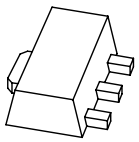


2PB1424

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

Rev. 02 — 15 January 2007 Product data sheet

1. Product profile

1.1 General description

PNP low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a medium power SOT89 (SC-62/TO-243) flat lead Surface-Mounted Device (SMD) plastic package.

NPN complement: 2PD2150.

1.2 Features

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- High efficiency due to less heat generation
- Smaller required Printed-Circuit Board (PCB) area than for conventional transistors

1.3 Applications

- DC-to-DC conversion
- MOSFET gate driving
- Motor control
- Charging circuits
- Power switches (e.g. motors, fans)
- Thin Film Transistor (TFT) backlight inverter

1.4 Quick reference data

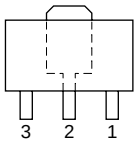
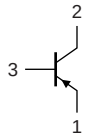
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	–20	V
I_C	collector current			-	-	–3	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	–5	A
V_{CEsat}	collector-emitter saturation voltage	I_C = –2 A; I_B = –0.1 A	[1]	-	–0.2	–0.5	V

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

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	emitter		
2	collector		
3	base		

006aaa231

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
2PB1424	SC-62	plastic surface-mounted package; collector pad for good heat transfer; 3 leads	SOT89

4. Marking

Table 4. Marking codes

Type number	Marking code
2PB1424	M1

5. Limiting values

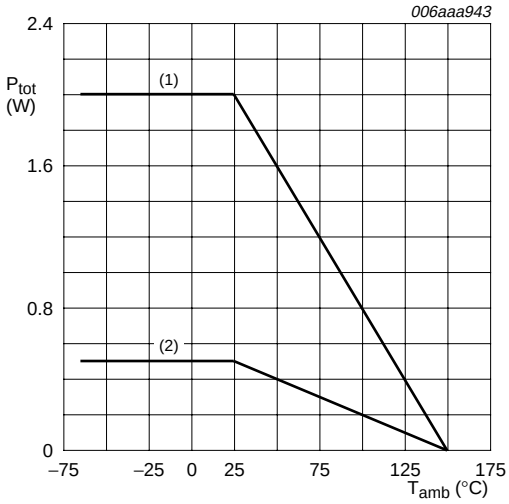
Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	–20	V
V_{CEO}	collector-emitter voltage	open base		-	–20	V
V_{EBO}	emitter-base voltage	open collector		-	–6	V
I_C	collector current			-	–3	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	–5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	0.5	W
			[2]	-	2	W
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			–65	+150	°C
T_{stg}	storage temperature			–65	+150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.



(1) Ceramic PCB, Al_2O_3, standard footprint

(2) FR4 PCB, standard footprint

Fig 1. Power derating curves

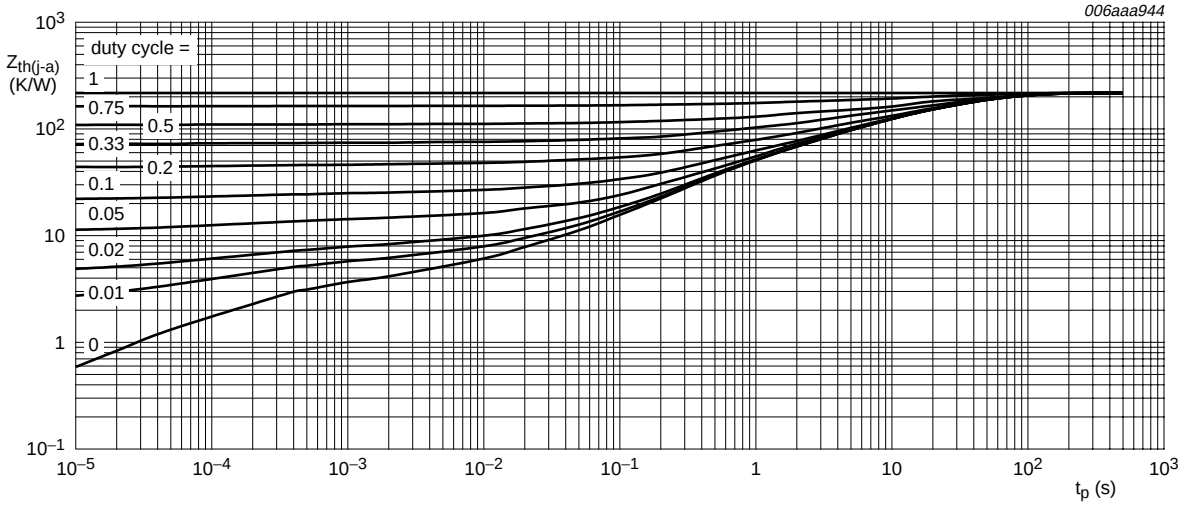
6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	250	K/W
			[2]	-	-	62	K/W

