

Kvaser BlackBird v2 User's Guide



Copyright 2011-2017 Kvaser AB, Mölndal, Sweden
<http://www.kvaser.com>

Printed Wednesday 13th September, 2017

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.

(This page is intentionally left blank.)

Contents

| | | |
|----------|---|-----------|
| 1 | About this manual | 4 |
| 2 | Introduction | 5 |
| 2.1 | Welcome to Kvaser BlackBird v2 | 5 |
| 2.2 | Major features of Kvaser BlackBird v2 | 6 |
| 2.3 | Additional software and documentation | 6 |
| 3 | Kvaser BlackBird v2 hardware | 7 |
| 3.1 | Hardware installation | 7 |
| 3.2 | USB connector | 7 |
| 3.3 | CAN | 7 |
| 3.4 | Power supply | 7 |
| 3.5 | LED indicators | 8 |
| 4 | How to use the Kvaser BlackBird v2 | 9 |
| 4.1 | Use as a USB CAN interface | 9 |
| 4.2 | Use as a Wireless CAN Interface | 9 |
| 4.3 | Troubleshooting | 9 |
| 5 | Appendices | 10 |
| 5.1 | Technical data | 10 |
| 5.2 | CAN connectors | 10 |
| 5.3 | CAN bus termination | 11 |
| 5.4 | Updating the firmware | 12 |
| 6 | Disposal and Recycling Information | 14 |
| 7 | Legal acknowledgements | 15 |
| 7.1 | Usage warning | 15 |
| 7.2 | Agency Approval | 15 |
| 7.3 | USA | 16 |
| 7.4 | RoHS compliance statement | 17 |
| 7.5 | Patents, copyrights and trademarks | 17 |
| 8 | Version history | 18 |

1 About this manual

This manual is intended for Kvaser BlackBird v2 users. This document contains a description of the hardware's properties and general instructions for connecting the device to a computer. The Kvaser BlackBird setup software is started from the Kvaser Hardware program in the control panel.

For information about how to set up a WLAN connection to the Kvaser BlackBird v2, see the Kvaser BlackBird Getting Started Guide.

2 Introduction

This section will describe the functions and features of the Kvaser BlackBird v2.

2.1 Welcome to Kvaser BlackBird v2



Figure 1: Kvaser BlackBird v2

The Kvaser BlackBird v2 is a small, yet advanced, wireless CAN interface. Configured via the USB interface, the Kvaser BlackBird v2 can be used as a wireless CAN interface or as a USB CAN interface.

This guide applies to Kvaser BlackBird v2 devices listed in Table 1.

| Device | Product Number |
|---------------------------|------------------|
| Kvaser BlackBird v2 | 73-30130-00671-3 |
| Kvaser BlackBird v2 OBDII | 73-30130-00675-1 |

Table 1: Kvaser BlackBird v2 devices and its EAN numbers

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

2.2 Major features of Kvaser BlackBird v2

- Wireless CAN interface
- Supports 802.11b/g/n
- Infrastructure and Ad-hoc mode
- Supports WPA2/WPA/WEK encryption
- Supports Kvaser REST API
- Can be either public or private.
- USB CAN interface
- Supports extreme data throughput and prevents bottlenecks with quick reaction times and precise time stamping.
- Supports both 11-bit (CAN 2.0A) and 29-bit (CAN 2.0B active) identifiers.
- Large on-board RAM buffer for CAN messages
- Supports silent mode for analysis tools – listen to the bus without interfering.
- 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.
- One USB 2.0 HiSpeed connection with data rates up to 480 Mbit/s while being compatible with USB 1.x and USB 3.0.
- Power supplied through the CAN bus interface or the USB interface. The device automatically switches between the CAN (primary) and the USB (secondary) power supply, reducing the power drain on a laptop's battery.
- Rugged aluminum housing.

2.3 Additional software and documentation

The Kvaser CANlib SDK includes everything you need in order to develop software for Kvaser CAN hardware. The SDK contains full documentation and many sample programs, written in C, C++, C#, Delphi, Python and Visual Basic. All Kvaser CAN interface hardware share a common software API. Programs written for 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 BlackBird v2 hardware

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

3.1 Hardware installation

The Kvaser BlackBird 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.

