



SSF11NS70UF

700V N-Channel MOSFET

Main Product Characteristics

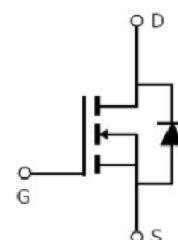
V_{DSS}	700V
$R_{DS(on)}$	0.45Ω (typ.)
I_D	11A



TO220F



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
- Lead free product



Description

The SSF11NS70UF series MOSFET is a new technology, which combines an innovative super junction technology and advance process. This new technology achieves low $R_{DS(ON)}$, energy saving, high reliability and uniformity, superior power density and space saving.

Absolute Max Rating

Symbol	Parameter	Max.	Units
I_D @ $T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	11	A
I_D @ $T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ ①	7	
I_{DM}	Pulsed Drain Current②	44	
P_D @ $T_C = 25^\circ C$	Power Dissipation③	31	W
	Linear Derating Factor	0.25	W/ $^\circ C$
V_{DS}	Drain-Source Voltage	700	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ $L=22.5mH$	45	mJ
I_{AS}	Avalanche Current @ $L=22.5mH$	2	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ C$


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Thermal Resistance

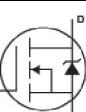
Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ⁽³⁾	—	4.0	°C/W
$R_{\theta JA}$	Junction-to-ambient ($t \leq 10s$) ⁽⁴⁾	—	80	°C/W

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	700	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	0.45	0.5	Ω	$V_{GS}=10V, I_D = 5.5A$
		—	1.26	—		$T_J = 125^\circ C$
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
		—	2.17	—		$T_J = 125^\circ C$
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 600V, V_{GS} = 0V$
		—	—	50		$T_J = 125^\circ C$
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 30V$
		—	—	-100		$V_{GS} = -30V$
Q_g	Total gate charge	—	18	—	nC	$I_D = 11A,$ $V_{DS} = 300V,$ $V_{GS} = 10V$
Q_{gs}	Gate-to-Source charge	—	4.7	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	7.1	—		
$t_{d(on)}$	Turn-on delay time	—	10	—		
t_r	Rise time	—	9.4	—	ns	$V_{GS}=10V, V_{DS}=300V,$ $R_L=54.5\Omega, R_{GEN}=4.7\Omega$ $ID=5.5A$
$t_{d(off)}$	Turn-Off delay time	—	21	—		
t_f	Fall time	—	4.4	—		
C_{iss}	Input capacitance	—	684	—	pF	$V_{GS} = 0V$
C_{oss}	Output capacitance	—	42	—		$V_{DS} = 50V$
C_{rss}	Reverse transfer capacitance	—	4.5	—		$f = 800KHz$

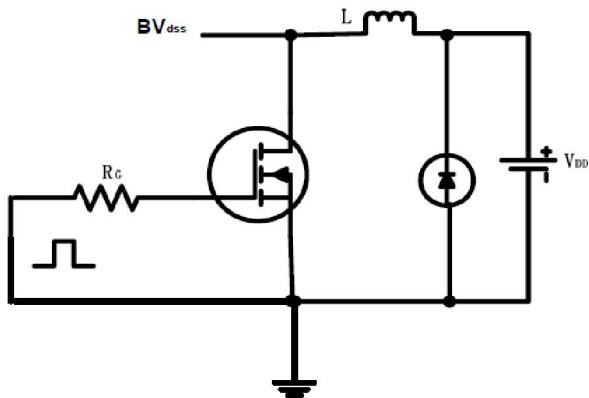
Source-Drain Ratings and Characteristics

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	—	—	1.2	V	$I_s=1A, V_{GS}=0V$

