

General Description

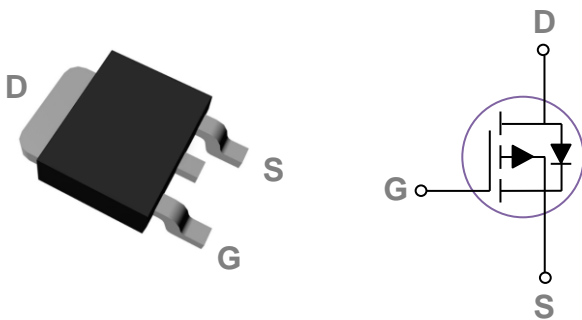
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|---------------------|----------------|
| BVDSS | R _{DS(ON)} | I _D |
| -40V | 15mΩ | -45A |

Features

- -40V, -45A, R_{DS(ON)} = 15mΩ @ V_{GS} = -10V
- Fast switching
- Green Device Available
- Suit for -4.5V Gate Drive Applications

TO252 Pin Configuration



Applications

- MB / VGA / V_{core}
- POL Applications
- Load Switch
- LED Application

Absolute Maximum Ratings T_c=25°C unless otherwise noted

| Symbol | Parameter | Rating | Units |
|------------------|--|------------|-------|
| V _{DS} | Drain-Source Voltage | -40 | V |
| V _{GS} | Gate-Source Voltage | ±20 | V |
| I _D | Drain Current – Continuous (T _C =25°C) | -45 | A |
| | Drain Current – Continuous (T _C =100°C) | -28 | A |
| I _{DM} | Drain Current – Pulsed ¹ | -180 | A |
| EAS | Single Pulse Avalanche Energy ² | 130 | mJ |
| IAS | Single Pulse Avalanche Current ² | -51 | A |
| P _D | Power Dissipation (T _C =25°C) | 73.5 | W |
| | Power Dissipation – Derate above 25°C | 0.59 | W/°C |
| T _{STG} | Storage Temperature Range | -55 to 150 | °C |
| T _J | Operating Junction Temperature Range | -55 to 150 | °C |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|------------------|--|------|------|------|
| R _{θJC} | Thermal Resistance Junction to Case | --- | 1.7 | °C/W |
| R _{θJA} | Thermal Resistance Junction to Ambient | --- | 62 | °C/W |

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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------|--------------------------------|---|------|------|-----------|---------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=-250\mu A$ | -40 | --- | --- | V |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=-40V, V_{GS}=0V, T_J=25^\circ C$ | --- | --- | -1 | μA |
| | | $V_{DS}=-32V, V_{GS}=0V, T_J=125^\circ C$ | --- | --- | -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 | $V_{GS}=-10V, I_D=-10A$ | --- | 11.5 | 15 | $m\Omega$ |
| | | $V_{GS}=-4.5V, I_D=-8A$ | --- | 16 | 22 | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=-250\mu A$ | -1.0 | -1.6 | -2.5 | V |
| gfs | Forward Transconductance | $V_{DS}=-10V, I_D=-10A$ | --- | 13 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|--------------|-------------------------------------|--|-----|------|------|----|
| Q_g | Total Gate Charge ^{3, 4} | $V_{DS}=-32V, V_{GS}=-4.5V, I_D=-10A$ | --- | 22.2 | 40 | nC |
| Q_{gs} | Gate-Source Charge ^{3, 4} | | --- | 8.2 | 16 | |
| Q_{gd} | Gate-Drain Charge ^{3, 4} | | --- | 8.8 | 16 | |
| $T_{d(on)}$ | Turn-On Delay Time ^{3, 4} | $V_{DD}=-20V, V_{GS}=-10V, R_G=6\Omega, I_D=-1A$ | --- | 23 | 40 | ns |
| T_r | Rise Time ^{3, 4} | | --- | 10 | 20 | |
| $T_{d(off)}$ | Turn-Off Delay Time ^{3, 4} | | --- | 135 | 250 | |
| T_f | Fall Time ^{3, 4} | | --- | 46 | 90 | |
| C_{iss} | Input Capacitance | $V_{DS}=-25V, V_{GS}=0V, F=1MHz$ | --- | 2757 | 4000 | pF |
| C_{oss} | Output Capacitance | | --- | 240 | 360 | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 137 | 200 | |

Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|---------------------------|--------------------------------------|------|------|------|------|
| I_S | Continuous Source Current | $V_G=V_D=0V, \text{ Force Current}$ | --- | --- | -45 | A |
| I_{SM} | Pulsed Source Current | | --- | --- | -90 | A |
| V_{SD} | Diode Forward Voltage | $V_{GS}=0V, I_S=-1A, T_J=25^\circ C$ | --- | --- | -1 | V |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-51A, R_G=25\Omega, \text{ Starting } T_J=25^\circ C$.
3. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

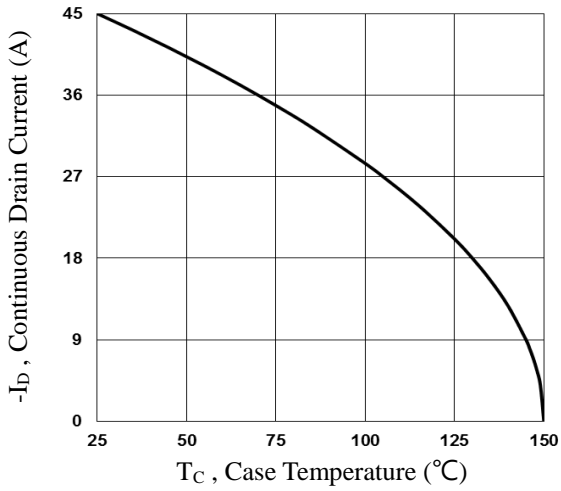


