KIT_A3G_TC4D7_LITE AURIX™ A3G Lite Kit user guide

About this document

Scope and purpose

This user guide provides detailed instructions for using the KIT_A3G_TC4D7_LITE, a low-cost evaluation kit based on the TC4D7 device from the AURIX™ third-generation microcontroller family. It highlights the features and functions of the KIT_A3G_TC4D7_LITE and includes comprehensive information about the available interfaces as well as the operation of all hardware components.

***Note**: This user manual applies to KIT_A3G_TC4D7_LITE version 2.x.*

Intended audience

This document is designed for software and hardware engineers evaluating the TC4D7 device from the AURIX™ third-generation microcontroller family. It provides a comprehensive guide to the features and applications of the device, offering essential insights and practical guidance for testing software and developing hardware designs.

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.*

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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.*

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1 Introduction

This document provides an overview of the features and hardware details of the KIT_A3G_TC4D7_LITE development kit, which is equipped with a 32-bit single-chip AURIX™ TriCore™-based microcontroller, the TC4D7x, from Infineon. The kit supports a variety of development tools, including Infineon's Eclipse-based Integrated Development Environment (IDE), AURIX™ Development Studio, and the "FreeEntry Toolchain" provided by HighTec, PLS, and Infineon.

The AURIX™ Development Studio is a comprehensive development platform that integrates an advanced C-compiler, multi-core debugger, and Infineon's low-level driver (iLLD). It offers unrestricted access with no time or code-size limitations, allowing seamless application code editing, compiling, and debugging. Alternatively, the FreeEntry Toolchain provides a full-featured C/C++ development environment. This toolchain also includes the PLS Universal Debug Engine (UDE) debugger at the source level and is built on Infineon's iLLD for efficient low-level programming.

Table 2 outlines the key specifications of the KIT_A3G_TC4D7_LITE development board.

Table 2 Board specifications overview

CPU core AURIX™	Manufacturer order number	SAK-TC4D7XP-20MF500MC
Board dimensions	66.0 x 131.0 mm	
Power	• Onboard miniWiggler USB-C interface • External power supply: 5 V–16 V (recommended range: 7 V–14 V)	
Connectors	• Most AURIX™ pins accessible through expansion connectors (X1, X2) • Two Infineon Shield2Go connectors • Arduino-compatible connectors for 3.3 V Arduino shields • mikroBUS connector • USB-C connector • DAP debug connector • CAN connector • RJ45 connector	
Others	• CAN transceiver (TLE9371VSJ) from Infineon • Low power 10/100 Mbps Ethernet physical layer transceiver (DP83825I) from Texas Instruments • One user push-button and two user LEDs • Reset push-button • Potentiometer (250 kΩ) for variable analog input	

***Note**: These boards are not optimized for cost or size and are not intended to serve as reference designs.*

1.1 Block diagram

Figure 1 shows the main components of the KIT_A3G_TC4D7_LITE board and their interconnections.

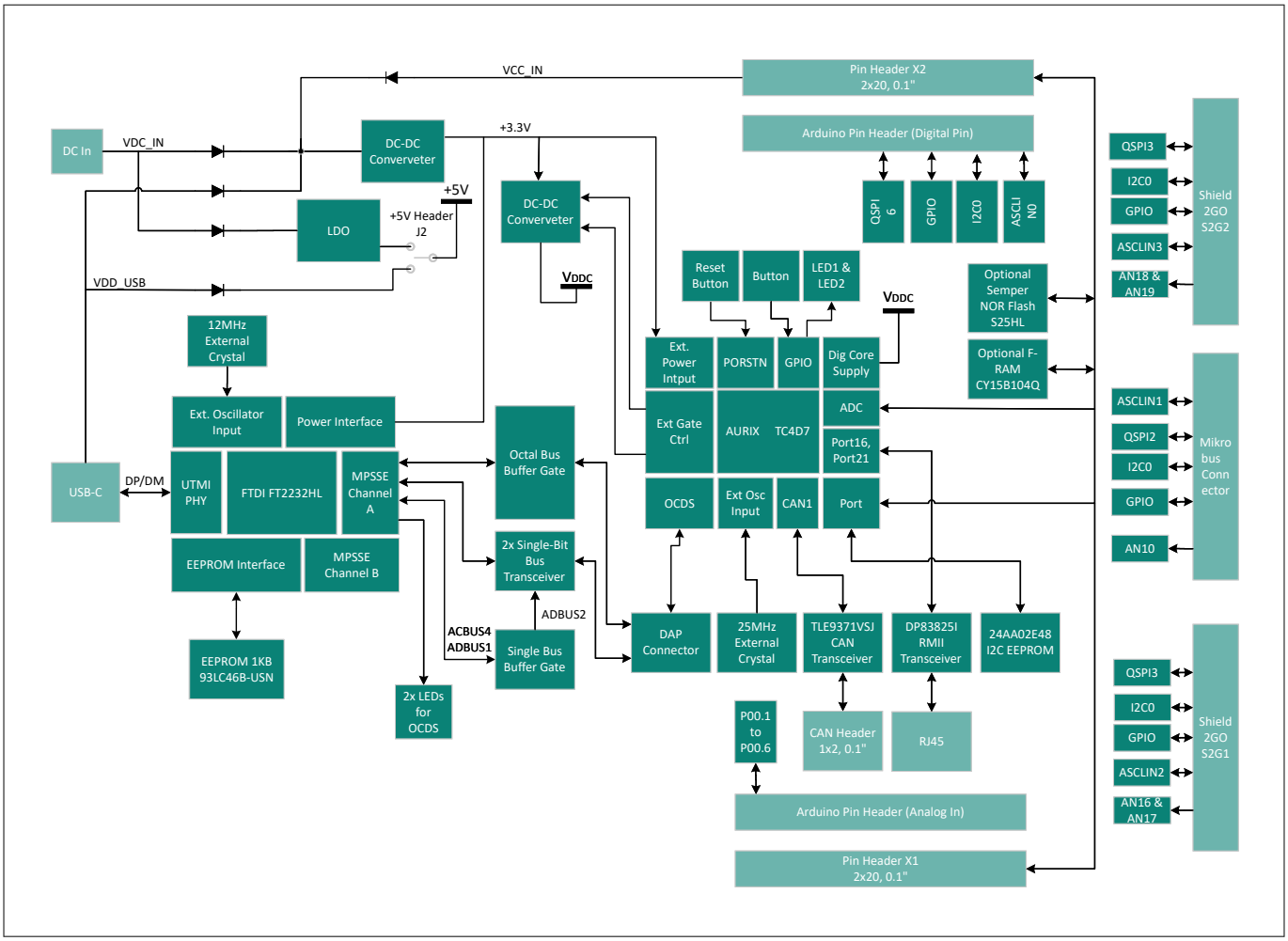

Figure 1 Block diagram of the KIT_A3G_TC4D7_LITE board

2 Hardware description

The following chapters provide a detailed description of the board hardware and its usage. The various components of the kit are shown in Figure 2 and Figure 3.

