

Advanced Power MOSFET

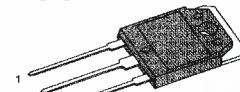
SSH5N90A

FEATURES

- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 25 μ A (Max.) @ $V_{DS} = 900V$
- Low $R_{DS(ON)}$: 2.300 Ω (Typ.)

$BV_{DSS} = 900 V$
 $R_{DS(on)} = 2.9 \Omega$
 $I_D = 5 A$

TO-3P



1. Gate 2. Drain 3. Source

Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
V_{DSS}	Drain-to-Source Voltage	900	V
I_D	Continuous Drain Current ($T_C=25^\circ C$)	5	A
	Continuous Drain Current ($T_C=100^\circ C$)	3.2	
I_{DM}	Drain Current-Pulsed	20	A
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy	529	mJ
I_{AR}	Avalanche Current	5	A
E_{AR}	Repetitive Avalanche Energy	16	mJ
dv/dt	Peak Diode Recovery dv/dt	1.5	V/ns
P_D	Total Power Dissipation ($T_C=25^\circ C$)	160	W
	Linear Derating Factor	1.28	$W/^\circ C$
T_J, T_{STG}	Operating Junction and Storage Temperature Range	- 55 to +150	$^\circ C$
	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	--	0.78	$^\circ C/W$
$R_{\theta CS}$	Case-to-Sink	0.24	--	
$R_{\theta JA}$	Junction-to-Ambient	--	40	

SAMSUNG

ELECTRONICS

SSH5N90A

N-CHANNEL
POWER MOSFET

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
BV_{DSS}	Drain-Source Breakdown Voltage	900	--	--	V	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_D=250\mu\text{A}$
$\Delta\text{BV}/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	1.14	--	V/ $^\circ\text{C}$	$\text{I}_D=250\mu\text{A}$ See Fig 7
$\text{V}_{\text{GS}(\text{th})}$	Gate Threshold Voltage	2.0	--	3.5	V	$\text{V}_{\text{DS}}=5\text{V}, \text{I}_D=250\mu\text{A}$
I_{GSS}	Gate-Source Leakage , Forward	--	--	100	nA	$\text{V}_{\text{GS}}=30\text{V}$
	Gate-Source Leakage , Reverse	--	--	-100		$\text{V}_{\text{GS}}=-30\text{V}$
I_{DSS}	Drain-to-Source Leakage Current	--	--	25	μA	$\text{V}_{\text{DS}}=900\text{V}$
		--	--	250		$\text{V}_{\text{DS}}=720\text{V}, T_C=125^\circ\text{C}$
$\text{R}_{\text{DS}(\text{on})}$	Static Drain-Source On-State Resistance	--	--	2.9	Ω	$\text{V}_{\text{GS}}=10\text{V}, \text{I}_D=2.5\text{A}$ ④*
g_{fs}	Forward Transconductance	--	4.0	--	O	$\text{V}_{\text{DS}}=50\text{V}, \text{I}_D=2.5\text{A}$ ④
C_{iss}	Input Capacitance	--	1110	1440	pF	$\text{V}_{\text{GS}}=0\text{V}, \text{V}_{\text{DS}}=25\text{V}, f=1\text{MHz}$ See Fig 5
C_{oss}	Output Capacitance	--	105	125		
C_{rss}	Reverse Transfer Capacitance	--	43	50		
$t_{\text{d}(\text{on})}$	Turn-On Delay Time	--	21	50	ns	$\text{V}_{\text{DD}}=450\text{V}, \text{I}_D=5\text{A},$ $\text{R}_G=13.6 \Omega$ See Fig 13 ④ ⑤
t_r	Rise Time	--	39	90		
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time	--	94	200		
t_f	Fall Time	--	32	75		
Q_g	Total Gate Charge	--	54	70	nC	$\text{V}_{\text{DS}}=720\text{V}, \text{V}_{\text{GS}}=10\text{V},$ $\text{I}_D=5\text{A}$ See Fig 6 & Fig 12 ④ ⑤
Q_{gs}	Gate-Source Charge	--	9.0	--		
Q_{gd}	Gate-Drain("Miller") Charge	--	25.0	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I_S	Continuous Source Current	--	--	5	A	Integral reverse pn-diode in the MOSFET
I_{SM}		--	--	20		
V_{SD}	Diode Forward Voltage ④	--	--	1.4	V	$T_J=25^\circ\text{C}, \text{I}_S=5\text{A}, \text{V}_{\text{GS}}=0\text{V}$
t_{rr}	Reverse Recovery Time	--	540	--	ns	$T_J=25^\circ\text{C}, \text{I}_F=5\text{A}$ $d\text{I}_F/dt=100\text{A}/\mu\text{s}$ ④
Q_{rr}	Reverse Recovery Charge	--	5.62	--		

