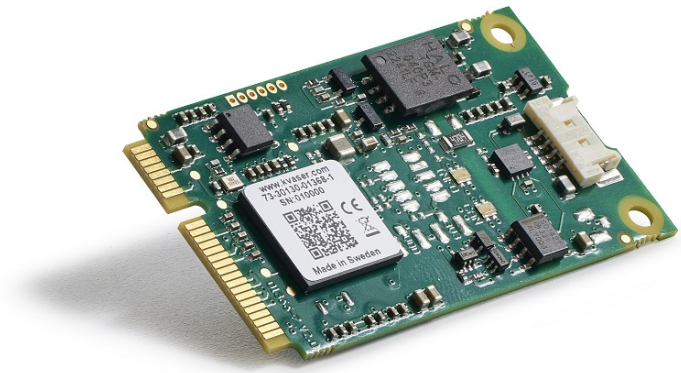
Kvaser Mini PCIe 1xCAN User's Guide



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Contents

1 About this manual

This manual is intended for Kvaser Mini PCIe 1xCAN 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 Mini PCIe 1xCAN.

2.1 Welcome to Kvaser Mini PCIe 1xCAN

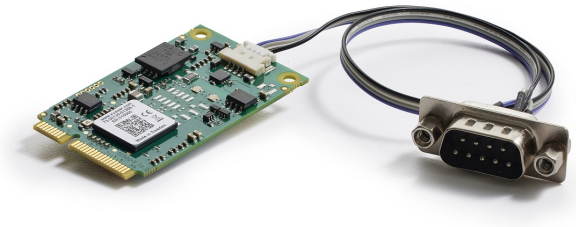

Figure 1: Kvaser Mini PCIe 1xCAN

Kvaser Mini PCIe 1xCAN is a small, yet advanced, real time CAN interface that handles transmission and reception of standard and extended CAN messages on the bus with a high time stamp precision. The Kvaser Mini PCIe 1xCAN is compatible with applications that use Kvaser's CANlib.

This guide applies to Kvaser Mini PCIe 1xCAN devices using at least firmware and driver versions listed in Table 1. For minimum compatible firmware and driver versions of Kvaser Mini PCIe 1xCAN see Table 5 on Page 10.

Device	Product Number	Firmware	Driver (Windows/Linux)
Kvaser Mini PCIe 1xCAN	73-30130-01368-1	v3.32	v5.45(kcany/mhydra)

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

2.2 Major features

- Mini PCIe 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.
- Fully 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.
- Support for SocketCAN.

2.3 Interface

Kvaser Mini PCIe 1xCAN provides a CAN bus interface through a Mini PCIe 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 Mini PCIe 1xCAN hardware

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

3.1 Hardware installation

The Kvaser Mini PCIe 1xCAN may be inserted in any free Mini PCIe slot equipped with USB-communication on the host computer. You do need to switch the power off before inserting or removing the device. For the Kvaser Mini PCIe 1xCAN to communicate with the host computer, compatible versions of the Kvaser driver and firmware must be used. The firmware is downloaded and installed directly on the Kvaser Mini PCIe 1xCAN. The driver is installed on the host computer.

The latest version of the drivers, `kvaser_drivers_setup.exe`, and firmware can be downloaded from www.kvaser.com/download.

3.2 Mini PCIe connection

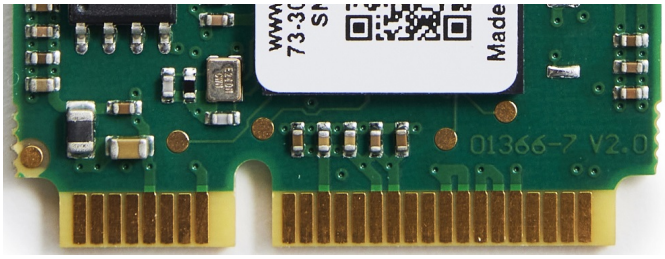

Figure 2: Mini PCIe connector

The Kvaser Mini PCIe 1xCAN is a Card of type F2 (Full-Mini with bottom side keep outs).

3.3 CAN channels

The Kvaser Mini PCIe 1xCAN has a single CAN channel in a 4-pin Molex connector (see Figure 3), see Section 3.8, CAN connectors, on Page 11 for pinout information.

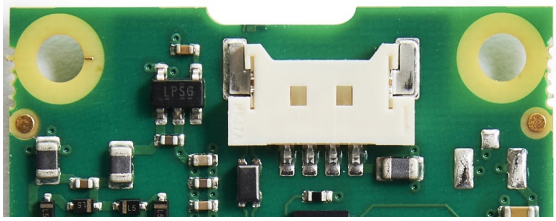

Figure 3: CAN connector on Kvaser Mini PCIe 1xCAN

3.4 Power supply

The Kvaser Mini PCIe 1xCAN is only powered using +3.3 V from the Mini PCIe connector.

3.5 LED Indicators

The Kvaser Mini PCIe 1xCAN has one power LED and one traffic LED for the CAN channel as shown in Figure 4.

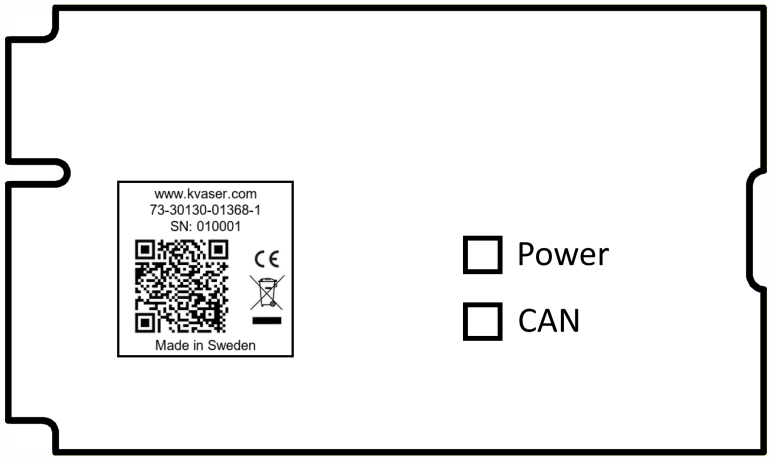

Figure 4: LEDs on the Kvaser Mini PCIe 1xCAN.

A Kvaser device has two basic types of LEDs; Power and Traffic. These are dual colored as shown in Table 2. A device with multiple CAN channels has one Traffic LED for each CAN channel. When the device has more than one channel a space and digit is added on the label, CAN 1, CAN 2 etc. The red Traffic LEDs are also used to indicate errors by using all red Traffic LEDs simultaneously.

LED	Label	Color
Power	PWR	Green/Yellow
Traffic	CAN	Yellow/Red

Table 2: The different type of LEDs.

The following definitions are used to describe the state of an LED:

Off The LED is off and no light is emitted.

Flash The LED is lit up for a very short time. A single flash may be hard to see and a continuous set of flashes will look the same as On.

Slow Blink The LED is repeatedly turned On and Off. The On and Off phase is equal in time.

Fast Blink The LED is repeatedly turned On and Off but with a higher frequency than Slow Blink. The On and Off time is still equal.

On The LED is constantly emitting light.

Slow Waver This is a variant of Slow Blink but instead of being Off, a second color is On. This is only possible with a dual colored LED.

Fast Waver The LED is alternating between two colors as in Slow Waver but using a higher frequency.

Running This means that all LEDs are lit, one at the time, in sequence with every color available i.e. "Power green->Power yellow->Traffic 1 yellow->Traffic 1 red->Traffic 2 yellow->Traffic 2 red->..."

As an example, "Slow Waver (Green/Yellow)" means that the LED is slowly blinking by alternating between green and yellow.

3.5.1 Interface mode

The device is in Interface mode when connected to the host computer via USB. If the Power LED is showing a steady green light, the device is in Interface mode and working correctly. When connected to the computer for the first time, the Power LED will blink slowly in yellow until the driver is installed and the device has received a USB configuration.

When in Interface mode, if the Power LED is yellow for an extended period, something is wrong. Please see Table 3.

The power should never be removed when firmware update is in progress.

Power LED	Traffic LED	Description
Slow Blink (Yellow)	All off (-)	Waiting for USB configuration
Slow Waver (Green/Yellow)	Slow Waver (Yellow/Red)	Firmware configuration error[1]
Slow Waver (Green/Yellow)	All Slow Blink (Yellow)	Power problem[2]

Table 3: Yellow Power LED shows problems in Interface mode.

[1] This should not normally happen. If it does, please contact Kvaser support.
[2] This indicates low power supply, such as using an unpowered USB hub.

Traffic LED	Description
Off (-)	Idle, no CAN traffic
Flash (Yellow)	CAN message received or sent
Flash (Red)	Error frame received
All Fast Blink (Yellow)	Firmware update is in progress
Fast Blink (Red)	CAN channel is error passive
On (Red)[3]	CAN overrun

Table 4: Traffic LED shows CAN bus status in Interface mode .

3.6 Updating the firmware

For the Kvaser Mini PCIe 1xCAN to communicate with the host computer, compatible versions of the Kvaser CANlib (including driver) and firmware must be installed.

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

Connect the Kvaser Mini PCIe 1xCAN to your host computer with the USB cable and start the update.exe application. A window opens showing the Firmware Update Instructions; read and follow those carefully.

To check the current firmware version, open "Kvaser Device Guide" which can be found in the Control Panel. Select "Kvaser Mini PCIe 1xCAN" 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 Mini PCIe 1xCAN are listed in Table 5.

Device	Min. Firmware Version	Min. Driver Version
Kvaser Mini PCIe 1xCAN	v3.32	v5.45

Table 5: Minimum compatible driver and firmware versions of Kvaser Mini PCIe 1xCAN.

3.7 Technical data

In Table 6 on Page 11 below you will find the technical specifications of Kvaser Mini PCIe 1xCAN.

[3]The red Traffic LED indicating overrun will stay on until the device goes bus off.

CAN Channels	1
CAN Transceivers	Compliant with ISO 11898-2
Galvanic isolation	Yes
CAN Controller	Built into the processor
CAN Bit Rate	20 kbit/s to 1 Mbit/s
CAN FD Bit Rate	Up to 8 Mbit/s
Time stamp resolution	1 µs
Max TX message rate	20000 msg/s per channel
Max RX message rate	20000 msg/s per channel
Error Frame Detection	Yes
Error Frame Generation	Yes
Silent mode	Yes
Kvaser MagiSync	Yes
Kvaser t programming	No
Kvaser CANtegrity	No
Host interface	Mini PCI Express with USB 2.0.
Host OS	Windows (10 or later), Linux.
Power consumption	Typically 180 mA at 3.3 V.
Hardware configuration	Done by software.
Dimensions	51 x 30 x 5 mm
Weight	5 g (13 g including cable)
Operating temperature	−40 °C to +85 °C
Storage temperature	−40 °C to +85 °C
Relative humidity	0 % to 85 % (non-condensing.)

Table 6: Technical Specifications.

3.8 CAN connectors

Kvaser Mini PCIe 1xCAN devices that use the 4-pin Molex connector (53780-0470) have the pinning described in Table 7 on Page 12.

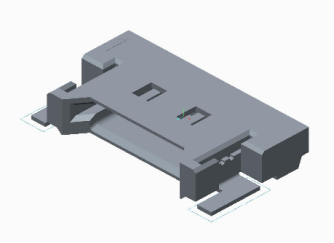

Figure 5: Molex Connector 53780-0470

Molex pin number	D-SUB 9	Function
1	3	GND
2	7	CAN_H
3	2	CAN_L
4	5	Shield

Table 7: Molex pin configuration

3.9 CAN bus termination

Every CAN bus must be terminated with a 120 Ohm resistor at each end of the bus. The Kvaser Mini PCIe 1xCAN 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 Mini PCIe 1xCAN. If the firmware version shown is all zeros, there are communication problems. If the LEDs are not flashing or do not light up at all, check the power supply.

5 Safety Instructions

5.1 Intended Use

Kvaser interfaces are used to connect computer systems to CAN buses. The Kvaser Mini PCIe 1xCAN is intended for connection to a computer via an available Mini 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

KVASER **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 Mini PCIe 1xCAN

Object of the declaration (identification of apparatus allowing traceability):
Product: Kvaser Mini PCIe 1xCAN
Type: 73-30130-01368-1

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	2024-04-26	
Place of issue	Date of issue	Kent Lennartsson, Research Manager

7.2 FCC Regulatory Compliance

KVASER

Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:
Product: Kvaser Mini PCIe 1xCAN
Type: 73-30130-01368-1

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

8 Document Revision History

Version history for document UG_98316_mini_pcie_1xcan:

Revision	Date	Changes
1.0	2024-04-26	Initial version.
1.1	2024-09-13	Updated pictures.