

FEATURES

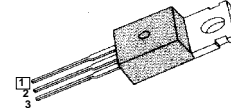
- ◆ Avalanche Rugged Technology
- ◆ Rugged Gate Oxide Technology
- ◆ Lower Input Capacitance
- ◆ Improved Gate Charge
- ◆ Extended Safe Operating Area
- ◆ Lower Leakage Current: 10 μ A (Max.) @ $V_{DS} = 200V$
- ◆ Lower $R_{DS(ON)}$: 1.185 Ω (Typ.)

$$BV_{DSS} = 200 V$$

$$R_{DS(on)} = 0.046\Omega$$

$$I_D = 3.3 A$$

TO-220



1.Gate 2. Drain 3. Source

Absolute Maximum Ratings

| Symbol | Characteristic | Value | Units |
|----------------|---|--------------|------------|
| V_{DSS} | Drain-to-Source Voltage | 200 | V |
| I_D | Continuous Drain Current ($T_C=25^\circ C$) | 3.3 | A |
| | Continuous Drain Current ($T_C=100^\circ C$) | 2.1 | |
| I_{DM} | Drain Current-Pulsed (1) | 12 | A |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| E_{AS} | Single Pulsed Avalanche Energy (2) | 29 | mJ |
| I_{AR} | Avalanche Current (1) | 3.3 | A |
| E_{AR} | Repetitive Avalanche Energy (1) | 3.3 | mJ |
| dv/dt | Peak Diode Recovery dv/dt (3) | 5.0 | V/ns |
| P_D | Total Power Dissipation ($T_C=25^\circ C$) | 33 | W |
| | Linear Derating Factor | 0.26 | |
| 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 | -- | 3.81 | $^\circ C/W$ |
| $R_{\theta CS}$ | Case-to-Sink | 0.5 | -- | |
| $R_{\theta JA}$ | Junction-to-Ambient | -- | 62.5 | |

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 | 200 | -- | -- | V | $V_{GS}=0V, I_D=250\mu A$ |
| $\Delta BV/\Delta T_J$ | Breakdown Voltage Temp. Coeff. | -- | 0.19 | -- | V/°C | $I_D=250\mu A$ See Fig 7 |
| $V_{GS(th)}$ | Gate Threshold Voltage | 1.0 | -- | 2.0 | V | $V_{DS}=5V, I_D=250\mu A$ |
| I_{GSS} | Gate-Source Leakage, Forward | -- | -- | 100 | nA | $V_{GS}=20V$ |
| | Gate-Source Leakage, Reverse | -- | -- | -100 | | $V_{GS}=-20V$ |
| I_{DSS} | Drain-to-Source Leakage Current | -- | -- | 10 | μA | $V_{DS}=200V$ |
| | | -- | -- | 100 | | $V_{DS}=160V, T_C=125^\circ C$ |
| $R_{DS(on)}$ | Static Drain-Source On-State Resistance | -- | -- | 1.5 | Ω | $V_{GS}=5V, I_D=1.65A$ (4) |
| g_{fs} | Forward Transconductance | -- | 1.9 | -- | \bar{U} | $V_{DS}=40V, I_D=1.65A$ (4) |
| C_{iss} | Input Capacitance | -- | 185 | 240 | pF | $V_{GS}=0V, V_{DS}=25V, f=1MHz$ See Fig 5 |
| C_{oss} | Output Capacitance | -- | 35 | 45 | | |
| C_{rss} | Reverse Transfer Capacitance | -- | 14 | 20 | | |
| $t_{d(on)}$ | Turn-On Delay Time | -- | 9 | 30 | ns | $V_{DD}=100V, I_D=3.3A,$ $R_G=22\Omega$ See Fig 13 (4) (5) |
| t_r | Rise Time | -- | 9 | 30 | | |
| $t_{d(off)}$ | Turn-Off Delay Time | -- | 20 | 50 | | |
| t_f | Fall Time | -- | 6 | 20 | | |
| Q_g | Total Gate Charge | -- | 6.1 | 9 | nC | $V_{DS}=160V, V_{GS}=5V,$ $I_D=3.3A$ See Fig 6 & Fig 12 (4) (5) |
| Q_{gs} | Gate-Source Charge | -- | 1.4 | -- | | |
| Q_{gd} | Gate-Drain (. Miller.) Charge | -- | 2.8 | -- | | |

Source-Drain Diode Ratings and Characteristics

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|----------|---------------------------|------|------|------|---------|---|
| I_S | Continuous Source Current | -- | -- | 3.3 | A | Integral reverse pn-diode in the MOSFET |
| I_{SM} | Pulsed-Source Current (1) | -- | -- | 12 | | |
| V_{SD} | Diode Forward Voltage (4) | -- | -- | 1.5 | V | $T_J=25^\circ C, I_S=3.3A, V_{GS}=0V$ |
| t_{rr} | Reverse Recovery Time | -- | 123 | -- | ns | $T_J=25^\circ C, I_F=3.3A$ |
| Q_{rr} | Reverse Recovery Charge | -- | 0.38 | -- | μC | $di_F/dt=100A/\mu s$ (4) |

