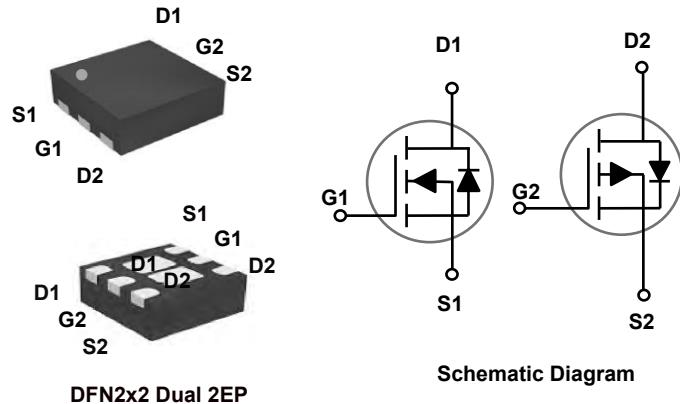


Main Product Characteristics

Polarity	N-Ch	P-Ch
V_{DSS}	20V	-20V
$R_{DS(ON)}$	40mΩ	100mΩ
I_D	3.8A	-2.5A



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 GSFB2116 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 supplies and a wide variety of other applications.

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

Parameter	Symbol	Max.		Unit
		N-Ch	P-Ch	
Drain-Source Voltage	V_{DS}	20	-20	V
Gate-Source Voltage	V_{GS}	± 10	± 10	V
Drain Current-Continuous ($T_C=25^\circ\text{C}$)	I_D	3.8	-2.5	A
Drain Current-Continuous ($T_C=100^\circ\text{C}$)		2.3	-1.5	
Drain Current-Pulsed ¹	I_{DM}	15.2	-10	A
Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	1.25		W
Power Dissipation-Derate above 25°C		0.01		W/°C
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	100		°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	15		°C/W
Operating Junction Temperature Range	T_J	-55 To +150		°C
Storage Temperature Range	T_{STG}	-55 To +150		°C

N-Channel 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}	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=250\mu\text{A}$	20	-	-	V
BV_{DSS} Temperature Coefficient	$\Delta \text{BV}_{\text{DSS}}/\Delta T_J$	Reference to 25°C , $I_{\text{D}}=1\text{mA}$	-	0.02	-	$^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{\text{DS}}=20\text{V}, V_{\text{GS}}=0\text{V}, T_J=25^\circ\text{C}$	-	-	1	μA
		$V_{\text{DS}}=16\text{V}, V_{\text{GS}}=0\text{V}, T_J=125^\circ\text{C}$	-	-	10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{\text{GS}}=\pm 10\text{V}, V_{\text{DS}}=0\text{V}$	-	-	± 100	nA
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=4.5\text{V}, I_{\text{D}}=3\text{A}$	-	30	40	$\text{m}\Omega$
		$V_{\text{GS}}=2.5\text{V}, I_{\text{D}}=2\text{A}$		42	55	
		$V_{\text{GS}}=1.8\text{V}, I_{\text{D}}=1.5\text{A}$	-	55	70	
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{GS}}=V_{\text{DS}}, I_{\text{D}}=250\mu\text{A}$	0.3	0.6	1	V
$V_{\text{GS}(\text{th})}$ Temperature Coefficient	$\Delta V_{\text{GS}(\text{th})}$		-	-2	-	$\text{mV}/^\circ\text{C}$
Forward Transconductance	g_{fs}	$V_{\text{DS}}=10\text{V}, I_{\text{D}}=2\text{A}$	-	4.4	-	S
Dynamic and Switching Characteristics						
Total Gate Charge ^{2,3}	Q_g	$V_{\text{DS}}=10\text{V}, I_{\text{D}}=3\text{A}$ $V_{\text{GS}}=4.5\text{V}$	-	5.8	10	nC
Gate-Source Charge ^{2,3}	Q_{gs}		-	0.6	1.5	
Gate-Drain Charge ^{2,3}	Q_{gd}		-	1.5	3	
Turn-On Delay Time ^{2,3}	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=10\text{V}, R_{\text{G}}=25\Omega$ $V_{\text{GS}}=4.5\text{V}, I_{\text{D}}=1\text{A}$	-	2.9	6	nS
Rise Time ^{2,3}	t_r		-	8.4	16	
Turn-Off Delay Time ^{2,3}	$t_{\text{d}(\text{off})}$		-	19.2	38	
Fall Time ^{2,3}	t_f		-	5.6	12	
Input Capacitance	C_{iss}	$V_{\text{DS}}=15\text{V}, V_{\text{GS}}=0\text{V}, F=1\text{MHz}$	-	315	600	pF
Output Capacitance	C_{oss}		-	50	80	
Reverse Transfer Capacitance	C_{rss}		-	40	60	
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_s	$V_G=V_D=0\text{V}$, Force Current	-	-	3.8	A
Pulsed Source Current	I_{SM}		-	-	7.6	A
Diode Forward Voltage	V_{SD}	$V_{\text{GS}}=0\text{V}, I_s=1\text{A}, T_J=25^\circ\text{C}$	-	-	1	V

