

**FEATURES**

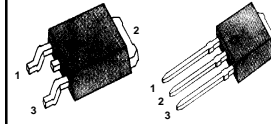
- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- 175°C Operating Temperature
- Lower Leakage Current : 10  $\mu$ A (Max.) @  $V_{DS} = 100V$
- Lower  $R_{DS(ON)}$  : 0.176  $\Omega$  (Typ.)

$$BV_{DSS} = 100 V$$

$$R_{DS(on)} = 0.22 \Omega$$

$$I_D = 9.2 A$$

**D<sup>2</sup>-PAK    I<sup>2</sup>-PAK**



1. Gate 2. Drain 3. Source

**Absolute Maximum Ratings**

| Symbol         | Characteristic  | Value        | Units         |
|----------------|---|--------------|---------------|
| $V_{DSS}$      | Drain-to-Source Voltage   | 100          | V             |
| $I_D$          | Continuous Drain Current ( $T_C=25^\circ C$ )                           | 9.2          | A             |
|                | Continuous Drain Current ( $T_C=100^\circ C$ )                          | 6.5          |               |
| $I_{DM}$       | Drain Current-Pulsed ①  | 32           | A             |
| $V_{GS}$       | Gate-to-Source Voltage  | $\pm 20$     | V             |
| $E_{AS}$       | Single Pulsed Avalanche Energy ②  | 112          | mJ            |
| $I_{AR}$       | Avalanche Current ①   | 9.2          | A             |
| $E_{AR}$       | Repetitive Avalanche Energy ①   | 4.9          | mJ            |
| dv/dt          | Peak Diode Recovery dv/dt ③   | 6.5          | V/ns          |
| $P_D$          | Total Power Dissipation ( $T_A=25^\circ C$ ) *                          | 3.8          | W             |
|                | Total Power Dissipation ( $T_C=25^\circ C$ )                            | 49           | W             |
|                | Linear Derating Factor  | 0.33         | W/ $^\circ C$ |
| $T_J, T_{STG}$ | Operating Junction and Storage Temperature Range                        | - 55 to +175 | $^\circ C$    |
| $T_L$          | 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      | --   | 3.04 | $^\circ C/W$ |
| $R_{\theta JA}$ | Junction-to-Ambient * | --   | 40   |              |
| $R_{\theta JA}$ | Junction-to-Ambient   | --   | 62.5 |              |

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



## 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          | 100  | --   | --   | V          | $V_{GS}=0V, I_D=250\mu A$   |
| $\Delta BV/\Delta T_J$ | Breakdown Voltage Temp. Coeff.          | --   | 0.1  | --   | V/°C       | $I_D=250\mu A$ <b>See Fig 7</b>   |
| $V_{GS(th)}$           | 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   | $\mu A$    | $V_{DS}=100V$   |
|                        |   | --   | --   | 100  |            | $V_{DS}=80V, T_C=150^\circ\text{C}$   |
| $R_{DS(on)}$           | Static Drain-Source On-State Resistance | --   | --   | 0.22 | $\Omega$   | $V_{GS}=5V, I_D=4.6A$ ④   |
| $g_{fs}$               | Forward Transconductance                | --   | 7.7  | --   | $\text{S}$ | $V_{DS}=40V, I_D=4.6A$ ④  |
| $C_{iss}$              | Input Capacitance                       | --   | 340  | 440  | pF         | $V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$<br><b>See Fig 5</b>                  |
| $C_{oss}$              | Output Capacitance                      | --   | 90   | 115  |            |   |
| $C_{rss}$              | Reverse Transfer Capacitance            | --   | 39   | 50   |            |   |
| $t_{d(on)}$            | Turn-On Delay Time                      | --   | 5    | 20   | ns         | $V_{DD}=50V, I_D=9.2A,$<br>$R_G=9\Omega$<br><b>See Fig 13</b> ④ ⑤           |
| $t_r$                  | Rise Time                               | --   | 10   | 30   |            |   |
| $t_{d(off)}$           | Turn-Off Delay Time                     | --   | 19   | 50   |            |   |
| $t_f$                  | Fall Time                               | --   | 9    | 30   |            |   |
| $Q_g$                  | Total Gate Charge                       | --   | 10.2 | 15   | nC         | $V_{DS}=80V, V_{GS}=5V,$<br>$I_D=9.2A$<br><b>See Fig 6 &amp; Fig 12</b> ④ ⑤ |
| $Q_{gs}$               | Gate-Source Charge                      | --   | 1.7  | --   |            |   |
| $Q_{gd}$               | 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 | --   | --   | 9.2  | A       | Integral reverse pn-diode in the MOSFET     |
| $I_{SM}$ | Pulsed-Source Current ①   | --   | --   | 32   |         |   |
| $V_{SD}$ | Diode Forward Voltage ④   | --   | --   | 1.5  | V       | $T_J=25^\circ\text{C}, I_S=9.2A, V_{GS}=0V$ |
| $t_{rr}$ | Reverse Recovery Time     | --   | 98   | --   | ns      | $T_J=25^\circ\text{C}, I_F=9.2A$            |
| $Q_{rr}$ | Reverse Recovery Charge   | --   | 0.34 | --   | $\mu C$ | $di_F/dt=100A/\mu s$ ④                      |

### Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ②  $L=2\text{mH}, I_{AS}=9.2A, V_{DD}=25V, R_G=27\Omega,$  Starting  $T_J=25^\circ\text{C}$
- ③  $I_{SD}\leq 9.2A, di/dt\leq 300A/\mu s, V_{DD}\leq BV_{DSS},$  Starting  $T_J=25^\circ\text{C}$
- ④ Pulse Test : Pulse Width =  $250\mu s,$  Duty Cycle  $\leq 2\%$
- ⑤ Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

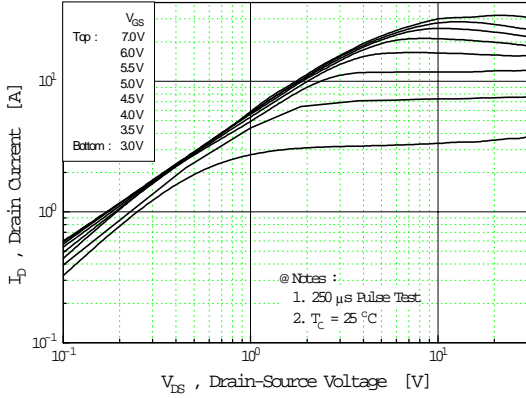


Fig 2. Transfer Characteristics

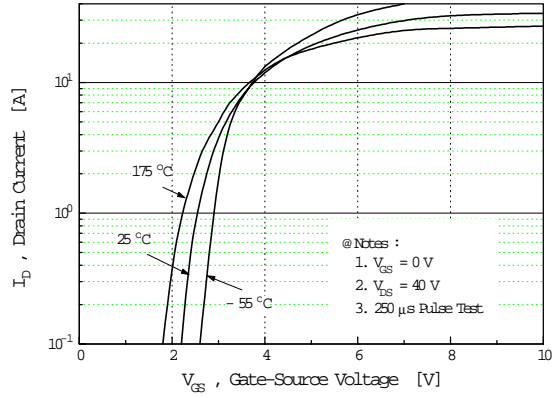


Fig 3. On-Resistance vs. Drain Current

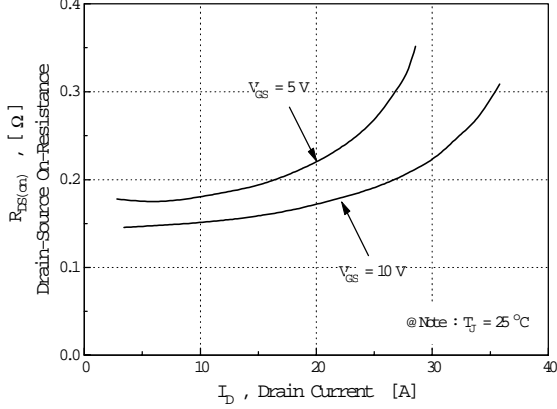


Fig 4. Source-Drain Diode Forward Voltage

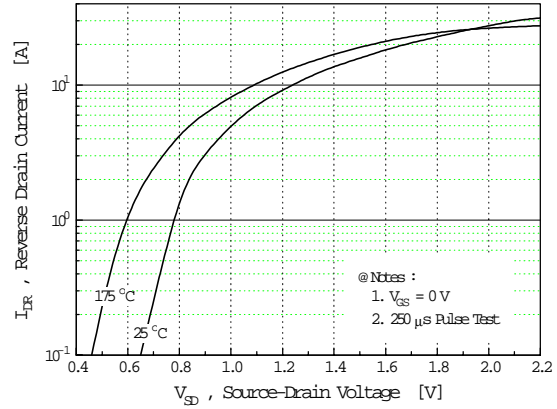


Fig 5. Capacitance vs. Drain-Source Voltage

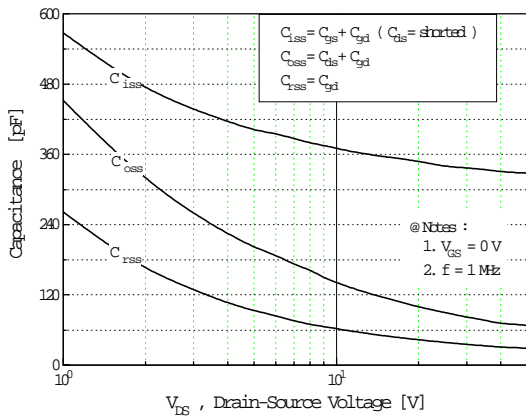
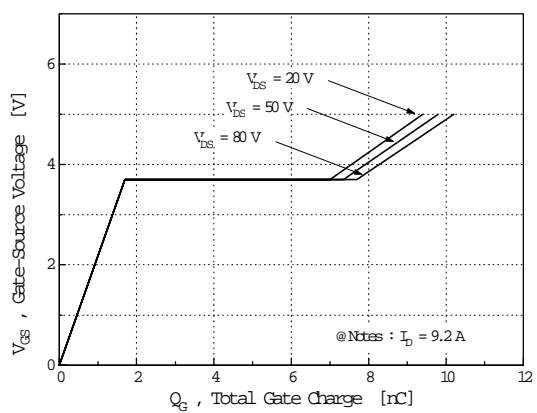
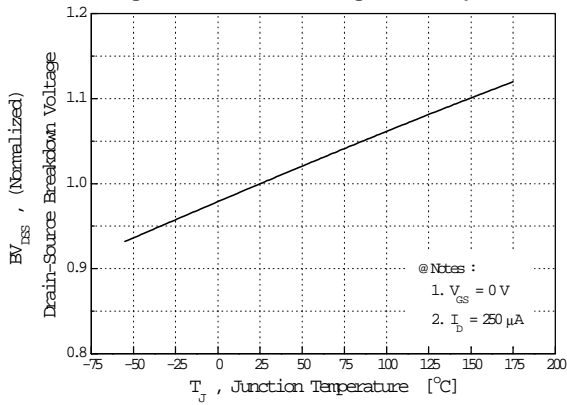


