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ST93003

High voltage fast-switching PNP power transistor

Features

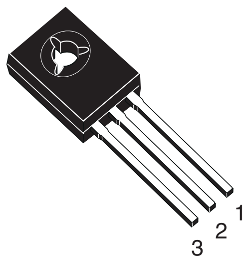
- High voltage capability
- Very high switching speed

Application

- Electronic ballast for fluorescent lighting

Description

The device is manufactured using high voltage multi epitaxial planar technology for high switching speeds and high voltage capability. It uses a cellular emitter structure with planar edge termination to enhance switching speeds while maintaining the wide RBSOA. The ST93003 is expressly designed for a new solution to be used in compact fluorescent lamps, where it is coupled with the ST83003, its complementary NPN transistor.



SOT-32

Figure 1. Internal schematic diagram

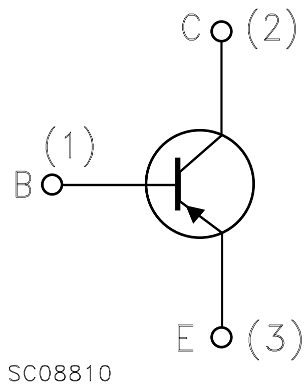


Table 1. Device summary

Order code	Marking	Package	Packaging
ST93003	93003	SOT-32	Bag

Contents

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage (V_{BE} = 0)	-500	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	-400	V
V_{EBO}	Emitter-base voltage (I_C = 0, I_B = -0.75 A, t_p < 10 µs)	$V_{(BR)EBO}$	V
I_C	Collector current	-1.5	A
I_{CM}	Collector peak current (t_p < 5 ms)	-3	A
I_B	Base current	-0.75	A
I_{BM}	Base peak current (t_p < 5 ms)	-1.5	A
P_{TOT}	Total dissipation at T_c = 25 °C	40	W
T_{STG}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case max	3.1	°C/W

2 Electrical characteristics

T_{case} = 25 °C unless otherwise specified

Table 4. On/off states

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
I_{CES}	Collector cut-off current (V_{BE} = 0)	V_{CE} = -500 V V_{CE} = -500 V, T_C = 125 °C			-1 -5	mA mA
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E = -10 mA	-5		-10	V
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C = -10 mA	-400			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = -0.5 A, I_B = -0.1 A I_C = -0.35 A, I_B = -50 mA			-0.5 -0.5	V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = -0.5 A, I_B = -0.1 A			-1	V
h_{FE} (1)	DC current gain	I_C = -10 mA, V_{CE} = -5 V I_C = -0.35 A, V_{CE} = -5 V I_C = -1 A, V_{CE} = -5 V	10 16 4	25	32	
t_r t_s t_f	Resistive load Rise time Storage time Fall time	I_C = -0.35 A, V_{CC} = 125 V, I_{B1} = -70 mA, I_{B2} = 70 mA $t_p \geq$ 25 µs see *Figure 14*	1.5	90 2.2 0.1	2.9	ns µs µs
t_s t_f	Inductive load Storage time Fall time	I_C = -0.5 A, I_{B1} = -0.1 A, $V_{BE(off)}$ = 5 V, L = 10 mH, V_{clamp} = 300 V see *Figure 13*		400 40		ns ns
E_{sb}	Avalanche energy	L = 4 mH, C = 1.8 nF, I_{BR} = 2.5 A, 25 °C < T_C < 125 °C	12			mJ

