

NLX3G14

Triple Schmitt-Trigger Inverter

The NLX3G14 MiniGate™ is an advanced high-speed CMOS triple Schmitt-trigger inverter in ultra-small footprint.

The NLX3G14 input and output structures provide protection when voltages up to 7.0 V are applied, regardless of the supply voltage.

The NLX3G14 can be used to enhance noise immunity or to square up slowly changing waveforms.

Features

- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Low Power Dissipation: $I_{CC} = 1 \mu A$ (Max) at $T_A = 25^\circ C$
- 24 Balanced Output Source and Sink Capability
- Balanced Propagation Delays
- Overvoltage Tolerant (OVT) Input and Output Pins
- Ultra-Small Packages
- These are Pb-Free Devices

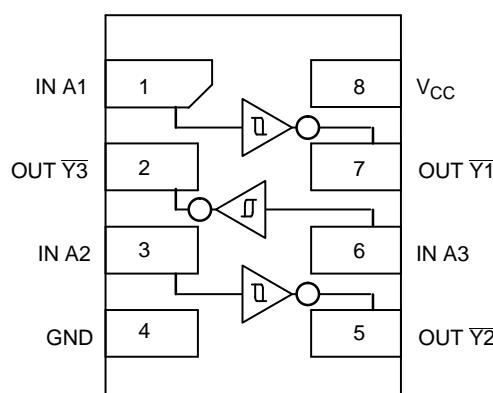


Figure 1. Pinout (Top View)

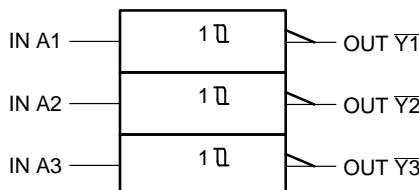


Figure 2. Logic Symbol

FUNCTION TABLE

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

PIN ASSIGNMENT

| | |
|---|-----------------|
| 1 | IN A1 |
| 2 | OUT \bar{Y}_3 |
| 3 | IN A2 |
| 4 | GND |
| 5 | OUT \bar{Y}_2 |
| 6 | IN A3 |
| 7 | OUT \bar{Y}_1 |
| 8 | V_{CC} |



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MARKING DIAGRAMS



F, AC, 2 = Specific Device Code
M = Date Code
▪ = Pb-Free Package

ORDERING INFORMATION

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

NLX3G14

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_K | 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 | |
| V_{ESD} | ESD Withstand Voltage Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4) | > 2000 > 200 N/A | V |
| $I_{LATCHUP}$ | 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 / JESD22-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 $V_{CC} = 2.5 \text{ V} \pm 0.2 \text{ V}$ $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$ $V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$ | 0 0 0 | No Limit No Limit No Limit | 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.

