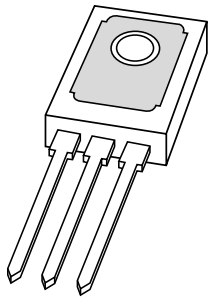


# DATA SHEET



## **BD135; BD137; BD139** NPN power transistors

Product specification  
Supersedes data of September 1994  
File under Discrete Semiconductors, SC04

1997 Mar 04

**NPN power transistors**

**BD135; BD137; BD139**

**FEATURES**

- High current (max. 1.5 A)
- Low voltage (max. 80 V).

**APPLICATIONS**

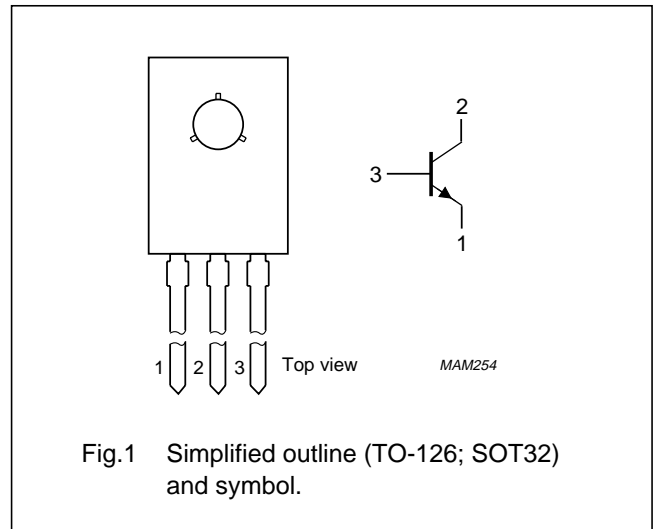
- Driver stages in hi-fi amplifiers and television circuits.

**DESCRIPTION**

NPN power transistor in a TO-126; SOT32 plastic package. PNP complements: BD136, BD138 and BD140.

**PINNING**

PIN	DESCRIPTION
1	emitter
2	collector, connected to metal part of mounting surface
3	base



**QUICK REFERENCE DATA**

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter				
	BD135		–	–	45	V
	BD137		–	–	60	V
	BD139		–	–	100	V
V <sub>CEO</sub>	collector-emitter voltage	open base				
	BD135		–	–	45	V
	BD137		–	–	60	V
	BD139		–	–	80	V
I <sub>CM</sub>	peak collector current		–	–	2	A
P <sub>tot</sub>	total power dissipation	T <sub>mb</sub> ≤ 70 °C	–	–	8	W
h <sub>FE</sub>	DC current gain	I <sub>C</sub> = 150 mA; V <sub>CE</sub> = 2 V	40	–	250	
f <sub>T</sub>	transition frequency	I <sub>C</sub> = 50 mA; V <sub>CE</sub> = 5 V; f = 100 MHz	–	190	–	MHz

## NPN power transistors

## BD135; BD137; BD139

**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter			
	BD135		–	45	V
	BD137		–	60	V
	BD139		–	100	V
V <sub>CEO</sub>	collector-emitter voltage	open base			
	BD135		–	45	V
	BD137		–	60	V
	BD139		–	80	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	5	V
I <sub>C</sub>	collector current (DC)		–	1.5	A
I <sub>CM</sub>	peak collector current		–	2	A
I <sub>BM</sub>	peak base current		–	1	A
P <sub>tot</sub>	total power dissipation	T <sub>mb</sub> ≤ 70 °C	–	8	W
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	junction temperature		–	150	°C
T <sub>amb</sub>	operating ambient temperature		–65	+150	°C

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-a</sub>	thermal resistance from junction to ambient	note 1	100	K/W
R <sub>th j-mb</sub>	thermal resistance from junction to mounting base		10	K/W

