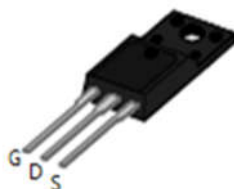


Application

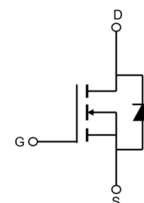
- Load Switch
- PWM Application
- Power management

Features

- 500V, 13A
 $R_{DS(ON)} < 0.55\Omega @ V_{GS} = 10V$
- Fast Switching
- Improved dv/dt Capability



TO-220F top view



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	TUBE (PCS)	Inner Box (PCS)	Per Carton (PCS)
SWF13N50XY	SWF13N50	TUBE	TO-220F	50	1,000	5,000

Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

Symbol	Parameter		Max.	Units
V _{DSS}	Drain-Source Voltage		500	V
V _{GSS}	Gate-Source Voltage		±30	V
I _D	Continuous Drain Current	T _C = 25°C	13	A
		T _C = 100°C	8.5	A
I _{DM}	Pulsed Drain Current ^{note1}		52	A
E _{AS}	Single Pulsed Avalanche Energy ^{note2}		259	mJ
P _D	Power Dissipation	T _C = 25°C	65	W
R _{θJC}	Thermal Resistance, Junction to Case		1.92	°C/ W
R _{θJA}	Thermal Resistance, Junction to Ambient		62.5	°C/ W
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +150	°C

**Electrical Characteristics** ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	500	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 500V, V _{GS} = 0V, T _J = 25℃	-	-	1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±30V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	2	3	4	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} =10V, I _D =6.5A	-	0.47	0.55	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz	-	1650	-	pF
C _{oss}	Output Capacitance		-	160	-	pF
C _{rss}	Reverse Transfer Capacitance		-	15	-	pF
Q _g	Total Gate Charge	V _{DD} = 400V, I _D = 13A, V _{GS} = 10V	-	35	-	nC
Q _{gs}	Gate-Source Charge		-	7	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	18	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = 250V, I _D = 13A, R _G = 25Ω	-	23	-	ns
t _r	Turn-on Rise Time		-	15	-	ns
t _{d(off)}	Turn-off Delay Time		-	90	-	ns
t _f	Turn-off Fall Time		-	30	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	13	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	52	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _{SD} =13A	-	-	1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} =0V, I _S =13A, di/dt=100A/μs	-	320	-	ns
Q _{rr}	Reverse Recovery Charge		-	4.2	-	μC

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: $T_J = 25^{\circ}\text{C}$, $V_{DD} = 50V$, $V_G = 10V$, $L = 10mH$, $I_{AS} = 7.2A$ 3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

