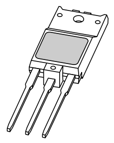


BU2527AX

Silicon diffused power transistor

Rev. 02 — 12 December 2005 **Product data sheet**

1. Product profile

1.1 General description

High-voltage, high-speed NPN power switching transistor in a SOT399 isolated plastic package.

1.2 Features

- Isolated package
- Fast switching

1.3 Applications

- High frequency Cathode Ray Tube (CRT) monitors

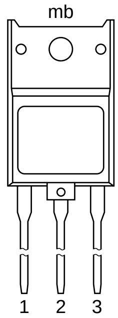
1.4 Quick reference data

- $V_{CESM} \leq 1500$ V
- $I_C \leq 12$ A
- $P_{tot} \leq 45$ W
- $h_{FE} = 7$ (typ)

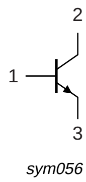
2. Pinning information

Table 1: Pinning

Pin	Description	Simplified outline	Symbol
1	base		
2	collector		
3	emitter		
mb	isolated		



SOT399



3. Ordering information

Table 2: Ordering information

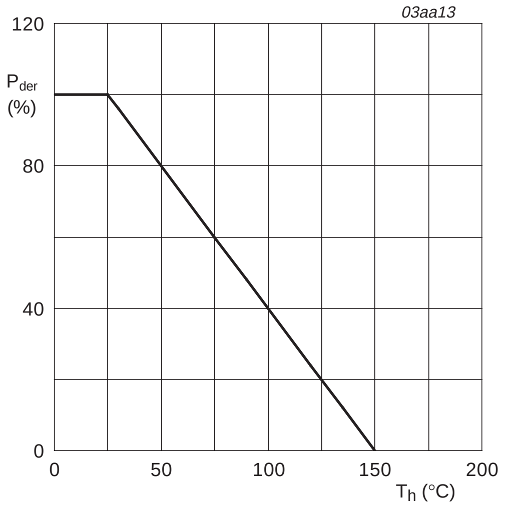
Type number	Package		
	Name	Description	Version
BU2527AX	-	plastic single-ended through-hole package; mountable to heatsink; 1 mounting hole; 3 in-line leads	SOT399

4. Limiting values

Table 3: Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CESM}	collector-emitter peak voltage	V_{BE} = 0 V	-	1500	V
V_{CEO}	collector-emitter voltage	open base	-	800	V
I_C	collector current		-	12	A
I_{CM}	peak collector current		-	30	A
I_B	base current		-	8	A
I_{BM}	peak base current		-	12	A
I_{BR}	reverse base current	averaged over any 20 ms period	-	0.2	A
I_{BRM}	peak reverse base current		-	7	A
P_{tot}	total power dissipation	$T_h \leq 25$ °C; see Figure 1	-	45	W
T_{stg}	storage temperature		–55	+150	°C
T_j	junction temperature		-	150	°C



With heatsink compound

$$P_{der} = \frac{P_{tot}}{P_{tot(25\,°C)}} \times 100\,\%$$

Fig 1. Normalized total power dissipation as a function of heatsink temperature

5. Thermal characteristics

Table 4: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	without heatsink compound	-	-	3.7	K/W
		with heatsink compound; see Figure 2	-	-	2.8	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	35	-	K/W

