KIT_T2G-B-E_LITE TRAVEO™ T2G Body Entry Lite Kit user guide

About this document

Scope and purpose

This document provides a comprehensive understanding of the TRAVEO™ T2G Body Entry Lite kit (KIT_T2G-B-E_LITE) low-cost evaluation kit. The kit is based on the TRAVEO™ T2G CYT2BL device from the TRAVEO™ Body Entry family of microcontrollers.

This document serves to describe the features and functions of the TRAVEO™ T2G Body Entry Lite kit. In addition, it offers a detailed information on the available interfaces and guidelines for using the hardware interfaces. By the end of this guide, users should have a thorough understanding of how to utilize the TRAVEO™ T2G Body Entry Lite kit and its various capabilities.

Intended audience

This document is designed for all customers who are interested in evaluating the capabilities of the TRAVEO™ T2G Body Entry family CYT2BL device. Its main purpose is to offer a comprehensive guide that outlines the various features of the device and how it can be used in a range of applications. Whether you are testing new software or exploring different hardware designs, this document can provide valuable insights and guidance to help you achieve your goals.

Evaluation board

The purpose of this board is to assist with the software evaluation during the design-in process. However, it is important to note that while this board can be a helpful tool during the design process, it is not intended for use in the final customer design. The PCB and auxiliary circuits are not optimized to meet the specific needs and requirements of the end user. Instead, they are designed to provide a simplified and streamlined platform exclusively for software evaluation purposes.

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Safety precautions

Note: *Please note the following warnings regarding the hazards associated with development systems.*

Table 1   **Safety precautions**

⚠️	**Caution:** *The evaluation or reference board contains parts and assemblies sensitive to electrostatic discharge (ESD). Electrostatic control precautions are required when installing, testing, servicing or repairing the assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with electrostatic control procedures, refer to the applicable ESD protection handbooks and guidelines.*
⚠️	**Caution:** *The evaluation or reference board is shipped with packing materials that need to be removed prior to installation. Failure to remove all packing materials that are unnecessary for system installation may result in overheating or abnormal operating conditions.*

Table of contents

1 Getting started

This section provides an overview of the TRAVEO™ T2G Body Entry Lite kit and offers step-by-step guidance on how to set up and power up the kit. Additionally, it provides instructions on how to run the preprogrammed firmware and default jumper configuration to ensure a seamless experience.

1.1 Kit overview

This section provides the brief overview of the KIT_T2G-B-E_LITE kit and the details about all the various interfaces and peripherals available.

Introduction

The KIT_T2G-B-E_LITE kit enables you to evaluate and develop applications using the TRAVEO™ T2G Body Entry family CYT2BL device.

The TRAVEO™ T2G B-E MCU is specifically designed for automotive applications and features an Arm® Cortex®-M4F CPU for primary processing, and an Arm® Cortex®-M0+ CPU for peripheral and security processing that supports low-power operations, up to 4 MB flash and 512 KB SRAM, and programmable analog and digital peripherals that allow for faster time-to-market.

The TRAVEO™ T2G B-E Lite kit is equipped with a TRAVEO™ T2G B-E family CYT2BL MCU, two expansion headers, two Shield2Go connectors, and headers that are compatible with Arduino shield and mikroBUS.

Additionally, the board features an onboard programmer/debugger (KitProg3), a CAN FD transceiver, a Micro-B connector for the 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 the TRAVEO™ T2G B-E MCU.

To develop and debug projects on the TRAVEO™ T2G B-E Lite kit, you can use the ModusToolbox™ software, which is a set of tools that enable you to integrate these devices into your existing development methodology.
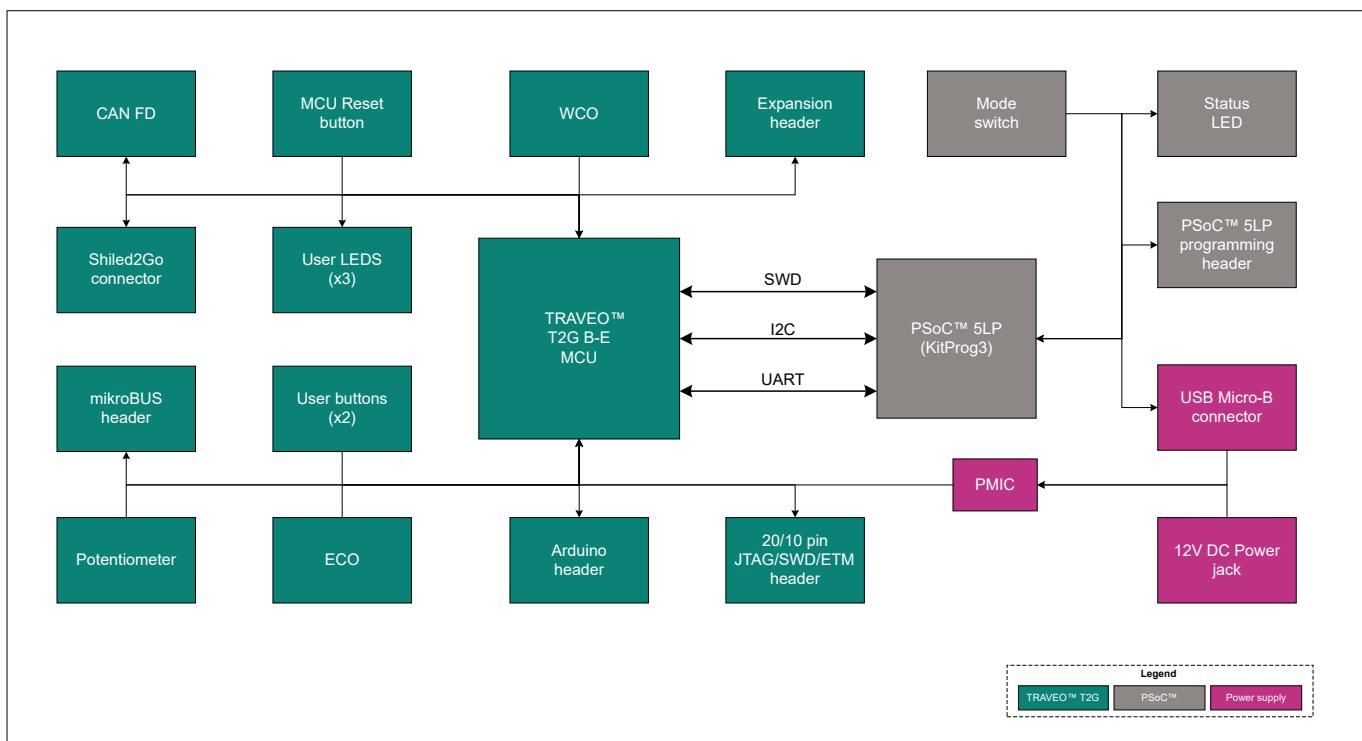

Figure 1   Block diagram of TRAVEO™ T2G B-E Lite kit

1 Getting started

Peripheral details
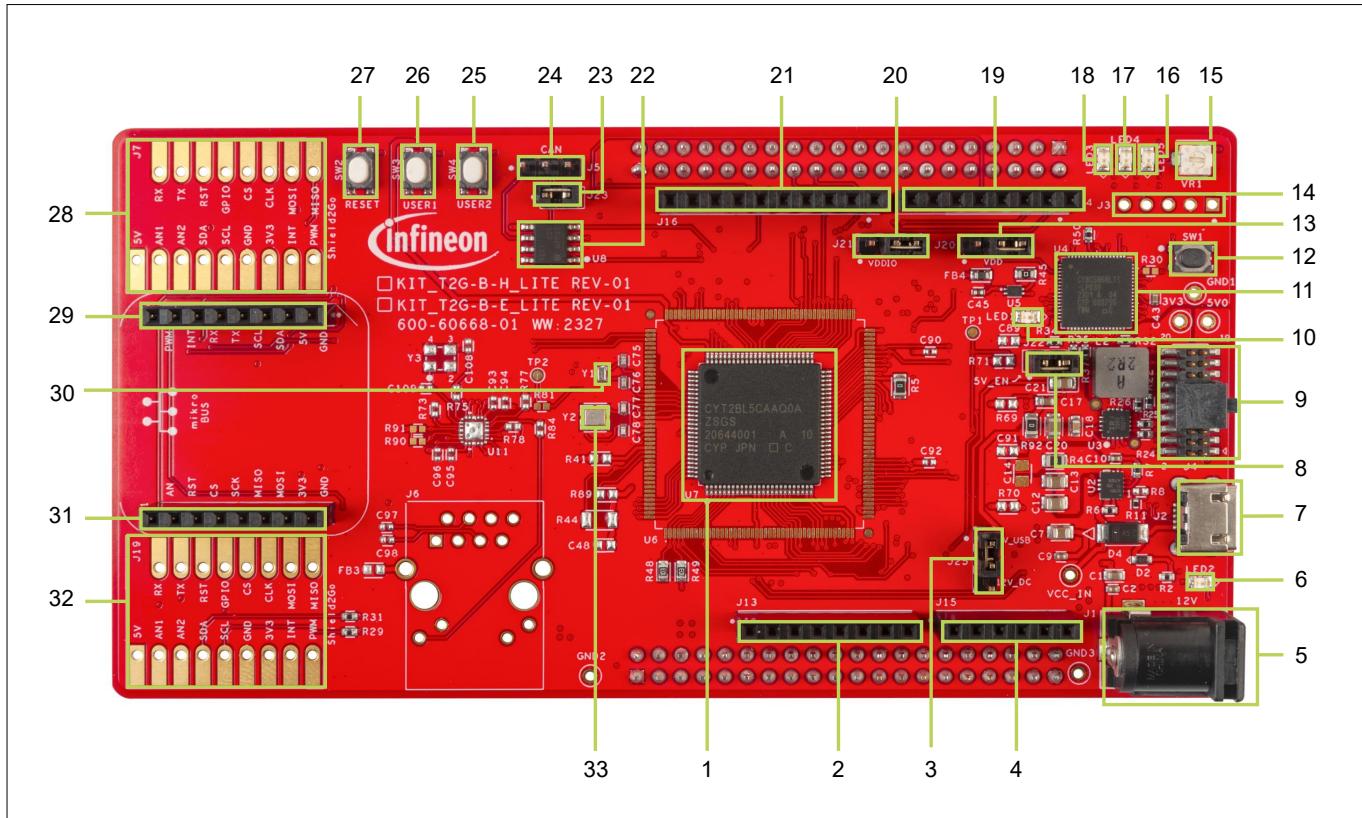
**Figure 2**   **Peripheral and interfaces in the TRAVEO™ T2G B-E Lite kit front side**
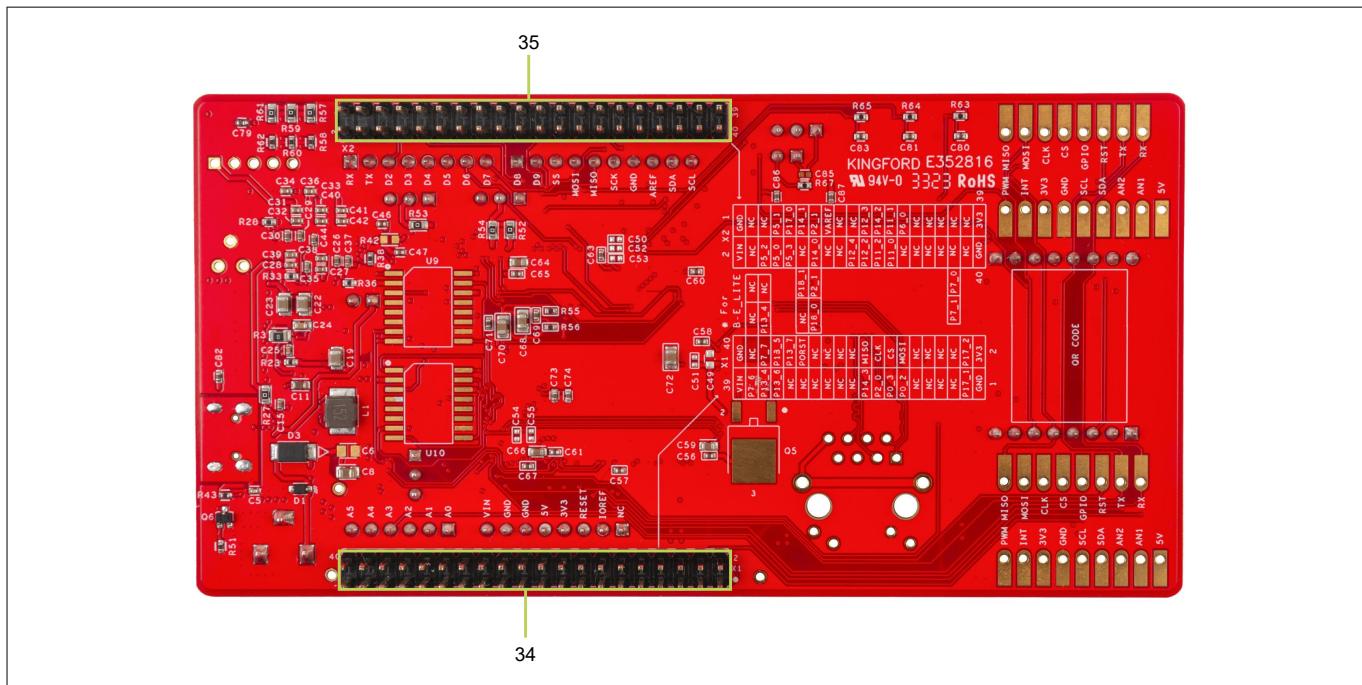
Figure 3   **Peripheral and interfaces in the TRAVEO™ T2G B-E Lite kit back side**

1 Getting started

Table 2   **Peripheral details**

Markup	Schematic reference designator	Peripheral	Description
1	U7	TRAVEO™ T2G MCU	TRAVEO™ T2G CYT2BL MCU device is used on the kit
2	J13	Arduino header	Powers the Arduino shields. It also has a provision to power the kit through the VIN input
3	J25	3-pin jumper	For input power supply selection
4	J15	Arduino header	Bring out pins from TRAVEO™ T2G B-E MCU to interface with Arduino shields. By default, a few of these pins are multiplexed with onboard peripherals and are not connected to TRAVEO™ T2G B-E MCU.
5	J1	12 V DC power jack	Connect to external 12 V/3 A DC power adapter
6	LED2	Power LED	Power supply ON/OFF LED status indicator
7	J2	USB Micro-B connector	Connect to a PC to use the onboard programmer and debugger KitProg3 and also to provide power to the kit
8	J22	2-pin jumper	5 V supply enable for feeding to the input of buck regulator
9	J4	MIPI-20 Cortex® debug + ETM connector	Connect to an Embedded Trace Macrocell (ETM)-compatible programmer/debugger
10	LED1	KitProg3 status LED	Amber LED indicates the status of KitProg3
11	U4	PSoC™ 5LP	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.
12	SW1	KitProg3 mode select button	Use this button to switch between various modes of operation of KitProg3. Note that this board supports only CMSIS-DAP BULK mode. This button function is reserved for future use.
13	J20	3-pin jumper	VDD current measurement jumper
14	J3	PSoC™ 5LP programming header	Can be used for programming the PSoC™ 5LP device
15	VR1	Potentiometer	10 kΩ potentiometer connected to TRAVEO™ T2G B-E MCU pin P6.0
16	LED5	User LED 3	The user LEDs can operate at the entire operating voltage range of the TRAVEO™ T2G B-E MCU
17	LED4	User LED 2	The user LEDs can operate at the entire operating voltage range of the TRAVEO™ T2G B-E MCU
18	LED3	User LED 1	The user LEDs can operate at the entire operating voltage range of the TRAVEO™ T2G B-E MCU
19	J14	Arduino header	Bring out pins from TRAVEO™ T2G B-E MCU to interface with Arduino shields. By default, a few of these pins are multiplexed with onboard peripherals and are not connected to TRAVEO™ T2G B-E MCU.
20	J21	3-pin jumper	VDDIO current measurement jumper

(table continues...)

Table 2 **(continued) Peripheral details**

Markup	Schematic reference designator	Peripheral	Description
21	J16	Arduino header	Bring out pins from TRAVEO™ T2G B-E MCU to interface with Arduino shields. By default, a few of these pins are multiplexed with onboard peripherals and are not connected to TRAVEO™ T2G B-E MCU.
22	U8	CAN FD transceiver	High-speed CAN FD transceiver which support speed up to 5 Mbps
23	J23	2-pin jumper	120 Ω termination resistor between CANH and CANL in CAN bus
24	J5	CAN FD interface connector	Connector to connect the kit to the other CAN FD nodes
25	SW4	User button 2	Provide input to TRAVEO™ T2G B-E MCU. Note that by default the button connects the TRAVEO™T2G B-E MCU pin to the ground when pressed, so you need to configure the TRAVEO™ T2G B-E MCU pin as a digital input with resistive pull-up for detecting the button press.
26	SW3	User button 1	Provide input to TRAVEO™ T2G B-E MCU. Note that by default the button connects the TRAVEO™ T2G B-E MCU pin to the ground when pressed, so you need to configure the TRAVEO™ T2G B-E MCU pin as a digital input with resistive pull-up for detecting the button press.
27	SW2	TRAVEO™ T2G B-E MCU reset button	Resets TRAVEO™ T2G B-E MCU. It connects the TRAVEO™ T2G B-E MCU reset (XRES) pin to the ground.
28	J7	Shield2Go connector	Optional connector for Shield2Go interface (DNI)
29	J12	mikroBUS header	Optional header for mikroBUS interface
30	Y1	Crystal oscillator	32.768 kHz watch crystal oscillator
31	J11	mikroBUS header	Optional header for mikroBUS interface
32	J19	Shield2Go connector	Optional connector for Shield2Go interface (DNI)
33	Y2	Crystal oscillator	16 MHz external crystal oscillator
34	X1	Expansion header	These headers provide connectivity to TRAVEO™ T2G B-E MCU GPIOs that are not connected to the other onboard functions.
35	X2	Expansion header	These headers provide connectivity to TRAVEO™ T2G B-E MCU GPIOs that are not connected to the other onboard functions.

1.2 Kit content

This section provides a detailed list of the components that are included in the kit.

Table 3   **Kit contents**

Quantity	Description	Remarks
1	KIT_T2G-B-E_LITE Rev-01	TRAVEO™ T2G Body Entry Lite Kit
1	USB Micro-B cable	To power up the board in addition to programming and debugging the lite kit.

Figure 4   **Kit content of the TRAVEO™ T2G B-E Lite kit Rev-01**

Note that the kit does not include a Quick Start Guide (QSG) in the box. However, you can find the QSG along with the additional resources on the KIT_T2G-B-E_LITE webpage.

1.3   Initial jumper configuration

This section describes the default jumper configuration and location required for each module. Because a few interfaces are multiplexed, the default interface selection is mentioned in Table 4.

This initial configuration also helps to generate all the power supplies from the regulators and distribute them to safely power-up the lite kit.

Table 4   **Default jumper configuration**

| Jumper	Function	Position
J20	VDD current measurement jumper	2-3: short
J21	VDDIO current measurement jumper	2-3: short
J22	5 V supply enable jumper	1-2: short
J23	CAN bus 120 Ω termination resistor jumper	1-2: short
J25	Input power supply selection jumper	1-2: short
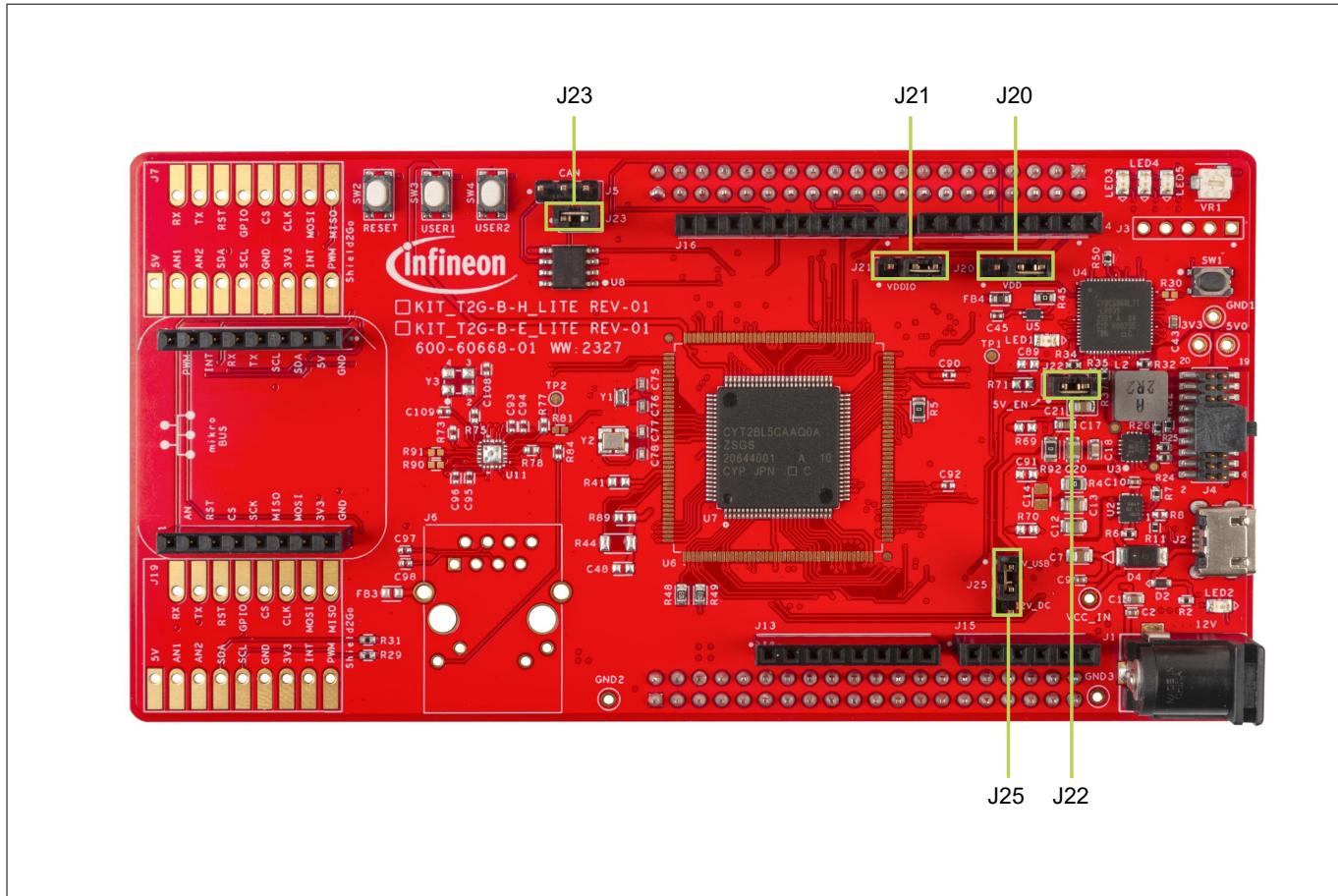
Figure 5   **Jumpers location in the TRAVEO™ T2G B-E Lite kit**

1.4   Powering up the kit

This section provides basic information on the different powering options that are available for the TRAVEO™ T2G B-E Lite kit.

