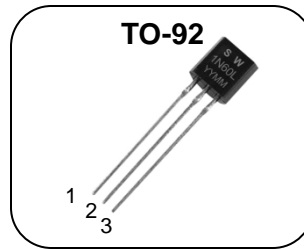


## N-channel MOSFET

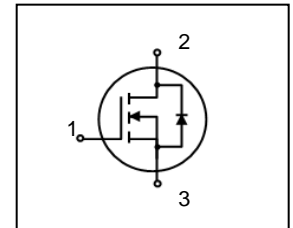
### Features

- High ruggedness
- $R_{DS(ON)}$  (Max 23  $\Omega$ ) @  $V_{GS}=10V$
- Gate Charge (Max 4.5nC)
- Improved dv/dt Capability
- 100% Avalanche Tested



1. Gate 2. Drain 3. Source

$BV_{DSS}$	: 600V
$I_D$	: 0.3A
$R_{DS(ON)}$	: 23ohm



### 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 1N60L	SW1N60L	TO-92	TAPE

### Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain to Source Voltage	600	V
$I_D$	Continuous Drain Current (@ $T_C=25^\circ C$ )	0.3	A
	Continuous Drain Current (@ $T_C=100^\circ C$ )	0.18	A
$I_{DM}$	Drain current pulsed (note 1)	1.2	A
$V_{GS}$	Gate to Source Voltage	$\pm 30$	V
$E_{AS}$	Single pulsed Avalanche Energy (note 2)	33	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 (@ $T_C=25^\circ C$ )	1	W
	Derating Factor above 25°C	0.02	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

### Thermal characteristics

Symbol	Parameter	Value	Unit
$R_{thCL}$	Thermal resistance, Junction to Lead Max	50	°C/W
$R_{thJA}$	Thermal resistance, Junction to ambient	140	°C/W

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

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
<b>Off characteristics</b>						
$BV_{DSS}$	Drain to source breakdown voltage	$V_{GS}=0V, I_D=250\mu A$	600	-	-	V
$I_{DSS}$	Drain to source leakage current	$V_{DS}=600V, V_{GS}=0V$	-	-	1	$\mu A$
		$V_{DS}=480V, T_C=125^\circ\text{C}$	-	-	10	$\mu A$
$I_{GSS}$	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
<b>On characteristics</b>						
$V_{GS(TH)}$	Gate threshold voltage	$V_{DS}=V_{GS}, I_D=50\mu A$	3.0	-	4.5	V
$R_{DS(ON)}$	Drain to source on state resistance	$V_{GS}=10V, I_D = 0.2A$			23	$\Omega$
<b>Dynamic characteristics</b>						
$C_{ISS}$	Input capacitance	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$	-		60	pF
$C_{OSS}$	Output capacitance		-		12	
$C_{RSS}$	Reverse transfer capacitance		-		3	
$t_{d(on)}$	Turn on delay time	$V_{DS}=300V, I_D=0.3A, R_G=25\Omega$	-	12		ns
$t_r$	Rising time		-	11		
$t_{d(off)}$	Turn off delay time		-	40		
$t_f$	Fall time		-	18		
$Q_g$	Total gate charge	$V_{DS}=480V, V_{GS}=10V, I_D=0.3A$	-	4.5		nC
$Q_{gs}$	Gate-source charge		-	1	-	
$Q_{gd}$	Gate-drain charge		-	3.5	-	

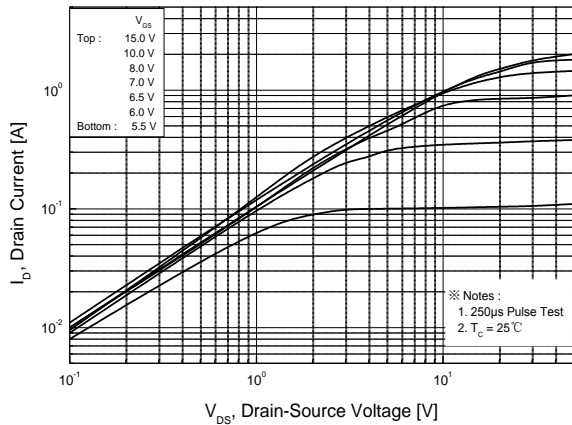
### Source to drain diode ratings characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous source current	Integral reverse p-n Junction diode in the MOSFET	-	-	0.3	A
$I_{SM}$	Pulsed source current		-	-	1.2	A
$V_{SD}$	Diode forward voltage drop.	$I_S=0.3A, V_{GS}=0V$	-	-	1.5	V
$T_{rr}$	Reverse recovery time	$I_S=0.3A, V_{GS}=0V,$	-	112	-	ns
$Q_{rr}$	Breakdown voltage temperature	$di_f/dt=100A/\mu s$	-	0.3	-	$\mu C$

