

General Description

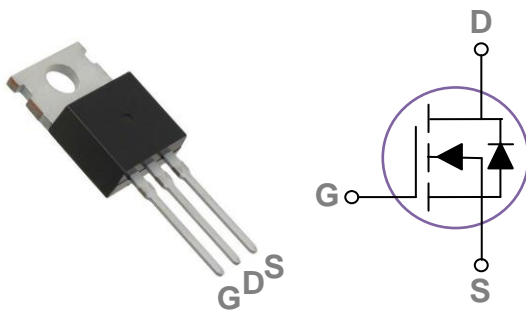
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|-------|------|
| BVDSS | RDSON | ID |
| 40V | 3.8mΩ | 150A |

Features

- 40V, 150A, $R_{DS(ON)} = 3.8m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

TO220 Pin Configuration



Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2nd SR

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ 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 ($T_C=25^\circ\text{C}$) | 150 | A |
| | Drain Current – Continuous ($T_C=100^\circ\text{C}$) | 95 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 600 | A |
| EAS | Single Pulse Avalanche Energy ² | 312 | mJ |
| IAS | Single Pulse Avalanche Current ² | 79 | A |
| P_D | Power Dissipation ($T_C=25^\circ\text{C}$) | 166 | W |
| | Power Dissipation – Derate above 25°C | 1.33 | W/ $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 62 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 0.75 | $^\circ\text{C/W}$ |

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 | 40 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.03 | --- | V/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =40V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =32V, 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 ³ | V _{GS} =10V, I _D =25A | --- | 3.1 | 3.8 | mΩ |
| | | V _{GS} =4.5V, I _D =12A | --- | 4.0 | 5.0 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.2 | 1.6 | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -5 | --- | mV/°C |
| gfs | Forward Transconductance | V _{DS} =10V, I _D =2A | --- | 16 | --- | S |

Dynamic Characteristics

| | | | | | | |
|---------------------|------------------------------------|--|-----|------|------|----|
| Q _g | Total Gate Charge ^{3,4} | V _{DS} =20V, V _{GS} =4.5V, I _D =10A | --- | 44.4 | 80 | nC |
| Q _{gs} | Gate-Source Charge ^{3,4} | | --- | 9.6 | 18 | |
| Q _{gd} | Gate-Drain Charge ^{3,4} | | --- | 16 | 30 | |
| T _{d(on)} | Turn-On Delay Time ^{3,4} | V _{DD} =20V, V _{GS} =10V, R _G =6Ω I _D =1A | --- | 28 | 50 | ns |
| T _r | Rise Time ^{3,4} | | --- | 3.2 | 6.5 | |
| T _{d(off)} | Turn-Off Delay Time ^{3,4} | | --- | 89 | 160 | |
| T _f | Fall Time ^{3,4} | | --- | 14 | 28 | |
| C _{iss} | Input Capacitance | V _{DS} =25V, V _{GS} =0V, F=1MHz | --- | 4940 | 7800 | pF |
| C _{oss} | Output Capacitance | | --- | 425 | 800 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 170 | 330 | |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, F=1MHz | --- | 1.4 | 2.8 | Ω |

Drain-Source Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|------------------------------------|---|------|------|------|------|
| I _S | Continuous Source Current | V _G =V _D =0V, Force Current | --- | --- | 150 | A |
| I _{SM} | Pulsed Source Current ³ | | --- | --- | 300 | A |
| V _{SD} | Diode Forward Voltage ³ | 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}=79A., Starting T_J=25°C
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.

