TRAVEO™ T2G Cluster 6M Lite Kit user guide

KIT_T2G_C-2D-6M_LITE

About this document

Scope and purpose

This user guide helps users operate the KIT_T2G_C-2D-6M_LITE (TRAVEO™ T2G Cluster 6M Lite), a cost-effective evaluation kit. The kit is built around the CYT4DN device from the TRAVEO™ Cluster 2D family of microcontrollers and includes an HDMI interface and onboard EZ-USB™ FX3.

The document outlines the features and functions of the TRAVEO™ T2G Cluster 6M Lite Kit, offering comprehensive information on available interfaces and the usage of all hardware interfaces.

Intended audience

This document is intended for software and hardware engineers who are evaluating the TRAVEO™ T2G Cluster 2D family CYT4DN device.

Evaluation board

This board is to be used during the design-in process for software evaluation.

***Note**: PCB and auxiliary circuits are NOT optimized for final customer design.*

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Safety precautions

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

Table 1	Safety precautions
	**Warning:** *The DC link potential of this board is up to 1000 VDC. When measuring voltage waveforms by oscilloscope, high voltage differential probes must be used. Failure to do so may result in personal injury or death.*
	**Warning:** *The evaluation or reference board contains DC bus capacitors which take time to discharge after removal of the main supply. Before working on the drive system, wait five minutes for capacitors to discharge to safe voltage levels. Failure to do so may result in personal injury or death. Darkened display LEDs are not an indication that capacitors have discharged to safe voltage levels.*
	**Warning:** *The evaluation or reference board is connected to the grid input during testing. Hence, high-voltage differential probes must be used when measuring voltage waveforms by oscilloscope. Failure to do so may result in personal injury or death. Darkened display LEDs are not an indication that capacitors have discharged to safe voltage levels.*
	**Warning:** *Remove or disconnect power from the drive before you disconnect or reconnect wires or perform maintenance work. Wait five minutes after removing power to discharge the bus capacitors. Do not attempt to service the drive until the bus capacitors have discharged to zero. Failure to do so may result in personal injury or death.*
	**Caution:** *The heat sink and device surfaces of the evaluation or reference board may become hot during testing. Hence, necessary precautions are required while handling the board. Failure to comply may cause injury.*
	**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:** *A drive that is incorrectly applied or installed can lead to component damage or reduction in product lifetime. Wiring or application errors such as under sizing the motor, supplying an incorrect or inadequate AC supply, or excessive ambient temperatures may result in system malfunction.*
	**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.*

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1 Getting started

This section provides an overview of the TRAVEO™ T2G Cluster 6M Lite Kit and provides step-by-step instructions on setting up and powering on the kit. It also includes guidance on running the preprogrammed firmware and configuring the default jumpers for a seamless experience.

1.1 Kit overview

This section offers a brief introduction to the TRAVEO™ T2G Cluster 6M Lite Kit and outlines the various interfaces and peripherals included in the kit.

1.1.1 Introduction

The TRAVEO™ T2G Cluster 6M Lite Kit belongs to the TRAVEO™ Cluster 2D graphics family, featuring the CYT4DN device as the MCU, an HDMI interface, and an onboard EZ-USB™ FX3 with a USB Type-C connector for streaming RGB data packets to a PC screen. This kit is primarily designed to evaluate the functions and features of the CYT4DN series microcontroller. The CYT4DN MCU includes two Arm® Cortex®-M7 CPUs for primary processing and an Arm® Cortex®-M0+ CPU for peripheral processing.

The TRAVEO™ T2G Cluster 6M Lite Kit includes a TRAVEO™ T2G CYT4DN MCU, an HDMI interface for high-resolution FPD-LINK video output, an EZ-USB™ FX3, external memories (SEMPER™ flash and HYPERRAM™), and an onboard Ethernet PHY. Additionally, the kit features an onboard programmer/debugger (KitProg3), three user LEDs, one potentiometer, two user push buttons, a MIPI-CSI2 connector, and two Type-C connectors.

1.1.2 Features

- The main features of the TRAVEO™ T2G Cluster 6M Lite Kit are as follows:
- TRAVEO™ T2G CYT4DN device (MCU)
- EZ-USB™ FX3 device
- PSOC™ 5LP (KitProg3) for programming and debugging
- Arm® Standard 20-pin JTAG header for programming and debugging
- **Crystal oscillators**:
  - 16 MHz external crystal oscillator (ECO)
  - 32.768 kHz watch crystal oscillator (WCO)
- **Serial Memory Interface (SMIF)**:
  - SEMPER™ NOR Flash (S28HS)
  - HYPERRAM™ (S27KS)
- **General-purpose I/O headers**:
  - mikroBUS header
  - Arduino-compatible header (also compatible with CY8CKIT for CAN and LIN)
  - Raspberry Pi-compatible I/O header (also compatible with Audio HAT for Audio Codec)
  - Shield2Go
- HDMI interface for FPDLINK/Dual-FPDLINK output
- MIPI-CSI2 camera connector
- Onboard Gigabit Ethernet PHY
- **Human Interface Devices (HID)**:
  - User LEDs

- Push button
- Potentiometer

- **2 x USB Type-C connectors**:
  - For FX3 output streaming and powering the kit
  - For KitProg3 USB-UART bridge and powering the kit

Figure 1 shows the block diagram of the TRAVEO™ T2G Cluster 6M Lite Kit.

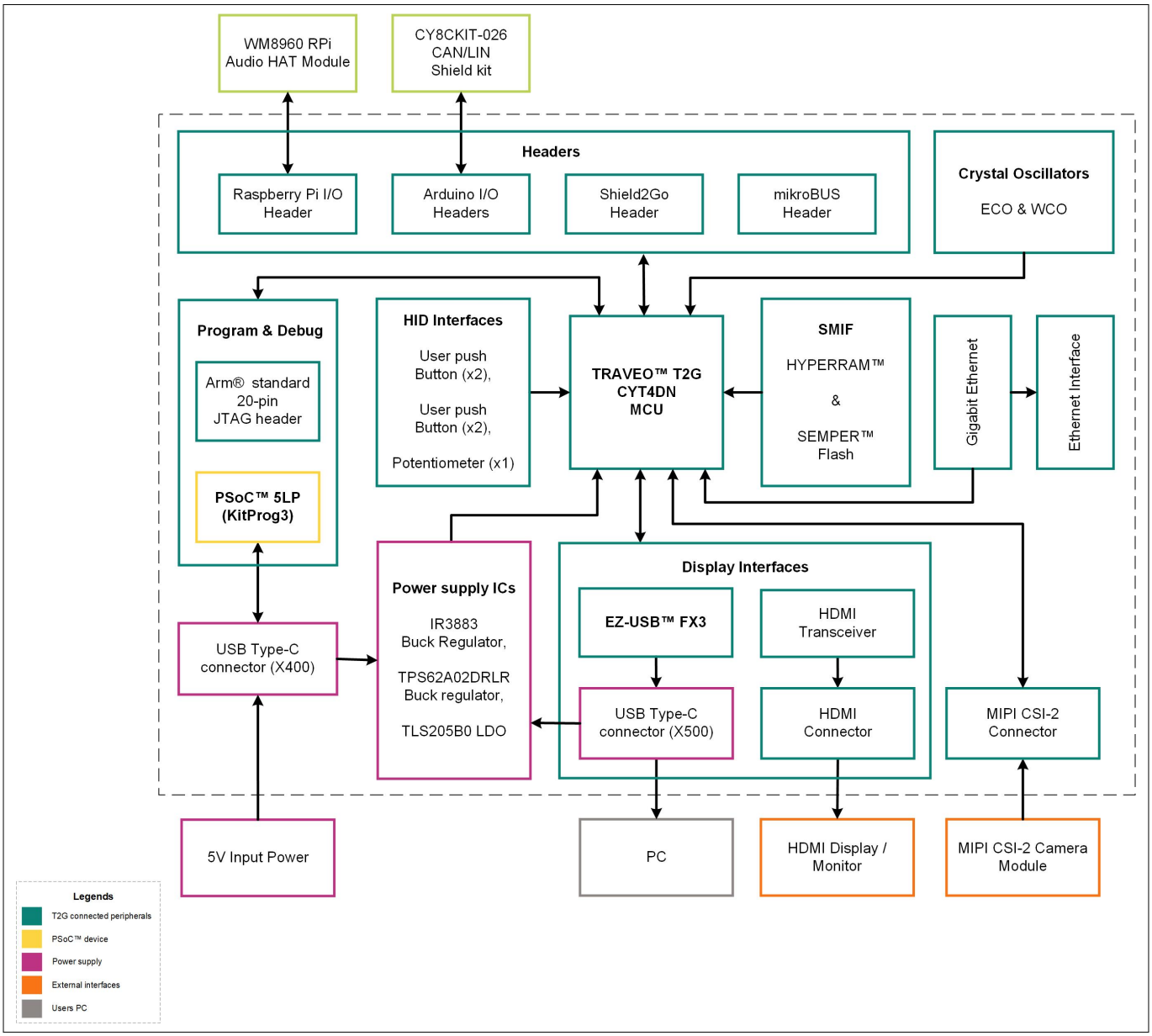

Figure 1 Block diagram of TRAVEO™ T2G Cluster 6M Lite Kit

***Note**: The block diagram includes only the major interfaces. Additional blocks may exist between the CYT4DN device and the peripheral component block.*

1.1.3 Peripheral details

This section provides an overview of the interfaces and peripherals available in the TRAVEO™ T2G Cluster 6M Lite Kit.

Table 2 shows the peripherals markup, reference designator and details about them, and their respective locations highlighted in Figure 2.

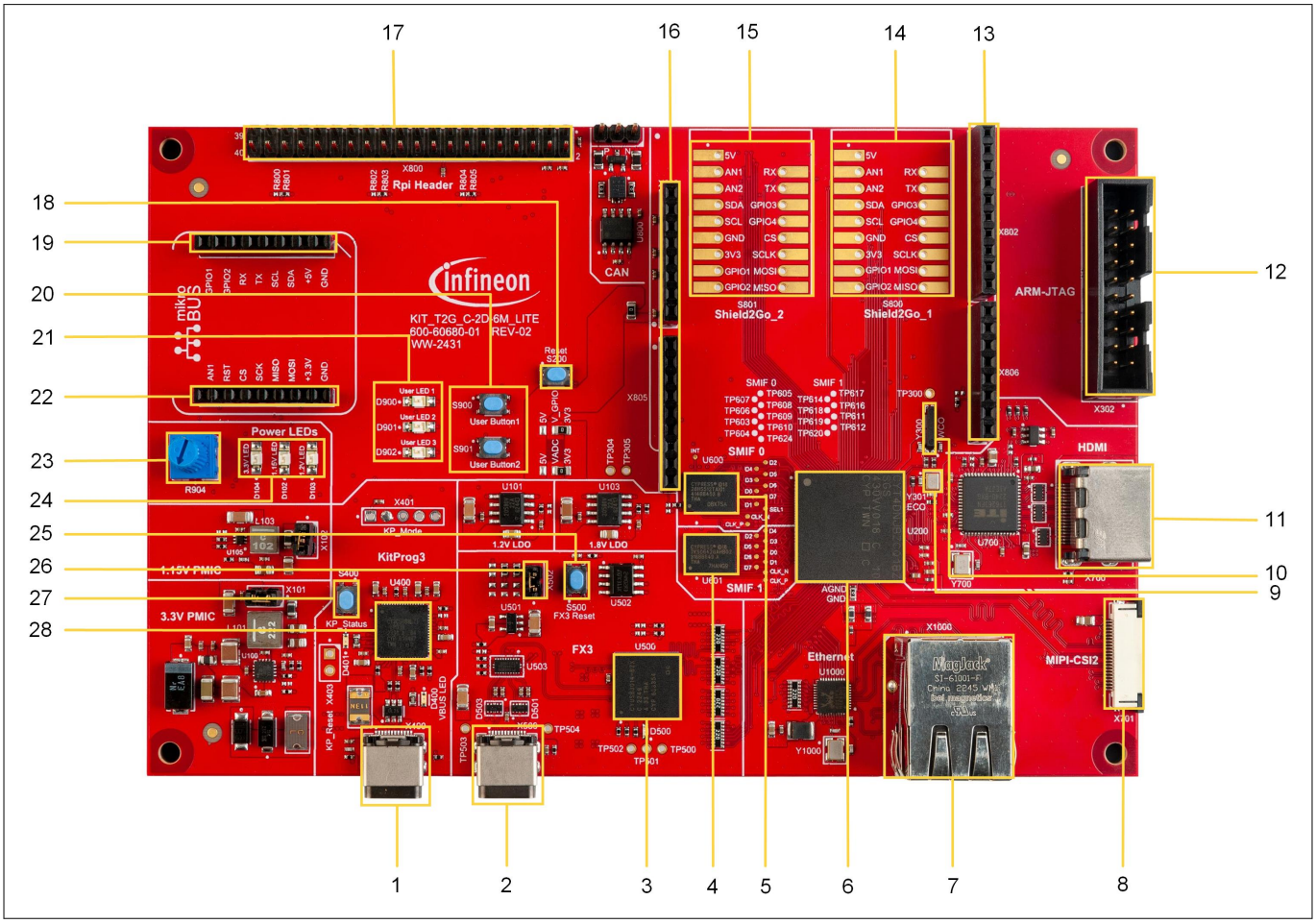

Figure 2 Peripherals and interfaces in the TRAVEO™ T2G Cluster 6M Lite Kit

Table 2 Peripheral details

Sl no.	Reference designator	Description
1	X400	The USB Type-C connector is used to program and debug the onboard PSOC™ 5LP (KitProg3) and to power up the kit.
2	X500	The USB Type-C connector is used for streaming TTL-RGB display output to a PC.
3	U500	The EZ-USB™ FX3 is a peripheral controller that converts RGB graphics output data packets to USB data packets.
4	U601	A 64 Mb HYPERRAM™ is connected to the SMIF-1 interface.
5	U600	A 512 Mb SEMPER™ flash is connected to the SMIF-0 interface.
6	U200	TRAVEO™ T2G CYT4DN microcontroller
7	X1000	Onboard Gigabit Ethernet PHY
8	X701	MIPI CSI-2 interface that supports MIPI CSI-2 camera module.
9	Y301	16 MHz external crystal oscillator

(table continues...)

Table 2 (continued) Peripheral details

Sl no.	Reference designator	Description
10	Y300	32.768 kHz watch crystal oscillator
11	X700	HDMI interface for display support
12	X302	Arm® Standard-20 pin JTAG connector for programming and debugging the kit.
13	X802	10-pin Arduino shields-compatible I/O header
	X806	8-pin Arduino shields-compatible I/O header
14	S800	Shield2Go1 header footprint
15	S801	Shield2Go2 header footprint
16	X803	8-pin Arduino shields-compatible I/O header
	X805	9-pin Arduino shields-compatible I/O header
17	X800	40-pin Raspberry Pi shields-compatible I/O header
18	S200	TRAVEO™ T2G CYT4DN MCU device reset button
19	X813	8-pin mikroBUS shields-compatible I/O header
20	S900	User push button 1 for human interface
	S901	User push button 2 for human interface
21	D900	User LED1 for human interface
	D901	User LED2 for human interface
	D902	User LED3 for human interface
22	X812	8-pin mikroBUS shields-compatible I/O header
23	R904	Resistor-based rotary potentiometer
24	D104	3.3 V power monitor LED
	D102	1.1 V power monitor LED
	D103	1.2 V power monitor LED
25	S500	EZ-USB™ FX3 reset button
26	X502	EZ-USB™ FX3 bootloader jumper
27	S400	KitProg3 mode select push button
28	U400	PSOC™ 5LP (KitProg3) as onboard programmer and debugger

1.2 Kit contents

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

Table 3 Kit contents

Quantity	Description	Remarks
1	KIT_T2G_C-2D-6M_LITE Rev-02	TRAVEO™ T2G Cluster 6M Lite Kit

(table continues...)

Table 3 (continued) Kit contents

Quantity	Description	Remarks
1	USB Type-C cable	For powering up the board and streaming EZ-USB™ FX3 data output.
1	HDMI cable	For displaying graphics output

***Note**: For streaming FX3 graphics RGB packets via the Type-C cable, ensure that your PC has a USB 3.0 port.*

Figure 3 Kit contents of TRAVEO™ T2G Cluster 6M Lite Kit

1.3 Initial jumper configuration

This section provides the default jumper configuration for each module. The default interface selection is mentioned in Table 4. The jumper configuration ensures the generation of all power supplies from the regulators and safely distributes them to power up the lite kit.

Table 4 Jumper configuration

Jumper	Default Position	Function
X101	Short	3.3 V PMIC
X102	Short	1.1 V PMIC
X403	Open	KitProg3 does not reset
X502	Open	FX3 will not be in bootloader mode

1.4 Powering up the lite kit

This section provides step-by-step guidance on how to power up the TRAVEO™ T2G Cluster 6M Lite Kit using a USB Type-C connection (KitProg3 also gets powered up here).

USB Type-C:

1. Connect the USB Type-C cable between the USB Type-C connector (X400) and the PC to power up the kit
2. Observe that the power LEDs (D104, D102, and D103) start glowing green
3. Additionally, observe that the VBUS LED (D400) starts glowing green

Figure 4 shows the connection of the USB Type-C cable.

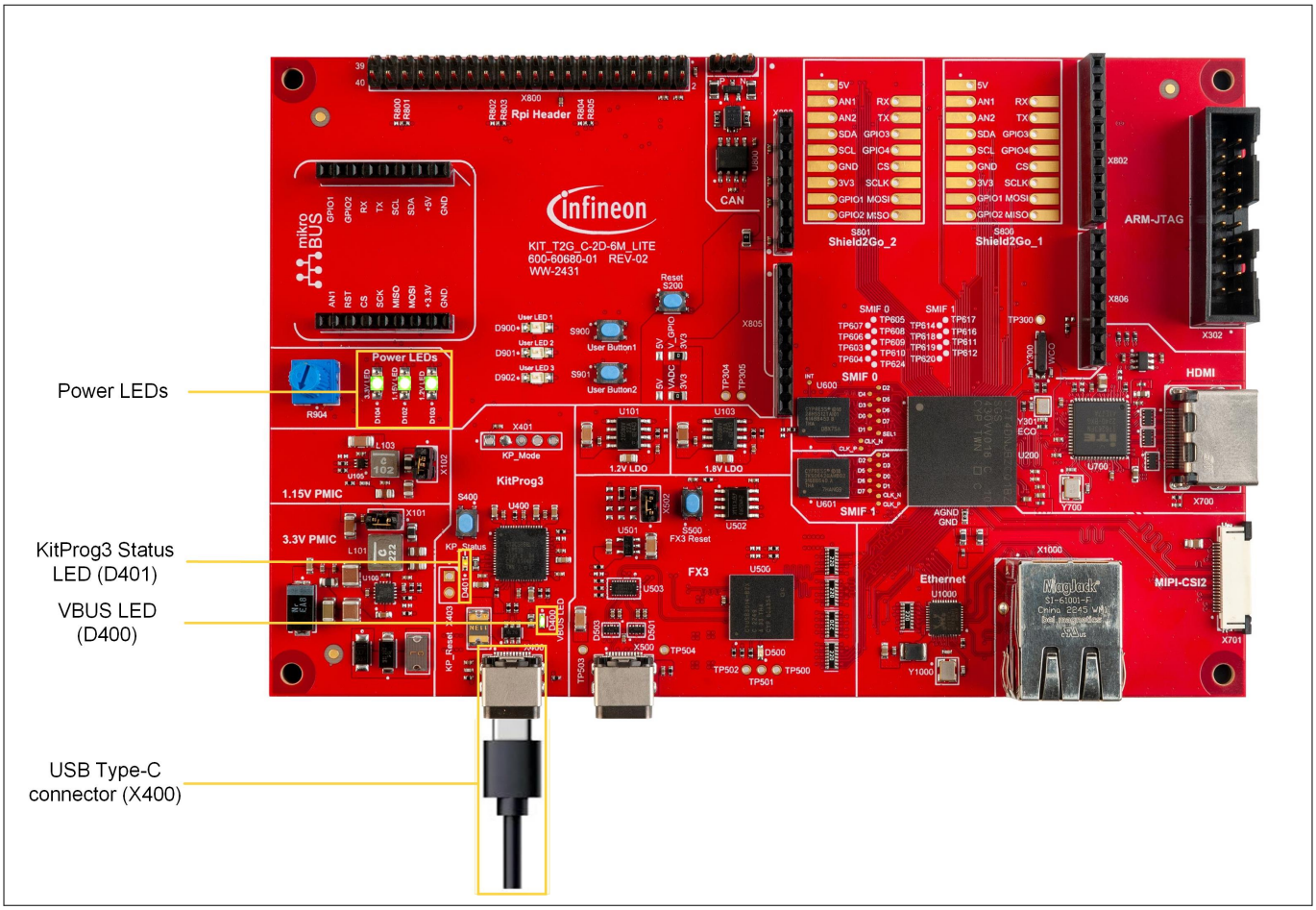

Figure 4 Connecting the USB Type-C cable between the X400 connector and the USB port of a PC

***Note**: The PSOC™ 5LP (KitProg3) also gets powered up. To verify if the PSOC™ 5LP (KitProg3) is powered up, check the KitProg3 mode status LED (D401). If it is glowing, then KitProg3 is powered up.*

1.5 Preprogrammed firmware

The TRAVEO™ T2G Cluster 6M Lite Kit undergoes thorough testing to ensure the proper functioning of all onboard peripherals, with the test report preloaded into the kit. Once the manufacturing test process is successfully completed, the kit is shipped with preloaded software, a preloaded test report, and the FX3 test pattern firmware.

To check the test report and run the preprogrammed firmware after powering up the kit, follow these steps:

1. Power up the kit
2. Follow the procedure outlined below to check the test report and run the preprogrammed firmware

1.5.1 Board test report

To view the test report on your serial terminal window:

1. Connect the kit to your PC using the USB Type-C cable (X400)
2. Open Tera Term (or any serial terminal software) on your PC

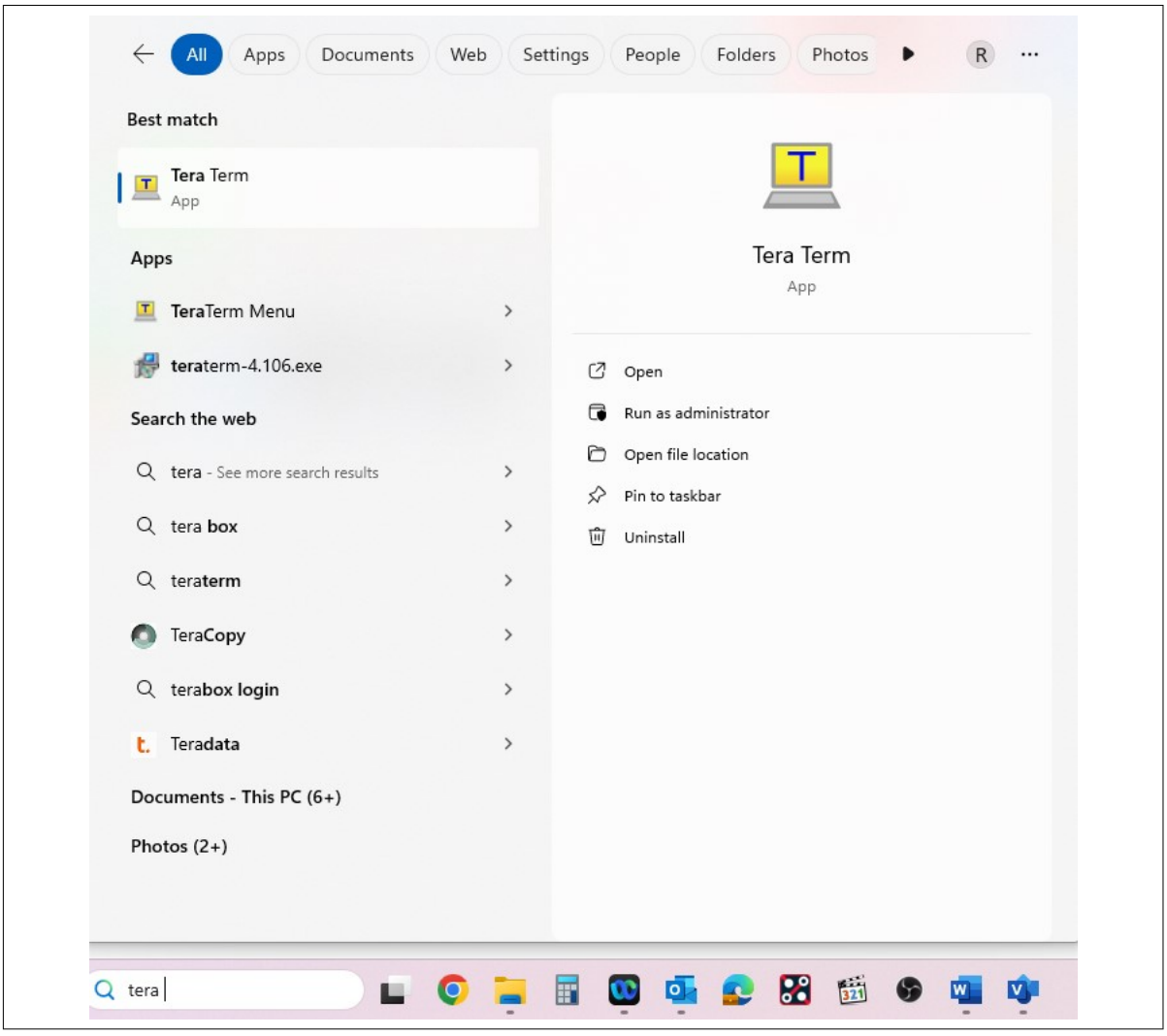

Figure 5 Opening a serial terminal on the PC

3. Select the connection type as **Serial** and then, in the **Port** option, choose the port labeled **KitProg3 USB-UART**

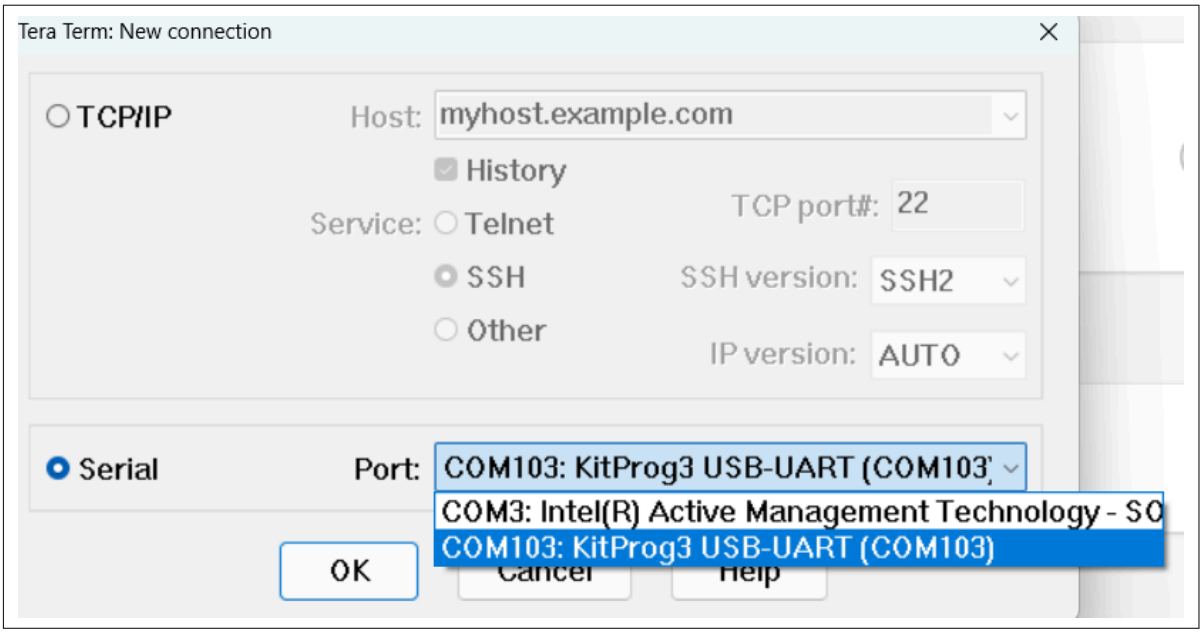

Figure 6 Selecting KitProg3 USB-UART port

4. Go to **Setup** > **Serial port** > **Speed**, select **115200** and press the **New setting** button

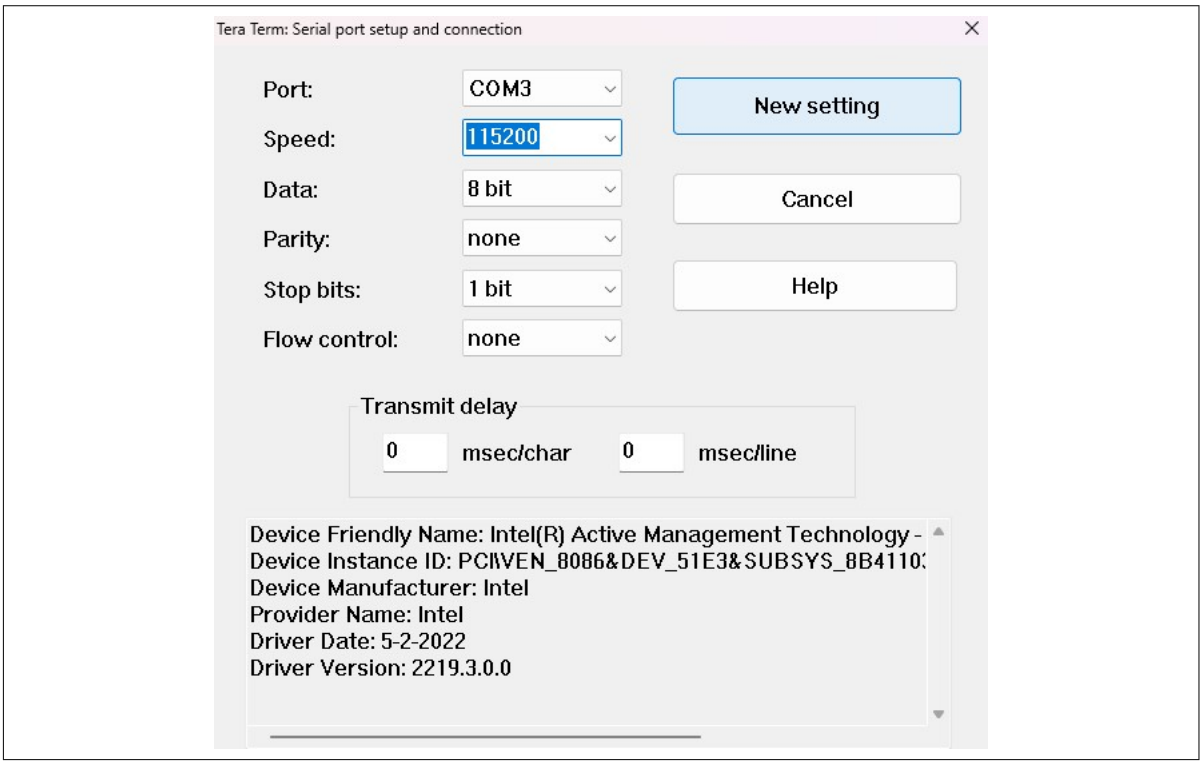

Figure 7 Selecting baud-rate of UART in terminal

5. Press the reset button **S200** on the kit. The message logs (test results of peripherals) will be printed in the terminal, as shown in Figure 8
6. Observe that the user LED (D901) in the kit will start blinking

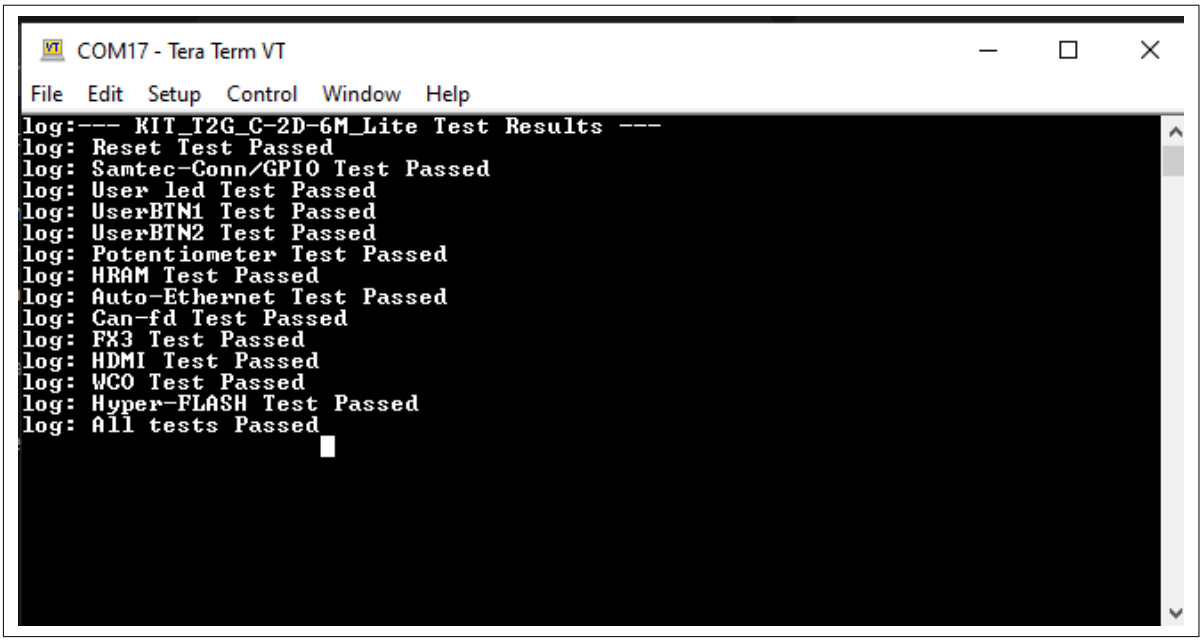

Figure 8 Test log printed on the serial terminal window

1.5.2 FX3 firmware

To see the test image on your PC via EZ-USB™ FX3, follow the steps mentioned below:

1. Ensure that the jumper X502 (highlighted in the yellow box in Figure 9) is not shorted. If it is shorted, remove the jumper
2. Disconnect and reconnect the power supply (USB Type-C, X400)

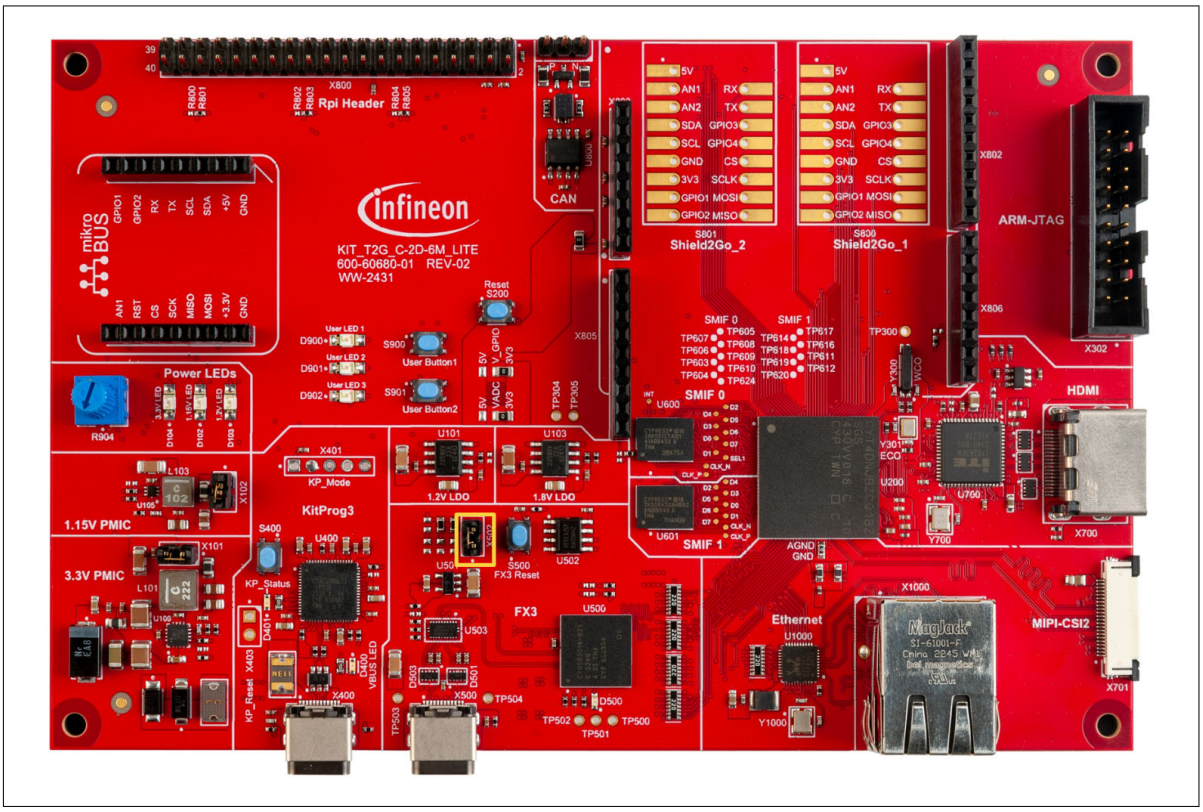

Figure 9 Checking FX3 bootloader jumper on the kit

3. Next, connect the Type-C cable (included in the kit) between jumper X500 and the USB 3.0 Type-C port on your laptop or PC (FX3 supports only USB 3.0 ports)

