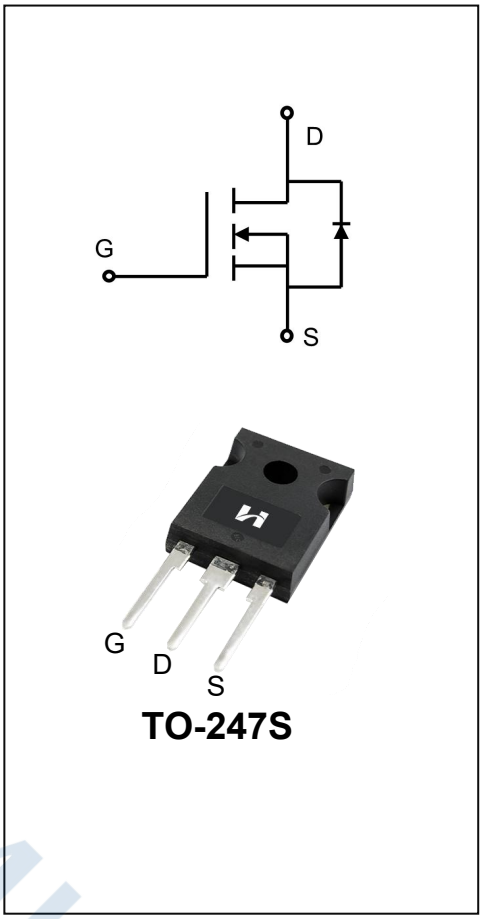
90A, 270V N-CHANNEL MOSFET



GENERAL DESCRIPTION

These N-Channel enhancement mode power field effect transistors are produced using Hi-semicon's 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 switched mode power supplies, active power factor correction, electronic lamp ballasts based on half bridge topology.

Features

- ◆VDS(V)=270V, ID=90A
- ◆$R_{DS(ON)}$
  - TYP:32mΩ@V_{GS}=10V
  - MAX:38mΩ

Applications

- ◆Power faction correction (PFC)
- ◆Switched mode power supplies (SMPS)
- ◆Uninterruptible power supply (UPS)

ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFW90N25	TO-247S	SFW90N25	Pb Free	Tube

ABSOLUTE MAXIMUM RATINGS (T_J=25°C unless otherwise noted)

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	270	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current	T_C = 25°C	I_D	90	A
	T_C = 100°C		63	
Drain Current Pulsed (Note 1)		I_{DM}	360	A
Power Dissipation(T_C=25°C)		P_D	140	W
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	1960	mJ
Operation Junction Temperature Range		T_J	-55～+150	°C
Storage Temperature Range		T_{stg}	-55～+150	°C
Maximum lead temperature for soldering purposes,1/8" from case for 5 seconds		TL	300	℃

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.89	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	60	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B_{VDSS}	V_{GS}=0V, I_D=250μA	270	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=250V, V_{GS}=0V	--	--	1.0	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=20V, V_{DS}=0V	--	--	100	nA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=-20V, V_{DS}=0V	--	--	-100	
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}= V_{DS}, I_D=250μA	2	3.0	4.0	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=45A	--	32	38	mΩ
Dynamic Characteristics						
Gate Resistance	Rg	V_{GS}=0V; f=1.0MHZ	--	2.0	--	Ω
Input Capacitance	C_{iss}	V_{DS}=25V V_{GS}=0V f=1.0MHZ	--	5784	--	pF
Output Capacitance	C_{oss}		--	893	--	
Reverse Transfer Capacitance	C_{rss}		--	561	--	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=20V; V_{GS}=10V R_G=10Ω; I_D=180A (Note 3.4)	--	55.1	--	ns
Turn-on Rise Time	t_r		--	165	--	
Turn-off Delay Time	$t_{d(off)}$		--	1054	--	
Turn-off Fall Time	t_f		--	367	--	

Total Gate Charge	Q_g	V_{DS}=20V, I_D=180A	--	363	--	nc
Gate-Source Charge	Q_{gs}	V_{GS}=10V	--	34	--	
Gate-Drain Charge	Q_{gd}	(Note 3.4)	--	176	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	90	A
Pulsed Source Current	I_{SM}		--	--	360	
Diode Forward Voltage	V_{SD}	I_S=90A,V_{GS}=0V	--	--	1.4	V
Reverse Recovery Time	T_{rr}	I_F=180A,V_R=520V, dIF/dt=100A/μS	--	362	--	ns
Reverse Recovery Charge	Q_{rr}		--	5.63	--	uC

