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Advanced Power MOSFET

SFW/I9640

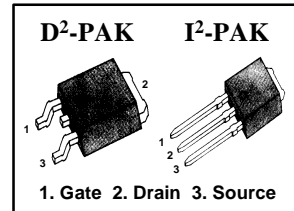
FEATURES

- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 10 μ A (Max.) @ $V_{DS} = -200V$
- Low $R_{DS(ON)}$: 0.344 Ω (Typ.)

$$BV_{DSS} = -200 V$$

$$R_{DS(on)} = 0.5 \Omega$$

$$I_D = -11 A$$



Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
V_{DSS}	Drain-to-Source Voltage	-200	V
I_D	Continuous Drain Current ($T_C=25^\circ C$)	-11	A
	Continuous Drain Current ($T_C=100^\circ C$)	-7.0	
I_{DM}	Drain Current-Pulsed ①	-44	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy ②	807	mJ
I_{AR}	Avalanche Current ①	-11	A
E_{AR}	Repetitive Avalanche Energy ①	12.3	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-5.0	V/ns
P_D	Total Power Dissipation ($T_A=25^\circ C$) *	3.1	W
	Total Power Dissipation ($T_C=25^\circ C$)	123	W
	Linear Derating Factor	0.98	W/ $^\circ C$
T_J, T_{STG}	Operating Junction and Storage Temperature Range	- 55 to +150	$^\circ C$
T_L	Maximum Lead Temp. for Soldering Purposes, 1/8 " from case for 5-seconds	300	

Thermal Resistance

Symbol	Characteristic	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	1.02	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient *	--	40	
$R_{\theta JA}$	Junction-to-Ambient	--	62.5	

* When mounted on the minimum pad size recommended (PCB Mount).

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Electrical Characteristics (T_C=25°C unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
BV _{DSS}	Drain-Source Breakdown Voltage	-200	--	--	V	V _{GS} =0V, I _D =-250μA
ΔBV/ΔT _J	Breakdown Voltage Temp. Coeff.	--	-0.16	--	V/°C	I _D =-250μA See Fig 7
V _{GS(th)}	Gate Threshold Voltage	-2.0	--	-4.0	V	V _{DS} =-5V, I _D =-250μA
I _{GSS}	Gate-Source Leakage, Forward	--	--	-100	nA	V _{GS} =-30V
	Gate-Source Leakage, Reverse	--	--	100		V _{GS} =30V
I _{DSS}	Drain-to-Source Leakage Current	--	--	-10	μA	V _{DS} =-200V
		--	--	-100		V _{DS} =-160V, T _C =125°C
R _{DS(on)}	Static Drain-Source On-State Resistance	--	--	0.5	Ω	V _{GS} =-10V, I _D =-5.5A ④
g _{fs}	Forward Transconductance	--	6.5	--	Ω	V _{DS} =-40V, I _D =-5.5A ④
C _{iss}	Input Capacitance	--	1220	1585	pF	V _{GS} =0V, V _{DS} =-25V, f=1MHz See Fig 5
C _{oss}	Output Capacitance	--	207	310		
C _{rss}	Reverse Transfer Capacitance	--	81	120		
t _{d(on)}	Turn-On Delay Time	--	16	40	ns	V _{DD} =-100V, I _D =-11A, R _G =9.1Ω See Fig 13 ④ ⑤
t _r	Rise Time	--	23	55		
t _{d(off)}	Turn-Off Delay Time	--	54	115		
t _f	Fall Time	--	19	50		
Q _g	Total Gate Charge	--	46	59	nC	V _{DS} =-160V, V _{GS} =-10V, I _D =-11A See Fig 6 & Fig 12 ④ ⑤
Q _{gs}	Gate-Source Charge	--	9.2	--		
Q _{gd}	Gate-Drain(" Miller ") Charge	--	22.9	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I _S	Continuous Source Current	--	--	-11	A	Integral reverse pn-diode in the MOSFET
I _{SM}	Pulsed-Source Current ①	--	--	-44		
V _{SD}	Diode Forward Voltage ④	--	--	-5.0	V	T _J =25°C, I _S =-11A, V _{GS} =0V
t _{rr}	Reverse Recovery Time	--	180	--	ns	T _J =25°C, I _F =-11A
Q _{rr}	Reverse Recovery Charge	--	1.24	--	μC	di _F /dt=100A/μs ④

Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② L=10mH, I_{AS}=-11A, V_{DD}=-50V, R_G=27Ω*, Starting T_J=25°C
- ③ I_{SD} < -11A, di/dt < 450A/μs, V_{DD} < BV_{DSS}, Starting T_J=25°C
- ④ Pulse Test : Pulse Width = 250 μs, Duty Cycle < 2%
- ⑤ Essentially Independent of Operating Temperature

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Fig 1. Output Characteristics

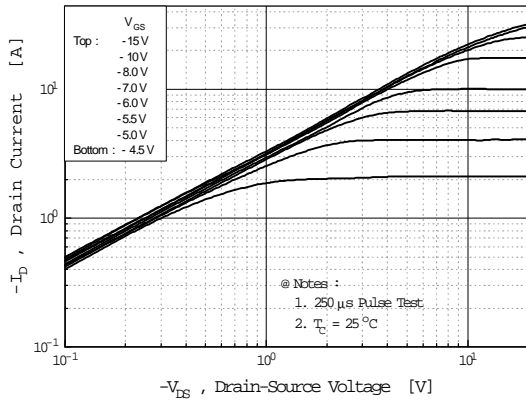


Fig 2. Transfer Characteristics

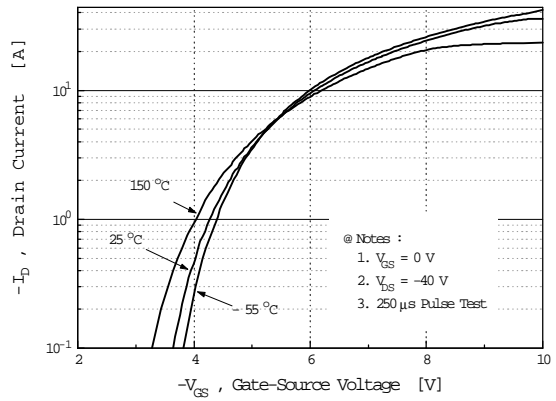


Fig 3. On-Resistance vs. Drain Current

