NL7SZ19

1-to-2 Decoder/ Demultiplexer

The NL7SZ19 is a 1−to−2 decoder. When the output enable ($\overline{E}$) is Low, the device passes data at input A to outputs Y0 (true) and Y1 (complement). The NL7SZ19 can also be used as a 1−to−2 demultiplexer. As a demultiplexer, data at input $\overline{E}$ is routed to either Y0 or Y1 depending on the state of A. The device operates over the voltage range from 1.65 V to 5.5 V. The device is fabricated in sub−micron CMOS for high speed and fast decode times. Both inputs and outputs are in high impedance state, when supply voltage is powered down. Both inputs are tolerant of voltages up to 5.5 V, regardless of operating voltage. This device is suitable for low power decoding in a variety of applications.

Features

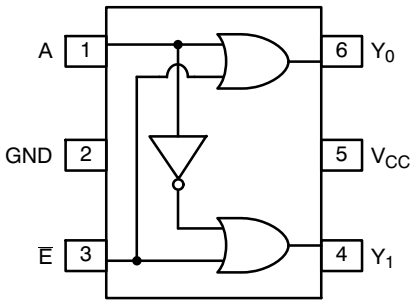
- High−Speed Propagation Delay:
  t_{PD} 2.7 nS (Typ), Load 50 pF @ 5.0 V
- 32 mA Output Drive Capability @ 5.0 V
- Power Down Impedance: Inputs/Outputs in High−Z
- Broad V_{CC} Operating Range: 1.65 V to 5.5 V
- Surface Mount Technology: SC−70, 6−Lead and UDFN6 Packaging
- OVT* on I/Os
- Pb−Free Package is Available

Typical Applications

- Cell Phones
- PDAs
- Digital Cameras
- Video Cameras

Important Information

- ESD Protection: Human Body Model >2000 V
- Latchup Max Rating: 300 mA
- Pin to Pin Compatible with NC7SZ19



(TOP VIEW)

Figure 1. Pinout

*Over Voltage Tolerance (OVT) enables input and output pins to function outside (higher) of their operating voltages, with no damage to the devices or to signal integrity.

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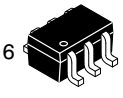
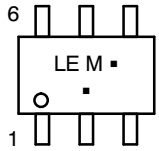
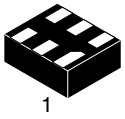
MARKING DIAGRAM



SOT−363/SC70−6/SC−88
DF SUFFIX
CASE 419B





UDFN6
MU SUFFIX
CASE 517AA

LE, U = Device Marking
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

PIN/FUNCTION TABLE

Pin	Function Description	
	As Decoder	As Demultiplexer
A	Address	Select
$\overline{E}$	Output Enable	Data
Y_0	Output 0	Output 0
Y_1	Output 1	Output 1

TRUTH TABLE

$\overline{E}$	A	$Y_0 = A + \overline{E}$	$Y_1 = \overline{A} + \overline{E}$
L	L	L	H
L	H	H	L
H	H	H	H
H	L	H	H

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

MAXIMUM RATINGS

Symbol	Rating		Value	Unit
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 +7.0	V
I_{IK}	DC Input Diode Current	@ V_1 < −0.5 V	−50	mA
I_{OK}	DC Output Diode Current	@ V_1 < −0.5 V	−50	mA
I_{OUT}	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 1)		250	°C/W
P_D	Power Dissipation in Still Air at 85°C		180	mW
MSL	Moisture Sensitivity		Level 1	−
F_R	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V−0 @ 0125 in	−
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	> 2000 > 150 n/a	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 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	Rating		Value	Unit
V_{CC}	DC Supply Voltage		1.65 to 5.5	V
V_{CC}	DC Supply Voltage, Data Retention		1.5 to 5.5	V
V_{IN}	Input Voltage		0 to 5.5	V
V_{OUT}	Output Voltage		0 to 5.5	V
T_A	Operating Temperature		−40 to 85	°C
t_r, t_f	Input Rise and Fall Times	V_{CC} @ 1.8 ± 0.15 V V_{CC} @ 2.5 ± 0.2 V V_{CC} @ 3.3 ± 0.3 V V_{CC} @ 5.0 ± 0.5 V	0 to 20 0 to 20 0 to 10 0 to 5	nS/V
θ_{JA}	Thermal Resistance		350	°C/W

