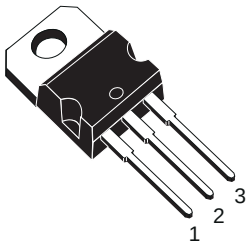
BUL1603ED

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



TO-220

APPLICATIONS

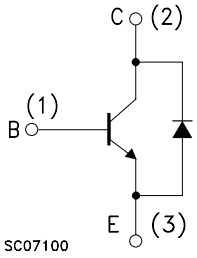
- TWO LAMPS ELECTRONIC BALLAST FOR FLUORESCENT LIGHTING 277 V_{AC} IN PUSH-PULL CONFIGURATION

DESCRIPTION

The BUL1603ED is a new device designed for fluorescent electronic ballast 277 V_{AC} push-pull applications.

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

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{BE} = 0; I_{CES} = 10 mA;)	1600	V
V_{CES}	Collector-Emitter Voltage (V_{BE} = 0; I_{CES} = 100 µA;)	1550	V
V_{CEO}	Collector-Emitter Voltage (I_B = 0)	650	V
V_{EBO}	Emitter-Base Voltage (I_C = 0)	11	V
I_C	Collector Current	3	A
I_{CM}	Collector Peak Current (t_p <5 ms)	6	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	80	W
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

THERMAL DATA

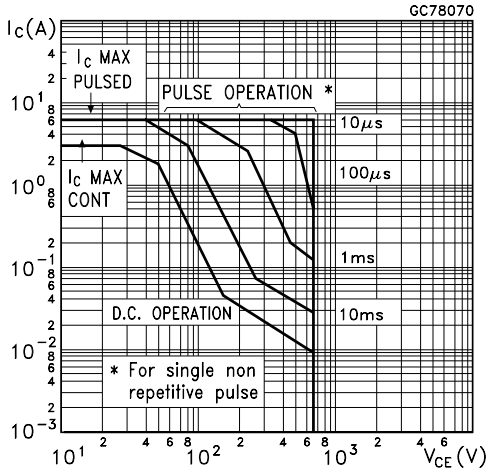
$R_{thj\text{-}case}$	Thermal Resistance Junction-Case	Max	1.56	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-Ambient	Max	62.5	°C/W

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

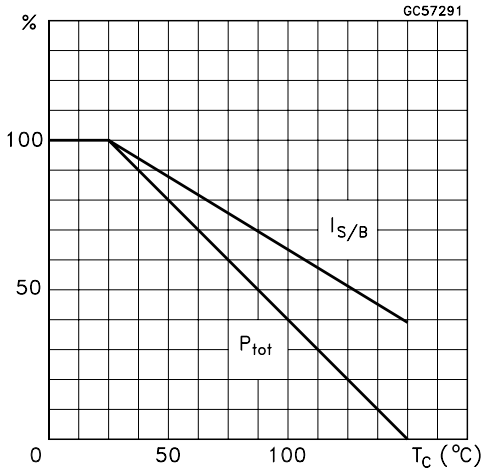
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector Cut-off Current (V_{BE} = 0)	V_{CE} = 1550 V			100	µA
I_{EBO}	Emitter Cut-off Current (I_C = 0)	V_{EB} = 9 V			100	µA
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage (V_{BE} = 0)	I_C = 10 mA I_C = 100 µA	1600 1550			V V
$V_{CEO(sus)}$*	Collector-Emitter Sustaining Voltage (I_B = 0)	I_C = 100 mA L = 25 mH	650			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage (I_C = 0)	I_E = 10 mA	11		18	V
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 1 A I_B = 0.25 A I_C = 0.25 A I_B = 0.025 A			1.5 1.5	V V
$V_{BE(sat)}$*	Base-Emitter Saturation Voltage	I_C = 1 A I_B = 0.25 A			1.2	V
h_{FE}*	DC Current Gain	I_C = 5 mA V_{CE} = 10 V I_C = 0.4 A V_{CE} = 3 V I_C = 1 A V_{CE} = 1.5 V	18 15 4		40	
	RESISTIVE LOAD					
t_d	Delay Time	I_C = 0.5 A V_{CC} = 125 V			0.3	µs
t_r	Rise Time	I_{B1} = 0.05 A I_{B2} = -0.25 A			0.8	µs
t_s	Storage Time	D.C. = 2% P.W. = 300 µs			1.2	µs
t_f	Fall Time	(see figure 1)			0.35	µs
E_{ar}	Repetitive Avalanche Energy	L = 2 mH C = 1.8 nF V_{CC} = 50 V V_{BE} = -5 V (see figure 2)	6			mJ

