

## NPN power transistor

### Features

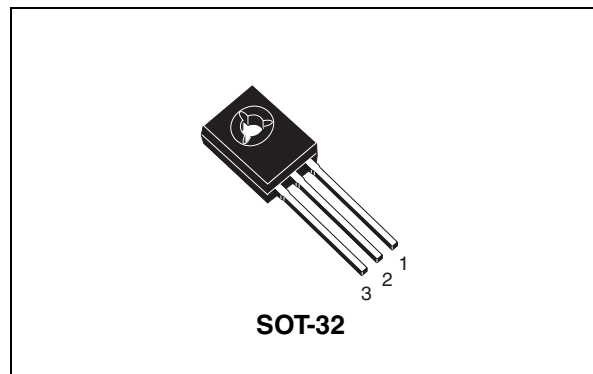
- NPN transistor

### Applications

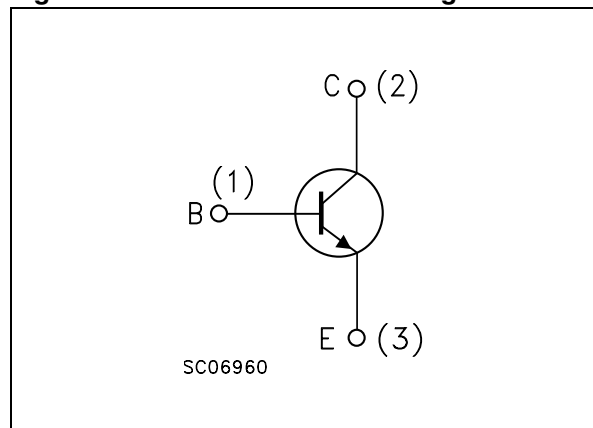
- Linear and switching industrial equipment

### Description

This device is manufactured in planar technology with “base island” layout. The resulting transistor shows exceptional high gain performance coupled with very low saturation voltage. The PNP type is BD442.



**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

Order code	Marking	Package	Packaging
BD441	BD441	SOT-32	Tube

# 1 Absolute maximum ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-base voltage ( $I_E = 0$ )	80	V
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )	80	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	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 $T_{case} = 25\text{ °C}$	36	W
$T_{stg}$	Storage temperature	-65 to 150	°C
$T_J$	Max. operating junction temperature	150	°C

## 2 Electrical characteristics

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

**Table 3. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CBO}}$	Collector cut-off current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 80\text{ V}$			0.1	mA
$I_{\text{CES}}$	Collector cut-off current ( $V_{\text{BE}} = 0$ )	$V_{\text{CE}} = 80\text{ V}$			0.1	mA
$I_{\text{EBO}}$	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 ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 100\text{ mA}$	80			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	$I_{\text{C}} = 10\text{ mA}$ , $V_{\text{CE}} = 5\text{ V}$ $I_{\text{C}} = 500\text{ mA}$ , $V_{\text{CE}} = 1\text{ V}$ $I_{\text{C}} = 2\text{ A}$ , $V_{\text{CE}} = 1\text{ V}$	15 40 15	130 140		

