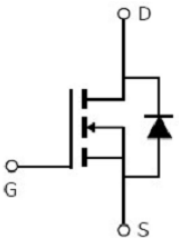
Main Product Characteristics:

V_{DSS}	600V
R_{DS}(on)	0.2ohm(typ.)
I_D	20A

TO247

Marking and pin Assignment



Schematic diagram

Features and Benefits:

- High dv/dt and avalanche capabilities
- 100% avalanche tested
- Low input capacitance and gate charge
- Low gate input resistance

Description:

The SSF20N60H series MOSFETs is a new technology，which combines an innovative super junction technology and advance process. This new technology achieves low Rdson, energy saving, high reliability and uniformity, superior power density and space saving.

Absolute max Rating:

Symbol	Parameter	Max.	Units
I_D @ TC = 25°C	Continuous Drain Current, V_{GS} @ 10V①	20	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V①	13	
I_{DM}	Pulsed Drain Current②	80	
P_D @TC = 25°C	Power Dissipation③	208	W
	Linear Derating Factor	1.66	W/°C
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ L=32mH	400	mJ
I_{AS}	Avalanche Current @ L=32mH	5	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

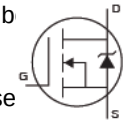
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case③	—	0.6	℃/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

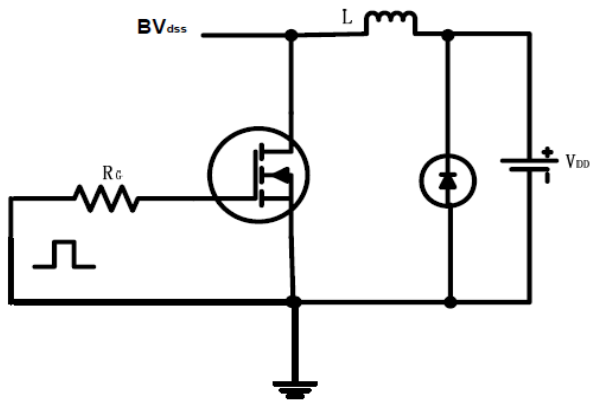
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	600	—	—	V	V_{GS} = 0V, ID = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	0.2	0.3	Ω	V_{GS}=10V,I_D = 13A
		—	0.55	—		T_J = 125°C
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	V_{DS} = V_{GS}, I_D = 250μA
		—	2.4	—		T_J = 125°C
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	V_{DS} =600V,V_{GS} = 0V
		—	—	50		T_J = 125°C
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V_{GS} =30V
		-100	—	—		V_{GS} = -30V
Q_g	Total gate charge	—	90	—	nC	I_D = 20A,
Q_{gs}	Gate-to-Source charge	—	12	—		V_{DS}=480V,
Q_{gd}	Gate-to-Drain("Miller") charge	—	34	—		V_{GS} = 10V
$t_{d(on)}$	Turn-on delay time	—	12	—	ns	V_{GS}=10V, VDS=380V,
t_r	Rise time	—	6	—		R_L=38Ω,
$t_{d(off)}$	Turn-Off delay time	—	65	—		R_{GEN}=4.7Ω
t_f	Fall time	—	6	—		ID=10A
C_{iss}	Input capacitance	—	2334	—	pF	V_{GS} = 0V
C_{oss}	Output capacitance	—	856	—		V_{DS} = 25V
C_{rss}	Reverse transfer capacitance	—	3	—		f = 1MHz

Source-Drain Ratings and Characteristics

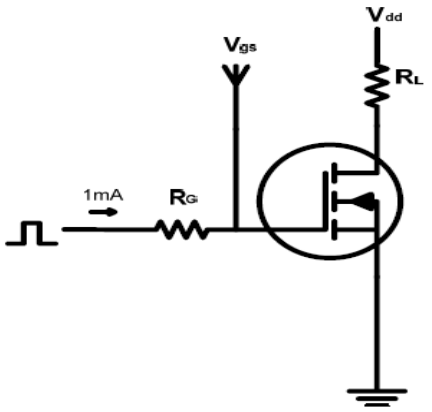
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	20	A	MOSFET symb showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	80	A	
V_{sd}	Diode Forward Voltage	—	—	1.2	V	I_S=20A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	480	—	ns	T_J = 25°C, I_F =20A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	10	—	nC	

