

TRAVEO™ T2G Cluster 4M Lite Kit user guide

KIT_T2G_C-2D-4M_LITE

About this document

Scope and purpose

This user guide enables users to use the KIT_T2G_C-2D-4M_LITE low-cost evaluation kit, also known as the TRAVEO™ T2G Cluster 4M Lite Kit. It is based on the CYT3DL device from the TRAVEO™ Cluster 2D family of microcontrollers with onboard EZ-USB™ FX3.

This document describes the features and functions of the TRAVEO™ T2G Cluster 4M Lite Kit. It also provides detailed information on available interfaces and the usage of all hardware interfaces.

Intended audience

This document is intended for software and hardware engineers evaluating the TRAVEO™ T2G Cluster 2D family CYT3DL 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 a new software or exploring different hardware designs, this document provides valuable insights and guidance to help you achieve your goals.

Evaluation board

This board is to be used during the design-in process for evaluating and measuring characteristic curves, and for checking datasheet specifications.

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

Important notice

Important notice

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Safety precautions

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.

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1 Getting started

1 Getting started

This section provides an overview of the TRAVEO™ T2G Cluster 4M Lite Kit and offers step-by-step guidance on how to set up and power up the kit. Additionally, it includes instructions on running the preprogrammed firmware and configuring the default jumpers to ensure a seamless experience.

1.1 Kit overview

This section provides a brief introduction to the TRAVEO™ T2G Cluster 4M Lite Kit and details all the various interfaces and peripherals available in this kit.

1.1.1 Introduction

The TRAVEO™ T2G Cluster 4M Lite Kit belongs to the TRAVEO™ Cluster 2D graphics family, featuring the TRAVEO™ T2G CYT3DL device as the MCU and an onboard EZ-USB™ FX3 with a USB Type-C connector for streaming RGB graphics data packets to a PC screen. This kit is primarily designed to evaluate the functions and features of the CYT3DL series microcontroller.

The TRAVEO™ T2G Cluster 4M Lite Kit includes:

- A TRAVEO™ T2G CYT3DL MCU
- An EZ-USB™ FX3 with a USB Type-C connector
- SMIF for interfacing HYPERBUS™ memories such as SEMPER™ Flash and HYPERRAM™
- An onboard PSOC™ 5LP (KitProg3) programmer/debugger with a USB Micro-B connector
- General-purpose I/O headers for interfacing with various external shield kits

1.1.2 Features

The main features of the TRAVEO™ T2G Cluster 4M Lite Kit include:

MCU device: TRAVEO™ T2G CYT3DL

Graphics and video interfaces:

- MIPI CSI-2 camera interface
- Single-channel FPD-Link/LVDS interface for up to 1920 x 720 video output
- EZ-USB™ FX3 device that converts RGB graphics data packets into USB packets

Program and debug interfaces:

- Arm® standard 20-pin JTAG header
- PSOC™ 5LP (KitProg3) as onboard programmer/debugger

Crystal oscillators:

- 16 MHz external crystal oscillator
- 32.768 kHz watch crystal oscillator

Serial memory interface:

- 64 Mb HYPERRAM™
- 512 Mb SEMPER™ Flash

General-purpose I/O headers:

- Shield2Go header
- mikroBUS header
- Header compatible with Arduino
- Raspberry Pi-compatible I/O header

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Communication interfaces:

- PMOD connector to support external Ethernet PHY shields

Human interfaces:

- User LEDs
- Push button
- Potentiometer

Connectors:

- 12 V DC power jack for powering the kit
- USB Micro-B connector for powering the kit and programming/debugging via the onboard programmer and debugger PSOC™ 5LP (KitProg3)
- USB Type-C connector for powering the kit and streaming EZ-USB™ FX3 graphics data output to the PC screen

Figure 1 shows the block diagram of the TRAVEO™ T2G Cluster 4M Lite Kit, highlighting only the major interfaces. There may be additional blocks between the CYT3DL device and the peripheral component blocks.

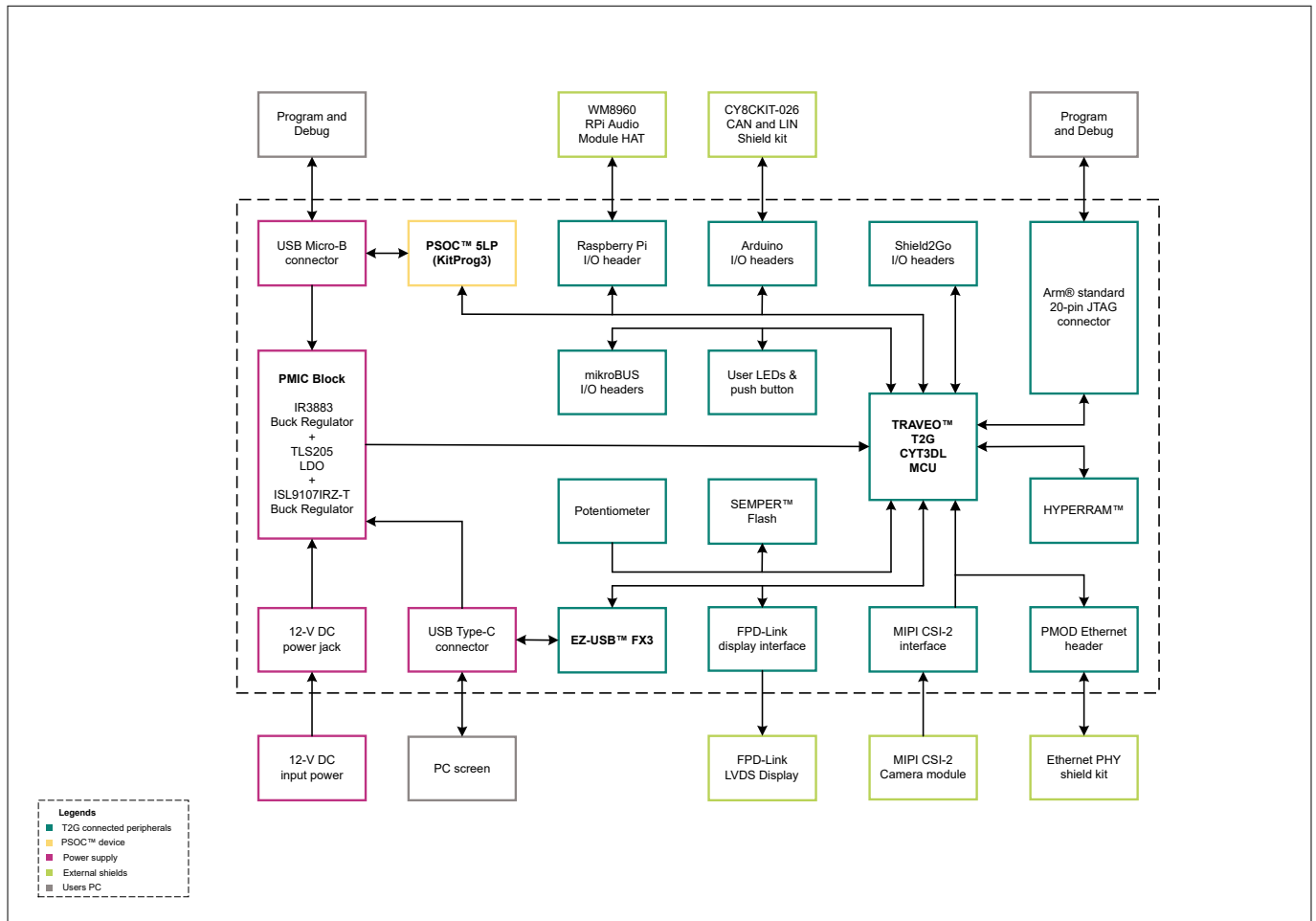


Figure 1 Block diagram of TRAVEO™ T2G Cluster 4M Lite Kit

1.1.3 Peripheral details

This section provides an overview of the various interfaces and peripherals available in the TRAVEO™ T2G Cluster 4M Lite Kit.

Table 2 shows the peripheral markings, reference designators, and details about them, which are highlighted in Figure 2.

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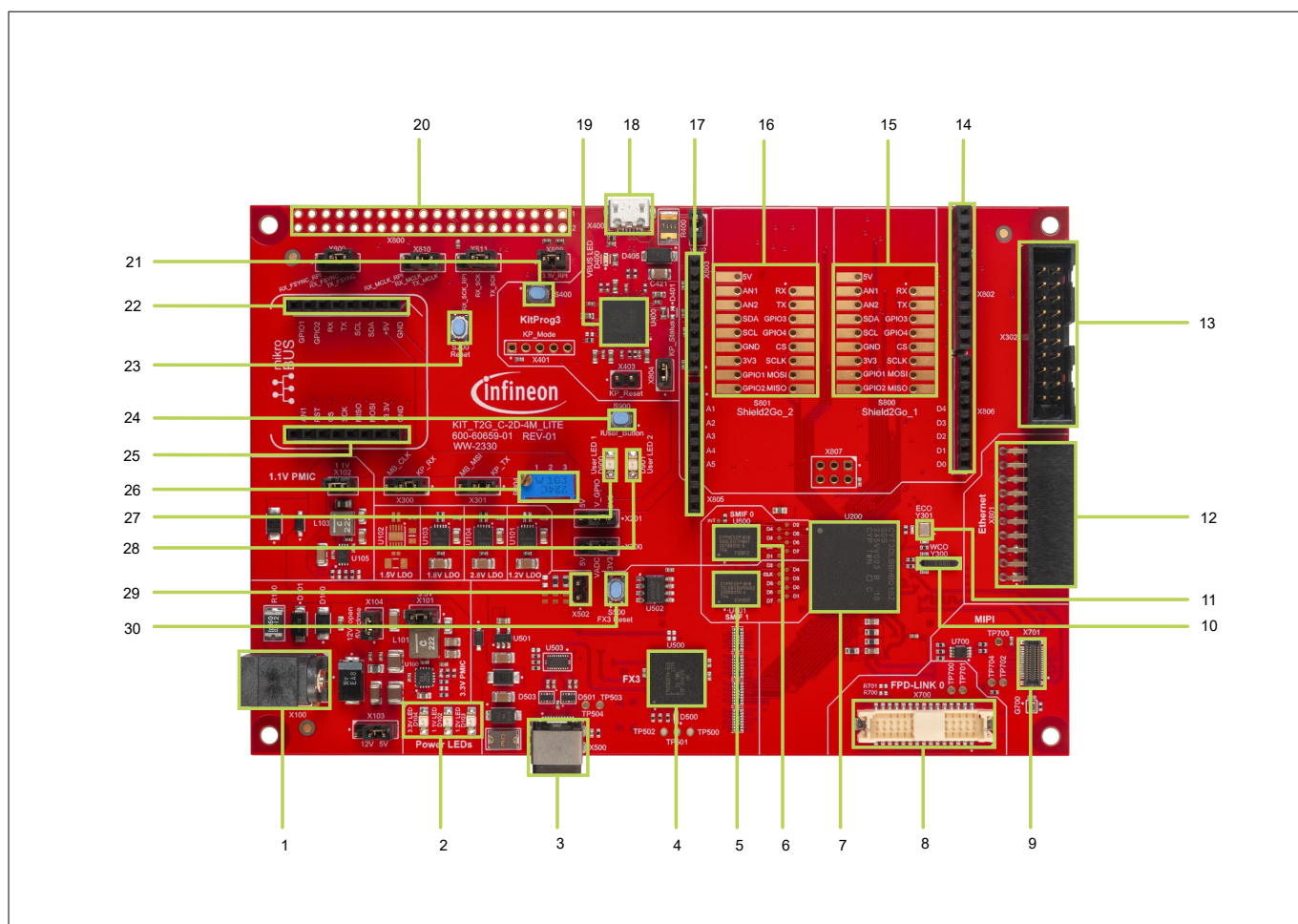


Figure 2 Peripherals and interfaces in the TRAVEO™ T2G Cluster 4M Lite Kit

Table 2 Peripheral details

Markup	Reference designator	Description
1	X100	12 V DC power jack for connecting the wall adapter to power the kit
2	D104	3.3 V power monitor LED
	D102	1.1 V power monitor LED
	D103	1.2 V power monitor LED
3	X500	USB Type-C connector for streaming data packets of EZ-USB™ FX3 as well as for powering the kit
4	U500	EZ-USB™ FX3 for converting RGB graphics output data packets to USB data packets
5	U601	64 Mb HYPERRAM™ connected to the SMIF-1 interface
6	U600	512 Mb SEMPER™ Flash connected to the SMIF-0 interface
7	U200	TRAVERO™ T2G CYT3DL MCU
8	X700	FPD-Link interface that supports FPD-Link display

(table continues...)

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Table 2 (continued) Peripheral details

Markup	Reference designator	Description
9	X701	MIPI CSI-2 interface that supports MIPI CSI-2 camera module
10	Y300	32.768-kHz watch crystal oscillator
11	Y301	16-MHz external crystal oscillator
12	X801	PMOD connector that supports external Ethernet PHY shield kits
13	X302	Arm® Standard 20-pin JTAG connector for programming and debugging the kit
14	X802	10-pin Arduino shield-compatible I/O header
	X806	8-pin Arduino shield-compatible I/O header
15	S800	Shield2Go header footprints
16	S801	Shield2Go1 header footprints
17	X803	8-pin Arduino shield-compatible I/O header
	X805	9-pin Arduino shield-compatible I/O header
18	X400	USB Micro-B connector for programming and debugging using PSOC™ 5LP (KitProg3) as well as for powering the kit
19	U400	PSOC™ 5LP (KitProg3) as onboard programmer and debugger
20	X800	40-pin Raspberry Pi shield-compatible I/O header
21	S400	KitProg3 mode select push button
22	X813	8-pin mikroBUS shield-compatible I/O header
23	S200	MCU device reset button
24	S900	User push button for human interface
25	X812	8-pin mikroBUS shield-compatible I/O header
26	R904	Resistor-based rotary potentiometer
27	D900	User LED1 for human interface
28	D901	User LED2 for human interface
29	X502	EZ-USB™ FX3 bootloader jumper
30	S500	EZ-USB™ FX3 reset button

1.2 Kit contents

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

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Table 3 Kit contents

Quantity	Description	Remarks
1	KIT_T2G_C-2D-4M_LITE Rev-01	TRAVEO™ T2G Cluster 4M Lite Kit
1	USB Type-C to Type-C cable	For powering the board and streaming EZ-USB™ FX3 graphics data output



Figure 3 Kit contents of TRAVEO™ T2G Cluster 4M Lite Kit

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 jumper configuration also helps to generate all the power supplies from the regulators and distribute them to safely power the Lite kit.

[Figure 4](#) shows the location of various jumpers available on the TRAVEO™ T2G Cluster 4M Lite Kit.

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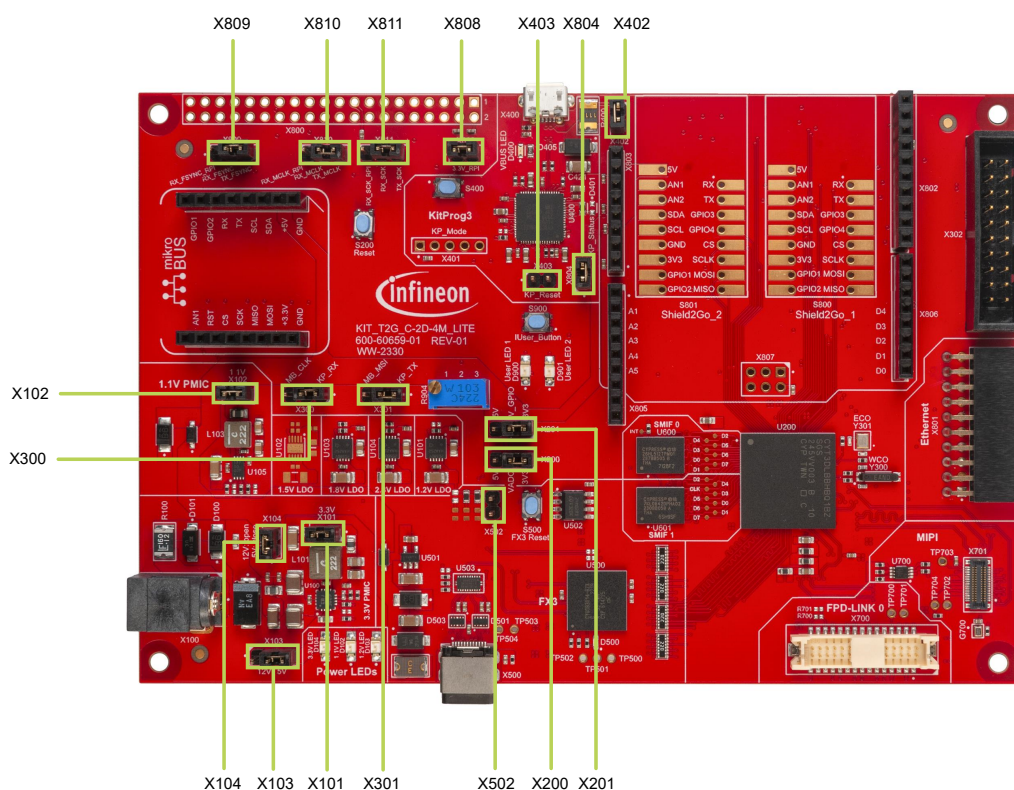


Figure 4 Location of all the jumpers in the TRAVEO™ T2G Cluster 4M Lite Kit

Table 4 Jumper configuration

Jumper	Function	Position: selection
X101	3.3 V PMIC	1-2: short (default)
		1-2: open
X102	1.1 V PMIC	1-2: short (default)
		1-2: open
X103	12 V VIN selected	1-2: short
	5 V VIN selected	2-3: short (default)
X104	12 V input	1-2: open
	5 V input	1-2: short (default)
X200	VDDA selected to 3.3 V	1-2: short (default)
	VDDA selected to 5 V	2-3: short
X201	VDDIO selected to 3.3 V	1-2: short (default)
	VDDIO selected to 5 V	2-3: short
X300	KitProg3 RX	1-2: short (default)

(table continues...)

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Table 4 (continued) **Jumper configuration**

Jumper	Function	Position: selection
	mikroBUS SPI CLK	2-3: short
X301	KitProg3 TX	1-2: short (default)
	mikroBUS SPI MOSI	1-2: open
X402	VBUS power enabled from Micro-B	1-2: short (default)
	VBUS power disabled from Micro-B	1-2: open
X403	KitProg3 will not reset	1-2: open (default)
	KitProg3 will reset	1-2: short
X502	FX3 will not be in bootloader mode	1-2: open (default)
	FX3 will be in bootloader mode	1-2: short
X804	VIN for Arduino header	1-2: short (default)
	No VIN for Arduino header	1-2: open
X808	3.3 V for RPi header	1-2: short (default)
	No 3.3 V to RPi header	1-2: open
X809	TDM RX FSYNC going to RPi header	1-2: short
	TDM RX FSYNC to TX FSYNC	2-3: short (default)
X810	TDM RX MCLK going to RPi header	1-2: short
	TDM RX MCLK to TX MCLK	2-3: short (default)
X811	TDM RX SCK routed to RPi header	1-2: short
	TDM RX SCK to TX SCK	2-3: short (default)

1.4 Powering the kit

This section provides step-by-step guidance on how to power up the kit using the different powering options available on the TRAVEO™ T2G Cluster 4M Lite Kit.

The TRAVEO™ T2G Cluster 4M Lite Kit can be powered through any of these three options:

1. USB Type-C¹⁾
2. USB Micro-B²⁾
3. 12 V DC power adapter³⁾

1.4.1 Powering through USB Type-C

1. Before connecting the USB Type-C to Type-C cable, short the jumpers as indicated below:
 - a. Short the 3-pin jumper (X103) between positions 2 and 3
 - b. Short the 2-pin jumper (X104)

¹ This is the default powering option for this kit

² KitProg3 will also be powered up with this option

³ If you are using an FPD-Link display with this kit, you will need this powering option, as the FPD-Link display will get power only with this option

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2. Connect the USB Type-C to Type-C cable between the USB Type-C connector (X500) on the kit and the USB Type-C port on the PC
3. Observe that the power LEDs (D104, D102, and D103) start glowing green

1.4.2 Powering through USB Micro-B

1. Before connecting the USB Micro-B cable, short the jumpers as indicated below:
 - a. Short the 3-pin jumper (X103) between positions 2 and 3
 - b. Short the 2-pin jumper (X104)
 - c. Short the 2-pin jumper (X402)
2. Connect the USB Micro-B⁴⁾ cable between the USB Micro-B connector of KitProg3 (X400) and the USB port of the PC
3. Observe that the power LEDs (D104, D102, and D103) start glowing green
4. Additionally, observe that the VBUS LED (D400) also starts glowing green

1.4.3 Powering through 12 V DC power adapter

1. Before connecting the 12 V DC power adapter to the kit, short the jumpers as indicated below:
 - a. Short the 3-pin jumper (X103) between positions 1 and 2
 - b. Remove the 2-pin jumper (X104)
2. Connect the 12 V DC power adapter⁵⁾ to the 12 V DC power jack (X100) on the kit
3. Observe that the power LEDs (D104, D102, and D103) start glowing green

Figure 5 shows the various powering option connectors available in the TRAVEO™ T2G Cluster 4M Lite Kit.

⁴ Not a part of the kit content

⁵ The 12-V DC power adapter should support at least 12 V, 1 A, while the preferable rating is 12 V, 3 A

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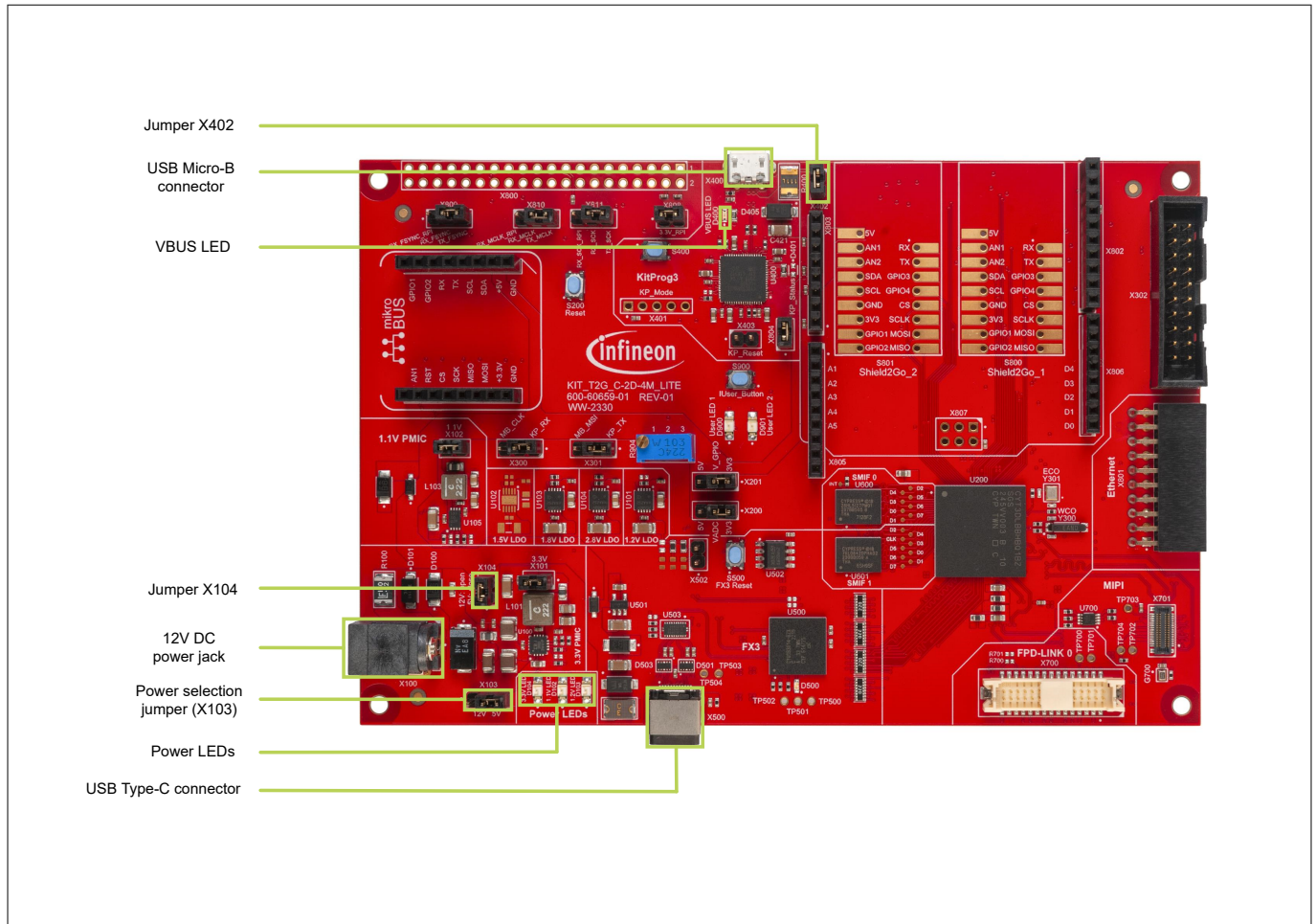


Figure 5 Various powering options in TRAVEO™ T2G Cluster 4M Lite Kit

1.5 Preprogrammed firmware

The TRAVEO™ T2G Cluster 4M Lite Kit is shipped with preloaded software that is ready to run as soon as the kit is powered up. This software prints the MCU silicon details and the results of all the interfaces tested on this kit. Additionally, there is preloaded firmware for the EZ-USB™ FX3, which streams the IRIS test pattern image on any media player display on the PC screen by connecting a USB Type-C to Type-C cable to the PC.

