2N6036
2N6039

Complementary power Darlington transistors

Features

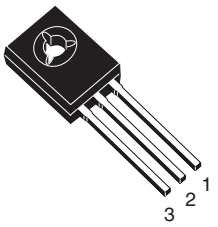
- Good h_{FE} linearity
- High f_T frequency
- Monolithic Darlington configuration with integrated antiparallel collector-emitter diode

Applications

- Linear and switching industrial equipment

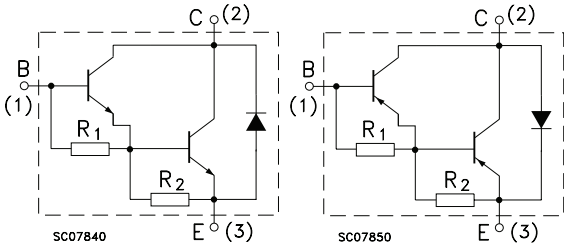
Description

The devices are manufactured in planar technology with “base island” layout and monolithic Darlington configuration.



SOT-32

Figure 1. Internal schematic diagram



R_1 typ. = 15 kΩ R_2 typ. = 100 Ω

Table 1. Device summary

Order codes	Marking	Polarity	Package	Packaging
2N6036	2N6036	NPN	SOT-32	Tube
2N6039	2N6039	PNP	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_{CEO}	Collector-emitter voltage (I_B = 0)		
V_{EBO}	Emitter-base voltage (I_C = 0)	5	V
I_C	Collector current	4	A
I_{CM}	Collector peak current	8	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_{CEV}	Collector cut-off current (V_{BE} = -1.5 V)	V_{CE} = 80 V V_{CE} = 80 V, T_c = 125 °C		-	0.1 0.5	mA mA
I_{CBO}	Collector cut-off current (I_E = 0)	V_{CB} = 80 V		-	0.1	mA
I_{CEO}	Collector cut-off current (I_B = 0)	V_{CE} = 80 V		-	0.1	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_C = 100 mA	80	-		V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 2 A I_B = 8 mA		-	2	V
		I_C = 4 A I_B = 40 mA		-	3	
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 4 A I_B = 40 mA		-	4	V
$V_{BE(on)}$	Base-emitter on voltage	I_C = 2 A V_{CE} = 3 V		-	2.8	V
h_{FE} (1)	DC current gain	I_C = 0.5 A V_{CE} = 3 V	500	-		
		I_C = 2 A V_{CE} = 3 V	750	-	15000	
		I_C = 4 A V_{CE} = 3 V	100	-		
h_{fe}	Small signal current gain	I_C = 0.75 A V_{CE} = 10 V f = 1 MHz	25	-		
C_{CBO}	Collector base capacitance (I_E = 0)	V_{CB} = 10 V f = 0.1 MHz for 2N6036 for 2N6039		-	100 200	pF pF

1. Pulsed duration = 300 µs, duty cycle 1.5%.

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

2.1 Typical characteristic (curves)

Figure 2. DC current gain (V_{CE} = 3 V NPN)

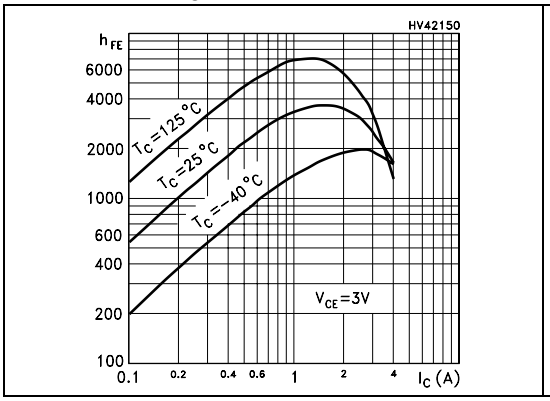


Figure 3. DC current gain (V_{CE} = - 3 V PNP)