Notes :

- ¤ Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ¤ $\text{fL}=40\text{mH}, \text{I}_{AS}=5\text{A}, \text{V}_{DD}=50\text{V}, \text{R}_G=27\Omega$, Starting $T_J=25^\circ\text{C}$
- ¤ $\text{I}_{SD} \leq 5\text{A}, d\text{I}/dt \leq 120\text{A}/\mu\text{s}, \text{V}_{DD} \leq \text{BV}_{DSS}$, Starting $T_J=25^\circ\text{C}$
- ¤ Pulse Test : Pulse Width = 250 μs , Duty Cycle $\leq 2\%$
- ¤ * Essentially Independent of Operating Temperature

N-CHANNEL
POWER MOSFET

SSH5N90A

Fig 1. Output Characteristics

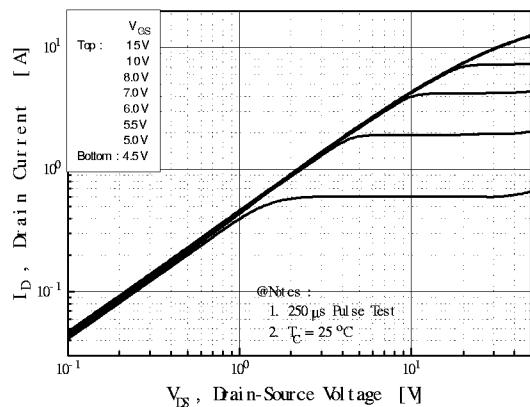


Fig 2. Transfer Characteristics

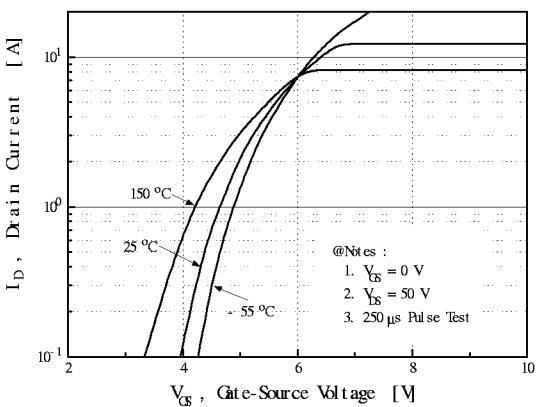


Fig 3. On-Resistance vs. Drain Current

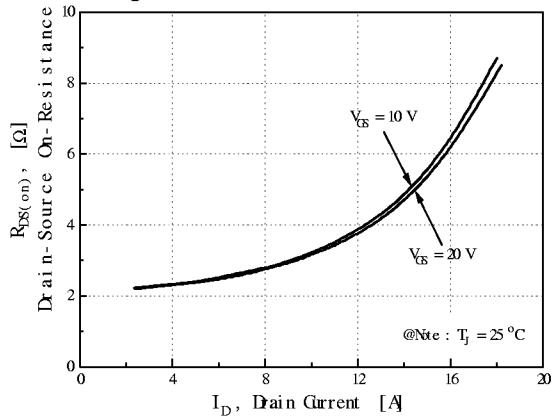


Fig 4. Source-Drain Diode Forward Voltage

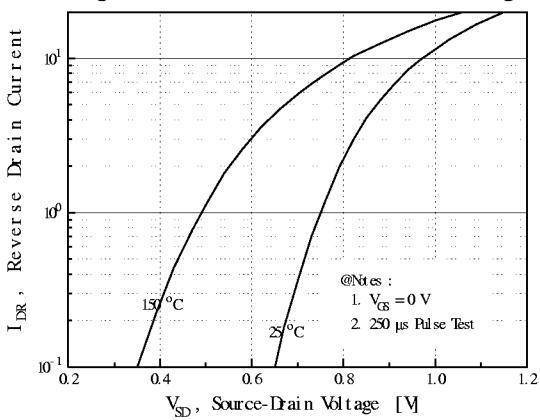


Fig 5. Capacitance vs. Drain-Source Voltage

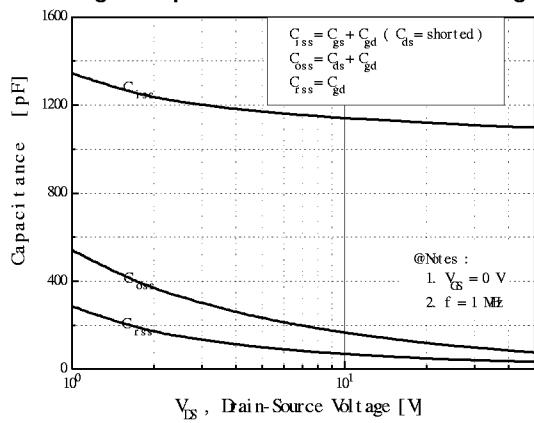
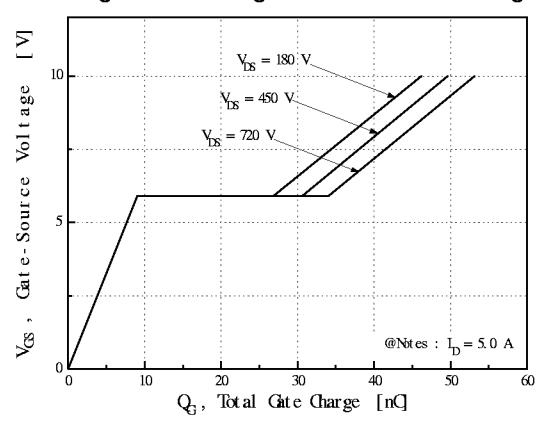


