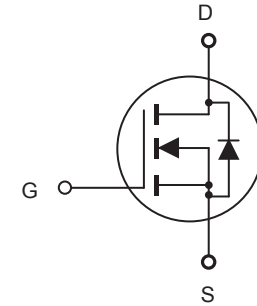


## N-Channel Enhancement Mode Field Effect Transistor

PRELIMINARY

### FEATURES

- 30V, 47A,  $R_{DS(ON)} = 12m\Omega$  @  $V_{GS} = 10V$ .  
 $R_{DS(ON)} = 21m\Omega$  @  $V_{GS} = 4.5V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handing capability.
- Lead-free plating ; RoHS compliant.
- TO-220 package.



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

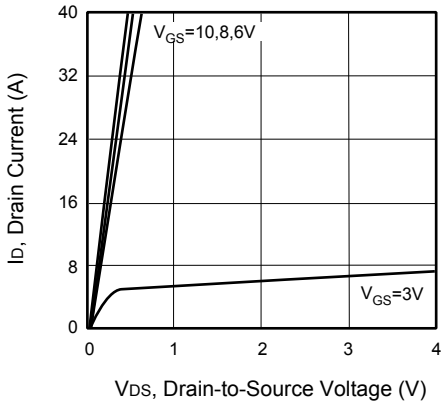
Parameter	Symbol	Limit	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous @ $T_C = 25^\circ\text{C}$ @ $T_C = 100^\circ\text{C}$	$I_D$	47	A
		33	A
Drain Current-Pulsed <sup>a</sup>	$I_{DM}$	188	A
Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$ - Derate above $25^\circ\text{C}$	$P_D$	48	W
		0.32	W/ $^\circ\text{C}$
Operating and Store Temperature Range	$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$

### Thermal Characteristics

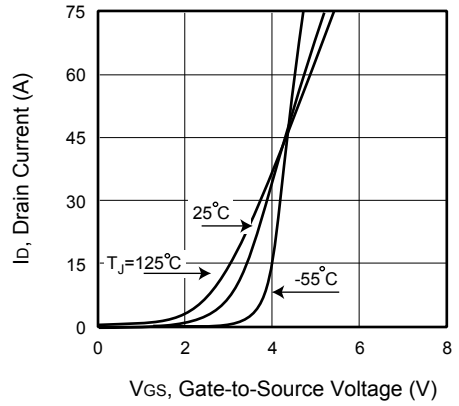
Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.1	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

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

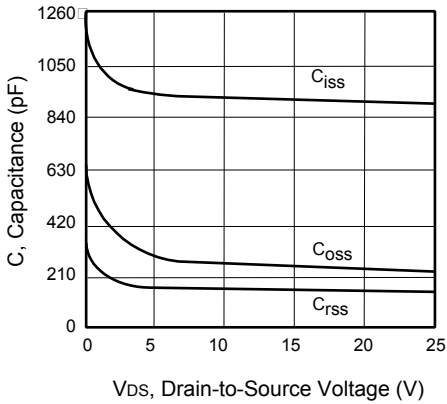
Parameter	Symbol	Test Condition	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	30			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30V, V_{GS} = 0V$			1	$\mu A$
Gate Body Leakage Current, Forward	$I_{GSSF}$	$V_{GS} = 20V, V_{DS} = 0V$			100	nA
Gate Body Leakage Current, Reverse	$I_{GSSR}$	$V_{GS} = -20V, V_{DS} = 0V$			-100	nA
<b>On Characteristics <sup>c</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	1		3	V
Static Drain-Source	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 23A$		9	12	$m\Omega$
On-Resistance		$V_{GS} = 4.5V, I_D = 11A$		16	21	$m\Omega$
<b>Dynamic Characteristics <sup>d</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 15V, V_{GS} = 0V,$ $f = 1.0\text{ MHz}$		895		pF
Output Capacitance	$C_{oss}$			215		pF
Reverse Transfer Capacitance	$C_{rss}$			160		pF
<b>Switching Characteristics <sup>d</sup></b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15V, I_D = 10A, \square$ $V_{GS} = 10V, R_{GEN} = 3\Omega$		11	22	ns
Turn-On Rise Time	$t_r$			7	14	ns
Turn-Off Delay Time	$t_{d(off)}$			31	62	ns
Turn-Off Fall Time	$t_f$			5	10	ns
Total Gate Charge	$Q_g$	$V_{DS} = 15V, I_D = 10A,$ $V_{GS} = 10V$		21	27	nC
Gate-Source Charge	$Q_{gs}$			2		nC
Gate-Drain Charge	$Q_{gd}$			6		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Current <sup>b</sup>	$I_S$				40	A
Drain-Source Diode Forward Voltage <sup>c</sup>	$V_{SD}$	$V_{GS} = 0V, I_S = 40A$			1.2	V
<b>Notes :</b> <input type="checkbox"/> a.Repetitive Rating : Pulse width limited by maximum junction temperature. <input type="checkbox"/> b.Surface Mounted on FR4 Board, $t \leq 10\text{ sec.}$ <input type="checkbox"/> c.Pulse Test : Pulse Width $\leq 300\mu s,$ Duty Cycle $\leq 2\%.$ <input type="checkbox"/> d.Guaranteed by design, not subject to production testing. <input type="checkbox"/>						



