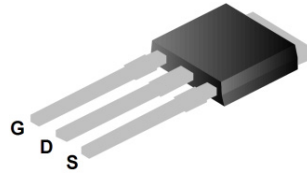


Main Product Characteristics

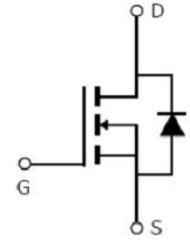
V_{DSS}	600V
$R_{DS(on)}$	1.85Ω (typ.)
I_D	4A



TO-251 (IPAK)



Marking and Pin Assignment



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal 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



Description

The SSF4N60G utilizes the latest processing techniques to achieve high cell density, low on-resistance and high repetitive avalanche rating. These features make this device extremely efficient and reliable device for use in power switching applications and a wide variety of other applications.

Absolute Max Ratings

Symbol	Parameter	Max.	Units
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}^{(1)}$	4	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}^{(1)}$	2.5	
I_{DM}	Pulsed Drain Current ⁽²⁾	16	
$P_D @ T_C = 25^\circ\text{C}$	Power Dissipation ⁽³⁾	77	W
	Linear Derating Factor	0.62	W/°C
V_{DS}	Drain-Source Voltage	600	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ L=25.9mH	117	mJ
I_{AS}	Avalanche Current @ L=25.9mH	3	A
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C

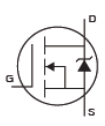
Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ^③	—	1.61	°C/W
$R_{\theta JA}$	Junction-to-Ambient ($t \leq 10s$) ^④	—	110	°C/W

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

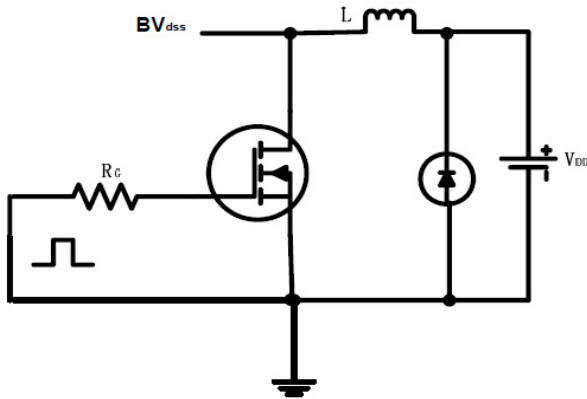
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	600	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source On-resistance	—	1.85	2.4	Ω	$V_{GS}=10V, I_D = 2A$
		—	4.36	—		$T_J = 125^\circ\text{C}$
$V_{GS(th)}$	Gate Threshold Voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
		—	2.36	—		$T_J = 125^\circ\text{C}$
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	—	8.2	—	nC	$I_D = 4A,$ $V_{DS}=480V,$ $V_{GS} = 10V$
Q_{gs}	Gate-to-Source Charge	—	2.6	—		
Q_{gd}	Gate-to-Drain("Miller") Charge	—	3.0	—		
$t_{d(on)}$	Turn-on Delay Time	—	10.8	—	ns	$V_{GS}=10V, V_{DS}=300V,$ $R_{GEN}=25\Omega, I_D=4A$
t_r	Rise Time	—	12.7	—		
$t_{d(off)}$	Turn-Off Delay Time	—	38.8	—		
t_f	Fall Time	—	19.3	—		
C_{iss}	Input Capacitance	—	653	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	56	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	5	—		$f = 1\text{MHz}$

Source-Drain Ratings and Characteristics

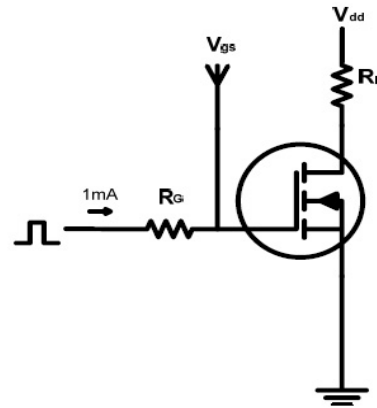
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	4	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	16	A	
V_{SD}	Diode Forward Voltage	—	—	1.4	V	$I_S=4A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	—	431.3	—	nS	$T_J = 25^\circ\text{C}, I_F = 4A,$
Q_{rr}	Reverse Recovery Charge	—	1955	—	nC	$di/dt = 100A/\mu s$

Test Circuits and Waveforms

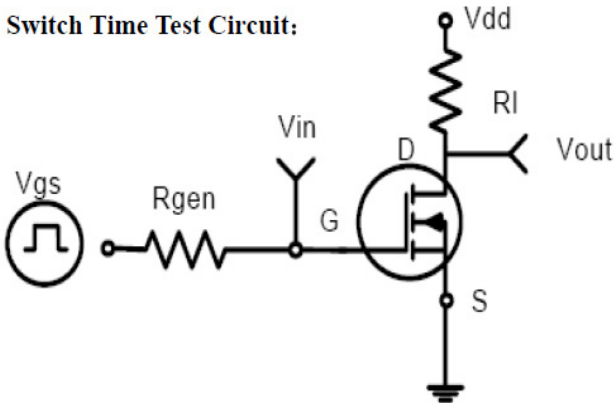
EAS test circuits:



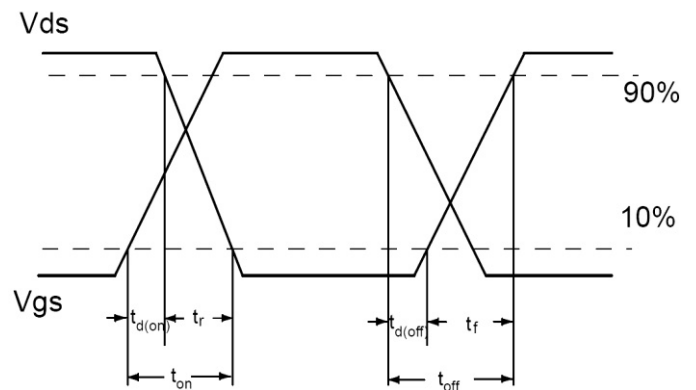
Gate charge test circuit:



Switch Time Test Circuit:



Switching 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 P_D 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 $T_A = 25^\circ\text{C}$

Typical Electrical and Thermal Characteristics

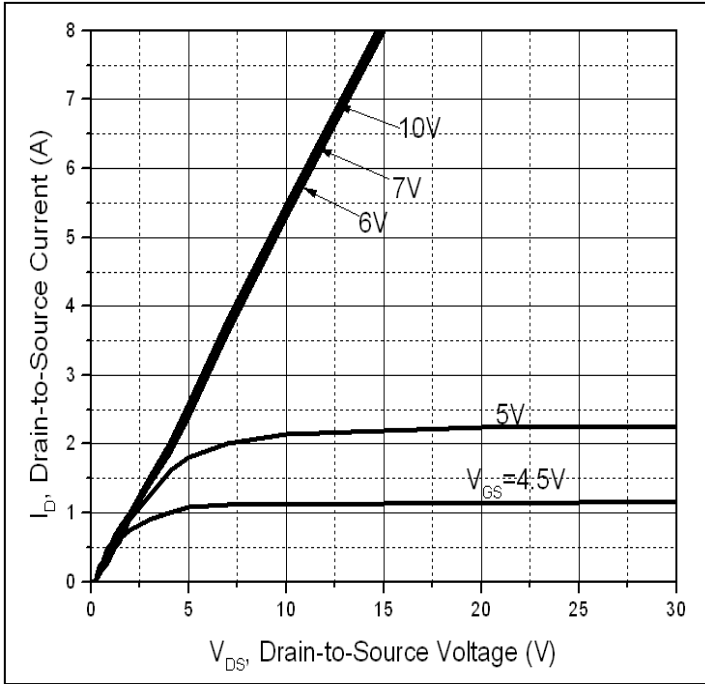


Figure 1. Typical Output Characteristics

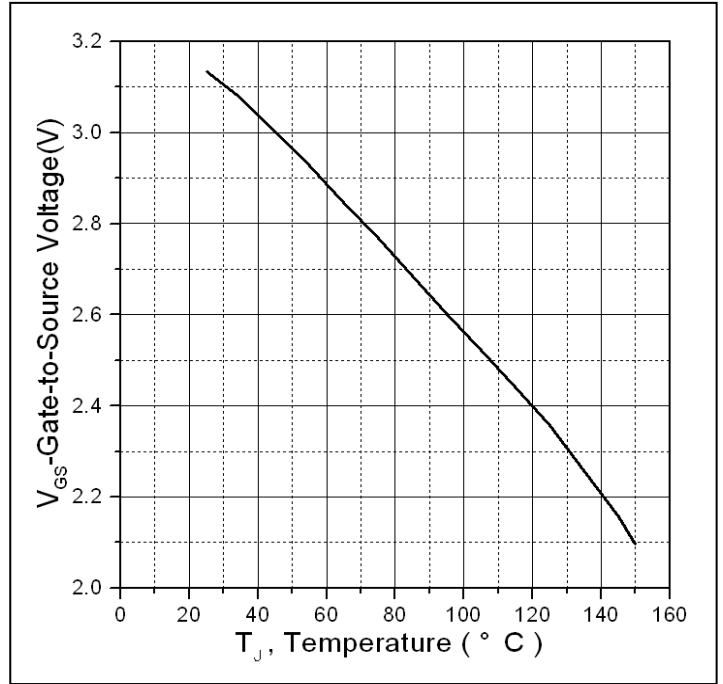


Figure 2. Gate to Source Cut-off Voltage

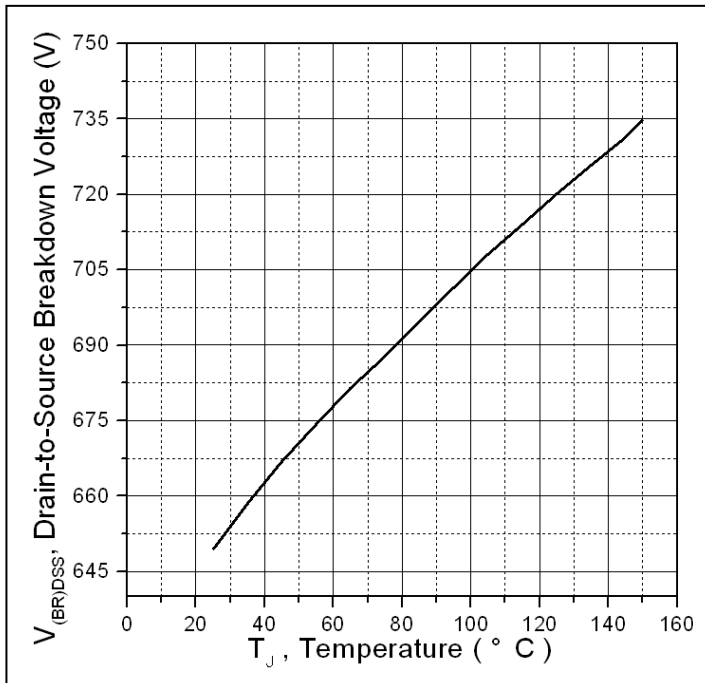


Figure 3. Drain-to-Source Breakdown Voltage Vs. Case Temperature

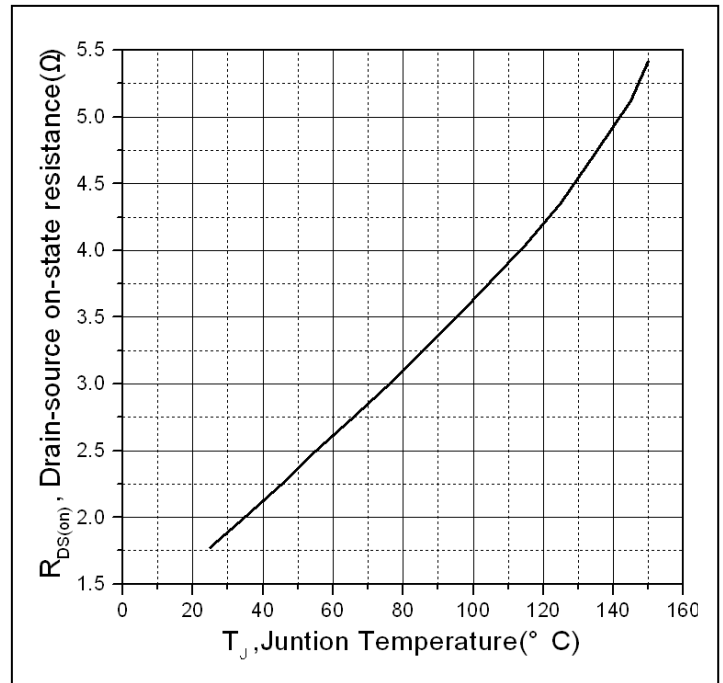


Figure 4. Normalized On-Resistance Vs. Case Temperature

Typical Electrical and Thermal Characteristics

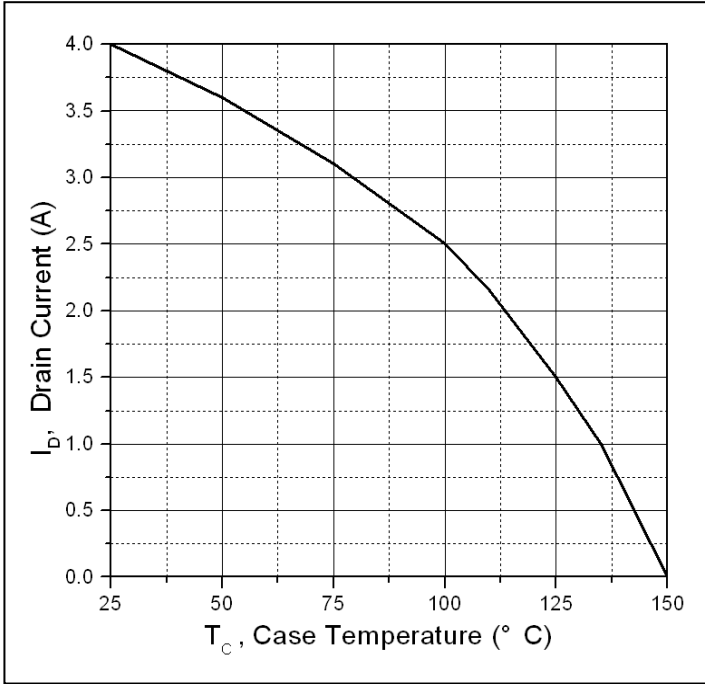


Figure 5. Maximum Drain Current Vs. Case Temperature

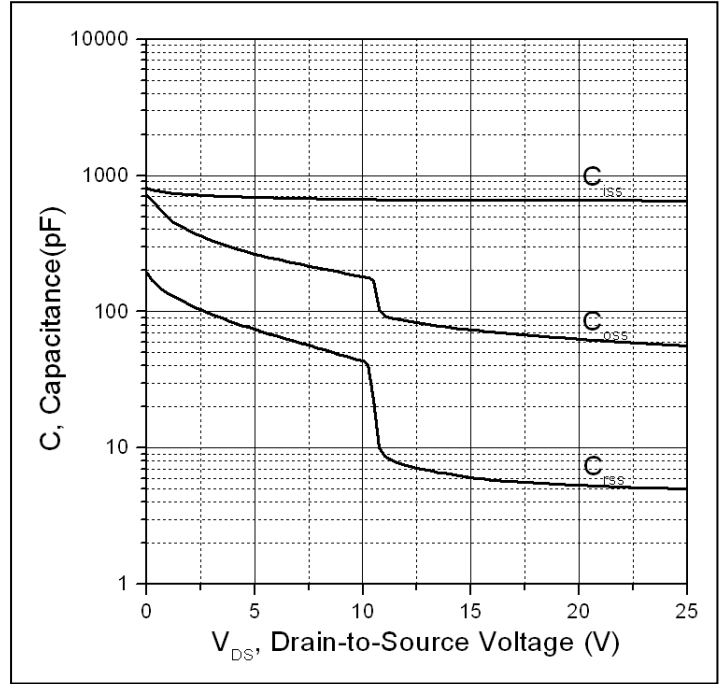
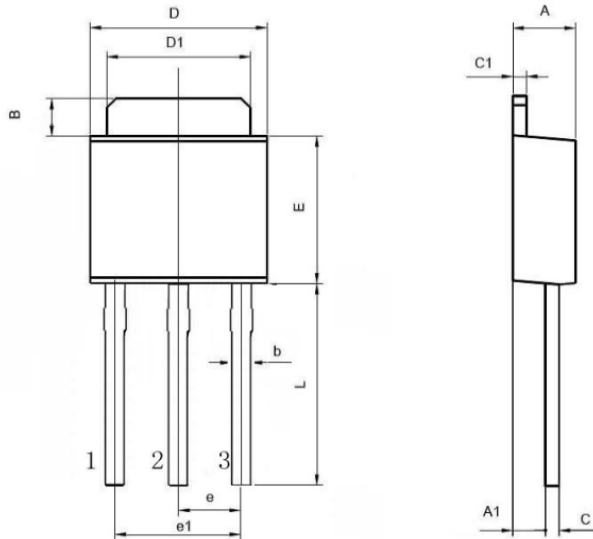


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

Mechanical Data

TO-251 PACKAGE OUTLINE DIMENSION



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.200	-	2.400	0.087	-	0.094
A1	0.950	-	1.150	0.037	-	0.045
B	0.950	-	1.250	0.037	-	0.049
b	0.500	-	0.700	0.020	-	0.028
c	0.450	-	0.550	0.018	-	0.022
c1	0.450	-	0.550	0.018	-	0.022
D	6.450	-	6.750	0.254	-	0.266
D1	5.200	-	5.400	0.205	-	0.213
E	5.950	-	6.250	0.234	-	0.246
e	2.240	-	2.340	0.088	-	0.092
e1	4.430	-	4.730	0.174	-	0.186
L	9.000	-	9.400	0.354	-	0.370

Ordering and Marking Information

Device Marking: SSF4N60G

Package (Available)
TO-251 (IPAK)
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-251	80	60	4800	5	24000

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