

General Description

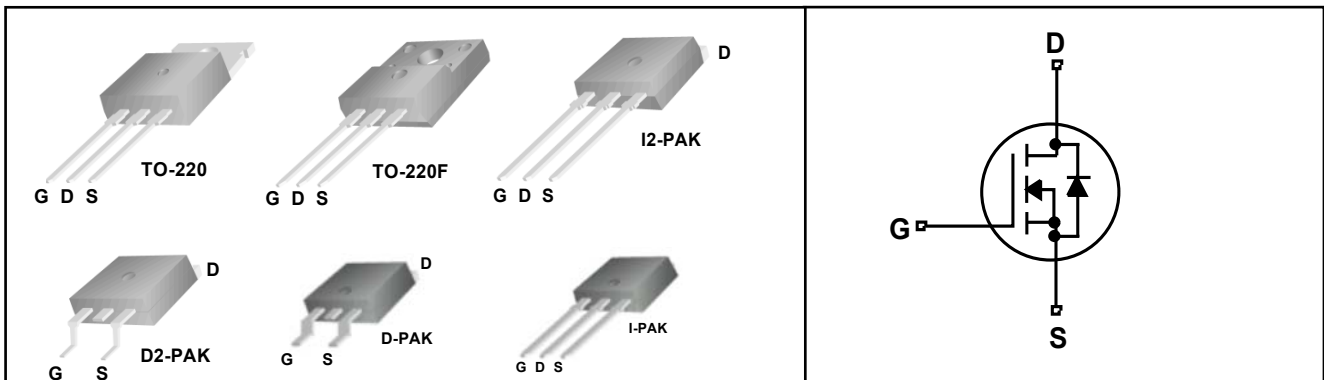
This Power MOSFET is produced using Maple semi's Advanced Super-Junction technology.

This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

These devices are well suited for AC/DC power conversion

Features

- 7A, 800V, $R_{DS(on)}$ typ.= $0.8\Omega @ V_{GS} = 10V$
- Low gate charge (typical 25nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings

TC = 25°C unless otherwise noted

| Symbol | Parameter | D2-PAK/D-PAK I2-PAK / I-PAK/ TO-220 | TO-220F | Units |
|----------|--|--|---------|-------|
| VDSS | Drain-Source Voltage | 800 | | V |
| ID | Drain Current | - Continuous (TC = 25°C) | 7.0 | 7.0* |
| | | - Continuous (TC = 100°C) | 4.2 | 4.2* |
| IDM | Drain Current - Pulsed (Note 1) | 13 | 13* | A |
| VGSS | Gate-Source Voltage | ±30 | | V |
| EAS | Single Pulsed Avalanche Energy (Note 2) | 86 | | mJ |
| IAR | Avalanche Current (Note 1) | 1.7 | | A |
| EAR | Repetitive Avalanche Energy (Note 1) | 0.2 | | mJ |
| dv/dt | Peak Diode Recovery dv/dt (Note 3) | 15 | | V/ns |
| PD | Power Dissipation (TC = 25°C) | 63 | 30 | W |
| | | - Derate above 25°C | 0.5 | 0.24 |
| TJ, TSTG | Operating and Storage Temperature Range | -55 to +150 | | °C |
| TL | Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | 300 | | °C |

*Drain current limited by maximum junction temperature.

Thermal Characteristics

| Symbol | Parameter | Value | | | | | | Units |
|--------|---|-------|------|-------|-------|-------|--------|-------|
| | | DPAK | IPAK | TO220 | D2PAK | I2PAK | TO220F | |
| RθJC | Thermal Resistance, Junction-to-Case | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 4.2 | °C/W |
| RθJS | Thermal Resistance, Case-to-Sink Typ. | - | - | 0.5 | 0.5 | 0.5 | - | °C/W |
| RθJA | Thermal Resistance, Junction-to-Ambient | 100 | 100 | 62 | 62 | 62 | 80 | °C/W |