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. Pulse test: pulse width $\leq 300\text{us}$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.

P-Channel 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}	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=-250\mu\text{A}$	-20	-	-	V
BV_{DSS} Temperature Coefficient	$\Delta \text{BV}_{\text{DSS}}/\Delta T_J$	Reference to 25°C , $I_{\text{D}}=-1\text{mA}$	-	-0.01	-	$\text{V}/^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{\text{DS}}=-20\text{V}, V_{\text{GS}}=0\text{V}, T_J=25^\circ\text{C}$ $V_{\text{DS}}=-16\text{V}, V_{\text{GS}}=0\text{V}, T_J=125^\circ\text{C}$	-	-	-1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{\text{GS}}=\pm 10\text{V}, V_{\text{DS}}=0\text{V}$	-	-	± 100	nA
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=-4.5\text{V}, I_{\text{D}}=-3\text{A}$ $V_{\text{GS}}=-2.5\text{V}, I_{\text{D}}=-2\text{A}$ $V_{\text{GS}}=-1.8\text{V}, I_{\text{D}}=-1\text{A}$	-	82 125 197	100 140 230	$\text{m}\Omega$
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{GS}}=V_{\text{DS}}, I_{\text{D}}=-250\mu\text{A}$	-0.3	-0.6	-1.0	V
$V_{\text{GS}(\text{th})}$ Temperature Coefficient	$\Delta V_{\text{GS}(\text{th})}$		-	3	-	$\text{mV}/^\circ\text{C}$
Forward Transconductance	g_{fs}	$V_{\text{DS}}=-10\text{V}, I_{\text{D}}=-1\text{A}$	-	2.2	-	S
Dynamic and Switching Characteristics						
Total Gate Charge ^{4,5}	Q_g	$V_{\text{DS}}=-10\text{V}, I_{\text{D}}=-2\text{A}$ $V_{\text{GS}}=-4.5\text{V}$	-	4.8	10	nC
Gate-Source Charge ^{4,5}	Q_{gs}		-	0.5	1	
Gate-Drain Charge ^{4,5}	Q_{gd}		-	1.9	4	
Turn-On Delay Time ^{4,5}	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=-10\text{V}, R_{\text{G}}=25\Omega$ $V_{\text{GS}}=-4.5\text{V}, I_{\text{D}}=-1\text{A}$	-	3.5	7	nS
Rise Time ^{4,5}	t_r		-	12.6	24	
Turn-Off Delay Time ^{4,5}	$t_{\text{d}(\text{off})}$		-	32.6	62	
Fall Time ^{4,5}	t_f		-	8.4	16	
Input Capacitance	C_{iss}	$V_{\text{DS}}=-15\text{V}, V_{\text{GS}}=0\text{V}, F=1\text{MHz}$	-	350	510	pF
Output Capacitance	C_{oss}		-	65	95	
Reverse Transfer Capacitance	C_{rss}		-	50	75	
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_s	$V_G=V_D=0\text{V}$, Force Current	-	-	-2.5	A
Pulsed Source Current	I_{SM}		-	-	-5	A
Diode Forward Voltage	V_{SD}	$V_{\text{GS}}=0\text{V}, I_s=-1\text{A}, T_J=25^\circ\text{C}$	-	-	-1	V

Note:

4. Pulse test: pulse width $\leq 300\text{us}$, duty cycle $\leq 2\%$.
5. Essentially independent of operating temperature.

