

UM12344

P3H2x4xHN-ARD Evaluation Board

Rev. 1.0 — 9 June 2025

User manual



Document information

Information	Content
Keywords	UM12344, P3H2840HN-ARD, P3H2841HN-ARD, P3H2440HN-ARD, P3H2441HN-ARD, user manual, I3C hub
Abstract	The P3H2x4xHN-ARD evaluation board is easy to test and designed for P3H2x4xHN which has two I3C/I2C controller ports and four/eight I3C/I2C target ports. The P3H2x4xHN-ARD uses MIMXRT685-EVK MCU board to provide an easy to use evaluation platform.



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1 Introduction

The P3H2x4xHN-ARD evaluation board features an I3C hub device which has two I3C/I2C controller ports and four/eight I3C/I2C target ports. A graphical interface allows the user to explore different functions of the driver easily. To create an evaluation system, the board can be connected in parallel with other I3C/I2C bus demo boards.

The IC communicates to the host via the industry standard I3C/I2C bus port. The evaluation software runs under the Microsoft Windows 7/8/10/11 PC platform.

2 Features

The main features of this board are:

- A complete evaluation platform for the P3H2x4xHN and the I3C hub with two controller ports and four/eight target ports.
- P3H2x4xHN in default configuration supports I2C/I3C interface.
- Two controller ports and eight target ports for P3H2840HN and P3H2841HN evaluation boards.
- Two controller ports and four target ports for P3H2440HN and P3H2441HN evaluation boards.
- Easy to use GUI-based software that demonstrates the capabilities of P3H2x4xHN.
- Onboard 1.0 V/1.2 V/1.8 V LDOs, two temperature sensors (P3T1755DP) with alert LEDs, two controller port connectors and four/eight target port connectors for P3H2x4xHN evaluation.
- Convenient test points for easy scope measurements and signal access.
- USB interface to the host PC.
- Power supply from USB port or external power supply can be used to power P3H2x4xHN-ARD evaluation board.

3 Finding kit resources and related information

NXP Semiconductors provides online resources for the P3H2x4xHN-ARD evaluation board and its supported devices on <http://www.nxp.com>.

The information page for the P3H2x4xHN-ARD evaluation board is at [P3H2x4xHN-ARD](#). The information page provides overview information, documentation, software and tools, parametrics, ordering information, and a **Get Started** button. The **Get Started** button provides quick-reference information applicable to using the P3H2x4xHN-ARD evaluation board, including the downloadable assets referenced in this document.

4 Getting ready

Working with the P3H2x4xHN-ARD evaluation board requires the kit contents, an additional hardware, and a Windows PC workstation with installed software.

4.1 Kit contents

Kit contents comprises the following components:

- An assembled and tested evaluation board in an antistatic bag
- A quick start guide

4.2 Assumptions

Familiarity with the I3C/I2C bus is helpful, but it is not necessary.

4.3 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.

4.4 Minimum system requirements

- PC Pentium processor (or equivalent)
- One USB port (either 3.0, 2.0, or 1.1 compatible)
- Windows 7/8/10/11
- [MIMXRT685-EVK MCU board](#)

4.5 Power requirements

The MIMXRT685-EVK MCU board obtains power from the PC USB port. Two USB parts can be connected to the MIMXRT685-EVK MCU board simultaneously. Use an external power supply option if the current capabilities of the USB port are exceeded.

5 Hardware installation

The P3H2x4xHN-ARD evaluation board connects to the MIMXRT685-EVK MCU board using four connectors (J4/J5/J7/J8 on P3H2x4xHN-ARD board and J27/J28/J29/J30 on MIMXRT685-EVK board). These four connectors are used for I2C bus connection and power supply. For I3C bus connection, one connector (J13 on P3H2x4xHN-ARD board and J18 on MIMXRT685-EVK board) comes into operation. [Figure 1](#) shows one of the four boards under the P3H2x4xHN-ARD evaluation boards with detailed labeling of jumpers and connectors.

