# 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.*

| BVDSS | RDSON | ID |
|---|---|---|
| 100V | 9.2mΩ | 60A |

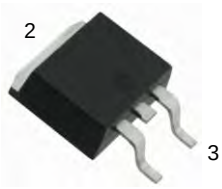
## Features

- *100V,60A, RDS(ON) =9.2mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

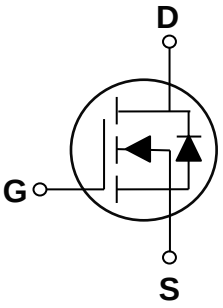
## Applications

- *Networking*
- *Load Switch*
- *LED applications*
- *Quick Charger*

## TO-252 Pin Configuration




1. Gate
2. Drain
3. Source




## Absolute Maximum Ratings (Tc=25℃ 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℃) | 60 | A |
| | Drain Current – Continuous ($T_C$=100℃) | 38 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | 240 | A |
| EAS | Single Pulse Avalanche Energy[2] | 211 | mJ |
| IAS | Single Pulse Avalanche Current[2] | 65 | A |
| $P_D$ | Power Dissipation ($T_C$=25℃) | 94 | W |
| | Power Dissipation – Derate above 25℃ | 0.75 | W/℃ |
| $T_{STG}$ | Storage Temperature Range | -50 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -50 to 150 | ℃ |

## Thermal Characteristics

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

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## Electrical Characteristics ($T_J$=25℃, 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 |
| $\triangle BV_{DSS}/\triangle T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to 25℃ , $I_D$=1mA | --- | 0.054 | --- | V/℃ |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=100V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=80V , $V_{GS}$=0V , $T_J$=125℃ | --- | --- | 10 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=+20V , $V_{DS}$=0V | --- | --- | 100 | nA |

### On Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | 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 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 1.0 | 1.6 | 2.5 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -5.5 | --- | mV/℃ |
| gfs | Forward Transconductance | $V_{DS}$=10V , $I_D$=3A | --- | 11 | --- | S |

### Dynamic and switching Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge[3,4] | $V_{DS}$=50V , $V_{GS}$=10V , $I_D$=8.5A | --- | 37.8 | 76 | nC |
| $Q_{gs}$ | Gate-Source Charge[3,4] | | --- | 7.8 | 16 | |
| $Q_{gd}$ | Gate-Drain Charge[3,4] | | --- | 8.4 | 17 | |
| $T_{d(on)}$ | Turn-On Delay Time[3,4] | $V_{DD}$=50V , $V_{GS}$=10V , $R_G$=6Ω $I_D$=1A | --- | 14.6 | 30 | ns |
| $T_r$ | Rise Time[3,4] | | --- | 21.5 | 44 | |
| $T_{d(off)}$ | Turn-Off Delay Time[3,4] | | --- | 54 | 108 | |
| $T_f$ | Fall Time[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 | $V_{GS}$=0V, $V_{DS}$=0V, F=1MHz | --- | 1.43 | --- | Ω |

### Drain-Source Diode Characteristics and Maximum 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℃ | --- | --- | 1 | V |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS}$=0V,$I_S$=15A , di/dt=100A/μs $T_J$=25℃ | --- | 42.4 | --- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 46.5 | --- | nC |

Note :
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℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

## 100V N-Channel MOSFETs

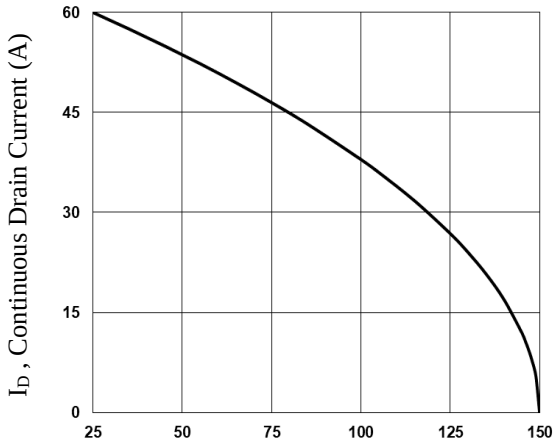


Fig.1 Continuous Drain Current vs. $T_C$

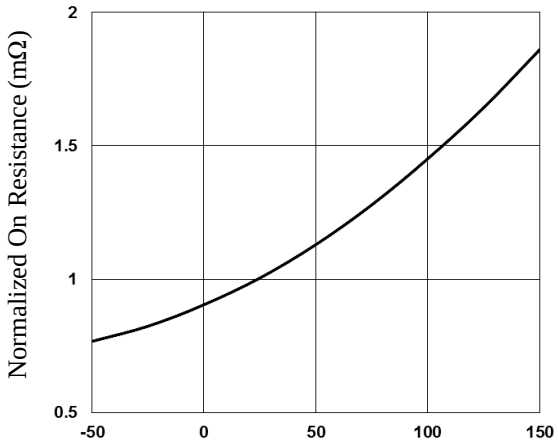


Fig.2 Normalized RDSON vs. $T_J$

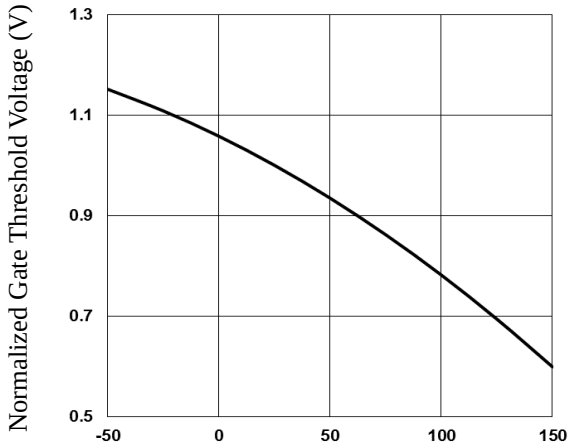


Fig.3 Normalized Vth vs. $T_J$

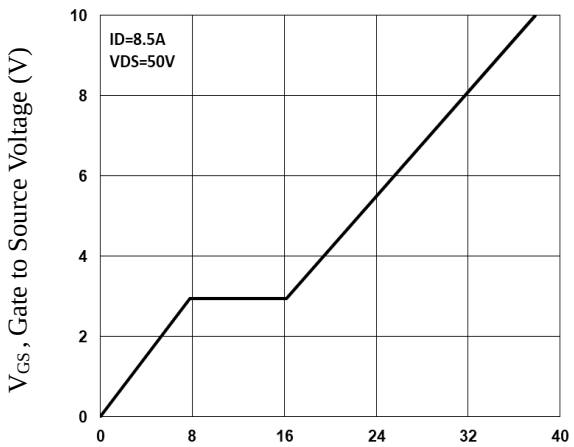


Fig.4 Gate Charge Characteristics

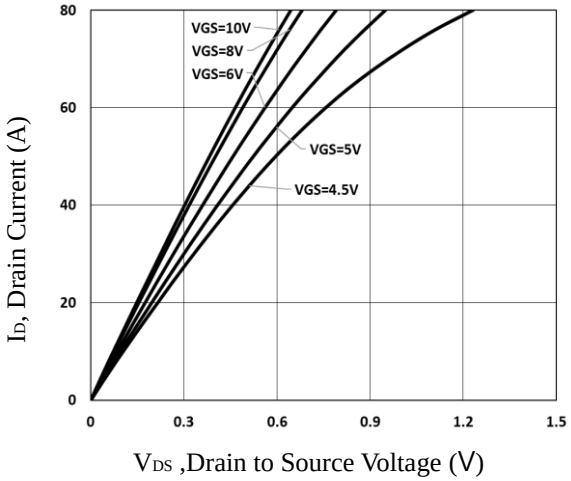


Fig.5 Typical Output Characteristics

