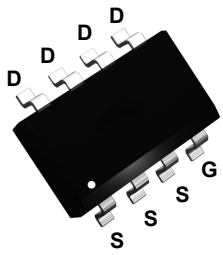
GOOD-ARK SEMICONDUCTOR

GSFQ4013

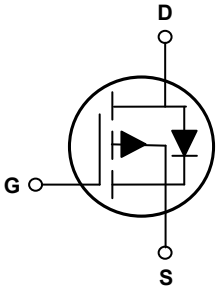
40V P-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	-40V
$R_{DS(ON)}$	13mΩ (Max.)
I_D	-11A



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

Description

The GSFQ4013 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 supplies and a wide variety of other applications.

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_C=25°C), V_{GS}=10V[1]	I_D	-11	A
Drain Current-Continuous (T_C=100°C), V_{GS}=10V[1]		-8	A
Drain Current-Pulsed[2]	I_{DM}	-44	A
Pulsed Source Current (Body Diode)[2]	I_{SM}	-44	A
Maximum Power Dissipation (T_C=25°C)[3]	P_D	2.5	W
Single Pulse Avalanche Energy (L=0.3mH)	E_{AS}	100	mJ
Single Pulse Avalanche Current (L=0.3mH)	I_{AS}	-20	A
Thermal Resistance, Junction-to-Ambient (t ≤10s)[4]	$R_{\theta JA}$	50	°C/W
Operating Junction Temperature Range	T_J	-55 To +150	°C
Storage Temperature Range	T_{STG}	-55 To +150	°C

Electrical Characteristics (T_A=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	-40	-	-	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=-40V, V_{GS}=0V	-	-	-1	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=-250uA	-1.0	-1.6	-2.5	V
Drain Static-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-8A	-	10	13	mΩ
		V_{GS}=-4.5V, I_D=-5A	-	13.6	20	mΩ
Dynamic and Switching Characteristics						
Total Gate Charge	Q_g	V_{DD}=-20V, I_D=-11A, V_{GS}=-10V	-	36	-	nC
Gate-Source Charge	Q_{gs}		-	6.3	-	
Gate-Drain Charge	Q_{gd}		-	7.2	-	
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=-20V, R_{GEN}=2.5Ω, V_{GS}=-10V, I_D=-11A	-	11	-	nS
Rise Time	t_r		-	21	-	
Turn-Off Delay Time	$t_{d(off)}$		-	50	-	
Fall Time	t_f		-	28	-	
Input Capacitance	C_{iss}	V_{DS}=-20V, V_{GS}=0V, F=1MHz	-	2103	-	pF
Output Capacitance	C_{oss}		-	282	-	
Reverse Transfer Capacitance	C_{rss}		-	232	-	
Drain-Source Ratings and Characteristics						
Maximum Body-Diode Continuous Current	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	-11	A
Maximum Body-Diode Pulse Current	I_{SM}		-	-	-44	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=-11A, T_J=25°C	-	-	-1.2	V
Reverse Recovery Time	t_{rr}	I_F=-11A, di/dt=100A/μs, T_J=25°C	-	35	-	nS
Reverse Recovery Charge	Q_{rr}		-	40	-	nC

Note:
1. Calculated continuous current based on maximum allowable junction temperature.
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 1 in^2 FR-4 board with 2oz. copper, in a still air environment with T_A=25°C.

