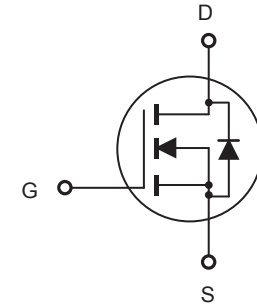


## N-Channel Enhancement Mode Field Effect Transistor

PRELIMINARY

### FEATURES

- 60V, 4A,  $R_{DS(ON)} = 102m\Omega$  @ $V_{GS} = 10V$ .  
 $R_{DS(ON)} = 126m\Omega$  @ $V_{GS} = 4.5V$ .
- High dense cell design for extremely low  $R_{DS(ON)}$ .
- Rugged and reliable.
- RoHS compliant.
- SOT-223 package.



### ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ C$ unless otherwise noted

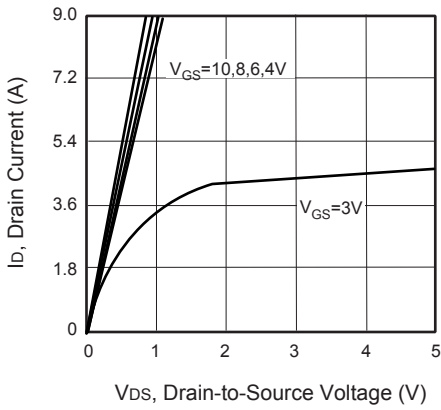
| Parameter                             | Symbol         | Limit      | Units      |
|---------------------------------------|----------------|------------|------------|
| Drain-Source Voltage                  | $V_{DS}$       | 60         | V          |
| Gate-Source Voltage                   | $V_{GS}$       | $\pm 20$   | V          |
| Drain Current-Continuous              | $I_D$          | 4          | A          |
| Drain Current-Pulsed <sup>a</sup>     | $I_{DM}$       | 16         | A          |
| Maximum Power Dissipation             | $P_D$          | 3          | W          |
| Operating and Store Temperature Range | $T_J, T_{stg}$ | -55 to 150 | $^\circ C$ |

### Thermal Characteristics

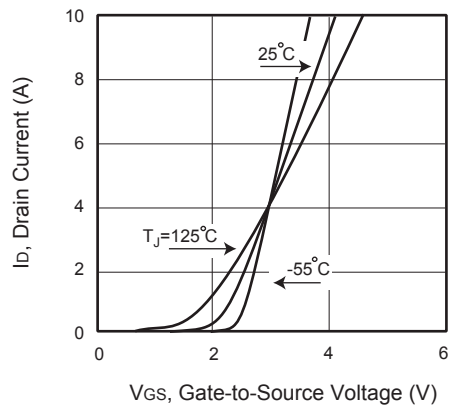
| Parameter  | Symbol          | Limit | Units        |
|--|-----------------|-------|--------------|
| Thermal Resistance, Junction-to-Ambient <sup>b</sup> | $R_{\theta JA}$ | 42    | $^\circ C/W$ |

## Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

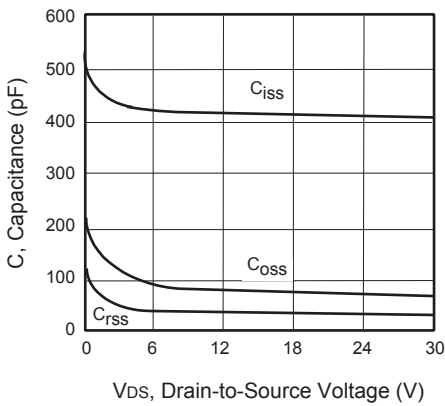
| Parameter  | Symbol       | Test Condition  | Min | Typ  | Max  | Units     |
|--|--------------|---|-----|------|------|-----------|
| <b>Off Characteristics</b>   |              |   |     |      |      |           |
| Drain-Source Breakdown Voltage   | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                               | 60  |      |      | V         |
| Zero Gate Voltage Drain Current  | $I_{DSS}$    | $V_{DS} = 60V, V_{GS} = 0V$                                 |     |      | 1    | $\mu A$   |
| Gate Body Leakage Current, Forward   | $I_{GSSF}$   | $V_{GS} = 20V, V_{DS} = 0V$                                 |     |      | 100  | nA        |
| Gate Body Leakage Current, Reverse   | $I_{GSSR}$   | $V_{GS} = -20V, V_{DS} = 0V$                                |     |      | -100 | nA        |
| <b>On Characteristics</b>  |              |   |     |      |      |           |
| Gate Threshold Voltage   | $V_{GS(th)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$                           | 1   |      | 3    | V         |
| Static Drain-Source On-Resistance  | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 2A$                                    |     | 85   | 102  | $m\Omega$ |
|  |              | $V_{GS} = 4.5V, I_D = 1A$                                   |     | 97   | 126  | $m\Omega$ |
| <b>Dynamic Characteristics<sup>d</sup></b>   |              |   |     |      |      |           |
| Input Capacitance  | $C_{iss}$    | $V_{DS} = 30V, V_{GS} = 0V, f = 1.0\text{ MHz}$             |     | 405  |      | pF        |
| Output Capacitance   | $C_{oss}$    |   |     | 70   |      | pF        |
| Reverse Transfer Capacitance   | $C_{rss}$    |   |     | 30   |      | pF        |
| <b>Switching Characteristics<sup>d</sup></b>   |              |   |     |      |      |           |
| Turn-On Delay Time   | $t_{d(on)}$  | $V_{DD} = 30V, I_D = 1.5A, V_{GS} = 10V, R_{GEN} = 3\Omega$ |     | 7.0  |      | ns        |
| Turn-On Rise Time  | $t_r$        |   |     | 2.7  |      | ns        |
| Turn-Off Delay Time  | $t_{d(off)}$ |   |     | 18.8 |      | ns        |
| Turn-Off Fall Time   | $t_f$        |   |     | 1.6  |      | ns        |
| Total Gate Charge  | $Q_g$        | $V_{DS} = 30V, I_D = 2.5A, V_{GS} = 4.5V$                   |     | 3.6  |      | nC        |
| Gate-Source Charge   | $Q_{gs}$     |   |     | 0.8  |      | nC        |
| Gate-Drain Charge  | $Q_{gd}$     |   |     | 1.6  |      | nC        |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b>  |              |   |     |      |      |           |
| Drain-Source Diode Forward Current <sup>b</sup>  | $I_S$        |   |     |      | 2.5  | A         |
| Drain-Source Diode Forward Voltage <sup>c</sup>  | $V_{SD}$     | $V_{GS} = 0V, I_S = 1A$                                     |     |      | 1.2  | V         |
| <b>Notes :</b><br>a.Repetitive Rating : Pulse width limited by maximum junction temperature.<br>b.Surface Mounted on FR4 Board, $t \leq 10$ sec.<br>c.Pulse Test : Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$ .<br>d.Guaranteed by design, not subject to production testing. |              |   |     |      |      |           |



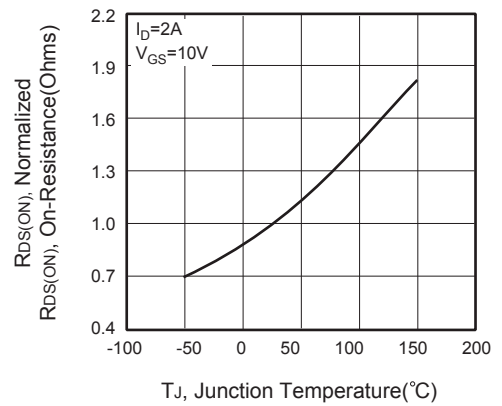
**Figure 1. Output Characteristics**



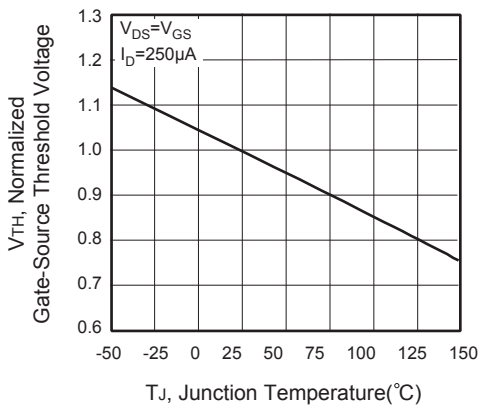
**Figure 2. Transfer Characteristics**



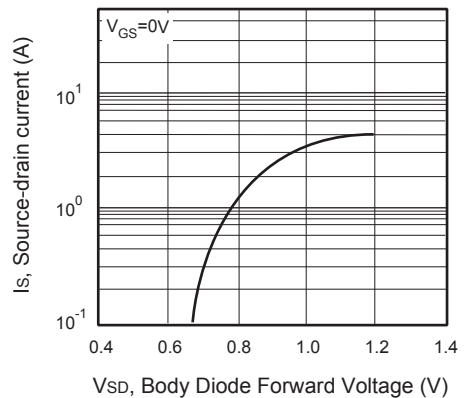
**Figure 3. Capacitance**



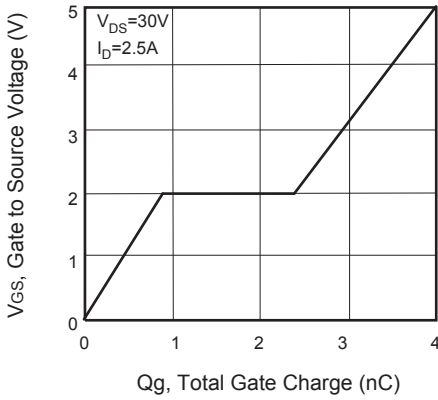
**Figure 4. On-Resistance Variation with Temperature**