1.Pluse width limited by maximum junction temperature

2.L=10mH, V_{DD}=50V, V_G=10V, R_G=25Ω, starting T_J=25°C

3.Pulse Test: Pulse width ≤300μs, Duty cycle≤2%

4.Essentially independent of operating temperature

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics (T_J = 25ºC)

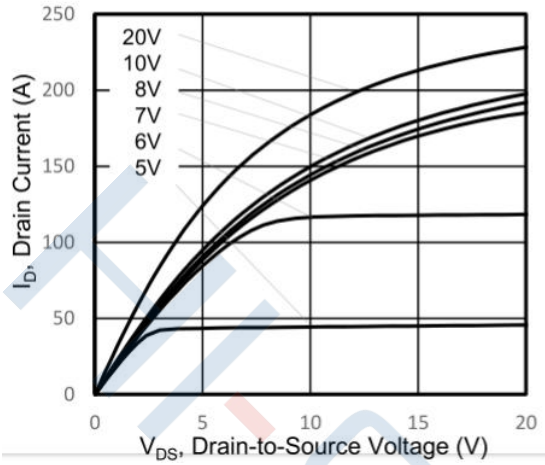


Figure 2. Body Diode Forward Voltage

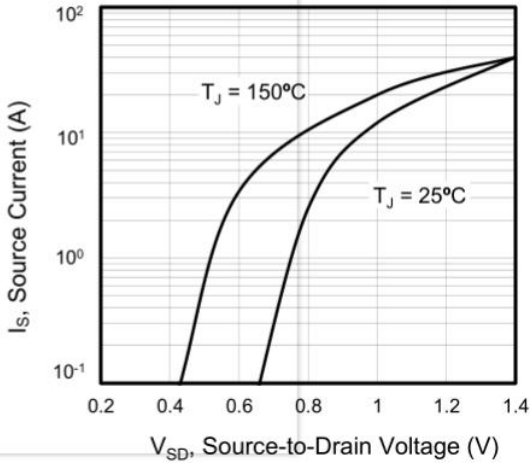


Figure 3. Drain Current vs. Temperature

