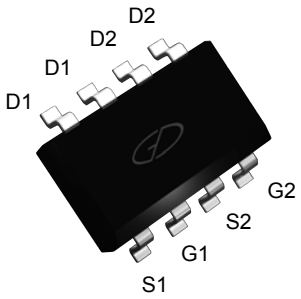
GOOD-ARK SEMICONDUCTOR

SSFQ3712

30V N-Channel + P-Channel Complementary MOSFET

Main Product Characteristics

Channel	N-Channel	P-Channel
B_{VDSS}	30V	-30V
$R_{DS(ON)}$	20mΩ	50mΩ
I_D	8A	-5.5A



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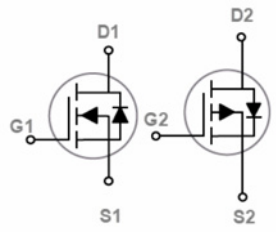


Schematic Diagram

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

RoHS Compliant

Description

The SSFQ3712 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}	30	-30	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Drain Current – Continuous (T_C=25°C)	I_D	8	-5.5	A
Drain Current – Continuous (T_C=100°C)		5	-3.5	A
Drain Current – Pulsed[1]	I_{DM}	32	-22	A
Single Pulse Avalanche Energy[2,6]	E_{AS}	14	5	mJ
Single Pulse Avalanche Current[2]	I_{AS}	17	10	A
Power Dissipation (T_C=25°C)	P_D	2.5		W
Power Dissipation – Derate above 25°C		0.02		W/°C
Storage Temperature Range	T_{STG}	-55 to +150		°C
Operating Junction Temperature Range	T_J	-55 to +150		°C

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	---	62.5	°C/W
Thermal Resistance Junction to Case	$R_{\theta JC}$	---	50	°C/W

N-Channel 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	30	---	---	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=30V , V_{GS}=0V , T_J=25°C	---	---	1	uA
		V_{DS}=24V , 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						nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V , I_D=8A	---	15	20	mΩ
		V_{GS}=4.5V , I_D=5A	---	21	30	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =250uA	1.2	1.5	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\triangle V_{GS(th)}$		---	-4	---	mV/°C
Forward Transconductance	gfs	V_{DS}=10V , I_D=3A	---	3	---	S
Dynamic Characteristics						
Total Gate Charge[3, 4]	Q_g	V_{DS}=15V , V_{GS}=4.5V , I_D=8A	---	4.1	6	nC
Gate-Source Charge[3, 4]	Q_{gs}		---	1	1.4	
Gate-Drain Charge[3, 4]	Q_{gd}		---	2.1	4	
Turn-On Delay Time[3, 4]	$T_{d(on)}$	V_{DD}=15V , V_{GS}=10V , R_G=6Ω I_D=1A	---	2.8	5	nS
Rise Time[3, 4]	T_r		---	7.2	14	
Turn-Off Delay Time[3, 4]	$T_{d(off)}$		---	15.8	30	
Fall Time[3, 4]	T_f		---	4.6	9	
Input Capacitance	C_{iss}	V_{DS}=25V , V_{GS}=0V , F=1MHz	---	345	500	pF
Output Capacitance	C_{oss}		---	55	80	
Reverse Transfer Capacitance	C_{rss}		---	32	55	
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	3.2	6.4	Ω
Drain-Source Diode Characteristics						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Continuous Source Current	I_S	V_G=V_D=0V , Force Current	---	---	8	A
Pulsed Source Current	I_{SM}		---	---	16	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}=17A, 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.

