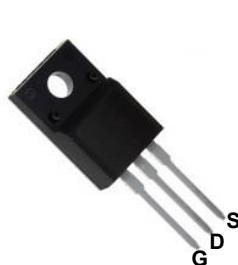
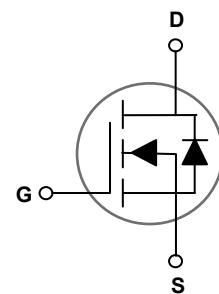


Main Product Characteristics

BV _{DSS}	500V
R _{DS(ON)}	0.8Ω
I _D	9A



TO-220F



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 GSFU5010 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 ($T_c=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V _{DS}	500	V
Gate-Source Voltage	V _{GS}	±30	V
Drain Current-Continuous ($T_c=25^\circ\text{C}$)	I _D	9	A
Drain Current-Continuous ($T_c=100^\circ\text{C}$)		5.6	
Drain Current-Pulsed ¹	I _{DM}	36	A
Single Pulse Avalanche Energy ²	E _{AS}	550	mJ
Single Pulse Avalanche Current ²	I _{AS}	10.5	A
Power Dissipation ($T_c=25^\circ\text{C}$)	P _D	36.8	W
Power Dissipation - Derate above 25°C		0.29	W/°C
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62	°C/W
Thermal Resistance, Junction-to-Case	R _{θJC}	3.4	°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
On / Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=250\mu\text{A}$	500	-	-	V
Drain-Source Leakage Current	$I_{\text{DS}(\text{SS})}$	$V_{\text{DS}}=500\text{V}, V_{\text{GS}}=0\text{V}, T_J=25^\circ\text{C}$	-	-	1	μA
		$V_{\text{DS}}=400\text{V}, V_{\text{GS}}=0\text{V}, T_J=100^\circ\text{C}$	-	-	10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{\text{GS}}=\pm 30\text{V}, V_{\text{DS}}=0\text{V}$	-	-	± 100	nA
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=10\text{V}, I_{\text{D}}=4\text{A}$	-	0.62	0.8	Ω
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{GS}}=V_{\text{DS}}, I_{\text{D}}=250\mu\text{A}$	2	3	4	V
Forward Transconductance	g_{fs}	$V_{\text{DS}}=30\text{V}, I_{\text{D}}=2\text{A}$	-	10	-	S
Dynamic and Switching Characteristics						
Total Gate Charge ^{3,4}	Q_g	$V_{\text{DS}}=400\text{V}, I_{\text{D}}=4\text{A}, V_{\text{GS}}=10\text{V}$	-	28	42	nC
Gate-Source Charge ^{3,4}	Q_{gs}		-	5.4	10	
Gate-Drain Charge ^{3,4}	Q_{gd}		-	10.2	15	
Turn-On Delay Time ^{3,4}	$t_{\text{d}(\text{on})}$	$V_{\text{DD}}=250\text{V}, R_{\text{G}}=25\Omega, V_{\text{GS}}=10\text{V}, I_{\text{D}}=4\text{A}$	-	21	42	nS
Rise Time ^{3,4}	t_r		-	27	54	
Turn-Off Delay Time ^{3,4}	$t_{\text{d}(\text{off})}$		-	54	108	
Fall Time ^{3,4}	t_f		-	20	40	
Input Capacitance	C_{iss}	$V_{\text{DS}}=25\text{V}, V_{\text{GS}}=0\text{V}, F=1\text{MHz}$	-	920	1800	pF
Output Capacitance	C_{oss}		-	103	200	
Reverse Transfer Capacitance	C_{rss}		-	15	30	
Gate Resistance	R_g	$V_{\text{GS}}=0\text{V}, V_{\text{DS}}=0\text{V}, F=1\text{MHz}$	-	2.4	4.8	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_s	$V_G=V_D=0\text{V}, \text{Force Current}$	-	-	9	A
Pulsed Source Current	I_{SM}		-	-	18	A
Diode Forward Voltage	V_{SD}	$V_{\text{GS}}=0\text{V}, I_s=1\text{A}, T_J=25^\circ\text{C}$	-	-	1	V

Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2. $V_{\text{DD}}=50\text{V}, V_{\text{GS}}=10\text{V}, L=10\text{mH}, I_{\text{AS}}=10.5\text{A}, R_{\text{G}}=25\Omega$, starting $T_J=25^\circ\text{C}$.
3. Pulse test: pulse width $\leq 300\text{us}$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

