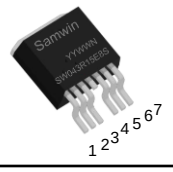
N-channel Enhanced mode TO-263-6 MOSFET

Features

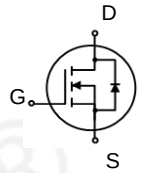
- High ruggedness
- Low $R_{DS(ON)}$ (Typ 3.6mΩ)@V_{GS}=10V
- Low Gate Charge (Typ 162nC)
- Improved dv/dt Capability
- 100% Avalanche Tested
- Application:Synchronous Rectification, Li Battery Protect Board, Motor Drives

TO-263-6



1. Gate 4.Drain 2,3,5~7.Source

BV_{DSS} : 150V
I_D : 250A
$R_{DS(ON)}$: 3.6mΩ



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 BD 043R15E8S	SW043R15E8S	TO-263-6	REEL

Absolute maximum ratings

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to source voltage		150	V
I_D	Continuous drain current (@T_C=25°C)		250*	A
	Continuous drain current (@T_C=100°C)		174*	A
I_{DM}	Drain current pulsed	(note 1)	1000	A
V_{GS}	Gate to source voltage		±20	V
E_{AS}	Single pulsed avalanche energy	(note 2)	812	mJ
E_{AR}	Repetitive avalanche energy	(note 1)	80	mJ
dv/dt	Peak diode recovery dv/dt	(note 3)	5	V/ns
P_D	Total power dissipation (@T_C=25°C)		416.7	W
	Derating factor above 25°C		3.3	W/°C
T_{STG}, T_J	Operating junction temperature & storage temperature		-55 ~ + 150	°C

*. Drain current is limited by junction temperature.

Thermal characteristics

Symbol	Parameter	Value	Unit
R_{thjc}	Thermal resistance, Junction to case	0.3	°C/W

Electrical characteristic (T_J = 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=250μA	150			V
ΔBV_{DSS} / ΔT_J	Breakdown voltage temperature coefficient	I_D=250μA, referenced to 25°C		0.06		V/°C
I_{DSS}	Drain to source leakage current	V_{DS}=150V, V_{GS}=0V			1	μA
		V_{DS}=120V, T_J=125°C			50	μA
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=250μA	2.5		4.5	V
$R_{DS(ON)}$	Drain to source on state resistance	V_{GS}=10V, I_D=30A,T_J=25°C		3.6	4.6	mΩ
		V_{GS}=10V, I_D=30A,T_J=125°C		5.1		mΩ
G_{fs}	Forward transconductance	V_{DS}=5V, I_D=20A		62		S
Dynamic characteristics						
C_{iss}	Input capacitance	V_{GS}=0V, V_{DS}=75V, f=100kHz		10695		pF
C_{oss}	Output capacitance			842		
C_{rss}	Reverse transfer capacitance			33		
$t_{d(on)}$	Turn on delay time	V_{DS}=75V, I_D=30A, R_G=4.7Ω, V_{GS}=10V (note 4,5)		60		ns
t_r	Rising time			75		
$t_{d(off)}$	Turn off delay time			96		
t_f	Fall time			40		
Q_g	Total gate charge	V_{DS}=120V, V_{GS}=10V, I_D=30A , I_G=5mA (note 4,5)		162		nC
Q_{gs}	Gate-source charge			61		
Q_{gd}	Gate-drain charge			41		
R_g	Gate resistance	f=1MHz,Open Drain		1.6		Ω

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			250	A
I_{SM}	Pulsed source current				1000	A
V_{SD}	Diode forward voltage drop.	I_S=50A, V_{GS}=0V			1.4	V
t_{rr}	Reverse recovery time	I_S=30A, V_{GS}=0V, dI_F/dt=100A/μs		110		ns
Q_{rr}	Reverse recovery charge			359		nC

※. Notes

1. Repeatitive rating : pulse width limited by junction temperature.
2. L =0.5mH, I_{AS} =57A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25°C
3. I_{SD} ≤30A, di/dt = 100A/μs, V_{DD} ≤ BV_{DSS}, Staring T_J =25°C
4. Pulse Test : Pulse Width ≤ 300μs, duty cycle ≤ 2%.
5. Essentially independent of operating temperature.

