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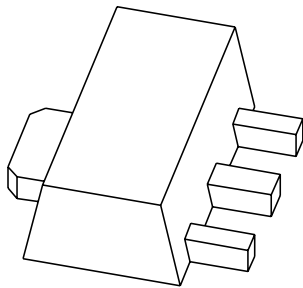
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Kind regards,

Team Nexperia

# DATA SHEET



**PBSS4480X**

80 V, 4 A

NPN low  $V_{CEsat}$  (BISS) transistor

Product data sheet  
Supersedes data of 2004 Aug 5

2004 Oct 25

# 80 V, 4 A NPN low $V_{CEsat}$ (BISS) transistor

**PBSS4480X**

### FEATURES

- High  $h_{FE}$  and low  $V_{CEsat}$  at high current operation
- High collector current capability:  $I_C$  maximum 4 A
- High efficiency leading to less heat generation.

### APPLICATIONS

- Medium power peripheral drivers; e.g. fan, motor
- Strobe flash units for DSC and mobile phones
- Inverter applications; e.g. TFT displays
- Power switch for LAN and ADSL systems
- Medium power DC-to-DC conversion
- Battery chargers.

### DESCRIPTION

NPN low  $V_{CEsat}$  transistor in a SOT89 (SC-62) plastic package.  
PNP complement: PBSS5480X.

### MARKING

TYPE NUMBER	MARKING CODE <sup>(1)</sup>
PBSS4480X	*1Y

### Note

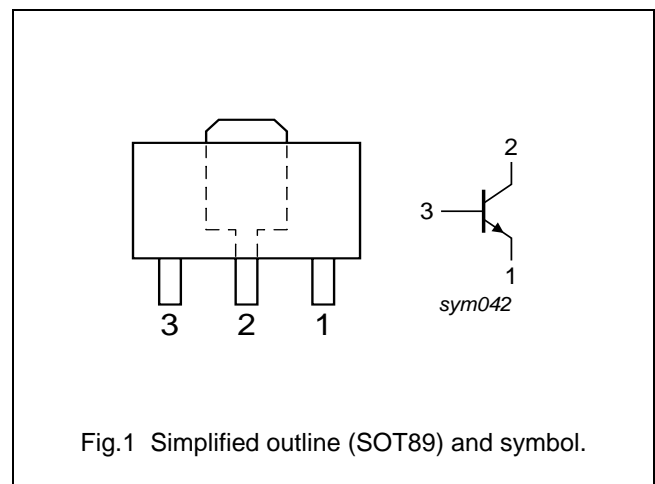
- \* = p: made in Hong Kong.  
\* = t: made in Malaysia.  
\* = W: made in China.

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
$V_{CEO}$	collector-emitter voltage	80	V
$I_C$	collector current (DC)	4	A
$I_{CM}$	peak collector current	10	A
$R_{CEsat}$	equivalent on-resistance	54	m $\Omega$

### PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base



### ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
PBSS4480X	–	plastic surface mounted package; collector pad for good heat transfer; 3 leads	SOT89

80 V, 4 A  
NPN low  $V_{CEsat}$  (BISS) transistor

PBSS4480X

**LIMITING VALUES**

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

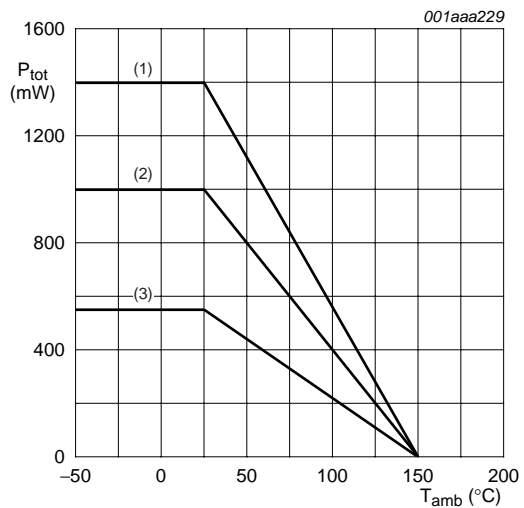
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	80	V
$V_{CEO}$	collector-emitter voltage	open base	–	80	V
$V_{EBO}$	emitter-base voltage	open collector	–	5	V
$I_C$	collector current (DC)	note 4	–	4	A
$I_{CRM}$	repetitive peak collector current	$t_p \leq 10$ ms; $\delta \leq 0.1$	–	6	A
$I_{CM}$	peak collector current	$t = 1$ ms or limited by $T_{j(max)}$	–	10	A
$I_B$	base current (DC)		–	1	A
$I_{BM}$	peak base current	$t \leq 300$ $\mu$ s	–	2	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C notes 1 and 2 note 2 note 3 note 4 note 5	–	2.5 550 1 1.4 1.6	W mW W W W
$T_j$	junction temperature		–	150	°C
$T_{amb}$	ambient temperature		–65	+150	°C
$T_{stg}$	storage temperature		–65	+150	°C

**Notes**

1. Operated under pulsed conditions; pulse width  $t_p \leq 10$  ms; duty cycle  $\delta \leq 0.2$ .
2. Device mounted on a printed-circuit board, single-sided copper, tin-plated and standard footprint.
3. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 1 cm<sup>2</sup>.
4. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 6 cm<sup>2</sup>.
5. Device mounted on a 7 cm<sup>2</sup> ceramic printed-circuit board, 1 cm<sup>2</sup> single-sided copper and tin-plated. For other mounting conditions, see “*Thermal considerations for SOT89 in the General Part of associated Handbook*”.