2 Hardware description

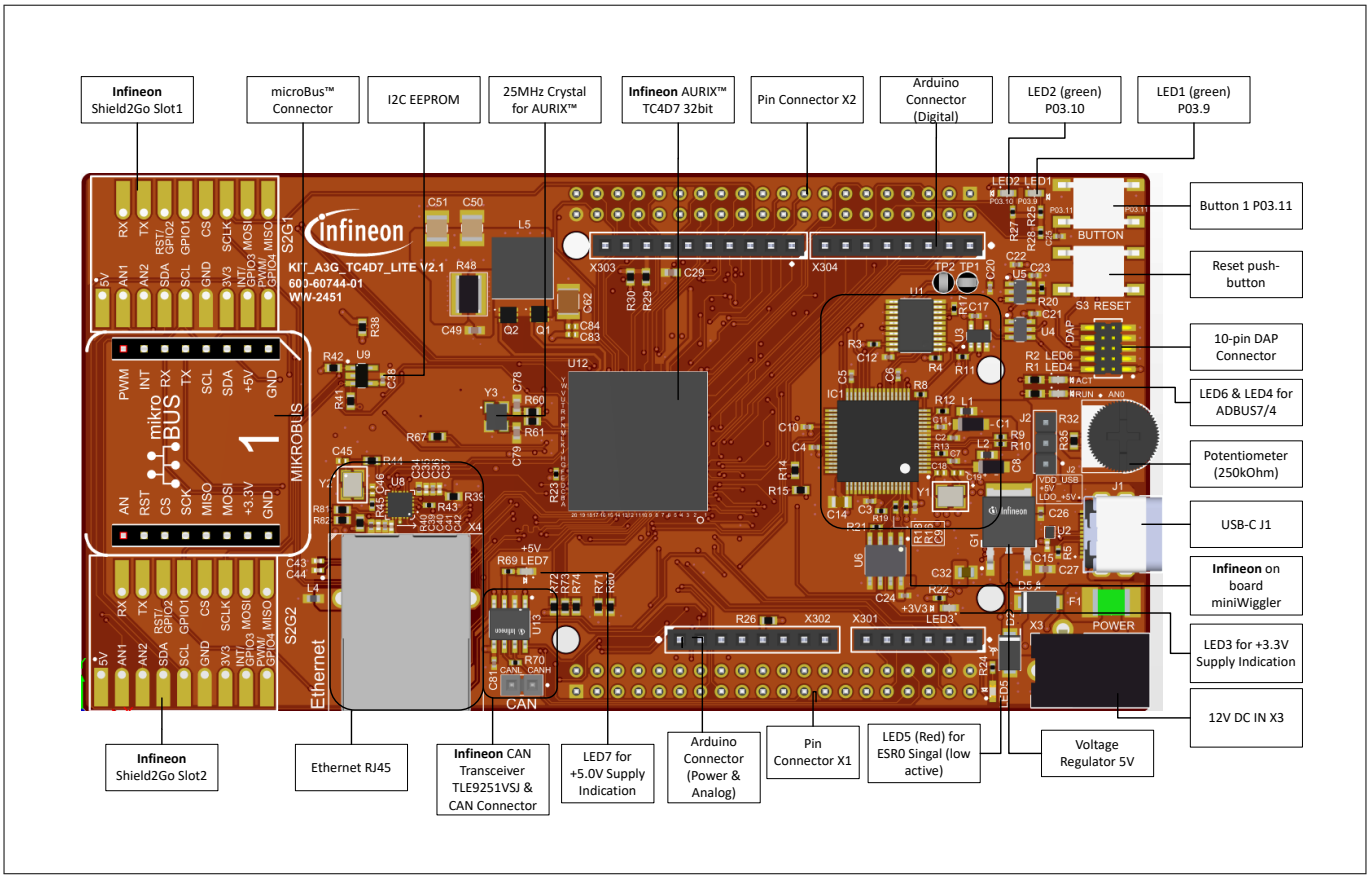

Figure 2 Front view of the KIT_A3G_TC4D7_LITE board

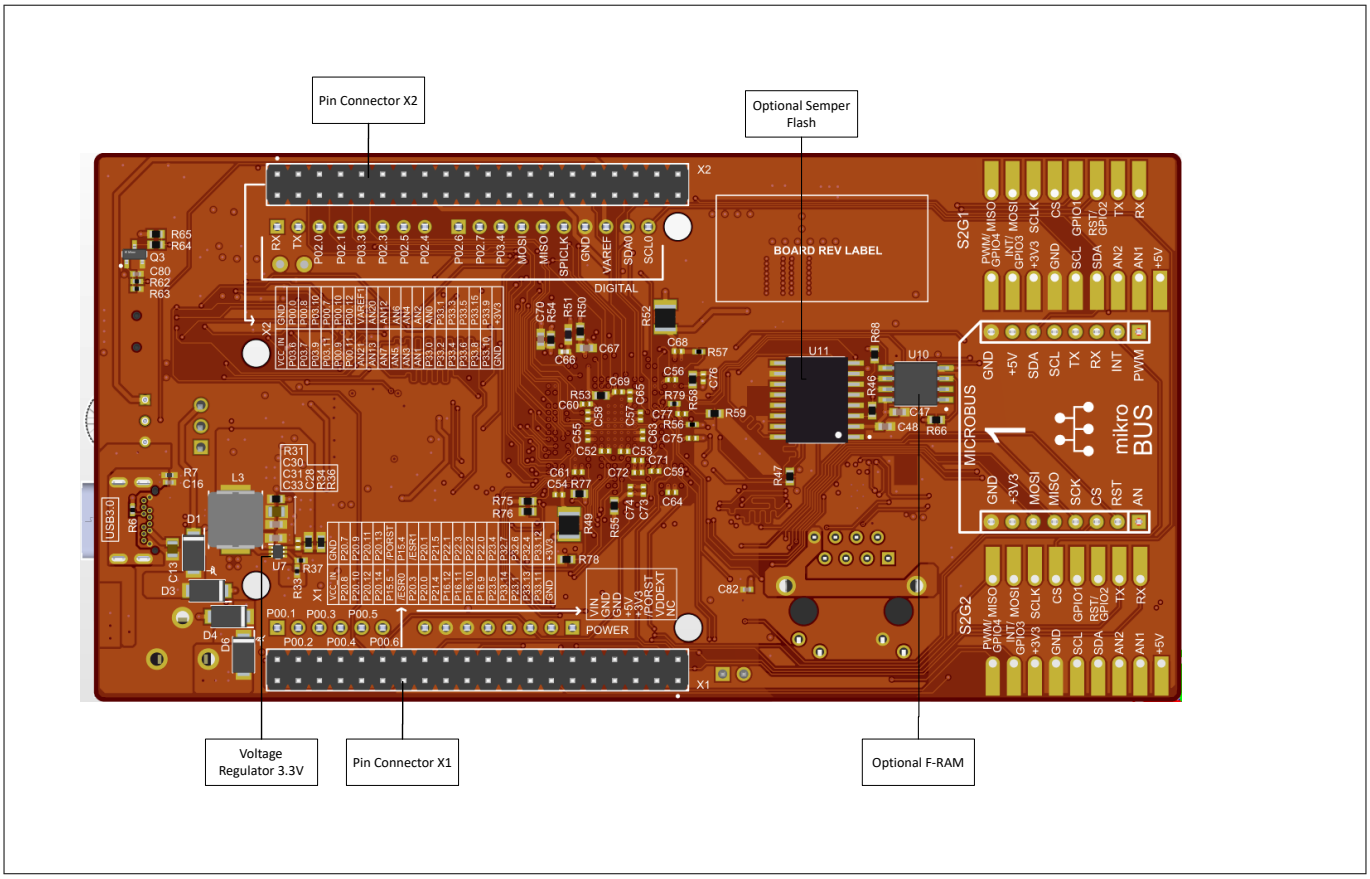

Figure 3 Rear view of the KIT_A3G_TC4D7_LITE board

2.1 Power supply

The KIT_A3G_TC4D7_LITE requires an external DC power supply, which can be provided through the DC plug X3 (recommended voltage range: +7 V to +14 V) or the USB-C plug J1 (+5 V). The green power LED indicators, LED3 and LED4, show the presence of the 3.3 V and 5.0 V supply voltages.

For the DC plug X3, use a female DC supply plug with an outer diameter of 5.5 mm and an inner diameter of 2.1 mm or 2.5 mm. Ensure that the inner contact is positive, and the outer contact is ground.

When the board is powered via the USB-C plug J1, the input voltage to the U7 +3.3 V buck converter is slightly less than 5 V (approximately 4.5 V) due to the protection provided by the Schottky diode (D3). It is possible to use both X3 and J1 simultaneously. The power source priority is as follows:

- If the voltage on X3 exceeds +7 V, the board is powered via X3
- If the voltage on X3 is less than +5.5 V, the board is powered via J1
- Between +5.5 V and +7 V on X3, the board is powered by both X3 and J1 together

For the 5 V supply, the source can be selected between the 5 V from the USB plug J1 or the LDO output G1 (powered via X3) using jumper J2.

If the board is powered via the USB-C plug J1 and/or the DC plug X3, do not apply an additional power supply to any of the power pins (VDDEXT, +5 V, +3.3 V) on the pin headers X1, X2, the Arduino power header X302, the Shield2GO slots, or the mikroBUS connectors. This is because there is no protection against reverse current flowing into an external power supply. These power pins are designed to supply power to external circuits and should only be used as outputs.

2.2 User push buttons, LEDs, and Potentiometer

The KIT_A3G_TC4D7_LITE is equipped with a user push-button and a reset push-button, complemented by two LEDs and a potentiometer. Additionally, LED5 serves to indicate the reset state of the device via ESR0 (Emergency Service Request). LED4 and LED6 provide visual feedback on activities through the onboard miniWiggler.

Table 3 AURIX™ pin mapping for user LEDs

Name	AURIX™ pin	Color	Active
LED1	P03.9	Green	Low-active (pull against GND)
LED2	P03.10	Green	Low-active (pull against GND)
LED5	ESR0	Red	Low-active (pull against GND)

Table 4 miniWiggler pin mapping for user LEDs

Name	AURIX™ Pin	Color	Active
LED4	ADBUS4 (ACTIV)	Green	Low-active (pull against GND)
LED6	ADBUS7 (RUN)	Green	Low-active (pull against GND)

Table 5 AURIX™ push buttons and potentiometer

Name	AURIX™ pin	Active
Button	P03.11	Low-active (pull against GND)
Reset	/PORST	Low-active (pull against GND)
R32	AN0	-

***Note**: Desoldering resistor R35 enables AN0 for other functions but disables potentiometer functionality.*

2.3 Debugging and onboard miniWiggler

The KIT_A3G_TC4D7_LITE supports debugging through two channels:

- Onboard miniWiggler via USB-C J1
- 10-pin DAP connector

2.3.1 USB-C connector

The USB-C connector connects the board to a PC. It allows powering the board, using ASCLIN0 as a serial connection via USB, and debugging through DAS.

***Note**: Before connecting the board to the PC, ensure that up-to-date DAS software is installed on the PC.*

The DAS installer is available on the DAS Tool Interface webpage.

2.3.2 Serial connection to the PC

When the kit is connected to a PC via USB for the first time, the required driver installs automatically, and a new COM port is created on the PC. This COM port facilitates communication with the board via ASCLIN0 (UART) or via ASCLIN11 if R14 and R15 are assembled.

By default, ASCLIN0 is assigned to P14.0 and P14.1 (for example, for the generic bootstrap loader). Since ASCLIN0 is also used for the Arduino pins, ASCLIN11 can be used as an alternative. In this case, ensure that P14.0 and P14.1 are not configured, and R14 and R15 are mounted.

2.3.3 miniWiggler JDS

The miniWiggler JDS is a low-cost debug interface that provides access to the device via DAP. Ensure that the latest version of DAS is installed on your PC. Debugging is performed through the DAS server 'UDAS.'

When the kit is connected to the PC and the DAS server is running, a successful connection is indicated by the green LED6 (ADBUS4). The status LED4 (ADBUS7, green) is controlled by the DAS server and is toggled on or off depending on the debugger (client) in use.

***Note**: Ensure that there is no connection or a tristated connection on the DAP connector when LED4 (indicating miniWiggler use) is on.*

2.4 Reset

The power-on reset input pin (/PORST) of the AURIX™ family is a bi-directional input/output pin designed for triggering power-related resets externally. If the /PORST pin remains asserted after a power event, the reset is extended until it is internally deasserted. This does not replace the functional reset provided by the ESR pins.

An internal pull-up resistor (2.2 kΩ) keeps the/PORST pin high during normal operation. A low signal at this pin triggers a warm power-on reset. In the case of an internal MCU reset, the /PORST pin drives a low signal.

A reset signal can be issued through the following sources:

- Onboard reset push-button (RESET)
- Onboard miniWiggler via IC FT2232HL (IC1.27 – ACBUS1)
- Onboard DAP connector (DAP.10)
- Arduino power header (X302.3, /PORST)
- Pin header X1 (X1.30, /PORST)

An internal AURIX™ circuit ensures a safe power-on reset. The KIT_A3G_TC4D7_LITE does not require any additional external components to generate a reset signal during power-up. For further details, refer to the datasheet or user manual of the assembled AURIX™ device.

2.5 CAN transceiver

The KIT_A3G_TC4D7_LITE provides a CAN interface through the CAN connector. TLE9371VSJ is Infineon's high-speed CAN transceiver, designed for use in HS-CAN networks for both automotive and industrial applications. It complies with the ISO 11898-2 (2016) physical layer specification and the SAE standards J1939 and J2284.

The CAN bus signals (CANH, CANL) are terminated with a 120 Ω resistor. The transceiver is connected to the CAN node 1 of the TriCore™ device. By default, the transceiver operates in standby mode. To switch it to normal operating mode, the CAN_STB pin must be driven low by the CPU.

See Table 6 for details on using the CAN pins.

Table 6 CAN signals and AURIX™ pin mappings

Signal	Pin assignment for CAN pin header	AURIX™ pin function
CANH	1	-
CANL	2	-

(table continues...)

Table 6 (continued) CAN signals and AURIX™ pin mappings

Signal	Pin assignment for CAN pin header	AURIX™ pin function
CAN_TX	-	P01.3, CAN01_TXD (CAN node 1 output)
CAN_RX	-	P01.4, CAN01_RXDC (CAN node 1 input)
CAN_STB	-	P03.5, P03.5 OUT (GPIO)

2.6 I2C EEPROM

The KIT_A3G_TC4D7_LITE provides a 2 Kb I2C serial EEPROM with a pre-programmed EUI-48 MAC ID (Microchip 24AA02E48). The slave address of this EEPROM is fixed at 0x50.

The upper half of the memory array (80h–FFh) is permanently write-protected. Write operations to this address range are blocked, but read operations remain unaffected. This upper half contains the pre-programmed EUI-48 node address, which can be used as the MAC ID for Ethernet.

The remaining 128 bytes of memory are writable and available for user applications.

Table 7 AURIX™ pin mapping for I2C EEPROM signals

Signal	AURIX™ pins and its corresponding functions
SCL	P13.1, I2C0_SCL
SDA	P13.2, I2C0_SDA

2.7 Ethernet

The KIT_A3G_TC4D7_LITE provides an RJ45 connector (X4) for standard twisted-pair Ethernet connections. The board uses the DP83825I low power 10/100 Mbps Ethernet physical layer transceiver (PHY) from Texas Instruments as the physical layer device. For more details about the Ethernet module, see the AURIX™ user manual, and for information about the PHY, see the DP83825I datasheet.

The AURIX™ Ethernet MAC and the PHY are connected via the RMII interface.