Fig. 1. On-state characteristics

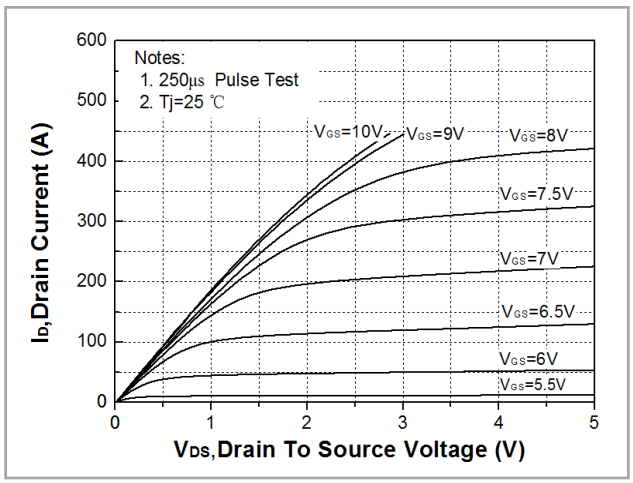


Fig. 2. Transfer Characteristics

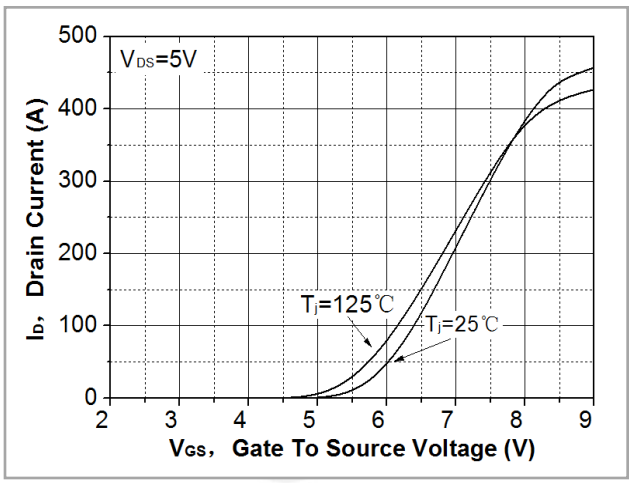


Fig. 3. On-resistance variation vs. drain current and gate voltage

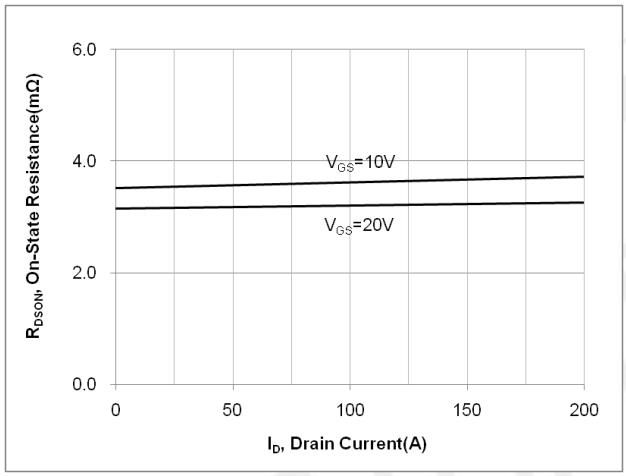


Fig. 4. On-state current vs. diode forward voltage

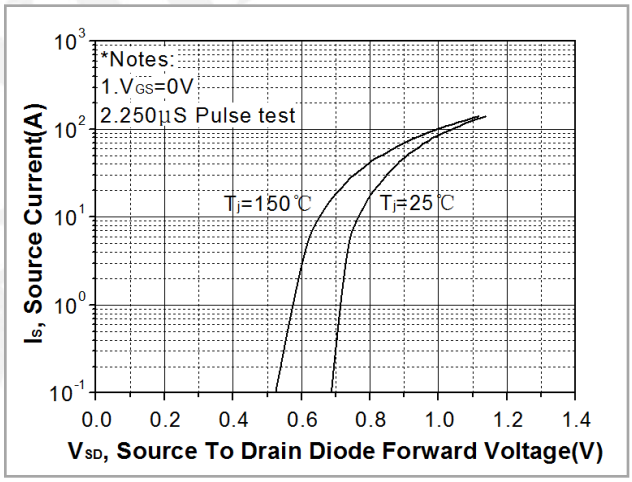


