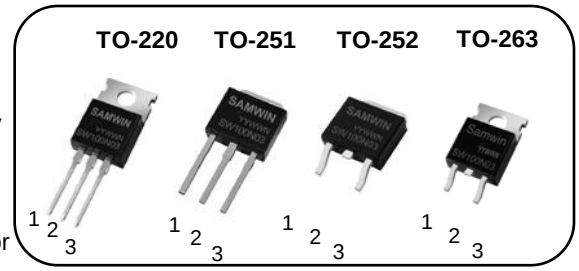
N-channel Enhanced mode TO-220/TO-251/TO-252/TO-263 MOSFET

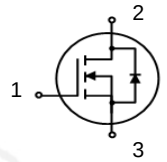
Features

- High ruggedness
- Low $R_{DS(ON)}$ (Typ 4.0mΩ)@V_{GS}=10V
- Low Gate Charge (Typ 69nC)
- Improved dv/dt Capability
- 100% Avalanche Tested
- Application: DC-DC Converter; Motor Control;Synchronous Rectification



1. Gate 2. Drain 3. Source

BV_{DSS} : 30V
I_D : 100A
$R_{DS(ON)}$: 4.0mΩ



General Description

This power MOSFET is produced with advanced technology of SAMWIN.
This technology enable the power MOSFET to have better characteristics, including fast switching time, low on resistance, low gate charge and especially excellent avalanche characteristics.

Order Codes

Item	Sales Type	Marking	Package	Packaging
1	SW P 100N03	SW100N03	TO-220	TUBE
2	SW I 100N03	SW100N03	TO-251	TUBE
3	SW D 100N03	SW100N03	TO-252	REEL
4	SW B 100N03	SW100N03	TO-263	REEL

Absolute maximum ratings

Symbol	Parameter	Value				Unit
		TO-220	TO-251	TO-252	TO-263	
V_{DSS}	Drain to source voltage	30				V
I_D	Continuous drain current (@T_C=25°C)	100*				A
	Continuous drain current (@T_C=100°C)	63*				A
I_{DM}	Drain current pulsed (note 1)	400				A
V_{GS}	Gate to source voltage	±20				V
E_{AS}	Single pulsed avalanche energy (note 2)	507				mJ
E_{AR}	Repetitive avalanche energy (note 1)	39				mJ
P_D	Total power dissipation (@T_C=25°C)	113	96	83	96	W
	Derating factor above 25°C	0.9	0.77	0.67	0.77	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

*. Drain current is limited by junction temperature.

Thermal characteristics

Symbol	Parameter	Value				Unit
		TO-220	TO-251	TO-252	TO-263	
R_{thjc}	Thermal resistance, Junction to case	1.1	1.3	1.5	1.3	°C/W
R_{thja}	Thermal resistance, Junction to ambient	62.5	100	100	62.5	°C/W

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	30			V
ΔBV_{DSS} / ΔT_J	Breakdown voltage temperature coefficient	I_D=250uA, referenced to 25ºC		0.16		V/ºC
I_{DSS}	Drain to source leakage current	V_{DS}=30V, V_{GS}=0V			1	uA
		V_{DS}=24V, T_C=125ºC			100	uA
I_{GSS}	Gate to source leakage current, forward	V_{GS}=20V, V_{DS}=0V			100	nA
	Gate to source leakage current, reverse	V_{GS}=-20V, V_{DS}=0V			-100	nA
On characteristics						
$V_{GS(TH)}$	Gate threshold voltage	V_{DS}=V_{GS}, I_D=250uA	1.0		3.0	V
$R_{DS(ON)}$	Drain to source on state resistance	V_{GS}=10V, I_D = 50A		4.0	5.3	mΩ
Dynamic characteristics						
C_{iss}	Input capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz		9500		pF
C_{oss}	Output capacitance			800		
C_{rss}	Reverse transfer capacitance			300		
$t_{d(on)}$	Turn on delay time	V_{DS}=15V, I_D=100A, R_G=25Ω (note 4,5)		14.5		ns
t_r	Rising time			100		
$t_{d(off)}$	Turn off delay time			212		
t_f	Fall time			156		
Q_g	Total gate charge	V_{DS}=24V, V_{GS}=10V, I_D=100A (note 4,5)		69		nC
Q_{gs}	Gate-source charge			13		
Q_{gd}	Gate-drain charge			16		

