

# BUL312FP

# HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

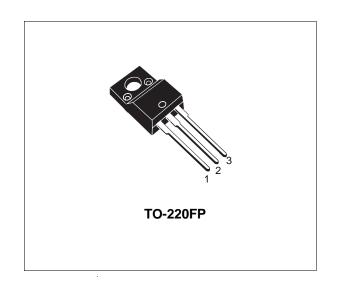
- HIGH VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- FULLY CHARACTERIZED AT 125°C
- LARGE RBSOA
- FULLY INSULATED PACKAGE (U.L. COMPLIANT) FOR EASY MOUNTING

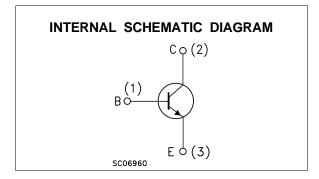
### **APPLICATIONS**

- HORIZONTAL DEFLECTION FOR TV
- SMPS
- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING



The BUL312FP is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capability. It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA.





### **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>BE</sub> = 0)	1150	V
V <sub>CEO</sub>	Collector-Emitter Voltage (I <sub>B</sub> = 0)	500	V
$V_{EBO}$	Emitter-Base Voltage (I <sub>C</sub> = 0)	9	V
Ic	Collector Current	5	Α
I <sub>CM</sub>	Collector Peak Current (t <sub>p</sub> <5 ms)	10	Α
I <sub>B</sub>	Base Current	3	Α
I <sub>BM</sub>	Base Peak Current (t <sub>p</sub> <5 ms)	4	Α
Ptot	Total Dissipation at Tc = 25 °C	36	W
V <sub>isol</sub>	Insulation Withstand Voltage (RMS) from All Three Leads to External Heatsink	1500	V
T <sub>stg</sub>	Storage Temperature	-65 to 150	°C
Tj	Max. Operating Junction Temperature	150	°C

March 2004 1/6

### THERMAL DATA

R <sub>thj-case</sub>	Thermal Resistance Junction-Case	Max	3.5	°C/W	İ
$R_{thj-amb}$	Thermal Resistance Junction-Ambient	Max	62.5	°C/W	

# **ELECTRICAL CHARACTERISTICS** (T<sub>case</sub> = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 1150 V V <sub>CE</sub> = 1150 V T <sub>j</sub> = 125 °C			1 2	mA mA
I <sub>CEO</sub>	Collector Cut-off Current (I <sub>B</sub> = 0)	V <sub>CE</sub> = 500 V			250	μΑ
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	Ic = 100 mA	500			V
V <sub>EBO</sub>	Emitter-Base Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 mA	10			V
V <sub>CE(sat)</sub> *	Collector-Emitter Saturation Voltage				0.5 0.7 1.1	V V V
V <sub>BE(sat)</sub> *	Base-Emitter Saturation Voltage				1 1.1 1.2	V V V
h <sub>FE</sub> *	DC Current Gain	I <sub>C</sub> = 10 mA	8 8		13.5	
ts t <sub>f</sub>	INDUCTIVE LOAD Storage Time Fall Time	$\begin{array}{ll} I_{C} = 2 \; A & I_{B1} = 0.4 \; A \\ V_{BE(off)} = -5 \; V & R_{BB} = 0 \; \Omega \\ V_{CL} = 250 \; V & L = 200 \; \mu H \\ (see fig. 1) & \end{array}$		1.2 80	1.9 160	μs ns
t <sub>s</sub>	INDUCTIVE LOAD Storage Time Fall Time	$\begin{array}{lll} I_{C} = 2 \; A & I_{B1} = 0.4 \; A \\ V_{BE(off)} = \text{-5V} & R_{BB} = 0 \; \Omega \\ V_{CL} = 250 \; V & L = 200 \; \mu\text{H} \\ T_{j} = 125 \; ^{\circ}\text{C} & (\text{see fig. 1}) \end{array}$		1.8 150		μs ns

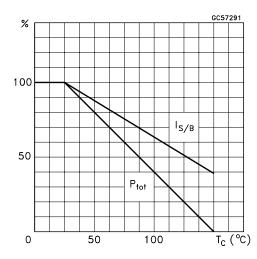
<sup>\*</sup> Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %

### Safe Operating Areas

2/6

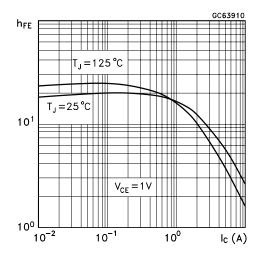
# Ic(A) Ic MAX PULSE OPERATION \* IC MAX PULSED IC MAX PULSED IC MAX CONT IC MAX PULSE OPERATION \* IC MAX CONT IC MAX

