

## Dual N-Channel Enhancement Mode Field Effect Transistor

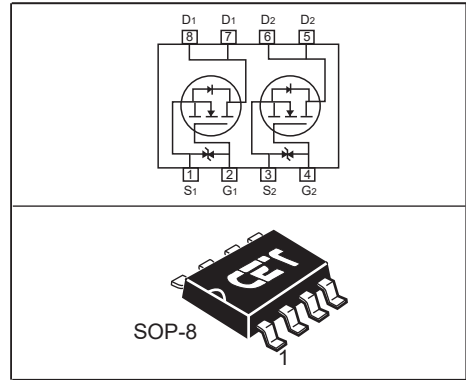
### FEATURES

- High power and current handing capability.
- Reliable and rugged.
- Pb-free lead plating ; RoHS compliant.
- Halogen Free.
- Surface mount Package.

### APPLICATIONS

- Battery protection.
- Power Bank.
- Battery Management System .

$V_{DSS}$	$R_{DS(ON)}$ typ @ $V_{GS}$	$I_D$
20V	10.1m $\Omega$ @ $V_{GS} = 10V$	10A
20V	11.1m $\Omega$ @ $V_{GS} = 4.5V$	9.3A
20V	14m $\Omega$ @ $V_{GS} = 2.5V$	8.0A
20V	20m $\Omega$ @ $V_{GS} = 1.8V$	6.7A



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



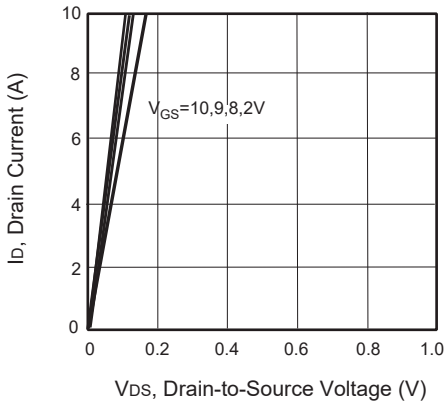
Parameter	Symbol	Limit	Units
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous@ $T_A = 25^\circ\text{C}$ @ $T_A = 70^\circ\text{C}$	$I_D$	10	A
		7.8	A
Drain Current-Pulsed <sup>a</sup>	$I_{DM}$	40	A
Maximum Power Dissipation	$P_D$	2	W
Operating and Store Temperature Range	$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

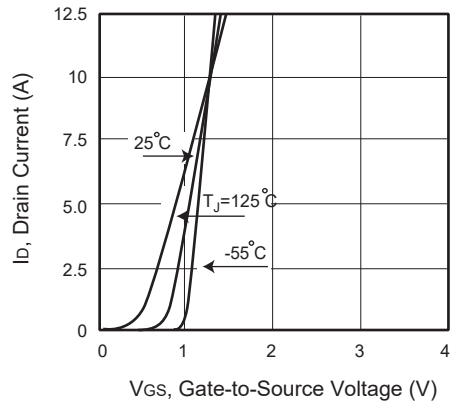
Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

