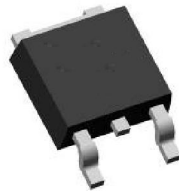
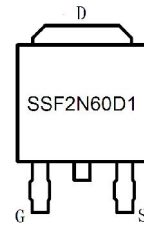


Main Product Characteristics

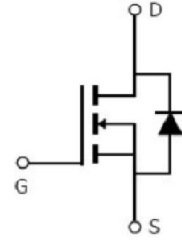
V_{DSS}	600V
$R_{DS(on)}$	3.9Ω (typ.)
I_D	2A



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°C 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
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	2	A
$I_D @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	1.35	
I_{DM}	Pulsed Drain Current②	8	
$P_D @ TC = 25^\circ C$	Power Dissipation③	48	W
	Linear Derating Factor	0.38	W/°C
V_{DS}	Drain-Source Voltage	600	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ L=59.5mH	130	mJ
I_{AS}	Avalanche Current @ L=59.5mH	2.0	A
$T_J \quad T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	°C

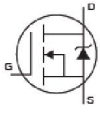
Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ^③	—	2.6	°C/W
$R_{\theta JA}$	Junction-to-ambient ($t \leq 10s$) ^④	—	62.5	°C/W

Electrical Characteristics @ $T_A=25^\circ\text{C}$ unless otherwise specified

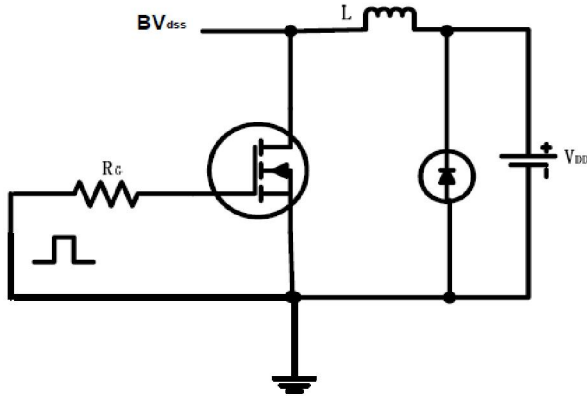
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	600	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	3.9	4.7	Ω	$V_{GS}=10V, I_D = 1.0A$
		—	8.2	—		$T_J = 125^\circ\text{C}$
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
		—	2.2	—		$T_J = 125^\circ\text{C}$
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 600V, V_{GS} = 0V$
		—	—	50		$T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 30V$
		—	—	-100		$V_{GS} = -30V$
Q_g	Total gate charge	—	7.0	9.5	nC	$I_D = 2.0A,$ $V_{DS}=480V,$ $V_{GS} = 10V$
Q_{gs}	Gate-to-Source charge	—	1.5	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	4.7	—		
$t_{d(on)}$	Turn-on delay time	—	9	—	ns	$V_{GS}=10V, V_{DS}=300V,$ $R_{GEN}=25\Omega, I_D=2.0A$
t_r	Rise time	—	25	—		
$t_{d(off)}$	Turn-Off delay time	—	24	—		
t_f	Fall time	—	28	—		
C_{iss}	Input capacitance	—	250	334	pF	$V_{GS} = 0V$
C_{oss}	Output capacitance	—	20	27		$V_{DS} = 25V$
C_{rss}	Reverse transfer capacitance	—	3.4	4.6		$f = 1MHz$

Source-Drain Ratings and Characteristics

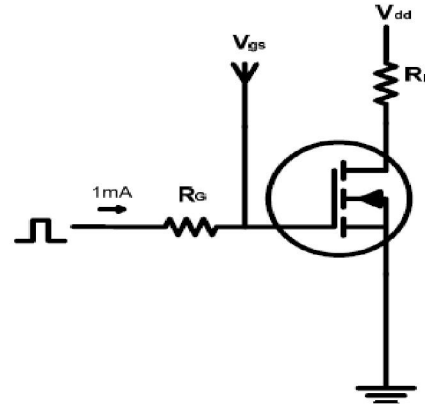
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	2	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	8	A	
V_{SD}	Diode Forward Voltage	—	—	1.4	V	$I_S=1.0A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	—	230	—	ns	$T_J = 25^\circ\text{C}, I_F = 1A,$
Q_{rr}	Reverse Recovery Charge	—	1000	—	nC	$di/dt = 100A/\mu s$

