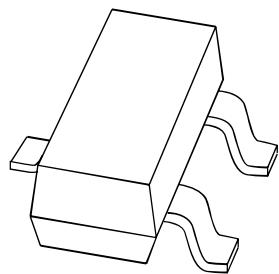


# DATA SHEET



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

Product specification  
Supersedes data of 2002 Feb 04

2004 Feb 06

## 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

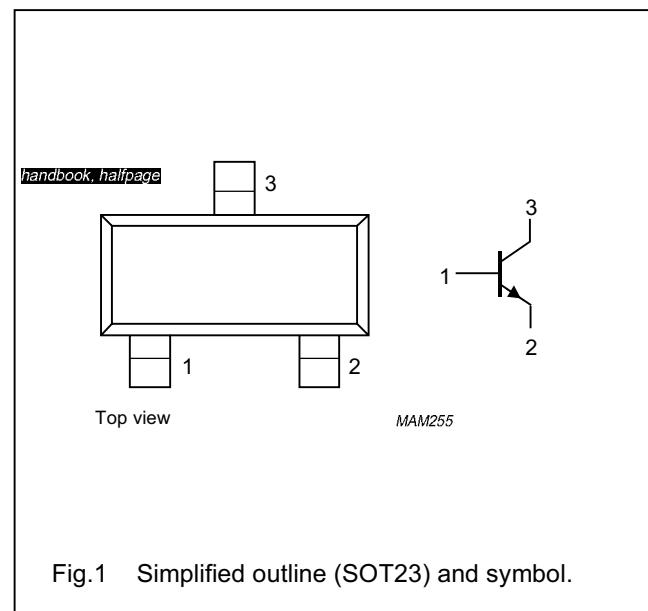
1. \* = p: made in Hong Kong.
- \* = t: made in Malaysia.
- \* = W: made in China.

## ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
BC846	-	plastic surface mounted package; 3 leads	SOT23
BC846A			
BC846B			
BC847			
BC847A			
BC847B			
BC847C			
BC848B			

## 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 BC846	open emitter	–	80	V
	BC847			50	V
	BC848			30	V
$V_{CEO}$	collector-emitter voltage BC846	open base	–	65	V
	BC847			45	V
	BC848			30	V
$V_{EBO}$	emitter-base voltage BC846; BC847	open collector	–	6	V
	BC848			5	V
	$I_C$			100	mA
$I_{CM}$	peak collector current		–	200	mA
$I_{BM}$	peak base current		–	200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25^\circ\text{C}$ ; 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

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

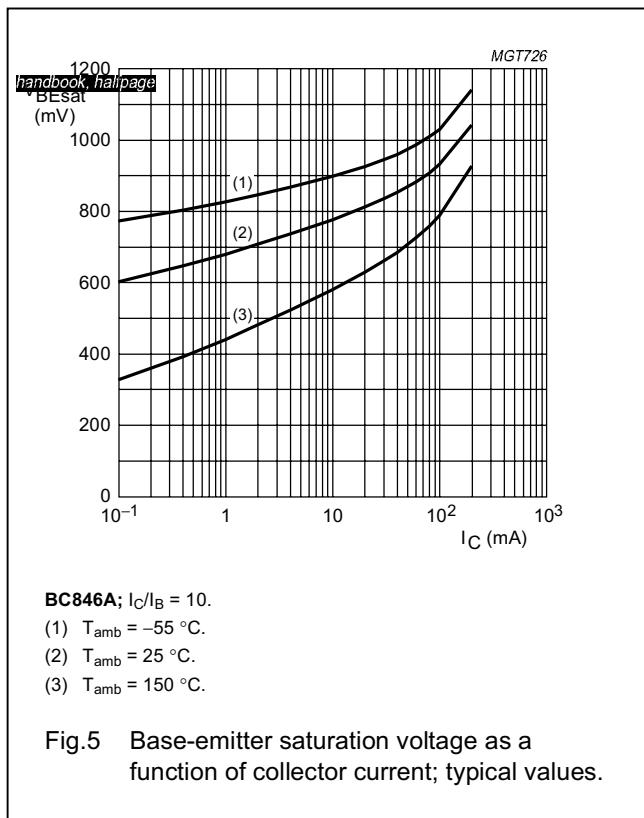
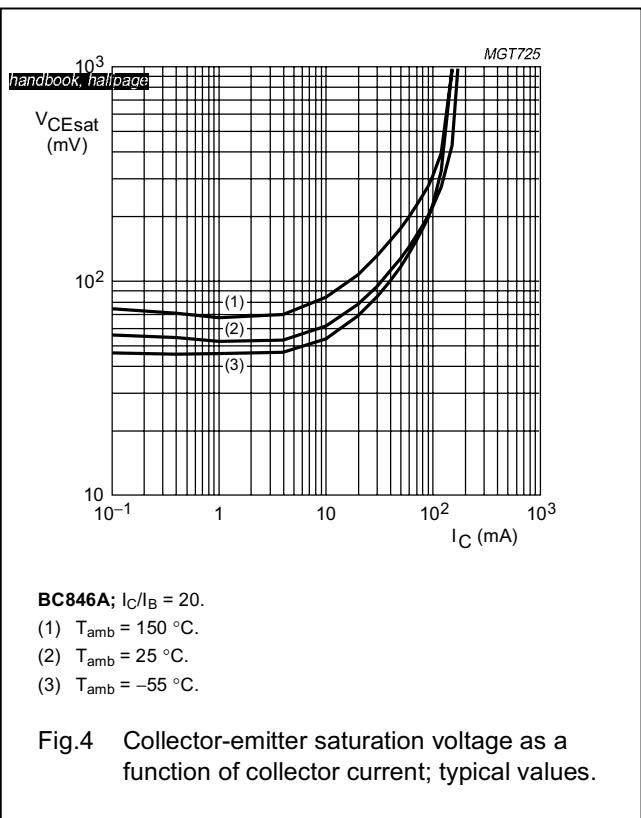
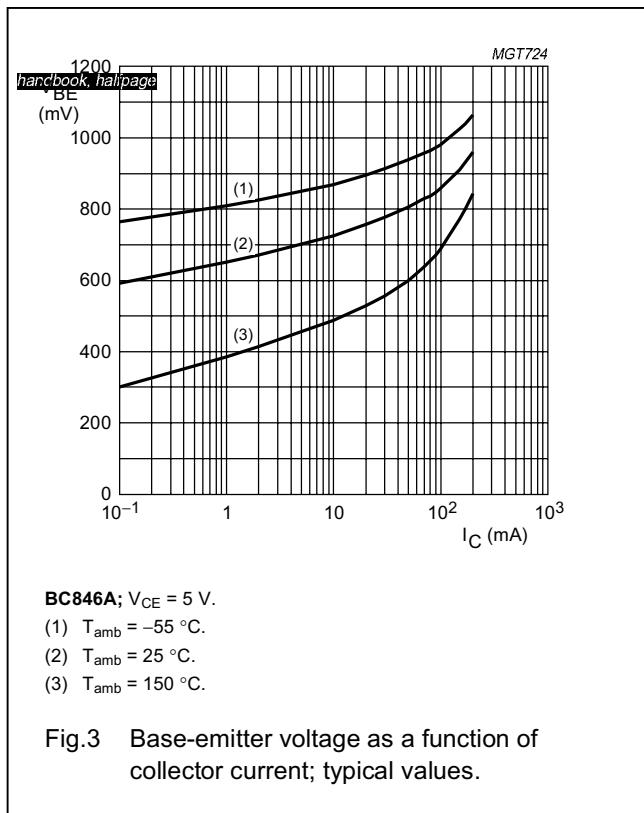
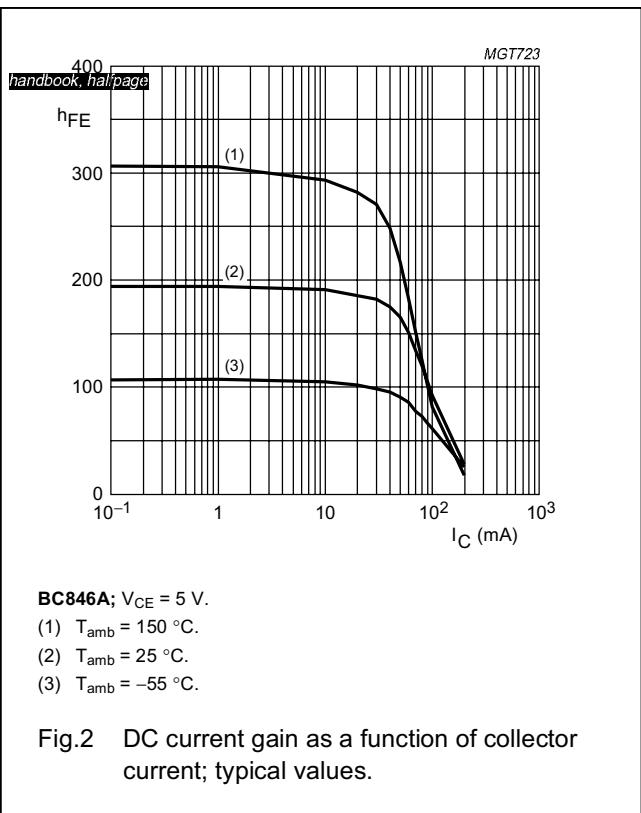
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 30\text{ V}; I_E = 0$	—	—	15	nA
		$V_{CB} = 30\text{ V}; I_E = 0; T_j = 150^\circ\text{C}$	—	—	5	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0$	—	—	100	nA
$h_{FE}$	DC current gain BC846A; BC847A BC846B; BC847B; BC848B BC847C	$I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$	—	90	—	
			—	150	—	
			—	270	—	
			110	—	450	
	DC current gain BC846 BC847 BC846A; BC847A BC846B; BC847B; BC848B BC847C	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$	110	—	800	
			110	180	220	
			200	290	450	
			420	520	800	
$V_{CEsat}$	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
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$	—	700	—	mV
		$I_C = 100\text{ mA}; I_B = 5\text{ mA};$ note 1	—	900	—	mV
$V_{BE}$	base-emitter voltage	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$	580	660	700	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:  $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ .

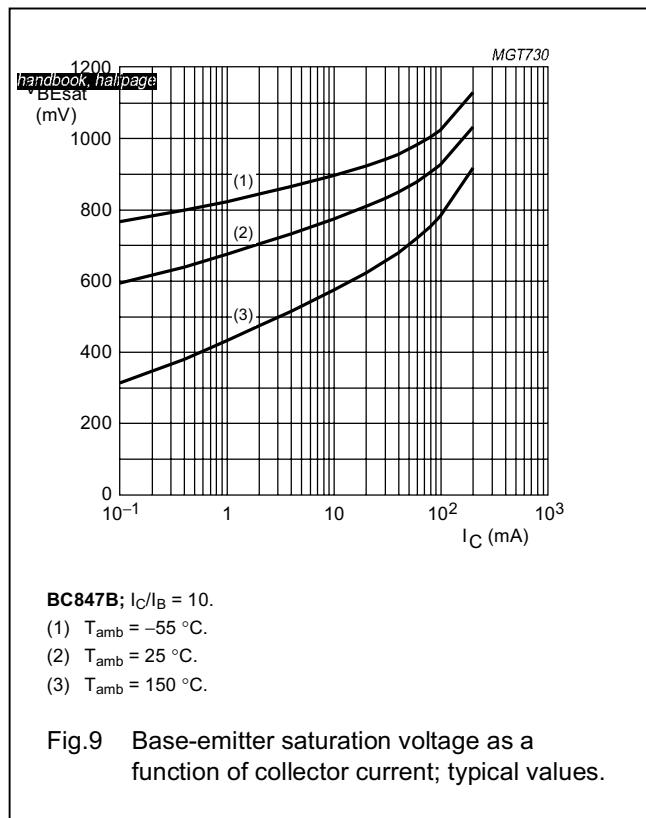
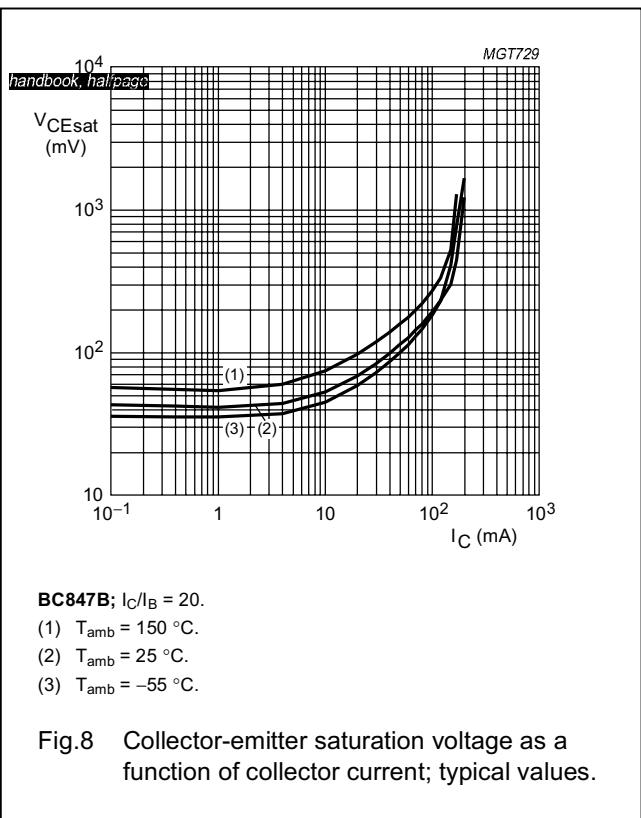
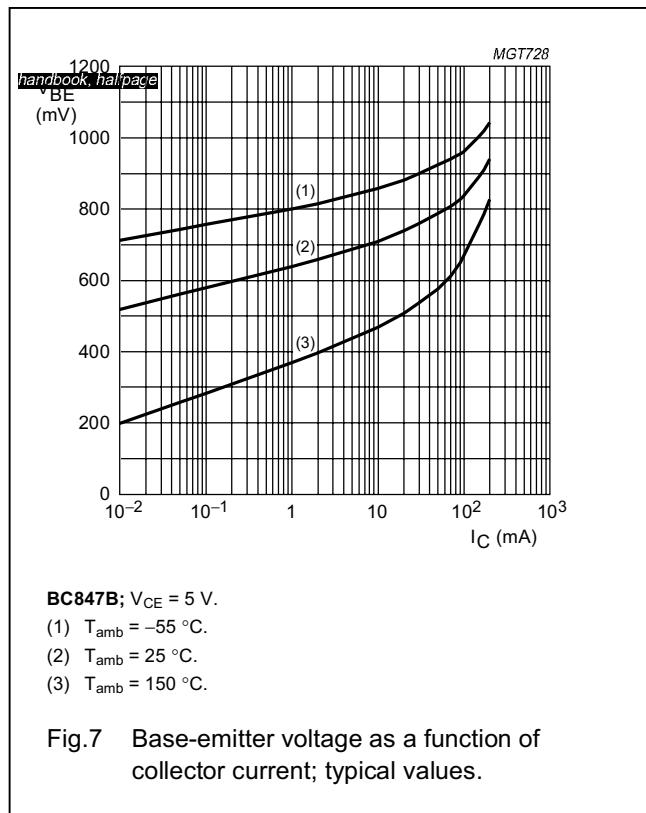
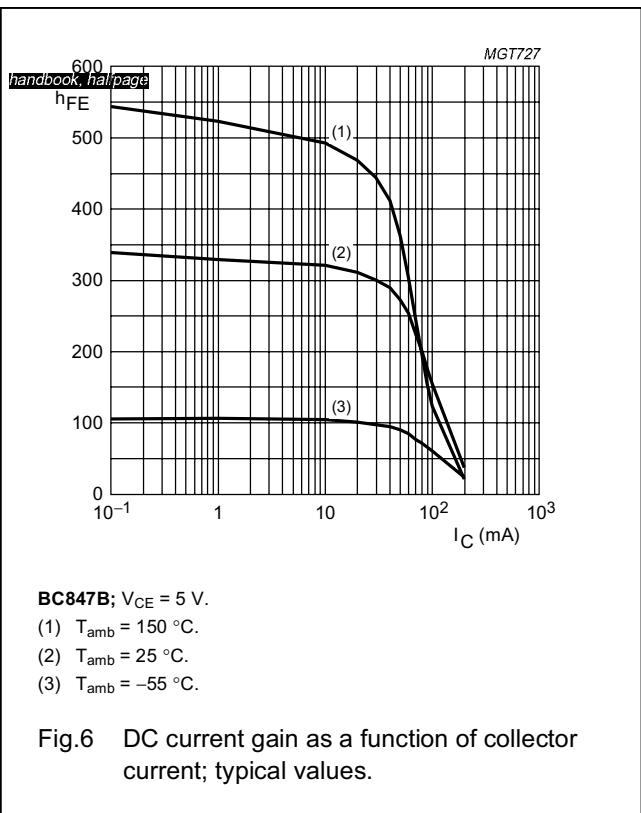
## NPN general purpose transistors

BC846; BC847; BC848



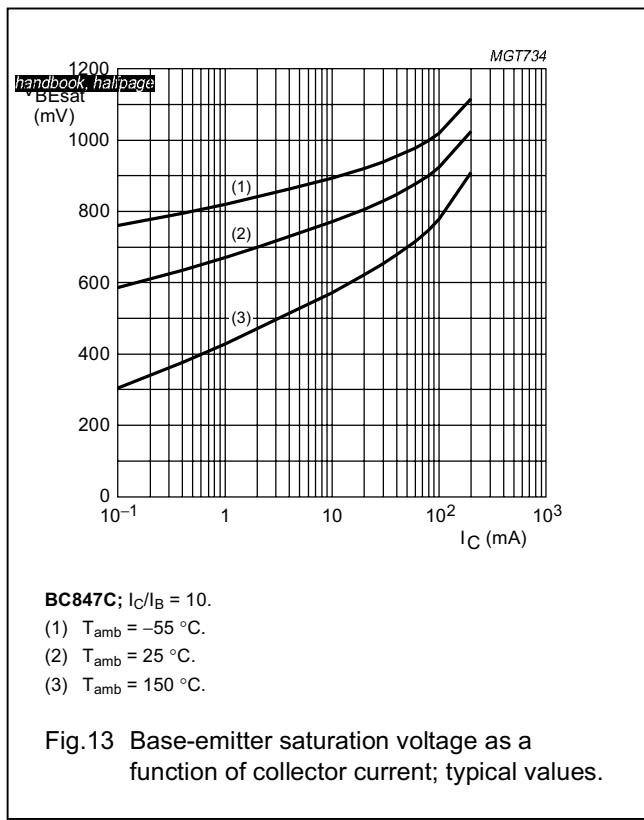
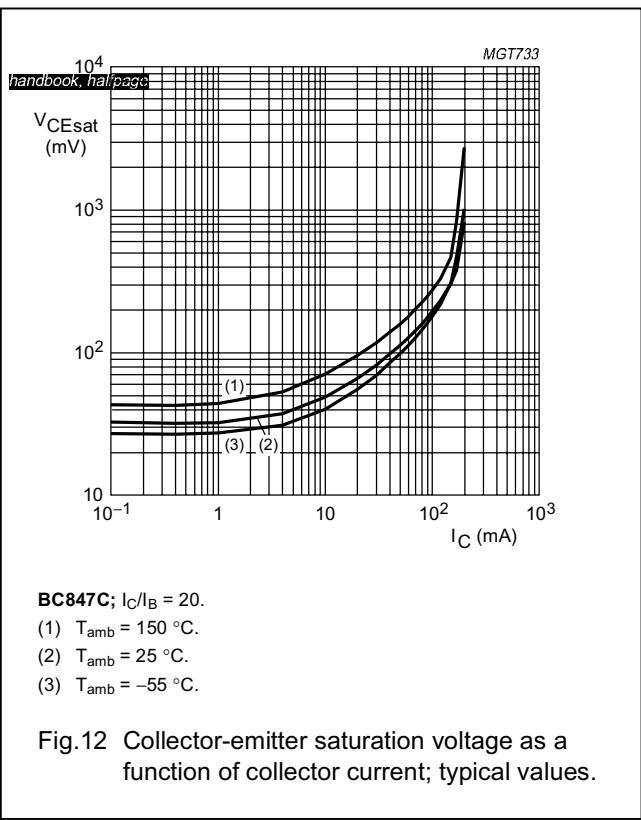
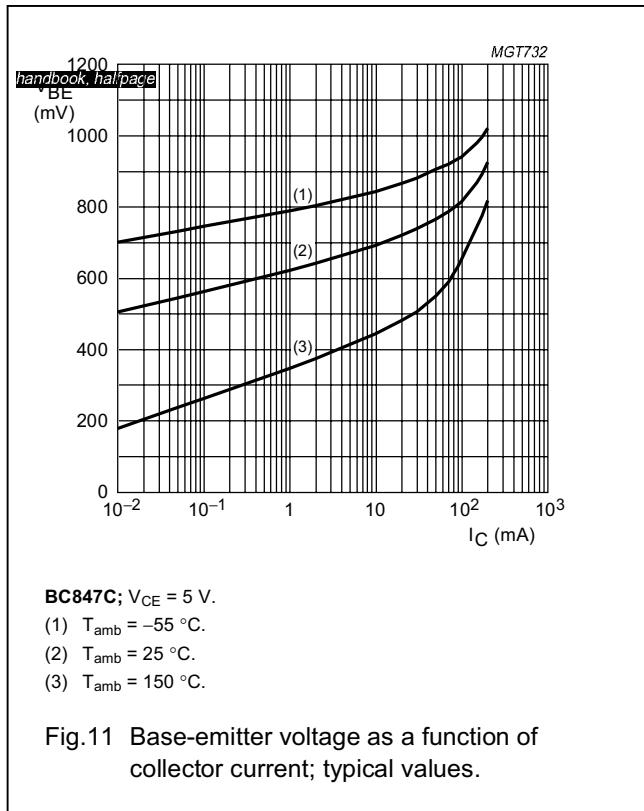
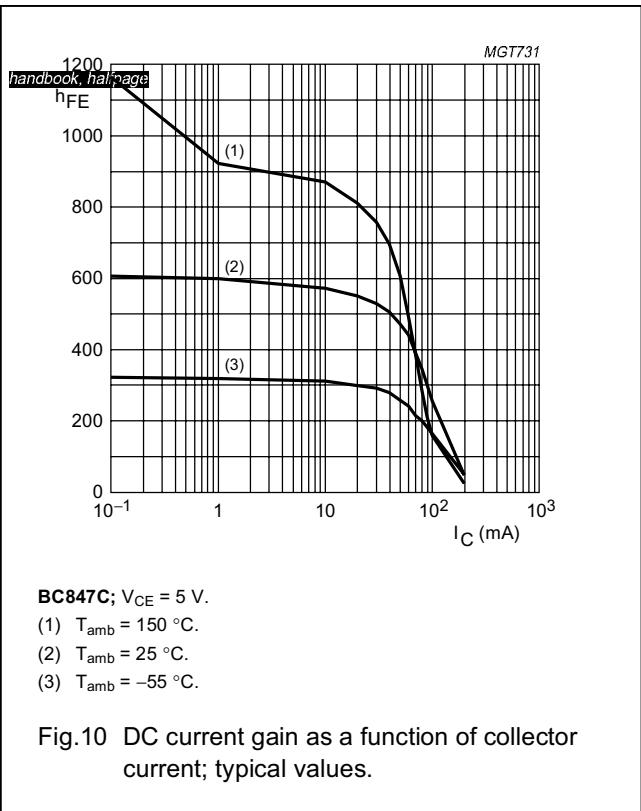
## NPN general purpose transistors

BC846; BC847; BC848



## NPN general purpose transistors

BC846; BC847; BC848



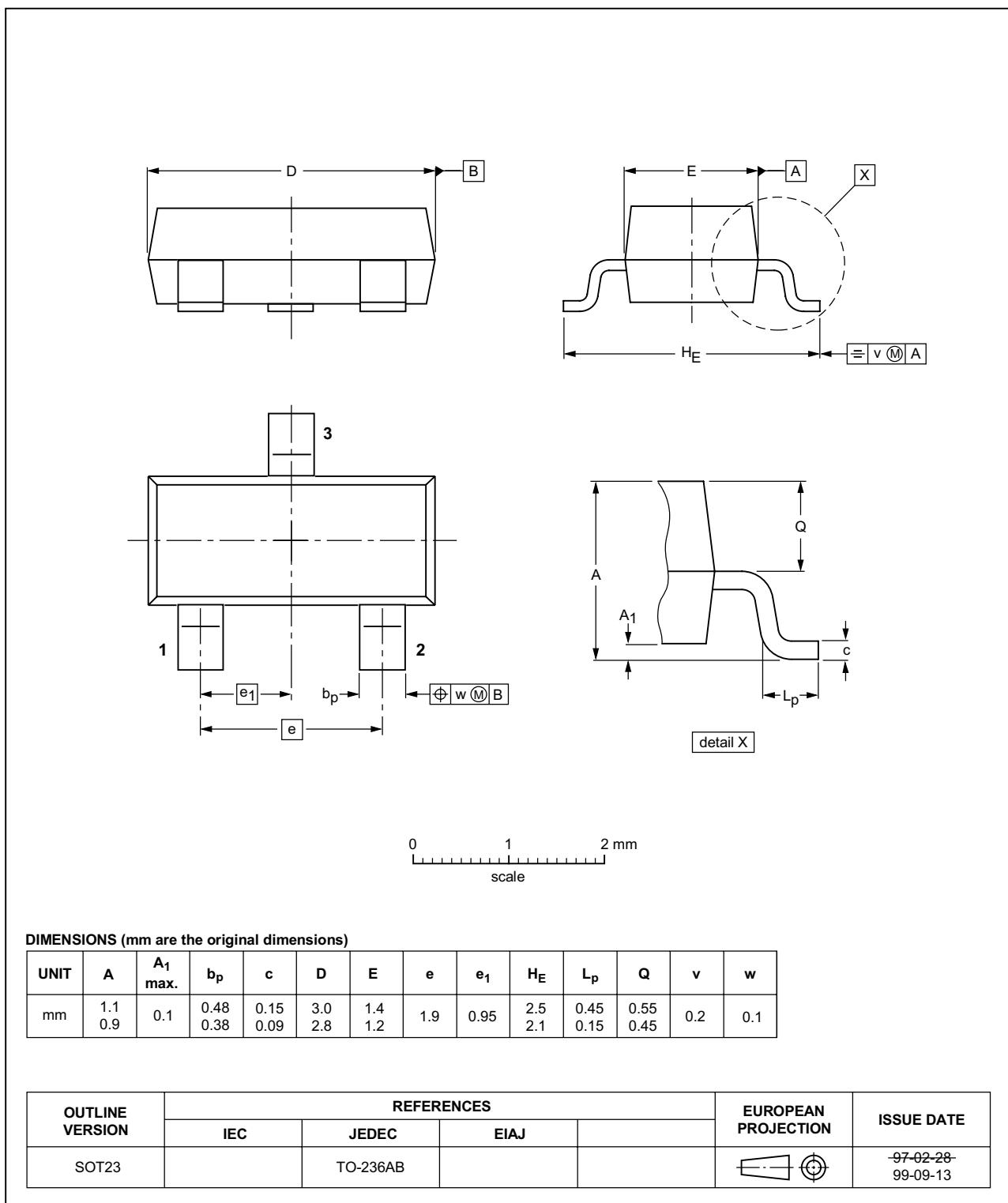
## NPN general purpose transistors

BC846; BC847; BC848

## PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



## DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub> max.	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT23		TO-236AB				-97-02-28- 99-09-13

## NPN general purpose transistors

BC846; BC847; BC848

## DATA SHEET STATUS

LEVEL	DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)(3)</sup>	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

## Notes

1. Please consult the most recently issued data sheet before initiating or completing a design.
2. The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.
3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

## DEFINITIONS

**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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** — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

## DISCLAIMERS

**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 Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

**Right to make changes** — Philips Semiconductors reserves the right to make changes in the products - including circuits, standard cells, and/or software - described or contained herein in order to improve design and/or performance. When the product is in full production (status 'Production'), relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no licence or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

# **Philips Semiconductors – a worldwide company**

## **Contact information**

For additional information please visit <http://www.semiconductors.philips.com>. Fax: +31 40 27 24825  
For sales offices addresses send e-mail to: [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com).

© Koninklijke Philips Electronics N.V. 2004

SCA76

All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner.

The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Printed in The Netherlands

R75/05/pp10

Date of release: 2004 Feb 06

Document order number: 9397 750 12395

*Let's make things better.*

**Philips  
Semiconductors**



**PHILIPS**