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NPN low  $V_{CEsat}$  (BISS) transistor

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- (1) FR4 PCB; 6 cm<sup>2</sup> mounting pad for collector.
- (2) FR4 PCB; 1 cm<sup>2</sup> mounting pad for collector.
- (3) FR4; standard footprint.

Fig.2 Power derating curves.

80 V, 4 A  
NPN low  $V_{CEsat}$  (BISS) transistor

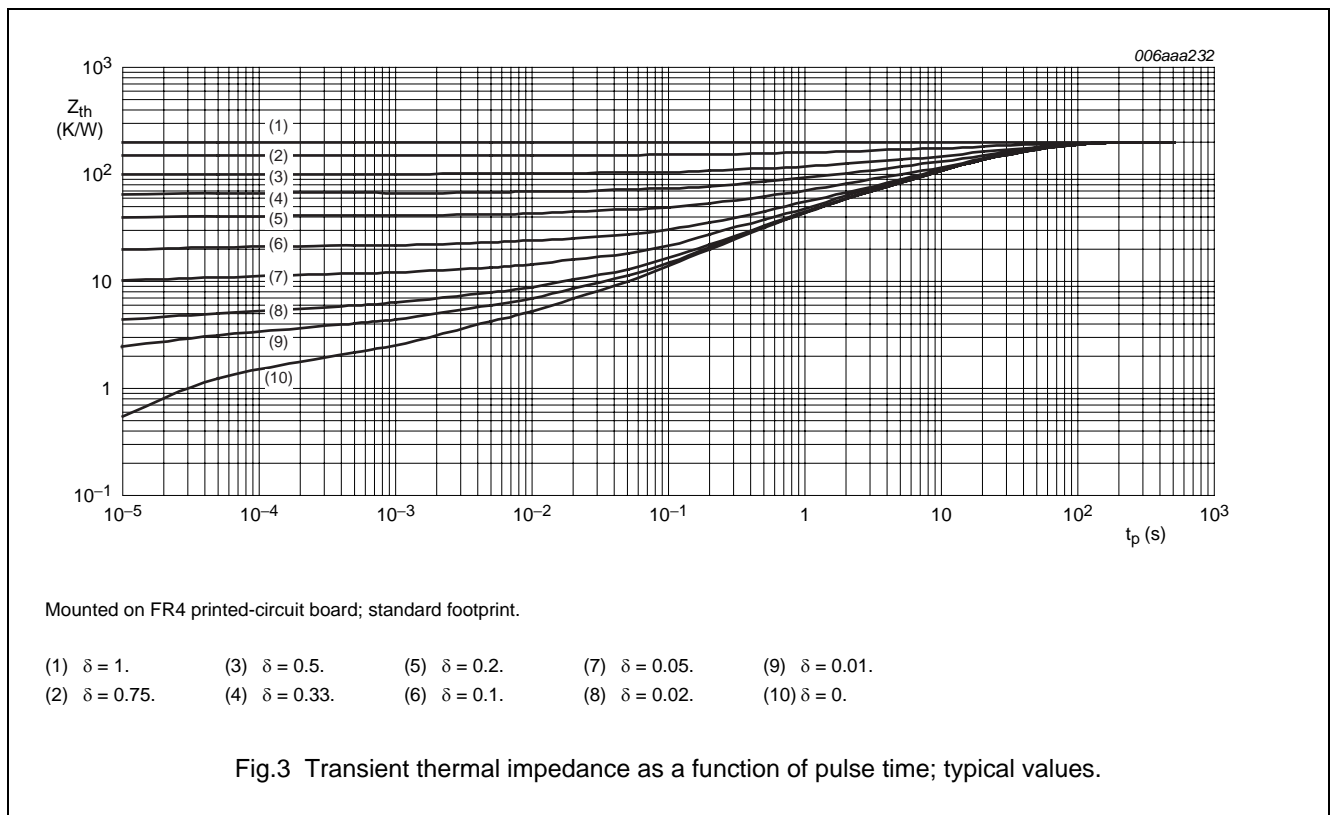
PBSS4480X

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		
		notes 1 and 2	50	K/W
		note 2	225	K/W
		note 3	125	K/W
		note 4	90	K/W
	note 5	80	K/W	
$R_{th(j-s)}$	thermal resistance from junction to soldering point		16	K/W

