



## BUL1203EFP

# 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

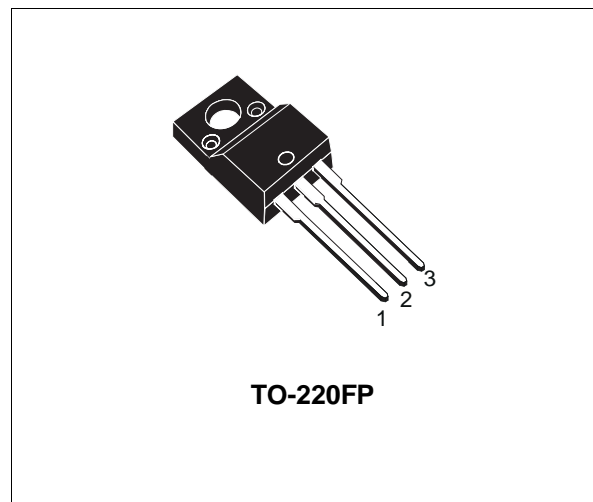
### APPLICATIONS

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING (277 V HALF BRIDGE AND 120 V PUSH-PULL TOPOLOGIES)

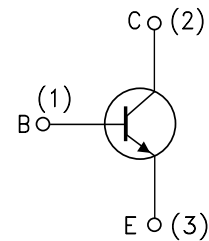
### DESCRIPTION

The BUL1203EFP is a new device manufactured using Diffused Collector technology to enhance switching speeds and tight  $h_{FE}$  range while maintaining a wide RBSOA.

Thanks to his structure 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



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-Base Voltage ( $I_E = 0$ )	1200	V
$V_{CES}$	Collector-Emitter Voltage ( $V_{BE} = 0$ )	1200	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	550	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	9	V
$I_C$	Collector Current	5	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	36	W
$V_{isol}$	Insulation Withstand Voltage (RMS) from All Three Leads to External Heatsink	1500	V
$T_{stg}$	Storage Temperature	-65 to 150	°C
$T_j$	Max. Operating Junction Temperature	150	°C

# BUL1203EFP

## THERMAL DATA

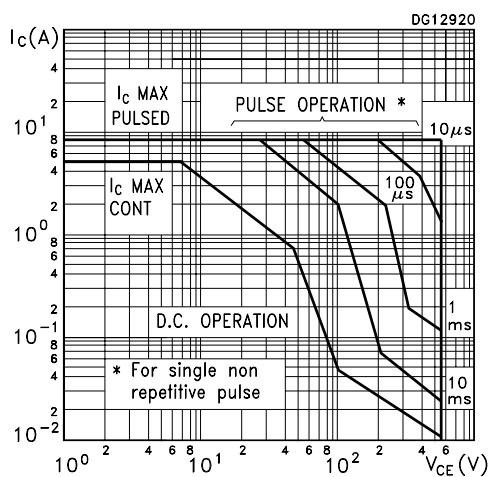
R <sub>thj-case</sub>	Thermal Resistance Junction-case	Max	3.47	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient	Max	62.5	°C/W

