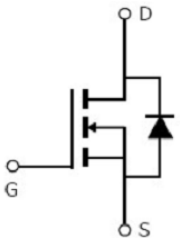
Main Product Characteristics:

V_{DSS}	600V
R_{DS}(on)	0.54Ω(typ.)
I_D	7A ①

TO220F

Marking and pin Assignment



Schematic diagram

Features and Benefits:

Feathers:

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

Description:

The SSF7NS60F 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°C	Continuous Drain Current, V_{GS} @ 10V	7 ①	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V	5 ①	
I_{DM}	Pulsed Drain Current ②	28	
P_D @TC = 25°C	Power Dissipation ③	32	W
	Linear Derating Factor	0.26	W/°C
V_{DS}	Drain-Source Voltage	600	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ L=15.2mH	68	mJ
I_{AR}	Avalanche Current @ L=15.2mH	3	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

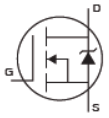
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ③	—	3.9	℃/W
$R_{\theta JA}$	Junction-to-ambient (t ≤ 10s) ④	—	80	℃/W

Electrical Characterizes @T_A=25℃ unless otherwise specified

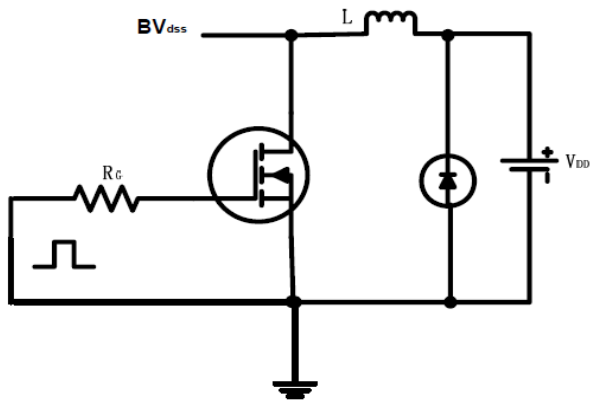
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	600	—	—	V	V_{GS} = 0V, I_D = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	0.54	0.65	Ω	V_{GS}=10V,I_D = 4.6A
		—	1.57	—		T_J = 125℃
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	V_{DS} = V_{GS}, I_D = 350μA
		—	2.82	—		T_J = 125℃
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	—	15.1	—	nC	I_D = 7.3A,
Q_{gs}	Gate-to-Source charge	—	3.8	—		V_{DS}=300V,
Q_{gd}	Gate-to-Drain("Miller") charge	—	7.0	—		V_{GS} = 10V
$t_{d(on)}$	Turn-on delay time	—	11.0	—	ns	V_{GS}=10V, V_{DS} =380V,
t_r	Rise time	—	22.2	—		R_L=52Ω,
$t_{d(off)}$	Turn-Off delay time	—	23.8	—		R_{GEN}=12Ω
t_f	Fall time	—	17.8	—		I_D =7.3A
C_{iss}	Input capacitance	—	475	—	pF	V_{GS} = 0V
C_{oss}	Output capacitance	—	399	—		V_{DS} = 25V
C_{rss}	Reverse transfer capacitance	—	4	—		f = 1MHz

Source-Drain Ratings and Characteristics

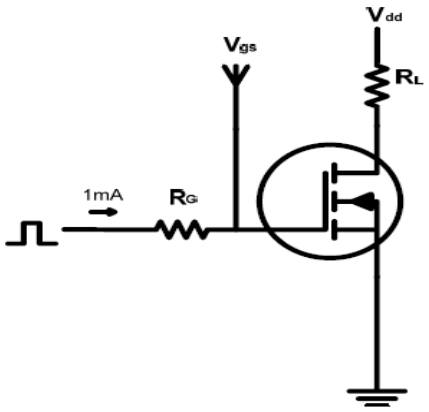
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	7 ①	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	28	A	
V_{sd}	Diode Forward Voltage	—	0.95	1.3	V	I_S=7.3A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	123	—	nS	T_J = 25°C, I_F =1A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	638	—	nC	

