

NPN power transistors

Features

- NPN transistors

Applications

- Linear and switching industrial equipment

Description

The devices are manufactured in Planar technology with “Base Island” layout. The resulting transistor shows exceptional high gain performance coupled with very low saturation voltage. The PNP types are BD440 and BD442.

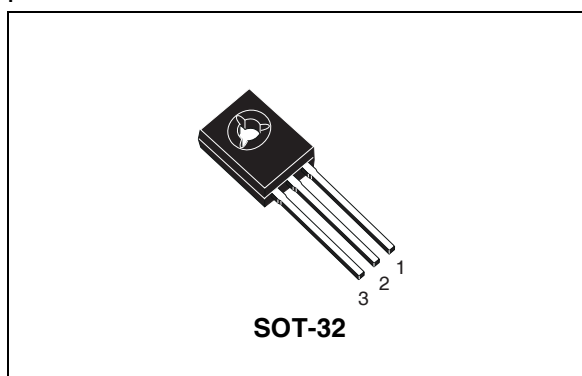


Figure 1. Internal schematic diagram

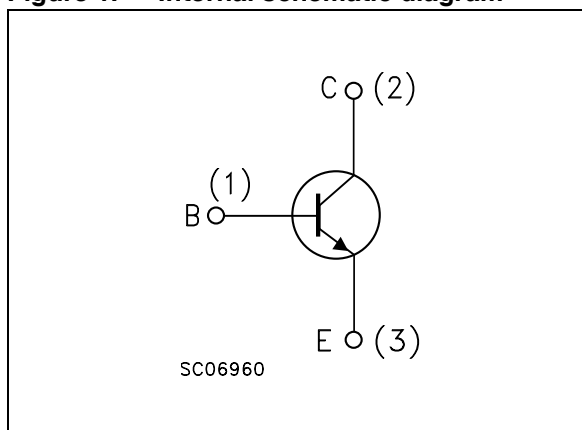


Table 1. Device summary

Order code	Marking	Package	Packaging
BD439	BD439	SOT-32	Tube
BD441	BD441	SOT-32	Tube

1 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		BD439	BD441	
V_{CBO}	Collector-base voltage ($I_E = 0$)	60	80	V
V_{CES}	Collector-emitter voltage ($V_{BE} = 0$)	60	80	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	60	80	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	5		V
I_C	Collector current	4		A
I_{CM}	Collector peak current ($t_p < \text{ms}$)	7		A
I_B	Base current	1		A
P_{TOT}	Total dissipation at $T_{\text{case}} = 25^\circ\text{C}$	36		W
T_{stg}	Storage temperature	-65 to 150		$^\circ\text{C}$
T_J	Max. operating junction temperature	150		$^\circ\text{C}$

2 Electrical characteristics

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

Table 3. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current ($I_{\text{E}} = 0$)	for BD439 $V_{\text{CB}} = 60\text{V}$ for BD441 $V_{\text{CB}} = 80\text{V}$			0.1 0.1	mA mA
I_{CES}	Collector cut-off current ($V_{\text{BE}} = 0$)	for BD439 $V_{\text{CE}} = 60\text{V}$ for BD441 $V_{\text{CE}} = 80\text{V}$			0.1 0.1	mA mA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 5\text{V}$			1	mA
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = 100\text{mA}$ for BD439 for BD441	60 80			V V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 2\text{A}$ $I_{\text{B}} = 0.2\text{A}$			0.8	V
$V_{\text{BE}}^{(1)}$	Base-emitter voltage	$I_{\text{C}} = 10\text{mA}$ $V_{\text{CE}} = 5\text{V}$ $I_{\text{C}} = 2\text{A}$ $V_{\text{CE}} = 1\text{V}$		0.58	1.5	V V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 10\text{mA}$ $V_{\text{CE}} = 5\text{V}$ for BD439 for BD441 $I_{\text{C}} = 500\text{mA}$ $V_{\text{CE}} = 1\text{V}$ for BD439 for BD441 $I_{\text{C}} = 2\text{A}$ $V_{\text{CE}} = 1\text{V}$ for BD439 for BD441	20 15 40 40 25 15	130 130 140 140		

