NL27WZ04

Dual Inverter

The NL27WZ04 is a high performance dual inverter operating from a 1.65 V to 5.5 V supply. High impedance TTL compatible inputs significantly reduce current loading to input drivers while TTL compatible outputs offer improved switching noise performance.

Features

- Extremely High Speed: t_{PD} 2.0 ns (typical) at V_{CC} = 5 V
- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Over Voltage Tolerant Inputs and Outputs
- LVTTL Compatible − Interface Capability with 5 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 NC7W04
- Chip Complexity: FET = 72; Equivalent Gate = 18
- Pb−Free Packages are Available

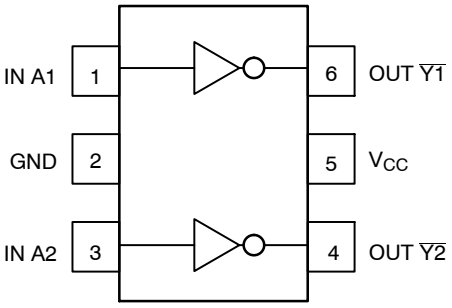


Figure 1. Pinout (Top View)

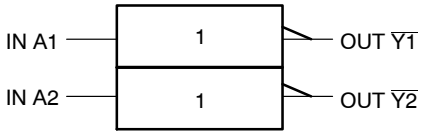


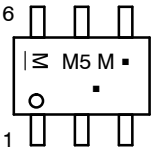
Figure 2. Logic Symbol

ON Semiconductor®

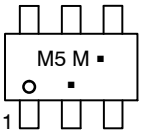
http://onsemi.com

MARKING DIAGRAMS

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



TSOP−6
DT SUFFIX
CASE 318G



M5 = Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or position and underbar 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	H
H	L

ORDERING INFORMATION

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

MAXIMUM RATINGS

Characteristics		Symbol	Value	Unit
DC Supply Voltage		V_{CC}	−0.5 to +7.0	V
DC Input Voltage		V_I	$-0.5 \le V_I \le +7.0$	V
DC Output Voltage	Output in HIGH or LOW State (Note 1)	V_O	$-0.5 \le V_O \le 7.0$	V
DC Input Diode Current	V_I < GND	I_{IK}	−50	mA
DC Output Diode Current	V_O < GND	I_{OK}	−50	mA
DC Output Source/Sink Current		I_O	±50	mA
DC Supply Current Per Supply Pin		I_{CC}	±100	mA
DC Ground Current Per Ground Pin		I_{GND}	±100	mA
Storage Temperature Range		T_{STG}	−65 to +150	°C
Power Dissipation in Still Air	SC−88, TSOP−6 (Note 2)	P_D	200	mW
Thermal Resistance	SC−88, TSOP−6 (Note 2)	θ_{JA}	333	°C/W
Lead temperature, 1 mm from Case for 10 Seconds		T_L	260	°C
Junction Temperature Under Bias		T_J	+150	°C
ESD Withstand Voltage	Human Body Model (Note 3) Machine Model (Note 4) Charged Device Model (Note 5)	V_{ESD}	> 2000 > 200 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. 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/JESD22−A114−A
4. Tested to EIA/JESD22−A115−A
5. Tested to JESD22−C101−A

RECOMMENDED OPERATING CONDITIONS

Parameter		Symbol	Min	Max	Unit
Supply Voltage	Operating Data Retention Only	V_{CC}	1.65 1.5	5.5 5.5	V
Input Voltage		V_I	0	5.5	V
Output Voltage	(HIGH or LOW State)	V_O	0	5.5	V
Operating Free−Air Temperature		T_A	−55	+125	°C
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	$\Delta t/\Delta V$	0 0 0	20 10 5	ns/V

