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BD6xxx

Complementary power Darlington transistors

Features

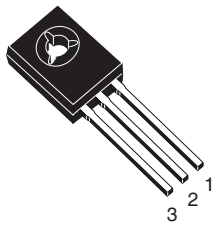
- Good h_{FE} linearity
- High f_T frequency
- Monolithic Darlington configuration with integrated antiparallel collector-emitter diode

Applications

- Linear and switching industrial equipment

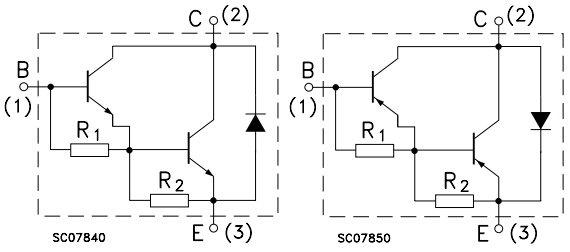
Description

The devices are manufactured in planar base island technology with monolithic Darlington configuration.



SOT-32

Figure 1. Internal schematic diagram



R1 typ.= 15 KΩ R2 typ.= 100 Ω

Table 1. Device summary

Order codes	Marking	Package	Packaging
BD677	BD677	SOT-32	Tube
BD677A	BD677A		
BD678	BD678		
BD678A	BD678A		
BD679	BD679		
BD679A	BD679A		
BD680	BD680		
BD680A	BD680A		
BD681	BD681		
BD682	BD682		

Contents

1 **Absolute maximum ratings** 3

2 **Electrical characteristics** 4

2.1 Typical characteristic (curves) 6

2.2 Test circuit 8

3 **Package mechanical data** 9

4 **Revision history** 11

1 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter		Value			Unit
		NPN	BD677 BD677A	BD679 BD679A	BD681	
		PNP	BD678 BD678A	BD680 BD680A	BD682	
V_{CBO}	Collector-base voltage (I_E = 0)		60	80	100	V
V_{CEO}	Collector-emitter voltage (I_B = 0)					
V_{EBO}	Emitte-base voltage (I_C = 0)		5			V
I_C	Collector current		4			A
I_{CM}	Collector peak current		6			A
I_B	Base current		0.1			A
P_{TOT}	Total dissipation at T_{case} = 25°C		40			W
T_{stg}	Storage temperature		-65 to 150			°C
T_J	Max. operating junction temperature		150			°C

Note: For PNP types voltage and current values are negative

2 Electrical characteristics

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

Table 3. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CEO}	Collector cut-off current (I_B = 0)	V_{CE} = half rated V_{CEO}			0.5	mA
I_{CBO}	Collector cut-off current (I_E = 0)	V_{CE} = rated V_{CBO} V_{CE} = rated V_{CBO} T_c = 100 °C			0.2 2	mA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 5 V			2	mA
$V_{CEO(sus)}$(1)	Collector-emitter sustaining voltage (I_B = 0)	for BD677, BD677A, BD678, BD678A I_C = 50 mA	60			V
		for BD679, BD679A, BD680, BD680A I_C = 50 mA	80			
		for BD681, BD682 I_C = 50 mA	100			
$V_{CE(sat)}$(1)	Collector-emitter saturation voltage	for BD677, BD678, BD679, BD680, BD681, BD682 I_C = 1.5 A I_B = 30 mA			2.5	V
		for BD677A, BD678A, BD679A, BD680A I_C = 2 A I_B = 40 mA			2.8	
V_{BE}(1)	Base-emitter voltage	for BD677, BD678, BD679, BD680, BD681, BD682 I_C = 1.5 A V_{CE} = 3 V			2.5	V
		for BD677A, BD678A, BD679A, BD680A I_C = 2 A V_{CE} = 3 V				

Table 3. Electrical characteristics (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
h_{FE}(1)	DC current gain	for BD677, BD678, BD679, BD680, BD681, BD682 I_C = 1.5 A V_{CE} = 3 V	750			
		for BD677A, BD678A, BD679A, BD680A I_C = 2 A V_{CE} = 3 V				

1. Pulsed duration = 300 ms, duty cycle ≥1.5%.

Note: For PNP types voltage e current values are negative.

