NL27WZ06

Dual Inverter with Open Drain Outputs

The NL27WZ06 is a high performance dual inverter with open drain outputs operating from a 1.65 V to 5.5 V supply.

The internal circuit is composed of multiple stages, including an open drain output which provides the capability to set output switching level. This allows the NL27WZ06 to be used to interface 5 V circuits to circuits of any voltage between V_{CC} and 7 V using an external resistor and power supply.

Features

- Extremely High Speed: t_{PD} 2.4 ns (typical) at V_{CC} = 5 V
- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Over Voltage Tolerant Inputs
- LVTTL Compatible − Interface Capability With 5 V TTL Logic with V_{CC} = 3 V
- LVCMOS Compatible
- 24 mA Output Sink Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Chip Complexity: FET = 72; Equivalent Gate = 18
- Pb−Free Packages are Available

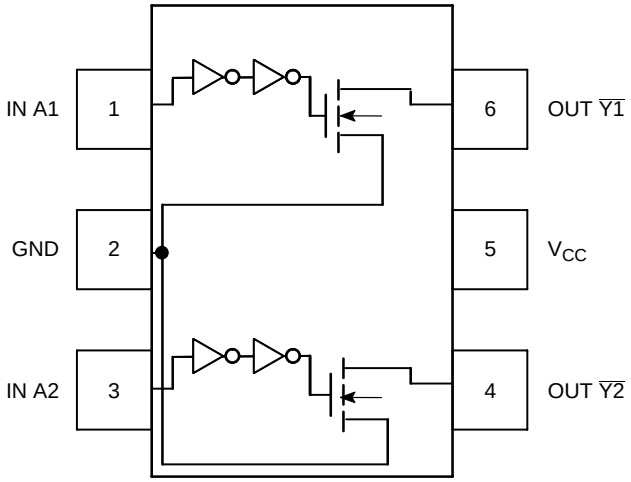

Figure 1. Pinout (Top View)

Figure 2. Logic Symbol

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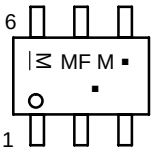
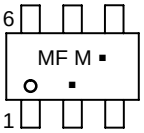
MARKING DIAGRAMS

SC−88
DF SUFFIX
CASE 419B



TSOP−6
DT SUFFIX
CASE 318G



MF = Device Code
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.

PIN ASSIGNMENT

1	IN A1
2	GND
3	IN A2
4	OUT $\overline{Y2}$
5	V_{CC}
6	OUT $\overline{Y1}$

FUNCTION TABLE

A Input	$\overline{Y}$ Output
L	Z
H	L

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 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		$-0.5 \le V_I \le +7.0$	V
V_O	DC Output Voltage	Output in Z or LOW State (Note 1)	$-0.5 \le V_O \le 7.0$	V
I_{IK}	DC Input Diode Current	V_I < GND	−50	mA
I_{OK}	DC Output Diode Current	V_O < 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
P_D	Power Dissipation in Still Air	SC−88, TSOP−6	200	mW
θ_{JA}	Thermal Resistance	SC−88, TSOP−6	333	°C/W
T_L	Lead temperature, 1 mm from case for 10 s		260	°C
T_J	Junction temperature under bias		+150	°C
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	> 2000 > 200 N/A	V
$I_{Latchup}$	Latchup Performance	Above V_{CC} and Below GND at 85°C (Note 5)	±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. Tested to EIA/JESD22−A114−A
3. Tested to EIA/JESD22−A115−A
4. Tested to JESD22−C101−A
5. Tested to EIA/JESD78

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	(Z or LOW State)	0	5.5	V
T_A	Operating Free−Air Temperature		−55	+125	°C
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate	V_{CC} = 2.5 V ±0.2 V V_{CC} =3.0 V ±0.3 V V_{CC} =5.0 V ±0.5 V	0 0 0	20 10 5	ns/V

