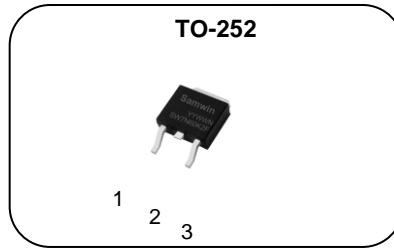


### N-channel Enhanced mode TO-252 MOSFET

#### Features

- High ruggedness
- Low  $R_{DS(ON)}$  (Typ 0.43Ω) @  $V_{GS}=10V$
- Low Gate Charge (Typ 13nC)
- Improved dv/dt Capability
- 100% Avalanche Tested
- Application: LED , Adaptor, Charge

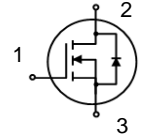


1. Gate 2. Drain 3. Source

$BV_{DSS} : 600V$

$I_D : 7A$

$R_{DS(ON)} : 0.43\Omega$



#### General Description

This power MOSFET is produced with super junction 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 7N60K2F	SW7N60K2F	TO-252	REEL

#### Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain to source voltage	600	V
$I_D$	Continuous drain current (@ $T_C=25^\circ C$ )	7*	A
	Continuous drain current (@ $T_C=100^\circ C$ )	4.4*	A
$I_{DM}$	Drain current pulsed (note 1)	28	A
$V_{GS}$	Gate to source voltage	$\pm 30$	V
$E_{AS}$	Single pulsed avalanche energy (note 2)	160	mJ
$E_{AR}$	Repetitive avalanche energy (note 1)	16	mJ
dv/dt	Peak diode recovery dv/dt (note 3)	5	V/ns
$P_D$	Total power dissipation (@ $T_C=25^\circ C$ )	89	W
	Derating factor above 25°C	0.7	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	1.4	°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
$\Delta BV_{DSS} / \Delta T_J$	Breakdown voltage temperature coefficient	$I_D=250\mu A$ , referenced to $25^\circ\text{C}$		0.23		$V/^\circ\text{C}$
$I_{DSS}$	Drain to source leakage current	$V_{DS}=600V, V_{GS}=0V$			5	$\mu A$
		$V_{DS}=480V, T_C=125^\circ\text{C}$		50		$\mu A$
$I_{GSS}$	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	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5		4.5	V
$R_{DS(ON)}$	Drain to source on state resistance	$V_{GS}=10V, I_D=3.5A$		0.43	0.5	$\Omega$
$G_{fs}$	Forward transconductance	$V_{DS}=30V, I_D=3.5A$		4.5		S
<b>Dynamic characteristics</b>						
$C_{iss}$	Input capacitance	$V_{GS}=0V, V_{DS}=200V, f=1\text{MHz}$		597		pF
$C_{oss}$	Output capacitance			34		
$C_{rss}$	Reverse transfer capacitance			11		
$t_{d(on)}$	Turn on delay time	$V_{DS}=300V, I_D=7A, R_G=25\Omega, V_{GS}=10V$ (note 4,5)		19		ns
$t_r$	Rising time			26		
$t_{d(off)}$	Turn off delay time			33		
$t_f$	Fall time			21		
$Q_g$	Total gate charge	$V_{DS}=480V, V_{GS}=10V, I_D=7A$ (note 4,5)		13		nC
$Q_{gs}$	Gate-source charge			4.9		
$Q_{gd}$	Gate-drain charge			5		
$R_g$	Gate resistance	$V_{DS}=0V$ , Scan F mode		1.8		$\Omega$

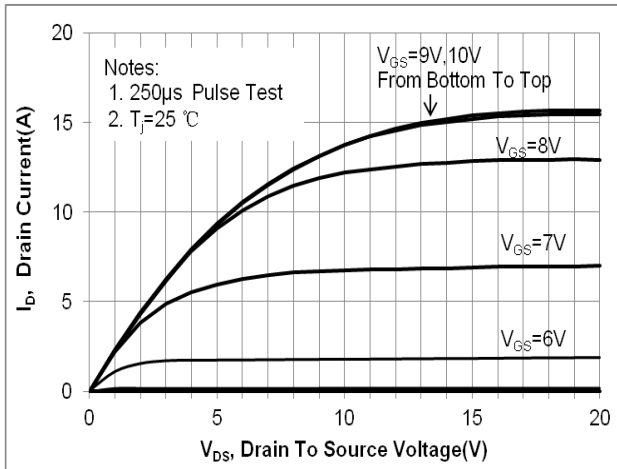
### Source to drain diode ratings characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous source current	Integral reverse p-n Junction diode in the MOSFET			7	A
$I_{SM}$	Pulsed source current				28	A
$V_{SD}$	Diode forward voltage drop.	$I_S=7A, V_{GS}=0V$			1.4	V
$t_{rr}$	Reverse recovery time	$I_S=7A, V_{GS}=0V,$ $dI_F/dt=100A/\mu s$		92		ns
$Q_{rr}$	Reverse recovery charge				319	nC

