ON Semiconductor

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Dual Inverter with Open Drain Outputs

NL27WZ06

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

Features

- Designed for 1.65 V to 5.5 V V_{CC} Operation
- 2.1 ns t_{PD} at $V_{CC} = 5 \text{ V (Typ)}$
- Inputs/Outputs Overvoltage Tolerant up to 5.5 V
- I_{OFF} Supports Partial Power Down Protection
- Sink 24 mA at 3.0 V
- Available in SC-88, SC-74 and UDFN6 Packages
- Chip Complexity < 100 FETs
- 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, Halogen Free/BFR Free and are RoHS Compliant

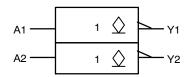
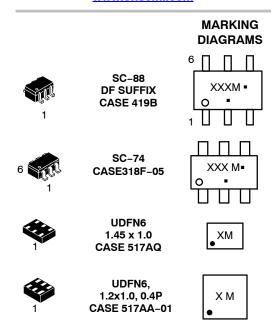


Figure 1. Logic Symbol



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UDFN6 1.0 x 1.0 CASE 517BX



X, XXX = Specific 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.

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 7 of this data sheet.

1

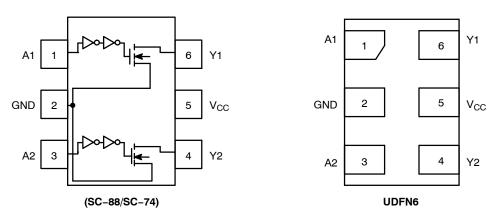


Figure 2. Pinout (Top View)

PIN ASSIGNMENT

Pin	Function
1	A1
2	GND
3	A2
4	Y2
5	V _{CC}
6	Y1

FUNCTION TABLE

A Input	Y Output
L	Z
Н	L

MAXIMUM RATINGS

Symbol	Char	Value	Unit	
V _{CC}	DC Supply Voltage	SC-88 (NLV) SC-88, SC-74, UDFN6	-0.5 to +7.0 -0.5 to +6.5	V
V_{IN}	DC Input Voltage	SC-88 (NLV) SC-88, SC-74, UDFN6	-0.5 to +7.0 -0.5 to +6.5	V
V _{OUT}	DC Output Voltage SC-88 (NLV)	Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode (V _{CC} = 0 V)	-0.5 to V _{CC} + 0.5 -0.5 to +7.0 -0.5 to +7.0	V
	DC Output Voltage SC-88, SC-74, UDFN6	Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode (V _{CC} = 0 V)	-0.5 to V _{CC} + 0.5 -0.5 to +6.5 -0.5 to +6.5	V
I _{IK}	DC Input Diode Current	V _{IN} < GND	-50	mA
I _{OK}	DC Output Diode Current	V _{OUT} < GND	-50	mA
l _{out}	DC Output Source/Sink Current		±50	mA
I _{CC} or I _{GND}	DC Supply Current per Supply Pin or	±100	mA	
T _{STG}	Storage Temperature Range		-65 to +150	°C
TL	Lead Temperature, 1 mm from Case	for 10 secs	260	°C
TJ	Junction Temperature Under Bias		+150	°C
$\theta_{\sf JA}$	Thermal Resistance (Note 2)	SC-88 SC-74 UDFN6	377 320 154	°C/W
P _D	Power Dissipation in Still Air	SC-88 SC-74 UDFN6	332 390 812	mW
MSL	Moisture Sensitivity		Level 1	-
F _R	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	-
V _{ESD}	ESD Withstand Voltage (Note 3)	Human Body Model Charged Device Model	2000 1000	V
I _{Latchup}	Latchup Performance (Note 4)		± 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. Applicable to devices with outputs that may be tri–stated.

Applicable to devices with outputs that may be the stated.
 Measured with minimum pad spacing on an FR4 board, using 10mm-by-1inch, 2 ounce copper trace no air flow per JESD51-7.
 HBM tested to ANSI/ESDA/JEDEC JS-001-2017. CDM tested to EIA/JESD22-C101-F. JEDEC recommends that ESD qualification to EIA/JESD22–A115–A (Machine Model) be discontinued per JEDEC/JEP172A.

