

# MOSFET - Power, Dual N-Channel

## 100 V, 26 mΩ, 28 A

### NVMFD027N10MCL

#### 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
- NVMFWD027N10MCL – Wettable Flank Products
- These Devices are Pb-Free, Halogen Free/BFR Free, Beryllium Free and are RoHS Compliant

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

| Parameter  |   | Symbol                    | Value       | Unit |
|--|---|---------------------------|-------------|------|
| Drain-to-Source Voltage  |   | $V_{DSS}$                 | 100         | V    |
| Gate-to-Source Voltage   |   | $V_{GS}$                  | $\pm 20$    | V    |
| Continuous Drain Current $R_{\theta JC}$ (Note 1)                                  | Steady State                                      | $T_C = 25^\circ\text{C}$  | $I_D$       | A    |
|  |   | $T_C = 100^\circ\text{C}$ |             |      |
| Power Dissipation $R_{\theta JC}$ (Note 1)   |   | $T_C = 25^\circ\text{C}$  | $P_D$       | W    |
|  |   | $T_C = 100^\circ\text{C}$ |             |      |
| Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)                              | Steady State                                      | $T_A = 25^\circ\text{C}$  | $I_D$       | A    |
|  |   | $T_A = 100^\circ\text{C}$ |             |      |
| Power Dissipation $R_{\theta JA}$ (Notes 1, 2)                                     |   | $T_A = 25^\circ\text{C}$  | $P_D$       | W    |
|  |   | $T_A = 100^\circ\text{C}$ |             |      |
| Pulsed Drain Current   | $T_A = 25^\circ\text{C}$ , $t_p = 10 \mu\text{s}$ | $I_{DM}$                  | 115         | A    |
| Operating Junction and Storage Temperature Range                                   |   | $T_J$ , $T_{Stg}$         | -55 to +175 | °C   |
| Source Current (Body Diode)  |   | $I_S$                     | 35          | A    |
| Single Pulse Drain-to-Source Avalanche Energy ( $I_{L(pk)} = 1.3 \text{ A}$ )      |   | $E_{AS}$                  | 154         | mJ   |
| Lead Temperature Soldering Reflow for Soldering Purposes (1/8" from case for 10 s) |   | $T_L$                     | 260         | °C   |

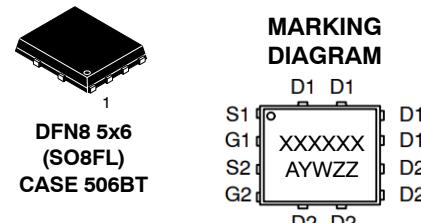
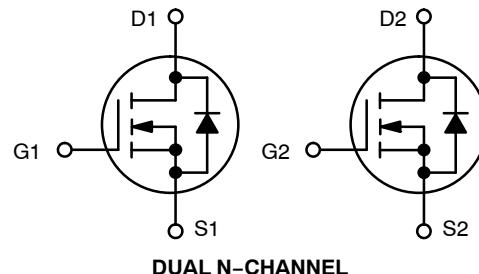
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

#### THERMAL RESISTANCE RATINGS

| Parameter                                   | Symbol          | Value | Unit |
|---|-----------------|-------|------|
| Junction-to-Case – Steady State (Note 1)    | $R_{\theta JC}$ | 3.29  | °C/W |
| Junction-to-Ambient – Steady State (Note 2) | $R_{\theta JA}$ | 48    |      |

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<sup>2</sup> pad size, 2 oz. Cu pad.

| $V_{(BR)DSS}$ | $R_{DS(on)} \text{ MAX}$ | $I_D \text{ MAX}$ |
|---------------|--------------------------|-------------------|
| 100 V         | 26 mΩ @ 10 V             | 28 A              |
|               | 35 mΩ @ 4.5 V            |                   |



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

#### ORDERING INFORMATION

| Device                              | Package        | Shipping†          |
|-------------------------------------|----------------|--------------------|
| NVMFD027N10MCL1G                    | DFN8 (Pb-Free) | 1500 / Tape & Reel |
| NVMFWD027N10MCL1G (Wettable Flanks) |                |                    |

†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.

