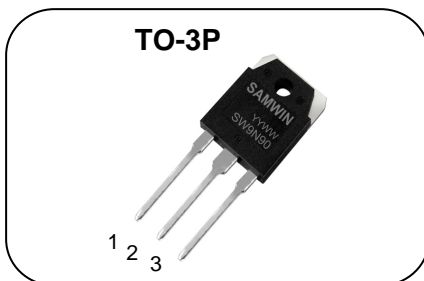


N-channel MOSFET

Features

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

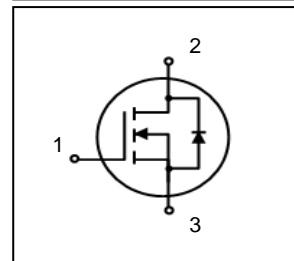


1. Gate 2. Drain 3. Source

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 (@ $T_C=25^\circ C$)	9.0		A
	Continuous Drain Current (@ $T_C=100^\circ C$)	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 (@ $T_C=25^\circ C$)	240		W
	Derating Factor above 25°C	1.92		W/°C
T_{STG}, T_J	Operating Junction Temperature & Storage Temperature	-55 ~ + 150		°C
T_L	Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds.	300		°C

Thermal characteristics

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

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

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Off characteristics						
BV_{DSS}	Drain to source breakdown voltage	$V_{GS}=0V, I_D=250\mu A$	900	-	-	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown voltage temperature coefficient	$I_D=250\mu A$, referenced to 25°C	-	1.0	-	$V/^\circ\text{C}$
I_{DSS}	Drain to source leakage current	$V_{DS}=900V, V_{GS}=0V$	-	-	10	μA
		$V_{DS}=720V, T_C=125^\circ\text{C}$	-	-	100	μA
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	$V_{DS}=V_{GS}, I_D=250\mu A$	3.0	-	5.0	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	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$			2700	pF
C_{oss}	Output capacitance				260	
C_{rss}	Reverse transfer capacitance				35	
$t_{d(on)}$	Turn on delay time	$V_{DS}=450V, I_D=9A, R_G=50\Omega$			100	ns
t_r	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	$I_S=9A, V_{GS}=0V,$	-	720	-	ns
Q_{rr}	Breakdown voltage temperature	$di_f/dt=100A/\mu s$	-	7.6	-	μC

*. Notes

1. Repetitive rating : pulse width limited by junction temperature.
2. $L = 23\text{mH}, I_{AS} = 9.0A, V_{DD} = 50V, R_G=25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 9.0A, di/dt = 300A/\mu s, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$
5. Essentially independent of operating temperature.

