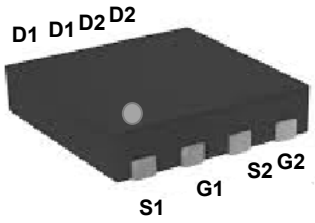
GSFN8116

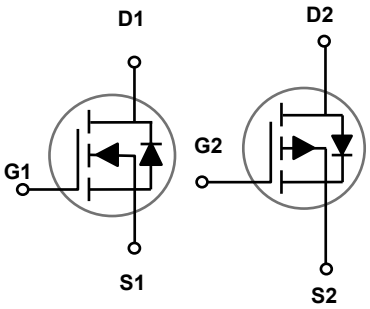
20V N-Channel + P-Channel Complementary MOSFET

Main Product Characteristics

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



PPAK2X3 Dual Pin



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 GSFN8116 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	Rating		Unit
Drain-Source Voltage	V_{DS}	20	-20	V
Gate-Source Voltage	V_{GS}	±10	±10	V
Drain Current – Continuous (T_C=25°C)	I_D	3.8	-2.5	A
Drain Current – Continuous (T_C=100°C)		2.3	-1.5	A
Drain Current – Pulsed[1]	I_{DM}	15.2	-10	A
Power Dissipation (T_C=25°C)	P_D	1.25	1.25	W
Power Dissipation – Derate above 25°C		0.01	0.01	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	$R_{\theta JA}$	---	100	°C/W

N-Channel 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=3A	---	30	40	mΩ
		V_{GS}=2.5V, I_D=2A	---	42	55	mΩ
		V_{GS}=1.8V, I_D=1.5A	---	55	70	mΩ
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_D=2A	---	4.4	---	S
Dynamic and Switching Characteristics						
Total Gate Charge[2, 3]	Q_g	V_{DS}=10V, V_{GS}=4.5V, I_D=3A	---	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]	$T_{d(on)}$	V_{DD}=10V, V_{GS}=4.5V, R_G=25Ω, I_D=1A	---	2.9	6	nS
Rise Time[2, 3]	T_r		---	8.4	16	
Turn-Off Delay Time[2, 3]	$T_{d(off)}$		---	19.2	38	
Fall Time[2, 3]	T_f		---	5.6	12	
Input Capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V, F=1MHz	---	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=0V, Force Current	---	---	3.8	A
Pulsed Source Current	I_{SM}		---	---	7.6	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=1A, T_J=25°C	---	---	1	V

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

P-Channel 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	---	-0.01	---	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=-3A	---	82	100	mΩ
		V_{GS}=-2.5V, I_D=-2A	---	125	140	mΩ
		V_{GS}=-1.8V, I_D=-1A	---	197	230	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D =-250uA	-0.3	-0.6	-1	V
$V_{GS(th)}$ Temperature Coefficient	$\triangle V_{GS(th)}$		---	3	---	mV/°C
Forward Transconductance	gfs	V_{DS}=-10V, I_D=-1A	---	2.2	---	S
Dynamic and switching Characteristics						
Total Gate Charge[2, 3]	Q_g	V_{DS}=-10V, V_{GS}=-4.5V, I_D=-2A	---	4.8	10	nC
Gate-Source Charge[2, 3]	Q_{gs}		---	0.5	1	
Gate-Drain Charge[2, 3]	Q_{gd}		---	1.9	4	
Turn-On Delay Time[2, 3]	$T_{d(on)}$	V_{DD}=-10V, V_{GS}=-4.5V, R_G=25Ω, I_D=-1A	---	3.5	7	nS
Rise Time[2, 3]	T_r		---	12.6	24	
Turn-Off Delay Time[2, 3]	$T_{d(off)}$		---	32.6	62	
Fall Time[2, 3]	T_f		---	8.4	16	
Input Capacitance	C_{iss}	V_{DS}=-15V, V_{GS}=0V, F=1MHz	---	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=0V, Force Current	---	---	-2.5	A
Pulsed Source Current	I_{SM}		---	---	-5	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=-1A, T_J=25°C	---	---	-1	V

Note:
4. Repetitive Rating: Pulsed width limited by maximum junction temperature.
5. The data tested by pulsed, pulse width ≦ 300 uS, duty cycle ≦ 2 % .
6. Essentially independent of operating temperature.

N-Channel Typical Characteristic Curves

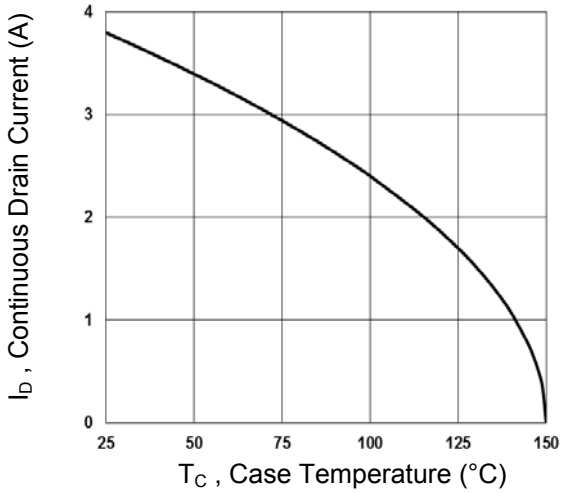


Fig.1 Continuous Drain Current vs. T_C

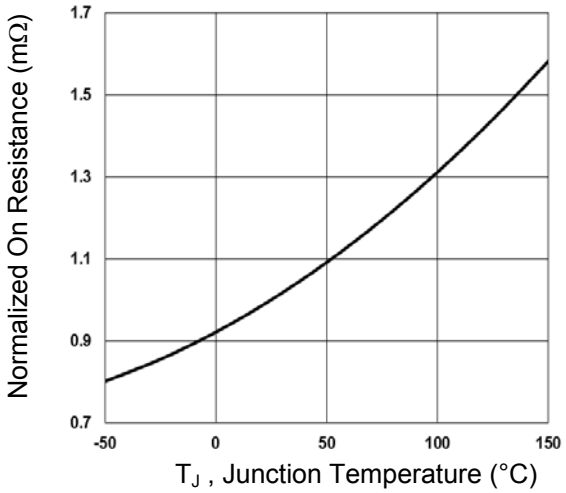


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

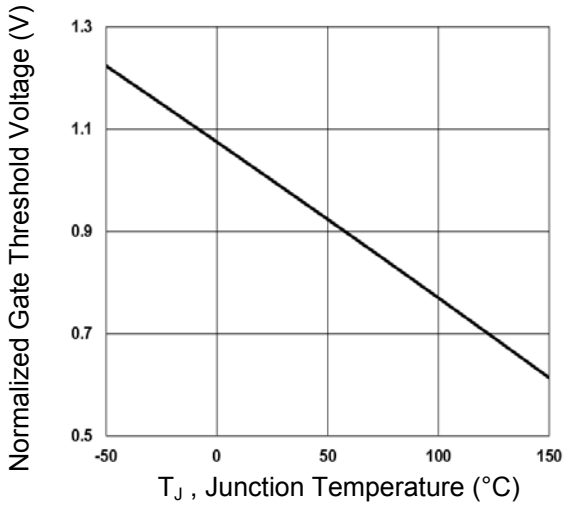


Fig.3 Normalized V_{th} vs. T_J

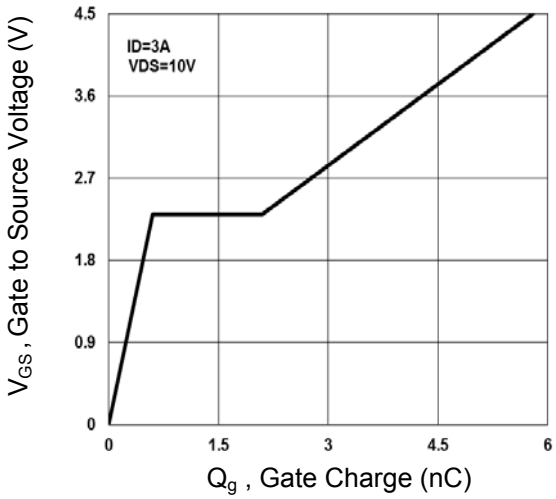


Fig.4 Gate Charge Waveform

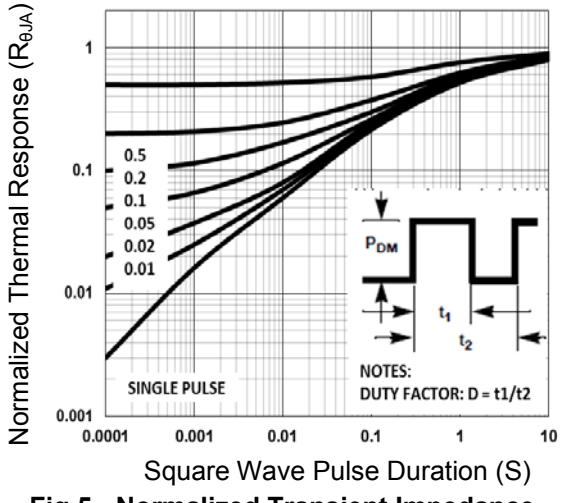


Fig.5 Normalized Transient Impedance

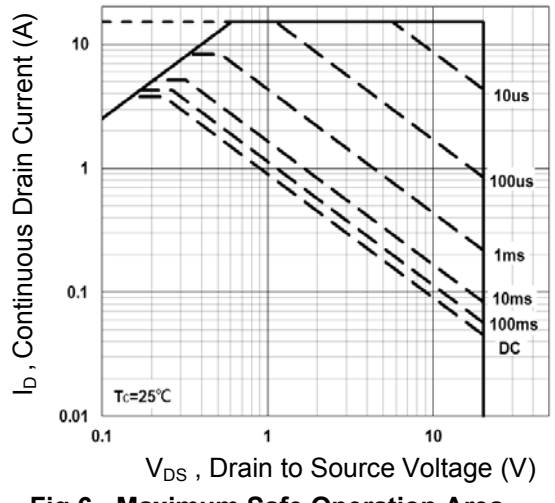


Fig.6 Maximum Safe Operation Area

P-Channel Typical Characteristic Curves

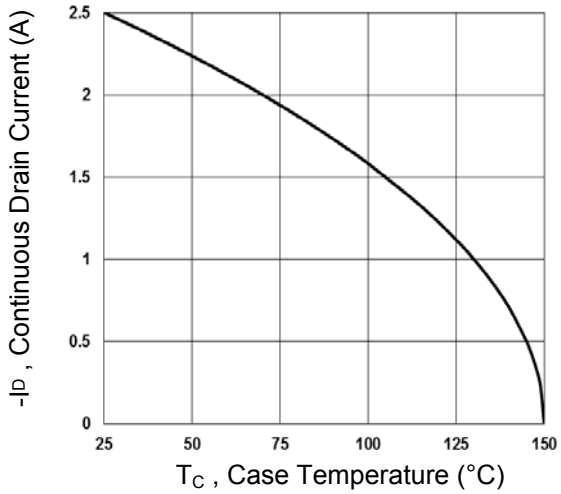


Fig.7 Continuous Drain Current vs. T_C

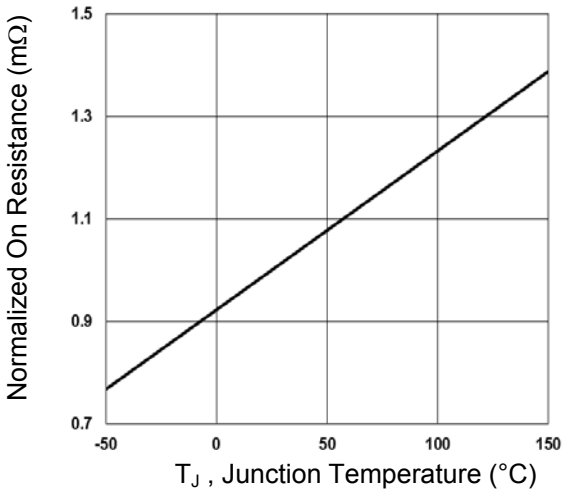


Fig.8 Normalized $R_{DS(ON)}$ vs. T_J

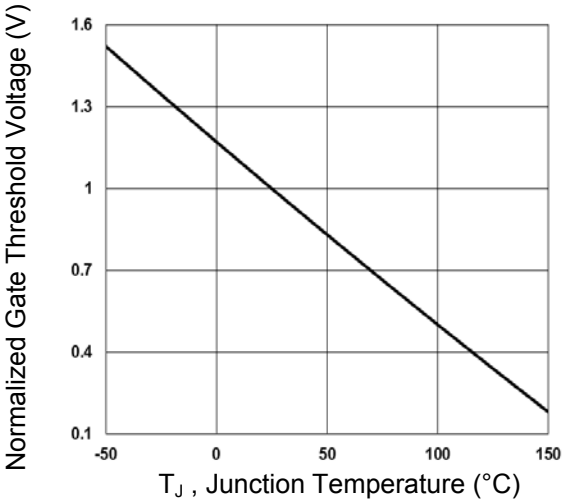


Fig.9 Normalized V_{th} vs. T_J

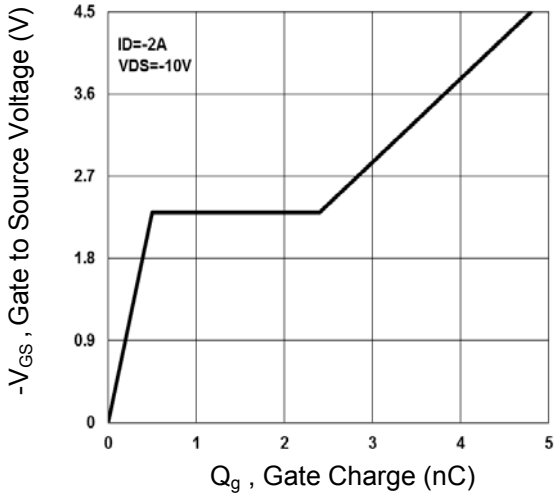


Fig.10 Gate Charge Waveform

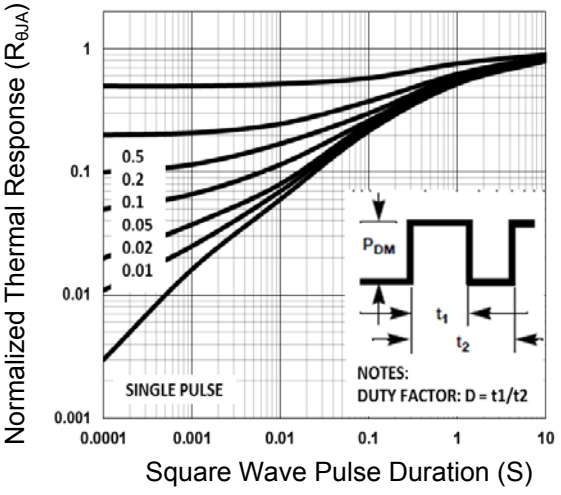


Fig.11 Normalized Transient Impedance

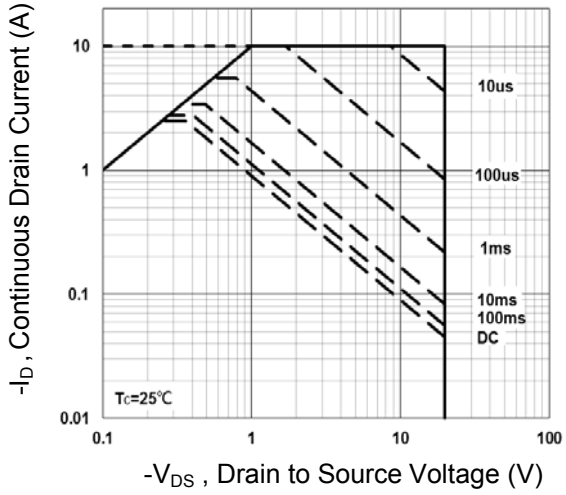