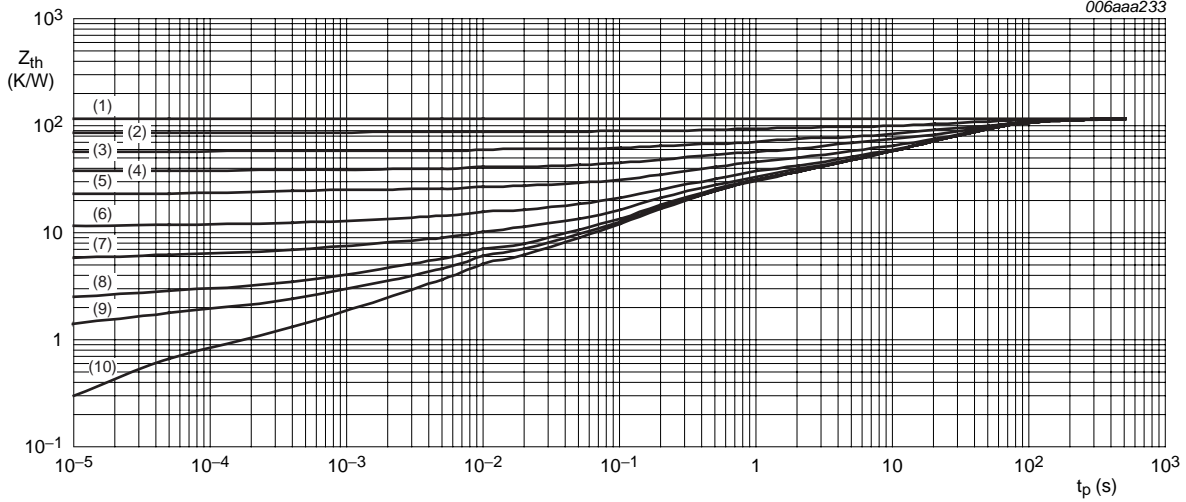
**Notes**

1. Operated under pulsed conditions; pulse width  $t_p \leq 10$  ms; duty cycle  $\delta \leq 0.2$ .
2. Device mounted on a printed-circuit board, single-sided copper, tin-plated and standard footprint.
3. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 1 cm<sup>2</sup>.
4. Device mounted on a printed-circuit board, single-sided copper, tin-plated and mounting pad for collector 6 cm<sup>2</sup>.
5. Device mounted on a 7 cm<sup>2</sup> ceramic printed-circuit board, 1 cm<sup>2</sup> single-sided copper and tin-plated. For other mounting conditions, see *“Thermal considerations for SOT89 in the General Part of associated Handbook”*.



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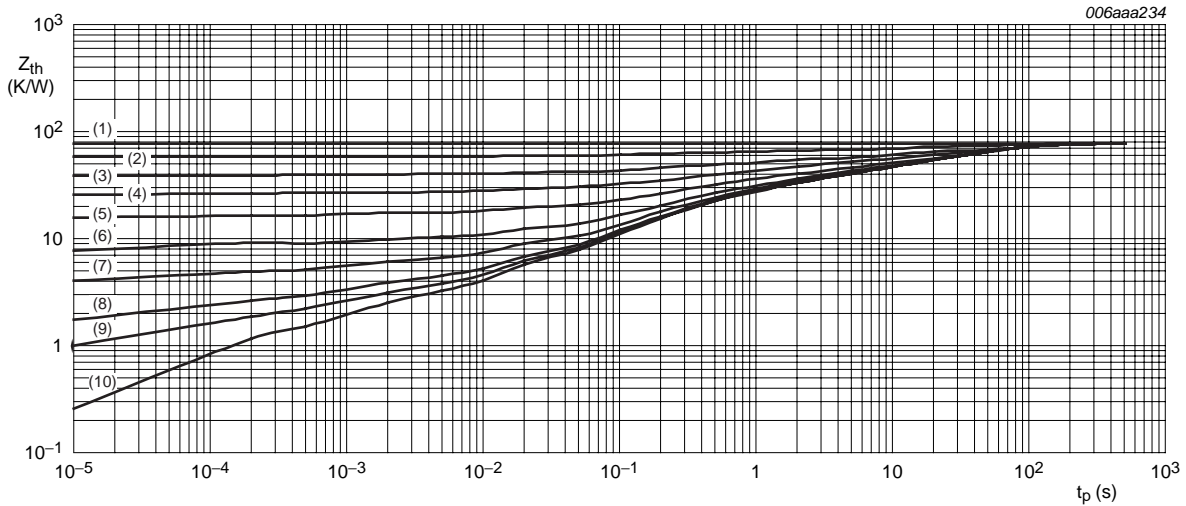
PBSS4480X



Mounted on FR4 printed-circuit board; mounting pad for collector 1 cm<sup>2</sup>.

- (1)  $\delta = 1.$       (3)  $\delta = 0.5.$       (5)  $\delta = 0.2.$       (7)  $\delta = 0.05.$       (9)  $\delta = 0.01.$
- (2)  $\delta = 0.75.$       (4)  $\delta = 0.33.$       (6)  $\delta = 0.1.$       (8)  $\delta = 0.02.$       (10)  $\delta = 0.$

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<sup>2</sup>.

