

2PD2150

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

Rev. 01 — 22 April 2005

Product data sheet

1. Product profile

1.1 General description

NPN low V_{CEsat} Breakthrough in Small Signal (BISS) transistor in a SOT89 (SC-62/TO-243) SMD plastic package.

PNP complement: 2PB1424.

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

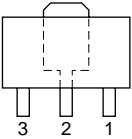
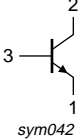
Table 1: Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	20	V
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	3	A
h_{FE}	DC current gain	$V_{CE} = 2$ V; $I_C = 0.1$ A	180	-	390	

PHILIPS

2. Pinning information

Table 2: Pinning

Pin	Description	Simplified outline	Symbol
1	emitter		
2	collector		
3	base		

3. Ordering information

Table 3: Ordering information

Type number	Package		
	Name	Description	Version
2PD2150	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
2PD2150	M2

5. Limiting values

Table 5: Limiting values

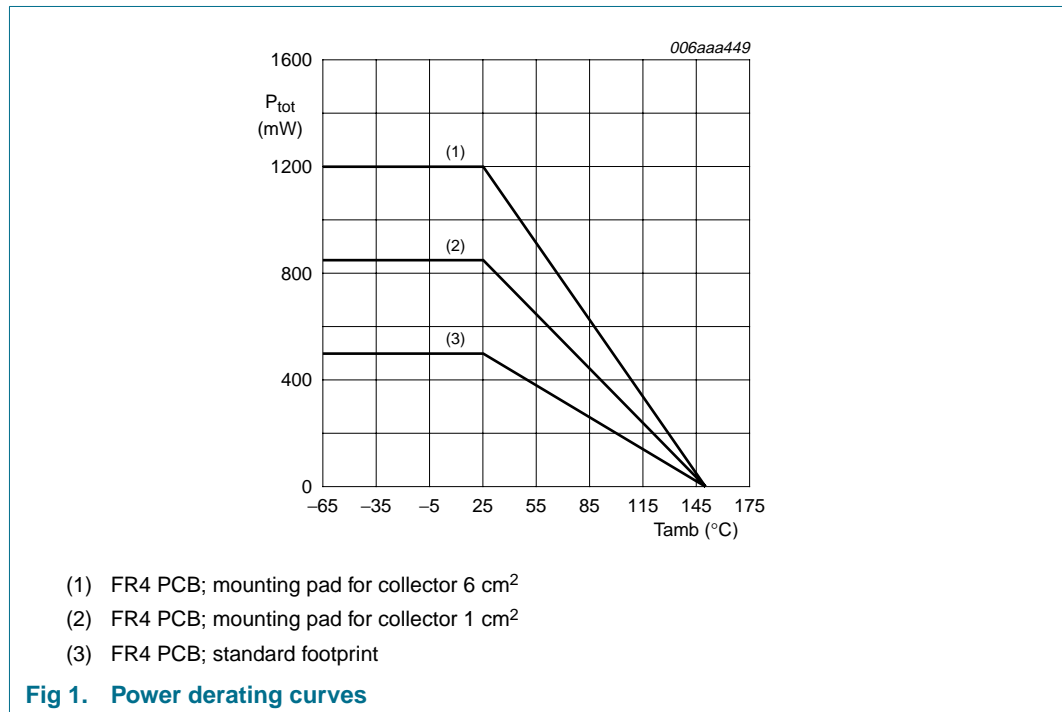
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit	
V_{CBO}	collector-base voltage	open emitter	-	40	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	single pulse; $t_p \leq 1$ ms	-	3	A	
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	500	mW
			[2]	-	850	mW
			[3]	-	1200	mW
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 an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

