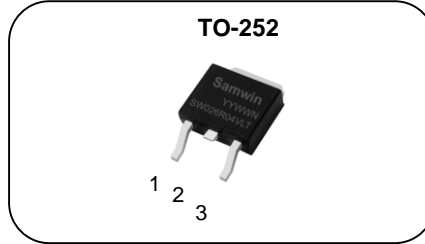


N-channel Enhanced mode TO-252 MOSFET

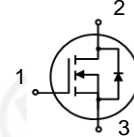
Features

- High ruggedness
- Low $R_{DS(ON)}$ (Typ 3.9mΩ)@ $V_{GS}=4.5V$
(Typ 2.9mΩ)@ $V_{GS}=10V$
- Low Gate Charge (Typ 153nC)
- Improved dv/dt Capability
- 100% Avalanche Tested
- Application: Synchronous Rectification, Li Battery Protect Board, Motor Drives



1. Gate 2. Drain 3. Source

BV_{DSS} : 40V
 I_D : 140A
 $R_{DS(ON)}$: 3.9mΩ@ $V_{GS}=4.5V$
 2.9mΩ@ $V_{GS}=10V$



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 D 026R04VLT	SW026R04VLT	TO-252	REEL

Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DSS}	Drain to source voltage	40	V
I_D	Continuous drain current (@ $T_C=25^\circ C$)	140*	A
	Continuous drain current (@ $T_C=100^\circ C$)	100*	A
I_{DM}	Drain current pulsed (note 1)	560	A
V_{GS}	Gate to source voltage	±20	V
E_{AS}	Single pulsed avalanche energy (note 2)	552	mJ
E_{AR}	Repetitive avalanche energy (note 1)	50	mJ
dv/dt	Peak diode recovery dv/dt (note 3)	5	V/ns
P_D	Total power dissipation (@ $T_C=25^\circ C$)	131.6	W
	Derating factor above 25°C	1.1	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	0.95	°C/W

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

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Off characteristics						
BV_{DSS}	Drain to source breakdown voltage	$V_{GS}=0V, I_D=250\mu A$	40			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown voltage temperature coefficient	$I_D=250\mu A$, referenced to 25°C		0.03		V/ $^\circ\text{C}$
I_{DSS}	Drain to source leakage current	$V_{DS}=40V, V_{GS}=0V$			1	μA
		$V_{DS}=32V, T_J=125^\circ\text{C}$			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	$V_{DS}=V_{GS}, I_D=250\mu A$	1		2.2	V
$R_{DS(ON)}$	Drain to source on state resistance	$V_{GS}=4.5V, I_D=30A, T_J=25^\circ\text{C}$		3.9	4.4	m Ω
		$V_{GS}=10V, I_D=30A, T_J=25^\circ\text{C}$		2.9	3.4	m Ω
		$V_{GS}=10V, I_D=30A, T_J=125^\circ\text{C}$		4.7		m Ω
G_{fs}	Forward transconductance	$V_{DS}=5V, I_D=30A$		82		S
Dynamic characteristics						
C_{iss}	Input capacitance	$V_{GS}=0V, V_{DS}=20V, f=1\text{MHz}$		7166		pF
C_{oss}	Output capacitance			972		
C_{riss}	Reverse transfer capacitance			662		
$t_{d(on)}$	Turn on delay time	$V_{DS}=20V, I_D=30A, R_G=4.7\Omega, V_{GS}=10V$ (note 4,5)		19		ns
t_r	Rising time			45		
$t_{d(off)}$	Turn off delay time			84		
t_f	Fall time			24		
Q_g	Total gate charge	$V_{DS}=32V, V_{GS}=10V, I_D=30A, I_G=5\text{mA}$ (note 4,5)		153		nC
Q_{gs}	Gate-source charge			21		
Q_{gd}	Gate-drain charge			43		
R_g	Gate resistance	$V_{DS}=0V$, Scan F mode		1.5		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			140	A
I_{SM}	Pulsed source current				560	A
V_{SD}	Diode forward voltage drop.	$I_S=45A, V_{GS}=0V$			1.4	V
t_{rr}	Reverse recovery time	$I_S=30A, V_{GS}=0V, di_f/dt=100A/\mu s$		30		ns
Q_{rr}	Reverse recovery charge			20		nC

