## Description

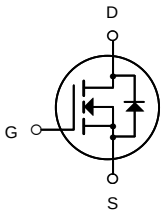
The DMN2009USS uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.


SOP-8

## General Features

$V_{DS}$ = 20V $I_D$ =20 A

$R_{DS(ON)}$ < 5.5mΩ @ $V_{GS}$=4.5 V




N-Channel MOSFET

## Application

Battery protection

Load switch

Uninterruptible power supply

## Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| DMN2009USS | SOP-8 | HXY MOSFET | 3000 |

## Absolute Maximum Ratings ($T_C$=25℃unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 20 | V |
| $V_{GS}$ | Gate-Source Voltage | ±12 | V |
| $I_D$ | Drain Current – Continuous ($T_C$=25℃) | 20 | A |
| | Drain Current – Continuous ($T_C$=70 ℃) | 16 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | 140 | A |
| EAS | Single Pulse Avalanche Energy[2] | 162 | mJ |
| IAS | Single Pulse Avalanche Current[2] | 57 | A |
| $P_D$ | Power Dissipation ($T_C$=25℃) | 3.1 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | 40 | ℃/W |

## Electrical Characteristics ($T_J$=25 ℃, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{DSS}$ | $I_D$=250 uA, $V_{GS}$=0V | 20 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=20V, $V_{GS}$=0V | | | 1 | uA |
| | | $V_{DS}$=20V, $V_{GS}$=0V, $T_J$=55℃ | | | 5 | |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±12V | | | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$ , $I_D$=250uA | 0.5 | | 1.6 | V |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=4.5V, $I_D$=20A | | | 5.5 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=20A $T_J$=125℃ | | | 7 | |
| | | $V_{GS}$=2.5V, $I_D$=18A | | | 7 | |
| On State Drain Current | $I_{D(ON)}$ | $V_{GS}$=10V, $V_{DS}$=5V | 140 | | | A |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=5V, $I_D$=20A | | 105 | | S |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=10V, f=1MHz | 3080 | | 4630 | pF |
| Output Capacitance | $C_{oss}$ | | 520 | | 960 | |
| Reverse Transfer Capacitance | $C_{rss}$ | | 350 | | 810 | |
| Gate Resistance | $R_g$ | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | 0.6 | | 2.1 | Ω |
| Total Gate Charge | $Q_g$ | $V_{GS}$=10V, $V_{DS}$=10V, $I_D$=20A | 28 | | 43 | nC |
| Gate Source Charge | $Q_{gs}$ | | 7 | | 11 | |
| Gate Drain Charge | $Q_{gd}$ | | 7 | | 17 | |
| Turn-On DelayTime | $t_{d(on)}$ | $V_{GS}$=10V, $V_{DS}$=10V, $R_L$=0.5Ω, $R_{GEN}$=3Ω | | 7 | | ns |
| Turn-On Rise Time | $t_r$ | | | 8 | | |
| Turn-Off DelayTime | $t_{d(off)}$ | | | 70 | | |
| Turn-Off Fall Time | $t_f$ | | | 18 | | |
| Body Diode Reverse Recovery Time | $t_{rr}$ | $I_F$= 20A, $dI/dt$= 500A/us | 13 | | 20 | |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | | 29 | | 43 | nC |
| Maximum Body-Diode Continuous Current | $I_S$ | | | | 4 | A |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=1A,$V_{GS}$=0V | | | 1 | V |

Note : The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5% max.