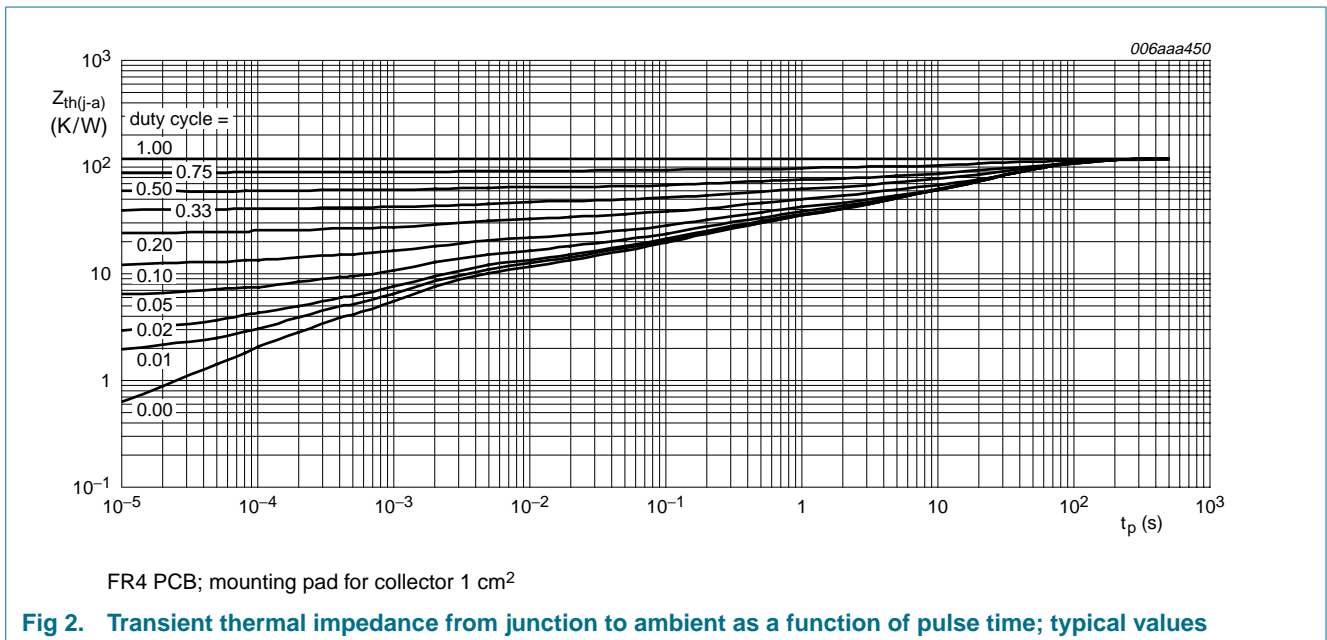


6. Thermal characteristics

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]	-	-	147	K/W
			[3]	-	-	104	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	20	K/W	

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².
- [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 m².