- (1)  $\delta = 1.$       (3)  $\delta = 0.5.$       (5)  $\delta = 0.2.$       (7)  $\delta = 0.05.$       (9)  $\delta = 0.01.$
- (2)  $\delta = 0.75.$       (4)  $\delta = 0.33.$       (6)  $\delta = 0.1.$       (8)  $\delta = 0.02.$       (10)  $\delta = 0.$

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

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

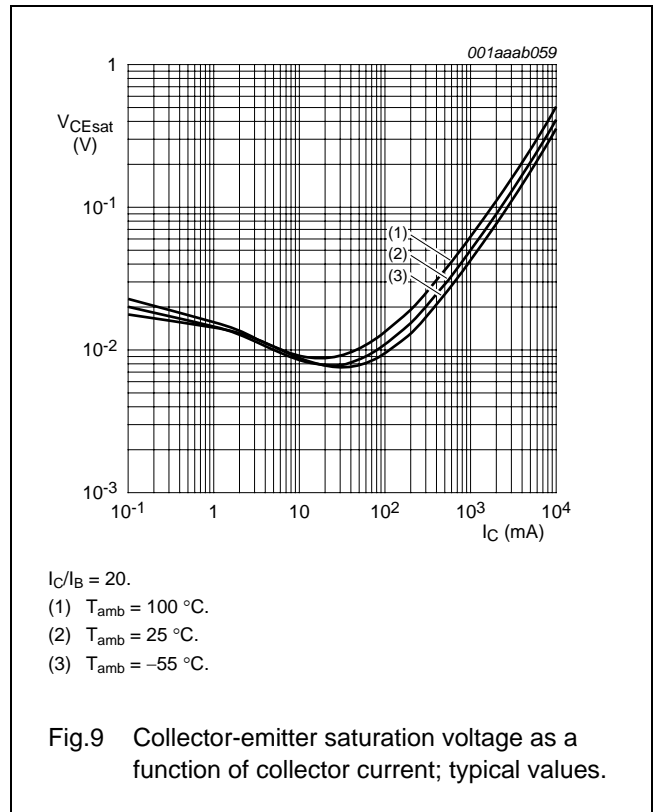
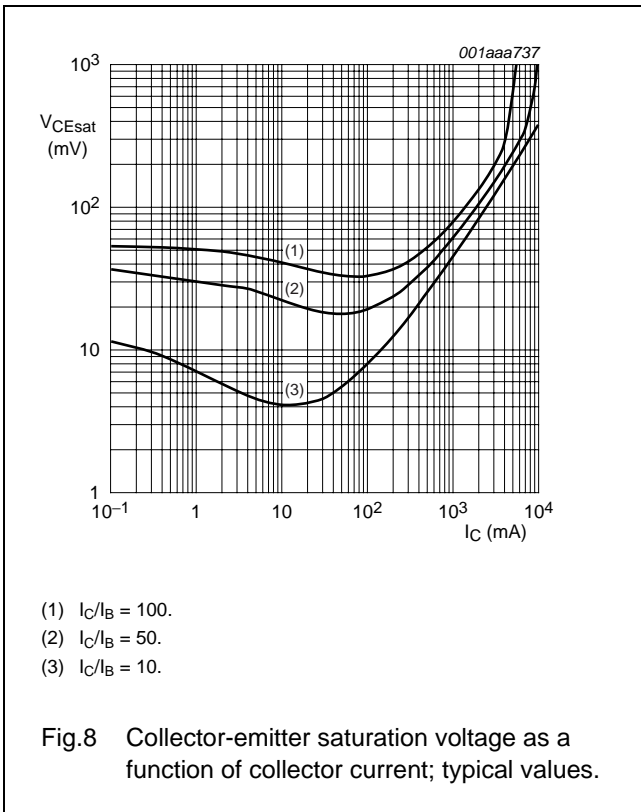
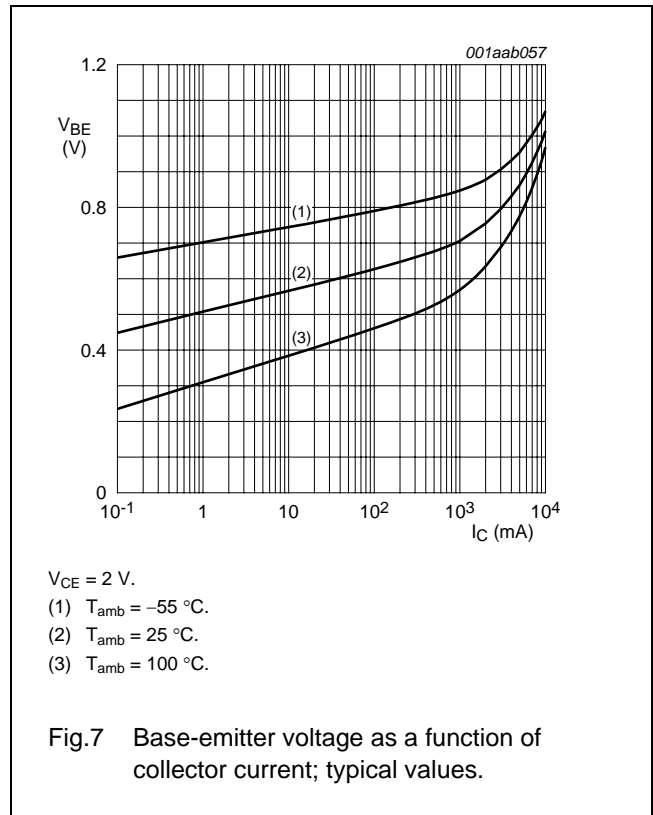
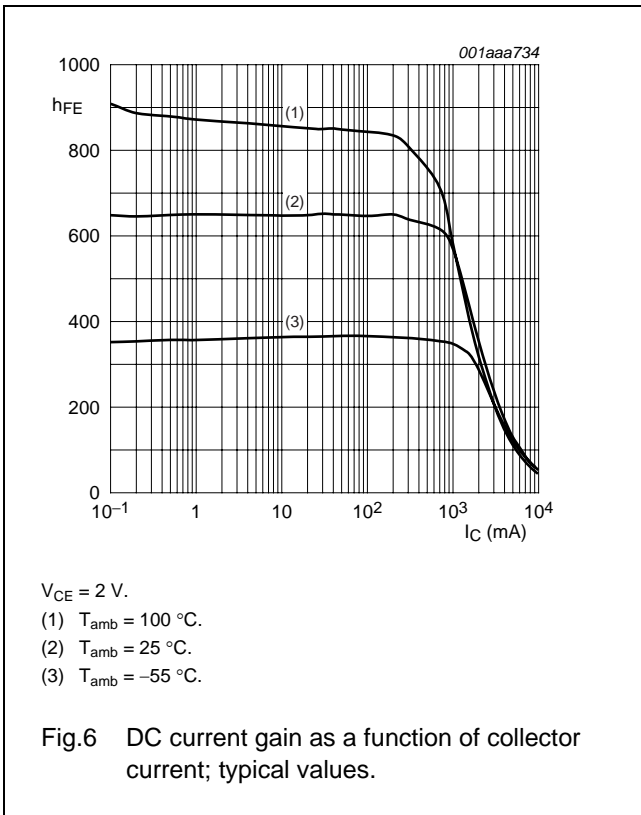
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 80\text{ V}; I_E = 0\text{ A}$	–	–	100	nA
		$V_{CB} = 80\text{ V}; I_E = 0\text{ A};$ $T_j = 150\text{ °C}$	–	–	50	$\mu\text{A}$
$I_{CES}$	collector-emitter cut-off current	$V_{CE} = 80\text{ V}; V_{BE} = 0\text{ V}$	–	–	100	nA
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	–	–	100	nA
$h_{FE}$	DC current gain	$V_{CE} = 2\text{ V}; I_C = 0.5\text{ A}$	250	400	–	–
		$V_{CE} = 2\text{ V}; I_C = 1\text{ A};$ note 1	250	400	–	–
		$V_{CE} = 2\text{ V}; I_C = 2\text{ A};$ note 1	175	270	–	–
