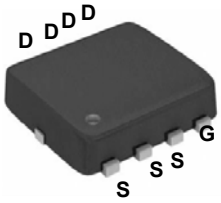
GOOD-ARK
SEMICONDUCTOR

GSFN3906

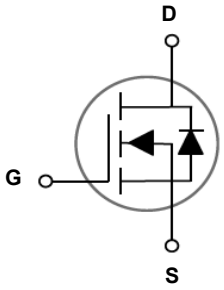
30V N-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	30V
$R_{DS(ON)}$	6mΩ
I_D	60A



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 GSFN3906 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	Value	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current – Continuous (T_C=25°C)	I_D	60	A
Drain Current – Continuous (T_C=100°C)		38	A
Drain Current – Pulsed[1]	I_{DM}	240	A
Single Pulse Avalanche Energy[2]	E_{AS}	88	mJ
Single Pulse Avalanche Current[2]	I_{AS}	42	A
Power Dissipation (T_C=25°C)	P_D	45	W
Power Dissipation – Derate above 25°C		0.36	W/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	62	°C/W
Thermal Resistance Junction to Case	$R_{\theta JC}$	2.8	°C/W
Operating Junction Temperature Range	T_J	-55 to +150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Electrical Characteristics (T_J=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static State Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	30	---	---	V
BV_{DSS} Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=1mA	---	0.04	---	V/°C
Drain-Source Leakage Current	I_{DSS}	V_{DS}=30V, V_{GS}=0V, T_J=25°C	---	---	1	uA
		V_{DS}=24V, V_{GS}=0V, T_J=125°C	---	---	10	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	---	---	±100	nA
Static Drain-Source On-Resistance[3]	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A	---	4.8	5.8	mΩ
		V_{GS}=10V, I_D=20A	---	4.8	6.0	
		V_{GS}=4.5V, I_D=10A	---	6.7	8.2	
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D =250uA	1.2	1.6	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\triangle V_{GS(th)}$		---	-4	---	mV/°C
Forward Transconductance	gfs	V_{DS}=10V, I_D=10A	---	23	---	S
Dynamic Characteristics						
Total Gate Charge[3, 4]	Q_g	V_{DS}=15V, V_{GS}=4.5V, I_D=20A	---	11.1	18	nC
Gate-Source Charge[3, 4]	Q_{gs}		---	1.85	3.8	
Gate-Drain Charge[3, 4]	Q_{gd}		---	6.8	12	
Turn-On Delay Time[3, 4]	$T_{d(on)}$	V_{DD}=15V, V_{GS}=10V, R_G=3.3Ω, I_D=15A	---	7.5	14	nS
Rise Time[3, 4]	T_r		---	14.5	28	
Turn-Off Delay Time[3, 4]	$T_{d(off)}$		---	35.2	67	
Fall Time[3, 4]	T_f		---	9.6	18	
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, F=1MHz	---	1210	1800	pF
Output Capacitance	C_{oss}		---	190	280	
Reverse Transfer Capacitance	C_{rss}		---	100	150	
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	2.5	5	Ω
Guaranteed Avalanche Energy						
Single Pulse Avalanche Energy	E_{AS}	V_{DD}=25V, L=0.1mH, IAS=20A	20	---	---	mJ
Drain-Source Diode Characteristics						
Continuous Source Current	I_S	V_G=V_D=0V, Force Current	---	---	60	A
Pulsed Source Current[3]	I_{SM}		---	---	240	A
Diode Forward Voltage[3]	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. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=42A, R_G=25Ω, Starting T_J=25°C.
3. The data tested by pulsed, pulse width ≦ 300uS, duty cycle ≦ 2 %.
4. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

