

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

Ordering Code	Marking	Shipment
BULB128D-1	BULB128D	Tube

- STMicroelectronics PREFERRED SALES TYPE
- NPN TRANSISTOR
- HIGH VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED
- INTEGRATED ANTI-PARALLEL COLLECTOR-EMITTER DIODE

APPLICATIONS:

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING
- FLYBACK AND FORWARD SINGLE TRANSISTOR LOW POWER CONVERTERS

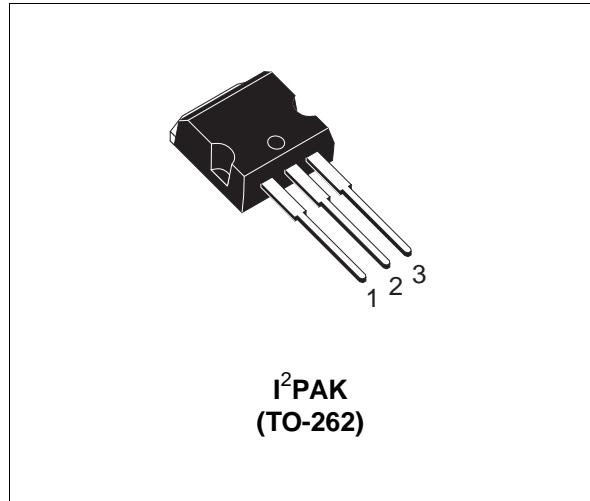
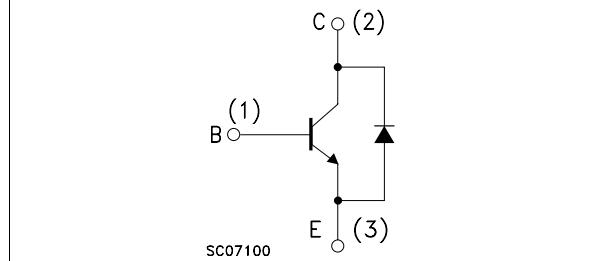
DESCRIPTION

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.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage ($V_{BE} = 0$)	700	V
V_{CEO}	Collector-Emitter Voltage ($I_B = 0$)	400	V
V_{EBO}	Emitter-Base Voltage ($I_C = 0$, $I_B = 2$ A, $t_p < 10\mu s$, $T_j < 150^\circ C$)	$V_{(BR)EBO}$	V
I_C	Collector Current	4	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 $T_c = 25^\circ C$	70	W
T_{stg}	Storage Temperature	-65 to 150	$^\circ C$
T_j	Max. Operating Junction Temperature	150	$^\circ C$


INTERNAL SCHEMATIC DIAGRAM


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THERMAL DATA

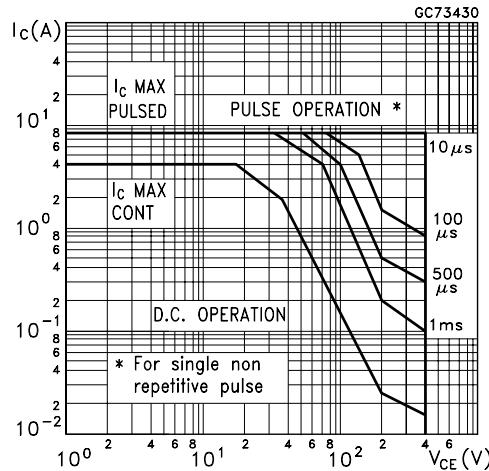
R _{thj-case}	Thermal Resistance Junction-Case	Max	1.78	°C/W
R _{thj-amb}	Thermal Resistance Junction-Ambient	Max	62.5	°C/W

