

# UM11834

P3T1755DP-ARD evaluation board

Rev. 1.0 — 15 February 2023

User manual

## Document information

Information	Content
Keywords	P3T1755, I <sup>2</sup> C/I3C-bus, I3C IBI, temperature resolution of 0.0625 °C, 12-bit A-to-D conversion, 0.5 °C temperature accuracy.
Abstract	The P3T1755DP-ARD evaluation board allows for easy test and design of the P3T1755, which is an I3C, I <sup>2</sup> C-bus, 0.5 °C accuracy, digital temperature sensor. This evaluation board, along with the MIMXRT685-EVK MCU board provides an easy to use evaluation platform.



Revision history

Rev	Date	Description
v.1.0	20230215	Initial version

## Important notice

### 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

The P3T1755DP-ARD evaluation board features an I3C, I<sup>2</sup>C-bus, 0.5 °C accuracy, digital temperature sensor. A graphical interface allows the user to easily explore the different functions of the driver. The board can be connected in parallel with other I<sup>2</sup>C-bus demo boards to create an evaluation system.

The IC communicates to the host via the industry standard I<sup>2</sup>C-bus port. The evaluation software runs under Microsoft Windows 7, 8, or 10 PC platform.

## 2 Features

- A complete evaluation platform for the P3T1755DP I3C, I<sup>2</sup>C-bus, 0.5 °C accuracy, digital temperature sensor
- Easy to use GUI-based software demonstrates the capabilities of the P3T1755DP
- On-board temperature sensor for system thermal management experiments
- Convenient test points for easy scope measurements and signal access
- USB interface to the host PC
- Power supply from USB port (x2) or external power supply can be used to power P3T1755DP-ARD evaluation board

## 3 Getting started

### 3.1 Assumptions

Familiarity with the SPI-bus is helpful but not required.

### 3.2 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.

### 3.3 Minimum system requirements

- PC Pentium processor (or equivalent)
- One USB port (either 3.0 or 2.0 or 1.1 compatible)
- Windows 7, 8, or 10
- MIMXRT685-EVK MCU board (from [www.nxp.com](http://www.nxp.com))

### 3.4 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 exceeding the USB port current capabilities.

## 4 Hardware installation

### 4.1 P3T1755DP-ARD EV board and MIMXRT685-EVK MCU board connection

The P3T1755DP-ARD evaluation board is connected to an MIMXRT685-EVK MCU board using four connectors (J4/J5/J7/J8 on P3T1755DP-ARD board and J27/J28/J29/J30 on MIMXRT685-EVK board) for I<sup>2</sup>C-bus and power supply, and one connector (J18 on P3T1755DP-ARD board and J on MIMXRT685-EVK board) for I3C-bus.

The MIMXRT685-EVK MCU board communicates with P3T1755DP-ARD demo GUI through PC USB port and uses I<sup>2</sup>C or I3C-bus to communicate to P3T1755.

