



## BUL903ED

# HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- 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

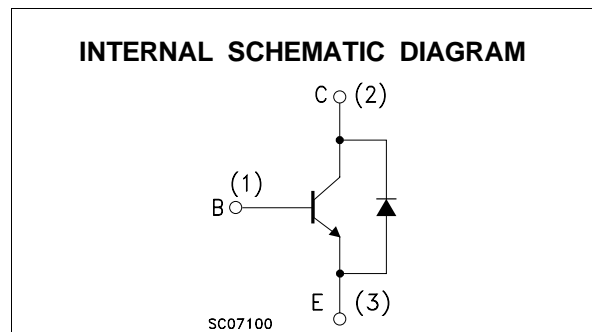
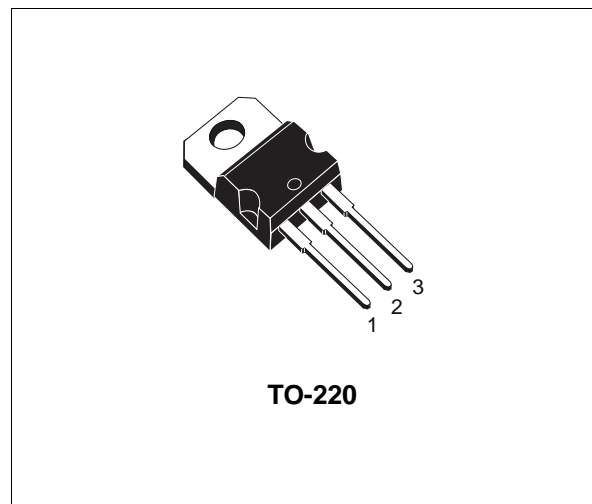
### APPLICATIONS

- LAMP ELECTRONIC BALLAST FOR FLUORESCENT LIGHTING USING 277V HALF BRIDGE CURRENT-FED CONFIGURATION

### DESCRIPTION

The BUL903ED is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capability.

The device has been designed to operate without baker clamp and transil protection. This enables saving from 2 up to 10 components in the application.



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-Emitter Voltage ( $V_{BE} = 0$ )	900	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	400	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	7	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	70	W
$T_{stg}$	Storage Temperature	-65 to 150	°C
$T_j$	Max. Operating Junction Temperature	150	°C

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### THERMAL DATA

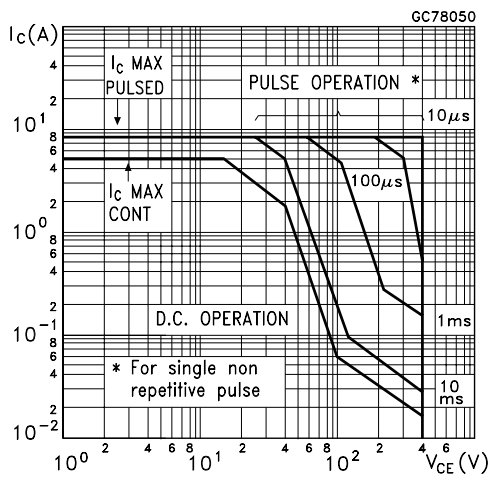
R <sub>thj-case</sub>	Thermal Resistance Junction-Case	Max	1.8	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-Ambient	Max	62.5	°C/W

