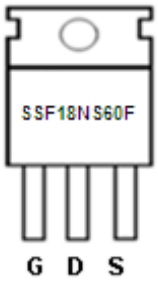
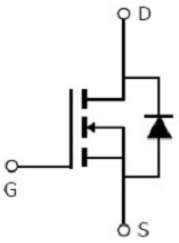
Main Product Characteristics:

V_{DSS}	610V
R_{DS}(on)	0.27ohm(typ.)
I_D	15A ①

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

Description:

The SSF18NS60F 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	15 ①	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V	9.4 ①	
I_{DM}	Pulsed Drain Current ②	60	
P_D @TC = 25°C	Power Dissipation ③	32.8	W
	Linear Derating Factor	0.26	W/°C
V_{DS}	Drain-Source Voltage	610	V
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy @ L=22.5mH	180	mJ
I_{AS}	Avalanche Current @ L=22.5mH	4	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

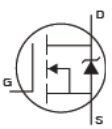
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ③	—	3.8	℃/W
$R_{\theta JA}$	Junction-to-ambient (t ≤ 10s) ④	—	80	℃/W

Electrical Characterizes @T_A=25℃ unless otherwise specified

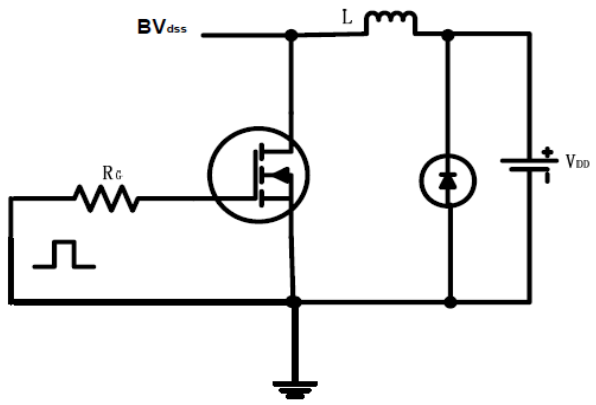
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	610	—	—	V	V_{GS} = 0V, I_D = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	0.27	0.35	Ω	V_{GS}=10V,I_D = 9.4A
		—	0.73	—		T_J = 125℃
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	V_{DS} = V_{GS}, I_D = 250μA
		—	2.66	—		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	—	27.0	—	nC	I_D = 10A,
Q_{gs}	Gate-to-Source charge	—	6.3	—		V_{DS}=480V,
Q_{gd}	Gate-to-Drain("Miller") charge	—	13.7	—		V_{GS} = 10V
$t_{d(on)}$	Turn-on delay time	—	12.3	—	nS	V_{GS}=10V, V_{DS} =480V,
t_r	Rise time	—	24.3	—		R_L=40Ω,
$t_{d(off)}$	Turn-Off delay time	—	27.1	—		R_{GEN}=4.1Ω
t_f	Fall time	—	19.7	—		I_D =12A
C_{iss}	Input capacitance	—	949	—	pF	V_{GS} = 0V
C_{oss}	Output capacitance	—	783	—		V_{DS} = 25V
C_{rss}	Reverse transfer capacitance	—	11	—		f = 400KHz

Source-Drain Ratings and Characteristics

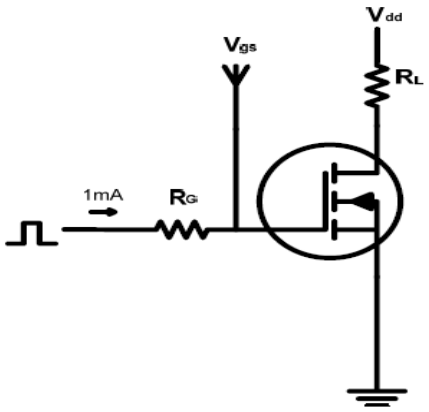
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	15 ①	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	60	A	
V_{sd}	Diode Forward Voltage	—	0.89	1.3	V	I_S=15A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	313	—	nS	T_J = 25°C, I_F =15A, di/dt =
Q_{rr}	Reverse Recovery Charge	—	3	—	μC	100A/μs

