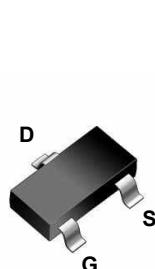
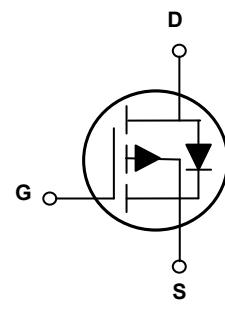


## Main Product Characteristics

BV <sub>DSS</sub>	-30V
R <sub>DS(ON)</sub>	32mΩ
I <sub>D</sub>	-5.1A



SOT-23



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 GSF3909 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 ( $T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Typ	Unit
Drain-Source Voltage	V <sub>DS</sub>	-30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Drain Current-Continuous( $T_C=25^\circ\text{C}$ )	I <sub>D</sub>	-5.1	A
Drain Current-Continuous( $T_C=100^\circ\text{C}$ )		-3.2	A
Drain Current-Pulsed <sup>1</sup>	I <sub>DM</sub>	-20.4	A
Single Pulse Avalanche Energy <sup>2</sup>	EAS	39.2	mJ
Single Pulse Avalanche Current <sup>2</sup>	I <sub>AS</sub>	28	A
Power Dissipation( $T_C=25^\circ\text{C}$ )	P <sub>D</sub>	1.56	W
Power Dissipation-Derate Above 25°C		0.012	W/°C
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	125	°C/W
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	80	°C/W
Storage Temperature Range	T <sub>STG</sub>	-55 To +150	°C
Operating Junction Temperature Range	T <sub>J</sub>	-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	$\text{BV}_{\text{DSS}}$	$V_{\text{GS}}=0\text{V}$ $I_D=-250\mu\text{A}$	-30	-	-	V
$\text{BV}_{\text{DSS}}$ Temperature Coefficient	$\Delta \text{BV}_{\text{DSS}}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=-1\text{mA}$	-	-0.03	-	$\text{V}/^\circ\text{C}$
Drain-Source Leakage Current	$I_{\text{DSS}}$	$V_{\text{DS}}=-30\text{V}$ , $V_{\text{GS}}=0\text{V}$ , $T_J=25^\circ\text{C}$	-	-	-1	$\mu\text{A}$
		$V_{\text{DS}}=-24\text{V}$ , $V_{\text{GS}}=0\text{V}$ , $T_J=125^\circ\text{C}$	-	-	-10	$\mu\text{A}$
Gate-Source Leakage Current	$I_{\text{GSS}}$	$V_{\text{GS}}=\pm 20\text{V}$ , $V_{\text{DS}}=0\text{V}$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}}=V_{\text{GS}}$ , $I_D=-250\mu\text{A}$	-1.2	-1.6	-2.2	V
$V_{\text{GS}(\text{th})}$ Temperature Coefficient	$\Delta V_{\text{GS}(\text{th})}$		-	4	-	$\text{mV}/^\circ\text{C}$
Static Drain-Source On-State Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=-10\text{V}$ , $I_D=-4\text{A}$	-	27	32	$\text{m}\Omega$
		$V_{\text{GS}}=-4.5\text{V}$ , $I_D=-2\text{A}$	-	38	46	
Forward Transconductance	$g_{\text{FS}}$	$V_{\text{DS}}=-10\text{V}$ , $I_D=3\text{A}$	-	9	-	S
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}}=-15\text{V}$ , $V_{\text{GS}}=0\text{V}$ , $F=1.0\text{MHz}$	-	757	1280	PF
Output Capacitance	$C_{\text{oss}}$		-	122	210	PF
Reverse Transfer Capacitance	$C_{\text{rss}}$		-	88	175	PF
<b>Switching Characteristics</b>						
Total Gate Charge <sup>2,3</sup>	$Q_g$	$V_{\text{DS}}=-15\text{V}$ , $I_D=-5\text{A}$ , $V_{\text{GS}}=-4.5\text{V}$	-	8	15	nC
Gate-Source Charge <sup>2,3</sup>	$Q_{\text{gs}}$		-	3.3	6	nC
Gate-Drain Charge <sup>2,3</sup>	$Q_{\text{gd}}$		-	2.3	5	nC
Turn-On Delay Time <sup>2,3</sup>	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=-15\text{V}$ , $I_D=-1\text{A}$ , $V_{\text{GS}}=-10\text{V}$ , $R_G=6\Omega$	-	4.6	9	nS
Rise Time <sup>2,3</sup>	$t_r$		-	14	26	nS
Turn-Off Delay Time <sup>2,3</sup>	$t_{\text{d}(\text{off})}$		-	34	58	nS
Fall Time <sup>2,3</sup>	$t_f$		-	18	35	nS
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage	$V_{\text{SD}}$	$V_{\text{GS}}=0\text{V}$ , $I_S=-1\text{A}$ , $T_J=25^\circ\text{C}$	-	-	-1	V
Continuous Source Current	$I_S$	Force Current	-	-	-5.1	A
Pulsed Source Current	$I_{\text{SM}}$		-	-	-10.2	A