Typical Electrical and Thermal Characteristic Curves

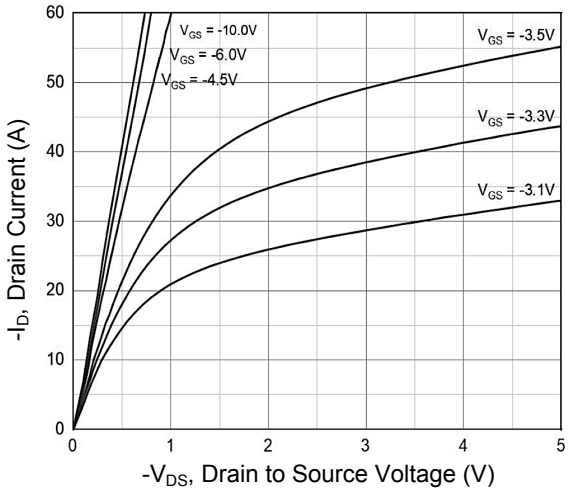


Figure 1. Output Characteristics

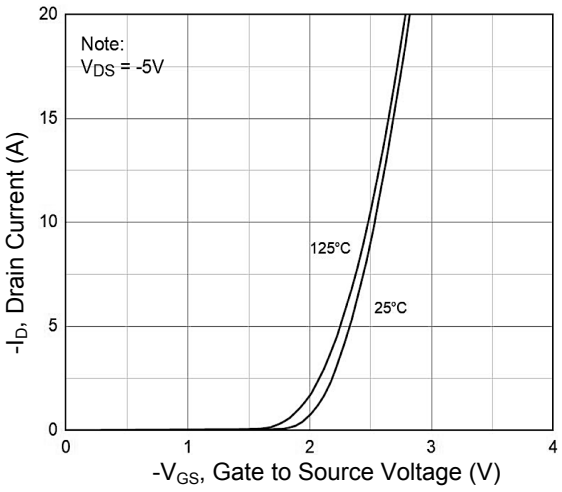


Figure 2. Typical Transfer Characteristics

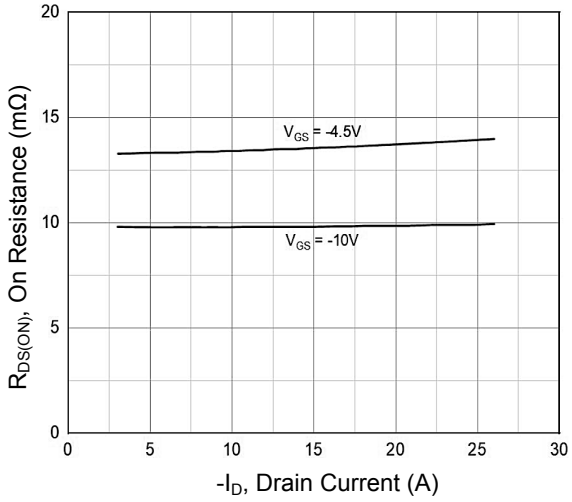


Figure 3. $R_{DS(ON)}$ vs. I_D

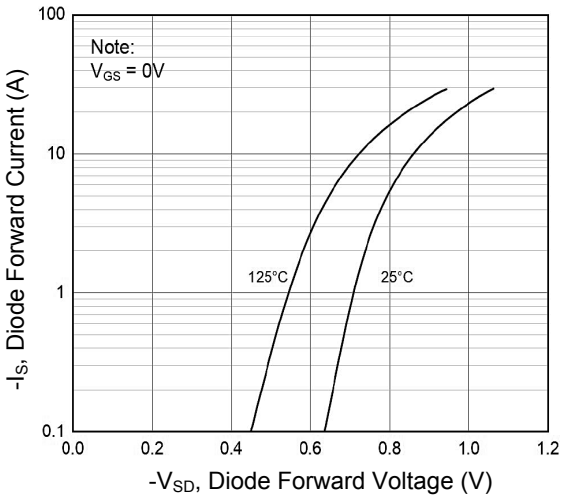


Figure 4. Body Diode Characteristics

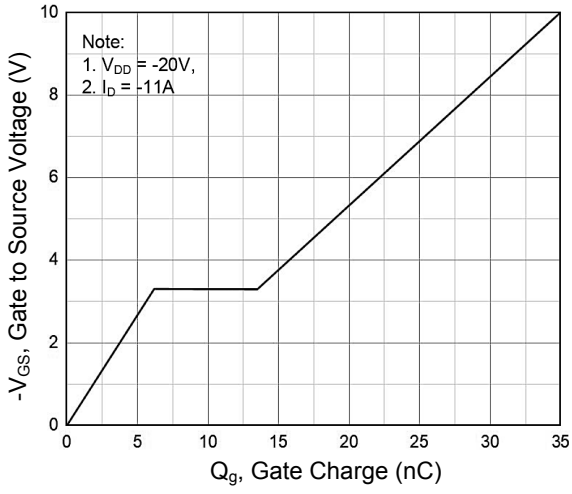


Figure 5. Gate Charge Characteristics

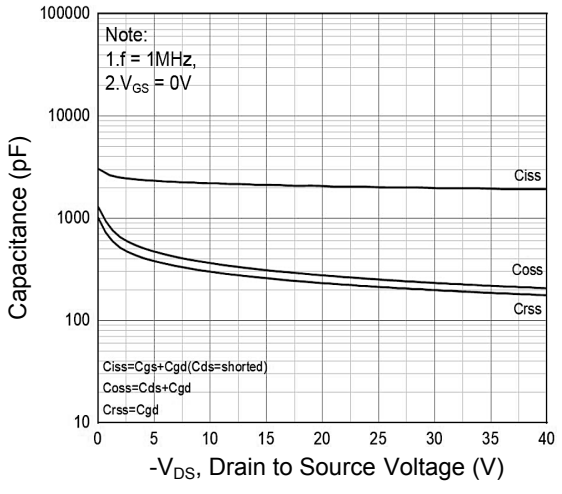


