

FEATURES

- ◆ Avalanche Rugged Technology
- ◆ Rugged Gate Oxide Technology
- ◆ Lower Input Capacitance
- ◆ Improved Gate Charge
- ◆ Extended Safe Operating Area
- ◆ Lower Leakage Current: 10 μ A (Max.) @ $V_{DS} = 250V$
- ◆ Lower $R_{DS(ON)}$: 1.393 Ω (Typ.)

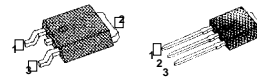
$$BV_{DSS} = 250 V$$

$$R_{DS(on)} = 2.0\Omega$$

$$I_D = 2.2 A$$

D-PAK

I-PAK



1. Gate 2. Drain 3. Source

Absolute Maximum Ratings

| Symbol | Characteristic | Value | Units |
|----------------|---|--------------|---------------|
| V_{DSS} | Drain-to-Source Voltage | 250 | V |
| I_D | Continuous Drain Current ($T_C=25^\circ C$) | 2.2 | A |
| | Continuous Drain Current ($T_C=100^\circ C$) | 1.4 | |
| I_{DM} | Drain Current-Pulsed (1) | 8.5 | A |
| V_{GS} | Gate-to-Source Voltage | ± 30 | V |
| E_{AS} | Single Pulsed Avalanche Energy (2) | 61 | mJ |
| I_{AR} | Avalanche Current (1) | 2.2 | A |
| E_{AR} | Repetitive Avalanche Energy (1) | 2.5 | mJ |
| dv/dt | Peak Diode Recovery dv/dt (3) | 4.8 | V/ns |
| P_D | Total Power Dissipation ($T_A=25^\circ C$) * | 2.5 | W |
| | Total Power Dissipation ($T_C=25^\circ C$) | 25 | W |
| | Linear Derating Factor | 0.20 | W/ $^\circ C$ |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | - 55 to +150 | $^\circ C$ |
| T_L | Maximum Lead Temp. for Soldering Purposes, 1/8. from case for 5-seconds | 300 | |

Thermal Resistance

| Symbol | Characteristic | Typ. | Max. | Units |
|-----------------|-----------------------|------|------|--------------|
| $R_{\theta JC}$ | Junction-to-Case | -- | 5.08 | $^\circ C/W$ |
| $R_{\theta JA}$ | Junction-to-Ambient * | -- | 50 | |
| $R_{\theta JA}$ | Junction-to-Ambient | -- | 110 | |

* When mounted on the minimum pad size recommended (PCB Mount).

Rev. B

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Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise specified)

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|------------------------|---|------|------|------|---------------------|---|
| BV_{DSS} | Drain-Source Breakdown Voltage | 250 | -- | -- | V | $V_{GS}=0V, I_D=250\mu A$ |
| $\Delta BV/\Delta T_J$ | Breakdown Voltage Temp. Coeff. | -- | 0.29 | -- | V/ $^\circ\text{C}$ | $I_D=250\mu A$ See Fig 7 |
| $V_{GS(th)}$ | Gate Threshold Voltage | 2.0 | -- | 4.0 | V | $V_{DS}=5V, I_D=250\mu A$ |
| I_{GSS} | Gate-Source Leakage, Forward | -- | -- | 100 | nA | $V_{GS}=30V$ |
| | Gate-Source Leakage, Reverse | -- | -- | -100 | | $V_{GS}=-30V$ |
| I_{DSS} | Drain-to-Source Leakage Current | -- | -- | 10 | μA | $V_{DS}=250V$ |
| | | -- | -- | 100 | | $V_{DS}=200V, T_C=125^\circ\text{C}$ |
| $R_{DS(on)}$ | Static Drain-Source On-State Resistance | -- | -- | 2.0 | Ω | $V_{GS}=10V, I_D=1.1A$ (4) |
| g_{fs} | Forward Transconductance | -- | 1.55 | -- | \bar{O} | $V_{DS}=40V, I_D=1.1A$ (4) |
| C_{iss} | Input Capacitance | -- | 180 | 230 | pF | $V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$ See Fig 5 |
| C_{oss} | Output Capacitance | -- | 35 | 43 | | |
| C_{rss} | Reverse Transfer Capacitance | -- | 14 | 18 | | |
| $t_{d(on)}$ | Turn-On Delay Time | -- | 10 | 30 | ns | $V_{DD}=125V, I_D=2.8A,$ $R_G=24\Omega$ See Fig 13 (4) (5) |
| t_r | Rise Time | -- | 11 | 30 | | |
| $t_{d(off)}$ | Turn-Off Delay Time | -- | 22 | 55 | | |
| t_f | Fall Time | -- | 14 | 40 | | |
| Q_g | Total Gate Charge | -- | 8.5 | 12 | nC | $V_{DS}=200V, V_{GS}=10V,$ $I_D=2.8A$ See Fig 6 & Fig 12 (4) (5) |
| Q_{gs} | Gate-Source Charge | -- | 1.8 | -- | | |
| Q_{gd} | Gate-Drain (. Miller.) Charge | -- | 3.9 | -- | | |

