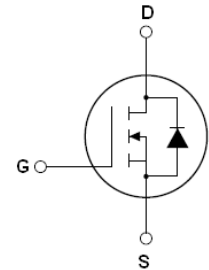


## Main Product Characteristics

$V_{DS}$	1500V
$R_{DS(ON)}$	10 $\Omega$ (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	Value	Unit
Drain-Source Voltage	$V_{DS}$	1500	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current at $T_C=25^\circ\text{C}$	$I_D (DC)$	2.5	A
Continuous Drain Current at $T_C=100^\circ\text{C}$	$I_D (DC)$	1.6	A
Pulsed Drain Current <sup>1</sup>	$I_{DM (pluse)}$	10	A
Maximum Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	100	W
Power Dissipation-Derate Above $25^\circ\text{C}$		0.8	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	36.5	mJ
Avalanche Current <sup>2</sup>	$I_{AS}$	2.7	A
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.25	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	$^\circ\text{C/W}$
Operating Junction Temperature Range	$T_J$	-55 to +150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ\text{C}$

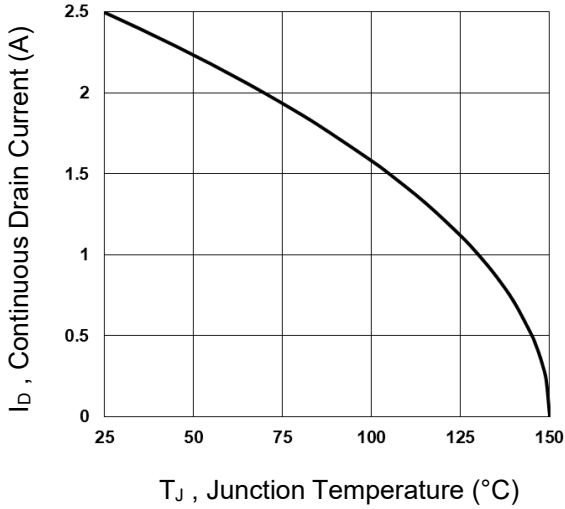
**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>On/off States</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	1500	-	-	V
Zero Gate Voltage Drain Current( $T_C=25^\circ\text{C}$ )	$I_{DSS}$	$V_{DS}=1200V, V_{GS}=0V$	-	-	1	$\mu A$
Zero Gate Voltage Drain Current( $T_C=85^\circ\text{C}$ )	$I_{DSS}$	$V_{DS}=960V, V_{GS}=0V$	-	-	10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3.2	5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=1A$	-	7	10	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_D=1A$	-	1	-	S
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, F=1.0\text{MHz}$	-	5.6	-	$\Omega$
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=100V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	1150	2300	pF
Output Capacitance	$C_{oss}$		-	50	100	pF
Reverse Transfer Capacitance	$C_{rss}$		-	23	46	pF
Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=100V, I_D=1A,$ $V_{GS}=10V$	-	41	82	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		-	12	24	nC
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		-	12.4	25	nC
<b>Switching Times</b>						
Turn-on Delay Time <sup>3,4</sup>	$t_{d(on)}$	$V_{DD}=100V, I_D=1A,$ $R_G=6\Omega, V_{GS}=10V$	-	38	70	nS
Turn-on Rise Time <sup>3,4</sup>	$t_r$		-	32	65	nS
Turn-Off Delay Time <sup>3,4</sup>	$t_{d(off)}$		-	48	95	nS
Turn-Off Fall Time <sup>3,4</sup>	$t_f$		-	45	90	nS
<b>Source- Drain Diode Characteristics</b>						
Source-Drain Current(Body Diode)	$I_S$	$V_D=V_G=0V, \text{Force Current}$	-	-	2.5	A
Pulsed Source-Drain Current(Body Diode)	$I_{SM}$		-	-	5.0	A
Forward On Voltage	$V_{SD}$	$T_J=25^\circ\text{C}, I_S=1A, V_{GS}=0V$	-	-	1.0	V
Reverse Recovery Time	$t_{rr}$	$T_J=25^\circ\text{C}, I_S=I_F=2A,$ $di/dt=100A/\mu S$	-	1.83	-	$\mu S$
Reverse Recovery Charge	$Q_{rr}$		-	48.7	-	$\mu C$

