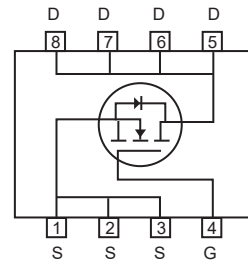
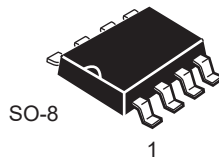


## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- 60V, 8.1A,  $R_{DS(ON)} = 21m\Omega$  @ $V_{GS} = 10V$ .  
 $R_{DS(ON)} = 28m\Omega$  @ $V_{GS} = 4.5V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handling capability.
- RoHS compliant.
- Surface mount Package.



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

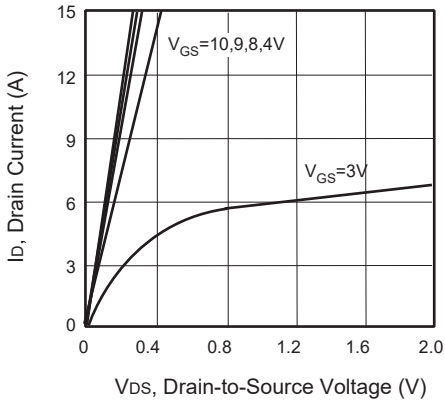
| Parameter                             | Symbol         | Limit      | Units            |
|---------------------------------------|----------------|------------|------------------|
| Drain-Source Voltage                  | $V_{DS}$       | 60         | V                |
| Gate-Source Voltage                   | $V_{GS}$       | $\pm 20$   | V                |
| Drain Current-Continuous              | $I_D$          | 8.1        | A                |
| Drain Current-Pulsed <sup>a</sup>     | $I_{DM}$       | 32.4       | A                |
| Maximum Power Dissipation             | $P_D$          | 2.5        | W                |
| Operating and Store Temperature Range | $T_J, T_{stg}$ | -55 to 150 | $^\circ\text{C}$ |

### Thermal Characteristics

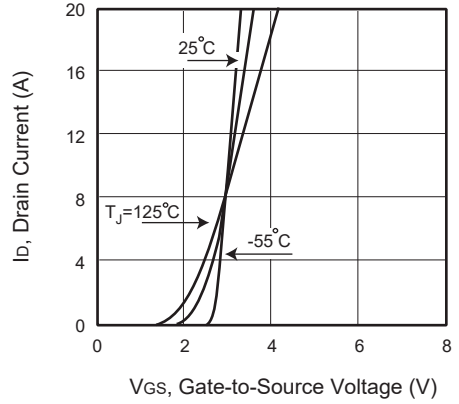
| Parameter                                            | Symbol          | Limit | Units              |
|------------------------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Ambient <sup>b</sup> | $R_{\theta JA}$ | 50    | $^\circ\text{C/W}$ |

