

## Low voltage NPN power transistors

### Features

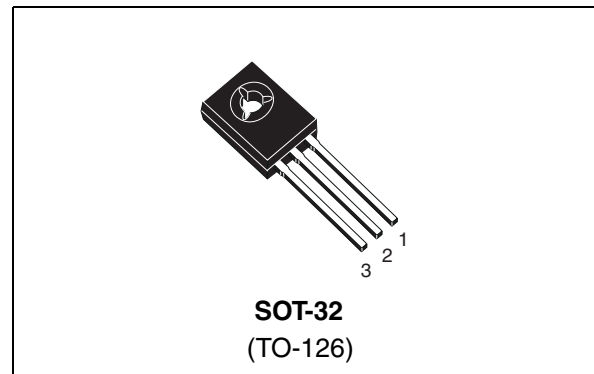
- Low saturation voltage
- NPN transistors

### Applications

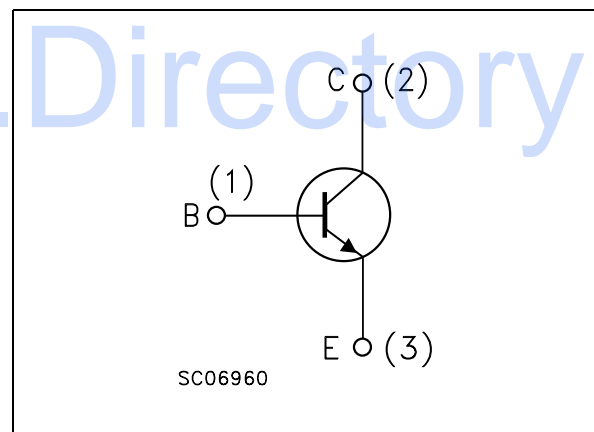
- Audio, power linear and switching applications

### 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 type is BD238.



**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

Order codes	Marking	Package	Packaging
BD235	BD235	SOT-32	Tube
BD237	BD237	SOT-32	Tube

# 1 Absolute maximum ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value		Unit
		BD235	BD237	
$V_{CBO}$	Collector-base voltage ( $I_E = 0$ )	60	100	V
$V_{CER}$	Collector-emitter voltage ( $R_{BE} = 1\text{ k}\Omega$ )	60	100	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	2		A
$I_{CM}$	Collector peak current ( $t_p < \text{ms}$ )	6		A
$P_{TOT}$	Total dissipation at $T_{case} = 25^\circ\text{C}$	25		W
$T_{stg}$	Storage temperature	-65 to 150		$^\circ\text{C}$
$T_J$	Max. operating junction temperature	150		$^\circ\text{C}$

## 2 Electrical characteristics

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

**Table 3. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$	Collector cut-off current ( $I_E = 0$ )	$V_{CB} = \text{rated } V_{CBO}$ $V_{CB} = \text{rated } V_{CBO} T_C = 150^{\circ}C$		-	0.1 2	mA mA
$I_{EBO}$	Emitter cut-off current ( $I_C = 0$ )	$V_{EB} = 5V$		-	1	mA
$V_{CEO(sus)}^{(1)}$	Collector-emitter sustaining voltage ( $I_B = 0$ )	$I_C = 100mA$ for BD235 for BD237	60 80	-		V V
$V_{CE(sat)}^{(1)}$	Collector-emitter saturation voltage	$I_C = 1A$ $I_B = 0.1A$		-	0.6	V
$V_{BE(on)}^{(1)}$	Base-emitter on voltage	$I_C = 1A$ $V_{CE} = 2V$		-	1.3	V
$h_{FE}^{(1)}$	DC current gain	$I_C = 150mA$ $V_{CE} = 2V$ $I_C = 1A$ $V_{CE} = 2V$	40 25	-		

