SSF1090A

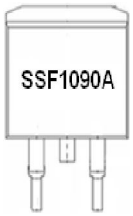
100V N-Channel MOSFET

Main Product Characteristics

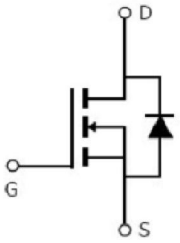
V_{DSS}	100V
R_{DS}(on)	72mΩ(typ)
I_D	15A ①



D2PAK



Marking and Pin Assignment



Schematic Diagram

Features and Benefits

- Advanced trench MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 175℃ operating temperature
- Lead free product

Description

It utilizes the latest trench processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute Max Rating

Symbol	Parameter	Max.	Units
I_D @ TC = 25°C	Continuous Drain Current, V_{GS} @ 10V ①	15	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V ①	10	
I_{DM}	Pulsed Drain Current ②	60	
P_D @TC = 25°C	Power Dissipation ③	41.7	W
	Linear Derating Factor	0.28	W/°C
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=30mH	135	mJ
I_{AS}	Avalanche Current @ L=30mH	3	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

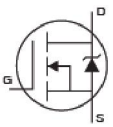
Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ③	—	3.6	℃/W
$R_{\theta JA}$	Junction-to-Ambient (t ≤ 10s)④	—	60	℃/W
	Junction-to-Ambient (PCB mounted, steady-state) ④	—	42	℃/W

Electrical Characteristics@T_A=25℃ unless otherwise specified

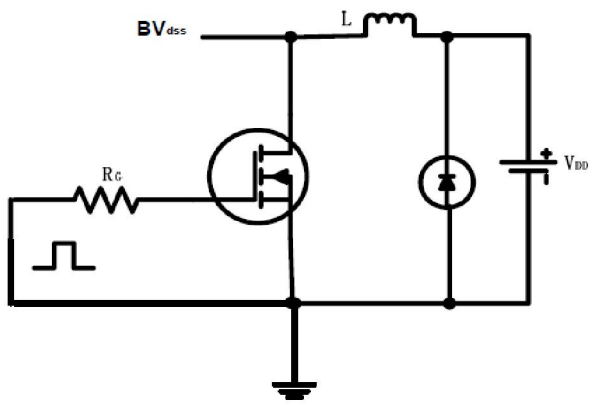
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	100	—	—	V	V_{GS} = 0V, ID = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	72	90	mΩ	V_{GS}=10V,I_D = 2A
		—	122.3	—		T_J = 125℃
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	V_{DS} = V_{GS}, I_D = 250μA
		—	2.76	—		T_J = 125℃
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	V_{DS} = 30V, V_{GS} =0V
		—	—	50		T_J = 125℃
I_{GSS}	Gate-to-Source forward leakage	—	—	100	A	V_{GS} =20V
	Gate-to-Source reverse leakage	-100	—	—		V_{GS} = -20V
Q_g	Total gate charge	—	20.5	—	nC	I_D = 9.2A
Q_{gs}	Gate-to-Source charge	—	4.6	—		V_{DD}=80V
Q_{gd}	Gate-to-Drain("Miller") charge	—	8.4	—		V_{GS} = 10V
$t_{d(on)}$	Turn-on delay time	—	12.2	—	ns	V_{GS}=10V, VDD=50V,
t_r	Rise time	—	36.5	—		R_L=5.4Ω,
$t_{d(off)}$	Turn-Off delay time	—	52.3	—		R_{GEN}=18Ω
t_f	Fall time	—	31.4	—		ID=9.2A
C_{iss}	Input capacitance	—	720	—	pF	V_{GS} = 0V
C_{oss}	Output capacitance	—	72	—		V_{DS} = 25V
C_{rss}	Reverse transfer capacitance	—	49	—		f = 1MHz

Source-Drain Ratings and Characteristics

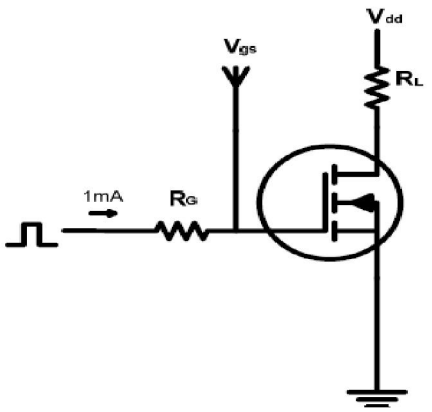
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	15 ①	A	MOSFET symb showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	60	A	
V_{SD}	Diode Forward Voltage	—	0.85	1.5	V	I_S=3A, V_{GS}=0V,T_J= 25°C
t_{rr}	Reverse Recovery Time	—	35.1	—	ns	T_J = 25°C, I_F =9.2A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	68.6	—	nC	

