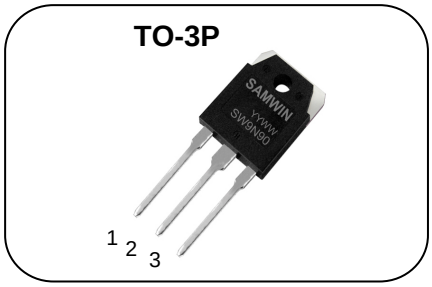
N-channel MOSFET

Features

- High ruggedness
- $R_{DS(ON)}$ (Max 1.45 Ω)@V_{GS}=10V
- Gate Charge (Typ 60nC)
- Improved dv/dt Capability
- 100% Avalanche Tested

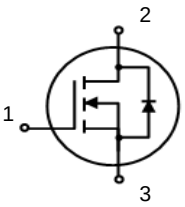


1. Gate 2. Drain 3. Source

BV_{DSS} : 900V

I_D : 9.0A

$R_{DS(ON)}$: 1.45ohm



General Description

This power MOSFET is produced with advanced VDMOS technology of SAMWIN. This technology enable power MOSFET to have better characteristics, such as fast switching time, low on resistance, low gate charge and especially excellent avalanche characteristics. It is mainly suitable for half bridge or full bridge resonant topology like a electronic ballast, and also low power switching mode power appliances.

Order Codes

Item	Sales Type	Marking	Package	Packaging
1	SW W 9N90	SW9N90	TO-3P	TAPE

Absolute maximum ratings

Symbol	Parameter		SW9n90	Unit
			TO-3P	
V_{DSS}	Drain to Source Voltage		900	V
I_D	Continuous Drain Current (@T_C=25ºC)		9.0	A
	Continuous Drain Current (@T_C=100ºC)		5.6	A
I_{DM}	Drain current pulsed	(note 1)	36	A
V_{GS}	Gate to Source Voltage		±30	V
E_{AS}	Single pulsed Avalanche Energy	(note 2)	850	mJ
E_{AR}	Repetitive Avalanche Energy	(note 1)	25	mJ
dv/dt	Peak diode Recovery dv/dt	(note 3)	4.5	V/ns
P_D	Total power dissipation (@T_C=25ºC)		240	W
	Derating Factor above 25ºC		1.92	W/ºC
T_{STG}, T_J	Operating Junction Temperature & Storage Temperature		-55 ~ + 150	ºC
T_L	Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds.		300	ºC

Thermal characteristics

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
R_{thjc}	Thermal resistance, Junction to case			0.52	ºC/W
R_{thcs}	Thermal resistance, Case to Sink	0.24			ºC/W
R_{thja}	Thermal resistance, Junction to ambient		40		ºC/W

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Electrical characteristic (T_C = 25ºC unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Off characteristics						
BV_{DSS}	Drain to source breakdown voltage	V_{GS}=0V, I_D=250uA	900	-	-	V
ΔBV_{DSS} / ΔT_J	Breakdown voltage temperature coefficient	I_D=250uA, referenced to 25ºC	-	1.0	-	V/ºC
I_{DSS}	Drain to source leakage current	V_{DS}=900V, V_{GS}=0V	-	-	10	uA
		V_{DS}=720V, T_C=125ºC	-	-	100	uA
I_{GSS}	Gate to source leakage current, forward	V_{GS}=30V, V_{DS}=0V	-	-	100	nA
	Gate to source leakage current, reverse	V_{GS}=-30V, V_{DS}=0V	-	-	-100	nA
On characteristics						
$V_{GS(TH)}$	Gate threshold voltage	V_{DS}=V_{GS}, I_D=250uA	2.0	-	4.0	V
$R_{DS(ON)}$	Drain to source on state resistance	V_{GS}=10V, I_D = 4.5A		1.1	1.45	Ω
Dynamic characteristics						
C_{iss}	Input capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz			2700	pF
C_{oss}	Output capacitance				260	
C_{rss}	Reverse transfer capacitance				35	
$t_{d(on)}$	Turn on delay time	V_{DS}=450V, I_D=9A, R_G=50Ω			100	ns
tr	Rising time				210	
$t_{d(off)}$	Turn off delay time				280	
t_f	Fall time				170	
Q_g	Total gate charge	V_{DS}=720V, V_{GS}=10V, I_D=9A		60	72	nC
Q_{gs}	Gate-source charge			12	-	
Q_{gd}	Gate-drain charge			26	-	

