

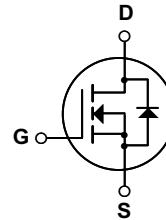
Features

- 6.8A, 200V, $R_{DS(on)} = 0.36\Omega @ V_{GS} = 10\text{ V}$
- Low gate charge (typical 13.5 nC)
- Low Crss (typical 13 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

General Description

These N-Channel enhancement mode power field effect transistors are produced using Kersemi proprietary planar stripe, DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switching DC/DC converters, switch mode power supply, DC-AC converters for uninterrupted power supply, motor control.

TO-220F

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	KSMF10N20	Units
V_{DSS}	Drain-Source Voltage	200	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 100^\circ\text{C}$)	6.8	A
		4.3	A
I_{DM}	Drain Current - Pulsed (Note 1)	27.2	A
V_{GSS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	180	mJ
I_{AR}	Avalanche Current (Note 1)	6.8	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	4.0	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5	V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	40	W
		0.32	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	3.13	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	62.5	$^\circ\text{C}/\text{W}$

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	200	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C	--	0.19	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 160\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	3.0	--	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 3.4\text{ A}$	--	0.28	0.36	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 3.4\text{ A}$ (Note 4)	--	6.7	--	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	510	670	pF
C_{oss}	Output Capacitance		--	95	130	pF
C_{rss}	Reverse Transfer Capacitance		--	13	17	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 100\text{ V}, I_D = 10\text{ A},$ $R_G = 25\ \Omega$	--	13	40	ns	
t_r	Turn-On Rise Time		--	90	190	ns	
$t_{d(off)}$	Turn-Off Delay Time		(Note 4, 5)	--	26	70	ns
t_f	Turn-Off Fall Time		(Note 4, 5)	--	50	110	ns
Q_g	Total Gate Charge	$V_{DS} = 160\text{ V}, I_D = 10\text{ A},$ $V_{GS} = 10\text{ V}$	--	13.5	18	nC	
Q_{gs}	Gate-Source Charge		(Note 4, 5)	--	3.8	--	nC
Q_{gd}	Gate-Drain Charge		(Note 4, 5)	--	5.5	--	nC

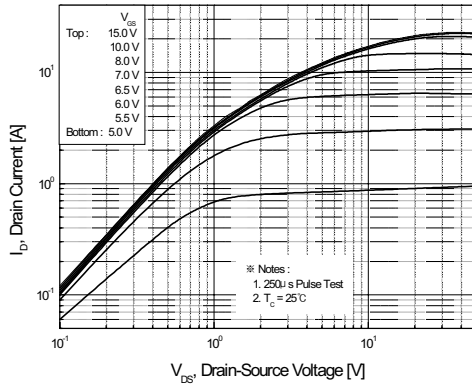
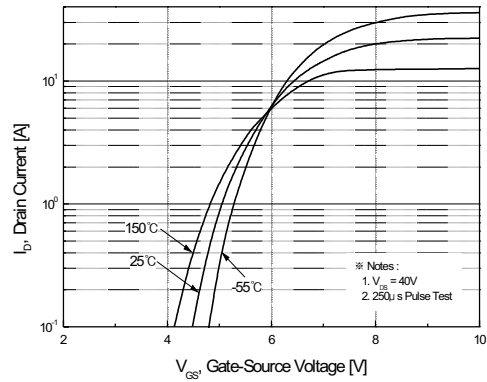
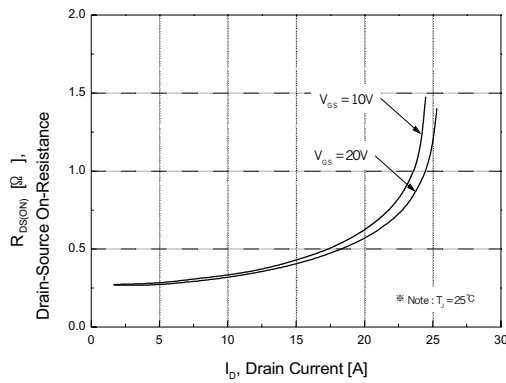
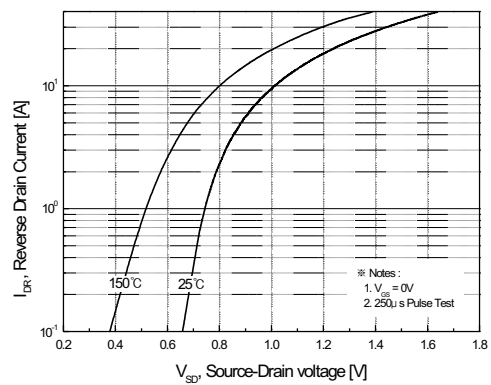
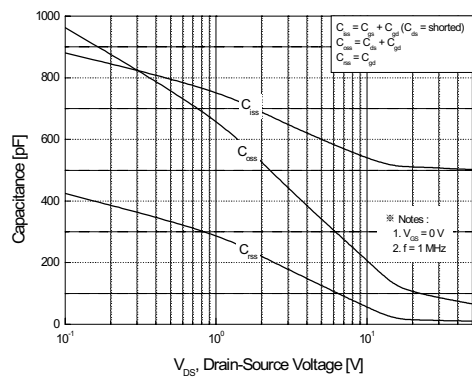
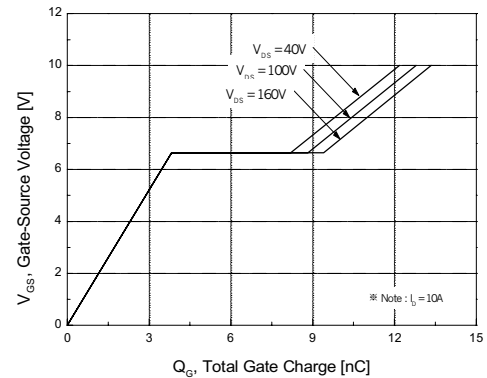
Drain-Source Diode Characteristics and Maximum Ratings