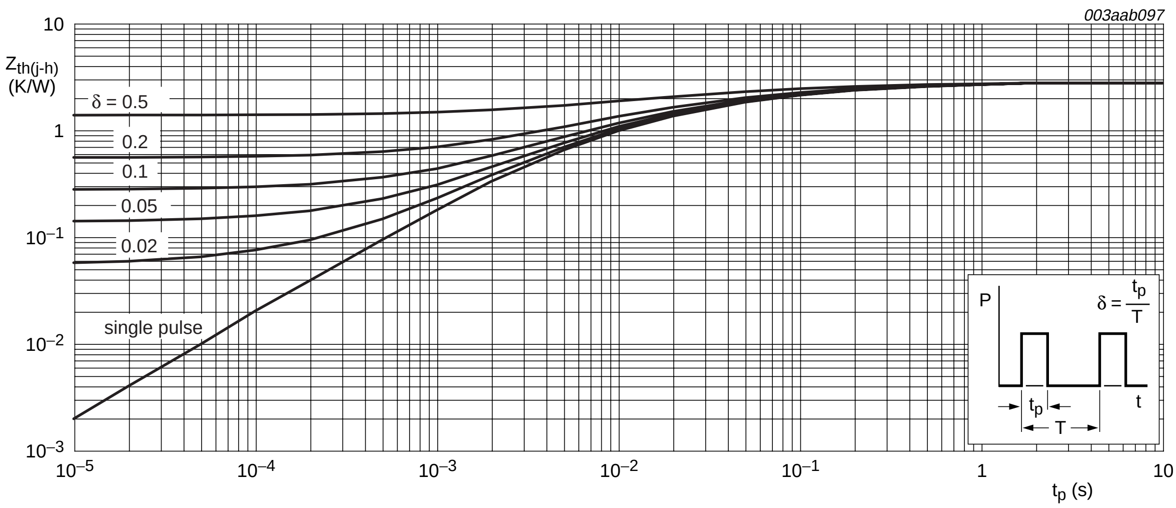


Fig 2. Transient thermal impedance from junction to heatsink as a function of pulse duration

6. Isolation characteristics

Table 5: Isolation limiting values and characteristics

T_h = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{isolRM}	repetitive peak isolation voltage	RH ≤ 65 %; clean and dust free	[1]	-	-	2500	V
C_{isol}	isolation capacitance	f = 1 MHz	[2]	-	22	-	pF

[1] From all three terminals to external heatsink.

[2] From pin 2 to external heatsink.

7. Characteristics

Table 6: Characteristics

T_{mb} = 25 °C; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{CES}	collector-emitter cut-off current	V_{BE} = 0 V; V_{CE} = V_{CESM}	[1]	-	-	0.25	mA
		V_{BE} = 0 V; V_{CE} = V_{CESM}; T_j = 125 °C	[1]	-	-	2	mA
I_{EBO}	emitter-base cut-off current	V_{EB} = 7.5 V; I_C = 0 A		-	-	0.25	mA
$V_{(BR)EBO}$	open-collector emitter-base breakdown voltage	I_B = 1 mA		7.5	13.5	-	V
V_{CEOsus}	collector-emitter sustaining voltage	I_B = 0 A; I_C = 100 mA; L_C = 25 mH; see Figure 3 and 4		800	-	-	V
V_{CEsat}	collector-emitter saturation voltage	I_C = 6 A; I_B = 1.2 A; see Figure 8		-	-	5	V
V_{BEsat}	base-emitter saturation voltage	I_C = 6 A; I_B = 1.2 A; see Figure 9 and 10		-	-	1.3	V
h_{FE}	DC current gain	I_C = 1 A; V_{CE} = 5 V; see Figure 7		6	10	21	-
		I_C = 6 A; V_{CE} = 5 V; see Figure 7		5	7	9	-
Dynamic characteristics							
C_C	collector capacitance	I_E = 0 A; V_{CB} = 10 V; f = 1 MHz		-	145	-	pF
t_s	storage time	I_{Csat} = 6 A; L_C = 170 µH; L_B = 0.6 µH V_{BB} = –2 V; C_{fb} = 5.4 nF; $I_{B(end)}$ = 0.55 A; –dI_B/dt = 3.33 A/µs; see Figure 5 and 6		-	1.7	2	µs
t_f	fall time			-	0.1	0.2	µs

[1] Measured with half sine-wave voltage (curve tracer).