		$V_{CE} = 2\text{ V}; I_C = 4\text{ A};$ note 1	80	140	–	–
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 0.5\text{ A}; I_B = 50\text{ mA}$	–	25	40	mV
		$I_C = 1\text{ A}; I_B = 50\text{ mA}$	–	55	80	mV
		$I_C = 2\text{ A}; I_B = 40\text{ mA}$	–	110	160	mV
		$I_C = 4\text{ A}; I_B = 200\text{ mA};$ note 1	–	170	230	mV
		$I_C = 5\text{ A}; I_B = 500\text{ mA};$ note 1	–	200	270	mV
$R_{CEsat}$	equivalent on-resistance	$I_C = 5\text{ A}; I_B = 500\text{ mA};$ note 1	–	40	54	$\text{m}\Omega$
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 0.5\text{ A}; I_B = 50\text{ mA}$	–	0.78	0.85	V
		$I_C = 1\text{ A}; I_B = 50\text{ mA}$	–	0.79	0.9	V
		$I_C = 1\text{ A}; I_B = 100\text{ mA};$ note 1	–	0.82	0.95	V
		$I_C = 4\text{ A}; I_B = 400\text{ mA};$ note 1	–	0.95	1.05	V
$V_{BEon}$	base-emitter turn-on voltage	$I_C = 2\text{ A}; V_{CE} = 2\text{ V}$	–	0.78	0.85	V
$f_T$	transition frequency	$I_C = 100\text{ mA}; V_{CE} = 10\text{ V};$ $f = 100\text{ MHz}$	120	150	–	MHz
$C_c$	collector capacitance	$I_E = I_e = 0\text{ A}; V_{CB} = 10\text{ V};$ $f = 1\text{ MHz}$	–	35	50	pF

