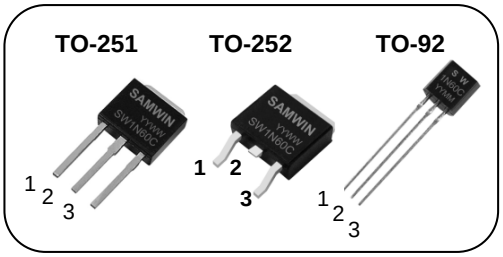
N-channel D-PAK/I-PAK/TO-92 MOSFET

Features

- High ruggedness
- $R_{DS(ON)}$ (Max 9 **Ω**)@V_{GS}=10V
- Gate Charge (Max 6nC)
- Improved dv/dt Capability
- 100% Avalanche Tested

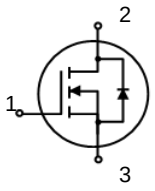


1. Gate 2. Drain 3. Source

BV_{DSS} : 600V

I_D : 1.0A

$R_{DS(ON)}$: 9.0ohm



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 AC adaptors and SMPS.

Order Codes

Item	Sales Type	Marking	Package	Packaging
1	SW C 1N60C	SW1N60C	TO-92	TAPE
2	SW I 1N60C	SW1N60C	TO-251	TUBE
3	SW D 1N60C	SW1N60C	TO-252	REEL

Absolute maximum ratings

Symbol	Parameter	Value			Unit
		TO-92	TO-251	TO-252	
V_{DSS}	Drain to Source Voltage	600			V
I_D	Continuous Drain Current (@T_C=25°C)	0.8	1.0		A
	Continuous Drain Current (@T_C=100°C)	0.5	0.65		A
I_{DM}	Drain current pulsed (note 1)	2.0	4.0		A
V_{GS}	Gate to Source Voltage	±30			V
E_{AS}	Single pulsed Avalanche Energy (note 2)	52			mJ
E_{AR}	Repetitive Avalanche Energy (note 1)	0.3			mJ
dv/dt	Peak diode Recovery dv/dt (note 3)	4.5			V/ns
P_D	Total power dissipation (@T_C=25°C)	3	30		W
	Derating Factor above 25°C	0.025	0.23		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.	260	275		°C

Thermal characteristics

Symbol	Parameter	Value			Unit
		TO-92	TO-251	TO-252	
R_{thjC}	Thermal resistance, Junction to case	-	4.2		°C/W
R_{thCS}	Thermal resistance, Junction to Lead Max	40	-		°C/W
R_{thjA}	Thermal resistance, Junction to ambient	120	100		°C/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	600	-	-	V
I_{DSS}	Drain to source leakage current	V_{DS}=600V, V_{GS}=0V	-	-	1	uA
		V_{DS}=480V, T_C=125ºC	-	-	10	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 = 0.5A		5	9	Ω
Dynamic characteristics						
C_{iss}	Input capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	120	150	pF
C_{oss}	Output capacitance		-	18	25	
C_{rss}	Reverse transfer capacitance		-	4	6	
$t_{d(on)}$	Turn on delay time	V_{DS}=300V, I_D=1.0A, R_G=25Ω	-	15	35	ns
tr	Rising time		-	75	140	
$t_{d(off)}$	Turn off delay time		-	30	60	
t_f	Fall time		-	35	60	
Q_g	Total gate charge	V_{DS}=480V, V_{GS}=10V, I_D=1.0A	-	7	9	nC
Q_{gs}	Gate-source charge		-	1.3	-	
Q_{gd}	Gate-drain charge		-	2.4	-	

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	-	-	1.0	A
I_{SM}	Pulsed source current		-	-	4.0	A
V_{SD}	Diode forward voltage drop.	I_S=1.0A, V_{GS}=0V	-	-	1.5	V
T_{rr}	Reverse recovery time	I_S=1.0A, V_{GS}=0V, dI_F/dt=100A/us	-	190	-	ns
Q_{rr}	Breakdown voltage temperature		-	0.44	-	uC

※. Notes

1. Repeatitive rating : pulse width limited by junction temperature.
2. L = 95mH, I_{AS} = 1.0A, V_{DD} = 50V, R_G=25Ω, Starting T_J = 25ºC
3. I_{SD} ≤ 1.0A, di/dt = 300A/us, V_{DD} ≤ 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

