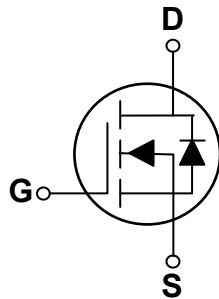


General Description

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.

TO251 Pin Configuration



| | | |
|-------|-------|----|
| BVDSS | RDSON | ID |
| 100V | 185mΩ | 8A |

Features

- 100V, 8A, $R_{DS(ON)} = 185m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed

Applications

- Networking
- Load Switch
- LED applications



Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|-----------|--|------------|---------------------|
| V_{DS} | Drain-Source Voltage | 100 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current – Continuous ($T_c=25^\circ\text{C}$) | 8 | A |
| | Drain Current – Continuous ($T_c=100^\circ\text{C}$) | 4.8 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 32 | A |
| P_D | Power Dissipation ($T_c=25^\circ\text{C}$) | 32 | W |
| | Power Dissipation – Derate above 25°C | 0.256 | W/ $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -50 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -50 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|---------------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 62 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction to case | --- | 3.8 | $^\circ\text{C}/\text{W}$ |

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)
Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|------------------------------------|--|------|------|-----------|--------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 100 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | BV_{DSS} Temperature Coefficient | Reference to 25°C , $I_D=1\text{mA}$ | --- | 0.10 | --- | $V/^\circ\text{C}$ |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=100V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=80V, V_{GS}=0V, T_J=125^\circ\text{C}$ | --- | --- | 10 | μA |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |

On Characteristics

| | | | | | | |
|---------------------|--------------------------------------|-------------------------------|-----|-----|-----|---------------------|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10V, I_D=2A$ | --- | 160 | 185 | $m\Omega$ |
| | | $V_{GS}=4.5V, I_D=1A$ | --- | 170 | 195 | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.2 | 1.8 | 2.5 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -4 | --- | $mV/^\circ\text{C}$ |
| g_{fs} | Forward Transconductance | $V_{DS}=10V, I_D=1A$ | --- | 5 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|--------------|------------------------------------|---|-----|------|------|----------|
| Q_g | Total Gate Charge ^{2,3} | $V_{DS}=50V, V_{GS}=10V, I_D=2A$ | --- | 13.4 | 21 | nC |
| Q_{gs} | Gate-Source Charge ^{2,3} | | --- | 2.9 | 6 | |
| Q_{gd} | Gate-Drain Charge ^{2,3} | | --- | 1.7 | 4 | |
| $T_{d(on)}$ | Turn-On Delay Time ^{2,3} | $V_{DD}=30V, V_{GS}=10V, R_G=3.3\Omega$ $I_D=1A$ | --- | 1.6 | 3 | ns |
| T_r | Rise Time ^{2,3} | | --- | 6.6 | 13 | |
| $T_{d(off)}$ | Turn-Off Delay Time ^{2,3} | | --- | 11.5 | 22 | |
| T_f | Fall Time ^{2,3} | | --- | 3.6 | 7 | |
| C_{iss} | Input Capacitance | $V_{DS}=50V, V_{GS}=0V, F=1\text{MHz}$ | --- | 820 | 1190 | pF |
| C_{oss} | Output Capacitance | | --- | 35 | 55 | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 20 | 30 | |
| R_g | Gate resistance | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$ | --- | 1.3 | 2.6 | 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 | --- | --- | 8 | A |
| I_{SM} | Pulsed Source Current | | --- | --- | 16 | A |
| V_{SD} | Diode Forward Voltage | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$ | --- | --- | 1 | V |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.

