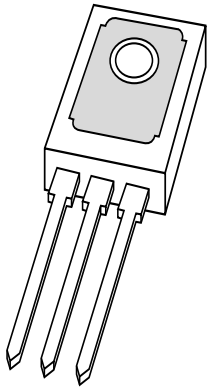


# DATA SHEET



## **BDX42; BDX43; BDX44** NPN Darlington transistors

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

1997 Jul 02

# NPN Darlington transistors

# BDX42; BDX43; BDX44

### FEATURES

- High current (max. 1 A)
- Low voltage (max. 80 V)
- Integrated diode and resistor.

### APPLICATIONS

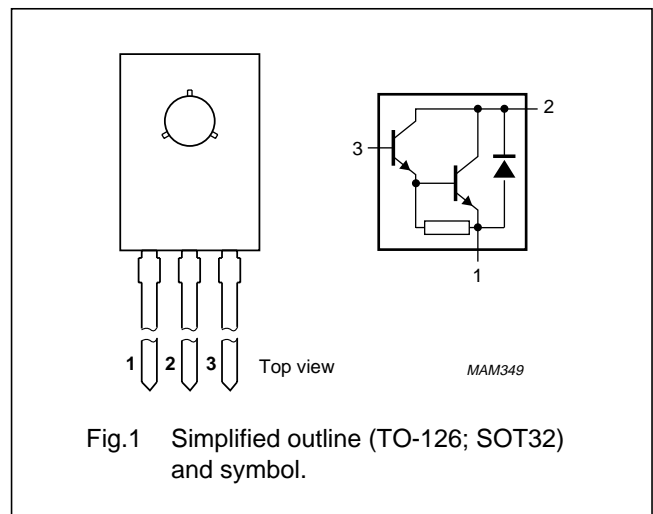
- Industrial switching applications such as:
  - print hammers
  - solenoids
  - relay and lamp drivers.

### DESCRIPTION

NPN Darlington transistor in a TO-126; SOT32 plastic package. PNP complements: BDX45 and BDX47.

### 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
$V_{CBO}$	collector-base voltage	open emitter				
	BDX42		–	–	60	V
	BDX43		–	–	80	V
	BDX44		–	–	90	V
$V_{CES}$	collector-emitter voltage	$V_{BE} = 0$				
	BDX42		–	–	45	V
	BDX43		–	–	60	V
	BDX44		–	–	80	V
$I_C$	collector current (DC)		–	–	1	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^\circ\text{C}$	–	–	1.25	W
		$T_{mb} \leq 100\text{ }^\circ\text{C}$	–	–	5	W
$h_{FE}$	DC current gain	$I_C = 150\text{ mA}; V_{CE} = 10\text{ V}$	1000	–	–	
		$I_C = 500\text{ mA}; V_{CE} = 10\text{ V}$	2000	–	–	
$f_T$	transition frequency	$I_C = 500\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$	–	200	–	MHz

## NPN Darlington transistors

## BDX42; BDX43; BDX44

**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			
	BDX42		–	60	V
	BDX43		–	80	V
	BDX44		–	90	V
V <sub>CES</sub>	collector-emitter voltage	V <sub>BE</sub> = 0			
	BDX42		–	45	V
	BDX43		–	60	V
	BDX44		–	80	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	5	V
I <sub>C</sub>	collector current (DC)		–	1	A
I <sub>CM</sub>	peak collector current		–	2	A
I <sub>B</sub>	base current (DC)		–	100	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	–	1.25	W
		T <sub>mb</sub> ≤ 100 °C	–	5	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	in free air	100	K/W
R <sub>th j-mb</sub>	thermal resistance from junction to mounting base		10	K/W

