

Low voltage NPN power transistor

Features

- High switching speed
- Good performances in terms of h_{FE} linearity

Application

- Linear and switching industrial applications

Description

The device is manufactured in planar technology with “base island” layout. The resulting transistor shows high gain performance coupled with low saturation voltage.

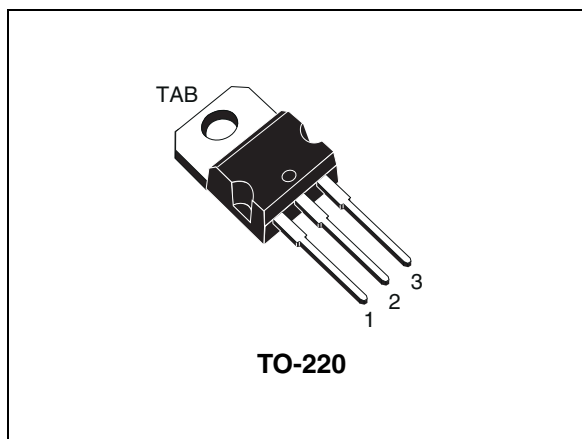


Figure 1. Internal schematic diagram

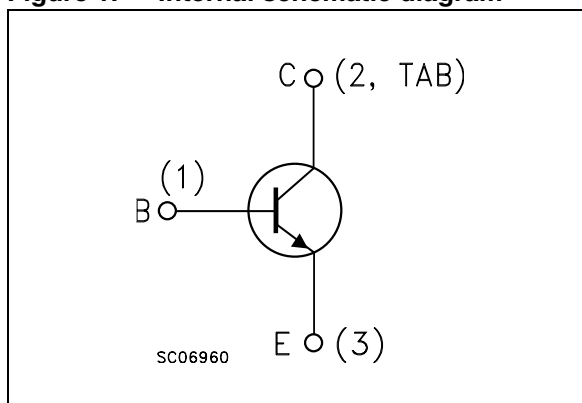


Table 1. Device summary

Order code	Marking	Package	Packaging
2ST31A	2ST31A	TO-220	Tube

1 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage ($I_E = 0$)	60	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	60	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	5	V
I_C	Collector current	3	A
I_{CM}	Collector peak current	5	A
I_B	Base current	1	A
P_{TOT}	Total dissipation at $T_{case} = 25^\circ\text{C}$	40	W
T_{STG}	Storage temperature	-65 to 150	$^\circ\text{C}$
T_J	Max. operating junction temperature	150	$^\circ\text{C}$

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case max.	3.1	$^\circ\text{C/W}$

2 Electrical characteristics

$T_{\text{case}} = 25\text{ °C}$ unless otherwise specified.

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CEO}	Collector cut-off current ($I_{\text{B}} = 0$)	$V_{\text{CE}} = 30\text{ V}$			0.3	mA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 5\text{ V}$			1	mA
I_{CES}	Collector cut-off current ($V_{\text{BE}} = 0$)	$V_{\text{CE}} = 60\text{ V}$			0.2	mA
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = 30\text{ mA}$	60			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 3\text{ A}$ $I_{\text{B}} = 375\text{ mA}$			1.2	V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 3\text{ A}$ $I_{\text{B}} = 375\text{ mA}$			1.45	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 20\text{ mA}$ $V_{\text{CE}} = 4\text{ V}$ $I_{\text{C}} = 1\text{ A}$ $V_{\text{CE}} = 4\text{ V}$	100 25	150		