Source to drain diode ratings characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_S	Continuous source current	Integral reverse p-n Junction diode in the MOSFET	-	-	9	A
I_{SM}	Pulsed source current		-	-	36	A
V_{SD}	Diode forward voltage drop.	I_S=9A, V_{GS}=0V	-	-	1.5	V
T_{rr}	Reverse recovery time	I_S=9A, V_{GS}=0V, dI_F/dt=100A/us	-	720	-	ns
Q_{rr}	Breakdown voltage temperature		-	7.6	-	uC

※. Notes

1. Repeatitive rating : pulse width limited by junction temperature.
2. L = 23mH, I_{AS} = 9.0A, V_{DD} = 50V, R_G=25Ω, Starting T_J = 25ºC
3. $I_{SD} \leq$ 9.0A, di/dt = 300A/us, $V_{DD} \leq BV_{DSS}$, Staring T_J =25ºC
4. Pulse Test : Pulse Width ≤ 300us, duty cycle ≤ 2%
5. Essentially independent of operating temperature.

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Fig. 1. On-state characteristics

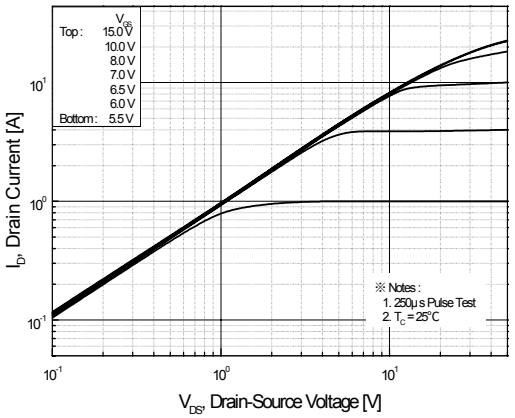

Fig. 2. Transfer characteristics

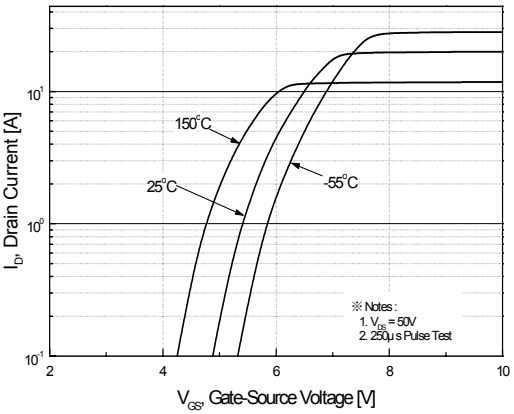

Fig. 3. On-resistance variation vs. drain current and gate voltage

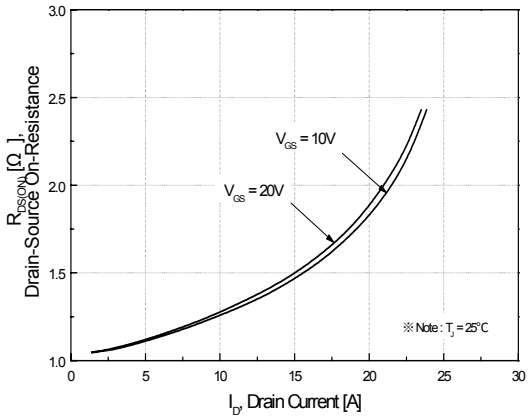

Fig. 4. On state current vs. diode forward voltage

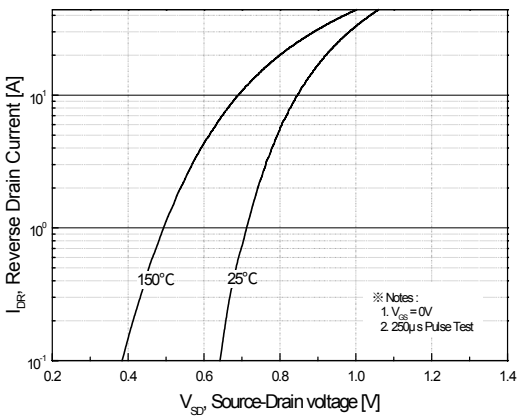

Fig. 5. Capacitance characteristics (Non-Repetitive)