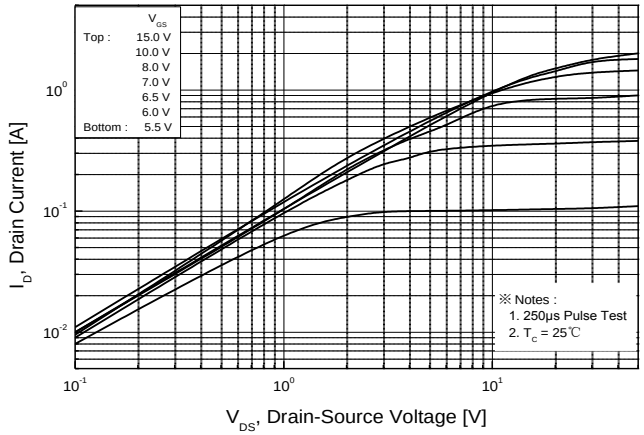

Fig. 2. Transfer characteristics

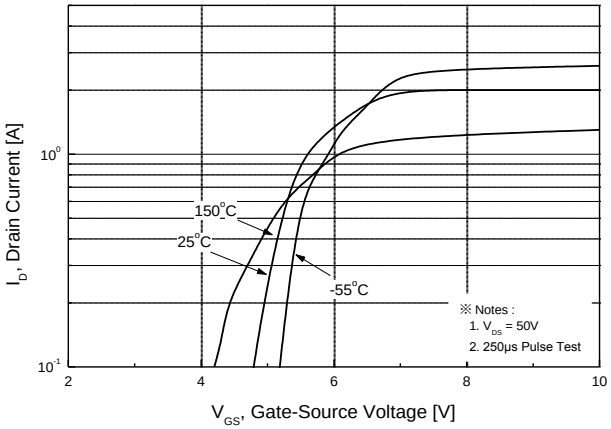

Fig. 3. On-resistance variation vs. drain current and gate voltage

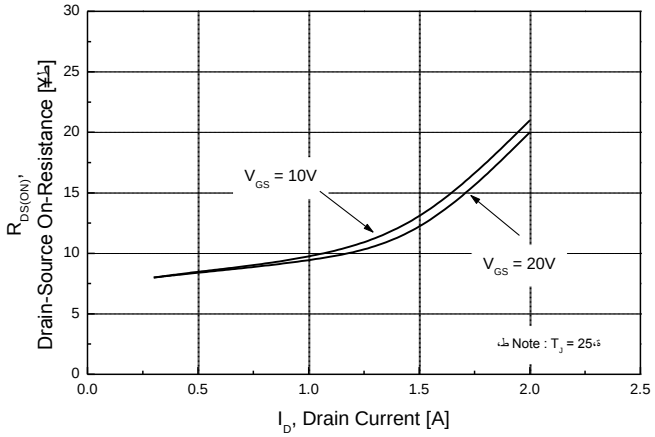

Fig. 4. On state current vs. diode forward voltage

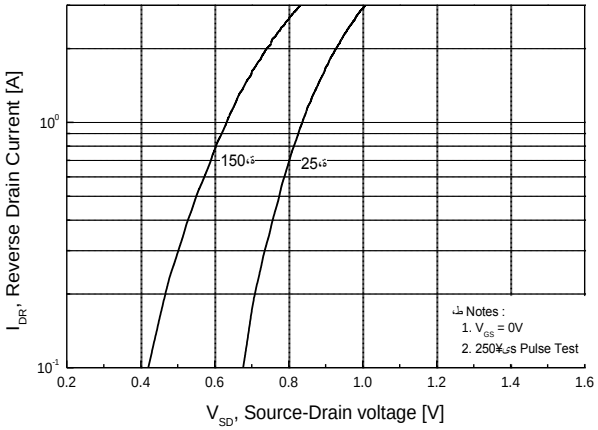

Fig. 5. Capacitance characteristics (Non-Repetitive)

Fig. 6. Gate charge characteristics

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Fig 7. Breakdown Voltage Variation vs. Junction Temperature