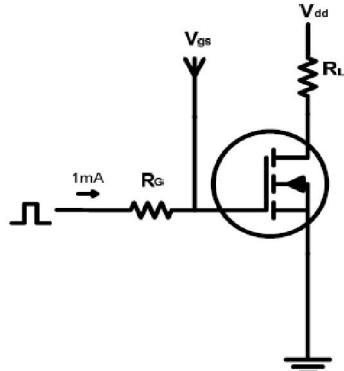


Test Circuits and Waveforms

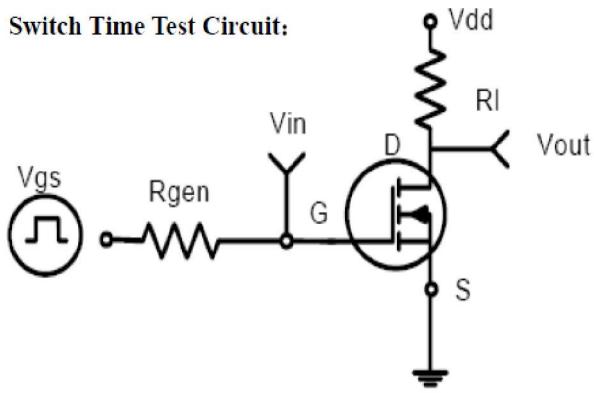
EAS test circuits:



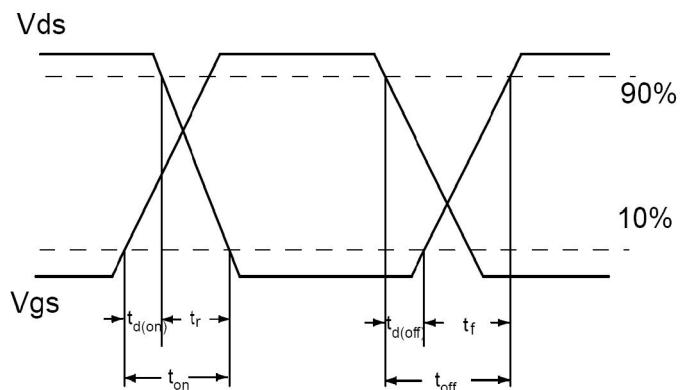
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



Notes:

- ① Calculated continuous current based on maximum allowable junction temperature.
- 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 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $TA = 25^{\circ}\text{C}$