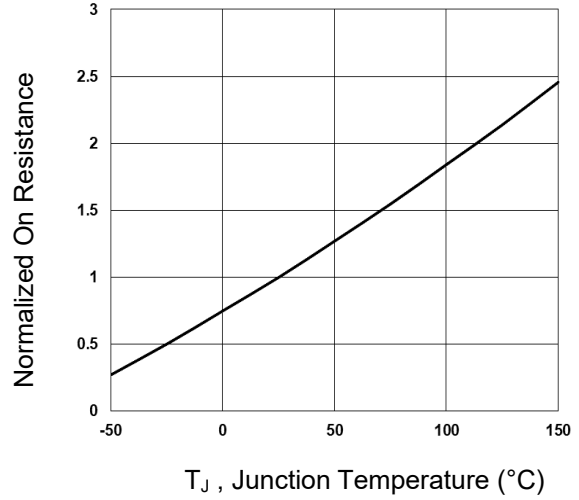
Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2.  $V_{DD}=100V, V_{GS}=10V, L=10\text{mH}, I_{AS}=2.7A, R_G=25$ , Starting  $T_J=25^\circ\text{C}$ .
3. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

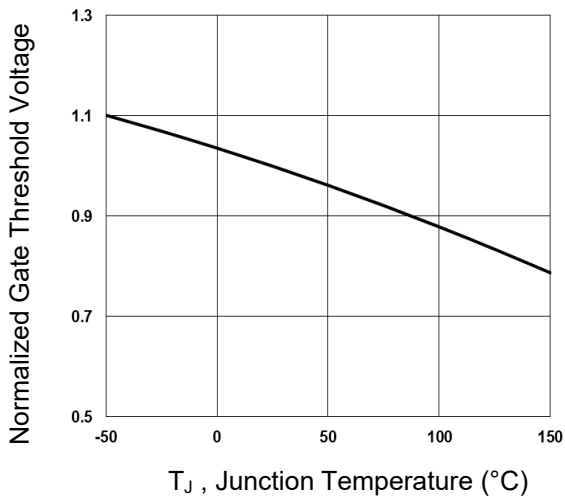
**Typical Electrical and Thermal Characteristic Curves**



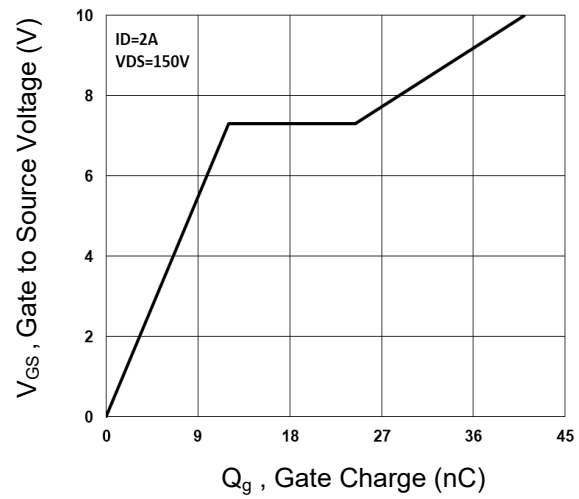
**Fig.1 Continuous Drain Current vs. T<sub>J</sub>**



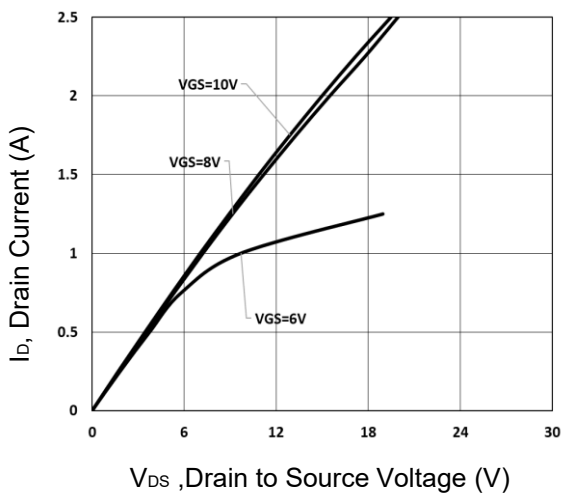
**Fig.2 Normalized R<sub>DS(ON)</sub> vs. T<sub>J</sub>**