ORDERING INFORMATION

Device Order Number	Package	Shipping†
NL7SZ19DFT2	SC70−6	3000 / Tape & Reel
NL7SZ19DFT2G	SC70−6 (Pb−Free)	3000 / Tape & Reel
NL7SZ19MUR2G	UDFN6 (Pb−Free)	3000 / 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.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition		V_{CC} (V)	T_A = 25°C			T_A = −40°C to 85°C		Unit
					Min	Typ	Max	Min	Max	
V_{IH}	High−Level Input Voltage			1.65 2.3 to 5.5	0.75 V_{CC} 0.70 V_{CC}			0.75 V_{CC} 0.70 V_{CC}		V
V_{IL}	Low−Level Output Voltage			1.65 2.3−5.5			0.25 V_{CC} 0.30 V_{CC}		0.25 V_{CC} 0.30 V_{CC}	V
V_{OH}	High−Level Output Voltage	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −100 μA	1.65 2.3 3.0 4.5	1.55 2.20 2.90 4.40	1.65 2.30 3.00 4.50		1.55 2.20 2.90 4.40		V
			I_{OH} = −3.0 mA I_{OH} = −8.0 mA I_{OH} = −16 mA I_{OH} = −24 mA I_{OH} = −32 mA	1.65 2.3 3.0 3.0 4.5	1.29 1.90 2.40 2.30 3.80	1.47 2.10 2.75 2.63 4.15		1.29 1.90 2.40 2.30 3.80		
V_{OL}	Low−Level Output Voltage	V_{IN} = V_{IL} or V_{IH}	I_{OL} = 100 μA	1.65 2.3 3.0 4.5		0.0 0.0 0.0 0.0	0.10 0.10 0.10 0.10		0.10 0.10 0.10 0.10	V
			I_{OL} = 3.0 mA I_{OL} = 8.0 mA I_{OL} = 16 mA I_{OL} = 24 mA I_{OL} = 32 mA	1.65 2.3 3.0 3.0 4.5		0.09 0.12 0.20 0.30 0.32	0.24 0.30 0.40 0.55 0.55		0.24 0.30 0.40 0.55 0.55	
I_{IN}	Input Leakage Current	V_{IN} = 5.5 V, GND		0.0 to 5.5			±0.1		±1.0	μA
I_{OFF}	Power−Off Leakage Current	V_{IN} or V_{OUT} = 5.5 V		0.0			1.0		10	μA
I_{CC}	Quiescent Supply Current	V_{IN} = 5.5 V, GND		1.65 to 5.5			1.0		10	μA

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V_{CC}	T_A = 25°C			T_A = −40°C to 85°C		Unit	Figure
				Min	Typ	Max	Min	Max		
t_{PLH} t_{PHL}	Propagation Delay A or • to Y_0 or Y_1	C_L = 15 pF R_D = 1.0 MΩ	1.8 ± 0.15 2.5 ± 0.2 3.3 ± 0.3 5.0 ± 0.5	2.5 1.2 0.8 0.5	6.2 3.6 2.9 2.4	10.5 6.0 4.1 3.2	2.5 1.2 0.8 0.5	11 6.4 4.5 3.5	nS	Figures 1 & 3
		C_L = 50 pF R_D = 500 Ω	3.3 ± 0.3 5.0 ± 0.5	1.2 0.8	3.2 2.7	5.1 4.0	1.2 0.8	5.4 4.3	nS	Figures 1 & 3
C_{IN}	Input Capacitance		0		2.3				pF	
C_{PD}	Power Dissipation Capacitance	Note 5	3.3 5.0		10.5 12.8				pF	Figure 2

5. C_{PD} is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I_{CCD}) at no output loading and operating at 50% duty cycle (see Figure 2). C_{PD} is related to I_{CCD} dynamic operating current by the expression: I_{CCD} = (C_{PD}) (V_{CC}) (f_{IN}) + (I_{CCD}static).

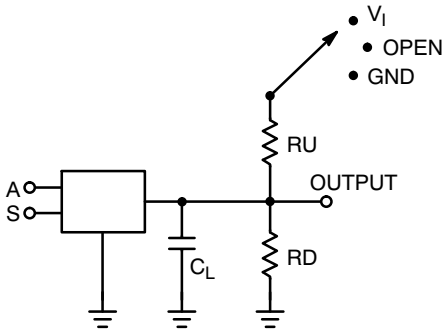


Figure 1. AC Test Circuit

C_L Includes Load and Stray Capacitance
Input PRR = 1.0 MHz; t_W = 500 ns

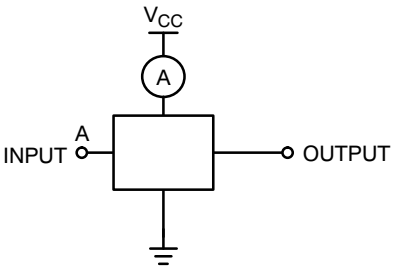


Figure 2. I_{CCD} Test Circuit

Input = AC Waveform; t_r = t_f = 1.8 nS
PRR = 10 MHz; Duty Cycle = 50%
S Input = GND or x