Fig 5. Breakdown voltage variation vs. junction temperature

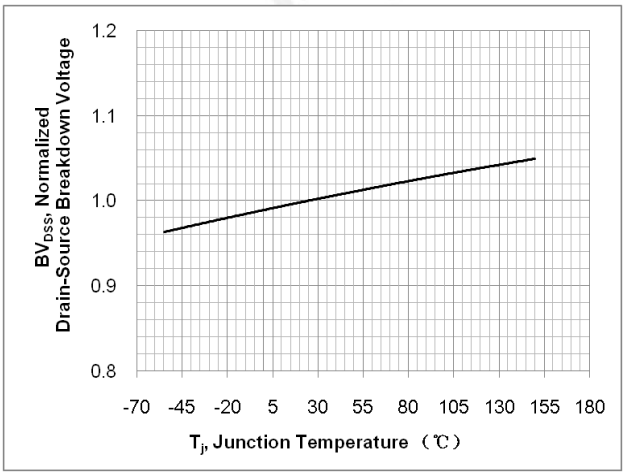


Fig. 6. On-resistance variation vs. junction temperature

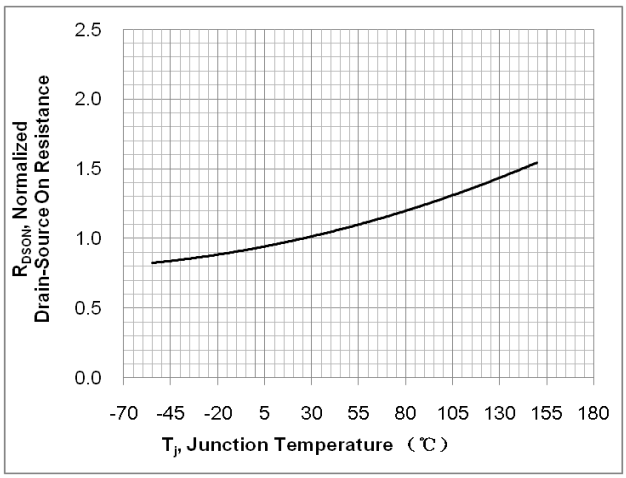


Fig. 7. Gate charge characteristics

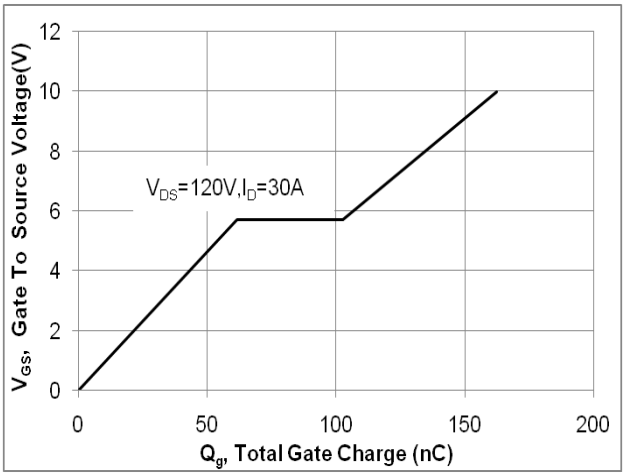


Fig. 8. Capacitance Characteristics

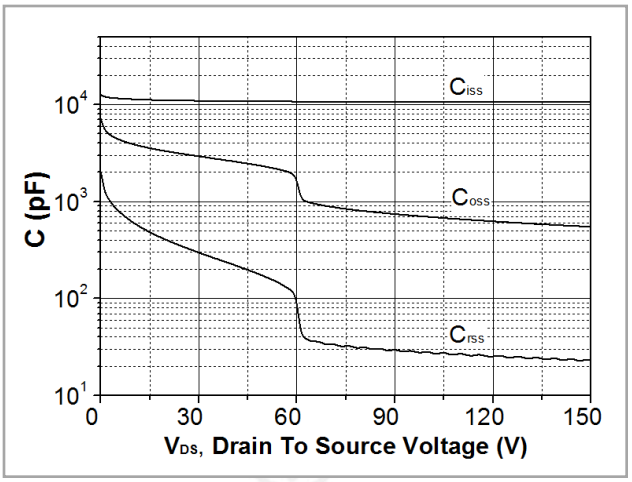