※. Notes

1. Repeattive rating : pulse width limited by junction temperature.
2. $L=0.5\text{mH}, I_{AS}=47A, V_{DD}=25V, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
3. $I_{SD} \leq 30A, di/dt = 100A/\mu s, V_{DD} \leq BV_{DSS}$, 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

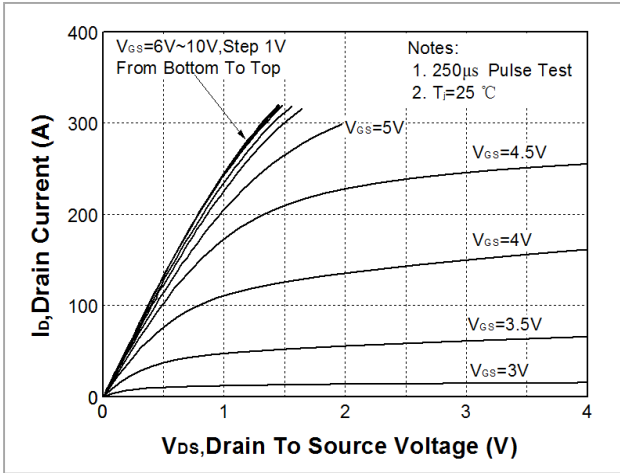


Fig. 2. Transfer Characteristics

