

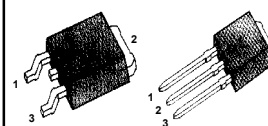
**FEATURES**

- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 25  $\mu$ A (Max.) @  $V_{DS} = 800V$
- Low  $R_{DS(on)}$  : 2.450  $\Omega$  (Typ.)c

$$BV_{DSS} = 800 V$$

$$R_{DS(on)} = 3.0 \Omega$$

$$I_D = 4.5 A$$

**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                                                 | 800                  | V          |
| $I_D$          | Continuous Drain Current ( $T_C=25^\circ C$ )                           | 4.5                  | A          |
|                | Continuous Drain Current ( $T_C=100^\circ C$ )                          | 2.8                  |            |
| $I_{DM}$       | Drain Current-Pulsed ①                                                  | 18                   | A          |
| $V_{GS}$       | Gate-to-Source Voltage                                                  | $\pm 30$             | V          |
| $E_{AS}$       | Single Pulsed Avalanche Energy ②                                        | 324                  | mJ         |
| $I_{AR}$       | Avalanche Current ①                                                     | 4.5                  | A          |
| $E_{AR}$       | Repetitive Avalanche Energy ①                                           | 13                   | mJ         |
| dv/dt          | Peak Diode Recovery dv/dt ③                                             | 2.0                  | V/ns       |
| $P_D$          | Total Power Dissipation ( $T_C=25^\circ C$ )                            | 3.1                  | W          |
|                | Linear Derating Factor                                                  | 130                  |            |
| $T_J, T_{STG}$ | Operating Junction and Storage Temperature Range                        | 1.04<br>- 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      | --   | 0.96 | $^\circ C / W$ |
| $R_{\theta JA}$ | Junction-to-Ambient * | --   | 40   |                |
| $R_{\theta JA}$ | Junction-to-Ambient   | --   | 62.5 |                |

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

# SSW/I4N80AS

## N-CHANNEL POWER MOSFET

### 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          | 800  | --   | --   | V                   | $V_{GS}=0V, I_D=250\mu A$                                                   |
| $\Delta BV/\Delta T_J$ | Breakdown Voltage Temp. Coeff.          | --   | 0.96 | --   | V/ $^\circ\text{C}$ | $I_D=250\mu A$ <b>See Fig 7</b>                                             |
| $V_{GS(th)}$           | Gate Threshold Voltage                  | 2.0  | --   | 3.5  | 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         | --   | --   | 25   | $\mu A$             | $V_{DS}=800V$                                                               |
|                        |                                         | --   | --   | 250  |                     | $V_{DS}=640V, T_C=125^\circ\text{C}$                                        |
| $R_{DS(on)}$           | Static Drain-Source On-State Resistance | --   | --   | 3.0  | $\Omega$            | $V_{GS}=10V, I_D=0.85A$ ④*                                                  |
| $g_{fs}$               | Forward Transconductance                | --   | 3.47 | --   | $\bar{O}$           | $V_{DS}=50V, I_D=0.85A$ ④                                                   |
| $C_{iss}$              | Input Capacitance                       | --   | 880  | 1140 | pF                  | $V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$<br><b>See Fig 5</b>                  |
| $C_{oss}$              | Output Capacitance                      | --   | 90   | 105  |                     |                                                                             |
| $C_{rss}$              | Reverse Transfer Capacitance            | --   | 35   | 42   |                     |                                                                             |
| $t_{d(on)}$            | Turn-On Delay Time                      | --   | 19   | 50   | ns                  | $V_{DD}=400V, I_D=2A,$<br>$R_G=16\Omega$<br><b>See Fig 13</b> ④ ⑤           |
| $t_r$                  | Rise Time                               | --   | 32   | 75   |                     |                                                                             |
| $t_{d(off)}$           | Turn-Off Delay Time                     | --   | 67   | 145  |                     |                                                                             |
| $t_f$                  | Fall Time                               | --   | 32   | 75   |                     |                                                                             |
| $Q_g$                  | Total Gate Charge                       | --   | 40   | 52   | nC                  | $V_{DS}=640V, V_{GS}=10V,$<br>$I_D=2A$<br><b>See Fig 6 &amp; Fig 12</b> ④ ⑤ |
| $Q_{gs}$               | Gate-Source Charge                      | --   | 7.3  | --   |                     |                                                                             |
| $Q_{gd}$               | Gate-Drain("Miller") Charge             | --   | 18.1 | --   |                     |                                                                             |