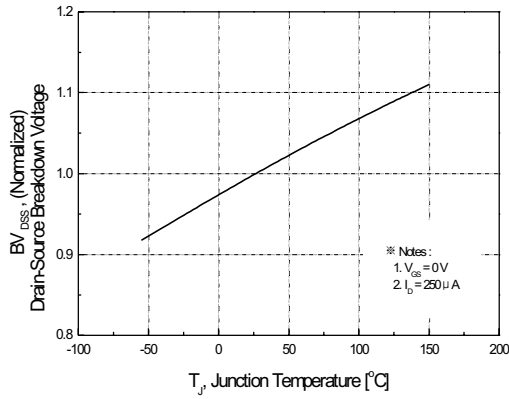
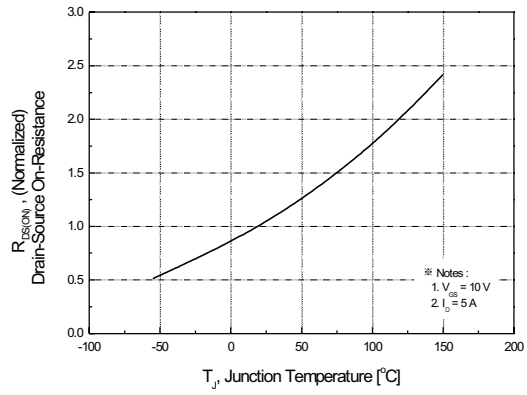
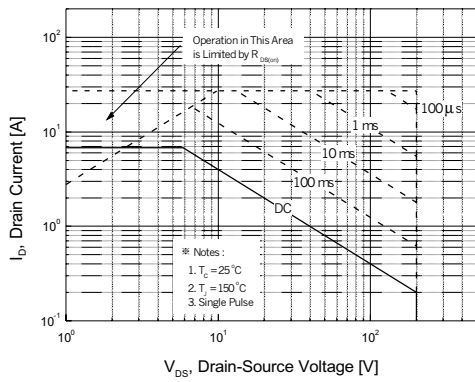
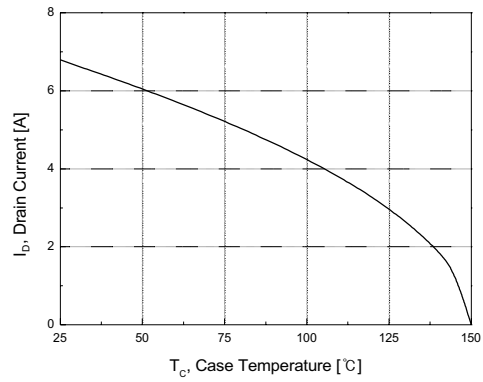
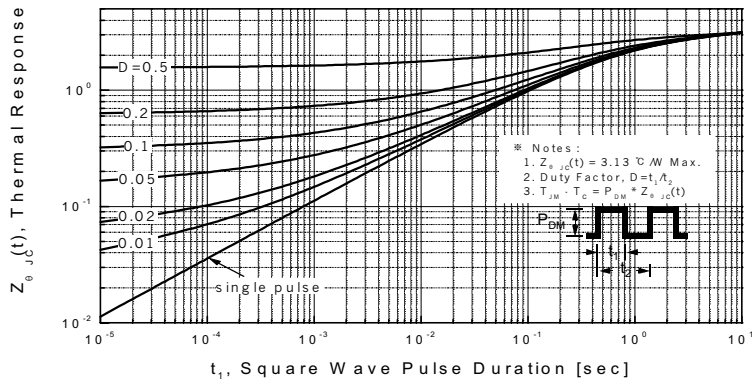
I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	6.8	A	
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	27.2	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 6.8\text{ A}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 10\text{ A},$	--	130	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	0.6	--	μC

