

# KIT\_T2G-B-H\_LITE user guide

## About this document

### Scope and purpose

This document serves as a guide for using the KIT\_T2G-B-H\_LITE. This document explains the kit operation, describes the out-of-the-box (OOB) example and its operation, and the hardware details of the board.

### Intended audience

This document is intended for TRAVEO™ T2G Body High Lite evaluation kit users.

### Reference documents

This user guide should be read in conjunction with the following documents:

- AN235305 - Getting started with TRAVEO™ T2G family MCUs in ModusToolbox™
- [TRAVEO™ T2G Body High datasheet](#)

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## Safety and regulatory compliance information

### Safety and regulatory compliance information

This kit is intended for development purposes only. Users are advised to test and evaluate this kit in an RF development environment.

Safety evaluation for this kit is done in factory default settings using default accessories shipped with the kit. All evaluations for safety are carried out using a 5-V (USB 2.0, @ 500 mA) supply. Attaching additional wiring to this product or modifying the product operation from the factory default may affect its performance and cause interference with other apparatus in the immediate vicinity. If such interference is detected, suitable mitigating measures should be taken.

This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required authorizations are first obtained. Contact [Infineon support](#) for details.



These kits contain electrostatic discharge (ESD) sensitive devices. Electrostatic charges readily accumulate on the human body and any equipment, which can cause a discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Store unused kits in the protective shipping package.



#### End-of-life/product recycling

The end-of-life cycle for this kit is five years from the date of manufacture mentioned on the back of the box. Contact your nearest recycler to discard the kit.

## General safety instructions

### ESD protection

ESD can damage boards and associated components. Infineon recommends that you perform procedures only at an ESD workstation. If an ESD workstation is unavailable, use appropriate ESD protection by wearing an anti-static wrist strap attached to the chassis ground (any unpainted metal surface) on your board when handling parts.

### Handling boards

This board is sensitive to ESD. Hold the board only by its edges. After removing the board from its box, place it on a grounded, static-free surface. Use a conductive foam pad, if available. Do not slide the board over any surface.

## Introduction

# 1 Introduction

Thank you for your interest in the KIT\_T2G-B-H\_LITE. The KIT\_T2G-B-H\_LITE enables you to evaluate and develop your applications using the [TRAVEO™ T2G Body High MCU](#) (hereafter called “TRAVEO™ T2G-B-H MCU”).

TRAVEO™ T2G-B-H MCU is designed for automotive applications. TRAVEO™ T2G-B-H MCU is a true programmable embedded system-on-chip, integrating up to two 350-MHz Arm® Cortex®-M7 as the primary application processors, a 100-MHz Arm® Cortex®-M0+ that supports low-power operations, up to 8 MB flash and 1 MB SRAM, Secure Digital Host Controller (SDHC) supporting SD/SDIO/eMMC interfaces, programmable analog and digital peripherals that allow faster time-to-market.

The evaluation board carries a TRAVEO™ T2G-B-H, a MikroBUS and two Sheild2Go connectors, and headers compatible with Arduino for interfacing Arduino shields. In addition, the board features an onboard programmer/debugger (KitProg3), a 512-Mbit QSPI NOR flash, CAN FD transceiver, Ethernet PHY transceiver with RJ45 connector interface, a micro-B connector for USB device interface, three user LEDs, one potentiometer, and two push buttons. The board supports operating voltages from 3.3 V to 5.0 V for TRAVEO™ T2G-B-H.

You can use ModusToolbox™ software to develop and debug your TRAVEO™ T2G-B-H MCU projects. [ModusToolbox™ software](#) is a set of tools that enable you to integrate these devices into your existing development methodology.

If you are new to TRAVEO™ T2G-B-H MCU and ModusToolbox™ software, see the application note AN235305 - Getting started with TRAVEO™ T2G Family MCUs in ModusToolbox™ software to help you familiarize with the TRAVEO™ T2G-B-H MCU and help you create your own design using the Eclipse IDE for ModusToolbox™ software.

## 1.1 Getting started

This guide will help you to get acquainted with this evaluation kit:

- The [Kit details](#) chapter provides the kit and package details and board details.
- The [Kit operation](#) chapter describes the major features of the [KIT\\_T2G-B-H\\_LITE](#) and functionalities such as programming, debugging, the USB-UART, and USB-I2C bridges.
- The [Hardware](#) chapter provides a detailed hardware description, kit schematics, and the bill of materials (BOM).
- Application development using [KIT\\_T2G-B-H\\_LITE](#) is supported in ModusToolbox™ software. ModusToolbox™ software is a free development eco-system that includes the Eclipse IDE for ModusToolbox™ software and the TRAVEO™ T2G-B-H SDK with TRAVEO™ T2G-B-H MCU. Using ModusToolbox™ software, you can enable and configure device resources, and middleware libraries; write C/assembly source code; and program and debug the device. You can download the software from the [ModusToolbox™ home page](#). See the ModusToolbox™ software installation guide for additional information.
- There is a wide range of code examples to evaluate the [KIT\\_T2G-B-H\\_LITE](#). These examples help you familiarize TRAVEO™ T2G-B-H MCU and create your own design. These examples can be accessed through the ModusToolbox™ Project Creator tool. Alternatively, you can also visit Infineon’s code example page to access these examples:
  - [Code examples for ModusToolbox™ software](#)

## Introduction

### 1.2 Additional learning resources

Infineon provides a wealth of data at [www.infineon.com/cms/en/product/microcontroller/32-bit-traveo-t2g-arm-cortex-microcontroller](http://www.infineon.com/cms/en/product/microcontroller/32-bit-traveo-t2g-arm-cortex-microcontroller) to help you to select the right TRAVEO™ T2G MCU device for your design and to help you quickly and effectively integrate the device into your design.

### 1.3 Technical support

For assistance, go to [www.infineon.com/support](http://www.infineon.com/support). Visit [community.infineon.com](http://community.infineon.com) to ask your questions in Infineon developer community.

You can also use the following support resources if you need quick assistance:

- [Self-help \(Technical documents\)](#)

### 1.4 Documentation conventions

**Table 1 Document conventions for guides**

| Convention         | Usage                                                                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Courier New        | Displays user-entered text and source code                                                                                             |
| <i>Italics</i>     | Displays file names and reference documentation:<br>Read about the <i>sourcefile.hex</i> file in the <i>PSoC™ Creator user guide</i> . |
| File > Open        | Represents menu paths: File > Open > New Project                                                                                       |
| <b>Bold</b>        | Displays commands, menu paths, and icon names in procedures:<br>Click the <b>File</b> icon and then click <b>Open</b> .                |
| Times New Roman    | Displays an equation:<br>$2 + 2 = 4$                                                                                                   |
| Text in gray boxes | Describes Cautions or unique functionality of the product.                                                                             |

### 1.5 Abbreviations and definitions

**Table 2 Abbreviations**

| Abbreviation | Definition                  |
|--------------|-----------------------------|
| ADC          | analog-to-digital converter |
| BOM          | bill of materials           |
| CINT         | Integration Capacitor       |
| CMOD         | Modulator Capacitor         |
| CPU          | central processing unit     |
| CSD          | capacitive sigma delta      |
| CSX          | CAPSENSE™ Crosspoint        |
| CTANK        | Shield Tank Capacitor       |
| DC           | direct current              |
| ECO          | external crystal oscillator |
| ESD          | electrostatic discharge     |
| FPC          | flexible printed circuit    |

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**Introduction**

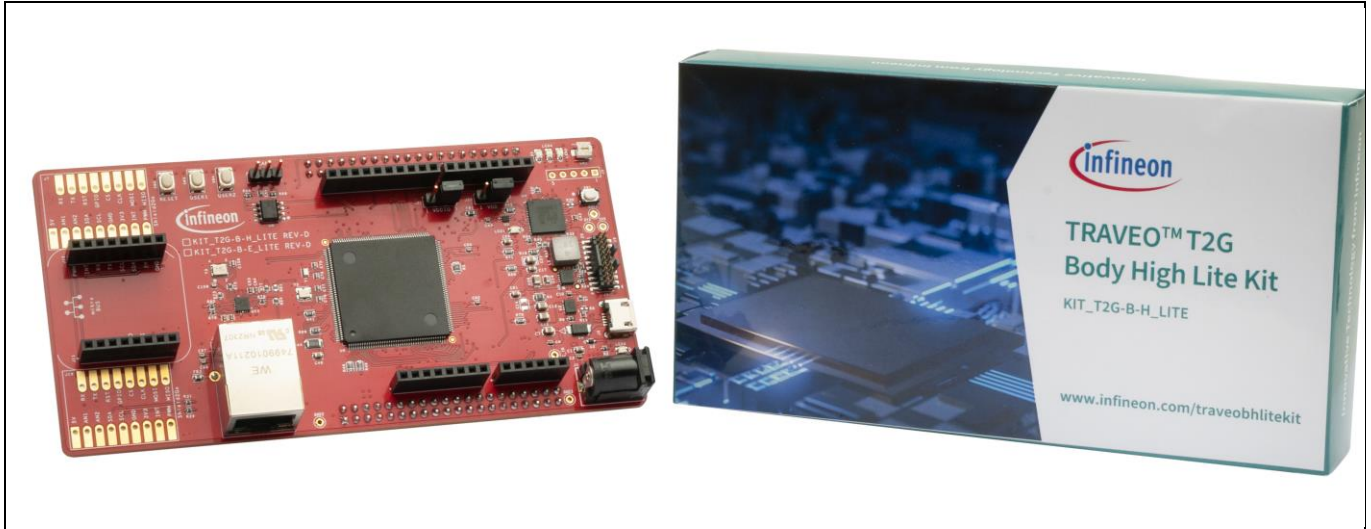
| Abbreviation | Definition                                  |
|--------------|---------------------------------------------|
| GPIO         | general-purpose input/output                |
| IC           | integrated circuit                          |
| IDE          | integrated development environment          |
| IoT          | Internet of Things                          |
| I2C          | inter-integrated circuit                    |
| I2S          | Inter-IC Sound                              |
| LED          | light-emitting diode                        |
| LPO          | low power oscillator                        |
| PC           | personal computer                           |
| PDL          | peripheral driver library                   |
| QSPI         | Quad serial peripheral interface            |
| SDHC         | Secure Digital Host Controller              |
| SDIO         | Secure Digital Input Output                 |
| SDK          | software development kit                    |
| SMIF         | Serial Memory Interface                     |
| SPI          | Serial Peripheral Interface                 |
| SRAM         | static random-access memory                 |
| SWD          | Serial Wire Debug                           |
| UART         | universal asynchronous receiver transmitter |
| USB          | Universal Serial Bus                        |
| WCO          | watch crystal oscillator                    |

## Kit details

## 2 Kit details

### 2.1 Kit contents

- KIT\_T2G-B-H\_LITE REV D Board



**Figure 1** Kit contents

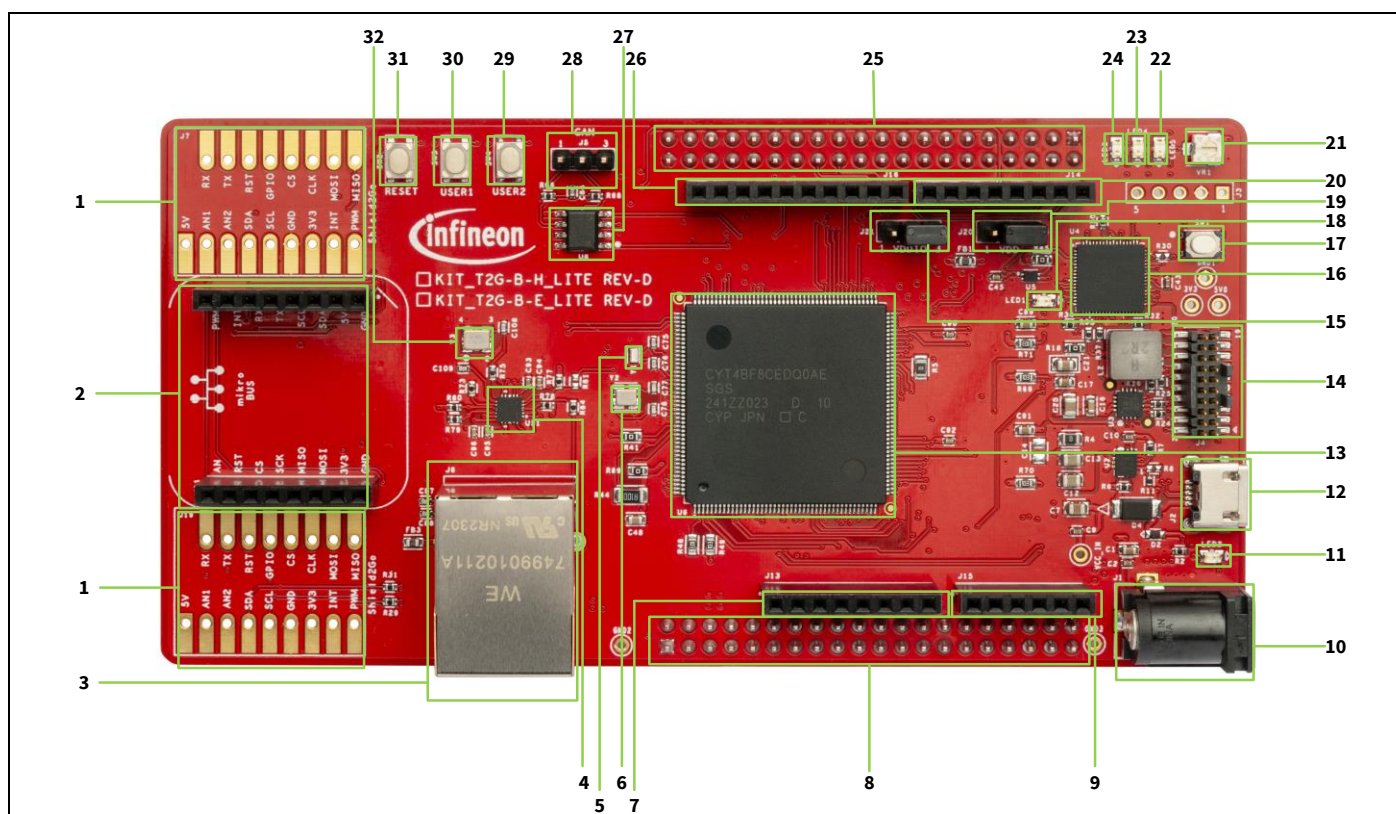
Inspect the contents of the kit; if you find any part missing, go to <https://www.infineon.com/cms/en/product/microcontroller/32-bit-traveo-t2g-arm-cortex-microcontroller/traveo-t2g-cyt4bf-series>.