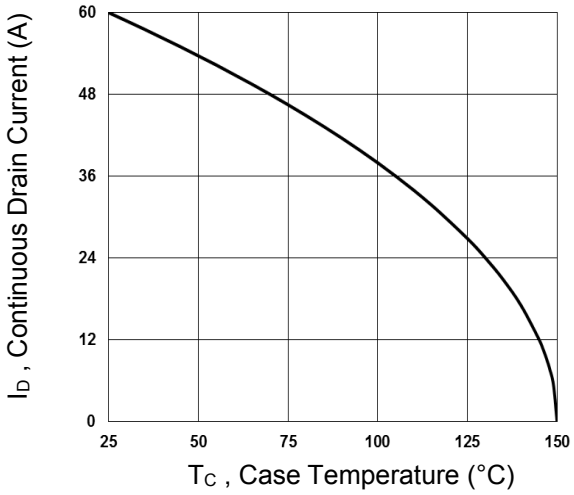


Fig.1 Continuous Drain Current vs. T_C

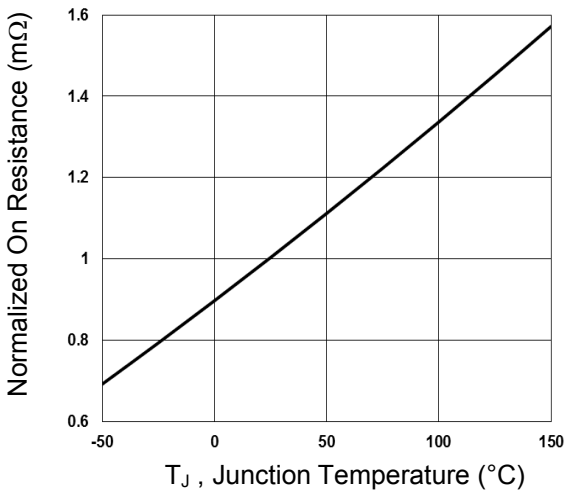


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

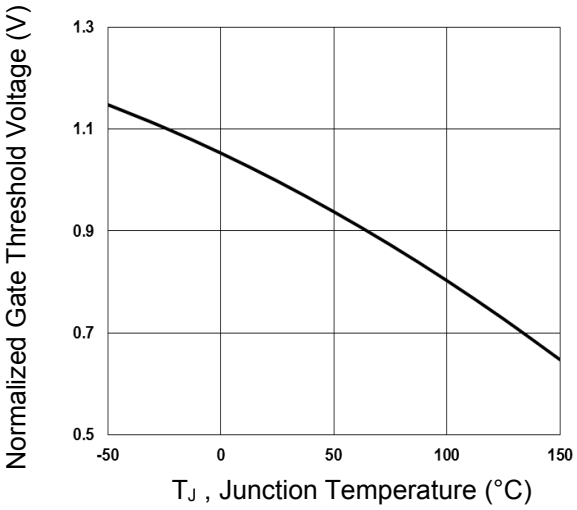


Fig.3 Normalized V_{th} vs. T_J

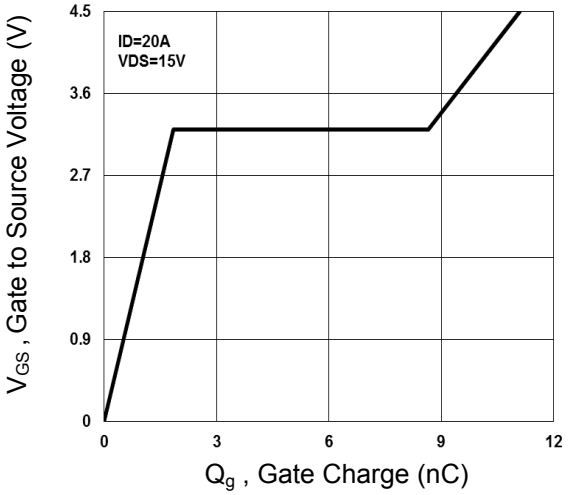


Fig.4 Gate Charge Waveform

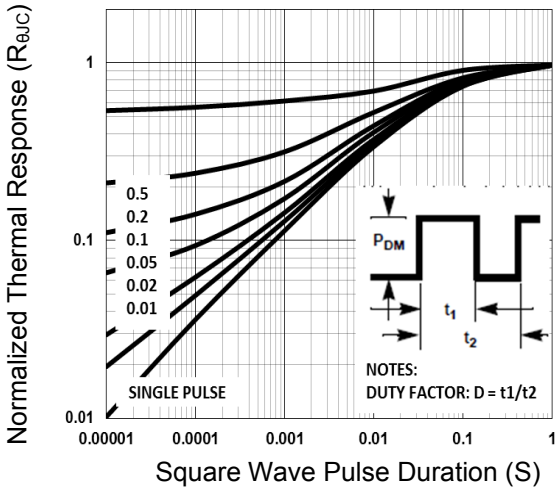