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_{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 Input Voltage		1.65 2.3 to 5.5			0.25 V_{CC} 0.30 V_{CC}		0.25 V_{CC} 0.30 V_{CC}	V
I_{LKG}	Z−State Output Leakage Current	V_{IN} = V_{IL} V_{OUT} = V_{CC} or GND	1.65 to 5.5			±5.0		±10.0	μA
V_{OL}	Low−Level Output Voltage V_{IN} = V_{IH}	I_{OL} = 100 μA	1.65 to 5.5		0.0	0.1		0.1	V
		I_{OL} = 3 mA	1.65		0.08	0.24			
		I_{OL} = 8 mA	2.3		0.22	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

AC ELECTRICAL CHARACTERISTICS t_R = t_F = 2.5 ns; C_L = 50 pF; R_L = 500 Ω

Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C			−40°C ≤ T_A ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
t_{PZL}	Propagation Delay (Figure 3 and 4)	R_L = R_1= 5000 Ω, C_L = 15 pF	1.8 ± 0.15	2.0	5.7	10.5	2.0	11.0	ns
		R_L = R_1= 500 Ω, C_L = 50 pF	2.5 ± 0.20	0.8	3.0	3.6	0.8	4.1	
		R_L = R_1= 500 Ω, C_L = 50 pF	3.3 ± 0.30	0.8	2.4	3.2	0.8	3.7	
		R_L = R_1= 500 Ω, C_L = 50 pF	5.0 ± 0.50	0.5	2.4	3.0	0.5	3.5	
t_{PLZ}	Propagation Delay (Figure 3 and 4)	R_L = R_1= 5000 Ω, C_L = 15 pF	1.8 ± 0.15	2.0	5.7	10.5	2.0	11.0	ns
		R_L = R_1= 500 Ω, C_L = 50 pF	2.5 ± 0.20	0.8	3.0	3.6	0.8	4.1	
		R_L = R_1= 500 Ω, C_L = 50 pF	3.3 ± 0.30	0.8	2.1	3.2	0.8	3.7	
		R_L = R_1= 500 Ω, C_L = 50 pF	5.0 ± 0.50	0.5	1.2	3.0	0.5	3.5	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C_{IN}	Input Capacitance	V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	2.5	pF
C_{OUT}	Output Capacitance	V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	4	pF
C_{PD}	Power Dissipation Capacitance (Note 6)	10 MHz, V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	4	pF

6. 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: $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$. C_{PD} is used to determine the no−load dynamic power consumption; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.

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 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 Input Voltage		1.65 2.3 to 5.5			0.25 V_{CC} 0.30 V_{CC}		0.25 V_{CC} 0.30 V_{CC}	V
I_{LKG}	Z−State Output Leakage Current	V_{IN} = V_{IL} V_{OUT} = V_{CC} or GND	1.65 to 5.5			±5.0		±10.0	μA
V_{OL}	Low−Level Output Voltage V_{IN} = V_{IH}	I_{OL} = 100 μA	1.65 to 5.5		0.0	0.1		0.1	V
		I_{OL} = 3 mA	1.65		0.08	0.24			
		I_{OL} = 8 mA	2.3		0.22	0.3		0.35	
		I_{OL} = 12 mA	2.7		0.22	0.4		0.45	
		I_{OL} = 16 mA	3.0		0.28	0.4		0.5	
		I_{OL} = 24 mA	3.0		0.38	0.55		0.65	
		I_{OL} = 32 mA	4.5		0.42	0.55		0.65	
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