2.1 Typical characteristic (curves)

Figure 2. DC current gain (NPN)

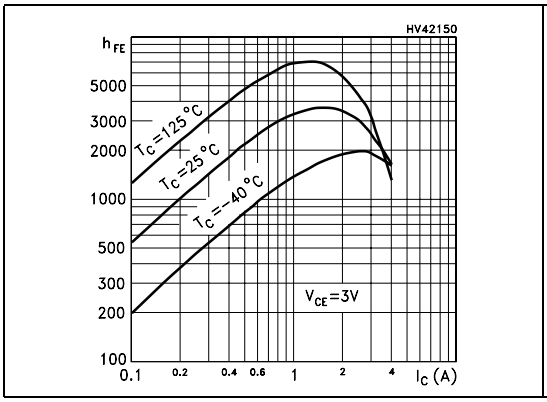


Figure 3. DC current gain (PNP)

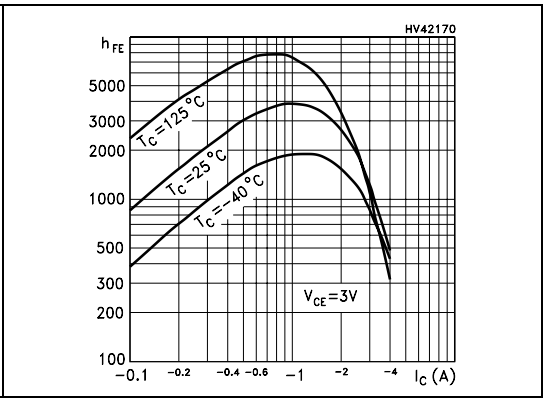


Figure 4. DC current gain (NPN)

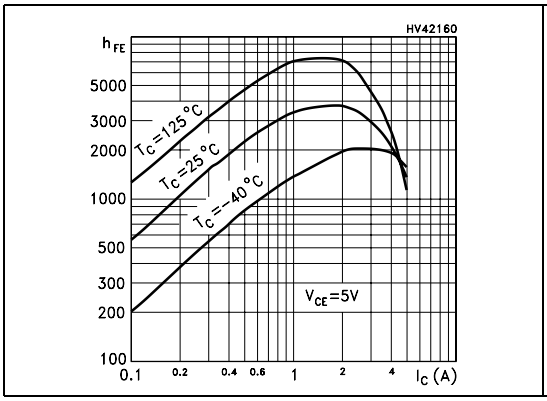


Figure 5. DC current gain (PNP)

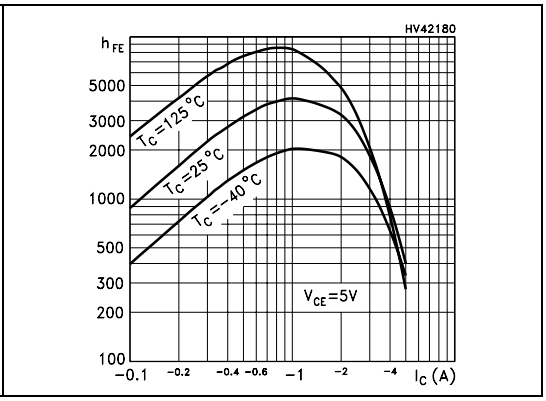


Figure 6. Collector-emitter saturation voltage (NPN)

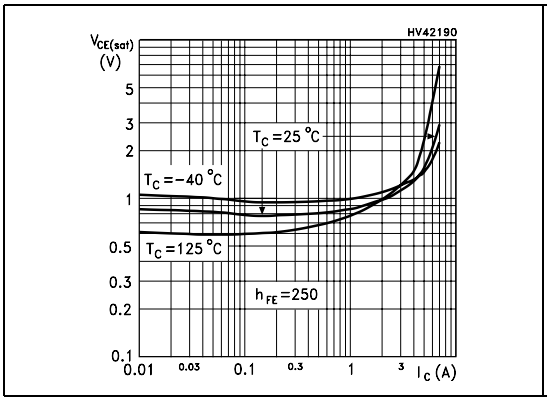


Figure 7. Collector-emitter saturation voltage (PNP)

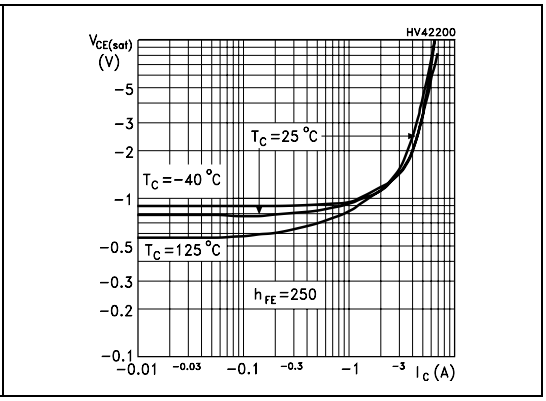


Figure 8. Base-emitter saturation voltage (NPN)

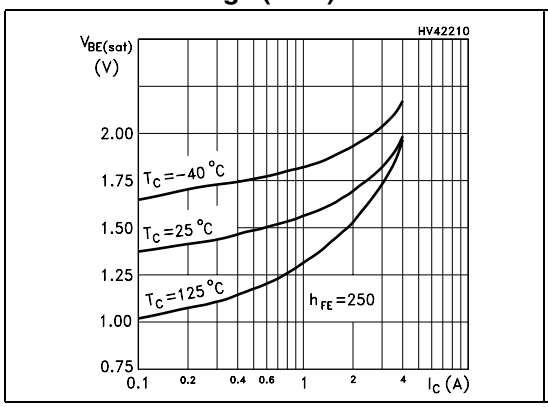


Figure 9. Base-emitter saturation voltage (PNP)