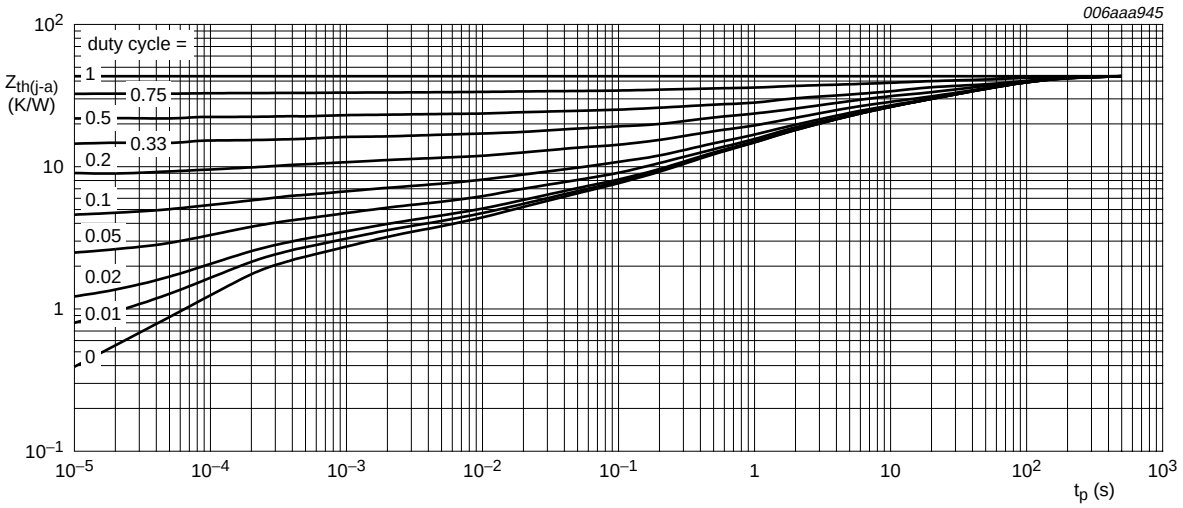
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.



FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



Ceramic PCB, Al_2O_3, standard footprint

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

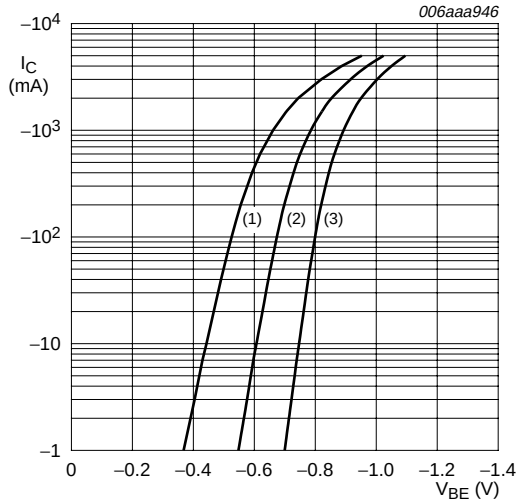
7. Characteristics

Table 7. Characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = –20 V; I_E = 0 A		-	-	–0.1	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = –5 V; I_C = 0 A		-	-	–0.1	µA
h_{FE}	DC current gain	V_{CE} = –2 V; I_C = –0.1 A		180	-	390	
V_{CEsat}	collector-emitter saturation voltage	I_C = –2 A; I_B = –0.1 A	[1]	-	–0.2	–0.5	V
f_T	transition frequency	V_{CE} = –2 V; I_E = 0.5 A; f = 100 MHz		-	125	-	MHz
C_{ib}	common-base input capacitance	V_{EB} = –5 V; $I_E = i_e$ = 0 A; f = 1 MHz		-	130	-	pF
C_{ob}	common-base output capacitance	V_{CB} = –10 V; $I_E = i_e$ = 0 A; f = 1 MHz		-	37	-	pF