Fig. 1. On-state characteristics

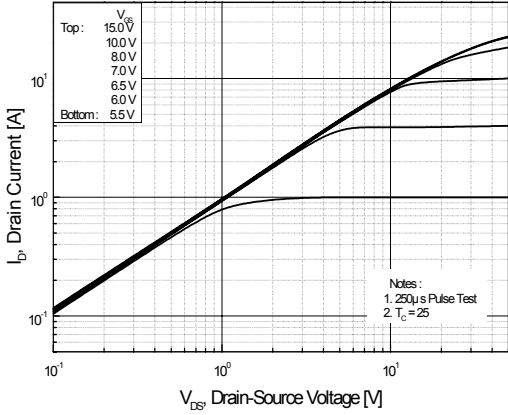


Fig. 2. Transfer characteristics

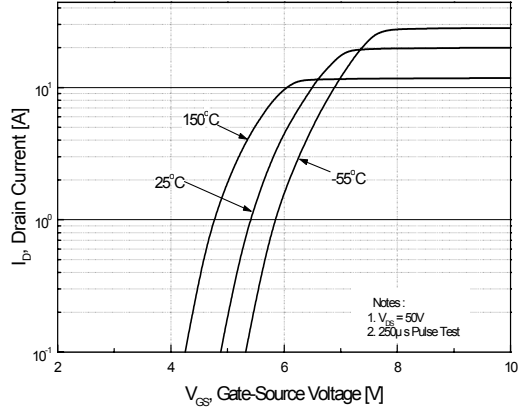


Fig. 3. On-resistance variation vs. drain current and gate voltage

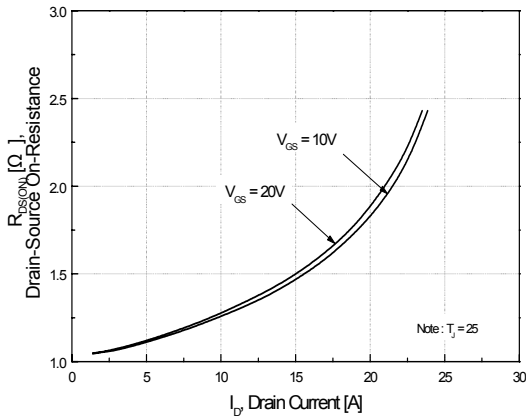


Fig. 4. On state current vs. diode forward voltage

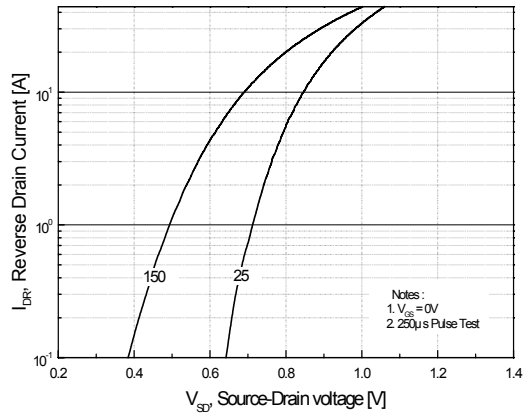


Fig. 5. Capacitance characteristics (Non-Repetitive)