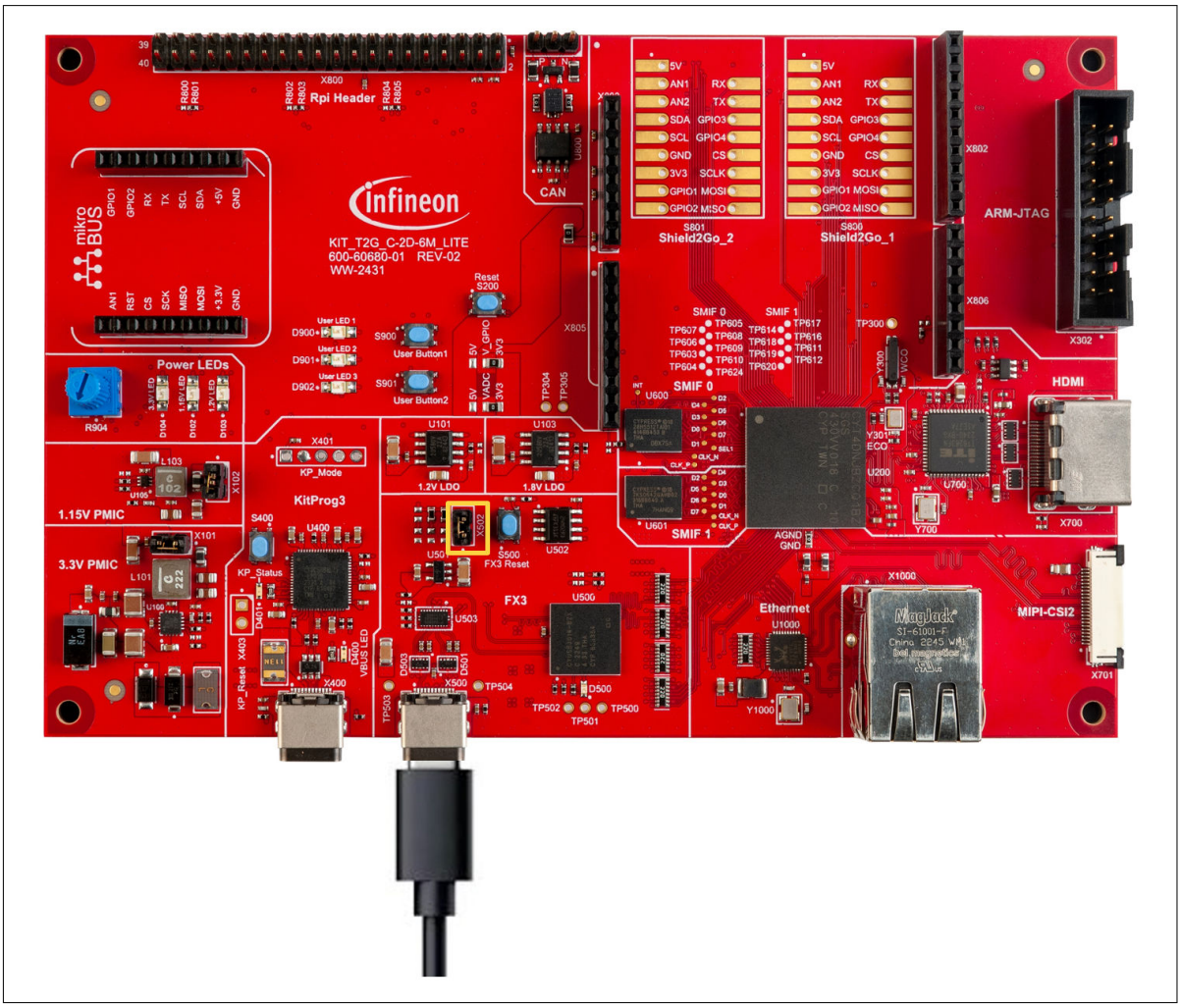

Figure 10 Connecting the Type-C between X500 and the laptop's USB 3.0 port

4. Open the VLC media player and navigate to **Media > Open Capture Device**

Note: *Alternatively, you can run this firmware with the provided Python script. Refer to the* Python script for streaming with FX3 *section to run the Python script.*

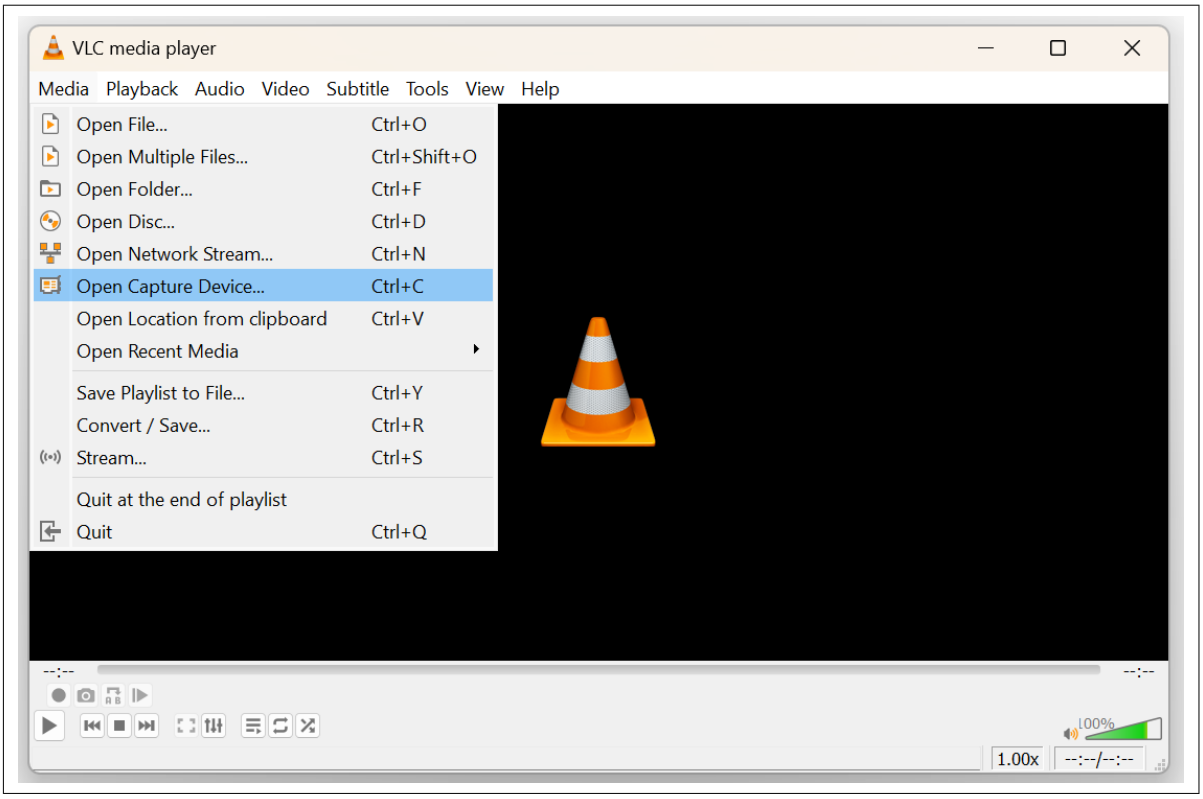

Figure 11 VLC media player window

5. On the **Open Media** window, in the **Capture Device** tab, do the following:
   a. In the **Capture mode** list, select **DirectShow**
   b. In the **Device Selection** section, in the **Video device name** drop-down, select **FX3**
   c. In the **Audio device name** list, select **Default**
   d. In the **Options** section, in the **Video size** field, enter **800×480**

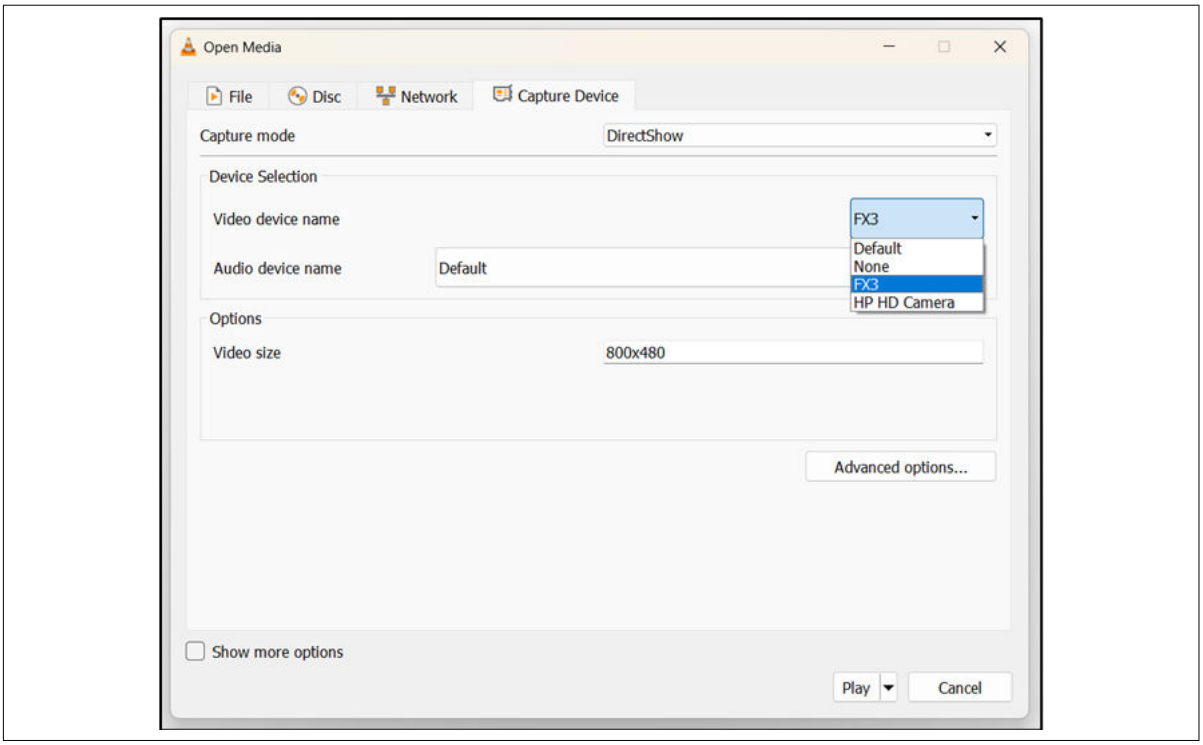

Figure 12 FX3 settings in VLC media player

6. Click the **Play** button and observe the test pattern **IRIS** in the VLC media player window

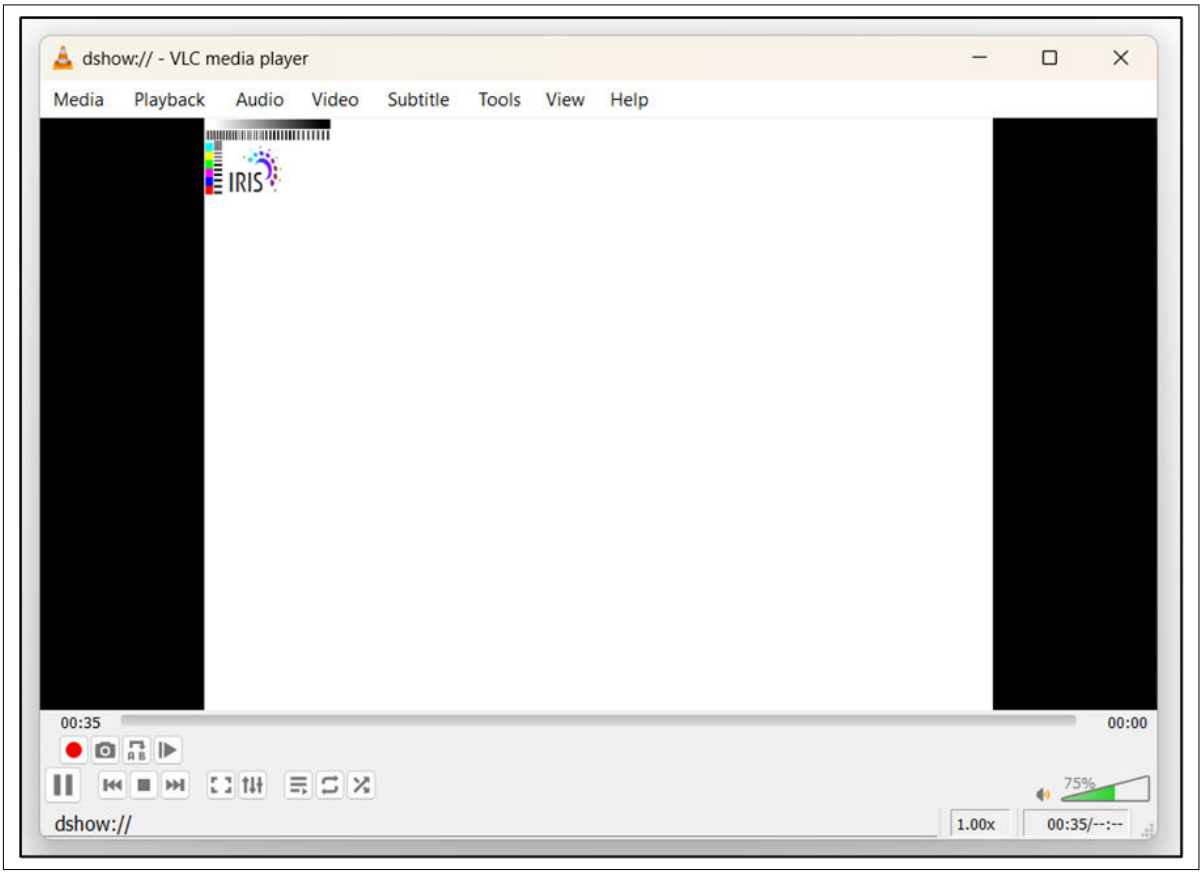

Figure 13 IRIS pattern image display on screen via FX3

2 Programming the kit

This section details the available programming interfaces in the kit and guides you on how to program and debug the kit using these interfaces and tools. The kit supports programming and debugging with third-party software and hardware such as:

- IAR-EWARM (Embedded Workbench for Arm®) software and i-Jet debugger (requires ADA-MIPI20-TI14 adapter)
- Green Hills System (Multi IDE software and GHS probe debugger)

Figure 14 JTAG to 20-pin Arm® converter

2.1 Programming interfaces

This section details the various programming interfaces available in the TRAVEO™ T2G Cluster 6M Lite Kit. The kit includes two programming interfaces:

- KitProg3 (onboard programmer/debugger)
- Arm® standard 20-pin JTAG connector

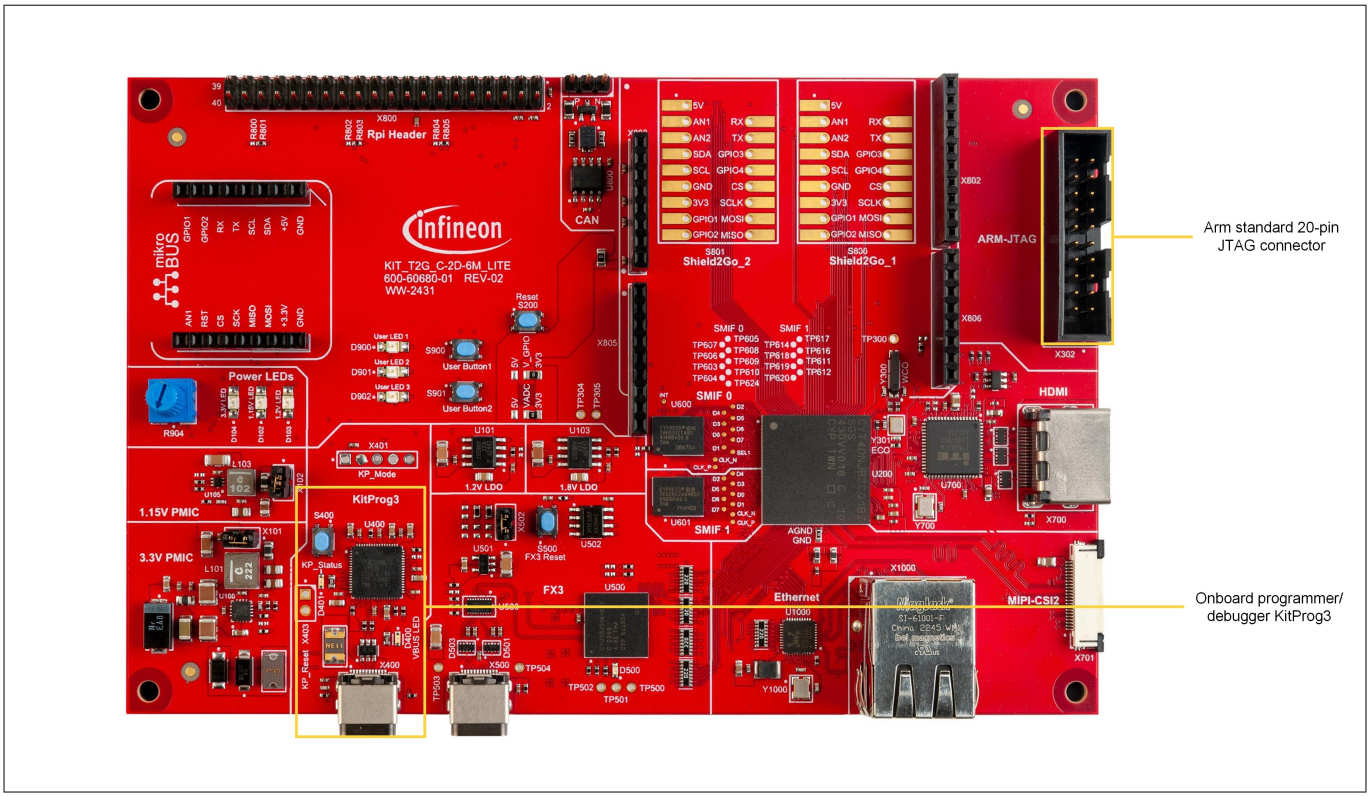

Figure 15 Various programming interfaces available in the kit

2.2 Blink an LED

This section provides instructions on how to blink the user LEDs using IAR Embedded Workbench Arm® 9.32.1 programming tool with the TRAVEO™ T2G Cluster 6M Lite Kit.

2.2.1 IAR Embedded Workbench for Arm®

2.2.1.1 Setting up the IDE

Before programming and debugging the LED blinky code, follow the steps below as a one-time setup for prerequisites and tools installation:

1. Download the latest T2G Sample Driver Library (SDL) for the TRAVEO™ T2G Cluster 6M Lite Kit to your PC
2. Install the SDL in a location outside the default program files to allow the IDE to access and create temporary files
3. Open the `Readme.pdf` file available inside the SDL folder and use the provided link from that file to download the version of IAR EWARM that is supported by that SDL version
4. Download the IAR Embedded Workbench software and run the installation. Note that it might take some time
5. When you open the IAR EWARM for the first time, select the license in the License wizard
6. If you do not have the license, it is strongly recommended to register for a code size limited license type
7. After downloading and setting up the IDE, extract the folder available at the following path: **SDL (version 7.9.0 or higher)** > **misc.** > **tools** > **iar** > **IAR_EWARM_9321_FlashLoader_Patch_TraveoII.zip**
8. Follow the `readme.txt` document available in that folder for copying the patch files to support SDL and the device with that IAR Embedded Workbench IDE

The IAR Embedded Workbench for Arm® tool and T2G SDL drivers are now ready for programming and debugging the TRAVEO™ T2G Cluster 6M Lite Kit.

2.2.1.2 Programming using the onboard debugger KitProg3

This section describes how to program the TRAVEO™ T2G Cluster 6M Lite Kit using the onboard programmer and debugger, KitProg3. Follow the steps below to program and debug the kit using the IAR Embedded Workbench for Arm® tool and the onboard KitProg3 programmer/debugger:

1. Connect the USB Type-C cable between the USB Type-C connector of KitProg3 (X400) and the USB port of the PC
2. Observe that the power LEDs (D104, D102, and D103) and the VBUS LED (D400) start glowing green. If the LEDs are not glowing, refer to the default jumper configuration table in Initial jumper configuration
3. Open the IAR Embedded Workbench 9.32.1 and navigate to **File** > **Open Workspace**. Then, navigate to the path where you have installed the T2G SDL, and select the following path: **T2G_Sample_Driver_Library_7.9.0** > **tviic2d6m** > **tools** > **iar** > **flash** > **tviic2dd6m_flash_cm0plus_template**
4. Select the **lite_kit** revision from the drop-down list under **Workspace** in the Workspace tab

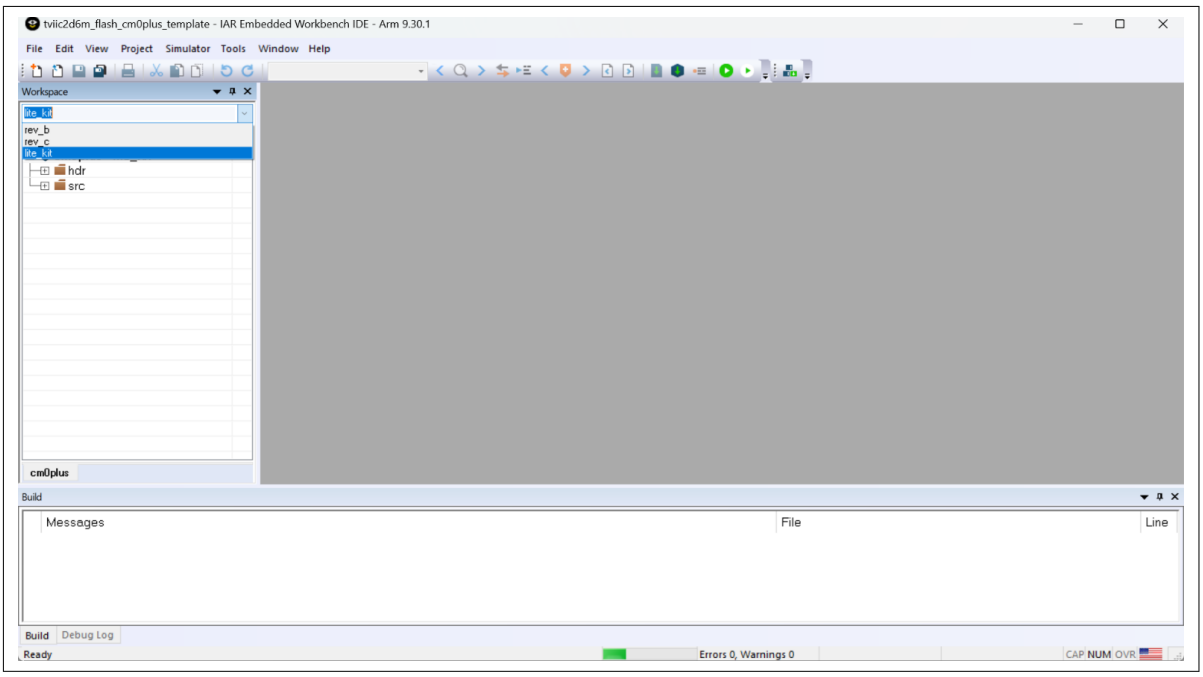

Figure 16 Selecting lite_kit workspace for the Cluster 6M Lite kit in IAR

5. In the Workspace tab, expand the **src** folder to find the `main_cm0plus.c` file

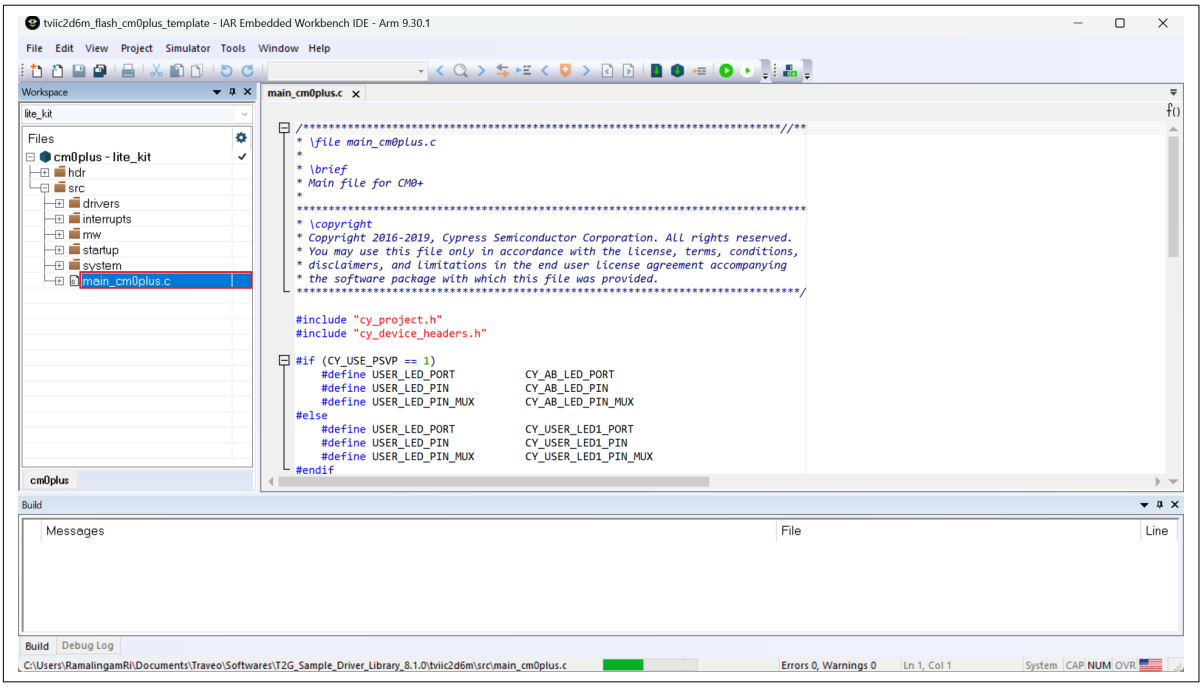

Figure 17 Opening the main C file in IAR

6. To ensure the correct debugger is selected, right-click on **cm0plus – lite_kit** in the Workspace window. Choose **Options**, then select **Debugger**. Navigate to the **Setup** tab, and under **Drivers**, select the **CMSIS DAP** option and press **OK**

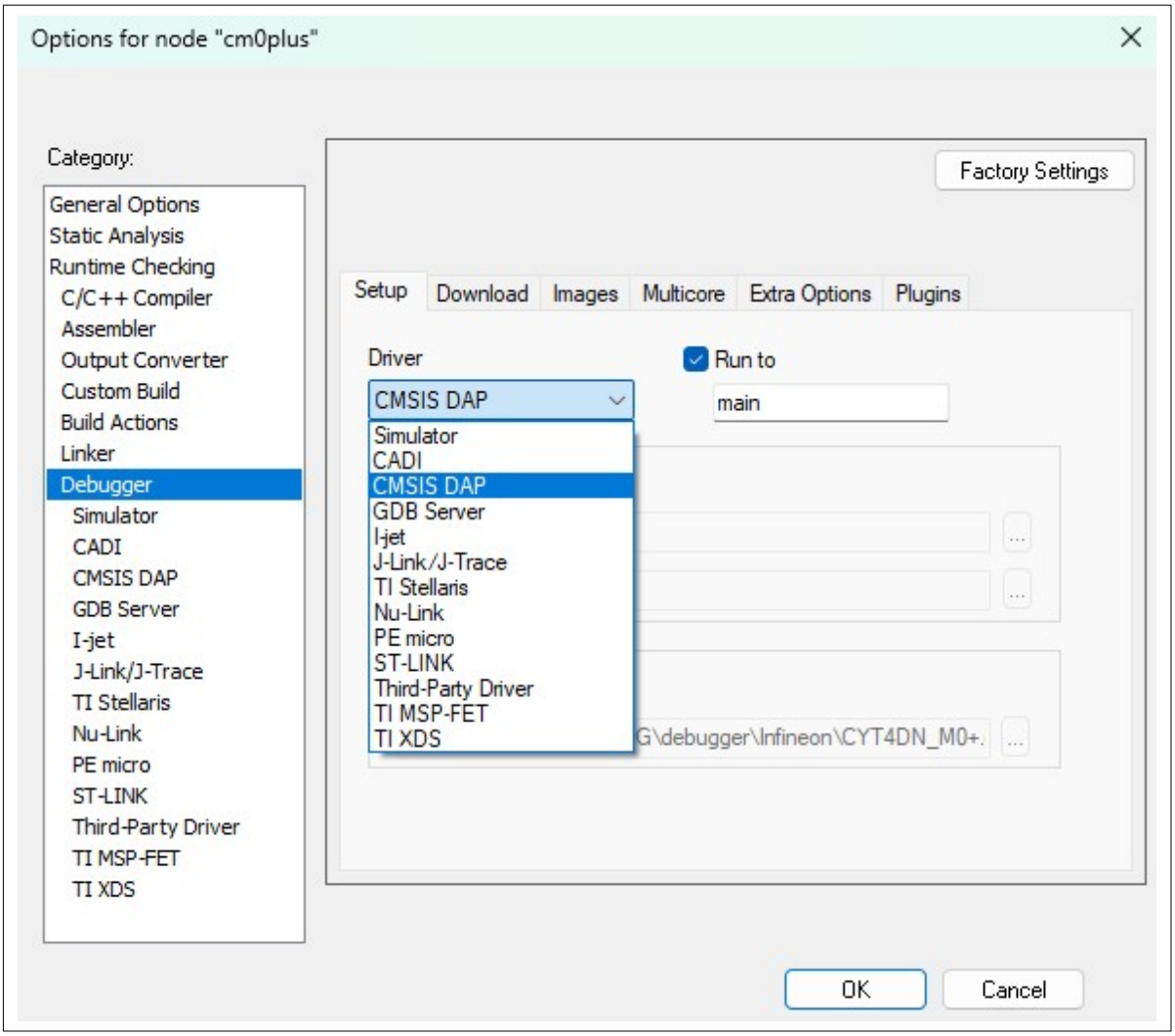

Figure 18 Checking the debugger option in IAR

7. For the build, right-click on **cm0plus – lite_kit** in the Workspace window and select **Rebuild All**

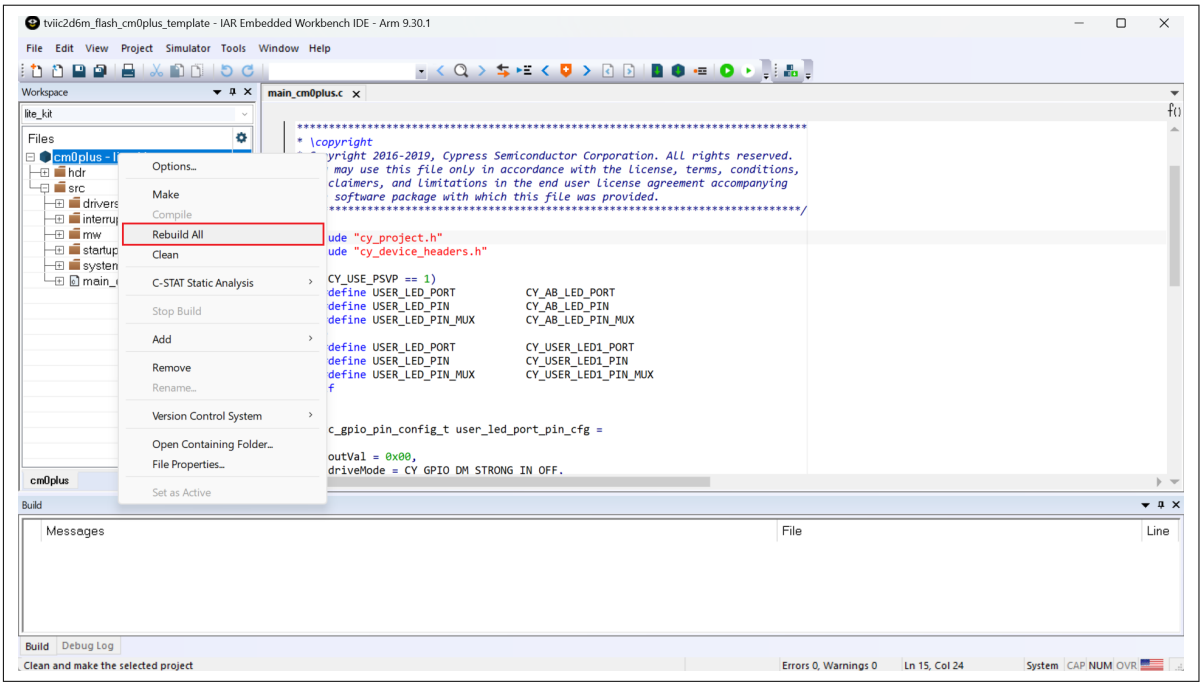

Figure 19 Compiling and building the code in IAR

8. Now, the rebuild process will start. You can check for errors and warnings in the **Build Log**

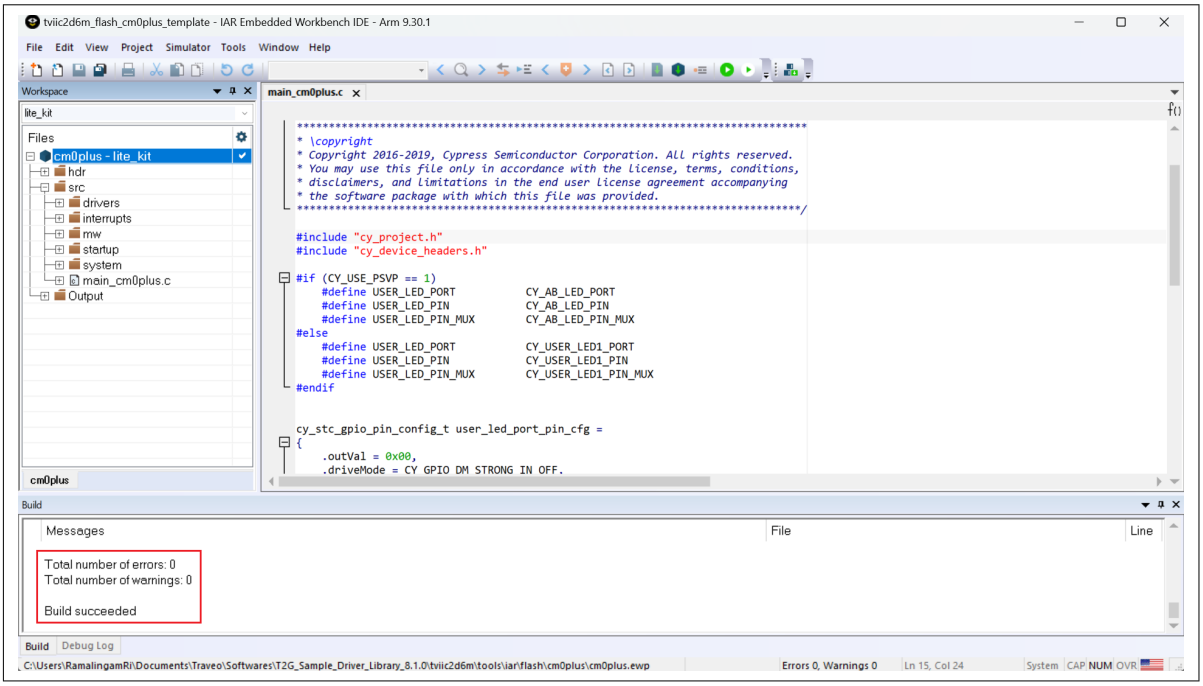

Figure 20 Checking for errors and warnings in the Build Log in IAR

***Note**: If the Build window does not appear on the screen, go to **View** > **Messages** > **Build**. In the Messages option under View, you can find the debug log, reference windows, etc*

9. To load the program to the flash region of the CM0+ core, click the **Download and Debug** icon in the toolbar

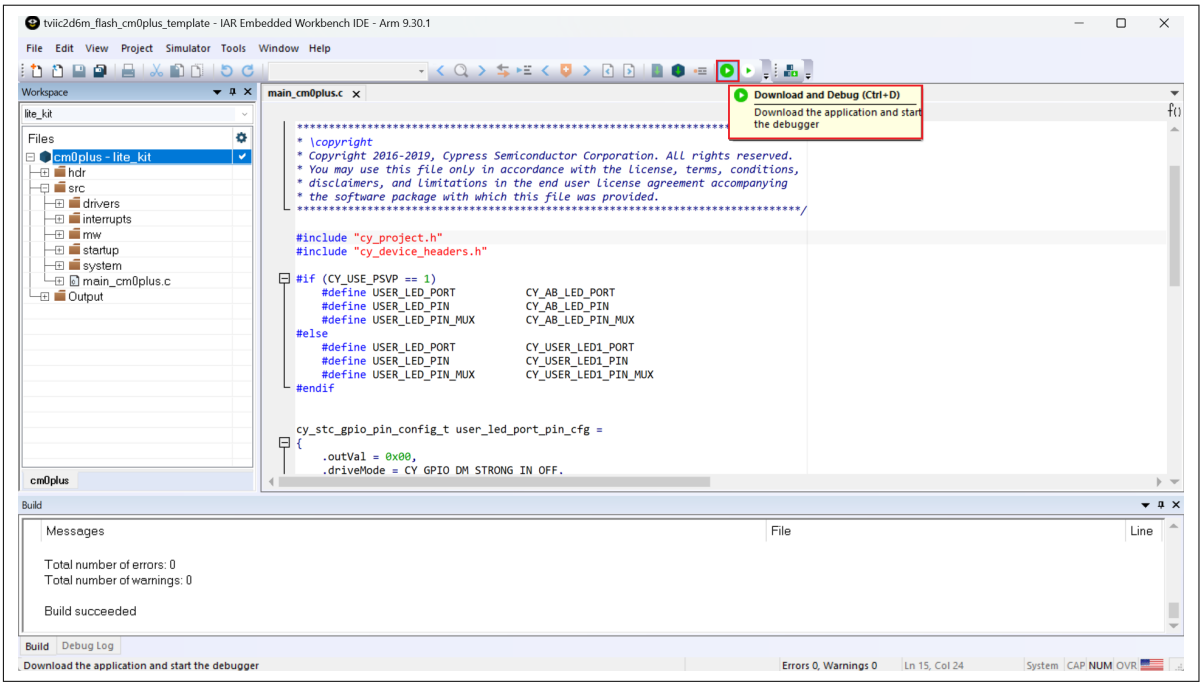

Figure 21 Downloading and debugging the code in the IAR workspace

10. Click the **Go** icon to start the execution. You can also use the function keys in the Debug window: F5 (Go), F10 (Step Over), F11 (Step into), and Ctrl+D (Download and Debug)