Source-Drain Diode Ratings and Characteristics

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|----------|---------------------------|------|------|------|---------------|---|
| I_S | Continuous Source Current | -- | -- | 2.2 | A | Integral reverse pn-diode in the MOSFET |
| I_{SM} | Pulsed-Source Current (1) | -- | -- | 8.5 | | |
| V_{SD} | Diode Forward Voltage (4) | -- | -- | 1.5 | V | $T_J=25^\circ\text{C}, I_S=2.2A, V_{GS}=0V$ |
| t_{rr} | Reverse Recovery Time | -- | 112 | -- | ns | $T_J=25^\circ\text{C}, I_F=2.8A$ |
| Q_{rr} | Reverse Recovery Charge | -- | 0.35 | -- | μC | $di_F/dt=100A/\mu\text{s}$ (4) |

Notes;

- (1) Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- (2) $L=20\text{mH}, I_{AS}=2.2A, V_{DD}=50V, R_G=27\Omega,$ Starting $T_J=25^\circ\text{C}$
- (3) $I_{SD} \leq 2.8A, di/dt \leq 130A/\mu\text{s}, V_{DD} \leq BV_{DSS},$ Starting $T_J=25^\circ\text{C}$
- (4) Pulse Test: Pulse Width = 250 μs , Duty Cycle $\leq 2\%$
- (5) Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

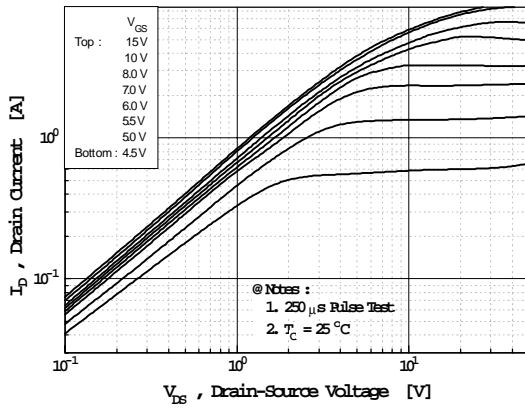


Fig 2. Transfer Characteristics

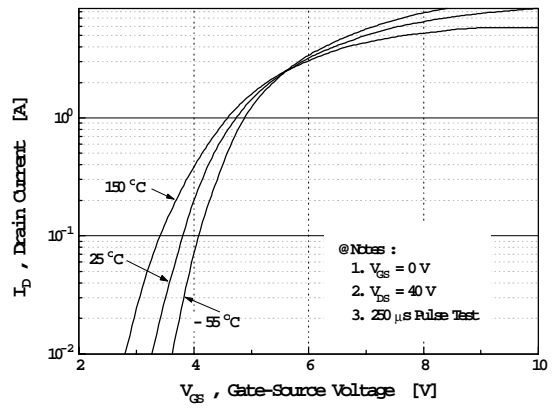


Fig 3. On-Resistance vs. Drain Current

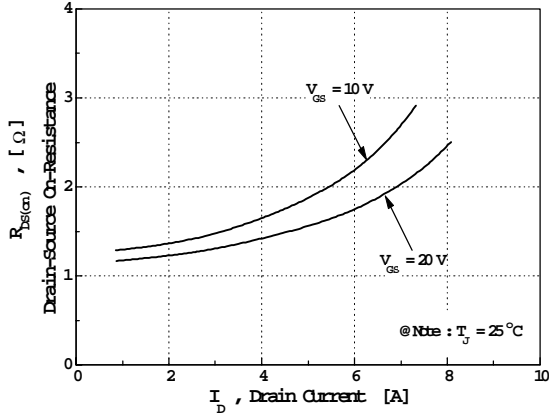


Fig 4. Source-Drain Diode Forward Voltage

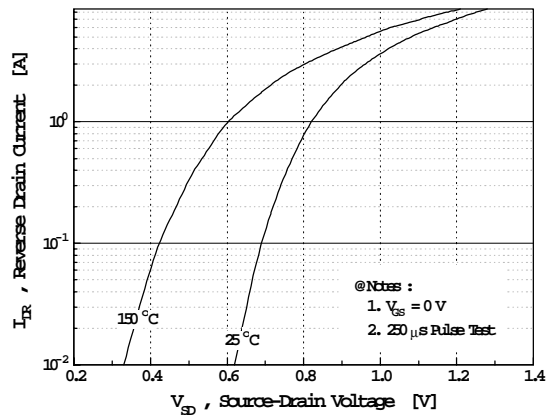


Fig 5. Capacitance vs. Drain-Source Voltage