For the Kvaser BlackBird v2 to communicate with the host computer, the correct version of the Kvaser driver and firmware must be installed. The firmware is downloaded and installed directly on the Kvaser BlackBird v2 and the driver is installed on the host computer. 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`.

For information on how to upgrade the firmware, see Section 5.4, Updating the firmware, on Page 12.

3.2 USB connector

The Kvaser BlackBird v2 has a standard USB type "A" connector.

3.3 CAN

The Kvaser BlackBird v2 offers different CAN connectors depending on the model. A 9-pin D-SUB or a 16-pin OBDII connector. See Section 5.2, CAN connectors, on Page 10 for details about the different connectors.

3.4 Power supply

The Kvaser BlackBird v2 can be powered from the CAN side or from the USB side. The device automatically switches between the CAN (primary) and the USB (secondary) power supply, reducing the power drain on a laptop's battery.

To operate the Kvaser BlackBird v2 as a wireless CAN interface, you must supply power on the CAN side. To use the device as a USB CAN interface or to configure the device, power on the USB side is sufficient.



Figure 2: LEDs on the Kvaser BlackBird v2

3.5 LED indicators

The LED indicators have somewhat different meaning depending on how your Kvaser BlackBird v2 is being used – as a CAN interface or a wireless interface. Table 2 on Page 8 describes the general purpose of each LED.

| LED | General meaning |
|---------------|--|
| CAN (Yellow) | Status for CAN channel. |
| INFO (Orange) | General Information. |
| ERROR (Red) | Indicates temporary or permanent errors. |
| WLAN (Blue) | WLAN status. |
| POWER (Green) | Power and general status. |

Table 2: LEDs on the Kvaser BlackBird v2

The ERROR LED indicator can give more information about the cause of failure.

| ERROR LED Signal | Auxiliary Signal | General Meaning |
|------------------|------------------|--------------------------------------|
| Blink | CAN LED blinks | CAN channel is in error passive mode |
| Slower blink | CAN LED blinks | CAN channel is bus off |
| Short flash | - | Error frame detected |

Table 3: ERROR LED Indicator Signals

A steady light on ERROR LED is used to indicate a variety of situations. Check the other LED signals to identify the issue.

| LED | Signal bursts | General Meaning |
|-------|-----------------------|--|
| INFO | 1 short blink | CAN overrun |
| INFO | 5 short blinks | Major error |
| INFO | 6 short blinks | WLAN failure |
| POWER | continuous fast blink | Software problems: configuration, parameters, firmware |

Table 4: LED interpretation when ERROR LED gives a steady light.

4 How to use the Kvaser BlackBird v2

4.1 Use as a USB CAN interface

To use the Kvaser BlackBird v2 as a USB CAN interface; connect the unit to a free USB port on your PC or USB hub.



When used as a USB CAN interface, the POWER LED will be illuminated and the CAN LED will emit short flashes when CAN messages are transmitted and received.

4.2 Use as a Wireless CAN Interface

To use the Kvaser BlackBird v2 as a Wireless CAN interface, supply power through the CAN connector and disconnect the USB connector.



When used as a Wireless CAN interface, the POWER LED will be illuminated and the CAN LED will emit short flashes when CAN messages are transmitted and received. When the WLAN LED is constantly illuminated, the BlackBird is connected as a CAN interface and the wireless communication is stable.

4.3 Troubleshooting

Use “Kvaser Hardware” in the Control Panel to verify that the computer can communicate with the Kvaser BlackBird 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.



For further troubleshooting, see the trouble shooting section in the Kvaser BlackBird Getting Started Guide.

5 Appendices

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

5.1 Technical data

In Table 5 you will find the Kvaser BlackBird v2's technical specifications.

| | |
|------------------------|---|
| CAN Channels | 1 (CAN 2.0A and 2.0B active). |
| 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 | 25 μ s |
| Error Frame Detection | Yes |
| Error Frame Generation | Yes |
| PC interface | Supports USB 2.0 HiSpeed at 480 Mbit/s. Compatible with USB 1.1 at 12 Mbit/s and with USB 3.0 at 480 Mbit/s. |
| Wireless communication | WLAN 802.11b/g/n, 2.4 GHz, (infrastructure and ad hoc-mode) |
| Wireless security | WPA2 / WPA / WEP128 / WEP64 |
| External power | Allowed operating voltage 9–40 V DC. Maximum input voltage 48 V DC. |
| Power consumption | Typical values are: 370 mA if powered from the USB (~5 V). 4.2 W for single channel powered from the CAN bus. |
| Hardware configuration | Done by software (Plug & Play). |
| Software requirements | Windows (XP with SP3 or later). (For other operating systems, see Kvaser web or contact Kvaser support.) |
| Dimensions | 30 x 190 x 20 mm |
| Weight | 165 g including cables and connectors. |
| Operating temperature | -40 °C to +70 °C |
| Storage temperature | -55 °C to +90 °C |
| Relative Humidity | 0 % to 85 % (non-condensing.) |

Table 5: Technical Specifications.