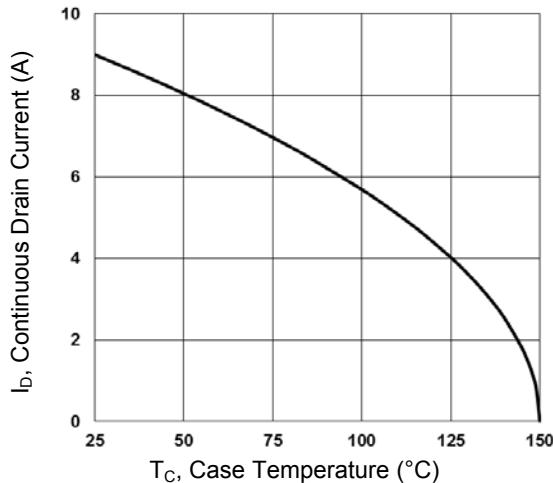


Figure 1. Continuous Drain Current vs. T_c

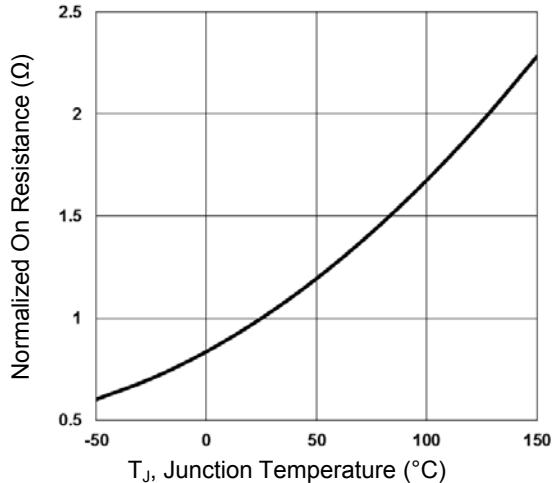


Figure 2. Normalized R_{DS(on)} vs. T_j

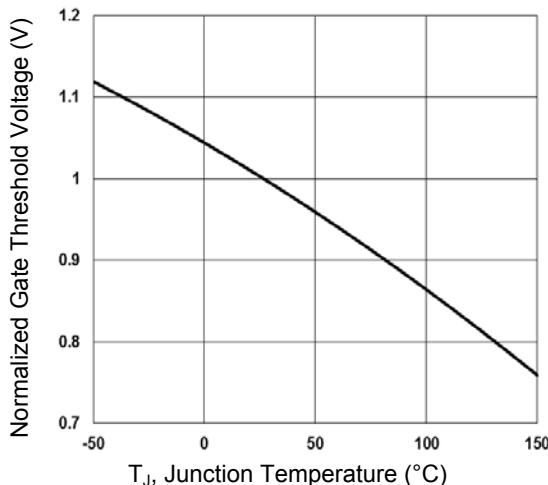


Figure 3. Normalized V_{th} vs. T_j

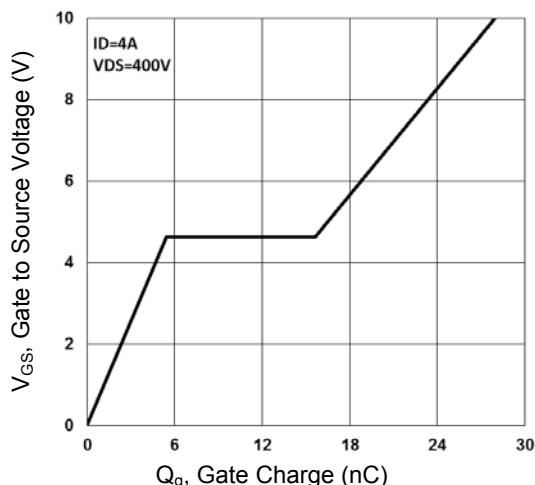


Figure 4. Gate Charge Characteristics

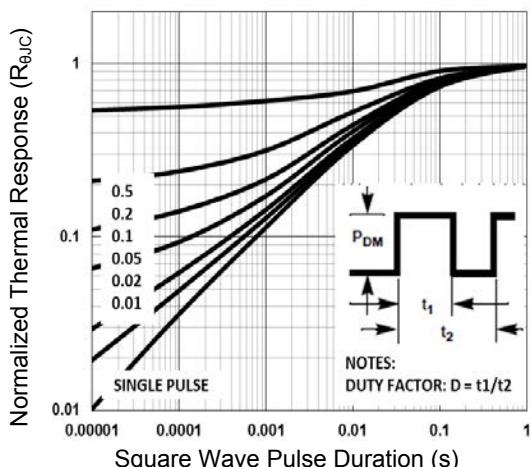


Figure 5. Normalized Transient Impedance

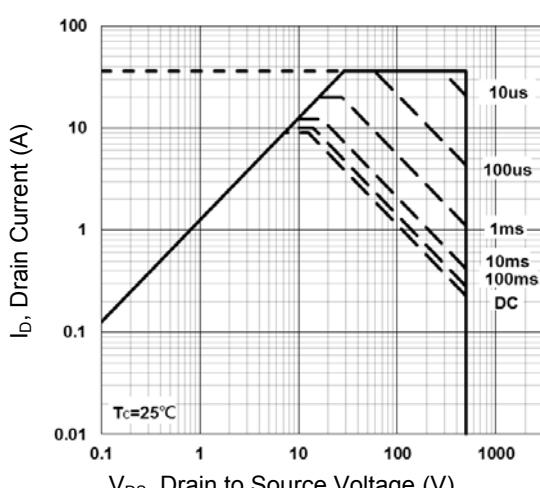


Figure 6. Maximum Safe Operation Area

Typical Electrical and Thermal Characteristic Curves

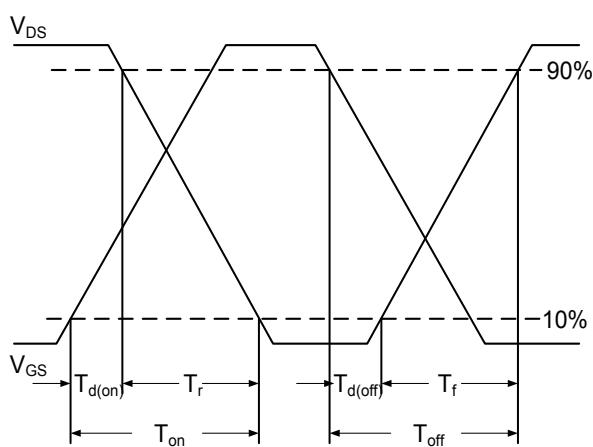


Figure 7. Switching Time Waveform

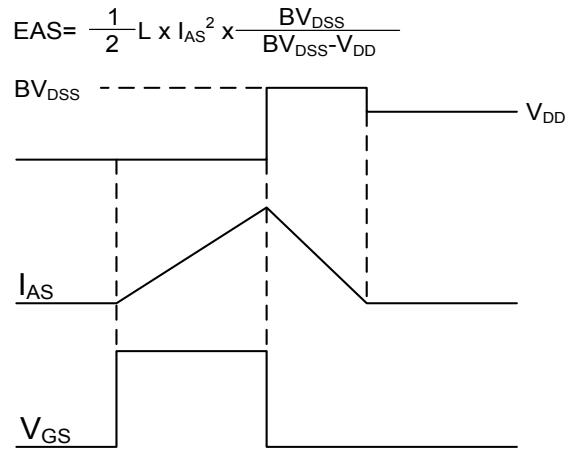