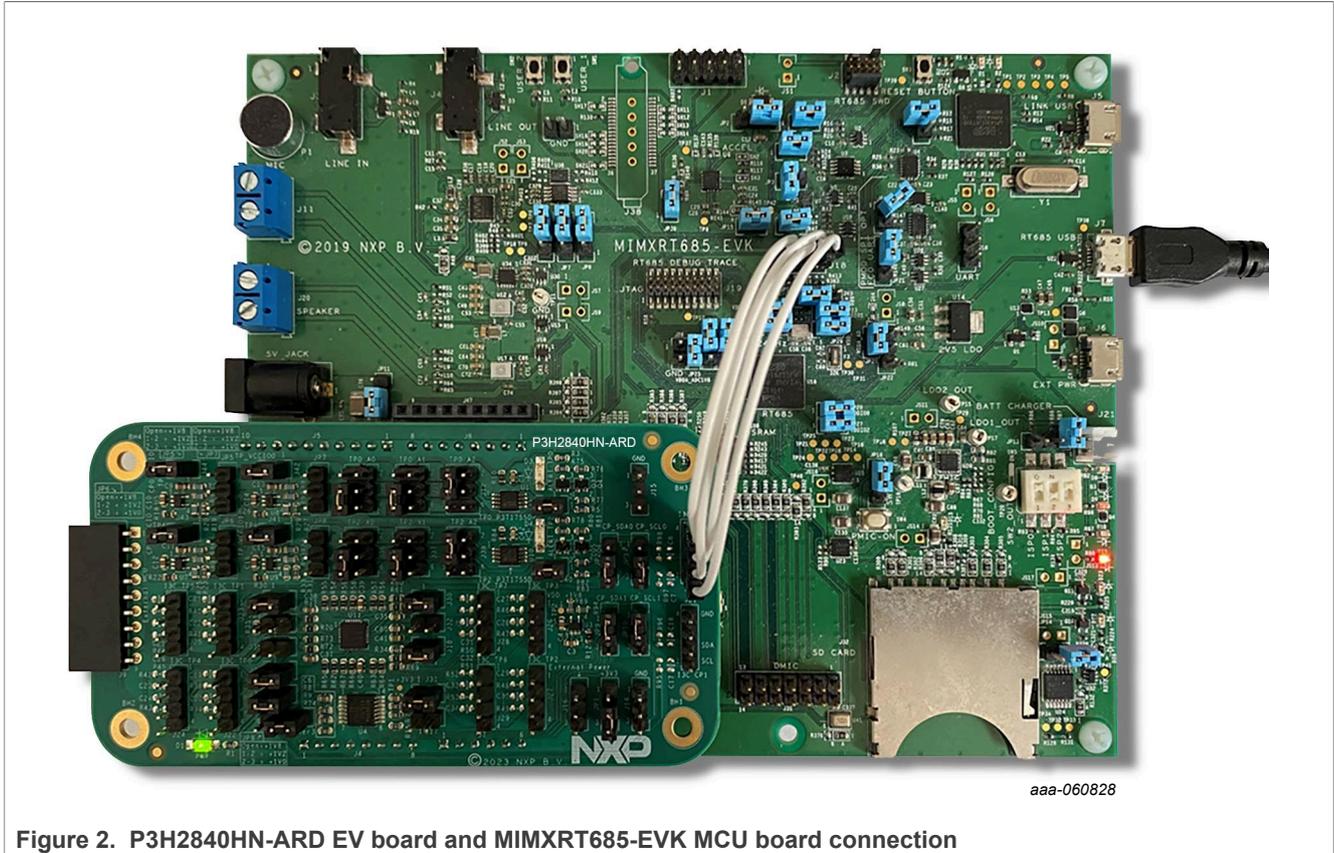


Figure 2. P3H2840HN-ARD EV board and MIMXRT685-EVK MCU board connection

6 Hardware description

- J4/J5/J7/J8 are connected to the MIMXRT685-EVK MCU board for P3H2x4xHN-ARD power supply and I2C bus interface.
- JP1 selects an internal or external +3.3 V power supply.
- JP5 selects a 1.0 V/1.2 V/1.8 V power supply for CP0_VCCIO.
- JP6 selects a 1.0 V/1.2 V/1.8 V power supply for CP1_VCCIO.
- JP7 selects a 1.0 V/1.2 V/1.8 V power supply for TP_VCCIO0.
- JP8 selects a 1.0 V/1.2 V/1.8 V power supply for TP_VCCIO1.
- JP11 selects CP0_VCCIO/CP1_VCCIO power supply for VCCA_PWR.

Table 1. P3H2x4xHN-ARD EV board main components

Device	Description	Location
P3H2x4xHN	I3C hub with two controller ports and four/eight target ports	U11
P3T1755DP	I3C, I2C bus, 0.5 °C accuracy, digital temperature sensor	U1, U10
TPS71701DCKT	150 mA LDO	U3, U5, U7, U8, U9
NTS0304EPWJ	4-bit dual supply voltage level translator	U4
Green LED	+3.3 V power LED	D1
Red LED	ALERT LED	D3, D4

Table 2. Jumper settings

Jumper	Default setting	Description
JP1	2-3	+3.3 V power supply selection 1-2: Use an external 3.3 V power supply 2-3: Use an internal 3.3 V (Arduino) power supply
JP2	1-2	CP0 SDA pin selection 1-2: CP0 SDA pin is connected to the I3C connector SDA pin 2-3: CP0 SDA pin is connected to the Arduino SDA pin
JP3	1-2	CP0 SCL pin selection 1-2: CP0 SCL pin is connected to the I3C connector SDA pin 2-3: CP0 SCL pin is connected to Arduino SDA pin
JP5	Open	CP0_VCCIO power selection Open: Select +1.8 V power supply for CP0_VCCIO 1-2: Select +1.2 V power supply for CP0_VCCIO 2-3: Select +1.0 V power supply for CP0_VCCIO
JP6	Open	CP1_VCCIO power selection Open: Select +1.8 V power supply for CP1_VCCIO 1-2: Select +1.2 V power supply for CP1_VCCIO 2-3: Select +1.0 V power supply for CP1_VCCIO
JP7	Open	TP_VCCIO0 power selection Open: Select +1.8 V power supply for TP_VCCIO0 1-2: Select +1.2 V power supply for TP_VCCIO0 2-3: Select +1.0 V power supply for TP_VCCIO0
JP8	Open	TP_VCCIO1 power selection Open: Select +1.8 V power supply for TP_VCCIO1 1-2: Select +1.2 V power supply for TP_VCCIO1 2-3: Select +1.0 V power supply for TP_VCCIO1
JP9	1-2	CP1 SDA pin selection 1-2: CP1 SDA pin is connected to the I3C connector SDA pin 2-3: CP1 SDA pin is connected to the Arduino SDA pin
JP10	1-2	CP1 SCL pin selection 1-2: CP0 SCL pin is connected to the I3C connector SDA pin 2-3: CP0 SCL pin is connected to Arduino SDA pin
JP11	2-3	U4 (voltage level translator) VCCA power supply selection 1-2: Use CP1_VCCIO power 2-3: Use CP0_VCCIO power
J3	1-2	U1 (P3T1755) ALERT LED selection Open: ALERT LED display is off 1-2: ALERT LED display is on
J10	3-5	U1 I2C slave address selection 1-3: A0 connects to VCC 2-4: A0 connects to GND 3-5: A0 connects SCL 4-6: A0 connects to SDA
J11	3-5	U1 I2C slave address selection 1-3: A1 connects to VCC

Table 2. Jumper settings...continued

Jumper	Default setting	Description
		2-4: A1 connects to GND 3-5: A1 connects to SCL 4-6: A1 connects to SDA
J12	1-3	U1 I2C slave address selection 1-3: A2 connects to VCC 2-4: A2 connects to GND 3-5: A2 connects SCL 4-6: A2 connects to SDA
J17	Open	U4 (NTS0304) enable/disable selection Open: U4 enable 1-2: U4 disable
J18, J19, J30, J31, J32, J33	1-2	J18: VDDIN pin current measurement connector J19: CP0_VCCIO pin current measurement connector J30: TP_VCCIO0 pin current measurement connector J31: TP_VCCIO1 pin current measurement connector J32: VDD18 pin current measurement connector J33: CP1_VCCIO pin current measurement connector
J20, J34, J35	J20 1-2	CP0, CP1 selection J20: 1-2, select CP0 J34: Open J35: Open
J36	3-5	U10 I2C slave address selection 1-3: A0 connects to VCC 2-4: A0 connects to GND 3-5: A0 connects SCL 4-6: A0 connects to SDA
J37	3-5	U10 I2C slave address selection 1-3: A1 connects to VCC 2-4: A1 connects to GND 3-5: A1 connects SCL 4-6: A1 connects to SDA
J38	1-3	U10 I2C slave address selection 1-3: A2 connects to VCC 2-4: A2 connects to GND 3-5: A2 connects to SCL 4-6: A2 connects to SDA
J40	1-2	U10 (P3T1755) ALERT LED selection Open: ALERT LED display is off 1-2: ALERT LED display is on
J41, J42, J43, J44	1-2	J41: TP_VCCIO1 pin current measurement connector J42: TP_VCCIO0 pin current measurement connector J43: CP1_VCCIO pin current measurement connector J44: CP0_VCCIO pin current measurement connector