Fig 6. Gate Charge vs. Gate-Source Voltage



SSH5N90A

N-CHANNEL POWER MOSFET

Fig 7. Breakdown Voltage vs. Temperature

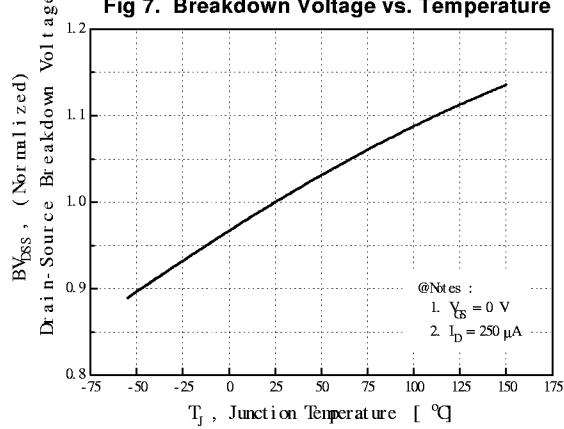


Fig 8. On-Resistance vs. Temperature

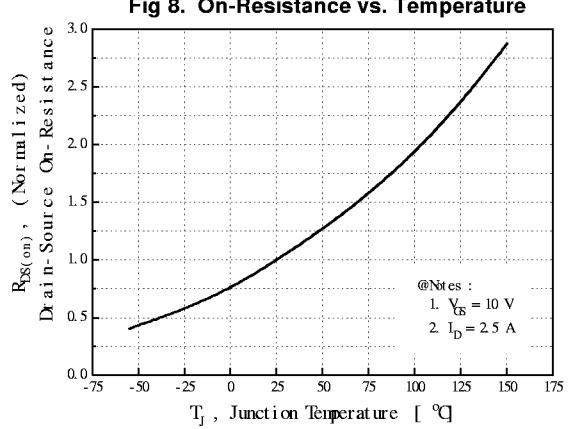


Fig 9. Max. Safe Operating Area

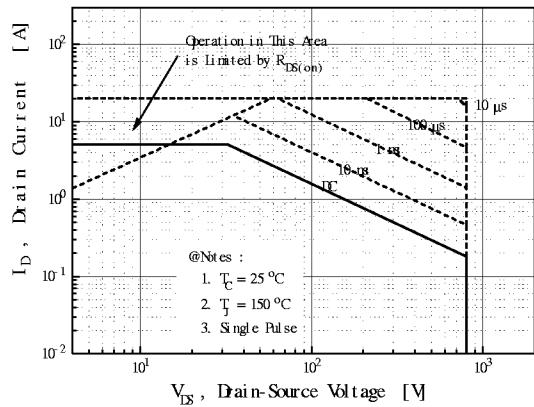


Fig 10. Max. Drain Current vs. Case Temperature

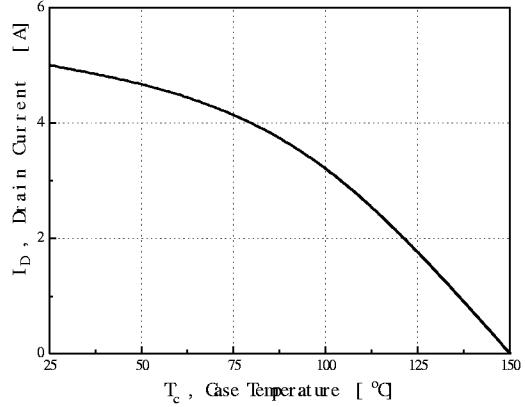


Fig 11. Thermal Response