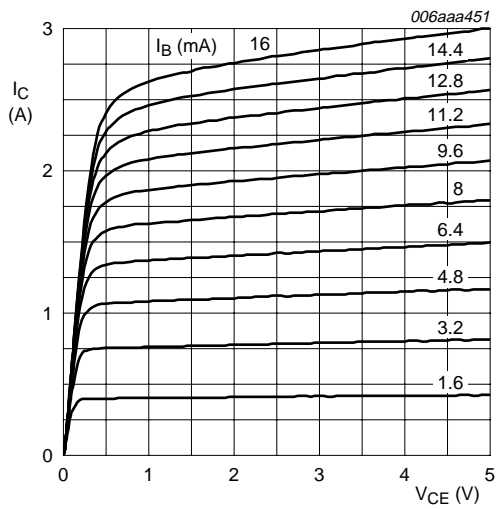
7. Characteristics

Table 7: Characteristics

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

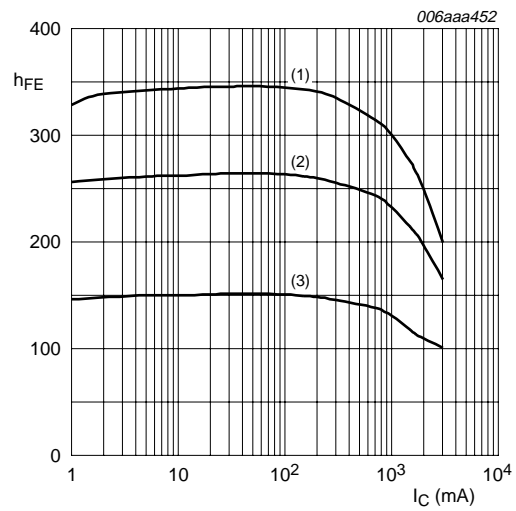
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = 30\text{ V}; I_E = 0\text{ A}$	-	-	0.1	μA
		$V_{CB} = 30\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	10	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	-	-	0.1	μA
h_{FE}	DC current gain	$V_{CE} = 2\text{ V}; I_C = 0.1\text{ A}$	180	-	390	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 2\text{ A}; I_B = 100\text{ mA}$	-	-	0.5	V
V_{BEon}	base-emitter turn-on voltage	$V_{CE} = 10\text{ V}; I_C = 5\text{ mA}$	[1]	-	0.7	V
		$V_{CE} = 1\text{ V}; I_C = 1\text{ A}$	[1]	-	1	V
f_T	transition frequency	$I_C = 500\text{ mA}; V_{CE} = 2\text{ V}; f = 100\text{ MHz}$	-	220	-	MHz
C_c	collector capacitance	$V_{CB} = 10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$	-	20	-	pF

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



$T_{amb} = 25\text{ }^\circ\text{C}$

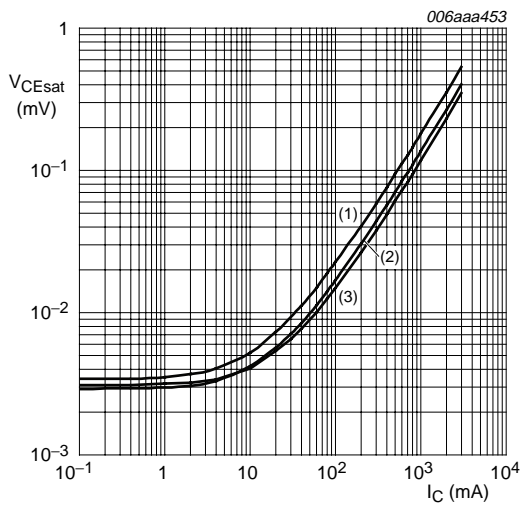
Fig 3. Collector current as a function of collector-emitter voltage; typical values



$V_{CE} = 2\text{ V}$

- (1) $T_{amb} = 100\text{ }^\circ\text{C}$
- (2) $T_{amb} = 25\text{ }^\circ\text{C}$
- (3) $T_{amb} = -55\text{ }^\circ\text{C}$

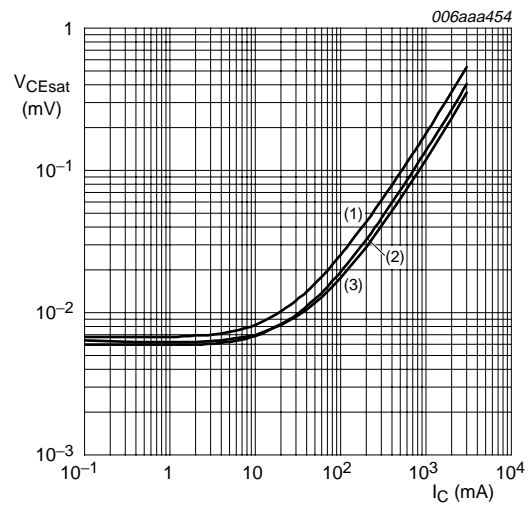
Fig 4. DC current gain as a function of collector current; typical values



$I_C/I_B = 10$

- (1) $T_{amb} = 100\text{ }^\circ\text{C}$
- (2) $T_{amb} = 25\text{ }^\circ\text{C}$
- (3) $T_{amb} = -55\text{ }^\circ\text{C}$

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

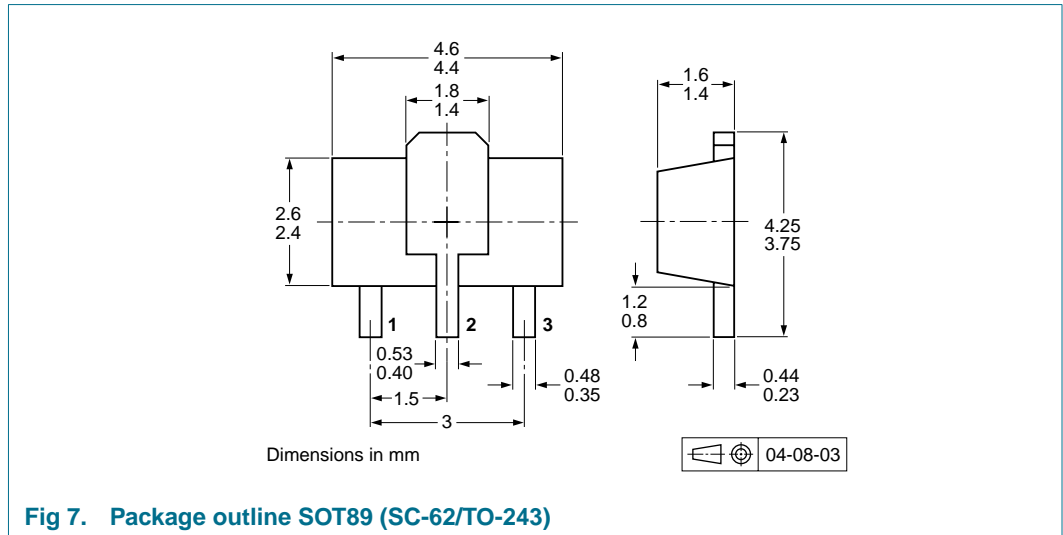


$I_C/I_B = 20$

- (1) $T_{amb} = 100\text{ }^\circ\text{C}$
- (2) $T_{amb} = 25\text{ }^\circ\text{C}$
- (3) $T_{amb} = -55\text{ }^\circ\text{C}$

