



# BULB128-1

## HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

Ordering Code	Marking	Shipment
BULB128-1	BULB128	Tube

- STMicroelectronics PREFERRED SALESTYPE
- NPN TRANSISTOR
- HIGH VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- THROUGH HOLE I<sup>2</sup>PAK (TO-262) POWER PACKAGE IN TUBE (SUFFIX "-1")

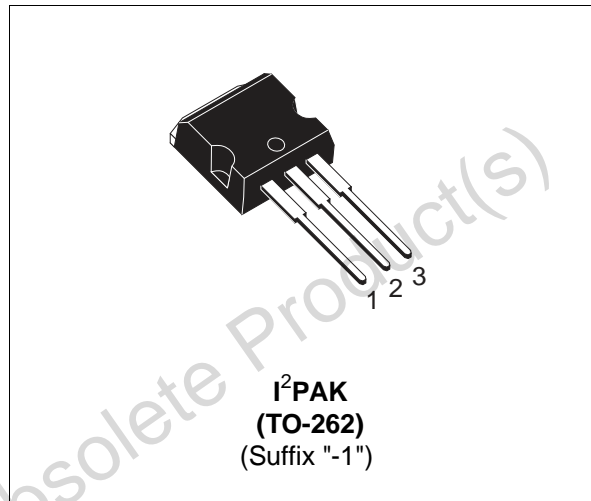
### APPLICATIONS:

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING

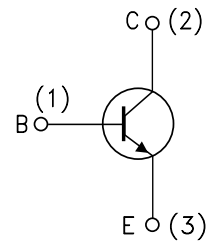
### DESCRIPTION

The device is manufactured using high voltage Multi-Epitaxial Planar technology for high switching speeds and medium voltage capability. It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining the wide RBSOA.

The device is designed for use in lighting applications and low cost switch-mode power supplies.



### INTERNAL SCHEMATIC DIAGRAM



SC06960

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>BE</sub> = 0)	700	V
V <sub>CEO</sub>	Collector-Emitter Voltage (I <sub>B</sub> = 0)	400	V
V <sub>EBO</sub>	Emitter-Base Voltage (I <sub>C</sub> = 0)	9	V
I <sub>C</sub>	Collector Current	4	A
I <sub>CM</sub>	Collector Peak Current (t <sub>p</sub> < 5 ms)	8	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	70	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

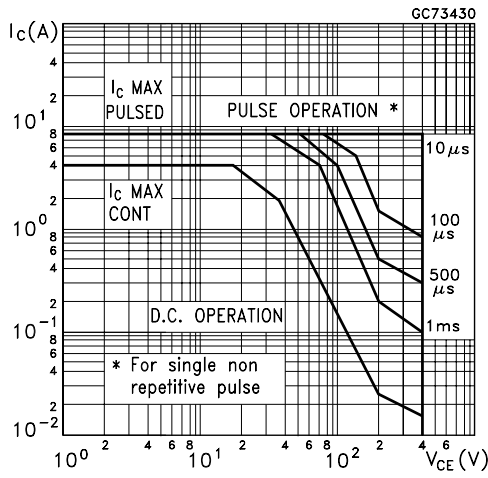
R <sub>thj-case</sub>	Thermal Resistance Junction-Case	Max	1.78	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-Ambient	Max	62.5	°C/W