1. Pulsed duration = 300  $\mu s$ , duty cycle = 1.5 %.

### 2.1 Electrical characteristic (curves)

**Figure 2. Safe operating area**

**Figure 3. Derating curves**

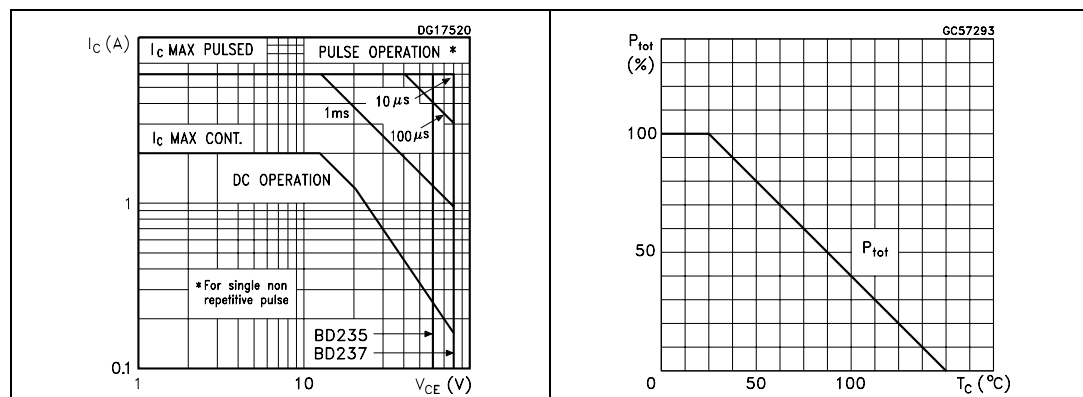


Figure 4. DC current gain ( $V_{CE} = 2\text{ V}$ )

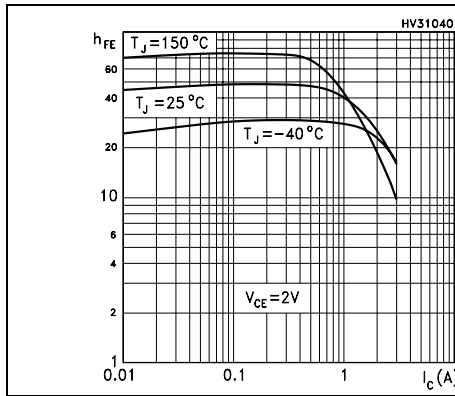


Figure 5. DC current gain ( $V_{CE} = 4\text{ V}$ )