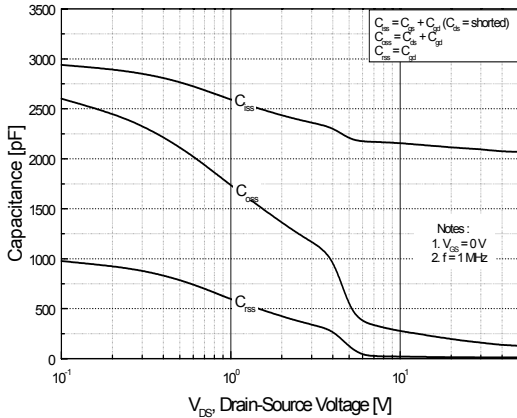


Fig. 6. Gate charge characteristics

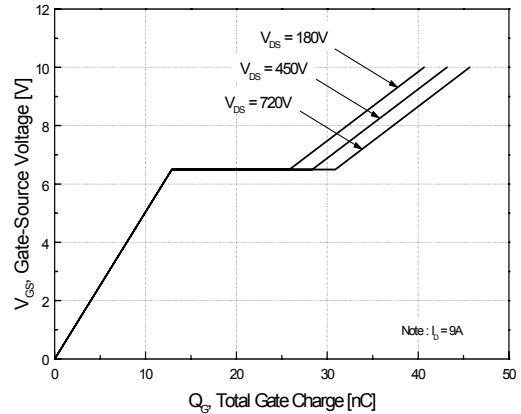


Fig 7. Breakdown Voltage Variation vs. Junction Temperature

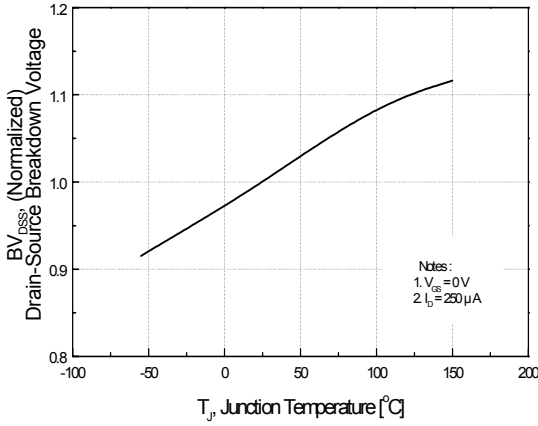


Fig. 8. On resistance variation vs. junction temperature

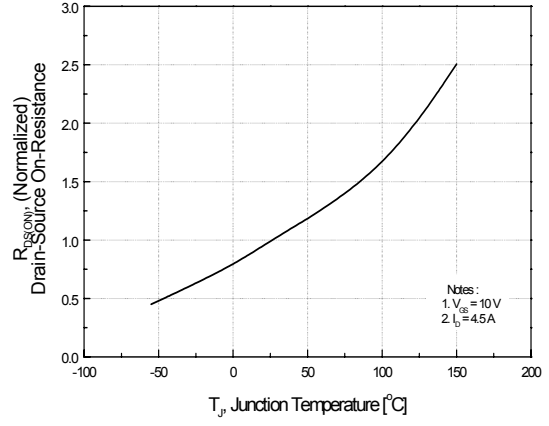


Fig. 9. Maximum drain current vs. case temperature.