Test circuits and Waveforms

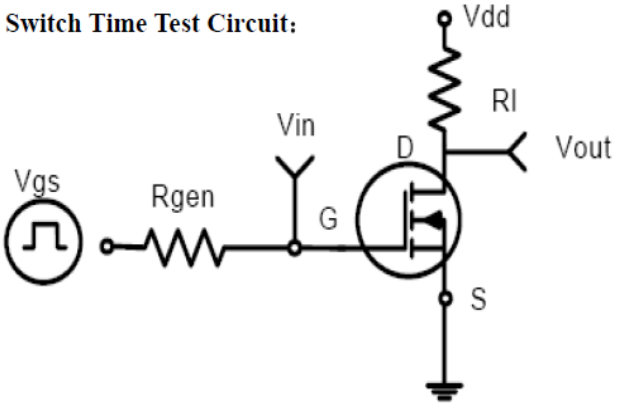
EAS test circuits:



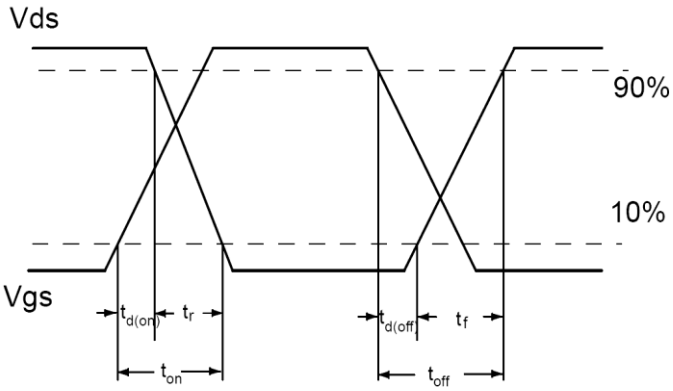
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



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 $T_{J(MAX)}$=150°C.
⑥ The maximum current rating is limited by bond-wires.

