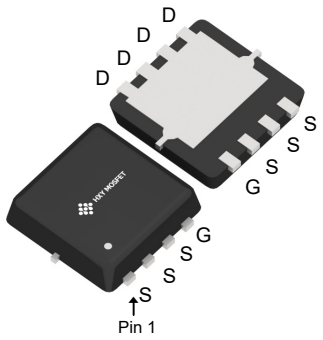
## Description

The DMN3009LFVQ-13 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.

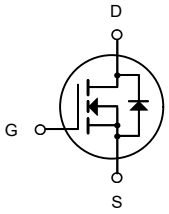



DFN3X3-8L

## General Features

$V_{DS}$ = 30V $I_D$ = 90A

$R_{DS(ON)}$ < 4.6 mΩ @ $V_{GS}$=10V




N-Channel MOSFET

## Application

Battery protection

Load switch

Uninterruptible power supply

## Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| DMN3009LFVQ-13 | DFN3X3-8L | HXY MOSFET | 5000 |

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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| VDS | Drain-Source Voltage | 30 | V |
| VGS | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 90 | A |
| $I_D$@$T_C$=75℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 45 | A |
| IDM | Pulsed Drain Current[2] | 290 | A |
| EAS | Single Pulse Avalanche Energy[3] | 196 | mJ |
| IAS | Avalanche Current | 36 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation[4] | 46 | W |
| TSTG | Storage Temperature Range | -55 to 175 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 175 | ℃ |
| $R_{\theta}JA$ | Thermal Resistance Junction-ambient [1] | 62 | ℃/W |
| $R_{\theta}JC$ | Thermal Resistance Junction-Case[1] | 1.72 | ℃/W |

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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 30 | --- | --- | V |
| $\triangle BV_{DSS}/\triangle T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to 25℃ , $I_D$=1mA | --- | --- | --- | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=10V , $I_D$=30A | --- | 3.5 | 4.6 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=15A | --- | 7.8 | 10 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 1.2 | 1.6 | 2.5 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | --- | --- | mV/℃ |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=30V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=30V, $V_{GS}$=0V , $T_J$=100℃ | --- | --- | 100 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | $V_{DS}$=10V , $I_D$=30A | --- | 80 | --- | S |
| $R_g$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | --- | 2 | --- | Ω |
| $Q_g$ | Total Gate Charge | $V_{DS}$=15V , $V_{GS}$=4.5V , $I_D$=30A | --- | 20 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 5 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 7.2 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | VGS=10V, VDD=15V, RG=3Ω, ID=30A | --- | 9 | --- | ns |
| $T_r$ | Rise Time | | --- | 16 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 43 | --- | |
| $T_f$ | Fall Time | | --- | 12 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V , $V_{GS}$=0V , f=1MHz | --- | 2088 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 277 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 209 | --- | |

## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current[1,5] | $V_G$=$V_D$=0V , Force Current | --- | --- | 90 | A |
| $V_{SD}$ | Diode Forward Voltage[2] | $V_{GS}$=0V , $I_S$=1A , $T_J$=25℃ | --- | --- | 1.2 | V |

Note :
1.The data tested by surface mounted on a 1 inch$^2$ FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The EAS data shows Max. rating . The test condition is TJ = 25ÁC,VDD=24V,VGS=10V,L=0.1mH,IAS=36A.
4.The power dissipation is limited by 150℃ junction temperature
5.The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