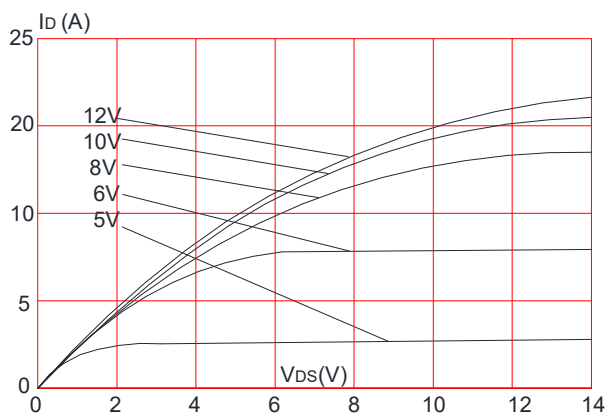


Figure 2: Typical Transfer Characteristics

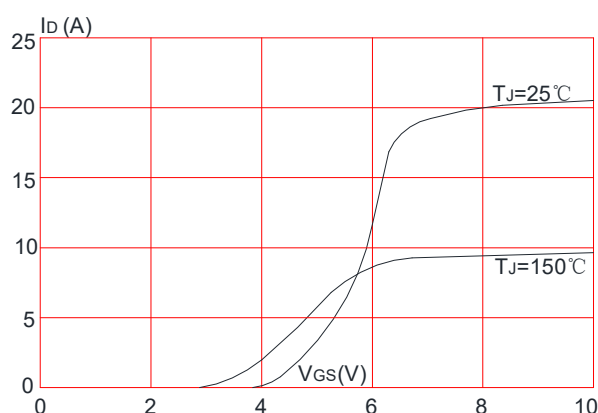


Figure 3: On-resistance vs. Drain Current

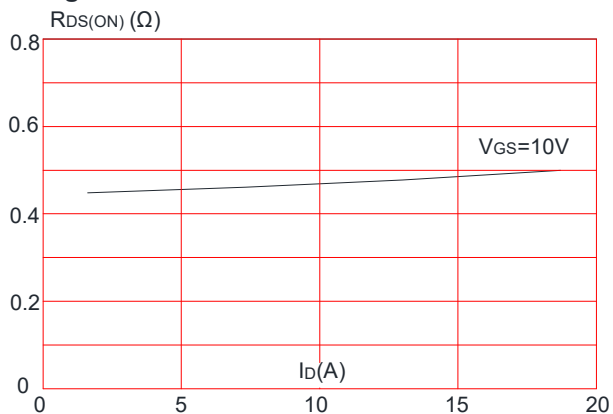


Figure 4: Body Diode Characteristics

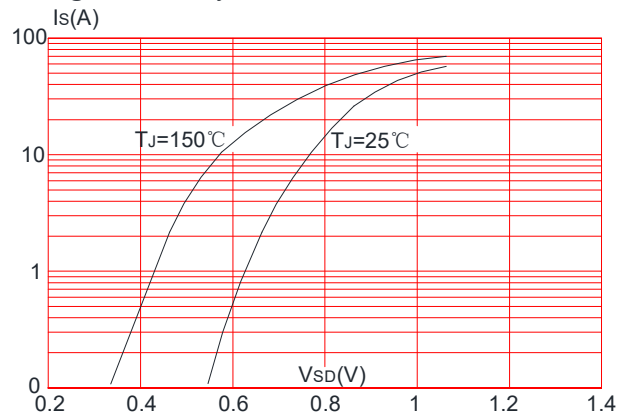


Figure 5: Gate Charge Characteristics

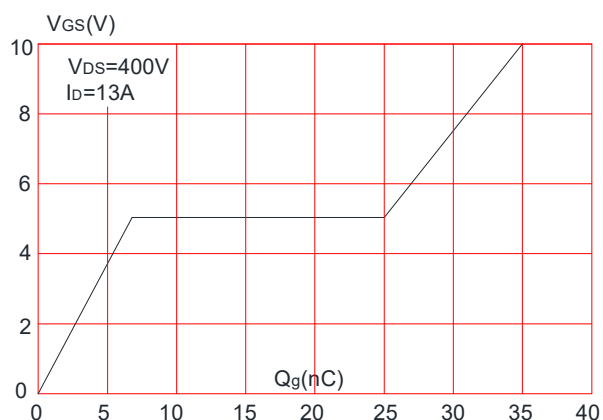


Figure 6: Capacitance Characteristics

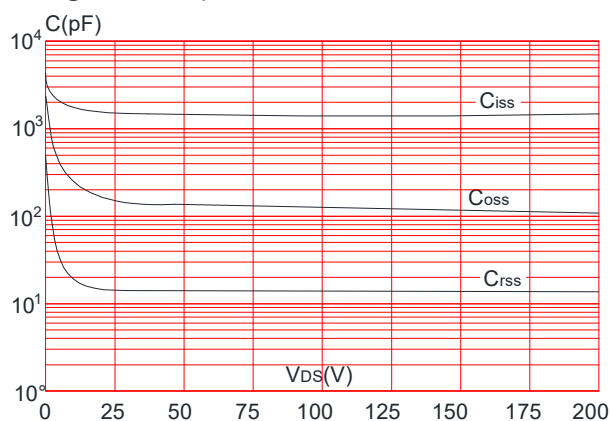