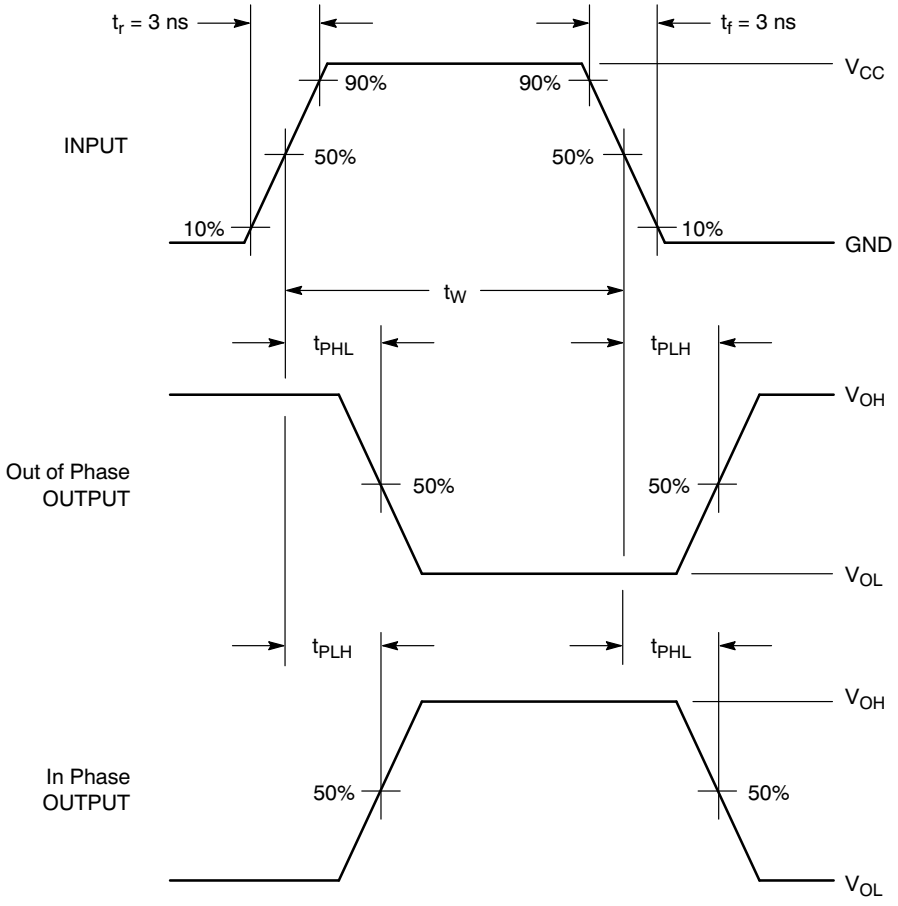
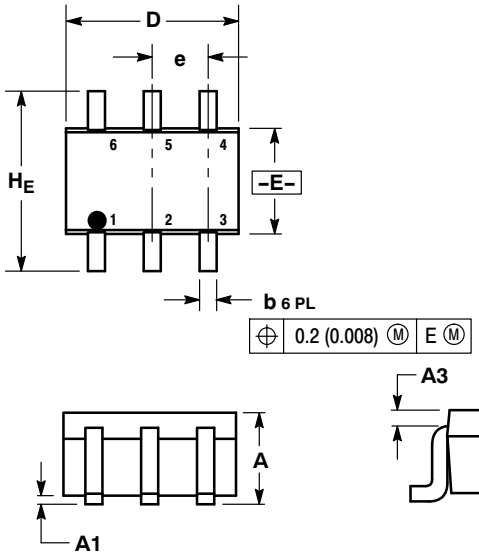