Table 3. Connector settings

Connector	Description
J4, J5, J7, J8	Arduino connector
J9	External MCU interface connector
J13, J21	J13: I3C CP0 connector J21: I3C CP1 connector
J14, J15	Ground connector
J16	External power connector
J22, J23, J24, J25, J26, J27, J28, J29	J22: I3C TP0 connector J23: I3C TP1 connector J24: I3C TP4 connector J25: I3C TP5 connector J26: I3C TP3 connector J27: I3C TP2 connector J28: I3C TP7 connector J29: I3C TP6 connector These are 4-pin I3C TP connectors. <ul style="list-style-type: none"> • Pin 1 connects to SCL • Pin 2 connects to SDA • Pin 3 connects to VCC • Pin 4 connects to GND

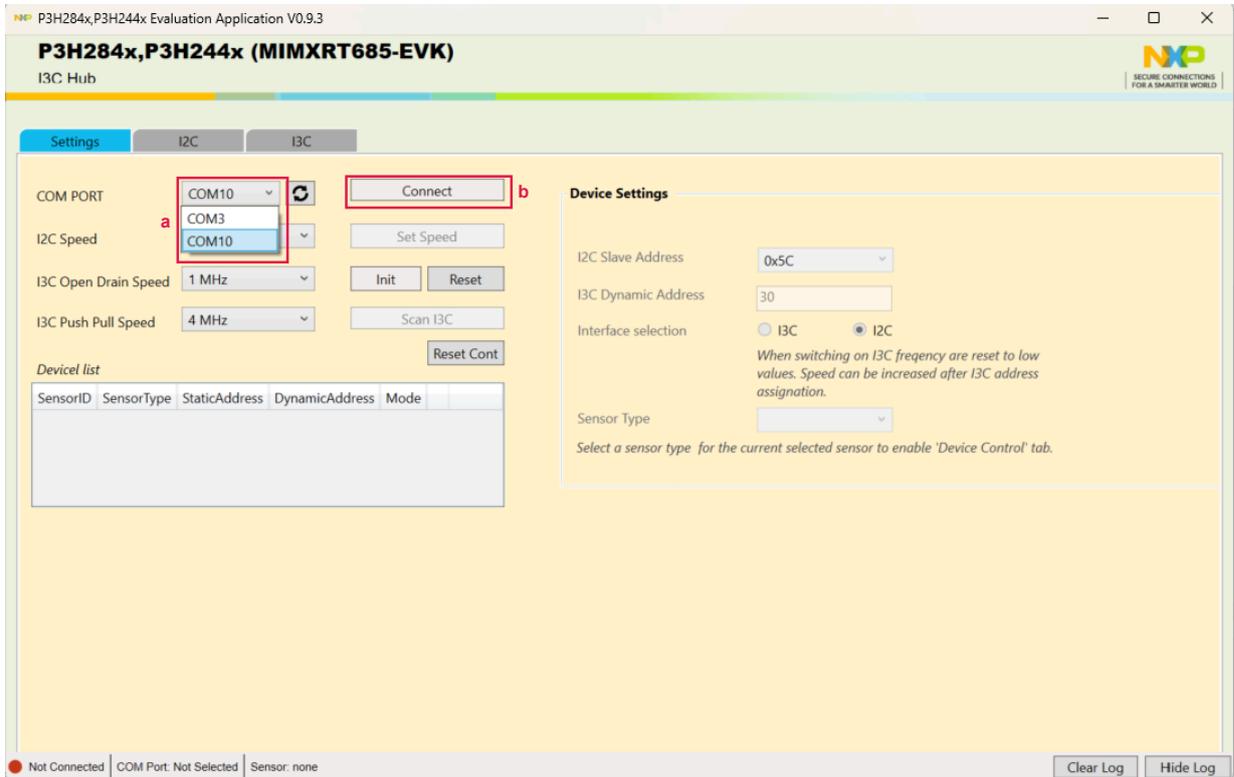
7 Schematic diagram

The schematic diagram of the P3H2x4xHN-ARD evaluation board is available at [P3H2x4xHN-ARD](#).

8 P3H2x4x-ARD EVB demo GUI

This section provides step-by-step instructions for using the P3H2x4x-ARD EVB demo GUI to configure, control, and interact with the P3H2x4x I3C hub device. The instructions given below are defined using the P3H2840 device and are common to all P3H2x4x devices.

