

Advanced Power MOSFET

SFH9140

FEATURES

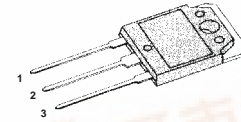
- v Avalanche Rugged Technology
- v Rugged Gate Oxide Technology
- v Lower Input Capacitance
- v Improved Gate Charge
- v Extended Safe Operating Area
- v 175°C Operating Temperature
- v Lower Leakage Current : 10 μA (Max.) @ $V_{DS} = -100V$
- v Lower $R_{DS(ON)}$: 0.161 Ω (Typ.)

$$BV_{DSS} = -100 V$$

$$R_{DS(on)} = 0.2 \Omega$$

$$I_D = -19 A$$

TO-3P



1.Gate 2. Drain 3. Source

Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
V_{DSS}	Drain-to-Source Voltage	-100	V
I_D	Continuous Drain Current ($T_C=25^\circ C$)	-19	A
	Continuous Drain Current ($T_C=100^\circ C$)	-13.3	
I_{DM}	Drain Current-Pulsed ①	-76	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ②	600	mJ
I_{AR}	Avalanche Current ①	-19	A
E_{AR}	Repetitive Avalanche Energy ①	16.6	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-6.5	V/ns
P_D	Total Power Dissipation ($T_C=25^\circ C$)	166	W
	Linear Derating Factor	1.11	
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	--	0.9	°C/W
$R_{\theta CS}$	Case-to-Sink	0.24	--	
$R_{\theta JA}$	Junction-to-Ambient	--	40	

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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	-100	--	--	V	V _{GS} =0V, I _D =-250μA
ΔBV/ΔT _J	Breakdown Voltage Temp. Coeff.	--	-0.11	--	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	--	--	0.2	Ω	V _{GS} =-10V, I _D =-9.5A ④
g _{fs}	Forward Transconductance	--	9.7	--	Ω	V _{DS} =-40V, I _D =-9.5A ④
C _{iss}	Input Capacitance	--	1180	1535	pF	V _{GS} =0V, V _{DS} =-25V, f =1MHz See Fig 5
C _{oss}	Output Capacitance	--	240	360		
C _{rss}	Reverse Transfer Capacitance	--	83	125		
t _{d(on)}	Turn-On Delay Time	--	14	40	ns	V _{DD} =-50V, I _D =-17A, 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	--	26	60		
Q _g	Total Gate Charge	--	43	54	nC	V _{DS} =-80V, V _{GS} =-10V, I _D =-17A See Fig 6 & Fig 12 ④⑤
Q _{gs}	Gate-Source Charge	--	7.4	--		
Q _{gd}	Gate-Drain(" Miller ") Charge	--	17.8	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I _S	Continuous Source Current	--	--	-19	A	Integral reverse pn-diode in the MOSFET
I _{SM}	Pulsed-Source Current ①	--	--	-76		
V _{SD}	Diode Forward Voltage ④	--	--	-4.0	V	T _J =25°C, I _S =-19A, V _{GS} =0V
t _{rr}	Reverse Recovery Time	--	135	--	ns	T _J =25°C, I _F =-17A
Q _{rr}	Reverse Recovery Charge	--	0.7	--	μC	di _F /dt=100A/μs ④

Notes :

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② L=2.5mH, I_{AS}=-19A, V_{DD}=-25V, R_G=27Ω*, Starting T_J=25°C
- ③ I_{SD} ≤ -17A, di/dt ≤ 450A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J=25°C
- ④ Pulse Test : Pulse Width = 250μs, Duty Cycle ≤ 2%
- ⑤ Essentially Independent of Operating Temperature