1. Pulse test: pulse duration 300 ≤ µs, duty cycle ≤ 2 %

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

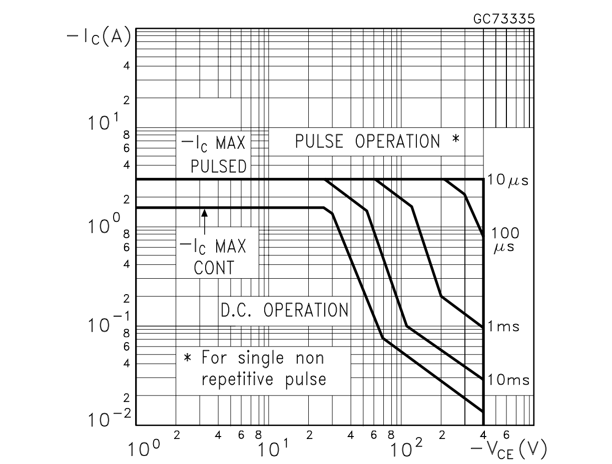


Figure 3. Derating

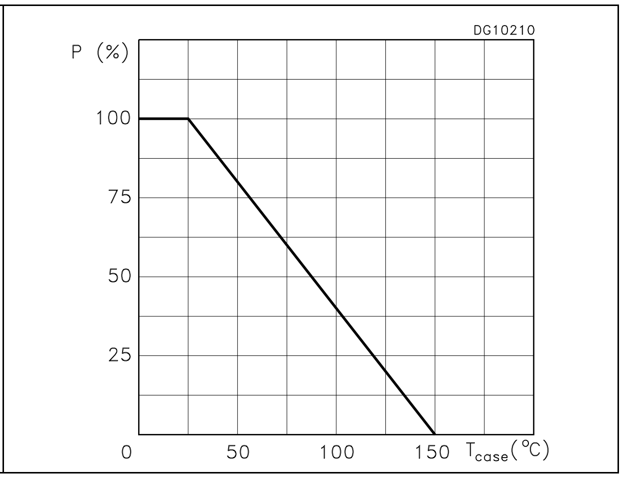


Figure 4. DC current gain (V_{CE} = - 5 V)

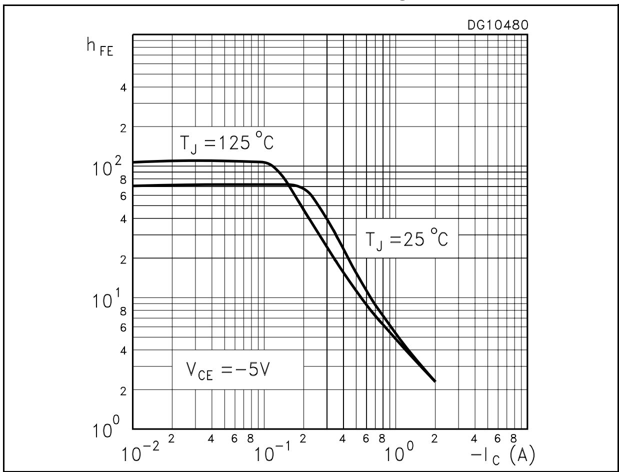


Figure 5. DC current gain (V_{CE} = - 1 V)

