

## Kvaser Leaf Light v2 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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## Contents

<b>1</b>	<b>About this manual</b>	<b>4</b>
<b>2</b>	<b>Introduction</b>	<b>5</b>
2.1	Welcome to Kvaser Leaf Light v2 . . . . .	5
2.2	Major features . . . . .	6
2.3	Additional software and documentation . . . . .	6
<b>3</b>	<b>Kvaser Leaf Light v2 hardware</b>	<b>7</b>
3.1	Hardware installation . . . . .	7
3.2	Firmware Update . . . . .	7
3.3	USB connector . . . . .	7
3.4	CAN channels . . . . .	7
3.5	Power supply . . . . .	8
3.6	LED Indicators . . . . .	8
3.7	Troubleshooting . . . . .	9
<b>4</b>	<b>Appendices</b>	<b>10</b>
4.1	Technical data . . . . .	10
4.2	CAN connectors . . . . .	11
4.3	CAN bus termination . . . . .	13
<b>5</b>	<b>Disposal and Recycling Information</b>	<b>14</b>
<b>6</b>	<b>Legal acknowledgements</b>	<b>15</b>
6.1	Usage warning . . . . .	15
6.2	EC Regulatory Compliance . . . . .	15
6.3	Patents, Copyrights and Trademarks . . . . .	16
<b>7</b>	<b>Document Revision History</b>	<b>18</b>

## **1 About this manual**

This manual is intended for Kvaser Leaf Light v2 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 Light v2.

### 2.1 Welcome to Kvaser Leaf Light v2



Figure 1: Kvaser Leaf Light HS v2 OBDII

Kvaser Leaf Light v2 is a reliable low cost product. With a time stamp precision of 100 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 Light v2 devices listed in Table 1.

Device	Product Number
Kvaser Leaf Light v2	73-30130-00685-0
Kvaser Leaf Light HS v2 OBDII	73-30130-00732-1
Kvaser Leaf Light HS v2 OEM <sup>1</sup>	73-30130-00735-2
Kvaser Leaf Light HS v2 NMEA	73-30130-00764-2
Kvaser Leaf Light HS v2 J1939-13	73-30130-00787-1

Table 1: Kvaser Leaf Light v2 devices and their EAN numbers.

Throughout this document, we use the name Kvaser Leaf Light v2 to mean any one of the different Kvaser Leaf Light v2 products listed in Table 1, unless otherwise noted.

<sup>1</sup>For usage of the OEM variant, please also see the Kvaser OEM Device Unlock Guide.

## 2.2 Major features

- USB CAN interface.
- 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.
- Fully compatible with J1939, CANopen, NMEA 2000<sup>®</sup> and DeviceNet.
- Simultaneous operation of multiple devices.

## 2.3 Additional software and documentation

- Kvaser CANlib SDK, which includes everything you need to develop software for the Kvaser CAN hardware. Includes full documentation and many sample programs, written in C, C++, C#, Delphi, Python and Visual Basic. All Kvaser CAN interface hardware shares a common software API. Programs written for one device type will run without modification on other device types!
- On-line documentation in Windows HTML Help and Adobe Acrobat format.
- The latest versions of documentation, software and drivers can be downloaded for free at <http://www.kvaser.com/download/>.

## 3 Kvaser Leaf Light v2 hardware

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

### 3.1 Hardware installation

For the Kvaser Leaf Light v2 to communicate with the host computer, the correct version of the Kvaser driver must be installed. The file `kvaser_drivers_setup.exe` and instructions can be found on the attached CD but it is recommended that the latest version is downloaded from <http://www.kvaser.com/download/>. The Kvaser Leaf Light v2 may then be connected to any available USB port on the host computer.

### 3.2 Firmware Update

Firmware updates and upgrade instructions can be found at <http://www.kvaser.com/download/>. Use “Kvaser Hardware” to see the current firmware version of your Kvaser Leaf Light v2.

### 3.3 USB connector

The Kvaser Leaf Light v2 has a standard USB type “A” connector.

### 3.4 CAN channels

The Kvaser Leaf Light v2 has one CAN Hi-Speed channel with a CAN connector depending on the model. Either a 9-pin DSUB, a 16-pin OBDII, a 5-pin NMEA or a 9-pin J1939-13 connector is used. See Section 4.2, CAN connectors, on Page 11 for details about the pinout.



Figure 2: OBDII CAN connector



Figure 3: NMEA CAN connector

### 3.5 Power supply

The Kvaser Leaf Light v2 is powered from the USB port.

### 3.6 LED Indicators

The Kvaser Leaf Light v2 has two LEDs as shown in Figure 4 on Page 9. Their functions are shown in Table 2.

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 Light v2.





Figure 4: LEDs on the Kvaser Leaf Light v2.

### 3.7 Troubleshooting

Use “Kvaser Hardware” in the Control Panel to verify that the computer can communicate with the Kvaser Leaf Light v2, if the firmware version shown is all zeroes, there are communication problems.

## 4 Appendices

In this section you will find technical information about the Kvaser Leaf Light v2 and its connectors.

### 4.1 Technical data

In Table 3 below you will find the Kvaser Leaf Light v2's technical specifications.

CAN Channels	1
CAN Transceivers	TJA1051T (Compliant with ISO 11898-2)
CAN Controller	Built into the processor
CAN Bit Rate	40 kbit/s to 1 Mbit/s
Time stamp resolution	100 $\mu$ s
Max message rate	8000
Error Frame Detection	Yes
Error Frame Generation	No
Silent mode	No
PC interface	USB Hi-Speed
Power consumption	Typical 90mA
Hardware configuration	Done by software (Plug & Play).
Software requirements	Windows XP or later. (For other operating systems, contact Kvaser support.)
Dimensions	35 x 165 x 17 mm for body incl. strain relief
Weight	110 g
Operating temperature	-20 °C to +70 °C
Storage temperature	-40 °C to +85 °C
Relative humidity	0 % to 85 % (non-condensing.)

Table 3: Technical Specifications.

## 4.2 CAN connectors

Kvaser Leaf Light v2 devices that uses the 9-pin D-SUB connector (see Figure 5) has the pinning described in Table 4.

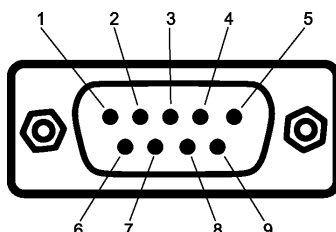


Figure 5: The D-SUB connector pin numbers

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.

Table 4: Configuration of the 9-pin DSUB

Kvaser Leaf Light v2 devices that uses the 16-pin OBDII plug (see Figure 6) has the pinning described in Table 5.

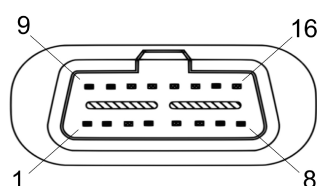


Figure 6: OBDII Connector

OBDII pin number	Function
4	GND
6	CAN_H
14	CAN_L
16	Not connected.

Table 5: OBDII pin configuration (showing only connected pins)

Kvaser Leaf Light v2 devices that uses the 5-pin NMEA connector has the pinning described in Table 6 on Page 12.

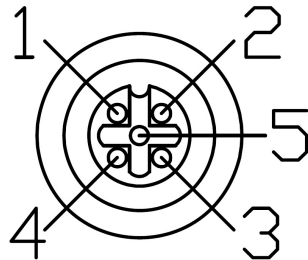


Figure 7: NMEA Connector

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

Table 6: NMEA pin configuration

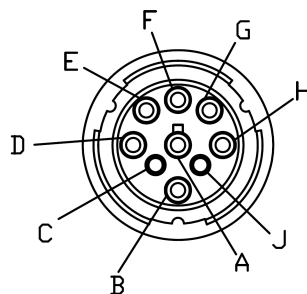


Figure 8: J1939-13 Connector

Kvaser Leaf Light v2 devices that uses the 9-pin J1939-13 connector has the pinning described in Table 7.

J1939-13 Pin	Function
A	GND
B	Not connected
C	CAN_HI
D	CAN_LOW
E	SHIELD
F-J	Not connected

Table 7: J1939-13 pin configuration

### 4.3 CAN bus termination

Every CAN bus must be terminated with a 120 Ohm resistor at each end of the bus. The Kvaser Leaf Light v2 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.**

## 5 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:  
<http://www.kvaser.com/en/kvaser/recycling-policy.html>

## 6 Legal acknowledgements

### 6.1 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.

### 6.2 EC Regulatory Compliance

The product(s); 73-30130-00787-1, 73-30130-00685-0, 73-30130-00732-1, 73-30130-00764-2, 73-30130-00735-2, is in conformity with the essential

requirements of the following regulations and directives:

- DIRECTIVE 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 (WEEE)
- REGULATION (EC) No. 1907/2006 (REACH), Annex XIV (the 'Candidate list') and Annex XVII ('Restriction of Substances')

The products listed above also complies with DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 (RoHS) and is in conformity with the following standards and/or other normative documents:

Standard	Description
EN 50 581 (2012)	Assessment with respect to restriction of hazardous substances

Table 8: Standards and normative documents for RoHS 2011

The products listed above also complies with DIRECTIVE 2004/108/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 December 2004 (EMC-directive) and is in conformity with the following standards and/or other normative documents:

Standard	Description
EN 55 022 (2010)	Class B, radiated. IT equipment, commercial emission
EN 55 024 (2010)	IT equipment, commercial immunity

Table 9: Standards and normative documents for EMC 2004

**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/her own expense.

### 6.3 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.

Adobe, the Adobe logo, and Reader are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

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



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

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

## 7 Document Revision History

Version history for document UG\_98146\_leaf\_light\_v2:

Revision	Date	Changes
1	2013-09-17	First version.
	2013-11-15	Added chapter CAN bus termination, relative humidity. Updated links and layout.
	2013-11-28	Changed layout of references, figures.
	2013-12-17	Added OBDII connector information.
	2014-01-14	Purchase of CD/USB not possible anymore.
	2014-02-28	Power pin on DSUB and OBDII is not connected.
2	2014-03-18	Updated compliance text. Added NMEA device.
3	2014-04-28	Added J1939 device. Renumbered pages, added images.