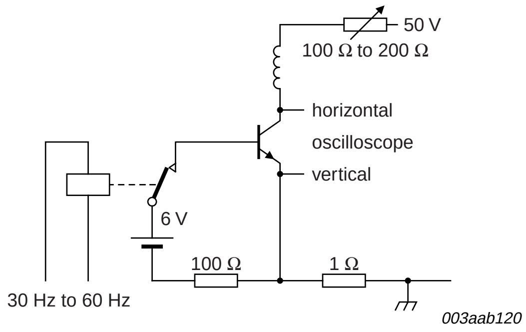


Fig 3. Test circuit for collector-emitter sustaining voltage

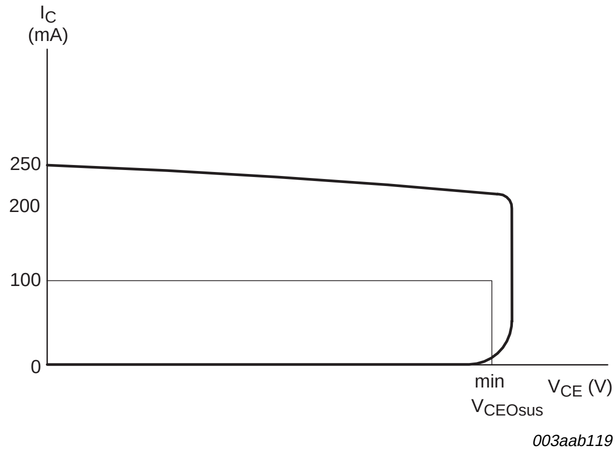


Fig 4. Oscilloscope display for collector-emitter sustaining voltage test waveform

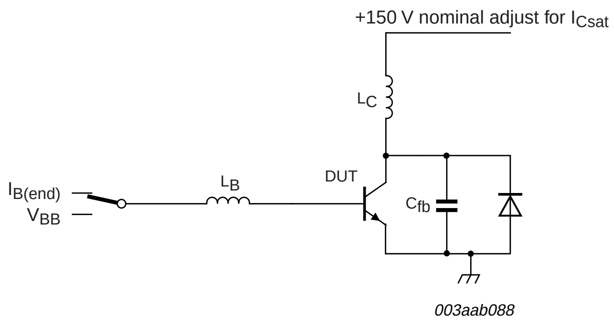


Fig 5. Test circuit for inductive load switching

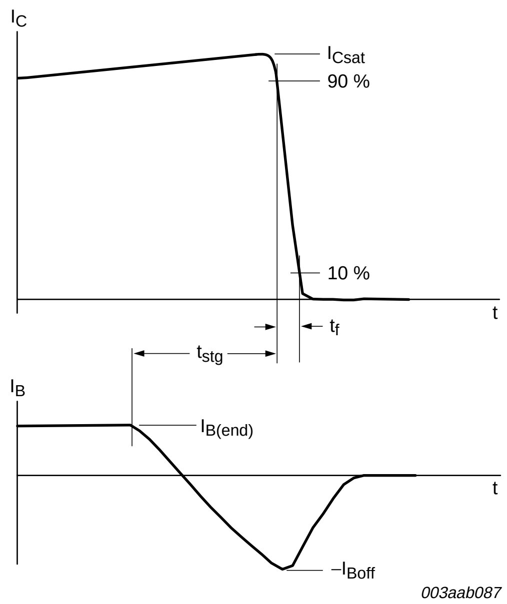
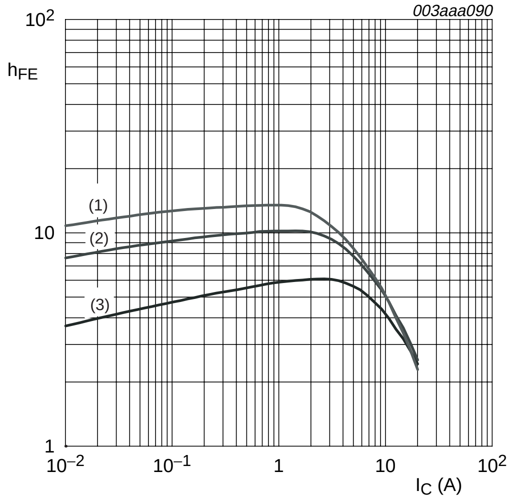