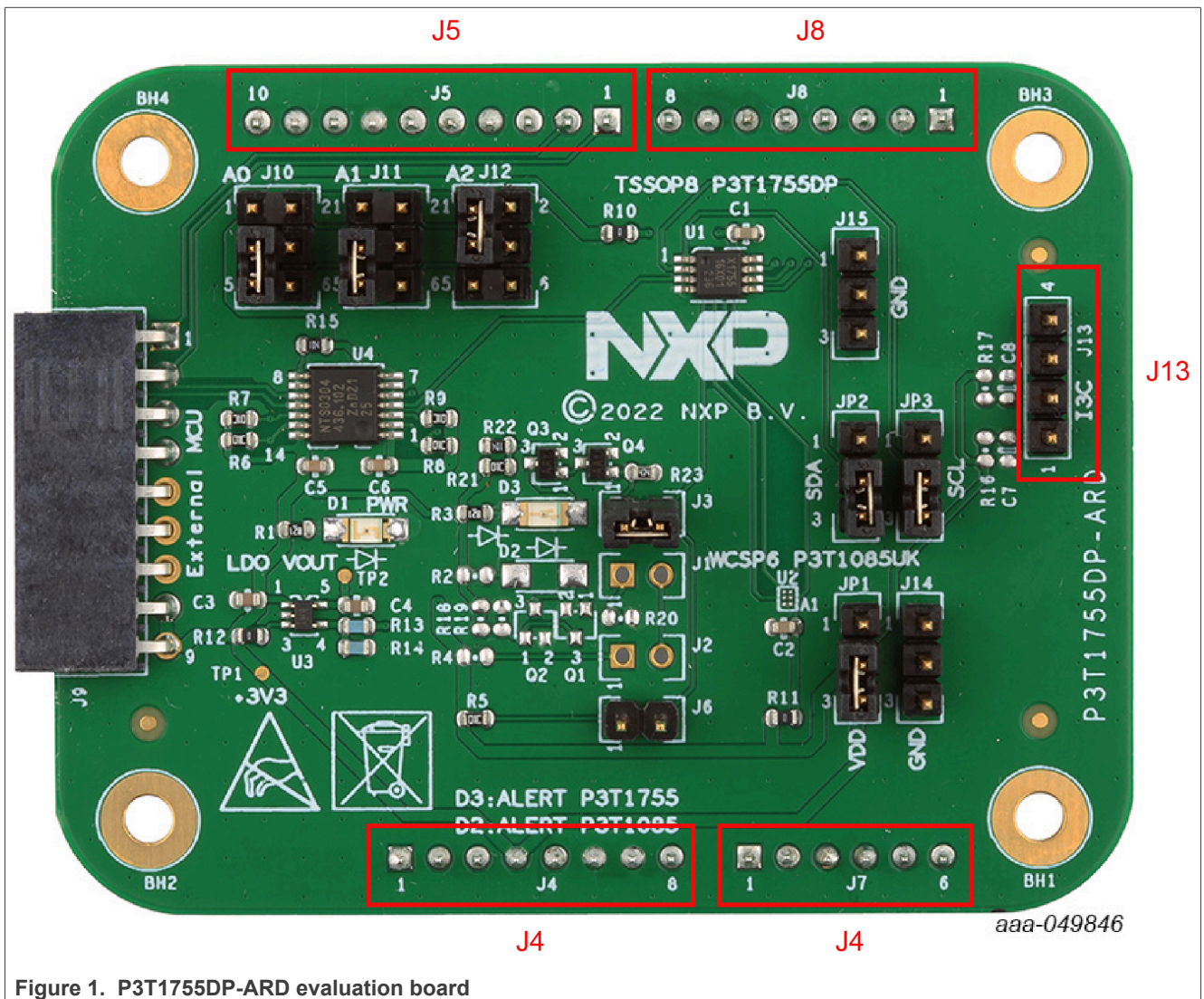
