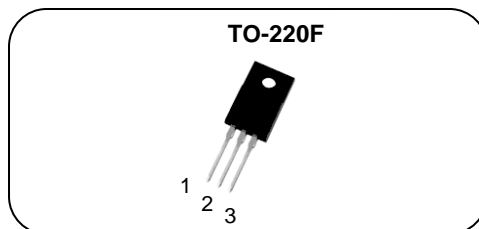


## N-channel Power MOSFET

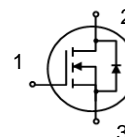
### Features

- High ruggedness
- Low  $R_{DS(ON)}$  (Typ 0.54Ω) @  $V_{GS}=10V$
- Low Gate Charge (Typ 67nC)
- Improved dv/dt Capability
- 100% Avalanche Tested
- Application: LED, PC Power, Charger



1. Gate 2. Drain 3. Source

$BV_{DSS}$  : 700V  
 $I_D$  : 16A  
 $R_{DS(ON)}$  : 0.54Ω



### 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	SP C 16N65G	16N65G	TO-220F	TUBE

### Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain to source voltage	700	V
$I_D$	Continuous drain current (@ $T_C=25^{\circ}C$ )	16*	A
	Continuous drain current (@ $T_C=100^{\circ}C$ )	10*	A
$I_{DM}$	Drain current pulsed (note 1)	64	A
$V_{GS}$	Gate to source voltage	±30	V
$E_{AS}$	Single pulsed avalanche energy (note 2)	630	mJ
$E_{AR}$	Repetitive avalanche energy (note 1)	43	mJ
dv/dt	Peak diode recovery dv/dt (note 3)	5	V/ns
$P_D$	Total power dissipation (@ $T_C=25^{\circ}C$ )	21	W
	Derating factor above 25°C	0.17	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
$R_{thjc}$	Thermal resistance, Junction to case	6	°C/W
$R_{thja}$	Thermal resistance, Junction to ambient	50	°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	$V_{GS}=0V, I_D=250\mu A$	700			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown voltage temperature coefficient	$I_D=250\mu A$ , referenced to $25^\circ\text{C}$		0.55		V/ $^\circ\text{C}$
$I_{DSS}$	Drain to source leakage current	$V_{DS}=700V, V_{GS}=0V$			1	$\mu A$
		$V_{DS}=560V, T_C=125^\circ\text{C}$			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	$V_{GS}=10V, I_D=8A$		0.54	0.65	$\Omega$
$G_{fs}$	Forward transconductance	$V_{DS}=30V, I_D=8A$		13		S
<b>Dynamic characteristics</b>						
$C_{iss}$	Input capacitance	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$		2893		pF
$C_{oss}$	Output capacitance			217		
$C_{rss}$	Reverse transfer capacitance			20		
$t_{d(on)}$	Turn on delay time	$V_{DS}=350V, I_D=16A, R_G=25\Omega, V_{GS}=10V$ (note 4,5)		36		ns
$t_r$	Rising time			66		
$t_{d(off)}$	Turn off delay time			140		
$t_f$	Fall time			59		
$Q_g$	Total gate charge	$V_{DS}=560V, V_{GS}=10V, I_D=16A, I_g=3\text{mA}$ (note 4,5)		67		nC
$Q_{gs}$	Gate-source charge			16		
$Q_{gd}$	Gate-drain charge			27		
$R_g$	Gate resistance	$V_{DS}=0V$ , Scan F mode		1.5		$\Omega$

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			16	A
$I_{SM}$	Pulsed source current				64	A
$V_{SD}$	Diode forward voltage drop.	$I_S=16A, V_{GS}=0V$			1.4	V
$t_{rr}$	Reverse recovery time	$I_S=16A, V_{GS}=0V,$		604		ns
$Q_{rr}$	Reverse recovery charge	$di/dt=100A/\mu s$		7.6		$\mu C$

※. Notes

1. Repeattive rating : pulse width limited by junction temperature.
2.  $L = 8.75\text{mH}, I_{AS} = 12A, V_{DD} = 100V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 16A, di/dt = 100A/\mu s, V_{DD} \leq BV_{DSS}$ , 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