1. Pulse test: pulse duration $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

2.1 Electrical characteristics (curve)

Figure 2. Safe operating area

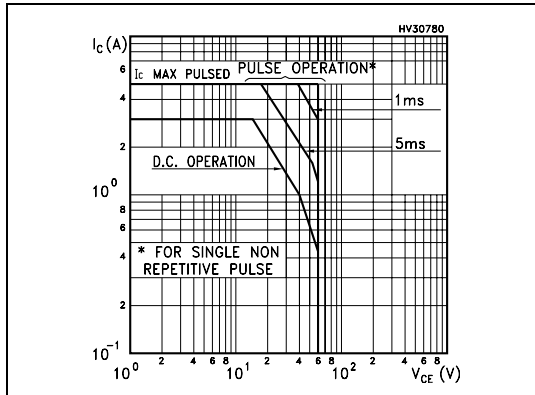


Figure 3. Derating curves

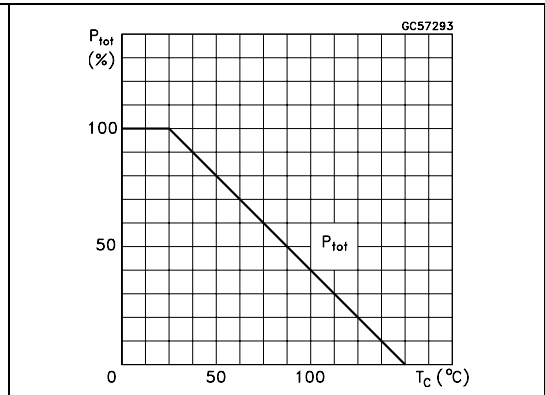


Figure 4. DC-current gain

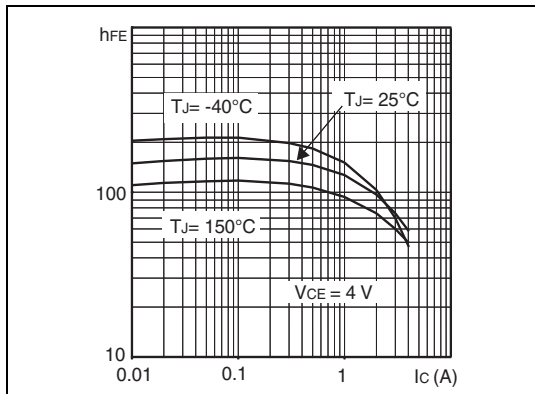


Figure 5. Base-emitter saturation voltage

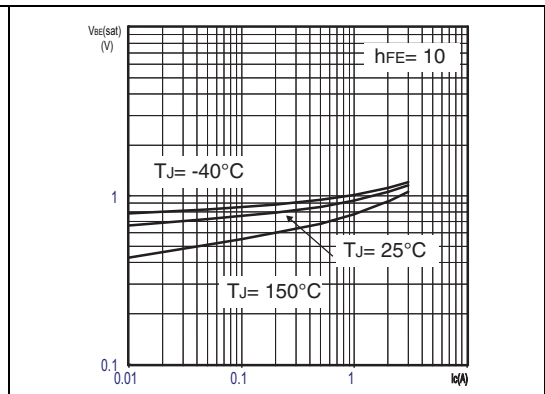
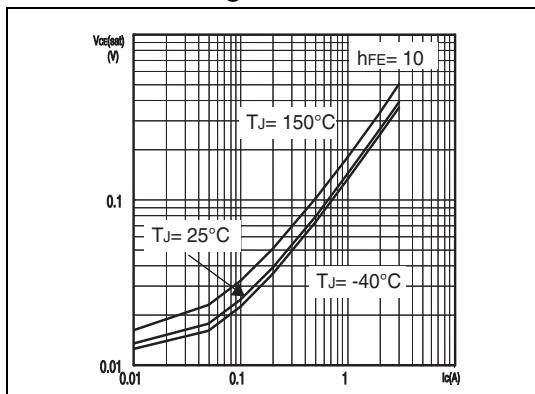


Figure 6. Collector-emitter saturation voltage

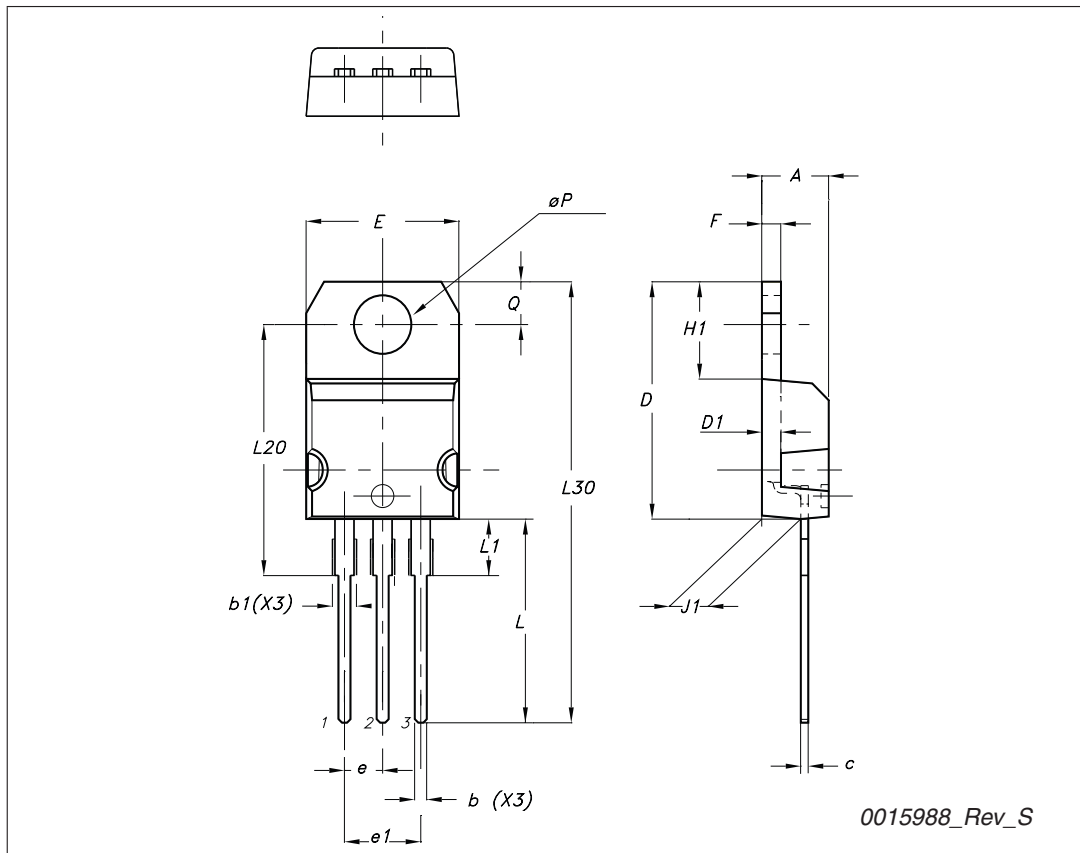


3 Package mechanical data

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TO-220 type A mechanical data

Dim	mm		
	Min	Typ	Max
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
∅P	3.75		3.85
Q	2.65		2.95



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
24-Aug-2010	1	Initial release.
14-Dec-2010	2	Document status promoted from preliminary data to datasheet.

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