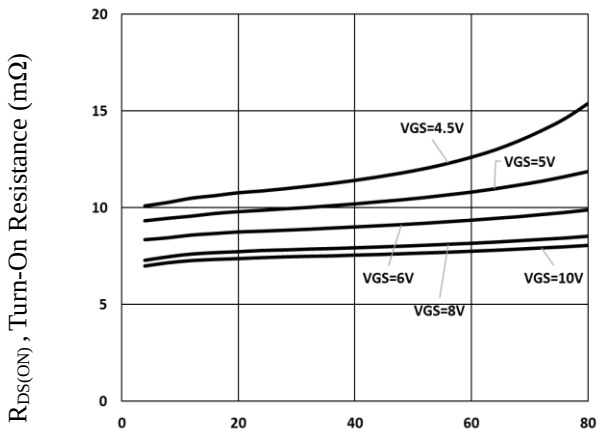


Fig.6 Turn-On Resistance vs. $I_D$

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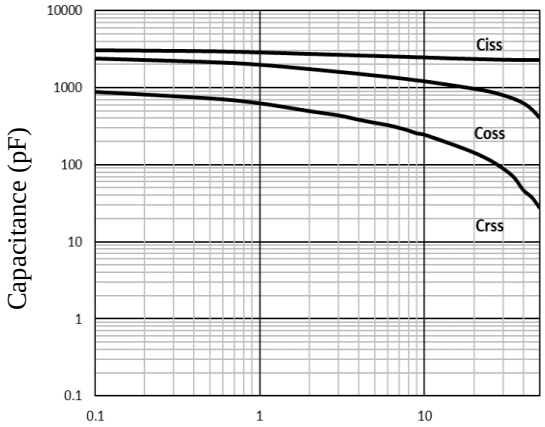
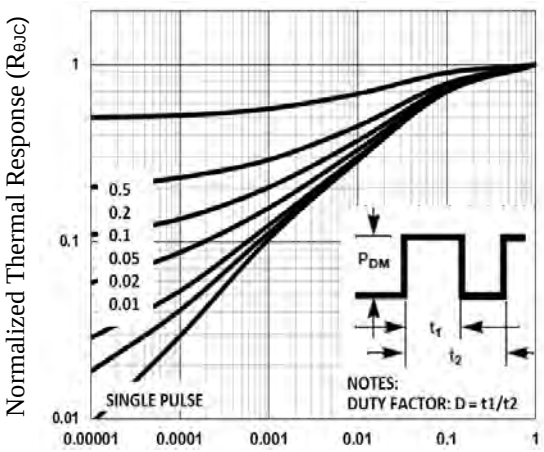


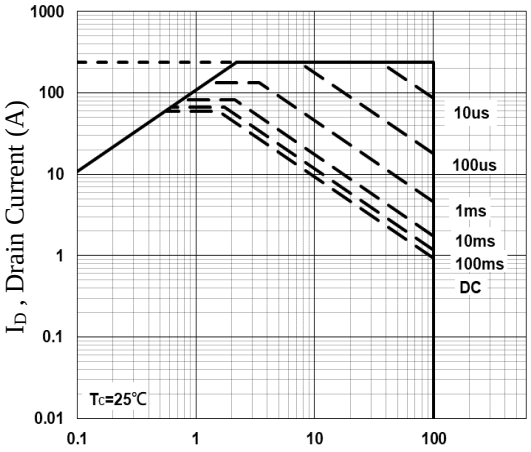

$V_{DS}$ , Drain to Source Voltage (V)

Fig.7 Capacitance Characteristics




Square Wave Pulse Duration (s)

Fig.8 Normalized Transient Impedance




$V_{DS}$ , Drain to Source Voltage (V)