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

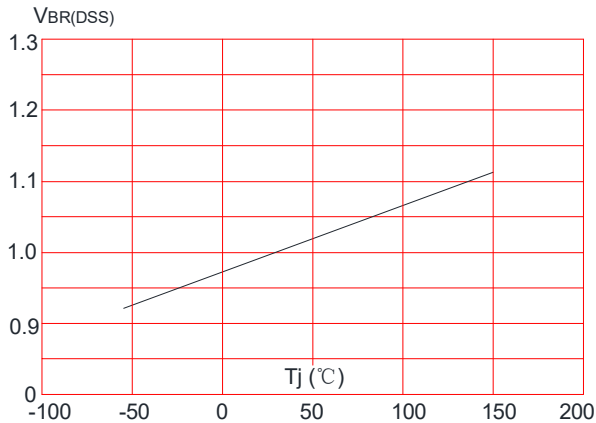


Figure 8: Normalized on Resistance vs. Junction Temperature

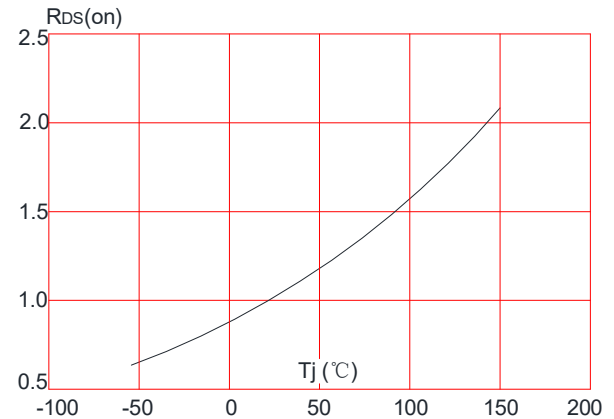


Figure 9: Maximum Safe Operating Area

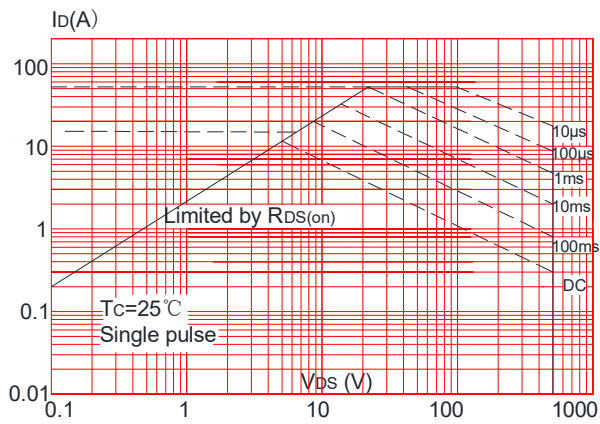


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

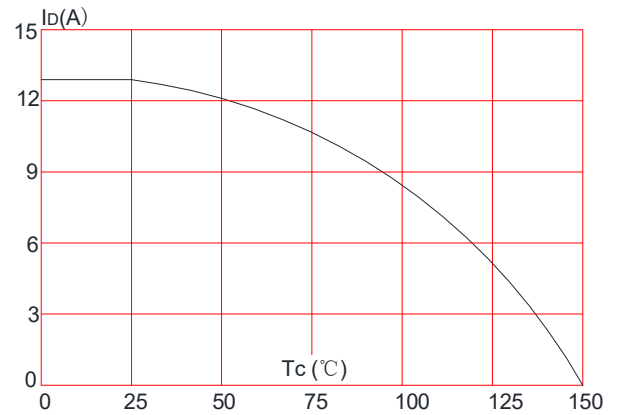
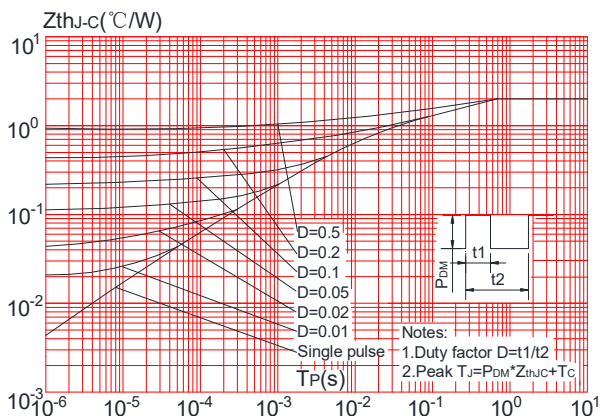