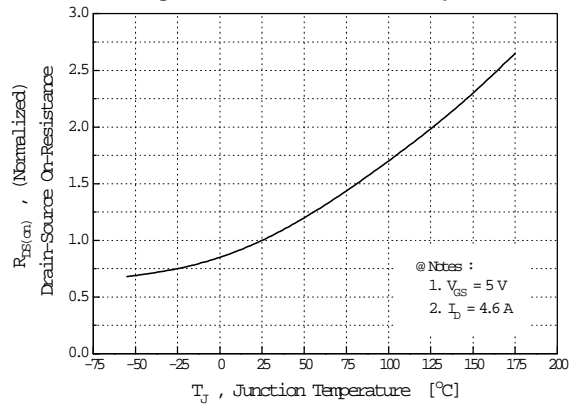
Fig 6. Gate Charge vs. Gate-Source Voltage



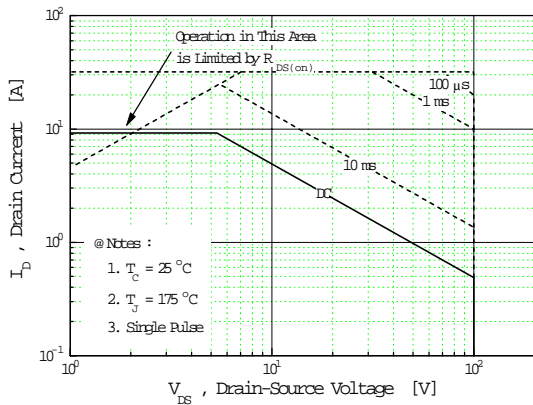
**Fig 7. Breakdown Voltage vs. Temperature**



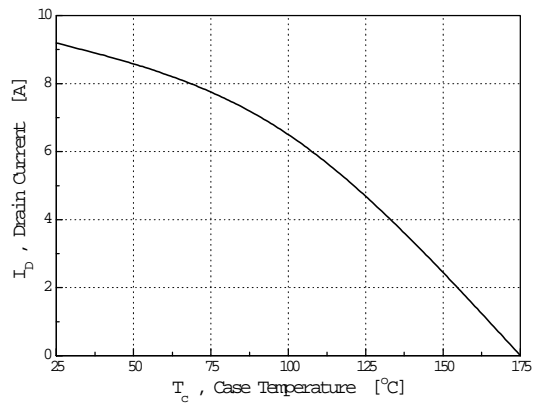
**Fig 8. On-Resistance vs. Temperature**