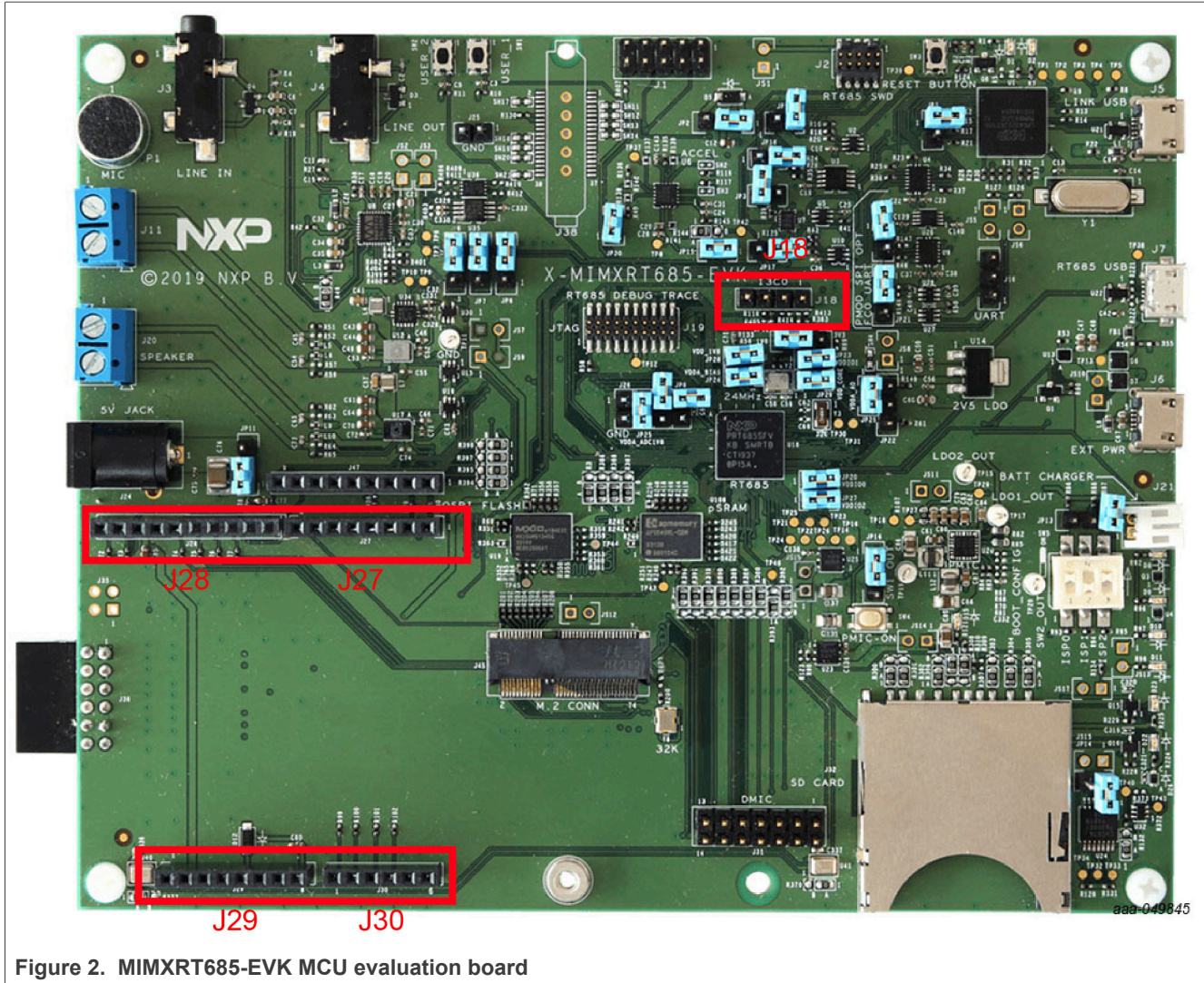
