



## BUL1102EFP

# 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 INSULATED PACKAGE (U.L. COMPLIANT) FOR EASY MOUNTING

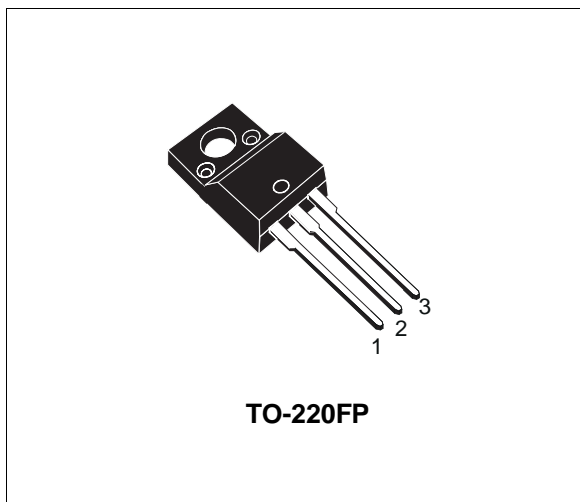
### APPLICATIONS

- FOUR LAMP ELECTRONIC BALLAST FOR:  
120 V MAINS IN PUSH-PULL CONFIGURATION;  
277 V MAINS IN HALF BRIDGE CURRENT FEED CONFIGURATION.

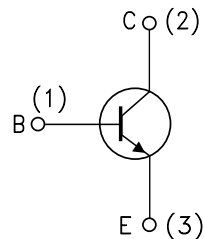
### DESCRIPTION

The device 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.

Thanks to an increased intermediate layer, it has an intrinsic ruggedness which enables the transistor to withstand a high collector current level during Breakdown condition, without using the transil protection usually necessary in typical converters for lamp ballast.



### INTERNAL SCHEMATIC DIAGRAM



SC06960

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-Emitter Voltage ( $V_{BE} = 0$ )	1100	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	450	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	12	V
$I_C$	Collector Current	4	A
$I_{CM}$	Collector Peak Current ( $t_p < 5$ ms)	8	A
$I_B$	Base Current	2	A
$I_{BM}$	Base Peak Current ( $t_p < 5$ ms)	4	A
$P_{tot}$	Total Dissipation at $T_c = 25$ °C	30	W
$V_{isol}$	Insulation Withstand Voltage (RMS) from All Three Leads to External Heatsink	1500	
$T_{stg}$	Storage Temperature	-65 to 150	°C
$T_j$	Max. Operating Junction Temperature	150	°C

THERMAL DATA

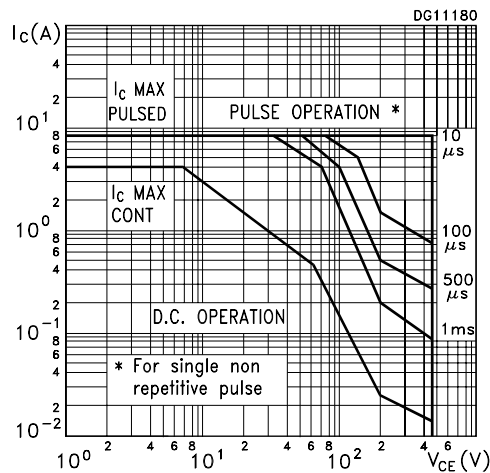
R <sub>thj-case</sub>	Thermal Resistance Junction-Case	Max	4.17	°C/W
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ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

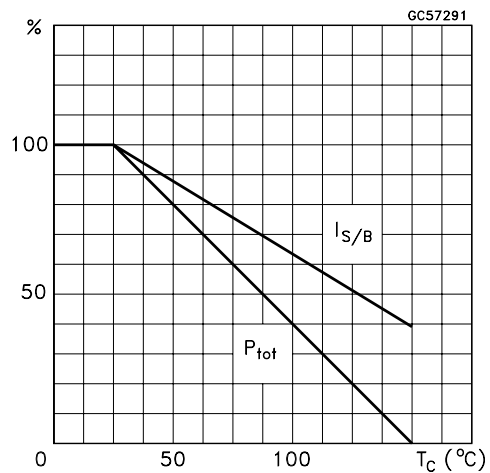
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 1100 V			100	μA
I <sub>EBO</sub>	Emitter Cut-off Current (I <sub>B</sub> = 0)	V <sub>EB</sub> = 12 V			1	mA
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 100 mA	450			V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 2 A      I <sub>B</sub> = 400 mA			1.5	V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 2 A      I <sub>B</sub> = 400 mA			1.5	V
h <sub>FE</sub> *	DC Current Gain	I <sub>C</sub> = 250 mA      V <sub>CE</sub> = 5 V I <sub>C</sub> = 2 A      V <sub>CE</sub> = 5 V	40 12		70 23	
t <sub>s</sub> t <sub>f</sub>	RESISTIVE LOAD Storage Time Fall Time	I <sub>C</sub> = 2.5 A      V <sub>CC</sub> = 250 V I <sub>B1</sub> = 0.5 A      I <sub>B2</sub> = 1 A T <sub>P</sub> = 30 μs      (see figure 2)			2.5 300	μs ns
E <sub>ar</sub>	Repetitive Avalanche Energy	L = 2 mH      C = 1.8 nF I <sub>BR</sub> ≤ 2.5A      25°C < T <sub>C</sub> < 125°C (see figure 1)	6			mJ

\* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %

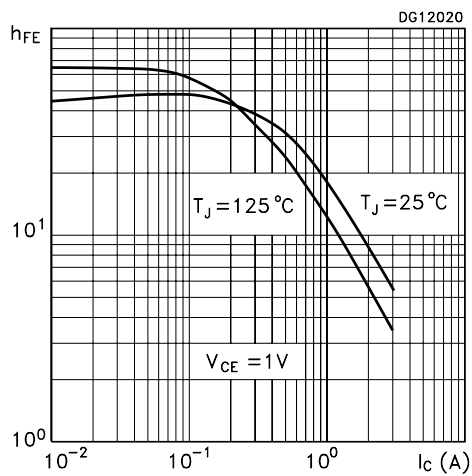
Safe Operating Areas



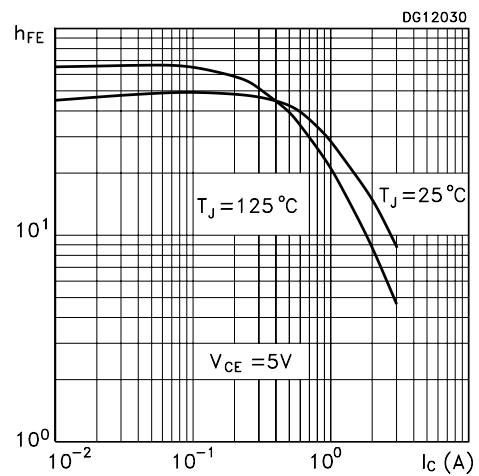
Derating Curve



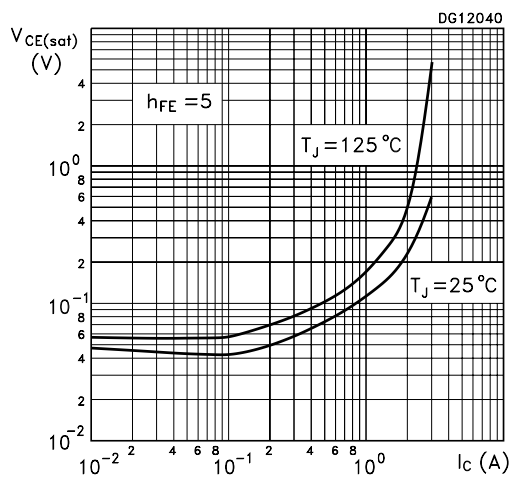
DC Current Gain



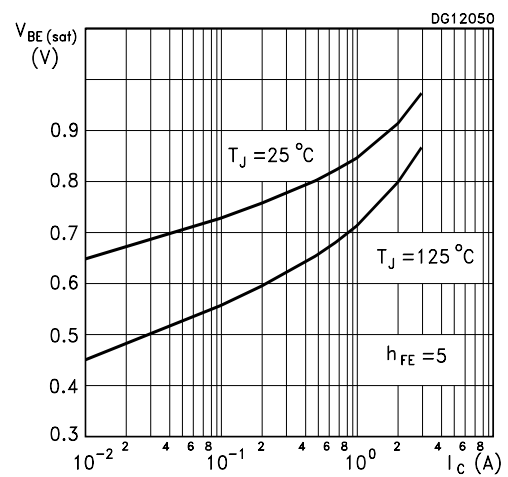
DC Current Gain



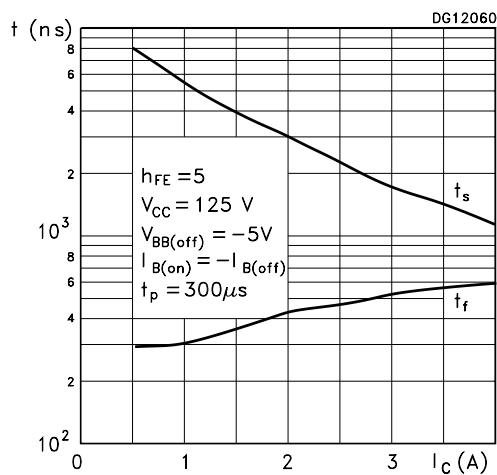