The TRAVEO™ T2G B-E Lite kit can be powered using one of two options:

- The default powering option is to use a USB Micro-B cable, which can be connected to the USB Micro-B connector (J2). This option is capable of powering both the MCU and the onboard programmer/debugger KitProg3

- If you prefer, use a 12 V DC power adapter to supply power to the kit through the 12 V DC power jack. However, note that this option is not able to power the KitProg3, but the USB Micro-B option is to power up the TRAVEO™ T2G B-E Lite kit using either of two options

1.4.1   Powering-up the kit through USB Micro-B

1.   Ensure that the power is disconnected from the kit
2.   Short the jumper (J25) between position 1-2
3.   Short the jumper (J22)
4.   Connect the USB Micro-B cable from the PC to the USB connector (J2)
5.   Observe that the power LED is glowing green
6.   Additionally, observe that the KitProg3 status LED begins glowing in amber
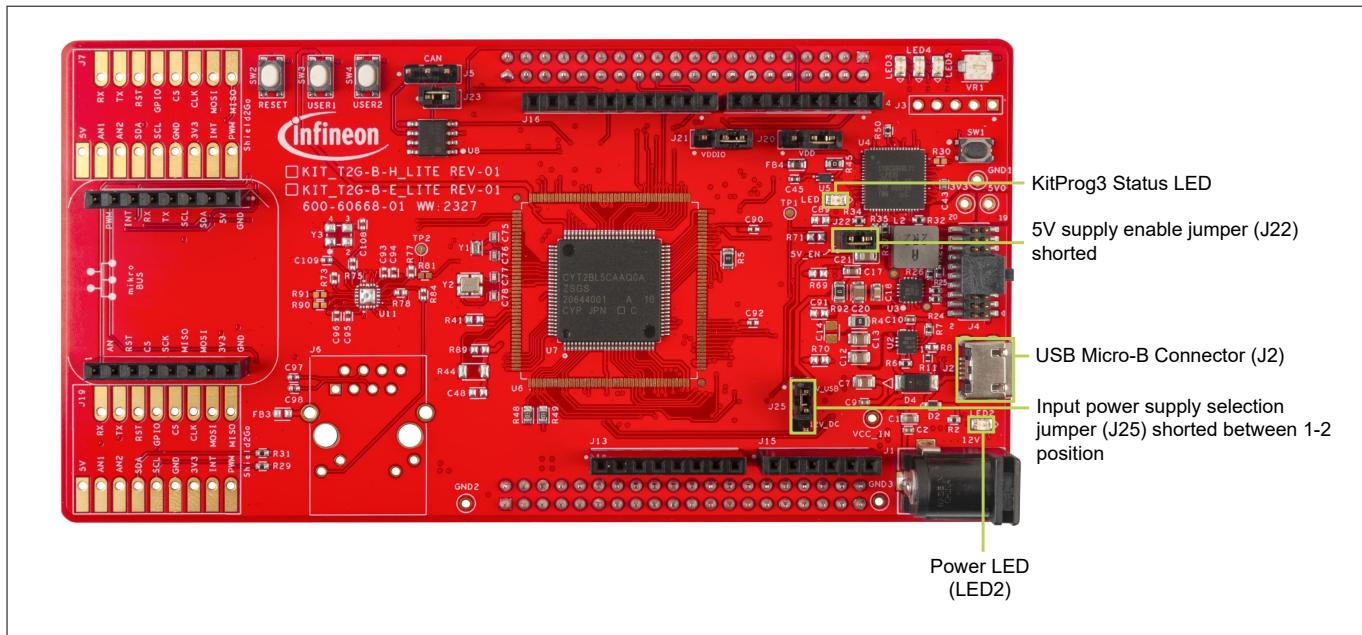
Figure 6   **Powering the kit through USB Micro-B**

1.4.2   Powering-up the kit through 12 V DC power adapter

1.   Ensure that the power is disconnected from the kit
2.   Short the jumper (J25) between position 2-3
3.   Connect the 12 V DC power adapter to power jack (J1)
4.   Observe that the power LED is glowing green
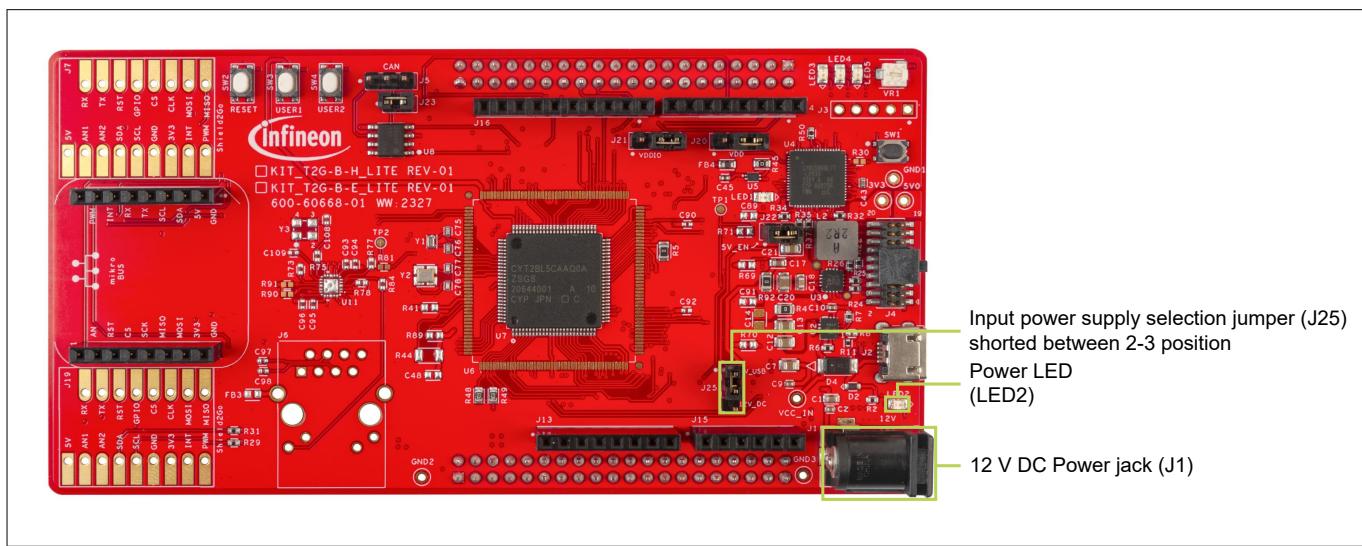
Figure 7   **Powering the kit through 12 V DC power adapter**

1.5   Preprogrammed firmware

The TRAVEO™ T2G B-E Lite kit is shipped with preloaded software that is ready to run as soon as the kit is powered up. This software includes the results of all the interfaces tests and can be a valuable resource for developers who want to verify the functionality status of the kit, ensuring it is in a working condition.

1 Getting started

To get started with the preloaded software, ensure that you have followed the correct jumper settings and powered up the TRAVEO™ T2G B-E Lite kit. Then, do the following to view the full test logs on the screen, along with a blinking pattern of the user LEDs:

1. Connect the lite kit with your PC via the USB Micro-B cable
2. Open any serial terminal software (such as Tera Term) in your PC
3. Configure the connection for "Serial" and choose the port that shows "KitProg3 USB-UART" in the port option
4. Go to **Setup** > **Serial port** > **Speed** and select **115200** as the **baud rate**. Click the **New setting** button to create a new configuration
5. Press the MCU reset button (SW2) on the Lite kit. The silicon details and test results of the peripherals are printed on the serial terminal screen
6. Observe that the user LEDs on the kit starts blinking in a pattern
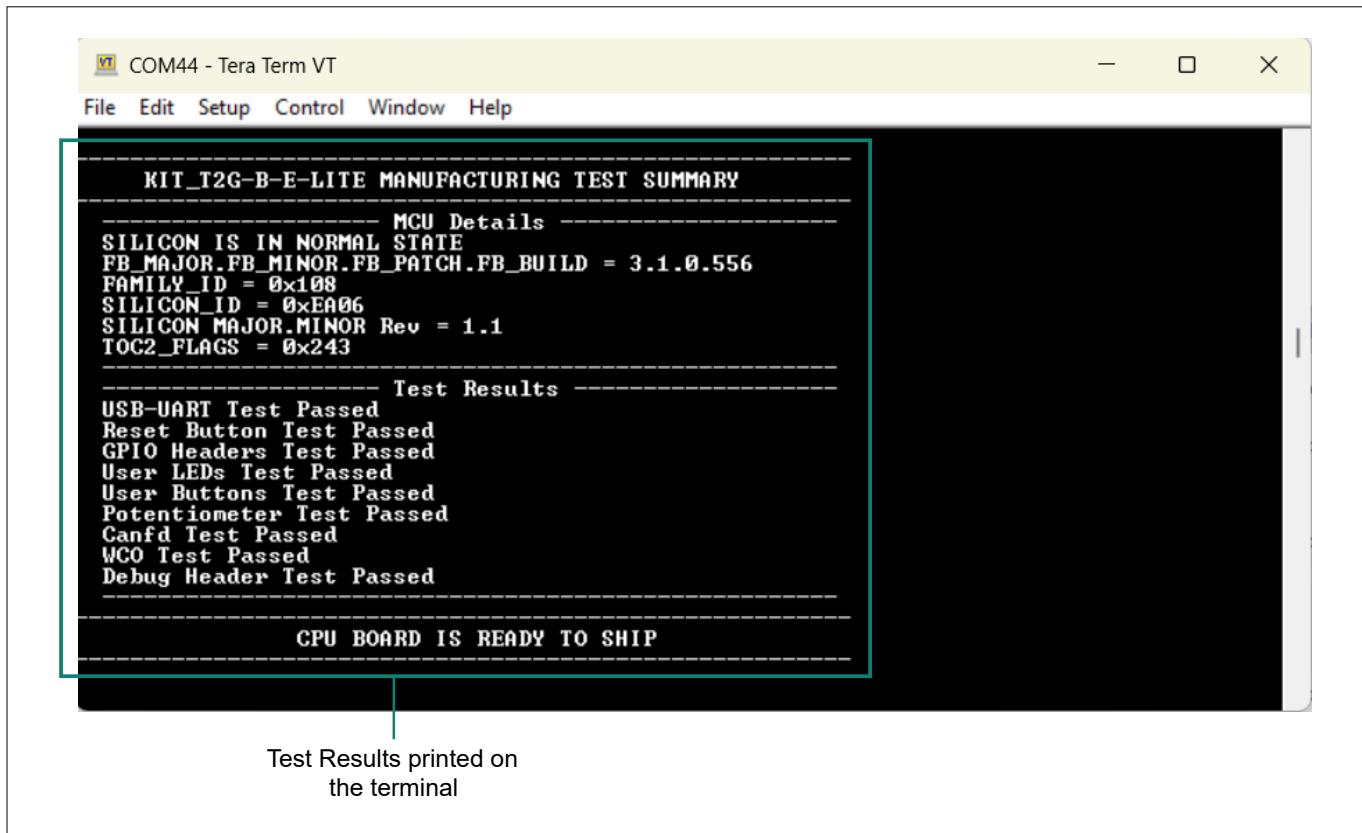
Figure 8   **Test logs printed on the serial terminal window (Tera Term)**

2 Programming the kit

This section provides the instructions for installing the ModusToolbox™ IDE and how to program the Lite kit using the ModusToolbox™ IDE.

If you are new to the TRAVEO™ T2G-B-E Lite kit and ModusToolbox™ software, see the AN235305 - Getting started with TRAVEO™ T2G Family MCUs in ModusToolbox™ software. This note provides detailed instructions and guidance on how to get started with the TRAVEO™ T2G kit and use the Eclipse IDE for ModusToolbox™ software to create your own designs.

2.1 ModusToolbox™ IDE

This section explains how to install ModusToolbox™ in your PC.

2.1.1 Software installation

To install the ModusToolbox™ software on your PC, do the following:

1. Download the latest version of the ModusToolbox™ software
2. Run the ModusToolbox™ installer file on your PC with administrative rights
3. Follow the on-screen prompts to complete the installation process, which includes accepting the license agreement, selecting a destination folder for the software, and choosing any additional components that you want to install (keep default settings)
4. Once the installation is complete, open the ModusToolbox™ software. A prompt will appear, asking you to select a directory as the workspace. Use the default path or change the path as per the requirement
5. After launching the ModusToolbox™ IDE, you can use ModusToolbox™ IDE with the TRAVEO™ T2G B-E Lite kit

2.1.2 ModusToolbox™ overview

Figure 9 shows the overview of the Eclipse IDE for ModusToolbox™. The following are the sections available in the Eclipse IDE:

- **Menus and Toolbars**: This section contains the main navigation menus and toolbars granting the access to a wide range of functions and features within ModusToolbox™
- **Project Explorer**: This area showcases the hierarchical structure of the current project, allowing easy navigation and management of files, folders, and project settings
- **Quick Panel**: The Quick Panel provides quick access to frequently used tools, commands, and settings, streamlining the development process
- **Code Editor**: This space serves as the central workspace for writing, editing, and managing code files, offering essential features for coding and software development
- **Console**: The console window provides real-time feedback by displaying system messages, build output, and debugging information, enhancing the development experience

| Quick Panel | Project Explorer | Code Editor | Console | Menus & Toolbar | Outline |
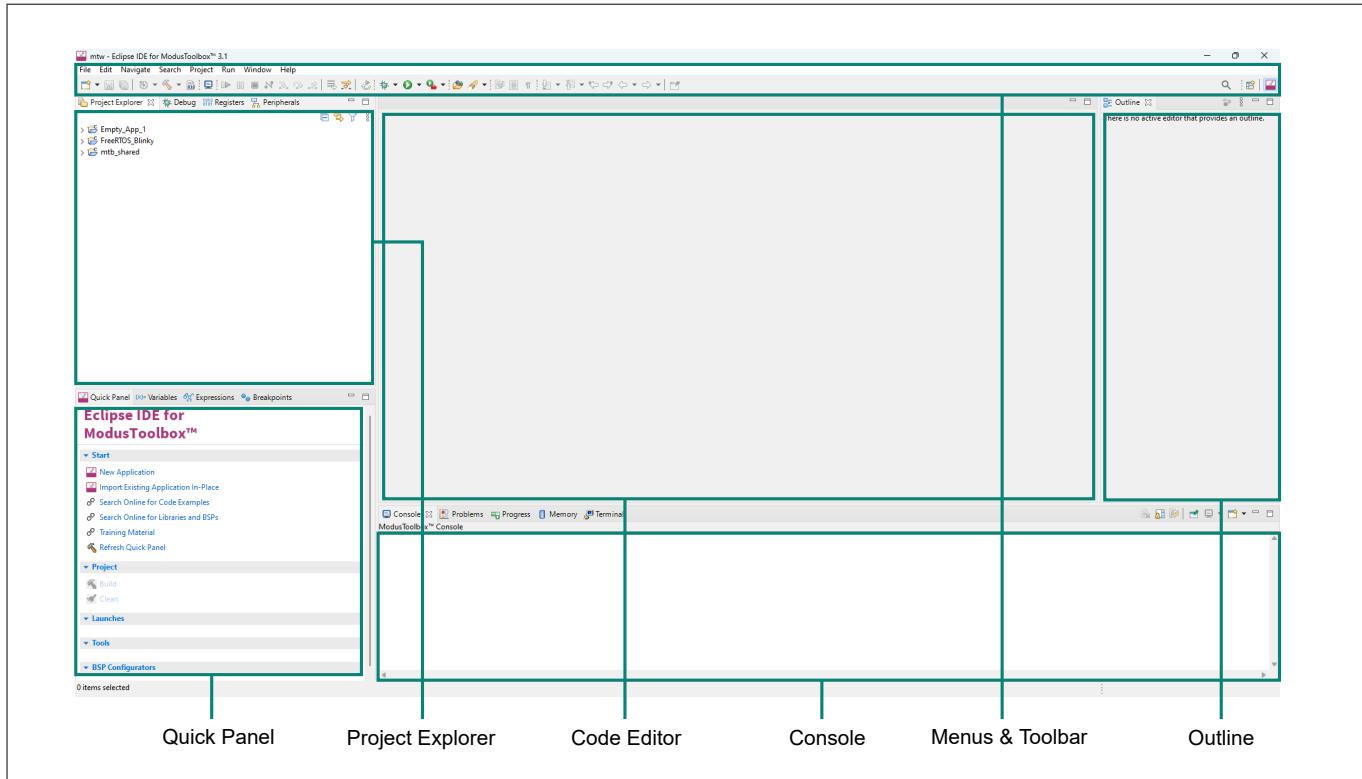
Figure 9   **ModusToolbox™ overview**

2.2   Blink the LED

The procedure for programming the kit and blinking the user LEDs is as follows:

1.   Ensure that the jumpers are configured according to the USB Micro-B powering option, and then connect the Lite kit to the PC using the USB Micro-B cable

2.   Open ModusToolbox™ in your PC with the default workspace

3.   Navigate to the **Quick Panel** window located at the bottom left corner of the screen, and then click on the **New Application** option

4.   Once the loading is complete, click on the "TRAVEO™ BSPs" and select the "KIT_T2G-B-E_LITE" in the kit name, and then press "next" button (as shown in Figure 10)

2 Programming the kit
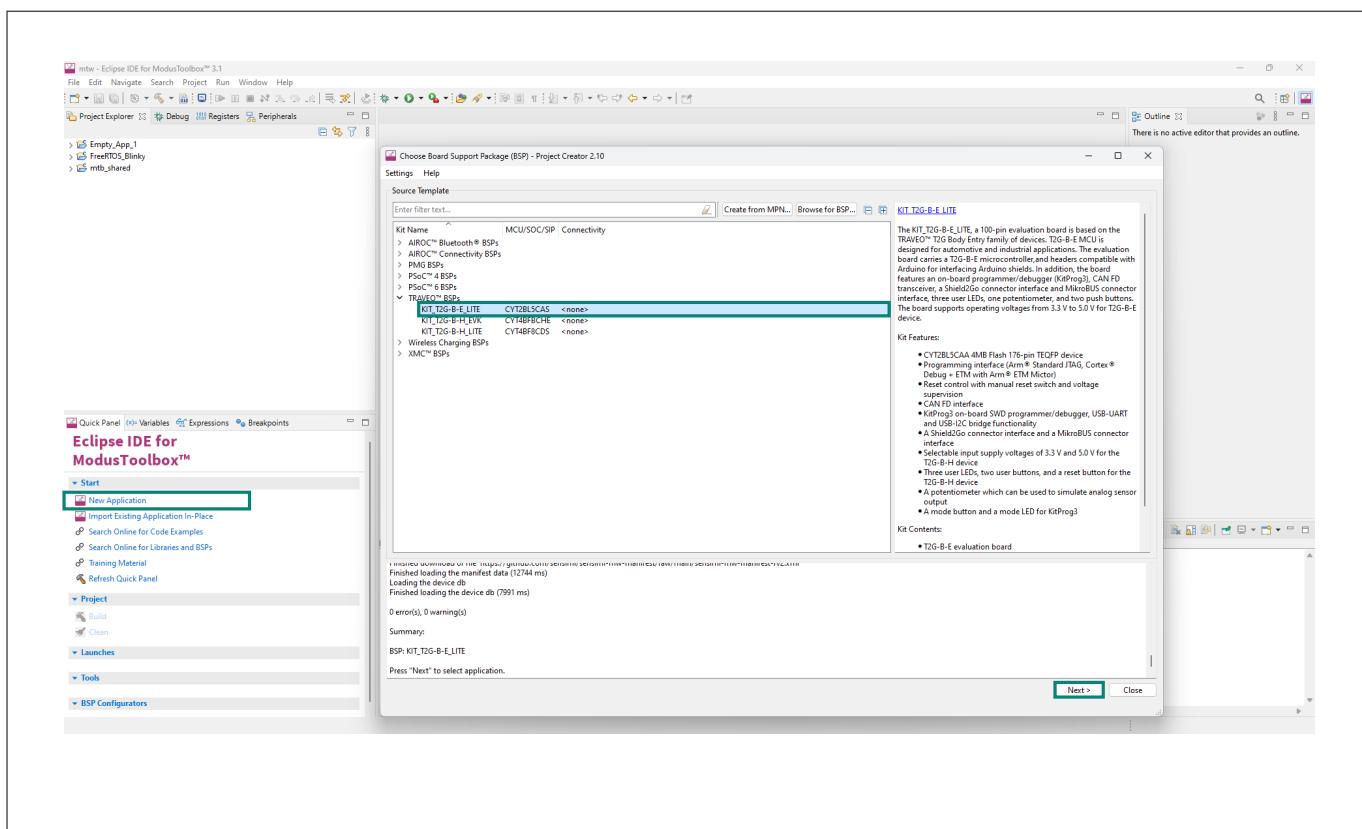
Figure 10 Selecting the TRAVEO™ T2G B-E Lite kit BSP

5. After loading the code examples, click on the "Getting Started" and select the "Hello World" code example. Keep the default application name and then press the **Create** button

6. Once the project is created successfully, go to the "Project Explorer" and expand the **Hello_World** project and see the *main.c* file (as shown in Figure 11)

7. Click on the *main.c* file. It opens the C code in the "Code Editor". Then, go to the **Quick Panel** window and press the **Build Application,** which compiles the code

8. Once the compiling and building is complete, **Build Finished** message appears in the **Console** window. Then, go to **Quick Panel** and select **Hello_World Program** under the "Launches" tab, and wait until the device is flashed

9. After flashing the device successfully, observe that the user LED (LED 1) starts to blink continuously

2 Programming the kit
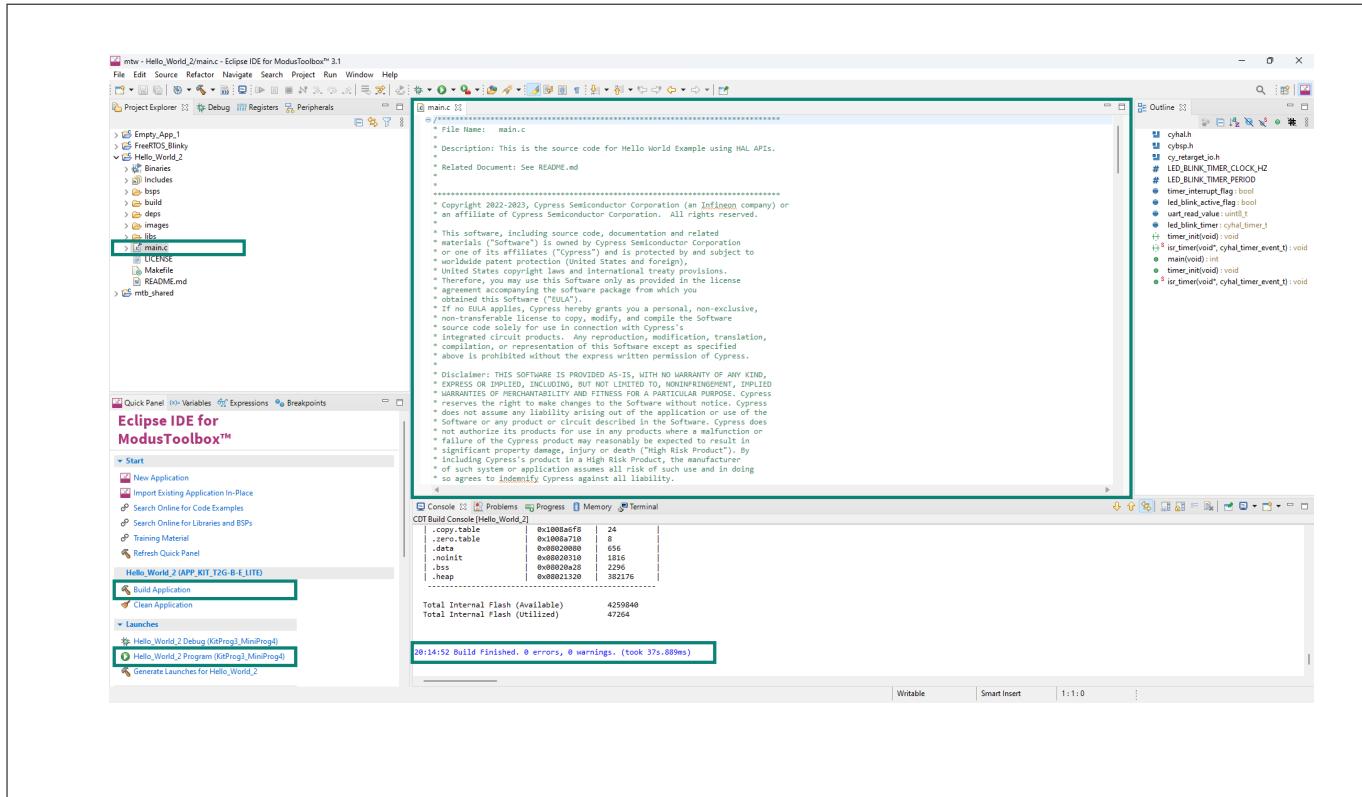
Figure 11   **Building and then programming the LED Blink code**

10. To view "Hello World" in the terminal window, make sure to open the serial terminal and connect it to the KitProg3 USB-UART COM port with baud rate of 115200. You can access the serial terminal available in the ModusToolbox™ near the **Console** window (see Figure 12)
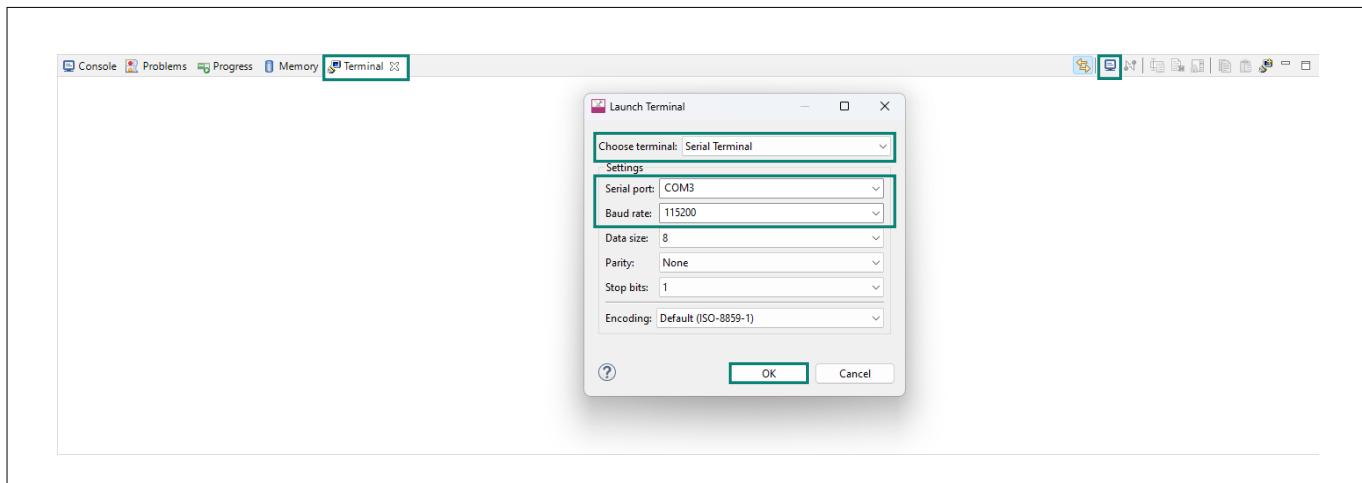

Figure 12   **Opening the serial terminal window and connecting to USB-UART for LED blink code**

3 Functional description

This section provides an overview of the major hardware blocks included in the TRAVEO™ T2G B-E Lite kit. Understanding these blocks helps in understanding the capabilities and features of the kit and developing more effective designs and applications.

