



## BUL1203E

# 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

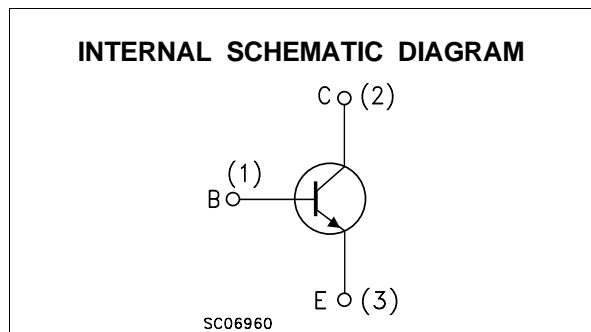
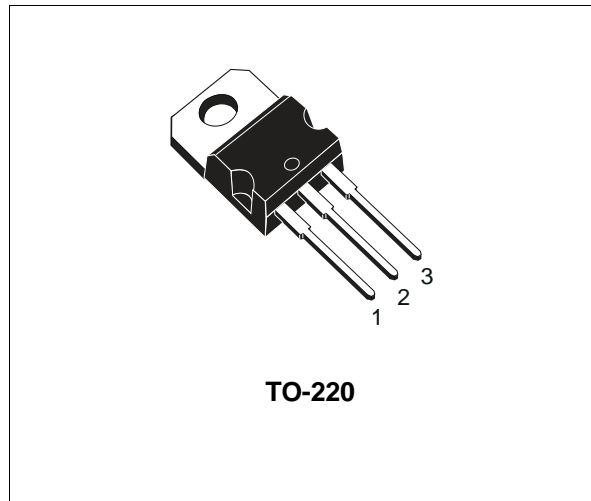
### APPLICATIONS

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

### DESCRIPTION

The BUL1203E 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.



### 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	100	W
$T_{stg}$	Storage Temperature	-65 to 150	°C
$T_j$	Max. Operating Junction Temperature	150	°C

# BUL1203E

## THERMAL DATA

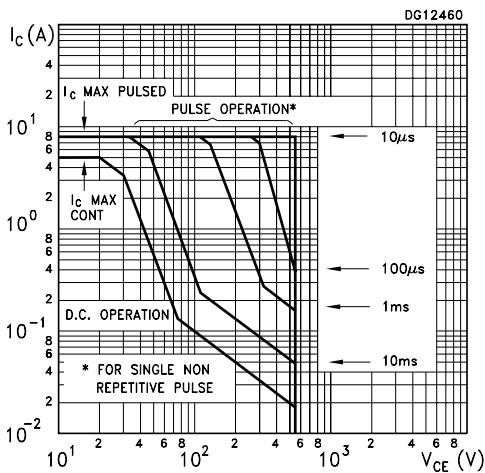
R <sub>thj-case</sub>	Thermal Resistance Junction-case	Max	1.25	°C/W
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## ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

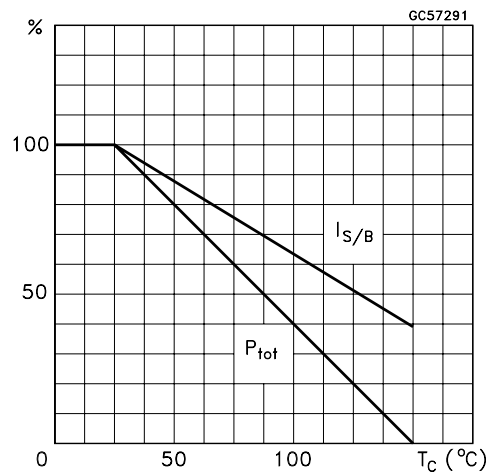
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 1200 V			100	μA
I <sub>CEO</sub>	Collector Cut-off Current (I <sub>B</sub> = 0)	V <sub>CE</sub> = 550 V			100	μA
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining 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    t <sub>p</sub> = 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 %

