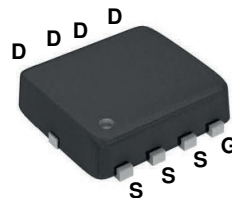
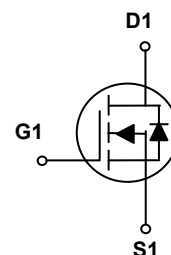


Main Product Characteristics

BV_{DSS}	40V
$R_{DS(ON)}$	7.2m Ω (max.)
I_D	45A



PPAK3X3



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 GSFP0446 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 ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	+20/-12	V
Drain Current-Continuous ($T_C=25^{\circ}\text{C}$)	I_D	45	A
Drain Current-Continuous ($T_C=100^{\circ}\text{C}$)		28	
Drain Current-Pulsed ¹	I_{DM}	180	A
Single Pulse Avalanche Energy ²	E_{AS}	65	mJ
Single Pulse Avalanche Current ²	I_{AS}	36	A
Power Dissipation ($T_C=25^{\circ}\text{C}$)	P_D	33	W
Power Dissipation-De-rate above 25°C		0.26	W/ $^{\circ}\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.84	$^{\circ}\text{C}/\text{W}$
Operating Junction Temperature Range	T_J	-55 To +150	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-55 To +150	$^{\circ}\text{C}$

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
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	-	-	1	μA
		$V_{DS}=32V, V_{GS}=0V, T_J=100^{\circ}\text{C}$	-	-	10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=20V, V_{DS}=0V$	-	-	100	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=8A$	-	6	7.2	m Ω
		$V_{GS}=4.5V, I_D=6A$	-	9.6	12.5	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.6	2.5	V
Forward Transconductance	g_{fs}	$V_{DS}=10V, I_S=1A$	-	5	-	S
Dynamic and Switching Characteristics						
Total Gate Charge ^{3,4}	Q_g	$V_{DS}=20V, I_D=25A$ $V_{GS}=10V$	-	13.7	20	nC
Gate-Source Charge ^{3,4}	Q_{gs}		-	2.2	5	
Gate-Drain Charge ^{3,4}	Q_{gd}		-	3.7	7	
Turn-On Delay Time ^{3,4}	$t_{d(on)}$	$V_{DD}=20V, R_G=6\Omega$ $V_{GS}=10V, I_D=25A$	-	10	15	nS
Rise Time ^{3,4}	t_r		-	14	21	
Turn-Off Delay Time ^{3,4}	$t_{d(off)}$		-	28	42	
Fall Time ^{3,4}	t_f		-	20	30	
Input Capacitance	C_{iss}	$V_{DS}=20V, V_{GS}=0V,$ $F=1\text{MHz}$	-	930	1400	pF
Output Capacitance	C_{oss}		-	380	570	
Reverse Transfer Capacitance	C_{rss}		-	30	45	
Gate Resistance	R_g	$V_{GS}=0V, V_{DS}=0V,$ $F=1\text{MHz}$	-	1	-	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_S	$V_G=V_D=0V,$ Force Current	-	-	45	A
Pulsed Source Current	I_{SM}		-	-	90	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V,$ $I_S=1A, T_J=25^{\circ}\text{C}$	-	-	1	V
Reverse Recovery Time	t_{rr}	$V_R=30V, I_S=10A$ $di/dt=100A/\mu s$ $T_J=25^{\circ}\text{C}$	-	45	-	nS
Reverse Recovery Charge	Q_{rr}		-	35	-	nC

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=36A, R_G=25\Omega$, starting $T_J=25^{\circ}\text{C}$.
3. Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