## Typical Characterisitics

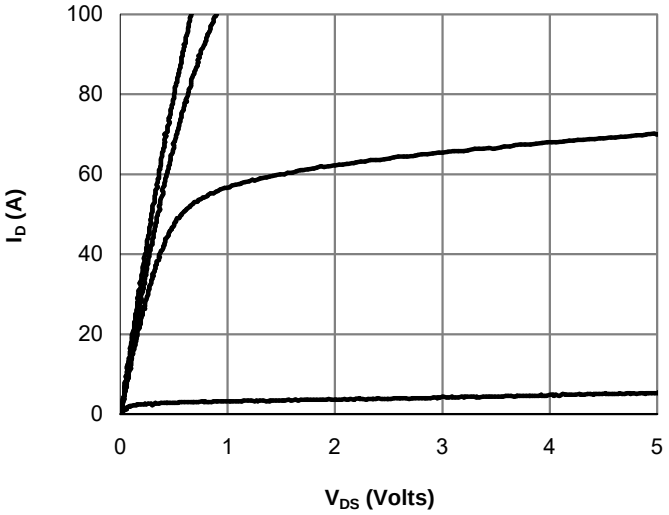



**Fig 1: On-Region Characteristics (Note E)**

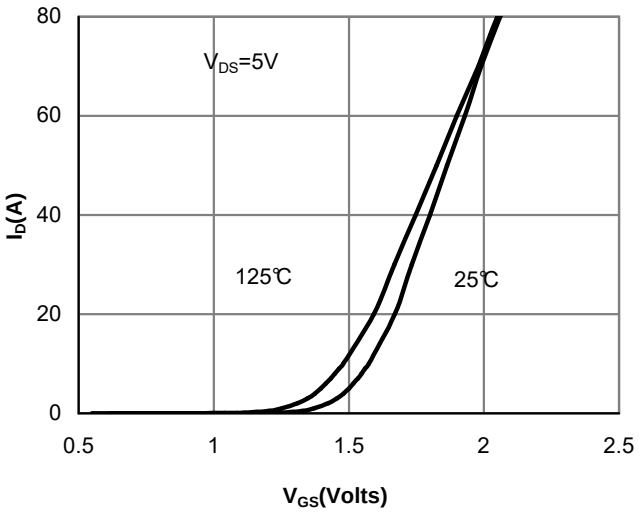



**Figure 2: Transfer Characteristics (Note E)**

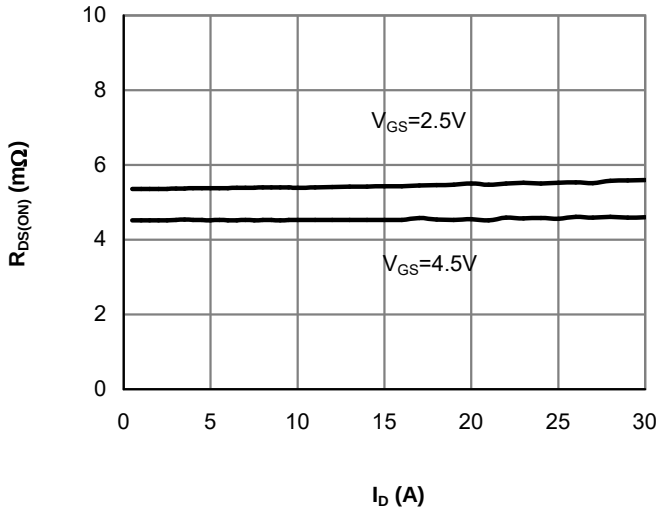



**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**

