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# Onsemi

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# Dual Buffer with Open Drain Outputs

# NL27WZ07

The NL27WZ07 is a high performance dual buffer 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  $V_{CC} = 5 V (Typ)$
- Inputs/Outputs Overvoltage Tolerant up to 5.5 V
- IOFF 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

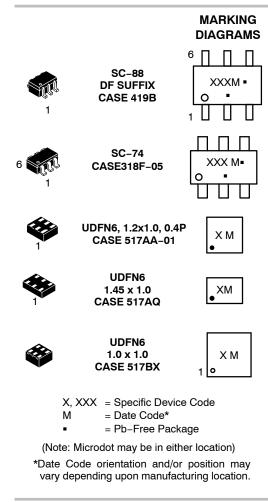


Figure 1. Logic Symbol



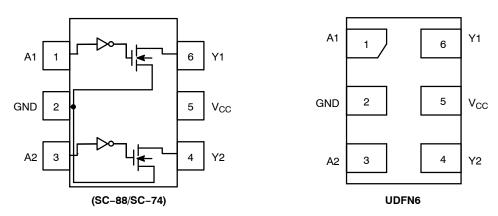
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## ORDERING INFORMATION

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





#### **PIN ASSIGNMENT**

Pin	Function
1	A1
2	GND
3	A2
4	Y2
5	V <sub>CC</sub>
6	Y1

#### FUNCTION TABLE

A Input	Y Output
L	L
Н	Z

#### MAXIMUM RATINGS

Symbol	Charac	teristics	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 <sub>IN</sub>	DC Input Voltage	SC-88 (NLV) SC-88, SC-74, UDFN6	-0.5 to +7.0 -0.5 to +6.5	V
V <sub>OUT</sub>	DC Output Voltage SC-88 (NLV)	Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode (V <sub>CC</sub> = 0 V)	-0.5 to V <sub>CC</sub> + 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 <sub>CC</sub> = 0 V)	-0.5 to V <sub>CC</sub> + 0.5 -0.5 to +6.5 -0.5 to +6.5	V
I <sub>IK</sub>	DC Input Diode Current	V <sub>IN</sub> < GND	-50	mA
I <sub>OK</sub>	DC Output Diode Current	-50	mA	
IOUT	DC Output Source/Sink Current	±50	mA	
I <sub>CC</sub> or I <sub>GND</sub>	DC Supply Current per Supply Pin or G	±100	mA	
T <sub>STG</sub>	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
$\theta_{JA}$	Thermal Resistance (Note 2)	SC-88 SC-74 UDFN6	377 320 154	°C/W
PD	Power Dissipation in Still Air	SC-88 SC-74 UDFN6	332 390 812	mW
MSL	Moisture Sensitivity		Level 1	-
F <sub>R</sub>	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 <sub>Latchup</sub>	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 in-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.
Tested to EIA/JESD78 Class II.