**Note**

1. Refer to TO-126; SOT32 standard mounting conditions.

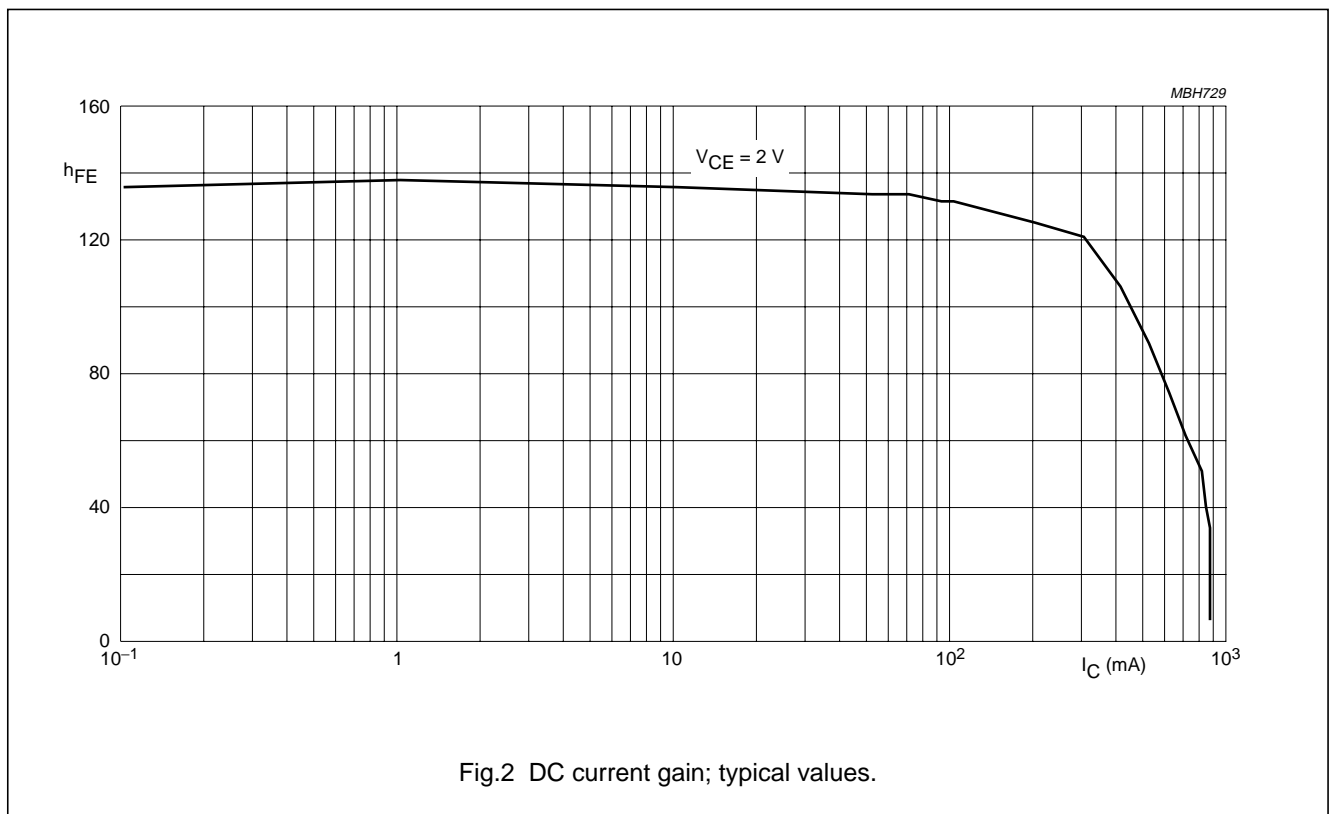
NPN power transistors

BD135; BD137; BD139

**CHARACTERISTICS**

$T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$I_E = 0; V_{CB} = 30\text{ V}$	–	–	100	nA
		$I_E = 0; V_{CB} = 30\text{ V}; T_j = 125\text{ }^\circ\text{C}$	–	–	10	$\mu\text{A}$
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = 5\text{ V}$	–	–	100	nA
$h_{FE}$	DC current gain	$V_{CE} = 2\text{ V};$ see Fig.2 $I_C = 5\text{ mA}$ $I_C = 150\text{ mA}$ $I_C = 500\text{ mA}$	40	–	–	
			40	–	250	
			25	–	–	
$h_{FE}$	DC current gain BD135-10; BD137-10; BD139-10 BD135-16; BD137-16; BD139-16	$I_C = 150\text{ mA}; V_{CE} = 2\text{ V};$ see Fig.2	63	–	160	
			100	–	250	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	–	–	0.5	V
$V_{BE}$	base-emitter voltage	$I_C = 500\text{ mA}; V_{CE} = 2\text{ V}$	–	–	1	V
$f_T$	transition frequency	$I_C = 50\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$	–	190	–	MHz
$\frac{h_{FE1}}{h_{FE2}}$	DC current gain ratio of the complementary pairs	$ I_C  = 150\text{ mA};  V_{CE}  = 2\text{ V}$	–	1.3	1.6	