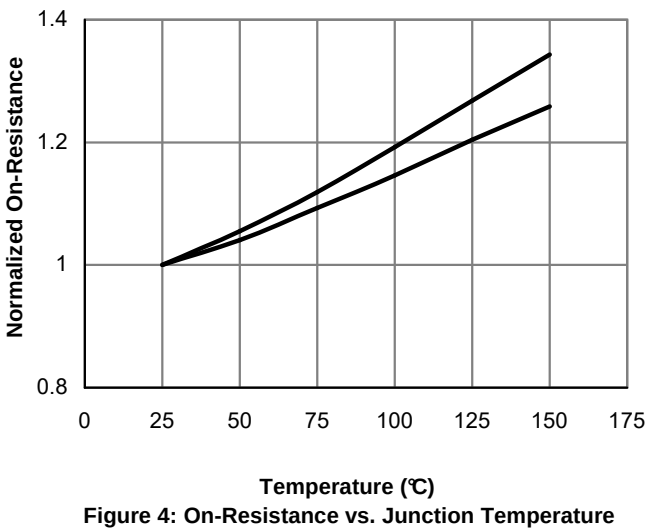



**Figure 4: On-Resistance vs. Junction Temperature (Note E)**

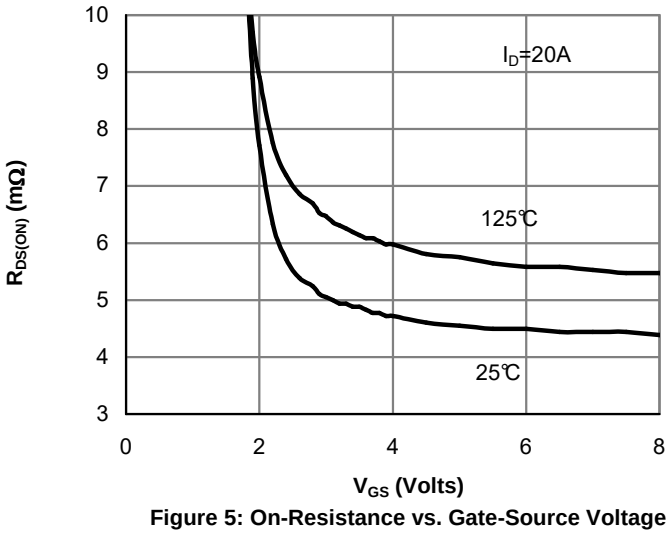



**Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)**

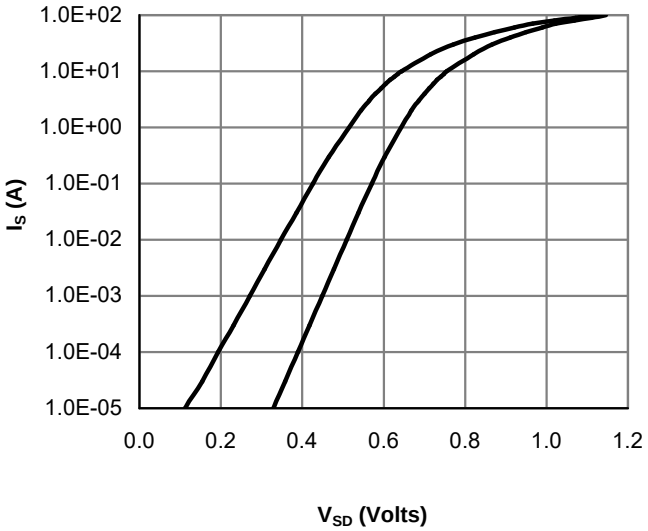



