



## BUL1603ED

# HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

PRELIMINARY DATA

- INTEGRATED ANTISATURATION AND PROTECTION NETWORK
- INTEGRATED ANTIPARALLEL COLLECTOR EMITTER DIODE
- HIGH VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- ARCING TEST SELF PROTECTED

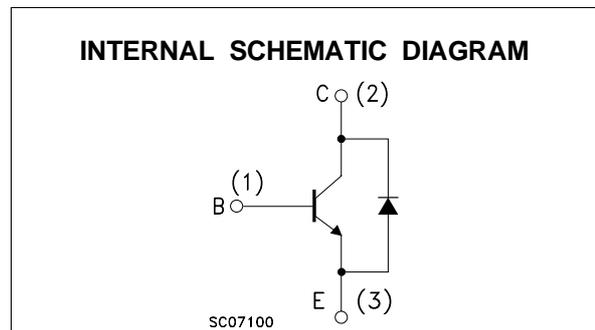
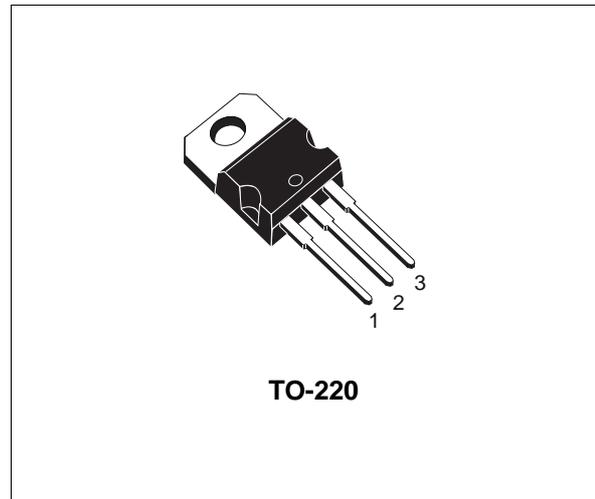
### APPLICATIONS

- TWO LAMPS ELECTRONIC BALLAST FOR FLUORESCENT LIGHTING 277 V<sub>AC</sub> IN PUSH-PULL CONFIGURATION

### DESCRIPTION

The BUL1603ED is a new device designed for fluorescent electronic ballast 277 V<sub>AC</sub> push-pull applications.

This device can be used without baker clamp and transil protection, reducing greatly the component count.



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>BE</sub> = 0; I <sub>CES</sub> = 10 mA; )	1600	V
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>BE</sub> = 0; I <sub>CES</sub> = 100 μA; )	1550	V
V <sub>CEO</sub>	Collector-Emitter Voltage (I <sub>B</sub> = 0)	650	V
V <sub>EBO</sub>	Emitter-Base Voltage (I <sub>C</sub> = 0)	11	V
I <sub>C</sub>	Collector Current	3	A
I <sub>CM</sub>	Collector Peak Current (t <sub>p</sub> < 5 ms)	6	A
I <sub>B</sub>	Base Current	2	A
I <sub>BM</sub>	Base Peak Current (t <sub>p</sub> < 5 ms)	4	A
P <sub>tot</sub>	Total Dissipation at T <sub>c</sub> = 25 °C	80	W
T <sub>stg</sub>	Storage Temperature	-65 to 150	°C
T <sub>j</sub>	Max. Operating Junction Temperature	150	°C

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### THERMAL DATA

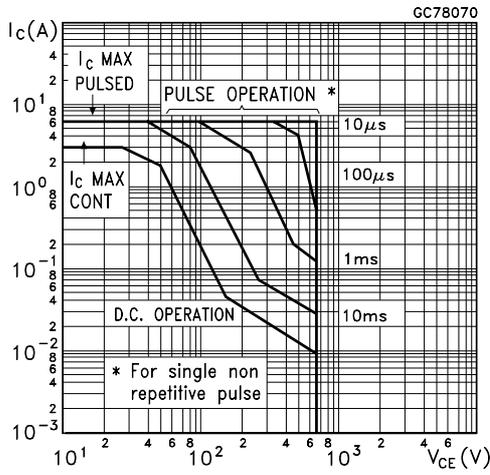
R <sub>thj-case</sub>	Thermal Resistance Junction-Case	Max	1.56	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-Ambient	Max	62.5	°C/W