### 2.2 Board details

The **KIT\_T2G-B-H\_LITE** has the following features:

- TRAVEO™ T2G-B-H MCU – CYT4BF8CDDQ0AESGS. See the device [datasheet](#).
- 512-Mb external Quad SPI NOR flash that provides a fast, expandable memory for data and code.
- KitProg3 on-board SWD programmer/debugger, USB-UART, and USB-I2C bridge functionality.
- A micro-B connector for USB device interface
- Selectable input supply voltages of 3.3 V and 5.0 V for the TRAVEO™ T2G-B-H MCU.
- Three user LEDs, two user buttons, and a reset button for the TRAVEO™ T2G-B-H MCU
- A potentiometer which can be used to simulate analog sensor output
- A mode button and a mode LED for KitProg3

## Kit details



**Figure 2 KIT\_T2G-B-H\_LITE board – top view**

1. Shield2Go connectors (Not Mounted) (J7, J19)
2. MikroBUS connectors (J11, J12)
3. RJ45 Ethernet connector (J6)
4. Ethernet physical layer (PHY) transceiver (U11)
5. 32.768-kHz oscillator for WCO (Y1)
6. 16-MHz oscillator for ECO (Y2)
7. 8-pin Arduino header (J13)
8. Expansion header 1 (X1 on the bottom side)
9. 6-pin Arduino header (J15)
10. DC Power Jack (J1)
11. Power LED (LED2)
12. KitProg3 USB Micro-B Connector (J2)
13. TRAVEO™ T2G microcontroller (U6)
14. MIPI10/20 DEBUG connector (J4)
15. T2G-B-H VDDIO voltage selection jumper (J21)
16. PSoC 5LP based KitProg3 (U4)
17. Mode switch (SW1)
18. KitProg3 Status LED (LED1)
19. T2G-B-H VDD voltage selection jumper (J20)
20. 8-pin Arduino header (J14)
21. Potentiometer (VR1)

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### Kit details

- 22. USER LED3 (LED5)
- 23. USER LED2 (LED4)
- 24. USER LED1 (LED3)
- 25. Expansion Header 2 (X2 on the bottom side)
- 26. 10-pin Arduino header (J16)
- 27. CAN FD transceiver (U8)
- 28. CAN FD connector (J5)
- 29. USER2 button (SW4)
- 30. USER1 button (SW3)
- 31. RESET button (SW2)
- 32. 25-MHz crystal for Ethernet transceiver (Y3)

### KIT\_T2G-B-H\_LITE board pinout details

**mikro BUS**

|      |     |
|------|-----|
| AN   | PWM |
| RST  | INT |
| CS   | RX  |
| SCK  | TX  |
| MISO | SCL |
| MOSI | SDA |
| 3V3  | 5V  |
| GND  | GND |

**Shield2Go**

|     |      |
|-----|------|
| 5V  | RX   |
| AN1 | TX   |
| AN2 | RST  |
| SDA | GPIO |
| SCL | CS   |
| GND | CLK  |
| 3V3 | MOSI |
| INT | MISO |
| PWM |      |

**J13**

|                  |
|------------------|
| (P1) N.C.        |
| (IOREF) 3V3      |
| (RST) XRES_L_MCU |
| (3V3) 3V3        |
| (5V) 5V          |
| (GND_1) GND      |
| (GND_2) GND      |
| (VIN) VIN        |

**J15**

|               |
|---------------|
| POT_AOUT (A0) |
| ADC1_6 (A1)   |
| ADC1_7 (A2)   |
| ADC1_8 (A3)   |
| ADC1_19 (A4)  |
| ADC1_22 (A5)  |

**J16**

|                   |
|-------------------|
| (AD5/SCL) I2C_SCL |
| (AD4/SDA) I2C_SDA |
| (AREF) 5V         |
| (GND_3) GND       |
| (D13) SPI_CLK     |
| (D12) SPI_MISO    |
| (D11) SPI_MOSI    |
| (D10) SPI_CS3     |
| (D9) P11_0        |
| (D8) P17_2        |

**X1**

|                |
|----------------|
| 3V3            |
| P17_2          |
| N.C.           |
| N.C.           |
| N.C.           |
| N.C.           |
| N.C.           |
| N.C.           |
| P0_2 SPI_MOSI  |
| P0_3 SPI_CS0   |
| P2_0 SPI_CLK   |
| P14_3 SPI_MISO |
| N.C.           |
| N.C.           |
| N.C.           |
| N.C.           |
| N.C.           |
| N.C.           |
| N.C.           |
| XRES_L_MCU     |
| ADC1_19        |
| SPI_CS3        |
| SPI_CS1        |
| P7_6           |
| VIN            |
| GND            |

**X2**

|           |
|-----------|
| 3V3       |
| N.C.      |
| N.C.      |
| N.C.      |
| N.C.      |
| N.C.      |
| N.C.      |
| N.C.      |
| POT_AOUT  |
| P11_0     |
| P11_2     |
| ADC1_22   |
| ADC1_7    |
| N.C.      |
| N.C.      |
| N.C.      |
| 5V        |
| P2_1      |
| N.C.      |
| UART_RX   |
| UART_TX   |
| USER_SW1  |
| USER_SW2  |
| USER_LED1 |
| USER_LED2 |
| N.C.      |
| N.C.      |
| N.C.      |
| GND       |

**J14**

|              |
|--------------|
| P17_1 (D7)   |
| P14_3 (D6)   |
| P2_1 (D5)    |
| P2_0 (D4)    |
| P0_3 (D3)    |
| P0_2 (D2)    |
| UART_TX (D1) |
| UART_RX (D0) |

**Table 3 KIT\_T2G-B-H\_LITE board pinout**

| Pin                             | Primary onboard function | Secondary onboard function | Connection details                                |
|---------------------------------|--------------------------|----------------------------|---------------------------------------------------|
| <b>TRAVEO™ T2G-B-H MCU pins</b> |                          |                            |                                                   |
| XRES                            | Hardware reset           | –                          | –                                                 |
| P12[0]                          | CAN transmit CAN_TX      | –                          | Connected to TxD of CAN FD transceiver TLE9251VSJ |
| P12[1]                          | CAN receive CAN_RX       | –                          | Connected to RxD of CAN FD transceiver TLE9251VSJ |
| P6[3]                           | SPIHB_CLK                | –                          | Connected to SCK of QSPI flash S25HL512TFAMHI010  |

## Kit details

| Pin    | Primary onboard function                     | Secondary onboard function                                        | Connection details                                     |
|--------|----------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------|
| P6[5]  | SPIHB_SEL0                                   | –                                                                 | Connected to CS of QSPI flash S25HL512TFAMHI010        |
| P6[0]  | Potentiometer (POT) output POT_AOUT          | Arduino header (J15.1)                                            | –                                                      |
| P7[1]  | SPIHB_DATA0                                  | –                                                                 | Connected to IO0 of QSPI flash S25HL512TFAMHI010 (U9)  |
| P7[2]  | SPIHB_DATA1                                  | –                                                                 | Connected to IO1 of QSPI flash S25HL512TFAMHI010 (U9)  |
| P7[3]  | SPIHB_DATA2                                  | –                                                                 | Connected to IO2 of QSPI flash S25HL512TFAMHI010 (U9)  |
| P7[4]  | SPIHB_DATA3                                  | –                                                                 | Connected to IO3 of QSPI flash S25HL512TFAMHI010 (U9)  |
| P7[5]  | SPIHB_DATA4                                  | –                                                                 | Connected to IO0 of QSPI flash S25HL512TFAMHI010 (U10) |
| P8[0]  | SPIHB_DATA5                                  | –                                                                 | Connected to IO0 of QSPI flash S25HL512TFAMHI010 (U10) |
| P8[1]  | SPIHB_DATA6                                  | –                                                                 | Connected to IO0 of QSPI flash S25HL512TFAMHI010 (U10) |
| P8[2]  | SPIHB_DATA7                                  | –                                                                 | Connected to IO0 of QSPI flash S25HL512TFAMHI010 (U10) |
| P13[0] | D12 – header compatible with Arduino (J16.5) | Expansion header (X1.20)                                          | –                                                      |
| P13[1] | D11 – header compatible with Arduino (J16.4) | Expansion header (X1.14)                                          | –                                                      |
| P13[2] | D13 – header compatible with Arduino (J16.6) | Expansion header (X1.18)                                          | –                                                      |
| P13[6] | D10 – header compatible with Arduino (J16.3) | Expansion header (X1.33)                                          | –                                                      |
| P11[0] | D9 – header compatible with Arduino (J16.2)  | Shield2Go Connector (J7.12)<br>Expansion header (X2.26)           | –                                                      |
| P17[2] | D8 – header compatible with Arduino (J16.1)  | Shield2Go Connector (J19.13)<br>Expansion header (X1.4)           | –                                                      |
| P14[0] | UART_RX                                      | Shield2Go Connector (J7.10, J19.10)<br>MikroBUS Connector (J12.6) | This pin is connected to the KitProg3 UART Tx pin.     |

## Kit details

| Pin    | Primary onboard function                                 | Secondary onboard function                                                                                         | Connection details                                                                                                                                            |
|--------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P14[1] | UART_TX                                                  | Pin D1 of connector J4.2 compatible with Arduino Shield2Go Connector (J7.11, J19.11)<br>MIKROBUS Connector (J12.5) | This pin is connected to the KitProg3 UART Rx pin.<br>Remove R132 and R142, and install R136, to connect to Pin D1 of connector J4.2 compatible with Arduino. |
| P0[2]  | Pin D2 of connector J14.3 compatible with Arduino        | –                                                                                                                  | –                                                                                                                                                             |
| P0[3]  | Pin D3 of connector J14.4 compatible with Arduino        | –                                                                                                                  | –                                                                                                                                                             |
| P2[0]  | Pin D4 of connector J14.5 compatible with Arduino        | –                                                                                                                  | –                                                                                                                                                             |
| P2[1]  | Pin D5 of connector J14.6 compatible with Arduino        | –                                                                                                                  | –                                                                                                                                                             |
| P14[3] | Pin D6 of connector J14.7 compatible with Arduino        | –                                                                                                                  | –                                                                                                                                                             |
| P17[1] | Pin D7 of connector J14.8 compatible with Arduino        | –                                                                                                                  | –                                                                                                                                                             |
| P12[2] | A1 – header compatible with Arduino (J15.2)              | –                                                                                                                  | –                                                                                                                                                             |
| P12[3] | A2 – header compatible with Arduino (J15.3)              | –                                                                                                                  | –                                                                                                                                                             |
| P12[4] | A3 – header compatible with Arduino (J15.4)              | –                                                                                                                  | –                                                                                                                                                             |
| P13[7] | A4 – header compatible with Arduino (J15.5)              | –                                                                                                                  | –                                                                                                                                                             |
| P14[2] | A5 – header compatible with Arduino (J15.6)              | –                                                                                                                  | –                                                                                                                                                             |
| P6[1]  | I2C SDA - Common I2C SDA pin for KitProg3 USB-I2C bridge | I2C SDA pin Arduino header (J16.9)                                                                                 | –                                                                                                                                                             |
| P6[2]  | I2C SCL - Common I2C SCL pin for KitProg3 USB-I2C bridge | I2C SCL pin on Arduino header (J16.10)                                                                             | –                                                                                                                                                             |
| P5[0]  | USER LED1 (LED1)                                         | ExpansionConnector (X2.8)                                                                                          | –                                                                                                                                                             |
| P5[1]  | USER LED2 (LED2)                                         | ExpansionConnector (X2.7)                                                                                          | –                                                                                                                                                             |

## Kit details

| Pin    | Primary onboard function   | Secondary onboard function        | Connection details                                                                             |
|--------|----------------------------|-----------------------------------|------------------------------------------------------------------------------------------------|
| P5[2]  | USER LED3 (LED3)           | ExpansionConnector (X2.6)         | –                                                                                              |
| P5[3]  | User Button (USER BUTTON1) | Expansion Connector (X2.10)       | –                                                                                              |
| P17[0] | User Button (USER BUTTON2) | Expansion Connector (X2.9)        | –                                                                                              |
| P21[0] | WCO IN (Y1)                | –                                 | 32.768-kHz watch crystal oscillator input                                                      |
| P21[1] | WCO OUT (Y1)               | –                                 | 32.768-kHz watch crystal oscillator output                                                     |
| P21[2] | ECO IN (Y2)                | –                                 | 16-MHz external crystal oscillator input                                                       |
| P21[3] | ECO OUT (Y2)               | –                                 | 16-MHz external crystal oscillator input                                                       |
| P23[4] | SWO_TDO                    | DEBUG MIPI 10/20 Connector (J4.6) | –                                                                                              |
| P23[5] | SWCLK_TCLK                 | DEBUG MIPI 10/20 Connector (J4.4) | –                                                                                              |
| P23[6] | SWDIO_TMS                  | DEBUG MIPI 10/20 Connector (J4.2) | –                                                                                              |
| P23[7] | SWDOE_TDI                  | DEBUG MIPI 10/20 Connector (J4.8) | –                                                                                              |
| P18[0] | ETH_REFCLK                 | –                                 | The Ethernet signals are connected to U11 Ethernet PHY transceiver in RMII configuration mode. |
| P18[4] | ETH_TXD0                   | –                                 |                                                                                                |
| P18[5] | ETH_TXD1                   | –                                 |                                                                                                |
| P18[1] | ETH_TXEN                   | –                                 |                                                                                                |
| P19[0] | ETH_RXD0                   | –                                 |                                                                                                |
| P19[1] | ETH_RXD1                   | –                                 |                                                                                                |
| P21[5] | ETH_RXCTL                  | –                                 |                                                                                                |
| P3[1]  | ETH_MDC                    | –                                 |                                                                                                |
| P3[0]  | ETH_MDIO                   | –                                 |                                                                                                |



The image shows the Infineon KIT\_T2G-B-H\_LITE REV-D development board. It is a red PCB with various components. The central component is a large black IC labeled 'CYT4BF8CEDQ0AE SGS 241Z2023 D: 10 CYP JPN'. To the left, there are two identical pin headers labeled '1' and '3', each with pins for 5V, AN1, AN2, TX, RX, SDA, SCL, RST, GP10, CS, GND, CS, 3V3, CLK, INT, MOS1, and MISO. Above the central IC, there are three push buttons labeled 'RESET', 'USER1', and 'USER2', and a small black component labeled 'CAN'. To the right, there is a USB port labeled '10', a power jack labeled '11', and a small display screen labeled '12'. The board also features several other components like capacitors, resistors, and a small black component labeled '13'. The Infineon logo and product name 'KIT\_T2G-B-H\_LITE REV-D' are printed on the board.