To get started with the preloaded software, you must ensure that you have followed the correct jumper settings and powered up the TRAVEO™ T2G Cluster 4M Lite Kit.

1.5.1 Silicon details and peripherals test result logs firmware

To view the MCU silicon details and the peripherals test result logs on your screen, along with a blinking pattern of the user LEDs, do the following:

1. Connect the kit to your PC via the USB Micro-B cable
2. Open any serial terminal software (such as Tera Term) on your PC
3. Configure for a **Serial** connection and choose the port that shows **KitProg3 USB-UART** in the port option
4. Navigate to **Setup > Serial port > Speed** and select 115200 as the baud rate. Then, click the **New setting** button to create a new configuration
5. Press the MCU reset button (S200) on the kit. You should be able to see the silicon details and test results of the peripherals printed on your serial terminal screen, as shown in [Figure 6](#)
6. Observe that the user LEDs (D900 and D901) on the kit will start blinking in a pattern

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```
-----
KIT_T2G_C-2D-4M_LITE MANUFACTURING TEST SUMMARY
-----
----- MCU Details -----
SILICON IS IN NORMAL STATE
FB_MAJOR.FB_MINOR.FB_PATCH.FB_BUILD = 3.1.0.563
FAMILY_ID = 0x10B
SILICON_ID = 0xE848
SILICON MAJOR.MINOR Rev = 1.3
TOC2_FLAGS = 0x243
-----
----- Test Results -----
USB-UART Test Passed
GPIO Test Passed
USER-LED1 Test Passed
USER-LED2 Test Passed
USER-BUTTON Test Passed
POTENTIOMETER Test Passed
HYPER-FLASH Test Passed
HYPER-RAM Test Passed
FPD-DISPLAY Test Passed
RGB-FX3 Test Passed
MIPI-CAMERA Test Passed
-----
CPU BOARD IS READY TO SHIP
-----
```

Figure 6 Silicon details printed on the serial terminal window of Tera Term

1.5.2 IRIS test image firmware

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

1. Ensure that the jumper (X502) is not shorted. If it is shorted, then remove that jumper
2. Disconnect the power from the kit and follow the steps mentioned in [Powering through USB Type-C](#)
3. Ensure that the USB Type-C to Type-C cable is connected to the USB 3.0 SuperSpeed USB Type-C port on the PC, as EZ-USB™ FX3 supports only USB 3.0 ports
4. Follow the steps mentioned in [Streaming the EZ-USB™ FX3](#) to install and use the TRAVEO™ T2G Virtual Display Tool for streaming the FX3 test image firmware
5. Observe that the IRIS test pattern appears on your screen, as shown in [Figure 7](#)

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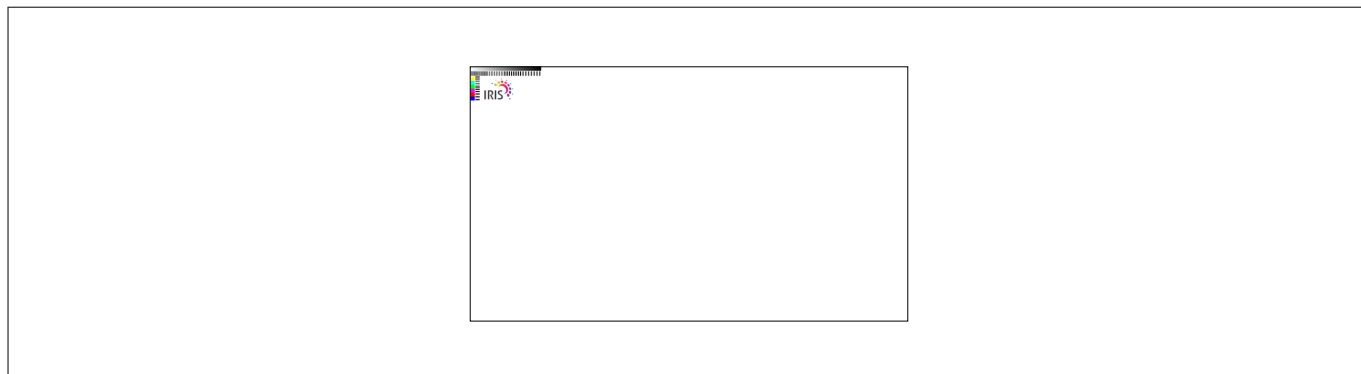


Figure 7 **IRIS test pattern coming on the screen**

2 Programming the kit

2 Programming the kit

This section provides information about the available programming interfaces in this kit and how to program and debug the kit using these interfaces and various programming tools.

This kit supports programming and debugging using third-party software, as shown in [Table 5](#).

Table 5 Programming tools and software IDEs supported

Programming IDEs/Tools	Debugger/Probes
AutoFlashUtility v1.3	Onboard programmer/debugger KitProg3
IAR Embedded Workbench for Arm® v9.32.1	I-jet debugger + JTAG to 20-pin Arm® converter
	Onboard programmer/debugger KitProg3
Green Hills Software MULTI v7.1.4	Green Hills Compiler v2017.1.4Probe v6.4.4

2.1 Programming interfaces

This section provides basic information about the programming interfaces available in the TRAVEO™ T2G Cluster 4M Lite Kit.

There are two programming interfaces available in the TRAVEO™ T2G Cluster 4M Lite Kit:

- Onboard programmer/debugger KitProg3
- Arm® standard 20-pin JTAG connector

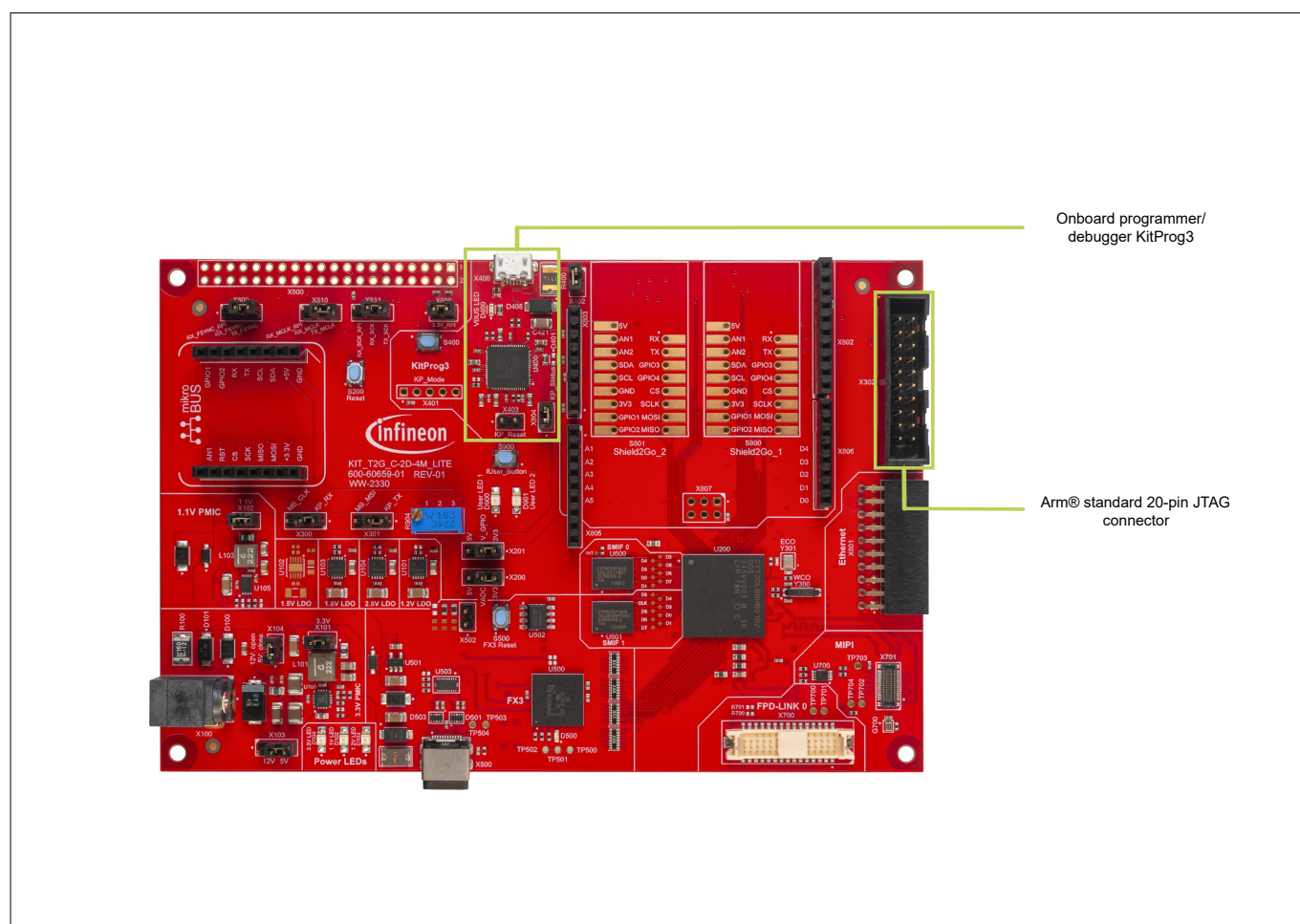


Figure 8 Programming interfaces available on the kit

2 Programming the kit

2.2 Blink the LED

This section provides instructions on how to blink the user LEDs using the IAR Embedded Workbench for Arm® 9.32.1 tool with the TRAVEO™ T2G Cluster 4M Lite Kit.

2.2.1 IAR Embedded Workbench for Arm®

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

1. Download the latest T2G Sample Driver Library for the TRAVEO™ T2G Cluster 4M Lite Kit to your PC
2. Install the SDL in a location outside the default program files so that the IDE can easily 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, keeping in mind that it might take some time
5. When you open IAR EWARM for the first time, select the license in the License wizard. If you do not have the license, register for a code size limited license type
6. After downloading and setting up the IDE, extract the folder from the path: SDL (v7.9.0 or higher) -> misc. -> tools -> iar -> IAR_EWARM_9301_FlashLoader_Patch_TraveoII.zip. Follow the instructions from the `readme.txt` document file available in that folder for copying the patch files to support SDL and the device with that IAR Embedded Workbench IDE
7. The IAR Embedded Workbench for Arm® tool and T2G SDL drivers are now ready for programming and debugging the TRAVEO™ T2G Cluster 4M Lite Kit

2.2.1.1 Programming using the onboard debugger KitProg3

This section describes how to program the TRAVEO™ T2G Cluster 4M 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. Before connecting any power or cable, ensure that the jumpers are shorted as mentioned below:
 - a. 3-pin jumper (X103) – shorted between positions 2-3
 - b. 2-pin jumper (X104) – shorted
 - c. 2-pin jumper (X402) – shorted
2. Now, connect the USB Micro-B cable between the USB Micro-B connector of KitProg3 (X400) and the USB port of the PC
3. 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](#) and [Powering through USB Micro-B](#)
4. 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\tviic2d4m\tools\iar\flash\tviic2dd4m_flash_cm0plus_template`
5. Select the **lite_kit** revision from the drop-down list under **Workspace** in the Workspace tab

2 Programming the kit

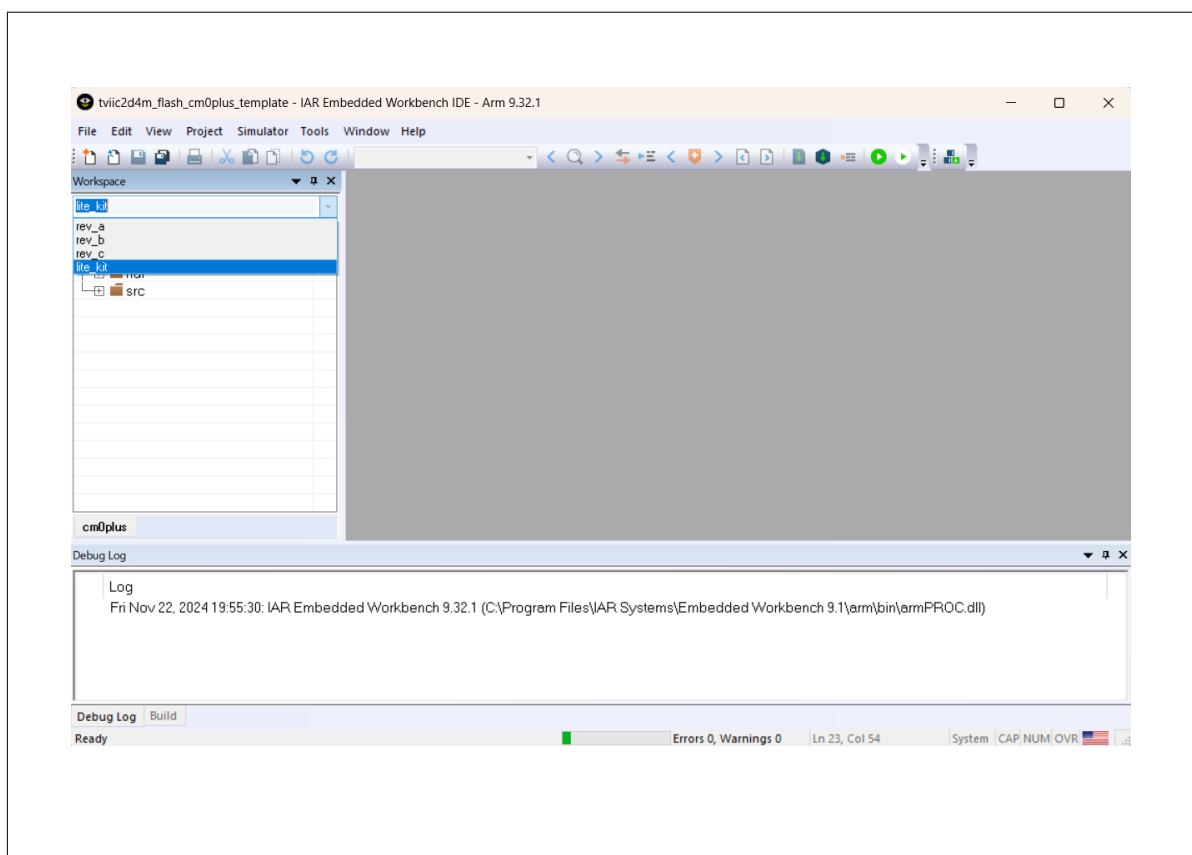


Figure 9 Selecting **lite_kit** workspace for TRAVEO™ T2G Cluster 4M Lite Kit in IAR

6. Expand the **src** folder in the Workspace tab to locate the **main_cm0plus.c** file
7. To ensure that 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 **CMSIS DAP** option, then press **OK**

2 Programming the kit

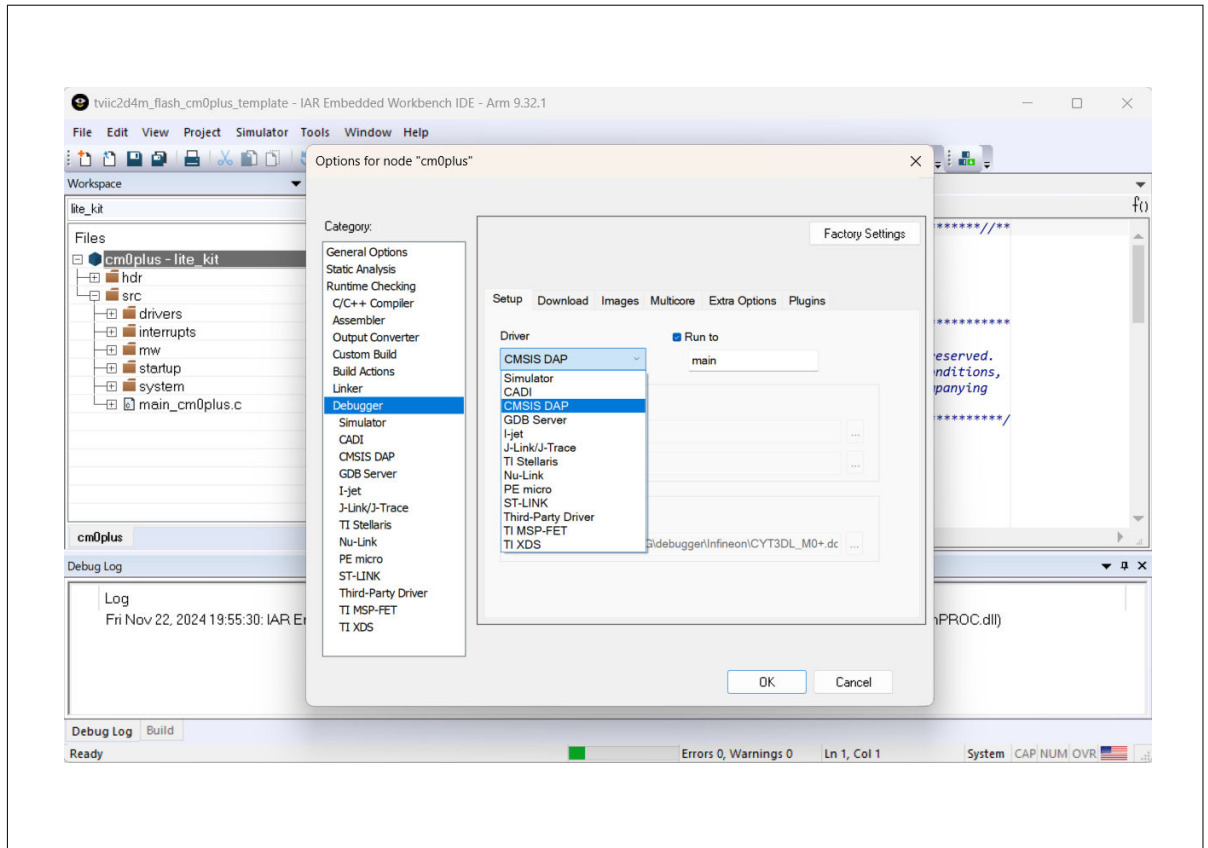


Figure 10 Checking the debugger option in IAR

8. To initiate the build process, right-click on **cm0plus – lite_kit** in the Workspace window and select **Rebuild All**
9. Monitor the **Build Log** for any errors and warnings as the rebuild process starts. If the build window is not visible, navigate to **View > Messages > Build**
10. To load the program into the flash region of the CM0+ core, click the **Download and Debug** icon in the toolbar. Then click the **Go** icon to start execution
11. In the Debug window, you can also use function keys on the keyboard:
 - F5 (Go)
 - F10 (Step Over)
 - F11 (Step Into)
 - Ctrl+D (Download and Debug)
12. During free-running execution, you should see user LED 1 (D900) blinking on the board
13. Follow the same steps for the CM7 core, and you should observe user LED 2 (D901) starting to blink similarly to user LED 1 (D900)

2.2.1.2 Programming using IAR Systems I-jet debugger

This section describes how to program the TRAVEO™ T2G Cluster 4M Lite Kit using the IAR Systems I-jet debugger. Follow these steps to program the kit using the IAR Embedded Workbench for Arm® tool and the IAR Systems I-jet debugger:

1. See [Powering the kit](#) for selecting any of the three powering options to power up the kit
2. After powering up the kit, ensure that you have the [JTAG-to-20-pin Arm® converter](#) with you as shown in [Figure 11](#). 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

2 Programming the kit



Figure 11 ADA-MIPI20-TI14 adapter

3. Open the IAR Embedded Workbench 9.32.1 and navigate to **File > Open Workspace**. Navigate to the path where you have installed the T2G SDL, and select the following path:
T2G_Sample_Driver_Library_7.9.0\ tviic2d4m\ tools\ iar\ flash\ tviic2dd4m_flash_cm0plus_template
4. Select the **lite_kit** revision from the drop-down list under **Workspace** in the Workspace tab

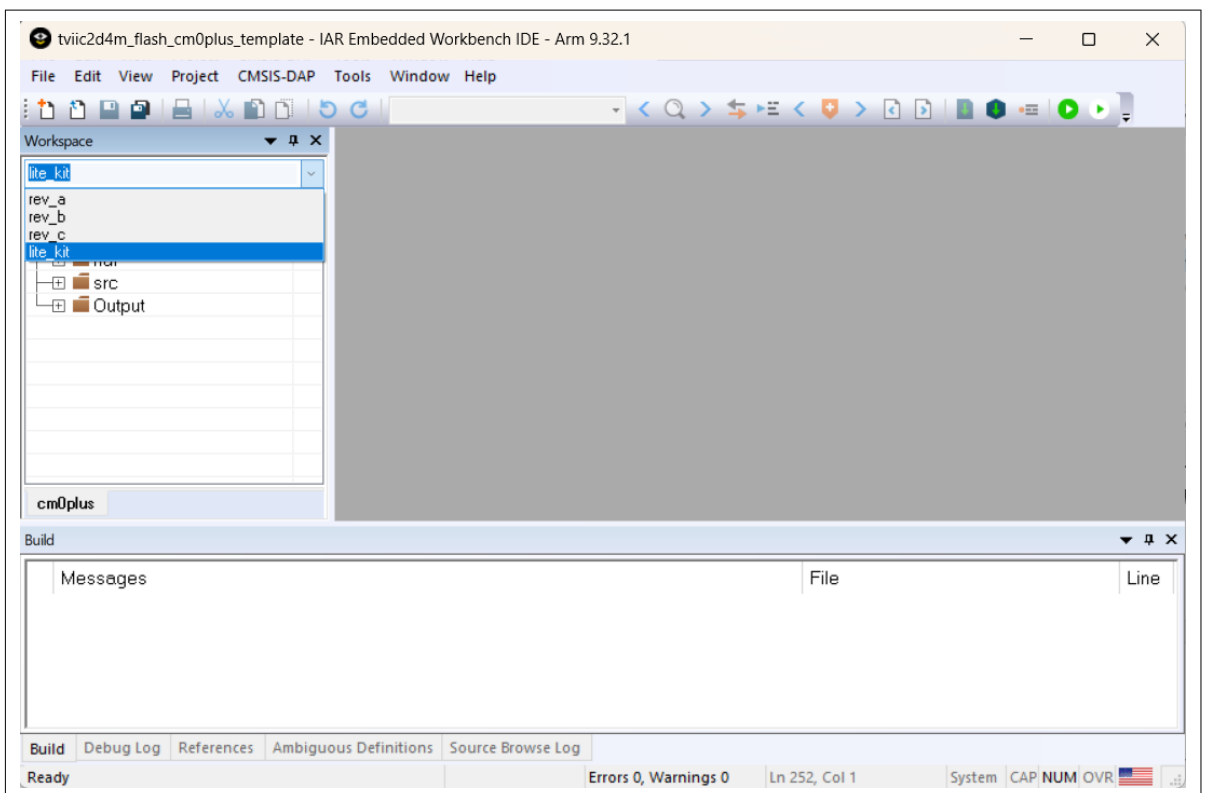


Figure 12 Selecting **lite_kit** workspace for TRAVEO™ T2G Cluster 4M Lite Kit in IAR

5. Expand the **src** folder in the Workspace tab to locate the **main_cm0plus.c** file
6. To ensure that 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, select **I-jet** under **Drivers**, and press **OK**

2 Programming the kit

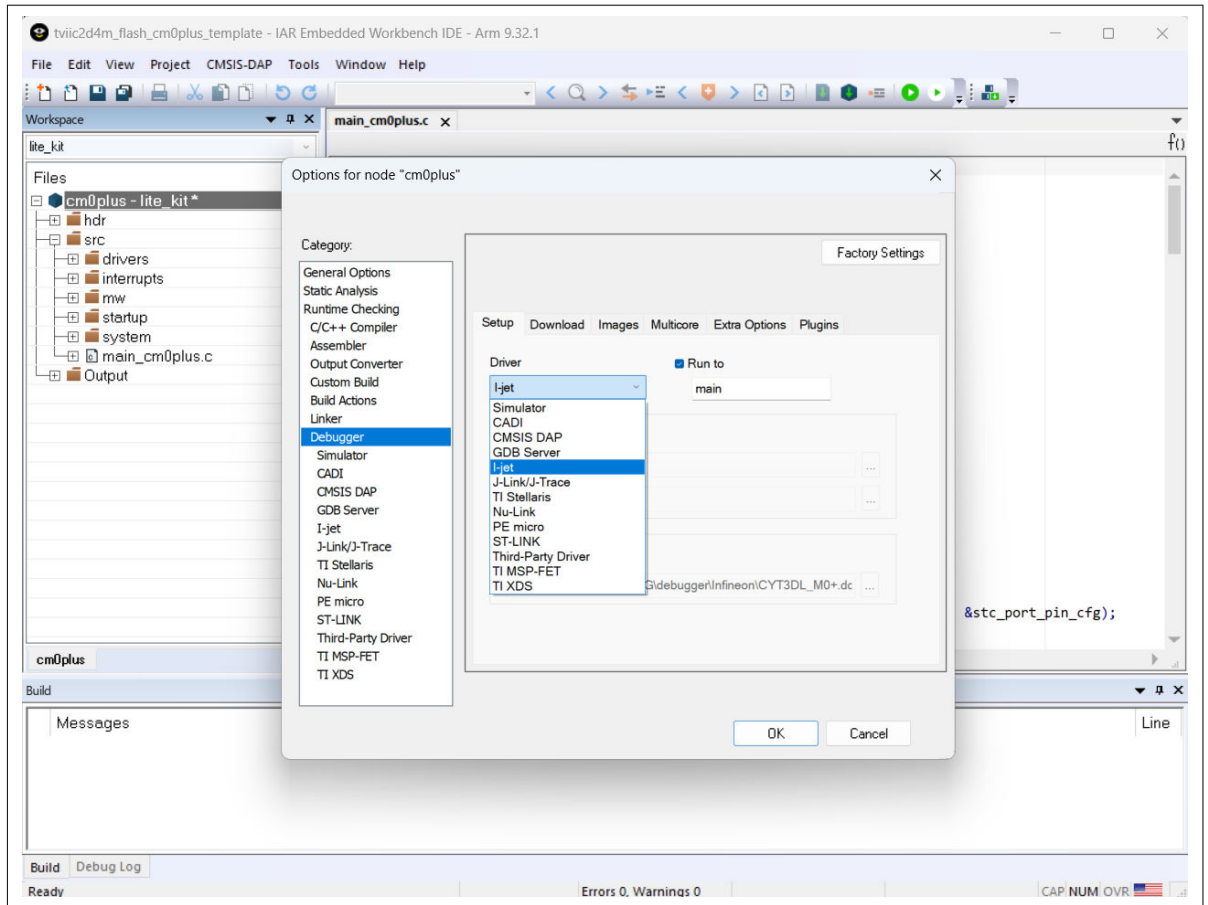


Figure 13 Checking the debugger option in IAR

7. For the build, right-click on **cm0plus - lite_kit** in the Workspace window and select the **Rebuild All** option
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**
9. To load the program to the flash region of the CM0+ core, click the **Download and Debug** icon in the toolbar