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

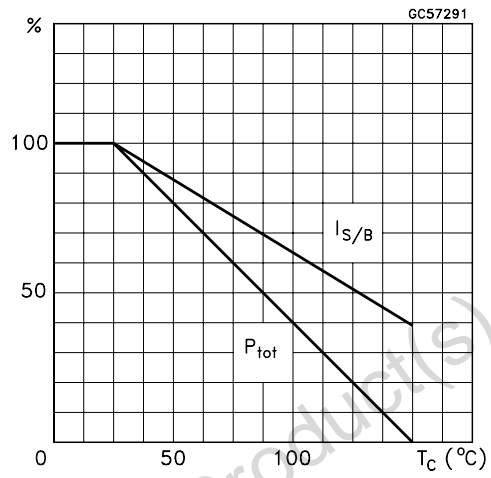
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 700 V V <sub>CE</sub> = 700 V      T <sub>C</sub> = 125 °C			100 500	μA μA
V <sub>EBO</sub>	Emitter-Base Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 mA	9			V
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 100 mA      L = 25 mH	400			V
I <sub>CEO</sub>	Collector Cut-Off Current (I <sub>B</sub> = 0)	V <sub>CE</sub> = 400 V			250	μA
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 0.5 A      I <sub>B</sub> = 0.1 A I <sub>C</sub> = 1 A      I <sub>B</sub> = 0.2 A I <sub>C</sub> = 2.5 A      I <sub>B</sub> = 0.5 A I <sub>C</sub> = 4 A      I <sub>B</sub> = 1 A		0.5	0.7 1 1.5	V V V V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 0.5 A      I <sub>B</sub> = 0.1 A I <sub>C</sub> = 1 A      I <sub>B</sub> = 0.2 A I <sub>C</sub> = 2.5 A      I <sub>B</sub> = 0.5 A			1.1 1.2 1.3	V V V
h <sub>FE*</sub>	DC Current Gain	I <sub>C</sub> = 10 mA      V <sub>CE</sub> = 5 V I <sub>C</sub> = 2 A      V <sub>CE</sub> = 5 V	10 14		28	
t <sub>s</sub> t <sub>f</sub>	RESISTIVE LOAD Storage Time Fall Time	V <sub>CC</sub> = 125 V      I <sub>C</sub> = 2 A I <sub>B1</sub> = 0.4 A      I <sub>B2</sub> = -0.4 A T <sub>p</sub> = 30 μs      (see fig.2)	1.5	0.2	3 0.4	μs μs
t <sub>s</sub> t <sub>f</sub>	INDUCTIVE LOAD Storage Time Fall Time	I <sub>C</sub> = 2 A      I <sub>B1</sub> = 0.4 A V <sub>BE(off)</sub> = -5 V      R <sub>BB</sub> = 0 Ω V <sub>clamp</sub> = 200 V      (see fig.1)		0.6 0.1	1 0.2	μs μs