P-Channel 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	-30	---	---	V
BV_{DSS} Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=-1mA	---	-0.03	---	V/°C
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-30V , V_{GS}=0V , T_J=25°C	---	---	-1	uA
		V_{DS}=-24V , 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=-5A	---	40	50	mΩ
		V_{GS}=-4.5V , I_D=-3A	---	65	90	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.6	-2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\triangle V_{GS(th)}$		---	4	---	mV/°C
Forward Transconductance	gfs	V_{DS}=-10V , I_D=-3A	---	3.5	---	S
Dynamic Characteristics						
Total Gate Charge[6, 7]	Q_g	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-3A	---	5.1	7	nC
Gate-Source Charge[6, 7]	Q_{gs}		---	2	3	
Gate-Drain Charge[6, 7]	Q_{gd}		---	2.2	4	
Turn-On Delay Time[6, 7]	$T_{d(on)}$	V_{DD}=-15V , V_{GS}=-10V , R_G=6Ω I_D=-1A	---	3.4	6	nS
Rise Time[6, 7]	T_r		---	10.8	21	
Turn-Off Delay Time[6, 7]	$T_{d(off)}$		---	26.9	51	
Fall Time[6, 7]	T_f		---	6.9	13	
Input Capacitance	C_{iss}	V_{DS}=-15V , V_{GS}=0V , F=1MHz	---	560	810	pF
Output Capacitance	C_{oss}		---	55	80	
Reverse Transfer Capacitance	C_{rss}		---	40	60	
Drain-Source Diode Characteristics						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Continuous Source Current	I_S	V_G=V_D=0V , Force Current	---	---	-5.5	A
Pulsed Source Current	I_{SM}		---	---	-11	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V , I_S=-1A , T_J=25°C	---	---	-1	V

Note:

5. V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-10A, R_G=25Ω,Starting T_J=25°C.
6. The data tested by pulsed, pulse width ≦ 300uS duty cycle ≦ 2%.
7. Essentially independent of operating temperature.

N-Channel Typical Electrical and Thermal Characteristic Curves

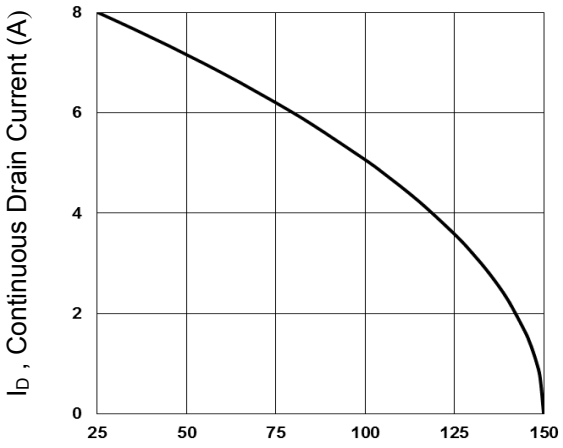


Fig.1 Continuous Drain Current vs. T_C

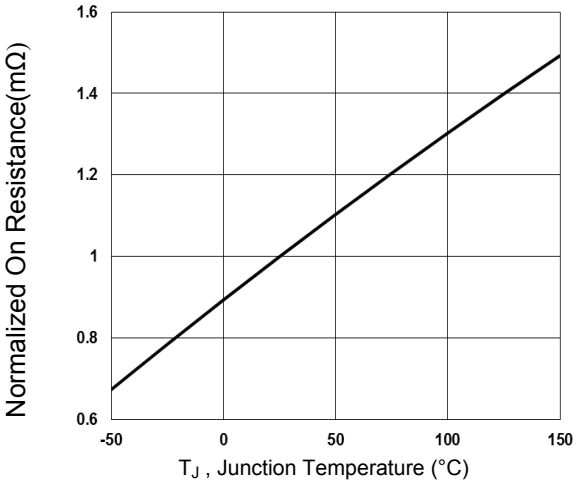


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

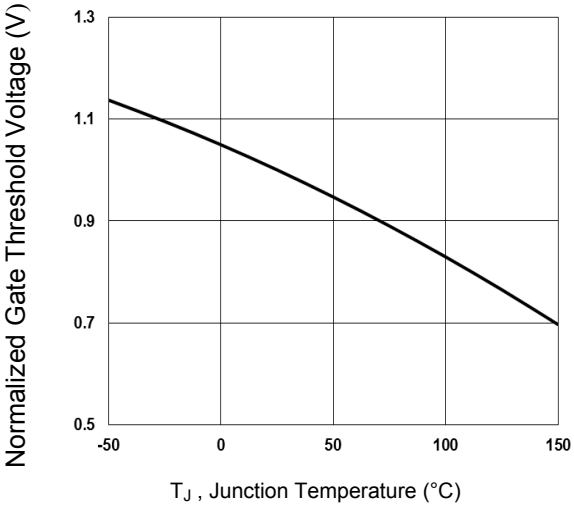


Fig.3 Normalized V_{th} vs. T_J

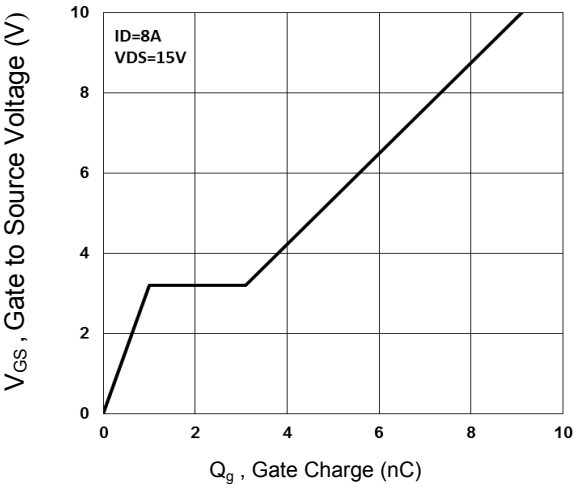


Fig.4 Gate Charge Characteristics

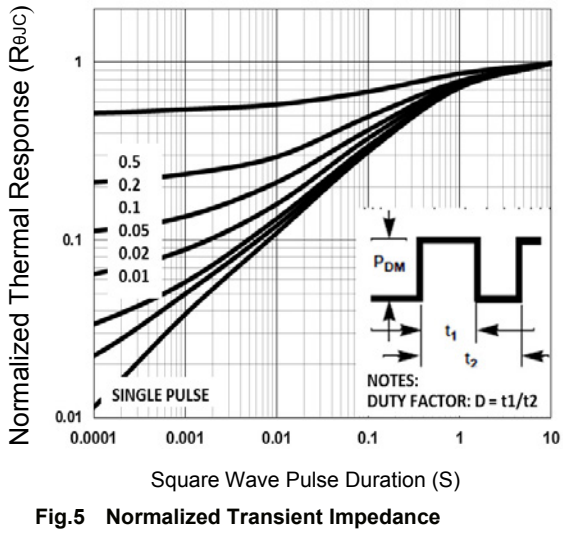


Fig.5 Normalized Transient Impedance

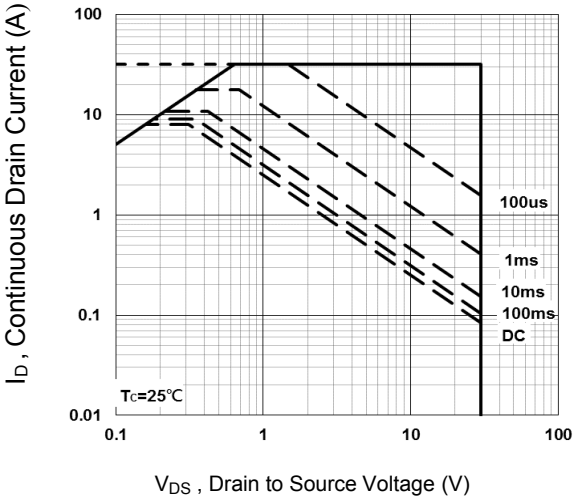
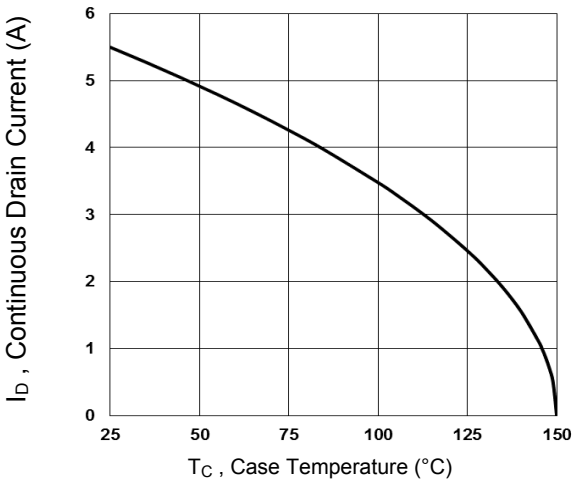


Fig.6 Maximum Safe Operation Area

P-Channel Typical Electrical and Thermal Characteristic Curves



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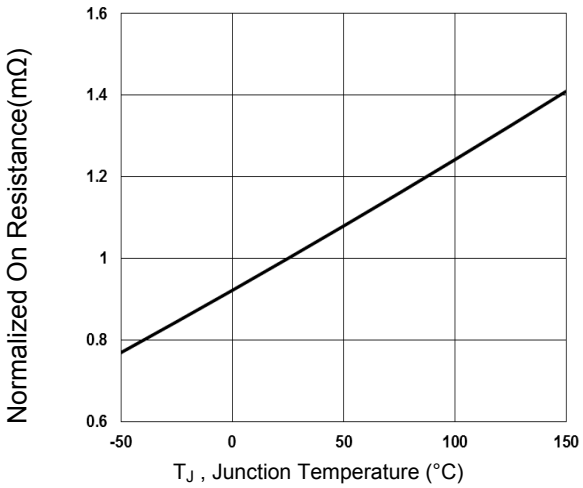


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

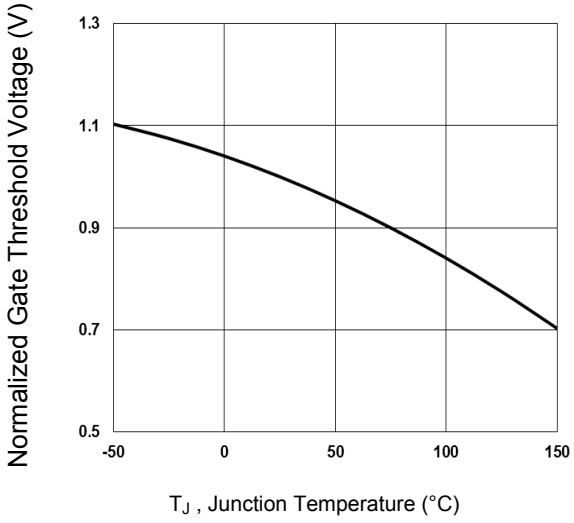


Fig.3 Normalized V_{th} vs. T_J

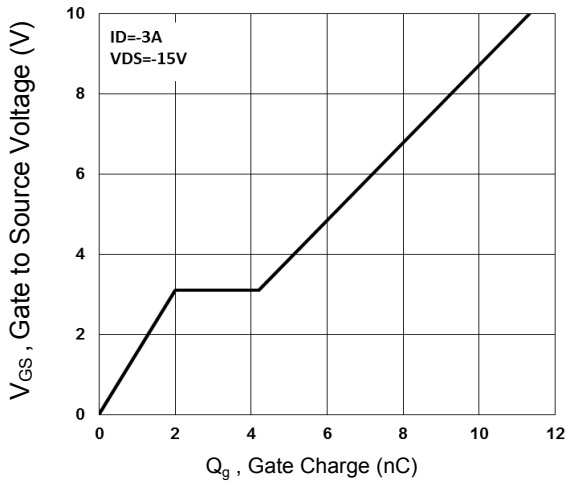
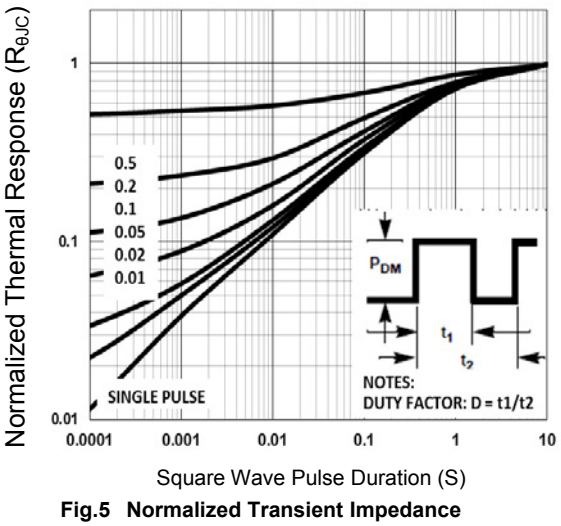


Fig.4 Gate Charge Characteristics



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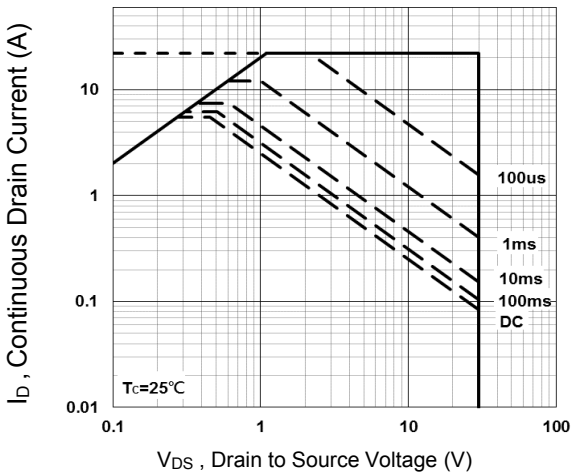
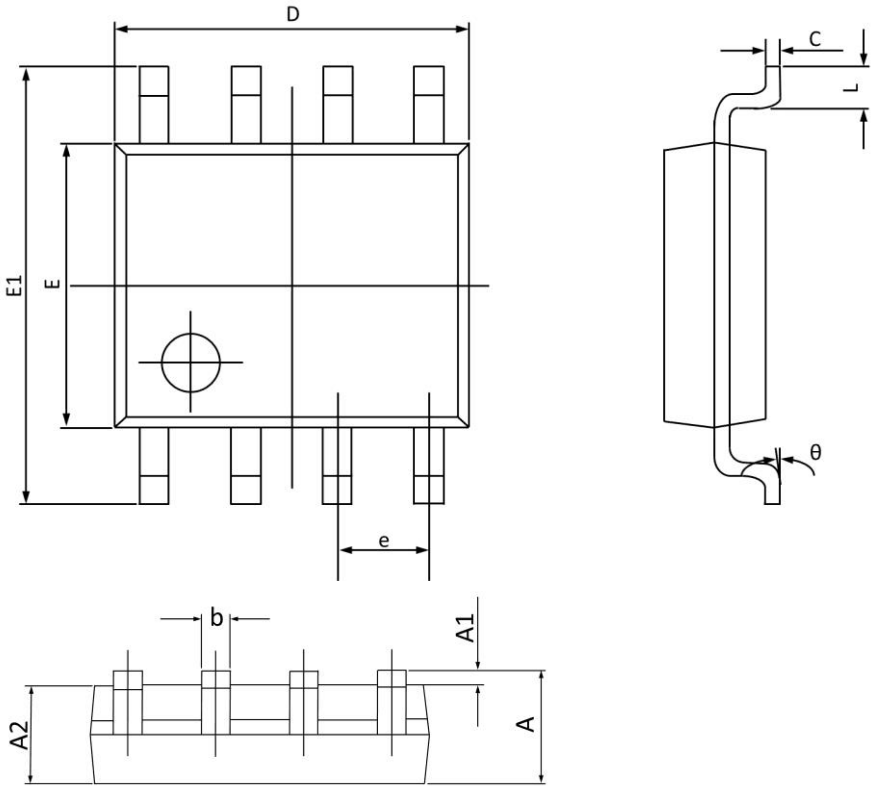


Fig.6 Maximum Safe Operation Area

Package Outline Dimensions SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.750	1.350	0.069	0.053
A1	0.250	0.100	0.010	0.004
A2	1.500	1.300	0.059	0.051
b	0.490	0.350	0.019	0.014
C	0.260	0.190	0.010	0.007
D	5.100	4.700	0.201	0.185
E	4.100	3.700	0.161	0.146
E1	6.200	5.800	0.244	0.228
e	1.27BSC		0.05BSC	
L	0.900	0.400	0.035	0.016
θ	8°	0°	8°	0°