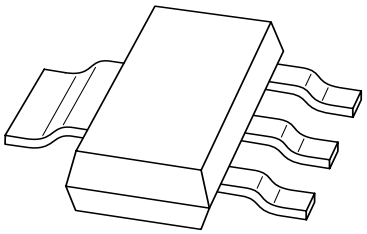
DATA SHEET



BCP69
PNP medium power transistor; 20 V, 1 A

Product specification
Supersedes data of 2002 Nov 15

2003 Nov 25

Philips Semiconductors

PHILIPS

PNP medium power transistor; 20 V, 1 A

BCP69

FEATURES

- High current
- Three current gain selections
- 1.4 W total power dissipation.

APPLICATIONS

- Linear voltage regulators (LDO)
- High side switches
- Supply line switches
- MOSFET drivers
- Audio pre-amplifiers.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{CEO}	collector-emitter voltage	–	–20	V
I_C	collector current (DC)	–	–1	A
I_{CM}	peak collector current	–	–2	A
h_{FE}	DC current gain			
	BCP69	85	375	
	BCP69-16	100	250	
	BCP69-16/IN	140	230	
	BCP69-25	160	375	

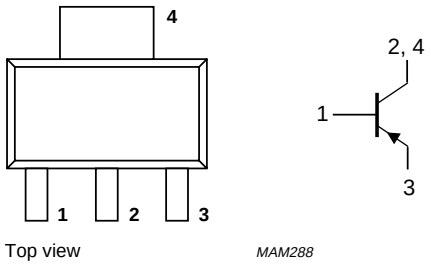
DESCRIPTION

PNP medium power transistor (see “Simplified outline, symbol and pinning”) for package details.

PRODUCT OVERVIEW

TYPE NUMBER	PACKAGE		MARKING CODE
	PHILIPS	EIAJ	
BCP69	SOT223	SC-73	BCP69
BCP69-16	SOT223	SC-73	BCP69/16
BCP69-16/IN	SOT223	SC-73	69-16N
BCP69-25	SOT223	SC-73	BCP69/25

SIMPLIFIED OUTLINE, SYMBOL AND PINNING

TYPE NUMBER	SIMPLIFIED OUTLINE AND SYMBOL	PINNING	
		PIN	DESCRIPTION
BCP69	 Top view MAM288	1	base
		2	collector
		3	emitter
		4	collector

RELATED PRODUCTS

TYPE NUMBER	DESCRIPTION	FEATURE
BCP68	NPN medium power transistor	NPN complement
BC869	PNP medium power transistor	SOT89, –20 V
BC369	PNP medium power transistor	SOT54, –20 V

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
BCP69	–	plastic surface mounted package; collector pad for good heat transfer; 4 leads	SOT223
BCP69-16			
BCP69-16/IN			
BCP69-25			

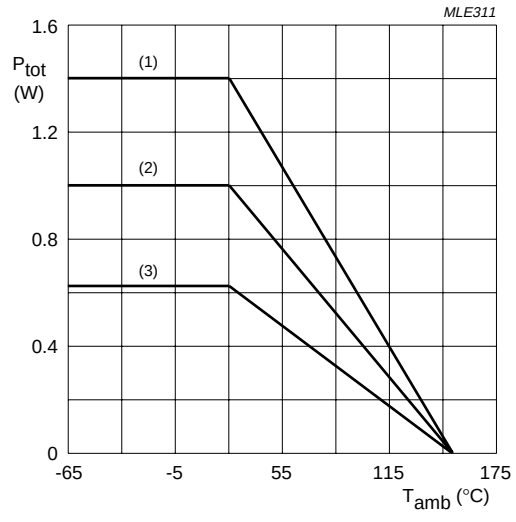
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–32	V
V_{CEO}	collector-emitter voltage	open base	–	–20	V
V_{EBO}	emitter-base voltage	open collector	–	–5	V
I_C	collector current (DC)		–	–1	A
I_{CM}	peak collector current		–	–2	A
I_{BM}	peak base current		–	–200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C; notes 1 and 2	–	0.625	W
		$T_{amb} \leq 25$ °C; notes 1 and 3	–	1	W
		$T_{amb} \leq 25$ °C; notes 1 and 4	–	1.4	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	operating ambient temperature		–65	+150	°C

Notes

1. See SOT223 (SC-73) standard mounting conditions.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; standard footprint for SOT223.
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; 1 cm^2 collector mounting pad.
4. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; 6 cm^2 collector mounting pad.



