



**THE DATASHEET OF
NLX2G16AMX1TCG**



NLX2G16

Dual Buffer

The NLX2G16 MiniGate™ is an advanced high-speed CMOS dual non-inverting buffer in ultra-small footprint.

The NLX2G16 input and output structures provide protection when voltages up to 7.0 V are applied, regardless of the supply voltage.

Features

- High Speed: $t_{PD} = 1.8 \text{ ns}$ (Typ) @ $V_{CC} = 5.0 \text{ V}$
- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Low Power Dissipation: $I_{CC} = 1 \mu\text{A}$ (Max) at $T_A = 25^\circ\text{C}$
- 24 mA Balanced Output Source and Sink Capability
- Balanced Propagation Delays
- Overvoltage Tolerant (OVT) Input and Output Pins
- Ultra-Small Packages
- 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

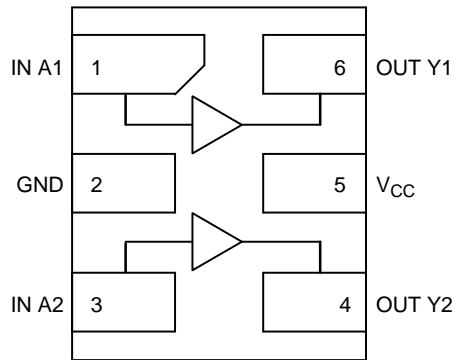


Figure 1. Pinout (Top View)

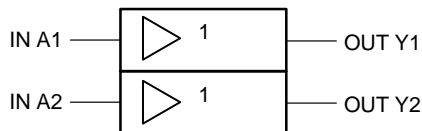


Figure 2. Logic Symbol

FUNCTION TABLE

| A | Y |
|---|---|
| L | L |
| H | H |

PIN ASSIGNMENT

| | |
|---|----------|
| 1 | IN A1 |
| 2 | GND |
| 3 | IN A2 |
| 4 | OUT Y2 |
| 5 | V_{CC} |
| 6 | OUT Y1 |



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MARKING DIAGRAMS



1

UDFN6
1.0 x 1.0
CASE 517BX



1

UDFN6
1.2 x 1.0
CASE 517AA



1

UDFN6
1.45 x 1.0
CASE 517AQ



M = Date Code

ORDERING INFORMATION

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

NLX2G16

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 $V_{IN} < GND$ | -50 | mA |
| I_{OK} | DC Output Diode Current $V_{OUT} < GND$ | -50 | mA |
| I_O | DC Output Source/Sink Current | ±50 | mA |
| I_{CC} | DC Supply Current Per Supply Pin | ±100 | mA |
| I_{GND} | DC Ground Current per Ground Pin | ±100 | 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 5) | ±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/JESD22-A114-A.
3. Tested to EIA/UESD22-A115-A.
4. Tested to JESD22-C101-A.
5. 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 $V_{CC} = 1.8 V \pm 0.18$ $V_{CC} = 2.5 V \pm 0.2 V$ $V_{CC} = 3.3 V \pm 0.3 V$ $V_{CC} = 5.0 V \pm 0.5 V$ | 0 0 0 0 | 20 20 10 5 | 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.