For details on using the Ethernet signals, see Table 8.

Table 8 AURIX™ pin mapping for Ethernet signals

DP838325I PHY signal	AURIX™ pins and its corresponding functions
MDIO	P21.3, GETH0_PX_MDIOD/GETH0_PX_MDIO3 (PortX MDIO input/Port0 MDIO output)
MDC	P21.2, GETH0_P0_MDC (Port0 MDIO Clock)
TX_EN	P16.13, GETH0_P0_RMIIC_TX_EN (GETH PortX RMII transmit enable)
TX_D0	P16.6, GETH0_P0_RMIIC_TXD0 (GETH PortX RMII transmit data bit 0)
TX_D1	P16.8, GETH0_P0_RMIIC_TXD1 (GETH PortX RMII transmit data bit 1)
CRS_DV	P16.1, GETH0_P0_CRSDVC (Port0 RMII Carrier Sense and Receive Data Valid)
RX_D0	P16.4, GETH0_P0_RXD0D (Port0 RMII receive data bit 0)
RX_D1	P16.0, GETH0_P0_RXD1D (Port0 RMII receive data bit 1)
50 MHz Out	P16.2, GETH0_P0_REFCLKD (Port0 Reference Clock input for RMII)

2.8 Optional Infineon SEMPER™ (Secure) Flash

The KIT_A3G_TC4D7_LITE provides the option to assemble an external flash. Supported devices include the Infineon SEMPER™ NOR flash device family (S25HL) and the Infineon SEMPER™ Secure NOR flash device family (S35HL) in an SOIC-16 package. For more information about the flash devices, see SEMPER™ NOR Flash.

If an external flash is assembled, ensure that the ceramic capacitor C48 (100 nF, size 0603) and the resistors R46 and R47 (0 Ω, size 0603) are also assembled.

Table 9 AURIX™ pin mapping for SEMPER™ Flash signals

Signal	AURIX™ pin and corresponding function
CS#	P23.1, QSPI4_SLSO6 (Master slave select output)
SCK	P22.3, QSPI4_SCLK_F (Master SPI clock output)
MOSI	P22.0, QSPI4_MTSR_F (Master SPI data output)
MISO	P22.1, QSPI4_MRSTB_F (Master SPI data input)
INT#	P20.6, GPIO

2.9 Optional F-RAM

The KIT_A3G_TC4D7_LITE provides the option to assemble an external serial F-RAM. Supported devices include the Infineon F-RAM FM25VN10-G and the Infineon F-RAM Series CY15B in an SOIC-8 package (SO8-150). For more information about the F-RAM devices, see F-RAM (Ferroelectric RAM).

If an F-RAM is assembled, ensure that the ceramic capacitor C47 (100 nF, size 0603) and the resistors R68 and R66 (10 kΩ, size 0603) are also assembled.

The F-RAM is connected to pins P22.0, P22.1, and P22.3 (QSPI4). Pin P23.5 (slave select output 4 of QSPI4) is used as the slave select.

Table 10 AURIX™ pin mapping for F-RAM signals

Signal	AURIX™ pin and corresponding function
CS#	P23.5, QSPI4_SLSO4_F (Master slave select output)
SCK	P22.3, QSPI4_SCLK_F (Master SPI clock output)
MOSI	P22.0, QSPI4_MTSR_F (Master SPI data output)
MISO	P22.1, QSPI4_MRSTB_F (Master SPI data input)

3 Configuration

3.1 Boot mode

Table 11 User startup modes

HWCFG[3..4]	Boot type	R73	R74	R75	R76
00	Generic BSL P14.0/1 (CAN/ASC)	NA	A	NA	A
10	ASC BSL P15.2/3	A	NA	NA	A
X1	Start from BHMD. If BHMD is not programmed, fall back to HARR or the generic BSL	X	X	A	NA

***Note**: 'A' indicates assembled, 'NA' indicates not assembled, and 'x' represents the don't-care states.*

3.2 Config signals

Table 12 Config signals

Short name	Description	Comment
P14.5	HWCFG[1] (EVRCON/EVRCOFF)	Resistor R72 (4.7 KΩ) pulls HWCFG[1] high, and resistor R71 (4.7 KΩ) pulls HWCFG[2] low (assembled initially). As a result, EVRCON with VDDEXT = 3.3 V (where 3.3 V ≤ VDDEXTDC ≤ 5 V) is selected.
P14.2	HWCFG[2] (EVRCON/EVRCOFF)	
P14.3	HWCFG[3] (See Boot mode)	-
P10.5	HWCFG[4] (See Boot mode)	-
P14.4	HWCFG[6] (Default Pad state)	Resistor R80 pulls HWCFG[6] low (assembled initially). As a result, all GPIO pins are in a tri-state configuration after reset.

3.3 Optional resistors

Some resistors or bridges enable, disable, or modify the functions of specific signals, as shown in Table 13. To disable a signal, the corresponding resistor must be removed. To enable a signal, the corresponding resistor must be assembled.

For example, desoldering the initially assembled resistor R35 disables the potentiometer and the analog signal AN0 of the AURIX™, making it available for other purposes.

Table 13 Signal mapping of the optional resistors

Resistor	Res.	Assembled	Signal	Size (Imperial)	Comment
R35	0 Ω	Yes	AN0	0603	Disassemble to disable the potentiometer (R32)
R61	0 Ω	Yes	XTAL2	0603	Use a serial resistor to reduce oscillator amplitude, if needed.
R38	0 Ω	No	+5 V	0603	Assemble to connect 5 V to the mikroBUS and Shield2Go connectors
R14	0 Ω	No	P14.1, P21.1	0603	Assemble to use ASCLIN11 (P21.1) instead of ASCLIN0 (P14.1) via USB
R15	0 Ω	No	P14.0, P21.0	0603	Assemble to use ASCLIN11 (P21.0) instead of ASCLIN0 (P14.0) via USB

4 Connector pin assignment

4.1 Pinout of X1 and X2 connectors

The pin headers X1 and X2 can be used to extend the evaluation board or perform measurements on the AURIX™ TC4D7. The available GPIOs and signals at these pin headers are shown in Table 14 and Table 15. The pin table is printed on the bottom side of the PCB.

Table 14 X1 pins

Header pin	Pin description	Header pin	Pin description
X1.1	GND	X1.2	+3.3 V
X1.3	P33.11	X1.4	P33.12
X1.5	P33.13	X1.6	P32.4
X1.7	P23.1	X1.8	P32.6
X1.9	P33.14	X1.10	P32.7
X1.11	P23.5	X1.12	RST_S2G1
X1.13	P16.9	X1.14	P22.0
X1.15	P16.10	X1.16	P22.2
X1.17	P16.11	X1.18	P22.3
X1.19	P16.12	X1.20	P22.1
X1.21	P21.4	X1.22	P21.5
X1.23	TXD_S2G2	X1.24	P20.1
X1.25	RXD_S2G2	X1.26	/ESR1
X1.27	/ESR0	X1.28	P15.4
X1.29	P15.5	X1.30	/PORST
X1.31	P20.14	X1.32	P20.13
X1.33	P20.12	X1.34	P20.11
X1.35	P20.10	X1.36	P20.9
X1.37	P20.8	X1.38	P20.7
X1.39	VCC_IN	X1.40	GND

Table 15 X2 pins

Header pin	Pin description	Header pin	Pin description
X2.1	GND	X2.2	VCC_IN
X2.3	P00.0	X2.4	P03.6
X2.5	CS_S2G2	X2.6	P03.7
X2.7	P03.10	X2.8	P03.9
X2.9	P00.7	X2.10	P03.11
X2.11	P00.10	X2.12	P00.9

(table continues...)

Table 15 (continued) X2 pins

Header pin	Pin description	Header pin	Pin description
X2.13	P00.12	X2.14	P00.11
X2.15	VAREF1	X2.16	AN21
X2.17	AN20	X2.18	AN13
X2.19	AN12	X2.20	AN7
X2.21	AN6	X2.22	AN5
X2.23	AN4	X2.24	AN3
X2.25	AN2	X2.26	AN1
X2.27	AN0	X2.28	P33.0
X2.29	P33.1	X2.30	P33.2
X2.31	P33.3	X2.32	P33.4
X2.33	P33.5	X2.34	P33.6
X2.35	P33.15	X2.36	P33.8
X2.37	P33.9	X2.38	P33.10
X2.39	+3V3	X2.40	GND

4.2 Shield2Go and mikroBUS pinout

The pin connectors for Shield2Go connectors 1 and 2, as well as mikroBUS, can be used to extend the evaluation board or perform measurements on the AURIX™ TC4D7_COM. The table below lists the available signals at these connectors. The pin table is also printed on the top side of the KIT_A3G_TC4D7_LITE.

Table 16 Shield2Go connector 1

S2G1 pins	Pin description	MCU port pin	S2G1 pins	Pin description	MCU port pin
1	+5 V	-	-	-	-
2	AN1	AN16	10	RX	P02.10
3	AN2	AN17	11	TX	P02.9
4	SDA	P13.2	12	RST/GPIO2	P23.4
5	SCL	P13.1	13	GPIO1	P32.2
6	GND	-	14	CS	P02.2
7	+3V3	-	15	SCLK	P01.7
8	INT/GPIO3	P10.3	16	MOSI	P01.6
9	PWM/GPIO4	P14.9	17	MISO	P01.5

Table 17 Shield2Go connector 2

S2G2 pins	Pin description	MCU port pin	S2G2 pins	Pin description	MCU port pin
1	+5 V	-	-	-	-

(table continues...)

Table 17 (continued) Shield2Go connector 2

S2G2 pins	Pin description	MCU port pin	S2G2 pins	Pin description	MCU port pin
2	AN1	AN18	10	RX	P20.3
3	AN2	AN19	11	TX	P20.0
4	SDA	P13.2	12	RST/GPIO2	P02.11
5	SCL	P13.1	13	GPIO1	P32.5
6	GND	-	14	CS	P00.8
7	+3V3	-	15	SCLK	P01.7
8	INT/GPIO3	P10.8	16	MOSI	P01.6
9	PWM/GPIO4	P14.10	17	MISO	P01.5

Table 18 mikroBUS connector

mikroBUS pins	Pin description	MCU port pin	mikroBUS pins	Pin description	MCU port pin
1	AN	AN10	16	PWM	P02.8
2	RST	P10.6	15	INT	P10.7
3	CS	P14.7	14	RX	P15.1
4	SCK	P15.8	13	TX	P15.0
5	MISO	P15.7	12	SCL	P13.1
6	MOSI	P15.6	11	SDA	P13.2
7	+3.3 V	-	10	+5 V	-
8	GND	-	9	GND	-

4.3 Connectors compatible with Arduino

The mapping of GPIOs and AURIX™ pin functions to Arduino-compatible functions is provided in Table 19. The Arduino-compatible connector supports the following:

- SPI interface
- I^2C interface
- UART interface
- PWM signal outputs
- ADC input
- Interrupt input

Table 19 Arduino header pin details

Header pin	Pin description	MCU port pins and its corresponding functions
X302		
1	NC	-
2	IOREF	-
3	RESET	/PORST

(table continues...)