Fig.5 Normalized Transient Impedance

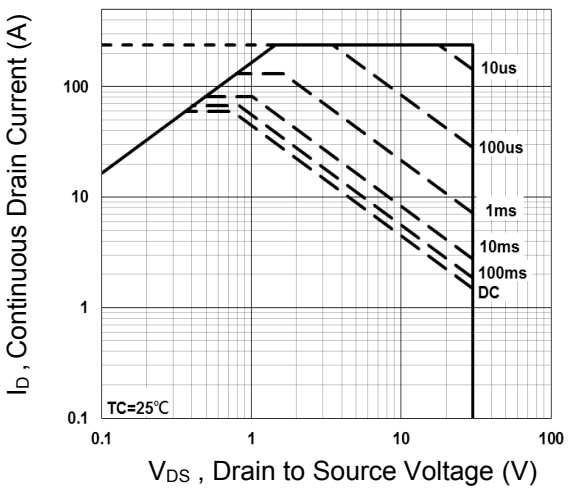


Fig.6 Maximum Safe Operation Area

Typical Electrical and Thermal Characteristic Curves

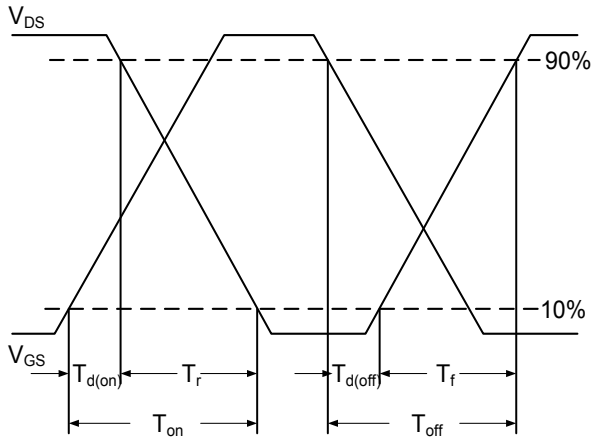


Fig.7 Switching Time Waveform

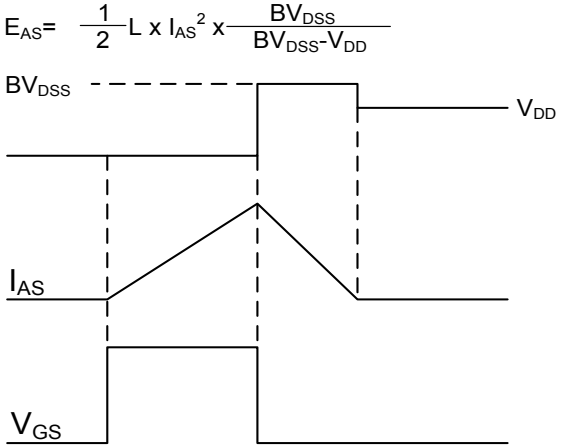
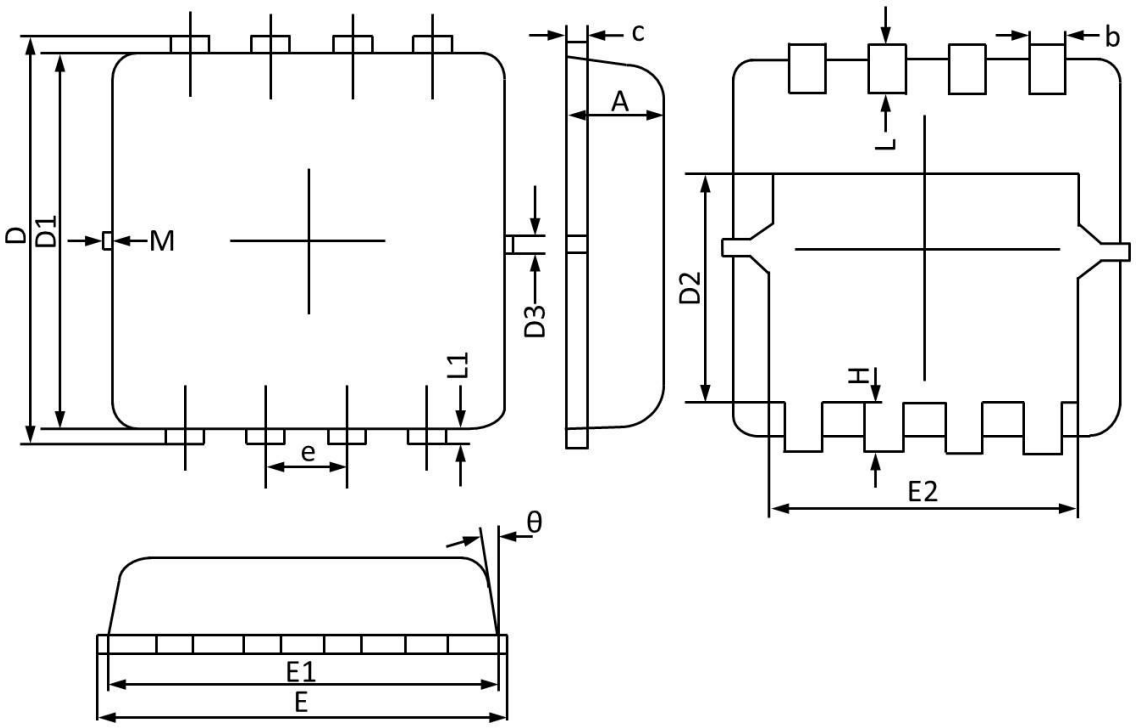


Fig.8 E_{AS} Waveform

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	