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

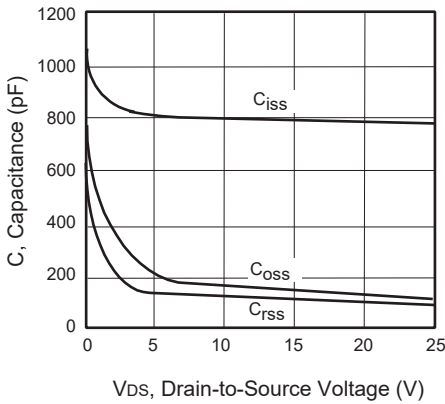
| Parameter                                                                                                                                                                                                                          | Symbol       | Test Condition                                              | 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                                                                                                                                                                                                  | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 6A$                                    |     | 16  | 21   | $m\Omega$ |
|                                                                                                                                                                                                                                    |              | $V_{GS} = 4.5V, I_D = 4A$                                   |     | 20  | 28   | $m\Omega$ |
| <b>Dynamic Characteristics <sup>c</sup></b>                                                                                                                                                                                        |              |                                                             |     |     |      |           |
| Input Capacitance                                                                                                                                                                                                                  | $C_{iss}$    | $V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{ MHz}$             |     | 780 |      | pF        |
| Output Capacitance                                                                                                                                                                                                                 | $C_{oss}$    |                                                             |     | 115 |      | pF        |
| Reverse Transfer Capacitance                                                                                                                                                                                                       | $C_{riss}$   |                                                             |     | 95  |      | pF        |
| <b>Switching Characteristics <sup>c</sup></b>                                                                                                                                                                                      |              |                                                             |     |     |      |           |
| Turn-On Delay Time                                                                                                                                                                                                                 | $t_{d(on)}$  | $V_{DD} = 30V, I_D = 7A, V_{GS} = 10V, R_{GEN} = 4.7\Omega$ |     | 15  |      | ns        |
| Turn-On Rise Time                                                                                                                                                                                                                  | $t_r$        |                                                             |     | 7   |      | ns        |
| Turn-Off Delay Time                                                                                                                                                                                                                | $t_{d(off)}$ |                                                             |     | 43  |      | ns        |
| Turn-Off Fall Time                                                                                                                                                                                                                 | $t_f$        |                                                             |     | 8   |      | ns        |
| Total Gate Charge                                                                                                                                                                                                                  | $Q_g$        | $V_{DS} = 48V, I_D = 7A, V_{GS} = 4.5V$                     |     | 14  |      | nC        |
| Gate-Source Charge                                                                                                                                                                                                                 | $Q_{gs}$     |                                                             |     | 2   |      | nC        |
| Gate-Drain Charge                                                                                                                                                                                                                  | $Q_{gd}$     |                                                             |     | 9   |      | nC        |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b>                                                                                                                                                                      |              |                                                             |     |     |      |           |
| Drain-Source Diode Forward Current                                                                                                                                                                                                 | $I_S$        |                                                             |     |     | 2    | A         |
| Drain-Source Diode Forward Voltage <sup>b</sup>                                                                                                                                                                                    | $V_{SD}$     | $V_{GS} = 0V, I_S = 2A$                                     |     |     | 1.2  | V         |
| <b>Notes :</b><br>a.Repetitive Rating : Pulse width limited by maximum junction temperature.<br>b.Pulse Test : Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$ .<br>c.Guaranteed by design, not subject to production testing. |              |                                                             |     |     |      |           |



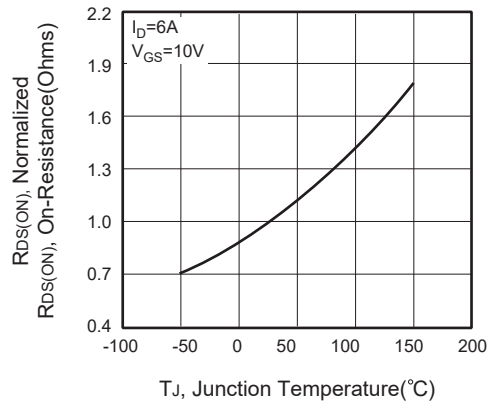
**Figure 1. Output Characteristics**



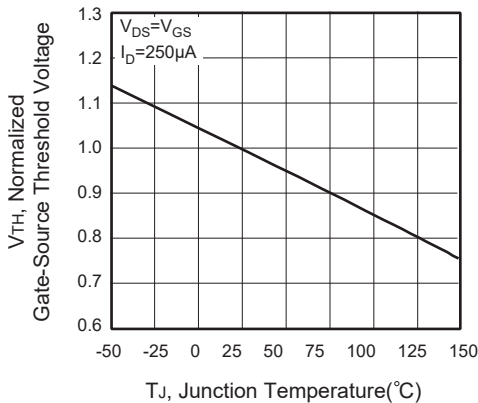
**Figure 2. Transfer Characteristics**



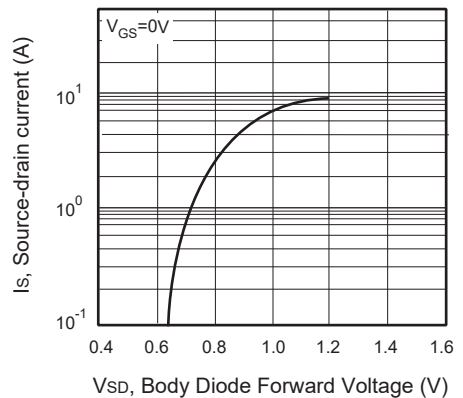
**Figure 3. Capacitance**



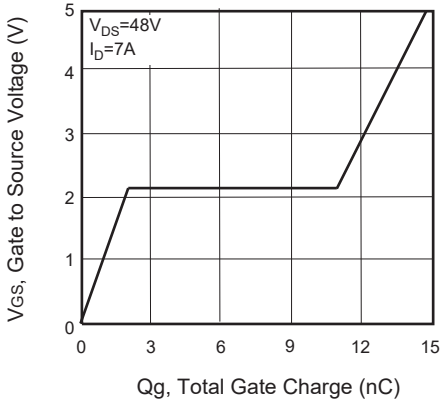
**Figure 4. On-Resistance Variation with Temperature**