Figure 6. Capacitance Characteristics

Typical Electrical and Thermal Characteristic Curves

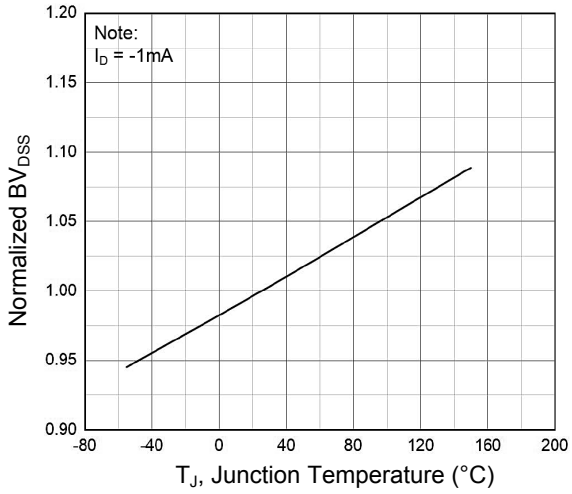


Figure 7. Normalized BV_{DSS} vs. T_J

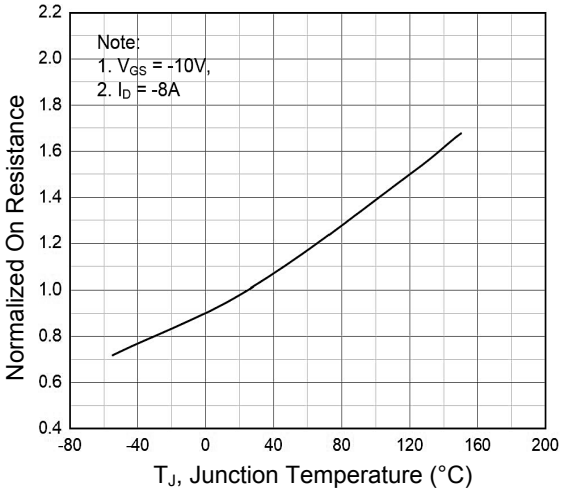


Figure 8. Normalized $R_{DS(ON)}$ vs. T_J

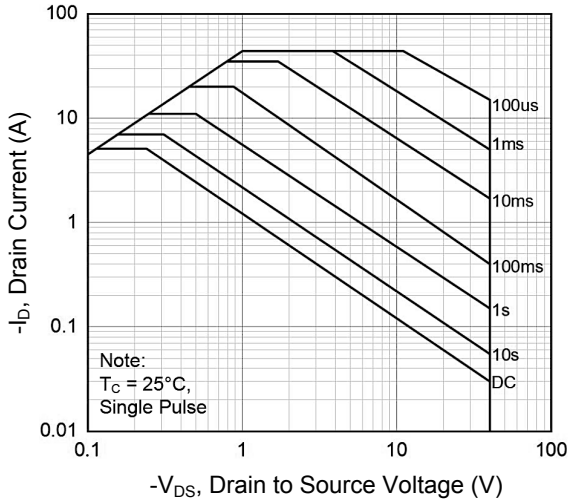


Figure 9. Safe Operating Area

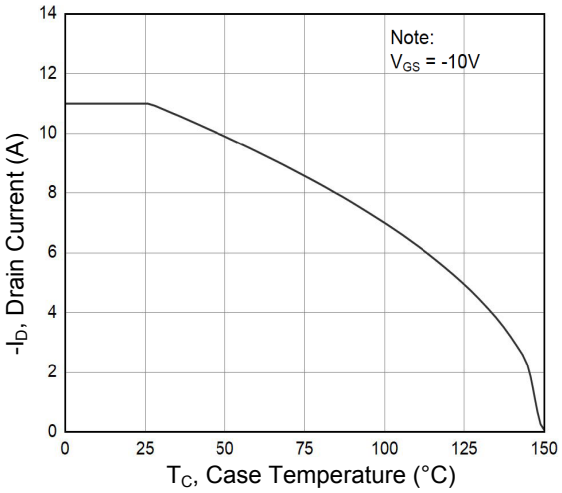


Figure 10. I_D vs. T_C

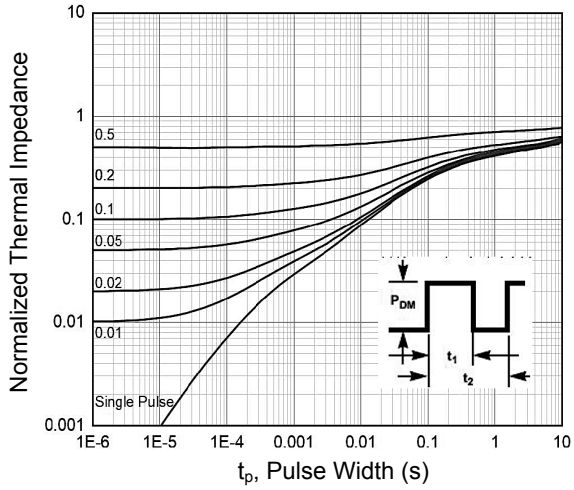


Figure 11. Transient Thermal Impedance vs. t_p

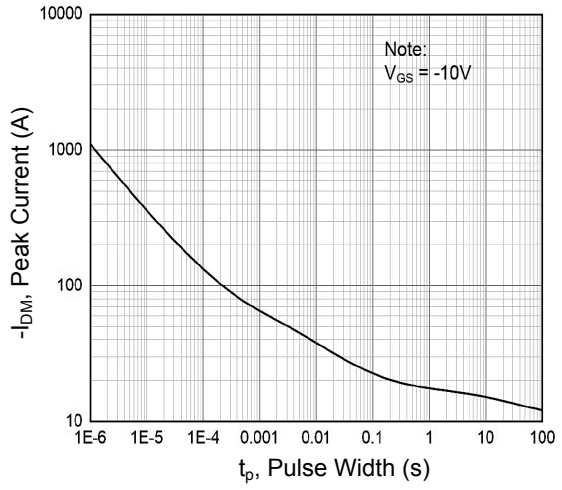