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



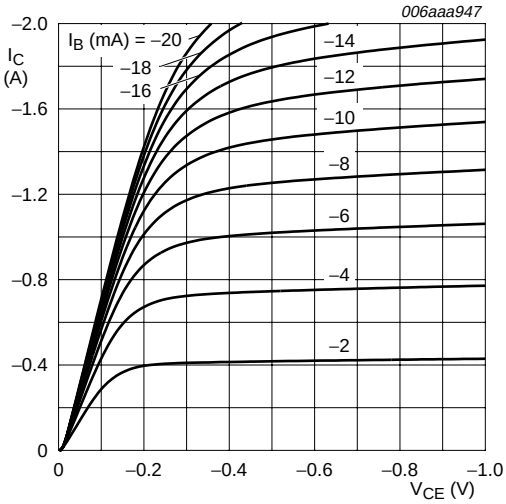
V_{CE} = −2 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

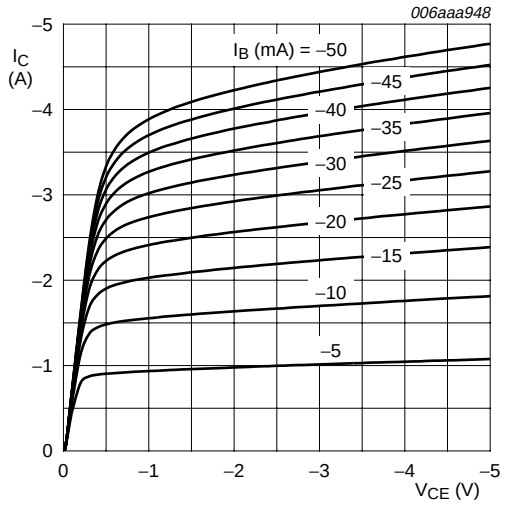
(3) T_{amb} = −40 °C

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



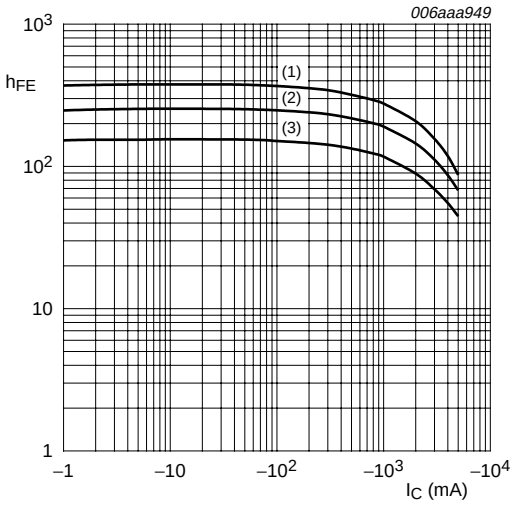
T_{amb} = 25 °C

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



T_{amb} = 25 °C

Fig 6. Collector current as a function of collector-emitter voltage; typical values



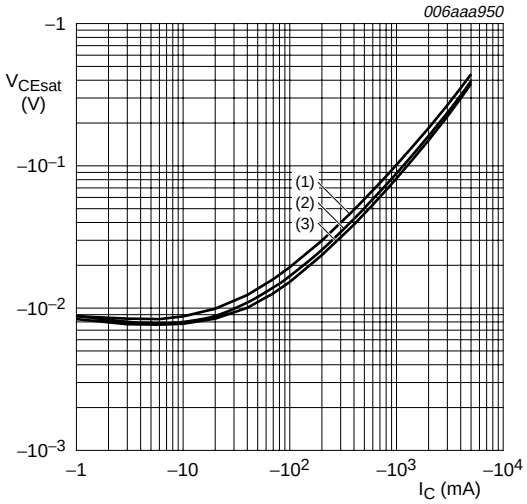
V_{CE} = −2 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

