BD135 - BD136
BD139 - BD140

Complementary low voltage transistor

Features

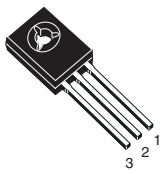
- Products are pre-selected in DC current gain

Application

- General purpose

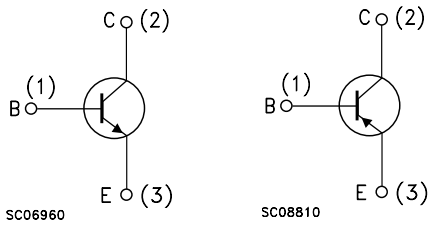
Description

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.



SOT-32

Figure 1. Internal schematic diagram



NPN PNP

Table 1. Device summary

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

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value				Unit
		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		V
I_C	Collector current	1.5		-1.5		A
I_{CM}	Collector peak current	3		-3		A
I_B	Base current	0.5		-0.5		A
P_{TOT}	Total dissipation at $T_c \leq 25$ °C	12.5				W
P_{TOT}	Total dissipation at $T_{amb} \leq 25$ °C	1.25				W
T_{stg}	Storage temperature	-65 to 150				°C
T_j	Max. operating junction temperature	150				°C

Table 3. Thermal data

Symbol	Parameter	Max value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	10	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient	100	°C/W

2 Electrical characteristics

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

Table 4. On/off states

Symbol	Parameter	Polarity	Test conditions	Value			Unit
				Min.	Typ.	Max.	
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	µA µA
		PNP	V_{CB} = -30 V V_{CB} = -30 V, T_C = 125 °C			-0.1 -10	µA µA
I_{EBO}	Emitter cut-off current (I_C=0)	NPN	V_{EB} = 5 V			10	µA
		PNP	V_{EB} = -5 V			-10	µA
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B=0)	NPN	I_C = 30 mA BD135 BD139	 45 80			 V V
		PNP	I_C = -30 mA BD136 BD140	 -45 -80			 V V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	NPN	I_C = 0.5 A, I_B = 0.05 A			0.5	V
		PNP	I_C = -0.5 A, I_B = -0.05 A			-0.5	V
V_{BE} (1)	Base-emitter voltage	NPN	I_C = 0.5 A, V_{CE} = 2 V			1	V
		PNP	I_C = -0.5 A, V_{CE} = -2 V			-1	V
h_{FE} (1)	DC current gain	NPN	I_C = 5 mA, V_{CE} = 2 V I_C = 150 mA, V_{CE} = 2 V I_C = 0.5 A, V_{CE} = 2 V	25 40 25		250	
		PNP	I_C = -5 mA, V_{CE} = -2 V I_C = -150 mA, V_{CE} = -2 V I_C = -0.5 A, V_{CE} = -2 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 µs, duty cycle 1.5%

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

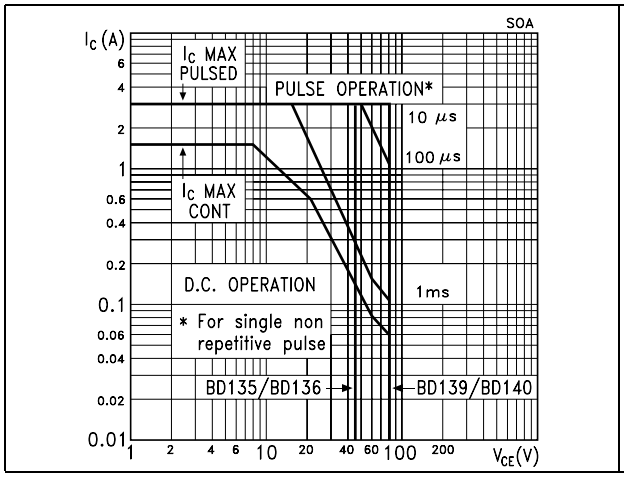
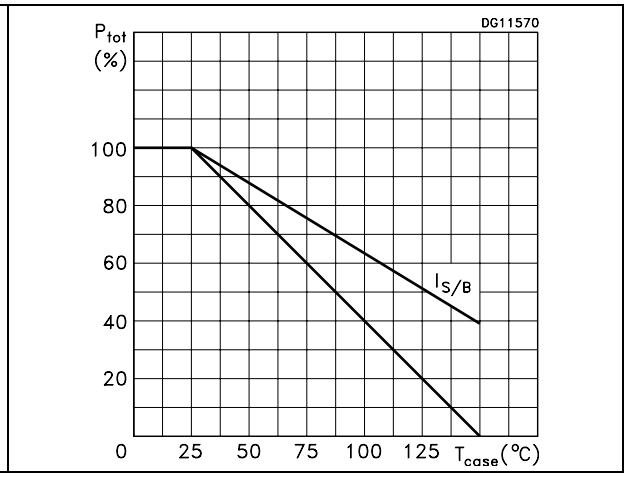
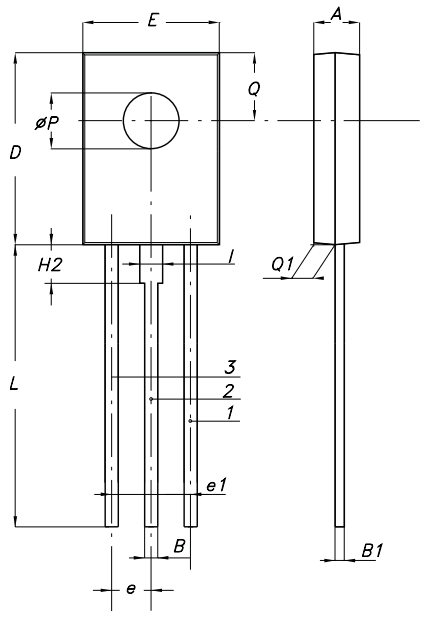


Figure 3. Derating



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

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