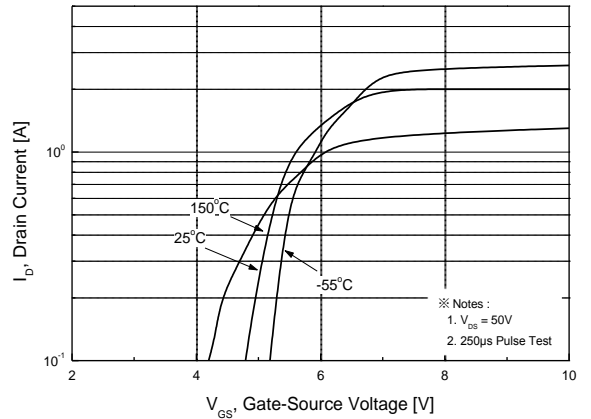
※. Notes

1. Repeitative rating : pulse width limited by junction temperature.
2.  $L = 92\text{mH}, I_{AS} = 0.3A, V_{DD} = 50V, R_G=25\Omega,$  Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 0.3A, di/dt = 100A/\mu s, V_{DD} \leq BV_{DSS},$  Staring  $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse Width  $\leq 300\mu s,$  duty cycle  $\leq 2\%$
5. Essentially independent of operating temperature.

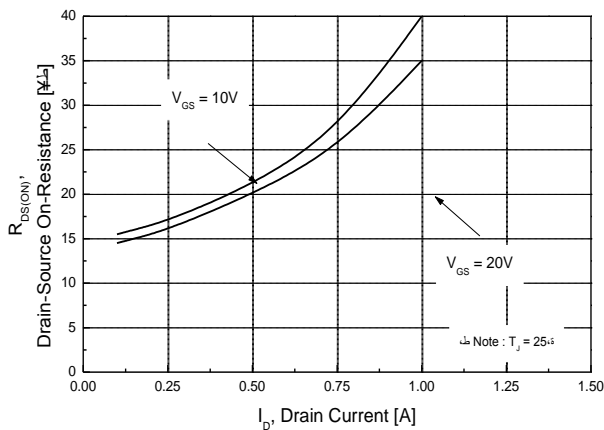
**Fig. 1. On-state characteristics**



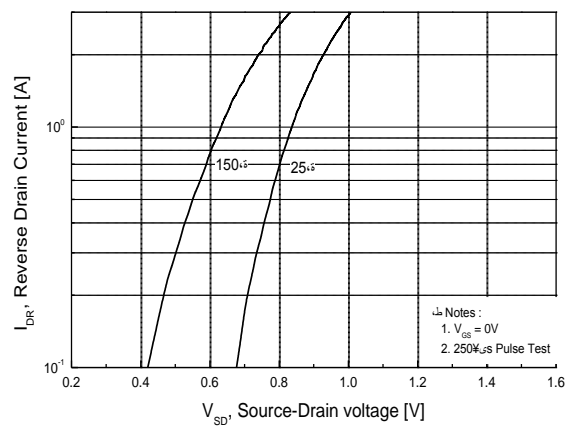
**Fig. 2. Transfer characteristics**



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



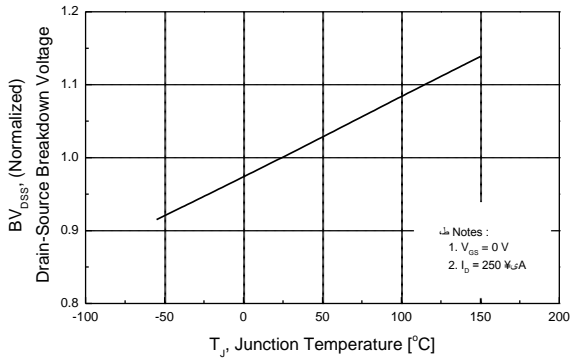
**Fig. 4. On state current vs. diode forward voltage**



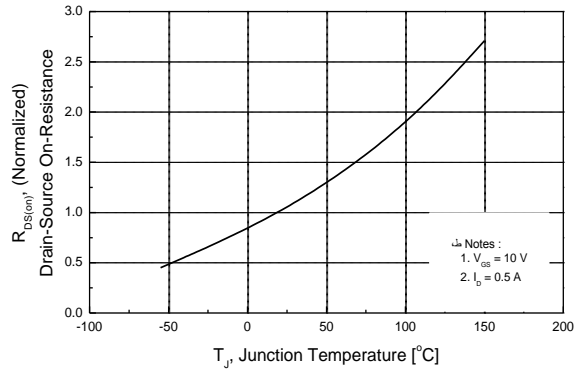
**Fig. 5. Capacitance characteristics (Non-Repetitive)**