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

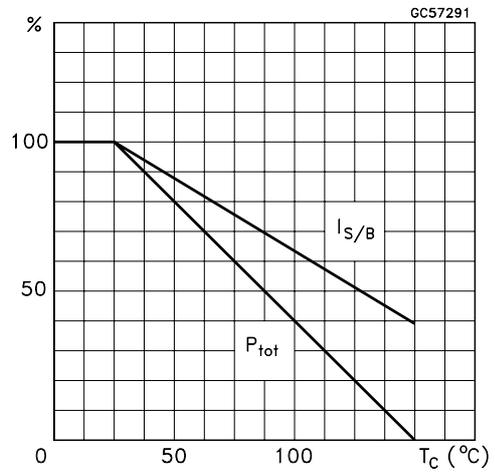
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 1550 V				100	μA
I <sub>EBO</sub>	Emitter Cut-off Current (I <sub>C</sub> = 0)	V <sub>EB</sub> = 9 V				100	μA
V <sub>(BR)CES</sub>	Collector-Emitter Breakdown Voltage (V <sub>BE</sub> = 0)	I <sub>C</sub> = 10 mA I <sub>C</sub> = 100 μA		1600 1550			V V
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 100 mA	L = 25 mH	650			V
V <sub>(BR)EBO</sub>	Emitter-Base Breakdown Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 mA		11		18	V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 1 A I <sub>C</sub> = 0.25 A	I <sub>B</sub> = 0.25 A I <sub>B</sub> = 0.025 A			1.5 1.5	V V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 1 A	I <sub>B</sub> = 0.25 A			1.2	V
h <sub>FE*</sub>	DC Current Gain	I <sub>C</sub> = 5 mA I <sub>C</sub> = 0.4 A I <sub>C</sub> = 1 A	V <sub>CE</sub> = 10 V V <sub>CE</sub> = 3 V V <sub>CE</sub> = 1.5 V	18 15 4		40	
t <sub>d</sub> t <sub>r</sub> t <sub>s</sub> t <sub>f</sub>	RESISTIVE LOAD Delay Time Rise Time Storage Time Fall Time	I <sub>C</sub> = 0.5 A I <sub>B1</sub> = 0.05 A D.C. = 2% (see figure 1)	V <sub>CC</sub> = 125 V I <sub>B2</sub> = -0.25 A P.W. = 300 μs			0.3 0.8 1.2 0.35	μs μs μs μs
E <sub>ar</sub>	Repetitive Avalanche Energy	L = 2 mH V <sub>CC</sub> = 50 V (see figure 2)	C = 1.8 nF V <sub>BE</sub> = -5 V	6			mJ