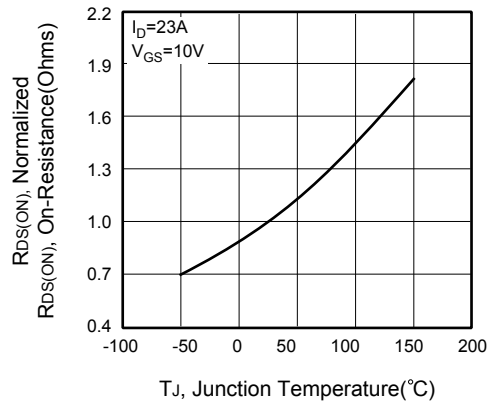
**Figure 1. Output Characteristics**



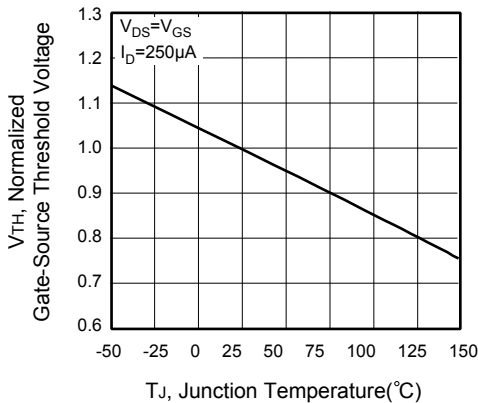
**Figure 2. Transfer Characteristics**



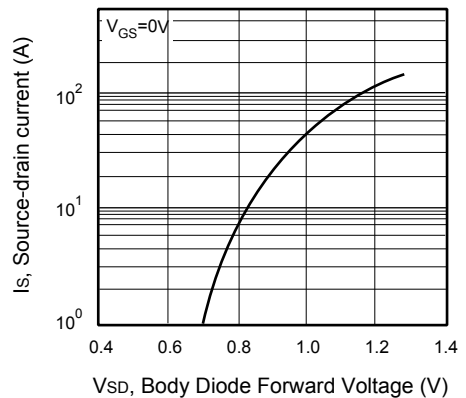
**Figure 3. Capacitance**



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



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



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

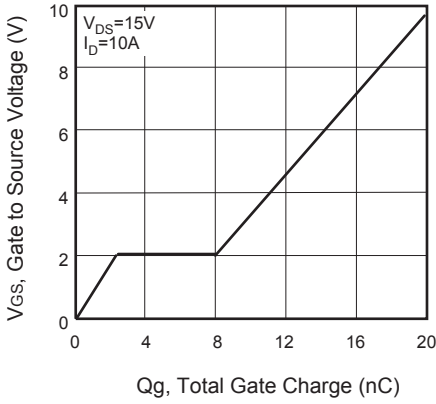


Figure 7. Gate Charge

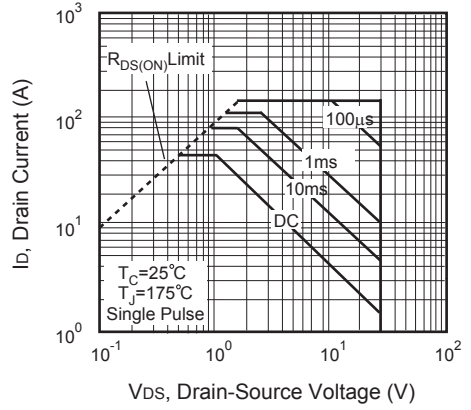


Figure 8. Maximum Safe Operating Area

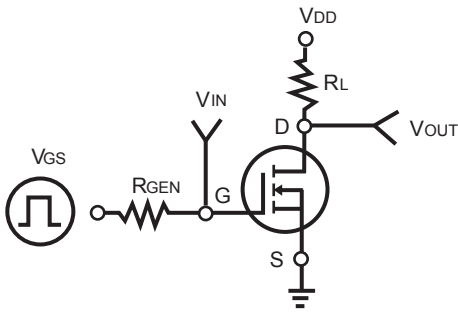


Figure 9. Switching Test Circuit



Figure 10. Switching Waveforms

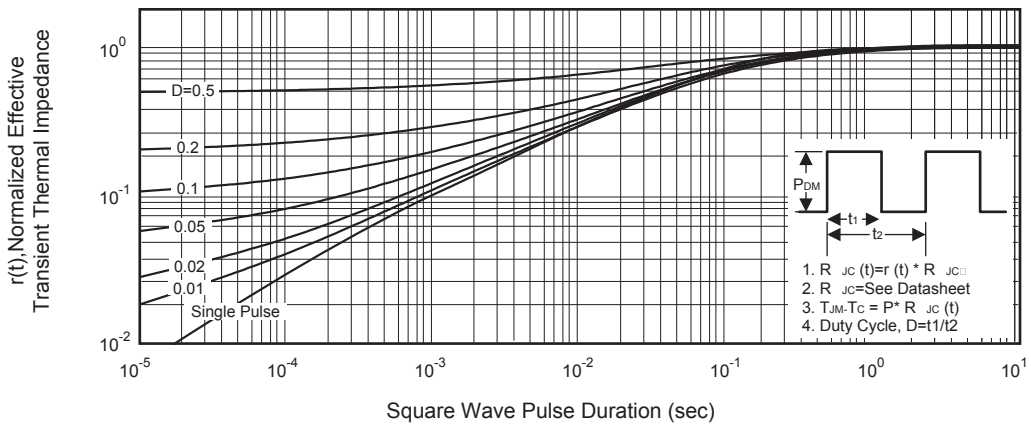


Figure 11. Normalized Thermal Transient Impedance Curve