# D1MNM9P2

## 100V N-Channel MOSFETs

### General Description

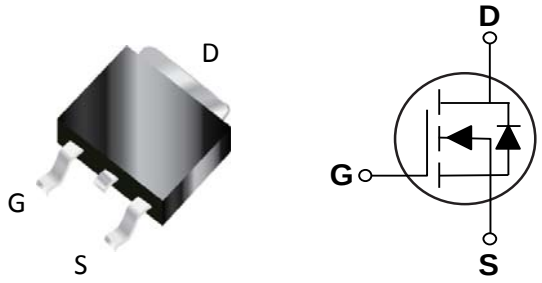
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

| $BV_{DSS}$ | $R_{DS(ON)}$ | $I_D$ |
|---|---|---|
| 100 V | 9.2 mΩ | 60 A |

### Features

- 100V, 60A, $R_{DS(ON)}$=9.2mΩ@$V_{GS}$=10V
- Improved dv/dt capability
- Fast switching
- Green Device Available

TO-252 Pin Configuration




### Applications

- Networking
- Load Switch
- LED applications
- Quick Charger

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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 100 | V |
| $V_{GS}$ | Gate-Source Voltage | +20 / -12 | V |
| $I_D$ | Drain Current - Continuous ($T_C$=25°C) | 60 | A |
| | Drain Current - Continuous ($T_C$=100°C) | 38 | |
| $I_{DM}$ | Drain Current - Pulsed (NOTE 1) | 240 | A |
| $E_{AS}$ | Single Pulse Avalanche Energy (NOTE 2) | 211 | mJ |
| $I_{AS}$ | Single Pulse Avalanche Current (NOTE 2) | 65 | A |
| $P_D$ | Power Dissipation ($T_C$=25°C) | 94 | W |
| | Power Dissipation - Derate above 25°C | 0.75 | W/°C |
| $T_J$ | Operating Junction Temperature Range | -50 to 150 | °C |
| $T_{STG}$ | Storage Temperature Range | -50 to 150 | °C |
| Marking Code | | NM9P2 | |

### Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient | --- | 62 | °C/W |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 1.33 | °C/W |

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

### Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 100 | --- | --- | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=100V , $V_{GS}$=0V , $T_J$=25°C | --- | --- | 1 | uA |
| | | $V_{DS}$=80V , $V_{GS}$=0V , $T_J$=125°C | --- | --- | 10 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=+20V , $V_{DS}$=0V | --- | --- | 100 | nA |

### On Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V , $I_D$=15A | --- | 7.4 | 9.2 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=8A | --- | 10.6 | 14 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$=250uA | 1.0 | 1.6 | 2.5 | V |
| gfs | Forward Transconductance | $V_{DS}$=10V , $I_D$=3A | --- | 11 | --- | S |

### Dynamic and switching Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge (NOTE 3、4) | $V_{DS}$=50V , $V_{GS}$=10V , $I_D$=8.5A | --- | 37.8 | 76 | nC |
| $Q_{gs}$ | Gate-Source Charge (NOTE 3、4) | | --- | 7.8 | 16 | |
| $Q_{gd}$ | Gate-Drain Charge (NOTE 3、4) | | --- | 8.4 | 17 | |
| $T_{d(on)}$ | Turn-On Delay Time (NOTE 3、4) | $V_{DD}$=50V , $V_{GS}$=10V , $R_G$=6Ω , $I_D$=1A | --- | 14.6 | 30 | nS |
| $T_r$ | Rise Time (NOTE 3、4) | | --- | 21.5 | 44 | |
| $T_{d(off)}$ | Turn-Off Delay Time (NOTE 3、4) | | --- | 54 | 108 | |
| $T_f$ | Fall Time (NOTE 3、4) | | --- | 84.3 | 168 | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=50V , $V_{GS}$=0V , f=1MHz | --- | 2250 | 4500 | pF |
| $C_{oss}$ | Output Capacitance | | --- | 410 | 820 | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 25 | 50 | |
| $R_g$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | --- | 1.43 | --- | Ω |

### Drain-Source Diode Characteristics and Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | 60 | A |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | 120 | A |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=1A , $T_J$=25°C | --- | --- | 1 | V |
| trr | Reverse Recovery Time | $V_{GS}$=0V , $I_S$=15A , di/dt=100A/μs , $T_J$=25°C | --- | 42.4 | --- | nS |
| Qrr | Reverse Recovery Charge | | --- | 46.5 | --- | nC |