Table 19 (continued) Arduino header pin details

Header pin	Pin description	MCU port pins and its corresponding functions
4	+3V3	-
5	+5 V	-
6	GND	-
7	GND	-
8	VIN	-
X301		
1	ADC0	P00.1, ADC_TMADC2CH11
2	ADC1	P00.2, ADC_TMADC2CH10
3	ADC2	P00.3, ADC_TMADC2CH9
4	ADC3	P00.4, ADC_TMADC2CH8
5	ADC4	P00.5, ADC_TMADC2CH7
6	ADC5	P00.6, ADC_TMADC2CH6
X304		
1	RX	P15.3, ASCLIN0_ARXB
2	TX	P15.2, ASCLIN0_ATX
3	PWM_2	P02.0, EGTM_TOUT0_F
4	PWM_3	P02.1, EGTM_TOUT1_F
5	PMW_4	P03.3, EGTM_TOUT274
6	PWM_5	P02.3, EGTM_TOUT3_F
7	PWM_6	P02.5, EGTM_TOUT5_F
8	PWM_7	P02.4, EGTM_TOUT4_F
X303		
1	PWM_8	P02.6, EGTM_TOUT6_F
2	PWM_9	P02.7, EGTM_TOUT7_F
3	SS/PWM_10	P03.4, QSPI3_SLSO0/EGTM_TOUT275
4	MOSI	P03.2, QSPI6_MTSR
5	MISO	P03.0, QSPI6_MRSTC
6	SPICLK	P03.1, QSPI6_SCLKC
7	GND	-
8	AREF	VAREF
9	SDA0	P13.2, I2C0_SDA/I2C_SDAB
10	SCL0	P13.1, I2C0_SCL

***Note**: The KIT_A3G_TC4D7_LITE operates with 3.3 V logic levels. Therefore, boards that use 5 V logic levels are not compatible.*

4.4 Infineon DAP debug connector (10-pin)

Infineon's 10-pin device access port (DAP) debug connector is a two-wire tool access port designed for microcontrollers and similar devices. It supports robust, high-speed connections over long cables, making it suitable for automotive applications. The pin assignment for the DAP debug connector is shown Table 20.

The board includes a DAP connector, which can be used to connect DAP hardware. When using this connector, ensure that the miniWiggler JDS is inactive (LED4 is off). For more details, see AP2400314.

Table 20 Pin assignment of the DAP debug connector

Pin	Name	AURIX™ pin	Direction	Description
1	VREF	VEXT	O	The supply voltage from the target system must be sufficient to power the target side of the level shifters within the tool hardware at operating frequencies of up to 20 MHz DAP. The required supply current is approximately 5 mA, primarily due to signal switching. This current can be reduced by lowering the operating frequency and capacitance. For frequencies beyond 20 MHz, the tool hardware must power the level shifters from an alternate source, using this pin solely as a voltage reference.
2	DAP1	TMS	IO	DAP: Data pin
	SPD		IO	SPD: Data pin
	UART		IO	Single-write UART: A serial communication interface (used for the Bootstrap Loader (BSL))
3	GND	GND	-	Recommended pin for the signal return of DAP1 to ensure high-frequency impedance matching
4	DAP0	TCK	I	DAP: Data clock
	SUP		I	SPD: Optional user pin for feedback into the target system; otherwise, it is reserved
5	GND	GND	-	Recommended pin for the signal return of DAP0 to ensure high-frequency impedance matching
6	DAP2	P21.7	IO	DAP: Optional second data pin
	USER0		IO/O	Generic signal that can be used for unspecified functions

(table continues...)

Table 20 (continued) Pin assignment of the DAP debug connector

Pin	Name	AURIX™ pin	Direction	Description
7	KEY (GND in cable)	GND	-	If the recommended connector with a keying shroud is not used, this pin offers an alternative option to enforce polarization. In this case, the pin is removed from the target connector, and the associated jack in the cable connector is closed with a plastic pin, for example.
8	DAP3	P21.6	IO	DAP: Optional third data pin
	USER1		IO/I	Generic signal that can be used for non-specified functions
	(DAPEN)		I	Optional indicator showing that the tool is connected, which can be used to enable the DAP interface of the device.
10	RESET	/PORST	IO	Target reset signal: An open-drain, active-low signal that can be used bi-directionally to drive or sense the target reset signal. It is typically driven by the tool to reset the target system. The target system must provide a pull-up resistor to VREF on this signal to establish a logic high. The pull-up resistor must have a value of at least 1 kΩ.

