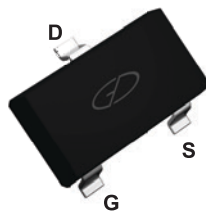
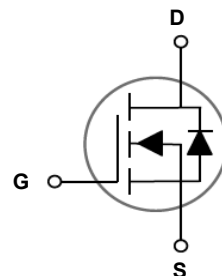


Main Product Characteristics

BV_{DSS}	40V
$R_{DS(ON)}$	33Ω (max.)
I_D	5A



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 GSF0406 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}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous ($T_c=25^{\circ}C$)	I_D	5	A
Drain Current-Continuous ($T_c=100^{\circ}C$)		3	
Drain Current-Pulsed ¹	I_{DM}	20	A
Power Dissipation ($T_c=25^{\circ}C$)	P_D	1.56	W
Power Dissipation-Derate above 25°C		0.012	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	80	°C/W
Operating Junction Temperature Range	T_J	-55 To +150	°C
Storage Temperature Range	T_{STG}	-55 To +150	°C

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
On/Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
BV_{DSS} Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C , $I_D=1mA$	-	0.04	-	$V/^{\circ}\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	-	-	1	μA
		$V_{DS}=32V, V_{GS}=0V, T_J=125^{\circ}\text{C}$	-	-	10	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Static Drain-Source On-Resistance ³	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2A$	-	26	33	m Ω
		$V_{GS}=4.5V, I_D=1.5A$	-	33	45	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.6	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		-	-4	-	mV/ $^{\circ}\text{C}$
Forward Transconductance	g_{fs}	$V_{DS}=10V, I_D=4A$	-	6	-	S
Dynamic and Switching Characteristics						
Total Gate Charge ^{2,3}	Q_g	$V_{DS}=20V, I_D=3A,$ $V_{GS}=4.5V$	-	4.7	8.0	nC
Gate-Source Charge ^{2,3}	Q_{gs}		-	0.45	1.0	
Gate-Drain Charge ^{2,3}	Q_{gd}		-	1.65	3.2	
Turn-On Delay Time ^{2,3}	$t_{d(on)}$	$V_{DD}=20V, R_G=25\Omega,$ $V_{GS}=4.5V, I_D=1A$	-	3.2	6.0	nS
Rise Time ^{2,3}	t_r		-	8.6	16	
Turn-Off Delay Time ^{2,3}	$t_{d(off)}$		-	18	36	
Fall Time ^{2,3}	t_f		-	6	12	
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $F=1MHz$	-	420	800	pF
Output Capacitance	C_{oss}		-	65	120	
Reverse Transfer Capacitance	C_{rss}		-	40	80	
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_s	$V_G=V_D=0V,$ Force Current	-	-	5.0	A
Pulsed Source Current ³	I_{SM}		-	-	10	A
Diode Forward Voltage ³	V_{SD}	$V_{GS}=0V, I_s=1A, T_J=25^{\circ}\text{C}$	-	-	1	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_s=1A,$ $di/dt=100A/\mu s, T_J=25^{\circ}\text{C}$	-	20	-	nS
Reverse Recovery Charge	Q_{rr}		-	7.5	-	nC

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. The datasheet test by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Essentially independent of operation temperature.

Typical Electrical and Thermal Characteristic Curves

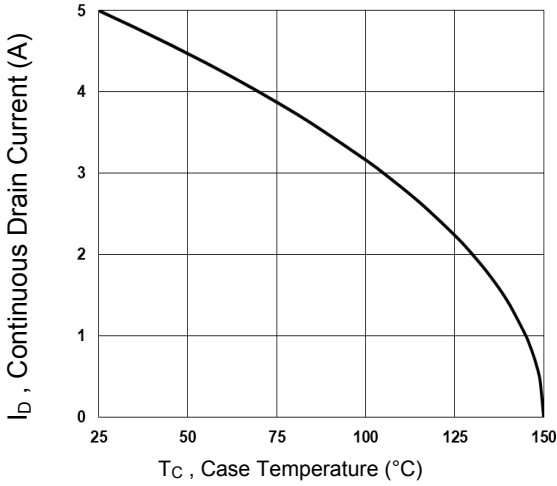


Fig.1 Continuous Drain Current vs. Tc

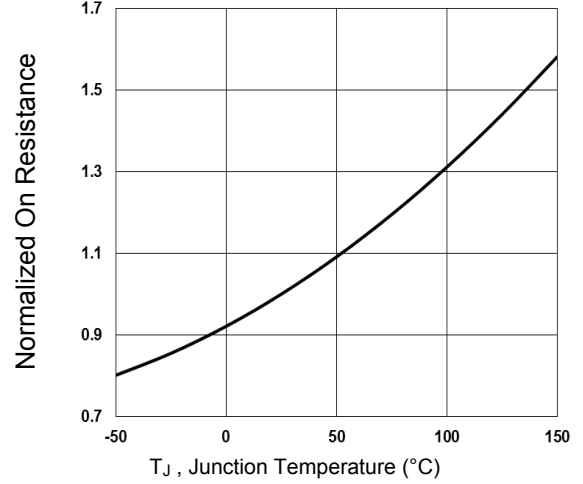


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

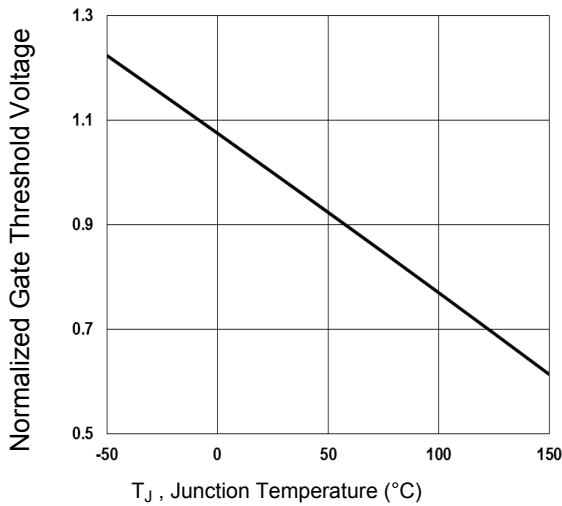


Fig.3 Normalized V_{th} vs. T_J

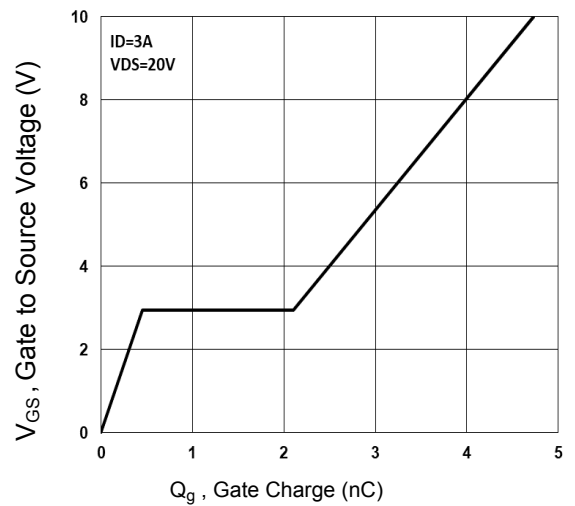


Fig.4 Gate Charge Waveform

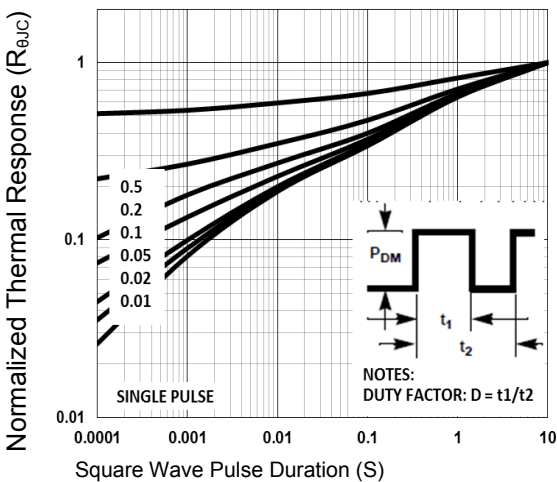


Fig.5 Normalized Transient Impedance

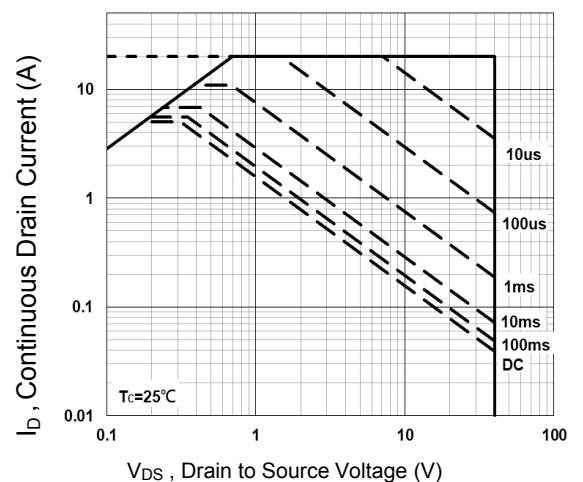


Fig.6 Maximum Safe Operation Area

Test Circuit & Waveform

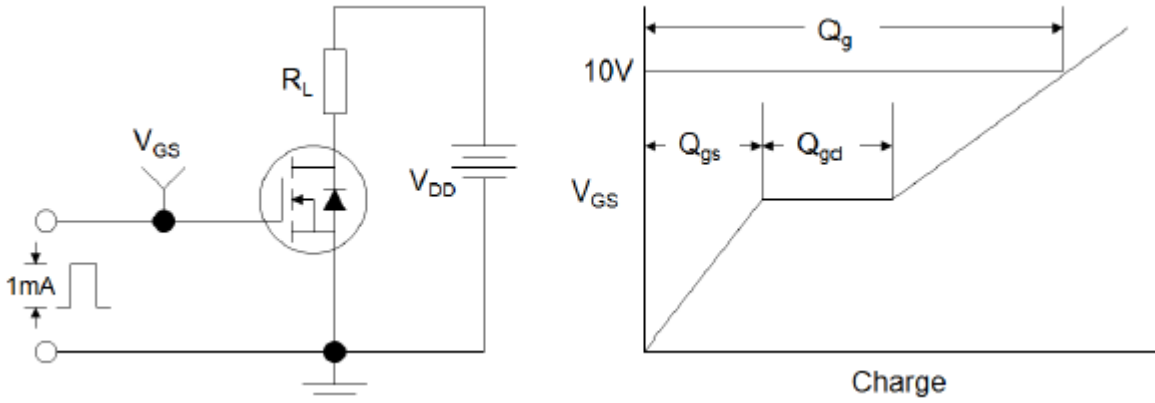


Figure 7. Gate Charge Test Circuit & Waveform

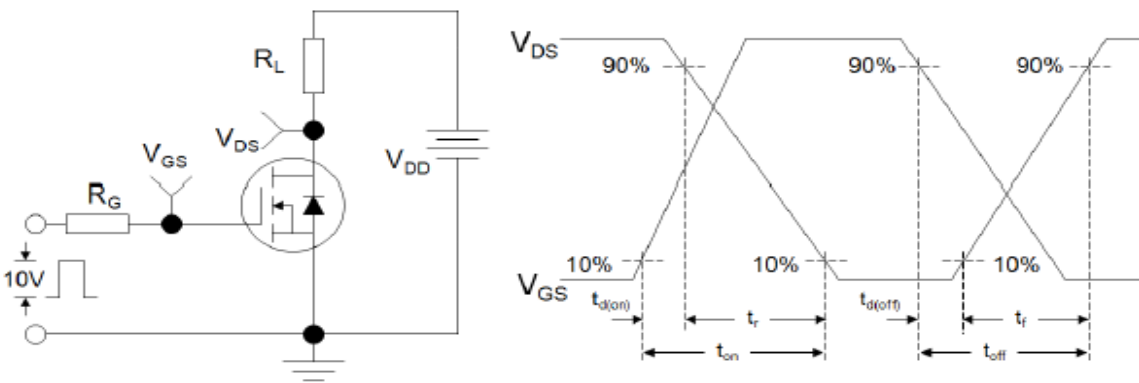


Figure 8. Resistive Switching Test Circuit & Waveforms

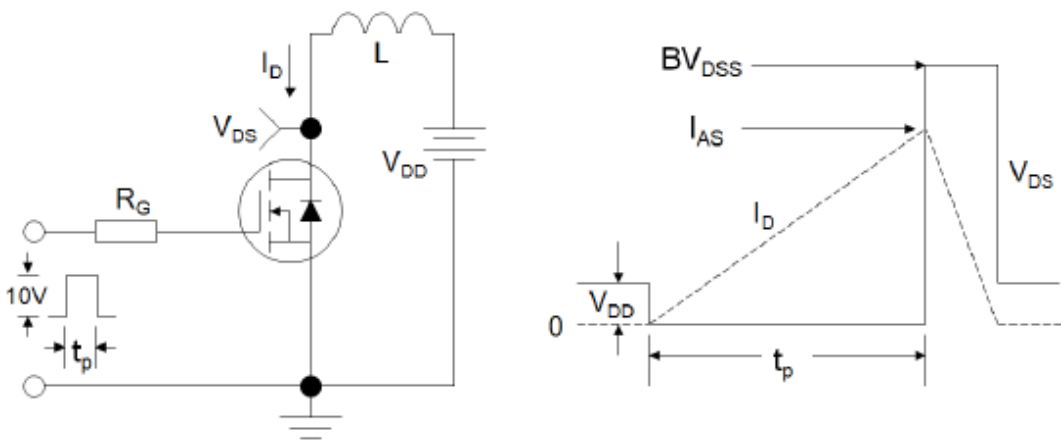
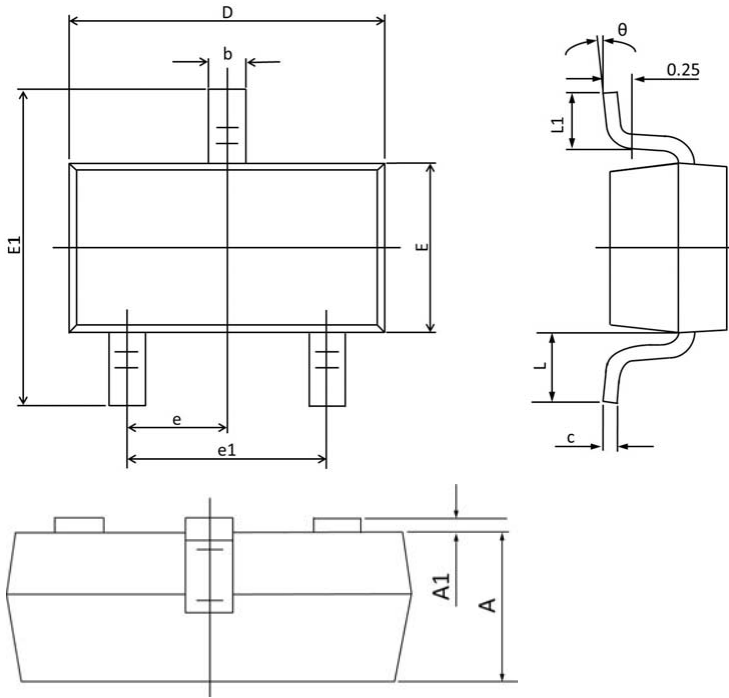


Figure 9. E_{AS} Circuit & Waveforms

Package Outline Dimensions

SOT-23



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.000	0.035	0.039
A1	0.000	0.100	0.000	0.004
b	0.300	0.500	0.012	0.020
c	0.090	0.110	0.003	0.004
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	1°	7°	1°	7°