Test Circuits and Waveforms

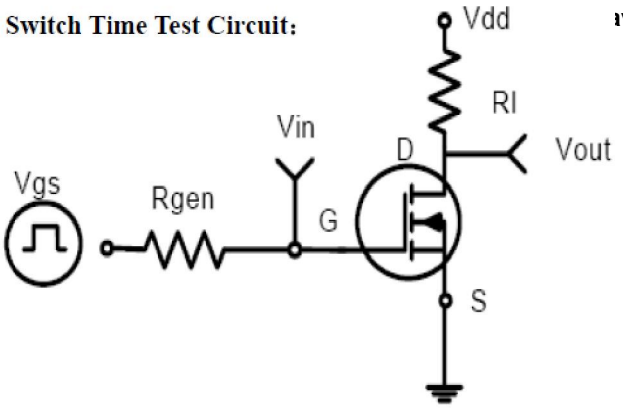
EAS test circuits:



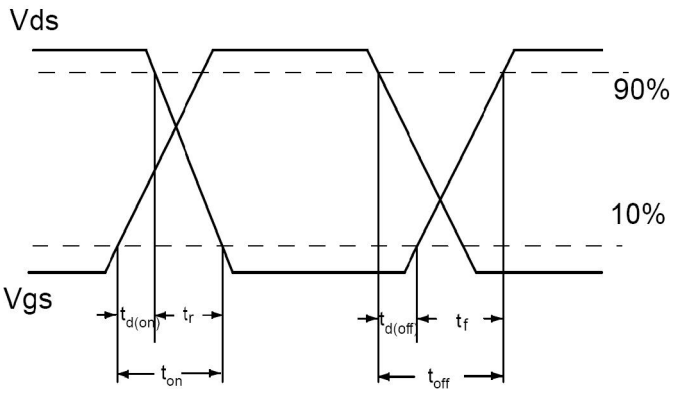
Gate charge test circuit:



Switch Time Test Circuit:



Waveforms:



Notes:

①Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

②Repetitive rating; pulse width limited by max junction temperature.

③The power dissipation PD is based on max junction temperature, using junction-to-case thermal resistance.

④The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C

⑤These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175°C.

