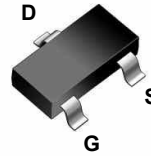
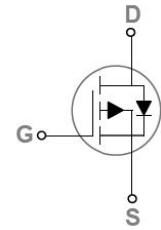


Main Product Characteristics

| | |
|--------------|-------|
| BV_{DSS} | -30V |
| $R_{DS(ON)}$ | 32mΩ |
| I_D | -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 ($T_C=25^{\circ}C$ unless otherwise specified)

| Parameter | Symbol | Typ | Unit |
|--|-----------------|-------------|------|
| Drain-Source Voltage | V_{DS} | -30 | V |
| Gate-Source Voltage | V_{GS} | ±20 | V |
| Drain Current-Continuous($T_C=25^{\circ}C$) | I_D | -5.1 | A |
| Drain Current-Continuous($T_C=100^{\circ}C$) | | -3.2 | A |
| Drain Current-Pulsed ¹ | I_{DM} | -20.4 | A |
| Single Pulse Avalanche Energy ² | EAS | 39.2 | mJ |
| Single Pulse Avalanche Current ² | IAS | 28 | A |
| Power Dissipation($T_C=25^{\circ}C$) | P_D | 1.56 | W |
| Power Dissipation-Derate Above 25°C | | 0.012 | W/°C |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 125 | °C/W |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 80 | °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°C unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|-------------------------------------|--|------|-------|-------|-------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V I _D =-250μA | -30 | - | - | V |
| BV _{DSS} Temperature Coefficient | ΔBV _{DSS} /ΔT _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 | μA |
| | | V _{DS} =-24V, V _{GS} =0V, T _J =125°C | - | - | -10 | μA |
| Gate-Source Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =-250μA | -1.2 | -1.6 | -2.2 | V |
| V _{GS(th)} Temperature Coefficient | ΔV _{GS(th)} | | - | 4 | - | mV/°C |
| Static Drain-Source On-State Resistance | R _{DS(on)} | V _{GS} =-10V, I _D =-4A | - | 27 | 32 | mΩ |
| | | V _{GS} =-4.5V, I _D =-2A | - | 38 | 46 | |
| Forward Transconductance | g _{FS} | V _{DS} =-10V, I _D =-3A | - | 9 | - | S |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =-15V, V _{GS} =0V, F=1.0MHz | - | 757 | 1280 | PF |
| Output Capacitance | C _{oss} | | - | 122 | 210 | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 88 | 175 | PF |
| Switching Characteristics | | | | | | |
| Total Gate Charge ^{2,3} | Q _g | V _{DS} =-15V, I _D =-5A, V _{GS} =-4.5V | - | 8 | 15 | nC |
| Gate-Source Charge ^{2,3} | Q _{gs} | | - | 3.3 | 6 | nC |
| Gate-Drain Charge ^{2,3} | Q _{gd} | | - | 2.3 | 5 | nC |
| Turn-On Delay Time ^{2,3} | t _{d(on)} | V _{DD} =-15V, I _D =-1A, V _{GS} =-10V, R _G =6Ω | - | 4.6 | 9 | nS |
| Rise Time ^{2,3} | t _r | | - | 14 | 26 | nS |
| Turn-Off Delay Time ^{2,3} | t _{d(off)} | | - | 34 | 58 | nS |
| Fall Time ^{2,3} | t _f | | - | 18 | 35 | nS |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage | V _{SD} | V _{GS} =0V, I _S =-1A, T _J =25°C | - | - | -1 | V |
| Continuous Source Current | I _S | V _G =V _D =0V, Force Current | - | - | -5.1 | A |
| Pulsed Source Current | I _{SM} | | - | - | -10.2 | A |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width ≤300us, duty cycle ≤2%.
3. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