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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 _{IH} | Low-Level Input Voltage | | 1.65–1.95 | 0.75 x V _{CC} | | | 0.75 x V _{CC} | | 0.75 x V _{CC} | | V |
| | | | 2.3 to 5.5 | 0.70 x V _{CC} | | | 0.70 x V _{CC} | | 0.70 x V _{CC} | | |
| V _{IL} | Low-Level Input Voltage | | 1.65–1.95 | | | 0.25 x V _{CC} | | 0.25 x V _{CC} | | 0.25 x V _{CC} | V |
| | | | 2.3 – 5.5 | | | 0.30 x V _{CC} | | 0.30 x V _{CC} | | 0.30 x V _{CC} | |
| V _{OH} | High-Level Output Voltage | V _{IN} = V _{IH} or V _{IL} I _{OH} = -100 μA | 1.65 – 5.5 | V _{CC} - 0.1 | V _{CC} | | V _{CC} - 0.1 | | V _{CC} - 0.1 | | V |
| | | V _{IN} = V _{IH} or V _{IL} I _{OH} = -4 mA | 1.65 | 1.29 | 1.52 | | 1.29 | | 1.29 | | |
| | | I _{OH} = -8 mA | 2.3 | 1.9 | 2.15 | | 1.9 | | 1.9 | | |
| | | I _{OH} = -16 mA | 3.0 | 2.4 | 2.8 | | 2.4 | | 2.4 | | |
| | | I _{OH} = -24 mA | 3.0 | 2.3 | 2.68 | | 2.3 | | 2.3 | | |
| I _{OH} = -32 mA | 4.5 | 3.8 | 4.2 | | 3.8 | | 3.8 | | | | |
| V _{OL} | Low-Level Output Voltage | V _{IN} = V _{IH} or V _{IL} I _{OL} = 100 μA | 1.65 – 5.5 | | | 0.1 | | 0.1 | | 0.1 | V |
| | | V _{IN} = V _{IH} or V _{IL} I _{OL} = 4 mA | 1.65 | | 0.08 | 0.24 | | 0.24 | | 0.24 | |
| | | I _{OL} = 8 mA | 2.3 | | 0.1 | 0.3 | | 0.3 | | 0.3 | |
| | | I _{OL} = 16 mA | 3.0 | | 0.15 | 0.4 | | 0.4 | | 0.4 | |
| | | I _{OL} = 24 mA | 3.0 | | 0.22 | 0.55 | | 0.55 | | 0.55 | |
| I _{OL} = 32 mA | 4.5 | | 0.22 | 0.55 | | 0.55 | | 0.55 | | | |
| I _{IN} | Input Leakage Current | 0 ≤ V _{IN} ≤ 5.5 V | 0 to 5.5 | | | ±0.1 | | ±1.0 | | ±1.0 | μA |
| I _{OFF} | Power-Off Output Leakage Current | V _{IN} or V _{OUT} = 5.5 V | 0 | | | 1.0 | | 10 | | 10 | μA |
| I _{CC} | Quiescent Supply Current | V _{IN} = 0 V or V _{CC} | 5.5 | | | 1.0 | | 10 | | 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.

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AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3.0$ nS)

| Symbol | Parameter | V _{CC} (V) | Test Condition | T _A = 25°C | | | T _A = -55°C to +125°C | | Unit |
|--|--|---------------------|--|-----------------------|---------|-----|----------------------------------|------|------|
| | | | | Min | Typ | Max | Min | Max | |
| t _{PLH} , t _{PHL} | Propagation Delay Input A to Output | 1.65–1.95 | R _L = 1 MΩ, C _L = 15 pF | 1.8 | 8.0 | 9.6 | 1.8 | 10.2 | ns |
| | | 2.3–2.7 | R _L = 1 MΩ, C _L = 15 pF | 1.0 | 3.0 | 5.2 | 1.0 | 5.8 | |
| | | 3.0–3.6 | R _L = 1 MΩ, C _L = 15 pF | 0.8 | 2.3 | 3.6 | 0.8 | 4.0 | |
| | | | R _L = 500 Ω, C _L = 50 pF | 1.2 | 3.0 | 4.6 | 1.2 | 5.1 | |
| | | 4.5–5.5 | R _L = 1 MΩ, C _L = 15 pF | 0.5 | 1.8 | 2.9 | 0.5 | 3.2 | |
| | | | R _L = 500 Ω, C _L = 50 pF | 0.8 | 2.4 | 3.8 | 0.8 | 4.2 | |
| C _{IN} | Input Capacitance | 5.5 | V _{IN} = 0 V or V _{CC} | | 7.0 | | | | pF |
| C _{PD} | Power Dissipation Capacitance (Note 6) | 3.3 5.5 | 10 MHz V _{IN} = 0 V or V _{CC} | | 9 11 | | | | pF |

6. 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 $I_{CC(OPR)} = C_{PD} \cdot V_{CC} \cdot f_{in} + I_{CC}$. C_{PD} is used to determine the no-load dynamic power consumption: $P_D = C_{PD} \cdot V_{CC}^2 \cdot f_{in} + I_{CC} \cdot V_{CC}$.