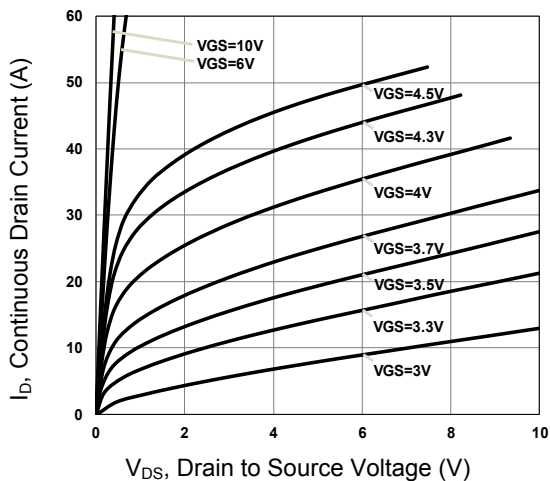


Figure 1. Typical Output Characteristics

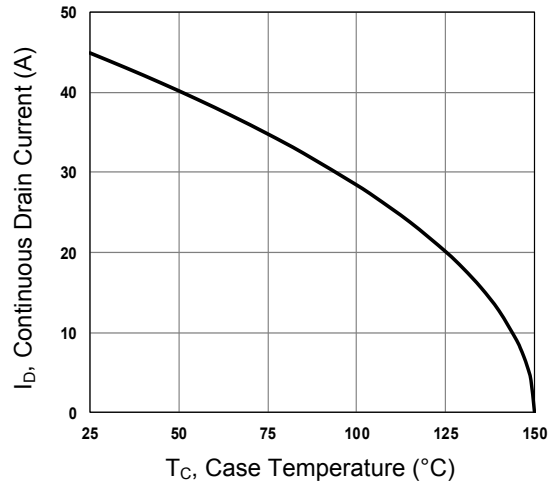


Figure 2. Continuous Drain Current vs. T_C

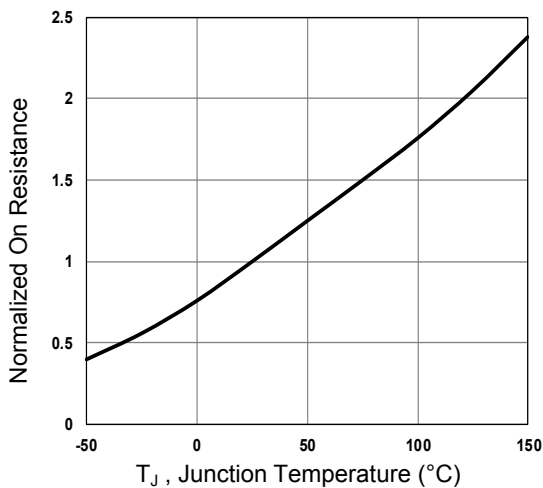


Figure 3. Normalized $R_{DS(ON)}$ vs. T_J

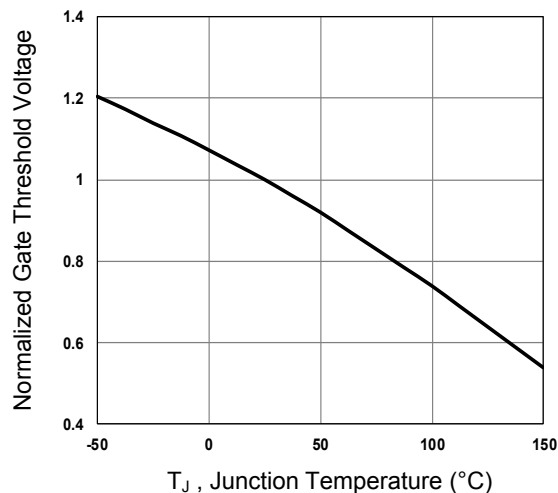


Figure 4. Normalized V_{th} vs. T_J

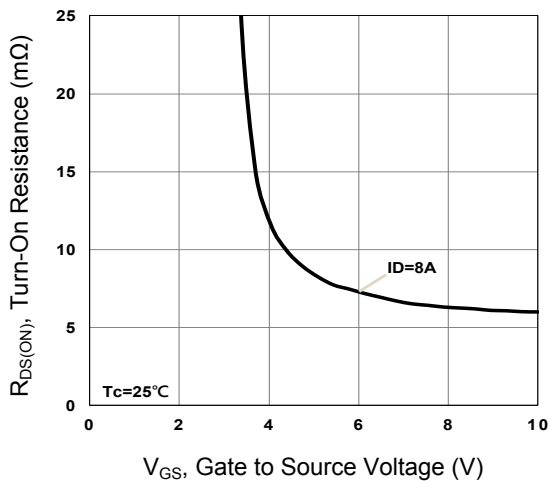


Figure 5. Turn-On Resistance vs. V_{GS}

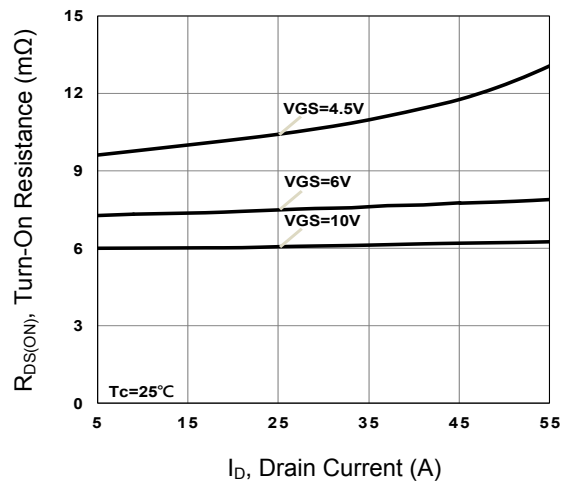


Figure 6. Turn-On Resistance vs. I_D

