Kvaser Air Bridge Light HS User's Guide

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Contents

1 About this manual

This manual is intended for Kvaser Air Bridge Light HS users. This document contains a description of the hardware's properties and general instructions on how to use the Kvaser Air Bridge Light HS.

Two complementary documents are available:

- Kvaser Air Bridge Installation Guide

- Kvaser Air Bridge System Integration Guide

The Kvaser Air Bridge Installation Guide provides installation advice for end-users who use Kvaser Air Bridge Light HS and want to optimize radio performance and reach.

The Kvaser Air Bridge System Integration Guide provides design-in advice for system integrators who use Kvaser Air Bridge Light HS as a system component and want to make the most of its data bridging capability, not least in scenarios where multiple Kvaser Air Bridge Light HSs are to be employed.

2 Introduction

This section describes the functions and features of the Kvaser Air Bridge Light HS.

2.1 Welcome to Kvaser Air Bridge Light HS

Figure 1: Kvaser Air Bridge Light HS

Kvaser Air Bridge Light HS is a small, yet advanced, wireless CAN bridge that can be used as a CAN system gateway between two CAN networks. The Kvaser Air Bridge Light HS consists of a preconfigured pair of plug and play units.

This guide applies to Kvaser Air Bridge Light HS devices listed in Table 1.

Device	Product Number
Kvaser Air Bridge Light HS	73-30130-00808-3
Kvaser Air Bridge Light HS M12	73-30130-01141-0
Kvaser Air Bridge Light HS (FCC)	73-30130-01008-6
Kvaser Air Bridge Light HS M12 (FCC)	73-30130-01148-9

Table 1: Kvaser Air Bridge Light HS devices and their EAN numbers.

The (00808-3 and 01141-0) Kvaser Air Bridge Light HS is approved for the European Union, while (01008-6 and 01148-9) Kvaser Air Bridge Light HS (FCC) is optimized for the US. They both share the same functionality but have different radio transmitting schemes due to regulatory differences.

Throughout this document, we use the name Kvaser Air Bridge Light HS to mean any one of the different Kvaser Air Bridge Light HS products listed in Table 1, unless otherwise stated.

2.2 Major Features

- A preconfigured pair of units that acts as a wireless CAN system gateway between two CAN networks.

- 2.4 GHz proprietary protocol.

- Point to point radio link.

- Internal antenna design, antenna output power max 18 dBm.

- Automatic baud rate detection (125K, 250K, 500K, 1M).

- Supports both 11-bit (CAN 2.0A) and 29-bit (CAN 2.0B active) identifiers.

- High-Speed CAN connection (compliant with ISO 11898-2), up to 1 Mbit/s.

- Power supplied through the CAN bus interface.

- Rugged aluminum housing.

- Plug and play, driver free, and configuration free.

3 Kvaser Air Bridge Light HS hardware

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

3.1 Hardware installation

The Kvaser Air Bridge Light HS consists of two preconfigured and paired CAN bus units. Just connect and power them through your CAN system, no user configuration, software tools or drivers are required.

When connected to your system, the two units will determine the bit rate used by the attached CAN systems using Automatic Baud Rate Detection (autobaud), see Section 3.5, Autobaud Detection, on Page 9. Once the autobaud detection has completed successfully, the units will transmit CAN messages back and forth until the units are powered down.

The Kvaser Air Bridge Light HS will only forward CAN messages between the two attached CAN networks. Error frames and arbitration information will not be forwarded since this information is only applicable for the local physical network.

3.2 CAN channel

The Kvaser Air Bridge Light HS has one CAN Hi-Speed channel with a CAN connector depending on the model. Either a 9-pin D-SUB or a 5-pin M12 Male connector is used. See Section 4.2, CAN Connectors, on Page 11 for details about the pinout.
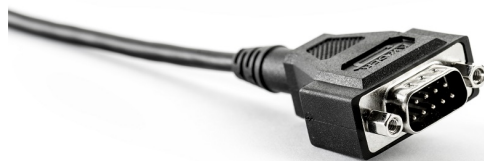

Figure 2: 9-pin Male D-SUB CAN connector

Figure 3: M12 5-pole Male CAN connector

3.3 Power supply

The Kvaser Air Bridge Light HS is powered through the CAN connector. To operate the Kvaser Air Bridge Light HS, you **must** supply 9 V-36 V DC power through the CAN connector.

3.4 LED Indicators

The functions of the LED indicators on the Kvaser Air Bridge Light HS are shown in Table 2.

Figure 4: LEDs on the Kvaser Air Bridge Light HS.

LED	Description
CAN (Yellow)	CAN channel status, indicate received and sent messages.
RF (Blue)	Radio Link status, indicate received radio packets and signal strength.
POWER (Green)	Power indicates that the unit has been powered on and baud rates are established.

Table 2: LEDs on the Kvaser Air Bridge Light HS.

> Before power is indicated, the LEDs briefly perform an LED test, indicate states related to the establishment of the radio link and indicate state of the autobaud detection.

3.5 Autobaud Detection

The Kvaser Air Bridge Light HS provides an Autobaud Detection feature which will automatically detect and connect to any of the following CAN network bit rates:

- 1 Mbit/s
- 500 Kbit/s
- 250 Kbit/s
- 125 Kbit/s.

The Autobaud Detection is done locally, so a Kvaser Air Bridge Light HS can be used to bridge two different CAN networks operating at different bit rates. However, the amount of traffic on the networks will determine whether the system designer should allow the networks to be bridged via the Kvaser Air Bridge Light HS.

> Autobaud is the process of automatically selecting the correct bus parameters for communication on the connected CAN bus based on received CAN traffic. The Autobaud Detection is driven by the reception of CAN messages on the CAN network. This means that there needs to be existing CAN traffic on the network for the Autobaud Detection to work.

If, after 15 seconds of power on, only one of the paired units have done a successful Autobaud Detection, the other unit will be configured to the same CAN network bit rate. The Autobaud Detection will continue even after 15 seconds, if none of the supported CAN system bit rates have been detected on either of the connected CAN networks.

> If the Kvaser Air Bridge Light HS is used to bridge two different CAN networks operating at different bit rates, both CAN networks needs to send messages during the initial 15 seconds after power on in order for the Autobaud Detection to correctly detect the different bit rates.

For any additional/specific bit rate requirement, please contact Kvaser for more info.

4 Appendices

In this section you will find technical information about the Kvaser Air Bridge Light HS.

4.1 Technical data

In Table 3 below you will find the Kvaser Air Bridge Light HS's technical specifications. The physical dimensions are given in Figure 5 on Page 11.

CAN Channels	1
CAN Transceivers	TJA1051T (Compliant with ISO 11898-2)
CAN Controller	Built into the processor
CAN Bit Rate	Autobaud at 1 Mbit/s, 500 Kbit/s, 250 Kbit/s, and 125 Kbit/s
Message Rate	Recommended maximum rate 1200 msg/s full duplex using 11-bit CAN identifier [1]
Message Latency	Approximately 5.5 ms [1]
Wireless Communication	2.4 GHz Gaussian Frequency-Shift Keying (GFSK) with Frequency Hopping Spread Spectrum (FHSS) modulation
Frequency Range	2400 MHz to 2483.5 MHz (2.4 GHz band)
Antenna Type	Internal antennas
Antenna Output Power	Max 18 dBm
External Power	Allowed operating voltage 9 V-36 V DC, maximum input voltage 48 V DC
Power Consumption	Approximately 2 W
Hardware Configuration	Plug and play
IP Rating	IP 65
Operating Temperature	−40 °C to +70 °C

Table 3: Technical Specifications.