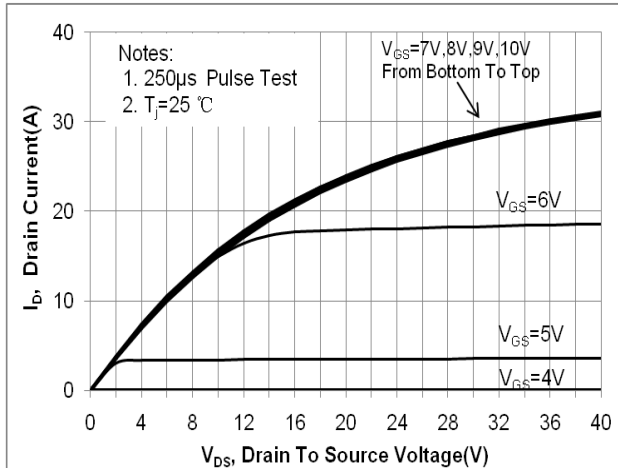


Fig. 2. Transfer Characteristics

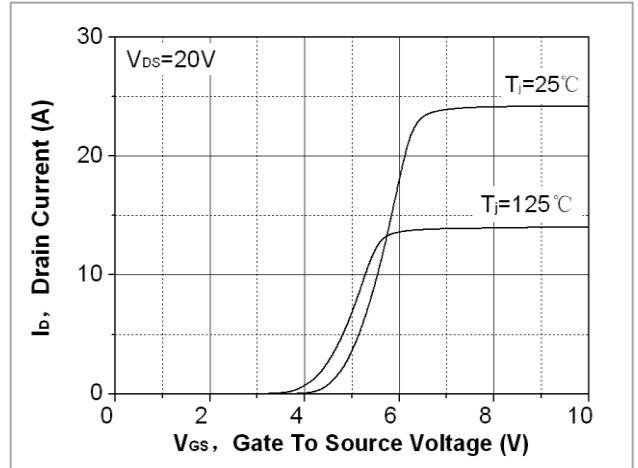


Fig. 3. On-resistance variation vs. drain current and gate voltage

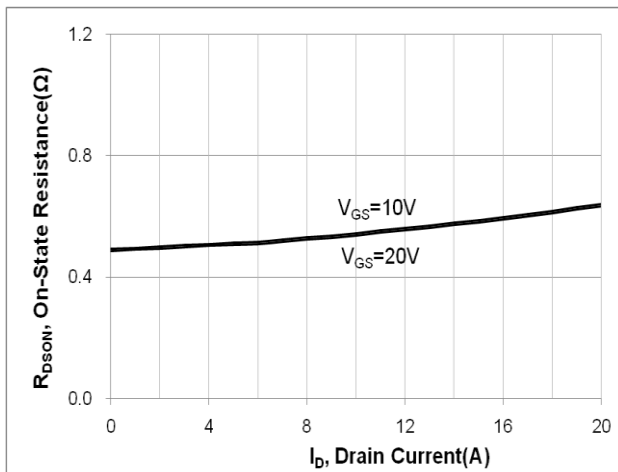


Fig. 4. On-state current vs. diode forward voltage

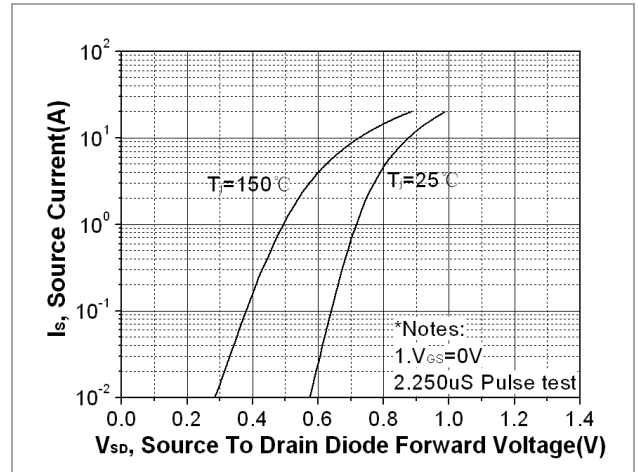