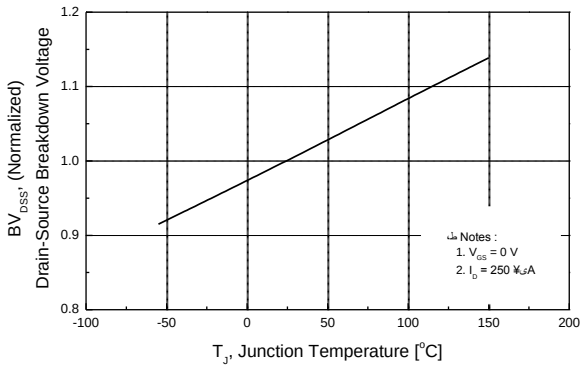

Fig. 8. On resistance variation vs. junction temperature

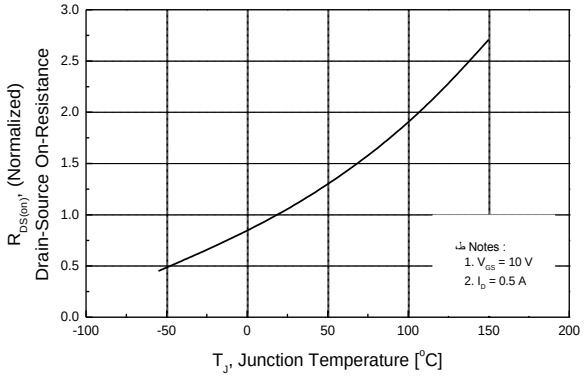

Fig. 9. Maximum drain current vs. case temperature.

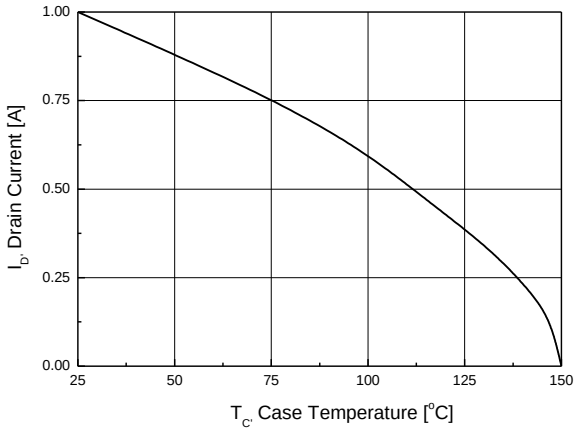

Fig. 10. Maximum safe operating area

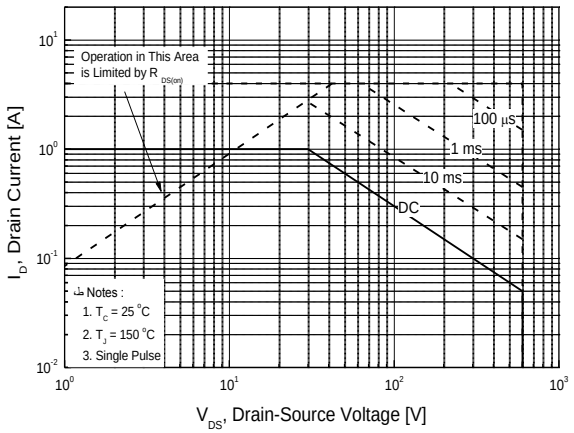

Fig. 11. Transient thermal response curve

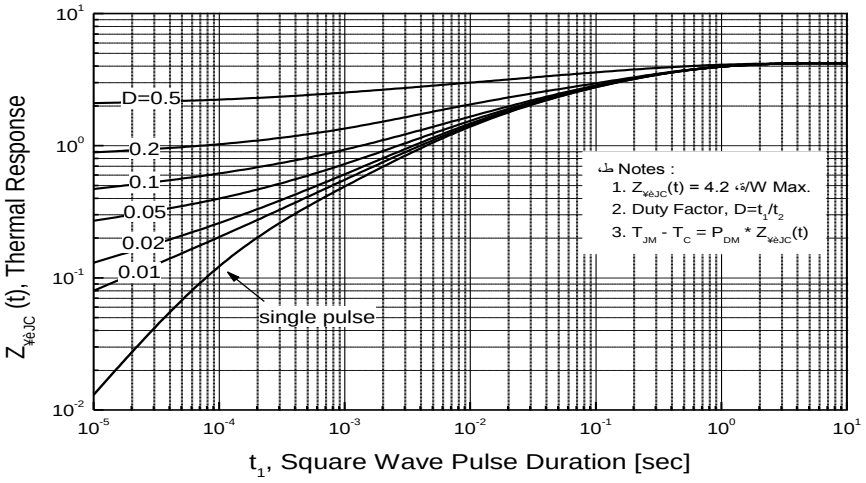

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Fig. 12. Gate charge test circuit & waveform