Fig 6. Switching times definitions for inductive load



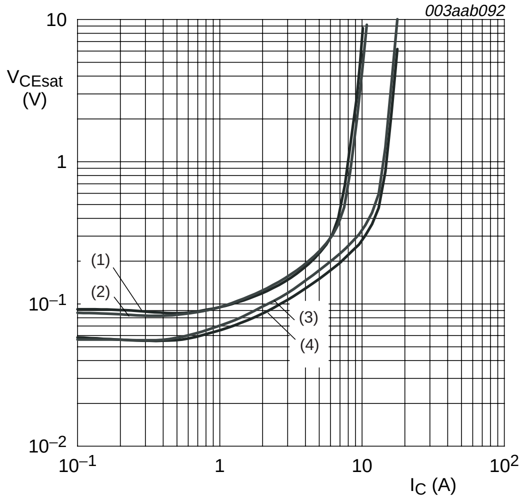
V_{CE} = 5 V

(1) T_j = 85 °C

(2) T_j = 25 °C

(3) T_j = −40 °C

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



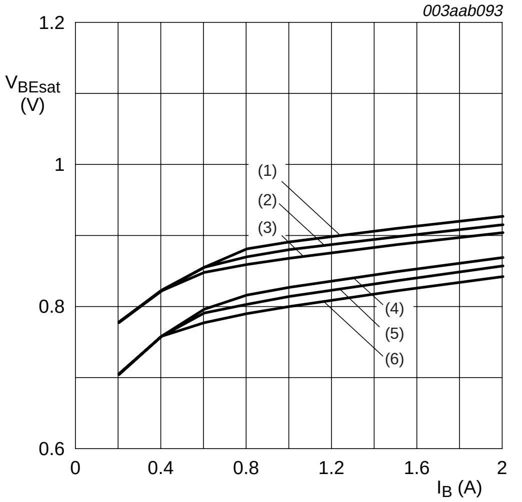
(1) T_j = 25 °C; h_{FE} = 5

(2) T_j = 85 °C; h_{FE} = 5

(3) T_j = 85 °C; h_{FE} = 3

(4) T_j = 25 °C; h_{FE} = 3

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



(1) T_j = 25 °C; I_C = 7 A

(2) T_j = 25 °C; I_C = 6 A

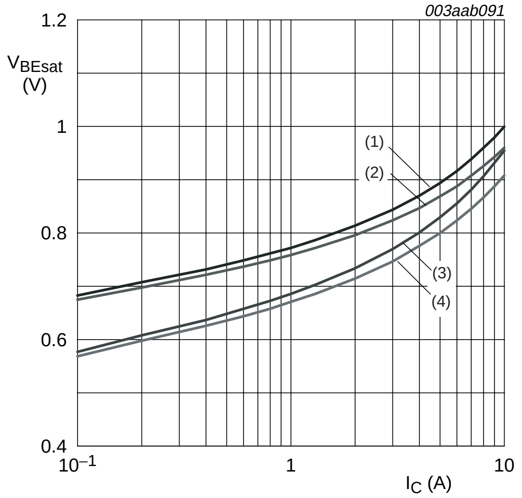
(3) T_j = 25 °C; I_C = 5 A

