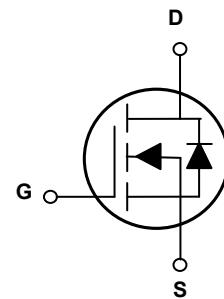


## Main Product Characteristics

$V_{DS}$	1500V
$R_{DS(ON)}$	10Ω (max.)
$I_D$	2.5A



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 GSFU15002 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 ( $T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	1500	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Drain Current-Continuous ( $T_C=25^\circ\text{C}$ )	$I_D$	2.5	A
Drain Current-Continuous ( $T_C=100^\circ\text{C}$ )		1.6	
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	10	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	36.5	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	2.7	A
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	100	W
Power Dissipation-Derate above 25°C		0.8	W/°C
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.25	°C/W
Operating Junction Temperature Range	$T_J$	-50 To +150	°C
Storage Temperature Range	$T_{STG}$	-50 To +150	°C

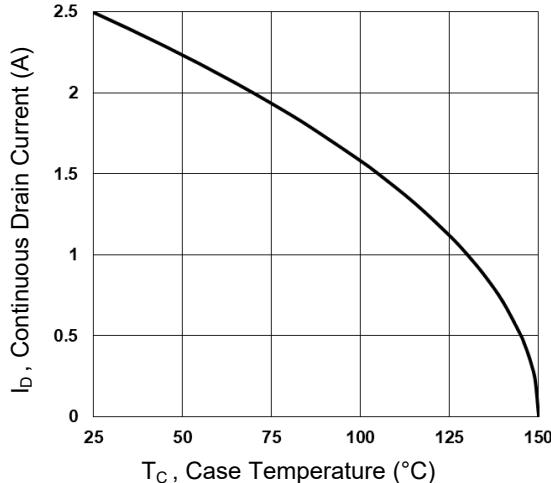
**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On/Off Characteristics</b>						
Drain-Source Breakdown Voltage	$\text{BV}_{\text{DSS}}$	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_D=250\mu\text{A}$	1500	-	-	V
Drain-Source Leakage Current	$\text{I}_{\text{DSS}}$	$\text{V}_{\text{DS}}=1200\text{V}, \text{V}_{\text{GS}}=0\text{V}, \text{T}_J=25^\circ\text{C}$	-	-	1	$\mu\text{A}$
		$\text{V}_{\text{DS}}=960\text{V}, \text{V}_{\text{GS}}=0\text{V}, \text{T}_J=85^\circ\text{C}$	-	-	10	$\mu\text{A}$
Gate-Source Leakage Current	$\text{I}_{\text{GSS}}$	$\text{V}_{\text{GS}}=\pm30\text{V}, \text{V}_{\text{DS}}=0\text{V}$	-	-	$\pm100$	nA
Static Drain-Source On-Resistance	$\text{R}_{\text{DS}(\text{ON})}$	$\text{V}_{\text{GS}}=10\text{V}, \text{I}_D=1\text{A}$	-	7	10	$\Omega$
Gate Threshold Voltage	$\text{V}_{\text{GS}(\text{th})}$	$\text{V}_{\text{GS}}=\text{V}_{\text{DS}}, \text{I}_D=250\mu\text{A}$	2	3.2	5	V
Forward Transconductance	$\text{g}_{\text{fs}}$	$\text{V}_{\text{DS}}=10\text{V}, \text{I}_D=1\text{A}$	-	1	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3,4</sup>	$\text{Q}_g$	$\text{V}_{\text{DS}}=100\text{V}, \text{I}_D=1\text{A}, \text{V}_{\text{GS}}=10\text{V}$	-	41	82	nC
Gate-Source Charge <sup>3,4</sup>	$\text{Q}_{\text{gs}}$		-	12	24	
Gate-Drain Charge <sup>3,4</sup>	$\text{Q}_{\text{gd}}$		-	12.4	25	
Turn-On Delay Time <sup>3,4</sup>	$\text{t}_{\text{d}(\text{on})}$	$\text{V}_{\text{DD}}=100\text{V}, \text{R}_G=6\Omega, \text{V}_{\text{GS}}=10\text{V}, \text{I}_D=1\text{A}$	-	38	70	nS
Rise Time <sup>3,4</sup>	$\text{t}_r$		-	32	65	
Turn-Off Delay Time <sup>3,4</sup>	$\text{t}_{\text{d}(\text{off})}$		-	48	95	
Fall Time <sup>3,4</sup>	$\text{t}_f$		-	45	90	
Input Capacitance	$\text{C}_{\text{iss}}$	$\text{V}_{\text{DS}}=100\text{V}, \text{V}_{\text{GS}}=0\text{V}, \text{F}=1\text{MHz}$	-	1150	2300	pF
Output Capacitance	$\text{C}_{\text{oss}}$		-	50	100	
Reverse Transfer Capacitance	$\text{C}_{\text{rss}}$		-	23	46	
Gate Resistance	$\text{R}_g$	$\text{V}_{\text{GS}}=0\text{V}, \text{V}_{\text{DS}}=0\text{V}, \text{F}=1\text{MHz}$	-	5.6	-	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$\text{I}_s$	$\text{V}_G=\text{V}_D=0\text{V}, \text{Force Current}$	-	-	2.5	A
Pulsed Source Current	$\text{I}_{\text{SM}}$		-	-	5	A
Diode Forward Voltage	$\text{V}_{\text{SD}}$	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_s=1\text{A}, \text{T}_J=25^\circ\text{C}$	-	-	1	V
Reverse Recovery Time	$\text{t}_{\text{rr}}$	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_s=2\text{A}, \text{di/dt}=100\text{A}/\mu\text{s}, \text{T}_J=25^\circ\text{C}$	-	1.83	-	nS
Reverse Recovery Charge	$\text{Q}_{\text{rr}}$		-	48.7	-	nC