**Figure 6 KIT\_T2G-B-H\_LITE board – top view**

## Kit operation

The KIT\_T2G-B-H\_LITE board has the following peripherals:

**Table 4 Peripheral details**

| Sl. No. | Peripheral                                                           | Description                                                                                                                                                                                                                                                                                                           |
|---------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.      | Shield2Go Connector                                                  | Optional connector for Shield2Go Interface (DNI)                                                                                                                                                                                                                                                                      |
| 2.      | MikroBUS Connector                                                   | Optional connector for MikroBUS Interface (DNI)                                                                                                                                                                                                                                                                       |
| 3.      | RJ45 Ethernet connector (J6)                                         | RJ45 Ethernet connector port to connect the kit to the Ethernet network.                                                                                                                                                                                                                                              |
| 4.      | Ethernet physical layer (PHY) transceiver (U11)                      | Ethernet PHY for connecting Ethernet network.                                                                                                                                                                                                                                                                         |
| 5.      | 32.768 kHz crystal for WCO (Y1)                                      | Oscillator for WCO clock.                                                                                                                                                                                                                                                                                             |
| 6.      | 16 MHz crystal for ECO (Y2)                                          | Oscillator for ECO clock.                                                                                                                                                                                                                                                                                             |
| 7.      | Digital I/O headers compatible with Arduino Uno R3 (J14)             | Bring out pins from TRAVEO™ T2G-B-H MCU to interface with shields compatible with Arduino. Some of these pins are multiplexed with onboard peripherals and are not connected to TRAVEO™ T2G-B-H MCU by default. For detailed information on how to rework the kit to access these pins, see <a href="#">Table 3</a> . |
| 8.      | Expansion headers (X1)                                               | These headers provide connectivity to TRAVEO™ T2G-B-H MCU GPIOs that are not connected to the other onboard functions.                                                                                                                                                                                                |
| 9.      | Analog-IN header compatible with Arduino Uno R3 (J15)                | Bring out pins from TRAVEO™ T2G-B-H MCU to interface with shields compatible with Arduino. Some of these pins are multiplexed with onboard peripherals and are not connected to TRAVEO™ T2G-B-H MCU by default. For detailed information on how to rework the kit to access these pins, see <a href="#">Table 3</a> . |
| 10.     | External power supply VIN connector (J1)                             | Connect to external 12 V/3 A DC power adapter.                                                                                                                                                                                                                                                                        |
| 11.     | Power LED (LED2)                                                     | Power supply ON/OFF LED status indicator.                                                                                                                                                                                                                                                                             |
| 12.     | KitProg3 USB connector (J2)                                          | Connect to a PC to use the KitProg3 onboard programmer and debugger and to provide power to the board.                                                                                                                                                                                                                |
| 13.     | T2G-B-H microcontroller (U6)                                         | TRAVEO™ T2G MCU device used on the kit.                                                                                                                                                                                                                                                                               |
| 14.     | DEBUG MIPI 10/20 connector (J4)                                      | Connect to an Embedded Trace Macrocell (ETM)-compatible programmer/debugger. This is not loaded by default.                                                                                                                                                                                                           |
| 15.     | T2G-B-H VDDIO voltage selection jumper (J21)                         | J12 connects MCU VDDIO2 to T2G-B-H_VDD which is the outcome of J10 (VCC_3V3 or VCC_5V0) power supply selection.                                                                                                                                                                                                       |
| 16.     | KitProg3 (PSoC™ 5LP) programmer and debugger (CY8C5868LTI-LP039, U4) | The PSoC™ 5LP device (CY8C5868LTI-LP039) serving as KitProg3, is a multi-functional system, which includes an SWD programmer, debugger, USB-I2C bridge, and USB-UART bridge. For more details, see the <a href="#">KitProg3 user guide</a> .                                                                          |
| 17.     | KitProg3 programming mode selection button (SW1)                     | Use this button to switch between various modes of operation of KitProg3. Note that this board supports only                                                                                                                                                                                                          |

## Kit operation

| Sl. No. | Peripheral                                               | Description                                                                                                                                                                                                                                                                                                           |
|---------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         |                                                          | CMSIS-DAP BULK mode. For more details, see the <a href="#">KitProg3 user guide</a> . This button function is reserved for future use.                                                                                                                                                                                 |
| 18.     | KitProg3 status LED (LED1)                               | Amber LED (LED1) indicates the status of KitProg3. For details on the KitProg3 status, see the <a href="#">KitProg3 user guide</a> .                                                                                                                                                                                  |
| 19.     | T2G-B-H VDD voltage selection jumper (J20)               | J12 connects MCU VDDIO2 to T2G-B-H_VDD which is the outcome of J10 (VCC_3V3 or VCC_5V0) power supply selection.                                                                                                                                                                                                       |
| 20.     | Power header compatible with Arduino Uno R3 (J13)        | Powers the shields compatible with Arduino. It also has a provision to power the kit through the VIN input.                                                                                                                                                                                                           |
| 21.     | Potentiometer (VR1)                                      | 10-kΩ potentiometer connected to TRAVEO™ T2G-B-H MCU pin P6[0]. It can be used to simulate a sensor output to TRAVEO™ T2G-B-H MCU.                                                                                                                                                                                    |
| 22.     | User LEDs (LED5)                                         | The user LEDs can operate at the entire operating voltage range of the TRAVEO™ T2G-B-H MCU. The LEDs are active LOW, so the pins must be driven to the ground to turn ON the LEDs.                                                                                                                                    |
| 23.     | User LEDs (LED4)                                         | The user LEDs can operate at the entire operating voltage range of the TRAVEO™ T2G-B-H MCU. The LEDs are active LOW, so the pins must be driven to the ground to turn ON the LEDs.                                                                                                                                    |
| 24.     | User LEDs (LED3)                                         | The user LEDs can operate at the entire operating voltage range of the TRAVEO™ T2G-B-H MCU. The LEDs are active LOW, so the pins must be driven to the ground to turn ON the LEDs.                                                                                                                                    |
| 25.     | Expansion Headers (X2)                                   | These headers provide connectivity to TRAVEO™ T2G-B-H MCU GPIOs that are not connected to the other onboard functions.                                                                                                                                                                                                |
| 26.     | Digital I/O headers compatible with Arduino Uno R3 (J16) | Bring out pins from TRAVEO™ T2G-B-H MCU to interface with shields compatible with Arduino. Some of these pins are multiplexed with onboard peripherals and are not connected to TRAVEO™ T2G-B-H MCU by default. For detailed information on how to rework the kit to access these pins, see <a href="#">Table 3</a> . |
| 27.     | CAN FD transceiver (U8)                                  | CAN FD transceiver.                                                                                                                                                                                                                                                                                                   |
| 28.     | CAN FD interface connector (J5)                          | Connector to connect the kit to the CAN / CAN FD network                                                                                                                                                                                                                                                              |
| 29.     | User buttons (SW4)                                       | Provide input to TRAVEO™ T2G-B-H MCU. Note that by default the button connects the TRAVEO™ T2G-B-H MCU pin to the ground when pressed, so you need to configure the TRAVEO™ T2G-B-H MCU pin as a digital input with resistive pull-up for detecting the button press.                                                 |
| 30.     | User buttons (SW3)                                       | Provide input to TRAVEO™ T2G-B-H MCU. Note that by default the button connects the TRAVEO™ T2G-B-H MCU pin to the ground when pressed, so you need to configure the TRAVEO™ T2G-B-H MCU pin as a digital input with resistive pull-up for detecting the button press.                                                 |

**Kit operation**

| Sl. No. | Peripheral                                   | Description                                                                                     |
|---------|----------------------------------------------|-------------------------------------------------------------------------------------------------|
| 31.     | T2G-B-H reset button (SW2)                   | Resets TRAVEO™ T2G-B-H MCU. It connects the TRAVEO™ T2G-B-H MCU reset (XRES) pin to the ground. |
| 32.     | 25-MHz crystal for Ethernet transceiver (Y3) | Oscillator for the Ethernet PHY.                                                                |

See [4.4 Layouts](#) for details on various hardware blocks.

## 3.2 BSP selection

The TRAVEO™ T2G-B-H evaluation kit comes with a KIT\_T2G-B-H\_Lite board support package (BSP) to build and run code examples on the kit by following the instructions given in the **Board Support Packages** section of the [ModusToolbox™ user guide](#).

## 3.3 KitProg3: Onboard programmer/debugger

The TRAVEO™ T2G-B-H evaluation board can be programmed and debugged using the onboard KitProg3, which has USB-UART, USB-I2C, and USB-SPI Bridge (not supported on this board) functionality. KitProg3 supports CMSIS-DAP only and does not support mass storage. A PSoC™ 5LP device is used to implement the KitProg3 functionality. For more details on the KitProg3 functionality, see the [KitProg3 user guide](#).

### 3.3.1 Programming and debugging using ModusToolbox™ software

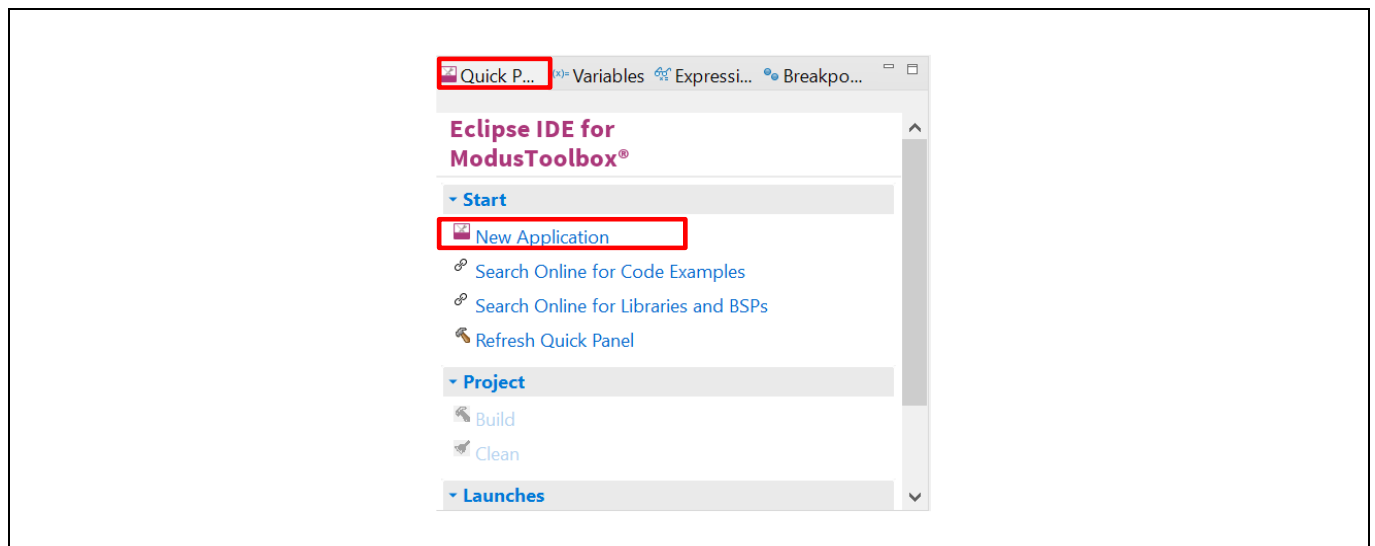
1. Connect the board to the PC using the provided USB cable through the KitProg3 USB connector, as shown in [Figure 7](#). It enumerates as a USB Composite Device when you connect it to your PC for the first time.
2. KitProg3 on this kit supports CMSIS-DAP Bulk mode (default) and CMSIS-DAP Bulk with two UARTs. The status LED (amber) is always ON in the CMSIS-DAP Bulk mode. If you do not see the desired LED status, see the [KitProg3 user guide](#) for details on the KitProg3 status and troubleshooting instructions.

