



N-channel Power MOSFET

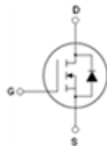
PRODUCT SUMMARY	
V_{DS} (V) at T_J max.	550
$R_{DS(on)}$ max. at 25°C (Ω)	$V_{GS}=10V$ 0.30
Q_g max. (nC)	88
Q_{gs} (nC)	21
Q_{gd} (nC)	28
Configuration	single

Features

- $I_D=18A(V_{GS}=10V)$
- Ultra Low Gate Charge
- Improved dv/dt Capability
- 100% Avalanche Tested
- ROHS compliant



TO-220F



Schematic diagram

Applications

- Switching Mode Power Supplies (SMPS)
- PWM Motor Controls
- DC to DC Converters
- LED Lighting
- Bridge Circuits

ORDERING INFORMATION	
Device	SPC18N50G
Device Package	TO-220F
Marking	18N50G

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted)			
Parameter	Symbol	Value	Unit
Drain to Source Voltage	V_{DSS}	500	V
Continuous Drain Current (@ $T_C=25^\circ\text{C}$)	I_D	18 ⁽¹⁾	A
Continuous Drain Current (@ $T_C=100^\circ\text{C}$)		13 ⁽¹⁾	A
Drain current pulsed ⁽²⁾	I_{DM}	72 ⁽¹⁾	A
Gate to Source Voltage	V_{GS}	± 30	V
Single pulsed Avalanche Energy ⁽³⁾	E_{AS}	1200	mJ
MOSFET dv/dt ruggedness (@ $V_{DS}=0\sim 400V$)	dv/dt	25	V/ns
Peak diode Recovery dv/dt ⁽⁴⁾	dv/dt	15	V/ns
Total power dissipation (@ $T_C=25^\circ\text{C}$)	P_D	40	W
Derating Factor above 25°C		0.3	W/°C
Operating Junction Temperature & Storage Temperature	T_{STG}, T_J	-55 to + 150	°C
Maximum lead temperature for soldering purpose	T_L	260	°C
Mounting torque ⁽⁵⁾		0.4~0.6	N.m

Notes

1. Drain current is limited by maximum junction temperature.
2. Repetitive rating : pulse width limited by junction temperature.
3. $L = 6mH, I_{AS} = 18A, V_{DD} = 50V, R_G=25\Omega$, Starting at $T_J = 25^\circ\text{C}$
4. $I_{SD} \leq I_D, di/dt = 100A/us, V_{DD} \leq BV_{DSS}$, Starting at $T_J = 25^\circ\text{C}$
5. Mounting consideration for TO220 Fullpack:
M3 screw plus flat washer is suggested, free of burr between devices and contact area, the devices are to be mounted to a hole not larger than 3.6mm in contact diameter (chamfer included).



THERMAL CHARACTERISTICS			
Parameter	Symbol	Value	Unit
		SPC18N50G	
Thermal resistance, Junction to case	R_{thjc}	3.0	°C/W
Thermal resistance, Junction to ambient	R_{thja}	46	°C/W

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise specified)						
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain to source breakdown voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	500			V
Breakdown voltage temperature coefficient	$\Delta BV_{DSS} / \Delta T_J$	$I_D=250\mu A$, referenced to 25°C		0.51		V/°C
Drain to source leakage current	I_{DSS}	$V_{DS}=500V, V_{GS}=0V$			1	μA
		$V_{DS}=400V, T_C=125^\circ\text{C}$			50	μA
Gate to source leakage current, forward	I_{GSS}	$V_{GS}=30V, V_{DS}=0V$			100	nA
Gate to source leakage current, reverse		$V_{GS}=-30V, V_{DS}=0V$			-100	nA
On Characteristics						
Gate threshold voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	3		5	V
Drain to source on state resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=9 A$		0.25	0.30	Ω
Forward Transconductance	G_{fs}	$V_{DS} = 30 V, I_D = 9 A$		18.5		S
Dynamic Characteristics						
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$		4670		pF
Output capacitance	C_{oss}			315		
Reverse transfer capacitance	C_{rss}			18.5		
Turn on delay time	$t_{d(on)}$	$V_{DS}=250V, I_D=18 A, R_G=25\Omega$		49		ns
Rising time	t_r			65		
Turn off delay time	$t_{d(off)}$			232		
Fall time	t_f			81		
Total gate charge	Q_g	$V_{DS}=400V, V_{GS}=10V, I_D=18A$		88		nC
Gate-source charge	Q_{gs}			22		
Gate-drain charge	Q_{gd}			29		
Gate Resistance	R_g	$V_{DS}=0V, \text{Scan F mode}$		1		Ω

SOURCE TO DRAIN DIODE RATINGS CHARACTERISTICS						
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous source current	I_S	Integral reverse p-n Junction diode in the MOSFET			18	A
Pulsed source current	I_{SM}				72	A
Diode forward voltage drop.	V_{SD}	$I_S=18A, V_{GS}=0V$			1.3	V
Reverse recovery time	T_{rr}	$I_S=18A, V_{GS}=0V, dl_F/dt=100A/us$		461		ns
Reverse recovery Charge	Q_{rr}				5.5	



Fig. 1. On-state characteristics

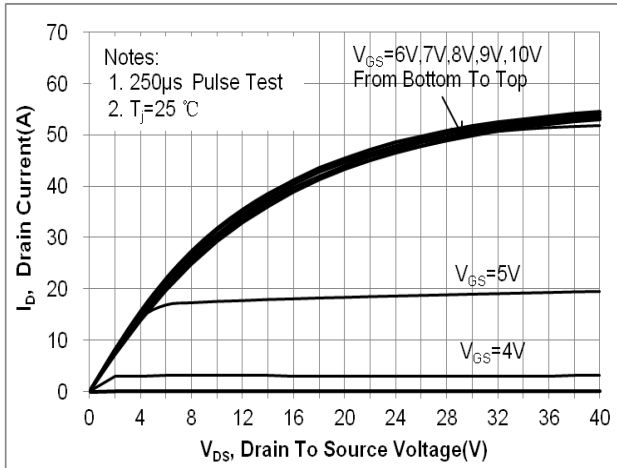


Fig. 2. Transfer Characteristics

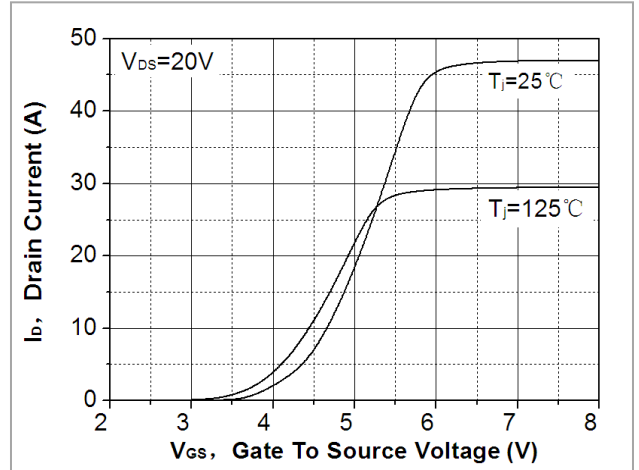


Fig. 3. On-resistance variation vs. drain current and gate voltage

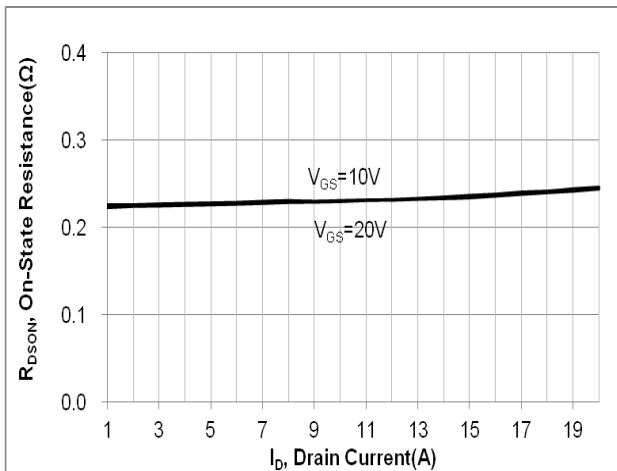


Fig. 4. On-state current vs. diode forward voltage

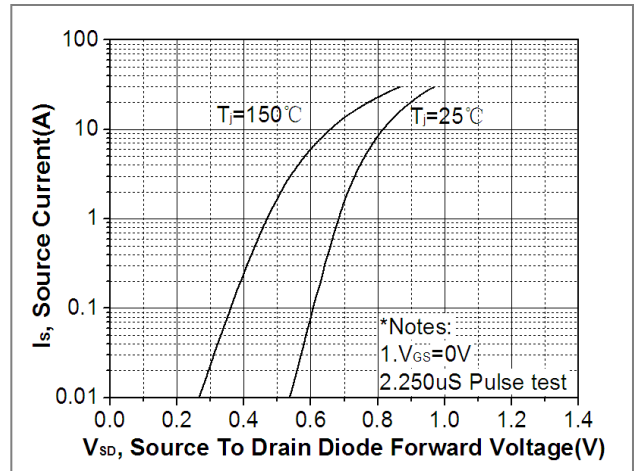


Fig 5. Breakdown voltage variation vs. junction temperature

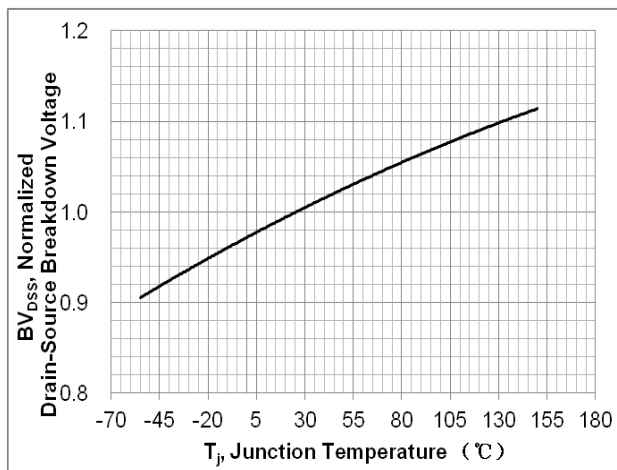


Fig. 6. On-resistance variation vs. junction temperature