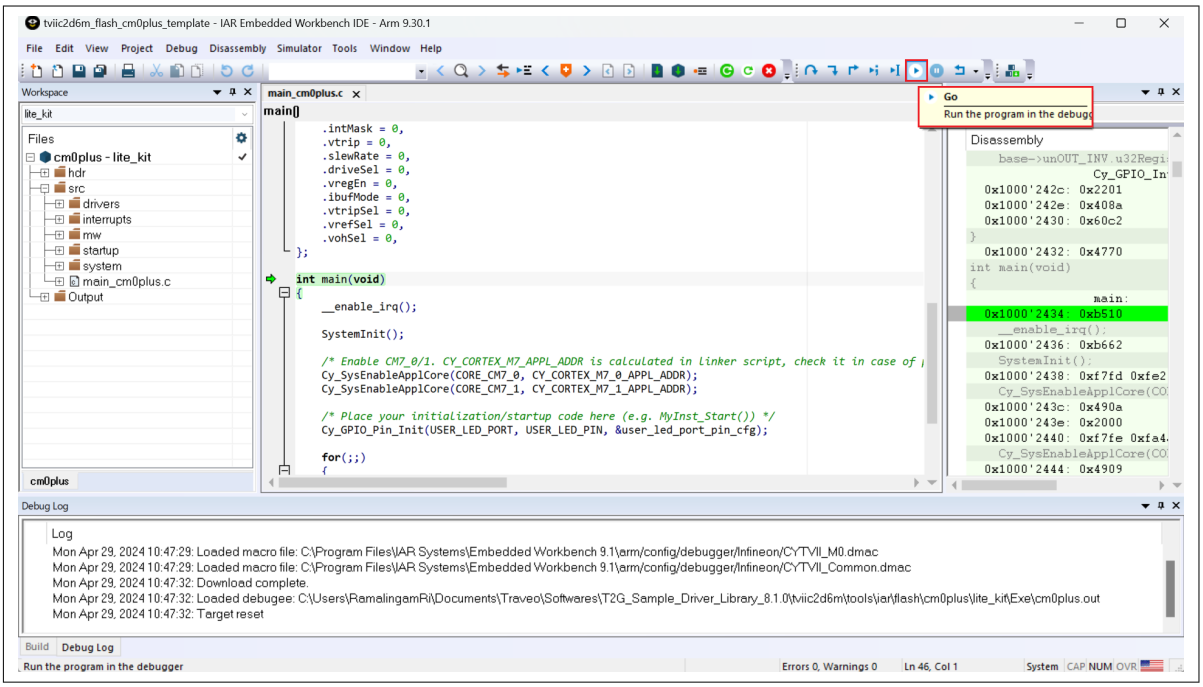

Figure 22 Running the code in the IAR workspace for the Cluster 6M Lite Kit

11. In free-running execution, the user LED1 (D900) starts blinking on the board

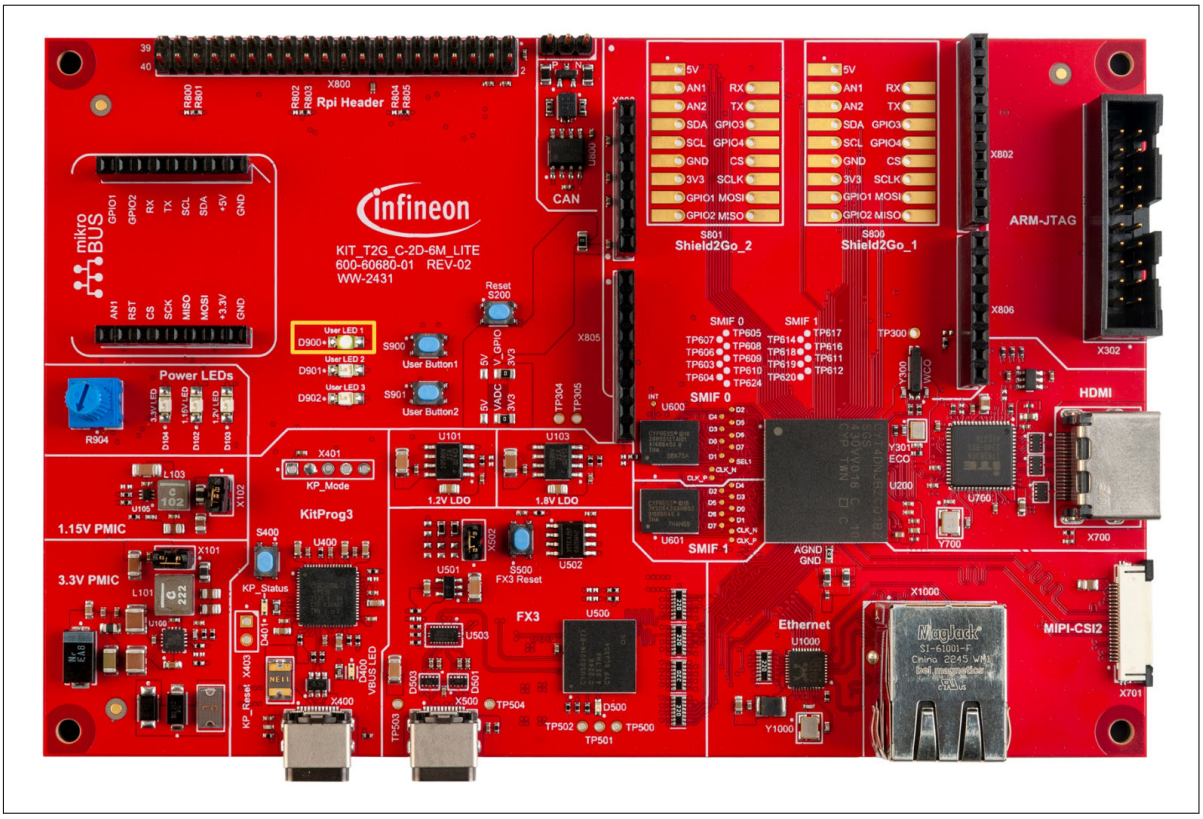

Figure 23 Blinking user LED1 (D900)

12. Follow the same steps for the other CM7 core and observe that user LED 2 (D901) also starts blinking, just like user LED1 (D900)

2.2.1.3 Programming using IAR Systems I-jet debugger

This section describes how to program the TRAVEO™ T2G Cluster 6M Lite Kit using the IAR Systems I-jet debugger. Follow the steps below to program the kit using the IAR Embedded Workbench for ARM tool and the IAR Systems I-jet debugger:

1. See Powering up the lite kit for instructions to power up the kit

2. After powering up the kit, ensure that you have the JTAG to 20-pin Arm® converter (ADA-MIPI20-TI14 adapter). Connect the JTAG to 20-pin Arm® converter to the Arm® Standard 20-pin JTAG connector (X302). Then, connect the I-jet debugger to the JTAG to 20-pin Arm® converter

3. Now, open IAR Embedded Workbench 9.32.1 and navigate to **File > Open Workspace**. Then, navigate to the path where you have installed the T2G SDL, and select the following path: **T2G_Sample_Driver_Library_7.9.0** > **tviic2d6m** > **tools** > **iar** > **flash** > **tviic2dd6m_flash_cm0plus_template**

4. Select the **lite_kit workspace** for the TRAVEO™ T2G Cluster 6M Lite Kit in IAR

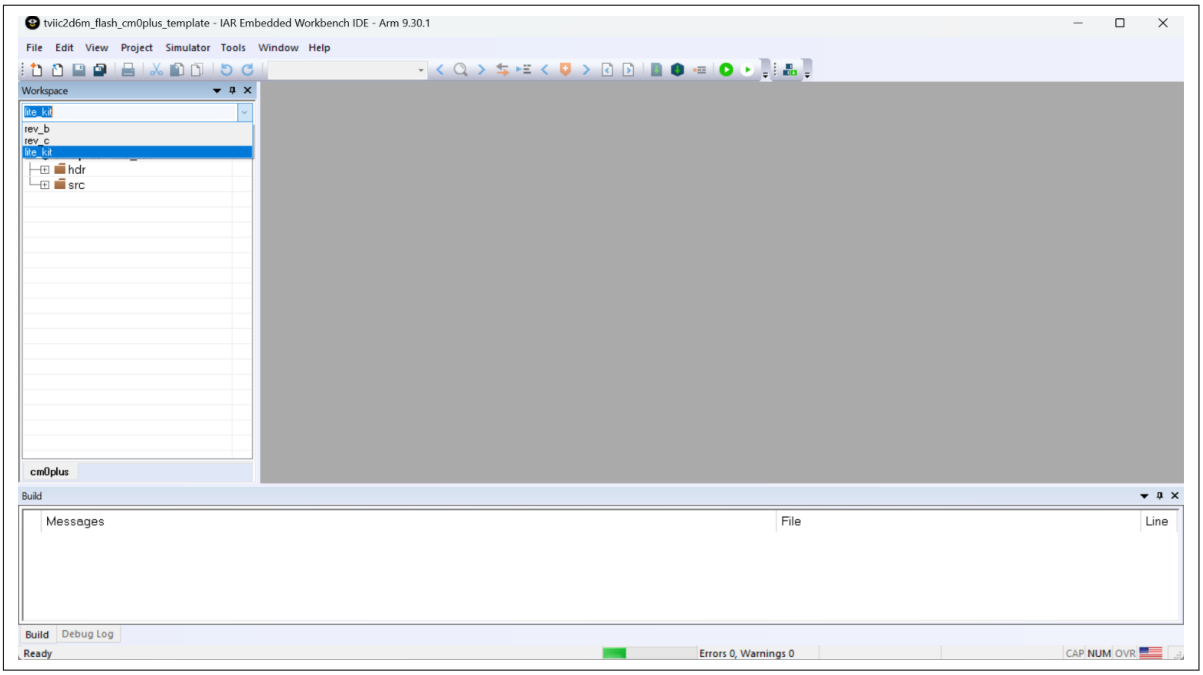

Figure 24 Selecting the lite_kit workspace for the Cluster 6M Lite Kit in IAR

5. Expand the `src` folder in the Workspace tab to locate the `main_cm0plus.c` file

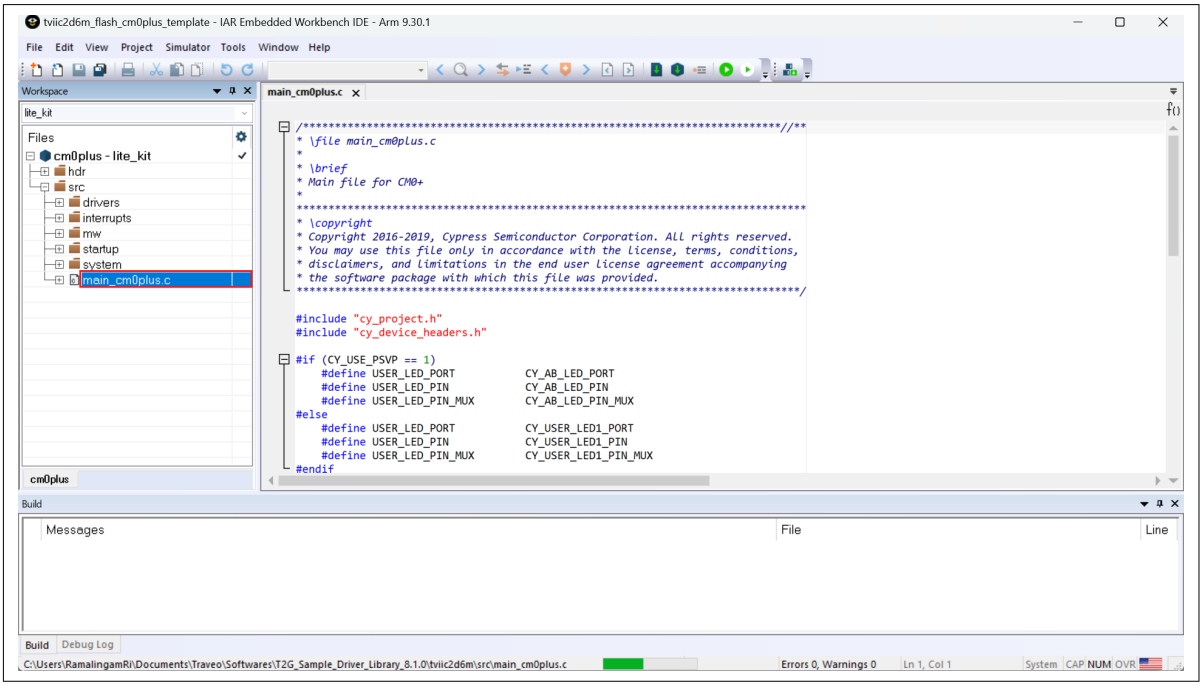

Figure 25 Opening the main C file in IAR

6. To ensure the correct debugger is selected, right-click on **cm0plus – lite_kit** in the Workspace window, choose **Options**, and then select **Debugger**. Navigate to the **Setup** tab, and under **Drivers**, select the **I-jet** option and press **OK**

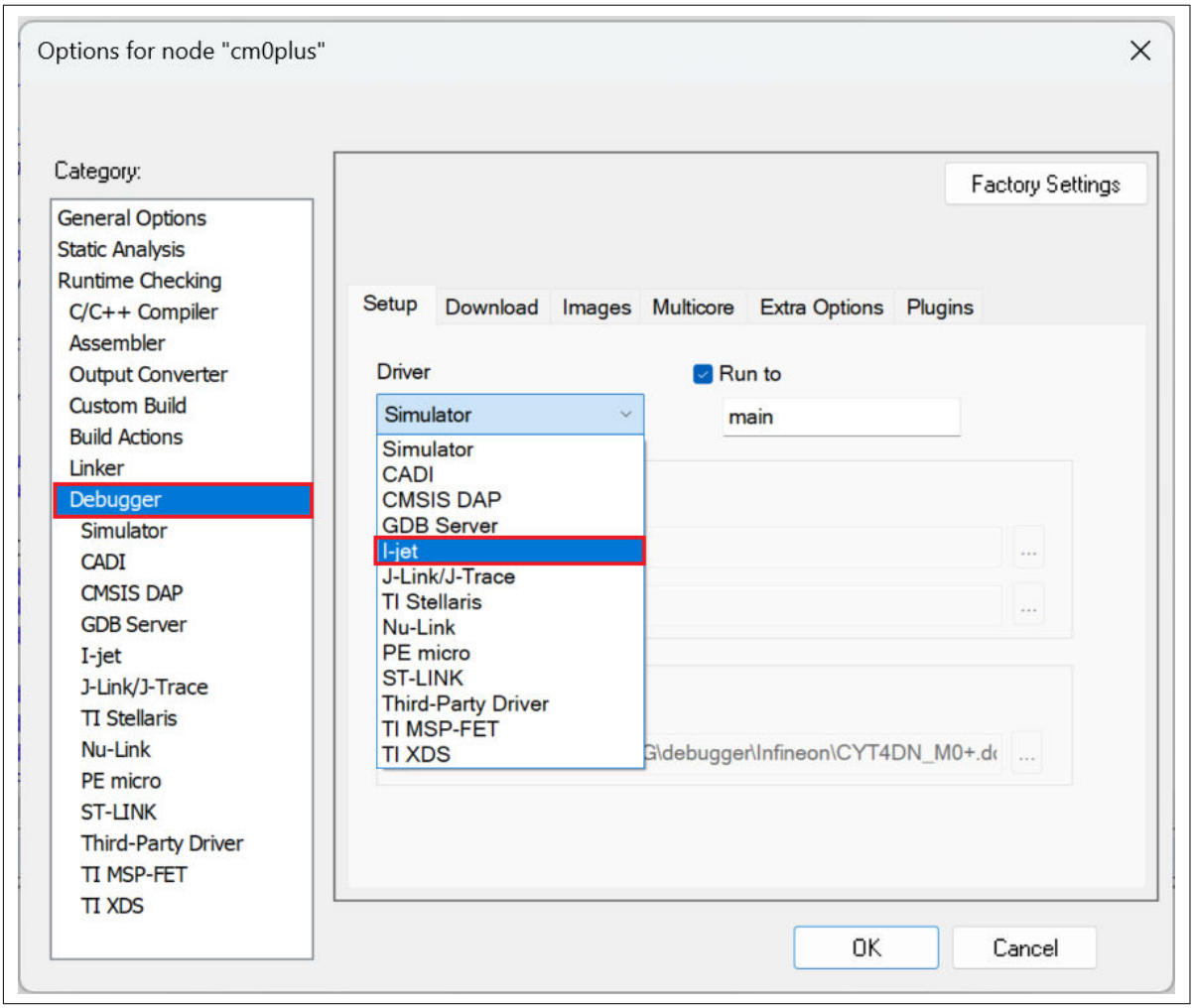

Figure 26 Checking the debugger option in IAR

7. For the build, right-click on **cm0plus – lite_kit** in the Workspace window and select **Rebuild All**

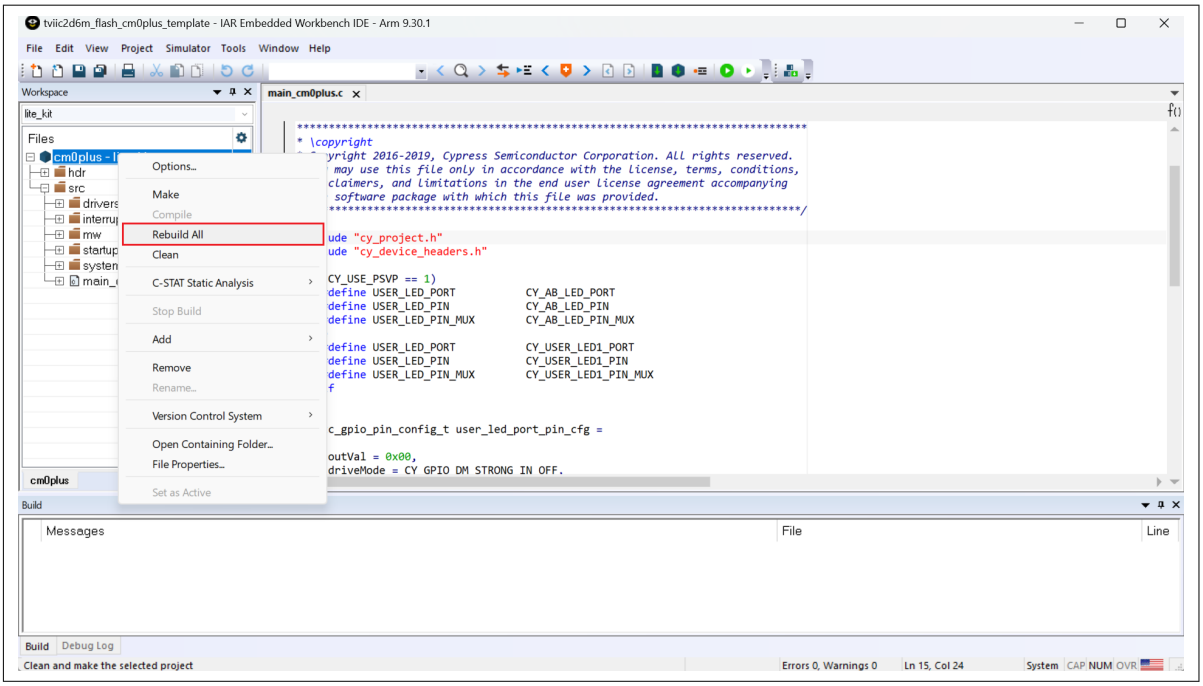

Figure 27 Compiling and building the code in IAR

8. Check for errors and warnings in the **Build Log** as the rebuild process begins. If the build window does not appear on the screen, go to **View** > **Messages** > **Build**

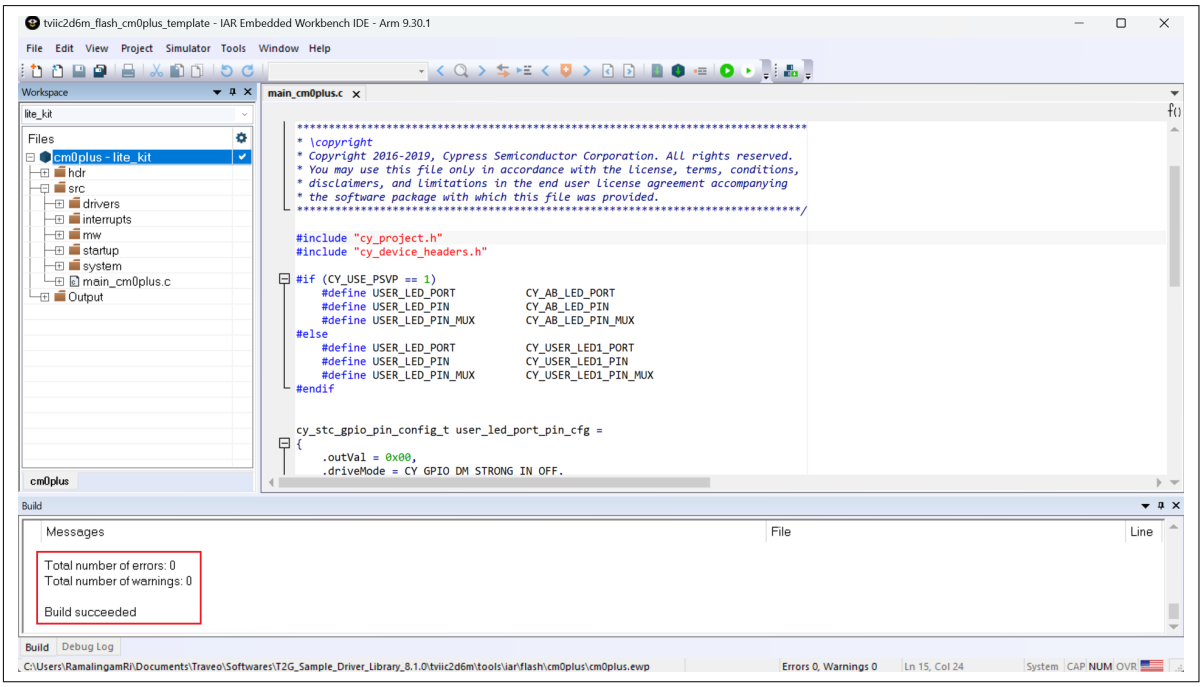

Figure 28 Checking for errors and warnings in build log in IAR

9. To load the program to the flash region of the CM0+ core, click the **Download and Debug** icon in the toolbar

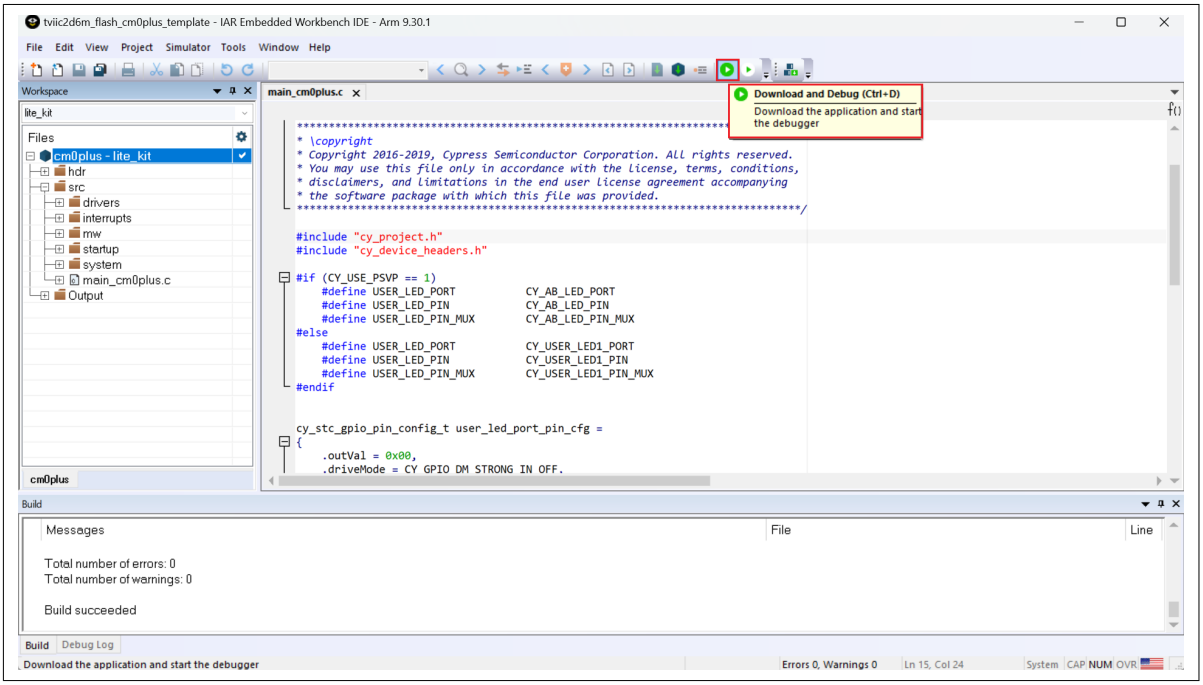

Figure 29 Downloading and debugging the code in the IAR workspace

10. Click the **Go** icon to start the execution. Function keys from the keyboard can also be used in the Debug window as follows:
    - **a.** F5 (Go)
    - **b.** F10 (Step Over)
    - **c.** F11 (Step into)
    - **d.** Ctrl+D (Download and Debug)

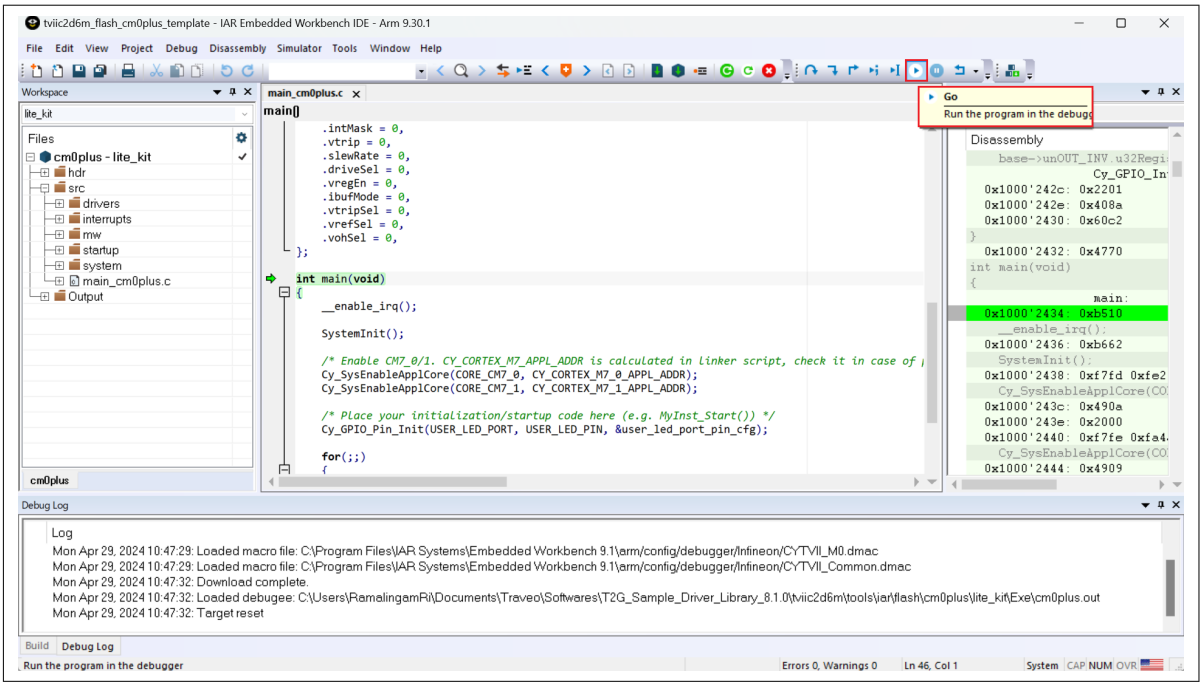

Figure 30 Running the code in the IAR workspace for the Cluster 6M Lite Kit

11. In free-running execution, user LED 1 (D900) starts blinking on the board

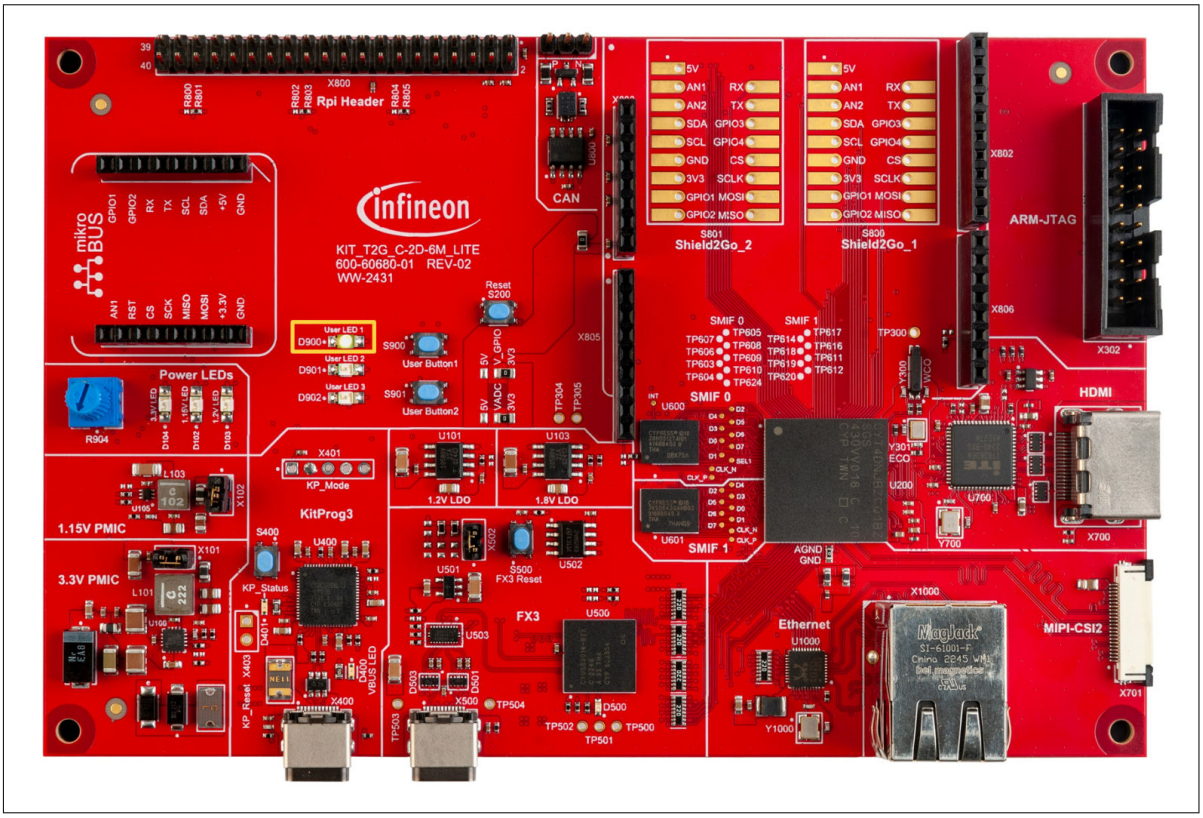

Figure 31 Blinking user LED1 (D900)

2.2.2 AutoFlashUtility

To use the AutoFlashUtility tool in this kit, follow these steps:

1. Connect a USB Type-C cable between the USB Type-C connector for KitProg3 (X400) and your PC's USB port to use the onboard debugger/programmer KitProg3
2. Run the commands from the command prompt to use the AutoFlashUtility tool for flashing codes

Note that the AutoFlashUtility tool does not support debugging and should be used solely for programming.

Instructions for AutoFlashUtility

```
openocd.exe -s ../scripts -f interface/kitprog3.cfg -f target/traveo2_6m.cfg -c "cm0_plus.hex
verify; exit"
openocd.exe -s ../scripts -f interface/kitprog3.cfg -f target/traveo2_6m.cfg -c "cm7_0.hex
verify; exit"
```

***Note**: Visit the Infineon AutoFlash Utility page on the web to download this tool.*

3 Funtional description

This section provides information about the major hardware blocks included in the TRAVEO™ T2G Cluster 6M Lite Kit.

The TRAVEO™ T2G Cluster 6M Lite Kit includes:

- A TRAVEO™ T2G CYT4DN MCU
- An HDMI interface
- An EZ-USB™ FX3
- SMIF for interfacing HYPERBUS™ memory (HYPERRAM™) and octal interface (SEMPER™ NOR flash)
- An onboard programmer/debugger KitProg3
- HID interfaces
- Reset buttons
- General-purpose I/O headers

3.1 TRAVEO™ CYT4DN MCU

The TRAVEO™ T2G Cluster 6M Lite Kit is designed to evaluate the different features and functionalities of the CYT4DN device, which belongs to the TRAVEO™ T2G Cluster family. The CYT4DN family of TRAVEO™ T2G microcontrollers is dedicated to automotive systems such as instrument clusters and Head-Up Displays (HUD).

The CYT4DN includes:

- A 2D graphics engine
- Sound processing capabilities
- Two 320 MHz Arm® Cortex®-M7 CPUs for primary processing
- One 100 MHz Arm® Cortex®-M0+ CPU for peripheral and security processing

These devices also feature embedded peripherals that support:

- Controller Area Network with Flexible Data Rate (CAN FD)
- Local Interconnect Network (LIN)
- Clock Extension Peripheral Interface (CXPI)
- Gigabit Ethernet

The CYT4DN package used in the Cluster 6M Lite Kit is a 327-pin BGA. Due to design limitations and the availability of certain peripherals and pins, some functionalities and features supported by the TRAVEO™ T2G CYT4DN device may not be available on the Lite Kit.

Figure 32 shows the block diagram of the TRAVEO™ T2G CYT4DN MCU.

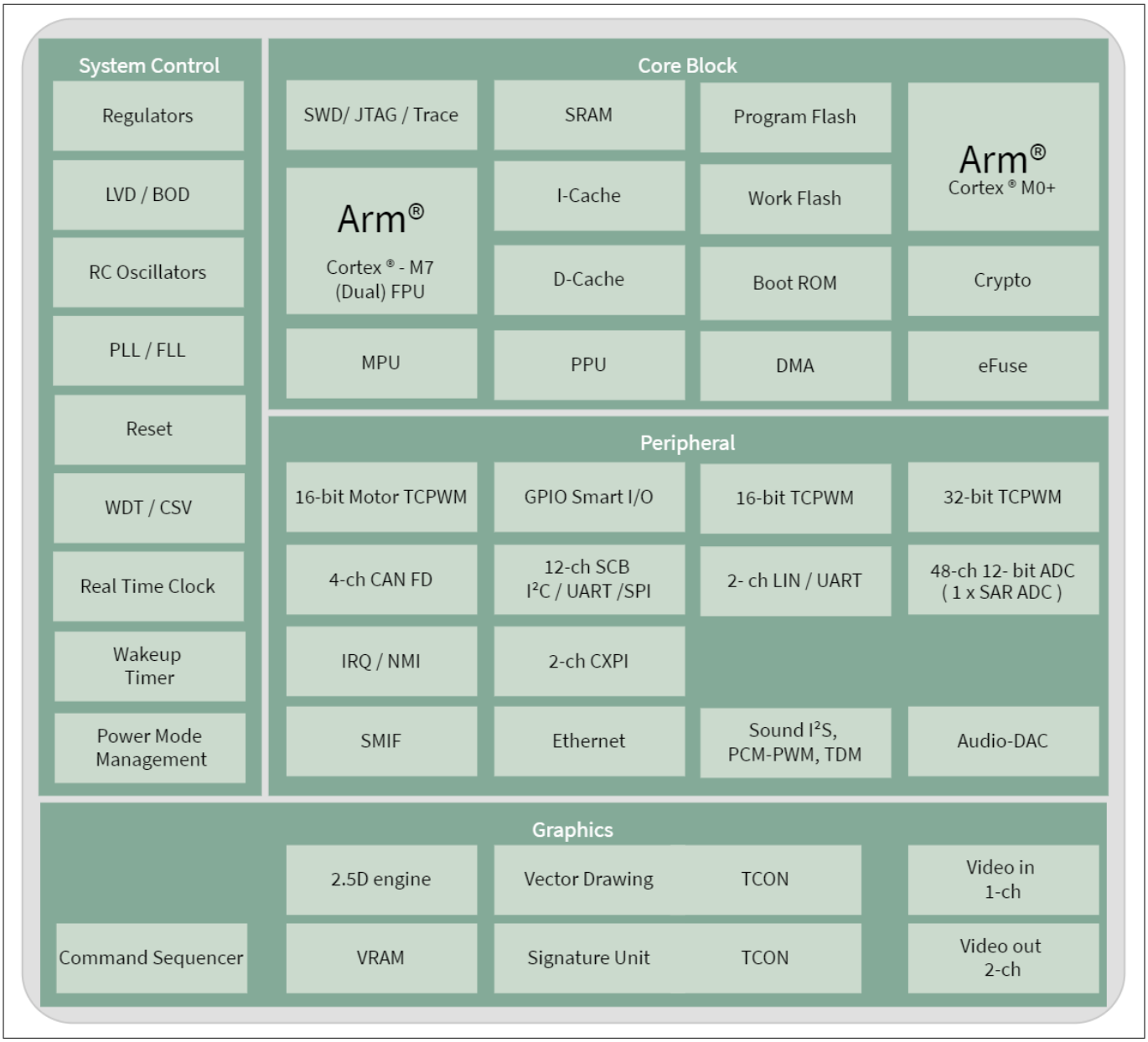

Figure 32 TRAVEO™ T2G CYT4DN block diagram

Table 5 shows the MCU device description.

Table 5 MCU device description

Reference	Manufacturer	Part number	Package, size
U200	Infineon Technologies	CYT4DN	327- Ball BGA

Figure 33 shows the location of the CYT4DN device (MCU) in this kit.

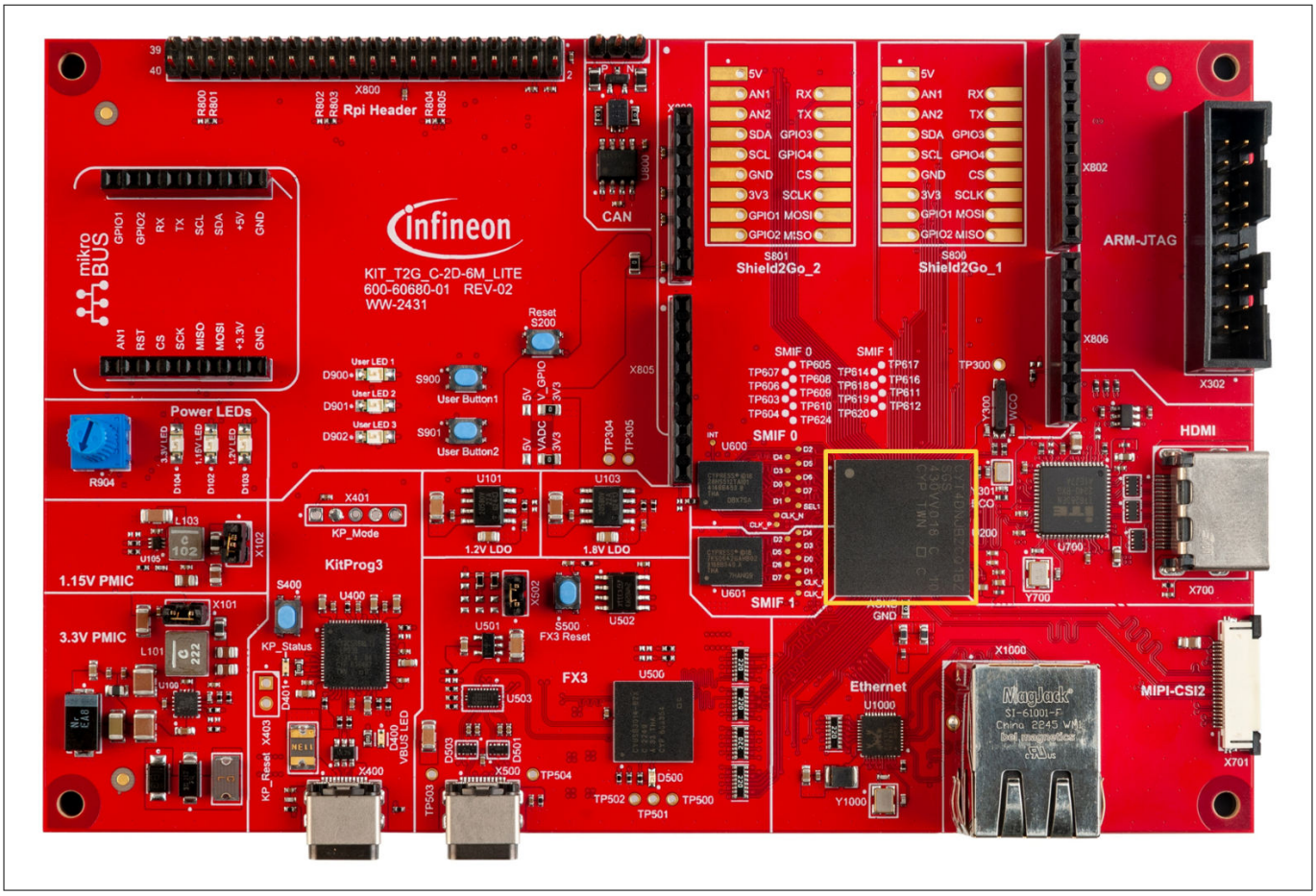

Figure 33 CYT4DN device location

3.2 Power supply block

This kit includes onboard power management ICs (PMICs) and LDOs to generate the necessary power supplies for operating the TRAVEO™ T2G CYT4DN MCU and other peripherals. The buck regulator and LDOs take a 5 V input from the USB connectors to produce the voltages required for various peripherals on this kit.

