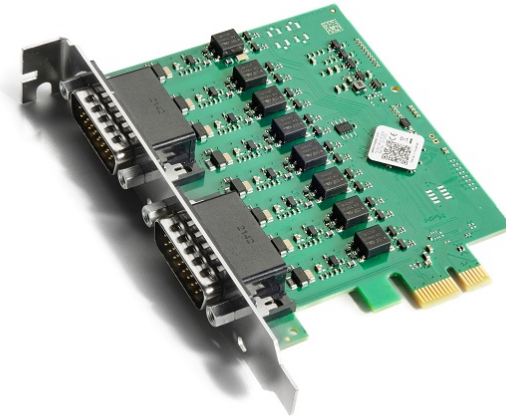




Kvaser PCIe 8xCAN User's Guide



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<https://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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1 About this manual

This manual is intended for Kvaser PCIe 8xCAN users. This document contains a description of the hardware's properties and general instructions for connecting the device to a computer.

2 Introduction

This section will describe the functions and features of the Kvaser PCIe 8xCAN.

2.1 Welcome to Kvaser PCIe 8xCAN

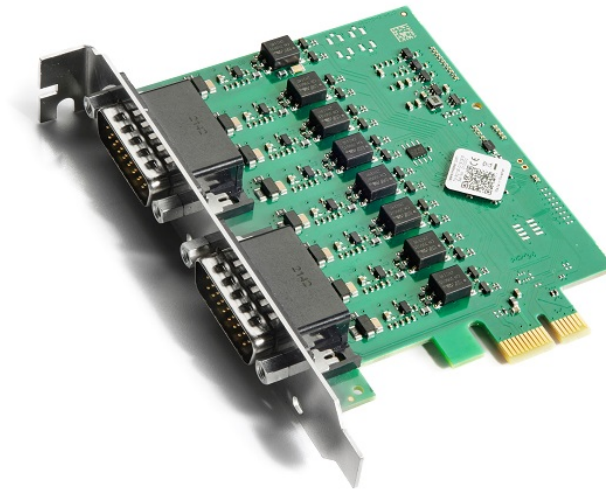


Figure 1: Kvaser PCIe 8xCAN

Kvaser PCIe 8xCAN is a small, yet advanced, CAN multi channel real time CAN interface that handles transmission and reception of standard and extended CAN messages on the bus with a high time stamp precision. It is compatible with applications that use Kvaser's CANlib.

This guide applies to Kvaser PCIe 8xCAN devices using at least firmware and driver versions listed in Table 1. For minimum compatible firmware and driver versions of Kvaser PCIe 8xCAN see Table 2 on Page 9.

Device	Product Number	Firmware	Driver (Windows/Linux)
Kvaser PCIe 8xCAN	73-30130-01512-8	v1.0	v5.45 (kcanf/kvpciefd)

Table 1: Firmware and driver versions needed to support all functionality present in this guide.

2.2 Major features

- PCI Express CAN interface.
- Supports CAN FD, up to 8 Mbit/s.
- Quick and easy plug-and-play installation.
- Supports both 11-bit (CAN 2.0A) and 29-bit (CAN 2.0B active) identifiers.
- 100 % compatible with applications written for other Kvaser CAN hardware with Kvaser CANlib.
- High-speed CAN connection (compliant with ISO 11898-2), up to 1 Mbit /s.
- Compatible with J1939, CANopen, NMEA 2000[®] and DeviceNet. Higher layer protocol translation is handled by the user's application. For software support please see our Technical Associates products and our Software Download page (www.kvaser.com).
- Supports silent mode for analysis tools – listen to the bus without interfering.
- Supports simultaneous usage of multiple Kvaser interfaces.
- Standard height PCI Express card.
- Support for SocketCAN.

2.3 Interface

Kvaser PCIe 8xCAN provides a CAN bus interface through a standard PCI Express x1 interface.

2.4 Additional software and documentation

The Kvaser CANlib SDK includes everything you need in order to develop software applications interacting with Kvaser CAN and LIN hardware. The SDK contains full documentation and many sample programs, written in C, C++, C#, Delphi, Python and Visual Basic. Kvaser CAN and LIN hardware is built around the same common software API. Applications developed using one device type will run without modification on other device types.

The latest versions of documentation, software and drivers can be downloaded for free at www.kvaser.com/download.

3 Kvaser PCIe 8xCAN hardware

In this section you can read more about the CAN channels, power supply and LED indicators.

3.1 Hardware installation

The Kvaser PCIe 8xCAN may be inserted in any free PCI Express slot on the host computer. Ensure the computer is powered off before inserting or removing the device.

3.2 CAN channels

The Kvaser PCIe 8xCAN has eight CAN channels in total. These are distributed over two 26-pin HD D-SUB CAN connectors (see Figure 2) with four channels each (see Figure 3). See Section 3.7, CAN connectors, on Page 10 for pinout information.



Figure 2: CAN connectors on Kvaser PCIe 8xCAN

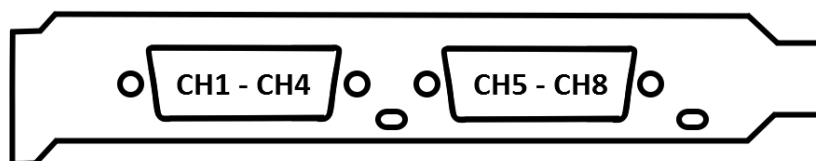


Figure 3: Channels for each CAN connector on Kvaser PCIe 8xCAN

3.3 Power supply

The Kvaser PCIe 8xCAN is powered from the PCI Express connector.

3.4 LED Indicators

The Kvaser PCIe 8xCAN has three LED indicators, two yellow LEDs at the left edge of the card viewed from the front and one green LED at the rear of the card,

see Figure 4 on Page 8.

The yellow LEDs, labeled as LED2 for channels 1-4 and LED3 for channels 5-8, indicate the bus state (on/off). A steady light signifies the bus state is on, while no light indicates the bus state is off.

The green LED, labeled LED1, blinks at a 1 Hz rate to signify established PCI Express communication with the host. When only power is supplied, this LED remains steadily lit, indicating the power status of the device.

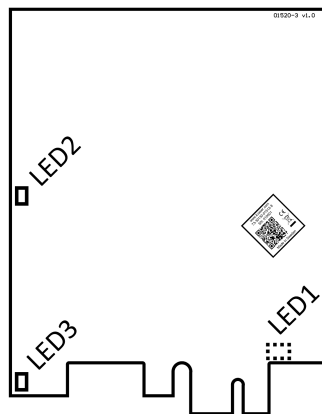


Figure 4: LEDs on the Kvaser PCIe 8xCAN.

3.5 Updating the firmware

For the Kvaser PCIe 8xCAN to communicate with the host computer, compatible versions of the Kvaser CANlib (including driver) and firmware or SocketCAN Device Drivers must be installed.

The latest versions of firmware and drivers can be downloaded for free at www.kvaser.com/download.

Connect the Kvaser PCIe 8xCAN to your host computer.

For Linux based operating systems, instructions for how to update the firmware when using Kvaser CANlib can be found in the README in the kvflash directory. The corresponding instructions for SocketCAN are found in the kvflash-mmap directory. Read and follow the README carefully. Note: when updating PCIEcan, a complete shutdown of the computer is required in order to power cycle the device.

Use the example utility 'listChannels' in Kvaser CANlib to check the current firmware version.

If your computer is running Windows, start the update.exe application. A window opens showing the Firmware Update Instructions; read and follow those carefully.

To check the current firmware version for a computer running Windows, open "Kvaser Device Guide" which can be found in the Control Panel. Select "Kvaser

PCIe 8xCAN” in the tree view to the left, and click on the channel. The firmware revision information now appears in the right half of the window.

The absolute minimum firmware and driver versions needed in order to use Kvaser PCIe 8xCAN are listed in Table 2.

Device	Min. Firmware Version	Min. Driver Version
Kvaser PCIe 8xCAN	v1.0	v5.45

Table 2: Minimum compatible driver and firmware versions of Kvaser PCIe 8xCAN.

3.6 Technical data

In Table 3 below you will find the technical specifications of Kvaser PCIe 8xCAN.

CAN Channels	8
CAN Transceivers	Compliant with ISO 11898-2
CAN Controller	Kvaser CAN IP in FPGA
Galvanic isolation	Yes
CAN Bit Rate	20 kbit/s to 1 Mbit/s
CAN FD Bit Rate	Up to 8 Mbit/s
Time stamp resolution	1 μ s
Max message rate	20000 ¹ msg/s per channel
Error Frame Detection	Yes
Error Frame Generation	Yes
Silent mode	Yes
Kvaser t programming	No
Kvaser CANtegrity	No
Power consumption	Typically 980 mA at 3.3 V.
Host interface	PCI Express
Host OS	Windows (10 or later), Linux.
Hardware configuration	Done by software.
Dimensions	Standard height, 102 x 80 mm
Weight	72 g
Operating temperature	-40 °C to +85 °C
Storage temperature	-40 °C to +85 °C
Relative humidity	0% to 85% (non-condensing.)

Table 3: Technical Specifications.

¹The message rate is based on tests on a reasonably powerful desktop computer. On a slow host computer, it might not be possible to reach the maximum message rate on all channels simultaneously, especially when running on smaller embedded systems.

3.7 CAN connectors

Kvaser PCIe 8xCAN devices have two 26-pin HD D-SUB connectors with four channels each. A HD26-4xDS9 splitter (<https://www.kvaser.com/product/kvaser-cable-hd26-4xds9-splitter/>) can be used to connect to four separate 9-pin D-SUB connectors. Alternatively, to connect to four separate 5-pin M12 connectors a HD26-4xM12 splitter (<https://www.kvaser.com/product/kvaser-cable-hd26-4xm12-splitter/>) can be used.

HD D-SUB	Channel	Function
1	1	CAN_L channel 1
2	2	CAN_L channel 2
3	3	CAN_L channel 3
4	4	CAN_L channel 4
5		Not connected
6		Not connected
7		Not connected
8		Reserved
9		Not connected
10		Not connected
11	1	CAN_H channel 1
12	2	CAN_H channel 2
13	3	CAN_H channel 3
14	4	CAN_H channel 4
15		Not connected
16		Not connected
17		Not connected
18		Not connected
19	1	GND channel 1
20	2	GND channel 2
21	3	GND channel 3
22	4	GND channel 4
23		Not connected
24		Not connected
25		Not connected
26		Not connected
Shell		Shield

Table 4: Pin configuration of the 26-pin HD D-SUB for channel 1-4

HD D-SUB	Channel	Function
1	5	CAN_L channel 5
2	6	CAN_L channel 6
3	7	CAN_L channel 7
4	8	CAN_L channel 8
5		Not connected
6		Not connected
7		Not connected
8		Not connected
9		Not connected
10		Not connected
11	5	CAN_H channel 5
12	6	CAN_H channel 6
13	7	CAN_H channel 7
14	8	CAN_H channel 8
15		Not connected
16		Not connected
17		Not connected
18		Not connected
19	5	GND channel 5
20	6	GND channel 6
21	7	GND channel 7
22	8	GND channel 8
23		Not connected
24		Not connected
25		Not connected
26		Not connected
Shell		Shield

Table 5: Pin configuration of the 26-pin HD D-SUB for channel 5-8

3.8 CAN bus termination

Every CAN bus must be terminated with a 120 Ohm resistor at each end of the bus. The Kvaser PCIe 8xCAN does not contain any CAN bus termination, because their inclusion could cause severe disturbance in a system which is already correctly terminated.

For laboratory or testing use, the exact value of the termination resistors is not always critical. Sometimes a single terminator is sufficient. For production, proper termination is essential. If you see error frames on the bus, you should check the termination.



To save yourself a lot of trouble, always terminate the CAN bus properly.

4 Troubleshooting

Use “Kvaser Device Guide” in the Control Panel to verify that the computer can communicate with the Kvaser PCIe 8xCAN. If the firmware version shown is all zeros, there are communication problems.

5 Safety Instructions

5.1 Intended Use

Kvaser interfaces are used to connect computer systems to CAN buses. The Kvaser PCIe 8xCAN is intended for connection to a computer via an available PCI Express slot.

5.2 Usage Warning



WARNING FOR ALL USERS

WARNING! - YOUR USE OF THIS DEVICE MUST BE DONE WITH CAUTION AND A FULL UNDERSTANDING OF THE RISKS!

THIS WARNING IS PRESENTED TO INFORM YOU THAT THE OPERATION OF THIS DEVICE MAY BE DANGEROUS. YOUR ACTIONS CAN INFLUENCE THE BEHAVIOR OF A CAN-BASED DISTRIBUTED EMBEDDED SYSTEM, AND DEPENDING ON THE APPLICATION, THE CONSEQUENCES OF YOUR IMPROPER ACTIONS COULD CAUSE SERIOUS OPERATIONAL MALFUNCTION, LOSS OF INFORMATION, DAMAGE TO EQUIPMENT, AND PHYSICAL INJURY TO YOURSELF AND OTHERS. A POTENTIALLY HAZARDOUS OPERATING CONDITION IS PRESENT WHEN THE FOLLOWING TWO CONDITIONS ARE CONCURRENTLY TRUE: THE PRODUCT IS PHYSICALLY INTERCONNECTED TO A REAL DISTRIBUTED EMBEDDED SYSTEM; AND THE FUNCTIONS AND OPERATIONS OF THE REAL DISTRIBUTED EMBEDDED SYSTEM ARE CONTROLLABLE OR INFLUENCED BY THE USE OF THE CAN NETWORK. A POTENTIALLY HAZARDOUS OPERATING CONDITION MAY RESULT FROM THE ACTIVITY OR NON-ACTIVITY OF SOME DISTRIBUTED EMBEDDED SYSTEM FUNCTIONS AND OPERATIONS, WHICH MAY RESULT IN SERIOUS PHYSICAL HARM OR DEATH OR CAUSE DAMAGE TO EQUIPMENT, DEVICES, OR THE SURROUNDING ENVIRONMENT.

WITH THIS DEVICE, YOU MAY POTENTIALLY:

- CAUSE A CHANGE IN THE OPERATION OF THE SYSTEM, MODULE, DEVICE, CIRCUIT, OR OUTPUT.
- TURN ON OR ACTIVATE A MODULE, DEVICE, CIRCUIT, OUTPUT, OR FUNCTION.
- TURN OFF OR DEACTIVATE A MODULE, DEVICE, CIRCUIT, OUTPUT, OR FUNCTION.
- INHIBIT, TURN OFF, OR DEACTIVATE NORMAL OPERATION.
- MODIFY THE BEHAVIOR OF A DISTRIBUTED PRODUCT.
- ACTIVATE AN UNINTENDED OPERATION.
- PLACE THE SYSTEM, MODULE, DEVICE, CIRCUIT, OR OUTPUT INTO AN UNINTENDED MODE.

ONLY THOSE PERSONS WHO:

- (A) ARE PROPERLY TRAINED AND QUALIFIED WITH RESPECT TO THE USE OF THE DEVICE,
- (B) UNDERSTAND THE WARNINGS ABOVE, AND
- (C) UNDERSTAND HOW THIS DEVICE INTERACTS WITH AND IMPACTS THE FUNCTION AND SAFETY OF OTHER PRODUCTS IN A DISTRIBUTED SYSTEM AND THE APPLICATION FOR WHICH THIS DEVICE WILL BE APPLIED, MAY USE THE DEVICE.

PLEASE NOTE THAT YOU CAN INTEGRATE THIS PRODUCT AS A SUBSYSTEM INTO HIGHER-LEVEL SYSTEMS. IN CASE YOU DO SO, KVASER AB HEREBY DECLARES THAT KVASER AB'S WARRANTY SHALL BE LIMITED TO THE CORRECTION OF DEFECTS, AND KVASER AB HEREBY EXPRESSLY DISCLAIMS ANY LIABILITY OVER AND ABOVE THE REFUNDING OF THE PRICE PAID FOR THIS DEVICE, SINCE KVASER AB DOES NOT HAVE ANY INFLUENCE ON THE IMPLEMENTATIONS OF THE HIGHER-LEVEL SYSTEM, WHICH MAY BE DEFECTIVE.

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:
<https://www.kvaser.com/en/kvaser/recycling-policy.html>

7 Legal acknowledgements

7.1 EU Regulatory Compliance



EU Declaration of Conformity (DoC)

We

Company Name:	Kvaser AB	City:	Mölndal
Postal address:	Aminogatan 25	Telephone number:	+46 31 886344
Postcode:	431 53	E-mail address:	sales@kvaser.com

declare that the DoC is issued under our sole responsibility and belongs to the following product:

Product: Kvaser PCIe 8xCAN

Object of the declaration (identification of apparatus allowing traceability):

Product: Kvaser PCIe 8xCAN
Type: 73-30130-01512-8

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:


Electromagnetic Compatibility (EMC) Directive 2014/30/EU (Art. 6)

RoHS recast Directive 2011/65/EU (Art. 4.1)

The following harmonised standards and technical specifications have been applied
(title, date of standard/specification):

EN 55032 (2015 + A11:2020)	EN 55035 (2017 + A11:2020)
EN 61000-6-2 (2019)	EN IEC 63000 (2018)

Signed for and on behalf of:

Mölndal	2024-04-24	
Place of issue	Date of issue	Kent Lennartsson, Research Manager

7.2 FCC Regulatory Compliance



Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser PCIe 8xCAN

Type: 73-30130-01512-8

APPLICABLE COMPLIANCE STATEMENTS:

CFR Title 47 Part 15 §15.107, §15.109

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

RESPONSIBLE PARTY (IN USA) NAME:

Kvaser Inc.

23881 Via Fabricante, Suite 503

Mission Viejo, CA 92691

Internet contact: support@kvaser.com

7.3 Patents, Copyrights and Trademarks

All trademarks are the property of their respective owner. Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

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MagiSync is a trademark of Kvaser AB.

DeviceNet is a trademark of Open DeviceNet Vendor Association, Inc.

NMEA 2000 is the registered trademark of the National Marine Electronics Association, Inc.

For information about Kvaser related CAN patents, see www.kvaser.com/patent.

8 Document Revision History

Version history for document UG_98298_pcie_8xcan:

Revision	Date	Changes
1.0	2024-04-24	Initial version.
1.1	2025-01-10	Added pin configuration tables and picture showing the channels for each connector. Minor textual changes.