Fig 7. DC current gain as a function of collector current; typical values



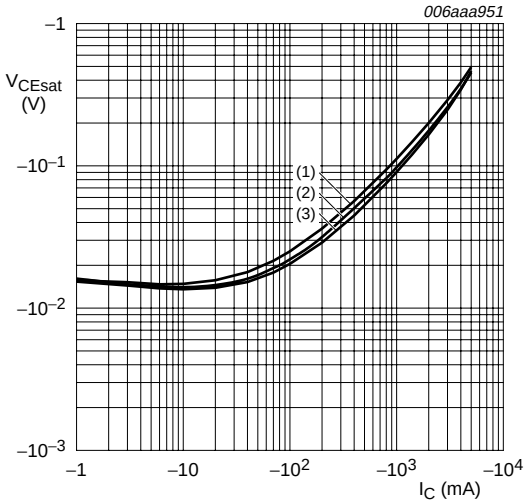
I_C/I_B = 10

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

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



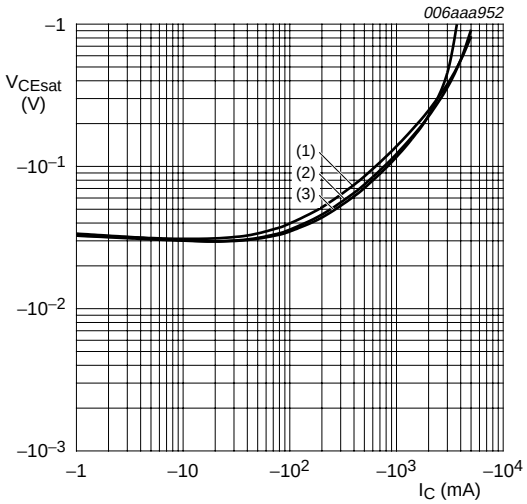
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −40 °C

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



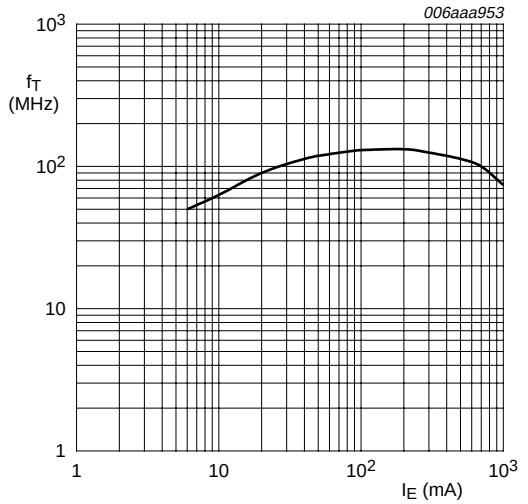
I_C/I_B = 50

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

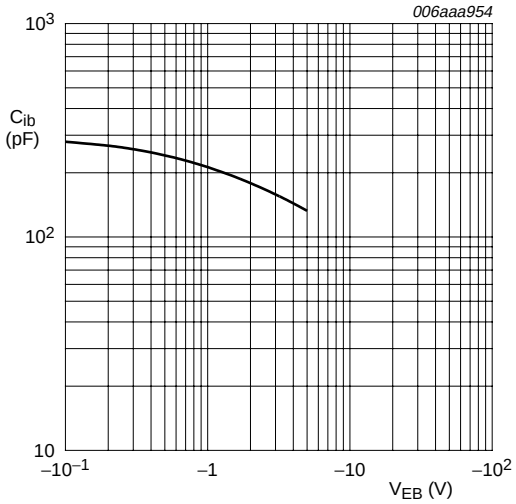
(3) T_{amb} = −40 °C

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



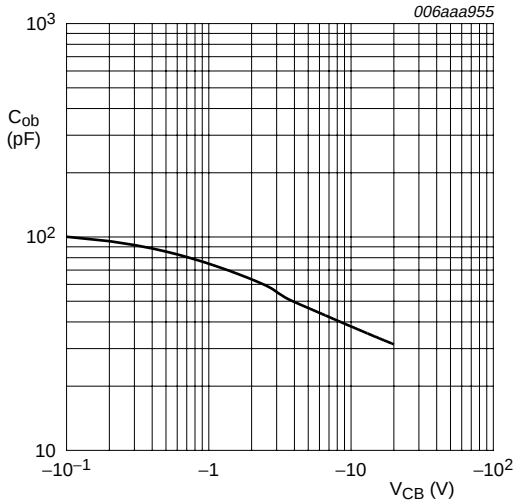
T_{amb} = 25 °C; V_{CE} = −2 V

Fig 11. Transition frequency as a function of emitter current; typical values



T_{amb} = 25 °C; f = 1 MHz; $I_E = i_e$ = 0 A

Fig 12. Common-base input capacitance as a function of emitter-base voltage; typical values



