



# THE DATASHEET OF BULK128D-B





## BULK128D-B

### HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

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

#### APPLICATIONS:

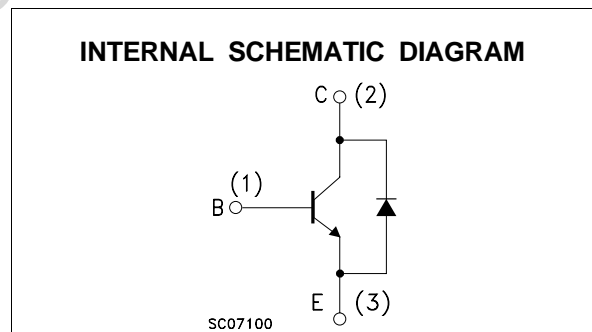
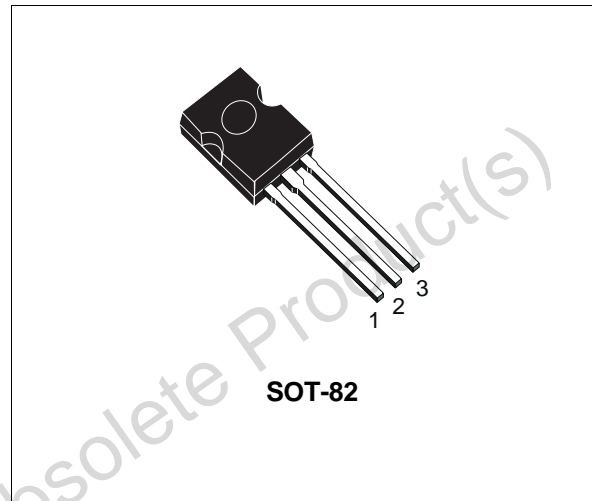
- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING
- FLYBACK AND FORWARD SINGLE TRANSISTOR LOW POWER CONVERTERS

#### 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, $t_p < 10\mu s$ , $T_j < 150^\circ C$ )	$BV_{EBO}$	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 $T_c = 25^\circ C$	55	W
$T_{stg}$	Storage Temperature	-65 to 150	$^\circ C$
$T_j$	Max. Operating Junction Temperature	150	$^\circ C$

## BULK128D-B

### THERMAL DATA

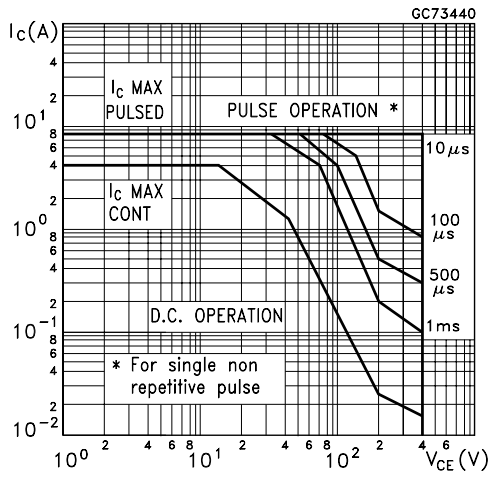
R <sub>thj-case</sub>	Thermal Resistance Junction-Case	Max	2.27	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-Ambient	Max	80	°C/W