NLX3G14

DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Conditions | V _{CC} (V) | T _A = 25 °C | | | T _A = +85°C | | T _A = -55°C to +125°C | | |
|------------------|-----------------------------------|--|---|---|---|---|---|---|---|---|----|
| | | | | Min | Typ | Max | Min | Max | Min | Max | |
| V _{T+} | Positive Threshold Voltage | | 1.65 2.3 2.7 3.0 3.0 4.5 | 0.6 1.0 1.2 1.3 1.9 2.2 | 1.0 1.5 1.7 1.9 2.7 3.3 | 1.4 1.8 2.0 2.2 3.1 3.6 | 0.6 1.0 1.2 1.3 1.9 2.2 | 1.4 1.8 2.0 2.2 3.1 3.6 | 0.6 1.0 1.2 1.3 1.9 2.2 | V | |
| V _{T-} | Negative Threshold Voltage | | 1.65 2.3 2.7 3.0 3.0 4.5 | 0.2 0.4 0.5 0.6 1.0 1.2 | 0.5 0.75 0.87 1.0 1.5 1.9 | 0.8 1.15 1.4 1.5 2.0 2.3 | 0.2 0.4 0.5 0.6 1.0 1.2 | 0.8 1.15 1.4 1.5 2.0 2.3 | 0.2 0.4 0.5 0.6 1.0 1.2 | V | |
| V _H | Hysteresis Voltage | | 1.65 2.3 2.7 3.0 3.0 4.5 | 0.1 0.25 0.3 0.4 0.6 0.7 | 0.48 0.75 0.83 0.93 1.2 1.4 | 0.9 1.1 1.15 1.2 1.5 1.7 | 0.1 0.25 0.3 0.4 0.6 0.7 | 0.9 1.1 1.15 1.2 1.5 1.7 | 0.1 0.25 0.3 0.4 0.6 0.7 | V | |
| V _{OH} | Minimum High-Level Output Voltage | V _{IN} ≤ V _{T-MIN} I _{OH} = -100 μA | 1.65 to 5.5 | V _{CC} - 0.1 | V _{CC} | | V _{CC} - 0.1 | | V _{CC} - 0.1 | | V |
| | | V _{IN} ≤ V _{T-MIN} I _{OH} = -4 mA I _{OH} = -8 mA I _{OH} = -12 mA I _{OH} = -16 mA I _{OH} = -24 mA I _{OH} = -32 mA | 1.65 2.3 2.7 3.0 3.0 4.5 | 1.29 1.9 2.2 2.4 2.3 3.8 | 1.52 2.1 2.4 2.7 2.5 4.0 | | 1.29 1.9 2.2 2.4 2.3 3.8 | | 1.29 1.8 2.1 2.3 2.2 3.7 | | |
| V _{OL} | Maximum Low-Level Output Voltage | V _{IN} ≥ V _{T+MAX} I _{OL} = 100 μA | 1.65 to 5.5 | | 0 | 0.1 | | 0.1 | | 0.1 | V |
| | | V _{IN} ≥ V _{T+MAX} I _{OH} = 4 mA I _{OH} = 8 mA I _{OH} = 12 mA I _{OH} = 16 mA I _{OH} = 24 mA I _{OH} = 32 mA | 1.65 2.3 2.7 3.0 3.0 4.5 | | 0.08 0.2 0.22 0.28 0.38 0.42 | 0.24 0.3 0.4 0.4 0.55 0.55 | | 0.24 0.3 0.4 0.4 0.55 0.55 | | 0.24 0.4 0.5 0.5 0.55 0.65 | |
| 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 _{OUT} = 5.5 V | 0 | | | 1.0 | | 10 | | 10 | μA |
| I _{CC} | Quiescent Supply Current | 0 ≤ V _{IN} ≤ 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.

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

| Symbol | Parameter | V_{CC} (V) | Test Condition | $T_A = 25^\circ C$ | | | $T_A = +85^\circ C$ | | $T_A = -55^\circ C$ to $+125^\circ C$ | | Unit |
|--------------------|---|-----------------|---|--------------------|------------|-----|---------------------|-----|--|-----|------|
| | | | | Min | Typ | Max | Min | Max | Min | Max | |
| t_{PLH}, t_{PHL} | Propagation Delay, Input A to Output Y | 2.3–2.7 | $R_L = 1 M\Omega$, $C_L = 15 pF$ | 1.8 | 4.3 | 7.4 | 1.8 | 8.1 | 1.8 | 9.1 | ns |
| | | 3.0–3.6 | $R_L = 1 M\Omega$, $C_L = 15 pF$ | 1.5 | 3.3 | 5.0 | 1.5 | 5.5 | 1.5 | 6.5 | |
| | | | $R_L = 500 \Omega$, $C_L = 50 pF$ | 1.8 | 4.0 | 6.0 | 1.8 | 6.6 | 1.8 | 7.6 | |
| | | 4.5–5.5 | $R_L = 1 M\Omega$, $C_L = 15 pF$ | 1.0 | 2.7 | 4.1 | 1.0 | 4.5 | 1.0 | 5.5 | |
| | | | $R_L = 500 \Omega$, $C_L = 50 pF$ | 1.2 | 3.2 | 4.9 | 1.2 | 5.4 | 1.2 | 6.4 | |
| C_{IN} | Input Capacitance | 5.5 | $V_{IN} = 0 V$ or V_{CC} | | 2.5 | | | | | | pF |
| C_{PD} | Power Dissipation Capacitance (Note 6) | 3.3 5.5 | 10 MHz $V_{IN} = 0 V$ or V_{CC} | | 11 12.5 | | | | | | 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: $P_D = C_{PD} \cdot V_{CC}^2 \cdot f_{in} + I_{CC} \cdot V_{CC}$.