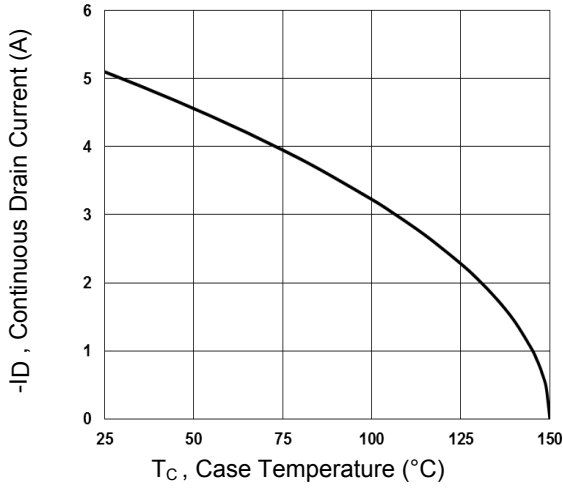


Figure 1. Continuous Drain Current vs. T_c

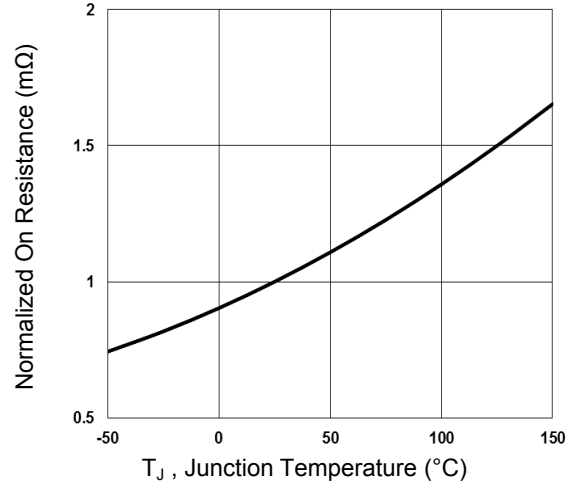


Figure 2. Normalized R_{DSON} vs. T_j

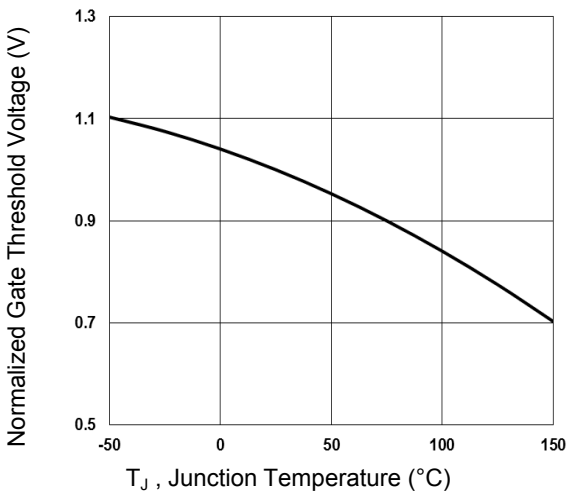


Figure 3. Normalized V_{th} vs. T_j

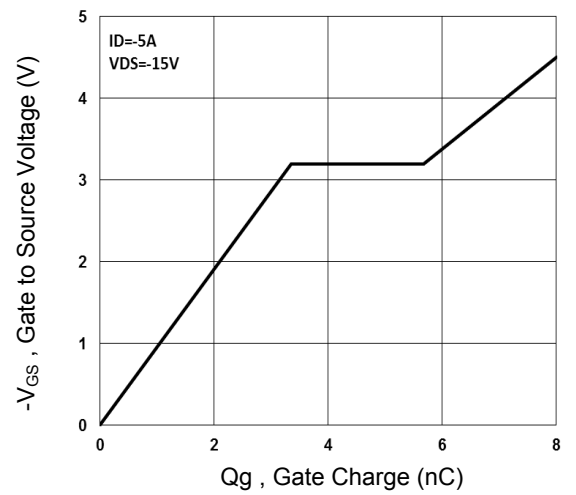


Figure 4. Gate Charge Waveform

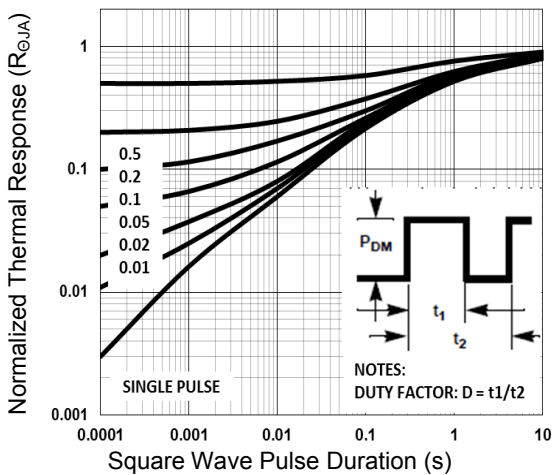


