

NVD6828NL

Power MOSFET

90 V, 20 mΩ, 41 A, Single N-Channel

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- High Current Capability
- Avalanche Energy Specified
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|----------------|------------|------|
| Drain-to-Source Voltage | V_{DSS} | 90 | V |
| Gate-to-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current $R_{\theta JC}$ (Notes 1 & 3) | I_D | 41 | A |
| | | 29 | |
| Power Dissipation $R_{\theta JC}$ (Note 1) | P_D | 83 | W |
| | | 42 | |
| Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2 & 3) | I_D | 8.7 | A |
| | | 6.1 | |
| Power Dissipation $R_{\theta JA}$ (Notes 1 & 2) | P_D | 3.8 | W |
| | | 1.9 | |
| Pulsed Drain Current | I_{DM} | 206 | A |
| Operating Junction and Storage Temperature | T_J, T_{stg} | -55 to 175 | °C |
| Source Current (Body Diode) | I_S | 40 | A |
| Single Pulse Drain-to-Source Avalanche Energy ($T_J = 25^\circ\text{C}$, $V_{GS} = 10$ V, $I_{L(pk)} = 24.5$ A, $L = 0.3$ mH, $R_G = 25$ Ω) | E_{AS} | 90 | mJ |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | T_L | 260 | °C |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL RESISTANCE MAXIMUM RATINGS

| Parameter | Symbol | Value | Unit |
|---|-----------------|-------|------|
| Junction-to-Case – Steady State (Drain) | $R_{\theta JC}$ | 1.8 | °C/W |
| Junction-to-Ambient – Steady State (Note 2) | $R_{\theta JA}$ | 40 | |

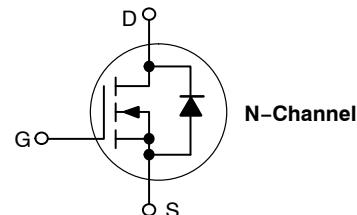
1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
3. Continuous DC current rating. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.



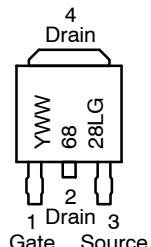
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| $V_{(BR)DSS}$ | $R_{DS(on)}$ | I_D |
|---------------|---------------|-------|
| 90 V | 20 mΩ @ 10 V | |
| | 25 mΩ @ 4.5 V | 41 A |



MARKING DIAGRAMS & PIN ASSIGNMENT



Y = Year
 WW = Work Week
 6828L = Device Code
 G = Pb-Free Package

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|--------------|----------------|-----------------------|
| NVD6828NLT4G | DPAK (Pb-Free) | 2500/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.

NVD6828NL

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|-----------|--------|----------------|-----|-----|-----|------|
|-----------|--------|----------------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|---|------------------------------------|--|------------------------|----|------|-------|
| Drain-to-Source Breakdown Voltage | V _{(BR)DSS} | V _{GS} = 0 V, I _D = 250 μA | 90 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | V _{(BR)DSS/T_J} | | | 87 | | mV/°C |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{GS} = 0 V, V _{DS} = 90 V | T _J = 25°C | | 1.0 | μA |
| | | | T _J = 125°C | | 100 | |
| Gate-to-Source Leakage Current | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±20 V | | | ±100 | nA |

ON CHARACTERISTICS (Note 4)

| | | | | | | |
|--|-----------------------------------|---|-----|------|-----|-------|
| Gate Threshold Voltage | V _{GS(TH)} | V _{GS} = V _{DS} , I _D = 250 μA | 1.5 | | 2.5 | V |
| Negative Threshold Temperature Coefficient | V _{GS(TH)/T_J} | | | -6.5 | | mV/°C |
| Drain-to-Source On Resistance | R _{DS(on)} | V _{GS} = 10 V, I _D = 20 A | | 16.5 | 20 | mΩ |
| | | V _{GS} = 4.5 V, I _D = 20 A | | 19.1 | 25 | |

