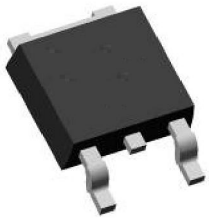
SSF2N60D2

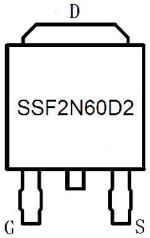
600V N-Channel MOSFET
Preliminary

Main Product Characteristics

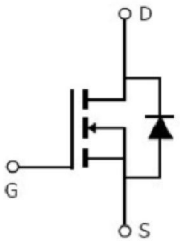
V_{DSS}	600V
R_{DS}(on)	3.7Ω (typ.)
I_D	2A



TO-252



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
- 150℃ operating temperature
- Lead free product

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	2	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V①	1.3	
I_{DM}	Pulsed Drain Current②	8	
P_D @TC = 25°C	Power Dissipation③	34	W
	Linear Derating Factor	0.27	W/°C
V_{DS}	Drain-Source Voltage	600	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ L=30mH	115	mJ
I_{AS}	Avalanche Current @ L=30mH	2.52	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C

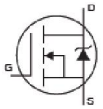
Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case③	—	3.7	℃/W
$R_{\theta JA}$	Junction-to-ambient (t ≤ 10s) ④	—	110	℃/W

Electrical Characteristics @T_A=25℃ unless otherwise specified

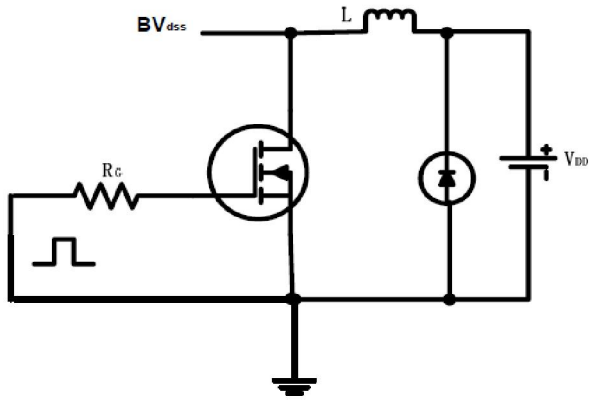
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	600	—	—	V	V_{GS} = 0V, ID = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	3.7	4.2	Ω	V_{GS}=10V,I_D = 1.0A
		—	8.2	—		T_J = 125℃
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	V_{DS} = V_{GS}, I_D = 250μA
		—	2.2	—		T_J = 125℃
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	V_{DS} = 600V,V_{GS} = 0V
		—	—	50		T_J = 125℃
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V_{GS} =30V
		—	—	-100		V_{GS} = -30V
Q_g	Total gate charge	—	5.67	—	nC	I_D = 2.0A,
Q_{gs}	Gate-to-Source charge	—	1.74	—		V_{DS}=480V,
Q_{gd}	Gate-to-Drain("Miller") charge	—	1.99	—		V_{GS} = 10V
$t_{d(on)}$	Turn-on delay time	—	9.2	—	ns	V_{GS}=10V, VDS=300V, R_{GEN}=25Ω, ID=2.0A
t_r	Rise time	—	23.4	—		
$t_{d(off)}$	Turn-Off delay time	—	15.3	—		
t_f	Fall time	—	20.1	—		
C_{iss}	Input capacitance	—	250.1	—	pF	V_{GS} = 0V
C_{oss}	Output capacitance	—	35.7	—		V_{DS} = 25V
C_{rss}	Reverse transfer capacitance	—	1.1	—		f = 1MHz