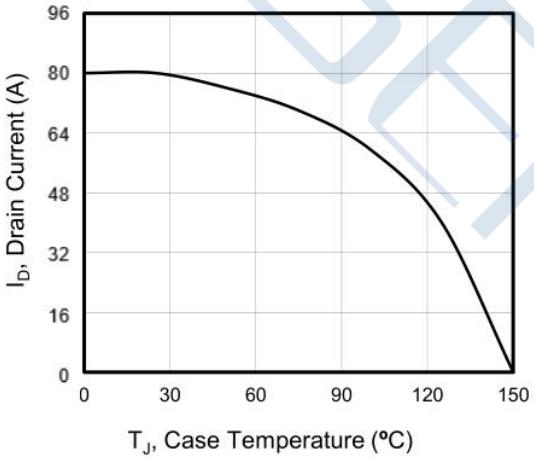


Figure 4. BV_{DSS} Variation vs. Temperature

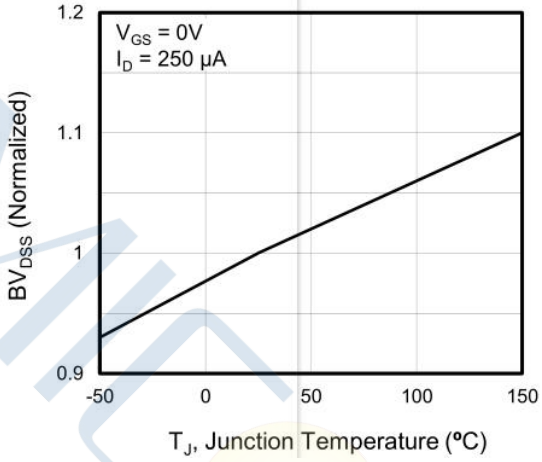


Figure 5. Transfer Characteristics

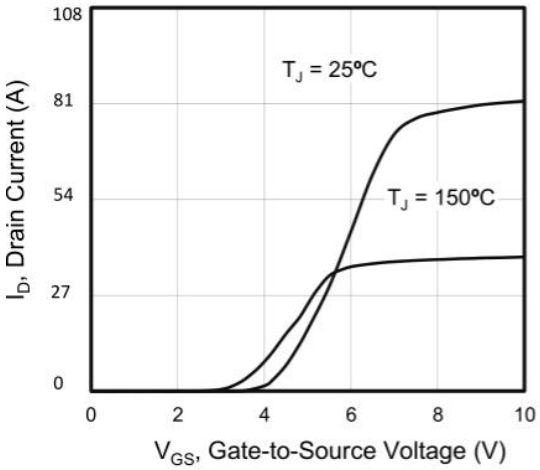


Figure 6. On-Resistance vs. Temperature

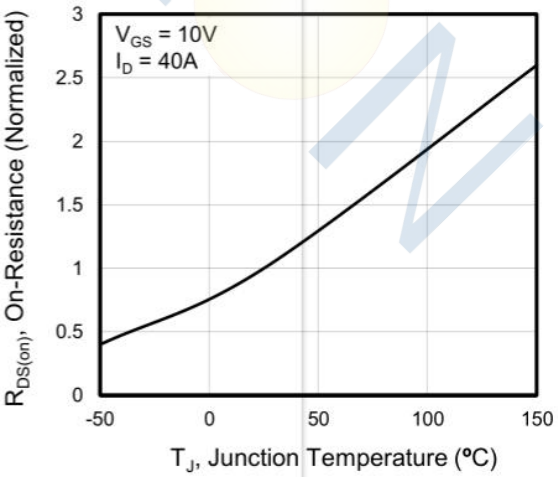


Figure 7. Capacitance

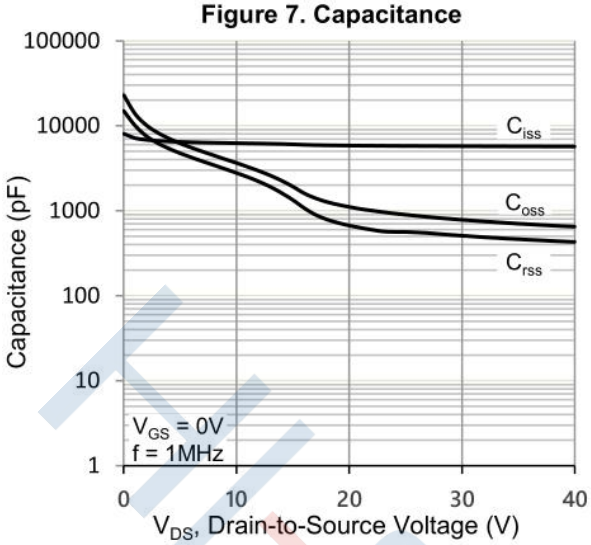


Figure 8. Gate Charge

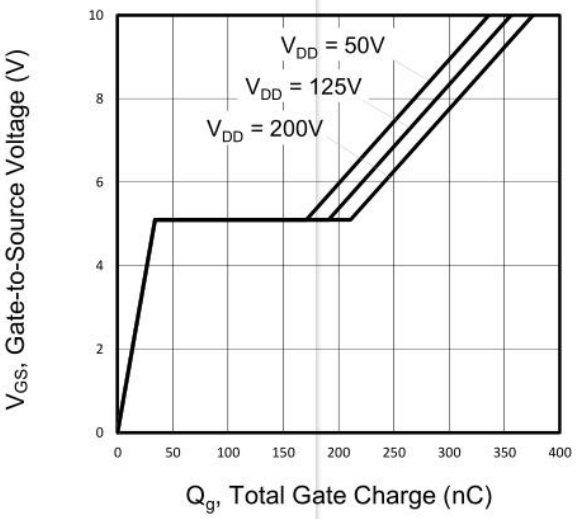
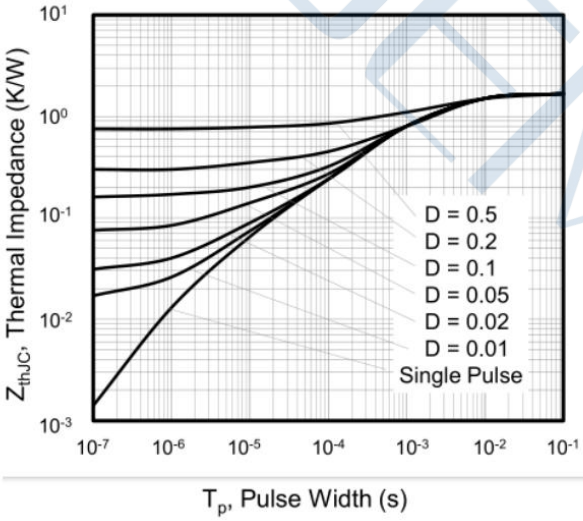