Test circuits and Waveforms

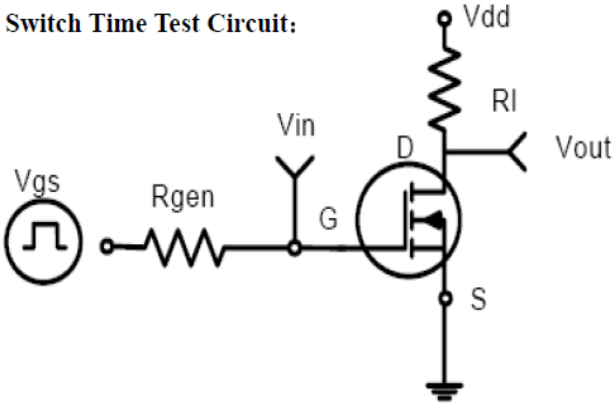
EAS test circuits:



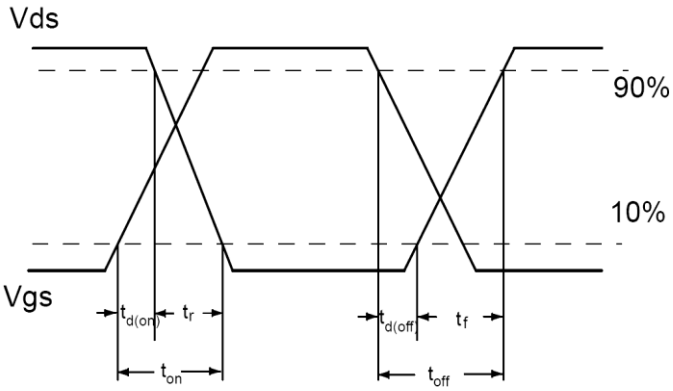
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



Notes:

①Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

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 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C

⑤These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175°C.

Typical electrical and thermal characteristics

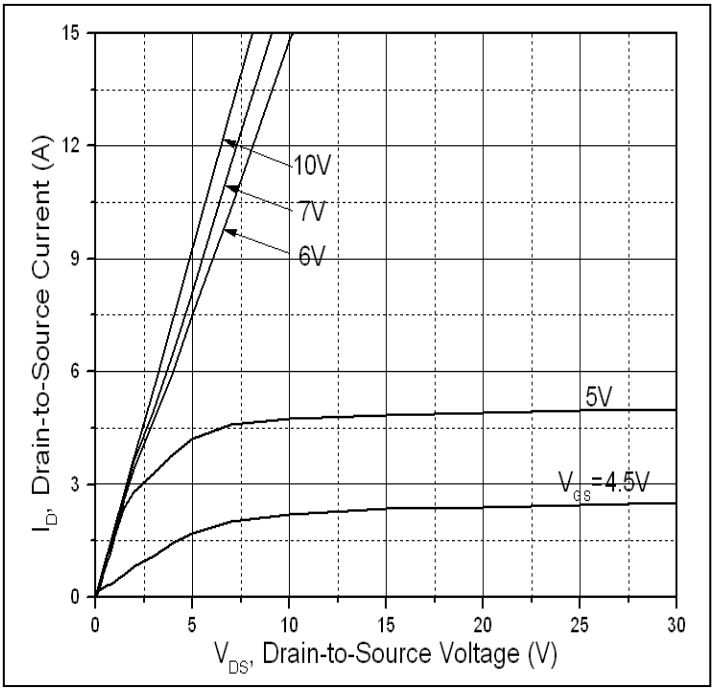


Figure 1: Typical Output Characteristics

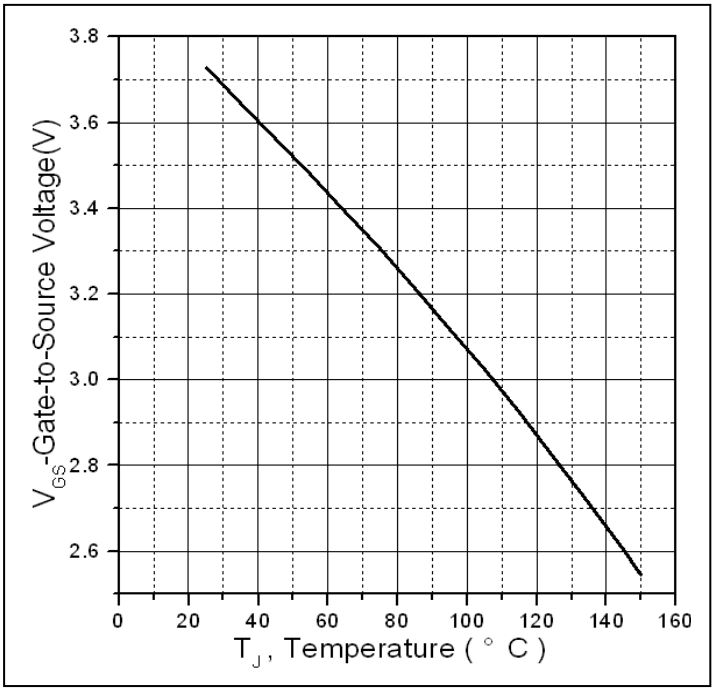


Figure 2. Gate to source cut-off voltage

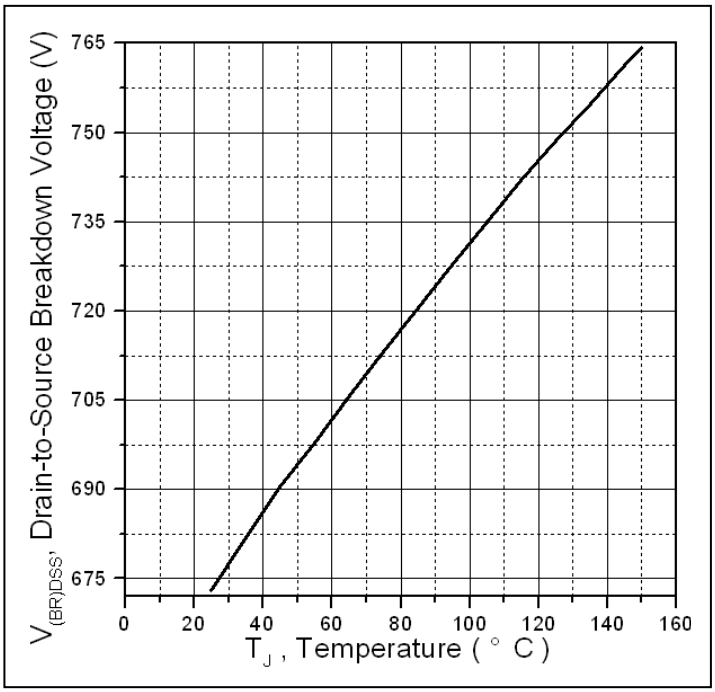


Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature

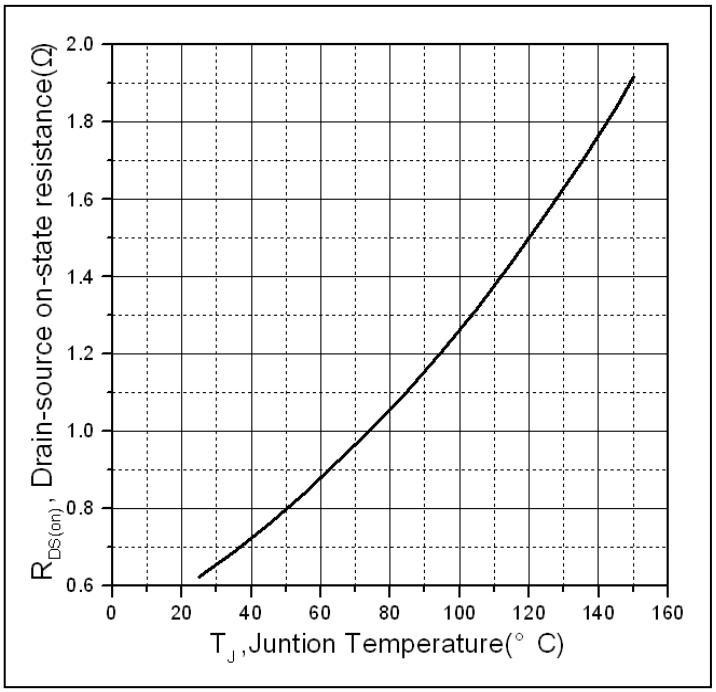


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical electrical and thermal characteristics

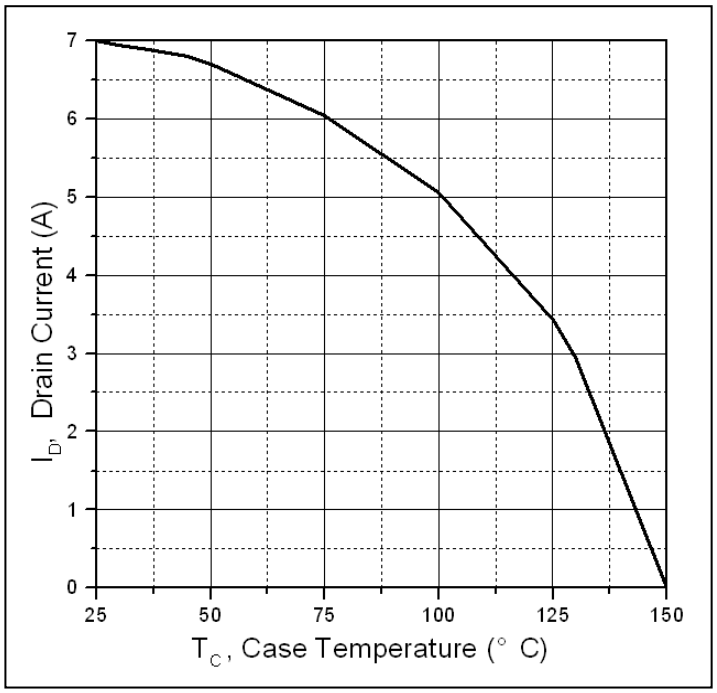


Figure 5. Maximum Drain Current Vs. Case Temperature

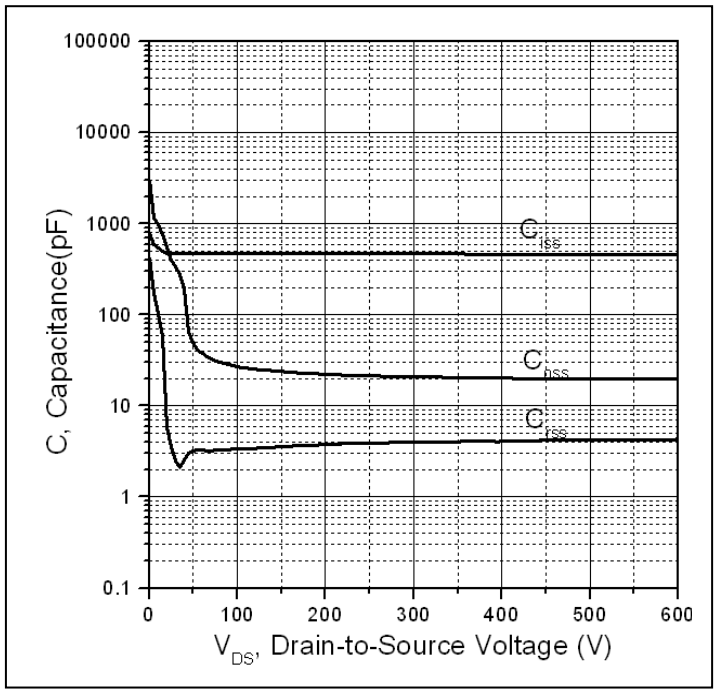


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

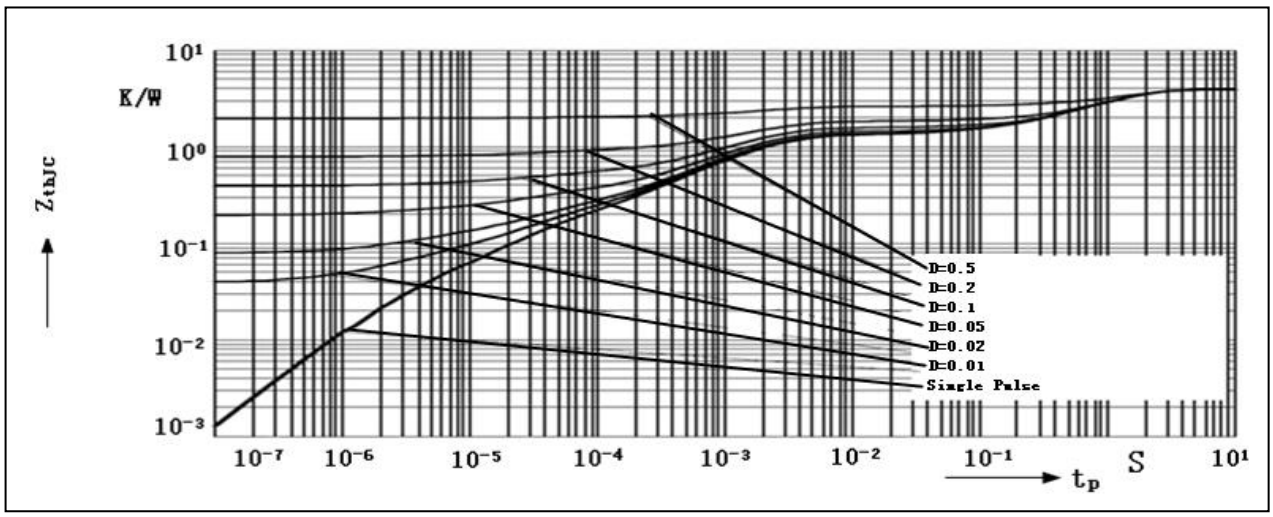
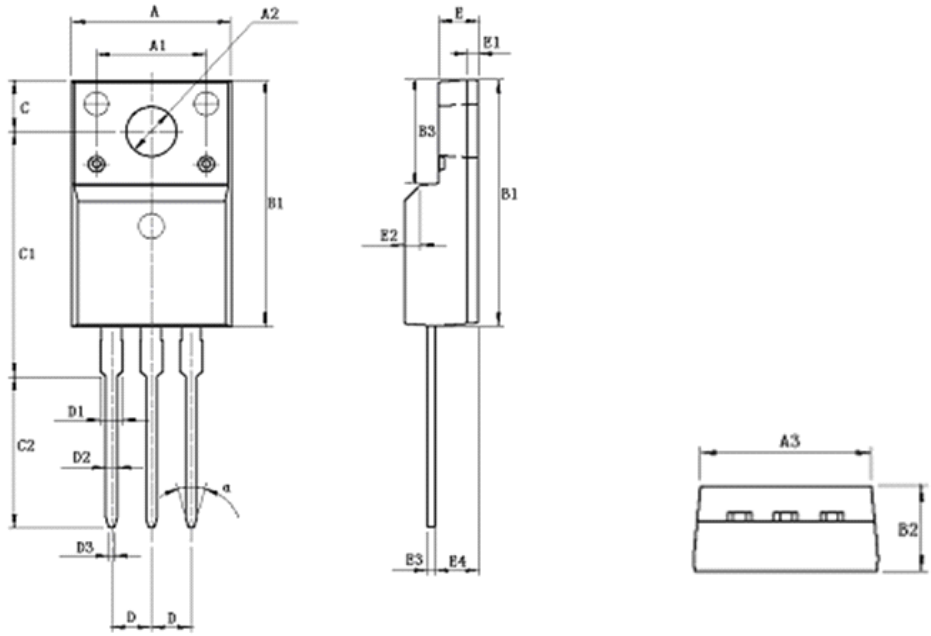


Figure7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data：

TO220F PACKAGE OUTLINE DIMENSION



Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	9.960	10.160	10.360	0.392	0.400	0.408
A1		7.000		0.276	0.000	0.000
A2	3.080	3.180	3.280	0.121	0.125	0.129
A3	9.260	9.460	9.660	0.365	0.372	0.380
B1	15.670	15.870	16.070	0.617	0.625	0.633
B2	4.500	4.700	4.900	0.177	0.185	0.193
B3	6.480	6.680	6.880	0.255	0.263	0.271
C	3.200	3.300	3.400	0.126	0.130	0.134
C1	15.600	15.800	16.000	0.614	0.622	0.630
C2	9.550	9.750	9.950	0.376	0.384	0.392
D		2.54 (TYP)			1.00 (TYP)	
D1	-	-	1.470	-	-	0.058
D2	0.700	0.800	0.900	0.028	0.031	0.035
D3	0.250	0.350	0.450	0.010	0.014	0.018
E	2.340	2.540	2.740	0.092	0.100	0.108
E1		0.700			0.028	
E2		$1.0*45^0$			$1.0*45^0$	
E3	0.450	0.500	0.600	0.018	0.020	0.024
E4	2.560	2.760	2.960	0.101	0.109	0.117
Θ		30^0			30^0	

Ordering and Marking Information

Device Marking: SSF7NS60F

Package (Available)

TO220F

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
TO220F	50	20	1000	6	6000

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

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