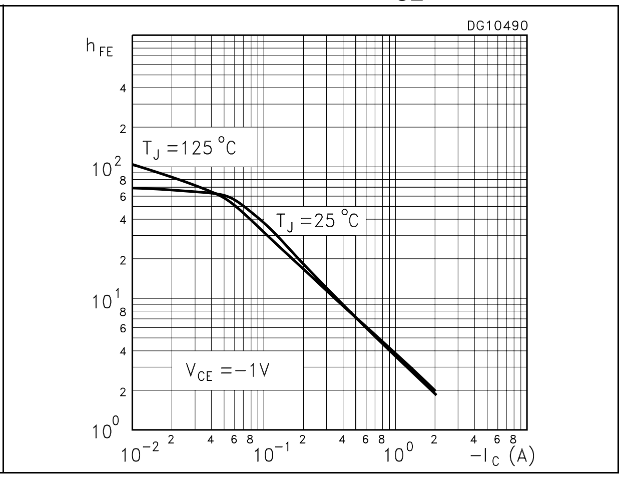


Figure 6. Collector emitter saturation voltage

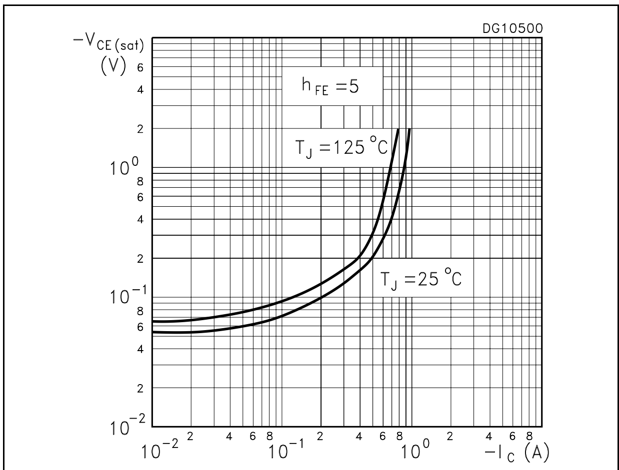


Figure 7. Base emitter saturation voltage

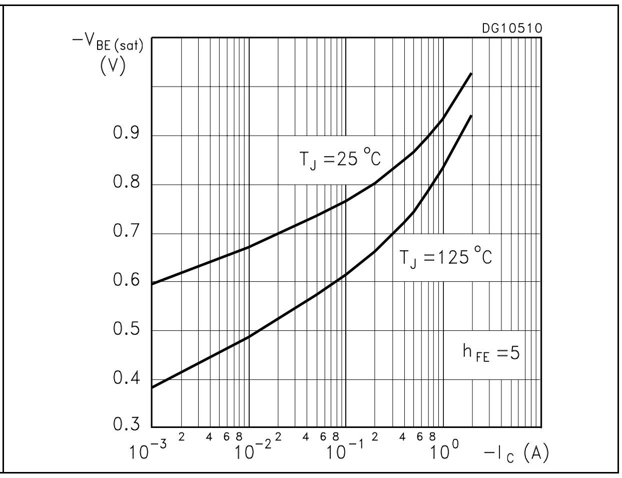


Figure 8. Resistive load fall time

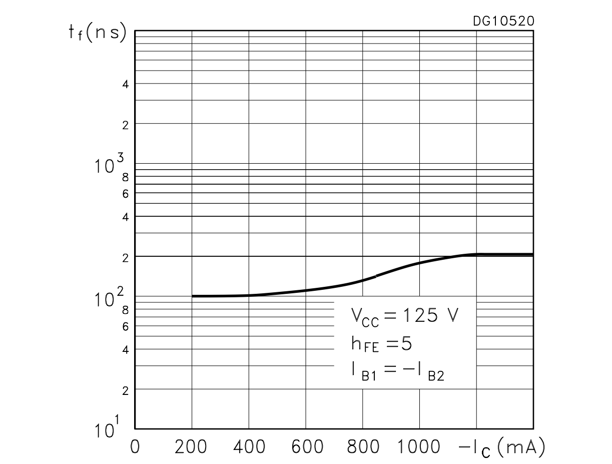