# NVMFD027N10MCL

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise specified)

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

### OFF CHARACTERISTICS

|   |                                      |   |                        |     |     |    |       |
|---|--------------------------------------|---|------------------------|-----|-----|----|-------|
| Drain-to-Source Breakdown Voltage                         | V <sub>(BR)DSS</sub>                 | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA    |                        | 100 |     |    | V     |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | V <sub>(BR)DSS</sub> /T <sub>J</sub> |   |                        |     | 50  |    | mV/°C |
| Zero Gate Voltage Drain Current                           | I <sub>DSS</sub>                     | V <sub>GS</sub> = 0 V,<br>V <sub>DS</sub> = 100 V | T <sub>J</sub> = 25°C  |     | 1.0 |    | μA    |
|   |                                      |   | T <sub>J</sub> = 125°C |     | 100 |    |       |
| Gate-to-Source Leakage Current                            | I <sub>GSS</sub>                     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = 20 V     |                        |     | 100 | nA |       |

### ON CHARACTERISTICS

|                                   |                                     |  |   |      |    |       |
|-----------------------------------|-------------------------------------|--|---|------|----|-------|
| Gate Threshold Voltage            | V <sub>GS(TH)</sub>                 | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 38 μA | 1 |      | 3  | V     |
| Threshold Temperature Coefficient | V <sub>GS(TH)</sub> /T <sub>J</sub> |  |   | -5.4 |    | mV/°C |
| Drain-to-Source On Resistance     | R <sub>DSS(on)</sub>                | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 7 A               |   | 21   | 26 | mΩ    |
|                                   |                                     | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 5 A              |   | 28   | 35 |       |
| Forward Transconductance          | g <sub>FS</sub>                     | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 7 A               |   | 27   |    | S     |

### CHARGES & CAPACITANCES

|                              |                     |   |  |     |  |    |
|------------------------------|---------------------|---|--|-----|--|----|
| Input Capacitance            | C <sub>ISS</sub>    | V <sub>GS</sub> = 0 V, f = 1 MHz, V <sub>DS</sub> = 50 V              |  | 720 |  | pF |
| Output Capacitance           | C <sub>OSS</sub>    |   |  | 300 |  |    |
| Reverse Transfer Capacitance | C <sub>rss</sub>    |   |  | 6   |  |    |
| Total Gate Charge            | Q <sub>G(TOT)</sub> | V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 50 V, I <sub>D</sub> = 7 A |  | 5.5 |  | nC |
| Total Gate Charge            | Q <sub>G(TOT)</sub> |   |  | 11  |  |    |
| Threshold Gate Charge        | Q <sub>G(TH)</sub>  |   |  | 1.1 |  |    |
| Gate-to-Source Charge        | Q <sub>GS</sub>     |   |  | 2   |  |    |
| Gate-to-Drain Charge         | Q <sub>GD</sub>     |   |  | 1.4 |  |    |
| Plateau Voltage              | V <sub>GP</sub>     |   |  | 2.5 |  | V  |

### SWITCHING CHARACTERISTICS (Note 3)

|                     |                     |   |  |     |  |    |
|---------------------|---------------------|---|--|-----|--|----|
| Turn-On Delay Time  | t <sub>d(ON)</sub>  | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 50 V,<br>I <sub>D</sub> = 7 A, R <sub>G</sub> = 6 Ω |  | 7   |  | ns |
| Rise Time           | t <sub>r</sub>      |   |  | 2.5 |  |    |
| Turn-Off Delay Time | t <sub>d(OFF)</sub> |   |  | 19  |  |    |
| Fall Time           | t <sub>f</sub>      |   |  | 3.2 |  |    |

