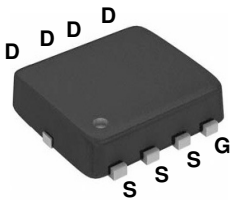
GOOD-ARK SEMICONDUCTOR

GSFN4013

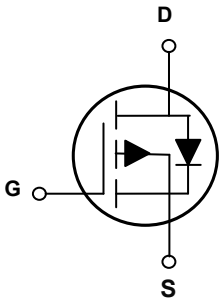
40V P-Channel MOSFET

Main Product Characteristics

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



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 GSFN4013 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°C unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{(BR)DSS}$	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_C=25°C), V_{GS}=10V[1]	I_D	-30	A
Drain Current-Continuous (T_C=100°C), V_{GS}=10V[1]		-21	
Drain Current-Pulsed[2]	I_{DM}	-120	A
Pulsed Source Current (Body Diode)[2]	I_{SM}	-120	A
Maximum Power Dissipation (T_C=25°C)[3]	P_D	25	W
Single Pulse Avalanche Energy (L=0.3mH)	E_{AS}	272	mJ
Single Pulse Avalanche Current (L=0.3mH)	I_{AS}	32	A
Junction-to-Ambient (t ≤ 10s)[4]	$R_{\theta JA}$	62	°C/W
Maximum Junction-to-Case[5]	$R_{\theta JC}$	5	°C/W
Operating Junction Temperature Range	T_J	-55 To +150	°C
Storage Temperature Range	T_{STG}	-55 To +150	°C

Electrical Characteristics (T_A=25°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=-250uA	-40	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-40V, V_{GS}=0V	-	-	-1	μA
		V_{DS}=-40V, V_{GS}=0V, T_J=125°C	-	-	-50	μA
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=-10A	-	10	13	mΩ
		V_{GS}=-4.5V, I_D=-8A	-	13.5	18	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=-250uA	-1	-1.6	-3	V
Dynamic and Switching Characteristics						
Total Gate Charge	Q_g	V_{DS}=-20V, I_D=-20A V_{GS}=-10V	-	60	-	nC
Gate-Source Charge	Q_{gs}		-	8.8	-	
Gate-to-Drain Charge	Q_{gd}		-	12.5	-	
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=-20V, R_G=3Ω V_{GS}=-10V, R_L=16Ω	-	18	-	nS
Rise Time	t_r		-	4.8	-	
Turn-Off Delay Time	$t_{d(off)}$		-	88	-	
Fall Time	t_f		-	27	-	
Input Capacitance	C_{lss}	V_{DS}=-25V, V_{GS}=0V, F=1MHz	-	3242	-	pF
Output Capacitance	C_{oss}		-	221	-	
Reverse Transfer Capacitance	C_{rss}		-	206	-	
Gate Resitance	R_g	F=1MHz	-	4.3	-	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Maximum Body-Diode Continuous Current	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-30	-	A
Maximum Body-Diode Pulse Current	I_{SM}		-	-120	-	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=-10A T_J=25°C	-	-0.95	-1.2	V
Reverse Recovery Time	T_{rr}	I_F=-10A, di/dt=100A/μs, T_J=25°C	-	17.5	-	nS
Reverse Recovery Charge	Q_{rr}		-	10.5	-	nC

Note:

1. Calculated continuous current based on maximum allowable junction temperature.
2. Repetitive rating; pulse width limited by max. junction temperature.
3. The power dissipation P_D is based on max. junction temperature, using junction-to-case thermal resistance.
4. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C