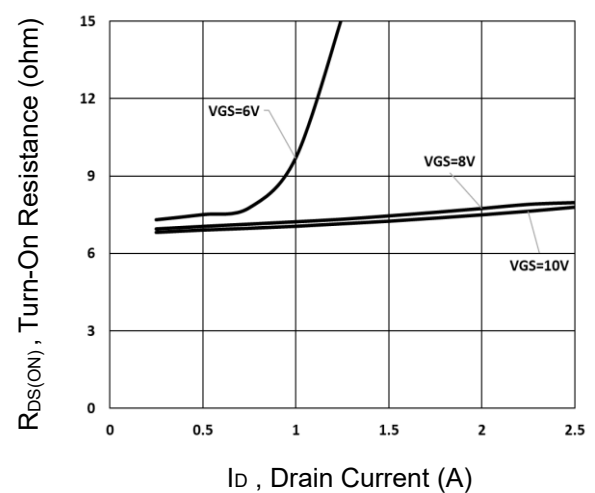
**Fig.3 Normalized V<sub>th</sub> vs. T<sub>J</sub>**



**Fig.4 Gate Charge Characteristics**

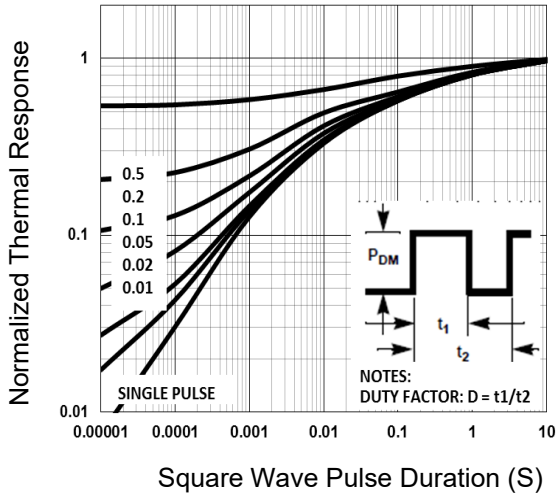


**Fig.5 Typical Output Characteristics**

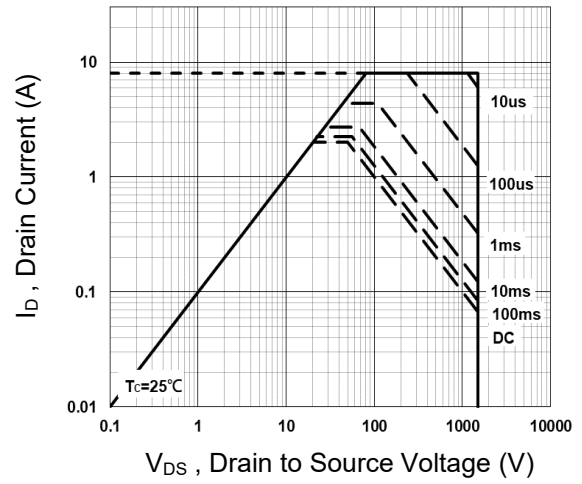


**Fig.6 Turn-On Resistance vs. I<sub>D</sub>**

**Typical Electrical and Thermal Characteristic Curves**

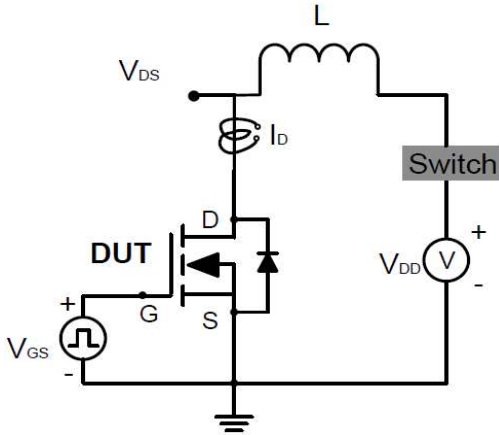


