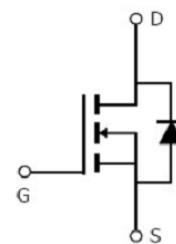


Main Product Characteristics:

V_{DSS}	600V
$R_{DS(on)}$	0.36Ω (typ.)
I_D	11A


TO-252

Marking and pin Assignment

Schematic diagram
Features and Benefits:
Features:

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


Description:

The SSF11NS60D 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	11	A
$I_D @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	7	
I_{DM}	Pulsed Drain Current②	44	
$P_D @ TC = 25^\circ C$	Power Dissipation③	125	W
	Linear Derating Factor	1.0	W/°C
V_{DS}	Drain-Source Voltage	600	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ L=22.5mH	281	mJ
I_{AS}	Avalanche Current @ L=22.5mH	5	A
$T_J T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	°C

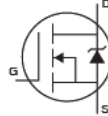
Thermal Resistance

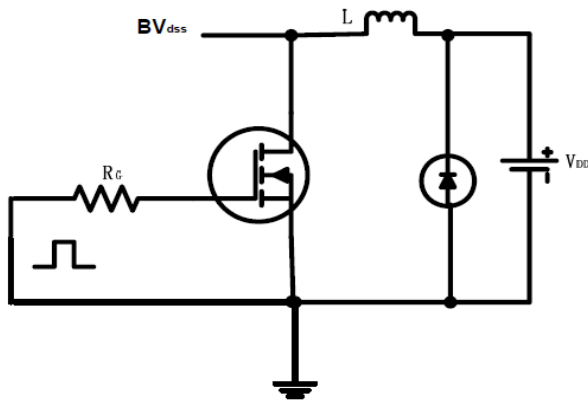
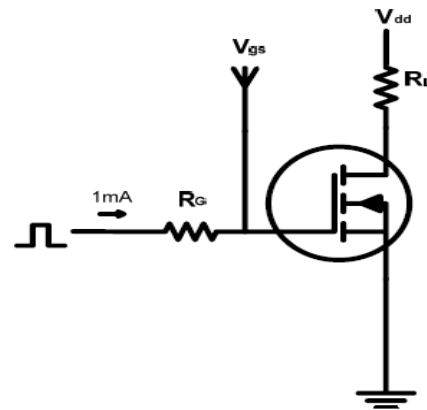
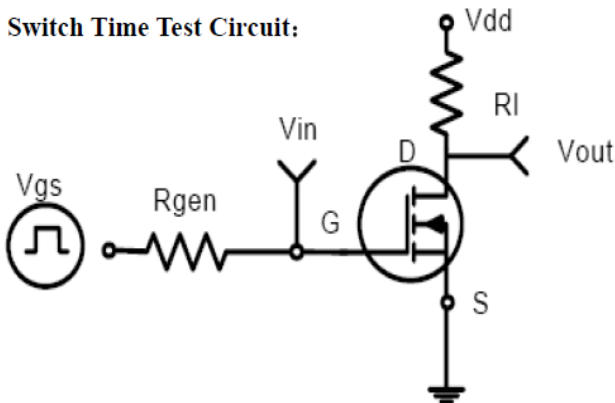
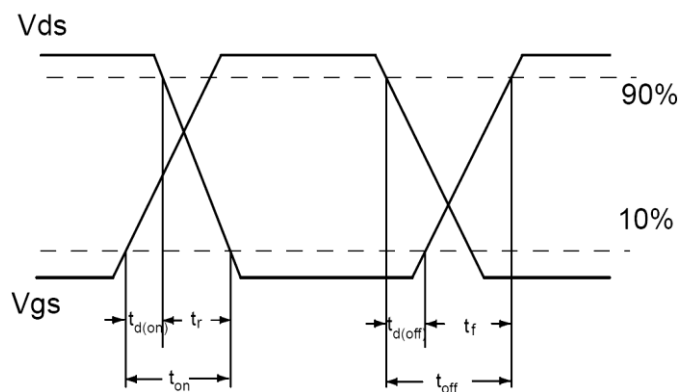
Symbol	Characterizes	Typ.	Max.	Units
R _{θJC}	Junction-to-case ^③	—	1.0	°C/W
R _{θJA}	Junction-to-ambient (t ≤ 10s) ^④	—	55	°C/W