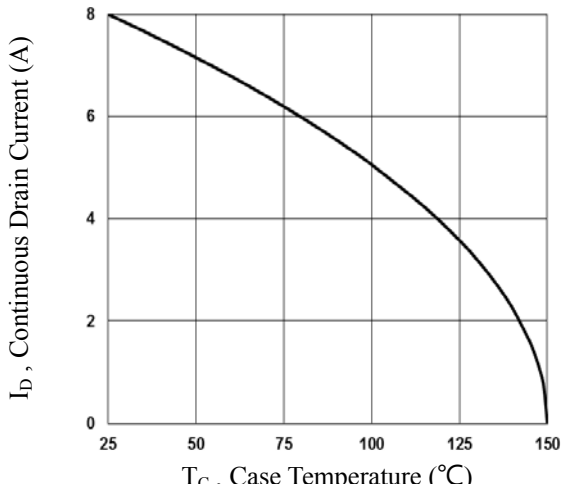


Fig.1 Continuous Drain Current vs. T_c

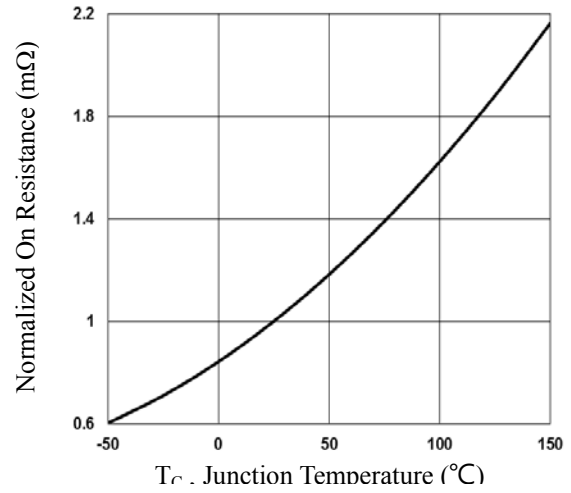


Fig.2 Continuous Drain Current vs. T_j

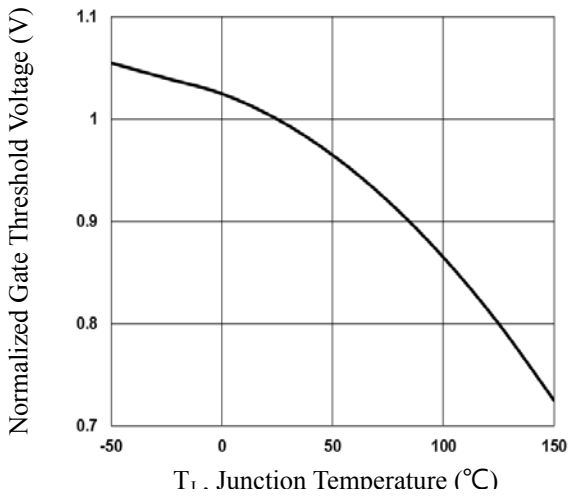


Fig.3 Normalized V_{th} vs. T_j

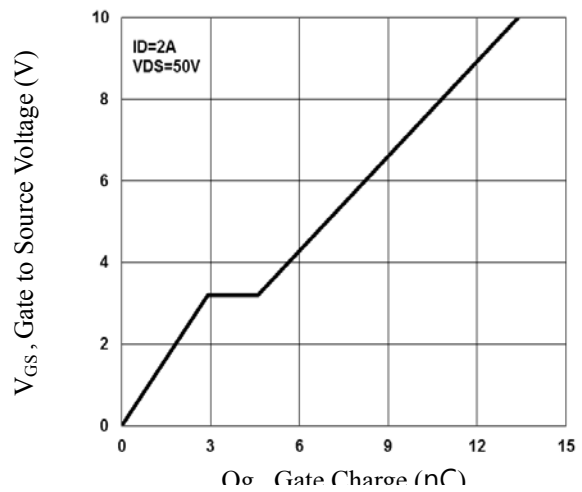


Fig.4 Gate Charge Waveform

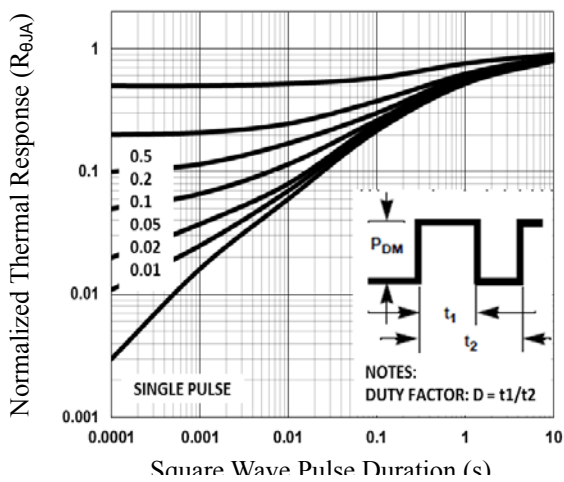


Fig.5 Normalized Transient Impedance

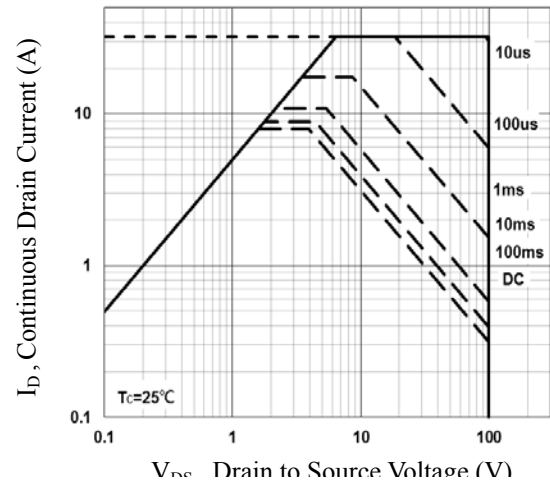


Fig.6 Maximum Safe Operation Area

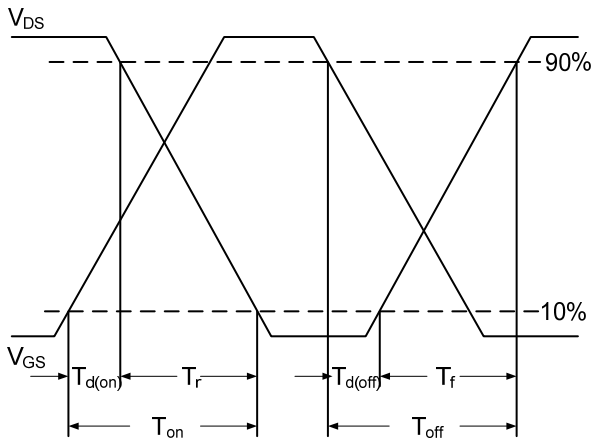


Fig.7 Switching Time Waveform

