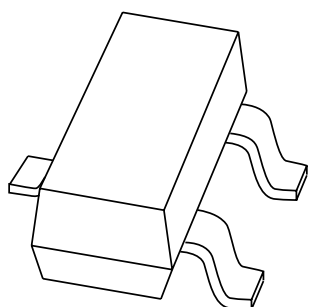


# DATA SHEET



## **BC846; BC847; BC848** NPN general purpose transistors

Product specification  
Supersedes data of 1999 Apr 23

2002 Feb 04

## NPN general purpose transistors

## BC846; BC847; BC848

## FEATURES

- Low current (max. 100 mA)
- Low voltage (max. 65 V).

## APPLICATIONS

- General purpose switching and amplification.

## DESCRIPTION

NPN transistor in a SOT23 plastic package.

PNP complements: BC856, BC857 and BC858.

## MARKING

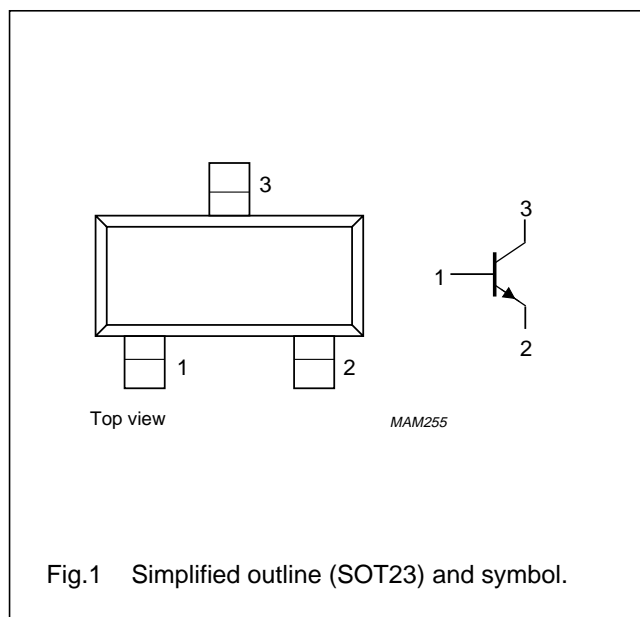
TYPE NUMBER	MARKING CODE <sup>(1)</sup>
BC846	1D*
BC846A	1A*
BC846B	1B*
BC847	1H*
BC847A	1E*
BC847B	1F*
BC847C	1G*
BC848B	1K*

## Note

- \* = p: made in Hong Kong.  
\* = t: made in Malaysia.

## PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



## NPN general purpose transistors

## BC846; BC847; BC848

**LIMITING VALUES**

In accordance with the Absolute Maximum System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter			
	BC846		–	80	V
	BC847		–	50	V
	BC848		–	30	V
$V_{CEO}$	collector-emitter voltage	open base			
	BC846		–	65	V
	BC847		–	45	V
	BC848		–	30	V
$V_{EBO}$	emitter-base voltage	open collector			
	BC846; BC847		–	6	V
	BC848		–	5	V
$I_C$	collector current (DC)		–	100	mA
$I_{CM}$	peak collector current		–	200	mA
$I_{BM}$	peak base current		–	200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$ ; note 1	–	250	mW
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	junction temperature		–	150	°C
$T_{amb}$	operating ambient temperature		–65	+150	°C

**Note**

1. Transistor mounted on an FR4 printed-circuit board, standard footprint.

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air; note 1	500	K/W

**Note**

1. Transistor mounted on an FR4 printed-circuit board, standard footprint.

## NPN general purpose transistors

## BC846; BC847; BC848

## CHARACTERISTICS

$T_{amb} = 25\text{ °C}$ ; unless otherwise specified.

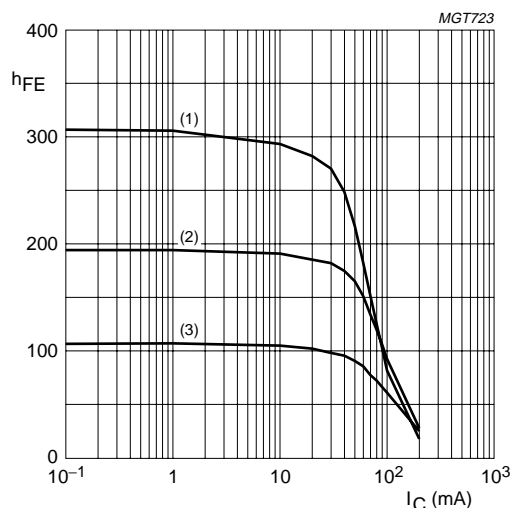
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 30\text{ V}; I_E = 0$	–	–	15	nA
		$V_{CB} = 30\text{ V}; I_E = 0$ ; $T_J = 150\text{ °C}$	–	–	5	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0$	–	–	100	nA
$h_{FE}$	DC current gain	$I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$				
	BC846A; BC847A		–	90	–	
	BC846B; BC847B; BC848B		–	150	–	
	BC847C		–	270	–	
	DC current gain	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$				
	BC846		110	–	450	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$	–	90	250	mV
		$I_C = 100\text{ mA}; I_B = 5\text{ mA}$ ; note 1	–	200	600	mV
		$I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$	–	700	–	mV
		$I_C = 100\text{ mA}; I_B = 5\text{ mA}$ ; note 1	–	900	–	mV
		$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$	580	660	700	mV
$V_{BE}$	base-emitter voltage	$I_C = 10\text{ mA}; V_{CE} = 5\text{ V}$	–	–	770	mV
		$I_C = 10\text{ mA}; V_{CE} = 5\text{ V}$	–	–	770	mV
$C_c$	collector capacitance	$V_{CB} = 10\text{ V}; I_E = I_e = 0$ ; $f = 1\text{ MHz}$	–	2.5	–	pF
$f_T$	transition frequency	$V_{CE} = 5\text{ V}; I_C = 10\text{ mA}$ ; $f = 100\text{ MHz}$	100	–	–	MHz
F	noise figure	$I_C = 200\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$ ; $R_S = 2\text{ k}\Omega; f = 1\text{ kHz}$ ; $B = 200\text{ Hz}$	–	2	10	dB

## Note

1. Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

## NPN general purpose transistors

## BC846; BC847; BC848



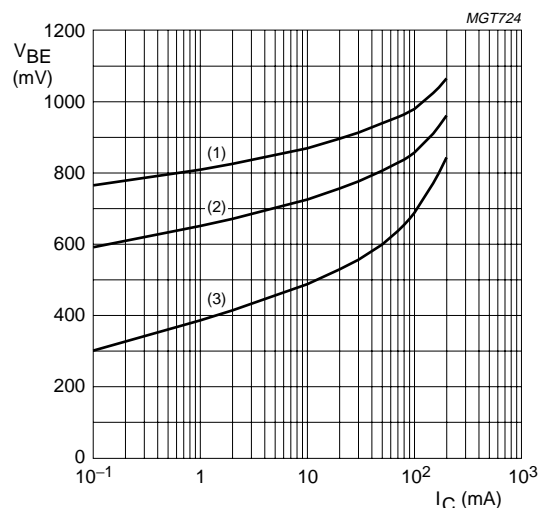
BC846A;  $V_{CE} = 5\text{ V}$ .

(1)  $T_{amb} = 150^\circ\text{C}$ .

(2)  $T_{amb} = 25^\circ\text{C}$ .

(3)  $T_{amb} = -55^\circ\text{C}$ .

Fig.2 DC current gain as a function of collector current; typical values.



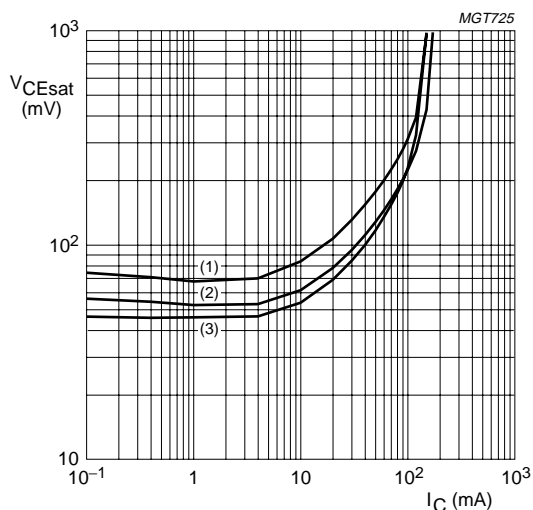
BC846A;  $V_{CE} = 5\text{ V}$ .

(1)  $T_{amb} = -55^\circ\text{C}$ .

(2)  $T_{amb} = 25^\circ\text{C}$ .

(3)  $T_{amb} = 150^\circ\text{C}$ .

Fig.3 Base-emitter voltage as a function of collector current; typical values.



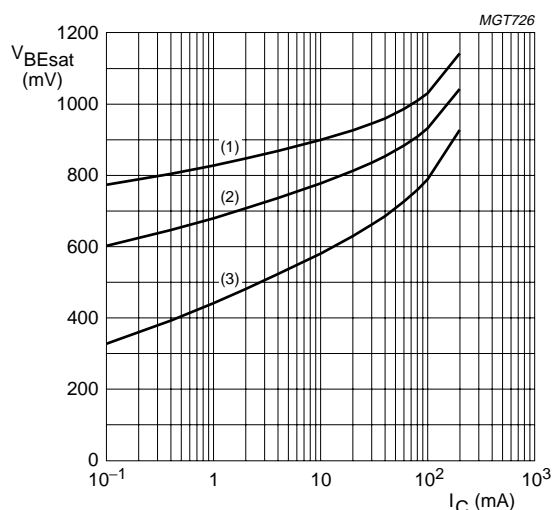
BC846A;  $I_C/I_B = 20$ .

(1)  $T_{amb} = 150^\circ\text{C}$ .

(2)  $T_{amb} = 25^\circ\text{C}$ .

(3)  $T_{amb} = -55^\circ\text{C}$ .

Fig.4 Collector-emitter saturation voltage as a function of collector current; typical values.



BC846A;  $I_C/I_B = 10$ .

(1)  $T_{amb} = -55^\circ\text{C}$ .

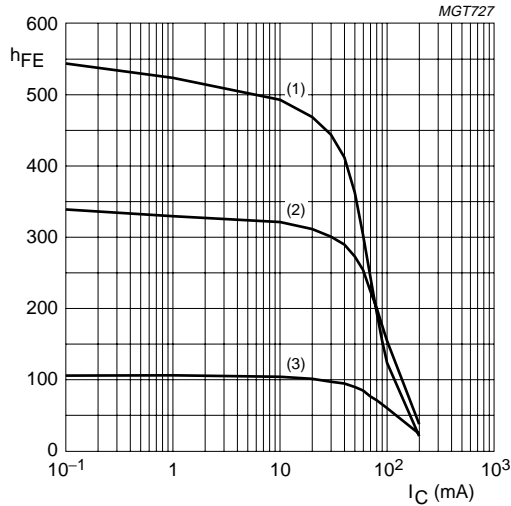
(2)  $T_{amb} = 25^\circ\text{C}$ .

(3)  $T_{amb} = 150^\circ\text{C}$ .

Fig.5 Base-emitter saturation voltage as a function of collector current; typical values.

## NPN general purpose transistors

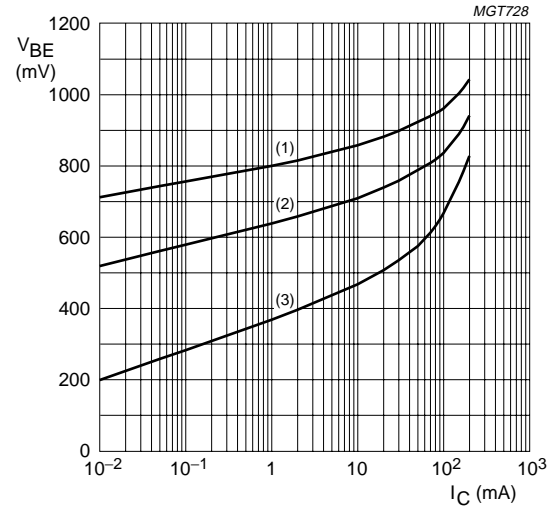
## BC846; BC847; BC848



**BC847B**;  $V_{CE} = 5\text{ V}$ .

- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$ .

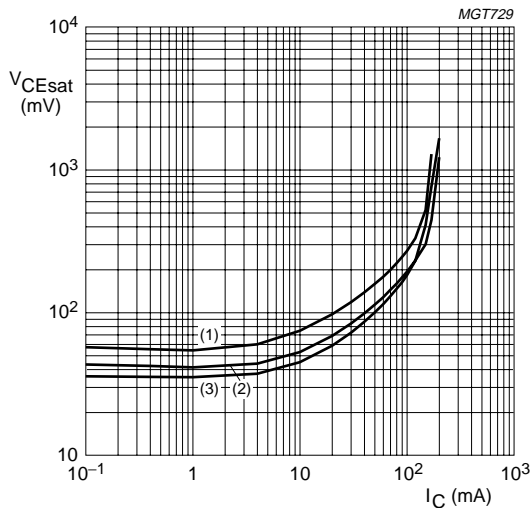
Fig.6 DC current gain as a function of collector current; typical values.



**BC847B**;  $V_{CE} = 5\text{ V}$ .

- (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$ .

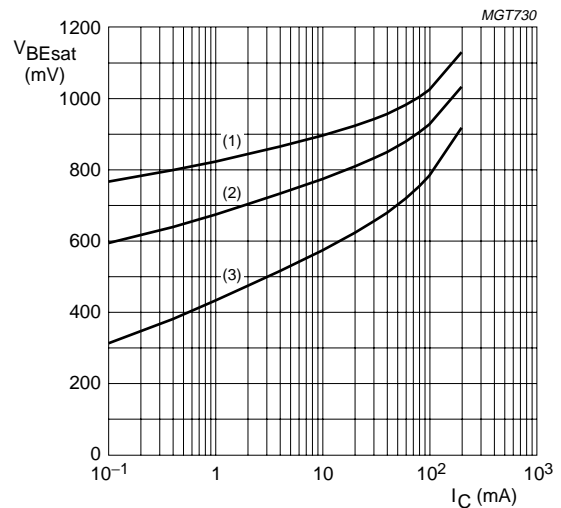
Fig.7 Base-emitter voltage as a function of collector current; typical values.



**BC847B**;  $I_C/I_B = 20$ .

- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$ .

Fig.8 Collector-emitter saturation voltage as a function of collector current; typical values.



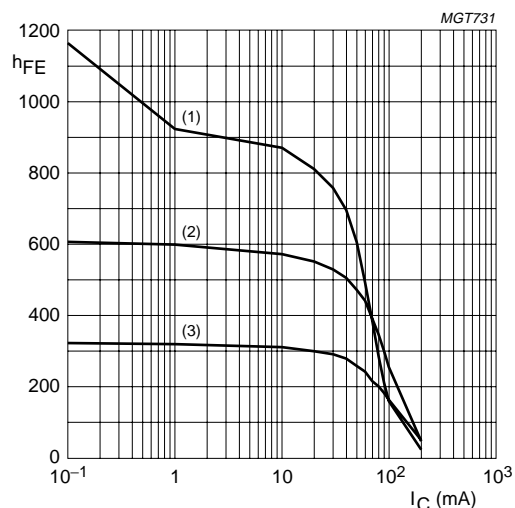
**BC847B**;  $I_C/I_B = 10$ .

- (1)  $T_{amb} = -55\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = 150\text{ }^{\circ}\text{C}$ .

Fig.9 Base-emitter saturation voltage as a function of collector current; typical values.

## NPN general purpose transistors

## BC846; BC847; BC848



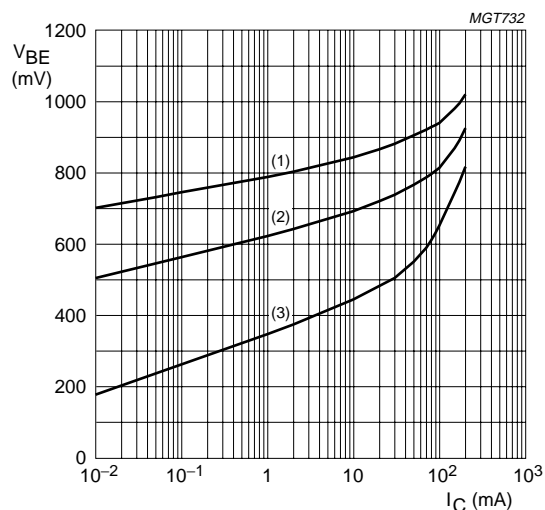
BC847C;  $V_{CE} = 5\text{ V}$ .

(1)  $T_{amb} = 150^\circ\text{C}$ .

(2)  $T_{amb} = 25^\circ\text{C}$ .

(3)  $T_{amb} = -55^\circ\text{C}$ .

Fig.10 DC current gain as a function of collector current; typical values.



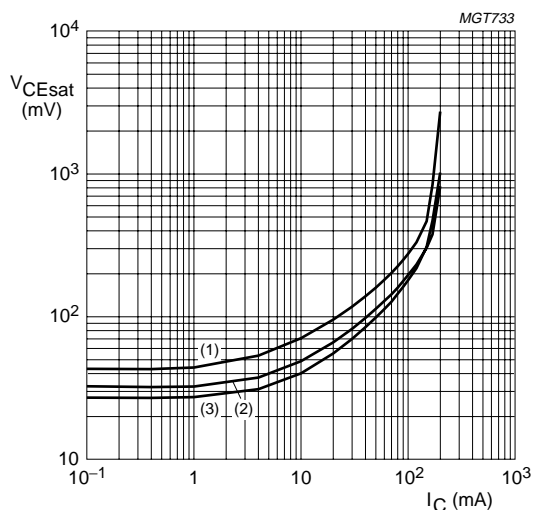
BC847C;  $V_{CE} = 5\text{ V}$ .

(1)  $T_{amb} = -55^\circ\text{C}$ .

(2)  $T_{amb} = 25^\circ\text{C}$ .

(3)  $T_{amb} = 150^\circ\text{C}$ .

Fig.11 Base-emitter voltage as a function of collector current; typical values.



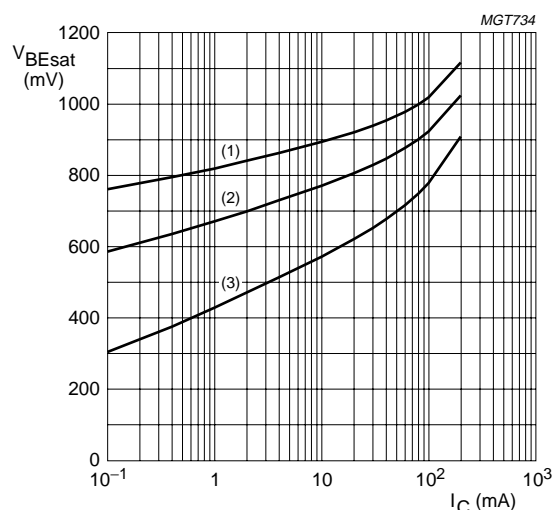
BC847C;  $I_C/I_B = 20$ .

(1)  $T_{amb} = 150^\circ\text{C}$ .

(2)  $T_{amb} = 25^\circ\text{C}$ .

(3)  $T_{amb} = -55^\circ\text{C}$ .

Fig.12 Collector-emitter saturation voltage as a function of collector current; typical values.



BC847C;  $I_C/I_B = 10$ .

(1)  $T_{amb} = -55^\circ\text{C}$ .

(2)  $T_{amb} = 25^\circ\text{C}$ .

(3)  $T_{amb} = 150^\circ\text{C}$ .

Fig.13 Base-emitter saturation voltage as a function of collector current; typical values.

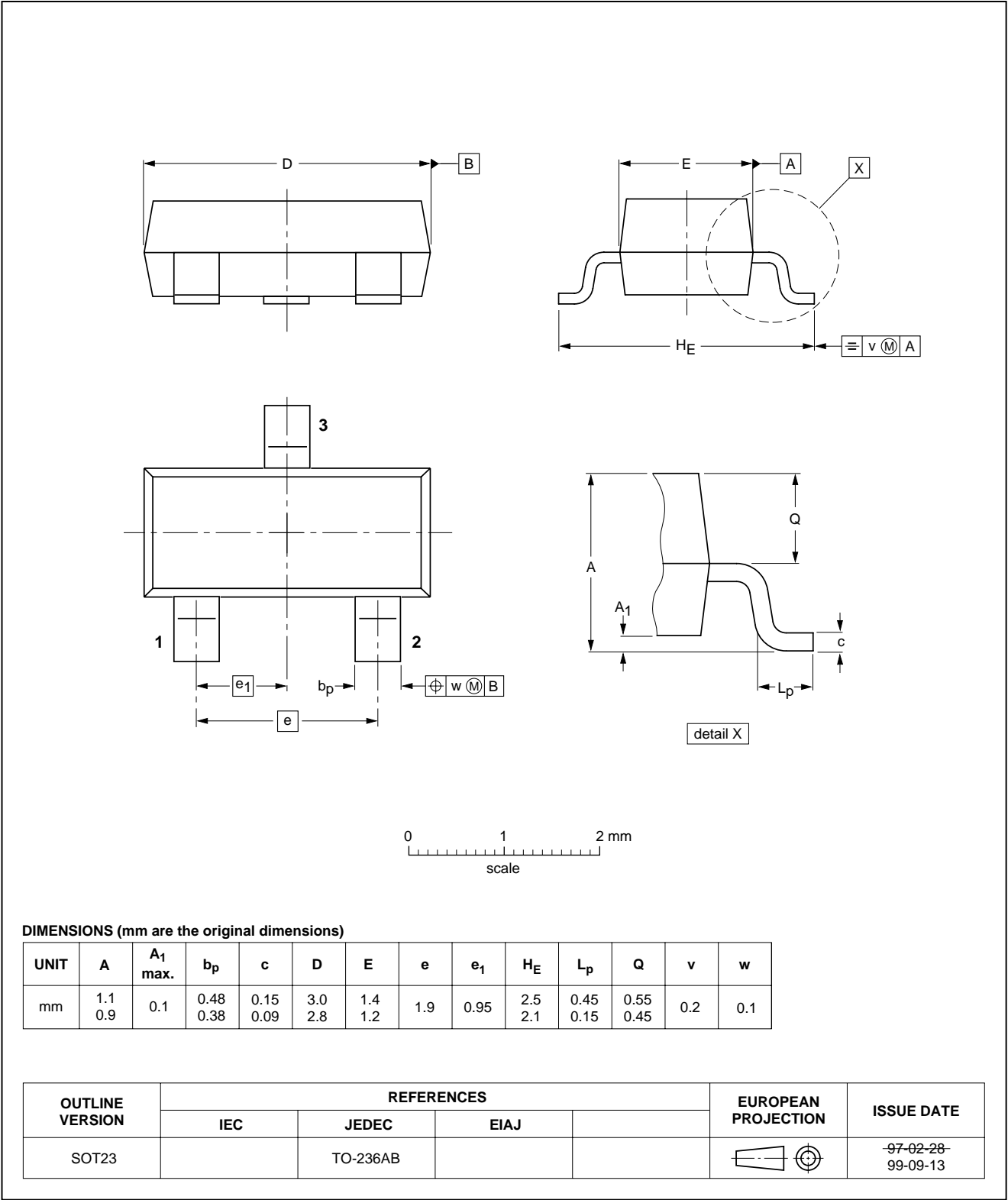
NPN general purpose transistors

BC846; BC847; BC848

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23





## NPN general purpose transistors

## BC846; BC847; BC848

## DATA SHEET STATUS

DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	DEFINITIONS
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NPN general purpose transistors

BC846; BC847; BC848

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**NOTES**

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**NOTES**

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Printed in The Netherlands

613514/04/pp12

Date of release: 2002 Feb 04

Document order number: 9397 750 09165

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