Fig.1 Continuous Drain Current vs. T_c

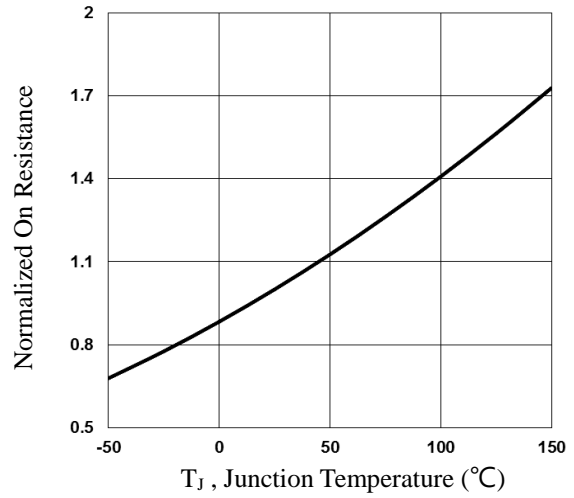


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

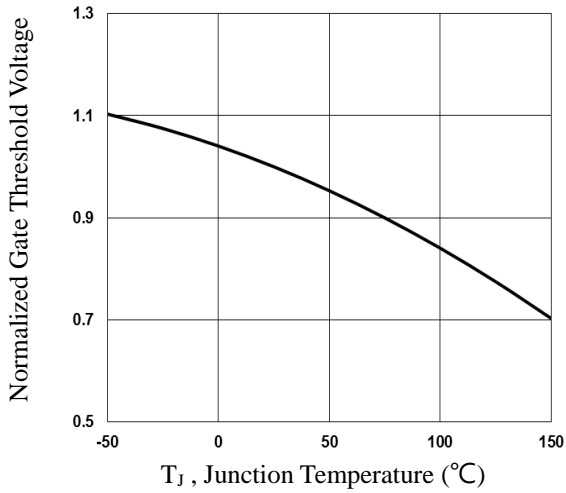


Fig.3 Normalized V_{th} vs. T_j

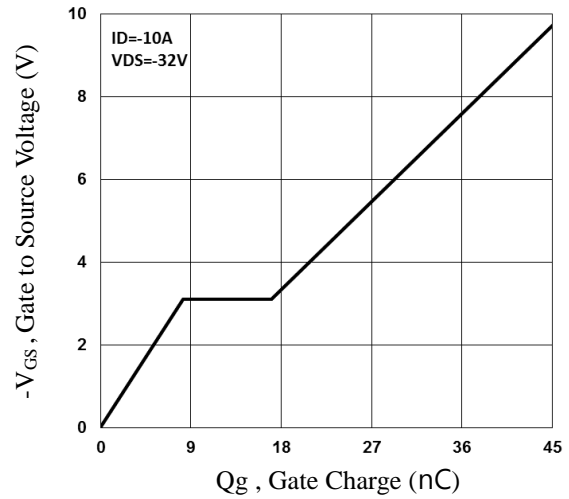


Fig.4 Gate Charge Waveform

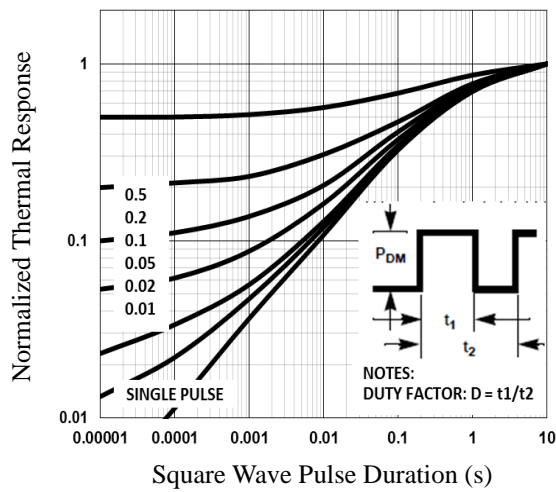


Fig.5 Normalized Transient Impedance

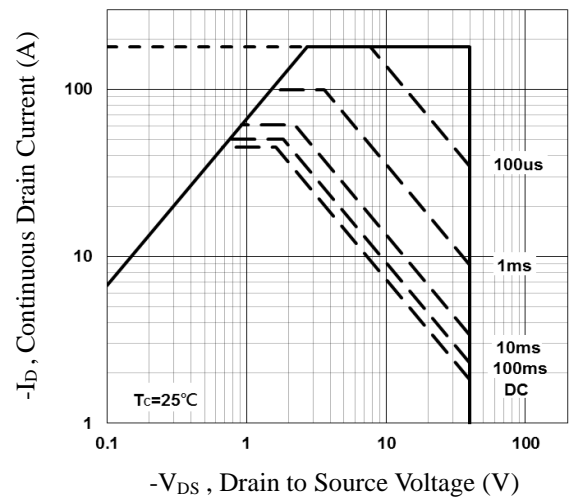


Fig.6 Maximum Safe Operation Area

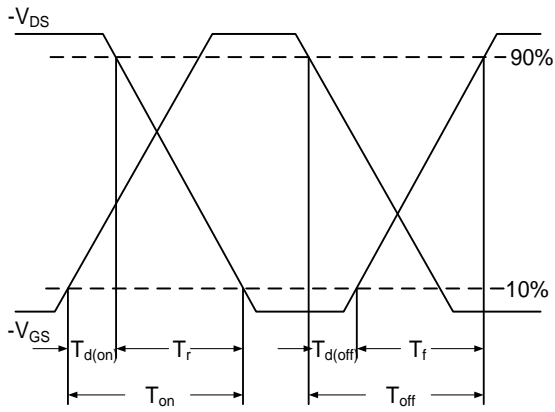


Fig.7 Switching Time Waveform

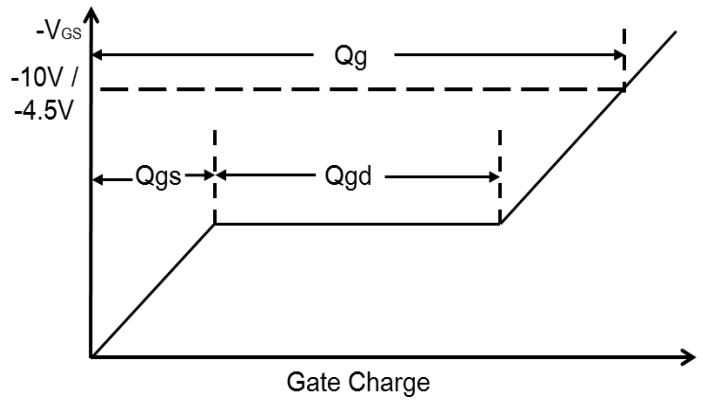