Electrical Characteristics (TC = 25 °C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|-------------------------------|---|--------------------------------|-----|-----|------|-------|
| Off Characteristics | | | | | | |
| BVDSS | Drain-Source Breakdown Voltage | VGS = 0V, ID = 250uA, TJ=25°C | 800 | - | - | V |
| | | VGS = 0V, ID = 250uA, TJ=150°C | - | 850 | - | V |
| Δ BVDSS Δ TJ | Breakdown Voltage Temperature coefficient | ID = 250uA, referenced to 25°C | - | 0.6 | - | V/°C |
| IDSS | Drain-Source Leakage Current | VDS =800V, VGS = 0V | - | - | 1 | uA |
| | | VDS =640V, TC = 125 °C | - | 10 | - | uA |
| IGSS | Gate-Source Leakage, Forward | VGS = 30V, VDS = 0V | - | - | 100 | nA |
| | Gate-source Leakage, Reverse | VGS = -30V, VDS = 0V | - | - | -100 | nA |

On Characteristics

| | | | | | | |
|---------|---|-----------------------|-----|-----|------|----------|
| VGS(th) | Gate Threshold Voltage | VDS = VGS, ID = 250uA | 2.5 | 3.5 | 4.5 | V |
| RDS(ON) | Static Drain-Source On-state Resistance | VGS =10 V, ID = 3.5A | - | 0.8 | 0.85 | Ω |

Dynamic Characteristics

| | | | | | | |
|------|------------------------------|------------------------------|---|-----|---|----|
| Ciss | Input Capacitance | VGS =0 V, VDS =25V, f = 1MHz | - | 380 | - | pF |
| Coss | Output Capacitance | | - | 110 | - | |
| Crss | Reverse Transfer Capacitance | | - | 7 | - | |

Dynamic Characteristics

| | | | | | | |
|---------|----------------------------------|--------------------------------------|---|-----|---|----|
| td(on) | Turn-on Delay Time | VDD =400V, ID =7.0A, RG =25 Ω | - | 13 | - | nS |
| tr | Rise Time | | - | 10 | - | |
| td(off) | Turn-off Delay Time | | - | 85 | - | |
| tf | Fall Time | | - | 14 | - | |
| Qg | Total Gate Charge | VDS =640V, VGS =10V, ID =7.0A | - | 25 | - | nC |
| Qgs | Gate-Source Charge | | - | 2.0 | - | |
| Qgd | Gate-Drain Charge(Miller Charge) | | - | 2.7 | - | |

Source-Drain Diode Ratings and Characteristics

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit. |
|--------|---|----------------------------------|------|------|------|-------|
| IS | Maximum Continuous Drain-Source Diode Forward Current | | - | - | 7.0 | A |
| ISM | Maximum Pulsed Drain-Source Diode Forward Current | | - | - | 13 | |
| VSD | Diode Forward Voltage | IS =7.0A, VGS =0V | - | - | 1.5 | V |
| trr | Reverse Recovery Time | IS =7.0A, VGS=0V, dIF/dt=100A/us | - | 190 | - | nS |
| Qrr | Reverse Recovery Charge | | - | 2.3 | - | uC |

NOTES

1. Repeatability rating : pulse width limited by junction temperature
2. L =60mH, IAS =1.7A, VDD = 150V, RG = 25 Ω , Starting TJ = 25°C
3. ISD \leq 7A, di/dt \leq 200A/us, VDD \leq BVDSS, Starting TJ = 25°C
4. Pulse Test : Pulse Width \leq 300us, Duty Cycle \leq 2%
5. Essentially independent of operating temperature.

