Kvaser Leaf v3 M12 User's Guide



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https://www.kvaser.com

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1 About this manual

This manual is intended for Kvaser Leaf v3 M12 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 Leaf v3 M12.

2.1 Welcome to Kvaser Leaf v3 M12



Figure 1: Kvaser Leaf v3 M12

Kvaser Leaf v3 M12 is a reliable low cost product. With a timestamp precision of 50 microseconds it handles transmission and reception of standard and extended CAN messages on the bus. It is compatible with applications that use Kvaser's CANlib.

This guide applies to Kvaser Leaf v3 M12 devices using at least firmware and driver versions listed in Table 1 on Page 6. For minimum compatible firmware and driver versions of Kvaser Leaf v3 M12 see Table 3 on Page 10.

Device	Product Number	Firmware	Driver (Windows/Linux)
Kvaser Leaf v3 M12	73-30130-01428-2	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

- USB CAN interface.
- Powered through the USB connector.
- 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.
- Supports silent mode for analysis tools – listen to the bus without interfering.
- 20 000 msg/s, each timestamped with a resolution of 50 µs.
- Fully compatible with applications written for other Kvaser CAN hardware with Kvaser CANlib.
- Support for SocketCAN.
- 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 simultaneous usage of multiple Kvaser interfaces.

2.3 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 Leaf v3 M12 hardware

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

3.1 Hardware installation

The Kvaser Leaf v3 M12 may be inserted in any free USB socket on the host computer. You do not need to switch the power off before inserting or removing the device. For the Kvaser Leaf v3 M12 to communicate with the host computer, a compatible version of the Kvaser driver and firmware must be installed.

The driver is installed by running the file `kvaser_drivers_setup.exe`. For instructions on how to update the firmware, see Section 3.6, Updating the firmware, on Page 10. The latest version of the driver and firmware can be downloaded from www.kvaser.com/download.

The firmware is downloaded and installed directly on the Kvaser Leaf v3 M12 and the driver is installed on the host computer. After the driver has been installed on the host computer, the firmware may then be downloaded and installed on the Kvaser Leaf v3 M12.

3.2 USB connection

The Kvaser Leaf v3 M12 has a standard USB type "A" connector.



Figure 2: A standard USB type "A" connector.

3.3 CAN connection

The Kvaser Leaf v3 M12 has one CAN channel in a 5-pin M12 connector (see Figure 3 on Page 9). See Section 3.8, CAN connectors, on Page 11 for pinout

information.



Figure 3: M12 CAN connector.

3.4 Power supply

The Kvaser Leaf v3 M12 is powered from the USB port.

3.5 LED Indicators

The Kvaser Leaf v3 M12 has two LEDs as shown in Figure 4. Their functions are shown in Table 2.

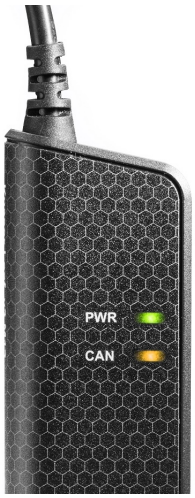

Figure 4: LEDs on the Kvaser Leaf v3 M12.

LED	Function	Description
PWR (Green)	Power	Steady light when unit is powered and working.
	USB configuration	Blinking once every three seconds when something is wrong with the USB connection.
	Firmware	2 Hz flash if something is wrong with the firmware or configuration.
CAN (Yellow)	CAN RxTx	Status for CAN channel.

Table 2: LEDs on the Kvaser Leaf v3 M12.

3.6 Updating the firmware

For the Kvaser Leaf v3 M12 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 Leaf v3 M12 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 Leaf v3 M12" 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 Leaf v3 M12 are listed in Table 3.

Device	Min. Firmware Version	Min. Driver Version
Kvaser Leaf v3 M12	v3.32	v5.45

Table 3: Minimum compatible driver and firmware versions of Kvaser Leaf v3 M12.

3.7 Technical data

In Table 4 on Page 11 below you will find the Kvaser Leaf v3 M12's technical specifications.

CAN Channels	1
CAN Connector	5-pin M12 plug A-coded
CAN Transceivers	Compliant with ISO 11898-2
Galvanic isolation	Yes
CAN Bit Rate	20 kbit/s to 1 Mbit/s
CAN FD Bit Rate	Up to 8 Mbit/s
Timestamp resolution	50 µs
Max message rate	20 000 msg/s
Error Frame Detection	Yes
Error Frame Generation	No
Silent mode	Yes
Kvaser MagiSync	No
Kvaser t programming	No
Kvaser CANtegrity	No
Host interface	USB 2.0, standard USB type "A" connector
Host OS	Windows (10 or later), Linux.
Power consumption	Typical 100 mA
Dimensions	35 x 165 x 17 mm for body incl. strain relief
Cable length	USB 1.0 m, CAN 0.3 m
Weight	110 g
Operating temperature	−20 °C to +70 °C
Storage temperature	−40 °C to +85 °C
Relative humidity	0 % to 85 % (non-condensing.)
IP Rating Housing	IP40
IP Rating CAN connector	IP67 Mated
IP Rating USB connector	IP40 Mated

Table 4: Technical Specifications.

3.8 CAN connectors

Kvaser Leaf v3 M12 devices that use the 5-pole male M12 connector have the pinning described in Table 5.

M12 pin number	**Function**
1	Shield
2	Not connected
3	GND
4	CAN_H
5	CAN_L

Table 5: 5-pole M12 pin configuration

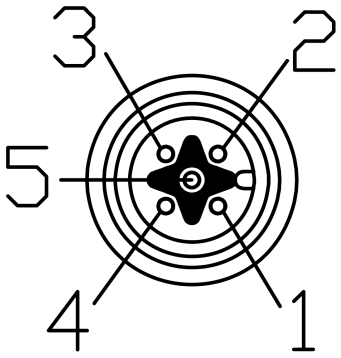

Figure 5: 5-pole male M12 Connector

3.9 CAN bus termination

Every CAN bus must be terminated with a 120 Ohm resistor at each end of the bus. The Kvaser Leaf v3 M12 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 Leaf v3 M12. 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 Leaf v3 M12 is intended for connection to a computer via the USB port.

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 Leaf v3 M12

Object of the declaration (identification of apparatus allowing traceability):
Product: Kvaser Leaf v3 M12
Type: 73-30130-01428-2

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

KVASER

Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:
Product: Kvaser Leaf v3 M12
Type: 73-30130-01428-2

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

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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.

The products described in this document are protected by U.S. patent 5,696,911.

8 Document Revision History

Version history for document UG_98251_leaf_v3_m12:

Revision	Date	Changes
1.0	2024-04-24	Initial version.
1.1	2024-08-23	Updated technical data table.