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit

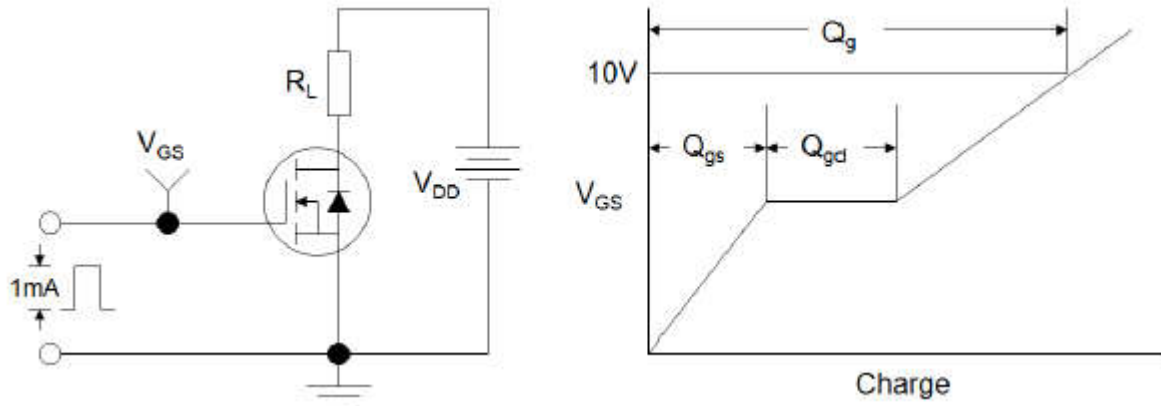


Figure1:Gate Charge Test Circuit & Waveform

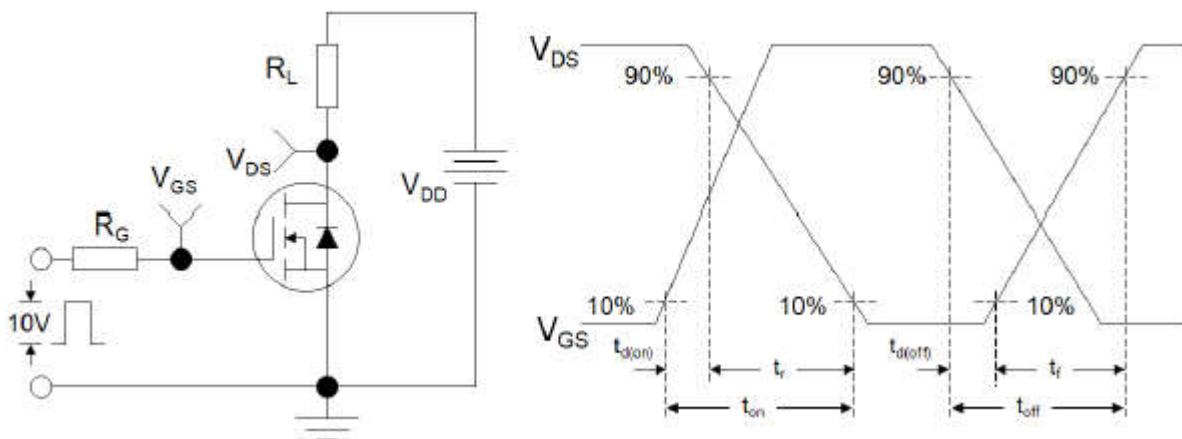


Figure 2: Resistive Switching Test Circuit & Waveforms

