

FEATURES

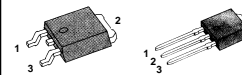
- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 10 μ A (Max.) @ $V_{DS} = -60V$
- Lower $R_{DS(ON)}$: 0.22 Ω (Typ.)

$$BV_{DSS} = -60 V$$

$$R_{DS(on)} = 0.3 \Omega$$

$$I_D = -7.6 A$$

D-PAK **I-PAK**



1. Gate 2. Drain 3. Source

Absolute Maximum Ratings

| Symbol | Characteristic | Value | Units |
|----------------|---|--------------|---------------|
| V_{DSS} | Drain-to-Source Voltage | -60 | V |
| I_D | Continuous Drain Current ($T_C=25^\circ C$) | -7.6 | A |
| | Continuous Drain Current ($T_C=100^\circ C$) | -5.4 | |
| I_{DM} | Drain Current-Pulsed | 30 | A |
| V_{GS} | Gate-to-Source Voltage ① | ± 20 | V |
| E_{AS} | Single Pulsed Avalanche Energy ② | 99 | mJ |
| I_{AR} | Avalanche Current ① | -7.6 | A |
| E_{AR} | Repetitive Avalanche Energy ① | 3.2 | mJ |
| dv/dt | Peak Diode Recovery dv/dt ③ | -5.5 | V/ns |
| P_D | Total Power Dissipation ($T_A=25^\circ C$) * | 2.5 | W |
| | Total Power Dissipation ($T_C=25^\circ C$) | 32 | W |
| | Linear Derating Factor | 0.26 | 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 | -- | 3.91 | $^\circ C/W$ |
| $R_{\theta JA}$ | 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°C unless otherwise specified)

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|---------------------|---|------|-------|------|-------|--|
| BV _{DSS} | Drain-Source Breakdown Voltage | -60 | -- | -- | V | V _{GS} =0V, I _D =-250μA |
| ΔBV/ΔT _J | Breakdown Voltage Temp. Coeff. | -- | -0.04 | -- | V/°C | I _D =-250μA See Fig 7 |
| V _{GS(th)} | Gate Threshold Voltage | -2.0 | -- | -4.0 | V | V _{DS} =-5V, I _D =-250μA |
| I _{GSS} | Gate-Source Leakage, Forward | -- | -- | -100 | nA | V _{GS} =-20V |
| | Gate-Source Leakage, Reverse | -- | -- | 100 | nA | V _{GS} =20V |
| I _{DSS} | Drain-to-Source Leakage Current | -- | -- | -10 | μA | V _{DS} =-60V |
| | | -- | -- | -100 | | V _{DS} =-48V, T _C =125°C ④ |
| R _{DS(on)} | Static Drain-Source On-State Resistance | -- | -- | 0.3 | Ω | V _{GS} =-10V, I _D =-3.8A |
| g _{fs} | Forward Transconductance | -- | 3.6 | -- | Ω | V _{DS} =-30V, I _D =-3.8A ④ |
| C _{iss} | Input Capacitance | -- | 465 | 600 | pF | V _{GS} =0V, V _{DS} =-25V, f=1MHz See Fig 5 |
| C _{oss} | Output Capacitance | -- | 140 | 215 | | |
| C _{rss} | Reverse Transfer Capacitance | -- | 40 | 60 | | |
| t _{d(on)} | Turn-On Delay Time | -- | 11 | 30 | ns | V _{DD} =-30V, I _D =-9.4A, R _G =18Ω See Fig 13 ④⑤ |
| t _r | Rise Time | -- | 21 | 50 | | |
| t _{d(off)} | Turn-Off Delay Time | -- | 29 | 65 | | |
| t _f | Fall Time | -- | 20 | 50 | | |
| Q _g | Total Gate Charge | -- | 15 | 19 | nC | V _{DS} =-48V, V _{GS} =-10V, I _D =-9.4A See Fig 6 & Fig 12 ④⑤ |
| Q _{gs} | Gate-Source Charge | -- | 2.9 | -- | | |
| Q _{gd} | Gate-Drain("Miller") Charge | -- | 6.0 | -- | | |