Source-Drain Ratings and Characteristics

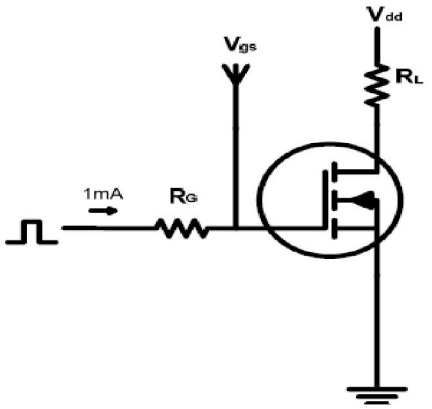
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	2	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	8	A	
V_{SD}	Diode Forward Voltage	—	—	1.4	V	I_S=2.0A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	356.8	—	ns	T_J = 25°C, I_F =2A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	1030	—	nC	

Test Circuits and Waveforms

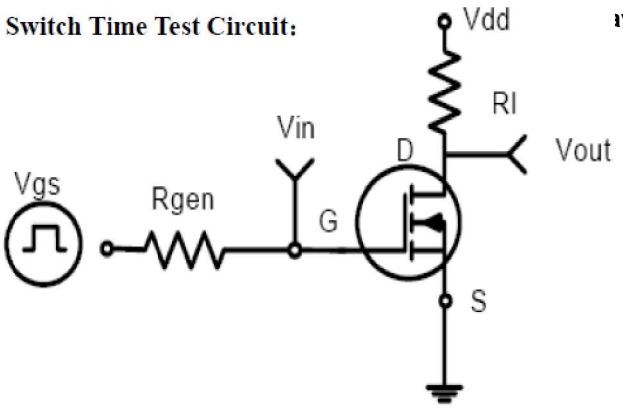
EAS test circuits:



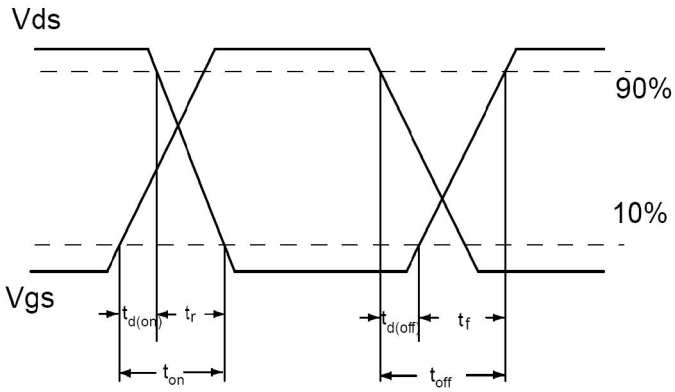
Gate charge test circuit:



Switch Time Test Circuit:



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

Typical Electrical and Thermal Characteristics

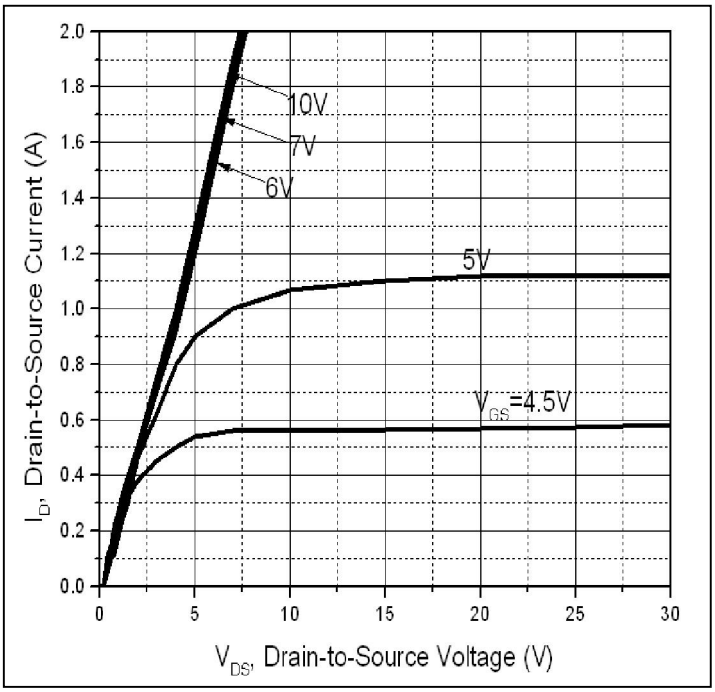


Figure 1: Typical Output Characteristics

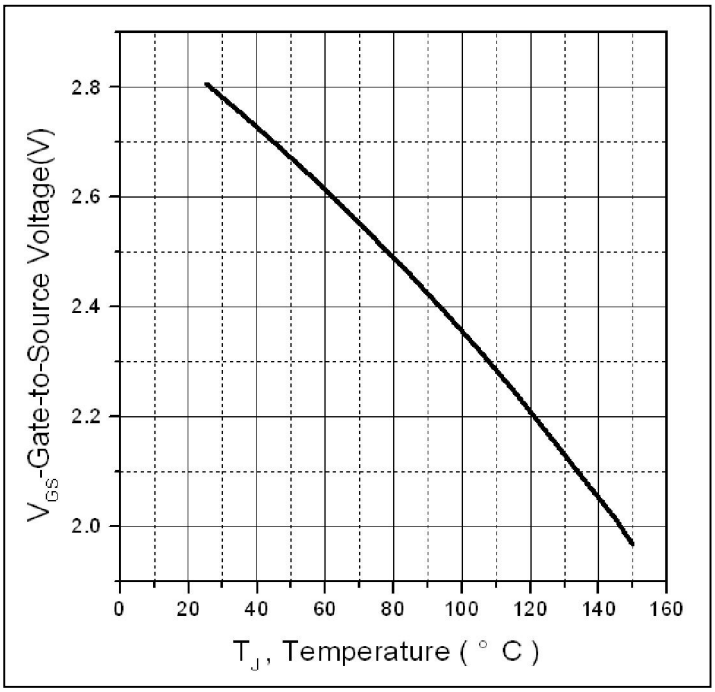


Figure 2. Gate to source cut-off voltage