#### RECOMMENDED OPERATING CONDITIONS

Symbol	Characteristics	Min	Мах	Unit
V <sub>CC</sub>	Positive DC Supply Voltage	1.65	5.5	V
V <sub>IN</sub>	DC Input Voltage	0	5.5	V
V <sub>OUT</sub>	DC Output Voltage Active–Mode (High or Low State) Tri–State Mode (Note 1) Power–Down Mode (V <sub>CC</sub> = 0 V)	0	V <sub>CC</sub> 5.5 5.5	
T <sub>A</sub>	Operating Temperature Range	-55	+125	°C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time $V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$ $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$ $V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$ $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	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 <sub>cc</sub>	T,	T <sub>A</sub> = 25°C			–55°C ≤ T <sub>A</sub> ≤ 125°C	
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Units
V <sub>IH</sub>	High-Level Input		1.65 to 1.95	0.65 V <sub>CC</sub>	-	_	0.65 V <sub>CC</sub>	-	V
	Voltage		2.3 to 5.5	0.70 V <sub>CC</sub>	-	-	0.70 V <sub>CC</sub>	-	
VIL	Low-Level Input		1.65 to 1.95	-	-	$0.35  V_{CC}$	-	$0.35  V_{CC}$	V
	Voltage		2.3 to 5.5	-	-	0.30 V <sub>CC</sub>	-	0.30 V <sub>CC</sub>	
V <sub>OL</sub>	Low-Level Output Voltage		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 <sub>IN</sub>	Input Leakage Current	$V_{IN}$ = 5.5 V or GND	1.65 to 5.5	-	-	±0.1	-	±1.0	μA
I <sub>OZ</sub>	3-State Output Leakage Current	$V_{OUT}$ = 0 V to 5.5 V	1.65 to 5.5	-	-	±0.5	-	±5.0	μΑ
I <sub>OFF</sub>	Power Off Leakage Current	V <sub>IN</sub> = 5.5 V or V <sub>OUT</sub> = 5.5 V	0	-	-	1.0	-	10	μΑ
I <sub>CC</sub>	Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND	5.5	-	-	1.0	_	10	μΑ
ICCT	Quiescent Supply Current	V <sub>IN</sub> = 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

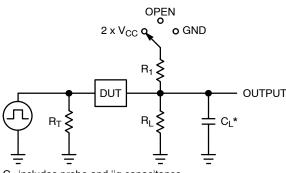
			V <sub>CC</sub>	T <sub>A</sub> = 25°C		С	–55°C ≤ T	<sub>A</sub> ≤ 125°C	
Symbol	Parameter	Condition	(V)	Min	Тур	Max	Min	Max	Units
t <sub>PZL</sub>	Propagation Delay, A to Y		1.65 to 1.95	-	6.0	9.0	-	9.5	ns
	(Figures 3 and 4)		2.3 to 2.7	-	3.6	6.1	-	6.5	
			3.0 to 3.6	-	2.7	5.6	-	6.0	
			4.5 to 5.5	-	2.1	4.4	-	4.8	
t <sub>PLZ</sub>	Propagation Delay, A to Y		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 <sub>IN</sub>	Input Capacitance	$V_{CC}$ = 5.5 V, $V_{IN}$ = 0 V or $V_{CC}$	2.5	pF
C <sub>OUT</sub>	Output Capacitance	$V_{CC}$ = 5.5 V, $V_{IN}$ = 0 V or $V_{CC}$	4.0	pF
C <sub>PD</sub>	Power Dissipation Capacitance (Note 5)	10 MHz, V <sub>CC</sub> = 5.5 V, V <sub>IN</sub> = 0 V or V <sub>CC</sub>	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:  $I_{CC(OPR)} = C_{PD} \bullet V_{CC} \bullet f_{in} + I_{CC}$ .  $C_{PD}$  is used to determine the no–load dynamic power consumption;  $P_D = C_{PD} \bullet V_{CC}^2 \bullet f_{in} + I_{CC} \bullet V_{CC}$ .

Test



	t <sub>PLH</sub> / t <sub>PHL</sub>	Open	See AC Character	istics Tat	ble
	t <sub>PLZ</sub> / t <sub>PZL</sub>	$2 \times V_{CC}$	50	500	5
т	$t_{PHZ}$ / $t_{PZH}$	GND	50	500	5
	X = Don't Car	е			

