

High voltage fast-switching NPN power transistor

Features

- High voltage capability
- Low spread of dynamic parameters
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed

Applications

- Compact fluorescent lamps (CFLs)

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.

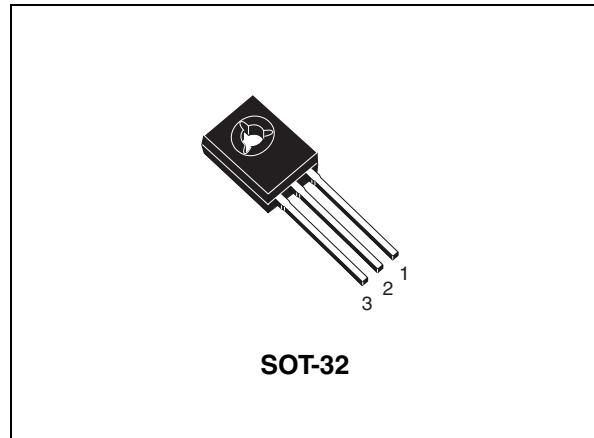


Figure 1. Internal schematic diagram

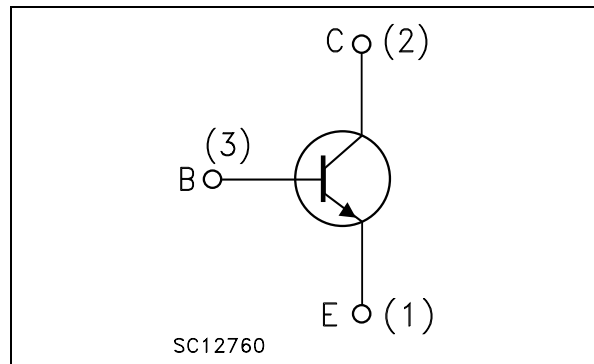


Table 1. Device summary

Order code	Marking	Package	Packaging
ST13003N	13003N	SOT-32	BAG

1 Electrical ratings

Table 2. 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}	Collector-base voltage ($I_C = 0$)	9	V
I_C	Collector current	1	A
I_{CM}	Collector peak current ($t_P < 5$ ms)	2	A
I_B	Base current	0.5	A
I_{BM}	Base peak current ($t_P < 5$ ms)	1	A
P_{TOT}	Total dissipation at $T_c = 25$ °C	20	W
T_{STG}	Storage temperature	-55 to 150	°C
T_J	Max. operating junction temperature	150	

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case	6.25	°C/W

2 Electrical characteristics

($T_{\text{case}} = 25\text{ }^{\circ}\text{C}$; unless otherwise specified)

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current ($V_{\text{BE}} = 0$)	$V_{\text{CE}} = 700\text{ V}$			1	mA
		$V_{\text{CE}} = 700\text{ V}$ $T_{\text{C}} = 125\text{ }^{\circ}\text{C}$			5	mA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 9\text{ V}$			1	mA
$V_{\text{CEQ(sus)}}^{(1)}$	Collector-emitter sustaining voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = 10\text{ mA}$	400			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 125\text{ mA}$			0.7	V
		$I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 330\text{ mA}$			1.2	V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 125\text{ mA}$			1.2	V
		$I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 330\text{ mA}$			1.3	V
h_{FE}	DC current gain	$I_{\text{C}} = 0.5\text{ A}$, $V_{\text{CE}} = 2\text{ V}$	6		18	
		$I_{\text{C}} = 1\text{ A}$, $V_{\text{CE}} = 10\text{ V}$	5		15	
t_{s} t_{f}	Inductive Load Storage time Fall time	$I_{\text{C}} = 0.4\text{ A}$ $V_{\text{clamp}} = 300\text{ V}$		2.5		μs
		$I_{\text{B(on)}} = -I_{\text{B(off)}} = 80\text{ mA}$ $V_{\text{BB(off)}} = -5\text{ V}$ <i>Figure 8</i>		180		ns

1. Pulsed duration = 300 μs , duty cycle $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 2. Derating curve

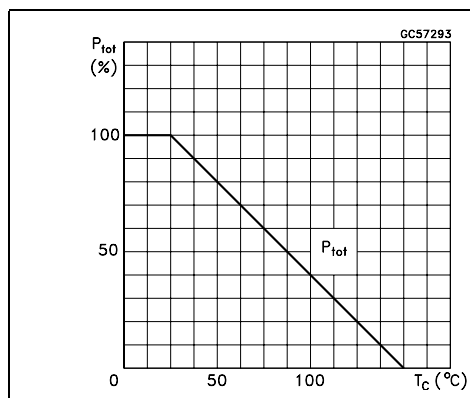


Figure 3. DC current gain ($V_{\text{CE}} = 3\text{ V}$)

