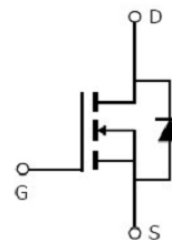


Main Product Characteristics:

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
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	20	A
$I_D @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	13	
I_{DM}	Pulsed Drain Current②	80	
$P_D @ TC = 25^\circ C$	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

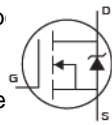
Thermal Resistance

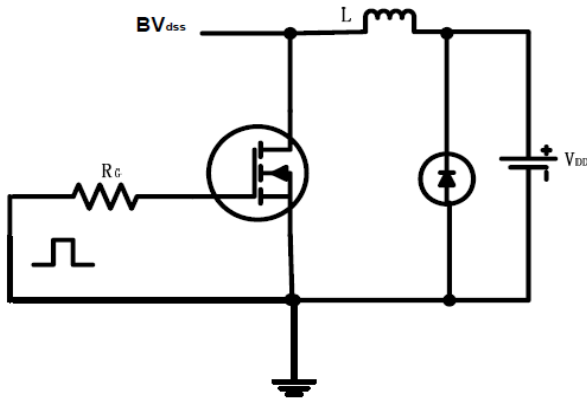
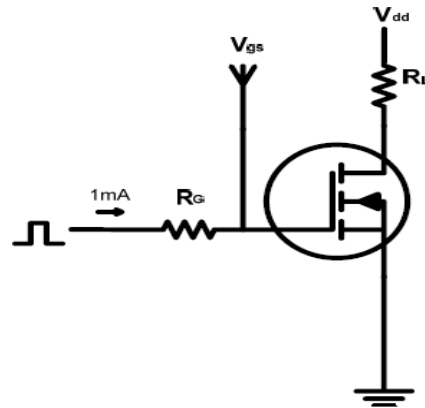
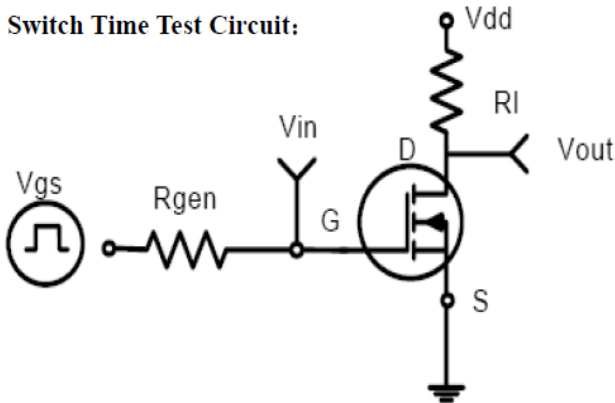
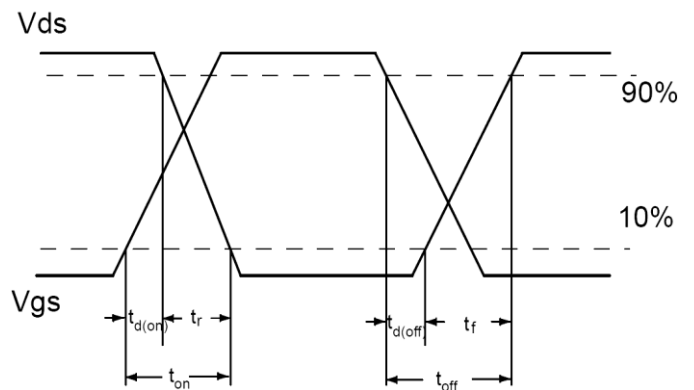
Symbol	Characterizes	Typ.	Max.	Units
R _{θJC}	Junction-to-case ^③	—	0.6	°C/W
R _{θJA}	Junction-to-ambient (t ≤ 10s) ^④	—	62	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ^④	—	40	°C/W