The major hardware blocks included in the TRAVEO™ T2G B-E Lite kit include the TRAVEO™ T2G B-E MCU itself. This powerful and flexible device supports a wide range of applications. Additionally, the kit includes the KitProg3 onboard programmer/debugger, which is a valuable tool for development and testing. Furthermore, the kit incorporates various interfaces and connectors that provide connectivity to the other devices and systems.

3.1 TRAVEO™ T2G MCU

The TRAVEO™ T2G B-E Lite kit is specifically designed to evaluate the various features and functionality of the TRAVEO™ T2G CYT2BL device, which is a high-performance MCU that is targeted at automotive systems such as body-control units. The CYT2BL device features an Arm® Cortex®-M4F CPU that is designed for primary processing and an Arm®Cortex®-M0+ CPU that is used for peripheral and security processing.

These devices include a range of embedded peripherals that support various communication protocols such as controller area network with flexible data rate (CAN FD), local interconnect network (LIN), and clock extension peripheral interface (CXPI). The TRAVEO™ T2G devices are manufactured using an advanced 40-nm process, and incorporate a low-power flash memory, multiple high-performance analog and digital peripherals, and other features that enable the creation of a secure computing platform.

The TRAVEO™ T2G B-E Lite kit provides a comprehensive set of functionalities and features that are designed to support a wide range of development and testing requirements. However, due to the design limitations and the availability of certain peripherals and pins, few functionalities and features supported by the TRAVEO™ T2G B-E CYT2BL MCU may not be available on the Lite kit.

Table 5 provides an overview of the functionalities and features supported on the TRAVEO™ T2G B-E Lite kit, as compared with the TRAVEO™ T2G B-E CYT2BL MCU.

Table 5   Functionalities available on TRAVEO™ T2G B-E Lite kit

Functionality/feature	Supported on TRAVEO™ T2G B-E Lite kit
CAN FD	Supported
CXPI	Not supported
LIN	Not supported
UART	Supported
I2C	Supported
SPI	Supported
ADC	Supported
DMA	Supported
RTC	Supported
TCPWM	Supported
SMIF	Not supported
IO	Supported

3.2 Power supply

This section provides a detailed information about the power supply and power flow in the TRAVEO™ T2G B-E Lite kit, including how power is generated and fed to the TRAVEO™ T2G B-E MCU and various components and peripherals in this kit.

Use the following options to power the TRAVEO™ T2G B-E Lite kit:

- USB Micro-B[1]
- 12V DC power adapter[2]

There is an 'OR'ing between the two power sources that ensures whichever power source is connected will supply power to both the 5 V buck boost regulator and the 3.3V buck regulator, which will then give the output of 5 V and 3.3 V that can feed to the TRAVEO™ T2G B-E MCU depending upon in which position the jumper J20 and J21 are shorted.

The functionality of the power jumpers (J20, J21, J22, and J25) are highlighted in Table 6.

Table 6   Functionality of power jumpers

Jumper	Configuration	Functionality
J20	1 – 2: shorted	TRAVEO™ T2G B-E MCU (VDDD) will receive 3.3 V power
	2 – 3: shorted	TRAVEO™ T2G B-E MCU will receive 5 V power
J21	1 – 2: shorted	General purpose I/O pins (VDDIO) will receive 3.3 V power
	2 – 3: shorted	General purpose I/O pins will receive 5 V power
J22	Shorted	Enable the 5 V power for input of 3.3 V buck regulator coming from the USB connector
	Opened	Disable the 5 V power for input of 3.3 V buck regulator coming from the USB connector
J25	1 – 2: shorted	Enable the 5 V power to be the input for 3.3 V buck regulator coming from USB connector
	2 – 3: shorted	Enable the 12 V power to be the input for 3.3 V buck regulator coming from 12 V DC power adapter

Figure 13 shows the power generation in the TRAVEO™ T2G B-E Lite kit.

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1   KitProg3 is powered up only in this option. Therefore, if you want to use KitProg3, ensure that you are using this powering option.
2   Ensure that the power adapter should support minimum 12 V/1 A power; however, 12 V/3 A is the default adapter for using with this kit

## 3 Functional description
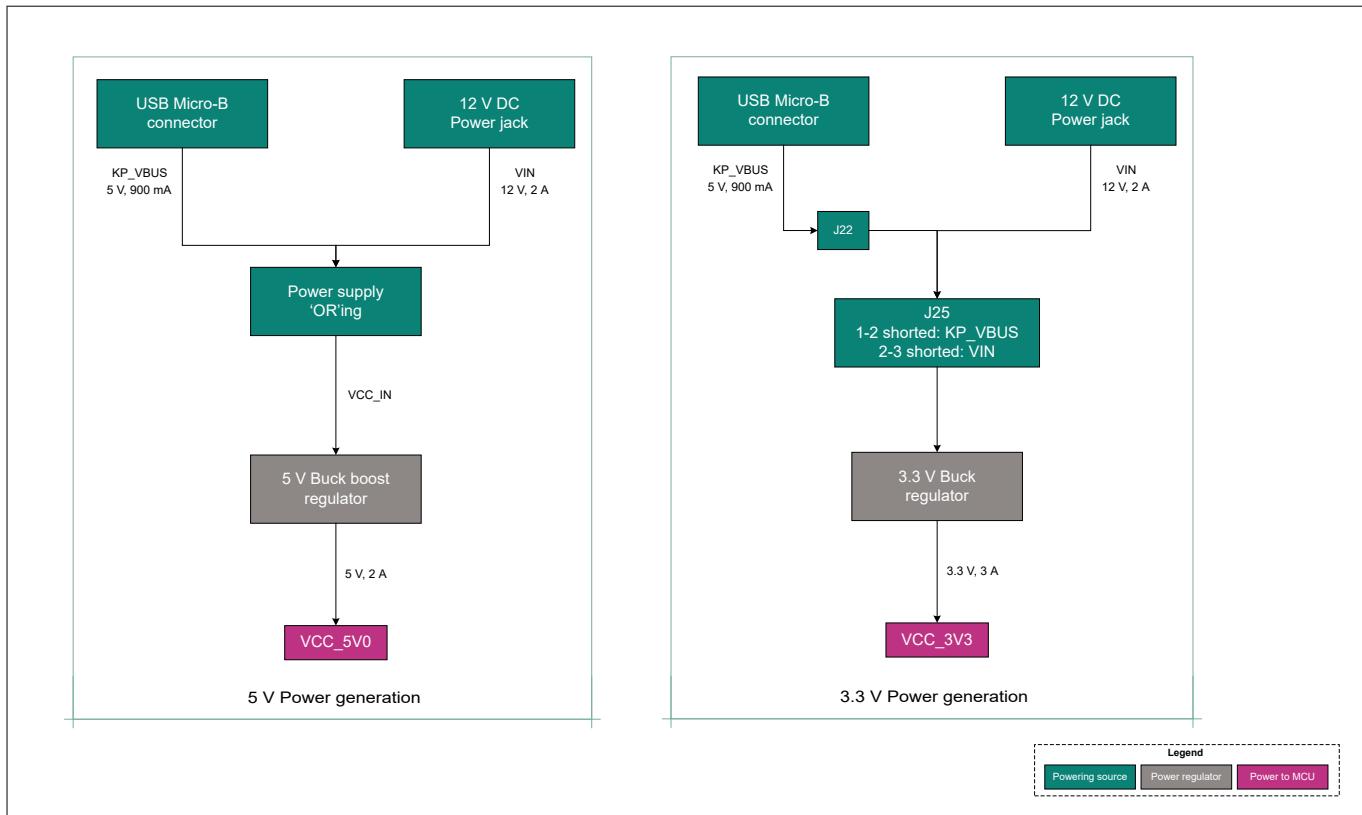
Figure 13   **Block diagram of various power generation in the Lite kit**

Figure 14 shows the power supply to the TRAVEO™ T2G B-E MCU based on jumper selections.
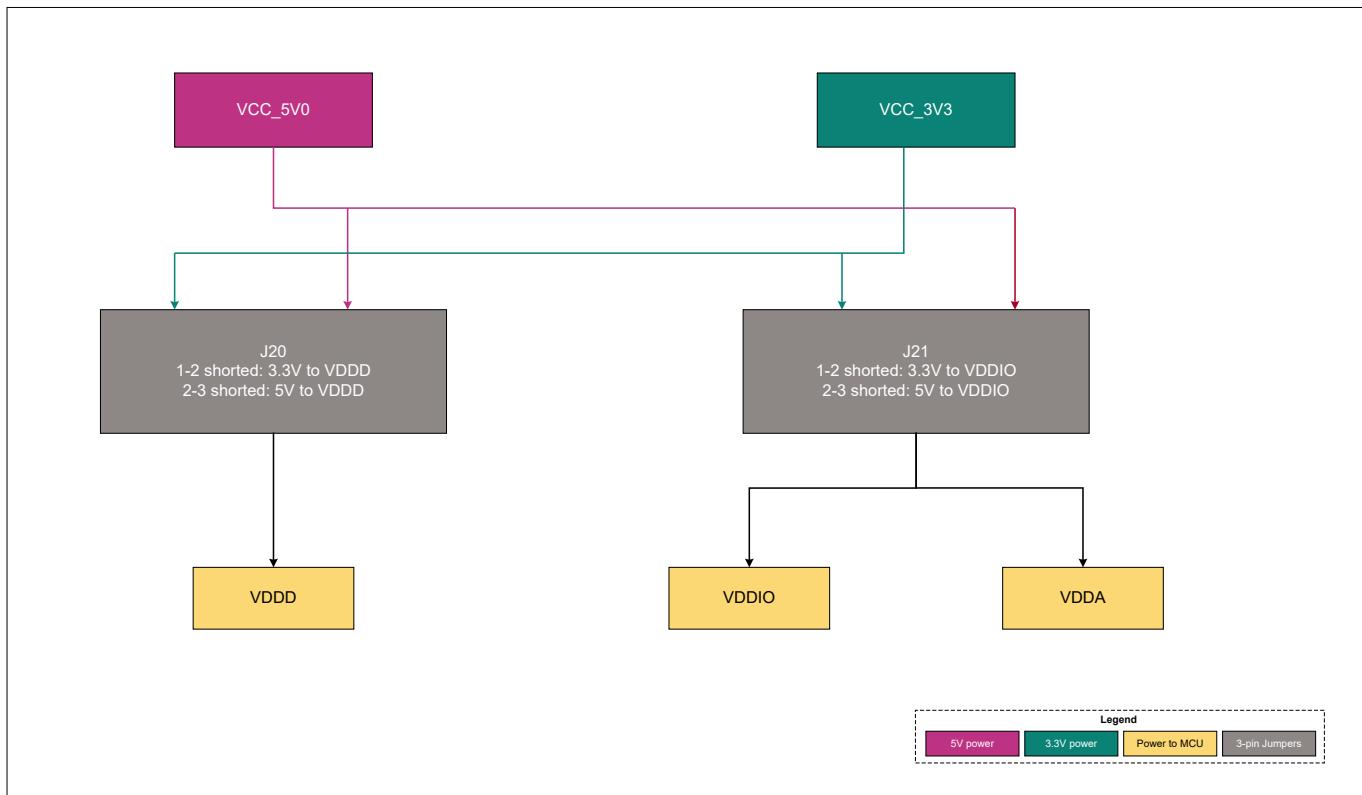
Figure 14   **Power to the TRAVEO™ T2G B-E MCU**

3.3 Clock

This section provides information about the various crystal oscillators available on the TRAVEO™ T2G B-E Lite kit that are used for clocking the TRAVEO™ T2G B-E MCU and other peripherals.

The TRAVEO™ T2G B-E Lite kit contains several crystal oscillators for clocking the TRAVEO™ T2G B-E MCU and other peripherals that are listed in Table 7.

Table 7   Crystals available in the lite kit

Crystal oscillator	Reference designator	Frequency
Watch crystal oscillator (WCO)	Y1	32.768 kHz
External crystal oscillator (ECO)	Y2	16 MHz
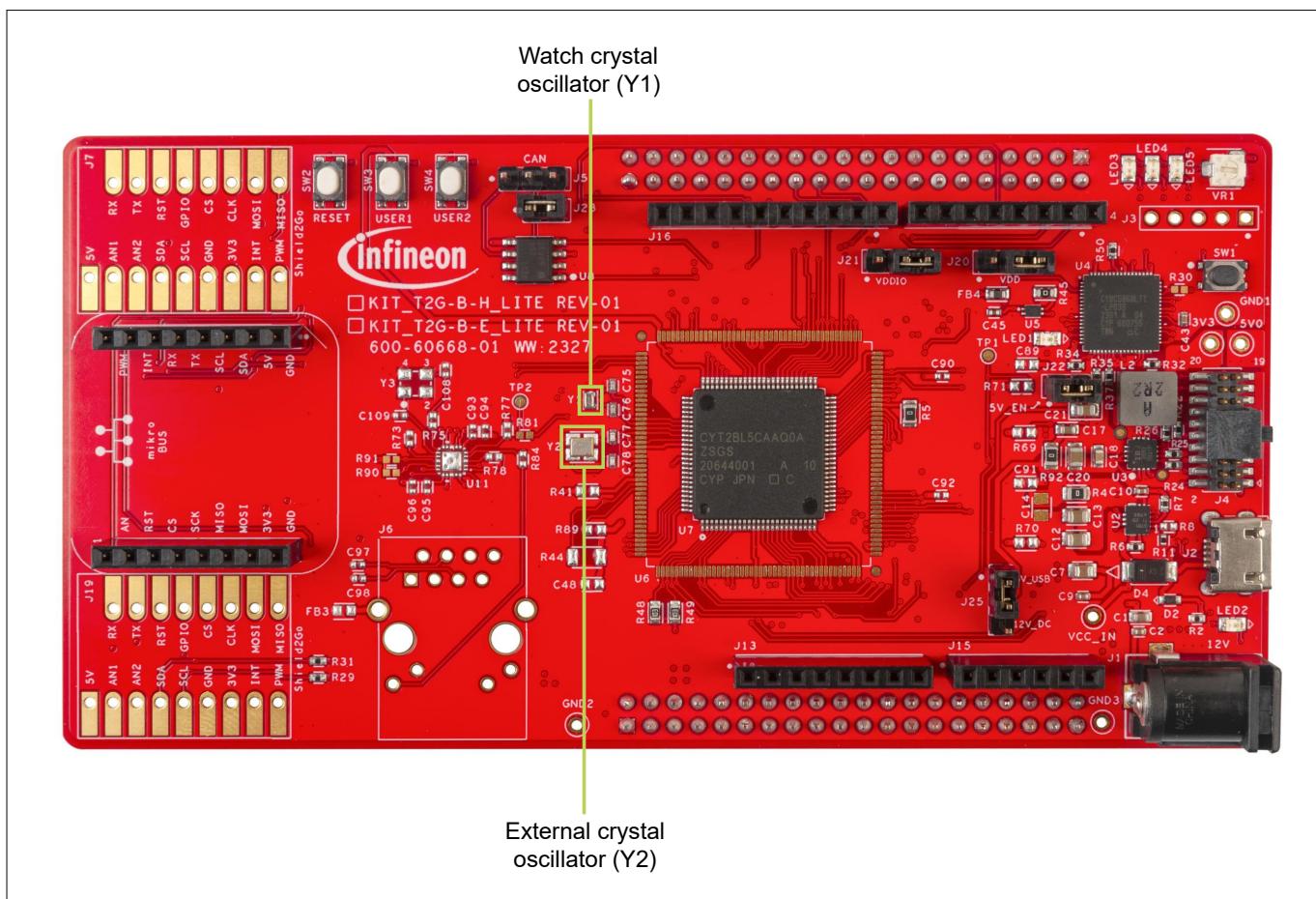
Figure 15   Location of various crystals in the lite kit

3.4 Reset

This section describes to reset the TRAVEO™ T2G B-E Lite kit MCU using the reset button (SW2).

The reset button (SW2) is specifically designed to reset the TRAVEO™ T2G B-E Lite kit MCU and is connected to the XRES pin of the MCU via a 4.7K resistor.

To reset the TRAVEO™ T2G B-E Lite kit MCU, simply press the rest button, which will connect the XRES pin to ground, initiating the reset process.

Table 8   Reset

User interface	Reference designator	MCU	
		Pin number	Port pin
Reset button	SW2	85	XRES
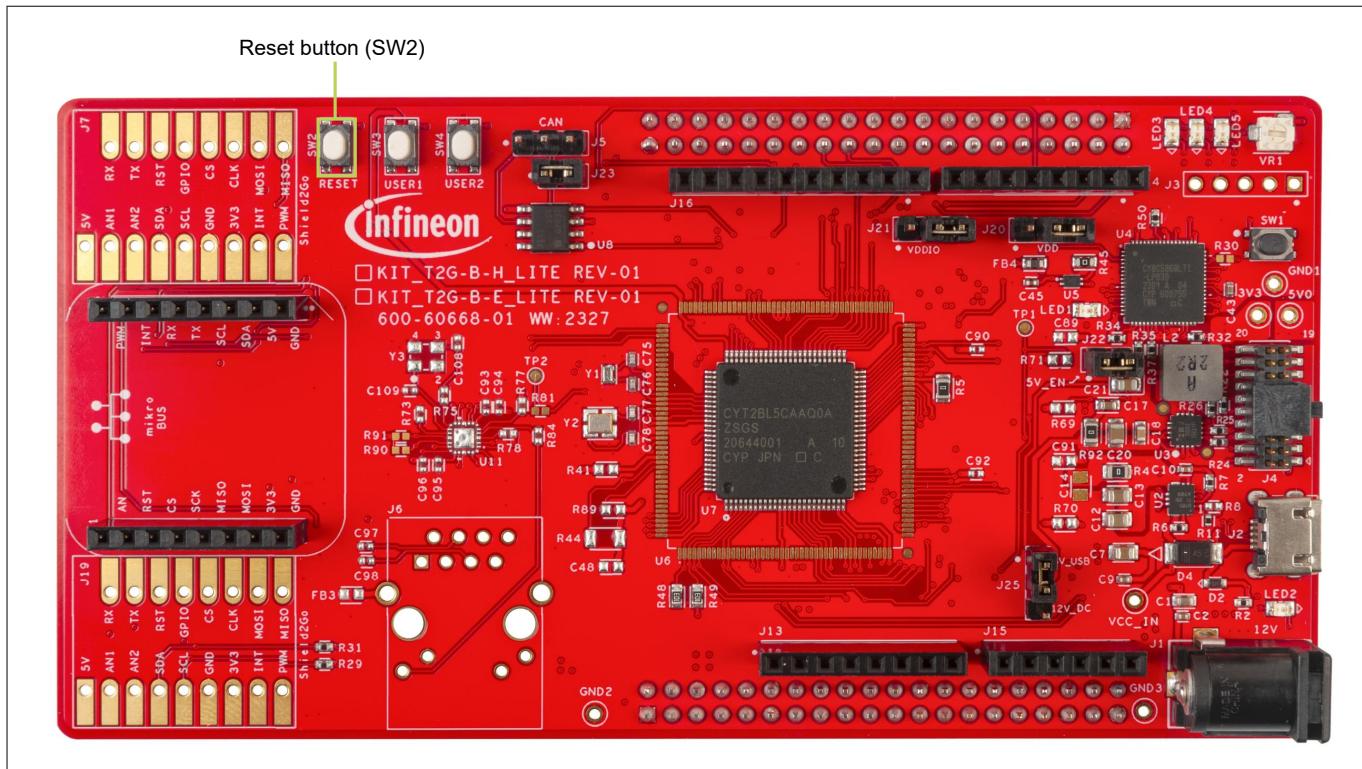
Figure 16   Location of the reset button in the lite kit

3.5 User interfaces

The TRAVEO™ T2G B-E Lite kit provides several interfaces for user interaction such as three user LEDs, two push buttons, and a potentiometer interface. These interfaces are intended to facilitate with the kit for developers and testers, allowing them to perform various operations and tests.

3.5.1 User LEDs

The user LEDs on the TRAVEO™ T2G B-E Lite kit can operate across the entire voltage range of the TRAVEO™ T2G B-E MCU. These LEDs function as active LOW, requiring the pins to be grounded to turn them ON.

Table 9   User LEDs

User interface	Reference designator	CYT2BL MCU	
		Pin number	Port pin
User LED 1	LED3	14	P5.0
User LED 2	LED4	15	P5.1
User LED 3	LED5	16	P5.2

3.5.2 User push buttons

The user push buttons on the TRAVEO™ T2G B-E Lite kit provide a means of input to the TRAVEO™ T2G B-E MCU. By default, this button connects the TRAVEO™ T2G B-E MCU pin to ground when pressed. Therefore, to detect the button press, you need to configure the TRAVEO™ T2G B-E MCU pin as a digital input with resistive pull-up.

Table 10   User push button

User interface	Reference designator	CYT2BL MCU	
		Pin number	Port pin
User push button 1	SW3	17	P5.3
User push button 2	SW4	64	P17.0

3.5.3 Potentiometer

The TRAVEO™ T2G B-E Lite kit features a 10 kΩ potentiometer that is connected to the TRAVEO™ T2G B-E MCU pin P6[0]. The potentiometer is used to simulate a sensor output to the TRAVEO™ T2G B-E MCU.

Table 11   Potentiometer

User interface	Reference designator	CYT2BL MCU	
		Pin number	Port pin
Potentiometer	VR1	18	P6.0
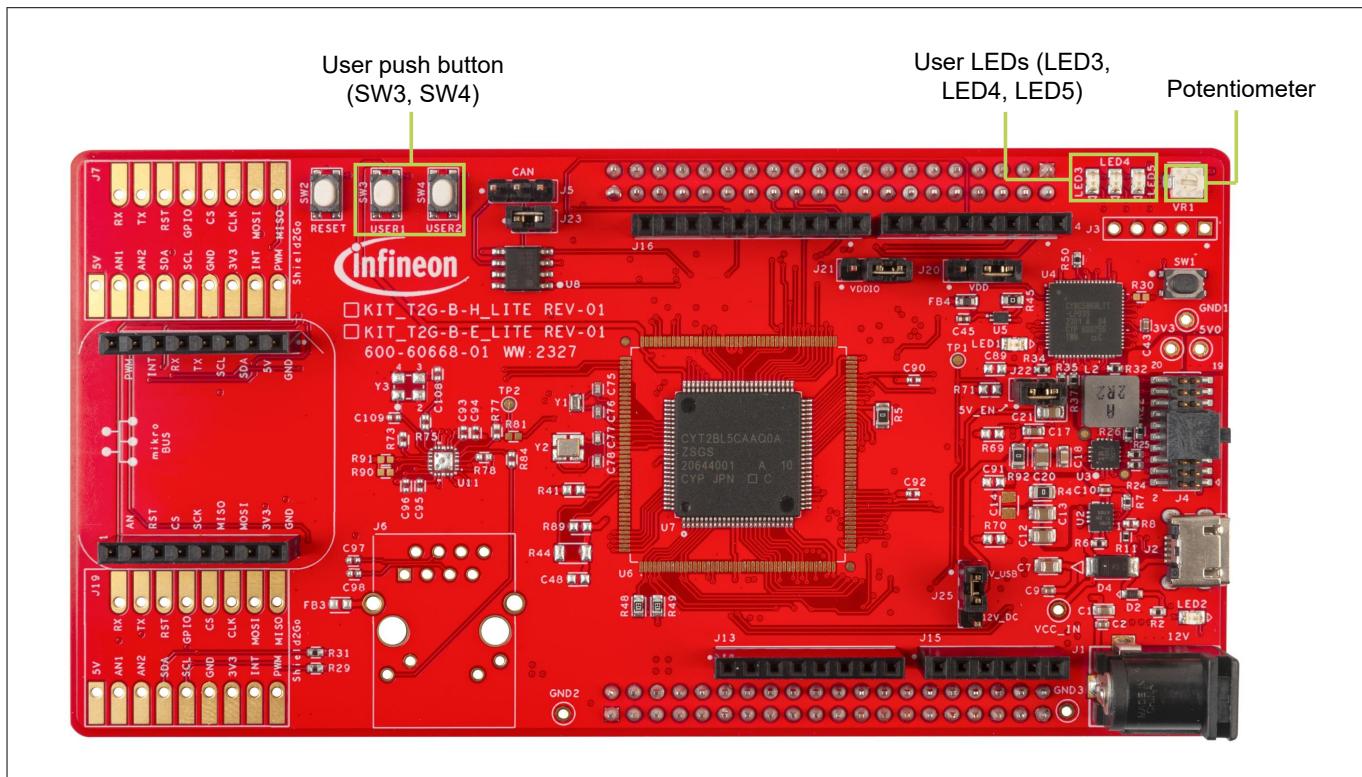
**Figure 17   Location of various user interfaces available**

3.6 Communication interfaces

The TRAVEO™ T2G B-E Lite kit provides a range of high-speed communication interfaces. These interfaces include CAN FD and LIN, and can be used for a variety of purposes, such as connecting to external devices or communicating with other systems.