10. Click the **Go** icon to start the execution. Function keys from the keyboard can also be used in the Debug window:
 - F5 (Go)
 - F10 (Step Over)
 - F11 (Step Into)
 - Ctrl+D (Download and Debug)
11. In free-running execution, user LED 1 (D900) will start blinking on the board
12. Follow the same steps for the CM7 core and observe user LED 2 (D901) also starting to blink, similar to user LED 1 (D900)

2.2.2 Green Hills Software MULTI

This section describes how to program the TRAVEO™ T2G Cluster 4M Lite Kit using the Green Hills Software MULTI IDE and GHS probe. Before programming and debugging the LED blinky code, follow these steps for a one-time setup of prerequisites and tools installation:

1. Download the latest T2G Sample Driver Library (SDL) for the TRAVEO™ T2G Cluster 4M Lite Kit to your PC

2 Programming the kit

2. Install the SDL in a location outside the default program files so that the IDE can easily access and create temporary files
3. Open the `Readme.pdf` file available inside the SDL folder. Read this file to get the details about the GHS Tool Chain version supported by that SDL version, and install the recommended version on your PC
4. After installing the GHS MULTI tool and probe firmware, navigate to the folder path `misc/tools/ghs` inside the T2G Sample Driver Library. Follow the steps mentioned inside the `readme.txt` files from both the `debugging` and `ghs_comp_XXXXXX_defaults_flash` directories
5. After following the steps from both `readme.txt` files, the GHS MULTI tools will be ready to program and debug the TRAVEO™ T2G Cluster 4M Lite Kit

Follow these steps to program the kit using the GHS MULTI tool and GHS probes:

1. See [Powering the kit](#) for selecting any of the three powering options to power up the kit
2. After powering up the kit, connect the GHS probe directly to the Arm® standard 20-pin JTAG connector (X302) in the kit
3. Open **File Explorer** and navigate to the location where you have installed the T2G Sample Driver Library (SDL). Then, navigate to the following path and open the template: `T2G_Sample_Driver_Library_7.9.0\tviic2d4m\ttools\ghs\tviic2d4m_rev_c_template.gpj`
4. Right-click on the `tviic2d4m_common.gpj` file in the `tviic2d4m_rev_c_template.gpj` window tab and select the **Edit** option. A new window of the MULTI Editor will open on the PC screen
5. In the MULTI Editor window, uncomment the macro `DEVICE=CYT3DLBBHS` and comment the macro `DEVICE=CYT3DLABHS`. Also, uncomment the macro `CPU_BOARD=CY_272BGA_EVKLITE_rev_a` and comment the macro `CPU_BOARD=CY_216TEQFP_EVK_rev_a` as shown in [Figure 14](#). Save and close the file

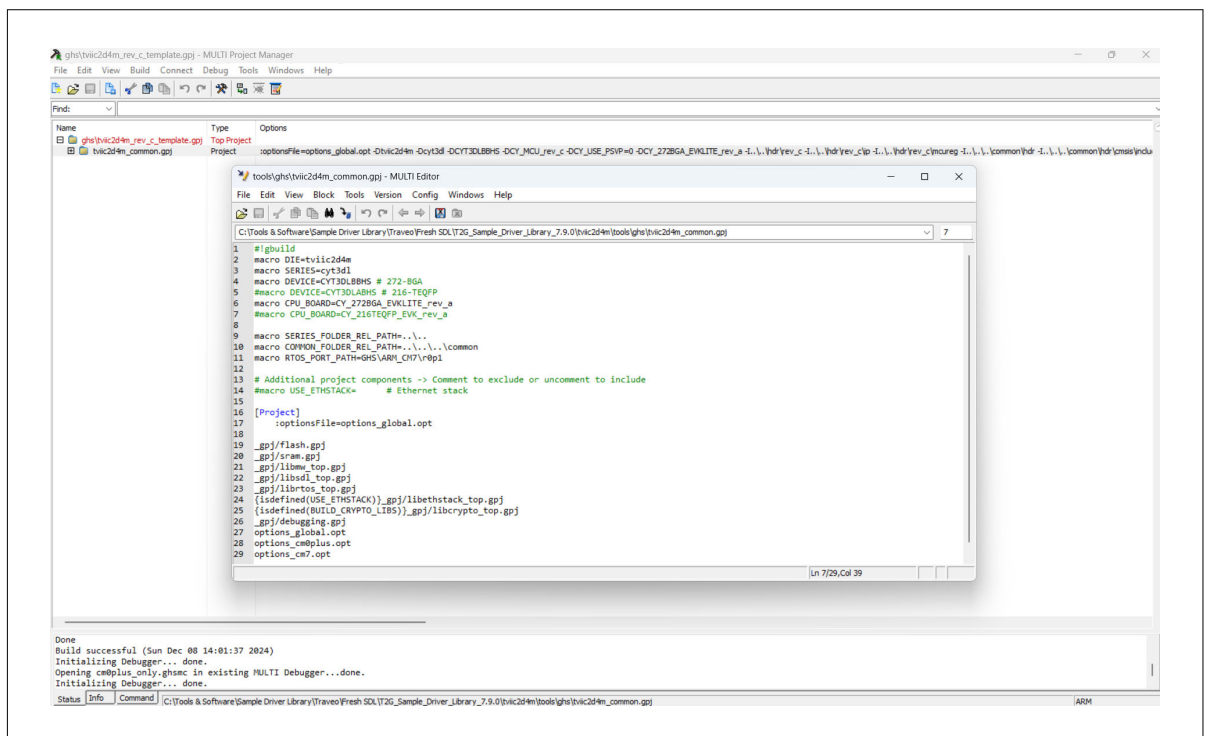


Figure 14 Setting up for the lite kit in the GHS workspace

6. In the `tviic2d4m_rev_c_template.gpj` window tab, navigate to the Build tab and select the option **Rebuild tviic2d4m_common.gpj** to build the code. Wait for the build to be successful, which you can verify in the status tab below the `tviic2d4m_rev_c_template.gpj` window tab
7. Once the build is successful, expand the `tviic2d4m_common.gpj`, then expand the `_gpj/flash.gpj` file. Single-click on the file `flash\cm0plus_only.ghsmc` and press the **F5** key on the keyboard
8. A new MULTI Debugger window will pop up on the PC screen. In that window, press the **D** button in the debugging tab, and then press the **F** button to flash the code to the TRAVEO™ T2G Cluster 4M Lite Kit

2 Programming the kit

9. Once the flashing is completed, the code will hit the breakpoint in the main function. Press the **F5** button on the keyboard to run the code
10. After running the code, you will observe that user LED 1 (D900) starts blinking in green
11. You can follow the same steps to flash the code to the CM7 core, and you will observe that user LED 2 (D901) also starts blinking in green

2.2.3 AutoFlashUtility

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

1. Connect a USB Micro-B cable between the USB Micro-B connector for KitProg3 (X400) and the USB port of your PC. This connection is necessary for using the onboard debugger/programmer KitProg3
2. Open the command prompt on your PC and run the required commands from the command prompt to use the AutoFlashUtility tool for flashing codes

Note: *The AutoFlashUtility tool does not support debugging and should be used only for programming. To obtain the AutoFlashUtility tool, visit the [Infineon AutoFlash Utility](#) page on the web.*

3 Functional description

3 Functional description

This section provides information about the major hardware blocks included in the TRAVEO™ T2G Cluster 4M Lite Kit. Understanding these components helps in comprehending the capabilities and features of the kit, which, in turn, facilitates the development of more effective designs and applications.

The TRAVEO™ T2G Cluster 4M Lite Kit includes a TRAVEO™ T2G CYT3DL MCU, an EZ-USB™ FX3, SMIF for connecting HYPERBUS™ memories (SEMPER™ Flash and HYPERRAM™), a MIPI CSI-2 camera interface, an FPD-Link display interface, an on-board programmer/debugger KitProg3, and several general-purpose I/O headers.

3.1 TRAVEO™ T2G MCU

The TRAVEO™ T2G Cluster 4M Lite Kit is designed to evaluate the features and functionality of the TRAVEO™ T2G CYT3DL device. The CYT3DL family includes a 2D graphics engine, sound processing, an Arm® Cortex®-M7 CPU running up to 240 MHz for primary processing, and an Arm® Cortex®-M0+ CPU for peripheral and security processing.

The TRAVEO™ T2G CYT3DL comes in two unique packages: a 216-pin TEQFP and a 272-ball BGA. The TRAVEO™ T2G Cluster 4M Lite Kit uses the 272-ball BGA package.

While the TRAVEO™ T2G Cluster 4M Lite Kit provides various functionalities and features, some functionalities and features supported by the TRAVEO™ T2G CYT3DL device may not be available on the Lite Kit due to design limitations and the availability of certain peripherals and pins.

The table below provides an overview of the functionalities and features supported on the TRAVEO™ T2G Cluster 4M Lite Kit compared to those on the TRAVEO™ T2G CYT3DL device.

Table 6 **Functionalities available on TRAVEO™ T2G Cluster 4M Lite Kit**

Functionality/feature	Supported on TRAVEO™ T2G Cluster 4M Lite Kit
FlexRay	Not supported
CXPI	Not supported
Ethernet	Supported ¹⁾ with external shields
CAN FD	Supported ²⁾ with external shields
LIN	Supported ²⁾ with external shields
UART	Supported
I2C	Supported
SPI	Supported
ADC	Supported
DMA	Supported
RTC	Supported
TCPWM	Supported
SMIF	Supported
IO	Supported
Graphics	Supported
CRYPTO	Supported
I2S	Supported ³⁾ with external shields

1) Supported with external Ethernet PHY, which can be connected to the PMOD connector (X801).

2) Supported only with the CY8CKIT-026 CAN and LIN Shield Kit, which you can connect using the Arduino headers.

3 Functional description

3) Supported only with external I2S shields, which can be connected via the Raspberry Pi IO header (X800).

3.2 Power supply

This section provides detailed information about the power supply and power flow in the TRAVEO™ T2G Cluster 4M Lite Kit, including how power is generated and distributed to the TRAVEO™ T2G CYT3DL MCU and various components and peripherals in this kit.

To power up the TRAVEO™ T2G Cluster 4M Lite Kit, use any of the following options:

- USB Type-C⁶⁾
- USB Micro-B⁷⁾
- 12 V DC power adapter⁸⁾

This kit features an onboard PMIC module and LDOs to generate the necessary power supplies for the TRAVEO™ T2G CYT3DL MCU and other peripherals. The PMIC module can take input from a 12 V adapter or 5 V from the USB connectors to generate voltages based on the kit's requirements and configurations. The PMIC output rails can also drive other peripherals available on the kit.

Figure 15 illustrates the kit's power supply block diagram.

⁶ If you connect the USB Type-C to Type-C cable to a standard USB port on the PC, it will only power up the kit. However, if you want to stream EZ-USB™ FX3 RGB packets to the screen, connect the cable to a USB 3.0 port on the PC.

⁷ KitProg3 is powered up only with this option. Therefore, if you want to use the onboard programmer/debugger KitProg3, ensure that you are using this power option.

⁸ Ensure that the power adapter supports a minimum of 12 V/1 A power. However, a 12 V/3 A adapter is the default rating recommended for use with this kit.

3 Functional description

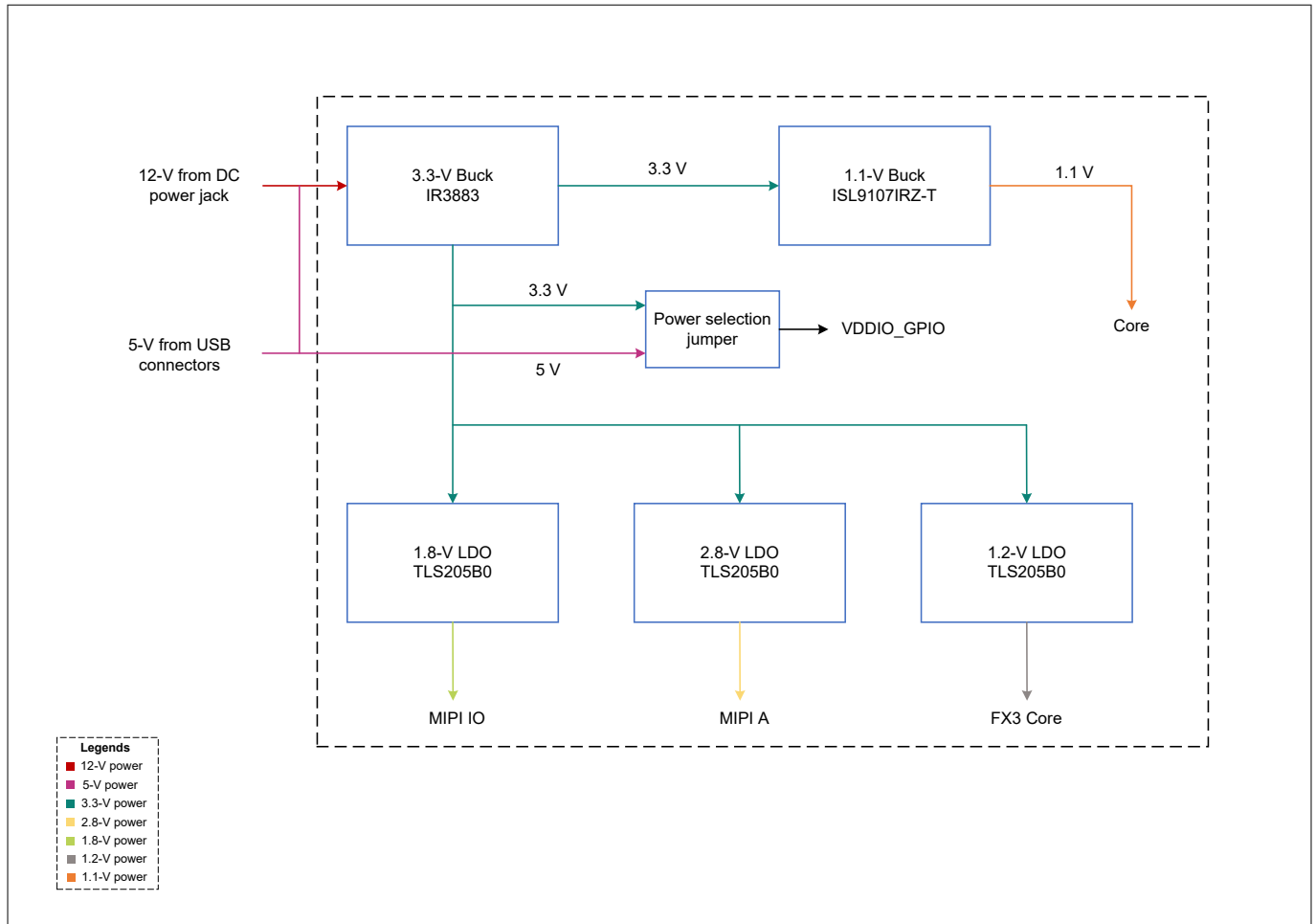


Figure 15 Power supply block diagram

For the 12 V powering option, connect the jumpers as follows:

- Jumper X103: shorted between pins 1-2
- Jumper X104: open

For the 5 V powering option, connect the jumpers as follows:

- Jumper X103: shorted between pins 2-3
- Jumper X104: shorted
- Jumper X402: shorted

In the TRAVEO™ T2G Cluster 4M Lite Kit:

- The primary supply comes from the IR3883 buck regulator