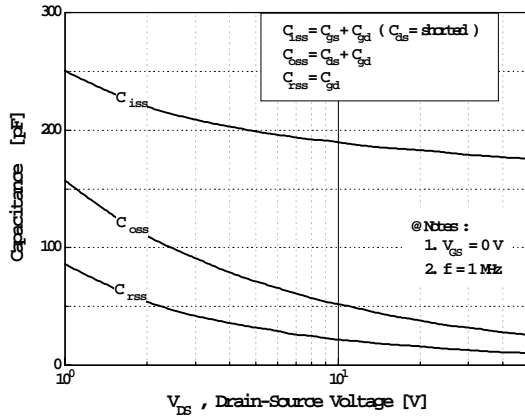


Fig 6. Gate Charge vs. Gate-Source Voltage

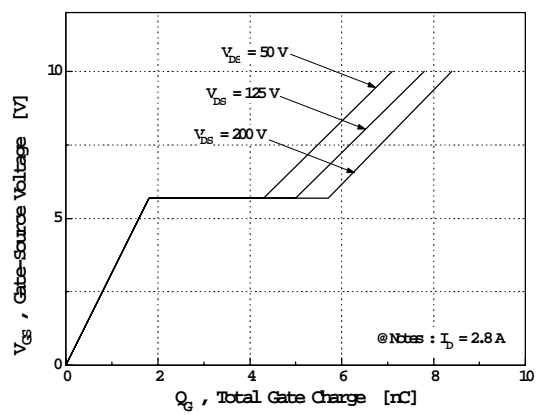


Fig 7. Breakdown Voltage vs. Temperature

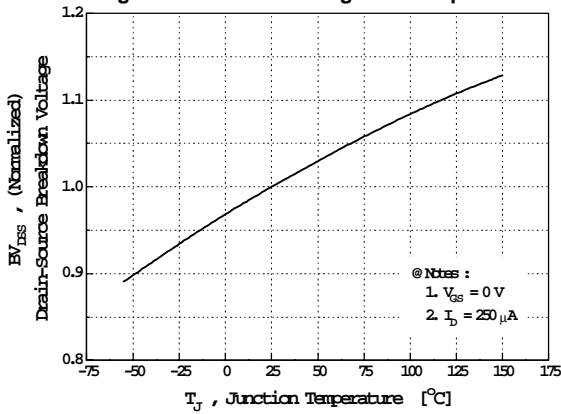


Fig 8. On-Resistance vs. Temperature

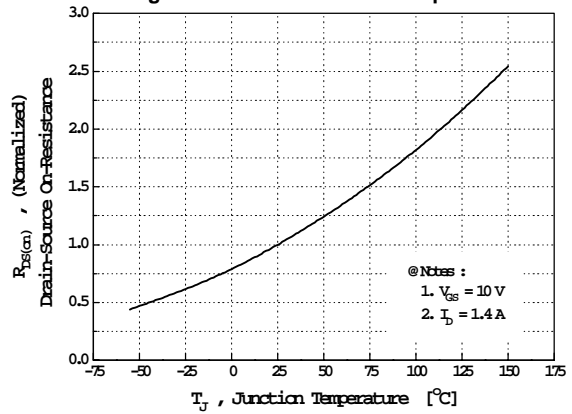


Fig 9. Max. Safe Operating Area