T_{amb} = 25 °C; f = 1 MHz; $I_E = i_e$ = 0 A

Fig 13. Common-base output capacitance as a function of collector-base voltage; typical values

8. Package outline

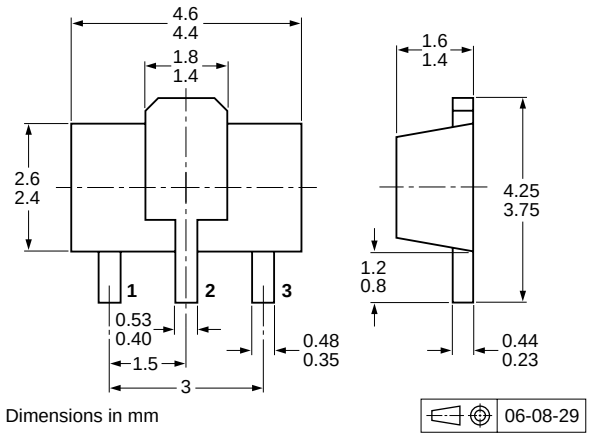


Fig 14. Package outline SOT89 (SC-62/TO-243)

9. Packing information

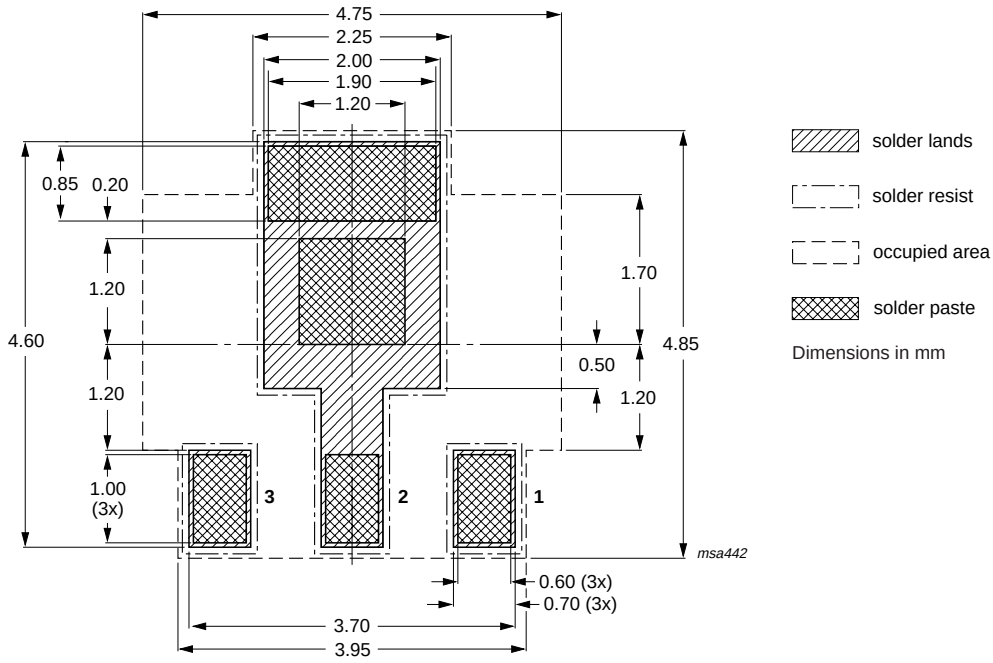
Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.[1]

Type number	Package	Description	Packing quantity	
			1000	4000
2PB1424	SOT89	8 mm pitch, 12 mm tape and reel	-115	-135