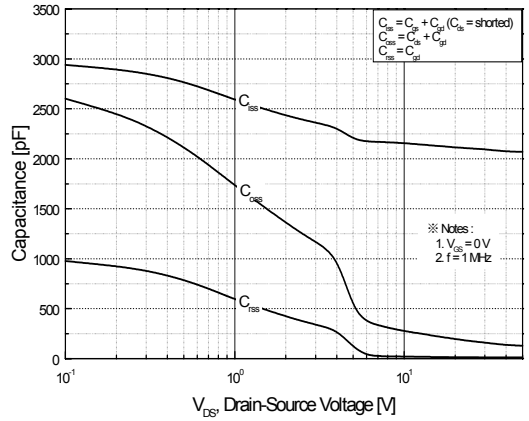

Fig. 6. Gate charge characteristics

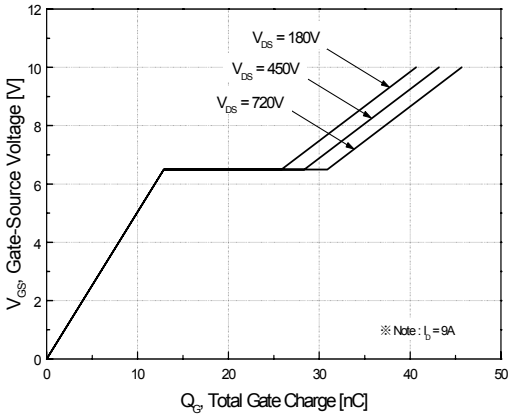

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Fig 7. Breakdown Voltage Variation vs. Junction Temperature

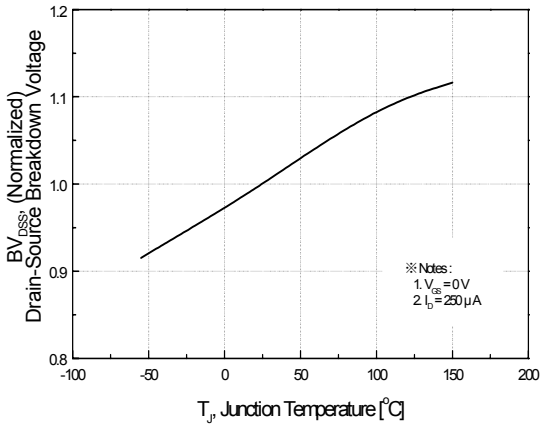

Fig. 8. On resistance variation vs. junction temperature

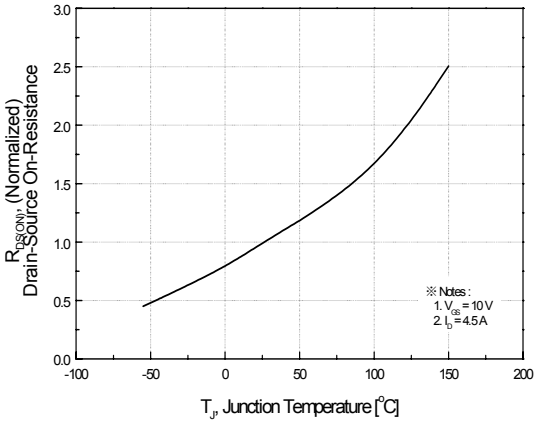

Fig. 9. Maximum drain current vs. case temperature.