### DRAIN-SOURCE DIODE CHARACTERISTICS

|                         |                 |  |                        |  |      |     |    |
|-------------------------|-----------------|--|------------------------|--|------|-----|----|
| Forward Diode Voltage   | V <sub>SD</sub> | V <sub>GS</sub> = 0 V,<br>I <sub>S</sub> = 7 A                                 | T <sub>J</sub> = 25°C  |  | 0.84 | 1.3 | V  |
|                         |                 |  | T <sub>J</sub> = 125°C |  | 0.73 |     |    |
| Reverse Recovery Time   | t <sub>RR</sub> | V <sub>GS</sub> = 0 V, dI <sub>S</sub> /dt = 100 A/μs,<br>I <sub>S</sub> = 3 A |                        |  | 28   |     | ns |
| Reverse Recovery Charge | Q <sub>RR</sub> |  |                        |  | 17   |     | nC |
| Charge Time             | t <sub>a</sub>  |  |                        |  | 13.9 |     | ns |
| Discharge Time          | t <sub>b</sub>  |  |                        |  | 14.2 |     | 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

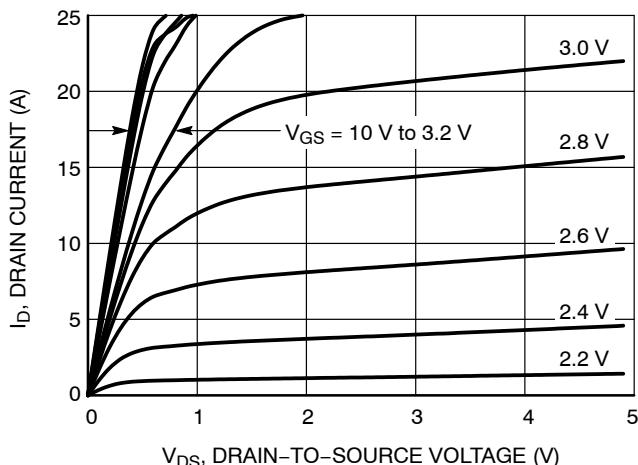


Figure 1. On-Region Characteristics

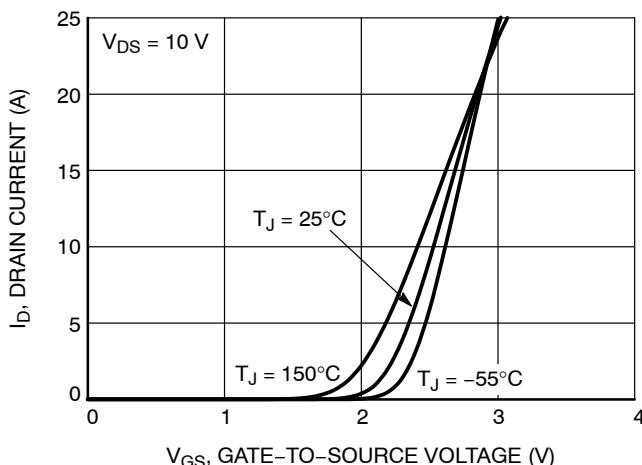


Figure 2. Transfer Characteristics

