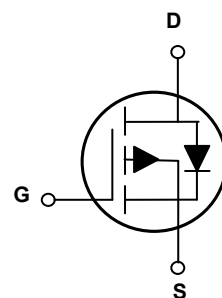
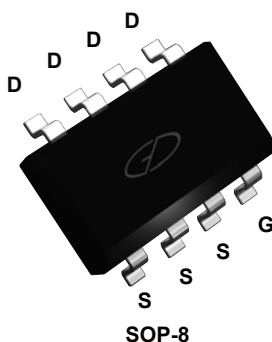


## Main Product Characteristics

$BV_{DSS}$	-30V
$R_{DS(ON)}$	10.8mΩ
$I_D$	-10A



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 GSFQ0309 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 ( $T_C=25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	±20	V
Drain Current-Continuous ( $T_A=25^{\circ}C$ )	$I_D$	-10	A
Drain Current-Continuous ( $T_A=70^{\circ}C$ )		-8	A
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	-40	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	125	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	50	A
Power Dissipation ( $T_A=25^{\circ}C$ )	$P_D$	2	W
Power Dissipation-Derate Above 25°C		0.016	W/°C
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

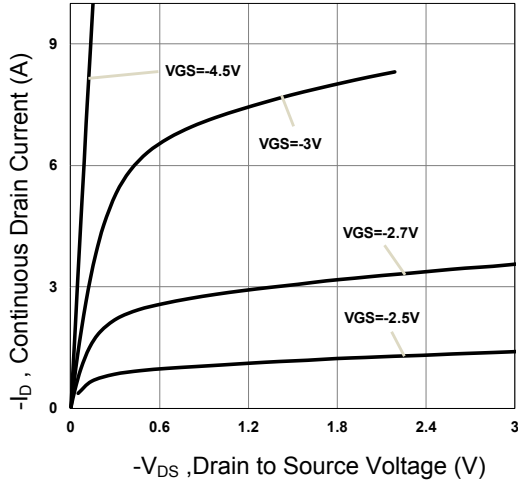
**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-30V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	-	-	-1	$\mu A$
		$V_{DS}=-24V, V_{GS}=0V, T_J=125^{\circ}\text{C}$	-	-	-10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-15A$	-	9	10.8	$m\Omega$
		$V_{GS}=-4.5V, I_D=-10A$	-	14	18	$m\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.2	-1.6	-2.5	V
Forward Transconductance	$g_{fs}$	$V_{DS}=-10V, I_D=-3A$	-	11	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=-15V, I_D=-5A, V_{GS}=-10V$	-	34	50	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		-	5.2	7.8	
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		-	7.9	12	
Turn-On Delay Time <sup>3,4</sup>	$t_{d(on)}$	$V_{DD}=-15V, R_G=6\Omega, V_{GS}=-10V, I_D=-5A$	-	20	30	nS
Rise Time <sup>3,4</sup>	$t_r$		-	15	22	
Turn-Off Delay Time <sup>3,4</sup>	$t_{d(off)}$		-	40	60	
Fall Time <sup>3,4</sup>	$t_f$		-	30	45	
Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V, F=1\text{MHz}$	-	2020	3000	pF
Output Capacitance	$C_{oss}$		-	305	460	
Reverse Transfer Capacitance	$C_{rss}$		-	245	370	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V, \text{Force Current}$	-	-	-10	A
Pulsed Source Current	$I_{SM}$		-	-	-20	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=-1A, T_J=25^{\circ}\text{C}$	-	-	-1	V
Reverse Recovery Time	$T_{rr}$	$V_R=-30V, I_R=-10A, di/dt=100A/\mu s, T_J=25^{\circ}\text{C}$	-	80	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	170	-	nC

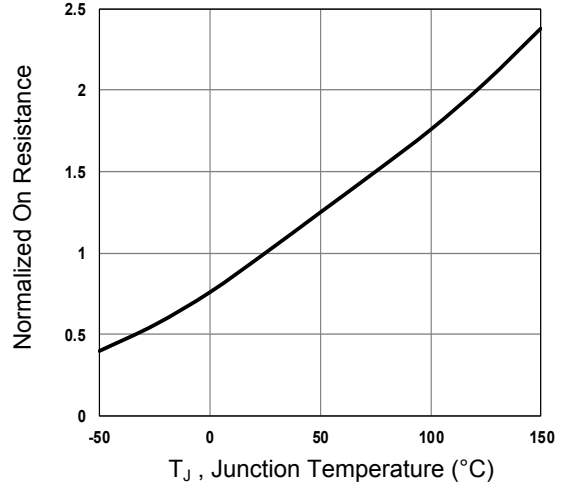
Notes:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=50A, R_G=25\Omega$ , starting  $T_J=25^{\circ}\text{C}$ .
3. Pluse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operation temperature.