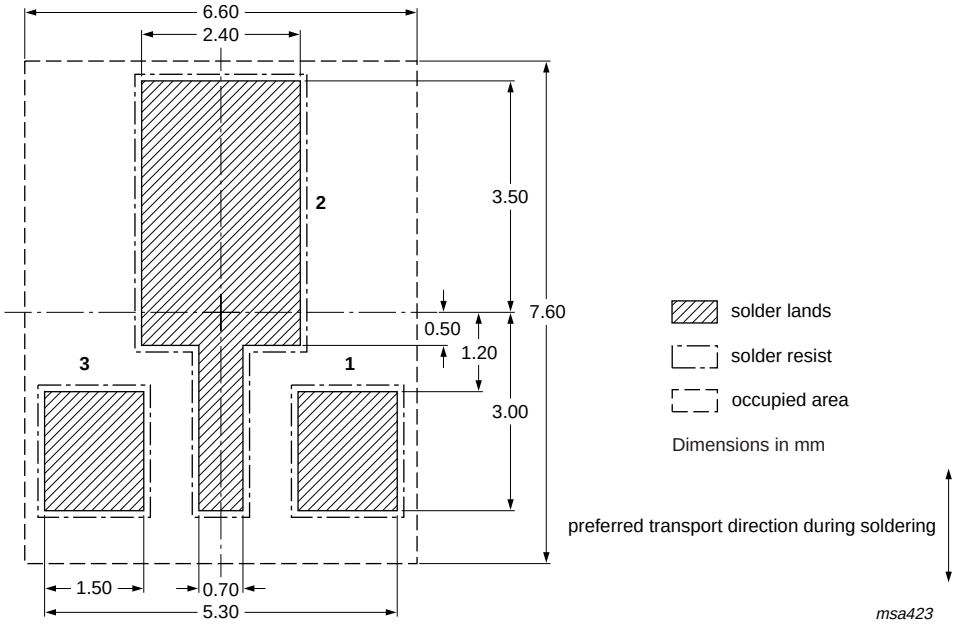
[1] For further information and the availability of packing methods, see Section 13.

10. Soldering



SOT89 standard mounting conditions for reflow soldering

Fig 15. Reflow soldering footprint SOT89 (SC-62/TO-243)



Not recommended for wave soldering

Fig 16. Wave soldering footprint SOT89 (SC-62/TO-243)

11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
2PB1424_2	20070115	Product data sheet	-	2PB1424_1
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Table 1 “Quick reference data”: I_C collector current added • Table 1 “Quick reference data”: I_{CM} peak collector current maximum value adapted • Table 1 “Quick reference data”: V_{CEsat} collector-emitter saturation voltage added • Table 5 “Limiting values”: V_{CBO} collector-base voltage maximum value adapted • Table 5 “Limiting values”: V_{EBO} emitter-base voltage maximum value adapted • Table 5 “Limiting values”: I_C collector current maximum value adapted • Table 5 “Limiting values”: I_{CM} peak collector current maximum value adapted • Table 5 “Limiting values”: P_{tot} total power dissipation for ceramic PCB condition added • Figure 1 “Power derating curves”: adapted • Table 6 “Thermal characteristics”: adapted • Table 6 “Thermal characteristics”: $R_{th(j-a)}$ thermal resistance from junction to ambient for ceramic PCB condition added • Figure 2: t_p pulse time redefined to pulse duration • Figure 3: added • Table 7 “Characteristics”: I_{CBO} collector-base cut-off current conditions adapted • Table 7 “Characteristics”: V_{CEsat} collector-emitter saturation voltage typical value added • Table 7 “Characteristics”: f_T transition frequency conditions and typical value adapted • Table 7 “Characteristics”: C_{ib} common-base input capacitance added • Table 7 “Characteristics”: C_{ob} common-base output capacitance added • Figure 4, 6, 10, 11, 12, 13 and 16: added • Figure 5, 7, 8 and 9: adapted • Section 12 “Legal information”: updated		
2PB1424_1	20050502	Product data sheet	-	-

12. Legal information

12.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

12.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

12.3 Disclaimers

General — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of a NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

Terms and conditions of sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nxp.com/profile/terms, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

12.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

13. Contact information

For additional information, please visit: **http://www.nxp.com**

For sales office addresses, send an email to: **salesaddresses@nxp.com**

14. Contents

1	**Product profile**	**1**
1.1	General description	1
1.2	Features	1
1.3	Applications	1
1.4	Quick reference data	1
2	**Pinning information**	**2**
3	**Ordering information**	**2**
4	**Marking**	**2**
5	**Limiting values**	**2**
6	**Thermal characteristics**	**3**
7	**Characteristics**	**5**
8	**Package outline**	**9**
9	**Packing information**	**9**
10	**Soldering**	**10**
11	**Revision history**	**11**
12	**Legal information**	**12**
12.1	Data sheet status	12
12.2	Definitions	12
12.3	Disclaimers	12
12.4	Trademarks	12
13	**Contact information**	**12**
14	**Contents**	**13**

For more information, please visit: http://www.nxp.com
For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 15 January 2007
Document identifier: 2PB1424_2