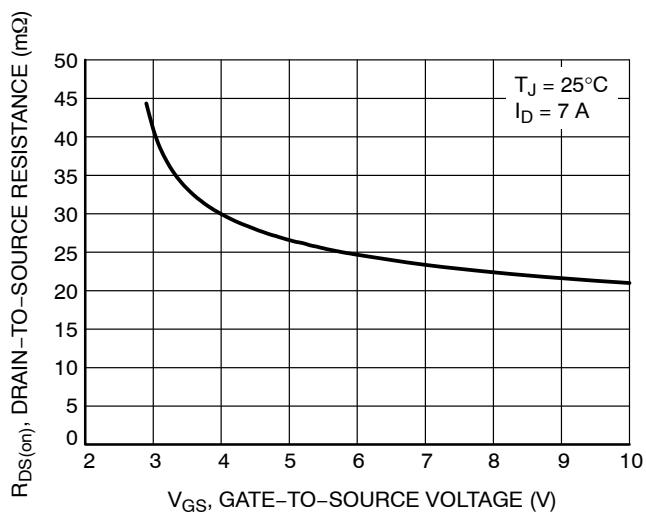


Figure 3. On-Resistance vs. Gate-to-Source Voltage

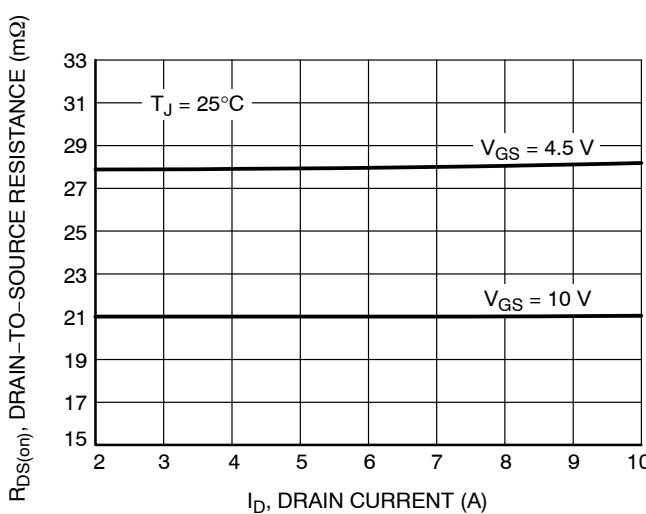


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

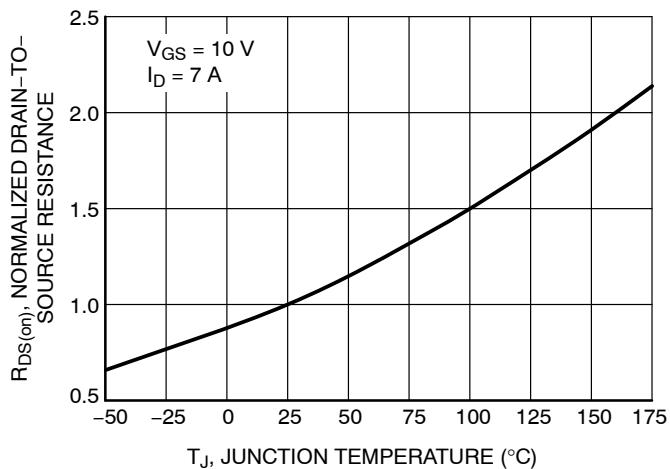


Figure 5. On-Resistance Variation with Temperature

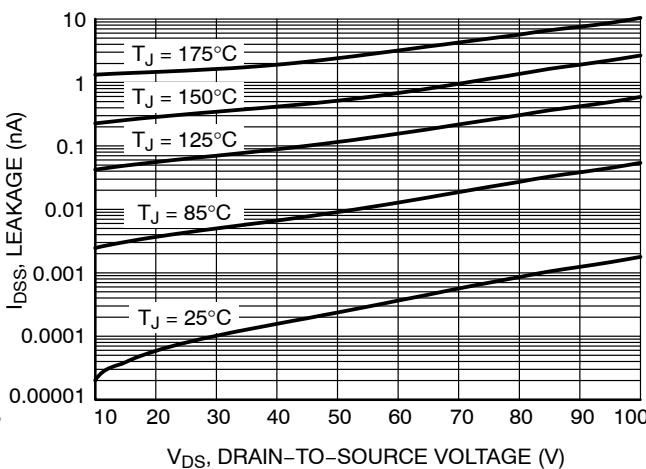
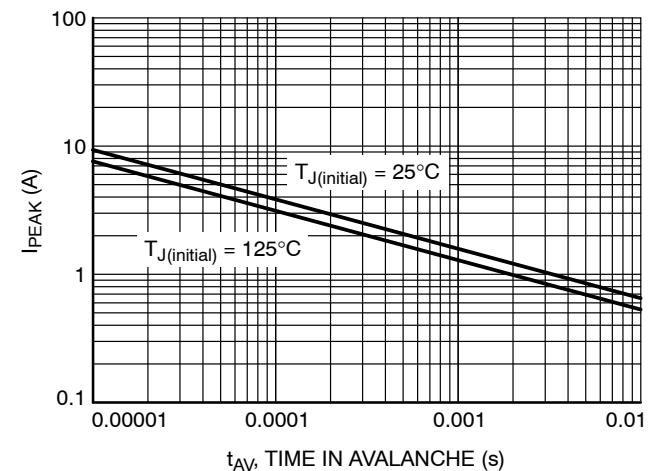
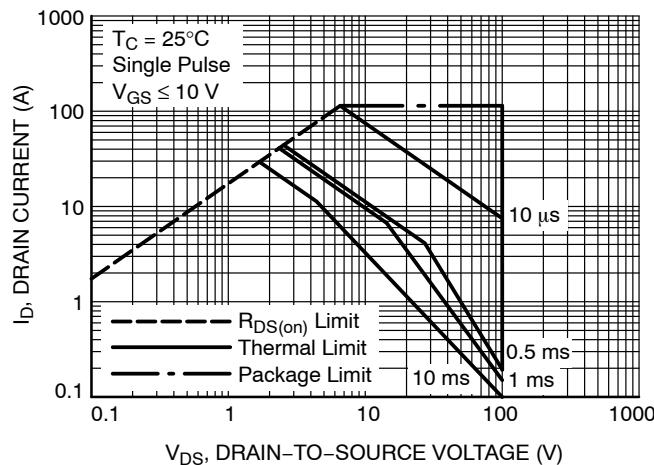
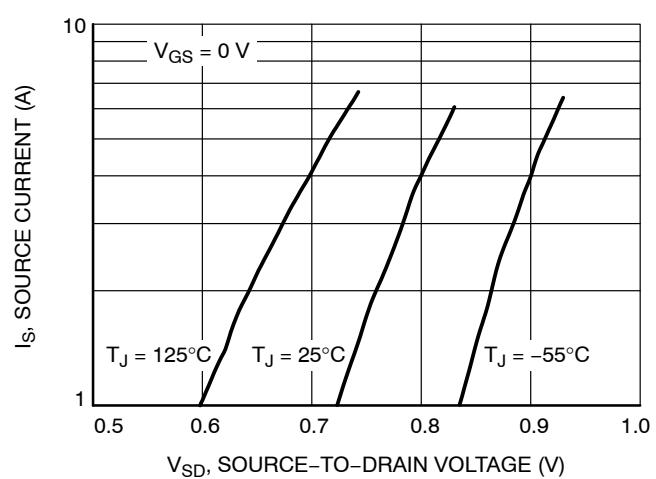
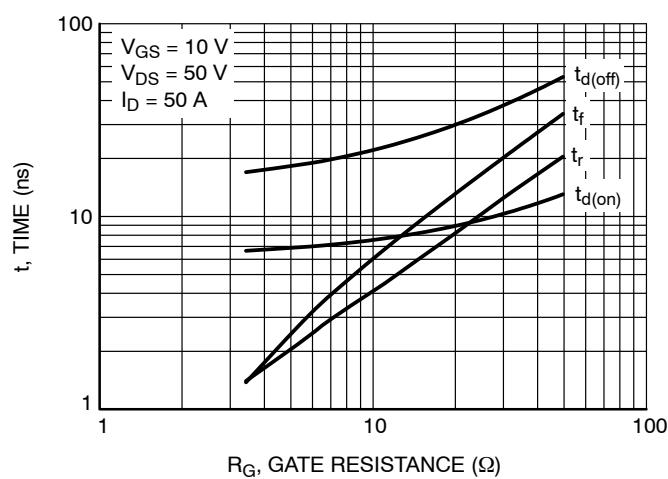
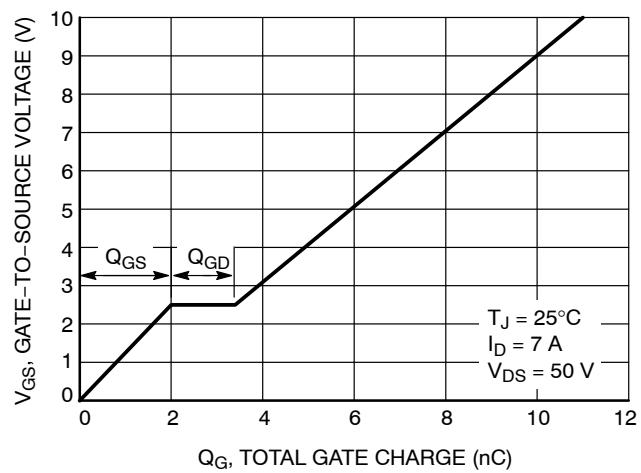
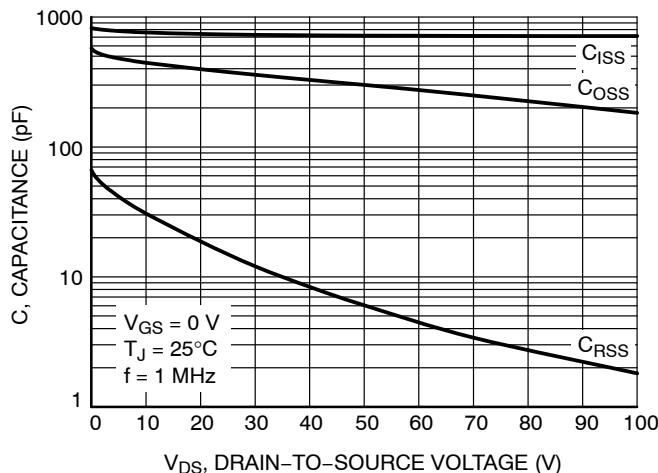