Typical electrical and thermal characteristics

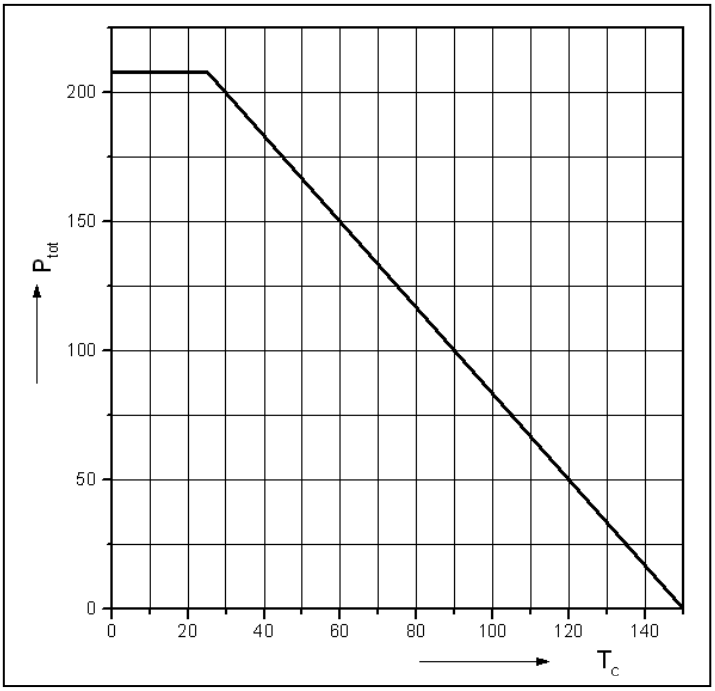


Figure 1: **Power dissipation**

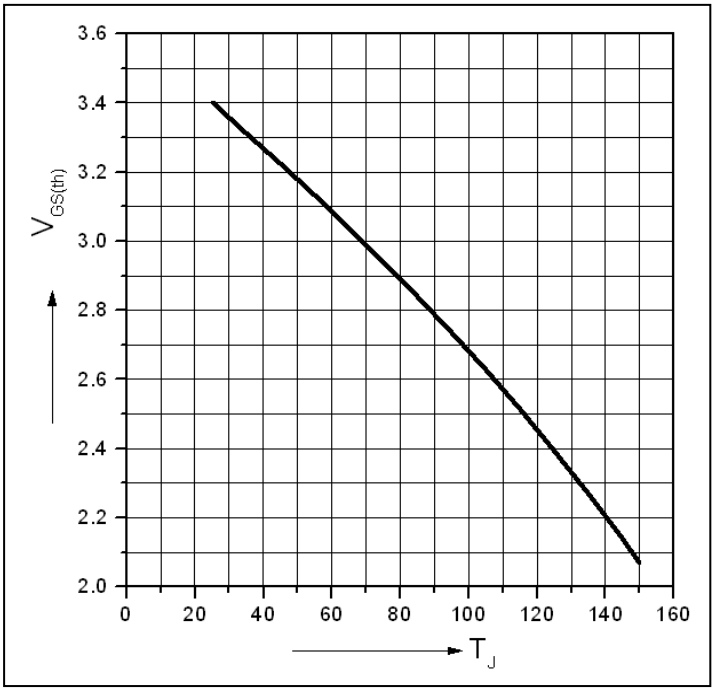


Figure 2. Typ. Gate to source cut-off voltage

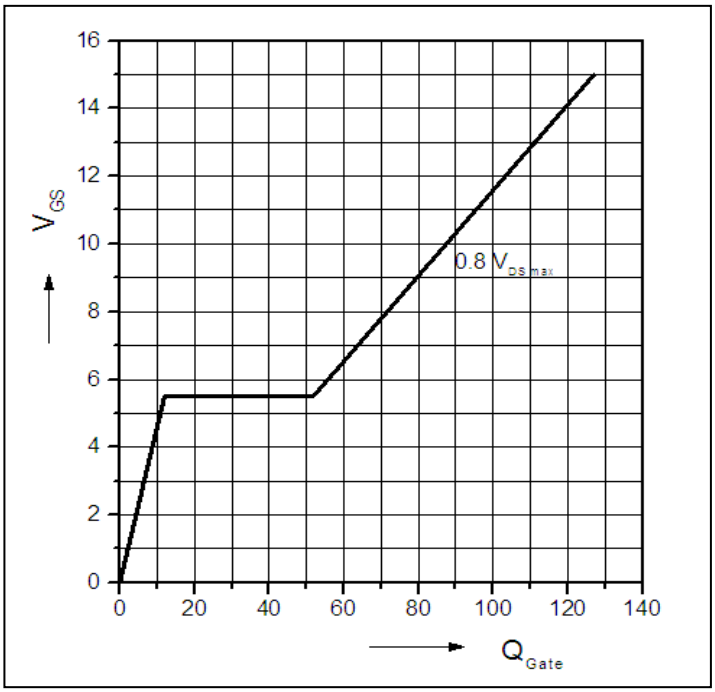


Figure 3. Typ. gate charge

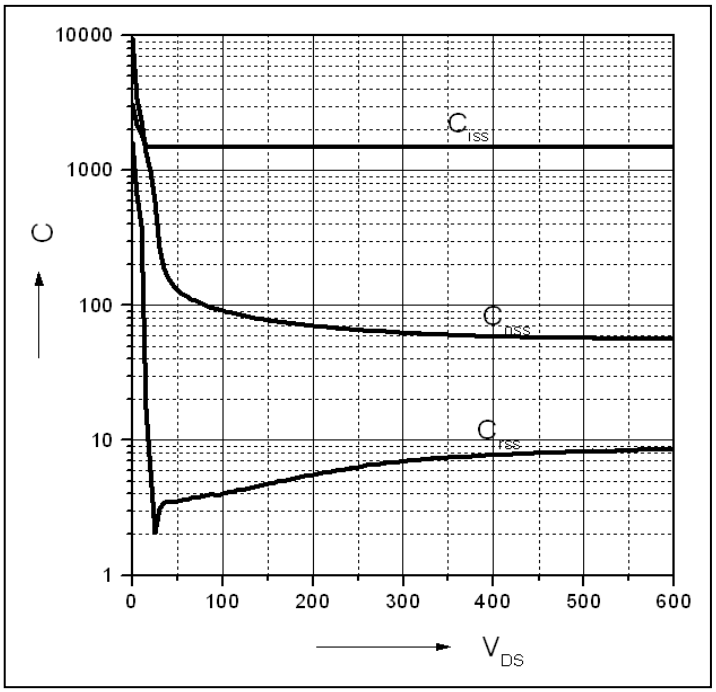


Figure 4: Typ. Capacitances

Typical electrical and thermal characteristics

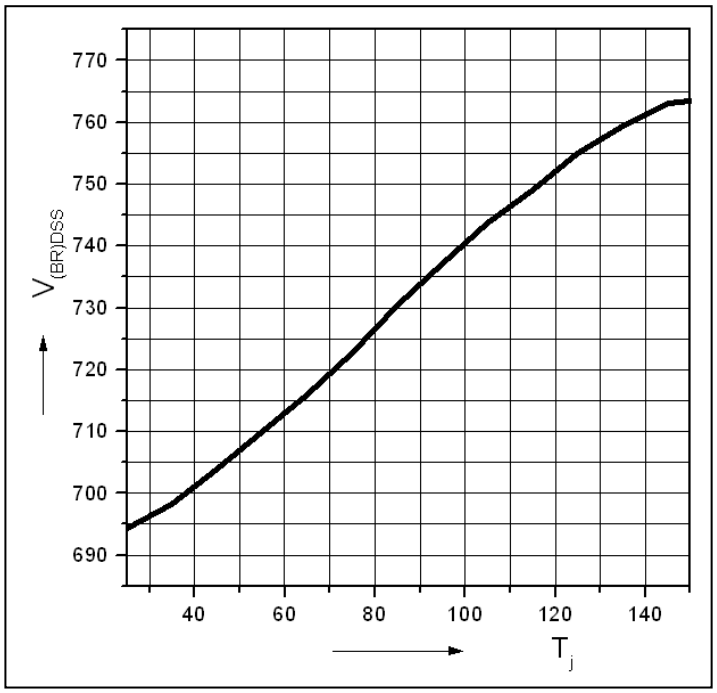


Figure 5. Drain-source breakdown voltage

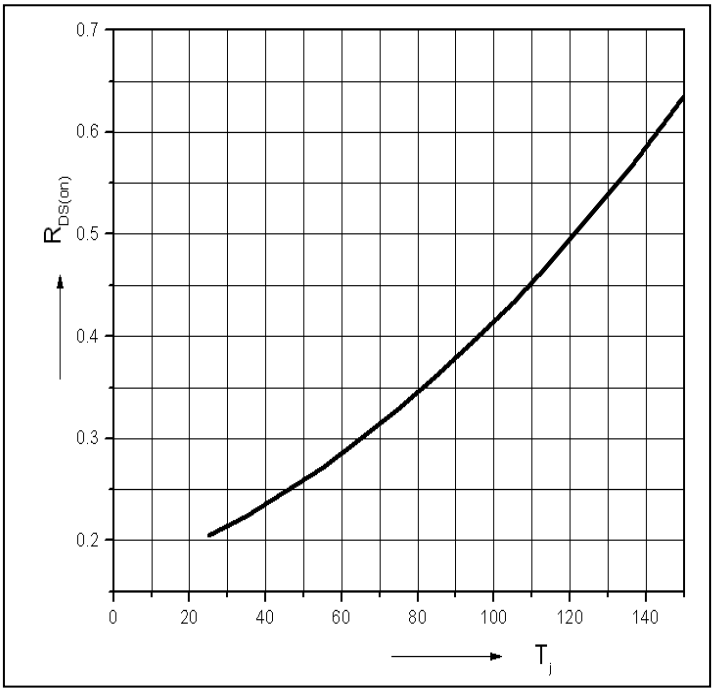
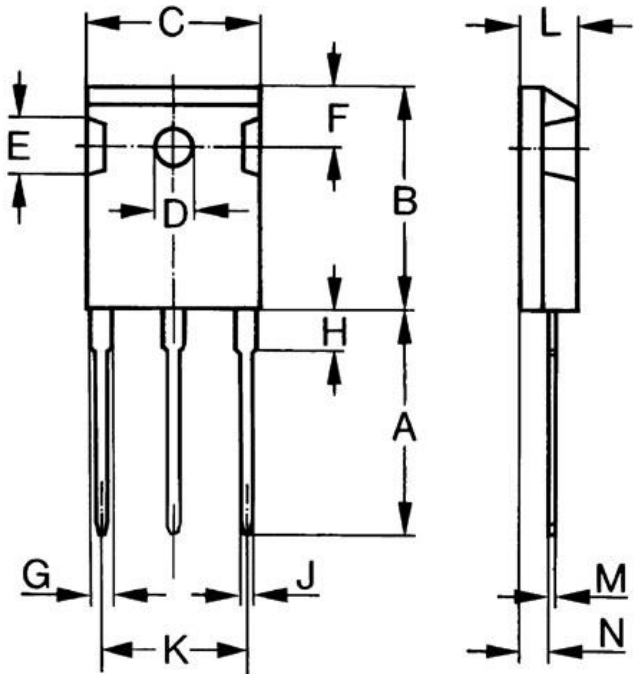


Figure 6. Drain-source on-state resistance

Mechanical Data：

TO247 PACKAGE OUTLINE DIMENSION



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	19.81	20.81	0.78	0.819
B	20.8	21.46	0.819	0.845
C	15.57	16.26	0.61	0.64
D	3.55	3.65	0.14	0.144
E	4.32	5.49	0.17	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	—	4.5	—	0.177
J	1	1.4	0.04	0.055
K	10.8	11	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

Ordering and Marking Information

Device Marking: SSF20N60H

Package (Available)

TO247

Operating Temperature Range

C : -55 to 150 ºC

Devices per Unit

Package Type	Units/ Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
TO247	30	8	240	5	1200

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

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Customer Service

Worldwide Sales and Service:

Sales@silikron.com

Technical Support:

Technical@silikron.com

Suzhou Silikron Semiconductor Corp.

11A, 428 Xinglong Street, Suzhou Industrial Park, P.R.China

TEL: (86-512) 62560688

FAX: (86-512) 65160705

E-mail: Sales@silikron.com