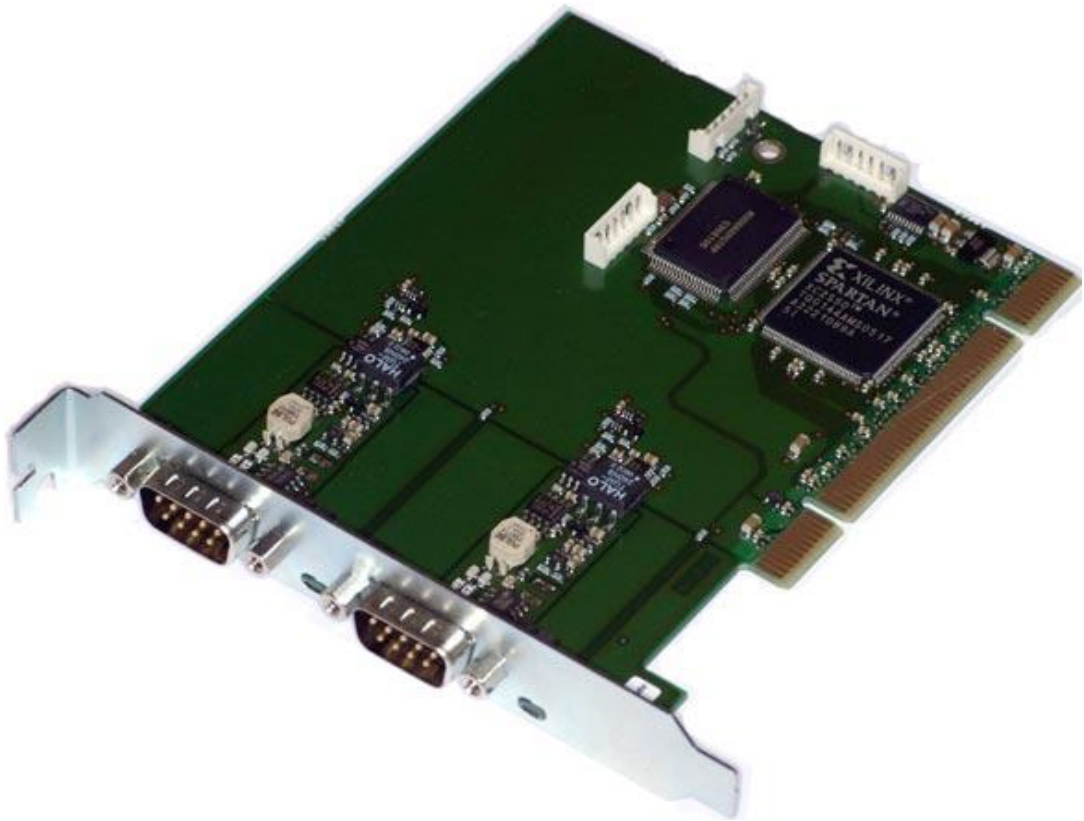


# Kvaser PCicanx II User's Guide



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<http://www.kvaser.com>

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We believe that the information contained herein was accurate in all respects at the time of printing. Kvaser AB cannot, however, assume any responsibility for errors or omissions in this text. Also note that the information in this document is subject to change without notice and should not be construed as a commitment by Kvaser AB.

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## 2 Introduction

Since 1985, Kvaser has turned its full attention towards Controller Area Network and associated technologies. Based in Sweden, Kvaser develops and manufactures innovative and high performance PC interfaces for the global market.

### 2.1 Scope of this document

This manual is applicable to the Kvaser PCICanx II products found in Table 1. Since the hardware is essentially the same, this guide will refer to all these devices as just Kvaser PCICanx II.

**Table 1. The PCICanx II devices and their product numbers.**

Device	Product Number <sup>1</sup>	Description
Kvaser PCICanx II HS/HS	00343-9	Two channel CAN interface board
Kvaser PCICanx II HS (both full height and low profile bracket included)	00344-6	One channel CAN interface board

The complete line of PCICan II products are discontinued, due the release of the new PCICanx II boards, see Table 2. PCICanx II is fully software compatible with PCICan II for easy integration in existing systems.

**Table 2. The discontinued PCICan II products and their product numbers.**

Device	Product Number	Replacement Product
Kvaser PCICan II HS/HS (3.3V and 5V version)	00235-7	Kvaser PCICanx II HS/HS
Kvaser PCICan II HS/HS (old 5V version)	00157-2	Kvaser PCICanx II HS/HS
Kvaser PCICan II HS	00226-5	Kvaser PCICanx II HS with full height PCI bracket
Kvaser PCICan II LP HS	00228-9	Kvaser PCICanx II HS with low profile bracket

### 2.2 General description

Kvaser PCICanx II is an interface board that connects up to two CAN networks to a PC using the PCI-X or PCI bus. You can with benefit use several Kvaser PCICanx II boards on the same PC.

The powerful M16C microcontroller from Renesas, with two built-in CAN controllers, provides accurate time stamping and high data throughput of CAN messages. Kvaser PCICanx II supports 11 bit (CAN 2.0A) as well as 29 bit (CAN 2.0B) identifiers. Remote frames can be transmitted and received without restrictions. Kvaser PCICanx II can detect and generate error frames on the CAN bus. Depending on product version, Kvaser PCICanx II offers one or two

<sup>1</sup> The full part numbers 733-0130-*nnnnn-n* are usually written *nnnnn-n*. You can use either number when ordering.



completely independent CAN channels with separate connectors. The CAN bus transceivers are integrated into the device.

Kvaser offers excellent software support. All Kvaser products use the common and user friendly Application Programming Interface, Kvaser CANlib API. It enables you to run any applications using Kvaser CANlib API on any Kvaser products, without the need of editing the code and recompile it.

Example of supported PCI, PC/104-Plus, USB and PCMCIA interfaces:

- Kvaser PClcanx II
- Kvaser PClcanx
- Kvaser PC104+
- Kvaser PClcan II
- Kvaser PClcan
- Kvaser PCcan
- Kvaser Leaf Professional / SemiPro / Light
- Kvaser Memorator II
- Kvaser Memorator
- Kvaser LAPcan II
- Kvaser LAPcan

### **2.3 PClcanx II features**

- Compliant with PCI 2.3
- PCI card compatible with all PCI-X and PCI slots (See chapter 4.1)
- High performance on-board microcontroller
- Communicates with the PC through a fast DPRAM
- Large on-board RAM buffer to off load the PC
- Supports CAN 2.0 A and 2.0 B (active)
- Supports "Silent Mode"
- ISO 11898-2 compliant High Speed CAN transceivers
- Supports bit rates from 20 kbit/s up to 1 Mbit/s
- CAN oscillator frequency: 16MHz
- DC/DC power supply to galvanically isolated bus drivers – no need for extra external power supply
- High-speed isolator circuits between CAN circuits and CAN drivers
- Quick and easy plug and play installation
- Extended temperature range of -40°C - +85°C
- Interfaces the CAN bus with industry standard DSUB connector(s)

### 3 Kvaser PCICanx II hardware

This chapter describes the hardware properties for Kvaser PCICanx II.

#### 3.1 Technical Specifications

The technical specifications for the Kvaser PCICanx II board with two CAN channels and one CAN channel are listed in Table 3 and Table 4, respectively.

**Table 3. Kvaser PCICanx II HS/HS.**

PCI Revision	2.3
PCI Bus Interface	PCI-X and PCI bus, see Chapter 2.4
PCI Bus Rate	32-bit, 33 MHz.
Voltage Signaling	Supports both 5V and 3.3V
Required PCI voltages	5V and 3.3V. Note – the computer must supply both to be compliant with the PCI standard.
Galvanic Isolation	Yes
Number of Channels	2
CAN 2.0A and 2.0B active	Yes
CAN Transceivers	High Speed CAN, ISO 11898-2 compliant
CAN Controller	Built into the M16C; ISO 11898-1 compliant.
Microcontroller	Renesas M16C/6N, 256 kB Flash and 10 kB RAM.
Bit rate, CAN bus	20 kbit/s to 1 Mbit/s
Timestamp resolution (µs)	1
Error Frame Detection	Yes
Error Frame Generation	Yes
Error Counters Reading	Yes
Silent Mode	Yes
Hardware requirements	Standard desktop PC.
Power consumption	Approximately 1 W (200 mA)
Software requirements <sup>2</sup>	Windows XP or later. (For other operating systems, see Kvaser web or contact Kvaser support.)
Configuration	Done by software via Plug & Play
Dimensions (W*L)	120 x 95 mm (approx. 4.5 x 4 in.)
Operating temperature	-40 °C ... +85 °C
Storage temperature	-40 °C ... +85 °C
Relative Humidity	0% ... 85% (non condensing.)

<sup>2</sup> Contact us for other operating systems.

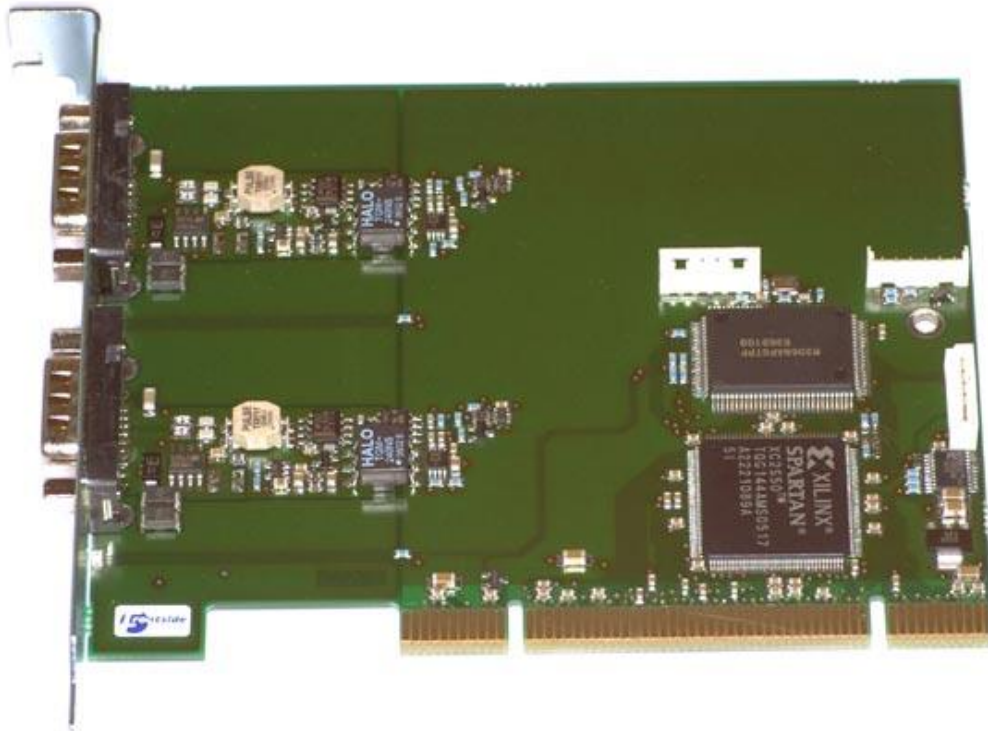
**Table 4. Kvaser PCICanx II HS.**

PCI Revision	2.3
PCI Bus Interface	PCI-X and PCI bus, see Chapter 2.4
PCI Bus Rate	32-bit, 33 MHz transfer rate
Voltage Signaling	5V or 3.3V
Required PCI voltages	5V and 3.3V, Note – the computer must supply both to be compliant with the PCI standard.
Galvanic Isolation	Yes
Number of Channels	1
CAN 2.0A and 2.0B active	Yes
CAN Transceivers	High Speed CAN, ISO 11898-2 compliant
CAN Controller	Built into the M16C; ISO 11898-1 compliant.
Microcontroller	Renesas M16C/6N, 256 kB Flash and 10 kB RAM.
Bit rate, CAN bus	20 kbit/s to 1 Mbit/s
Timestamp resolution(µs)	1
Error Frame Detection	Yes
Error Frame Generation	Yes
Error Counters Reading	Yes
Silent Mode	Yes
Hardware requirements	Standard desktop PC.
Power consumption	Approximately 0.6 W (120 mA)
Software requirements <sup>3</sup>	Windows XP or later. (For other operating systems, see Kvaser web or contact Kvaser support.)
Configuration	Done by software via Plug & Play
Dimensions (W*L)	Low profile 120 x 64 mm (approx. 4.5 x 2.4 in.)
PCI bracket	Full height and low profile support
Operating temperature	-40 °C ... +85 °C
Storage temperature	-40 °C ... +85 °C
Relative Humidity	0% ... 85% (non condensing.)

### 3.2 Schematics

The two CAN channel Kvaser PCICanx II interface board for full height PCI slots, shown in Figure 1.

<sup>3</sup> Contact us for other operating systems.



**Figure 1. The full height Kvaser PCICanx II HS/HS board**

The Kvaser PCICanx II HS board is designed in a low-profile form factor to fit for use with both full height PCI as well as low profile brackets, see Figure 2. The Kvaser PCICanx II HS board is shipped with the full height PCI bracket mounted. A free of charge low profile bracket is included in the package for full flexibility.



**Figure 2. Kvaser PCICanx II HS with the low profile bracket mounted**



### 3.3 The Isolated CAN Drivers

Each CAN transceiver is isolated from the CAN controller and all other CAN transceivers. The CAN transceiver will get the necessary power from the PCI bus via an isolated DC/DC convert. The isolation between the CAN controller and the CAN transceiver has a delay of maximum 50 ns in each direction. This will reduce the possible cable length with 20 meter compared to having no isolation.

Due to human safety, the voltage should never at any part of the PCICanx II board be more than +/- 50 Volt from the PC-computer chassis ground. If any USB pin has an external voltage in the range below +/-500 Volt from chassis ground this will also be the true voltage at this pin.

Each CAN transceiver circuit is protected from short time over voltage like ESD and accidental short cuts to high voltage. An over voltage beyond +/-500 Volt, on any used DSUB pin, will cause a rapid shortcut to ground. If the applied over voltage do have a high-energy source some PCB wires may burn away in that case.

### 3.4 PCI-X and PCI slots

The universal design of the Kvaser PCICanx II boards makes them suitable for both PCI-X and PCI slots. Although the board fits in PCI-X as well as PCI slots, it is not a PCI-X product. Hence, it operates in PCI mode in all slots. Major features of the Kvaser PCICanx II board:

- Compliant with PCI Local Bus Specification v2.3
- Support for PCI-X Specification v 1.0 and higher versions
- Universal 3.3V and 5V keyed board connector
- Supports 3.3V and 5V supply voltage
- Operates at a bus frequency of 33MHz

To summarize, the Kvaser PCICanx II boards can be used in any PCI-X and PCI slots. Just keep in mind - all cards on a common bus can only run as fast as the slowest card. For example if there is a 33MHz card in slot 1 and a 66MHz card in slot 2, both cards will run at 33MHz. The performance degradation can be avoided by separating the Kvaser PCICanx II board (33 MHz/32-Bit) and other PCI and PCI-X devices using different bus segments. Note – not all motherboard vendors comply with the industry standards for PCI-X and PCI slots. Kvaser AB cannot assume any responsibility for that. Here is a list of supported PCI-X and PCI slots:

- 3.3V, 64 bit
- 3.3V, 32 bit
- 5V, 64 bit
- 5V, 32 bit.

The PCI connectors voltage keying is seen in Figure 3.

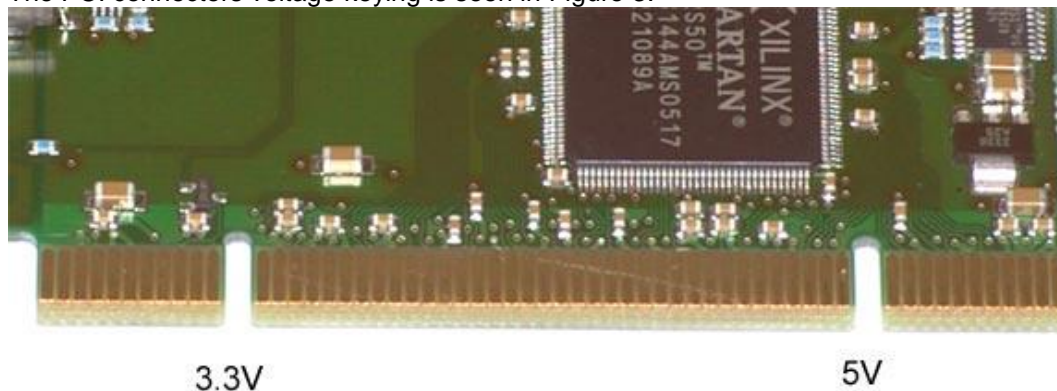


Figure 3. The PCI connectors voltage keying



## 4 Kvaser PCICanx II Installation

The Kvaser PCICanx II is plug-and-play. There are no switches or jumpers to set. For best results, install the device drivers first. Follow the instructions on the Kvaser CD to do so. Important – you must read this entire chapter before installing your Kvaser PCICanx II board.

### 4.1 *Install hardware*

For driver installation and firmware update, see the driver installation documentation. After installing the Kvaser Drivers that comes with the PCICanx II card, follow these steps.

- Power down the computer.
- For your personal safety, unplug the computer from mains.
- Touch the metal chassis of the computer before you remove the PCICanx II from its protective antistatic plastic bag.
- Insert the board into an empty PCI-X or PCI slot.
- Power up the computer.

### 4.2 *Updated drivers and device firmware*

Updated drivers and device firmware is available from our web site, <http://www.kvaser.com>.

### 4.3 *Adjusting interrupt and I/O space resources*

This is done by the computer's BIOS at startup time. Interrupt assignment and I/O space usage can normally not be adjusted.

Note: It is perfectly normal for PCI devices to share a single interrupt in the PC. Kvaser PCICanx II will work without problems when sharing the interrupt with other PCI devices.

### 4.4 *Motherboard power supply*

The PCI standard mandates that if a PCI connector on the computer motherboard provides 5V, it must also provide 3.3V. However, not all computers follow the standard here. If your PCICanx II board is not responding after installation, it could be a good idea to check the computer documentation if the PCI slots really are compliant to the PCI standard.

### 4.5 *The CAN Channels*

Depending on product version, The PCICanx II has either one or two CAN channels. The first channel, CAN 1, on the Kvaser PCICanx II HS/HS board is the one closest to the PCI connector. See Figure 4.

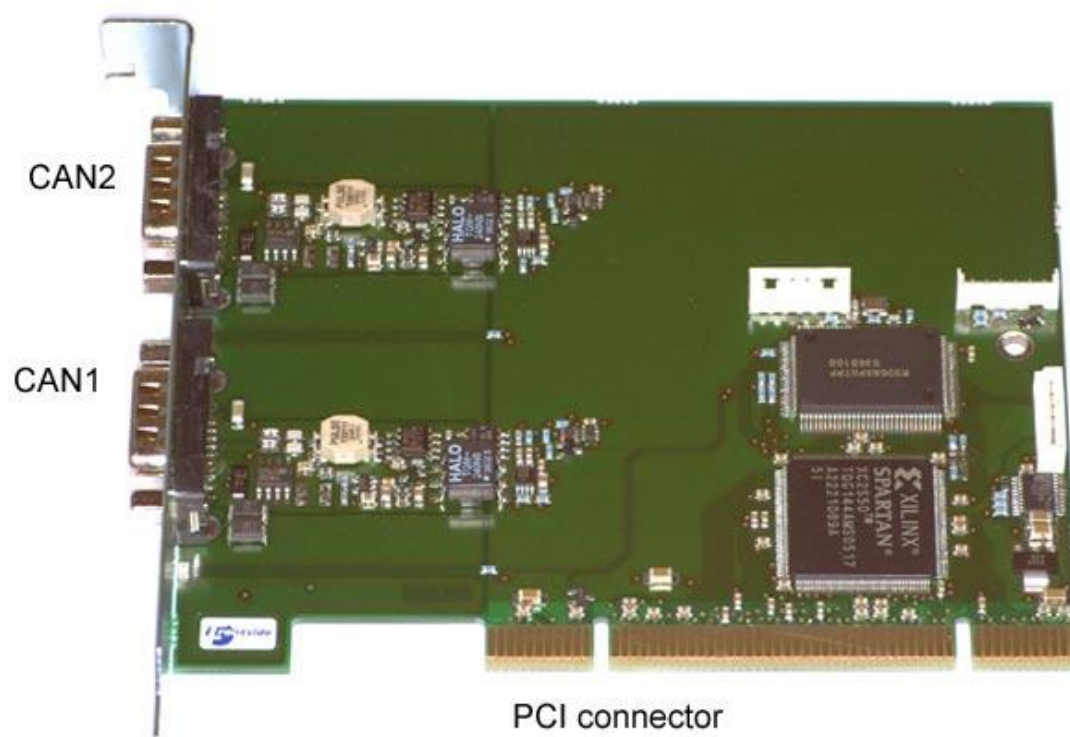


Figure 4. The first CAN channel, CAN1, is the one closest to the PCI connector.

The pin numbering of the DSUB CAN connector is seen in Figure 5 and the functions of the pins are listed in Table 5.

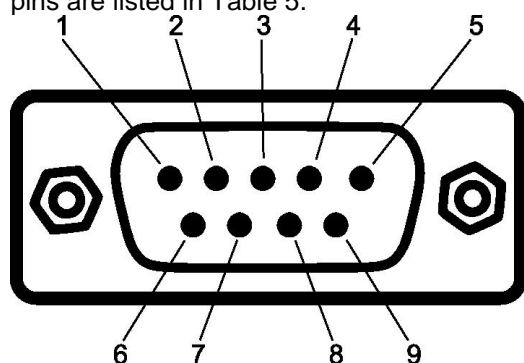


Figure 5. The D-SUB connector pin numbers on a CAN channel.

Table 5. D-SUB Pin configuration of the HS channels.

D-SUB pin number	Function
1	Not connected.
2	CAN_L
3	GND
4	Not connected.
5	Shield
6	Not connected.
7	CAN_H
8	Not connected.
9	Not connected.

#### 4.6 CAN bus termination

There are no on-board CAN bus terminators on the PC104+ board. You must terminate the CAN bus yourself by placing a 120 Ohms resistor between CAN\_H and CAN\_L at each end of the CAN bus.

Note that without terminators on the CAN bus, the communication may or may not work – it's totally unpredictable. For laboratory use the termination need not be perfect but you will always need some load resistance between CAN\_H and CAN\_L somewhere on the CAN bus.

## 4.7 LED Indicators

The on-board LEDs, shown in Figure 6 from the CAN connector side, indicate the status of the card according to Table 6.

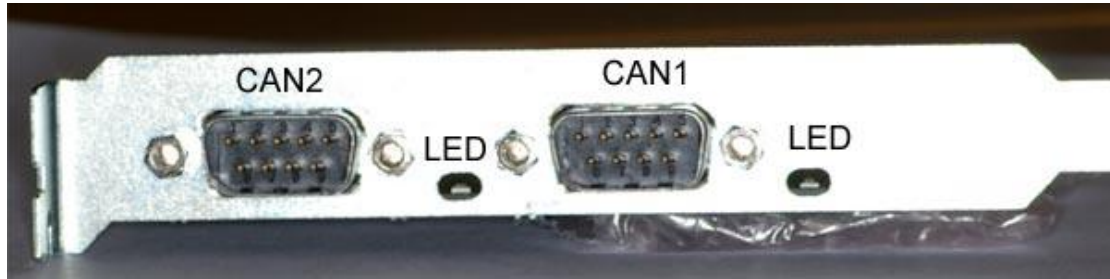


Figure 6. Position of the LEDs on a PC1can II board.

Table 6. Meaning of the LED activity on the PC1canx II boards.

LED Activity	Meaning of LED Activity
Both LEDs (or the single LED on the one-channel devices) are blinking continuously with a frequency of around 5 Hz	The built-in self-test failed.
Steady light	The card is OK.
Blinking irregularly	The card is OK, and there is activity (transmit or receive) on the CAN bus.

## 4.8 Do's and Don'ts

**Do** connect the ground pin on the D-SUB to the ground of your CAN bus.

In case of trouble, **do** verify that you have **at least one terminator on the CAN bus**.

## 5 Software Support

The Kvaser PCICanx II boards are supported by drivers routines and program examples for Windows, Linux, etc<sup>4</sup>. The software and its documentation are available from our web site, and not further documented here.

Kvaser CANKing - a free-of-charge and general-purpose interactive CAN bus monitor can be download from our web site.

Please visit our homepage <http://www.kvaser.com> to find software updates, hints and tips and other helpful information. You are always welcome to contact our Support Team - [support@kvaser.com](mailto:support@kvaser.com).

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<sup>4</sup> Contact us for other operating systems.



## 6 Disposal and Recycling Information



When this product reaches its end of life, please dispose of it according to your local environmental laws and guidelines.

 For information about Kvaser's recycling programs, visit:  
[www.kvaser.com/en/kvaser/environment/recycling](http://www.kvaser.com/en/kvaser/environment/recycling)



## 7 Legal Information

This document is Copyright © 2001-2008 Kvaser AB. This document may not be reproduced without our written permission. Infringement will render the user liable to prosecution.

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### **CE Marking Directive**

This line of products has been CE marked. We will be pleased to inform you on which standards this equipment has been tested for compliance.

### **RoHS Directive**

This product is manufactured in accordance with directive 2002/95/EC on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS.)

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### **NOTE**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## 8 Document Revision History

Date	Version	Changes
2006-03-20	1	Initial Edition
2006-03-22	2	Reviewed for Release
2006-03-23	3	Released
2006-11-10	4	New layout
2008-12-02	5	Updated legal information
2011-01-14	6	Updated supported OS list
2011-09-12	7	Updated disposal information
2012-08-31	8	Corrected minimum CAN bit rate