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



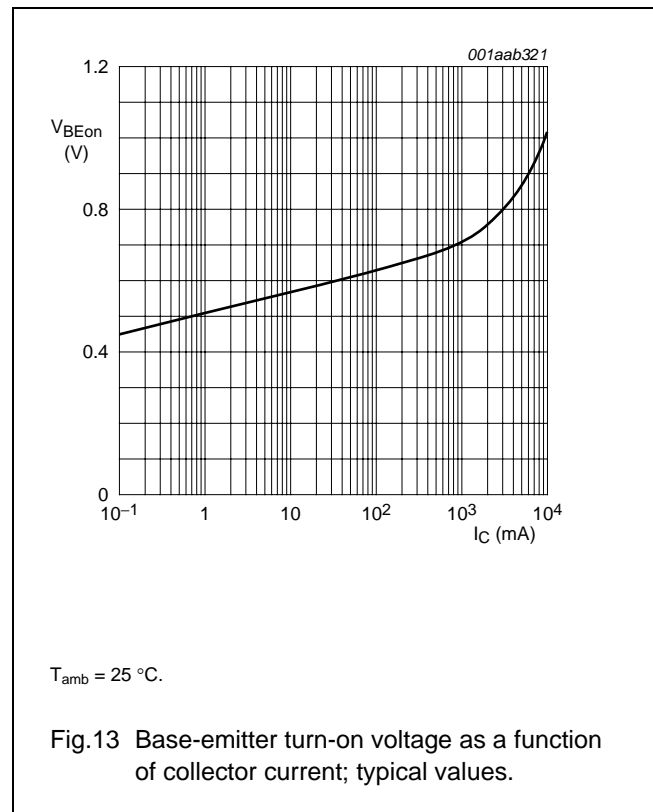
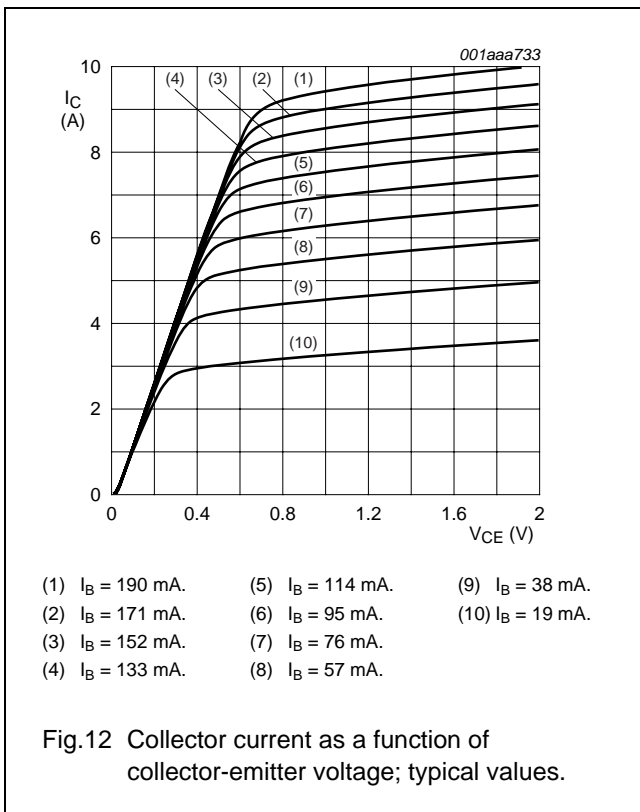
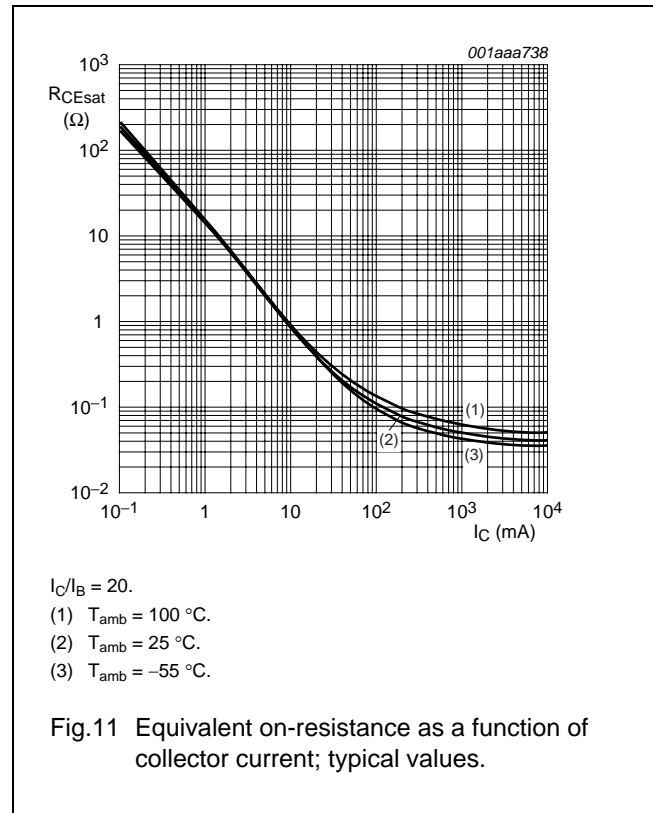
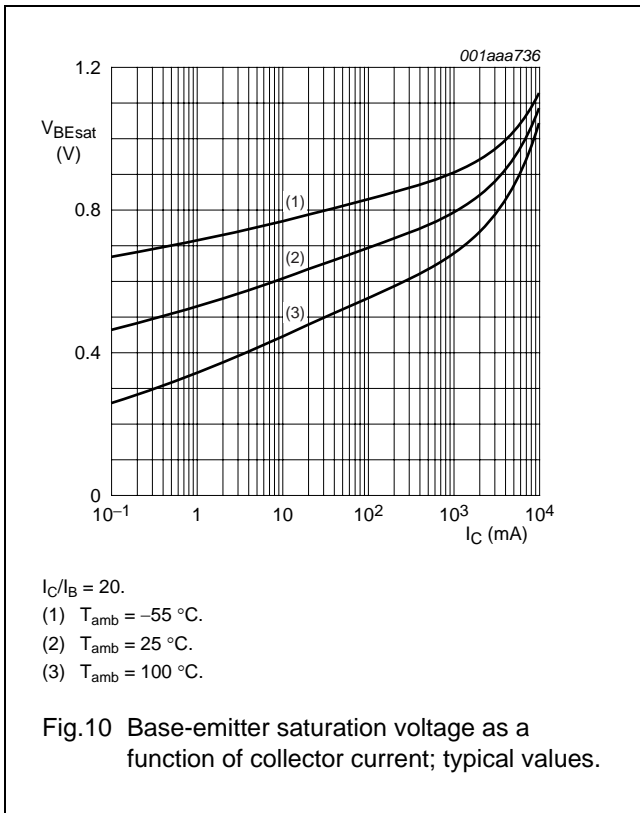