1. Pulsed duration = 300 ms, duty cycle $\geq 1.5\%$.

2.1 Electrical characteristic (curves)

Figure 2. DC current gain

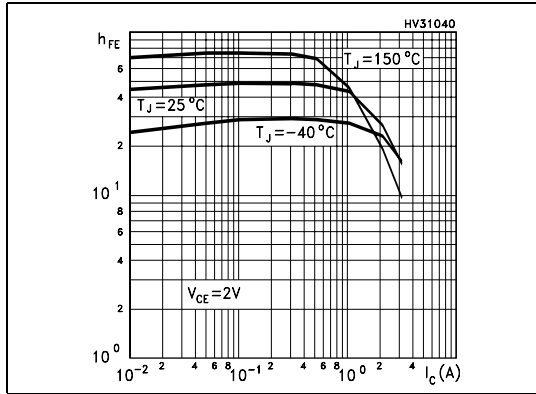


Figure 3. DC current gain

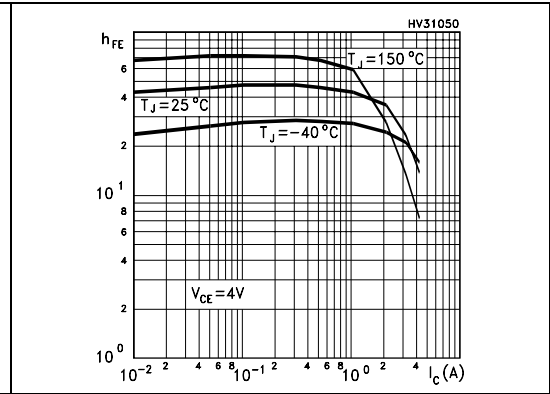


Figure 4. Collector-emitter saturation voltage

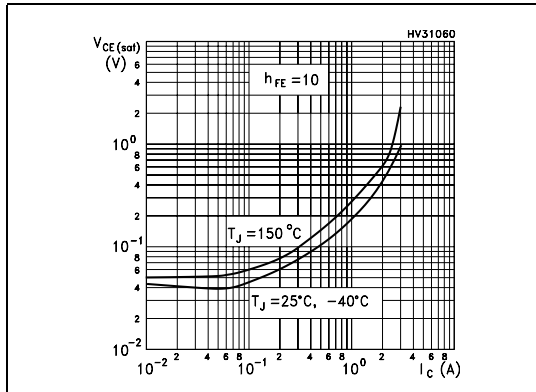


Figure 5. Base-emitter saturation voltage

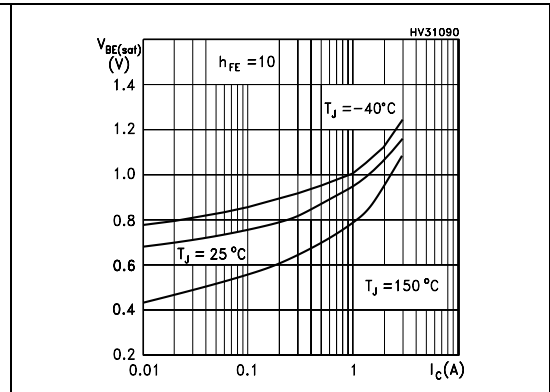


Figure 6. Base-emitter on voltage

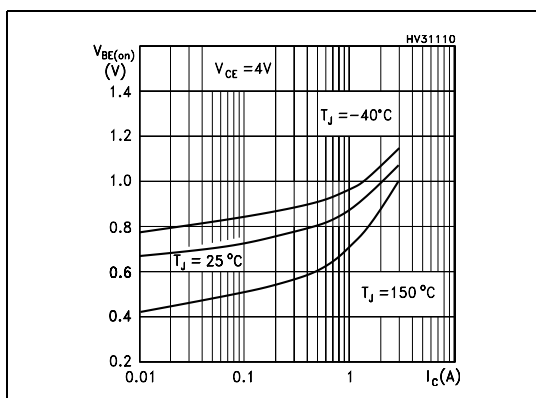


Figure 7. Resistive load switching time

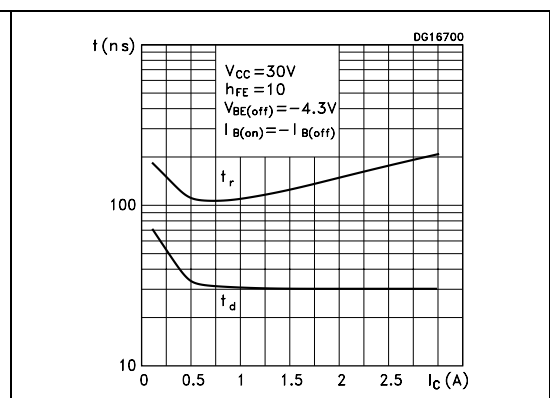
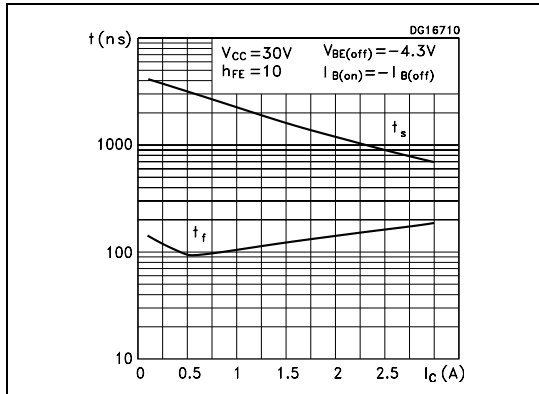