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

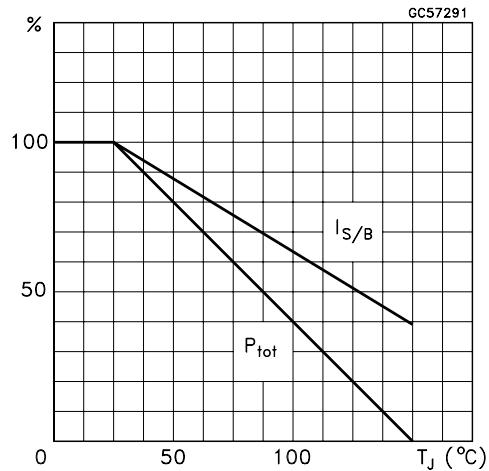
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I _{CES}	Collector Cut-off Current (V _{BE} = 0 V)	V _{CE} = 700 V V _{CE} = 700 V T _C = 125 °C			100 500	μA μA
I _{CEO}	Collector Cut-off Current (I _B = 0)	V _{CE} = 400 V			250	μA
V _{(BR)EBO}	Emitter-Base Breakdown Voltage (I _C = 0)	I _E = 10 mA	9		18	V
V _{CEO(sus)*}	Collector-Emitter Sustaining Voltage (I _B = 0)	I _C = 100 mA L = 25 mH	400			V
V _{CE(sat)*}	Collector-Emitter Saturation Voltage	I _C = 0.5 A I _B = 0.1 A I _C = 1 A I _B = 0.2 A I _C = 2.5 A I _B = 0.5 A I _C = 4 A I _B = 1 A		0.5	0.7 1 1.5	V V V
V _{BE(sat)*}	Base-Emitter Saturation Voltage	I _C = 0.5 A I _B = 0.1 A I _C = 1 A I _B = 0.2 A I _C = 2.5 A I _B = 0.5 A			1.1 1.2 1.3	V V V
h _{FE} *	DC Current Gain	I _C = 10 mA V _{CE} = 5 V I _C = 2 A V _{CE} = 5 V	10 12		32	
V _f	Forward Voltage Drop	I _f = 2 A			2.5	V
t _s t _f	INDUCTIVE LOAD Storage Time Fall Time	V _{CC} = 200 V I _C = 2 A I _{B1} = 0.4 A V _{BE(off)} = -5 V R _{BB} = 0 Ω L = 200 μH (see fig.1)		0.6 0.1		μs μs
t _s t _f	RESISTIVE LOAD Storage Time Fall Time	V _{CC} = 250 V I _C = 2 A I _{B1} = 0.4 A I _{B2} = -0.4 A T _p = 300 μs (see fig.2)	2	0.2	2.9	μs μs

