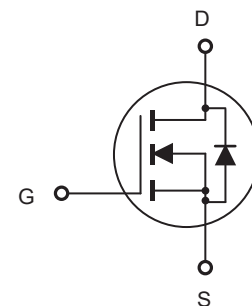
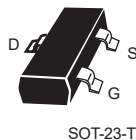


## N-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- 30V, 4.8A,  $R_{DS(ON)} = 34m\Omega$  @  $V_{GS} = 10V$ .  
 $R_{DS(ON)} = 40m\Omega$  @  $V_{GS} = 4.5V$ .  
 $R_{DS(ON)} = 45m\Omega$  @  $V_{GS} = 2.5V$ .  
 $R_{DS(ON)} = 60m\Omega$  @  $V_{GS} = 1.8V$ .
- High dense cell design for extremely low  $R_{DS(ON)}$ .
- Rugged and reliable.
- RoHS compliant.
- SOT-23-T package.



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

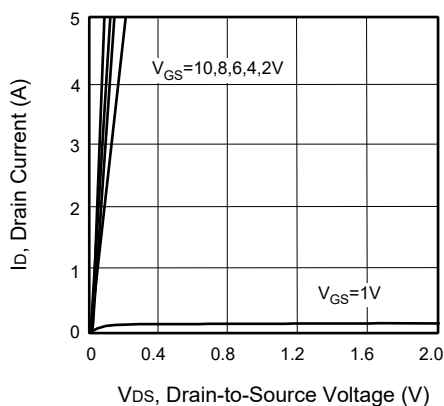
| Parameter                             | Symbol         | Limit      | Units            |
|---------------------------------------|----------------|------------|------------------|
| Drain-Source Voltage                  | $V_{DS}$       | 30         | V                |
| Gate-Source Voltage                   | $V_{GS}$       | $\pm 12$   | V                |
| Drain Current-Continuous              | $I_D$          | 4.8        | A                |
| Drain Current-Pulsed <sup>a</sup>     | $I_{DM}$       | 20         | A                |
| Maximum Power Dissipation             | $P_D$          | 1.25       | W                |
| Operating and Store Temperature Range | $T_J, T_{stg}$ | -55 to 150 | $^\circ\text{C}$ |

### Thermal Characteristics

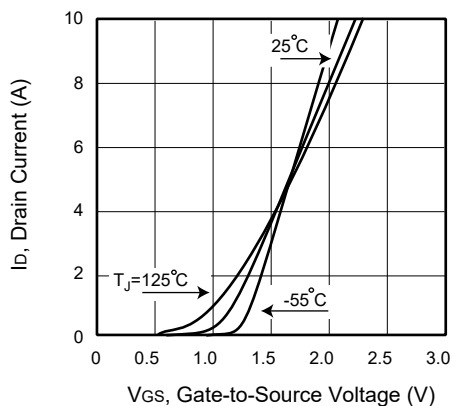
| Parameter                                            | Symbol          | Limit | Units              |
|------------------------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Ambient <sup>b</sup> | $R_{\theta JA}$ | 100   | $^\circ\text{C/W}$ |