## Typical Characteristics

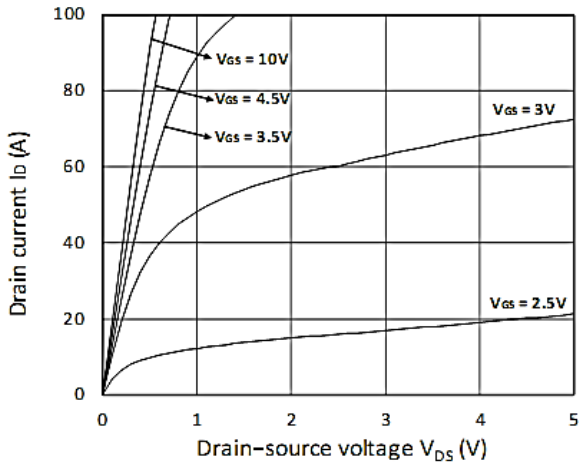



**Figure 1. Output Characteristics**

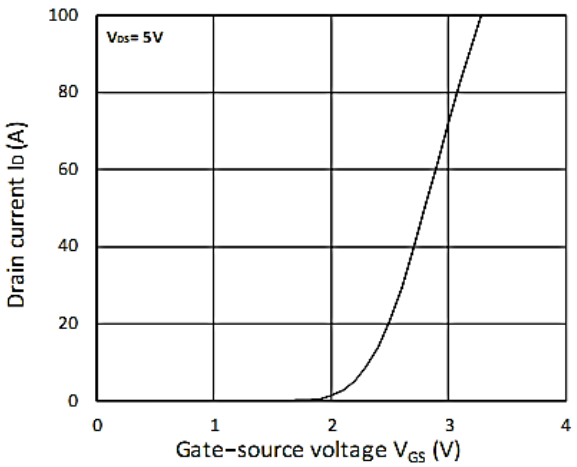



**Figure 2. Transfer Characteristics**

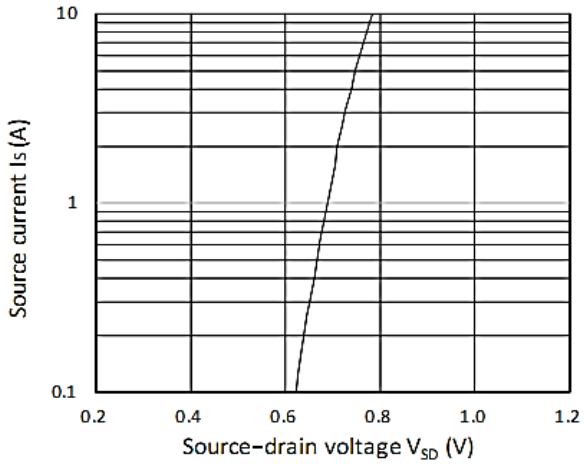



**Figure 3. Forward Characteristics of Reverse**

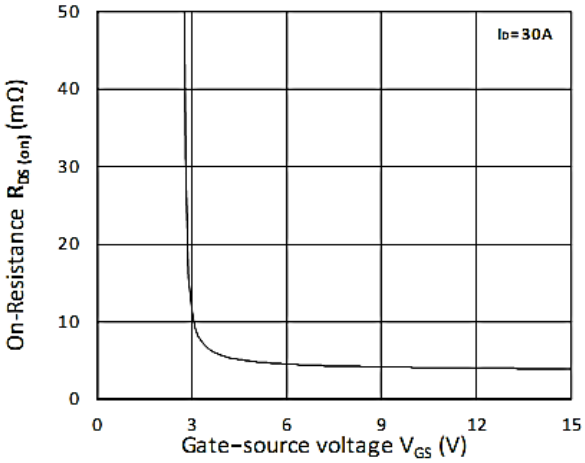



**Figure 4. RDS(ON) vs. VGS**

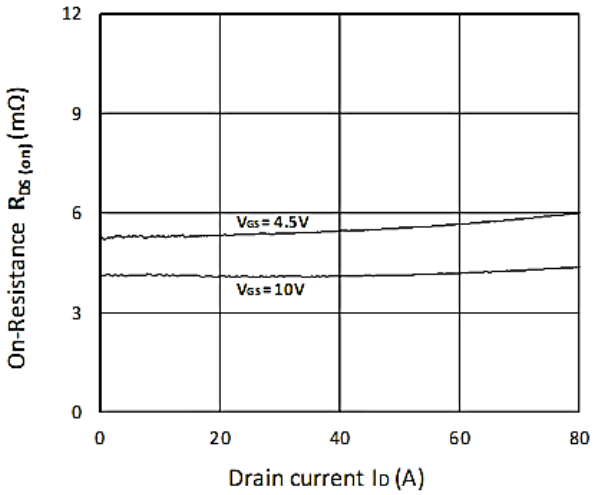



**Figure 5. R DS(ON) vs. ID**

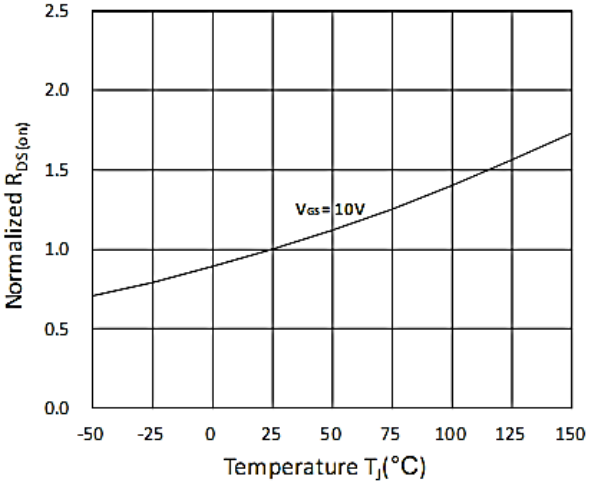



**Figure 6. Normalized R DS(on) vs. Temperature**

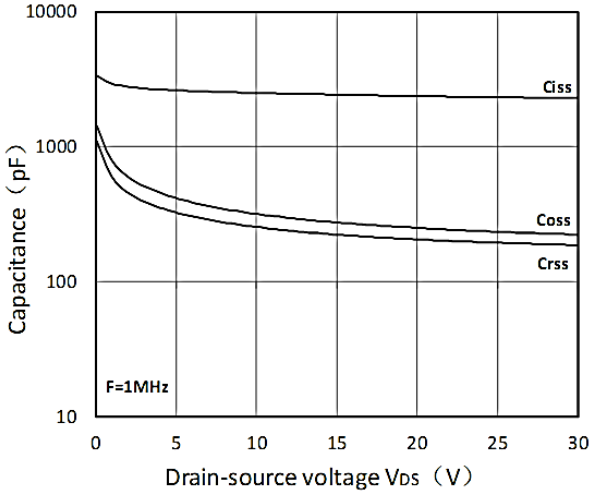