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

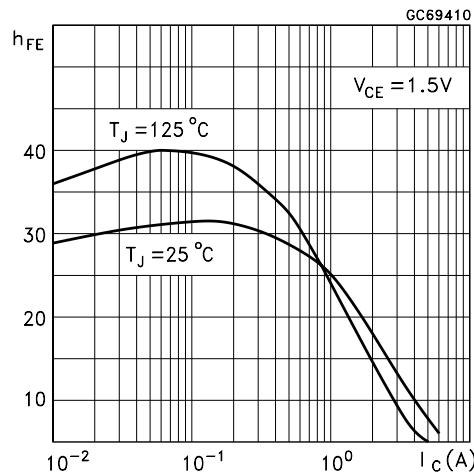
Safe Operating Areas



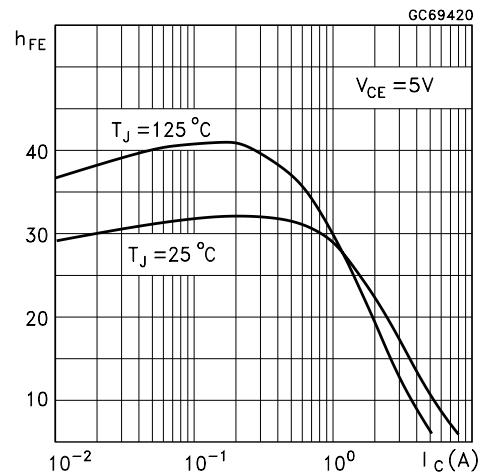
Derating Curve



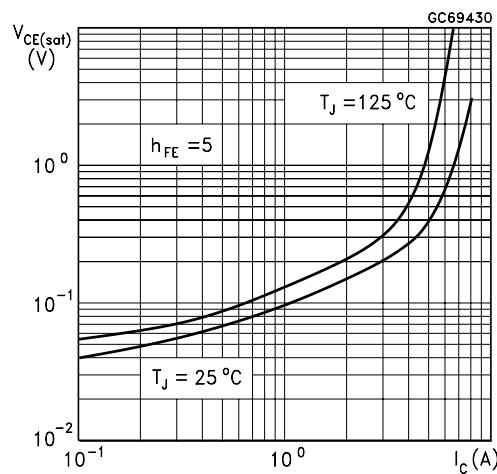
DC Current Gain



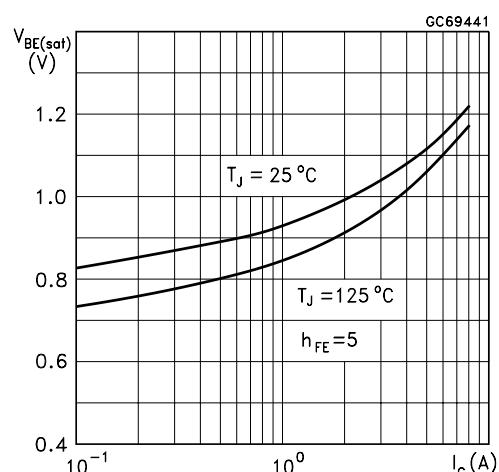
DC Current Gain



Collector Emitter Saturation Voltage

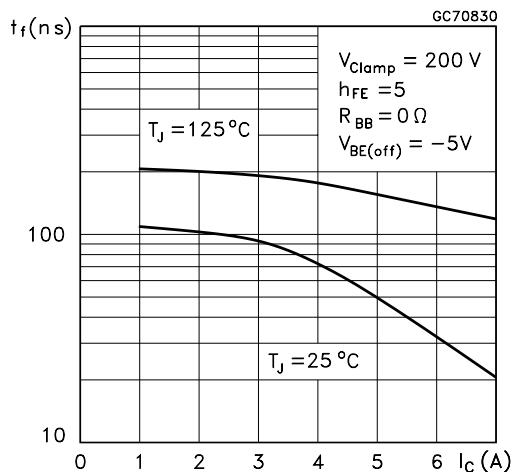


Base Emitter Saturation Voltage

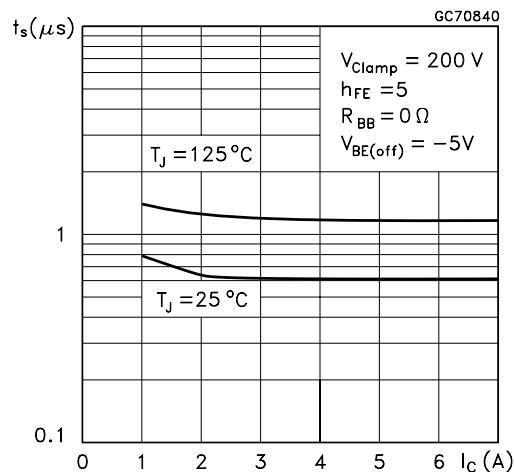


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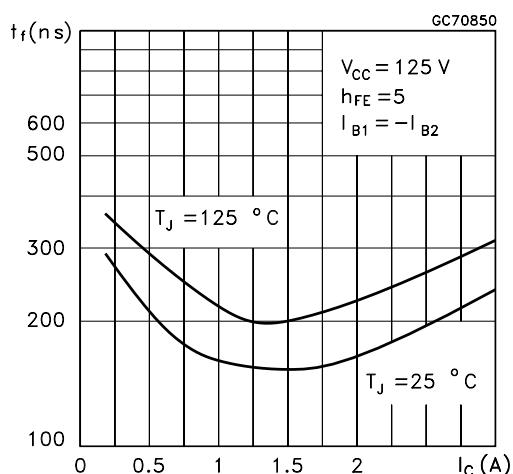
Inductive Fall Time