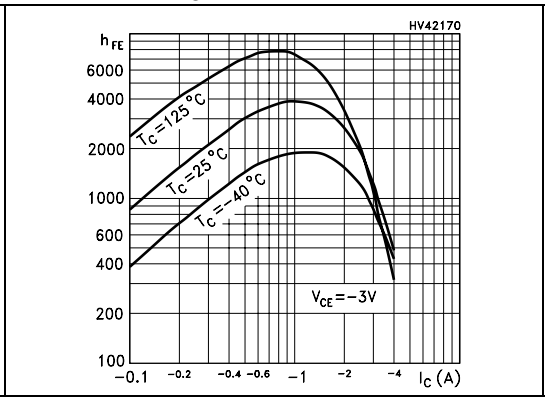


Figure 4. DC current gain (V_{CE} = 5 V NPN)

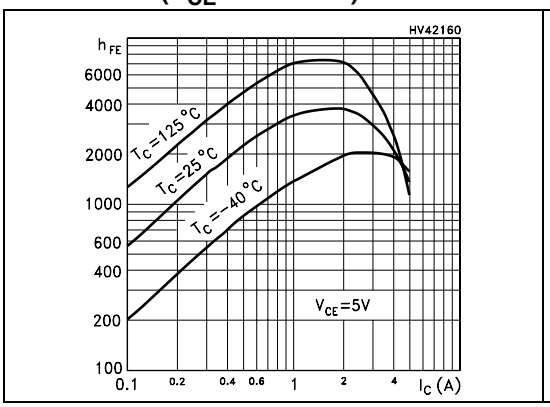


Figure 5. DC current gain (V_{CE} = - 5 V PNP)

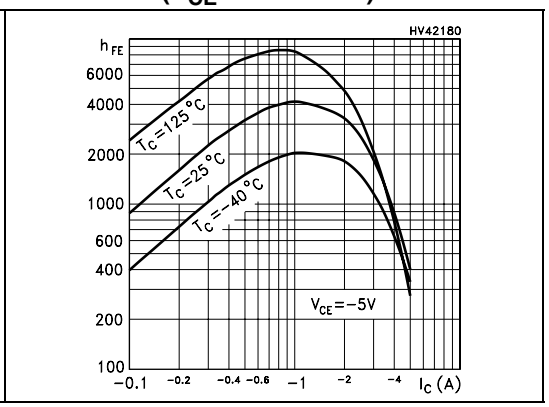


Figure 6. Collector-emitter saturation voltage (NPN)

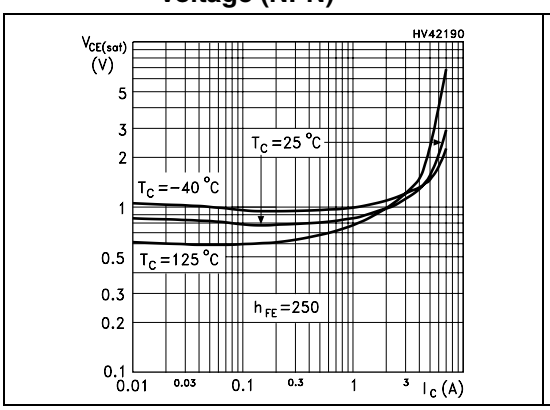


Figure 7. Collector-emitter saturation voltage (PNP)

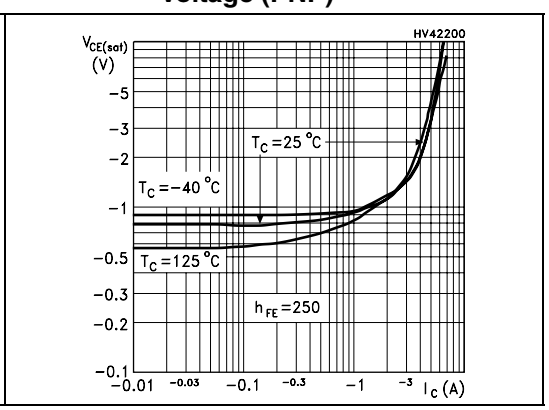


Figure 8. Base-emitter saturation voltage (NPN)