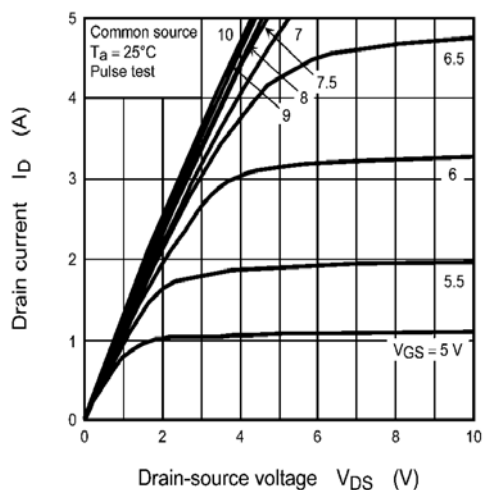


Figure 1: On-Region Characteristics@25°C

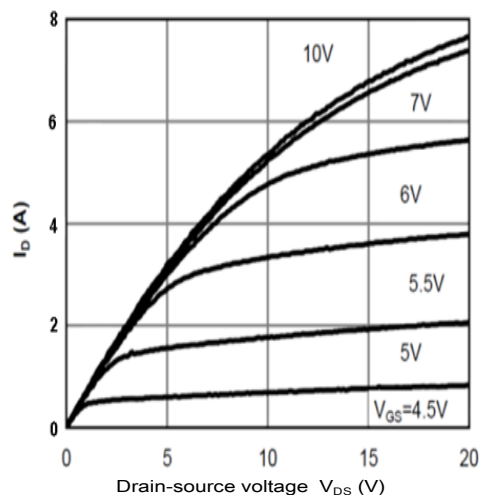


Figure 2: On-Region Characteristics@125°C

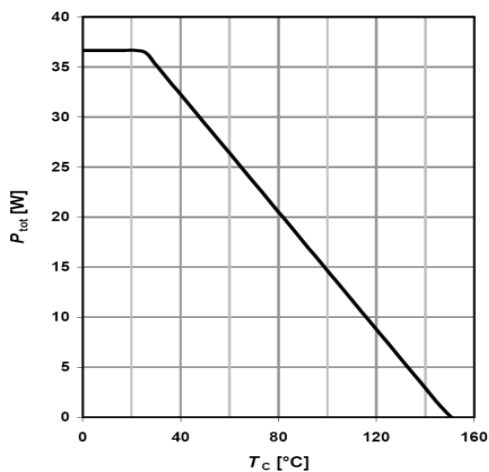


Figure 3: Power Dissipation (TO-220, TO-252)