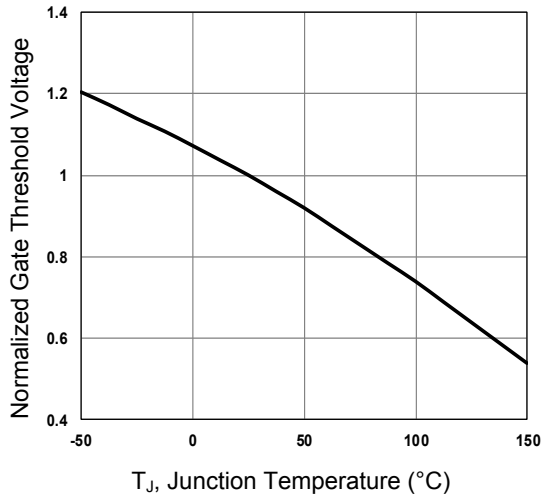
## Typical Electrical and Thermal Characteristic Curves



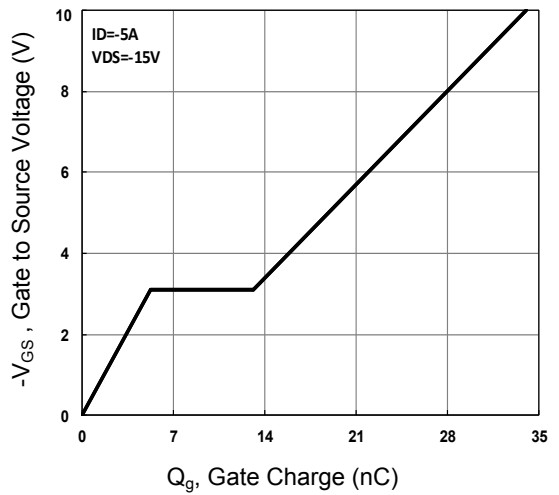
**Fig.1 Typical Output Characteristics**



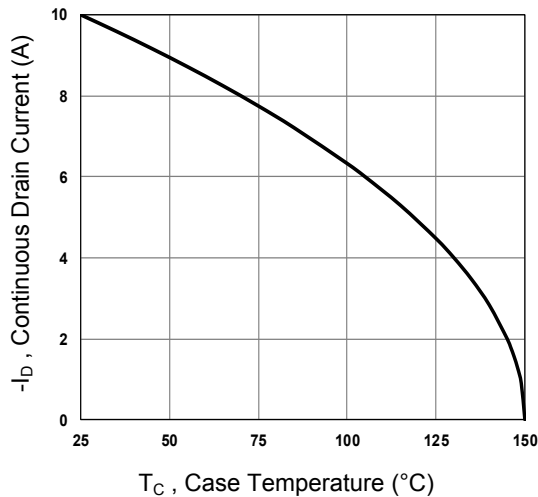
**Fig.2 Normalized  $R_{DS(ON)}$  vs.  $T_J$**



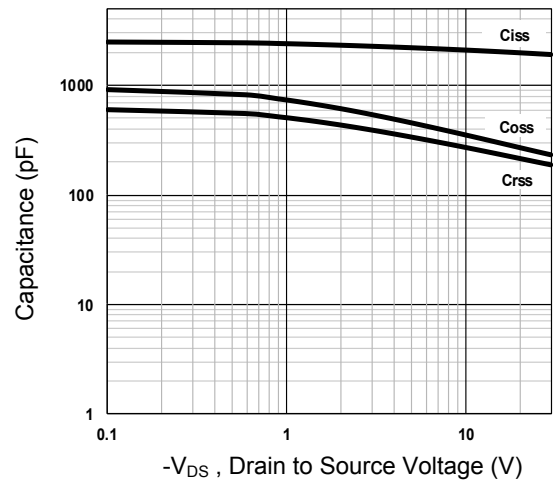
**Fig.3 Normalized  $V_{th}$  vs.  $T_J$**