 $R_L, \Omega$ 

 $C_L, pF$ 

 $R_1, \Omega$ 

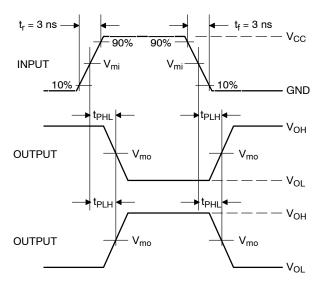
500

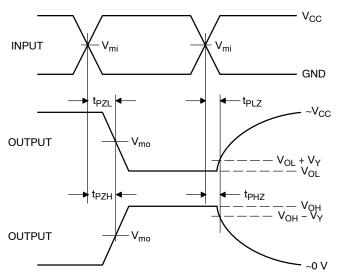
500

Switch Position

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

### Figure 3. Test Circuit





#### Figure 4. Switching Waveforms

		Vm		
V <sub>CC</sub> , V	V <sub>mi</sub> , V	t <sub>PLH</sub> , t <sub>PHL</sub> t <sub>PZL</sub> , t <sub>PLZ</sub> , t <sub>PZH</sub> , t <sub>PHZ</sub>		V <sub>Y</sub> , V
1.65 to 1.95	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.15
2.3 to 2.7	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.15
3.0 to 3.6	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.3
4.5 to 5.5	V <sub>CC</sub> /2	V <sub>CC</sub> /2	V <sub>CC</sub> /2	0.3

#### **DEVICE ORDERING INFORMATION**

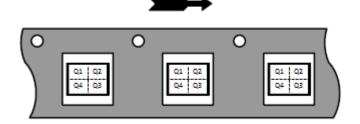
Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping <sup>†</sup>
NL27WZ07DFT2G	SC-88	M7	Q4	3000 / Tape & Reel
NLV27WZ07DFT2G*	SC-88	M7	Q4	3000 / Tape & Reel
NL27WZ07DBVT1G	SC-74	M7	Q4	3000 / Tape & Reel
NL27WZ07MU1TCG (In Development)	UDFN6, 1.45 x 1.0 x 0.5P	V (Rotated 90° CW)	Q4	3000 / Tape & Reel
NL27WZ07MU2TCG (In Development)	UDFN6, 1.2 x 1.0 x 0.4P	K (Rotated 180° CW)	Q4	3000 / Tape & Reel
NL27WZ07MU3TCG	UDFN6, 1.0 x 1.0 x 0.35P	A (Rotated 180° 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.
 \*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP

Capable.

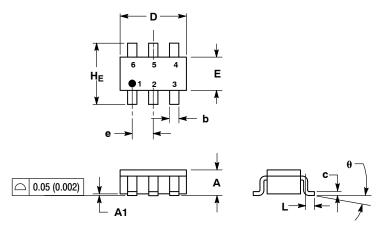
#### Pin 1 Orientation in Tape and Reel





## PACKAGE DIMENSIONS

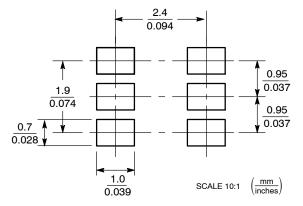
SC-74 CASE 318F-05 **ISSUE N** 



- 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
Е	1.30	1.50	1.70	0.051	0.059	0.067
е	0.85	0.95	1105	0.084	0.037	0.10 <sup>0</sup> 41
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		-			-	

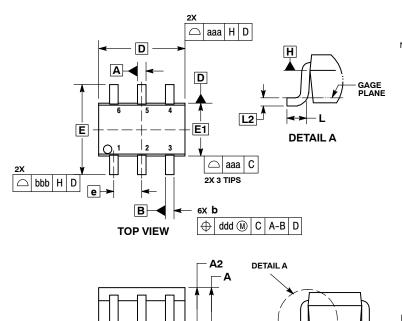
#### SOLDERING FOOTPRINT\*



\*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

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



NOTES:

С

**END VIEW** 

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

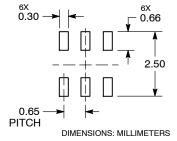
	MILLIMETERS			INCHES			
DIM	MIN	NOM	MAX	MIN	NOM	MAX	
Α			1.10			0.043	
A1	0.00		0.10	0.000		0.004	
A2	0.70	0.90	1.00	0.027	0.035	0.039	
b	0.15	0.20	0.25	0.006	0.008	0.010	
С	0.08	0.15	0.22	0.003	0.006	0.009	
D	1.80	2.00	2.20	0.070	0.078	0.086	
E	2.00	2.10	2.20	0.078	0.082	0.086	
E1	1.15	1.25	1.35	0.045	0.049	0.053	
е	(	0.65 BS	С	0.026 BSC			
L	0.26	0.36	0.46	0.010	0.014	0.018	
L2		0.15 BS	SC	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\***

