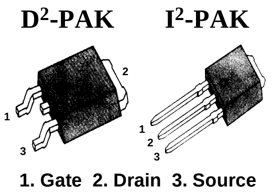
Advanced Power MOSFET

SFW/I9530

BV_{DSS} = -100 V

$R_{DS(on)}$ = 0.3Ω

I_D = -10.5 A



FEATURES

- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- 175°C Operating Temperature
- Lower Leakage Current : 10 μA (Max.) @ V_{DS} = -100V
- Low $R_{DS(ON)}$: 0.225 Ω (Typ.)

Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
V_{DSS}	Drain-to-Source Voltage	-100	V
I_D	Continuous Drain Current (T_C=25°C)	-10.5	A
	Continuous Drain Current (T_C=100°C)	-7.5	
I_{DM}	Drain Current-Pulsed ①	-42	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ②	368	mJ
I_{AR}	Avalanche Current ①	-10.5	A
E_{AR}	Repetitive Avalanche Energy ①	6.6	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-6.5	V/ns
P_D	Total Power Dissipation (T_A=25°C) *	3.8	W
	Total Power Dissipation (T_C=25°C)	66	W
	Linear Derating Factor	0.44	W/°C
T_J , T_{STG}	Operating Junction and Storage Temperature Range	- 55 to +175	°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	--	2.27	°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).

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

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
BV_{DSS}	Drain-Source Breakdown Voltage	-100	--	--	V	V_{GS}=0V,I_D=-250μA
$\Delta BV/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	-0.1	--	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}=-20V
	Gate-Source Leakage , Reverse	--	--	100		V_{GS}=20V
I_{DSS}	Drain-to-Source Leakage Current	--	--	-10	μA	V_{DS}=-100V
		--	--	-100		V_{DS}=-80V,T_C=150°C
$R_{DS(on)}$	Static Drain-Source On-State Resistance	--	--	0.3	Ω	V_{GS}=-10V,I_D=-5.3A ④
g_{fs}	Forward Transconductance	--	5.5	--	℧	V_{DS}=-40V,I_D=-5.3A ④
C_{iss}	Input Capacitance	--	800	1035	pF	V_{GS}=0V,V_{DS}=-25V,f =1MHz ***See Fig 5***
C_{oss}	Output Capacitance	--	160	240		
C_{rss}	Reverse Transfer Capacitance	--	60	90		
$t_{d(on)}$	Turn-On Delay Time	--	13	35	ns	V_{DD}=-50V,I_D=-10.5A, R_G=12 Ω ***See Fig 13*** ④⑤
t_r	Rise Time	--	22	55		
$t_{d(off)}$	Turn-Off Delay Time	--	45	100		
t_f	Fall Time	--	25	60		
Q_g	Total Gate Charge	--	30	38	nC	V_{DS}=-80V,V_{GS}=-10V, I_D=-10.5A ***See Fig 6 & Fig 12*** ④⑤
Q_{gs}	Gate-Source Charge	--	5.4	--		
Q_{gd}	Gate-Drain("Miller") Charge	--	12.2	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I_S	Continuous Source Current	--	--	-10.5	A	Integral reverse pn-diode in the MOSFET
I_{SM}	Pulsed-Source Current ①	--	--	-42		
V_{SD}	Diode Forward Voltage ④	--	--	-4.0	V	T_J=25°C,I_S=-10.5A,V_{GS}=0V
t_{rr}	Reverse Recovery Time	--	120	--	ns	T_J=25°C,I_F=-10.5A di_F/dt=100A/μs ④
Q_{rr}	Reverse Recovery Charge	--	0.53	--	μC	

Notes ;

① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
② L=5.0mH, I_{AS}=-10.5A, V_{DD}=-25V, R_G=27Ω*, Starting T_J=25°C
③ $I_{SD} \leq$-10.5A, di/dt $\leq$400A/μs, $V_{DD} \leq BV_{DSS}$, Starting T_J=25°C
④ Pulse Test : Pulse Width = 250 μs, Duty Cycle $\leq$2%
⑤ Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