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width  $\leq 300\mu\text{s}$ , v.duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.

## Typical Electrical and Thermal Characteristic Curves

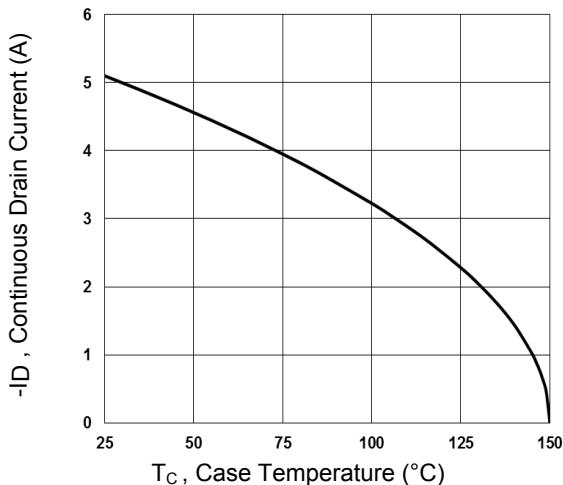


Figure 1. Continuous Drain Current vs. T<sub>c</sub>

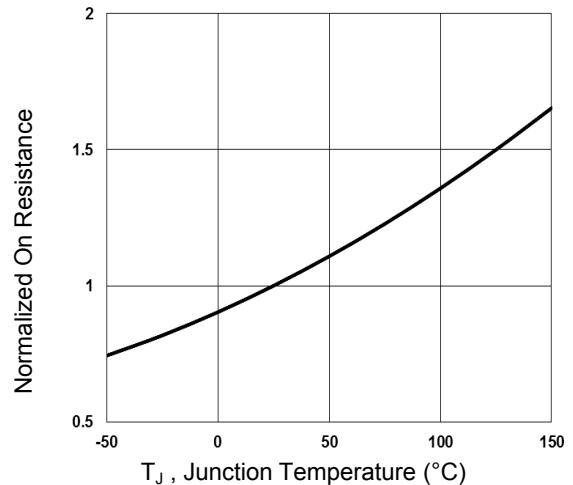


Figure 2. Normalized RDS(on) vs. T<sub>j</sub>

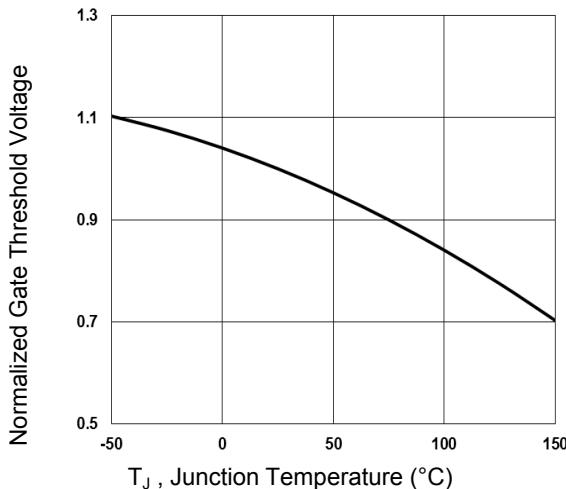


