NL17SZ32

Single 2-Input OR Gate

The NL17SZ32 is a single 2−input OR Gate in two tiny footprint packages. The device performs much as LCX multi−gate products in speed and drive. They should be used wherever the need for higher speed and drive are needed.

Features

- Tiny SOT−353 and SOT−553 Packages
- 2.4 ns T_{PD} at 5.0 V (typ)
- Source/Sink 24 mA at 3.0 V
- Over−Voltage Tolerant Inputs
- Pin For Pin with NC7SZ32P5X, TC7SZ32FU and TC7SZ32AFE
- Chip Complexity: FETs = 20
- Designed for 1.65 V to 5.5 V V_{CC} Operation
- These Devices are Pb−Free and are RoHS Compliant
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable
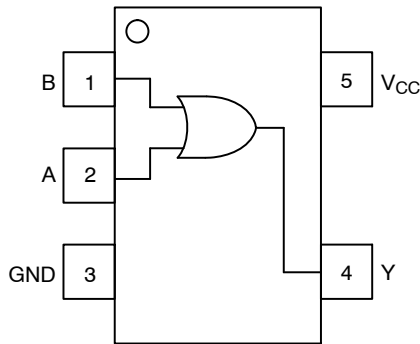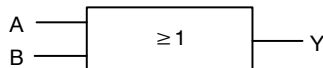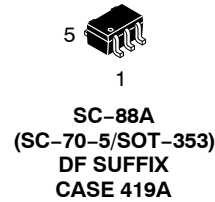
ON Semiconductor®

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MARKING DIAGRAMS

SC−88A
(SC−70−5/SOT−353)
DF SUFFIX
CASE 419A

L4 M ▪

SOT−553
XV5 SUFFIX
CASE 463B

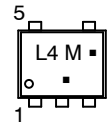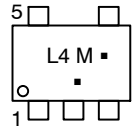L4 M ▪

L4 = Specific Device Marking
M = Date Code*
▪ = Pb−Free Package
(Note: Microdot may be in either location)

*Date Code orientation and/or position may vary depending upon manufacturing location.

Figure 1. Pinout (Top View)

Figure 2. Logic Symbol

PIN ASSIGNMENT

Pin	Function
1	B
2	A
3	GND
4	Y
5	V_{CC}

FUNCTION TABLE

Input		Output $Y = A + B$
A	**B**	**Y**
L	L	L
L	H	H
H	L	H
H	H	H

ORDERING INFORMATION

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

NL17SZ32

MAXIMUM RATINGS

Symbol	Parameter		Value	Units
V$_{CC}$	DC Supply Voltage		−0.5 to +7.0	V
V$_{IN}$	DC Input Voltage		−0.5 to +7.0	V
V$_{OUT}$	DC Output Voltage		−0.5 to V$_{CC}$ +0.5	V
I$_{IK}$	DC Input Diode Current		−50	mA
I$_{OK}$	DC Output Diode Current		−50	mA
I$_{OUT}$	DC Output Sink Current		±50	mA
I$_{CC}$	DC Supply Current per Supply 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	SOT−353 (Note 1) SOT−553	350 496	°C/W
P$_D$	Power Dissipation in Still Air at 85°C	SOT−353 SOT−553	186 135	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 2) Machine Model (Note 3)	4000 400	V

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. 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, rated to EIA/JESD22−A114−B.
3. Tested to EIA/JESD22−A115−A, rated to EIA/JESD22−A115−A.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Max	Units
V$_{CC}$	DC Supply Voltage		1.65	5.5	V
V$_{IN}$	DC Input Voltage		0	5.5	V
V$_{OUT}$	DC Output Voltage		0	5.5	V
T$_A$	Operating Temperature Range		−55	+125	°C
t$_r$, t$_f$	Input Rise and Fall Time	V$_{CC}$ = 3.0 V ±0.3 V V$_{CC}$ = 5.0 V ±0.5 V	0 0	100 20	ns/V

NL17SZ32

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V_{CC} (V)	$T_A = 25°C$ Min	Typ	Max	$-55°C \leq T_A \leq 125°C$ Min	Max	Units
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	1.52		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_{OH}	$I_{OL} = 100$ μA	1.65 to 5.5			0.1		0.1	V
		$I_{OL} = 3$ mA	1.65		0.08	0.24		0.24	
		$I_{OL} = 8$ mA	2.3		0.20	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	$V_{IN} = 5.5$ V or GND	0 to 5.5			±0.1		±1.0	μA
I_{OFF}	Power Off Leakage Current	$V_{IN} = 5.5$ 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)	$T_A = 25°C$ Min	Typ	Max	$-55°C \leq T_A \leq 125°C$ Min	Max	Units
t_{PLH} t_{PHL}	Propagation Delay (Figure 3 and 4)	$R_L = 1$ MΩ, $C_L = 15$ pF	1.65	2.0	5.5	12.0	2.0	12.7	ns
		$R_L = 1$ MΩ, $C_L = 15$ pF	1.8	2.0	4.6	10	2.0	10.5	
		$R_L = 1$ MΩ, $C_L = 15$ pF	2.5 ± 0.2	0.8	3.0	7	0.8	7.5	
		$R_L = 1$ MΩ, $C_L = 15$ pF	3.3 ± 0.3	0.5	2.6	4.7	0.5	5.0	
		$R_L = 500$ Ω, $C_L = 50$ pF		1.5	3.0	5.2	1.5	5.5	
		$R_L = 1$ MΩ, $C_L = 15$ pF	5.0 ± 0.5	0.5	2.2	4.1	0.5	4.4	
		$R_L = 500$ Ω, $C_L = 50$ pF		0.8	2.4	4.5	0.8	4.8	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Units
C_{IN}	Input Capacitance	$V_{CC} = 5.5$ V, $V_I = 0$ V or V_{CC}	> 4	pF
C_{PD}	Power Dissipation Capacitance (Note 4)	10 MHz, $V_{CC} = 3.3$ V, $V_I = 0$ V or V_{CC}	25	pF
		10 MHz, $V_{CC} = 5.5$ V, $V_I = 0$ V or V_{CC}	30	