Typical Electrical and Thermal Characteristic Curves

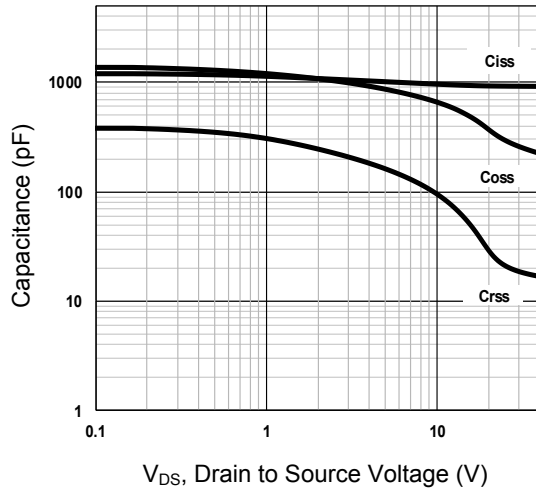


Figure 7. Capacitance Characteristics

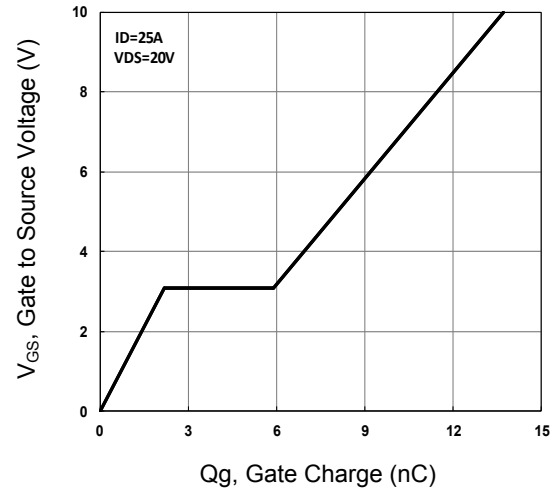


Figure 8. Gate Charge Characteristics

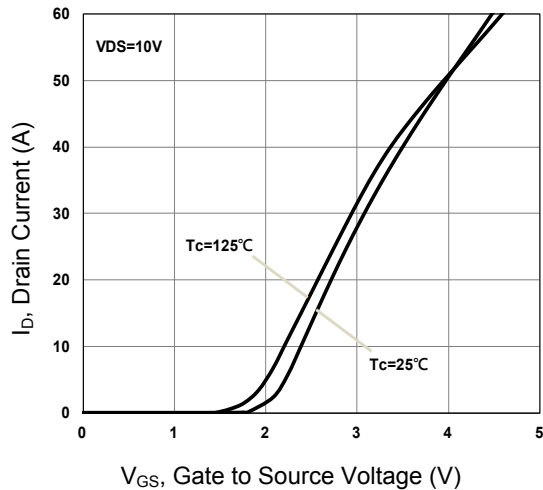


Figure 9. Transfer Characteristics

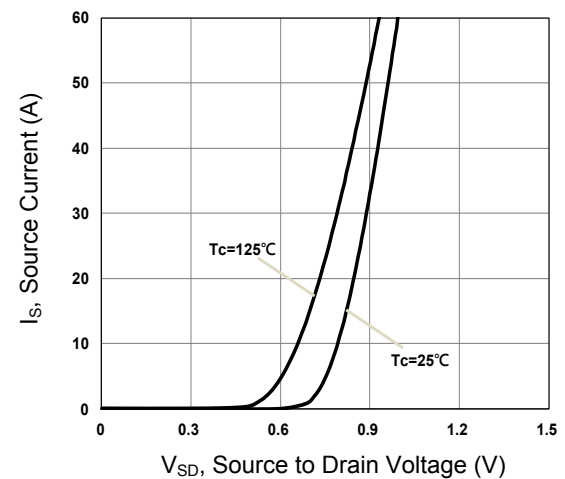


Figure 10. Source Current vs. V_{SD}

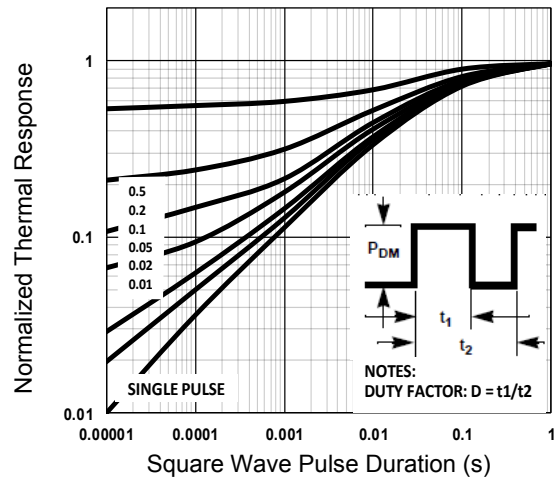


Figure 11. Normalized Transient Impedance

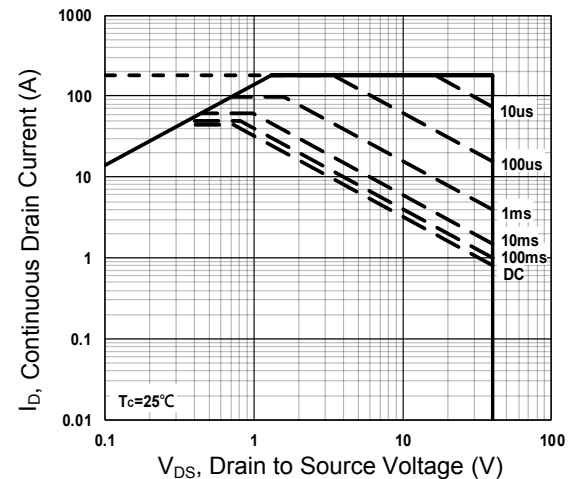
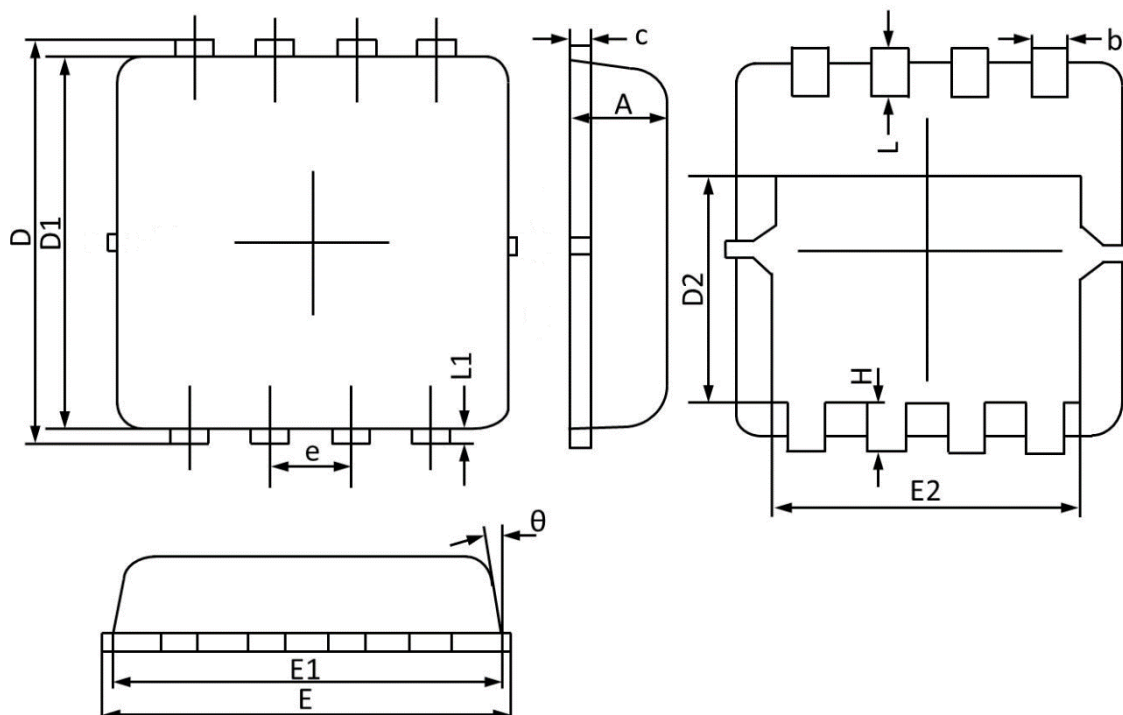


Figure 12. Maximum Safe Operation Area

Package Outline Dimensions (PPAK3X3)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.900	0.028	0.035
b	0.250	0.350	0.010	0.014
c	0.100	0.250	0.004	0.010
D	3.050	3.500	0.120	0.138
D1	2.900	3.200	0.114	0.126
D2	1.350	1.950	0.053	0.077
E	3.000	3.400	0.118	0.134
E1	2.900	3.300	0.114	0.130
E2	2.350	2.600	0.093	0.102
e	0.65BSC		0.026BSC	
H	0.300	0.750	0.012	0.030
L	0.300	0.600	0.012	0.024
L1	0.060	0.200	0.002	0.008
θ	6°	14°	6°	14°

Recommended Pad Layout