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

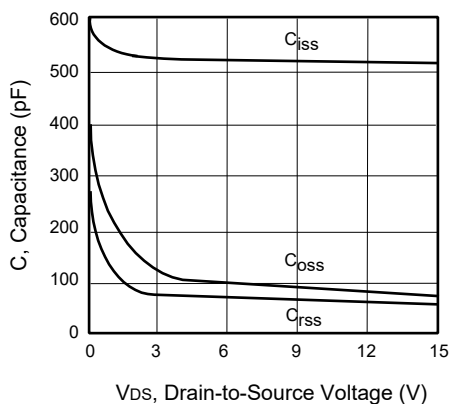
| Parameter                                                                                                                                                                                                                                                                           | Symbol       | Test Condition                                                     | Min | Typ | Max  | Units      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------|-----|-----|------|------------|
| Off Characteristics                                                                                                                                                                                                                                                                 |              |                                                                    |     |     |      |            |
| Drain-Source Breakdown Voltage                                                                                                                                                                                                                                                      | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu A$                                      | 30  |     |      | V          |
| Zero Gate Voltage Drain Current                                                                                                                                                                                                                                                     | $I_{DSS}$    | $V_{DS} = 30V, V_{GS} = 0V$                                        |     |     | 1    | $\mu A$    |
| Gate Body Leakage Current, Forward                                                                                                                                                                                                                                                  | $I_{GSSF}$   | $V_{GS} = 12V, V_{DS} = 0V$                                        |     |     | 100  | nA         |
| Gate Body Leakage Current, Reverse                                                                                                                                                                                                                                                  | $I_{GSSR}$   | $V_{GS} = -12V, V_{DS} = 0V$                                       |     |     | -100 | nA         |
| On Characteristics <sup>c</sup>                                                                                                                                                                                                                                                     |              |                                                                    |     |     |      |            |
| Gate Threshold Voltage                                                                                                                                                                                                                                                              | $V_{GS(th)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$                                  | 0.4 |     | 1    | V          |
| Static Drain-Source<br>On-Resistance                                                                                                                                                                                                                                                | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 4.8A$                                         |     | 24  | 34   | m $\Omega$ |
|                                                                                                                                                                                                                                                                                     |              | $V_{GS} = 4.5V, I_D = 4A$                                          |     | 26  | 40   | m $\Omega$ |
|                                                                                                                                                                                                                                                                                     |              | $V_{GS} = 2.5V, I_D = 2A$                                          |     | 30  | 45   | m $\Omega$ |
|                                                                                                                                                                                                                                                                                     |              | $V_{GS} = 1.8V, I_D = 1A$                                          |     | 34  | 60   | m $\Omega$ |
| Dynamic Characteristics <sup>d</sup>                                                                                                                                                                                                                                                |              |                                                                    |     |     |      |            |
| Input Capacitance                                                                                                                                                                                                                                                                   | $C_{iss}$    | $V_{DS} = 15V, V_{GS} = 0V,$<br>$f = 1.0 \text{ MHz}$              |     | 520 |      | pF         |
| Output Capacitance                                                                                                                                                                                                                                                                  | $C_{oss}$    |                                                                    |     | 85  |      | pF         |
| Reverse Transfer Capacitance                                                                                                                                                                                                                                                        | $C_{rss}$    |                                                                    |     | 60  |      | pF         |
| Switching Characteristics <sup>d</sup>                                                                                                                                                                                                                                              |              |                                                                    |     |     |      |            |
| Turn-On Delay Time                                                                                                                                                                                                                                                                  | $t_{d(on)}$  | $V_{DD} = 15V, I_D = 4.8A,$<br>$V_{GS} = 4.5V, R_{GEN} = 10\Omega$ |     | 9   |      | ns         |
| Turn-On Rise Time                                                                                                                                                                                                                                                                   | $t_r$        |                                                                    |     | 6   |      | ns         |
| Turn-Off Delay Time                                                                                                                                                                                                                                                                 | $t_{d(off)}$ |                                                                    |     | 44  |      | ns         |
| Turn-Off Fall Time                                                                                                                                                                                                                                                                  | $t_f$        |                                                                    |     | 10  |      | ns         |
| Total Gate Charge                                                                                                                                                                                                                                                                   | $Q_g$        | $V_{DS} = 15V, I_D = 4.8A,$<br>$V_{GS} = 4.5V$                     |     | 10  |      | nC         |
| Gate-Source Charge                                                                                                                                                                                                                                                                  | $Q_{gs}$     |                                                                    |     | 1   |      | nC         |
| Gate-Drain Charge                                                                                                                                                                                                                                                                   | $Q_{gd}$     |                                                                    |     | 3   |      | nC         |
| Drain-Source Diode Characteristics and Maximun Ratings                                                                                                                                                                                                                              |              |                                                                    |     |     |      |            |
| Drain-Source Diode Forward Current <sup>b</sup>                                                                                                                                                                                                                                     | $I_S$        |                                                                    |     |     | 1.2  | A          |
| Drain-Source Diode Forward Voltage <sup>c</sup>                                                                                                                                                                                                                                     | $V_{SD}$     | $V_{GS} = 0V, I_S = 1A$                                            |     |     | 1    | V          |
| Notes :<br>a.Repetitive Rating : Pulse width limited by maximum junction temperature.<br>b.Surface Mounted on FR4 Board, $t < 5 \text{ sec.}$<br>c.Pulse Test : Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$ .<br>d.Guaranteed by design, not subject to production testing. |              |                                                                    |     |     |      |            |



