



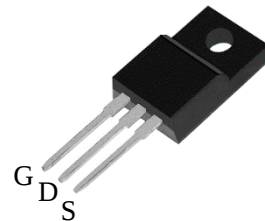
General Features

RoHS Compliant
 $R_{DS(ON),typ.}=0.24\Omega@V_{GS}=10V$
Low Gate Charge Minimize Switching Loss
Fast Recovery Body Diode

BV_{DSS}	$R_{DS(ON),Typ.}$	I_D
500V	0.24 Ω	20A

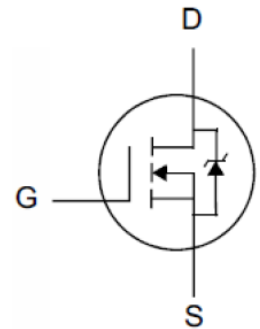
Applications

Adaptor
Charger
SMPS Standby Power



TO-220F

Package Not to Scale



Absolute Maximum Ratings

 $T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	SWF20N50	Unit
V_{DSS}	Drain-to-Source Voltage	500	V
V_{GSS}	Gate-to-Source Voltage	± 30	
I_D	Continuous Drain Current	20	A
I_{DM}	Pulsed Drain Current at $V_{GS}=10V$	80	
E_{AS}	Single Pulse Avalanche Energy $L=30mH$	1502	mJ
P_D	Power Dissipation	54	W
	Derating Factor above 25°C	0.43	W/ $^{\circ}\text{C}$
T_L T_{PAK}	Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10 seconds, Package Body for 10 seconds	300 260	$^{\circ}\text{C}$
T_J & T_{STG}	Operating and Storage Temperature Range	-55 to 150	

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	SWF20N50	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	2.31	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	100	



Electrical Characteristics

OFF Characteristics

 $T_J = 25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	500	--	--	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	μA	$V_{DS}=500V, V_{GS}=0V$
I_{GSS}	Gate-to-Source Leakage Current	--	--	+100	nA	$V_{GS}=+30V, V_{DS}=0V$
		--	--	-100		$V_{GS}=-30V, V_{DS}=0V$

ON Characteristics

 $T_J = 25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	0.24	0.3	Ω	$V_{GS}=10V, I_D=10A$
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	2320	--	pF	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$
C_{rss}	Reverse Transfer Capacitance	--	7.2	--		
C_{oss}	Output Capacitance	--	282	--		
Q_g	Total Gate Charge	--	38	--	nC	$V_{DD}=400V, I_D=20A, V_{GS}=10V$
Q_{gs}	Gate-to-Source Charge	--	12	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	12	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	60	--	ns	$V_{DD}=250V, I_D=20A, V_{GS}=10V, R_g=25\Omega$
t_{rise}	Rise Time	--	131	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	115	--		
t_{fall}	Fall Time	--	75	--		

**Source-Drain Body Diode Characteristics** $T_J=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current ^[2]	--	--	20	A	Integral pn-diode in MOSFET
I_{SM}	Pulsed Source Current ^[2]	--	--	80		
V_{SD}	Diode Forward Voltage	--	--	1.3	V	$I_S=20\text{A}$, $V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	--	583	--	ns	$V_{GS}=0\text{V}$ $I_S=20\text{A}$, $di/dt=100\text{A}/\mu\text{s}$
Q_{rr}	Reverse Recovery Charge	--	7.1	--	uC	

Note:[1] $T_J=+25^{\circ}\text{C}$ to $+150^{\circ}\text{C}$ [2] Pulse width $\leq 380\mu\text{s}$; duty cycle $\leq 2\%$.