**Fig. 6. Gate charge characteristics**

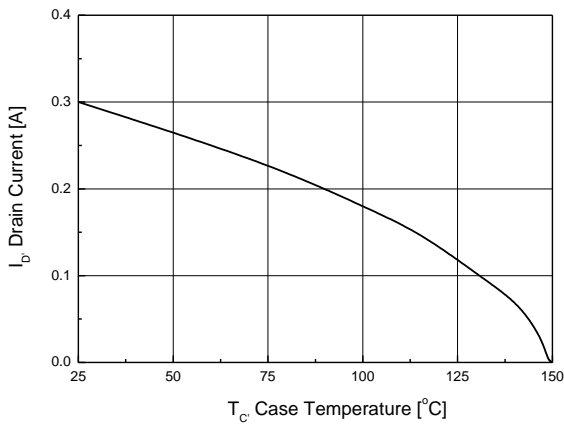
**Fig 7. Breakdown Voltage Variation vs. Junction Temperature**



**Fig. 8. On resistance variation vs. junction temperature**



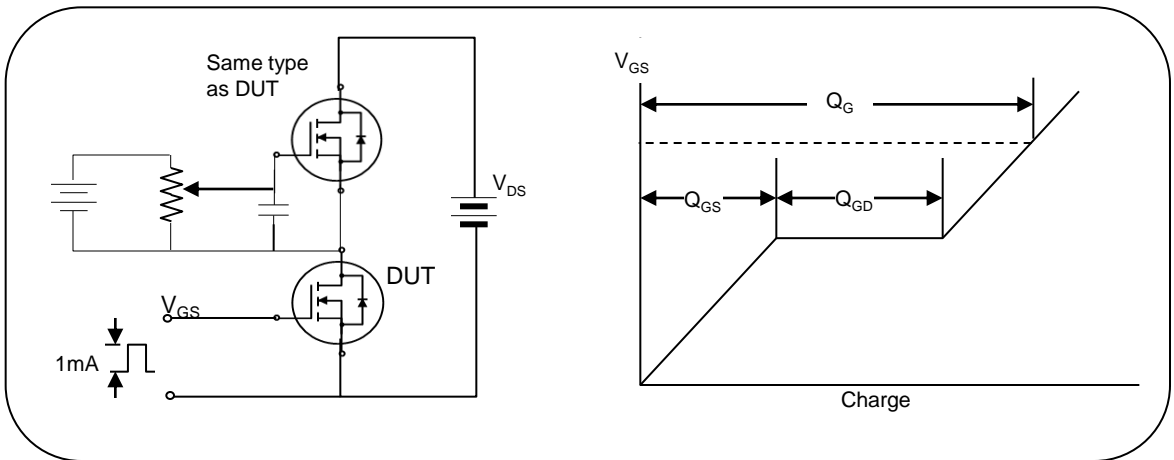
**Fig. 9. Maximum drain current vs. case temperature.**



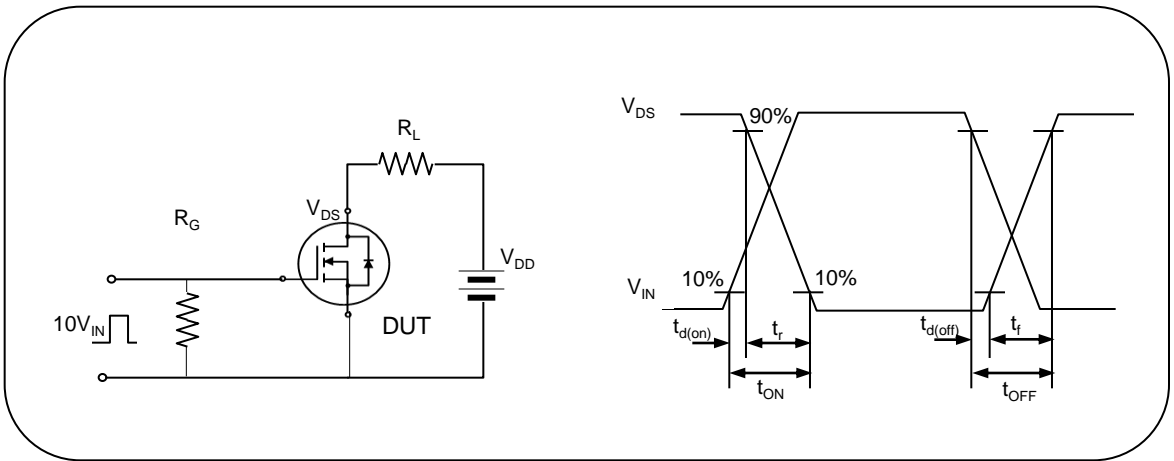
**Fig. 10. Maximum safe operating area**