N-Channel Typical Characteristic Curves

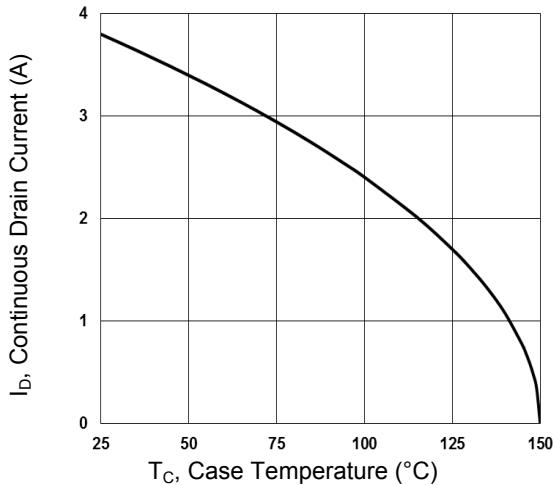


Figure 1. Continuous Drain Current vs. T_C

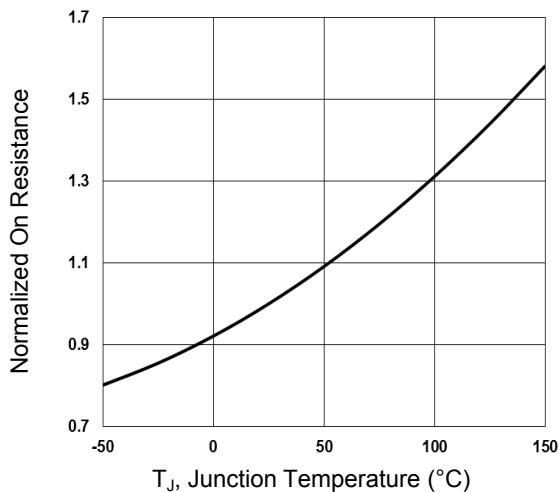


Figure 2. Normalized R_{DS(on)} vs. T_J

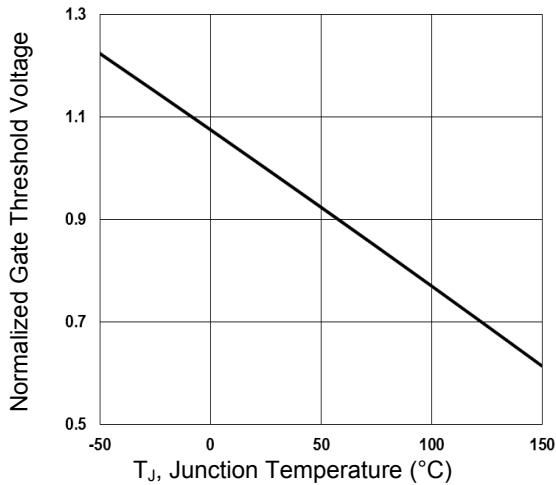


Figure 3. Normalized V_{th} vs. T_J

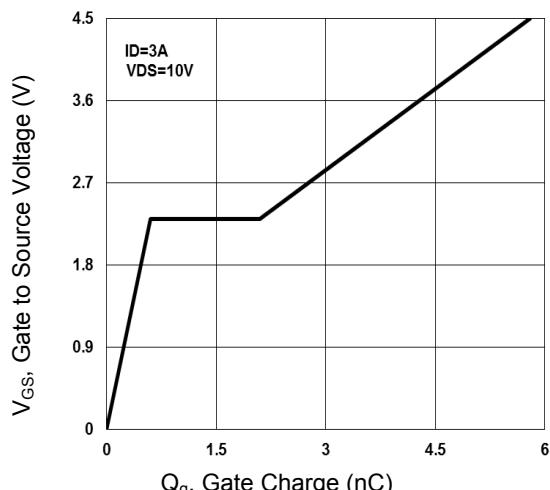


Figure 4. Gate Charge Waveform

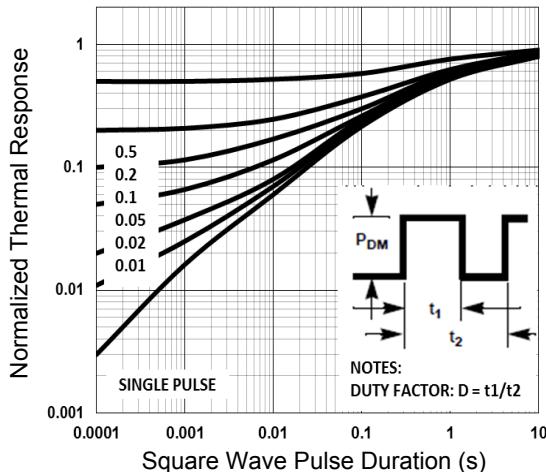


Figure 5. Normalized Transient Impedance

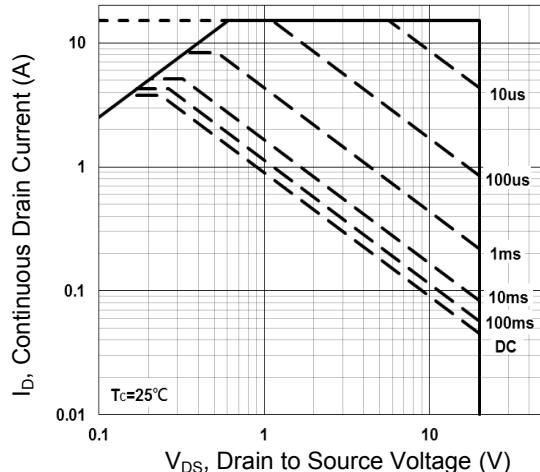


Figure 6. Maximum Safe Operation Area

P-Channel Typical Characteristic Curves

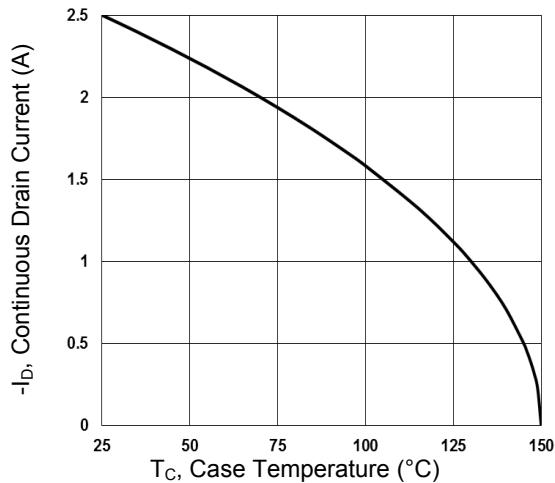


Figure 7. Continuous Drain Current vs. T_c

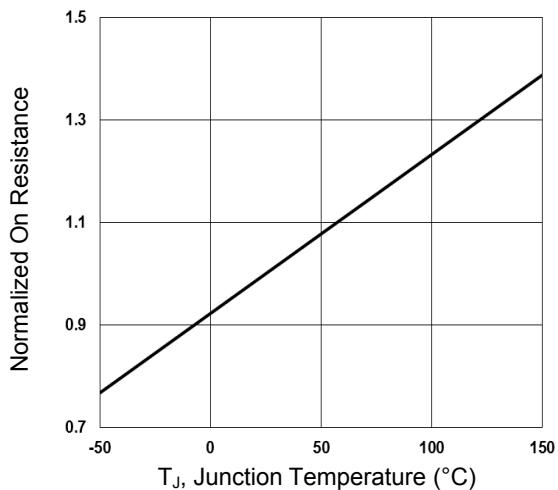


Figure 8. Normalized R_{DS(on)} vs. T_j

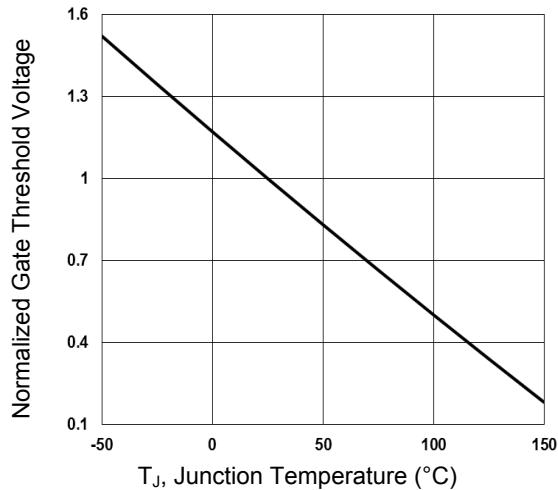


Figure 9. Normalized V_{th} vs. T_j

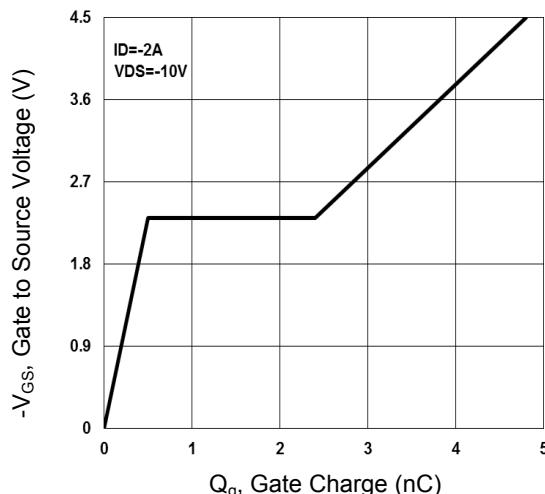


Figure 10. Gate Charge Waveform

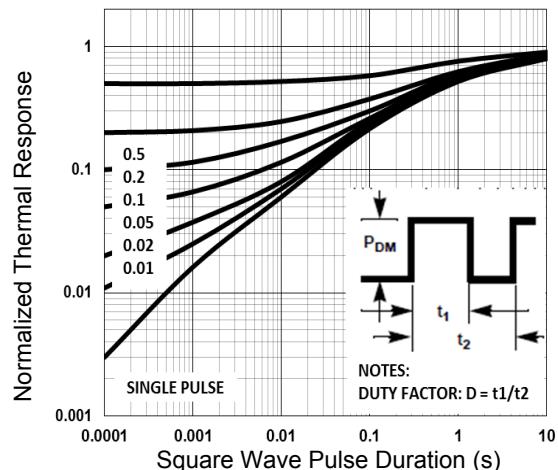


Figure 11. Normalized Transient Impedance

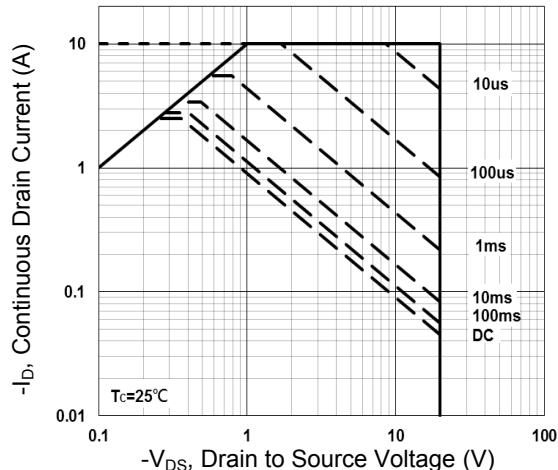