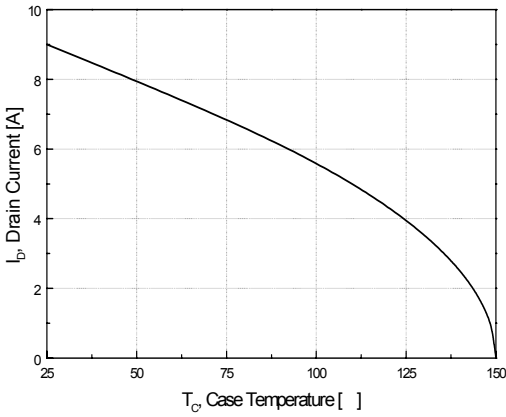


Fig. 10. Maximum safe operating area

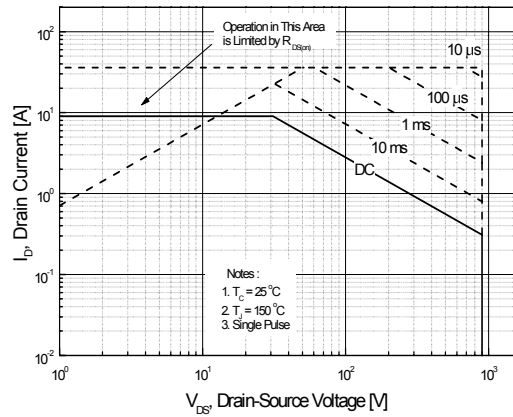


Fig. 11. Transient thermal response curve

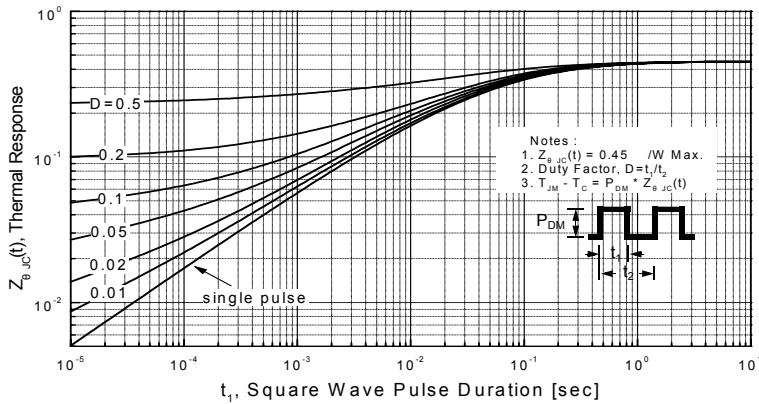


Fig. 12. Gate charge test circuit & waveform

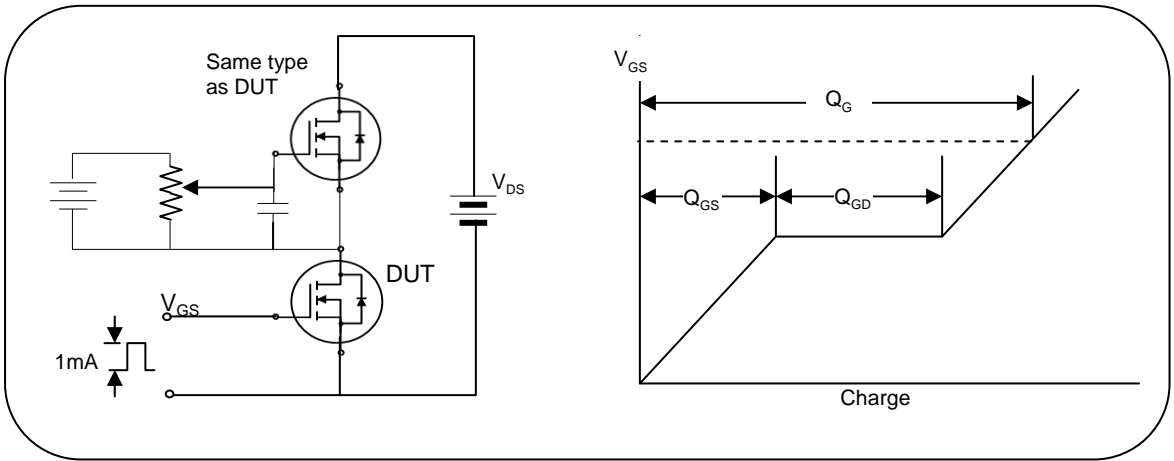


Fig. 13. Switching time test circuit & waveform

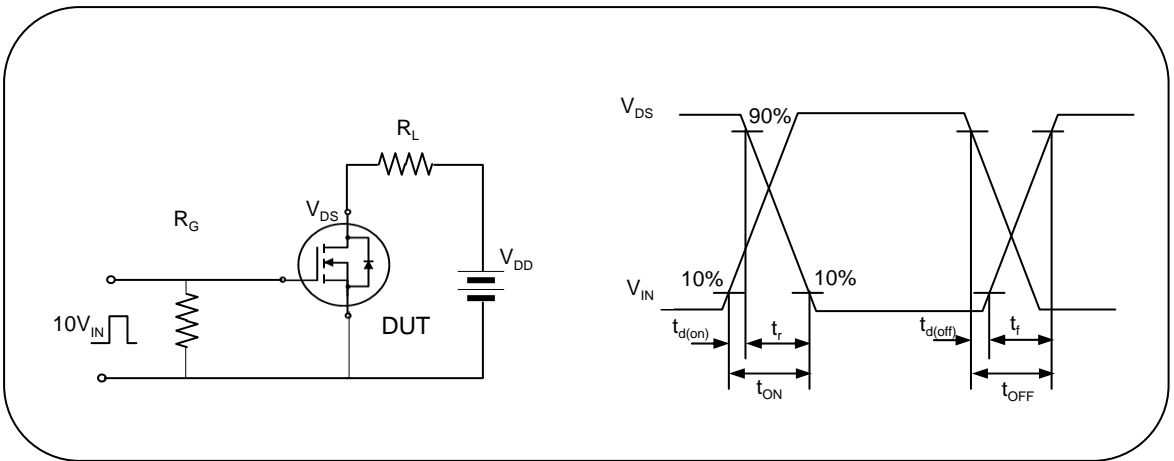


