NL27WZ14

Dual Schmitt-Trigger Inverter

The NL27WZ14 is a high performance dual inverter with Schmitt−Trigger inputs operating from a 1.65 to 5.5 V supply.

Pin configuration and function are the same as the NL27WZ04, but the inputs have hysteresis and, with its Schmitt trigger function, the NL27WZ14 can be used as a line receiver which will receive slow input signals. The NL27WZ14 is capable of transforming slowly changing input signals into sharply defined, jitter−free output signals. In addition, it has a greater noise margin than conventional inverters. The NL27WZ14 has hysteresis between the positive−going and the negative−going input thresholds (typically 1 V) which is determined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

Features

- 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
- Current Drive Capability is 24 mA at the Outputs
- Chip Complexity: FET = 72
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable
- These Devices are Pb−Free and are RoHS Compliant

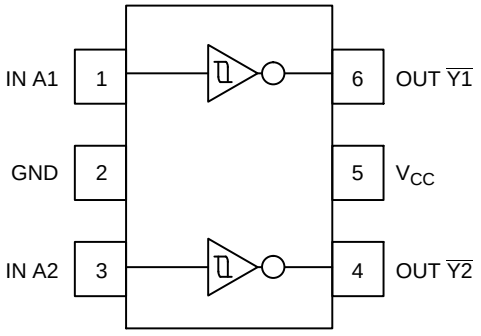

Figure 1. Pinout (Top View)

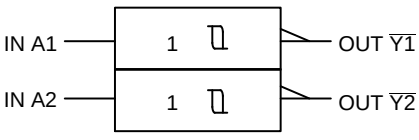

Figure 2. Logic Symbol

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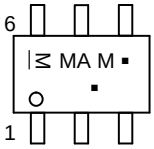
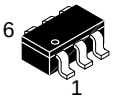
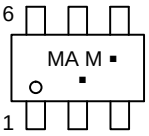
MARKING DIAGRAMS

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





TSOP−6
DT SUFFIX
CASE 318G



MA = 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.

PIN ASSIGNMENT

Pin	Function
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 2 of this data sheet.

MAXIMUM RATINGS

Symbol	Characteristics	Value	Units
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 HIGH 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 125°C (Note 5)	±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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	Units
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 (High 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	 No Limit No Limit No Limit	ns/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

ORDERING INFORMATION

Device	Package	Shipping†
NL27WZ14DFT2G	SC−88/SOT−363/SC70−6 (Pb−Free)	3000 / Tape & Reel
NLV27WZ14DFT2G*		
NL27WZ14DTT1G	TSOP−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.