Electrical Characterizes @T_A=25°C unless otherwise specified

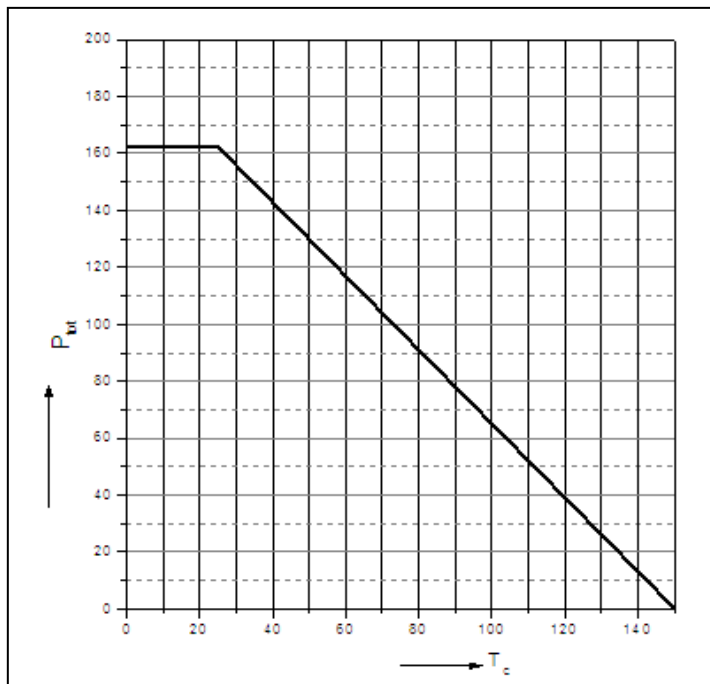
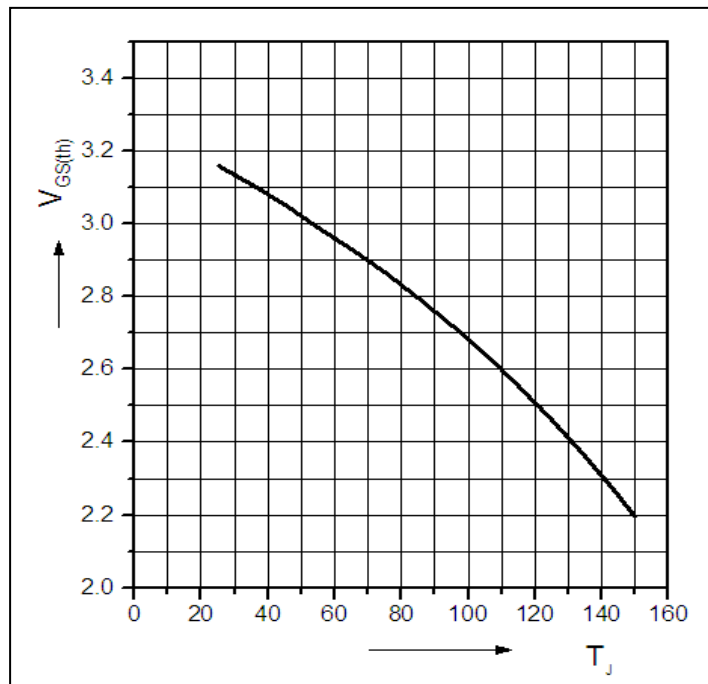
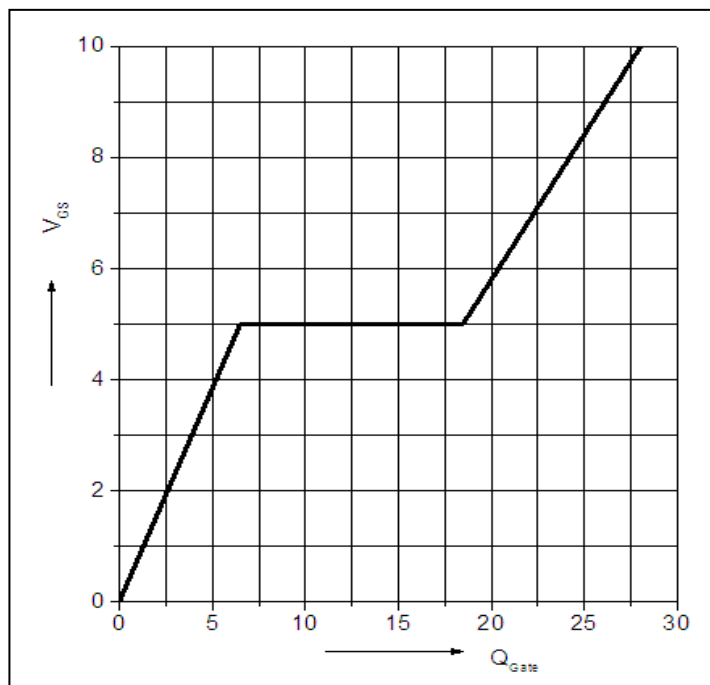
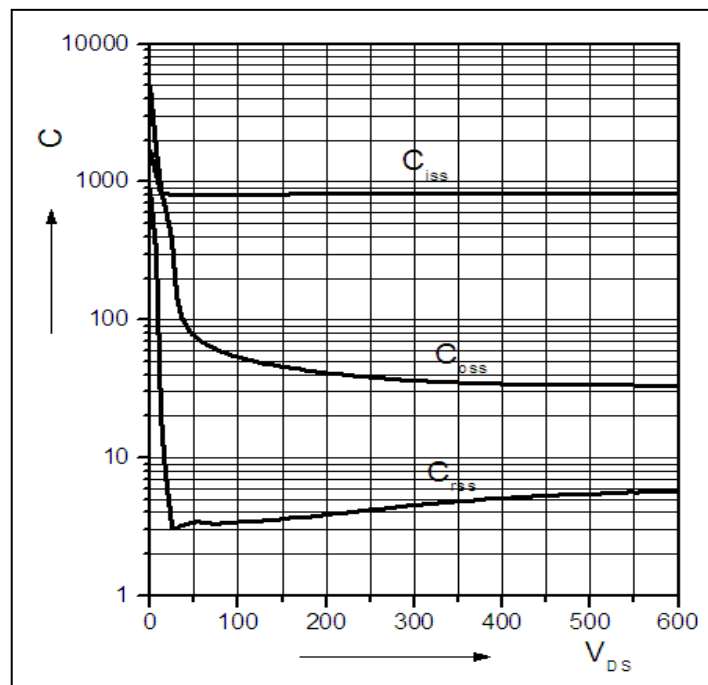
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source breakdown voltage	600	—	—	V	V _{GS} = 0V, I _D = 250μA
R _{DS(on)}	Static Drain-to-Source on-resistance	—	0.36	0.41	Ω	V _{GS} =10V, I _D = 5.5A
		—	0.88	—		T _J = 125°C
V _{GS(th)}	Gate threshold voltage	2	—	4	V	V _{DS} = V _{GS} , I _D = 250μA
		—	2.46	—		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	—	28.41	—	nC	I _D = 11A,
Q _{gs}	Gate-to-Source charge	—	6.64	—		V _{DS} =480V,
Q _{gd}	Gate-to-Drain("Miller") charge	—	12.34	—		V _{GS} = 10V
t _{d(on)}	Turn-on delay time	—	12.85	—	ns	V _{GS} =10V, V _{DS} =300V,
t _r	Rise time	—	9.45	—		R _L =54.5Ω,
t _{d(off)}	Turn-Off delay time	—	30.40	—		R _{GEN} =4.7Ω
t _f	Fall time	—	6.30	—		I _D =5.5A
C _{iss}	Input capacitance	—	824.8	—	pF	V _{GS} = 0V
C _{oss}	Output capacitance	—	78.06	—		V _{DS} = 50V
C _{rss}	Reverse transfer capacitance	—	2.75	—		f = 600KHz

