

General Description

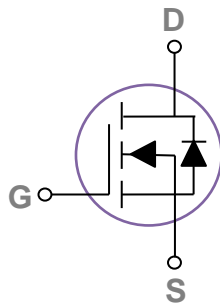
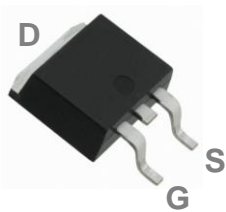
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|---------------------|----------------|
| BVDSS | R _{DS(ON)} | I _D |
| 60V | 4.5mΩ | 90A |

Features

- 60V,90A, R_{DS(ON)} = 4.5mΩ@V_{GS} = 10V
- Improved dv/dt capability
- Fast switching
- Green Device Available

TO252 Pin Configuration



Applications

- PowerTools
- Quick Charger
- LED applications
- Motor Drive Applications

Absolute Maximum Ratings T_c=25°C unless otherwise noted

| Symbol | Parameter | Rating | Units |
|------------------|--|------------|-------|
| V _{DS} | Drain-Source Voltage | 60 | V |
| V _{GS} | Gate-Source Voltage | ±20 | V |
| I _D | Drain Current – Continuous (T _c =25°C) | 90 | A |
| | Drain Current – Continuous (T _c =100°C) | 60 | A |
| I _{DM} | Drain Current – Pulsed ¹ | 360 | A |
| EAS | Single Pulse Avalanche Energy ² | 450 | mJ |
| IAS | Single Pulse Avalanche Current ² | 95 | A |
| P _D | Power Dissipation (T _c =25°C) | 132 | W |
| | Power Dissipation – Derate above 25°C | 1.06 | W/°C |
| T _{STG} | Storage Temperature Range | -50 to 150 | °C |
| T _J | Operating Junction Temperature Range | -50 to 150 | °C |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|------------------|--|------|------|------|
| R _{θJA} | Thermal Resistance Junction to ambient | --- | 62 | °C/W |
| R _{θJC} | Thermal Resistance Junction to Case | --- | 0.94 | °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 | 60 | --- | --- | V |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =60V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =48V, 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

| | | | | | | |
|---------------------|-----------------------------------|--|-----|-----|-----|----|
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =20A | --- | 3.8 | 4.5 | mΩ |
| | | V _{GS} =4.5V, I _D =10A | --- | 4.2 | 5.5 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1 | 1.6 | 2.5 | V |
| g _{fs} | Forward Transconductance | V _{DS} =10V, I _D =3A | --- | 25 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|---------------------|------------------------------------|--|-----|------|-------|----|
| Q _g | Total Gate Charge ^{3,4} | V _{DS} =30V, V _{GS} =4.5V, I _D =10A | --- | 58.2 | 116 | nC |
| Q _{gs} | Gate-Source Charge ^{3,4} | | --- | 16.2 | 32 | |
| Q _{gd} | Gate-Drain Charge ^{3,4} | | --- | 23.4 | 46 | |
| T _{d(on)} | Turn-On Delay Time ^{3,4} | V _{DD} =30V, V _{GS} =10V, R _G =6Ω I _D =1A | --- | 19.2 | 40 | ns |
| T _r | Rise Time ^{3,4} | | --- | 56.3 | 120 | |
| T _{d(off)} | Turn-Off Delay Time ^{3,4} | | --- | 90.8 | 200 | |
| T _f | Fall Time ^{3,4} | | --- | 21.6 | 40 | |
| C _{iss} | Input Capacitance | V _{DS} =25V, V _{GS} =0V, F=1MHz | --- | 6805 | 10000 | pF |
| C _{oss} | Output Capacitance | | --- | 445 | 680 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 195 | 280 | |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, F=1MHz | --- | 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 | --- | --- | 90 | A |
| I _{SM} | Pulsed Source Current | | --- | --- | 180 | A |
| V _{SD} | Diode Forward Voltage | V _{GS} =0V, I _S =1A, T _J =25°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}=95A., Starting T_J=25°C
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.