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

## 2.1 Electrical characteristic (curves)

Figure 2. DC current gain

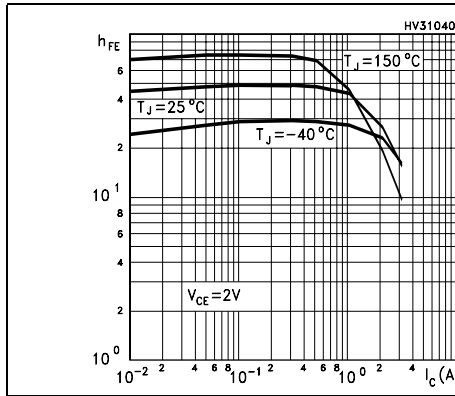


Figure 3. DC current gain

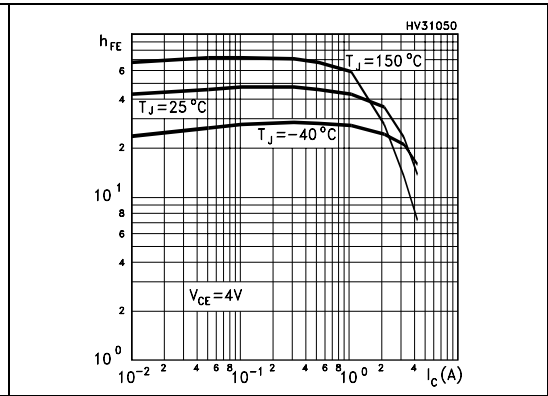


Figure 4. Collector-emitter saturation voltage

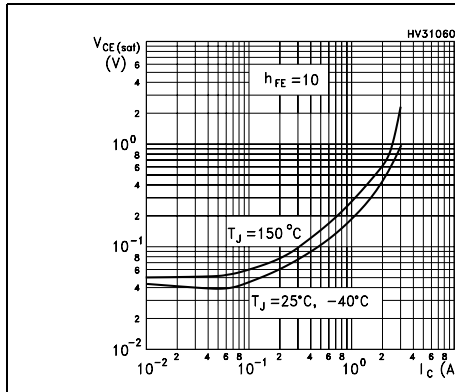


Figure 5. Base-emitter saturation voltage

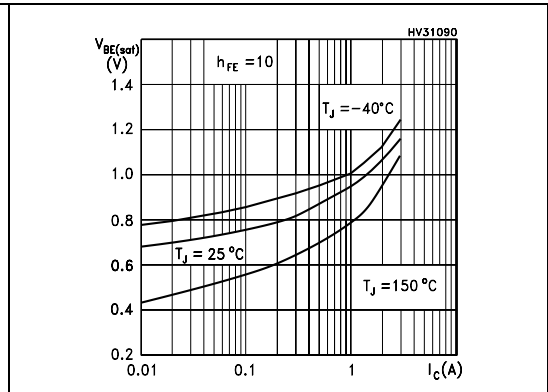


Figure 6. Base-emitter on voltage

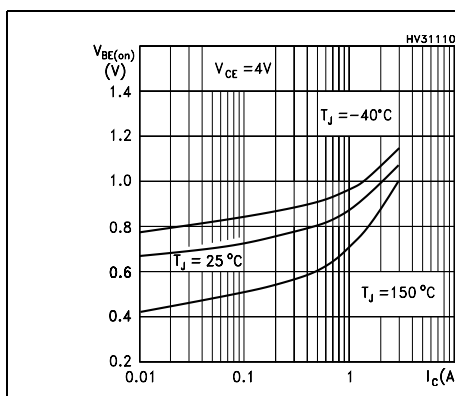


Figure 7. Resistive load switching time

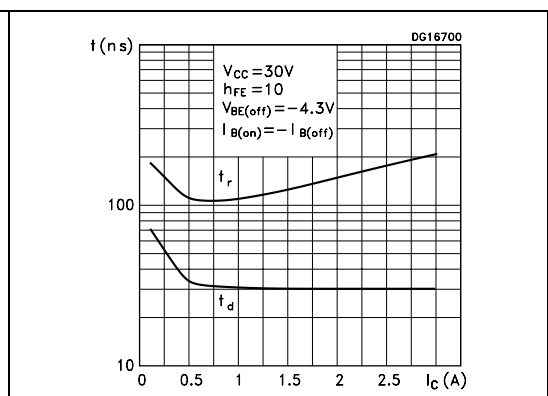
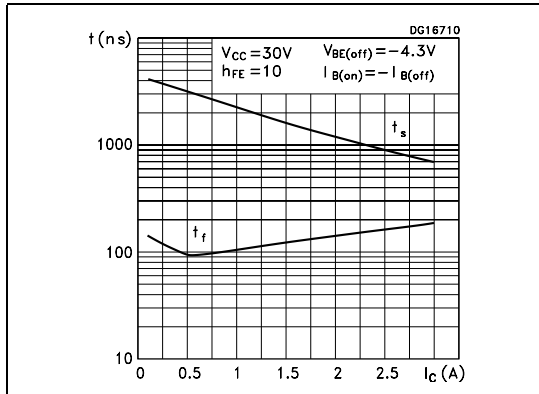
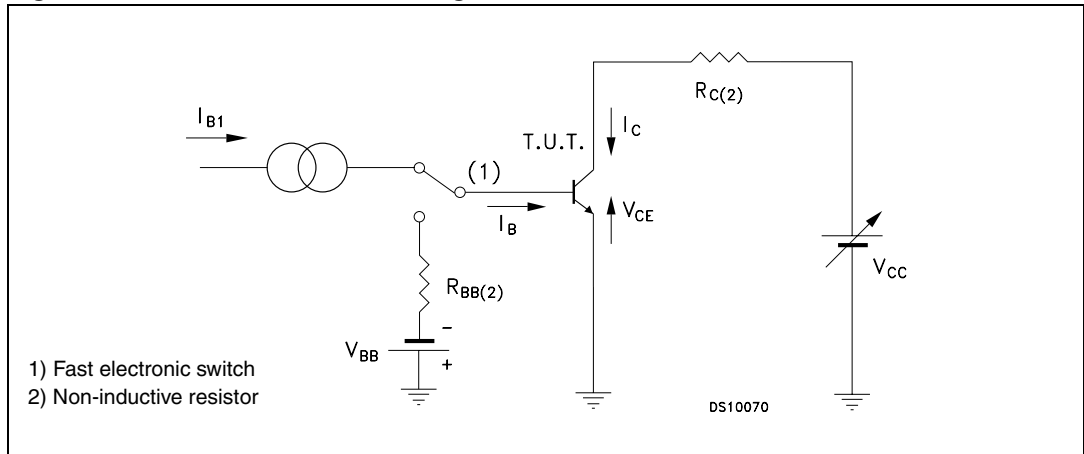