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

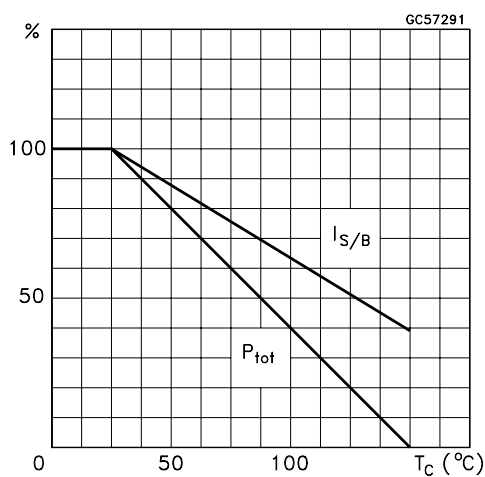
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 1200 V			100	μA
I <sub>CEO</sub>	Collector Cut-off Current (I <sub>B</sub> = 0)	V <sub>CE</sub> = 550 V			100	μA
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 100 mA    L = 25 mH	550			V
V <sub>EBO</sub>	Emitter-Base Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 mA	9			V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 1 A    I <sub>B</sub> = 0.2 A I <sub>C</sub> = 2 A    I <sub>B</sub> = 0.4 A I <sub>C</sub> = 3 A    I <sub>B</sub> = 1 A			0.5 0.7 1.5	V V V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 2 A    I <sub>B</sub> = 0.4 A I <sub>C</sub> = 3 A    I <sub>B</sub> = 1 A			1.5 1.5	V V
h <sub>FE*</sub>	DC Current Gain	I <sub>C</sub> = 1 mA    V <sub>CE</sub> = 5 V I <sub>C</sub> = 10 mA    V <sub>CE</sub> = 5 V I <sub>C</sub> = 0.8 A    V <sub>CE</sub> = 3 V I <sub>C</sub> = 2 A    V <sub>CE</sub> = 5 V	10 10 14 9		32 28	
t <sub>on</sub> t <sub>s</sub> t <sub>f</sub>	RESISTIVE LOAD Turn-on Time Storage Time Fall Time	I <sub>C</sub> = 2 A    I <sub>B1</sub> = 0.4 A I <sub>B2</sub> = -0.8 A    tp = 30 μs V <sub>CC</sub> = 150 V    (see figure 2)		2.5 0.2	0.5 3.0 0.3	μs μs μs
E <sub>ar</sub>	Repetitive Avalanche Energy	L = 2 mH    C = 1.8 nF V <sub>CC</sub> = 50 V    V <sub>BE</sub> = -5 V (see figure 3)	6			mJ

