

General Description

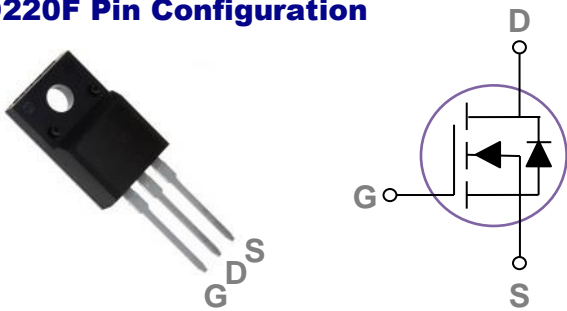
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|-------|-----|
| BVDSS | RDSON | ID |
| 100V | 4.4mΩ | 85A |

Features

- 100V,85A, $R_{DS(ON)} = 4.4m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

TO220F Pin Configuration



Applications

- Networking
- Load Switch
- LED applications
- Quick Charger

Absolute Maximum Ratings $T_c=25^\circ C$ 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 ($T_c=25^\circ C$) | 85 | A |
| | Drain Current – Continuous ($T_c=100^\circ C$) | 54 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 340 | A |
| EAS | Single Pulse Avalanche Energy ² | 378 | mJ |
| IAS | Single Pulse Avalanche Current ² | 87 | A |
| P_D | Power Dissipation ($T_c=25^\circ C$) | 66.1 | W |
| | Power Dissipation – Derate above $25^\circ C$ | 0.53 | 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 |
|-----------------|--|------|------|------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 62 | °C/W |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 1.89 | °C/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 |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=100V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=80V, V_{GS}=0V, T_J=85^\circ\text{C}$ | --- | --- | 10 | μA |
| 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 | 4.4 | $m\Omega$ |
| | | $V_{GS}=4.5V, I_D=15A$ | --- | 4.8 | 6.5 | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.2 | 1.8 | 2.5 | V |
| gfs | Forward Transconductance | $V_{DS}=10V, I_D=3A$ | --- | 20 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|--------------|-------------------------------------|--|-----|------|------|----------|
| Q_g | Total Gate Charge ^{3, 4} | $V_{DS}=50V, V_{GS}=10V, I_D=40A$ | --- | 115 | 173 | nC |
| Q_{gs} | Gate-Source Charge ^{3, 4} | | --- | 16 | 24 | |
| Q_{gd} | Gate-Drain Charge ^{3, 4} | | --- | 34 | 51 | |
| $T_{d(on)}$ | Turn-On Delay Time ^{3, 4} | $V_{DD}=50V, V_{GS}=10V, R_G=6\Omega, I_D=40A$ | --- | 23 | 35 | ns |
| T_r | Rise Time ^{3, 4} | | --- | 32 | 48 | |
| $T_{d(off)}$ | Turn-Off Delay Time ^{3, 4} | | --- | 157 | 236 | |
| T_f | Fall Time ^{3, 4} | | --- | 115 | 173 | |
| C_{iss} | Input Capacitance | $V_{DS}=50V, V_{GS}=0V, F=1\text{MHz}$ | --- | 6000 | 9000 | pF |
| C_{oss} | Output Capacitance | | --- | 1090 | 1640 | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 27 | 41 | |
| R_g | Gate resistance | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$ | --- | 1.9 | --- | Ω |

Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|---------------------------|---|------|------|------|------|
| I_S | Continuous Source Current | $V_G=V_D=0V, \text{Force Current}$ | --- | --- | 85 | A |
| I_{SM} | Pulsed Source Current | | --- | --- | 170 | A |
| V_{SD} | Diode Forward Voltage | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$ | --- | --- | 1 | V |
| t_{rr} | Reverse Recovery Time | $V_R=100V, I_S=10A$ | --- | 120 | --- | ns |
| Q_{rr} | Reverse Recovery Charge | $di/dt=100A/\mu s, T_J=25^\circ\text{C}$ | --- | 310 | --- | nC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=87A, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$.
3. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