Typical Characteristics

图1. 输出特性

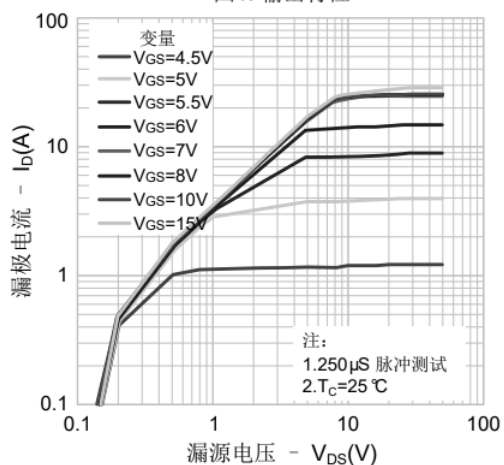


图2. 传输特性

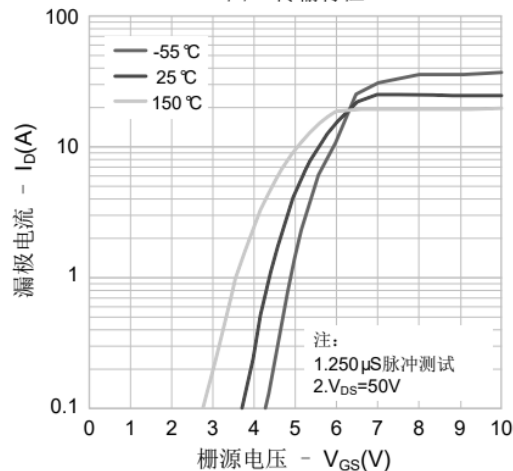


图3. 导通电阻 vs. 漏极电流、栅极电压

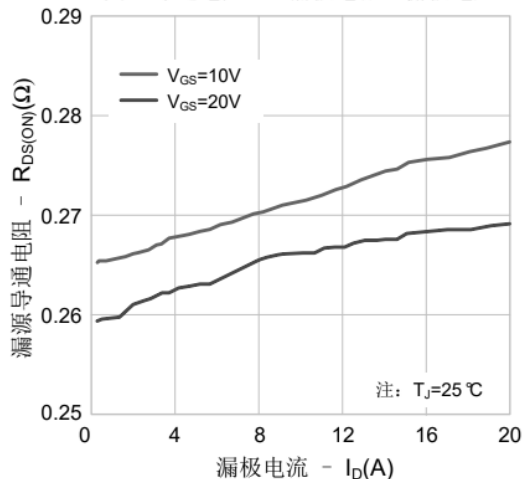


图4. 体二极管正向压降 vs. 源极电流、温度

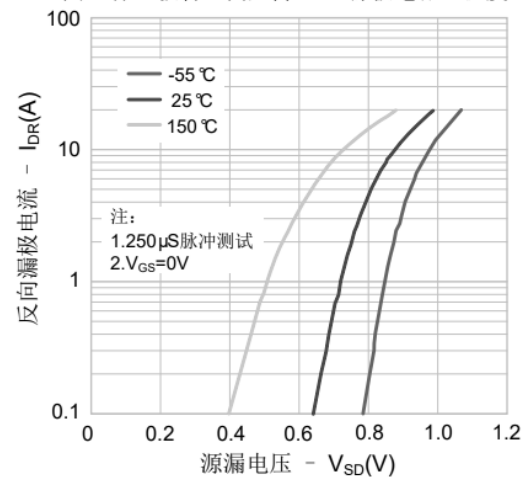


图5. 电容特性