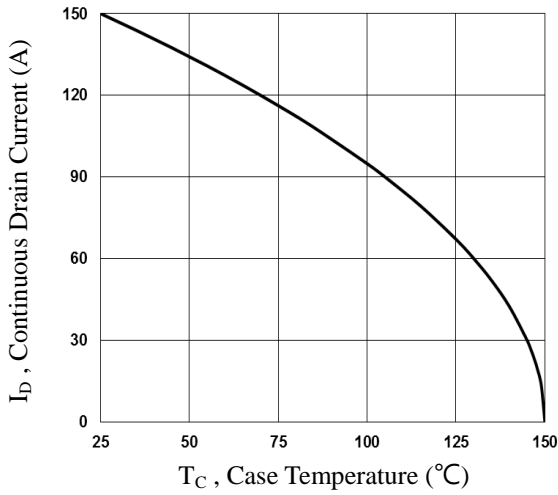


Fig.1 Continuous Drain Current vs. T_c

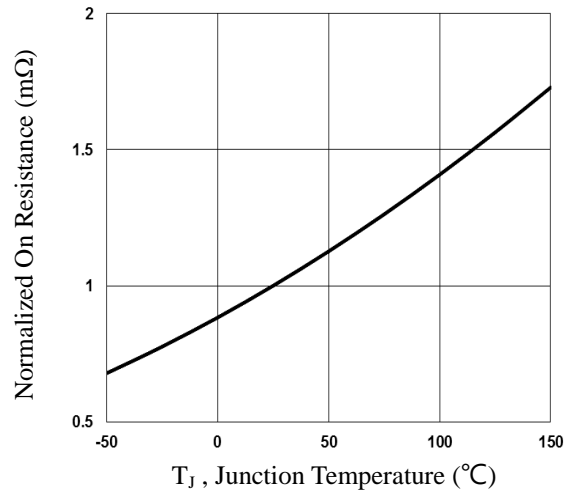


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

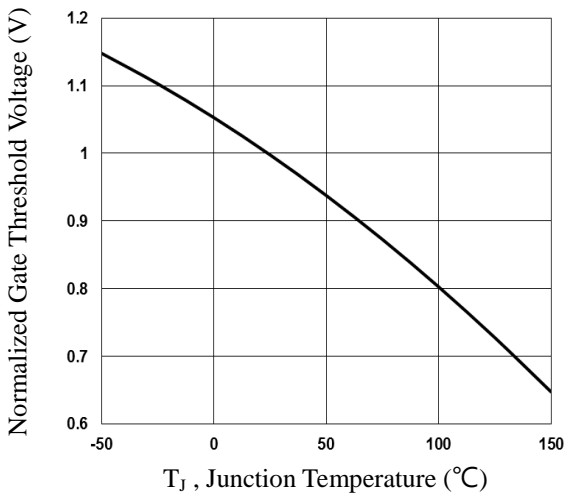


Fig.3 Normalized V_{th} vs. T_j

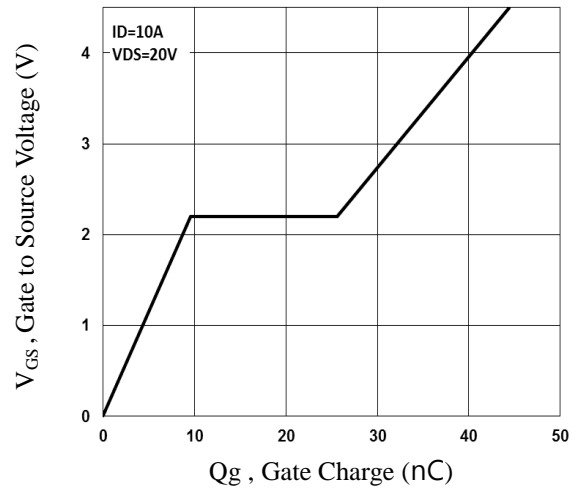


Fig.4 Gate Charge Waveform

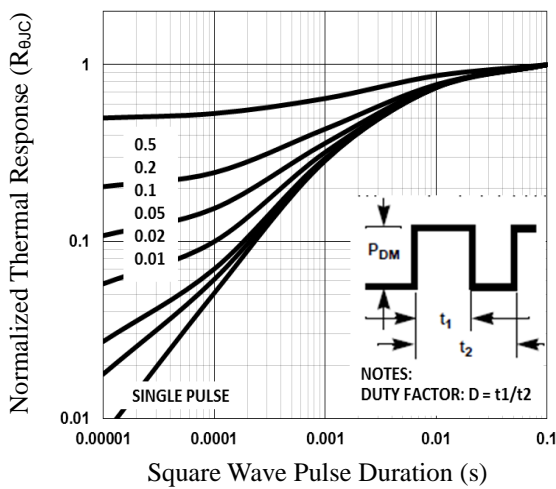


Fig.5 Normalized Transient Impedance

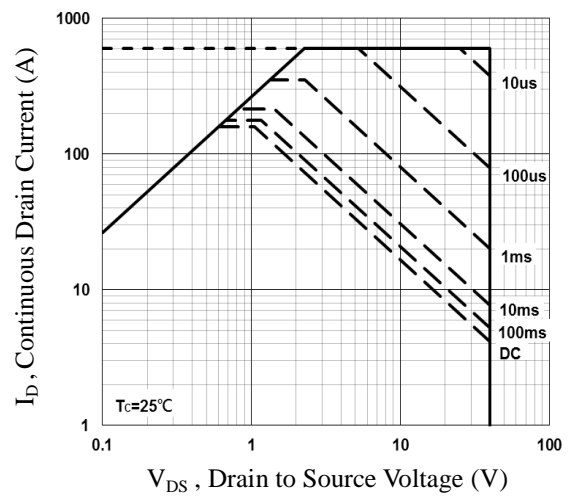


Fig.6 Maximum Safe Operation Area

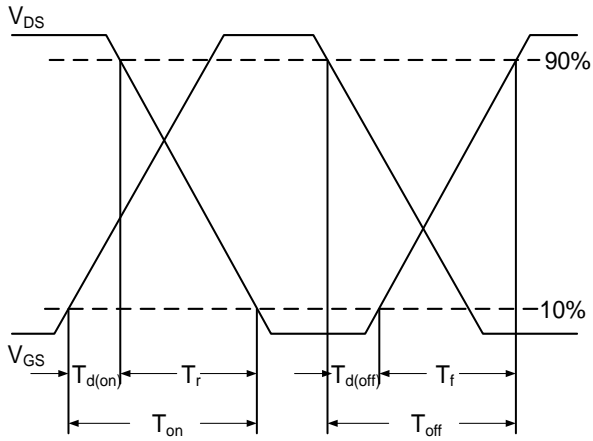


Fig.7 Switching Time Waveform

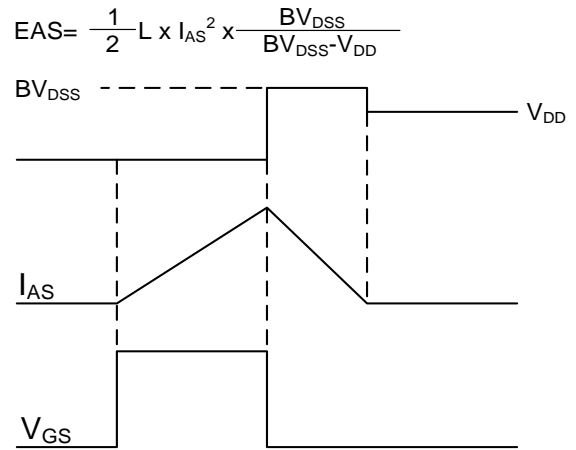
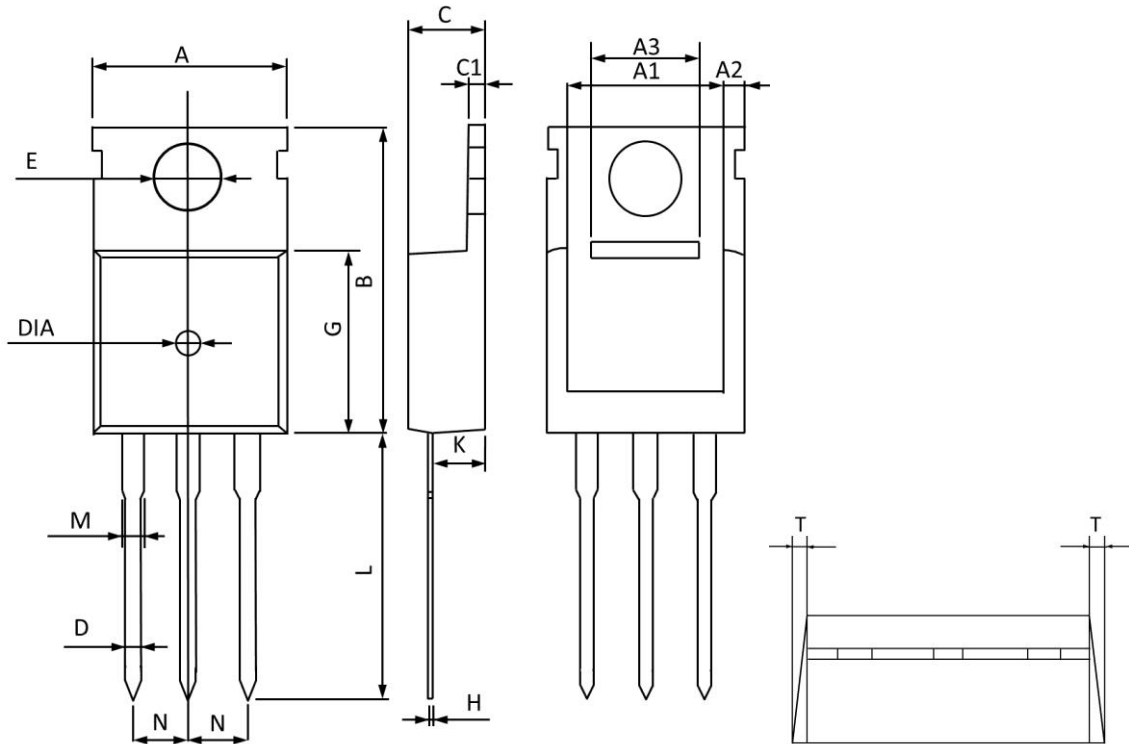


Fig.8 EAS Waveform

TO220 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------------|----------------------|----------------|
