Non-Inverting 3-State Buffer, TTL Level

LSTTL-Compatible Inputs

The NLU1GT126 MiniGate[™] is an advanced CMOS high-speed non-inverting buffer in ultra-small footprint.

The NLU1GT126 requires the 3-state control input (OE) to be set Low to place the output in the high impedance state.

The device input is compatible with TTL-type input thresholds and the output has a full 5.0 V CMOS level output swing.

The NLU1GT126 input and output structures provide protection when voltages up to 7.0 V are applied, regardless of the supply voltage.

Features

- High Speed: $t_{PD} = 3.8 \text{ ns (Typ)} @ V_{CC} = 5.0 \text{ V}$
- Low Power Dissipation: $I_{CC} = 2 \mu A$ (Max) at $T_A = 25$ °C
- TTL–Compatible Input: $V_{IL} = 0.8 \text{ V}$; $V_{IH} = 2.0 \text{ V}$
- CMOS–Compatible Output:

 $V_{OH} > 0.8 \ V_{CC}; \ V_{OL} < 0.1 \ V_{CC}$ @ Load

- Power Down Protection Provided on inputs
- Balanced Propagation Delays
- Ultra-Small Packages
- These are Pb-Free Devices

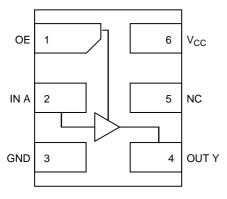


Figure 1. Pinout (Top View)



Figure 2. Logic Symbol

FUNCTION TABLE

Inp	Input		
Α	OE	Y	
L	Н	L	
Н	Н	Н	
Х	L	Z	

PIN ASSIGNMENT

1	OE
2	IN A
3	GND
4	OUT Y
5	NC
6	V _{CC}



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MARKING DIAGRAMS



UDFN6 1.2 x 1.0 CASE 517AA





ULLGA6 1.0 x 1.0 CASE 613AD





ULLGA6 1.2 x 1.0 CASE 613AE





ULLGA6 1.45 x 1.0 CASE 613AF





UDFN6 1.0 x 1.0 CASE 517BX





UDFN6 1.45 x 1.0 CASE 517AQ



9 = Device MarkingM = Date Code

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section 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.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter			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			+125	°C
Δt/ΔV	Input Transition Rise or Fall Rate $ \begin{array}{c} V_{CC} = 3.3 \ V \pm 0.3 \ V \\ V_{CC} = 5.0 \ V \pm 0.5 \ V \\ \end{array} $		0 0	100 20	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.

Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow.
 Tested to EIA / JESD78.

DC ELECTRICAL CHARACTERISTICS

				Т	A = 25 °	°C	T _A = -	+85°C		-55°C 25°C	
Symbol	Parameter	Conditions	V _{CC} (V)	Min	Тур	Max	Min	Max	Min	Max	Unit
V _{IH}	Low-Level Input Voltage		3.0 4.5 to 5.5	1.4 2.0			1.4 2.0		1.4 2.0		V
V _{IL}	Low-Level Input Voltage		3.0 4.5 to 5.5			0.53 0.8		0.53 0.8		0.53 0.8	V
V _{OH}	High-Level Output Voltage	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OH} = -50 \mu\text{A}$	3.0 4.5	2.9 4.4	3.0 4.5		2.9 4.4		2.9 4.4		V
		$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OH} = -4 \text{ mA}$ $I_{OH} = -8 \text{ mA}$	3.0 4.5	2.58 3.94			2.48 3.80		2.34 3.66		
V _{OL}	Low-Level Output Voltage	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OL} = 50 \mu A$	3.0 4.5		0	0.1 0.1		0.1 0.1		0.1 0.1	V
		$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OL} = 4 \text{ mA}$ $I_{OL} = 8 \text{ mA}$	3.0 4.5			0.36 0.36		0.44 0.44		0.52 0.52	
I _{IN}	Input Leakage Current	$0 \le V_{IN} \le 5.5 V$	0 to 5.5			±0.1		±1.0		±1.0	μΑ
I _{CC}	Quiescent Supply Current	$0 \le V_{IN} \le V_{CC}$	5.5			1.0		20		40	μΑ
ГССТ	Quiescent Supply Current	V _{IN} = 3.4 V Other Input: V _{CC} or GND	5.5			1.35		1.50		1.65	mA
I _{OPD}	Output Leakage Current	V _{OUT} = 5.5 V	0			0.5		5.0		10	μΑ
loz	3-State Leakage Current	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $V_{OUT} = V_{CC} \text{ or }$ GND	0			±0.25		±2.5		±2.5	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 (Input $t_r = t_f = 3.0 \text{ ns}$)

