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NLX2G66

Dual Bilateral Analog Switch / Digital Multiplexer

The NLX2G66 is a dual single pole, single throw (SPST) analog switch / digital multiplexer. This single supply voltage IC is designed with a sub-micron CMOS technology to provide low propagation delays (t_{pd}) and ON resistance (R_{ON}), while maintaining low power dissipation. This bi-lateral switch can be used with either analog or digital signals that may vary across the full power supply range from V_{CC} to GND.

Features

- Wide V_{CC} Operating Range: 1.65 V to 5.5 V
- OVT up to +5.5 V for Control Pin
- R_{ON} : Typically 5.5 Ω at $V_{CC} = 4.5$ V and $I_S = 32$ mA
- Rail-to-Rail Input/Output
- High On-Off Output Voltage Ratio
- High Degree of Linearity
- Ultra-Small Pb-Free, Halide-Free, RoHS-Compliant Packages
- ESD Performance: > 5000 V HBM, > 400 V MM

Typical Applications

- Cell Phones, PDAs, MP3 and other Portable Media Players

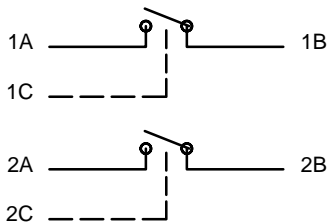


Figure 1. Analog Symbol

PIN ASSIGNMENTS

| UDFN8 | WLCSP8 | Description |
|-------|--------|-------------|
| 1 | A1 | 1A |
| 2 | B1 | 1B |
| 3 | C1 | 2C |
| 4 | D1 | GND |
| 5 | D2 | 2A |
| 6 | C2 | 2B |
| 7 | B2 | 1C |
| 8 | A2 | V_{CC} |

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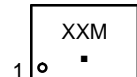
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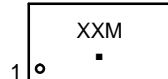
MARKING DIAGRAMS



UDFN8
MU SUFFIX
CASE 517BZ



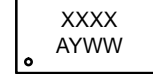
UDFN8
MU SUFFIX
CASE 517CA



XX = Specific Device Code
M = Date Code
■ = Pb-Free Package

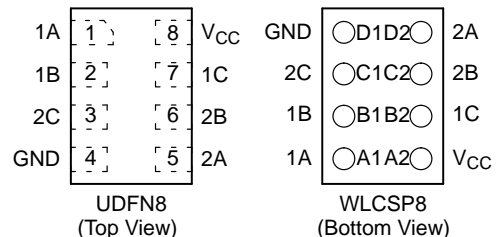


WLCSP8
FC SUFFIX
CASE 567MR



A = Assembly Location
Y = Year
WW = Work Week

PIN ASSIGNMENTS



FUNCTION TABLE

| Control Input (C) | Switch |
|-------------------|--------|
| L | OFF |
| H | ON |

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

NLX2G66

Table 1. MAXIMUM RATINGS

| Symbol | Rating | Value | Unit |
|-----------|---|--------------------------|------|
| V_{CC} | Positive DC Supply Voltage | -0.5 to +7.0 | V |
| V_S | Switch Input / Output Voltage (Pins 1A, 1B, 2A and 2B) | -0.5 to + V_{CC} + 0.5 | V |
| V_I | Digital Control Input Voltage (Pins 1C and 2C) | -0.5 to +7.0 | V |
| I_{OK} | I/O port diode current | ±50 | mA |
| I_{IK} | Control input diode current | -50 | mA |
| $I_{I/O}$ | Continuous DC Current Through Analog Switch | ±100 | mA |
| I_L | Latch-up Current, (Above V_{CC} and below GND at 125°C) | ±100 | mA |
| T_s | Storage Temperature | -65 to +150 | °C |
| V_{ESD} | ESD Withstand Voltage: Human Body Model (HBM) Machine Model (MM) | ≥ 5000 > 400 | V |

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.