SIDE VIEW

A1

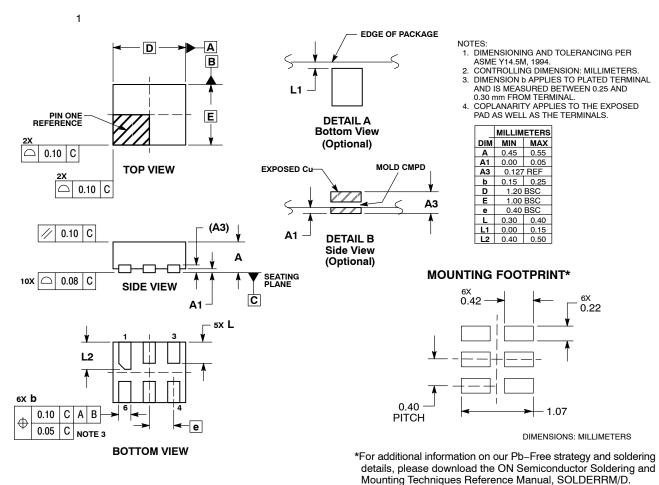
ex □ ccc C



\*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

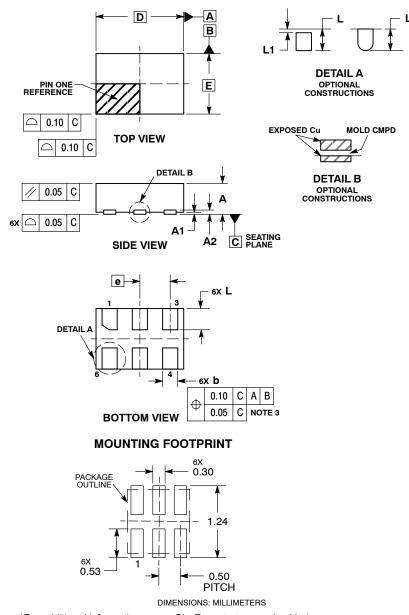
UDFN6, 1.2x1.0, 0.4P CASE 517AA-01 ISSUE D



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#### PACKAGE DIMENSIONS

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



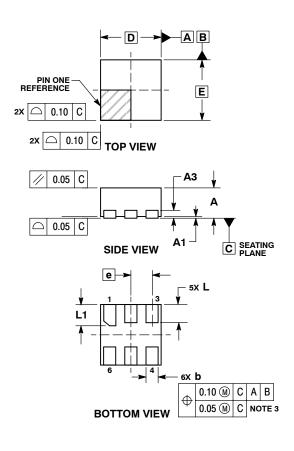
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NOTES:
 DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 CONTROLLING DIMENSION: MILLIMETERS.
 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

#### PACKAGE DIMENSIONS

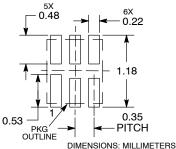
UDFN6, 1x1, 0.35P CASE 517BX ISSUE O



- NOTES: 1. DIMENSIONING AND TOLERANCING PER ASME X14 5M 1994
- ASME Y14.5M, 1994. 2. CONTROLLING DIMENSION: MILLIMETERS. 3. DIMENSION 6 APPLIES TO PLATED
- DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM TERMINAL TIP.
   PACKAGE DIMENSIONS EXCLUSIVE OF

	IS AND I		
	MILLIMETERS		
DIM	MIN	MAX	
Α	0.45	0.55	
A1	0.00	0.05	
A3	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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