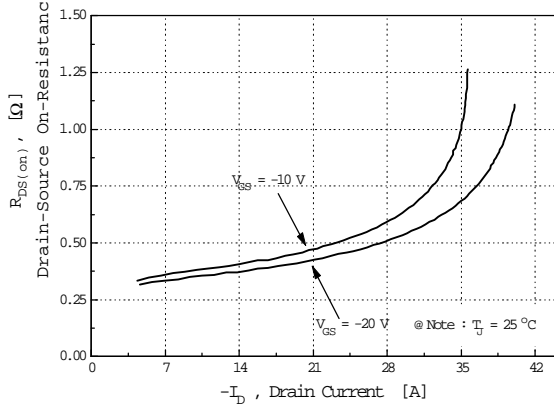


Fig 4. Source-Drain Diode Forward Voltage

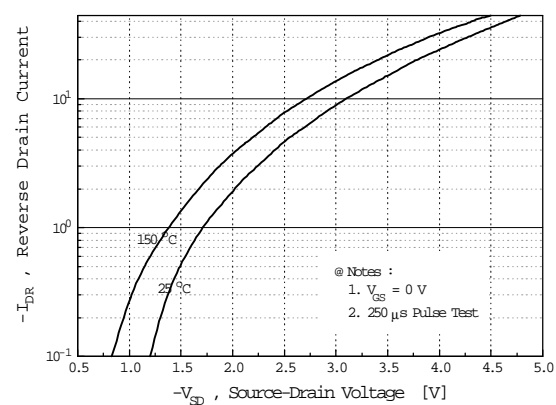


Fig 5. Capacitance vs. Drain-Source Voltage

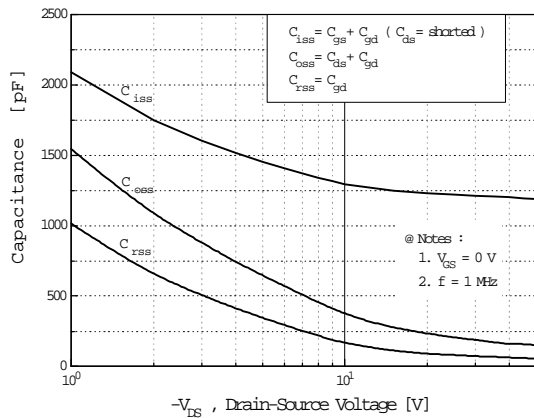
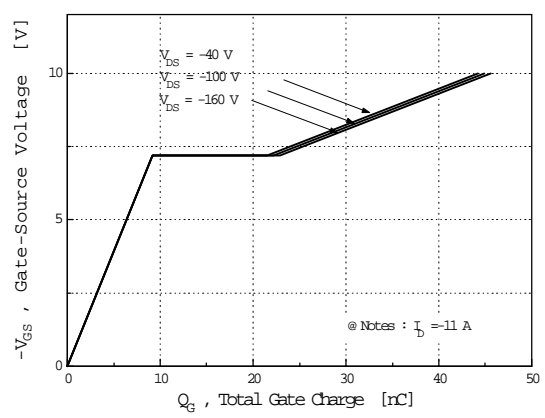


Fig 6. Gate Charge vs. Gate-Source Voltage



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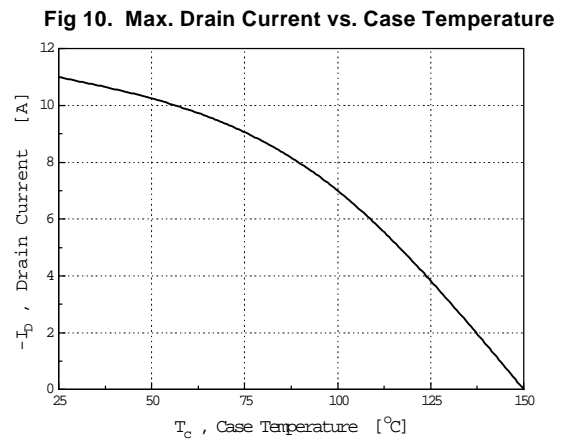
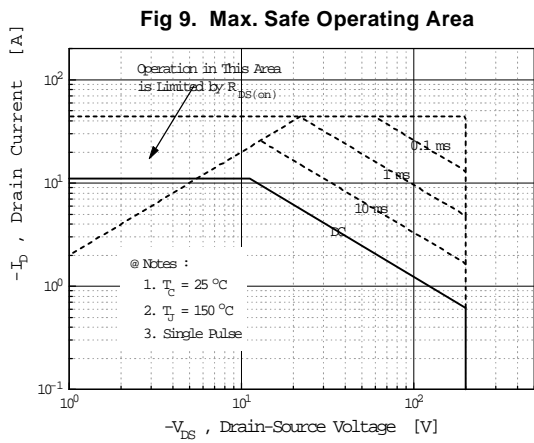
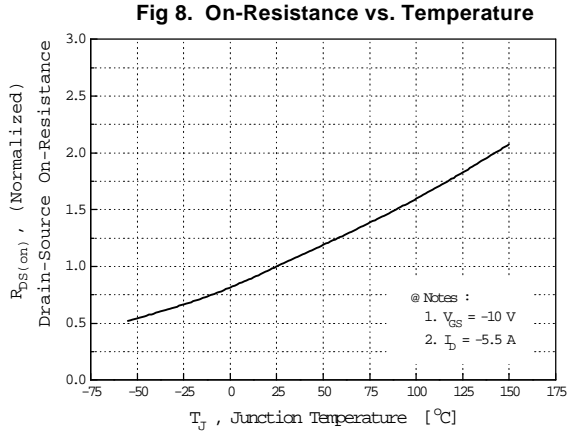
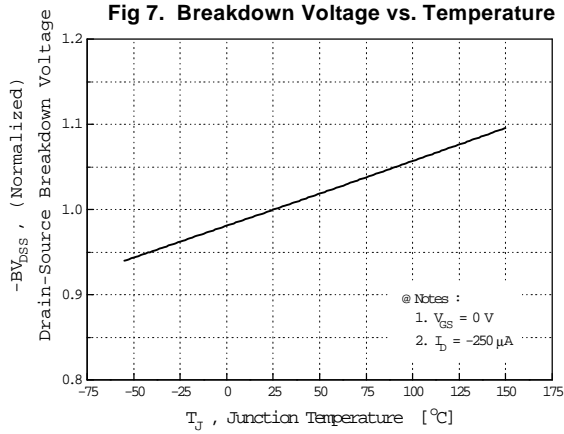
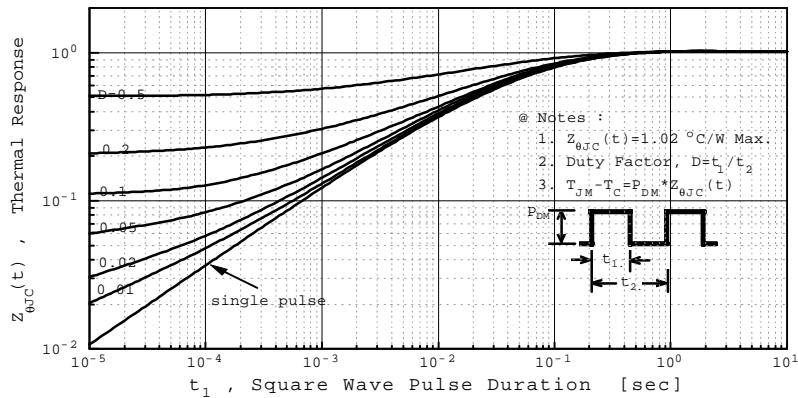