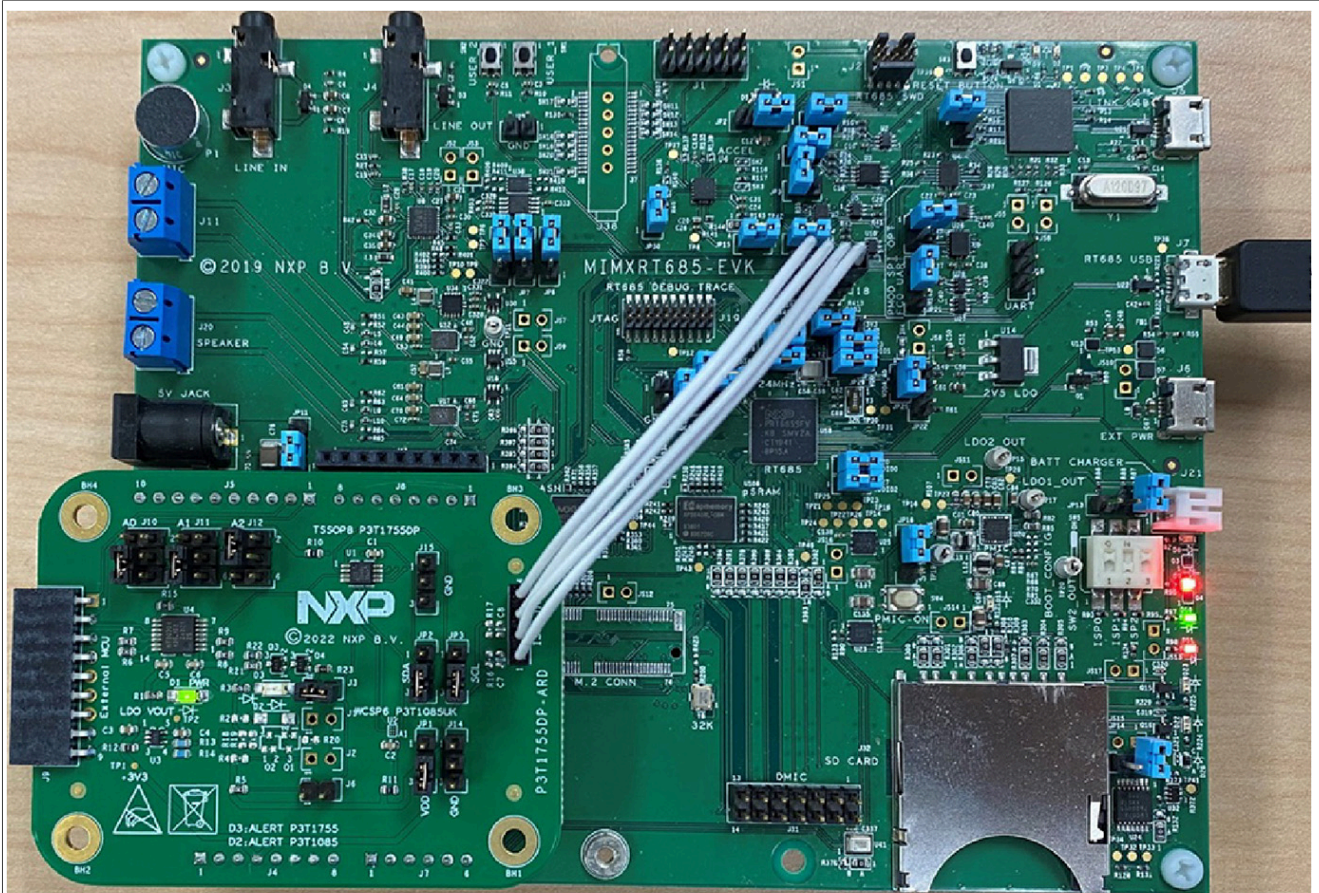


Figure 1. P3T1755DP-ARD evaluation board









aaa-049847

Figure 3. P3T1755DP-ARD evaluation board connecting to the MIMXRT685-EVK MCU board

Use J7 (USB Micro-B connector) on MIMXRT685-EVK for power supply and GUI communication port.

## 5 Hardware description

- J4/J5/J7/J8 are connected to the MIMXRT685-EVK MCU board for P3T1755DP-ARD power supply and I<sup>2</sup>C-bus interface.
- J13 is connected to the MIMXRT685-EVK MCU board for P3T1755DP-ARD I3C-bus interface.
- JP1 selects P3T1755DP VDD power supply.
- J10 selects P3T1755DP I<sup>2</sup>C target address.
- JP2/JP3 select I<sup>2</sup>C or I3C-bus interface.

Table 1. P3T1755DP-ARD board main components

Device	Description	Location
P3T1755DP	I3C, I <sup>2</sup> C-bus, 0.5 °C accuracy, digital temperature sensor	U1
TPS71701DCKT	Adjustable output voltage LDO	U3
NTS0304EPWJ	4-bit dual supply translating transceiver	U4
Green LED	Power supply on LED	D1
Red LED	Alert LED	D3

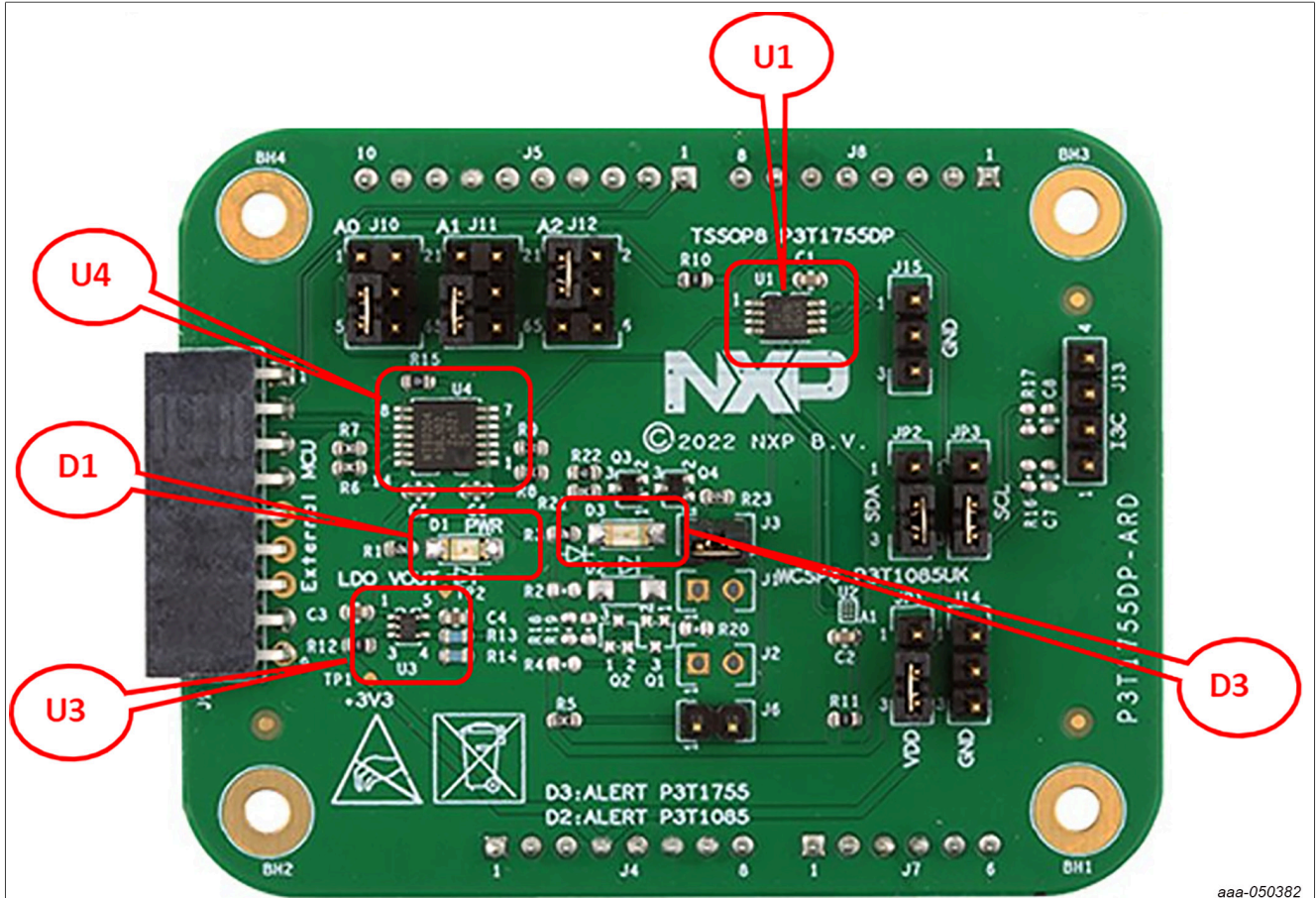


Figure 4. P3T1755DP-ARD board main components

Table 2. Jumper settings

Jumper	Default setting	Comment
J1	1-2	1-2: Alert LED is used. Open: No Alert LED used.
J2	Open	1-2: Alert pin 10 kΩ pull-up resistor is selected. Open: No Alert pin 10 kΩ pull-up resistor selected.
J3	DNP	No used
J4-J5		Arduino connector
J6	DNP	No used
J7-J8	N/A	Arduino connector
J9		External MCU interface connector
J10	3-5	1-3: A0 pin connected to VDD 3-5: A0 pin connected to ground 2-4: A0 pin connected to SCL 4-6: A0 pin connected to SDA
J11-12	DNP	No used
J13		I3C connector
J14-15		Ground test pins



