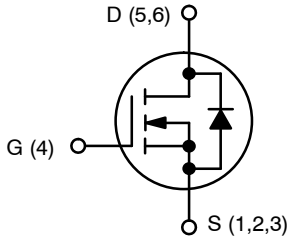
# MOSFET - Power, Single N-Channel
## 100 V, 3.1 mΩ, 169 A

# NVMFWS003N10MC

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ MAX | $I_D$ MAX |
|---|---|---|
| 100 V | 3.1 mΩ @ 10 V | 169 A |




**N−CHANNEL MOSFET**

### Features
- Small Footprint (5x6 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low $Q_G$ and Capacitance to Minimize Driver Losses
- AEC−Q101 Qualified and PPAP Capable
- Wettable Flank Product
- These Devices are Pb−Free, Halogen Free/BFR Free, Beryllium Free and are RoHS Compliant

### MAXIMUM RATINGS ($T_J$ = 25°C unless otherwise noted)

| Parameter | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain−to−Source Voltage | | | $V_{DSS}$ | 100 | V |
| Gate−to−Source Voltage | | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current $R_{\theta JC}$ (Note 1) | Steady State | $T_C$ = 25°C | $I_D$ | 169 | A |
| | | $T_C$ = 100°C | | 119 | |
| Power Dissipation $R_{\theta JC}$ (Note 1) | | $T_C$ = 25°C | $P_D$ | 194 | W |
| | | $T_C$ = 100°C | | 97 | |
| Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2) | Steady State | $T_A$ = 25°C | $I_D$ | 23.7 | A |
| | | $T_A$ = 100°C | | 16.8 | |
| Power Dissipation $R_{\theta JA}$ (Notes 1, 2) | | $T_A$ = 25°C | $P_D$ | 3.8 | W |
| | | $T_A$ = 100°C | | 1.9 | |
| Pulsed Drain Current | $T_A$ = 25°C, $t_p$ = 10 μs | | $I_{DM}$ | 900 | A |
| Operating Junction and Storage Temperature Range | | | $T_J$, $T_{stg}$ | −55 to +175 | °C |
| Source Current (Body Diode) | | | $I_S$ | 149 | A |
| Single Pulse Drain−to−Source Avalanche Energy ($I_{L(pk)}$ = 11.9 A) | | | $E_{AS}$ | 1307 | mJ |
| Lead Temperature Soldering Reflow for Soldering Purposes (1/8″ from case for 10 s) | | | $T_L$ | 260 | °C |

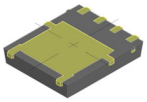
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL RESISTANCE RATINGS

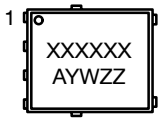
| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Junction−to−Case − Steady State (Note 1) | $R_{\theta JC}$ | 0.77 | °C/W |
| Junction−to−Ambient − Steady State (Note 2) | $R_{\theta JA}$ | 39 | |

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 1 $in^2$ pad size, 2 oz. Cu pad.

### MARKING DIAGRAM



**DFNW5**
**CASE 507BA**




XXXXXX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceability

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NVMFWS003N10MCT1G | DFNW5 (Pb−Free) | 1500 / Tape & Reel |