Typical Electrical and Thermal Characteristics

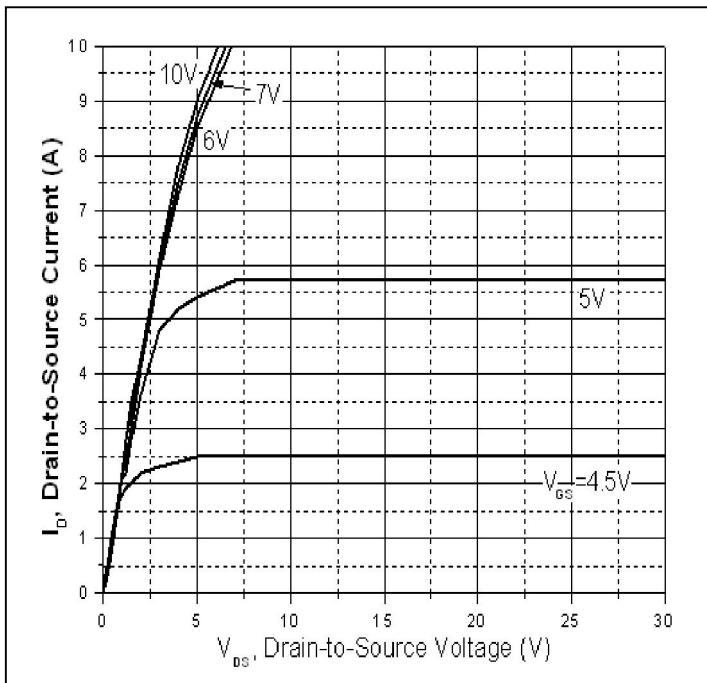


Figure 1: Typical Output Characteristics

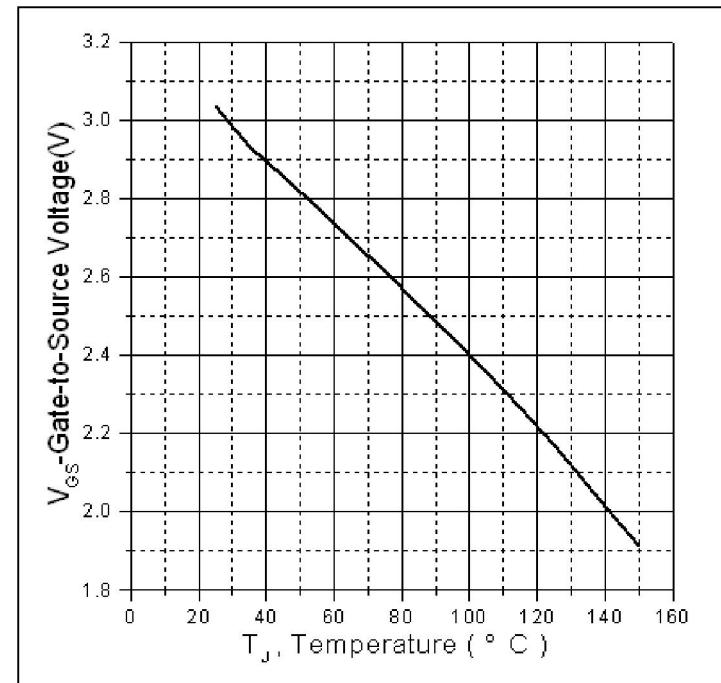


Figure 2. Gate to source cut-off voltage

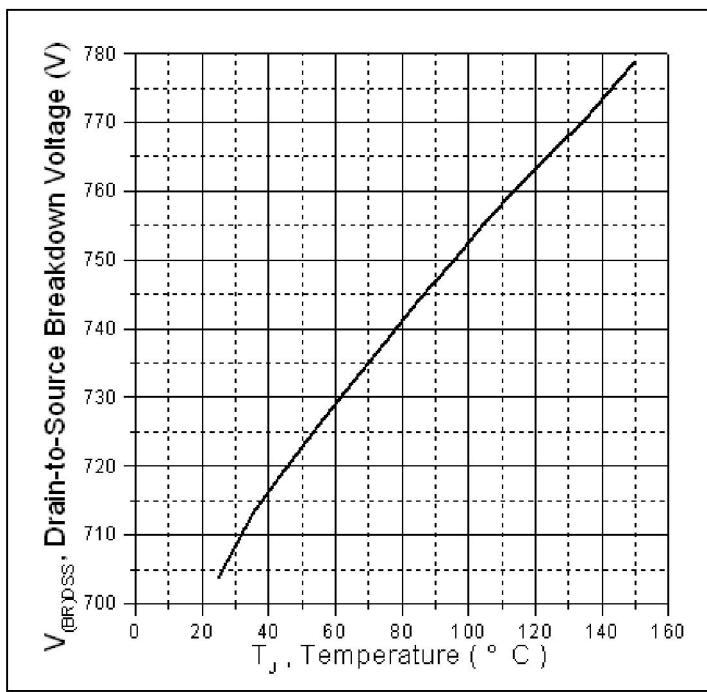


Figure 3. Drain-to-Source Breakdown Voltage Vs.
Case Temperature

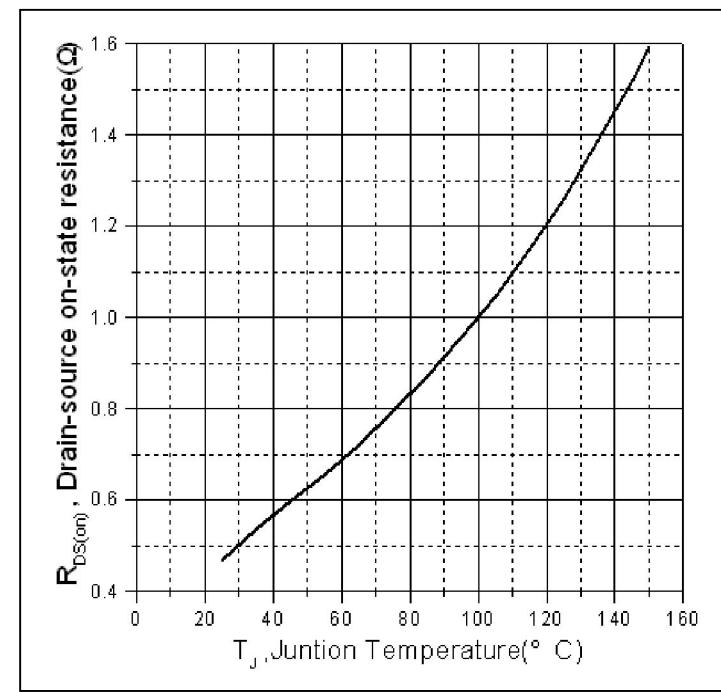


Figure 4: Normalized On-Resistance Vs. Case
Temperature

Typical Electrical and Thermal Characteristics

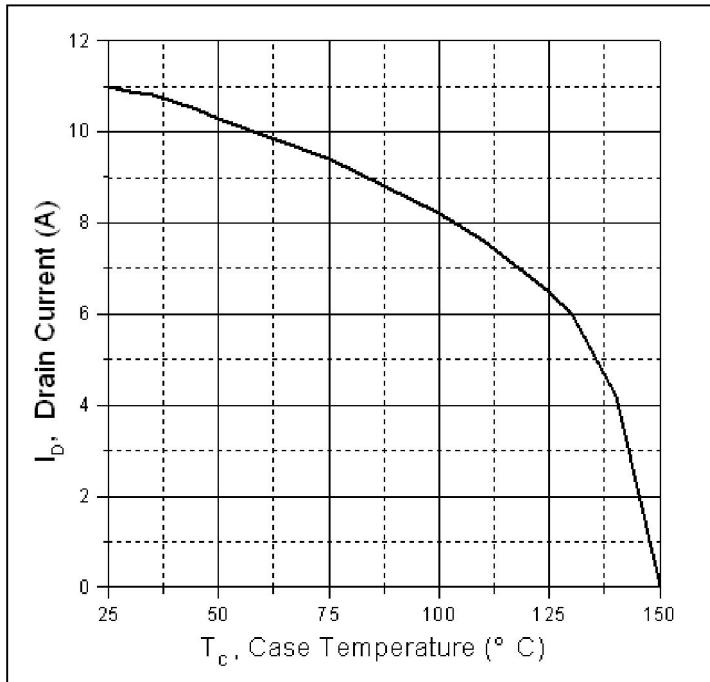


Figure 5. Maximum Drain Current Vs. Case Temperature

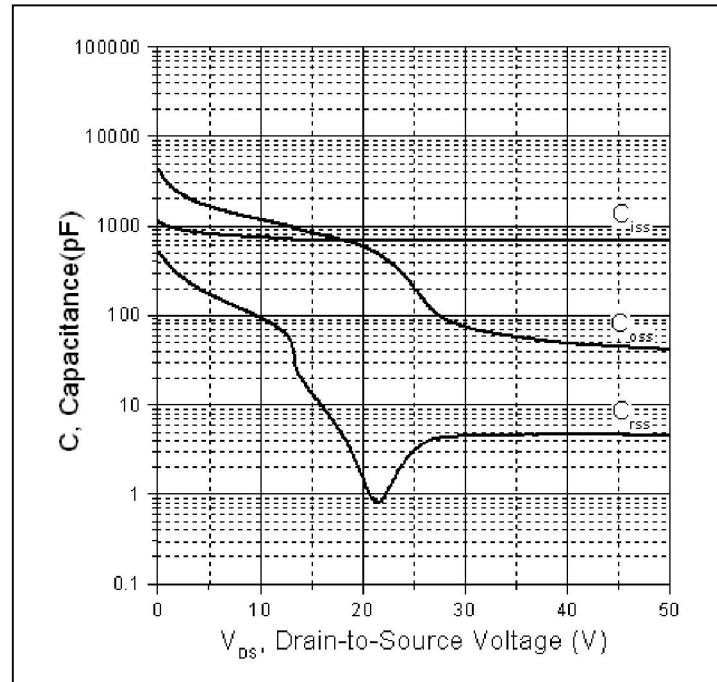


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

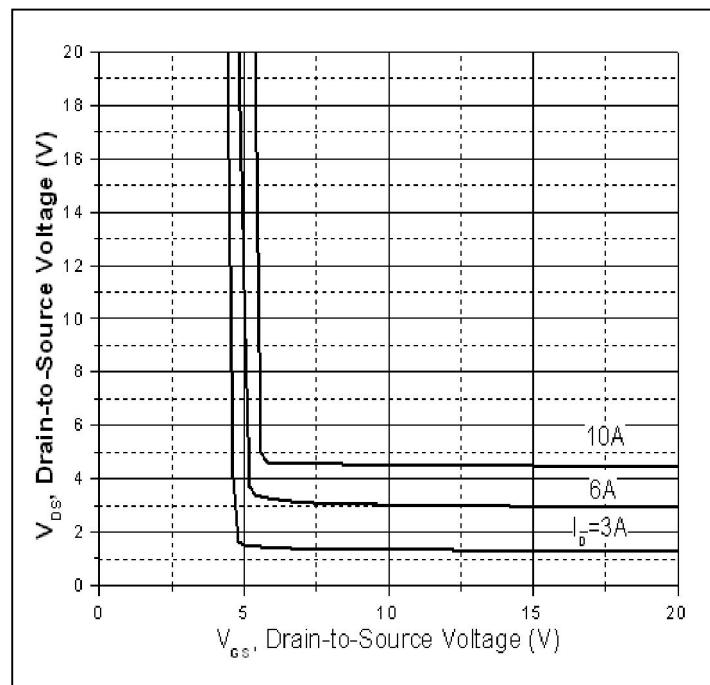