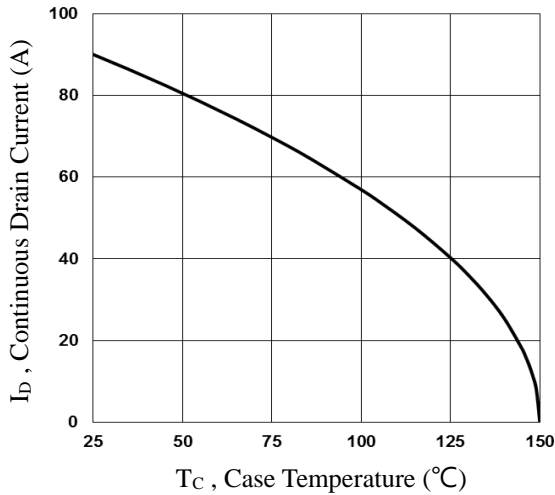


Fig.1 Continuous Drain Current vs. T_c

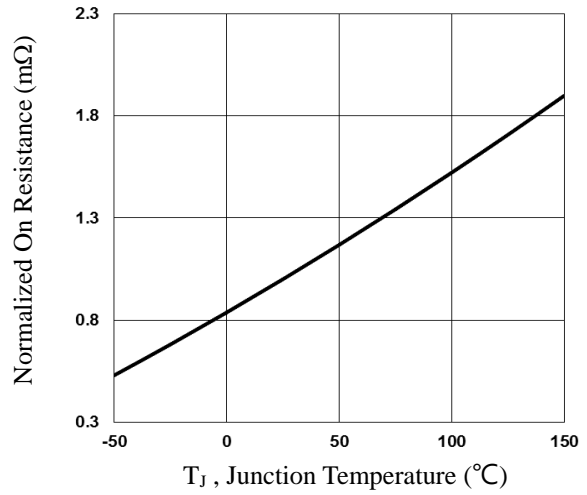


Fig.2 Normalized R_{DS(on)} vs. T_j

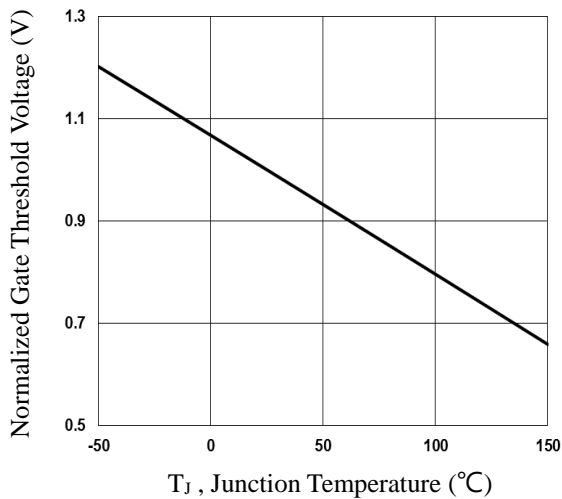


Fig.3 Normalized V_{th} vs. T_j

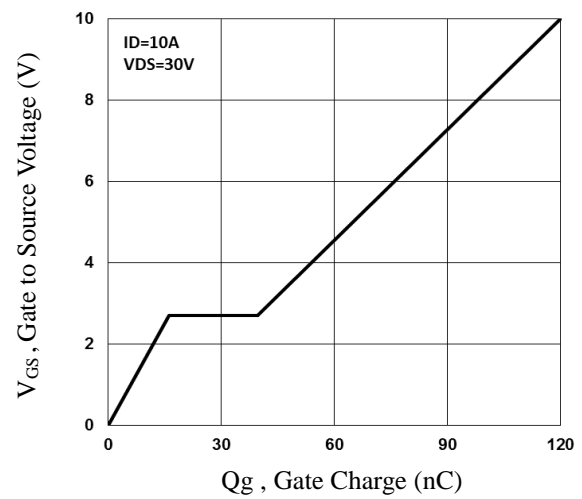


Fig.4 Gate Charge Characteristics

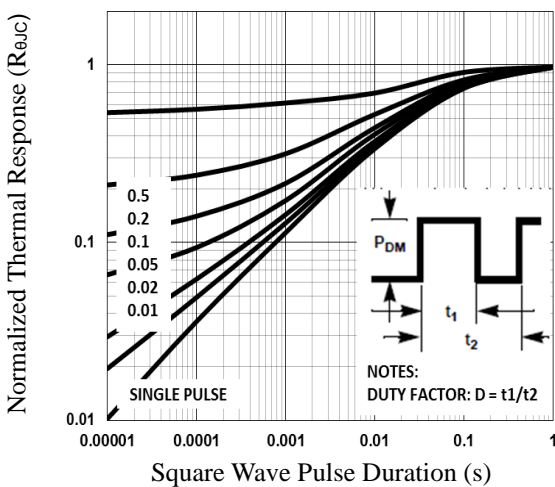


Fig.5 Normalized Transient Impedance

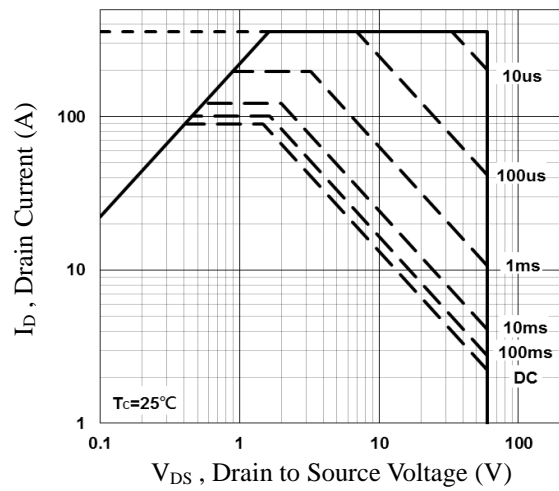