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[1] Refer to complementary documentation "Kvaser Air Bridge System Integration Guide" for more information
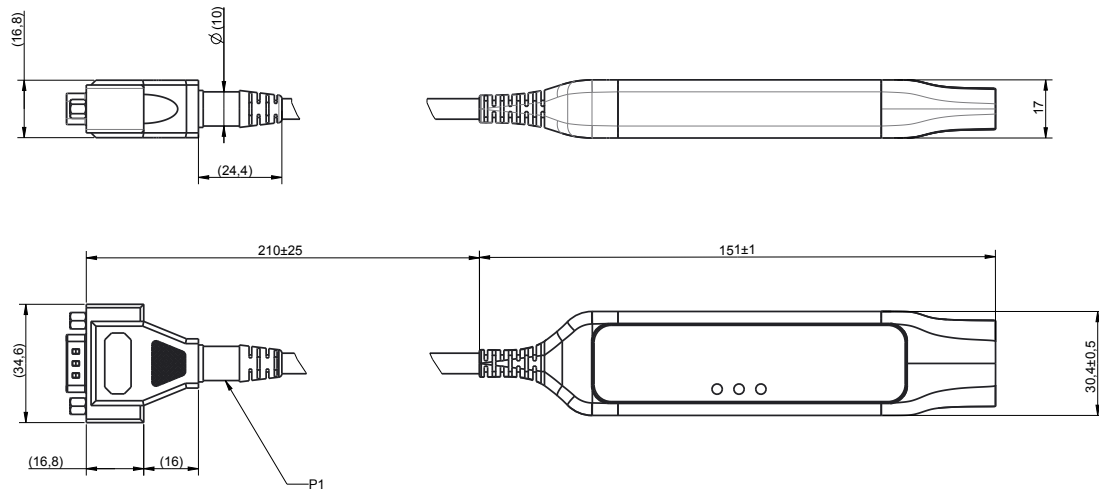
Figure 5: Physical dimensions of the Kvaser Air Bridge Light HS

4.2 CAN Connectors

Kvaser Air Bridge Light HS devices that use the 9-pin D-SUB connector (see Figure 6) have the pinning described in Table 4.
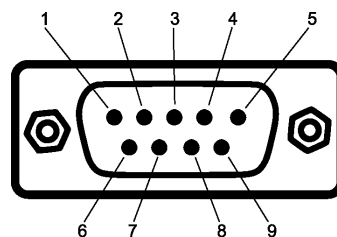
Figure 6: The D-SUB 9 connector pin numbers

D-SUB pin number	Function
1	Not connected
2	CAN_L
3	GND
4	Reserved
5	Shield
6	Not connected
7	CAN_H
8	Not connected
9	Power supply to the device

Table 4: Configuration of the 9-pin D-SUB

Kvaser Air Bridge Light HS devices that use the 5-pole male M12 connector have the pinning described in Table 5 on Page 12.

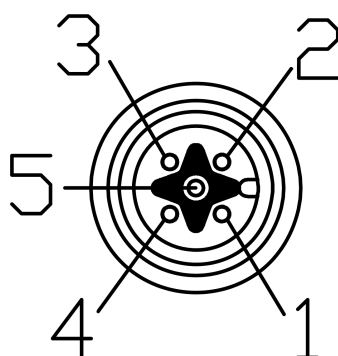Figure 7: 5-pole male M12 Connector

M12 pin number	Function
1	Shield
2	Power supply to the device
3	GND
4	CAN_H
5	CAN_L

Table 5: 5-pole M12 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 Air Bridge Light HS 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

KVASER
Advanced CAN Solutions

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 Air Bridge Light HS

Object of the declaration (identification of apparatus allowing traceability):
Product: Kvaser Air Bridge Light HS
Type: 73-30130-00808-3

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:
Radio Equipment Directive (RED) 2014/53/EU (Art. 3.1a, 3.1b and 3.2)

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 203 367 (2016-03 (1.1.0))	EN 300 328 (2016-11 (2.1.1))
EN 301 489-1 (2016-11 (2.1.1))	EN 301 489-17 (2016 (3.1.1))
EN 55032 (2012)	EN 62 368-1 (2014 + AC1:2015)
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

6.3 FCC Regulatory Compliance

Federal Communications Commission (FCC) Compliance Information Statement

IDENTIFICATION OBJECT:

Product: Kvaser Air Bridge Light HS (FCC)

Type: 73-30130-01008-6

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

6.4 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.

7 Document Revision History

Version history for document UG_98208_air_bridge_light_hs:

Revision	Date	Changes
1.0	2018-09-04	Initial version
2.0	2018-11-22	Corrected IP Rating and operating temperature, updated EU Regulatory Compliance.
2.1	2018-12-06	Clarified CAN Bit Rate.
2.2	2019-08-09	Url protocol updated
3.0	2020-05-15	Added devices with M12 Connector, CAN bus termination chapter
3.0	2020-05-15	Added devices with M12 Connector, CAN bus termination chapter
4.0	2020-08-24	Corrected power pin of M12 Connector