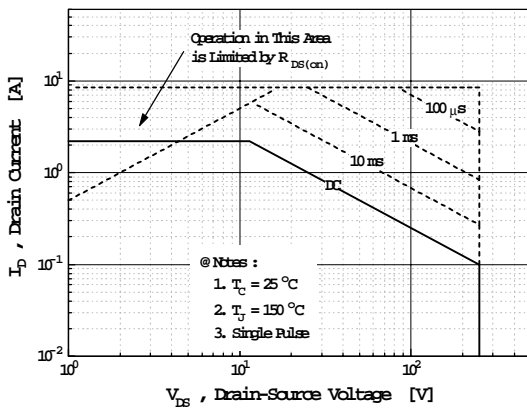


Fig 10. Max. Drain Current vs. Case Temperature

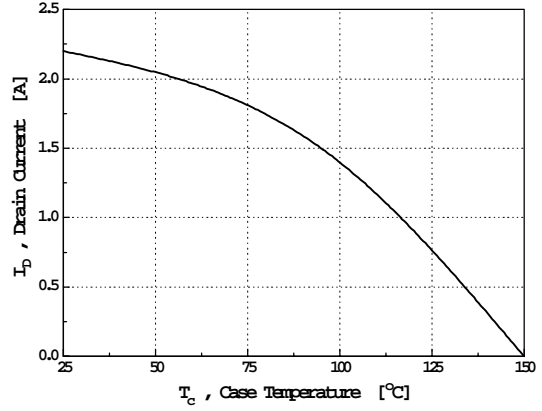


Fig 11. Thermal Response

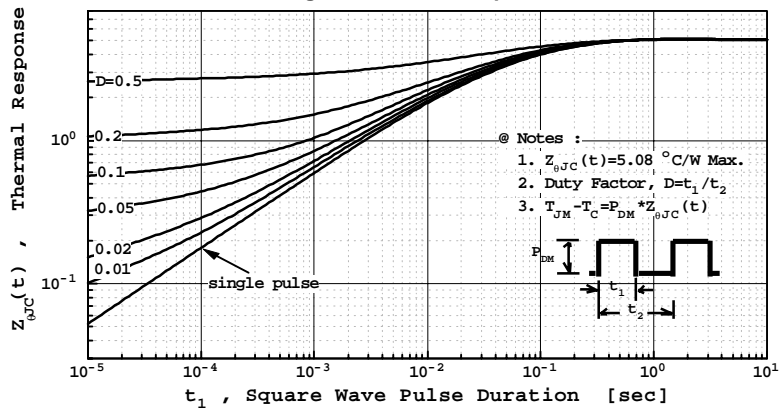


Fig 12. Gate Charge Test Circuit & Waveform

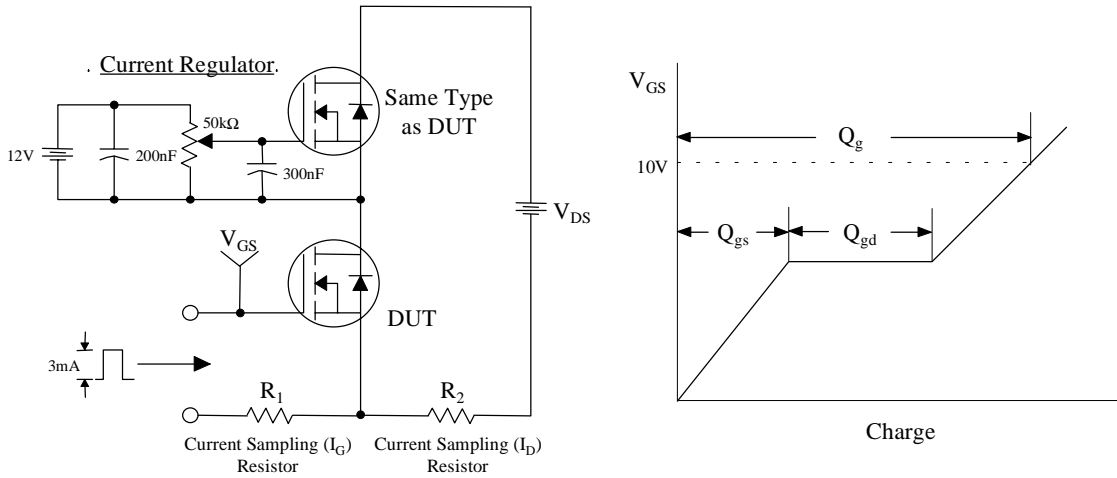