Fig 5. Breakdown voltage variation vs. junction temperature

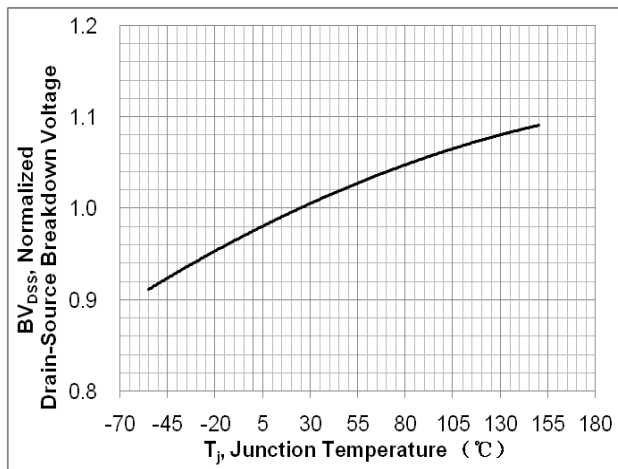


Fig. 6. On-resistance variation vs. junction temperature

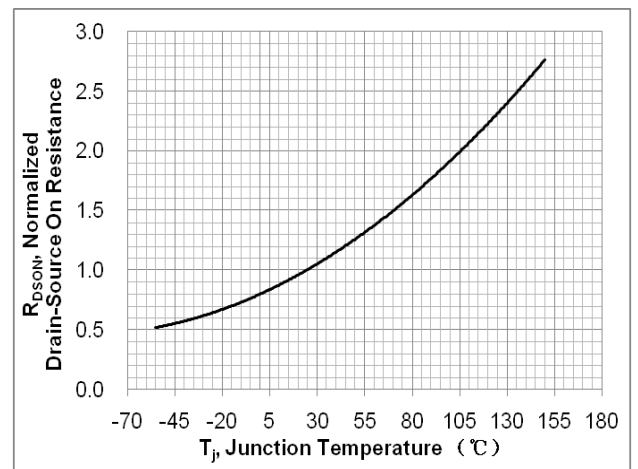




Fig. 7. Gate charge characteristics

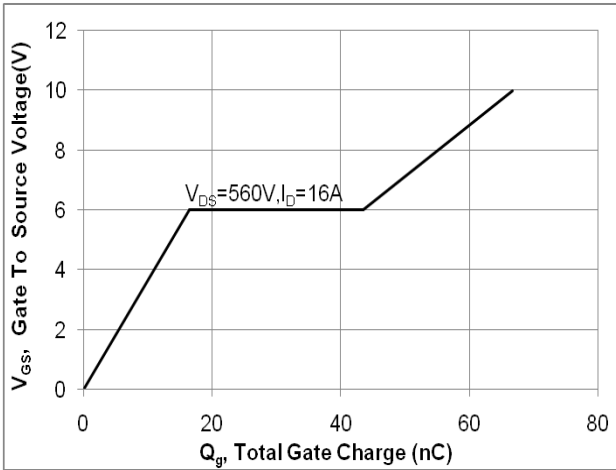


Fig. 8. Capacitance Characteristics

