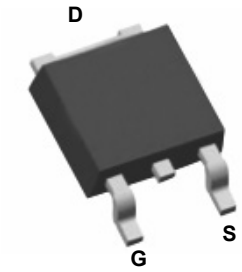
GOOD-ARK SEMICONDUCTOR

SSFD6909

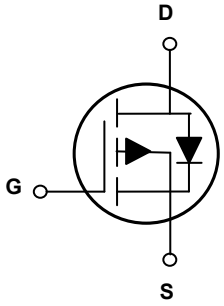
60V P-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	-60V
$R_{DS(ON)}$	105mΩ
I_D	-10A



TO-252 (DPAK)



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery

Description

The SSFD6909 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supply and a wide variety of other applications.

Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current – Continuous (T_C=25°C)	I_D	-10	A
Drain Current – Continuous (T_C=100°C)		-6.3	A
Drain Current – Pulsed[1]	I_{DM}	-40	A
Single Pulse Avalanche Energy[2]	E_{AS}	25	mJ
Single Pulse Avalanche Current[2]	I_{AS}	-18	A
Power Dissipation (T_C=25°C)	P_D	32	W
Power Dissipation – Derate above 25°C		0.25	W/°C
Storage Temperature Range	T_{STG}	-50 to +150	°C
Operating Junction Temperature Range	T_J	-50 to +150	°C

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	---	62	°C/W
Thermal Resistance Junction to Case	$R_{\theta JC}$	---	3.84	°C/W

Electrical Characteristics (T_J=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250uA	-60	---	---	V
BV_{DSS} Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=-1mA	---	-0.05	---	V/°C
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-60V, V_{GS}=0V, T_J=25°C	---	---	-1	uA
		V_{DS}=-48V, V_{GS}=0V, T_J=125°C	---	---	-10	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	---	---	±100	nA
On Characteristics						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-6A	---	87	105	mΩ
		V_{GS}=-4.5V, I_D=-3A	---	120	145	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=-250uA	-1	-1.6	-2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\triangle V_{GS(th)}$		---	3	---	mV/°C
Forward Transconductance	gfs	V_{DS}=-10V, I_D=-6A	---	5.5	---	S
Dynamic and Switching Characteristics						
Total Gate Charge[3, 4]	Q_g	V_{DS}=-30V, V_{GS}=-10V, I_D=-4A	---	10	15	nC
Gate-Source Charge[3, 4]	Q_{gs}		---	1.6	3.2	
Gate-Drain Charge[3, 4]	Q_{gd}		---	3	6	
Turn-On Delay Time[3, 4]	$T_{d(on)}$	V_{DD}=-30V, V_{GS}=-10V, R_G=6Ω, I_D=-1A	---	8	16	nS
Rise Time[3, 4]	T_r		---	15.4	30	
Turn-Off Delay Time[3, 4]	$T_{d(off)}$		---	42.8	80	
Fall Time[3, 4]	T_f		---	8.4	16	
Input Capacitance	C_{iss}	V_{DS}=-30V, V_{GS}=0V, F=1MHz	---	785	1300	pF
Output Capacitance	C_{oss}		---	175	300	
Reverse Transfer Capacitance	C_{rss}		---	112	220	
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	36	---	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_S	V_G=V_D=0V, Force Current	---	---	-10	A
Pulsed Source Current	I_{SM}		---	---	-20	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=-1A, T_J=25°C	---	---	-1	V

Note:
1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-18A, R_G=25Ω, Starting T_J=25°C.
3. The data tested by pulsed, pulse width ≦ 300uS, duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

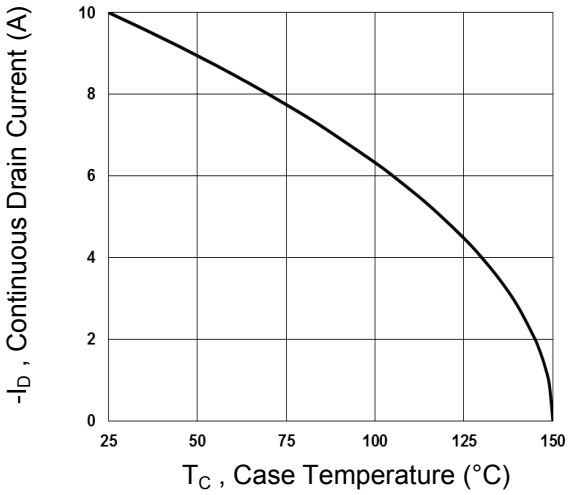


Fig.1 Continuous Drain Current vs. T_C

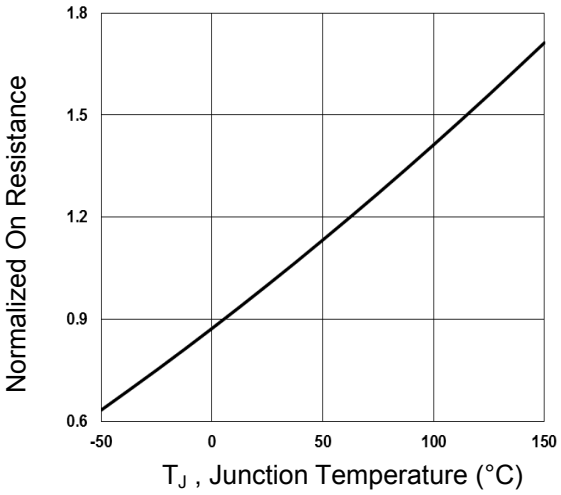


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

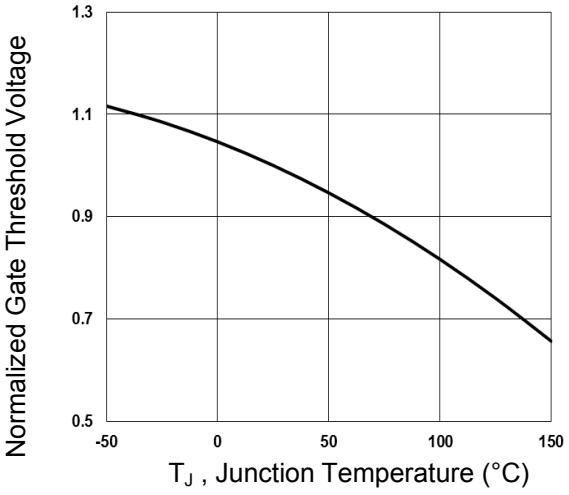


Fig.3 Normalized V_{th} vs. T_J

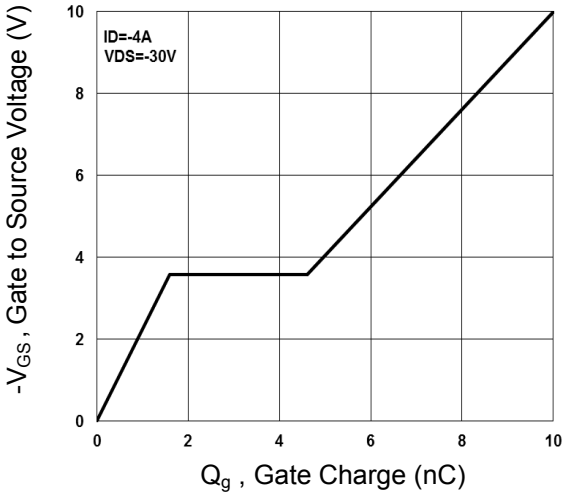


Fig.4 Gate Charge Waveform

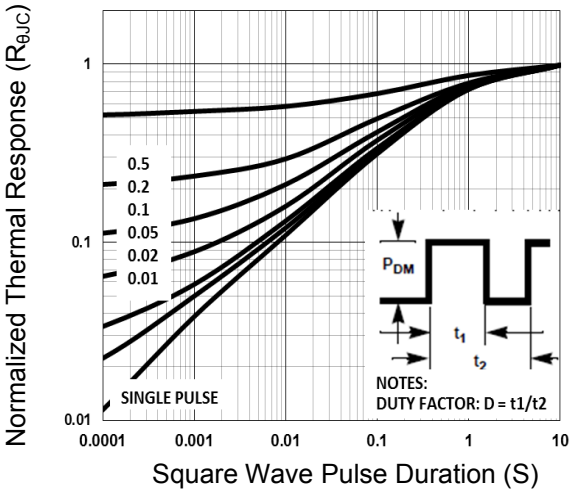


Fig.5 Normalized Transient Impedance

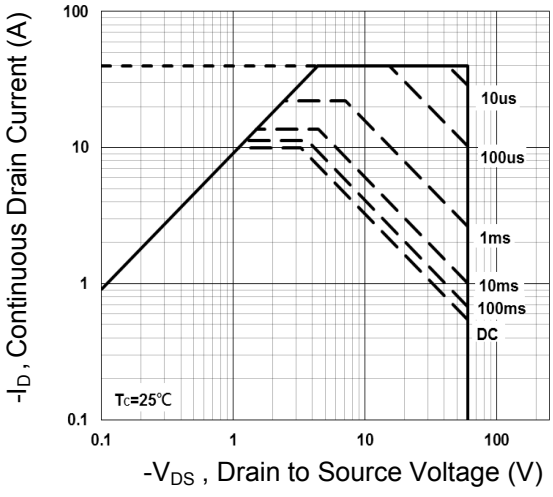


Fig.6 Maximum Safe Operation Area

Typical Electrical and Thermal Characteristic Curves

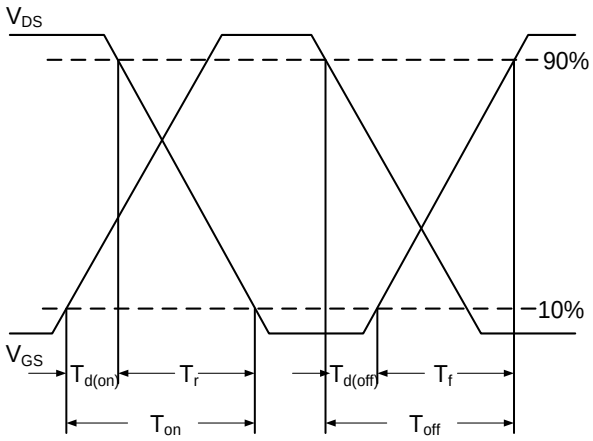


Fig.7 Switching Time Waveform

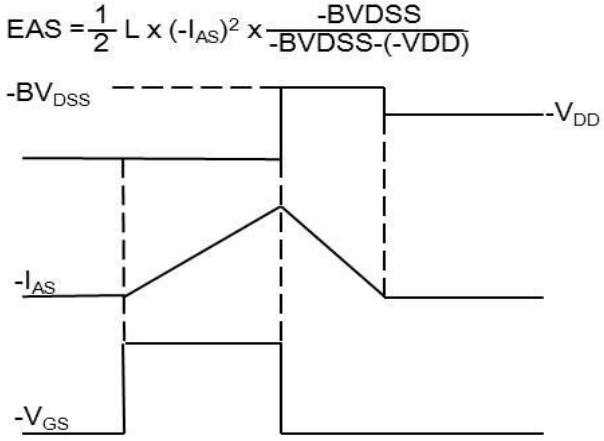
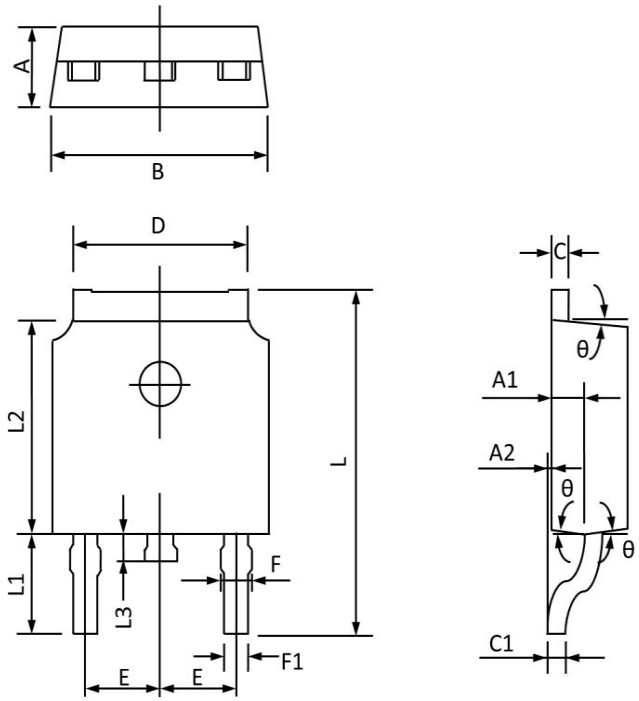


Fig.8 E_{AS} Waveform

Package Outline Dimensions TO-252 (DPAK)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	2.400	2.200	0.094	0.087
A1	1.110	0.910	0.044	0.036
A2	0.150	0.000	0.006	0.000
B	6.800	6.400	0.268	0.252
C	0.580	0.450	0.023	0.018
C1	0.580	0.460	0.023	0.018
D	5.500	5.100	0.217	0.201
E	2.386	2.186	0.094	0.086
F	0.940	0.600	0.037	0.024
F1	0.860	0.500	0.034	0.020
L	10.400	9.400	0.409	0.370
L1	3.000	2.400	0.118	0.094
L2	6.200	5.400	0.244	0.213
L3	1.200	0.600	0.047	0.024
θ	9°	3°	9°	3°