Figure 5. Normalized Transient Impedance

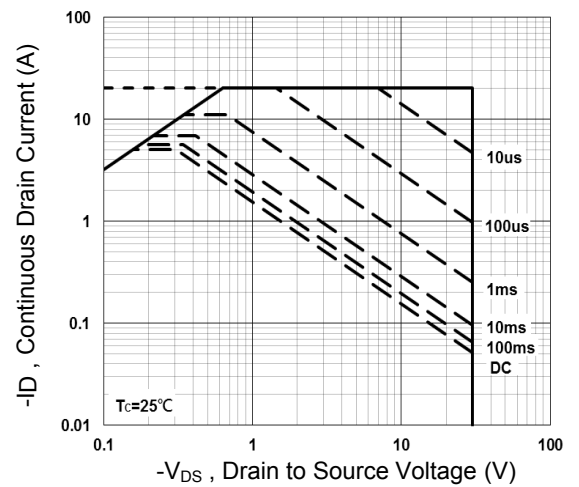


Figure 6. Maximum Safe Operation Area

Typical Electrical and Thermal Characteristic Curves

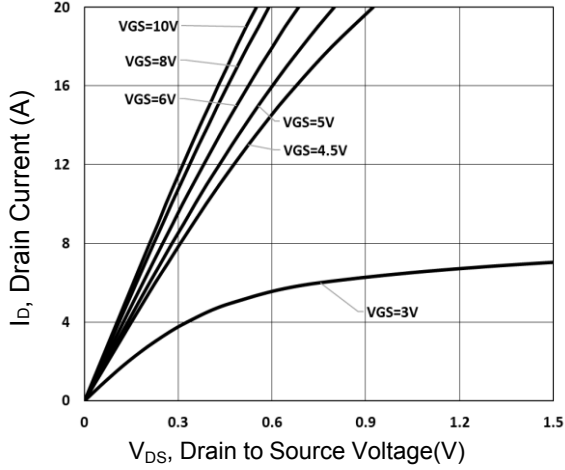


Figure 7. Typical Output Characteristics

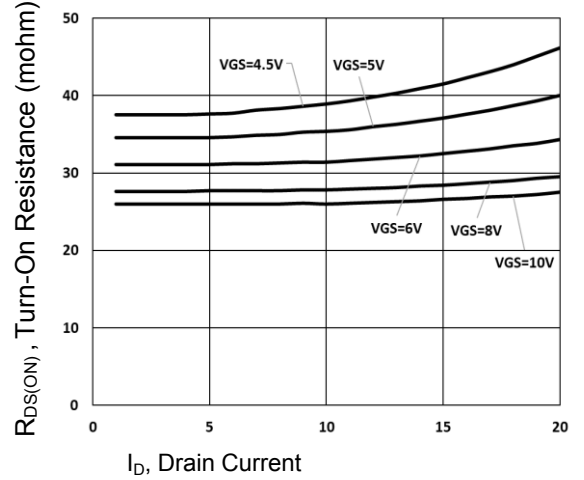


Figure 8. Turn-On Resistance vs. ID