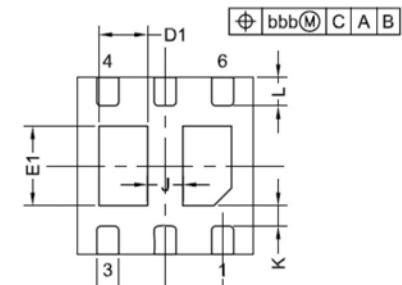
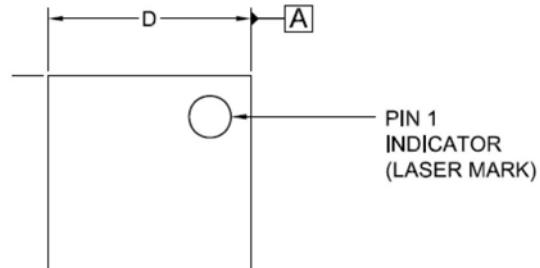


Figure 12. Maximum Safe Operation Area

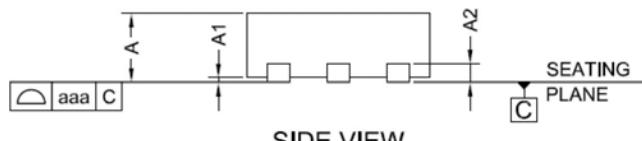
Package Outline Dimensions DFN2x2 Dual 2EP



BOTTOM VIEW



TOP VIEW



SIDE VIEW

Symbol	Dimensions in Millimeters		
	Min	Typ	Max
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2		0.203	
b	0.20	0.25	0.30
D	1.95	2.00	2.05
D1	0.50	0.55	0.60
E	1.95	2.00	2.05
E1	0.85	0.90	0.95
e		0.650 BSC	
L	0.27	0.32	0.37
J		0.40 BSC	
K		0.20 MIN	
N		6	
aaa		0.08	
bbb		0.10	