5.2 CAN connectors

Kvaser BlackBird v2 devices that use the 9-pin D-SUB connector (see Figure 3 on Page 11) have the pinning described in Table 6 on Page 11.

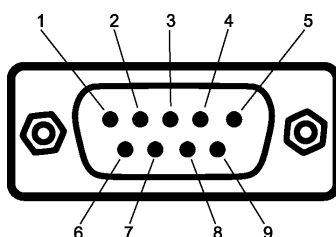


Figure 3: The D-SUB 9 connector pin numbers

| 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 | Power supply to the device |

Table 6: Configuration of the 9-pin D-SUB

Kvaser BlackBird v2 devices that use the 16-pin OBDII plug (see Figure 4) have the pinning described in Table 7.

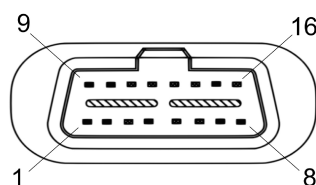


Figure 4: OBDII Connector

| OBDII pin number | Function |
|------------------|----------------------------|
| 4 | GND |
| 6 | CAN_H |
| 14 | CAN_L |
| 16 | Power supply to the device |

Table 7: OBDII pin configuration (showing only connected pins)

5.3 CAN bus termination

Every CAN bus must be terminated with a 120 Ohm resistor at each end of the bus. The Kvaser BlackBird 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.

5.4 Updating the firmware

For the Kvaser BlackBird v2 to communicate with the host computer, compatible versions of the Kvaser CANlib (including driver) and firmware must be installed. Read the Release Notes carefully.

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

Connect the Kvaser BlackBird v2 to your PC with the USB cable. Start the update.exe application. A window opens where you should see the device listed if correctly connected to your PC (see Figure 5). Select the device to update and click the Next button.

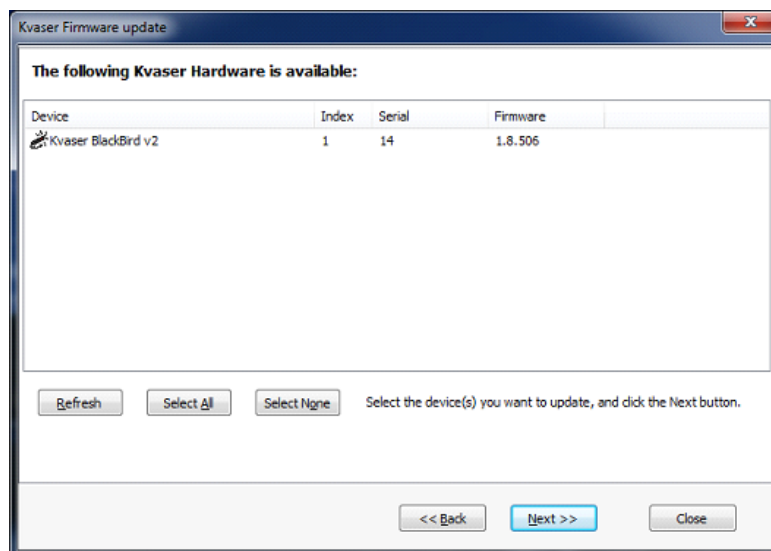


Figure 5: Firmware Update, Select Device

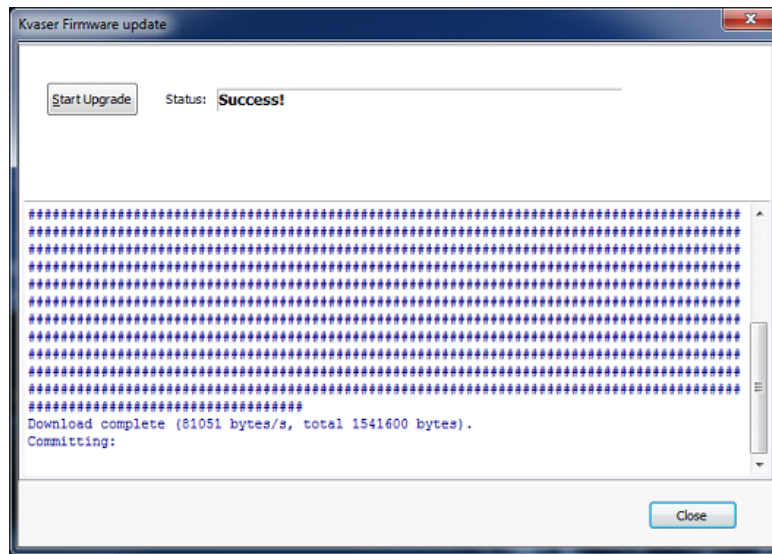


Figure 6: Firmware Update, Start Upgrade

Click on the Start Upgrade button to start programming (see Figure 6 on Page 13) . Programming takes approximately 30 seconds. The progress is displayed on the screen.

If you see any error messages, try to disconnect and reconnect the device, and then perform the operation again.

To verify that the firmware is updated,

- Open “Kvaser Hardware” in Control Panel. Select “Kvaser BlackBird v2” in the tree view to the left, and click on the channel. The firmware revision information appears in the right half of the window.

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

7 Legal acknowledgements

7.1 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.

7.2 Agency Approval

7.2.1 R&TTE Declaration of Conformity (DoC)

The equipment comply with the applicable directive R&TTE 1999/5/EC and the following applicable standards EN 301 489-1 (1.8.1), EN 301 489-17 (2.1.1), EN 300 328 (1.7.1) and EN 60950-1 (2006).

We,

Kvaser AB Aminogatan 25A SE-431 53 Mölndal Sweden

declare under our sole responsibility that the product:

Product name: Kvaser BlackBird v2

Trademark: Kvaser

Model: Kvaser BlackBird v2, EAN: 73-30130-00671-3
Kvaser BlackBird v2 OBDII, EAN: 73-30130-00675-1

to which this declaration relates is in conformity with the essential requirements and other relevant requirements of the R&TTE Directive (1999/5/EC).

The product is in conformity with the following standards and/or other normative documents: HEALTH & SAFETY (Art. 3(1)(a)): EN 60950-1 (2006) and A11 (2009), EN 62 311 (2008) EMC (Art. 3(1)(b)): EN 301 489-1 V1.8.1(2008), EN 301 489-17 V2.1.1(2009) SPECTRUM (Art 3(2)): EN 300 328 V1.7.1 (2006-10)

Notified body involved: HEALTH & SAFETY (Art. 3(1)(a)), EMC (Art. 3(1)(b) and SPECTRUM (Art 3(2)) tested by SGS Fimko oy

Technical file held by:

Kvaser AB Aminogatan 25A SE-431 53 Mölndal Sweden

Place and date of issue (of this DoC):

Mölndal 2013-06-10

Kent Lennartsson, Hardware Manager

7.3 USA

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.

FCC Compliance

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.

This device contains
FCC ID: XF6-RS9110N1102

When using the Kvaser BlackBird v2 device, you will be exposed to some of the transmitted RF energy. This exposure is well below the prescribed limits in all national and international RF safety standards and regulations. For security reasons: This modular transmitter **MUST** have a separation distance of at least 20 cm between the antenna and the body of the user or nearby persons.

7.4 RoHS compliance statement

This product is manufactured in accordance with directive 2002/95/EC on the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS.)

7.5 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.

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 and 7,100,042.

8 Version history

Version history for document UG_98105_blackbird_v2:

| Revision | Date | Changes |
|----------|------------|---------------------------------------|
| 4.0 | 2014-01-31 | First public release. |
| | 2014-03-07 | Hardware installation chapter updated |
| 4.1 | 2014-03-08 | Restructuring chapters. |
| 4.2 | 2014-04-15 | Renumbered pages |
| 4.3 | 2015-01-08 | Minor update |
| 4.4 | 2015-08-11 | Minor textual changes |
| 4.5 | 2016-02-04 | Minor textual changes |
| 4.6 | 2017-01-09 | Added link to patents |