5 Schematics and placement

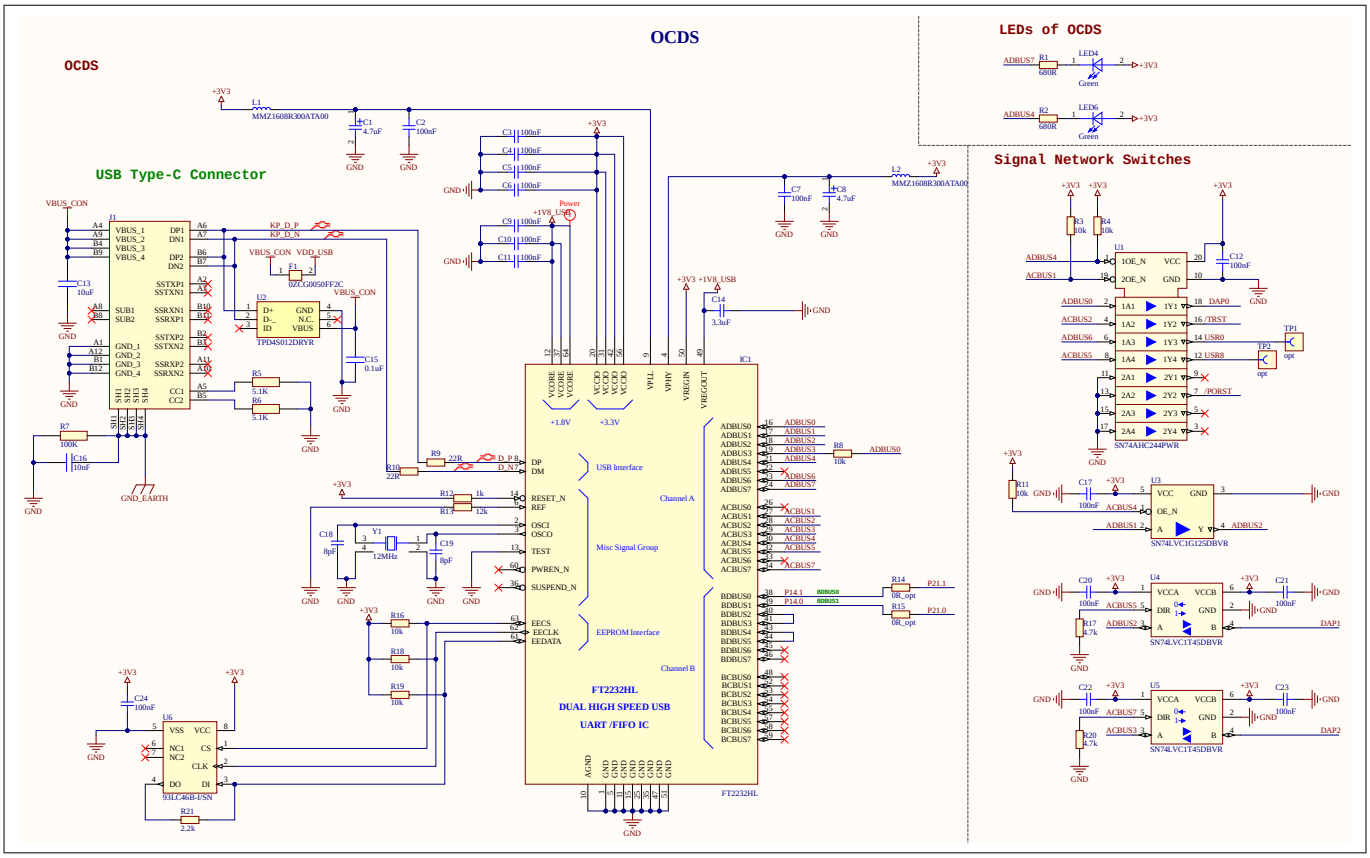

Figure 4 OCDS

5 Schematics and placement

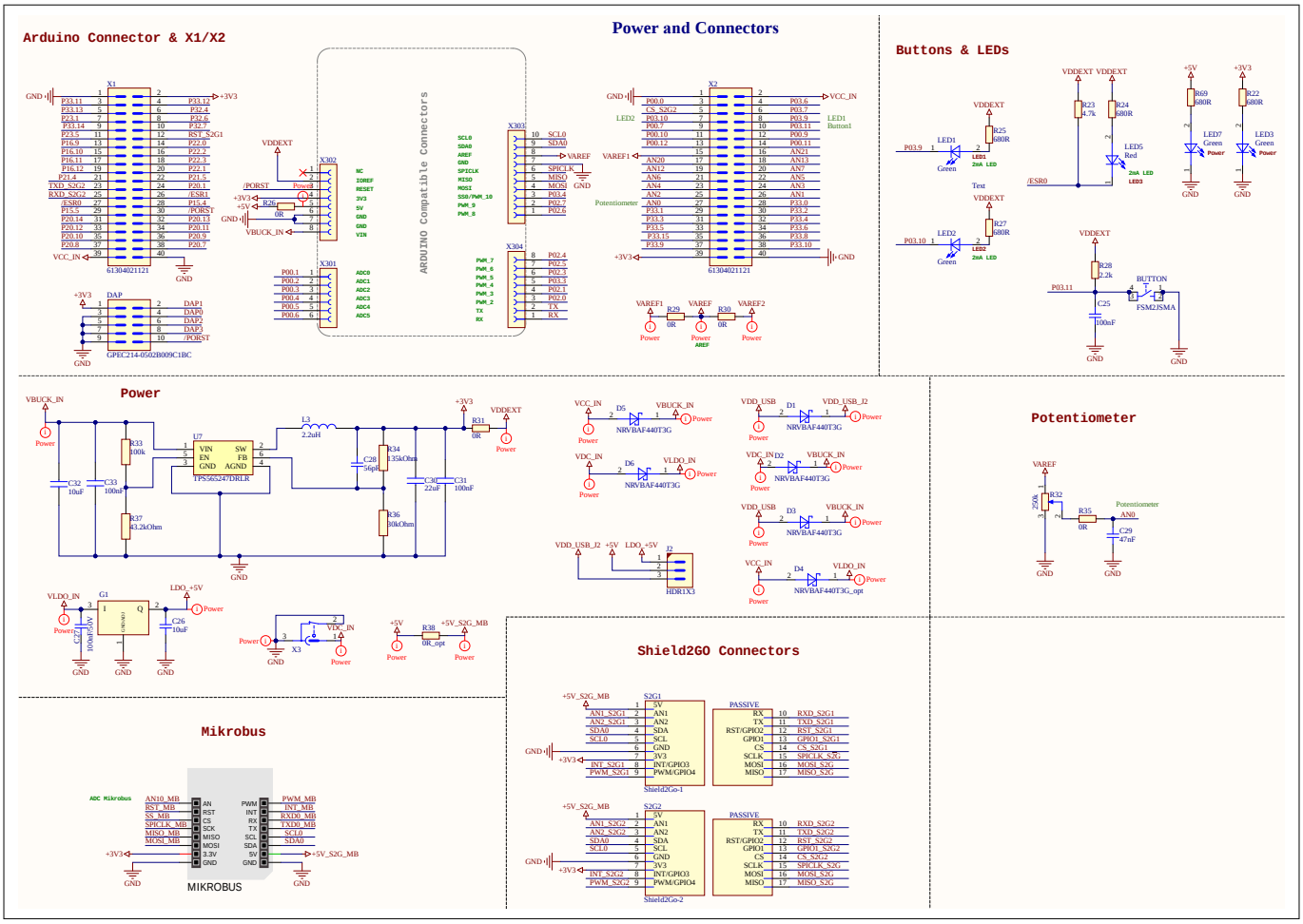

Figure 5 Power supply and expansion connectors

5 Schematics and placement

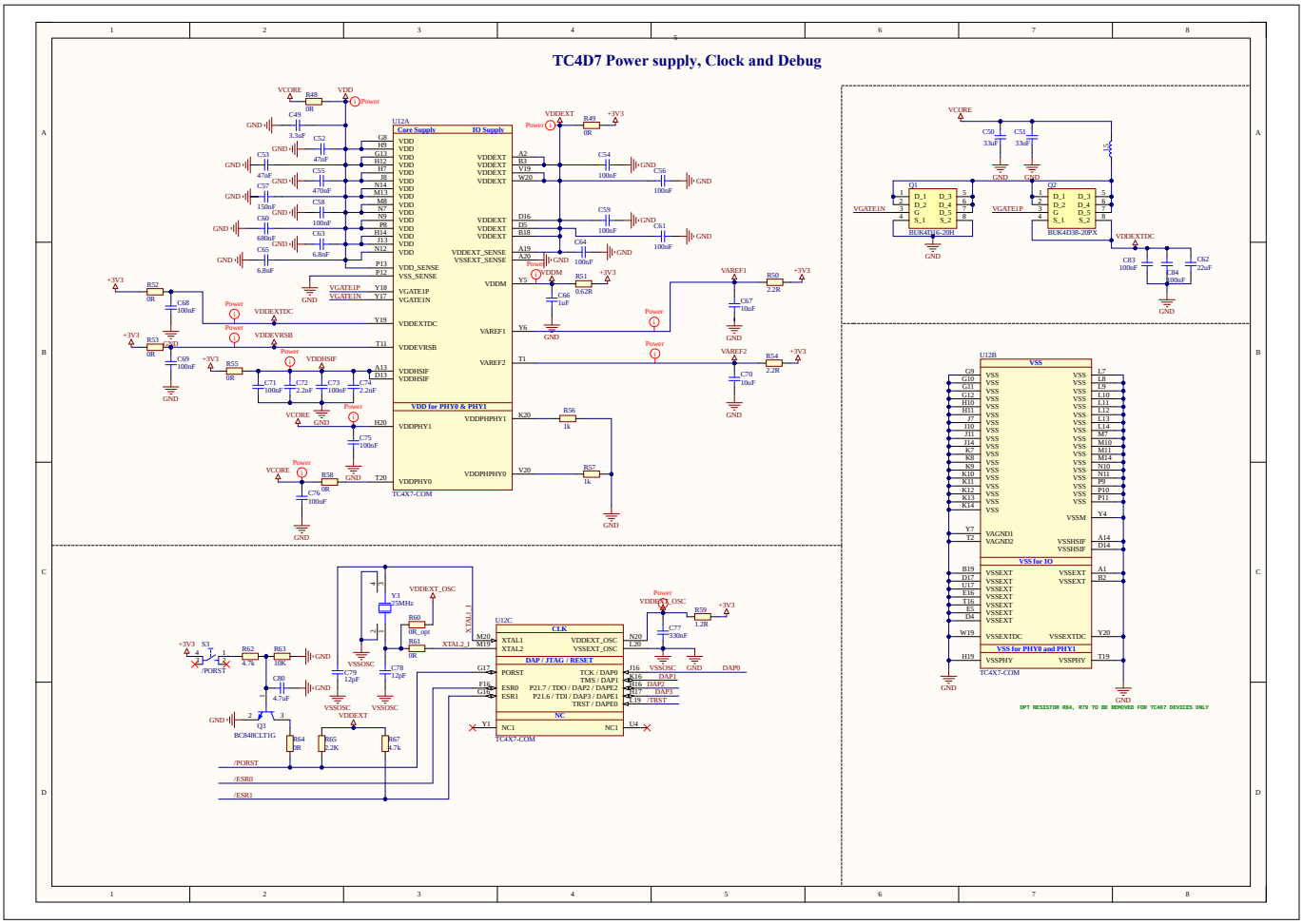

Figure 6 TC4D7 power supply, clock, and debug

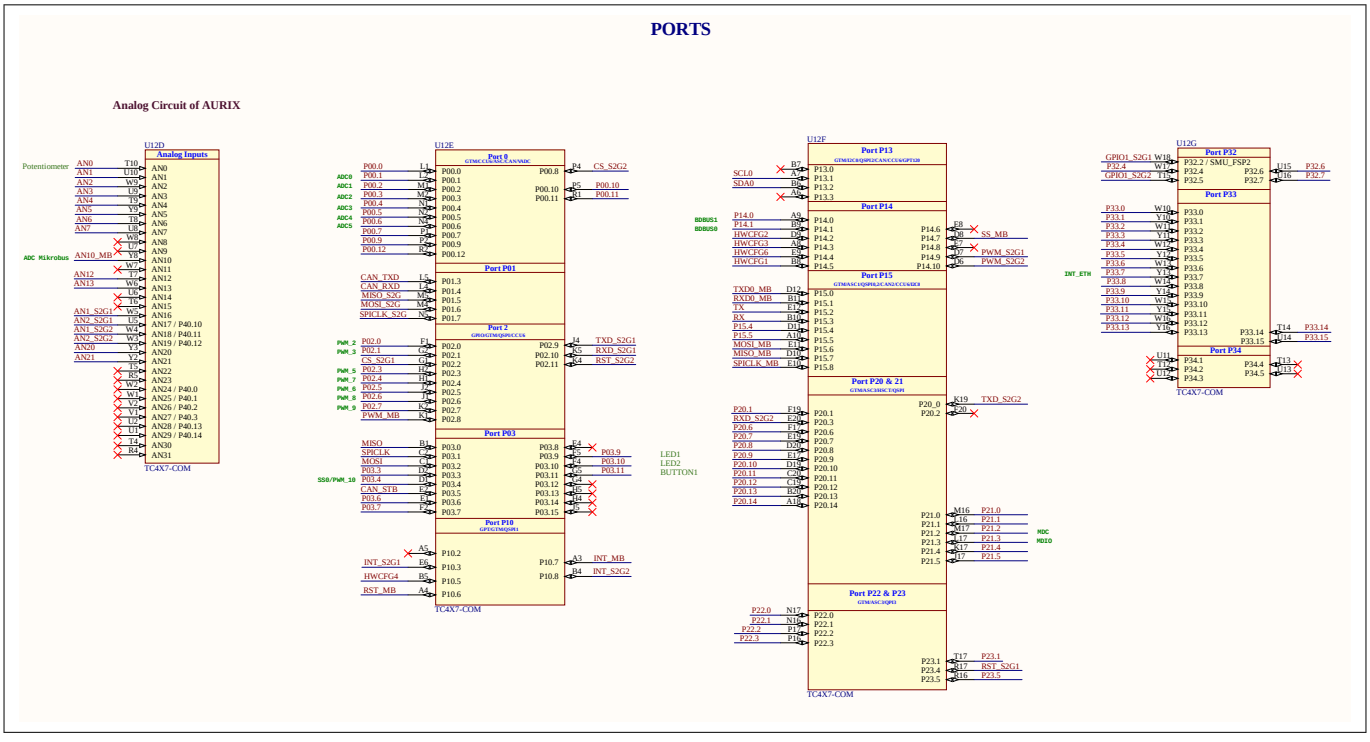

Figure 7 TC4D7 ports

5 Schematics and placement

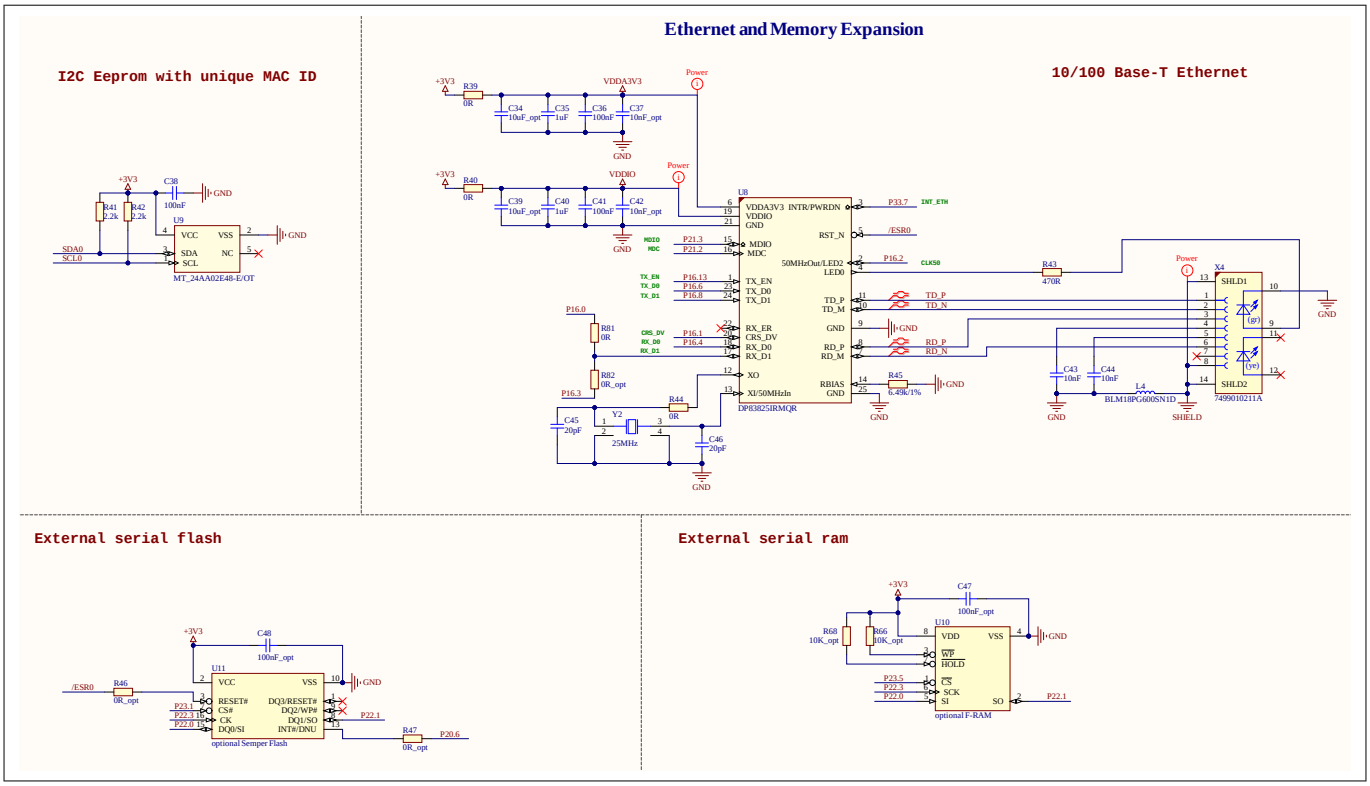

Figure 8 Ethernet and memory expansion

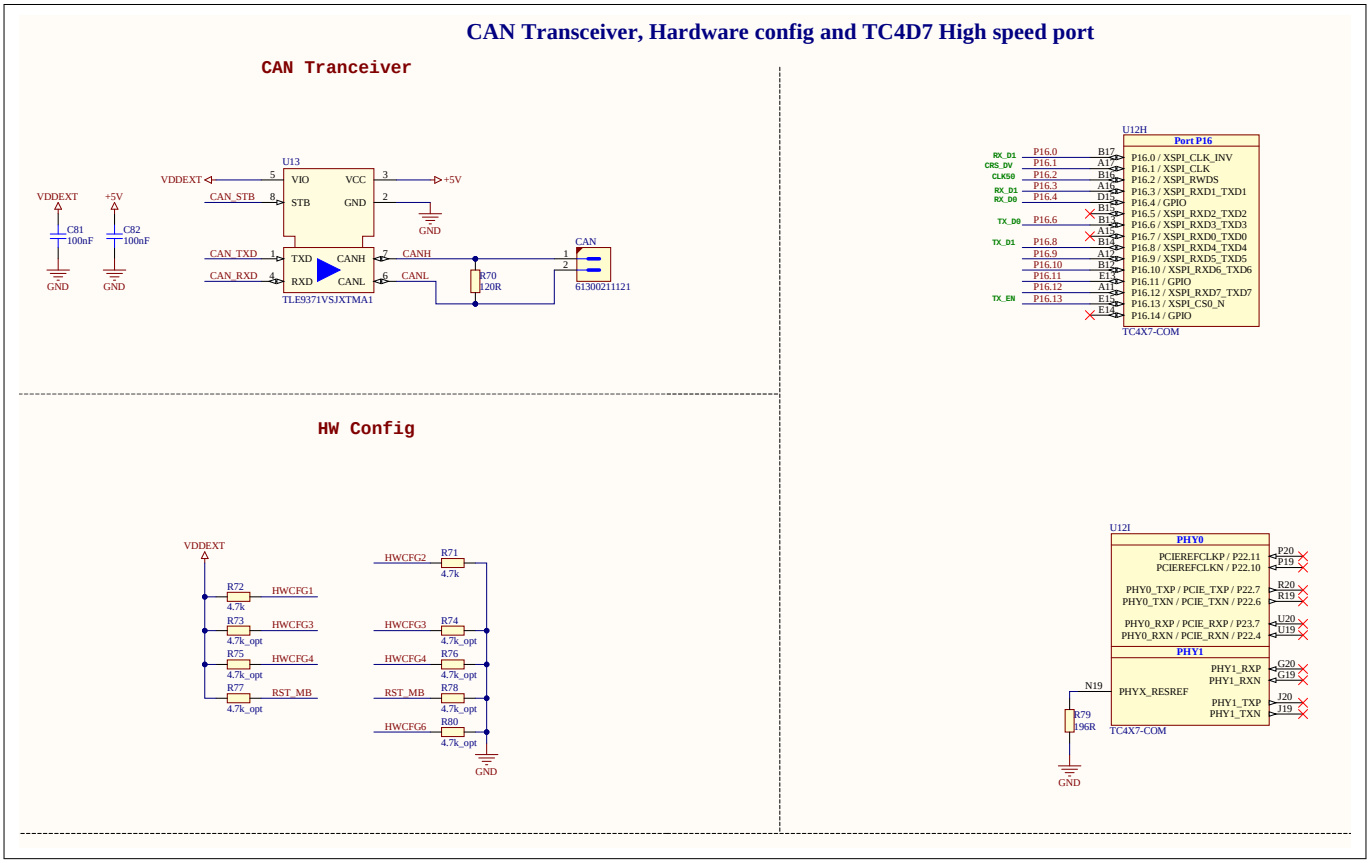

Figure 9 CAN transceiver, hardware config, and TC4D7 high-speed port

5 Schematics and placement

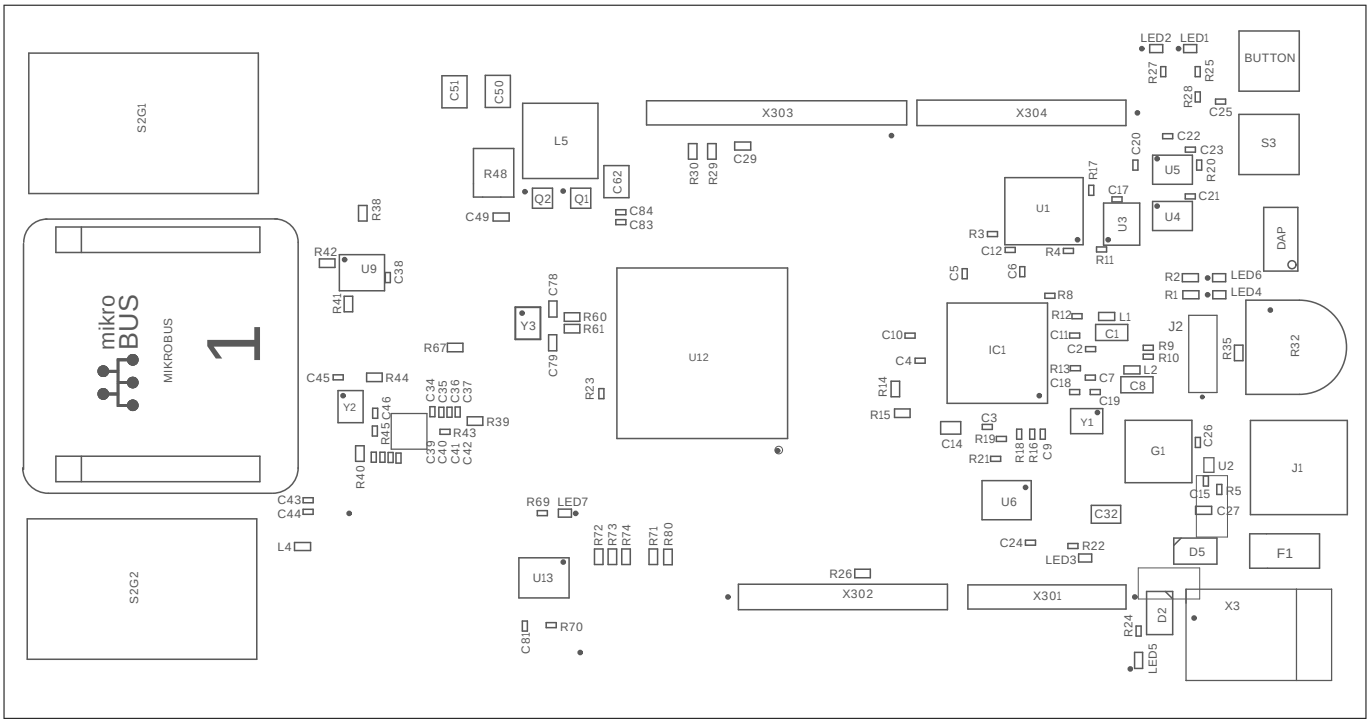

Figure 10 Primary side assembly

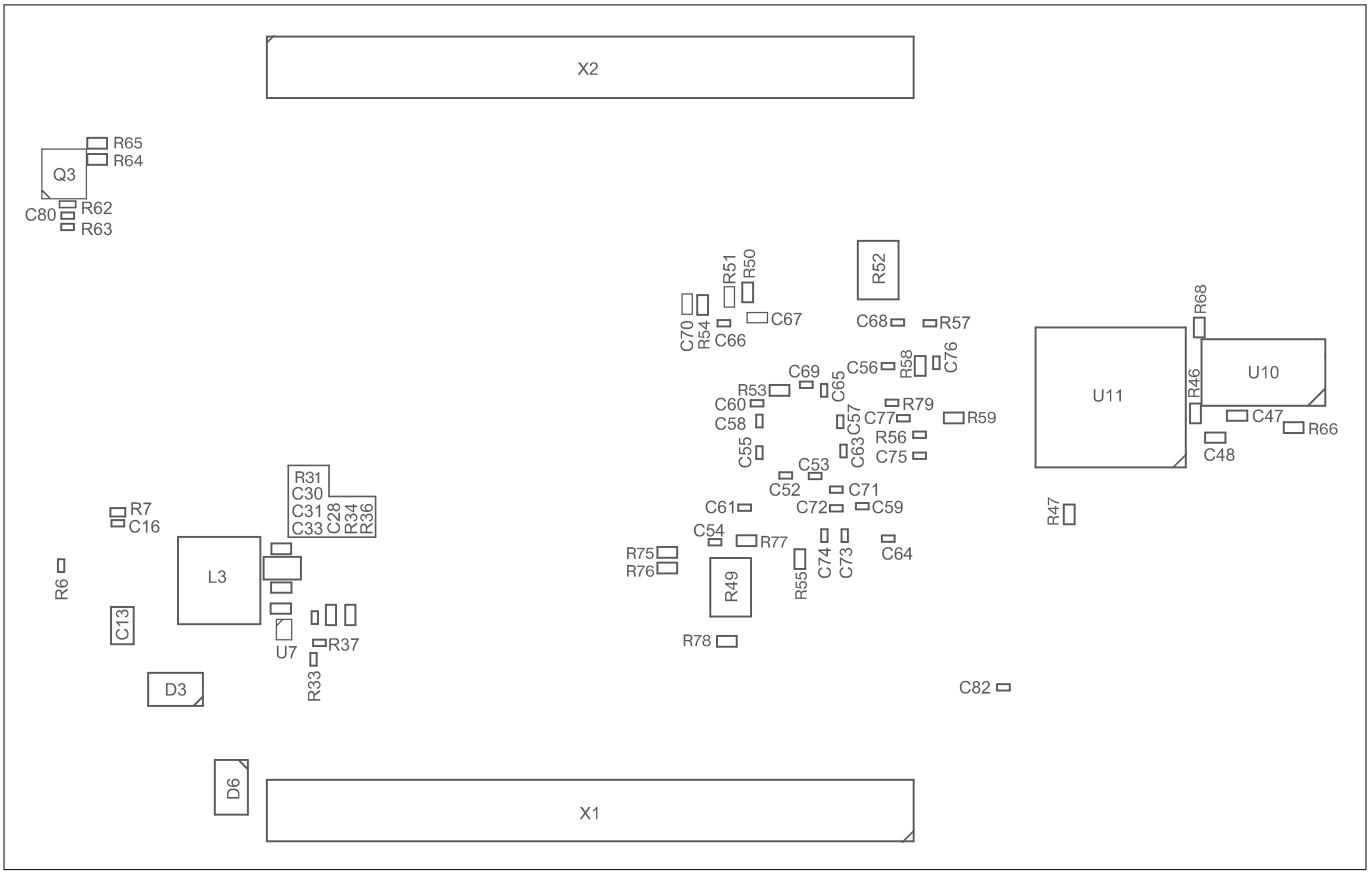

Figure 11 Secondary side assembly

6 Bill of materials

Table 21 Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
1	BUTTON	Tactile Switch SPST-NO Top Actuated Surface Mount	FSM2JSMA	TE Connectivity ALCOSWITCH Switches	FSM2JSMA	Tactile Switch SPST-NO 0.05A 24V