CHARGES, CAPACITANCES AND GATE RESISTANCES

| | | | | | | |
|------------------------------|---------------------|---|--|------|--|----|
| Input Capacitance | C _{iss} | V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 25 V | | 2900 | | pF |
| Output Capacitance | C _{oss} | | | 175 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 126 | | |
| Total Gate Charge | Q _{G(TOT)} | V _{GS} = 4.5 V, V _{DS} = 72 V, I _D = 20 A | | 32 | | nC |
| | | V _{GS} = 10 V, V _{DS} = 72 V, I _D = 20 A | | 61 | | |
| Threshold Gate Charge | Q _{G(TH)} | V _{GS} = 10 V, V _{DS} = 72 V, I _D = 20 A | | 3.3 | | |
| Gate-to-Source Charge | Q _{GS} | | | 9.0 | | |
| Gate-to-Drain Charge | Q _{GD} | | | 16 | | |

SWITCHING CHARACTERISTICS (Note 5)

| | | | | | | |
|---------------------|---------------------|--|--|----|--|----|
| Turn-On Delay Time | t _{d(on)} | V _{GS} = 10 V, V _{DD} = 72 V, I _D = 20 A, R _G = 2.5 Ω | | 14 | | ns |
| Rise Time | t _r | | | 64 | | |
| Turn-Off Delay Time | t _{d(off)} | | | 28 | | |
| Fall Time | t _f | | | 43 | | |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | | |
|-------------------------|-----------------|---|------------------------|--|------|-----|----|
| Forward Diode Voltage | V _{SD} | V _{GS} = 0 V, I _S = 20 A | T _J = 25°C | | 0.84 | 1.2 | V |
| | | | T _J = 125°C | | 0.72 | | |
| Reverse Recovery Time | t _{RR} | V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 20 A | | | 35 | | ns |
| Charge Time | t _a | | | | 25 | | |
| Discharge Time | t _b | | | | 10 | | |
| Reverse Recovery Charge | Q _{RR} | | | | 49 | | nC |

4. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

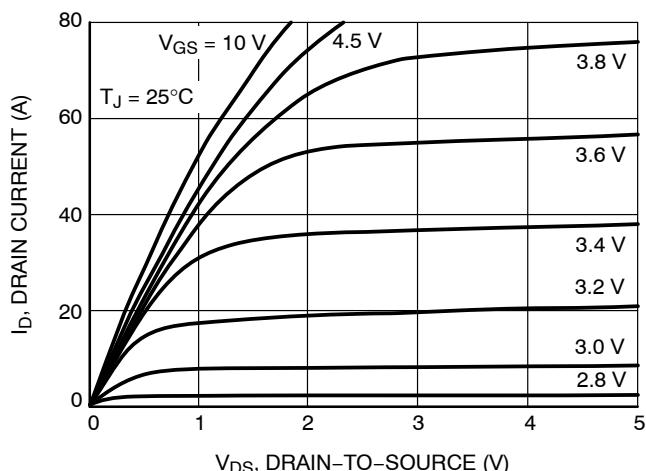


Figure 1. On-Region Characteristics

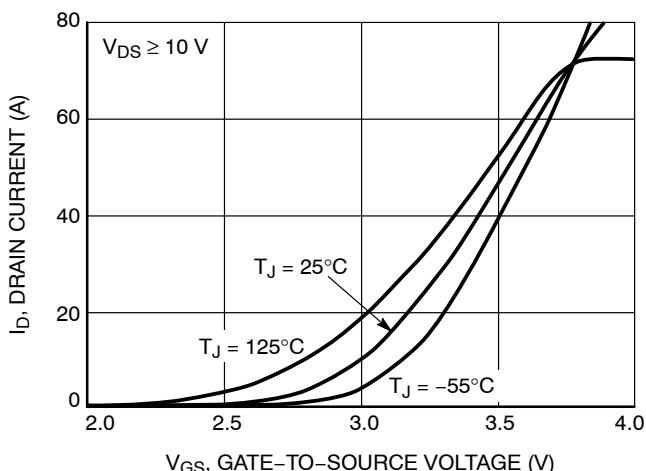


Figure 2. Transfer Characteristics

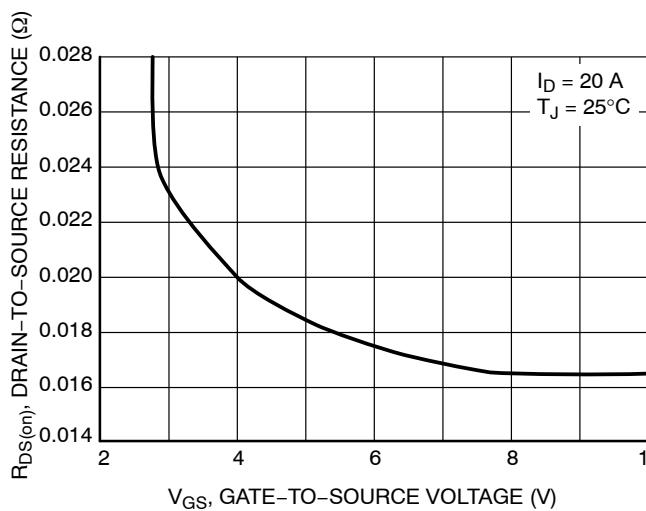


Figure 3. On-Resistance vs. Gate Voltage

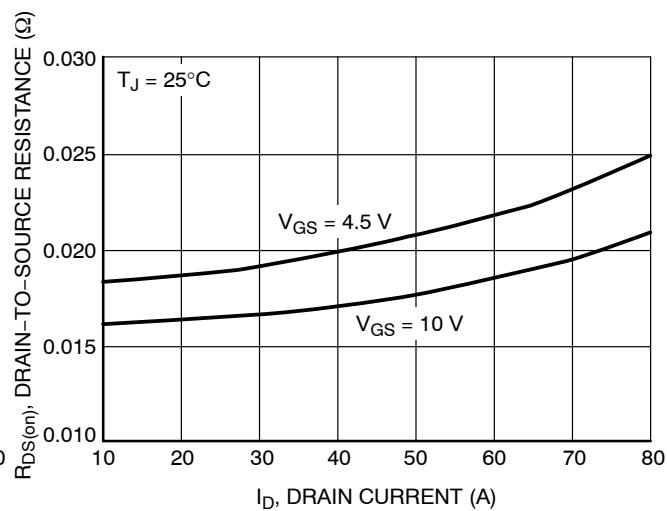


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

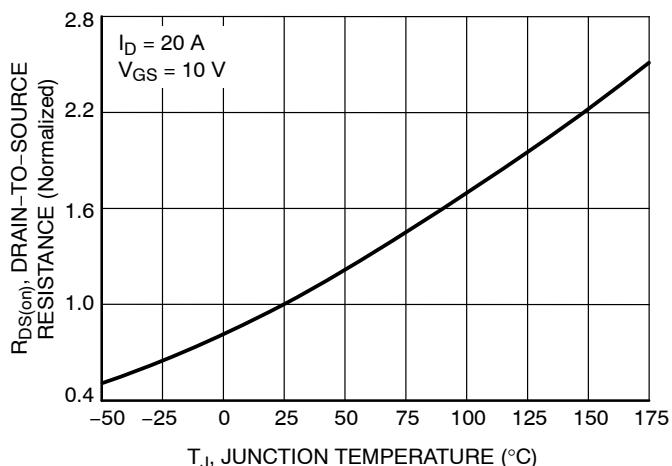


Figure 5. On-Resistance Variation with Temperature

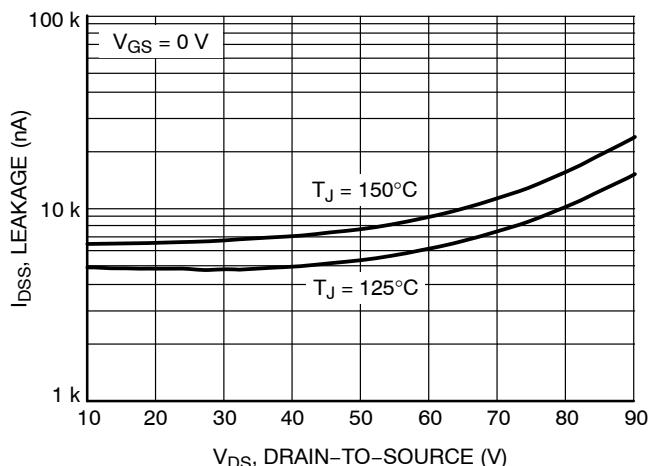