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

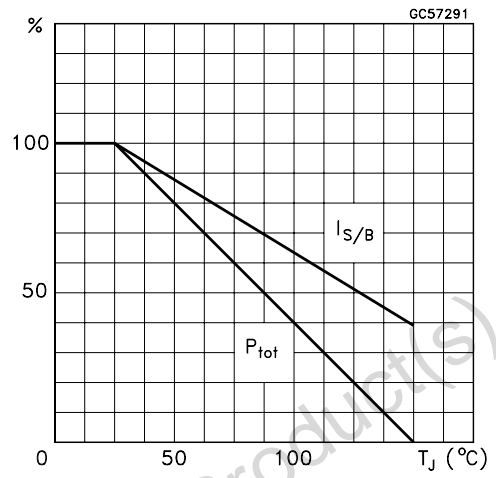
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current (V <sub>BE</sub> = -1.5 V)	V <sub>CE</sub> = 700 V V <sub>CE</sub> = 700 V      T <sub>C</sub> = 125 °C			100 500	μA μA
I <sub>CEO</sub>	Collector-Emitter Leakage Current (I <sub>B</sub> = 0)	V <sub>CE</sub> = 400 V			250	μA
BV <sub>EBO</sub>	Emitter-Base Breakdown Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 mA	9		18	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
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			0.7 1 1.5	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 8		40	
V <sub>f</sub>	Forward Voltage Drop	I <sub>f</sub> = 2 A			2.5	V
t <sub>s</sub> t <sub>f</sub>	RESISTIVE LOAD Storage Time Fall Time	V <sub>CC</sub> = 250 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)	2	0.2	2.9	μs μs
t <sub>s</sub> t <sub>f</sub>	INDUCTIVE LOAD Storage Time Fall Time	V <sub>CC</sub> = 200 V      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         L = 200 μH (see fig. 1)		0.6 0.1		μs μs

