

PMLL4148L; PMLL4448

High-speed switching diodes

Rev. 06 — 4 April 2005

Product data sheet

1. Product profile

1.1 General description

Single high-speed switching diodes, fabricated in planar technology, and encapsulated in small hermetically sealed glass SOD80C SMD packages.

Table 1: Product overview

Type number	Package		Configuration
	Philips	JEITA	
PMLL4148L	SOD80C	-	single diode
PMLL4448	SOD80C	-	single diode

1.2 Features

- Small hermetically sealed glass SMD package
- High switching speed: ≤ 4 ns
- Continuous reverse voltage: ≤ 75 V
- Repetitive peak reverse voltage: ≤ 100 V
- Repetitive peak forward current: ≤ 450 mA

1.3 Applications

- High-speed switching
- Inverse-polarity protection

1.4 Quick reference data

Table 2: Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_F	forward current		[1] -	-	200	mA
I_{FRM}	repetitive peak forward current		-	-	450	mA
V_R	reverse voltage		-	-	75	V
V_F	forward voltage	$I_F = 100$ mA	-	-	1000	mV
		PMLL4148L $I_F = 10$ mA	-	-	1000	mV
		PMLL4448 $I_F = 5$ mA	620	-	720	mV
t_{rr}	reverse recovery time		[2] -	-	4	ns



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

[2] When switched from $I_F = 10$ mA to $I_R = 60$ mA; $R_L = 100$ Ω ; measured at $I_R = 1$ mA

PHILIPS

2. Pinning information

Table 3: Pinning

Pin	Description	Simplified outline	Symbol
1	cathode		 sym006
2	anode		

[1] The marking band indicates the cathode.

3. Ordering information

Table 4: Ordering information

Type number	Package		
	Name	Description	Version
PMLL4148L	-	hermetically sealed glass surface mounted package; 2 connectors	SOD80C
PMLL4448	-	hermetically sealed glass surface mounted package; 2 connectors	SOD80C

4. Marking

Table 5: Marking codes

Type number	Marking code [1]
PMLL4148L	marking band
PMLL4448	marking band

[1] black: made in Philippines
brown: made in China

5. Limiting values

Table 6: Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	100	V
V_R	reverse voltage		-	75	V
I_F	forward current		[1] -	200	mA
I_{FRM}	repetitive peak forward current		-	450	mA
I_{FSM}	non-repetitive peak forward current	square wave	[2]		
		$t_p = 1 \mu\text{s}$	-	4	A
		$t_p = 1 \text{ms}$	-	1	A
		$t_p = 1 \text{s}$	-	0.5	A
P_{tot}	total power dissipation	$T_{amb} = 25 \text{ }^\circ\text{C}$	[1] -	500	mW

Table 6: Limiting values ...continued

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

Symbol	Parameter	Conditions	Min	Max	Unit
T_j	junction temperature		-	200	°C
T_{amb}	ambient temperature		-65	+200	°C
T_{stg}	storage temperature		-65	+200	°C

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

[2] $T_j = 25$ °C prior to surge

6. Thermal characteristics

Table 7: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	350	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	300	K/W

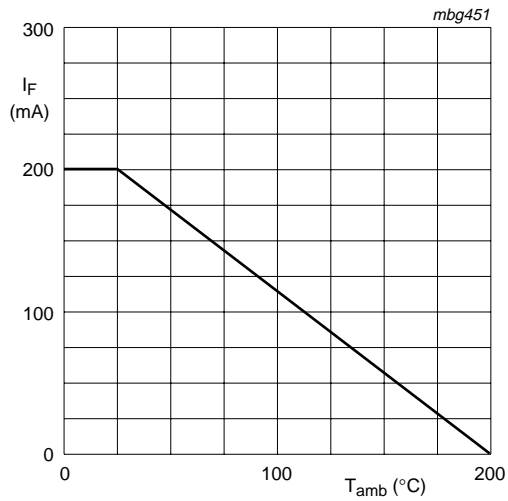
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

7. Characteristics

Table 8: Characteristics $T_{amb} = 25$ °C unless otherwise specified.

