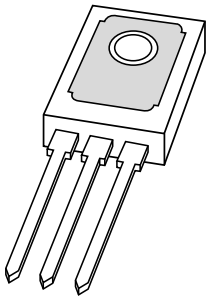
DATA SHEET



BDX35; BDX36; BDX37
NPN switching transistors

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

1997 Apr 16

Philips
Semiconductors

PHILIPS

NPN switching transistors BDX35; BDX36; BDX37

FEATURES

- High current (max. 5 A)
- Low voltage (max. 75 V).

APPLICATIONS

- High-current switching in power applications.

DESCRIPTION

NPN switching transistor in a TO-126; SOT32 plastic package.

PINNING

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

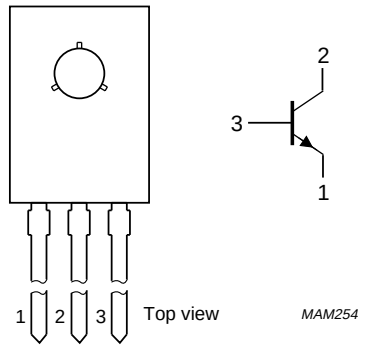


Fig.1 Simplified outline (TO-126; SOT32) and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter				
	BDX35		–	–	100	V
	BDX36; BDX37		–	–	120	V
V_{CEO}	collector-emitter voltage	open base				
	BDX35; BDX36		–	–	60	V
	BDX37		–	–	75	V
I_C	collector current (DC)		–	–	5	A
P_{tot}	total power dissipation	$T_{mb} \leq 75$ °C	–	–	15	W
h_{FE}	DC current gain	$I_C = 0.5$ A; $V_{CE} = 10$ V	45	–	450	
f_T	transition frequency	$I_C = 0.5$ A; $V_{CE} = 5$ V; f = 100 MHz	–	100	–	MHz
t_{off}	turn-off time	$I_{Con} = 5$ A; $I_{Bon} = 0.5$ A; $I_{Boff} = -0.5$ A	–	350	500	ns

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			
	BDX35		–	100	V
	BDX36; BDX37		–	120	V
V_{CEO}	collector-emitter voltage	open base			
	BDX35; BDX36		–	60	V
	BDX37		–	75	V
V_{EBO}	emitter-base voltage	open collector	–	5	V
I_C	collector current (DC)		–	5	A
I_{CM}	peak collector current		–	10	A
I_{BM}	peak base current		–	2	A
P_{tot}	total power dissipation	$T_{mb} \leq 75$ °C	–	15	W
		$T_{amb} \leq 25$ °C	–	1.25	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C

THERMAL CHARACTERISTICS

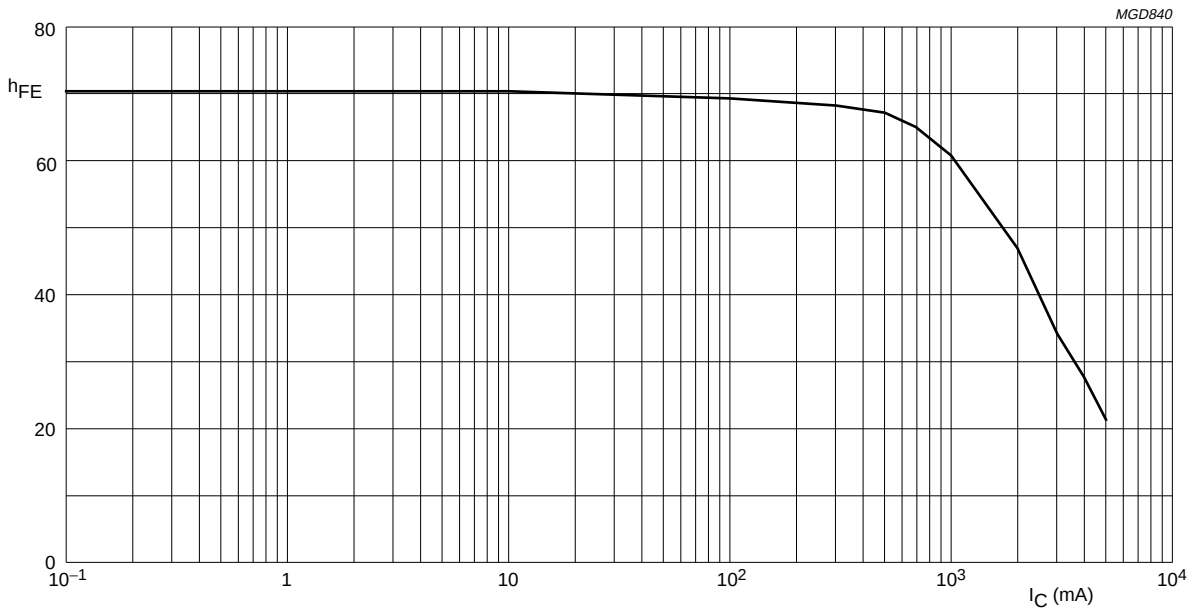
SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	in free air	100	K/W
$R_{th\ j\text{-}mb}$	thermal resistance from junction to mounting base		5	K/W

CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current					
	BDX35	$I_E = 0$; $V_{CB} = 80$ V	–	–	100	nA
		$I_E = 0$; $V_{CB} = 80$ V; $T_j = 100$ °C	–	–	10	µA
I_{CBO}	collector cut-off current					
	BDX36; BDX37	$I_E = 0$; $V_{CB} = 100$ V	–	–	100	nA
		$I_E = 0$; $V_{CB} = 100$ V; $T_j = 100$ °C	–	–	10	µA
I_{EBO}	emitter cut-off current	$I_C = 0$; $V_{EB} = 5$ V	–	–	100	nA
h_{FE}	DC current gain	$I_C = 0.5$ A; $V_{CE} = 10$ V; see Fig.2				
	BDX35; BDX36		45	130	450	
	BDX37		45	80	450	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 5$ A; $I_B = 0.5$ A	–	–	900	mV
V_{CEsat}	collector-emitter saturation voltage					
	BDX35; BDX37	$I_C = 7$ A; $I_B = 0.7$ A	–	–	1.2	V
	BDX36	$I_C = 10$ A; $I_B = 1$ A	–	–	2	V

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{BEsat}	base-emitter saturation voltage	I_C = 5 A; I_B = 0.5 A	–	–	1.7	V
V_{BEsat}	base-emitter saturation voltage					
	BDX35; BDX37	I_C = 7 A; I_B = 0.7 A	–	–	2	V
	BDX36	I_C = 10 A; I_B = 1 A	–	–	2.5	V
C_c	collector capacitance	$I_E = i_e$ = 0; V_{CB} = 10 V; f = 1 MHz	–	40	60	pF
f_T	transition frequency	I_C = 0.5 A; V_{CE} = 5 V; f = 100 MHz	–	100	–	MHz
Switching times (between 10% and 90% levels)						
t_{on}	turn-on time	I_{Con} = 1 A; I_{Bon} = 0.1 A; I_{Boff} = –0.1 A	–	60	100	ns
		I_{Con} = 2 A; I_{Bon} = 0.2 A; I_{Boff} = –0.2 A	–	–	80	ns
		I_{Con} = 5 A; I_{Bon} = 0.5 A; I_{Boff} = –0.5 A	–	180	300	ns
t_{off}	turn-off time	I_{Con} = 1 A; I_{Bon} = 0.1 A; I_{Boff} = –0.1 A	–	600	800	ns
		I_{Con} = 2 A; I_{Bon} = 0.2 A; I_{Boff} = –0.2 A	–	450	700	ns
		I_{Con} = 5 A; I_{Bon} = 0.5 A; I_{Boff} = –0.5 A	–	350	500	ns

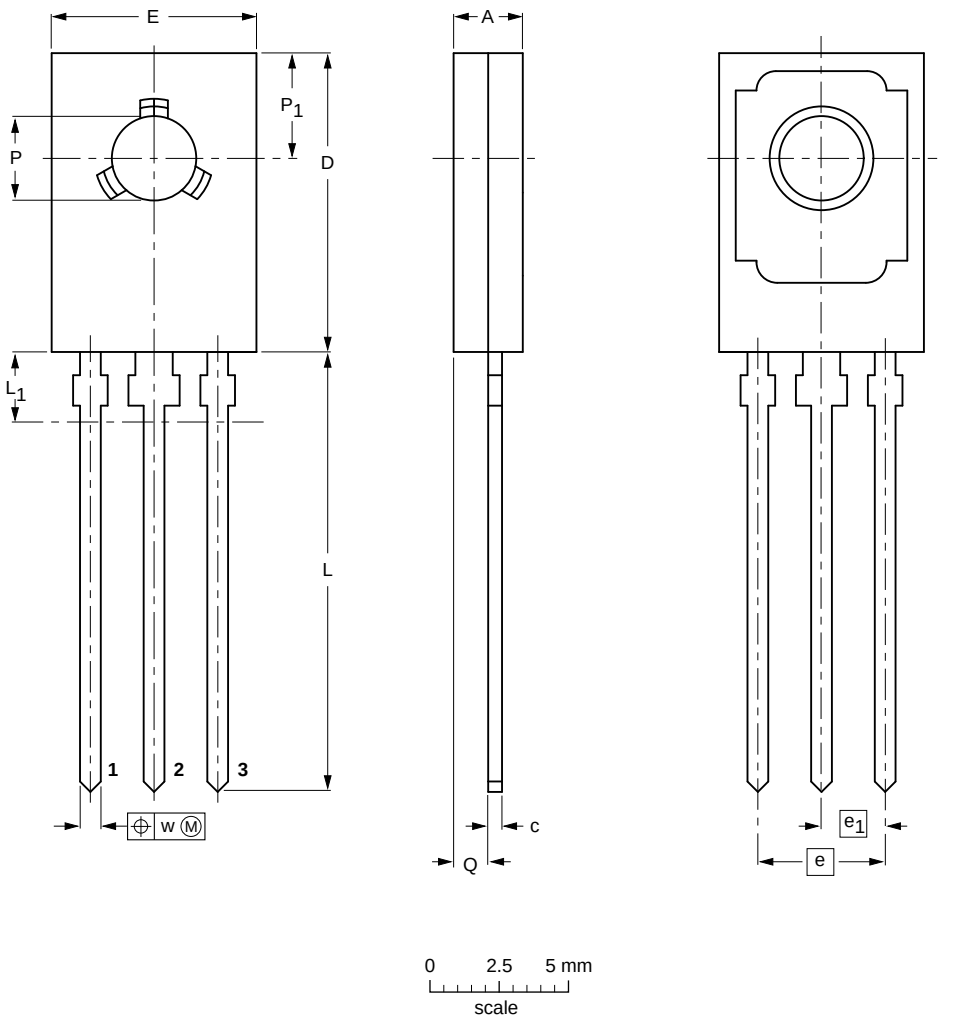


V_{CE} = 1 V.

Fig.2 DC current gain; typical values.

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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These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

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