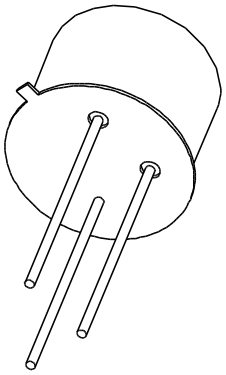
DATA SHEET



BFX85
NPN switching transistor

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

1997 Apr 22

Philips
Semiconductors

PHILIPS

NPN switching transistor BFX85

FEATURES

- High current (max. 1 A)
- Low voltage (max. 60 V).

APPLICATIONS

- General purpose switching and amplification
- Industrial applications.

DESCRIPTION

NPN transistor in a TO-39 metal package.

PINNING

PIN	DESCRIPTION
1	emitter
2	base
3	collector, connected to case

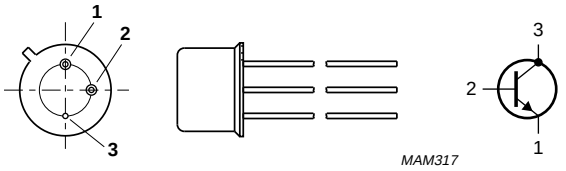


Fig.1 Simplified outline (TO-39) and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–	100	V
V_{CEO}	collector-emitter voltage	open base	–	–	60	V
I_C	collector current (DC)		–	–	1	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	–	–	800	mW
		$T_{case} \leq 100$ °C	–	–	2.86	W
h_{FE}	DC current gain	I_C = 150 mA; V_{CE} = 10 V	70	142	–	
f_T	transition frequency	I_C = 50 mA; V_{CE} = 10 V; f = 100 MHz	50	–	–	MHz
t_{off}	turn-off time	I_{Con} = 150 mA; I_{Bon} = 15 mA; I_{Boff} = –15 mA	–	360	–	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	–	100	V
V_{CEO}	collector-emitter voltage	open base	–	60	V
V_{EBO}	emitter-base voltage	open collector	–	6	V
I_C	collector current (DC)		–	1	A
I_{CM}	peak collector current		–	1	A
I_{BM}	peak base current		–	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	–	800	mW
		$T_{case} \leq 25$ °C	–	5	W
		25° C $\leq T_{case} \leq 100$ °C	–	2.86	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	175	°C
T_{amb}	operating ambient temperature		–65	+150	°C

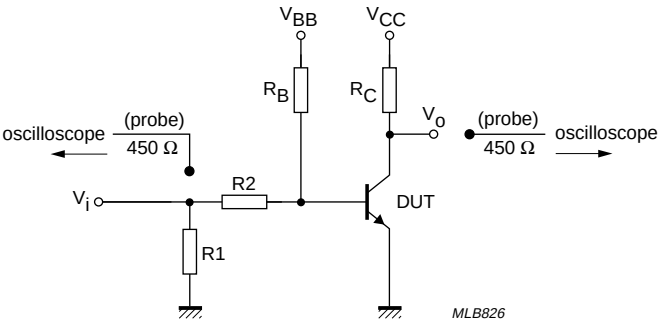
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	in free air	200	K/W
$R_{th\ j\text{-}c}$	thermal resistance from junction to case		35	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	I_E = 0; V_{CB} = 80 V	–	2	50	nA
		I_E = 0; V_{CB} = 80 V; T_j = 100 °C	–	0.1	2.5	μA
		I_E = 0; V_{CB} = 100 V	–	10	500	nA
		I_E = 0; V_{CB} = 100 V; T_j = 100 °C	–	0.5	30	μA
I_{EBO}	emitter cut-off current	I_C = 0; V_{EB} = 5 V	–	2	50	nA
		I_C = 0; V_{EB} = 5 V; T_j = 100 °C	–	0.1	2.5	μA
		I_C = 0; V_{EB} = 6 V	–	10	500	nA
h_{FE}	DC current gain	I_C = 10 mA; V_{CE} = 10 V	50	90	–	
		I_C = 150 mA; V_{CE} = 10 V	70	142	–	
		I_C = 500 mA; V_{CE} = 10 V	30	90	–	
		I_C = 1 A; V_{CE} = 10 V	15	50	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 1 mA	–	150	200	mV
		I_C = 150 mA; I_B = 15 mA	–	150	350	mV
		I_C = 500 mA; I_B = 50 mA	–	0.35	1	V
		I_C = 1 A; I_B = 100 mA	–	0.66	1.6	V
V_{BEsat}	base-emitter saturation voltage	I_C = 10 mA; I_B = 1 mA	–	0.69	1.2	V
		I_C = 150 mA; I_B = 15 mA	–	0.92	1.3	V
		I_C = 500 mA; I_B = 50 mA	–	1.15	1.5	V
		I_C = 1 A; I_B = 100 mA	–	1.4	2	V
C_c	collector capacitance	I_E = i_e = 0; V_{CB} = 10 V; f = 1 MHz	–	7	12	pF
f_T	transition frequency	I_C = 50 mA; V_{CE} = 10 V; f = 100 MHz	50	185	–	MHz
Switching Times (between 10% and 90% levels) see Fig.2						
t_{on}	turn-on time	I_{Con} = 150 mA; I_{Bon} = 15 mA; I_{Boff} = –15 mA	–	55	–	ns
t_d	delay time		–	15	–	ns
t_r	rise time		–	40	–	ns
t_{off}	turn-off time		–	360	–	ns
t_s	storage time		–	300	–	ns
t_f	fall time		–	60	–	ns

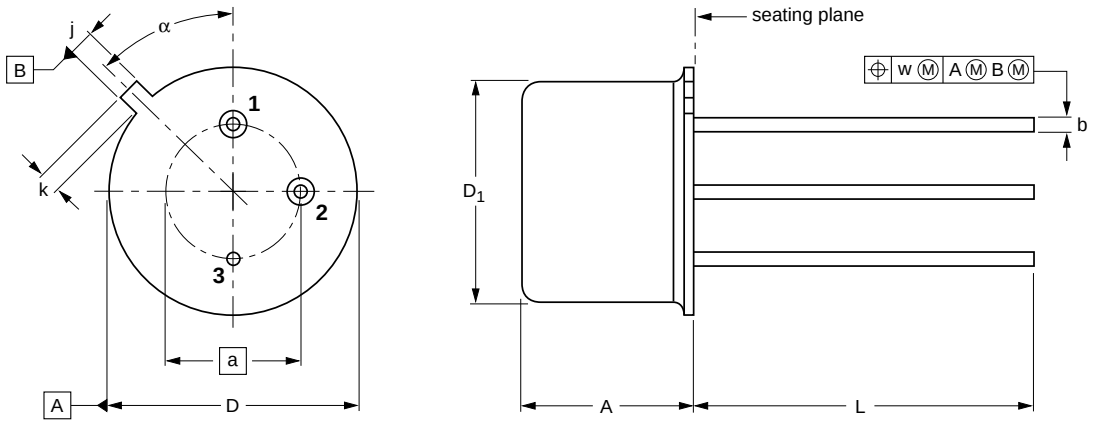


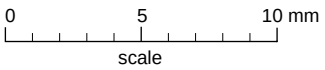
V_i = 9.5 V; T = 500 µs; t_p = 10 µs; $t_r = t_f \leq 3$ ns.
R1 = 68 Ω; R2 = 325 Ω; R_B = 325 Ω; R_C = 160 Ω.
V_{BB} = −3.5 V; V_{CC} = 29.5 V.
Oscilloscope: input impedance Z_i = 50 Ω.

Fig.2 Test circuit for switching times.

PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads **SOT5/11**





DIMENSIONS (mm are the original dimensions)

UNIT	A	a	b	D	D_1	j	k	L	w	α
mm	6.60 6.35	5.08	0.48 0.41	9.39 9.08	8.33 8.18	0.85 0.75	0.95 0.75	14.2 12.7	0.2	45°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT5/11		TO-39				97-04-11

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.	

LIFE SUPPORT APPLICATIONS

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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