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

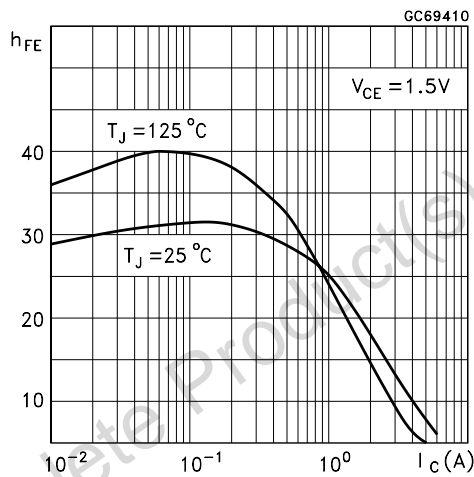
Safe Operating Areas



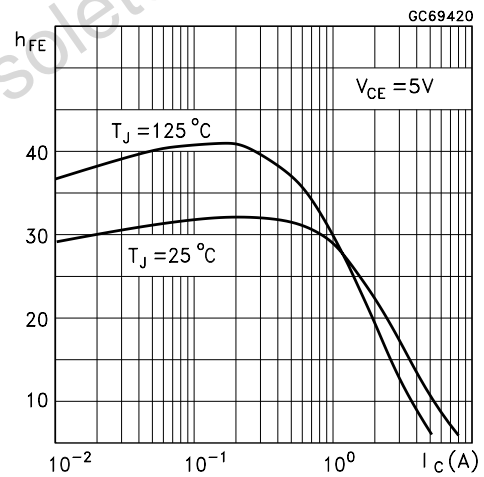
Derating Curve



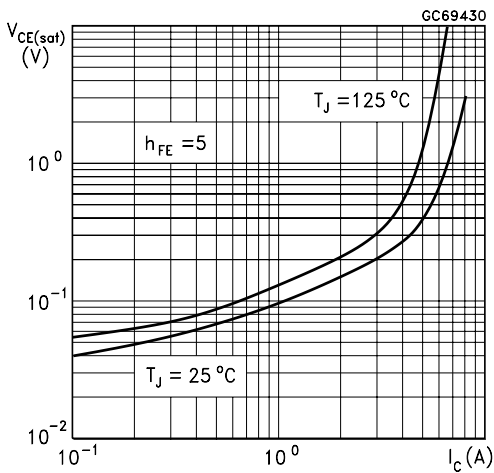
DC Current Gain



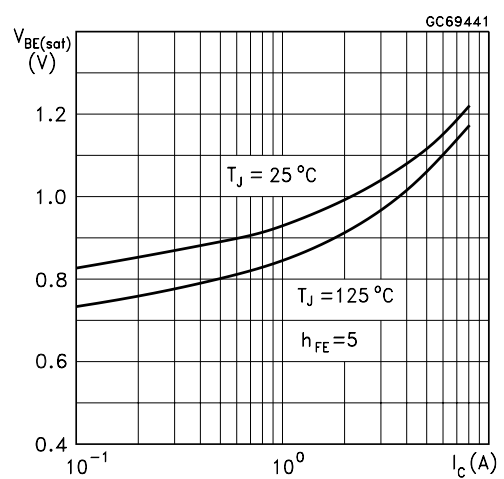
DC Current Gain



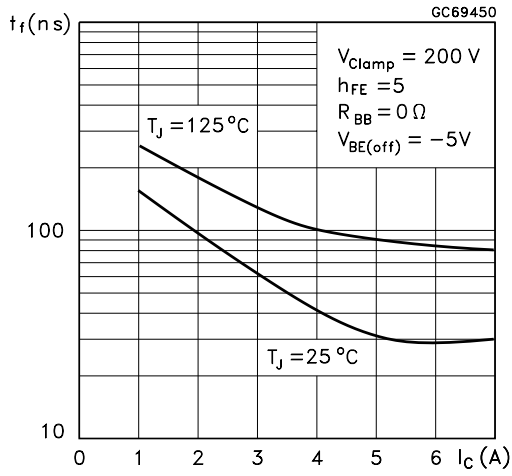
Collector Emitter Saturation Voltage