DC ELECTRICAL CHARACTERISTICS

Parameter	Condition	Symbol	V_{CC} (V)	T_A = 25°C Min	T_A = 25°C Typ	T_A = 25°C Max	−55°C ≤ T_A ≤ 125°C Min	−55°C ≤ T_A ≤ 125°C Max	Unit
High−Level Input Voltage		V_{IH}	1.65−1.95	0.75 V_{CC}			0.75 V_{CC}		V
			2.3 to 5.5	0.7 V_{CC}			0.7 V_{CC}		
Low−Level Input Voltage		V_{IL}	1.65−1.95			0.25 V_{CC}		0.25 V_{CC}	V
			2.3 to 5.5			0.3 V_{CC}		0.3 V_{CC}	
High−Level Output Voltage V_{IN} = V_{IL}	I_{OH} = −100 μA	V_{OH}	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		
Low−Level Output Voltage V_{IN} = V_{IH}	I_{OL} = 100 μA	V_{OL}	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	
Input Leakage Current	V_{IN} = V_{CC} or GND	I_{IN}	0 to 5.5			±0.1		±1.0	μA
Power Off−Output Leakage Current	V_{OUT} = 5.5 V	I_{OFF}	0			1		10	μA
Quiescent Supply Current	V_{IN} = V_{CC} or GND	I_{CC}	1.65 to 5.5			1		10	μA

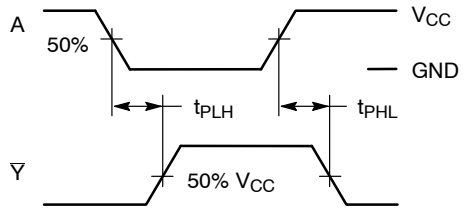
AC ELECTRICAL CHARACTERISTICS t_R = t_F = 2.5 ns; C_L = 50 pF; R_L = 500 Ω

Parameter	Condition	Symbol	V_{CC} (V)	T_A = 25°C Min	T_A = 25°C Typ	T_A = 25°C Max	−55°C ≤ T_A ≤ 125°C Min	−55°C ≤ T_A ≤ 125°C Max	Unit
Propagation Delay (Figure 3 and 4)	R_L = 1 MΩ, C_L = 15 pF	t_{PLH} t_{PHL}	1.65	1.8	2.3	9.2	1.8	11.0	ns
	R_L = 1 MΩ, C_L = 15 pF		1.8	1.8	4.4	7.6	1.8	8.4	
	R_L = 1 MΩ, C_L = 15 pF		2.5 ± 0.2	1.2	3.0	5.1	1.2	5.6	
	R_L = 1 MΩ, C_L = 15 pF		3.3 ± 0.3	0.8	2.2	3.4	0.8	3.8	
	R_L = 500 Ω, C_L = 50 pF			1.2	2.9	4.5	1.2	5.0	
	R_L = 1 MΩ, C_L = 15 pF		5.0 ± 0.5	0.5	1..8	2.8	0.5	3.1	
	R_L = 500 Ω, C_L = 50 pF			0.8	2.3	3.6	0.8	4.0	

CAPACITIVE CHARACTERISTICS

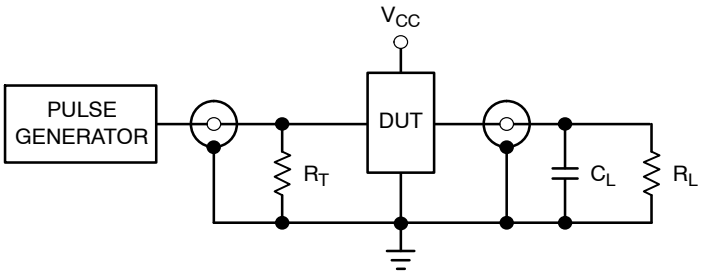
Parameter	Symbol	Condition	Typical	Unit
Input Capacitance	C_{IN}	V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	2.5	pF
Power Dissipation Capacitance (Note 6)	C_{PD}	10 MHz, V_{CC} = 3.3 V, V_I = 0 V or V_{CC} 10 MHz, V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	9 11	pF

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} • 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}.