*Note: The programming can be done in either of the KitProg3 programming modes but it is recommended to program the kit in CMSIS-DAP Bulk mode.*

The image shows the Infineon KIT\_T2G-B-E\_LITE REV-D development board. It is a red PCB populated with various components. Key features include:

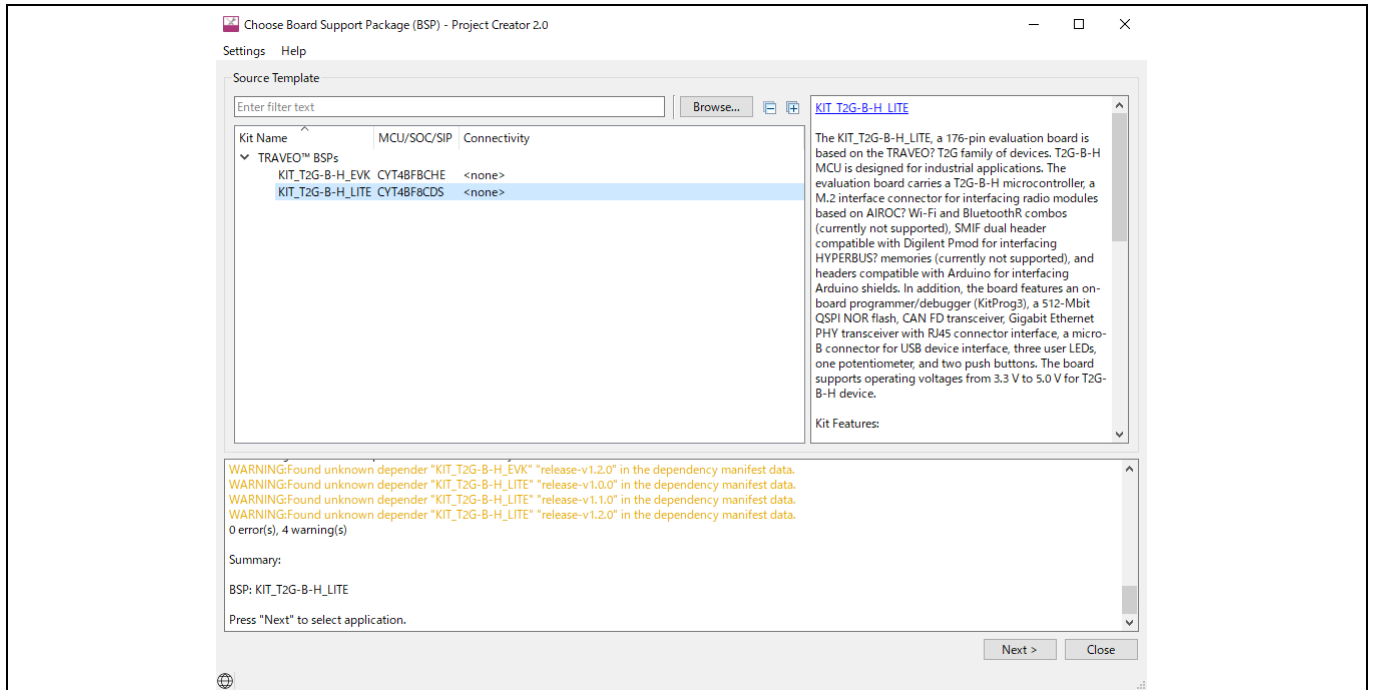
- Microcontroller:** A large black square chip in the center, labeled "CYT46F8CEDQ0AE 5G5 2412Z023 D: 10 CYP JPN".
- Memory:** A silver rectangular chip on the left, labeled "7499010211A WE".
- Connectors:** Multiple pin headers for I/O, including a 25-pin header at the top, a 10-pin header on the left, and a 25-pin header at the bottom.
- Buttons:** Two push buttons labeled "USER1" and "USER2" near the top center.
- LEDs:** Several LEDs are visible, including "LED1" and "LED2" near the microcontroller, and "LED3" and "LED4" near the top right.
- Power Regulation:** A DC-DC converter module is located on the right side, with a black cable connected to it.
- Infineon Logo:** The Infineon logo is prominently displayed in the upper left quadrant.
- Board Labels:** The board is labeled "KIT\_T2G-B-E\_LITE REV-D" in the upper left area.

3. In the Eclipse IDE for ModusToolbox™ software, import the desired code example (application) into a new workspace.
  - a) Click on **New Application** from **Quick Panel**.



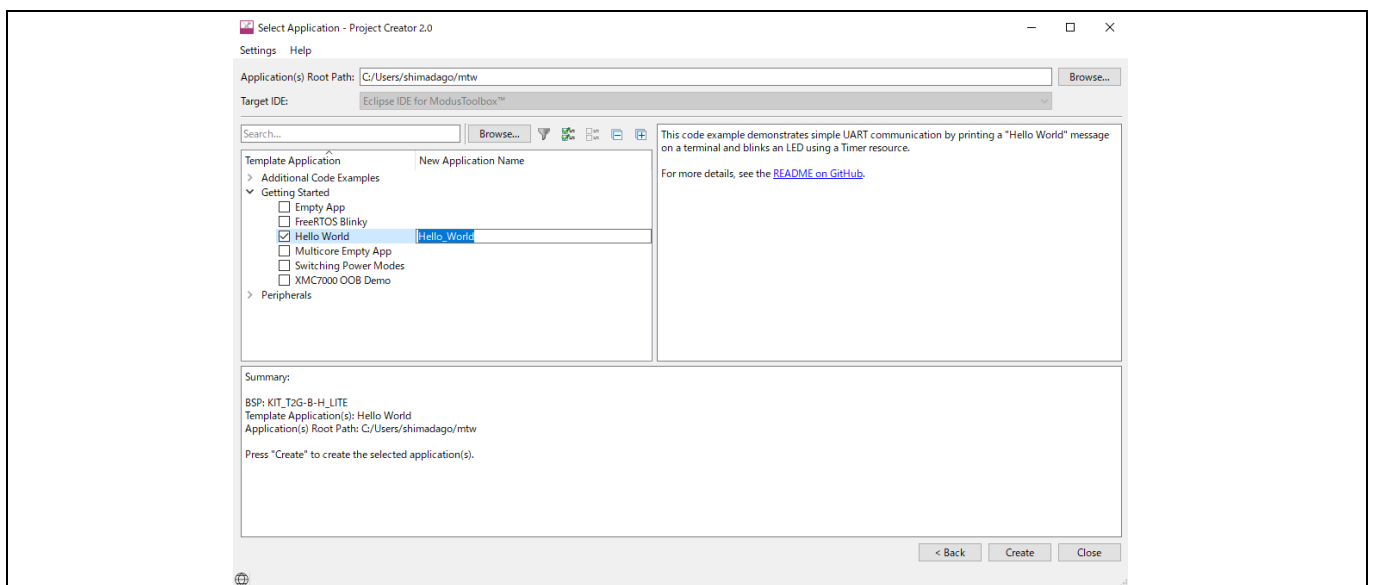
## Kit operation

- b) Select the BSP in the “Choose Board Support Package (BSP)” window and click **Next**.  
As noted in section [3.2 BSP selection](#), select the BSP based on the combination of baseboard and radio module used. The rest of the steps assume there is no radio module connected to the baseboard and use the KIT\_T2G-B-H\_EVK BSP for the explanation.



**Figure 9 Creating a new application: Choose Board Support Package (BSP)**

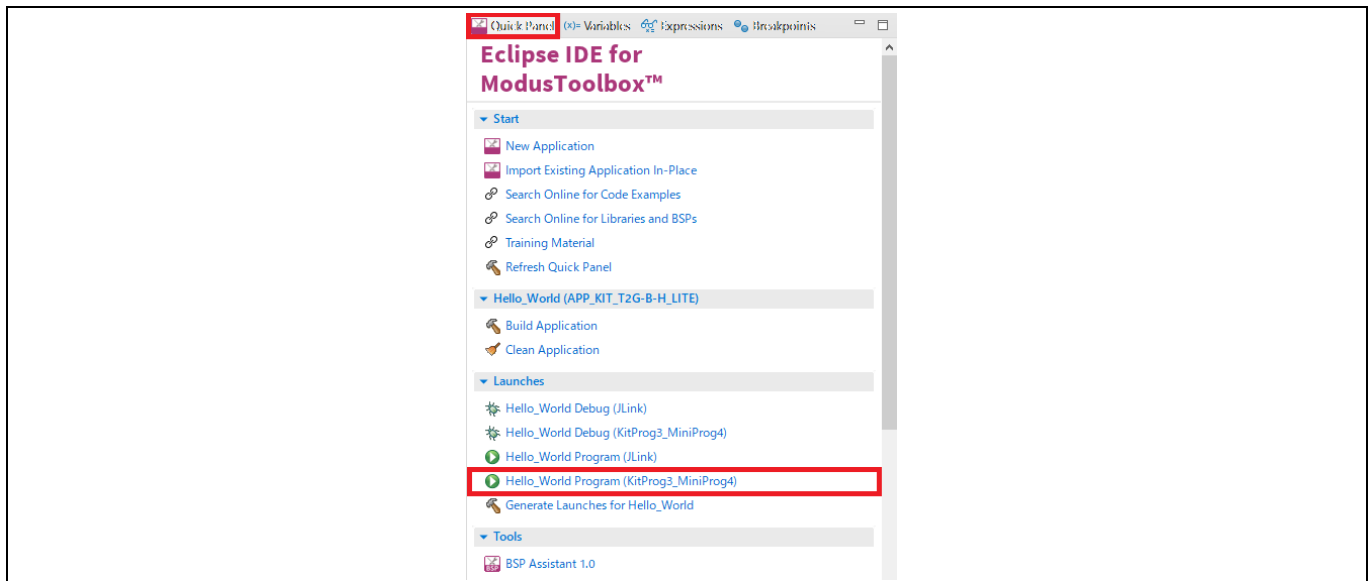
- c) Select the application in the “Select Application” window and click **Create**.



**Figure 10 Creating a new application: Select application**

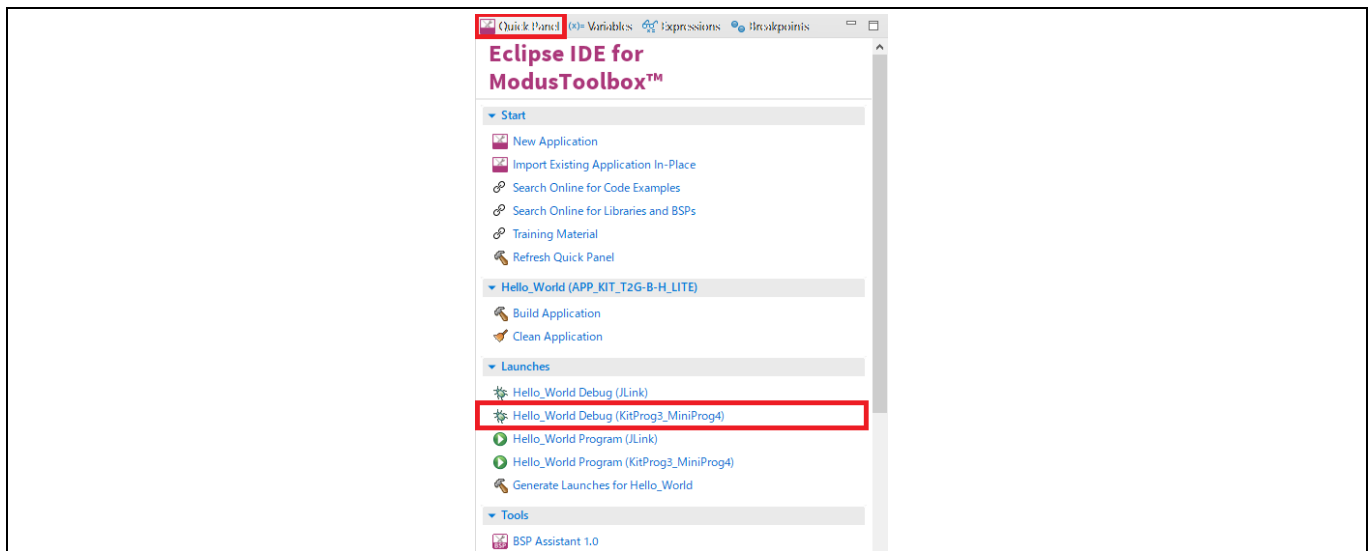
## Kit operation

- To build and program a TRAVEO™ T2G-B-H MCU application, in the Project Explorer, select **<App\_Name>** project. In the Quick Panel, scroll to the Launches section and click the **<App\_Name> Program (KitProg3\_MiniProg4)** configuration as shown in [Figure 11](#).



**Figure 11 Programming in ModusToolbox™ software**

- ModusToolbox™ software has an integrated debugger. To debug a TRAVEO™ T2G-B-H MCU application, in the Project Explorer, select **<App\_Name>** project. In the Quick Panel, scroll to the **Launches** section and click the **<App\_Name> Debug (KitProg3\_MiniProg4)** configuration as shown in [Figure 12](#). For more details, see the “Program and debug” section in the [Eclipse IDE for ModusToolbox™ user guide](#).



**Figure 12 Debugging in ModusToolbox™ software**

Kit operation

3.3.2 USB-UART bridge

KitProg3 on the TRAVEO™ T2G-B-H evaluation board can act as a USB-UART bridge.