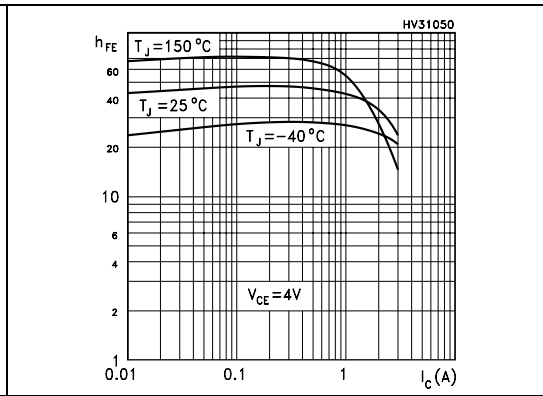


Figure 6. Collector-emitter saturation voltage

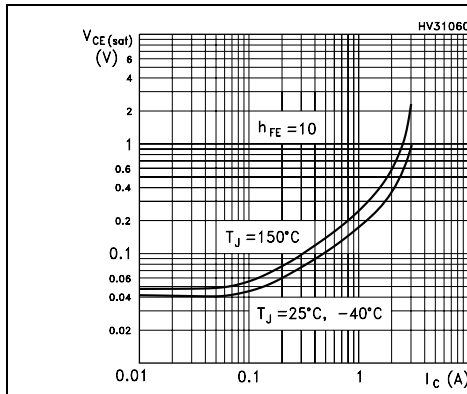


Figure 7. Base-emitter saturation voltage

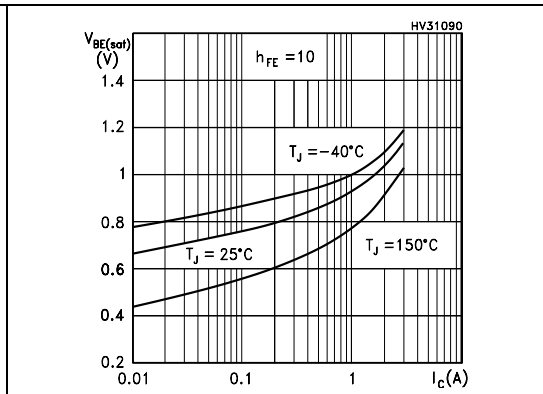


Figure 8. Base-emitter on voltage

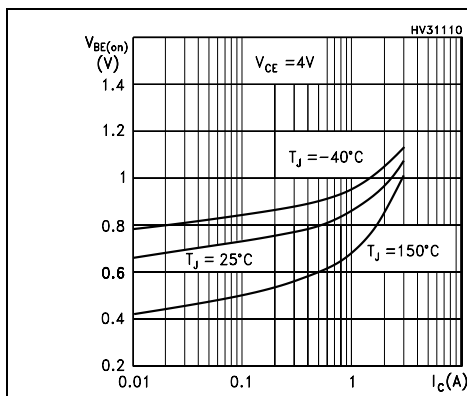
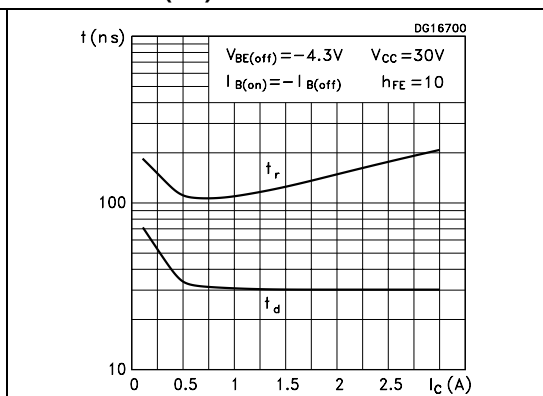
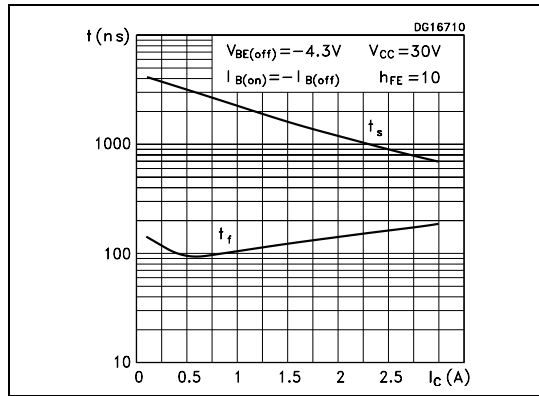


Figure 9. Resistive load switching time (on)

