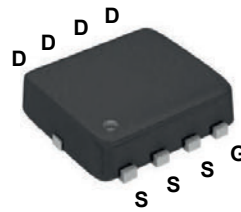
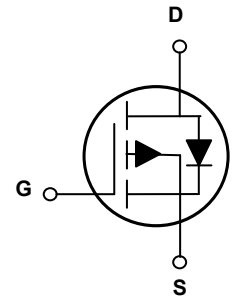


**Main Product Characteristics**

$BV_{DSS}$	-30V
$R_{DS(ON)}$	13mΩ (max.)
$I_D$	-40A



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 GSFN3013 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 supplies and a wide variety of other applications.

**Absolute Maximum Ratings** ( $T_A=25^{\circ}C$  unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	±20	V
Drain Current-Continuous ( $T_C=25^{\circ}C$ )	$I_D$	-40	A
Drain Current-Continuous ( $T_C=100^{\circ}C$ )		-28	
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	-160	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	100	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	-20	A
Power Dissipation ( $T_C=25^{\circ}C$ )	$P_D$	30	W
Power Dissipation-Derate above 25°C		0.24	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.17	°C/W
Operating Junction Temperature Range	$T_J$	-55 To +150	°C
Storage Temperature Range	$T_{STG}$	-55 To +150	°C

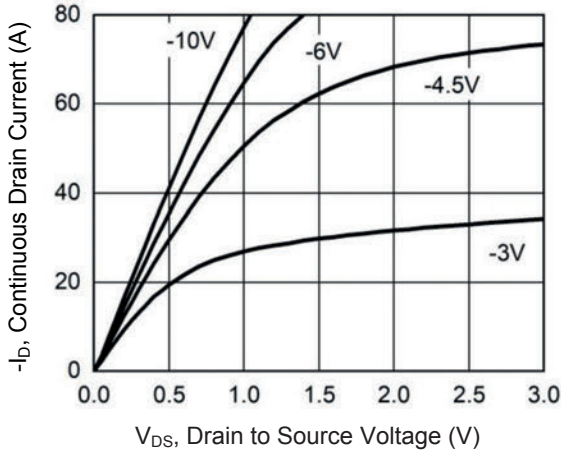

**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On / Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=-1\text{mA}$	-	-0.03	-	$V/^\circ\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-27V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	-1	$\mu\text{A}$
		$V_{DS}=-24V, V_{GS}=0V, T_J=125^\circ\text{C}$	-	-	-10	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-8A$	-	10	13	m $\Omega$
		$V_{GS}=-4.5V, I_D=-6A$	-	15	21	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.1	-1.6	-2.9	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		-	4	-	mV/ $^\circ\text{C}$
Forward Transconductance	gfs	$V_{DS}=-5V, I_D=-6A$	-	10	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>2,3</sup>	$Q_g$	$V_{DS}=-10V, I_D=-6A, V_{GS}=-10V$	-	37	-	nC
Gate-Source Charge <sup>2,3</sup>	$Q_{gs}$		-	8	-	
Gate-Drain Charge <sup>2,3</sup>	$Q_{gd}$		-	9	-	
Turn-On Delay Time <sup>2,3</sup>	$t_{d(on)}$	$V_{DD}=-15V, R_G=3\Omega, V_{GS}=-10V, I_D=-6A$	-	14.4	-	nS
Rise Time <sup>2,3</sup>	$t_r$		-	3.1	-	
Turn-Off Delay Time <sup>2,3</sup>	$t_{d(off)}$		-	89	-	
Fall Time <sup>2,3</sup>	$t_f$		-	35	-	
Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V, F=1\text{MHz}$	-	1480	-	pF
Output Capacitance	$C_{oss}$		-	165	-	
Reverse Transfer Capacitance	$C_{rss}$		-	131	-	
<b>Source-Drain Ratings and Characteristics</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V,$ Force Current	-	-	-40	A
Pulsed Source Current	$I_{SM}$		-	-	-140	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=-3A, T_J=25^\circ\text{C}$	-	-	-1.2	V
Reverse Recovery Time	$T_{rr}$	$I_F=-3A, T_J=25^\circ\text{C}$ $di/dt=-100A/\mu\text{s}$	-	13.9	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	5.1	-	nC

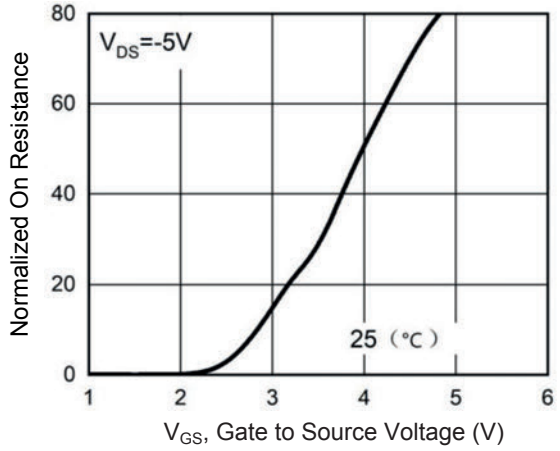
Notes:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=-25V, V_{GS}=-10V, L=0.5\text{mH}, I_{AS}=-20A$ , starting  $T_J=25^\circ\text{C}$ .
3. Pulse test: pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