Collector Emitter Saturation Voltage



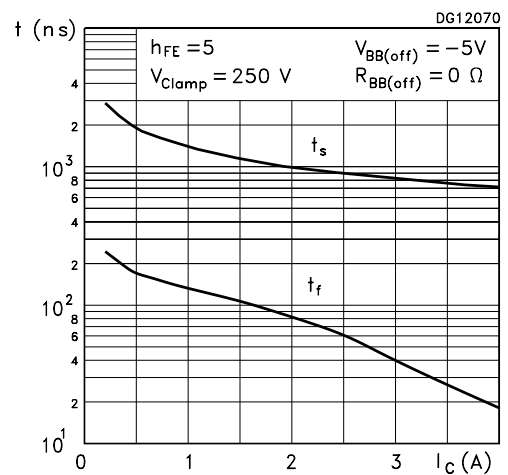
Base Emitter Saturation Voltage



Switching Time Resistive Load



Switching Time Inductive Load



Reverse Biased SOA

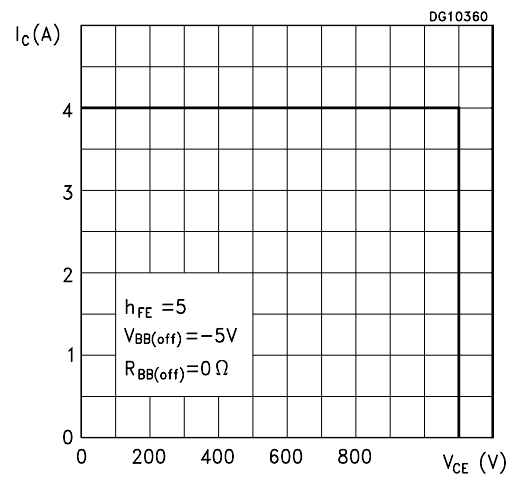


Figure 1: Energy Rating Test Circuit

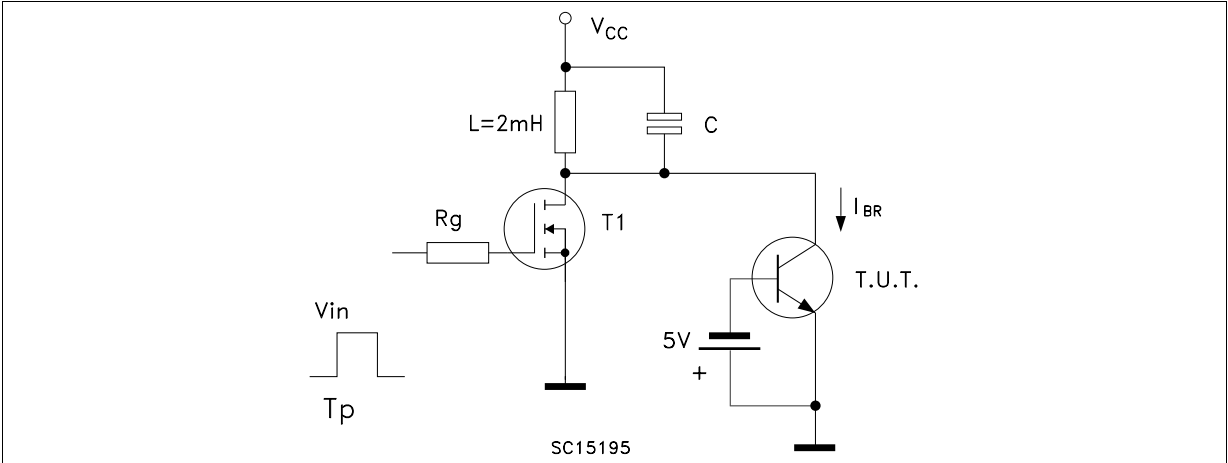
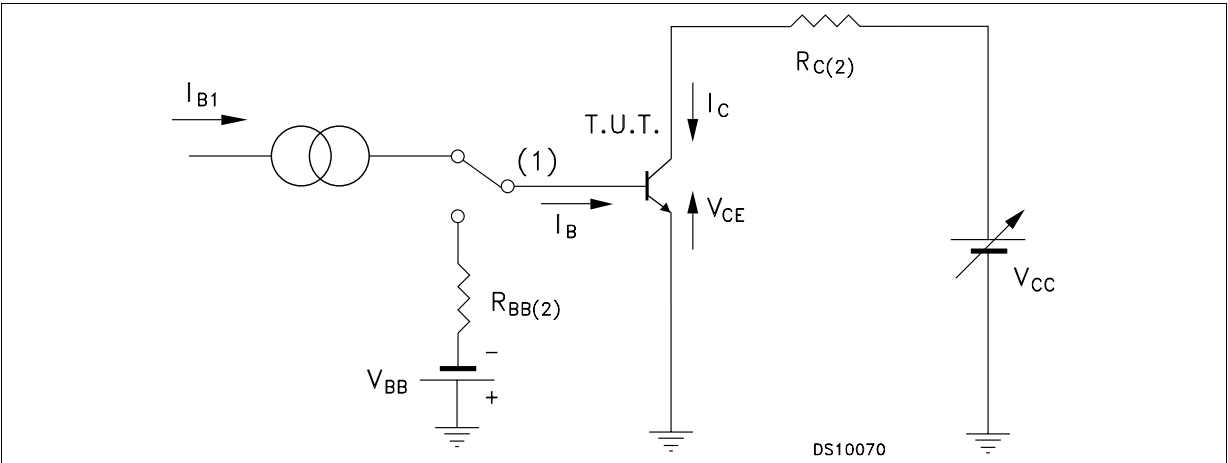