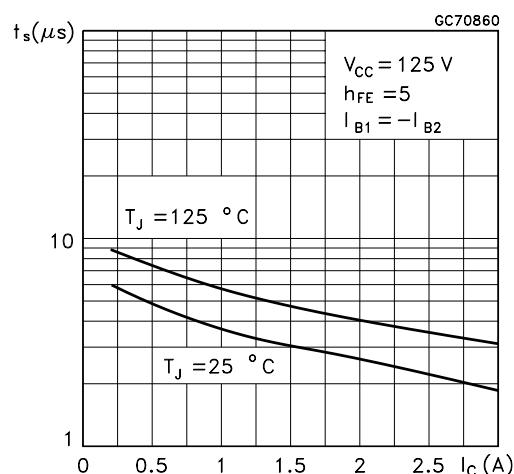
Inductive Storage Time



Resistive Load Fall Time



Resistive Load Storage Time



Reverse Biased SOA

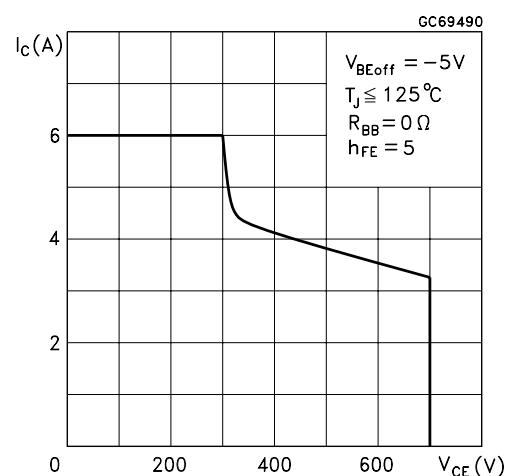
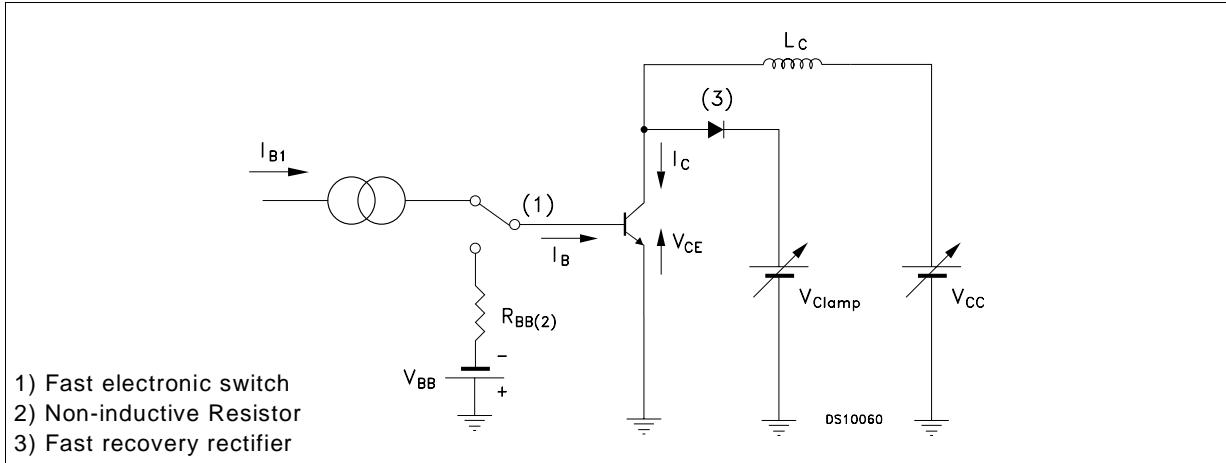
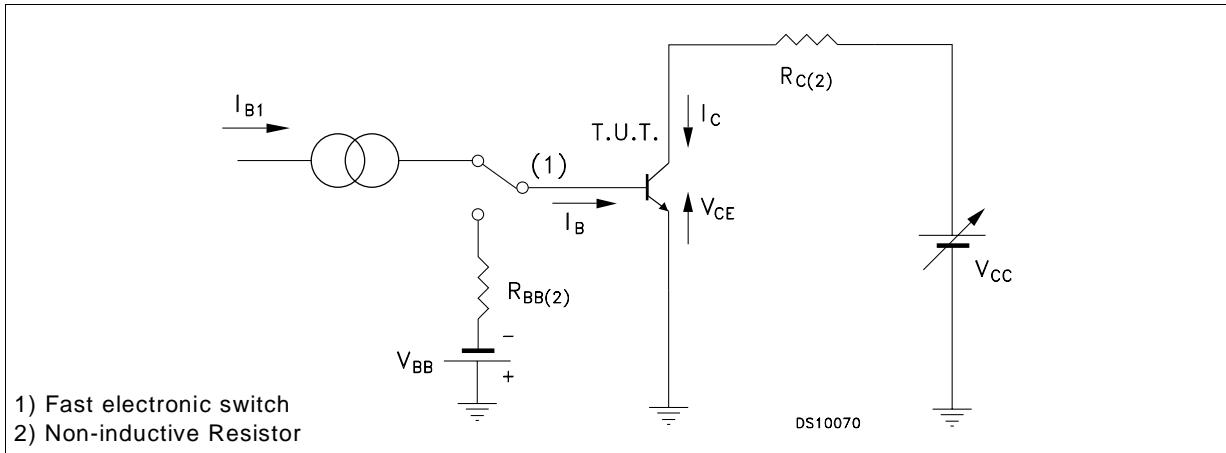
