

Kvaser Leaf Light v2 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 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 ¹	73-30130-00735-2
Kvaser Leaf Light HS v2 J1939-13	73-30130-00787-1
Kvaser Leaf Light HS v2 J1939-13 Type II	73-30130-00915-8
Kvaser Leaf Light HS v2 M12	73-30130-00881-6

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.

¹For 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® and DeviceNet.
- Simultaneous operation of multiple devices.

2.3 Additional software and documentation

The Kvaser CANlib SDK includes everything you need in order to develop software applications interacting with Kvaser CAN hardware. The SDK contains full documentation and many sample programs, written in C, C++, C#, Delphi, Python and Visual Basic. Kvaser CAN 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 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, a compatible version of the Kvaser driver and firmware must be installed.

After the driver has been installed on the host computer, the firmware may then be downloaded and installed on the Kvaser Leaf Light v2.

The latest version of the driver and firmware can be downloaded from www.kvaser.com/download.

The driver is installed by running the file `kvaser_drivers_setup.exe`.

The Kvaser Leaf Light v2 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.

3.2 Firmware Update

Firmware updates and upgrade instructions can be found at www.kvaser.com/download. Use “Kvaser Device Guide” 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 D-SUB, a 16-pin OBDII, a 5-pin M12 Male, a 9-pin J1939-13 Type I, or a 9-pin J1939-13 Type II connector is used. See Section 4.2, CAN connectors, on Page 12 for details about the pinout.



Figure 2: 9-pin D-SUB CAN connector



Figure 3: OBDII CAN connector



Figure 4: M12 5-pole Male CAN connector



Figure 5: J1939-13 Type I CAN connector



Figure 6: J1939-13 Type II 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 7. Their functions are shown in Table 2.

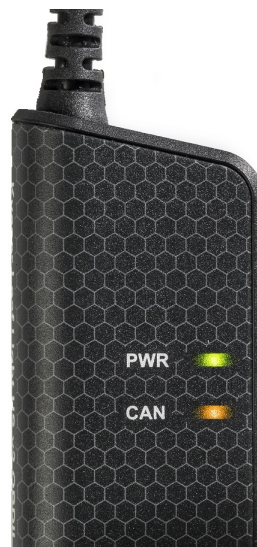


Figure 7: LEDs on the Kvaser Leaf Light v2.

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.

3.7 Troubleshooting

Use “Kvaser Device Guide” in the Control Panel to verify that the computer can communicate with the Kvaser Leaf Light v2. 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.

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)
Galvanic isolation	Yes
CAN Controller	Built into the processor
CAN Bit Rate	40 kbit/s to 1 Mbit/s
Time stamp resolution	100 µs
Max message rate	8000 msg/s
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 (7 or later), Linux.
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 use the 9-pin D-SUB connector (see Figure 8) have the pinning described in Table 4.

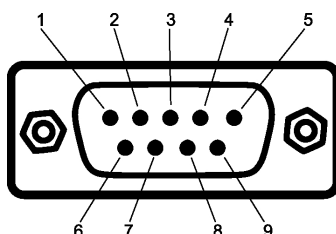


Figure 8: The D-SUB 9 connector pin numbers

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 D-SUB

Kvaser Leaf Light v2 devices that use the 16-pin OBDII plug (see Figure 9) have the pinning described in Table 5.

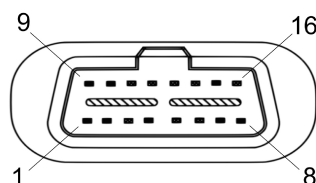


Figure 9: OBDII Connector

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 use the 5-pole male M12 connector have the pinning described in Table 6 on Page 13.

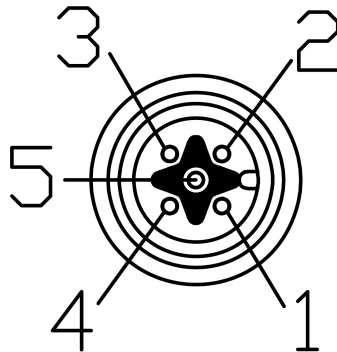


Figure 10: 5-pole male M12 Connector

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

Table 6: 5-pole M12 pin configuration

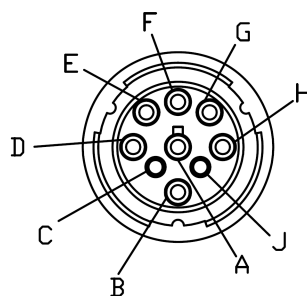


Figure 11: J1939-13 Type I Connector

Kvaser Leaf Light v2 devices that use the 9-pin J1939-13 Type I or Type II connector have the pinning described in Table 7 on Page 14.

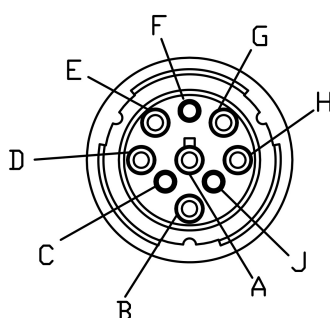


Figure 12: J1939-13 Type II Connector

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:
<https://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 EU Regulatory Compliance



EU Declaration of Conformity (DoC)

We

Company Name:	Kvaser AB	City:	Mölnadal
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 Light HS v2

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

Product: Kvaser Leaf Light HS v2

Type: 73-30130-00685-0

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 55024 (2010)

EN 55032 (2012)

EN 61000-6-3 (2007 + A1:2011)

EN 50581 (2012)

Signed for and on behalf of:

Mölnadal

2019-12-05

Place of issue

Date of issue

Claes Haglund, Supply Chain and Quality director



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 Light HS v2 OBDII

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

Product: Kvaser Leaf Light HS v2 OBDII

Type: 73-30130-00732-1

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):

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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 Light HS v2 OEM

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

Product: Kvaser Leaf Light HS v2 OEM

Type: 73-30130-00735-2

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

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EN 61000-6-3 (2007 + A1:2011)

EN 50581 (2012)


Signed for and on behalf of:

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Place of issue

Date of issue


Claes Haglund, Supply Chain and Quality director



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Company Name:	Kvaser AB	City:	Möln dal
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 Light HS v2 J1939-13

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

Product: Kvaser Leaf Light HS v2 J1939-13

Type: 73-30130-00787-1

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 55024 (2010)

EN 55032 (2012)

EN 61000-6-3 (2007 + A1:2011)

EN 50581 (2012)


Signed for and on behalf of:

Möln dal

2019-12-05

Place of issue

Date of issue


Claes Haglund, Supply Chain and Quality director



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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 Light HS v2 M12

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

Product: Kvaser Leaf Light HS v2 M12

Type: 73-30130-00881-6

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 55024 (2010)

EN 55032 (2012)

EN 61000-6-3 (2007 + A1:2011)

EN 50581 (2012)


Signed for and on behalf of:

Mölndal

2019-12-05

Place of issue

Date of issue


Claes Haglund, Supply Chain and Quality director



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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 Light HS v2 J1939-13 Type II

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

Product: Kvaser Leaf Light HS v2 J1939-13 Type II

Type: 73-30130-00915-8

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 55024 (2010)

EN 55032 (2012)

EN 61000-6-3 (2007 + A1:2011)

EN 50581 (2012)


Signed for and on behalf of:

Möln dal

2019-12-05

Place of issue

Date of issue


Claes Haglund, Supply Chain and Quality director

6.3 FCC Regulatory Compliance



Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser Leaf Light HS v2

Type: 73-30130-00685-0

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



Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser Leaf Light HS v2 OBDII

Type: 73-30130-00732-1

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



Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser Leaf Light HS v2 OEM

Type: 73-30130-00735-2

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



Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser Leaf Light HS v2 J1939-13

Type: 73-30130-00787-1

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



Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser Leaf Light HS v2 M12

Type: 73-30130-00881-6

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



Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser Leaf Light HS v2 J1939-13 Type

II

Type: 73-30130-00915-8

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

6.4 Patents, Copyrights and Trademarks

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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.

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.

7 Document Revision History

Version history for document UG_98146_leaf_light_v2:

Revision	Date	Changes
1	2013-09-17	First version.
2	2014-03-18	Updated compliance text. Added NMEA device. Changed layout of references, figures. Purchase of CD/USB not possible anymore. Added OBDII connector information. Added chapter CAN bus termination, relative humidity. Updated links and layout.
3	2014-04-28	Added J1939 device. Renumbered pages, added images. Power pin on D-SUB and OBDII is not connected.
4	2015-01-08	Minor update.
5	2015-08-11	Minor textual changes.
6	2016-02-09	Added photo of J1939 Type I connector. Replaced 00764-2 with 00881-6.
7	2016-09-05	Added 00915-8.
8	2016-10-26	Added image of 9-pin D-SUB.
9	2017-01-09	Updated compliance text, added link to patents
10	2017-08-25	Updated EU Declaration of Conformity
10.1	2018-01-29	"Kvaser Device Guide" has replaced "Kvaser Hardware"
10.2	2018-08-28	Minor textual changes
11.0	2018-10-15	Updated EU Regulatory Compliance
12.0	2019-02-11	Windows Vista or later supported, minor textual changes
12.1	2019-08-09	Url protocol updated
12.2	2020-02-21	Added more Declaration of Conformities, removed reference to CD
12.3	2020-05-06	Updated Technical data table with galvanic isolation
12.4	2020-08-19	Updated supported OS