Electrical Characterizes @T_A=25°C unless otherwise specified

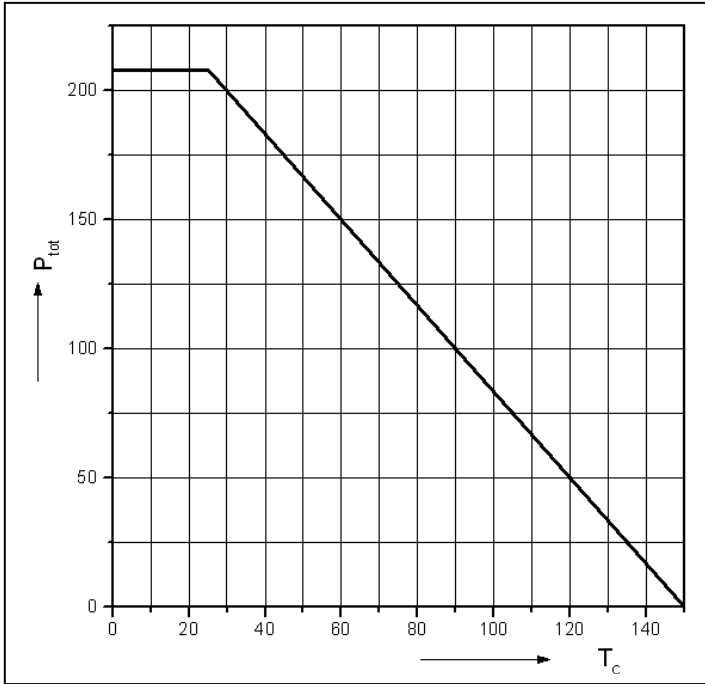
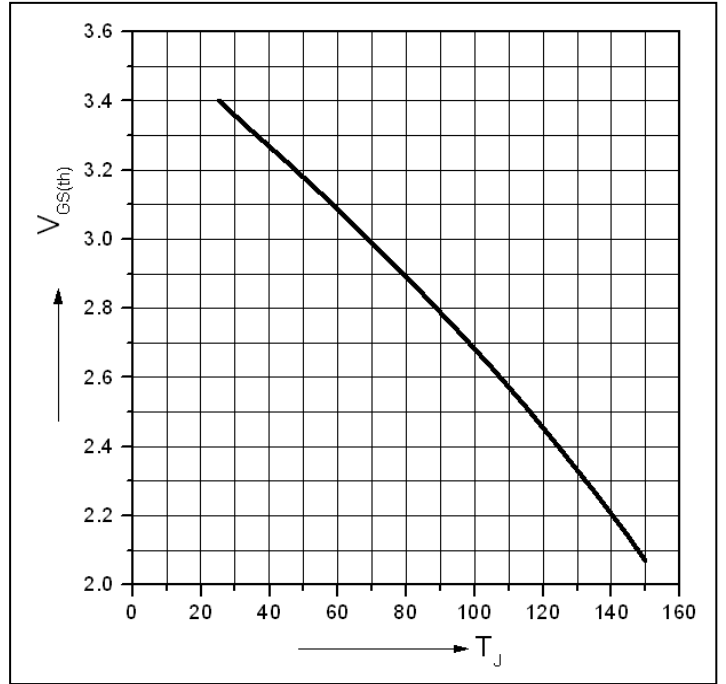
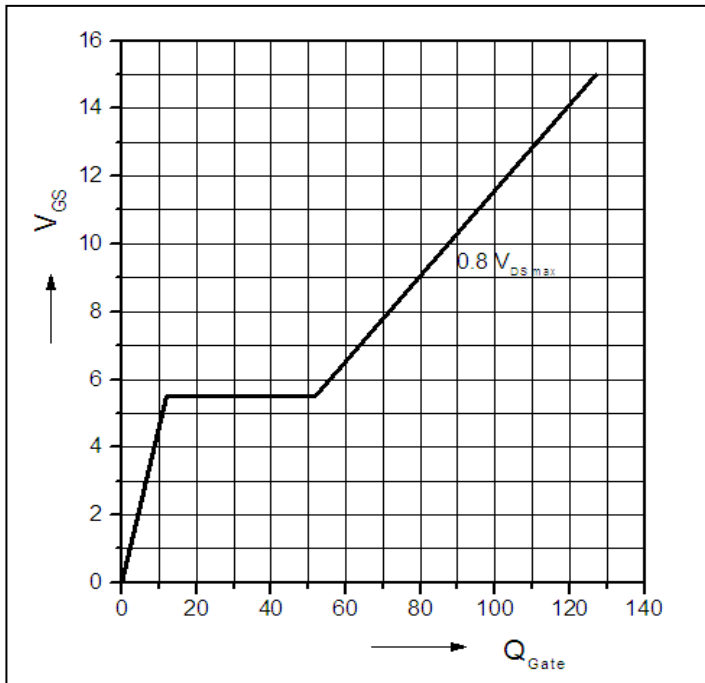
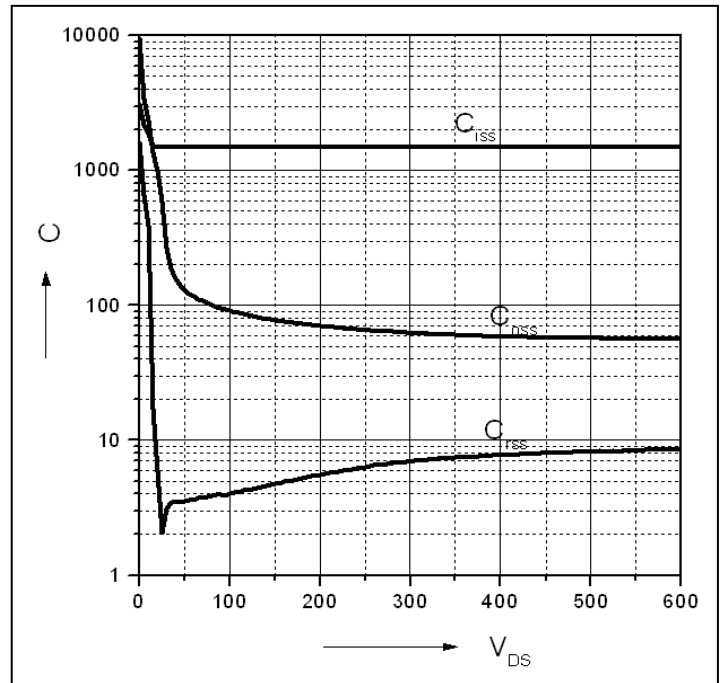
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source breakdown voltage	600	—	—	V	V _{GS} = 0V, I _D = 250μA
R _{DS(on)}	Static Drain-to-Source on-resistance	—	0.2	0.3	Ω	V _{GS} =10V, I _D = 13A T _J = 125°C
		—	0.55	—		
V _{GS(th)}	Gate threshold voltage	2	—	4	V	V _{DS} = V _{GS} , I _D = 250μA T _J = 125°C
		—	2.4	—		
I _{DSS}	Drain-to-Source leakage current	—	—	1	μA	V _{DS} = 600V, V _{GS} = 0V T _J = 125°C
		—	—	50		
I _{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V _{GS} = 30V V _{GS} = -30V
		-100	—	—		
Q _g	Total gate charge	—	90	—	nC	I _D = 20A, V _{DS} =480V, V _{GS} = 10V
Q _{gs}	Gate-to-Source charge	—	12	—		
Q _{gd}	Gate-to-Drain("Miller") charge	—	34	—		
t _{d(on)}	Turn-on delay time	—	12	—	ns	V _{GS} =10V, V _{DS} =380V, R _L =38Ω, R _{GEN} =4.7Ω I _D =10A
t _r	Rise time	—	6	—		
t _{d(off)}	Turn-Off delay time	—	65	—		
t _f	Fall time	—	6	—		
C _{iss}	Input capacitance	—	2334	—	pF	V _{GS} = 0V V _{DS} = 25V f = 1MHz
C _{oss}	Output capacitance	—	856	—		
C _{rss}	Reverse transfer capacitance	—	3	—		