NOTES：

1. Repetitive Rating：Pulsed width limited by maximum junction temperature.
2. $V_{DD}$=50V, $V_{GS}$=10V, L=0.1mH, $I_{AS}$=65A, $R_G$=25Ω, Starting $T_J$=25°C.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

## Characteristics Curves

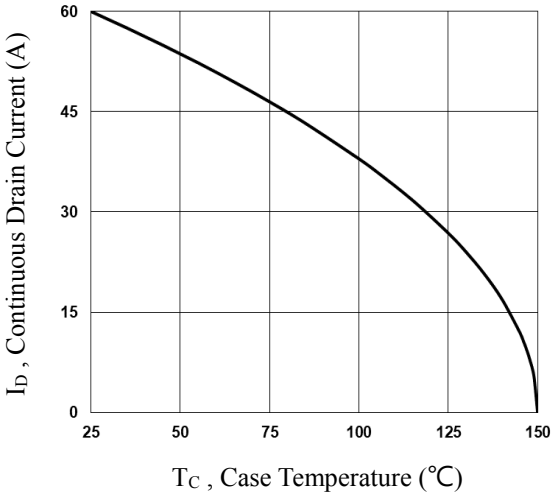



**Fig.1 Continuous Drain Current vs. $T_C$**

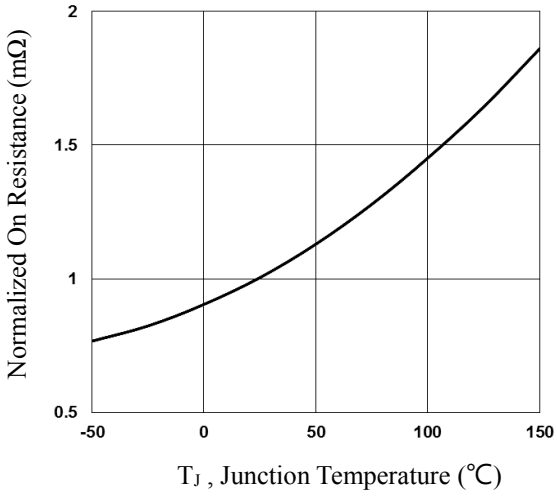



**Fig.2 Normalized RDSON vs. $T_J$**

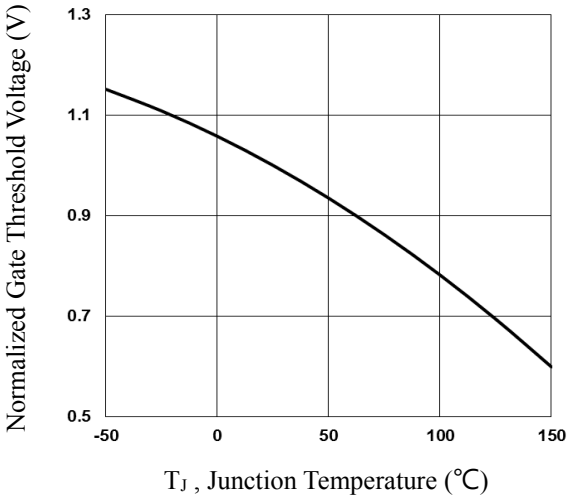



