

## FEATURES

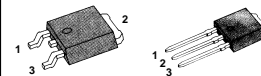
- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 10  $\mu$ A (Max.) @  $V_{DS} = 100V$
- Lower  $R_{DS(ON)}$  : 0.155  $\Omega$ (Typ.)

$$BV_{DSS} = 100 V$$

$$R_{DS(on)} = 0.2 \Omega$$

$$I_D = 8.4 A$$

**D-PAK**      **I-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 ( $T_C=25^\circ C$ )                           | 8.4          | A             |
|                | Continuous Drain Current ( $T_C=100^\circ C$ )                          | 5.3          |               |
| $I_{DM}$       | Drain Current-Pulsed ①  | 34           | A             |
| $V_{GS}$       | Gate-to-Source Voltage  | $\pm 20$     | V             |
| $E_{AS}$       | Single Pulsed Avalanche Energy ②  | 141          | mJ            |
| $I_{AR}$       | Avalanche Current ①   | 8.4          | A             |
| $E_{AR}$       | Repetitive Avalanche Energy ①   | 3.2          | mJ            |
| dv/dt          | Peak Diode Recovery dv/dt ③   | 6.5          | 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      | --   | 3.9  | $^\circ C/W$ |
| $R_{\theta JA}$ | Junction-to-Ambient * | --   | 50   |              |
| $R_{\theta JA}$ | Junction-to-Ambient   | --   | 110  |              |

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

Rev. B

### Electrical Characteristics ( $T_{\theta}=25^{\circ}\text{C}$ 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.          | --   | 0.12 | --   | V/ $^{\circ}\text{C}$ | $I_D=250\mu A$ <b>See Fig 7</b>   |
| $V_{GS(th)}$           | Gate Threshold Voltage                  | 2.0  | --   | 4.0  | V                     | $V_{DS}=5V, I_D=250\mu A$   |
| $I_{GSS}$              | Gate-Source Leakage, Forward            | --   | --   | 100  | nA                    | $V_{GS}=20V$  |
|                        | Gate-Source Leakage, Reverse            | --   | --   | -100 |                       | $V_{GS}=-20V$   |
| $I_{DSS}$              | Drain-to-Source Leakage Current         | --   | --   | 10   | $\mu A$               | $V_{DS}=100V$   |
|                        |   | --   | --   | 100  |                       | $V_{DS}=80V, T_C=125^{\circ}\text{C}$                                       |
| $R_{DS(on)}$           | Static Drain-Source On-State Resistance | --   | --   | 0.2  | $\Omega$              | $V_{GS}=10V, I_D=4.2A$ ④  |
| $g_{fs}$               | Forward Transconductance                | --   | 6.29 | --   | $\Omega$              | $V_{DS}=40V, I_D=4.2A$ ④  |
| $C_{iss}$              | Input Capacitance                       | --   | 370  | 480  | pF                    | $V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$<br><b>See Fig 5</b>                  |
| $C_{oss}$              | Output Capacitance                      | --   | 95   | 110  |                       |   |
| $C_{rss}$              | Reverse Transfer Capacitance            | --   | 38   | 45   |                       |   |
| $t_{d(on)}$            | Turn-On Delay Time                      | --   | 14   | 40   | ns                    | $V_{DD}=50V, I_D=9.2A,$<br>$R_G=18\Omega$<br><b>See Fig 13</b> ④⑤           |
| $t_r$                  | Rise Time                               | --   | 14   | 40   |                       |   |
| $t_{d(off)}$           | Turn-Off Delay Time                     | --   | 36   | 90   |                       |   |
| $t_f$                  | Fall Time                               | --   | 28   | 70   |                       |   |
| $Q_g$                  | Total Gate Charge                       | --   | 16   | 22   | nC                    | $V_{DS}=80V, V_{GS}=10V,$<br>$I_D=9.2A$<br><b>See Fig 6 &amp; Fig 12</b> ④⑤ |
| $Q_{gs}$               | Gate-Source Charge                      | --   | 2.7  | --   |                       |   |
| $Q_{gd}$               | Gate-Drain("Miller") Charge             | --   | 7.8  | --   |                       |   |