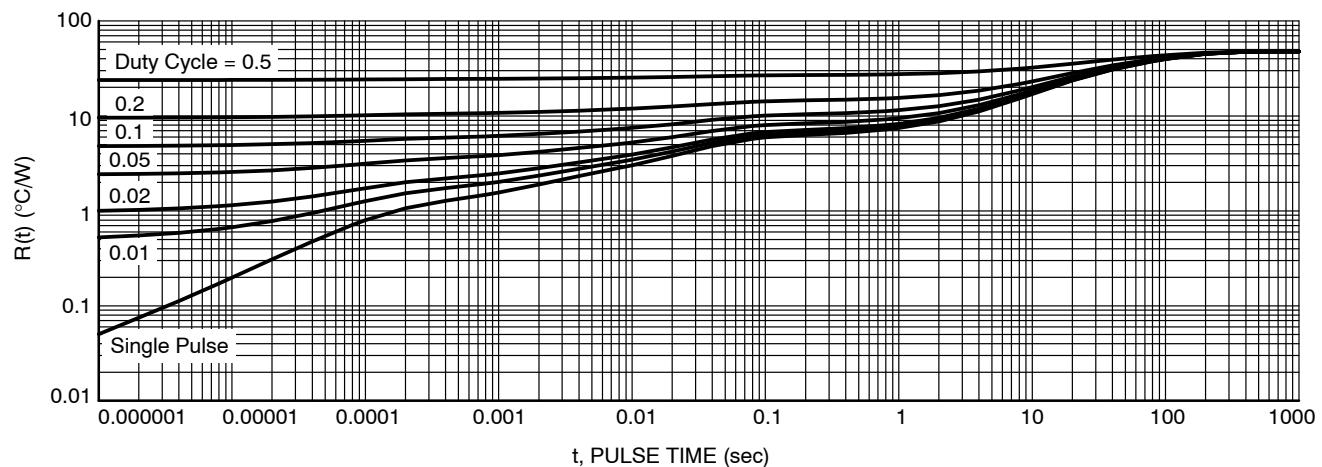
Figure 6. Drain-to-Source Leakage Current vs. Voltage

