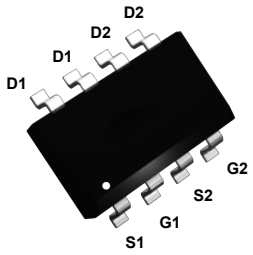
GOOD-ARK
SEMICONDUCTOR

SSFQ3712

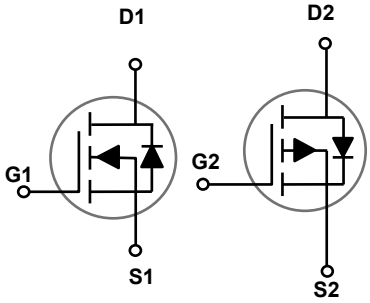
30V N-Channel + P-Channel Complementary MOSFET

Main Product Characteristics

Channel	N-Channel	P-Channel
BV_{DSS}	30V	-30V
$R_{DS(ON)}$	20mΩ (Max.)	50mΩ (Max.)
I_D	8A	-5.5A



SOP-8



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		Units
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Drain Current-Continuous (T_A=25°C)	I_D	8	-5.5	A
Drain Current-Continuous (T_A=70°C)		6.4	-4.4	A
Drain Current-Pulsed[1,5]	I_{DM}	32	-22	A
Single Pulse Avalanche Energy[2,6]	E_{AS}	14	5	mJ
Single Pulse Avalanched Current[2]	I_{AS}	17	10	A
Power Dissipation (T_A=25°C)	P_D	2		W
Power Dissipation-Derate above 25°C		0.016		W/°C
Max. Thermal Resistance Junction to Ambient	$R_{\theta JA}$	62.5		°C/W
Storage Temperature Range	T_{STG}	-55 to +150		°C
Operating Junction Temperature Range	T_J	-55 to +150		°C

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On / 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
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 and Switching 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 Ratings and Characteristics						
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
Reverse Recovery Time	t_{rr}	V_R=30V, I_S=4A, di/dt=100A/μs, T_J=25°C	-	110	-	nS
Reverse Recovery Charge	Q_{rr}		-	145	-	nC

Notes:

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
On / Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250uA	-30	-	-	V
BV_{DSS} Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	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
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 and Switching Characteristics						
Total Gate Charge[7,8]	Q_g	V_{DS}=-15V, V_{GS}=-4.5V, ID=-3A	-	5.1	7	nC
Gate-Source Charge[7,8]	Q_{gs}		-	2	3	
Gate-Drain Charge[7,8]	Q_{gd}		-	2.2	4	
Turn-On Delay Time[7,8]	$t_{d(on)}$	V_{DD}=-15V, V_{GS}=-10V, R_G=6Ω, I_D=-1A	-	3.4	6	nS
Rise Time[7,8]	t_r		-	10.8	21	
Turn-Off Delay Time[7,8]	$t_{d(off)}$		-	26.9	51	
Fall Time[7,8]	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 Ratings and Characteristics						
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
Reverse Recovery Time	t_{rr}	V_R=-30V, I_S=-3A, di/dt=100A/μs, T_J=25°C	-	155	-	nS
Reverse Recovery Charge	Q_{rr}		-	250	-	nC

Notes:

5. Repetitive rating: Pulsed width limited by maximum junction temperature.
6. V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-10A, R_G=25Ω, starting T_J=25°C.
7. The data tested by pulsed, pulse width ≤ 300uS, duty cycle ≤ 2%.
8. Essentially independent of operating temperature.

N-Channel Typical Electrical and Thermal Characteristic Curves

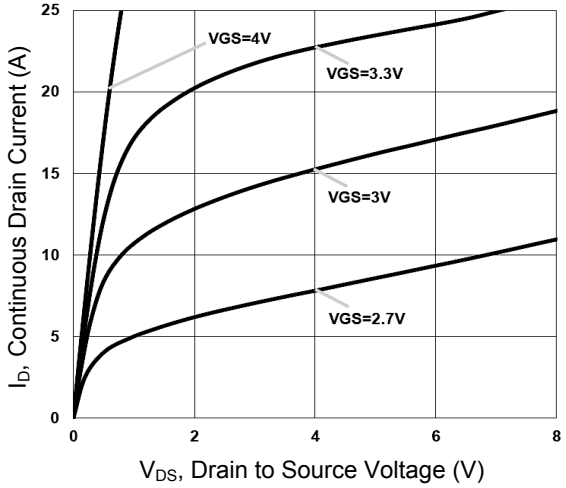


Figure 1. Typical Output Characteristics

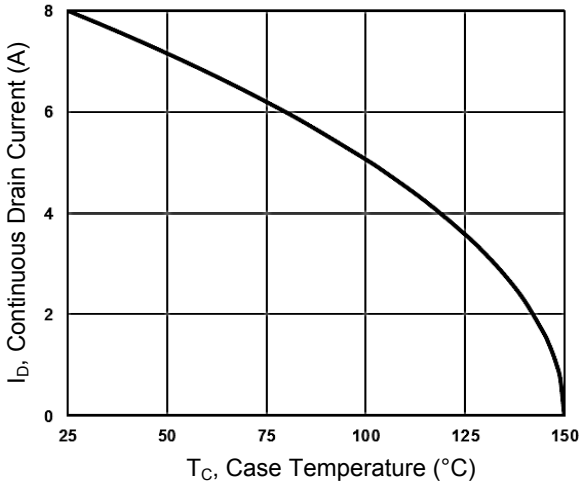


Figure 2. Continuous Drain Current vs. T_C

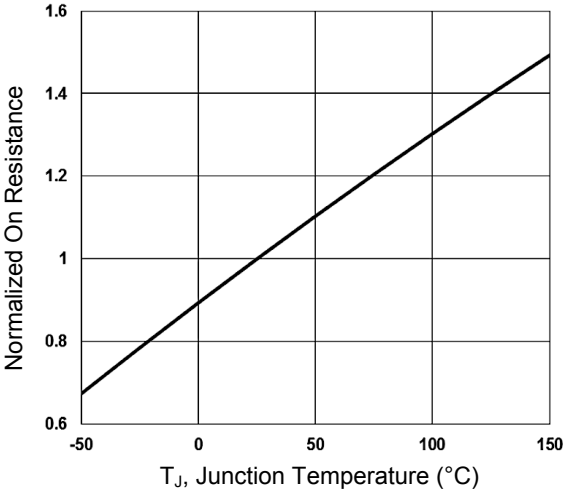


Figure 3. Normalized $R_{DS(ON)}$ vs. T_J

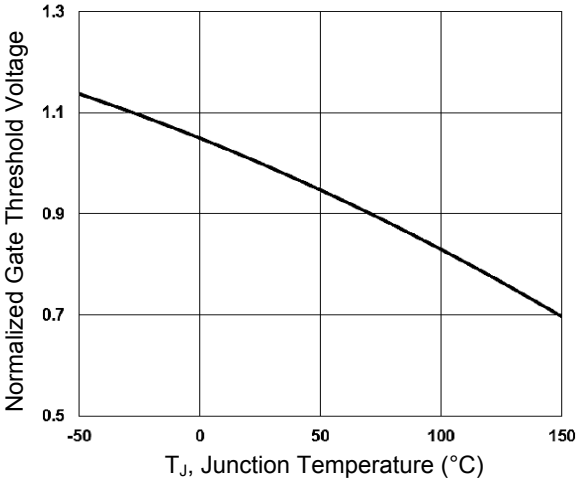


Figure 4. Normalized V_{th} vs. T_J

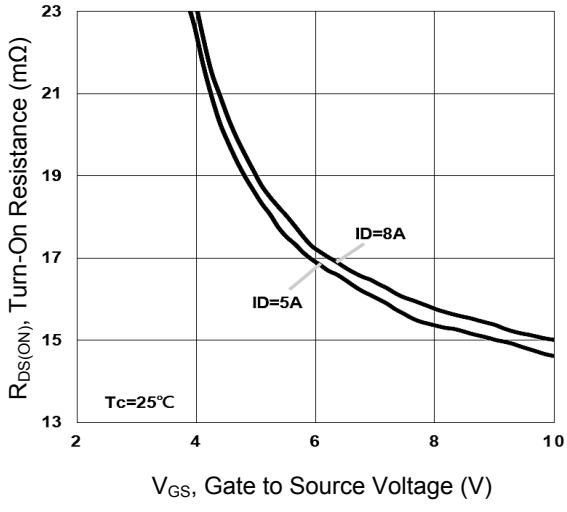


Figure 5. Turn-On Resistance vs. V_{GS}

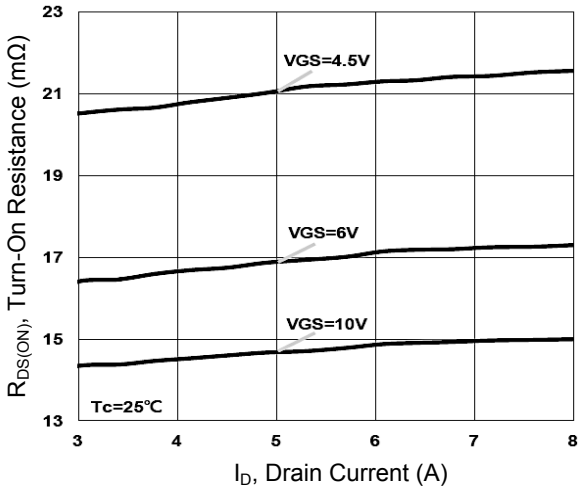


Figure 6. Turn-On Resistance vs. I_D

N-Channel Typical Electrical and Thermal Characteristic Curves

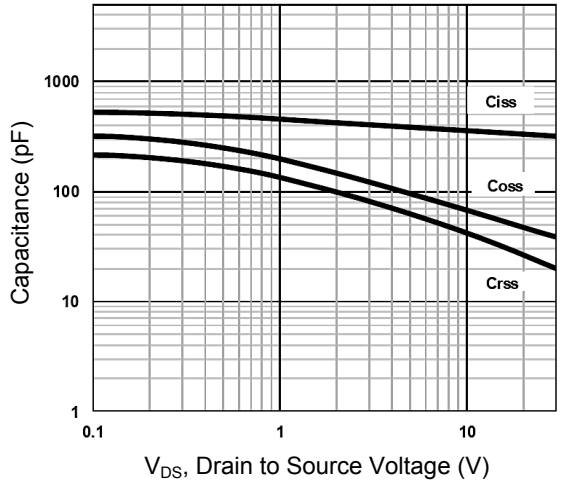


Figure 7. Capacitance Characteristics

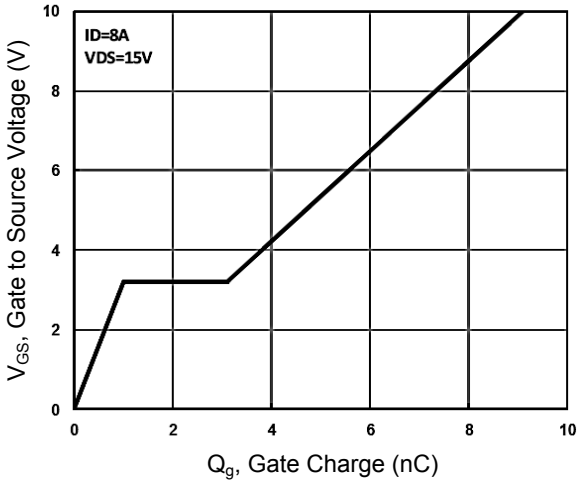


Figure 8. Gate Charge Characteristics

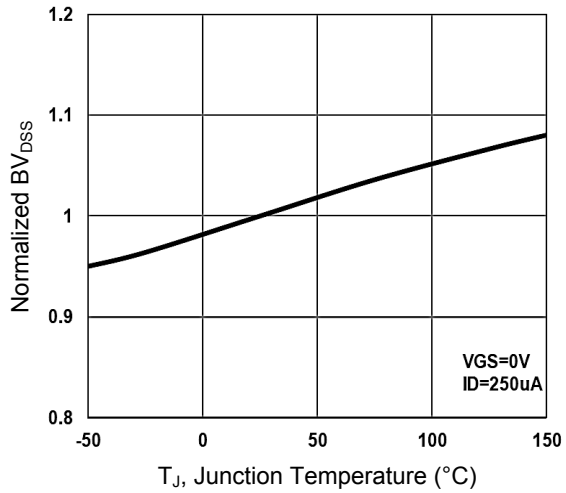


Figure 9. Normalized BV_{DSS} vs. T_J

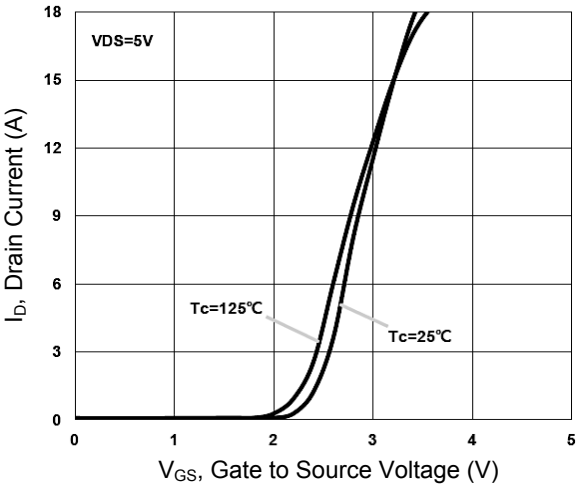


Figure 10. Transfer Characteristics

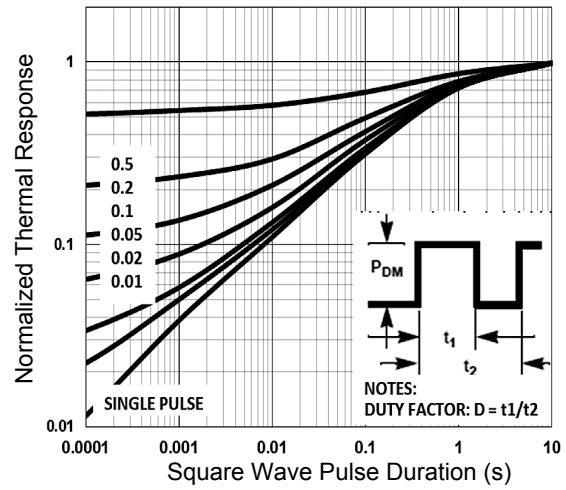


Figure 11. Normalized Transient Impedance

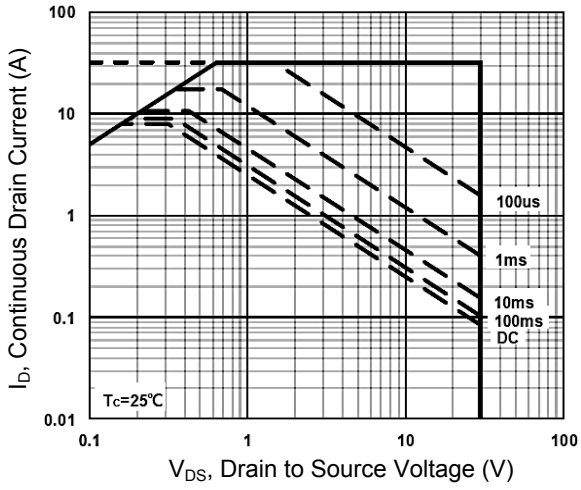


Figure 12. Maximum Safe Operation Area

P-Channel Typical Electrical and Thermal Characteristic Curves

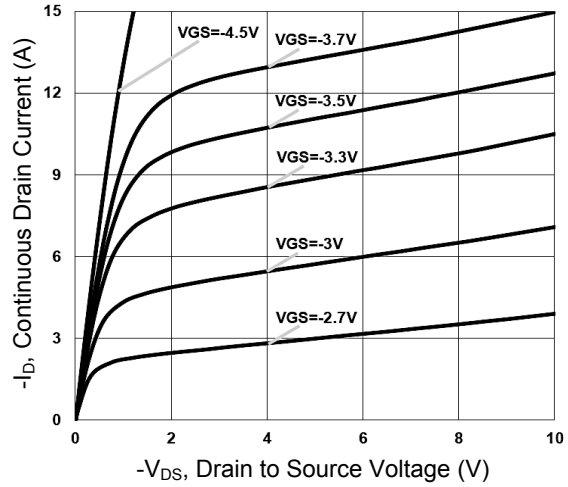


Figure 1. Typical Output Characteristics

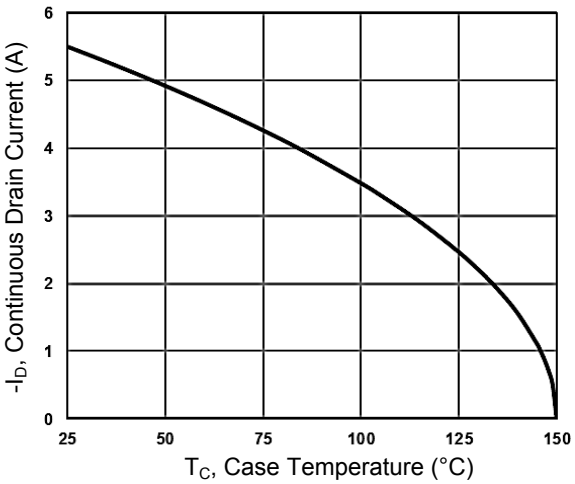


Figure 2. Continuous Drain Current vs. T_C

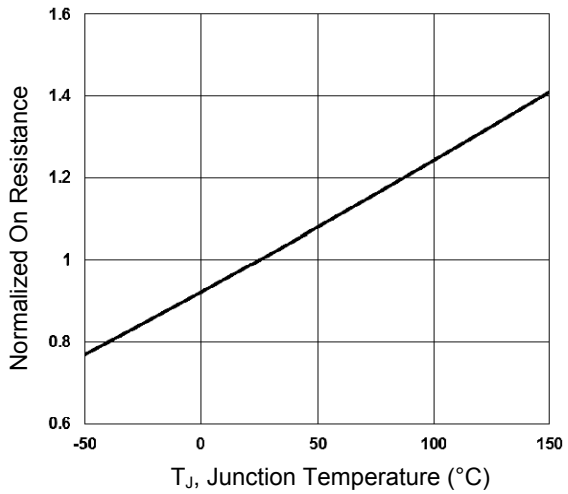


Figure 3. Normalized $R_{DS(ON)}$ vs. T_J

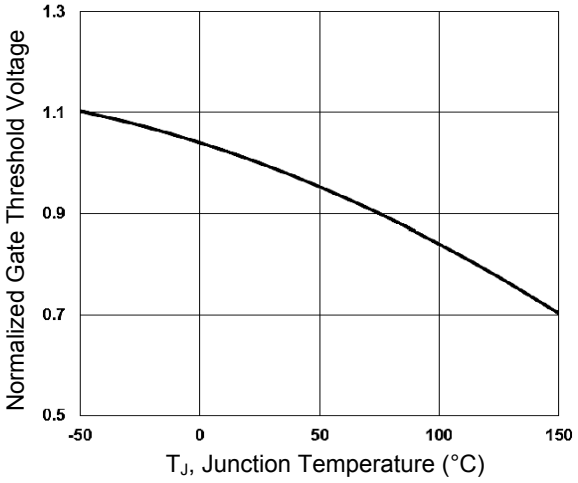


Figure 4. Normalized V_{th} vs. T_J

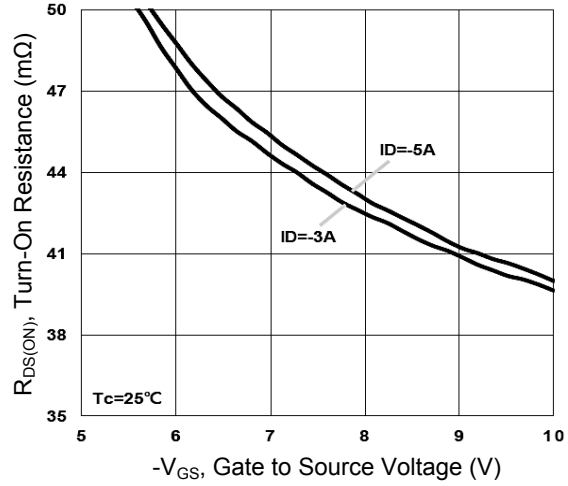


Figure 5. Turn-On Resistance vs. V_{GS}

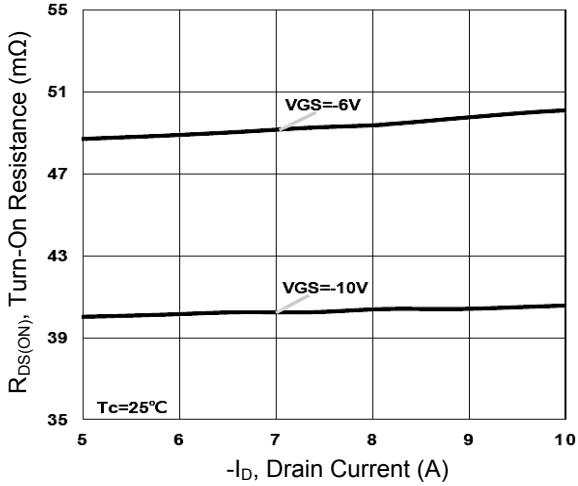


Figure 6. Turn-On Resistance vs. I_D

P-Channel Typical Electrical and Thermal Characteristic Curves

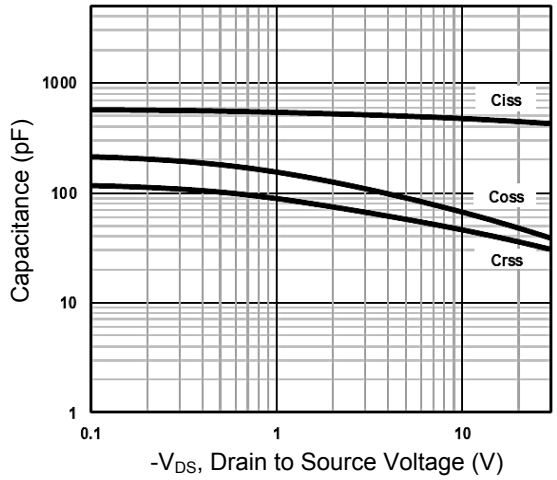


Figure 7. Capacitance Characteristics

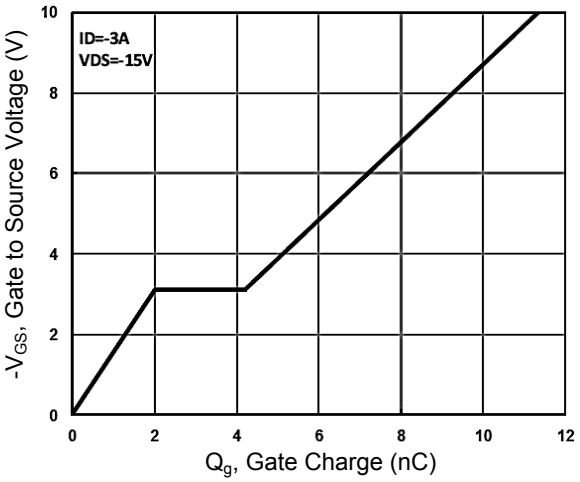


Figure 8. Gate Charge Characteristics

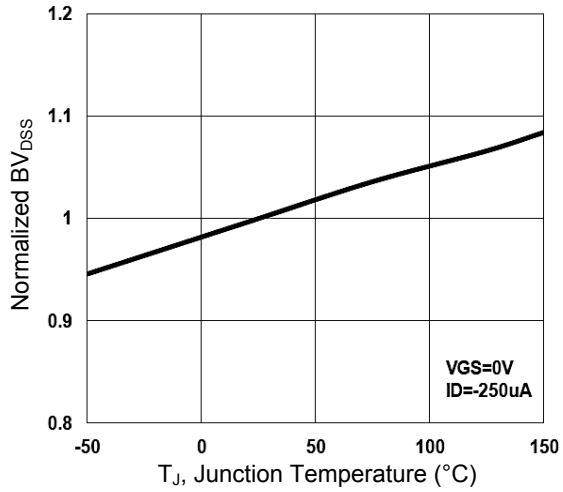


Figure 9. Normalized BV_{DSS} vs. T_J

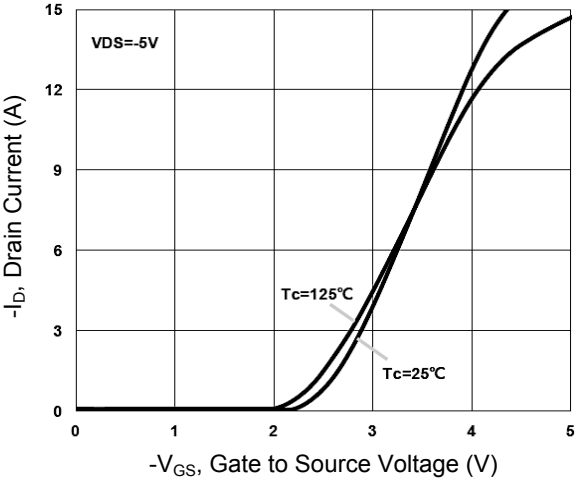


Figure 10. Transfer Characteristics

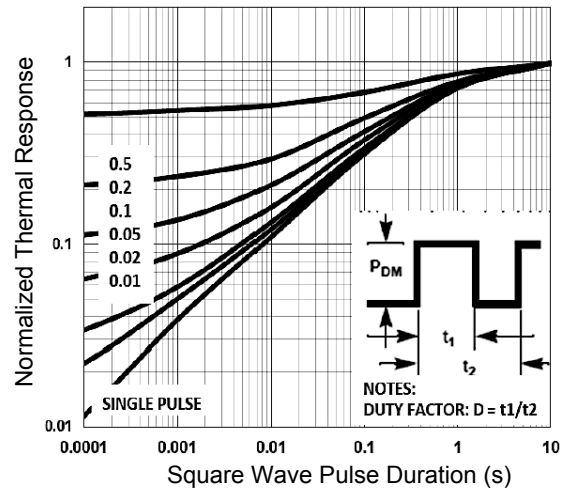


Figure 11. Normalized Transient Impedance

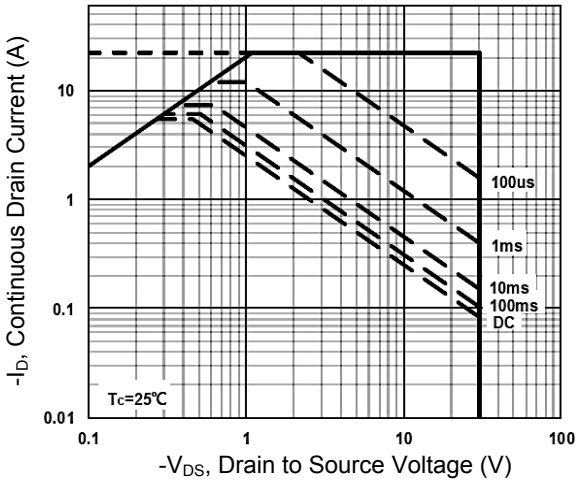
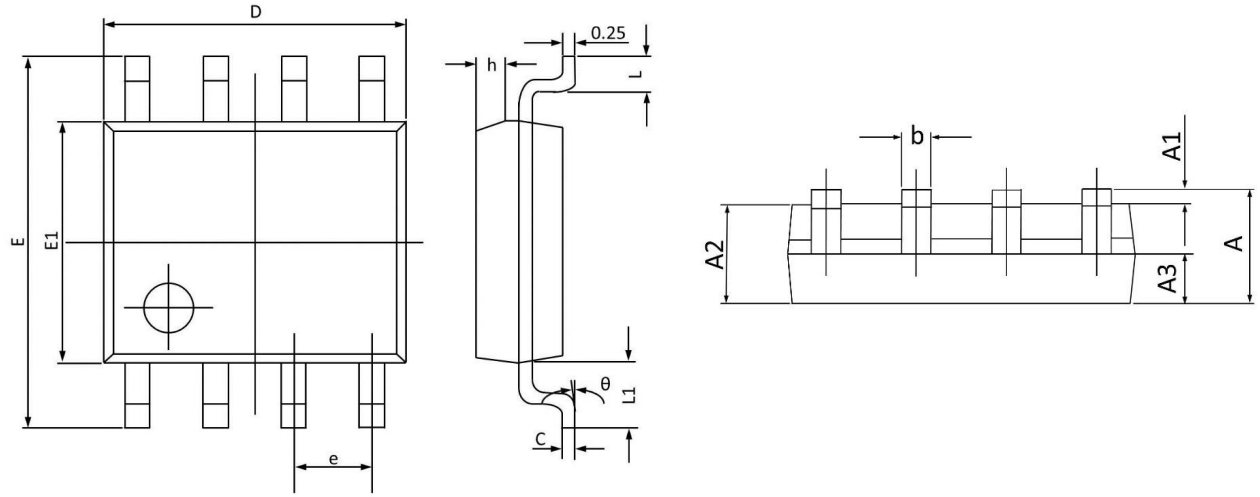


Figure 12. Maximum Safe Operation Area

Package Outline Dimensions (SOP-8)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.800	0.053	0.069
A1	0.050	0.250	0.002	0.010
A2	1.250	1.650	0.049	0.065
A3	0.500	0.700	0.020	0.028
b	0.300	0.510	0.012	0.020
C	0.150	0.260	0.006	0.010
D	4.700	5.100	0.185	0.201
E	5.800	6.200	0.228	0.244
E1	3.700	4.100	0.146	0.161
e	1.270 BSC		0.050 BSC	
h	0.250	0.500	0.010	0.020
L	0.400	1.000	0.016	0.039
L1	1.050 BSC		0.041 BSC	
θ	0°	8°	0°	8°

Order Information

Device	Package	Marking	Carrier	Quantity
SSFQ3712	SOP-8	DS3712	Tape & Reel	3,000 Pcs / Reel