- The IR3883 buck regulator is used for converting 12 V DC or 5 V DC to 3.3 V DC
- The ISL9107IRZ-T buck regulator is used for converting 3.3 V to 1.1 V DC
- The kit includes other power LDOs to generate power supplies for various peripherals
- The TLS205B0 LDO regulator is used for generating power supplies of 1.2 V, 1.8 V, and 2.8 V
- The board generates 1.2 V, 1.8 V, and 2.8 V voltage rails for different peripherals such as Ethernet, MIPI CSI-2, and FPD-Link display interfaces

Figure 16 explains the operation of 12 V and 5 V with VIN ORED connection in the TRAVEO™ T2G Cluster 4M Lite Kit.

3 Functional description

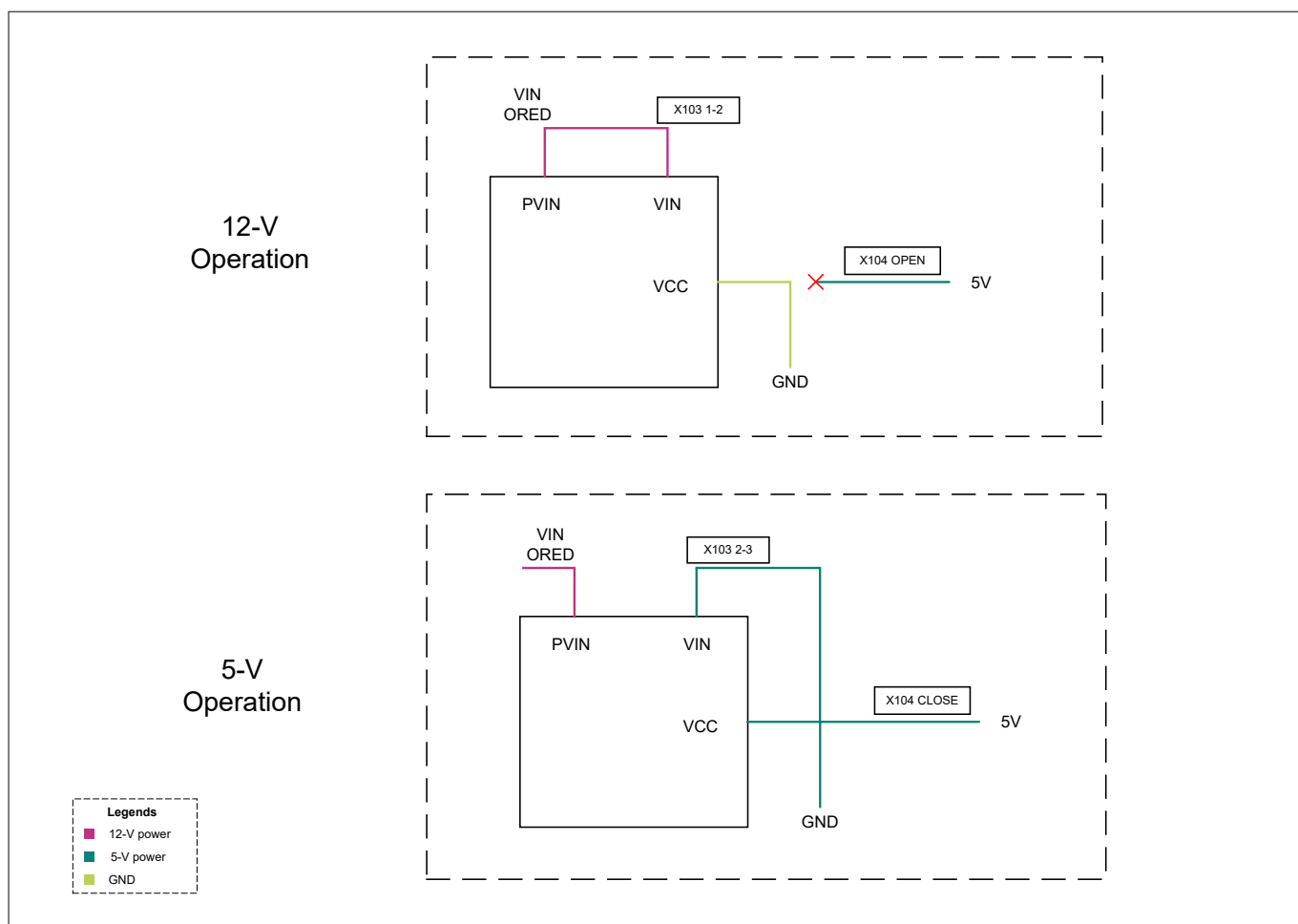


Figure 16 Power operation block diagram

3.3 Clock

This section provides information about the various crystal oscillators available on the TRAVEO™ T2G Cluster 4M Lite Kit that are used for clocking the TRAVEO™ T2G CYT3DL MCU and other peripherals.

The TRAVEO™ T2G Cluster 4M Lite Kit contains several crystal oscillators for clocking the TRAVEO™ T2G CYT3DL MCU and other peripherals, which are listed in [Table 7](#).

Table 7 Crystals available in this kit

Crystal oscillator	Reference designator	Frequency
Watch Crystal Oscillator (WCO)	Y300	32.768 kHz
External Crystal Oscillator (ECO)	Y301	16 MHz
Crystal oscillator for EZ-USB™ FX3	Y500	19.2 MHz

3.4 Reset

This section describes how to reset the TRAVEO™ T2G CYT3DL MCU using the MCU reset button (S200). The MCU reset button (S200) is specifically designed to reset the TRAVEO™ T2G CYT3DL MCU and is connected to the XRES pin of the MCU via a 10K resistor.

To reset the TRAVEO™ T2G CYT3DL MCU, simply press the reset button. This action connects the XRES pin to the ground, initiating the reset process.

3 Functional description

3.5 User interfaces

The TRAVEO™ T2G Cluster 4M Lite Kit provides several interfaces for user interaction, including two user LEDs, one push button, and a potentiometer interface. These interfaces are designed to facilitate the use of 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 Cluster 4M Lite Kit can operate across the entire voltage range of VDD. These LEDs function as active HIGH, requiring the pins to supply VDD to turn them ON.

3.5.2 User push button

The user push button on the TRAVEO™ T2G Cluster 4M Lite Kit provides a means of input to the TRAVEO™ T2G CYT3DL MCU. By default, pressing this button connects the TRAVEO™ T2G CYT3DL MCU pin to the ground.

3.5.3 Potentiometer

The TRAVEO™ T2G Cluster 4M Lite Kit features a 10 kΩ potentiometer that is connected to the TRAVEO™ T2G CYT3DL MCU pin P7[0]. The potentiometer is used to simulate a sensor output to the TRAVEO™ T2G CYT3DL MCU.

3.6 Graphics and video interfaces

This kit supports various video-compatible interfaces that can be accessed via specific connectors. These interfaces are compatible with components, such as displays, cameras, and adapter boards.

3.6.1 EZ-USB™ FX3

This kit supports the FX3 video interface via a USB Type-C connector to stream the graphics output to the 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 CYT3DL device are converted into USB 3.2 packets by the FX3 and streamed to a PC. The PC detects the FX3 as a camera, allowing any media player application (such as MPC Player or VLC) to display the graphics streamed by it.

For streaming, use the TRAVEO™ T2G Virtual Display Tool mentioned in [Streaming the EZ-USB™ FX3](#).

Note: For more information, such as programming the EZ-USB™ FX3, see [Programming the EZ-USB™ FX3](#).

3.6.1.1 Streaming the EZ-USB™ FX3

The following section provides a detailed, step-by-step guide for installing and running the TRAVEO™ T2G Virtual Display Tool to stream the FX3 device as a camera.

1. Download the TRAVEO™ T2G Virtual Display Tool from the [IDC webpage](#)
2. Open the downloads folder and double-click on the `traveot2gvirtualdisplaytool_1.0.0_Windows_x64.exe` file to launch the installer
3. During installation, select the recommended option for user access and proceed

3 Functional description

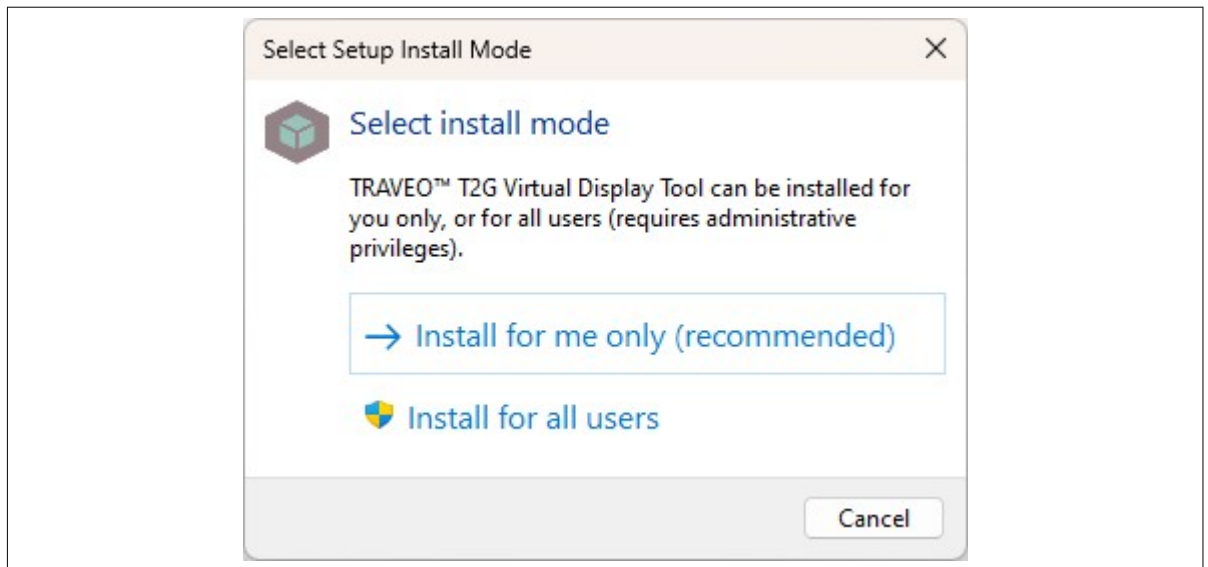


Figure 17 Installation of the tool

4. Accept the license agreement by reading through it and selecting **I accept the agreement**, then click **Next**

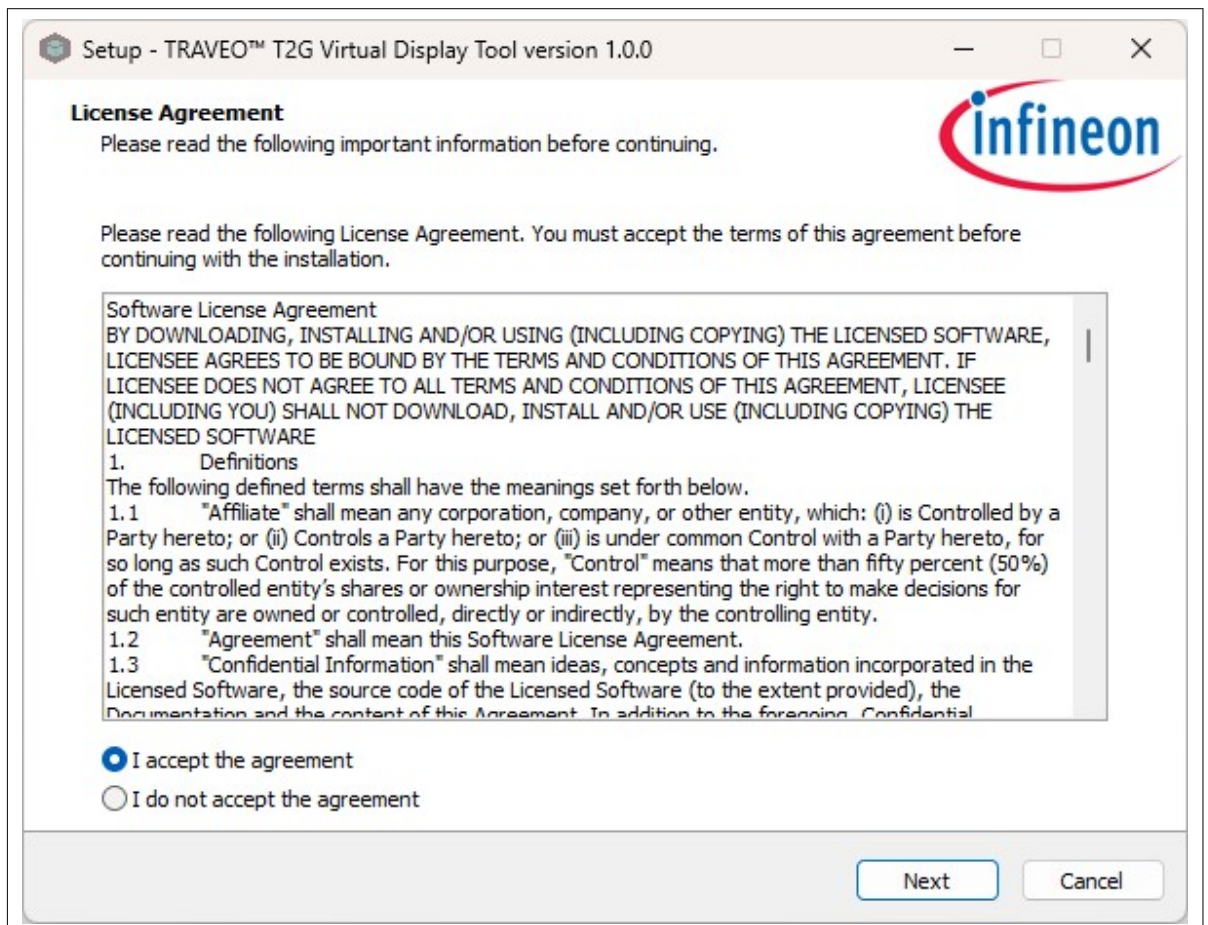


Figure 18 License agreement

5. Choose the installation type. Select **Quick Installation (Recommended)** and click **Install**

3 Functional description

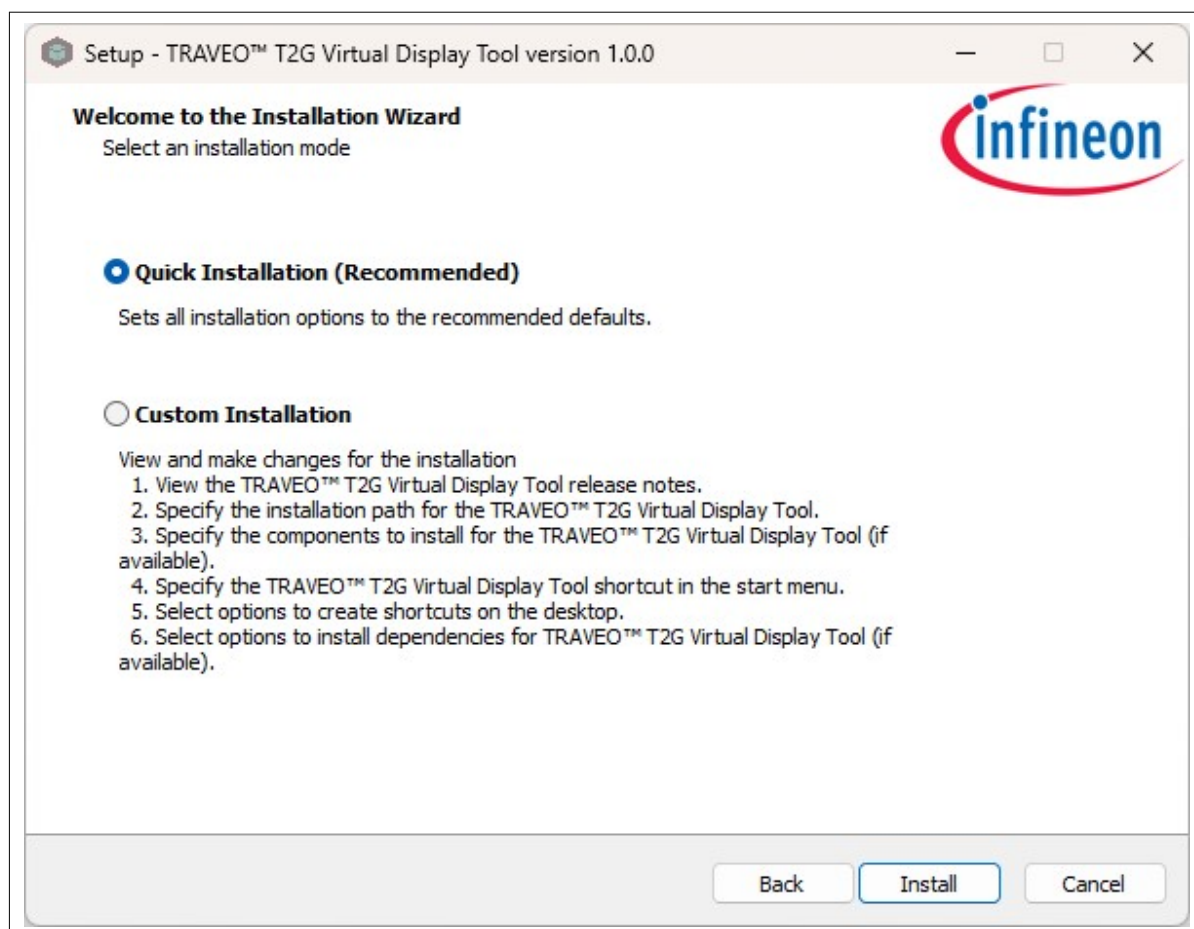


Figure 19 Quick installation

6. The tool will be installed automatically. Once completed, a **Finish** message will appear. Ensure the checkbox for **Run TRAVEO™ T2G Virtual Display Tool** is selected, then click **Finish**

3 Functional description

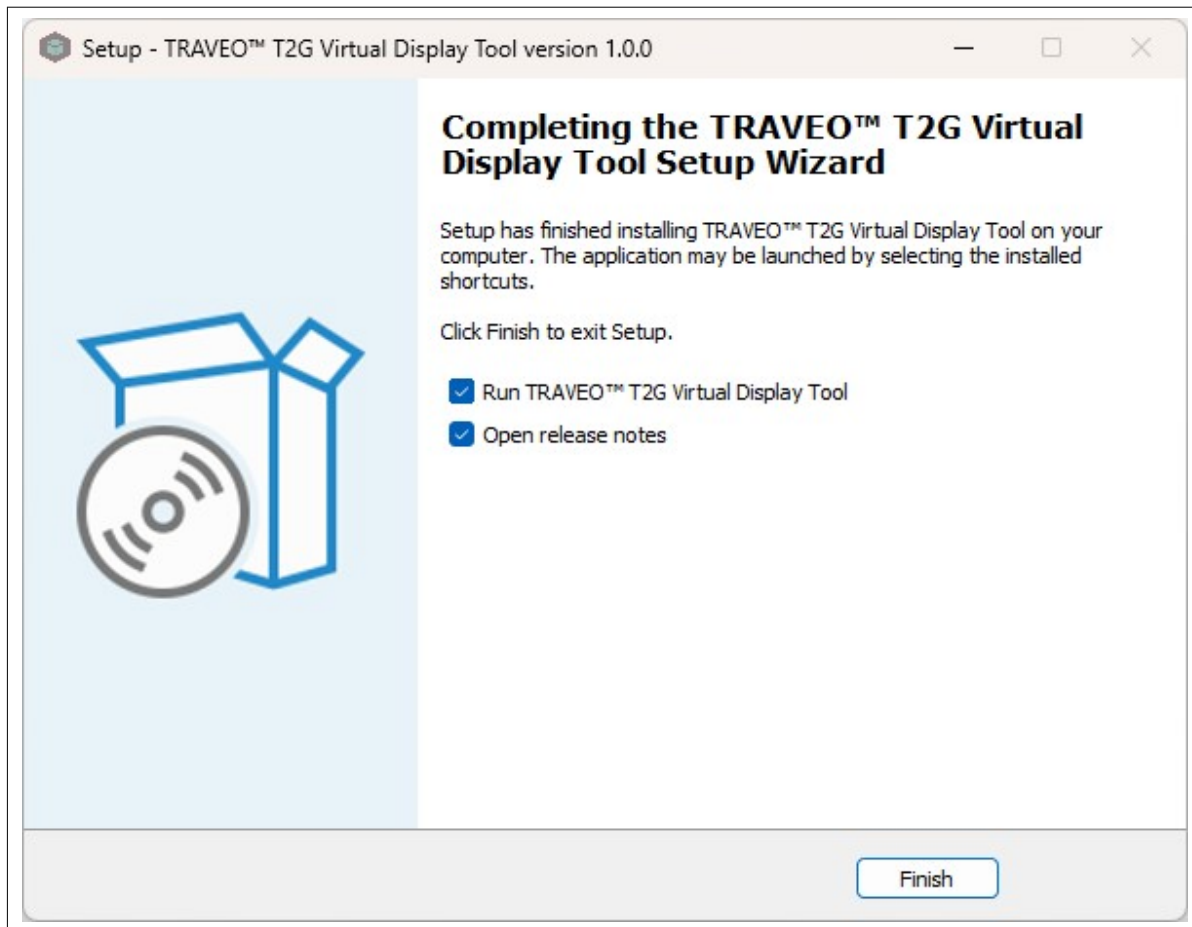


Figure 20 Installation finish message in the installation wizard

7. The TRAVEO™ T2G Virtual Display Tool GUI will now open on your screen

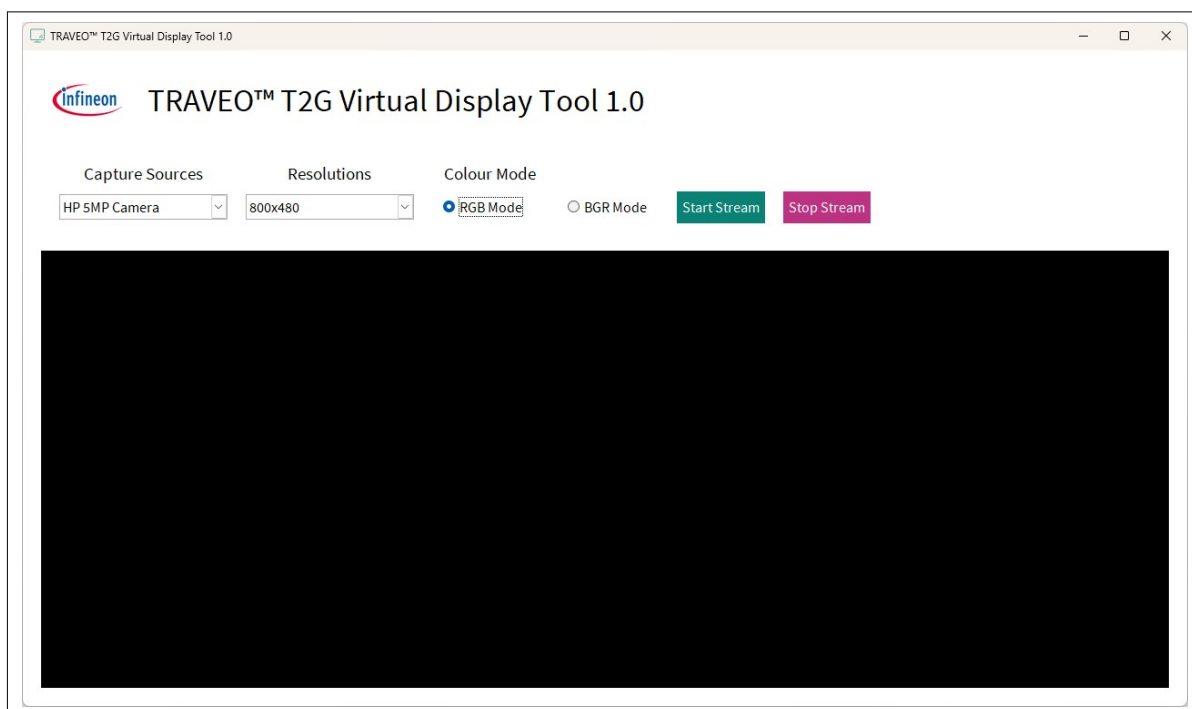


Figure 21 TRAVEO™ T2G Virtual Display Tool GUI window

3 Functional description

8. From the **Capture Sources** dropdown, select **FX3**. Next, choose the resolution for the captured video from the **Resolutions** dropdown. For the default shipping firmware, select **800x480**

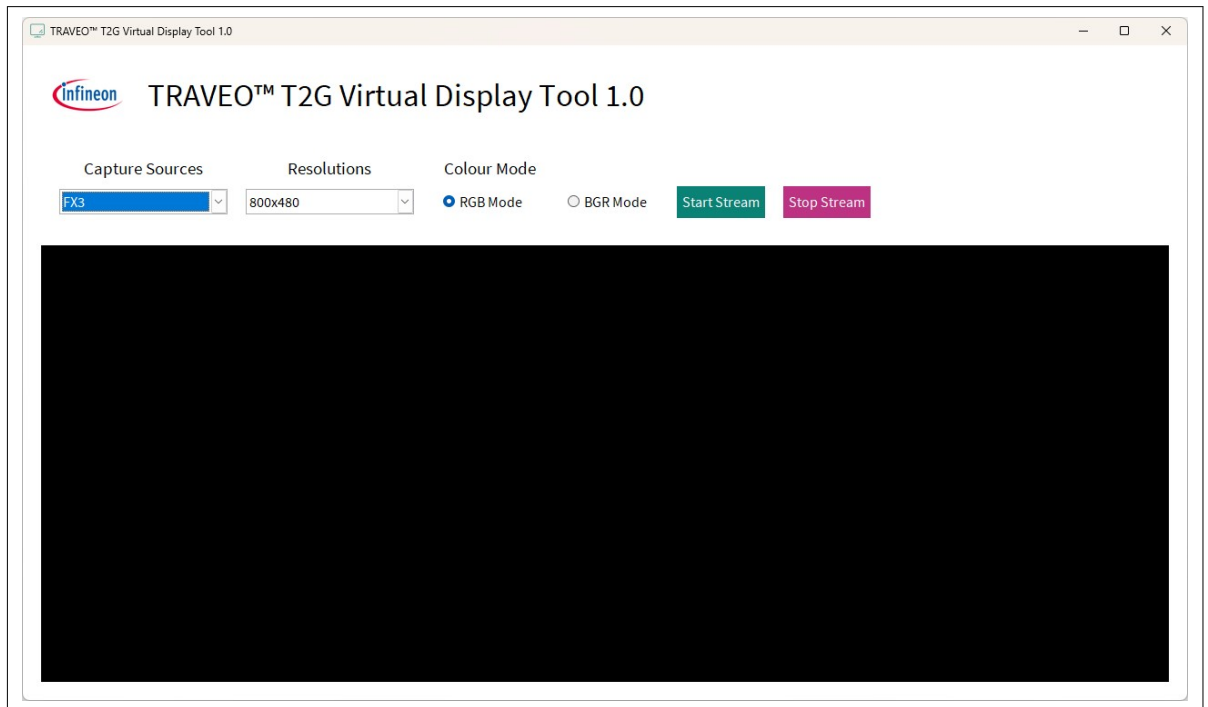


Figure 22 Selecting FX3 and resolutions

9. After selecting the resolution, click **Start Stream** to begin streaming video from the FX3 source
10. Once streaming starts, the captured video or image will play in the **Video Capture Window** of the GUI

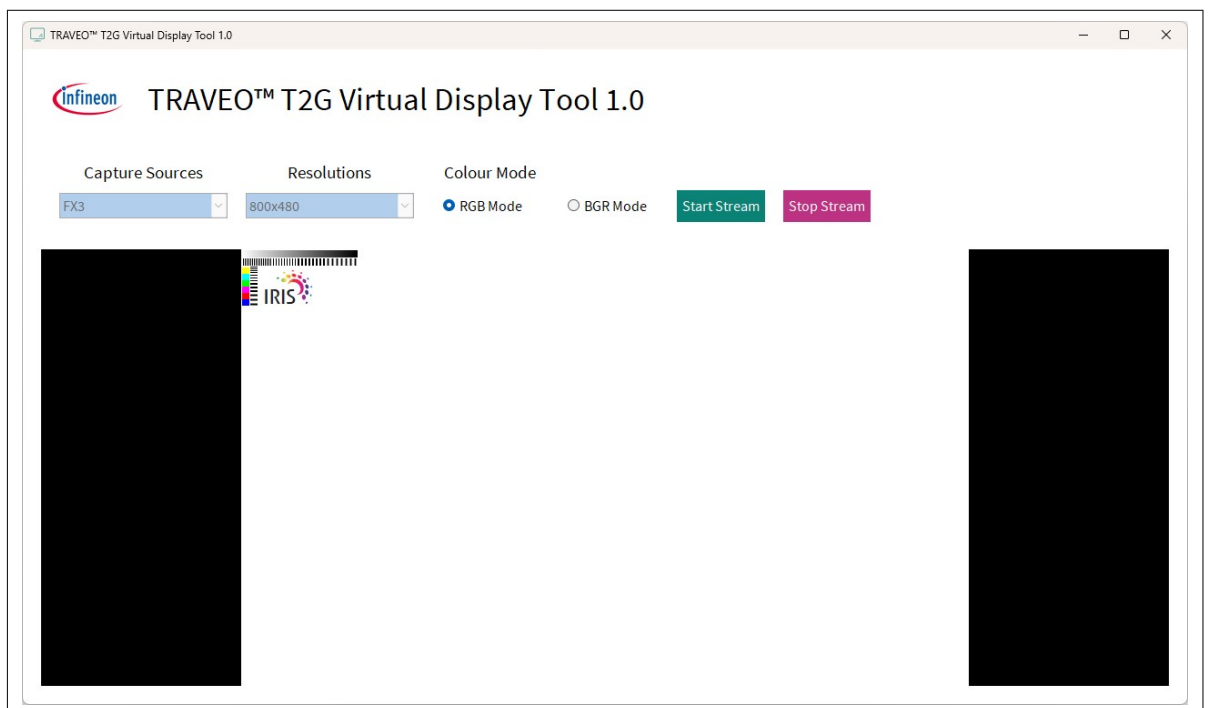


Figure 23 IRIS test pattern image streaming

11. To change the color mode, select the desired option (**RGB** or **BGR**) from the **Colour Mode** radio buttons
12. If the video freezes or gets stuck, the tool will automatically reconnect and resume video capture. If the issue persists, press the **MCU Reset** button, then click **Stop Stream**, and finally click **Start Stream** to restart the video stream

3 Functional description

3.6.2 FPD-Link interface

This kit includes one FPD-Link interface and supports graphics output. To stream graphics output, connect the FPD-Link display, which is compatible with [Innolux G070Y2-L01](#).

Attention: *You will need to connect a 12 V DC power adapter if you are using the FPD-Link display with this kit. See [Powering through 12 V DC power adapter for step-by-step guidance on how to power this kit using a 12 V DC power adapter](#).*

3.6.3 MIPI CSI-2 interface

This kit supports the MIPI CSI-2 interface. Since the CSI-2 receiver is integrated into the CYT3DL device, you will need an external camera module to transmit the video stream to the device. The MIPI CSI-2 camera interface (X701) supports multiple imaging formats, including YUV, RGB, and raw formats. This connector is compatible with an eCON camera module, specifically the [e-CAM52A_5640_MOD](#) MIPI camera.

3.7 Communication interfaces

The TRAVEO™ T2G Cluster 4M Lite Kit offers a range of communication interfaces, including I²C, 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 4M Lite Kit includes a PMOD connector that can be used with an external Ethernet shield module. The following section provides more details about the various Ethernet shield module kits that are supported with this kit.

3.7.1.1 Ethernet PHY shields

The TRAVEO™ T2G Cluster 4M Lite Kit does not have an onboard Ethernet PHY. However, you can use external Ethernet PHY boards by connecting them to the PMOD connector for Ethernet (X801) on the board. The supported shields for Ethernet communication protocol are listed below:

- **DP83848 Ethernet board:** The DP83848 Ethernet board is an accessory board that includes an onboard Ethernet Physical Layer Transceiver (DP83848), an RJ45 connector, and a control interface
- **LAN8720 Ethernet board:** The LAN8720 Ethernet board supports the RMII interface with a 10/100 Ethernet Transceiver (LAN8720)

[Figure 24](#) shows the available shields that you can use with the PMOD headers of this kit.

3 Functional description



Figure 24 Different Ethernet shields supported by the TRAVEO™ T2G Cluster 4M Lite Kit

Note: See the [References](#) section to obtain the ordering details for all these shield kits.

3.8 Serial memory interface

The TRAVEO™ T2G Cluster 4M Lite Kit includes a serial memory interface (SMIF) that acts as a master, providing a low pin count connection to off-chip SPI devices, such as EEPROM, FRAM, MRAM, or NAND memories, in both SDR and DDR modes. It also supports HYPERBUS™ devices, including HYPERFLASH™ (NOR flash) and HYPERRAM™ (PSRAM and pseudo static RAM).

The TRAVEO™ T2G Cluster 4M Lite Kit has two onboard SMIF devices:

- **512 Mb SEMPER™ Flash (S26HL):** Connected to the SMIF-0 instance
- **64 Mb HYPERRAM™ (S27KL):** Connected to the SMIF-1 instance

3.8.1 SEMPER™ Flash

The TRAVEO™ T2G Cluster 4M Lite Kit features a 512 Mb SEMPER™ Flash (S26HL512T), a high-speed CMOS, MIRRORBIT™ NOR flash device compliant with the JEDEC JESD251 eXpanded SPI (xSPI) specification. The SEMPER™ Flash with HYPERBUS™ interface supports both the HYPERBUS™ interface and legacy (x1) SPI. Both interfaces serially transfer transactions, thereby reducing the number of interface connection signals.

3 Functional description

3.8.2 HYPERRAM™

This kit includes a 64 Mb HYPERRAM™ self-refresh DRAM (PSRAM). The Infineon 64 Mb HYPERRAM™ (S27KL0642) device is a high-speed CMOS, self-refresh DRAM with a HYPERBUS™ interface. The DRAM array uses dynamic cells that require periodic refresh.

Note: For the datasheet and more details about SEMPER™ Flash and HYPERRAM™, see [References](#).

3.9 Program and debug interface

This kit includes an onboard programmer/debugger, the PSOC™ 5LP (KitProg3), equipped with a USB Micro-B connector for programming and debugging the CYT3DL device. Additionally, you can use the Arm® Standard 20-pin JTAG connector to program and debug the CYT3DL device.

3.9.1 PSOC™ 5LP (KitProg3)

The KitProg3 (onboard programmer/debugger) is implemented using a PSOC™ 5LP device (CY8C5868LTI-LP039). The PSOC™ 5LP handles the low-level communication firmware needed for programming and debugging, facilitating communication between a programming tool and a target, such as the TRAVEO™ T2G Cluster 4M Lite Kit.

In this kit, the KitProg3 is pre-configured to function as a USB-UART bridge for programming and debugging the CYT3DL device. The kit also features a KitProg3 mode switch (S400) and a KitProg3 status LED (D401) (not populated). These interfaces allow you to switch between various operating modes of KitProg3 and 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, available via the 5-pin header (X401) (footprint only). It is important to note that the hardware revision ID of the KitProg3 is 0x08.

To use the onboard programmer/debugger KitProg3 on the TRAVEO™ T2G Cluster 4M Lite Kit, simply connect a USB Micro-B cable to the USB Micro-B connector of KitProg3 (X400) and the USB port of your PC to program and debug this kit.

3.9.2 Arm® Standard SWD/JTAG header

When it comes to programming and debugging the kit using the Arm® Standard 20-pin JTAG connector, use any of the following options:

1. **Using the GHS Probe:** Connect the GHS Probe directly to the Arm® Standard 20-pin JTAG connector (X302) for programming and debugging
2. **Using the I-jet debugger:** Use a JTAG-to-20-pin Arm® converter ([ADA-MIP120-TI14 adapter](#)) to connect the I-jet debugger to the Arm® Standard 20-pin JTAG connector (X302). This allows programming and debugging with the I-jet debugger

These options provide flexibility in choosing the appropriate tools for programming and debugging the TRAVEO™ T2G Cluster 4M Lite Kit.

3.10 General-purpose I/O headers

This kit provides a variety of general-purpose I/O headers that are compatible with popular interfaces. These include:

- One Raspberry Pi-compatible I/O header
- Arduino-compatible headers
- mikroBUS-compatible headers
- Two Shield2Go footprints

3 Functional description

Additionally, this kit supports various shields to use different peripherals not available on the board. These peripherals can be accessed by connecting to the I/O headers of the kit.

3.10.1 Raspberry Pi header

Table 8 Raspberry Pi header pin details

Pins	Functionality
X800.1	3V3
X800.2	5V0
X800.3	SCB2 I2C SDA
X800.4	5V0
X800.5	SCB2 I2C SCL
X800.6	GND
X800.7	GPIO1 (P7.1)
X800.8	SCB6 UART RX
X800.9	GND
X800.10	SCB6 UART TX
X800.11	GPIO2 (P7.2)
X800.12	TDM TX SCK0
X800.13	GPIO3 (P7.3)
X800.14	GND
X800.15	GPIO4 (P8.0)
X800.16	TDM RX SCK0
X800.17	3V3
X800.18	TDM TX MCK0
X800.19	SCB7 SPI MOSI
X800.20	GND
X800.21	SCB7 SPI MISO
X800.22	GPIO9 (P7.1)
X800.23	SCB7 SPI CLK
X800.24	SCB7 SPI SEL0
X800.25	GND
X800.26	SCB7 SPI SEL1
X800.27	SCB2 I2C SDA
X800.28	SCB2 I2C SCL
X800.29	GPIO5 (P8.1)
X800.30	GND

(table continues...)

3 Functional description

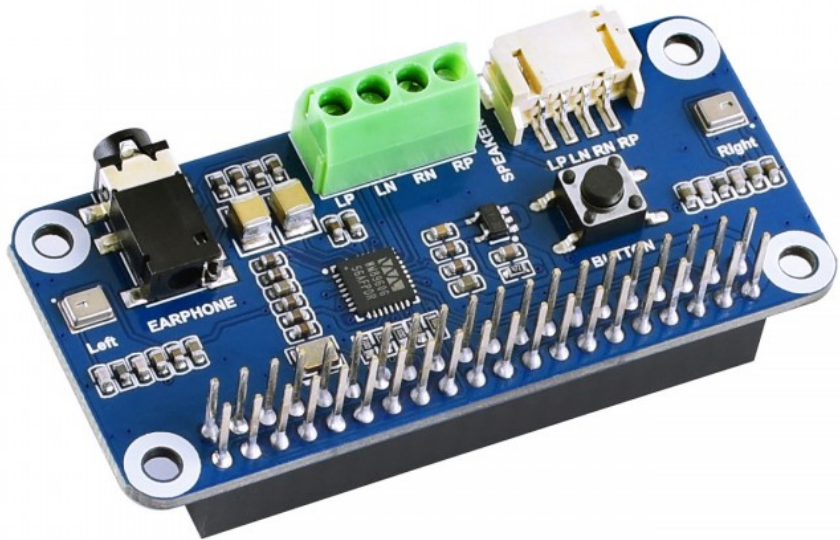
Table 8 (continued) Raspberry Pi header pin details

Pins	Functionality
X800.31	GPIO6 (P9.2)
X800.32	GPIO8 (P9.0)
X800.33	TDM RX MCK0
X800.34	GND
X800.35	TDM TX FSYNC0
X800.36	GPIO7 (P8.3)
X800.37	TDM RX FSYNC0
X800.38	TDM RX SD0
X800.39	GND
X800.40	TDM TX SD0

3.10.1.1 WM8960 Audio HAT

The TRAVEO™ T2G Cluster 4M Lite Kit includes a Raspberry Pi-compatible I/O header, which can be used to connect the WM8960 Audio HAT for audio codec purposes. The WM8960 Audio HAT is a sound card HAT designed for Raspberry Pi, featuring low power consumption, support for stereo encoding/decoding, and Hi-Fi playback/recording capabilities.

3 Functional description



WM8690
Audio HAT

Figure 25 WM8960 Audio HAT

3.10.2 Arduino headers

Table 9 Arduino headers pin details

Arduino header pins	Functionality
Arduino header X802	
X802.1	LIN0 TX
X802.2	LIN0 RX
X802.3	SCB8 SPI SEL0
X802.4	SCB8 SPI MOSI
X802.5	SCB8 SPI MISO
X802.6	SCB8 SPI CLK
X802.7	GND
X802.8	VADC
X802.9	SCB2 I2C SCL
X802.10	SCB2 I2C SDA

(table continues...)

3 Functional description

Table 9 (continued) **Arduino headers pin details**

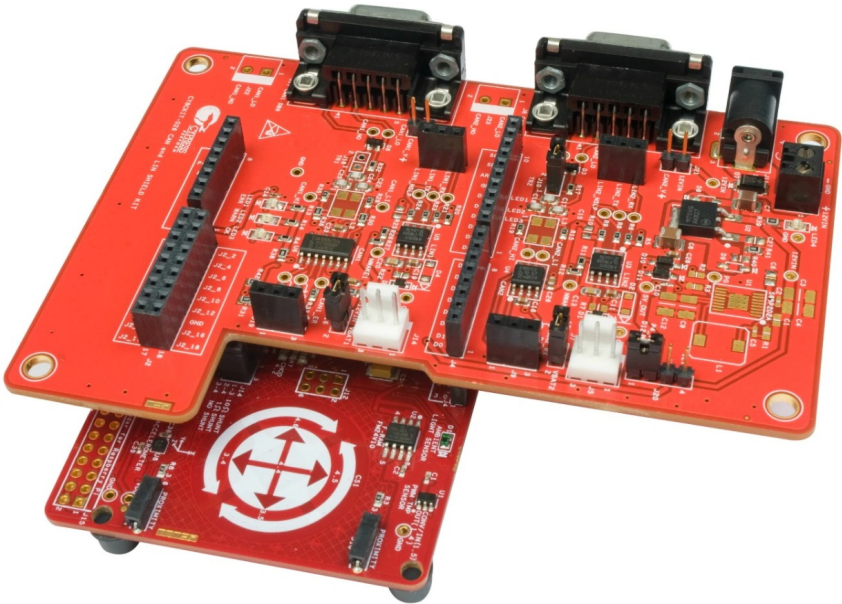
Arduino header pins	Functionality
Arduino header X803	
X803.1	VIN
X803.2	GND
X803.3	GND
X803.4	5V0
X803.5	3V3
X803.6	XRES#
X803.7	VDDIO
X803.8	NC
Arduino header X805	
X805.1	AN1 (P4.4)
X805.2	AN2 (P4.5)
X805.3	AN3 (P2.0)
X805.4	AN4 (P5.0)
X805.5	SCB2 I2C SDA
X805.6	SCB2 I2C SCL
X805.7	DAC_AOUT_R
X805.8	DAC_AOUT_L
X805.9	DAC_COM_R
Arduino header X806	
X806.1	LIN1 TX
X806.2	LIN1 RX
X806.3	DAC_COM_L
X806.4	GPIO3 (P11.1)
X806.5	CAN0 TX
X806.6	CAN0 RX
X806.7	GPIO2 (P8.2)
X806.8	GPIO1 (P4.2)

3.10.2.1 CY8CKIT-026 CAN and LIN Shield Kit

The TRAVEO™ T2G Cluster 4M Lite Kit supports the CY8CKIT-026 CAN and LIN Shield Kit, an Arduino-compatible shield kit used for CAN and LIN communication capabilities.

By default, the TRAVEO™ T2G Cluster 4M Lite Kit does not include CAN and LIN transceivers. However, by using this shield, you can enable those communication protocols on the kit.

3 Functional description



CY8CKIT-026 CAN LIN
Shield Kit

Figure 26 CY8CKIT-026 CAN and LIN Shield Kit

3.10.3 mikroBUS headers

Table 10 mikroBUS headers pin details

mikroBUS header pins	Functionality
mikroBUS header X812	
X812.1	AN1 (P5.3)
X812.2	RST
X812.3	SCB7 SPI SEL0
X812.4	SCB7 SPI CLK
X812.5	SCB7 SPI MISO
X812.6	SCB7 SPI MOSI
X812.7	3V3
X812.8	GND
mikroBUS header X813	
X813.1	GPIO1 (P19.3)

(table continues...)

3 Functional description

Table 10 (continued) mikroBUS headers pin details

mikroBUS header pins	Functionality
X813.2	GPIO2 (P21.3)
X813.3	SCB6 UART RX
X813.4	SCB6 UART TX
X813.5	SCB2 I2C SCL
X813.6	SCB2 I2C SDA
X813.7	5V0
X813.8	GND

3.10.4 Shield2Go headers

Shield2Go footprints are available on this kit, and you can mount the headers based on your requirements.

Note: See [Kit design documents](#) for schematic drawings and pin details of these GPIO headers.

4 Kit design documents

4 Kit design documents

This section provides detailed information on resources that can be used to understand the layout, design, and components of the TRAVEO™ T2G Cluster 4M Lite Kit. These resources include: layout images, schematics, assembly drawings, bill of materials (BOM), and pinout details.

4.1 Schematics

This section provides the schematics for the TRAVEO™ T2G Cluster 4M Lite Kit Rev-01. These schematics can be used to understand the electrical connections and components of the kit.

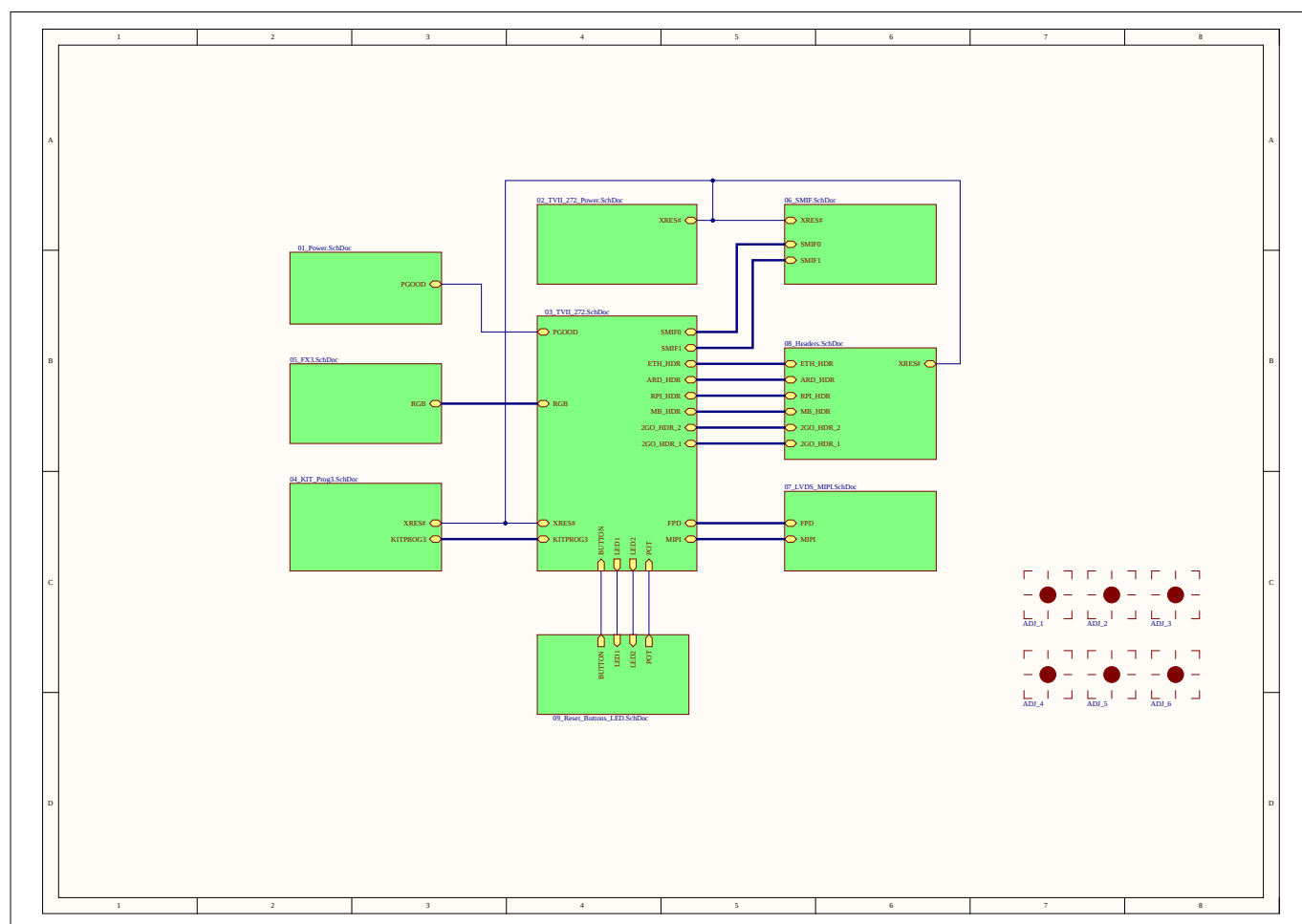


Figure 27 Overview

Figure 28 **Board power**

4 Kit design documents

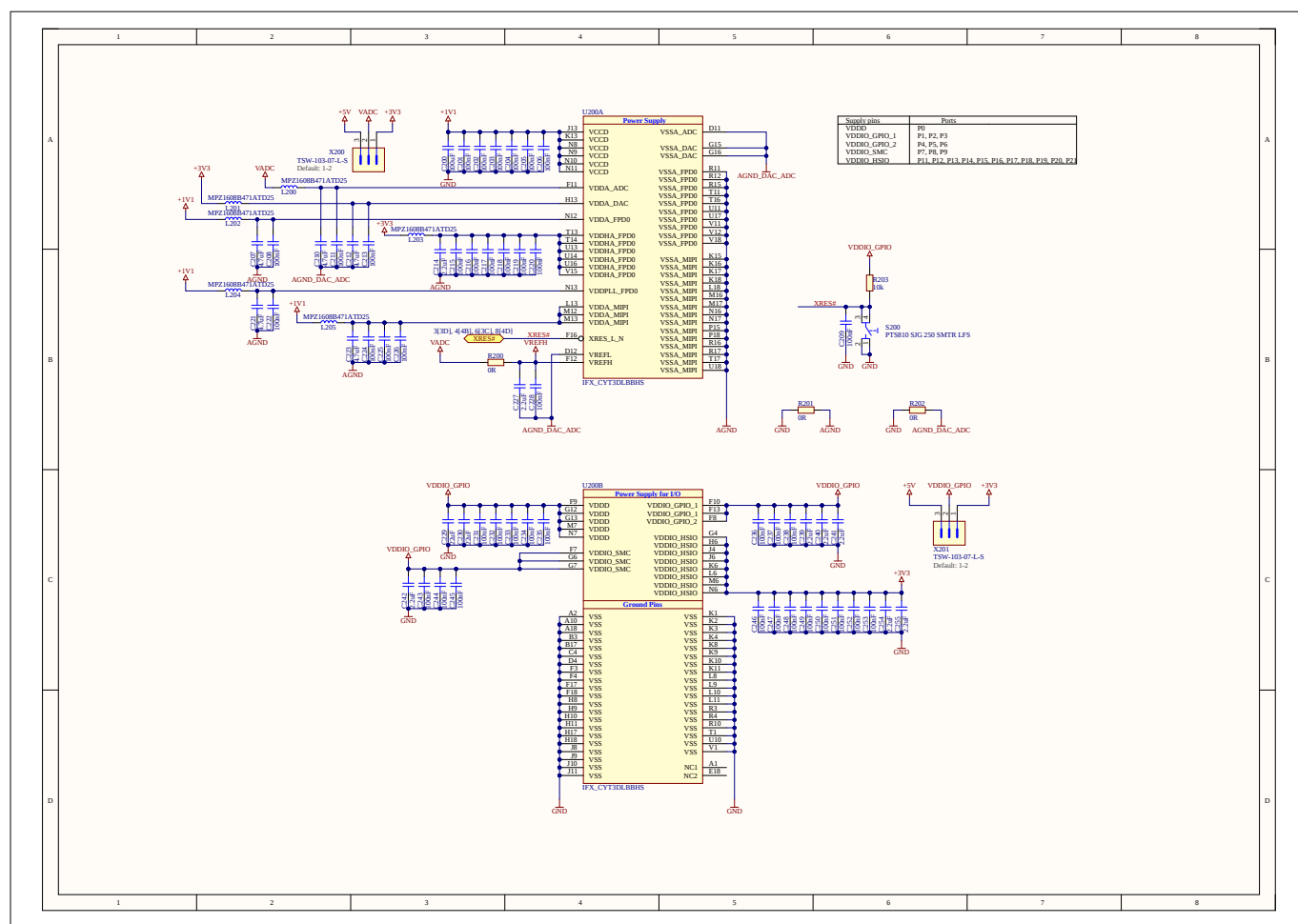


Figure 29 TVII-272 MCU power

Figure 30 **TVII-272 MCU**

Figure 31 **KitProg3**

Figure 32 **EZ-USB™ FX3**

4 Kit design documents

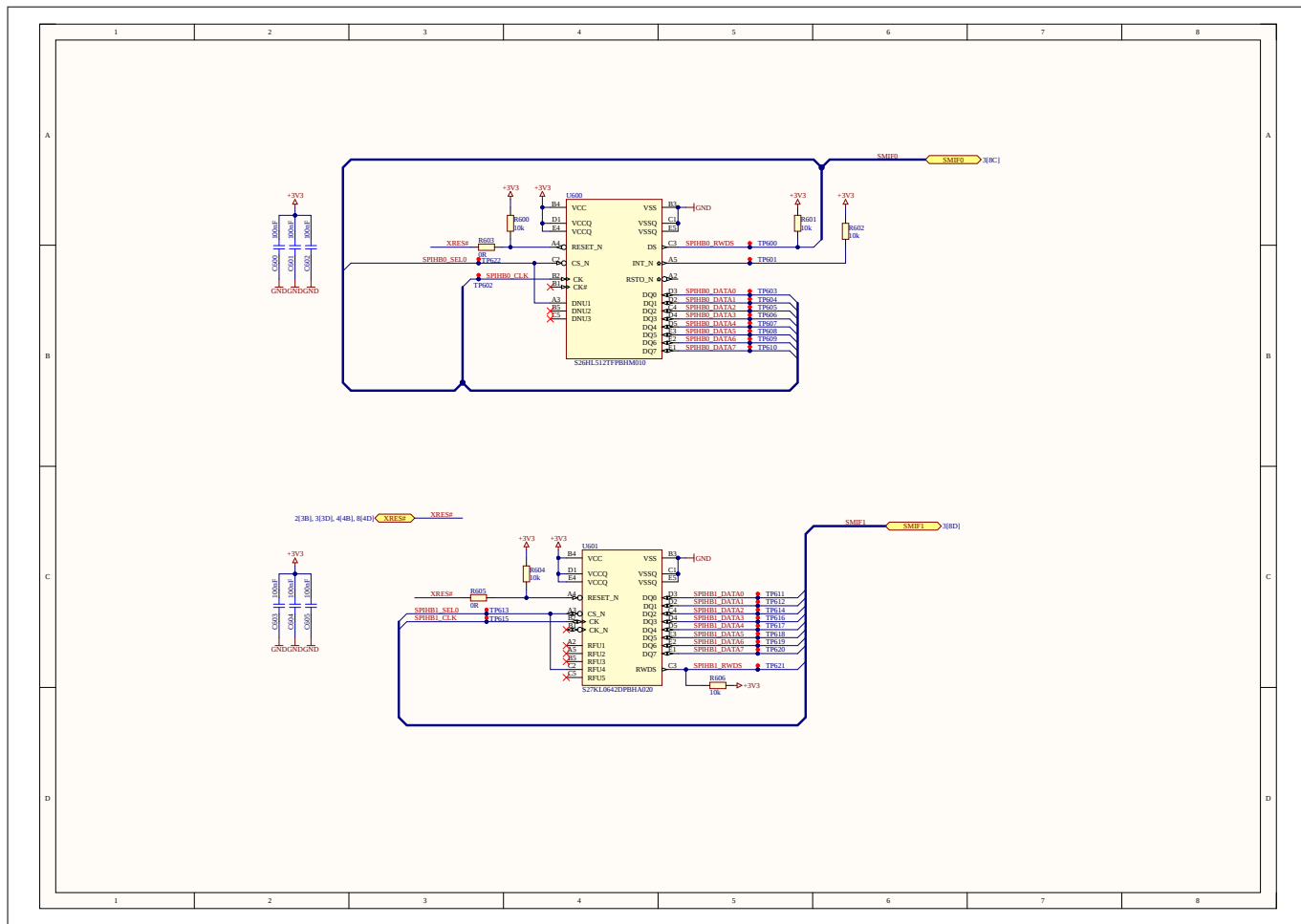


Figure 33 Serial memory interface

4 Kit design documents

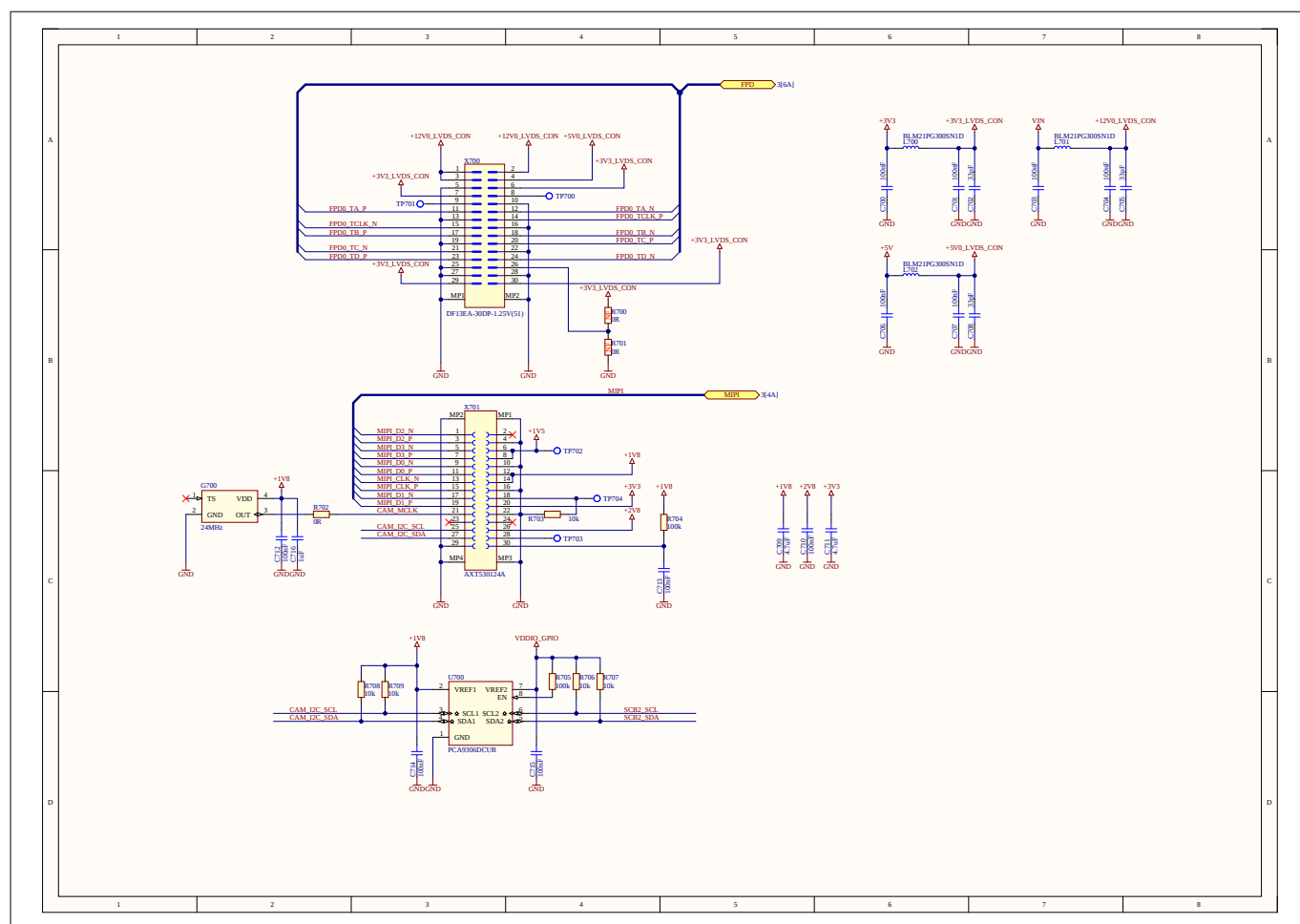


Figure 34 FPD-Link and MIPI CSI-2 interface

Figure 35 **I/O headers**



4.2 Assembly drawing

This section provides the primary and secondary side assembly drawings for the TRAVEO™ T2G Cluster 4M Lite Kit Rev-01. These drawings can be used to understand the physical layout and assembly of the kit.

4 Kit design documents

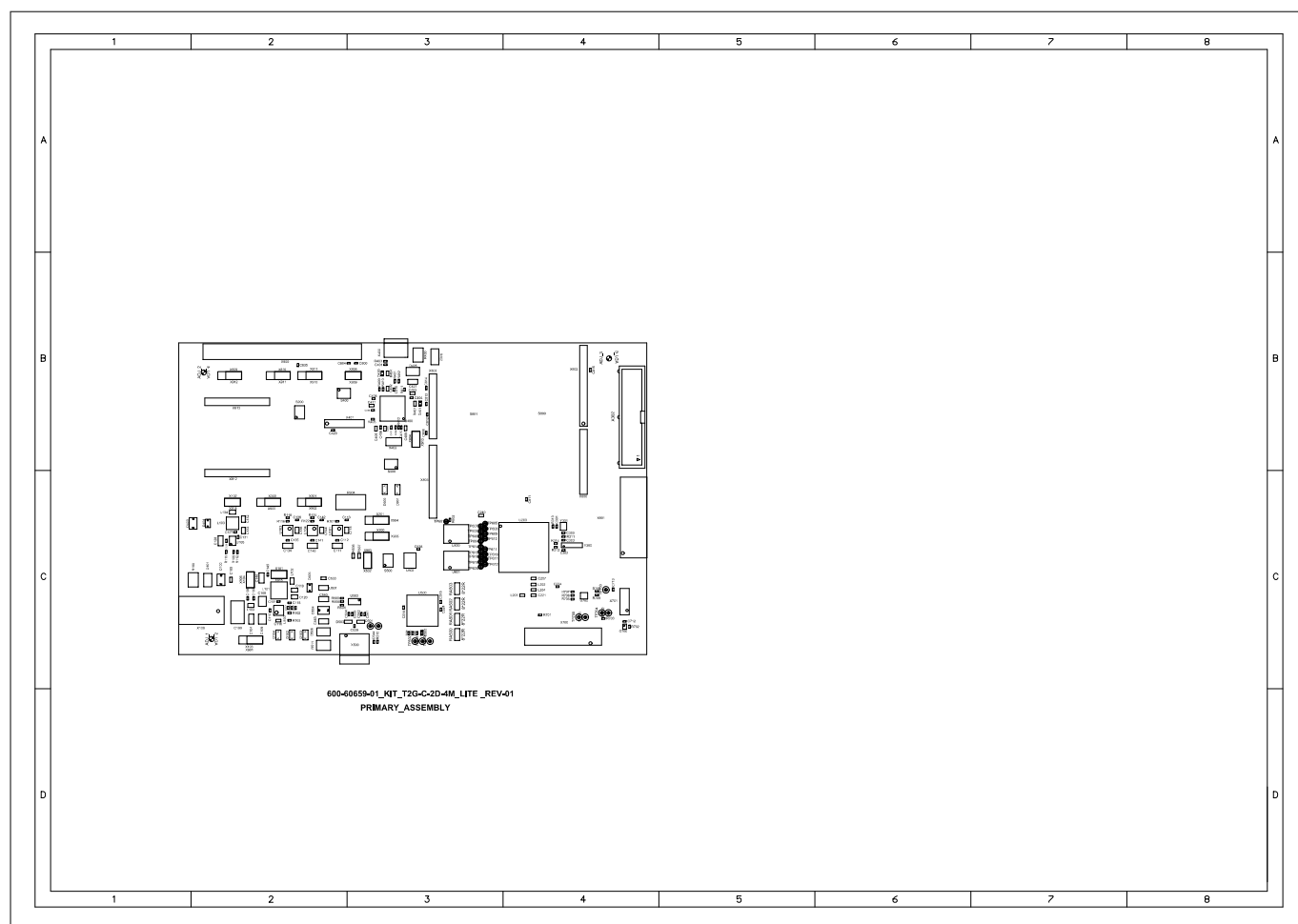


Figure 37 Primary side assembly of TRAVEO™ T2G Cluster 4M Lite Kit Rev-01

4 Kit design documents

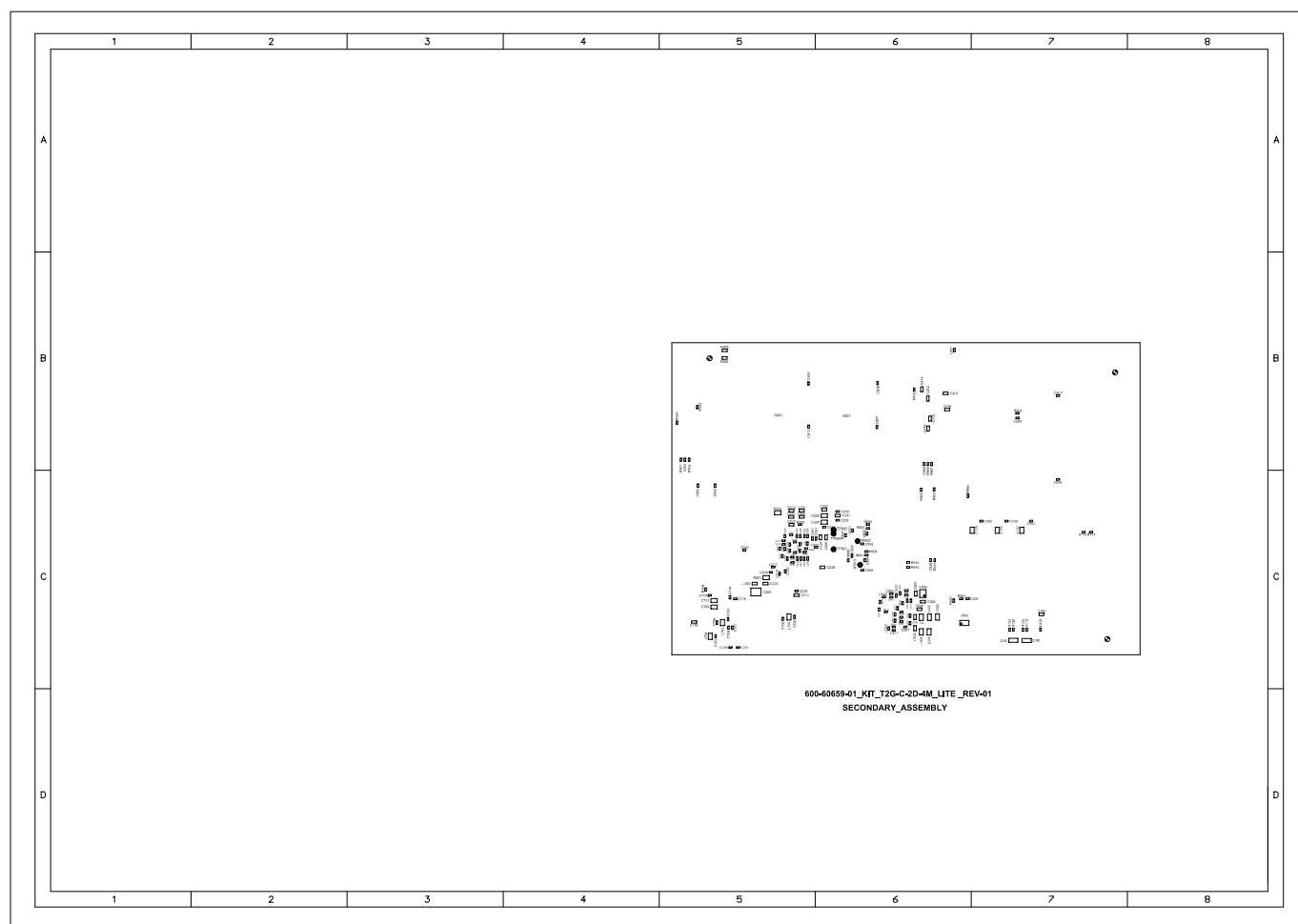


Figure 38 Secondary side assembly of TRAVEO™ T2G Cluster 4M Lite Kit Rev-01

4 Kit design documents

4.3 Layout images

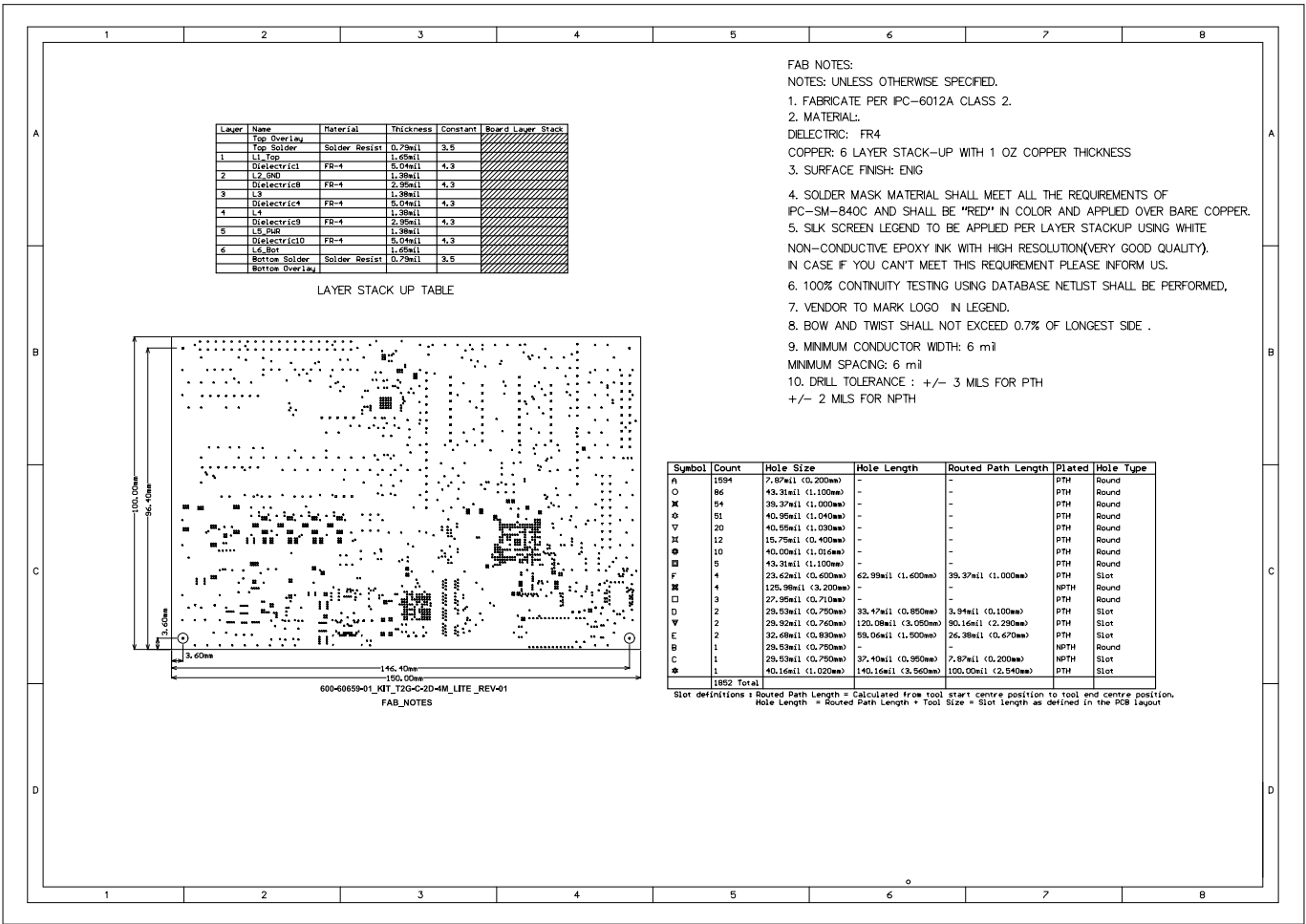
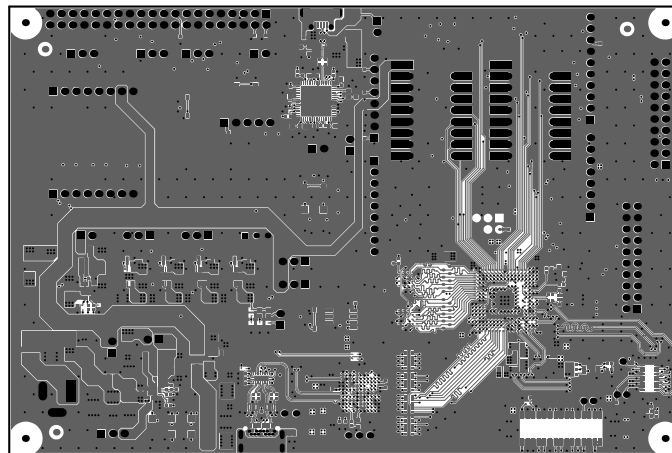


Figure 39 PCB fabrication

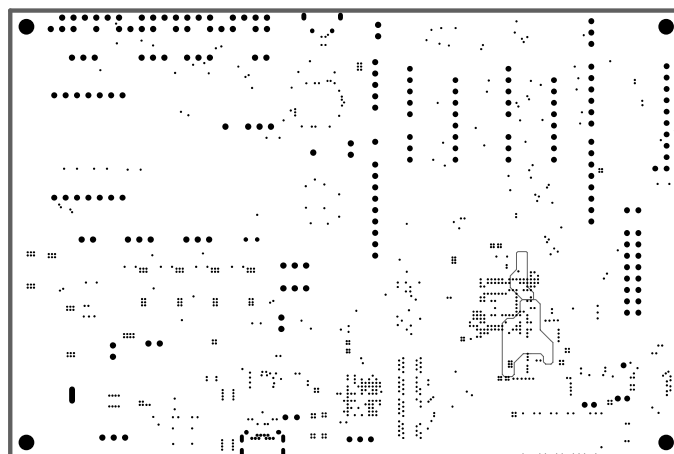
4 Kit design documents



600-60659-01_KIT_T2G-C-2D-4M_LITE_REV-01
PRIMARY_SIDE-L1-TOP

Figure 40 **Primary side layer 1**