**Fig. 11. Transient thermal response curve**

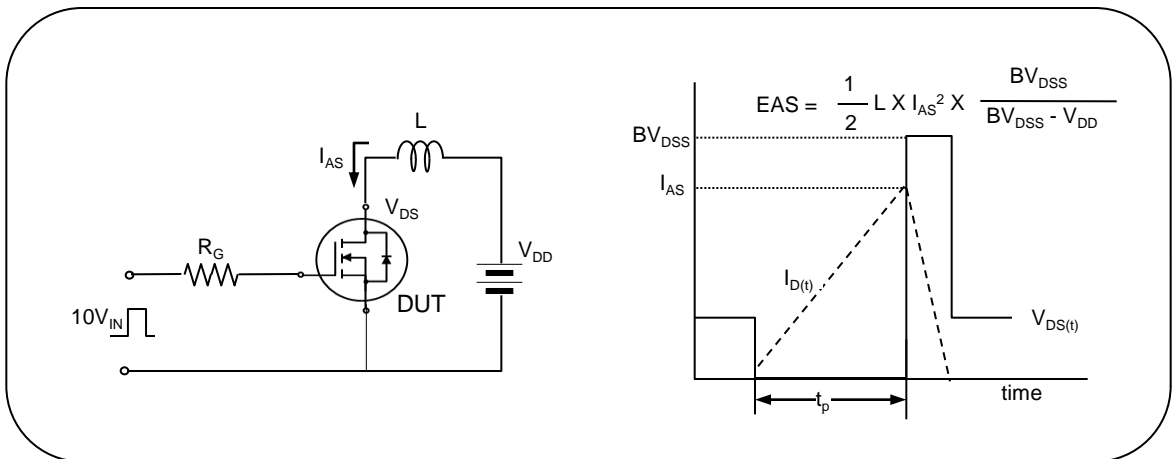
**Fig. 12. Gate charge test circuit & waveform**



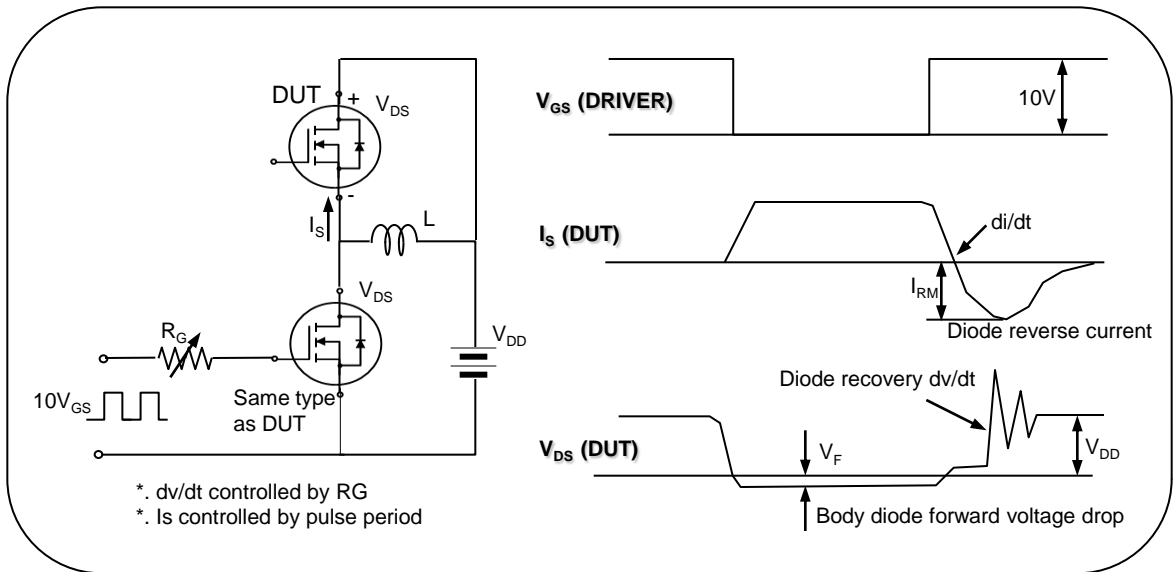
**Fig. 13. Switching time test circuit & waveform**



**Fig. 14. Unclamped Inductive switching test circuit & waveform**



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



## 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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