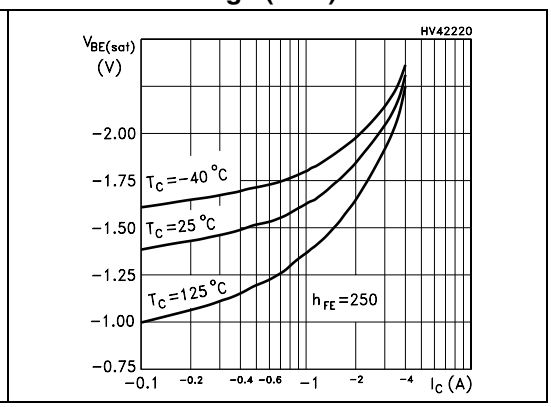


Figure 10. Base-emitter voltage (NPN)

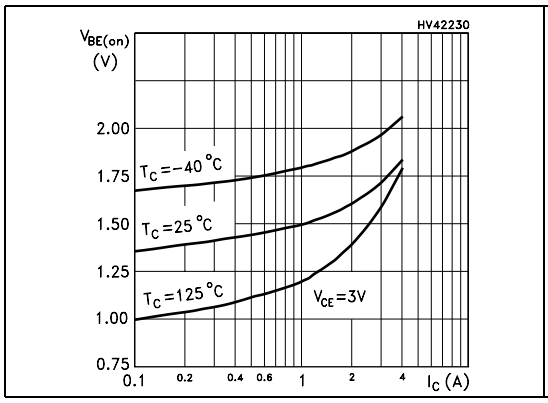


Figure 11. Base-emitter voltage (PNP)

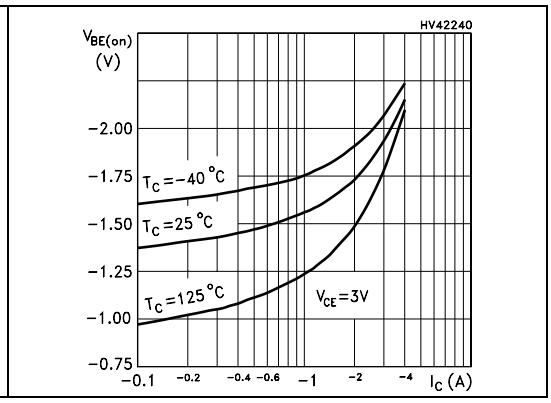


Figure 12. Resistive load switching time (NPN, on)

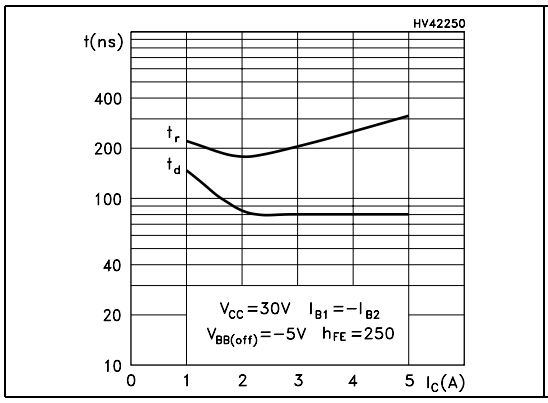


Figure 13. Resistive load switching time (PNP, on)

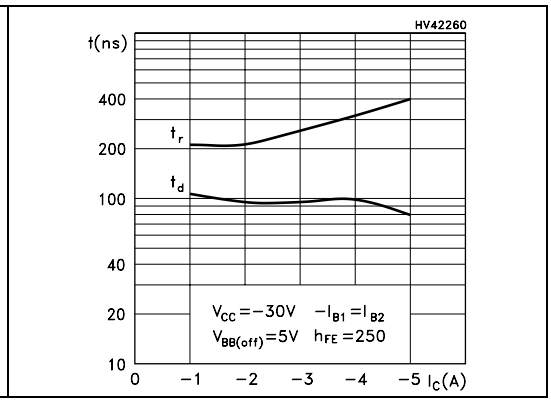


Figure 14. Resistive load switching time (NPN, off)