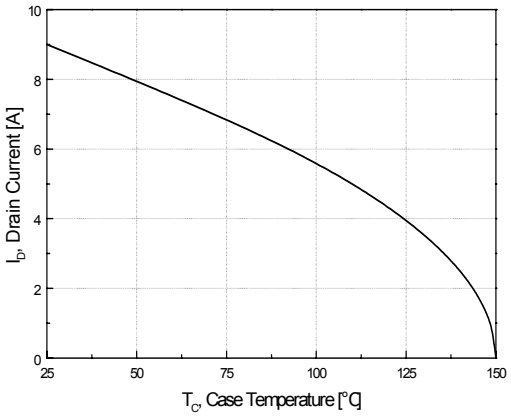

Fig. 10. Maximum safe operating area

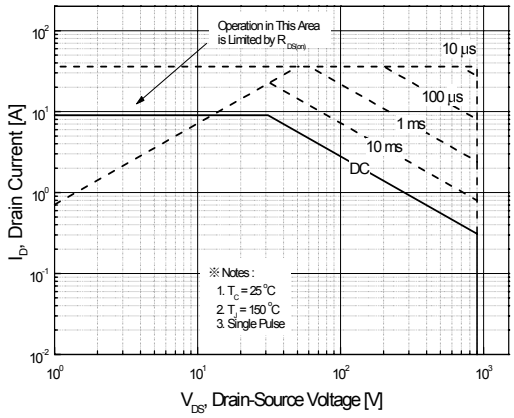

Fig. 11. Transient thermal response curve

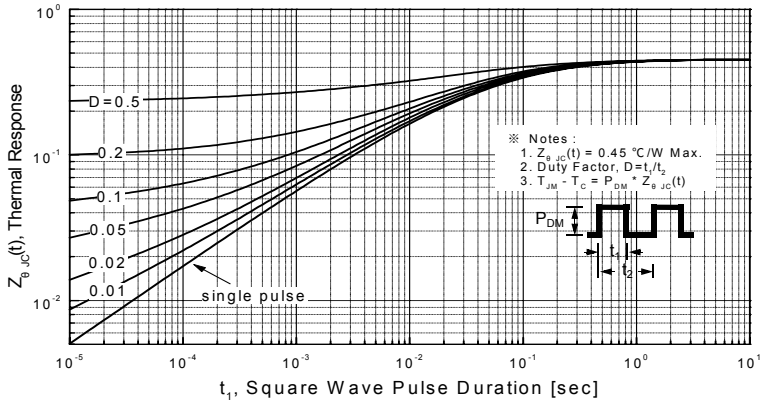

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Fig. 12. Gate charge test circuit & waveform