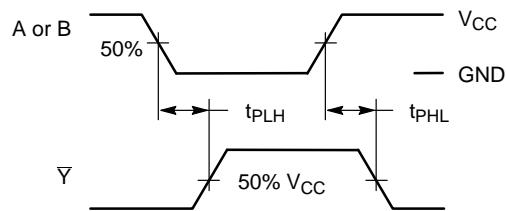
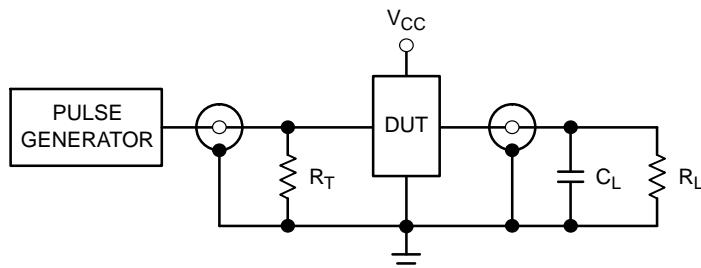


Figure 3. Switching Waveforms



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

Figure 4. Test Circuit

NLX3G14

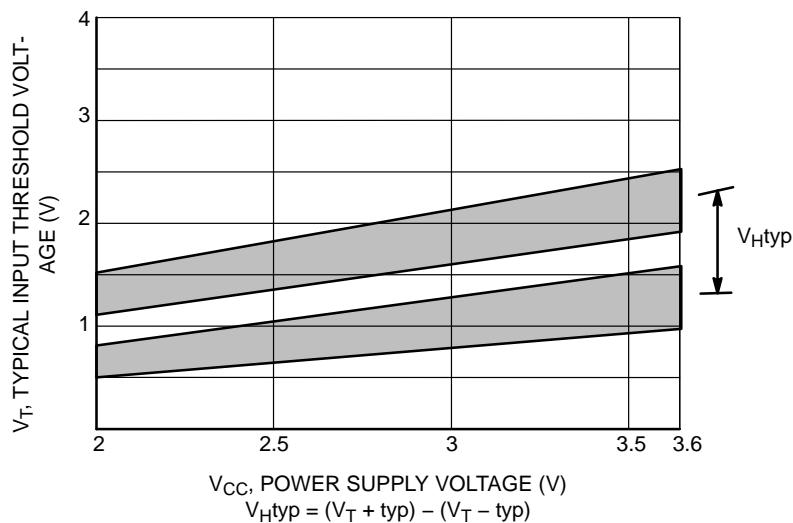
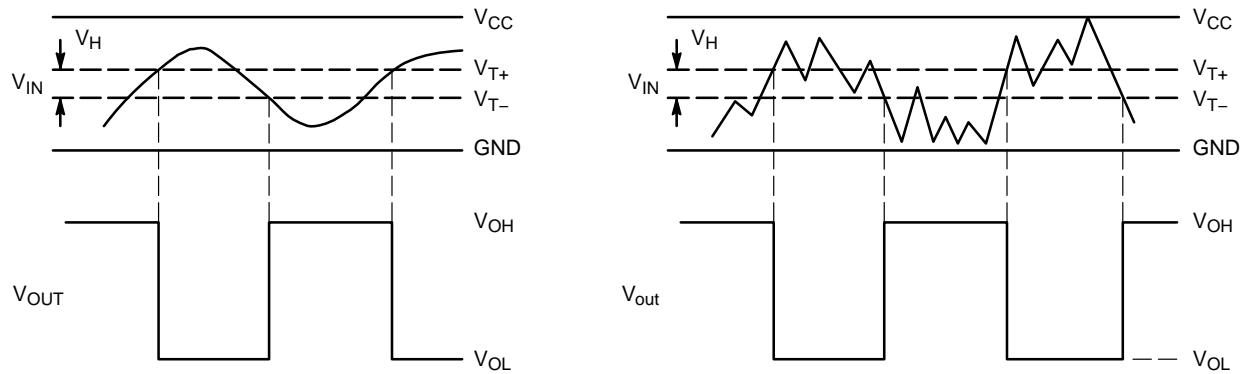