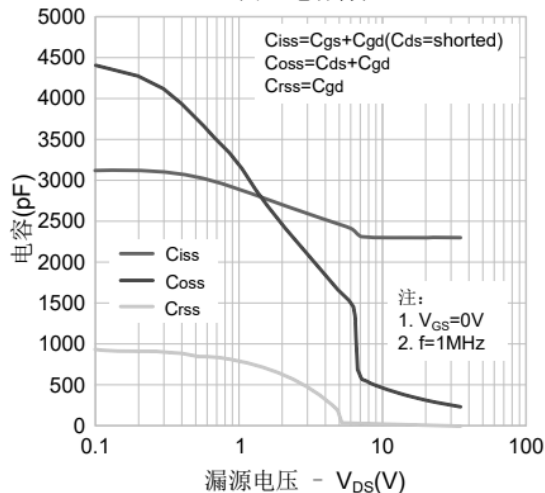


图6. 电荷量特性

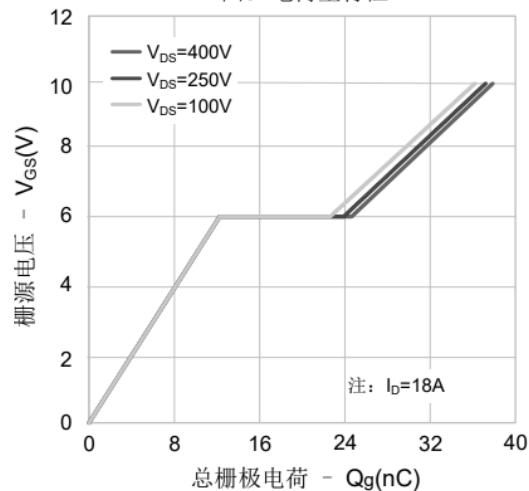


图7. 击穿电压 vs. 温度特性

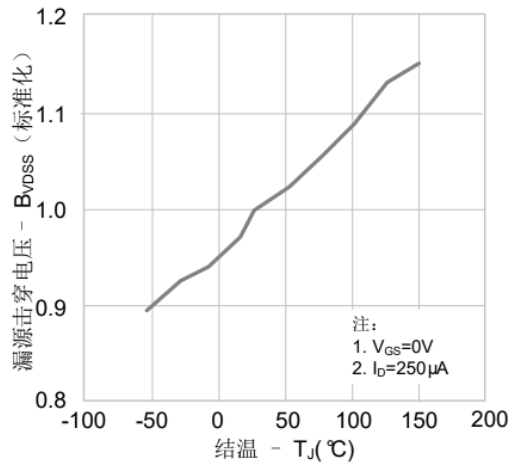


图8. 导通电阻 vs. 温度特性

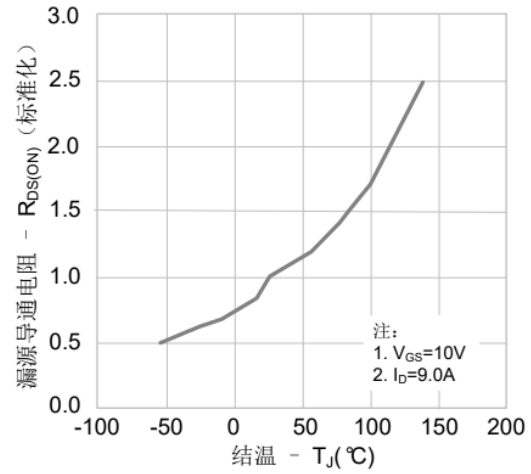
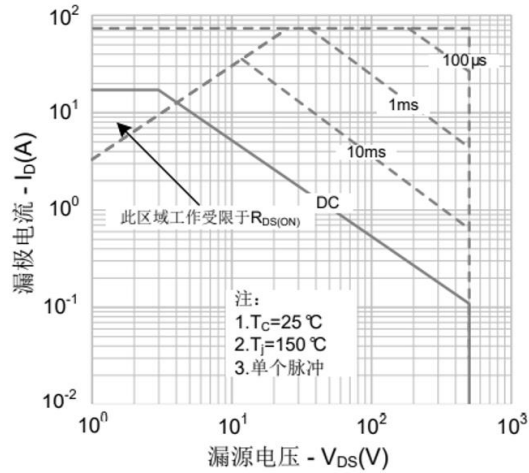


图9. 最大安全工作区域



Test Circuits and Waveforms (Cont.)

