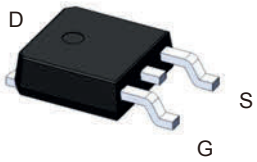
GOOD-ARK SEMICONDUCTOR

GSFD6046

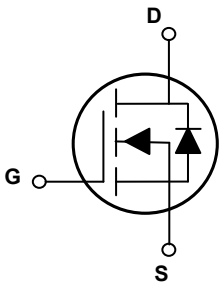
60V N-Channel MOSFET

Main Product Characteristics

$V_{(BR)DSS}$	60V
$R_{DS(ON)}$	35mΩ (Typ.)
I_D	20A



TO-252 (DPAK)



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 GSFD6046 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_{DS}	60	V
Gate-to-Source Voltage	V_{GS}	±20	V
Continuous Drain Current, @ Steady-State (T_A=25°C)[1]	I_D	20	A
Continuous Drain Current, @ Steady-State (T_A=70°C)		15	A
Pulsed Drain Current[2]	I_{DM}	80	A
Power Dissipation (T_A=25°C)	P_D	40	W
Linear Derating Factor (T_A=25°C)		0.32	W/°C
Single Pulse Avalanche Energy[3]	E_{AS}	14	mJ
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.1	°C/W
Junction-to-Ambient (PCB Mounted, Steady-State)[4]	$R_{\theta JA}$	65	°C/W
Operating Junction and Storage Temperature Range	T_J/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-to-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA	60	-	-	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V	-	-	1	μA
		T_J=125°C	-	-	50	
Gate-to-Source Forward Leakage	I_{GSS}	V_{GS}=20V	-	-	100	nA
		V_{GS}=-20V	-	-	-100	
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=6A	-	35	46	mΩ
		V_{GS}=4.5V, I_D=4A	-	38	50	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.2	1.6	2.5	V
Forward Transconductance	gfs	V_{DS}=10V, I_D=6A	-	6	-	S
Dynamic and Switching Characteristics						
Input Capacitance	C_{lss}	V_{GS}=0V, V_{DS}=30V, F=1MHz	-	1180	1720	pF
Output Capacitance	C_{oss}		-	68	100	
Reverse Transfer Capacitance	C_{rss}		-	45	70	
Total Gate Charge	Q_g	I_D=9A, V_{DS}=30V, V_{GS}=10V	-	2.2	4.4	nC
Gate-to-Source Charge	Q_{gs}		-	16.6	24	
Gate-to-Drain ("Miller") Charge	Q_{gd}		-	3.9	-	
Turn-On Delay Time	$t_{d(on)}$	V_{GS}=10V, V_{DS}=30V, I_D=1A, R_{GEN}=6Ω	-	4.6	9.0	nS
Rise Time	t_r		-	14.8	28	
Turn-Off Delay Time	$t_{d(off)}$		-	26.2	52	
Fall Time	t_f		-	7.8	16	
Gate Resistance	R_g	F=1MHz	-	2.1	4.2	Ω
Source-Drain Ratings and Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-	20	A
Pulsed Source Current (Body Diode)	I_{SM}		-	-	80	A
Diode Forward Voltage	V_{SD}	I_S=2A, V_{GS}=0V	-	1	1.2	V
Reverse Recovery Time	T_{rr}	T_J=25°C, I_F=1A, di/dt=100A/μs	-	14	28	nS
Reverse Recovery Charge	Q_{rr}		-	10	20	nC

Note:

1. Pulse test: Pulse width ≤ 300us, duty cycle ≤ 2%.
2. Repetitive rating; pulse width limited by max. junction temperature.
3. L=0.1mH, R_g=25Ω, V_{DD}=25V, T_J=25°C.
4. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