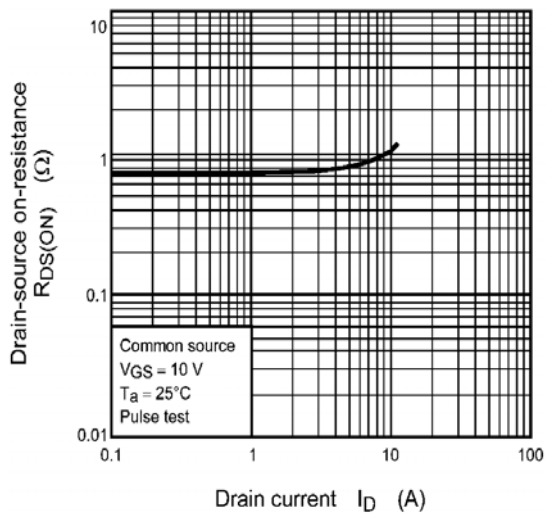


Figure 4: On-Resistance vs. Drain Current

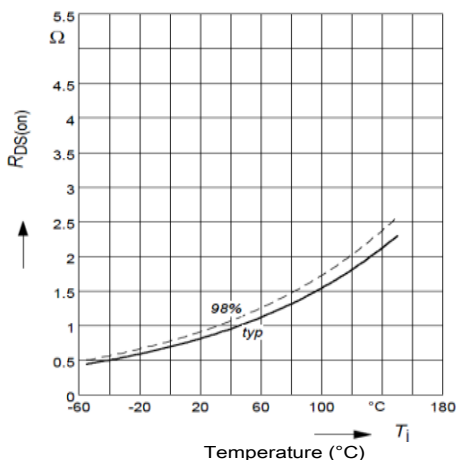


Figure 5: On-Resistance vs. Junction Temperature

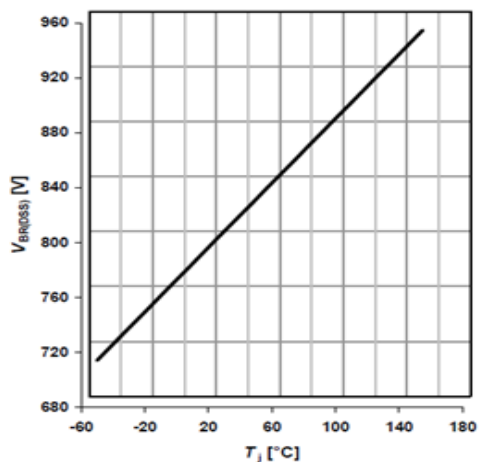


Figure 6: Break Down vs. Junction Temperature

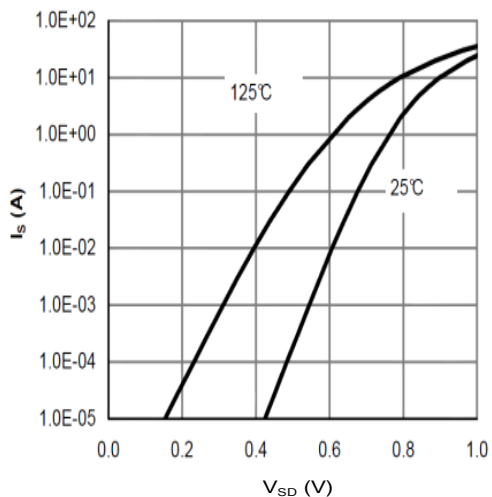


Figure 7: Body-Diode Characteristics

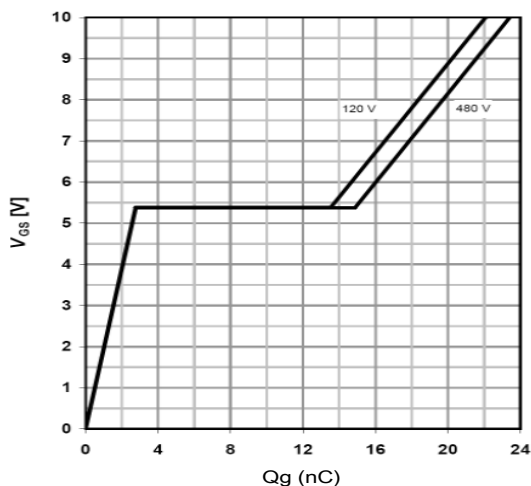


Figure 8: Gate-Charge Characteristics