Figure 5. Typical Input Threshold, V_{T+} , V_{T-} versus Power Supply Voltage



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

(b) A Schmitt-Trigger Offers Maximum Noise Immunity

Figure 6. Typical Schmitt-Trigger Applications

ORDERING INFORMATION

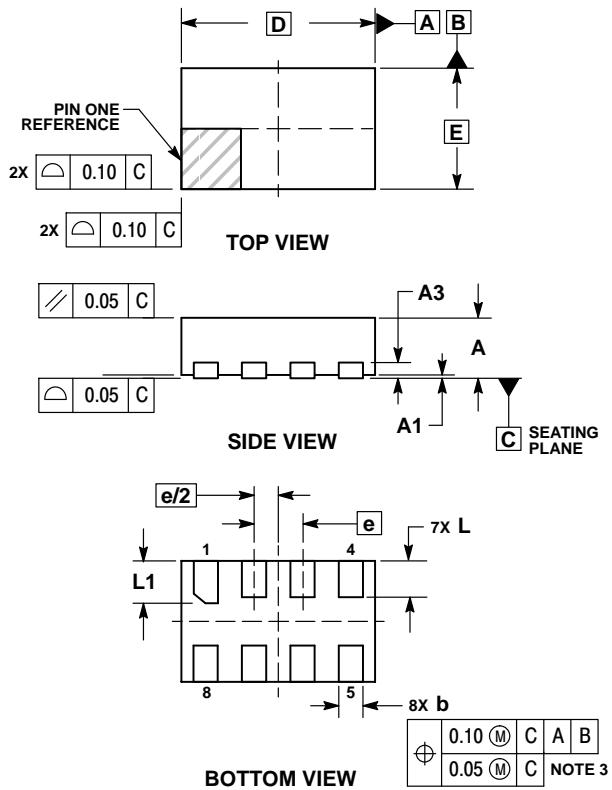
| Device | Package | Shipping [†] |
|-----------------------------------|---------------------------------------|-----------------------|
| NLX3G14DMUTCG (In Development) | UDFN8, 1.95 x 1.0, 0.5P (Pb-Free) | 3000 / Tape & Reel |
| NLX3G14EMUTCG (In Development) | UDFN8, 1.6 x 1.0, 0.4P (Pb-Free) | 3000 / Tape & Reel |
| NLX3G14FMUTCG | UDFN8, 1.45 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.