Source-Drain Diode Ratings and Characteristics

| Symbol | Characteristic | Min. | Typ. | Max. | Units | Test Condition |
|-----------------|---------------------------|------|------|------|-------|--|
| I _S | Continuous Source Current | -- | -- | -7.6 | A | Integral reverse pn-diode in the MOSFET |
| I _{SM} | Pulsed-Source Current ① | -- | -- | -30 | | |
| V _{SD} | Diode Forward Voltage ④ | -- | -- | -3.8 | V | T _J =25°C, I _S =-7.6A, V _{GS} =0V |
| t _{rr} | Reverse Recovery Time | -- | 80 | -- | ns | T _J =25°C, I _F =-9.4A |
| Q _{rr} | Reverse Recovery Charge | -- | 0.22 | -- | μC | di _F /dt=100A/μs ④ |

Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② L=2.0mH, I_{AS}=-7.6A, V_{DD}=-25V, R_G=27Ω*, Starting T_J=25°C
- ③ I_{SD} ≤ -9.4A, di/dt ≤ 250A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J=25°C
- ④ Pulse Test : Pulse Width = 250 μs, Duty Cycle ≤ 2%
- ⑤ Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

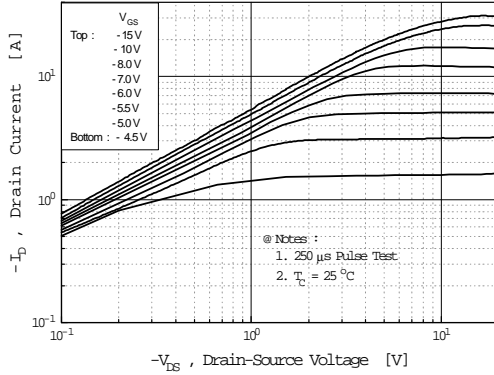


Fig 2. Transfer Characteristics

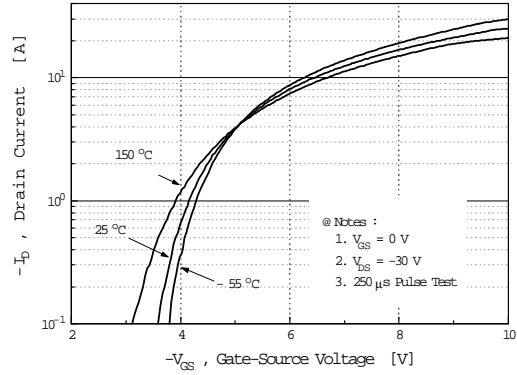


Fig 3. On-Resistance vs. Drain Current

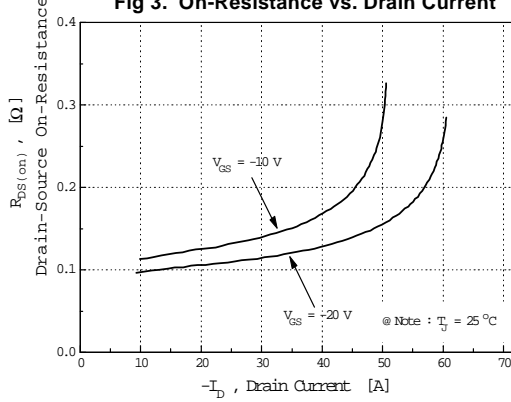


Fig 4. Source-Drain Diode Forward Voltage

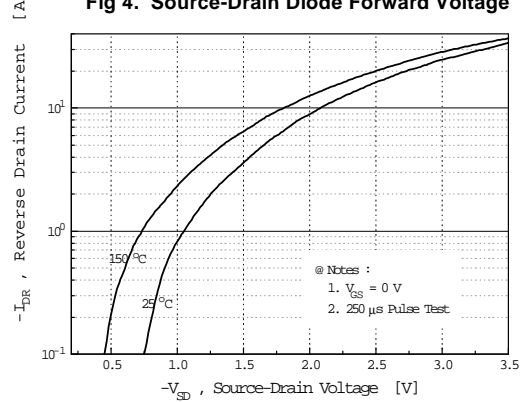


Fig 5. Capacitance vs. Drain-Source Voltage

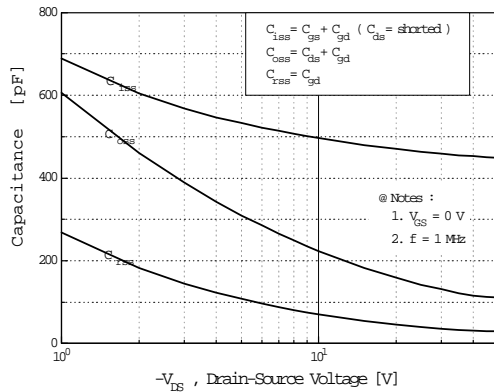


Fig 6. Gate Charge vs. Gate-Source Voltage

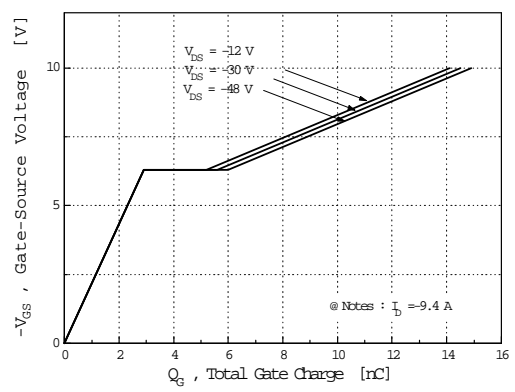


Fig 7. Breakdown Voltage vs. Temperature