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

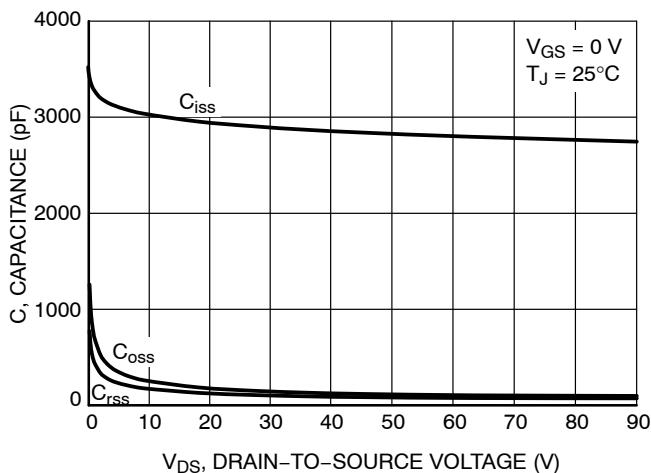


Figure 7. Capacitance Variation

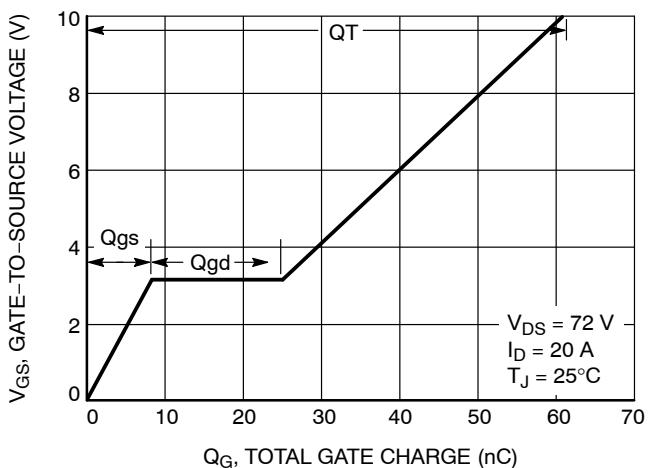


Figure 8. Gate-to-Source Voltage vs. Total Charge

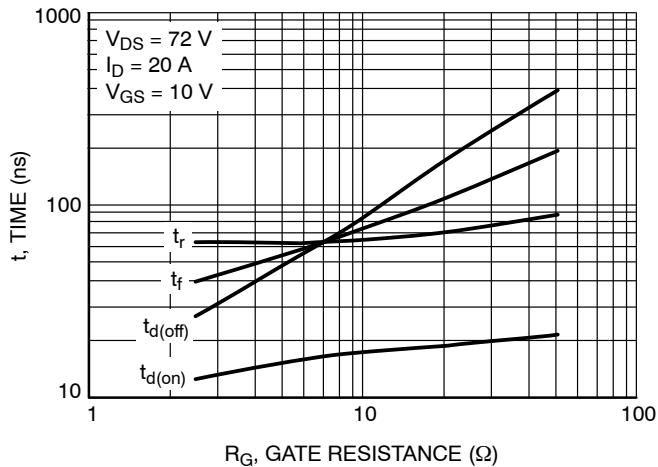


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

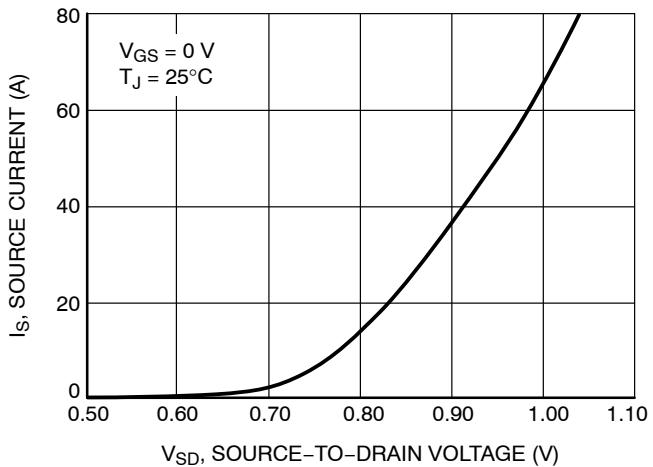


Figure 10. Diode Forward Voltage vs. Current

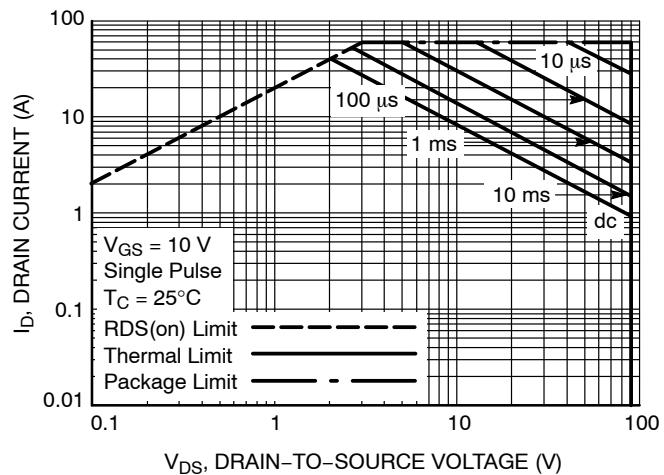


Figure 11. Maximum Rated Forward Biased Safe Operating Area

