

Main Product Characteristics:

V_{DS}	75V
$R_{DS(on)}$	6.5mohm(typ.)
I_D	80A


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°C operating temperature


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
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	80	A
$I_D @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	70	
I_{DM}	Pulsed Drain Current②	320	
$P_D @ TC = 25^\circ C$	Power Dissipation③	187	W
	Linear Derating Factor	2.0	W/°C
V_{DS}	Drain-Source Voltage	75	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ $L=0.3mH$ ②	375	mJ
I_{AR}	Avalanche Current @ $L=0.3mH$ ②	50	A
$T_J T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 175	°C

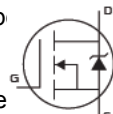
Thermal Resistance

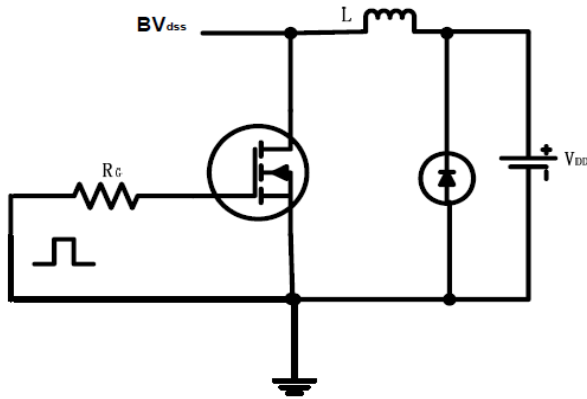
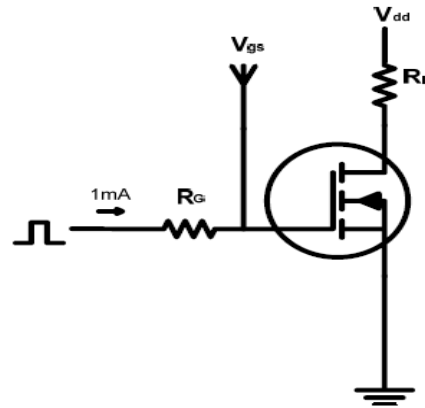
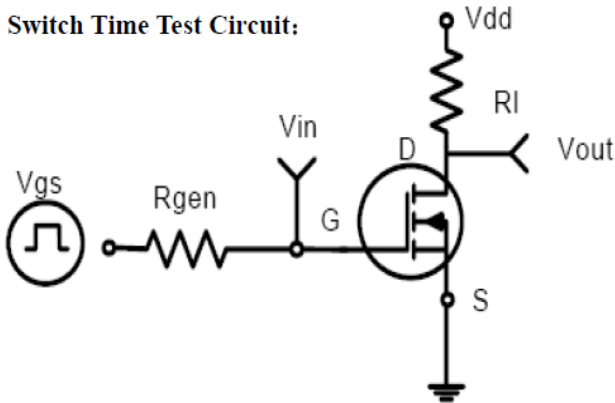
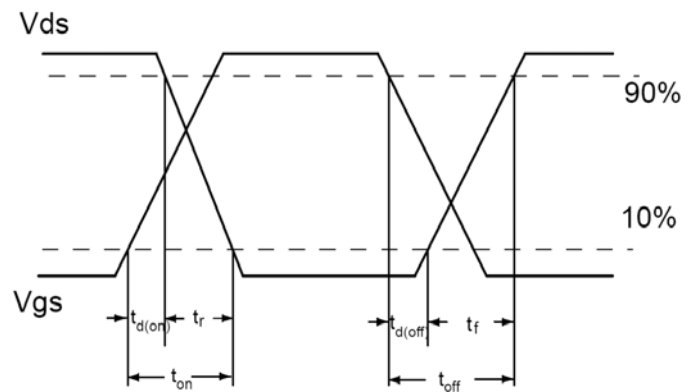
Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ^③	—	0.8	°C/W
$R_{\theta JA}$	Junction-to-ambient ($t \leq 10s$) ^④	—	62	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ^④	—	40	°C/W

Electrical Characterizes @ $T_A=25^\circ C$ unless otherwise specified

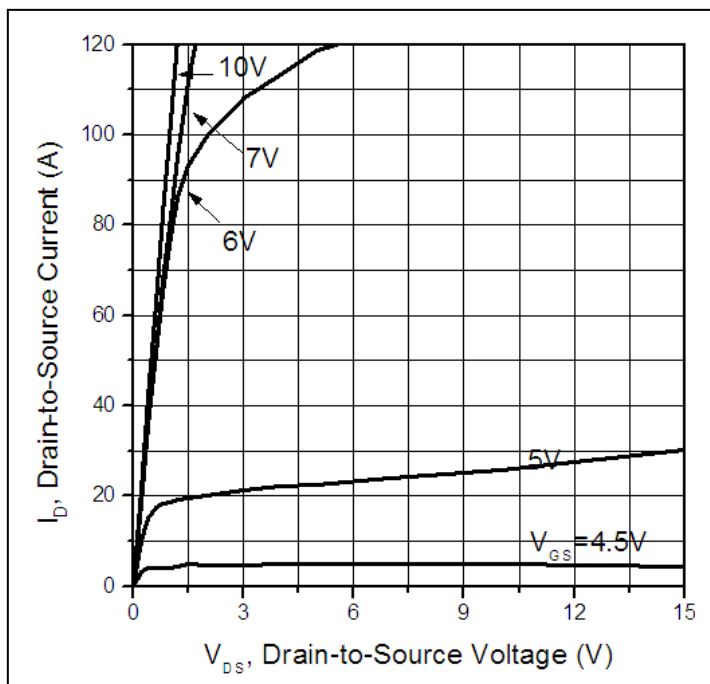
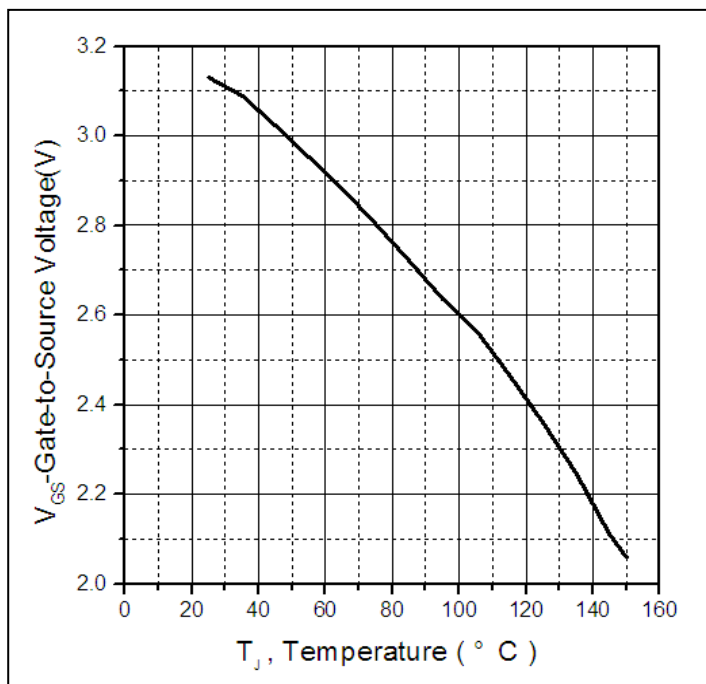
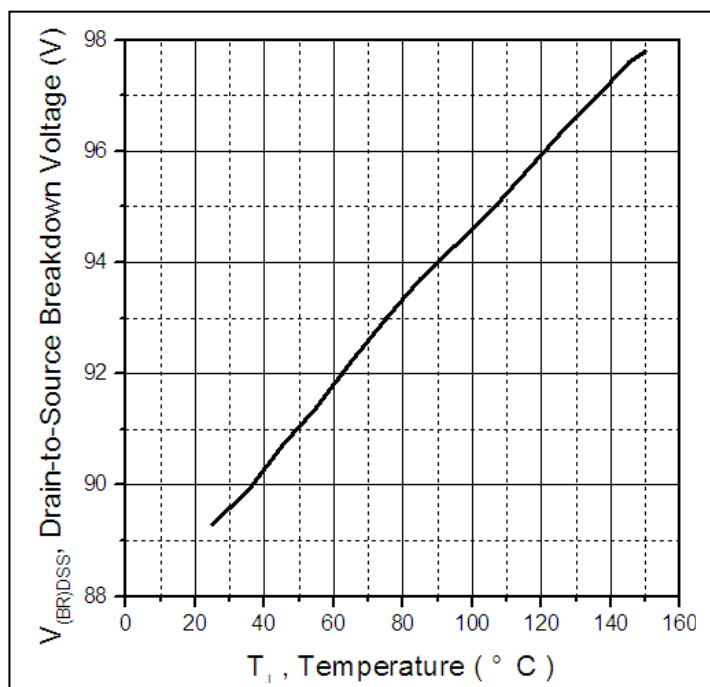
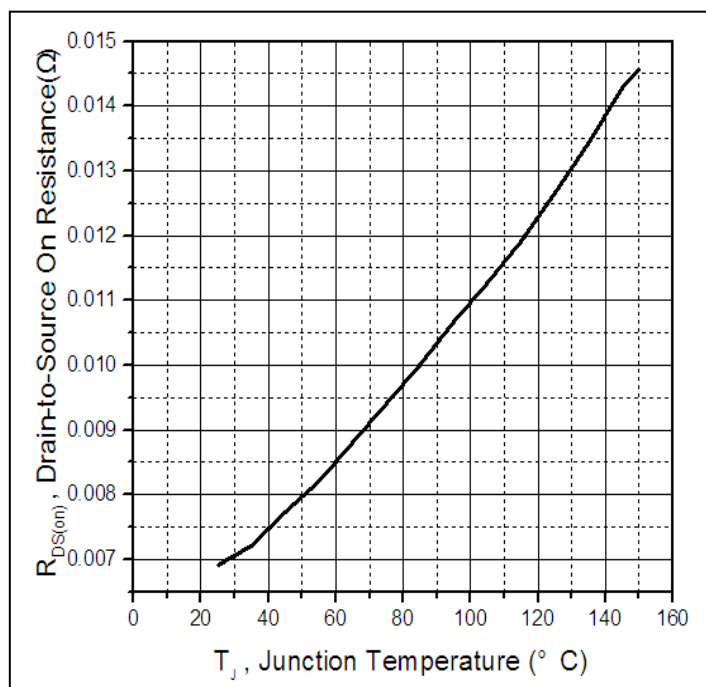
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	75	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	6.5	8	m Ω	$V_{GS}=10V, I_D = 30A$
		—	12.5	13		$T_J = 125^\circ C$
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
		—	2.35	—		$T_J = 125^\circ C$
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 75V, V_{GS} = 0V$
		—	—	50		$T_J = 125^\circ C$
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20V$
		-100	—	—		$V_{GS} = -20V$
Q_g	Total gate charge	—	93.6	—	nC	$I_D = 30A,$ $V_{DS}=30V,$ $V_{GS} = 10V$
Q_{gs}	Gate-to-Source charge	—	20.2	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	33.3	—		
$t_{d(on)}$	Turn-on delay time	—	17.3	—	ns	$V_{GS}=10V, V_{DS}=30V,$ $R_L=15\Omega,$ $R_{GEN}=2.5\Omega$
t_r	Rise time	—	15.2	—		
$t_{d(off)}$	Turn-Off delay time	—	52	—		
t_f	Fall time	—	19	—		
C_{iss}	Input capacitance	—	4373	—	pF	$V_{GS} = 0V$
C_{oss}	Output capacitance	—	352	—		$V_{DS} = 25V$
C_{rss}	Reverse transfer capacitance	—	306	—		$f = 1MHz$

Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	80	A	MOSFET symb showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	320	A	
V_{SD}	Diode Forward Voltage	—	0.85	1.3	V	$I_S=30A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	—	36	—	ns	$T_J = 25^\circ C, I_F = 75A, di/dt =$
Q_{rr}	Reverse Recovery Charge	—	62	—	nC	$100A/\mu s$

Test circuits and Waveforms
EAS test circuits:

Gate charge test circuit:

Switch Time Test Circuit:

Switch Waveforms:

Notes:

- ① The maximum current rating is limited by bond-wires.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$
- ⑤ These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)} = 175^\circ\text{C}$.
- ⑥ The maximum current rating is limited by bond-wires.

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

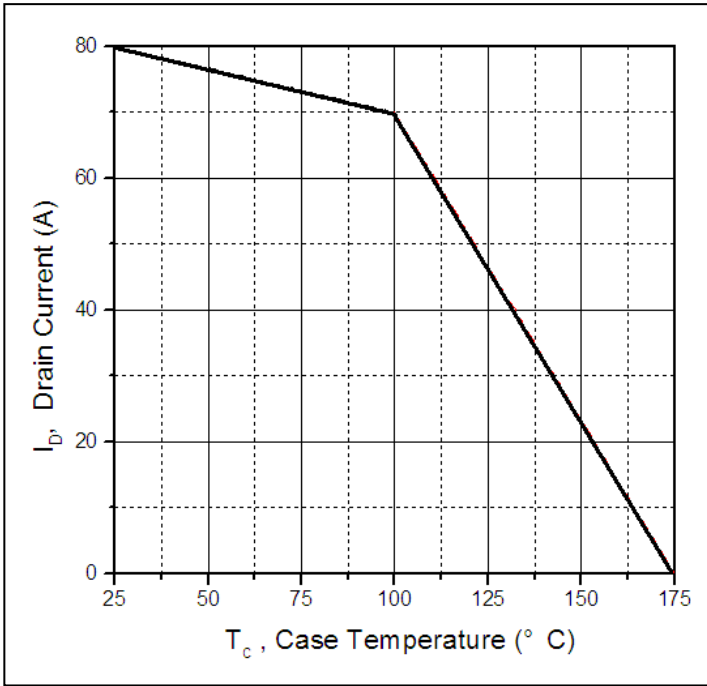


Figure 5. Maximum Drain Current Vs. Case Temperature

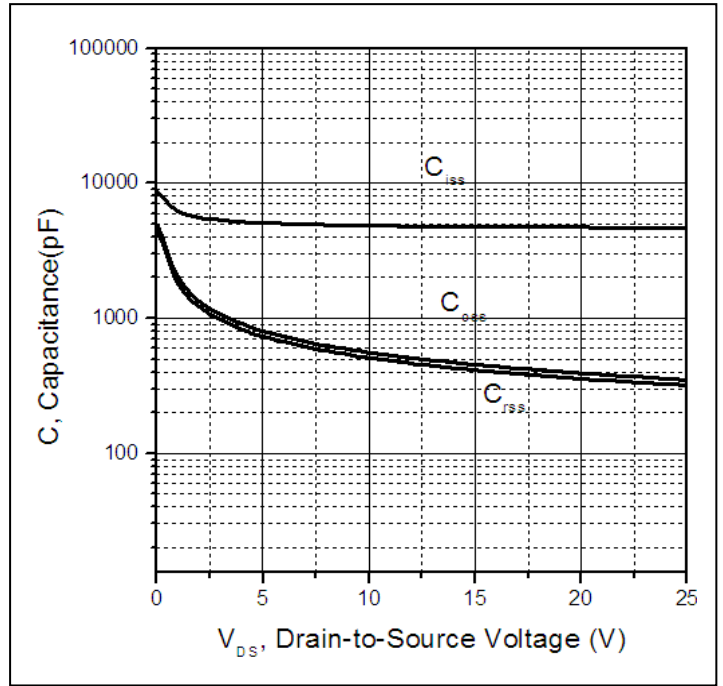


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

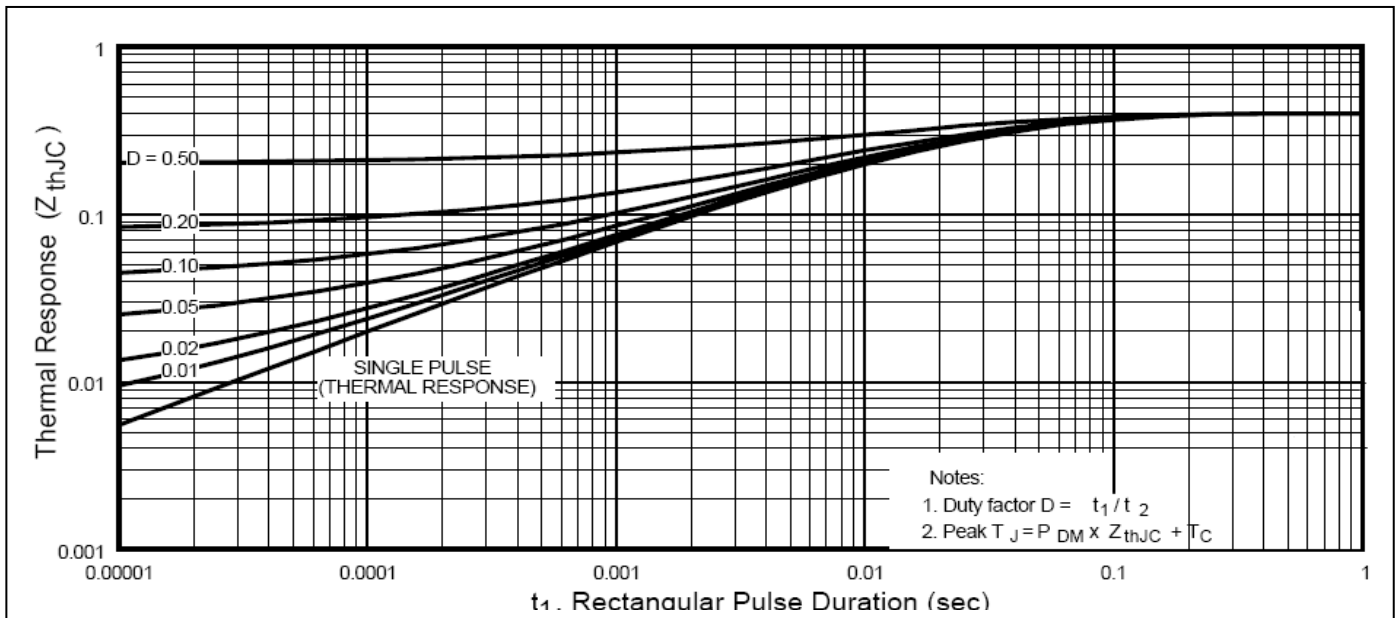
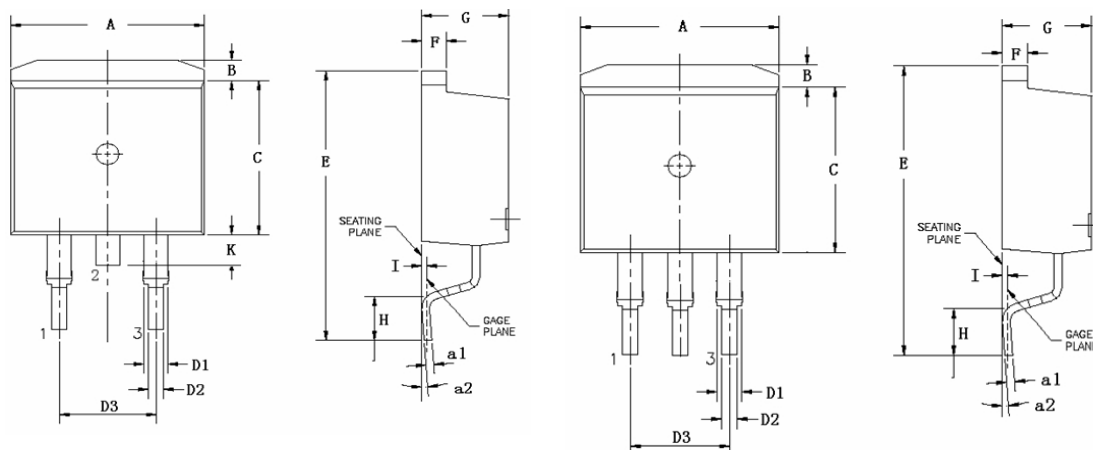


Figure 7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data:
TO263 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°	8°	1°	8°

Ordering and Marking Information
Device Marking: SSF7509A

Package (Available)
D2PAK
Operating Temperature Range
C : -55 to 175 °C

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°C to 175°C @ 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°C or 175°C @ 100% of Max V _{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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