

Dual Non-Inverting Schmitt-Trigger Buffer

The NLU2G17 MiniGate™ is an advanced high-speed CMOS dual non-inverting Schmitt-trigger buffer in ultra-small footprint.

The NLU2G17 input and output structures provide protection when voltages up to 7.0 V are applied, regardless of the supply voltage.

The NLU2G17 can be used to enhance noise immunity or to square up slowly changing waveforms.

Features

- High Speed: $t_{PD} = 4.0$ ns (Typ) @ $V_{CC} = 5.0$ V
- Low Power Dissipation: $I_{CC} = 1 \mu\text{A}$ (Max) at $T_A = 25^\circ\text{C}$
- Power Down Protection Provided on inputs
- Balanced Propagation Delays
- Overvoltage Tolerant (OVT) Input and Output Pins
- Ultra-Small Packages
- These are Pb-Free Devices

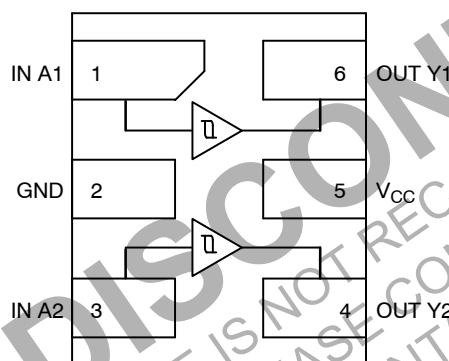


Figure 1. Pinout (Top View)

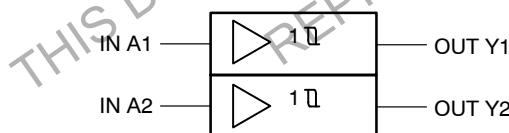


Figure 2. Logic Symbol

PIN ASSIGNMENT

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

FUNCTION TABLE

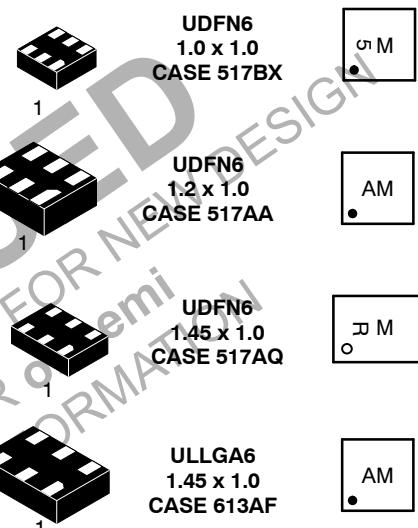
A	Y
L	L
H	H



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MARKING DIAGRAMS



M = Date Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage	-0.5 to +7.0	V
V_{IN}	DC Input Voltage	-0.5 to +7.0	V
V_{OUT}	DC Output Voltage	-0.5 to +7.0	V
I_{IK}	DC Input Diode Current $V_{IN} < GND$	-20	mA
I_{OK}	DC Output Diode Current $V_{OUT} < GND$	± 20	mA
I_O	DC Output Source/Sink Current	± 12.5	mA
I_{CC}	DC Supply Current Per Supply Pin	± 25	mA
I_{GND}	DC Ground Current per Ground Pin	± 25	mA
T_{STG}	Storage Temperature Range	-65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C
T_J	Junction Temperature Under Bias	150	°C
MSL	Moisture Sensitivity	Level 1	
F_R	Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in	
$I_{LATCHUP}$	Latchup Performance Above V_{CC} and Below GND at 125°C (Note 2)	± 500	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. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow.
2. Tested to EIA / JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Positive DC Supply Voltage	1.65	5.5	V
V_{IN}	Digital Input Voltage	0	5.5	V
V_{OUT}	Output Voltage	0	5.5	V
T_A	Operating Free-Air Temperature	-55	+125	°C
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ $V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	0 0	No Limit No Limit	ns/V