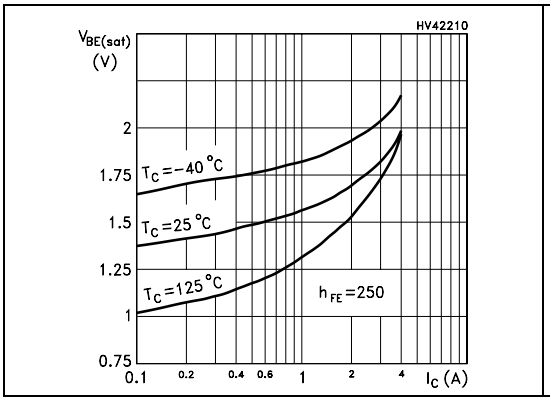


Figure 9. Base-emitter saturation voltage (PNP)

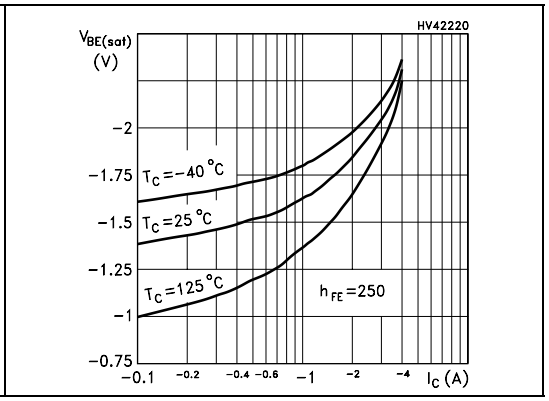


Figure 10. Base-emitter on voltage (NPN)

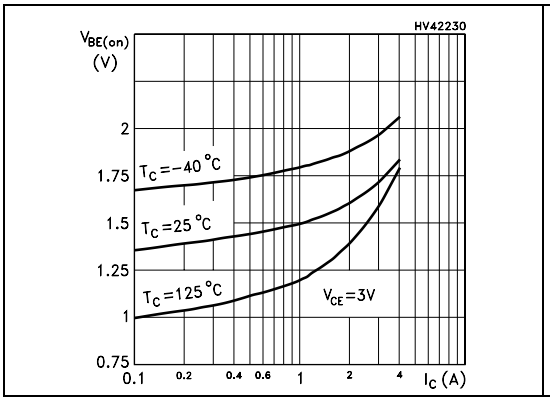


Figure 11. Base-emitter on voltage (PNP)

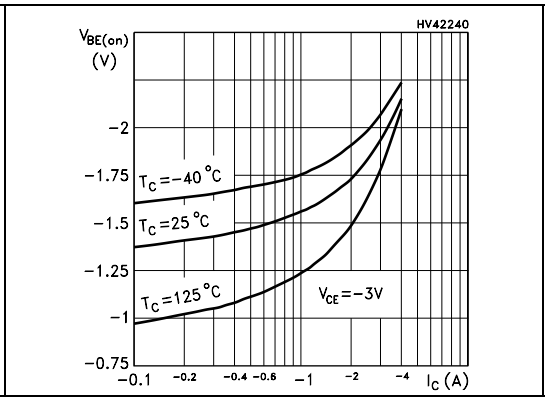


Figure 12. Resistive load switching time (NPN, on)

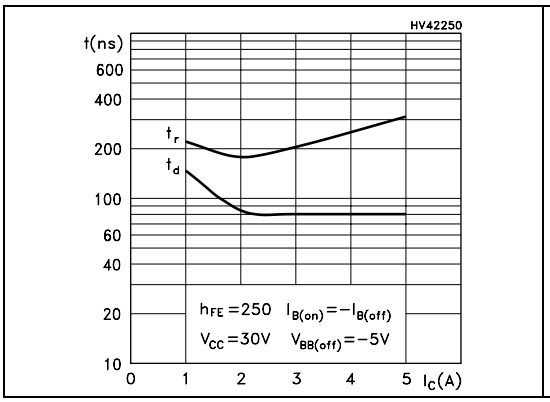


Figure 13. Resistive load switching time (PNP, on)

