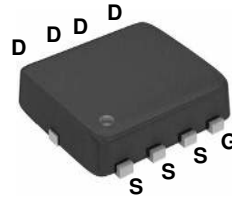
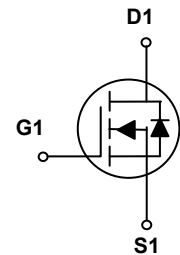


## Main Product Characteristics

$BV_{DSS}$	40V
$R_{DS(ON)}$	7.2m $\Omega$
$I_D$	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 <sup>1</sup>	$I_{DM}$	180	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	65	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	36	A
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	33	W
Power Dissipation-Derate above $25^\circ\text{C}$		0.26	
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	$^\circ\text{C}$

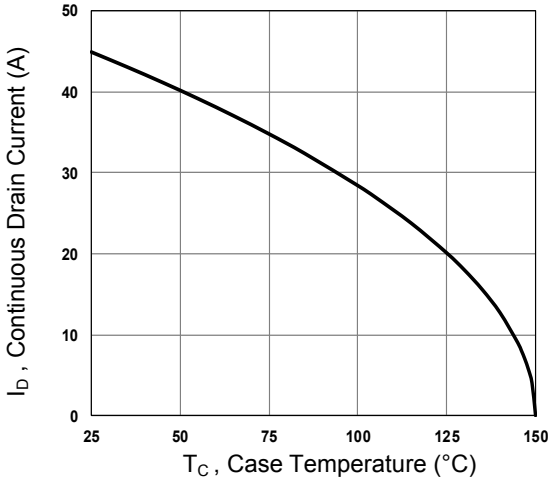
**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On/Off Characteristics</b>						
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	$\mu A$
		$V_{DS}=32V, V_{GS}=0V, T_J=100^{\circ}\text{C}$	-	-	10	$\mu A$
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 $\Omega$
		$V_{GS}=4.5V, I_D=6A$	-	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
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=20V, I_D=25A$ $V_{GS}=10V$	-	13.7	20	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		-	2.2	5	
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		-	3.7	7	
Turn-On Delay Time <sup>3,4</sup>	$t_{d(on)}$	$V_{DD}=20V, R_G=6\Omega$ $V_{GS}=10V, I_D=25A$	-	10	15	nS
Rise Time <sup>3,4</sup>	$t_r$		-	14	21	
Turn-Off Delay Time <sup>3,4</sup>	$t_{d(off)}$		-	28	42	
Fall Time <sup>3,4</sup>	$t_f$		-	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	-	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
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

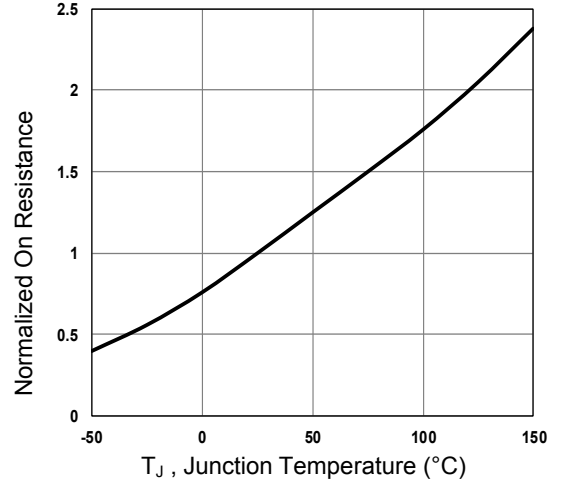
Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=36A, R_G=25\Omega,$  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.

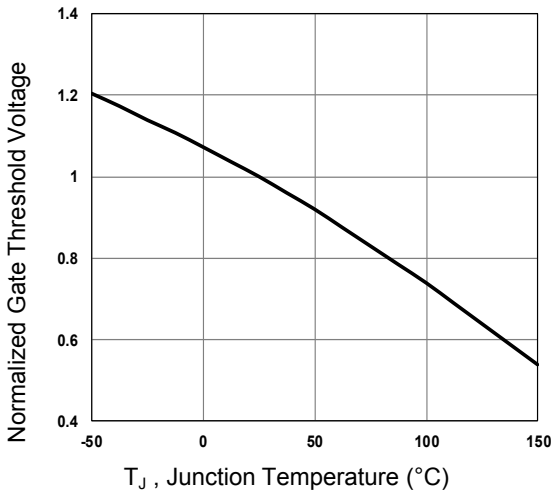
**Typical Electrical and Thermal Characteristic Curves**