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

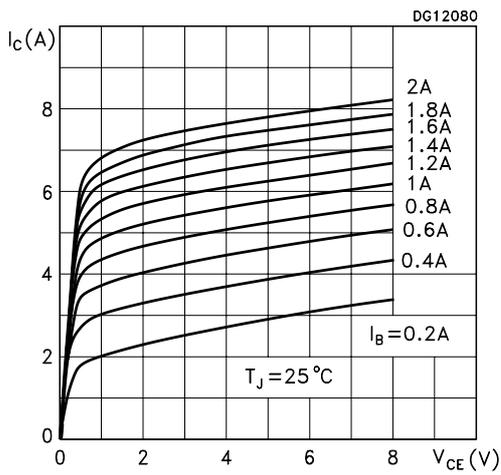
Safe Operating Area



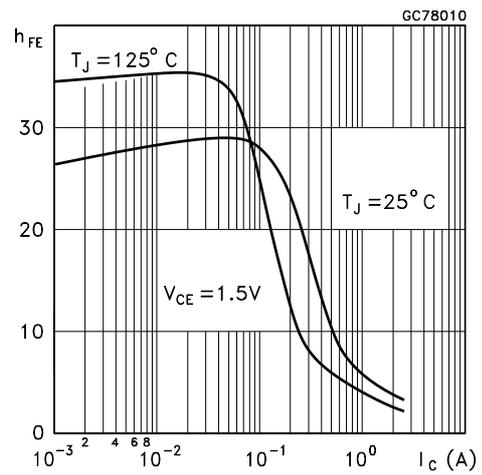
Derating Curve



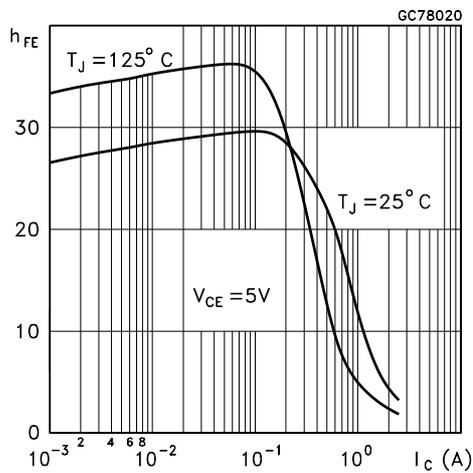
Output Characteristics



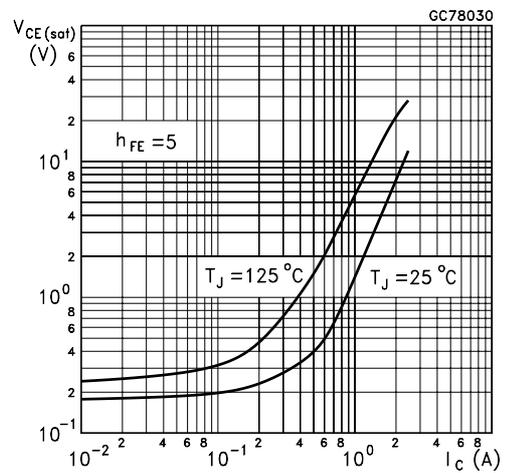
DC Current Gain



DC Current Gain



Collector Emitter Saturation Voltage



Base Emitter Saturation Voltage