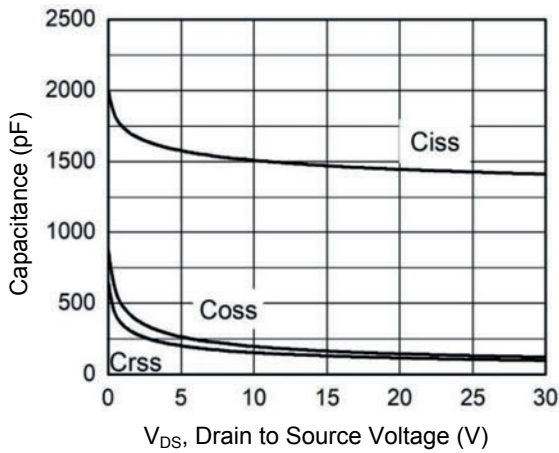
**Typical Electrical and Thermal Characteristic Curves**



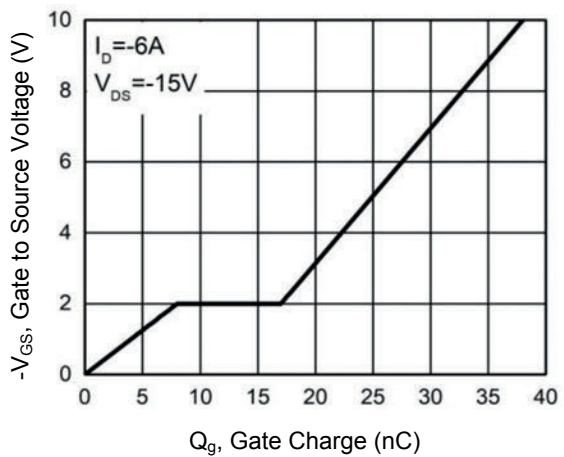
**Figure 1. Output Characteristics**



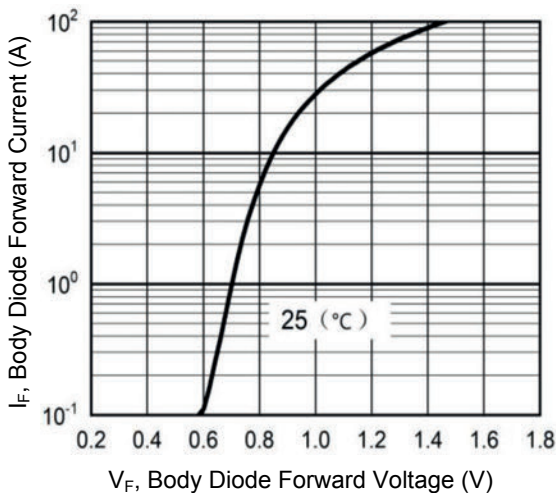
**Figure 2. Transfer Characteristics**



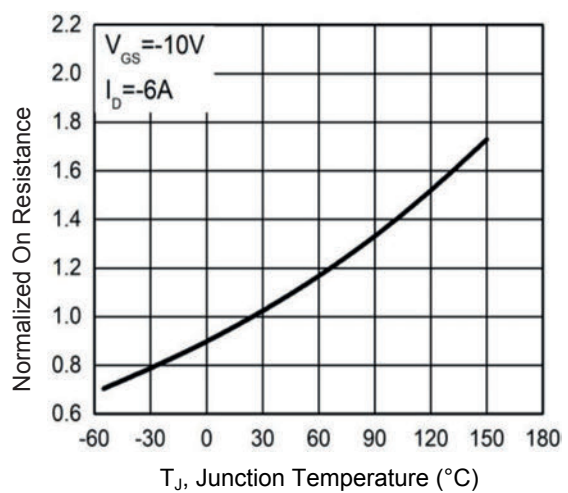
**Figure 3. Capacitance Characteristics**



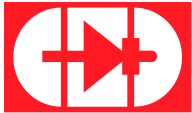
**Figure 4. Gate Charge Waveform**



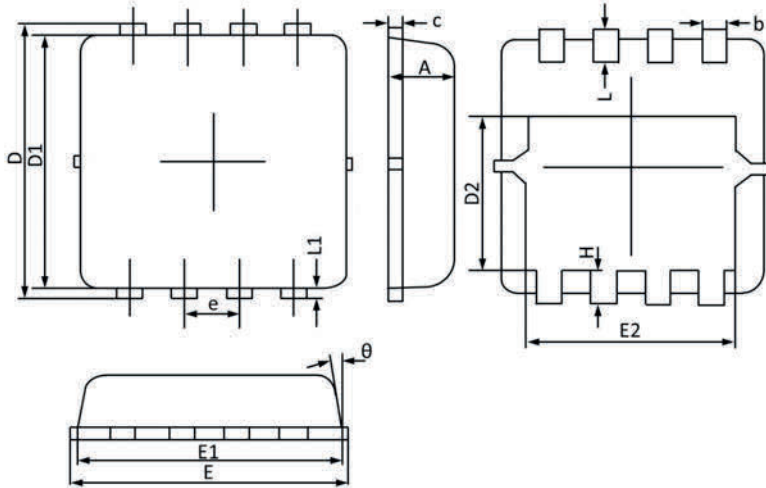
**Figure 5. Body Diode Characteristics**



**Figure 6. Normalized  $R_{DS(ON)}$  vs.  $T_J$**



## Package Outline Dimensions (PPAK3x3)



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.70	0.90	0.028	0.035
b	0.25	0.35	0.010	0.014
c	0.10	0.25	0.004	0.010
D	3.05	3.50	0.120	0.138
D1	2.90	3.20	0.114	0.126
D2	1.35	1.95	0.053	0.077
E	3.00	3.40	0.118	0.134
E1	2.90	3.30	0.114	0.130
E2	2.35	2.60	0.093	0.102
e	0.65 BSC		0.026 BSC	
H	0.30	0.75	0.012	0.030
L	0.30	0.60	0.012	0.024
L1	0.06	0.20	0.002	0.008
$\theta$	6°	14°	6°	14°