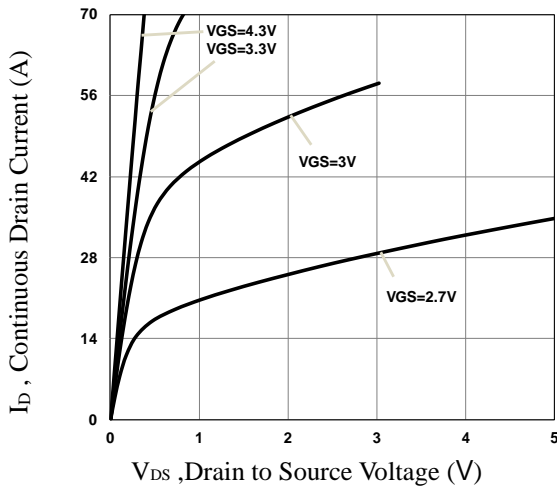


Fig.1 Typical Output Characteristics

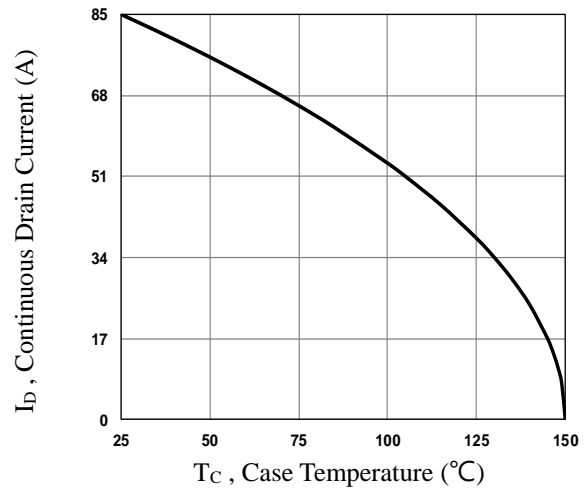


Fig.2 Continuous Drain Current vs. T_c

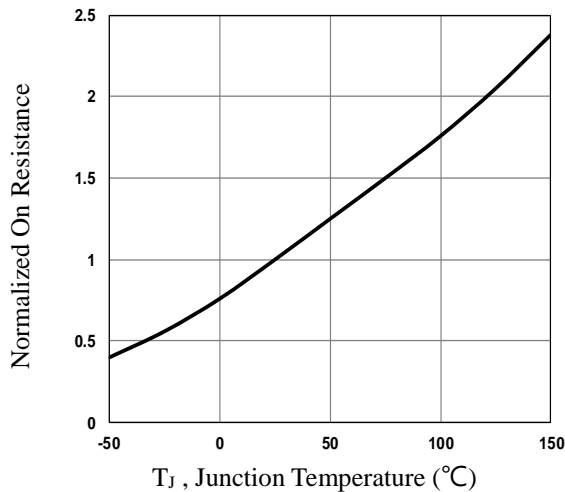


Fig.3 Normalized R_{DS(on)} vs. T_j

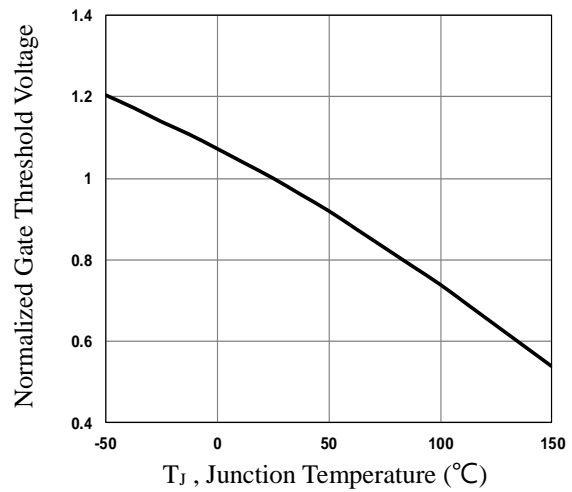


Fig.4 Normalized V_{th} vs. T_j

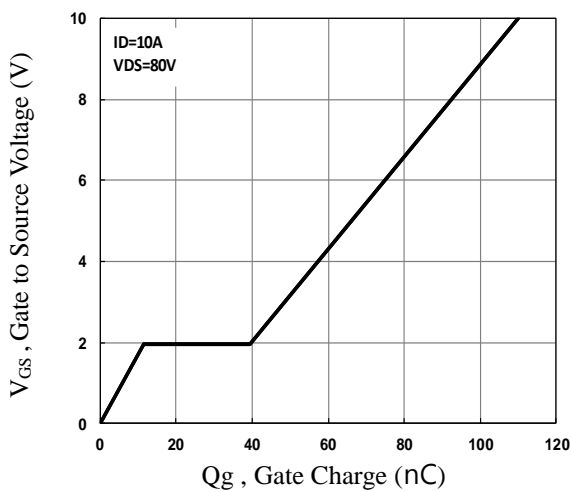


Fig.5 Gate Charge Characteristics

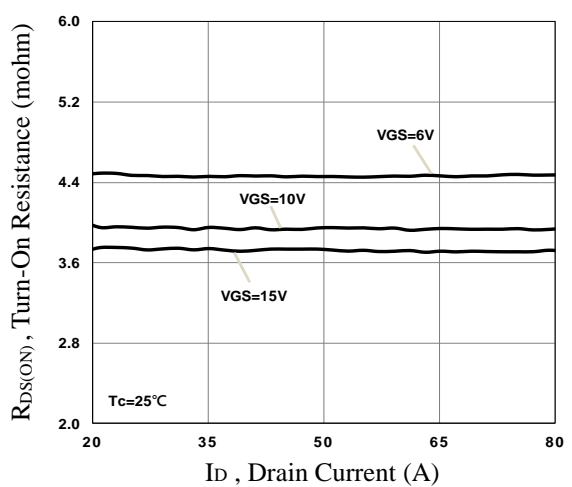