Fig.6 Maximum Safe Operation Area

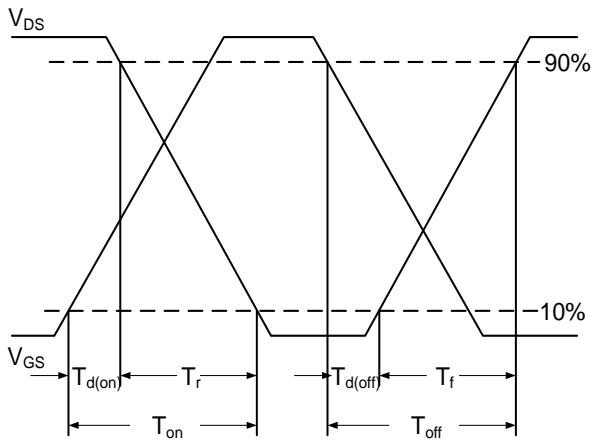


Fig.7 Switching Time Waveform

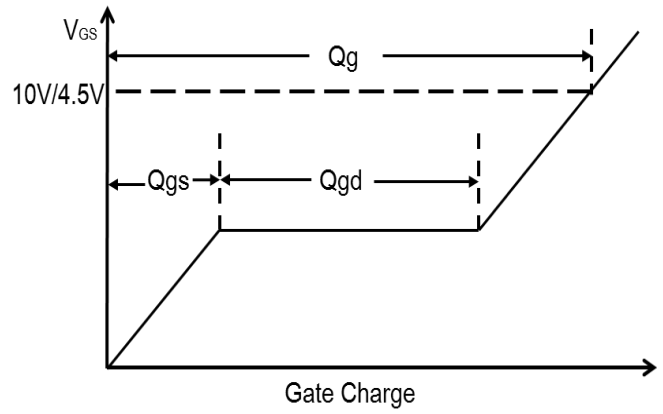
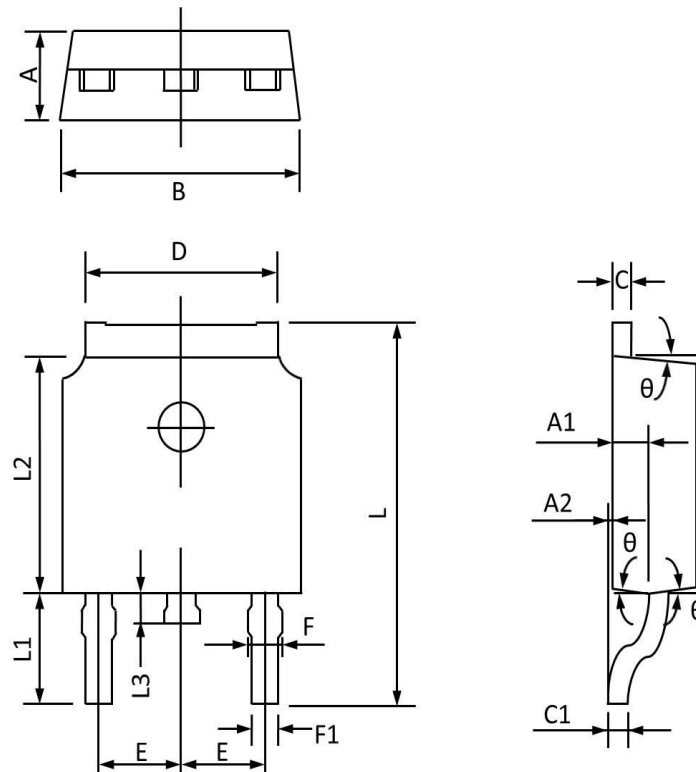


Fig.8 Gate Charge Waveform

TO252 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | MAX | MIN | MAX | MIN |
| A | 2.400 | 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° |

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