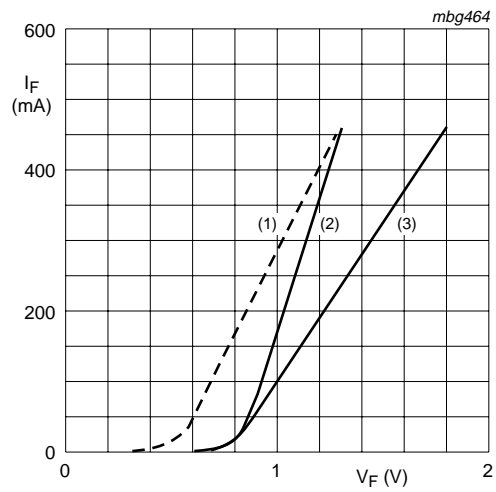
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_F	forward voltage	$I_F = 100$ mA	-	-	1000	mV
		PMLL4148L $I_F = 10$ mA	-	-	1000	mV
		PMLL4448 $I_F = 5$ mA	620	-	720	mV
I_R	reverse current	$V_R = 20$ V	-	-	25	nA
		$V_R = 20$ V; $T_j = 150$ °C	-	-	50	μA
		PMLL4448 $V_R = 20$ V; $T_j = 100$ °C	-	-	3	μA
C_d	diode capacitance	$V_R = 0$ V; $f = 1$ MHz	-	-	4	pF
t_{rr}	reverse recovery time		[1]	-	4	ns
V_{FR}	forward recovery voltage		[2]	-	2.5	V

[1] When switched from $I_F = 10$ mA to $I_R = 60$ mA; $R_L = 100$ Ω; measured at $I_R = 1$ mA[2] When switched from $I_F = 50$ mA; $t_r = 20$ ns



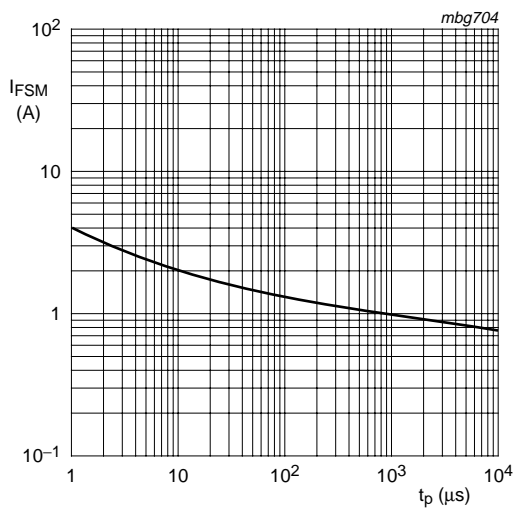
FR4 PCB; standard footprint

Fig 1. Maximum permissible forward current as a function of ambient temperature



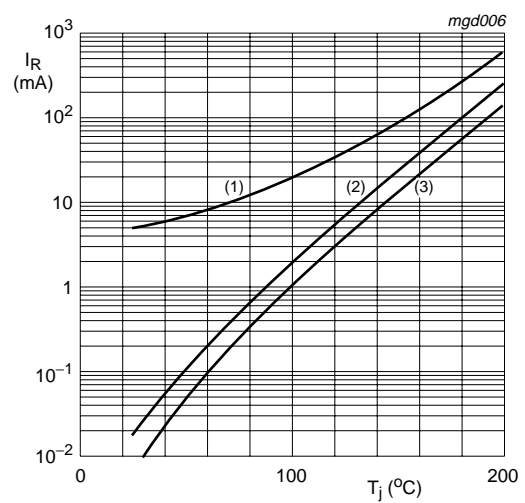
- (1) $T_j = 175$ °C; typical values
- (2) $T_j = 25$ °C; typical values
- (3) $T_j = 25$ °C; maximum values

Fig 2. Forward current as a function of forward voltage



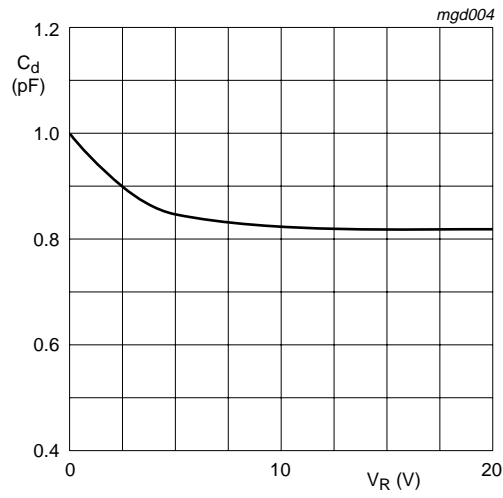
Based on square wave currents
 $T_j = 25$ °C prior to surge