4. 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; $P_D = C_{PD} \cdot V_{CC}^2 \cdot f_{in} + I_{CC} \cdot V_{CC}$.
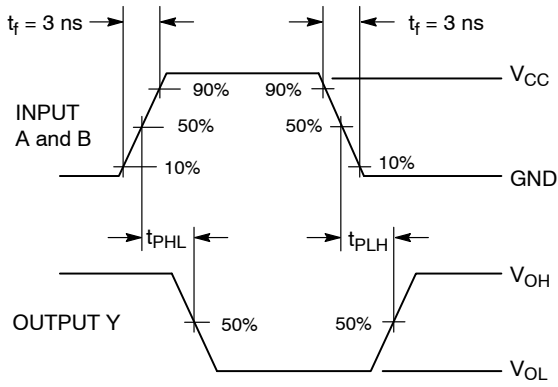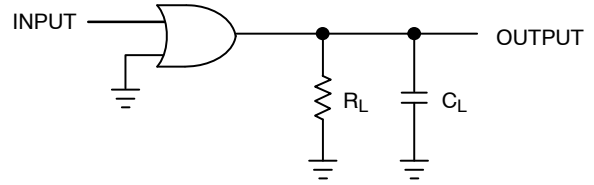
NL17SZ32

Figure 3. Switching Waveform

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

Figure 4. Test Circuit

ORDERING INFORMATION

Device Order Number	Package Type	Tape and Reel Size[†]
NL17SZ32DFT2G	SC−88A/SC−70−5/SOT−353 (Pb−Free)	3000 / Tape & Reel
NLV17SZ32DFT2G*	SC−88A/SC−70−5/SOT−353 (Pb−Free)	3000 / Tape & Reel
NL17SZ32XV5T2G	SOT−553 (Pb−Free)	4000 / 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.

NL17SZ32

PACKAGE DIMENSIONS

SC−88A
(SC−70−5/SOT−353)
DF SUFFIX
CASE 419A−02
ISSUE K
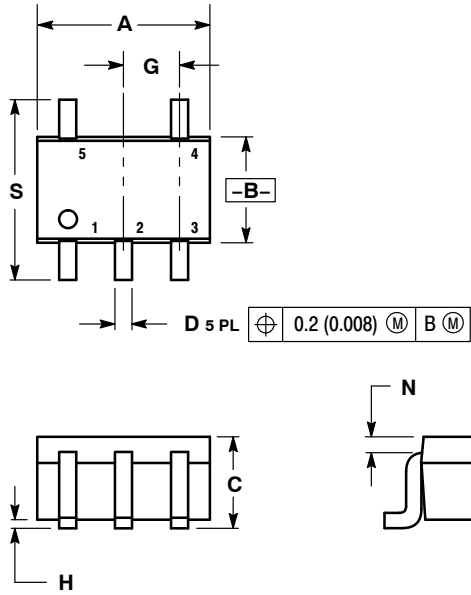
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419A−01 OBSOLETE. NEW STANDARD 419A−02.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

D 5 PL ⊕ 0.2 (0.008) Ⓜ B Ⓜ

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

NL17SZ32

PACKAGE DIMENSIONS

SOT−553
XV5 SUFFIX
CASE 463B
ISSUE B

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.50	0.55	0.60	0.020	0.022	0.024
b	0.17	0.22	0.27	0.007	0.009	0.011
c	0.08	0.13	0.18	0.003	0.005	0.007
D	1.50	1.60	1.70	0.059	0.063	0.067
E	1.10	1.20	1.30	0.043	0.047	0.051
e	0.50 BSC			0.020 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
H_E	1.50	1.60	1.70	0.059	0.063	0.067

$\oplus$ 0.08 (0.003) Ⓜ X Y

STYLE 1:
PIN 1. BASE 1
2. EMITTER 1/2
3. BASE 2
4. COLLECTOR 2
5. COLLECTOR 1

STYLE 2:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. CATHODE

SOLDERING FOOTPRINT*

0.3 / 0.0118
0.45 / 0.0177
1.0 / 0.0394
1.35 / 0.0531
0.5 / 0.0197
0.5 / 0.0197

SCALE 20:1 (mm / inches)
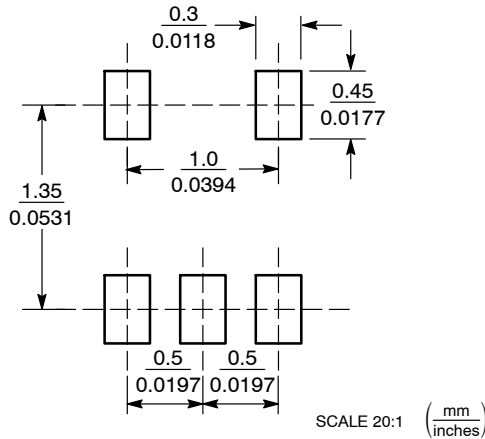
*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.