Figure 34 illustrates the kit's power supply block.

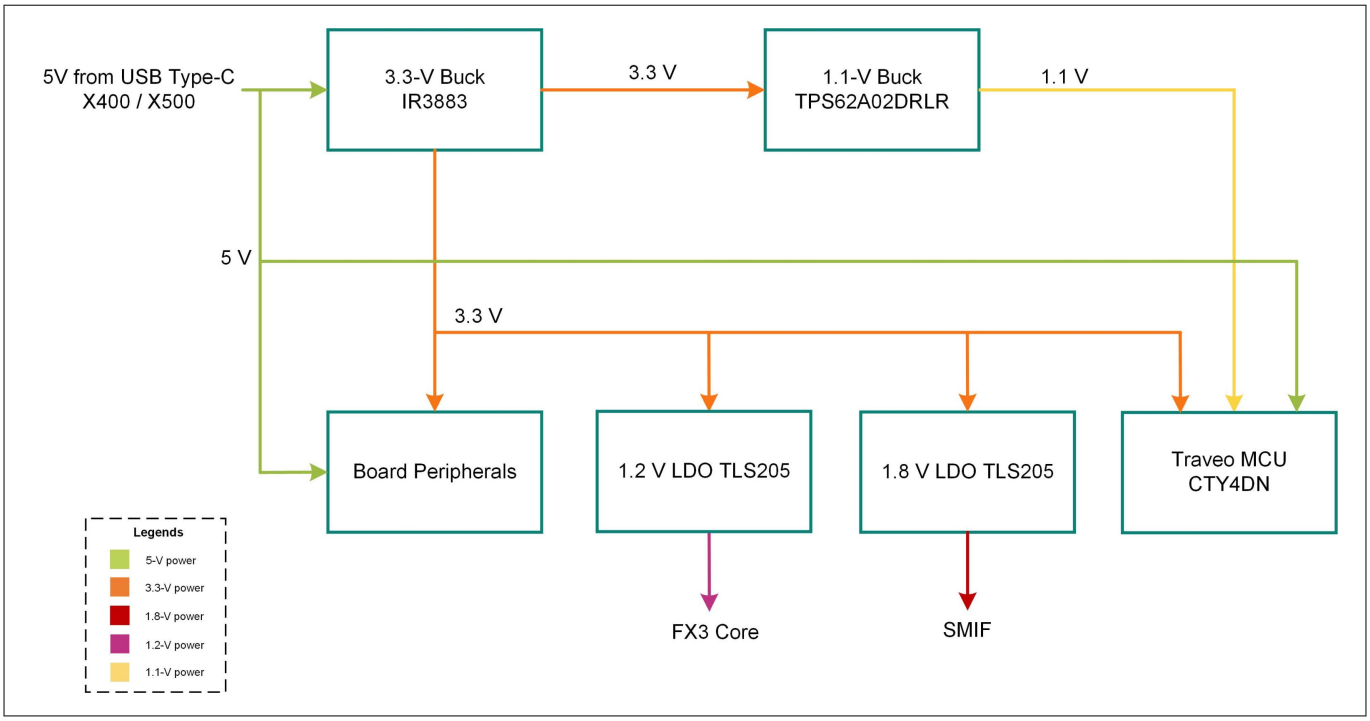

Figure 34 Power supply block diagram

In this kit, the IR3883 buck regulator is used for 5 V DC to 3.3 V DC conversion, and the TPS62A02DRLR buck regulator is used for 3.3 V DC to 1.1 V DC conversion. The primary supply comes from the IR3883 buck regulator.

3.3 V PMIC: The IR3883 buck regulator supports a wide input voltage range of 2.5 V to 14 V with an external Vcc and a single input voltage range of 4.5 V to 14 V. The IR3883 is an easy-to-use, fully integrated, and highly efficient monolithic DC-DC regulator. The on-chip PWM controller and MOSFETs make the IR3883 a space-efficient solution, providing accurate power delivery. See the References section for the IR3883 buck regulator details and datasheet.

1.1 V PMIC: The TPS62A02DRLR buck regulator is optimized for generating low output voltages down to 0.8 V. The supply voltage range is from 2.7 V to 5.5 V, allowing for the use of a single Li+ cell, three NiMH cells, or a regulated 5 V input. See the References section for the TPS62A02DRLR buck regulator details and datasheet.

LDO: This kit includes other power LDOs to generate the power supply for various peripherals. The board generates a 1.2 V voltage rail for the FX3 peripheral and a 1.8 V voltage rail for HDMI.

In this kit, the TLS205B0 adjustable version low dropout voltage regulator is used for generating power supplies of 1.2 V and 1.8 V. TLS205B0 is a micropower, low noise, low-dropout voltage regulator. The device can supply an output current of 500 mA with a dropout voltage of 320 mV. See the References section for TLS205B0 details and datasheet.

Figure 35 shows the location of different PMICs and LDOs in the Cluster 6M Lite Kit.

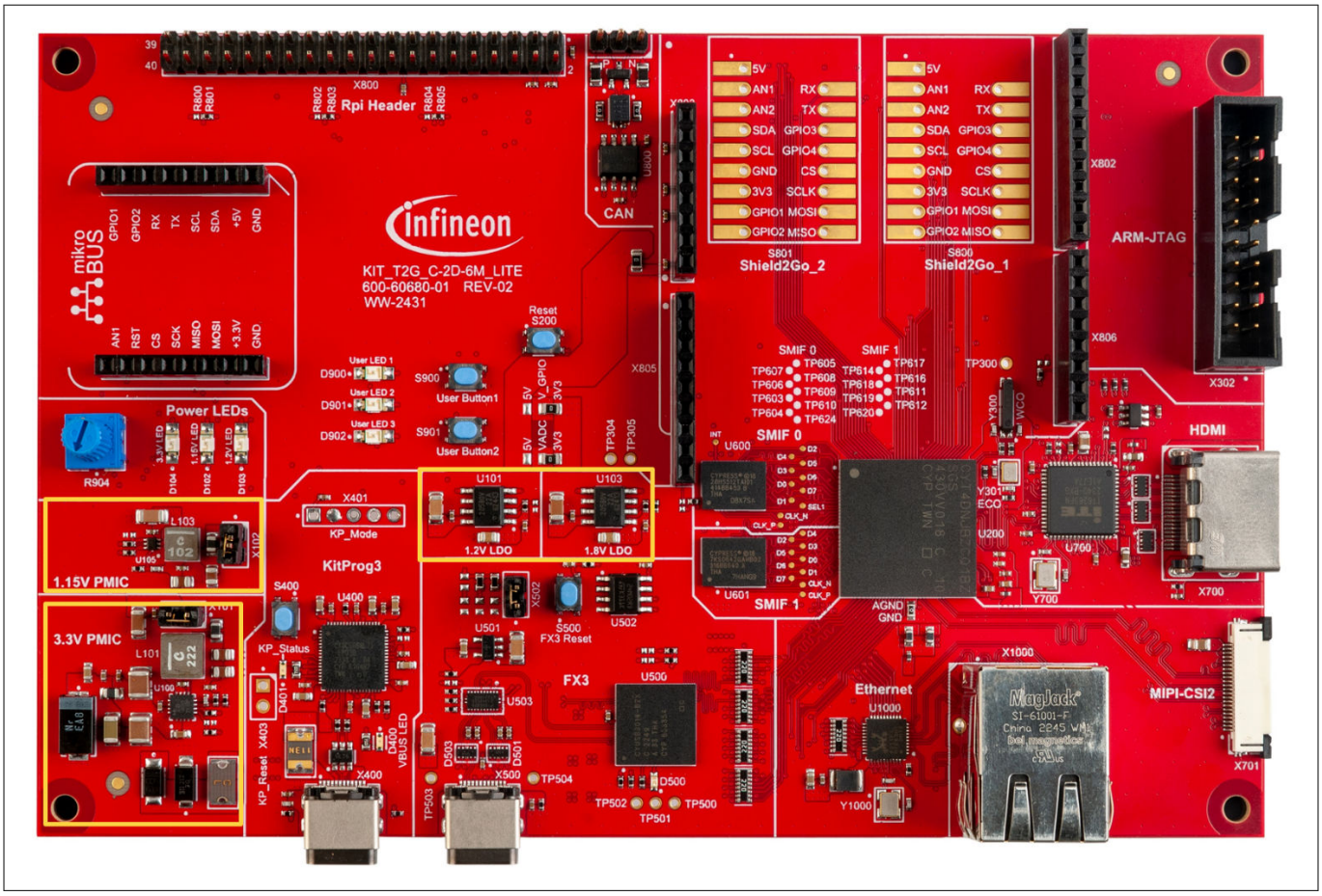

Figure 35 **PMIC and LDO location**

3.3 Clocks

This section provides information about the various crystal oscillators on the TRAVEO™ T2G Cluster 6M Lite Kit, which are used for clocking the TRAVEO™ T2G CYT4DN MCU and other peripherals.

Table 6 **Crystals available in this kit**

Crystal oscillator	Reference designator	Frequency
Watch Crystal Oscillator (WCO for MCU)	Y300	32.768 kHz
External Crystal Oscillator (ECO for MCU)	Y301	16 MHz
Crystal oscillator for EZ-USB™ FX3*	Y500	19.2 MHz
Crystal oscillator for LVDS to HDMI converter	Y700	25 MHz
Crystal oscillator for Ethernet transceiver	Y1000	25 MHz

Figure 36 and Figure 37 shows the location of the crystal oscillators in this kit.

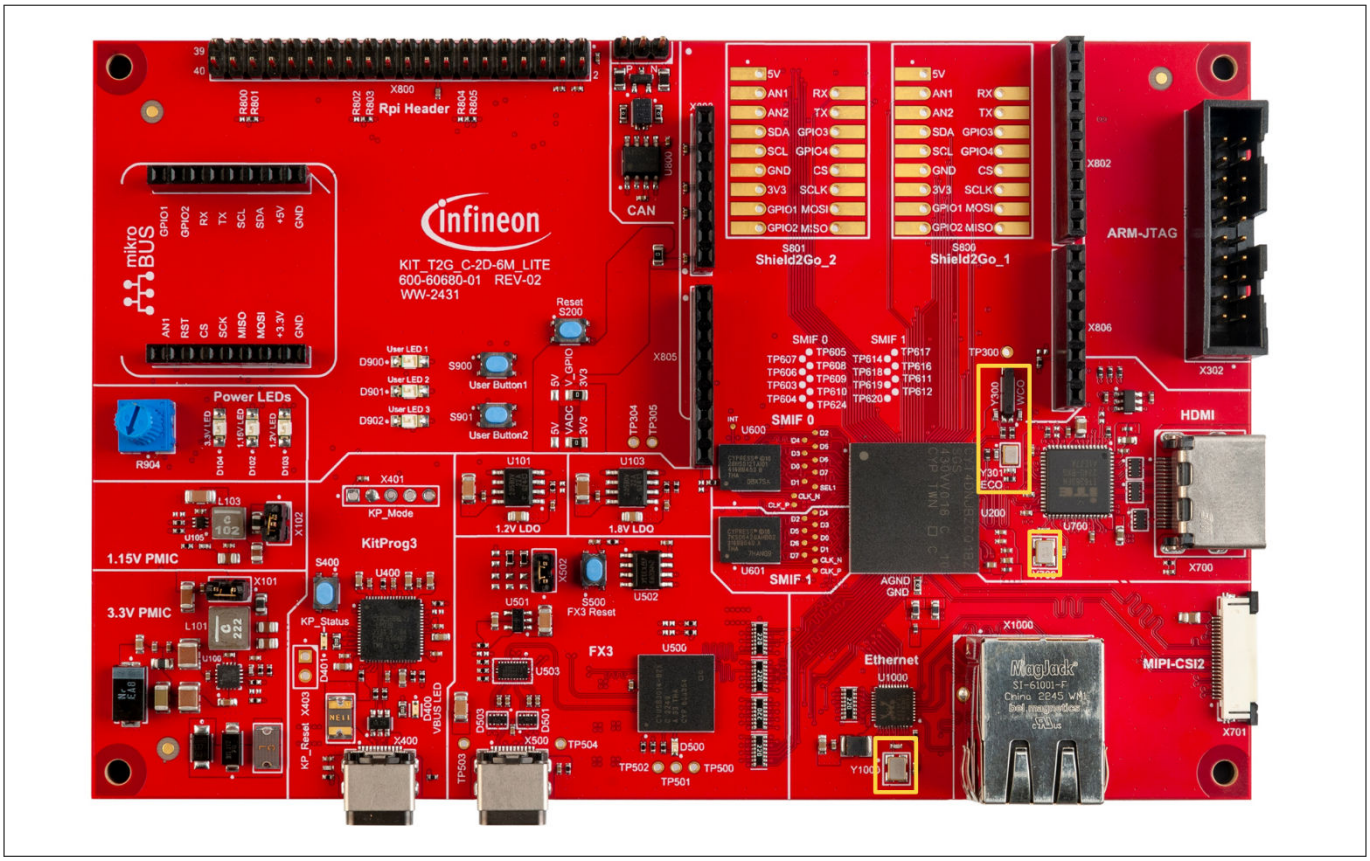

Figure 36 Crystals location-Top

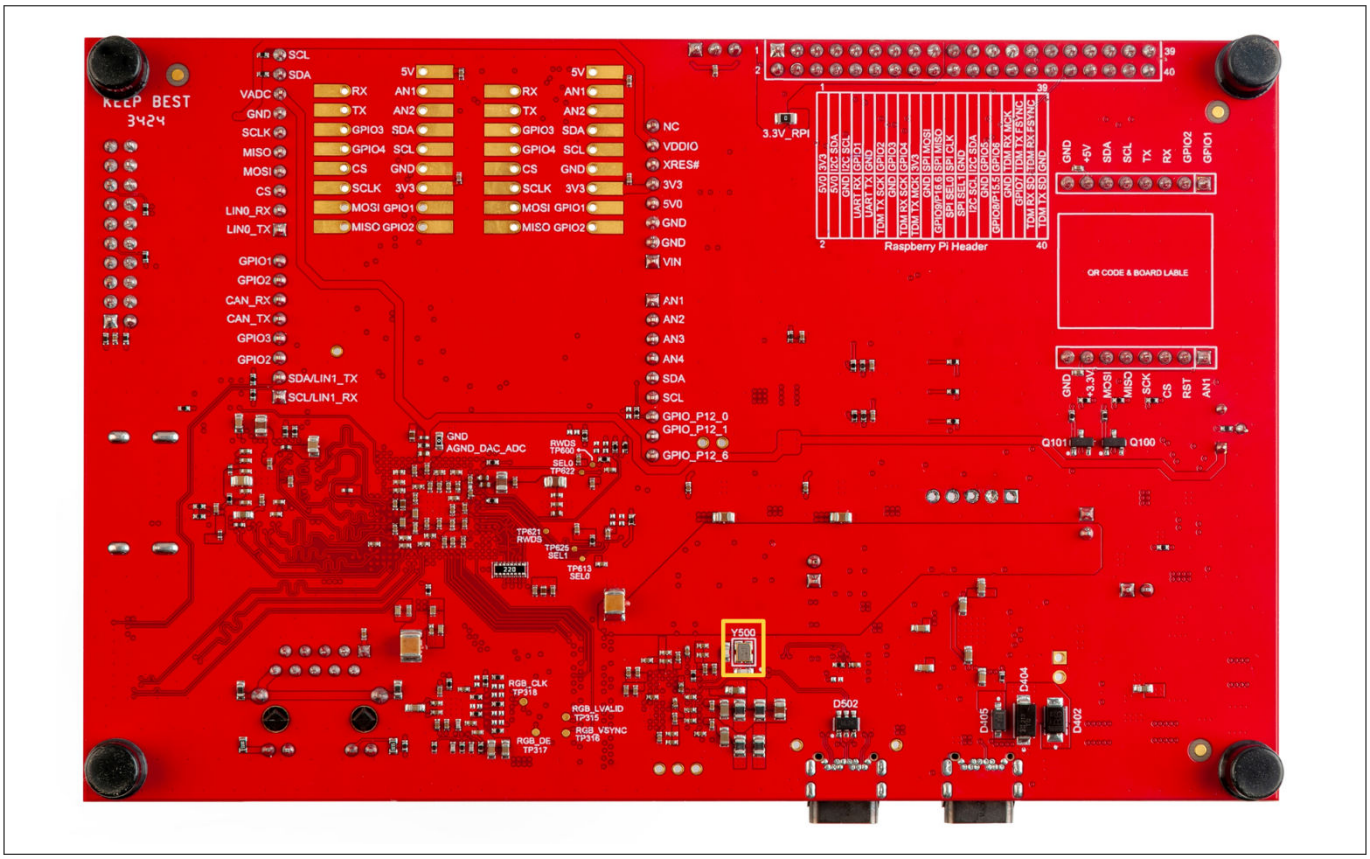

Figure 37 Crystal location-Bottom

3.4 Reset button

There are two reset buttons on the board: the S200 button for resetting the TRAVEO™ T2G CYT4DN MCU and the S500 button for resetting the FX3.

The reset button (S200) is specifically designed to reset the TRAVEO™ T2G CYT4DN MCU and is connected to the XRES pin of the MCU via a 10K resistor. To reset the TRAVEO™ T2G CYT4DN MCU, simply press and release the S200 button once, which will connect the XRES pin to ground, initiating the reset process.

- S200: CYT4DN MCU reset
- S500: FX3 reset

Figure 38 shows the locations of these reset buttons on the kit.

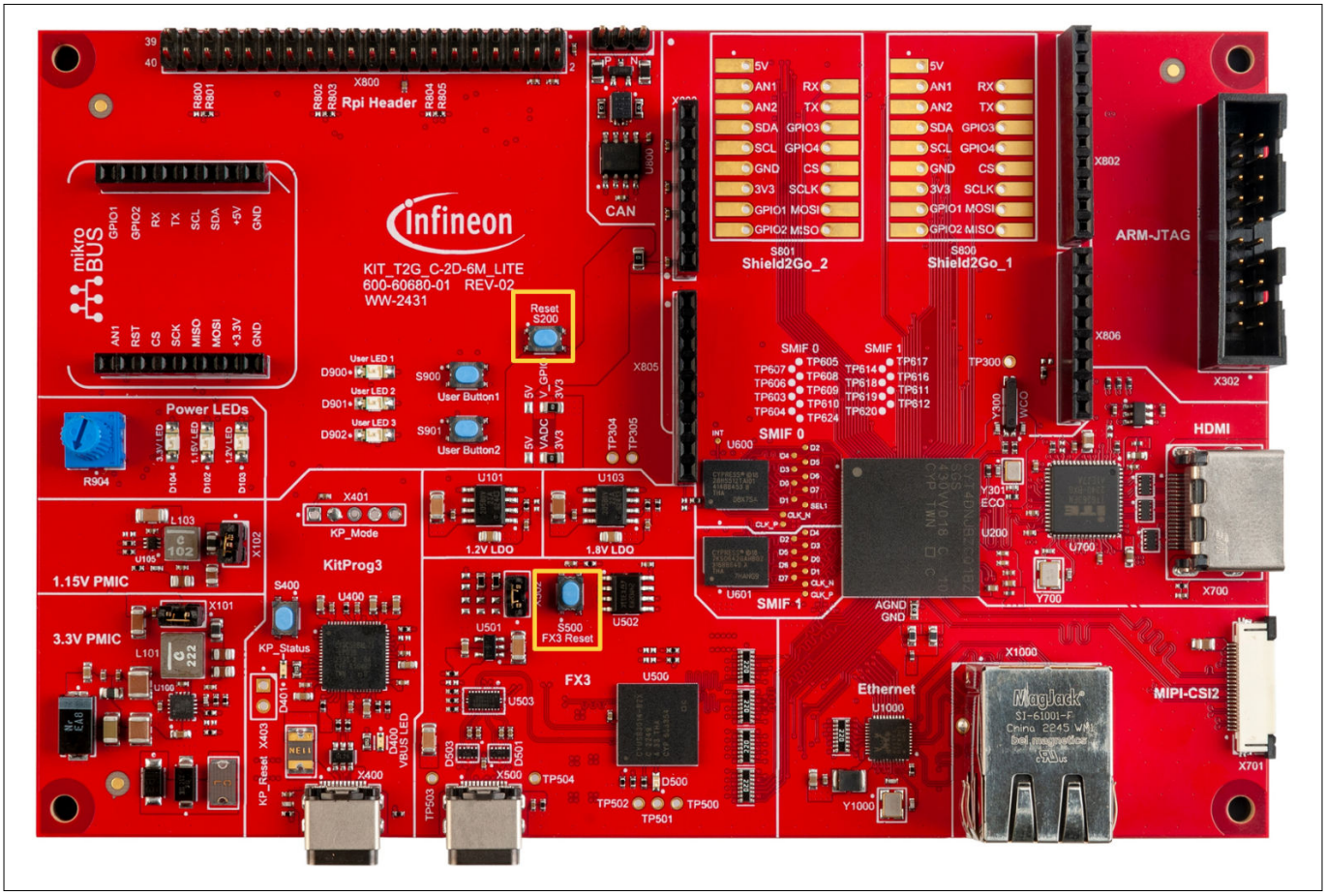

Figure 38 Reset buttons

3.5 Human Interface Devices (HID)

The TRAVEO™ T2G Cluster 6M Lite Kit supports several Human Interface Devices (HIDs) for user interaction. These include three user LEDs (D900, D901, D902), two push buttons (S900, S901), and a potentiometer (R904). These interfaces are intended to facilitate use of the kit for developers and testers, allowing them to perform various operations and tests.

Table 7 MCU port pin details

Pin	Net	RefDes
P0[2]	BUTTON1	USER BUTTON1 (S900)
P0[3]	BUTTON2	USER BUTTON2 (S901)

(table continues...)

Table 7 (continued) MCU port pin details

Pin	Net	RefDes
P7[5]	LED1	LED1 (D900)
P7[6]	LED2	LED2 (D901)
P7[7]	LED3	LED3 (D902)
P7[4]	POT	POT (R904)

Figure 39 shows the location of the user LEDs, push buttons, and potentiometer in this kit.

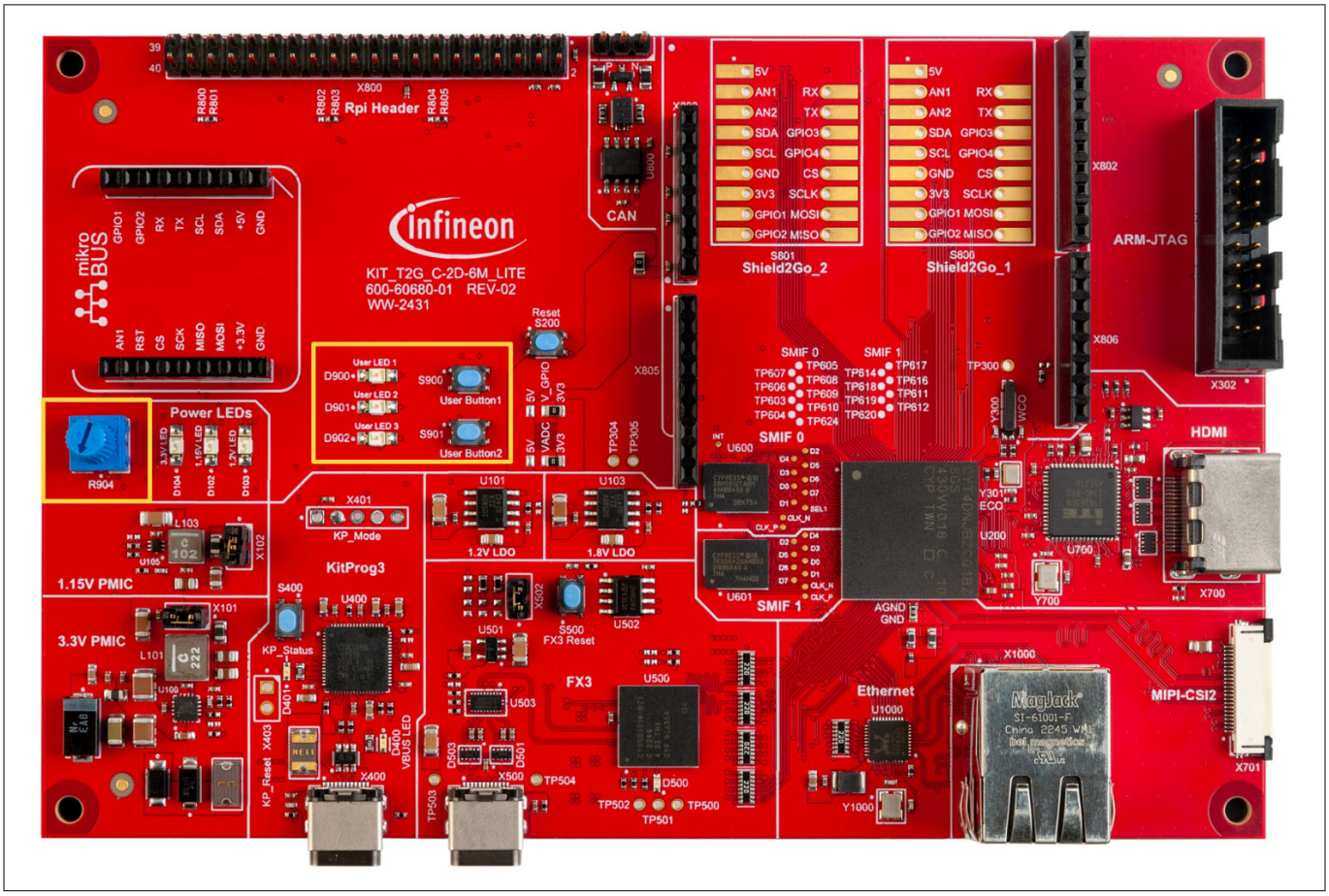

Figure 39 User LEDs, push buttons, and potentiometer in the Cluster 6M Lite Kit

3.5.1 User LEDs

The LEDs D900, D901, and D902 (LED-SMD-LTST-C150KGKT) on the TRAVEO™ T2G Cluster 6M Lite Kit can operate across the entire voltage range of VDD. These LEDs function as active HIGH, meaning they require the pins to supply VDD to turn them ON.

3.5.2 User push button

The user push buttons S900 and S901 (PTS810 SJG 250 SMTR LFS) on the TRAVEO™ T2G Cluster 6M Lite Kit provide input to the TRAVEO™ T2G CYT4DN MCU. By default, pressing these buttons connects the TRAVEO™ T2G CYT4DN MCU pin to ground.

3.5.3 Potentiometer

The TRAVEO™ T2G Cluster 6M Lite Kit features a 10 kΩ potentiometer (R904, POT-THT-3362P) connected to the TRAVEO™ T2G CYT4DN MCU. This potentiometer is used to simulate an analog sensor output to the TRAVEO™ T2G CYT4DN MCU. The VDDA power reference is provided to the potentiometer, so any change in its position affects the ADC conversion result accordingly.

3.6 Graphics and video interface

The TRAVEO™ T2G Cluster 6M Lite Kit supports various video-compatible interfaces accessible via specific connectors and compatible with components such as displays, cameras, and adapter boards.

Figure 40 shows the different video and graphic interfaces available in this kit.

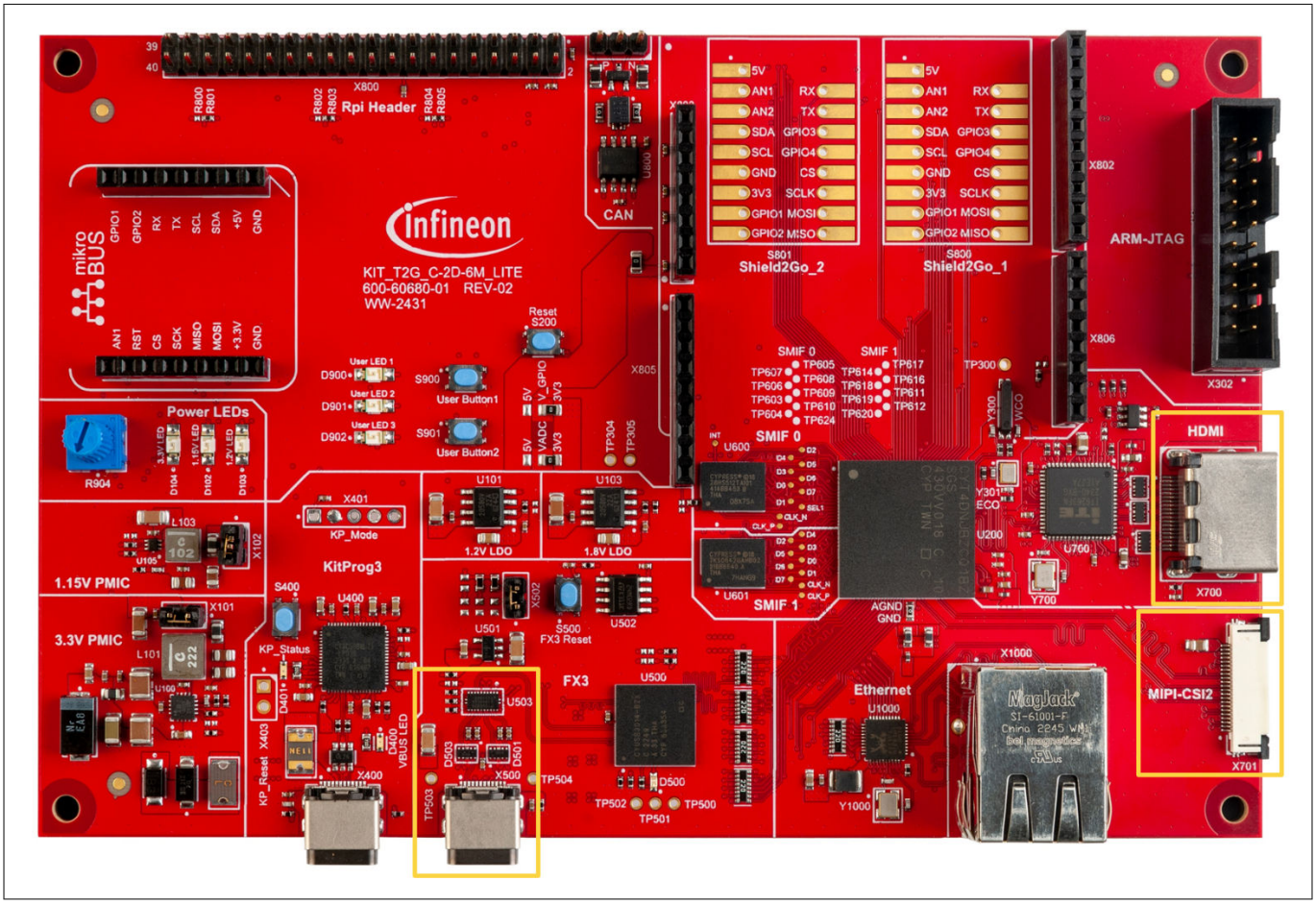

Figure 40 Video interfaces

3.6.1 EZ-USB™ FX3 interface

This kit supports the FX3 video interface via a Type-C connector for streaming graphics output to a screen. It is a plug-and-play device, as the EZ-USB™ FX3 comes with the necessary firmware preloaded. The RGB display signals from the CYT4DN device are converted into USB 3.0 packets by the FX3 and streamed to a PC. The PC detects the FX3 as a standard USB camera, so any suitable video rendering application can display the streamed graphics.

For streaming, use VLC media player (see Preprogrammed firmware for configuring the media player and FX3) or a Python script mentioned in Python script for streaming with FX3 to stream the graphics output.

***Note**: For further information about programming the EZ-USB™ FX3, see Programming the EZ-USB™ FX3.*

Figure 41 shows the connection of the Type-C cable required to stream FX3 to a PC. Ensure that jumper X502 is not shorted in this kit.

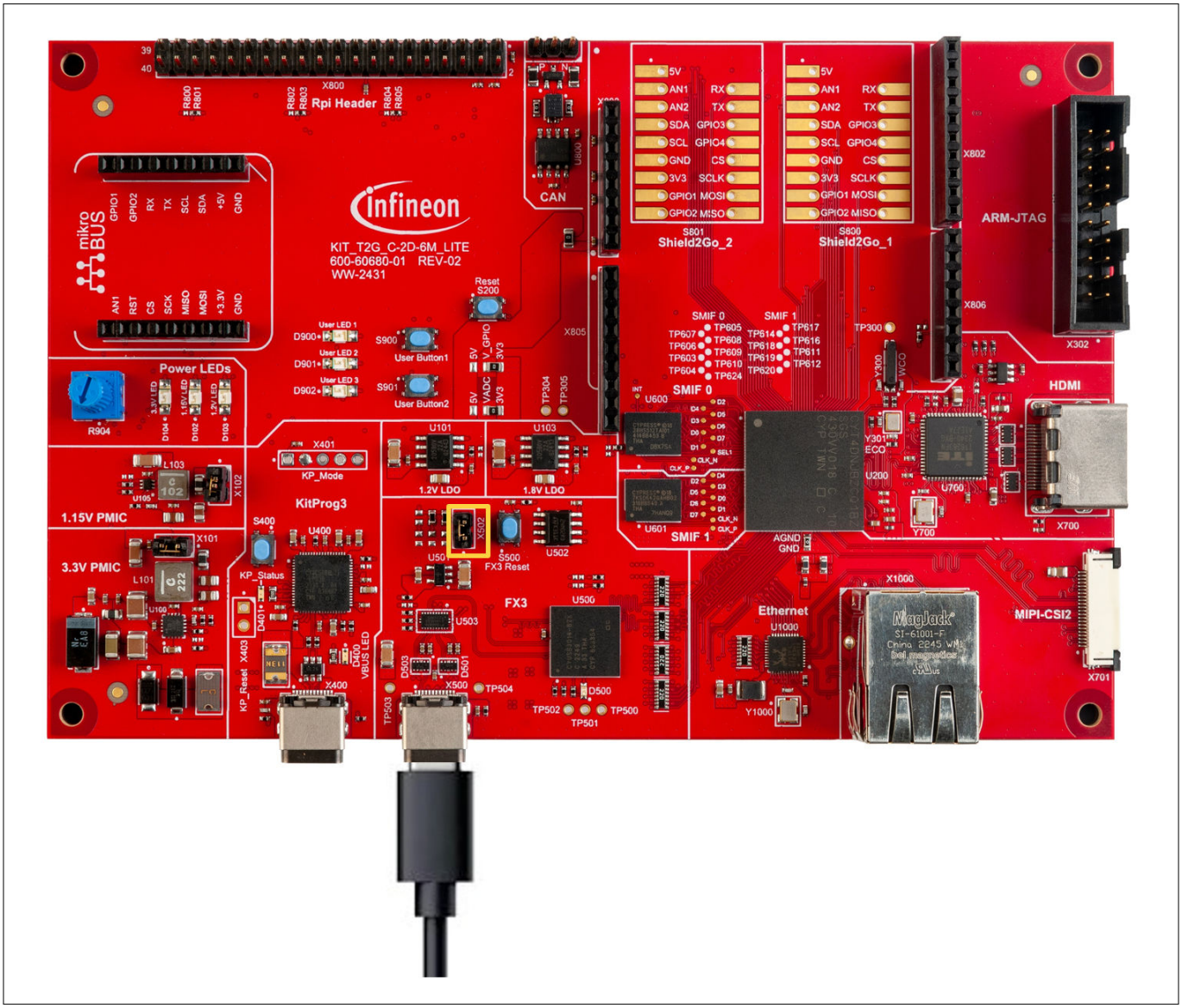

Figure 41 Connection required to stream FX3 to a PC

***Note**: To stream the graphics output via EZ-USB™ FX3, remove the jumper X502 (highlighted in Figure 41) from the board.*

3.6.2 HDMI interface

The TRAVEO™ T2G Cluster 6M Lite Kit includes one HDMI interface and supports graphics output. To stream graphics output, connect the HDMI cable between X700 and the display.

The IT6263 (U700) is a high-performance single-chip LVDS to HDMI converter. It combines an LVDS receiver and an HDMI 1.4a transmitter, supporting LVDS input and HDMI 1.4 output through its conversion function. The built-in LVDS receiver can support single-link and dual-link LVDS inputs, while the built-in HDMI transmitter is fully compliant with HDMI 1.4a. With a high-speed LVDS RX, the IT6263 can support resolutions up to 1080P and 10-bit deep colors.