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 =
Q _{rr}	Reverse Recovery Charge	—	10	—	nC	100A/μs

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 $T_{J(MAX)} = 150^\circ\text{C}$.
- 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

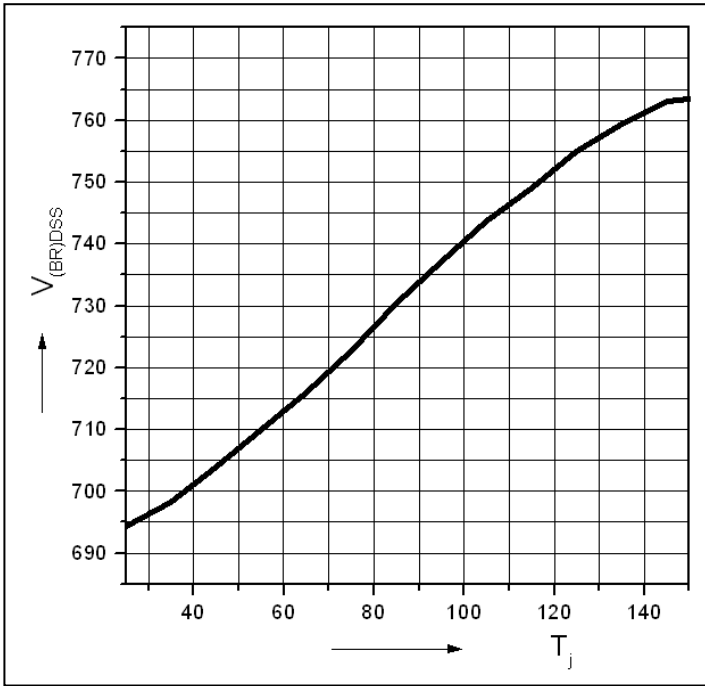


Figure 5. Drain-source breakdown voltage

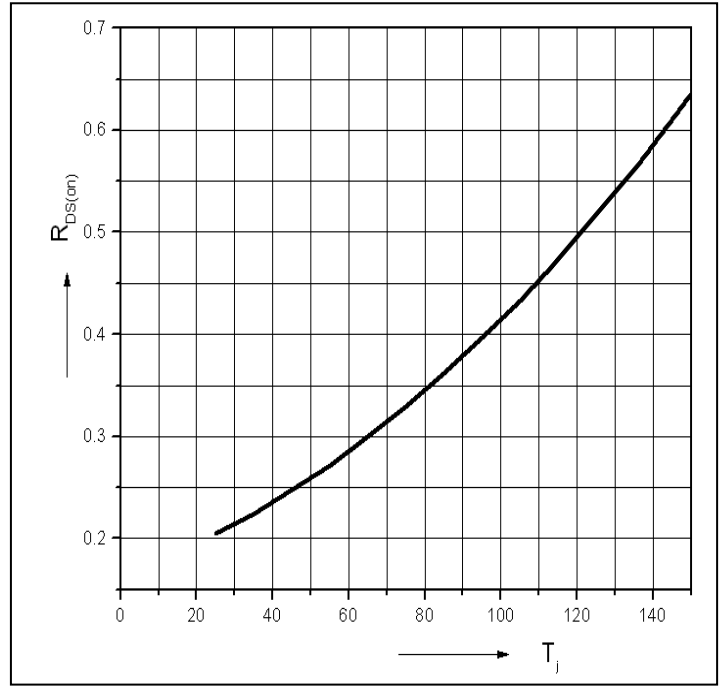
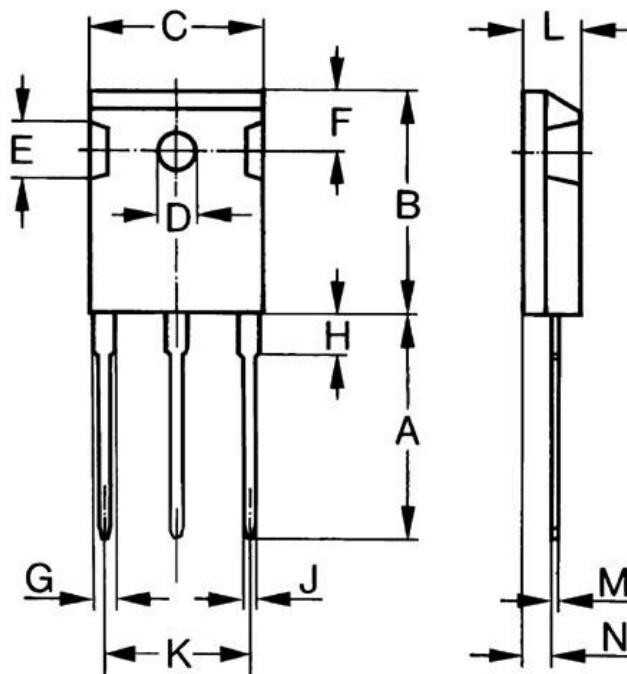


Figure 6. Drain-source on-state resistance

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 °C
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)	$T_j=125^{\circ}\text{C}$ to 175°C @ 80% of Max $V_{DSS}/V_{CES}/V_R$	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	$T_j=150^{\circ}\text{C}$ or 175°C @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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