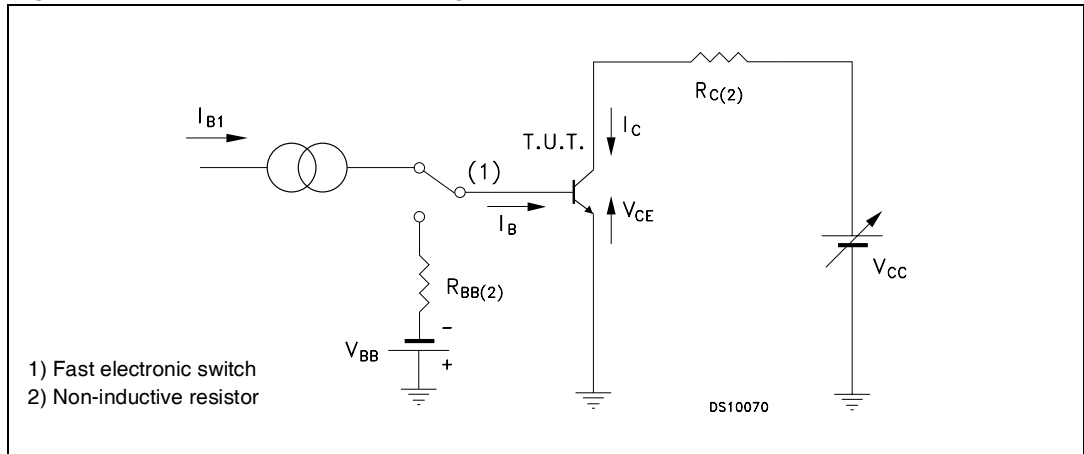


Figure 8. Resistive load switching time



2.2 Test circuits

Figure 9. Resistive load switching test circuit

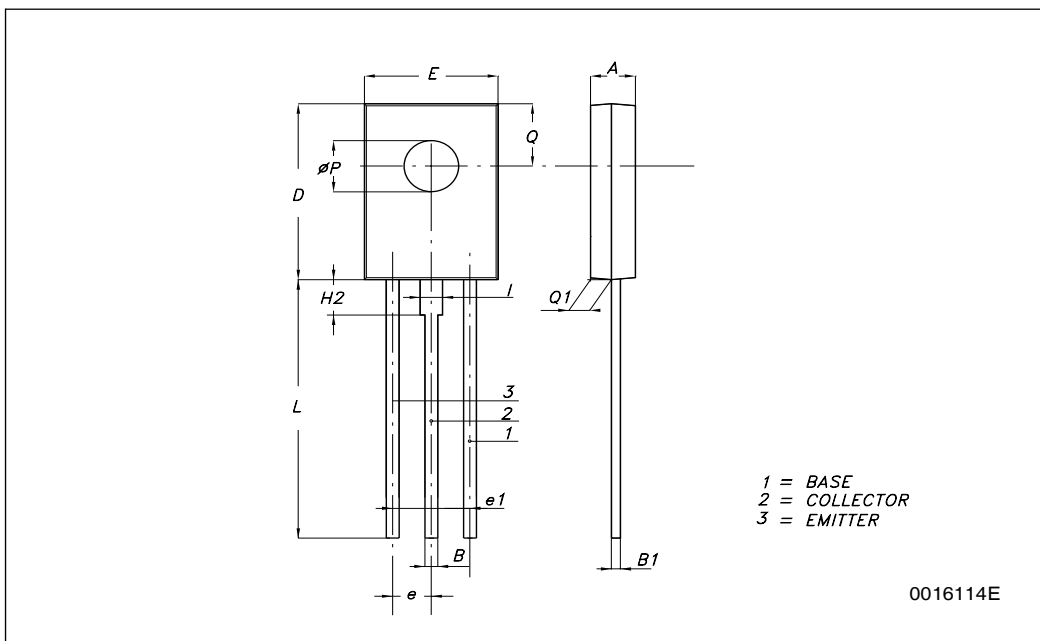


3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

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 4. Revision history

Date	Revision	Changes
01-Dec-2000	1	Initial Release
11-Feb-2003	2	Minor text changes
03-Apr-2007	3	The document has been reformatted.
16-Jul-2007	4	Figure 2, 3, 4, 5, 6, 7, 8 and figure 9 added.

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