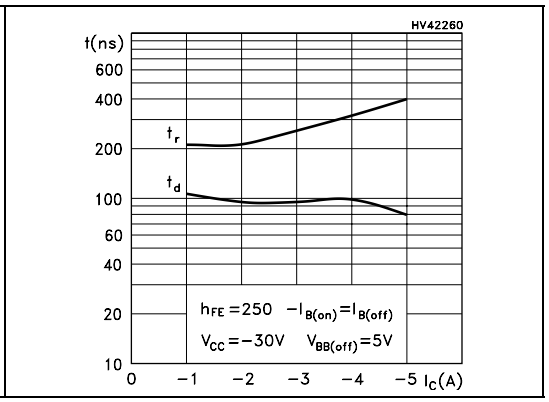


Figure 14. Resistive load switching time (NPN, off)

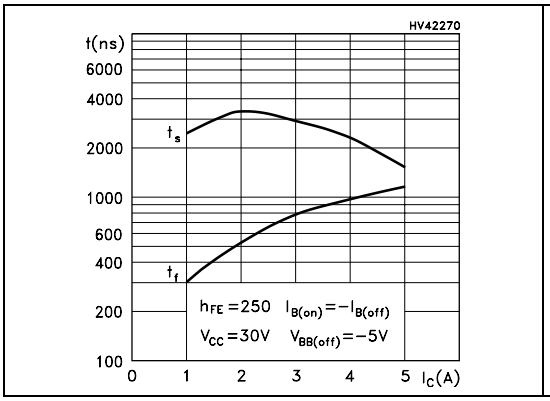
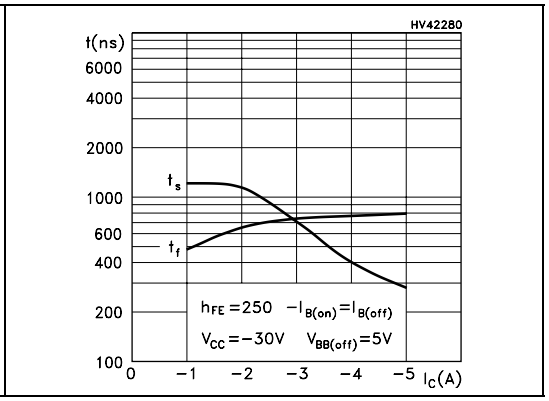


Figure 15. Resistive load switching time (PNP, off)

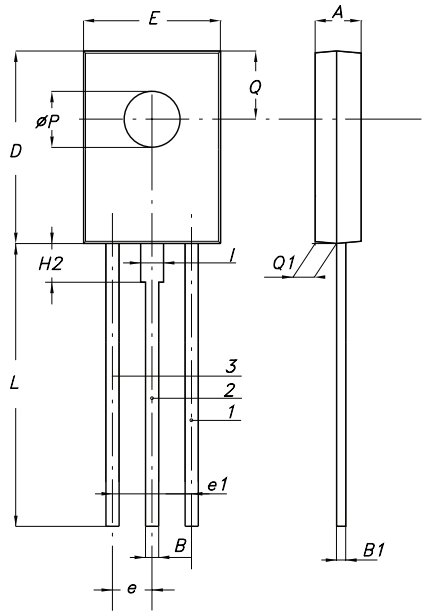


3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*.
ECOPACK® 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	



1 = BASE
2 = COLLECTOR
3 = EMITTER

0016114E

4 Revision history

Table 4. Document revision history

Date	Revision	Changes
21-Jun-2004	4	Document migration, no content change.
20-May-2009	5	Modified SOT-32 mechanical data.