**Fig 9. Max. Safe Operating Area**



**Fig 10. Max. Drain Current vs. Case Temperature**



**Fig 11. Thermal Response**

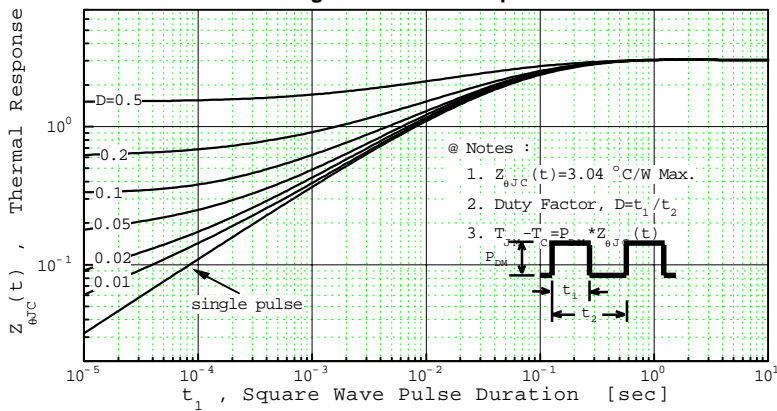


Fig 12. Gate Charge Test Circuit & Waveform

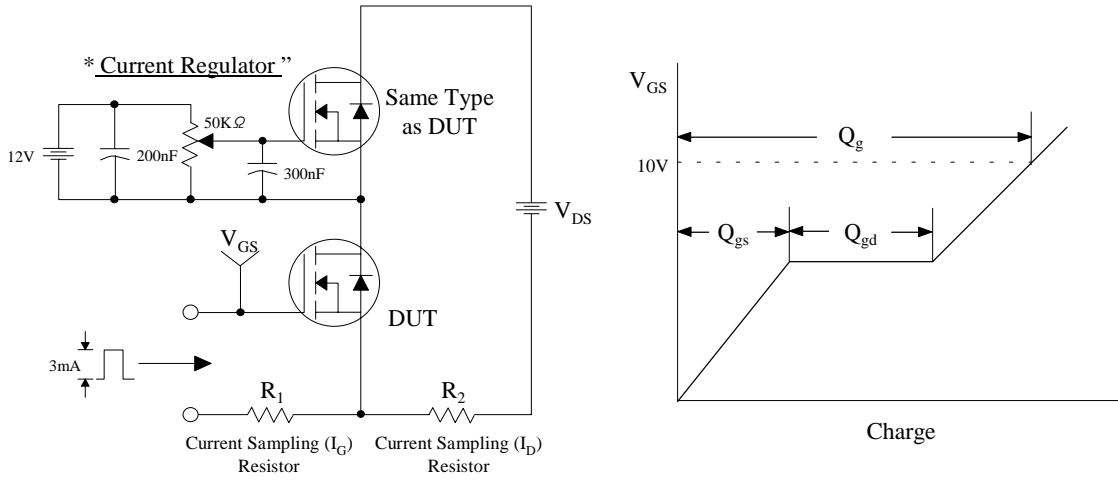


Fig 13. Resistive Switching Test Circuit & Waveforms

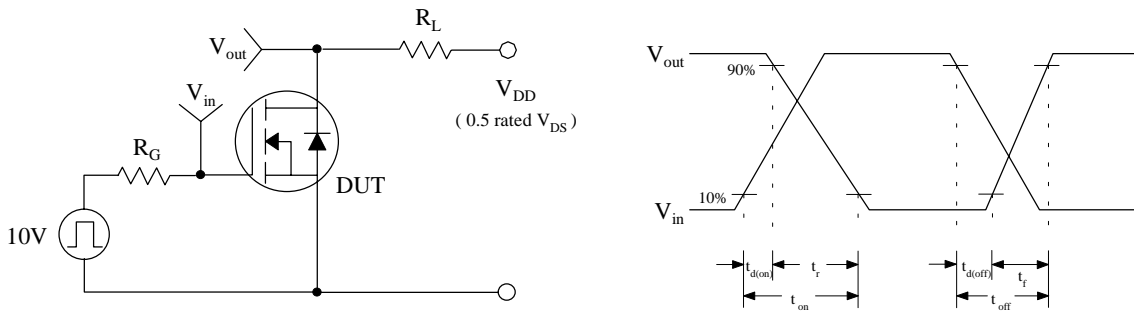


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

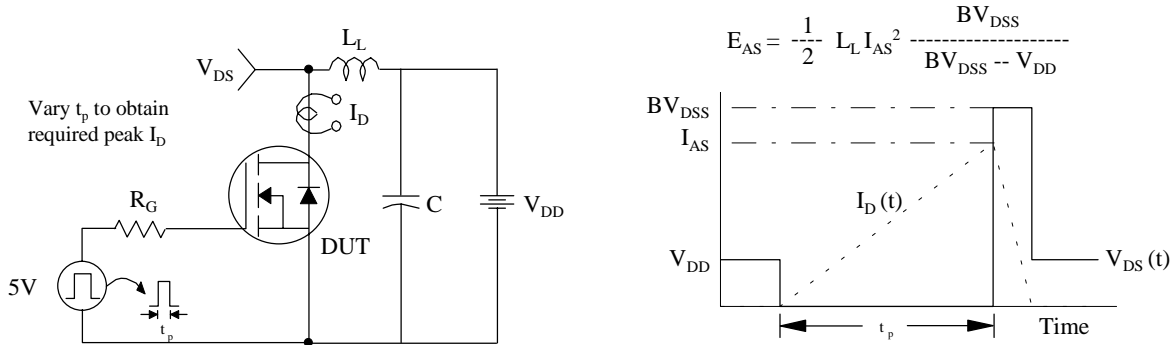