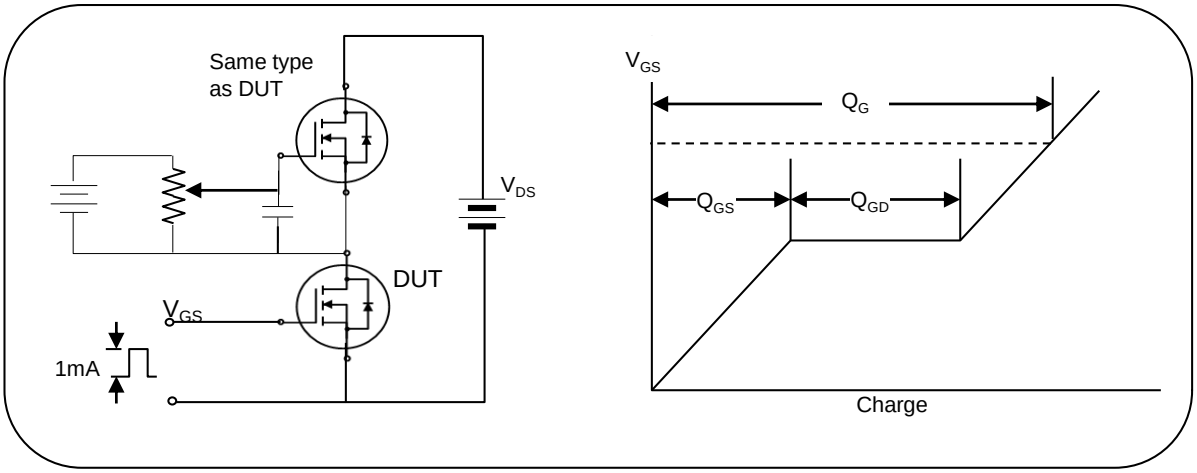

Fig. 13. Switching time test circuit & waveform

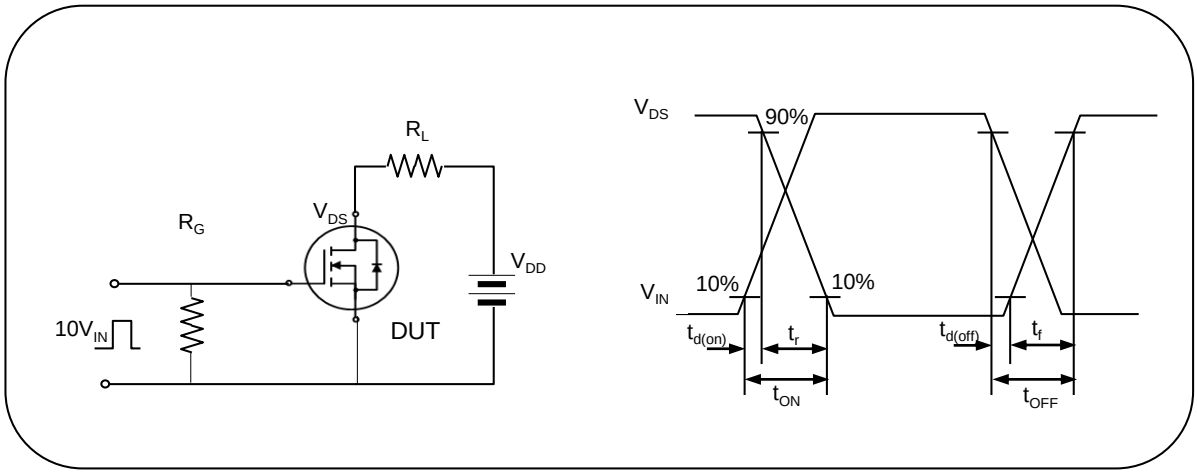

Fig. 14. Unclamped Inductive switching test circuit & waveform

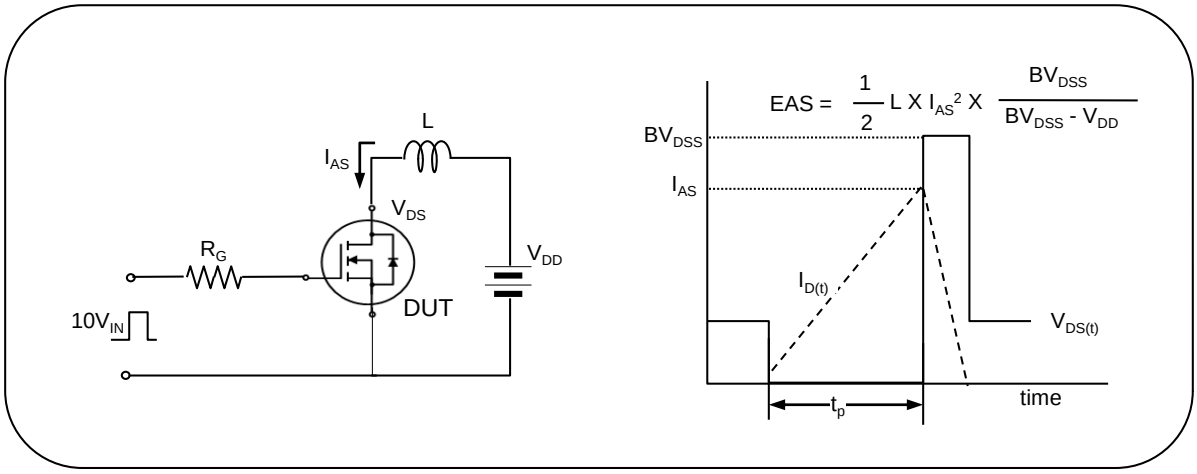