Notes;

- (1) Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- (2) $L=4mH, I_{AS}=3.3A, V_{DD}=50V, R_G=27\Omega,$ Starting $T_J=25^\circ C$
- (3) $I_{SD} \leq 3.3A, di/dt \leq 140A/\mu s, V_{DD} \leq BV_{DSS},$ Starting $T_J=25^\circ C$
- (4) Pulse Test: Pulse Width = 250 $\mu s,$ Duty Cycle $\leq 2\%$
- (5) Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

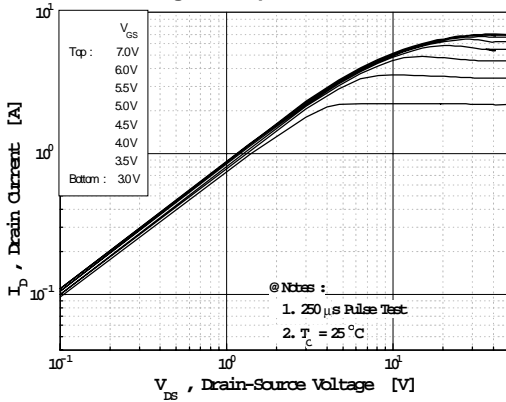


Fig 2. Transfer Characteristics

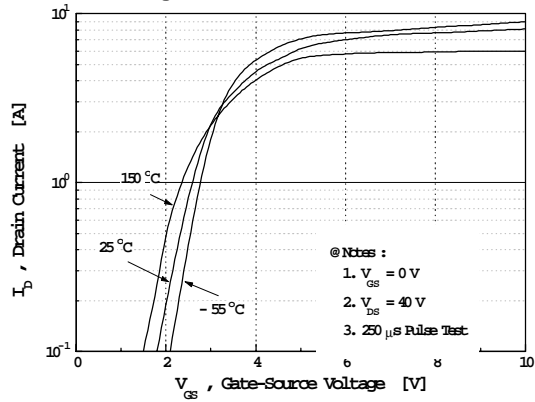


Fig 3. On-Resistance vs. Drain Current