**Fig.7 Normalized Transient Impedance**

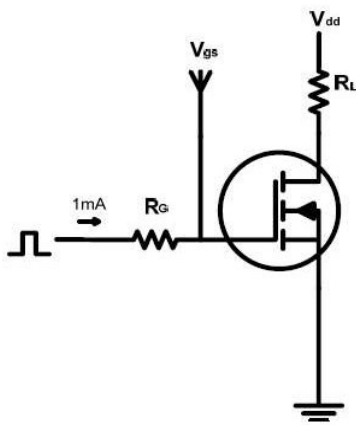


**Fig.8 Maximum Safe Operation Area**

**Test Circuits & Waveforms**

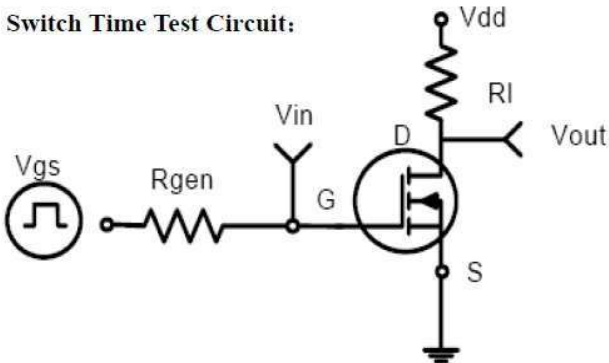


**Figure 9.  $E_{AS}$  Test Circuit and waveforms**



**Figure 10. Gate Charge Test Circuit and waveforms**

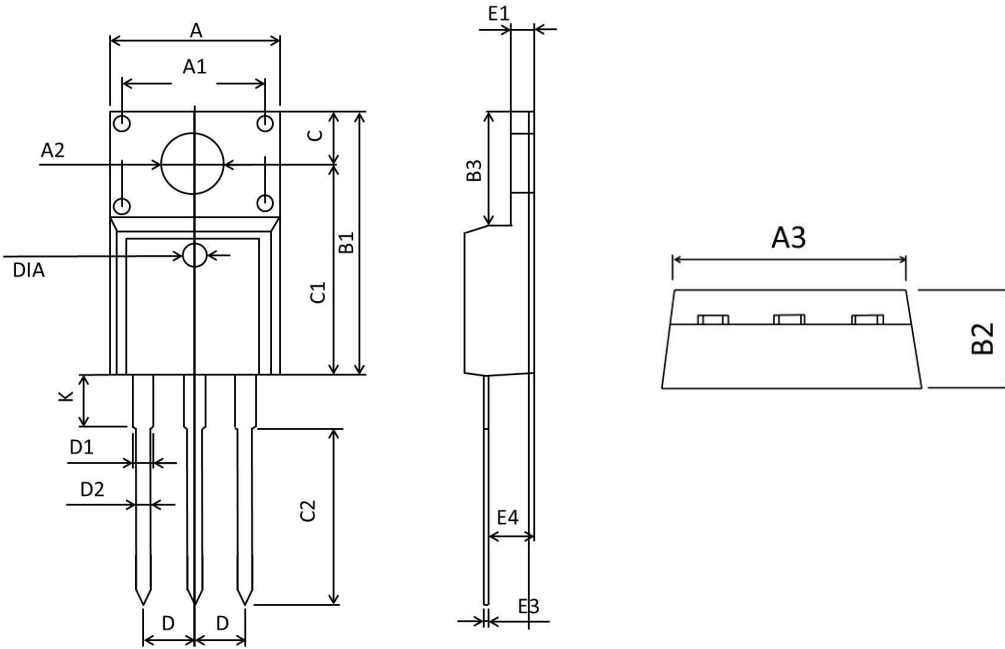
Switch Time Test Circuit:



**Figure 11. Switch Time Test Circuit and waveforms**

**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