

BD135 - BD136 BD139 - BD140

Complementary low voltage transistor

Features

■ Products are pre-selected in DC current gain

Application

■ General purpose

Description

These epitaxial planar transistors are mounted in the SOT-32 plastic package. They are designed for audio amplifiers and drivers utilizing complementary or quasi-complementary circuits. The NPN types are the BD135 and BD139, and the complementary PNP types are the BD136 and BD140.

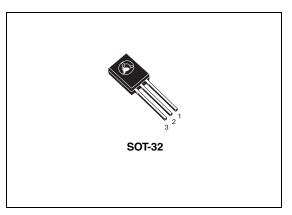
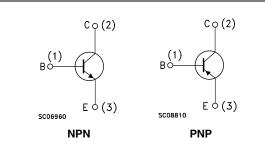


Figure 1. Internal schematic diagram



Order codes	Marking	Package	Packaging
BD135	BD135		
BD135-16	BD135-16		
BD136	BD136		
BD136-16	BD136-16		
BD139	BD139	SOT-32	Tube
BD139-10	BD139-10	501-52	Tube
BD139-16	BD139-16		
BD140	BD140		
BD140-10	BD140-10		
BD140-16	BD140-16		

Table 1. Device summary

May 2008

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1 Electrical ratings

		Value				
Symbol	Parameter		NPN		PNP	
		BD135	BD139	BD136	BD140	
V _{CBO}	Collector-base voltage $(I_E = 0)$	45	80	-45	-80	V
V _{CEO}	Collector-emitter voltage (I _B = 0)	45	80	-45	-80	V
V _{EBO}	Emitter-base voltage (I _C = 0)	5 -5		5	V	
Ι _C	Collector current	1.5 -1.5		.5	А	
I _{CM}	Collector peak current	3 -3		3	А	
ا _B	Base current 0.5 -0.5		.5	А		
P _{TOT}	Total dissipation at $T_c \le 25 \text{ °C}$		12	2.5		W
P _{TOT}	Total dissipation at $T_{amb} \leq 25 \ ^{\circ}C$ 1.25			W		
T _{stg}	Storage temperature -65 to 150			°C		
Тj	Max. operating junction temperature 150			°C		

Table 2.Absolute maximum ratings

Symbol	Parameter	Max value	Unit
R _{thj-case}	Thermal resistance junction-case	10	°C/W
R _{thj-amb}	Thermal resistance junction-ambient	100	°C/W



2 Electrical characteristics

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

Symbol	Parameter	Polority	Test conditions	Value			Unit
Symbol	Farameter	Polarity	Test conditions	Min.	Тур.	Max.	Unit
I _{CBO}	Collector cut-off current (I _E =0)	NPN	V _{CB} = 30 V V _{CB} = 30 V, T _C = 125 °C			0.1 10	μΑ μΑ
		PNP	V _{CB} = -30 V V _{CB} = -30 V, T _C = 125 °C			-0.1 -10	μΑ μΑ
	Emitter cut-off current (I _C =0)	NPN	V _{EB} = 5 V			10	μA
I _{EBO}		PNP	V _{EB} = -5 V			-10	μA
V _{CEO(sus)} ⁽¹⁾	Collector-emitter sustaining voltage (I _B =0)	NPN	l _C = 30 mA BD135 BD139	45 80			V V
		PNP	l _C = -30 mA BD136 BD140	-45 -80			V V
V (1)	Collector-emitter saturation voltage	NPN	$I_{\rm C} = 0.5 \text{ A}, I_{\rm B} = 0.05 \text{ A}$			0.5	V
V _{CE(sat)} ⁽¹⁾		PNP	$I_{C} = -0.5 \text{ A}, I_{B} = -0.05 \text{ A}$			-0.5	V
V _{BE} ⁽¹⁾	Base-emitter voltage	NPN	$I_{C} = 0.5 \text{ A}, V_{CE} = 2 \text{ V}$			1	V
VBE (Dase-emilier voltage	PNP	$I_{C} = -0.5 \text{ A}, V_{CE} = -2 \text{ V}$			-1	V
h _{FE} ⁽¹⁾	DC current gain	NPN	$\begin{split} I_{C} &= 5 \text{ mA}, \text{ V}_{CE} = 2 \text{ V} \\ I_{C} &= 150 \text{ mA}, \text{ V}_{CE} = 2 \text{ V} \\ I_{C} &= 0.5 \text{ A}, \text{ V}_{CE} = 2 \text{ V} \end{split}$	25 40 25		250	
		PNP	$I_{C} = -5 \text{ mA}, V_{CE} = -2 \text{ V}$ $I_{C} = -150 \text{ mA}, V_{CE} = -2 \text{ V}$ $I_{C} = -0.5 \text{ A}, V_{CE} = -2 \text{ V}$	25 40 25		250	
h _{FE} ⁽¹⁾	h _{FE} groups	NPN	I _C = 150 mA, V _{CE} = 2 V BD139-10 BD135-16/BD139-16	63 100		160 250	
		PNP	I _C = -150 mA, V _{CE} = -2 V BD140-10 BD136-16/BD140-16	63 100		160 250	

1. Pulsed: pulse duration = 300 μ s, duty cycle 1.5%

2.1 Electrical characteristics (curves)

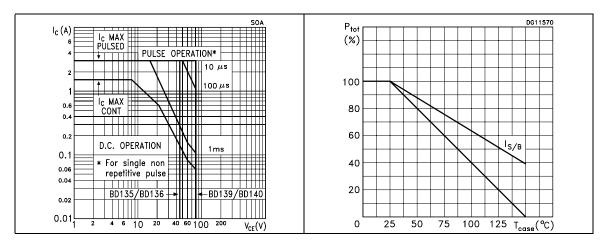


Figure 2. Safe operating area

Figure 3. Derating

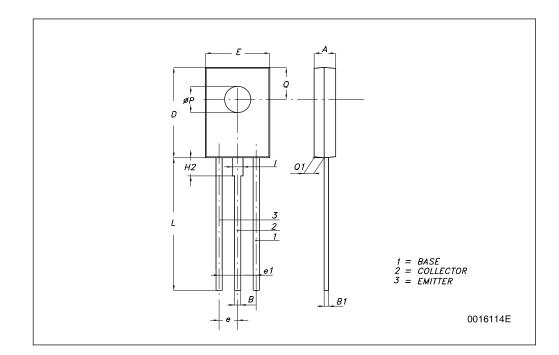


3 Package mechanical data

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.				
DIM.	MIN.	ТҮР	MAX.		
A	2.4		2.9		
В	0.64		0.88		
B1	0.39		0.63		
D	10.5		11.05		
E	7.4		7.8		
е	2.04	2.29	2.54		
e1	4.07	4.58	5.08		
L	15.3		16		
Р	2.9		3.2		
Q		3.8			
Q1	1		1.52		
H2		2.15			
I		1.27			



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4 Revision history

Table 5.Document revision history

Date	Revision	Changes
16-Sep-2001	4	
22-May-2008	5	Mechanical data has been updated.



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