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

**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C unless otherwise specified)

| 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 | | 100 | | | V |
| Drain−to−Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | $I_D$ = 250 μA, ref to 25°C | | | 50 | | mV/°C |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 100 V | $T_J$ = 25°C | | | 1 | 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** | | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = 351 μA | | 2 | | 4 | V |
| Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | $I_D$ = 250 μA, ref to 25°C | | | −9.3 | | mV/°C |
| Drain−to−Source On Resistance | $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 50 A | | | 2.6 | 3.1 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = 10 V, $I_D$ = 50 A | | | 150 | | S |
| Gate−Resistance | $R_G$ | $T_A$ = 25°C | | | 0.40 | | Ω |
| **CHARGES & CAPACITANCES** | | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$ = 0 V, f = 1 MHz, $V_{DS}$ = 50 V | | | 4650 | | pF |
| Output Capacitance | $C_{OSS}$ | | | | 2400 | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | | 33 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 50 V, $I_D$ = 50 A | | | 62 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | | 14 | | |
| Gate−to−Source Charge | $Q_{GS}$ | | | | 22 | | |
| Gate−to−Drain Charge | $Q_{GD}$ | | | | 10 | | |
| Plateau Voltage | $V_{GP}$ | | | | 5 | | V |
| **SWITCHING CHARACTERISTICS** (Note 3) | | | | | | | |
| Turn−On Delay Time | $t_{d(ON)}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 50 V, $I_D$ = 50 A, $R_G$ = 6 Ω | | | 28 | | ns |
| Rise Time | $t_r$ | | | | 15 | | |
| Turn−Off Delay Time | $t_{d(OFF)}$ | | | | 46 | | |
| Fall Time | $t_f$ | | | | 14 | | |
| **DRAIN−SOURCE DIODE CHARACTERISTICS** | | | | | | | |
| Forward Diode Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = 50 A | $T_J$ = 25°C | | 0.80 | 1.3 | V |
| | | | $T_J$ = 125°C | | 0.67 | | |
| Reverse Recovery Time | $t_{RR}$ | $V_{GS}$ = 0 V, $dI_S/dt$ = 100 A/μs, $I_S$ = 31 A | | | 72 | | ns |
| Reverse Recovery Charge | $Q_{RR}$ | | | | 91 | | nC |
| Charge Time | $t_a$ | | | | 34 | | ns |
| Discharge Time | $t_b$ | | | | 38 | | ns |

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.