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

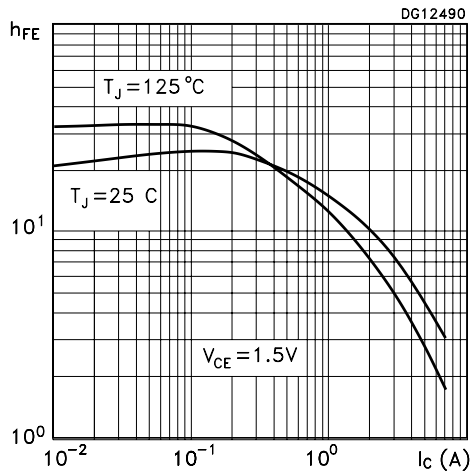
## Safe Operating Area



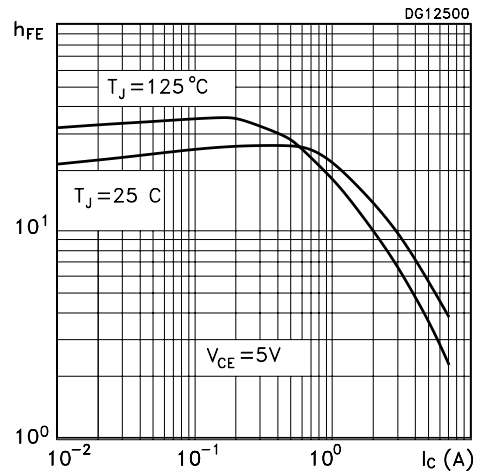
## Derating Curve



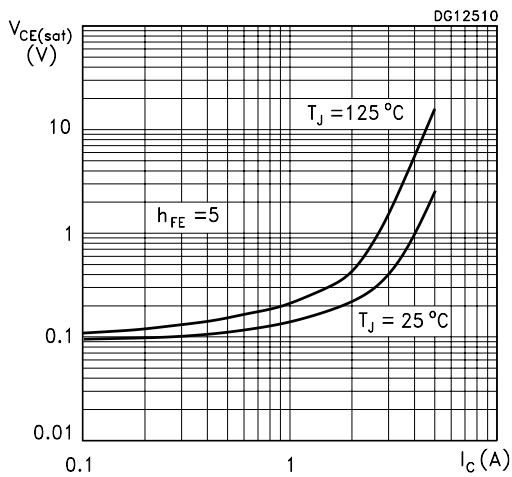
DC Current Gain



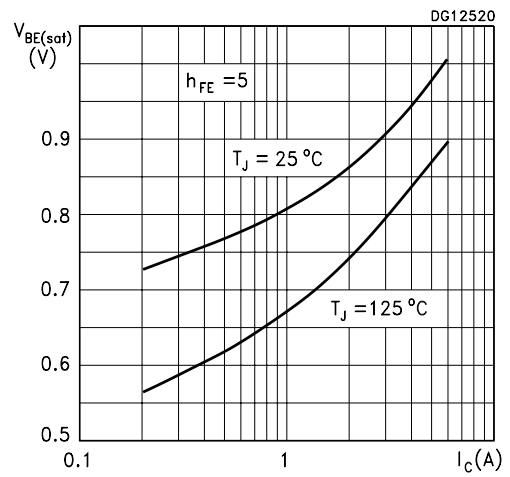
DC Current Gain



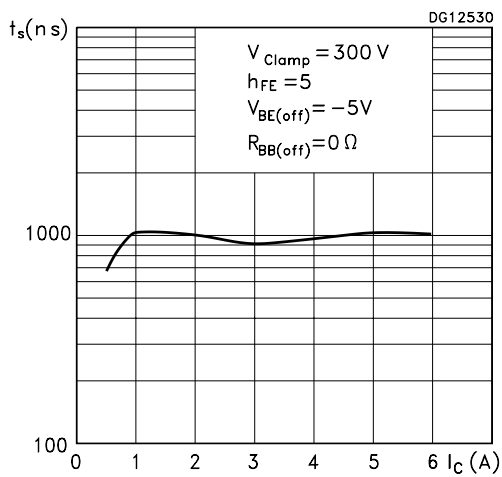
