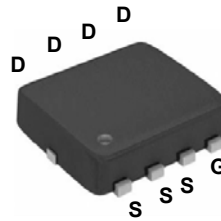
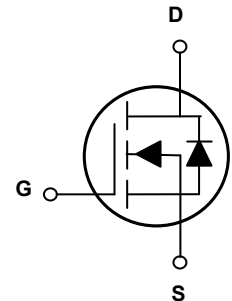


Main Product Characteristics

$V_{(BR)DSS}$	30V
$R_{DS(ON)}$	3.8mΩ
I_D	80A



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 GSFN3904 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 ($T_C=25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous($T_C=25^{\circ}C$)	I_D	80	A
Drain Current-Continuous($T_C=100^{\circ}C$)		51	
Drain Current-Pulsed ¹	I_{DM}	320	A
Single Pulse Avalanche Energy ²	E_{AS}	125	mJ
Single Pulse Avalanche Current ²	I_{AS}	50	A
Power Dissipation($T_C=25^{\circ}C$)	P_D	66	W
Power Dissipation-Derate above 25°C		0.53	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2	°C/W
Operating Junction Temperature Range	T_J	-55 To +175	°C
Storage Temperature Range	T_{STG}	-55 To +175	°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}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
BV_{DSS} Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C , $I_D=1mA$	-	0.03	-	$V/^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=30V,$ $V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	1	μA
		$V_{DS}=24V, V_{GS}=0V,$ $T_J=125^\circ\text{C}$	-	-	10	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Static Drain-Source On-Resistance ³	$R_{DS(ON)}$	$V_{GS}=10V, I_D=24A$	-	2.9	3.8	m Ω
		$V_{GS}=4.5V, I_D=12A$	-	4.3	5.5	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.6	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		-	-5	-	$mV/^\circ\text{C}$
Forward Transconductance	g_{fs}	$V_{DS}=10V, I_D=10A$	-	28	-	S
Dynamic and Switching Characteristics						
Total Gate Charge ^{3,4}	Q_g	$V_{DS}=15V,$ $I_D=24A,$ $V_{GS}=4.5V$	-	24	34	nC
Gate-Source Charge ^{3,4}	Q_{gs}		-	4.2	6	
Gate-Drain Charge ^{3,4}	Q_{gd}		-	13	18	
Turn-On Delay Time ^{3,4}	$t_{d(on)}$	$V_{DD}=15V, R_G=3.3\Omega,$ $V_{GS}=10V, I_D=15A$	-	12.6	24	nS
Rise Time ^{3,4}	t_r		-	19.5	37	
Turn-Off Delay Time ^{3,4}	$t_{d(off)}$		-	42.8	81	
Fall Time ^{3,4}	t_f		-	13.2	25	
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $F=1MHz$	-	2200	3190	pF
Output Capacitance	C_{oss}		-	280	405	
Reverse Transfer Capacitance	C_{rss}		-	177	255	
Gate Resistance	R_g	$V_{GS}=0V, V_{DS}=0V,$ $F=1MHz$	-	2	4	Ω
Guaranteed Avalanche Energy						
Single Pulse Avalanche Energy	E_{AS}	$V_{DD}=25V,$ $L=0.1mH, I_{AS}=24A$	31	-	-	mJ
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_S	$V_G=V_D=0V,$ Force Current	-	-	80	A
Pulsed Source Current ³	I_{SM}		-	-	320	A
Diode Forward Voltage ³	V_{SD}	$V_{GS}=0V,$ $I_S=1A, T_J=25^\circ\text{C}$	-	-	1	V

Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=50A, R_G=25\Omega,$ Starting $T_J=25^\circ\text{C}$.
3. Pulsed tested: pulse width $\leq 300\mu s,$ duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