Table 2. RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
|------------|---|------|----------|------|
| V_{CC} | Positive DC Supply Voltage | 1.65 | 5.5 | V |
| V_S | Switch Input / Output Voltage (Pins 1A, 2A, 1B and 2B) | GND | V_{CC} | V |
| V_I | Digital Control Input Voltage (Pins 1C and 2C) | GND | 5.5 | V |
| T_A | Operating Temperature Range | -55 | +125 | °C |
| t_r, t_f | Input Transition Rise or Fall Time (ON/OFF Control Input) | | | ns/V |
| | $V_{CC} = < 3.0\text{ V}$ | 0 | 20 | |
| | $V_{CC} = \geq 3.0\text{ V}$ | 0 | 10 | |

Table 3. ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Condition | V_{CC} | Guaranteed Limit | | | | Unit |
|-----------------|---|--|--------------|------------------|------|----------------------|----------------------|------|
| | | | | 25°C | | -55° to 125°C | | |
| | | | | Min | Max | Min | Max | |
| V_{IH} | High-Level Input Voltage, Control Input | | 1.65 to 1.95 | | | $V_{CC} \times 0.65$ | | V |
| | | | 2.3 to 5.5 | | | $V_{CC} \times 0.7$ | | |
| V_{IL} | Low-Level Input Voltage, Control Input | | 1.65 to 1.95 | | | | $V_{CC} \times 0.35$ | V |
| | | | 2.3 to 5.5 | | | | $V_{CC} \times 0.30$ | |
| I_I | Input Leakage Current, Control Input | $V_I = V_{CC}$ or GND | 5.5 | | ±0.1 | | ±1 | µA |
| $I_{S(ON)}$ | ON-State Switch Leakage Current | $V_{IS} = V_{CC}$ or GND, $V_I = V_{IH}$, $V_{OS} = \text{Open}$ | 5.5 | | ±0.1 | | ±1 | µA |
| $I_{S(OFF)}$ | OFF-State Switch Leakage Current | $V_{IS} = V_{CC}$ and $V_{OS} = \text{GND}$, or $V_{IS} = \text{GND}$ and $V_{OS} = V_{CC}$ GND, $V_I = V_{IL}$. | 5.5 | | ±0.1 | | ±1 | µA |
| I_{CC} | Quiescent Supply Current | $V_I = V_{CC}$ or GND | 5.5 | | 1.0 | | 10 | µA |
| ΔI_{CC} | Supply Current Change | $V_I = V_{CC} - 0.6$ | 5.5 | | | | 500 | µA |
| C_I | Control Input Capacitance | | 5 | | | | 3.0 | pF |
| $C_{I/O(Off)}$ | Switch OFF Input / Output Capacitance | See Figure 3 | 5 | | | | 6.0 | pF |
| $C_{I/O(On)}$ | Switch ON Input / Output Capacitance | See Figure 4 | 5 | | | | 13 | pF |

NLX2G66

Table 4. SWITCHING CHARACTERISTICS

| Symbol | Parameter | Condition | V _{CC} | Guaranteed Limit | | Unit |
|--|--|--|-----------------|------------------|-----|------|
| | | | | -55° to 125°C | | |
| | | | | Min | Max | |
| t _{PLH} , t _{PHL} | Propagation Delay, A to B, B to A | C _L = 30 pF, R _L = 1 kΩ | 1.8 | | 6.5 | ns |
| | | | 2.5 | | 3.3 | |
| | | C _L = 50 pF, R _L = 500 Ω | 3.3 | | 2.5 | |
| | | | 5.0 | | 2.2 | |
| t _{EN} (t _{PZL} , t _{PZH}) | Enable Time, C to Analog Output (A or B) | C _L = 50 pF, R _L = 500 Ω See Figure 6 | 1.8 | | 10 | ns |
| | | | 2.5 | | 6.5 | |
| | | | 3.3 | | 5.5 | |
| | | | 5.0 | | 4.9 | |
| t _{DIS} (t _{PLZ} , t _{PHZ}) | Disable Time, C to Analog Output (A or B) | C _L = 50 pF, R _L = 500 Ω See Figure 6 | 1.8 | | 9.0 | ns |
| | | | 2.5 | | 7.2 | |
| | | | 3.3 | | 6.5 | |
| | | | 5.0 | | 6.0 | |