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			90	A
I_{SM}	Pulsed source current				360	A
V_{SD}	Diode forward voltage drop.	I_S=100A, V_{GS}=0V			1.4	V
t_{rr}	Reverse recovery time	I_S=100A, V_{GS}=0V, dI_F/dt=100A/us		12		ns
Q_{rr}	Reverse recovery charge			4.2		nC

※. Notes

1. Repeatitive rating : pulse width limited by junction temperature.
2. L = 105uH, I_{AS} = 100A, V_{DD} = 25V, R_G=25Ω, Starting T_J = 25ºC
3. I_{SD} ≤ 100A, di/dt = 100A/us, V_{DD} ≤ BV_{DSS}, Staring T_J =25ºC
4. Pulse Test : Pulse Width ≤ 300us, duty cycle ≤ 2%.
5. Essentially independent of operating temperature.

Fig. 1. On-state characteristics

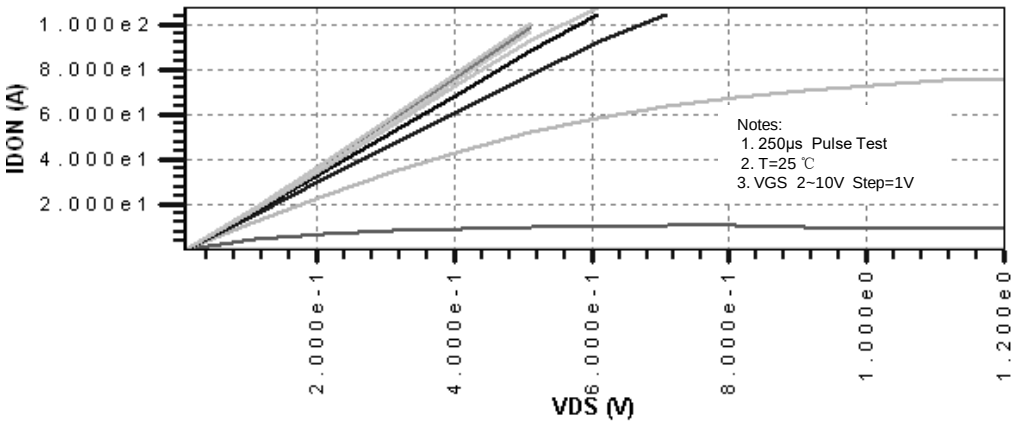


Fig. 2. Gate charge characteristics

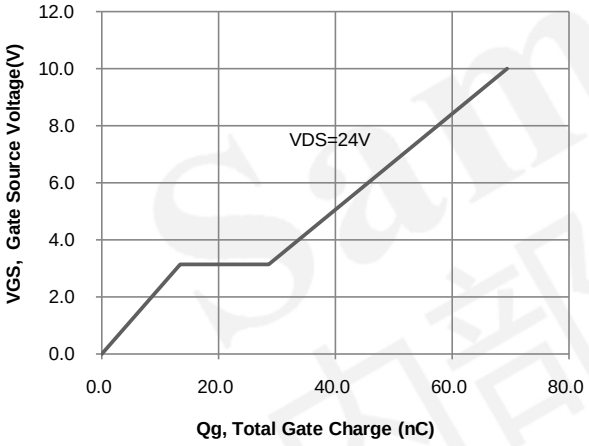


Fig. 3. On state current vs. diode forward voltage

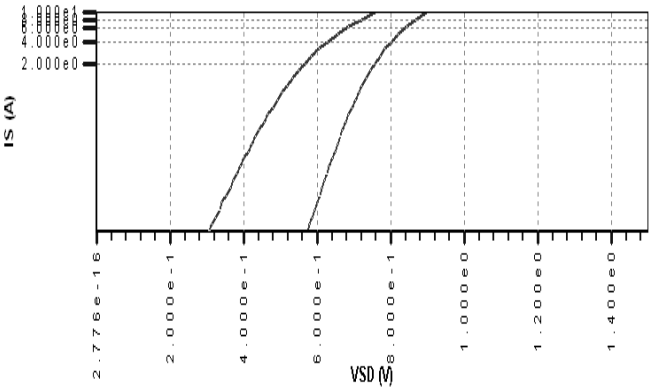