**Fig.4 Gate Charge Waveform**

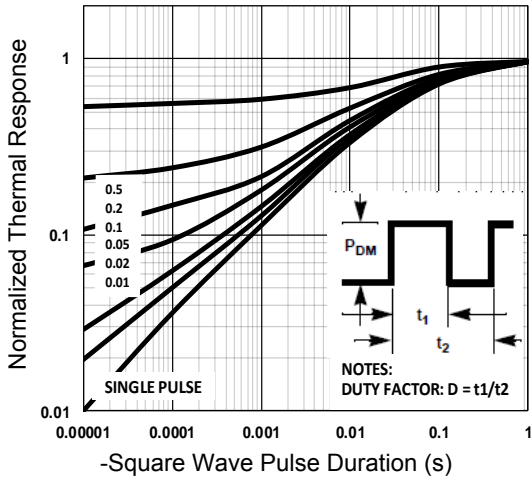


**Fig.5 Continuous Drain Current vs.  $T_C$**

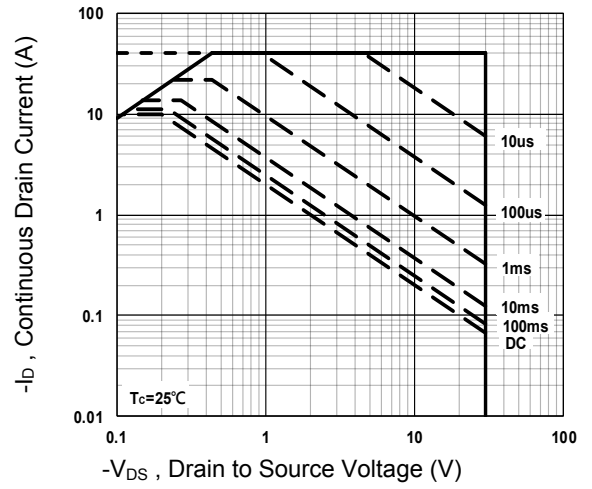


**Fig.6 Capacitance Characteristics**

## Typical Electrical and Thermal Characteristic Curves

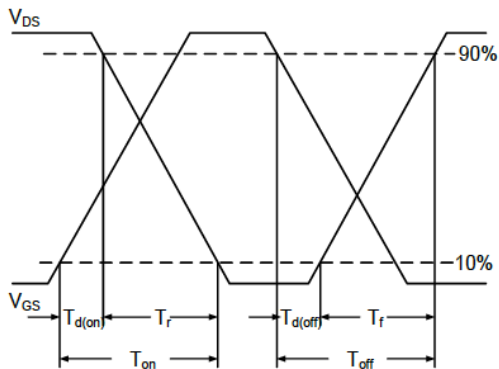


**Fig.7 Normalized Transient Impedance**

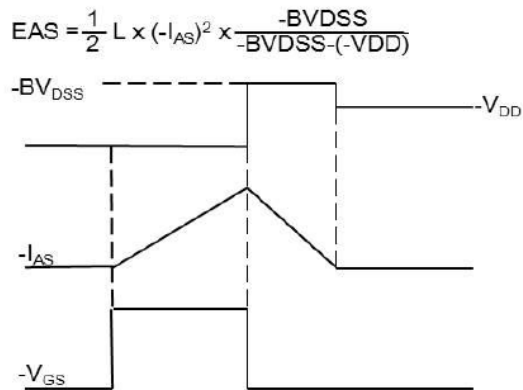


**Fig.8 Maximum Safe Operation Area**

**Typical Electrical and Thermal Characteristic Curves**



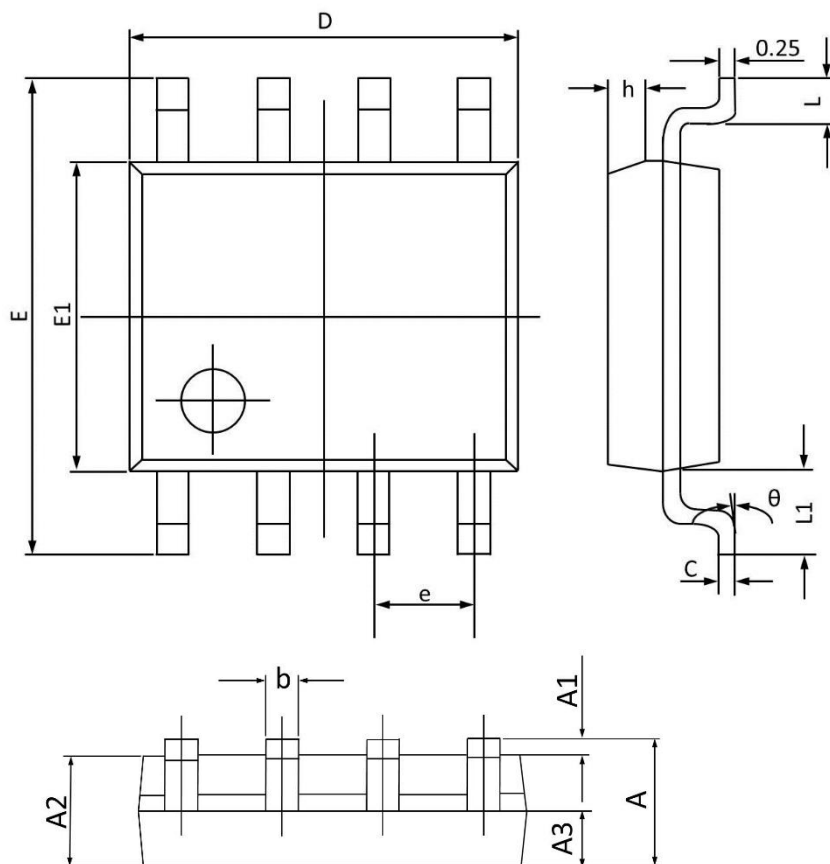
**Fig.9 Switching Time Waveform**



**Fig.10 EAS Waveform**

**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)	
theta	0°	8°	0°	8°