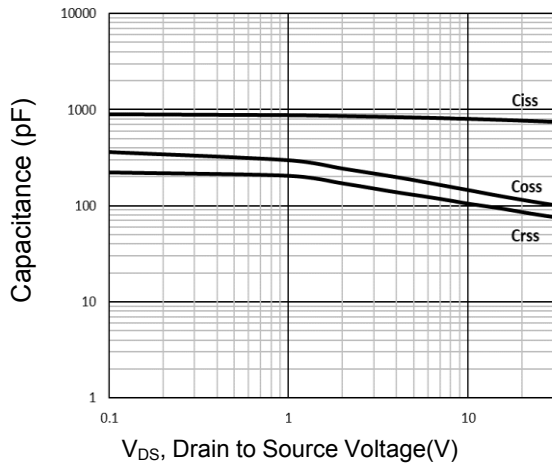


Figure 9. Capacitance Characteristics

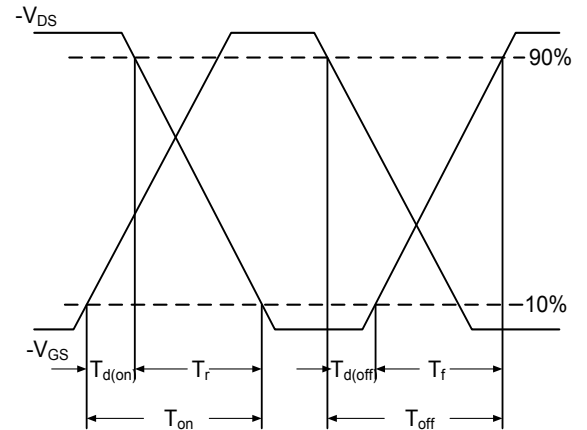


Figure 10. Switching Time Waveform

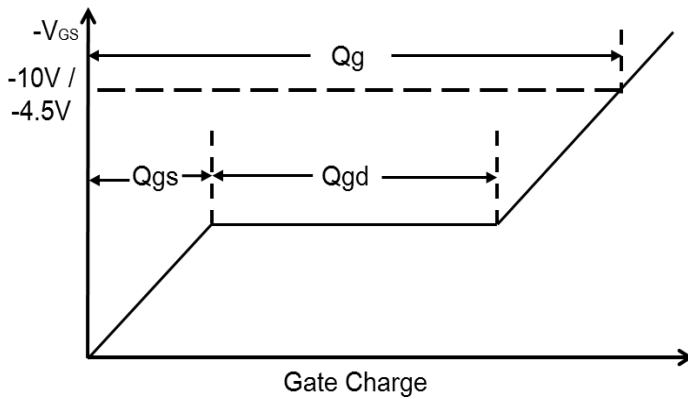
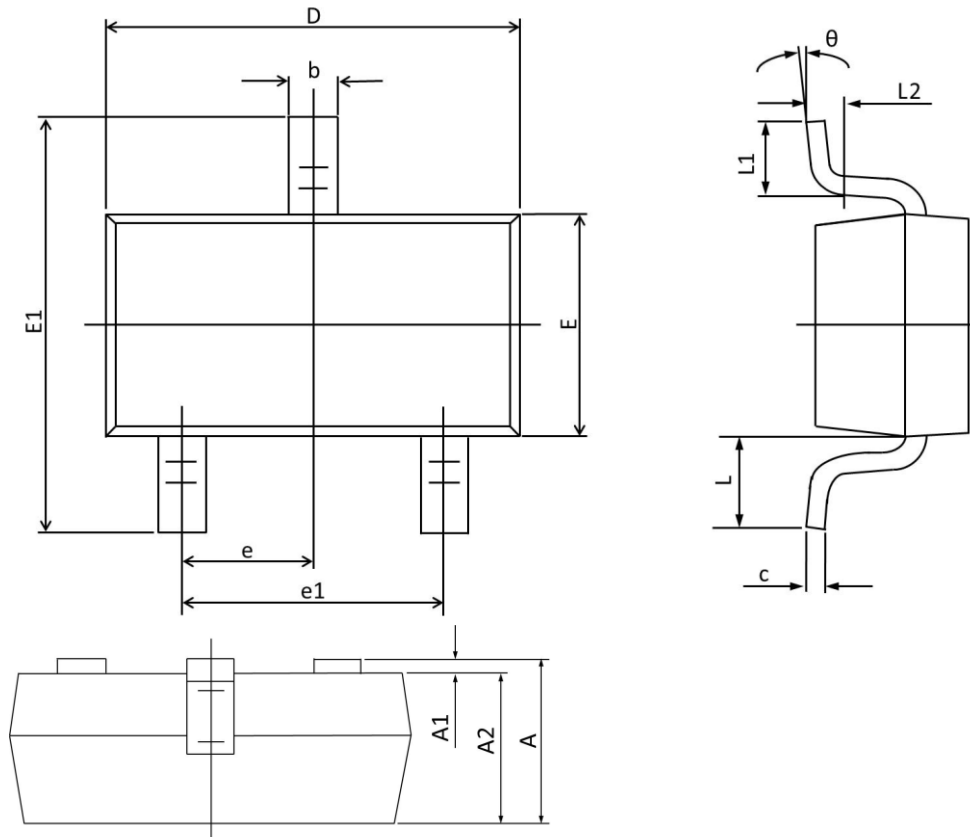


Figure 11. Gate Charge Waveform

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. | |
| θ | 8° | 0° | 8° | 0° |