**Figure 6: Body-Diode Characteristics (Note E)**

## Typical Characterisitics

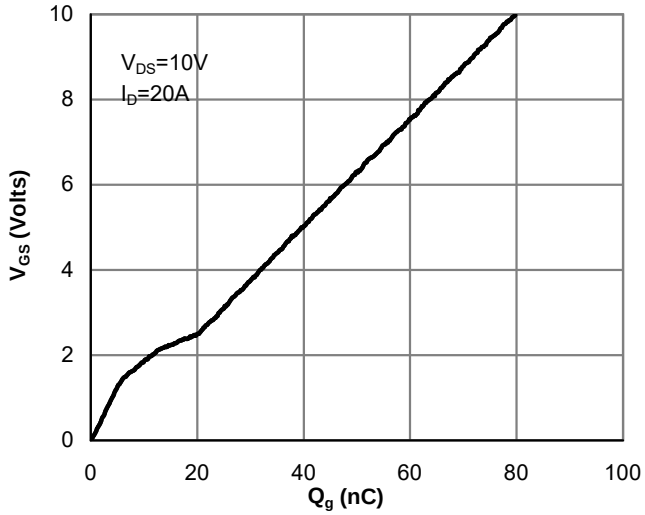



**Figure 7: Gate-Charge Characteristics**

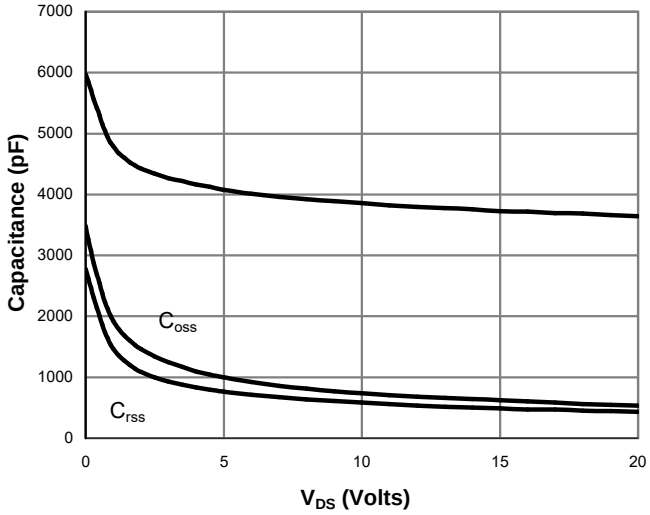



**Figure 8: Capacitance Characteristics**

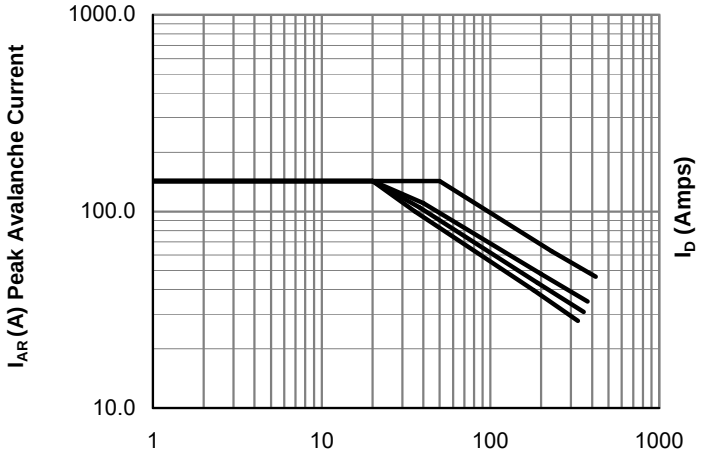
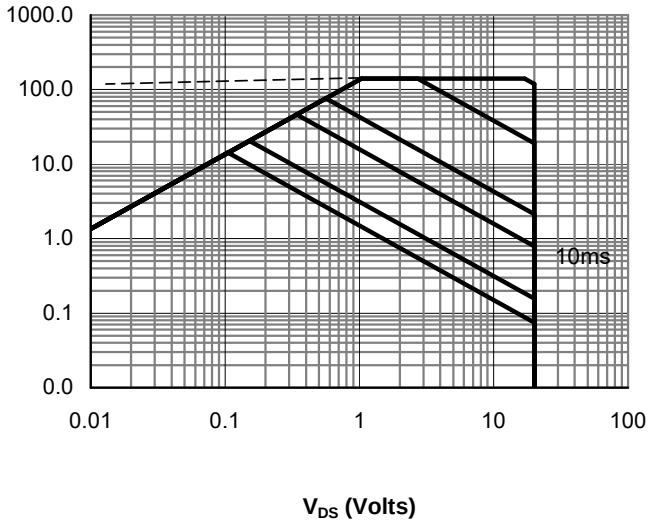