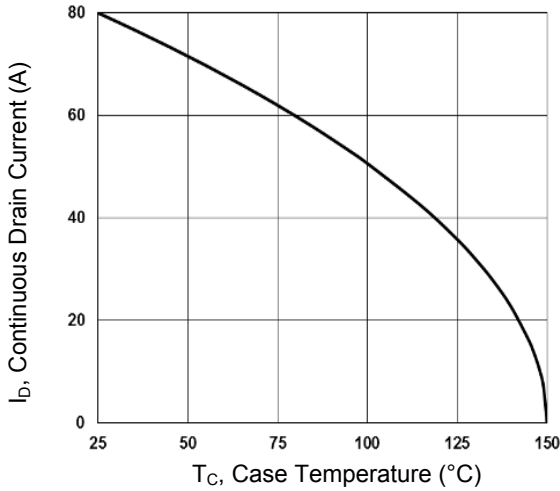


Figure 1. Continuous Drain Current vs. T_c

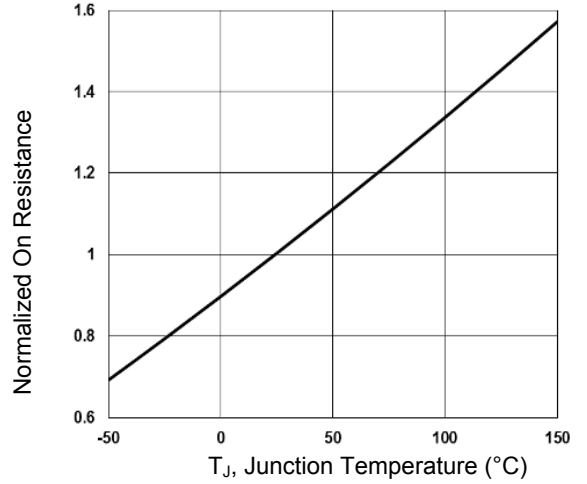


Figure 2. Normalized $R_{DS(ON)}$ vs. T_j

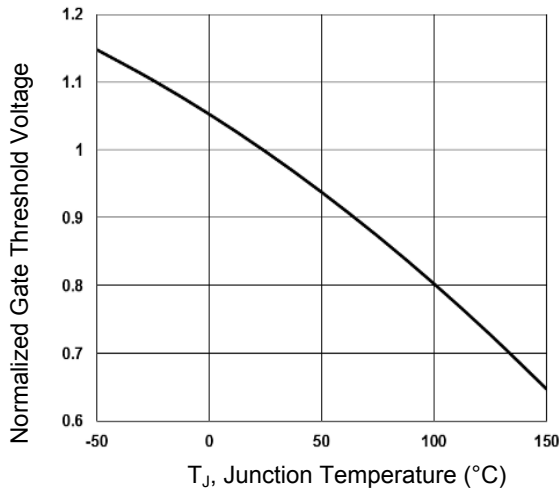


Figure 3. Normalized V_{th} vs. T_j

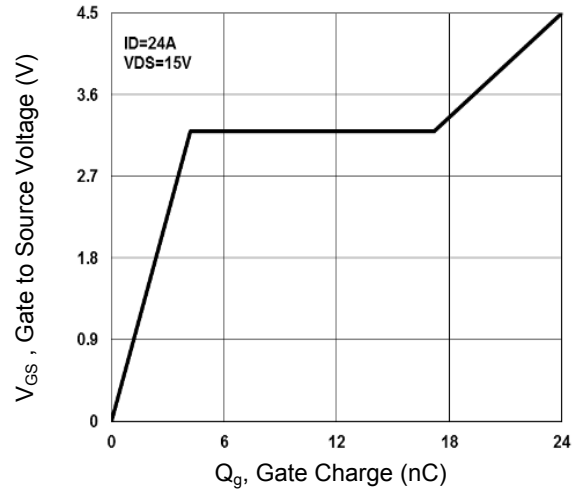


Figure 4. Gate Charge Characteristics

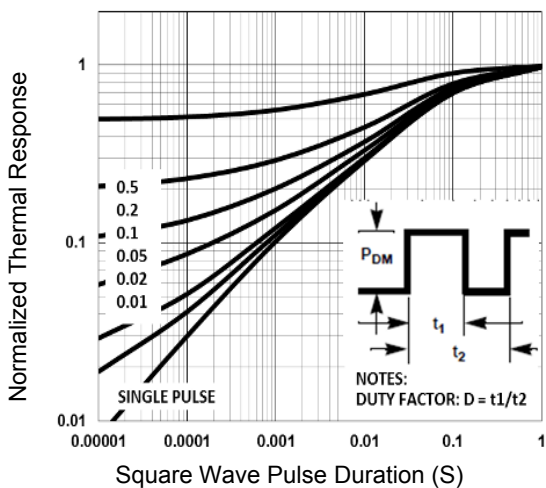


Figure 5. Normalized Transient Impedance

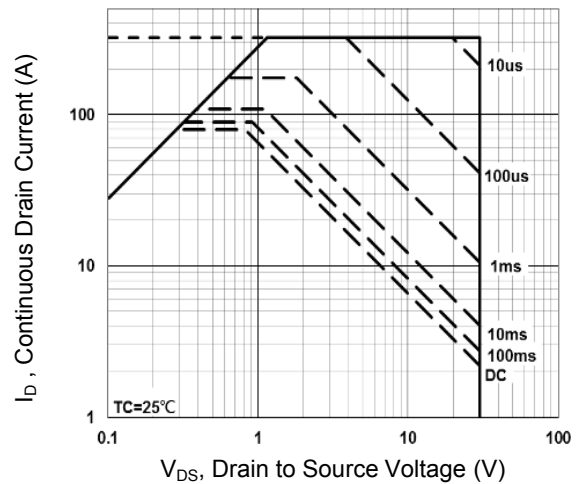


Figure 6. Maximum Safe Operation Area

Typical Electrical and Thermal Characteristic Curves

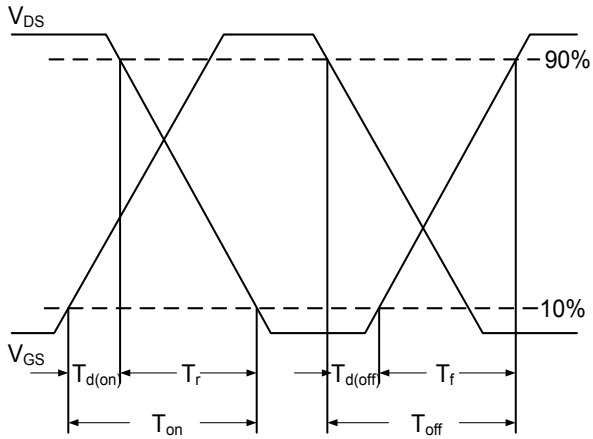


Figure 7. Switching Time Waveform