Fig 13. Resistive Switching Test Circuit & Waveforms

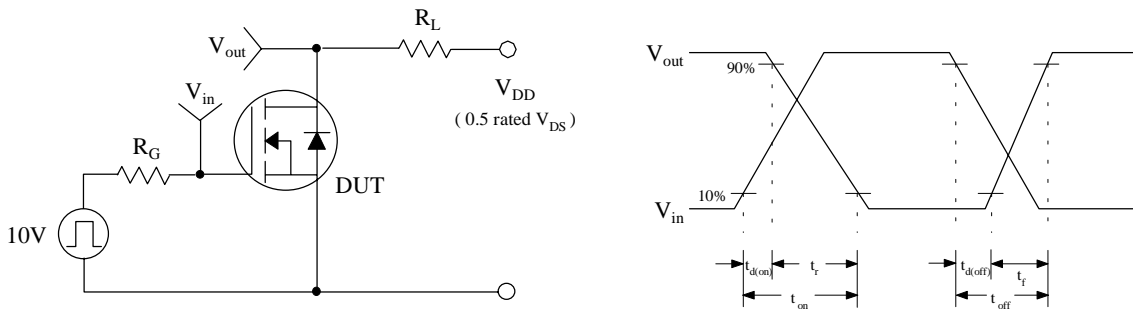


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

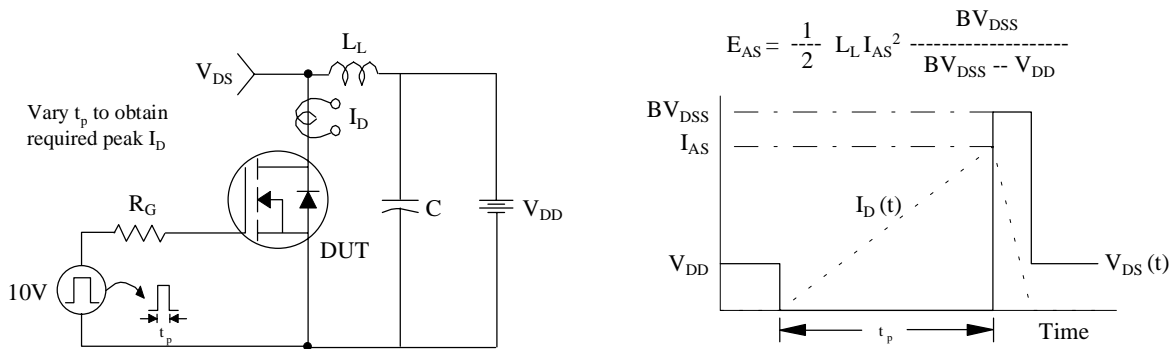
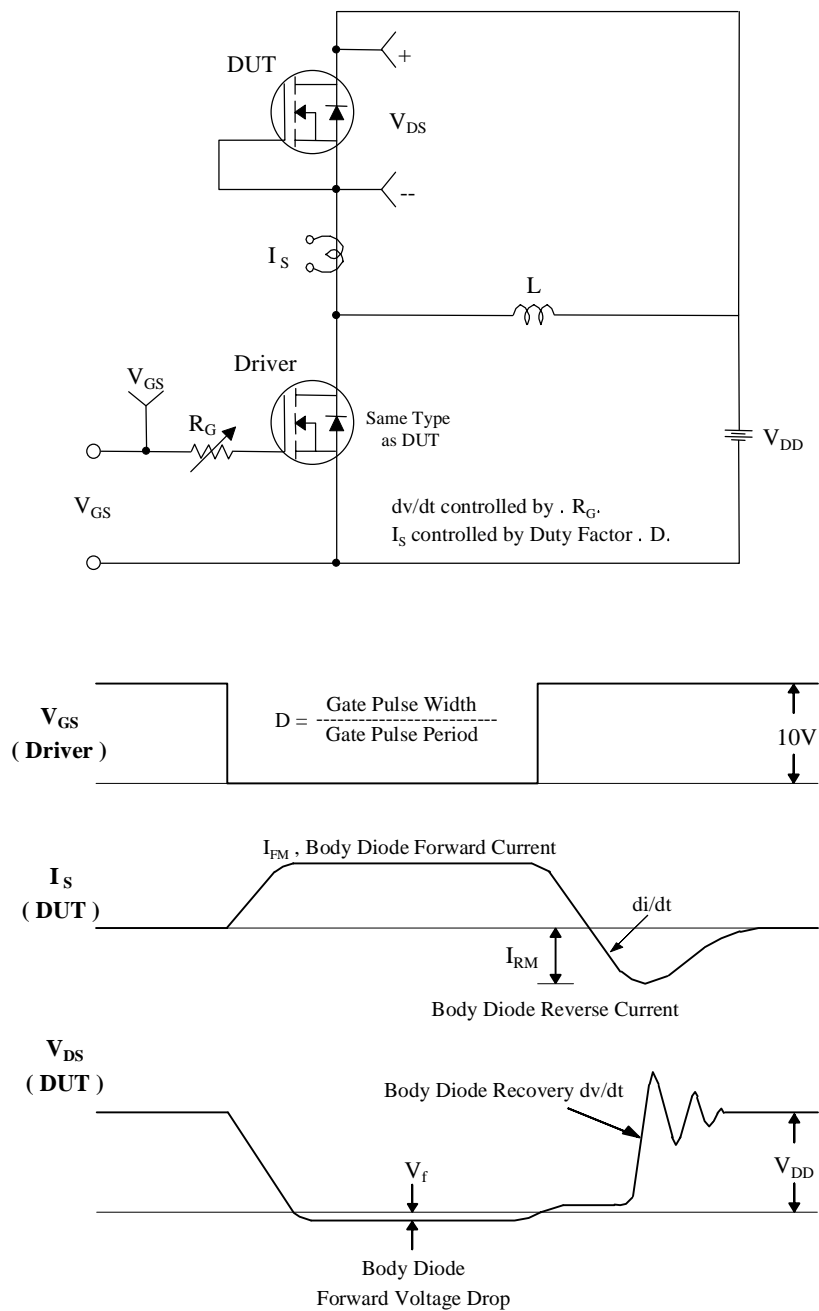


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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