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

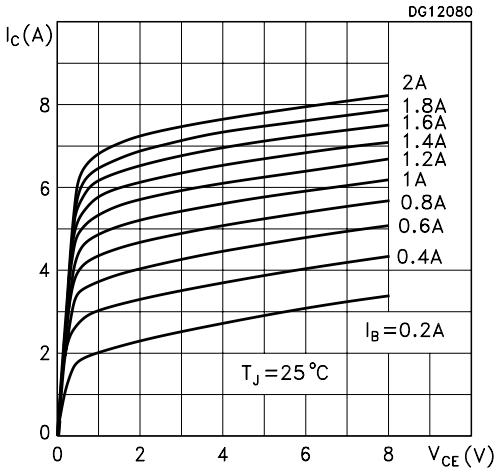
Safe Operating Area



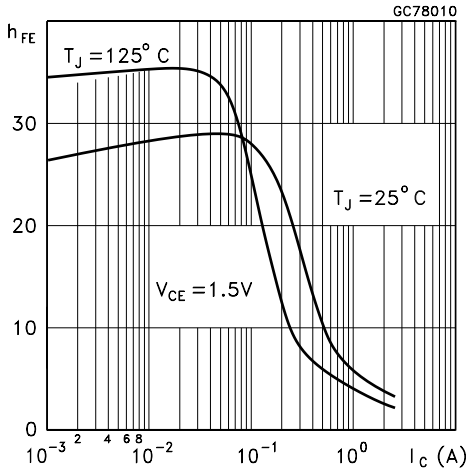
Derating Curve



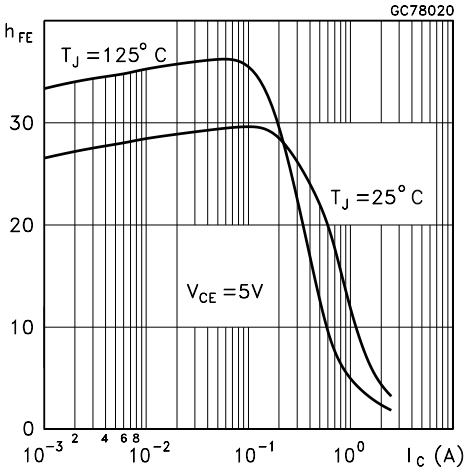
Output Characteristics



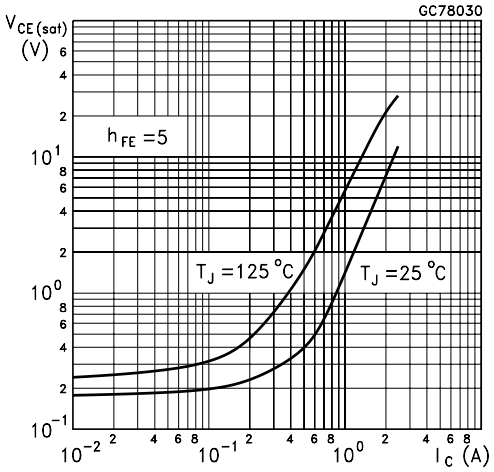
DC Current Gain



DC Current Gain



Collector Emitter Saturation Voltage