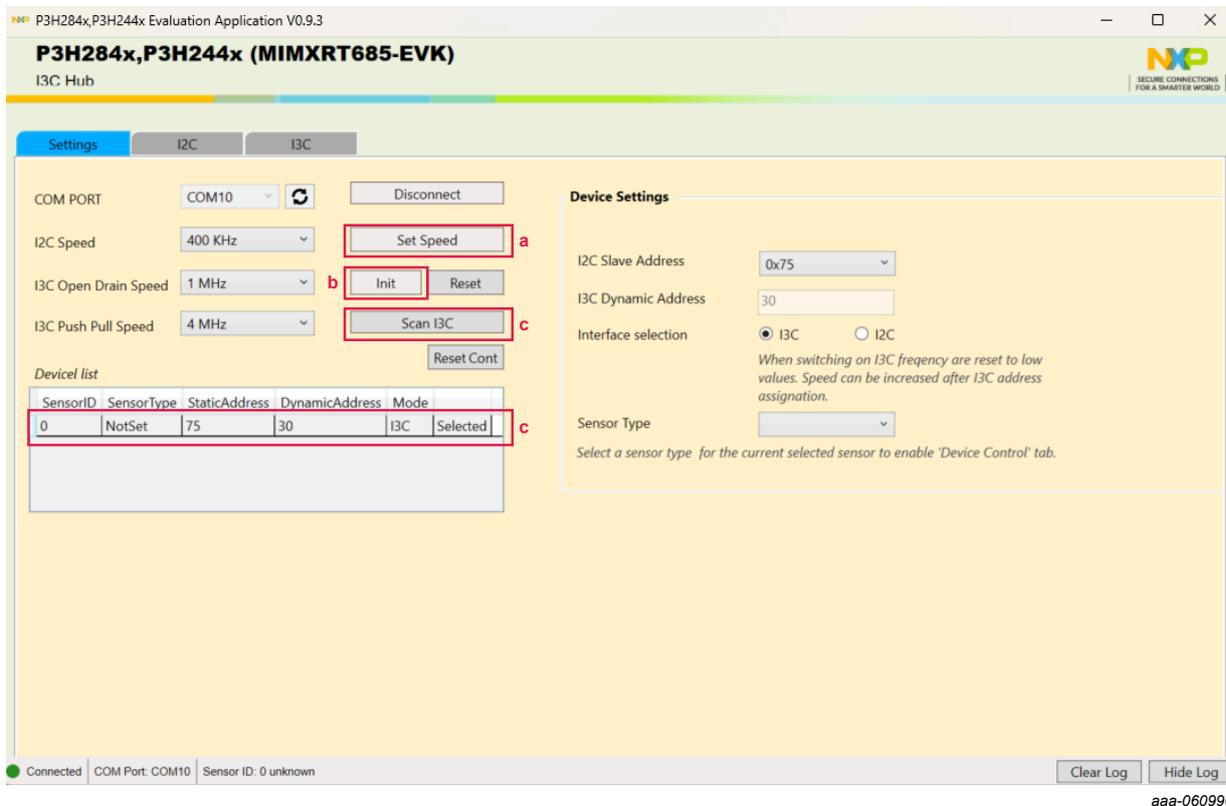
1. Run **P3H284X I3C Hub GUI.exe** on Windows 10/11 PC.
 - a. Select the **COM PORT** from the drop-down. Choose the last option in this drop-down.
 - b. Click the **Connect** button to connect the GUI and MIMXRT685-EVK board.



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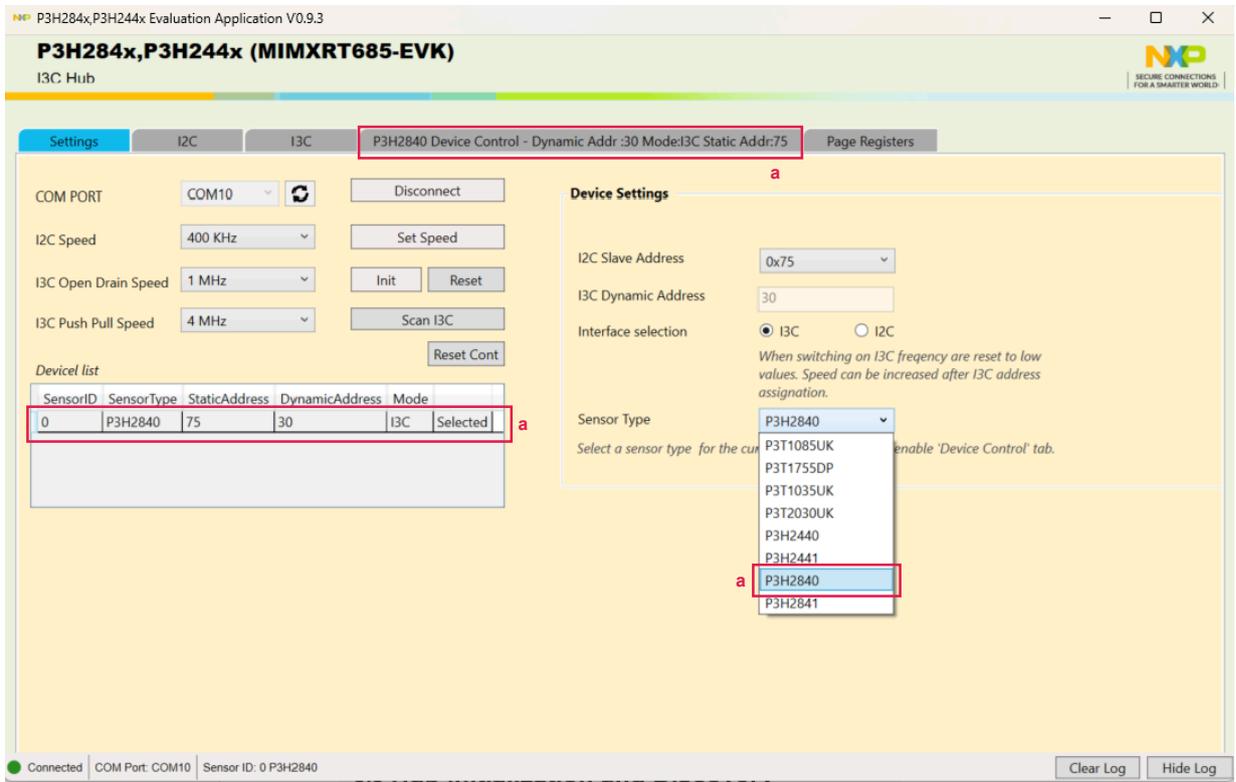
2. Hub initialization and discovery

- a. Click the **Set Speed** button to set I3C default speed.
- b. Initial Hub CP/TP at 1.8 V.
- c. Click the **Scan I3C** button. The **Device List** displays a hub on I3C bus.



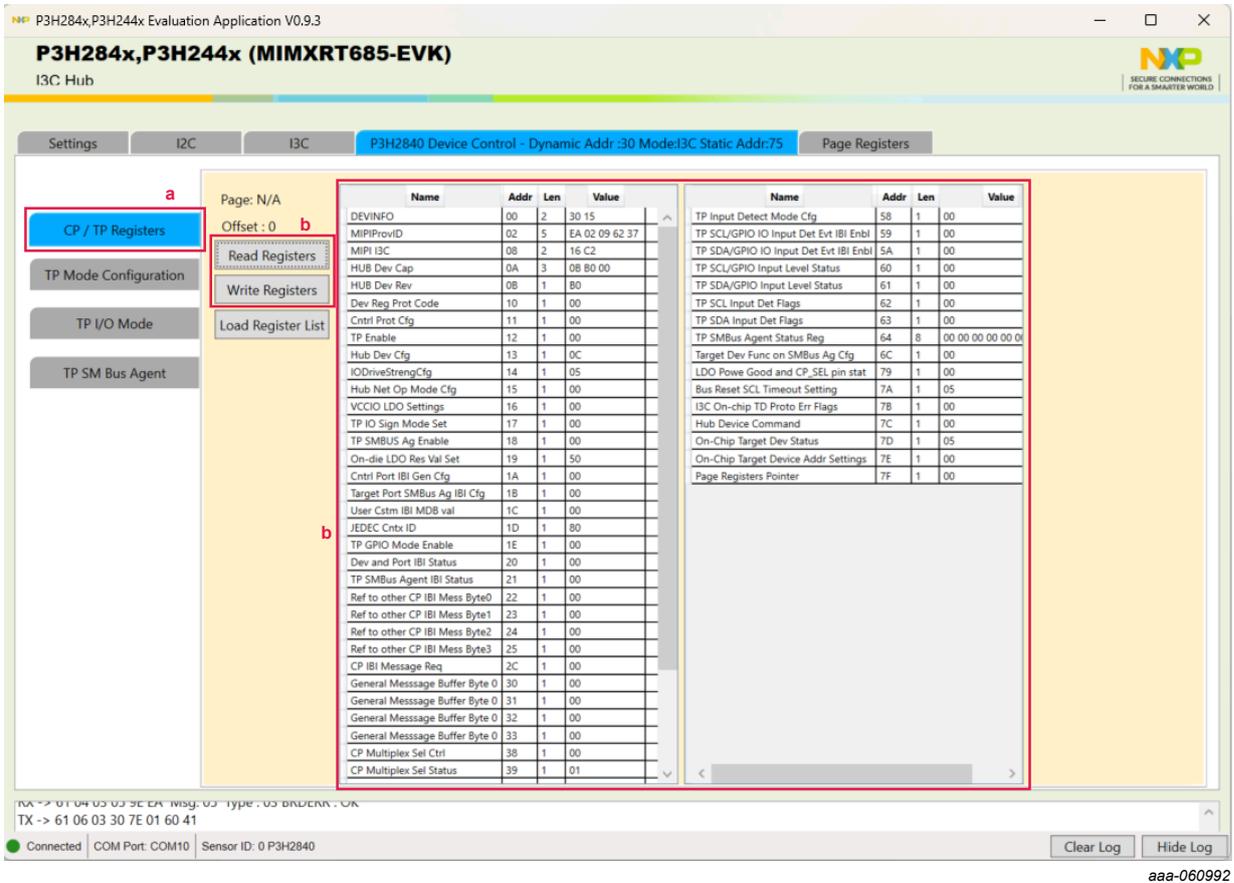
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3. Select P3H2840 I3C hub
 - a. Select **P3H2840** from the **Sensor Type** drop-down visible under the **Device Settings** section.



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4. Read/write P3H2840 internal registers
 - a. Click the **CP/TP Registers** tab.
 - b. Use **Read Registers** and **Write Registers** buttons to read and write P3H2840 internal registers, respectively.



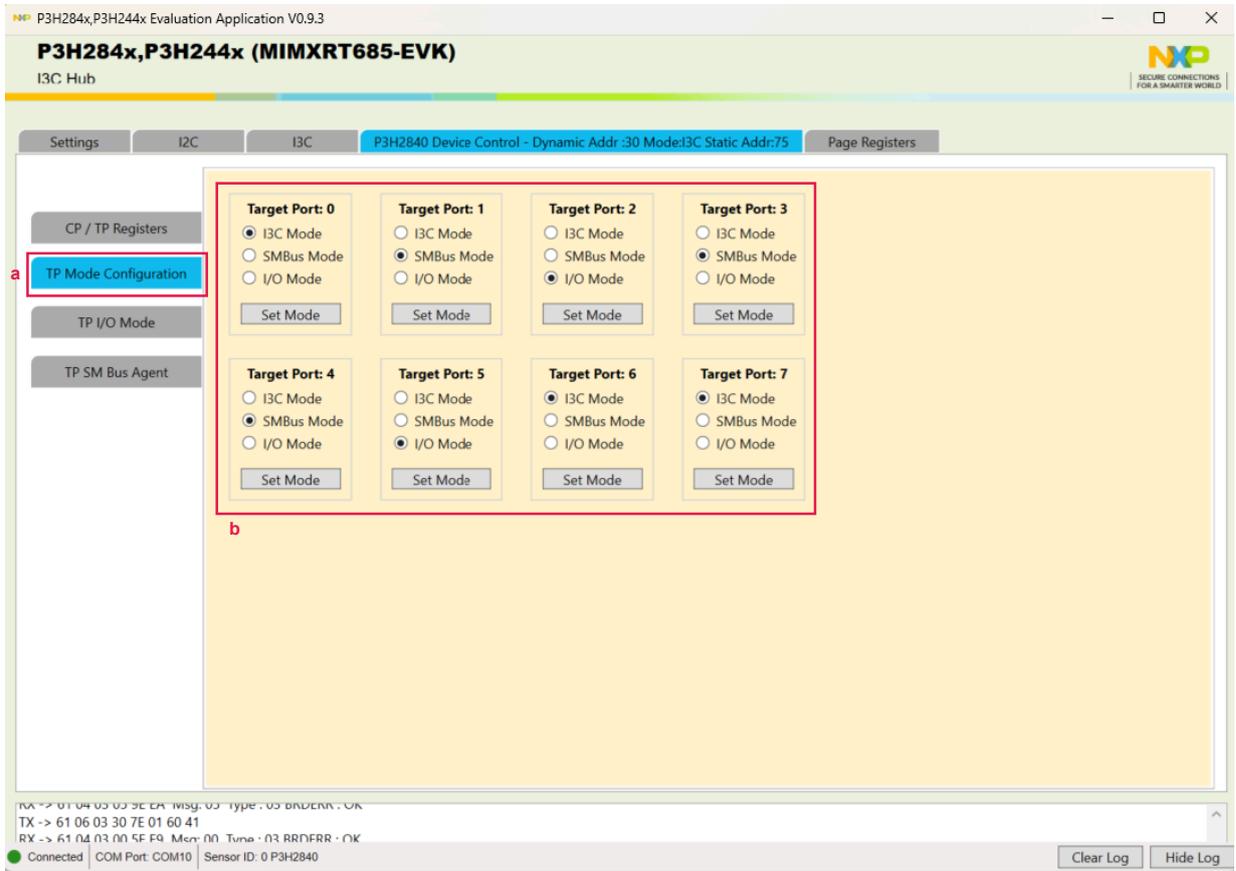
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5. Set P3H2840 target ports mode configuration

a. Click the **TP Mode Configuration** tab.

b. Assign four/eight target ports in **I3C Mode**, **SMBus Mode**, or **I/O Mode** as per the requirement.