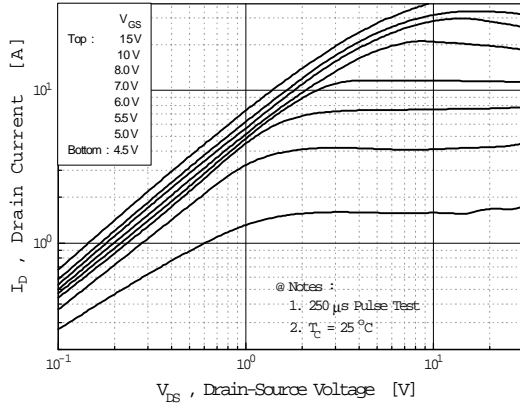
### Source-Drain Diode Ratings and Characteristics

| Symbol   | Characteristic            | Min. | Typ. | Max. | Units   | Test Condition                                |
|----------|---------------------------|------|------|------|---------|---|
| $I_S$    | Continuous Source Current | --   | --   | 8.4  | A       | Integral reverse pn-diode in the MOSFET       |
| $I_{SM}$ | Pulsed-Source Current ①   | --   | --   | 34   |         |   |
| $V_{SD}$ | Diode Forward Voltage ④   | --   | --   | 1.5  | V       | $T_J=25^{\circ}\text{C}, I_S=8.4A, V_{GS}=0V$ |
| $t_{rr}$ | 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                        |

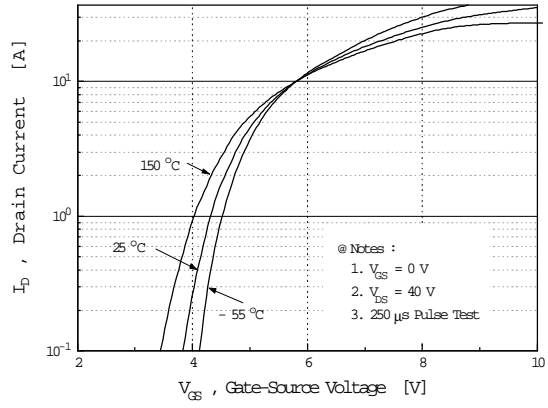
#### Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ②  $L=3\text{mH}, I_{AS}=8.4A, V_{DD}=25V, R_G=27\Omega$ , 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

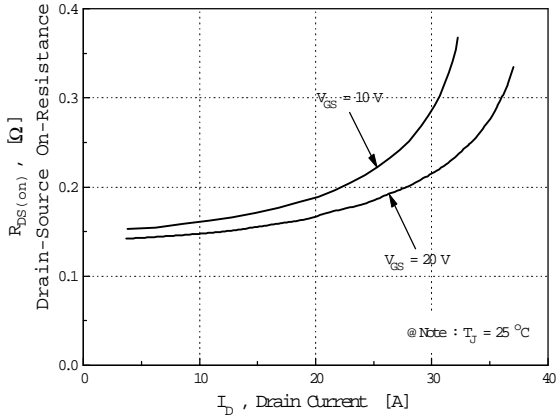
**Fig 1. Output Characteristics**



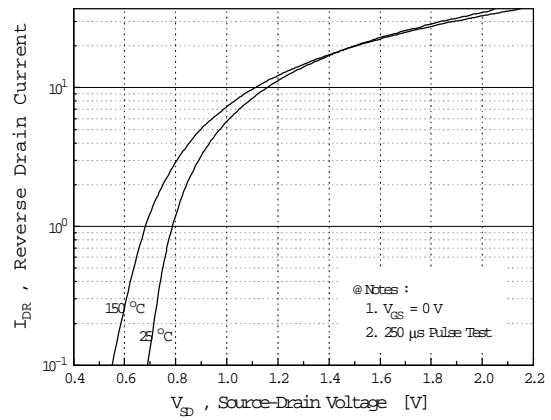
**Fig 2. Transfer Characteristics**



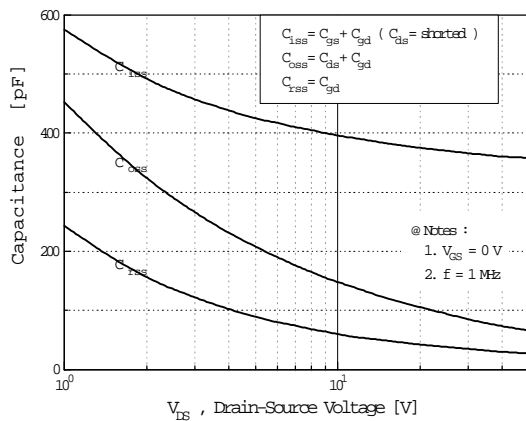
**Fig 3. On-Resistance vs. Drain Current**



