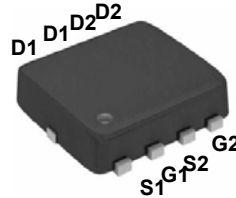
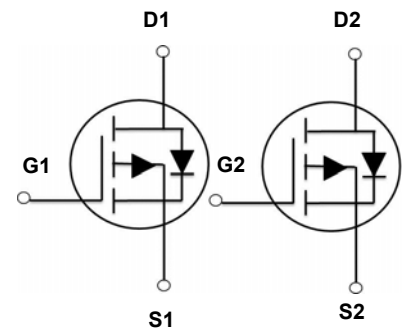


**Main Product Characteristics**

$V_{(BR)DSS}$	-20V
$R_{DS(ON)}$	33mΩ
$I_D$	-7.5A



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 GSFN2209 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	Rating	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	±10	V
Drain Current – Continuous ( $T_C=25^{\circ}C$ )	$I_D$	-7.5	A
Drain Current – Continuous ( $T_C=100^{\circ}C$ )		-4.5	A
Drain Current – Pulsed <sup>1</sup>	$I_{DM}$	-30	A
Power Dissipation ( $T_C=25^{\circ}C$ )	$P_D$	25	W
Power Dissipation – Derate above 25°C		0.2	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	$R_{\theta JA}$	---	62	°C/W
Thermal Resistance Junction to Case	$R_{\theta JC}$	---	5	°C/W

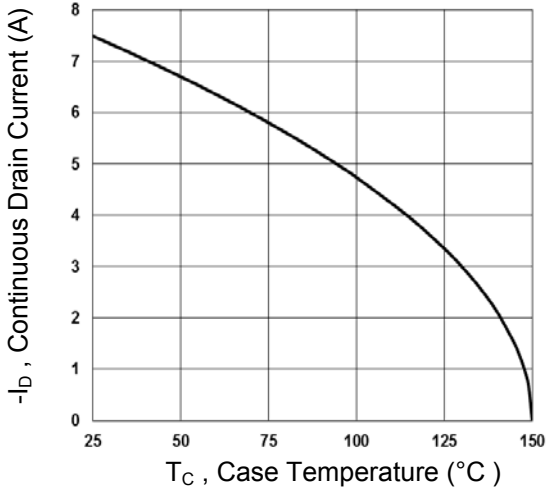
**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-20	---	---	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}, I_D=-1mA$	---	-0.02	---	$V/^\circ\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-20V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	$\mu A$
		$V_{DS}=-16V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 10V, V_{DS}=0V$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance <sup>2</sup>	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_D=-4A$	---	28	33	m $\Omega$
		$V_{GS}=-2.5V, I_D=-3A$	---	37	45	m $\Omega$
		$V_{GS}=-1.8V, I_D=-2A$	---	49	65	m $\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.3	-0.6	-1	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		---	2	---	$mV/^\circ\text{C}$
Forward Transconductance	gfs	$V_{DS}=-10V, I_D=-3A$	---	8.5	---	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>2,3</sup>	$Q_g$	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-4A$	---	16.1	25	nC
Gate-Source Charge <sup>2,3</sup>	$Q_{gs}$		---	1.8	3.6	
Gate-Drain Charge <sup>2,3</sup>	$Q_{gd}$		---	3.8	7	
Turn-On Delay Time <sup>2,3</sup>	$T_{d(on)}$	$V_{DD}=-10V, V_{GS}=-4.5V, R_G=25\Omega, I_D=1A$	---	8.2	16	nS
Rise Time <sup>2,3</sup>	$T_r$		---	30	57	
Turn-Off Delay Time <sup>2,3</sup>	$T_{d(off)}$		---	71	135	
Fall Time <sup>2,3</sup>	$T_f$		---	20	38	
Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V, F=1MHz$	---	1440	2100	pF
Output Capacitance	$C_{oss}$		---	155	230	
Reverse Transfer Capacitance	$C_{rss}$		---	115	170	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V, \text{Force Current}$	---	---	-7.5	A
Pulsed Source Current <sup>2</sup>	$I_{SM}$		---	---	-15	A
Diode Forward Voltage <sup>2</sup>	$V_{SD}$	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1	V

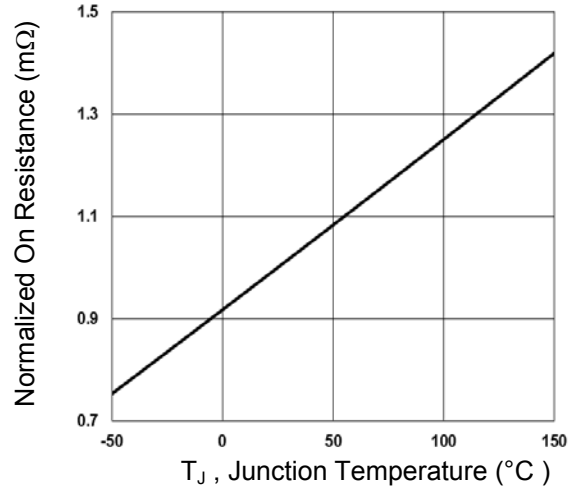
Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width  $\leq 300\mu S$ , duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.