Figure 3. Normalized V<sub>th</sub> vs. T<sub>j</sub>

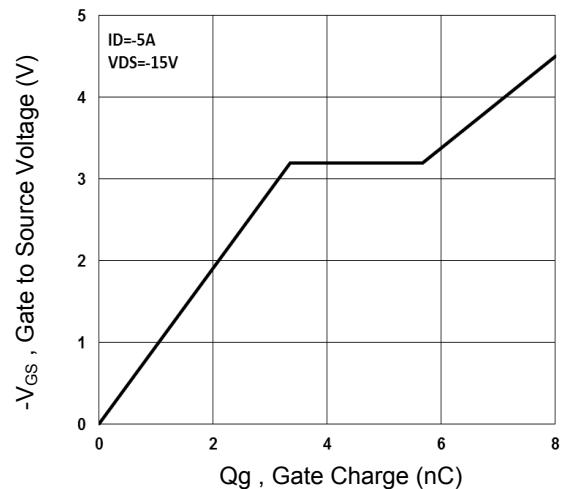


Figure 4. Gate Charge Waveform

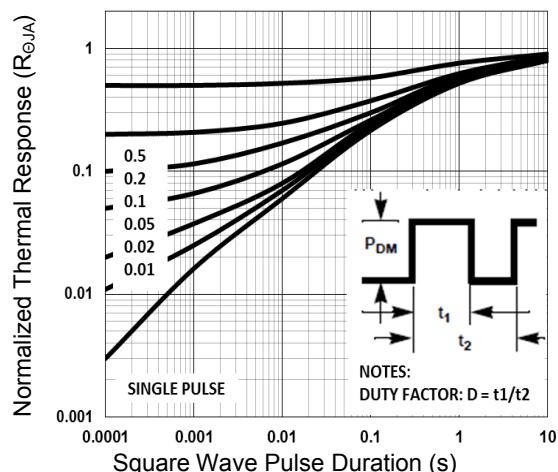


Figure 5. Normalized Transient Impedance

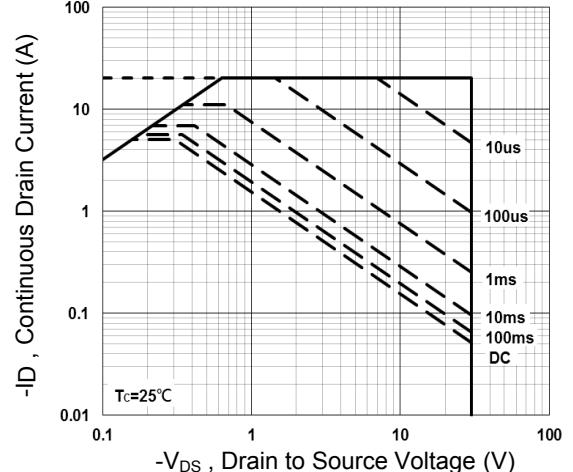


Figure 6. Maximum Safe Operation Area

## Typical Electrical and Thermal Characteristic Curves

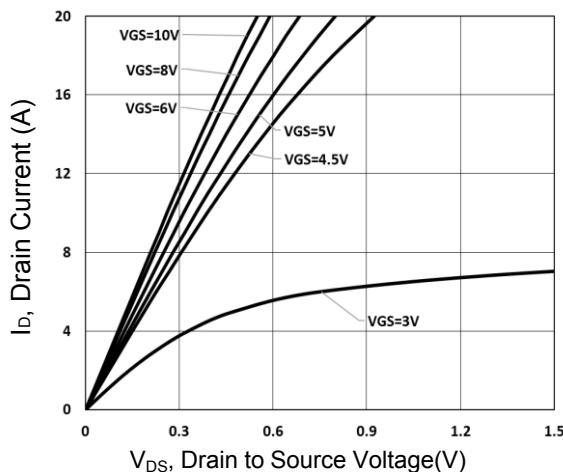