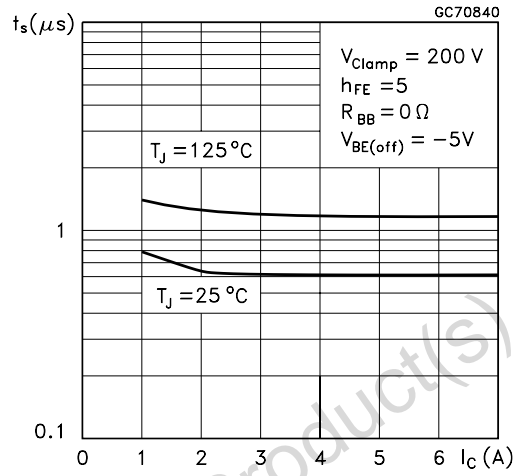
Base Emitter Saturation Voltage



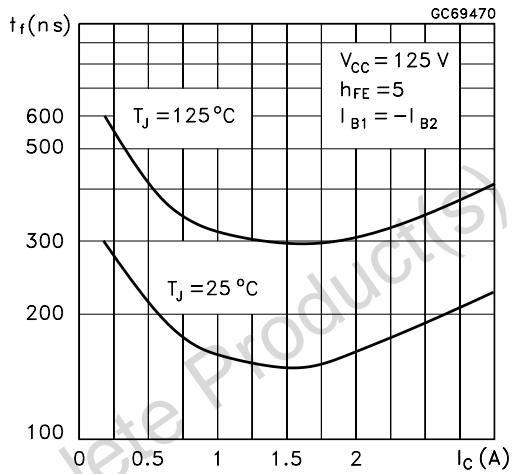
Inductive Fall Time



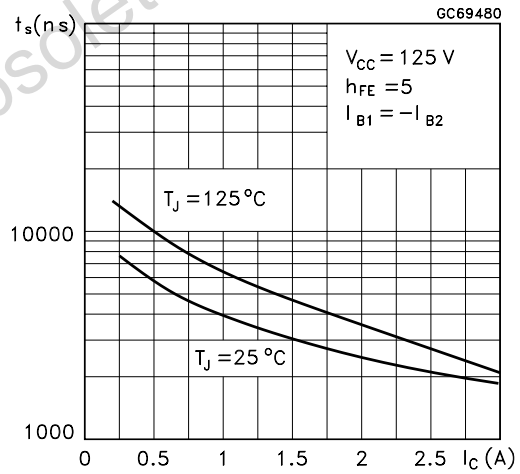
Inductive Storage Time



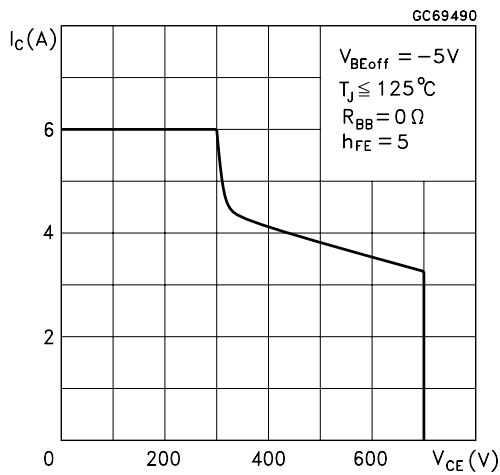
Resistive Fall Time



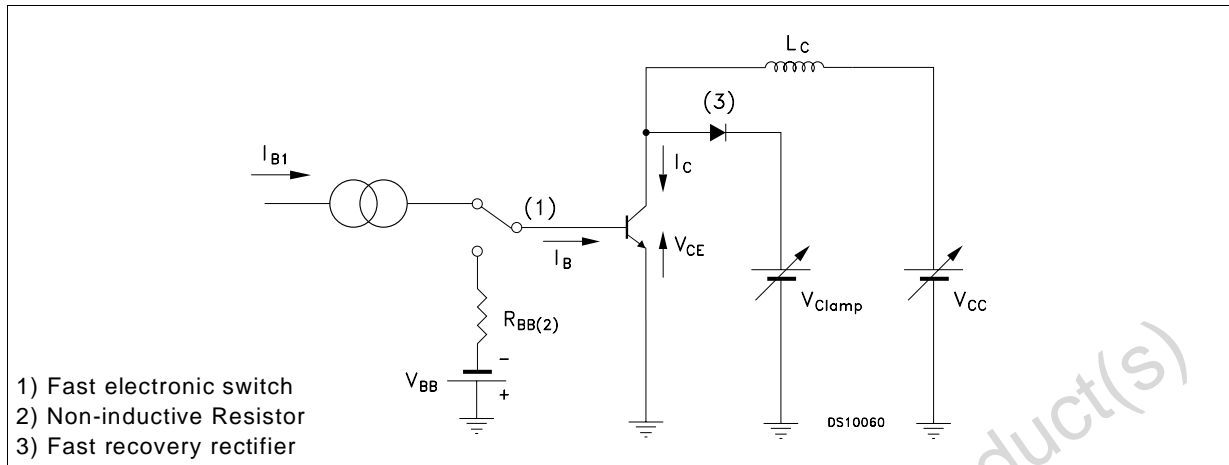
Resistive Load Storage Time



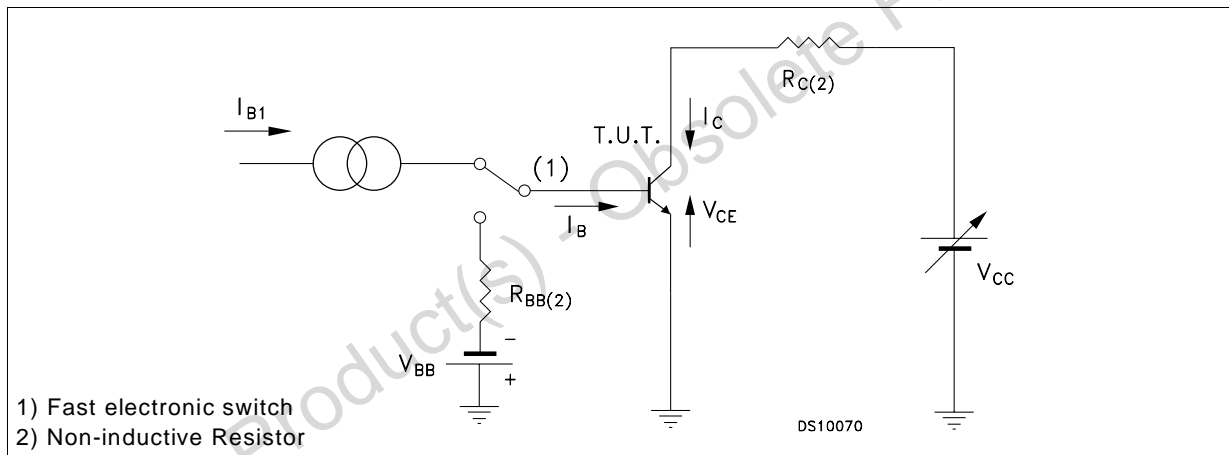
Reverse Biased SOA