PROPAGATION DELAYS
$t_R = t_F$ = 2.5 ns, 10% to 90%; f = 1 MHz; t_W = 500 ns

Figure 3. Switching Waveforms



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

Figure 4. Test Circuit

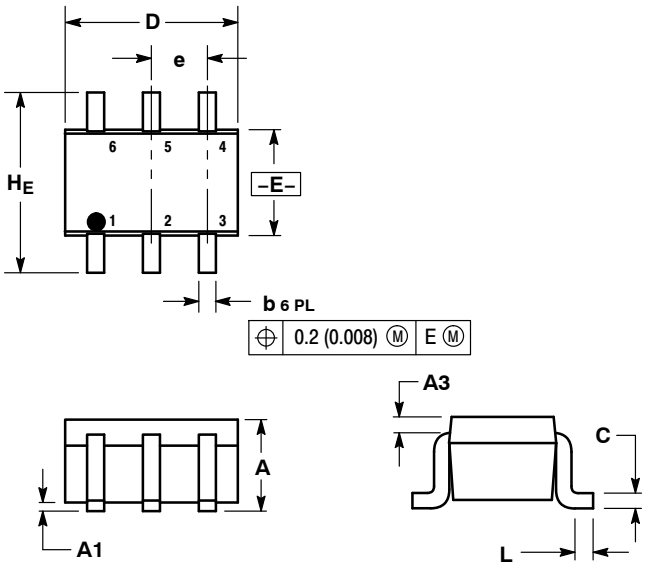
ORDERING INFORMATION

Device	Package	Shipping†
NL27WZ04DFT2	SC−88/SC70−6/SOT−363	3000 / Tape & Reel
NL27WZ04DFT2G	SC−88/SC70−6/SOT−363 (Pb−Free)	
NL27WZ04DTT1	TSOP−6	
NL27WZ04DTT1G	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

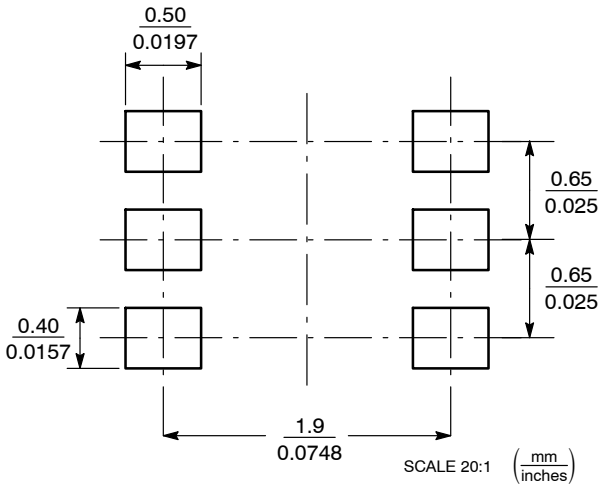
SC−88/SC70−6/SOT−363
CASE 419B−02
ISSUE W



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

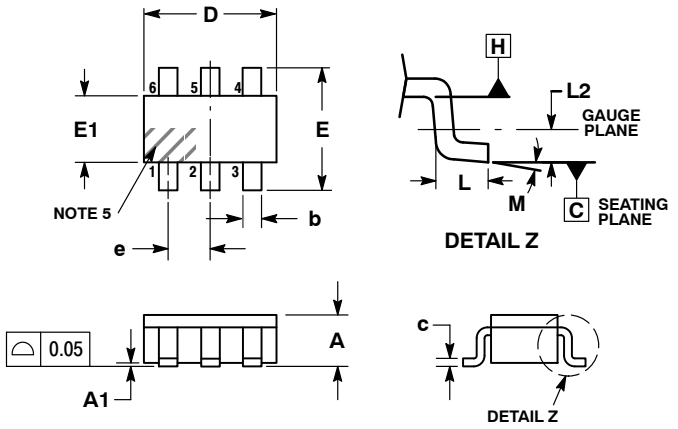
SOLDERING FOOTPRINT*



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

PACKAGE DIMENSIONS

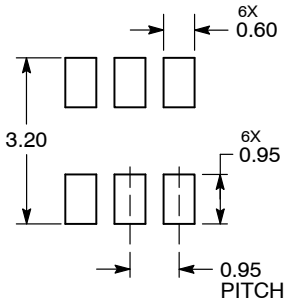
TSOP−6
CASE 318G−02
ISSUE U



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 BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

	MILLIMETERS		
DIM	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
b	0.25	0.38	0.50
c	0.10	0.18	0.26
D	2.90	3.00	3.10
E	2.50	2.75	3.00
E1	1.30	1.50	1.70
e	0.85	0.95	1.05
L	0.20	0.40	0.60
L2		0.25 BSC	
M	0°	–	10°

RECOMMENDED 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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
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

For additional information, please contact your local Sales Representative

NL27WZ04/D