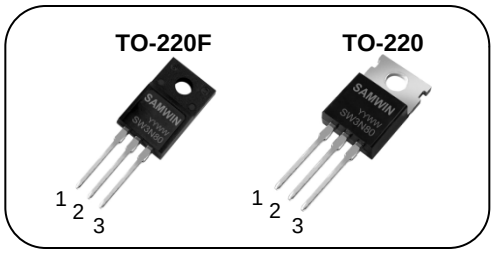
N-channel MOSFET

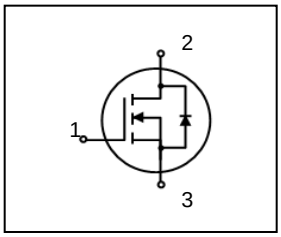
Features

- High ruggedness
- $R_{DS(ON)}$ (Max 4.5 **Ω**)@V_{GS}=10V
- Gate Charge (Typ 26nC)
- Improved dv/dt Capability
- 100% Avalanche Tested



1. Gate 2. Drain 3. Source

BV_{DSS} : 800V
I_D : 3.0A
$R_{DS(ON)}$: 4.5ohm



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. This power MOSFET is usually used at high efficient DC to DC converter block and switch mode power supply.

Order Codes

Item	Sales Type	Marking	Package	Packaging
1	SW P 3N80	SW3N80	TO-220	TUBE
2	SW F 3N80	SW3N80	TO-220F	TUBE

Absolute maximum ratings

Symbol	Parameter	Value		Unit
		TO-220	TO-220F	
V_{DSS}	Drain to Source Voltage	800		V
I_D	Continuous Drain Current (@T_C=25ºC)	3.0	3.0*	A
	Continuous Drain Current (@T_C=100ºC)	1.9	1.9*	A
I_{DM}	Drain current pulsed (note 1)	12		A
V_{GS}	Gate to Source Voltage	±30		V
E_{AS}	Single pulsed Avalanche Energy (note 2)	310		mJ
E_{AR}	Repetitive Avalanche Energy (note 1)	10		mJ
dv/dt	Peak diode Recovery dv/dt (note 3)	4.5		V/ns
P_D	Total power dissipation (@T_C=25ºC)	106	39*	W
	Derating Factor above 25ºC	0.8	0.31	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

*. Drain current is limited by junction temperature.

Thermal characteristics

Symbol	Parameter	Value		Unit
		TO-220	TO-220F	
R_{thjc}	Thermal resistance, Junction to case	1.18	3.18	ºC/W
R_{thcs}	Thermal resistance, Case to Sink	0.5		ºC/W
R_{thja}	Thermal resistance, Junction to ambient	62.5		ºC/W

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Electrical characteristic (T_C = 25°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=250uA	800	-	-	V
ΔBV_{DSS} / ΔT_J	Breakdown voltage temperature coefficient	I_D=250uA, referenced to 25°C	-	1.0	-	V/°C
I_{DSS}	Drain to source leakage current	V_{DS}=800V, V_{GS}=0V	-	-	1	uA
		V_{DS}=640V, T_C=125°C	-	-	20	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	3.0	-	5.0	V
$R_{DS(ON)}$	Drain to source on state resistance	V_{GS}=10V, I_D = 1.5A		3.8	4.5	Ω
Dynamic characteristics						
C_{iss}	Input capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz		540	700	pF
C_{oss}	Output capacitance			55	70	
C_{rss}	Reverse transfer capacitance			6	7.5	
$t_{d(on)}$	Turn on delay time	V_{DS}=400V, I_D=3.0A, R_G=25Ω		20	40	ns
tr	Rising time			28	95	
$t_{d(off)}$	Turn off delay time			45	55	
t_f	Fall time			48	75	
Q_g	Total gate charge	V_{DS}=640V, V_{GS}=10V, I_D=3.0A		26	35	nC
Q_{gs}	Gate-source charge			3.5		
Q_{gd}	Gate-drain charge			8.0		

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	-	-	3	A
I_{SM}	Pulsed source current		-	-	12	A
V_{SD}	Diode forward voltage drop.	I_S=3.0A, V_{GS}=0V	-	-	1.4	V
T_{rr}	Reverse recovery time	I_S=3.0A, V_{GS}=0V, dI_F/dt=100A/us	-	640	-	ns
Q_{rr}	Breakdown voltage temperature		-	4.0	-	uC

※. Notes

1. Repeatitive rating : pulse width limited by junction temperature.
2. L = 67mH, I_{AS} = 3.0A, V_{DD} = 50V, R_G=25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 3.0A, di/dt = 200A/us, V_{DD} ≤ BV_{DSS}, Staring T_J =25°C
4. Pulse Test : Pulse Width ≤ 300us, duty cycle ≤ 2%
5. Essentially independent of operating temperature.