Fig 1. Output Characteristics

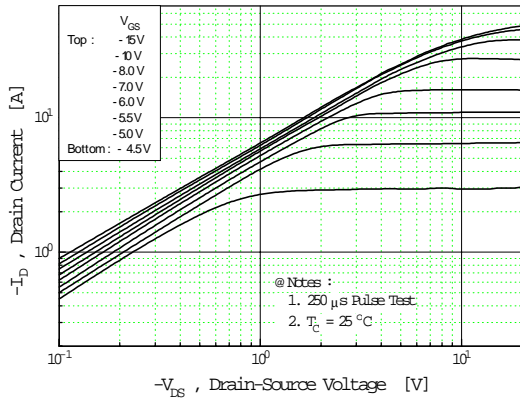


Fig 2. Transfer Characteristics

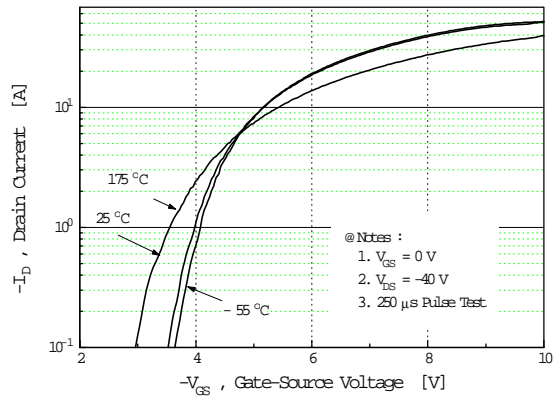


Fig 3. On-Resistance vs. Drain Current

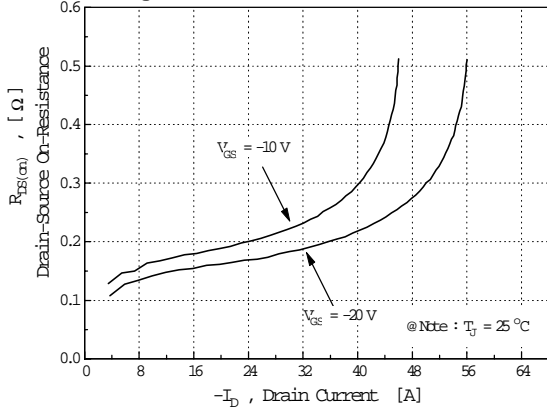


Fig 4. Source-Drain Diode Forward Voltage

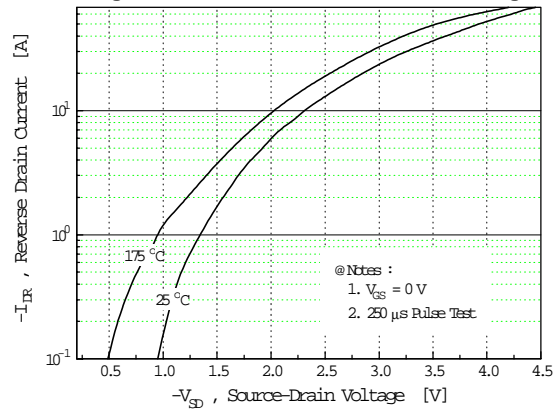


Fig 5. Capacitance vs. Drain-Source Voltage

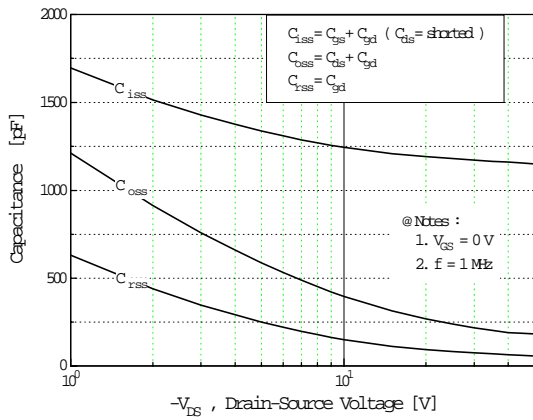
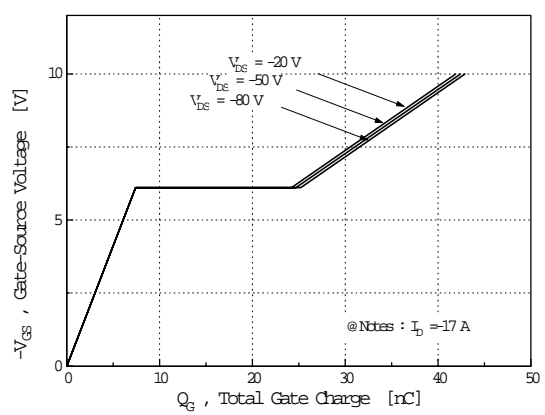