Test circuits and Waveforms

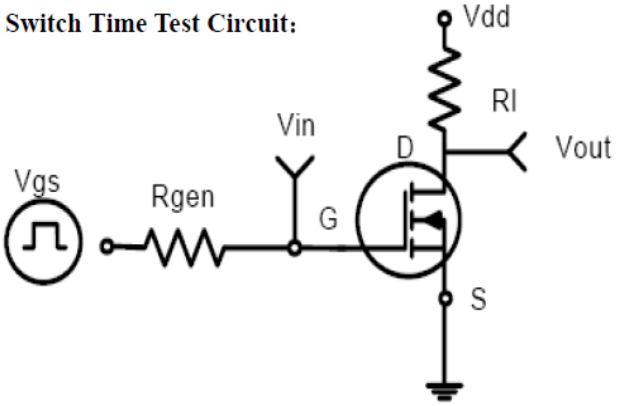
EAS test circuits:



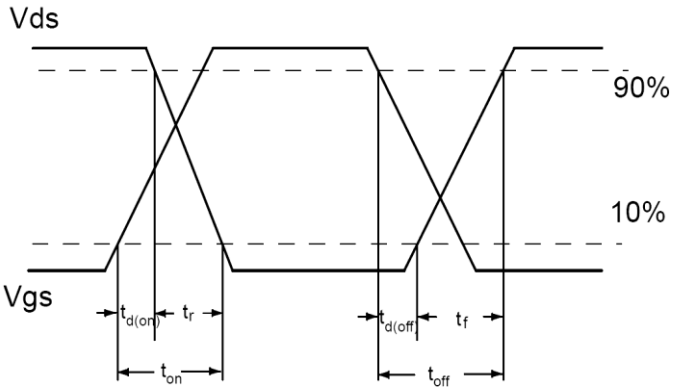
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



Notes:

①Calculated continuous current based on maximum allowable junction temperature.

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 $T_{J(MAX)}$=150°C.