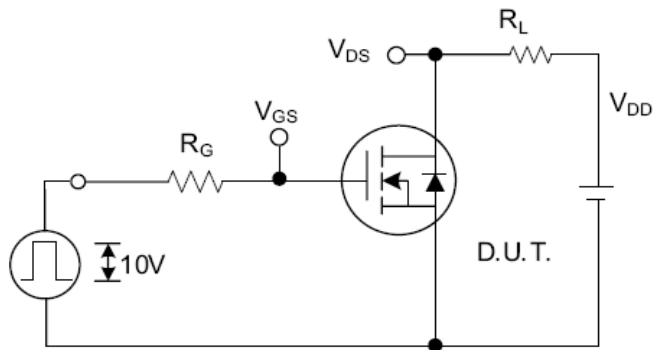


Fig. 2.1 Switching Test Circuit

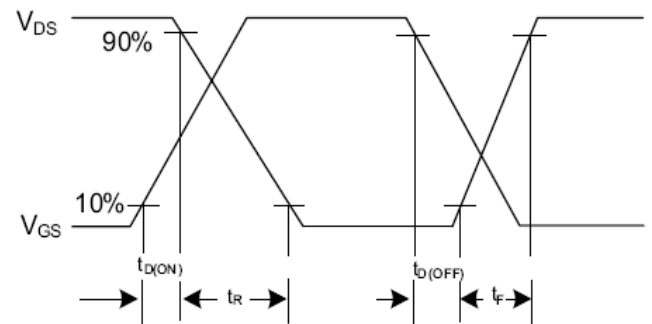


Fig. 2.2 Switching Waveforms

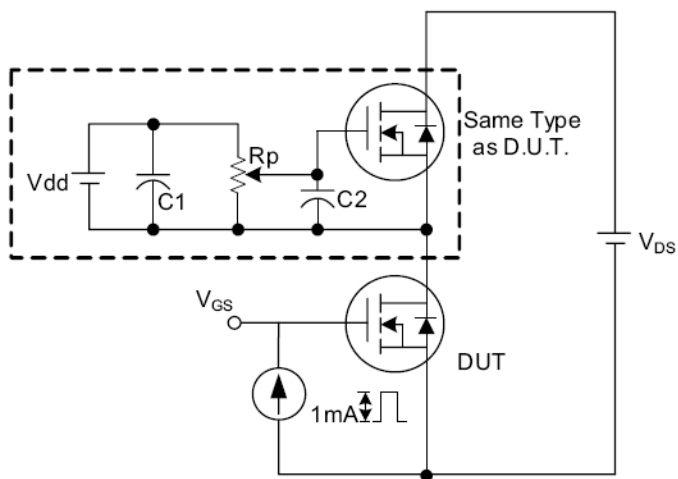


Fig. 3.1 Gate Charge Test Circuit

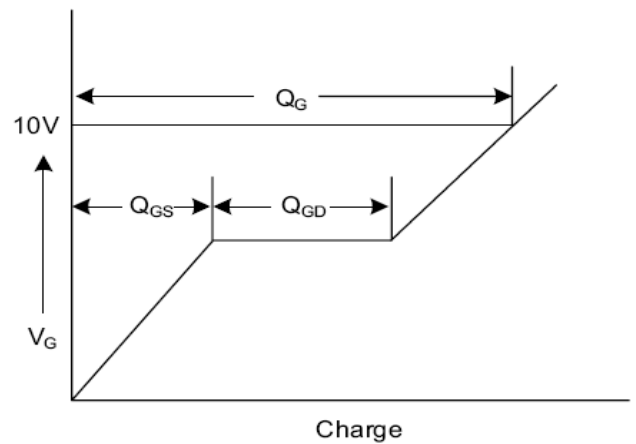


Fig. 3.2 Gate Charge Waveform

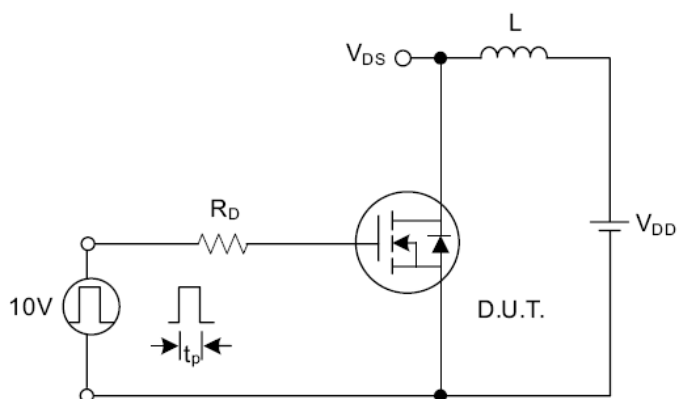


Fig. 4.1 Unclamped Inductive Switching Test Circuit

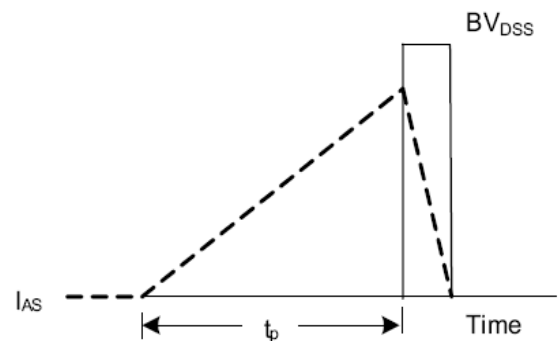