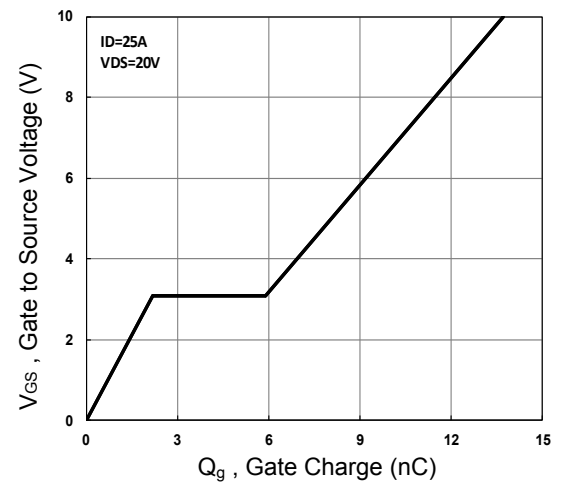
**Figure 1. Continuous Drain Current vs.  $T_c$**



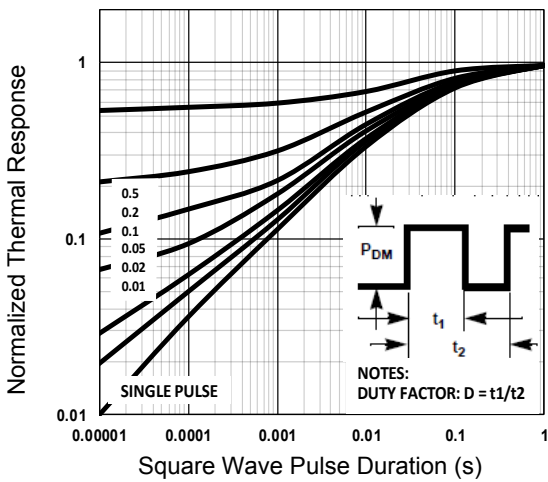
**Figure 2. Normalized  $R_{DS(ON)}$  vs.  $T_j$**



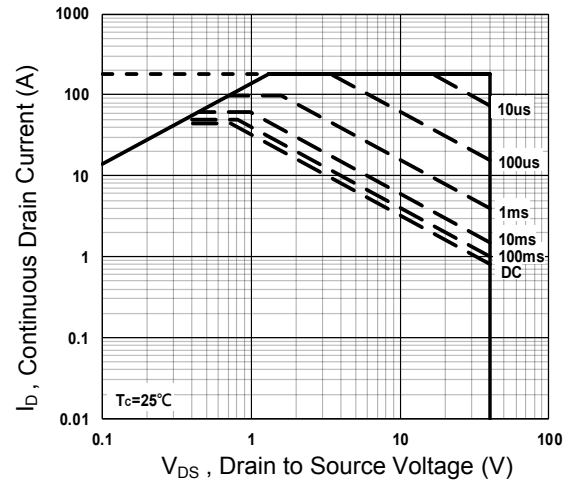
**Figure 3. Normalized  $V_{th}$  vs.  $T_j$**



