

Three-Input AND Gate

NL17SZ11

The NL17SZ11 is a single three-input AND Gate operating from a 1.65 to 5.5 V supply.

Features

- Designed for 1.65 V to 5.5 V V_{CC} Operation
- 2.9 ns t_{PD} at $V_{CC} = 5$ V (Typ)
- Inputs/Outputs Overvoltage Tolerant up to 5.5 V
- I_{OFF} Supports Partial Power Down Protection
- Sink 32 mA at 4.5 V
- Available in SC-88, SC-74 and UDFN6 Packages
- Chip Complexity < 100 FETs
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

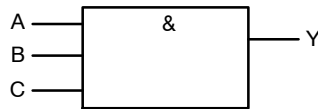
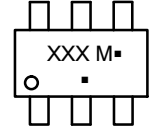


Figure 1. Logic Symbol

MARKING DIAGRAMS



SC-74
CASE 318F-05



UDFN6
1.45 x 1.0
CASE 517AQ



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 6 of this data sheet.

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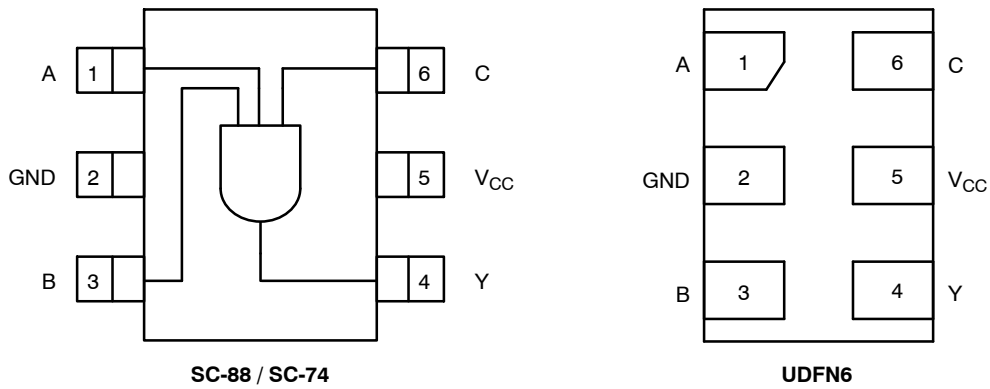


Figure 2. Pinout (Top View)

PIN ASSIGNMENT

Pin	Function
1	A
2	GND
3	B
4	Y
5	V _{CC}
6	C

FUNCTION TABLE (Y = ABC)

Inputs			Output
A	B	C	Y
X	X	L	L
X	L	X	L
L	X	X	L
H	H	H	H

H = HIGH Logic Level
 L = LOW Logic Level
 X = Either LOW or HIGH Logic Level

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MAXIMUM RATINGS

Symbol	Characteristics	Value	Unit
V _{CC}	DC Supply Voltage	-0.5 to +6.5	V
V _{IN}	DC Input Voltage	-0.5 to +6.5	V
V _{OUT}	DC Output Voltage	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
I _{IK}	DC Input Diode Current	V _{IN} < GND	-50
I _{OK}	DC Output Diode Current	V _{OUT} < GND	-50
I _{OUT}	DC Output Source/Sink Current		±50
I _{CC} or I _{GND}	DC Supply Current per Supply Pin or Ground Pin		±100
T _{STG}	Storage Temperature Range		-65 to +150
T _L	Lead Temperature, 1 mm from Case for 10 secs		260
T _J	Junction Temperature Under Bias		+150
θ _{JA}	Thermal Resistance (Note 2)	SC-88 SC-74 UDFN6	377 320 154
P _D	Power Dissipation in Still Air	SC-88 SC-74 UDFN6	332 390 812
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 Mode	2000 1000
I _{Latchup}	Latchup Performance (Note 4)		± 100

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. Operating the device outside its recommended conditions, but still within its maximum rated limits may not cause immediate damage. However, doing so can lead to reduced performance, unpredictable behavior, and potentially shorten the device's lifespan or reliability.

1. Applicable to devices with outputs that may be tri-stated.

2. Measured with minimum pad spacing on an FR4 board, using 10mm-by-1inch, 2 ounce copper trace no air flow per JESD51-7.