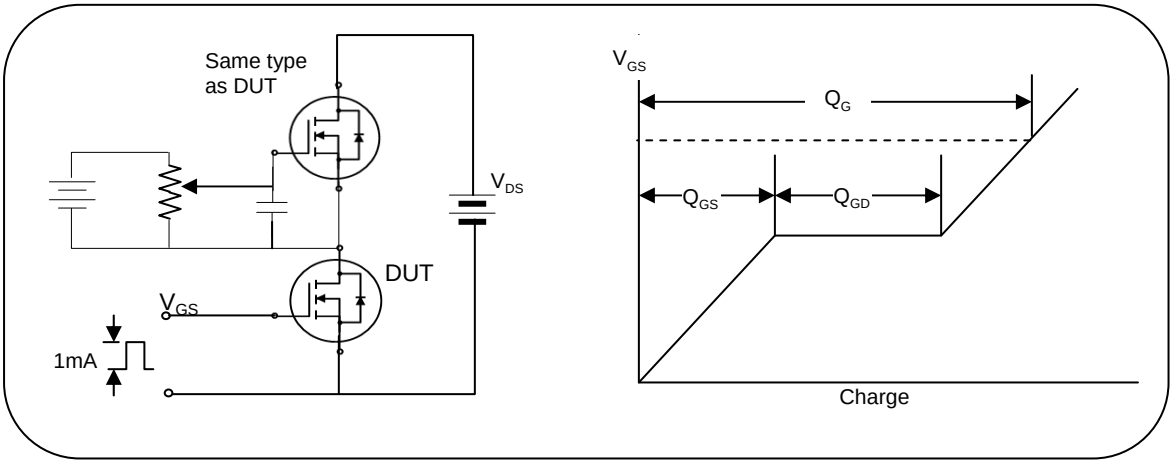

Fig. 13. Switching time test circuit & waveform

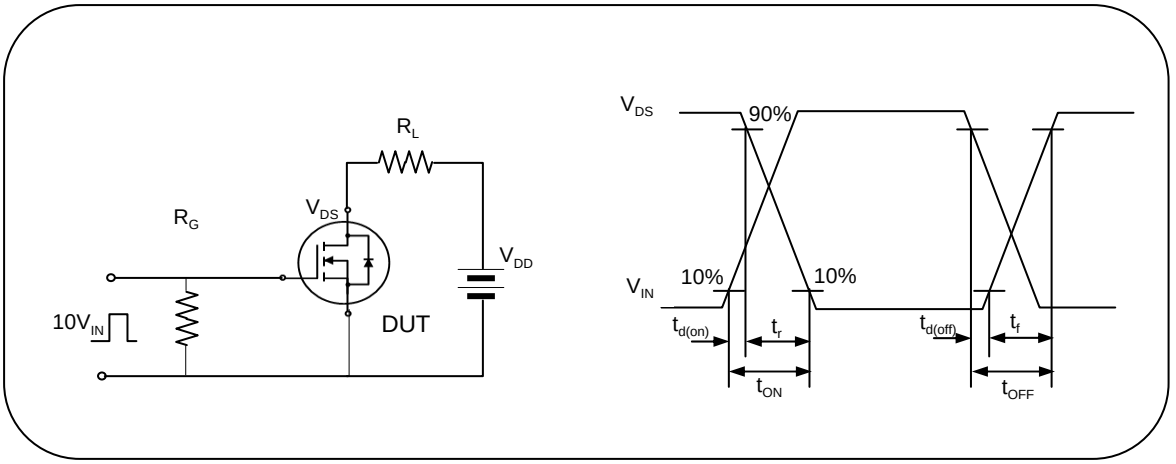

Fig. 14. Unclamped Inductive switching test circuit & waveform

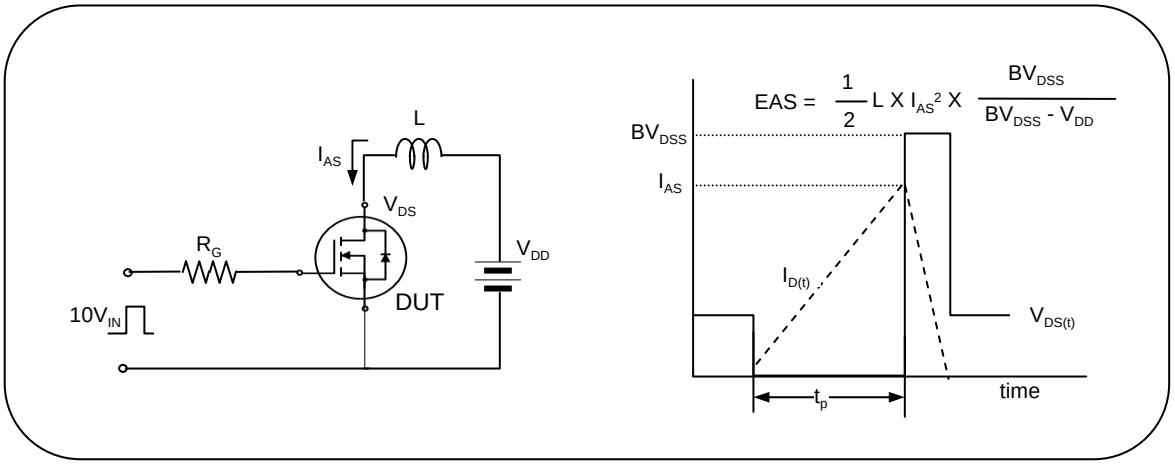

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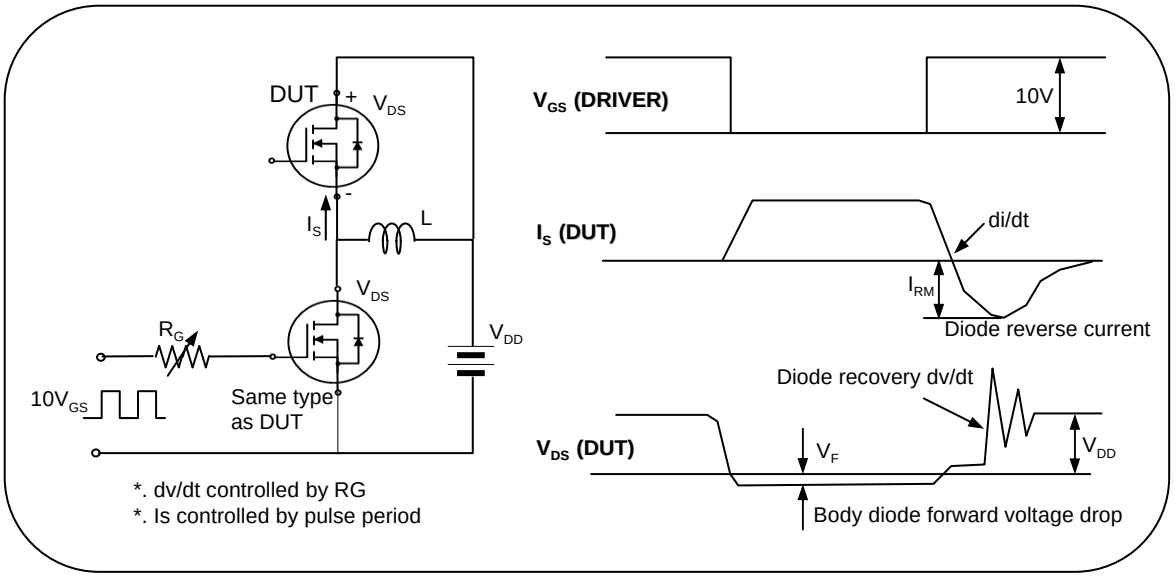
Fig. 15. Peak diode recovery dv/dt test circuit & waveform



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REVISION HISTORY

Revision No.	Changed Characteristics	Responsible	Date	Issuer
REV 1.0	Origination, First Release	Alice Nie	2007.12.05	XZQ
REV 2.0	Updated the format of datasheet and added Order Codes.	Alice Nie	2011.03.24	XZQ

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