Figure 10. Transient Thermal Impedance



Test Circuit

Figure A: Gate Charge Test Circuit and Waveform

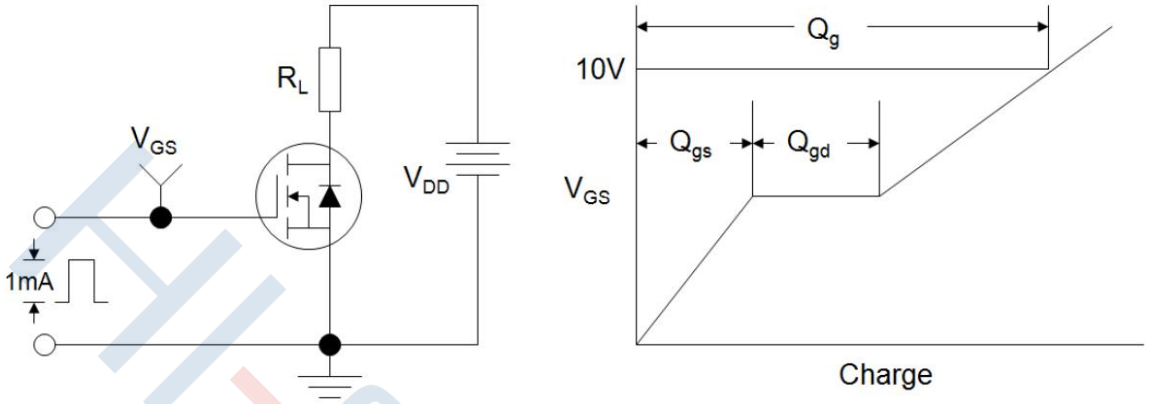


Figure B: Resistive Switching Test Circuit and Waveform

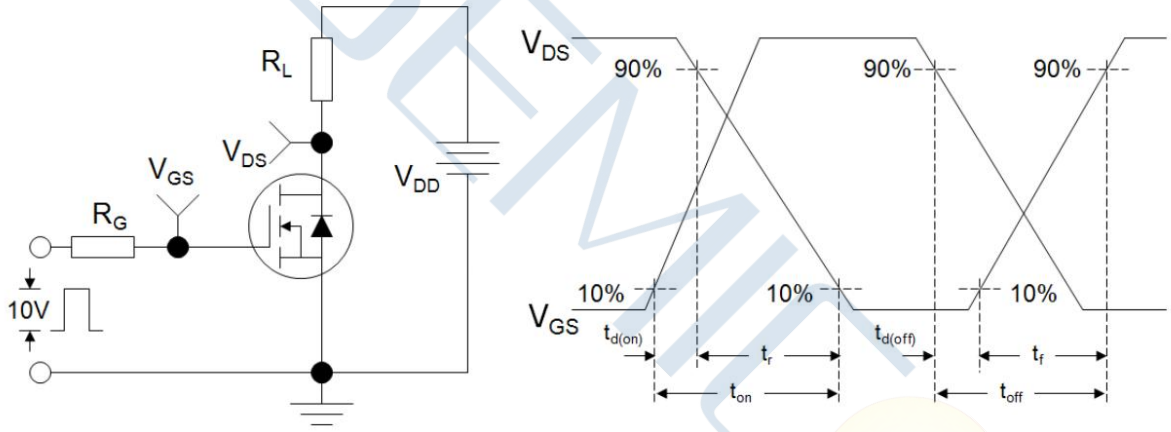