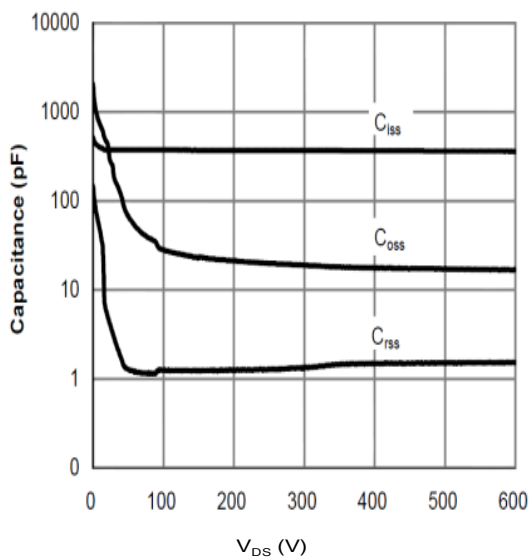


Figure 9: Capacitance Characteristics

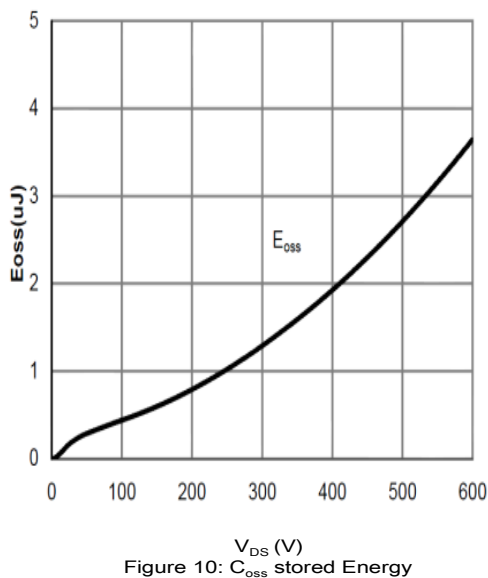


Figure 10: C_{oss} stored Energy

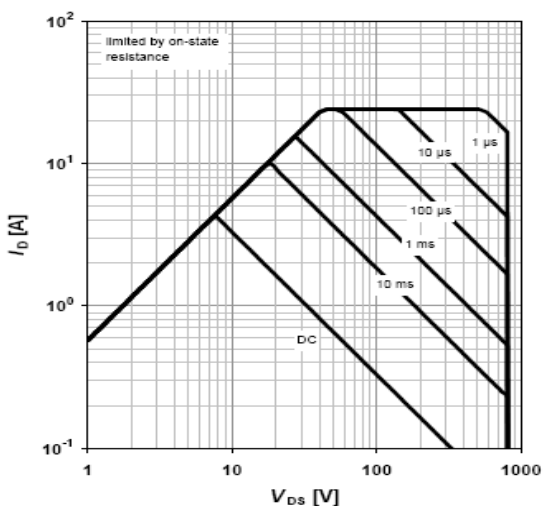


Figure 11: Maximum Forward Biased Safe Operating Area

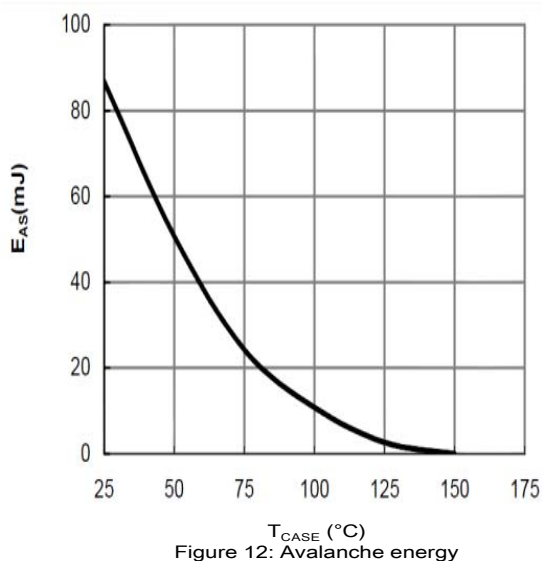
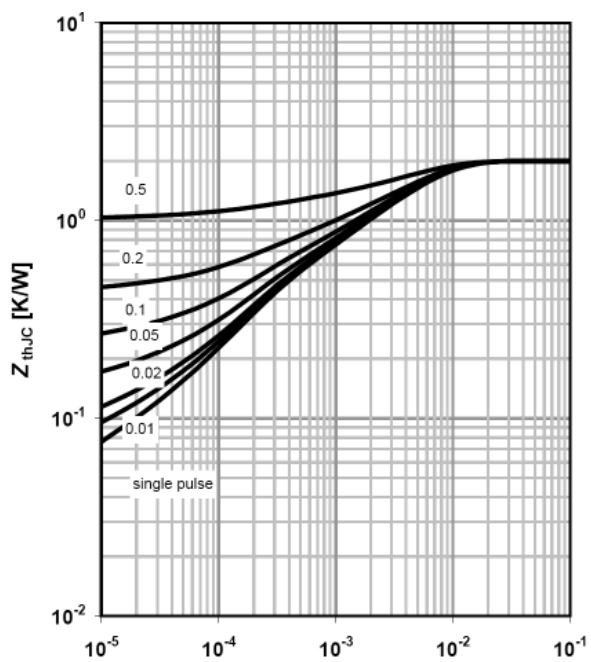
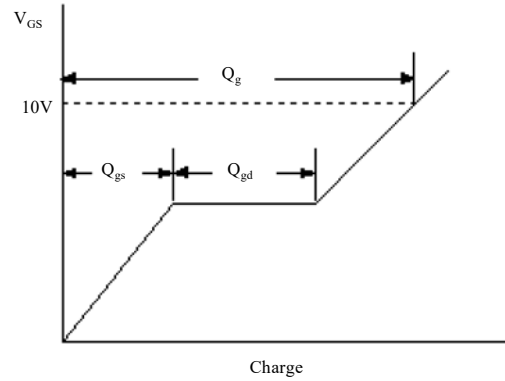
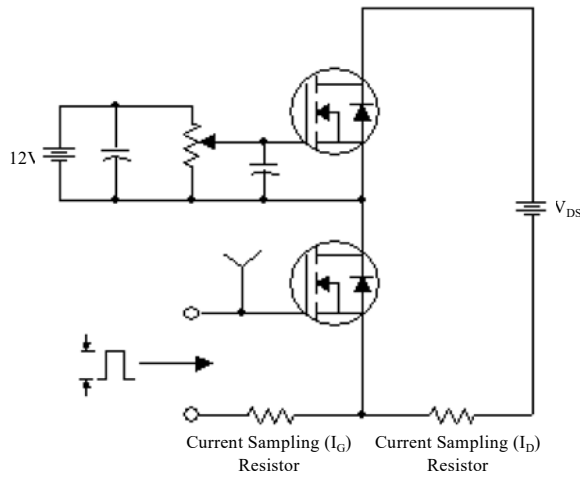