3.6.1 CAN FD

The TRAVEO™ T2G B-E Lite kit provides a CAN FD transceiver (TLE9251VSJ), which supports data transmission rates of up to 5 MBit/s. For connecting to other CAN FD nodes, the TRAVEO™ T2G B-E Lite kit features a 3-pin CAN FD interface connector (J5), with pin 1 serving as the CANL pin, pin 2 serving as the CANH pin, and pin 3 serving as the common GND.

In addition, if you require a termination resistor in the CAN FD bus, you can short the 120 Ω termination resistor jumper (J23) on the board. This jumper provides a 120 Ω termination resistor that is connected between the CANL and CANH pins.
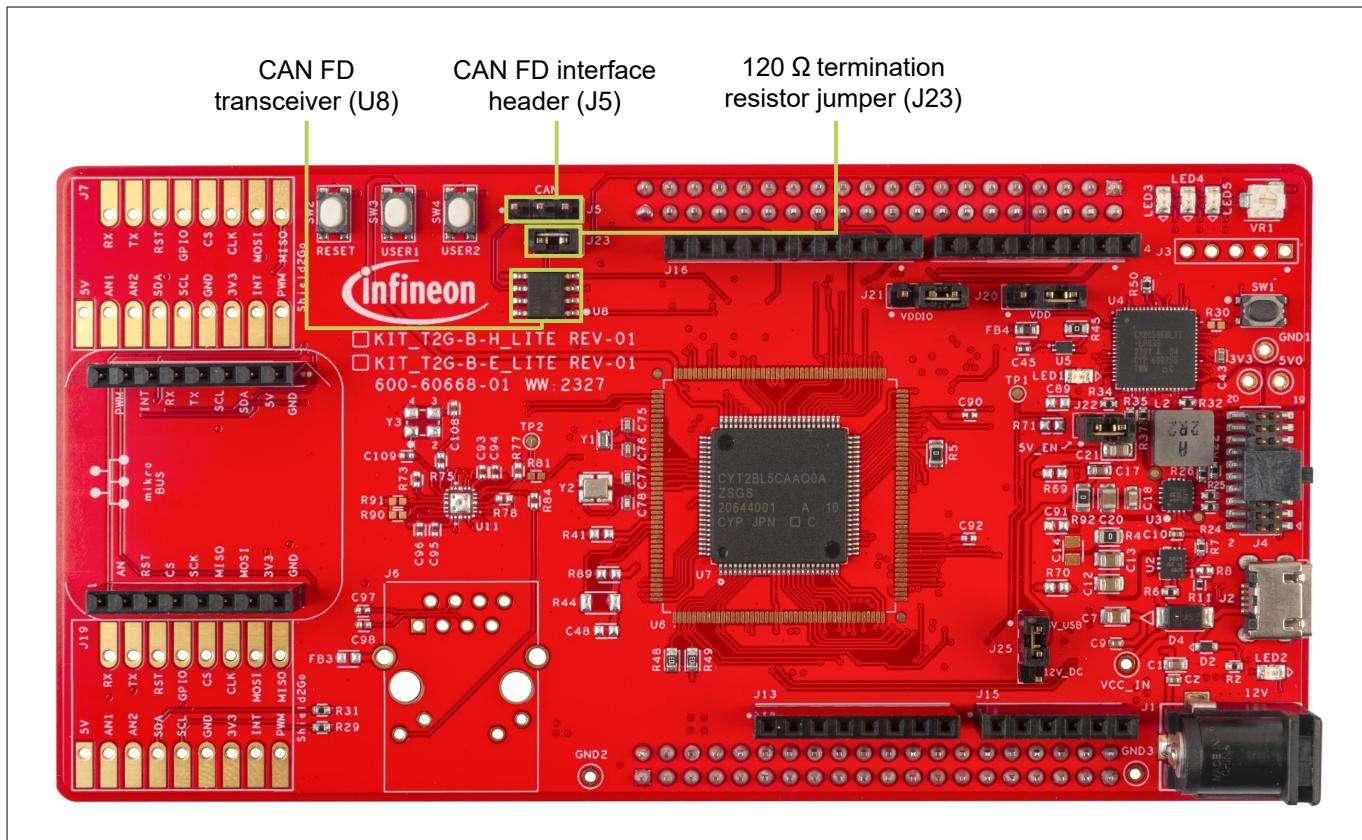
Figure 18   **Location of CAN FD interface**

3.7 Program and debug interface

The TRAVEO™ T2G B-E Lite kit includes an onboard programmer/debugger called KitProg3, which can be used to program and debug the MCU on the kit. The KitProg3 provides USB-UART, USB-I2C, and USB-SPI Bridge functionality, although USB-SPI is not supported on this board.

3.7.1 PSoC™ 5LP

The KitProg3 (onboard programmer/ debugger) is implemented using a PSoC™ 5LP device (CY8C5868LTI-LP039), which is a true programmable embedded system-on-chip that integrates configurable analog and digital

3 Functional description

peripherals, memory, and a microcontroller on a single chip. The PSoC™ 5LP is used to implement the low-level communication firmware for programming and debugging and provides communication between a programming tool (such as PSoC™ Programmer) and a target, such as the TRAVEO™ T2G B-E MCU.

Additionally, KitProg3 on the TRAVEO™ T2G B-E Lite kit can act as a USB_UART bridge. The UART RX and TX pins of KitProg3 are connected to the TRAVEO™ T2G B-E MCU UART pins as follows:
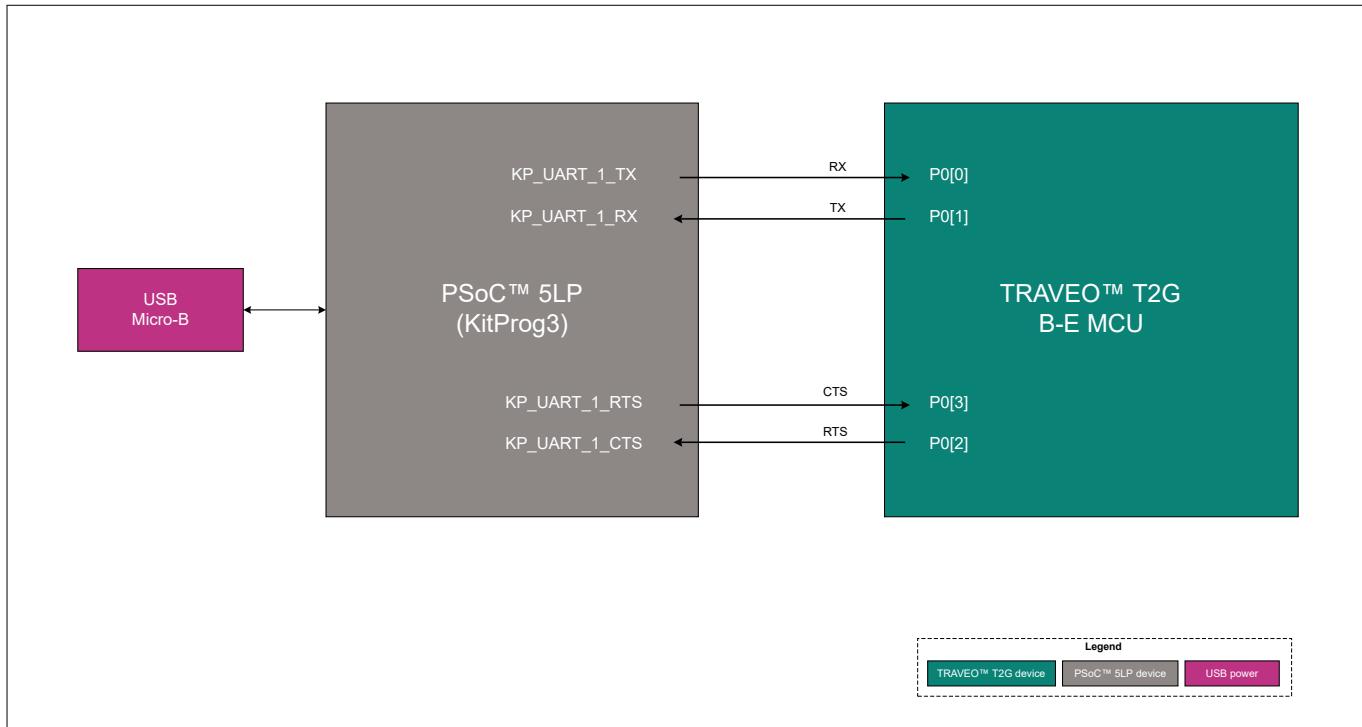

Figure 19 **UART connection between KitProg3 and TRAVEO™ T2G B-E MCU**

Use the onboard programmer/debugger KitProg3 on the TRAVEO™ T2G B-E Lite kit simply by connecting the USB Micro-B cable to the USB connector (J2) and the PC to program and debug the TRAVEO™ T2G B-E Lite kit.

The kit also features a mode switch (SW1) and status LED (LED1) for the KitProg3. These interfaces can be used to switch between various modes of operation of KitProg3, and LED to monitor the status of the KitProg3. Note that this board supports only CMSIS-DAP BULK mode.

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).

In addition, there is an optional programming header for programming the PSoC™ 5LP, which is available via the 5-pin header (J3) (footprint only). It is important to note that the KitProg3 hardware revision ID is 0x0D.

Table 12 **Mode button**

User interface	Reference designator	PSoC™ 5LP	
		Pin number	Port pin
Mode switch	SW1	13	P1[2]

3 Functional description
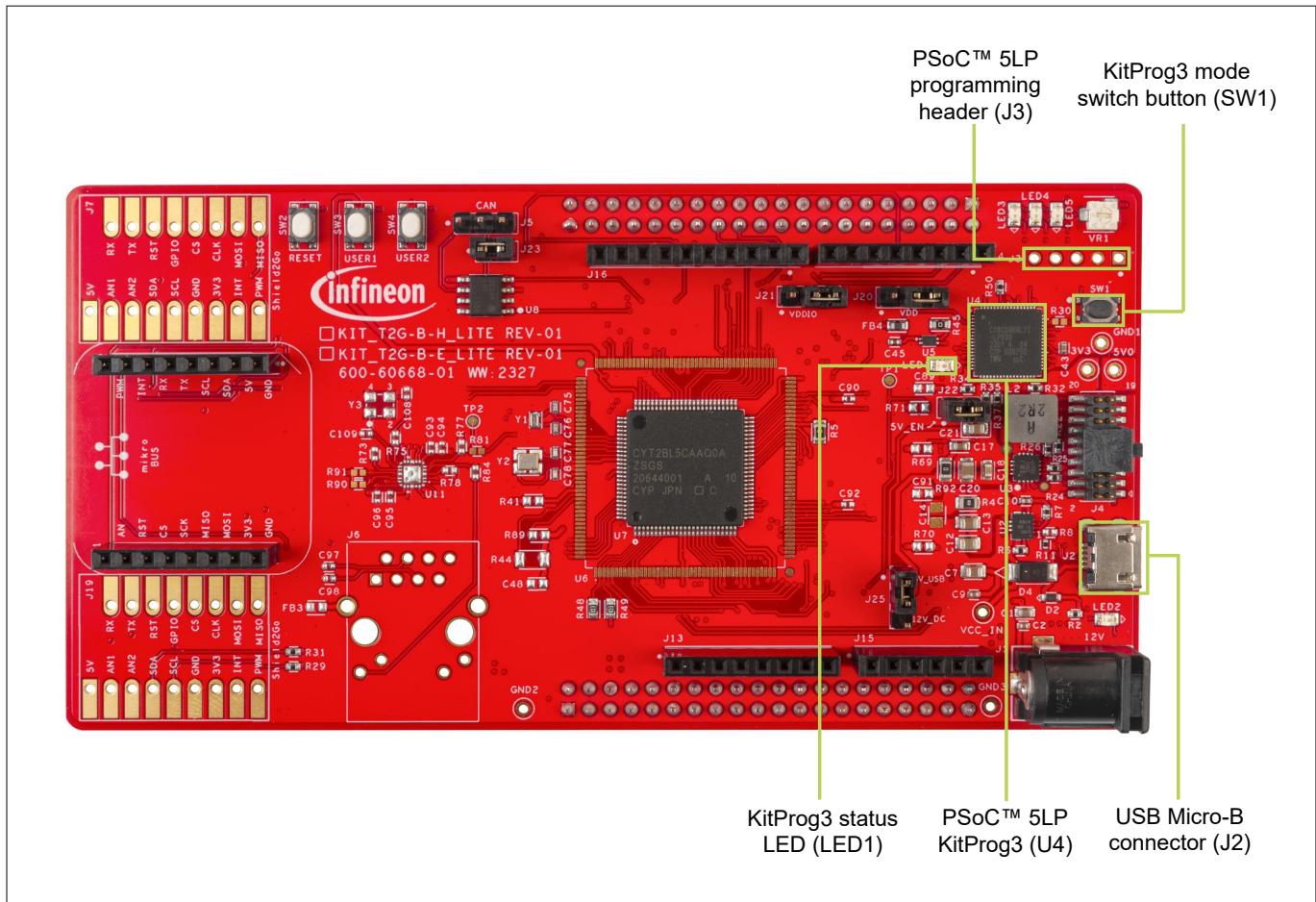
Figure 20   **Location of KitProg3 and their interfaces**

3.7.2   MIPI-20 Cortex® debug connector

The TRAVEO™ T2G B-E Lite kit is equipped with a MIPI-20 Cortex® debug + ETM connector, which serves as a programming interface when connected to a debugger. Additionally, you have the flexibility to utilize other programming tools for connecting and programming the Lite kit.

3 Functional description

MIPI-20 Cortex® debug +
ETM connector – J4
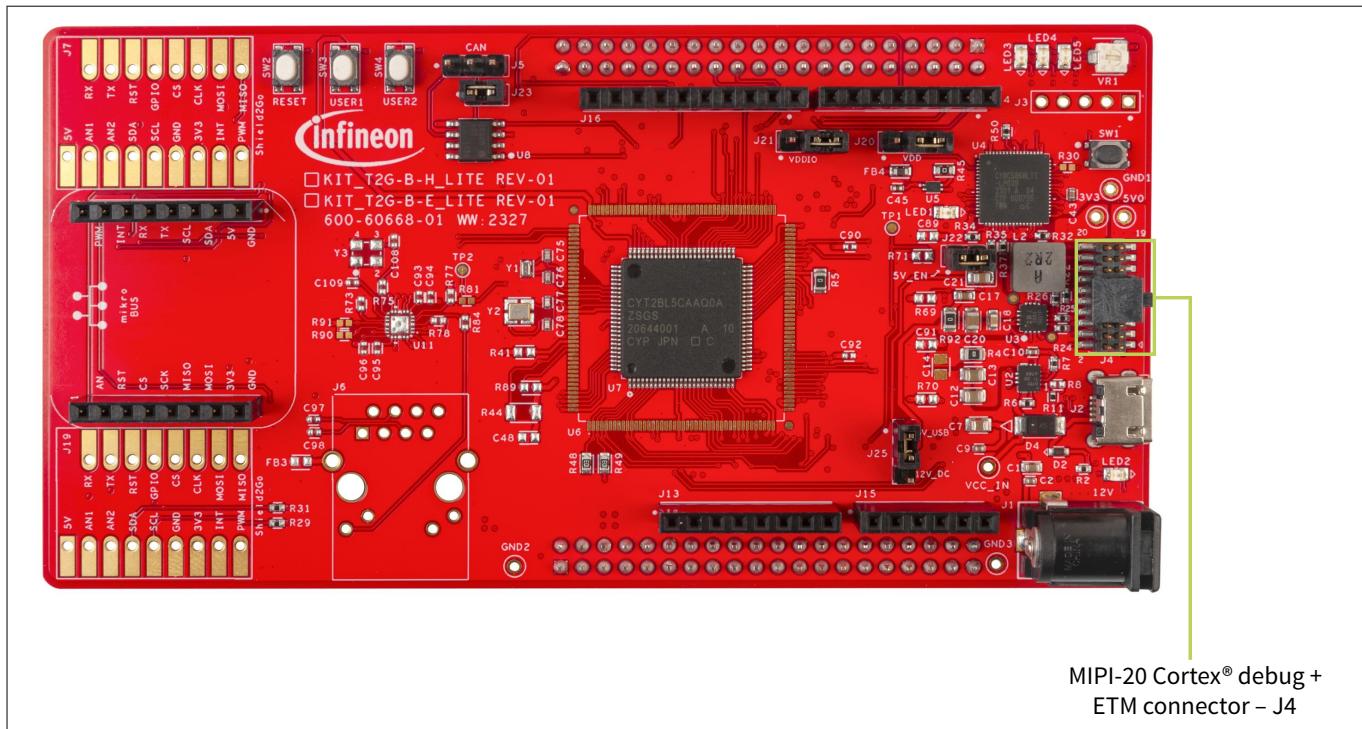
Figure 21   **Other programming and debug interface available in the Lite kit**

3.8   General purpose IO headers

The TRAVEO™ T2G B-E Lite kit provides a range of general-purpose I/O headers, which include two expansion headers, an Arduino shields compatible header, a mikroBUS header, and two Shield2Go footprints.

Figure 22 shows the pinout diagram of all the general purpose IO headers available in the TRAVEO™ T2G B-E Lite kit.

3 Functional description

KIT_T2G-B-E_Lite Board pinout details
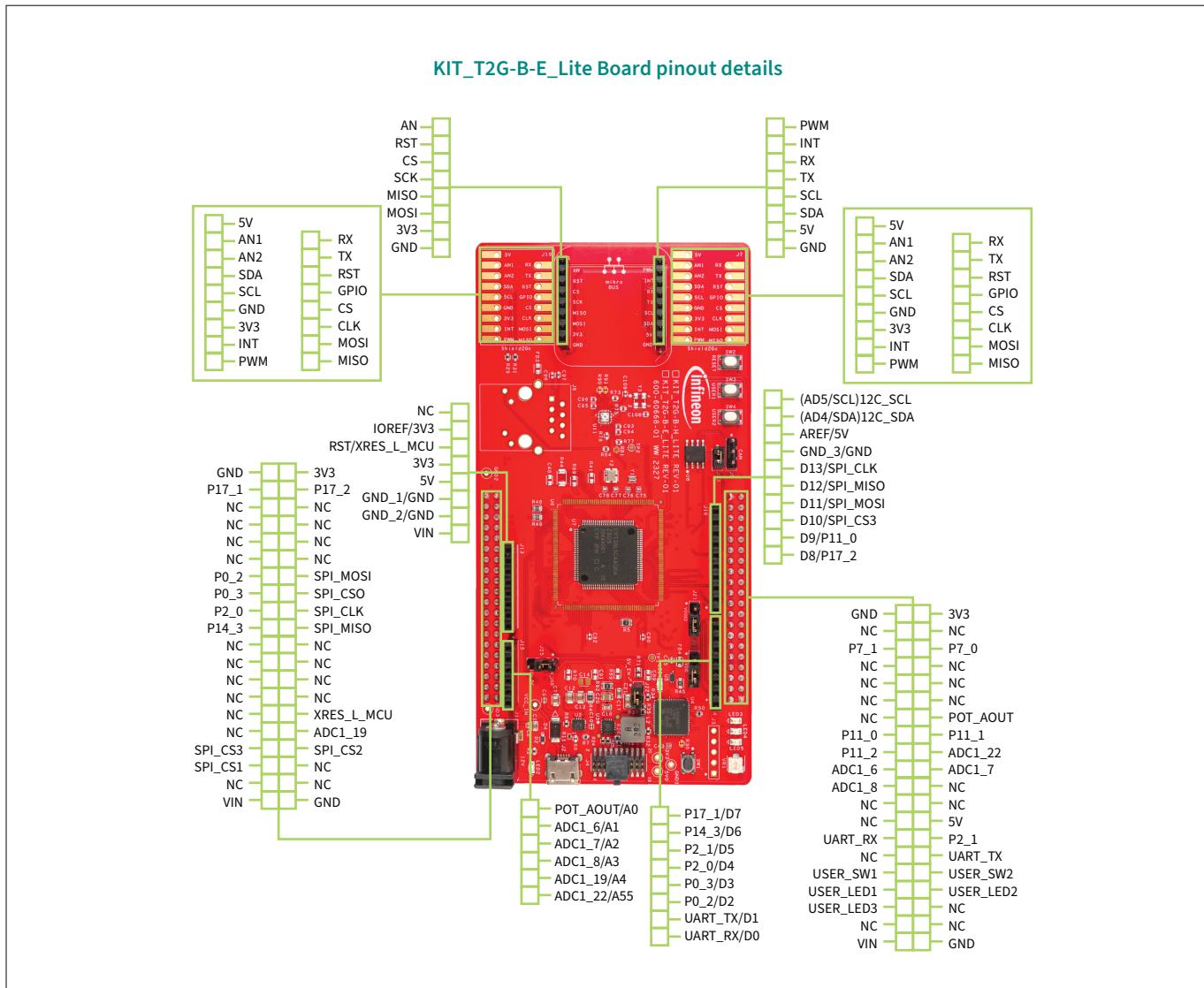
Figure 22   **TRAVEO™ T2G B-E Lite kit pinout details**

3.8.1   Expansion headers

Table 13   **Expansion I/O header pin details**

Header pin	Connected to MCU's port pin	Pin description
X1 pins		
X1.1	–	GND
X1.2	–	3V3
X1.3	P17.1	P17_1
X1.4	P17.2	P17_2
X1.13	P0.2	P0_2
X1.14	P13.1	SPI_MOSI
X1.15	P0.3	P0_3

(table continues...)

Table 13   (continued) Expansion I/O header pin details

Header pin	Connected to MCU's port pin	Pin description
X1.16	P13.3	SPI_CS0
X1.17	P2.0	P2_0
X1.18	P13.2	SPI_CLK
X1.19	P14.3	P14_3
X1.20	P13.0	SPI_MISO
X1.30	–	XRES_L_MCU
X1.32	P13_7	ADC1_19
X1.33	P13.6	SPI_CS3
X1.34	P13.5	SPI_CS2
X1.35	P13.4	SPI_CS1
X1.36	P7.7	P7_7
X1.37	P7.6	P7_6
X1.39	–	VIN
X1.40	–	GND
X2 pins		
X2.1	-	GND
X2.2	-	VIN
X2.6	P5.2	USER_LED3
X2.7	P5.1	USER_LED2
X2.8	P5.0	USER_LED1
X2.9	P17.0	USER_SW2
X2.10	P5.3	USER_SW1
X2.11	P14.1	UART_TX
X2.13	P2.1	P2_1
X2.14	P14.0	UART_RX
X2.15	5V	VAREF
X2.20	P12.4	ADC1_8
X2.21	P12.3	ADC1_7
X2.22	P12.2	ADC1_6
X2.23	P14.2	ADC1_22
X2.24	P11.2	P11_2
X2.25	P11.1	P11_1
X2.26	P11.0	P11_0

(table continues…)

Table 13   **(continued) Expansion I/O header pin details**

Header pin	Connected to MCU's port pin	Pin description
X2.27	P6.0	POT_AOUT
X2.39	–	3V3
X2.40	–	GND

3.8.2   Arduino headers

Table 14   **Arduino header pin details**

Header pin	Connected to MCU's port pin	Pin description
J13 pins		
J13.1	–	NC
J13.2	–	3V3
J13.3	–	XRES_L_MCU
J13.4	–	3V3
J13.5	–	5V
J13.6	–	GND
J13.7	–	GND
J13.8	–	VIN
J14 pins		
J14.1	P18.0	UART_RX/D0
J14.2	P18.1	UART_TX/D1
J14.3	P0.2	P0_2/D2
J14.4	P0.3	P0_3/D3
J14.5	P2.0	P2_0/D4
J14.6	P2.1	P2_1/D5
J14.7	P14.3	P14_3/D6
J14.8	P17.1	P17_1/D7
J15 pins		
J15.1	P6.0	POT_AOUT/A0
J15.2	P12.2	ADC1_6/A1
J15.3	P12.3	ADC1_7/A2
J15.4	P12.4	ADC1_8/A3
J15.5	P13.7	ADC1_19/A4
J15.6	P14.2	ADC1_22/A5
J16 pins		

(table continues...)

Table 14 **(continued) Arduino header pin details**

Header pin	Connected to MCU's port pin	Pin description
J16.1	P17.2	P17_2/D8
J16.2	P11.0	P11_0/D9
J16.3	P13.6	SPI_CS3/D10
J16.4	P13.1	SPI_MOSI/D11
J16.5	P13.0	SPI_MISO/D12
J16.6	P13.2	SPI_CLK/D13
J16.7	–	GND
J16.8	–	AREF/5V
J16.9	P6.1	I2C_SDA (AD4/SDA)
J16.10	P6.2	I2C_SCL (AD5/SCL)

3.8.3 mikroBUS headers

Table 15 **mikroBUS header pin details**

Header pin	Connected to MCU's port pin	Pin description
J12 pins		
J12.1	–	GND
J12.2	–	5V
J12.3	P6.1	I2C_SDA
J12.4	P6.2	I2C_SCL
J12.5	P14.1	UART_TX
J12.6	P14.0	UART_RX
J12.7	P17.2	INT
J12.8	P14.3	PWM
J11 pins		
J11.1	P14.2	AN
J11.2	P11.2	RST
J11.3	P13.5	SPI_CS2
J11.4	P13.2	SPI_CLK
J11.5	P13.0	SPI_MISO
J11.6	P13.1	SPI_MOSI
J11.7	–	3V3
J11.8	–	GND

3.8.4 Shield2Go connectors

Table 16 **Shield2Go connector pin details**

Header pin	Connected to MCU's port pin	Pin description
J7 pins		
J7.1	–	5 V
J7.2	P12.2	AN1
J7.3	P12.3	AN2
J7.4	P6.1	I2C_SDA
J7.5	P6.2	I2C_SCL
J7.6	–	GND
J7.7	–	3V3
J7.8	P0.2	INT/GPIO3
J7.9	P0.3	PWM/GPIO4
J7.10	P18.0	UART_RX
J7.11	P18.1	UART_TX
J7.12	P11.0	RST/GPIO2
J7.13	P17.1	GPIO1
J7.14	P13.3	SPI_CS0
J7.15	P13.2	SPI_CLK
J7.16	P13.1	SPI_MOSI
J7.17	P13.0	SPI_MISO
J19 pins		
J19.1	–	5 V
J19.2	P12.4	AN1
J19.3	P13.7	AN2
J19.4	P6.1	I2C_SDA
J19.5	P6.2	I2C_SCL
J19.6	–	GND
J19.7	–	3V3
J19.8	P2.0	INT/GPIO3
J19.9	P2.1	PWM/GPIO4
J19.10	P18.0	UART_RX
J19.11	P18.1	UART_TX
J19.12	P11.1	RST
J19.13	P17.2	GPIO1

(table continues…)

3 Functional description

Table 16   **(continued) Shield2Go connector pin details**

Header pin	Connected to MCU's port pin	Pin description
J19.14	P13.4	SPI_CS1
J19.15	P13.2	SPI_CLK
J19.16	P13.1	SPI_MOSI
J19.17	P13.0	SPI_MISO
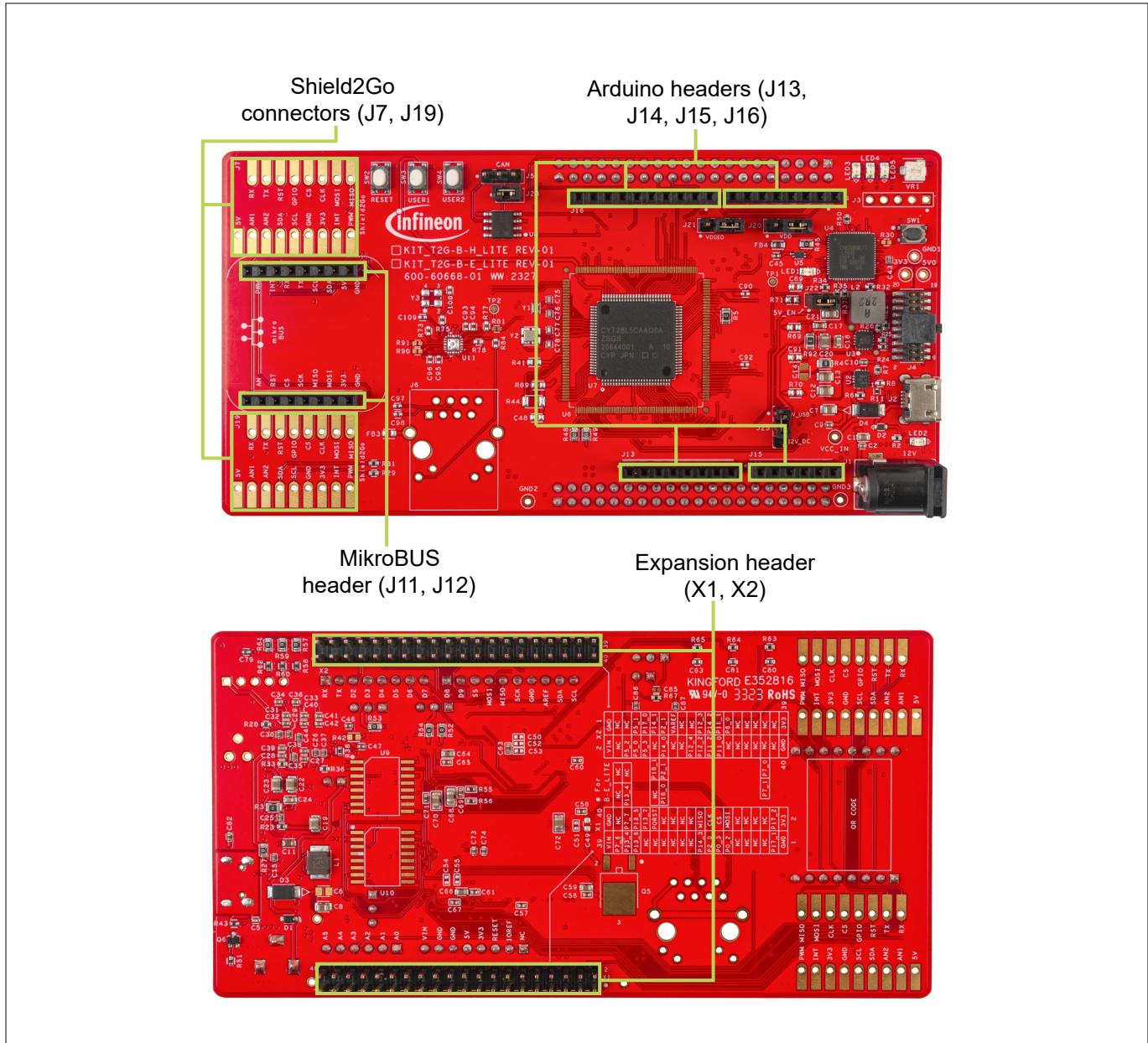
Figure 23   **Location of GPIO headers in the Lite kit**

4 Kit design documents

This section provides a detailed information on resources that can be used to understand the layout, design, and components of the TRAVEO™ T2G B-E Lite kit. These resources include layout images, schematics, assembly drawings, bills of materials (BOM), and pinout details, which can be used to build a deeper understanding of how the kit is put together and how it can be used.

4.1 Schematic images

This section provides the schematics for the TRAVEO™ T2G B-E Lite kit rev-01, which can be used to understand the electrical connections and components of the kit.
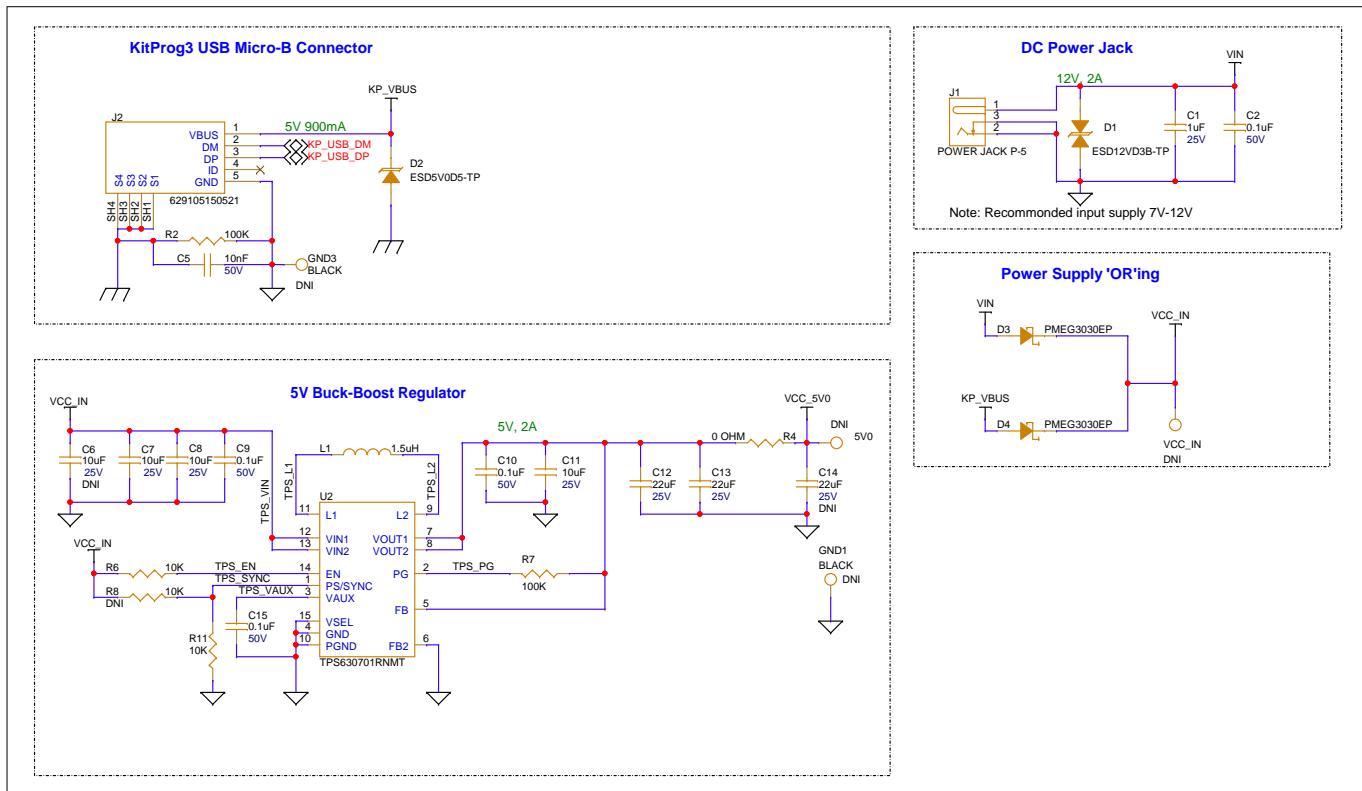

Figure 24   Power supply 1

4 Kit design documents
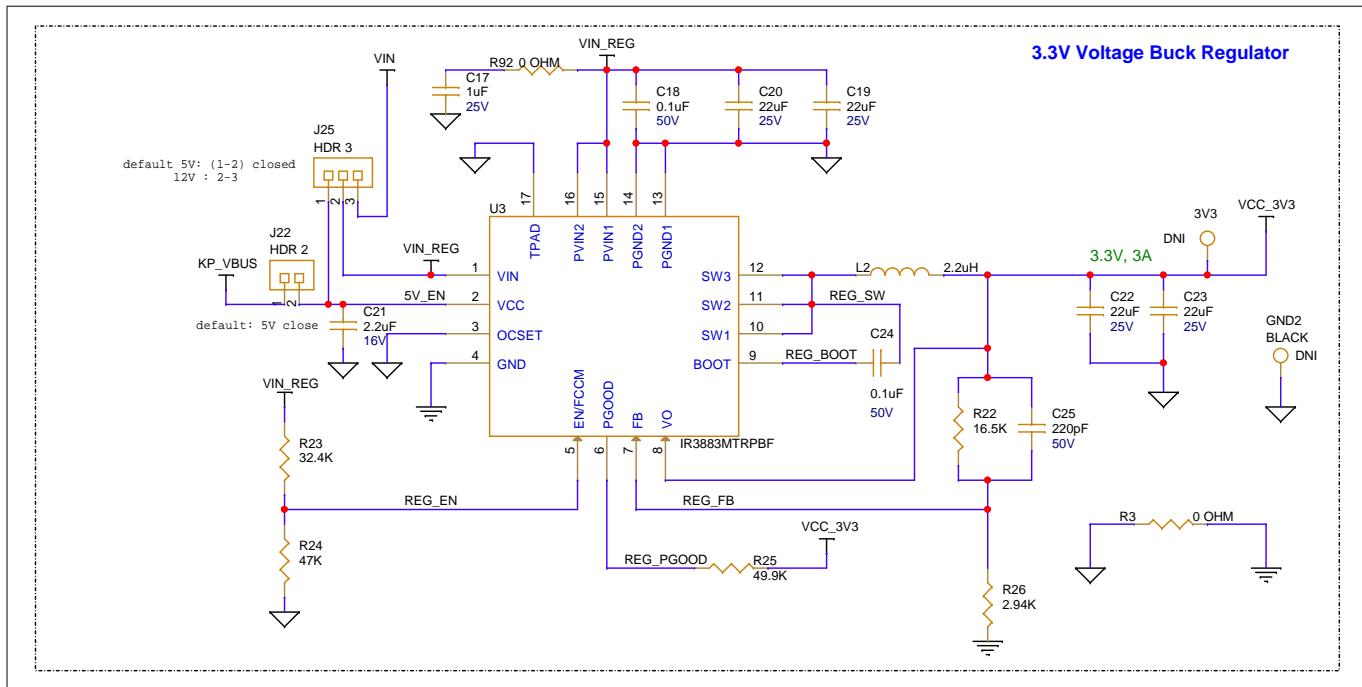

Figure 25   Power supply 2
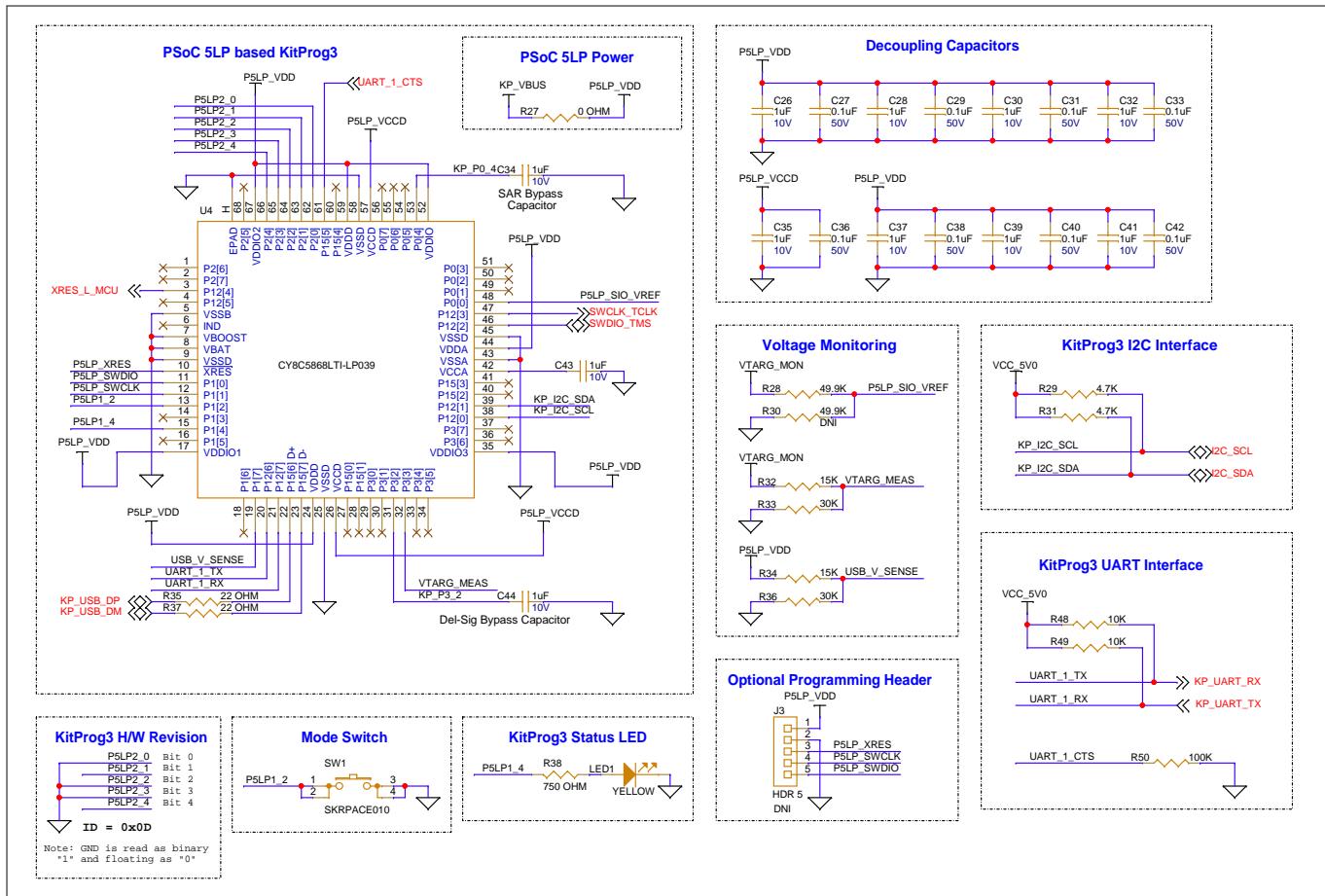
Figure 26   KitProg3 interface

4 Kit design documents
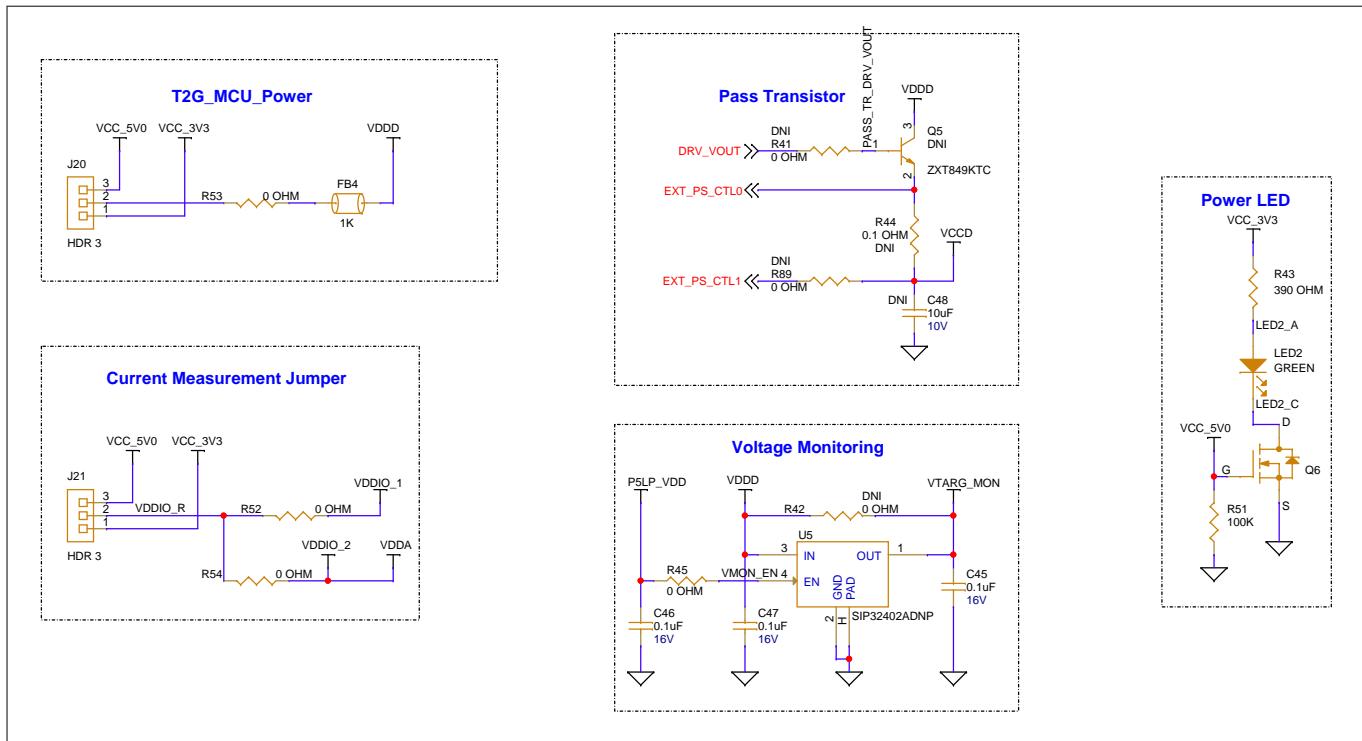
**Figure 27**   T2G MCU power
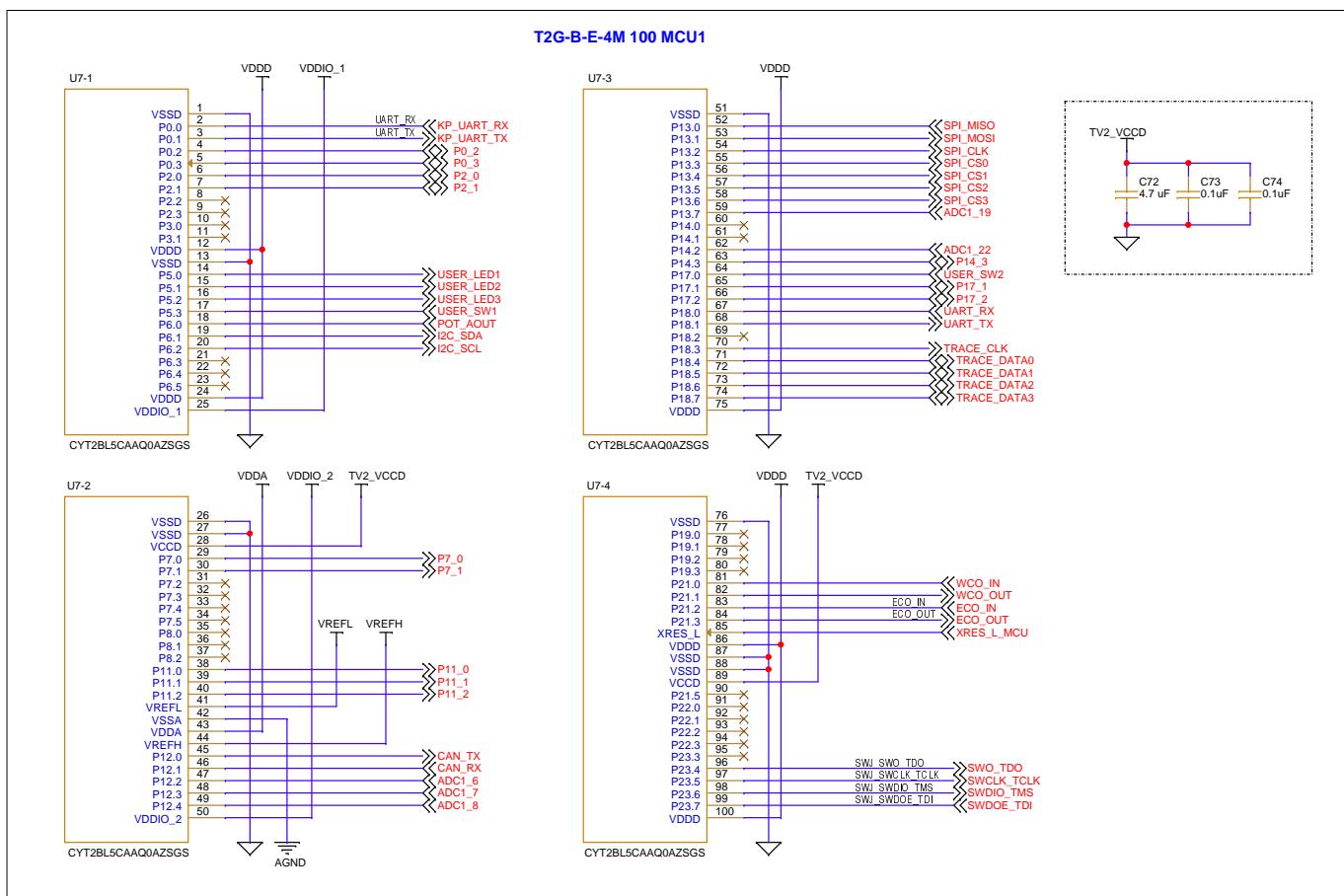
Figure 28   T2G-B-E-4M 100 MCU

4 Kit design documents
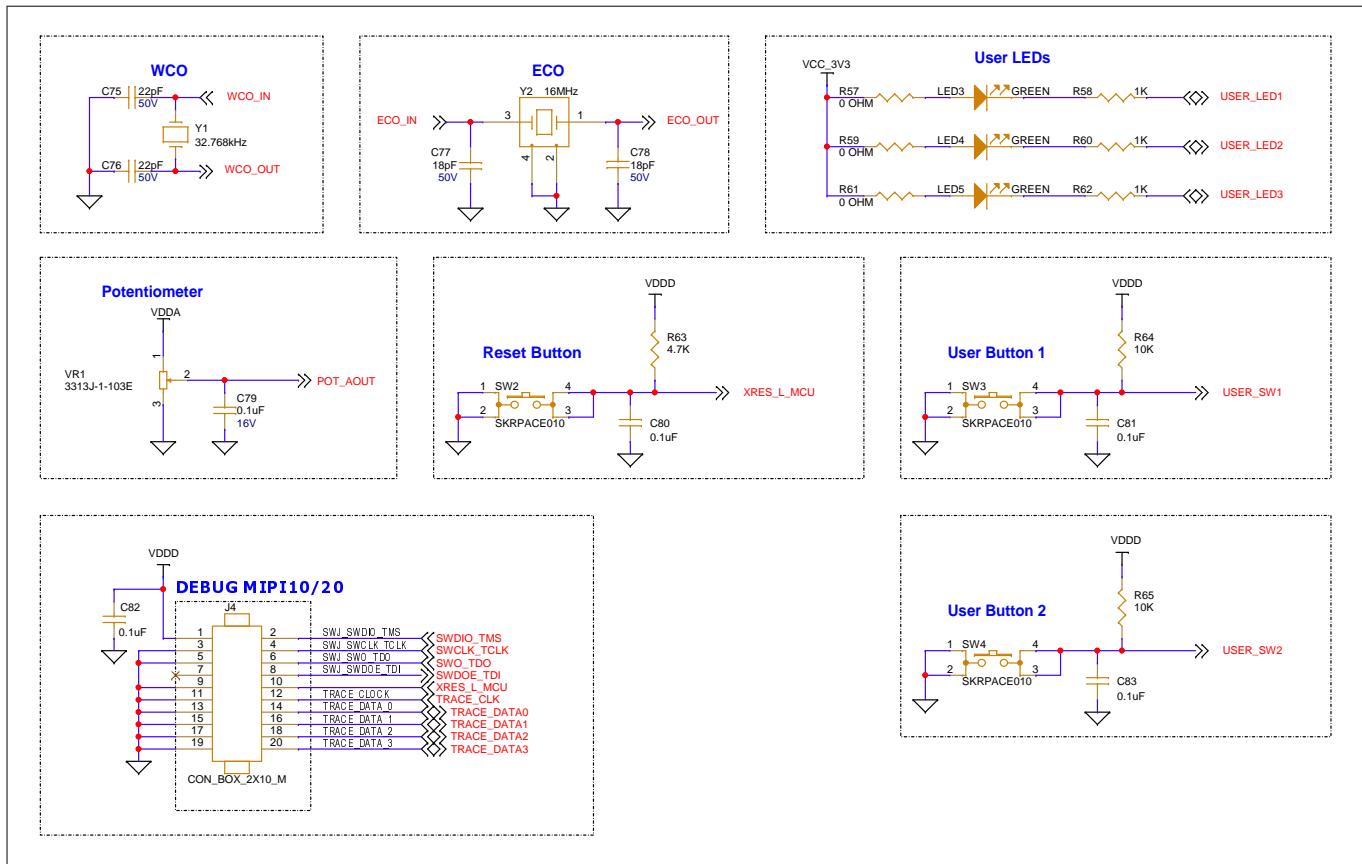
Figure 29   **Peripheral interface**

4 Kit design documents
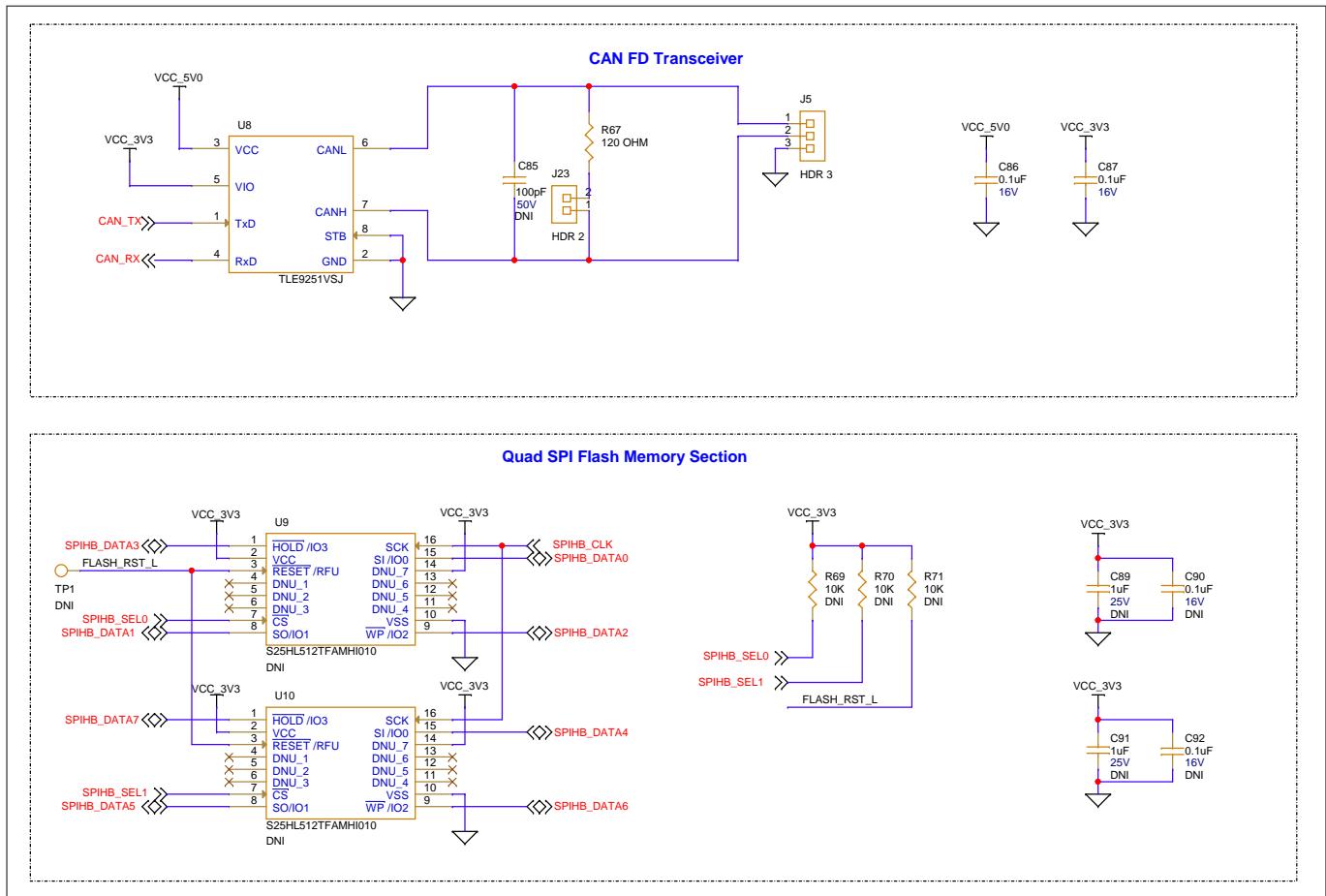
Figure 30 **CAN FD and QSPI interface**

4 Kit design documents
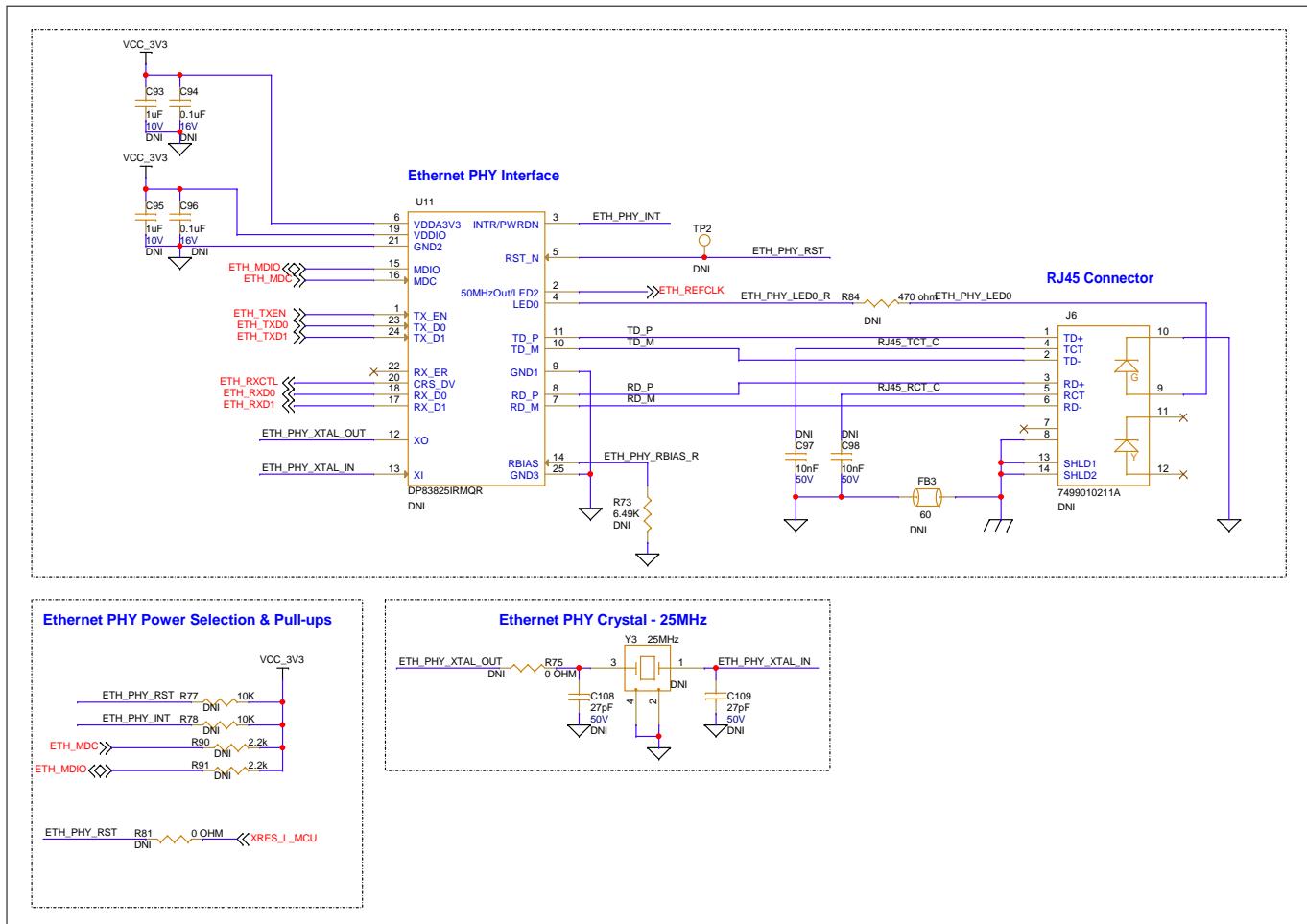
Figure 31   Ethernet interface

4 Kit design documents
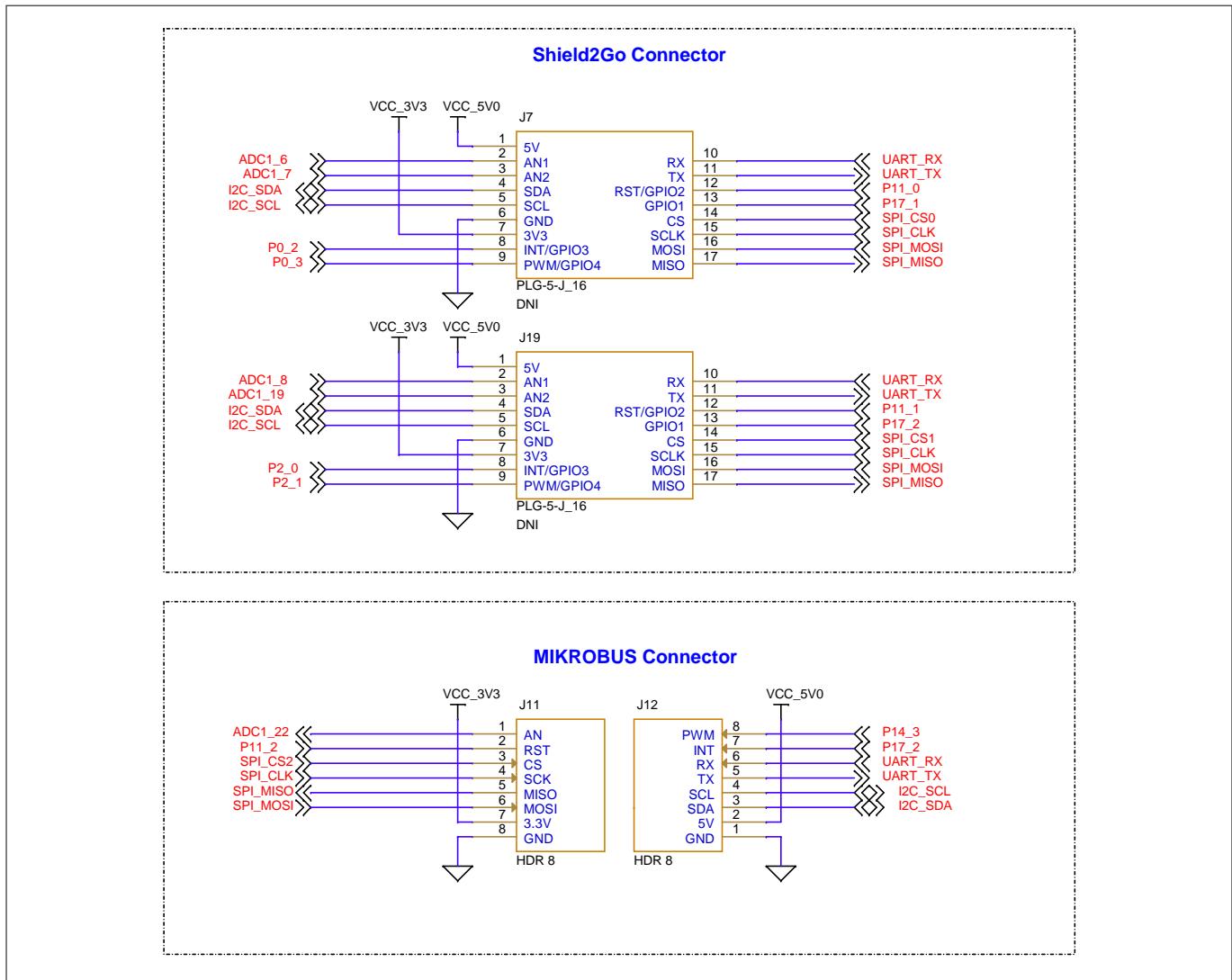
Figure 32   **Shield2Go and mikroBUS**

4 Kit design documents
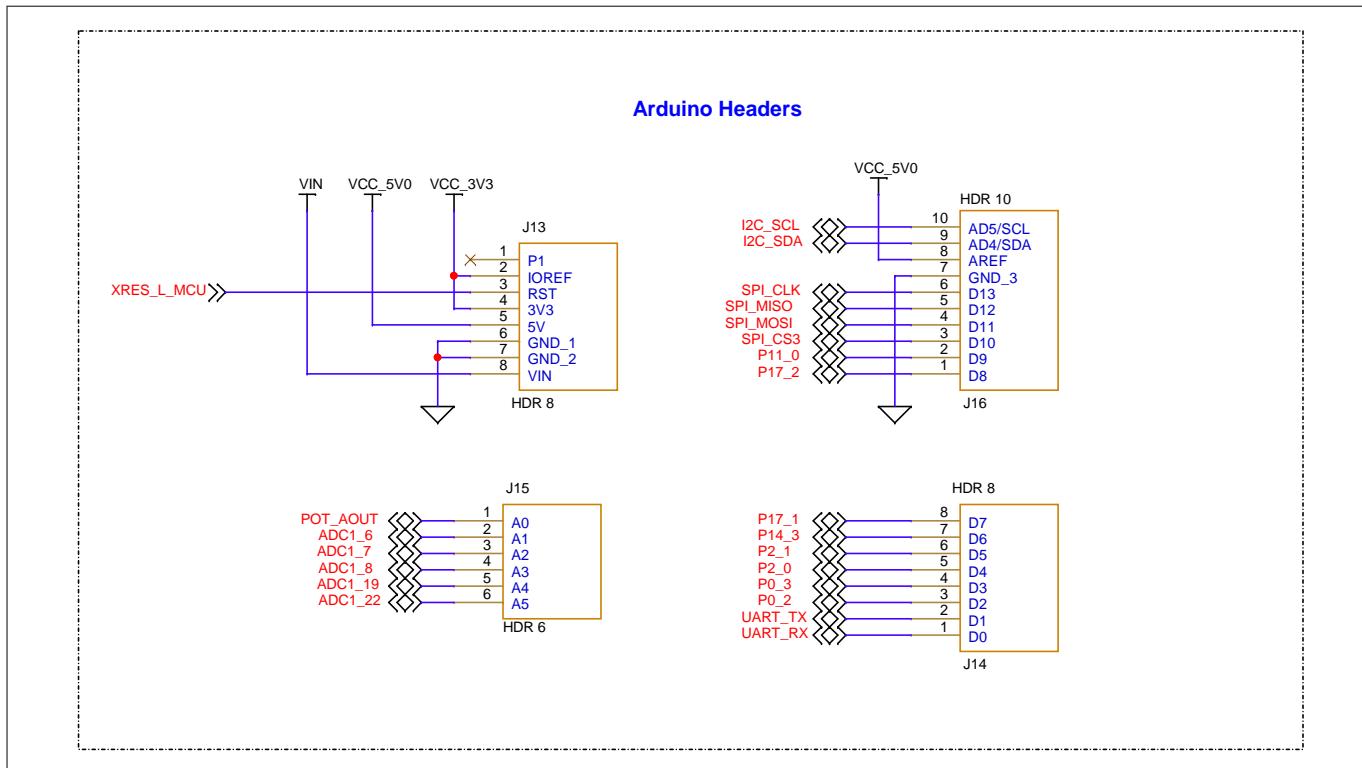
Figure 33   **Arduino headers**
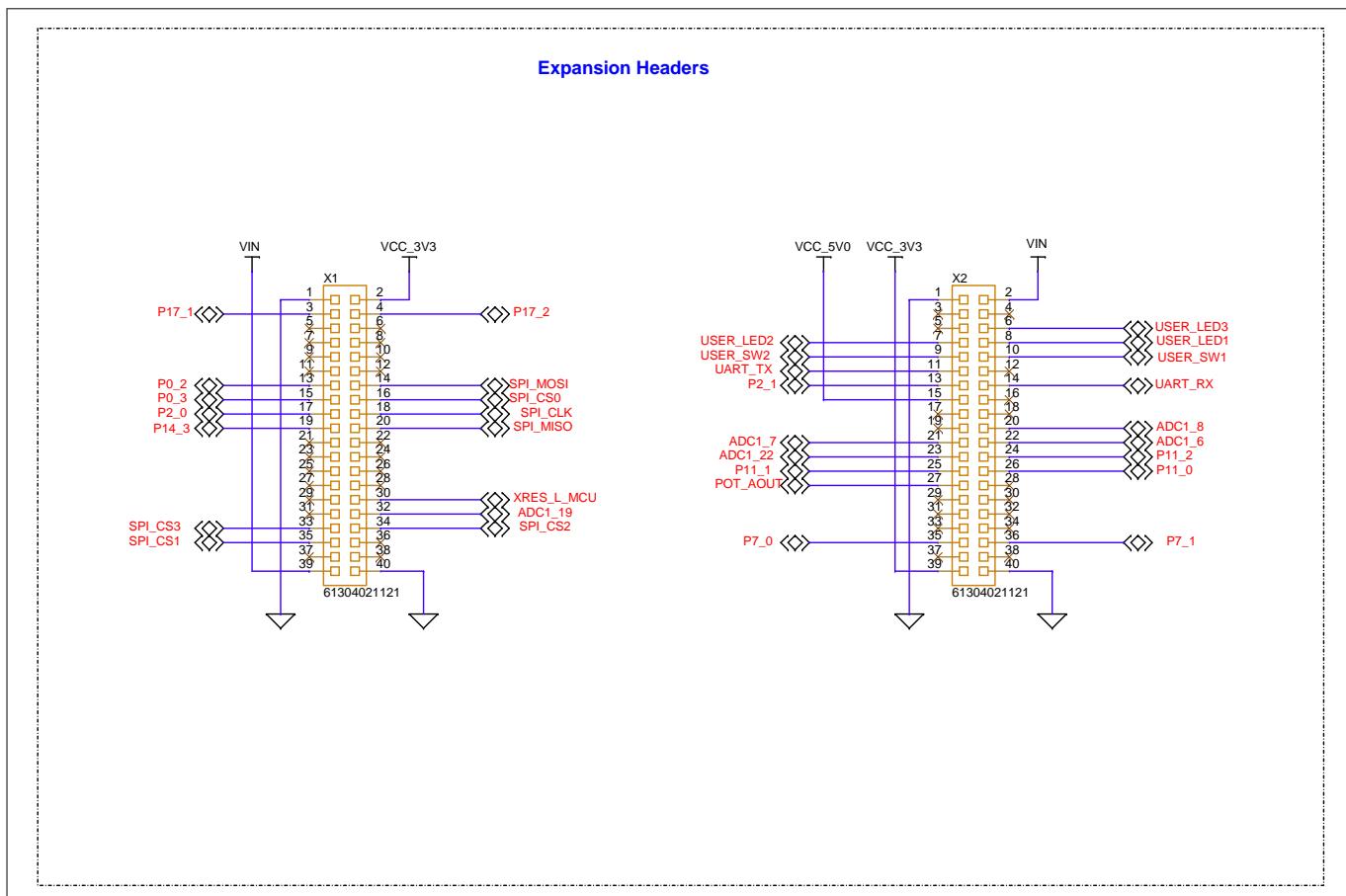
Figure 34   **Expansion headers**

Figure 35   **Accessories**
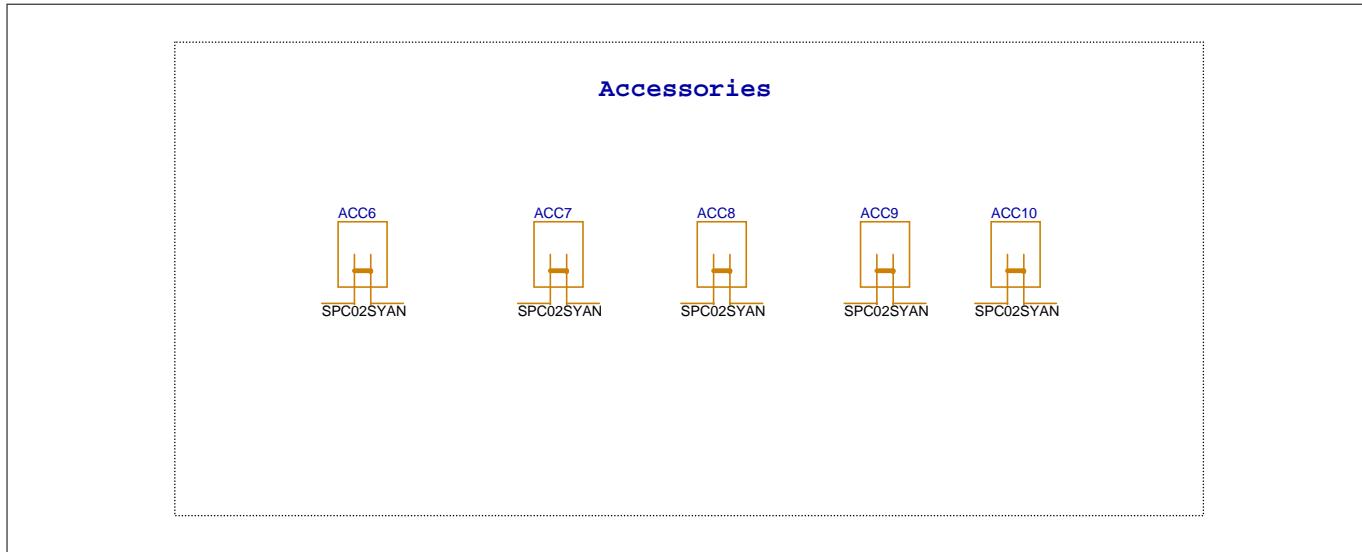
4.2   Assembly drawings

This section provides primary and secondary side assembly drawings for the TRAVEO™ T2G B-E Lite kit rev-01, which can be used to understand the physical layout and assembly of the kit.
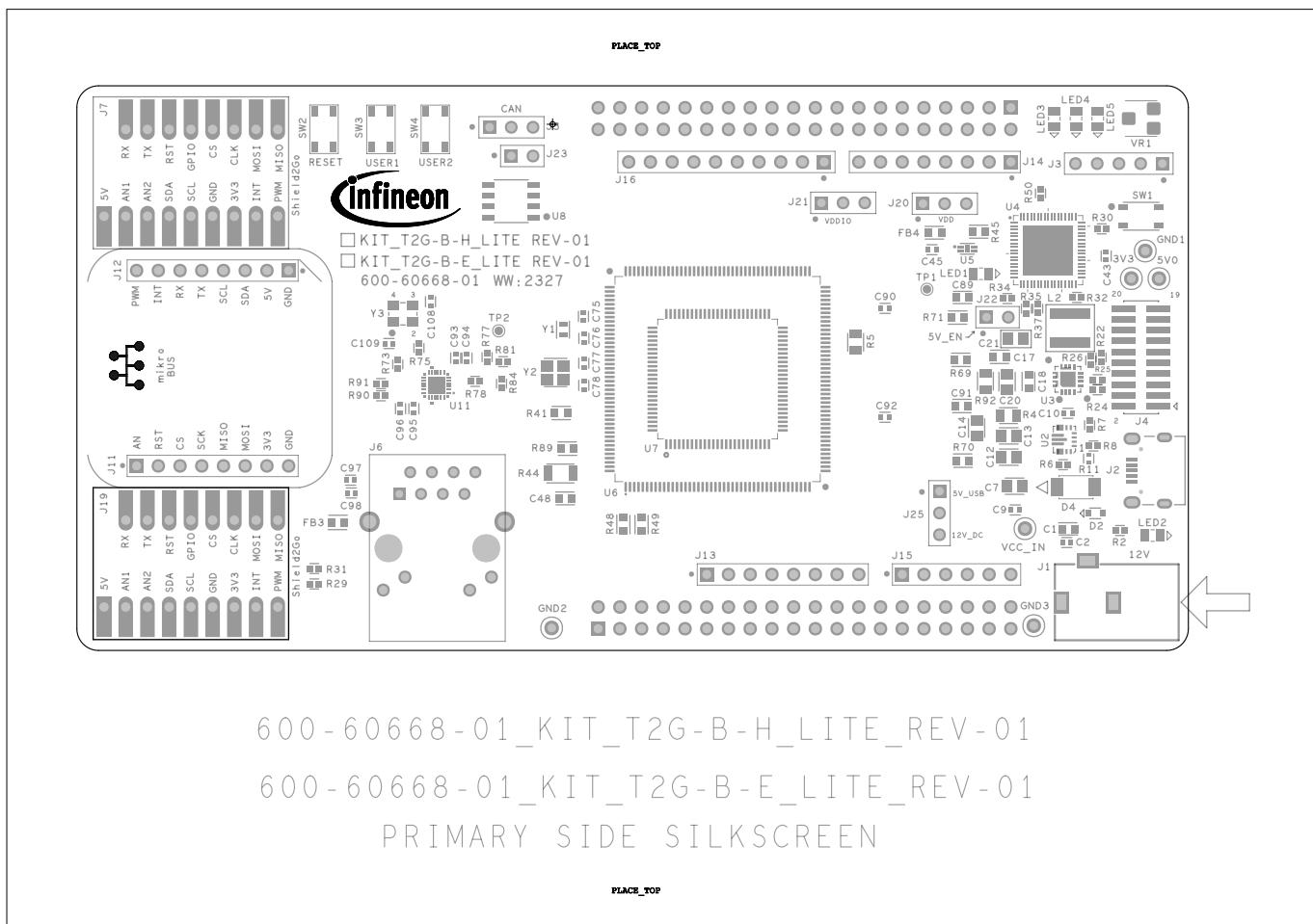
Figure 36   **Primary side assembly of TRAVEO™ T2G B-E Lite kit rev-01**

4 Kit design documents
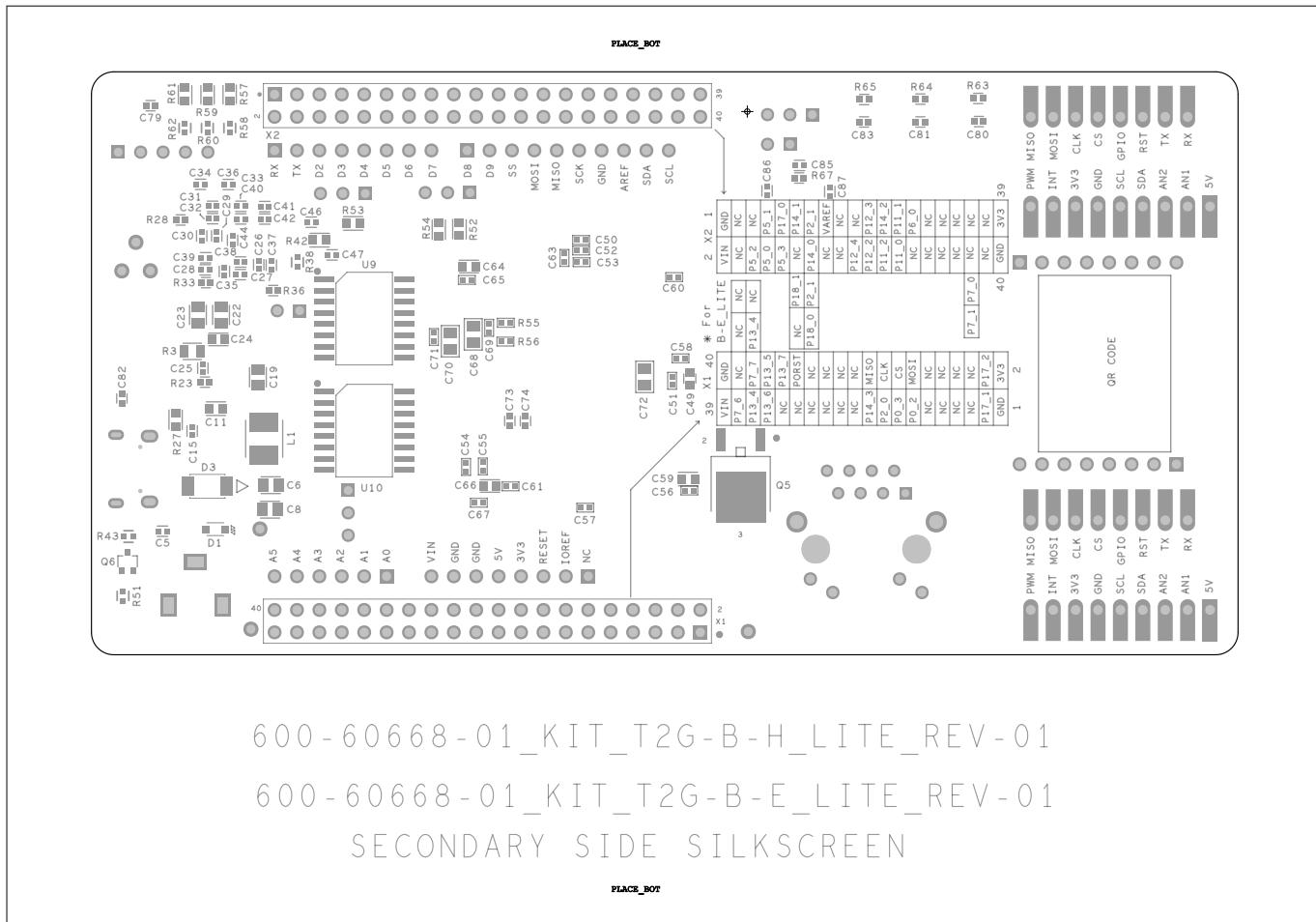
Figure 37   **Secondary side assembly of TRAVEO™ T2G B-E Lite kit rev-01**

4.3   Layout images

This section provides primary and secondary side layout images of the TRAVEO™ T2G B-E Lite kit rev-01.

4 Kit design documents
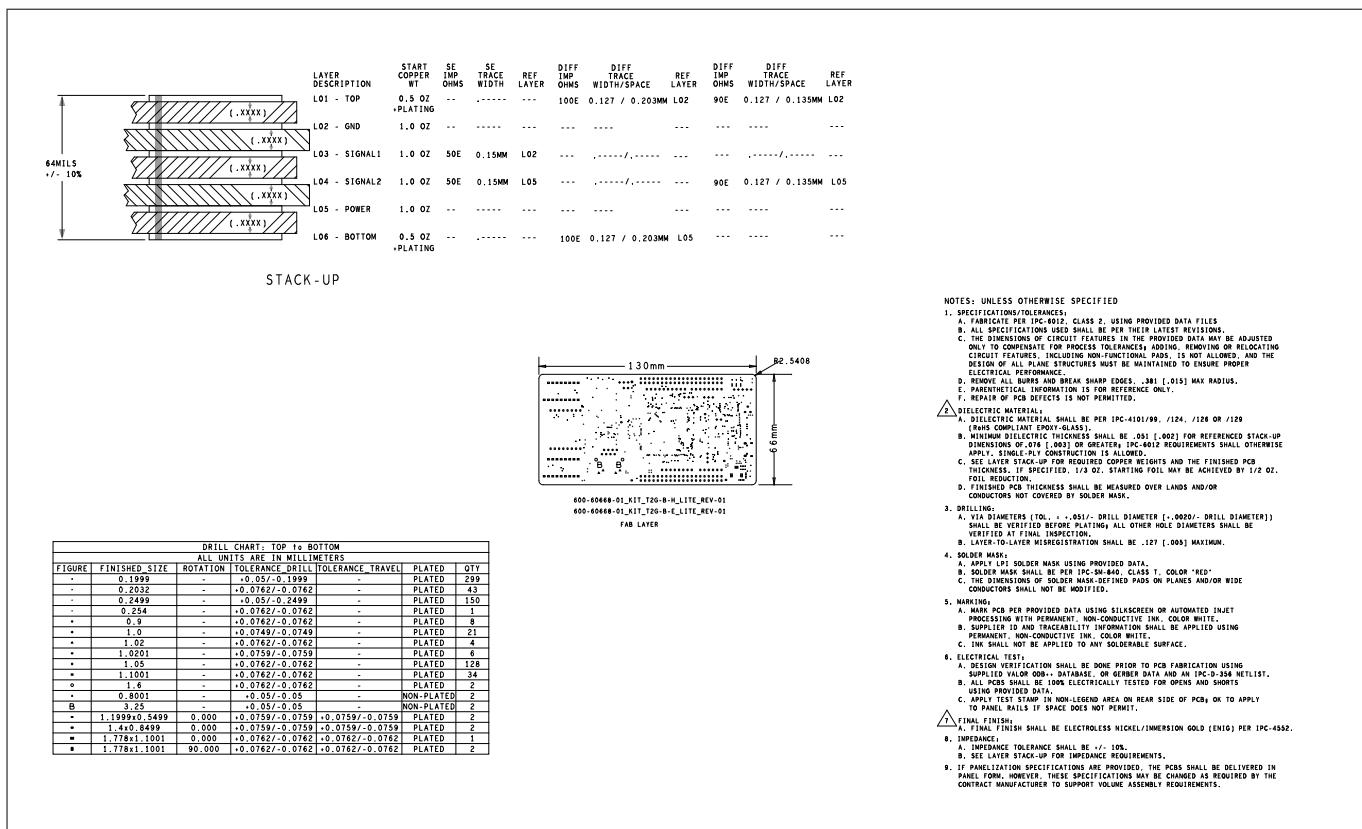
Figure 38   **PCB fabrication**
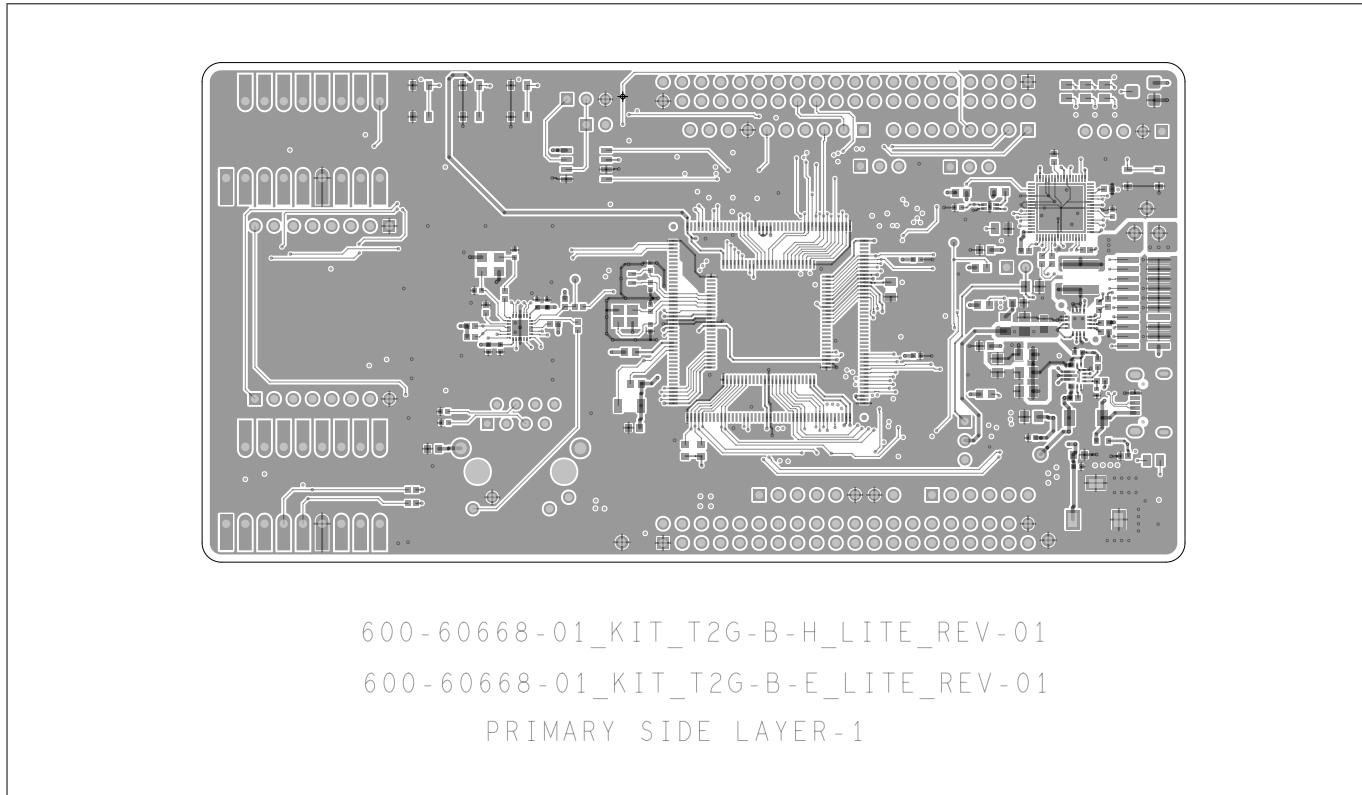
Figure 39   **Primary side layer 1**

4 Kit design documents
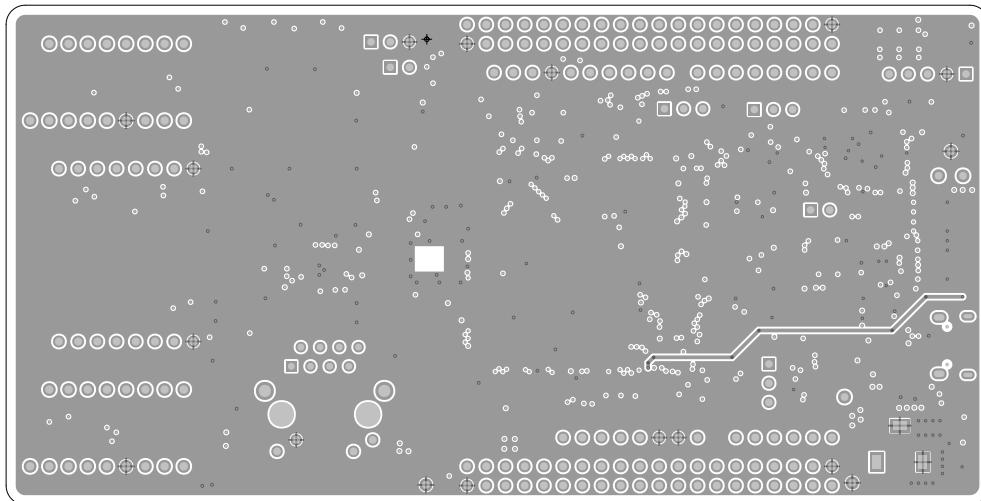
Figure 40   **Ground layer 2**
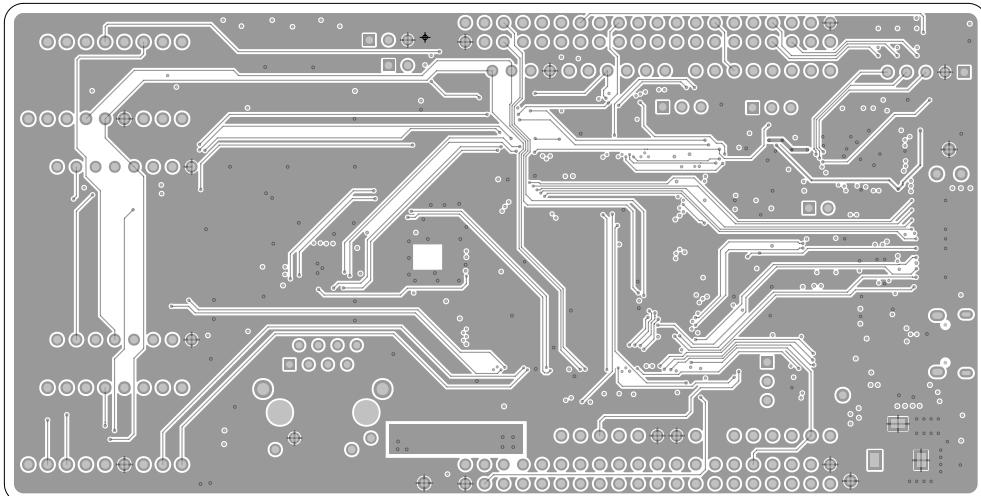
Figure 41   **Signal layer 3**

4 Kit design documents
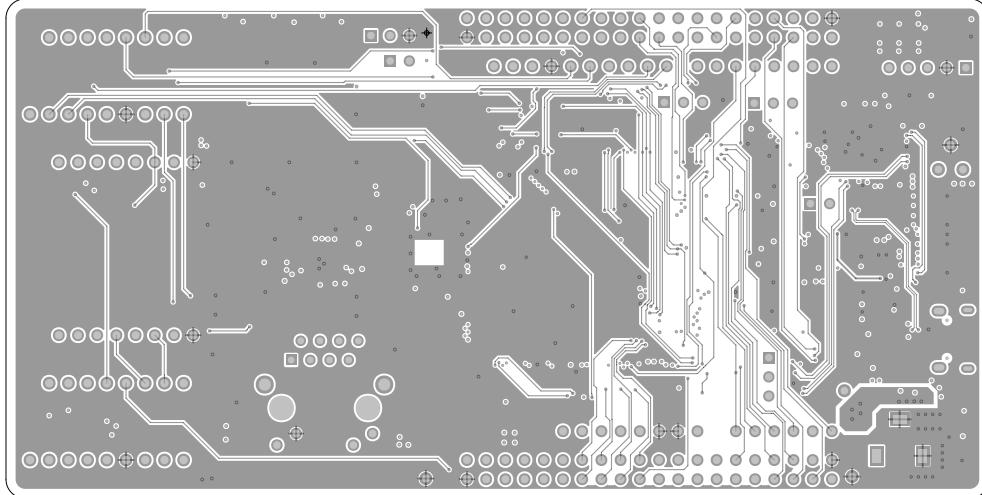
Figure 42 **Signal layer 4**
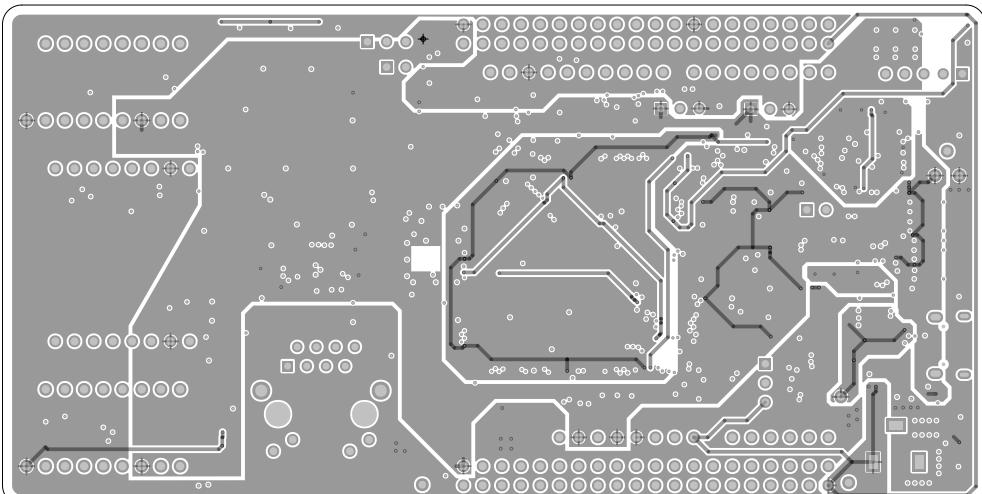
Figure 43 **Power layer 5**
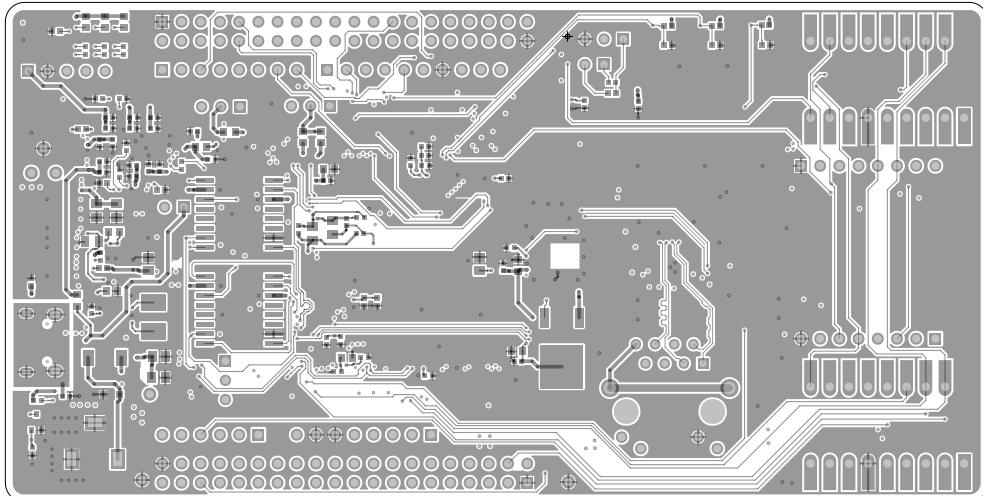
Figure 44 Secondary side layer 6

4.4 Bill of materials (BOM)

This section provides the BOM for the TRAVEO™ T2G B-E Lite kit, which is a detailed list of all the components and parts that are included in the kit (see Table 17).

Table 17 **KIT_T2G-B-E_LITE rev-01 bill of materials**

Quantity	Reference	Description	PCB footprint	Manufacturer name	Manufacturer part number	Value	Loading
5	ACC6,ACC7, ACC8,ACC9, ACC10	2 (1 x 2) Position shunt connector black closed top 0.100 (2.54 mm) Gold	TBD	Sullins Connector Solutions	SPC02SYAN	SPC02 SYAN	–
4	C1,C17,C64, C66	CAP CER 1 µF 10% 25 V X7R 0603	CAPC1608_0 603N	Murata Electronics	GCM188R71E1 05KA64D	1 µF	–
12	C2,C9,C10,C 15,C27,C29, C31,C33,C3 6,C38,C40,C 42	CAP CER 0.1 µF 50 V X5R 0402	CAPC1005_0 402N	Murata Electronics	GRM155R61H1 04KE14D	0.1 µF	–

(table continues…)

4 Kit design documents

Table 17 **(continued) KIT_T2G-B-E_LITE rev-01 bill of materials**

Quantity	Reference	Description	PCB footprint	Manufacturer name	Manufacturer part number	Value	Loading
1	C5	CAP CER 10000PF 50 V X7R 0402	CAPC1005_0402N	Würth Elektronik	885012205067	10 nF	–
2	C7,C8	CAP CER 10 µF 25 V X5R 0805	CAPC2012_0805N	Murata Electronics	GRM21BR61E106KA73L	10 µF	–
1	C11	CAP CER 10 µF 25 V X5R 0603	CAPC1608_0603N	Murata	GRM188R61E106MA73D	10 µF	–
6	C12,C13,C19,C20,C22,C23	CAP CER 22 µF 25 V X5R 0805	CAPC2012_0805N	Yageo	CC0805MKX5R8BB226	22 µF	–
2	C18,C24	CAP CER 0.1 µF 50 V X7R 0603	CAPC1608_0603N	Würth Elektronik	885012206095	0.1 µF	–
3	C21,C68,C70	CAP CER 2.2 µF 10% 16 V X7R 0805	CAPC2012X140N	Murata Electronics	GCM21BR71C225KA64L	2.2 µF	–
1	C25	CAP CER 220PF 50 V X7R 0402	CAPC1005_0402N	Würth Elektronik	885012205057	220 pF	–
11	C26,C28,C30,C32,C34,C35,C37,C39,C41,C43,C44	CAP CER 1 µF 10% 10 V X7R 0402	CAPC1005_0402N	Murata Electronics	GRM155Z71A105KE01J	1 µF	–
22	C45,C46,C47,C86,C87,C56,C57,C58,C60,C61,C63,C65,C67,C69,C71,C73,C74,C79,C80,C81,C82,C83	CAP CER 0.1 µF 10% 16 V X7R 0402	CAPC1005_0402N	Murata Electronics	GRT155R71C104KE01D	0.1 µF	–
1	C59	CAP CER 10 µF 10% 10 V X7R 0603	CAPC1608_0603N	Murata Electronics	GRM188Z71A106KA73D	10 µF	–
1	C72	CAP CER 4.7 µF 10% 25 V X7R 0805	CAPC2012X140N	TDK Corporation	CGA4J1X7R1E475K125AD	4.7 µF	–
2	C75,C76	CAP CER 22 PF 50 V C0G/NP0 0402	CAPC1005_0402N	Würth Elektronik	885012005057	22 pF	–

(table continues…)

4 Kit design documents

Table 17 **(continued) KIT_T2G-B-E_LITE rev-01 bill of materials**

Quantity	Reference	Description	PCB footprint	Manufacturer name	Manufacturer part number	Value	Loading
2	C77,C78	CAP CER 18 PF 50 V C0G/NPO 0402	CAPC1005_0402N	Yageo	CC0402FRNPO9BN180	18 pF	–
1	D1	TVS DIODE 12 VWM 15.5 VC SOD323	DIO2_SOD323_BIQ	Micro Commercial Co	ESD12VD3B-TP	ESD12VD3B-TP	–
1	D2	TVS DIODE 5 VWM 18.6 VC SOD523	sodfl1608 x 77 m	Micro Commercial Co	ESD5V0D5-TP	ESD5V0D5-TP	–
2	D3,D4	DIODE SCHOTTKY 30 V 3A SOD128	DIO_NXP_SOD-128	Nexperia USA Inc.	PMEG3030EP,115	PMEG3030EP	–
1	FB4	Ferrite bead 1 KΩ 0603 1LN	INDC1608_0603N	Murata Electronics	BLM18KG102SN1D	1K	–
1	J1	CONN PWR jack 2X5.5 mm Solder	CUI_PJ-102A	CUI Devices	PJ-102A	POWER JACK P-5	–
1	J2	CONN RCPT USB2.0 Micro-B SMD R/A	WURTH_629105150521	Würth Elektronik	629105150521	629105150521	–
1	J4	CONN header SMD 20POS 1.27 mm	FTSH-110-01-DV-K	Samtec Inc.	FTSH-110-01-F-DV-K	CON_BOX_2X10_M	–
4	J5,J20,J21,J25	CONN header VERT 3POS 2.54 mm	CTST254P1X03_W260	Würth Elektronik	61300311121	HDR 3	–
4	J11,J12,J13,J14	CONN header VERT 8POS 2.54 mm	HDRV8W64P254_8X1	Würth Elektronik	61300811821	HDR 8	–
1	J15	WR-PHD 2.54 mm socket header 6 P	HDRV6W64P254_6X1	Wurth Elektronik	61300611821	HDR 6	–
1	J16	CONN HDR 10POS 0.1 GOLD PCB	HDRV10W64P254_10X1	Wurth Elektronik	61301011821	HDR 10	–
2	J22,J23	CONN, HDR, MALE, SINGLE, 2POS, 2.54 mm, GOLD, STR, TH	CTST254P1X02_W260	Würth Elektronik	61300211121	HDR 2	–

(table continues...)

4 Kit design documents

Table 17 (continued) KIT_T2G-B-E_LITE rev-01 bill of materials

Quantity	Reference	Description	PCB footprint	Manufacturer name	Manufacturer part number	Value	Loading
1	LED1	LED, YELLOW, CLEAR, 585 nm, 2.0 V, 0805	LEDC2012_0805	Visual Communications Company - VCC	CMD17-21VYC/TR8	YELLOW	–
4	LED2,LED3, LED4,LED5	LED GREEN CLEAR 0805 SMD	LEDC2012_0805	Visual Communications Company - VCC	CMD17-21VGC/TR8	GREEN	–
1	L1	FIXED IND 1.5 UH 5.2 A 36 MΩ SMD	INDM4242X200M	Pulse Electronics	PA4332,152NLT	1.5 uH	–
1	L2	FIXED IND 2.2 UH 9.7 A 14.5 MΩ SM	IND_XAL5030-222MEB	Abracon LLC	ASPIAIG-F5030-2R2M-T	2.2 uH	–
1	Q6	MOSFET N-CH 30 V 180 MA SOT323	SOT323_SC70-3N_NXP	NXP	NX3020NAKW,115	NX3020NAKW,115	–
3	R2,R50,R51	RES 100K Ω 5% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402JR-07100KL	100K	–
4	R3,R4,R5,R92	RES 0 Ω jumper 2 A 0805	RESC2012X60N	Yageo	AC0805JR-070RL	0 Ω	–
4	R6,R64,R65, R11	RES 10K Ω 5% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402JR-0710KL	10K	–
1	R7	RES 100K Ω 1% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402FR-07100KL	100K	–
1	R22	RES 16.5K Ω 1% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402FR-0716K5L	16.5K	–
1	R23	RES 32.4K Ω 1% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402FR-0732K4L	32.4K	–
1	R24	RES 47K Ω 1% 1/16 W 0402	RESC1005X40M_B	Vishay	CRCW040247K0FKEDC	47K	–
2	R25,R28	RES 49.9K Ω 1% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402FR-0749K9L	49.9K	–
1	R26	RES 2.94K Ω 1% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402FR-072K94L	2.94K	–

(table continues…)

4 Kit design documents

Table 17 **(continued) KIT_T2G-B-E_LITE rev-01 bill of materials**

Quantity	Reference	Description	PCB footprint	Manufacturer name	Manufacturer part number	Value	Loading
8	R27,R45,R52,R53,R54,R57,R59,R61	RES 0 Ω jumper 1/10 W 0603	RESC1608_0603N	Yageo	RC0603JR-070RL	0 Ω	–
3	R29,R31,R63	RES 4.7K Ω 5% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402JR-074K7L	4.7K	–
2	R32,R34	RES 15K Ω 1% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402FR-0715KL	15K	–
2	R33,R36	RES 30K Ω 1% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402FR-0730KL	30K	–
2	R35,R37	RES 22 Ω 1% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402FR-0722RL	22 Ω	–
1	R38	RES 750 Ω 5% 1/16 W 0402	RESC1005_0402M	Yageo	RC0402JR-07750RL	750 Ω	–
1	R43	RES SMD 390 Ω 5% 1/10W 0402	RESC1005_0402M	Panasonic Electronic Components	ERJ-2GEJ391X	390 Ω	–
2	R48,R49	RES 10K Ω 5% 1/10 W 0603	RESC1608_0603N	Yageo	RC0603JR-0710KL	10K	–
2	R55,R56	RES SMD 0 Ω 1/16 W 0402	RES0402_0-5	YAGEO	AF0402JR-070RL	0 Ω	–
3	R58,R60,R62	RES 1K Ω 5% 1/10 W 0402	RESC1005_0402M	Panasonic Electronic Components	ERJ-2GEJ102X	1K	–
1	R67	RES 120 Ω 1% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402FR-07120RL	120 Ω	–
4	SW1,SW2,SW3,SW4	Tactile Switches 4.2x3.2x2.5 mm 260 gf surface mount	SKRPACE010	Alps Alpine	SKRPACE010	SKRPACE010	–
1	U2	IC REG BCK BST 5 V 2 A 15VQFN	qfn50p250x300x100-15m_NOFID	Texas Instruments	TPS630701RNMT	TPS630701RNMT	–
1	U3	IC REG buck adjustable 3 A 16PQFN	QFN50P300X300X90-16N_TP	Infineon Technologies	IR3883MTRPBF	IR3883MTRPBF	–
1	U4	IC MCU 32BIT 256KB flash 68QFN	QFN40P800X800_68-H580N	Infineon Technologies	CY8C5868LTI-LP039	CY8C5868LTI-LP039	–

(table continues...)

4 Kit design documents

Table 17 (continued) KIT_T2G-B-E_LITE rev-01 bill of materials

Quantity	Reference	Description	PCB footprint	Manufacturer name	Manufacturer part number	Value	Loading
1	U5	IC PWR switch N-CHAN 1:1 4TDFN	TDFN50P160X120_4-HS86X50M	Vishay Siliconix	SIP32402ADNP-T1GE4	SIP32402ADNP	–
1	U7	TRAVEO™ T2G MCU IC 32-bit dual-core 100 MHz, 160 MHz 4.063 MB	TVII-B-E-1M_100	Infineon Technologies	CYT2BL5CAAQ0AZSGS	CYT2BL5CAAQ0AZSGS	–
1	U8	IC transceiver 1/1 DSO-8	SOIC127P600X175-8N_A	Infineon Technologies	TLE9251VSJ	TLE9251VSJ	–
1	VR1	Trimmer 10K Ω 0.125 W J lead top	3313J-1-103E	Bourns Inc.	3313J-1-103E	3313J-1-103E	–
2	X1,X2	CONN header VERT 40 POS 2.54 mm	HDRV40W64P254_20X2	Wurth Elektronik	61304021121	61304021121	–
1	Y1	Crystal 32.7680 KHz 12.5 PF SMD	XTAL_ABS05_1M6X1M	TXC CORPORATION	9H03277003	32.768 kHz	–
1	Y2	CRYSTAL 16.0000 MHz 10 PF SMD	OSCCC200X250X90-4M	Abracon LLC	ABM10-16.000MHZ-D30-T3	16 MHz	–

No load components

Quantity	Reference	Description	PCB footprint	Manufacturer name	Manufacturer part number	Value	Loading
1	C6	CAP CER 10 μF 25 V X5R 0805	CAPC2012_0805N	Murata Electronics	GRM21BR61E106KA73L	10 μF	DNI
1	C14	CAP CER 22 μF 25 V X5R 0805	CAPC2012_0805N	Yageo	CC0805MKX5R8BB226	22 μF	DNI
1	C48	CAP CER 10 μF 10% 10 V X7R 0603	CAPC1608_0603N	Murata Electronics	GRM188Z71A106KA73D	10 μF	DNI
3	C49,C89,C91	CAP CER 1 μF 10% 25 V X7R 0603	CAPC1608_0603N	Murata Electronics	GCM188R71E105KA64D	1 μF	DNI
6	C50,C51,C52,C53,C54,C55	CAP CER 0.1 μF 10% 16 V X7R 0402	CAP0402_0-75	Murata Electronics	GRT155R71C104KE01D	0.1 μF	DNI
1	C85	CAP CER 100 PF 50 V C0G 0402	CAPC1005_0402N	TDK Corporation	CGA2B2C0G1H101J050BA	100 pF	DNI

(table continues...)

4 Kit design documents

Table 17   (continued) KIT_T2G-B-E_LITE rev-01 bill of materials

Quantity	Reference	Description	PCB footprint	Manufacturer name	Manufacturer part number	Value	Loading
2	C90,C92	CAP CER 0.1 µF 10% 16 V X7R 0402	CAPC1005_0402N	Murata Electronics	GRT155R71C104KE01D	0.1 µF	DNI
2	C108,C109	CAP CER 27PF 50V C0G/NP0 0402	CAPC1005_0402N	Murata	GCM1555C1H270JA16D	27 pF	DNI
3	GND1,GND2,GND3	PC test point miniature black	TPT_KEY_5000	Keystone Electronics	5001	BLACK	DNI
1	J3	CONN header VERT 5POS 2.54 mm	CTST254P1X05_W260	Molex	22284050	HDR 5	DNI
2	J7,J19	Shield2go	S2G-1P	-	-	PLG-5-J_16	DNI
1	Q5	TRANS NPN 30V 7A TO252-3	TO229P991X252-3N	Diodes Inc	ZXT849KTC	ZXT849KTC	DNI
3	R8,R77,R78	RES 10K Ω 5% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402JR-0710KL	10K	DNI
1	R30	RES 49.9K Ω 1% 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402FR-0749K9L	49.9K	DNI
3	R41,R42,R89	RES 0 Ω jumper 1/10 W 0603	RESC1608_0603N	Yageo	RC0603JR-070RL	0 Ω	DNI
1	R44	RES 0.1 Ω 1% ¼ W 1206	RESC3116X65N	Yageo	RL1206FR-070R1L	0.1 Ω	DNI
3	R69,R70,R71	RES 10K Ω 5% 1/10 W 0603	RESC1608_0603N	Yageo	RC0603JR-0710KL	10K	DNI
2	R75,R81	RES 0 Ω jumper 1/16 W 0402	RESC1005X40M_B	Yageo	RC0402JR-070RL	0 Ω	DNI
2	R90,R91	RES SMD 2.2K Ω 5% 1/16 W 0402	RESC1005X40M_B	Vishay Dale	CRCW04022K20JNED	2.2k	DNI
2	TP1,TP2	PC test point miniature red	tpt_key_5000_smd_01	Keystone Electronics	5000	TP	DNI

(table continues…)

4 Kit design documents

Table 17 (continued) KIT_T2G-B-E_LITE rev-01 bill of materials

Quantity	Reference	Description	PCB footprint	Manufacturer name	Manufacturer part number	Value	Loading
1	U6	T2G MCU IC 32-Bit Quad-Core 100 MHz, 350 MHz 8.1875- MB flash 176-TEQFP	QFP176P50_2600X2600X170L60X22N	Infineon Technologies	CYT4BF8CDDQ0AESGS	CYT4BF8CDDQ0AESGS	DNI
2	U9,U10	IC flash 512 MBIT SPI/QUAD 16SOIC	SOIC127P1030_16_D1030N	Infineon Technologies	S25HL512TFAMHI010	S25HL512TFAMHI010	DNI
3	3V3,5V0,VCC_IN	PC test point miniature red	TPT_KEY_5000	Keystone Electronics	5000	RED	DNI
1	Y3	Crystal 25.0000 MHz 18PF SMD	OSCCC250X320X80-4N	ECS Inc	ECS-250-18-33-JGN-TR	25 MHz	DNI
2	C93,C95	CAP CER 1UF 10% 10 V X7R 0402	CAPC1005_0402N	Murata Electronics	GRM155Z71A105KE01J	1 µF	DNI
2	C94,C96	CAP CER 0.1UF 10% 16 V X7R 0402	CAPC1005_0402N	Murata Electronics	GRT155R71C104KE01D	0.1 µF	DNI
2	C97,C98	CAP CER 10000PF 50V X7R 0402	CAPC1005_0402N	Würth Elektronik	885012205067	10 nF	DNI
1	FB3	FERRITE BEAD 60 Ω 0603 1LN	INDC1608_0603N	Murata Electronics	BLM18PG600SN1D	60	DNI
1	J6	1 Port RJ45 through hole 10/100 Base-T, AutoMDIX	7499010211A	Würth Elektronik	7499010211A	7499010211A	DNI
1	R73	RES 6.49K Ω 1% 1/16W 0402	RESC1005X40M_B	Yageo	RC0402FR-076K49L	6.49K	DNI
1	R84	RES SMD 470 Ω 0.1% 1/16W 0402	RESC1005X40M_B	Panasonic Electronic Components	ERA-2ARB471X	470 Ω	DNI
1	U11	IC TXRX FULL/HALF 1/1 24WQFN	RMQ24_3P1X3P1_TEX	Texas Instruments	DP83825IRMQR	DP83825IRMQR	DNI

4.5 Pinout details

This section provides information about the primary onboard functionalities of the TRAVEO™ T2G B-E MCU pins on the lite kit, as well as details about pins and where these pins are routed on the board.

Table 18   TRAVEO™ T2G B-E MCU pin details

Pin	Primary onboard function	Secondary onboard function	Connection details
XRES	Hardware reset	–	–
P0[0]	KitProg3 UART RX pin	–	This pin is connected between TRAVEO™ T2G B-E MCU RX and KitProg3 UART TX pin
P0[1]	KitProg3 UART TX pin	–	This pin is connected between TRAVEO™ T2G B-E MCU TX and KitProg3 UART RX pin
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[0]	Potentiometer (POT) output POT_AOUT	Arduino header (J15.1)	–
P13[0]	D12 – Arduino header (J16.5)	Expansion header (X1.20)	–
P13[1]	D11 – Arduino header (J16.4)	Expansion header (X1.14)	–
P13[2]	D13 – Arduino header (J16.6)	Expansion header (X1.18)	–
P13[6]	D10 – Arduino header (J16.3)	Expansion header (X1.33)	–
P11[0]	D9 – Arduino header (J16.2)	Shield2Go connector (J7.12) Expansion header (X2.26)	–
P17[2]	D8 – Arduino header (J16.1)	Shield2Go connector (J19.13) Expansion header (X1.4)	–
P18[0]	UART_RX	Arduino header J14.1 Shield2Go connector (J7.10, J19.10) mikroBUS connector (J12.6)	This pin is connected to the UART TX pin
P18[1]	UART_TX	Arduino header J14.2 Shield2Go connector (J7.11, J19.11) mikroBUS connector (J12.5)	This pin is connected to the UART RX pin
P0[2]	Pin D2 of connector J14.3 Arduino header	–	–

(table continues...)

4 Kit design documents

Table 18 **(continued) TRAVEO™ T2G B-E MCU pin details**

Pin	Primary onboard function	Secondary onboard function	Connection details
P0[3]	Pin D3 of connector J14.4 Arduino header	–	–
P2[0]	Pin D4 of connector J14.5 Arduino header	–	–
P2[1]	Pin D5 of connector J14.6 Arduino header	–	–
P14[3]	Pin D6 of connector J14.7 Arduino header	–	–
P17[1]	Pin D7 of connector J14.8 Arduino header	–	–
P12[2]	A1 – Arduino header (J15.2)	–	–
P12[3]	A2 – Arduino header (J15.3)	–	–
P12[4]	A3 – Arduino header (J15.4)	–	–
P13[7]	A4 – Arduino header (J15.5)	–	–
P14[2]	A5 – Arduino header (J15.6)	–	–
P6[1]	I2C SDA - Common I2C SDA pin for KitProg3 USB-I2C bridge	I2C SDA pin on 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)	Expansion connector (X2.8)	–
P5[1]	USER LED2 (LED2)	Expansion connector (X2.7)	–
P5[2]	USER LED3 (LED3)	Expansion connector (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)	–

(table continues…)

4 Kit design documents

Table 18   (continued) TRAVEO™ T2G B-E MCU pin details

Pin	Primary onboard function	Secondary onboard function	Connection details
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[3]	TRACE_CLK	DEBUG MIPI 10/20 connector (J4.12)	–
P18[4]	TRACE_DATA0	DEBUG MIPI 10/20 connector (J4.14)	–
P18[5]	TRACE_DATA1	DEBUG MIPI 10/20 connector (J4.16)	–
P18[6]	TRACE_DATA2	DEBUG MIPI 10/20 connector (J4.18)	–
P18[7]	TRACE_DATA3	DEBUG MIPI 10/20 connector (J4.20)	–

5 Additional information

This section describes the test points available and the advance features in this lite kit.

5.1 Test points

Table 19 lists all the test points available in the Lite kit.

Table 19 **Test points**

Test point	Description
TP1	Connected to the flash reset line of both Quad SPI flash memory pin 3 (U9.3 and U10.3)
TP2	DNI
VCC_IN	Connected to monitor the voltage coming after power supply 'OR'ing
5V0	Connected to monitor the 5 V power output from the 5 V buck boost regulator
3V3	Connected to monitor the 3.3 V power output from the 3.3 V buck regulator
GND1	Connected to common ground point of the kit
GND2	Connected to common ground point of the kit
GND3	Connected to common ground point of the kit
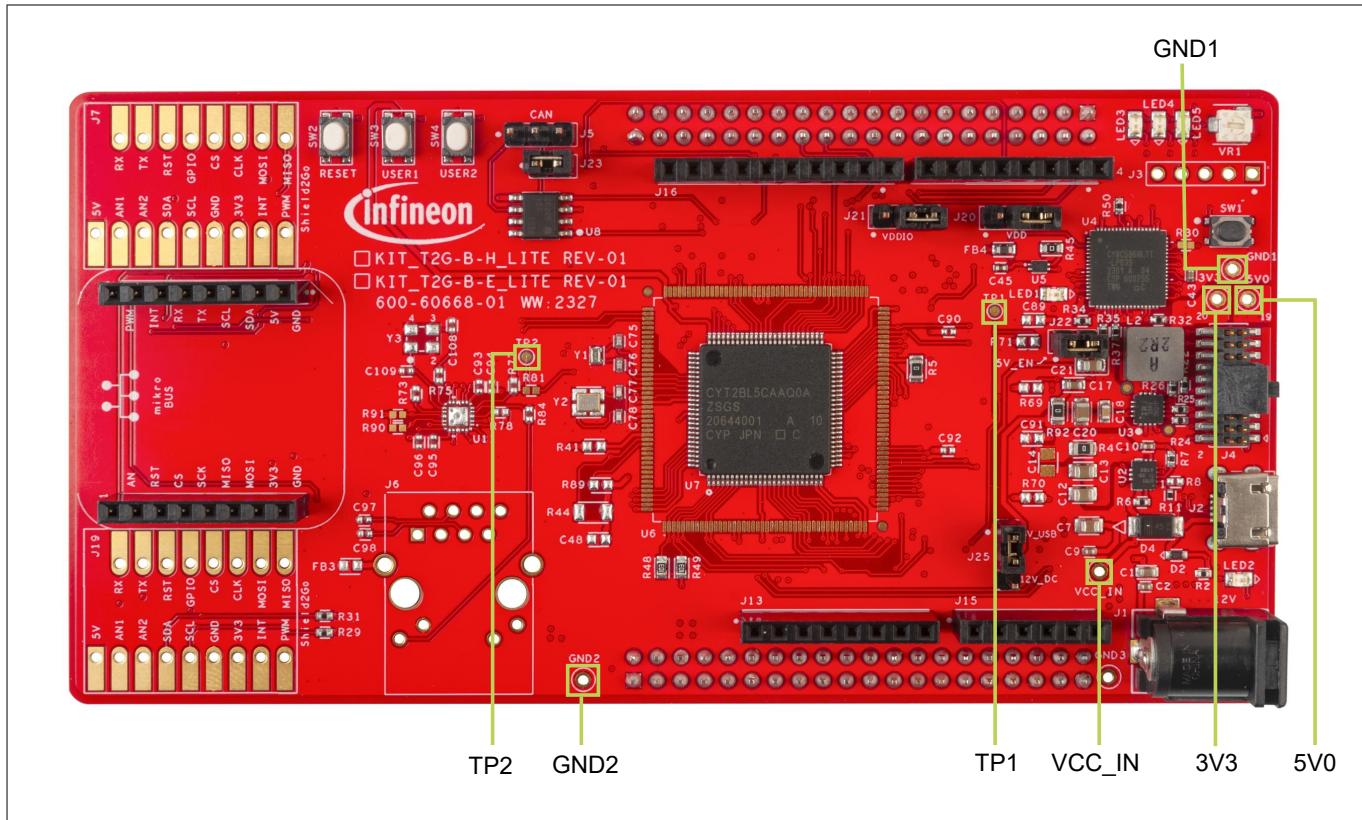
Figure 45 **Location of various test points available in the Lite kit**

References

[1] Datasheet
- TRAVEO™ T2G 32-bit Automotive MCU
- PSoC™ 5LP: CY8C58LP family
- TPS63070 2-V to 16-V buck-boost converter with 3.6-A switch current
- IR3883 SupIRBuck synchronous buck regulator
- TLE9251V High-speed CAN transceiver

[2] User guides
- KIT_T2G-B-E_LITE kit guide
- Eclipse IDE for ModusToolbox ™ user guide
- KitProg3 user guide

[3] Reference manuals
- TRAVEO™ T2G Automotive MCU body controller entry architecture reference manual
- TRAVEO™ T2G CYT2BL register reference manual

[4] TRAVEO™ T2G Body Entry Lite Kit Quick Start Guide

[5] ModusToolbox™ software

Note: *For any questions regarding any peripheral block or code examples, visit the* Infineon Developer Community *for solutions.*

Glossary

AC

alternating current

ADC

analog-to-digital converter

B-E

body entry

BOM

bill of materials

CAN

controller area network

CAP

capacitor

CAN FD

controller area network flexible data rate

CO

crystal oscillator

CPU

central processing unit

DAC

digital-to-analog converter

DC

direct current

DNI

do not include

ECO

external crystal oscillator

ESD

electrostatic discharge

ETH

ethernet

GPIO

general-purpose input output

HFLASH

HYPERFLASH™

HRAM

hyper random-access memory

IC

integrated circuit

IDE

integrated development environment

I/O

input output

I2C

inter-integrated circuit

I2S

Glossary

inter-IC sound
LED
light-emitting diode
LIN
local interconnect network
LDO
low dropout voltage regulator
LPO
low power oscillator
MCU
microcontroller unit
PC
personal computer
POT
potentiometer
PMIC
power management integrated circuits
QSPI
quad serial peripheral interface
SCB
serial communication block
SDK
software development kit
SMIF
serial memory interface
SPI
serial peripheral interface
SRAM
static random-access memory
SWD
serial wire debug
TP
test point
T2G
TRAVEO™ 2nd generation
UART
universal asynchronous receiver transmitter
USB
Universal Serial Bus
WCO
watch crystal oscillator

Revision history

Document revision	Date	Description of changes
**	2023-07-20	Initial release
*A	2023-10-19	Corrected website links. Fixed pinout (Figure 3) and fixed schematics.
*B	2024-06-14	Restructured the document and added content for the kit KIT_T2G-B-E_LITE rev. 01. Updated template.

Trademarks

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