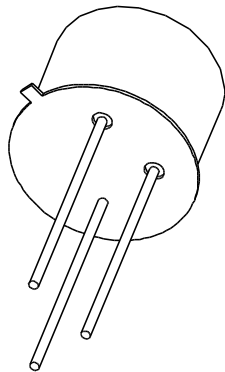


# DATA SHEET



## **BFX85** NPN switching transistor

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

1997 Apr 22

## 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

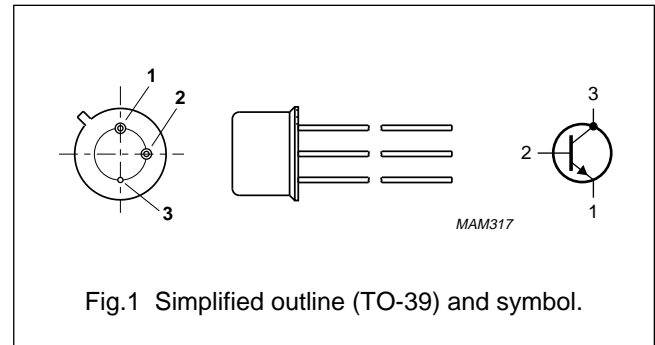


Fig.1 Simplified outline (TO-39) and symbol.

## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CB0}$	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	$T_{amb} \leq 25\text{ °C}$	–	–	800	mW
		$T_{case} \leq 100\text{ °C}$	–	–	2.86	W
$h_{FE}$	DC current gain	$I_C = 150\text{ mA}; V_{CE} = 10\text{ V}$	70	142	–	
$f_T$	transition frequency	$I_C = 50\text{ mA}; V_{CE} = 10\text{ V}; f = 100\text{ MHz}$	50	–	–	MHz
$t_{off}$	turn-off time	$I_{Con} = 150\text{ mA}; I_{Bon} = 15\text{ mA}; I_{Boff} = -15\text{ mA}$	–	360	–	ns

## NPN switching transistor

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**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	$T_{amb} \leq 25\text{ °C}$	–	800	mW
		$T_{case} \leq 25\text{ °C}$	–	5	W
		$25\text{ °C} \leq T_{case} \leq 100\text{ °C}$	–	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
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air	200	K/W
$R_{th\ j-c}$	thermal resistance from junction to case		35	K/W

## NPN switching transistor

## BFX85

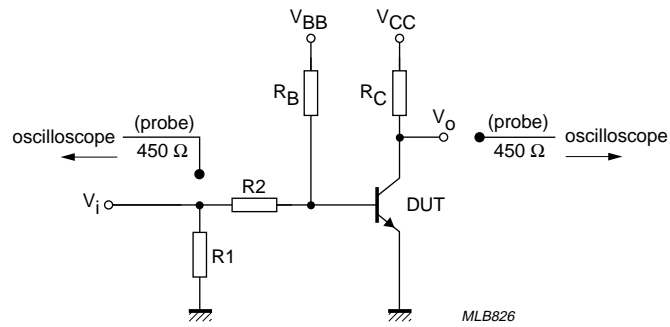
## CHARACTERISTICS

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

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

## NPN switching transistor

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$V_i = 9.5 \text{ V}$ ;  $T = 500 \mu\text{s}$ ;  $t_p = 10 \mu\text{s}$ ;  $t_r = t_f \leq 3 \text{ ns}$ .  
 $R_1 = 68 \Omega$ ;  $R_2 = 325 \Omega$ ;  $R_B = 325 \Omega$ ;  $R_C = 160 \Omega$ .  
 $V_{BB} = -3.5 \text{ V}$ ;  $V_{CC} = 29.5 \text{ V}$ .  
 Oscilloscope: input impedance  $Z_i = 50 \Omega$ .

Fig.2 Test circuit for switching times.

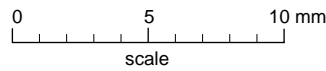
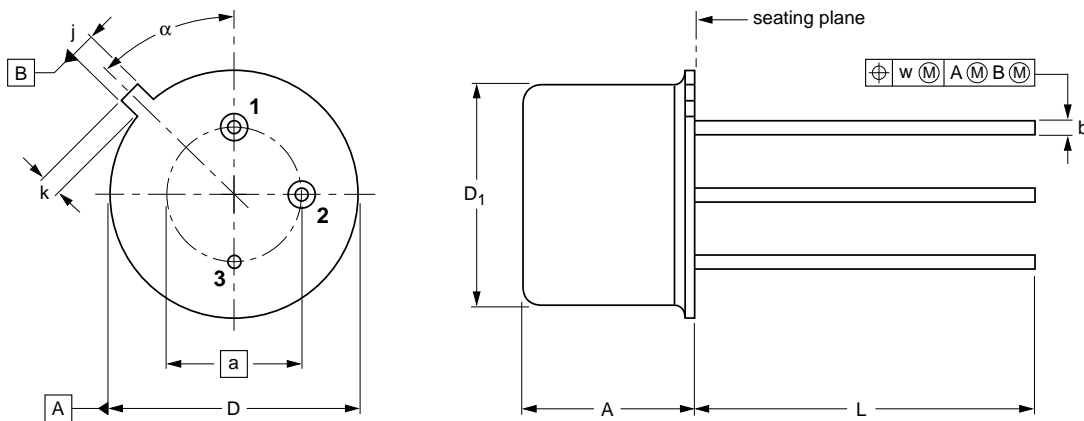
NPN switching transistor

BFX85

PACKAGE OUTLINE

Metal-can cylindrical single-ended package; 3 leads

SOT5/11



DIMENSIONS (mm are the original dimensions)

UNIT	A	a	b	D	D <sub>1</sub>	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

## NPN switching transistor

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**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>	
Where application information is given, it is advisory and does not form part of the specification.	

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