Typical Electrical and Thermal Characteristic Curves

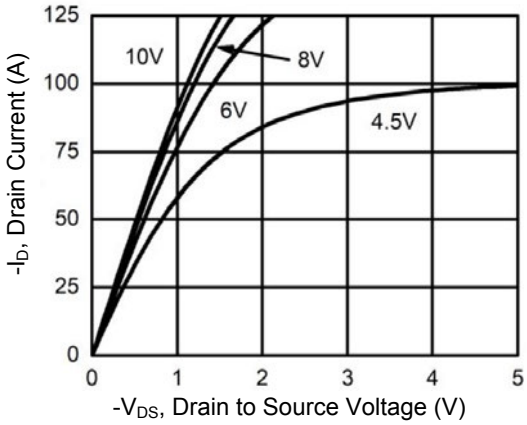


Figure 1. Output Characteristics

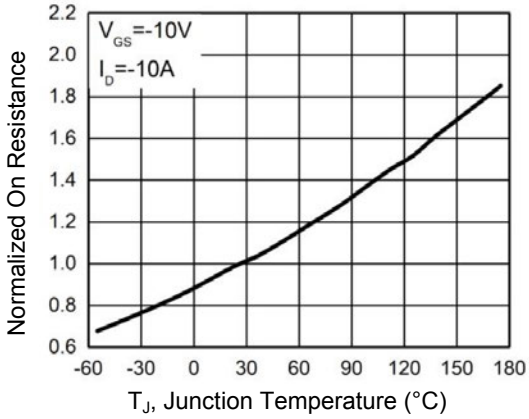


Figure 2. Normalized R_{DSON} vs. T_J

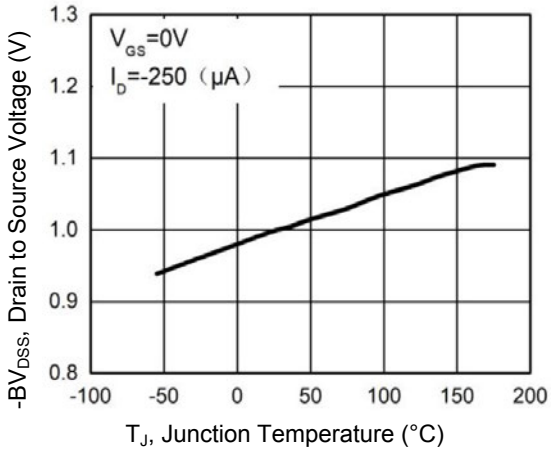


Figure 3. Drain to Source Voltage vs. T_J

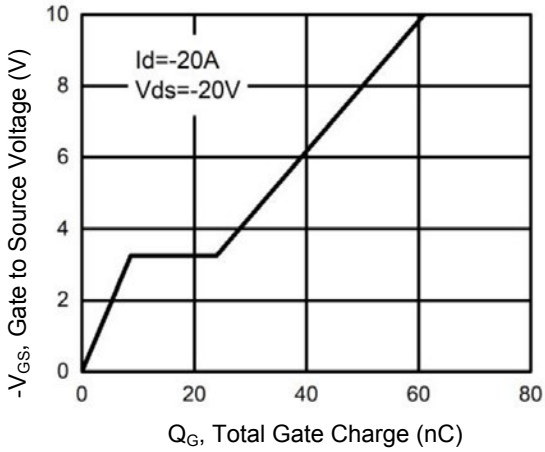


Figure 4. Gate Charge Characteristics

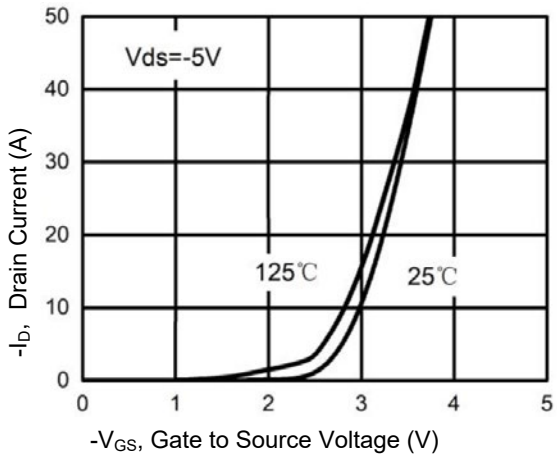


Figure 5. Transfer Characteristics

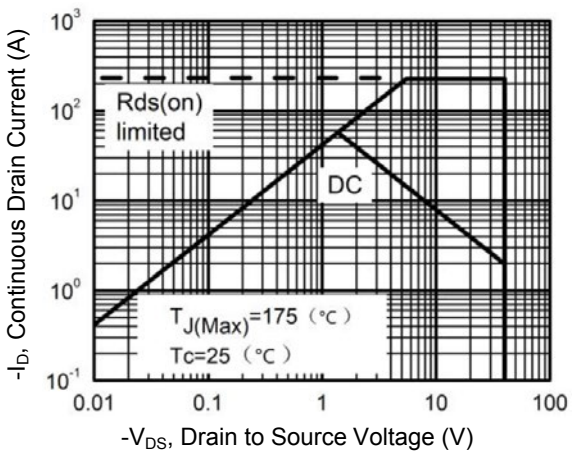


Figure 6. Maximum Safe Operation Area

Typical Electrical and Thermal Characteristic Curves

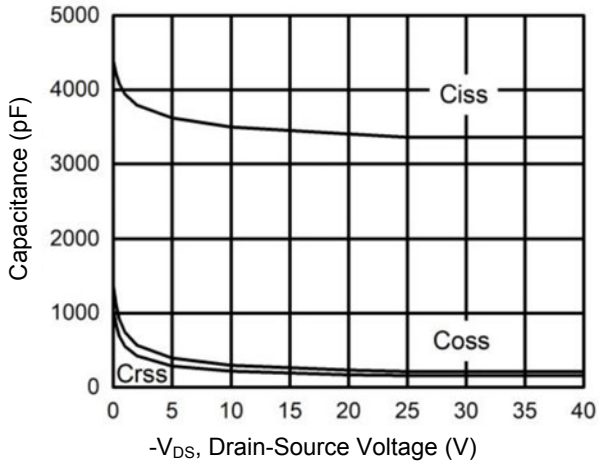


Figure 7. Capacitance Characteristics

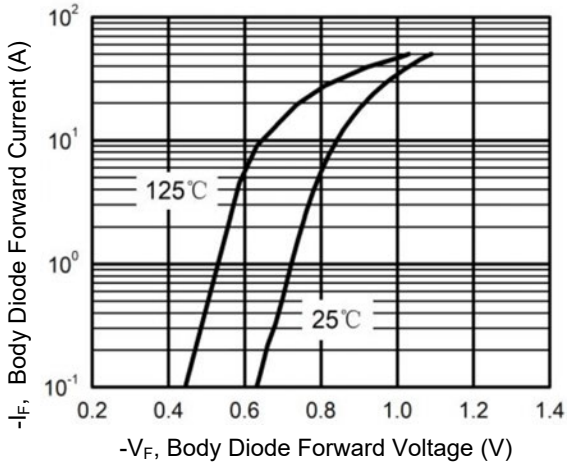
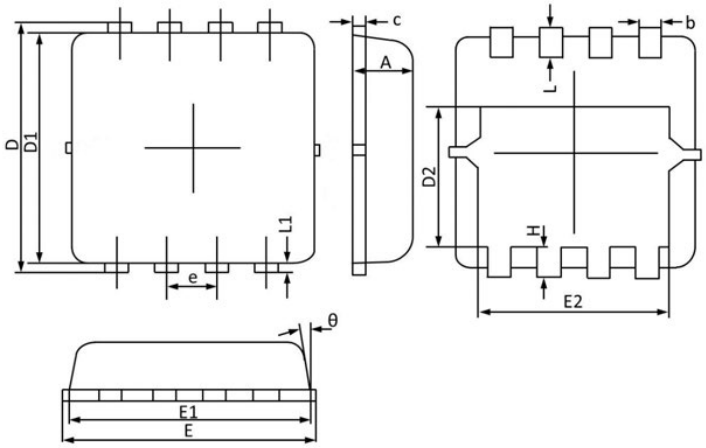