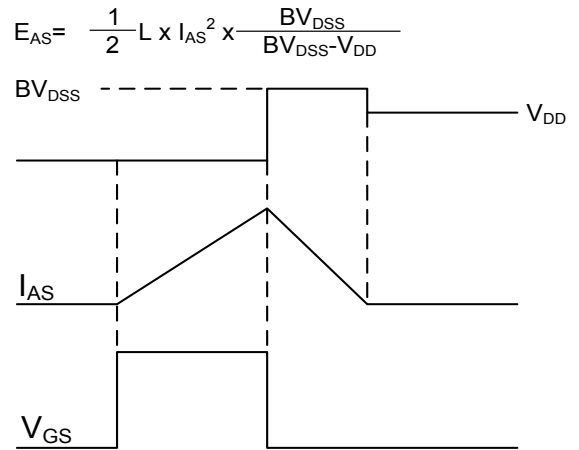
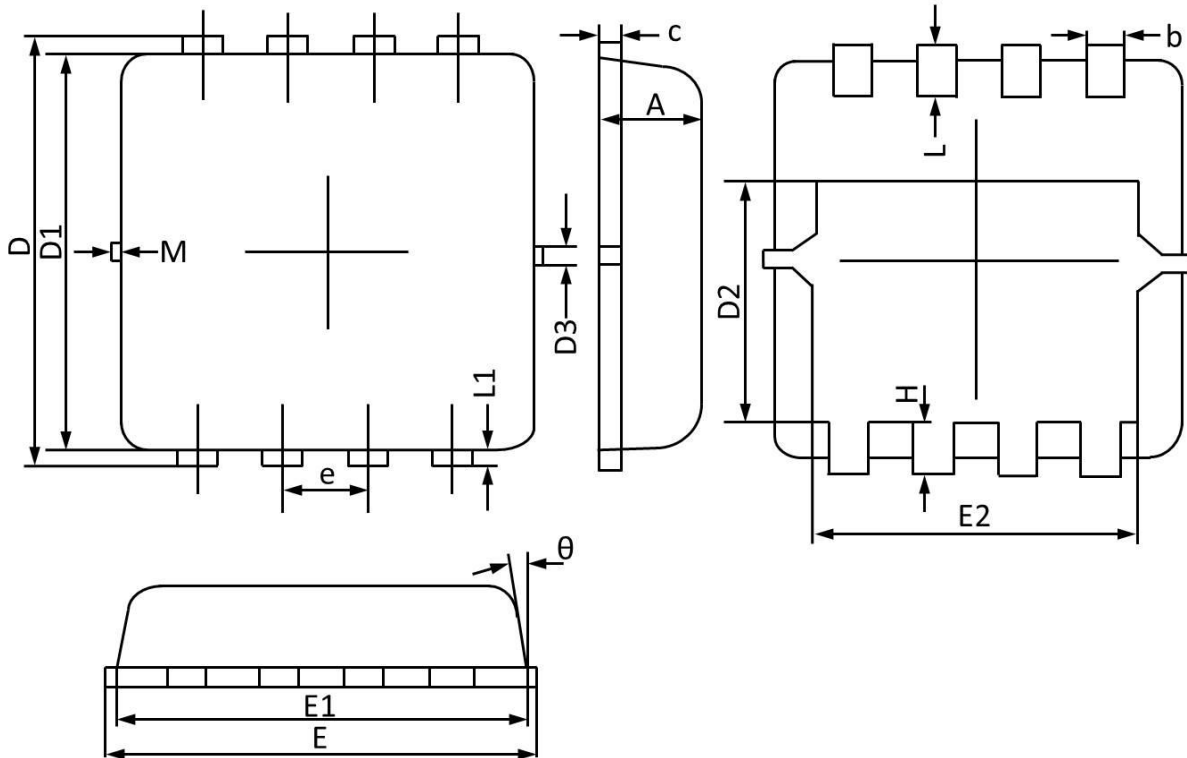


Figure 8. EAS Waveform

$$E_{AS} = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

Package Outline Dimensions

PPAK3X3



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
b	0.250	0.350	0.010	0.013
c	0.100	0.250	0.004	0.009
D	3.250	3.450	0.128	0.135
D1	3.000	3.200	0.119	0.125
D2	1.780	1.980	0.070	0.077
D3	0.130 REF		0.005 REF	
E	3.200	3.400	0.126	0.133
E1	3.000	3.200	0.119	0.125
E2	2.390	2.590	0.094	0.102
e	0.650 BSC		0.026 BSC	
H	0.300	0.500	0.011	0.019
L	0.300	0.500	0.011	0.019
L1	0.130 REF		0.005 REF	
θ	0°	12°	0°	12°
M	0.150 REF		0.006 REF	