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Fig. 1. On-state characteristics

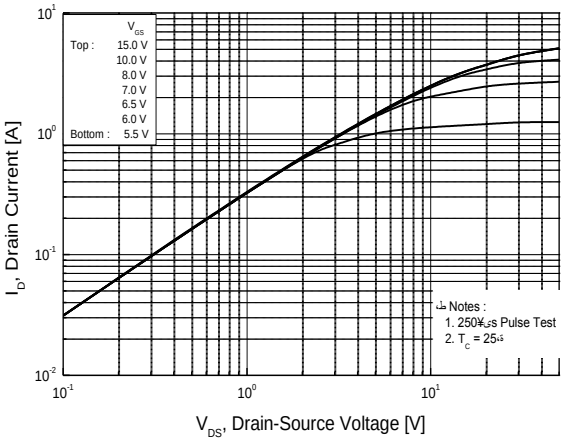

Fig. 2. Transfer characteristics

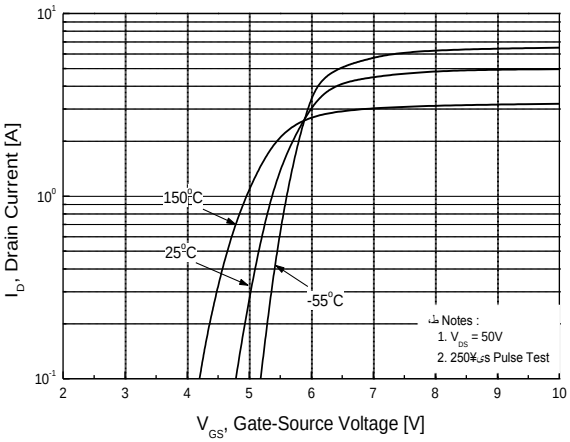

Fig. 3. On-resistance variation vs. drain current and gate voltage

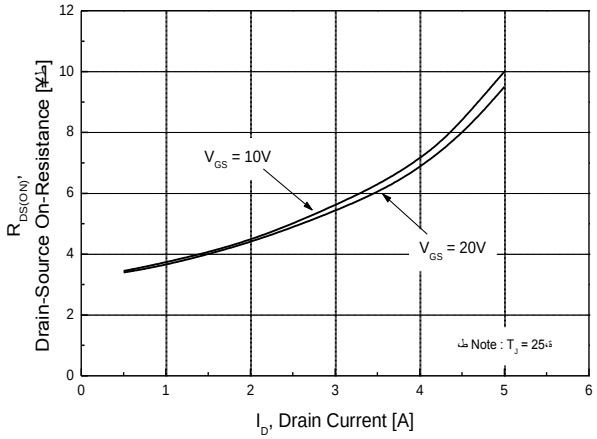

Fig. 4. On state current vs. diode forward voltage

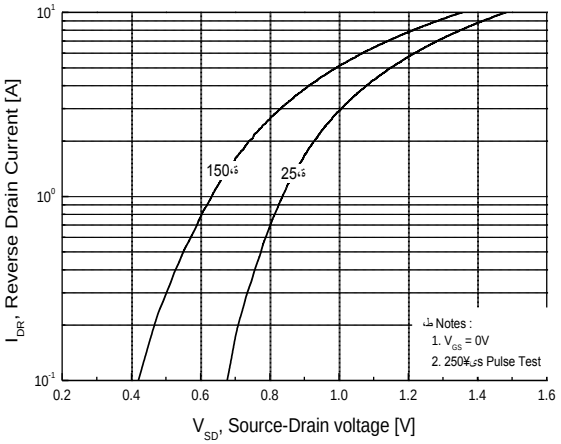

Fig. 5. Capacitance characteristics (Non-Repetitive)