**Figure 1: Inductive Load Switching Test Circuit.**

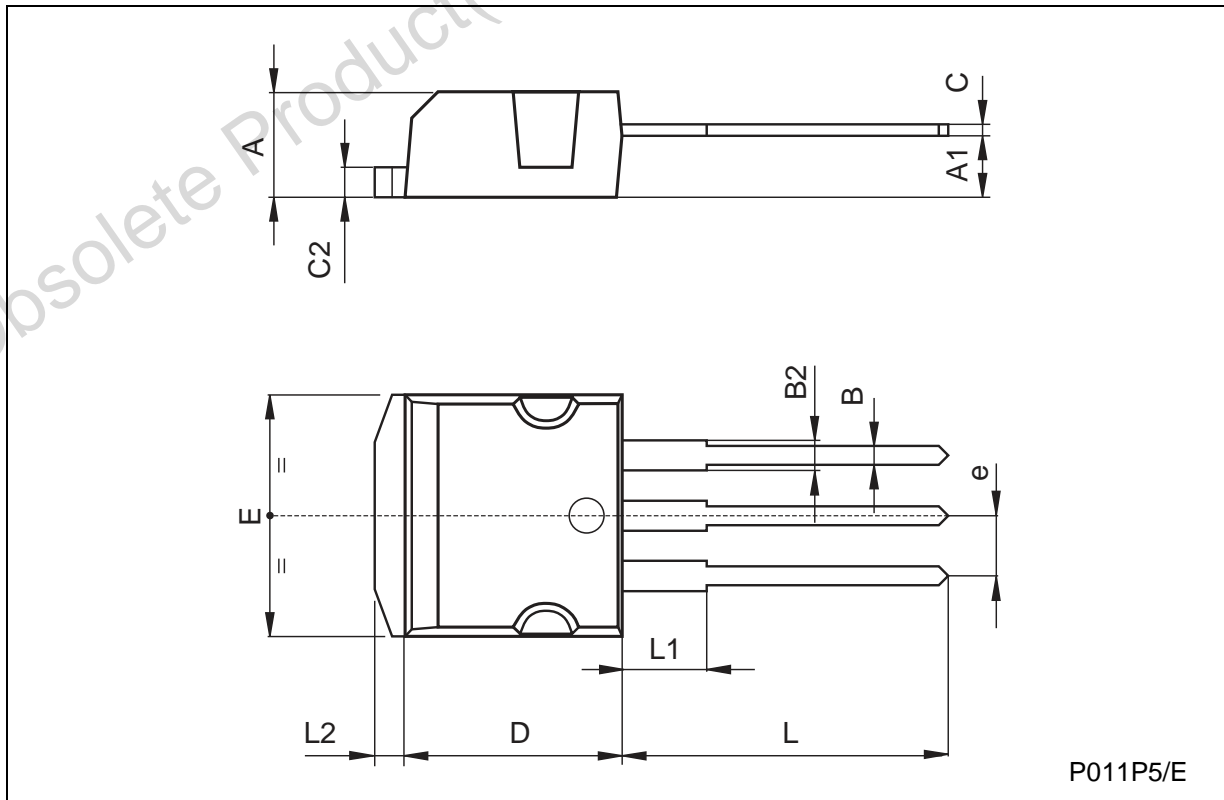


**Figure 2: Resistive Load Switching Test Circuit.**



TO-262 (I<sup>2</sup>PAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
e	2.4		2.7	0.094		0.106
E	10		10.4	0.393		0.409
L	13.1		13.6	0.515		0.531
L1	3.48		3.78	0.137		0.149
L2	1.27		1.4	0.050		0.055



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