3. Switching characteristics are independent of operating junction temperatures

## TYPICAL CHARACTERISTICS

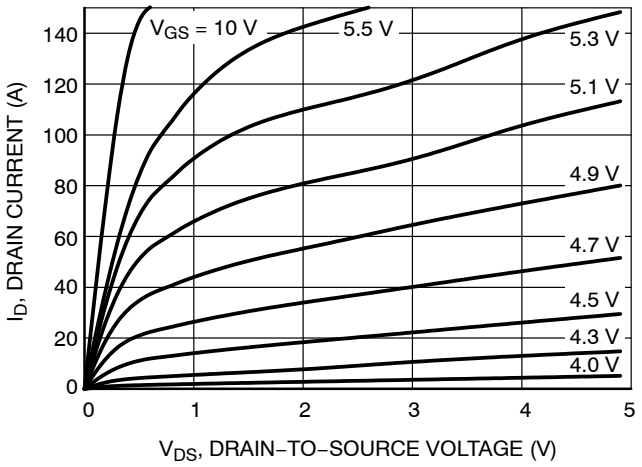



**Figure 1. On−Region Characteristics**

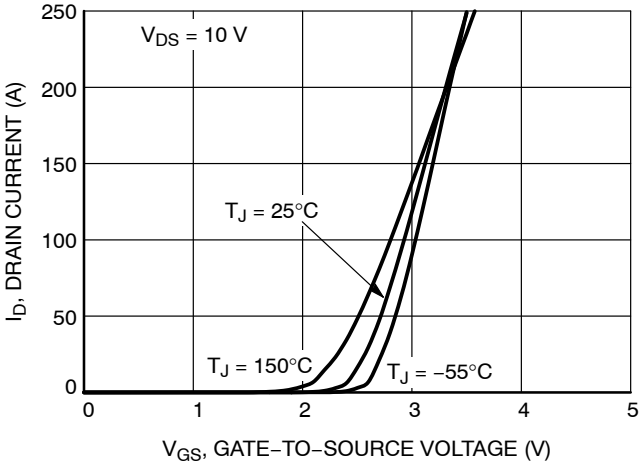



**Figure 2. Transfer Characteristics**

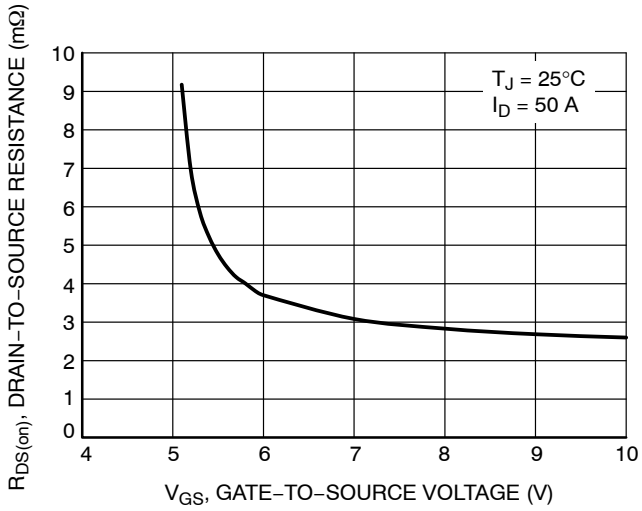



**Figure 3. On−Resistance vs. Gate−to−Source Voltage**

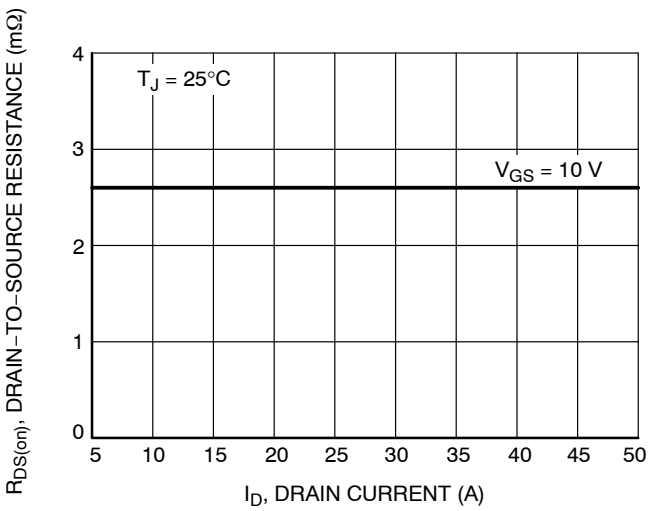



**Figure 4. On−Resistance vs. Drain Current and Gate Voltage**

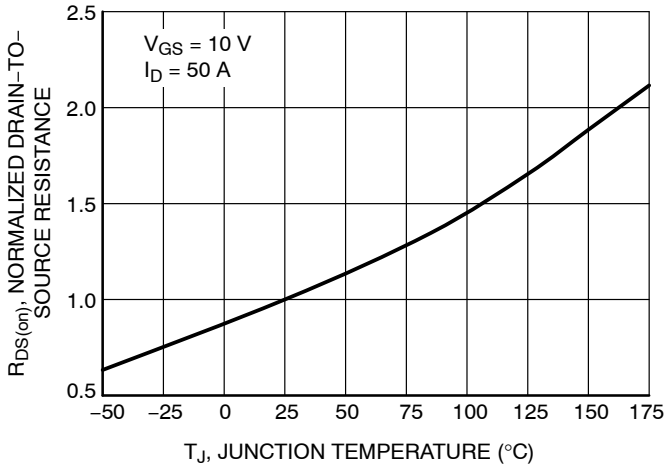