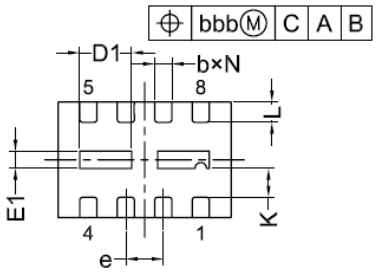


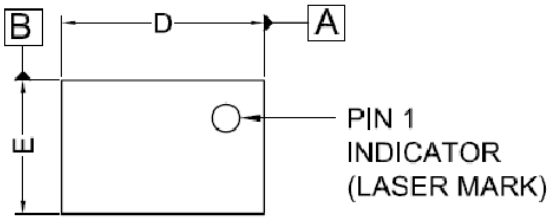
Fig.12 Maximum Safe Operation Area

Package Outline Dimensions

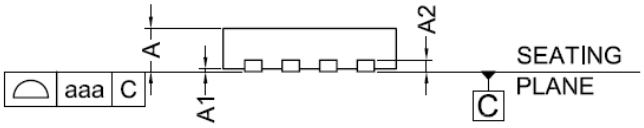
PPAK2X3 Dual Pin



BOTTOM VIEW



TOP VIEW



SIDE VIEW

SYMBOL	MIN	TYP	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2		0.203	
b	0.25	0.30	0.35
D	2.95	3.00	3.05
D1	0.80	0.90	1.00
E	195	2.00	2.05
E1	0.20	0.30	0.40
e		0.65BSC	
L	0.30	0.35	0.40
K		0.20MIN	
N		8	
aaa		0.08	
bbb		0.10	