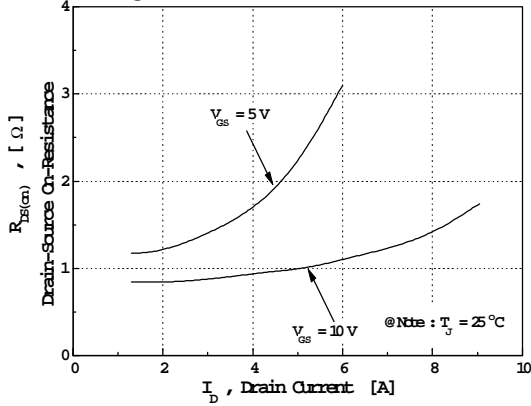


Fig 4. Source-Drain Diode Forward Voltage

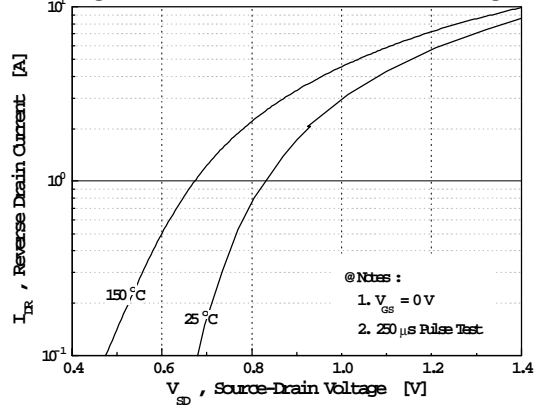


Fig 5. Capacitance vs. Drain-Source Voltage

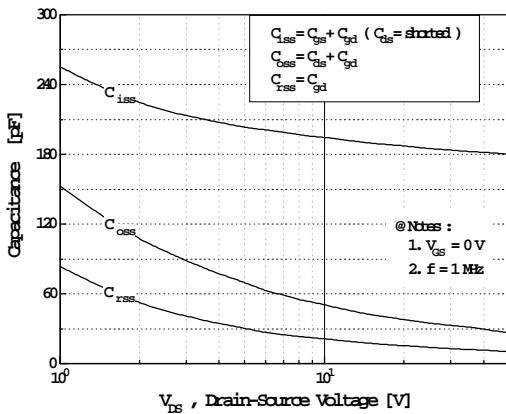


Fig 6. Gate Charge vs. Gate-Source Voltage

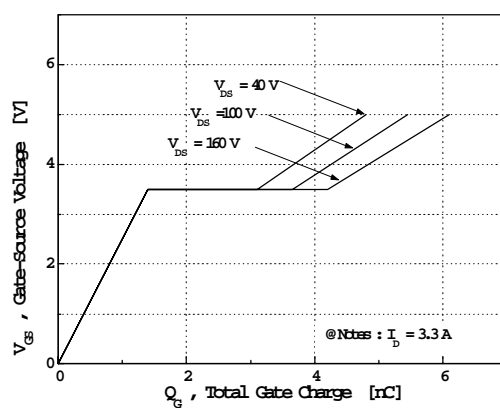


Fig 7. Breakdown Voltage vs. Temperature

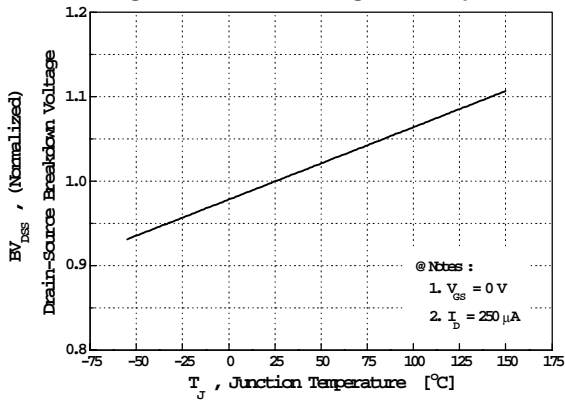


Fig 8. On-Resistance vs. Temperature

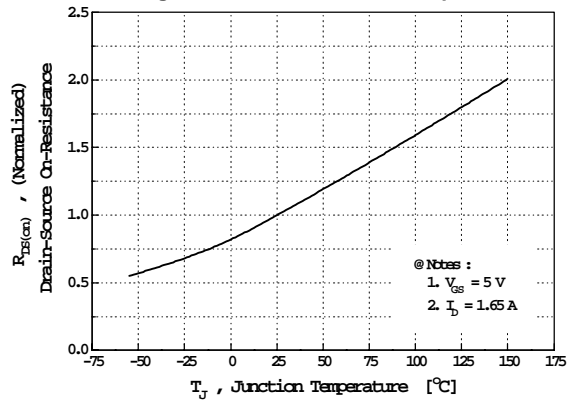


Fig 9. Max. Safe Operating Area