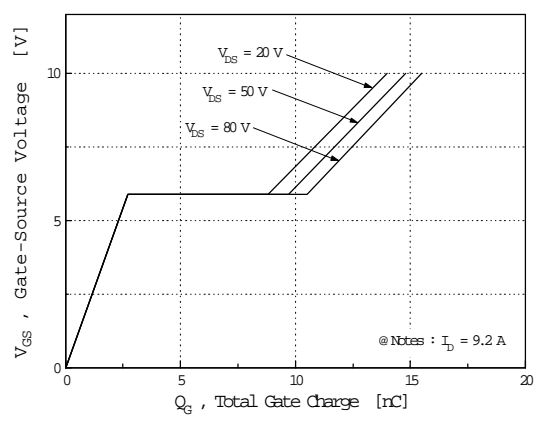
**Fig 4. Source-Drain Diode Forward Voltage**



**Fig 5. Capacitance vs. Drain-Source Voltage**



**Fig 6. Gate Charge vs. Gate-Source Voltage**



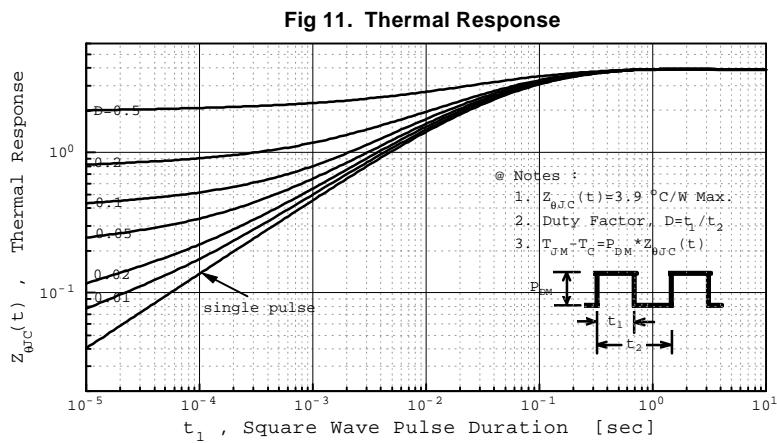
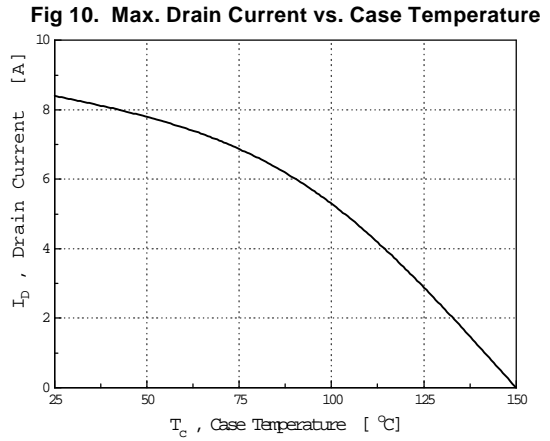
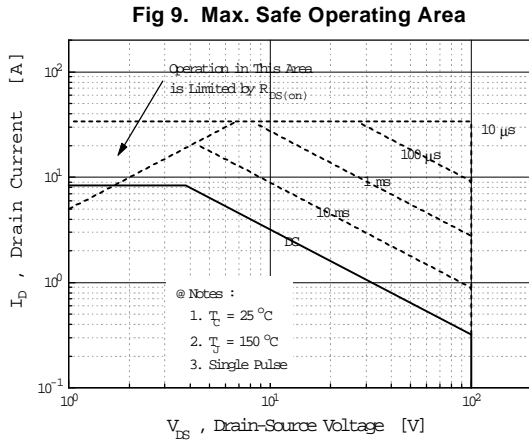
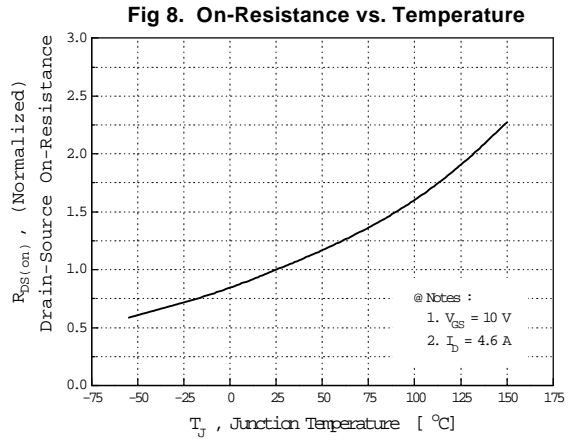
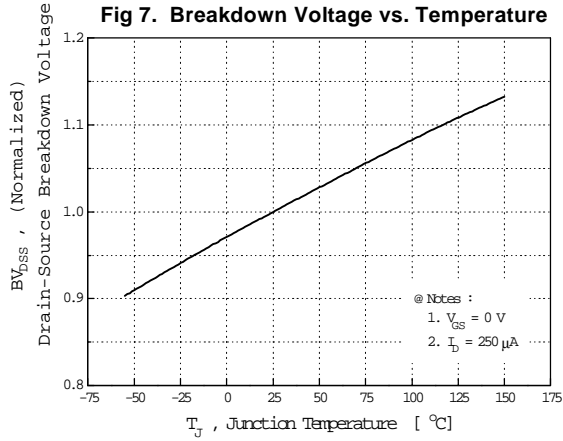