**Figure 9: Single Pulse Avalanche capability (Note C)**



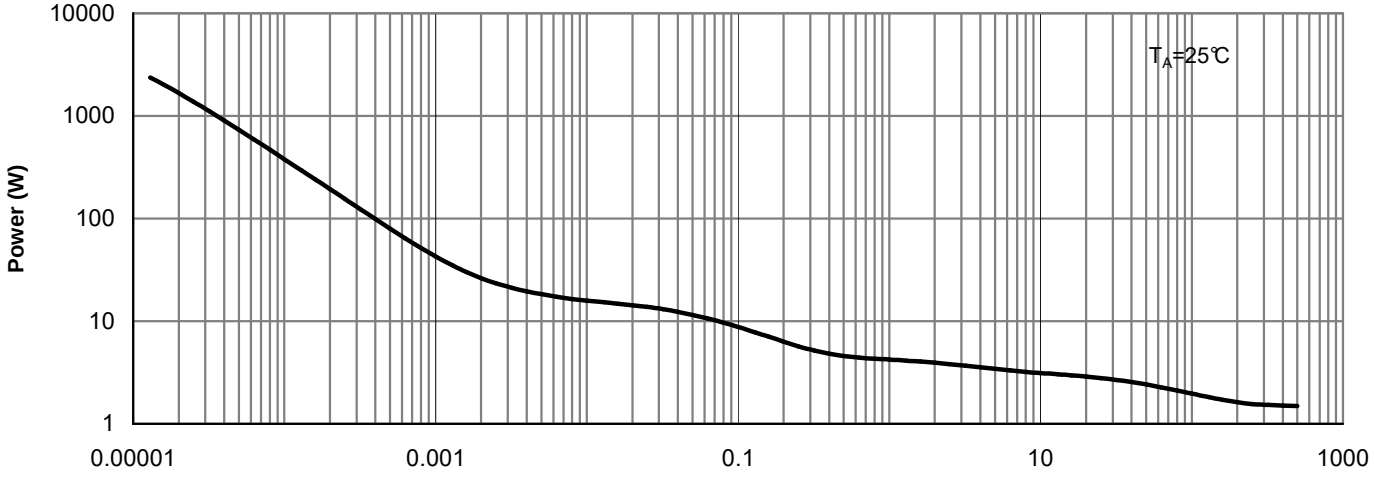




**Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note F)**

## Typical Characterisitics

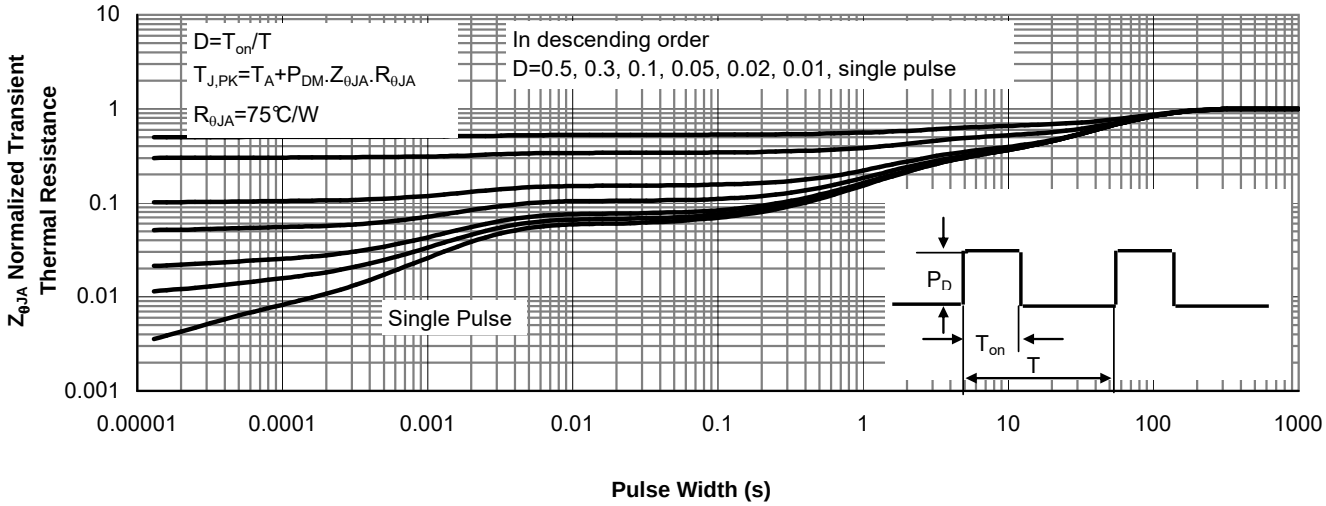
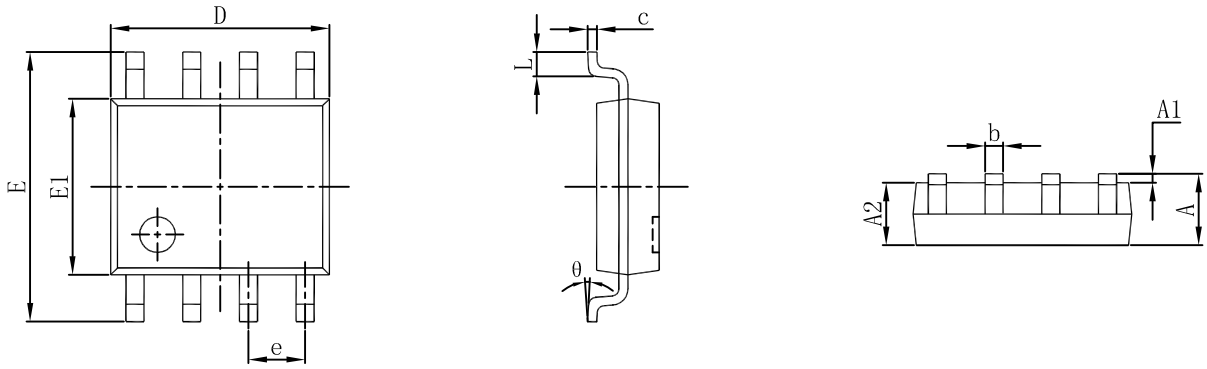
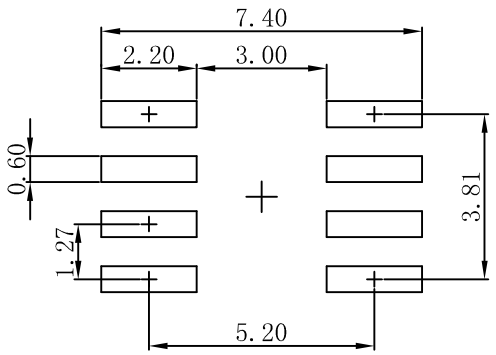



**Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)**

## SOP-8 Package Outline Dimensions




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | **Min** | **Max** | **Min** | **Max** |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.007 | 0.010 |
| D | 4.800 | 5.000 | 0.189 | 0.197 |
| e | 1.270 (BSC) | | 0.050 (BSC) | |
| E | 5.800 | 6.200 | 0.228 | 0.244 |
| E1 | 3.800 | 4.000 | 0.150 | 0.157 |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |




Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.

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