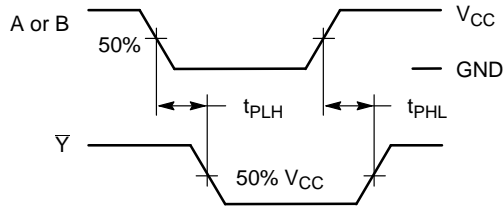
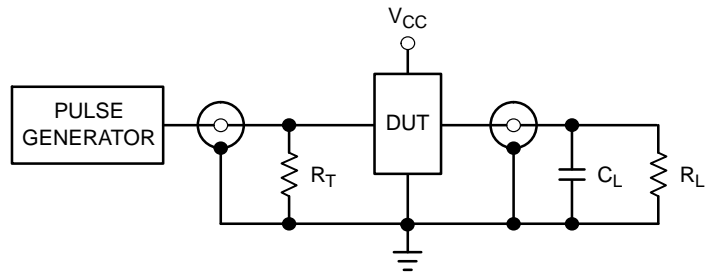


Figure 3. Switching Waveforms



$R_T = Z_{OUT}$ of pulse generator (typically 50 Ω)

Figure 4. Test Circuit

ORDERING INFORMATION

| Device | Package | Shipping† |
|--------------------------------|-----------------------------------|--------------------|
| NLX2G16MUTCG | UDFN6, 1.2 x 1.0, 0.4P (Pb-Free) | 3000 / Tape & Reel |
| NLX2G16AMUTCG, NLVX2G16AMUTCG* | UDFN6, 1.45 x 1.0, 0.5P (Pb-Free) | 3000 / Tape & Reel |
| NLX2G16CMUTCG | UDFN6, 1.0 x 1.0, 0.35P (Pb-Free) | 3000 / Tape & Reel |

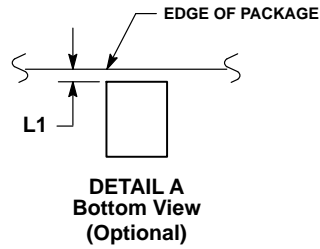
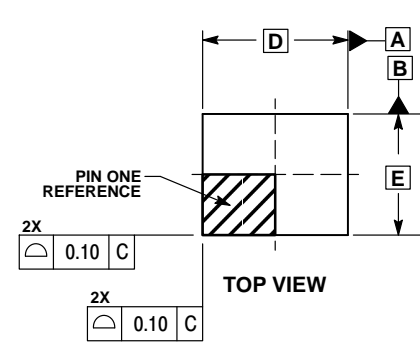
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

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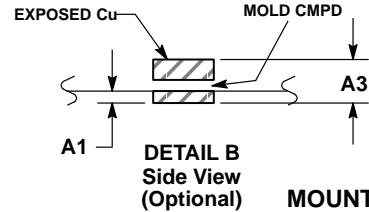
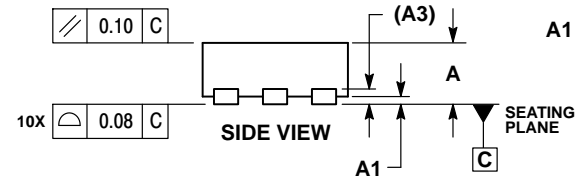
PACKAGE DIMENSIONS

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

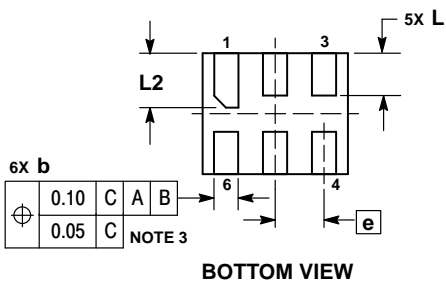
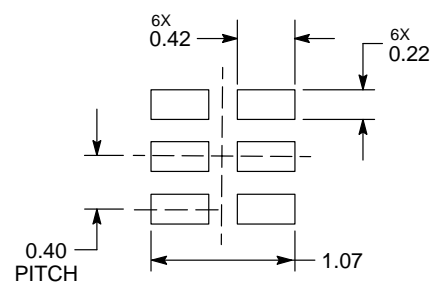


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 mm FROM TERMINAL.
 4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| 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 |