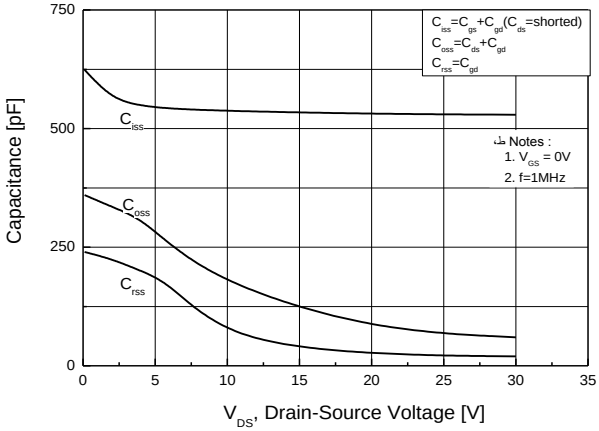

Fig. 6. Gate charge characteristics

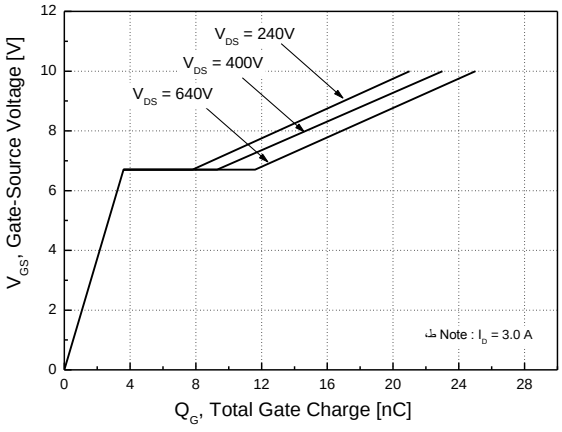

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Fig 7. Breakdown Voltage Variation vs. Junction Temperature

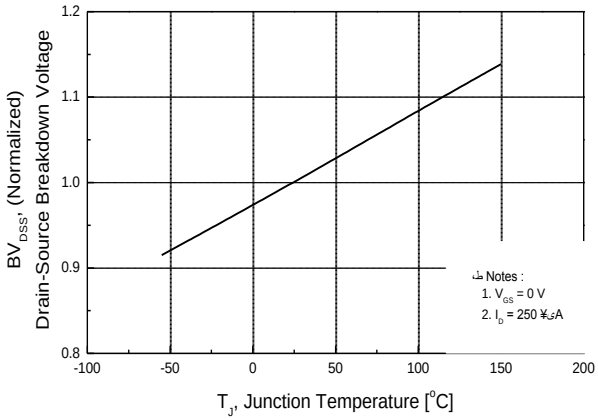

Fig. 8. On resistance variation vs. junction temperature

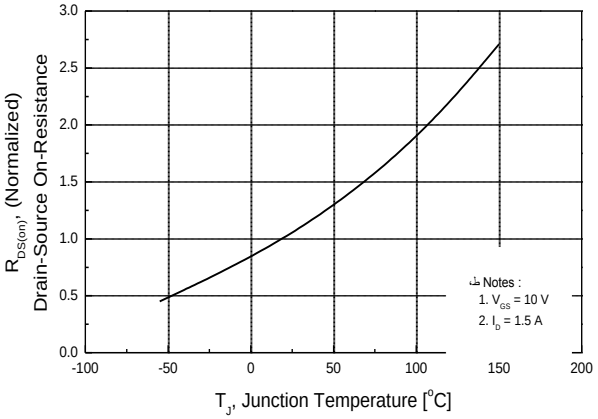

Fig. 9. Maximum drain current vs. case temperature.