| | MAX | MIN | MAX | MIN |
| A | 10.300 | 9.700 | 0.406 | 0.382 |
| A1 | 8.840 | 8.440 | 0.348 | 0.332 |
| A2 | 1.250 | 1.050 | 0.049 | 0.041 |
| A3 | 5.300 | 5.100 | 0.209 | 0.201 |
| B | 16.200 | 15.400 | 0.638 | 0.606 |
| C | 4.680 | 4.280 | 0.184 | 0.169 |
| C1 | 1.500 | 1.100 | 0.059 | 0.043 |
| D | 1.000 | 0.600 | 0.039 | 0.024 |
| E | 3.800 | 3.400 | 0.150 | 0.134 |
| G | 9.300 | 8.700 | 0.366 | 0.343 |
| H | 0.600 | 0.400 | 0.024 | 0.016 |
| K | 2.700 | 2.100 | 0.106 | 0.083 |
| L | 13.600 | 12.800 | 0.535 | 0.504 |
| M | 1.500 | 1.100 | 0.059 | 0.043 |
| N | 2.590 | 2.490 | 0.102 | 0.098 |
| T | W0.35 | | W0.014 | |
| DIA | Φ1.5 TYP. | deep0.2 TYP. | Φ0.059 TYP. | deep0.008 TYP. |