Table 5. ANALOG SWITCH CHARACTERISTICS

| Symbol | Parameter | Conditions | V _{CC} | 25°C | -55° to 125°C | | Unit | |
|-----------------------|---|---|------------------------|------|---------------|-----|-------|-----|
| | | | | Typ | Min | Max | | |
| R _{ON} | On-Resistance | V _{IS} = V _{CC} or GND, V _I = V _{IH} , See Figure 2 | I _S = 4 ma | 1.65 | 12 | | 30 | Ω |
| | | | I _S = 8 ma | 2.3 | 9 | | 20 | |
| | | | I _S = 24 ma | 3.0 | 7.5 | | 15 | |
| | | | I _S = 32 ma | 4.5 | 5.5 | | 13 | |
| R _{ON(peak)} | Peak On-Resistance | V _{IS} = GND to V _{CC} ; V _I = V _{IH} , See Figure 2 | I _S = 4 ma | 1.65 | 74.5 | | 220 | Ω |
| | | | I _S = 8 ma | 2.3 | 20 | | 75 | |
| | | | I _S = 24 ma | 3.0 | 11.5 | | 25 | |
| | | | I _S = 32 ma | 4.5 | 7.5 | | 17 | |
| ΔR _{ON} | On-Resistance Mismatch between Switches | V _{IS} = GND to V _{CC} ; V _I = V _{IH} , See Figure 2 | I _S = 4 ma | 1.65 | | | 8.0 | Ω |
| | | | I _S = 8 ma | 2.3 | | | 5.0 | |
| | | | I _S = 24 ma | 3.0 | | | 3.0 | |
| | | | I _S = 32 ma | 4.5 | | | 2.0 | |
| BW | Bandwidth (f _{-3dB}) | R _L = 50 Ω, C _L = 5 pF, f _N = Sine Wave See Figure 8 | 1.65 | | | | > 270 | MHz |
| | | | 2.3 | | | | > 270 | |
| | | | 3.0 | | | | > 270 | |
| | | | 4.5 | | | | > 270 | |

NLX2G66

Table 5. ANALOG SWITCH CHARACTERISTICS (continued)

| Symbol | Parameter | Conditions | V _{CC} | 25°C | Unit |
|--------------------|--------------------------------------|---|-----------------|-------|------------------|
| | | | | Typ | |
| ISO _{Off} | Off-Channel Feedthrough Isolation | R _L = 600 Ω, C _L = 50 pF, f _{IN} = 1 MHz Sine Wave See Figure 9 | 1.65 | -70 | dB |
| | | | 2.3 | -70 | |
| | | | 3.0 | -70 | |
| | | | 4.5 | -70 | |
| | | R _L = 50 Ω, C _L = 5 pF, f _{IN} = 1 MHz Sine Wave See Figure 9 | 1.65 | -60 | |
| | | | 2.3 | -60 | |
| | | | 3.0 | -60 | |
| | | | 4.5 | -60 | |
| XTalk | Crosstalk Between Switches | R _L = 600 Ω, C _L = 50 pF, f _{IN} = 1 MHz Sine Wave See Figure 10 | 1.65 | -100 | dB |
| | | | 2.3 | -100 | |
| | | | 3.0 | -100 | |
| | | | 4.5 | -100 | |
| | | R _L = 50 Ω, C _L = 5 pF, f _{IN} = 1 MHz Sine Wave See Figure 10 | 1.65 | -90 | |
| | | | 2.3 | -90 | |
| | | | 3.0 | -90 | |
| | | | 4.5 | -90 | |
| | Feedthrough Noise, Control to Switch | R _L = 600 Ω, C _L = 50 pF, f _{IN} = 1 MHz Square Wave, t _r = t _f = 2 ns, See Figure 11 | 1.65 | 10 | mV _{pp} |
| | | | 2.3 | 10 | |
| | | | 3.0 | 10 | |
| | | | 4.5 | 15 | |
| THD | Total Harmonic Distortion | C _L = 50 pF, R _L = 50 Ω, f _{IN} = 600 Hz to 20 KHz Sine Wave, See Figure 12 | 2.3 | 0.025 | % |
| | | | 3.0 | 0.015 | |
| | | | 4.5 | 0.01 | |