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

8. Package outline



9. Packing information

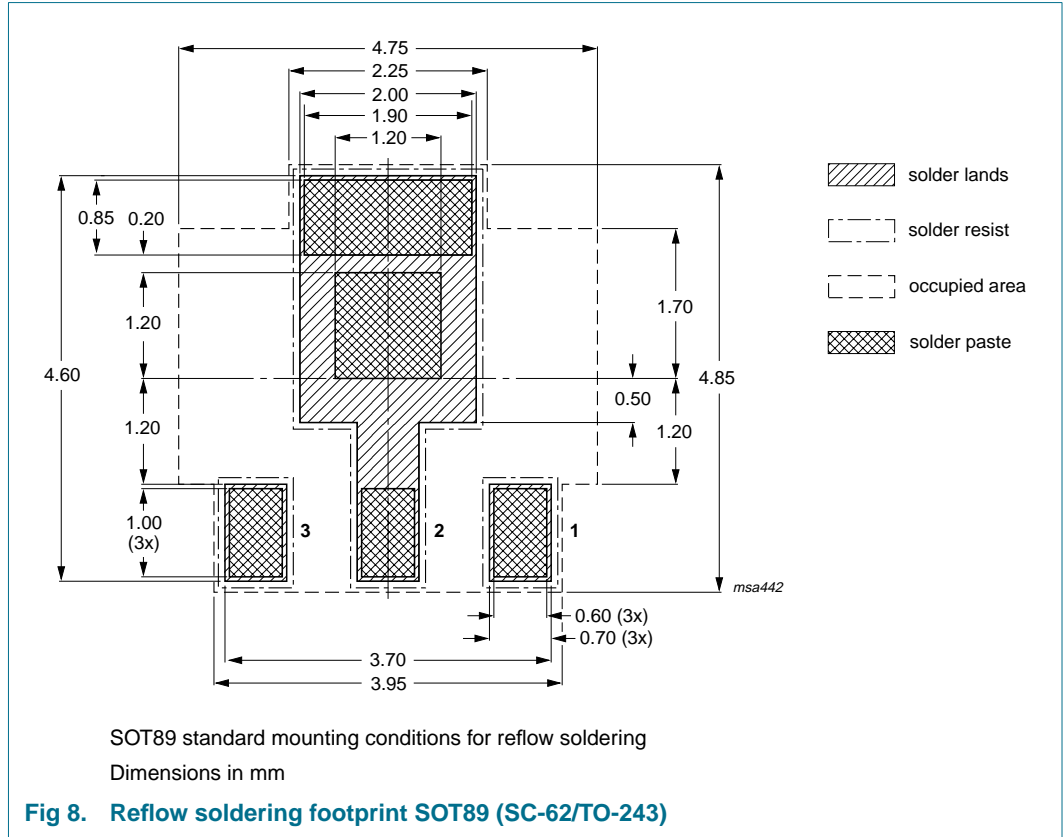
Table 8: Packing methods

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

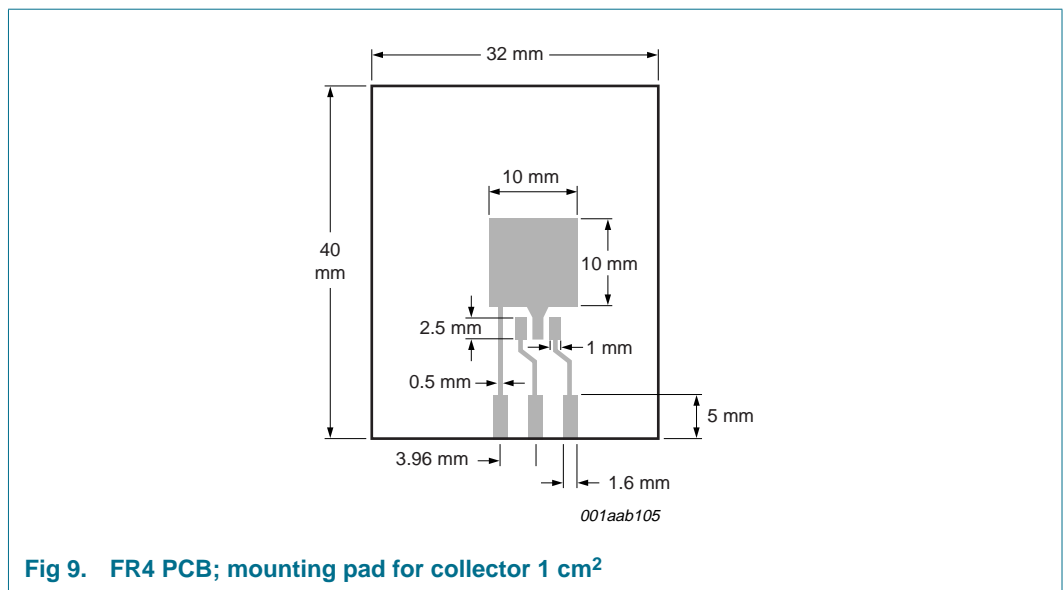
Type number	Package	Description	Packing quantity	
			1000	4000
2PD2150	SOT89	8 mm pitch, 12 mm tape and reel	-115	-135

[1] For further information and the availability of packing methods, see [Section 16](#).

10. Soldering



11. Mounting



12. Revision history

Table 9: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
2PD2150_1	20050422	Product data sheet	-	9397 750 14987	-

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).

[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.

14. 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.

15. Disclaimers

Life support — 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 license 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.

16. Contact information

For additional information, please visit: <http://www.semiconductors.philips.com>

For sales office addresses, send an email to: sales.addresses@www.semiconductors.philips.com

17. 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	3
6	Thermal characteristics	4
7	Characteristics	5
8	Package outline	7
9	Packing information	7
10	Soldering	8
11	Mounting	8
12	Revision history	9
13	Data sheet status	10
14	Definitions	10
15	Disclaimers	10
16	Contact information	10



© Koninklijke Philips Electronics N.V. 2005

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.

Date of release: 22 April 2005
Document number: 9397 750 14987

Published in The Netherlands