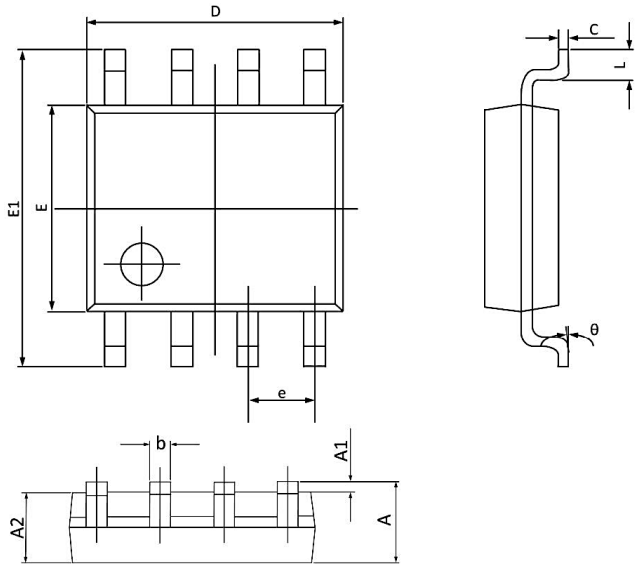


Figure 12. Peak Current Capacity

Package Outline Dimensions (SOP-8)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.30	1.50	0.051	0.059
b	0.35	0.49	0.014	0.019
C	0.19	0.26	0.007	0.010
D	4.70	5.10	0.185	0.201
E	3.70	4.10	0.146	0.161
E1	5.80	6.20	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.40	0.90	0.016	0.035
θ	0°	8°	0°	8°

Order Information

Device	Package	Marking	Packaging	SPQ
GSFQ4013	SOP-8	Q4013	Tape & Reel	3,000 Pcs / Reel