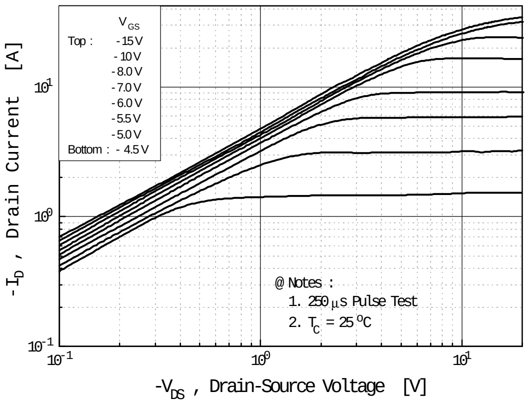


Fig 2. Transfer Characteristics

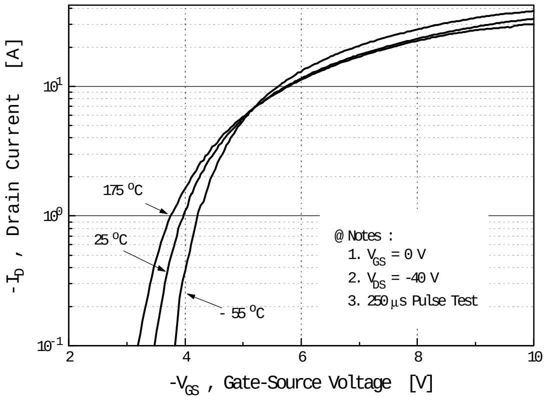


Fig 3. On-Resistance vs. Drain Current

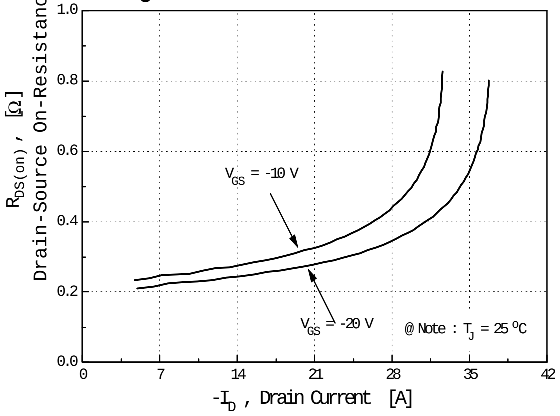


Fig 4. Source-Drain Diode Forward Voltage

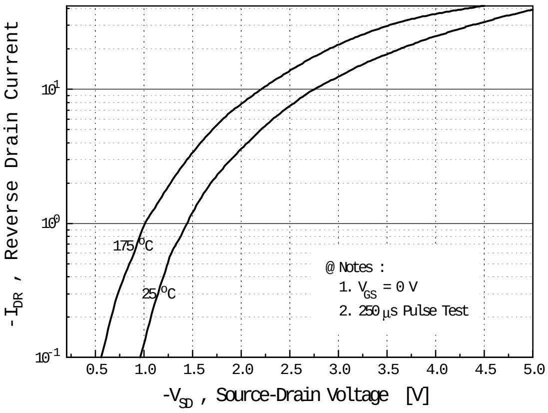


Fig 5. Capacitance vs. Drain-Source Voltage

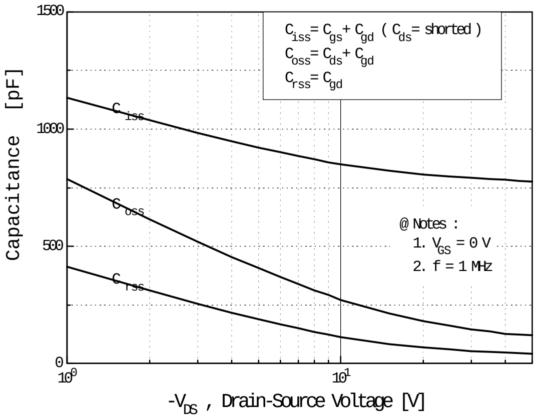
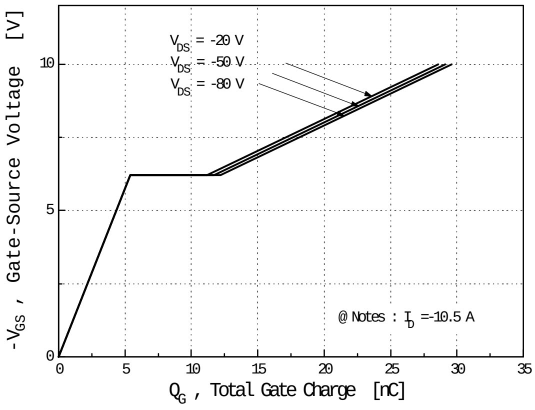