**Figure 5. On−Resistance Variation with Temperature**

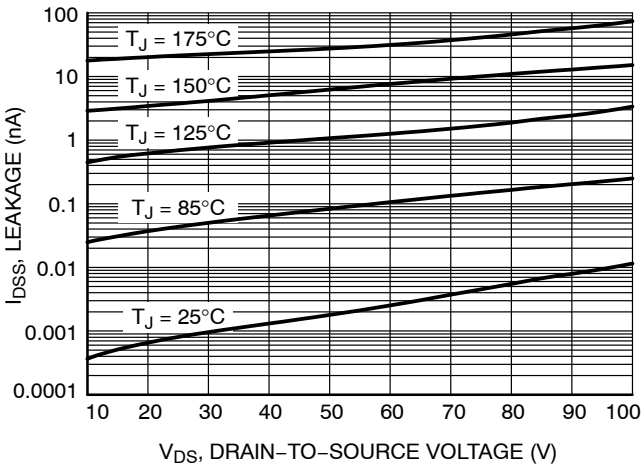



**Figure 6. Drain−to−Source Leakage Current vs. Voltage**

## TYPICAL CHARACTERISTICS

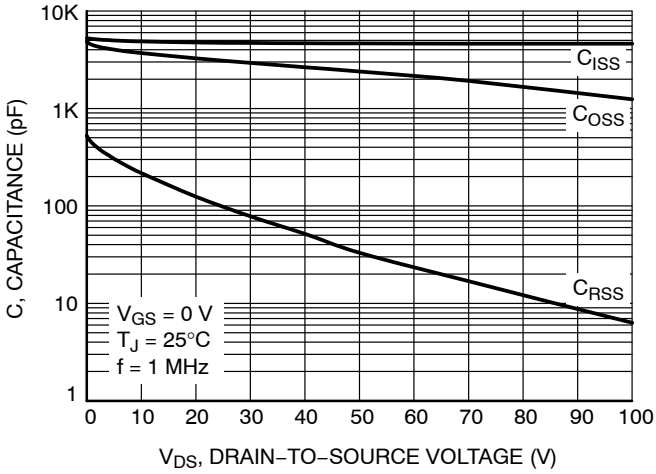



**Figure 7. Capacitance Variation**

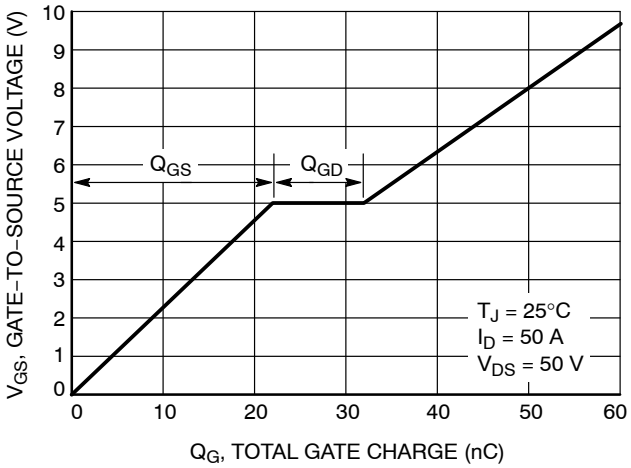



**Figure 8. Gate−to−Source Voltage vs. Total Charge**

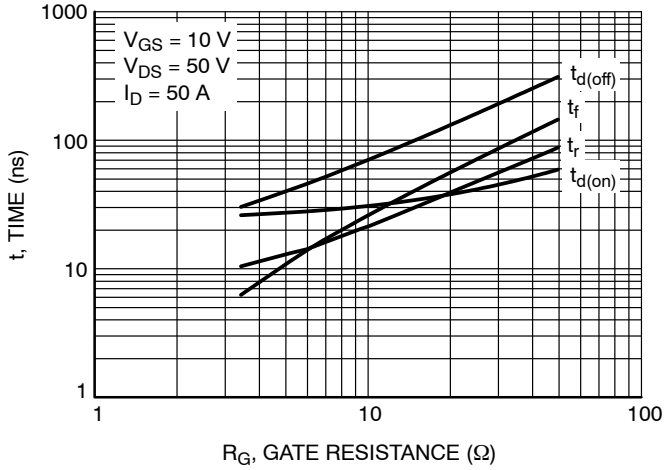