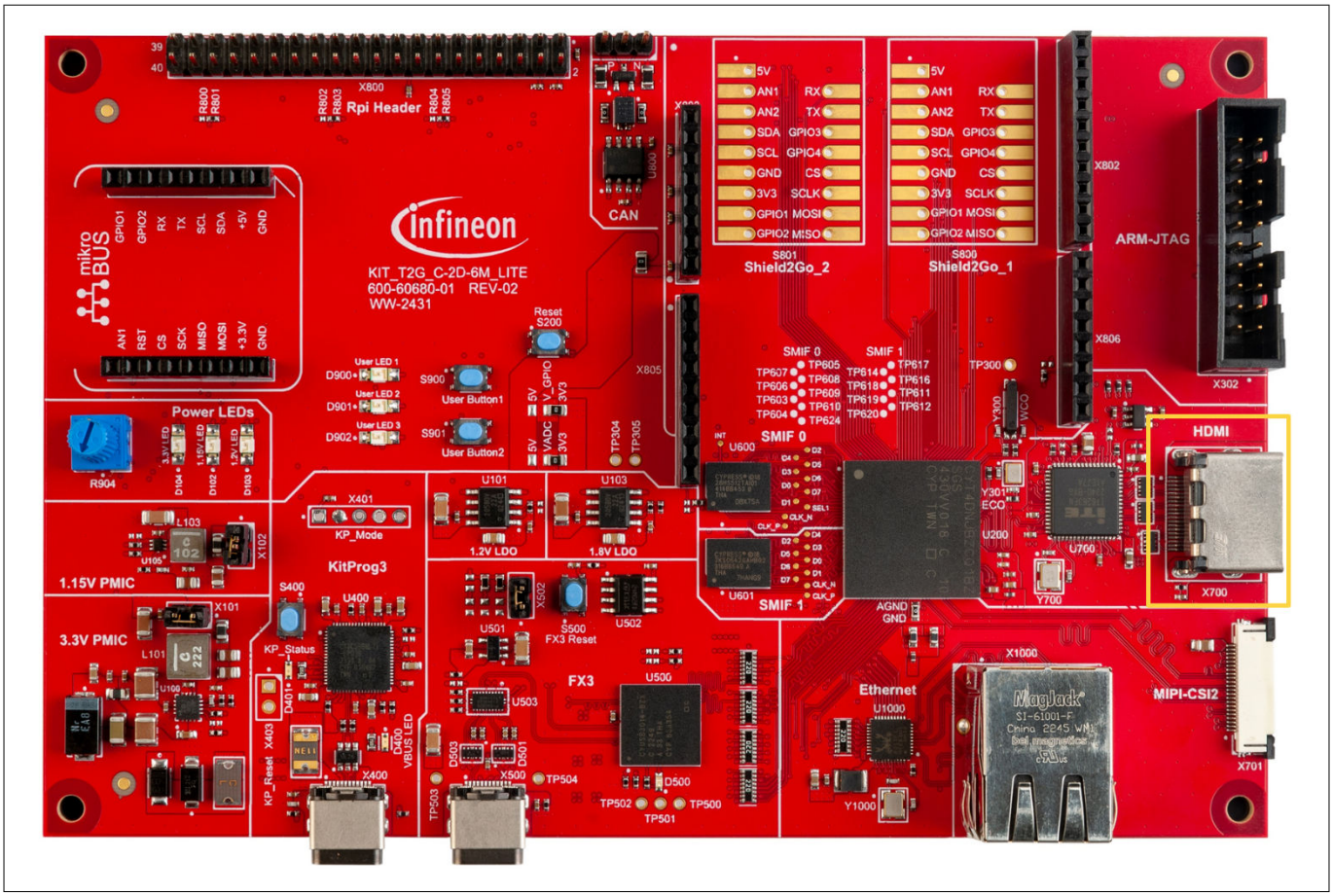

Figure 42 Location of the HDMI connector on the Cluster 6M Lite Kit

3.6.3 MIPI-CSI2 interface

The TRAVEO™ T2G Cluster 6M Lite Kit supports the MIPI-CSI2 interface. Since the Camera Serial Interface (CSI2) receiver is part of the CYT4DN device, you need an external camera module to transmit the video stream to the device. The MIPI-CSI2 interface (X701) supports all imaging formats like YUV, RGB, and RAW.

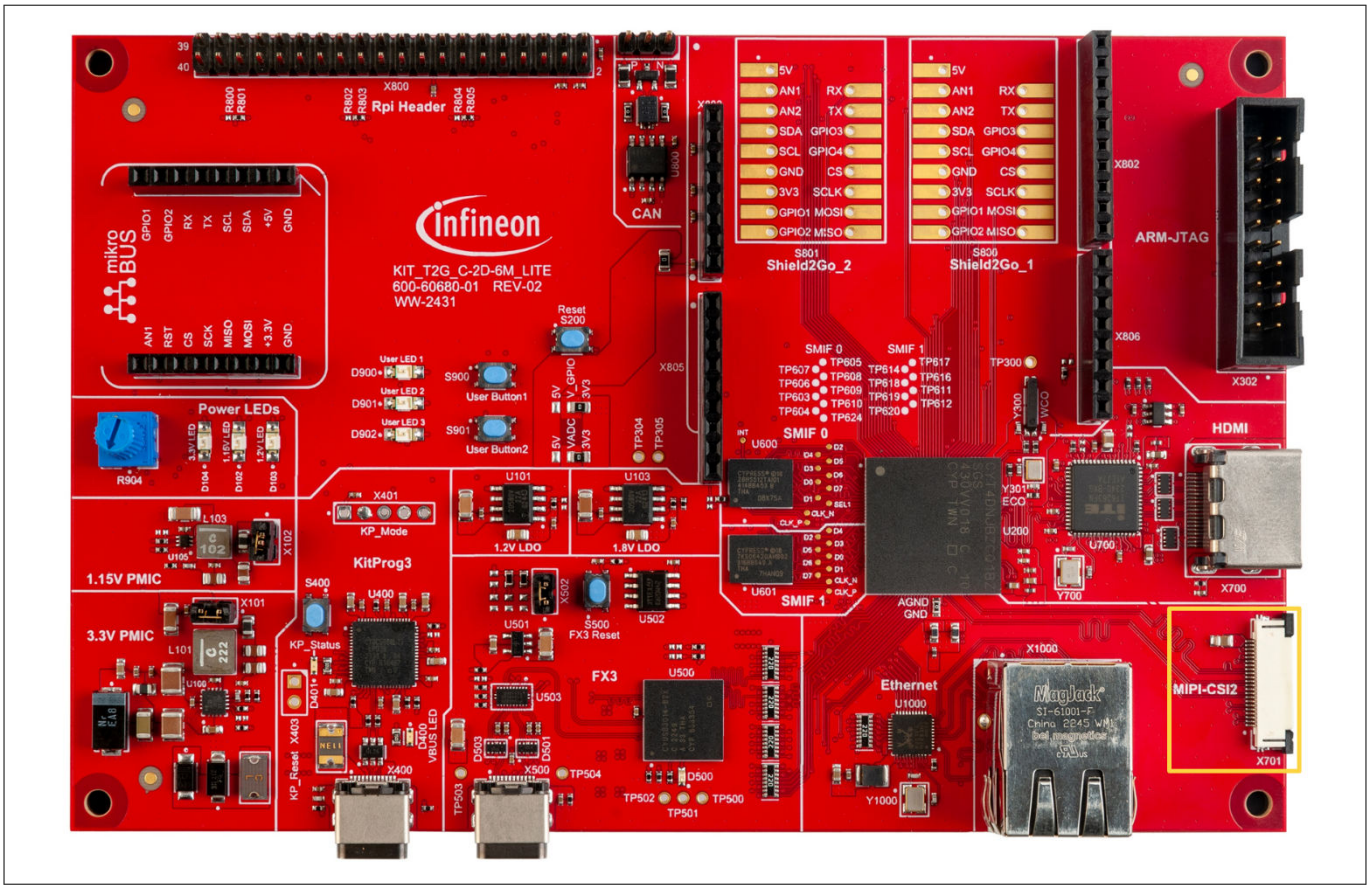

Figure 43 Location of the MIPI-CSI2 Interface on the Cluster 6M Lite Kit

3.7 Communication interface

The TRAVEO™ T2G Cluster 6M Lite Kit offers a range of communication interfaces, including I^2C, SPI, UART, and Ethernet. These interfaces can be used for various purposes, such as connecting to external devices or communicating with other systems.

3.7.1 Ethernet

The TRAVEO™ T2G Cluster 6M Lite Kit includes an onboard Ethernet PHY (X1000). The Realtek RTL8211FI (U1000) is a highly integrated Ethernet transceiver that supports RGMII with 10Base-T, 100Base-TX, and 1000Base-T IEEE 802.3 standards. It provides all the necessary physical layer functions to transmit and receive Ethernet packets over CAT.5 UTP cable. The RTL8211FI is housed in a 40-pin QFN green package.

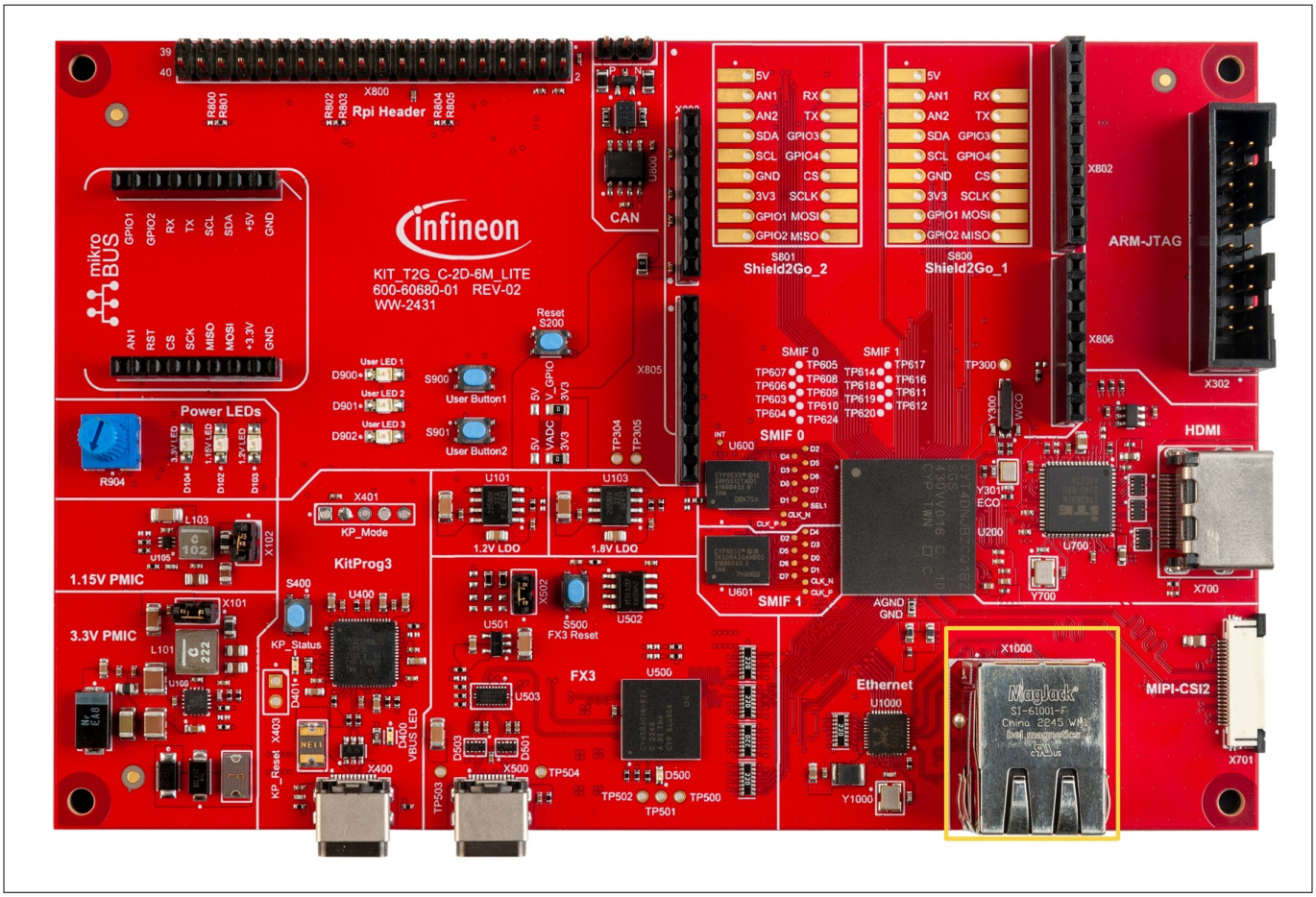

Figure 44 Location of the Ethernet PHY on the Cluster 6M Lite Kit

3.8 Serial memory interface

The TRAVEO™ T2G Cluster 6M Lite Kit includes a serial memory interface (SMIF) that serves as a master, providing a low pin count connection to off-chip SPI devices such as EEPROM, FRAM, MRAM, or NAND memories, in SDR or DDR mode, and HYPERBUS™ devices such as HYPERFLASH™ (NOR Flash) and HYPERRAM™ (Pseudo Static RAM). SMIF provides two modes for data transfer operation to and from external devices.

The TRAVEO™ T2G Cluster 6M Lite Kit has two SMIF devices:

- SEMPER™ NOR flash (S28HS) connected to the SMIF-0 instance
- HYPERRAM™ (S27KS) connected to the SMIF-1 instance

Figure 45 shows the locations of SEMPER™ flash and HYPERRAM™ mounted in this kit.

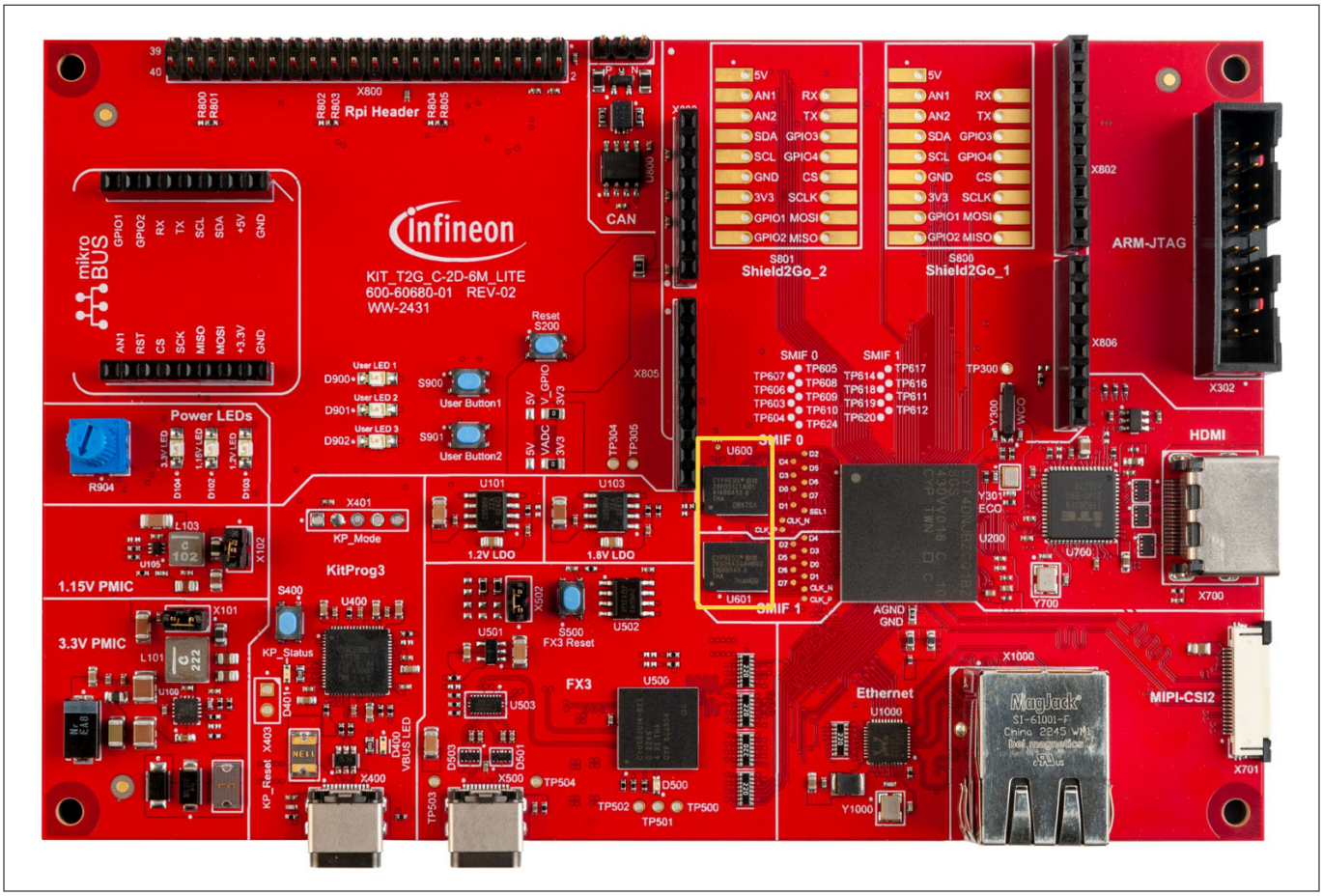

Figure 45 SEMPER™ flash and HYPERRAM™ location

3.8.1 HYPERFLASH™

This kit includes an S28HS512T 512 Mb SEMPER™ flash (U600). The Infineon SEMPER™ flash family consists of high-speed CMOS, MIRRORBIT™ NOR flash devices that comply with the JEDEC JESD251 eXpanded SPI (xSPI) specification. SEMPER™ flash is designed for functional safety and is developed according to the ISO 26262 standard to achieve ASIL-B compliance and ASIL-D readiness.

SEMPER™ flash with HYPERBUS™ interface devices support both the HYPERBUS™ interface and legacy (x1) SPI. Both interfaces serially transfer transactions, reducing the number of interface connection signals.

3.8.2 HYPERRAM™

This kit includes an S27KS0642 64 Mb HYPERRAM™ (U601) self-refresh DRAM (PSRAM). The Infineon 64 Mb HYPERRAM™ device is a high-speed CMOS, self-refresh DRAM with a HYPERBUS™ interface. The DRAM array uses dynamic cells that require periodic refresh.

The refresh control logic within the device manages the refresh operations on the DRAM array when the memory is not actively read or written by the HYPERBUS™ interface master (host). Since the host is not required to manage any refresh operations, the DRAM array appears to the host as though the memory uses static cells that retain data without refresh. Thus, the memory is more accurately described as Pseudo Static RAM (PSRAM).

***Note**: For the datasheet and more details about SEMPER™ flash and HYPERRAM™, see References.*

3.9 Program and debug interface

The TRAVEO™ T2G Cluster 6M Lite Kit includes an onboard programmer/debugger, KitProg3, with a USB Type-C connector (X400) for programming and debugging the CYT4DN device. Additionally, you can use the Arm® Standard 20-pin JTAG connector (X302) to program and debug the CYT4DN device.

3.9.1 PSOC™ 5LP (KitProg3)

The KitProg3 (onboard programmer/debugger) is implemented using a PSOC™ 5LP device (CY8C5868LTI-LP039). ThePSOC™ 5LP is responsible for implementing the low-level communication firmware for programming and debugging, facilitating communication between a programming tool and a target, such as the TRAVEO™ T2G Cluster 6M Lite Kit.

In this kit, the KitProg3 is pre-configured to function as a USB-UART bridge for programming and debugging the CYT4DN device. The kit also includes a KitProg3 mode switch (S400) and a KitProg3 status LED (D401). These interfaces allow you to switch between various modes of operation of KitProg3 and use the LED to monitor its status. Note that this board supports only CMSIS-DAP BULK mode.

Additionally, there is an optional programming header for programming the PSOC™ 5LP, accessible via the 5-pin header (X401). It is important to note that the KitProg3 hardware revision ID is 0x08.

To use the onboard programmer/debugger KitProg3 on the TRAVEO™ T2G Cluster 6M Lite Kit, simply connect the USB Type-C cable to the USB connector (X400) and the USB port of your PC for programming and debugging.

KitProg3 uses the industry-standard SWD protocol, supporting CMSIS-DAP V2.0.0 and V1.2.0 as the bulk and HID endpoint transport mechanisms.

Figure 46 shows how to connect this kit to the PC for programming and debugging through KitProg3.

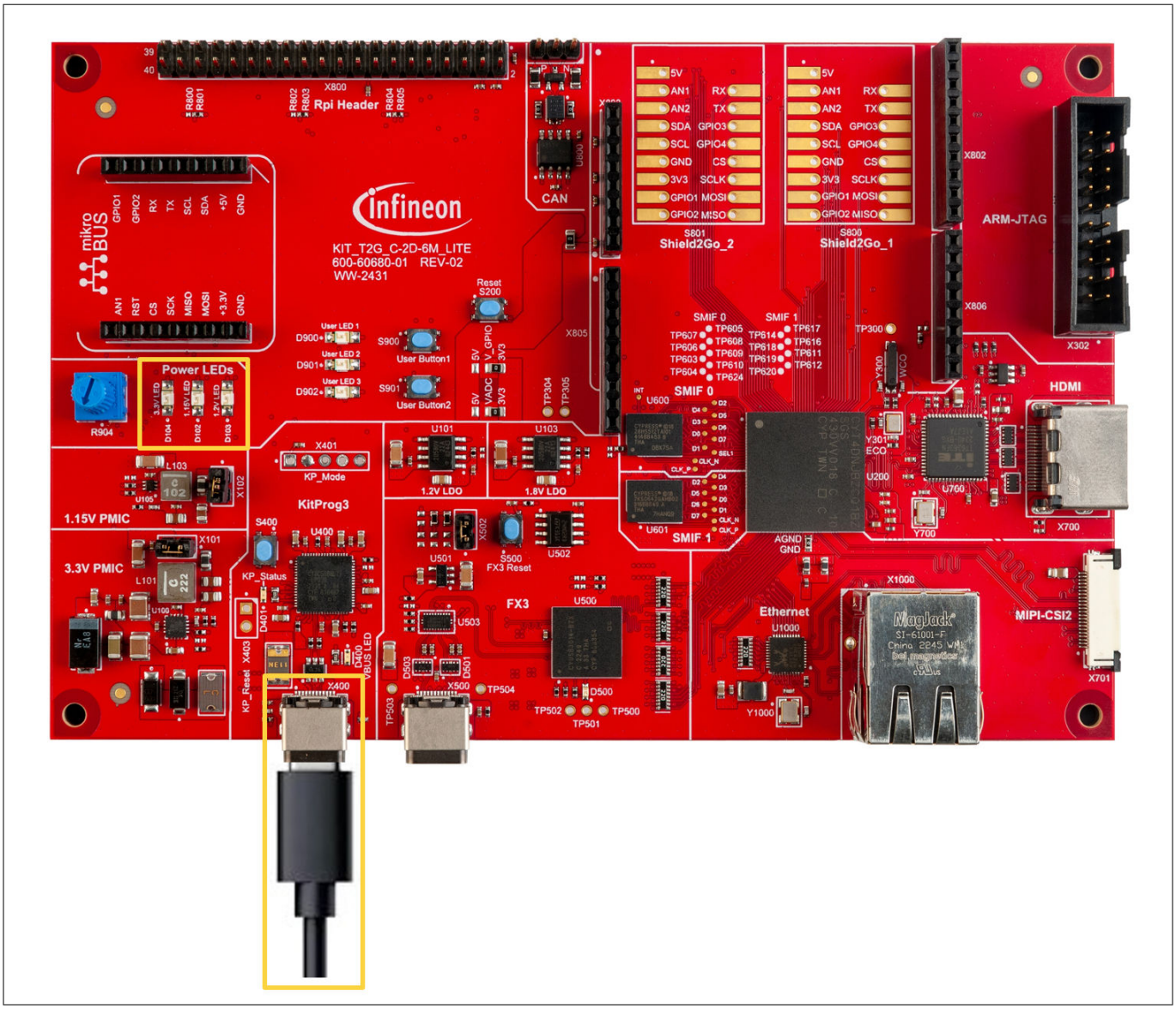

Figure 46 **KitProg3 USB-UART bridge connected to the PC**

3.9.2 Arm® standard SWD/JTAG interface

When it comes to programming and debugging the kit using the Arm® Standard 20-pin JTAG connector, you have a couple of options. Firstly, you can use the GHS Probe directly by connecting it to the Arm® Standard 20-pin JTAG connector (X302). Alternatively, you can use the JTAG-to-20-pin Arm® converter (I-jet MIPI20 to Arm® 20 adapter) to connect the I-jet with the Arm® Standard 20-pin JTAG connector (X302), enabling you to program and debug with the I-jet debugger.

Figure 47 shows the JTAG connector X302.

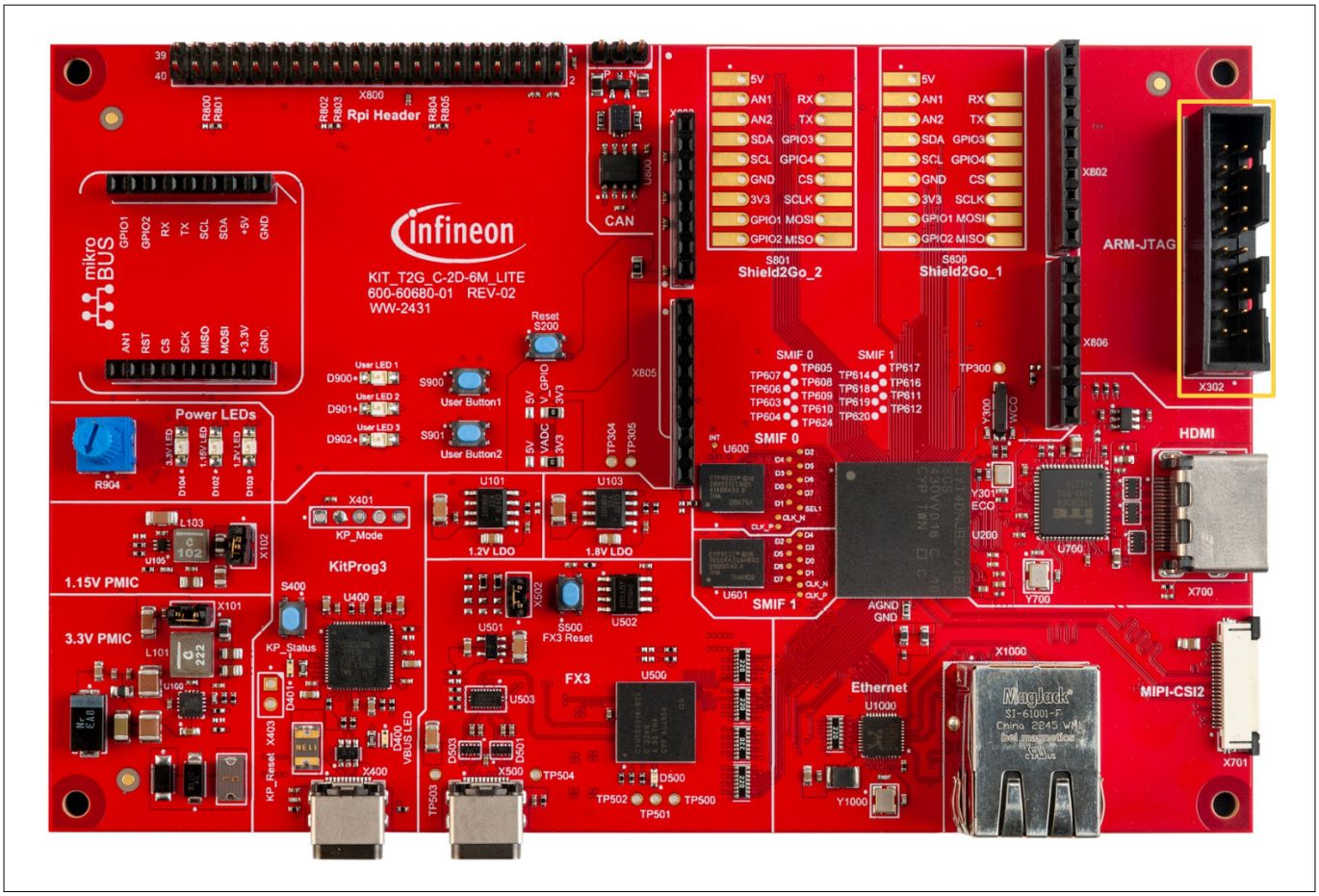

Figure 47 Connecting the GHS Probe to the JTAG header X302

3.10 General-purpose I/O headers

The TRAVEO™ T2G Cluster 6M Lite Kit provides a variety of general-purpose I/O headers compatible with popular interfaces. These include a Raspberry Pi I/O header, an Arduino header, a mikroBUS header, and two Shield2Go footprints. This kit also supports various shields to use different peripherals that are not available on the board but can be connected to the I/O headers of the kit.

Figure 48 shows the locations of the different headers in this kit.

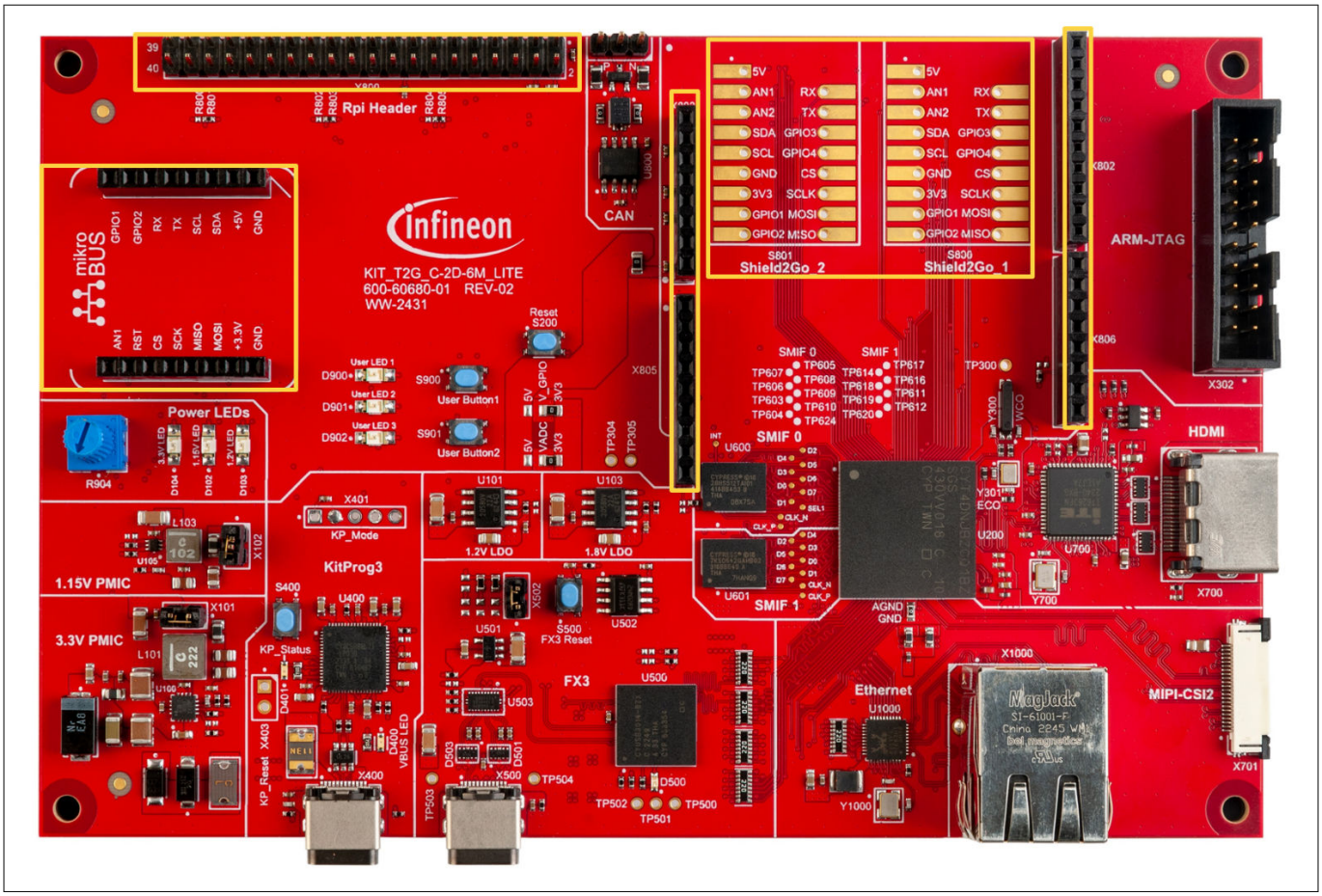

Figure 48 **Expansion headers**

3.10.1 Raspberry Pi header

Table 8 **Raspberry Pi header pin details**

Pin	MCU port pin	Functionality	Pin	MCU port pin	Functionality
X800.1	-	3V3	X800.21	P11[0]	SCB0_MISO
X800.2	-	5V0	X800.22	P16[6]	RPI_GPIO9/P16.6
X800.3	P0[4]	SCB11_SDA	X800.23	P11[2]	SCB0_CLK
X800.4	-	5V0	X800.24	P11[1]	SCB0_SEL0
X800.5	P0[5]	SCB11_SCL	X800.25	-	GND
X800.6	-	GND	X800.26	P12[0]	SCB0_SEL3
X800.7	P9[2]	RPI_GPIO1	X800.27	P0[4]	SCB11_SDA
X800.8	P29[0]	SCB9_RX	X800.28	P0[5]	SCB11_SCL
X800.9	-	GND	X800.29	P9[6]	RPI_GPIO5
X800.10	P29[1]	SCB9_TX	X800.30	-	GND
X800.11	P9[3]	RPI_GPIO2	X800.31	P9[7]	RPI_GPIO6
X800.12	P15[7]	TDM_TX_SCK0	X800.32	P15[5]	RPI_GPIO8/P15.5

(table continues...)

Table 8 (continued) Raspberry Pi header pin details

Pin	MCU port pin	Functionality	Pin	MCU port pin	Functionality
X800.13	P9[4]	RPI_GPIO3	X800.33	-	TDM_RX_MCK0_RPI
X800.14	-	GND	X800.34	-	GND
X800.15	P9[5]	RPI_GPIO4	X800.35	P16[0]	TDM_TX_FSYNC0
X800.16	-	TDM_RX_SCK0_RPI	X800.36	P11[4]	RPI_GPIO7
X800.17	-	3V3	X800.37	-	TDM_RX_FSYNC0_RPI
X800.18	P15[6]	TDM_TX_MCK0	X800.38	P16[5]	TDM_RX_SD0
X800.19	P11[3]	SCB0_MOSI	X800.39	-	GND
X800.20	-	GND	X800.40	P16[1]	TDM_TX_SD0

3.10.2 Arduino UNO header

Table 9 Arduino header X803 and X802 pin details

Pin	Functionality	Pin	Functionality
X803.1	VIN	X802.1	LIN0_TX
X803.2	GND	X802.2	LIN0 _RX
X803.3	GND	X802.3	SCB8_SEL0
X803.4	5V0	X802.4	SCB8_MOSI
X803.5	3V3	X802.5	SCB8_MISO
X803.6	XRES#	X802.6	SCB8_CLK
X803.7	VDDIO_GPIO	X802.7	GND
X803.8	NC	X802.8	VADC
		X802.9	SCB11_SCL
		X802.10	SCB11_SDA

Table 10 Arduino header X805 and X806 pin details

Pin	Functionality	Pin	Functionality
X805.1	AN1_ARD	X806.1	SCB10_SCL/LIN1_RX
X805.2	AN2_ARD	X806.2	SCB10_SDA/LIN1_TX
X805.3	AN3_ARD	X806.3	DAC_COM_L
X805.4	AN4_ARD	X806.4	GPIO3_ARD
X805.5	SCB11_SDA	X806.5	CAN0_0_TX
X805.6	SCB11_SCL	X806.6	CAN0_0_RX
X805.7	DAC_AOUTS_R	X806.7	GPIO2_ARD
X805.8	DAC_AOUTS_L	X806.8	GPIO1_ARD
X805.9	DAC_COM_R		

3.10.3 mikroBUS header

Table 11 mikroBUS header X812 and X813 pin details

Pin	Functionality	Pin	Functionality
X812.1	AN1_MB	X813.1	GPIO1_MB
X812.2	XRES#	X813.2	GPIO2_MB
X812.3	SCB0_SEL3	X813.3	SCB9_RX
X812.4	SCB0_CLK	X813.4	SCB9_TX
X812.5	SCB0_MISO	X813.5	SCB11_SCL
X812.6	SCB0_MOSI	X813.6	SCB11_SDA
X812.7	3V3	X813.7	5V0
X812.8	GND	X813.8	GND

3.10.4 Shield2Go header

Shield2Go footprints are available on this kit, and you can mount the headers as needed.

Table 12 Shield2Go S800 and S801 pin details

Pin	Functionality	Pin	Functionality
S800.1/S801.1	5V	S800.10/S801.10	RX
S800.2/S801.2	AN1	S800.11/S801.11	TX
S800.3/S801.3	AN2	S800.12/S801.12	RST/GPIO2
S800.4/S801.4	SDA	S800.13/S801.13	GPIO1
S800.5/S801.5	SCL	S800.14/S801.14	CS
S800.6/S801.6	GND	S800.15/S801.15	SCLK
S800.7/S801.7	3V3	S800.16/S801.16	MOSI
S800.8/S801.8	INT/GPIO3	S800.17/S801.17	MISO
S800.9/S801.9	PWM/GPIO4		

4 Additional information

4.1 Test points

Table 13 describes the test points available on the TRAVEO™ T2G Cluster 6M Lite Kit.

Table 13 Available test points

Sl. no.	Test points	Description
1	TP501	FX3 UART_RX
2	TP502	FX3 UART_TX
3	TP600	SMIF0 RWDS
4	TP602	SMIF0 CLK
5	TP603	SMIF0 DATA0
6	TP604	SMIF0 DATA1
7	TP605	SMIF0 DATA2
8	TP606	SMIF0 DATA3
9	TP607	SMIF0 DATA4
10	TP608	SMIF0 DATA5
11	TP609	SMIF0 DATA6
12	TP610	SMIF0 DATA7
13	TP611	SMIF1 DATA0
14	TP612	SMIF1 DATA1
15	TP613	SMIF1 SEL0
16	TP614	SMIF1 DATA2
17	TP615	SMIF1 CLK
18	TP616	SMIF1 DATA3
19	TP617	SMIF1 DATA4
20	TP618	SMIF1 DATA5
21	TP619	SMIF1 DATA6
22	TP620	SMIF1 DATA7
23	TP621	SMIF1 RWDS
24	TP622	SMIF0 SEL0

4.2 Advanced features

4.2.1 Programming the EZ-USB™ FX3

To program the EZ-USB™ FX3, follow the procedure outlined in this section. Before proceeding, ensure you have downloaded the necessary software required to program the FX3. It is recommended to use the FX3 software development kit (FX3 SDK), which includes tools, drivers, and application examples, to program and utilize the EZ-USB™ FX3.