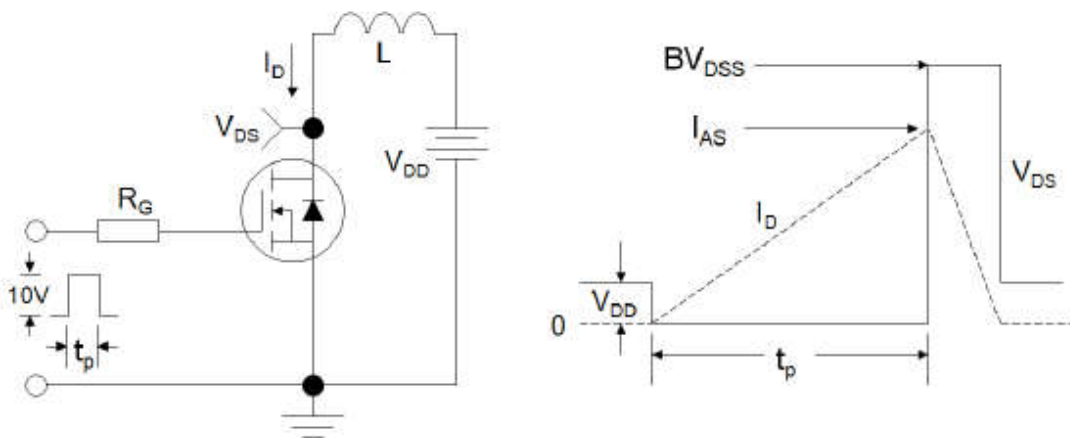
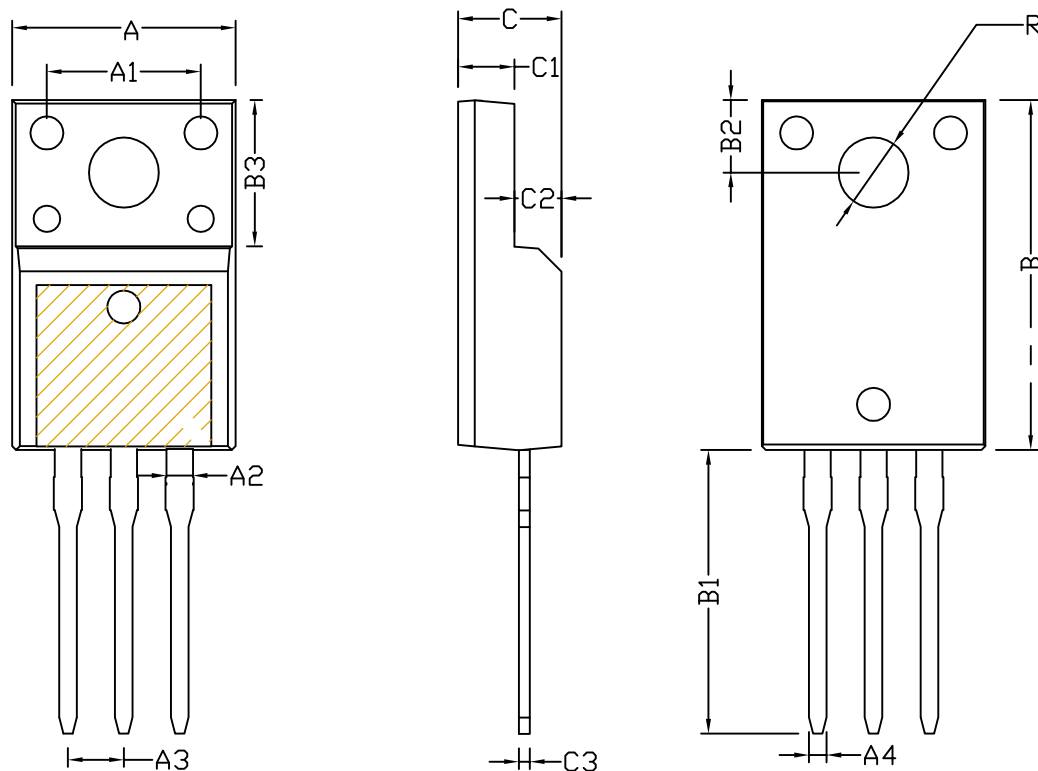


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

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					