Fig 6. Gate Charge vs. Gate-Source Voltage



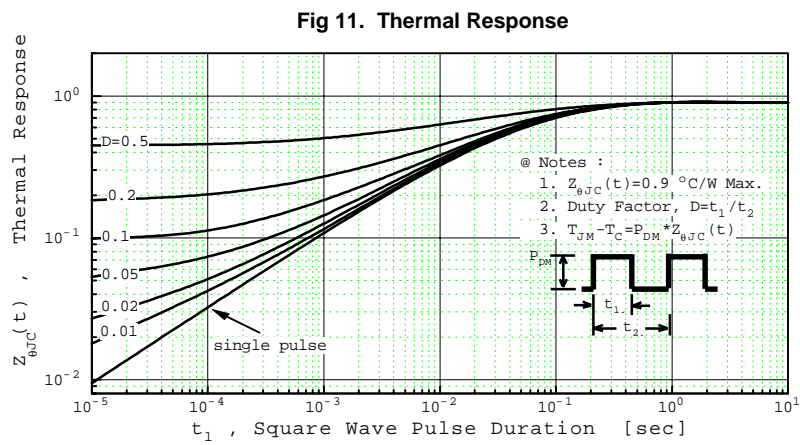
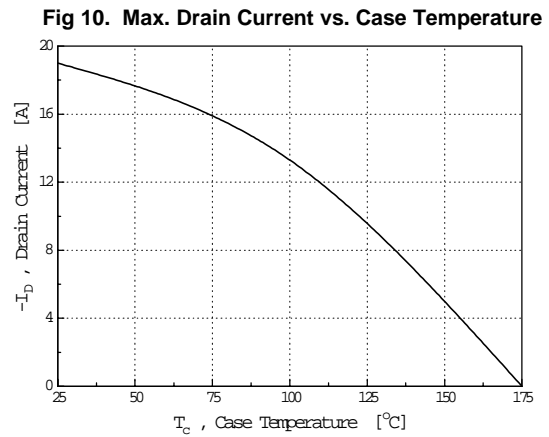
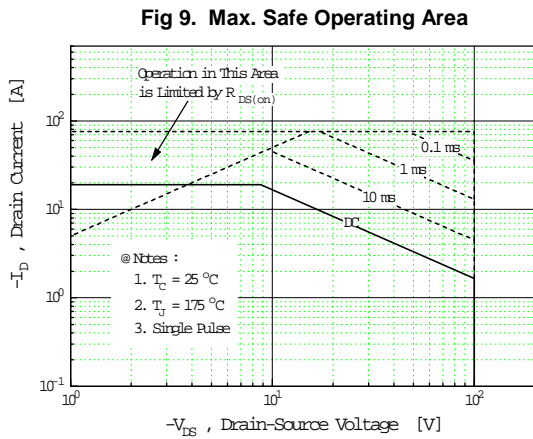
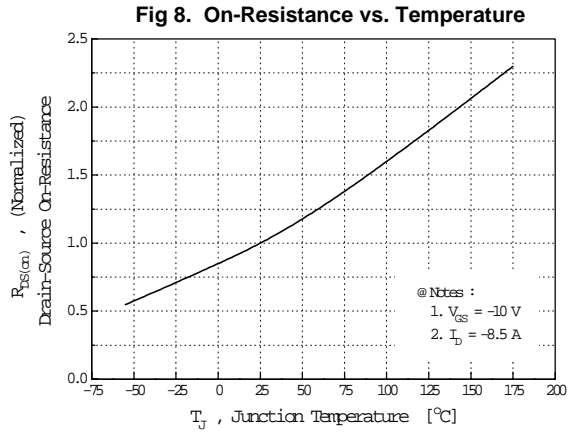
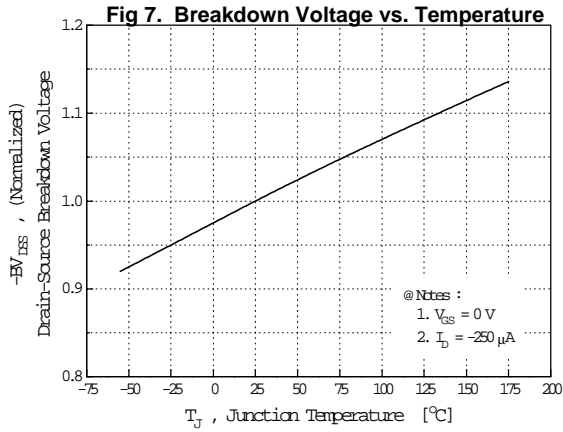