3. 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	Characteristics	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 V)	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 0	20 20 10 5

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.

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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 to 1.95	0.65 V _{CC}	-	-	0.65 V _{CC}	-	V
			2.3 to 5.5	0.70 V _{CC}	-	-	0.70 V _{CC}	-	
V _{IL}	Low-Level Input Voltage		1.65 to 1.95	-	-	0.35 V _{CC}	-	0.35 V _{CC}	V
			2.3 to 5.5	-	-	0.30 V _{CC}	-	0.30 V _{CC}	
V _{OH}	High-Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OH} = -100 μA I _{OH} = -4 mA I _{OH} = -8 mA I _{OH} = -16 mA I _{OH} = -24 mA I _{OH} = -32 mA	1.65 to 5.5	V _{CC} - 0.1	V _{CC}	-	V _{CC} - 0.1	-	V
			1.65	1.29	1.52	-	1.29	-	
			2.3	1.9	2.1	-	1.9	-	
			3	2.5	2.8	-	2.4	-	
			3	2.4	2.68	-	2.3	-	
			4.5	3.9	4.2	-	3.8	-	
V _{OL}	Low-Level Output Voltage	V _{IN} = V _{IH} or V _{IL} I _{OH} = 100 μA I _{OH} = 4 mA I _{OH} = 8 mA I _{OH} = 16 mA I _{OH} = 24 mA I _{OH} = 32 mA	1.65 to 5.5	-	-	0.1	-	0.1	V
			1.65	-	0.08	0.24	-	0.24	
			2.3	-	0.11	0.3	-	0.3	
			3	-	0.15	0.4	-	0.4	
			3	-	0.22	0.55	-	0.55	
			4.5	-	0.22	0.55	-	0.55	
I _{IN}	Input Leakage Current	V _{IN} = 5.5 V or GND	1.65 to 5.5	-	-	±0.1	-	±1.0	μA
I _{OFF}	Power Off Leakage Current	V _{IN} = 5.5 V or V _{OUT} = 5.5 V	0	-	-	1.0	-	10	μA
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5	-	-	1.0	-	10	μA

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

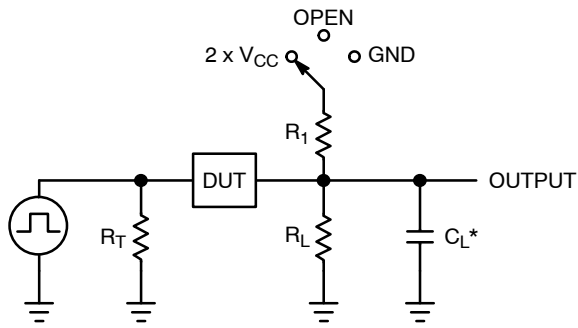
Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25 °C			-55 °C ≤ T _A ≤ 125 °C		Unit
				Min	Typ	Max	Min	Max	
t _{PLH} , t _{PHL}	Propagation Delay (A or B or C) to Y (Figure 3 and 4)	R _L = 1 MΩ, C _L = 50 pF	1.8 ± 0.15	-	9.0	18.5	-	19.0	ns
		R _L = 1 MΩ, C _L = 15 pF	2.5 ± 0.2	-	4.9	10.5	-	11.0	
		R _L = 1 MΩ, C _L = 15 pF	3.3 ± 0.3	-	3.5	8.5	-	9.0	
		R _L = 500 Ω, C _L = 50 pF		-	4.1	8.5	-	9.0	
		R _L = 1 MΩ, C _L = 15 pF	5.0 ± 0.5	-	2.5	6.5	-	7.0	
		R _L = 500 Ω, C _L = 50 pF		-	2.9	7.5	-	8.0	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C _{IN}	Input Capacitance	V _{CC} = 5.5 V, V _{IN} = 0 V or V _{CC}	2.5	pF
C _{OUT}	Output Capacitance	V _{CC} = 5.5 V, V _{IN} = 0 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}.