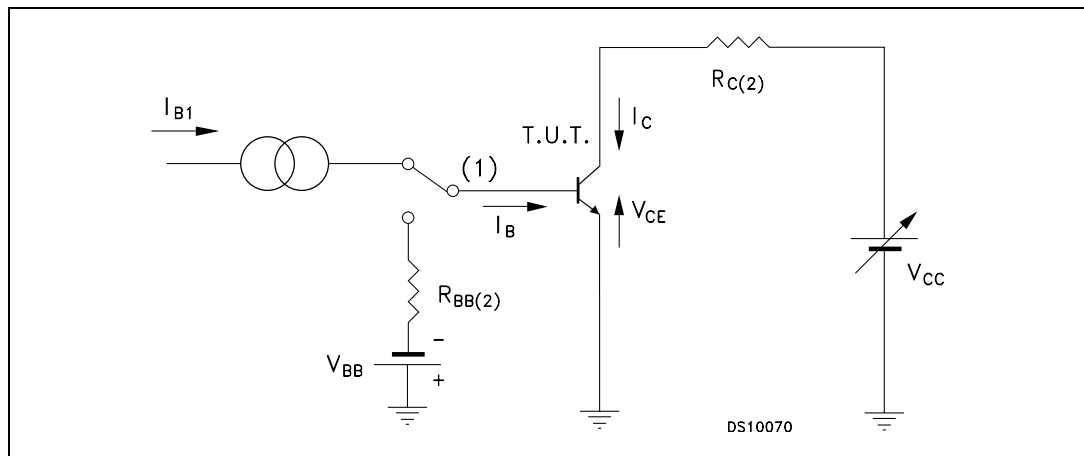


**Figure 10. Resistive load switching time (off)**



## 2.2 Test circuit

**Figure 11. Resistive load switching test circuit**



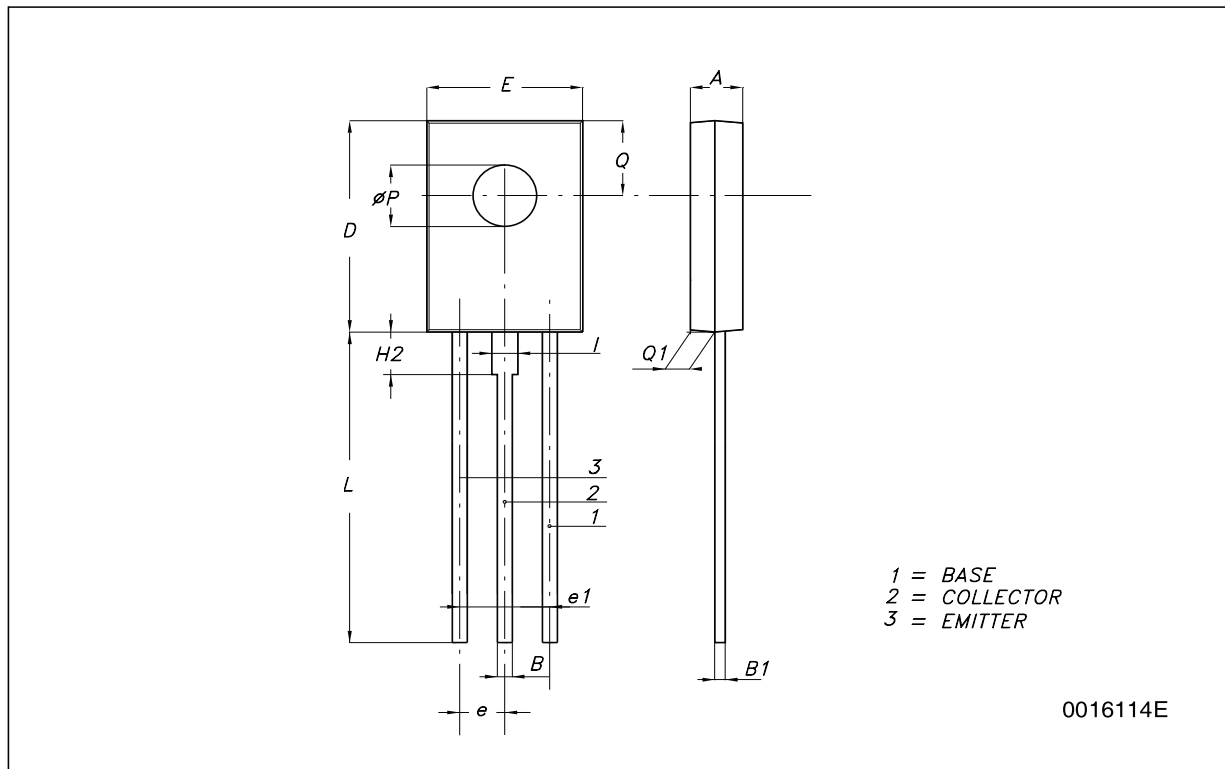
1. Fast electronic switch
2. Non-inductive resistor

### 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> 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	



## 4 Revision history

**Table 4. Document revision history**

Date	Revision	Changes
11-Feb-2003	1	Initial release.
09-Jul-2007	2	Added: figures 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12.
03-Jun-2009	3	Minor text changes.



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