*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C			−40°C ≤ T_A ≤ 85°C		−55°C ≤ T_A ≤ 125°C		Units
				Min	Typ	Max	Min	Max	Min	Max	
V_T+	Positive Input Threshold Voltage		2.3 2.7 3.0 4.5 5.5	1.0 1.2 1.3 1.9 2.2	1.5 1.7 1.9 2.7 3.3	1.8 2.0 2.2 3.1 3.6	1.0 1.2 1.3 1.9 2.2	1.8 2.0 2.2 3.1 3.6	1.0 1.2 1.3 1.9 2.2	1.8 2.0 2.2 3.1 3.6	V
V_T-	Negative Input Threshold Voltage		2.3 2.7 3.0 4.5 5.5	0.4 0.5 0.6 1.0 1.2	0.75 0.87 1.0 1.5 1.9	1.15 1.4 1.5 2.0 2.3	0.4 0.5 0.6 1.0 1.2	1.15 1.4 1.5 2.0 2.3	0.4 0.5 0.6 1.0 1.2	1.15 1.4 1.5 2.0 2.3	V
V_H	Input Hysteresis Voltage		2.3 2.7 3.0 4.5 5.5	0.25 0.3 0.4 0.6 0.7	0.75 0.83 0.93 1.2 1.4	1.1 1.15 1.2 1.5 1.7	0.25 0.3 0.4 0.6 0.7	1.1 1.15 1.2 1.5 1.7	0.25 0.3 0.4 0.6 0.7	1.1 1.15 1.2 1.5 1.7	V
V_{OH}	High−Level Output Voltage V_{IN} = V_{IH} or V_{IL}	I_{OH} = −100 μA I_{OH} = −3 mA I_{OH} = −8 mA I_{OH} = −12 mA I_{OH} = −16 mA I_{OH} = −24 mA I_{OH} = −32 mA	1.65 to 5.5 1.65 2.3 2.7 3.0 3.0 4.5	V_{CC} − 0.1 1.29 1.9 2.2 2.4 2.3 3.8	V_{CC} 1.52 2.1 2.4 2.7 2.5 4.0		V_{CC} − 0.1 1.29 1.9 2.2 2.4 2.3 3.8		V_{CC} − 0.1 1.29 1.8 2.1 2.3 2.2 3.7		V
V_{OL}	Low−Level Output Voltage V_{IN} = V_{IH} or V_{IL}	I_{OL} = 100 μA I_{OL} = 4 mA I_{OL} = 8 mA I_{OL} = 12 mA I_{OL} = 16 mA I_{OL} = 24 mA I_{OL} = 32 mA	1.65 to 5.5 1.65 2.3 2.7 3.0 3.0 4.5		0.08 0.2 0.22 0.28 0.38 0.42	0.1 0.24 0.3 0.4 0.4 0.55 0.55		0.1 0.24 0.3 0.4 0.4 0.55 0.55		0.1 0.24 0.4 0.5 0.5 0.55 0.65	V
I_{IN}	Input Leakage Current	V_{IN} = 5.5 V or GND	0 to 5.5			±0.1		±1.0		±1.0	μA
I_{OFF}	Power Off Leakage Current	V_{IN} = 5.5 V or V_{OUT} = 5.5 V	0			1		10		10	μA
I_{CC}	Quiescent Supply Current	V_{IN} = 5.5 V or GND	5.5			1		10		10	μA

AC ELECTRICAL CHARACTERISTICS (Input t_r = t_f = 3.0 ns)

Symbol	Parameter	Condition	V_{CC} (V)	T_A = 25°C			−40°C ≤ T_A ≤ 85°C		−55°C ≤ T_A ≤ 125°C		Units
				Min	Typ	Max	Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay Input A to Y (Figure 3 & 4)	R_L = 1 MΩ, C_L = 15 pF	2.5 ± 0.2	1.8	4.3	7.4	1.8	8.1	1.8	9.1	ns
		R_L = 1 MΩ, C_L = 15 pF R_L = 500 Ω, C_L = 50 pF	3.3 ± 0.3	1.5 1.8	3.3 4.0	5.0 6.0	1.5 1.8	5.5 6.6	1.5 1.8	6.5 7.6	
		R_L = 1 MΩ, C_L = 15 pF R_L = 500 Ω, C_L = 50 pF	5.0 ± 0.5	1.0 1.2	2.7 3.2	4.1 4.9	1.0 1.2	4.5 5.4	1.0 1.2	5.5 6.4	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Units
C_{IN}	Input Capacitance	V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	2.5	pF
C_{PD}	Power Dissipation Capacitance (Note 6)	10 MHz, V_{CC} = 3.3 V, V_I = 0 V or V_{CC} 10 MHz, V_{CC} = 5.0 V, V_I = 0 V or V_{CC}	11 12.5	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; $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$.