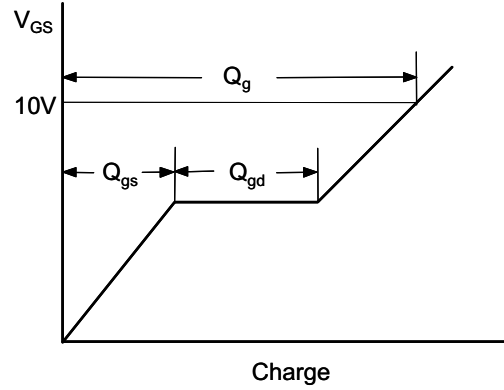
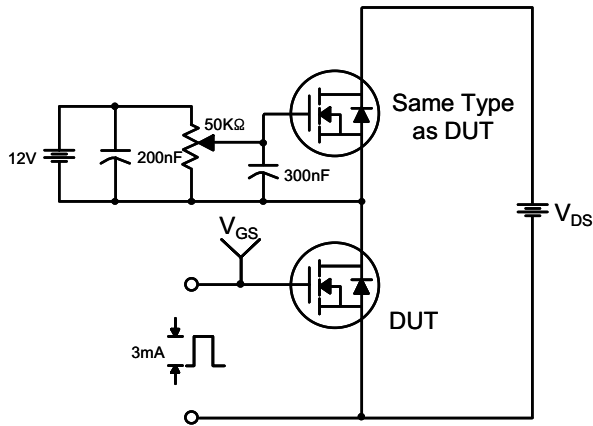
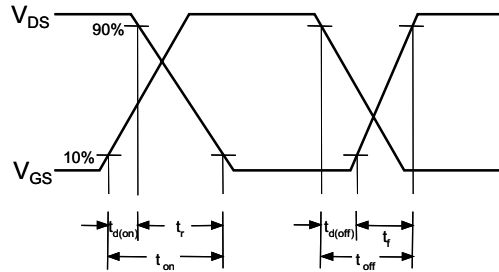
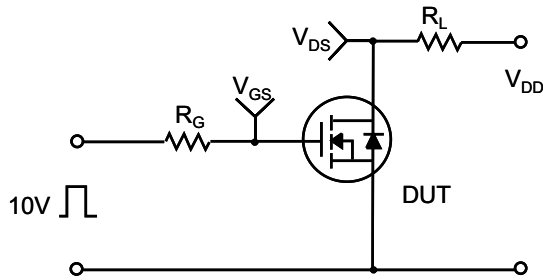
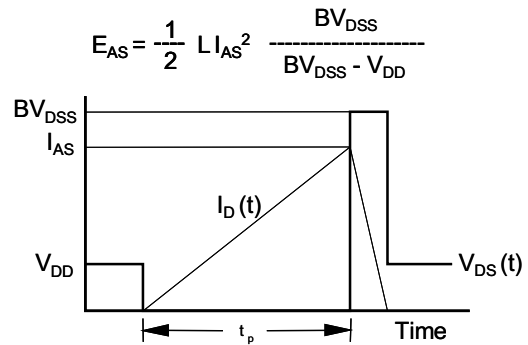
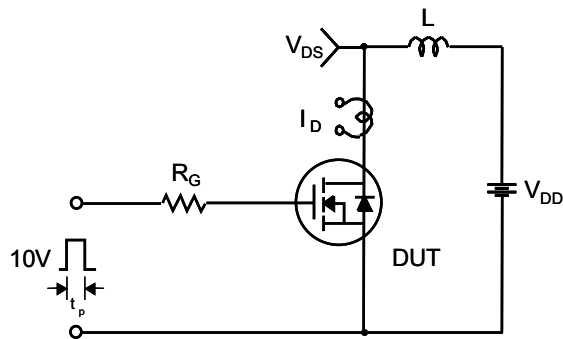
Notes:

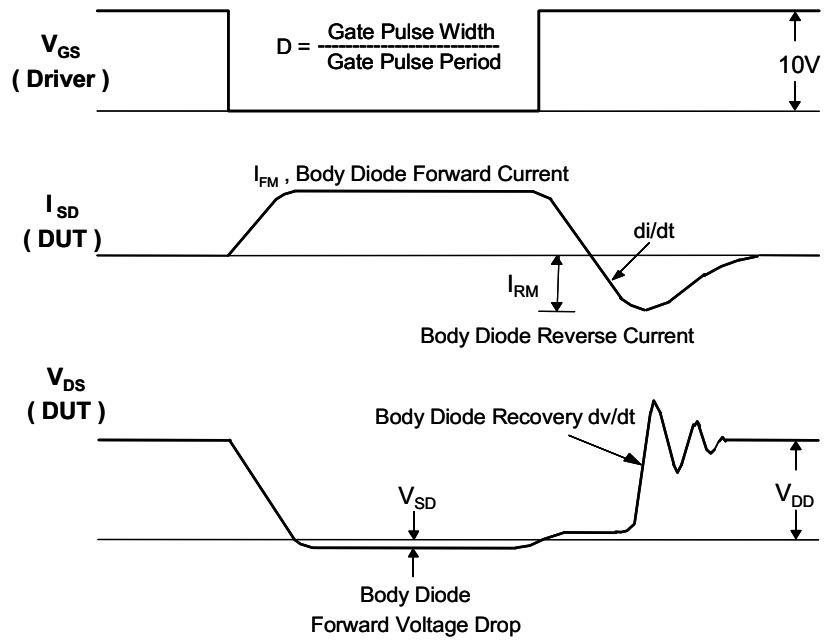
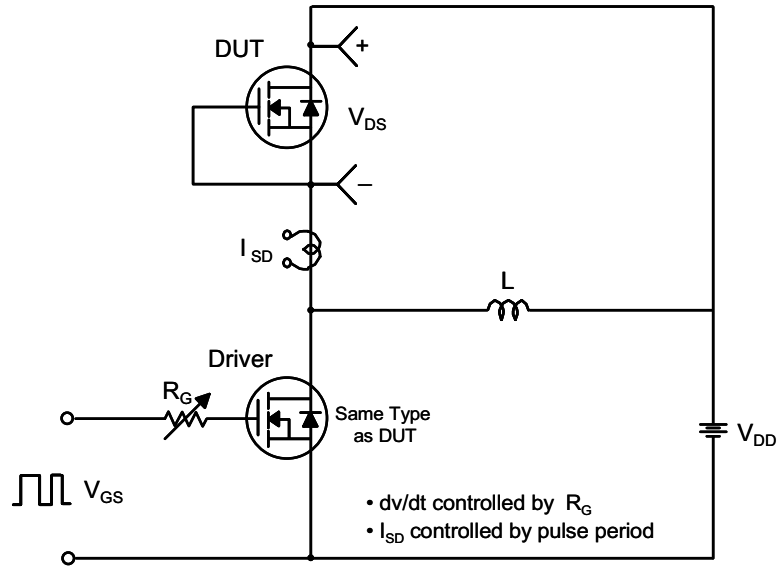
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 5.9\text{ mH}, I_{AS} = 6.8\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 10\text{ A}, di/dt \leq 300\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\ \mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Typical Characteristics


Figure 1. On-Region Characteristics

Figure 2. Transfer Characteristics

Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

Figure 8. On-Resistance Variation vs. Temperature

Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

Figure 11. Transient Thermal Response Curve

Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching Test Circuit & Waveforms


Peak Diode Recovery dv/dt Test Circuit & Waveforms


Package Dimensions
TO-220F