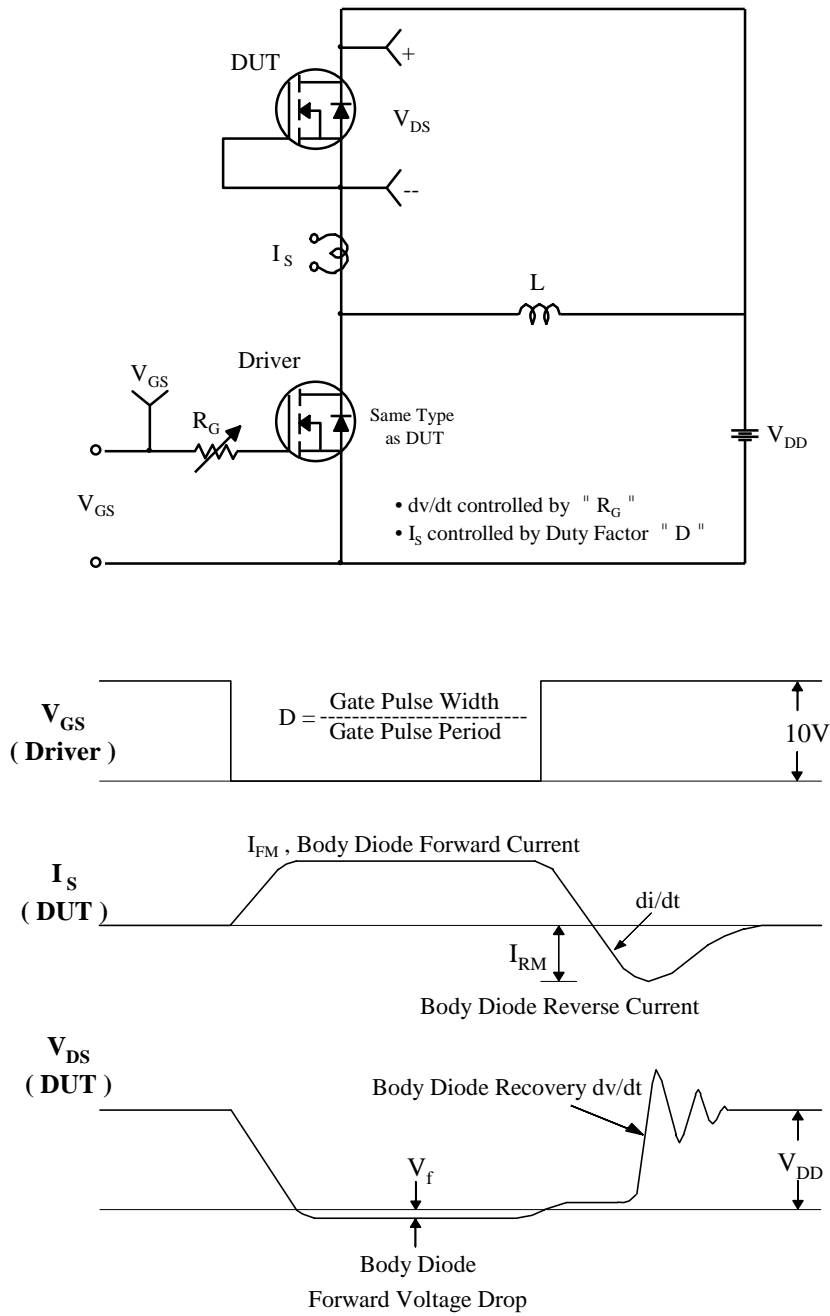


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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| DOME™                | ISOPLANAR™          | Quiet Series™       |            |
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| FACT™                | OPTOPLANAR™         | SuperSOT™-3         |            |
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