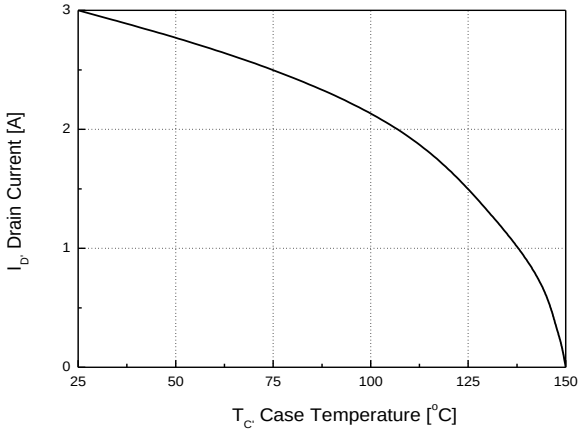

Fig. 10. Maximum safe operating area

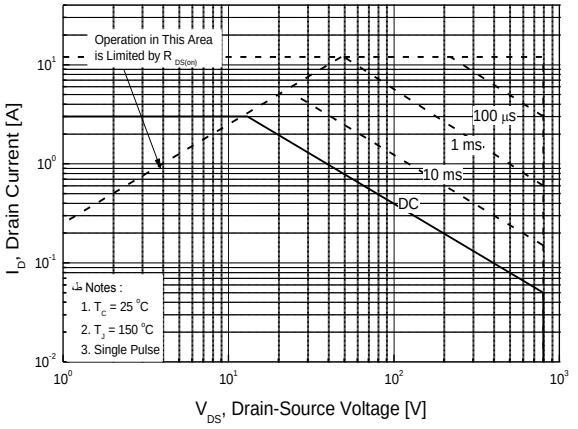

Fig. 11. Transient thermal response curve

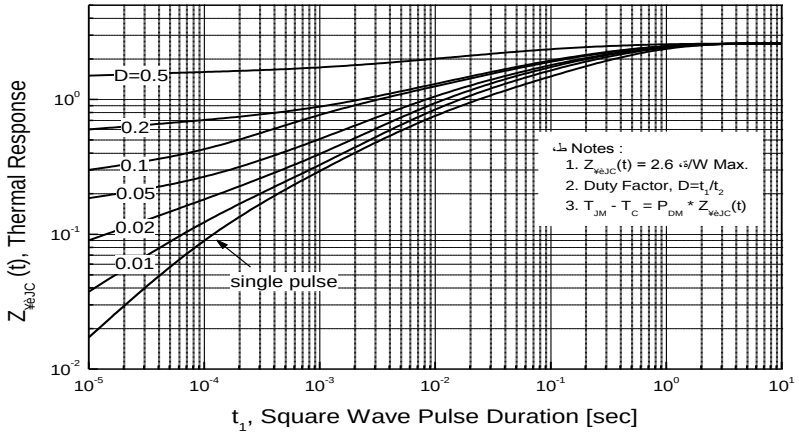

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Fig. 12. Gate charge test circuit & waveform