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

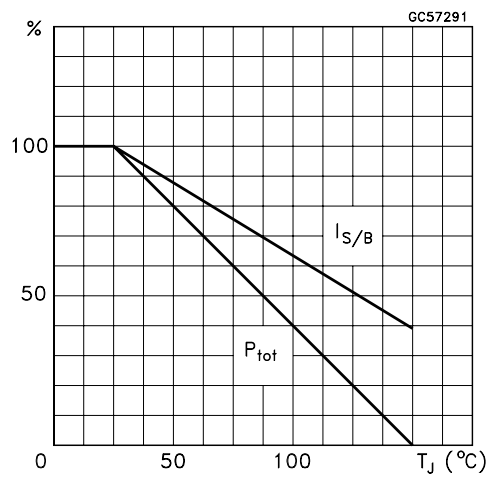
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 900 V			1	mA
I <sub>EBO</sub>	Base-Emitter Leakage Current	V <sub>EB</sub> = 7 V			100	μA
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 10 mA    L = 25 mH	400			V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 1 A    I <sub>B</sub> = 0.15 A			1.0	V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 0.1 A    I <sub>B</sub> = 0.05 A I <sub>C</sub> = 0.5 A    I <sub>B</sub> = 0.1 A I <sub>C</sub> = 2.0 A    I <sub>B</sub> = 0.4 A			1.0 1.1 1.2	V V V
h <sub>FE*</sub>	DC Current Gain	I <sub>C</sub> = 5 mA    V <sub>CE</sub> = 10 V I <sub>C</sub> = 0.5 A    V <sub>CE</sub> = 3 V	8 20			
V <sub>F</sub>	Parallel Diode Forward Voltage	I <sub>F</sub> = 3 A			1.2	V
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	V <sub>CC</sub> = 125 V    I <sub>C</sub> = 0.7 A I <sub>B1</sub> = 0.05 A    I <sub>B2</sub> = 0.4 A t <sub>p</sub> = 300 μs			0.2 1.0 0.8 0.25	μs μs μs μs
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	V <sub>CC</sub> = 125 V    I <sub>C</sub> = 0.5 A I <sub>B1</sub> = 0.045 A    I <sub>B2</sub> = 0.5 A t <sub>p</sub> = 300 μs			0.2 0.5 0.8 0.5	μs μs μs μs
T <sub>RR</sub>	Diode Reverse Recovery Time	I <sub>F</sub> = 1 A    di/dt = 100 A/μs V <sub>DD</sub> = 30 V		300		ns
E <sub>sb</sub>	Avalanche Energy	L = 2 mH	6			mJ