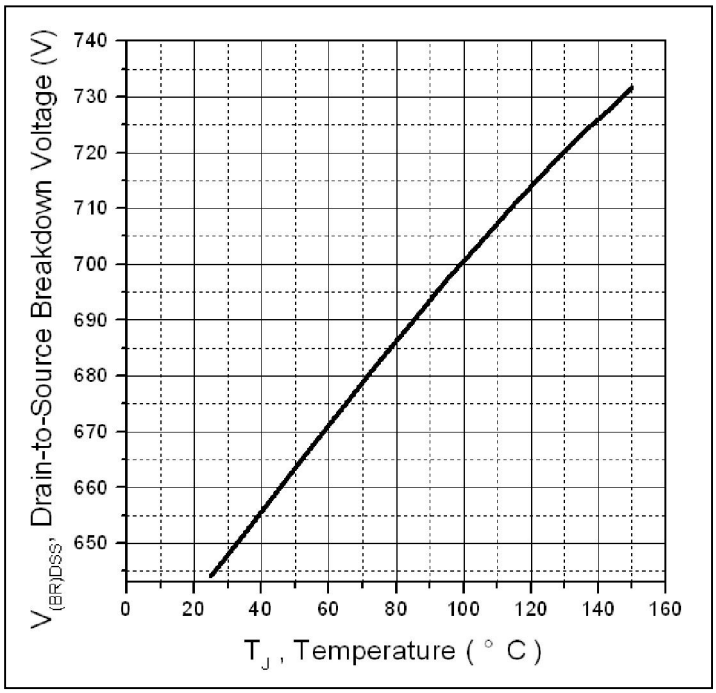


Figure 3. Drain-to-Source Breakdown Voltage Vs. Case Temperature

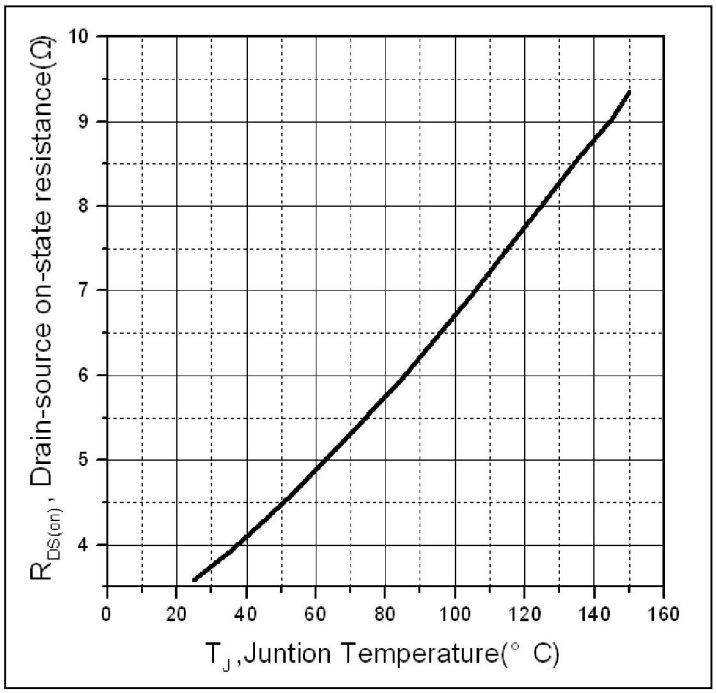


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical Electrical and Thermal Characteristics