### Source-Drain Diode Ratings and Characteristics

| Symbol   | Characteristic            | Min. | Typ. | Max. | Units   | Test Condition                              |
|----------|---------------------------|------|------|------|---------|---------------------------------------------|
| $I_S$    | Continuous Source Current | --   | --   | 4.5  | A       | Integral reverse pn-diode in the MOSFET     |
| $I_{SM}$ | Pulsed-Source Current ①   | --   | --   | 18   |         |                                             |
| $V_{SD}$ | Diode Forward Voltage ④   | --   | --   | 1.4  | V       | $T_J=25^\circ\text{C}, I_S=4.5A, V_{GS}=0V$ |
| $t_{rr}$ | Reverse Recovery Time     | --   | 430  | --   | ns      | $T_J=25^\circ\text{C}, I_F=4.5A$            |
| $Q_{rr}$ | Reverse Recovery Charge   | --   | 4.06 | --   | $\mu C$ | $di_F/dt=100A/\mu s$ ④                      |

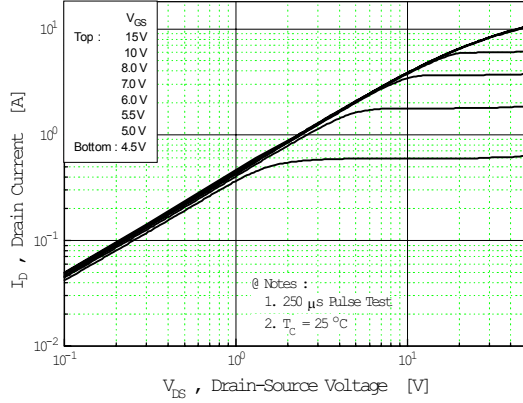
#### Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ②  $L=30\text{mH}, I_{AS}=4.5A, V_{DD}=50V, R_G=27\Omega$ , Starting  $T_J=25^\circ\text{C}$
- ③  $I_{SD}\leq 4.5A, di/dt\leq 120A/\mu s, V_{DD}\leq BV_{DSS}$ , 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

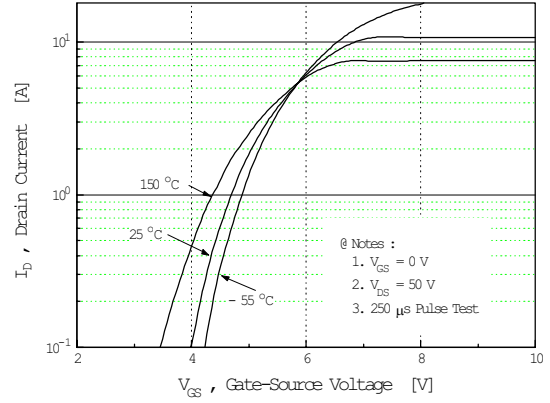
# N-CHANNEL POWER MOSFET

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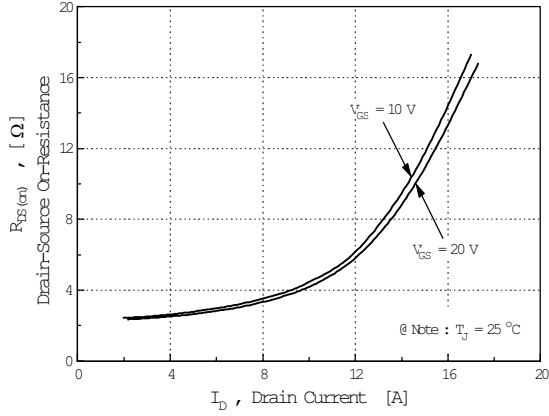
**Fig 1. Output Characteristics**