Fig 4. Breakdown Voltage Variation vs. Junction Temperature

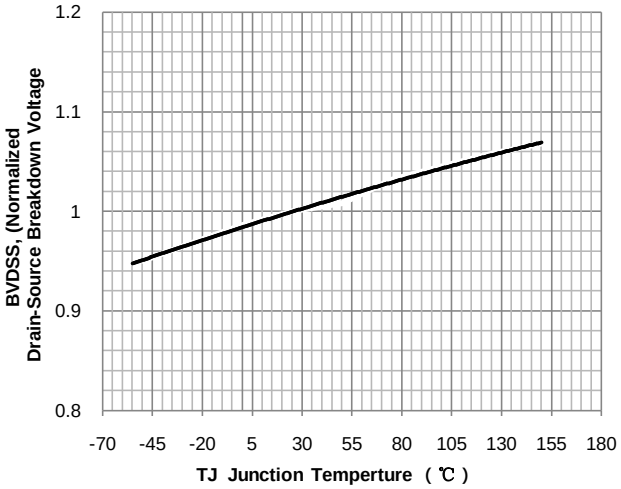


Fig. 5. On resistance variation vs. junction temperature

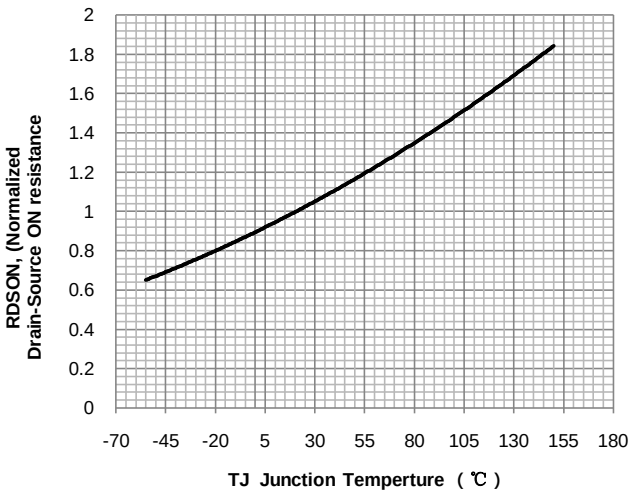


Fig. 6. Maximum safe operating area

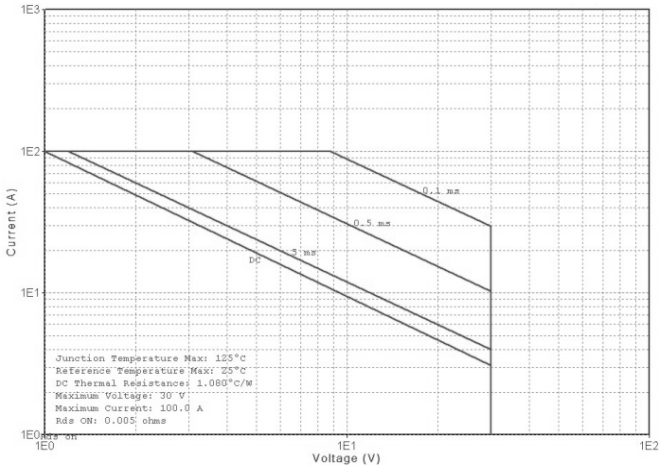


Fig. 7. Transient thermal response curve

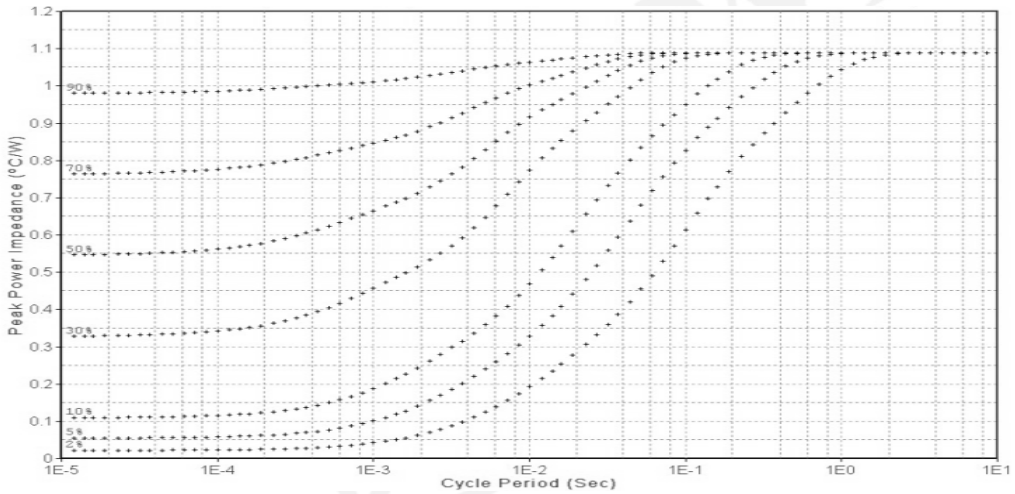
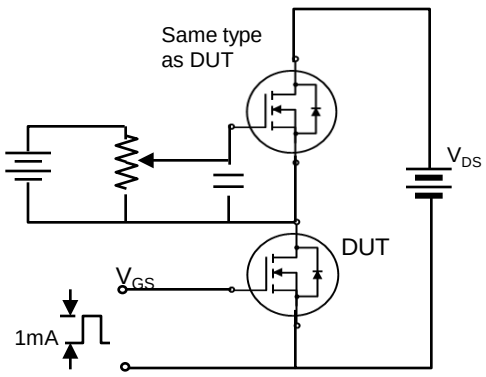


