

UM11705

PCF85063TP-ARD evaluation board

Rev. 1.0 — 19 November 2021

User manual

Document information

Information	Content
Keywords	PCF85063TP, I ² C-bus, RTC, Arduino port, EVK
Abstract	The PCF85063TP-ARD evaluation board is a daughter card equipped with Arduino port, designated for easy test and design of PCF85063TP IC, tiny real-time clock/calendar with low power consumption, controlled through Fm I ² C 2-wire bus. The board is fully compliant with IMXRT1050 EVK, LPCXpresso55S69 and i.MX 8M Mini LPDDR4 EVK, including GUI software control. The board can be attached to any device equipped with Arduino port.



Revision history

Rev	Date	Description
v.1.0	20211119	Initial version

IMPORTANT NOTICE**For engineering development or evaluation purposes only**

NXP provides the product under the following conditions:

This evaluation kit is for use of **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY**. It is provided as a sample IC pre-soldered to a printed-circuit board to make it easier to access inputs, outputs and supply terminals. This evaluation board may be used with any development system or other source of I/O signals by connecting it to the host MCU computer board via off-the-shelf cables. This evaluation board is not a Reference Design and is not intended to represent a final design recommendation for any particular application. Final device in an application heavily depends on proper printed-circuit board layout and heat sinking design as well as attention to supply filtering, transient suppression, and I/O signal quality.

The product provided may not be complete in terms of required design, marketing, and or manufacturing related protective considerations, including product safety measures typically found in the end device incorporating the product. Due to the open construction of the product, it is the responsibility of the user to take all appropriate precautions for electric discharge. In order to minimize risks associated with the customers' applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards. For any safety concerns, contact NXP sales and technical support services.

1 Introduction

This document describes the PCF85063TP-ARD demo board. The evaluation board is built around the PCF85063TP IC and works as a daughter card which can be connected through an Arduino port to various Arduino compatible (including original Arduino Uno R3) boards. The board is intended to test and measure the characteristics of the PCF85063TP low power, tiny real-time clock/calendar, produced by NXP Semiconductors.

The RTC communicates with the controller / microprocessor through a bidirectional Fm I²C-bus. Among the device under test (DUT) IC, the board is equipped with an Arduino port and the necessary components for easy testing, shortening the time to make measurements and check operation of the PCF85063TP IC.

Additionally, the daughter board has software support and a graphical user interface (Windows platform) for the following NXP evaluation boards: IMXRT1050 EVK Board, LPCXpresso55S69 Development Board and i.MX 8M Mini LPDDR4 EVK Board.

2 Finding kit resources and information on the NXP web site

NXP Semiconductors provides online resources for evaluation board and its supported device(s) on <http://www.nxp.com>.

The information page for PCF85063TP-ARD evaluation board is at <http://www.nxp.com/PCF85063TP-ARD>. The information page provides overview information, documentation, software and tools, parametrics, ordering information and a **Getting Started** tab. The Getting Started tab provides quick-reference information applicable to using the PCF85063TP-ARD evaluation board, including the downloadable assets referenced in this document.

2.1 Collaborate in the NXP community

The NXP community is for sharing ideas and tips, ask and answer technical questions, and receive input on just about any embedded design topic.

The NXP community is at <http://community.nxp.com>.

3 Getting ready

Working with the PCF85063TP-ARD requires the kit contents, additional hardware, and a Windows PC workstation with installed software.

3.1 Kit contents

- Assembled and tested evaluation board in an antistatic bag
- Quick Start Guide

3.2 Assumptions

Familiarity with the I²C bus is helpful but not required.

3.3 Static handling requirements

CAUTION

This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling. You must use a ground strap or touch the PC case or other grounded source before unpacking or handling the hardware.

3.4 Minimum system requirements

This evaluation board requires a Windows PC workstation. Meeting these minimum specifications should produce great results when working with this evaluation board.

- Computer with Windows 10
- One USB port (either 3.0 or 2.0 or 1.1 compatible)
- One of three EVK boards (MIMXRT1050-EVK, LPC55S69-EVK, 8MMINILPD4-EVK) along with the associated firmware / GUI software
- USB cable for power and data connection between PC and EVK board (if not included in the EVK package)

4 Getting to know the hardware

4.1 PCF85063TP-ARD features

- Connector for external access to I²C-bus;
- On-board LED for interrupt pin monitoring;
- Equipped with Arduino Uno R3 port for direct connection with Arduino devices;
- Fully compliant with IMXRT1050 EVK board, including GUI (Windows 10);
- Fully compliant with LPCXpresso55S69 dev. board, including GUI (Windows 10);
- Compliant with i.MX Mini LPDDR4 EVK board, including GUI (Windows 10);

Note: For i.MX Mini LPDDR4 EVK Board is necessary to use IMX8MMINI-IARD interposer board between the EVK and PCF85063TP-ARD daughter board (see IMX8MMINI-IARD User Manual).

4.2 Kit featured components

[Figure 1](#) identifies the main components on the board. The main elements are called out in the picture. The Arduino port connectors (J5, J6, J35, J36) are located on the bottom side of the board.

The board was developed around the DUT IC, PCF85038AT (U1, see [Figure 1](#)). Using the Arduino interface, the board can be attached to any device equipped with Arduino port. The PCF85063TP-ARD daughter board communicates with the host device or EVK, through an I²C-bus, with a maximum speed of 400 kHz. The I²C-bus is linked to the dedicated pins of the Arduino connector (J35) and to on-board connector (J38), allowing the user to access the I²C-bus from external. For more details about I²C description and bus transactions, see PCF85063TP datasheet (NXP Semiconductors).

The internal interrupt control of PC85063TP IC (pin 3) is connected to the Arduino connector J5, pin 3. An on-board LED (D2) can be connected through J24 jumper to the interrupt line for monitoring purposes. The internal clock signal of PCF85063TP is driven

out through pin 7 (CLKOUT, push-pull configuration). The CLKOUT pin is connected to the Arduino connector J4 pin 1 through zero-ohm resistor R35.

The board is powered through the Arduino connector J6 (pin 4 – 3.3V, pin 6, 7 – GND). The power is delivered to the DUT through J37 (on the PCF85063TP-ARD board). The purpose of J37 is to facilitate power-off tests and current measurements. If C8 supercapacitor and R32 resistor (both components not populated) will be installed on the board, the user can test the RTC back-up function of the DUT. The role of R32 is to limit the charging current of the supercapacitor C8. The on-board LED D1 is power supply indicator.

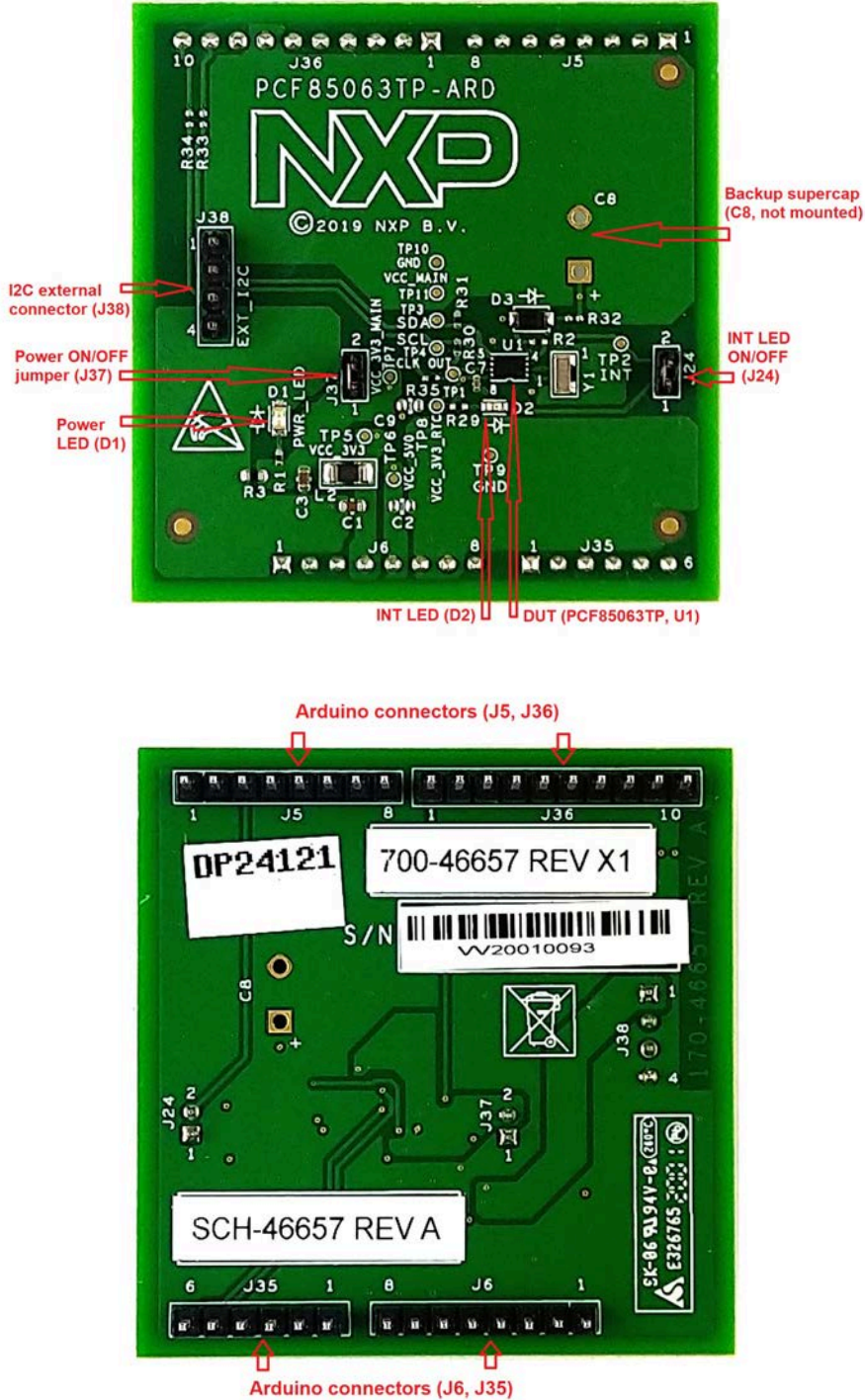


Figure 1. The PCF85063TP-ARD board picture, top view (up), bottom view (down)

4.3 Schematic diagram

The schematic diagram of PCF85063TP-ARD is available at URL: <http://www.nxp.com/PCF85063TP-ARD>.

4.4 Arduino port

J5, J6, J35, and J36 are the mated pin headers of Arduino Uno R3 connectors, having the same electrical function and placed on the board, so that the daughter board can be directly inserted in the Arduino port. The daughter card uses only four signal lines. [Table 1](#) shows the pin chart of connectors, and the lines used in the circuit (see also the [SPF-46657.pdf](#) schematic file):

Table 1. The pin chart of Arduino connectors and their usage

Ref Des	#	Arduino label	PCF85063TP-ARD function
J6 (Power)	1	NC	Not used
	2	IOREF	Not used
	3	RESET	Not used
	4	3.3V	Not used
	5	5V	Power supply
	6	GND	Power supply return
	7	GND	Power supply return
	8	Vin	Not used
J35 (analog, digital, I²C)	1	A0	Not used
	2	A1	Not used
	3	A2	Not used
	4	A3	Not used
	5	A4 / SDA	I ² C – SDA
	6	A5 / SCL	I ² C – SCL
J5 (digital, UART, PWM)	1	D0 / RX	Not used
	2	D1 / TX	Not used
	3	D2	RTC_INT
	4	D3 / PWM	Not used
	5	D4	Not used
	6	D5 / PWM	Not used
	7	D6 / PWM	Not used
	8	D7	Not used
J36 (mixed)	1	D8	RTC_CLKOUT
	2	D9 / PWM	Not used
	3	D10 / SS / PWM	Not used
	4	D11 / MOSI / PWM	Not used
	5	D12 / MISO	Not used

Table 1. The pin chart of Arduino connectors and their usage...continued

Ref Des	#	Arduino label	PCF85063TP-ARD function
	6	D13 / SCK	Not used
	7	GND	Power supply return
	8	AREF	Not used
	9	A4 / SDA	Not used
	10	A5 / SCL	Not used

The circuit is supplied with 3.3 V from Arduino port through J6 and J36. Pin no. 4 of J6 is 3.3 V power supply, while pin no. 6, 7 of J6, and pin no. 7 of J36 represents the power supply return (ground).

4.5 I²C external connector (J38)

The I²C-bus of the PCF85063TP can be directly accessed from external through the connector J38, located on the PCF85063TP-ARD daughter board. [Table 2](#) describes the pin chart of J38.

Table 2. The J38 pin chart

J38 pin no.	Function	Comment
1	VCC_3V3	Power supply (3.3 V)
2	I2C_3V3_SDA	I ² C-bus data (SDA)
3	I2C_3V3_SCL	I ² C-bus clock (SCL)
4	GND	Power supply return (ground)

4.6 Jumpers and test points

The board contains two jumpers and several test points. [Table 3](#) and [Figure 2](#) detail the jumper locations and their default configurations. [Table 4](#) describes the test points located on the PCF85063TP-ARD board.

Table 3. PCF85063TP-ARD jumpers

Ref Des	Label	Default	Description
J24	INT MONITOR ON / OFF	ON	ON: Enable the interrupt monitor LED (D2)
			OFF: Disable the interrupt monitor LED (D2)
J37	RTC power ON / OFF	ON	ON: PCF85063TP (U1) power on
			OFF: PCF85063TP (U1) power off

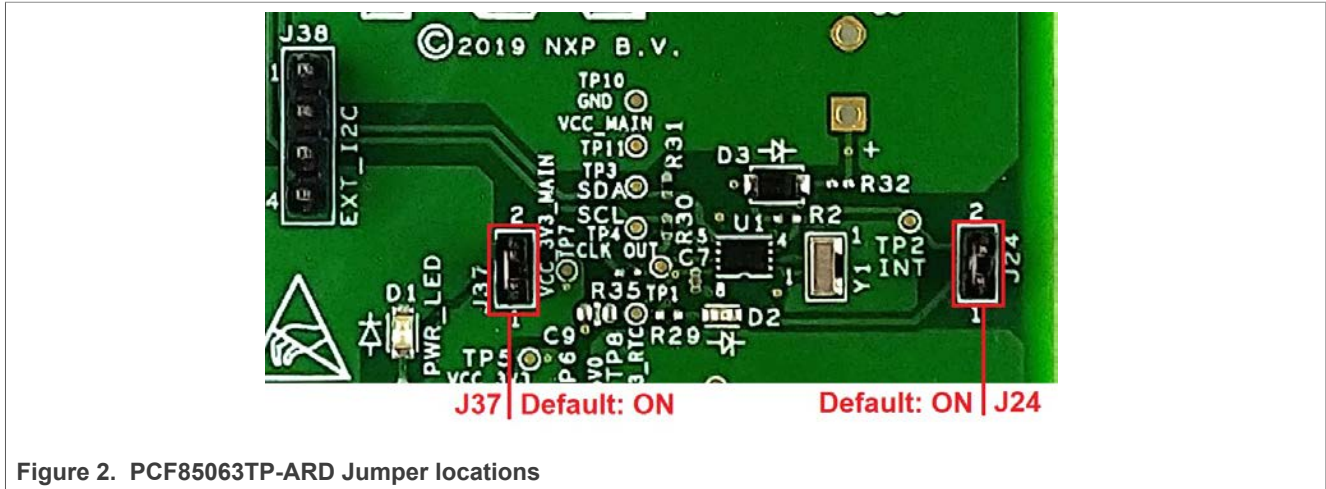


Figure 2. PCF85063TP-ARD Jumper locations

Table 4. PCF85063TP-ARD test points

Ref Des	Test point / jumper label	Description
TP1	CLK OUT	CLKOUT (pin 7) of PCF85063TP
TP2	INT	INT (pin 3) of PCF85063TP
TP3	SDA	SDA (pin 5) of PCF85063TP
TP4	SCL	SCL (pin 6) of PCF85063TP
TP5	VCC_3V3	3.3 V power rail
TP6	VCC_5V0	5 V power rail
TP7	VCC_3V3_MAIN	3.3 V – MAIN power rail
TP8	VCC_3V3_RTC	3.3 V – RTC power rail
TP9	GND	Ground
TP10	GND	Ground
TP11	VCC_Main	VCC – MAIN power rail

5 Installing and configuring software tools

PCF85063TP-ARD evaluation board is designed and built as a daughter board able to work in conjunction with a mother board equipped with an Arduino port. The board was built to be fully compatible with the following NXP Evaluation (EVK) boards:

- IMXRT1050 EVK Board
- LPCXpresso55S69 Development Board
- i.MX 8M Mini LPDDR4 EVK Board

Each evaluation/development board benefits by firmware support which can be downloaded from NXP company site (www.nxp.com/). Before starting, the EVK motherboard must be programmed with the corresponding firmware package. Additionally, a GUI application (Windows 10) is available for download from the NXP site, allowing rapid testing and operation of PCF85063TP-ARD daughter board through the one of above mentioned EVK. The GUI application is common for all three EVKs

and for the RTC development board family, manufactured by NXP (PCF85063TP-ARD, PCF85063AT-ARD and PCF85263ATL-ARD).

For details regarding installation of the EVK firmware and GUI host software on PC please download [EVK_Firmware_And_GUI_Install_Guide_For_Arduino_Boards.pdf](#) instruction file from NXP site (www.nxp.com/). Once the software is installed, the first step is to select the correct combination EVK – PCF85063TP-ARD daughter card, and then the board can be controlled from the GUI interface. See [Section 6](#) and [Section 7](#) for more details regarding the operation of PCF85063TP-ARD from GUI software.

6 Configuring the hardware

6.1 Using the PCF85063TP-ARD with an IMXRT1050 EVK board

[Figure 3](#) shows the required hardware for operation of the PCF85063TP-ARD daughter board with IMXRT1050 EVK. The following items are necessary:

- One IMXRT1050-EVK board
- One PCF85063TP-ARD daughter board
- One USB-A / USB Micro-B cable
- A PC with Windows 10 operating system

The IMXRT1050 EVK mother board can be powered by one of the three methods:

- Connecting an external 5VDC power supply to the barrel power connector (J2) on the board
- Connecting a USB cable from the PC to the Micro-B USB connector (J9) on the board
- Connecting a USB cable from the PC to the USB connector (J28) on the board. When the PC is connected in this fashion, the USB port can simultaneously act as a debug interface. Therefore, by using a single USB cable connected to J28, the EVK can be powered and at the same time linked to the PC for data exchange.

The older USB ports (from PC) are not able to deliver the necessary current (500mA), before establishing the communication, use an external power supply (connected to J2).

From J1 on the EVK board (see [Figure 3](#)) the user can select the power configuration for the mother board. For further details, refer to the [MIMXRT1050 EVK Board Hardware User's Guide](#).

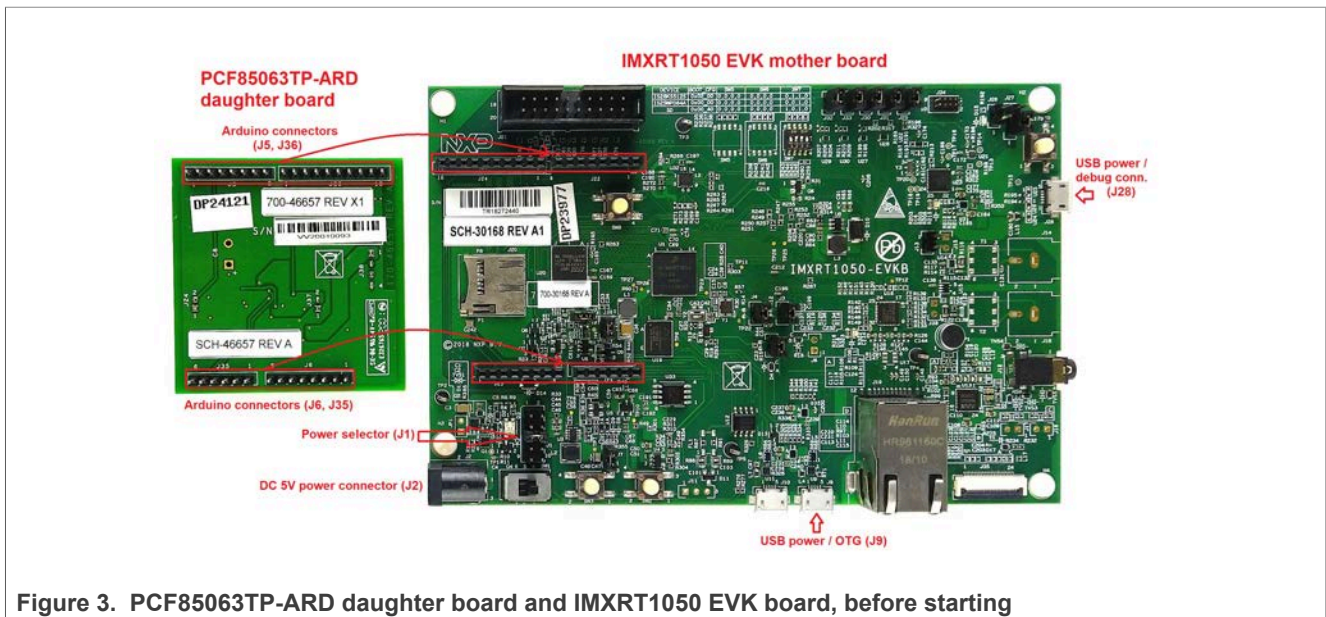


Figure 3. PCF85063TP-ARD daughter board and IMXRT1050 EVK board, before starting

To configure the hardware and workstation, complete the following procedure:

1. Configure the suitable power configuration of EVK (J1). If using J28 for power supply, the J1 jumper shall be placed in position 5-6. If using an external power supply (connected to J2), the jumper J1 will be placed in position 1-2.
2. Insert the PCF85063TP-ARD daughter card on the Arduino connector of the EVK (see [Figure 4](#)).
3. Using USB connector J28, connect the EVK board to a USB port of the computer.
4. Install the IMXRT1050 target firmware (download from NXP site and see UM11581, [Arduino shields GUI and firmware installation manual](#) for step-by-step instructions).
5. Install GUI application (see [UM11581, Arduino shields GUI and firmware installation manual](#)).
6. Open the GUI application to operate the device from the PC. For details regarding GUI operation see [Section 7](#).

[Figure 4](#) shows the boards during the operation.

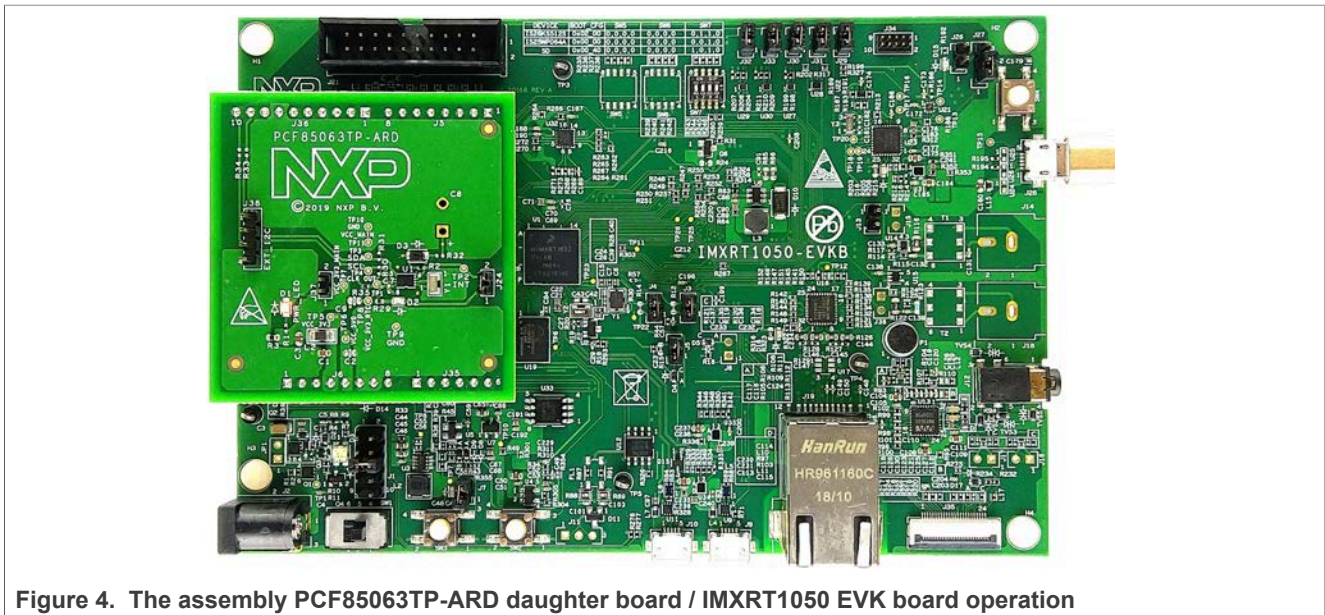


Figure 4. The assembly PCF85063TP-ARD daughter board / IMXRT1050 EVK board operation

6.2 Using the PCF85063TP-ARD with an LPCXpresso55S69 development board

Figure 5 shows the required hardware for operation of the PCF85063TP-ARD and LPCXpresso55S69 EVK board. This configuration consists of:

- One LPCXpresso55S69 EVK board
- One PCF85063TP-ARD daughter board
- One USB-A / USB Micro-B cable
- A PC with Windows 10 operating system

The LPCXpresso55S69 development board is equipped with four USB Micro-B connectors: P5, P6, P9 and P10. The board can be powered through any USB port. Using P6 USB connector to connect the board to the PC simplifies the start-up operation because P6 is designated for debugging and the USB cable thus accomplishes two tasks at the same time: powering the board, and serving as a data link between the EVK board and PC. For more details regarding power-up and operation of the LPCXpresso55S69 development board, see the *LPCXpresso55S69/LPCXpresso55S28 Development Board User Manual* [here](#).

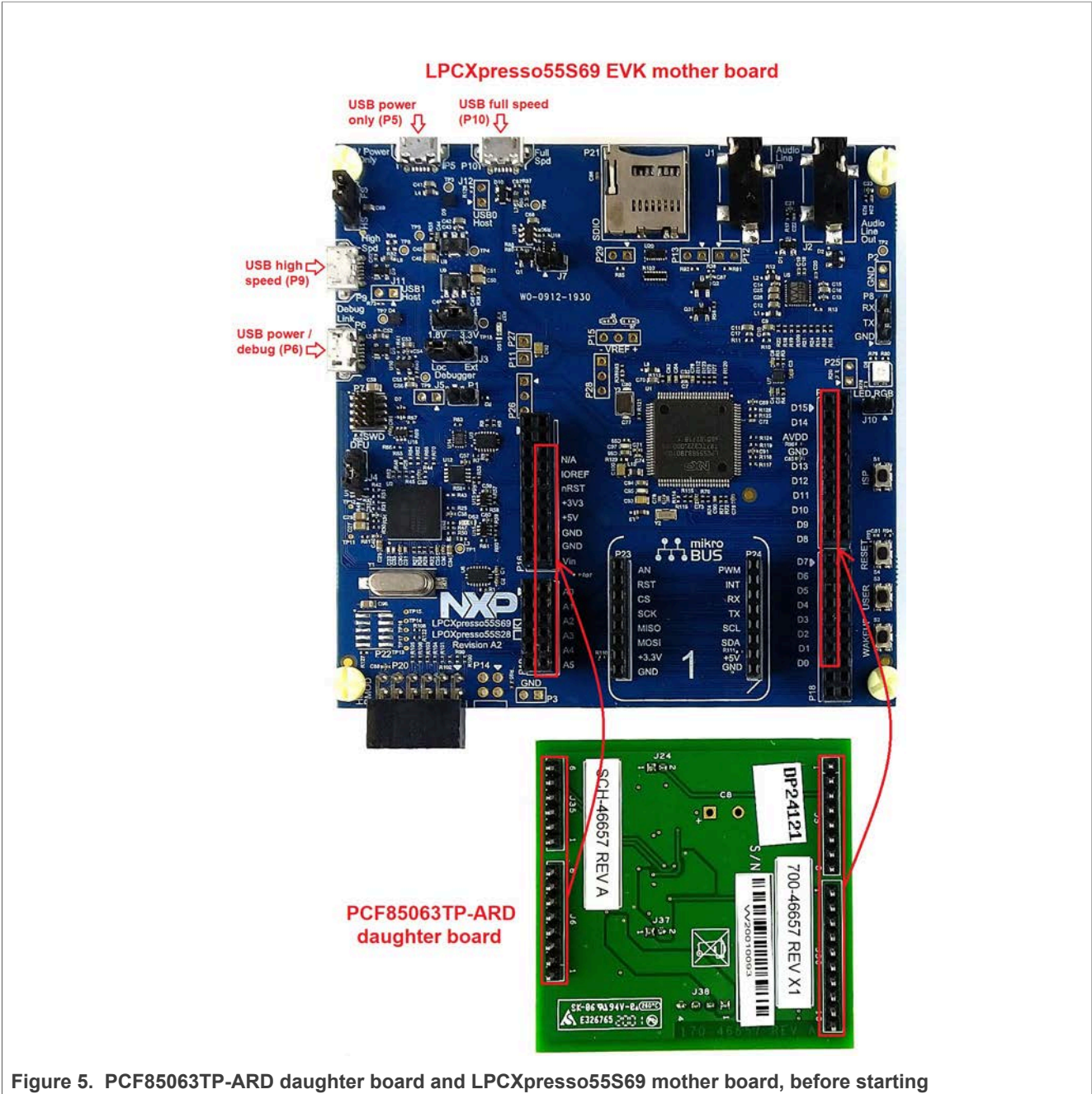


Figure 5. PCF85063TP-ARD daughter board and LPCXpresso55S69 mother board, before starting

The following steps describe how to assemble, program, and operate the configuration shown in [Figure 5](#).

1. Insert the PCF85063TP-ARD daughter card to P16 – P19 connectors located on LPCXpresso55S69 development board (see the marked pins of P16 – P19, [Figure 5](#));
2. Connect the development board using port P6 USB port of PC;
3. Install the LPCXpresso55S69 target firmware (download from NXP site and read the *EVK_Firmware_And_GUI_Install_Guide_For_Arduino_Boards.pdf* instruction file);
4. Install GUI application on PC (see the instruction file called out in the previous step);

5. Open the GUI application to operate the device from the PC. For details regarding GUI operation see next section 8 “GUI description”;

Figure 5 shows the two boards in operation.

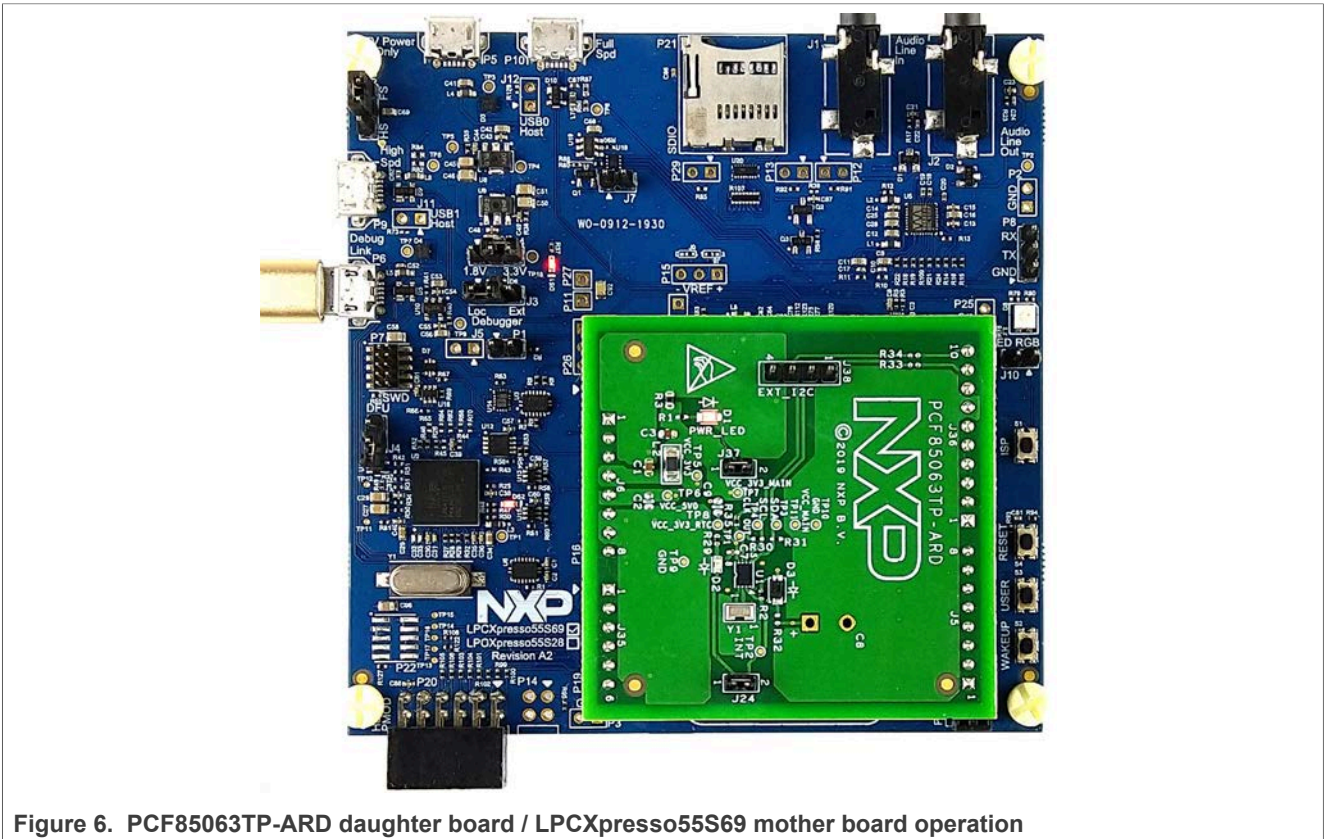


Figure 6. PCF85063TP-ARD daughter board / LPCXpresso55S69 mother board operation

6.3 Using the PCF85063TP-ARD with an i.MX 8M Mini LPDDR4 EVK board

When an i.MX 8M Mini LPDDR4 EVK board is used with the PCF85063TP-ARD board, a third board (IMX8MMINI-IARD interposer board) must be used, especially designed and built as EVK – daughter board interconnection. The EVK board i.MX 8M Mini LPDDR4 is not equipped with an Arduino port; instead it has a 2 x 20 pin expansion connector (J1003, see i.MX 8M Mini LPDDR4 EVK user manual). J1003 is a multipurpose port, containing various digital I/O lines, including specialized I²C and SPI buses. Starting from the expansion connector pin chart, an Arduino port interposer board was developed, with the role of signal-to-signal bridge between the 2 x 20 connector pins on the i.MX 8M Mini LPDDR4 EVK and the mated connectors of the Arduino port present on the PCF85063TP-ARD daughter board.

To operate the setup, along with the EVK and the daughter board, a third board must be included in the setup assembly. Figure 7 shows the necessary boards and how these boards are connected. The configuration consists of:

- One i.MX 8M Mini LPDDR4 EVK board
- One PCF85063TP-ARD daughter board
- One IMX8MMINI-IARD interposer board
- One USB-A / USB-C cable

- One USB-A / USB Micro-B cable
- A PC with Windows 10 operating system

It is recommended to attach the PCF85063TP-ARD to the Arduino connectors of the IMX8MMINI-IARD interposer board first, and then the resulting assembly to the i.MX 8M Mini LPDDR4 EVK. This can be done by plugging J1 connector located on the interposer board to J1003 connector on the EVK.

To power-up the EVK, a USB-C type cable connected to PORT 2 of the EVK is used. The power switch SW101 on the EVK board must be set to ON position to power-up the setup. Data communication is achieved by routing a separate USB (Micro-B type) cable from a USB port on the PC to debug port (J901) on the EVK (see [Figure 7](#) and [Figure 8](#)).

The user may find details regarding power-up and operation of the setup assembly in 8MMINI-LPDDR4-EVK user manual and IMX8MMINI-IARD User Manual. The files can be downloaded from www.nxp.com/.

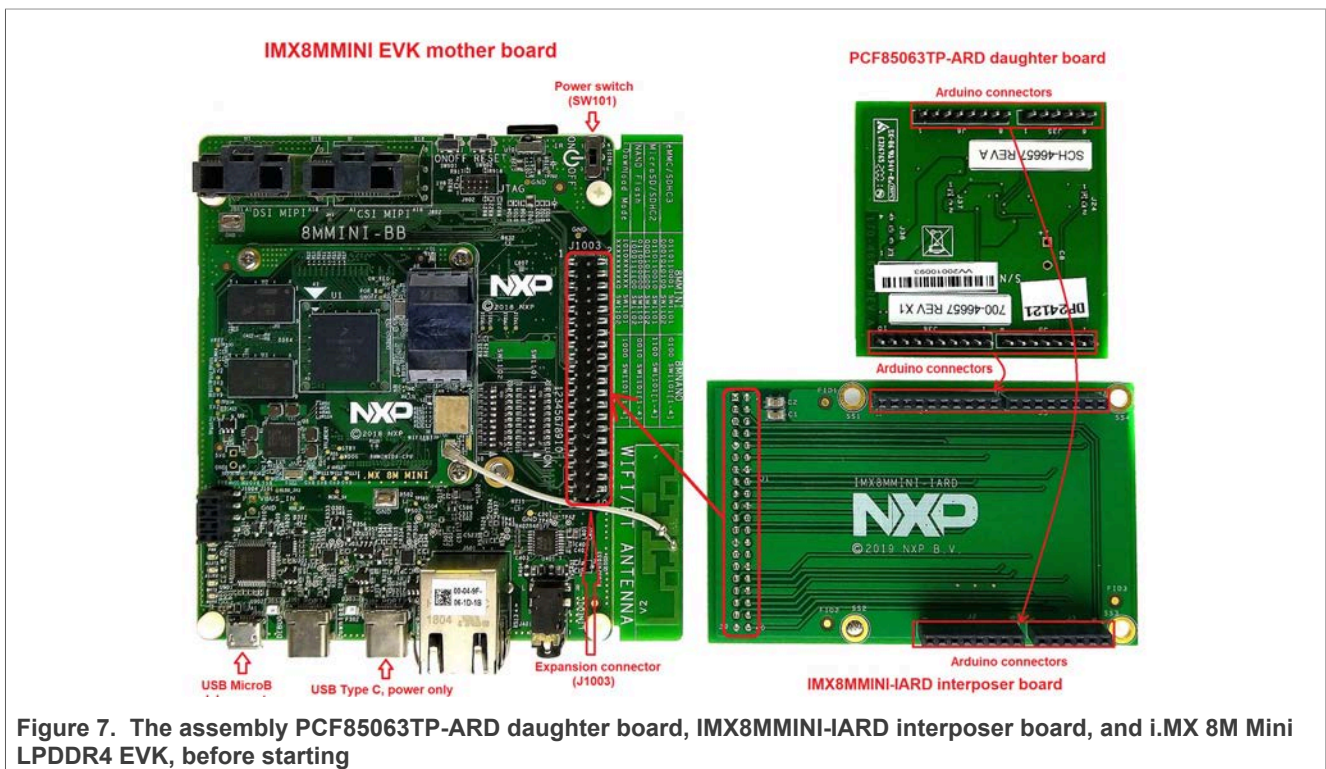


Figure 7. The assembly PCF85063TP-ARD daughter board, IMX8MMINI-IARD interposer board, and i.MX 8M Mini LPDDR4 EVK, before starting

To configure and operate the setup, follow the below steps:

1. Insert the PCF85063TP-ARD onto the IMX8MMINI-IARD interposer board Arduino connectors (located on the top side);
2. Attach IMXMMINI-IARD connector plug J1 (located on the bottom of the board) into J1003 expansion board located on the top side of i.MX 8M Mini LPDDR4 EVK (see [Figure 8](#));
3. Power-up the EVK board using a USB Type C cable attached to PORT 2;
4. Connect the EVK to the PC, using a USB Micro-B cable, attached to J901 debug port;
5. Place SW101 in ON position to power-up the boards;
6. Install the MIMXRT1050 target firmware (download [UM11581, Arduino shields GUI and firmware installation manual](#) from NXP site);

7. Install GUI application on the PC (see the instruction file referred in the above step);
8. Open the GUI application to operate the device from the PC. For details regarding GUI operation see Section 8 “GUI description”;

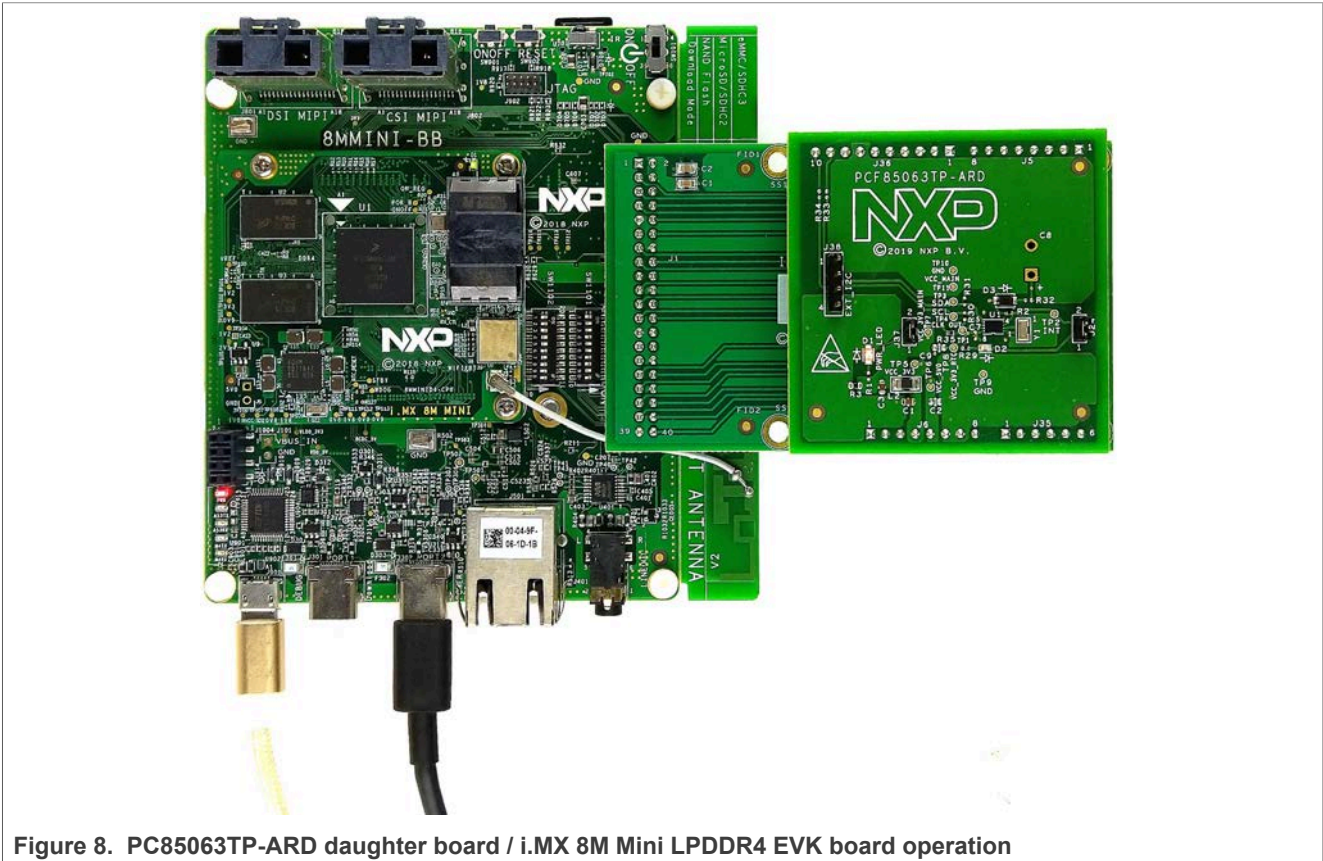


Figure 8. PCF85063TP-ARD daughter board / i.MX 8M Mini LPDDR4 EVK board operation

6.4 Using PCF85063TP-ARD with another device

The PCF85063TP-ARD daughter board can be operated with other EVK board, which has an Arduino port. There are two options to connect the board: using other EVK equipped with an Arduino port, and an EVK without Arduino port. In the first case, a firmware shall be developed according with PCF85063TP specifications, and then simply attach PCF85063TP-ARD daughter board to the EVK, to operate the board. In the second case, using the pin chart of Arduino connectors ([Table 1](#)), make the necessary electrical connections (for power, I²C-bus and control lines), and develop the desired firmware, assuring that it is compliant with IC specifications. Use PCF85063TP datasheet to read details about internal registers of the DUT IC and data exchange between internal controller and the EVK. Assure for correct electrical connections and avoid data conflicts on the signal lines, to prevent IC damage.

7 GUI description

A GUI application is available for the three EVK boards from NXP Semiconductors. The application is common for all EVKs and the development boards of the RTC family, produced by NXP Semiconductors (PCF85063TP, PCF85063A, and PCF85263A).

This section describes the GUI application and how the user can control the PCF85063TP-ARD daughter board from the graphical interface. First, install the GUI package and software on the PC (Windows 10). For more details, see [UM11581](#).

Once installation is complete, assure that one of the mentioned three EVKs with attached PCF85063TP-ARD daughter board is connected to PC and powered-on. Open NXP_GUI(PCF85063TP,PCF85263ATL,PCF85063A) GUI application. An interface will appear as is shown in [Figure 9](#).

The GUI application starts with **Settings** tab (marked with red arrow). The left side of the window displays **Board settings**. The section provides the following settings:

- **Select EVK:** displays the list of EVKs. Selecting a wrong EVK board causes the connection to fail and a pop-up window with the message: *“Unable to Connect with EVK”* appears on the screen.
- **Select COM port:** displays the port selected for communication. The port is automatically selected by the system (in the picture is COM 3).
- **Select Board:** allows the user to select the correct daughter board (the application can support three different boards). In [Figure 9](#), the selected board is PCF85063TP. Selecting a wrong daughter board causes the connection to fail and a pop-up window with the message: *“Unable to Connect with Daughter Card”* appears on the screen.

In the right side of the window is located **Device Setting** section. In this section a single setting is available, **I2C Frequency**, which sets the I²C-bus clock to 100kHz or 400kHz.

Assuming the correct parameters are chosen, clicking the **Connect** button establishes the connection with the EVK. In the bottom side of the GUI window a status bar shows in real time the status regarding connection between PC and the EVK.

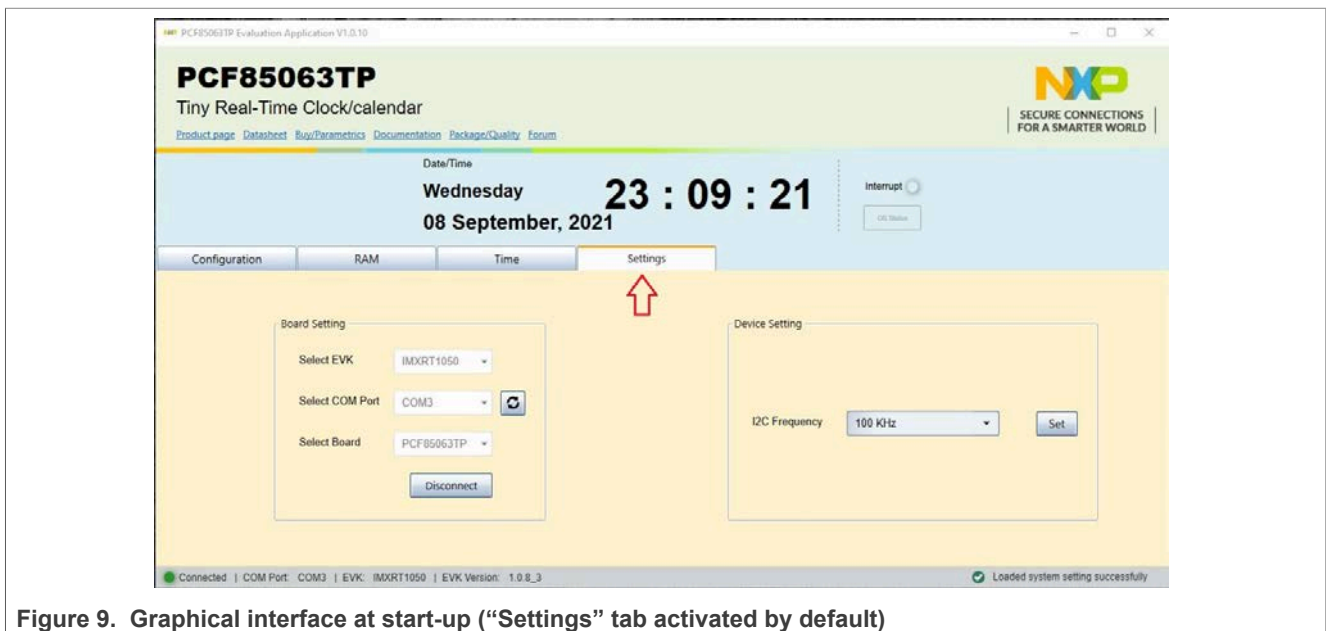


Figure 9. Graphical interface at start-up (“Settings” tab activated by default)

Clicking on **Time** tab, a new window appears (see [Figure 10](#)). From this tab, the time and calendar functions of the RTC are available. For the calendar section, the following internal registers of PCF85063TP can be read or written: **Weekday**, **Day**, **Month**, and **Year**. For the time section the user can set or read: **Hour**, **Minute**, and **Second**.

The **Write** button which set the RTC registry with the new values by the user from the GUI, while the **Read** button brings back the data from the RTC to the GUI. The third

button **Set PC Time** allow the user to set the RTC registers with the current time of the PC. For more details about the register map of the RTC, see the PCF85063TP datasheet.

In the upper side, in the blue region (marked with red arrow), the date and time of the RTC is displayed in real time.

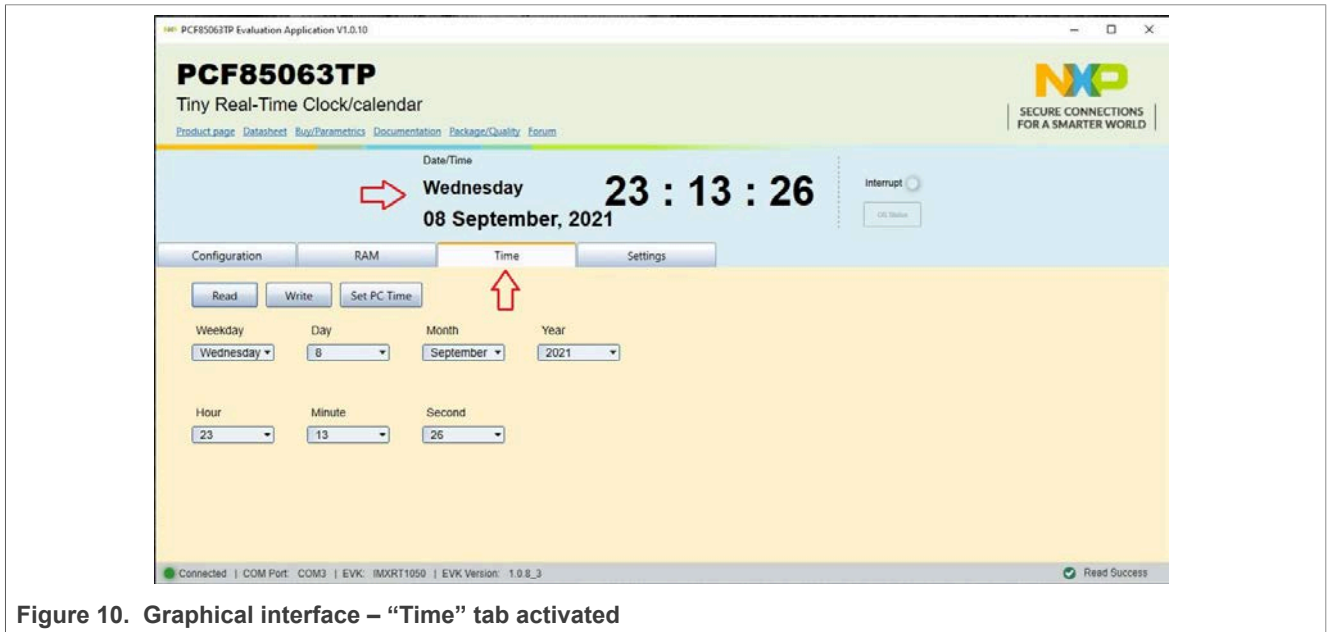


Figure 10. Graphical interface – “Time” tab activated

The **Configuration** tab, is accessing the control and offset registers of the PCF85063TP. [Figure 11](#) shows the interface of the Configuration tab. From left to right, the user can control the following registers:

- **Control Register1** – register address: 00h;
- **Control Register2** – register address: 01h;
- **Offset Register** – register address: 02h;

See the PCF85063TP datasheet for more details about the control / offset registers of the RTC. In the upper / right side of the blue region (marked with red arrow) the interrupt indicator is monitoring in real time the INT output (pin 3) of the RTC.

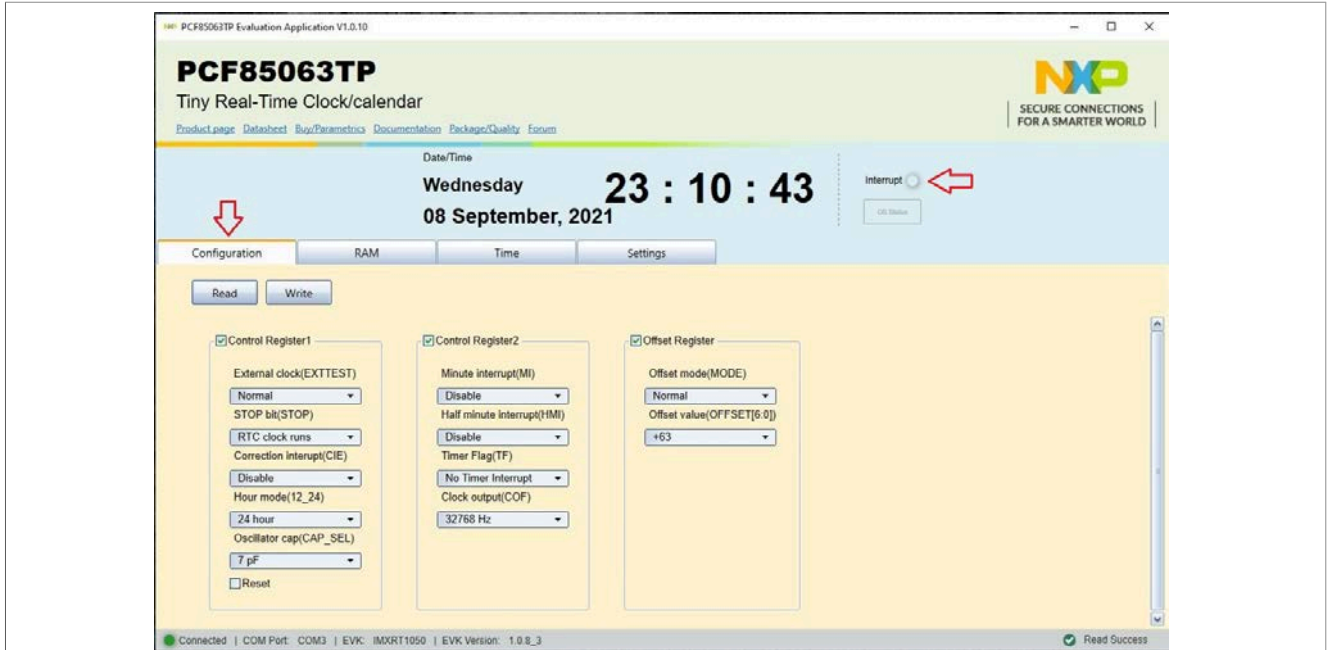


Figure 11. Graphical interface – “Configuration” tab activated

The **RAM** tab (Figure 12) allows for direct setting or reading the value of the internal RAM byte of the RTC. The data can be introduced by the user in four modes. Setting each bit in low or high, introducing hex, or decimal values, or by using the graphical slider (the blue arrow in Figure 12).



Figure 12. Graphical interface – “RAM” tab activated

8 Abbreviations

Table 5. Abbreviations

Acronym	Description
DUT	Device Under Test
ESD	Electro Static Discharge
EVK	Evaluation Board
GUI	Graphical User Interface
I ² C bus	Inter-Integrated Circuit bus
IC	Integrated Circuit
I/O	Input / Output
LED	Light Emitting Diode
PC	Personal Computer
RTC	Real-Time Clock
USB	Universal Serial Bus

9 References

1. *PCF85063TP, Tiny Real-Time Clock/calendar*
Product data sheet; NXP Semiconductors;
2. *MIMxrt1050 EVK Board Hardware User's Guide*
User manual; NXP Semiconductors;
3. *i.MX RT1050 Crossover Processors Data Sheet for Consumer Products*
Data sheet; NXP Semiconductors;
4. *UM11158 – LPCXpresso55S69 Development Board*
User manual; NXP Semiconductors;
5. *LPC556x 32-bit ARM Cortex-M33; M33 coprocessor, TrustZone, PowerQuad, CASPER, 320KB SRAM; 640 KB flash, USB HS, Flexcomm Interface, SDIO, 32-bit counter/timers, SCTimer/PWM, PLU, 16-bit 1.0 Msamples/sec ADC, Comparator, Temperature Sensor, AES, PUF, SHA, CRC, RNG*
Product data sheet; NXP Semiconductors;
6. *i.MX 8M Mini LPDDR4 EVK Board Hardware User's Guide*
User guide; NXP Semiconductors;
7. *i.MX 8M Mini Application Processor Datasheet for Consumer Products*
Data sheet; NXP Semiconductors;
8. *i.MX 8M Mini Application Processor Reference Manual*
Reference manual; NXP Semiconductors;
9. *Arduino Uno R3 Reference Manual*
Reference manual; NXP Semiconductors;
10. *IMX8MMINI-IARD interposer board User Manual*
User manual; NXP Semiconductors;
11. *NXP EVK Firmware and GUI Installation Guide for Arduino Series Boards*
User manual; NXP Semiconductors;

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