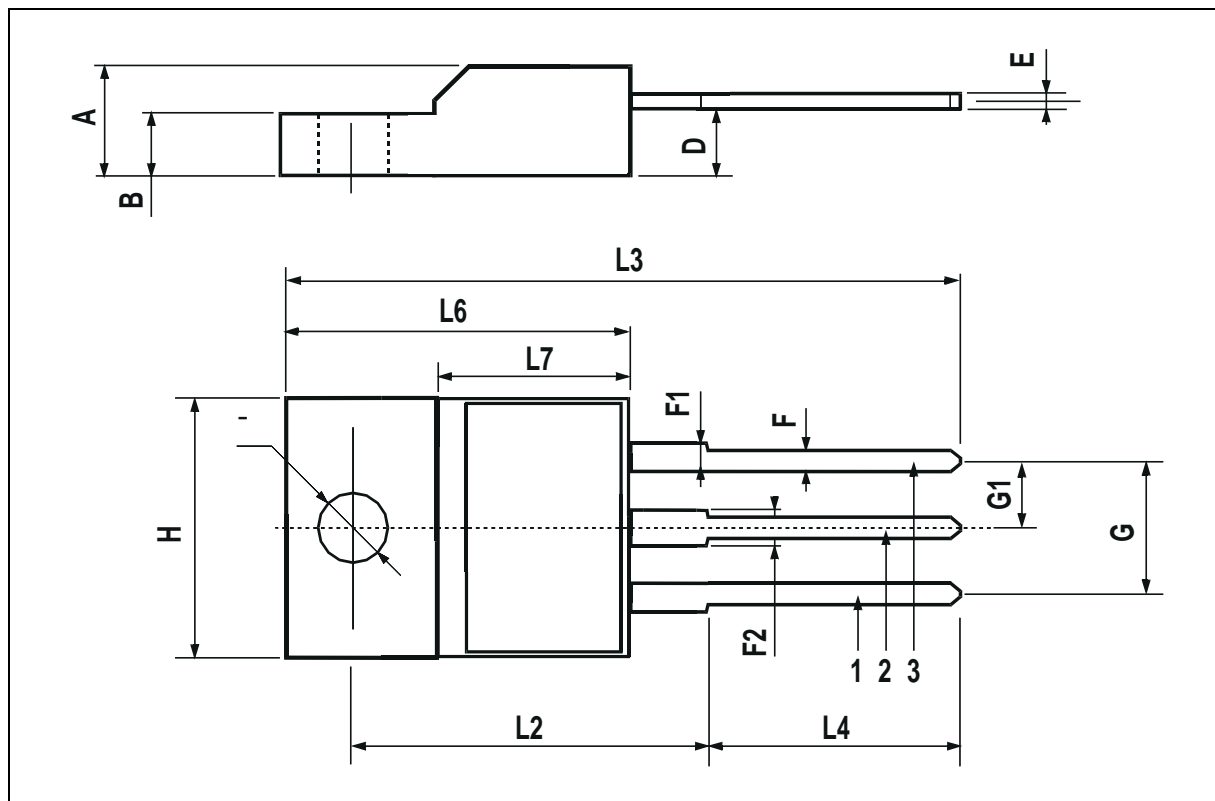


Figure 2: Resistive Load Switching Test Circuit



## TO-220FP MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	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
H	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



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