Fig. 8. Gate charge test circuit & waveform



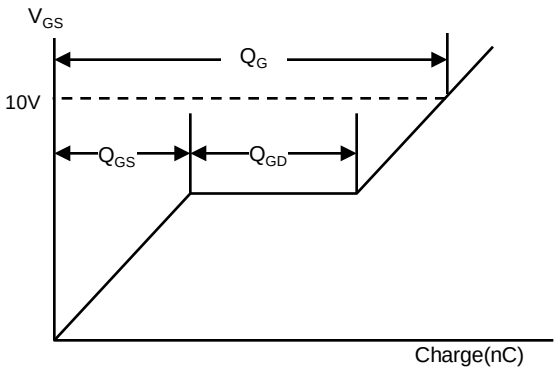


Fig. 9. Switching time test circuit & waveform

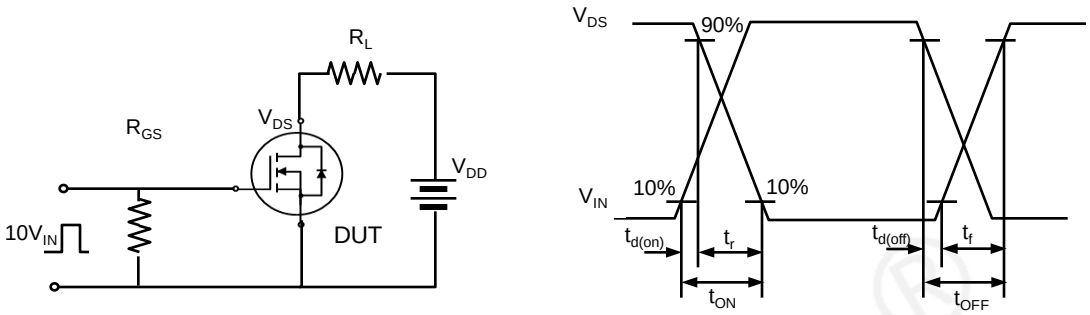


Fig. 10. Unclamped Inductive switching test circuit & waveform

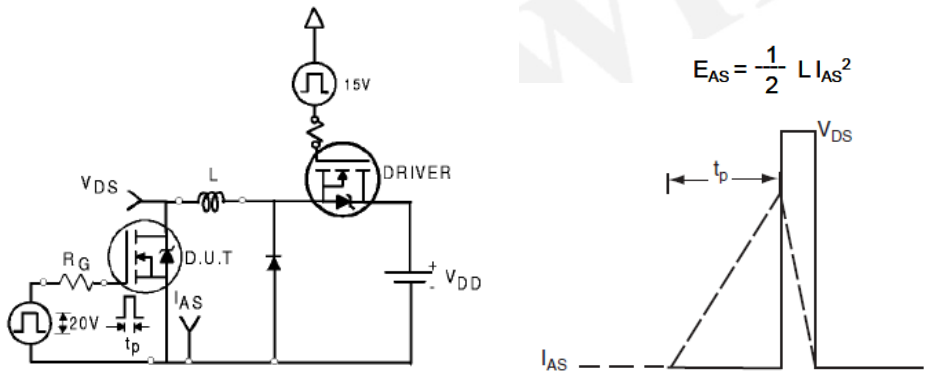
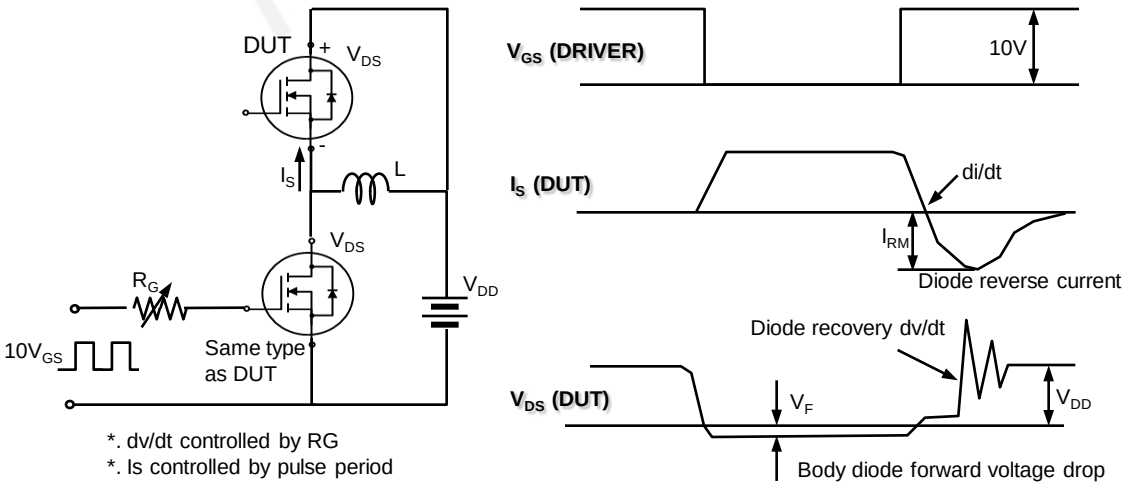


Fig. 11. Peak diode recovery dv/dt test circuit & waveform



*. dv/dt controlled by RG
*. Is controlled by pulse period

DISCLAIMER

* All the data & curve in this document was tested in XI'AN SEMIPOWER TESTING & APPLICATION CENTER.
* This product has passed the PCT,TC,HTRB,HTGB,HAST,PC and Solderdunk reliability testing.
* Qualification standards can also be found on the Web site (**http://www.semipower.com.cn**)
* Suggestions for improvement are appreciated, Please send your suggestions to **samwin@samwinsemi.com**