Figure 7. Typical Output Characteristics

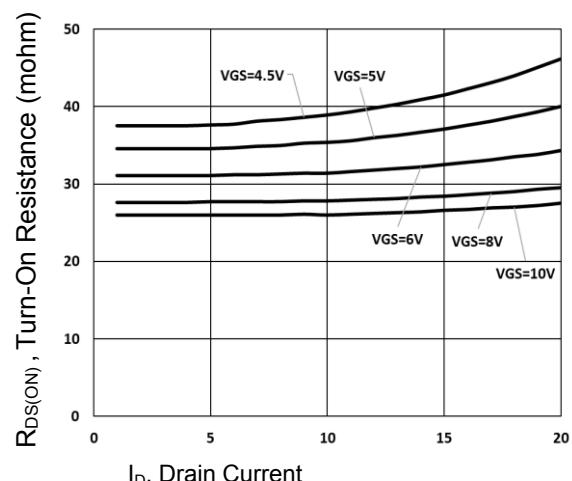


Figure 8. Turn-On Resistance vs.  $I_D$

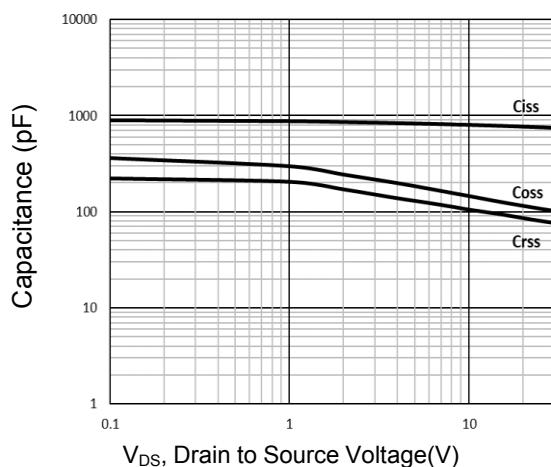


Figure 9. Capacitance Characteristics

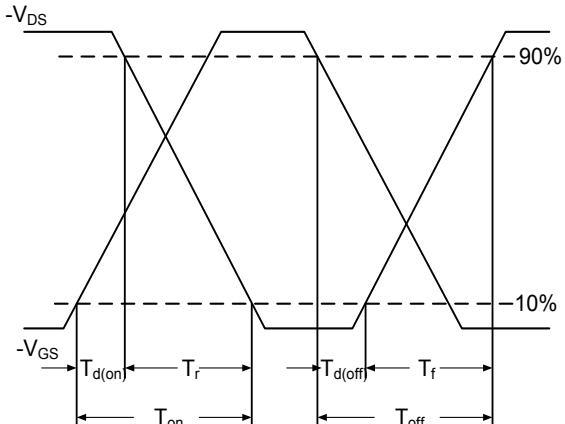


Figure 10. Switching Time Waveform

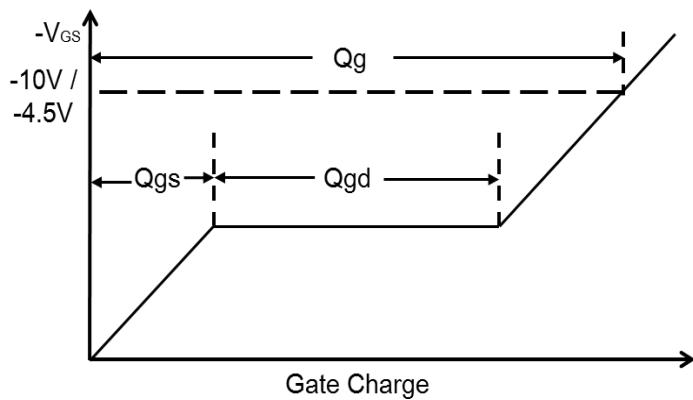
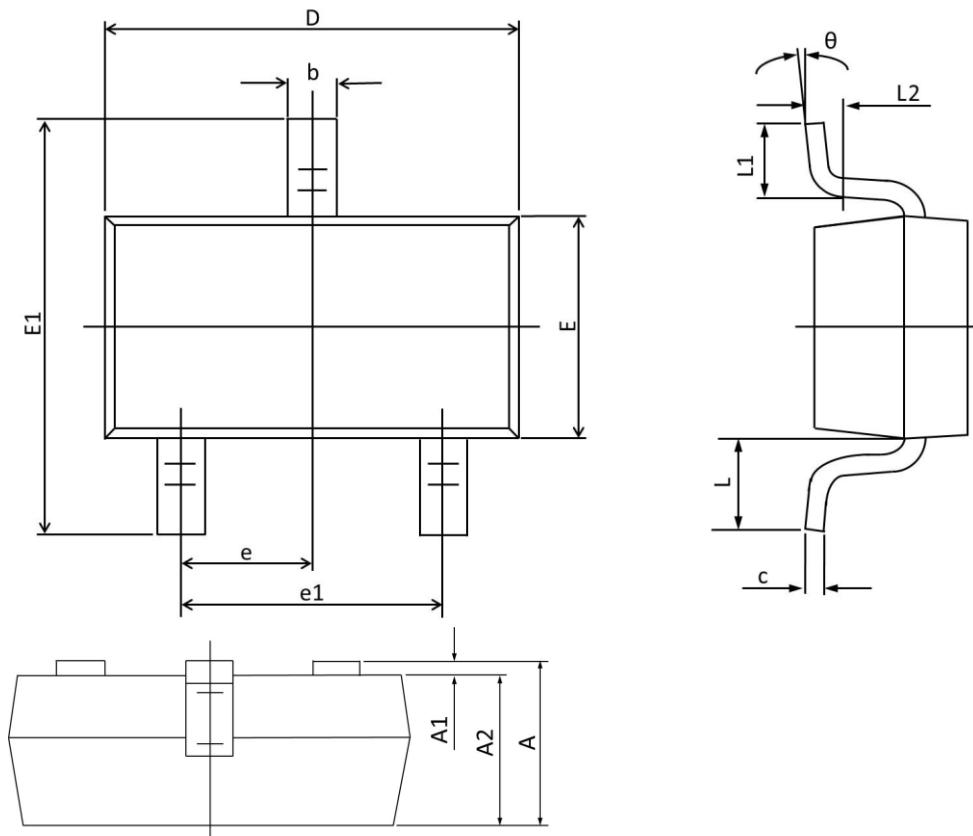


Figure 11. Gate Charge Waveform

### Package Outline Dimensions (SOT-23)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.150	0.900	0.045	0.035
A1	0.100	0.000	0.004	0.000
A2	1.050	0.900	0.041	0.035
b	0.500	0.300	0.020	0.012
c	0.150	0.080	0.006	0.003
D	3.000	2.800	0.118	0.110
E	1.400	1.200	0.055	0.047
E1	2.550	2.250	0.100	0.089
e	0.95 TYP.		0.037 TYP.	
e1	2.000	1.800	0.079	0.071
L	0.55 REF.		0.022 REF.	
L1	0.500	0.300	0.020	0.012
L2	0.25 TYP.		0.01 TYP.	
$\theta$	8°	0°	8°	0°