The UART Rx and Tx pins of KitProg3 are connected to the TRAVEO™ T2G-B-H MCU UART pins as follows:

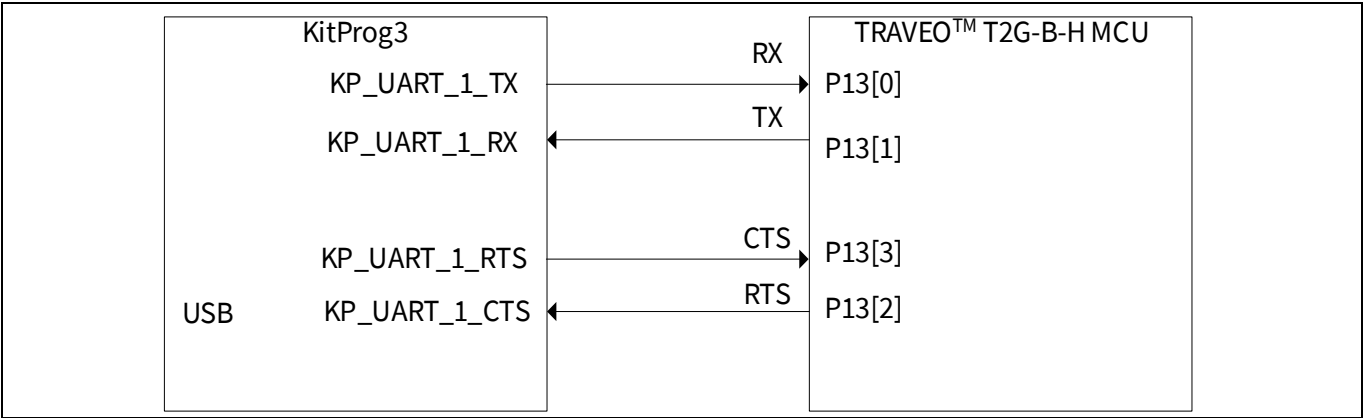


Figure 13 UART connection between KitProg3 and TRAVEO™ T2G-B-H MCU

For more details on the KitProg3 USB-UART functionality, see the [KitProg3 user guide](#).

## Hardware

# 4 Hardware

## 4.1 KIT\_T2G-B-H\_Lite kit connections

### 4.1.1 USER LEDs

The correspondence between the LEDs on the board and the CYT4BF8xx device pins and the port pins are shown in [Table 5](#).

**Table 5** USER LEDs

| USER LED   | Ref. Designator | CYT4BF8xx |      |
|------------|-----------------|-----------|------|
|            |                 | Pin       | Pin  |
| USER LED 1 | LED3            | 29        | P5.0 |
| USER LED 2 | LED4            | 30        | P5.1 |
| USER LED 3 | LED5            | 31        | P5.2 |

### 4.1.2 USER switches

The correspondence between the switches and the CYT4BF8xx device pins and the port pins are shown in [Table 6](#).

**Table 6** USER switches

| USER switch | Ref. Designator | CYT4BF8xx |       |
|-------------|-----------------|-----------|-------|
|             |                 | Pin       | Pin   |
| USER SW 1   | SW3             | 32        | P5.3  |
| USER SW 2   | SW4             | 116       | P17.0 |

### 4.1.3 RESET switch

The correspondence between the RESET switch and the CYT4BF8xx device pin and the port pin are shown in [Table 7](#).

**Table 7** RESET switch

| USER switch | Ref. Designator | CYT4BF8xx |      |
|-------------|-----------------|-----------|------|
|             |                 | Pin       | Pin  |
| RESET SW    | SW2             | 152       | XRES |

## Hardware

### 4.1.4 MODE switch

The mode switch will change the mode of operation of the KitProg3 device. While communicating with the TRAVEO™ T2G device, make sure that the KitProg3 device should be in CMSIS DAP mode (LED1 is solid ON).

The correspondence between the MODE SW and the PSoC™ 5LP pin number is given in [Table 8](#).

**Table 8** MODE switch

| USER switch | Ref. Designator | PSoC 5LP |       |
|-------------|-----------------|----------|-------|
|             |                 | Pin      | Pin   |
| MODE SW     | SW1             | 13       | P1[2] |

## 4.2 System configuration

To work with the starter kit, install the KitProg3 USB-UART driver in the system; see the [KitProg3 User Guide](#).

For software and tool configuration, see the [TRAVEO™ T2G Body High Lite Kit - Getting Started](#).

## 4.3 Schematics

This section shows the schematics of the TRAVEO™ T2G Body High Lite Kit.