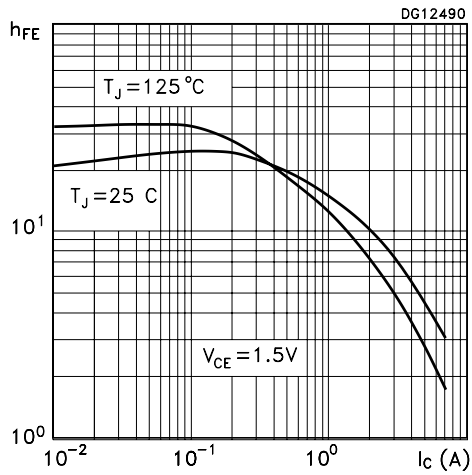
## Safe Operating Area



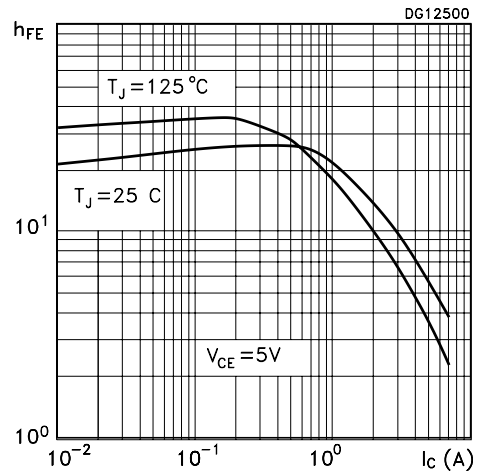
## Derating Curve



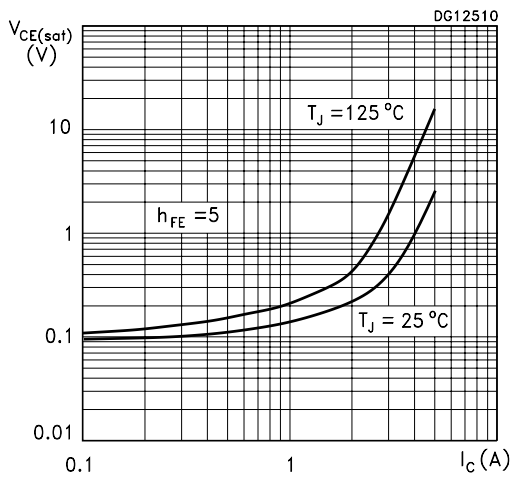
DC Current Gain



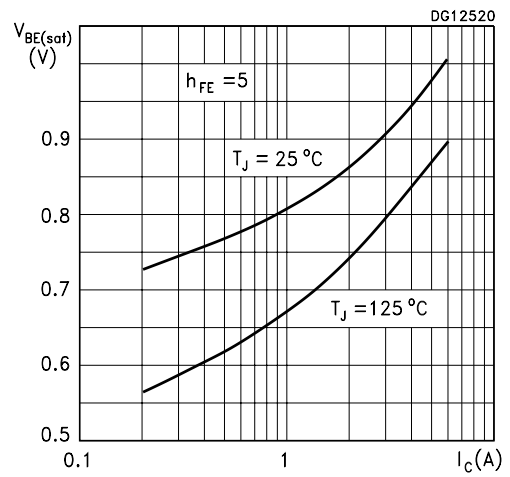
DC Current Gain



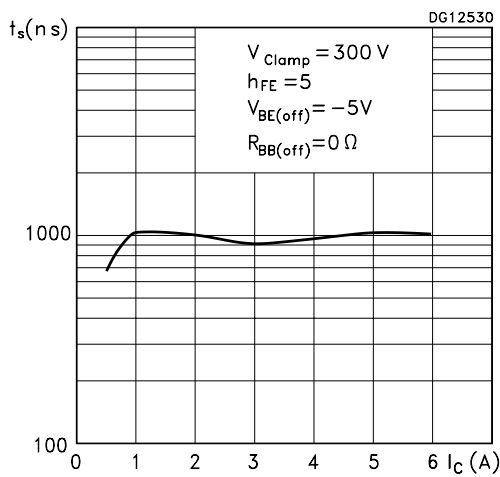
Collector-Emitter Saturation Voltage