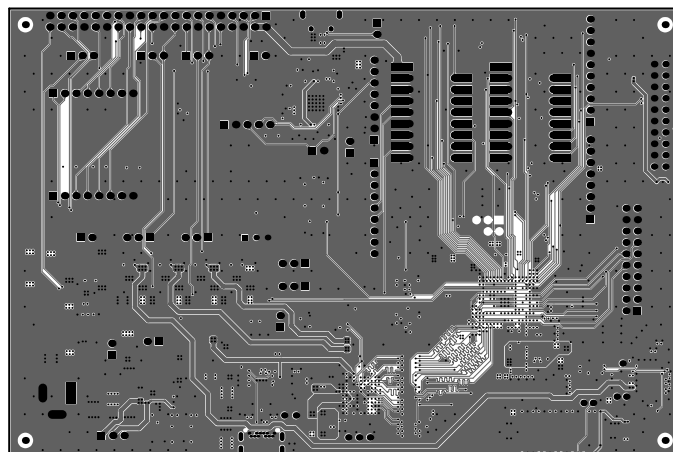
4 Kit design documents



600-60659-01_KIT_T2G-C-2D-4M_LITE_REV-01
L2-GND

Figure 41 **Ground layer 2**

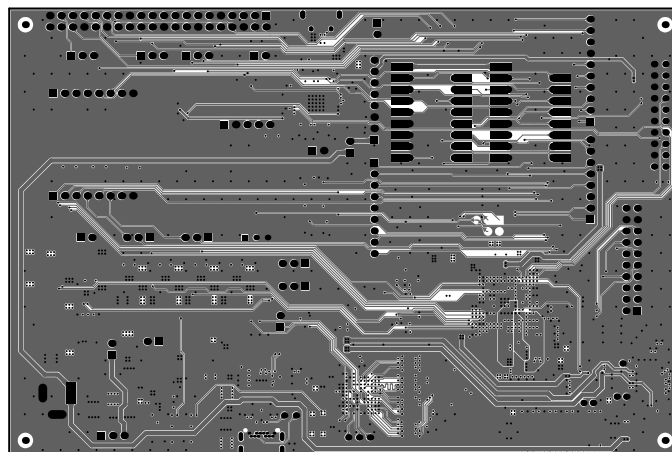
4 Kit design documents



600-60659-01_KIT_T2G-C-2D-4M_LITE_REV-01
L3-SIGNAL_LAYER-1

Figure 42 **Signal layer 3**

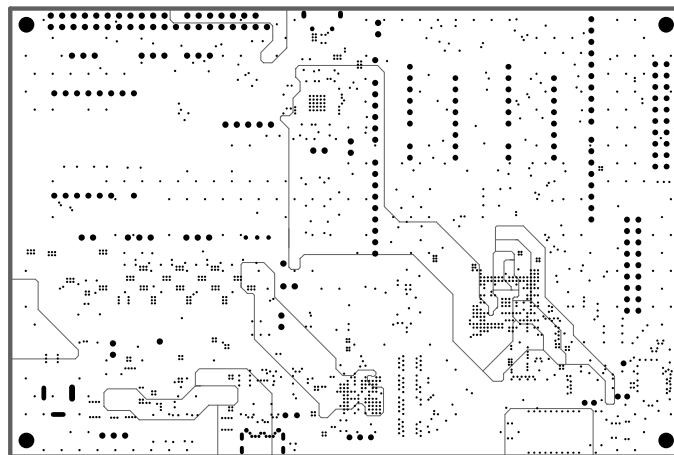
4 Kit design documents



600-60659-01_KIT_T2G-C-2D-4M_LITE_REV-01
L4-SIGNAL_LAYER-2

Figure 43 **Signal layer 4**

4 Kit design documents



600-60659-01_KIT_T2G-C-2D-4M_LITE_REV-01
L5-PWR

Figure 44 **Power layer 5**

4 Kit design documents

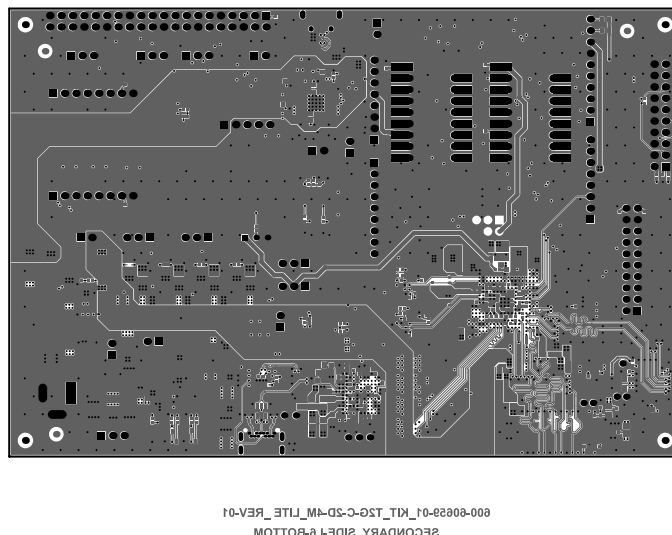


Figure 45 **Secondary side layer 6**

4.4 Bill of materials

This section provides the bill of materials (BOM) for the TRAVEO™ T2G Cluster 4M Lite Kit Rev-01, which is a detailed list of all the components and parts that are included in the kit (see [Table 11](#)).

4 Kit design documents

Table 11 KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	R100	RES/PTC/-/800 mW/-/-/-/ 1812(4532)/SMD/-	Bourns	MF-MSMF150/12-2	-	-
1	R511	RES/PTC/-/800 mW/-/-/-/ 1812(4532)/SMD/-	Bourns	MF-MSMF250/16X-2	-	-
4	L500, L501, L502, L503	IND/-/-/2A/25%/-/-/ 0805(2012)/Inductor, Chip; 2.00 mm L X 1.25 mm W X 1.05 mm H/SMD/-	TDK Corporation	MPZ2012S601AT000	-	-
2	R201, R202	RES/STD/0R/-/0%/-/-/5 5°C to 155°C/ 0805(2012)/SMD/-	Vishay	CRCW08050000Z0EA	0R	-
15	R112, R200, R301, R302, R303, R311, R312, R313, R314, R413, R501, R603, R605, R701, R702	RES/STD/0R/63 mW/1%/-/-55°C to 155°C/0402 (1005)/SMD/-	Yageo	RC0402FR-070RL	0R	-
2	R101, R905	RES/STD/1k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD/-	ROHM Semiconductors	MCR01MZPF1001	1k	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
3	R103, R902, R903	RES/STD/1k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD/-	Vishay	CRCW04021K00FK	1k	-
1	C105	CAP/CERA/1 uF/25V/20%/X7R (EIA)/-55°C to 125°C/ 0603(1608)/SMD/-	Murata	GCM188R71E105MA64	1 uF	-
14	C400, C402, C403, C405, C407, C409, C411, C412, C413, C414, C416, C418, C533, C716	CAP/CERA/1 uF/25V/10%/X7R (EIA)/-55°C to 125°C/ 0603/SMD/-	Samsung	CL10B105KA8NNNC	1 uF	-
2	R542, R543	RES/STD/2k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD/-	Vishay	CRCW04022K00FK	2k	-
1	C103	CAP/CERA/2.2 uF/25 V/10%/X5R (EIA)/-55°C to 85°C/ 0603(1608)/SMD/-	Murata	GRM188R61E225KA12	2.2 uF	-
10	C116, C214, C227, C239, C240, C241, C242, C254, C255, C525	CAP/CERA/2.2 uF/16 V/10%/X5R (EIA)/-55°C to 85°C/ 0603(1608)/SMD/-	Murata	GRM188R61C225KE15	2.2 uF	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	L101	IND/STD/2.2 uH/9.2 A/20%/-40°C to 125°C/14.5 mR/SMD/IND;2 pin,5.28 mm L X 5.48 mm W X 3.10 mm H/SMD/-	Coilcraft	XAL5030-222MEC	2.2 uH	-
1	L103	IND/STD/2.2 uH/5.5 A/20%/-40°C to 125°C/38.7 mR/SMD/Inductor, SMD; 2-Leads, 4 mm L X 4 mm W X 2.1 mm H body/SMD/-	Coilcraft	XAL4020-222MEC	2.2 uH	-
1	R107	RES/STD/2.94k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402(1005)/SMD/-	Vishay	CRCW04022K94FK	2.94k	-
2	R305, R306	RES/STD/4.7k/100 mW/1%/100 ppm/K/-55°C to 155°C/0603(1608)/SMD/-	Yageo	RC0603FR-074K7L	4.7k	-
2	C709, C711	CAP/CERA/4.7 uF/16 V/20%/X5R (EIA)/-55°C to 85°C/0805(2012)/SMD/-	Murata	GRM21BR61C475MA88	4.7 uF	-
(table continues...)						

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
5	C207, C210, C212, C221, C223	CAP/CERA/4.7 uF/16 V/20%/X5R (EIA)/-55°C to 85°C/0603(1608)/SMD/-	Murata	GRM188R61C475MAAJ	4.7 uF	-
2	R508, R509	RES/STD/5.1k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402(1005)/SMD /-	Vishay	CRCW04025K10FK	5.1k	-
1	R525	RES/STD/6.04k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402(1005)/SMD/-	Vishay	CRCW04026K04FK	6.04k	-
4	RA500, RA501, RA502, RA503	Chip Resistor Array	Panasonic	-	8*22R	-
1	R904	RES/VAR/10k/500 mW/10%/100 ppm/K/-55°C to 125°C/3/8 Square Multi-Turn Cermet Trimmer, 9.53L X 4.83W X 12.05H mm/THT/-	Bourns	3296W-1-103LF	10k	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
2	R536, R537	RES/STD/10k/100 mW/1%/100 ppm/K/-55°C to 155°C/ 0603(1608)/SMD /-	Vishay	CRCW060310K0FKEA	10k	-
15	R115, R203, R502, R504, R600, R601, R602, R604, R606, R703, R706, R707, R708, R709, R900	RES/STD/10k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD/-	Vishay	CRCW040210K0FK	10k	-
14	C102, C130, C139, C401, C510, C512, C515, C516, C517, C518, C519, C520, C521, C531	CAP/CERA/10 nF/50 V/10%/X7R (EIA)/-55°C to 125°C/ 0402(1005)/SMD/-	Murata	GCM155R71H103KA55	10 nF	-
2	C300, C301	CAP/CERA/10 pF/50 V/5%/C0G (EIA)/NP0/-55°C to 125°C/ 0402(1005)/SMD/-	Murata	GRM1535C1H100JDD5	10 pF	-
8	C111, C128, C134, C140, C146, C421, C540, C543	CAP/CERA/10 uF/16 V/20%/X7R (EIA)/-55°C to 125°C/ 1206(3216)/SMD/-	Murata	GCM31CR71C106MA64	10 uF	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
8	C114, C115, C132, C133, C137, C138, C143, C144	CAP/CERA/10 uF/10 V/10%/X7R (EIA)/-55°C to 125°C/ 0805(2012)/SMD/-	Würth Elektronik	885012207026	10 uF	-
2	C302, C303	CAP/CERA/12 pF/50 V/5%/C0G (EIA)/NP0/-55°C to 125°C/ 0402(1005)/SMD/-	Murata	GRM15X5C1H120JDB4	12 pF	-
2	C500, C501	CAP/CERA/13 pF/50 V/2%/C0G (EIA)/NP0/-55°C to 125°C/ 0603(1608)/SMD/-	Murata	GRM1885C1H130GA01	13 pF	-
1	R300	RES/STD/15k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD /-	Vishay	CRCW040215K0FK	15k	-
2	R409, R411	RES/STD/15k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402/SMD/-	Vishay	CRCW040215K0FK	15k	-
1	Y301	Ceramic SMD Ultra Miniature Quartz Crystal, 16 MHz	Abrakon Corporation	ABM10-16.000MHZ-D30-T3	16 MHz	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	R105	RES/STD/16.5k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD/-	Vishay	CRCW040216K5FK	16.5k	-
1	Y500	Crystal Units OA AV Mobile Communications Short Range Wireless	Nihon Dempa Kogyo	NX2520SA-19.2 MHz- EXS00A-CS05400	19.2 MHz	-
2	R304, R901	RES/STD/20R/63 mW/5%/100 ppm/K/-55°C to 155°C/0402 (1005)/SMD /-	Yageo	RC0402JR-0720RL	20R	-
2	R401, R402	RES/STD/22R/63 mW/1%/100 ppm/K/-55°C to 155°C/0402/SMD/-	Vishay	CRCW040222R0FK	22R	-
2	C108, C109	CAP/CERA/22 uF/16 V/10%/X7R (EIA)/-55°C to 125°C/ 1210(3225)/SMD/-	Taiyo Yuden	EMK325B7226KM-PR	22 uF	-
2	C529, C530	CAP/CERA/22 uF/16 V/20%/X5R (EIA)/-55°C to 85°C/ 0603(1608)/SMD/-	Samsung	CL10A226MO7JZNC	22 uF	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
5	C119, C120, C229, C230, C532	CAP/CERA/22 uF/16 V/20%/X5R (EIA)/-55°C to 85°C/0805(2012)/SMD/-	Murata	GRM219R61C226ME15	22 uF	-
1	G700	Ultra Miniature SMD Crystal Clock Oscillator	Abracon Corporation	ASCO2-24,000MHZ-EK-T3	24 MHz	-
2	R410, R412	RES/STD/30k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402/SMD/-	Vishay	CRCW040230K0FK	30k	-
6	L100, L102, L104, L700, L701, L702	IND/FERR/30R/4 A/-55°C to 125°C/14 mR/SMD 0805 (2012 metric) /Inductor, Chip;2.00 mm L X 1.25 mm W X 1.05 mm H/SMD/-	Murata	BLM21PG300SN1D	30R	-
1	Y300	kHz RANGE CRYSTAL UNIT	Epson	MC-146 32.7680KA-A5_PURE SN	32.768 kHz	-
1	R116	RES/STD/33k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402(1005)/SMD /-	Vishay	CRCW040233K0FK	33k	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
3	C702, C705, C708	CAP/CERA/33 pF/50 V/5%/C0G (EIA)/NP0/-55°C to 150°C/0402(1005)/SMD/-	TDK Corporation	CGA2B2NP01H330J050BA	33pF	-
1	R125	RES/STD/36k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402(1005)/SMD /-	Vishay	CRCW040236K0FK	36k	-
3	R102, R109, R122	RES/STD/47k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402(1005)/SMD /-	Vishay	CRCW040247K0FK	47k	-
1	C104	CAP/CERA/47 uF/16 V/20%/X5R (EIA)/-55°C to 85°C/1206(3216)/SMD/-	TDK	C3216X5R1E476M160AC	47 uF	-
1	R405	RES/STD/49.9k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402/SMD/-	Vishay	CRCW040249K9FK	49.9k	-
1	R118	RES/STD/68k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402(1005)/SMD /-	Vishay	CRCW040268K0FK	68k	-
(table continues...)						

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	R113	RES/STD/75k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD /-	Vishay	CRCW040275K0FK	75k	-
6	R403, R408, R510, R541, R704, R705	RES/STD/100k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD /-	Vishay	CRCW0402100KFK	100k	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
125	C101, C106, C107, C110, C112, C113, C118, C129, C131, C135, C136, C141, C142, C145, C201, C202, C203, C204, C205, C206, C208, C209, C211, C213, C215, C216, C217, C218, C219, C220, C222, C224, C225, C226, C228, C231, C232, C233, C234, C235, C236, C237, C238, C243, C244, C245, C246, C247, C248, C249, C250, C251, C252, C253, C304, C404, C406, C408, C410, C415, C417, C419, C420, C502,	CAP/CERA/100 nF/50 V/10%/X7R (EIA)/-55°C to 125°C/0402(1005)/SMD/-	Murata	GRM155R71H104KE14D	100 nF	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
	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, C700, C701, C703, C704, C706, C707, C710, C712, C713, C714, C715, C800, C801, C802, C803, C804, C805, C806, C807, C808, C809, C810, C811, C812, C813, C814, C815, C816, C817, C900					