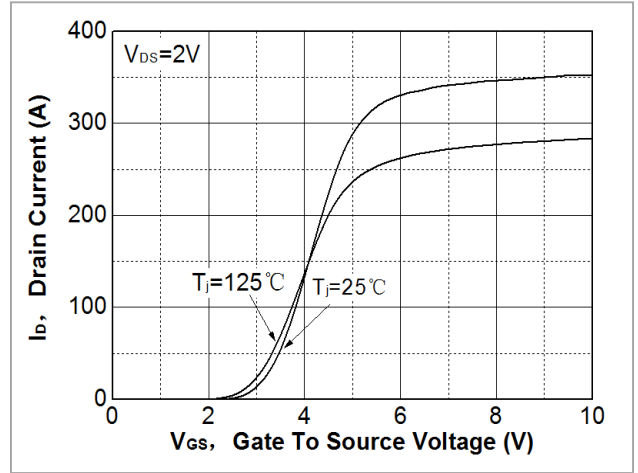


Fig. 3. On-resistance variation vs. drain current and gate voltage

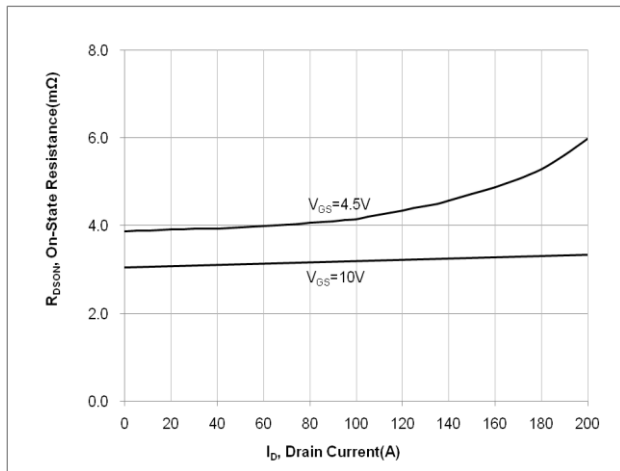


Fig. 4. On-state current vs. diode forward voltage

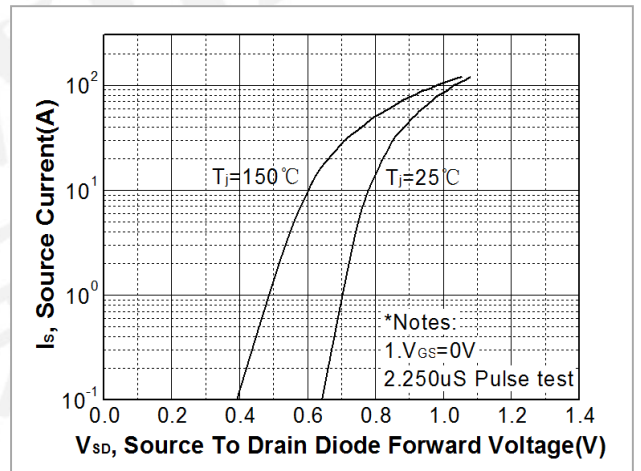


Fig 5. Breakdown voltage variation vs. junction temperature

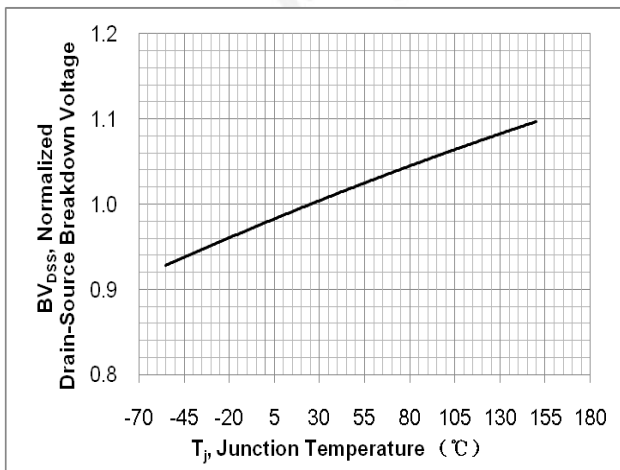


