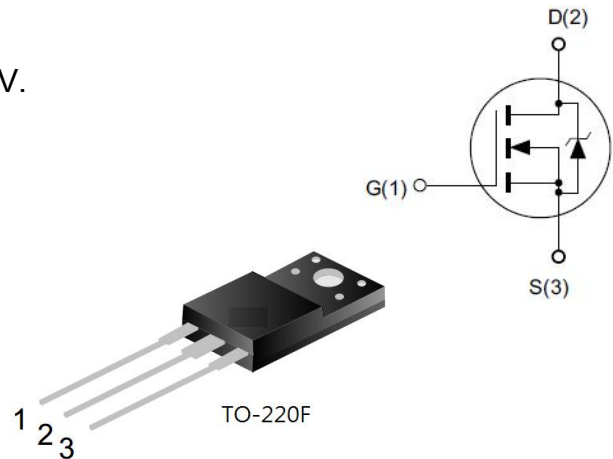


Features

- ◆ 500V, 13A, $R_{DS(ON)}(Max.) = 0.5\Omega @ V_{GS} = 10V$.
- ◆ Fast Switching
- ◆ 100% Avalanche Tested

Application

- ◆ Adaptor
- ◆ Standby Power
- ◆ Switching power supply
- ◆ PFC



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

| Symbol | Parameter | Limit | Unit |
|----------------|--|------------|------------------|
| | | TO-220F | |
| V_{DS} | Drain-Source Voltage ^a | 500 | V |
| V_{GS} | Gate-Source Voltage | ± 30 | V |
| I_D | Drain Current-Continuous, $T_c = 25^\circ\text{C}$ | 13 | A |
| | Drain Current-Continuous, $T_c = 100^\circ\text{C}$ | 8.2 | A |
| I_{DM} | Drain Current-Pulsed ^b | 52 | A |
| P_D | Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$ | 42 | W |
| EAS | Single Pulsed Avalanche Energy ^d | 720 | mJ |
| T_J, T_{STG} | Operating and Store Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Symbol | Parameter | Value | Unit |
|-----------------|--|-------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-Case Max | 2.98 | $^\circ\text{C}/\text{W}$ |

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

Off Characteristics

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|------------|-----------------------------------|-------------------------------------|------|------|-----------|---------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 250\mu\text{A}$ | 500 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 500V, V_{GS} = 0V$ | - | - | 1 | μA |
| I_{GSS} | Forward Gate Body Leakage Current | $V_{DS} = 0V, V_{GS} = \pm 30V$ | - | - | ± 100 | nA |

On Characteristics

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|--------------|------------------------|---|------|------|------|------|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ | 2 | - | 4 | V |

N-Channel Power MOSFET

| | | | | | | |
|--------------|--|----------------------------|---|------|-----|----------|
| $R_{DS(on)}$ | Static Drain-Source On-Resistance ^c | $V_{GS} = 10V, I_D = 6.5A$ | - | 0.36 | 0.5 | Ω |
|--------------|--|----------------------------|---|------|-----|----------|

Dynamic Characteristics

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|-----------|------------------------------|---|------|------|------|------|
| C_{iss} | Input Capacitance | $V_{DS} = 25V,$ $V_{GS} = 0V,$ $f = 1.0MHz$ | - | 1995 | - | pF |
| C_{oss} | Output Capacitance | | - | 203 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 9 | - | pF |

On Characteristics

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|--------------|---------------------|---|------|------|------|------|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD} = 250V, I_D = 13A,$ $V_{GS} = 10V$ | - | 29 | - | ns |
| t_r | Turn-On Rise Time | | - | 22 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 64 | - | ns |
| t_f | Turn-Off Fall Time | | - | 33 | - | ns |
| Q_g | Total Gate Charge | $V_{DS} = 400V, I_D = 13A,$ $V_{GS} = 10V$ | - | 41 | - | nC |
| Q_{gs} | Gate-Source Charge | | - | 9 | - | nC |
| Q_{gd} | Gate-Drain Charge | | - | 13.2 | - | nC |

Drain-Source Diode Characteristics

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|----------|---|--------------------------|------|------|------|------|
| I_S | Drain-Source Diode Forward Continuous Current | $V_{GS} = 0V$ | - | - | 13 | A |
| I_{SM} | Maximum Pulsed Current | $V_{GS} = 0V$ | - | - | 52 | A |
| V_{SD} | Drain-Source Diode Forward Voltage | $V_{GS} = 0V, I_S = 13A$ | - | - | 1.4 | V |

Notes:

- $T_J = +25\text{ }^\circ\text{C}$ to $+150\text{ }^\circ\text{C}$
- Repetitive rating; pulse width limited by maximum junction temperature.
- Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$
- $L = 10\text{mH}$, $I_{AS} = 12A$