## TYPICAL CHARACTERISTICS



# NVMFD027N10MCL

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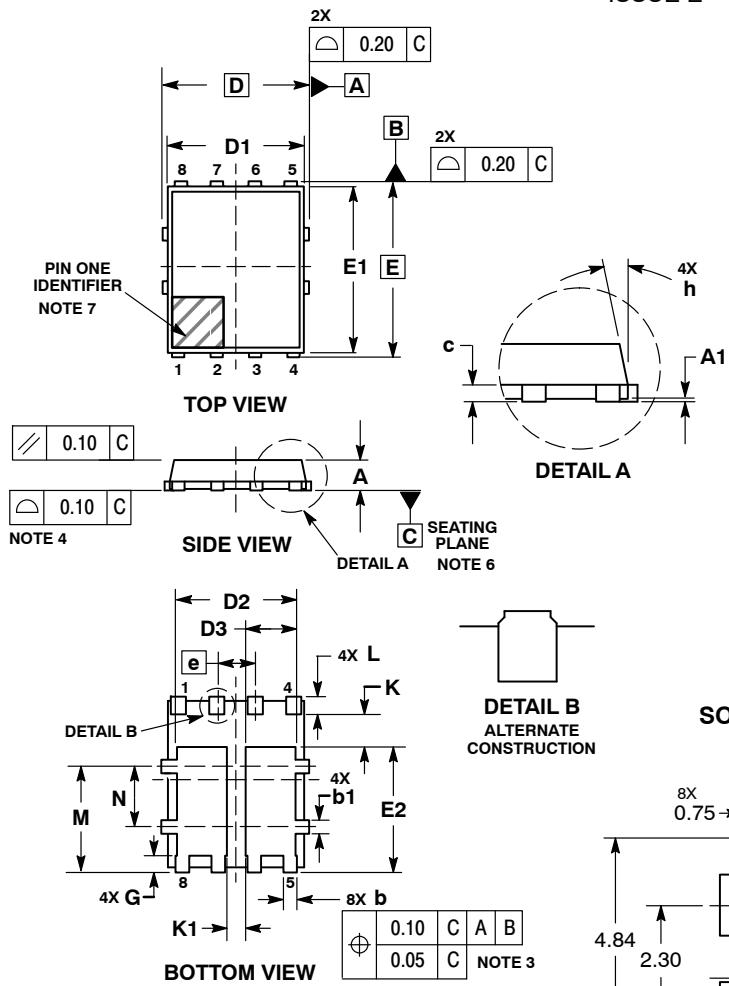
**Figure 13. Transient Thermal Impedance**

## PACKAGE DIMENSIONS

## DFN8 5x6, 1.27P Dual Flag (SO8FL-Dual)

CASE 506BT

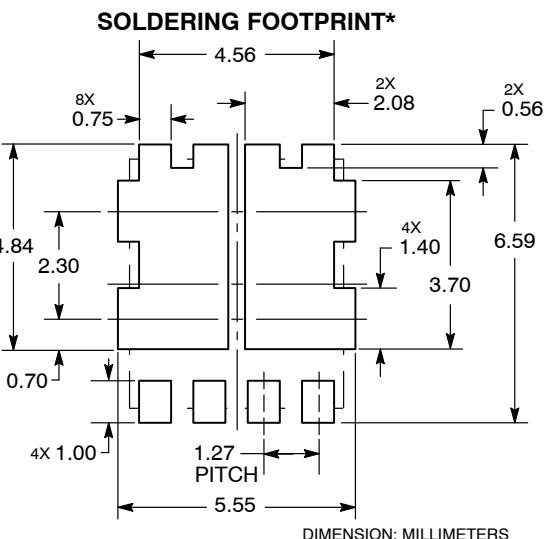
ISSUE E



## 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.
4. PROFILE TOLERANCE APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
5. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
6. SEATING PLANE IS DEFINED BY THE TERMINALS. A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
7. A VISUAL INDICATOR FOR PIN 1 MUST BE LOCATED IN THIS AREA.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN         | MAX  | MAX  |
| A   | 0.90        | ---  | 1.10 |
| A1  | ---         | ---  | 0.05 |
| b   | 0.33        | 0.42 | 0.51 |
| b1  | 0.33        | 0.42 | 0.51 |
| c   | 0.20        | ---  | 0.33 |
| D   | 5.15 BSC    |      |      |
| D1  | 4.70        | 4.90 | 5.10 |
| D2  | 3.90        | 4.10 | 4.30 |
| D3  | 1.50        | 1.70 | 1.90 |
| E   | 6.15 BSC    |      |      |
| E1  | 5.70        | 5.90 | 6.10 |
| E2  | 3.90        | 4.15 | 4.40 |
| e   | 1.27 BSC    |      |      |
| G   | 0.45        | 0.55 | 0.65 |
| h   | ---         | ---  | 12°  |
| K   | 0.51        | ---  | ---  |
| K1  | 0.56        | ---  | ---  |
| L   | 0.48        | 0.61 | 0.71 |
| M   | 3.25        | 3.50 | 3.75 |
| N   | 1.80        | 2.00 | 2.20 |



\*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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