Fig. 6. On-resistance variation vs. junction temperature

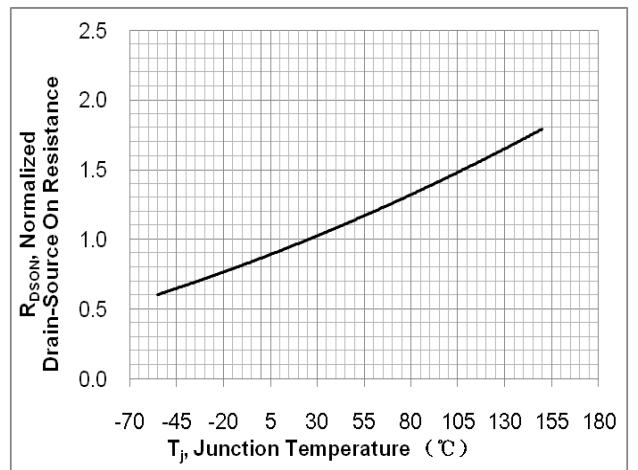


Fig. 7. Gate charge characteristics

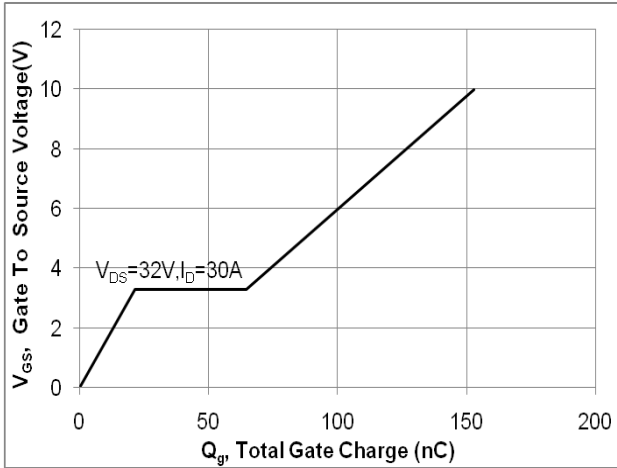


Fig. 8. Capacitance Characteristics

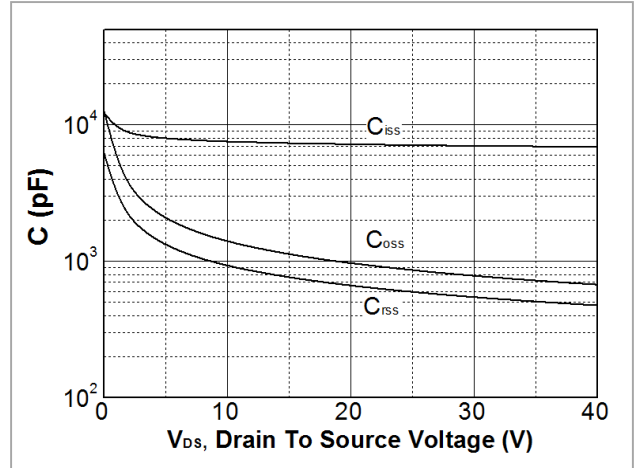


Fig. 9. Maximum safe operating area

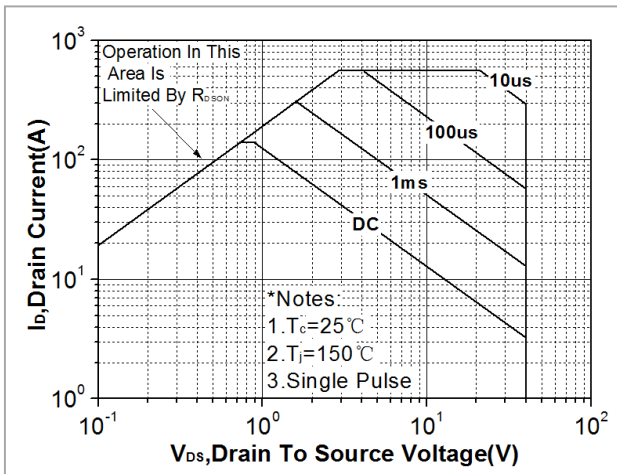


Fig. 10. Maximum drain current vs. case temperature