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

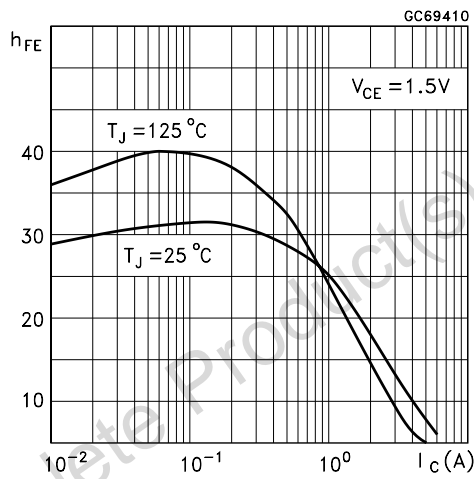
Safe Operating Areas



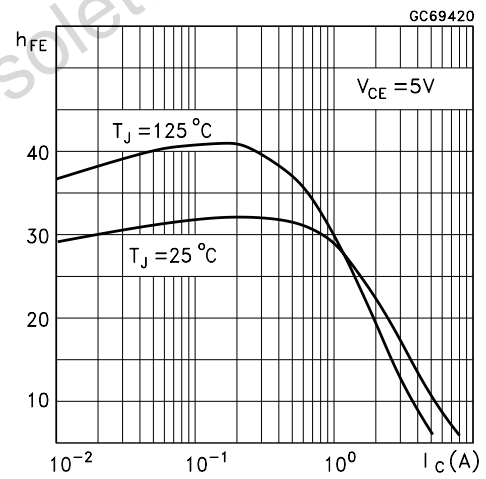
Derating Curve



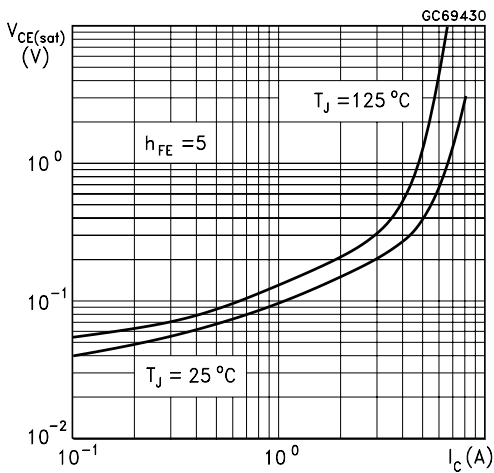
DC Current Gain



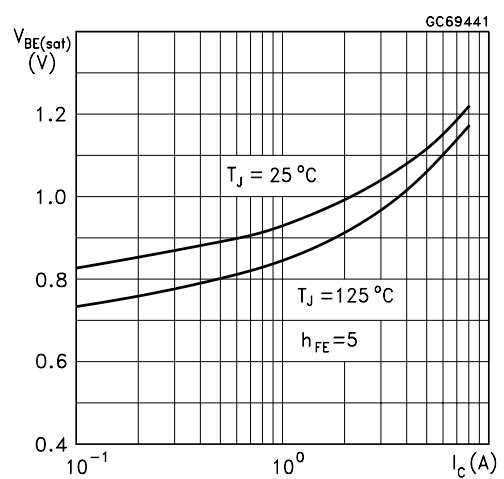
DC Current Gain



Collector Emitter Saturation Voltage

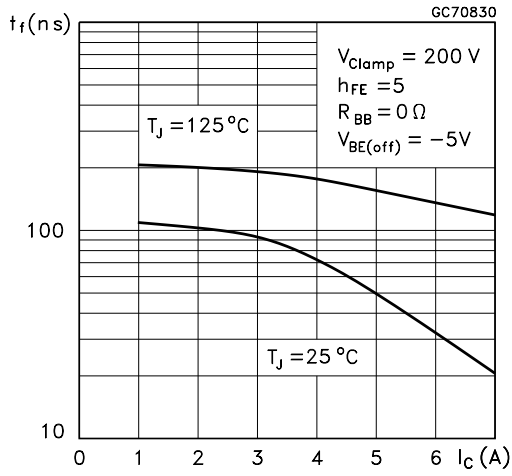


Base Emitter Saturation Voltage

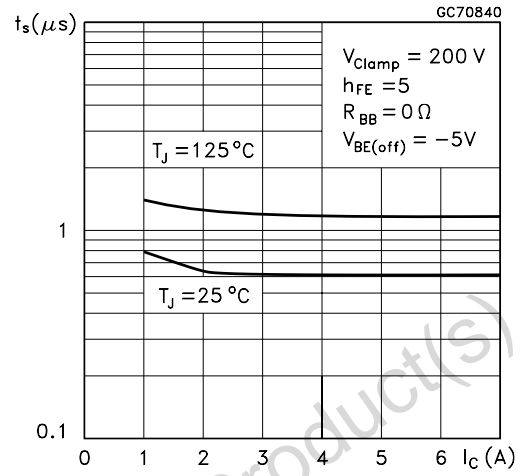