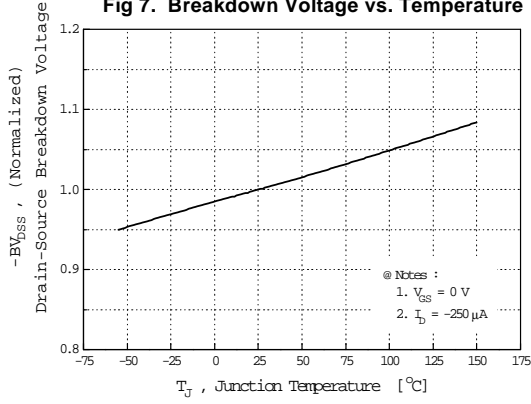


Fig 8. On-Resistance vs. Temperature

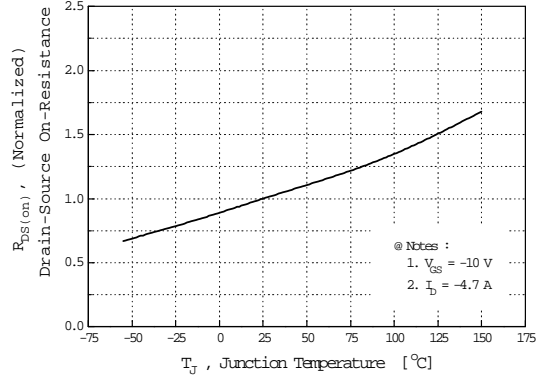


Fig 9. Max. Safe Operating Area

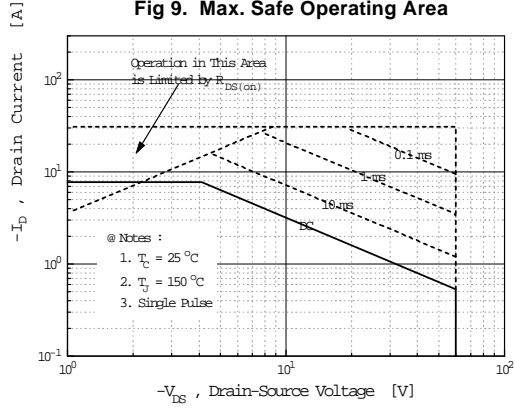


Fig 10. Max. Drain Current vs. Case Temperature

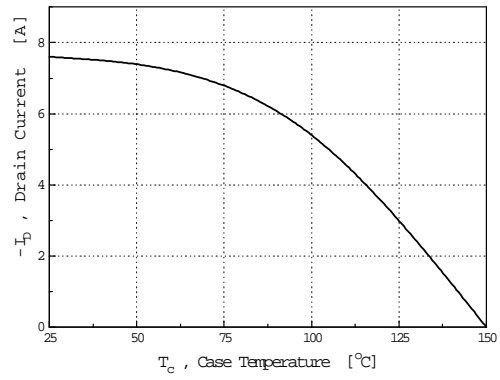


Fig 11. Thermal Response

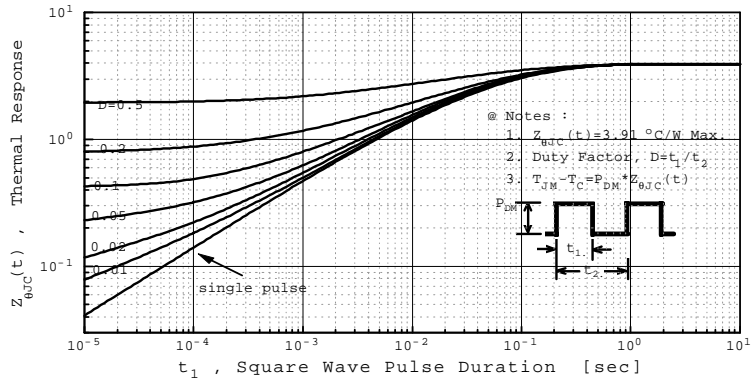


Fig 12. Gate Charge Test Circuit & Waveform

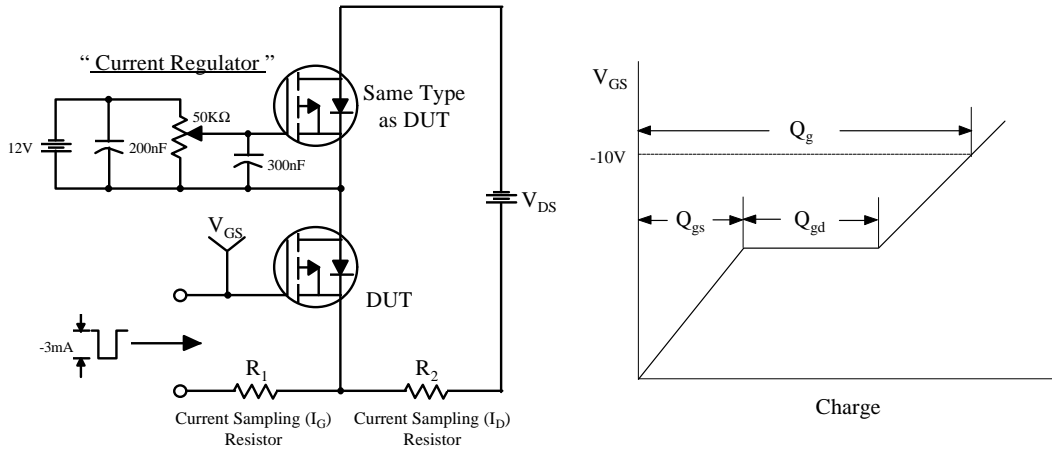


Fig 13. Resistive Switching Test Circuit & Waveforms

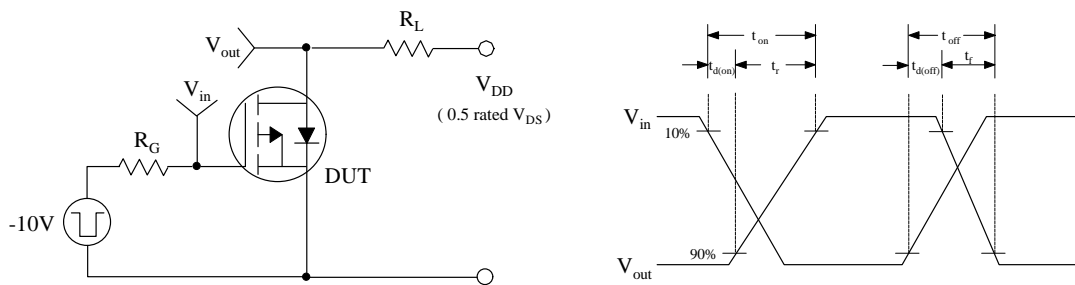
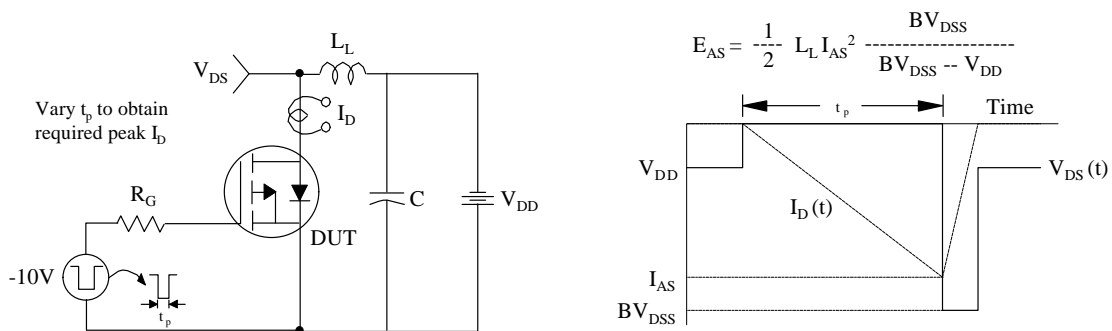


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms



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