4. Tested to EIA/JESD78 Class II.

RECOMMENDED OPERATING CONDITIONS

Symbol	Chara	Min	Max	Unit	
V _{CC}	Positive DC Supply Voltage		1.65	5.5	V
V _{IN}	DC Input Voltage		0	5.5	V
V _{OUT}	DC Output Voltage	Active–Mode (High or Low State) Tri–State Mode (Note 1) Power–Down Mode ($V_{CC} = 0 \text{ V}$)	0 0 0	V _{CC} 5.5 5.5	
T _A	Operating Temperature Range		-55	+125	°C
t _r , t _f	Input Rise and Fall Time	V_{CC} = 1.65 V to 1.95 V V_{CC} = 2.3 V to 2.7 V V_{CC} = 3.0 V to 3.6 V V_{CC} = 4.5 V to 5.5 V	0 0 0	20 20 10 5	ns

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.

DC ELECTRICAL CHARACTERISTICS

			V _{cc}	T _A = 25°C			-55°C ≤ T	_A ≤ 125°C	
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Units
V _{IH}	High-Level Input		1.65 to 1.95	0.65 V _{CC}	-	-	0.65 V _{CC}	_	V
	Voltage		2.3 to 5.5	0.70 V _{CC}	1	-	0.70 V _{CC}	-	
V_{IL}	Low-Level Input		1.65 to 1.95	-	_	0.35 V _{CC}	-	0.35 V _{CC}	V
	Voltage		2.3 to 5.5	-	ı	0.30 V _{CC}	-	0.30 V _{CC}	
V _{OL}	Low-Level Output Voltage	$\begin{array}{l} V_{IN} = V_{IH} \text{ or } V_{IL} \\ I_{OL} = 100 \ \mu\text{A} \\ I_{OL} = 4 \ \text{mA} \\ I_{OL} = 8 \ \text{mA} \\ I_{OL} = 12 \ \text{mA} \\ I_{OL} = 16 \ \text{mA} \\ I_{OL} = 24 \ \text{mA} \\ I_{OL} = 32 \ \text{mA} \end{array}$	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	V
I _{IN}	Input Leakage Current	V _{IN} = 5.5 V or GND	1.65 to 5.5	-	ı	±0.1	-	±1.0	μΑ
I _{OZ}	3-State Output Leakage Current	V _{OUT} = 0 V to 5.5 V	1.65 to 5.5	ı	İ	±0.5	İ	±5.0	μΑ
I _{OFF}	Power Off Leakage Current	V _{IN} = 5.5 V or V _{OUT} = 5.5 V	0	ı	ı	1.0	ı	10	μΑ
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5		_	1.0	-	10	μΑ
I _{CCT}	Quiescent Supply Current	V _{IN} = 3.0 V	3.6	-	-	10	_	100	μΑ

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

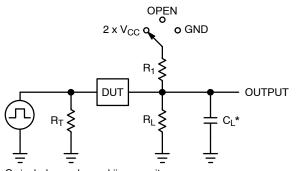
AC ELECTRICAL CHARACTERISTICS

			V _{CC}		_Δ = 25°	С	-55°C ≤ T	_A ≤ 125°C	
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Units
t _{PZL}	Propagation Delay,		1.65 to 1.95	-	6.0	9.0	=	9.5	ns
(Figures 3 and 4)	(Figures 3 and 4)		2.3 to 2.7	-	3.6	6.1	=	6.5	
		3.0 to 3.6	-	2.7	5.6	=	6.0		
			4.5 to 5.5	-	2.1	4.4	=	4.8	
t _{PLZ}	Propagation Delay,	1.65 to 1.95	-	4.0	9.0	=	9.5	ns	
	(Figures 3 and 4)		2.3 to 2.7	_	2.8	6.1	=	6.5	
		3.0 to 3.6	_	2.5	5.6	=	6.0		
			4.5 to 5.5	_	2.2	4.4	_	4.8	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Units
C _{IN}	Input Capacitance	$V_{CC} = 5.5 \text{ V}, V_{IN} = 0 \text{ V or } V_{CC}$	2.5	pF
C _{OUT}	Output Capacitance	$V_{CC} = 5.5 \text{ V}, V_{IN} = 0 \text{ V or } V_{CC}$	4.0	pF
C _{PD}	Power Dissipation Capacitance (Note 5)	10 MHz, V_{CC} = 5.5 V, V_{IN} = 0 V or V_{CC}	4.0	pF

^{5.} 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}.