# BULK128D-B

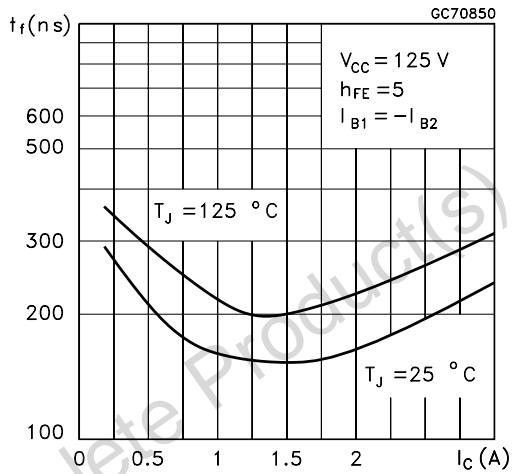
Inductive Fall Time



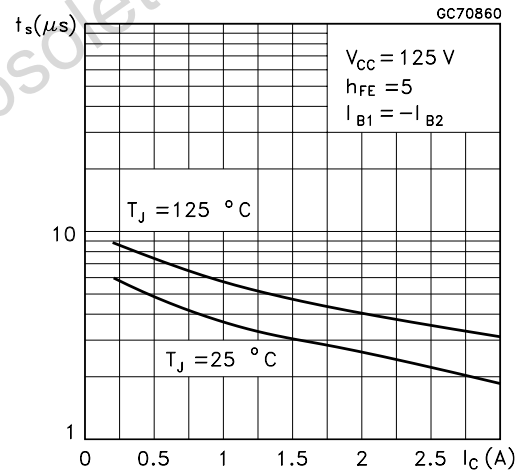
Inductive Storage Time



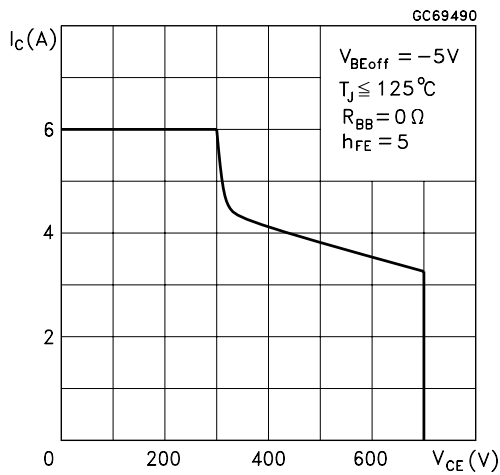
Resistive Load Fall Time



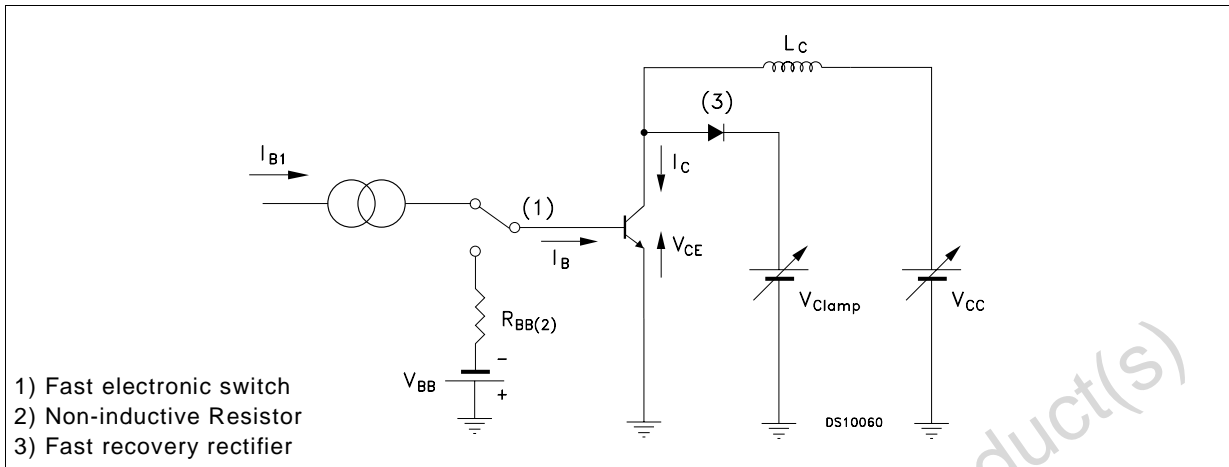
Resistive Load Storage Time



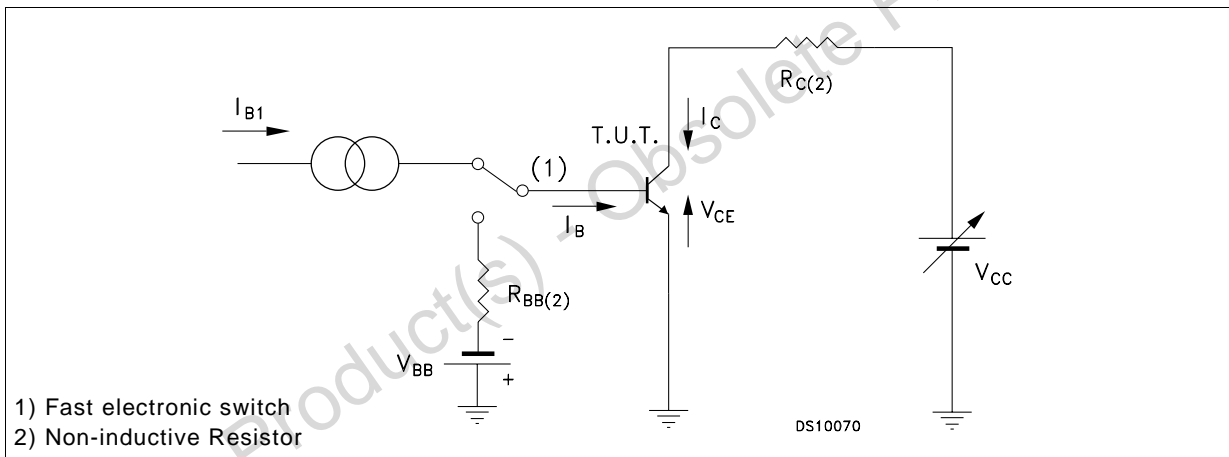
Reverse Biased SOA



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

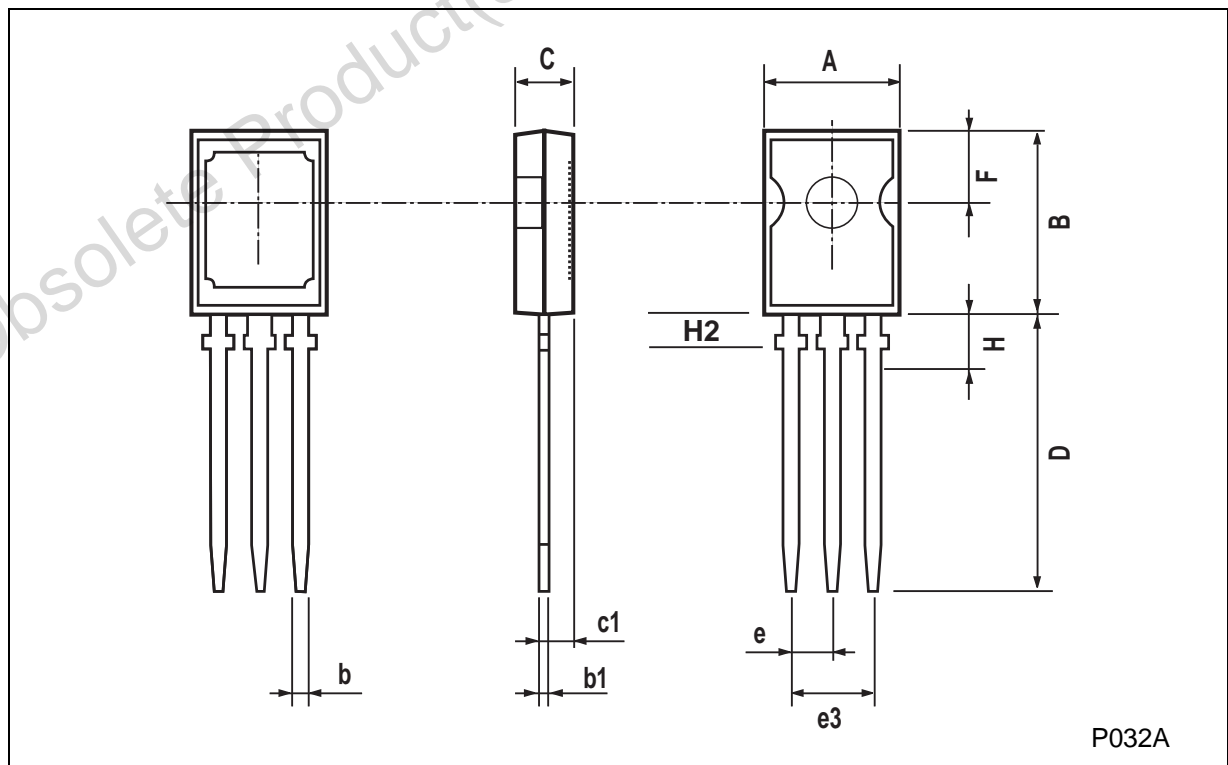


**Figure 2: Resistive Load Switching Test Circuit.**



**SOT-82 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	7.4		7.8	0.291		0.307
B	10.5		10.8	0.413		0.444
b	0.7		0.9	0.028		0.035
b1	0.49		0.75	0.019		0.030
C	2.4		2.7	0.04		0.106
c1	1.0		1.3	0.039		0.05
D	15.4		16	0.606		0.629
e		2.2			0.087	
e3	4.15		4.65	0.163		0.183
F		3.8			0.150	
H			2.54		0.100	
H2		2.15			0.084	



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