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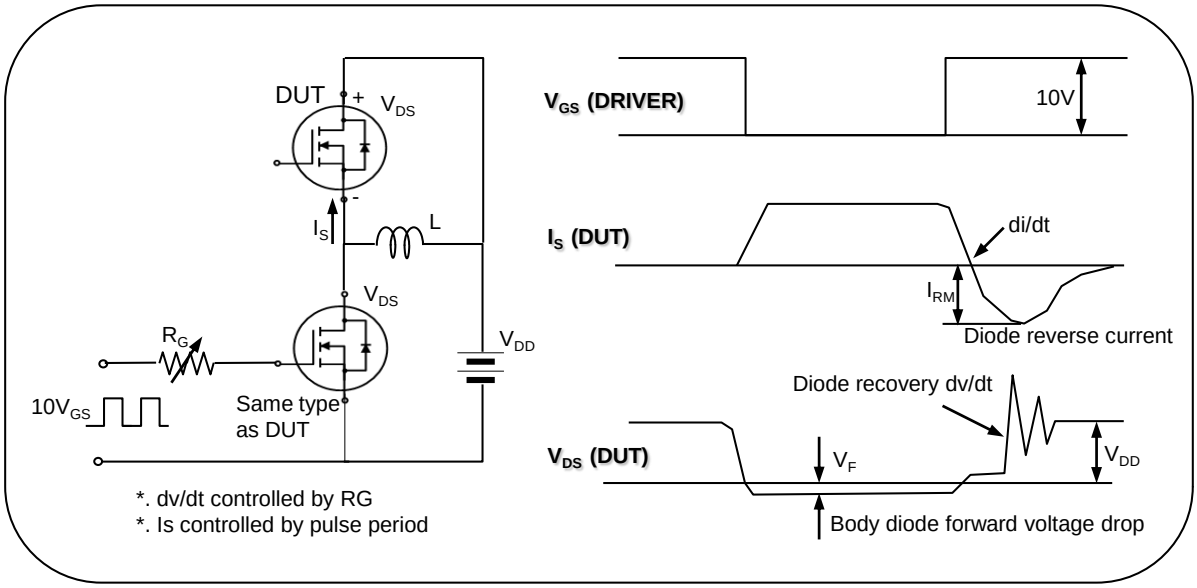
Fig. 15. Peak diode recovery dv/dt test circuit & waveform



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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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