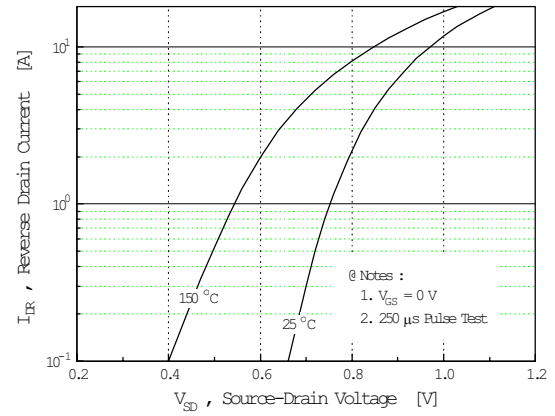
**Fig 2. Transfer Characteristics**



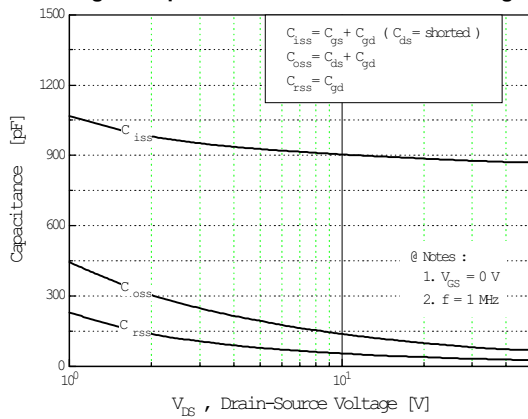
**Fig 3. On-Resistance vs. Drain Current**



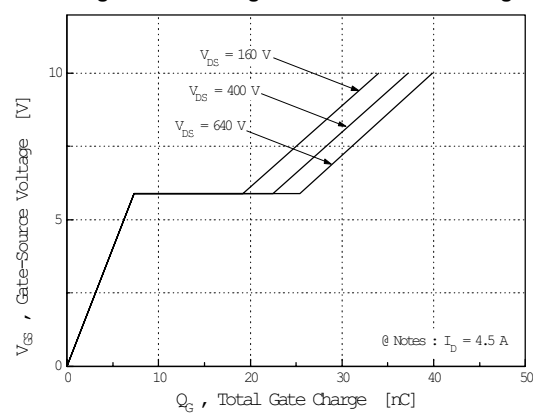
**Fig 4. Source-Drain Diode Forward Voltage**