Figure 9. Resistive load storage time

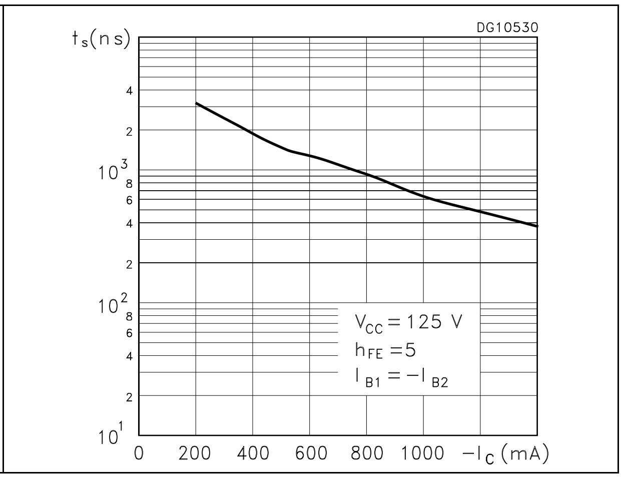


Figure 10. Inductive load fall time

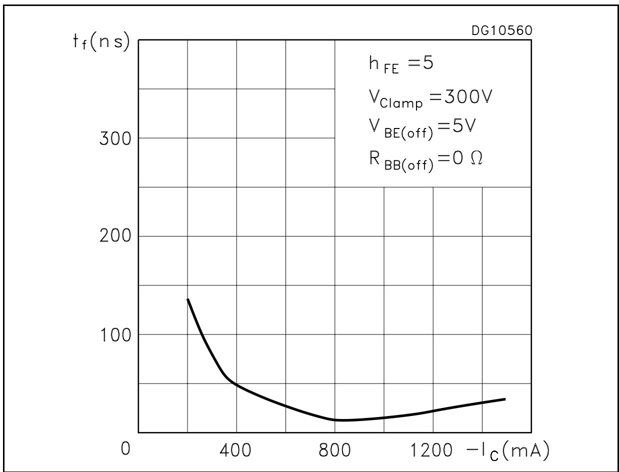


Figure 11. Inductive load storage time

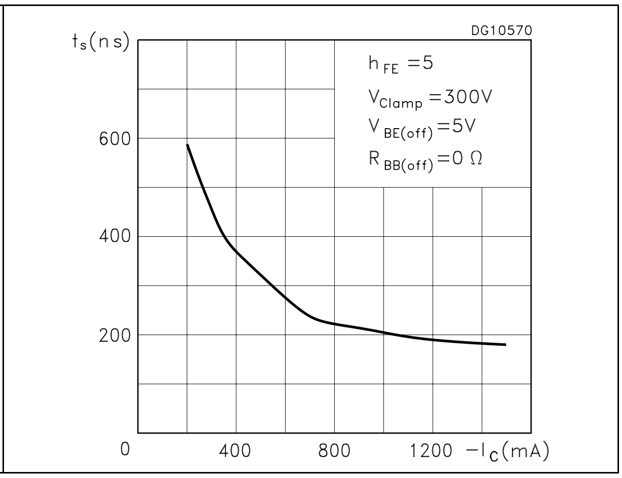
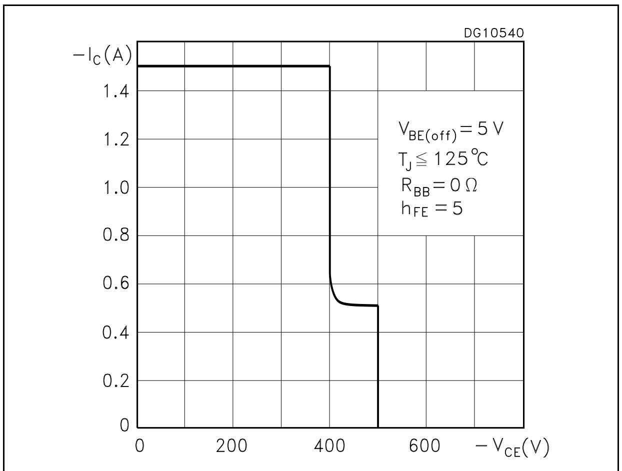
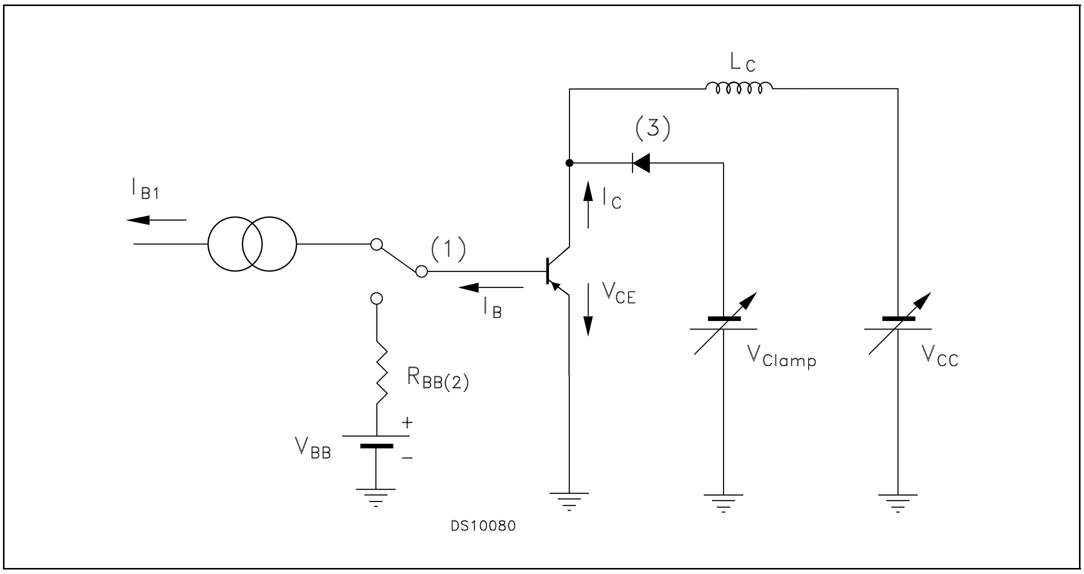