Fig. 9. Maximum safe operating area

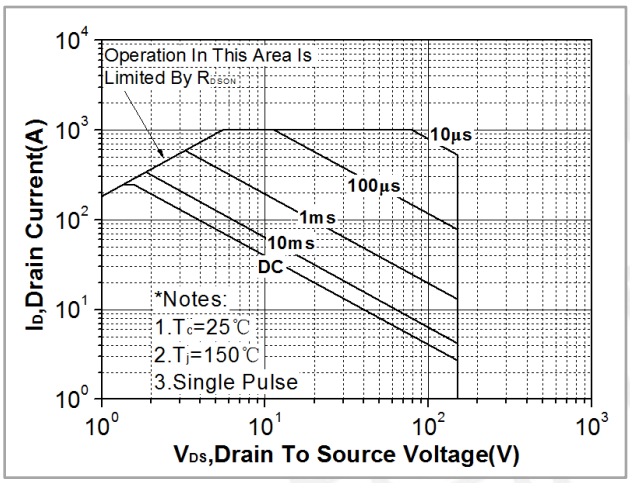


Fig. 10. Maximum drain current vs. case temperature

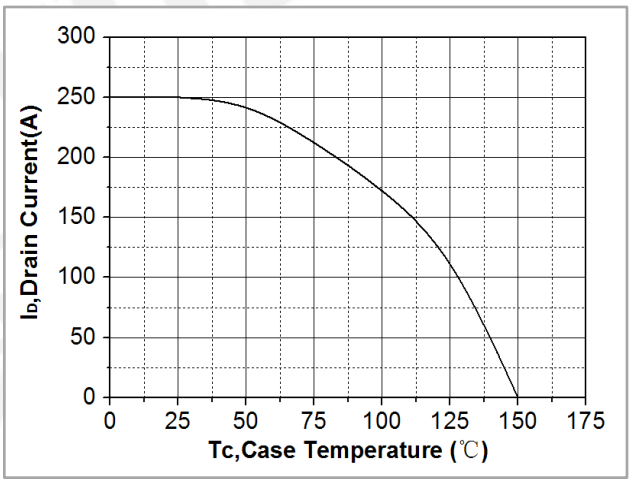


Fig. 11. Transient thermal response curve

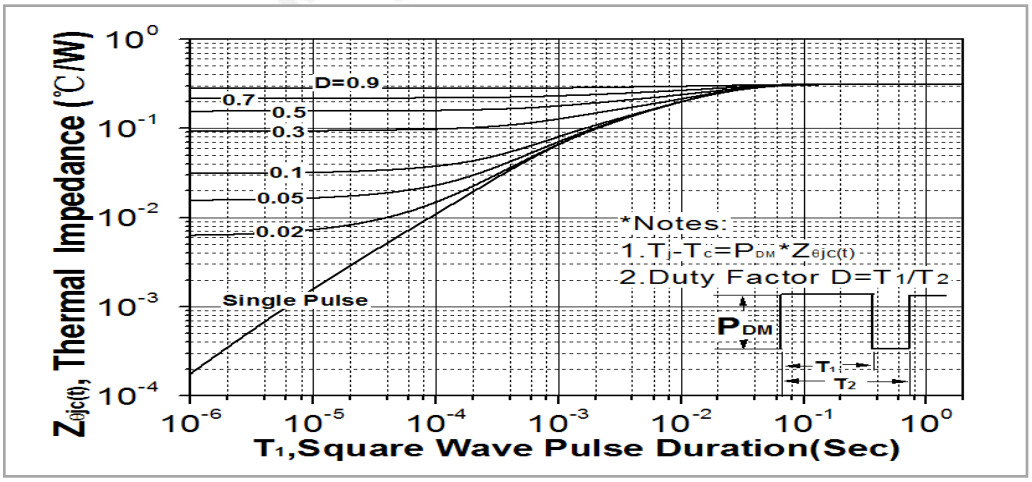


Fig. 12. Gate charge test circuit & waveform

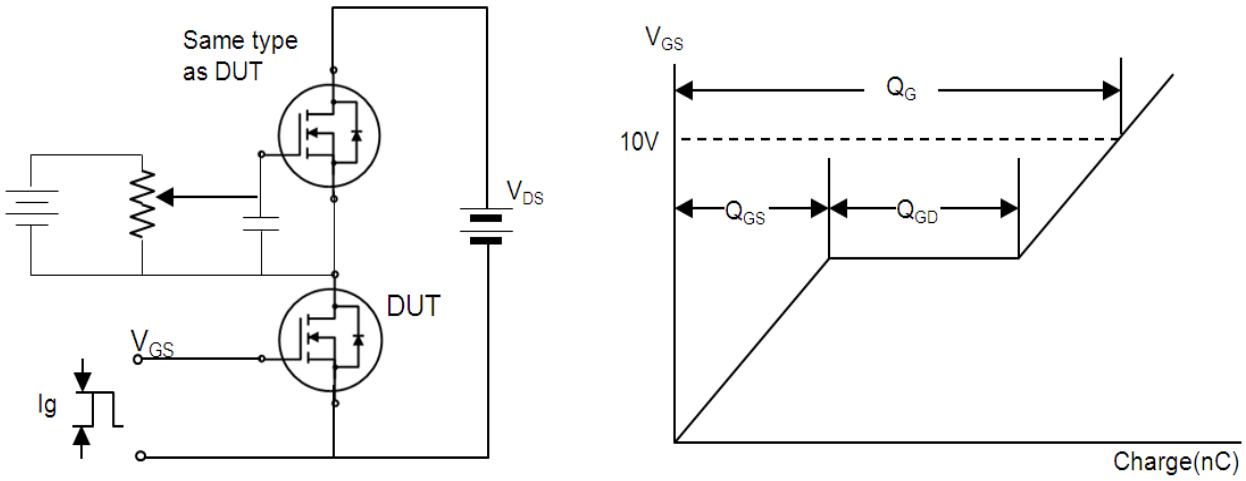