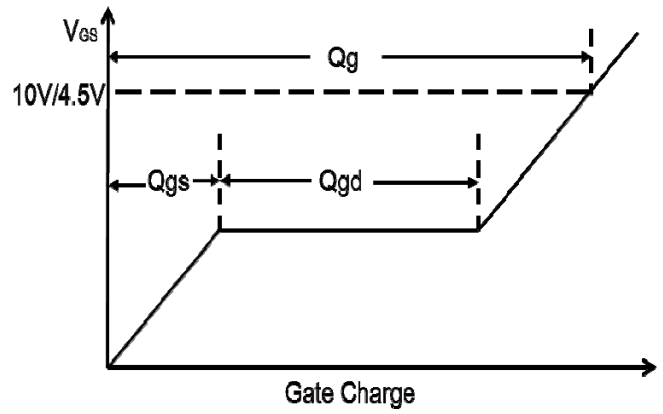
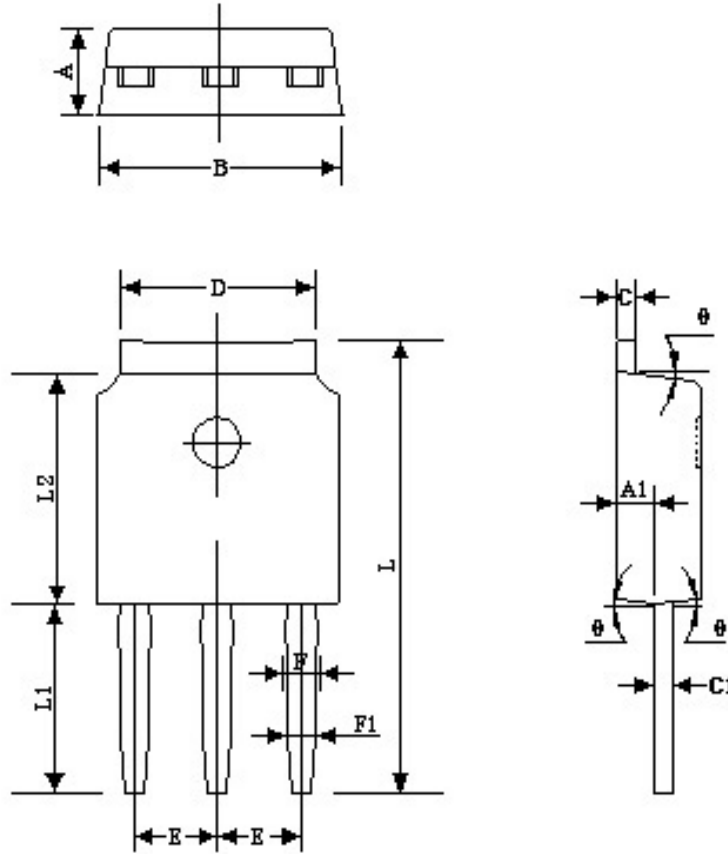


Fig.8 Gate Charge Waveform



TO251 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 |
| B | 6.700 | 6.500 | 0.264 | 0.256 |
| C | 0.580 | 0.460 | 0.023 | 0.018 |
| C1 | 0.580 | 0.460 | 0.023 | 0.018 |
| D | 5.460 | 5.100 | 0.215 | 0.201 |
| E | 2.386 | 2.186 | 0.094 | 0.086 |
| F | 0.940 | 0.740 | 0.037 | 0.029 |
| F1 | 0.860 | 0.660 | 0.034 | 0.026 |
| L | 12.300 | 11.700 | 0.484 | 0.461 |
| L1 | 5.200 | 4.800 | 0.205 | 0.189 |
| L2 | 6.200 | 6.000 | 0.244 | 0.236 |
| θ | 9° | 3° | 9° | 3° |