Fig 12. Gate Charge Test Circuit & Waveform

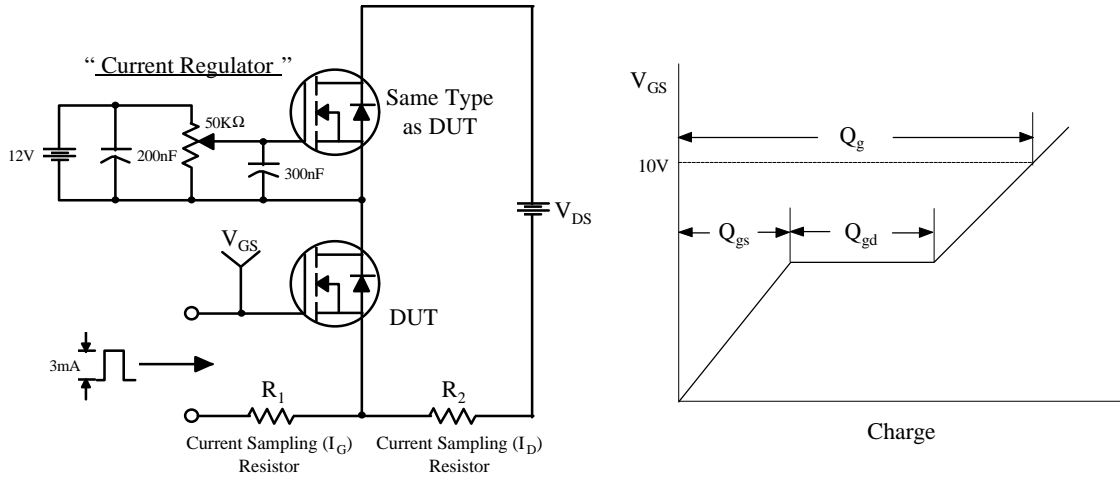
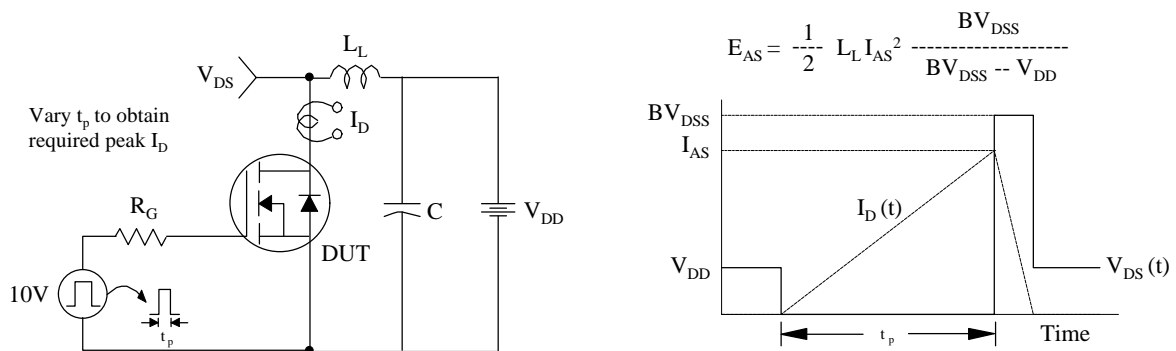