(1) 6 cm^2 collector mounting pad.
(2) 1 cm^2 collector mounting pad.
(3) Standard PCB footprint.

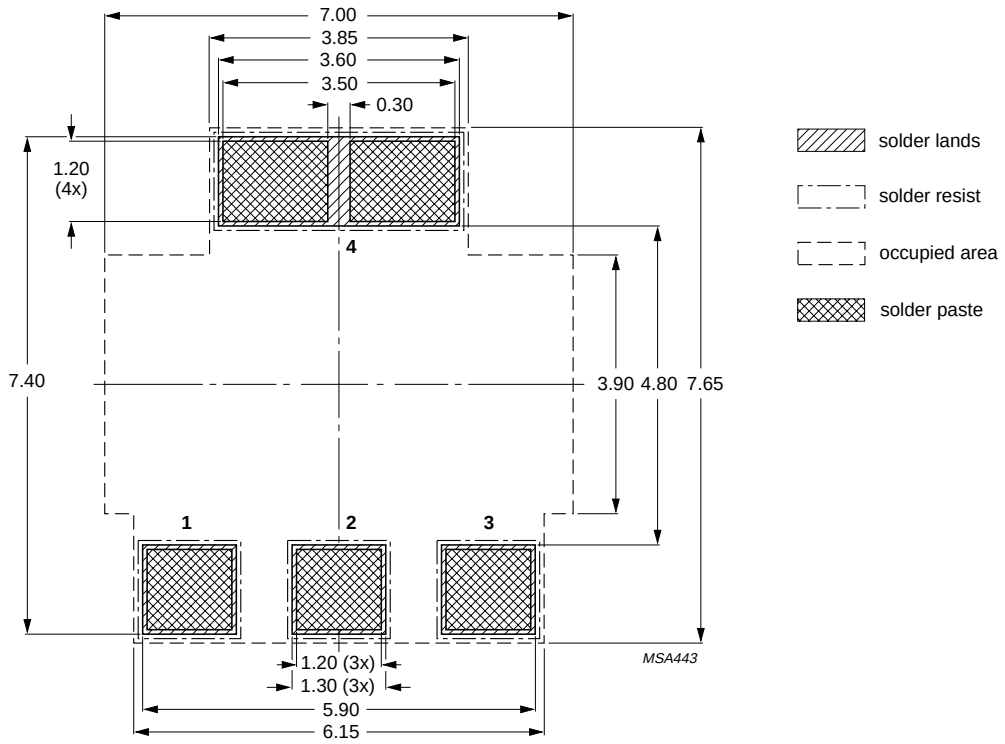
Fig.1 Power derating curve.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th(j-a)}$	thermal resistance from junction to ambient	$T_{amb} \leq 25$ °C; notes 1 and 2	200	K/W
		$T_{amb} \leq 25$ °C; notes 1 and 3	125	K/W
		$T_{amb} \leq 25$ °C; notes 1 and 4	89	K/W
$R_{th(j-s)}$	thermal resistance from junction to solder point	$T_{amb} \leq 25$ °C	15	K/W

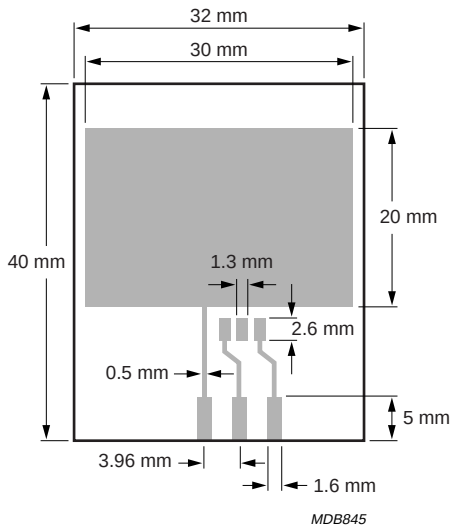
Notes

1. See SOT223 (SC-73) standard mounting conditions.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; standard footprint for SOT223.
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; 1 cm^2 collector mounting pad.
4. Device mounted on a FR4 printed-circuit board; single-sided copper; tinplated; 6 cm^2 collector mounting pad.



Dimensions in mm.

Fig.2 Standard PCB footprint for mounting SOT223 (reflow soldering).



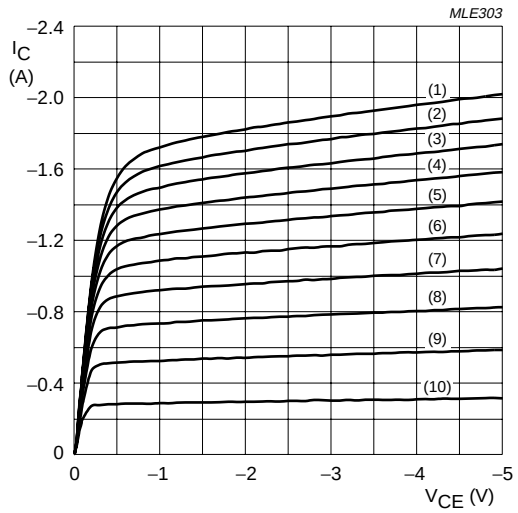
Dimensions in mm.

Fig.3 6 cm^2 collector mounting pad.

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	V_{CB} = –25 V; I_E = 0	–	–	–100	nA
		V_{CB} = –25 V; I_E = 0; T_j = 150 °C	–	–	–10	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = –5 V; I_C = 0	–	–	–100	nA
h_{FE}	DC current gain	BCP69				
		V_{CE} = –10 V; I_C = –5 mA	50			
		V_{CE} = –1 V; I_C = –500 mA	85	–	375	
		V_{CE} = –1 V; I_C = –1 A	60	–	–	
		BCP69-16				
		V_{CE} = –1 V; I_C = –500 mA	100	–	250	
		BCP69-16/IN				
		V_{CE} = –1 V; I_C = –500 mA	140		230	
		BCP69-25				
		V_{CE} = –1 V; I_C = –500 mA	160		375	
V_{CEsat}	collector-emitter saturation voltage	I_C = –1 A; I_B = –100 mA	–	–	–500	mV
V_{BE}	base-emitter voltage	V_{CE} = –10 V; I_C = –5 mA	–	–	–700	mV
		V_{CE} = –1 V; I_C = –1 A	–	–	–1	V
C_c	collector capacitance	V_{CB} = –10 V; I_E = i_e = 0; f = 1 MHz	–	28	–	pF
f_T	transition frequency	V_{CE} = –5 V; I_C = –50 mA; f = 100 MHz	40	140	–	MHz

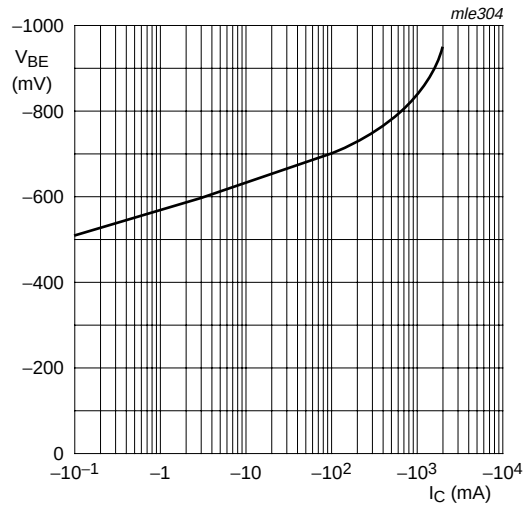


BCP69-16.

T_{amb} = 25 °C.

(1) I_B = −18.0 mA.
(2) I_B = −16.2 mA.
(3) I_B = −14.4 mA.
(4) I_B = −12.6 mA.
(5) I_B = −10.8 mA.
(6) I_B = −9.0 mA.
(7) I_B = −7.2 mA.
(8) I_B = −5.4 mA.
(9) I_B = −3.6 mA.
(10) I_B = −1.8 mA.

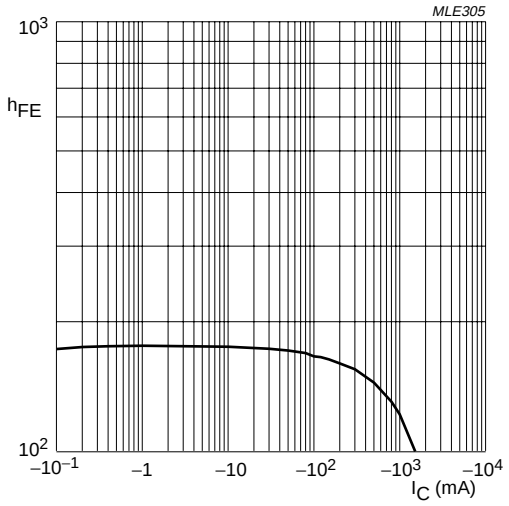
Fig.4 Collector current as a function of collector-emitter voltage; typical values.



BCP69-16.

V_{CE} = −1 V.

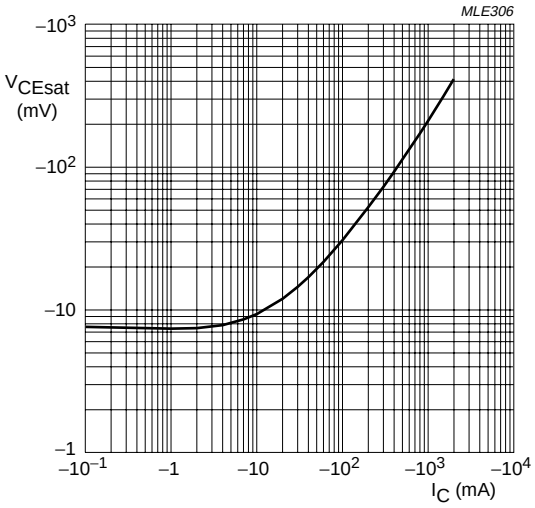
Fig.5 Base-emitter voltage as a function of collector current; typical values.



BCP69-16.

V_{CE} = −1 V.

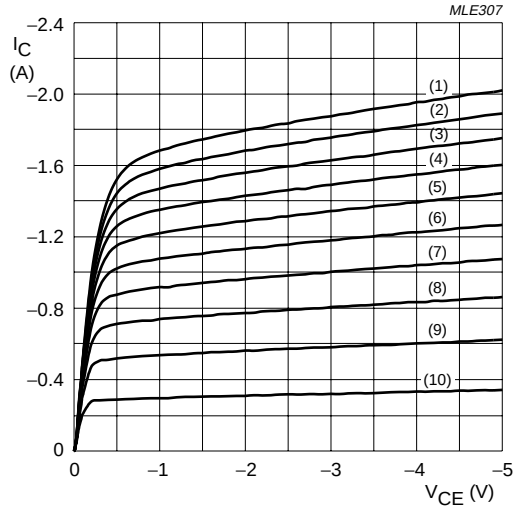
Fig.6 DC current gain as a function of collector current; typical values.



BCP69-16.

I_C/I_B = 10.

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

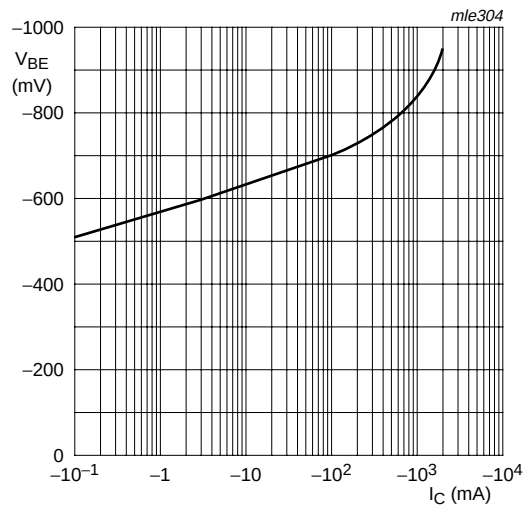


BCP69-25.

T_{amb} = 25 °C.

(1) I_B = −12 mA.
(2) I_B = −10.8 mA.
(3) I_B = −9.6 mA.
(4) I_B = −8.4 mA.
(5) I_B = −7.2 mA.
(6) I_B = −6.0 mA.
(7) I_B = −4.8 mA.
(8) I_B = −3.6 mA.
(9) I_B = −2.4 mA.
(10) I_B = −1.2 mA.

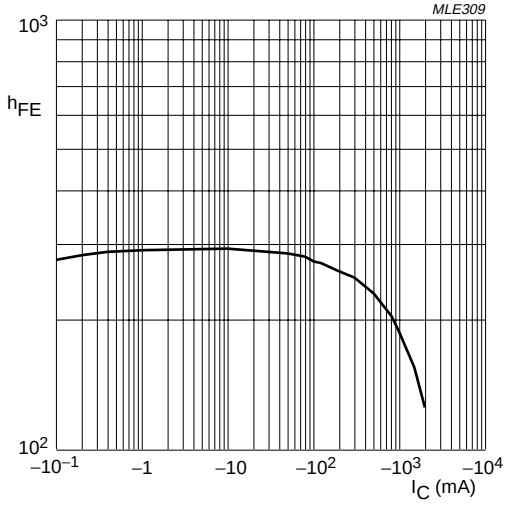
Fig.8 Collector current as a function of collector-emitter voltage; typical values.



BCP69-25.

V_{CE} = −1 V.

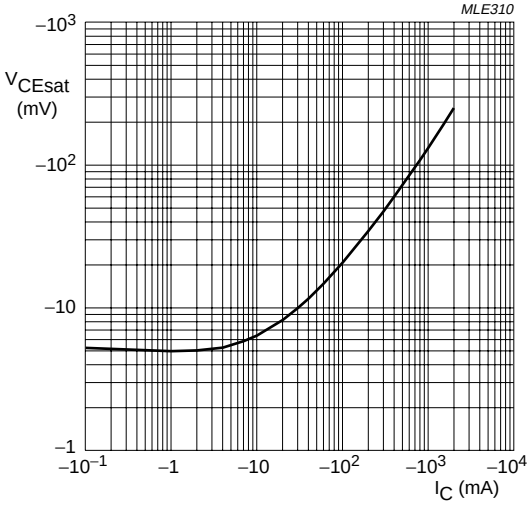
Fig.9 Base-emitter voltage as a function of collector current; typical values.



BCP69-25.

V_{CE} = –1 V.

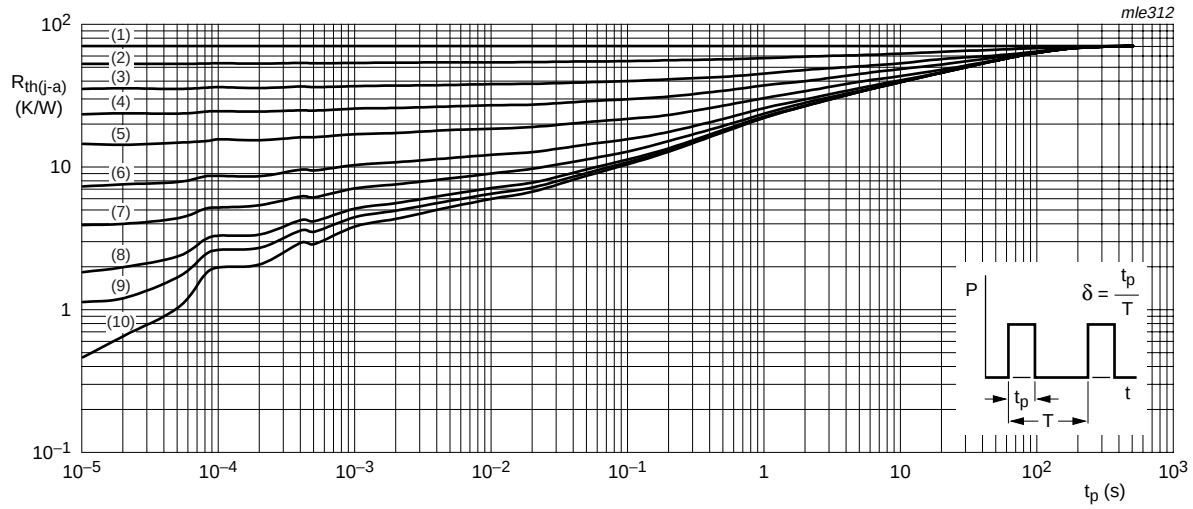
Fig.10 DC current gain as a function of collector current; typical values.



BCP69-25.

I_C/I_B = 10.

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

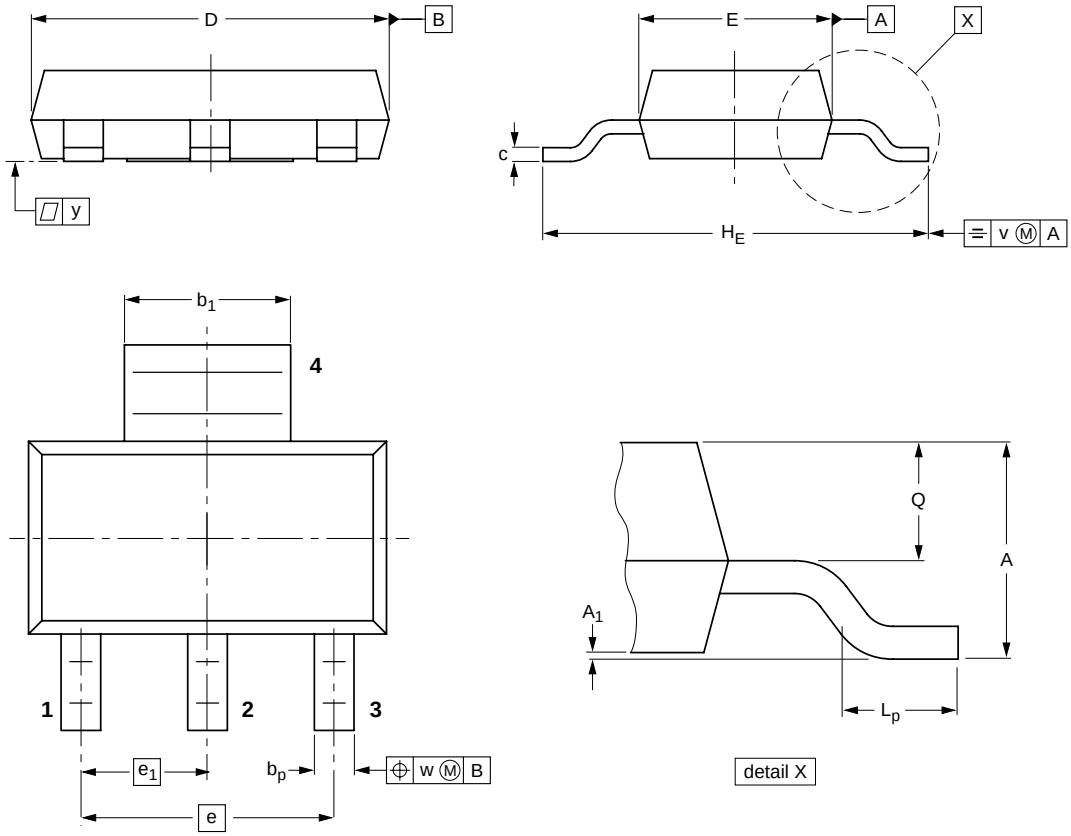


(1) δ = 1.0. (3) δ = 0.5. (5) δ = 0.2. (7) δ = 0.05. (9) δ = 0.01.
(2) δ = 0.75. (4) δ = 0.33. (6) δ = 0.1. (8) δ = 0.02. (10) δ = 0.0.

Fig.12 Transient thermal resistance from junction to ambient as a function of pulse time for 6 cm^2 collector mounting pad.

PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 4 leads **SOT223**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT223			SC-73			~~97-02-28~~ 99-09-13

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS(1)	PRODUCT STATUS(2)(3)	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**.

Printed in The Netherlands R75/05/pp14 Date of release: 2003 Nov 25 Document order number: 9397 750 12042

Let's make things better.

Philips
Semiconductors

PHILIPS