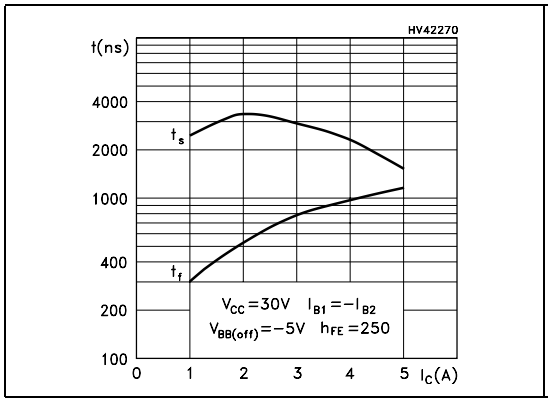
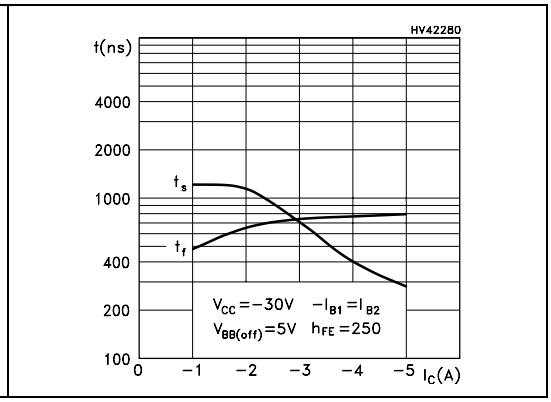
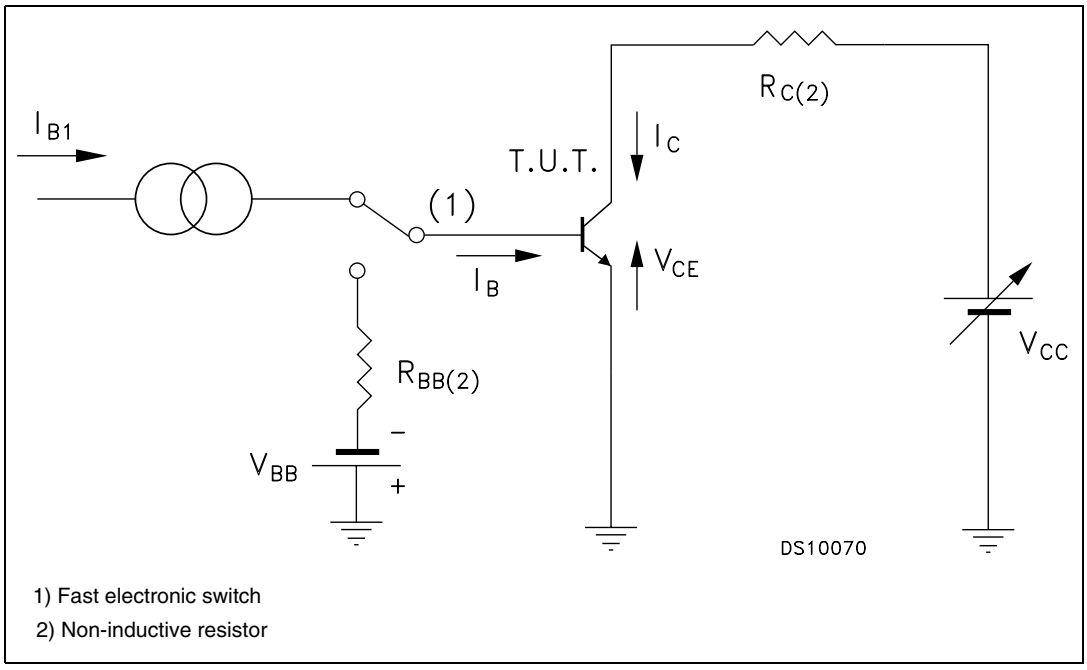


Figure 15. Resistive load switching time (PNP, off)



2.2 Test circuit

Figure 16. Resistive load switching test circuit



1) Fast electronic switch
2) Non-inductive resistor

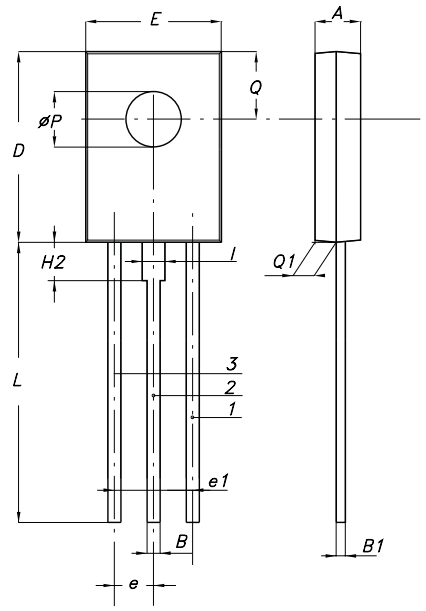
Note: For PNP types voltage e current values are negative.

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. Document revision history

Date	Revision	Changes
21-Jun-2004	4	
14-Jan-2008	5	1. Technology change from epybase to planar. 2. Updated *Section 2.1: Typical characteristic (curves) on page 6* 3. Content reworked to improve readability.

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