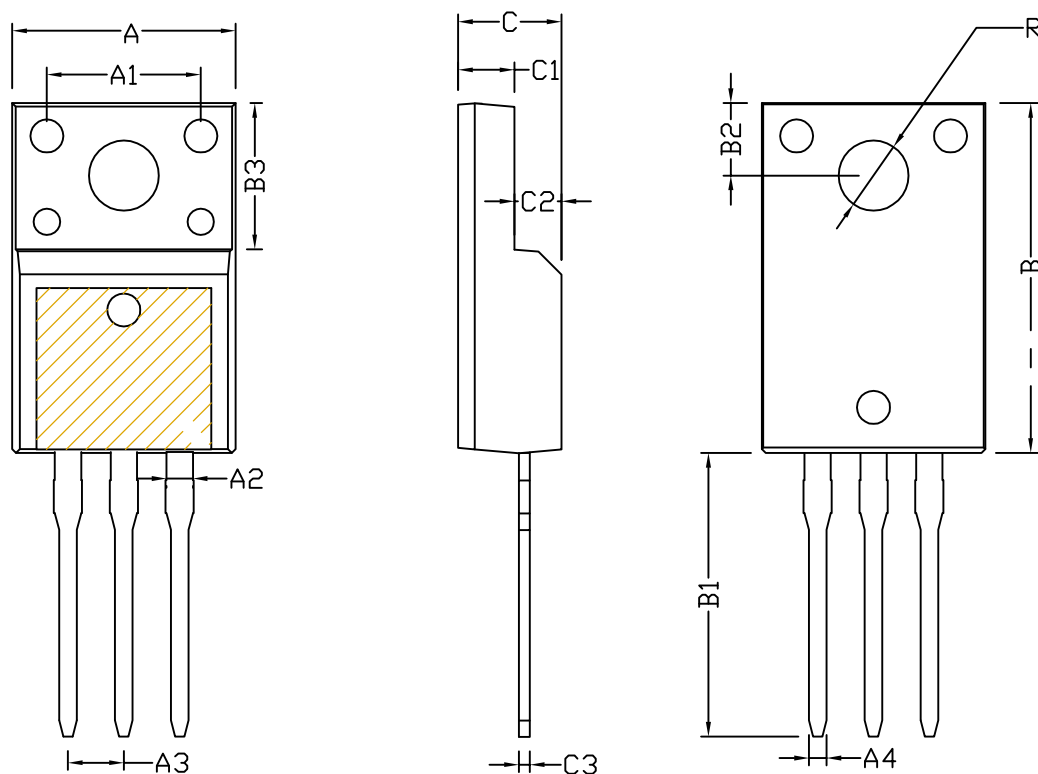
Fig. 4.2 Unclamped Inductive Switching Waveforms



SWF20N50

500V N-ch Planar MOSFET

Package Mechanical Data



标注	最小	标准	最大	标注	最小	标准	最大	标注	最小	标准	最大
A	10.03	10.13	10.23	B	15.81	15.91	16.01	C	4.62	4.7	4.78
A1	6.5	7.0	7.5	B1	12.79	12.89	12.99	C1	2.5	2.55	2.6
A2	1.20	1.28	1.36	B2	3.0	3.3	3.6	C2	2.1	2.15	2.2
A3		2.54		B3	6.6	6.65	6.7	C3		0.5	
A4	0.7	0.8	0.9	R		3.18					