Fig 12. Gate Charge Test Circuit & Waveform

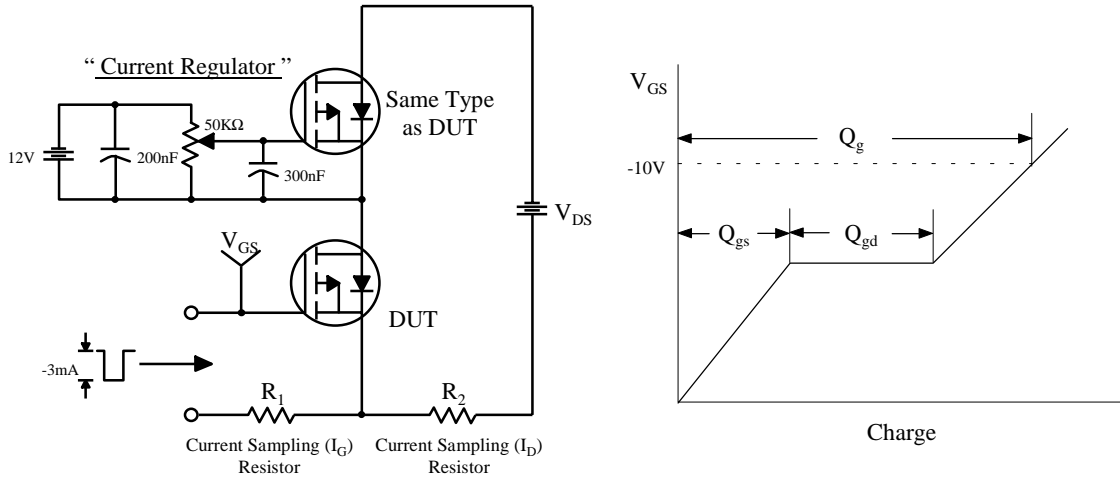


Fig 13. Resistive Switching Test Circuit & Waveforms

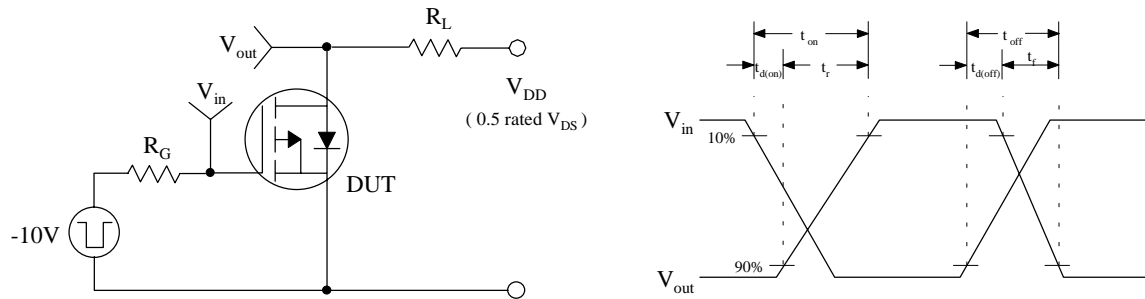


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

