	pF
C _{PD}	Power Dissipation Capacitance (Note 8)	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}	9 11	pF

8. 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}.

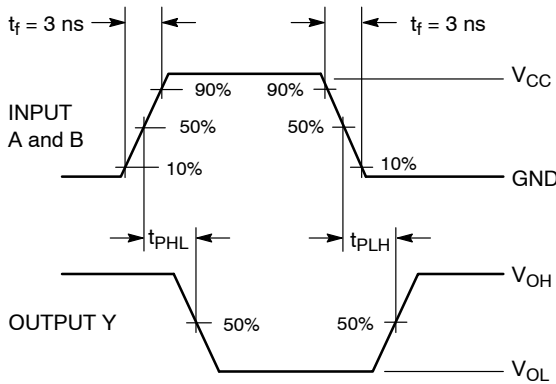
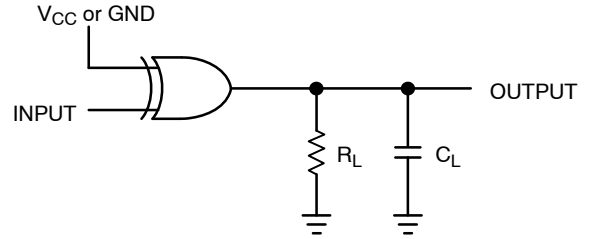


Figure 3. Switching Waveform



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

Figure 4. Test Circuit

DEVICE ORDERING INFORMATION

Device	Package	Shipping [†]
NL17SZ86DFT2G	SC70-5/SC-88A/SOT-353 (Pb-Free)	3000 / Tape & Reel
NLV17SZ86DFT2G*	SC70-5/SC-88A/SOT-353 (Pb-Free)	3000 / Tape & Reel
NL17SZ86P5T5G	SOT-953 (Pb-Free)	8000 / Tape & Reel

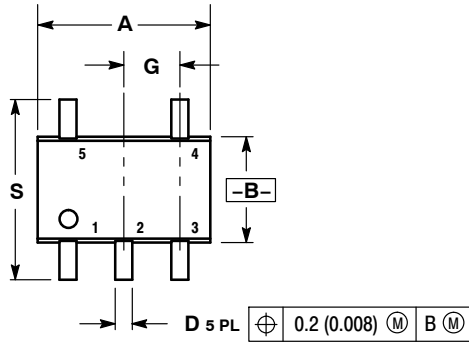
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

NL17SZ86

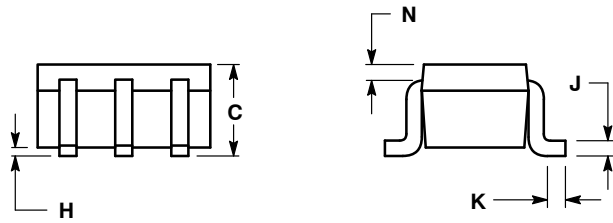
PACKAGE DIMENSIONS

SC-88A (SC-70-5/SOT-353)
CASE 419A-02
ISSUE L

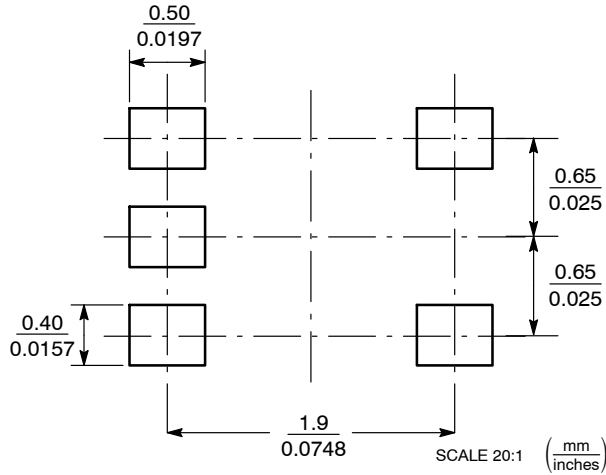


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. 419A-01 OBSOLETE. NEW STANDARD 419A-02.
 4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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



SOLDER FOOTPRINT*

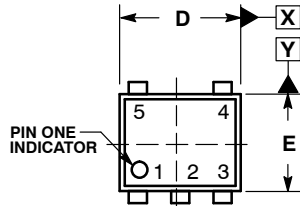


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

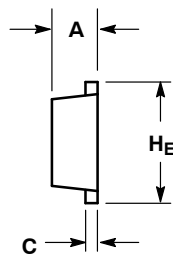
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PACKAGE DIMENSIONS

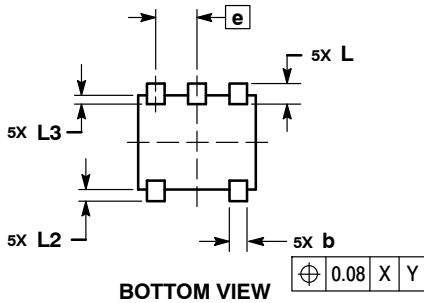
SOT-953 CASE 527AE ISSUE E



TOP VIEW



SIDE VIEW



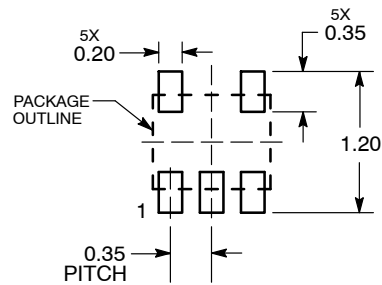
BOTTOM VIEW

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.


DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.34	0.37	0.40
b	0.10	0.15	0.20
C	0.07	0.12	0.17
D	0.95	1.00	1.05
E	0.75	0.80	0.85
e	0.35 BSC		
He	0.95	1.00	1.05
L	0.175 REF		
L2	0.05	0.10	0.15
L3	---	---	0.15

SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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

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