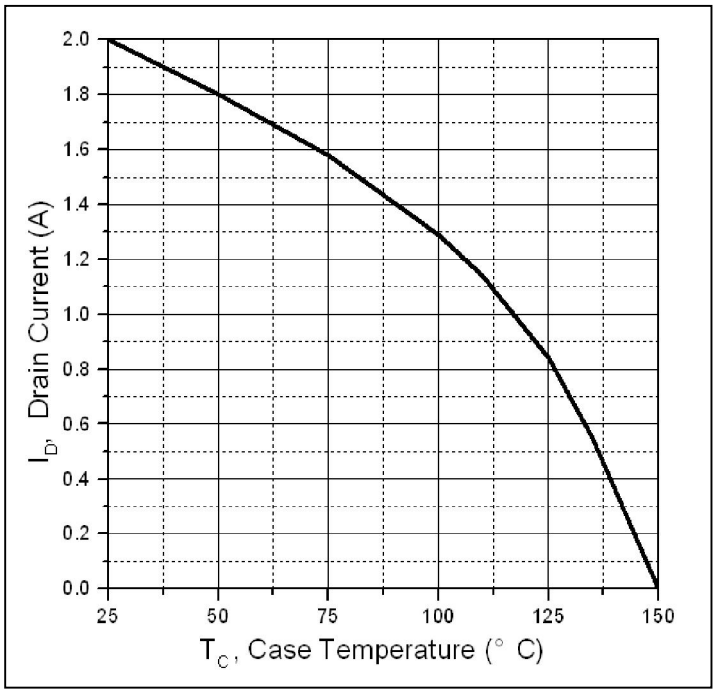


Figure 5. Maximum Drain Current Vs. Case Temperature

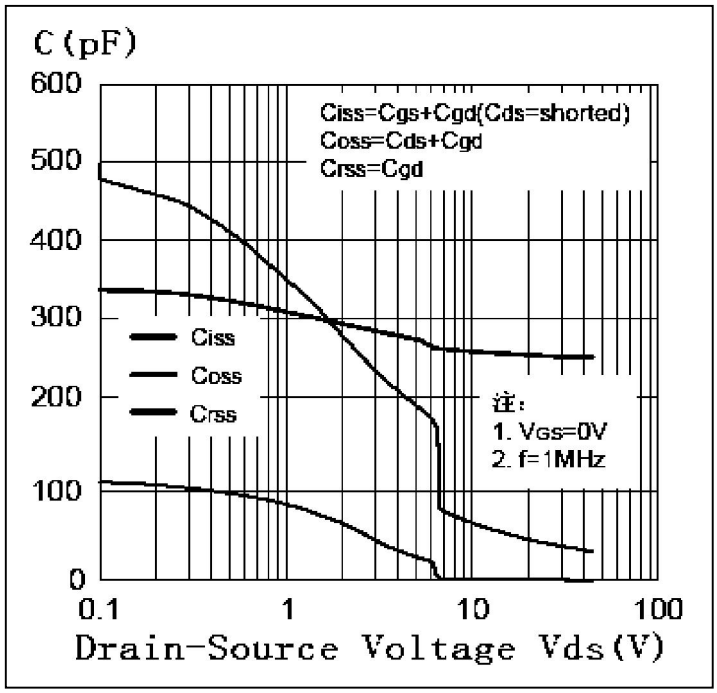
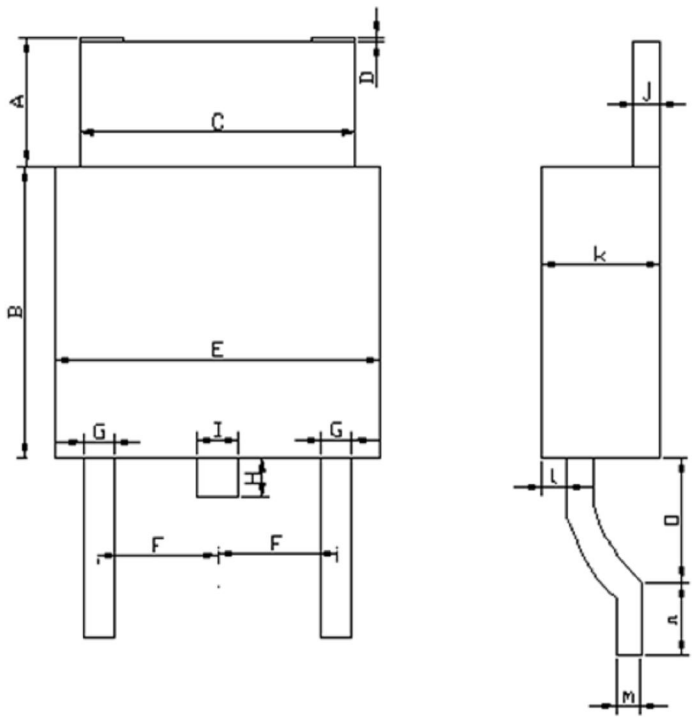


Figure 6.Typical Capacitance Vs. Drain-to-Source Voltage

Mechanical Data

TO-252 PACKAGE OUTLINE DIMENSION



Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.400	0.900	1.400	0.016	0.035	0.055
B	5.350	5.850	6.350	0.211	0.230	0.250
C	4.800	5.300	5.800	0.189	0.209	0.228
D	0.980	0.100	1.020	0.039	0.004	0.040
E	5.800	6.300	6.800	0.228	0.248	0.268
F	2.200	2.300	2.400	0.087	0.091	0.094
G	0.600	0.700	0.800	0.024	0.028	0.031
H	0.200	0.700	1.200	0.008	0.028	0.047
I	0.700	0.800	0.900	0.028	0.031	0.035
J	0.408	0.508	0.608	0.016	0.020	0.024
K	2.050	2.300	2.550	0.081	0.091	0.100
L	0.550	0.800	1.050	0.022	0.031	0.041
M	0.408	0.508	0.608	0.016	0.020	0.024
N	1.050	1.300	1.550	0.041	0.051	0.061
O	1.250	1.500	1.750	0.049	0.059	0.069

Ordering and Marking Information

Device Marking: SSF2N60D2

Package (Available)

TO-252（DPAK）

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
TO-252	80	50	4000	10	40000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	T_j=125℃ to 150℃ @ 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℃ @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices