RKX-EVK-001and ROHM EVK EVB

ROHM EVK SW User's Guide

The ROHM EVK Platform is an easy-to-use platform that allows evaluation of ROHM products. It supports multiple Host Adapters and connectivity methods including RKX-A3-EVK-001 which uses CY8CKIT-059 Prototyping Kit or Arduino Uno R3 as a Host Adapter. RKX-A3-EVK-001 is a highly configurable adapter board that provides an easy-to-use hardware interface for a variety of ROHM products in a plug-and-play fashion.

The ROHM EVK GUI SW, a powerful Windows-based desktop application, is an evaluation kit software that provides an intuitive Graphical User Interface capable of displaying and logging the real-time product's data and configuring the product functions through a graphical register editor. This user guide describes usage of the ROHM EVK GUI SW. For the ROHM EVK HW, please refer to the ROHM EVK HW User's Guide.

1 Acronyms

ADC	A/D Converter
GUI	Graphical User Interface
MCU	Micro Controller Unit
ODR	Output Data Rate
PSoC	Programmable SoC (System on Chip)
WU	Wake-Up

2 Definitions

ROHM EVK Platform	Provides the full range of software, hardware and the firmware used for the product evaluation purposes
ROHM EVK SW	The software for product evaluation purposes consists of ROHM EVK GUI SW and ROHM EVK FW
ROHM EVK GUI SW	ROHM Product evaluation software with a graphical user interface running on Windows OS
ROHM EVK FW	Proprietary firmware running on microcontroller-based host adapters
ROHM EVK HW	ROHM EVK EVB connected for example to RKX-EVK-001 board
RKX-EVK-001	RKX-A3-EVK-001 + CY8CKIT-059 Prototyping Kit
RKX-A3-EVK-001	Adapter board designed to interface with the ROHM EVK Evaluation Board and Host adapter board
Accelerometer EVB	Evaluation board with an accelerometer
ADC EVB	Evaluation board with an ADC
ROHM EVK Host adapter board	Refers to MCU board hardware that connects computer systems to peripheral devices. The host adapter board requires firmware for communication between the host adapter board and the computer
ROHM EVK EVB	Evaluation board having ROHM Product

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4 Introduction

Reliability is a paramount property in integrated circuits (ICs), sensors, Power Management Integrated Circuits (PMICs) etc. During product development, powerful tools for testing and debugging are needed. Many enterprises also need a specific environment tailored to the unique needs of their products to verify correct behavior. Highlighting the features and properties of developed products also requires a separate application developed for the purpose. Engineers at ROHM noticed that a generic platform capable of utilizing commonly available MCU boards as a Host Adapter can fulfill those needs.

ROHM EVK Platform offers a single application with graphical user interface (ROHM EVK GUI SW) and multiple MCU board options to control various ROHM products such as sensors, LED drivers, PMICs etc. The ROHM EVK GUI SW has another particularly advantageous property on distribution, in that adding new ROHM products, users are usually only required to restart the ROHM EVK GUI SW for getting product updates. In such a case there is no need for reinstallation of the whole EVK GUI SW as typical of software products. Various demo environments can be easily built on top of the ROHM EVK GUI SW. Because of its versatile use, the ROHM EVK GUI SW is used by people in various responsibilities and technical expertise from product development, quality control and marketing.

The contents of this user guide can be divided into two parts. Chapter 5 allows users to get quickly started with ROHM EVK GUI SW while Chapters 6 to 10 contain more detailed and advanced subjects. Chapter 5.4 gives a list of the most common ways to use the GUI. In Chapter 7 the main components of the ROHM EVK GUI SW, namely menu bar, tabs, status bar and pop-up windows are gone through. The ROHM EVK GUI SW is usually used in conjunction with firmware. Firmware updates can introduce new features, and the procedures for these updates, along with solutions to common GUI issues, are detailed in Chapter 8.

5 First time set-up

ROHM EVK GUI SW with latest ROHM EVK FW and User's Guide can be downloaded from the website Accelerometer Evaluation Kit (rohm.com). (Figure 1)

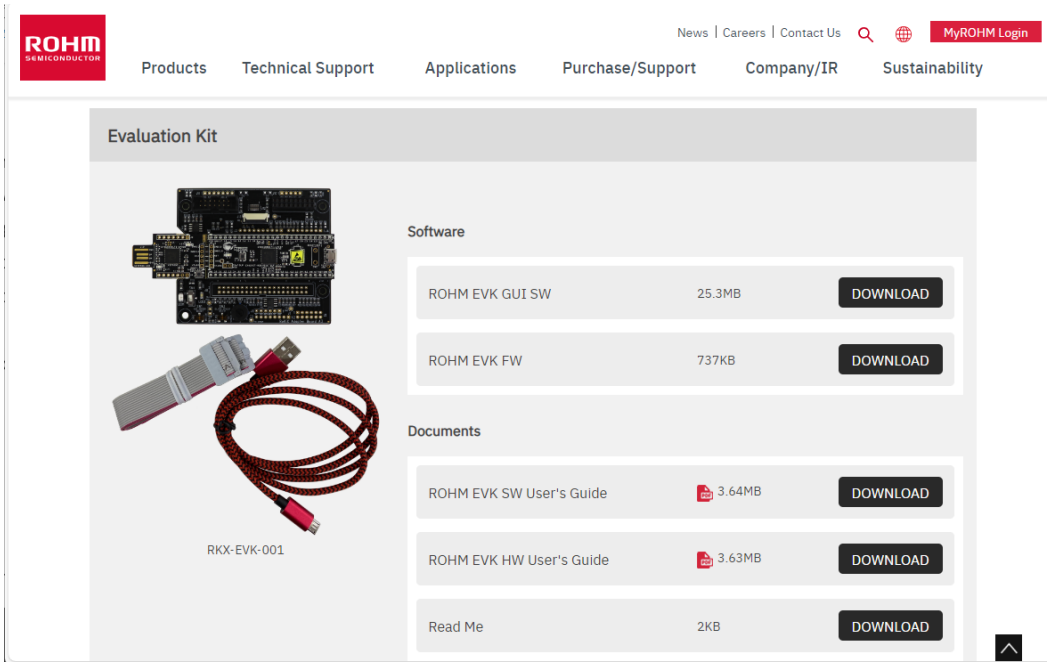

Figure 1 ROHM EVK SW download page

5.1 Installation

After the Install package is downloaded the installation can be started, as normally, by double clicking the installer file *"ROHM_EVK-<version number>.exe"*.

After accepting the license, the installation begins. The default, and recommended, installation location is *%USERPROFILE%\Documents\ROHM_EVK_v<version number>*

After Installation, the ROHM EVK GUI SW startup icon can be found from the desktop (Figure 2) and from the start menu. (Figure 3)

Figure 2. ROHM EVK GUI SW icon

Figure 3 ROHM application folder in the start menu of Windows 10

5.2 Quick start instructions

The following steps describe how to quickly take RKX-EVK-001 (Figure 4) with digital accelerometer quickly in use.

1. Install and set up the software as described in Chapter 5.1.
2. From the Board menu, select "RKX-EVK-001 / Accelerometer EVB / I2C". The status of ROHM EVK GUI SW in the Sidebar is "EVK Disconnected". (Figure 5)
3. From "RKX-A3-EVK-001 info" tab, confirm that the EVB corresponds to the image and EVB is configured as instructed in the image. (Figure 35)
4. Connect RKX-A3-EVK-001 to PC with USB cable (Figure 4) and wait for the status of the ROHM EVK GUI SW in the Sidebar to become "EVK Connected". (Figure 5) This indicates that ROHM EVK GUI SW has a connection with ROHM EVK FW.
5. From the Sidebar (7.4.1), press "Confirm board" button (Figure 5). This will initialize ROHM EVK FW and the ROHM Product on the EVB. Wait for the status of the ROHM EVK GUI SW in the Sidebar to become "EVK Ready". (Figure 5)
6. Click "Register" tab and select the ROHM product, (Figure 8) which is on the EVB, from the "Device name" pull-down menu.
7. Registers of the selected ROHM product are shown the same way as in the data sheet. At this point it is possible to apply read and write operations to any register and parameter of the product.

Alternative EVB connection methods are shown in Figure 57.

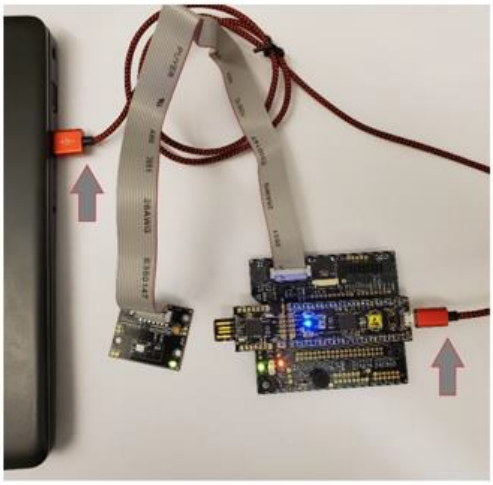

Figure 4 RKX-EVK-001 connection to PC

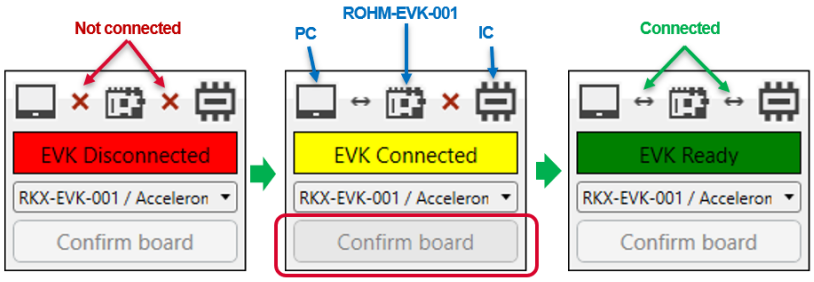

Figure 5 ROHM EVK GUI SW connection status

5.3 First time product family selection

The ROHM EVK GUI SW is designed to work with a wide range of ROHM products, including sensors, LED drivers, and more. To ensure you have the right tools for evaluating your specific product, you will be prompted to choose a product family when you launch the software for the first time. By choosing the product family, the software will narrow down the product range to those under evaluation. For example, if "Sensor and AFE" is selected, the software will focus on products related to sensors and AFE, displaying only the features and settings relevant to those product types. Once the appropriate product family is selected, the ROHM EVK GUI SW will be ready for you to begin evaluating your specific ROHM product.

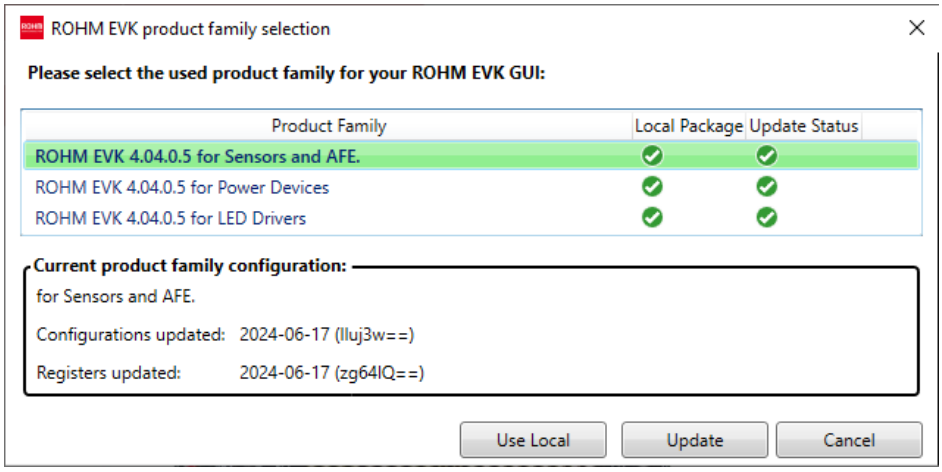

Figure 6 First time startup and product family selection dialog

The Product Family selection can be changed any time when ROHM EVK GUI SW is used. (6) Detailed explanation of product family selection functionality is in Chapter 7.1.4.1. On the first-time set up, click "Use local" button to use found configuration files. If an update is available, you can use the "Update" button.

5.4 List of common use cases

Selecting product information	Chapter 7.1.4.1 Reconfigure Product Family
Updating the product family	Chapter 7.1.4.1 Reconfigure Product Family
Selecting product	Chapter 7.5 Product information tab
Editing register values	Chapter 7.6 Register editor
Continuous monitoring of register values	Chapter 7.6.2 Register polling.
Oscilloscope view of the data	Chapter 7.7.2 Plotter view
Logging data to a file	Chapter 7.7.1 Operations in Plotter toolbar

6 Product family

Product information is organized into groups known as product families, which help the software focus on relevant products under evaluation. These products' information can be updated, and new product families can be added without installing a new version of the ROHM EVK GUI SW. Only a set of product families are included during the installation of the software. (6.1) To update a product family, use the Reconfigure Product Family dialog (7.1.4.1), which requires an internet connection. (Figure 6) Alternatively, if no internet connection is available, new product information can be added using a ZIP file. The ROHM EVK GUI SW enabled switching between different product families if the configuration for each family has already been downloaded. (6.2) To add a new key for a product family, follow the steps outlined in Chapter 6.1.

6.1 Product family key

As each product family has a separate key in *%USERPROFILE%\Documents\ROHM_EVK_v<version number>\ROHM-EVK-GUI\ConfigurationKeys* directory, it is important to ensure that the product family dialog is closed before proceeding. In some cases, a separate product family key may be provided specifically for product evaluation. The key may be provided as part of your product evaluation package. Place the product family key to *%USERPROFILE%\Documents\ROHM_EVK_v<version number>\ROHM-EVK-GUI\ConfigurationKeys* directory. Navigate to the *Settings* menu then open the *Reconfigure Product Family* dialog. (7.1.4.1) When you open the *"product family"* dialog

(Figure 14), the added product family is shown. Please note that an active internet connection is required to complete the reconfiguration process.

6.2 Offline usage

This functionality is essential where an internet connection is unavailable due to security restrictions, limited access to Google service or no internet access. Make sure that the ROHM EVK GUI SW is closed before moving the zip configuration to *%USERPROFILE%\Documents\ROHM_EVK_v<version number>\ROHM-EVK-GUI\Configuration* directory. After moving the file, restart the ROHM EVK GUI SW then navigate to settings menu (Figure 13) then select the *Reconfiguration product family.* (7.1.4.1) You can now switch to the downloaded product family.

7 ROHM EVK GUI SW

The ROHM EVK GUI SW provides generic functionality for evaluating a variety of ROHM products with unified user interface. Some parts of the user interface are always visible, and some of the functionality is under tabs. Since all tabs are dockable it is also possible to view and use several tabs at same time (Figure 7). The main components of the ROHM EVK GUI SW are the following:

- Menu bar. (7.1)
- Title bar. (7.2)
- Status bar. (7.3)
- Sidebar. (7.4)
- Product information tab. (7.5)
- Register editor tab. (7.6) (Figure 8)
- Plotter tab. (7.7) (Figure 9)
- Event View panel. (7.8)
- Pop-up windows. (7.9)

Additionally, there can be product specific functionality in the menu bar and in the Sidebar. (7.4.3) (Figure 10) For advanced use, several operations can also be achieved with keyboard shortcuts. (7.10)

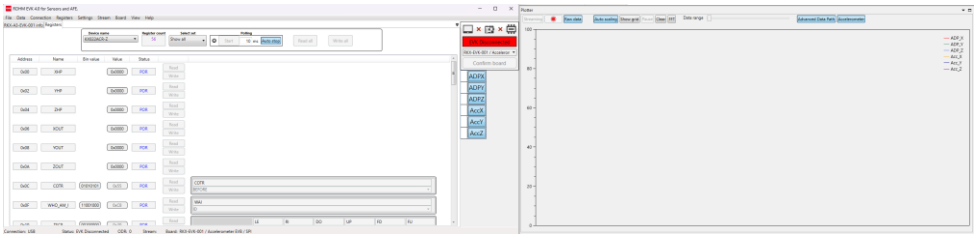

Figure 7 ROHM EVK GUI main view

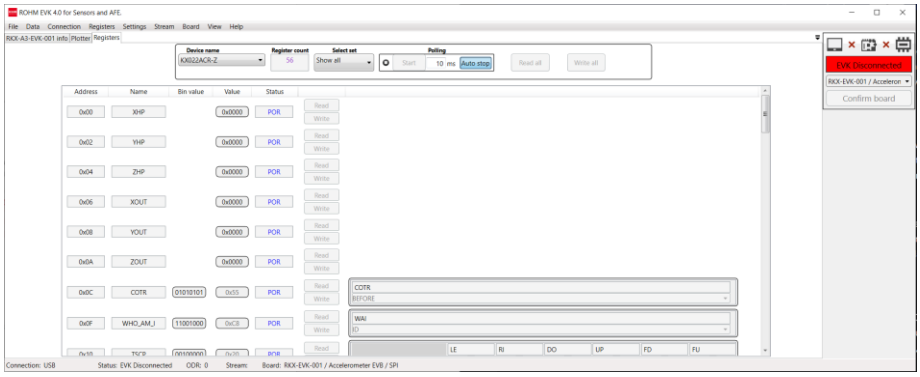

Figure 8 ROHM EVK GUI register editor tab

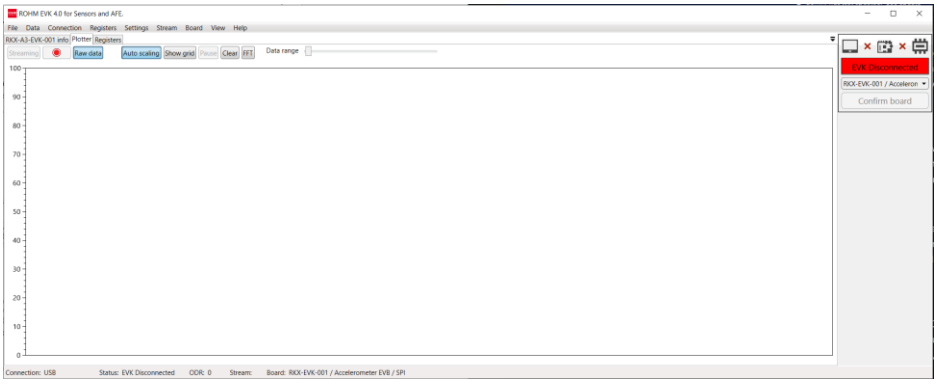

Figure 9 ROHM EVK GUI plotter tab

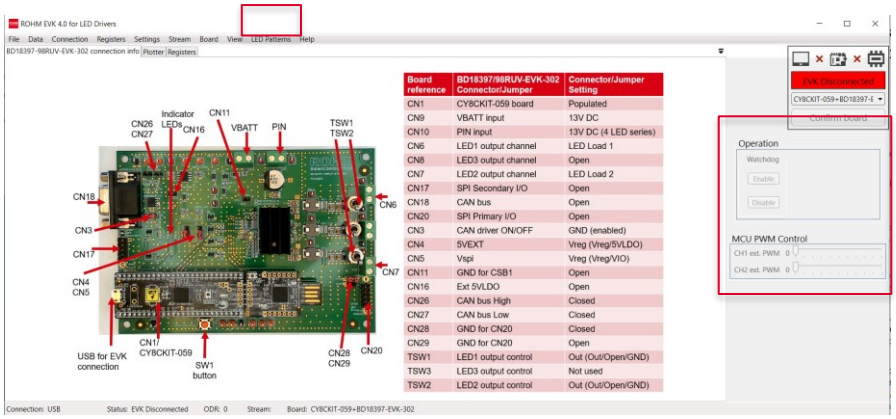

Figure 10 Product specific operations in menu bar and sidebar

7.1 Menu bar

Most of the functionality of the ROHM EVK GUI SW is accessible from the menu bar. (Figure 11)

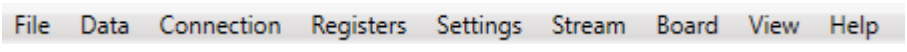

Figure 11 ROHM EVK GUI menu bar

7.1.1 File

Selecting Exit from File menu will close the ROHM EVK GUI SW.

7.1.2 Data

The Data menu contains the options related to acquiring the data.

- "Streaming" corresponds to same operation as "Streaming" button in Plotter tab. (Figure 44)
- "Logging" corresponds to same operation as Recording button in Plotter tab. (Figure 44)

The ROHM EVK GUI SW connects to most Host Adapters, including the RKX-EVK-001 via a USB COM port. The Bluetooth connection (Windows BLE) is reserved for other Host Adapters supported by the ROHM EVK. When *Settings/Auto connect USB* menu item (7.1.4) is enabled, the USB connection is automatically established when a compatible Host Adapter with ROHM EVK FW, for example the RKX-EVK-001, is connected. The connectivity options in the *Connection* menu are based on what is supported by the selected EVB in the *Board* menu. The ROHM EVK GUI SW remembers the type of last used connection.

NOTE: Changing connection may take a while, please be patient.

NOTE: If there is a problem with the connection, "CTRL+R" can be used to refresh the connection.

7.1.3 Registers

The *Registers* menu contains the functionality related to Register Editor (7.6) and how values in the Register Editor are load/save from/to file or read/write the connected EVB.

- Load register configuration from file: Load pre-saved register values into register editor. ROHM EVK GUI SW confirms that pre-saved values are from same part number which is currently active in the register editor.
- Save register configuration to file: Save part number and current values from the register editor to file.
- Read all values from IC: Corresponds to same operation as "Read all" button in (7.6.1).
- Write all values to IC: Corresponds to same operation as "Write all" button in (7.6.1).
- Dump register values to file: Save part number and current values from the register editor to human readable text file. (Figure 12)
- Open register map definition: This allows the user to load any register definition file from any directory using the file dialog to the register editor.
- Verify write: If enabled, register value is read back and verified after each register editor write operation. Success and failure are indicated in the register editor's register specific status field. (Figure 40)

NOTE: Some ROHM products change register value right after it is written. For such products, this operation is bypassed automatically.

```
Register dump for KX132-1211

0x00 0          MAN_ID              0x4b        75          0b01001011
0x01 1          PART_ID             0x3d        61          0b00111101
0x02 2          XADP_L              0x00b0      176         0b0000000010110000
0x03 3          XADP_H              0x00        0           0b00000000
0x04 4          YADP_L              0x0070      112         0b0000000001110000
0x05 5          YADP_H              0x00        0           0b00000000
0x06 6          ZADP_L              0x00e0      224         0b0000000011100000
0x07 7          ZADP_H              0x00        0           0b00000000
0x08 8          XOUT_L              0xffe6      65510       0b1111111111100110
0x09 9          XOUT_H              0xff        255         0b11111111
0x0A 10         YOUT_L              0x002e      46          0b0000000000101110
0x0B 11         YOUT_H              0x00        0           0b00000000
0x0C 12         ZOUT_L              0x102c      4140        0b0001000000101100
0x0D 13         ZOUT_H              0x10        16          0b00010000
0x12 18         COTR                0x55        85          0b01010101
0x13 19         WHO_AM_I            0x3d        61          0b00111101
0x14 20         TSCP                0x20        32          0b00100000
0x15 21         TSPP                0x20        32          0b00100000
0x16 22         INS1                0x00        0           0b00000000
0x17 23         INS2                0x10        16          0b00010000
0x18 24         INS3                0x00        0           0b00000000
0x19 25         STATUS_REG          0x11        17          0b00010001
0x1A 26         INT_REL             0x00        0           0b00000000
0x1B 27         CNTL1               0xf0        240         0b11110000
0x1C 28         CNTL2               0x3f        63          0b00111111
0x1D 29         CNTL3               0xae        174         0b10101110
0x1E 30         CNTL4               0x46        70          0b01000110
```

Figure 12 Partial snapshot of the KX132-1211 register dump

7.1.4 Settings

The settings menu (Figure 13) contains various connectivity and functionality settings.

- Auto connect USB: Connection is established automatically to first USB connected ROHM EVK Host Adapter.

- Auto config and registers download: When enabled, the ROHM EVK GUI SW will automatically check and download the latest configuration files from the selected product information. The user will be notified when there are new configurations available for download.
- Automatic streaming: When this is enabled, the ROHM EVK GUI will automatically start data streaming when the device stream is changed. (Figure 44)
- COM port: Allows user to define the USB COM port. This can be used for example when multiple Host Adapters are connected or if "Auto connect USB" does not work. Note: this setting is enabled only if "Auto connect USB" is disabled.
- Reset connection: Reinitialize connection to connected Host Adapter.
- Reinitialize board: Resets the Host Adapter and applies "Confirm Board."
- Reconfigure product family: Opens dialog for changing Product Family or updating product information of the selected Product Family. (7.1.4.1)
- Host Adapter Programmer: Tool for updating ROHM EVK Firmware. (7.1.4.2)

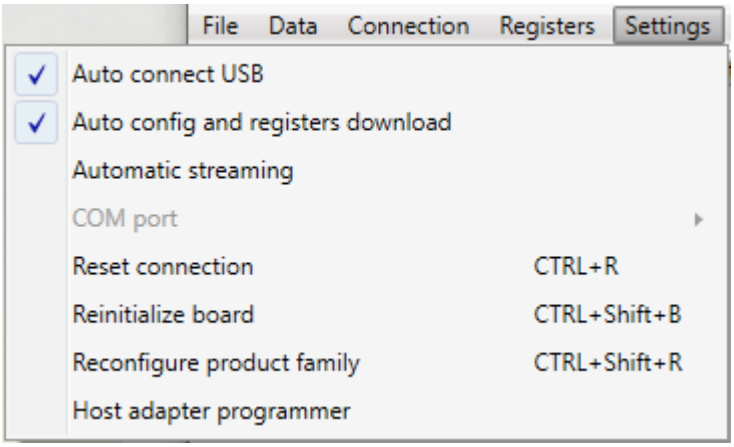

Figure 13 Settings menu

7.1.4.1 Reconfigure Product Family

The Reconfigure Product Family menu item opens a dialog (Figure 14) for browsing and selecting different ROHM EVK product families. The dialog displays the available product families along with their update status in three columns.

- Product Family: The name of the product family.
- Local Package: indicates if the product family is already downloaded and available offline or it is not found locally.
  - This status indicates that the product family is found locally.
  - This status indicates that the product family configuration file is not found locally.
- Update Status: indicates whether product updates can be downloaded and reflects the current internet connection status.
  - This status indicates that the corresponding product family configuration is up to date.
  - This status indicates that there is update available for the corresponding product family configuration.
  - This status indicates that there is no internet connection.

The current product family configuration section provides more information on the currently selected product family. This section provides the dates for both configurations and registers update with their corresponding hash code.

The three buttons:

- Use Local: activates currently highlighted product family and uses Local Package even when update is available.

- Update: activates currently highlighted product family and downloads the latest product information from the cloud if there is internet connection. The button is disabled if there is no internet connection. Note: there are cases where the firewall might block access to cloud services. In such cases, ROHM can provide offline updates. (6.2)
- Cancel: Closes the dialog without changing the product family.

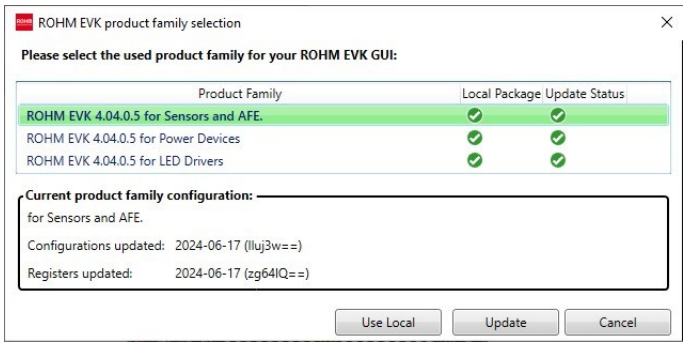

Figure 14 Product family selection dialog

7.1.4.2 Host Adapter Programmer

The Host adapter programmer menu item opens a dialog for updating ROHM EVK Firmware. It is recommended to update the Firmware always to the latest one. EVK GUI SW will always check that the FW is compatible with the board selected (7.1.6) and informs if the version is not compatible. (Figure 31) Detailed instructions of the Firmware update procedure are explained in the Chapter 8 .

NOTE: Firmware files are in folder %USERPROFILE%\Documents\ROHM_EVK_v<version number>\ROHM-EVK-Firmware

7.1.5 Stream

The Stream menu can be used to preconfigure applicable ROHM products to operate in certain modes. It can also be used to define how data is received or processed from the ROHM product and shown in the plotter. (7.7) This setup is named Data Stream. The list of Data Streams will change according to the chosen board. (7.1.6) Data Streams can show analog data like voltage level or binary data like GPIO state.

7.1.5.1 Product example Data Stream from KXTJ3

For example, if the RKX-EVK-001 / Accelerometer EVB / SPI board is selected from the Board menu, the KXTJ3 sensor will not be shown in the Stream menu because it does not support an SPI interface. However, when the *RKX-EVK-001/Accelerometer EVB/I2C* board configuration is selected, the KXTJ3 sensor will be shown. (Figure 15)

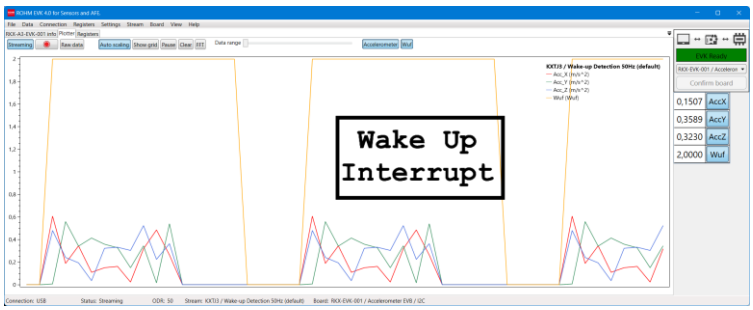

Figure 15 KXTJ3 wake up interrupt

7.1.5.2 Product example Data Stream from BU79100G

In the case of board menu selection "RKX-EVK-001 / ADC EVB", stream menu provides the following options for BU79100G. (Figure 16)

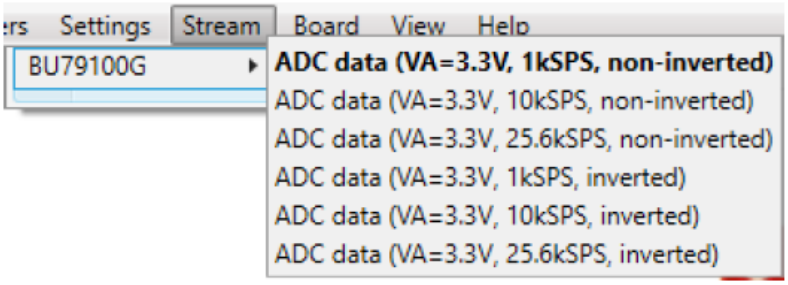

Figure 16 BU79100G streaming menu

7.1.6 Board

The board menu is used for selecting the ROHM EVK HW that is going to be used. Some EVK HW are product specific, and some can be used for multiple products. In such case, the product can be selected from the *"Device name"* pull down menu. (Figure 36) After Board is selected, user needs to visually verify from Product Information tab (7.5) that the selection is correct and then confirm the board selection with *"Confirm board"* button. (7.4.1)

The Board menu lists all supported board configurations for all supported Host Adapters when *"Show all board configuration"* (Figure 18) is selected via the View menu. (7.1.7) Otherwise, the Board menu lists only the ones which are compatible with currently connected Host Adapter. For example, Figure 17 shows the case of RKX-EVK-001 with CY8CKIT-059 when the *"Show all board configuration"* is not selected.

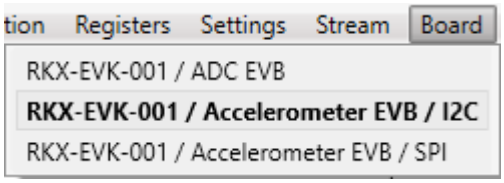

Figure 17 The Board menu when "Show all board configuration" is not selected

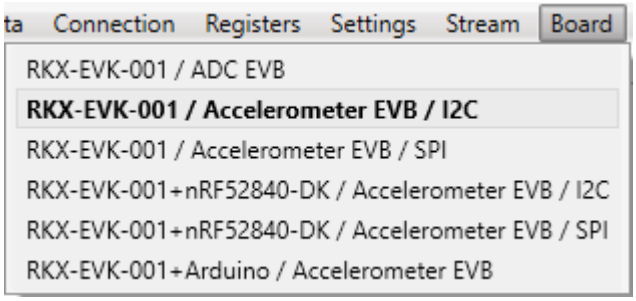

Figure 18 The board menu when "Show all board configuration" is selected

Naming convention of board menu item names has the following convention:

- ROHM EVK Host Adapter name.
- ROHM EVK Adapter Board name, if in use.
- ROHM EVK EVB name, if board is EVB specific.
- Communication interface, CRC mode etc. product specific parameters.

7.1.7 View

The View menu item provides distinctive features that can be shown or hidden in the ROHM EVK GUI SW. (Figure 19)

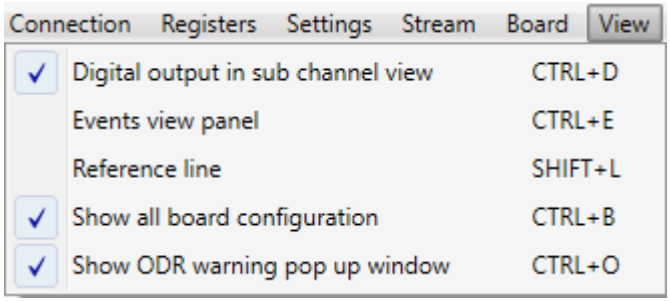

Figure 19 View menu

- Digital output in sub channel view: Shows numeric data from the plotter 7.7 in the Sidebar 7.4.2.
- Events view panel: Show window where executed operations between the ROHM EVK GUI SW and the ROHM product are listed. (7.8)
- Reference line: Display a horizontal line that the user can move or reposition in the Plotter. (7.7)
- Show all board configurations: Shows all boards in the selected product family or only the ones which are currently connected Host Adapters supports.
- Show ODR warning pop up window: Shows notification window if the output sample rate in the plotter is not what is expected. This phenomenon could occur if there are connectivity problems between the ROHM EVK GUI SW and the ROHM product or with high data rates. (7.9)

7.1.7.1 Product example KXTJ3 wake up Pop Up window

For sensor evaluation, if selected stream contains accelerometer ASIC engine wake up or back to sleep function (7.1.5.1), then by selecting "Show wake up pop up window" (Figure 20) it is possible to show additional Pop-Up window (Figure 21) when the event is detected.

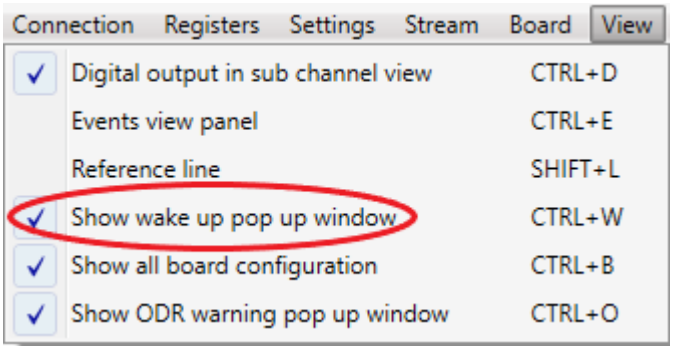

Figure 20 View menu with Show wake up pop up window

Figure 21 Wake Up Interrupt pop-up window

7.1.8 Help

From the Help menu it is possible to access ROHM EVK User's guides as well as version information about the ROHM EVK GUI SW, ROHM EVK FW and when Product Family information has been updated.

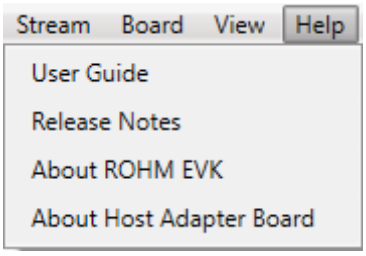

Figure 22 Help Menu

- User Guide: Opens the ROHM-EVK-Doc's folder, where available User's Guides are located.
- Release Notes: Opens release notes text file, where details of the version release are explained.
- About ROHM EVK: Shows information about ROHM EVK GUI SW and selected Product Family. (7.1.8.1)
- About Host Adapter Board: ROHM EVK FW version number and ID number. (Figure 23)

If reporting problems regarding ROHM EVK Platform functionality, it is good to include information provided in Figure 23 and Figure 24.

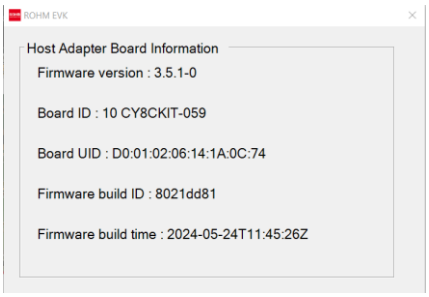

Figure 23 Host Adapter Board

7.1.8.1 About ROHM EVK

This view displays the version number of the current ROHM EVK GUI software. (Figure 24)

The configuration information shows:

- the current ROHM EVK GUI SW's version number.
- the date when it is downloaded to ROHM EVK GUI SW.
- hash code of the product information. More information in Chapter 7.1.4.1.
- the name of the currently selected product family.

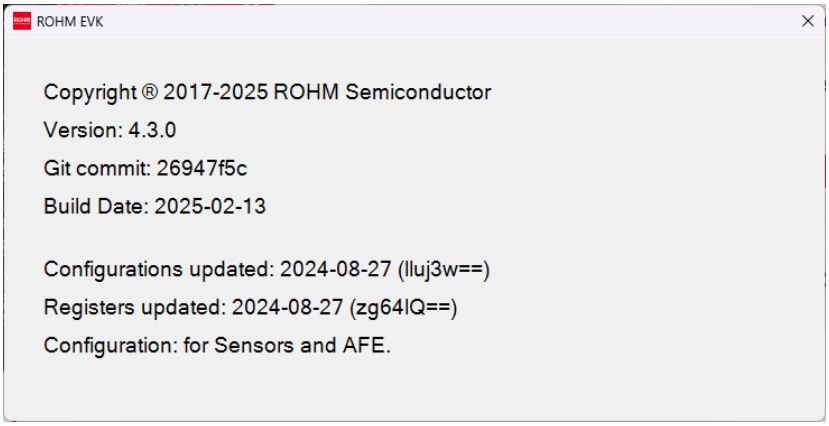

Figure 24 About ROHM EVK

7.2 Title bar

Title bar shows the ROHM EVK GUI SW version and the selected Product Family. If the product information contains confidential information, it is also indicated in the title bar. The same information can be found from menu Help/About ROHM EVK. (7.1.8.1)

Figure 25 ROHM EVK title bar

7.3 Status bar

The status bar shows the following information: (Figure 26)

- Current connection interface (USB / Bluetooth).
- The status of the communication (Streaming, Connected, Disconnected, No Data).
- Output Data Rate (ODR) of the Plotter data. (7.7)
- Selected plotter stream. (7.7)
- Selected evaluation board. (7.1.6)

Figure 26 ROHM EVK GUI SW status bar

NOTE: Calculated ODR value can vary from the actual ODR value since data is sent from ROHM EVK FW to ROHM EVK GUI SW in bursts which timing is controlled by the operating system. See also (7.1.7) and (7.9).

7.4 Sidebar

The Sidebar is on the right side of the ROHM EVK GUI SW window. (Figure 10) Sidebar holds both generic operations of the ROHM EVK GUI SW and possible product specific operations.

Main components of the Sidebar are:

- EVK status with board selection and confirmation operations. (7.4.1)
- Numeric representation of the Plotter data. (7.4.2)
- Product specific operations for the ROHM Product. (7.4.3)

7.4.1 EVK status

EVK Status-view holds information about the ROHM EVK Platform connection status and provides functionality to select and confirm ROHM EVK

HW to be used. The ROHM EVK HW is selected from the EVK Status-view board pull-down menu. (Figure 27) The pull-down menu content is same as Board menu content. (7.1.6)

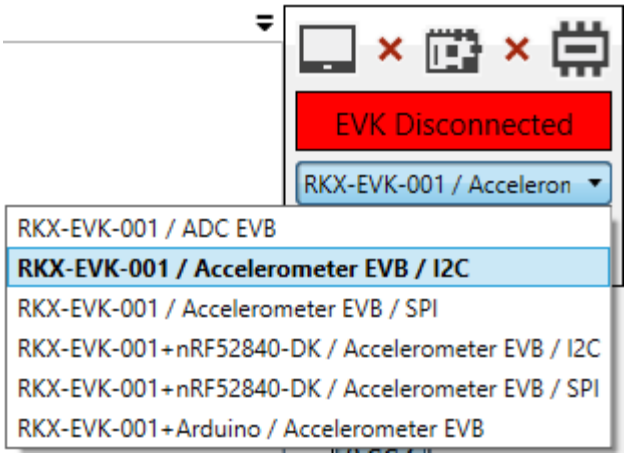

Figure 27 Board pull-down menu

If there is no connection to Host Adapter, the EVK status is *"EVK Disconnected"*. (Figure 28)

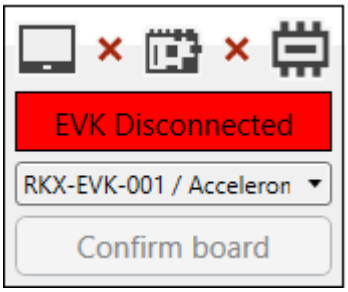

Figure 28 EVK status-view in EVK Disconnected state

After connecting compatible Host Adapter, the status becomes *"EVK Connected"* and *"Confirm board"* button starts to blink. (Figure 29)

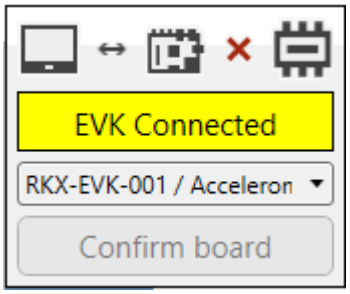

Figure 29 Status-view in EVK Connected state

NOTE: In this phase it is important to check that the physical ROHM EVK HW corresponds to the image in the Product Information tab (7.5) and the electrical connection is done according to information accordingly. After this check, the ROHM EVK FW and ROHM product on the EVB can be initialized by pressing *"Confirm board"* button and the EVK status becomes *"EVK Ready"* (Figure 30). Now, ROHM EVK Platform is set up and ready to be used.

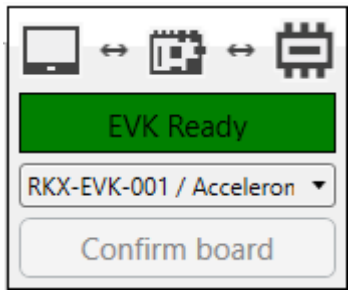

Figure 30 Status-view in EVK Ready state

If the ROHM EVK FW has not been updated for a while or if a custom version of the ROHM EVK FW is required for the ROHM EVK Host Adapter of the selected ROHM EVK HW, then the status will be "*EVK Mismatch*". (Figure 31) The required ROHM EVK FW version can be found on the error_log.txt file which is on the root folder of the ROHM EVK GUI SW installation.

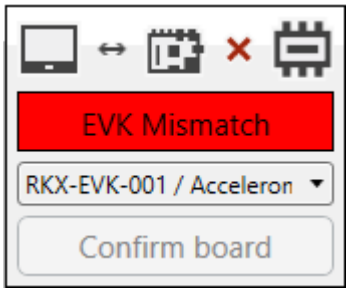

Figure 31 Status-view in EVK Mismatch state

7.4.2 Plotter sub channel

Sub channels of the selected Data Stream (7.1.5) are shown in Sidebar sub channel view. By toggling Sub channel name buttons, it is possible to select which sub channels Plotter (7.7) will show. If View/Digital output in sub channel view menu item (7.1.7) is selected, then numeric values of Plotter sub channel data are also shown.

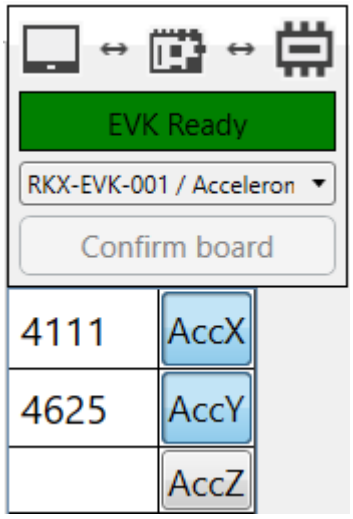

Figure 32 Sidebar sub channel view

7.4.3 Side bar product specific functionality

The sidebar can contain additional controls: buttons, sliders etc. which contain product specific input and output of the Host Adapter digital or analog input pins. Information about each functionality can be seen with tooltip help which is activated by hovering mouse over the control.

7.4.3.1 Product example BD18397 Sidebar controls

In (Figure 33), the Sidebar contains buttons for enabling and disabling BD18397 Watchdog functionality and sliders for controlling duty cycle of the Host Adapter PWM output. Additional information of any functionality can be shown by hovering mouse over controls. For example, in Figure 33 Tooltip window is shown for slider "CH1 ext. PWM".

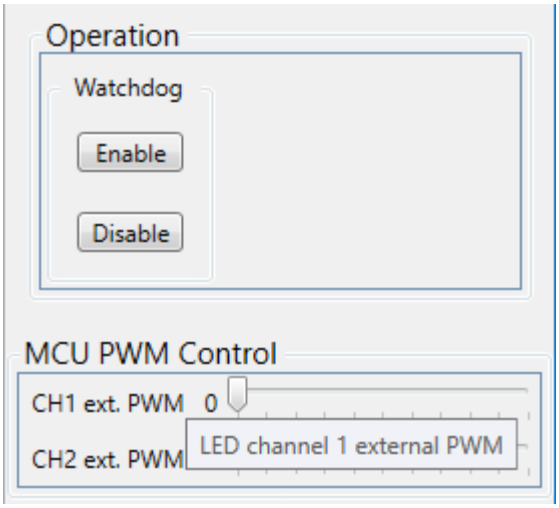

Figure 33 Product specific controls for BD18397

7.4.3.2 Product example BD18333

In Figure 34, the Sidebar contains Control for toggling Host Adapter GPIO output in state and status for monitoring Host Adapter GPIO input pin states.

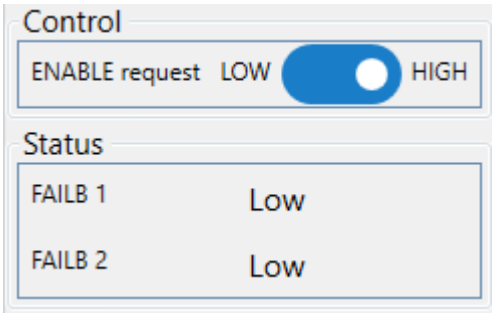

Figure 34 Product specific controls for BD18333

7.5 Product information tab

The product information tab is always activated when a new ROHM EVK HW is selected from the board menu 7.1.6 and 7.4.1. This tab contains essential information about the ROHM EVK HW. There is a reference image of the ROHM EVK HW and HW setup information. After the visual check and HW setup are done, the ROHM EVK Platform can be initialized for the ROHM EVK HW by pressing the *"Confirm board"* button from the Sidebar. (7.4.1)

NOTE: if confirming incorrect ROHM EVK HW or if the HW setup is not done according to instructions there is a possibility of physical damage of ROHM EVK HW.

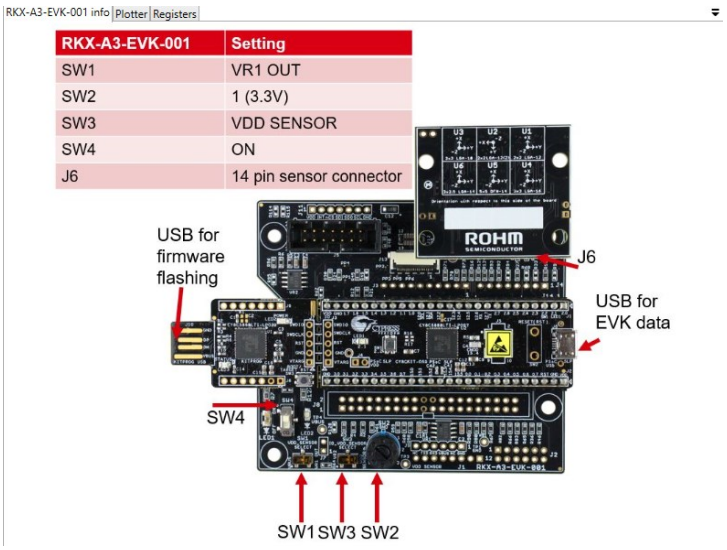

Figure 35 Product information tab

7.6 Register editor

Register Editor tab is shown for ROHM products which has internal registers. Register editor contains Register Editor Toolbar 7.6.1 for common operations and the Register Editor View 7.6.3 for viewing editing register values of selected ROHM product. (Figure 36)

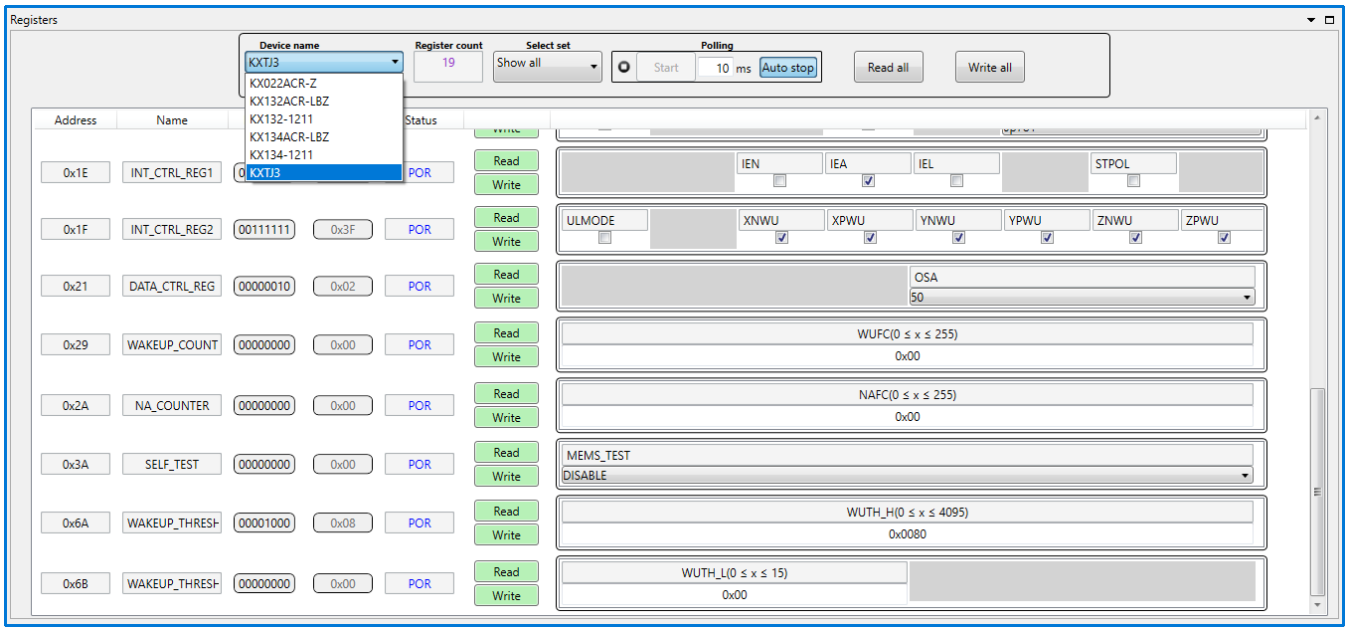

Figure 36 ROHM EVK GUI SW register editor tab with opened device name pull-down menu

7.6.1 Operations in register editor toolbar

The Register Editor toolbar is the upper horizontal area of the Register Editor tab. The following are the information about each operation:

- "Device name" pull-down menu that shows all ROHM products which can be used with selected ROHM EVK HW. (Figure 36)
- "Register count" displays how many registers a currently selected ROHM product contains.
- "Select set" pull down menu contains list of subsets of register space for the currently selected product. (Figure 37)

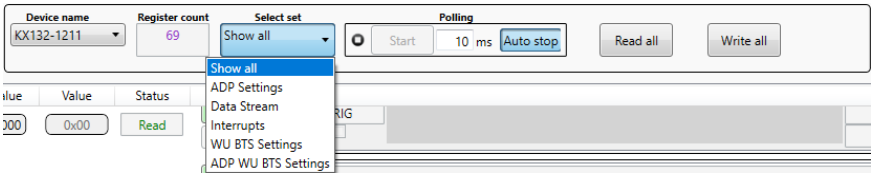

Figure 37 Register set pull-down menu

- Polling view is for controlling continuous monitoring of register values. (7.6.2)
- Read all: button reads all register values from the currently selected product to the Register Editor.
- Write all: button writes all values from the Register Editor to the connected ROHM product.

7.6.2 Register polling.

Register polling is a functionality for monitoring subsets of registers. In this way, it is possible to monitor the state of the ROHM product via registers. Polling can be started with the *"Start"* button and stopped with the same button, which during polling operation has text *"Stop"*. Polling interval can be defined in the corresponding numeric input box. Status column of register which value is changed turns from "Unchanged" to "Changed". This may be difficult to detect, especially if the polling interval is short and value changes are not static.

When *"Auto stop"* operation is enabled, the polling operation will stop immediately when any of the register values are changed. (Figure 39) This way it is easy to analyze register changes.

NOTE: Register polling can be activated only if subset of registers is selected from the "Select set" pull down menu.

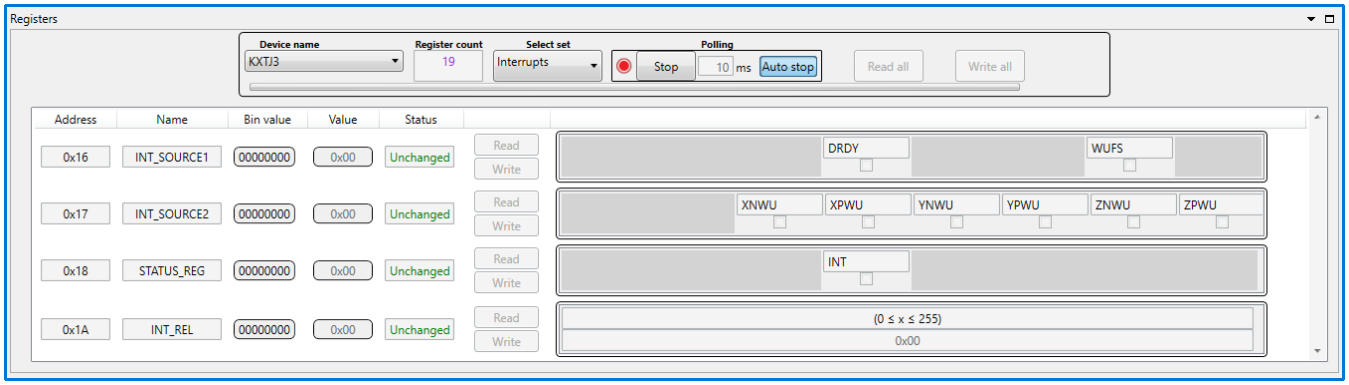

Figure 38 Register polling function active

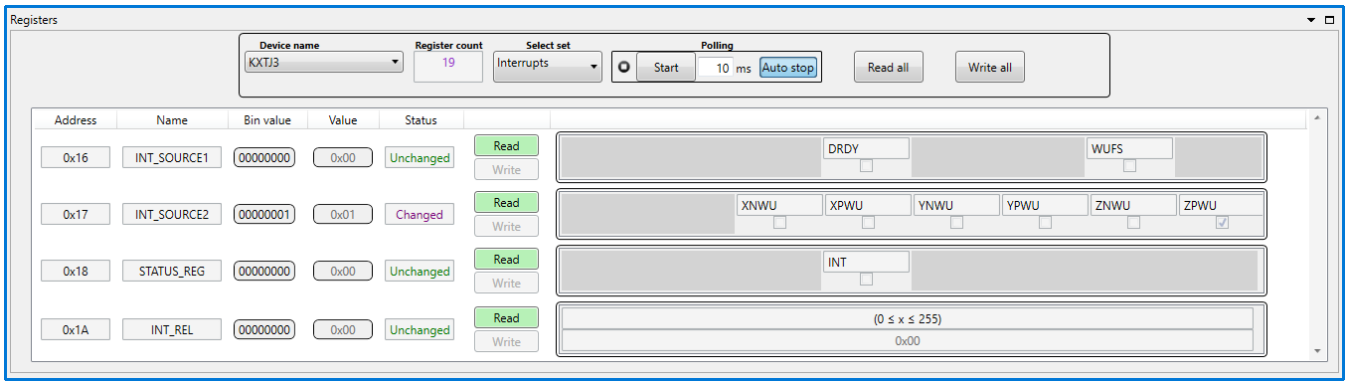

Figure 39 Register polling auto stop

7.6.3 Operations in register editor view

Register Editor view is a common tool for editing register values of all ROHM products that have internal register map. Register Editor view has following columns:

- Address: Register address as hexadecimal number.

- Name: Register name.
- Bin value: Register value as binary number.
- Value: Register value as hexadecimal number.
- Status: Status of the latest register operation.
- Read and Write: Buttons for reading the register value from the ROHM product to register editor and vice versa.
- Register values: Register value shown as specified in the datasheet.

7.6.3.1 Register Status field

The register status field shows the status of the latest operation for the register. Common statuses are the following:

- POR: After the new ROHM product is selected from the Device pull-down menu.
- Edited: After editing the register value.
- Read: After pressing the Read button.
- Stored: After pressing the Write button.

If *Verify write* is enabled 7.1.3 and after writing, the value does not match the written value, then the status is *Verify fail*. (Figure 40) Status values during Register polling are explained in 7.6.2.

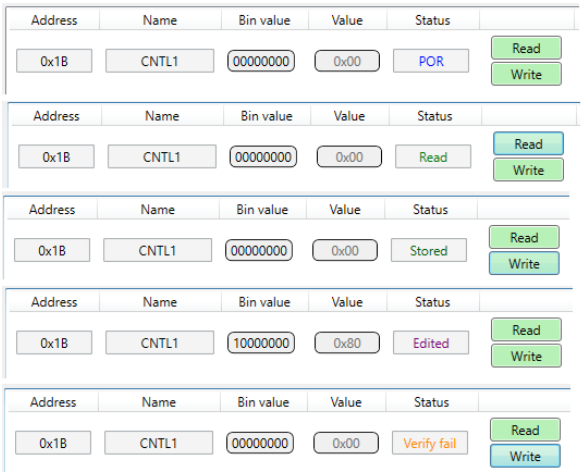

Figure 40 Register editor status values

7.6.3.2 Register value viewing and editing

Register values can be viewed and edited from the register value column. For read only registers the value can be only shown and for read / write registers, the value can be also edited. If the register is read only, then the Write button is disabled, and value fields are gray.

Register values are shown according to the following value types:

- Binary values are shown as check boxes. (Figure 41)
- Enumerated values are shown as pull-down menus. (Figure 41)
- Numeric values are shown as hexadecimal values in numeric input boxes. (Figure 42)

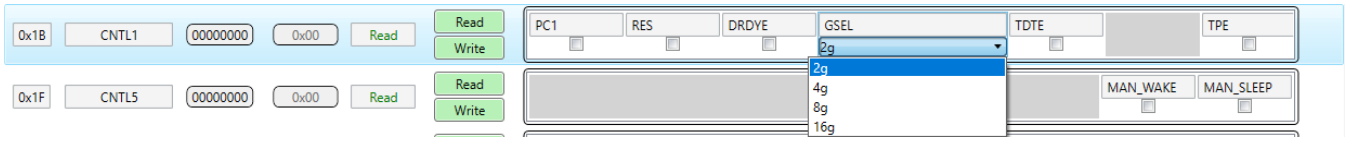

Figure 41 Binary and enumerated values in the register editor

7.6.3.3 Editing numeric values

Numeric values can be entered as in decimal or as in hexadecimal format. After editing, the value is always shown as hexadecimal. Allowed value range is shown in the header field of the value. (Figure 42) Numeric values can be modified with arrow up and down keys as well as page up and page down keys.

Figure 42 Numeric values in the register editor

Sometimes, numeric values are encoded to multiple registers. In such case, the whole value can be shown in a single register editor row which register address points to first address where the value is stored. The magnitude of the value can be seen from the header field. (Figure 43)

Figure 43 Large numeric values in the register editor

7.7 Plotter tab

Plotter tab provides oscilloscope functionality for viewing information from the connected ROHM product. The data to be plotted is selected from the Stream menu (7.1.5). Plotter contains Plotter Toolbar for common operations (7.7.1) and the Plotter view (7.7.2) for viewing numeric values in graphical form. The data can be shown both on time domain (e.g., x-axis is time) or frequency domain (e.g., x-axis is frequency). The numeric values are shown on the right-side panel. (Figure 15)

7.7.1 Operations in Plotter toolbar

The plotter toolbar is the upper horizontal area of the Plotter tab. Toolbar has the following functionalities:

- Streaming: start or stop data reading to plotter.
- Data logging (red circle): start or stop storing data to a file. NOTE when logging is enabled the red circle icon starts to blink.
- Raw data: toggle data to be shown as "counts" or SI-units.
- Auto scaling: plotter will automatically zoom the y-axis according to the shown data.
- Show grid: show or hide grid lines. NOTE: grid lines may slow down plotter performance.
- Pause: temporarily pause the plotter, allowing you to capture or analyze specific moments in the real time data.
- Clear: clears the plotter's view. This can be useful if the x axis contains data from long time window.
- FFT: toggle plotter between time and frequency domain. Frequency calculation is done with Fast Fourier Transform.
- Data range: with the slider, it is possible to adjust the amount of data points shown in the plotter. NOTE: At high data rates, the slider area of Data Range may blink red. This indicates that all data samples cannot be drawn, and the data is averaged.

Plotter data has one or more channels. All of these can be divided into subchannels. The purpose of the channels is to divide data into logical groups. Each channel is shown as a button on the right end of the plotter toolbar. Subchannels of each channel are listed in the Sidebar. (7.4.2) By hiding uninterested channels or subchannels, it is possible to focus only on the data which is under current interest.

Figure 44 Plotter toolbar

If FFT mode is selected the plotter toolbar has options for selecting linear or logarithmic X and Y axis.

Figure 45 Plotter toolbar in FFT mode

7.7.2 Plotter view

Plotter view shows graphical data from the data stream selected from Stream menu (7.1.5) according to settings done in the plotter toolbar (7.7.1) and side bar. (7.4.2)

The following operations are available in the plotter view:

- Zooming: zoom in/out can be accomplished using mouse scroll wheel or right mouse button + CTRL.
- Panning: y-axis can be panned by pressing the right mouse button and moving the mouse.
- Reference line: If reference line is enabled from (7.1.7) it can be moved by clicking it with the left mouse button and moving the mouse. The numeric value of the reference line Y-axis position can be seen from the status bar. (7.3)

Notes on Frequency Analysis:

1. The stream menu (7.1.5) usually contains data with different data rates. Suitable data rates should be selected for frequency analysis since the frequency range is always up to ODR/2 Hz.
2. The frequency of detailed data points can be seen by clicking the left mouse button over the plotted line.
3. The logarithmic Y axis shows the frequency data in decibels.

7.7.2.1 Product example Frequency plot of BU79100G data

- Select the board RKX-EVK-001 / ADC EVB from the board menu.
- Select BU79100G / ADC data (VA=3.3V, 10kSPS, non-inverted) from the stream menu.

The plotter should now display real time output for ADC. (Figure 46)

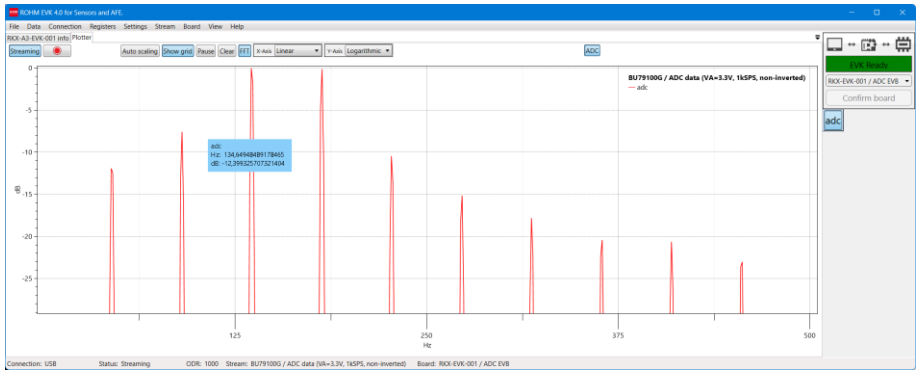

Figure 46 FFT plot with RKX-EVK-001/ADC EVB

7.7.3 Product example KXTJ3 wake up detection

The KXTJ3 wake-up detection streaming can be selected using *RKX-EVK-001/Accelerometer EVB/I2C* board configuration (7.1.5.1) by selecting

Wake-up Detection 50Hz (default) streaming. (Figure 47)

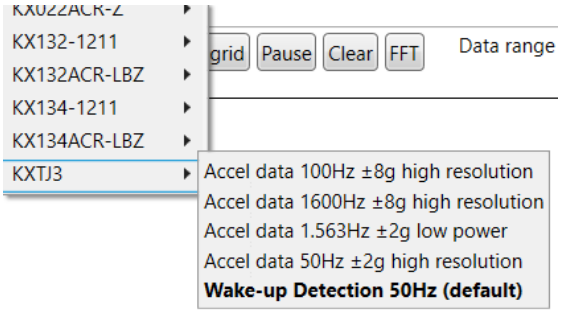

Figure 47 KXTJ3 wake up streaming

The *wake-up pop-up window* (Figure 15) appears for selected wake-up / back-to sleep event detection streams. (Figure 47) When a wake-up event is detected, the pop-up window is displayed in the plotter. (Figure 15)

7.8 Event view panel

The Event View panel is in the bottom part of the ROHM EVK GUI SW window, if it is enabled from the View menu. (7.1.7) Event view panel shows time stamped communication events between the ROHM EVK GUI SW and the ROHM EVK Host Adapter. This includes for example register read and write operations. Operations listed in the event view can be saved to a JSON file by clicking the save button in the top right corner for later analysis.

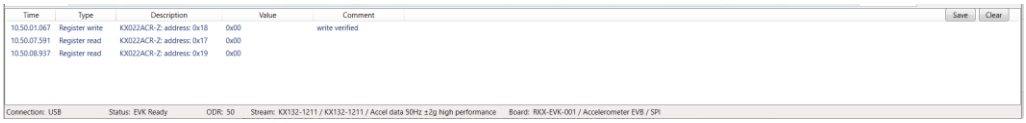

Figure 48 Event view panel

7.9 Pop-up windows

The ROHM EVK SW GUI uses pop-up windows for providing status information or other information. These pop-up windows can be in several locations:

- pop-up windows are used to notify the users about important actions. For example, the ODR warning pop-up window appears anytime when the real time ODR as measured by the ROHM EVK GUI SW is significantly different from the normal ODR set in the stream.

Figure 49 ODR information window

- Tooltips: Most of the ROHM EVK SW GUI elements, including buttons, menu items, register editor fields, and sidebar operations have tooltips which provides additional information about the functionality. The tooltip window can be shown by hovering the mouse over the location of interest.
- Toast windows: After time consuming operations like product information download, the toast window is shown on the lower left corner of the Windows menu bar.

7.10 Keyboard shortcuts

CTRL + L	Enable/disable logging
CTRL + S	Enable/disable streaming
CTRL + R	Reset used connection and data streaming (disconnect and connect when having connection problem). Re-enable the Streaming when connection is established.
CTRL + E	Hide/Show events view
CTRL + D	Hide/Show digital output in sub channel view (works only if subchannel view is enabled)
C	Clears the current points in plotter view
CTRL + B	Enable/Disable Show all board configuration
CTRL + O	Show ODR warning pop up window
G	Shows the grid in the plotter
P	Pause plotter
CTRL + W	Hide/show wake up interrupt pop up window
SHIFT + L	Hide/show reference line
CTRL + SHIFT + D	Register dump
CTRL + SHIFT + V	Enable/Disable Verify write
CTRL + SHIFT + B	Reinitialize board (re-execute board initialization messages)

8 ROHM EVK firmware

Several MCU boards can be used as a Host Adapter in the ROHM EVK Platform. Most common MCU boards are:

- CY8CKIT-059 by Infineon
- Adafruit Metro M4 by Adafruit Industries

Programming of these MCU boards is explained in Chapters 8.1 and 8.3.

Additionally, ROHM EVK firmware is provided for the following MCU boards:

- Arduino UNO R3 by Arduino.
- nRF52-DK by Nordic Semiconductor.

The firmware update procedure for these MCU boards is explained in Chapter 8.1.2.

8.1 Default firmware update method

The firmware programmer tool with graphical user interface is provided for most common MCU boards. The tool can be launched from Settings-menu. (7.1.4.2)

8.1.1 Firmware update for Adafruit Metro M4

Firmware update for Adafruit Metro M4 can be done with following steps when ROHM EVK GUI SW is running:

1. Connect the MCU board to the PC. (Figure 4)
2. From the Board menu, select the board corresponding to the connected MCU board. (7.1.6)
    a. Wait for the EVK status to become "EVK Connected" or "EVK Mismatch".
3. From the Settings menu, select Host adapter programmer. (7.1.4.2)
4. Wait for the programmer to start and for the status to become Connected. (Figure 50)
5. Double click reset button from the MCU board.
    a. RGB LED on the MCU board turns to green or bright white indicating that the MCU board is in bootloader mode.
6. Press "…" button to select Firmware image file (Figure 50). Firmware image files are in directory *%USERPROFILE%\Documents\ROHM_EVK_v<version number>\ROHM-EVK-Firmware\Metro-M4*.
7. Press Program button to load the Firmware into the MCU. (Figure 50)
8. Wait for the programming to be completed and for the status to become successful. (Figure 51).
    a. RGB LED on the MCU board turns to Blue indicating that the MCU board is in the normal mode.
9. Close the ROHM EVK Programmer from the upper right corner X button.

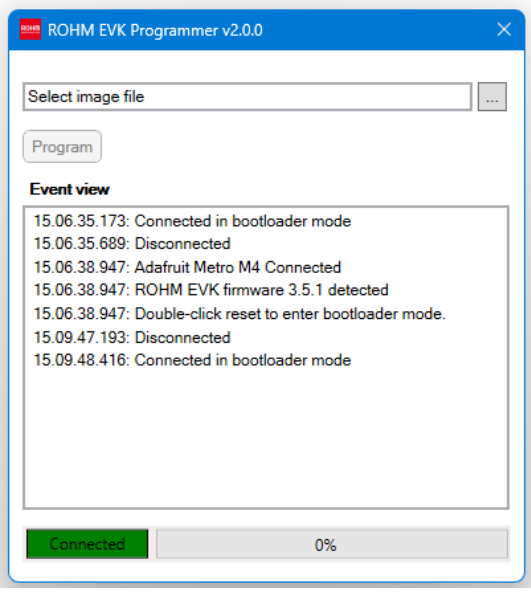

Figure 50 Firmware programming start / Adafruit Metro M4

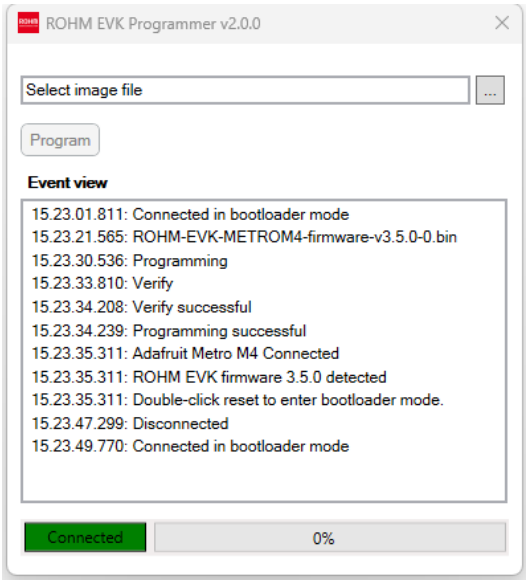

Figure 51 Firmware programming done / Adafruit Metro M4

The same procedure can be used also for other Adafruit industries' MCU boards.

NOTE: If ROHM EVK FW is not yet available in the Adafruit Metro M4 MCU board, then the ROHM EVK Programmer must be started separately from the %USERPROFILE%\Documents\ROHM_EVK_v<version number>/ROHM-EVK-GUI/FirmwareProgrammer directory.

8.1.2 Firmware update for CY8CKIT-059

Firmware update for CY8CKIT-059 can be done with the following steps when ROHM EVK GUI SW is running:

1. Connect the MCU board to the PC. (Figure 4)
2. From the Board menu, select the board corresponding to the connected MCU board. (7.1.6)
    a. Wait for the EVK status to become "EVK Connected" or "EVK Mismatch."
3. From the Settings menu, select Host adapter programmer. (7.1.4.2)
4. Wait for the programmer to start and for the status to become Connected. (Figure 52)
    a. Blue LED on the MCU Board starts to blink indicating the MCU board is in bootloader mode. (Figure 55)

5. Press the "..." button to select a firmware image file (Figure 52). Firmware image files are in the *%USERPROFILE%\Documents\ROHM_EVK_v<version number>\ROHM-EVK-Firmware\CY8CKIT-059* directory. The image files are in .cyacd format. The postfix of the image file indicates the SPI mode. For example, ROHM-EVK-CY8CKIT059-firmware-v3.5.2-1.cyacd file indicates SPI mode 1.
6. Press Program button to load the Firmware into the MCU.
7. Wait for the programming to be completed and for the status to become successful. (Figure 53).
8. Close the ROHM EVK Programmer from the upper right corner X button.

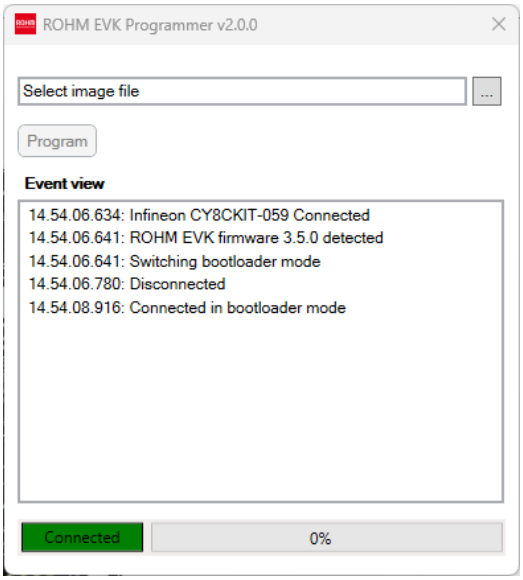

Figure 52 Firmware programming start / CY8CKIT-059

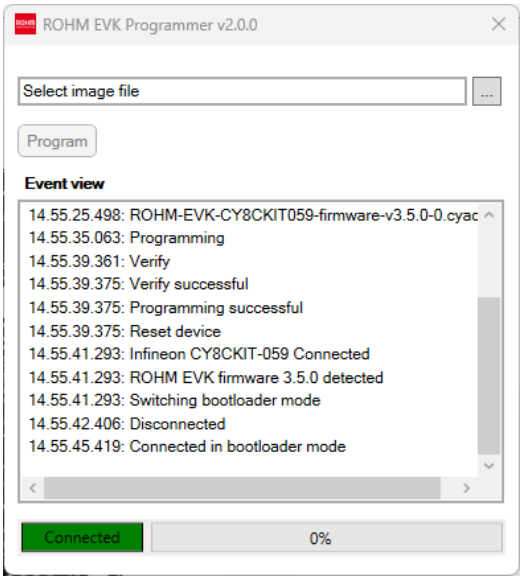

Figure 53 Firmware programming done / CY8CKIT-059

8.2 Firmware update for other host adapters

Sometimes Arduino Uno R3 or nRF52-DK MCU boards are used as ROHM EVK Host Adapter. For these host adapters, the firmware update procedure is different.

8.2.1 Firmware update procedure for Arduino UNO R3

Firmware update for Arduino UNO R3 can be done with the following steps when ROHM EVK GUI SW is not running:

1. Download the avrdude zip package (Windows) from the avrdude official website: https://download.savannah.gnu.org/releases/avrdude/avrdude-6.4-mingw32.zip
2. Connect the Arduino UNO R3 into the USB port of the PC.
3. Open a command prompt to the *%USERPROFILE%\Documents\ROHM_EVK_v<version number>\ROHM-EVK-Firmware\Arduino* directory and execute arduino_flash.bat.
4. Follow the instructions of the .bat file.

8.2.2 Firmware update procedure for nRF52-DK

Firmware update for nRF52-DK can be done with the following steps when ROHM EVK GUI SW is not running.

1. Set nRF52-DK "Power source" switch to VDD and the "nRF" switch to default. Turn "Power" switch On and connect the nRF52-DK into the USB port of the PC.
   NOTE: There are two USB ports on the board so make sure not to use the nRF USB port for programming.
2. After USB connection, the JLINK drive should be visible in the file explorer.
3. The NRF52-DK image file is in the directory *%USERPROFILE%\Documents\ROHM_EVK_v<version number>\ROHM-EVK-Firmware\nRF52840-DK*.
4. Drag and drop the image file to the JLINK drive.
5. LED blinking animation should be seen after successful programming.

8.3 Firmware update procedure for CY8CKIT-059 without ROHM EVK bootloader

For a CY8CKIT-059 MCU board that does not yet have a compatible version of the ROHM EVK Firmware, the initial update must be performed using the Infineon PSoC Programmer tool. This procedure needs to be done only once, provided that the ROHM EVK Firmware has not been previously flashed. After the initial flashing, all subsequent firmware updates can be done using the "EVK GUI SW Host Adapter Programmer."

1. Download and install PSoC Programmer application from https://softwaretools.infineon.com/tools/com.ifx.tb.tool.psocprogrammer.
2. Connect the CY8CKIT-059 into the USB port of the PC directly or with USB extension cable A-Male to A-Female to the PC.
   NOTE: Make sure to use the USB port for firmware flashing.
3. Image files are in directory *%USERPROFILE%\Documents\ROHM_EVK_v<version number>\ROHM-EVK-Firmware\CY8CKIT-059*. The image files are in .hex format
4. Open the PSoC programmer application on your computer. Once opened, verify that "Powered" and "Connected" status messages are seen.
5. If you receive the Warning messages such as the programmer is not up to date, use the "Upgrade Firmware" button for installing latest firmware to the programmer.
6. Select image file by using the "Open Folder" button.
7. Program the firmware into CY8CKIT-059 by pressing "Down Arrow" button.
8. If the programming was successful, the message is seen in the "Results" window.

9 Troubleshooting

In case of connection problems or an application crash, please check the error log file of the ROHM EVK GUI SW. The default path of this file is *..\Documents\ROHM_EVK_v4\ROHM-EVK-GUI\errorlog.txt*.

9.1 Communication troubleshooting

9.1.1 Host adapter communication issues

The communication between the ROHM EVK GUI SW and the host adapter may not work for several reasons. The issue can be related to hardware, software, or both. The following steps can be used as guidance to troubleshoot such issues.

9.1.1.1 "Status: EVK Disconnected" in ROHM EVK GUI SW status bar

Figure 54 Status bar, Disconnected

This status means that the ROHM EVK GUI is not connected to the host adapter board. If the host adapter is connected but the status is disconnected, you can check the status and settings from the host adapter board.

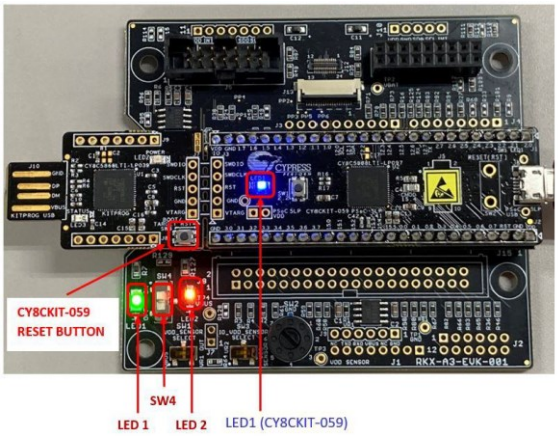

Figure 55 ROHM_EVK_001 status LED1, SW4, LED2, LED1(CYCKIT-059) must be ON

1. The blue LED1 (CY8CKIT-059) should be constantly ON and not blinking. (Figure 55)

- If the blue LED1 (CY8CKIT-059) is blinking, the CY8CKIT-059 is not programmed with the ROHM EVK FW. Please program the latest ROHM EVK FW. See (8.3) for details.
- If the blue LED1 (CY8CKIT-059) is turned off, please try the following:
    - Check that the micro-USB cable is securely connected to the CY8CKIT-059 prototyping kit and to the USB port on the PC.
    - Connect to a different USB port on the PC.
    - Replace the micro-USB cable with a new, high quality, USB certified cable.

2. The green LED1: (Figure 55)

- If the green LED1 is OFF but the blue LED1 (CY8CKIT-059) is ON:
    - Ensure the CY8CKIT-059 prototyping kit is securely connected to the RKX-A3-EVK-001.

9.2 "EVK Mismatch" – state with the ROHM EVK GUI SW

This error means that the firmware version is not compatible with the board configuration. Make sure that HW, board configuration and firmware versions are compatible.

For example, if the "EVK Mismatch" pop-up window appears you should check the "errorlog.txt".

If you can find the following text in the errorlog.txt:

##########

[ERROR] EVK Mismatch - state detected:

"board_04ADC_10_RKX-EVK-001_spi_0" does not support the protocol version (2.0) of the firmware.

Supported protocol versions in board config: [

"2.4",

"3.1"

]

##########

9.3 Known issues

- If you have a previous ROHM EVK GUI version installed already, make sure to close it before running the installer. (5.1)
- To have the best user experience, it is recommended to use a display resolution of not less than 3440 x 1440.

10 Appendix

10.1 Information about RKX-EVK-001

For detailed information on the hardware, please refer to the ROHM EVK HW User's Guide.

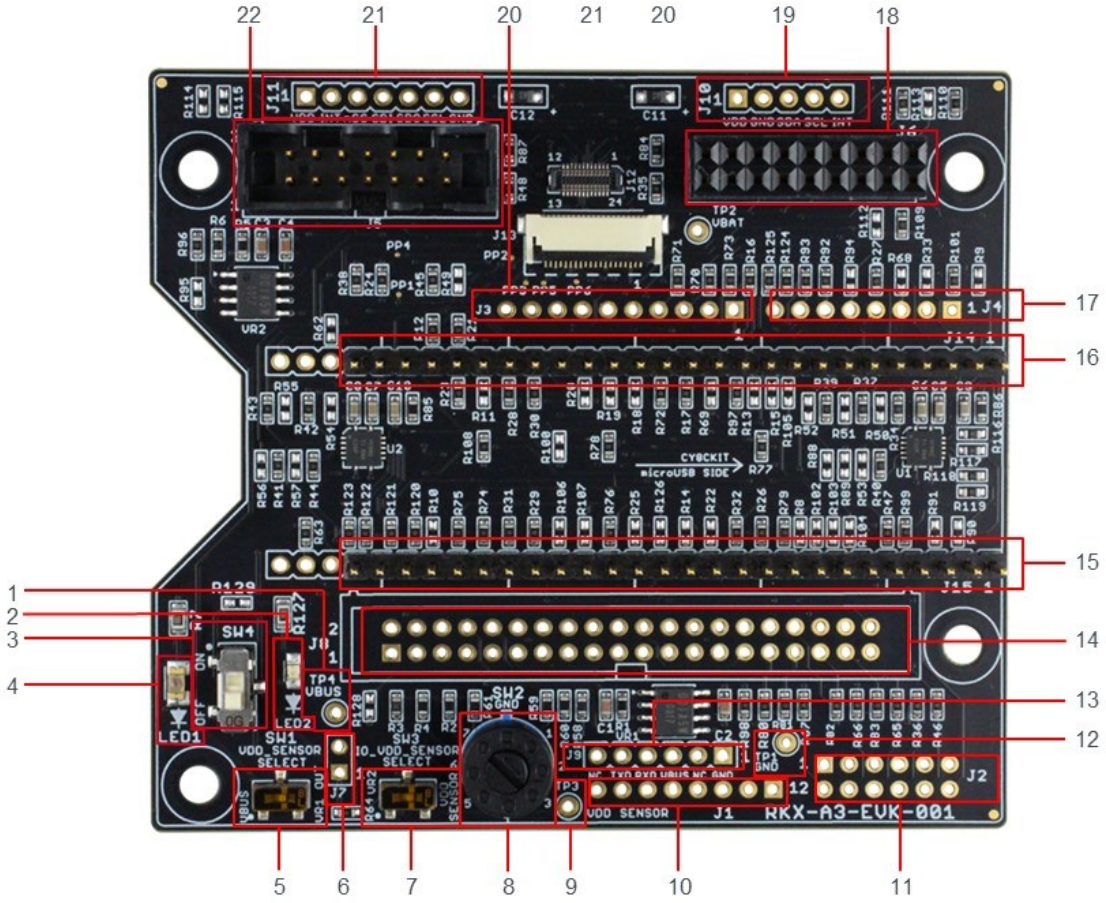

Figure 56 RKX-A3-EVK-001 main features

1	TP4 - Test Point 4 for VBUS (Host) input voltage measurement	12	TP1 - Test Point 1 for GND reference voltage measurements
2	LED2 - Orange LED is ON when VDD_SENSOR voltage is ON	13	J9 - Raspberry Pi 6-pin debug header
3	SW4 - Switch that connects VDD_SENSOR to VBUS/VR1_OUT	14	J8 - Raspberry Pi 40-pin dual-row header
4	LED1 - Green LED is ON when VBUS (Host) Voltage is provided	15	J15 - Infineon CY8CKIT-059 compatible header
5	SW1 - VDD_SENSOR select switch (VBUS or VR1_OUT)	16	J14 - Infineon CY8CKIT-059 compatible header
6.	J7 / R64 - VDD_Sensor current measurement header/bypass.	17	J4 - Arduino UNO R3 Compatible Digital Header (bottom mount)
7	SW3 - IO_VDD Select switch (VDD_SENSOR of VR2_OUT)	18	J6 - ROHM EVK EVB compatible header
8	SW2 - 7-position rotary switch to configure VR1_OUT voltage: 1 = 3.3V, 2 = 3.0V, 3 = 2.8V, 4 = 2.5V, 5 = 1.8V, 6 = 1.7V, 7 = 3.6V	19	J10 - ROHM Sensor Module 5-Pin Digital / 4-Pin Analog Header
9	TP3 - Test Point 3 for VDD_SENSOR voltage measurement.	20	J3 – Arduino UNO R3 Compatible Digital Header (bottom mount)
10	J1 - Arduino UNO R3 Compatible Power Header (bottom mount)	21	J11 - ROHM 7-Pin Digital Sensor (SPI) Header
11	J2 - Arduino UNO R3 Compatible Analog Header (bottom mount, even-numbered pins).	22	J5 - ROHM EVK EVB ribbon cable compatible header

10.1.1 Sensor EVB interface with RKX-EVK-001

Sensor Evaluation Board can be connected to RKX-EVK-001 adapter board either with ribbon cable to J5 - ROHM EVK EVB ribbon cable compatible header or directly to J6 - ROHM EVK EVB compatible header.

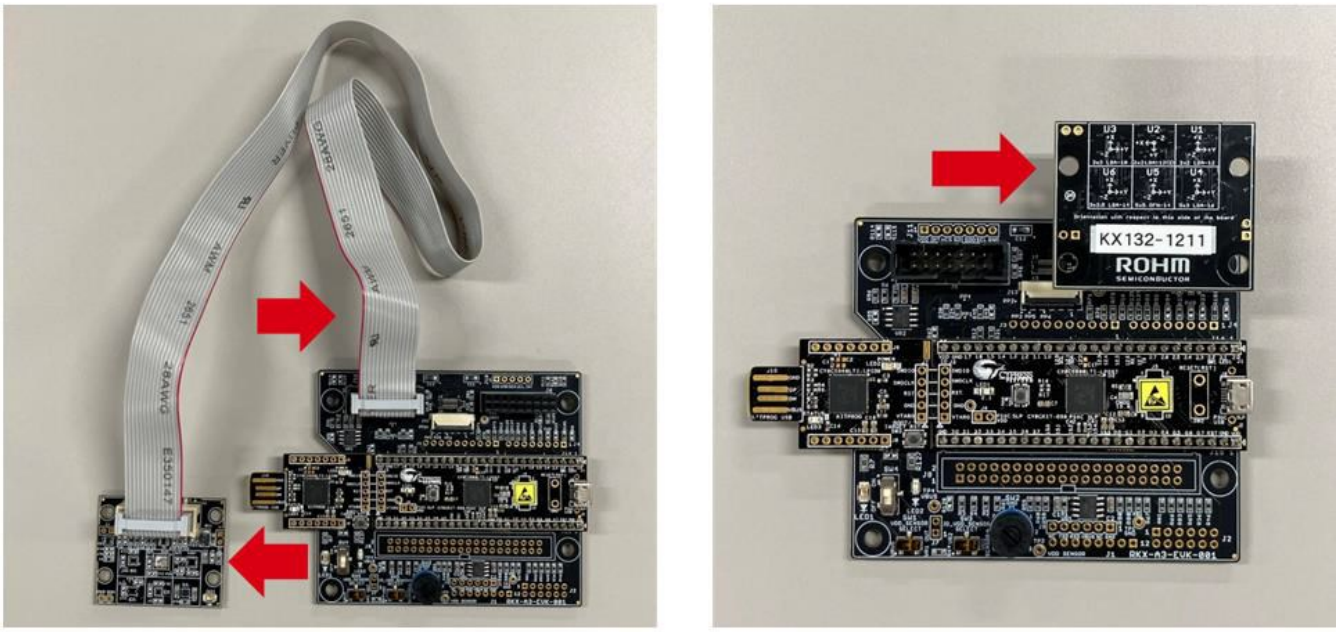

Figure 57 Interface with ROHM EVK EVB

10.2 List of Figures

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