NLX3G14

PACKAGE DIMENSIONS

UDFN8 1.6x1.0, 0.4P
CASE 517BY
ISSUE O



RECOMMENDED SOLDERING FOOTPRINT*

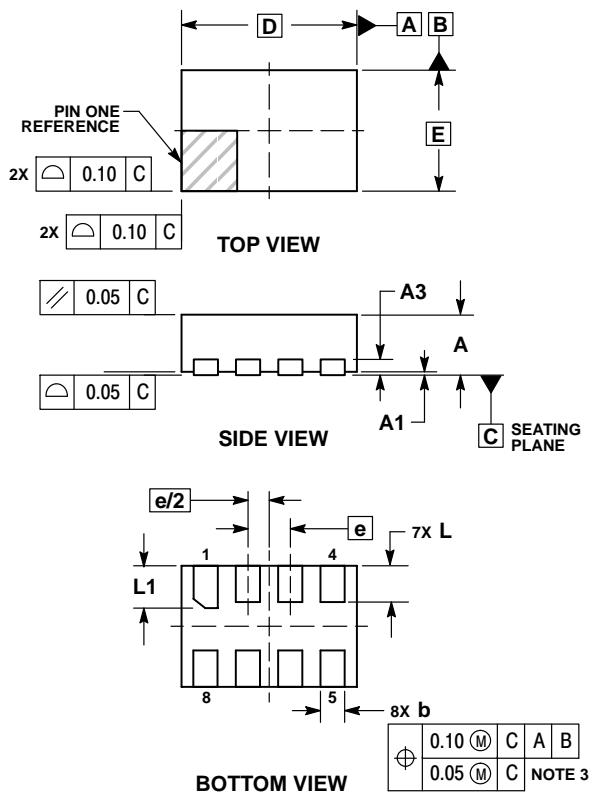
7X 0.49 8X 0.26
 1.24
 0.53 PKG OUTLINE 0.40 PITCH

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

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

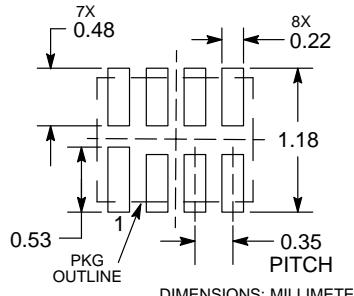


NOTES:

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.

| MILLIMETERS | | |
|-------------|----------|------|
| DIM | 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***

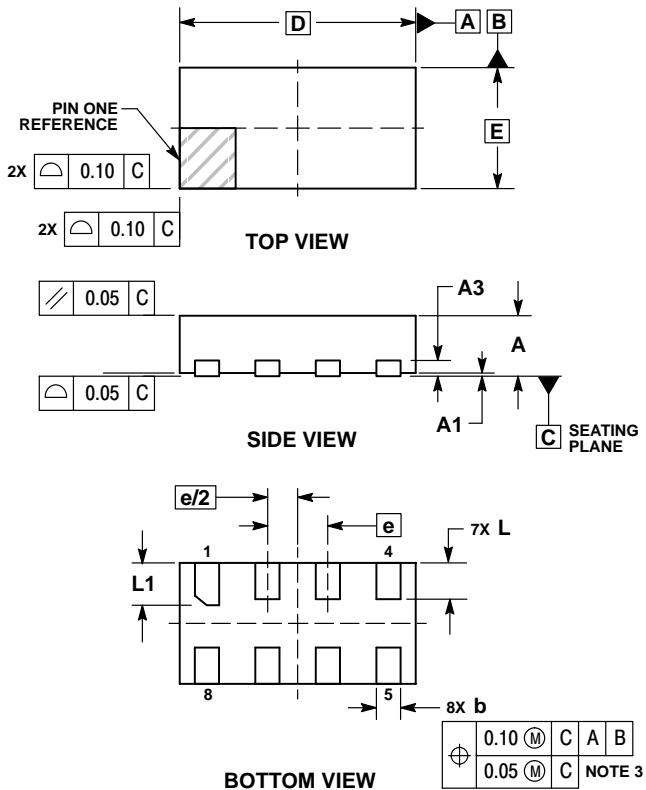


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NLX3G14

PACKAGE DIMENSIONS

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

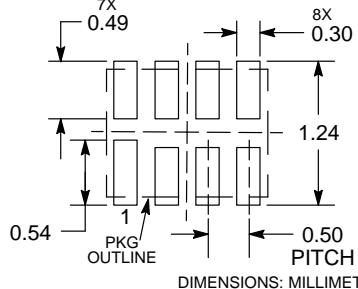


NOTES:

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.

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JONHON

«JONHON» (основан в 1970 г.)

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(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

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