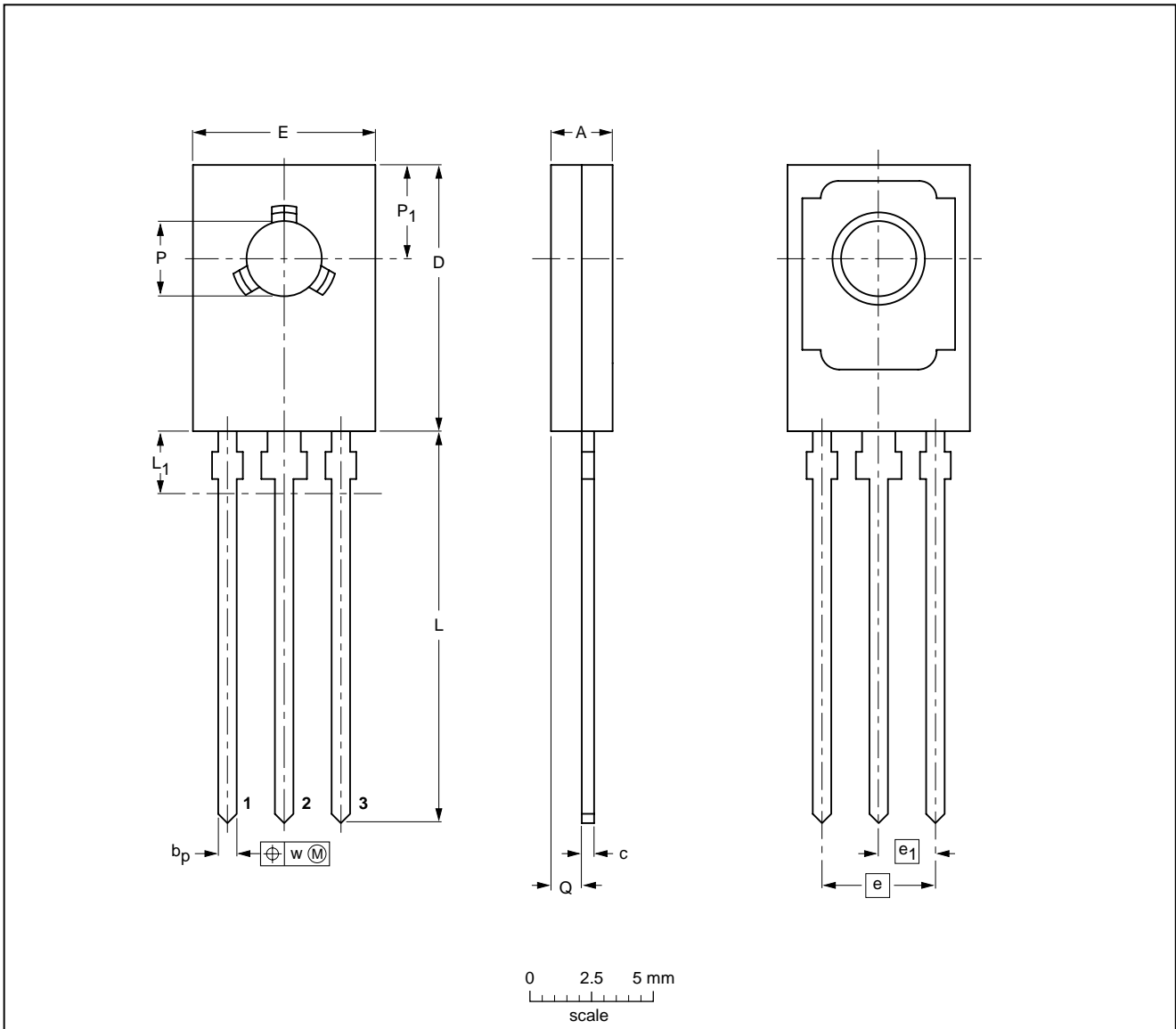


NPN power transistors

BD135; BD137; BD139

PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; mountable to heatsink, 1 mounting hole; 3 leads SOT32



DIMENSIONS (mm are the original dimensions)

UNIT	A	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	L	L <sub>1</sub> <sup>(1)</sup> max	Q	P	P <sub>1</sub>	w
mm	2.7 2.3	0.88 0.65	0.60 0.45	11.1 10.5	7.8 7.2	4.58	2.29	16.5 15.3	2.54	1.5 0.9	3.2 3.0	3.9 3.6	0.254

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT32		TO-126				97-03-04