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = 25 °C			T _A = +85°C		T _A = -55°C to +125°C		Unit	
				Min	Typ	Max	Min	Max	Min	Max		
V _{T+}	Positive Threshold Voltage		3.0 4.5 5.5		2.0 3.0 3.6	2.2 3.15 3.85			2.2 3.15 3.85		2.2 3.15 3.85	V
V _{T-}	Negative Threshold Voltage		3.0 4.5 5.5	0.9 1.35 1.65	1.5 2.3 2.9	1.65 2.46 3.05	0.9 1.35 1.65		0.9 1.35 1.65			V
V _H	Hysteresis Voltage		3.0 4.5 5.5	0.30 0.40 0.50	0.57 0.67 0.74	1.20 1.40 1.60	0.30 0.40 0.50	1.20 1.40 1.60	0.30 0.40 0.50	1.20 1.40 1.60	V	
V _{OH}	Minimum High-Level Output Voltage	V _{IN} ≥ V _{T+MAX} I _{OH} = -50 μA	2.0 3.0 4.5	1.9 2.9 4.4	2.0 3.0 4.5		1.9 2.9 4.4		1.9 2.9 4.4			V
		V _{IN} ≥ V _{T+MAX} I _{OH} = -4 mA I _{OH} = -8 mA	3.0 4.5	2.58 3.94			2.48 3.80		2.34 3.66			
V _{OL}	Maximum Low-Level Output Voltage	V _{IN} ≤ V _{T-MIN} I _{OL} = 50 μA	2.0 3.0 4.5		0 0 0	0.1 0.1 0.1		0.1 0.1 0.1		0.1 0.1 0.1		V
		V _{IN} ≤ V _{T-MIN} I _{OL} = 4 mA I _{OL} = 8 mA	3.0 4.5			0.36 0.36		0.44 0.44		0.52 0.52		
I _{IN}	Input Leakage Current	0 ≤ V _{IN} ≤ 5.5 V	0 to 5.5			±0.1		±1.0		±1.0		μA
I _{CC}	Quiescent Supply Current	V _{IN} = 5.5 V or GND	5.5			1.0		10		40		μA

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

Symbol	Parameter	V _{CC} (V)	Test Condition	T _A = 25 °C			T _A = +85°C		T _A = -55°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t _{PLH} , t _{PHL}	Propagation Delay, Input A to Output Y	3.0 to 3.6	C _L = 15 pF		7.0	12.8	1.0	15	1.0	17	ns
			C _L = 50 pF		8.5	16.3	1.0	18.5	1.0	20.5	
		4.5 to 5.5	C _L = 15 pF		4.0	8.6	1.0	10	1.0	11.5	
			C _L = 50 pF		5.5	10.6	1.0	12	1.0	13.5	
C _{IN}	Input Capacitance				5.0	10		10		10	pF
C _{PD}	Power Dissipation Capacitance (Note 3)	5.0			7.0						pF

3. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the dynamic 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}.

NLU2G17

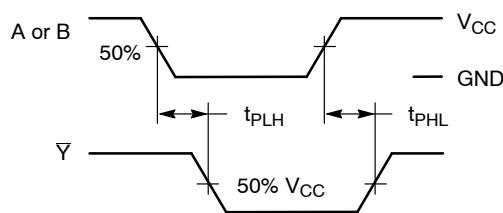
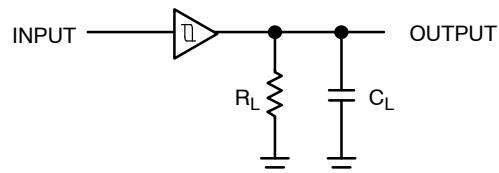
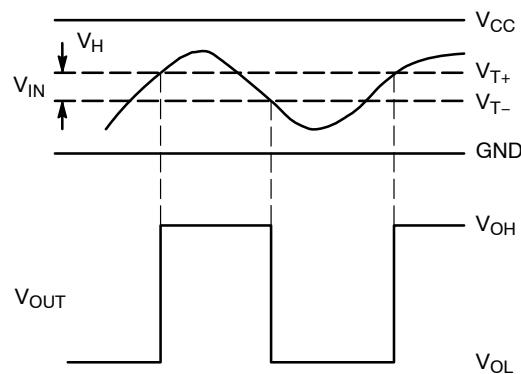