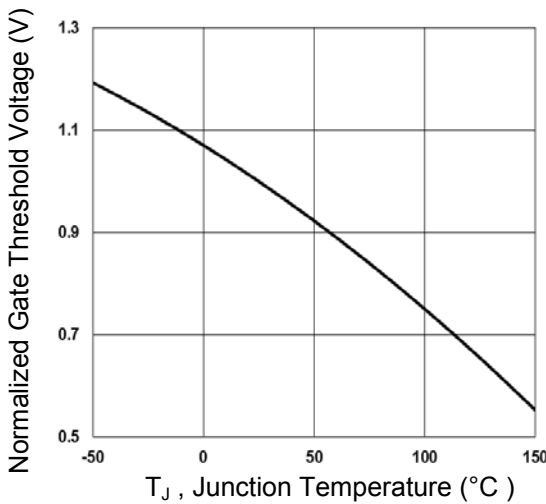
**Typical Electrical and Thermal Characteristic Curves**



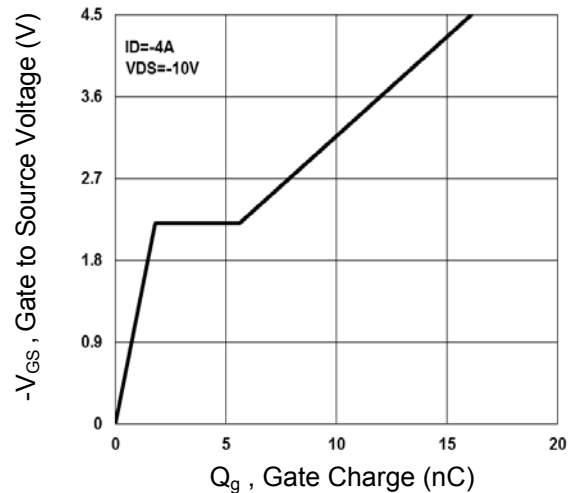
**Fig.1 Continuous Drain Current vs.  $T_c$**



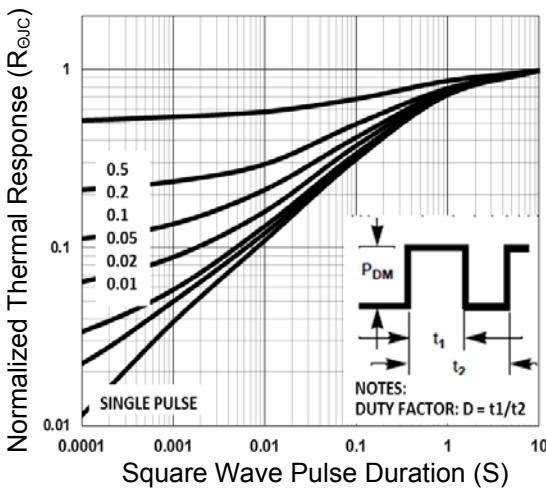
**Fig.2 Normalized  $R_{DS(ON)}$  vs.  $T_j$**



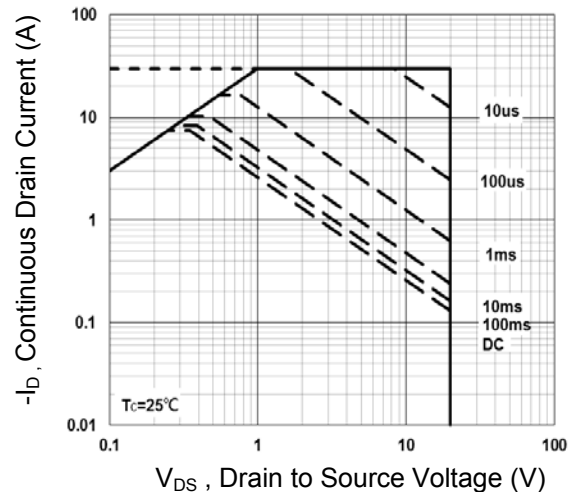
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