AC ELECTRICAL CHARACTERISTICS t_R = t_F = 2.5 ns; C_L = 50 pF; R_L = 500 Ω

Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C			−55°C ≤ T_A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
t_{PZL}	Propagation Delay (Figure 3 and 4)	R_L = R_1= 5000 Ω, C_L = 15 pF	1.8 ± 0.15	2.0	5.7	10.5	2.0	11.0	ns
		R_L = R_1= 500 Ω, C_L = 50 pF	2.5 ± 0.20	0.8	3.0	3.6	0.8	4.1	
		R_L = R_1= 500 Ω, C_L = 50 pF	3.3 ± 0.30	0.8	2.4	3.2	0.8	3.7	
		R_L = R_1= 500 Ω, C_L = 50 pF	5.0 ± 0.50	0.5	2.4	3.0	0.5	3.5	
t_{PLZ}	Propagation Delay (Figure 3 and 4)	R_L = R_1= 5000 Ω, C_L = 15 pF	1.8 ± 0.15	2.0	5.7	10.5	2.0	11.0	ns
		R_L = R_1= 500 Ω, C_L = 50 pF	2.5 ± 0.20	0.8	3.8	4.5	0.8	5.0	
		R_L = R_1= 500 Ω, C_L = 50 pF	3.3 ± 0.30	0.8	2.9	3.2	0.8	3.7	
		R_L = R_1= 500 Ω, C_L = 50 pF	5.0 ± 0.50	0.5	1.2	3.0	0.5	3.5	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C_{IN}	Input Capacitance	V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	2.5	pF
C_{OUT}	Output Capacitance	V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	4	pF
C_{PD}	Power Dissipation Capacitance (Note 6)	10 MHz, V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	4	pF

7. 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: $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$. C_{PD} is used to determine the no−load dynamic power consumption; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.

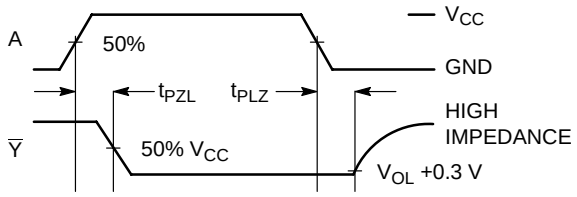
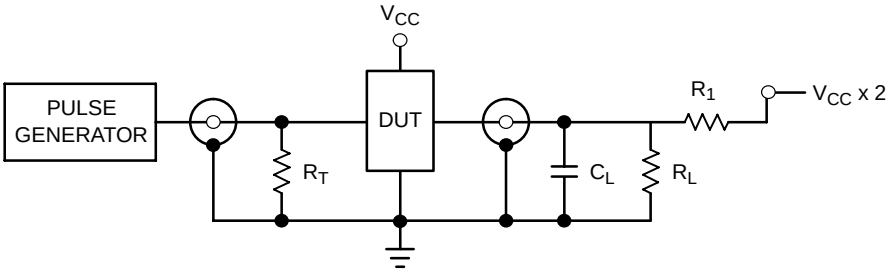


Figure 3. Switching Waveforms



R_T = Z_{OUT} of pulse generator (typically 50 Ω)

Figure 4. Test Circuit

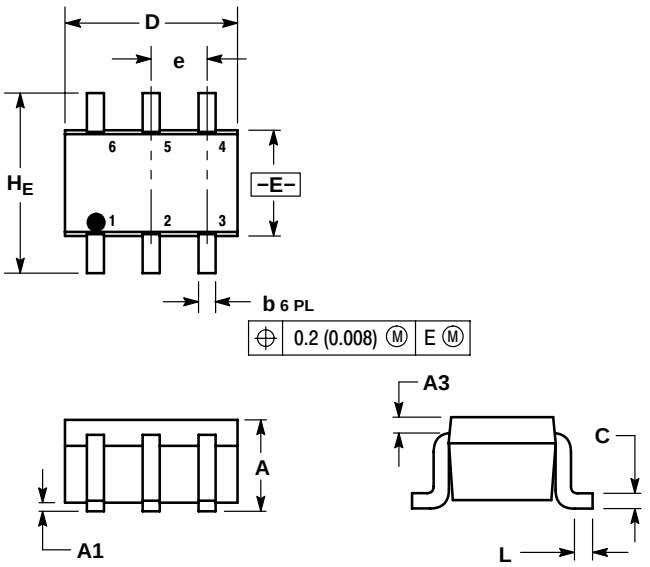
ORDERING INFORMATION

Device	Package	Shipping†
NL27WZ06DFT2	SC−88	3000 / Tape & Reel
NL27WZ06DFT2G	SC−88 (Pb−Free)	
NL27WZ06DTT1	TSOP−6	
NL27WZ06DTT1G	TSOP−6 (Pb−Free)	

†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.

PACKAGE DIMENSIONS

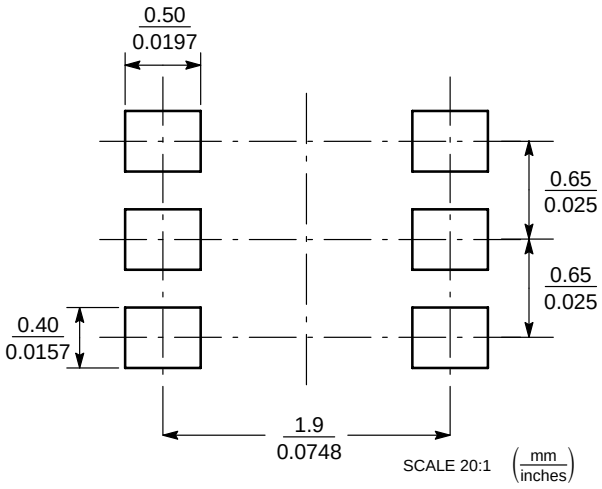
SC−88/SC70−6/SOT−363
CASE 419B−02
ISSUE W



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*

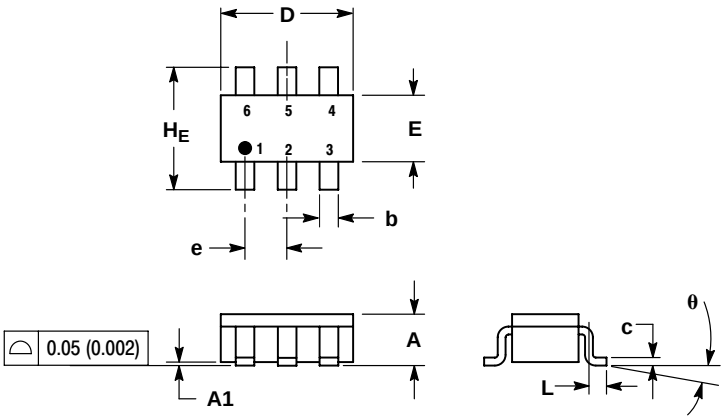


*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NL27WZ06

PACKAGE DIMENSIONS

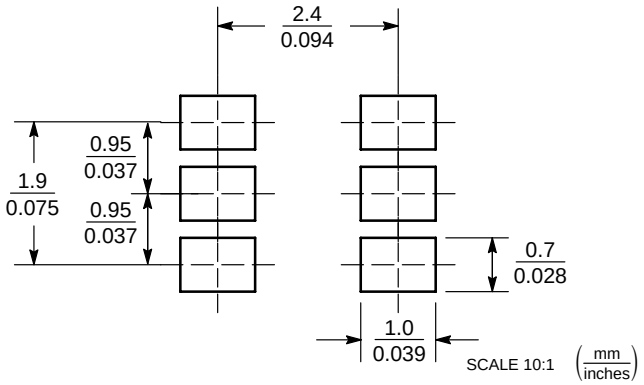
TSOP−6
CASE 318G−02
ISSUE S



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.38	0.50	0.010	0.014	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
L	0.20	0.40	0.60	0.008	0.016	0.024
H_E	2.50	2.75	3.00	0.099	0.108	0.118
θ	0°	–	10°	0°	–	10°

SOLDERING FOOTPRINT*



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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

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5773−3850

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

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