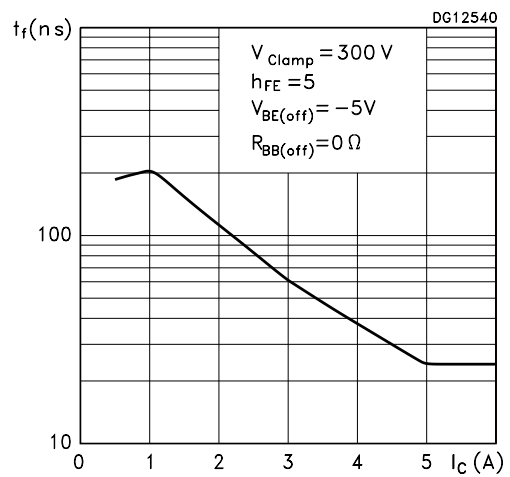
Base-Emitter Saturation Voltage



Inductive Load Storage Time



Inductive Load Fall Time



Reverse Biased Safe Operating Area

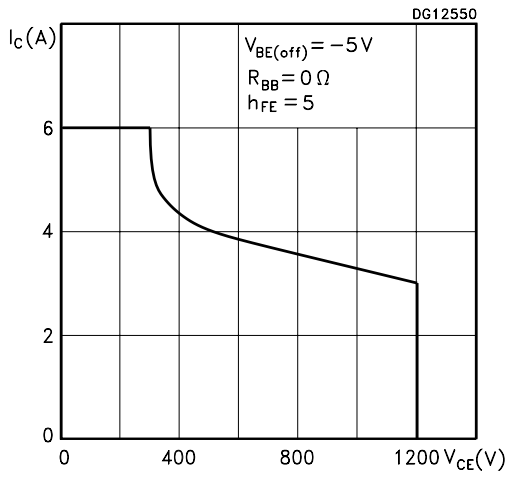


Figure 1: Inductive Load Switching Test Circuit

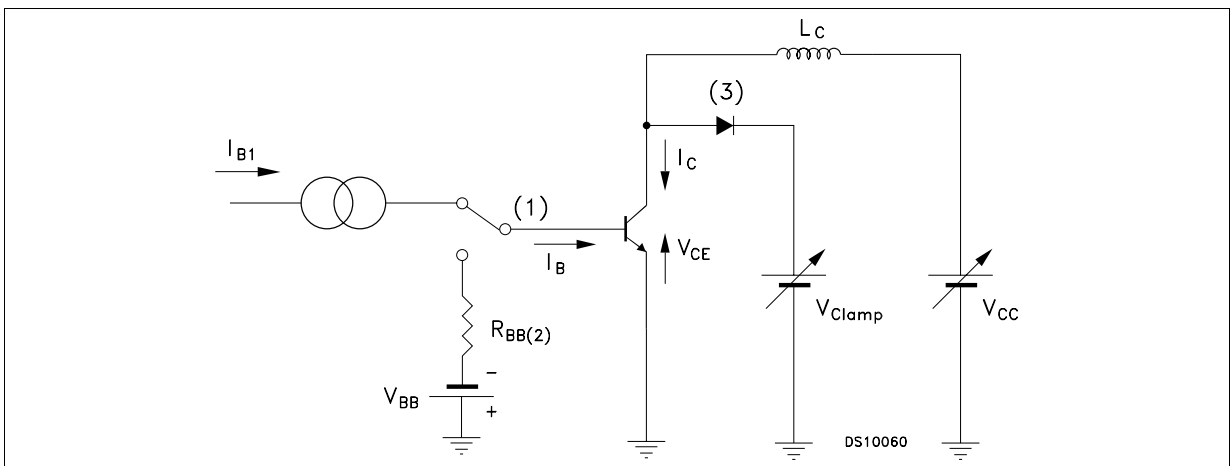