Steps to program FX3:

1. Install the FX3 SDK on your PC for drivers and programming tools
2. Program the FX3

***Notes**:*

1. *Once the FX3 is reprogrammed, the default FX3 video streaming will stop working*
2. *See* References *to get the link for downloading the FX3 SDK. For more details about FX3 and its usage, refer to the links provided there*

4.2.1.1 Installing the FX3 SDK

1. Download the FX3 SDK
2. After downloading it from the web, unzip the file and open the FX3 SDK Setup application
3. In the Installation Type tab of the SDK window, select your preferred option (in this example, the **Custom** option is selected), and then click **Next**
4. In the **Selected Release** table, do not select or deselect or change anything. Follow the default setup and click **Next**
5. Carefully read and accept the terms and conditions, then click **Next**
6. Follow the same process for the subsequent steps and wait for the window to show the installation status
7. After the installation is complete, a window with **Contact Information** will pop up; fill it in and click **Finish**
8. Your FX3 SDK installation is now complete

4.2.1.2 Programming the FX3 using Control Center

1. Before programming the FX3, ensure that you have connected the jumper X502 on the board to switch the FX3 to Bootloader mode
2. Next, connect the USB Type-C cable between the USB Type-C connector (X500) on the board and the USB 3.0 port on your PC. Then, press the FX3 Reset button (S500) on the board

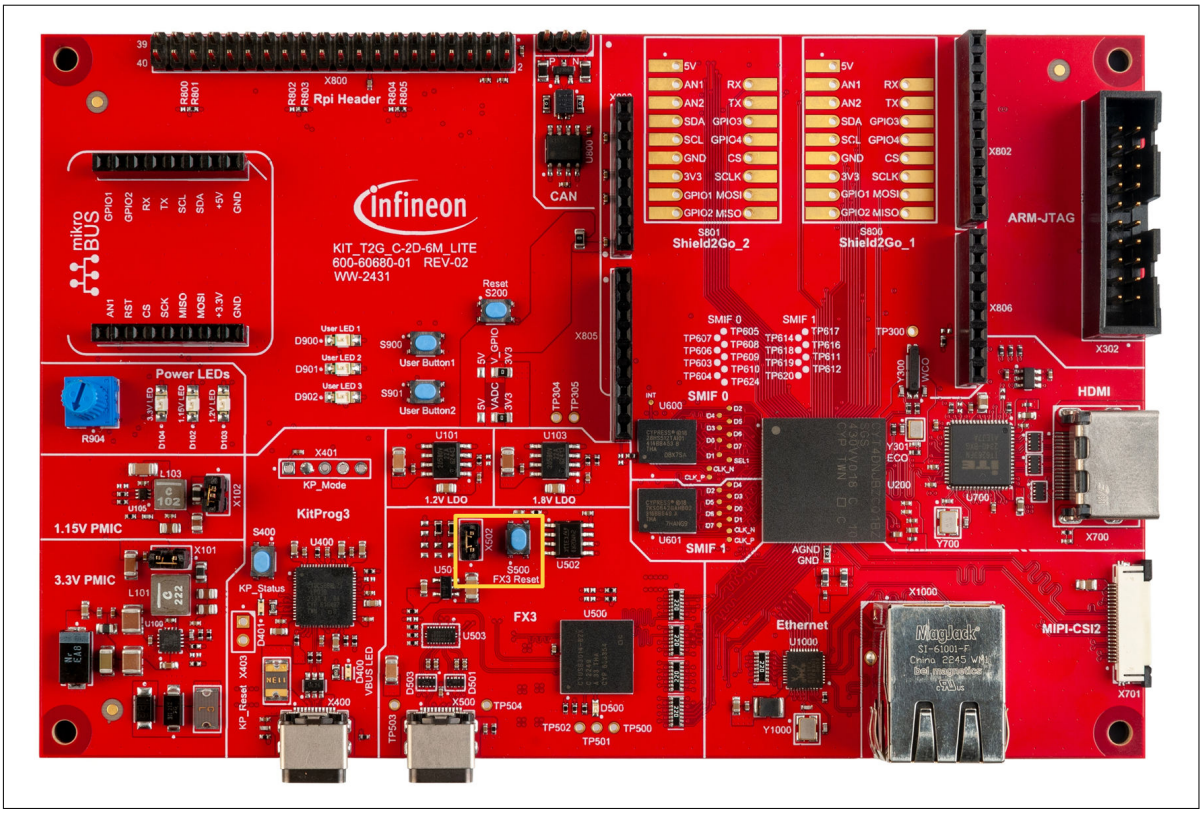

Figure 49 **Shorting the jumper X502 and pressing the reset button in the Cluster 6M Lite Kit**

3. Open the search tab and search for **Control Center**. If you cannot find it, navigate to **Start** > **All apps** > **Cypress**, and open it

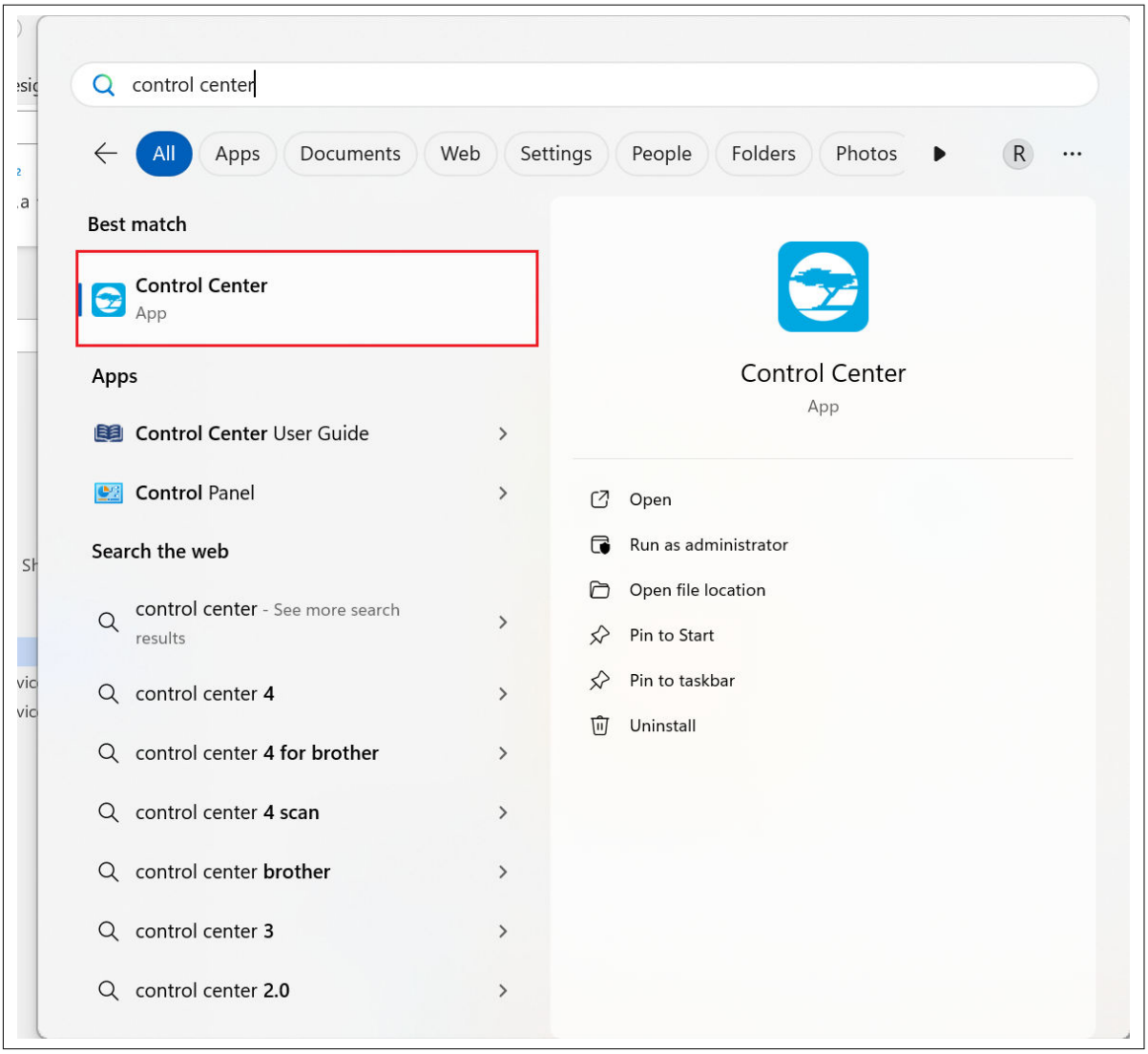

Figure 50 Opening Control Center for programming FX3

4. Select the **Cypress FX3 USB Bootloader Device** in the Control Center. Then navigate to **Program** > **FX3**, and select **I2C EEPROM**

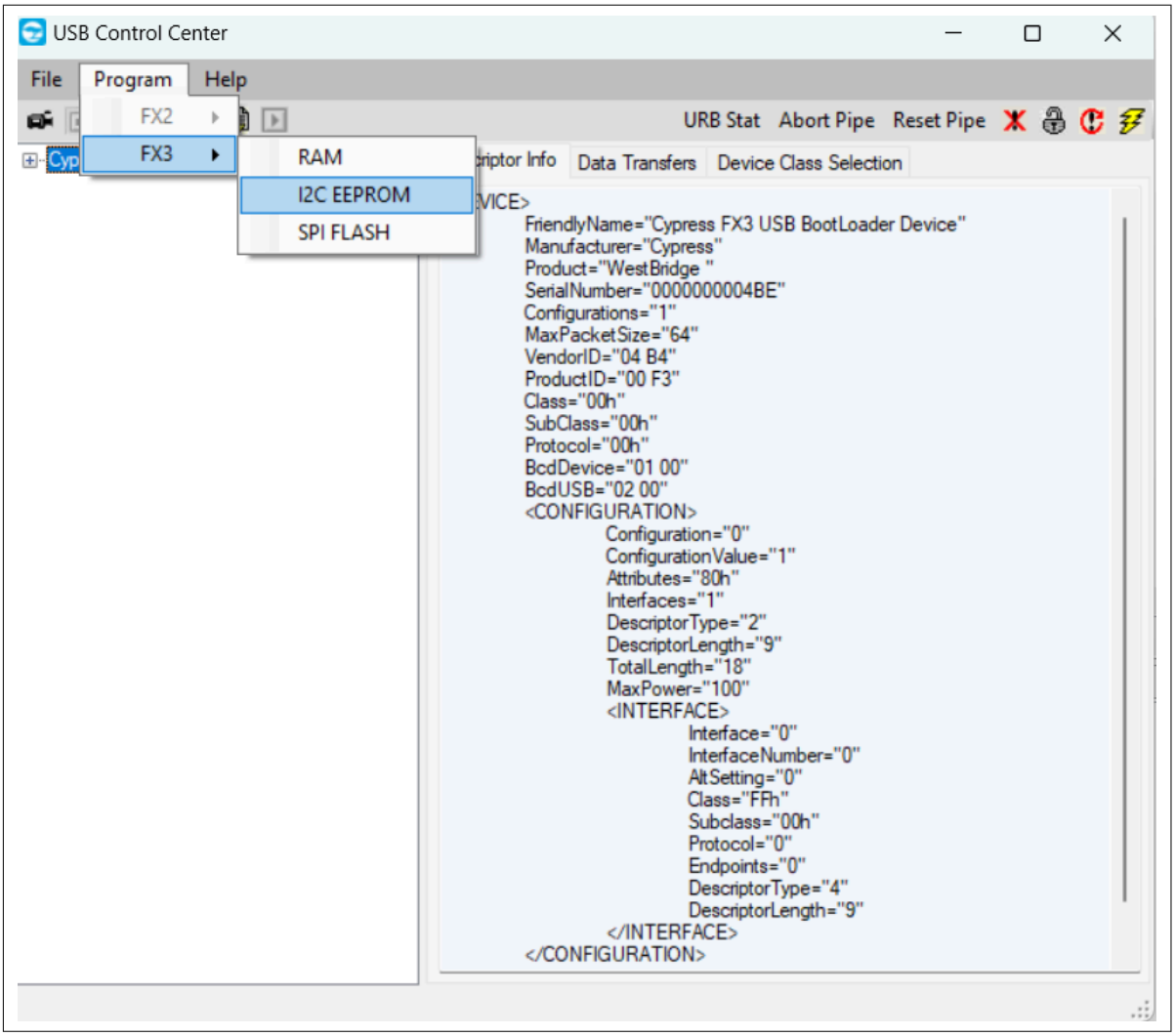

Figure 51 Programming EZ-USB™ FX3

5. You will now be prompted for the location of the UVC image to flash into FX3. Locate the directory where you have generated or downloaded the **UVC_Traveo.img** firmware. After selecting that image, check the status of the flashing in the bottom left of the Control Center.

***Note**: The `UVC_Traveo.img` file will not be provided. Users can create their own `.img` file to program*

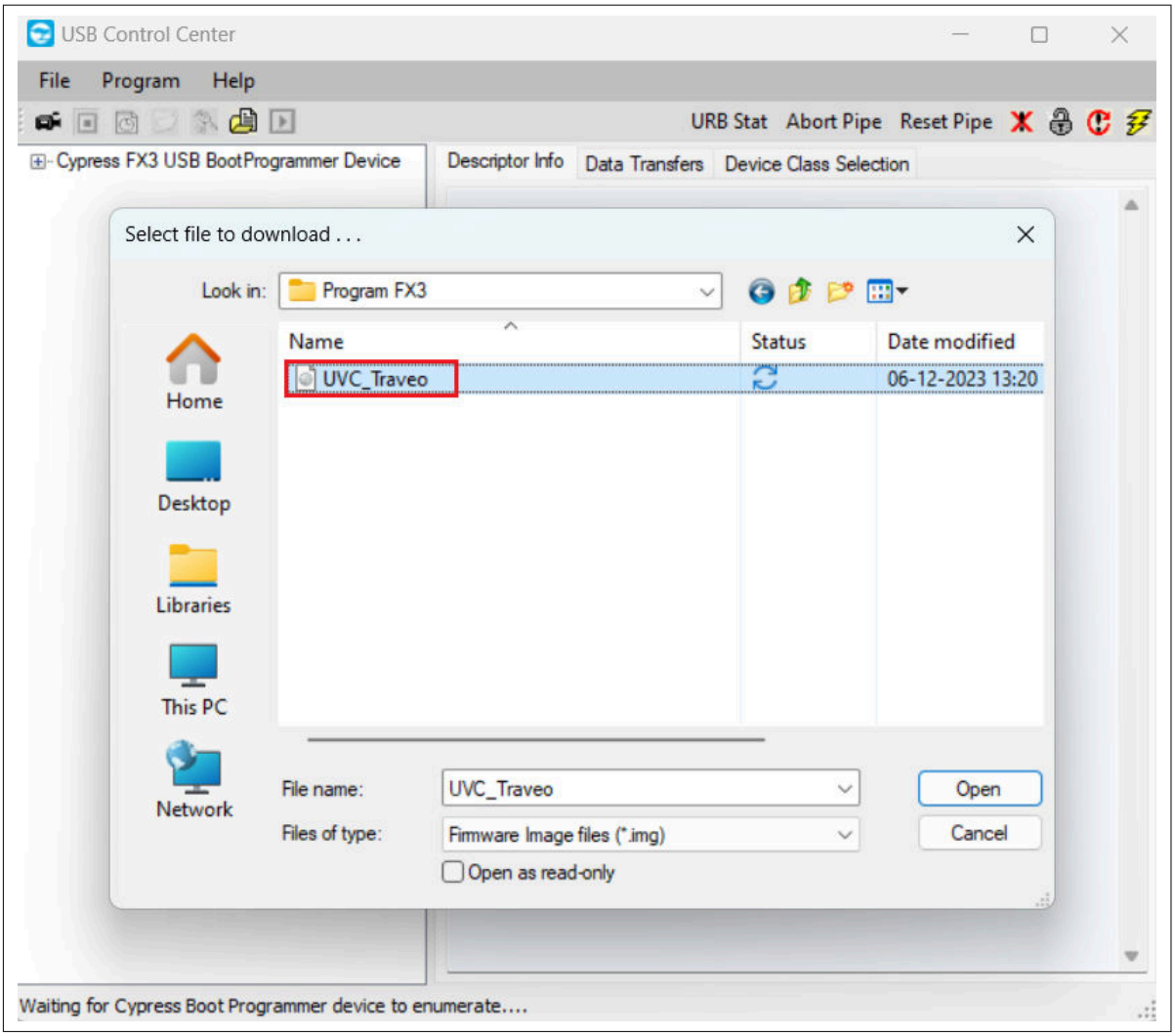

Figure 52 Flashing UVC image into FX3

6. When the status shows **Programming of I2C EEPROM Succeeded**, the FX3 is programmed. You can now close the Control Center tab and remove the X502 jumper from the 6M kit.

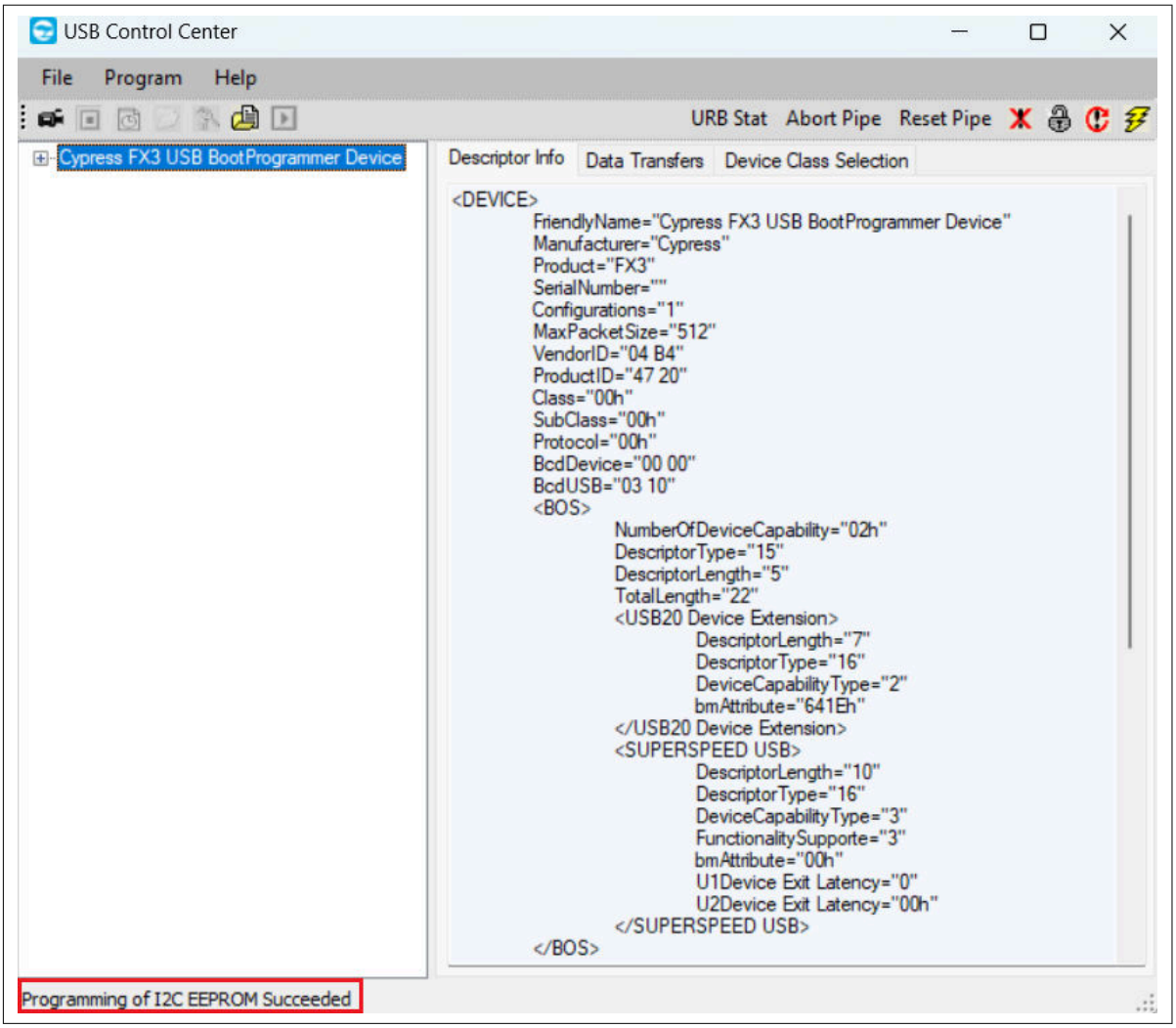

Figure 53 Programing of FX3 is complete

7. If you have connected the X502 jumper on the 6M board, you should see the device **Cypress FX3 USB Boot Programmer Device** listed under the **Universal Serial Bus controllers** tab in the Device Manager, as shown in Figure 54

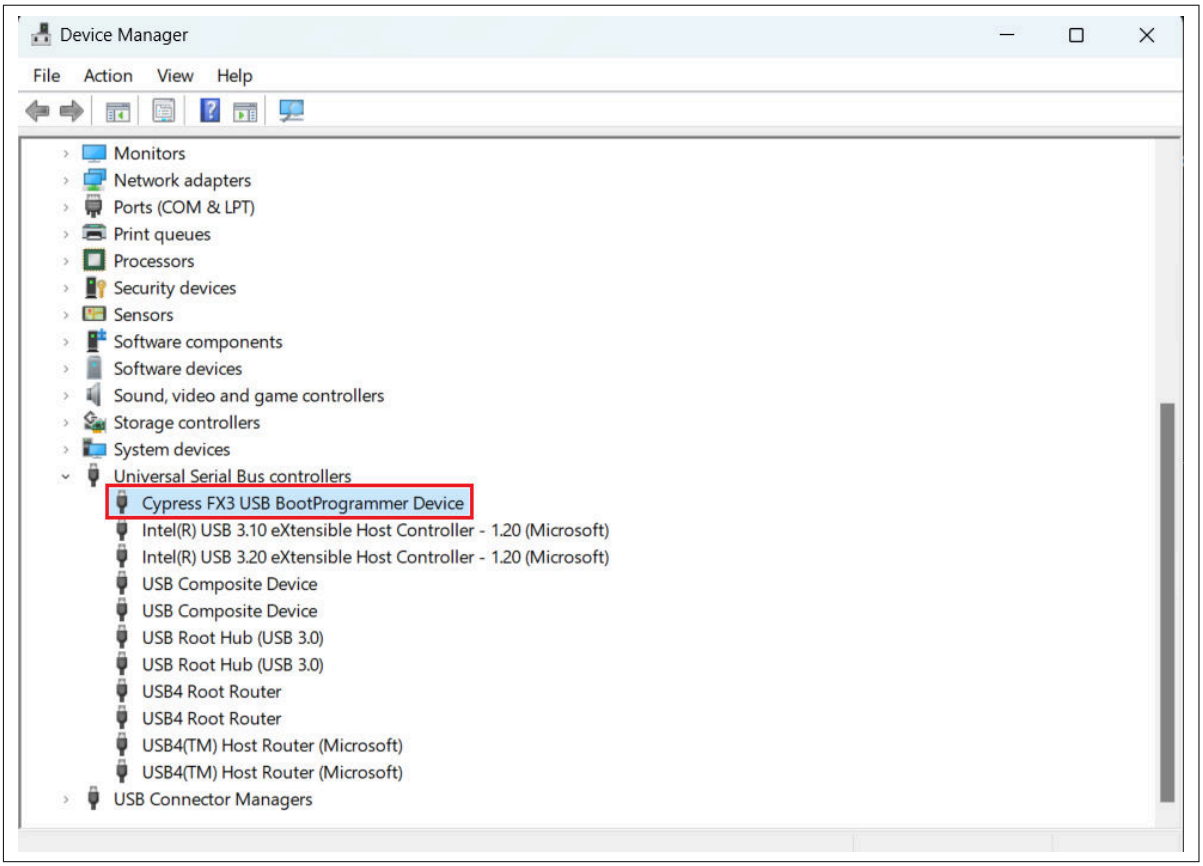

Figure 54 EZ-USB™ FX3 under Universal Serial Bus Controllers

8. If you remove the X502 jumper from your 6M board, note the **FX3** device under **Cameras** in the Device Manager, as shown in Figure 55. Before or after removing the X502 jumper, disconnect and reconnect the power to the 6M kit to see the devices listed under these tabs in the Device Manager

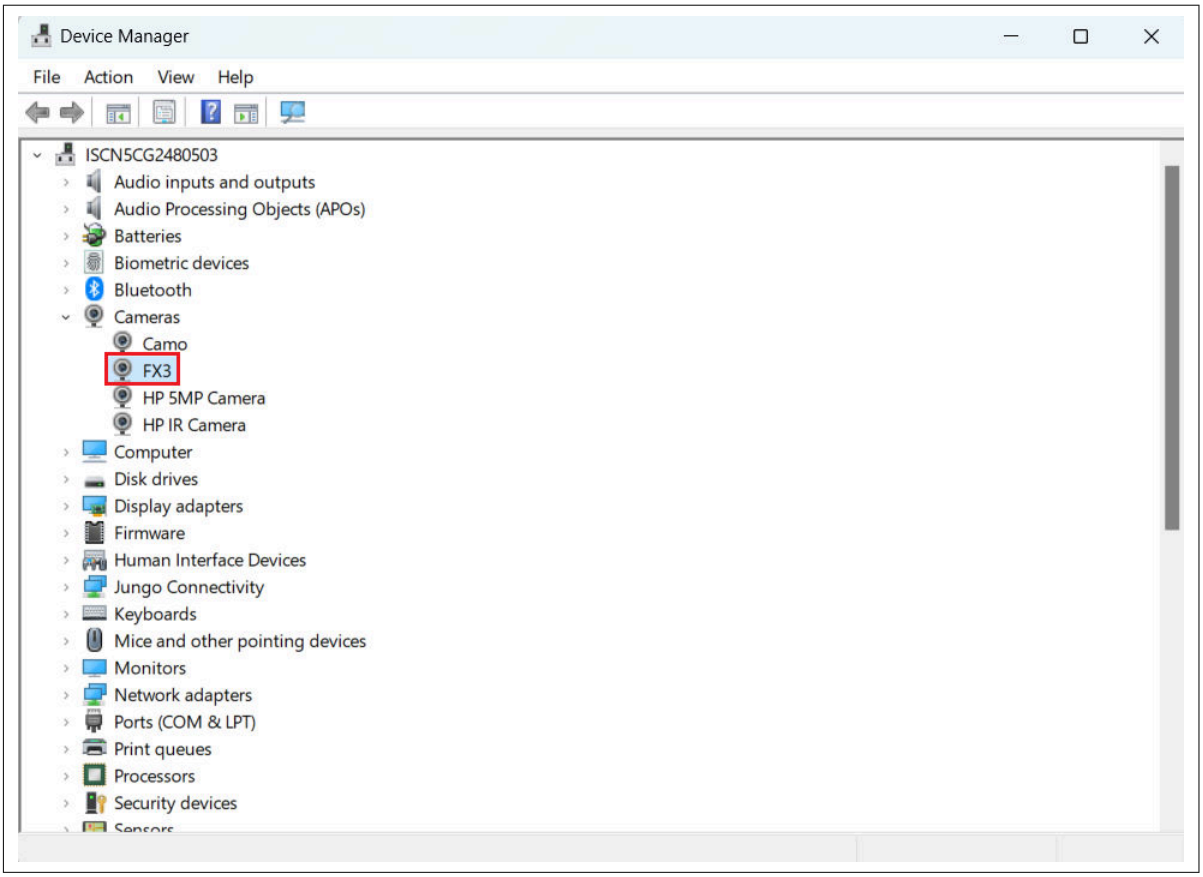

Figure 55 EZ-USB™ FX3 coming under Camera in Device Manager

4.2.2 Python script for streaming with FX3

This section provides a step-by-step guide on how to integrate the Python script for streaming the FX3 device as a camera, including necessary code snippets or references to relevant code files that need to be added or modified.

Points to remember when working with the FX3 device:

- The onboard FX3 acts as a camera when the USB Type-C cable is connected between the kit and the USB 3.0 port of the PC. To ensure a proper connection, FX3 must be listed under 'Cameras' in the Device Manager. If it is not listed, it is recommended to install the latest FX3 drivers
- Any video streaming application or script on the PC can be used to view the output from FX3. However, playback performance may vary depending on the color formats and the application used
- A simple Python-based script is provided below as a sample. The script has been tested on Python 3.11, and it is recommended to use this version of Python

4.2.2.1 One-time setup of the Python script

1. Install Python 3.11 on your PC
2. Install the necessary packages using pip:
   - configparser (v)
   - pygrabber (v)
   - OpenCV-python (v)
3. Create a directory named `FX3_Capture` on the C drive of Windows
4. In this directory, create a file named `FX3_Capture.py`

5. Also, create a text file in this directory named **`FX3_Capture_Config.txt`**
6. Copy the FX3_Capture_Config.txt code into the **`FX3_Capture_Config.txt`** file and save it
7. Copy the complete code mentioned in Python script for FX3 capture to the python file **`FX3_Capture.py`** and save it
8. Open the terminal from this directory and run the command **`Python FX3_Capture.py`**
9. You will see a message pop-up in the terminal asking you to enter the index for FX3 as listed in the **Available capture sources**. Enter the FX3 index number
10. Upon pressing Enter, if the T2G-C-2D-6M MCU is set to the resolution and frame rate as mentioned in **FX3_Capture_Config.txt**, the output will be displayed in a new window on the PC screen
11. If a frame is occasionally missed by the PC, the script will automatically re-open the new window on the PC screen
12. If the new window does not open even after verifying the resolution, press the FX3 reset button (S500) on the Lite Kit. This should allow the FX3 to stream video properly if it is in a hung state

FX3_Capture_Config.txt

```
[Frame_Options]
Frame_Width = 800
Frame_Height = 480
Frame_Rate = 60
Windows = 1
```

4.2.2.2 Python script code for streaming FX3 as a camera

Figure 56 illustrates the process of the Python script for streaming the FX3 as a camera.

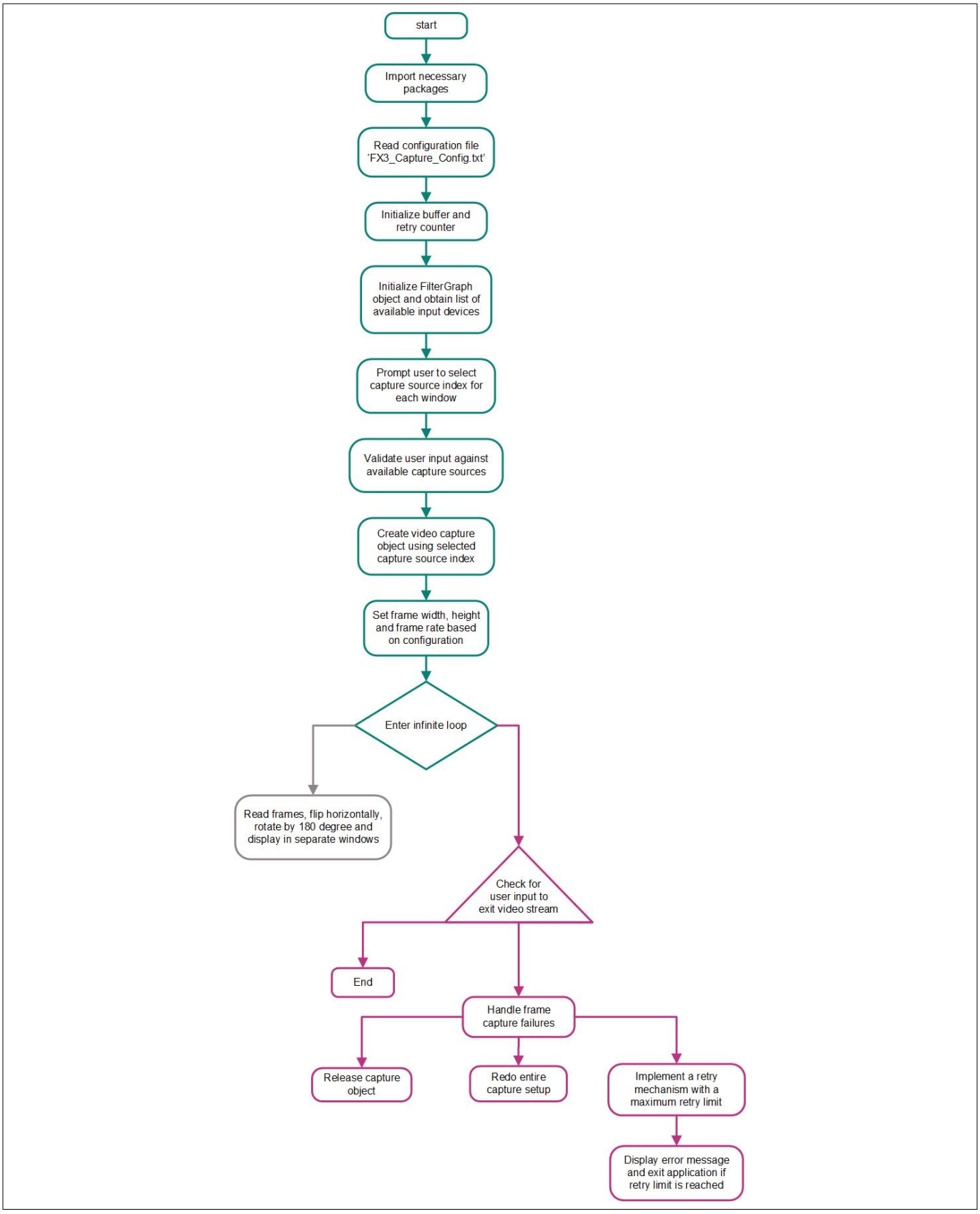

Figure 56 Flowchart of the Python script for FX3

The Python script for FX3 capture code should be copied into the `FX3_Capture.py` file as described above.

Python script for FX3 capture

```
# Import required packages
from configparser import ConfigParser, ExtendedInterpolation
from pygrabber.dshow_graph import FilterGraph
import sys
import cv2
import os
import time

mypath = os.path.dirname(__file__)
os.chdir(mypath) #This is necessary to support script to be run from anywhere

FX3CfgFileObj = ConfigParser(interpolation=ExtendedInterpolation())
FX3CfgFileObj.read('FX3_Capture_Config.txt')

Frame_Width  = FX3CfgFileObj.get('Frame_Options', 'Frame_Width')
Frame_Height = FX3CfgFileObj.get('Frame_Options', 'Frame_Height')
Frame_Rate   = FX3CfgFileObj.get('Frame_Options', 'Frame_Rate')
Windows      = FX3CfgFileObj.get('Frame_Options', 'Windows')
Windows      = int(Windows)

# Creating empty buffers for video data
UsrInput           = [0] * Windows
CaptureSourceIndex = [0] * Windows
CaptureObject      = [0] * Windows
FrameValid         = [0] * Windows
Frame              = [0] * Windows

# Creating a counter to record number of re-tries (in case of stream freeze)
retryCounter = 0

graph = FilterGraph()
CaptureSourceList = graph.get_input_devices()

# Check whether the capture sources are available on the machine
if (len(CaptureSourceList) == 0):
    print("No valid capture sources found. Exiting application...")
    sys.exit()
print("\n\nPython Streaming Application for FX3\n\n")

print("Available capture sources:")
for Index, CaptureSource in enumerate(CaptureSourceList):
    print(Index , " - ", CaptureSource)

for WinNum in range (0, Windows):
    print("\nPlease enter the Capture source index you want to use for stream - ", WinNum)
    UsrInput[WinNum] = input()

for WinNum in range (0, Windows):
    CaptureSourceIndex[WinNum] = int(UsrInput[WinNum])
```

```
# Check whether the capture sources index is out of range
for WinNum in range (0, Windows):

    if CaptureSourceIndex[WinNum] not in range(0, len(CaptureSourceList)):
        print("\n\n Error! Source ", CaptureSourceIndex[WinNum] , " is invalid, Please select a
valid source. Exitting application.\n\n")
        sys.exit()

for WinNum in range (0, Windows):

    # Create the video capture object
    CaptureObject[WinNum] = cv2.VideoCapture(CaptureSourceIndex[WinNum] + cv2.CAP_ANY )
    #Set the Frame Width
    CaptureObject[WinNum].set(cv2.CAP_PROP_FRAME_WIDTH, int(Frame_Width))
    #Set the Frame Height
    CaptureObject[WinNum].set(cv2.CAP_PROP_FRAME_HEIGHT, int(Frame_Height))
    #Set the Frame rate
    CaptureObject[WinNum].set(cv2.CAP_PROP_FPS, int(Frame_Rate))

    print("\nPress any key on the video window to exit the application")

# Display the received frames in an infinite loop
while (True):

    for WinNum in range (0, Windows):
        FrameValid[WinNum], Frame[WinNum] = CaptureObject[WinNum].read()
        #Flip the frame horizontally
        Frame[WinNum] = cv2.flip(Frame[WinNum],1)
        #Rotate the frame by 180degrees
        Frame[WinNum] = cv2.rotate(Frame[WinNum], cv2.ROTATE_180)

        StreamName = "Live Stream" + str(WinNum)

        if FrameValid[WinNum]:
            cv2.imshow(StreamName, Frame[WinNum])
            retryCounter = 0        # Reset the counter

            #User input to press any to exit the video stream
            UserInput = cv2.waitKey(1)
            if UserInput > 0:
                print("\nKey press detected. \n")
                CaptureObject[WinNum].release()
                cv2.destroyAllWindows()
                print("\nStream closed. \n")
                sys.exit()
                break
        else:
            retryCounter = retryCounter + 1
            print("\nFrame capture failed. Retry...",retryCounter,"\n")
            CaptureObject[WinNum].release()
            cv2.destroyAllWindows()

            # Redo the entire capture setup
```

```
            CaptureObject[WinNum] = cv2.VideoCapture(CaptureSourceIndex[WinNum] + cv2.CAP_ANY
)
            CaptureObject[WinNum].set(cv2.CAP_PROP_FRAME_WIDTH, int(Frame_Width))
            CaptureObject[WinNum].set(cv2.CAP_PROP_FRAME_HEIGHT, int(Frame_Height))
            CaptureObject[WinNum].set(cv2.CAP_PROP_FPS, int(Frame_Rate))
            time.sleep(0.1)

            if (retryCounter > 10):
                print("\nAll retry attempts failed. Check input stream.\n")
                CaptureObject[WinNum].release()
                cv2.destroyAllWindows()
                sys.exit()
```

5 Schematic and board designs

5.1 Board images

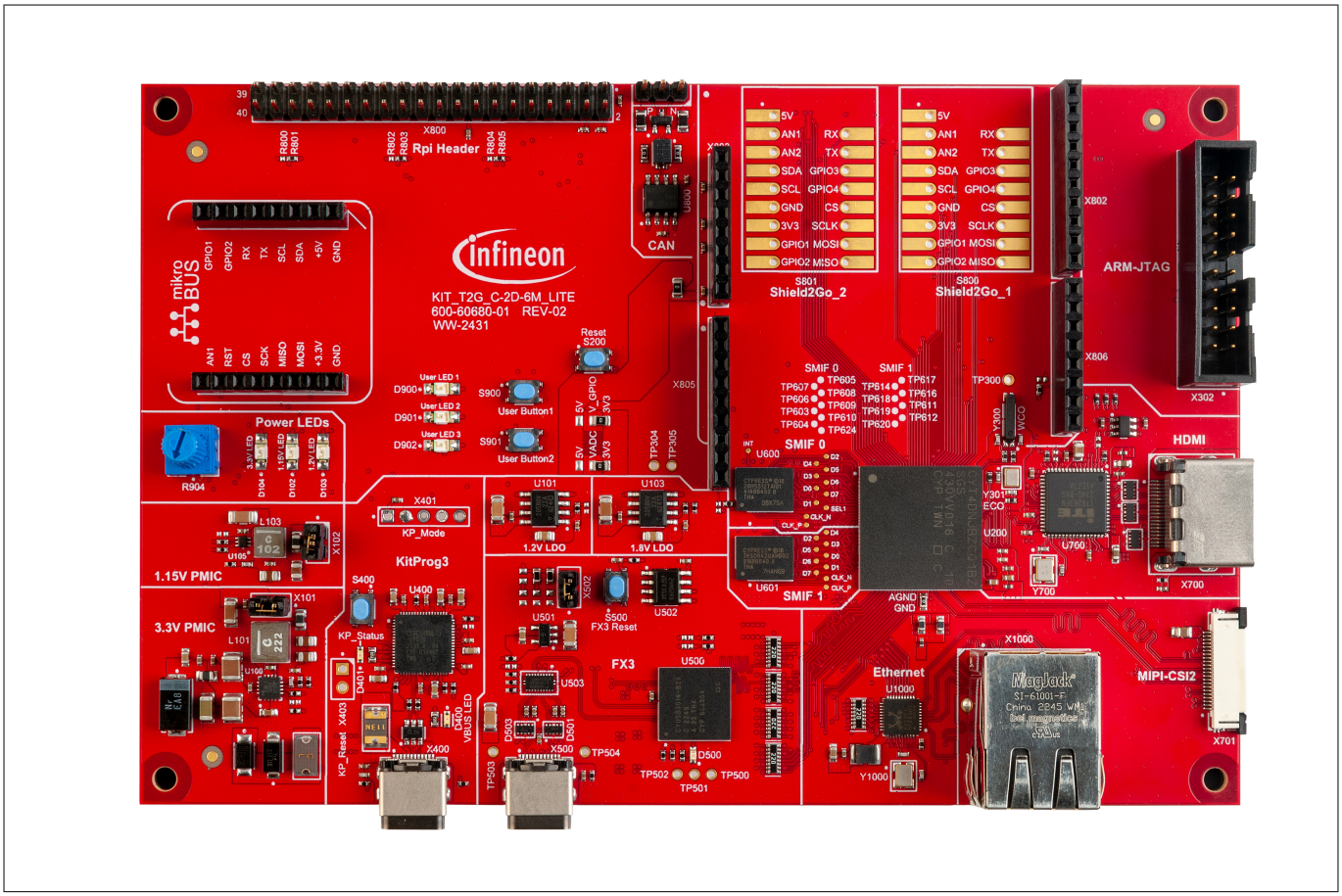

Figure 57 Top view of the Cluster 6M Lite Kit

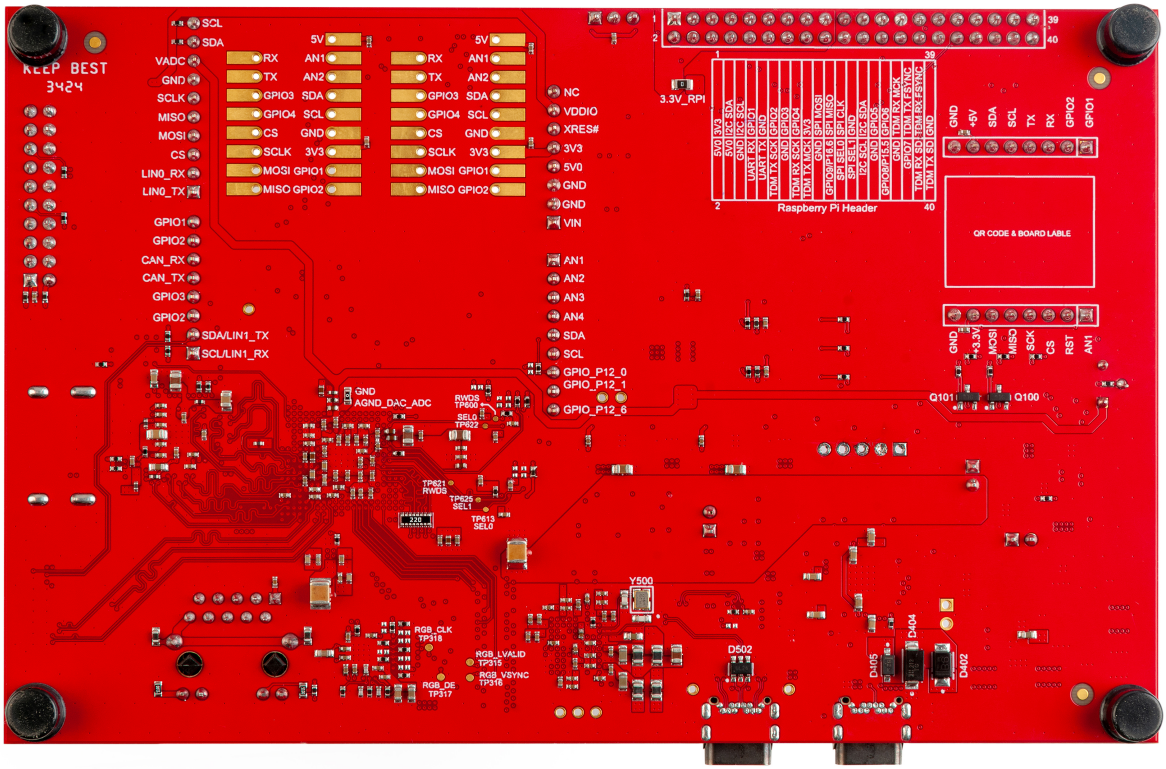

Figure 58 Bottom view of the Cluster 6M Lite Kit

5.2 Schematics

The schematics for the TRAVEO™ T2G Cluster 6M Lite Kit is documented in this section.