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

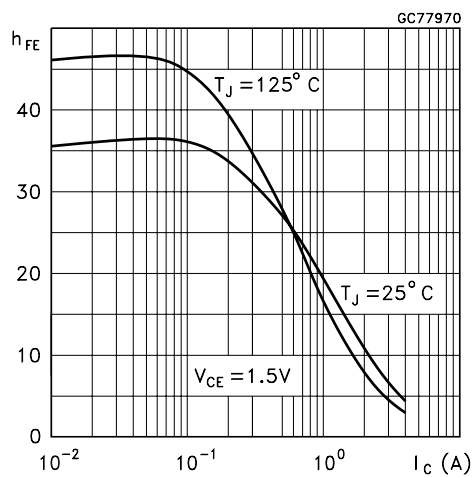
Safe Operating Areas



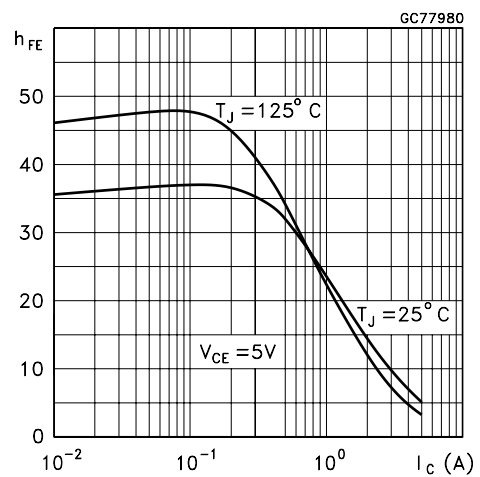
Derating Curve



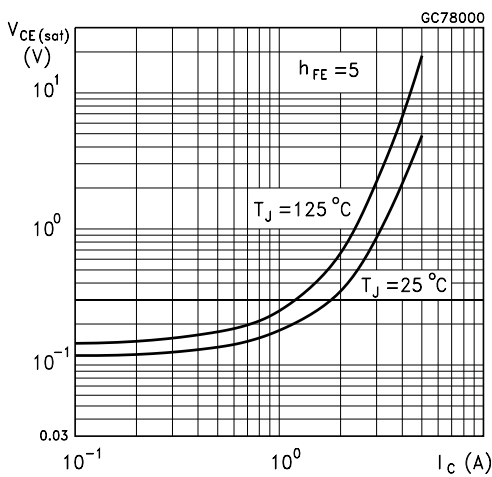
DC Current Gain



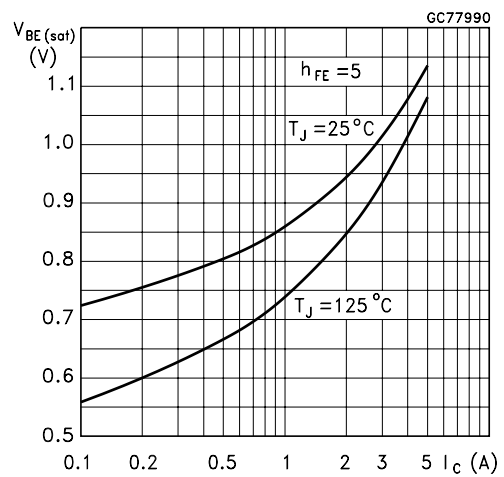
DC Current Gain



Collector Emitter Saturation Voltage

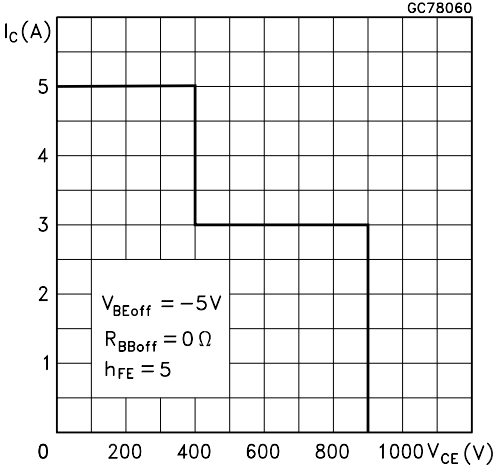


Base Emitter Saturation Voltage

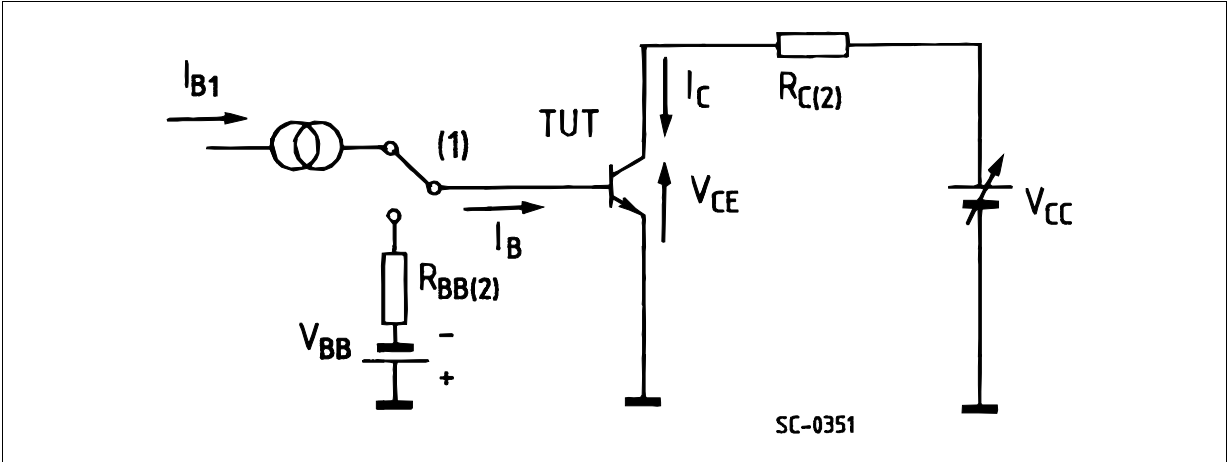


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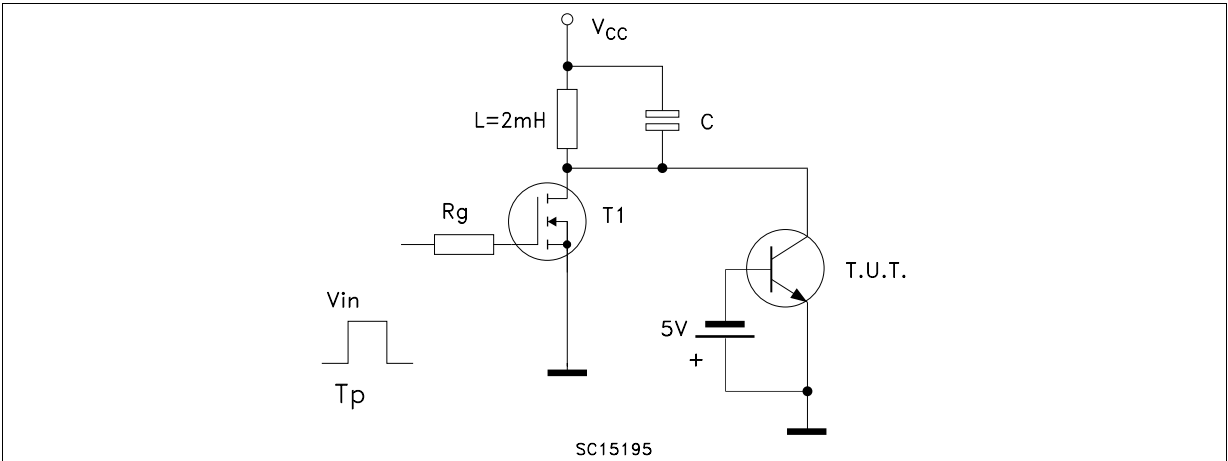
Reverse Biased SOA