### **Derating Curve**

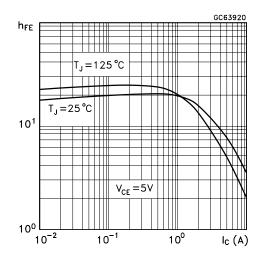


**△**577

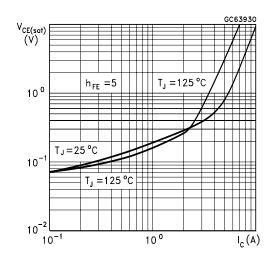
### DC Current Gain



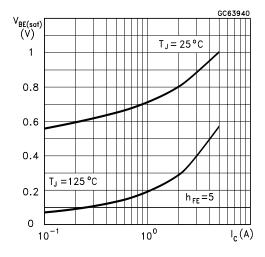
### DC Current Gain



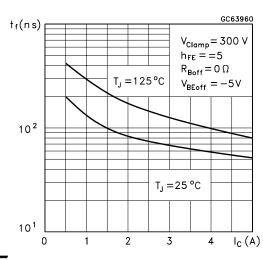
## Collector Emitter Saturation Voltage



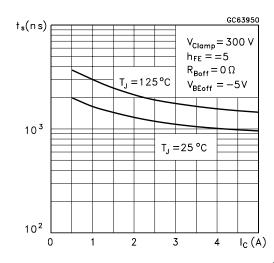
Base Emitter Saturation Voltage



# Inductive Fall Time

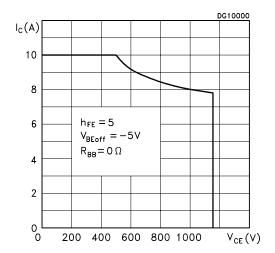


Inductive Storage Time

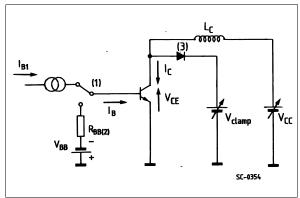


**477** 

### Reverse Biased SOA



**Figure 1**: Inductive Load Switching Test Circuit

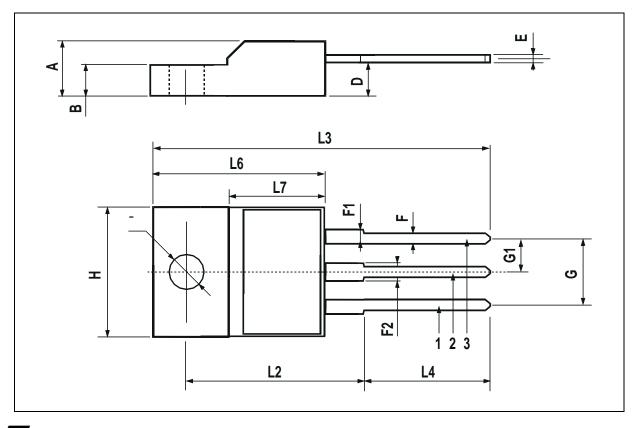


- (1) Fast electronic switch
- (2) Non-inductive Resistor
- (3) Fast recovery rectifier

4/6

# **TO-220FP MECHANICAL DATA**

DIM.	mm			inch			
DIIVI.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
А	4.4		4.6	0.173		0.181	
В	2.5		2.7	0.098		0.106	
D	2.5		2.75	0.098		0.108	
E	0.45		0.7	0.017		0.027	
F	0.75		1	0.030		0.039	
F1	1.15		1.7	0.045		0.067	
F2	1.15		1.7	0.045		0.067	
G	4.95		5.2	0.195		0.204	
G1	2.4		2.7	0.094		0.106	
Н	10		10.4	0.393		0.409	
L2		16			0.630		
L3	28.6		30.6	1.126		1.204	
L4	9.8		10.6	0.385		0.417	
L6	15.9		16.4	0.626		0.645	
L7	9		9.3	0.354		0.366	
Ø	3		3.2	0.118		0.126	



5/6

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a trademark of STMicroelectronics.

All other names are the property of their respective owners.

© 2004 STMicroelectronics – All Rights reserved STMicroelectronics GROUP OF COMPANIES

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

http://www.st.com

6/6