Table 6. POWER DISSIPATION CHARACTERISTICS

| Symbol | Parameter | Conditions | V _{CC} | 25°C | Unit |
|-----------------|-------------------------------|------------|-----------------|------|------|
| | | | | Typ | |
| C _{PD} | Power Dissipation Capacitance | f = 10 MHz | 1.65 | 8.0 | pF |
| | | | 2.3 | 8.9 | |
| | | | 3.0 | 9.6 | |
| | | | 4.5 | 10.9 | |

NLX2G66

Table 7. DEVICE ORDERING INFORMATION

| Device Order Number | Package | Shipping† |
|-----------------------------------|--|--------------------|
| NLX2G66DMUTAG | UDFN8–0.5P, 1.95 mm x 1.0 mm (Pb–Free) | 3000 / Tape & Reel |
| NLX2G66DMUTCG | UDFN8–0.5P, 1.95 mm x 1.0 mm (Pb–Free) | 3000 / Tape & Reel |
| NLX2G66MU3TCG (In Development) | UDFN8–0.35P, 1.45 mm x 1.0 mm (Pb–Free) | 3000 / Tape & Reel |
| NLX2G66FCTAG | WLCSP8, 1.888 mm x 0.888 mm (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.

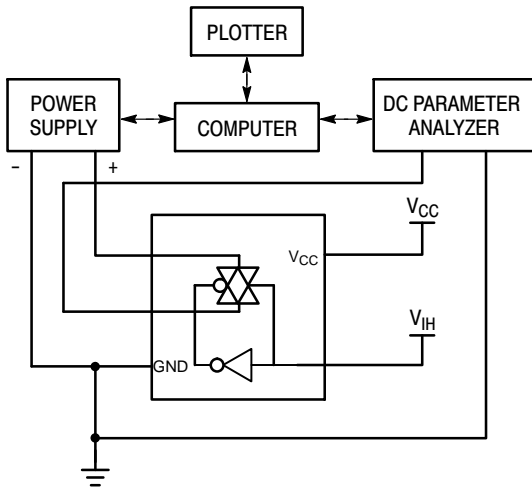


Figure 2. On Resistance Test Set-Up

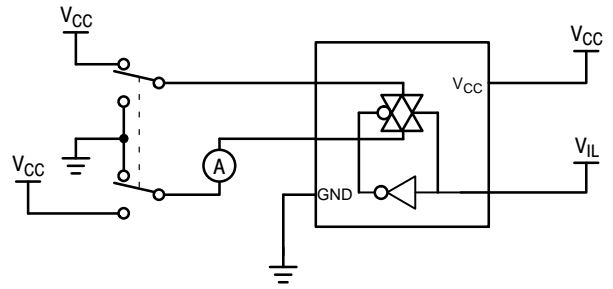


Figure 3. Maximum Off-Channel Leakage Current Test Set-Up

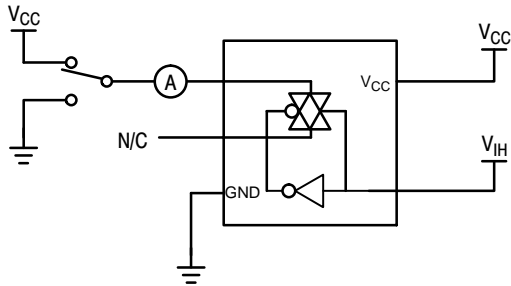


Figure 4. Maximum On-Channel Leakage Current Test Set-Up

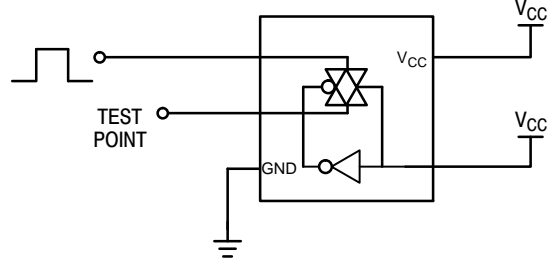


Figure 5. Propagation Delay Test Set-Up

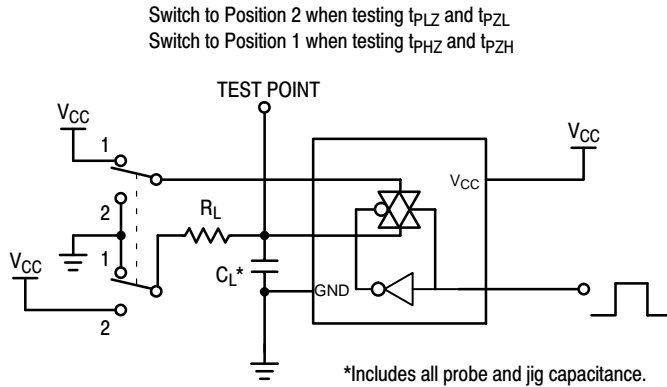


Figure 6. Propagation Delay Output Enable/Disable Test Set-Up

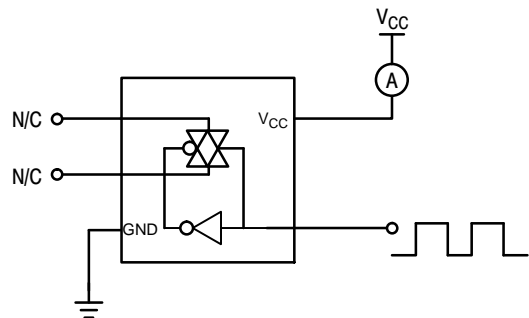


Figure 7. Power Dissipation Capacitance Test Set-Up

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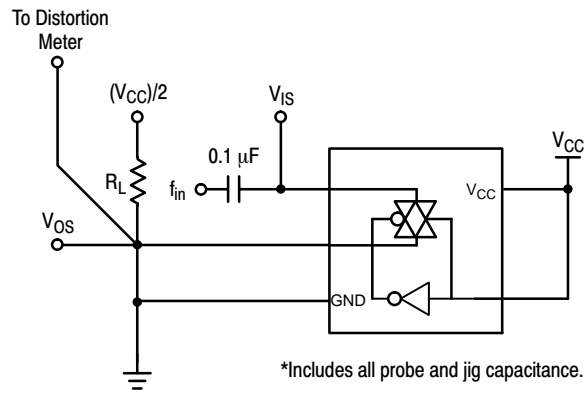