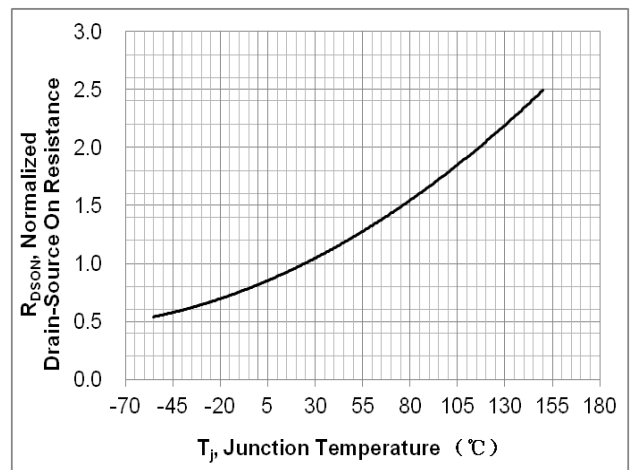




Fig. 7. Gate charge characteristics

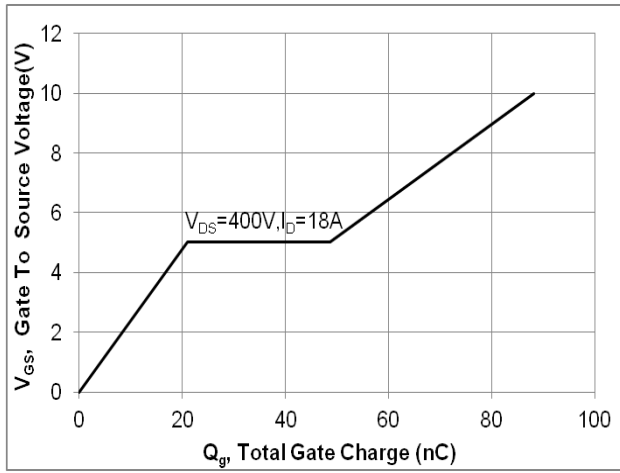


Fig. 8. Capacitance Characteristics

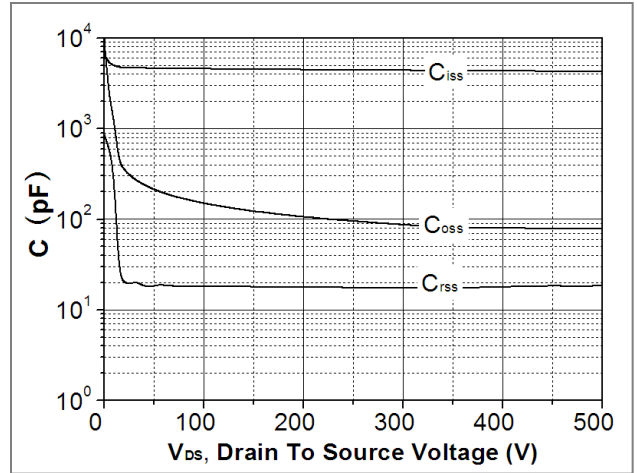


Fig. 9. Maximum safe operating area(TO-220F)

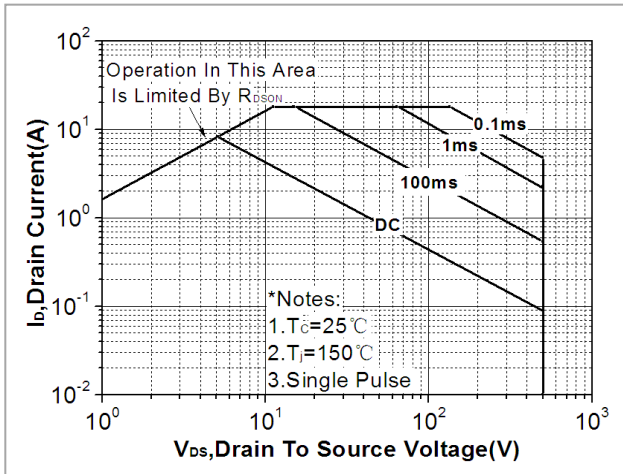


Fig. 10. Maximum safe operating area(TO-247)

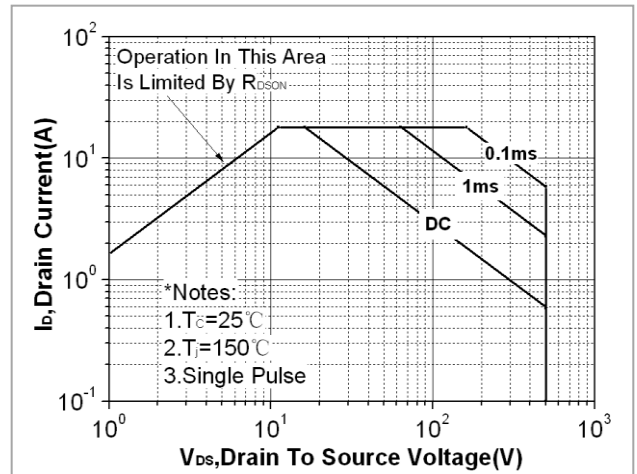


Fig. 11. Transient thermal response curve(TO-220F)

