

# NL7SZ19

## 1-of-2 Decoder/ Demultiplexer

The NL7SZ19 is a 1 of 2 decoder/demultiplexer that can operate from 1.65 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 volts, 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 Packaging
- OVT\* on I/Os
- Pb-Free Package is Available

### Typical Applications

- Cell Phones
- PDAs
- Digital Cameras
- Video Cameras

### Important Information

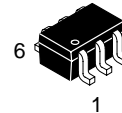
- ESD Protection: HBM >2000 V
- Latchup Max Rating: 300 mA
- Pin to Pin Compatible with NC7SZ19

\*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.



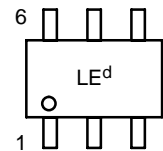
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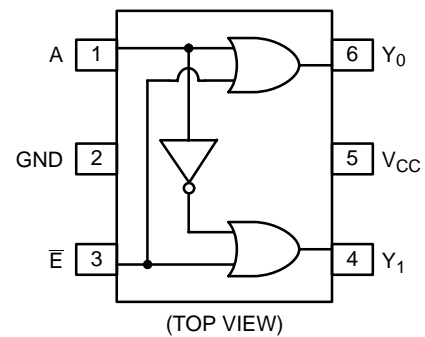


SOT-363/SC70-6/SC-88  
 DF SUFFIX  
 CASE 419B

### MARKING DIAGRAM



LE = Device Marking  
 d = Date Code



### PIN/FUNCTION TABLE

Pin	Function
A	Decoder Address/Demultiplexer Select
$\bar{E}$	Decoder Output Enable/Demultiplexer Data
$Y_0$	Output 0
$Y_1$	Output 1

### TRUTH TABLE

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

X = Don't Care

### ORDERING INFORMATION

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

# NL7SZ19

## MAXIMUM RATINGS

Symbol	Rating	Value	Unit
V <sub>CC</sub>	DC Supply Voltage	-0.5 to +7.0	V
V <sub>IN</sub>	DC Input Voltage	-0.5 to +7.0	V
V <sub>OUT</sub>	DC Output Voltage	-0.5 to +7.0	V
I <sub>IK</sub>	DC Input Diode Current @ V <sub>1</sub> < -0.5 V	-50	mA
I <sub>OK</sub>	DC Output Diode Current @ V <sub>1</sub> < -0.5 V	-50	mA
I <sub>OUT</sub>	DC Output Sink Current	± 50	mA
I <sub>CC</sub>	DC Supply Current per Supply Pin	± 100	mA
I <sub>GND</sub>	DC Ground Current per Ground Pin	± 100	mA
T <sub>STG</sub>	Storage Temperature Range	-65 to +150	°C
T <sub>L</sub>	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T <sub>J</sub>	Junction Temperature Under Bias	+150	°C
θ <sub>JA</sub>	Thermal Resistance (Note 1)	250	°C/W
P <sub>D</sub>	Power Dissipation in Still Air at 85°C	180	mW
MSL	Moisture Sensitivity	Level 1	-
F <sub>R</sub>	Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0125 in	-
V <sub>ESD</sub>	ESD Withstand Voltage Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	> 2000 > 150 n/a	V

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 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 <sub>CC</sub>	DC Supply Voltage	1.65 to 5.5	V
V <sub>CC</sub>	DC Supply Voltage, Data Retention	1.5 to 5.5	V
V <sub>IN</sub>	Input Voltage	0 to 5.5	V
V <sub>OUT</sub>	Output Voltage	0 to 5.5	V
T <sub>A</sub>	Operating Temperature	-40 to 85	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Times V <sub>CC</sub> @ 1.8 ± 0.15 V V <sub>CC</sub> @ 2.5 ± 0.2 V V <sub>CC</sub> @ 3.3 ± 0.3 V V <sub>CC</sub> @ 5.0 ± 0.5 V	0 to 20 0 to 20 0 to 10 0 to 5	nS/V
θ <sub>JA</sub>	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

†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.

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## DC ELECTRICAL CHARACTERISTICS

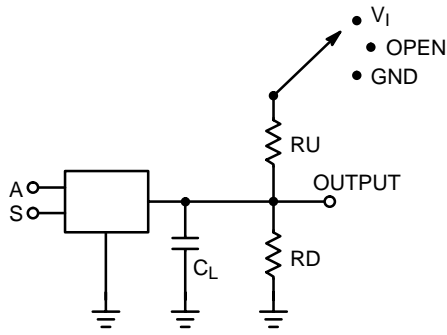
Symbol	Parameter	Condition	V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C			T <sub>A</sub> = -40°C to 85°C		Unit	
				Min	Typ	Max	Min	Max		
V <sub>IH</sub>	High-Level Input Voltage		1.65 2.3 to 5.5	0.75 V <sub>CC</sub> 0.70 V <sub>CC</sub>			0.75 V <sub>CC</sub> 0.70 V <sub>CC</sub>		V	
V <sub>IL</sub>	Low-Level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

## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V <sub>CC</sub>	T <sub>A</sub> = 25°C			T <sub>A</sub> = -40°C to 85°C		Unit	Figure
				Min	Typ	Max	Min	Max		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay A or • to Y <sub>0</sub> or Y <sub>1</sub>	C <sub>L</sub> = 15 pF R <sub>D</sub> = 1.0 MΩ	1.8 ± 0.15	2.5	6.2	10.5	2.5	11	nS	Figures 1 & 3
			2.5 ± 0.2	1.2	3.6	6.0	1.2	6.4		
			3.3 ± 0.3	0.8	2.9	4.1	0.8	4.5		
			5.0 ± 0.5	0.5	2.4	3.2	0.5	3.5		
			3.3 ± 0.3	1.2	3.2	5.1	1.2	5.4	nS	Figures 1 & 3
			5.0 ± 0.5	0.8	2.7	4.0	0.8	4.3		
C <sub>IN</sub>	Input Capacitance		0		2.3				pF	
C <sub>PD</sub>	Power Dissipation Capacitance	Note 5	3.3 5.0		10.5 12.8				pF	Figure 2