Figure 12. Total Harmonic Distortion Test Set-Up

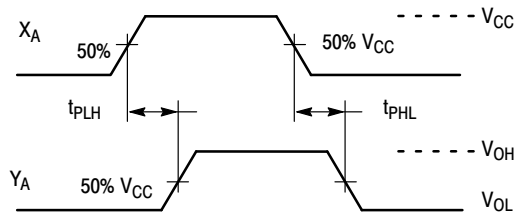


Figure 13. Propagation Delay, Analog In to Analog Out Waveforms

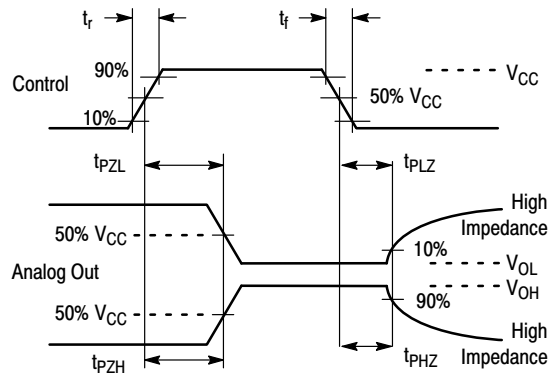
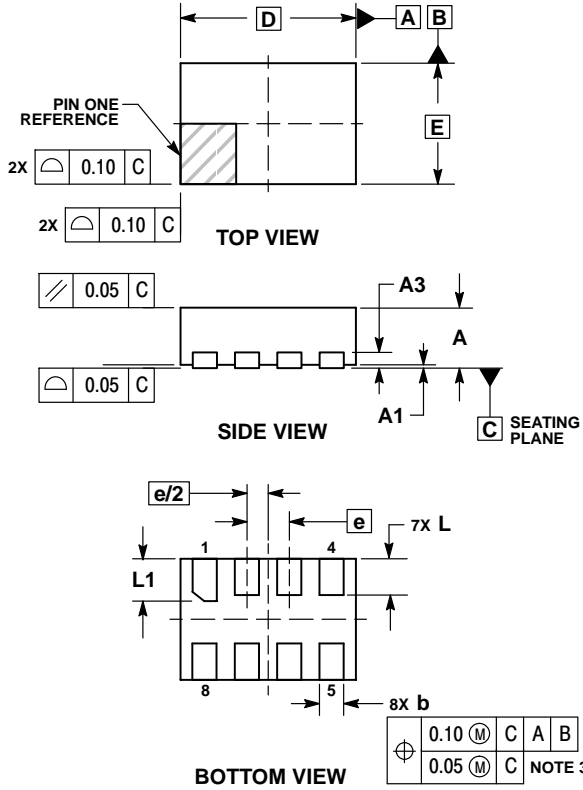


Figure 14. Propagation Delay, ON/OFF Control

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PACKAGE DIMENSIONS

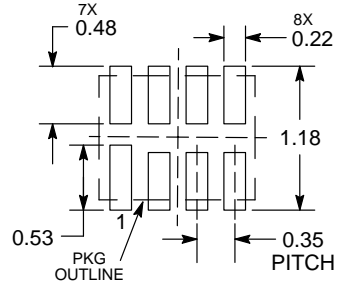
UDFN8 1.45x1.0, 0.35P
CASE 517BZ
ISSUE O



- 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.

| DIM | MILLIMETERS | |
|-----|-------------|------|
| | MIN | MAX |
| A | 0.45 | 0.55 |
| A1 | 0.00 | 0.05 |
| A3 | 0.13 REF | |
| b | 0.15 | 0.25 |
| D | 1.45 BSC | |
| E | 1.00 BSC | |
| e | 0.35 BSC | |
| L | 0.25 | 0.35 |
| L1 | 0.30 | 0.40 |