2	C1, C8	4.7 µF Molded Tantalum Capacitors 10 V 1206 (3216 Metric) 5Ohm	CAPMP3216X180N	Kemet	T491A475K010AT	4.7 uF
22	C2, C3, C4, C5, C6, C7, C9, C10, C11, C12, C17, C20, C21, C22, C23, C24, C25, C36, C38, C41, C81, C82	0.1 µF ±10% 16 V Ceramic Capacitor X7R 0402 (1005 Metric)	CAPC1005X55N-1	TDK Corporation	CGA2B1X7R1C104K050BC	100 nF
1	C13	10 µF ±10% 25 V Ceramic Capacitor X5R 0805 (2012 Metric)	CAPC2012X145N	TDK	C2012X5R1E106K125AB	10 uF
1	C14	3.3 µF ±10% 10V Ceramic Capacitor X5R 0805 (2012 Metric)	CAPC2013X95N	Samsung Electro-Mechanics	CL21A335KPFNNNE	3.3 uF
1	C15	0.1 µF -20%, +80% 16 V Ceramic Capacitor Y5V (F) 0402 (1005 Metric)	CAPC1005X55N	Samsung Electro-Mechanics	CL05F104ZO5NNNC	0.1 uF
1	C16	10000 pF ±5% 50 V Ceramic Capacitor X7R 0402 (1005 Metric)	CAPC1005X55N-1	muRata Electronics	GRM155R71H103JA88D	10 nF
2	C18, C19	8 pF ±0.05 pF 50 V Ceramic Capacitor C0G, NP0 0402 (1005 Metric)	CAPC1005X55N-0	muRata	GJM1555C1H8R0WB01D	8 pF