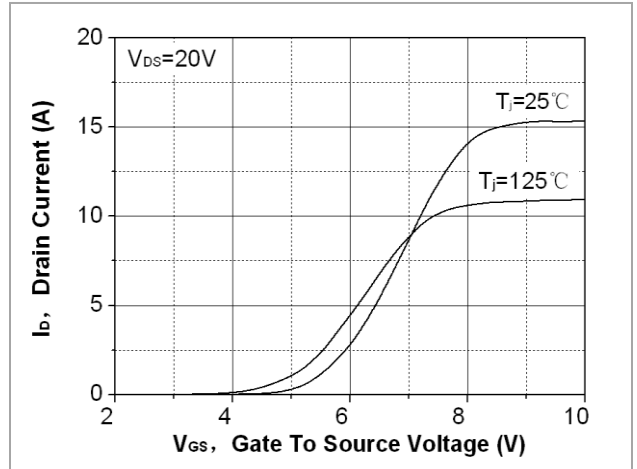
#### ※. Notes

1. Repeattive rating : pulse width limited by junction temperature.
2.  $L=80\text{mH}, I_{AS}=2A, V_{DD}=50V, R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$
3.  $I_{SD} \leq 7A, di/dt = 100A/\mu s, V_{DD} \leq BV_{DSS}$ , 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.

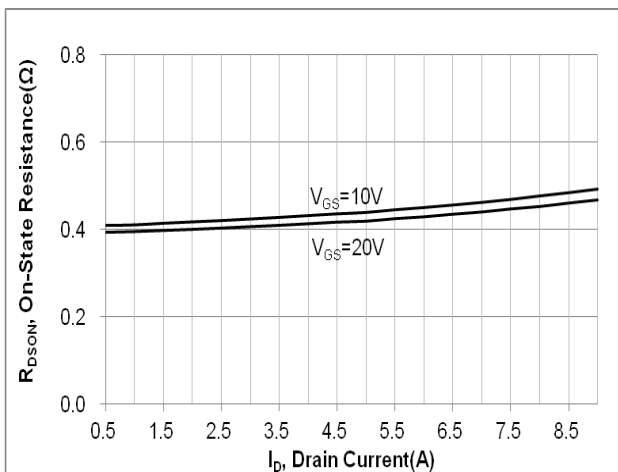
**Fig. 1. On-state characteristics**



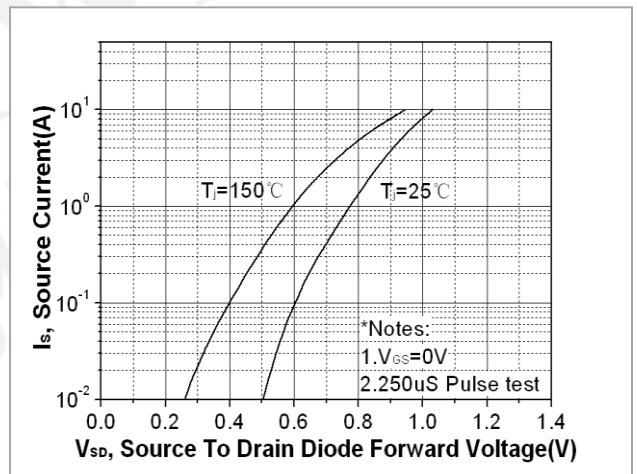
**Fig. 2. Transfer Characteristics**



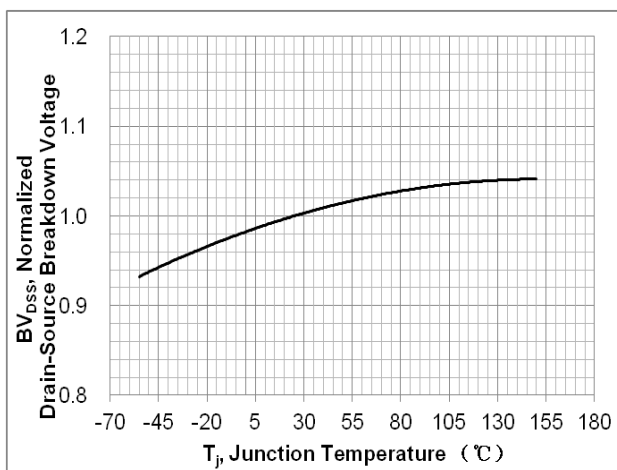
**Fig. 3. On-resistance variation vs. drain current and gate voltage**