Collector-Emitter Saturation Voltage



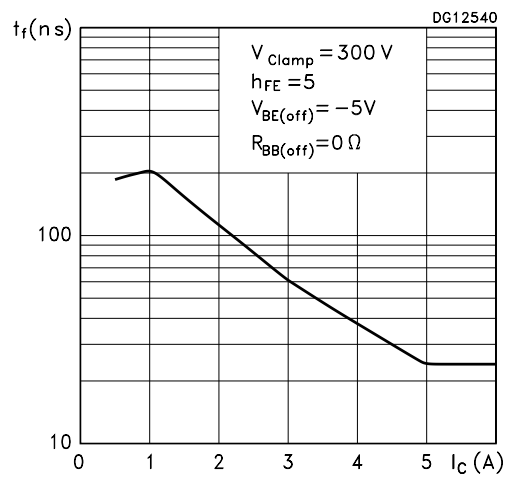
Base-Emitter Saturation Voltage



Inductive Load Storage Time



Inductive Load Fall Time



Reverse Biased Safe Operating Area

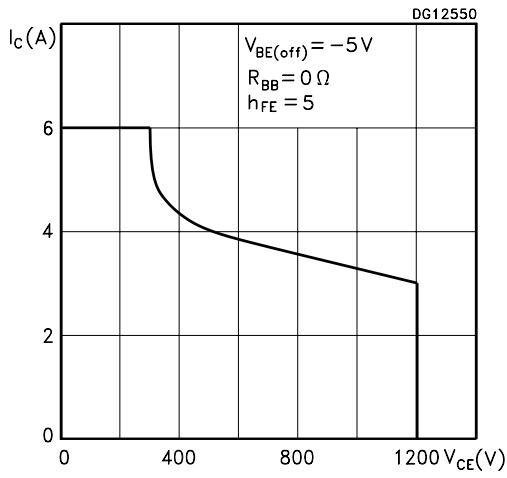


Figure 1: Inductive Load Switching Test Circuit

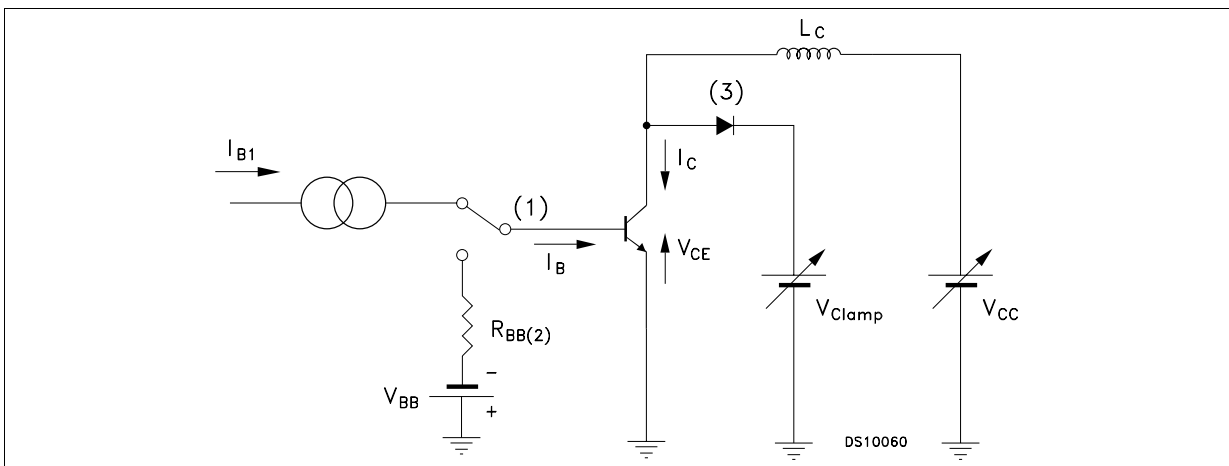