MOUNTING FOOTPRINT*



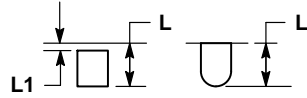
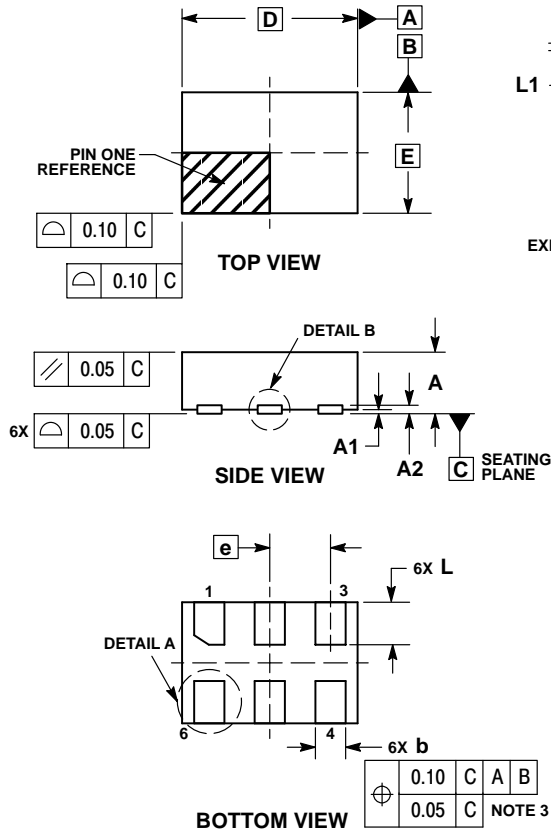
DIMENSIONS: MILLIMETERS

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

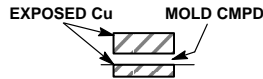
NLX2G16

PACKAGE DIMENSIONS

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



DETAIL A
OPTIONAL
CONSTRUCTIONS



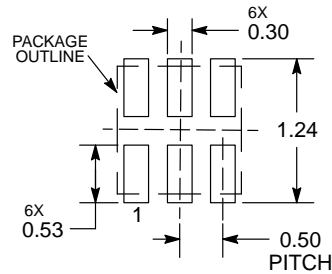
DETAIL B
OPTIONAL
CONSTRUCTIONS

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



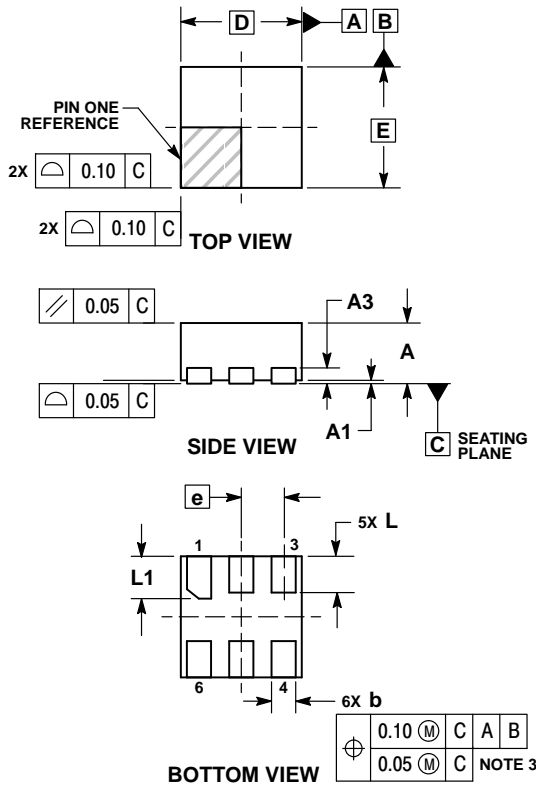
DIMENSIONS: MILLIMETERS

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

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PACKAGE DIMENSIONS

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

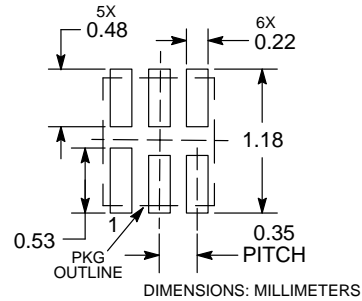


NOTES:

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 0.20 MM FROM TERMINAL TIP.
4. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

| MILLIMETERS | | |
|-------------|----------|------|
| DIM | 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.

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