**Figure 4. Gate Charge Waveform**

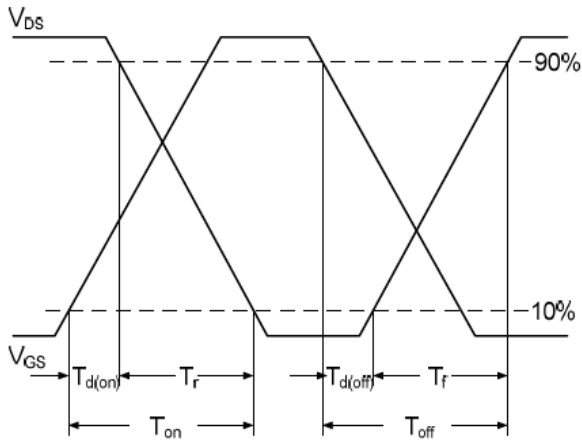


**Figure 5. Normalized Transient Impedance**

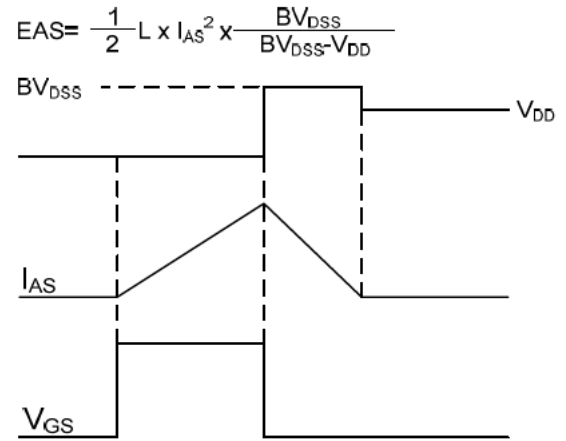


**Figure 6. Maximum Safe Operation Area**

**Typical Electrical and Thermal Characteristic Curves**

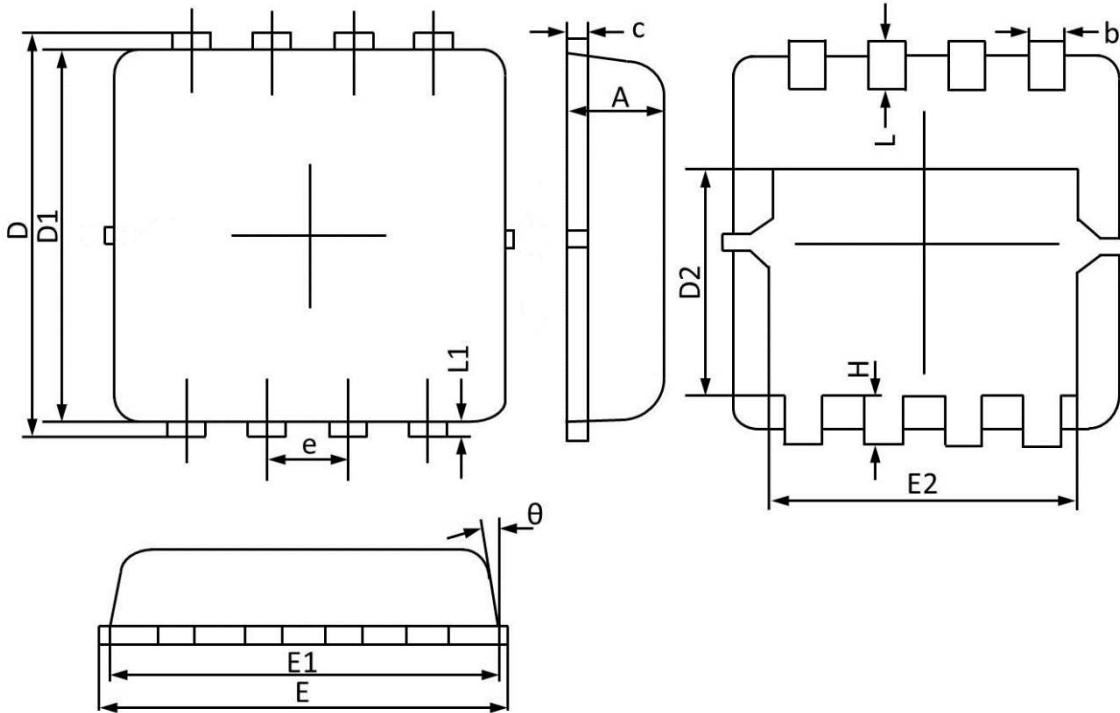


**Figure 7. Switching Time Waveform**



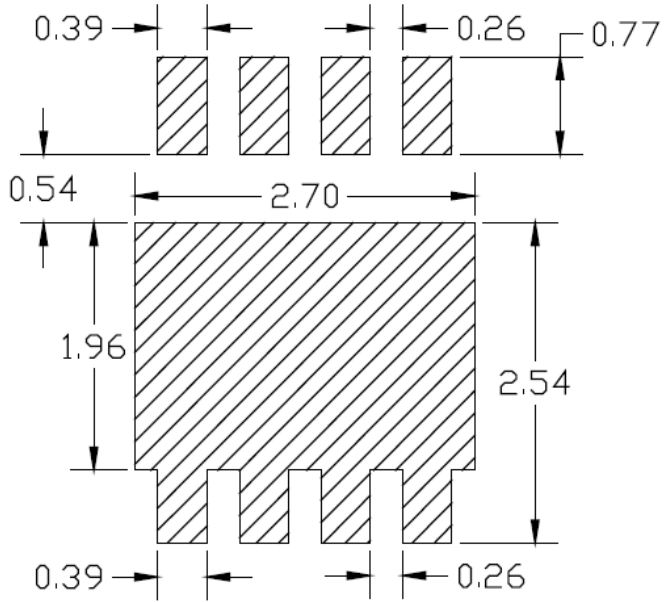
**Figure 8. EAS Waveform**

**Package Outline Dimensions PPAK3X3**



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

### Recommended Pad Layout



unit : mm