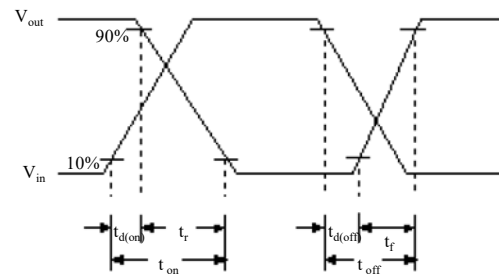
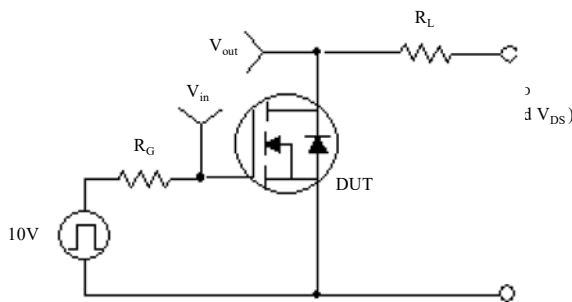
Figure 12: Avalanche energy



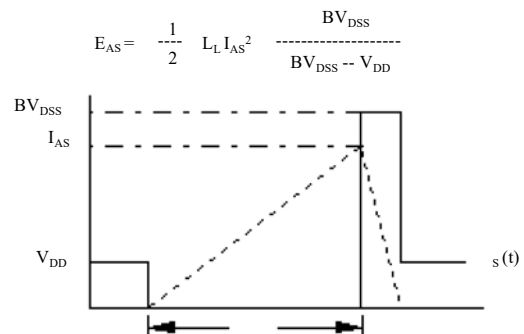
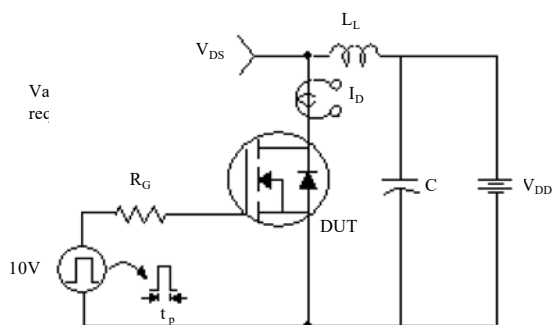
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