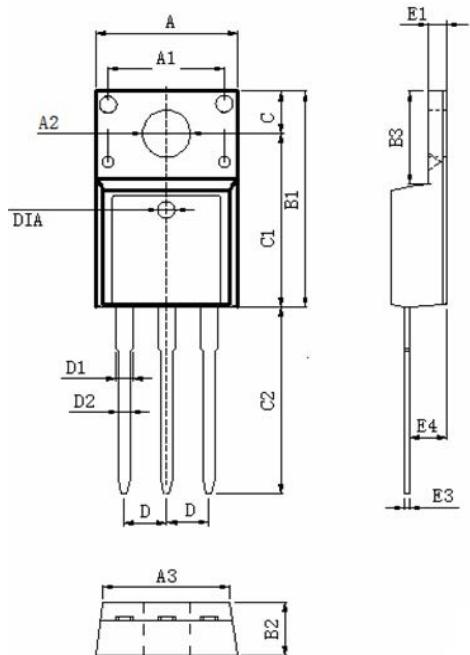


Figure 8. EAS Waveform

Package Outline Dimensions (TO-220F)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	9.860	10.460	0.388	0.412
A1	6.900	7.100	0.272	0.280
A2	3.100	3.500	0.122	0.138
A3	9.500	9.900	0.374	0.390
B1	15.570	16.170	0.613	0.637
B2	4.500	4.900	0.177	0.193
B3	6.480	6.880	0.255	0.271
C	3.100	3.500	0.122	0.138
C1	12.270	12.870	0.483	0.507
C2	12.580	13.380	0.495	0.527
D	2.490	2.590	0.098	0.102
D1	1.070	1.470	0.042	0.058
D2	0.700	0.900	0.028	0.035
E1	2.340	2.740	0.092	0.108
E3	0.400	0.600	0.016	0.024
E4	2.560	2.960	0.101	0.117
DIA	deep 0.1 TYP.	Φ1.5 TYP.	deep 0.004 TYP.	Φ0.059 TYP.