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	C100	CAP/ELCO/100 uF/25 V/20%/ Tantalumelectrolytic/ -55°C to 105°C/7.30 mm L X 4.30 mm W X 3.10 mm H/SMD/-	Vishay	T55D107M025C0060	100 uF	-
1	C200	CAP/CERA/100 uF/6.3 V/20%/X5R (EIA)/-55°C to 85°C/ 1210(3225)/SMD/-	Murata	GRM32ER60J107ME20	100 uF	-
1	R117	RES/STD/169k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD /-	Vishay	CRCW0402169KFKED	169k	-
1	R526	RES/STD/200R/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD /-	Vishay	CRCW0402200RFX	200R	-
1	C117	CAP/CERA/220 pF/50 V/5%/C0G (EIA)/NP0/-55°C to 125°C/ 0402(1005)/SMD/-	Murata	GRM1535C1H221JDD5	220 pF	-
3	R119, R120, R121	RES/STD/220R/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD /-	Vishay	CRCW0402220RFX	220R	-

(table continues...)

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Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	C127	CAP/CERA/300 pF/50 V/5%/C0G (EIA)/NP0/-55°C to 125°C/ 0402(1005)/SMD/-	Murata	GRM1535C1H301JDD5	300 pF	-
1	R531	RES/STD/330R/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD /-	Vishay	CRCW0402330RFK	330R	-
2	R123, R124	RES/STD/470R/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD /-	Vishay	CRCW0402470RFK	470R	-
6	L200, L201, L202, L203, L204, L205	IND/FERR/470R/1 A/25%/-55°C to 125°C/150 mR/ 0603(1608)/Inductor, Chip;1.60 mm L X 0.80 mm W X 0.95 mm H/SMD/-	TDK Corporation	MPZ1608B471ATD25	470R	-
2	R404, R407	RES/STD/750R/100 mW/1%/100 ppm/K/-55°C to 155°C/0603/SMD/-	Vishay	CRCW0603750RFK	750R	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	R500	RES/STD/910k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402(1005)/SMD /-	Vishay	CRCW0402910KFK	910k	-
1	X401	WR-PHD 2.54 mm Pitch, 5Pins, THT Pin Header	Wurth Elektronik	61300511121	61300511121	-
1	X801	WR-PHD 2.54 mm Angled Dual Socket Header	Wurth Elektronik	613020243121	613020243121	-
1	X701	Socket 15X2, 4 Mounting Pads	Panasonic	AXT530124A	AXT530124A	-
2	Q100, Q101	NPN Silicon AF Transistor	Infineon Technologies	BC848C	BC848C	-
1	D500	SMD LED, InGaN Blue, Peak Emission Wavelength 468 nm, Luminous Intensity (IV): 28 mcd to 180 mcd, VF 3.8 V Max	LiteOn Optoelectronics	LTST-C190TBKT	Blue	-
1	U400	Programmable System-on-Chip (PSOC™)	Cypress Semiconductor	CY8C5868LTI-LP039	CY_CY8C5868LTI-LP039	-
1	U500	EZ-USB™ FX3: SuperSpeed USB Controller 256 SRAM 32Bit GPIF II Data Bus Width	Cypress Semiconductor	CYUSB3014-BZXC	CYUSB3014-BZXC	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	X700	1.25 mm Pitch Miniature Crimping Connector, 32 Pin, Dual Row, 1 A, 500V, 30 mOhm	Hirose Connectors	DF13EA-30DP-1.25V (51)	DF13EA-30DP-1.25V (51)	-
1	X500	Socket 12X2 Alphanumeric Pinning with 4 Mounting Holes	JAE	DX07S024XJ1R1100	DX07S024XJ1R1100	-
1	D400	Chip LED, 573nm, Green, Electronic Equipment Applications	OSRAM Opto Semiconductors	LG Q396-PS-35	Green	-
5	D102, D103, D104, D900, D901	Ultra bright AlInGaP Chip LED. Green, D901	LiteOn Optoelectronics	LTST-C150KGKT	Green	-
1	U200	TRAVEO™ T2G 32-bit Automotive MCU	Infineon Technologies	CYT3DLBBHS	IFX_CYT3DLBBHS	-
1	U100	800 kHz 3 A IR MOSFET IPOL Synchronous Buck Regulator	IFX		IR3883	-
1	U105	Low Quiescent Current High Efficiency Synchronous Buck Regulator	Renesas	ISL9107IRZ-T	ISL9107IRZ-T	-
1	U502	2-Mbit serial I ² C bus EEPROM	STMicroelectronics	M24M02-DRMN6TP	M24M02-DRMN6TP	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
2	D404, D505	Surface Mount Schottky Power Rectifier, 0.5 A/20 V	ON Semiconductor	MBR0520LT1G	MBR0520LT1G	-
1	R400	RES/PTC/-/800 mW/-/-/1812(4532)/SMD/-	Bourns	MF-MSMF110-2	MF-MSMF110-2	-
1	U501	USB Positive Overvoltage Protection Controller with Internal PMOS FET Status FLAG	ON Semiconductor	NCP360SNT1G	NCP360SNT1G	-
1	U700	Dual Bidirectional I2C Bus and SMBus Voltage Level Translator	Texas Instruments	PCA9306DCUR	PCA9306DCUR	-
1	U503	Type-C Dual Role Port Controller with USB3.1 Gen1 5 Gbps Mux	Diodes Inc.	PI5USB30213AXEAX	PI5USB30213AXEAX	-
4	S200, S400, S500, S900	Microminiature SMT Top Actuated	C&K	PTS810 SJG 250 SMTR LFS	PTS810 SJG 250 SMTR LFS	-
1	X100	Right Angle PC Mount DC Power Jack, Open Frame, 250 V AC, 5 A	Switchcraft	RAPC722X	RAPC722X	-
2	D100, D403	Schottky Barrier Diode	ROHM Semiconductors	RBS2LAM40CTR	RBS2LAM40CTR	-
1	D504	Schottky Barrier Diode	ROHM Semiconductors	RBS3LAM40CTR	RBS3LAM40CTR	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	X302	Stift-Leiste 2-reihig je 10-polig, Shrouded	3M		S2*10	-
1	U600	HYPERBUS™ interface	Infineon Technologies	S26HL512TFPBHM010	S26HL512TFPBHM010	-
1	U601	64 Mb HYPERRAM™ self-refresh DRAM	Infineon Technologies	S27KL0642DPBHA020	S27KL0642DPBHA020	-
2	D405, D506	Surface Mount Transient Voltage Suppressor	Diodes Incorporated	SMAJ5.0CA-13-F	SMAJ5.0CA-13-F	-
1	D101	Surface Mount Transient Voltage Suppressor	Diodes Incorporated	SMAJ12CA-13-F	SMAJ12CA-13-F	-
14	X900, X901, X902, X903, X904, X905, X906, X909, X910, X911, X912, X913, X914, X915	Jumper, 1x2-Positions, Pitch 2,54 mm, Body 5,08x2,54 mm, black, Au, without handle	Samtec	SNT-100-BK-G	SNT-100-BK-G	-
2	D501, D503	TVS 0.45 pF Diode Array, Low Capacitance ESD Protection	Littelfuse	SP3010-04UTG	SP3010-04UTG	-
4	X803, X806, X812, X813	Through hole .025 SQ Post Socket, 2.54 mm pitch, 8 pin, vertical, single row	Samtec	SSW-108-01-G-S	SSW-108-01-G-S	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	X805	Through hole .025 SQ Post Socket, 2.54 mm pitch, 9 pins, vertical, single row	Samtec	SSW-109-01-G-S	SSW-109-01-G-S	-
1	X802	THROUGH-HOLE .025 SQ POST SOCKET, Single Row, 10 pins	Samtec	SSW-110-01-G-S	SSW-110-01-G-S	-
3	U101, U103, U104	LDO 500 mA, ADJ, Vin 2.3-20V, AEC, PG-TSON-10	Infineon Technologies AG		TLS205B0LDV	-
8	X101, X102, X104, X402, X403, X502, X804, X808	Through hole .025 SQ Post Header, 2.54 mm pitch, 2 pin, vertical, single row	Samtec	TSW-102-07-L-S	TSW-102-07-L-S	-
8	X103, X200, X201, X300, X301, X809, X810, X811	Through hole .025 SQ Post Header, 2.54 mm pitch, 3 pin, vertical, single row	Samtec	TSW-103-07-L-S	TSW-103-07-L-S	-
1	D502	Very low capacitance ESD protection	STMicroelectronics	USBLC6-2SC6	USBLC6-2SC6	-
1	D401	Chip LED, 589 nm, Yellow, Electronic Equipment Applications	OSRAM Opto Semiconductors	LY Q396-P1Q2-36	Yellow	-
1	X400	Micro-USB 2.0 Standard, Type AB, Bottom Mount, Shell THT	Hirose Connectors	ZX62D-AB-5P8(30)	ZX62D-AB-5P8(30)	-

(table continues...)

4 Kit design documents

Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	C121	CAP/CERA/10 nF/50 V/20%/X7R (EIA)/-55°C to 125°C/ 0402(1005)/SMD/-	Murata	GCM155R71H103MA55J	10 nF	DNI
1	C122	CAP/CERA/10 uF/16 V/20%/X7R (EIA)/-55°C to 125°C/ 1206(3216)/SMD/-	Murata	GCM31CR71C106MA64L	10 uF	DNI
2	C123, C124	CAP/CERA/100 nF/50 V/10%/X7R (EIA)/-55°C to 125°C/ 0402(1005)/SMD/-	Murata	GRM155R71H104KE14D	100 nF	DNI
2	R503, R507	RES/STD/10k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD /-	Vishay	CRCW040210K0FK	10k	DNI
1	R108	RES/STD/27k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD /-	Vishay	CRCW040227K0FKED	27k	DNI
1	R406	RES/STD/49.9k/63 mW/1%/100 ppm/K/-55°C to 155°C/0402/SMD/-	Vishay	CRCW040249K9FKED	49.9k	DNI
(table continues...)						

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Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	R110	RES/STD/110k/63 mW/1%/100 ppm/K/-55°C to 155°C/ 0402(1005)/SMD /-	Vishay	CRCW0402110KFKTD	110k	DNI
4	R535, R538, R539, R540	RES/STD/10k/100 mW/1%/100 ppm/K/-55°C to 155°C/ 0603(1608)/SMD /-	Vishay	CRCW060310K0FKEA	10k	DNI
1	X807	Through hole .025 SQ Post Header, 2.54 mm pitch, 6 pin, vertical, double row	Samtec	TSW-103-07-L-D	TSW-103-07-L-D	DNI
2	C125, C126	CAP/CERA/10 uF/10 V/10%/X7R (EIA)/-55°C to 125°C/ 0805(2012)/SMD/-	Wurth Elektronik	885012207026	10 uF	DNI
8	R104, R106, R111, R114, R505, R506, R700, R701	RES/STD/0R/63 mW/1%//-55°C to 155°C/0402 (1005)/SMD/-	Yageo	RC0402FR-070RL	0R	DNI
1	U102	LDO 500 mA, ADJ, Vin 2.3-20V, AEC, PG- TSON-10	Infineon Technologies AG	-	TLS205B0LDV	DNI
1	PA1	AC/DC WALL MOUNT ADAPTER 12V 36W	XP Power	VER36US120-JA		DNI
1	UC1	CABLE MINI USB 5PIN 1M 2.0 VERS	Molex	687840001		DNI

(table continues...)

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Table 11 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 bill of materials

Quantity	Designator	Description	Manufacturer	Manufacturer Order Number	Value	Load
1	X401	WR-PHD 2.54 mm Pitch, 5Pins, THT Pin Header	Wurth Elektronik	61300511121	61300511121	DNI
1	X800	Through hole .025 SQ Post Header, 2.54mm pitch, 40 pin, vertical, double row	Samtec	TSW-120-07-L-D	TSW-120-07-L-D	DNI

4 Kit design documents

4.5 Pinout details

This section provides information about the primary onboard functionalities of the TRAVEO™ T2G C-2D MCU pins on the Lite Kit. It also includes details about the pins and their routing on the kit (see [Table 12](#)).

Table 12 KIT_T2G_C-2D-4M_LITE Rev-01 pin details

Pin	Label	Connection details
XRES	XRES	-
P0[0]	WCI	-
P0[1]	WCO	-
P0[2]	ECI	-