Fig 6. Gate Charge vs. Gate-Source Voltage



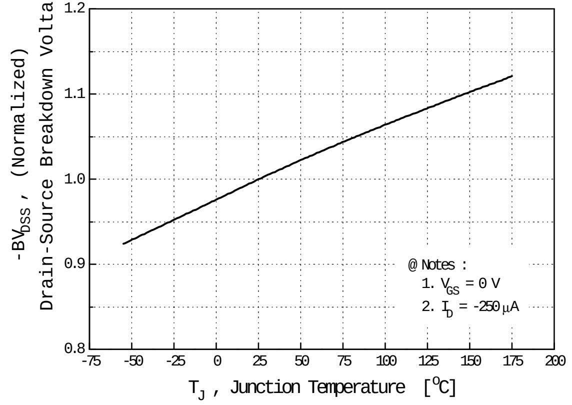


Fig 7. Breakdown Voltage vs. Temperature

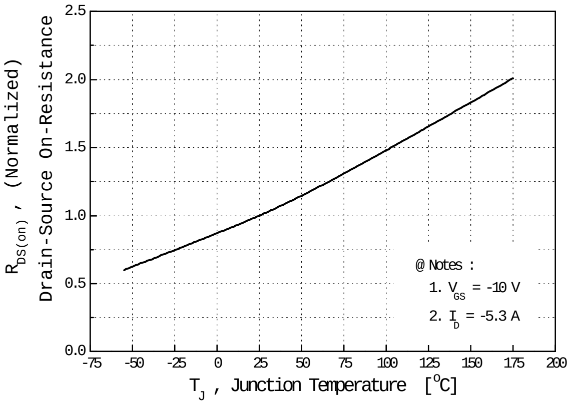


Fig 8. On-Resistance vs. Temperature

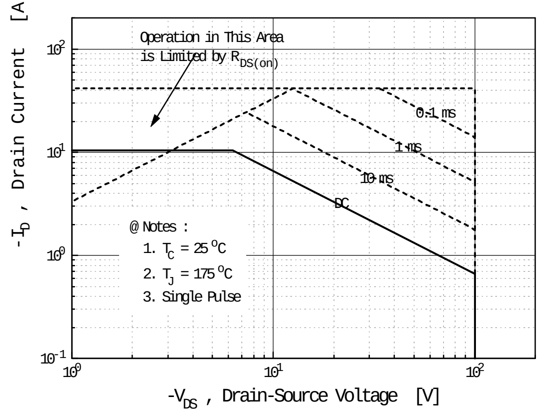


Fig 9. Max. Safe Operating Area

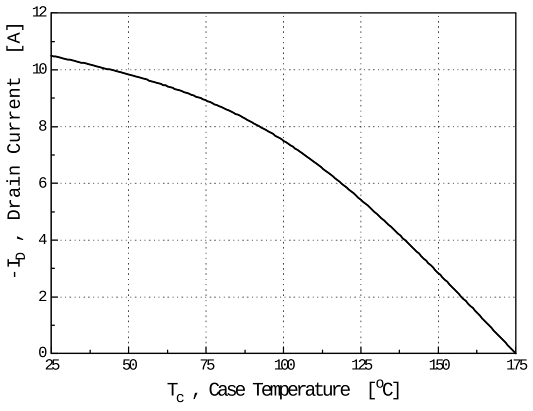


Fig 10. Max. Drain Current vs. Case Temperature