Test	Switch Position	C _L , pF	R_L, Ω	R ₁ , Ω	
t _{PLH} / t _{PHL}	Open	See AC Characteristics Table			
t _{PLZ} / t _{PZL}	2 x V _{CC}	50	500	500	
t _{PHZ} / t _{PZH}	GND	50	500	500	

X = Don't Care

C_L includes probe and jig capacitance R_T is Z_{OUT} of pulse generator (typically 50 Ω) f=1 MHz

Figure 3. Test Circuit

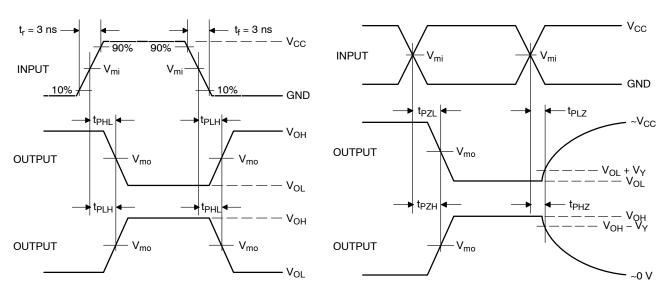


Figure 4. Switching Waveforms

		V _m		
V _{CC} , V	V _{mi} , V	t _{PLH} , t _{PHL}	t _{PZL} , t _{PLZ} , t _{PZH} , t _{PHZ}	V _Y , V
1.65 to 1.95	V _{CC} /2	V _{CC} /2	V _{CC} /2	0.15
2.3 to 2.7	V _{CC} /2	V _{CC} /2	V _{CC} /2	0.15
3.0 to 3.6	V _{CC} /2	V _{CC} /2	V _{CC} /2	0.3
4.5 to 5.5	V _{CC} /2	V _{CC} /2	V _{CC} /2	0.3

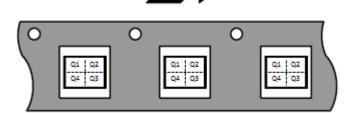
DEVICE ORDERING INFORMATION

Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping [†]
NL27WZ06DFT2G	SC-88	MF	Q4	3000 / Tape & Reel
NLV27WZ06DFT2G*	SC-88	MF	Q4	3000 / Tape & Reel
NL27WZ06DBVT1G	SC-74	MF	Q4	3000 / Tape & Reel
NL27WZ06MU1TCG (In Development)	UDFN6, 1.45 x 1.0 x 0.5P	K (Rotated 90° CW)	Q4	3000 / Tape & Reel
NL27WZ06MU3TCG (In Development)	UDFN6, 1.0 x 1.0 x 0.35P	Y (Rotated 90° CW)	Q4	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.

Pin 1 Orientation in Tape and Reel

Direction of Feed

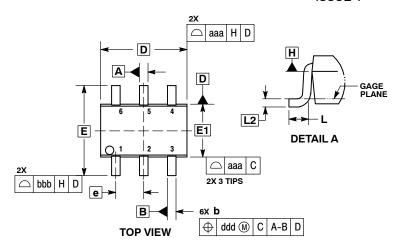


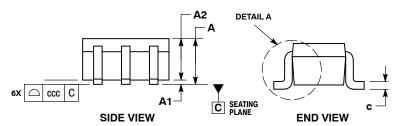
^{*}NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363

CASE 419B-02 **ISSUE Y**





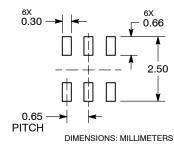
- NOTES:

 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

- DIMENSION 5 DOES NOT INCLUDE DAMBAR PROTRUSION.
 ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN
 EXCESS OF DIMENSION 5 AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER

	MIL	MILLIMETERS			INCHES	3
DIM	MIN	NOM	MAX	MIN	NOM	MAX
Α			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
С	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
е		0.65 BS	С	0	.026 BS	С
L	0.26	0.36	0.46	0.010	0.014	0.018
L2		0.15 BS	C	-	0.006 BS	SC
aaa	0.15				0.006	
bbb	0.30			0.012		
ccc	0.10			0.004		
ddd		0.10			0.004	

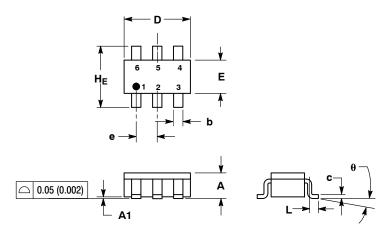
RECOMMENDED SOLDERING FOOTPRINT*



^{*}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

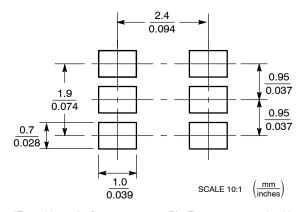
SC-74 CASE 318F-05 ISSUE N



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH
 THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM
 THICKNESS OF BASE MATERIAL.
 4. 318F-01, -02, -03, -04 OBSOLETE. NEW STANDARD 318F-05.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
Α	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	0.37	0.50	0.010	0.015	0.020
С	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
е	0.985	0.95	11.05	0.084	0.037	0.10241
L	0.20	0.40	0.60	0.008	0.016	0.024
HE	2.50	2.75	3.00	0.099	0.108	0.118
θ		_			_	