Figure 2: Resistive Load Switching Test Circuit

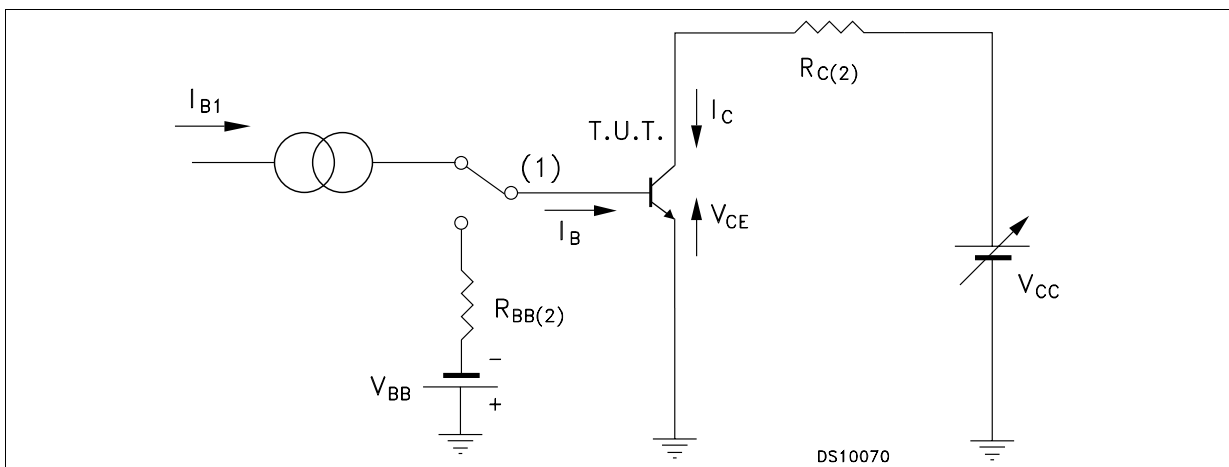
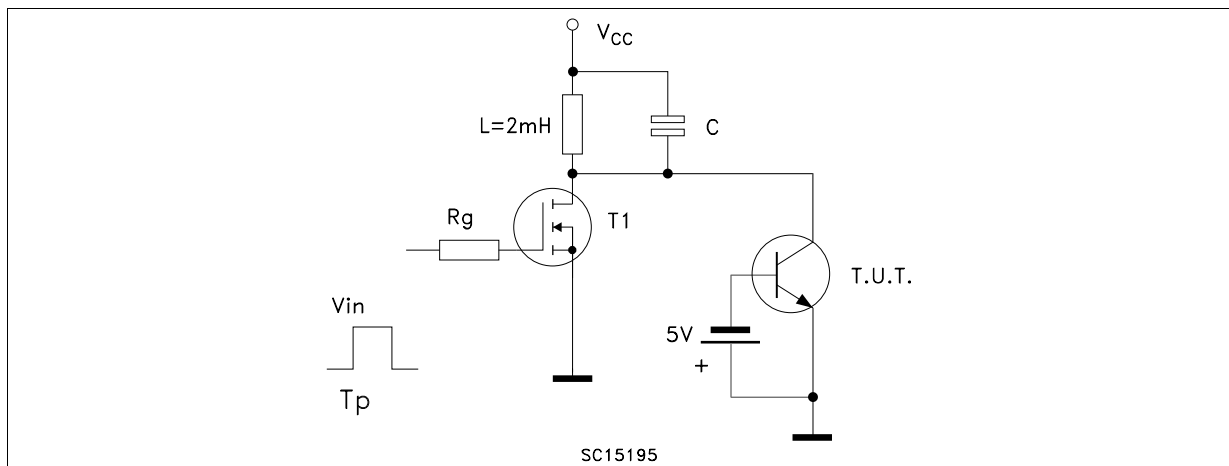
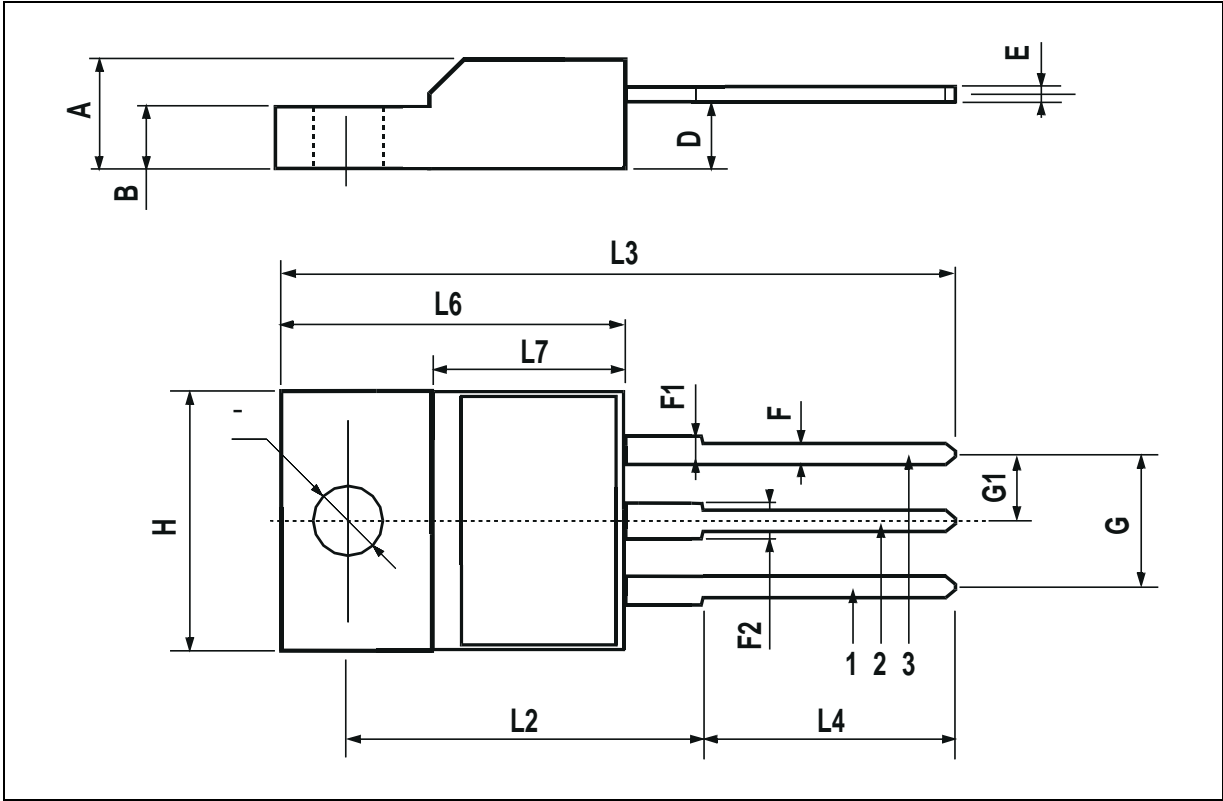


Figure 3: Energy Rating Test Circuit



**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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