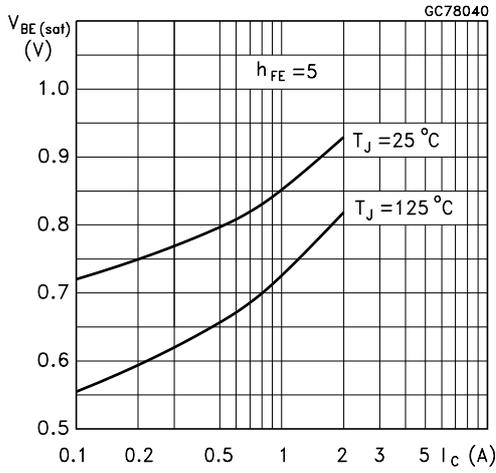


Figure 1: Resistive Load Switching Test Circuit

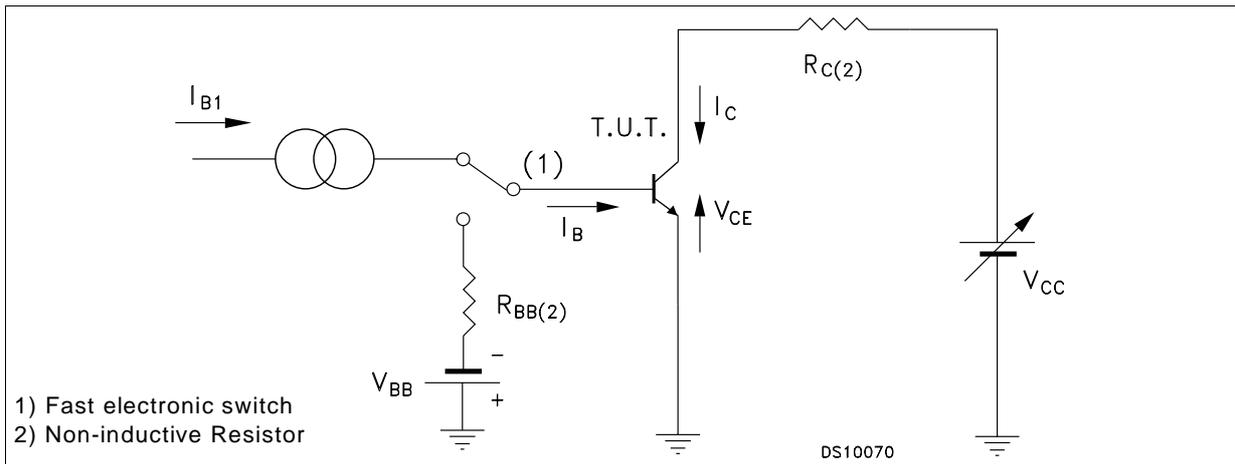
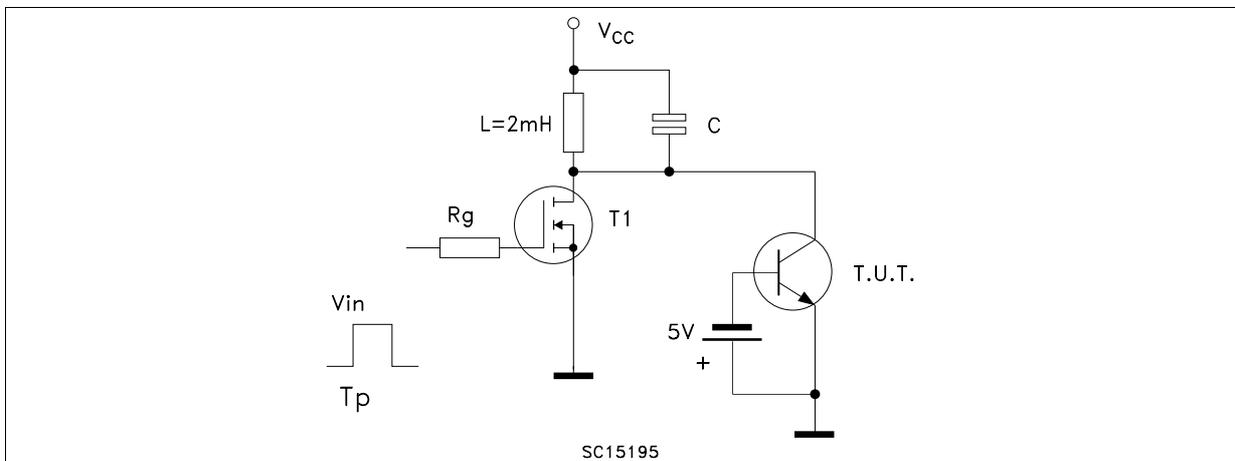
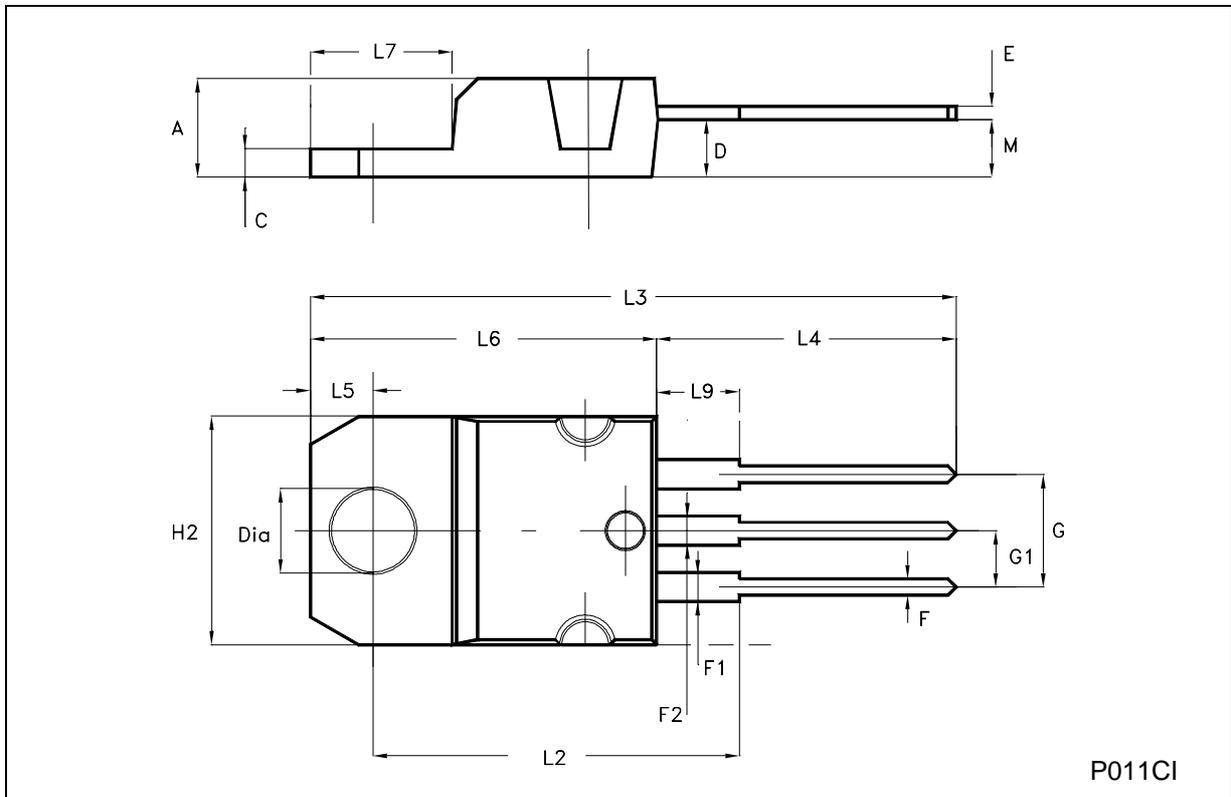


Figure 2: Energy Rating Test Circuit



**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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