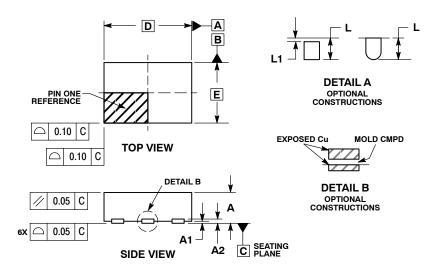
SOLDERING FOOTPRINT*



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

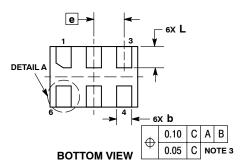
PACKAGE DIMENSIONS

UDFN6, 1.45x1.0, 0.5P CASE 517AQ ISSUE O

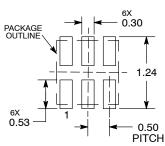


- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. DIMENSION & APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.

	MILLIMETERS	
DIM	MIN	MAX
Α	0.45	0.55
A1	0.00	0.05
A2	0.07 REF	
b	0.20	0.30
D	1.45 BSC	
Е	1.00 BSC	
е	0.50 BSC	
L	0.30	0.40
L1		0.15



MOUNTING FOOTPRINT

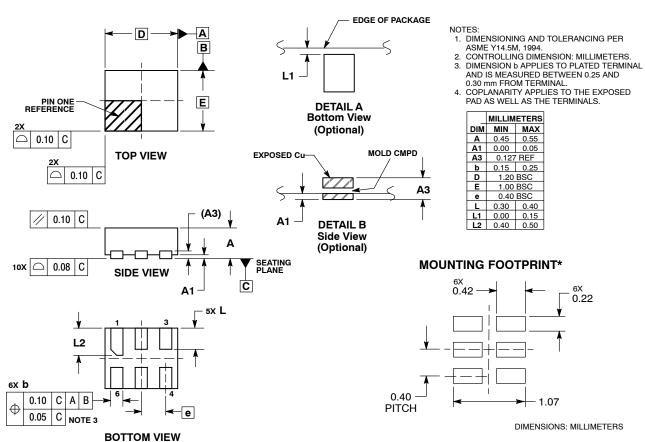


DIMENSIONS: MILLIMETERS

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

PACKAGE DIMENSIONS

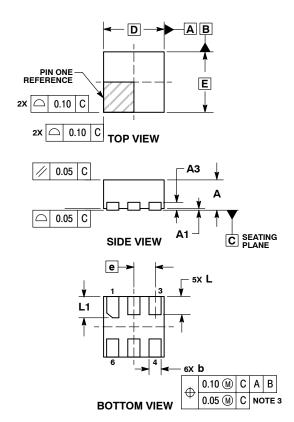
UDFN6, 1.2x1.0, 0.4PCASE 517AA-01 ISSUE D



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PACKAGE DIMENSIONS

UDFN6, 1x1, 0.35P CASE 517BX **ISSUE O**

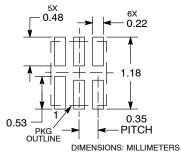


NOTES

- DIMENSIONING AND TOLERANCING PER
- ASME Y14.5M, 1994.
 CONTROLLING DIMENSION: MILLIMETERS.
 DIMENSION 6 APPLIES TO PLATED
 TERMINAL AND IS MEASURED BETWEEN
- 0.15 AND 0.20 MM FROM TERMINAL TIP. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

	MILLIMETERS	
DIM	MIN	MAX
Α	0.45	0.55
A1	0.00	0.05
А3	0.13 REF	
b	0.12	0.22
D	1.00 BSC	
E	1.00 BSC	
е	0.35 BSC	
L	0.25	0.35
L1	0.30	0.40

RECOMMENDED SOLDERING FOOTPRINT*



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NL17SH17P5T5G 74HCT126T14-13 74LVC2G34FW4-7 74VHC9126FT(BJ) RHRXH162244K1 74AUP1G34FW5-7 74LVC1G126FW4-7

74LVC2G126RA3-7 74LVCE1G125FZ4-7 74AUP1G126FW5-7 54FCT240TLB 74LVCE1G07FZ4-7 NLX3G16DMUTCG

NLX2G06AMUTCG LE87100NQCT LE87285NQC LE87290YQC LE87290YQCT 74AUP1G125FW5-7 NLU2G16CMUTCG

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NLU2G07MUTCG