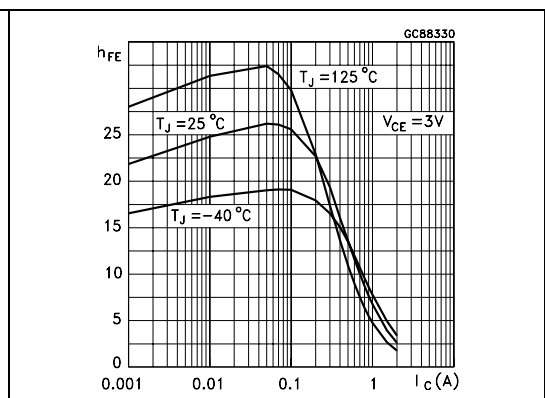


Figure 4. DC current gain ($V_{CE} = 5\text{ V}$)

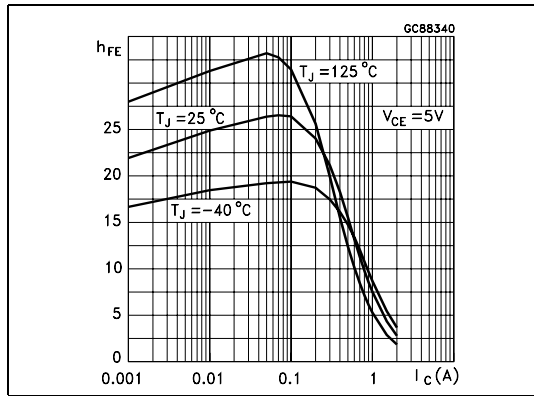


Figure 5. Collector-emitter saturation voltage

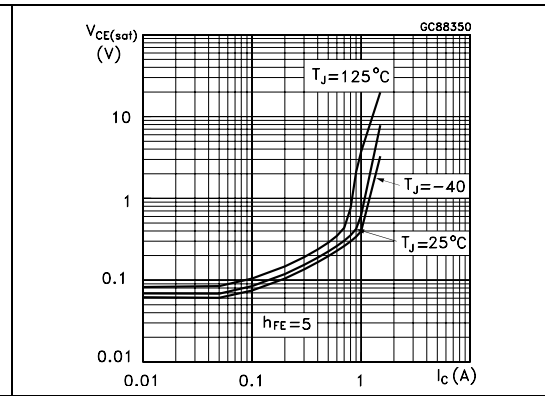


Figure 6. Base-emitter saturation voltage

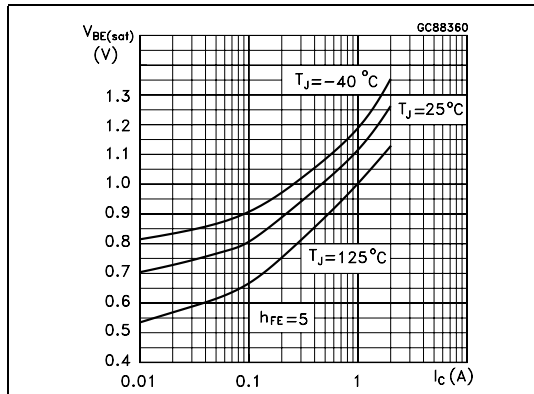
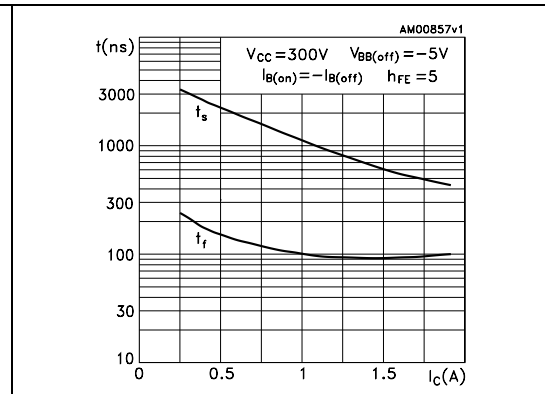
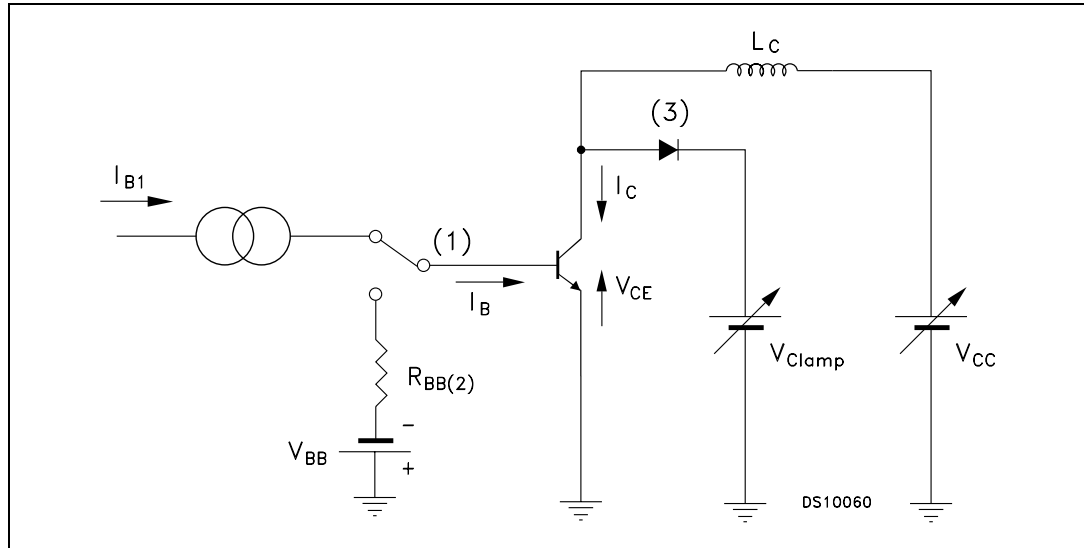


Figure 7. Switching time inductive load



2.2 Test circuit