Test Circuits and Waveforms

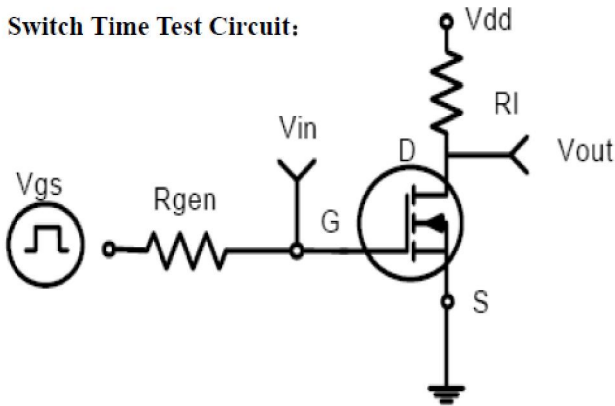
EAS test circuits:



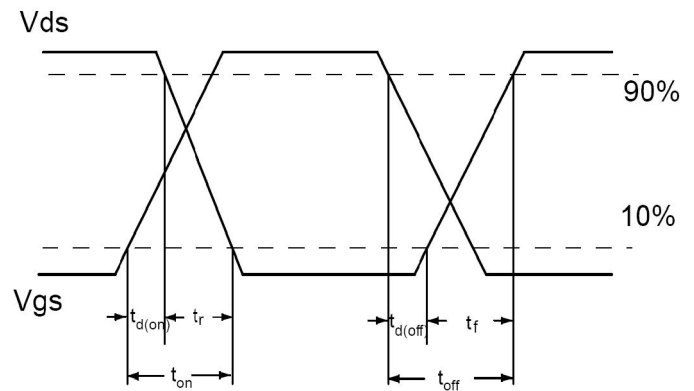
Gate charge test circuit:



Switch Time Test Circuit:



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 $T_A = 25^\circ C$

Typical Electrical and Thermal Characteristics

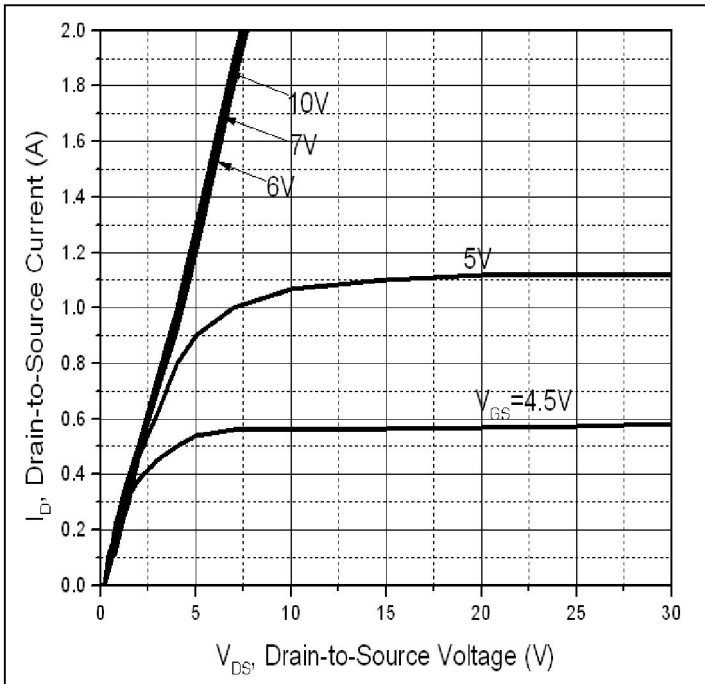


Figure 1: Typical Output Characteristics

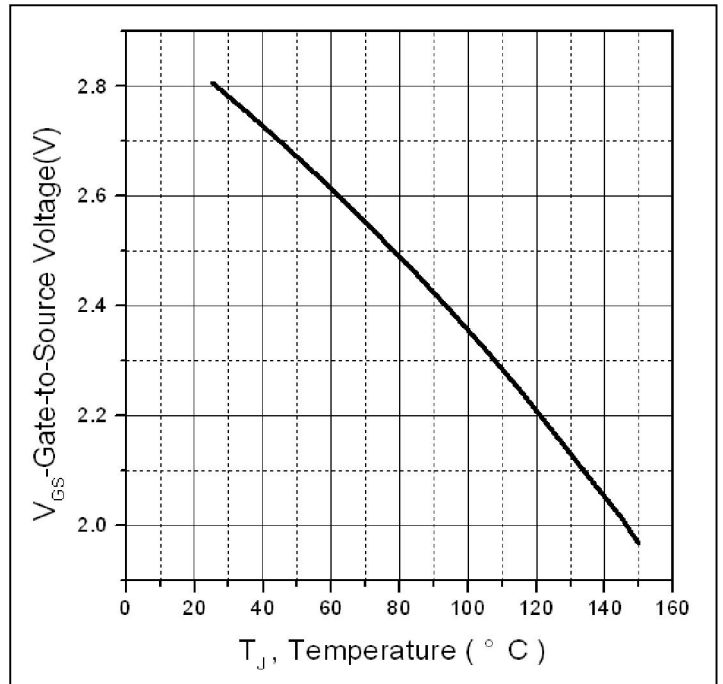


Figure 2: Gate to source cut-off voltage

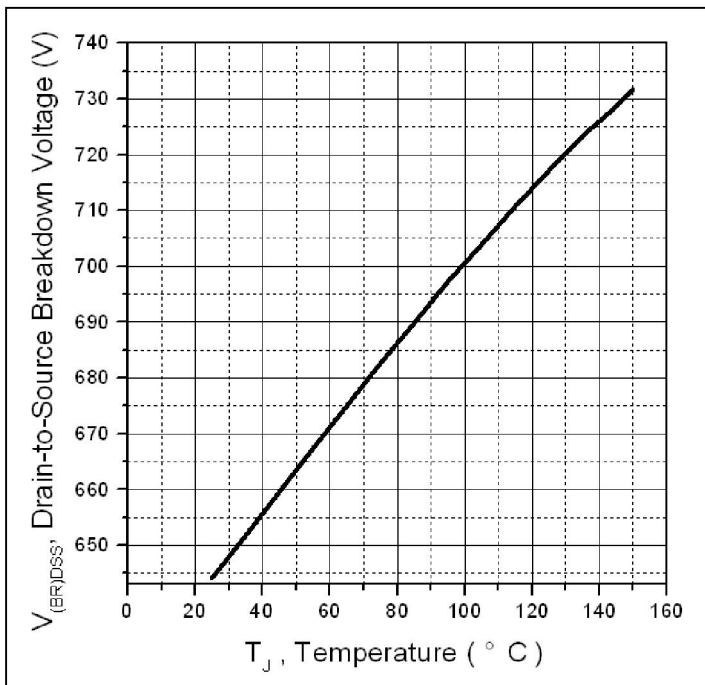


Figure 3: Drain-to-Source Breakdown Voltage Vs. Case Temperature

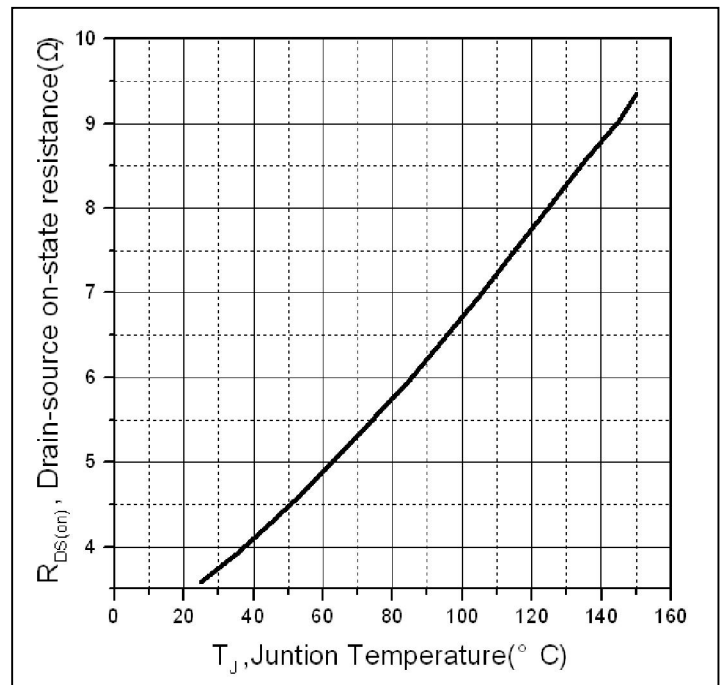


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical Electrical and Thermal Characteristics

