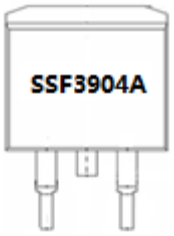
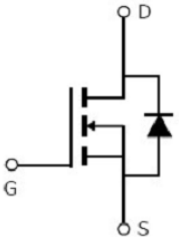
Main Product Characteristics:

V_{DSS}	30V
R_{DS}(on)	2.6mΩ (typ.)
I_D	120A

TO263



Marking and pin Assignment



Schematic diagram

Features and Benefits:

- Advanced 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

Description:

It utilizes the latest 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} @ 10V①	120	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V①	90	
I_{DM}	Pulsed Drain Current②	480	
P_D @TC = 25°C	Power Dissipation③	100	W
	Linear Derating Factor	0.55	W/°C
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.1mH②	320	mJ
I_{AR}	Avalanche Current @ L=0.1mH②	80	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

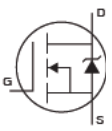
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case③	—	0.9	℃/W
$R_{\theta JA}$	Junction-to-ambient (t ≤ 10s) ④	—	62	℃/W
	Junction-to-Ambient (PCB mounted, steady-state) ④	—	40	℃/W

Electrical Characterizes @T_A=25℃ unless otherwise specified

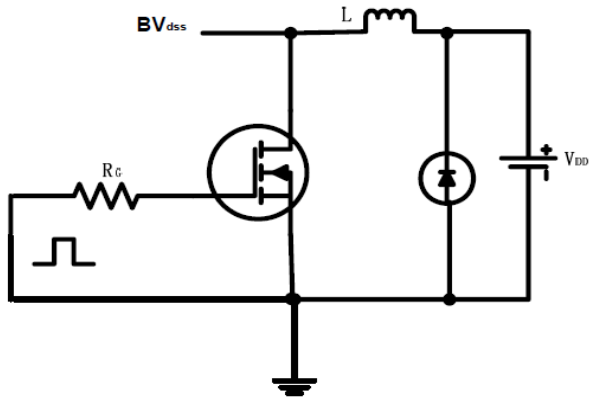
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	30	—	—	V	V_{GS} = 0V, ID = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	2.6	3.6	mΩ	V_{GS}=10V,I_D = 30A
		—	3.8	—		T_J = 125℃
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	3.2	5	mΩ	V_{GS}=4.5V,I_D = 16A
		—	4.8	—		T_J = 125℃
$V_{GS(th)}$	Gate threshold voltage	1	—	3	V	V_{DS} = V_{GS}, I_D = 250μA
		—	1.3	—		T_J = 125℃
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	V_{DS} = 30V,V_{GS} = 0V
		—	—	50		T_J = 125°C
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V_{GS} =20V
		—	—	-100		V_{GS} = -20V
Q_g	Total gate charge	—	68	—	nC	V_{DS}=15V,
Q_{gs}	Gate-to-Source charge	—	19	—		I_D=16A,
Q_{gd}	Gate-to-Drain("Miller") charge	—	25	—		V_{GS}=5V
$t_{d(on)}$	Turn-on delay time	—	19	—	ns	V_{GS}=10V, VDS=15V, R_{GEN}=6Ω, I_D=1A
t_r	Rise time	—	18	—		
$t_{d(off)}$	Turn-Off delay time	—	145	—		
t_f	Fall time	—	63	—		
C_{iss}	Input capacitance	—	9291	—	pF	V_{GS} = 0V
C_{oss}	Output capacitance	—	748	—		V_{DS} = 15V
C_{rss}	Reverse transfer capacitance	—	702	—		f = 1MHz

Source-Drain Ratings and Characteristics

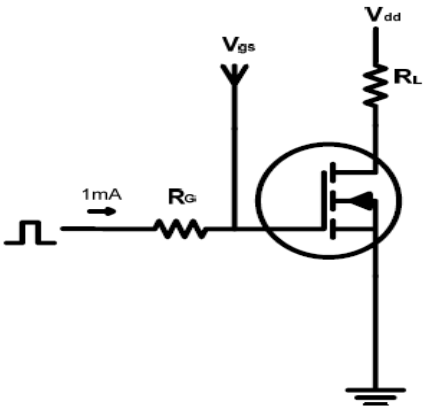
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	110	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	440	A	
V_{SD}	Diode Forward Voltage	—	0.85	1.3	V	I_S=50A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	20	—	ns	T_J = 25°C, I_F =32A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	7.8	—	nC	

Test circuits and Waveforms

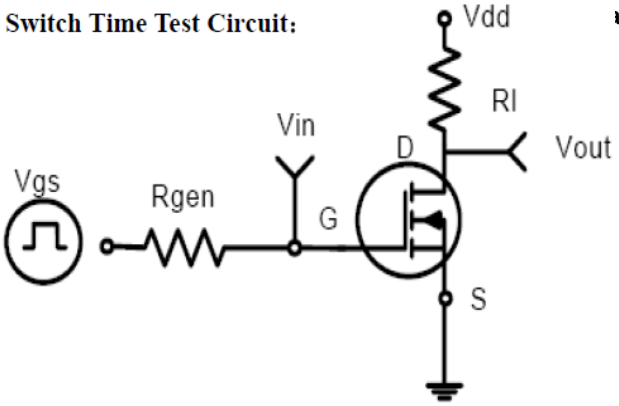
EAS test circuits:



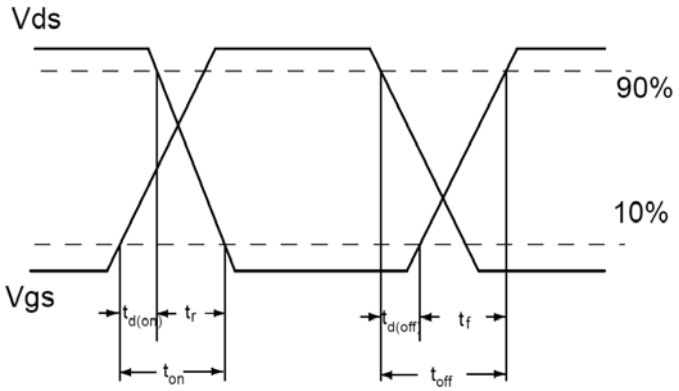
Gate charge test circuit:



Switch Time Test Circuit:



ıveforms:



Notes:

①The maximum current rating is limited by bond-wires.

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 1in 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 characteristics

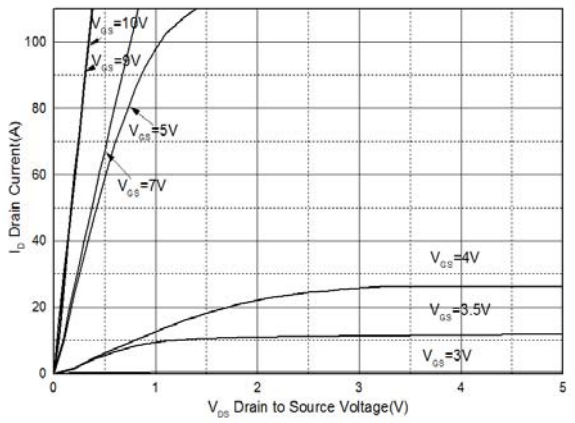


Figure 1: Typical Output Characteristics

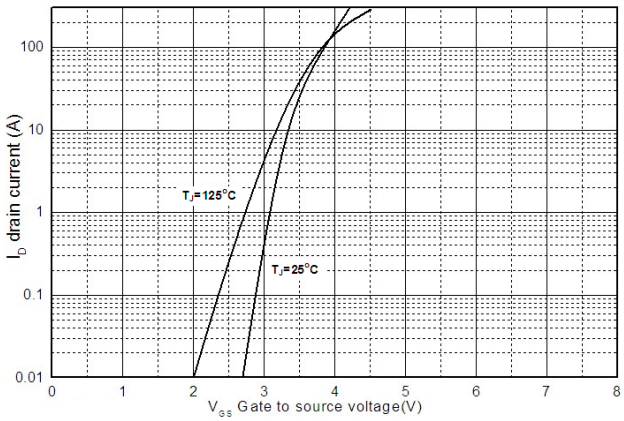


Figure 2: Typical Transfer Characteristics

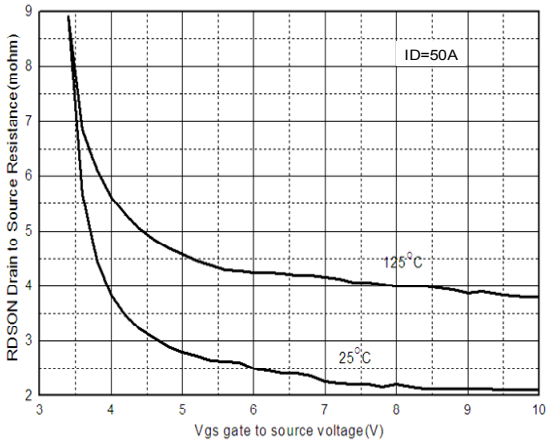


Figure 3: On-Resistance vs. Gate-Source Voltage

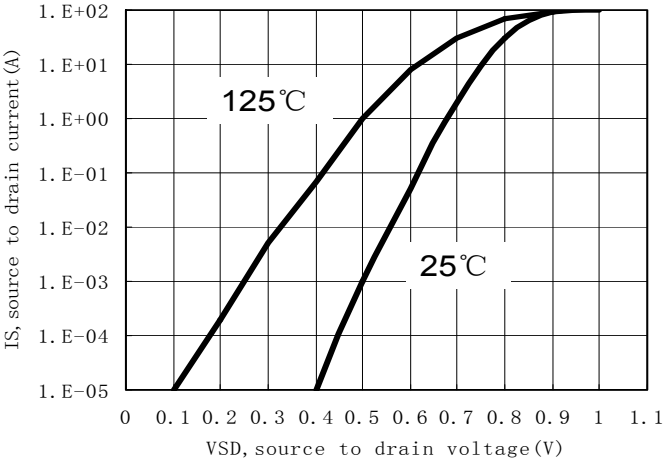


Figure 4: Body-Diode Characteristics

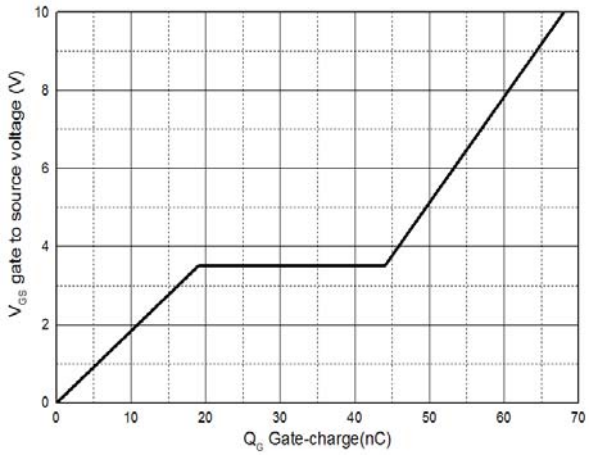


Figure 5: Gate-Charge Characteristics

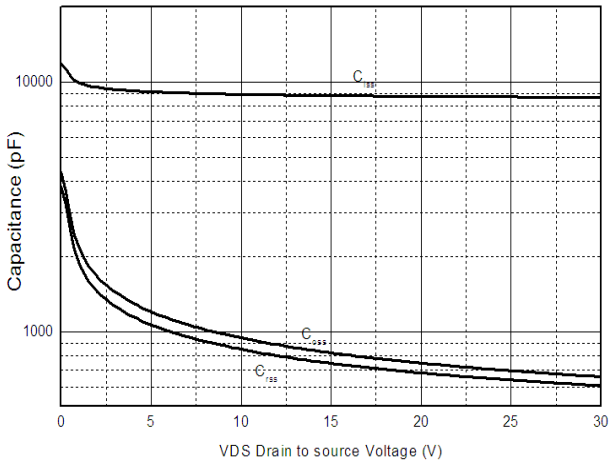


Figure 6: Capacitance Characteristics

Typical thermal characteristics

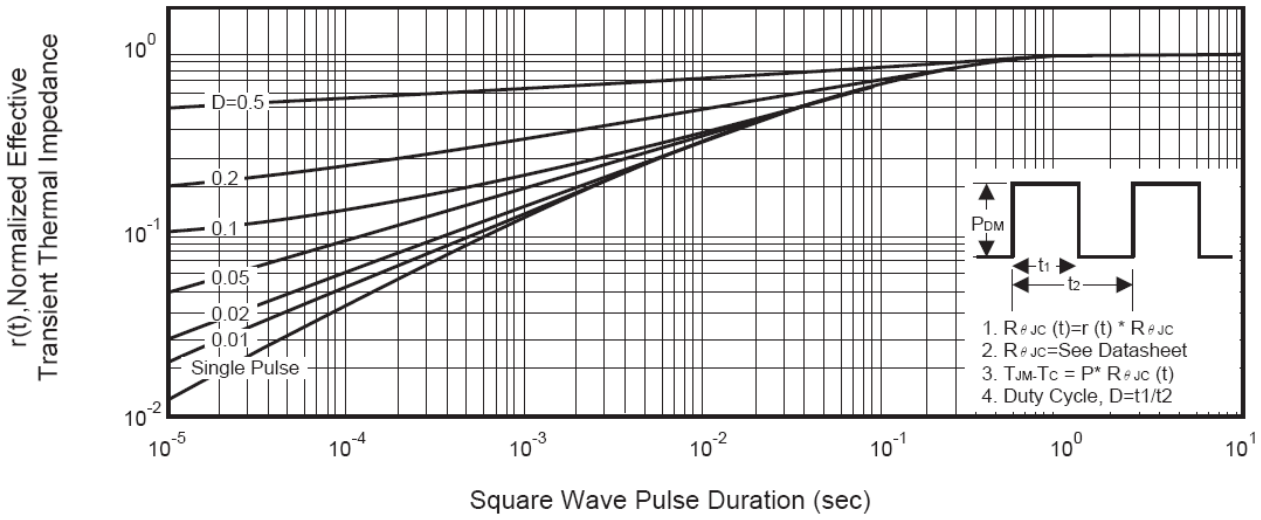
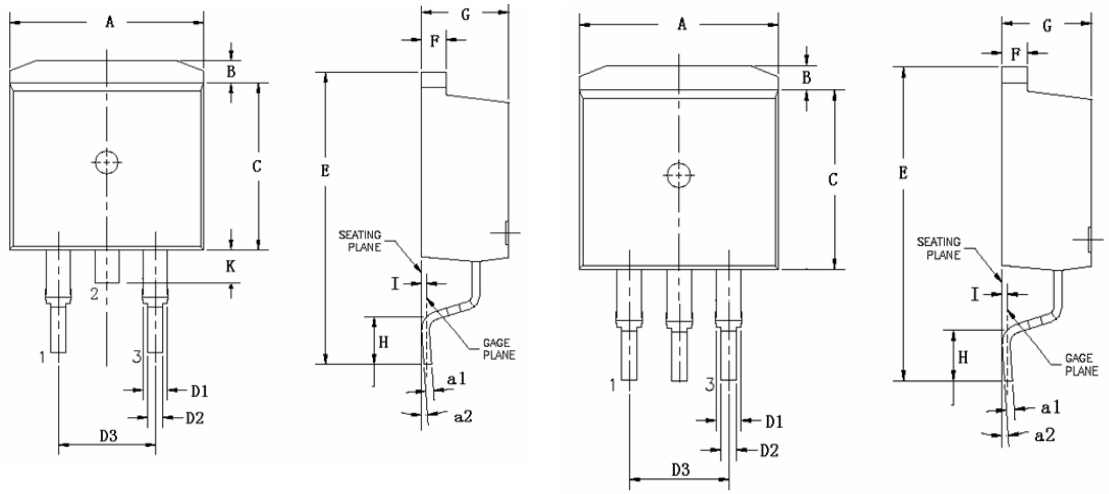


Figure 7: Normalized Thermal transient Impedance Curve

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: SSF3904A

Package (Available)

TO263(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
TO263	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=125℃ to 175℃ @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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Customer Service

Worldwide Sales and Service:

Sales@silikron.com

Technical Support:

Technical@silikron.com

Suzhou Silikron Semiconductor Corp.

Building 11A Suchun Industrial Square, 428# Xinglong Street, Suzhou P.R. China

TEL: (86-512) 62560688

FAX: (86-512) 65160705

E-mail: Sales@silikron.com