Fig 13. Resistive Switching Test Circuit & Waveforms

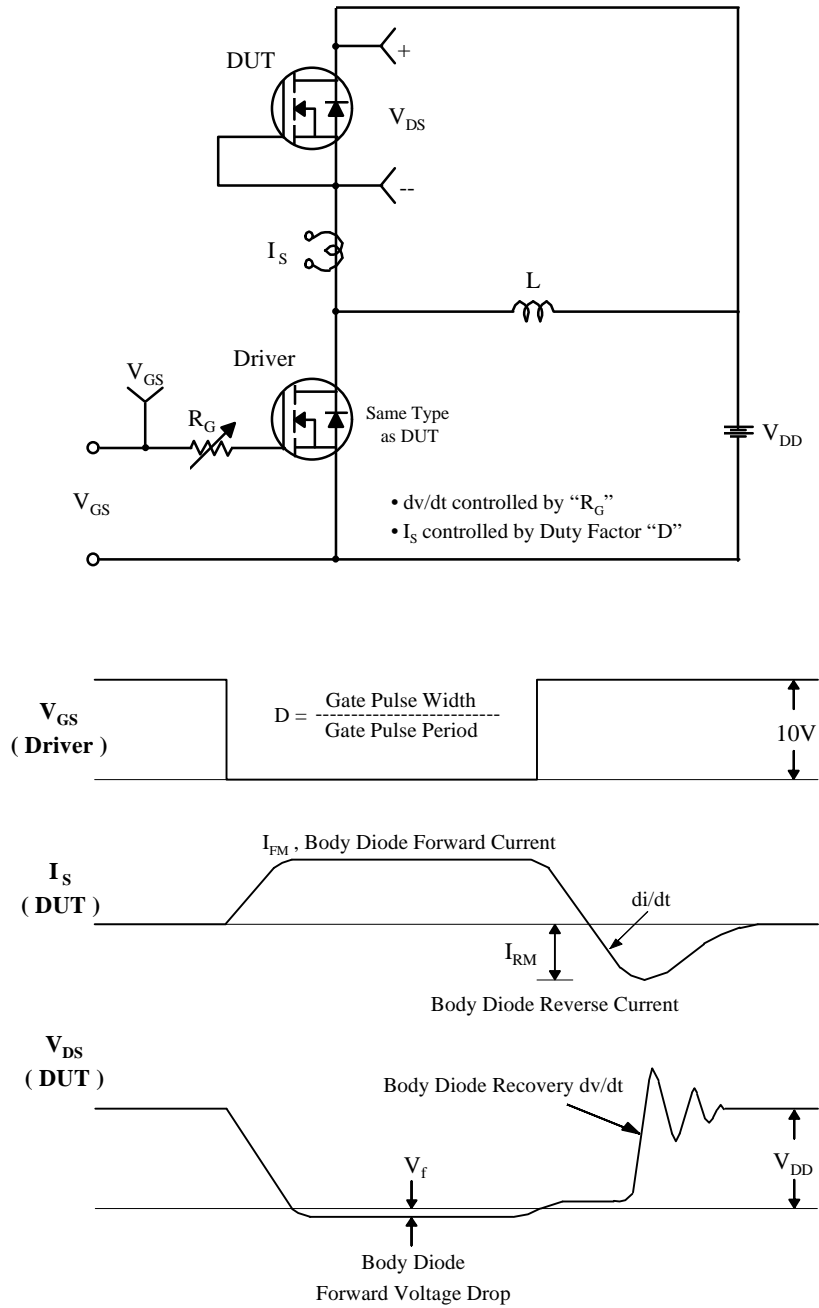


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L_L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

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



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| FACT Quiet Series™   | Quiet Series™ |      |
| FAST®                | SuperSOT™-3   |      |
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