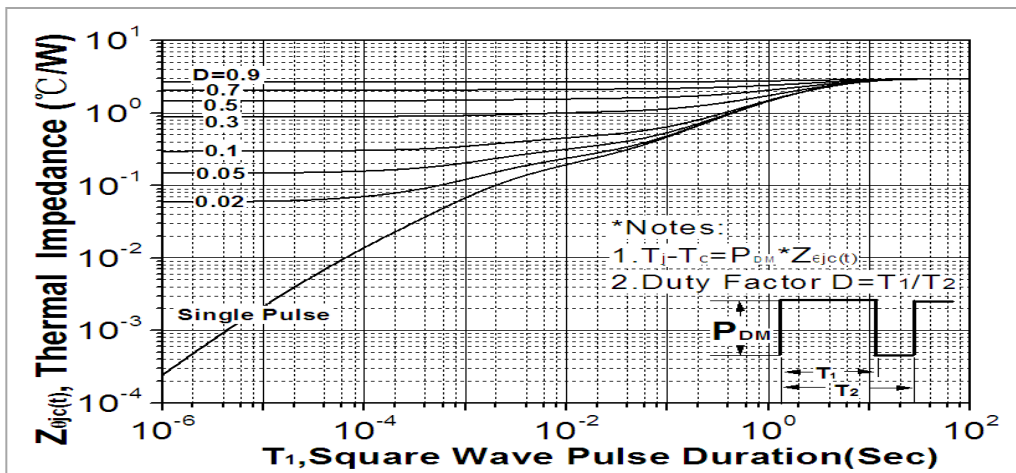


Fig. 12. Transient thermal response curve(TO-247)