## General safety instructions

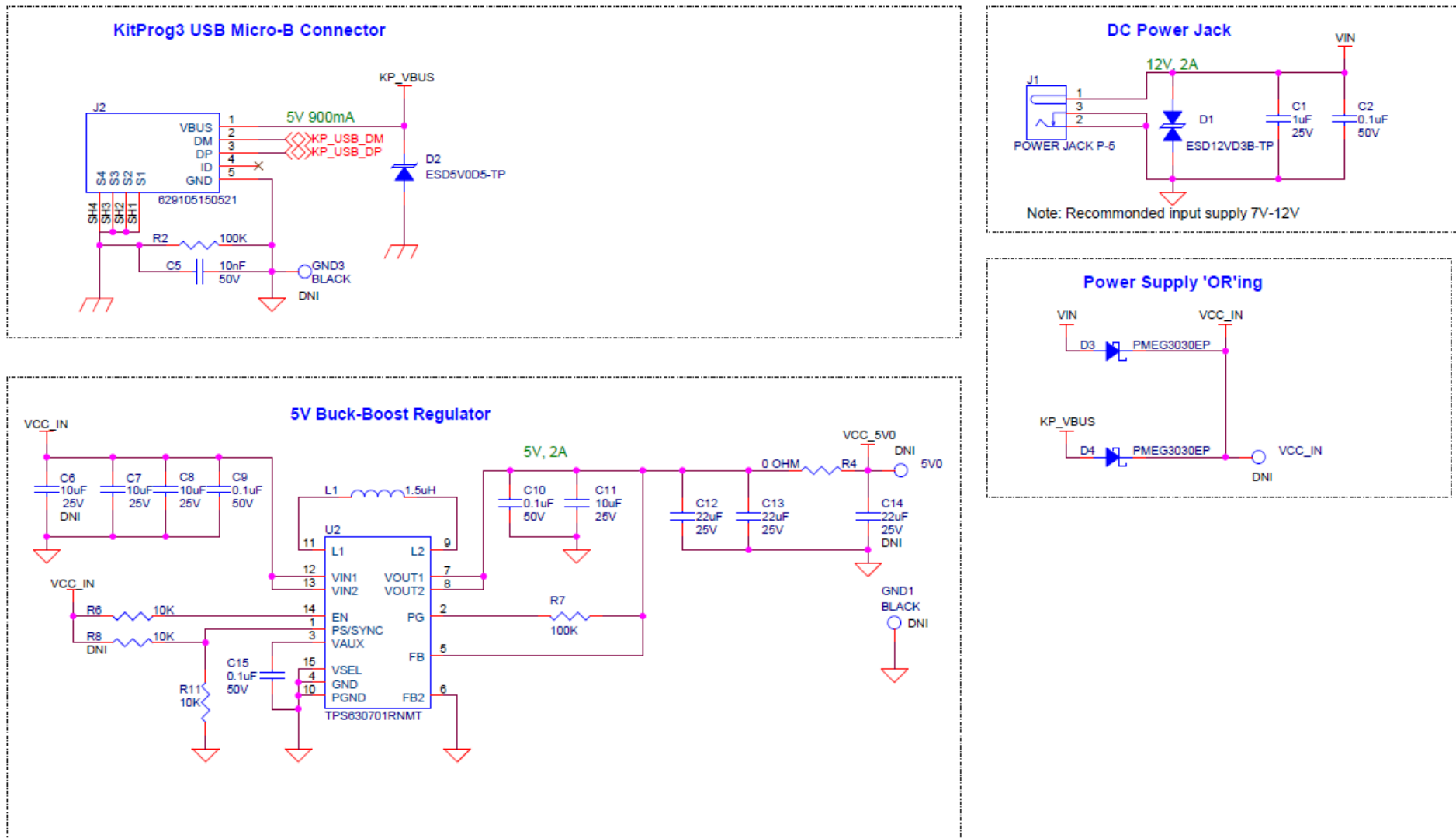


Figure 14 Power Supply - 1

## General safety instructions

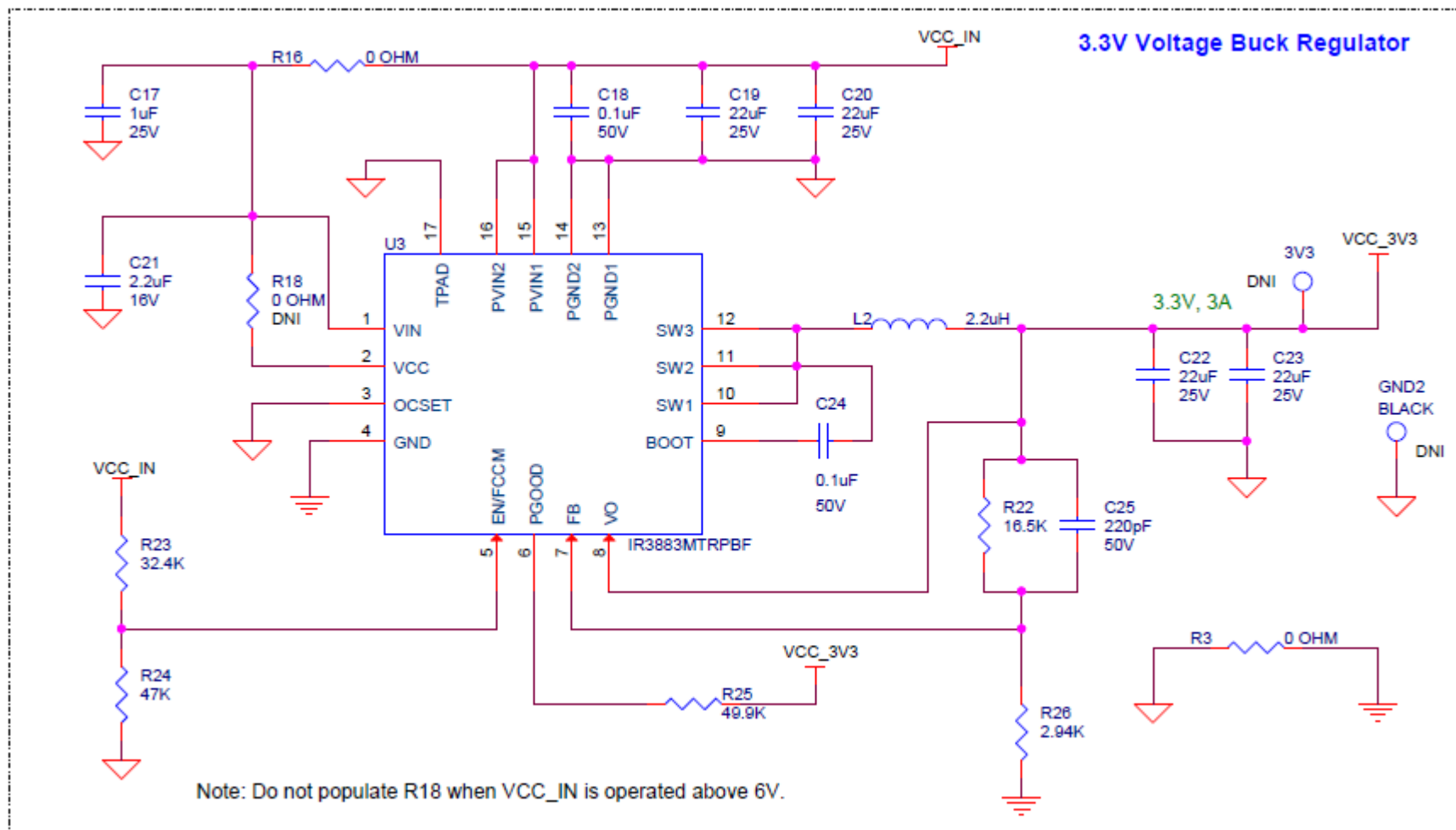


Figure 15 Power Supply - 2

## General safety instructions

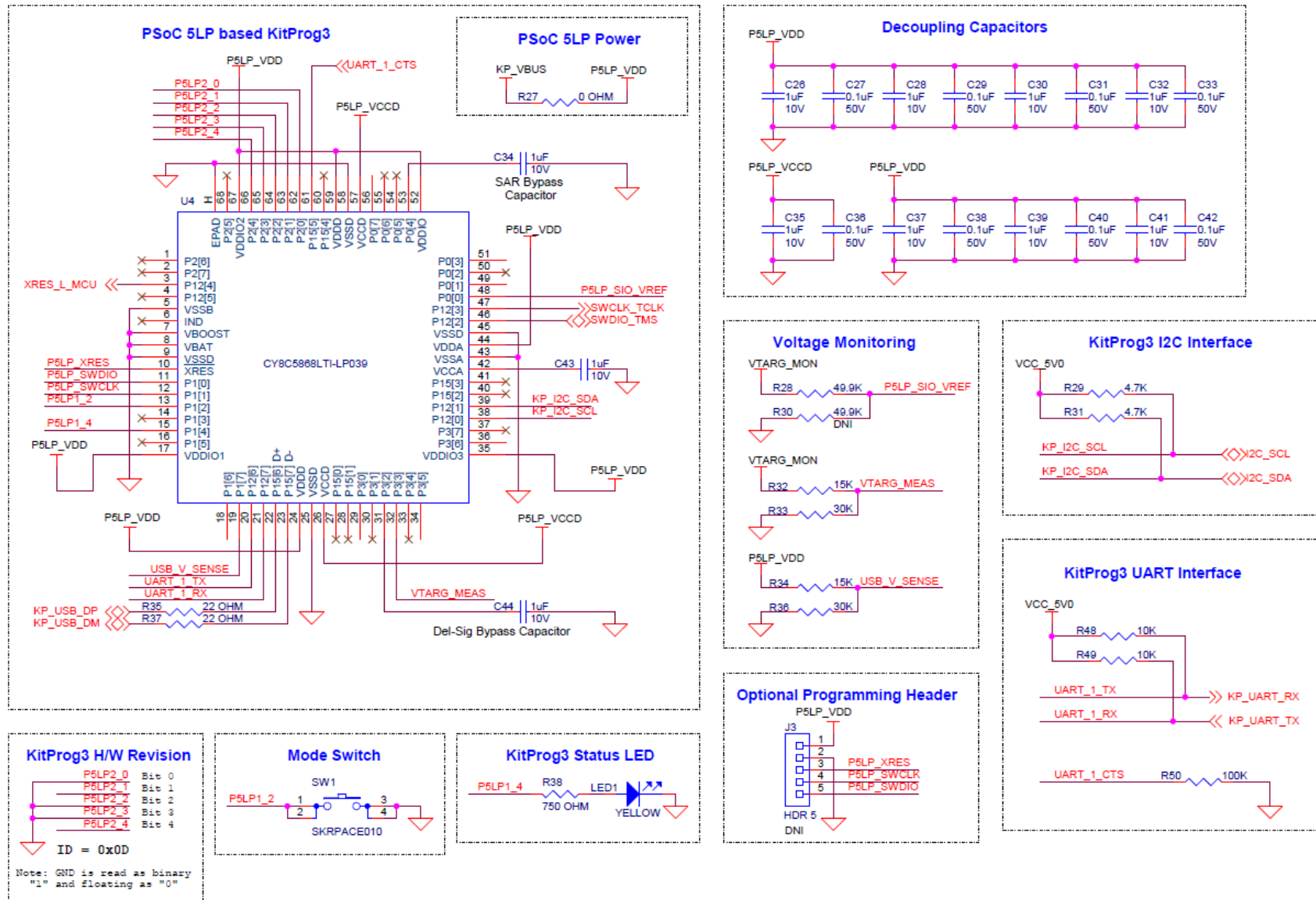
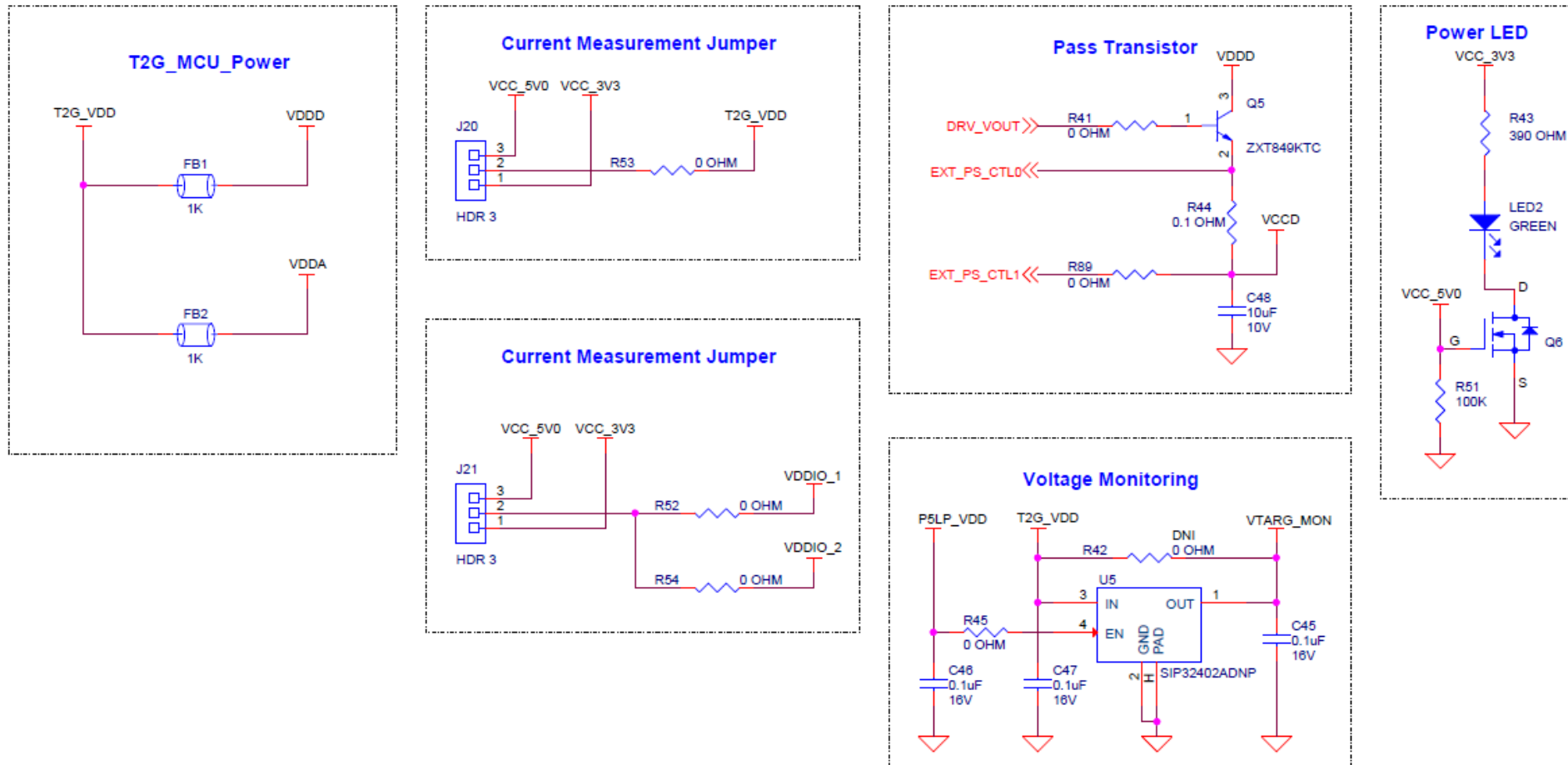


Figure 16 KitProg3 Interface

## General safety instructions



**Figure 17 TRAVEO T2G MCU Power**

## General safety instructions

## T2G-B-H-8M 176 MCU1



Figure 18 TRAVEO™ T2G-B-H-8M 176-pin MCU - 1

## General safety instructions

## T2G-B-H-8M 176 MCU2



Figure 19 TRAVEO T2G-B-H-8M 176-pin MCU - 2

## General safety instructions

## T2G-B-H-8M 176 MCU3



Figure 20 TRAVEO T2G-B-H-8M 176-pin MCU - 3

## General safety instructions

## T2G-B-H-8M 176 MCU4

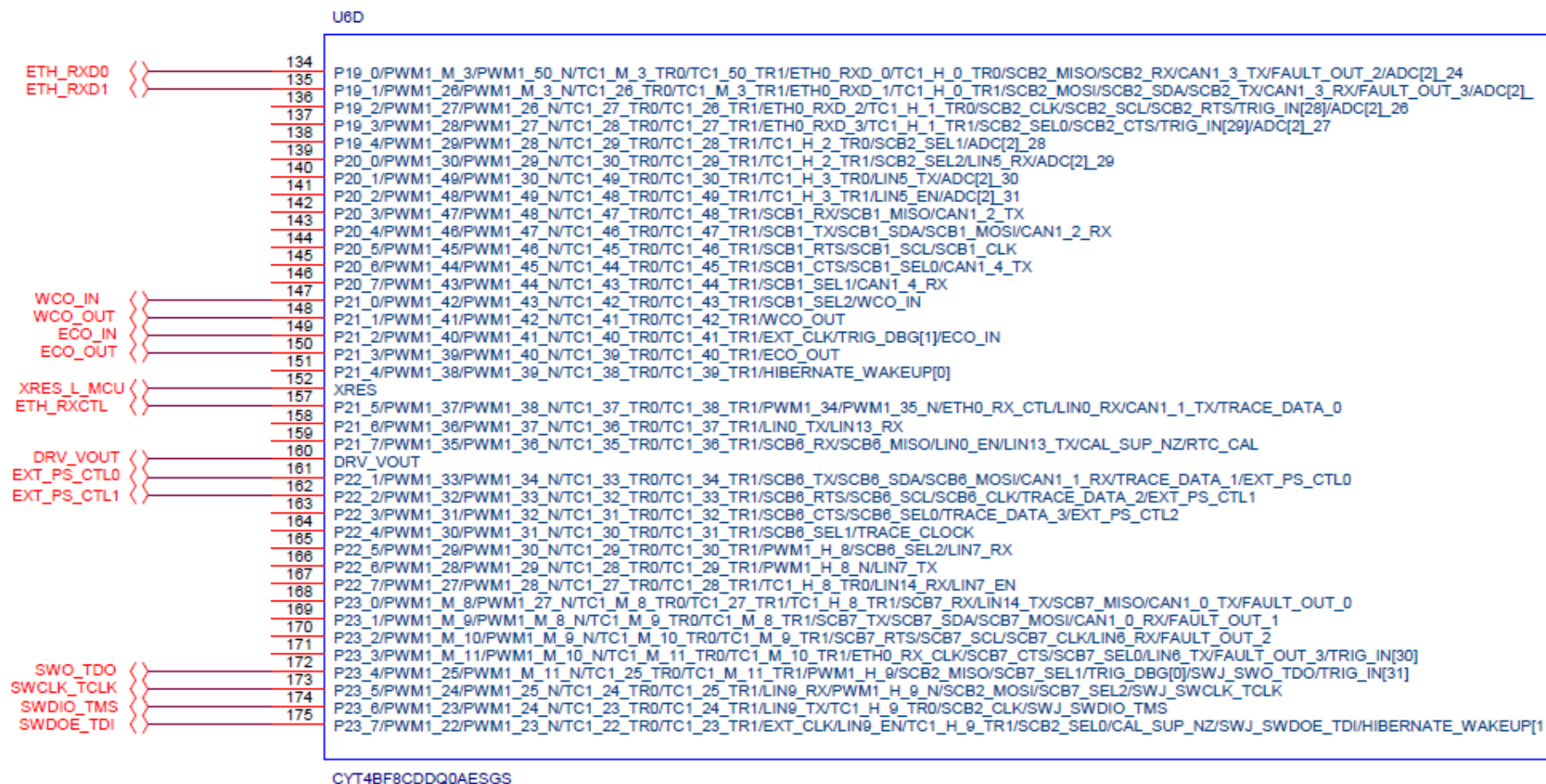


Figure 21 TRAVEO T2G-B-H-8M 176-pin MCU - 4

## General safety instructions

T2G-B-H-8M 176 MCU5

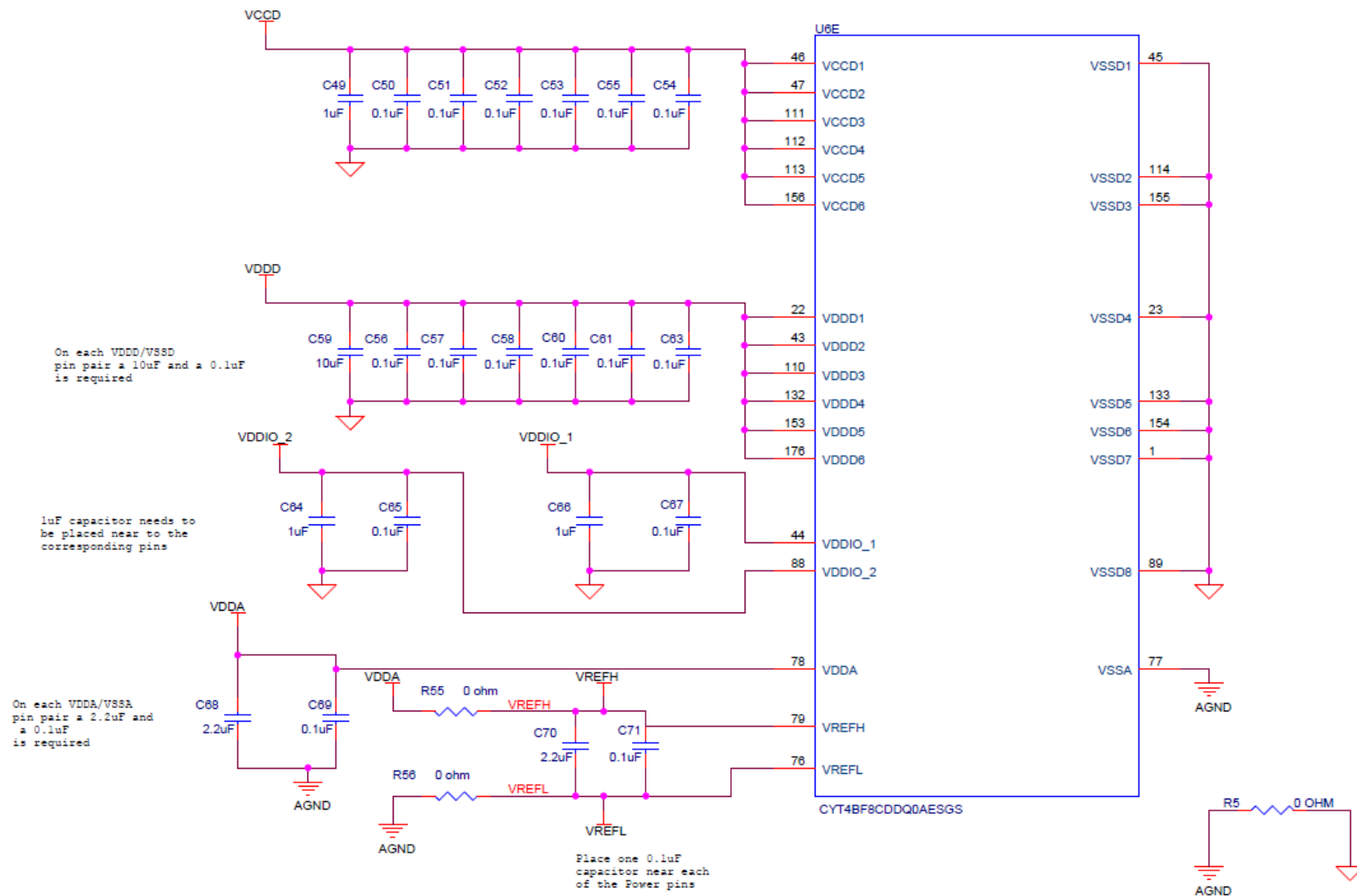
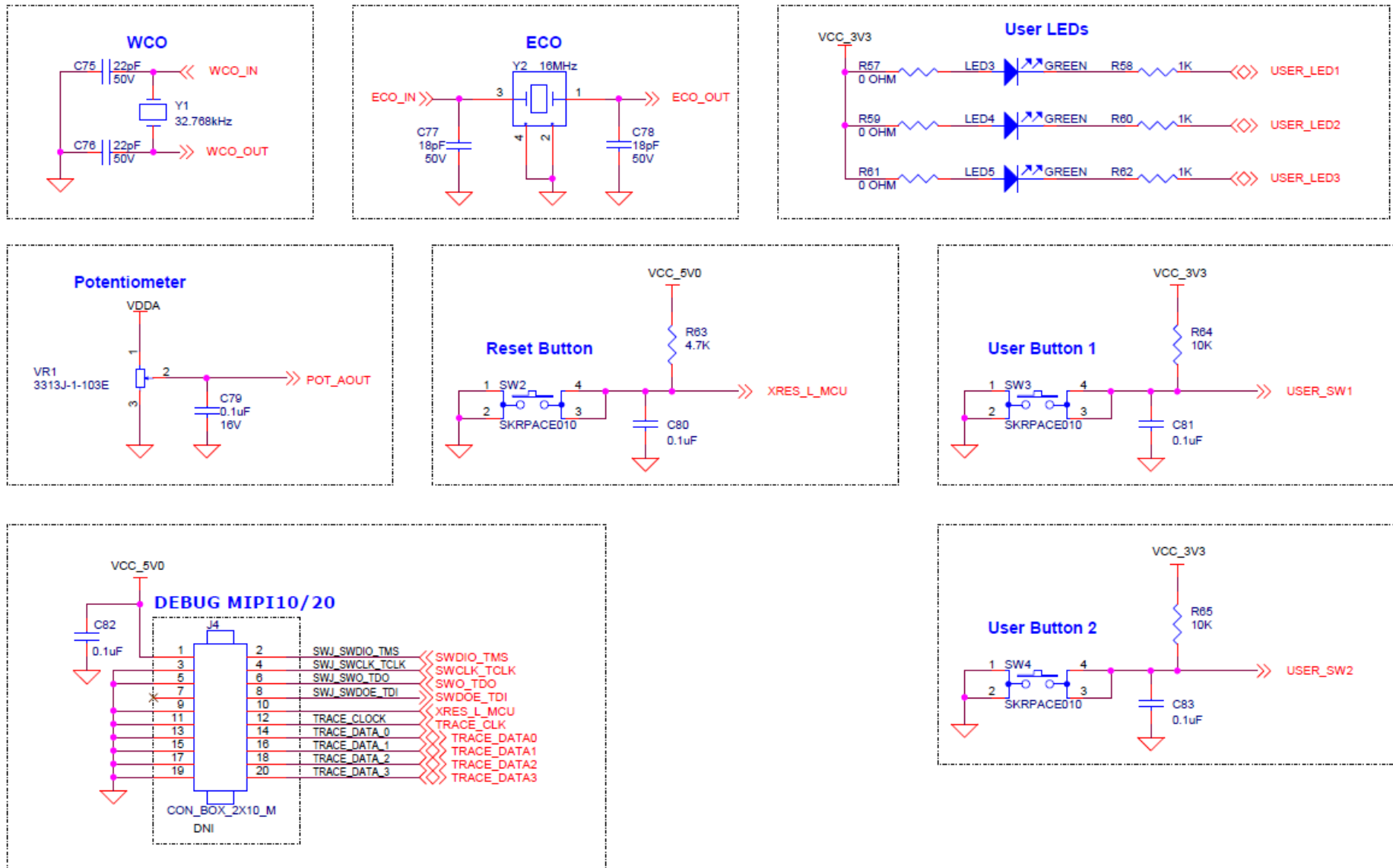


Figure 22 TRAVEO T2G-B-H-8M 176-pin MCU - 5

## General safety instructions



**Figure 23** Peripheral Interface

## General safety instructions

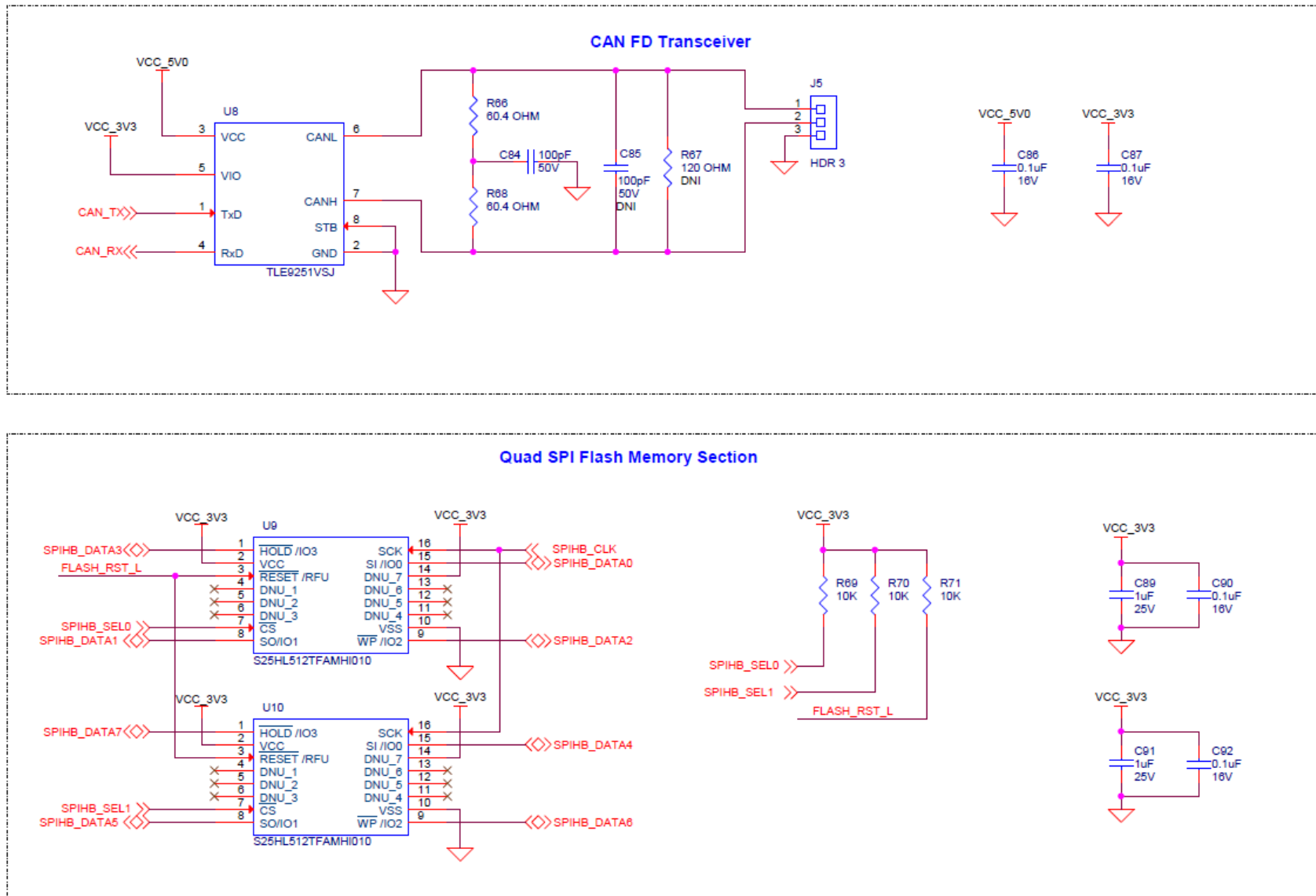
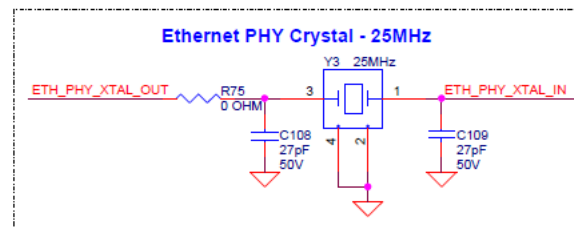
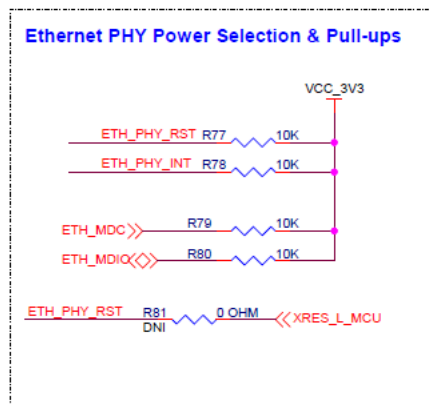
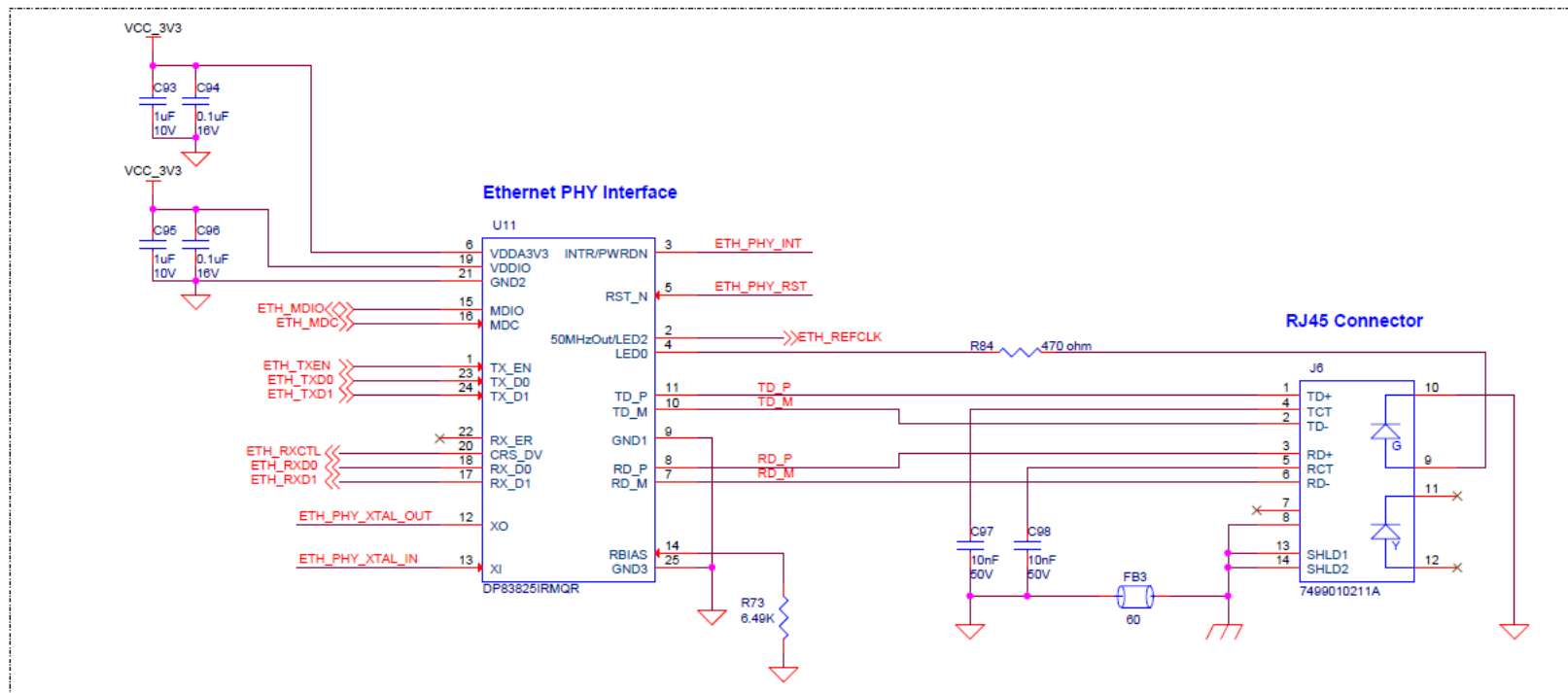