Base Emitter Saturation Voltage

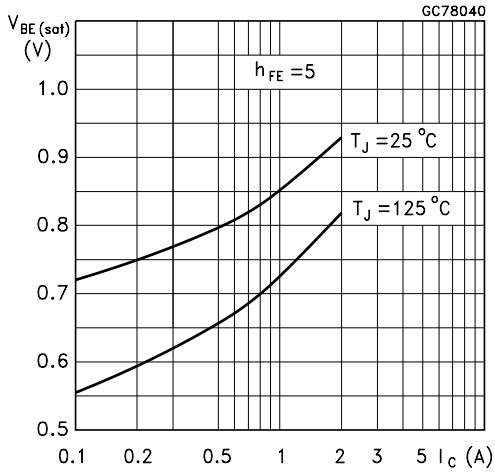


Figure 1: Resistive Load Switching Test Circuit

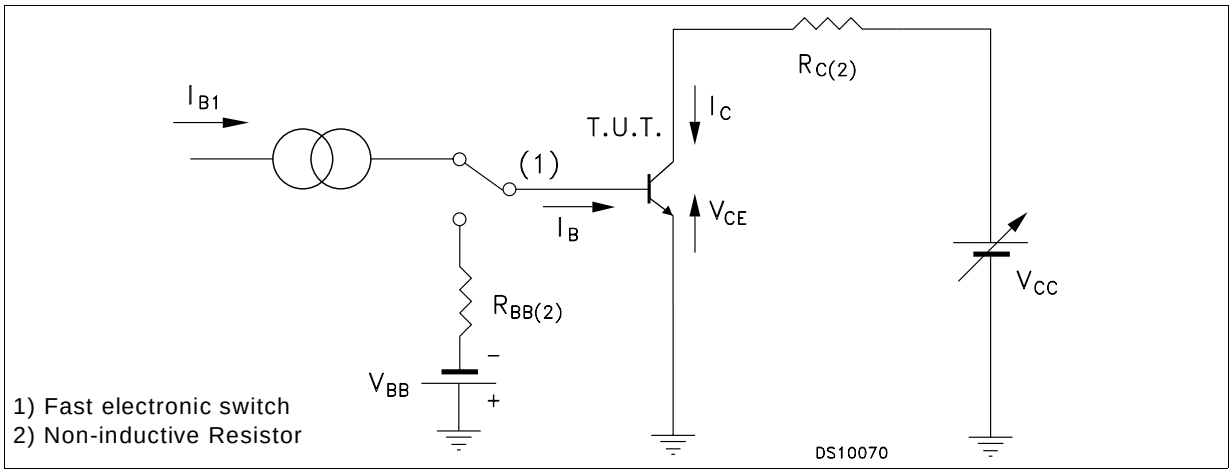
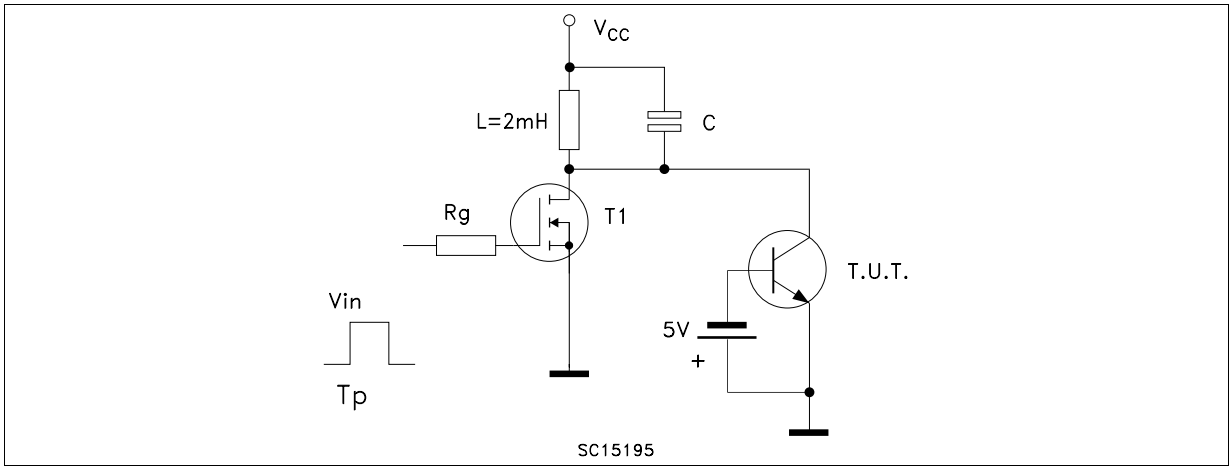
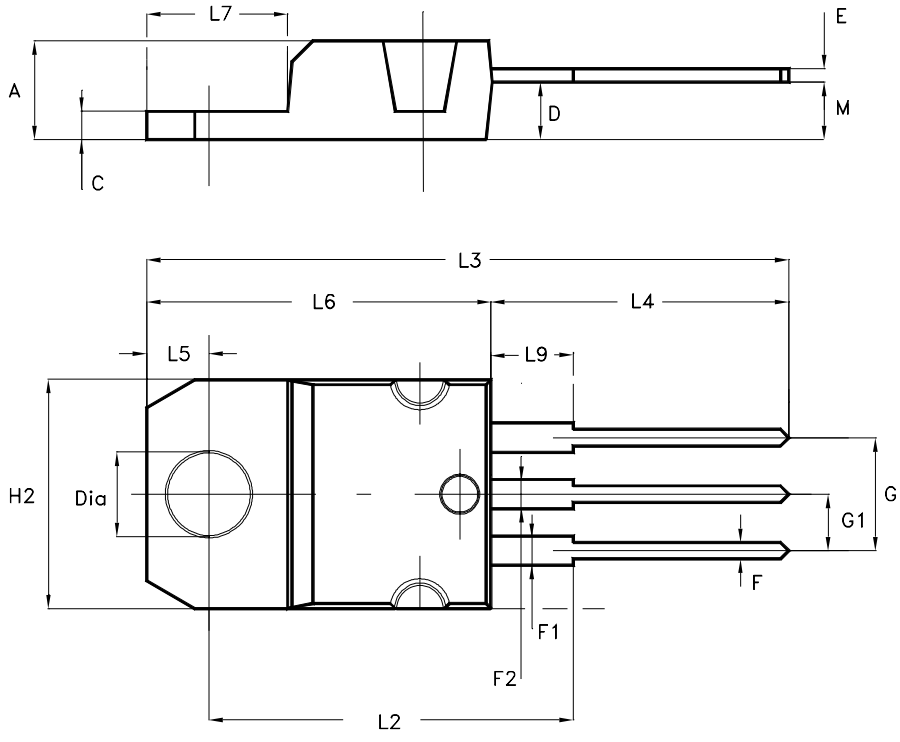


Figure 2: Energy Rating Test Circuit



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



P011CI