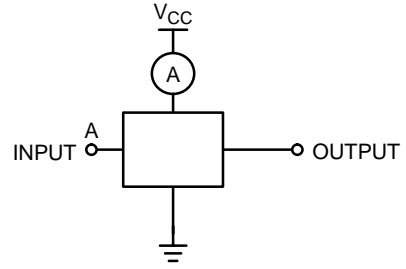
5. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle (see Figure 2). C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating current by the expression: I<sub>CCD</sub> = (C<sub>PD</sub>) (V<sub>CC</sub>) (f<sub>IN</sub>) + (I<sub>CCD</sub>static).

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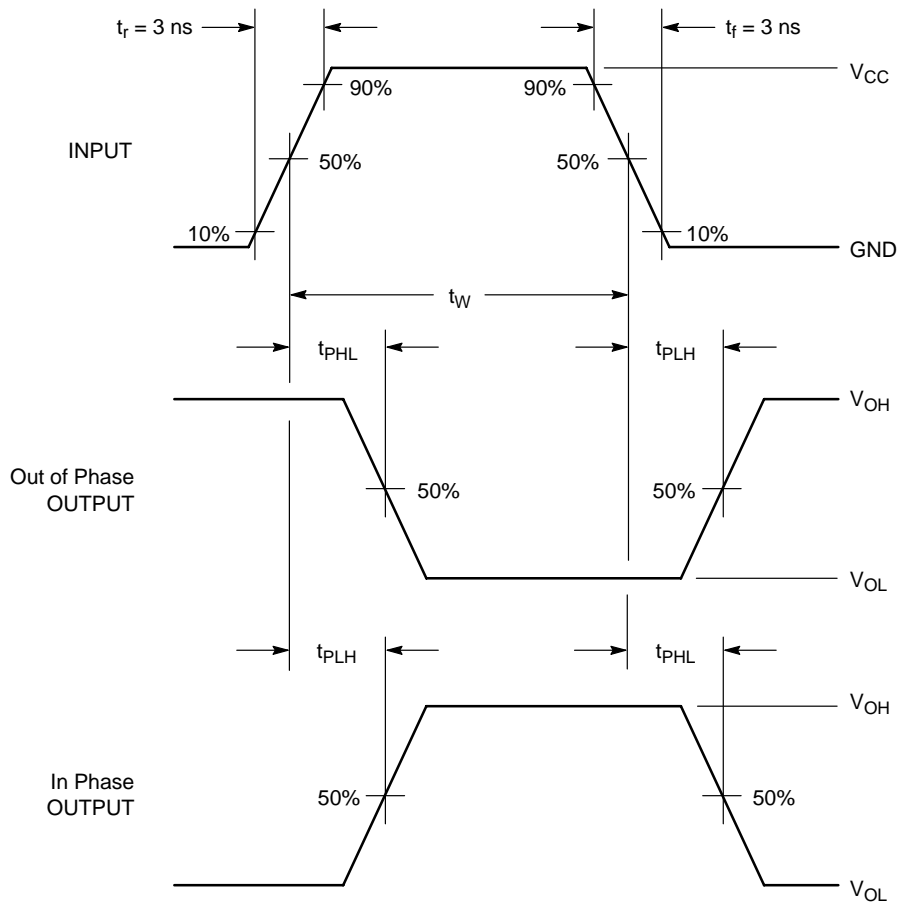
**Figure 1. AC Test Circuit**

$C_L$  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

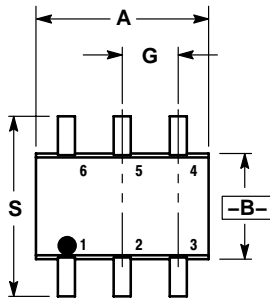


**Figure 3. AC Waveforms**

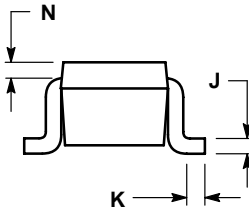
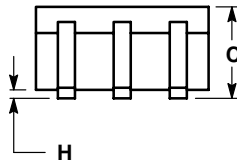
# NL7SZ19

## PACKAGE DIMENSIONS

SOT-363/SC70-6/SC-88  
 DF SUFFIX  
 6-LEAD PACKAGE  
 CASE 419B-02  
 ISSUE U



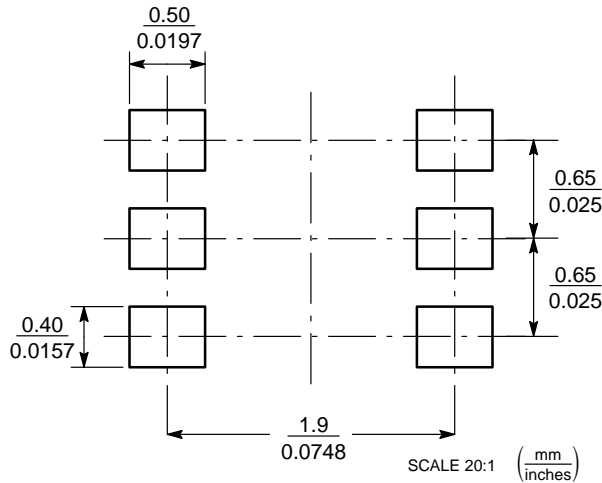
D 6 PL  $\oplus 0.2 (0.008) \text{ (M)}$  B  $\text{(M)}$



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

### SOLDERING 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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