**Fig.4 Gate Charge Waveform**

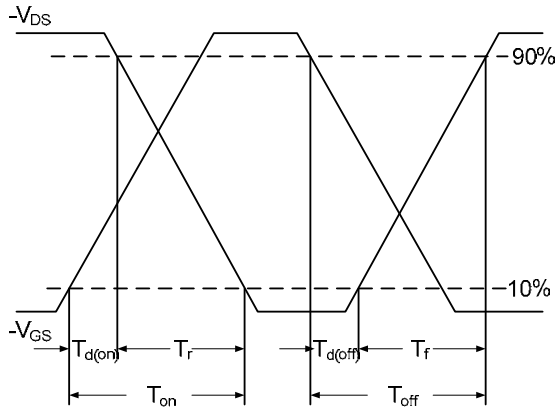


**Fig.5 Normalized Transient Response**

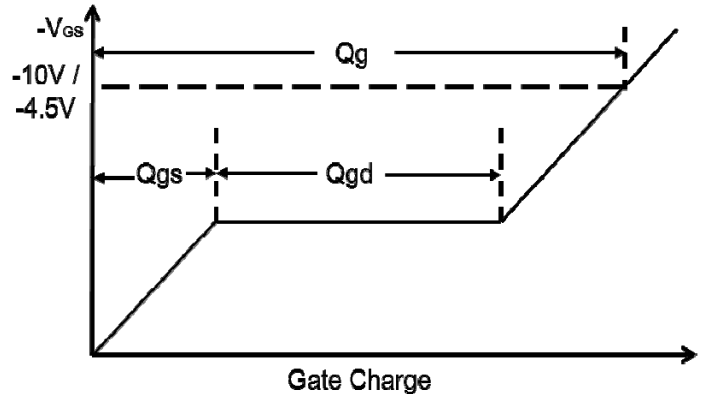


**Fig.6 Maximum Safe Operation Area**

**Typical Electrical and Thermal Characteristic Curves**



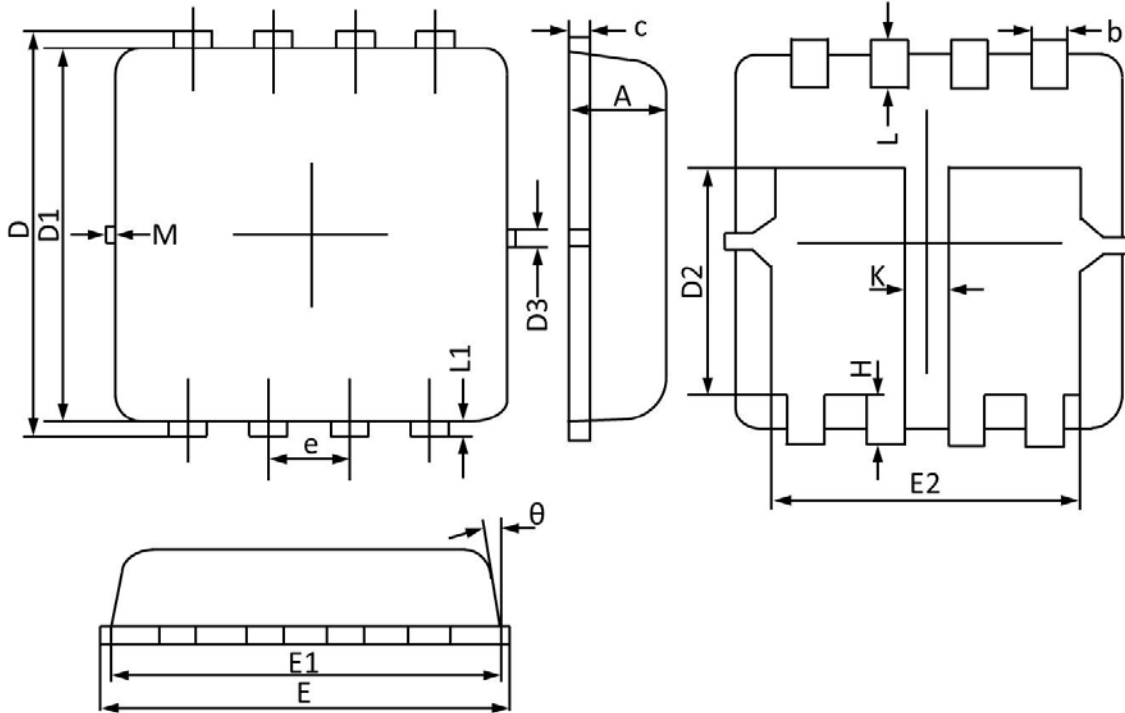
**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge Waveform**

**Package Outline Dimensions**

**PPAK3X3**



Gma Vc`	8 ja Ybg]cbg' -b' A]` ja YHfg		8 ja Ybg]cbg' -b' -bW Yg	
	A ]b	A U	A ]b	A U
A	0.7	0.8	0.028	0.031
b	0.25	0.35	0.01	0.013
c	0.1	0.25	0.004	0.009
D	3.25	3.45	0.128	0.135
D1	3	3.2	0.119	0.125
D2	1.78	1.98	0.07	0.077
D3	0.130 REF		0.005 REF	
E	3.2	3.4	0.126	0.133
E1	3	3.2	0.119	0.125
E2	2.39	2.59	0.094	0.102
e	0.650 BSC		0.026 BSC	
H	0.3	0.5	0.011	0.019
L	0.3	0.5	0.011	0.019
L1	0.130 REF		0.005 REF	
K	0.300 REF		0.012 REF	
θ	0°	12°	0°	12°
M	0.150 REF		0.006 REF	