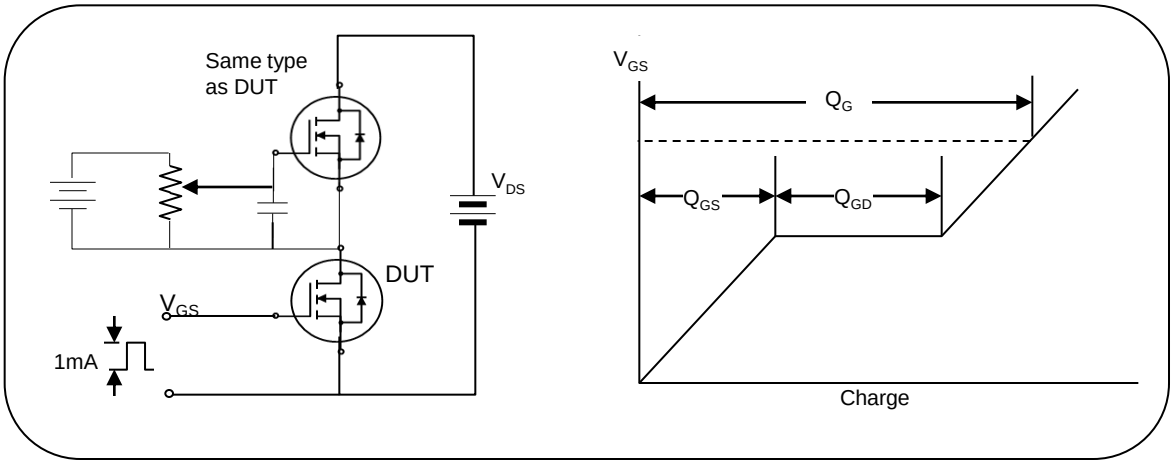

Fig. 13. Switching time test circuit & waveform

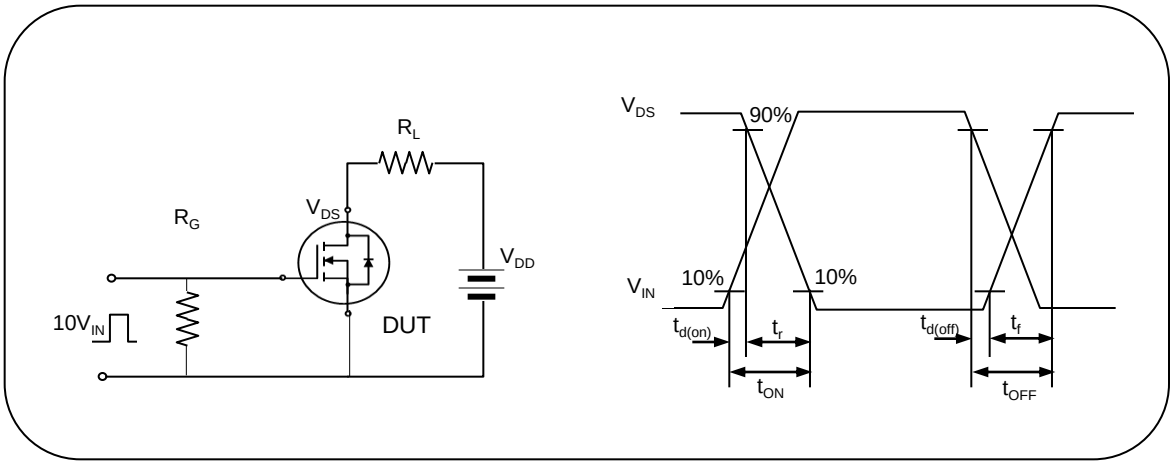

Fig. 14. Unclamped Inductive switching test circuit & waveform

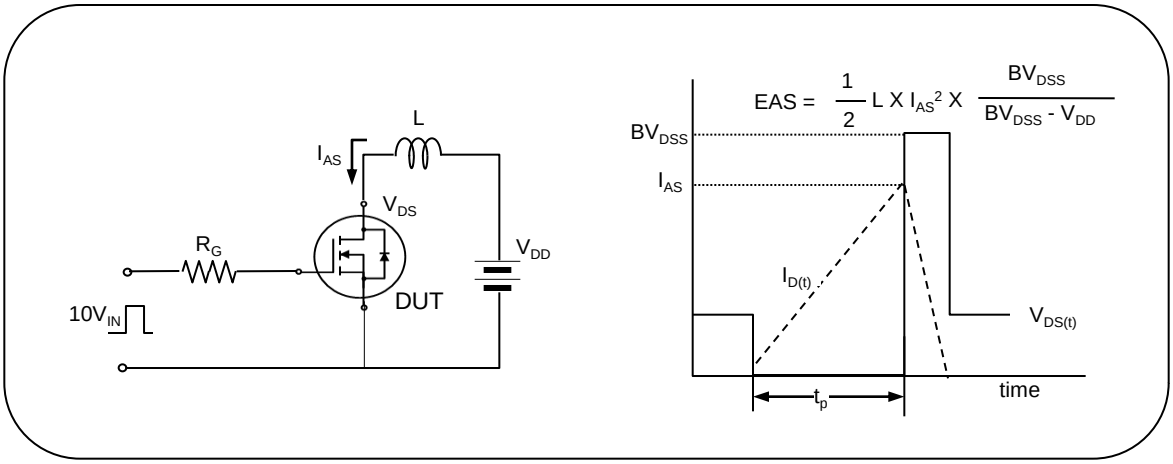

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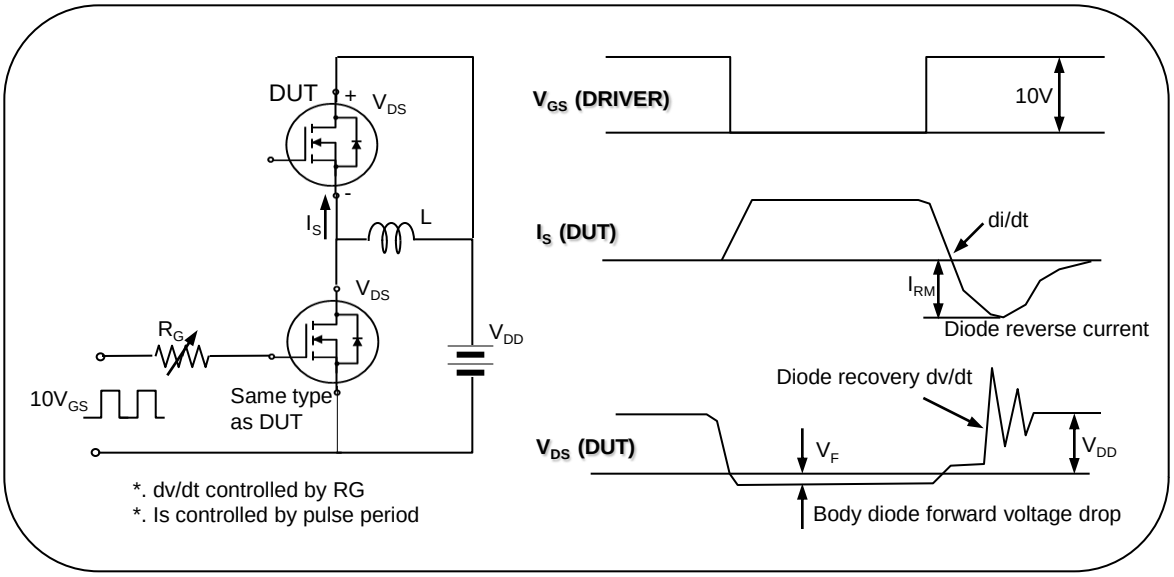
Fig. 15. Peak diode recovery dv/dt test circuit & waveform



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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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