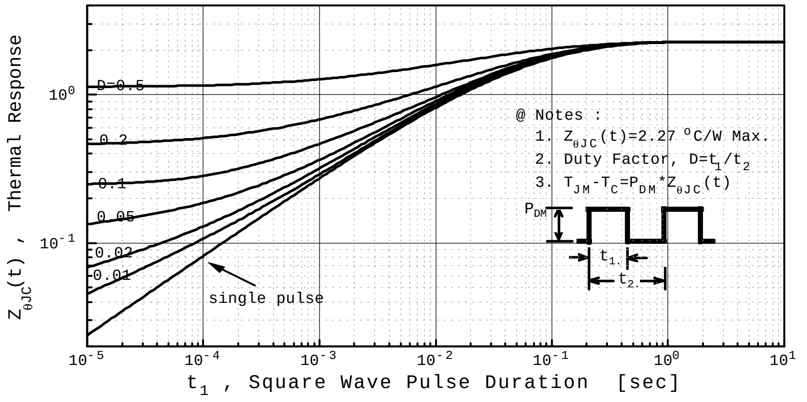


Fig 11. Thermal Response

Fig 12. Gate Charge Test Circuit & Waveform

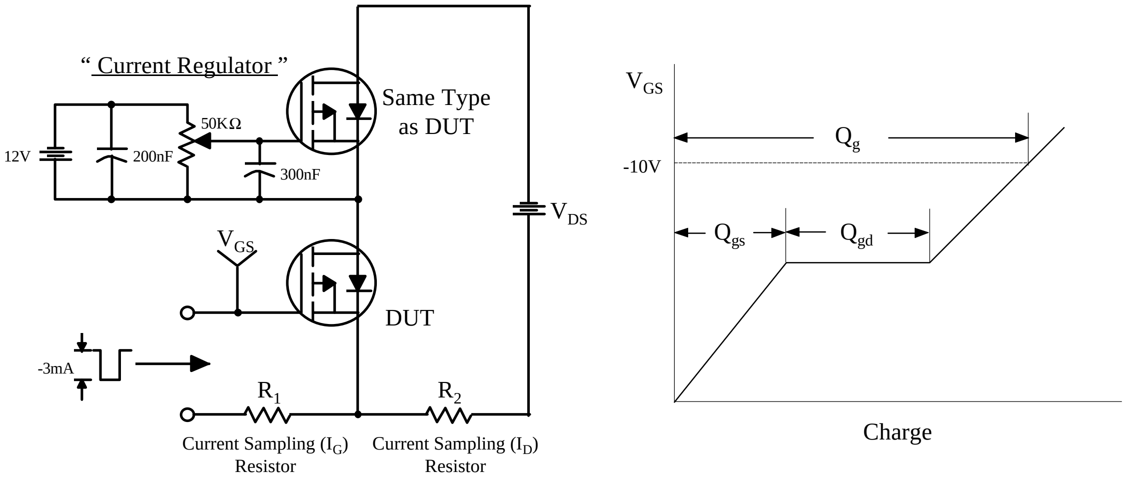


Fig 13. Resistive Switching Test Circuit & Waveforms

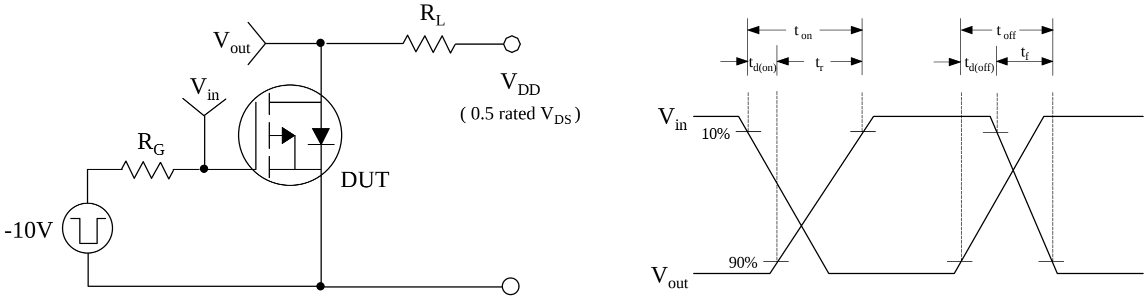


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

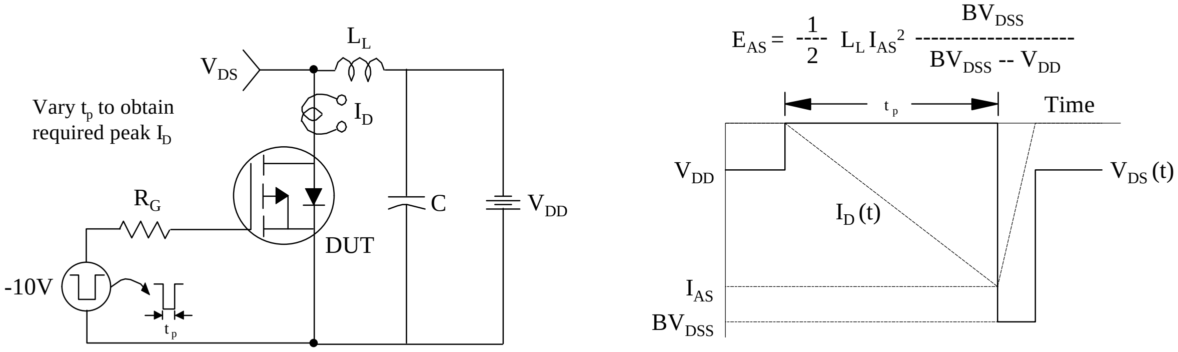


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms