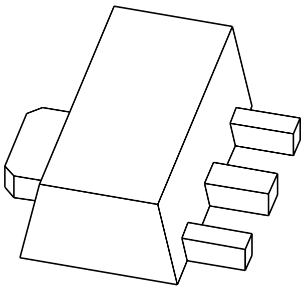
DISCRETE SEMICONDUCTORS

DATA SHEET



PBSS5330X

30 V, 3 A

PNP low V_{CEsat} (BISS) transistor

Product data sheet
Supersedes data of 2003 Nov 28

2004 Nov 03

30 V, 3 A
PNP low V_{CEsat} (BISS) transistor

PBSS5330X

FEATURES

- SOT89 (SC-62) package
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability: I_C and I_{CM}
- Higher efficiency leading to less heat generation
- Reduced printed-circuit board requirements.

APPLICATIONS

- Power management
  - DC/DC converters
  - Supply line switching
  - Battery charger
  - LCD backlighting.
- Peripheral drivers
  - Driver in low supply voltage applications (e.g. lamps and LEDs)
  - Inductive load driver (e.g. relays, buzzers and motors).

DESCRIPTION

PNP low V_{CEsat} transistor in a SOT89 plastic package.

MARKING

TYPE NUMBER	MARKING CODE[1]
PBSS5330X	*1S

Note

1. * = p: Made in Hong Kong.
   * = t: Made in Malaysia.
   * = W: Made in China.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{CEO}	collector-emitter voltage	–30	V
I_C	collector current (DC)	–3	A
I_{CM}	peak collector current	–5	A
R_{CEsat}	equivalent on-resistance	107	mΩ

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base

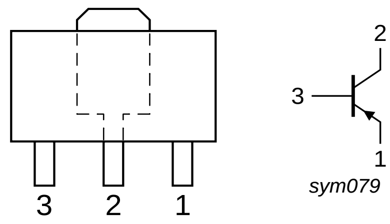


Fig.1 Simplified outline (SOT89) and symbol.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS5330X	SC-62	plastic surface mounted package; collector pad for good heat transfer; 3 leads	SOT89

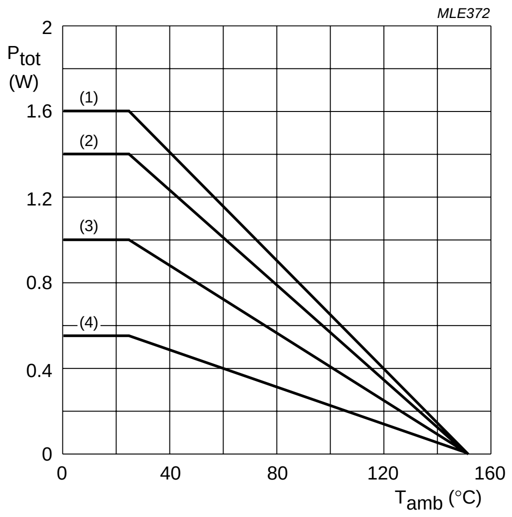
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–30	V
V_{CEO}	collector-emitter voltage	open base	–	–30	V
V_{EBO}	emitter-base voltage	open collector	–	–6	V
I_C	collector current (DC)	note 4	–	–3	A
I_{CM}	peak collector current	limited by $T_{j(max)}$	–	–5	A
I_B	base current (DC)		–	–0.5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C			
		note 1	–	550	mW
		note 2	–	1	W
		note 3	–	1.4	W
		note 4	–	1.6	W
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C
T_{amb}	ambient temperature		–65	+150	°C

Notes

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 1 cm^2.
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 6 cm^2.
4. Device mounted on a ceramic printed-circuit board 7 cm^2, single-sided copper, tin-plated.



(1) Ceramic PCB; 7 cm^2 mounting pad for collector.
(2) FR4 PCB; 6 cm^2 copper mounting pad for collector.
(3) FR4 PCB; 1 cm^2 copper mounting pad for collector.
(4) Standard footprint.

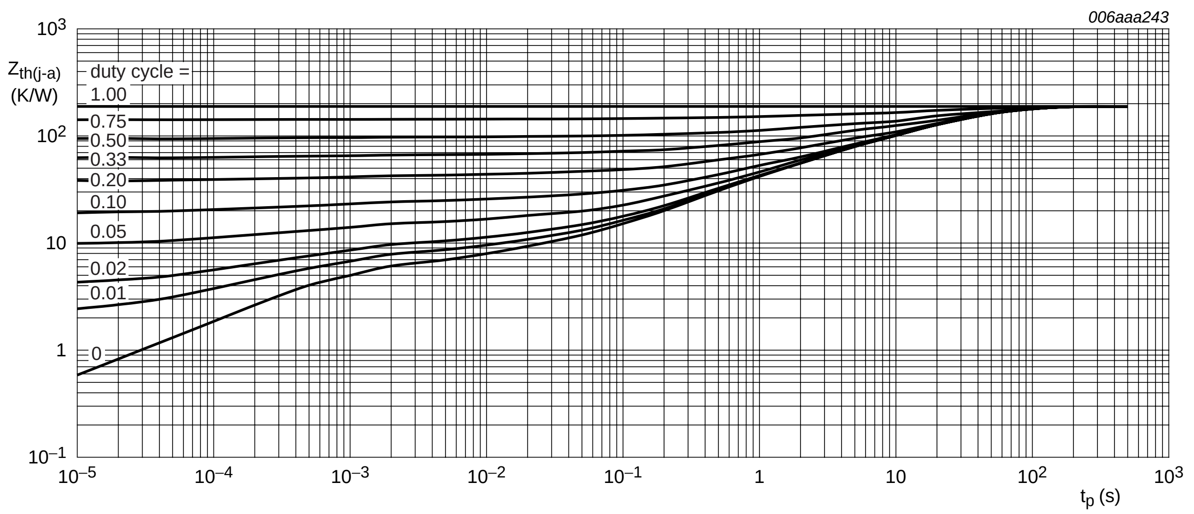
Fig.2 Power derating curves.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		
		note 1	225	K/W
		note 2	125	K/W
		note 3	90	K/W
		note 4	80	K/W
$R_{th(j-s)}$	thermal resistance from junction to soldering point		16	K/W

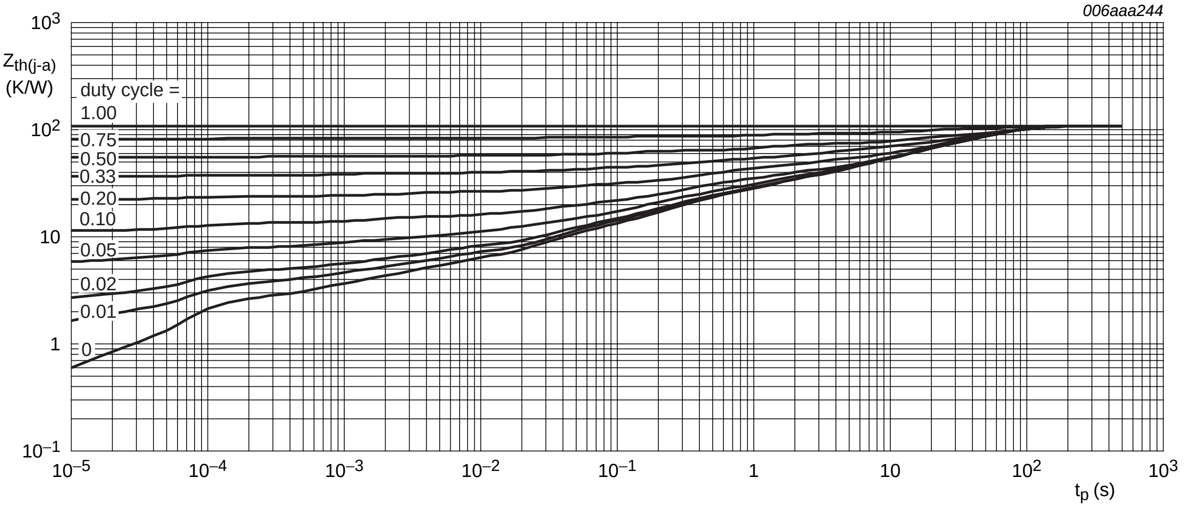
Notes

1. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; standard footprint.
2. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 1 cm^2.
3. Device mounted on a FR4 printed-circuit board; single-sided copper; tin-plated; mounting pad for collector 6 cm^2.
4. Device mounted on a ceramic printed-circuit board 7 cm^2, single-sided copper, tin-plated.



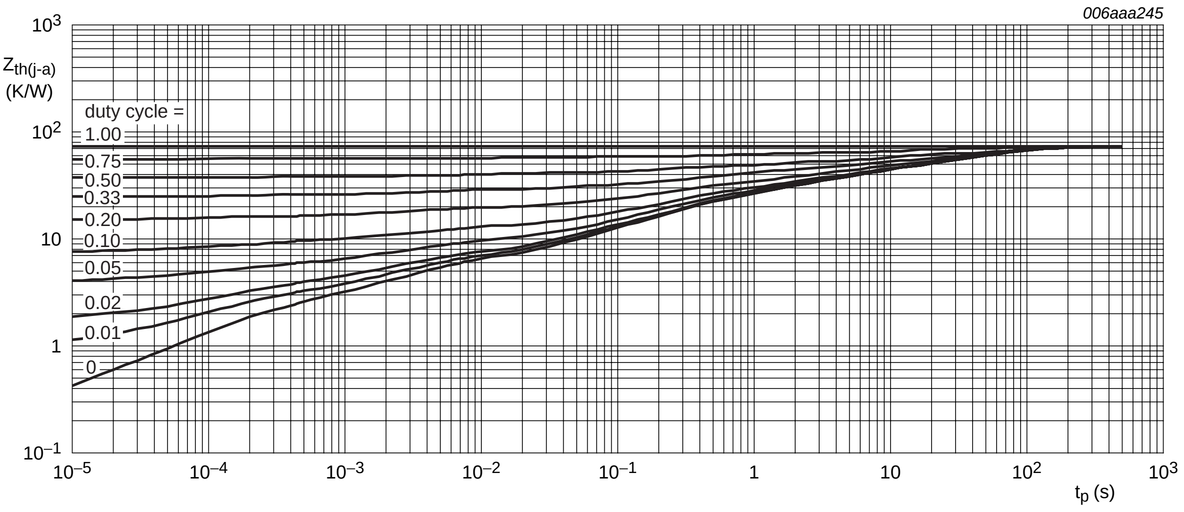
Mounted on FR4 printed-circuit board; standard footprint.

Fig.3 Transient thermal impedance as a function of pulse time; typical values.



Mounted on FR4 printed-circuit board; mounting pad for collector 1 cm^2.

Fig.4 Transient thermal impedance as a function of pulse time; typical values.



Mounted on FR4 printed-circuit board; mounting pad for collector 6 cm^2.

Fig.5 Transient thermal impedance as a function of pulse time; typical values.

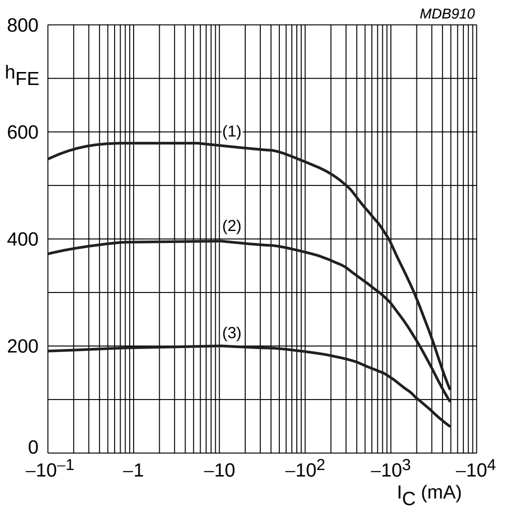
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector-base cut-off current	V_{CB} = –30 V; I_E = 0 A	–	–	–100	nA
		V_{CB} = –30 V; I_E = 0 A; T_j = 150 °C	–	–	–50	μA
I_{CES}	collector-emitter cut-off current	V_{CE} = –30 V; V_{BE} = 0 V	–	–	–100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = –5 V; I_C = 0 A	–	–	–100	nA
h_{FE}	DC current gain	V_{CE} = –2 V				
		I_C = –0.1 A	200	–	–	
		I_C = –0.5 A	200	–	–	
		I_C = –1 A; note 1	175	–	450	
		I_C = –2 A; note 1	140	–	–	
		I_C = –3 A; note 1	100	–	–	
V_{CEsat}	collector-emitter saturation voltage	I_C = –0.5 A; I_B = –50 mA	–	–	–70	mV
		I_C = –1 A; I_B = –50 mA	–	–	–130	mV
		I_C = –2 A; I_B = –100 mA	–	–	–240	mV
		I_C = –3 A; I_B = –300 mA; note 1	–	–	–320	mV
R_{CEsat}	equivalent on-resistance	I_C = –3 A; I_B = –300 mA; note 1	–	80	107	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = –2 A; I_B = –100 mA	–	–	–1.1	V
		I_C = –3 A; I_B = –300 mA; note 1	–	–	–1.2	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} = –2 V; I_C = –1 A	–1.0	–	–	V
f_T	transition frequency	I_C = –100 mA; V_{CE} = –5 V; f = 100 MHz	100	–	–	MHz
C_c	collector capacitance	V_{CB} = –10 V; I_E = i_e = 0 A; f = 1 MHz	–	–	45	pF

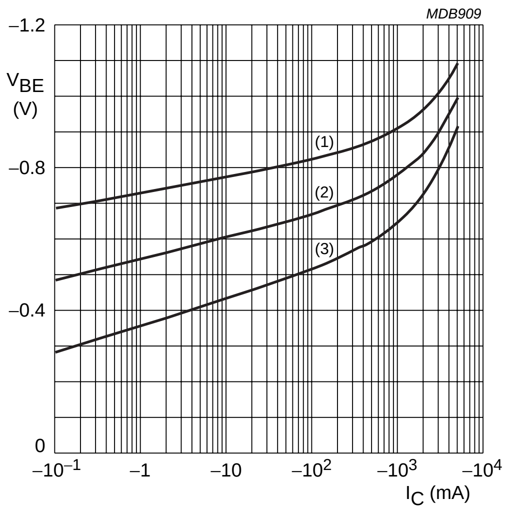
Note

1. Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.02$.



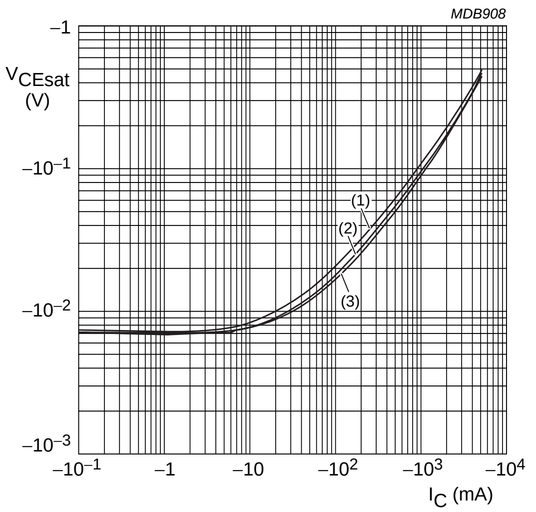
$V_{CE} = -2$ V.
(1) $T_{amb} = 100$ °C.
(2) $T_{amb} = 25$ °C.
(3) $T_{amb} = -55$ °C.

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



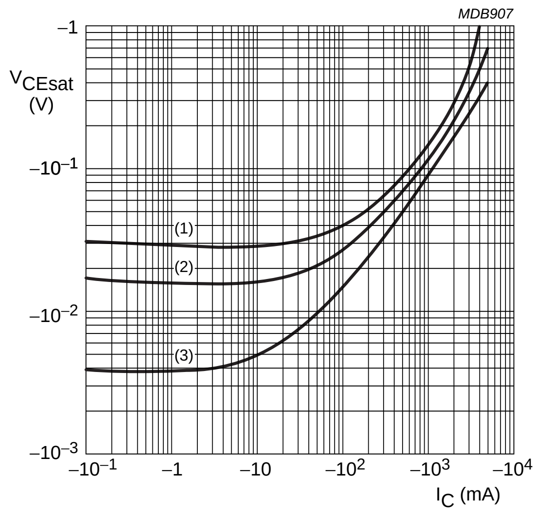
$V_{CE} = -2$ V.
(1) $T_{amb} = -55$ °C.
(2) $T_{amb} = 25$ °C.
(3) $T_{amb} = 100$ °C.

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



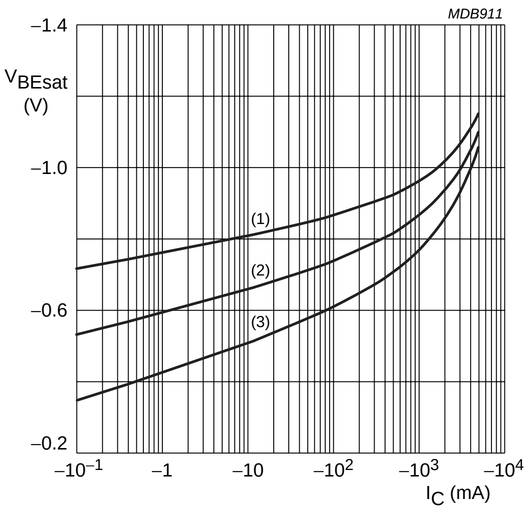
$I_C/I_B = 20$.
(1) $T_{amb} = 100$ °C.
(2) $T_{amb} = 25$ °C.
(3) $T_{amb} = -55$ °C.

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



$T_{amb} = 25$ °C.
(1) $I_C/I_B = 100$.
(2) $I_C/I_B = 50$.
(3) $I_C/I_B = 10$.

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



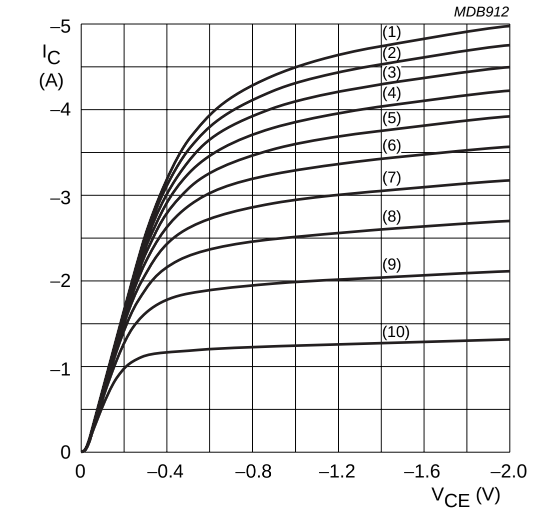
$I_C/I_B = 20$.

(1) $T_{amb} = -55$ °C.

(2) $T_{amb} = 25$ °C.

(3) $T_{amb} = 100$ °C.

Fig.10 Base-emitter saturation voltage as a function of collector current; typical values.



$T_{amb} = 25$ °C.

(1) $I_B = 53.0$ mA.

(2) $I_B = 47.7$ mA.

(3) $I_B = 42.4$ mA.

(4) $I_B = 37.1$ mA.

(5) $I_B = 31.8$ mA.

(6) $I_B = 26.5$ mA.

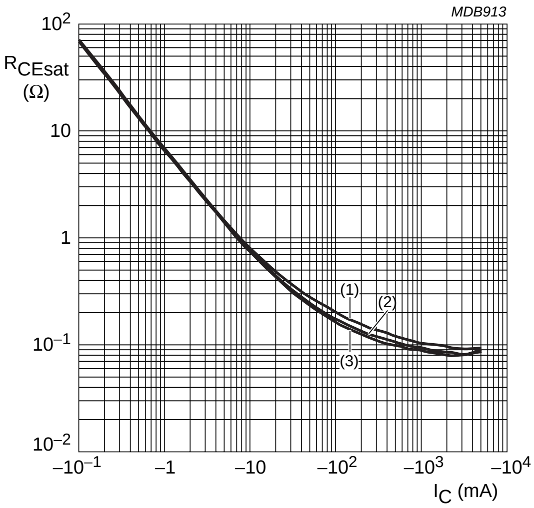
(7) $I_B = 21.2$ mA.

(8) $I_B = 15.9$ mA.

(9) $I_B = 10.6$ mA.

(10) $I_B = 5.3$ mA.

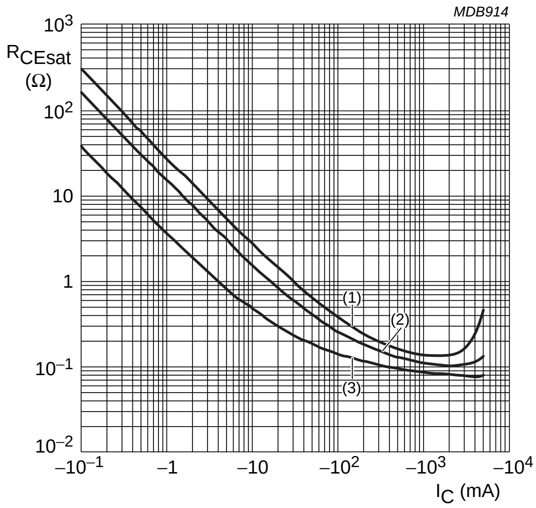
Fig.11 Collector current as a function of collector-emitter voltage; typical values.