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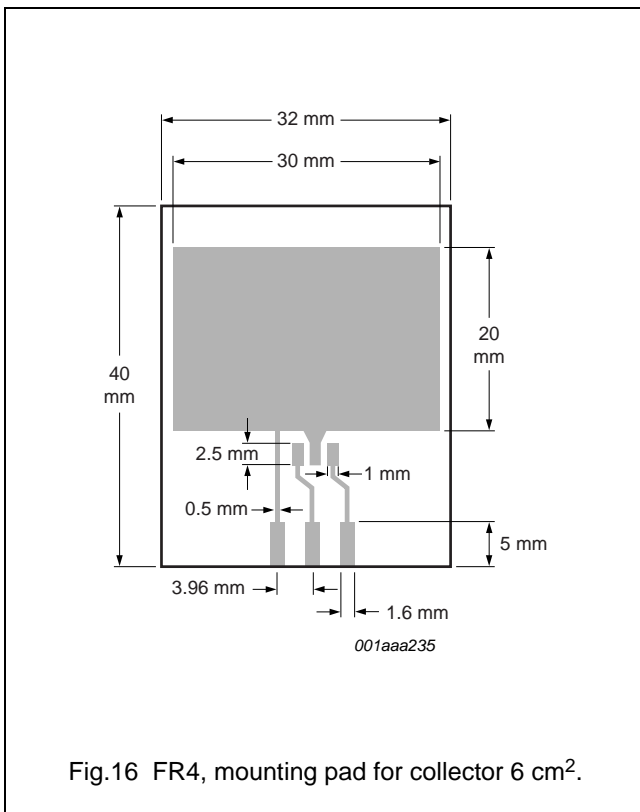
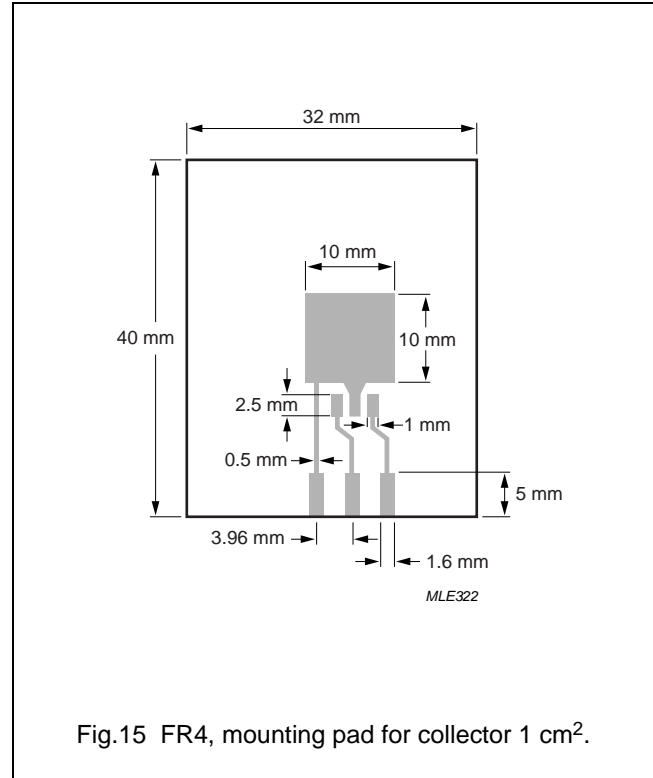
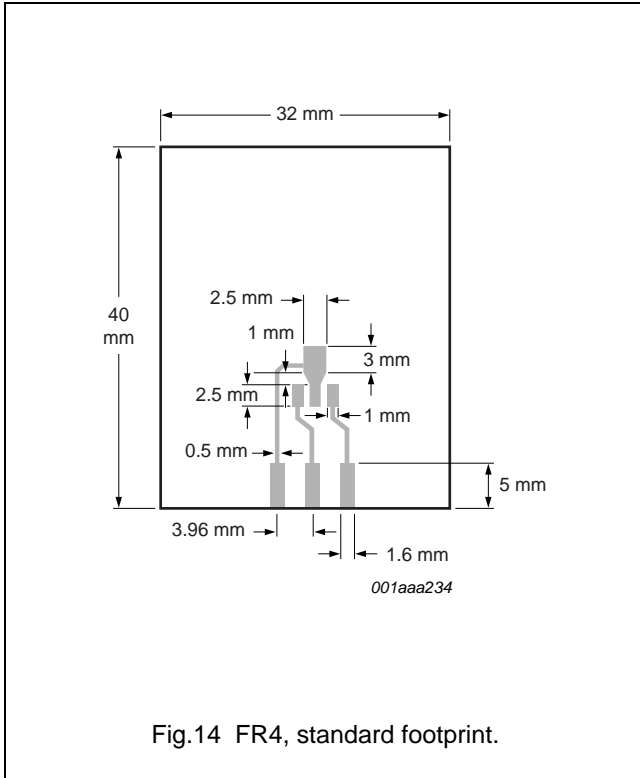
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Reference mounting conditions