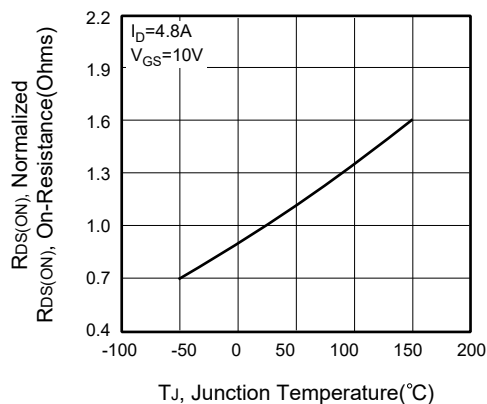
**Figure 1. Output Characteristics**



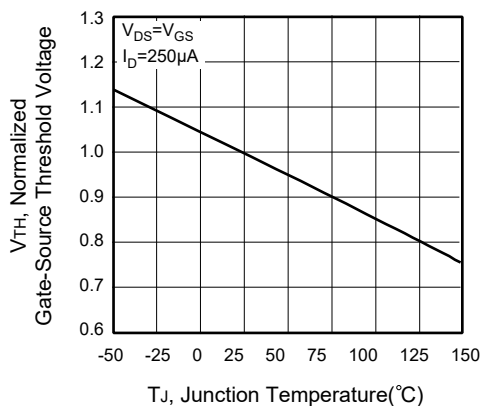
**Figure 2. Transfer Characteristics**



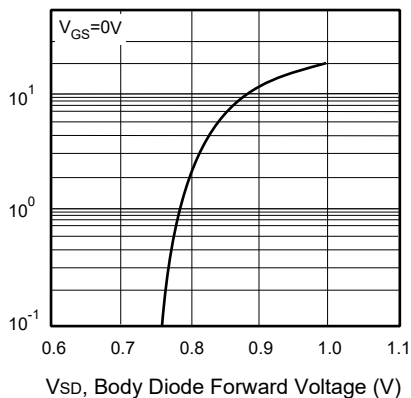
**Figure 3. Capacitance**



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



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



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

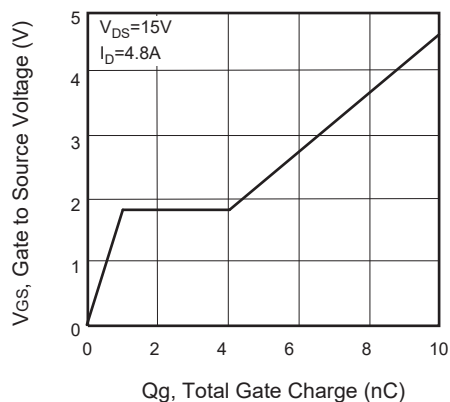


Figure 7. Gate Charge

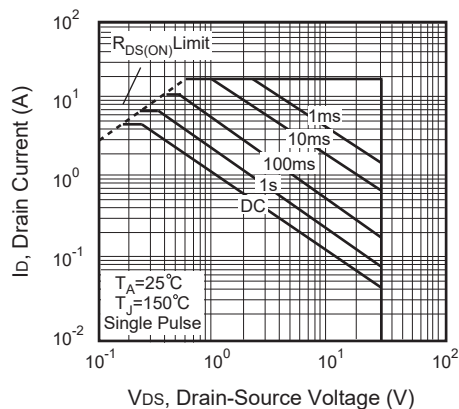


Figure 8. Maximum Safe Operating Area

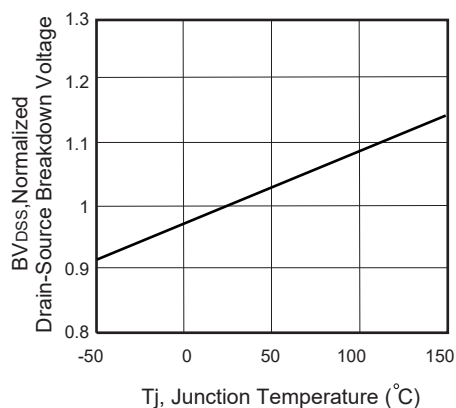


Figure 9. Breakdown Voltage Variation VS Temperature

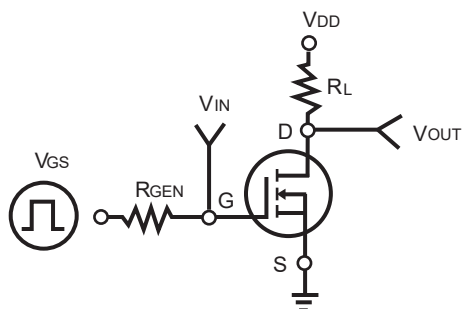


Figure 10. Switching Test Circuit

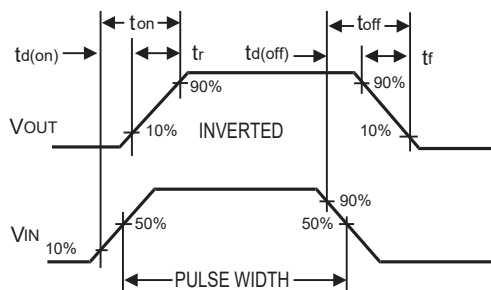
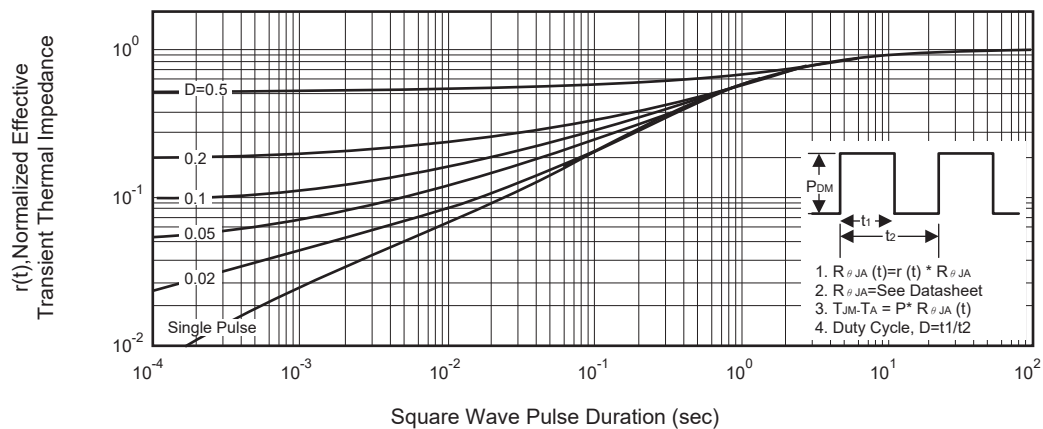


Figure 11. Switching Waveforms



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