Table 2. Jumper settings...continued

Jumper	Default setting	Comment
JP1	2-3	1-2: VDD = 1.8 V 2-3: VDD = 3.3 V
JP2	2-3	1-2: SDA = SDA_I3C 2-3: SDA = SDA_I2C
JP3	2-3	1-2: SCL = SCL_I3C 2-3: SCL = SCL_I2C

## 6 Schematic

The schematic diagram of P3T1755DP-ARD EVB is available at URL: <http://www.nxp.com/P3T1755DP-ARD>.

## 7 P3T1755DP-ARD EVB demo GUI

### 7.1 Run P3T1755DP-ARD GUI V0.1.exe on Windows 7,8,10 PC

1. As shown in Figure 5, click “Connect” button to connect MIMXRT685-EVK board
2. Use Setting tab to select I<sup>2</sup>C and I3C-bus speed
3. Use I<sup>2</sup>C tab to use I<sup>2</sup>C-bus to access to the P3T1755
4. Use I3C tab to use I3C-bus to access to the P3T1755

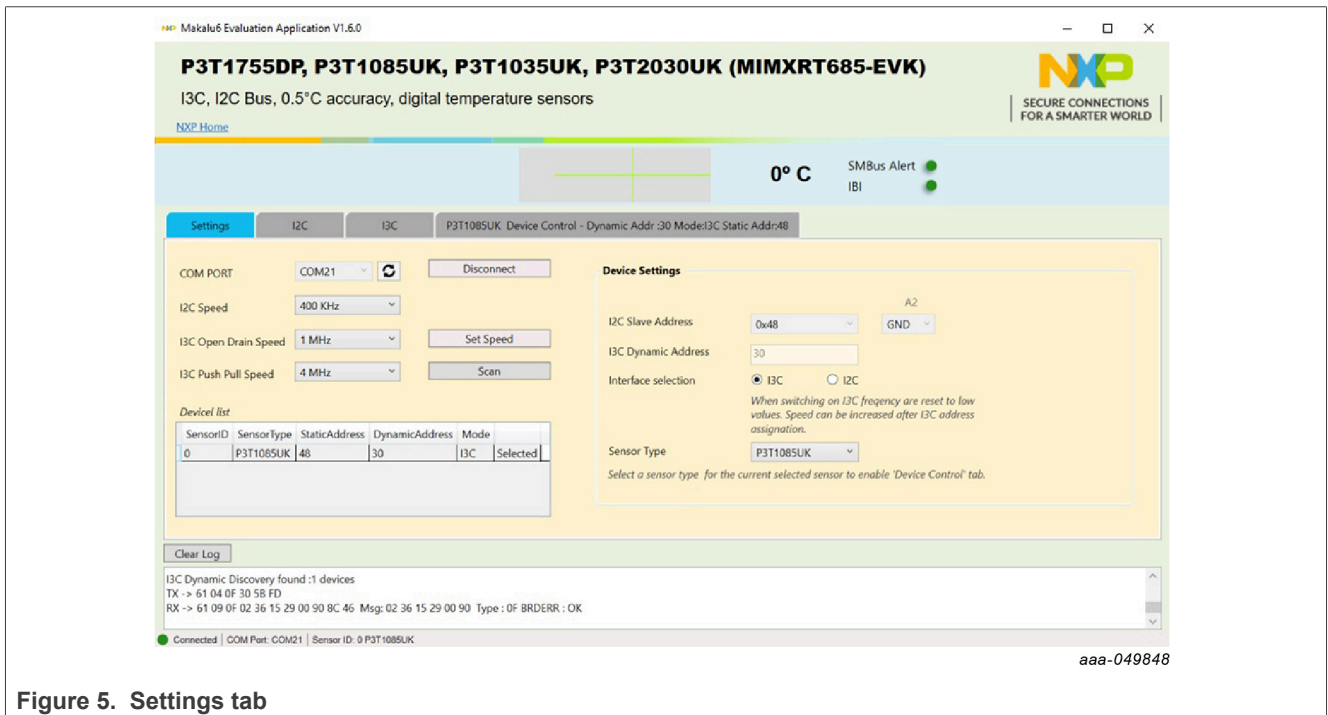


Figure 5. Settings tab

## 8 Abbreviations

Table 3. Abbreviations

Acronym	Description
DUT	Device Under Test

Table 3. Abbreviations...continued

Acronym	Description
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
SPI	Serial Peripheral Interface
USB	Universal Serial Bus