Fig. 13. Switching time test circuit & waveform

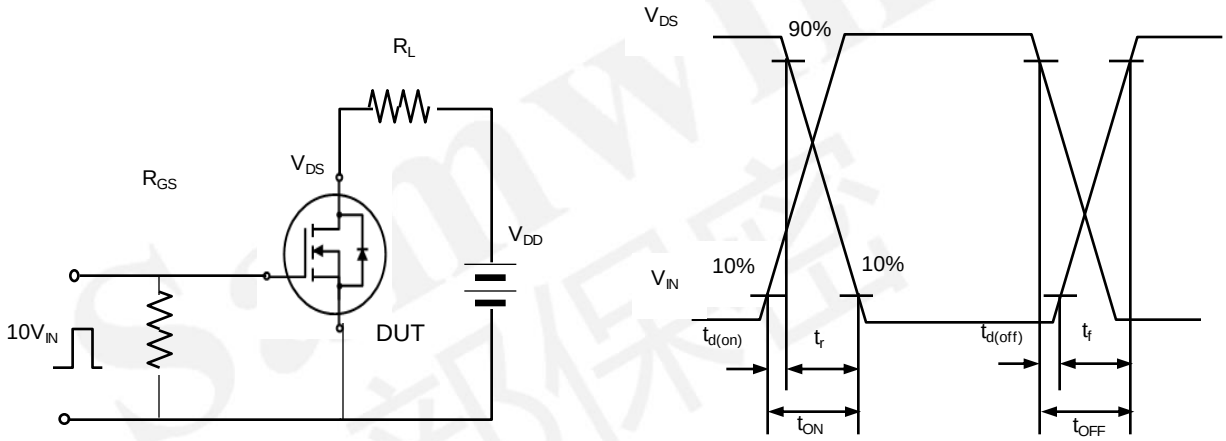
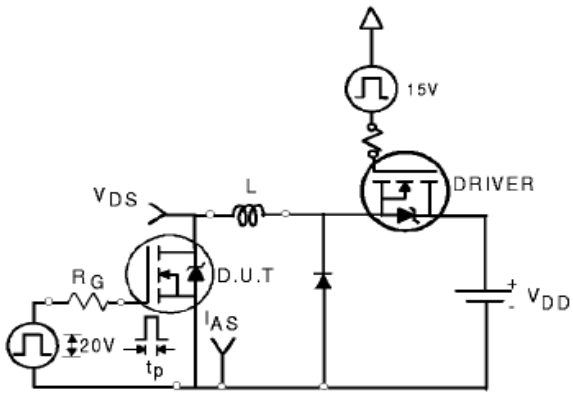


Fig. 14. Unclamped Inductive switching test circuit & waveform



$$E_{AS} = \frac{1}{2} L I_{AS}^2$$

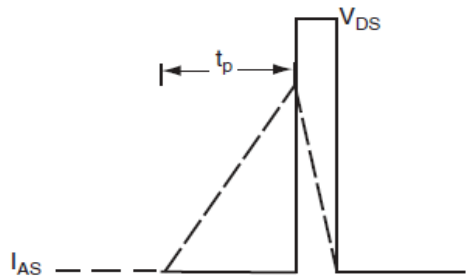


Fig. 15. Peak diode recovery dv/dt test circuit & waveform