Fig. 14. Unclamped Inductive switching test circuit & waveform

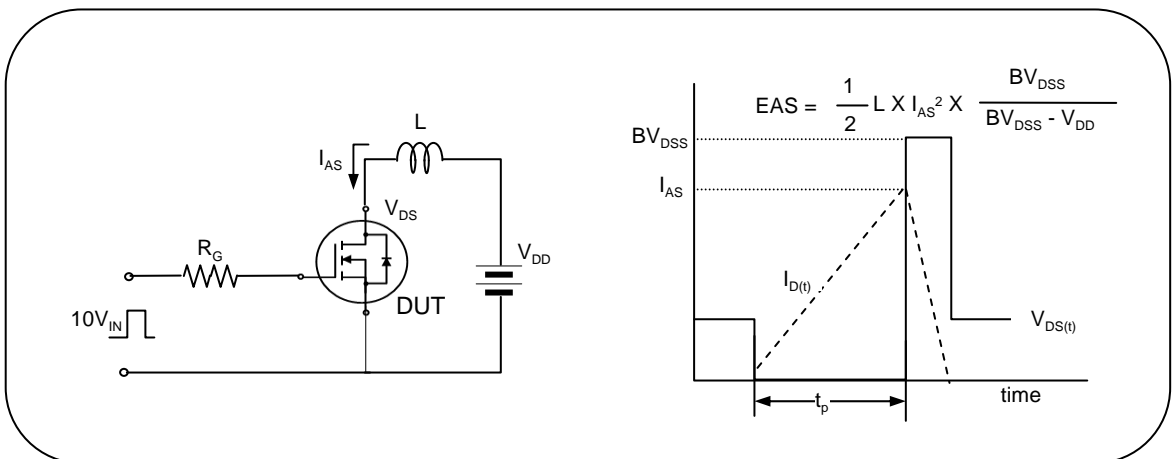
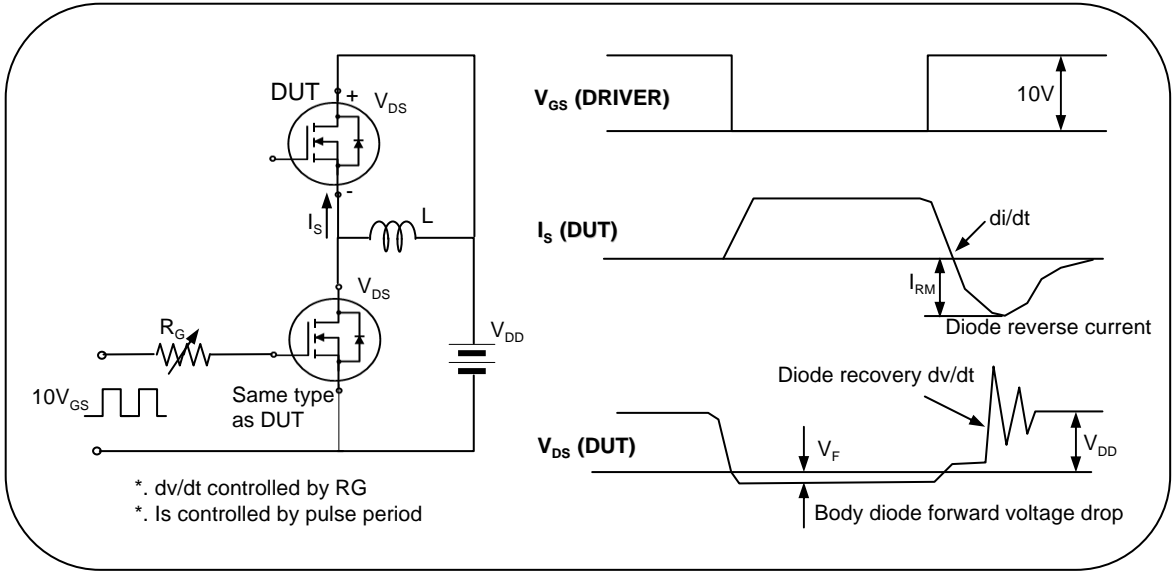


Fig. 15. Peak diode recovery dv/dt test circuit & waveform



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
REV 3.0	Confirmed the VTH characteristic	Alice Nie	2011.09.16	XZQ

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