## 9 References

1. *P3T1755DP - I3C, I<sup>2</sup>C-bus, 0.5 °C accuracy, digital temperature sensor*; Product data sheet; NXP Semiconductors

## 10 Legal information

### 10.1 Definitions

**Draft** — A draft status on a document indicates that the content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included in a draft version of a document and shall have no liability for the consequences of use of such information.

### 10.2 Disclaimers

**Limited warranty and liability** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of NXP Semiconductors.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

**Terms and conditions of commercial sale** — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

**Export control** — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

**Suitability for use in non-automotive qualified products** — Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

**Translations** — A non-English (translated) version of a document, including the legal information in that document, is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

**Security** — Customer understands that all NXP products may be subject to unidentified vulnerabilities or may support established security standards or specifications with known limitations. Customer is responsible for the design and operation of its applications and products throughout their lifecycles to reduce the effect of these vulnerabilities on customer's applications and products. Customer's responsibility also extends to other open and/or proprietary technologies supported by NXP products for use in customer's applications. NXP accepts no liability for any vulnerability. Customer should regularly check security updates from NXP and follow up appropriately. Customer shall select products with security features that best meet rules, regulations, and standards of the intended application and make the ultimate design decisions regarding its products and is solely responsible for compliance with all legal, regulatory, and security related requirements concerning its products, regardless of any information or support that may be provided by NXP.

NXP has a Product Security Incident Response Team (PSIRT) (reachable at [PSIRT@nxp.com](mailto:PSIRT@nxp.com)) that manages the investigation, reporting, and solution release to security vulnerabilities of NXP products.

### 10.3 Trademarks

Notice: All referenced brands, product names, service names, and trademarks are the property of their respective owners.

**NXP** — wordmark and logo are trademarks of NXP B.V.



## Tables

---

Tab. 1.	P3T1755DP-ARD board main components .....	7	Tab. 3.	Abbreviations .....	9
Tab. 2.	Jumper settings .....	8			

## Figures

---

Fig. 1.	P3T1755DP-ARD evaluation board .....	5	Fig. 4.	P3T1755DP-ARD board main components .....	8
Fig. 2.	MIMXRT685-EVK MCU evaluation board .....	6	Fig. 5.	Settings tab .....	9
Fig. 3.	P3T1755DP-ARD evaluation board connecting to the MIMXRT685-EVK MCU board .....	7			

---

## Contents

---

<b>1</b>	<b>Introduction</b> .....	<b>4</b>
<b>2</b>	<b>Features</b> .....	<b>4</b>
<b>3</b>	<b>Getting started</b> .....	<b>4</b>
3.1	Assumptions .....	4
3.2	Static handling requirements .....	4
3.3	Minimum system requirements .....	4
3.4	Power requirements .....	4
<b>4</b>	<b>Hardware installation</b> .....	<b>5</b>
4.1	P3T1755DP-ARD EV board and MIMXRT685-EVK MCU board connection .....	5
<b>5</b>	<b>Hardware description</b> .....	<b>7</b>
<b>6</b>	<b>Schematic</b> .....	<b>9</b>
<b>7</b>	<b>P3T1755DP-ARD EVB demo GUI</b> .....	<b>9</b>
7.1	Run P3T1755DP-ARD GUI V0.1.exe on Windows 7,8,10 PC .....	9
<b>8</b>	<b>Abbreviations</b> .....	<b>9</b>
<b>9</b>	<b>References</b> .....	<b>10</b>
<b>10</b>	<b>Legal information</b> .....	<b>11</b>

---

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

---

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[NXP:](#)

[P3T1755DP-ARD](#)