Note: For P3H244x devices, four target ports appear on this tab. For P3H284x devices, eight target ports appear on this tab.

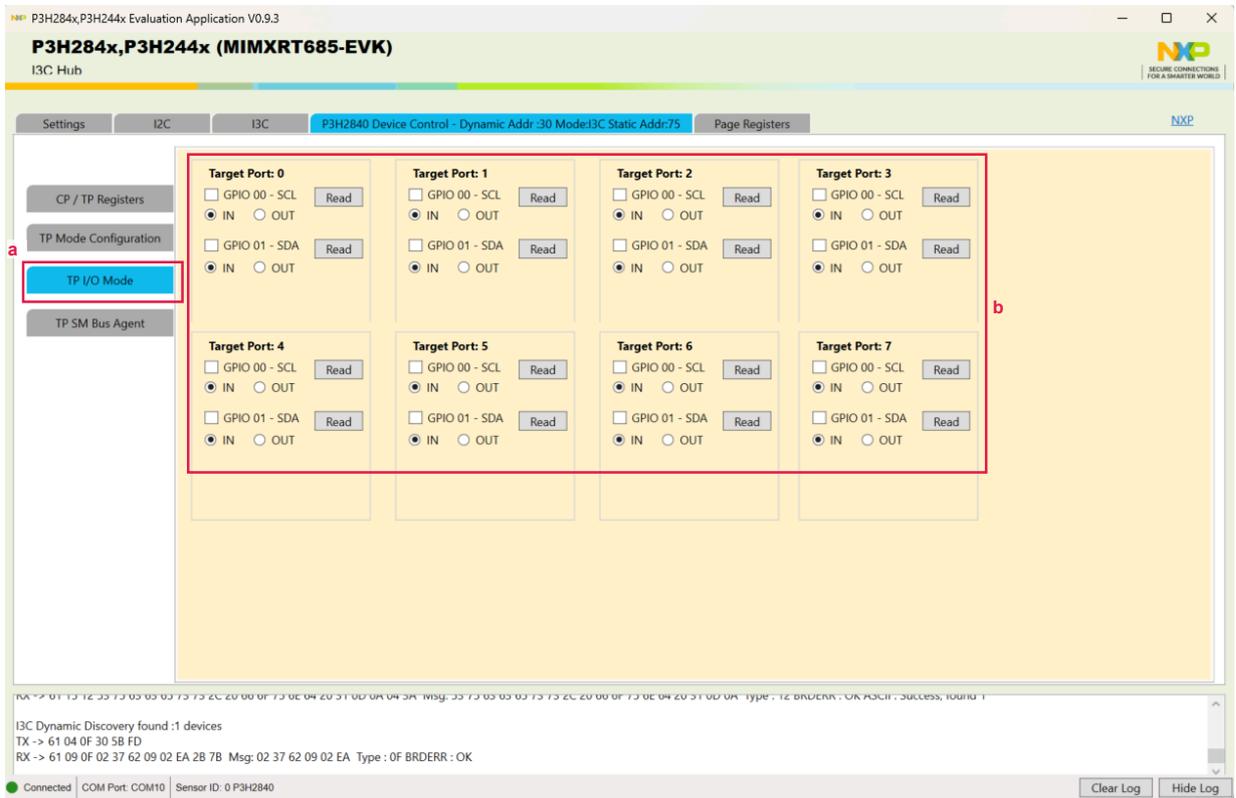


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6. Target ports I/O mode configuration

a. Click the **TP I/O Mode** tab.

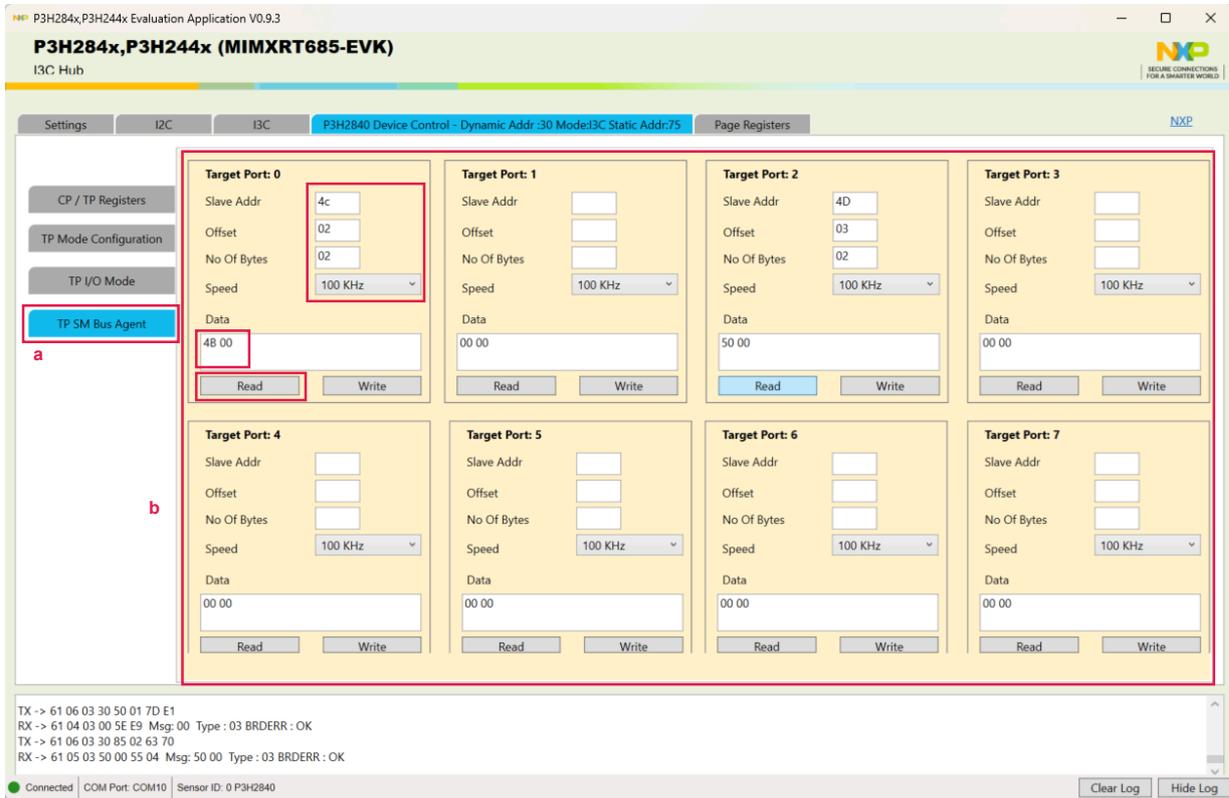
b. Set **IN** (input port) or **OUT** (output port) to the target ports. Also, assign read/write to the target ports.



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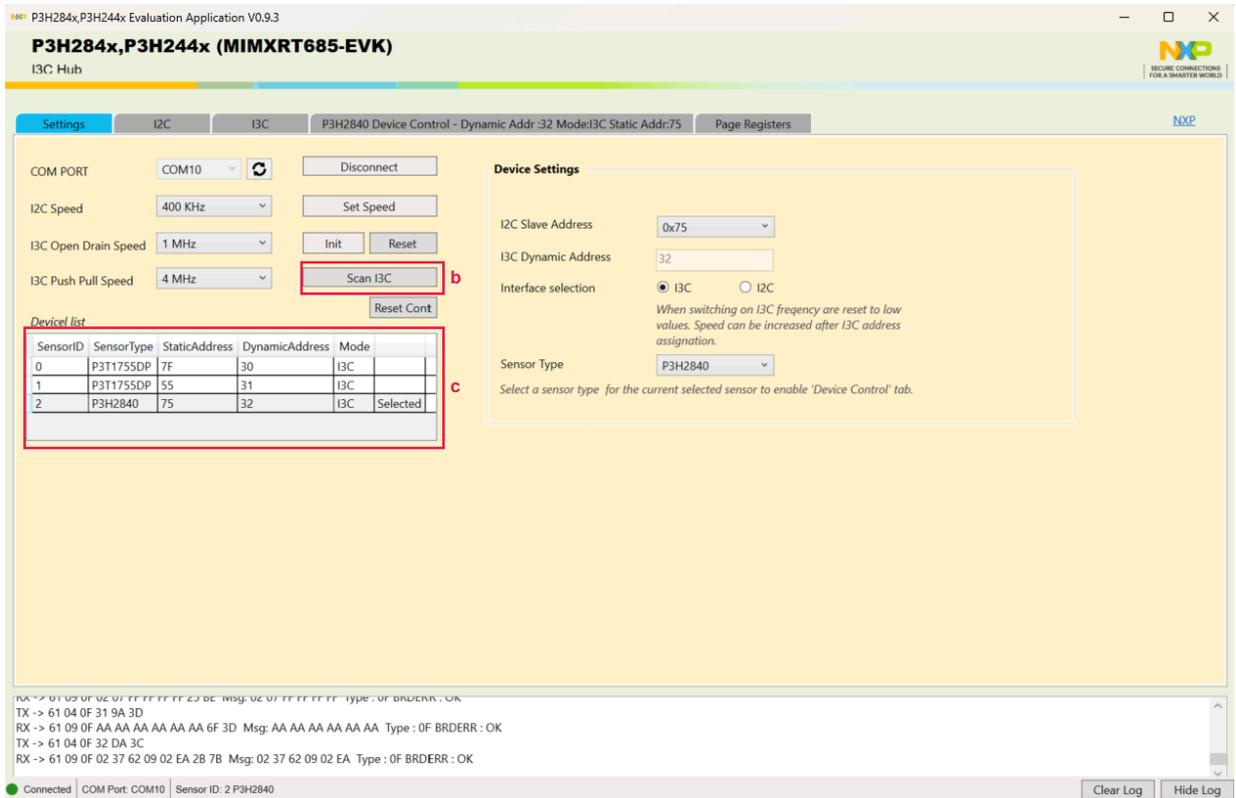
7. Target ports SMBus agent configuration

- a. Click the **TP SM Bus Agent** tab.
- b. To read/write SMBus target devices connected to the P3H2840 target ports, fill in the **Slave Addr**, **Offset**, and **No Of Bytes** as below:



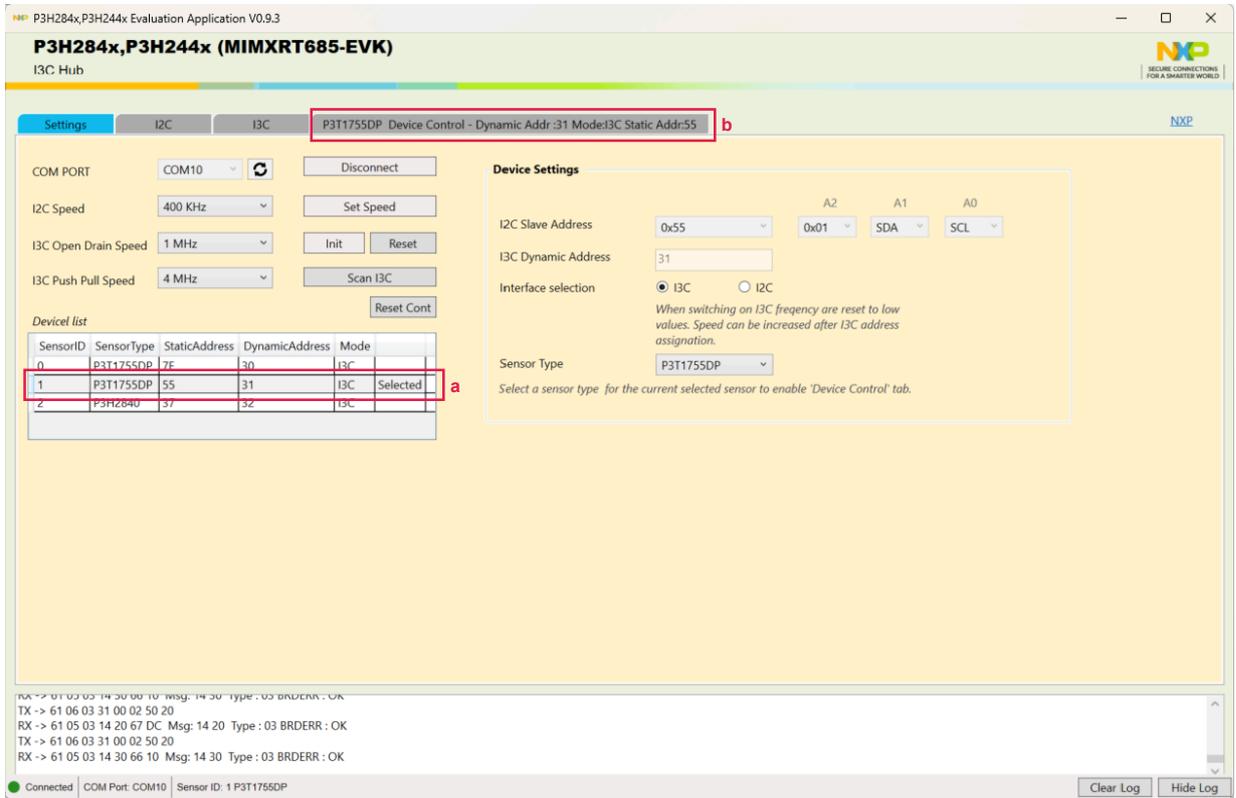
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8. Discover three I3C devices on the P3H2840HN-ARD board
 - a. Go to the **TP Mode Configuration** tab and select **TP0** and **TP2** in **I3C** mode.
 - b. Go to the **Settings** tab and click the **Scan I3C** button.
 - c. Three I3C devices (one hub and two I3C temperature sensors) are discovered on I3C bus.