Figure 3. Switching Waveforms

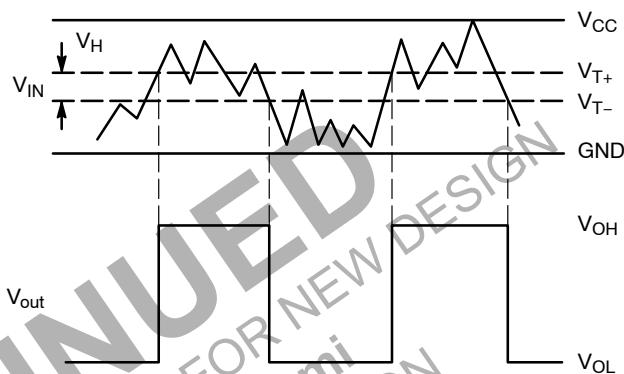


A 1-MHz square input wave is recommended for propagation delay tests.

Figure 4. Test Circuit



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



(b) A Schmitt-Trigger Offers Maximum Noise Immunity

Figure 5. Typical Schmitt-Trigger Applications

ORDERING INFORMATION

Device	Package	Shipping [†]
NLU2G17MUTCG	UDFN6, 1.2 x 1.0, 0.4P (Pb-Free)	3000 / Tape & Reel
NLU2G17AMUTCG	UDFN6, 1.45 x 1.0, 0.5P (Pb-Free)	3000 / Tape & Reel
NLU2G17CMUTCG	UDFN6, 1.0 x 1.0, 0.35P (Pb-Free)	3000 / Tape & Reel
NLU2G17AMX1TCG	ULLGA6, 1.45 x 1.0, 0.5P (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.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

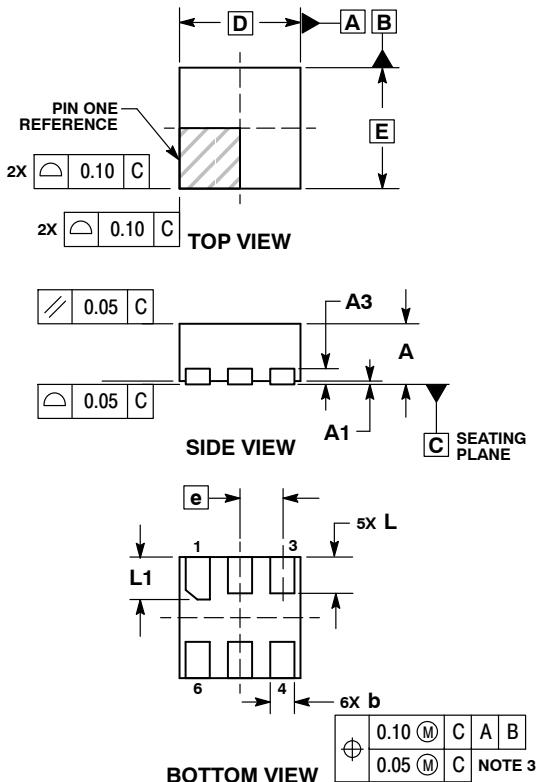
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SCALE 4:1

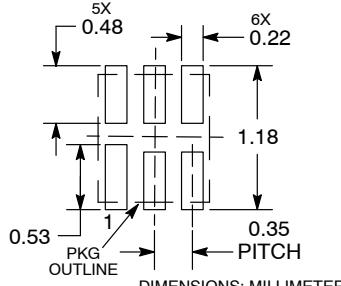
UDFN6, 1x1, 0.35P
CASE 517BX
ISSUE O

DATE 18 MAY 2011



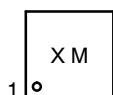
DIM.	MILLIMETERS	
	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.12	0.22
D	1.00 BSC	
E	1.00 BSC	
e	0.35 BSC	
L	0.25	0.35
L1	0.30	0.40

**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.

**GENERIC
MARKING DIAGRAM***



X = Specific Device Code
M = Date Code

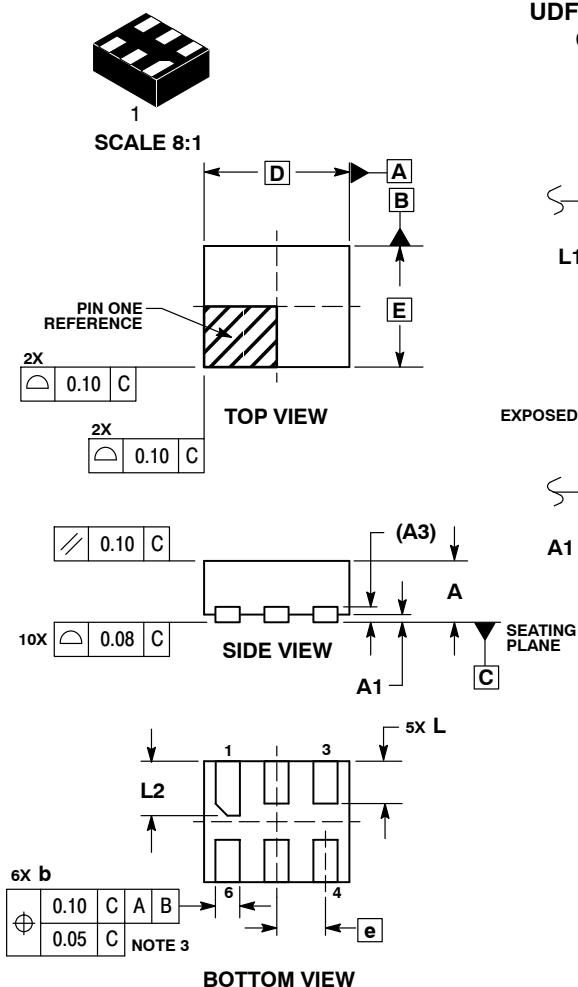
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DESCRIPTION:	UDFN6, 1x1, 0.35P	PAGE 1 OF 1

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MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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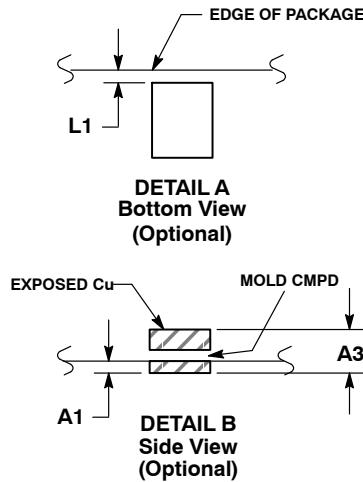


UDFN6, 1.2x1.0, 0.4P
CASE 517AA
ISSUE D

DATE 03 SEP 2010

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 0.25 AND 0.30 mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.127 REF	
b	0.15	0.25
D	1.20 BSC	
E	1.00 BSC	
e	0.40 BSC	
L	0.30	0.40
L1	0.00	0.15
L2	0.40	0.50



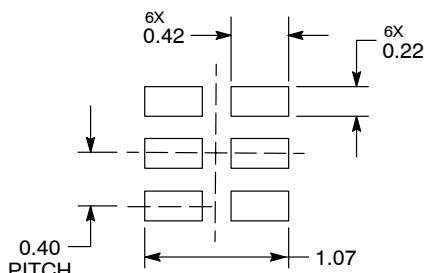
**GENERIC
MARKING DIAGRAM***



X = Specific Device Code
M = Date Code

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MOUNTING FOOTPRINT*



DIMENSIONS: MILLIMETERS

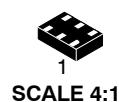
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PACKAGE DIMENSIONS