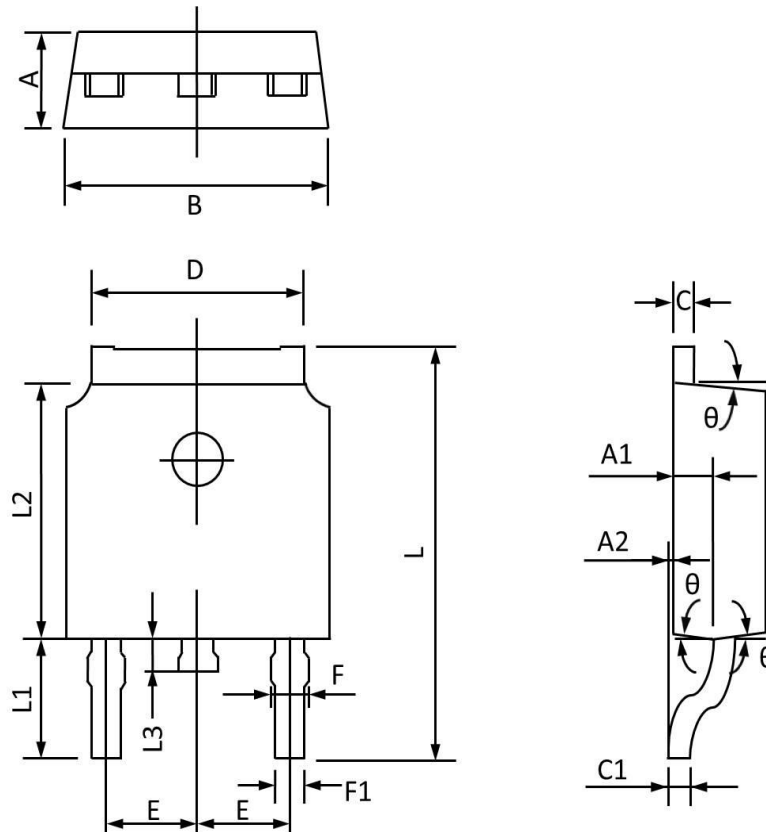


Fig.8 Gate Charge Waveform

TO252 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | MAX | MIN | MAX | MIN |
| A | 2.450 | 2.150 | 0.096 | 0.085 |
| A1 | 1.200 | 0.910 | 0.047 | 0.036 |
| A2 | 0.150 | 0.000 | 0.006 | 0.000 |
| B | 6.800 | 6.300 | 0.268 | 0.248 |
| C | 0.580 | 0.350 | 0.023 | 0.014 |
| C1 | 0.550 | 0.380 | 0.022 | 0.015 |
| D | 5.500 | 5.100 | 0.217 | 0.201 |
| E | 2.390 | 2.000 | 0.094 | 0.079 |
| 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 | 5.300 | 0.244 | 0.209 |
| L3 | 1.200 | 0.600 | 0.047 | 0.024 |
| θ | 9° | 3° | 9° | 3° |