RECOMMENDED SOLDERING FOOTPRINT*



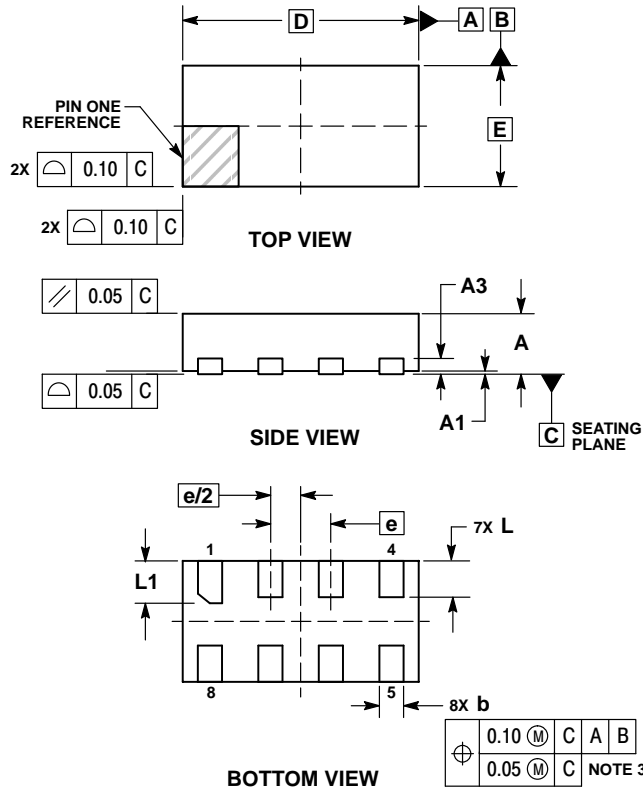
DIMENSIONS: MILLIMETERS

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

NLX2G66

PACKAGE DIMENSIONS

UDFN8 1.95x1.0, 0.5P
CASE 517CA
ISSUE O

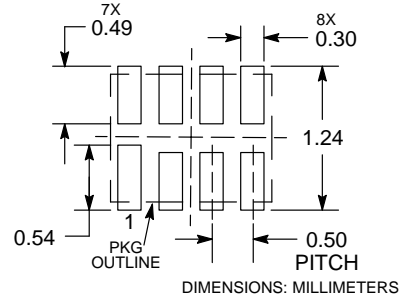


NOTES:

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.

| DIM | MILLIMETERS | |
|-----|-------------|------|
| | MIN | MAX |
| A | 0.45 | 0.55 |
| A1 | 0.00 | 0.05 |
| A3 | 0.13 REF | |
| b | 0.15 | 0.25 |
| D | 1.95 BSC | |
| E | 1.00 BSC | |
| e | 0.50 BSC | |
| L | 0.25 | 0.35 |
| L1 | 0.30 | 0.40 |

RECOMMENDED SOLDERING FOOTPRINT*

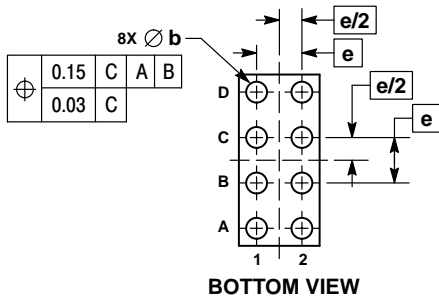
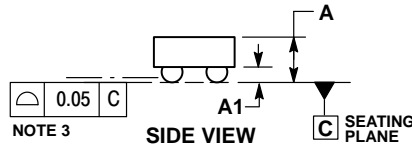
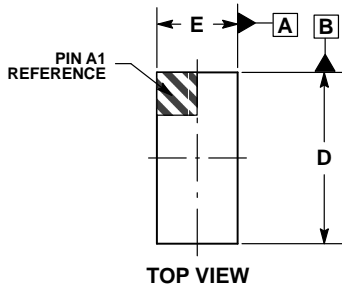


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NLX2G66

PACKAGE DIMENSIONS

WLCSP8, 1.888x0.888
CASE 567MR
ISSUE O

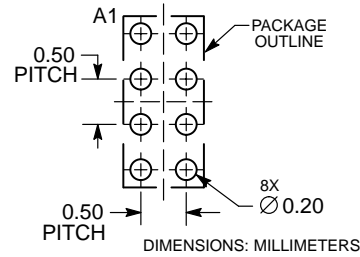


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. COPLANARITY APPLIES TO SPHERICAL CROWNS OF SOLDER BALLS.

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | — | 0.50 |
| A1 | 0.15 | 0.19 |
| b | 0.21 | 0.25 |
| D | 1.858 | 1.918 |
| E | 0.858 | 0.918 |
| e | 0.50 BSC | |

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