Figure 8. Inductive load switching test circuit



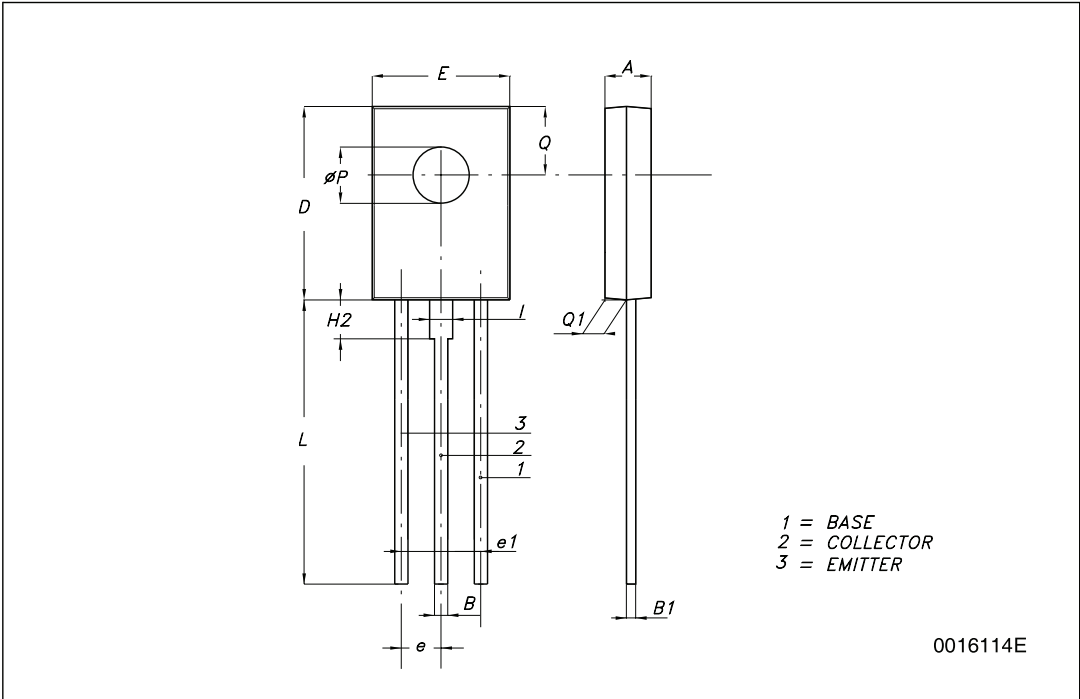
1. Fast electronic switch
2. Non-inductive resistor
3. Fast recovery rectifier

3 Package mechanical data

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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	



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
26-May-2009	1	First release.

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