(4) T_j = 85 °C; I_C = 7 A

(5) T_j = 85 °C; I_C = 6 A

(6) T_j = 85 °C; I_C = 5 A

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



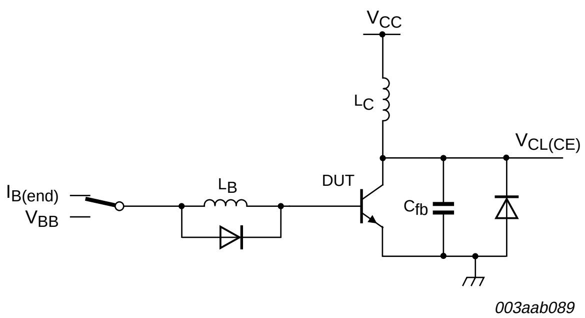
(1) T_j = 25 °C; h_{FE} = 3

(2) T_j = 25 °C; h_{FE} = 5

(3) T_j = 85 °C; h_{FE} = 3

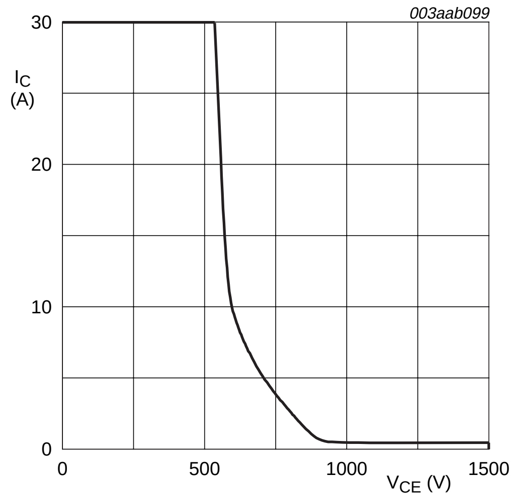
(4) T_j = 85 °C; h_{FE} = 5

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



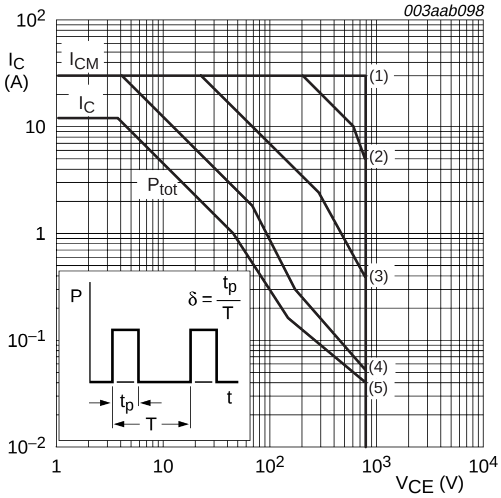
$V_{CL(CE)} \leq 1500$ V; $V_{CC} = 140$ V; $V_{BB} = -4$ V;
$L_B = 3$ µH; $L_C = 100$ µH to 200 µH;
$C_{fb} = 1$ nF to 22 nF