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
1	C26	10 µF ±20% 10 V Ceramic Capacitor X5R 0402 (1005 Metric)	CAPC1005X70N	Samsung	CL05A106MP6NUN8	10 uF
1	C27	0.1 µF ±20% 100 V Ceramic Capacitor X7S 0603 (1608 Metric)	CAPC1608X90N-4	TDK Corporation	CGA3E3X7S2A104M080AB	100 nF
1	C28	56 pF ±5% 50 V Ceramic Capacitor C0G, NP0 0402 (1005 Metric)	CAPC1005X55N-0	KYOCERA AVX	KGM05ACG1H560JH	56 pF
1	C29	0.047 µF ±10% 50 V Ceramic Capacitor X7R 0603 (1608 Metric)	CAPC1608X90N-4	TDK Corporation	CGA3E2X7R1H473K080AA	47 nF
1	C30	22 µF ±20% 10 V Ceramic Capacitor X5R 0805 (2012 Metric)	CAPC2012X145N	muRata Electronics	GRT21BR61A226ME13L	22 uF
2	C31, C33	0.1 µF ±10% 25 V Ceramic Capacitor X7R 0603 (1608 Metric)	CAPC1608X90N	muRata Electronics	GCJ188R71E104KA12D	100 nF
1	C32	10 µF ±20% 25 V Ceramic Capacitor X5R 0805 (2012 Metric)	CAPC2012X145N_1	muRata Electronics	GRM21BR61E106MA73L	10 uF
3	C35, C40, C66	1 µF ±10% 10 V Ceramic Capacitor X5R 0402 (1005 Metric)	CAPC1005X55N	Kemet	C0402C105K8PACTU	1 uF
2	C43, C44	10000 pF ±10% 16 V Ceramic Capacitor X7R 0402 (1005 Metric)	CAPC1005X55N	Kemet	C0402C103K4RACAUTO	10 nF

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
2	C45, C46	20 pF ±2% 50 V Ceramic Capacitor C0G, NP0 0402 (1005 Metric)	CAPC1005X55N-0	YAGEO	CC0402GRNPO9BN200	20 pF
1	C49	3.3 µF ±10% 6.3 V Ceramic Capacitor X5R 0603 (1608 Metric)	CAPC1608X90N-3_1	TDK Corporation	CGA3E3X5R0J335K080AB	3.3 uF
2	C50, C51	33 µF ±20% 10 V Ceramic Capacitor X7S 1210 (3225 Metric)	CAPC3225X280N-3	TDK	CGA6M1X7S1A336M200AC	33 uF
2	C52, C53	0.047 µF ±10% 25 V Ceramic Capacitor X7R 0402 (1005 Metric)	CAPC1005X55N-0	muRata	GCM155R71E473KA55D	47 nF
14	C54, C56, C58, C59, C61, C64, C68, C69, C71, C73, C75, C76, C83, C84	0.1 µF ±10% 50 V Ceramic Capacitor X7R 0402 (1005 Metric)	CAPC1005X55N-0	muRata	GCM155R71H104KE02J	100 nF
1	C55	0.47 µF ±10% 10 V Ceramic Capacitor X7R 0402 (1005 Metric)	CAPC1005X55N-0	muRata	GRT155R71A474KE01D	470 nF
1	C57	0.15 µF ±10% 16 V Ceramic Capacitor X7R 0402 (1005 Metric)	CAPC1005X55N-0	muRata	GCM155R71C154KE02D	150 nF
1	C60	0.68 µF ±10% 10 V Ceramic Capacitor X7S 0402 (1005 Metric)	CAPC1005X55N-0	muRata	GCM155C71A684KE38D	680 nF
1	C62	22 µF ±10% 16 V Ceramic Capacitor X7R 1210 (3225 Metric)	CAPC3225X280N-0	Samsung Electro-Mechanics	CL32B226KOJVPNE	22 uF

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
2	C63, C65	6800 pF ±10% 25 V Ceramic Capacitor X7R 0402 (1005 Metric)	CAPC1005X55N-0	muRata	GCM155R71E682KA37D	6.8 nF
2	C67, C70	10 µF ±20% 10 V Ceramic Capacitor X7T 0603 (1608 Metric)	CAPC1608X100N	muRata	GRM188D71A106MA73D	10 uF
2	C72, C74	2200 pF ±10% 50 V Ceramic Capacitor X7R 0402 (1005 Metric)	CAPC1005X55N-0	muRata	GRM155R71H222KA01D	2.2 nF
1	C77	0.33 µF ±10% 10 V Ceramic Capacitor X5R 0402 (1005 Metric)	CAPC1005X55N-0	muRata	GRM155R61A334KE15D	330 nF
2	C78, C79	12 pF ±2% 50 V Ceramic Capacitor C0G, NP0 0603 (1608 Metric)	CAPC1608X90N	YAGEO	CC0603GRNPO9BN120	12 pF
1	C80	4.7 µF ±10% 10 V Ceramic Capacitor X5R 0402 (1005 Metric)	CAPC1005X65N	TDK Corporation	C1005X5R1A475K050BC	4.7 uF
1	CAN	Connector Header Through Hole 2 position 0.100" (2.54 mm)	HDRV2W64P254_1X2_496X248X838B	Samtec	61300211121	2-pin header (2.54 mm)
5	D1, D2, D3, D5, D6	Diode 40 V 4A Surface Mount SMA-FL	SODFL5126X110N	onsemi	NRVBAF440T3G	Diode Schottky 40V 4A
1	DAP	1.27 Pin Header Dual Rows Smt Type, Brass, 1 Amp, 1000 Mohm min, 300 vAC	CON-M-SMD-GPEC214-0502B009C1BC	Greenconn Corporation	GPEC214-0502B009C1BC	10-pin header (1.27 mm)

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
1	F1	Polymeric PTC Resettable Fuse 16V 500 mA Ih Surface Mount 1812 (4532 Metric), Concave	0ZCG0050FF2C	Bel Fuse Inc.	0ZCG0050FF2C	PTC Reset Fuse 0.5 A/16 V
1	G1	Linear Voltage Regulator IC Positive Fixed 1 Output 1A PG-TO252-3-11	INF-PG-TO252-3-11_N	Infineon Technologies	TLE4284DV50A TMA1	Voltage regulator 1A
1	IC1	IC USB HS DUAL UART/ FIFO 64-LQFP	QFP50P1200X1 200X160-64N	Future Technology Devices International	FT2232HL-REEL	USB to UART/DAP Bridge
1	J1	USB-C (USB TYPE-C) USB 3.2 Gen 2 (USB 3.1 Gen 2, Superspeed + (USB 3.1)) Receptacle Connector 24 Position Surface Mount, Right Angle; Through Hole	DX07S024XJ1R 1100	JAE Electronics	DX07S024XJ1R 1100	USB-C Connector
1	J2	Connector Header Through Hole 3 position 0.100" (2.54mm)	HDRV2W110P0 X254_1X3_508X 254X854P	Würth Elektronik	61300311121	3-pin header
2	L1, L2	30 Ohms @ 100 MHz 1 Signal Line Ferrite Bead 0603 (1608 Metric) 1.5A 50mOhm	INDC1608X95N _MMZ1608	TDK Corporation	MMZ1608R300 ATA00	Ferrite Bead 30 OHM
1	L3	2.2 µH Shielded Molded Inductor 9 A 16.5 mOhm Max Nonstandard	INDPM6965X30 0N	Vishay	IHLP2525CZER 2R2M11	Fixed Inductor 2.2 uH 9 A

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
1	L4	60 Ohms @ 100 MHz 1 Power Line Ferrite Bead 0603 (1608 Metric) 500 mA 100 mOhm	INDC1608X95N-2	muRata	BLM18PG600SN1D	Ferrite Bead 60 OHM
1	L5	2.2 µH Shielded Molded Inductor 12.9 A 15.07 mOhm Max Nonstandard	XAL7030-222MEC	Coilcraft	XAL7030-222MEC	Fixed Inductor 2.2 uH 12.9 A
6	LED1, LED2, LED3, LED4, LED6, LED7	Green 574 nm LED Indication - Discrete 1.9V 0603 (1608 Metric)	LED-SMD-LG L29K-XXXX-24	Bivar Inc.	SM0603GCL	LED Green Clear
1	LED5	Red LED Indication - Discrete 2V 0603 (1608 Metric)	LEDSC160X80X80-2N	Lumex Opto/ Components Inc.	SML-LX0603IW-TR	LED Red Diffused
1	MIKROBUS	mikroBUS Host Socket	MIKROBUS HOST CONN.		PPTC081LFBN-RC	MIKROBUS HOST CONN.
1	Q1	N-Channel 20 V 8.5A (Ta), 26A (Tc) 2W (Ta), 19W (Tc) Surface Mount DFN2020MD-6	BUK4D1620X	Nexperia USA Inc.	BUK4D16-20H	Small Signal N-Channel MOSFETS
1	Q2	P-Channel 20 V 6A (Ta), 18A (Tc) 2W (Ta), 19W (Tc) Surface Mount DFN2020MD-6	BUK4D3820PX	Nexperia USA Inc.	BUK4D38-20PX	Small Signal P-Channel MOSFETS
1	Q3	Bipolar (BJT) Transistor NPN 30 V 100 mA 100 MHz 300 mW Surface Mount SOT-23-3 (TO-236)	SOT95P240X110-3N_01	onsemi	BC848CLT1G	Bipolar Transistor NPN 30 V 100 mA

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
2	R1, R2	680 Ohms ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Moisture Resistant Thick Film	RESC1608X55N-1	Yageo	RC0603FR-07680RL	680 R
8	R3, R4, R8, R11, R16, R18, R19, R63	10 kΩ ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200 Thick Film	RESC1005X40N	Vishay	CRCW040210K0FKED	10 k
2	R5, R6	5.1 kΩ ±5% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Moisture Resistant Thick Film	RESC1005X40N	Yageo	RC0402JR-075K1L	5.1 k
1	R7	100 kΩ ±5% 0.1W, 1/10W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200 Thick Film	RESC1005X40N_1	Panasonic Electronic Components	ERJ-2GEJ104X	100 k
2	R9, R10	22 Ohms ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200 Thick Film	RESC1005X40N	Vishay	CRCW040222R0FKED	22 R
3	R12, R56, R57	1 kΩ ±5% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Moisture Resistant Thick Film	RESC1005X40N-1	Yageo	RC0402JR-131KL	1 k