		V _{CC}	Test	Т	A = 25 °	°C	T _A =	+85°C		–55°C ∣25°C	
Symbol	Parameter	(V)	Condition	Min	Тур	Max	Min	Max	Min	Max	Unit
t _{PLH} , t _{PHL}	Propagation Delay, A to Y (Figures 3 and 5)	3.0 to 3.6	$C_L = 15 \text{ pF}$ $C_L = 50 \text{ pF}$		5.6 8.1	8.0 11.5	1.0 1.0	9.5 13		12 16	ns
		4.5 to 5.5	$C_L = 15 \text{ pF}$ $C_L = 50 \text{ pF}$		3.8 5.3	5.5 7.5	1.0 1.0	6.5 8.5		8.5 10.5	
t _{PZL} , t _{PZH}	Output Enable Time, OE to Y (Figures 4 and 6)	3.0 to 3.6	$C_L = 15 \text{ pF}$ $C_L = 50 \text{ pF}$		5.4 7.9	8.0 11.5	1.0 1.0	9.5 13		11.5 15	ns
		4.5 to 5.5	$C_L = 15 \text{ pF}$ $C_L = 50 \text{ pF}$		3.6 5.1	5.1 7.1	1.0 1.0	6.0 8.0		7.5 9.5	
t _{PLZ} , t _{PHZ}	Output Disable Time, OE to Y (Figures 4 and 6)	3.0 to 3.6	$C_L = 15 \text{ pF}$ $C_L = 50 \text{ pF}$		6.5 8.0	9.7 13.2	1.0 1.0	11.5 15		14.5 18.5	ns
		4.5 to 5.5	$C_L = 15 \text{ pF}$ $C_L = 50 \text{ pF}$		4.8 7.0	6.8 8.8	1.0 1.0	8.0 10		10 12	
C _{IN}	Input Capacitance				4	10		10		10	pF
C _{OUT}	3-State Output Capacitance (Output in High Impedance State)				6						pF
C _{PD}	Power Dissipation Capacitance (Note 3)	5.0			14						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}.

SWITCHING WAVEFORMS

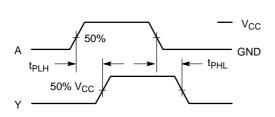
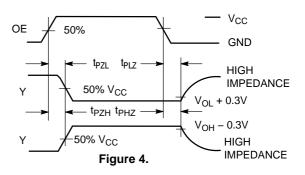
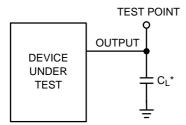


Figure 3. Switching Waveforms





*Includes all probe and jig capacitance

DEVICE UNDER TEST POINT $C_{C} = C_{C} + C_{C$

*Includes all probe and jig capacitance

Figure 5. Test Circuit

Figure 6. Test Circuit

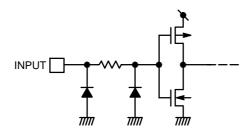


Figure 7. Input Equivalent Circuit

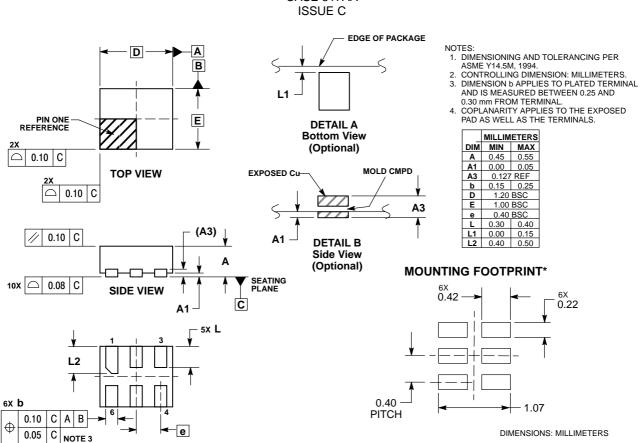
ORDERING INFORMATION

Device	Package	Shipping [†]
NLU1GT126MUTCG	UDFN6, 1.2 x 1.0, 0.4P (Pb–Free)	3000 / Tape & Reel
NLU1GT126AMX1TCG	ULLGA6, 1.45 x 1.0, 0.5P (Pb-Free)	3000 / Tape & Reel
NLU1GT126BMX1TCG	ULLGA6, 1.2 x 1.0, 0.4P (Pb-Free)	3000 / Tape & Reel
NLU1GT126CMX1TCG	ULLGA6, 1.0 x 1.0, 0.35P (Pb-Free)	3000 / Tape & Reel
NLU1GT126AMUTCG	UDFN6, 1.45 x 1.0, 0.5P (Pb-Free)	3000 / Tape & Reel
NLU1GT126CMUTCG	UDFN6, 1.0 x 1.0, 0.35P (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.