Fig.6 Turn-On Resistance vs. I_D

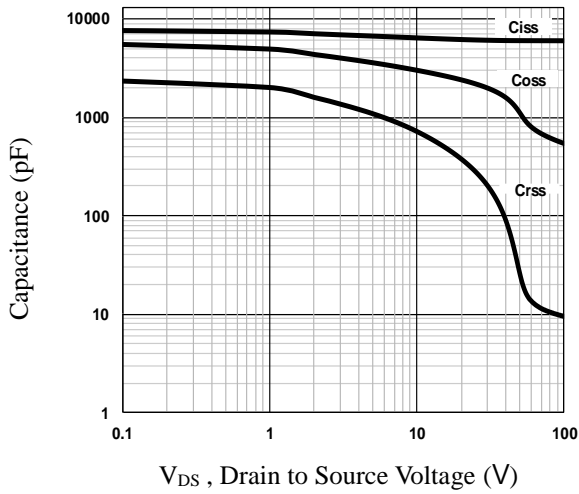


Fig.7 Capacitance Characteristics

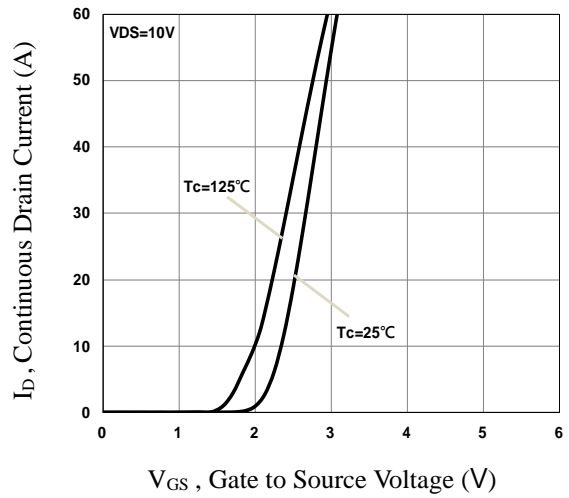


Fig.8 Transfer Characteristics

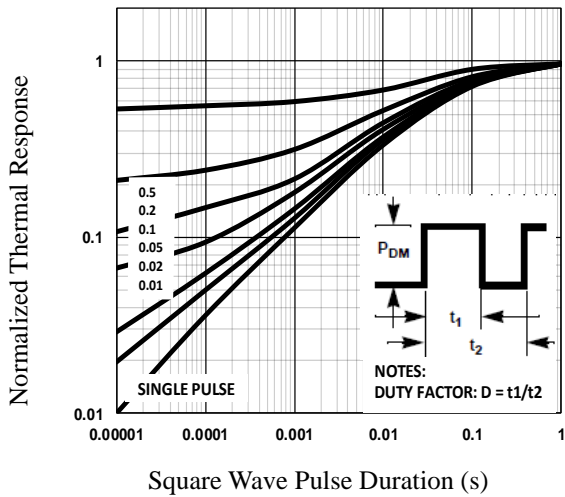


Fig.9 Normalized Transient Impedance

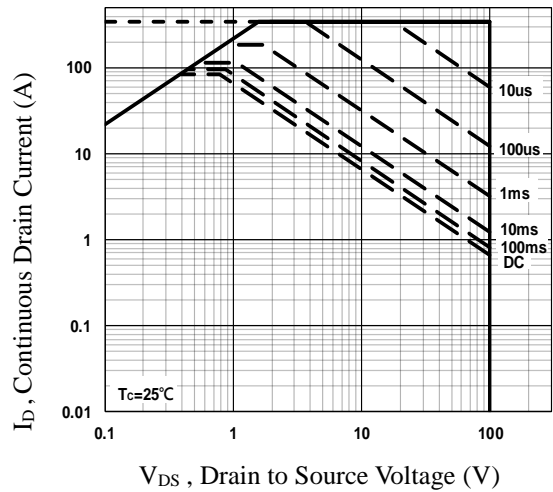


Fig.10 Maximum Safe Operation Area

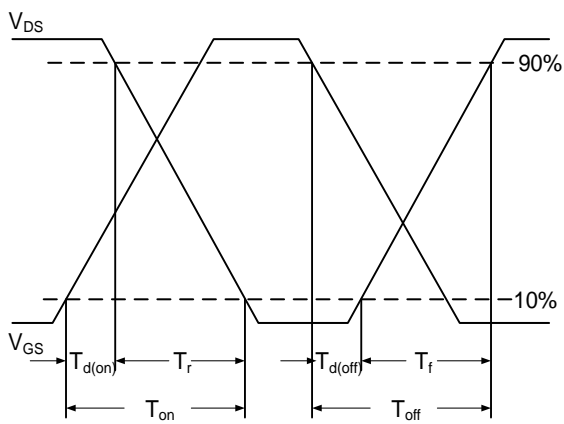