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

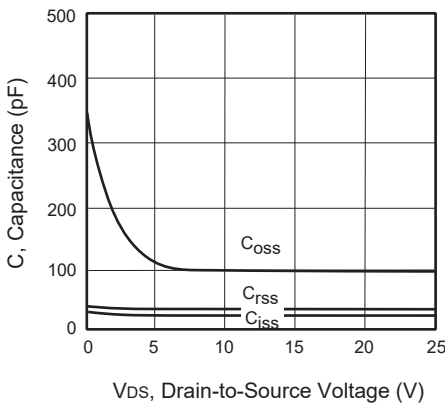
Parameter	Symbol	Test Condition	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20V, V_{GS} = 0V$			1	$\mu A$
Gate Body Leakage Current, Forward	$I_{GSSF}$	$V_{GS} = 12V, V_{DS} = 0V$			10	$\mu A$
Gate Body Leakage Current, Reverse	$I_{GSSR}$	$V_{GS} = -12V, V_{DS} = 0V$			-10	$\mu A$
<b>On Characteristics<sup>b</sup></b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	0.4		1	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 6A$		10.1	13.0	$m\Omega$
		$V_{GS} = 4.5V, I_D = 3A$		11.1	14.4	$m\Omega$
		$V_{GS} = 2.5V, I_D = 2A$		14.0	19.6	$m\Omega$
		$V_{GS} = 1.8V, I_D = 1A$		20.0	28.0	$m\Omega$
<b>Dynamic Characteristics<sup>c</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 10V, V_{GS} = 0V,$ $f = 1.0\text{ MHz}$		15		pF
Output Capacitance	$C_{oss}$			100		pF
Reverse Transfer Capacitance	$C_{rss}$			20		pF
<b>Switching Characteristics<sup>c</sup></b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10V, I_D = 1A,$ $V_{GS} = 10V, R_{GEN} = 3\Omega$		3.4		$\mu s$
Turn-On Rise Time	$t_r$			8.1		$\mu s$
Turn-Off Delay Time	$t_{d(off)}$			52		$\mu s$
Turn-Off Fall Time	$t_f$			66		$\mu s$
Total Gate Charge	$Q_g$	$V_{DS} = 10V, I_D = 8A,$ $V_{GS} = 4.5V$		10		nC
Gate-Source Charge	$Q_{gs}$			1.6		nC
Gate-Drain Charge	$Q_{gd}$			3.4		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Current	$I_S$				1.6	A
Drain-Source Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$V_{GS} = 0V, I_S = 1.5A$			1.2	V
<b>Notes :</b> a. Repetitive Rating : Pulse width limited by maximum junction temperature b. Pulse Test : Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$ . c. Guaranteed by design, not subject to production testing.						



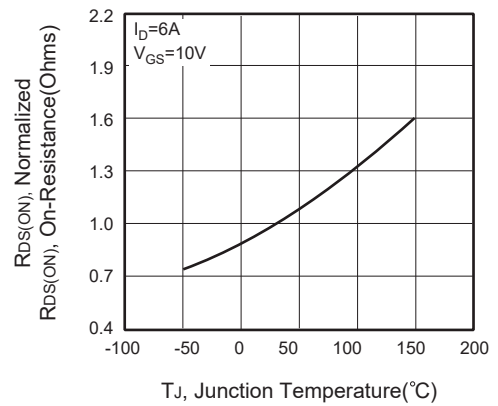
**Figure 1. Output Characteristics**



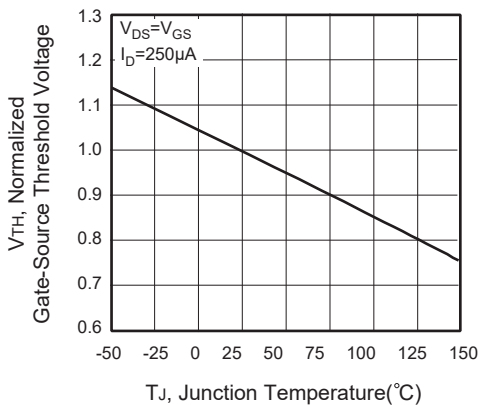
**Figure 2. Transfer Characteristics**



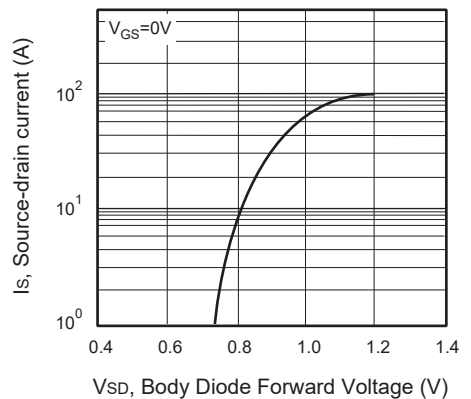
**Figure 3. Capacitance**



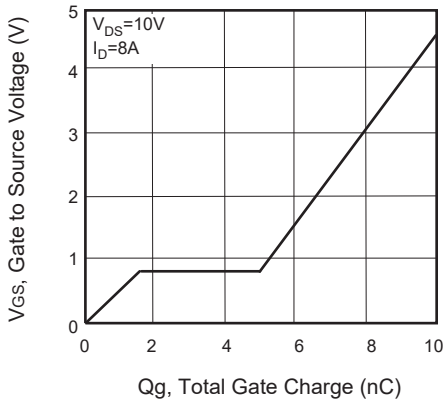
**Figure 4. On-Resistance Variation with Temperature**



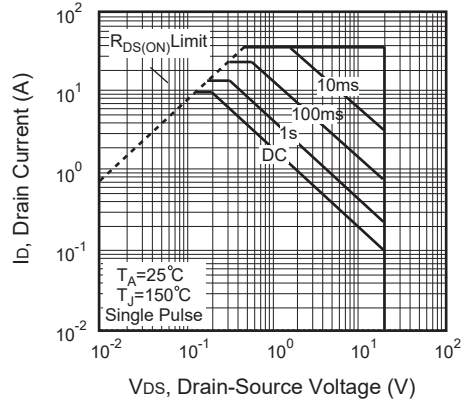
**Figure 5. Gate Threshold Variation with Temperature**



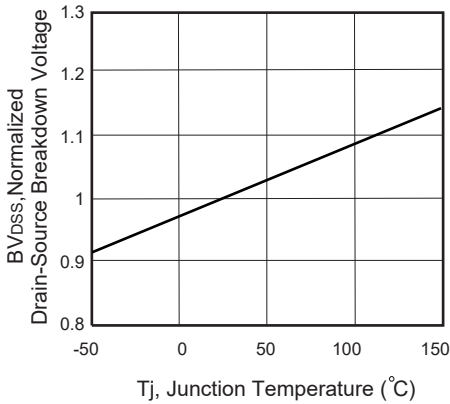
**Figure 6. Body Diode Forward Voltage Variation with Source Current**



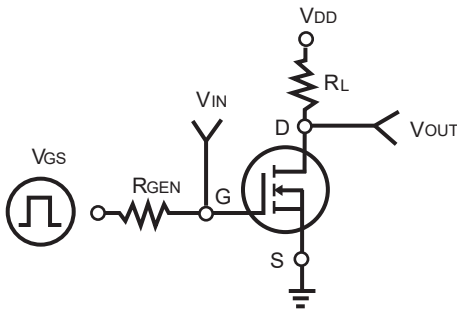
**Figure 7. Gate Charge**



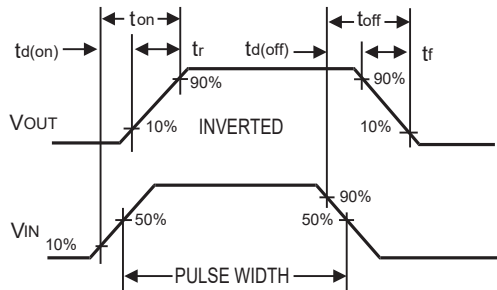
**Figure 8. Maximum Safe Operating Area**



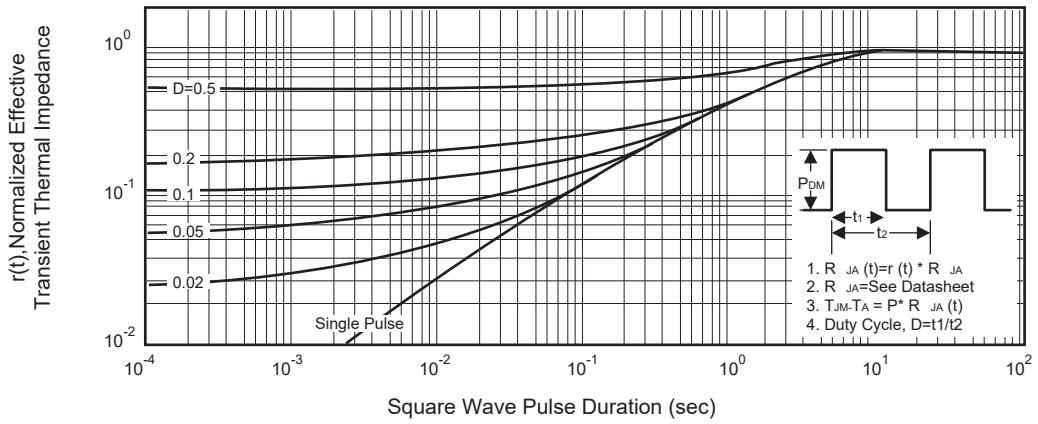
**Figure 9. Breakdown Voltage Variation VS Temperature**



**Figure 10. Switching Test Circuit**



**Figure 11. Switching Waveforms**



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