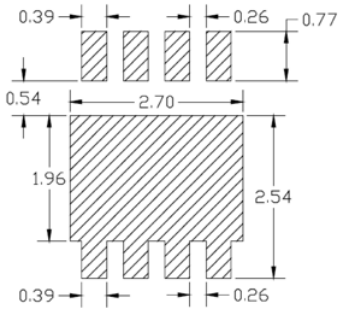
Figure 8. Body Diode Characteristics

Package Outline Dimensions (PPAK3x3)



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.700	0.900	0.028	0.035
b	0.250	0.350	0.010	0.014
c	0.100	0.250	0.004	0.010
D	3.050	3.500	0.120	0.138
D1	2.900	3.200	0.114	0.126
D2	1.350	1.950	0.053	0.077
E	3.000	3.400	0.118	0.134
E1	2.900	3.300	0.114	0.130
E2	2.350	2.600	0.093	0.102
e	0.650 BSC		0.026 BSC	
H	0.300	0.750	0.012	0.030
L	0.300	0.600	0.012	0.024
L1	0.060	0.200	0.002	0.008
θ	6°	14°	6°	14°

Recommended Pad Layout



Note:

1. Controlling dimension: in millimeters
2. General tolerance: ±0.05mm
3. The pad layout is for reference purposes only

Order Information

Device	Package	Marking	Quantity	HSF Status
GSFN4013	PPAK3x3	N4013	5,000pcs / Reel	RoHS Compliant