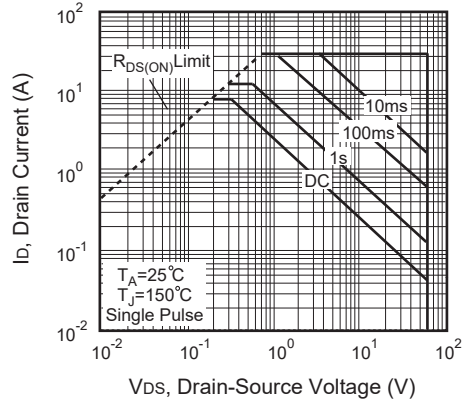
**Figure 5. Gate Threshold Variation with Temperature**



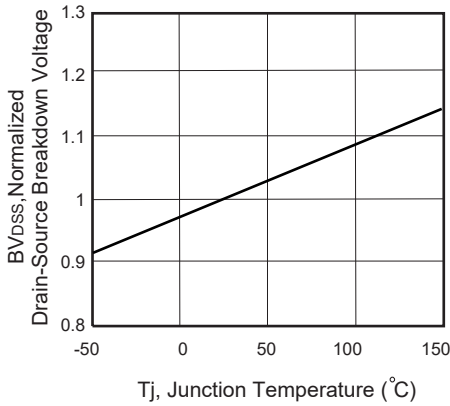
**Figure 6. Body Diode Forward Voltage Variation with Source Current**



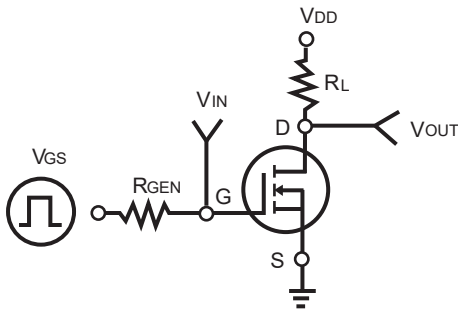
**Figure 7. Gate Charge**



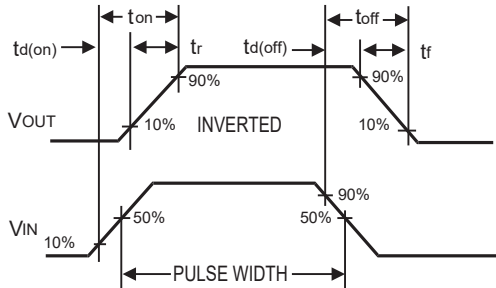
**Figure 8. Maximum Safe Operating Area**



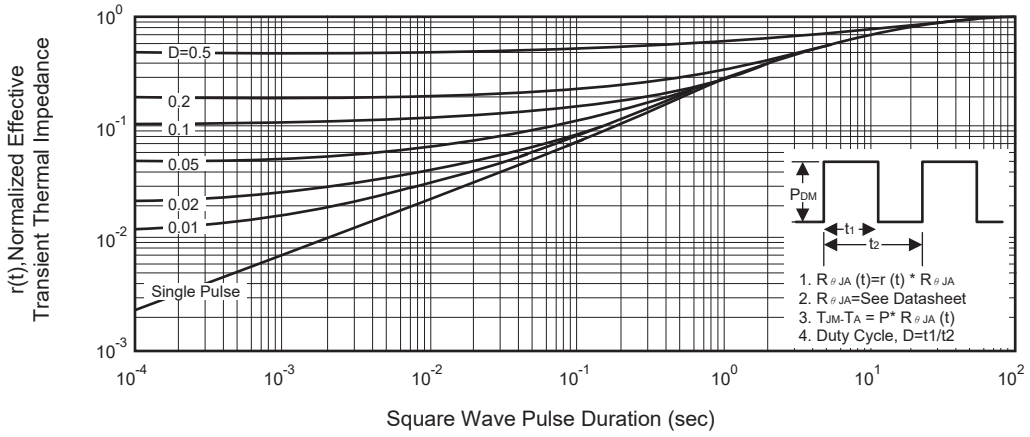
**Figure 9. Breakdown Voltage Variation VS Temperature**



**Figure 10. Switching Test Circuit**



**Figure 11. Switching Waveforms**



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