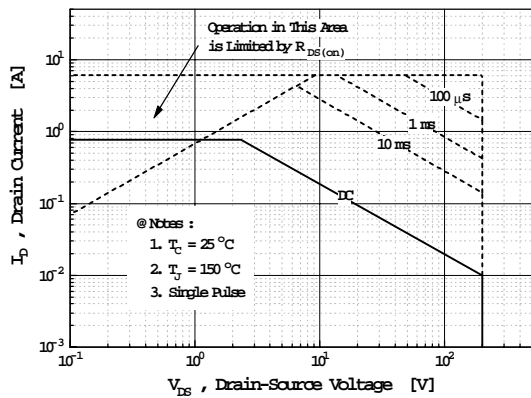


Fig 10. Max. Drain Current vs. Ambient Temperature

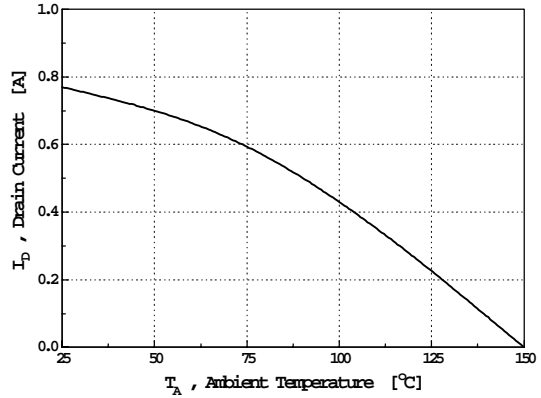


Fig 11. Thermal Response

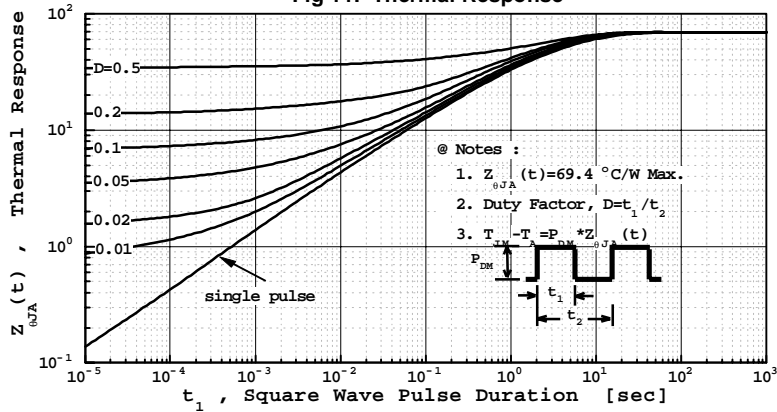


Fig 12. Gate Charge Test Circuit & Waveform

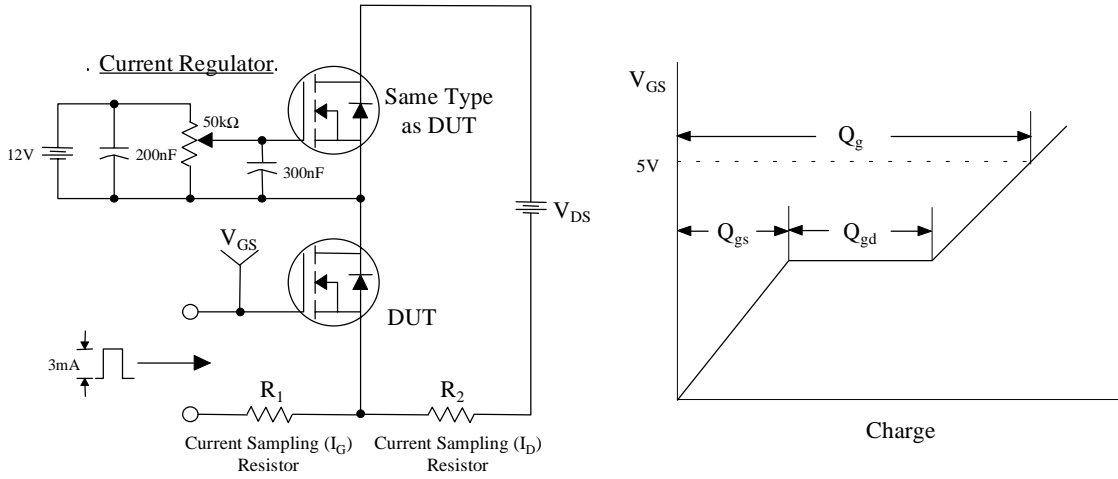


Fig 13. Resistive Switching Test Circuit & Waveforms

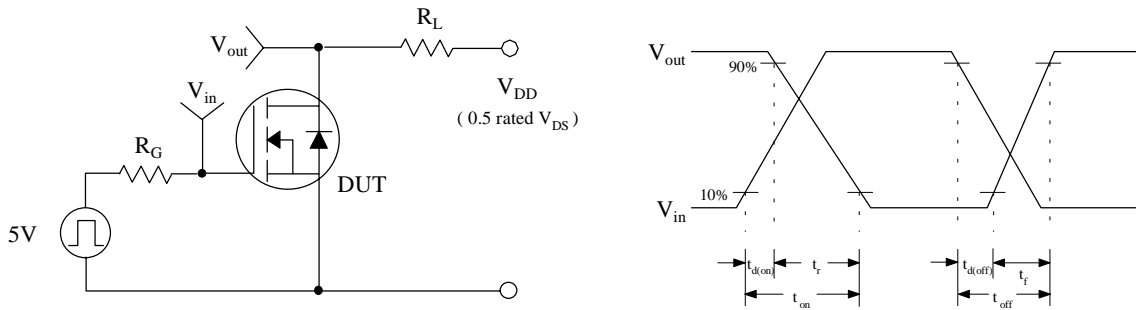
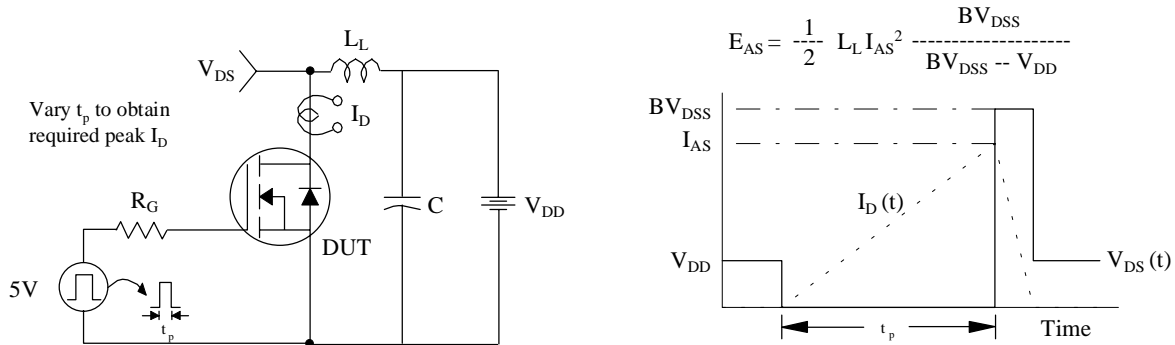


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms



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