Fig.9 Maximum Safe Operation Area

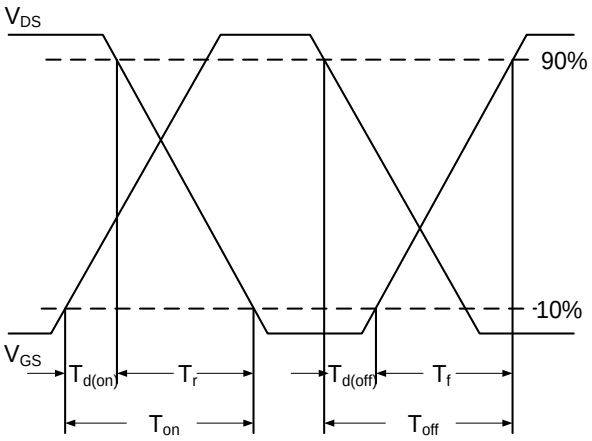



Fig.10 Switching Time Waveform

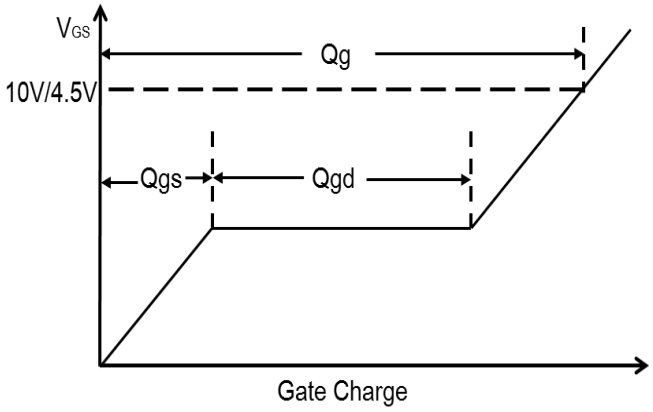
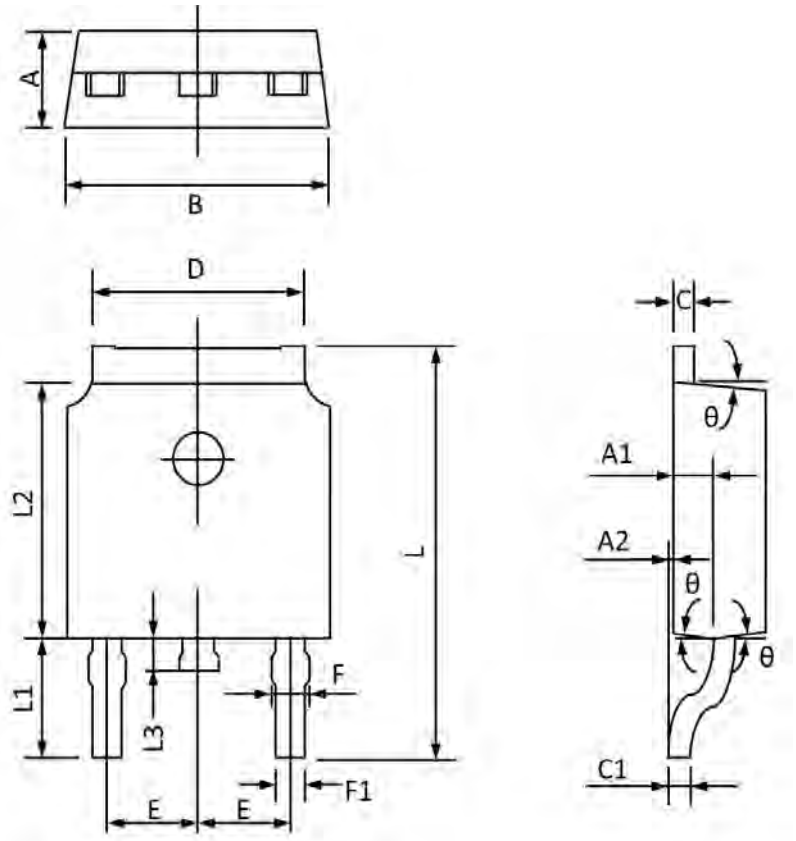



Fig.11 Gate Charge Waveform

## 100V N-Channel MOSFETs

# TO-252 PACKAGE INFORMATION




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | MAX | MIN | MAX | MIN |
| A | 2.400 | 2.200 | 0.094 | 0.087 |
| A1 | 1.110 | 0.910 | 0.044 | 0.036 |
| A2 | 0.150 | 0.000 | 0.006 | 0.000 |
| B | 6.800 | 6.400 | 0.268 | 0.252 |
| C | 0.580 | 0.450 | 0.023 | 0.018 |
| C1 | 0.580 | 0.460 | 0.023 | 0.018 |
| D | 5.500 | 5.100 | 0.217 | 0.201 |
| E | 2.386 | 2.186 | 0.094 | 0.086 |
| F | 0.940 | 0.600 | 0.037 | 0.024 |
| F1 | 0.860 | 0.500 | 0.034 | 0.020 |
| L | 10.400 | 9.400 | 0.409 | 0.370 |
| L1 | 3.000 | 2.400 | 0.118 | 0.094 |
| L2 | 6.200 | 5.400 | 0.244 | 0.213 |
| L3 | 1.200 | 0.600 | 0.047 | 0.024 |
| θ | 9° | 3° | 9° | 3° |