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TYPICAL CHARACTERISTICS

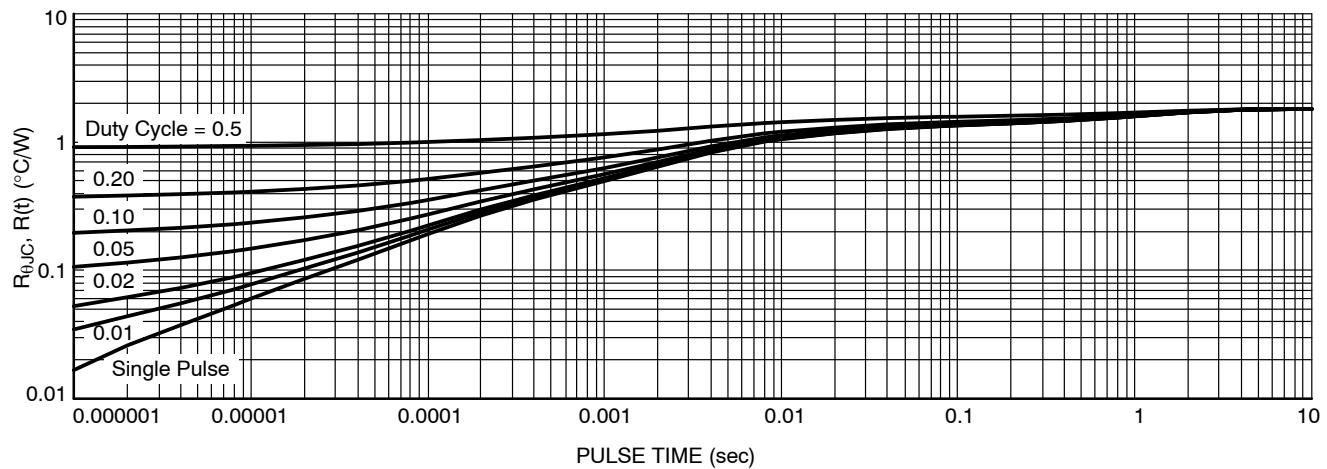
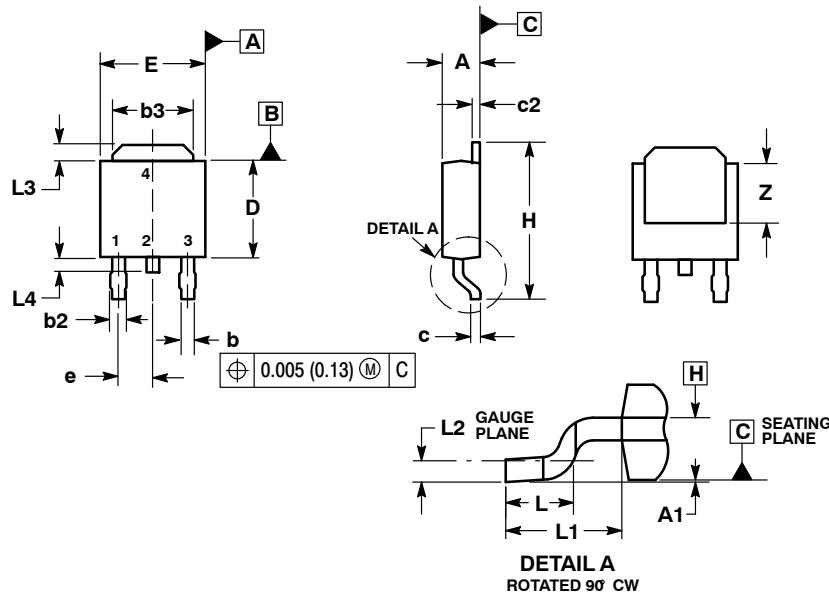


Figure 12. Thermal Response

PACKAGE DIMENSIONS

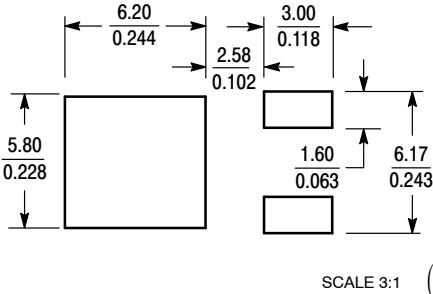
DPAK (SINGLE GAUGE)
CASE 369C
ISSUE D

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.086 | 0.094 | 2.18 | 2.38 |
| A1 | 0.000 | 0.005 | 0.00 | 0.13 |
| b | 0.025 | 0.035 | 0.63 | 0.89 |
| b2 | 0.030 | 0.045 | 0.76 | 1.14 |
| b3 | 0.180 | 0.215 | 4.57 | 5.46 |
| c | 0.018 | 0.024 | 0.46 | 0.61 |
| c2 | 0.018 | 0.024 | 0.46 | 0.61 |
| D | 0.235 | 0.245 | 5.97 | 6.22 |
| E | 0.250 | 0.265 | 6.35 | 6.73 |
| e | 0.090 | BSC | 2.29 | BSC |
| H | 0.370 | 0.410 | 9.40 | 10.41 |
| L | 0.055 | 0.070 | 1.40 | 1.78 |
| L1 | 0.108 | REF | 2.74 | REF |
| L2 | 0.020 | BSC | 0.51 | BSC |
| L3 | 0.035 | 0.050 | 0.89 | 1.27 |
| L4 | --- | 0.040 | --- | 1.01 |
| Z | 0.155 | --- | 3.93 | --- |

SOLDERING FOOTPRINT*

SCALE 3:1 (mm
inches)

*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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