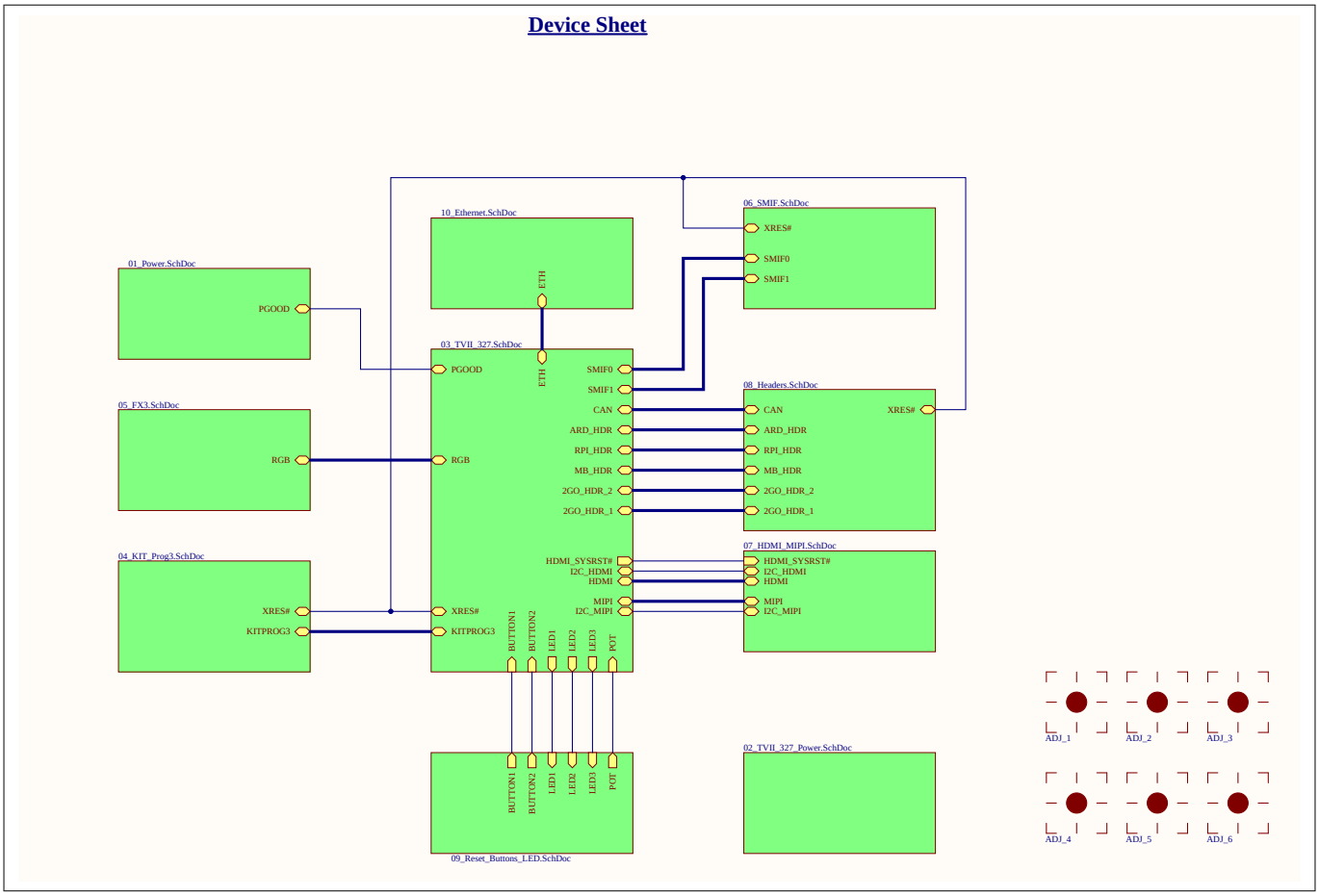

Figure 59 Overview schematic

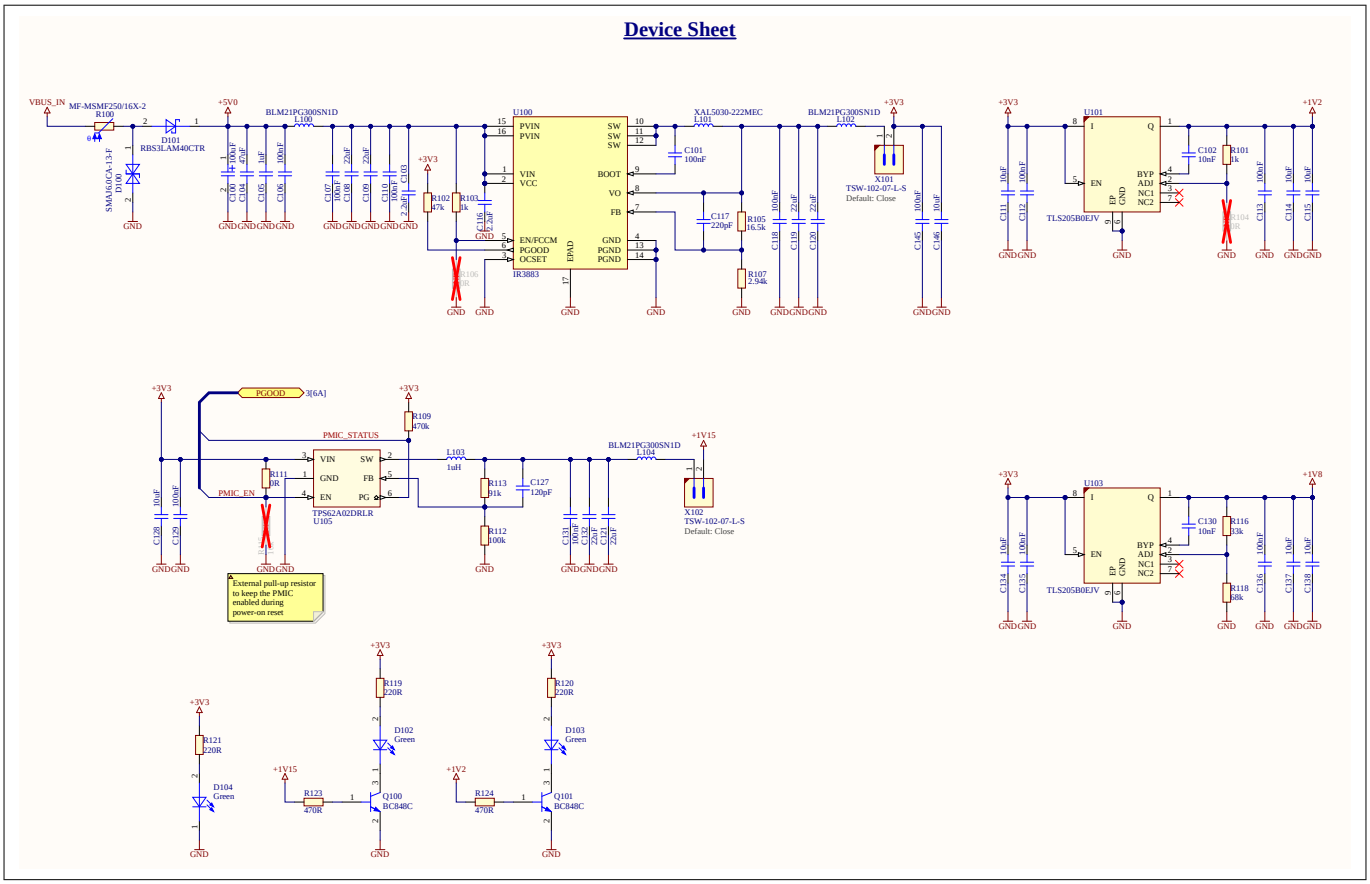

Figure 60 Board power schematic

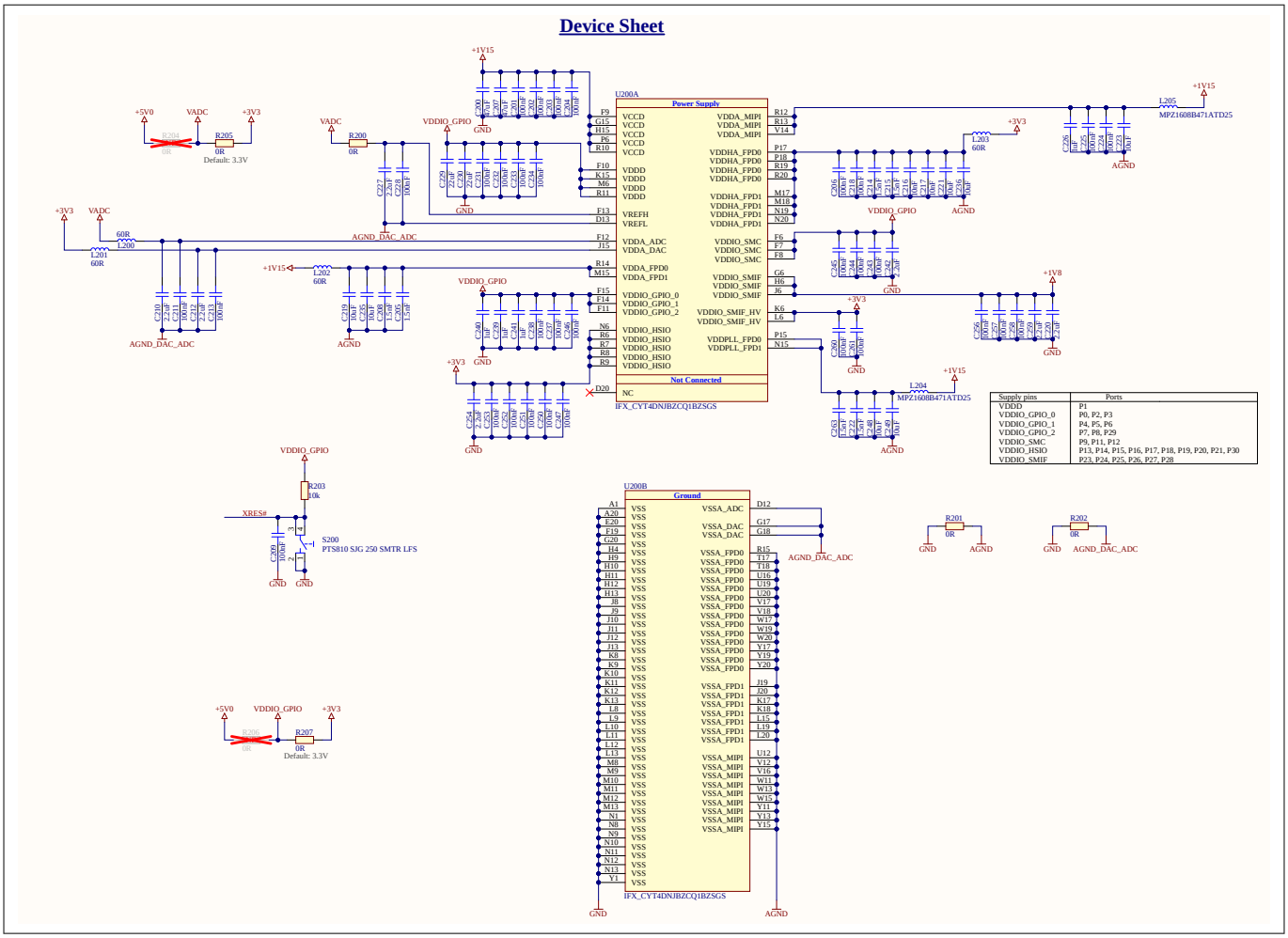

Figure 61 TVII-272 MCU power schematic

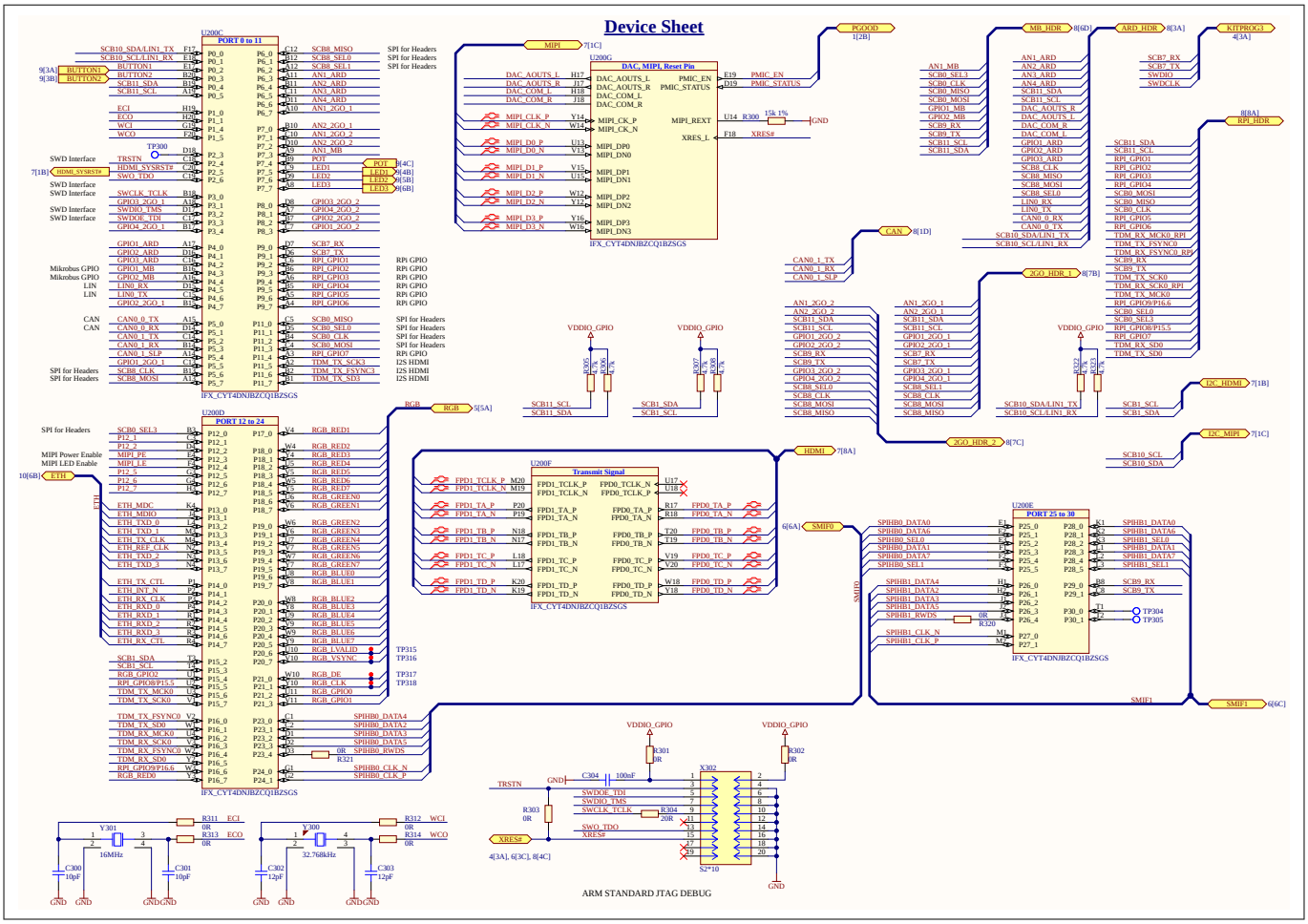

Figure 62 TVII-272 MCU schematic

5 Schematic and board designs

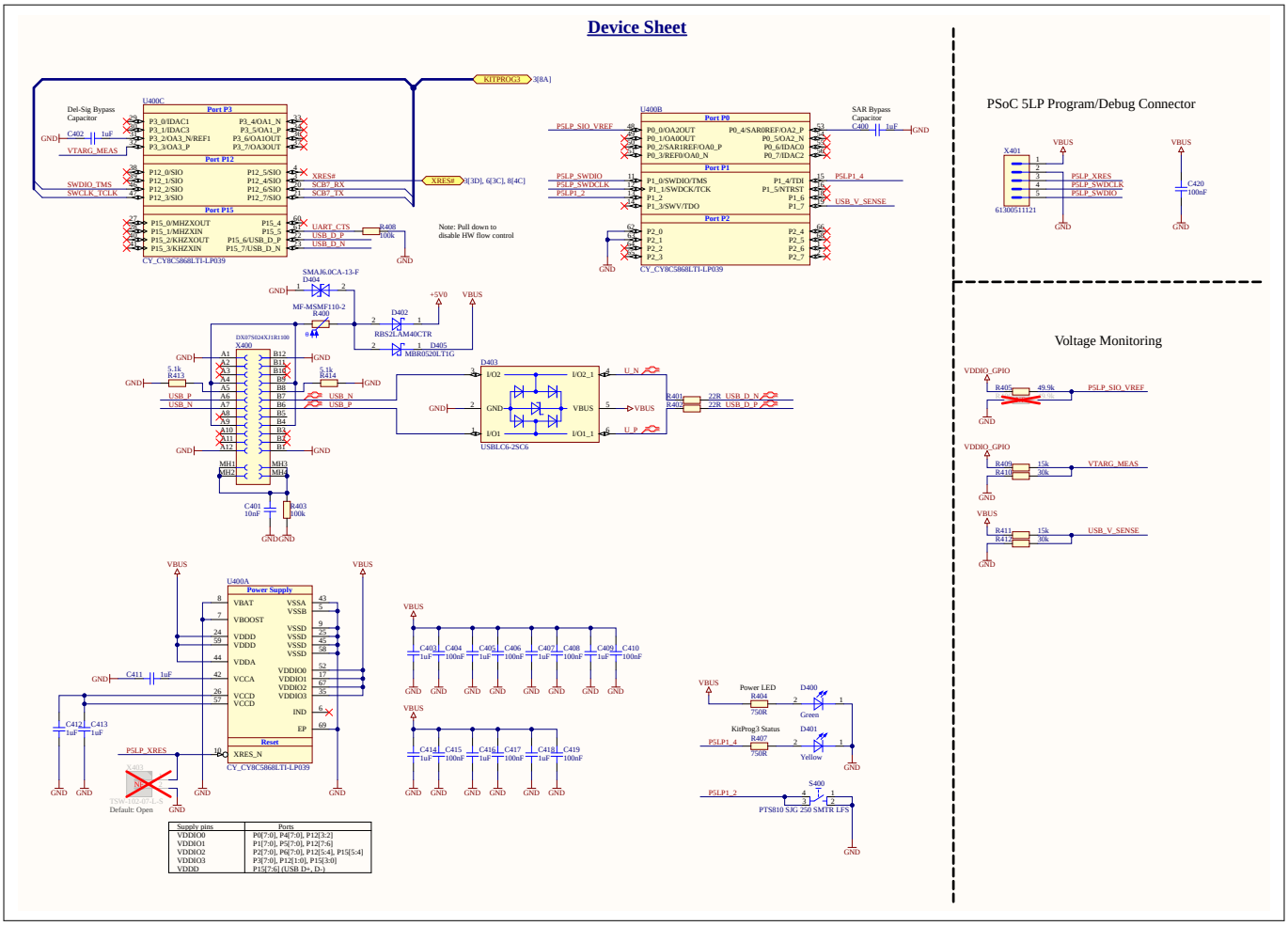

Figure 63 KitProg3 schematic

5 Schematic and board designs

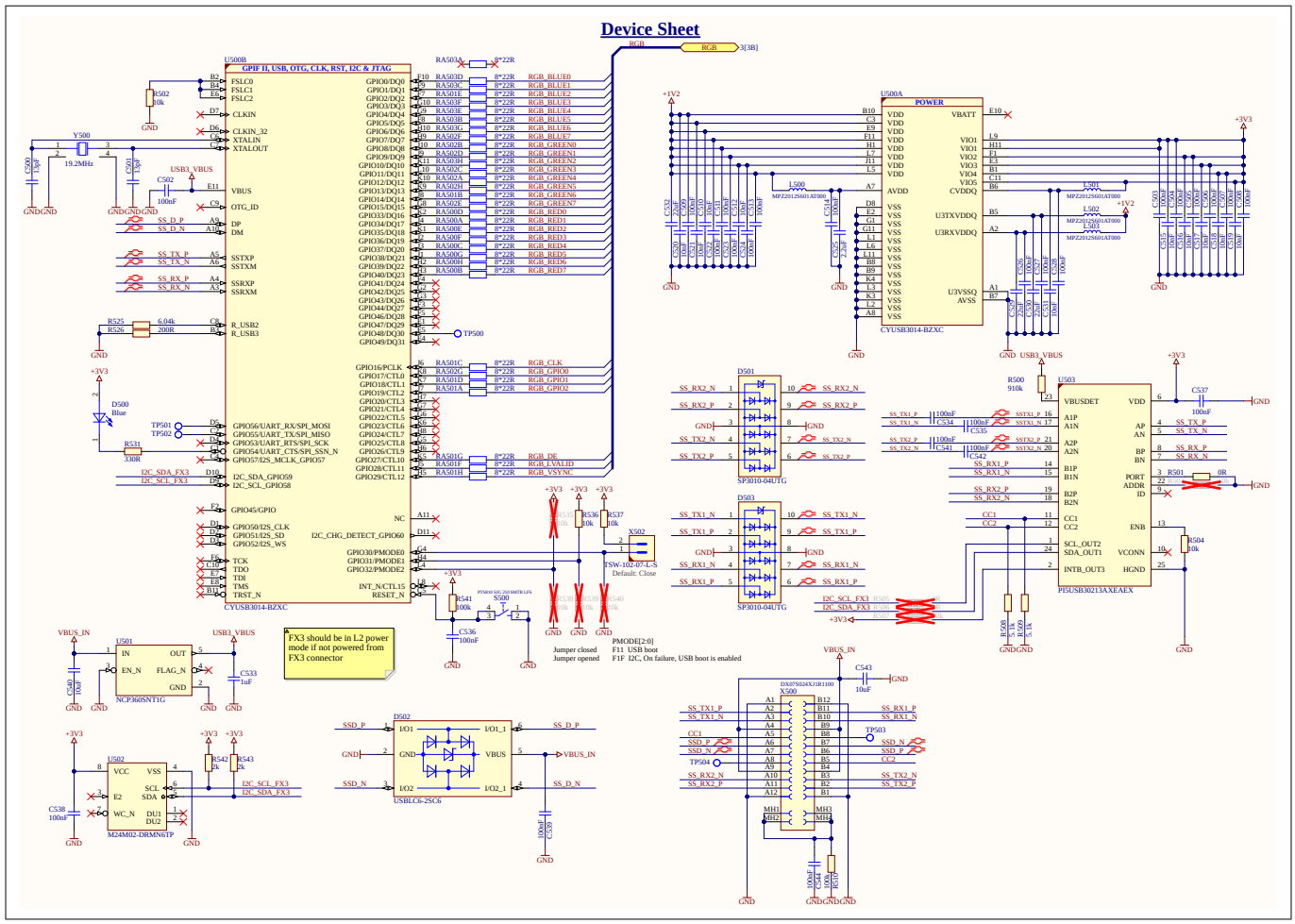

Figure 64 FX3 schematic

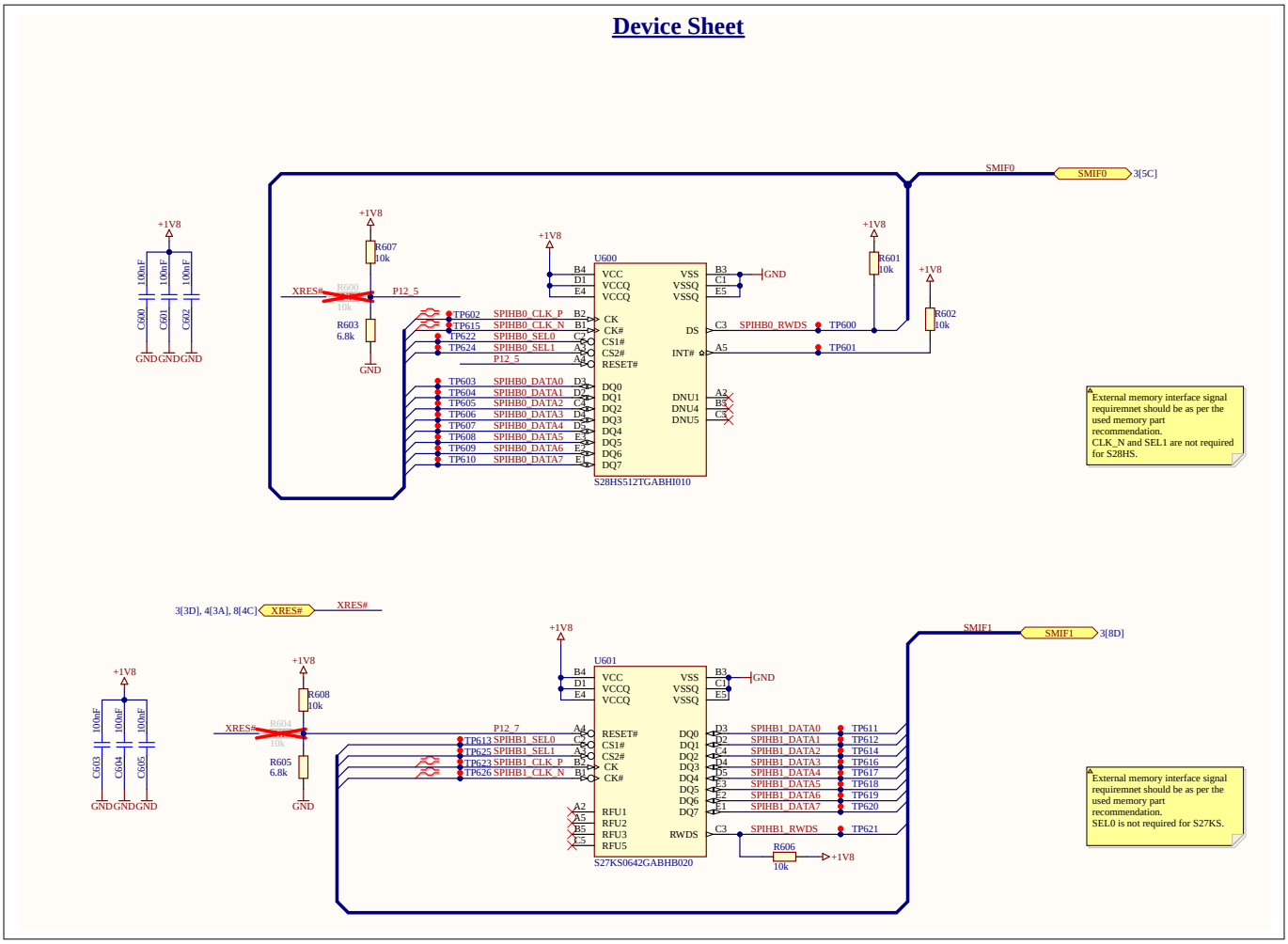

Figure 65 Serial memory interface schematic

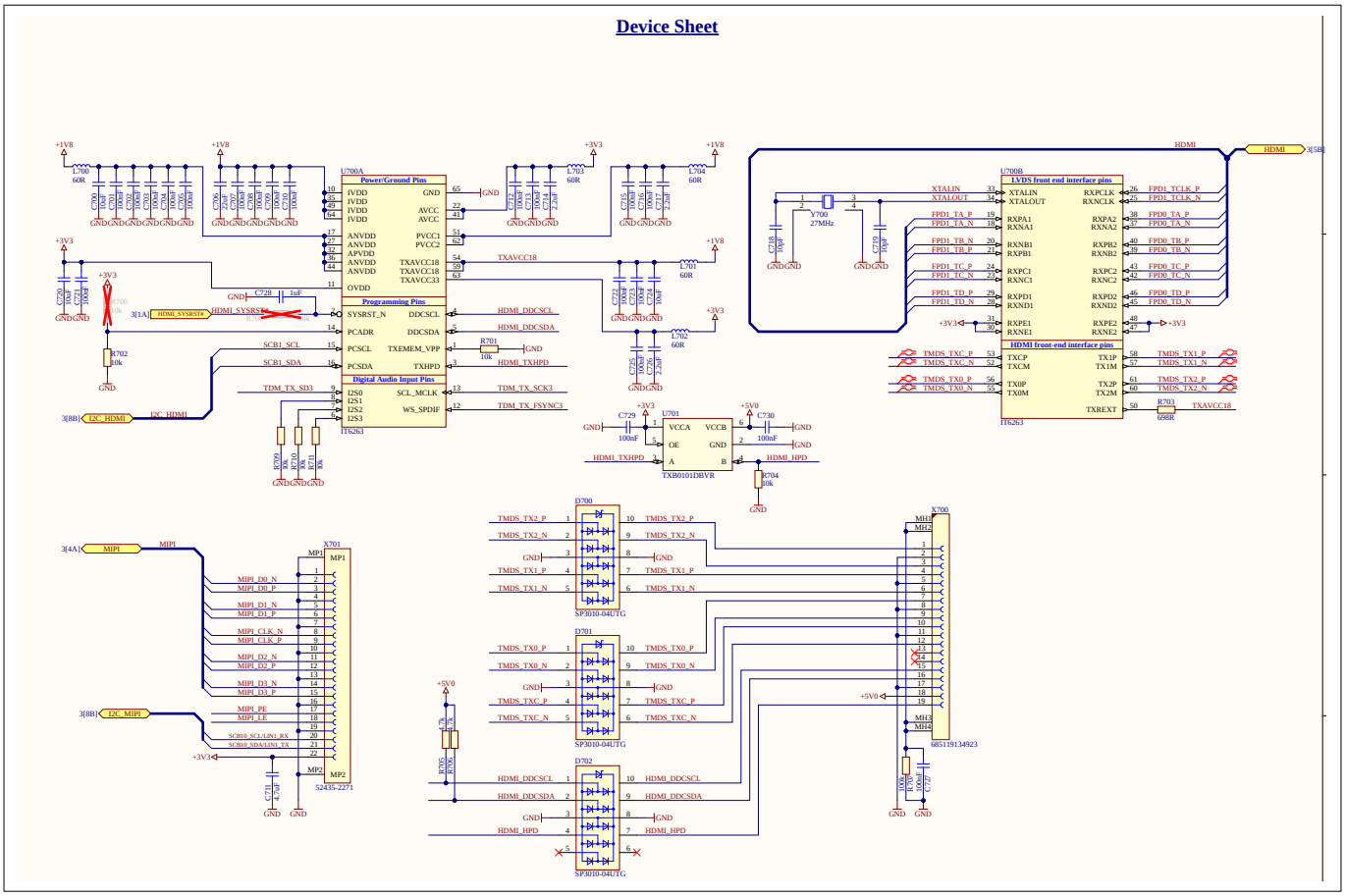

Figure 66 LVDS and MIPI schematic

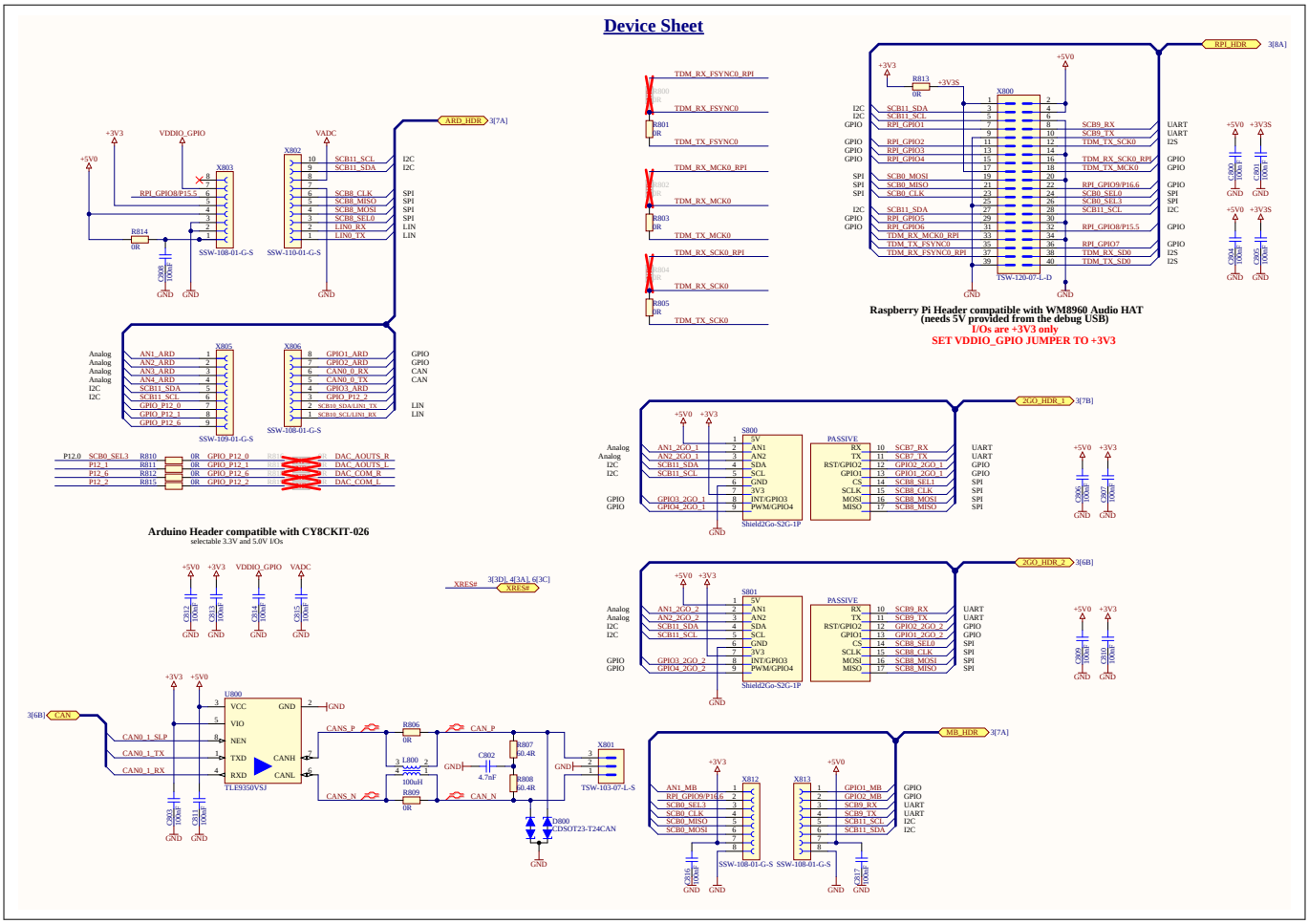

Figure 67 Schematic of the I/O headers

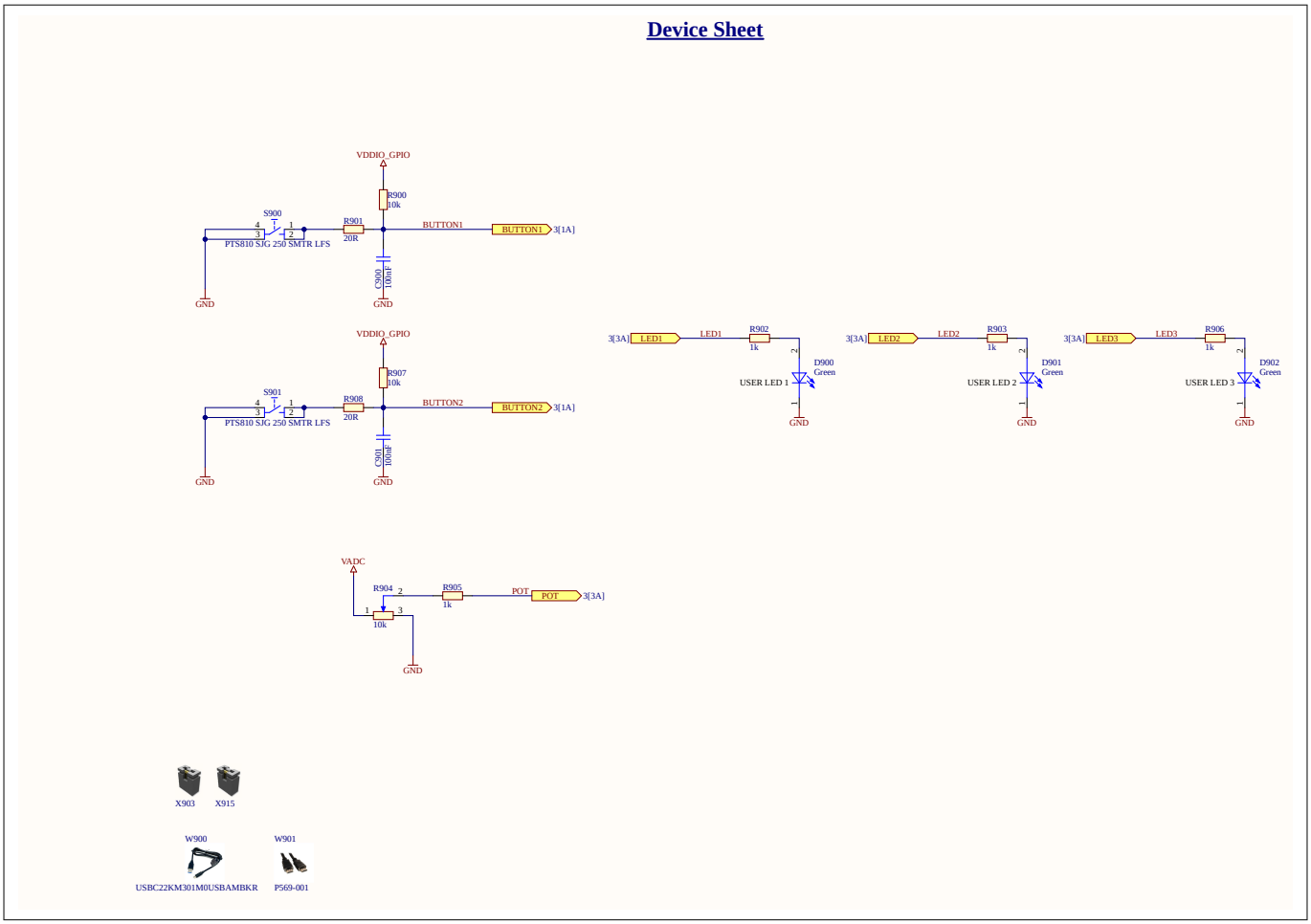

Figure 68 Reset button, LEDs, and potentiometer schematic

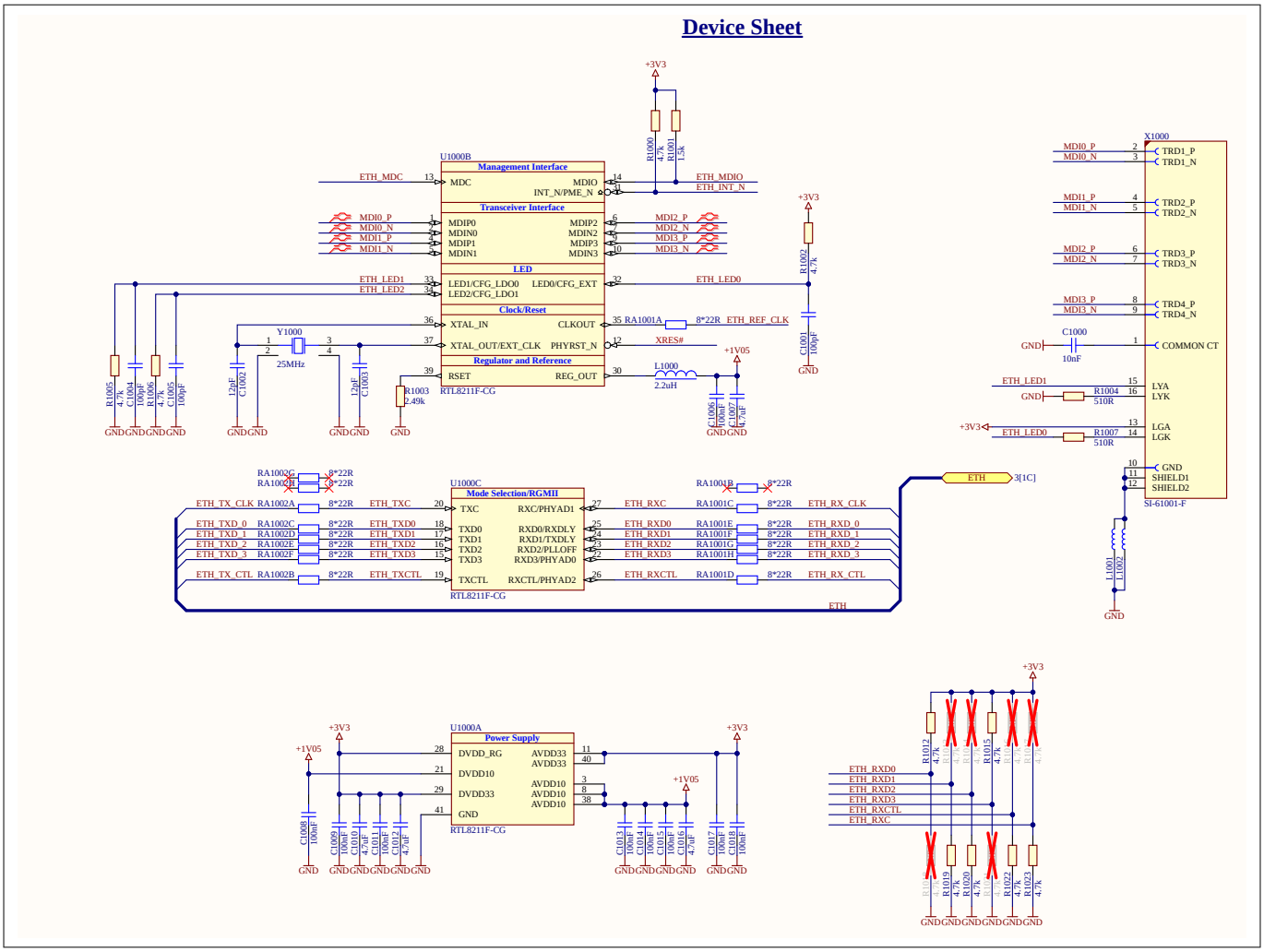

Figure 69 Schematic of the Reset button, LEDs, and potentiometer

5.3 Assembly drawings

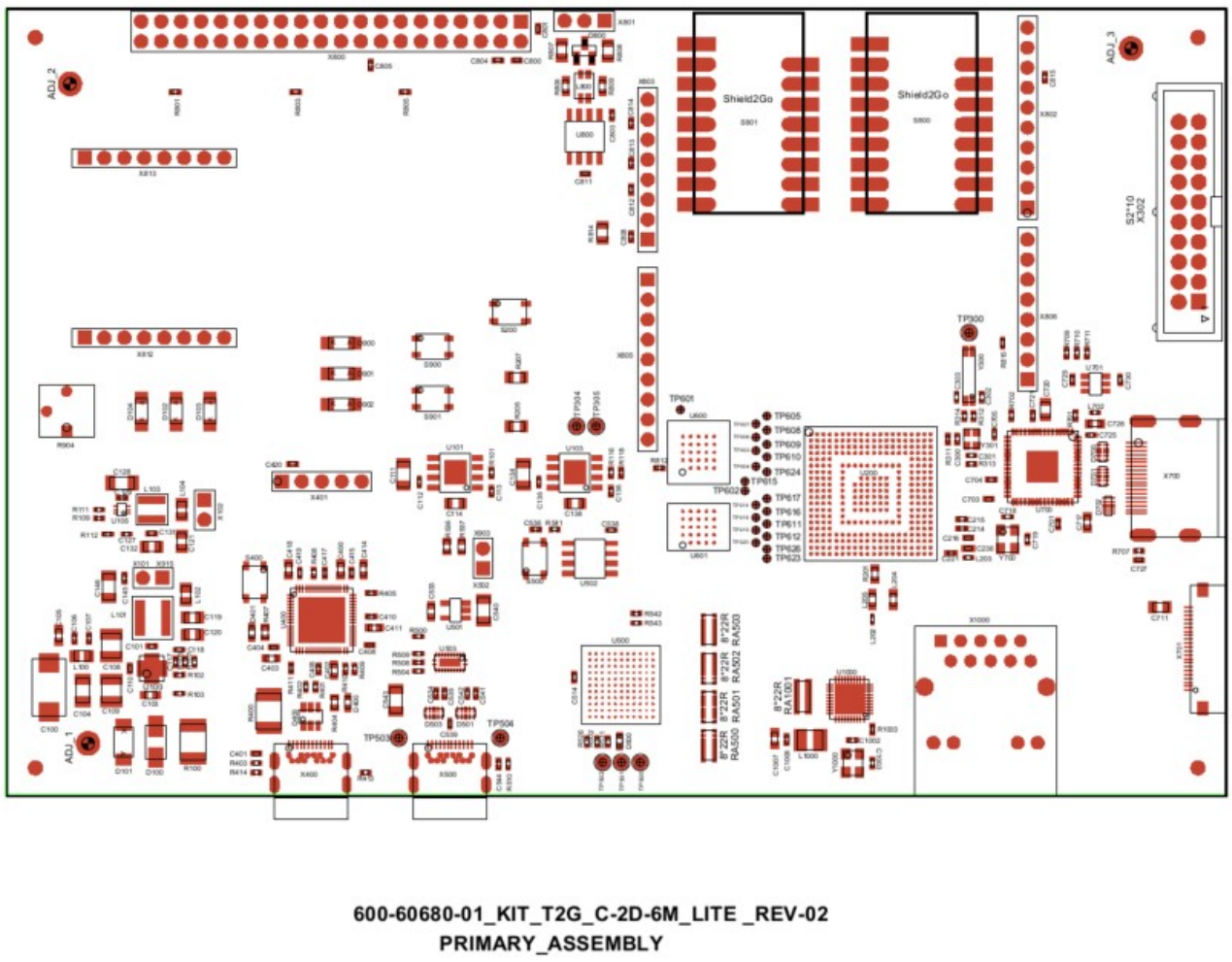

Figure 70 Primary assembly drawing of the Cluster 6M Lite Kit

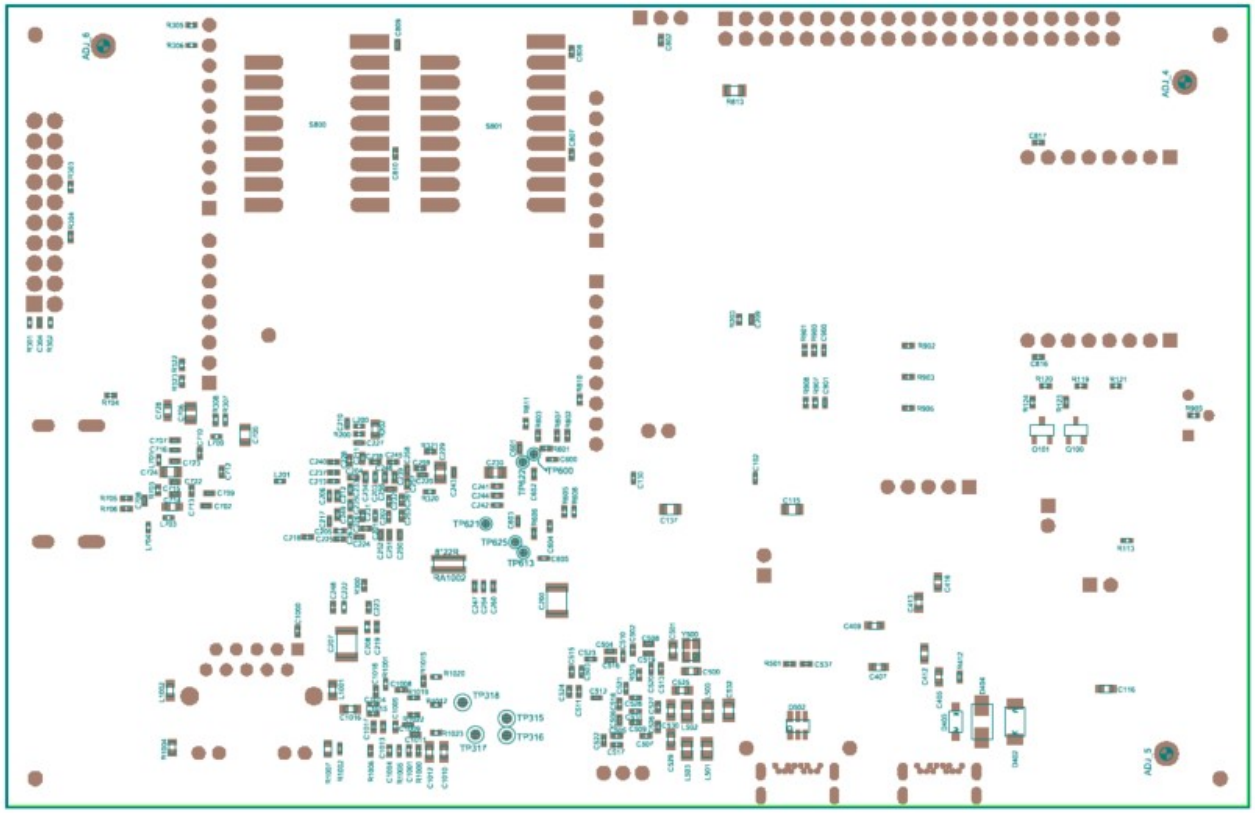

Figure 71 **Secondary assembly drawing of the Cluster 6M Lite Kit**

5.4 Bill of materials

The complete bill of materials is available in the download section of the Infineon homepage. A log-in is required to download this material.

Table 14 **An example of the bill of materials (BOM) for the most important or critical parts of the evaluation or reference board**

S No.	Reference designator	Item name	Description
1		Printed circuit assembly	ASSY, PCBA, KIT_T2G_C-2D-6M_LITE
2	U501	Miscellaneous	IC, USB, POSITIVE OVER VOLTAGE/CURRENT PROTECTION, 5PIN, TSOP
3	U502	EEPROM	EEPROM, IC, 2MBIT, 1MHZ, 8PIN, SOIC
4	D403, D502	Miscellaneous	IC, ESD, 6V, 2LINE, 6PIN, SOT-23
5	U601	Cypress	IC, INFINEON, PSRAM, 3.0 V, 66 Mbit, 166 MHz, FBGA24

(table continues...)

Table 14 (continued) An example of the bill of materials (BOM) for the most important or critical parts of the evaluation or reference board

S No.	Reference designator	Item name	Description
6	U503	Miscellaneous	Type-C Dual Role Port Controller with USB3.1 Gen1.5 Gbps Mux
7	U700	Miscellaneous	IC, LVDS to HDMI converter, 64QFN
8	U105	Regulator, switching	IC, REG, BUCK, 2A, SOT563
9	R403,R408,R510,R541,R707	Fixed resistor	RES, 100K OHM, 1%, 100PPM, 1/16W, 0402
10	R525	Fixed resistor	RES, 6.04K OHM, 1%, 100PPM, 1/10W, 0402, SMD
11	R401,R402, R708	Fixed resistor	RES, 22 OHM, 1%, 100PPM, 1/16W, 0402
12	R405	Resistor	RES, 49.9K OHM, 1%, 100PPM, 1/16W, 0402, SMD
13	R101,R905	Resistor	RES, 1K OHM, 1%, 100PPM, 1/16W, 0402, SMD
14	R113	Fixed resistor	RES, 91K OHM, 1%, 100PPM, 1/16W, 0402, SMD
15	R201,R202	Resistor	RES, 0.0 OHM, 1/8W, 0603, SMD
16	R305,R306, R307, R308, R322, R323, R705, R706, R1000, R1002, R1005, R1006, R1012, R1015, R1019, R1020, R1022, R1023	Resistor	RES, 4.7K OHM, 1%, 100PPM, 1/10W, 0402, SMD
17	R536,R537	Resistor	RES, 10K OHM, 1%, 100PPM, 1/10W, 0603, SMD
18	R200, R301, R302, R303, R311, R312, R313, R314, R320, R321, R501, R801, R803, R805, R810, R811, R812	Resistor	RES, 0.0 OHM, 1%, 1/16W, 0402, SMD
19	R526	Resistor	RES, 200 OHM, 1%, 1/10W, 0402, SMD
20	R531	Resistor	RES, 330 OHM, 1%, 1/16W, 0402, SMD
21	R123,R124	Resistor	RES, 470 OHM, 1%, 1/10W, 0402, SMD
22	R116	Resistor	RES, 33K OHM, 1%, 0402, 1/16W
23	R410,R412	Resistor	RES, 30K OHM, 1%, 1/16W, 0402, SMD
24	R413, R414, R508,R509	Resistor	RES, 5.1K OHM, 1%, 1/16W, 0402, SMD
25	R300,R409,R411	Resistor	RES, 15K OHM, 1%, 1/16W, 0402, SMD
26	R304,R901, R908	Resistor	RES, CHIP, 20 OHM, 5%, 1/16W, 0402
27	R119, R120, R121	Resistor	RES, 220 OHM, 1%, 1/10W, 0402, SMD
28	R102	Resistor	RES, 47K OHM, 1%, 1/16W, 0402, SMD
29	R118	Resistor	RES, 68K OHM, 1%, 1/16W, 0402, SMD

(table continues...)

Table 14 (continued) An example of the bill of materials (BOM) for the most important or critical parts of the evaluation or reference board

S No.	Reference designator	Item name	Description
30	R105	Resistor	RES, 16.5K OHM, 1%, 1/16W, 0402
31	R107	Resistor	RES, 2.94K OHM, 1%, 1/16W, 0402
32	R500	Resistor	RES, 910K OHM, 1%, 1/16W, 0402
33	R542,R543	Resistor	RES, 2K OHM, 1%, 1/16W, 0402, SMD
34			
35	R404, R407	Fixed resistor	RES, 750 OHM, 1%,100PPM, 1/10W, 0603, SMD
36	R904	VARIABLE RESISTOR	RES, TRIMMER, 10K OHM, 0.5W, PC PIN, TOP
37	R115, R203, R502, R504, R600, R601, R602, R604, R606, R701, R702, R704, R900, R907	Resistor	RES, 10K OHM, 1%, 100PPM, 1/16W, 0402, SMD-AUTO
38	RA500, RA501, RA502, RA503, RA1001, RA1002	Resistor array	RES, ARRAY 8, 22 OHM, 5%, 1/16W, 1606
39	C116, C525, C714, C717, C726	Ceramic capacitor	CAP, CER, 2.2uF, 10%, 16V, X5R, 0603
40	C200, C207	Ceramic capacitor	CAP, CER, 47uF, 10%, 6.3V, X7R, 1210
41	C105,C400, C402, C403, C405, C407, C409, C411, C412, C413, C414, C416, C418, C533, C728	Ceramic capacitor	CAP, CER, 1uF, 10%, X7R, 25V, 0603
42	C102, C130, C216, C217, C401, C510, C512, C515, C516, C517, C518, C519, C520, C521, C531, C1000	Ceramic capacitor	CAP, CER, 10nF, 10%, X7R, 50V, 0402
43	C119, C120, C121, C132, C229, C230, C532	Ceramic capacitor	CAP, CER, 22uF, 20%, 16V, X5R, 0805
44	C103	Ceramic capacitor	CAP, CER, 2.2uF, 10%, 25V, X5R, 0603
45	C711	Ceramic capacitor	CAP, CER, 4.7UF, 20%, 16V, X5R, 0805
46	C108,C109	Ceramic capacitor	CAP, CER, 22UF, 10%, X7R, 16V, 1210
47	C104	Ceramic capacitor	CAP, CER, 47UF, 20%, X5R, 16V, 1206
48	C117	Ceramic capacitor	CAP, CER, 220PF, 5%, 50V, 0402
49	C302,C303	Ceramic capacitor	CAP, CER, 12PF, 5%, C0G, 50V, 0402
50	C300,C301, C718, C719	Ceramic capacitor	CAP, CER, 10PF, 5%, C0G, 50V, 0402
51	C111,C128,C134,C146,C540,C543	Ceramic capacitor	CAP, CER, 10UF, 20%, X7R, 16V, 1206
52	C500,C501	Ceramic capacitor	CAP, CER, 13PF, 2%, C0G/NP0, 50V, 0603
53	C529,C530	Ceramic capacitor	CAP, CER, 22UF, 20%, X5R, 16V, 0603
54	C100	TANTALUM	CAP, TANT POLY, 100uF, 20%, 25V, SMD

(table continues...)

Table 14 (continued) An example of the bill of materials (BOM) for the most important or critical parts of the evaluation or reference board

S No.	Reference designator	Item name	Description
55	C127	Ceramic capacitor	CAP, CER, 120pF, 5%, C0G/NP0, 50V, 0402
56	C101, C106, C107, C110, C112, C113, C118, C129, C131, C135, C136, C145, C201, C202, C203, C204, C206, C209, C211, C213, C218, C224, C225, C228, C231, C232, C233, C234, C237, C238, C243, C244, C245, C246, C247, C250, C251, C252, C253, C256, C257, C258, C260, C261, C304, C404, C406, C408, C410, C415, C417, C419, C420, C502, C503, C504, C505, C506, C507, C508, C509, C511, C513, C514, C522, C523, C524, C526, C527, C528, C534, C535, C536, C537, C538, C539, C541, C542, C544, C600, C601, C602, C603, C604, C605, C701, C702, C703, C704, C705, C707, C708, C709, C710, C712, C713, C715, C716, C721, C722, C723, C725, C727, C729, C730, C800, C801, C804, C805, C806, C807, C808, C809, C810, C812, C813, C814, C815, C816, C817, C900, C901, C1006, C1008, C1009, C1011, C1013, C1014, C1015, C1017, C1018	Ceramic capacitor	CAP, CER, 100nF, 10%, X7R, 50V, 0402
57	C114, C115, C137, C138, C700, C706, C724	Ceramic capacitor	CAP, CER, 10UF, 10%, 10V, X7R, 0805, SMD
58	L200, L201, L202, L203, L700, L701, L702, L703, L704	FERRITE BEAD INDUCTOR	IND, FERRITE, 60 OHM, 1.7A, 0402
59	L100, L102, L104	FERRITE BEAD INDUCTOR	FERRITE, BEAD, 30 OHM, 0805, 1LN
60	L500, L501, L502, L503	FERRITE BEAD INDUCTOR	IND, FERRITE BEAD, 600 OHM, 0805, 1LN
61	L101	Inductor	IND, SHLD, 2.2uH, 20%, 9.2A, 2221
62	L103	Inductor	IND, SHLD, 2.2uH, 20%, 5.5A, 1616
63	D501, D503, D700, D701, D702	TVS diode	DIO, TVS ARRAY, ESD, 4CH, .45PF, 8KV, UDFN
64	D101	TVS diode	DIO, TVS DIODE, 12V, 19.9V, DO214AC
65	Q100,Q101	Transistor	TRANS, BIPOLAR, NPN, 30V, 0.1A, SMT, SOT-23-3
66	D102, D103, D104, D900, D901, D902	LED	LED, GREEN, CLEAR, 1206, SMD
67	D400	LED	LED, 573nm, GREEN, RECT, CLEAR, 0603

(table continues...)

Table 14 (continued) An example of the bill of materials (BOM) for the most important or critical parts of the evaluation or reference board

S No.	Reference designator	Item name	Description
68	D500	LED	LED, BLUE, CLEAR, 468nm, 3.3V, 0603
69	Y500	Crystal	CRYSTAL, 19.2MHZ, 13PF, SMD
70	Y300	Crystal	CRYSTAL, 32.7680 KHZ, 12.5PF, SMD