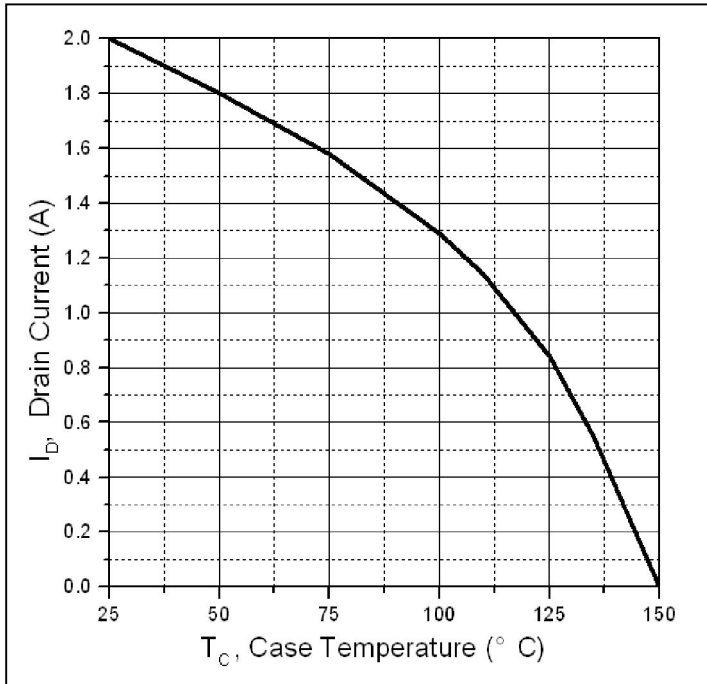


Figure 5. Maximum Drain Current Vs. Case Temperature

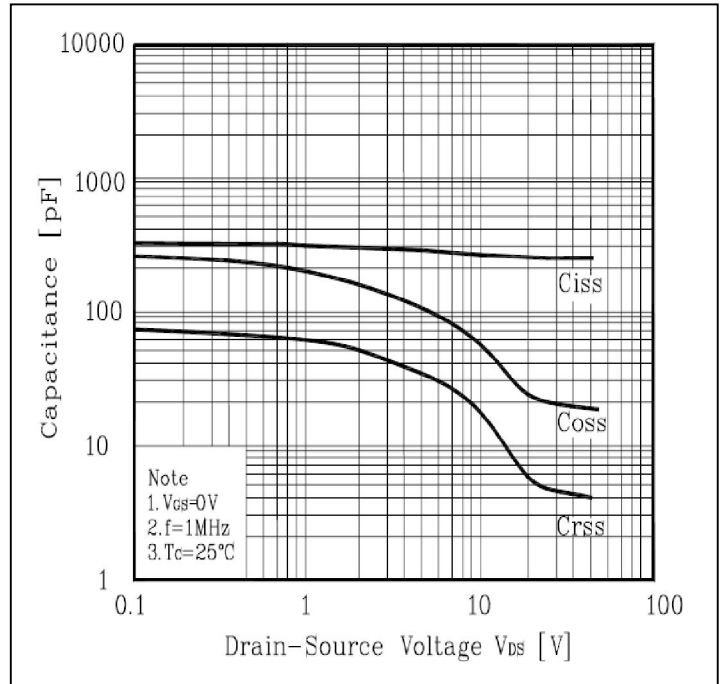
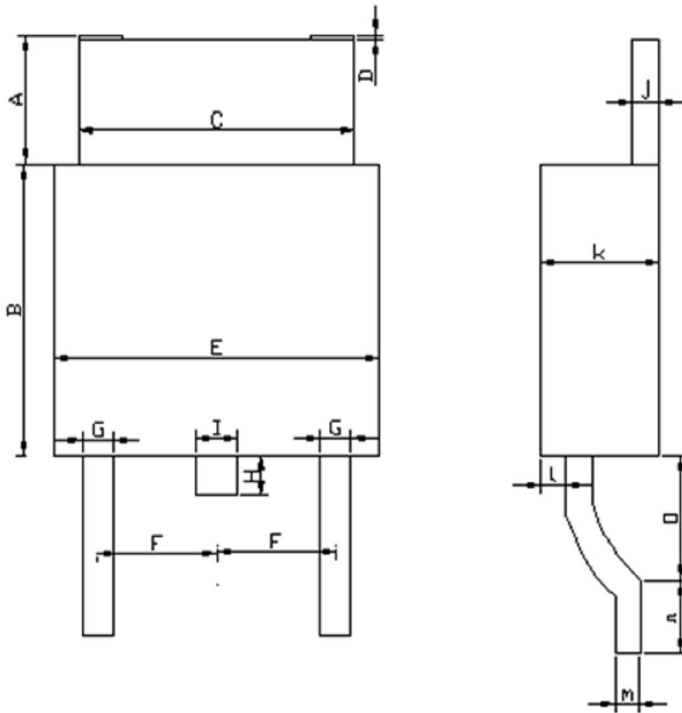


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

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: SSF2N60D1

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