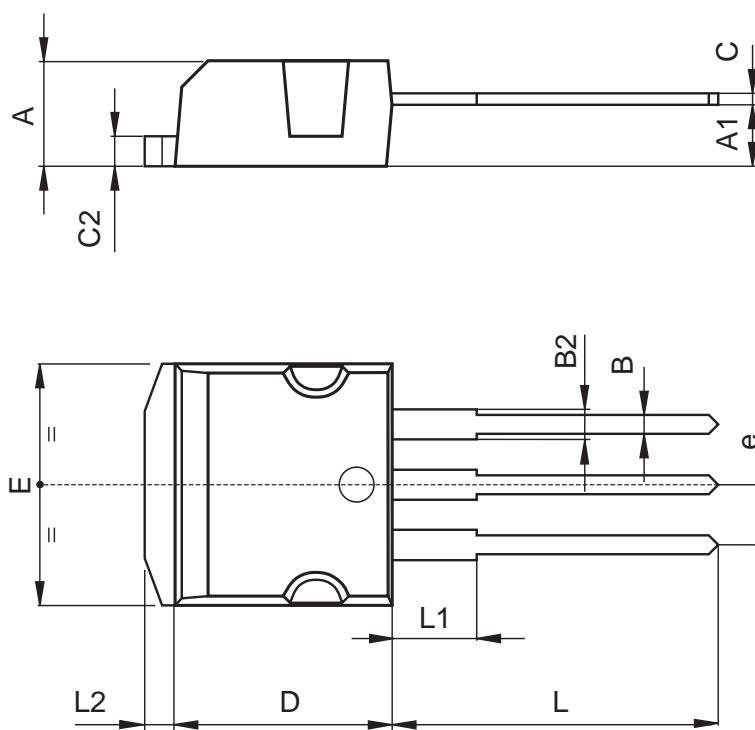


Figure 1: Inductive Load Switching Test Circuits.**Figure 2:** Resistive Load Switching Test Circuits.

TO-262 (I²PAK) 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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