Figure 8. Resistive load switching time



## 2.2 Test circuit

Figure 9. Resistive load switching test circuit

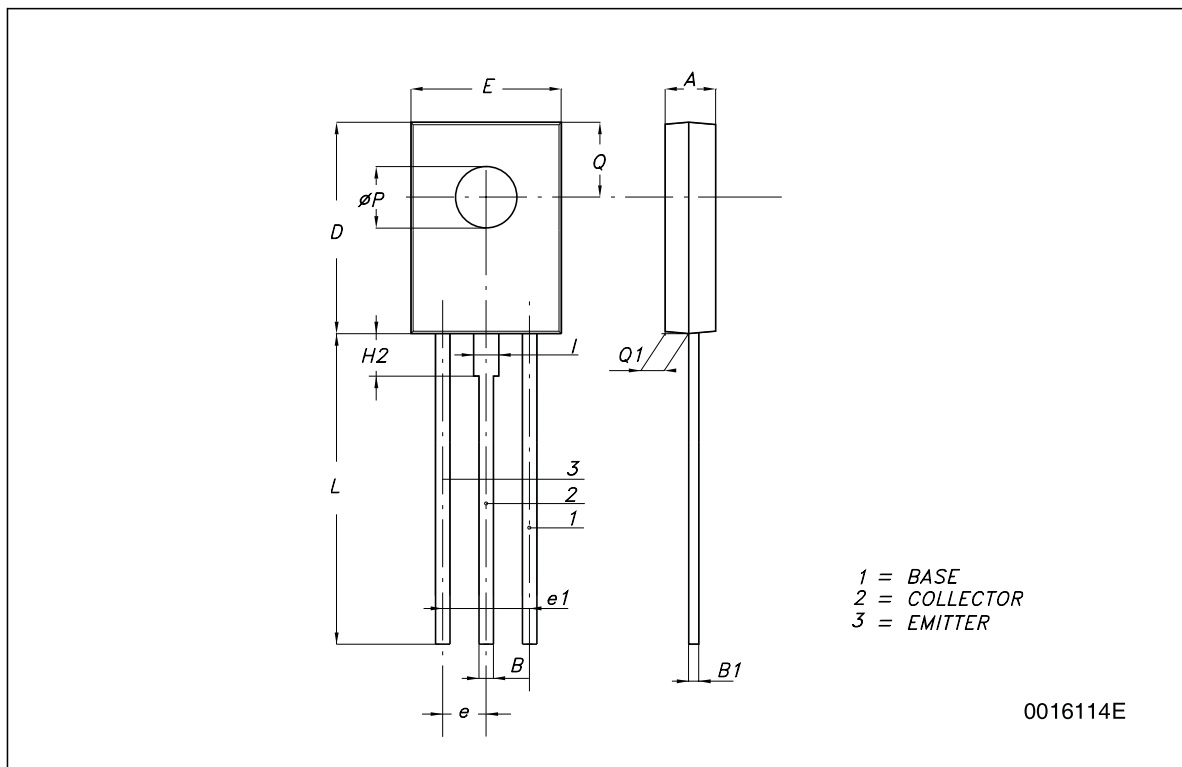


### 3 Package mechanical data

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](http://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**

<b>Date</b>	<b>Revision</b>	<b>Changes</b>
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.
20-May-2008	5	Removed part number BD439



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