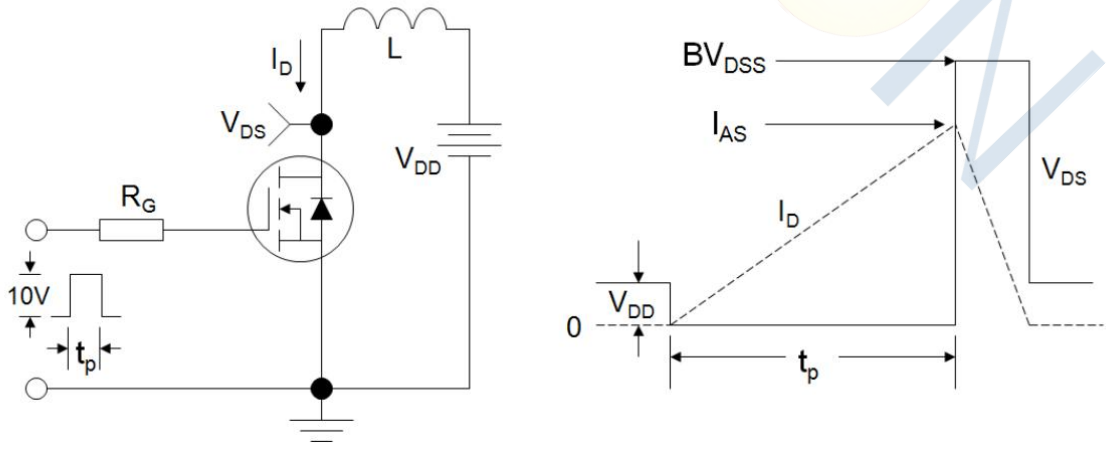
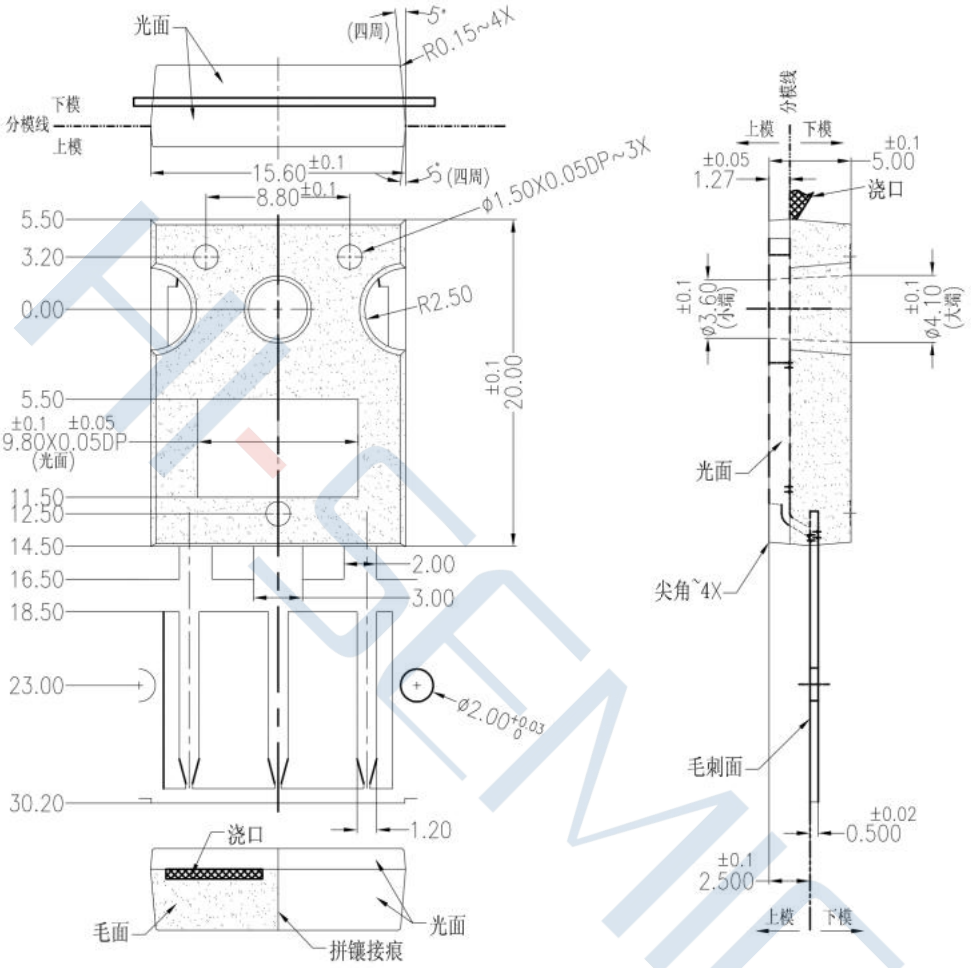


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



Package Dimensions of TO-247S



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