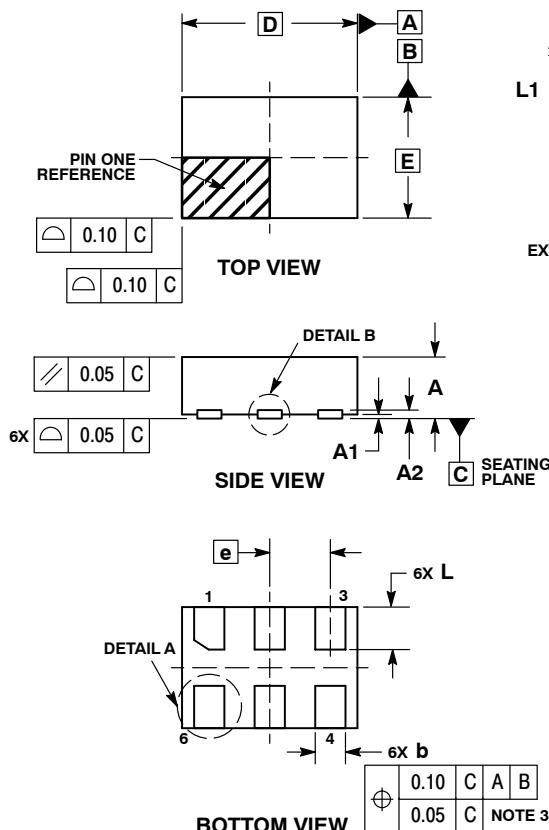
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CASE 517AQ
ISSUE O

DATE 15 MAY 2008

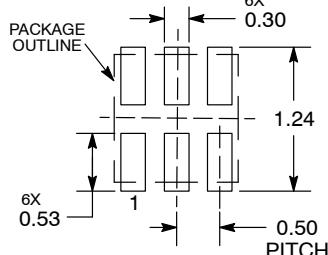


NOTES:

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.

DIM	MILLIMETERS	
	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

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**GENERIC
MARKING DIAGRAM***

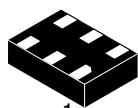


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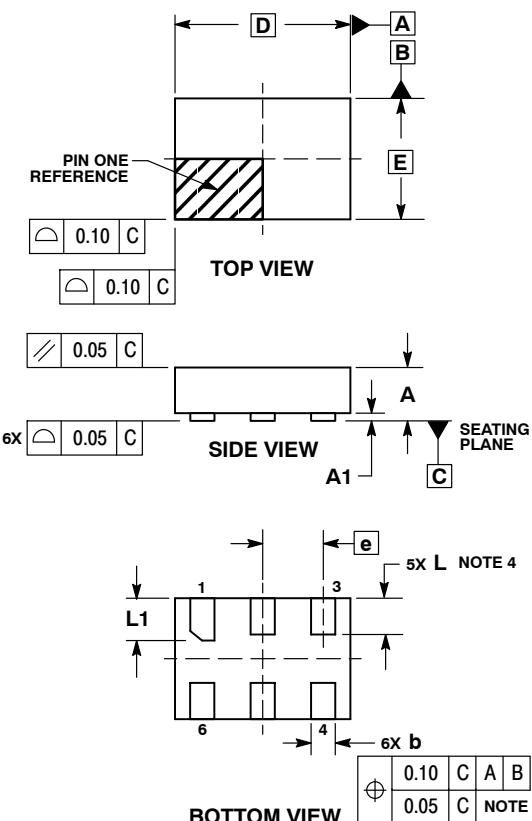
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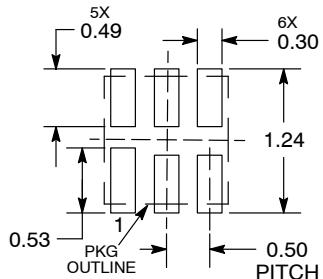
ULLGA6, 1.45x1.0, 0.5P
CASE 613AF-01
ISSUE A

DATE 06 FEB 2008



MILLIMETERS		
DIM	MIN	MAX
A	---	0.40
A1	0.00	0.05
<i>b</i>	0.15	0.25
D	1.45 BSC	
E	1.00 BSC	
<i>e</i>	0.50 BSC	
L	0.25	0.35
L1	0.30	0.40

**MOUNTING FOOTPRINT
SOLDERMASK DEFINED***



DIMENSIONS: MILLIMETERS

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