**Fig.3 Normalized Vth vs. $T_J$**

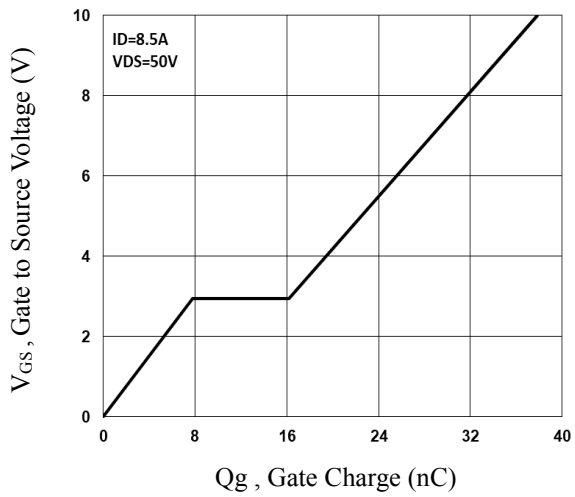



**Fig.4 Gate Charge Characteristics**

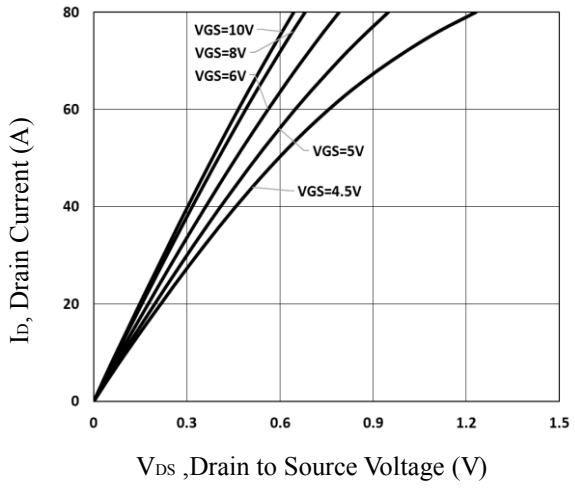



**Fig.5 Typical Output Characteristics**

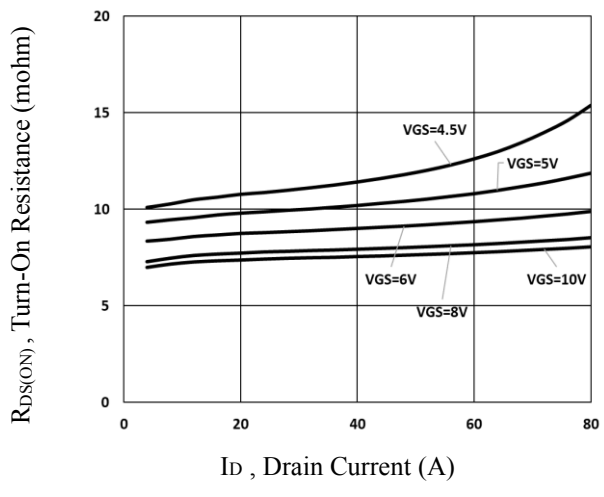



**Fig.6 Turn-On Resistance vs. ID**

## Characteristics Curves

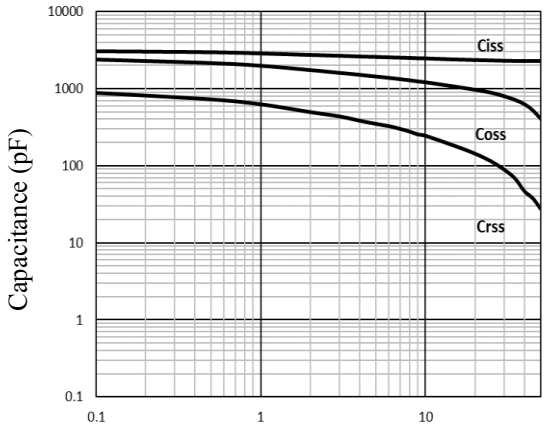



**Fig.7 Capacitance Characteristics**

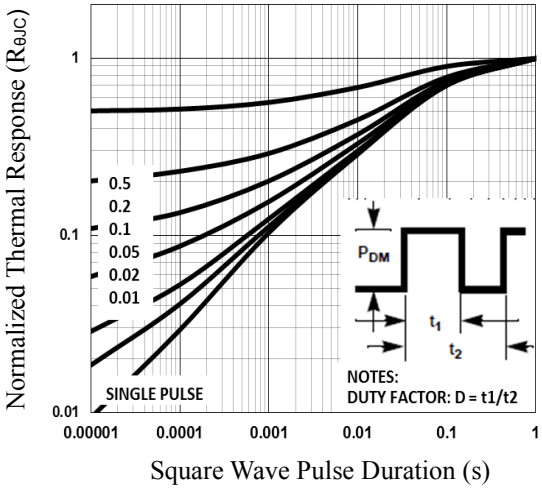