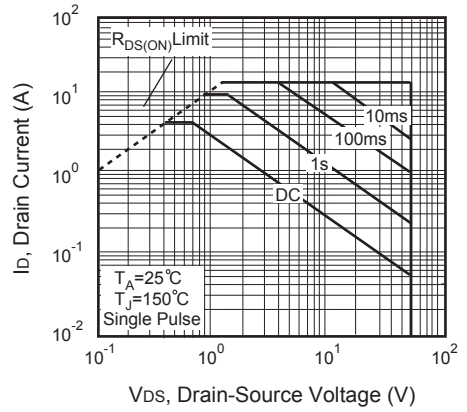
**Figure 5. Gate Threshold Variation with Temperature**



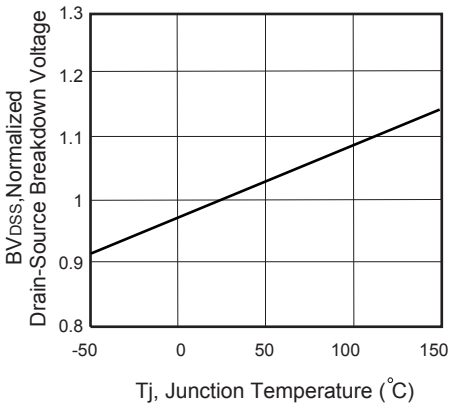
**Figure 6. Body Diode Forward Voltage Variation with Source Current**



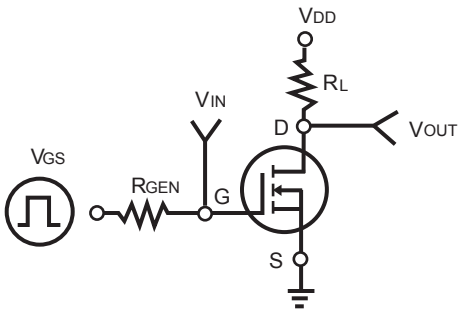
**Figure 7. Gate Charge**



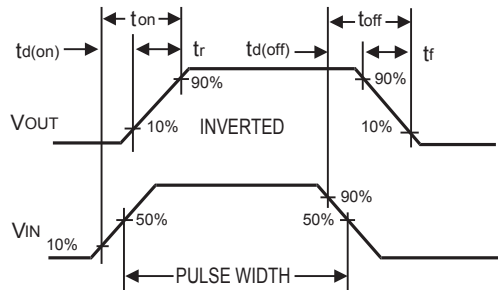
**Figure 8. Maximum Safe Operating Area**



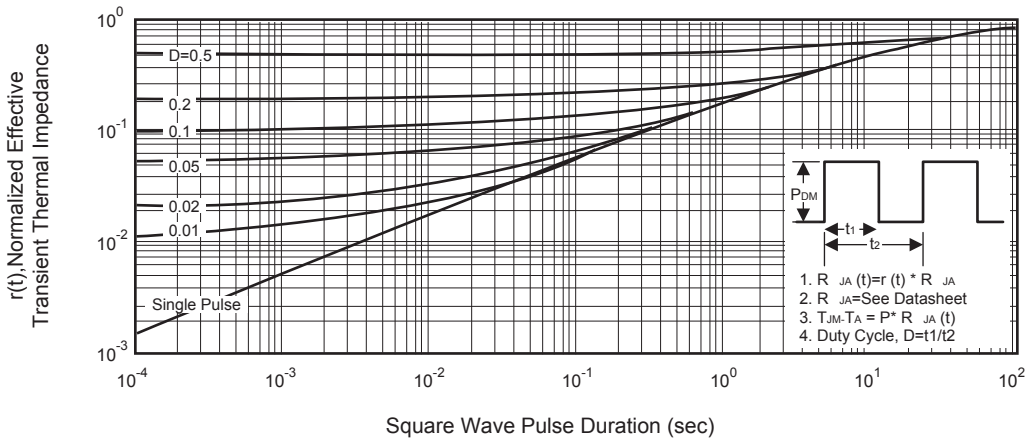
**Figure 9. Breakdown Voltage Variation VS Temperature**



**Figure 10. Switching Test Circuit**



**Figure 11. Switching Waveforms**



**Figure 12. Normalized Thermal Transient Impedance Curve**