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

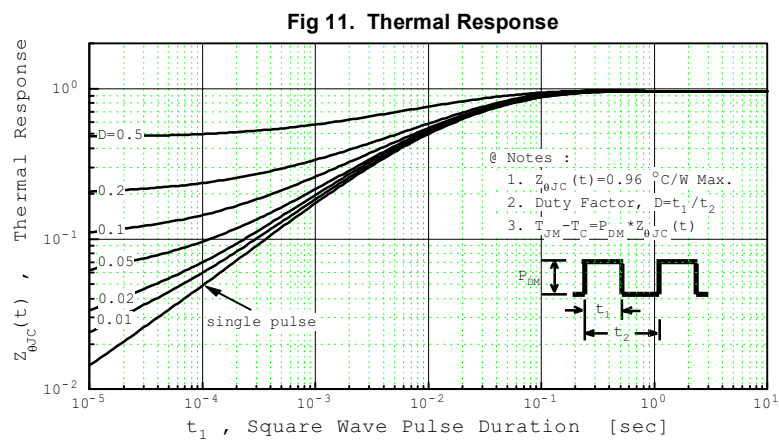
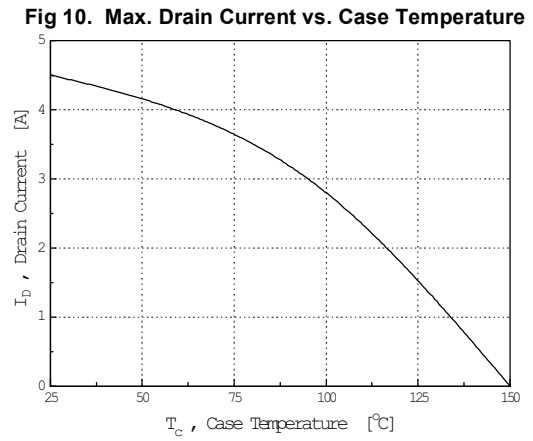
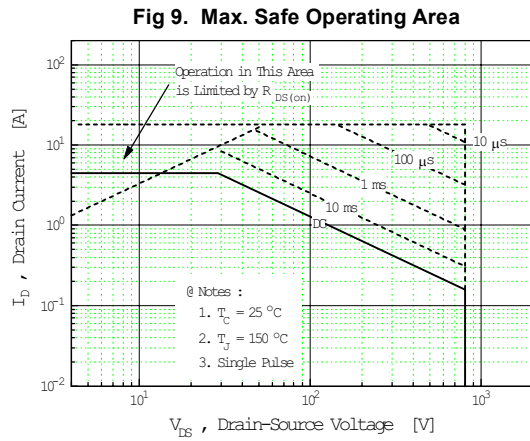
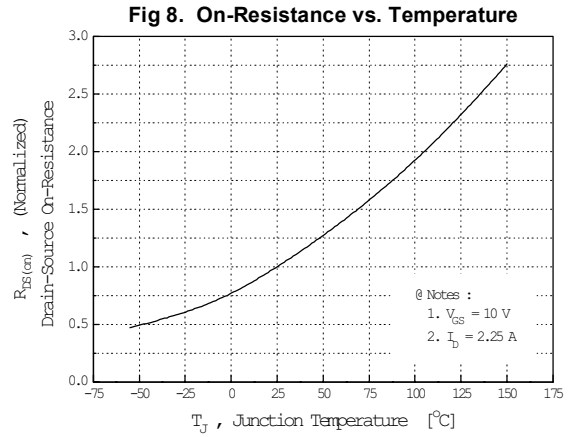
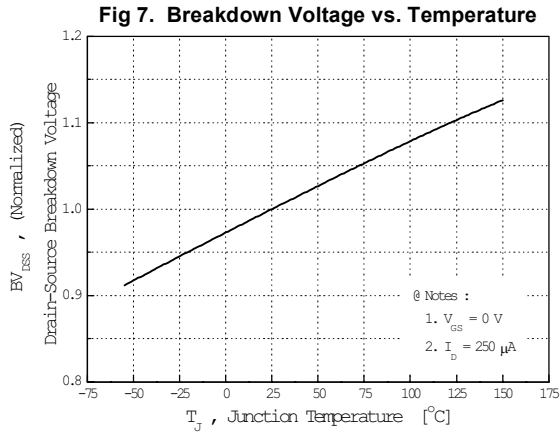