**Figure 9. Resistive Switching Time Variation vs. Gate Resistance**

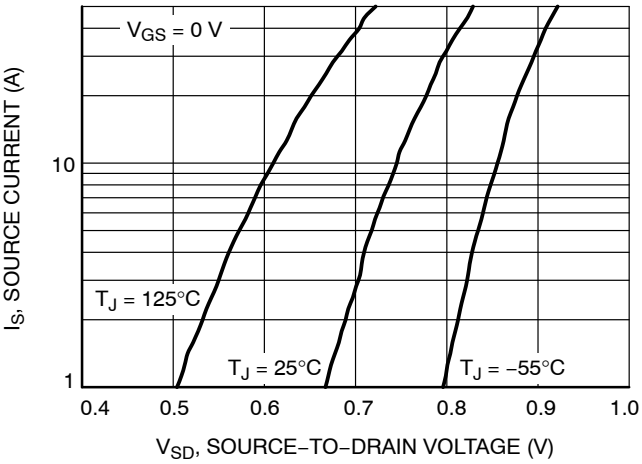



**Figure 10. Diode Forward Voltage vs. Current**

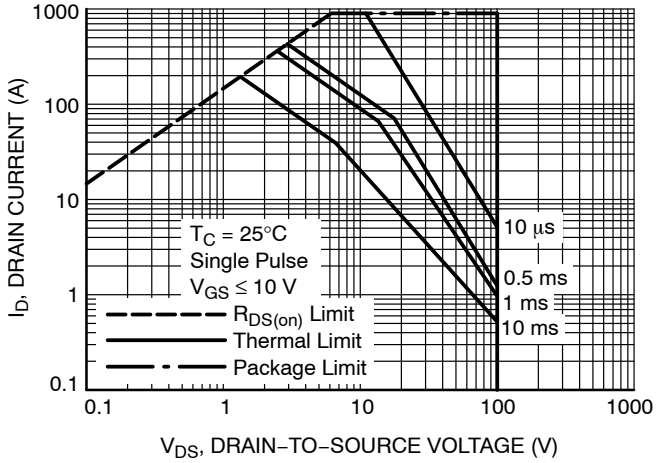



**Figure 11. Maximum Rated Forward Biased Safe Operating Area**

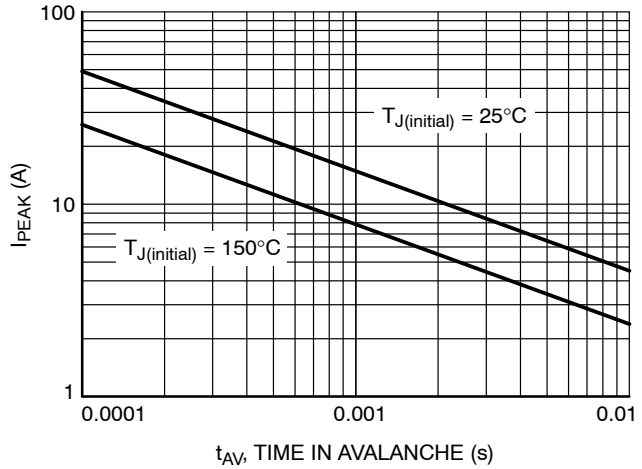



**Figure 12. Maximum Drain Current vs. Time in Avalanche**

## TYPICAL CHARACTERISTICS

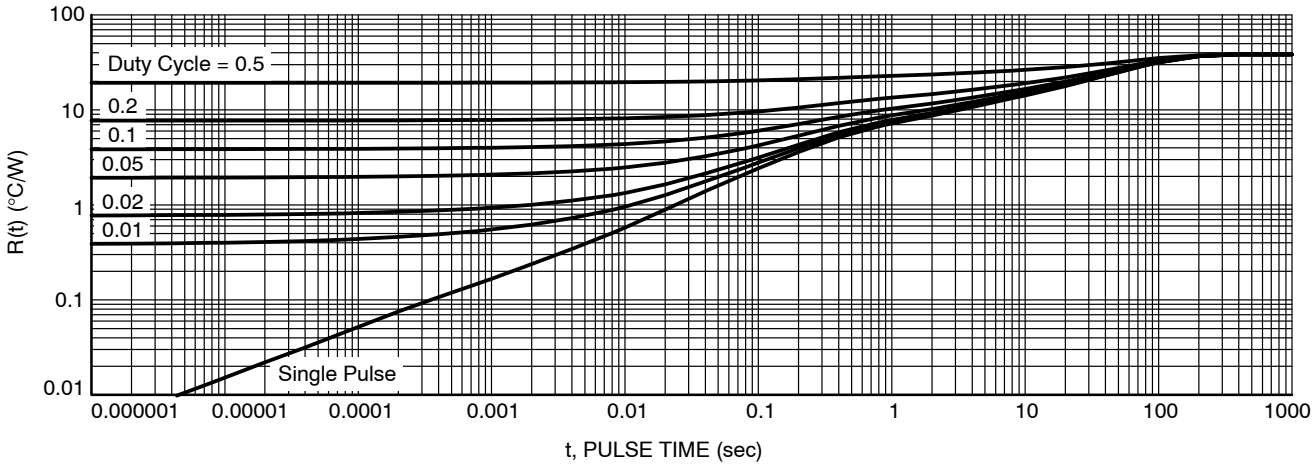
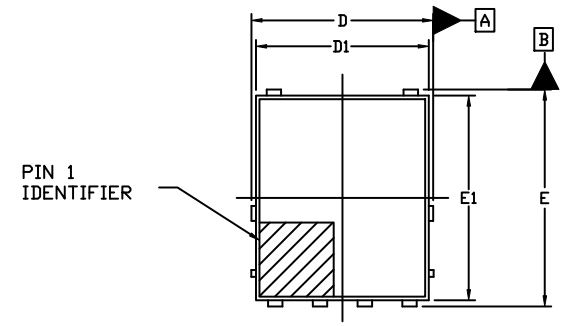