**Figure 7. Capacitance Characteristics**

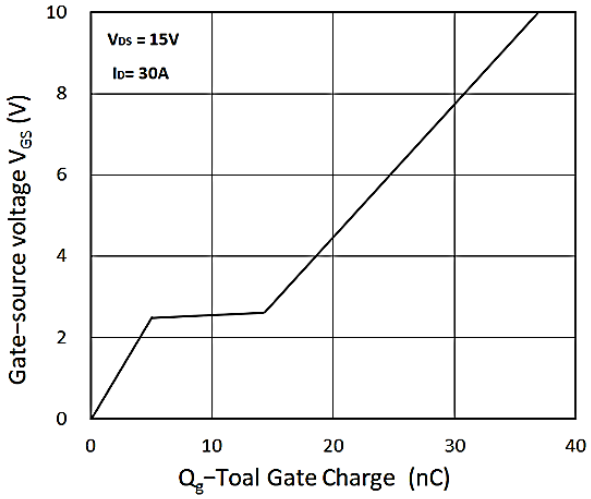



**Figure 8. Gate Charge Characteristics**

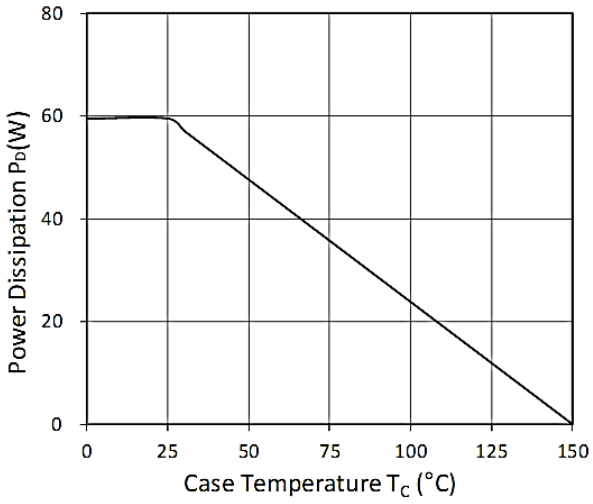



**Figure 9. Power Dissipation**

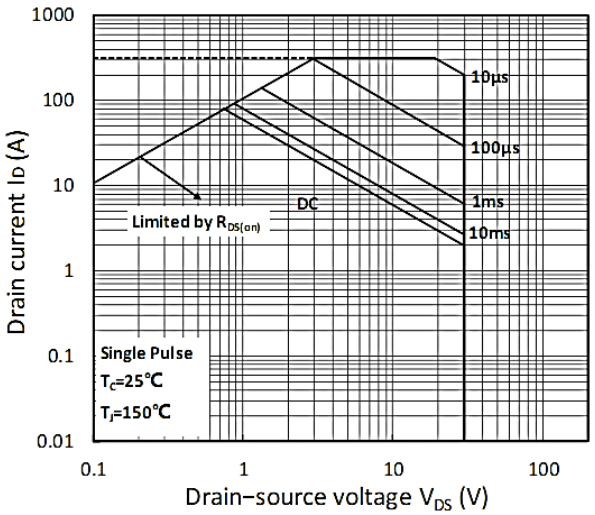



**Figure10. Safe Operating Area**

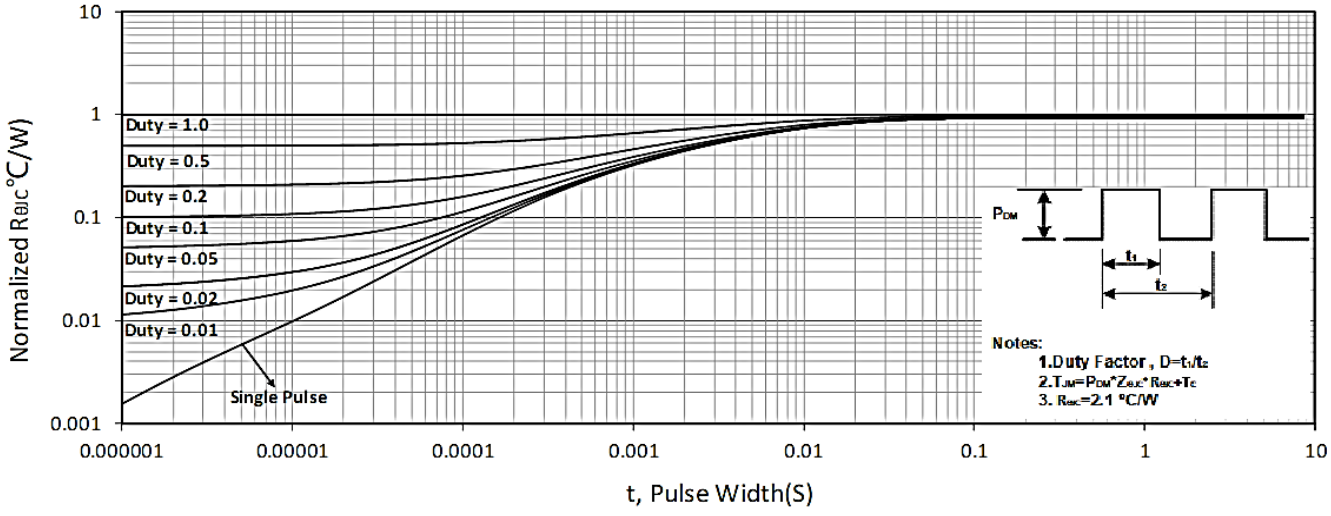
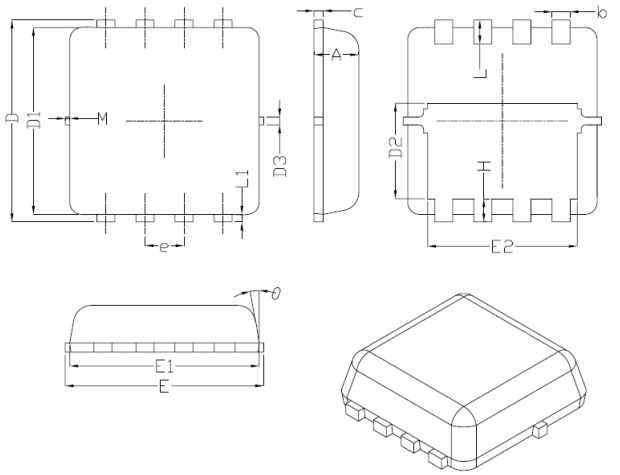



**Figure 11. Normalized Maximum Transient Thermal Impedance**

## DFN3X3-8L Package Information




| Symbol | Dimensions In Millimeters | | |
|---|---|---|---|
| | Min. | Nom. | Max. |
| A | 0.70 | 0.75 | 0.80 |
| b | 0.25 | 0.30 | 0.35 |
| c | 0.10 | 0.15 | 0.25 |
| D | 3.25 | 3.35 | 3.45 |
| D1 | 3.00 | 3.10 | 3.20 |
| D2 | 1.48 | 1.58 | 1.68 |
| D3 | - | 0.13 | - |
| E | 3.20 | 3.30 | 3.40 |
| E1 | 3.00 | 3.15 | 3.20 |
| E2 | 2.39 | 2.49 | 2.59 |
| e | 0.65BSC | | |
| H | 0.30 | 0.39 | 0.50 |
| L | 0.30 | 0.40 | 0.50 |
| L1 | - | 0.13 | - |
| M | * | * | 0.15 |
| θ | | 10° | 12° |

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