**Fig 6. Gate Charge vs. Gate-Source Voltage**

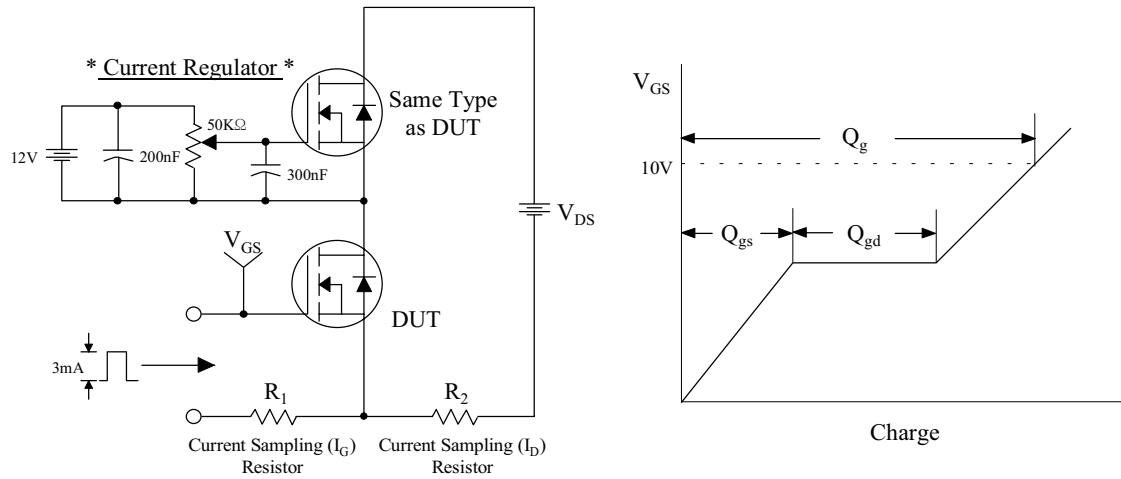


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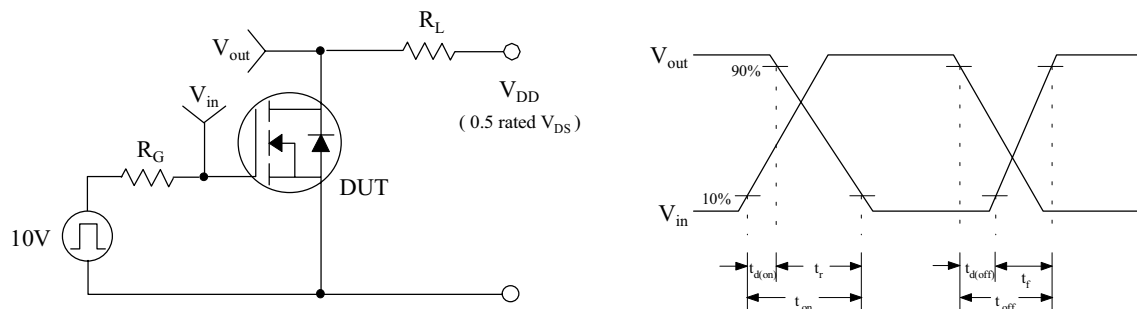
## N-CHANNEL POWER MOSFET



**Fig 12. Gate Charge Test Circuit & Waveform**



**Fig 13. Resistive Switching Test Circuit & Waveforms**



**Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms**

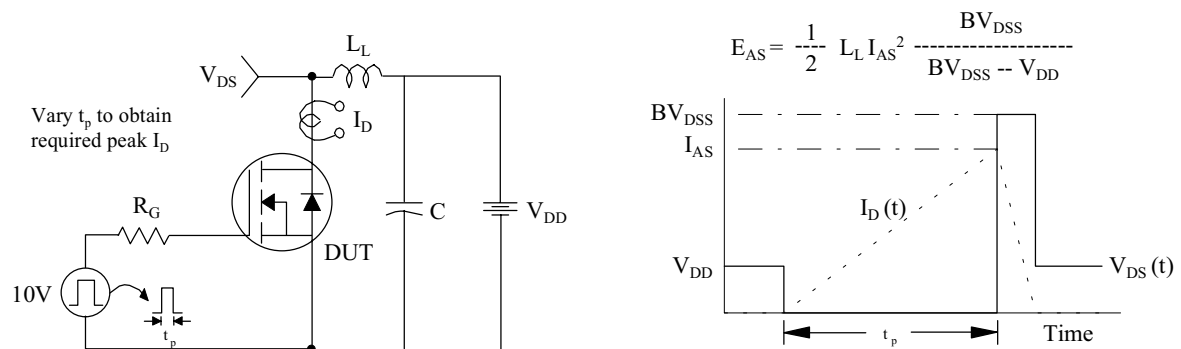


Fig 15. Peak Diode Recovery dv/dt Test Circuit &amp; Waveforms