Figure 3. AC Waveforms

PACKAGE DIMENSIONS

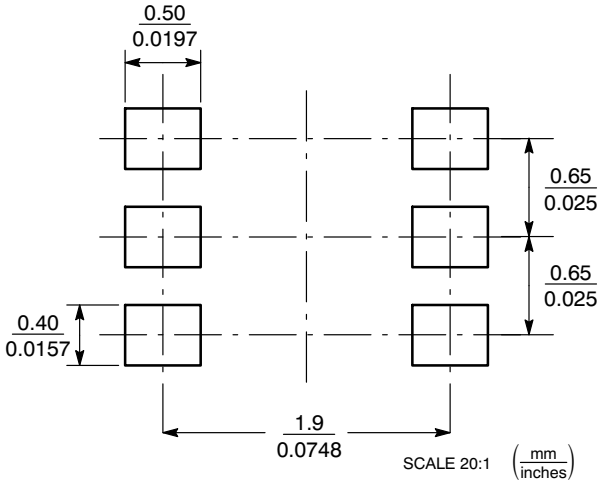
SC−88/SC70−6/SOT−363
CASE 419B−02
ISSUE W



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

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3		0.20 REF			0.008 REF	
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e		0.65 BSC			0.026 BSC	
L	0.10	0.20	0.30	0.004	0.008	0.012
H_E	2.00	2.10	2.20	0.078	0.082	0.086

SOLDERING FOOTPRINT*

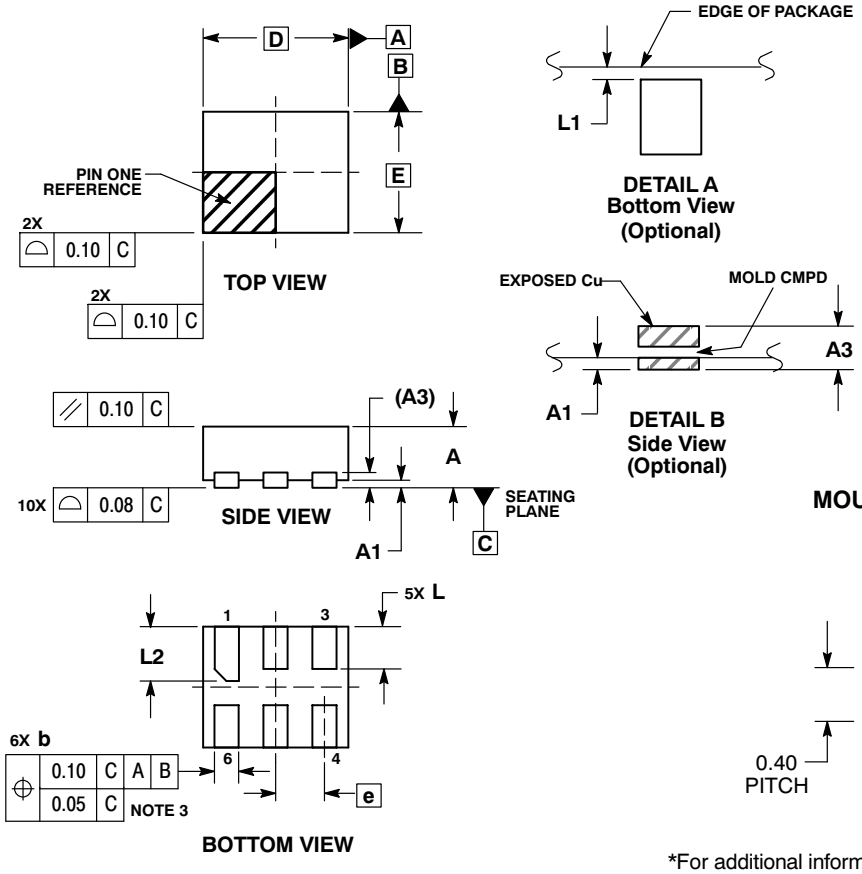


SC−88/SC70−6/SOT−363

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

PACKAGE DIMENSIONS

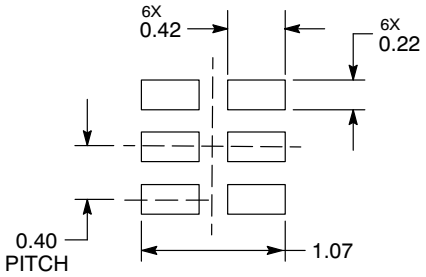
UDFN6, 1.2x1.0, 0.4P
CASE 517AA−01
ISSUE C



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.127 REF	
b	0.15	0.25
D	1.20 BSC	
E	1.00 BSC	
e	0.40 BSC	
L	0.30	0.40
L1	0.00	0.15
L2	0.40	0.50

MOUNTING 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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
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Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

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NL7SZ19/D