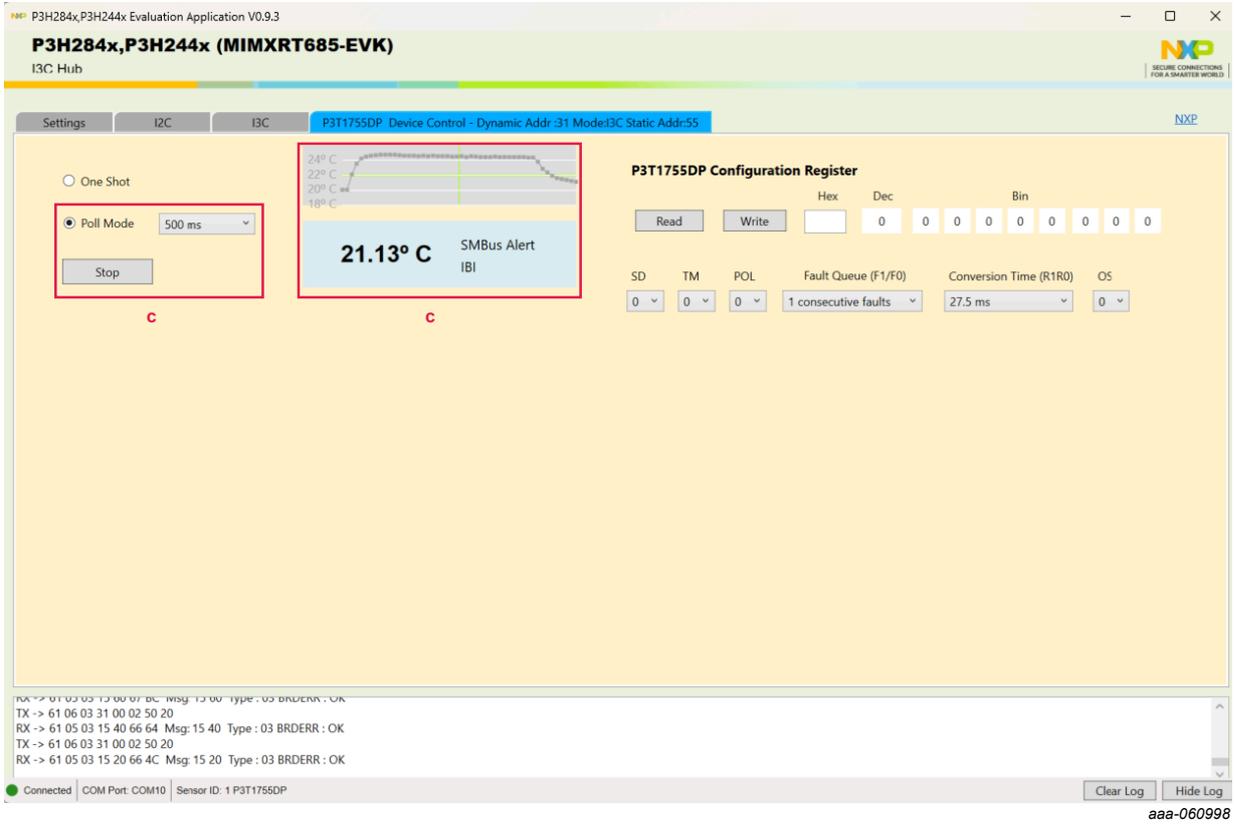
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9. Read temperature data from P3T1755DP
 - a. Select temperature sensor **P3T1755DP** from the **Sensor Type** drop-down.
 - b. Go to **P3T1755DP Device Control** tab.



aaa-060997

c. Select **Poll Mode** radio-button and click **Start** button below to read the temperature data.



9 Acronyms

Table 4 describes the acronyms used in this user manual.

Table 4. Acronyms

Acronym	Description
ESD	Electrostatic discharge
GUI	Graphical user interface
I3C/I2C bus	Serial peripheral interface bus
IC	Integrated circuit
LED	Light-emitting diode
PC	Personal computer
USB	Universal serial bus

10 References

Table 5 lists and explains the additional documents and resources that can be referred to if more information is required. Some of the documents listed below may be available only under a non-disclosure agreement (NDA). To request access to these documents, contact your local field applications engineer (FAE) or sales representative.

Table 5. References and related documentation

Document	Link/how to access
P3H244x/P3H284x, I3C hub with two controller ports and four/eight target ports	https://www.nxp.com/doc/P3H244x_P3H284x

11 Revision history

[Table 6](#) summarizes the revisions to this document.

Table 6. Revision history

Document ID	Release date	Description
UM12344 v.1.0	9 June 2025	Initial public release

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