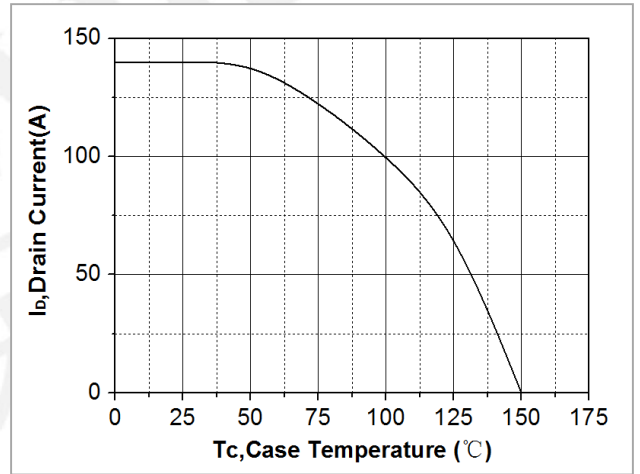


Fig. 11. Transient thermal response curve

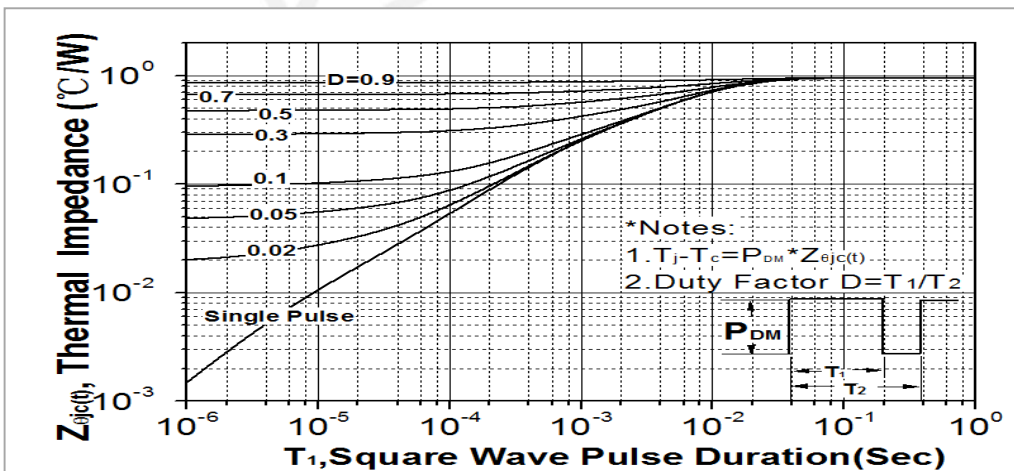


Fig. 12. Gate charge test circuit & waveform

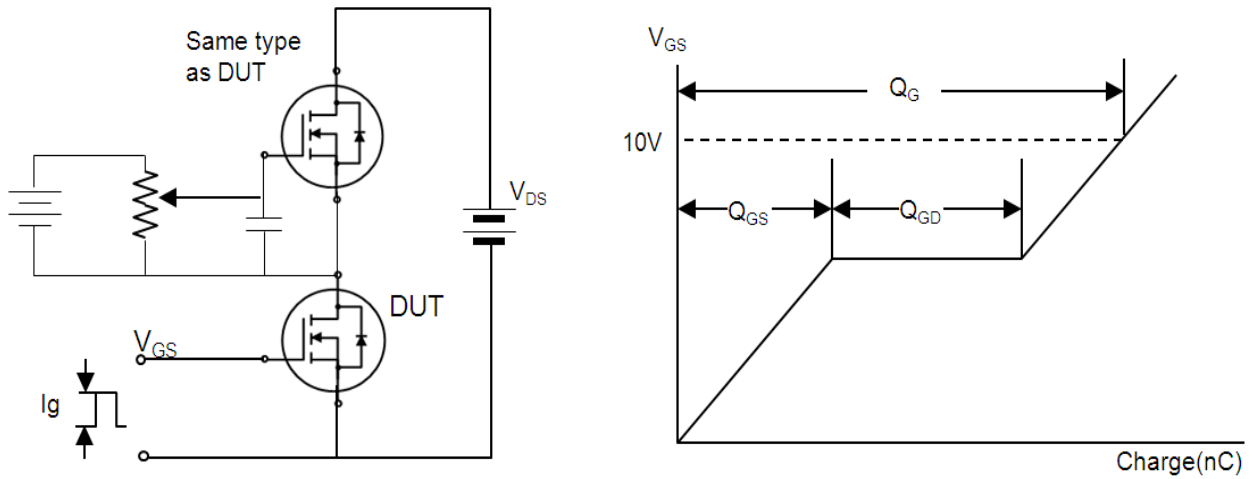


Fig. 13. Switching time test circuit & waveform

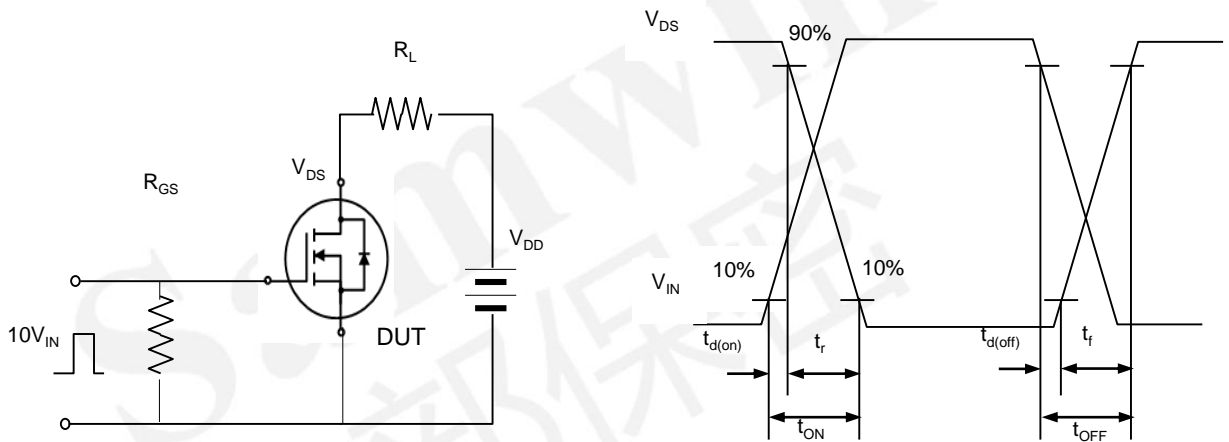


Fig. 14. Unclamped Inductive switching test circuit & waveform