PACKAGE DIMENSIONS

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

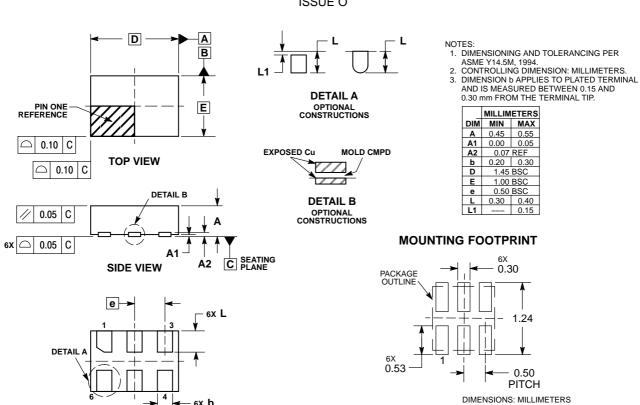


BOTTOM VIEW

^{*}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



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and

Mounting Techniques Reference Manual, SOLDERRM/D.

6X **b**

BOTTOM VIEW

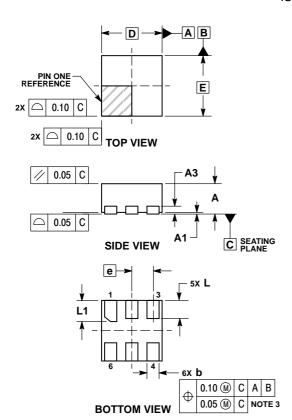
0.10 \oplus

CAB

0.05 C NOTE 3

PACKAGE DIMENSIONS

UDFN6 1.0x1.0, 0.35P CASE 517BX ISSUE O



NOTES:

- NOTES:

 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.

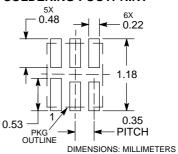
 2. CONTROLLING DIMENSION: MILLIMETERS.

 3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM TERMINAL TIP.

 4. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

	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					

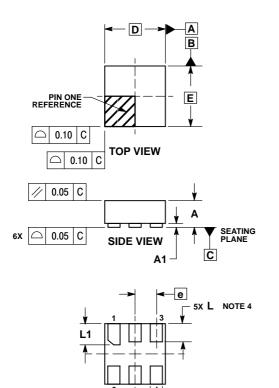
RECOMMENDED **SOLDERING FOOTPRINT***



*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

ULLGA6 1.0x1.0, 0.35P CASE 613AD ISSUE A



BOTTOM VIEW

0.10

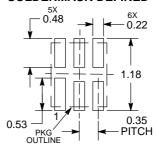
CAB

0.05 C NOTE 3

- 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.
 4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED. PACKAGE IS ALLOWED.

	MILLIMETERS					
DIM	MIN	MAX				
Α	-	0.40				
A1	0.00	0.05				
b	0.12	0.22				
D	1.00	BSC				
Е	1.00	BSC				
е	0.35 BSC					
L	0.25	0.35				
11	0.30	0.40				

MOUNTING FOOTPRINT SOLDERMASK DEFINED*

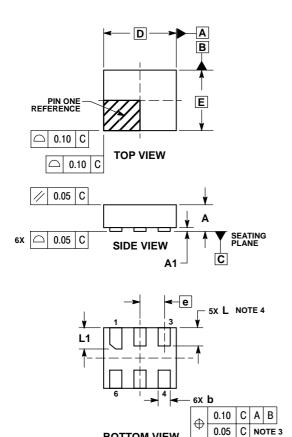


DIMENSIONS: MILLIMETERS

^{*}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

ULLGA6 1.2x1.0, 0.4P CASE 613AE ISSUE A

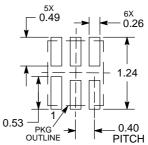


BOTTOM VIEW

- 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.
 4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

	MILLIMETERS							
DIM	MIN	MAX						
Α		0.40						
A1	0.00	0.05						
b	0.15	0.25						
D	1.20 BSC							
Е	1.00	BSC						
е	0.40 BSC							
L	0.25	0.35						
11	0.35	0.45						

MOUNTING FOOTPRINT SOLDERMASK DEFINED*

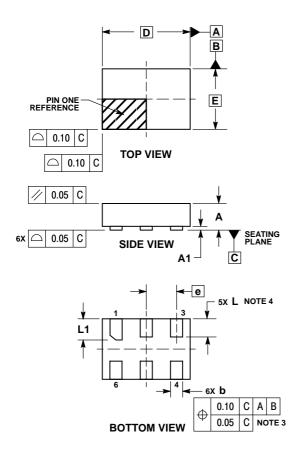


DIMENSIONS: MILLIMETERS

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PACKAGE DIMENSIONS

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



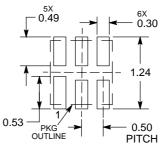
NOTES:

- ATTES.

 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
- DIMENSION 6 APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND
- 0.30 mm FROM THE TERMINAL TIP.
 A MAXIMUM OF 0.05 PULL BACK OF THE
 PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

	MILLIMETERS					
DIM	MIN	MAX				
Α		0.40				
A1	0.00	0.05				
b	0.15	0.25				
D	1.45	BSC				
E	1.00	BSC				
е	0.50 BSC					
L	0.25	0.35				
L1	0.30	0.40				

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



DIMENSIONS: MILLIMETERS

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