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
1	R13	12 kΩ ±1% 0.2W, 1/5W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200, Pulse Withstanding Thick Film	RESC1005X40N	Vishay	CRCW040212K0 FKEDHP	12 k
3	R17, R20, R23	4.7 kΩ ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Moisture Resistant Thick Film	RESC1005X40N -1	Yageo	RC0402FR-074K 7L	4.7 k
2	R21, R28	2.2 kΩ ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200 Thick Film	RESC1005X40N	Vishay	CRCW04022K20 FKED	2.2 k
5	R22, R24, R25, R27, R69	680 Ohms ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200 Thick Film	RESC1005X40N	Stackpole Electronics Inc, Vishay	RMCF0402FT68 0R	680 R
14	R26, R29, R30, R31, R35, R39, R40, R44, R53, R55, R58, R61, R64, R81	0 Ohms Jumper Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200, Pulse Withstanding Thick Film	RESC1609X50N	Vishay	CRCW06030000 Z0EAHP	0 R
1	R32	250 kΩ 0.5W, 1/2W Through Hole Thumbwheel Potentiometer Top Adjustment	TRIM_3352T-1-254LF	Bourns Inc.	3352T-1-254LF	250 k

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
1	R33	100 kΩ ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200 Thick Film	RESC1005X40N	Vishay	CRCW0402100KFKED	100 k
1	R34	135 kΩ ±0.1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Thin Film	RESC1608X55N	Yageo	RT0603BRD07135KL	135 k
1	R36	30 kΩ ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Moisture Resistant Thick Film	RESC1608X55N	Yageo	RC0603FR-0730KL	30 k
1	R37	43.2 kΩ ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200 Thick Film	RESC1005X40N	Vishay Dale	CRCW040243K2FKED	43.2 k
3	R41, R42, R65	2.2 kΩ ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200 Thick Film	RESC1609X50N	Vishay	CRCW06032K20FKTA	2.2 k
1	R43	470 Ohms ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Thick Film	RESC1005X40N	Vishay	CRCW0402470RFKEDC	470 R

(table continues...)

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
1	R45	6.49 kΩ ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200 Thick Film	RESC1005X40N	Vishay	CRCW04026K49FKED	6.49 k
1	R48	0 Ohms Jumper Chip Resistor Wide 1812 (4532 Metric), 1218 Automotive AEC-Q200, Moisture Resistant Thick Film	RESC3246X60N	Yageo	AC1218JK-070RL	0 R
2	R49, R52	0 Ohms Jumper Chip Resistor 1210 (3225 Metric) Automotive AEC-Q200 Thick Film	RESC3225X60N	Vishay	CRCW12100000Z0EA	0 R
2	R50, R54	2.2 Ohms ±1% 0.333W, 1/3W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200, Pulse Withstanding Thick Film	RESC1609X50N	Vishay	CRCW06032R20FKEAHP	2.2 R
1	R51	620 mOhms ±1% 0.125W, 1/8W Chip Resistor 0603 (1608 Metric) Thick Film	RESC1608X55N-2	Bourns	CRL0603-FW-R620ELF	0.62 R
1	R59	1.2 Ohms ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200 Thick Film	RESC1609X50N	Vishay	CRCW06031R20FKEA	1.2 R

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
1	R62	4.7 kΩ ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200 Thick Film	RESC1005X40N	Vishay	CRCW04024K70FKED	4.7 k
3	R67, R71, R72	4.7 kΩ ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200 Thick Film	RESC1609X50N	Vishay	CRCW06034K70FKEA	4.7 k
1	R70	120 Ohms ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200 Thick Film	RESC1005X40N	Vishay	CRCW0402120RFKED	120 R
1	R79	196 Ohms ±1% 0.063W, 1/16W Chip Resistor 0402 (1005 Metric) Automotive AEC-Q200 Thick Film	RESC1005X40N	Vishay	CRCW0402196RFKED	196 R
1	S3	Tactile Switch SPST-NO Top Actuated Surface Mount	FSM2JSMA	TE Connectivity ALCOSWITCH Switches	FSM2JSMA	Tactile switch SPST NO
1	U1	Buffer, Non-Inverting 2 Element 4 Bit per Element 3-State Output 20-TSSOP	SOP65P640X120-20N	Texas Instruments	SN74AHC244PWR	Buffer, Non-Inverting 2 Element 4 Bit per Element 3-State Output
1	U2	Clamp 3A (8/20 µs) Ipp Tvs Diode Surface Mount 6-SON (1.45x1)	TPD4S012DRYR	Texas Instruments	TPD4S012DRYR	TVS Diode 5.5VWM

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
1	U3	Buffer, Non-Inverting 1 Element 1 Bit per Element 3-State Output SOT-23-5	SOT95P280X145-5N-2	Texas Instruments	SN74LVC1G125DBVR	Buffer, Non-Inverting 1 Element 1 Bit per Element 3-State Output
2	U4, U5	Voltage Level Translator Bidirectional 1 Circuit 1 Channel 420 Mbps SOT-23-6	SOT95P280X145-6N-6	Texas Instruments	SN74LVC1T45DBVR	Voltage Level Translator Bidirectional 1 Circuit 1 Channel
1	U6	EEPROM Memory IC 1 Kbit Microwire 2 MHz 8-SOIC	SOIC127P600X175-8N-1	Microchip Technology	93LC46BT-I/SN	EEPROM 1 Kbit Microwire
1	U7	Buck Switching Regulator IC Positive Adjustable 0.6V 1 Output 6A SOT-563, SOT-666	SOTFL50P160X60-6N	Texas Instruments	TPS565247DRLR	Buck Switching Regulator
1	U8	1/1 Transceiver Full, Half Ethernet, IEEE 802.3 24-WQFN (3x3)	DP83825IRMQR	Texas Instruments	DP83825IRMQR	RMII Ethernet Transceiver
1	U9	EEPROM Memory IC 2 Kbit I^2C 400 kHz 900 ns SOT-23-5	SOT95P270X145-5N-1	Microchip Technology	24AA02E48T-E/OT	EEPROM Memory IC 2 Kbit I2C
1	U12	TC4D7 MCU	TC4X7_292BGA	Infineon Technologies	SAK-TC4D7XP-20MF500MC AA	TC4D7 MCU
1	U13	1/1 Transceiver CAN bus PG-DSO-8	SOIC127P600X175-8N-3	Infineon Technologies	TLE9371VSJXTMA1	CAN Transceiver
2	X1, X2	Connector Header Through Hole 40 position 0.100" (2.54 mm)	CON-M-THT-68691-440HLF	Würth Elektronik	61304021121	20-pin header (2.54 mm)

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
1	X3	2.1 mm and 2.5 mm Right Angle PCB Mount DC Power Socket 5A, 12V dc, Nickel Plated	CON-THT-JACK-FC681465P	Cliff	FC681465P	Power Barrel Connector Jack 2.1mm for +12V DC input
1	X4	1 Port RJ45 Through Hole 10/100 Base-T, Auto MDIX	CON-THT-RJ45-7499010211A	Würth Elektronik	7499010211A	RJ45 Through Hole 10/100 Base-T
1	X301	6 Position Header Connector 0.100" (2.54 mm) Through Hole Tin	CON-F-THT-SSQ-106-03-G-S	Sullins Connector Solutions	PPTC061LFBN-RC	6-pin header (2.54 mm)
2	X302, X304	8 Position Header Connector 0.100" (2.54 mm) Through Hole Tin	CON-F-THT-PPTC081LFBN-RC	Sullins Connector Solutions	PPTC081LFBN-RC	8-pin header (2.54 mm)
1	X303	10 Position Header Connector 0.100" (2.54 mm) Through Hole Tin	CON-F-THT-SSQ-110-03-F-S	Sullins Connector Solutions	PPTC101LFBN-RC	10-pin header (2.54 mm)
1	Y1	12 MHz ±15 ppm Crystal 8 pF 120 Ohms 4-SMD, No Lead	XTAL-SMD-NX3225SA	Nihon Dempa Kogyo	NX3225SA-12.000M-STD-CRS-2	12 MHz Crystal
1	Y2	25 MHz ±50 ppm Crystal 18 pF 50 Ohms 4-SMD, No Lead	XTAL-SMD-FA-238_1	Epson	FA-238 25.0000MB-C3	25 MHz Crystal
1	Y3	25 MHz ±20 ppm Crystal 12 pF 40 Ohms 4-SMD, No Lead	ECS2501233QJESTR	ECS Inc	ECS-250-12-33Q-JES-TR	25 MHz Crystal
No load components						
2	C34, C39	10 µF ±20% 10V Ceramic Capacitor X5R 0402 (1005 Metric)	CAPC1005X70N	Samsung	CL05A106MP6NUN8	10 uF optional

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
2	C37, C42	10000 pF ±10% 16V Ceramic Capacitor X7R 0402 (1005 Metric)	CAPC1005X55N	Kemet	C0402C103K4RACAUTO	10 nF optional
2	C47, C48	0.1 µF ±20% 100V Ceramic Capacitor X7S 0603 (1608 Metric)	CAPC1608X90N-4	TDK Corporation	CGA3E3X7S2A104M080AB	100 nF optional
1	D4	Diode 40 V 4A Surface Mount SMA-FL	SODFL5126X110N	onsemi	NRVBAF440T3G	Schottky diode 40 V 4 A
7	R14, R15, R38, R46, R47, R60, R82	0 Ohms Jumper Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200, Pulse Withstanding Thick Film	RESC1609X50N	Vishay	CRCW06030000Z0EAHP	0 R optional
2	R66, R68	10 kΩ ±5% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200 Thick Film	RESC1609X50N	Vishay	CRCW060310K0JNEA	10 k optional
7	R73, R74, R75, R76, R77, R78, R80	4.7 kΩ ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200 Thick Film	RESC1609X50N	Vishay	CRCW06034K70FKEA	4.7 k optional
2	TP1, TP2	Black bead terminal assembly 1.02 mm hole	TPCW100D120H460B	Vero Technologies	20-2137	PCB Test point optional
1	U10	FRAM (Ferroelectric RAM) Memory IC 4 Mbit SPI 40 MHz 8-SOIC	SOIC127P800X203-8N	Infineon Technologies	448-CY15B104Q-SXI-ND	F-RAM optional

(table continues...)

6 Bill of materials

Table 21 (continued) Bill of materials

Quantity	Designator	Description	Footprint	Manufacturer	Manufacturer order number	Comment
1	U11	FLASH - NOR Memory IC 512 Mbit SPI - Quad I/O 133 MHz 16-SOIC	SOIC127P1030 X265-16N-1	Infineon Technologies	S25HL512TDP MHI010	SEMPER™ Flash optional

Revision history

Document version	Date of release	Description of changes
**	2025-05-15	Initial release

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Edition 2025-05-15

Published by

Infineon Technologies AG

81726 Munich, Germany

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Document reference
IFX-mfa1731391624325

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