Figure 2: Resistive Load Switching Test Circuit

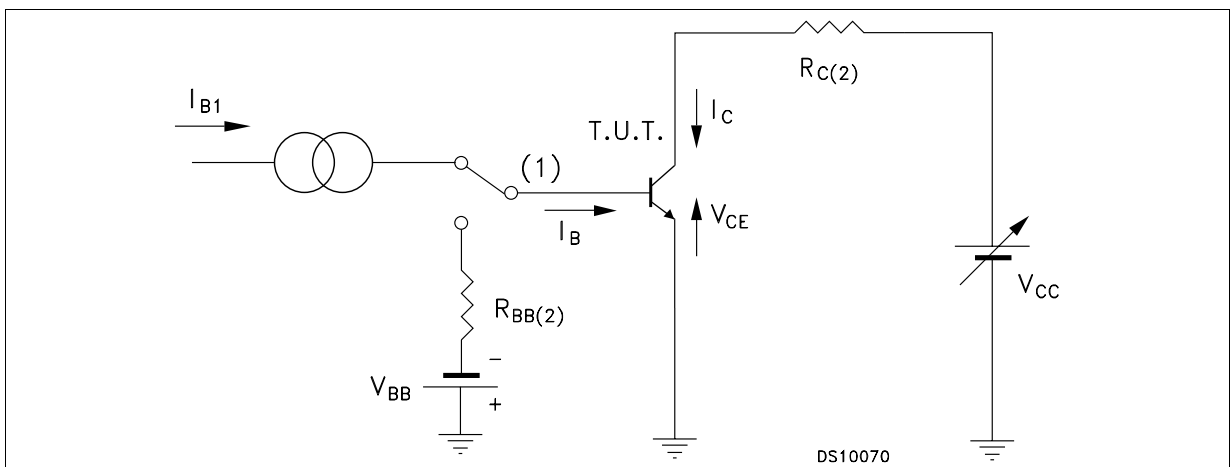
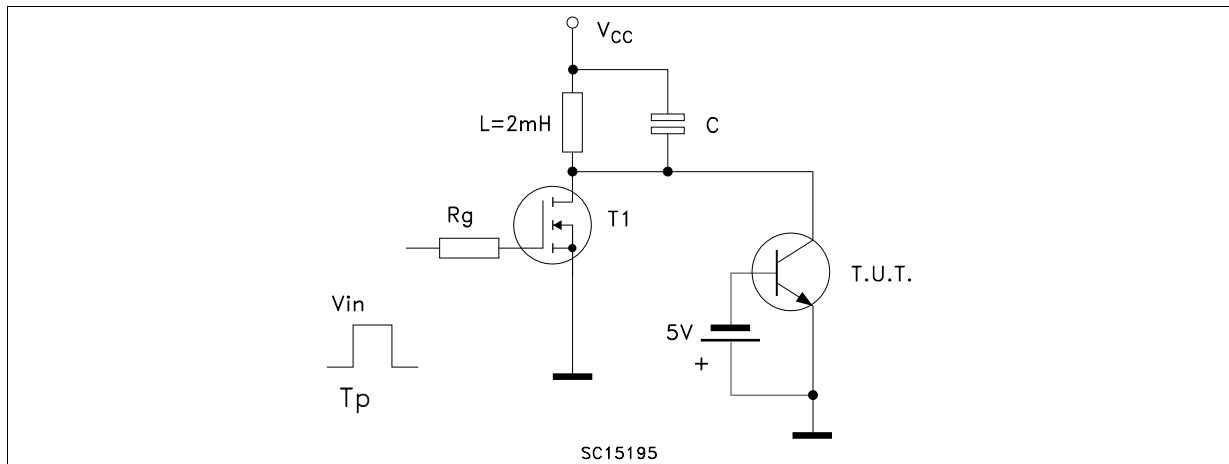
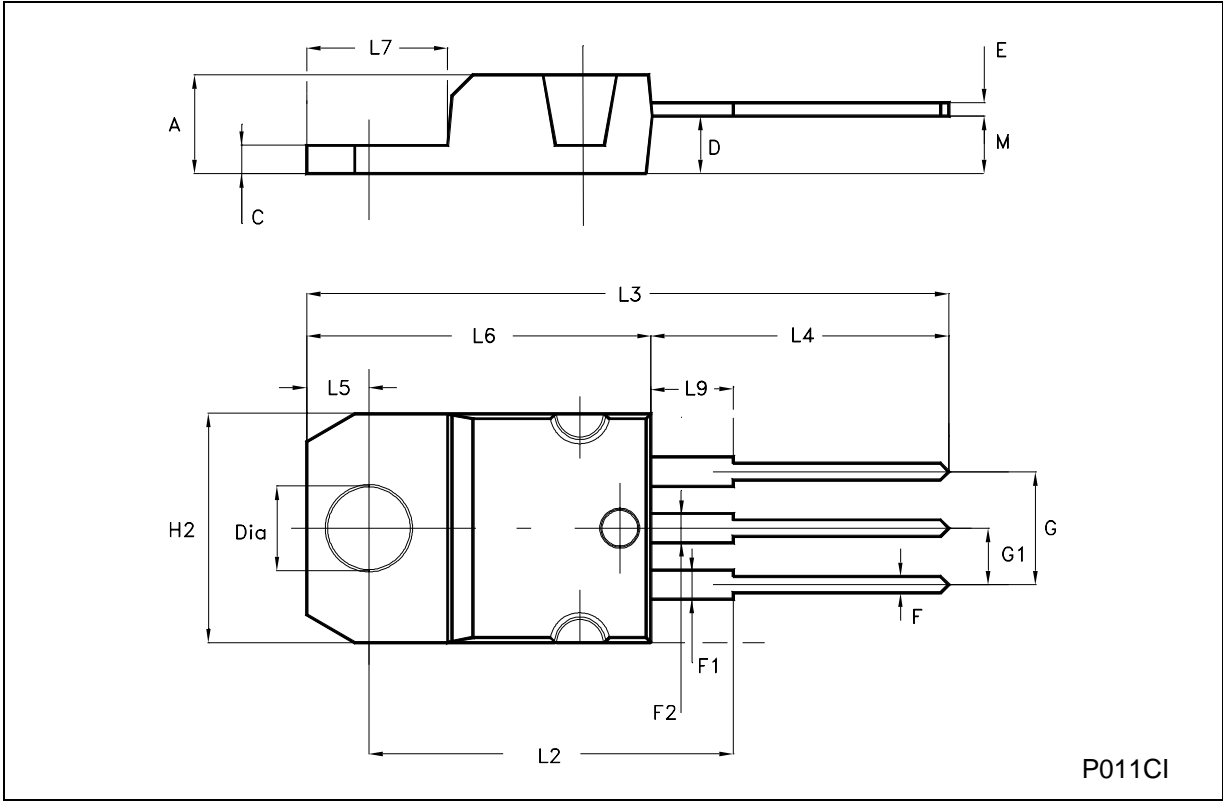


Figure 3: Energy Rating Test Circuit



**TO-220 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.052
D	2.40		2.72	0.094		0.107
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.202
G1	2.40		2.70	0.094		0.106
H2	10.00		10.40	0.394		0.409
L2		16.40			0.645	
L4	13.00		14.00	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.20		6.60	0.244		0.260
L9	3.50		3.93	0.137		0.154
M		2.60			0.102	
DIA.	3.75		3.85	0.147		0.151



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