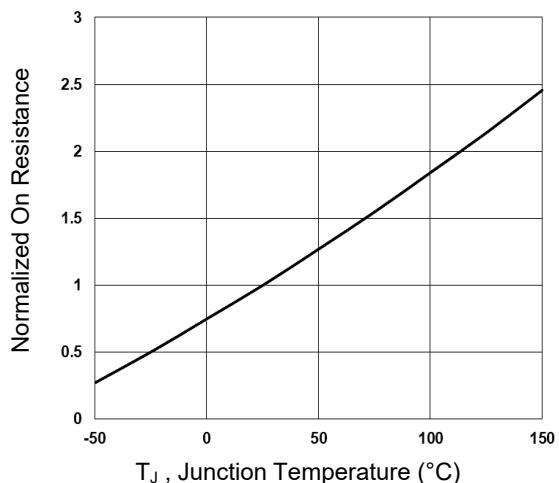
Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2.  $\text{V}_{\text{DD}}=100\text{V}, \text{V}_{\text{GS}}=10\text{V}, \text{L}=10\text{mH}, \text{I}_{\text{AS}}=2.7\text{A}, \text{R}_G=25\Omega$ , starting  $\text{T}_J=25^\circ\text{C}$ .
3. Pulse test: pulse width  $\leq 300\text{us}$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operation temperature.

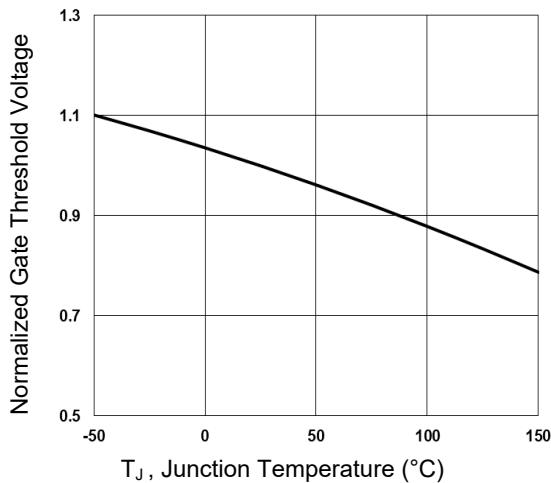
## Typical Electrical and Thermal Characteristic Curves



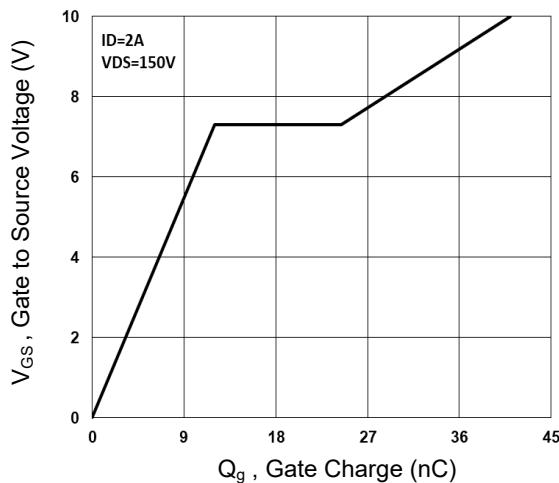
**Figure 1. Continuous Drain Current vs. T<sub>c</sub>**