$I_C/I_B = 20$.

(1) $T_{amb} = 100$ °C. (2) $T_{amb} = 25$ °C. (3) $T_{amb} = -55$ °C.

Fig.12 Equivalent on-resistance as a function of collector current; typical values.



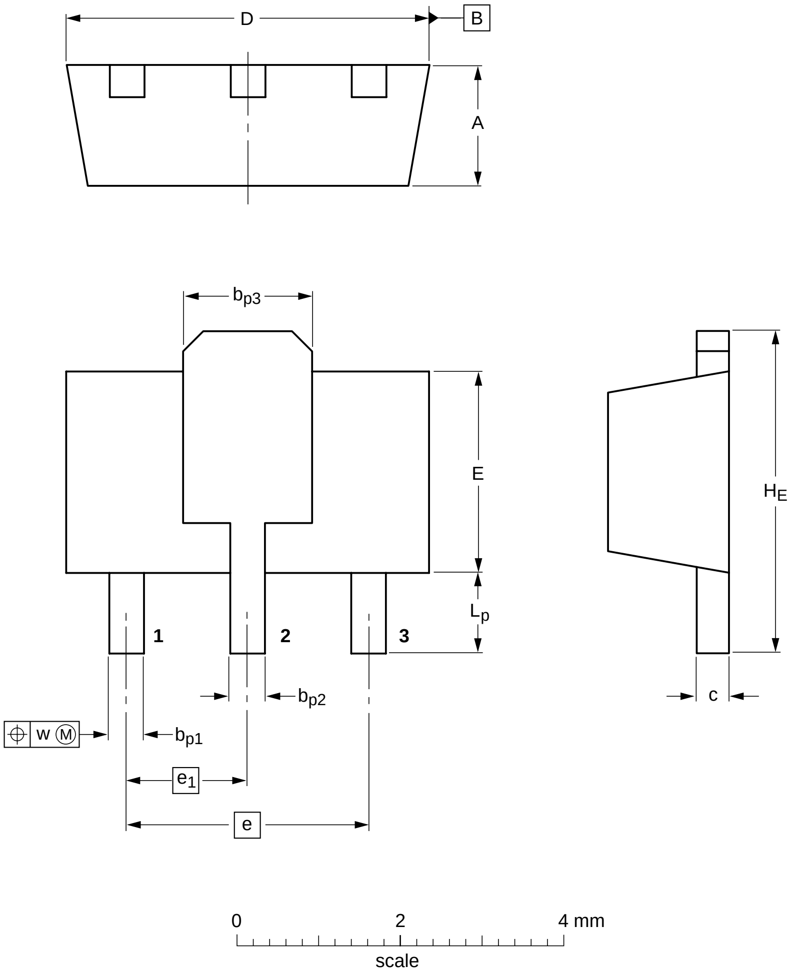
$T_{amb} = 25$ °C.

(1) $I_C/I_B = 10$. (2) $I_C/I_B = 5$. (3) $I_C/I_B = 1$.

Fig.13 Equivalent on-resistance as a function of collector current; typical values.

PACKAGE OUTLINE

Plastic surface-mounted package; collector pad for good heat transfer; 3 leads **SOT89**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b_{p1}	b_{p2}	b_{p3}	c	D	E	e	e_1	H_E	L_p	w
mm	1.6 1.4	0.48 0.35	0.53 0.40	1.8 1.4	0.44 0.23	4.6 4.4	2.6 2.4	3.0	1.5	4.25 3.75	1.2 0.8	0.13

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT89		TO-243	SC-62			~~04-08-03~~ 06-03-16

DATA SHEET STATUS

DOCUMENT STATUS(1)	PRODUCT STATUS(2)	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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NXP Semiconductors

Customer notification

This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content, except for package outline drawings which were updated to the latest version.

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