**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**

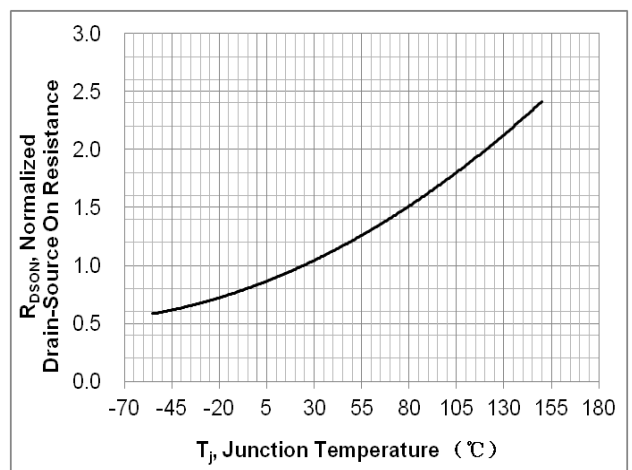


Fig. 7. Gate charge characteristics

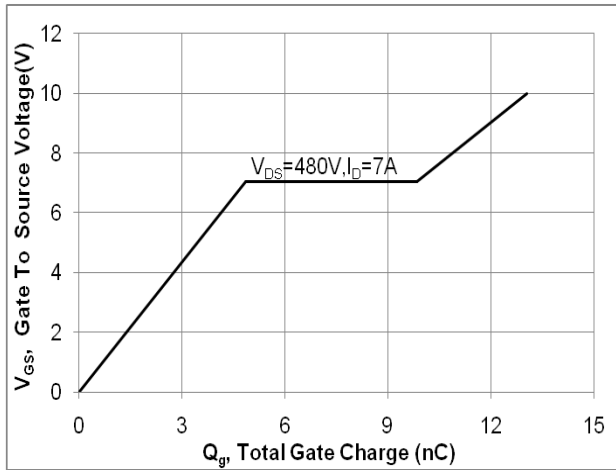


Fig. 8. Capacitance Characteristics

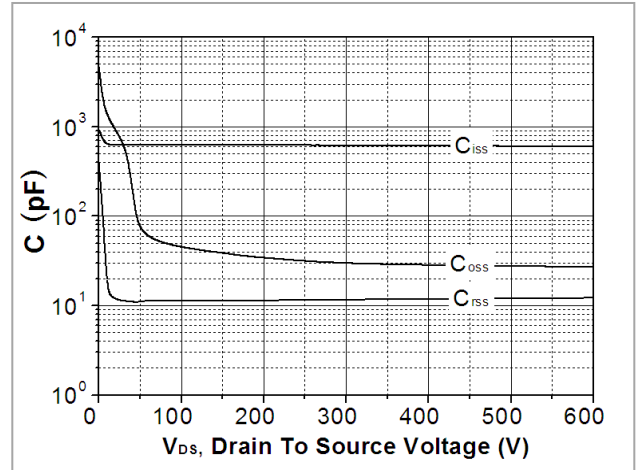


Fig. 9. Maximum safe operating area

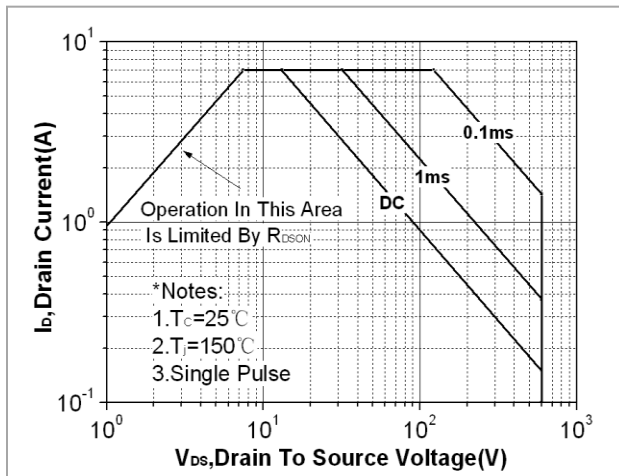