**Fig.8 Normalized Transient Impedance**

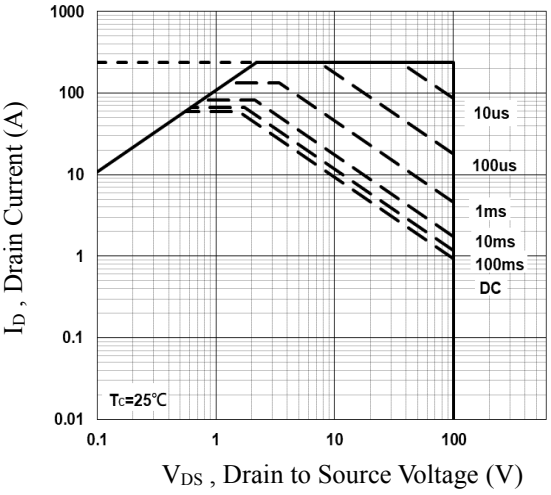



**Fig.9 Maximum Safe Operation Area**

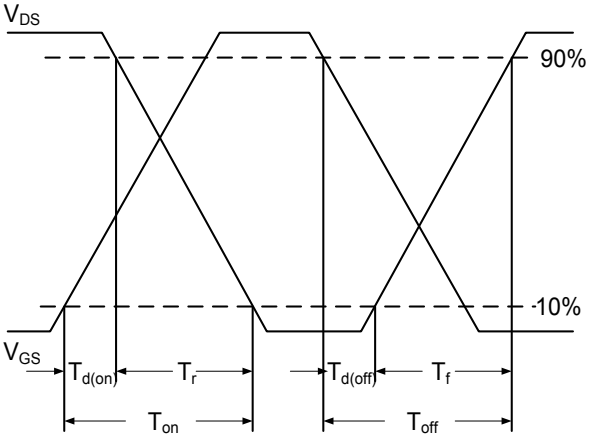



**Fig.10 Switching Time Waveform**

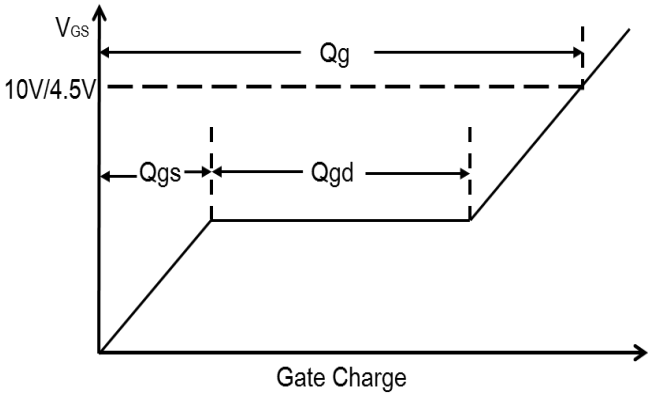
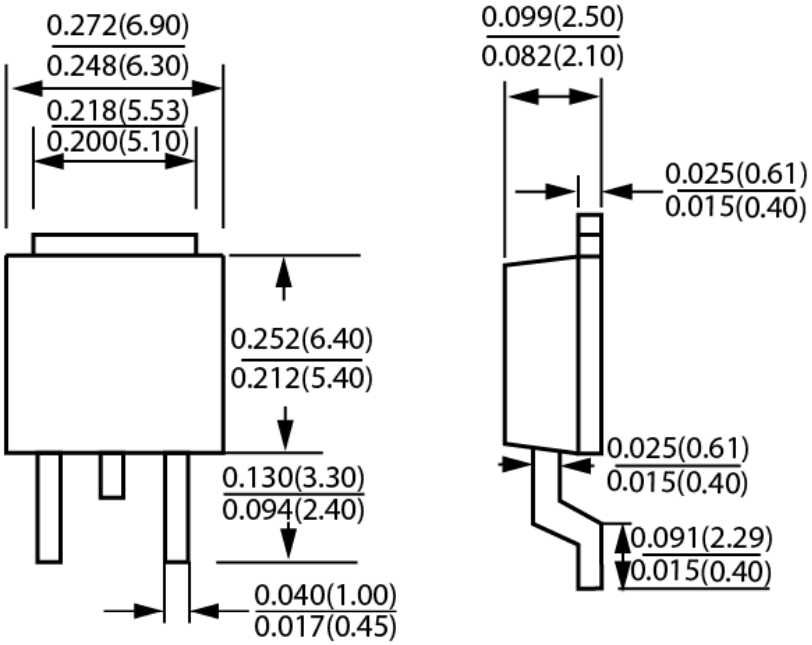



**Fig.11 Gate Charge Waveform**

**Package Outline Dimensions**




**TO-252**

Dimensions in inches and (millimeters)

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