71	Y301	Crystal	CRYSTAL, 16.0000MHZ, 10PF, SMD
72		Printed Circuit Board	PCB, BARE, KIT_T2G_C-2D-6M_LITE
73		Fabrication Drawing	DRW, FABRICATION DRAWING, KIT_T2G_C-2D-6M_LITE
74		Assembly Drawing	DRW, ASSEMBLY DRAWING, KIT_T2G_C-2D-6M-LITE
75		Schematic Drawing	DRW, SCHEMATIC DRAWING, KIT_T2G_C-2D-6M_LITE
76		General Hardware	HW, BUMPER, BLACK, .312" X.200", CYLINDRICAL
77	X803, X806, X812, X813	Header	HDR, CONN, HEADER, FEMALE, 2.56Mm, 8POS, GOLD, TH
78	X802	Header	HDR, CONN, HEADER, FEMALE, 2.56Mm, 10POS, GOLD, TH
79	X101, X102, X403, X502, X808	Header	HDR, CONN, HEADER, MALE, SINGLE, 2.54Mm, 2POS, STRAIGHT, GOLD, TH
80	X805	Header	CONN, HEADER, 9POS, 2.54Mm, GOLD, T/H
81	X400, X500	Connector	CONN, RCPT, USB C, TOP, MNT, HYBRID
82	X302	Connector	CONN, HDR, SHROUDED, 2X10 PIN, PTH
83	X903, X908, X913, X914, X915	Connector	CONN, JUMPER, SHORTING, .100", GOLD
84	X700	Connector	CONN, HDMI Horizontal SMT, Female, 19 Contacts, 0.5mm Pitch
85	X701	Connector	CONN, SOCKET, 0.5 FPC Conn ZIF, SMT
86	X801	Socket	CONN SOCKET, Dual Angled,2.54Mm,20POS
87	S200, S400, S500, S900, S901	Tact Switch	SW, TACTILE SWITCH, SPST-NO, 0.05A, 16V
88		Label	LBL, PCA Label, Vendor Code, Date code, Serial Number (YYWWVVXXXXX)
89	U400	Microcontroller	IC, CYPRESS, MCU, PSOC™ 5LP, 32-bit MCU, 67 MHz, 1.8 V-5.5 V, 68-QFN
90	U200	CY_MCU	IC, CYPRESS, MCU TRAVEO™ II, Cluster, 6M-216TQFP
91	U500	Miscellaneous	IC, CYPRESS, FX3, 121, BGA

(table continues...)

Table 14 (continued) An example of the bill of materials (BOM) for the most important or critical parts of the evaluation or reference board

S No.	Reference designator	Item name	Description
92	U100	Regulator, Switching	IC, IFX, REG, BUCK, 800KHz, 2.5V-14V, 0.5V-6V, 3A, 16-QFN
93	U600	Cypress parts	IC, IFX, SEMPER™ FLASH, 3.0 V, 512 Mbit, 166 MHz, FBGA 6 x 8 mm
94	U101, U103	Cypress parts	IC, INFINEON, REG, LIN POS, ADJ, 500MA

5.5 Pin details

This section provides information about the primary onboard functionalities of the TRAVEO™ T2G C-2D MCU pins on the Lite Kit and where these pins are routed, as shown in Table 15.

Table 15 MCU pin details

Pin	Net	RefDes
XRES	XRES	-
P0[0]	SCB10_SDA/LIN1_TX	-
P0[1]	SCB10_SCL/LIN1_RX	-
P0[2]	BUTTON1	USER BUTTON1 (S900)
P0[3]	BUTTON2	USER BUTTON2 (S901)
P0[4]	SCB11_SDA	-
P0[5]	SCB11_SCL	-
P1[0]	ECI	-
P1[1]	ECO	-
P1[4]	WCI	-
P1[5]	WCO	-
P2[3]	TP300	TP300
P2[4]	TRSTN	X302.3
P2[5]	HDMI_SYSRST	R708, U700.2
P2[6]	SWO_TDO	X302.13
P3[0]	SWCLK_TCLK	R304, X302.9, U400.47
P3[1]	GPIO1_2GO_1	S800.8
P3[2]	SWDIO_TMS	X302.7, U400.46
P3[3]	SWDOE_TDI	X302.5
P3[4]	GPIO2_2GO_1	S800.9
P4[0]	GPIO1_ARD	X806.8
P4[1]	GPIO2_ARD	X806.7

(table continues...)

Table 15 (continued) MCU pin details

Pin	Net	RefDes
P4[2]	GPIO3_ARD	X806.4
P4[3]	GPIO1_MB	X813.1
P4[4]	GPIO2_MB	X813.2
P4[5]	LIN0_RX	X802.2
P4[6]	LIN0_TX	X802.1
P4[7]	GPIO3_2GO_1	X800.12
P5[0]	CAN0_0_TX	X806.5
P5[1]	CAN0_0_RX	X806.6
P5[2]	CAN0_1_TX	U800.1
P5[3]	CAN0_1_RX	U800.4
P5[4]	CAN0_1_SLP	U800.8
P5[5]	GPIO4_2GO_1	S800.13
P5[6]	SCB8_CLK	-
P5[7]	SCB8_MOSI	-
P6[0]	SCB8_MISO	-
P6[1]	SCB8_SEL0	-
P6[2]	SCB8_SEL1	-
P6[3]	AN1_ARD	X805.1
P6[4]	AN2_ARD	X805.2
P6[5]	AN3_ARD	X805.3
P6[6]	AN4_ARD	X805.4
P6[7]	AN1_2GO_1	S800.2
P7[0]	AN2_2GO_1	S800.3
P7[1]	AN1_2GO_2	S801.2
P7[2]	AN2_2GO_2	S801.3
P7[3]	AN1_MB	X812.1
P7[4]	POT	POT (R904)
P7[5]	LED1	LED1 (D900)
P7[6]	LED2	LED2 (D901)
P7[7]	LED3	LED3 (D902)
P8[0]	GPIO1_2GO_2	S801.8
P8[1]	GPIO2_2GO_2	S801.9
P8[2]	GPIO3_2GO_2	S801.12

(table continues...)

Table 15 (continued) MCU pin details

Pin	Net	RefDes
P8[3]	GPIO4_2GO_2	S801.13
P9[0]	SCB7_RX	-
P9[1]	SCB7_TX	-
P9[2]	RPI_GPIO1	X800.7
P9[3]	RPI_GPIO2	X800.11
P9[4]	RPI_GPIO3	X800.13
P9[5]	RPI_GPIO4	X800.15
P9[6]	RPI_GPIO5	X800.29
P9[7]	RPI_GPIO6	X800.31
P11[0]	SCB0_MISO	-
P11[1]	SCB0_SEL0	-
P11[2]	SCB0_CLK	-
P11[3]	SCB0_MOSI	-
P11[4]	RPI_GPIO7	X800.36
P11[5]	TDM_TX_SCK3	U700.13
P11[6]	TDM_TX_FSYNC3	U700.12
P11[7]	TDM_TX_SD3	U700.9
P12[0]	SCB0_SEL3	-
P12[1]	P12.1	-
P12[2]	NC	-
P12[3]	MIPI_PE	X701.17
P12[4]	MIPI_LE	X701.18
P12[5]	ETH_INT_N	U1000.31
P12[6]	P12.6	-
P12[7]	NC	-
P13[0]	ETH_MDC	U1000.13
P13[1]	ETH_MDIO	U1000.14
P13[2]	ETH_TXD_0	U1000.18
P13[3]	ETH_TXD_1	U1000.17
P13[4]	ETH_TXD_CLK	U1000.20
P13[5]	ETH_REF_CLK	U1000.35
P13[6]	ETH_TXD_2	U1000.16
P13[7]	ETH_TXD_3	U1000.15

(table continues...)

Table 15 (continued) MCU pin details

Pin	Net	RefDes
P14[0]	ETH_TX_CTL	U1000.19
P14[1]	TP303	TP303
P14[2]	ETH_RX_CLK	U1000.27
P14[3]	ETH_RXD_0	U1000.25
P14[4]	ETH_RXD_1	U1000.24
P14[5]	ETH_RXD_2	U1000.23
P14[6]	ETH_RXD_3	U1000.22
P14[7]	ETH_RX_CTL	U1000.26
P15[2]	SCB1_SDA	-
P15[3]	SCB1_SCL	-
P15[4]	RGB_GPIO2	-
P15[5]	RPI_GPIO8/P15.5	X800.32
P15[6]	TDM_TX_MCK0	X800.18
P15[7]	TDM_TX_SCK0	X800.12
P16[0]	TDM_TX_FSYNC0	X800.35
P16[1]	TDM_TX_SD0	X800.40
P16[2]	TDM_RX_MCK0	-
P16[3]	TDM_RX_SCK0	-
P16[4]	TDM_RX_FSYNC0	-
P16[5]	TDM_RX_SD0	X800.38
P16[6]	RPI_GPIO9/P16.6	X800.22
P16[7]	RGB_RED0	-
P17[0]	RGB_RED1	-
P18[0]	RGB_RED2	-
P18[1]	RGB_RED3	-
P18[2]	RGB_RED4	-
P18[3]	RGB_RED5	-
P18[4]	RGB_RED6	-
P18[5]	RGB_RED7	-
P18[6]	RGB_GREEN0	-
P18[7]	RGB_GREEN1	-
P19[0]	RGB_GREEN2	-
P19[1]	RGB_GREEN3	-

(table continues...)

Table 15 (continued) MCU pin details

Pin	Net	RefDes
P19[2]	RGB_GREEN4	-
P19[3]	RGB_GREEN5	-
P19[4]	RGB_GREEN6	-
P19[5]	RGB_GREEN7	-
P19[6]	RGB_BLUE0	-
P19[7]	RGB_BLUE1	-
P20[0]	RGB_BLUE2	-
P20[1]	RGB_BLUE3	-
P20[2]	RGB_BLUE4	-
P20[3]	RGB_BLUE5	-
P20[4]	RGB_BLUE6	-
P20[5]	RGB_BLUE7	-
P20[6]	RGB_LVALID	-
P20[7]	RGB_VSYNC	-
P21[0]	RGB_DE	-
P21[1]	RGB_CLK	-
P21[2]	RGB_GPIO0	-
P21[3]	RGB_GPIO1	-
P23[0]	SPIHB0_DATA4	U600.D5
P23[1]	SPIHB0_DATA2	U600.C4
P23[2]	SPIHB0_DATA3	U600.D4
P23[3]	SPIHB0_DATA5	U600.E3
P23[4]	SPIHB0_RWDS	U600.C3
P24[0]	SPIHB0_CLK_N	U600.B1
P24[1]	SPIHB0_CLK_P	U600.B2
P25[0]	SPIHB0_DATA0	U600.D3
P25[1]	SPIHB0_DATA6	U600.E2
P25[2]	SPIHB0_SEL0	U600.C2
P25[3]	SPIHB0_DATA1	U600.D2
P25[4]	SPIHB0_DATA7	U600.E1
P25[5]	SPIHB0_SEL1	U600.A3
P26[0]	SPIHB1_DATA4	U601.D5
P26[1]	SPIHB1_DATA2	U601.C4

(table continues...)

Table 15 (continued) MCU pin details

Pin	Net	RefDes
P26[2]	SPIHB1_DATA3	U601.D4
P26[3]	SPIHB1_DATA5	U601.E3
P26[4]	SPIHB1_RWDS	U601.C3
P27[0]	SPIHB1_CLK_N	U601.B1
P27[1]	SPIHB1_CLK_P	U601.B2
P28[0]	SPIHB1_DATA0	U601.D3
P28[1]	SPIHB1_DATA6	U601.E2
P28[2]	SPIHB1_SEL0	U601.C2
P28[3]	SPIHB1_DATA1	U601.D2
P28[4]	SPIHB1_DATA7	U601.E1
P28[5]	SPIHB1_SEL1	U601.A3
P29[0]	SCB9_RX	-
P29[1]	SCB9_TX	-
P30[0]	TP304	TP304
P30[1]	TP305	TP305

Glossary

Abbreviation	Definition
AC	Alternating current
ADC	Analog-to-digital converter
BOM	Bill of materials
CAN	Controller area network
CAP	Capacitor
CAN FD	Controller area network flexible data-rate
CPU	Central processing unit
DAC	Digital-to-analog converter
DC	Direct current
ECO	External crystal oscillator
ESD	Electrostatic discharge
ETH	Ethernet
GPIO	General-purpose input output
HFLASH	Hyper-Flash
HRAM	Hyper random-access memory
IC	Integrated circuit
IDE	Integrated development environment
IoT	Internet of things
I2C	Inter-integrated circuit
I2S	Inter-IC sound
LED	Light-emitting diode
LIN	Local interconnect network
LDO	Ow 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
UART	Universal asynchronous receiver transmitter

Glossary

Abbreviation	Definition
USB	Universal serial bus
WCO	Watch crystal oscillator

References

This section has some links for datasheet and documents, you can visit and find resources as per needs.

1. TRAVEO™ T2G Cluster 6M Lite Kit
2. TRAVEO™ T2G CYT4DN
3. TRAVEO™ T2G CYT4DN Datasheet
4. EZ-USB™ FX3
5. EZ-USB™ FX3 Getting Started
6. EZ-USB™ FX3 SDK
7. PSOC™ 5LP
8. PSOC™ 5LP Datasheet
9. KitProg3 User Guide
10. SEMPER™ Flash Datasheet
11. HYPERRAM™ (S27KS) Datasheet
12. IR3883 PMIC
13. IR3883 PMIC Datasheet
14. TLS205B0 LDO Datasheet
15. TPS62A02DRLR PMIC Datasheet
16. CY8CKIT-026 CAN and LIN Shield
17. CY8CKIT-026 CAN and LIN Shield Schematic
18. WM8960 Audio HAT
19. WM8960 Audio HAT Schematic
20. WM8960 Audio HAT Datasheet

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

Revision history

Document revision	Date	Description of changes
**	2024-04-29	Initial release of User guide for Cluster 6M Lite kit Rev-01
*A	2025-02-06	• Template update • Added and removed a few sections • Rearranged the TOC • Updated figures

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