Figure 12. Reverse biased SOA



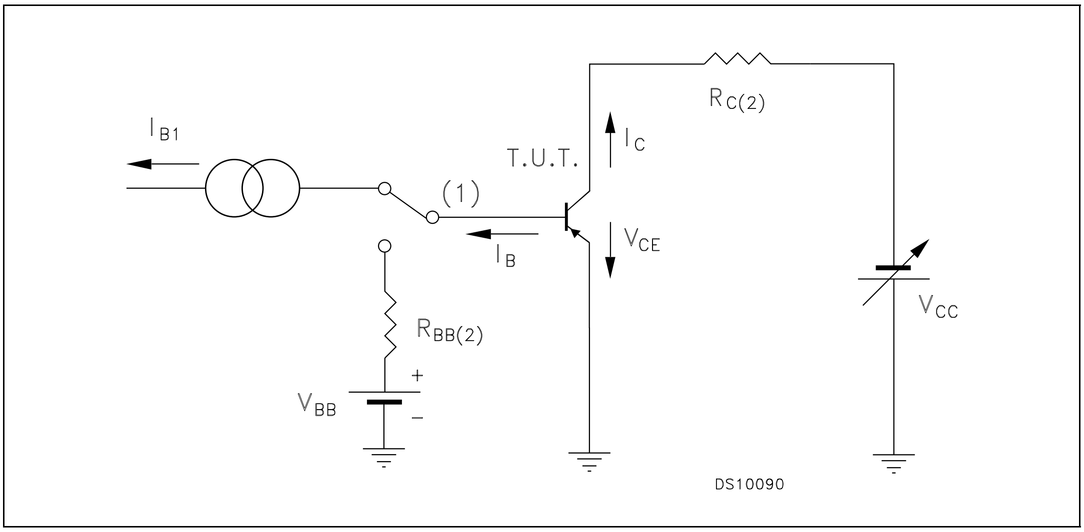
3 Test circuits

Figure 13. Inductive load switching



1. Fast electronic switch
2. Non-inductive resistor
3. Fast recovery rectifier

Figure 14. Resistive load switching



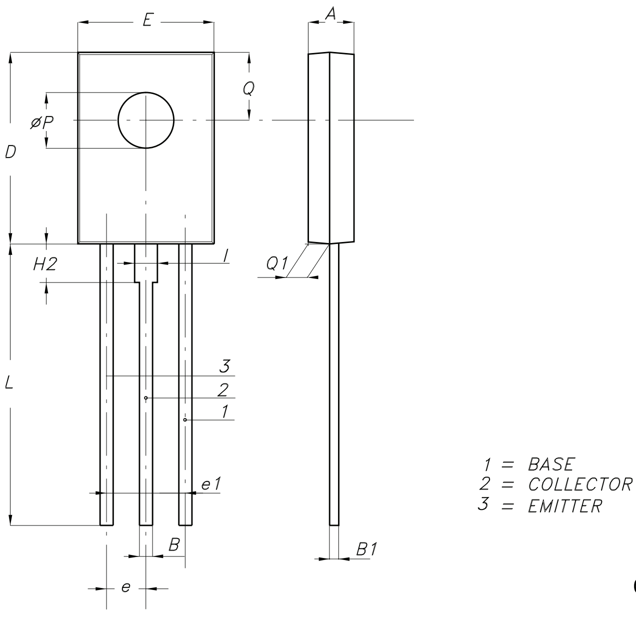
1. Fast electronic switch
2. Non-inductive resistor

4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

SOT-32 (TO-126) MECHANICAL DATA

DIM.	mm.		
	MIN.	TYP	MAX.
A	2.4		2.9
B	0.64		0.88
B1	0.39		0.63
D	10.5		11.05
E	7.4		7.8
e	2.04	2.29	2.54
e1	4.07	4.58	5.08
L	15.3		16
P	2.9		3.2
Q		3.8	
Q1	1		1.52
H2		2.15	
I		1.27	



0016114E

5 Revision history

Table 5. Document revision history

Date	Revision	Changes
08-Jul-2008	3	Mechanical data has been updated.
08-Sep-2009	4	Updated packaging information *Table 1 on page 1*.
06-Dec-2010	5	Added *Table 3: Thermal data on page 3*.

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