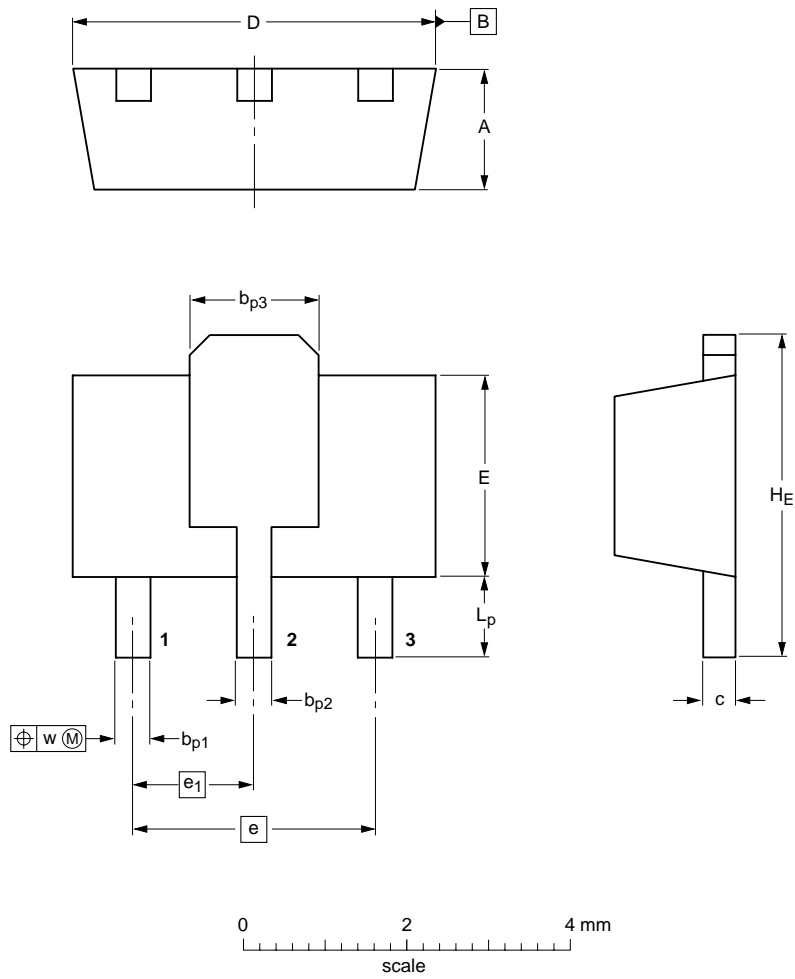
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PACKAGE OUTLINE

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

SOT89



DIMENSIONS (mm are the original dimensions)

UNIT	A	b <sub>p1</sub>	b <sub>p2</sub>	b <sub>p3</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	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

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**DATA SHEET STATUS**

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	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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## **Customer notification**

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## **Contact information**

For additional information please visit: <http://www.nxp.com>

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