P0[3]	ECO	-
P1[0]	LED1	USER LED1 (D900)
P1[1]	LED2	USER LED2 (D901)
P1[2]	SCB7 RX/CLK	X300.2
P1[3]	SCB7 TX/MOSI	X301.2
P1[4]	SCB7 MISO	X800.21, X812.5
P1[5]	SCB7 SEL0	X800.24
P1[6]	LIN0 TX	X802.1
P1[7]	LIN0 RX	X802.2
P2[0]	AN3_ARD	X805.3
P2[1]	BUTTON	USER PUSH BUTTON (S900)
P2[2]	SWO_TDO	X302.13
P2[4]	SWCLK_TCLK	X302.9
P2[5]	SWDIO TMS	X302.7
P3[0]	SWDOE TDI	X302.5
P3[1]	TRSTN	X302.3
P4[0]	SCB6 RX	X800.8, X813.3, S801.10
P4[1]	SCB6 TX	X800.10, X813.4, S801.11
P4[2]	GPIO1_ARD	X806.8
P4[3]	SCB7 SEL1	X800.26, X812.3
P4[4]	AN1_ARD	X805.1
P4[5]	AN2_ARD	X805.2
P4[6]	CAN1 0 TX	X806.5
P4[7]	CAN1 0 RX	X806.6
P5[0]	AN4_ARD	X805.4
P5[1]	LIN1 TX	X806.2
P5[2]	LIN1 RX	X806.1

(table continues...)

4 Kit design documents

Table 12 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 pin details

Pin	Label	Connection details
P5[3]	AN1_MB	X812.1
P5[4]	SCB2 SDA	X800.27, X802.10, X805.5, X813.6
P5[5]	SCB2 SCL	X800.28, X802.9, X805.6, X813.5
P6[0]	AN1_2G0_1	S800.2
P6[1]	AN2_2G0_1	S800.3
P6[2]	AN1_2G0_2	S801.2
P6[3]	AN2_2G0_2	S801.3
P7[0]	POT	POT (R904)
P7[1]	RPI_GPIO1	X800.7
P7[2]	RPI_GPIO2	X800.11
P7[3]	RPI_GPIO3	X800.13
P7[4]	GPIO1_2GO_1	S800.8
P7[5]	GPIO2_2GO_1	S800.9
P7[6]	GPIO3_2GO_1	S800.12
P7[7]	GPIO4_2GO_1	S800.13
P8[0]	RPI_GPIO4	X800.15
P8[1]	RPI_GPIO5	X800.29
P8[2]	GPIO2_ARD	X806.7
P8[3]	RPI_GPIO7	X800.36
P8[4]	GPIO1_2GO_2	S801.8
P8[5]	GPIO2_2GO_2	S801.9
P8[6]	GPIO3_2GO_2	S801.12
P8[7]	GPIO4_2GO_2	S801.13
P9[0]	RPI_GPIO8	X800.32
P9[1]	RPI_GPIO9	X800.22
P9[2]	RPI_GPIO6	X800.31
P9[3]	SCB8 SEL1	S800.14
P9[4]	SCB8 CLK	X802.6, S800.15, S801.15
P9[5]	SCB8 MOSI	X802.4, S800.16, S801.16
P9[6]	SCB8 MISO	X802.5, S800.17, S801.17
P9[7]	SCB8 SEL0	X802.3, S801.14
P11[0]	RMII_REF_CLK	X801.14
P11[1]	GPIO3_ARD	X806.4

(table continues...)

4 Kit design documents

Table 12 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 pin details

Pin	Label	Connection details
P11[2]	RMII_RXD0	X801.12
P11[3]	RMII_RXD1	X801.11
P11[4]	RMII_TXD0	X801.9
P11[5]	RMII_TXD1	X801.8
P11[6]	RMII_TXEN	X801.10
P11[7]	RMII CRS DV	X801.13
P12[0]	RMII_MDC	X801.15
P12[1]	RMII_MDIO	X801.16
P12[2]	TDM_TX_MCK0	X800.18
P12[3]	TDM_TX_SCK0	X800.12
P12[4]	TDM_TX_FSYNC0	X800.35
P12[5]	TDM_TX_SD0	X800.40
P12[6]	TDM_RX_MCK0	X800.33
P12[7]	TDM_RX_SCK0	X800.16
P13[0]	TDM_RX_FSYNC0	X800.37
P13[1]	TDM_RX_SD0	X800.38
P13[2]	RGB_BLUE7	-
P13[3]	RGB_BLUE6	-
P13[4]	RGB_BLUE5	-
P13[5]	RGB_BLUE4	-
P13[6]	RGB_BLUE3	-
P13[7]	RGB_BLUE2	-
P14[0]	RGB_BLUE1	-
P14[1]	RGB_BLUE0	-
P14[2]	RGB_GREEN7	-
P14[3]	RGB_GREEN6	-
P14[4]	RGB_GREEN5	-
P14[5]	RGB_GREEN4	-
P14[6]	RGB_GREEN3	-
P14[7]	RGB_GREEN2	-
P15[0]	RGB_GREEN1	-
P15[1]	RGB_GREEN0	-
P15[2]	RGB_RED7	-

(table continues...)

4 Kit design documents

Table 12 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 pin details

Pin	Label	Connection details
P15[3]	RGB_RED6	-
P15[4]	RGB_RED5	-
P15[5]	RGB_RED4	-
P15[6]	RGB_RED3	-
P15[7]	RGB_RED2	-
P16[0]	RGB_RED1	-
P16[1]	RGB_RED0	-
P16[2]	RGB_CLK	-
P16[3]	RGB_LVALID	-
P16[4]	RGB_VSYNC	-
P16[5]	RGB_DE	-
P16[6]	-	-
P16[7]	RGB_GPIO0	-
P17[0]	RGB_GPIO1	-
P17[1]	RGB_GPIO2	-
P18[0]	SPIHB0_DATA4	TP607
P18[1]	SPIHB0_DATA2	TP605
P18[2]	SPIHB0_DATA3	TP606
P18[3]	SPIHB0_DATA5	TP608
P18[4]	SPIHB0_DATA0	TP603
P18[5]	SPIHB0_DATA6	TP609
P18[6]	SPIHB0_DATA1	TP604
P18[7]	SPIHB0_DATA7	TP610
P19[0]	SPIHB0_CLK	TP602
P19[1]	SPIHB0_RWDS	TP600
P19[2]	SPIHB0_SEL0	TP622
P19[3]	GPIO1_MB	X813.1
P20[0]	SPIHB1_DATA4	TP617
P20[1]	SPIHB1_DATA2	TP614
P20[2]	SPIHB1_DATA3	TP616
P20[3]	SPIHB1_DATA5	TP618
P20[4]	SPIHB1_DATA0	TP611
P20[5]	SPIHB1_DATA6	TP619

(table continues...)

4 Kit design documents

Table 12 (continued) KIT_T2G_C-2D-4M_LITE Rev-01 pin details

Pin	Label	Connection details
P20[6]	SPIHB1 DATA1	TP612
P20[7]	SPIHB1 DATA7	TP620
P21[0]	SPIHB1 CLK	TP615
P21[1]	SPIHB1_RWDS	TP621
P21[2]	SPIHB1 SEL0	TP613
P21[3]	GPIO2_MB	X813.2

5 Additional information

5 Additional information

This section provides additional information about the TRAVEO™ T2G Cluster 4M Lite Kit, including advanced features and test points.

5.1 Test points

Table 13 describes the test points available in this kit.

Table 13 Available test points available

#	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

5 Additional information

5.2 Advance features

5.2.1 Programming the EZ-USB™ FX3

To program the EZ-USB™ FX3, follow the steps outlined in this section. Before you begin, ensure you have downloaded the necessary software. The FX3 Software Development Kit (FX3 SDK) is recommended for programming and utilizing the EZ-USB™ FX3, as it includes essential tools, drivers, and application examples.

5.2.1.1 Installing FX3 SDK

1. Download the FX3 SDK⁹⁾
2. After downloading it from the web, unzip it and open the FX3 SDK Setup application
3. In the **Installation Type** tab in the SDK window, select your preferred option (in this example, the **Custom** option is selected) and click **Next**
4. In the **Selected Release** table, leave the default setup unchanged and click **Next**
5. Carefully read the terms and conditions, then click **Accept the terms and conditions** and click **Next**
6. Follow the subsequent steps as prompted and wait for the installation status window
7. After the installation is complete, a window with **Contact Information** will pop up. Fill in the required information and click **Finish**
8. Your FX3 SDK installation is now complete

5.2.1.2 Programming the FX3

1. Before programming the FX3, make sure to connect the jumper X502 on the board to change the FX3 mode to Bootloader mode
2. Connect the USB Type-C to Type-C cable between the USB Type-C connector (X500) on the board and the USB 3.0 port of your PC. Then, press the **FX3 Reset button** (S500) on the board
3. Open the search tab and search for **Control Center**. If you cannot find it, go to **Start > All Apps > Cypress**, and you will find it there. Open the Control Center
4. In the Control Center, select **Cypress FX3 USB Bootloader Device**. Then, go to **Program > FX3** and select **I2C EEPROM**

⁹ See the [References](#) section at the end of the document to find the link for downloading the FX3 SDK

5 Additional information

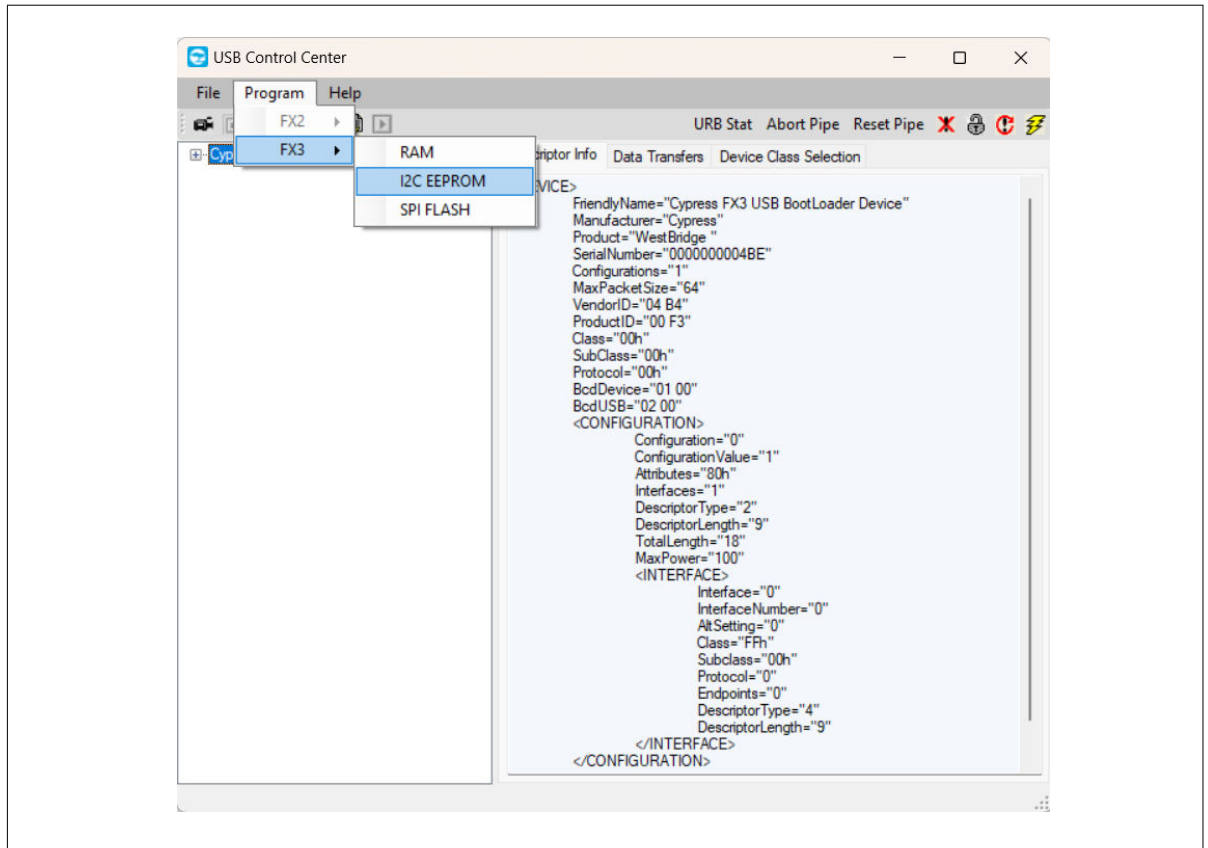


Figure 46 Programming EZ-USB™ FX3

5. You will be prompted for the location of the UVC image to flash into FX3. Locate the directory where you have the UVC image file for FX3. After selecting the UVC image file, check the status of the flashing in the bottom left corner of the Control Center
6. Once 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 kit
7. If you have connected the X502 jumper on your board, the device **Cypress FX3 USB Boot Programmer Device** will appear under the **Universal Serial Bus controllers** tab in the Device Manager, as shown in [Figure 47](#)

5 Additional information

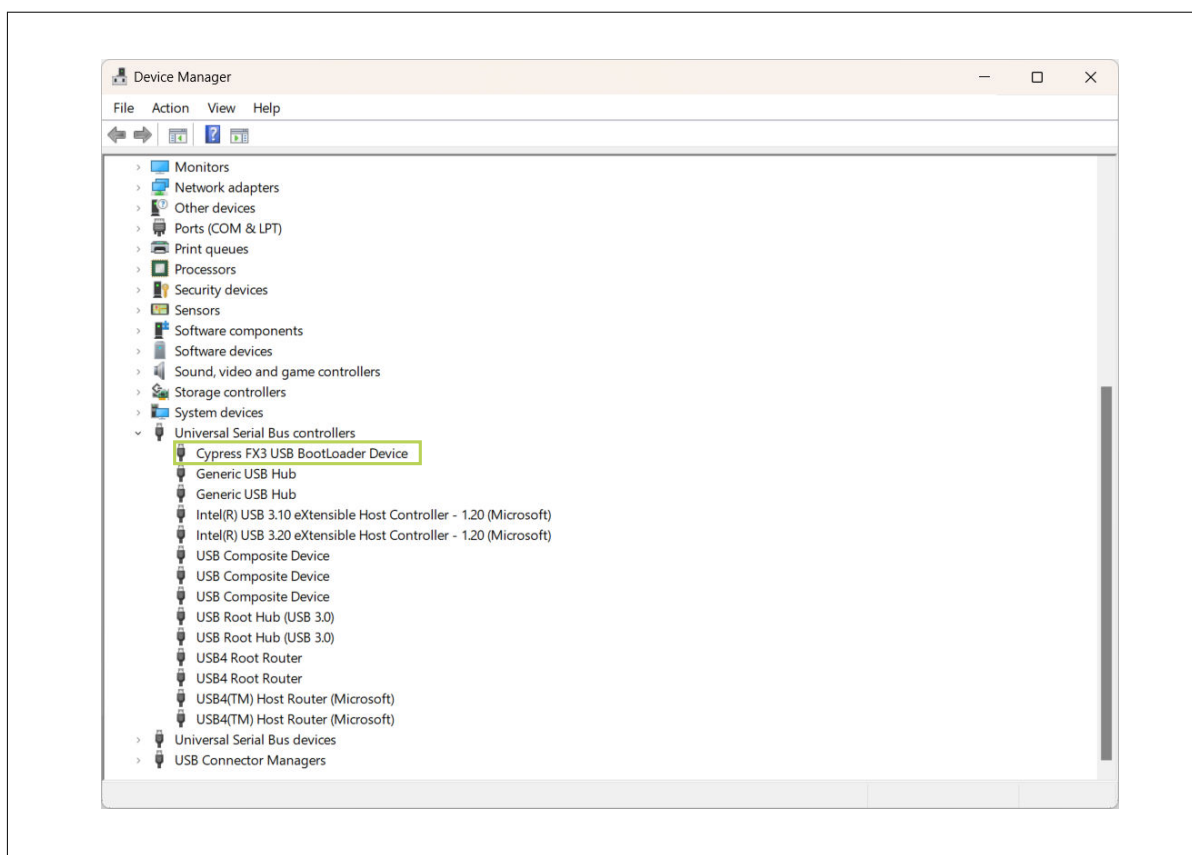


Figure 47 EZ-USB™ FX3 coming under Universal Serial Bus Controllers

8. If you remove the X502 jumper from your board, you will see the **FX3** device under the **Camera** section in the Device Manager, as shown in [Figure 48](#). Before or after removing the X502 jumper, disconnect and reconnect the power to the kit to see the device under these tabs in the Device Manager

5 Additional information

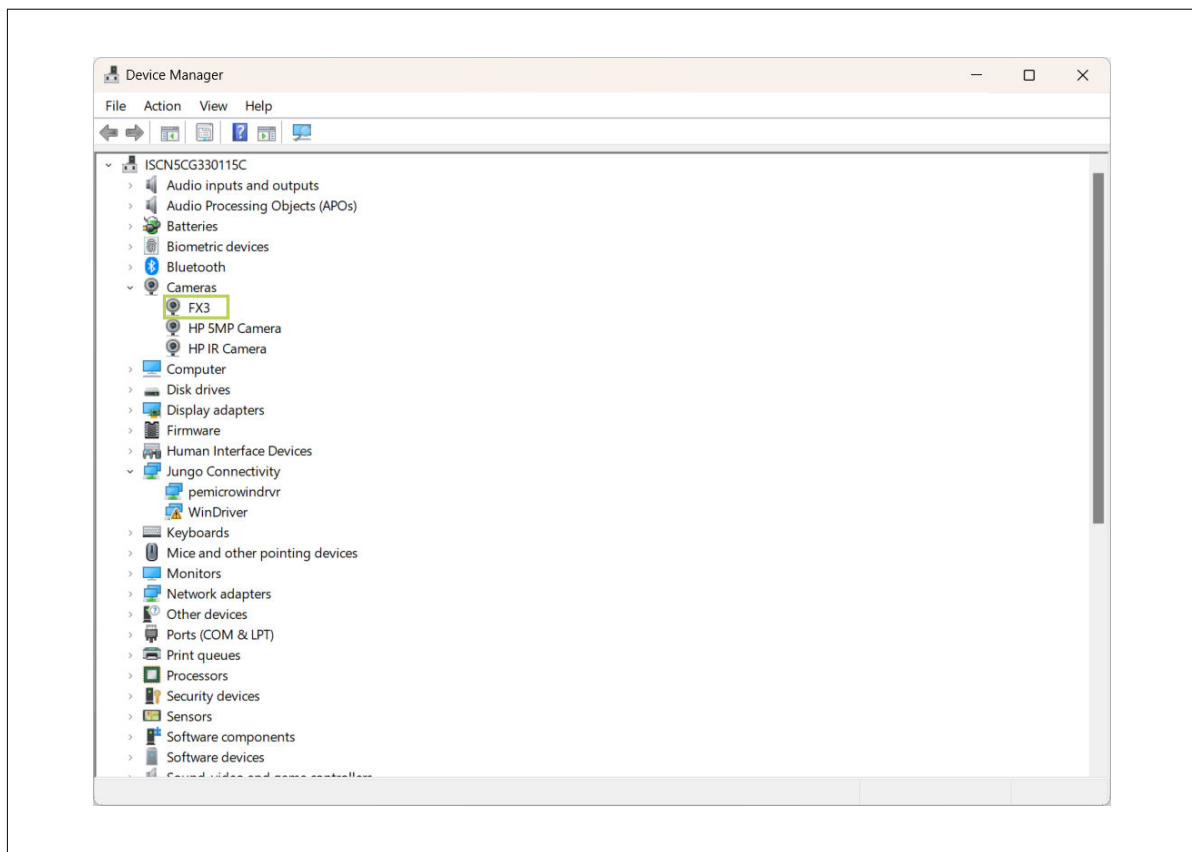


Figure 48 EZ-USB™ FX3 coming under Camera in Device Manager

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Note: For any further queries, visit the [Infineon Developer Community](#).

Glossary

Glossary

AC

Alternating current

ADC

Analog-to-digital converter

BOM

Bill of materials

CAN

Controller area network

CAN FD

Controller area network flexible data-rate

CAP

Capacitor

CPU

Central processing unit

CSI-2

Camera Serial Interface-2

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

I2C

Inter-integrated circuit

Glossary

I2S

Inter-IC sound

IC

Integrated circuit

IDE

Integrated development environment

IoT

Internet of things

LDO

Low-dropout voltage regulator

LED

Light-emitting diode

LIN

Local interconnect network

LPO

Low power oscillator

MCU

Microcontroller unit

PC

Personal computer

PMIC

Power management integrated circuits

POT

Potentiometer

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

Glossary

SWD

Serial wire debug

TP

Test point

UART

Universal asynchronous receiver transmitter

USB

Universal serial bus

WCO

Watch crystal oscillator

Revision history

Revision history

Document revision	Date	Description of changes
**	2023-09	Initial release of user guide for T2G Cluster 4M Lite Kit Rev-B
*A	2025-01-09	Initial release of user guide for T2G Cluster 4M Lite Kit Rev-01
*B	2025-06-11	Replaced section 3.6.1.1 - Python script for streaming with FX3 to Streaming the EZ-USB™ FX3 . Updated References to align with the latest template. Updated the IRIS test image firmware section.

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