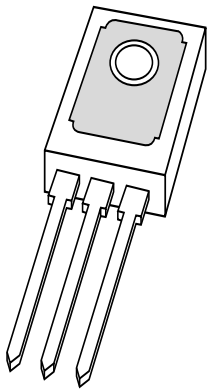
DATA SHEET



BDX42; BDX43; BDX44
NPN Darlington transistors

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

1997 Jul 02

Philips
Semiconductors

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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

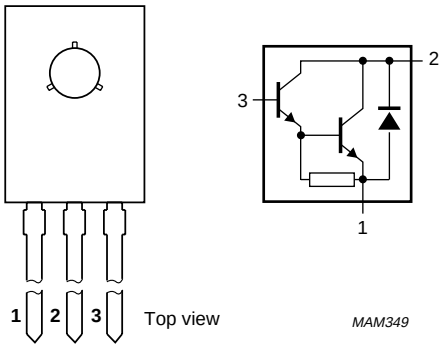


Fig.1 Simplified outline (TO-126; SOT32) and symbol.

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	$T_{amb} \leq 25$ °C	–	–	1.25	W
		$T_{mb} \leq 100$ °C	–	–	5	W
h_{FE}	DC current gain	I_C = 150 mA; V_{CE} = 10 V	1000	–	–	
		I_C = 500 mA; V_{CE} = 10 V	2000	–	–	
f_T	transition frequency	I_C = 500 mA; V_{CE} = 5 V; f = 100 MHz	–	200	–	MHz

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	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
V_{EBO}	emitter-base voltage	open collector	–	5	V
I_C	collector current (DC)		–	1	A
I_{CM}	peak collector current		–	2	A
I_B	base current (DC)		–	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	–	1.25	W
		$T_{mb} \leq 100$ °C	–	5	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C

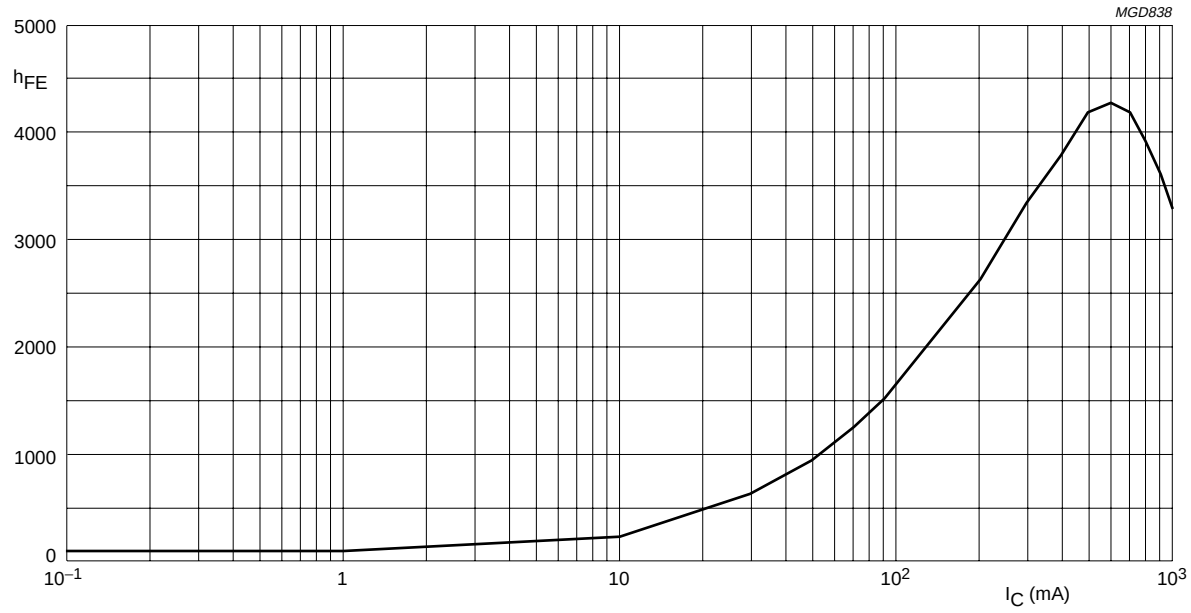
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	in free air	100	K/W
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base		10	K/W

CHARACTERISTICS

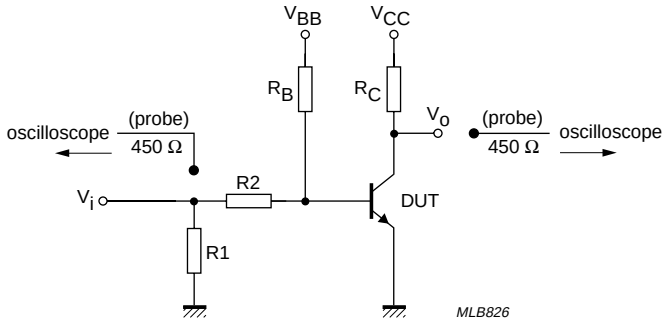
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current					
	BDX42	I_E = 0; V_{CB} = 60 V	–	–	100	nA
	BDX43	I_E = 0; V_{CB} = 80 V	–	–	100	nA
	BDX44	I_E = 0; V_{CB} = 100 V	–	–	100	nA
I_{CES}	collector cut-off current					
	BDX42	V_{BE} = 0; V_{CE} = 45 V	–	–	50	nA
	BDX43	V_{BE} = 0; V_{CE} = 60 V	–	–	50	nA
	BDX44	V_{BE} = 0; V_{CE} = 80 V	–	–	50	nA
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = 4 V	–	–	50	nA
h_{FE}	DC current gain	V_{CE} = 10 V; see Fig. 2				
		I_C = 150 mA	1000	–	–	
		I_C = 500 mA	2000	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = 500 mA; I_B = 0.5 mA	–	–	1.3	V
		I_C = 500 mA; I_B = 0.5 mA; T_j = 150 °C	–	–	1.3	V
V_{CEsat}	collector-emitter saturation voltage					
	BDX42; BDX44	I_C = 1 A; I_B = 4 mA	–	–	1.6	V
		I_C = 1 A; I_B = 4 mA; T_j = 150 °C	–	–	1.6	V
V_{CEsat}	collector-emitter saturation voltage					
	BDX43	I_C = 1 A; I_B = 1 mA	–	–	1.6	V
		I_C = 1 A; I_B = 1 mA; T_j = 150 °C	–	–	1.8	V
V_{BEsat}	base-emitter saturation voltage	I_C = 500 mA; I_B = 0.5 mA	–	–	1.9	V
V_{BEsat}	base-emitter saturation voltage	I_C = 1 A; I_B = 4 mA				
	BDX42; BDX44		–	–	2.2	V
V_{BEsat}	base-emitter saturation voltage	I_C = 1 A; I_B = 1 mA				
	BDX43		–	–	2.2	V
f_T	transition frequency	I_C = 500 mA; V_{CE} = 5 V; f = 100 MHz	–	200	–	MHz
Switching times (between 10% and 90% levels); see Fig.3						
t_{on}	turn-on time	I_{Con} = 500 mA; I_{Bon} = 0.5 mA; I_{Boff} = –0.5 mA	–	–	500	ns
t_d	delay time		–	–	200	ns
t_r	rise time		–	–	300	ns
t_{off}	turn-off time		–	–	1300	ns
t_s	storage time		–	–	950	ns
t_f	fall time		–	–	350	ns



V_{CE} = 10 V.

Fig.2 DC current gain; typical values.

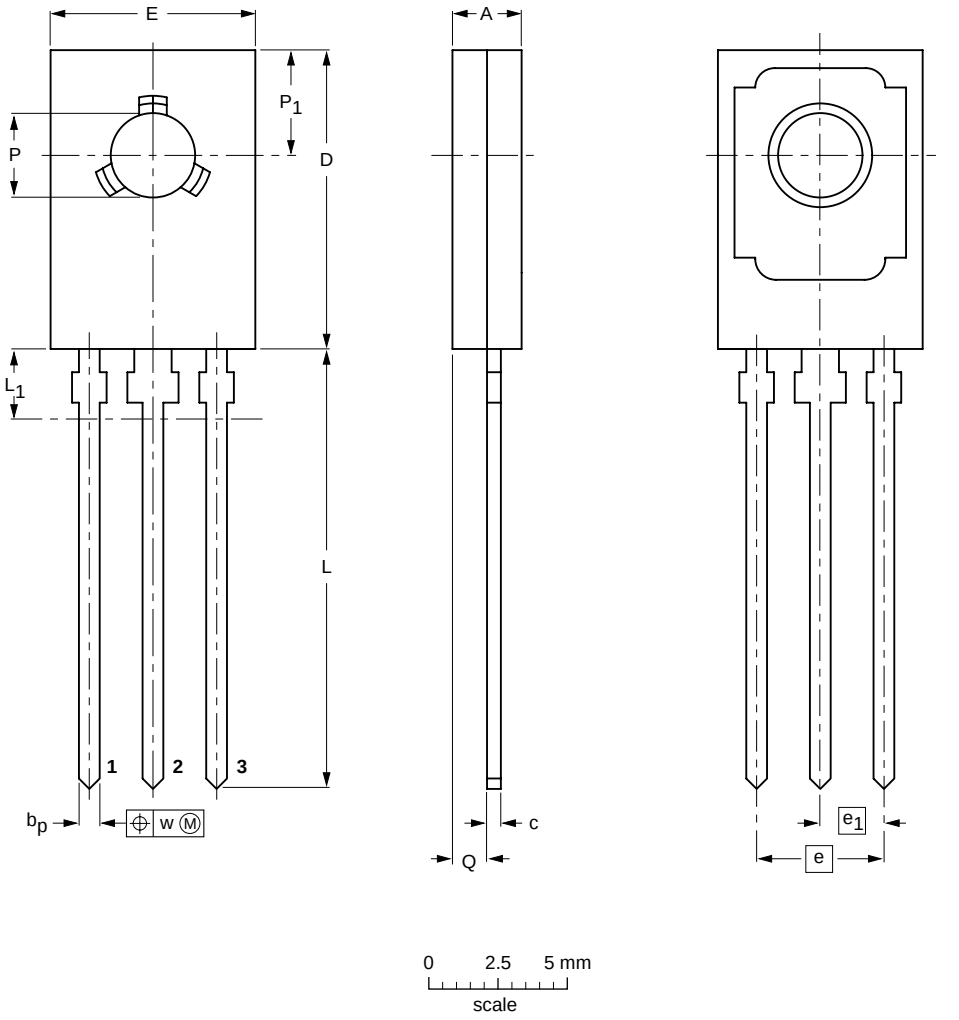


V_i = 10 V; T = 200 µs; t_p = 6 µs; $t_r = t_f \leq 3$ ns.
R1 = 56 Ω; R2 = 10 kΩ; R_B = 10 kΩ; R_C = 18 Ω.
V_{BB} = −1.8 V; V_{CC} = 10.7 V.
Oscilloscope input impedance Z_i = 50 Ω.

Fig.3 Test circuit for switching times.

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

DEFINITIONS

Data Sheet Status	
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.
Limiting values	
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.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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Printed in The Netherlands 117047/00/02/pp8 Date of release: 1997 Jul 02 Document order number: 9397 750 02575

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