Fig 3. Maximum permissible non-repetitive peak forward current as a function of pulse duration



- (1) $V_R = 75$ V; maximum values
- (2) $V_R = 75$ V; typical values
- (3) $V_R = 20$ V; typical values

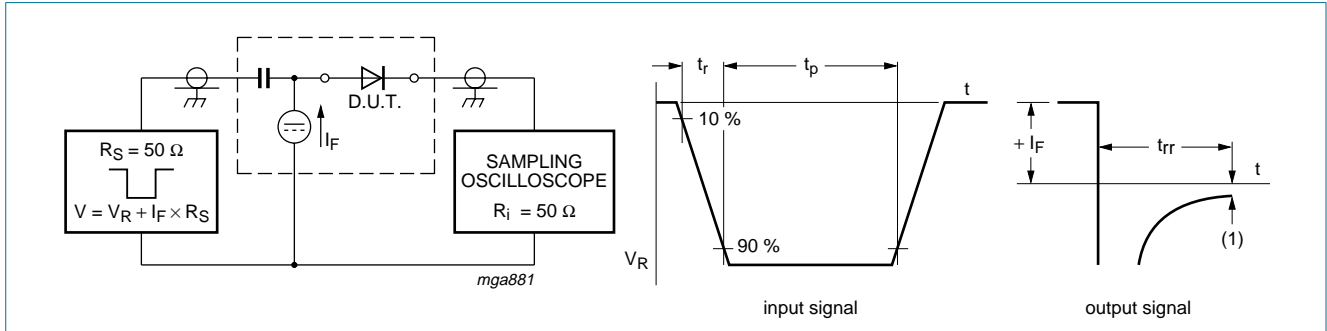
Fig 4. Reverse current as a function of junction temperature



$T_j = 25\text{ }^\circ\text{C}; f = 1\text{ MHz}$

Fig 5. Diode capacitance as a function of reverse voltage; typical values

8. Test information

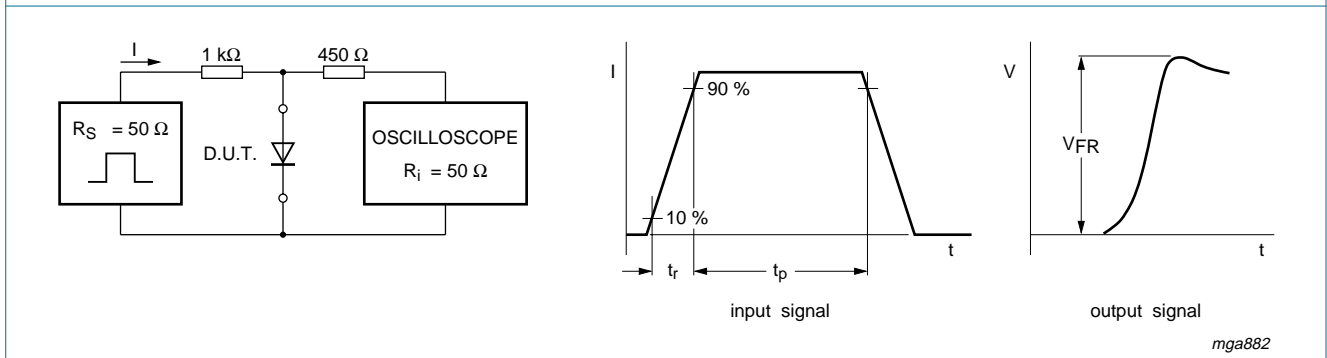


Input signal: Reverse pulse rise time $t_r = 0.6 \text{ ns}$; reverse voltage pulse duration $t_p = 100 \text{ ns}$; duty factor $\delta \leq 0.05$

Oscilloscope: Rise time $t_r = 0.35 \text{ ns}$

(1) $I_R = 1 \text{ mA}$

Fig 6. Reverse recovery time test circuit and waveforms



Input signal: Forward pulse rise time $t_r = 20 \text{ ns}$; forward current pulse duration $t_p \geq 100 \text{ ns}$; duty factor $\delta \leq 0.005$

Fig 7. Forward recovery voltage test circuit and waveforms

9. Package outline

Hermetically sealed glass surface mounted package; 2 connectors

SOD80C

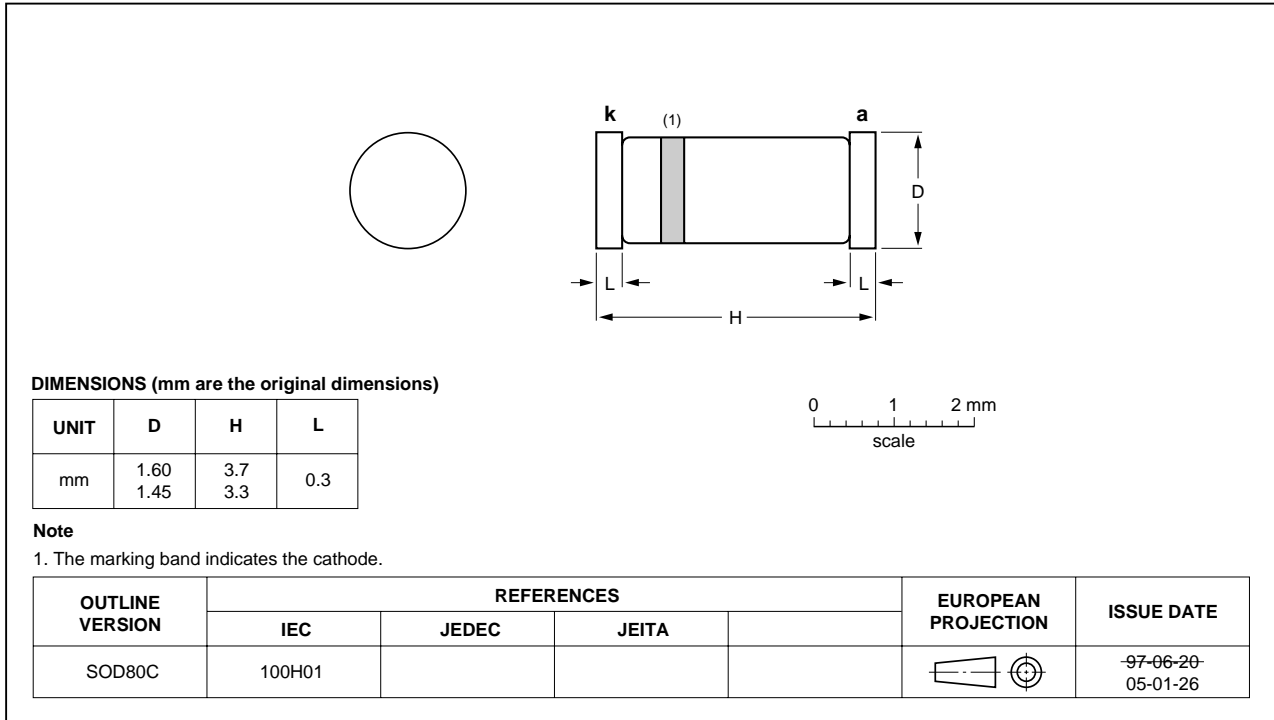


Fig 8. Package outline SOD80C

10. Packing information

Table 9: Packing methods

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

Type number	Package	Description	Packing quantity	
			2500	10000
PMLL4148L	SOD80C	4 mm pitch, 8 mm tape and reel	-115	-135
PMLL4448	SOD80C	4 mm pitch, 8 mm tape and reel	-115	-135