## NPN Darlington transistors

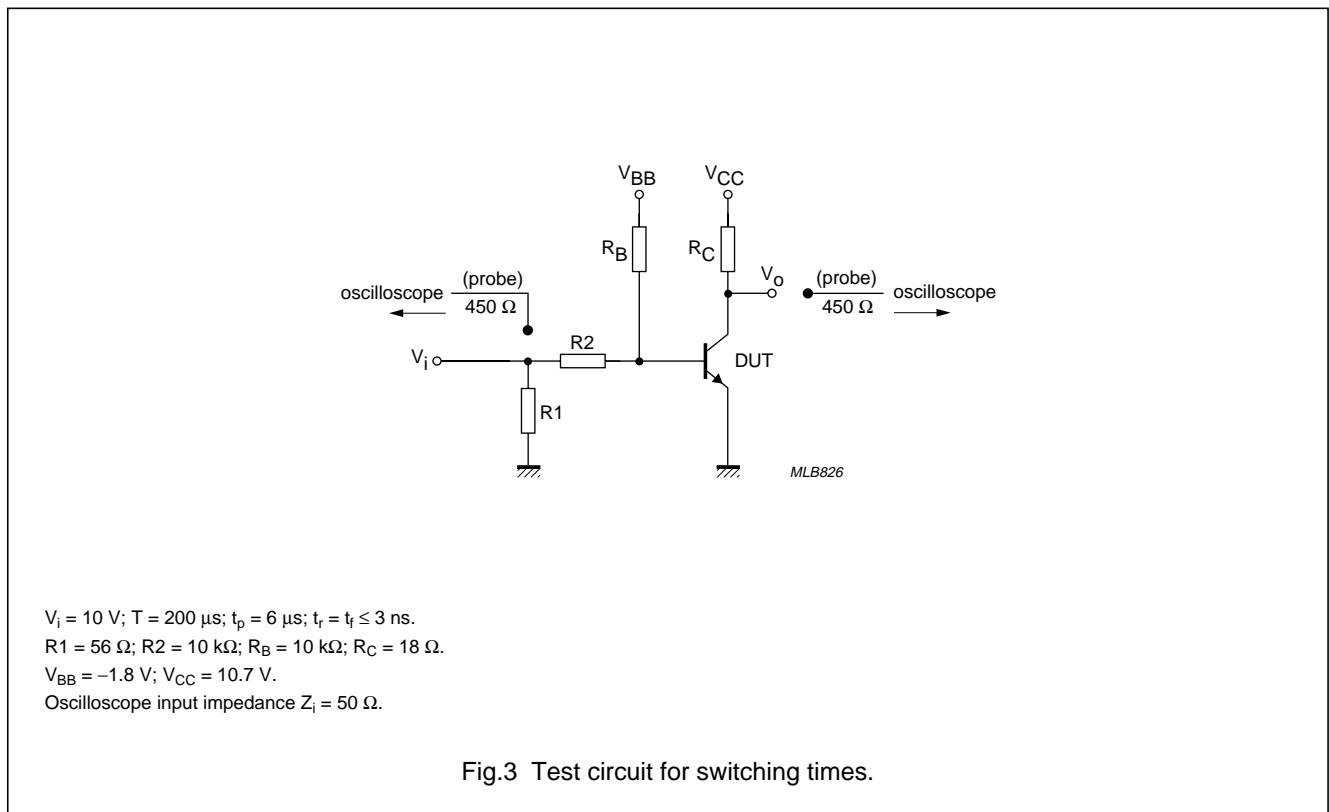
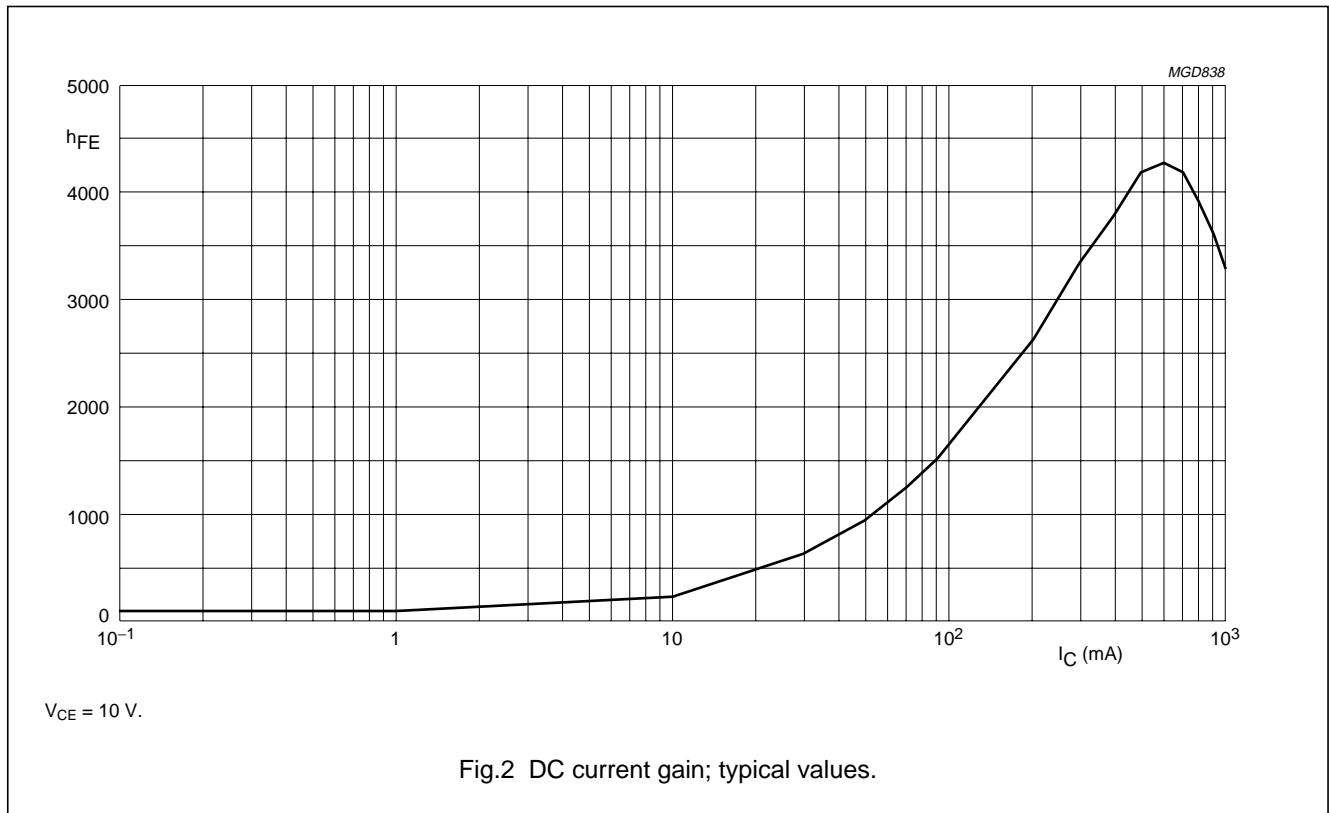
## BDX42; BDX43; BDX44

**CHARACTERISTICS**T<sub>j</sub> = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I <sub>CBO</sub>	collector cut-off current					
	BDX42	I <sub>E</sub> = 0; V <sub>CB</sub> = 60 V	–	–	100	nA
	BDX43	I <sub>E</sub> = 0; V <sub>CB</sub> = 80 V	–	–	100	nA
	BDX44	I <sub>E</sub> = 0; V <sub>CB</sub> = 100 V	–	–	100	nA
I <sub>CES</sub>	collector cut-off current					
	BDX42	V <sub>BE</sub> = 0; V <sub>CE</sub> = 45 V	–	–	50	nA
	BDX43	V <sub>BE</sub> = 0; V <sub>CE</sub> = 60 V	–	–	50	nA
	BDX44	V <sub>BE</sub> = 0; V <sub>CE</sub> = 80 V	–	–	50	nA
I <sub>EBO</sub>	emitter cut-off current	I <sub>C</sub> = 0; V <sub>EB</sub> = 4 V	–	–	50	nA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = 10 V; see Fig. 2 I <sub>C</sub> = 150 mA I <sub>C</sub> = 500 mA	1000 2000	– –	– –	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 500 mA; I <sub>B</sub> = 0.5 mA	–	–	1.3	V
		I <sub>C</sub> = 500 mA; I <sub>B</sub> = 0.5 mA; T <sub>j</sub> = 150 °C	–	–	1.3	V
V <sub>CEsat</sub>	collector-emitter saturation voltage BDX42; BDX44	I <sub>C</sub> = 1 A; I <sub>B</sub> = 4 mA	–	–	1.6	V
		I <sub>C</sub> = 1 A; I <sub>B</sub> = 4 mA; T <sub>j</sub> = 150 °C	–	–	1.6	V
V <sub>CEsat</sub>	collector-emitter saturation voltage BDX43	I <sub>C</sub> = 1 A; I <sub>B</sub> = 1 mA	–	–	1.6	V
		I <sub>C</sub> = 1 A; I <sub>B</sub> = 1 mA; T <sub>j</sub> = 150 °C	–	–	1.8	V
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = 500 mA; I <sub>B</sub> = 0.5 mA	–	–	1.9	V
V <sub>BEsat</sub>	base-emitter saturation voltage BDX42; BDX44	I <sub>C</sub> = 1 A; I <sub>B</sub> = 4 mA	–	–	2.2	V
V <sub>BEsat</sub>	base-emitter saturation voltage BDX43	I <sub>C</sub> = 1 A; I <sub>B</sub> = 1 mA	–	–	2.2	V
f <sub>T</sub>	transition frequency	I <sub>C</sub> = 500 mA; V <sub>CE</sub> = 5 V; f = 100 MHz	–	200	–	MHz
<b>Switching times (between 10% and 90% levels); see Fig.3</b>						
t <sub>on</sub>	turn-on time	I <sub>Con</sub> = 500 mA; I <sub>Bon</sub> = 0.5 mA; I <sub>Boff</sub> = –0.5 mA	–	–	500	ns
t <sub>d</sub>	delay time		–	–	200	ns
t <sub>r</sub>	rise time		–	–	300	ns
t <sub>off</sub>	turn-off time		–	–	1300	ns
t <sub>s</sub>	storage time		–	–	950	ns
t <sub>f</sub>	fall time		–	–	350	ns

NPN Darlington transistors

BDX42; BDX43; BDX44

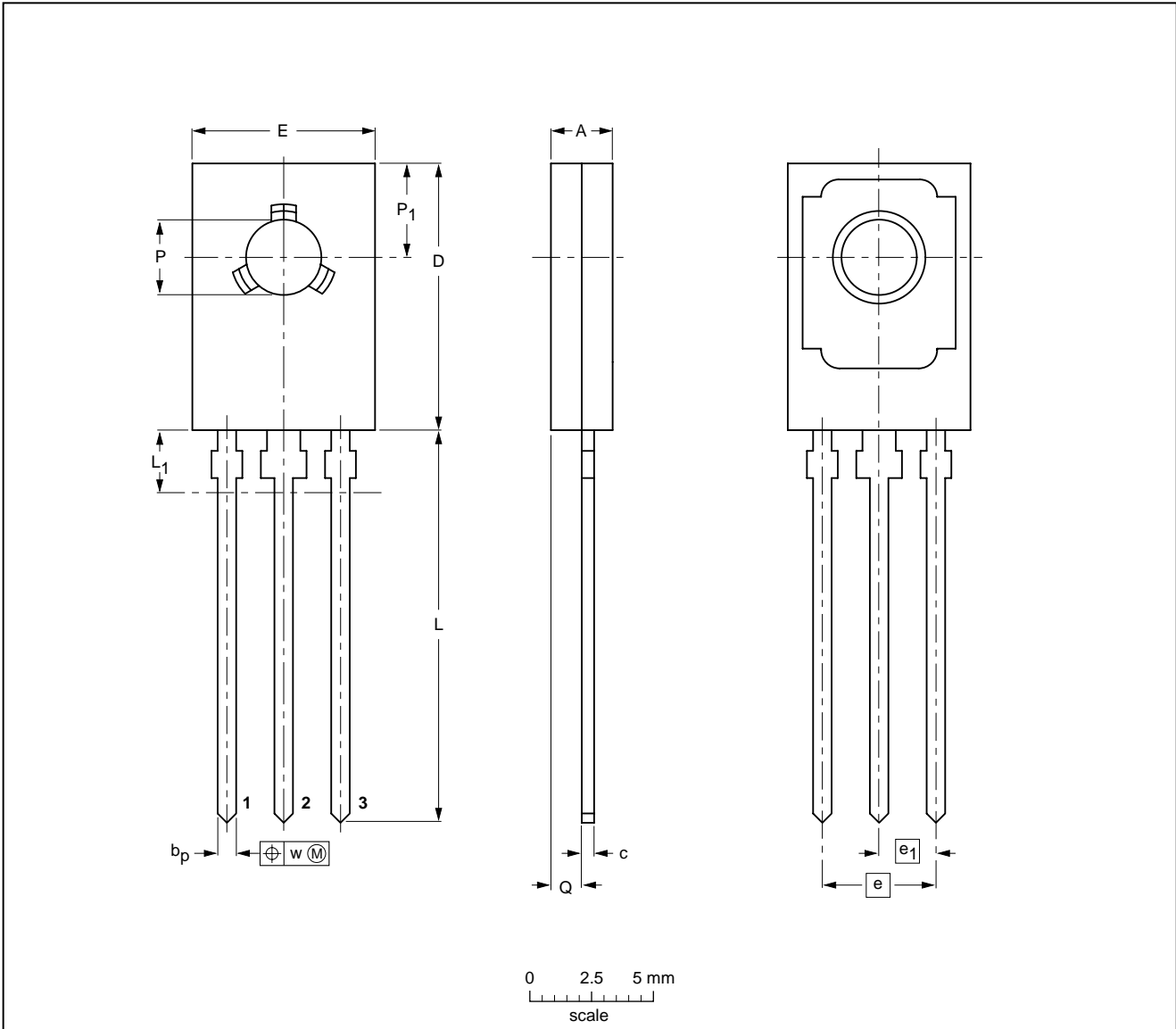


NPN Darlington transistors

BDX42; BDX43; BDX44

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	$b_p$	c	D	E	e	$e_1$	L	$L_1^{(1)}$ max	Q	P	$P_1$	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

## NPN Darlington transistors

## BDX42; BDX43; BDX44

**DEFINITIONS**

<b>Data Sheet Status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
<b>Application information</b>	
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