Typical Electrical and Thermal Characteristics

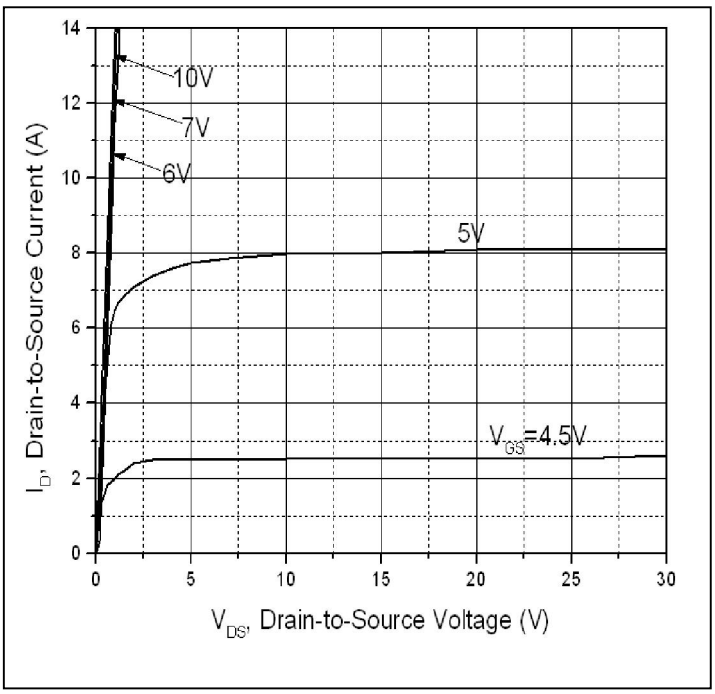


Figure 1: Typical Output Characteristics

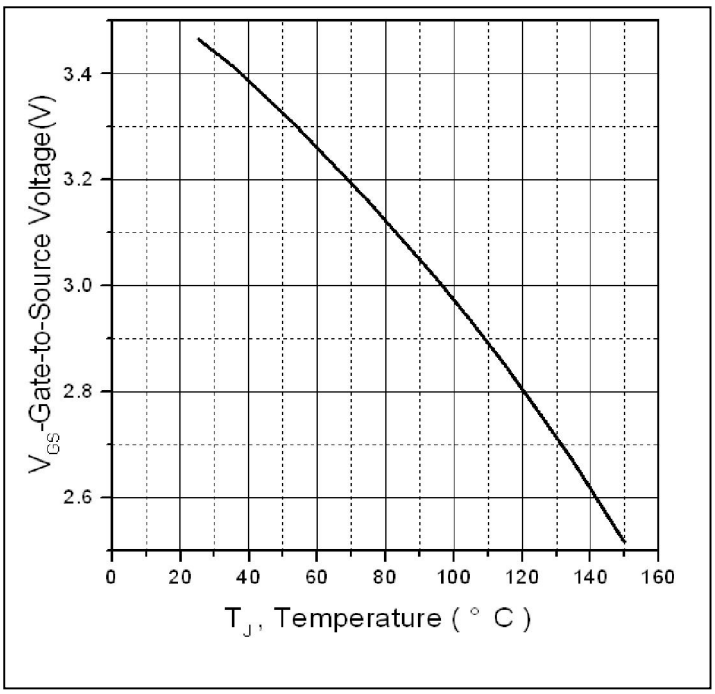


Figure 2. Gate to source cut-off voltage

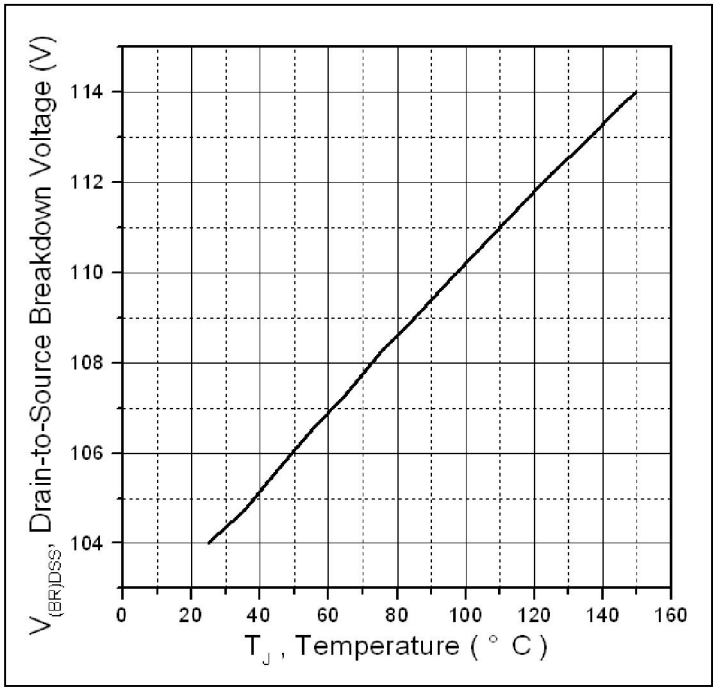


Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature

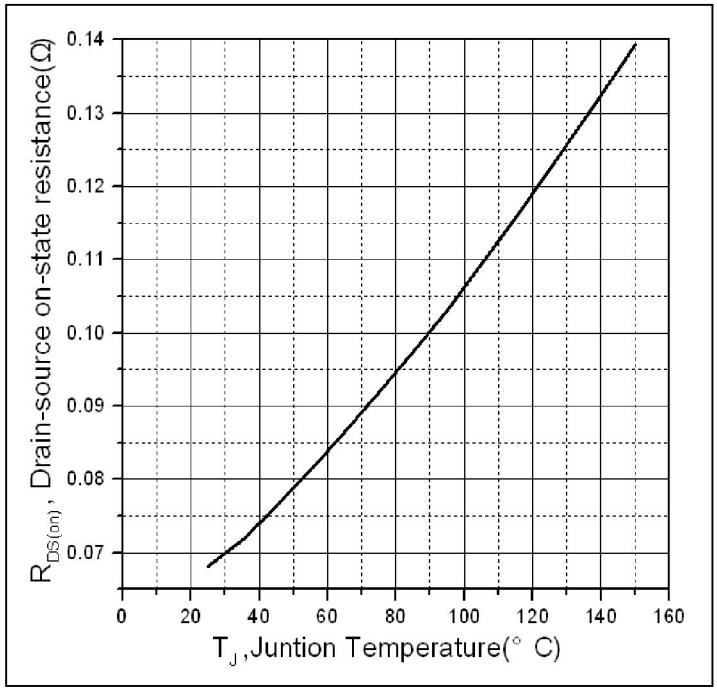


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical Electrical and Thermal Characteristics

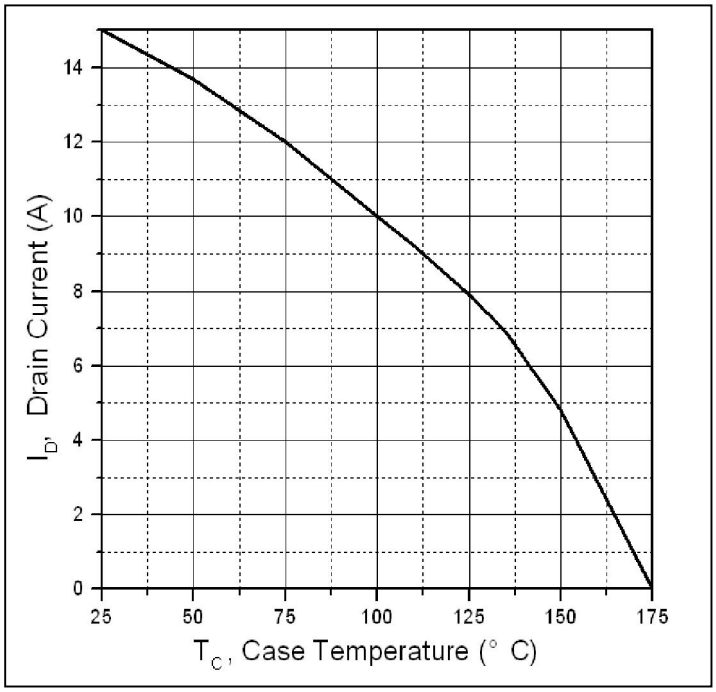


Figure 5. Maximum Drain Current Vs. Case Temperature

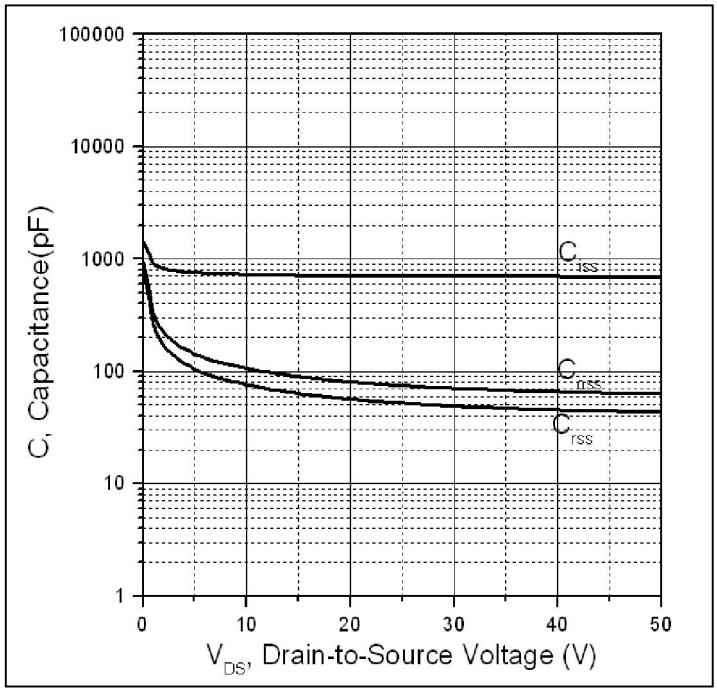


Figure 6.Typical Capacitance Vs. Drain-to-Source Voltage

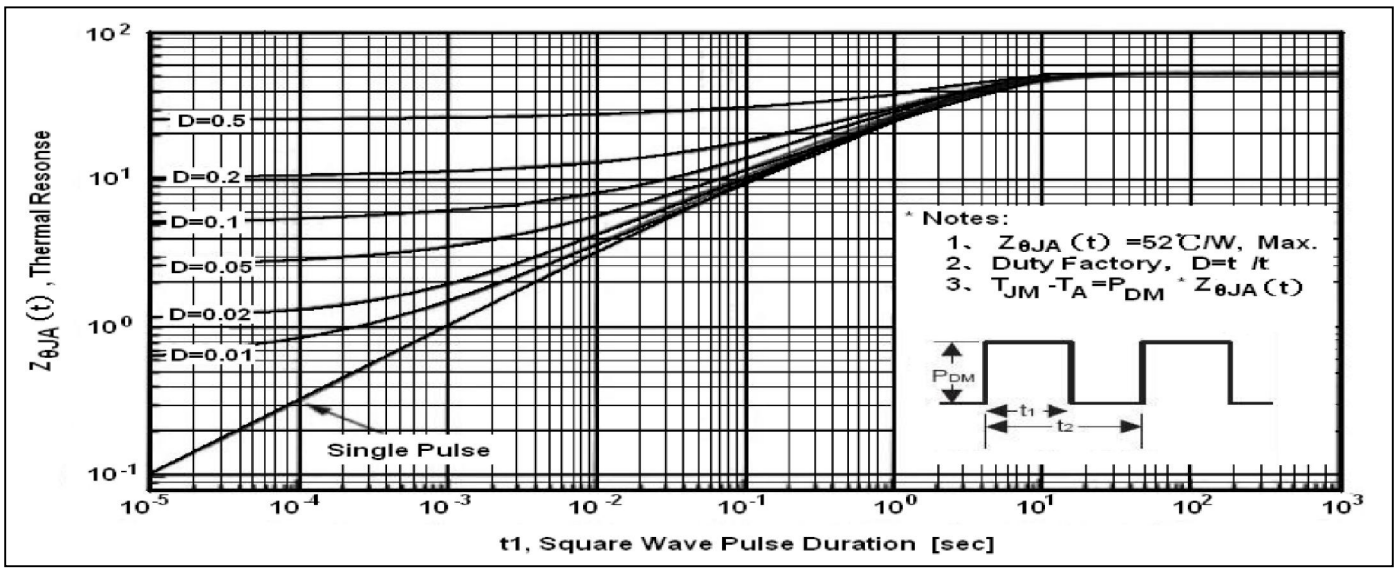
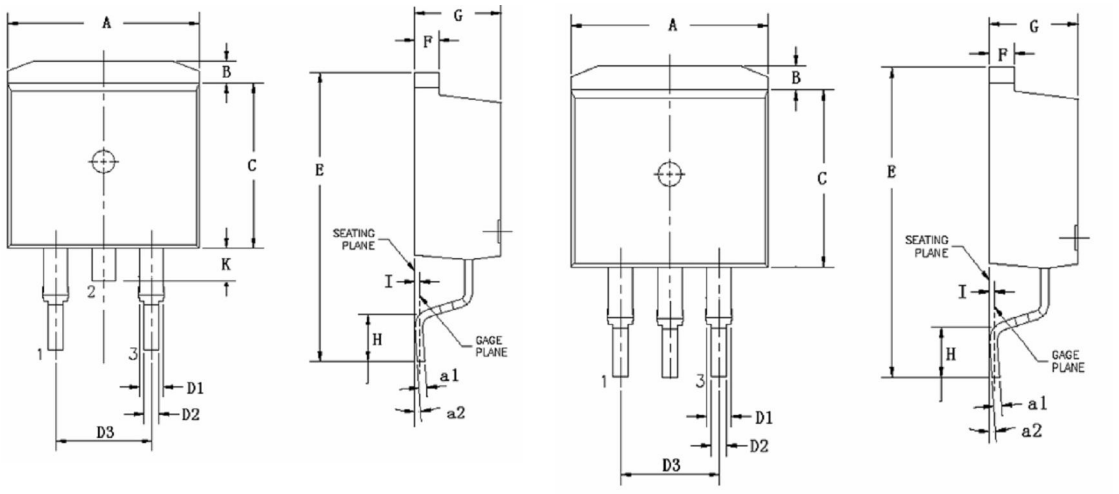


Figure7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data

D2PAK PACKAGE OUTLINE DIMENSION



Symbol	Dimension In Millimeters		Dimension In Inches	
	Min	Max	Min	Max
A	9.660	10.280	0.380	0.405
B	1.020	1.320	0.040	0.052
C	8.590	9.400	0.338	0.370
D1	1.140	1.400	0.045	0.055
D2	0.700	0.950	0.028	0.037
D3	5.080 (TYP)		0.200 (TYP)	
E	15.090	15.390	0.594	0.606
F	1.150	1.400	0.045	0.055
G	4.300	4.700	0.169	0.185
H	2.290	2.790	0.090	0.110
I	0.250 (TYP)		0.010 (TYP)	
K	1.300	1.600	0.051	0.063
a1	0.450	0.650	0.018	0.026
a2	0^0	8^0	1^0	8^0

Ordering and Marking Information

Device Marking: SSF1090A

Package (Available)

D2PAK

Operating Temperature Range

C : -55 to 175 ºC

Devices per Unit

Package Type	Units/ Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
D2PAK	50	20	1000	6	6000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	T_j=125℃ to 175℃ @ 80% of Max V_{DSS}/V_{CES}/VR	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	T_j=150℃ or 175℃ @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices