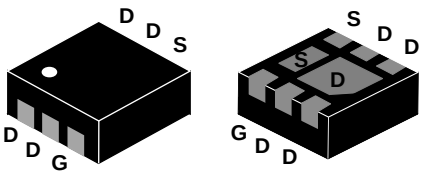
GOOD-ARK SEMICONDUCTOR

GSFB2309

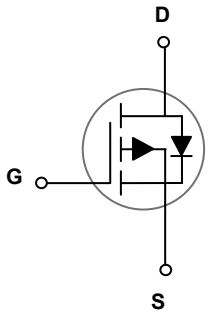
20V P-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	-20V
$R_{DS(ON)}$	28mΩ
I_D	-8.5A



DFN2x2-6L



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Ideal for hand-held devices, battery protection and load switch
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery

Description

The GSFB2309 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°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±10	V
Drain Current – Continuous (T_C=25°C)	I_D	-8.5	A
Drain Current – Continuous (T_C=100°C)		-5.4	A
Drain Current – Pulsed[1]	I_{DM}	-34	A
Power Dissipation (T_C=25°C)	P_D	3.3	W
Power Dissipation – Derate above 25°C	P_D	0.026	W/°C
Storage Temperature Range	T_{STG}	-55 to +150	°C
Operating Junction Temperature Range	T_J	-55 to +150	°C

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	---	62	°C/W
Thermal Resistance Junction to Case	$R_{\theta JC}$	---	38	°C/W

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=-250uA	-20	---	---	V
BV_{DSS} Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C , I_D=-1mA	---	-0.02	---	V/°C
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-20V , V_{GS}=0V , T_J=25°C	---	---	-1	uA
		V_{DS}=-16V , V_{GS}=0V , T_J=125°C	---	---	-10	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±10V , V_{DS}=0V	---	---	±100	nA
On Characteristics						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V , I_D=-4A	---	22	28	mΩ
		V_{GS}=-2.5V , I_D=-3A	---	27	37	
		V_{GS}=-1.8V , I_D=-2A	---	33	45	
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =-250uA	-0.3	-0.6	-1	V
$V_{GS(th)}$ Temperature Coefficient	$\triangle V_{GS(th)}$		---	2	---	mV/°C
Forward Transconductance	gfs	V_{DS}=-10V , I_S=-3A	---	8.4	---	S
Dynamic and Switching Characteristics						
Total Gate Charge[2,3]	Q_g	V_{DS}=-10V , V_{GS}=-4.5V , I_D=-4A	---	16.1	25	nC
Gate-Source Charge[2,3]	Q_{gs}		---	1.8	3	
Gate-Drain Charge[2,3]	Q_{gd}		---	3.8	7	
Turn-On Delay Time[2,3]	$T_{d(on)}$	V_{DD}=-10V , V_{GS}=-4.5V , R_G=25Ω, I_D=-1A	---	8.2	16	nS
Rise Time[2,3]	T_r		---	30	57	
Turn-Off Delay Time[2,3]	$T_{d(off)}$		---	71.1	135	
Fall Time[2,3]	T_f		---	19.8	38	
Input Capacitance	C_{iss}	V_{DS}=-15V , V_{GS}=0V , F=1MHz	---	1440	2100	pF
Output Capacitance	C_{oss}		---	155	230	
Reverse Transfer Capacitance	C_{rss}		---	115	170	
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_S	V_G=V_D=0V , Force Current	---	---	-8.5	A
Pulsed Source Current	I_{SM}		---	---	-17	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V , I_S=-1A , T_J=25°C	---	---	-1	V

Notes:

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 Characteristics

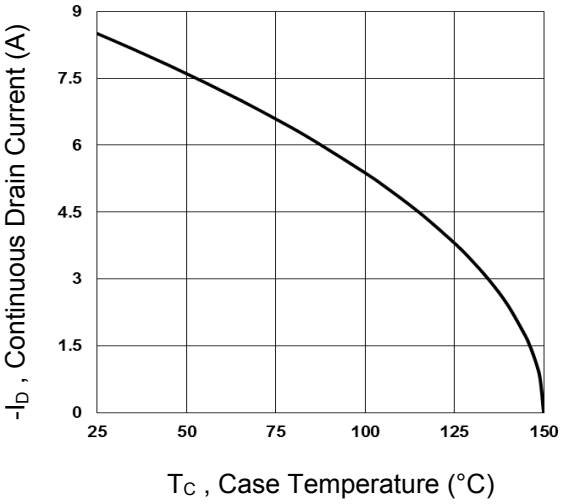


Fig.1 Continuous Drain Current vs. T_C

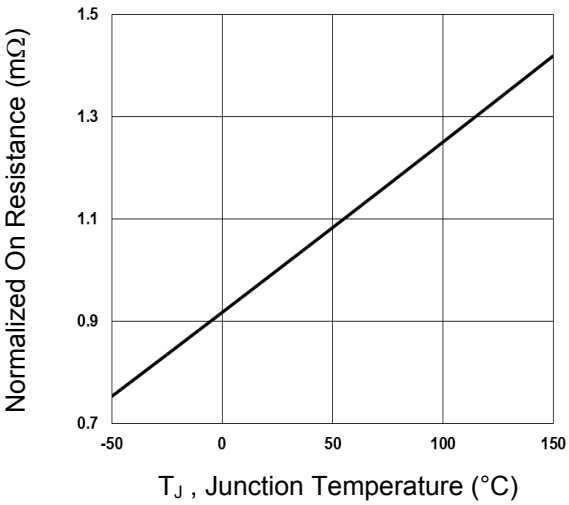


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

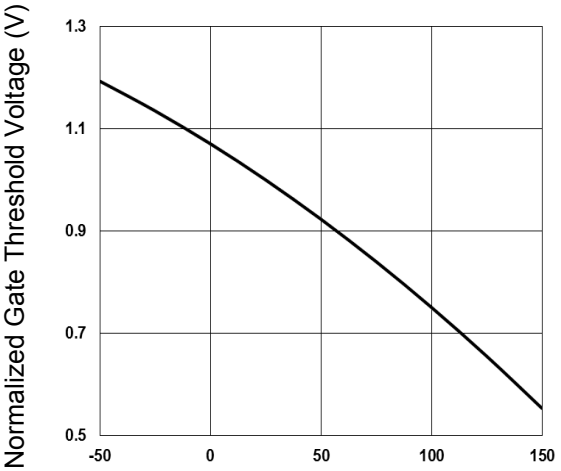


Fig.3 Normalized V_{th} vs T_J

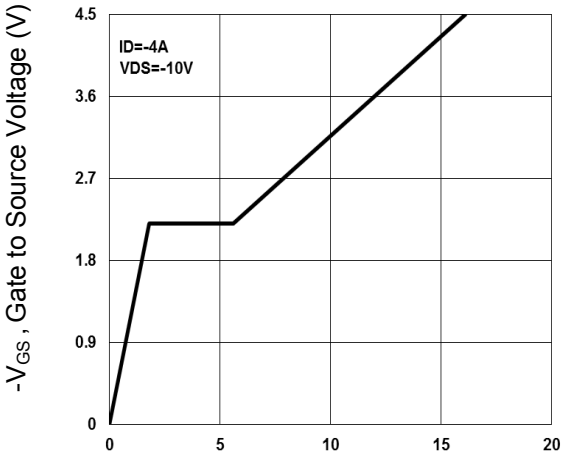


Fig.4 Gate Charge Waveform

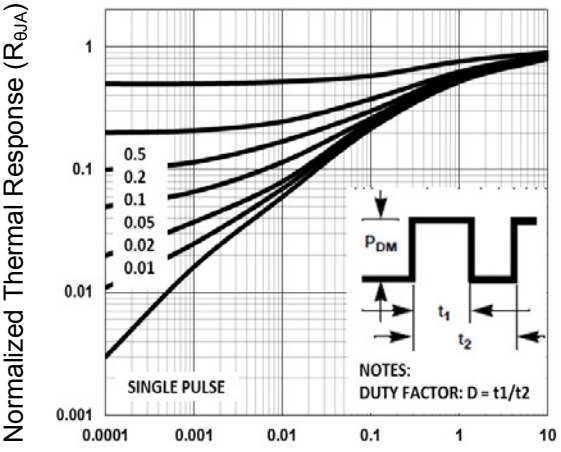


Fig.5 Normalized Transient Impedance

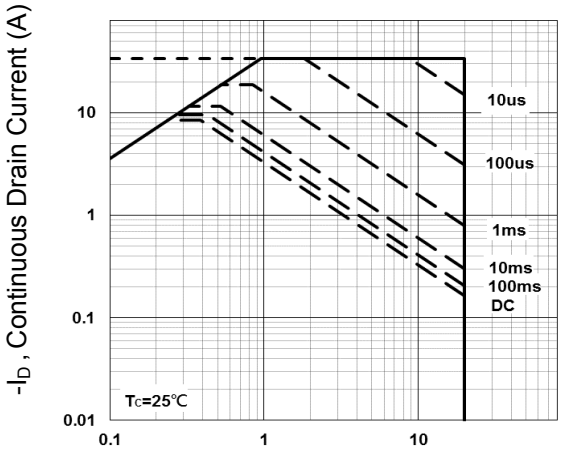


Fig.6 Maximum Safe Operation Area

Typical Electrical and Thermal Characteristics

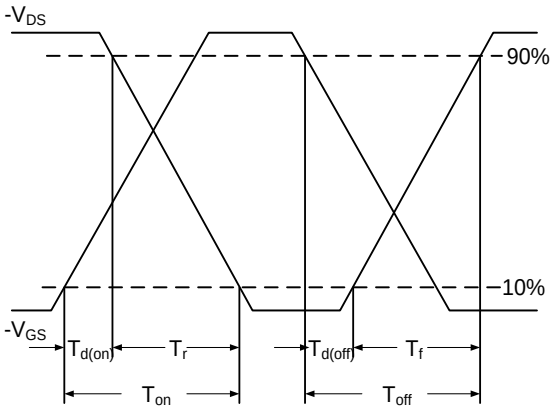


Fig.7 Switching Time Waveform

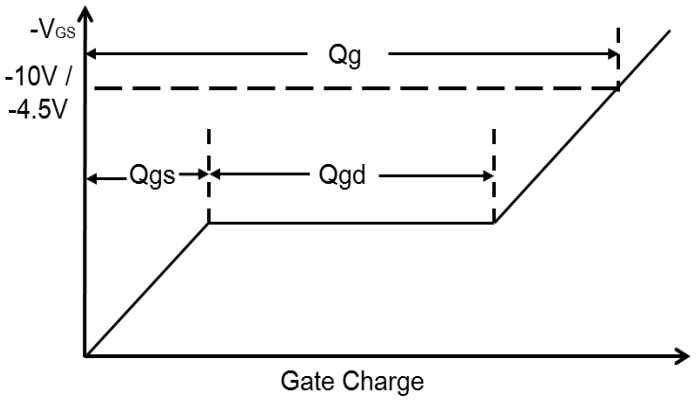
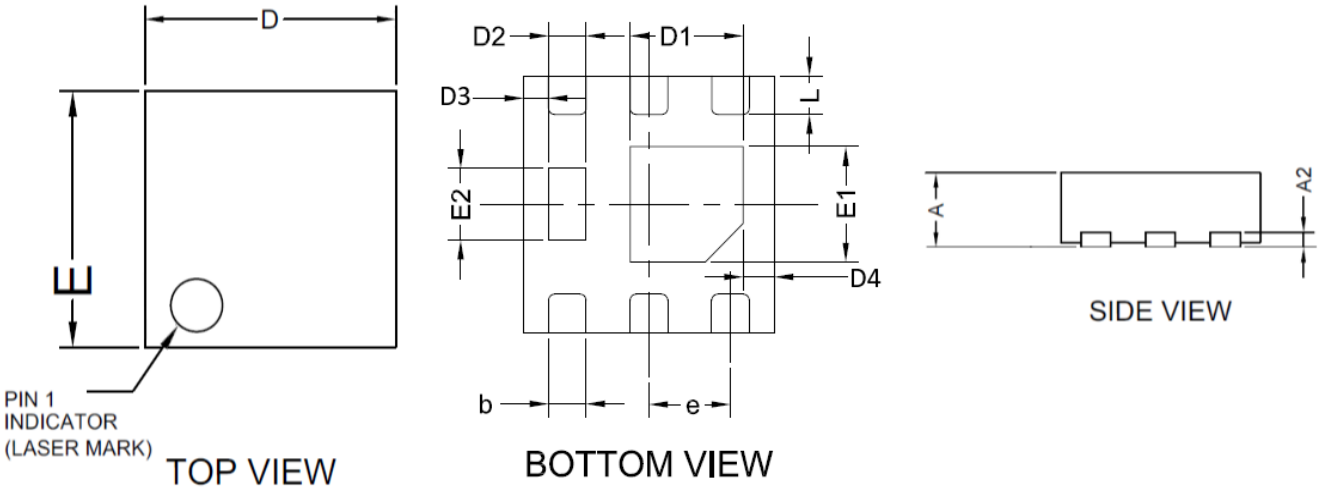


Fig.8 E_{AS} Waveform

Package Outline Dimensions

DFN2x2-6L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	0.800	0.500	0.031	0.019
A2	0.250	0.145	0.010	0.006
b	0.350	0.250	0.014	0.010
D	2.100	1.900	0.083	0.075
D1	1.000	0.800	0.040	0.031
D2	0.350	0.250	0.014	0.010
D3	0.200BSC		0.008BSC	
D4	0.200BSC		0.008BSC	
E	2.100	1.900	0.083	0.075
E1	1.050	0.800	0.041	0.031
E2	0.66	0.46	0.026	0.018
e	0.650BSC		0.026BSC	
L	0.350	0.250	0.014	0.010