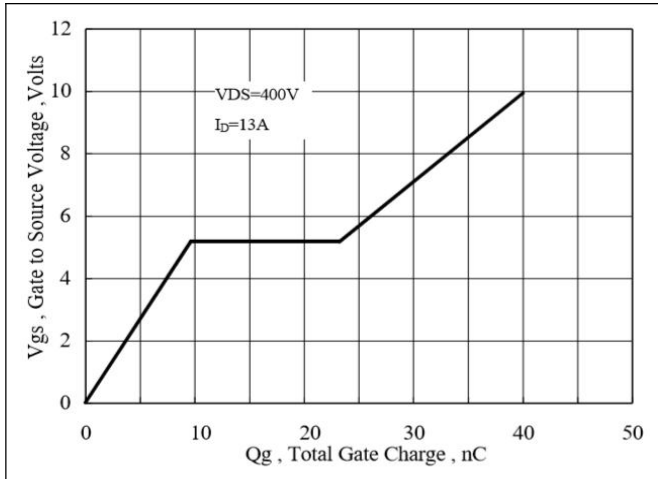


Figure 1. Gate Charge Characteristics

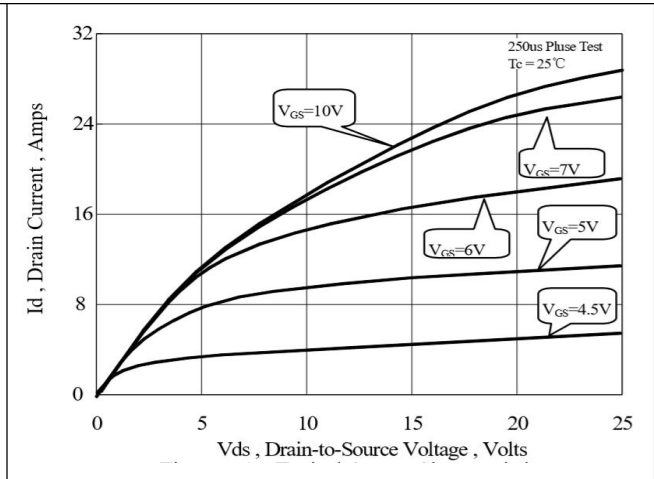


Figure 2. On-State Characteristics

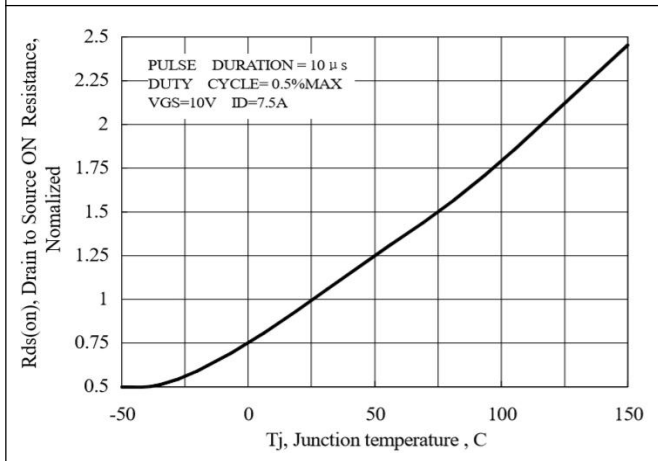


Figure 3. Normalized On-Resistance Variation with Temperature

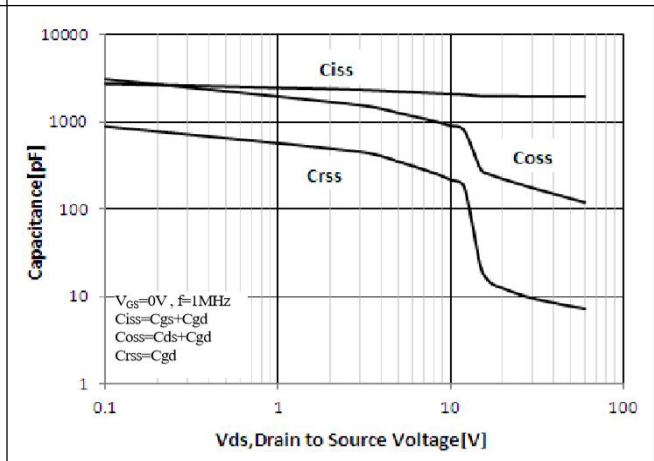


Figure 4. Typical Capacitance vs Drain to Source Voltage

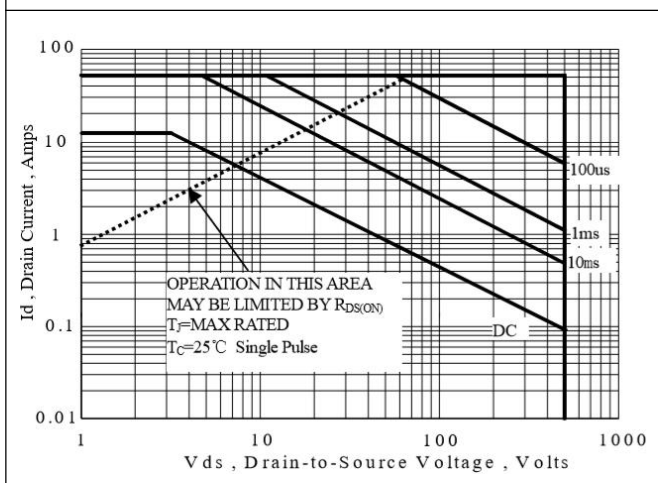


Figure 5 Maximum Forward Bias Safe Operating Area

TO-220F

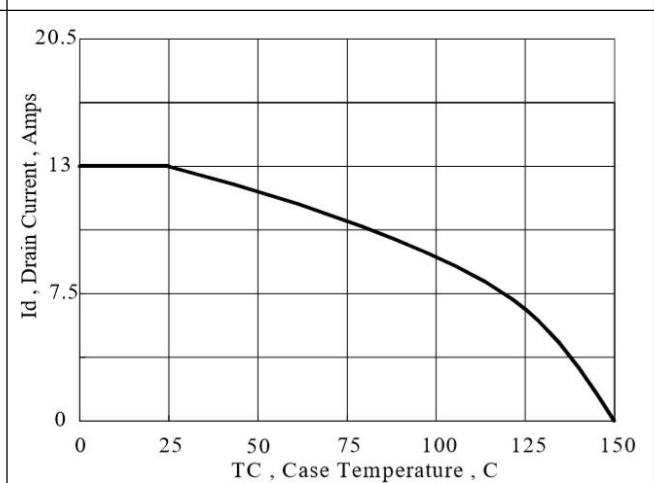


Figure 6. Maximum Continuous Drain Current vs Case Temperature