Typical electrical and thermal characteristics

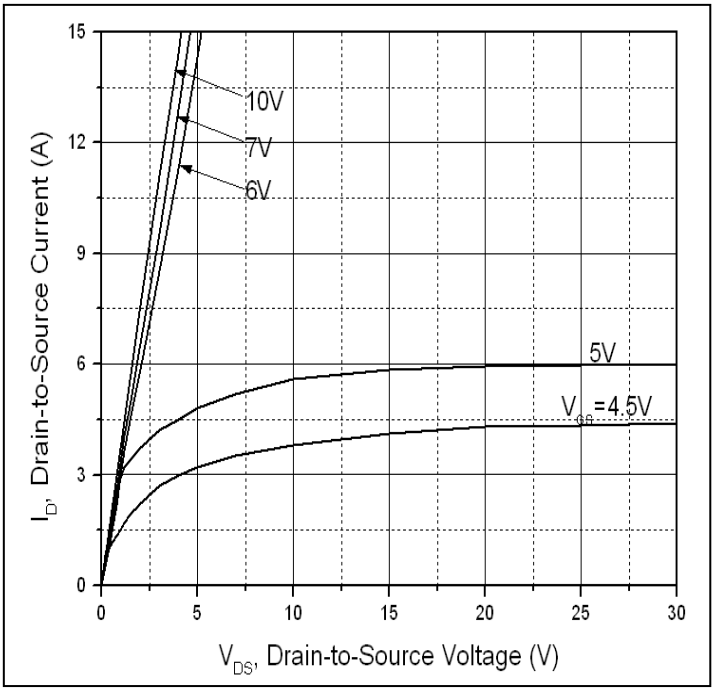


Figure 1: Typical Output Characteristics

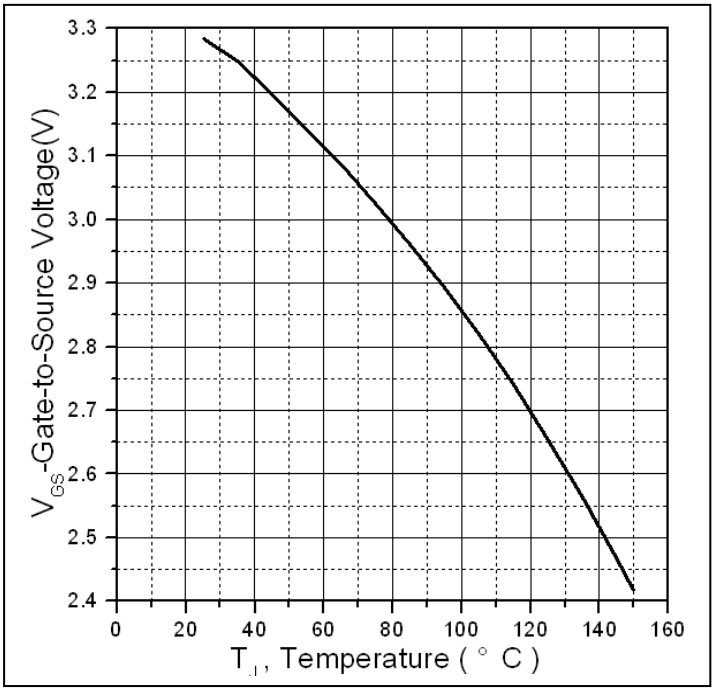


Figure 2. Gate to source cut-off voltage

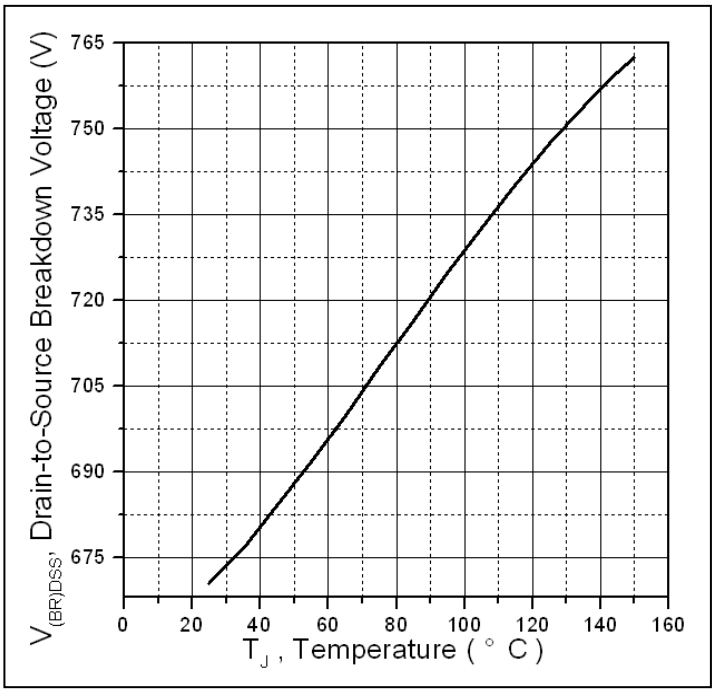


Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature

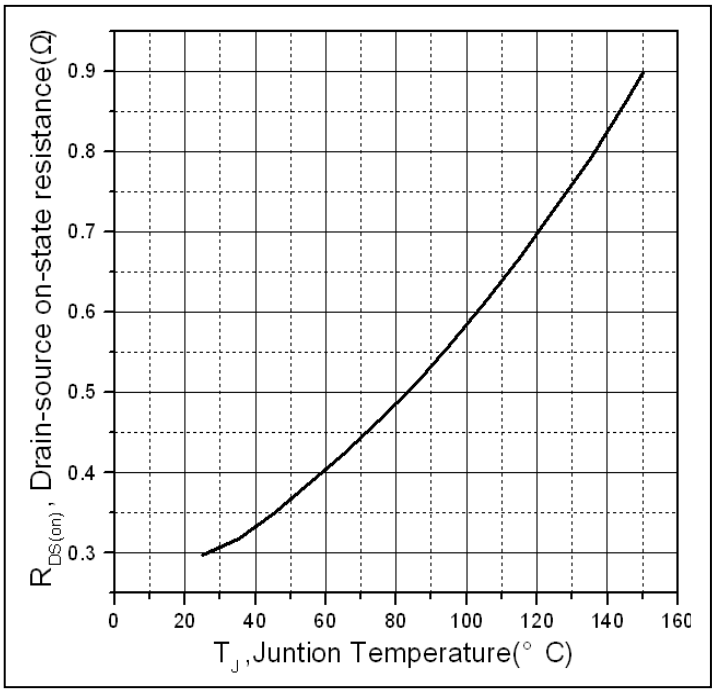


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical electrical and thermal characteristics

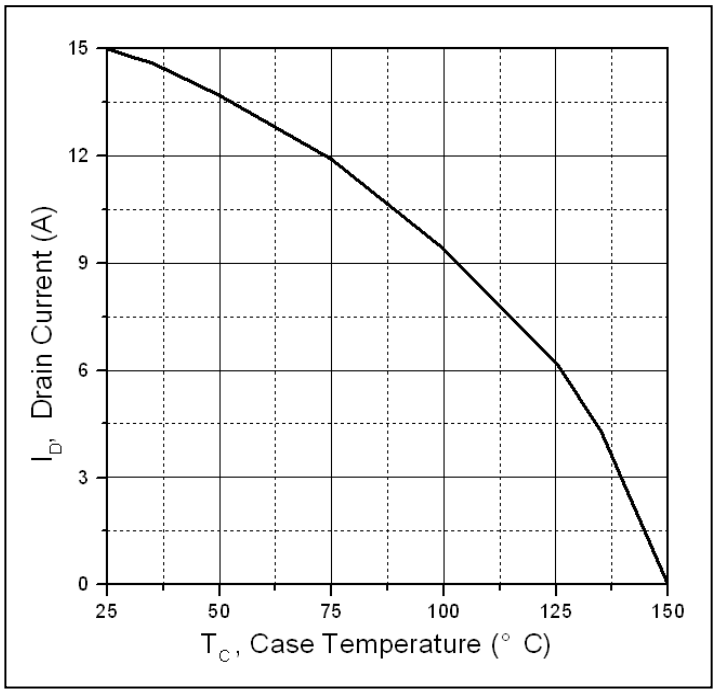


Figure 5. Maximum Drain Current Vs. Case Temperature

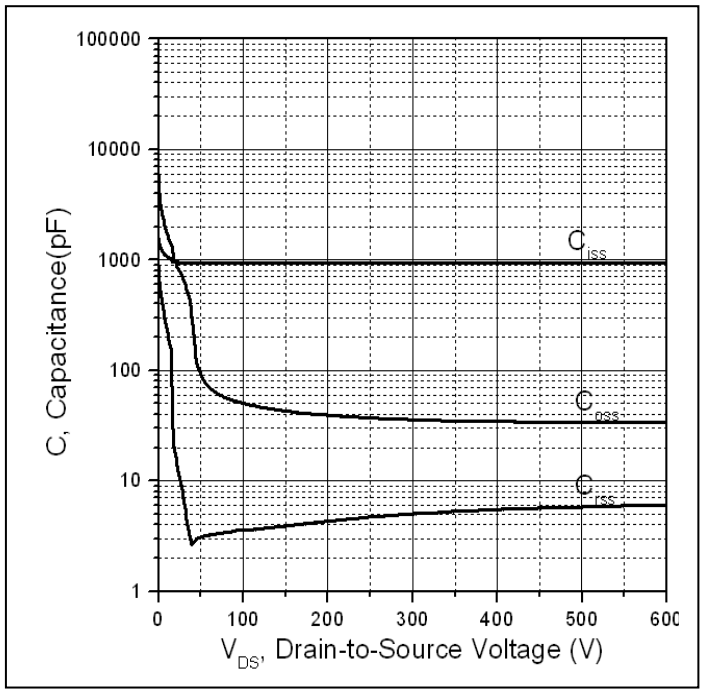
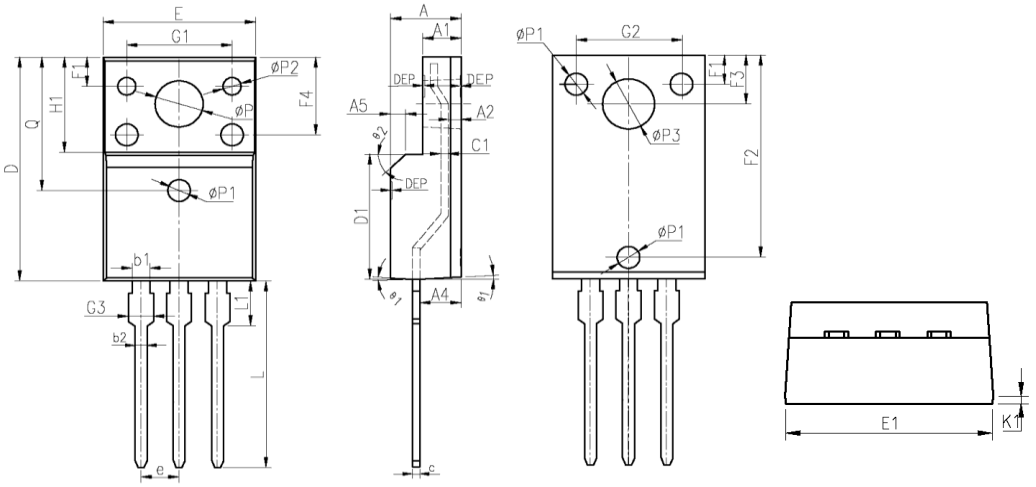


Figure 6.Typical Capacitance Vs. Drain-to-Source Voltage

Mechanical Data：

TO220F PACKAGE OUTLINE DIMENSION



Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
E	10.040	10.200	10.360	0.395	0.402	0.408
A	4.500	4.700	4.900	0.177	0.185	0.193
A1	2.340	2.540	2.740	0.092	0.100	0.108
A2	0.950	1.050	1.150	0.037	0.041	0.045
A4	2.650	2.750	2.850	0.104	0.108	0.112
A5		1.00REF			0.039REF	
c	0.420	0.500	0.580	0.017	0.020	0.023
c1	0.420	0.500	0.580	0.017	0.020	0.023
D	15.670	15.870	16.070	0.617	0.625	0.633
Q		9.20REF			0.362REF	
H1		6.70REF			0.264REF	
e		2.54BSC			0.10BSC	
ΦP		3.183REF			0.125REF	
L	12.780	12.980	13.180	0.503	0.511	0.519
L1	3.250	3.450	3.650	0.128	0.136	0.144
D1		9.17REF			0.362REF	
ΦP1	1.400	1.500	1.600	0.055	0.059	0.063
ΦP2	1.150	1.200	1.250	0.045	0.047	0.049
ΦP3		3.45REF			0.136REF	
Θ1	5^o	7^o	9^o	5^o	7^o	9^o
Θ2	-	45^o	-	-	45^o	-
DEP	0.050	0.100	0.150	0.002	0.004	0.006
F1	1.900	2.000	2.100	0.075	0.079	0.083
F2	13.800	13.900	14.000	0.543	0.547	0.551
F3	3.200	3.300	3.400	0.126	0.130	0.134
F4	5.300	5.400	5.500	0.209	0.213	0.217
G1	6.600	6.700	6.800	0.260	0.264	0.268
G2	6.900	7.000	7.100	0.272	0.276	0.280
G3	1.100	1.300	1.500	0.043	0.051	0.059
E1	9.900	10.000	10.100	0.390	0.394	0.398
K1	0.650	0.700	0.750	0.026	0.028	0.030
b1	1.050	1.200	1.350	0.041	0.047	0.053
b2	0.700	0.800	0.850	0.028	0.031	0.033

Ordering and Marking Information

Device Marking: SSF18NS60F

Package (Available)

TO220F

Operating Temperature Range

C : -55 to 150 ºC

Devices per Unit

Package Type	Units/ Tube	Tubes/Inner Box	Units/Inner Box	InnerBoxes/ CartonBox	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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