Typical Electrical and Thermal Characteristic Curves

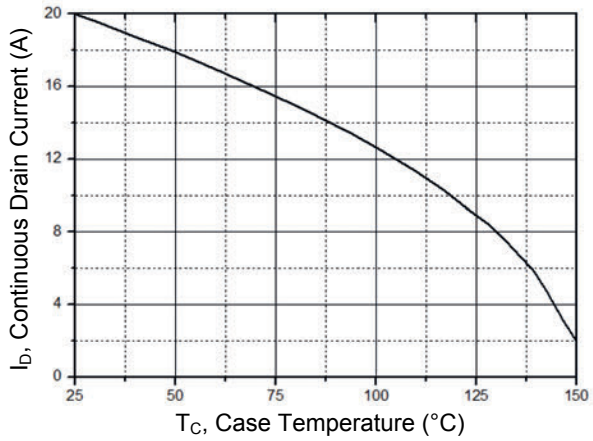


Figure 1. Continuous Drain Current vs. T_C

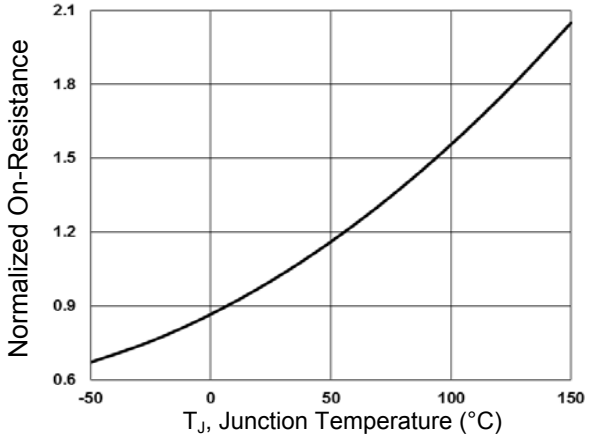


Figure 2. Normalized $R_{DS(ON)}$ vs. T_J

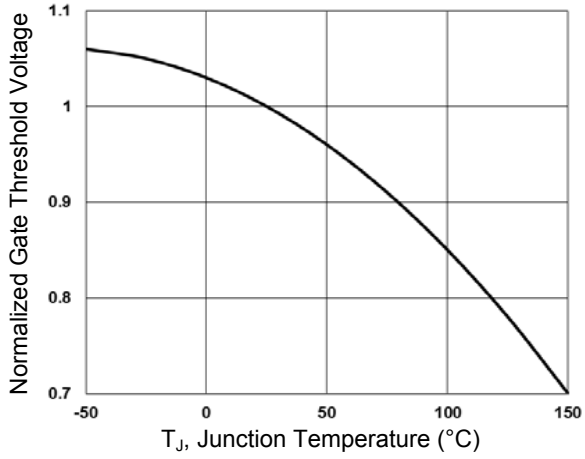


Figure 3. Normalized V_{th} vs. T_J

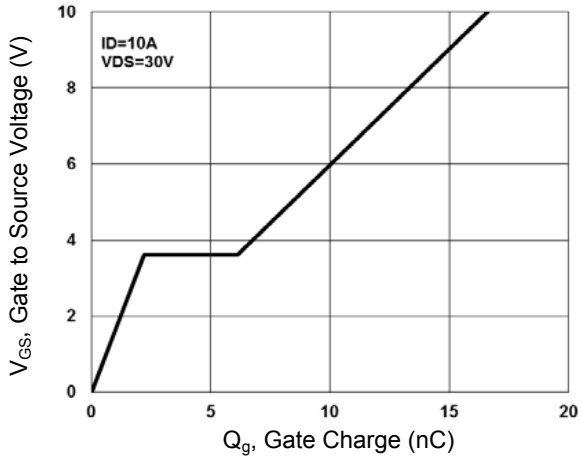


Figure 4. Gate Charge Waveform

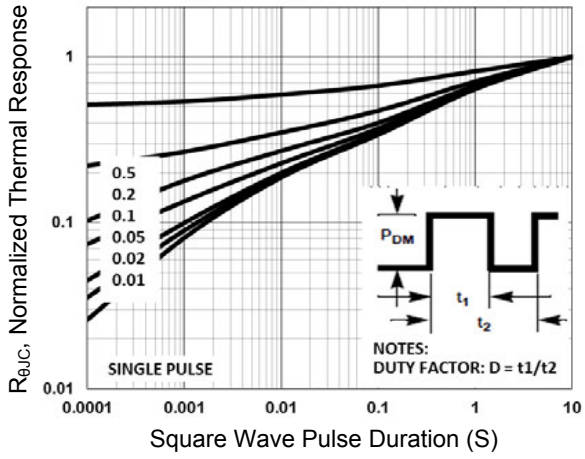


Figure 5. Normalized Transient Impedance

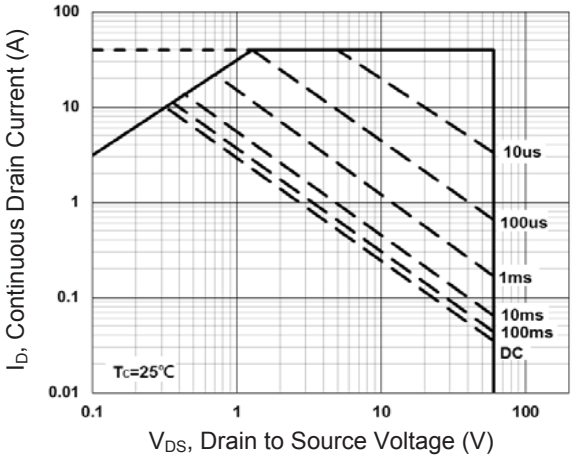
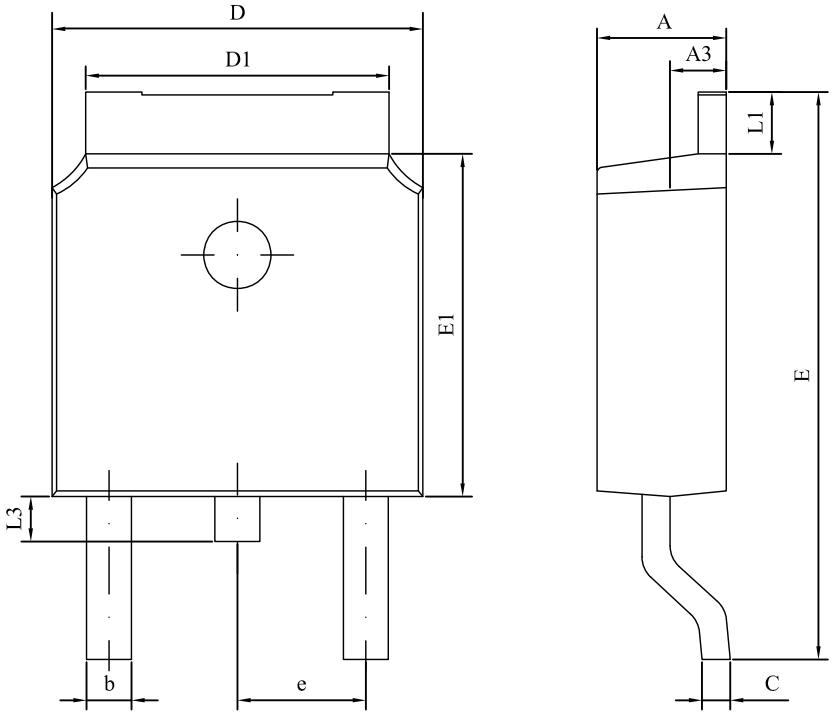


Figure 6. Maximum Safe Operation Area

Package Outline Dimensions TO-252 (DPAK)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.15	2.40	0.085	0.094
A3	0.90	1.10	0.035	0.043
b	0.50	0.90	0.020	0.035
C	0.40	0.65	0.016	0.026
D	6.30	6.90	0.248	0.272
D1	4.95	5.50	0.195	0.217
E	9.40	10.41	0.370	0.410
E1	5.90	6.30	0.232	0.248
e	2.286 BSC		0.090 BSC	
L1	0.89	1.27	0.035	0.050
L3	0.60	1.10	0.024	0.043

Order Information

Device	Package	Marking	Carrier	Quantity
GSFD6046	TO-252 (DPAK)	D6046	Tape & Reel	2,500 Pcs / Reel