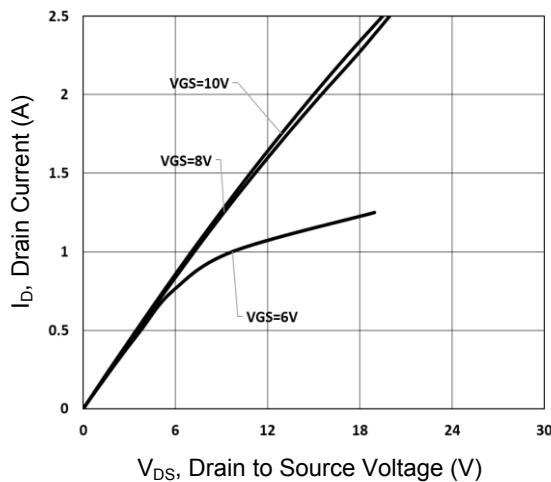
**Figure 2. Normalized R<sub>DSON</sub> vs. T<sub>j</sub>**



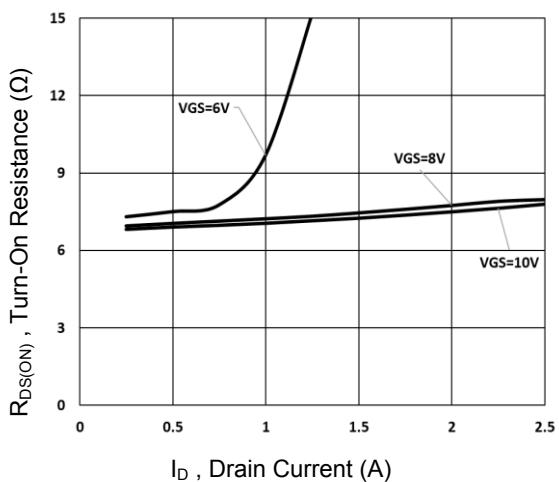
**Figure 3. Normalized V<sub>th</sub> vs. T<sub>j</sub>**