Fig 11. Test circuit for reverse bias safe operating area



$T_j \leq T_{j(max)}$

Fig 12. Reverse bias safe operating area



$T_{mb} \leq 25$ °C; mounted with heatsink compound; δ = 0.01

(1) $t_p = 40$ µs; δ = 0.01

(2) $t_p = 100$ µs; δ = 0.01

(3) $t_p = 1$ ms; δ = 0.01

(4) $t_p = 10$ ms; δ = 0.01

(5) DC

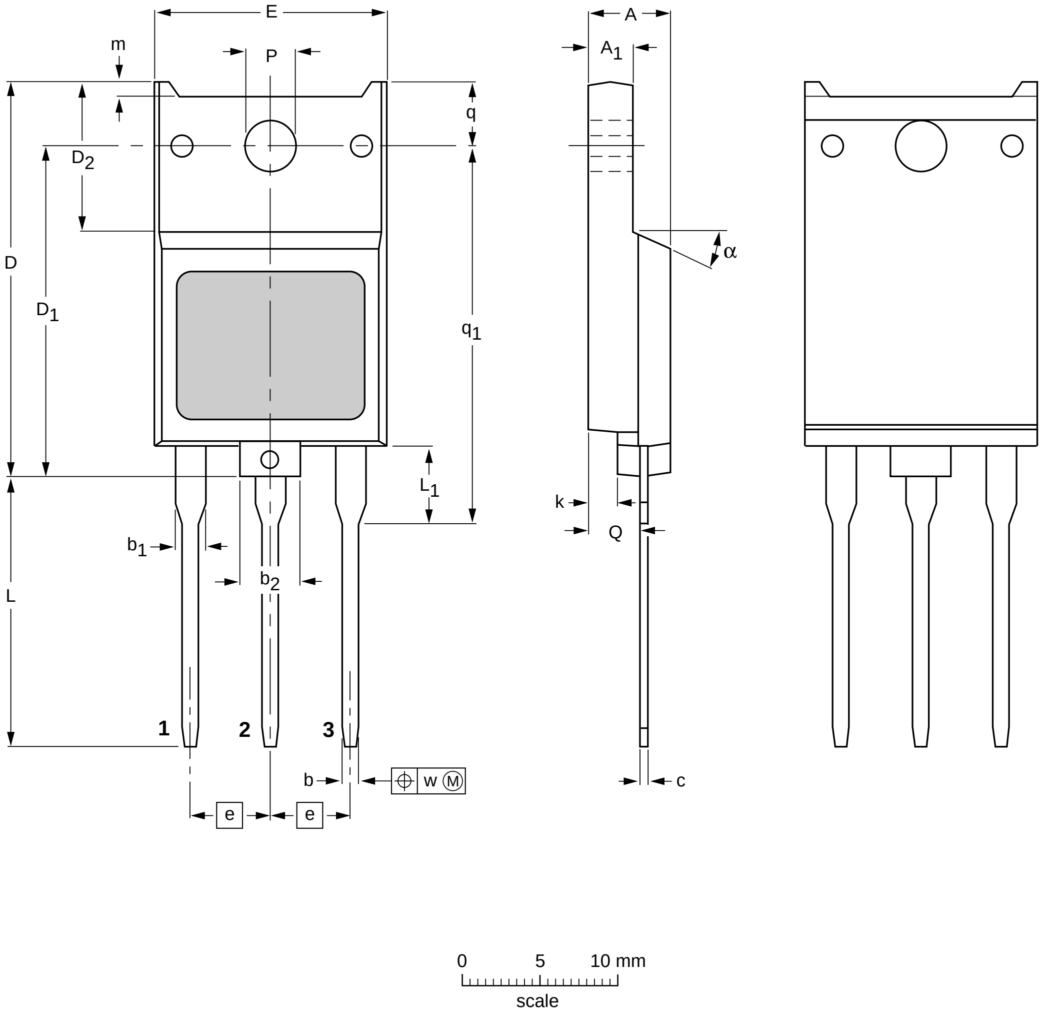
Fig 13. Forward bias safe operating area

8. Package information

Epoxy meets requirements of UL94 V-0 at ⅛ inch.

9. Package outline

Plastic single-ended through-hole package; mountable to heatsink; 1 mounting hole; 3 in-line leads SOT399



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	b_2	c	D	D_1	D_2	E	e	k	L	L_1 (1)	m	P	Q	q	q_1	w	α
mm	5.8 4.8	3.3 2.7	1.2 0.9	2.2 1.8	4.7 4.2	0.9 0.6	27 26	22.5 21.5	10.2 9.9	16 15	5.45	2.2 1.8	19.1 18.1	5.4 4.8	0.8 0.6	3.4 3.1	3.4 3.2	4.7 4.3	25.7 25.1	0.4	27° 23°

Note

1. Tinning of terminals are uncontrolled within zone L_1.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT399						98-11-06

Fig 14. Package outline SOT399

10. Revision history

Table 7: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
BU2527AX_2	20051212	Product data sheet	-	-	BU2527AX_1
Modifications:	• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.				
BU2527AX_1	19970901	Product specification	-	-	-

11. 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.

12. 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 makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

13. 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.

14. Trademarks

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

15. 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**

16. Contents

Date of release: 12 December 2005
Document number: BU2527AX_2

Published in The Netherlands