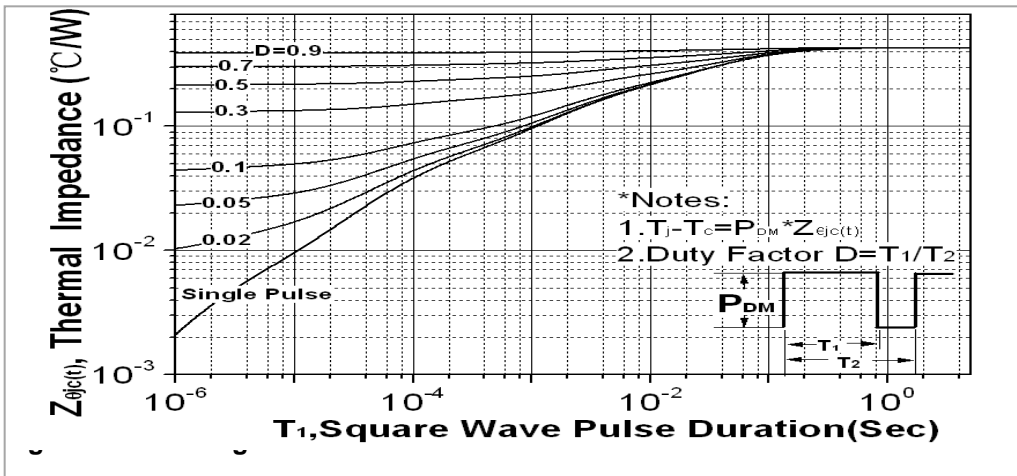


Fig. 13. Gate charge test circuit & waveform

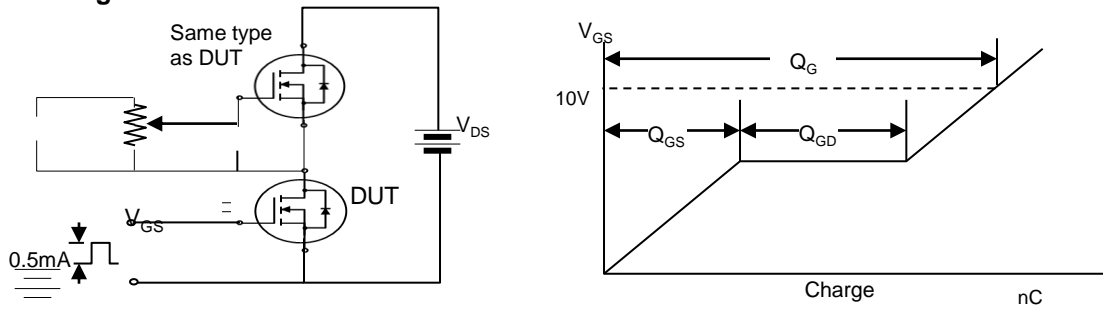


Fig 14. Switching time test circuit & waveform

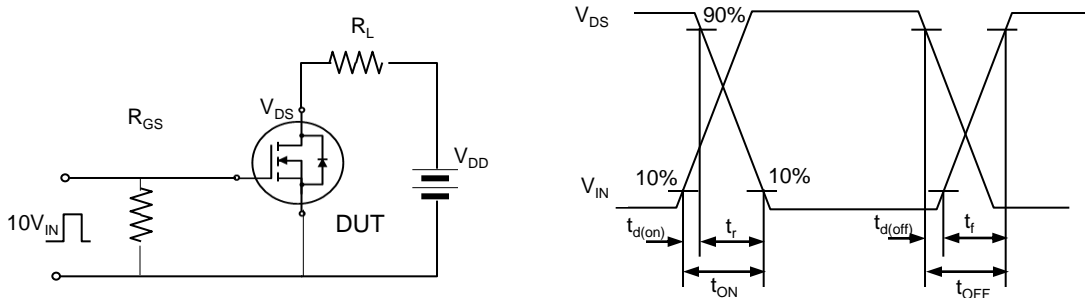


Fig 15. Unclamped Inductive switching test circuit & waveform

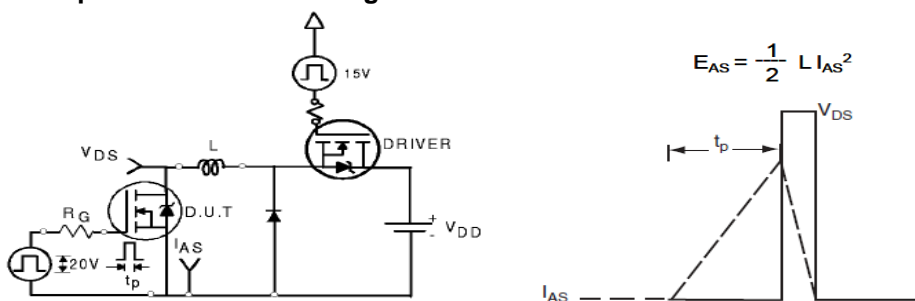
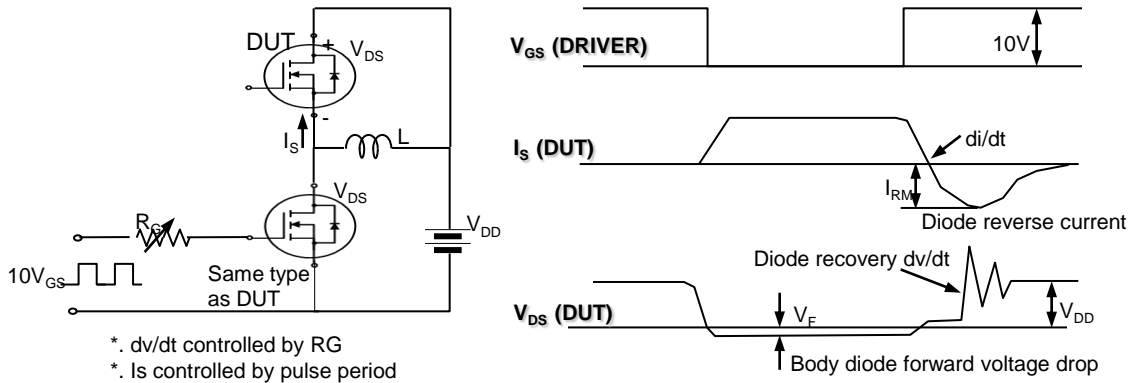


Fig 16. Peak diode recovery dv/dt test circuit & waveform



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