Fig. 10. Transient thermal response curve

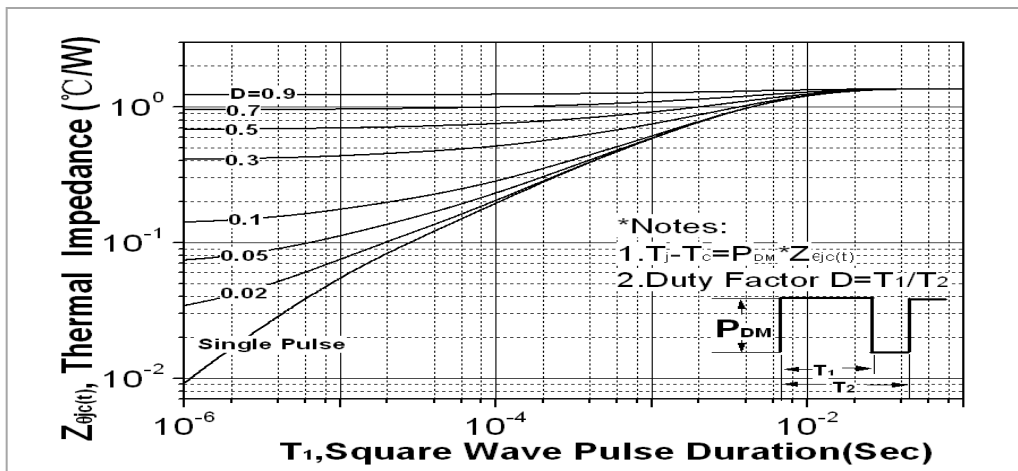


Fig. 11. Gate charge test circuit & waveform

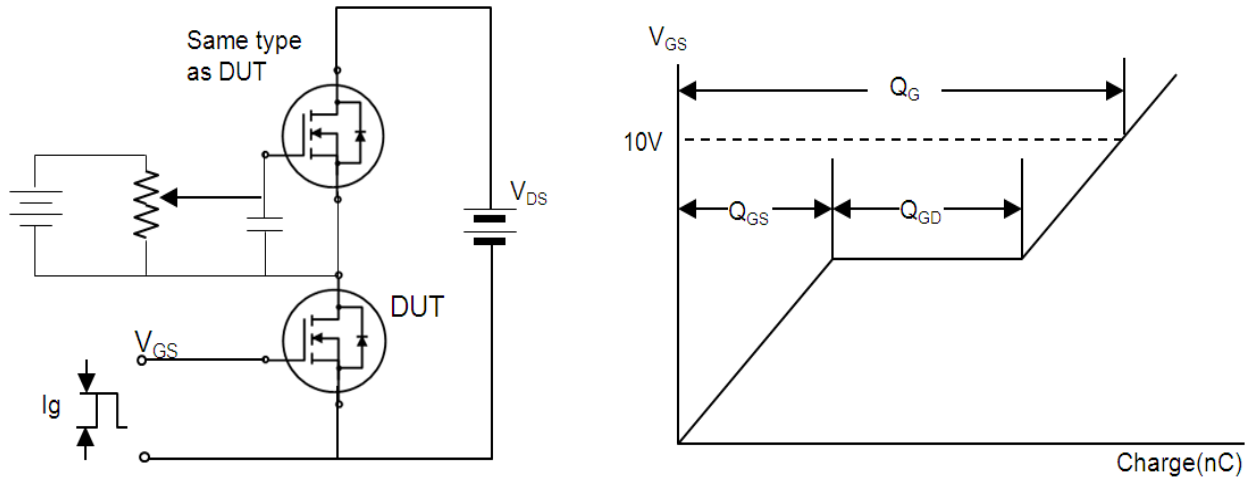


Fig. 12. Switching time test circuit & waveform

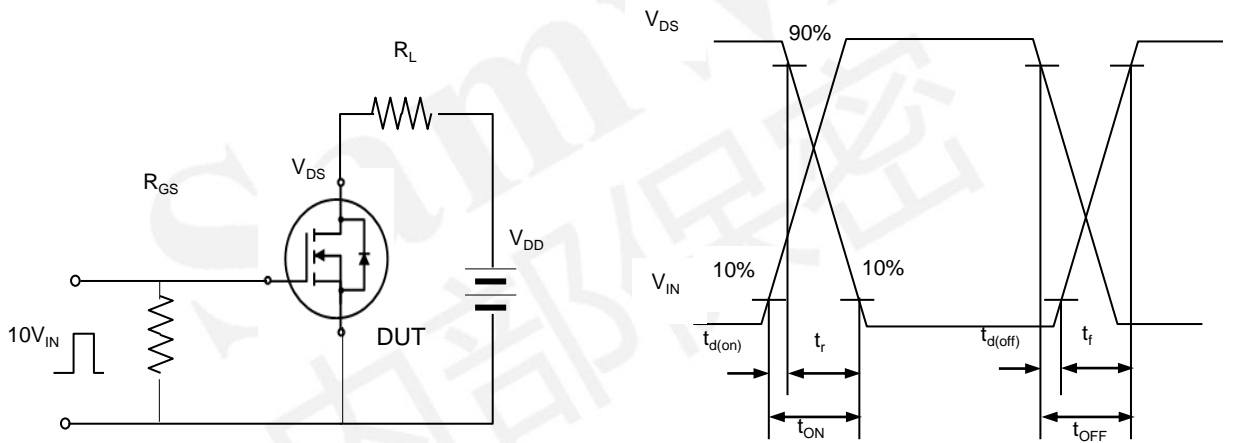


Fig. 13. Unclamped Inductive switching test circuit & waveform