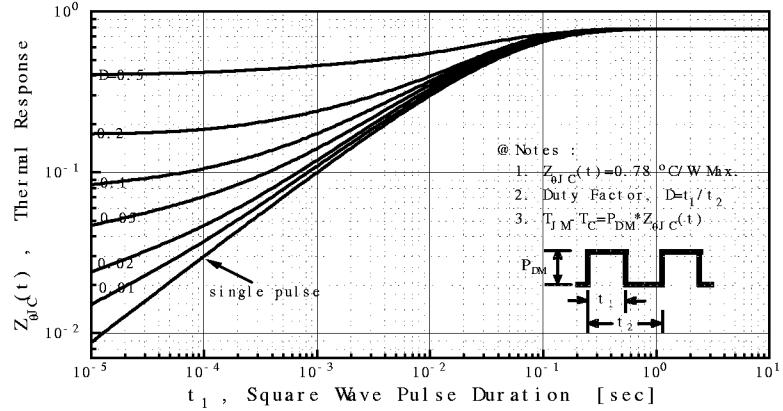


Fig 12. Gate Charge Test Circuit & Waveform

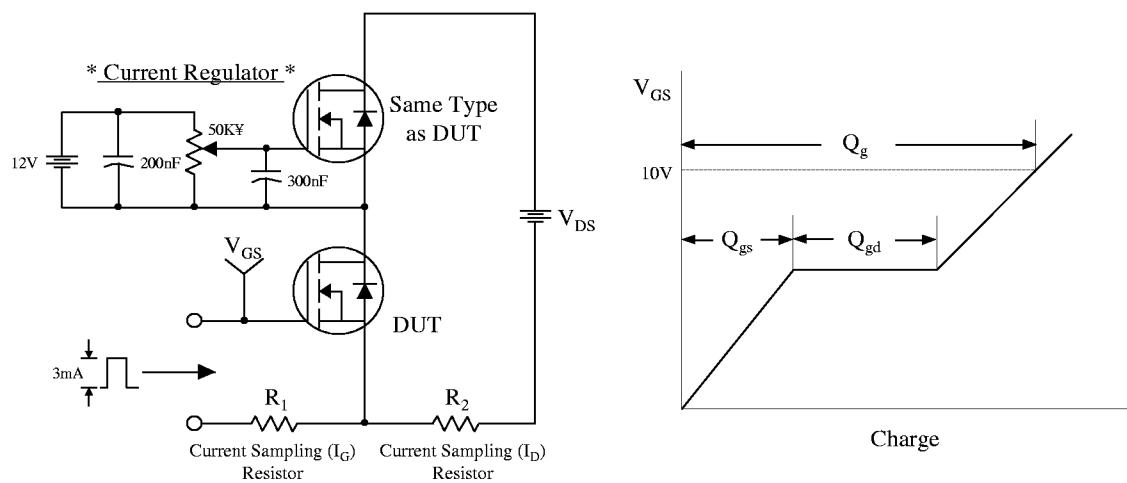


Fig 13. Resistive Switching Test Circuit & Waveforms

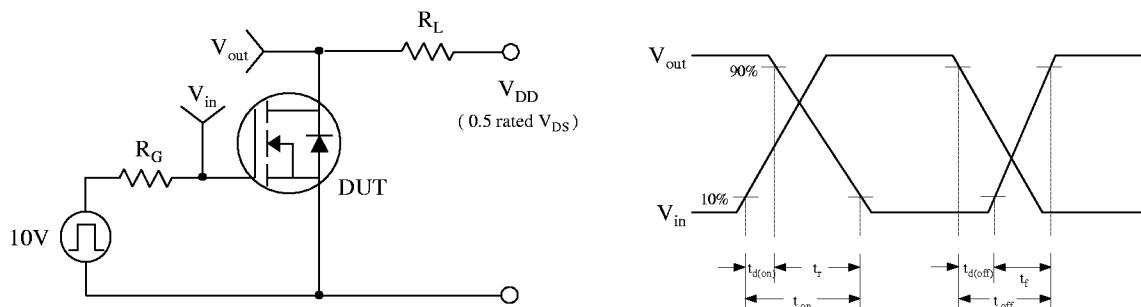
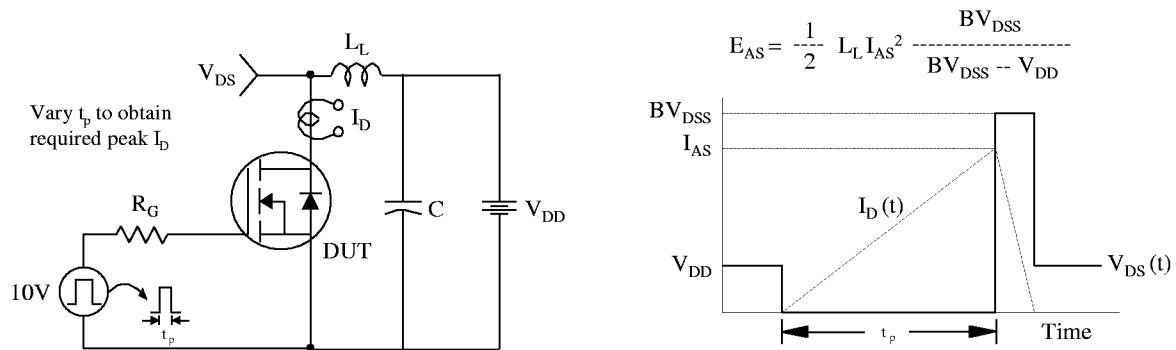


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms



SSH5N90A

N-CHANNEL
POWER MOSFET

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