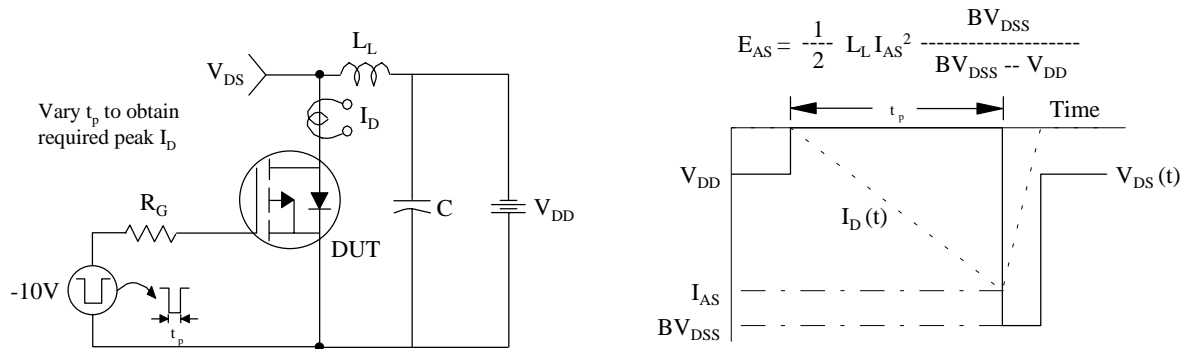
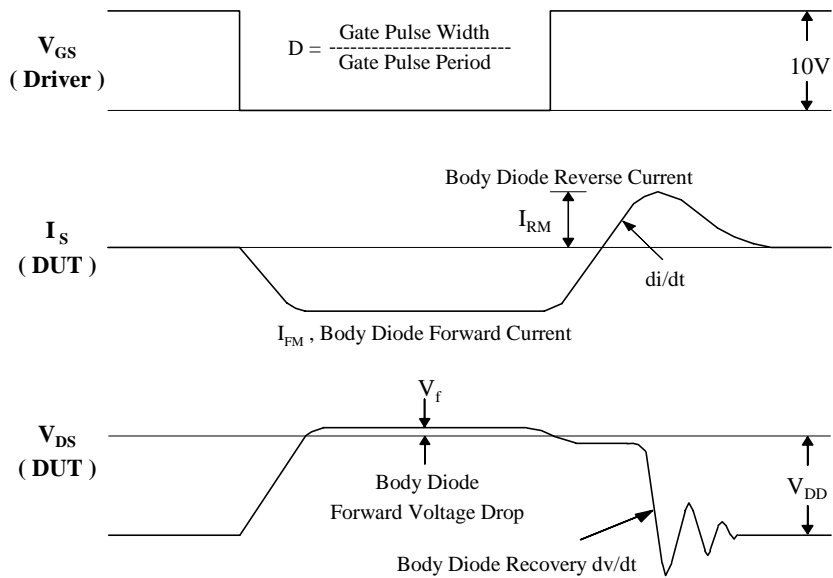
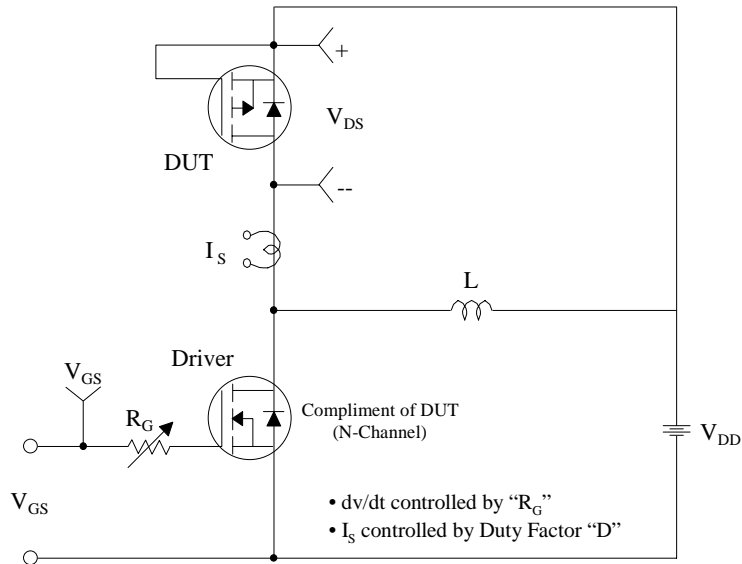


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



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