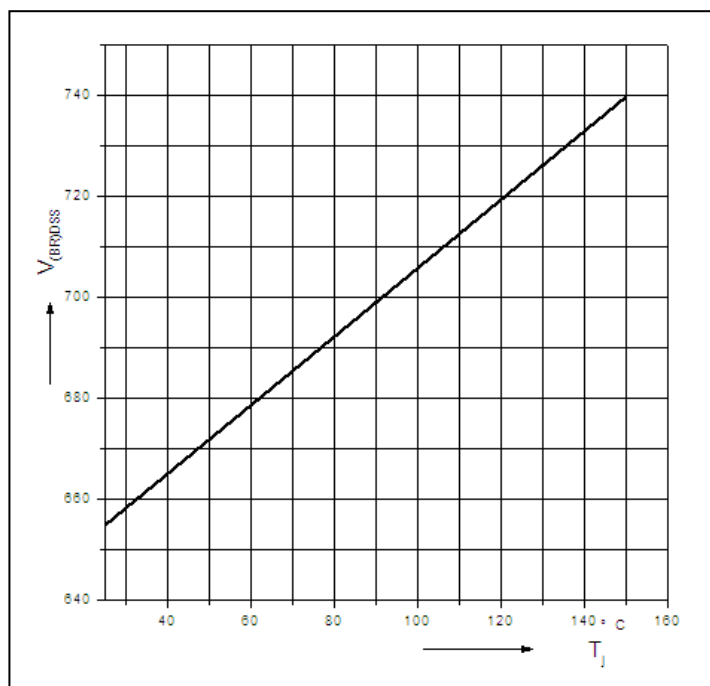
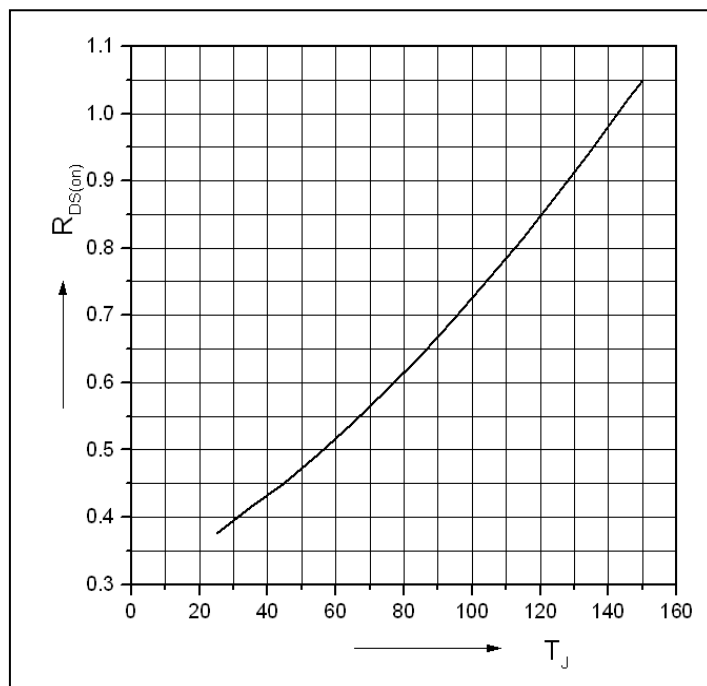
Source-Drain Ratings and Characteristics

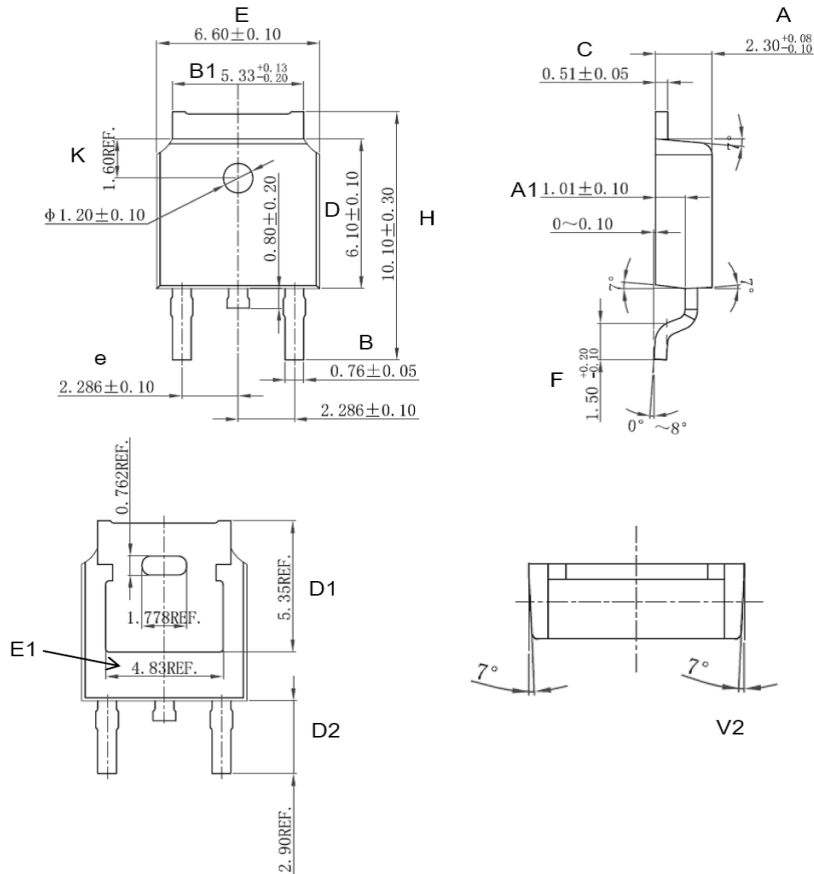
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	11	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode)	—	—	44	A	
V _{SD}	Diode Forward Voltage	—	—	1.5	V	I _S =11A, V _{GS} =0V
t _{rr}	Reverse Recovery Time	—	313	—	ns	T _J = 25°C, I _F = 11A, di/dt =
Q _{rr}	Reverse Recovery Charge	—	2.97	—	uC	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 $T_A = 25^\circ C$
- 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 $T_{J(MAX)} = 150^\circ C$.

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:
TO-252 PACKAGE OUTLINE DIMENSION


Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.200	2.300	2.380	0.087	0.091	0.094
A1	0.910	1.010	1.110	0.036	0.040	0.044
B	0.710	0.760	0.810	0.028	0.030	0.032
B1	5.130	5.330	5.460	0.202	0.210	0.215
C	0.460	0.510	0.560	0.018	0.020	0.022
D	6.000	6.100	6.200	0.236	0.240	0.244
D1	5.350 (REF)			0.211 (REF)		
D2	2.900 (REF)			0.114 (REF)		
E	6.500	6.600	6.700	0.256	0.260	0.264
E1	4.83 (REF)			0.190 (REF)		
e	2.186	2.286	2.386	0.086	0.090	0.094
H	9.800	10.100	10.400	0.386	0.398	0.409
F	1.400	1.500	1.700	0.055	0.059	0.067
K	1.600 (REF)			0.063 (REF)		
V2	8° (REF)			8° (REF)		

Ordering and Marking Information**Device Marking: SSF11NS60D**

Package (Available)
TO-252(DPAK)
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
TO-252	80	50	4000	10	40000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	$T_j=125^{\circ}\text{C}$ to 150°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)	$T_j=150^{\circ}\text{C}$ @ 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