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

11. Soldering

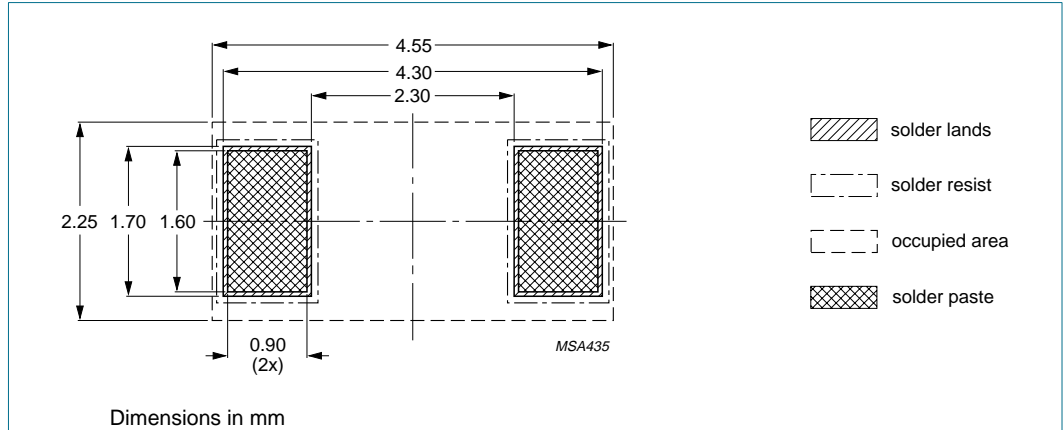


Fig 9. Reflow soldering footprint SOD80C

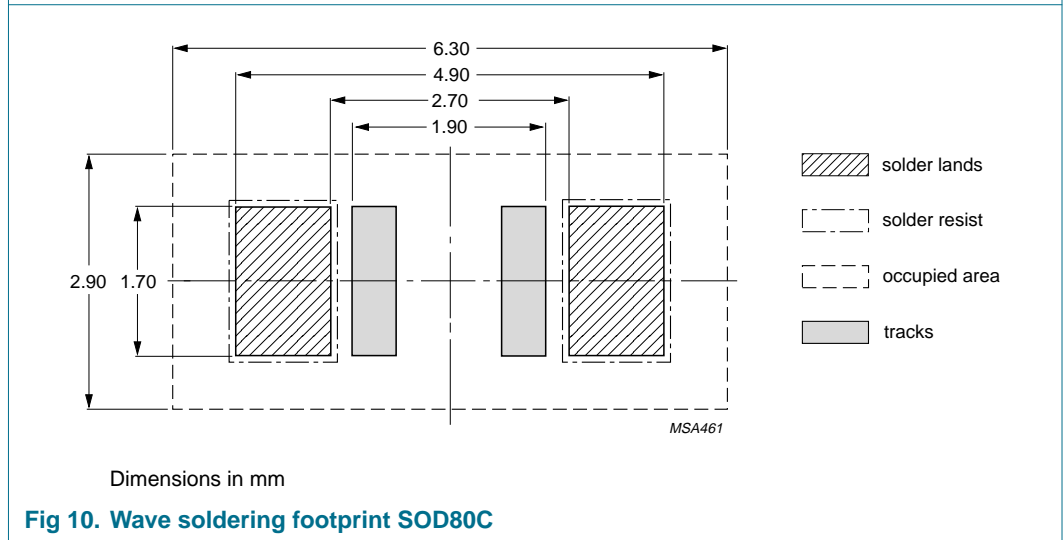


Fig 10. Wave soldering footprint SOD80C

12. Revision history

Table 10: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
PMLL4148L_ PMLL4448_6	20050404	Product data sheet	-	9397 750 14606	PMLL4148L_4448_5
Modifications:	<ul style="list-style-type: none"> • The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors. • Table 1 “Product overview” added • Section 4 “Marking” added • Table 7 “Thermal characteristics” $R_{th(j-tp)}$ thermal resistance from junction to tie-point redefined to $R_{th(j-sp)}$ thermal resistance from junction to solder point • Section 10 “Packing information” added • Section 11 “Soldering” added 				
PMLL4148L_4448_5	20020123	Product specification	-	9397 750 09265	PMLL4148_4448_4
PMLL4148L_4448_4	20001115	Product specification	-	9397 750 07615	PMLL4148_3
PMLL4148_3	19990527	Product specification	-	9397 750 05889	PMLL4148_2
PMLL4148_2	19960918	Product specification	-	117021	PMLL4148_1
PMLL4148_1	19960423	Product specification	-	117011	-

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	2
6	Thermal characteristics	3
7	Characteristics	3
8	Test information	6
9	Package outline	7
10	Packing information	7
11	Soldering	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: 4 April 2005
Document number: 9397 750 14606

Published in The Netherlands