Fig.11 Switching Time Waveform

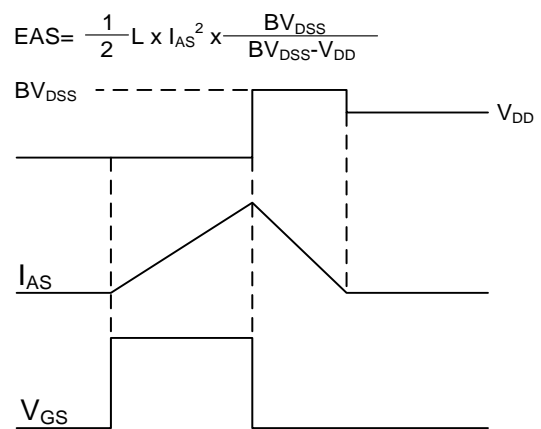
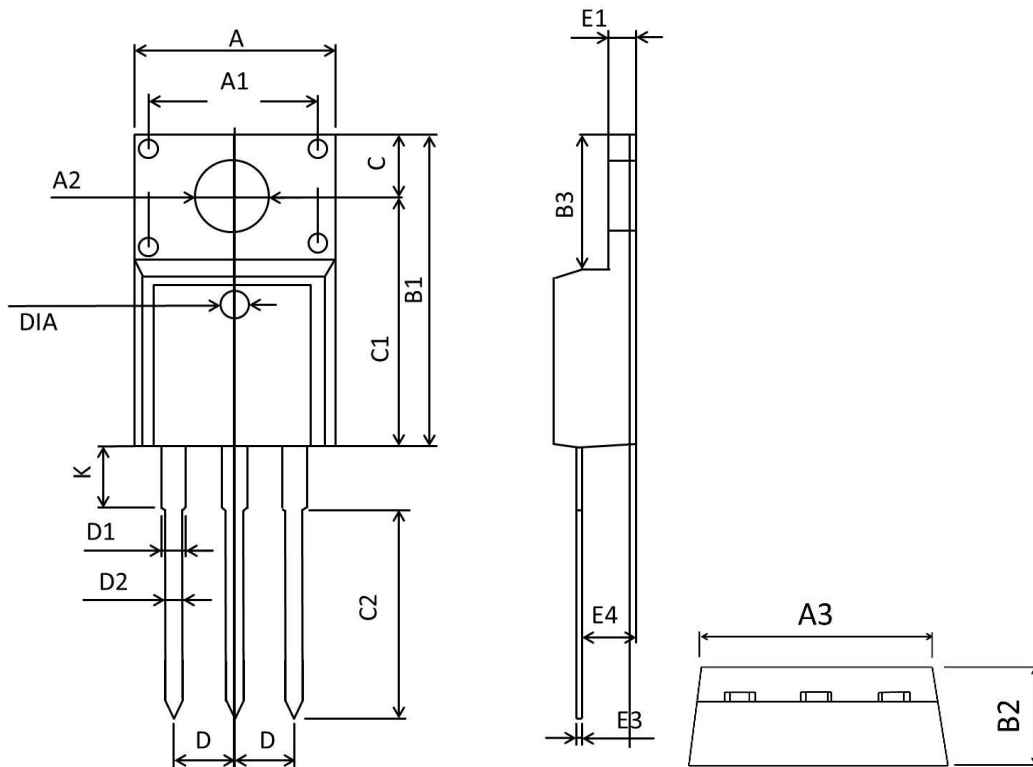


Fig.12 EAS Waveform

TO220F PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 9.860 | 10.460 | 0.389 | 0.411 |
| A1 | 6.900 | 7.100 | 0.272 | 0.280 |
| A2 | 3.100 | 3.500 | 0.122 | 0.138 |
| B1 | 15.450 | 16.300 | 0.608 | 0.642 |
| B2 | 4.400 | 5.000 | 0.173 | 0.197 |
| B3 | 6.280 | 7.100 | 0.247 | 0.280 |
| C | 3.100 | 3.500 | 0.122 | 0.138 |
| C1 | 12.270 | 12.870 | 0.483 | 0.507 |
| C2 | 9.600 | 10.520 | 0.378 | 0.414 |
| D | 2.540BSC | | 0.1BSC | |
| D1 | 1.070 | 1.470 | 0.042 | 0.058 |
| D2 | 0.600 | 1.000 | 0.024 | 0.039 |
| K | 2.800 | 3.500 | 0.110 | 0.138 |
| E1 | 2.340 | 2.740 | 0.092 | 0.108 |
| E3 | 0.350 | 0.650 | 0.014 | 0.026 |
| E4 | 2.460 | 2.960 | 0.097 | 0.117 |
| DIA | 1.35 | 1.65 | 0.053 | 0.065 |