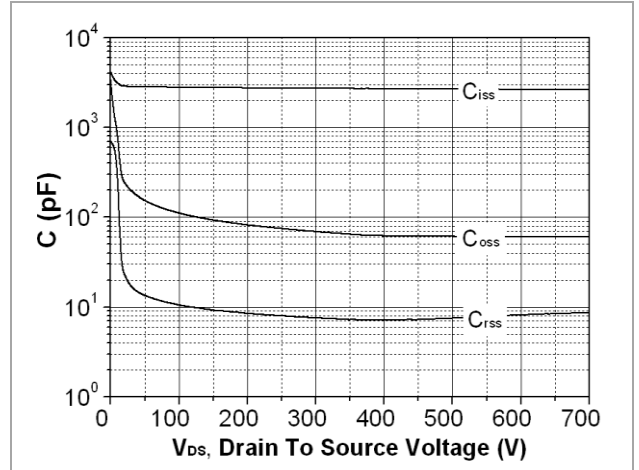


Fig. 9. Maximum safe operating area

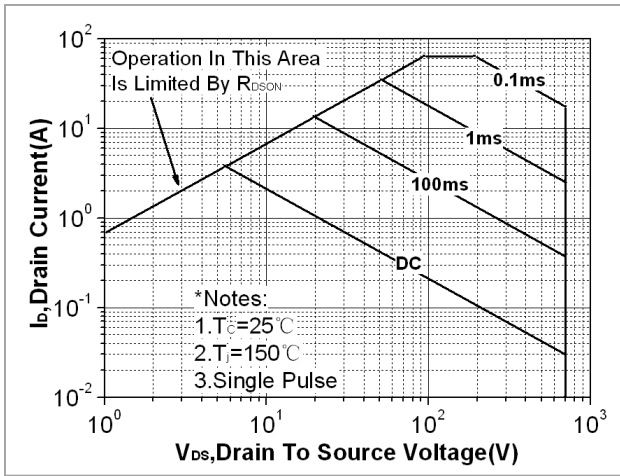


Fig. 10. Transient thermal response curve

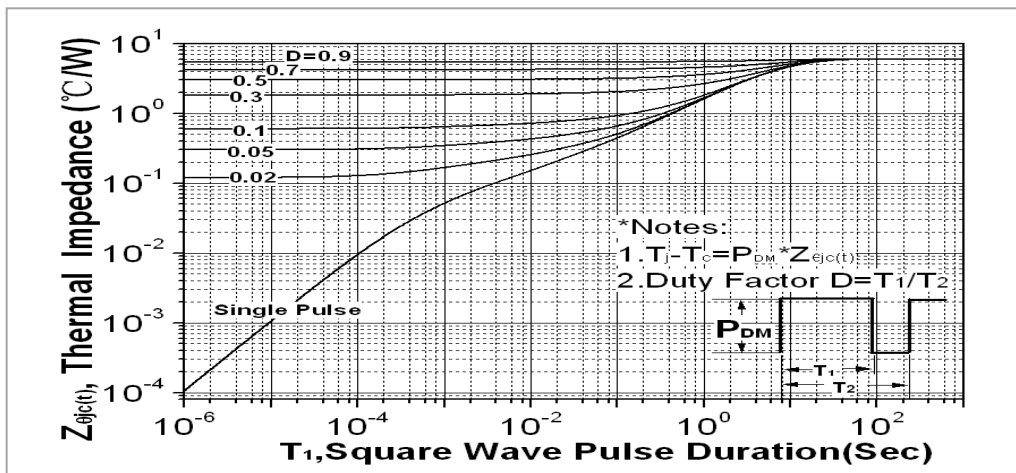


Fig. 11. Gate charge test circuit & waveform

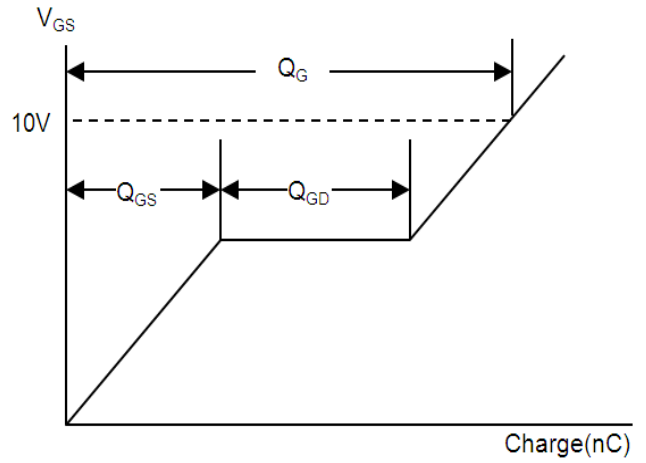
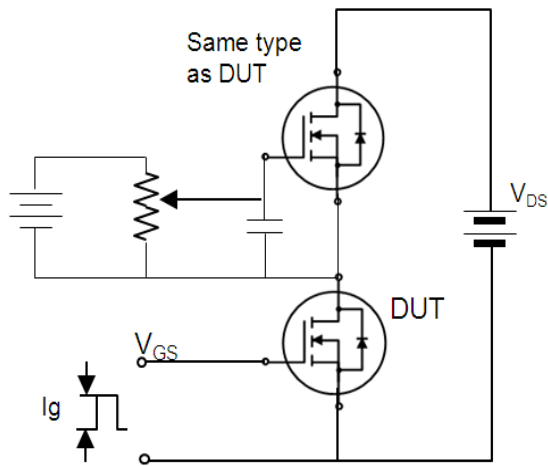


Fig. 12. Switching time test circuit & waveform

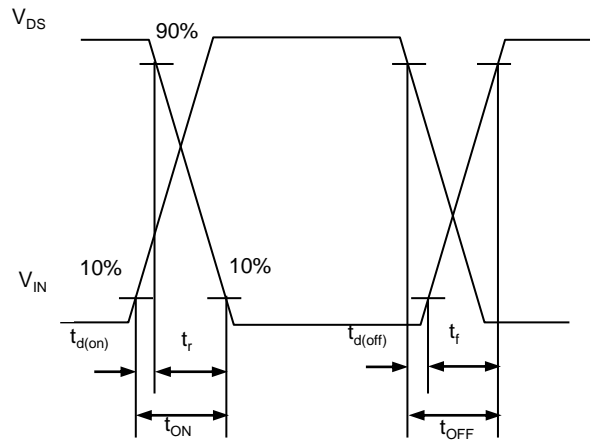
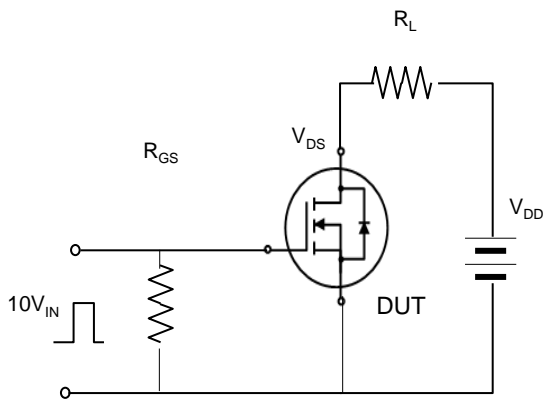


Fig. 13. Unclamped Inductive switching test circuit & waveform

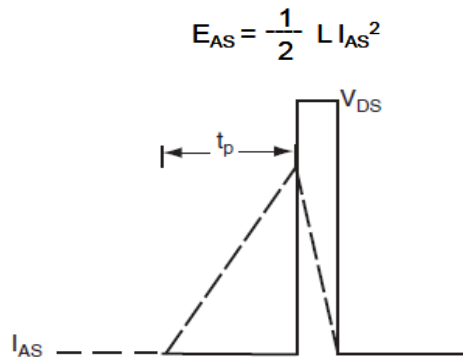
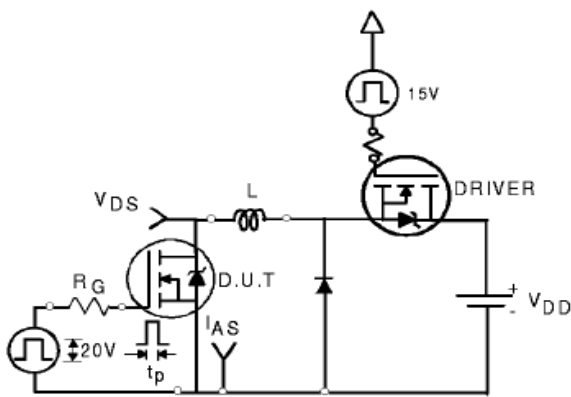


Fig. 14. Peak diode recovery dv/dt test circuit & waveform