**Figure 4. Gate Charge Waveform**



**Figure 5. Typical Output Characteristics**



**Figure 6. Turn-On Resistance vs. I<sub>D</sub>**

## Typical Electrical and Thermal Characteristic Curves

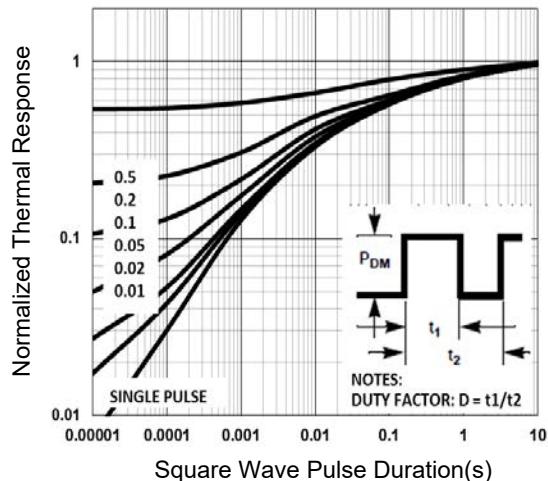


Figure 7. Normalized Transient Impedance

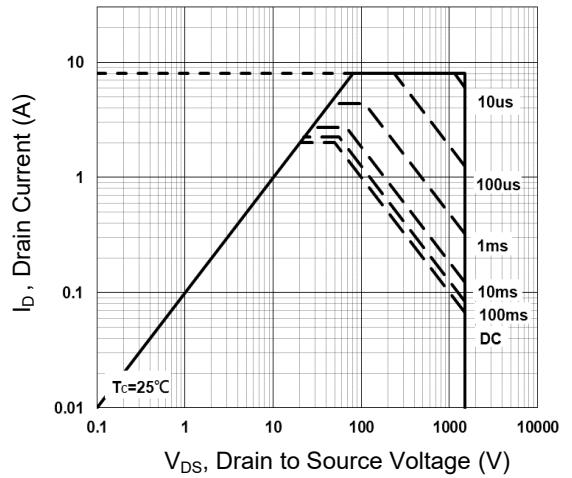


Figure 8. Maximum Safe Operation Area

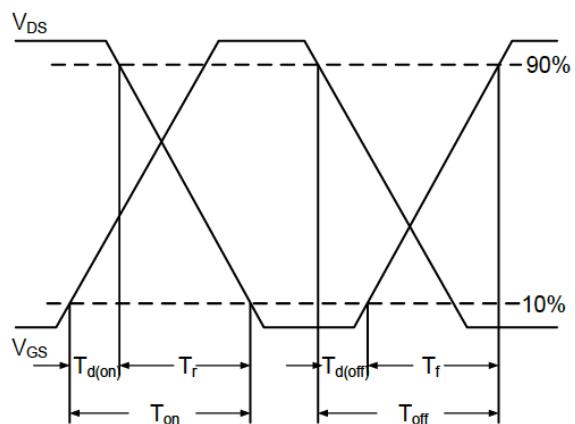


Figure 9. Switching Time Waveform

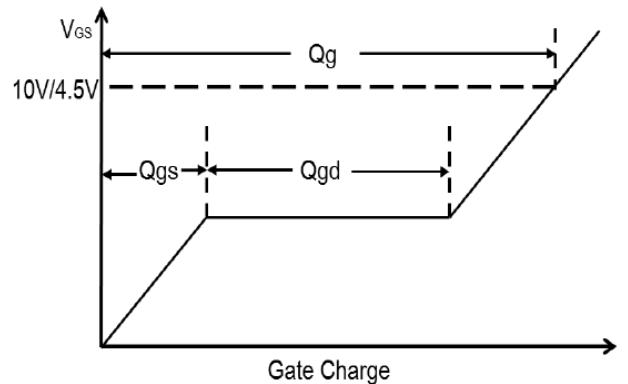
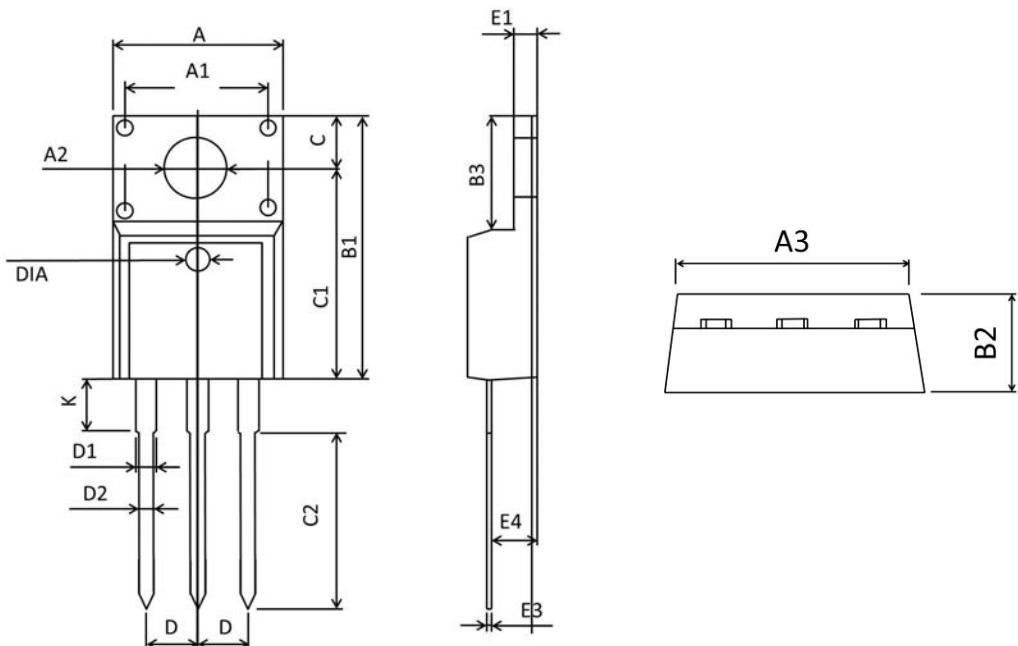


Figure 10. Gate Charge Waveform

### Package Outline Dimensions

**TO-220F**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	9.860	10.460	0.389	0.411
A1	6.900	7.100	0.272	0.280
A2	3.100	3.500	0.122	0.138
B1	15.450	16.300	0.608	0.642
B2	4.400	5.000	0.173	0.197
B3	6.280	7.100	0.247	0.280
C	3.100	3.500	0.122	0.138
C1	12.270	12.870	0.483	0.507
C2	9.600	10.520	0.378	0.414
D	2.540BSC		0.1BSC	
D1	1.070	1.470	0.042	0.058
D2	0.600	1.000	0.024	0.039
K	2.800	3.500	0.110	0.138
E1	2.340	2.740	0.092	0.108
E3	0.350	0.650	0.014	0.026
E4	2.460	2.960	0.097	0.117
DIA	1.35	1.65	0.053	0.065