

# UM11759

## PCA9846PW-ARD evaluation board

Rev. 1 — 6 June 2022

User manual

### Document information

Information	Content
Keywords	PCA9846, I <sup>2</sup> C-bus, level translator, bus switch, Arduino port, EVK
Abstract	The PCA9846PW-ARD evaluation board is an expansion card equipped with Arduino port, designated for easy test and design of PCA9846 IC, four-channel ultra-low voltage, FM+ I <sup>2</sup> C-bus switch with reset. The board is fully compliant with IMXRT1050 EVK, LPCXpresso55S69 (LPC55S69-ECK) and i.MX 8M Mini LPDDR4 EVK (8MMINILPD4-EVK, 8MMINID4-EVK), including GUI software control. The board can be attached to any device equipped with Arduino port.



Revision history

Rev	Date	Description
1	20220606	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

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This document describes the PCA9846PW-ARD evaluation board. The evaluation board is built around the PCA9846, four-channel ultra-low voltage, FM+ I<sup>2</sup>C-bus switch with reset, produced by NXP Semiconductors. The evaluation board serves as an expansion board that can be connected through an Arduino port to various Arduino-compatible EVK/motherboards with the purpose of testing and measuring the characteristics of the PCA9846 device under test (DUT). This includes the original Arduino Uno R3.

The development board contains one PCA9846 IC (DUT) and four I<sup>2</sup>C EEPROM ICs, connected to each channel of PCA9846 IC. The PCA9846PW-ARD expansion board allows testing and measurement of the static and dynamic characteristics of the DUT by accessing the EEPROMs from the Arduino port through the PCA9846 I<sup>2</sup>C switch. PCA9846 is supplied from a programmable power supply, and each EEPROM works at a different rail voltage. This configuration allows testing of the PCA9846 IC with several combinations of logic levels. The programmable power supply is controlled by the motherboard (EVK) through the same Arduino port. Power also is delivered from the motherboard (EVK) through the Arduino port.

Additionally, a graphical user interface (Windows platform GUI) is provided to facilitate the evaluation of the expansion board. The GUI is used with 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

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

The information page for PCA9846PW-ARD evaluation board is at <http://www.nxp.com/PCA9846PW-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 PCA9846PW-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

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Working with the PCA9846PW-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 I<sup>2</sup>C 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 PCA9846PW-ARD features

- Equipped with four I<sup>2</sup>C EEPROMs for rapid test and measurements
- Equipped with programmable power supply for logic level combination
- Onboard I<sup>2</sup>C-bus external connector (channel 3 and 4)
- 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 development 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, use IMX8MMINI-IARD interposer board between the EVK and PCA9846PW-ARD expansion board. Refer to 11612 [\[10\]](#).

### 4.2 Kit featured components

[Figure 1](#) and [Figure 2](#) identify the main components on the board. The main elements are called out. The PCA9846 (U11) is placed in the center of the board. In [Figure 1](#), the EEPROMs are indicated along with the corresponding LDOs. The I<sup>2</sup>C address jumpers (J12, J13) are placed in the upper side of the board. The user can find the power LEDs (D1-3.3 V, D2-5 V) in the left side.

The Arduino port connectors (J1, J4, J5, J6) are indicated in [Figure 2](#), on the bottom side of the board.

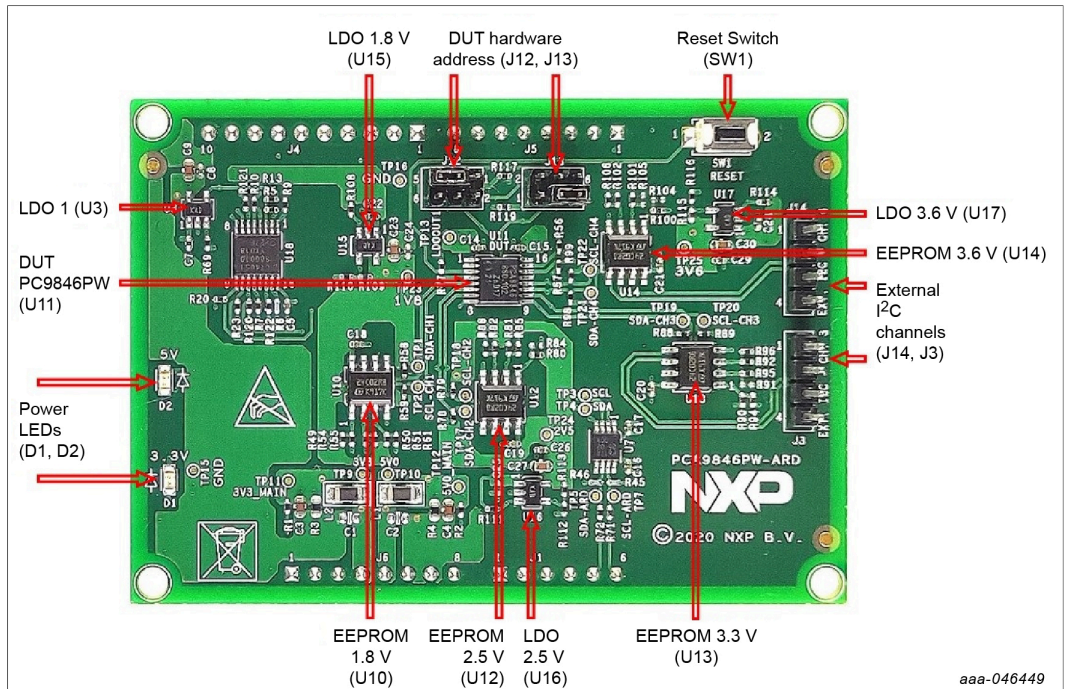


Figure 1. PCA9846PW-ARD top view

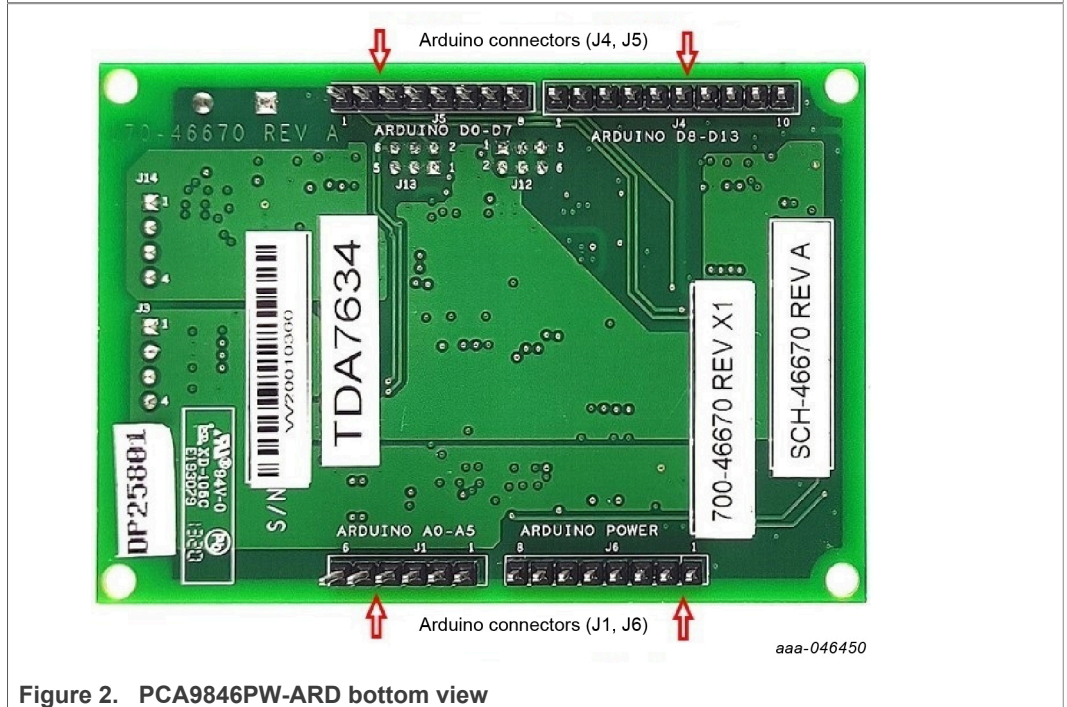


Figure 2. PCA9846PW-ARD bottom view

#### 4.2.1 Arduino connectors

J1, J4, J5, and J6 are the mated pin headers of Arduino Uno R3 connectors, having the same electrical function and placed on the board so the expansion board can be directly inserted in the Arduino port. The expansion board uses five signal lines. [Table 1](#) is the pin chart of connectors and the used lines in the circuit. Also refer to the [SPF-46670\\_A.pdf schematic file](#):

Table 1. Pin chart of Arduino connectors and usage

Ref Des	#	Arduino label	PCA9846PW-ARD function
<b>J6 (Power)</b>	1	NC	Not used
	2	IOREF	Not used
	3	RESET	Not used
	4	3.3V	Power supply (3.3V)
	5	5V	Power supply (5V)
	6	GND	Power supply return
	7	GND	Power supply return
	8	Vin	Not used
<b>J1 (analog, digital, I<sup>2</sup>C)</b>	1	A0	Not used
	2	A1	Not used
	3	A2	Not used
	4	A3	Not used
	5	A4 / SDA	I <sup>2</sup> C_SDA
	6	A5 / SCL	I <sup>2</sup> C_SCL
<b>J5 (digital, UART, PWM)</b>	1	D0 / RX	MUX1_LDO1_S0
	2	D1 / TX	MUX1_LDO1_S1
	3	D2	MUX1_LDO1_S2
	4	D3 / PWM	Not used
	5	D4	Not used
	6	D5 / PWM	Not used
	7	D6 / PWM	Not used
	8	D7	Not used
<b>J4 (mixed)</b>	1	D8	Not used
	2	D9 / PWM	Not used
	3	D10 / SS / PWM	Not used
	4	D11 / MOSI / PWM	Not used
	5	D12 / MISO	Not used
	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 from Arduino port through J6 and J4. Pin 4 of J6 is 3.3 V power supply while pin 5 of J6 is 5 V power supply. Pin 6, 7 of J6, and pin 7 of J4 represents the power supply return (ground). LED D1 is the 3.3 V power supply indicator ("VCC\_3V3\_MAIN" power net), and D2 is 5 V power supply indicator ("VCC\_5V\_MAIN"

power net). Refer to the SPF-46670\_A.pdf schematic file of PCA9846PW-ARD expansion board.

4.2.2 Jumpers and test points

The board contains two jumpers and several test points. Table 5 and Figure 9 show the jumper locations and their default configurations. Table 6 shows the test points located on the PCA9846PW-ARD board.

Table 2. PCA9846PW-ARD jumpers

Ref Des	Label	Default	Description
J12	AD0	3-5	3-5: A0 connected to GND
			1-3: A0 connected to VCC_LDOOUT1
			2-4: A0 connected to SCL
			4-6: A0 connected to SDA
J13	AD1	3-5	3-5: A1 connected to GND
			1-3: A1 connected to VCC_LDOOUT1
			2-4: A1 connected to SCL
			4-6: A1 connected to SDA

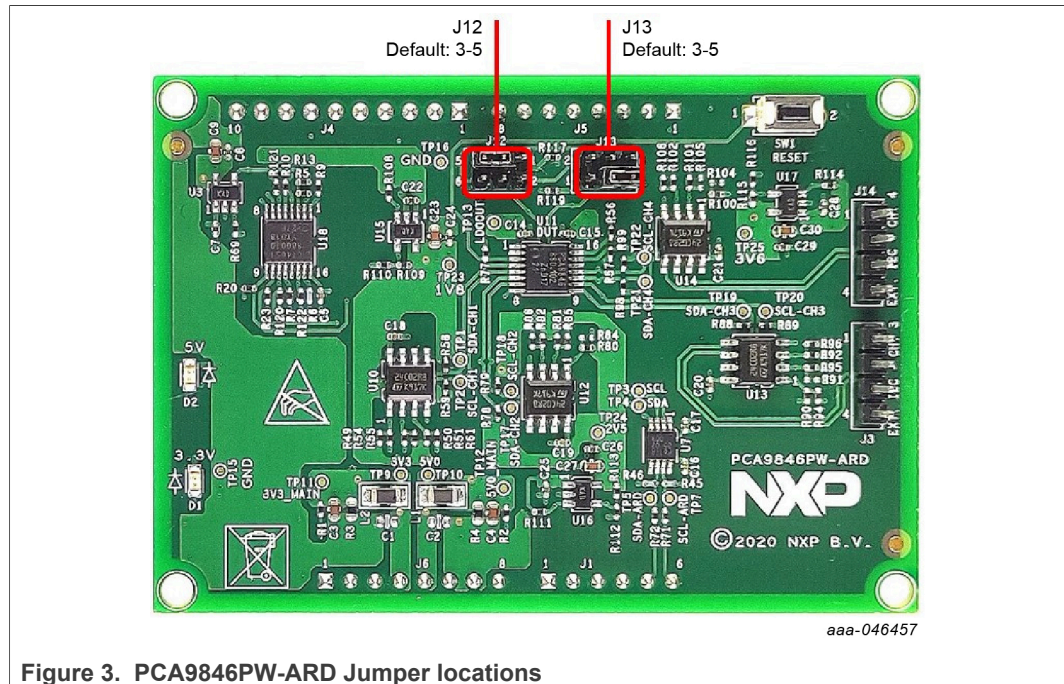


Figure 3. PCA9846PW-ARD Jumper locations

Table 3. PCA9846PW-ARD test points

Ref Des	Test point / jumper label	Description
TP1	SDA-CH1	I <sup>2</sup> C SDA line, channel 1
TP2	SCL-CH1	I <sup>2</sup> C SCL line, channel 1
TP3	SCL	I <sup>2</sup> C SCL main line
TP4	SDA	I <sup>2</sup> C SDA main line



Table 3. PCA9846PW-ARD test points...continued

Ref Des	Test point / jumper label	Description
TP5	SDA-ARD	I <sup>2</sup> C SDA line, Arduino port
TP7	SCL-ARD	I <sup>2</sup> C SCL line, Arduino port
TP9	3V3	VCC_3V3 rail
TP10	5V0	VCC_5V0 rail
TP11	3V3_MAIN	VCC_3V3_MAIN rail
TP12	5V0_MAIN	VCC_5V0_MAIN rail
TP13	LDOOUT1	VCC_LDOOUT1 rail
TP15	GND	Ground
TP16	GND	Ground
TP17	SDA-CH2	I <sup>2</sup> C SDA line, channel 2
TP18	SCL-CH2	I <sup>2</sup> C SCL line, channel 2
TP19	SDA-CH3	I <sup>2</sup> C SDA line, channel 3
TP20	SCL-CH3	I <sup>2</sup> C SCL line, channel 3
TP21	SDA-CH4	I <sup>2</sup> C SDA line, channel 4
TP22	SCL-CH4	I <sup>2</sup> C SCL line, channel 4
TP23	1V8	VCC_1V8 rail
TP24	2V5	VCC_2V5 rail
TP25	3V6	VCC_3V6 rail

### 4.2.3 I<sup>2</sup>C bus switch/repeater

Figure 3 shows the PCA9846 I<sup>2</sup>C-bus switch/repeater (U11) section. From the Arduino port, the I<sup>2</sup>C (SDA, SCL) lines go to the DUT through the level translator PCA9617A (U7). The level shifter U7 assures the separation between the logic level of the Arduino port (3.3 V) and the selected logic level of the PCA9846 (VCC\_LDOOUT1). The I<sup>2</sup>C interface of U11 is pin 14 for SCL, and pin 15 for SDA. The I<sup>2</sup>C-bus pullup resistors are R56 and R57. The pin 3 of the DUT is RESET input (active low), and is driven by the onboard switch SW1. SW1 resets the internal state machine of PCA9846, meaning all channels are deselected. The address pins A0 and A1 are controlled by the jumper headers J12 and J13. Refer to PCA9846 data sheet [\[1\]](#) for more details about the hardware address selection. The default selected address is "00", which corresponds to 0xE2h for the 8-bit I<sup>2</sup>C-bus address. The VDD1 pin (logic level power supply) is connected to VCC\_LDOOUT1 (the programmable voltage regulator), and the VDD2 pin (core logic power supply) is connected to VCC\_1V8 voltage rail, provided by the LDO regulator U15.

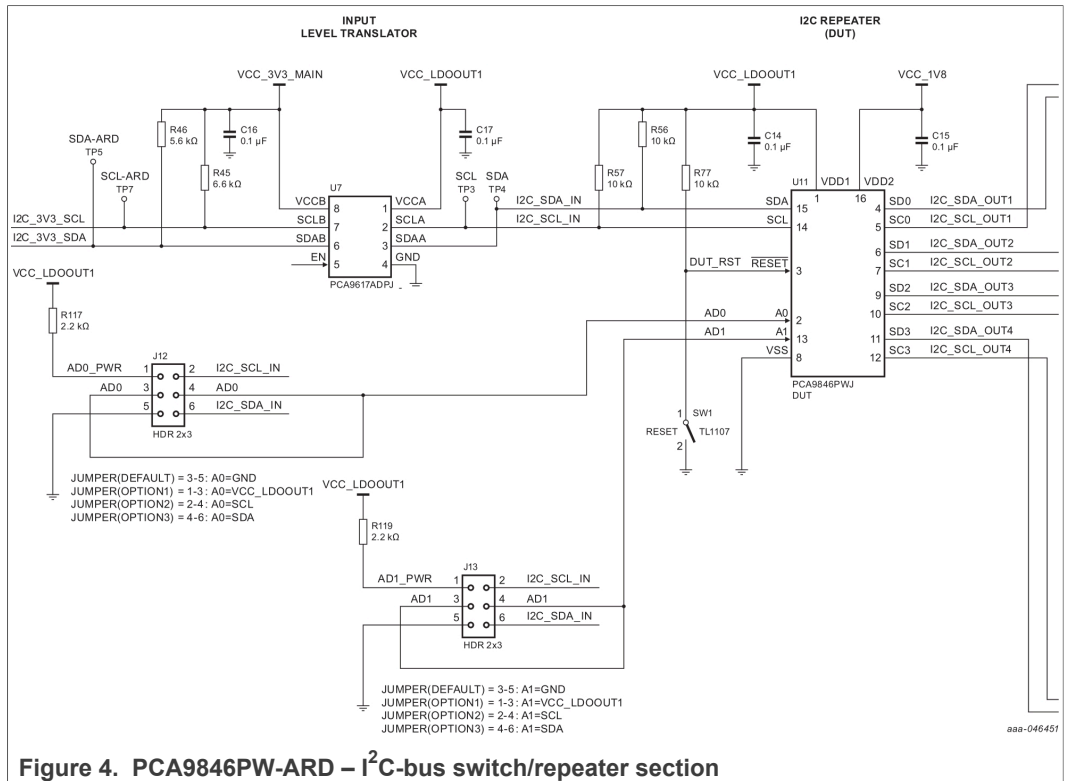


Figure 4. PCA9846PW-ARD – I<sup>2</sup>C-bus switch/repeater section

### 4.3 Power distribution

The VDD1 power pin of PCA9846 (U11) and the VCCA power pin of PCA9617A (U7) are supplied from VCC\_LDOOUT1 rail, provided by the programmable power supply LDO 1. This configuration allows testing and measurement of the static and dynamic characteristics of the DUT for multiple logic levels for the I<sup>2</sup>C-bus interface (SDA and SCL pins of PCA9846). Figure 4 shows the LDO 1 circuit. The main element of the programmable power supply is the adjustable voltage regulator LDK120MK IC (U3). As shown in Figure 4, in the feedback loop the analog multiplexer U18 is placed in the feedback loop of the LDO, allowing for multiple combinations of the programmable resistors to be selected. The result is the voltage regulator can provide multiple output voltages for the VCC\_LDOOUT1 rail. The analog multiplexer is controlled from the EVK through the Arduino port (the connector J5, pin 1, 2, and 3). Table 3 shows the control lines, logic level, and the available output voltages of the LDO 1 regulator.

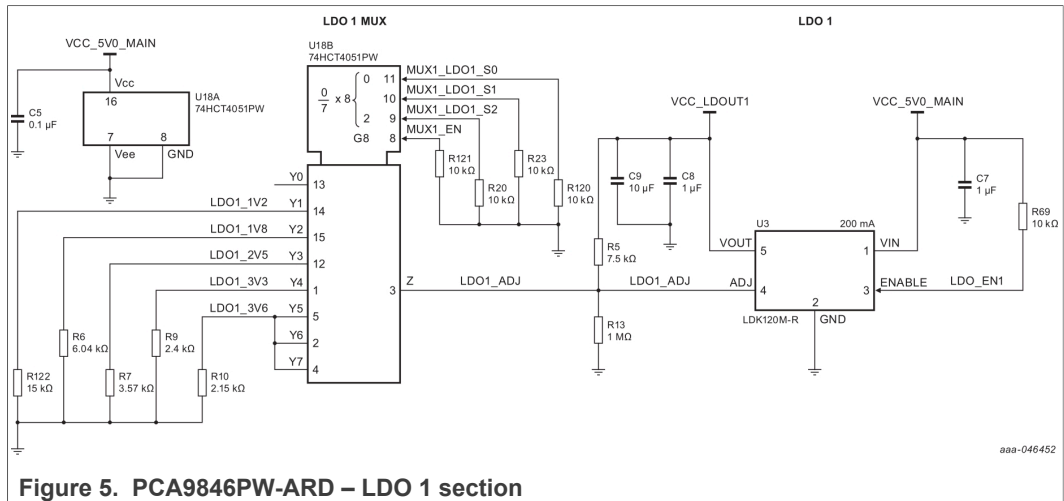


Figure 5. PCA9846PW-ARD – LDO 1 section

Table 4. The VCC\_LDOOUT1 voltages

MUX1_LDO1_S2	MUX1_LDO1_S1	MUX1_LDO1_S0	VCC_LDOOUT1
Low	Low	Low	0.8 V
Low	Low	High	1.2 V
Low	High	Low	1.8 V
Low	High	High	2.5 V
High	Low	Low	3.3 V
High	Low	High	3.6 V
High	High	Low	
High	High	High	

### 4.4 EEPROM

Each channel of PCF9846 is connected to an EEPROM. Therefore, the board contains four I<sup>2</sup>C memory ICs. Each EEPROM has its own voltage regulator (except U13, which is supplied with 3.3 V directly from the Arduino port). This configuration allows testing of the DUT behavior when working with I<sup>2</sup>C busses at different logic levels. Table 4 shows the EEPROM ICs connected to I<sup>2</sup>C switch, along with their corresponding LDOs.

Table 5. VCCA programmable voltages

Channel (SDx, SCx)	EEPROM RefDes	LDO RefDes	Voltage	Circuit presented in:
Channel #1 (SD0, SC0)	U10	U15	1.8 V	<a href="#">Figure 6</a>
Channel #2 (SD1, SC1)	U12	U16	2.5 V	<a href="#">Figure 7</a>
Channel #3 (SD2, SC2)	U13	-	3.3 V	<a href="#">Figure 8</a>
Channel #4 (SD3, SC3)	U14	U17	3.6 V	<a href="#">Figure 9</a>

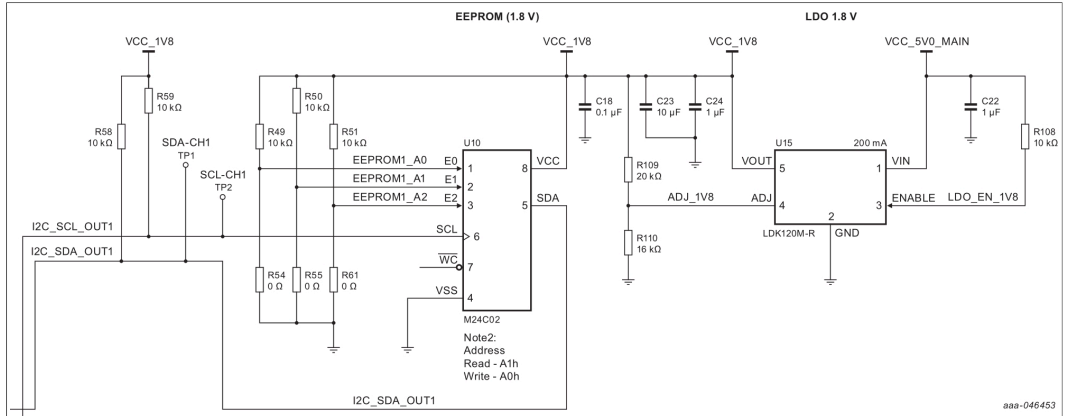


Figure 6. The PCA9846PW-ARD – EEPROM (1.8 V) section

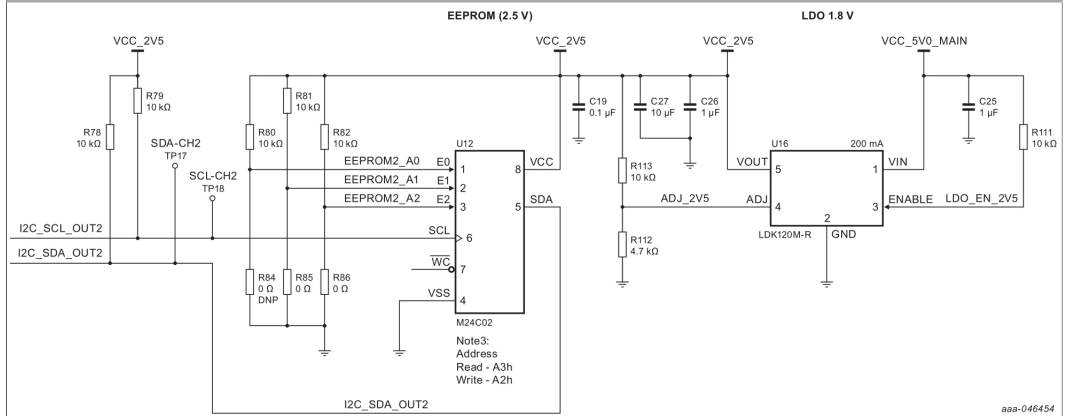


Figure 7. The PCA9846PW-ARD – EEPROM (2.5 V) section

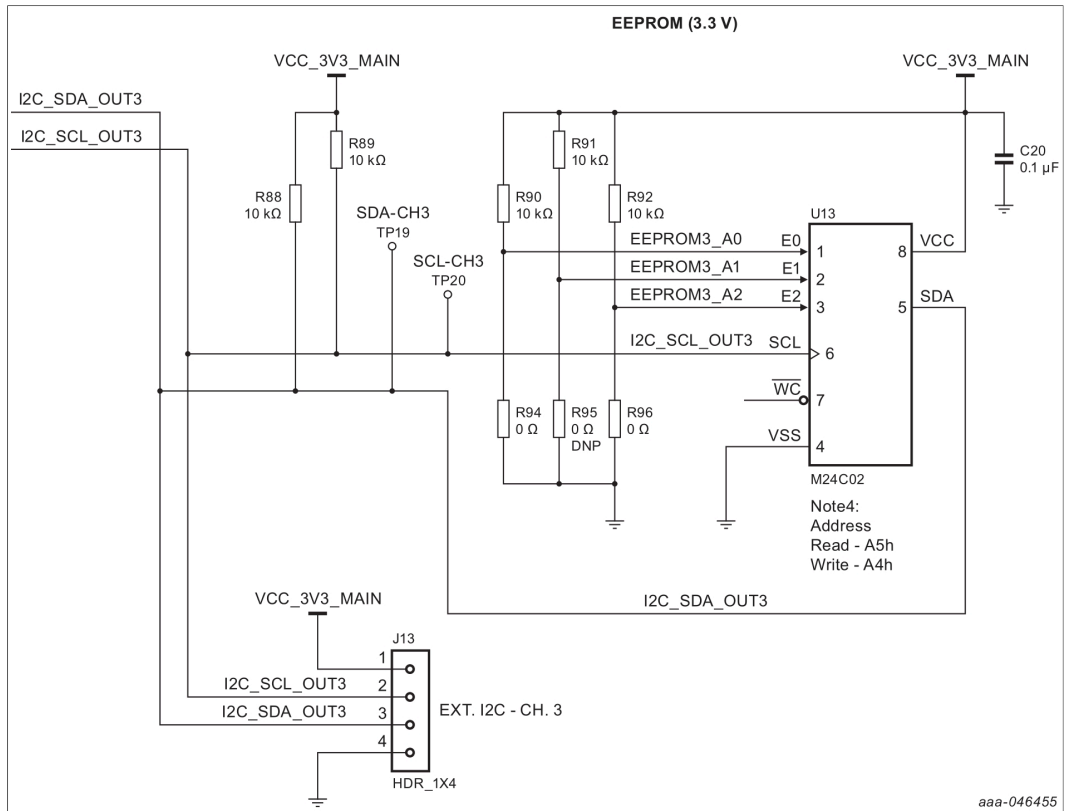


Figure 8. The PCA9846PW-ARD – EEPROM (3.3 V) section

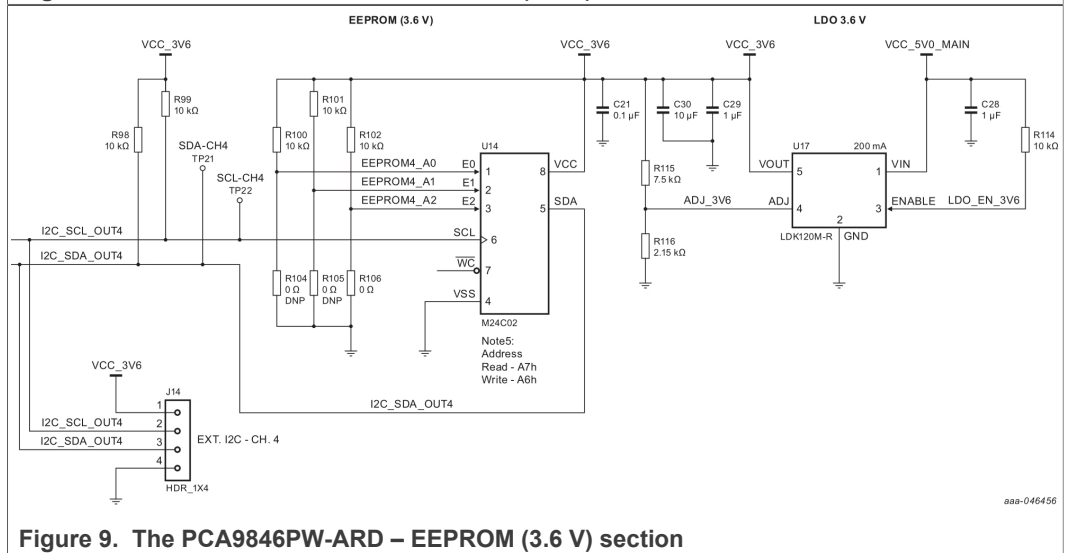


Figure 9. The PCA9846PW-ARD – EEPROM (3.6 V) section

#### 4.5 Schematic, board layout and bill of materials

The schematic, board layout and bill of materials for the PCA9846PW-ARD evaluation board are available at <http://www.nxp.com/PCA9846PW-ARD>.

## 5 Installing and configuring software tools

PCA9846PW-ARD evaluation board is designed and built as an expansion board able to work in conjunction with a motherboard equipped with an Arduino port. The board was built to be fully compatible with the following NXP evaluation boards:

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

Each evaluation or development board mentioned above benefits from firmware support, which can be downloaded from [www.nxp.com/](http://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 PCA9846PW-ARD expansion board through one of above mentioned [EVBs](#). The GUI application is common for all three evaluation boards. The GUI software is also built to control two expansion boards: the PCA9617ADP-ARD and the PCA9846PW-ARD. Both are manufactured by NXP Semiconductors. For details regarding installation of the EVB firmware and GUI host software on PC, refer to UM11581<sup>[12]</sup>. Once the software is installed, select the correct combination of EVK and PCA9846PW-ARD expansion card. The board can be controlled from the GUI interface. See [Section 6](#) and [Section 7](#) for more details regarding the operation of PCA9846PW-ARD from GUI software.

## 6 Configuring the hardware

### 6.1 Using the PCA9846PW-ARD with an IMXRT1050 EVK board

[Figure 10](#) shows the required hardware for operation of the PCA9846PW-ARD expansion board with IMXRT1050 EVK. The following items are necessary:

- One IMXRT1050-EVK board
- One PCA9846PW-ARD expansion board
- One USB-A/USB Micro-B cable
- A PC with Windows 10 operating system

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

- Connecting an external 5 V DC power supply to the barrel power connector (J2) on the board
- Connecting an USB cable from the PC to the Micro-B USB connector (J9) on the board
- Connecting an 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 (500 mA), before establishing the communication, use an external power supply (connected to J2).

From J1 on the EVK board, see [Figure 10](#), the user can select the power configuration for the motherboard. Refer to IMXRT1050 EVKB Board Hardware User's Guide<sup>[2]</sup>.

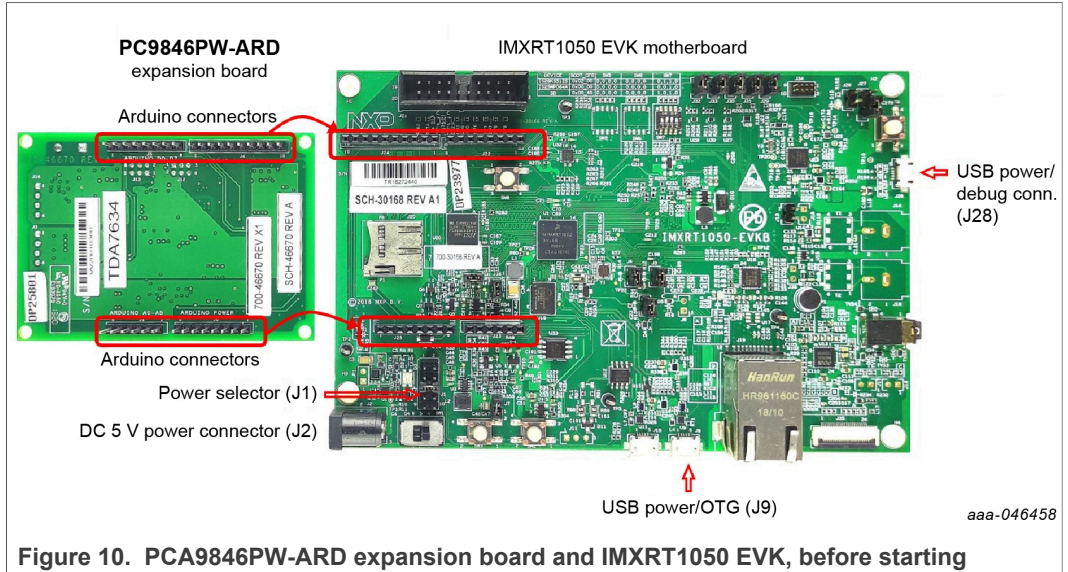


Figure 10. PCA9846PW-ARD expansion board and IMXRT1050 EVK, before starting

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, place the J1 jumper in position 5-6. If using an external power supply (connected to J2), place the jumper J1 in position 1-2.
2. Insert the PCA9846PW-ARD expansion card on the Arduino connector of the EVK. See [Figure 10](#).
3. Using USB connector J28, connect the EVK board to an USB port of the computer.
4. Install the IMXRT1050 target firmware. Refer to [UM11581](#)<sup>[12]</sup>, for step-by-step instructions.
5. Install GUI application. Refer to [UM11581](#)<sup>[12]</sup>.
6. Open the GUI application to operate the device from the PC. See [Section 7](#).

[Figure 11](#) shows the boards during the operation.

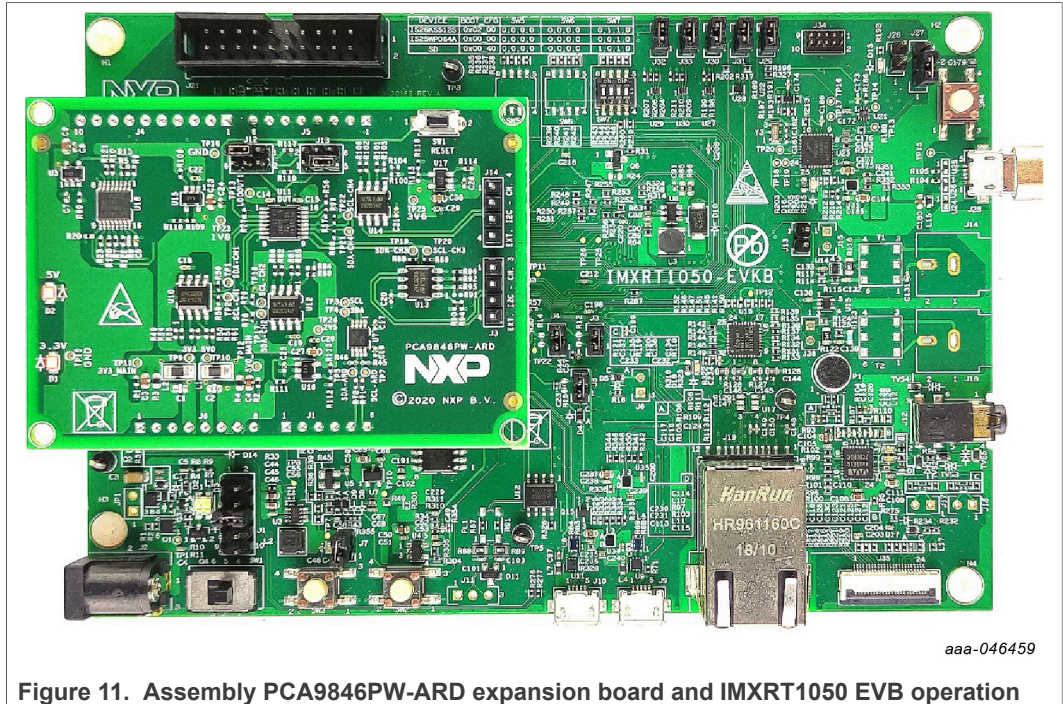


Figure 11. Assembly PCA9846PW-ARD expansion board and IMXRT1050 EVB operation

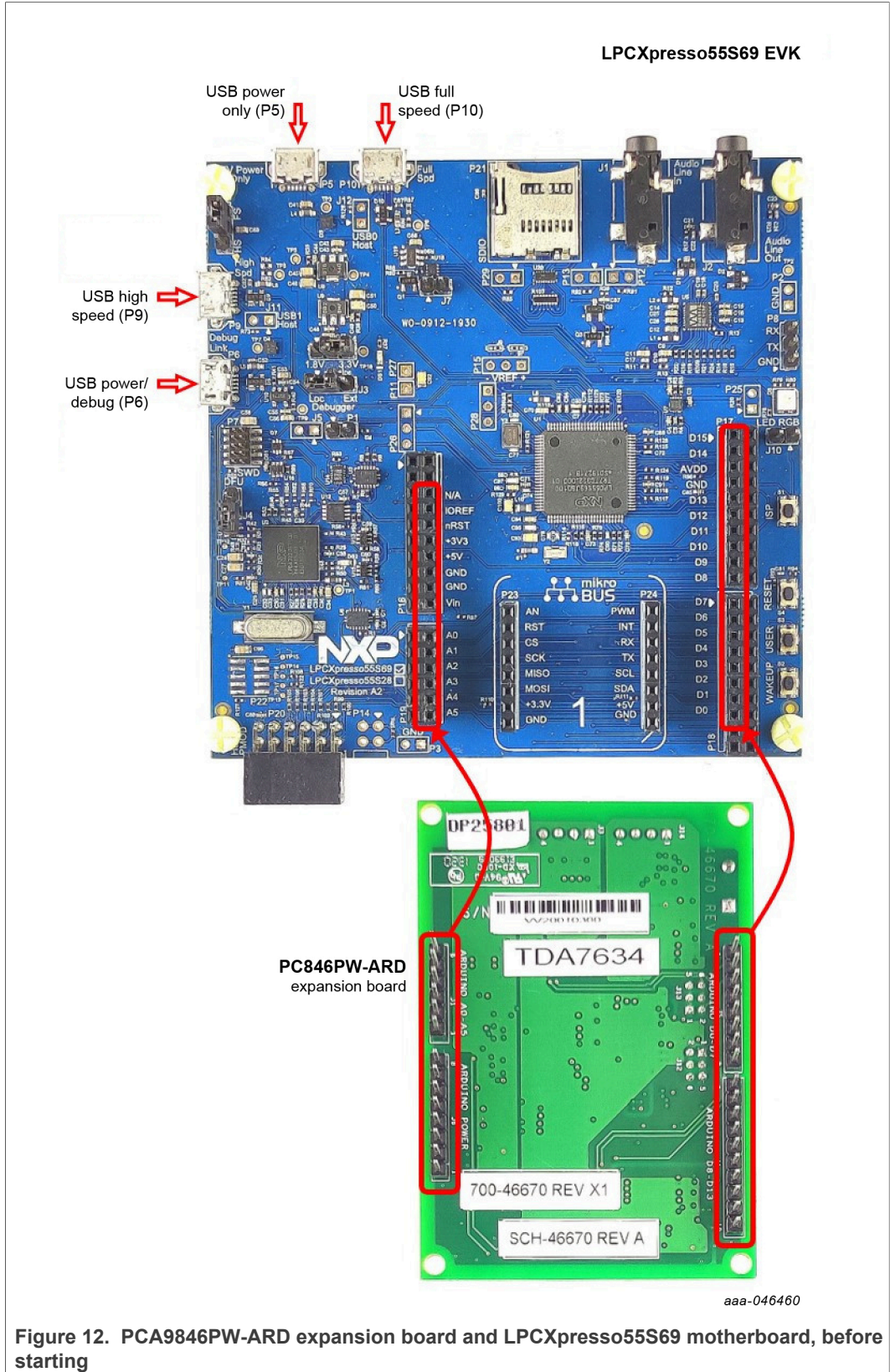
## 6.2 Using the PCA9846PW-ARD with an LPCXpresso55S69 development board

Figure 12 shows the required hardware for operation of the PCA9846PW-ARD and LPCXpresso55S69 EVK board. This configuration consists of:

- One LPCXpresso55S69 EVK board
- One PCA9846PW-ARD expansion 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 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. Refer to UM11158<sup>[4]</sup>.





The following steps describe how to assemble, program, and operate the configuration shown in Figure 11.

1. Insert the PCA9846PW-ARD expansion board. to P16-P19 connectors located on LPCXpresso55S69 development board. See the marked pins of P16-P19 in [Figure 12](#).
2. Connect the development board using port P6 USB port of PC.
3. Install the LPCXpresso55S69 target firmware. Refer to UM11581<sup>[12]</sup> for more information.
4. Install GUI application on the PC. See the instruction file called out in [Step 3](#).
5. Open the GUI application to operate the device from the PC. See [Section 7](#).

[Figure 13](#) shows the two boards in operation.

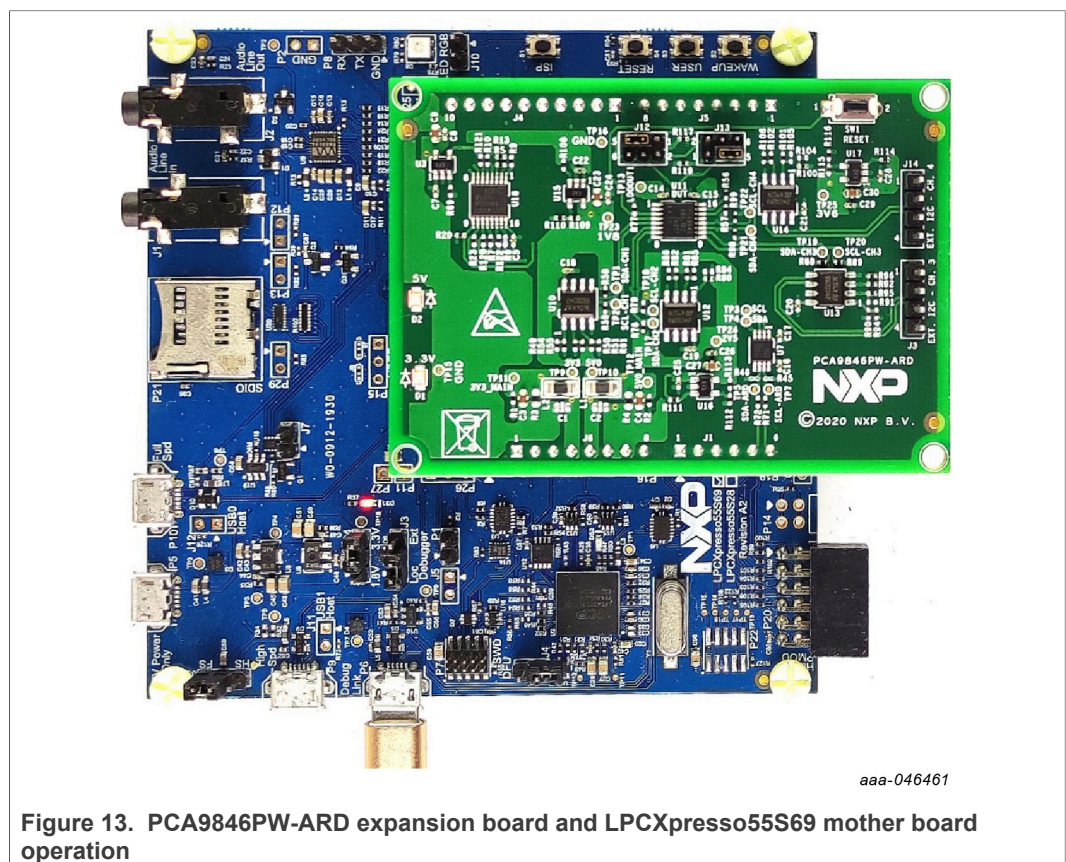


Figure 13. PCA9846PW-ARD expansion board and LPCXpresso55S69 mother board operation

### 6.3 Using the PCA9846PW-ARD with an i.MX 8M Mini LPDDR4 EVK board

When an i.MX 8M Mini LPDDR4 EVK board is used with the PCA9846PW-ARD board, a third board (IMX8MMINI-IARD interposer board) must be used, especially designed and built as EVK-expansion 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, refer to UM11612<sup>[10]</sup>). J1003 is a multipurpose port, containing various digital I/O lines, including specialized I<sup>2</sup>C 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 PCA9846PW-ARD expansion board.

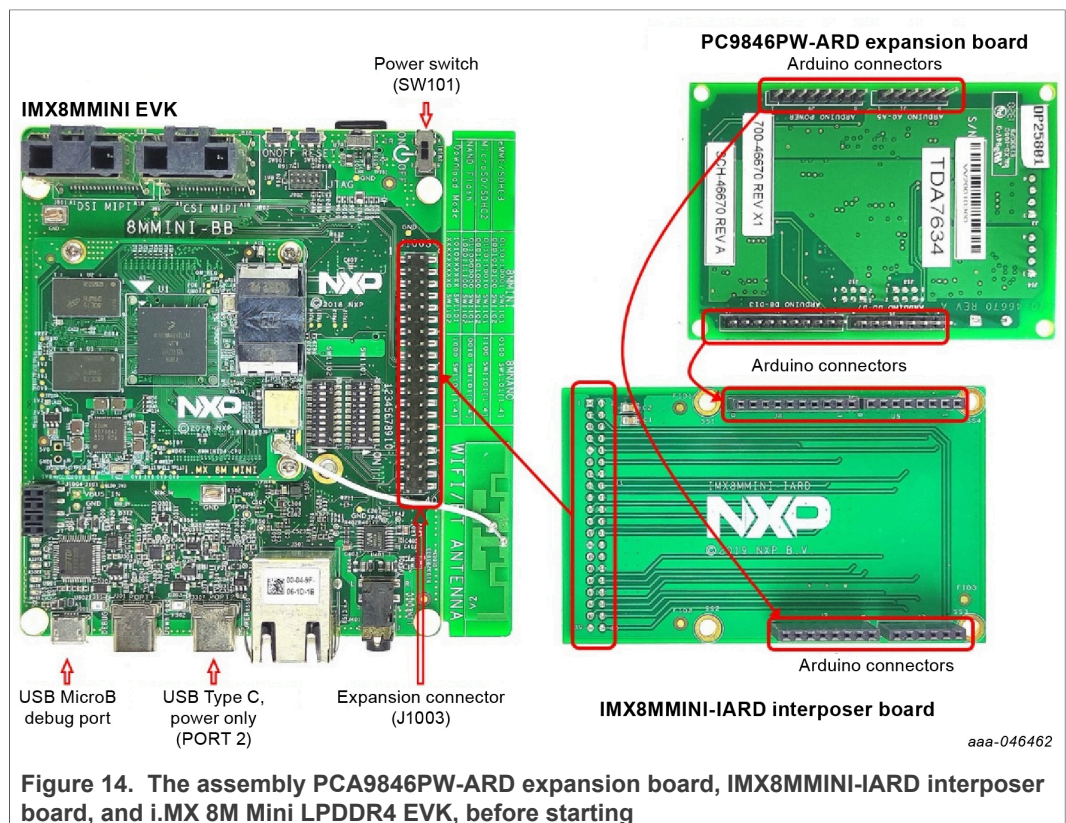
To operate the setup, along with the EVK and the expansion board, a third board must be included in the setup assembly. [Figure 13](#) shows the necessary boards and how these boards are connected. The configuration consists of:

- One i.MX 8M Mini LPDDR4 EVK board
- One PCA9846PW-ARD expansion 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 PCA9846PW-ARD to the Arduino connectors of the IMX8MMINI-IARD interposer board first, and 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 to power up the setup. Data communication is achieved by routing a separate USB (Micro-B type) cable from an USB port on the PC to debug port (J901) on the EVK. See [Figure 13](#) and [Figure 14](#).

Refer to [UM11612<sup>\[10\]</sup>](#) for details regarding power up and operation of the setup assembly.



**Figure 14. The assembly PCA9846PW-ARD expansion 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 PCA9846PW-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 13](#).
3. Power up the EVK board using an USB Type C cable attached to PORT 2.
4. Connect the EVK to the PC, using an 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. Refer to UM11581 [\[12\]](#).
7. Install GUI application on the PC. Refer to UM11581 [\[12\]](#) 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 7](#).

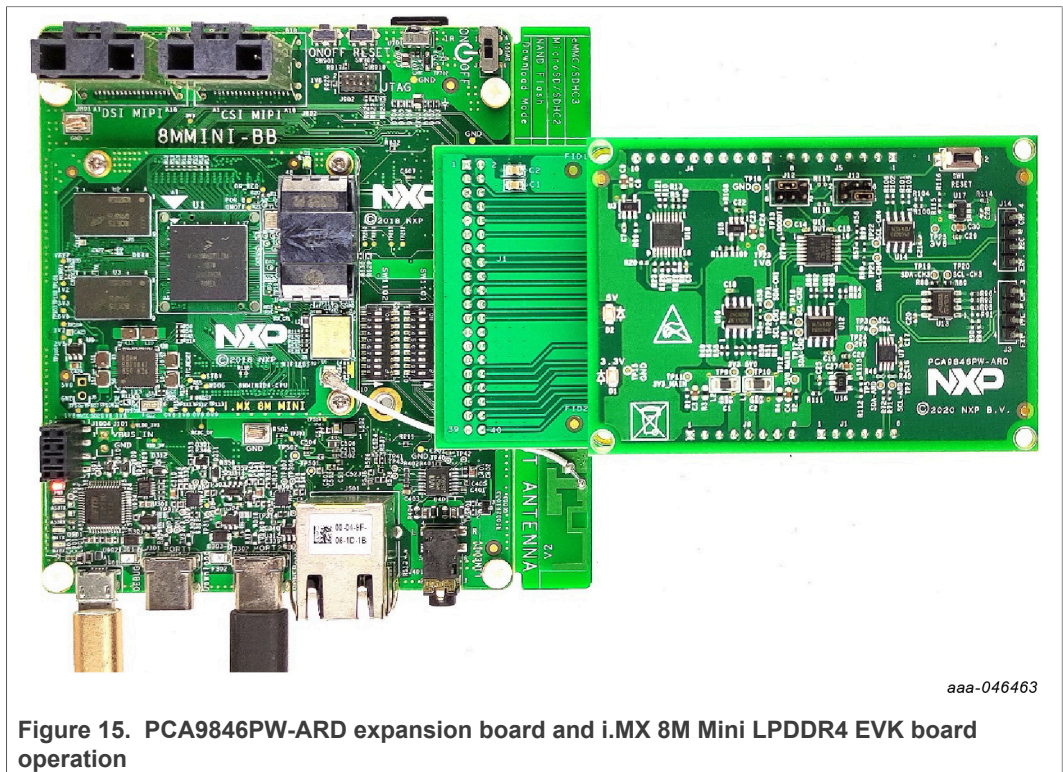


Figure 15. PCA9846PW-ARD expansion board and i.MX 8M Mini LPDDR4 EVK board operation

#### 6.4 Using PCA9846PW-ARD with another device

The PCA9846PW-ARD expansion board can be operated with other EVK board, which has an Arduino port. There are two options to connect the board. Use another EVK equipped with an Arduino port, or an EVK without Arduino port. In the first case, use a firmware developed with PCA9846A specifications and attach PCA9846PW-ARD expansion board to the EVK to operate the board. In the second case, using the pin chart of Arduino connectors, see [Table 1](#), make the necessary electrical connections (for power, I<sup>2</sup>C-bus and control lines), and develop the desired firmware, assuring that is compliant with IC specifications. Refer to PCA9846A [\[13\]](#) to read details about internal registers of the DUT IC and data exchange between internal controller and the EVK. Check 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 three EVKs described in [Section 6](#), and the following development boards: PCA9617ADP-ARD and PCA9846PW-ARD.

This section describes the GUI application and how the user can control the PCA9846PW-ARD expansion board from the graphical interface. First, install the GUI package and software on the PC (Windows 10). Refer to UM11581<sup>[12]</sup>

Once installation is complete, ensure that one of the mentioned three EVKs with attached PCA9846PW-ARD expansion board is connected to the PC and powered on. Open NXP\_GUI (PCA9617A, PCA9846) GUI application. An interface will appear as is shown in [Figure 16](#).

The GUI application starts with the Settings tab (marked in [Figure 16](#) with a 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. A pop-up window with the message, “Unable to Connect with EVK,” will appear on the screen.
- **Select COM port:** Displays port selected for communication. The port is automatically selected by the system. [Figure 16](#) shows COM 5.
- **Select Board:** Allows the user to select the correct expansion board. The application can support two different boards. In [Figure 16](#), the selected board is PCA9846PW. Selecting a wrong expansion board causes the connection to fail.

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

The Device setting section is located at the right of the screen. The following settings are provided:

- **I<sup>2</sup>C Frequency:** Displays the I<sup>2</sup>C-bus clock frequency. The drop-down box allows for selection of one of the three values: 100 kHz (default value), 400 kHz and 1 MHz.
- **I<sup>2</sup>C Address Selection:** Allows the user to select the hardware address of PCA9846A. From drop-down lists one of the values that can be selected: 0 (default), 1, SDA, SCL. Note the selected device address must be identical to the selected address from jumpers J12 and J13 on the PCA9846PW-ARD expansion board. Use [Table 4](#) to select the correct I<sup>2</sup>C address. Refer to the Device address section in PCA9846<sup>[13]</sup>. Any difference between the two addresses will cause communication between the PC and the expansion board to fail.

The Set button writes the new values in the internal registers of PCA9846A IC. When the Set button is pressed, a pop-up window with the message “Setting device set successfully” will appear on the screen. Click OK to close the pop-up window.

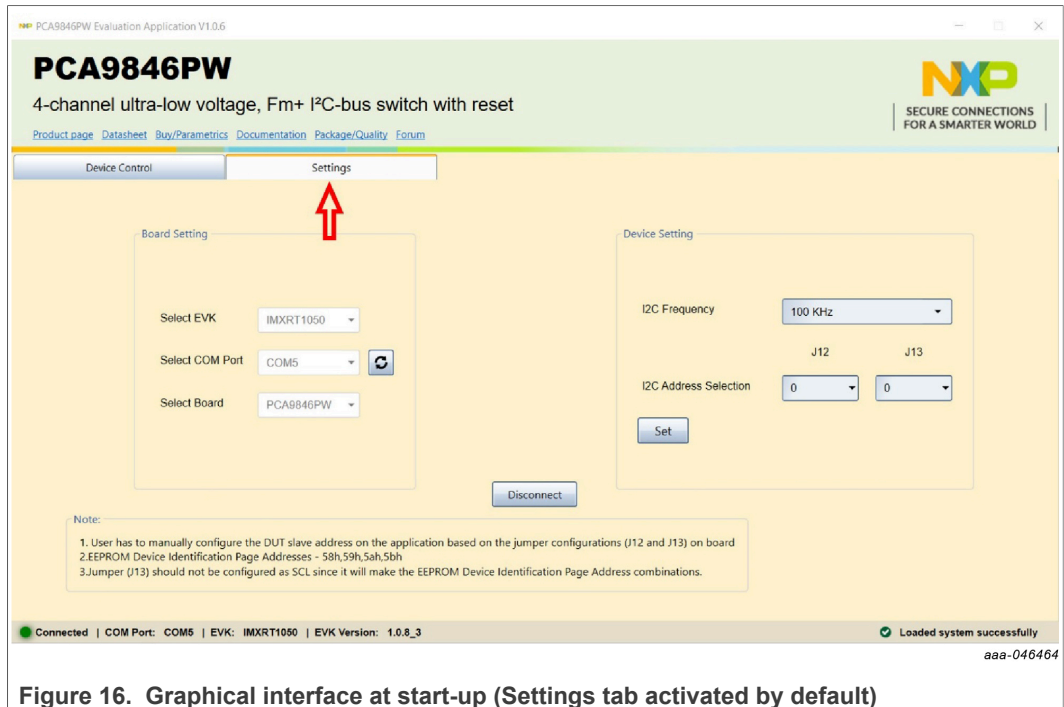


Figure 16. Graphical interface at start-up (Settings tab activated by default)

The second tab is Device Control. Click on this tab and a new window appears. See [Figure 17](#). The user can select the VDD1 power supply voltage from the drop-down box at the center of the screen. [Table 2](#) details the available voltages for VDD1.

At the bottom side of the window is a chain of blocks connected with bidirectional arrows indicating the data flow through the chain. To write data in the EEPROM memory, the user must complete the following steps:

- Write any ASCII character in the Input Data box.
- Select the desired channel to use for data write.
- Select the corresponding EEPROM box. The selected box will change to red.
- Click on Send Data.

When the Send Data button is pressed, any alphanumeric value in the Input Data box is sent through the PCA9846A I<sup>2</sup>C switch and stored in the selected EEPROM memory. The stored information is displayed in the Output Data box.

If the Input Data box is empty (no character or break/pause typed in the box), when the Send Data button is pressed, a pop-up window with the message "Input Data should not be Null or Empty" appears on the screen. Click OK to close the pop-up window.

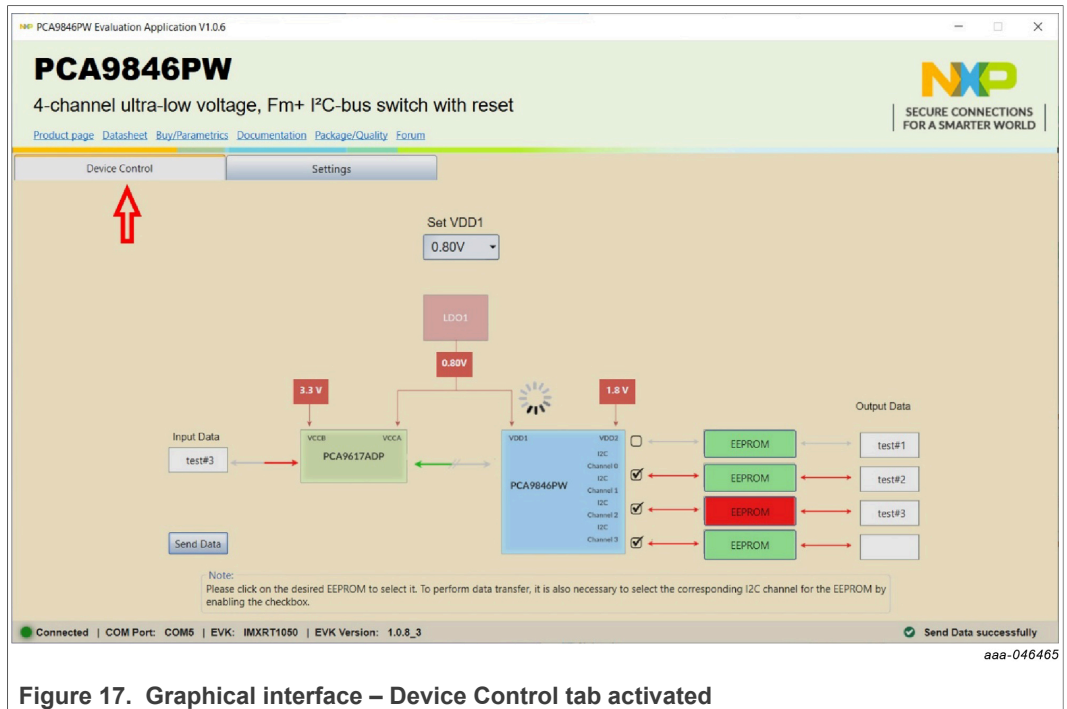


Figure 17. Graphical interface – Device Control tab activated

## 8 Abbreviations

Table 6. Abbreviations

Acronym	Description
DUT	device under test
EEPROM	electrically erasable read-only memory
ESD	electro static discharge
EVK	evaluation board
GUI	graphical user interface
I <sup>2</sup> C-bus	inter-integrated circuit bus
IC	integrated circuit
I/O	input/output
LED	light emitting diode
PC	personal computer
USB	universal serial bus

## 9 References

Table 7. References

[1]	<a href="#">PCA9846, 4-channel ultra-low voltage, Fm+ I<sup>2</sup>C-bus switch with reset</a> — data sheet
[2]	<a href="https://www.nxp.com/webapp/Download?colCode=MIMXRT1050EVKBHUGMIMXRT1050">https://www.nxp.com/webapp/Download?colCode=MIMXRT1050EVKBHUGMIMXRT1050</a> EVKB Board Hardware User's Guide — user guide
[3]	<a href="#">i.MX RT1050 Crossover MCUs for Consumer Products</a> — data sheet
[4]	<a href="#">LPCXpresso55S69 Development Board User Manual</a> — user manual

Table 7. References...continued

[5]	LPC556x, data sheet; NXP Semiconductors
[6]	i.MX 8M Mini LPDDR4 EVK, Board Hardware User's Guide; user guide; NXP Semiconductors
[7]	<a href="#">i.MX 8M Mini Application Processor Datasheet for Consumer Products</a> — data sheet
[8]	<a href="#">i.MX 8M Mini Application Processor Reference Manual</a> — reference manual
[9]	Arduino Uno R3, reference manual, NXP Semiconductors
[10]	<a href="#">UM11612, IMX8MMINI-IARD interposer board</a> — user manual
[11]	NXP EVK, Firmware and GUI Installation Guide for Arduino Series Boards; user manual; NXP Semiconductors
[12]	<a href="#">UM11581, Arduino Shields GUI and firmware installation</a> — user guide
[13]	<a href="#">PCA9846, 4-channel ultra-low voltage, Fm+ I2C-bus switch with reset</a> — data sheet



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