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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

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}	$2 \times V_{CC}$	50	500	500
t_{PHZ} / t_{PZH}	GND	50	500	500

X = Don't Care

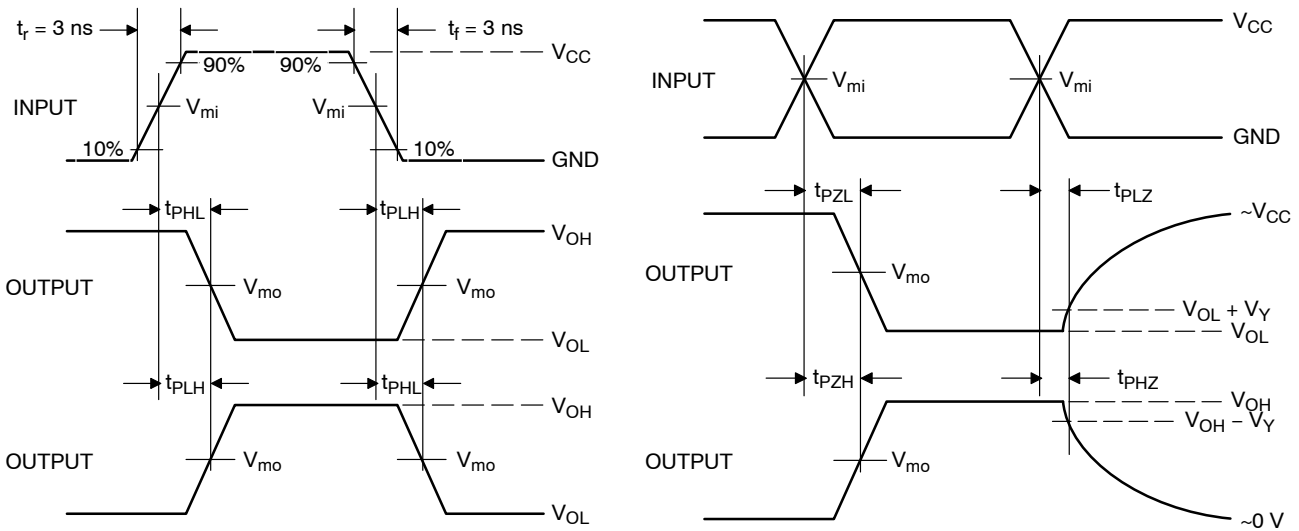


Figure 4. Switching Waveforms

V_{CC} , V	V_{mi} , V	V_{mo} , V		V_Y , V
		t_{PLH}, t_{PHL}	$t_{PZL}, t_{PLZ}, t_{PZH}, t_{PHZ}$	
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

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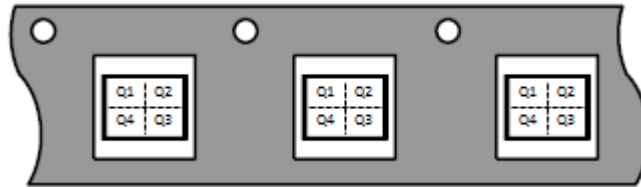
DEVICE ORDERING INFORMATION

Device	Packages	Specific Device Code	Pin 1 Orientation (See below)	Shipping [†]
NL17SZ11DBVT1G	SC-74	AD	Q4	3000 / Tape & Reel
NL17SZ11MU1TCG-Q (Please contact onsemi)	UDFN6, 1.45 x 1.0, 0.5P	P (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](#).