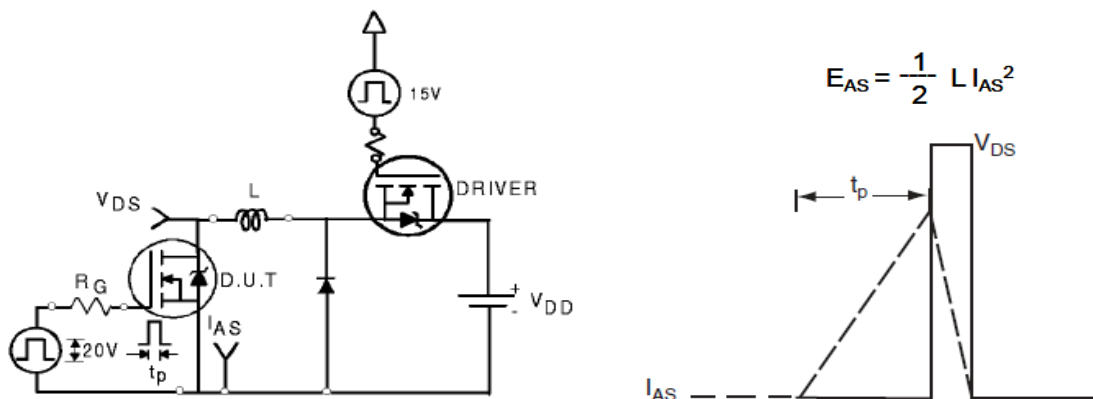
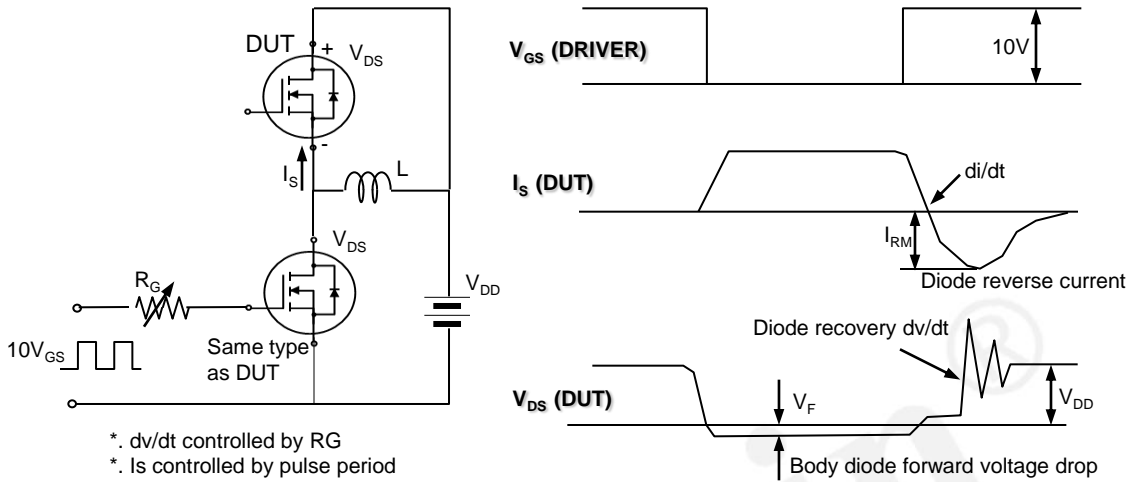


Fig. 14. Peak diode recovery dv/dt test circuit & waveform



### 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 test 

\* 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](mailto:samwin@samwinsemi.com)