Fig 11. Thermal Response



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Fig 12. Gate Charge Test Circuit & Waveform

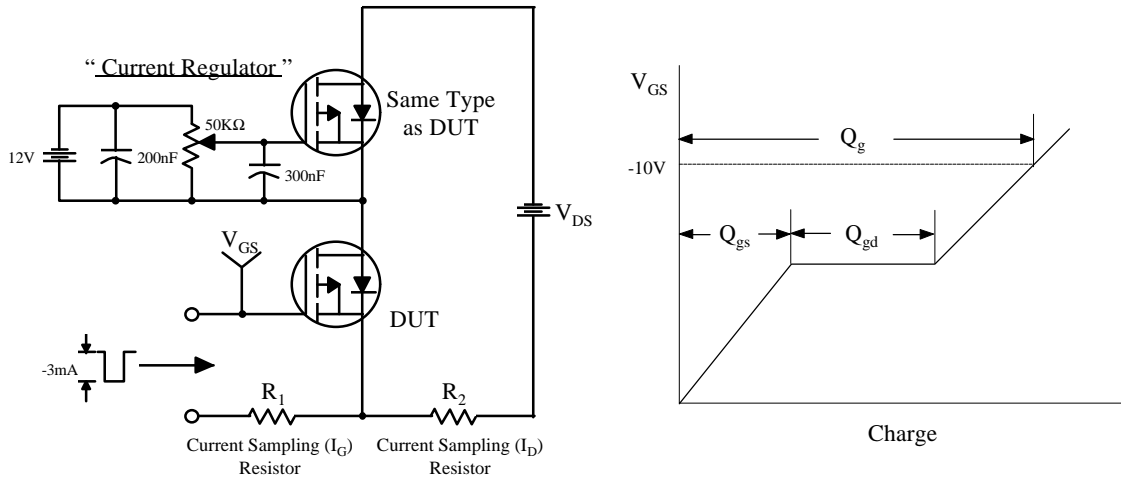


Fig 13. Resistive Switching Test Circuit & Waveforms

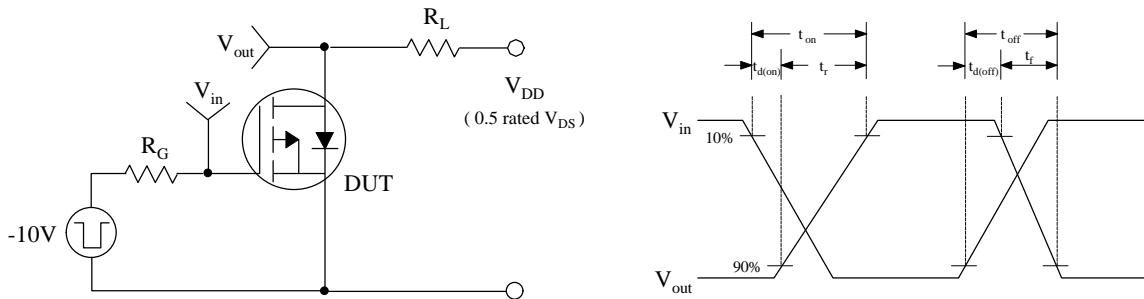
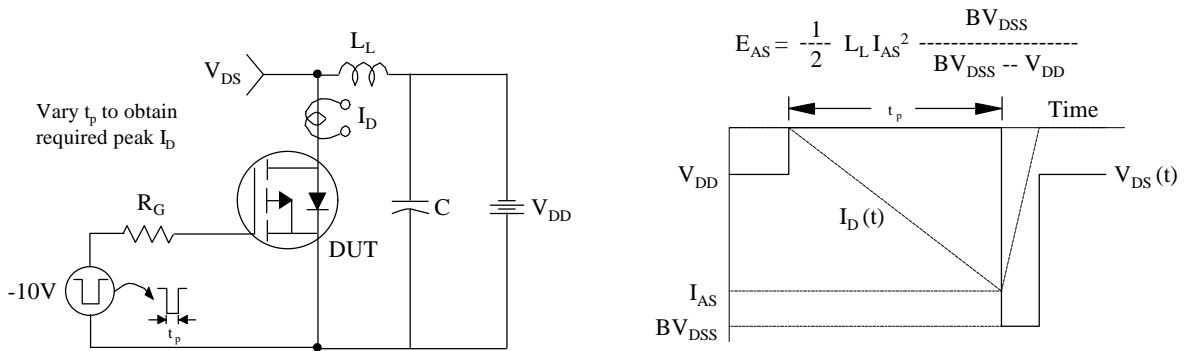