Figure 24 CAN and QSPI Interface

## General safety instructions



**Figure 25 Ethernet Transceiver**

General safety instructions

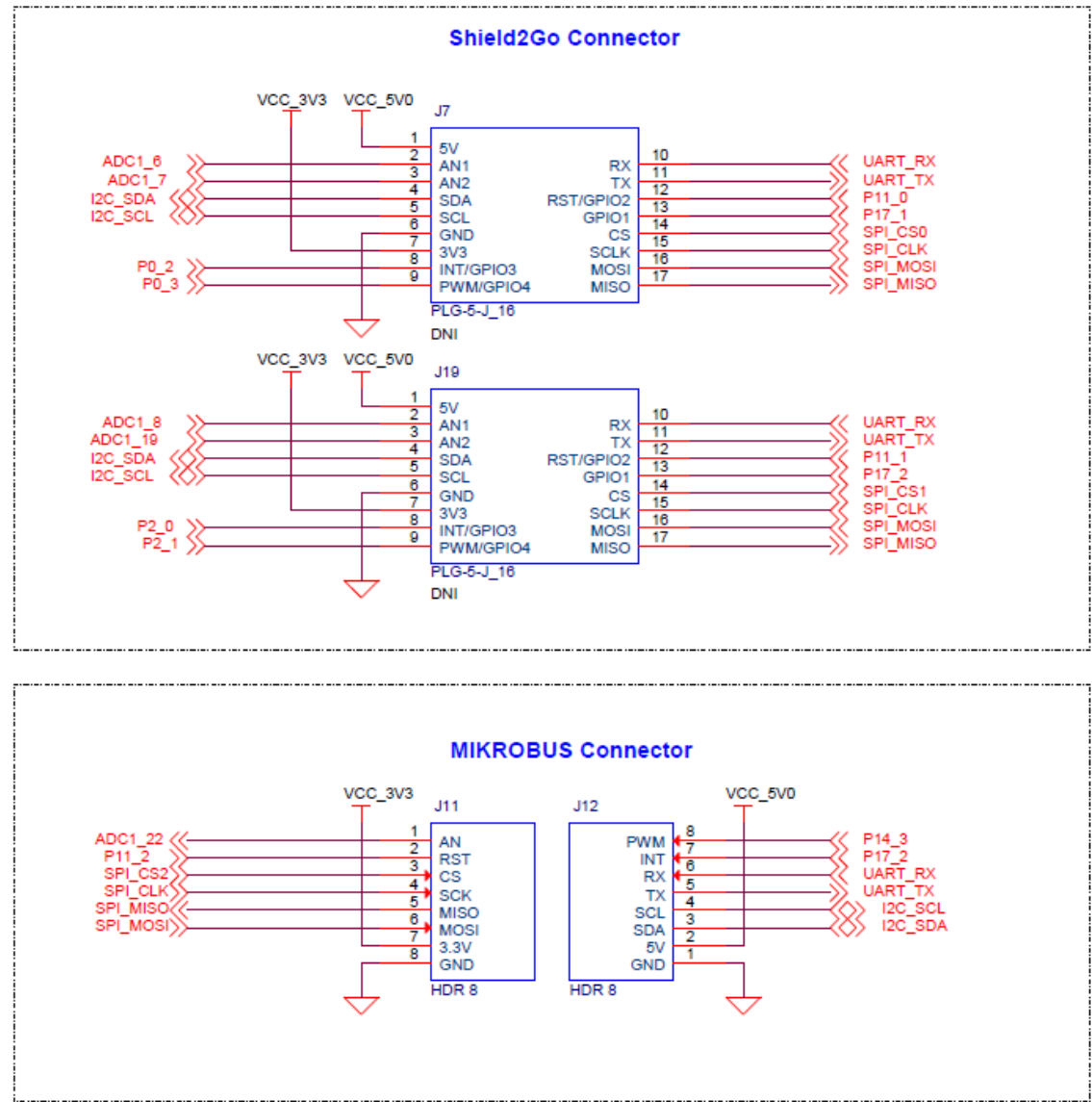


Figure 26 Ethernet Clock and RJ45 Connector

General safety instructions

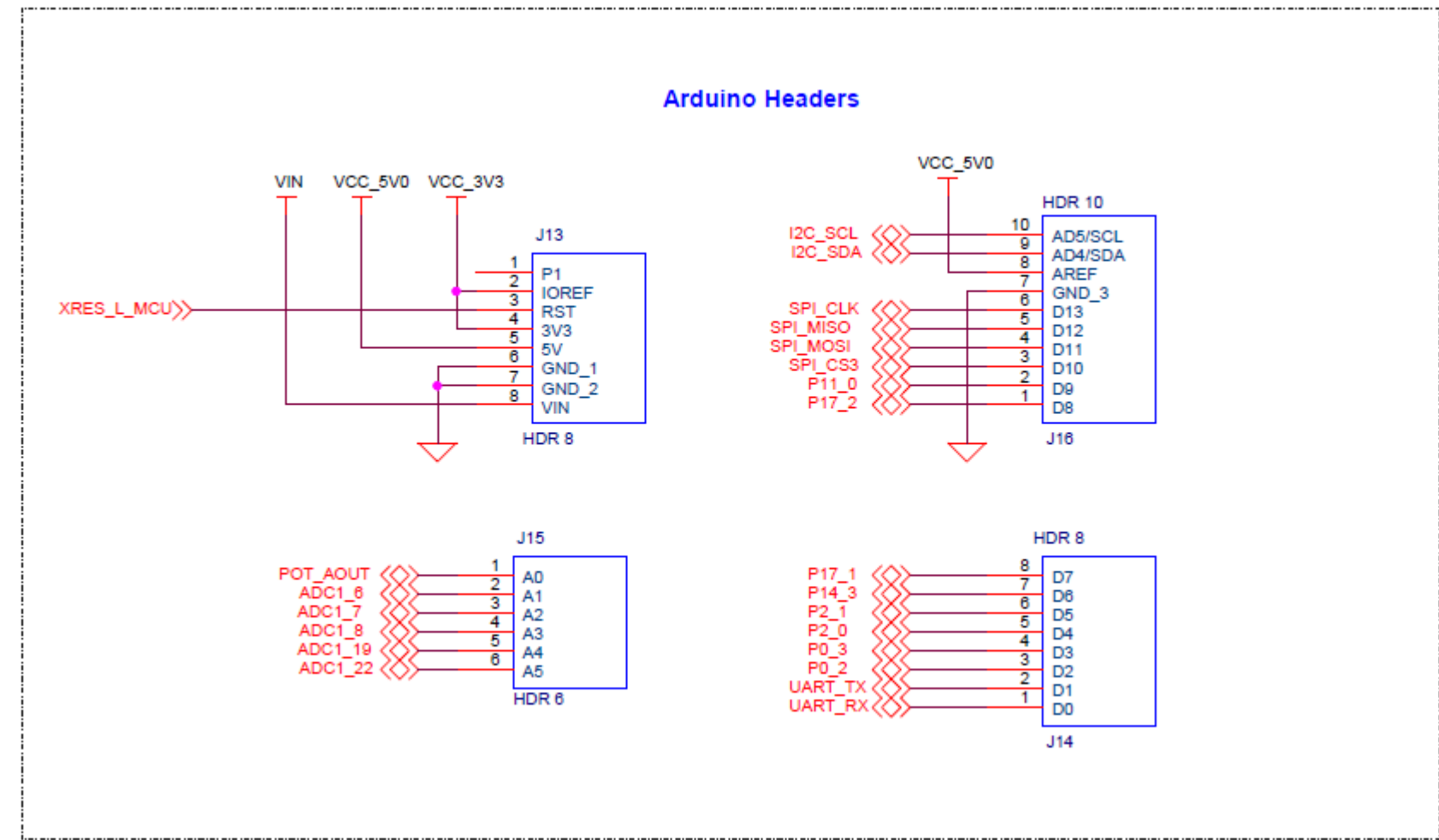
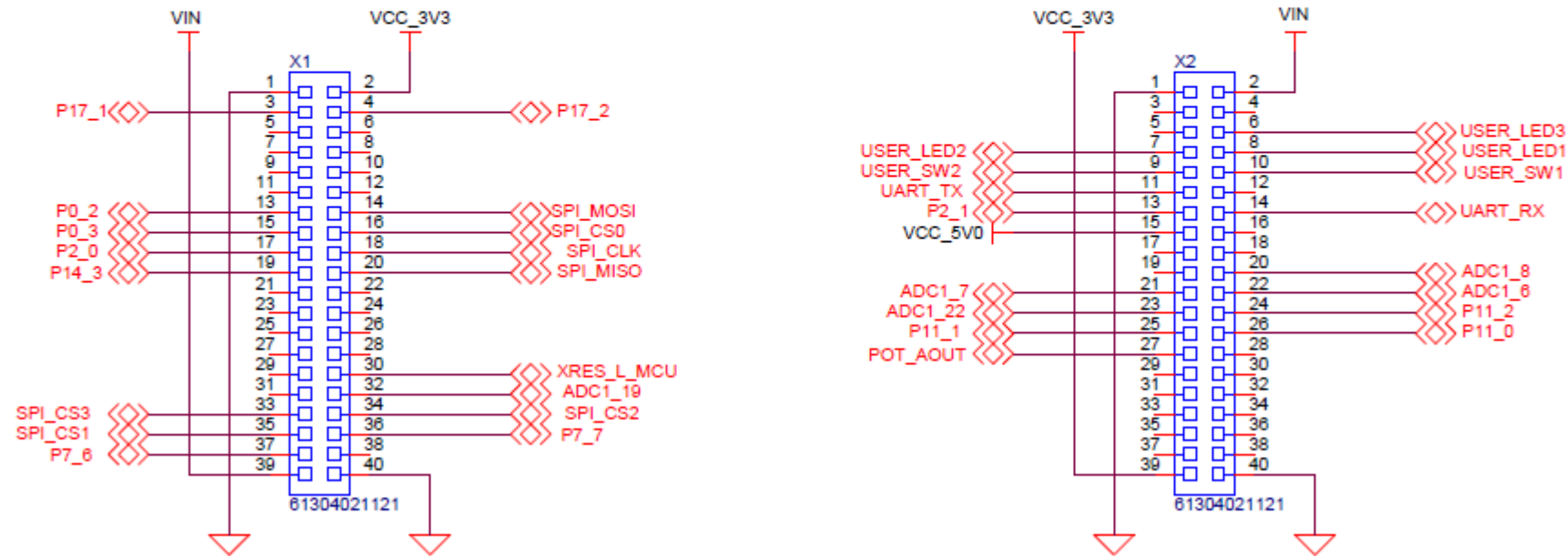


Figure 27 Ethernet Clock and RJ45 Connector



**Figure 28** Shield2Go /MikroBUS

### 4.4 Layouts

This section shows the board layouts of the TRAVEO T2G Body High Lite kit.

General safety instructions

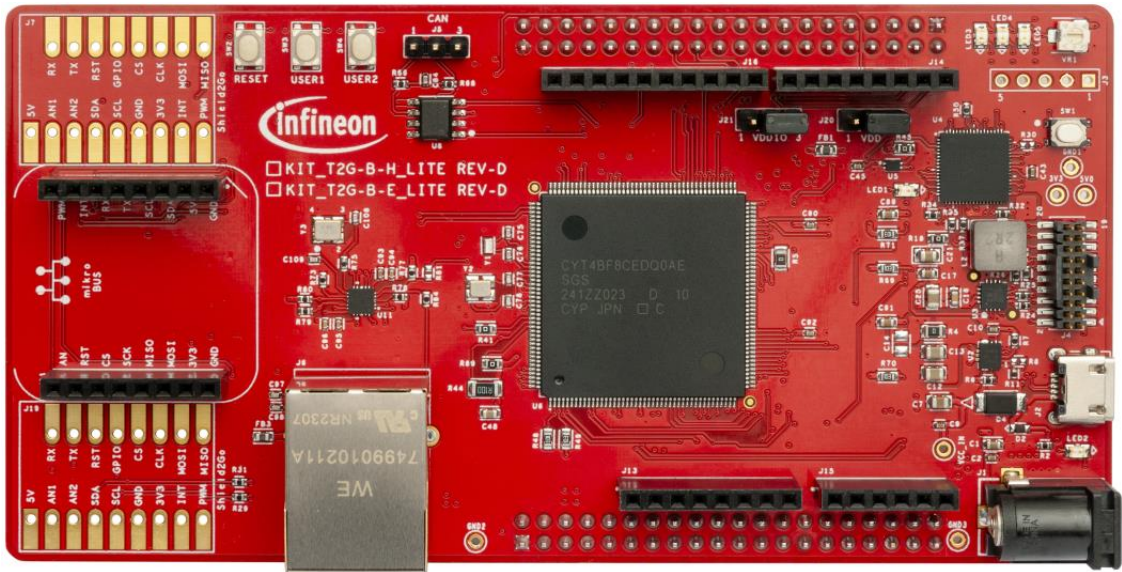


Figure 29 Top view

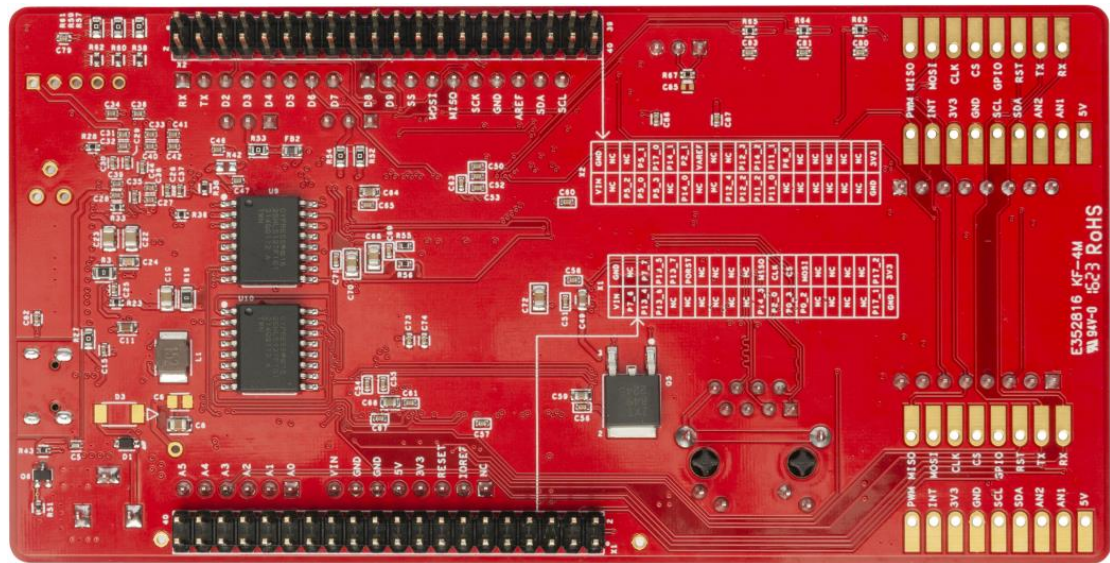


Figure 30 Bottom view

## 5 Known limitations

This section lists the known limitations of the KIT\_T2G-B-H\_LITE.

**Table 9**      **Limitation information**

| No. | Description                                        | Workaround                                                       | Application     |
|-----|----------------------------------------------------|------------------------------------------------------------------|-----------------|
| 1   | Power supply from the DC power jack does not work. | Do not use DC 12-V AC adaptor plugged to the DC Power Jack (J1). | Rev. D version. |

---

**Revision history****Revision history**

| Document revision | Date       | Description of changes                                                       |
|-------------------|------------|------------------------------------------------------------------------------|
| **                | 2023-07-20 | Initial release                                                              |
| *A                | 2023-10-19 | Added a note about schematics.<br>Fixed pinout Figure 3 and fixed schematics |

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