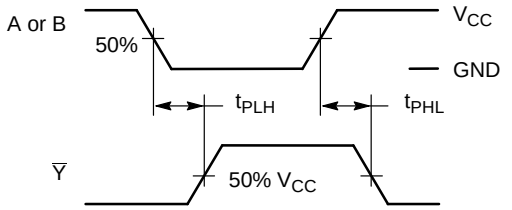
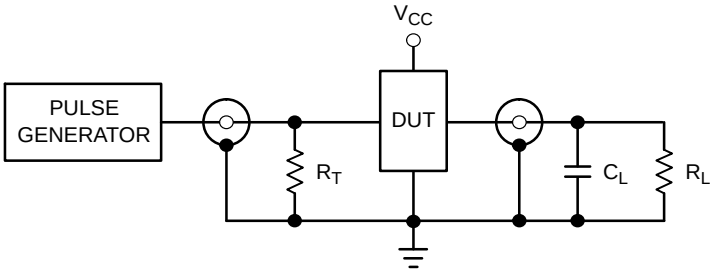
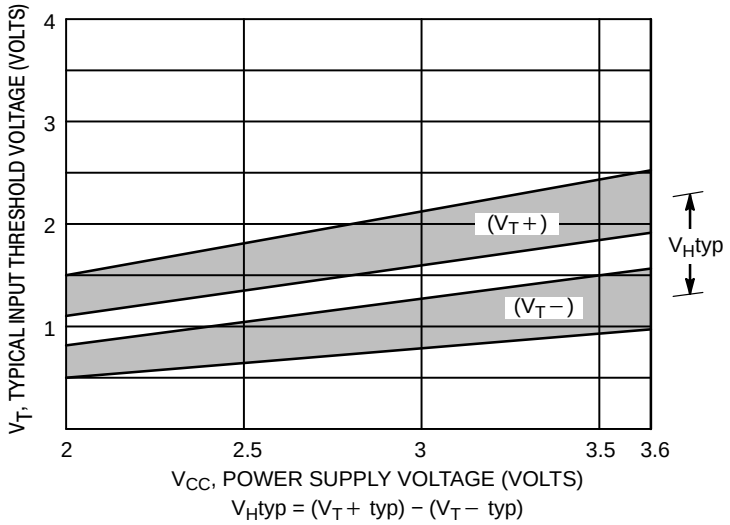


Figure 3. Switching Waveforms



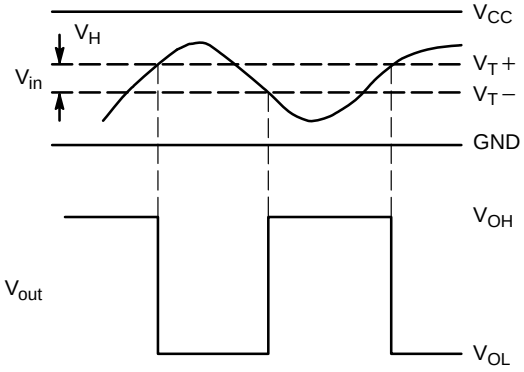
R_T = C_L or equivalent (includes jog and probe capacitance)
R_T = Z_{OUT} of pulse generator (typically 50 Ω)

Figure 4. Test Circuit

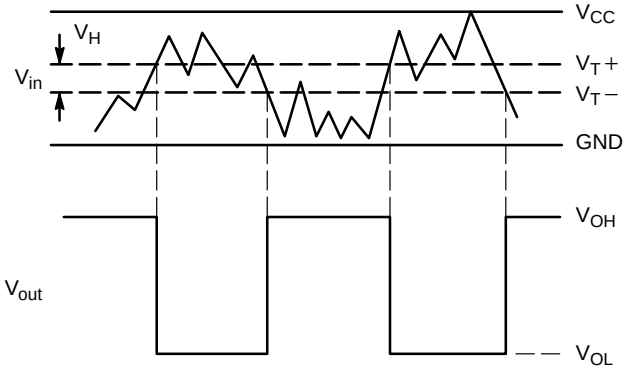


$V_H$typ = (V_T+ typ) − (V_T- typ)

Figure 5. Typical Input Threshold, V_T+, V_T- versus Power Supply Voltage



(a) A Schmitt−Trigger Squares Up Inputs With Slow Rise and Fall Times

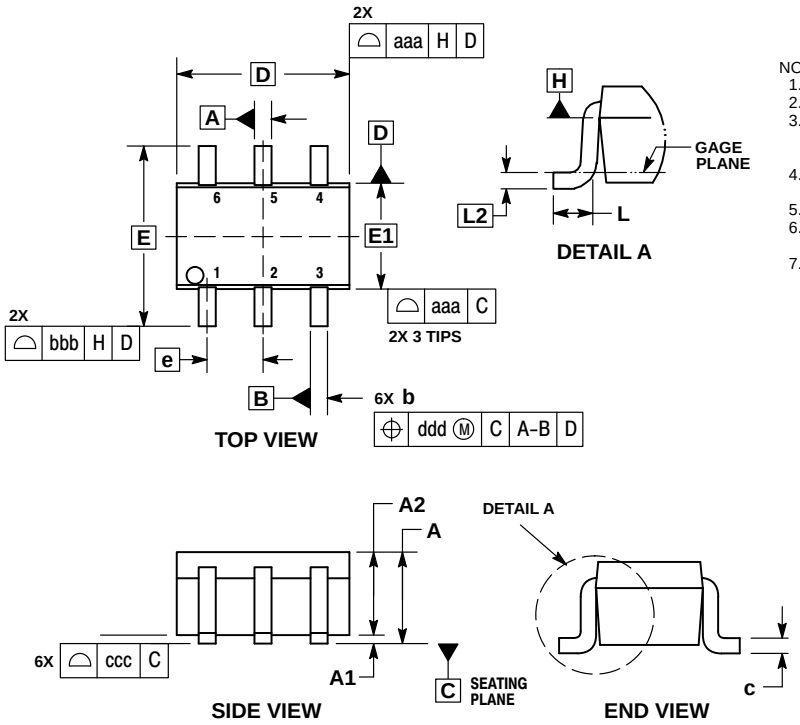


(b) A Schmitt−Trigger Offers Maximum Noise Immunity

Figure 6. Typical Schmitt−Trigger Applications

PACKAGE DIMENSIONS

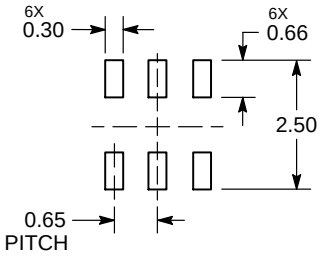
SC−88/SC70−6/SOT−363
CASE 419B−02
ISSUE Y



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
4. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
5. DATUMS A AND B ARE DETERMINED AT DATUM H.
6. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.
7. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	−−−	−−−	1.10	−−−	−−−	0.043
A1	0.00	−−−	0.10	0.000	−−−	0.004
A2	0.70	0.90	1.00	0.027	0.035	0.039
b	0.15	0.20	0.25	0.006	0.008	0.010
C	0.08	0.15	0.22	0.003	0.006	0.009
D	1.80	2.00	2.20	0.070	0.078	0.086
E	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
L2	0.15 BSC			0.006 BSC		
aaa	0.15			0.006		
bbb	0.30			0.012		
ccc	0.10			0.004		
ddd	0.10			0.004		

RECOMMENDED SOLDERING FOOTPRINT*

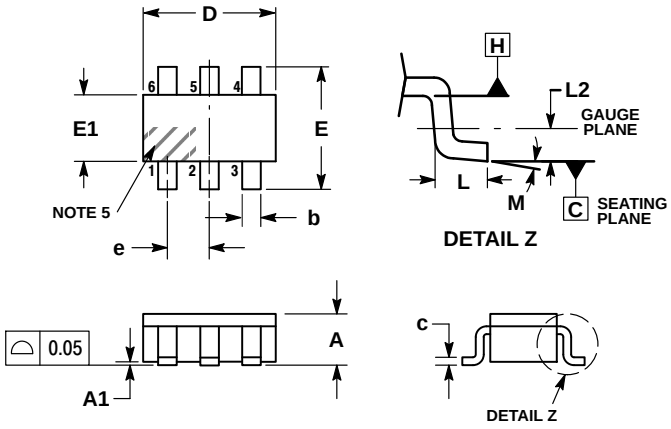


DIMENSIONS: MILLIMETERS

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

PACKAGE DIMENSIONS

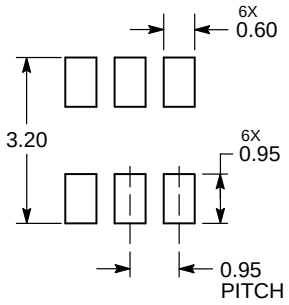
TSOP−6
CASE 318G−02
ISSUE V



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

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Email: orderlit@onsemi.com

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