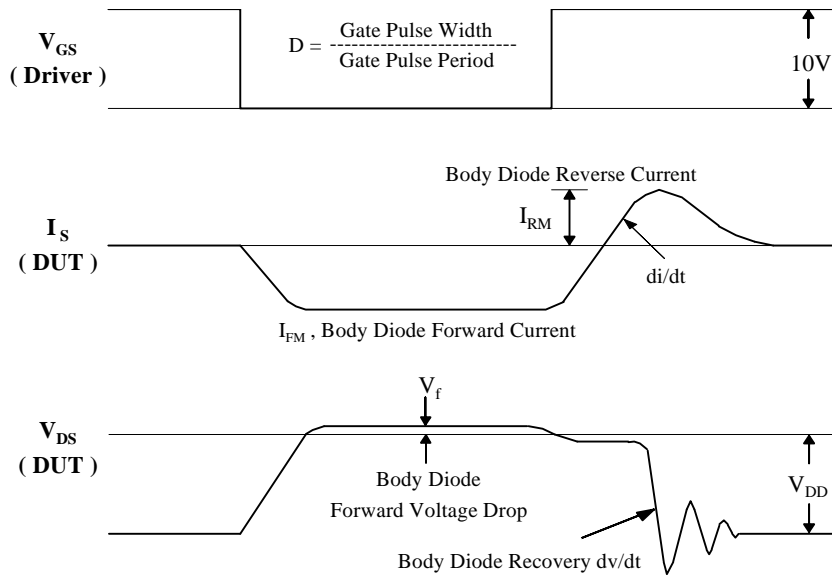
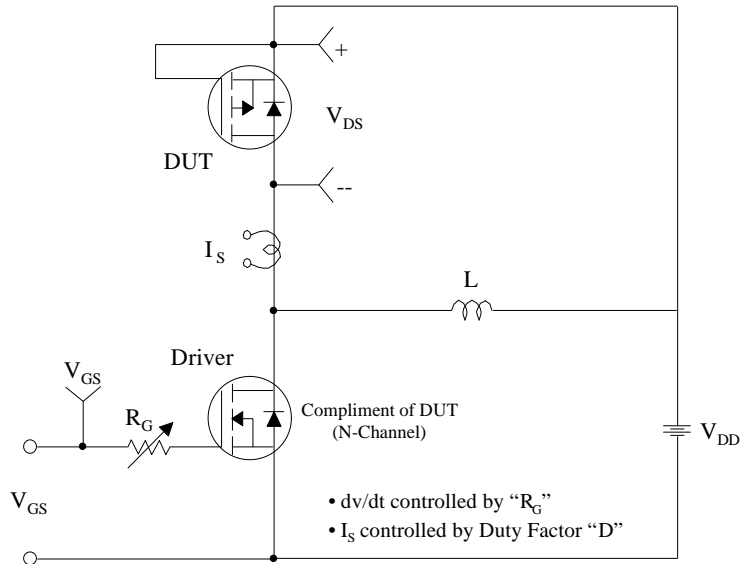
Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms



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Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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