Figure7. Drain-to-Source Voltage Vs. Gate-to-Source Voltage

Mechanical Data

TO220F PACKAGE OUTLINE DIMENSION_GN						
Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
E	9.960	10.160	10.360	0.392	0.400	0.408
E1	9.840	10.040	10.240	0.387	0.395	0.403
E2	6.800	7.000	7.200	0.268	0.276	0.283
A	4.600	4.700	4.800	0.181	0.185	0.189
A1	2.440	2.540	2.640	0.096	0.100	0.104
A2	2.660	2.760	2.860	0.105	0.109	0.113
A3	0.600	0.700	0.800	0.024	0.028	0.031
c	-	0.500	-	-	0.020	-
D	15.780	15.870	15.980	0.621	0.625	0.629
D1	8.970	9.170	9.370	0.353	0.361	0.369
H1	6.500	6.700	6.800	0.256	0.264	0.268
e	2.54BSC			0.10BSC		
ΦP	3.080	3.180	3.280	0.121	0.125	0.129
ΦP1	1.400	1.500	1.600	0.055	0.059	0.063
ΦP2	0.900	1.000	1.100	0.035	0.039	0.043
ΦP3	0.100	0.200	0.300	0.004	0.008	0.012
L	12.780	12.980	13.180	0.503	0.511	0.519
L1	2.970	3.170	3.370	0.117	0.125	0.133
L2	0.830	0.930	1.030	0.033	0.037	0.041
Q 1	3°	5°	7°	3°	5°	7°
Q 2	43°	45°	47°	43°	45°	47°
b1	1.180	1.280	1.380	0.046	0.050	0.054
b2	0.760	0.800	0.840	0.030	0.031	0.033
b3	-	-	1.420	-	-	0.056



SSF11NS70UF
700V N-Channel MOSFET

Ordering and Marking Information

Device Marking: SSF11NS70UF

Package (Available)

TO220F

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
TO220F	50	20	1000	6	6000

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 $V_{DSS}/V_{CES}/VR$	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_{GS}	168 hours 500 hours 1000 hours	3 lots x 77 devices