PIN 1 ORIENTATION IN TAPE AND REEL

Direction of Feed



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REVISION HISTORY

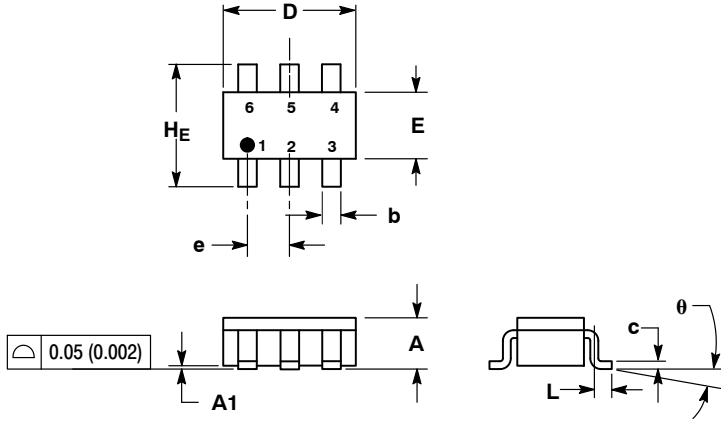
2	<ul style="list-style-type: none">- Rebranded the document to onsemi format.- Removed three OPNs from the Ordering Information table: NL17SZ11DFT2G, NL17SZ11MU1TCG, and NL17SZ11MU3TCG.- Deleted corresponding Case Outlines and Marking Diagrams from page 1.- Added NL17SZ11MU1TCG-Q to the Ordering Information table.	10/16/2025
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This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

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PACKAGE DIMENSIONS

SC-74
CASE 318F-05
ISSUE N

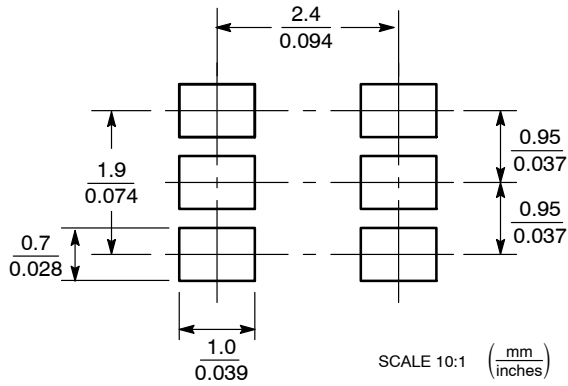


NOTES:

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.

DIM	MILLIMETERS			INCHES		
	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	0.37	0.50	0.010	0.015	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
HE	2.50	2.75	3.00	0.099	0.108	0.118
θ	0°	-	10°	0°	-	10°

SOLDERING FOOTPRINT*

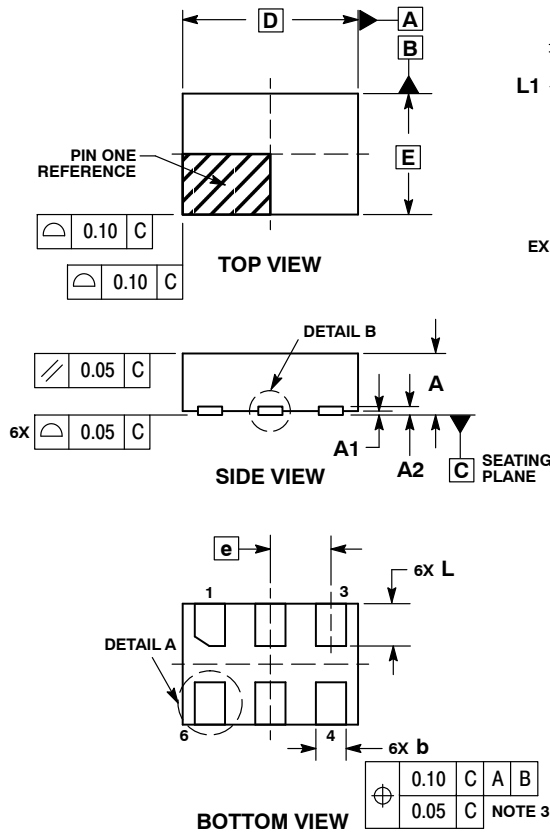


* For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, [SOLDERRM/D](#).

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PACKAGE DIMENSIONS

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

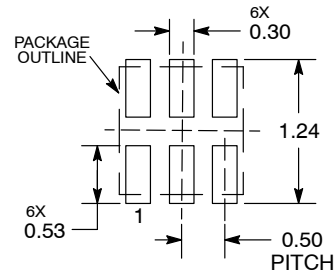


NOTES:

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

MILLIMETERS		
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A2	0.07 REF	
b	0.20	0.30
D	1.45 BSC	
E	1.00 BSC	
e	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 **onsemi** Soldering and Mounting Techniques Reference Manual, [SOLDERRM/D](http://www.onsemi.com/SOLDERRM/D).

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