Resistive Load Switching Test Circuit

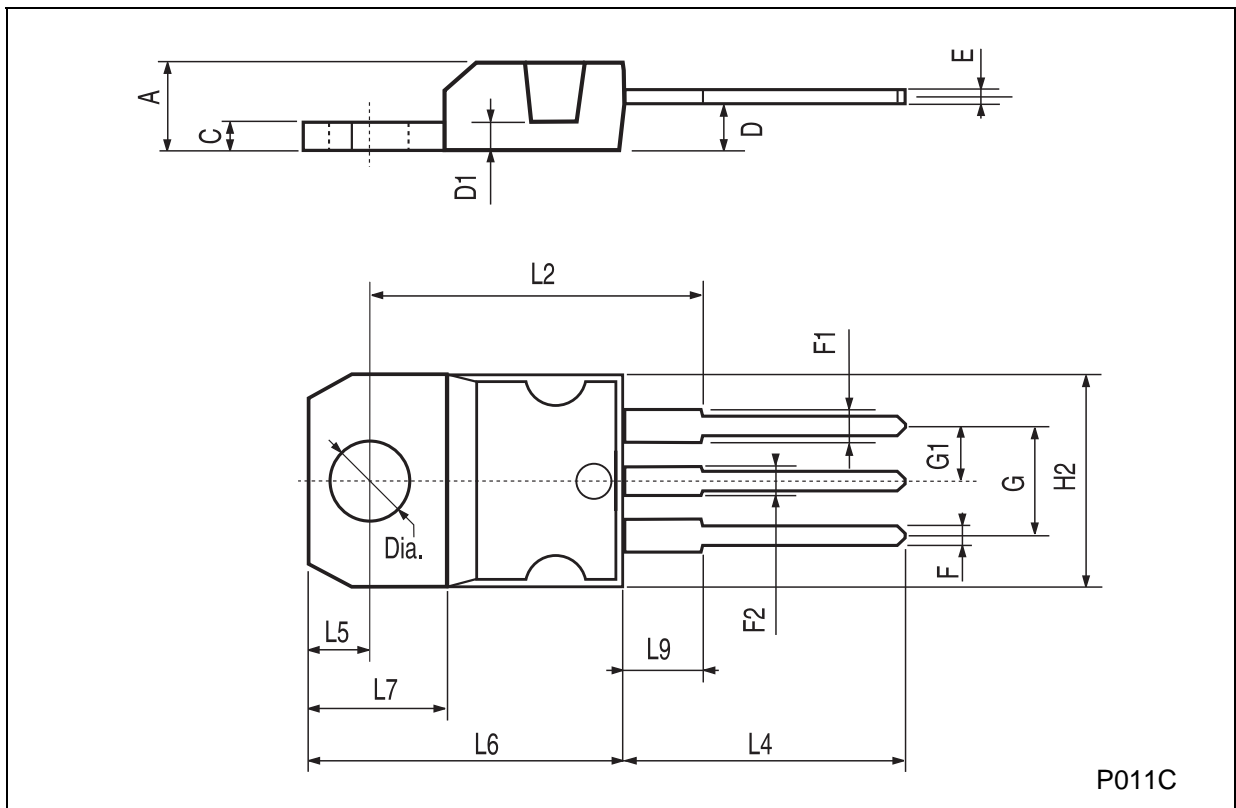


Energy Rating Test Circuit



**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		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
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		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



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