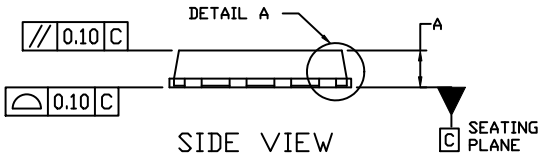

**Figure 13. Transient Thermal Impedance**

## PACKAGE DIMENSIONS

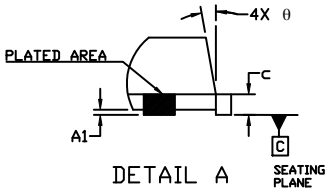
**DFNW5 5x6 (FULL−CUT SO8FL WF)**
CASE 507BA
ISSUE A



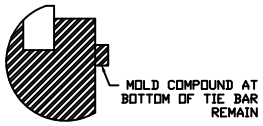

TOP VIEW



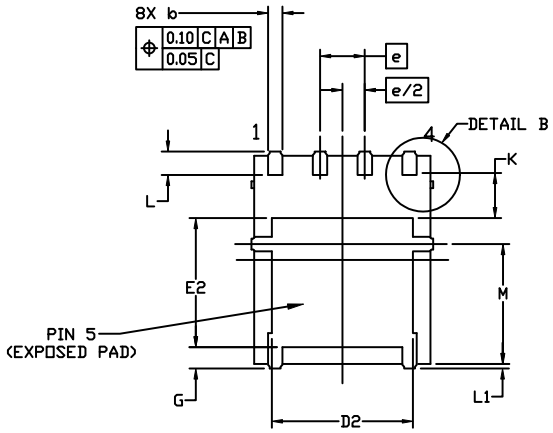

SIDE VIEW




DETAIL A



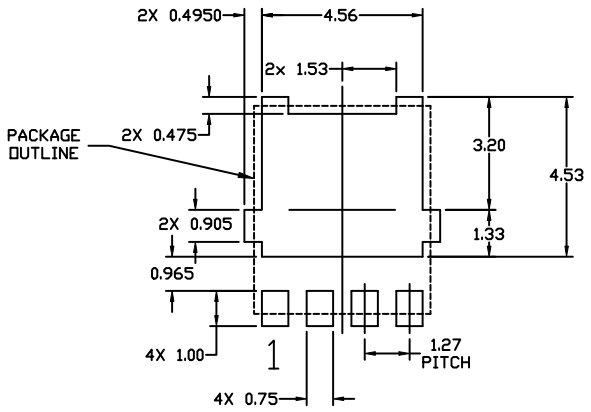

DETAIL B




BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
4. THIS PACKAGE CONTAINS WETTABLE FLANK DESIGN FEATURES TO AID IN FILLET FORMATION ON THE LEADS DURING MOUNTING.

| | MILLIMETERS | | |
|---|---|---|---|
| DIM | MIN. | NOM. | MAX. |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0.00 | --- | 0.05 |
| b | 0.33 | 0.41 | 0.51 |
| c | 0.23 | 0.28 | 0.33 |
| D | 5.00 | 5.15 | 5.30 |
| D1 | 4.70 | 4.90 | 5.10 |
| D2 | 3.80 | 4.00 | 4.20 |
| E | 6.00 | 6.15 | 6.30 |
| E1 | 5.70 | 5.90 | 6.10 |
| E2 | 3.45 | 3.65 | 3.85 |
| e | 1.27 BSC | | |
| G | 0.51 | 0.575 | 0.71 |
| K | 1.20 | 1.35 | 1.50 |
| L | 0.51 | 0.575 | 0.71 |
| L1 | 0.150 REF | | |
| M | 3.00 | 3.40 | 3.80 |
| θ | 0° | --- | 12° |




RECOMMENDED
MOUNTING 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.

## PUBLICATION ORDERING INFORMATION

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**Europe, Middle East and Africa Technical Support:**
Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative

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