

## Introduction

The PIC32CXMTG-EK (EV11K09A) is an evaluation kit for the PIC32CXMTG series from Microchip Technology Inc. The PIC32CXMTG series is a family of system-on-chip (SoC) solutions well suited for smart energy applications, such as communication modules and residential split meter systems. This is built around a single-core Arm® Cortex®-M4F processor. The application core runs at a maximum frequency of 200 MHz.

The PIC32CXMTG-EK is an evaluation kit to help Microchip customers evaluate the PIC32CXMTG series and its different features, such as its high processing power combined with a high memory footprint, which is required in any wired and/or wireless connected products. Advanced embedded security and low power are among the other features available in the PIC32CXMTG series that the customer can evaluate with this kit.

This user's guide describes the PIC32CXMTG-EK Evaluation Kit features and how to get started with the board.

## Contents

The Evaluation Kit includes the following:

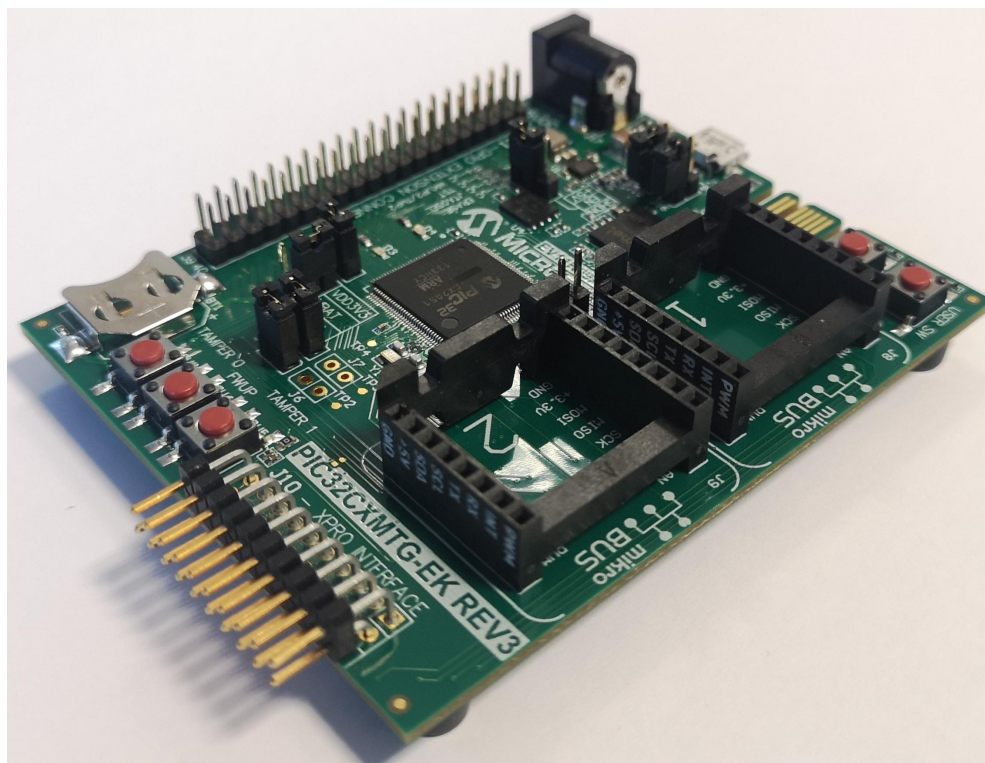
- One PIC32CXMTG-EK board
- One Micro A/B-type USB cable

## Features

The PIC32CXMTG-EK Evaluation Board includes the following key features:

- On-Board Debugger: J-Link OB:
  - UART debug
  - SWD mode
- Jumper for ERASE signal
- Two mikroBUS sockets:
  - Socket for SPI, PWM, UART, and analog input in accordance with [mikroBUS Standard Specifications](#)
- One Xplained Pro EXT connector for extension boards, like [ATREB233-XPRO](#), [ATREB215-XPRO](#), [ATOLED1-XPRO](#), and [PL460-EK](#)
- User Interface:
  - Five mechanical user buttons
  - One green and one blue user LED
- Power supplies:
  - USB or DC-Jack
  - 3V coin cell battery holder
  - Power-on red LED
  - Jumpers on relevant power supply rails to allow current consumption measurements
- Memory:
  - 64-Mbit Quad I/O SPI Flash

- Peripherals:
  - Most GPIO or peripheral I/Os not used for the mikroBUS, and Xplained Pro Extension are made available in an I/O expander connector



# Table of Contents

|                                                            |    |
|------------------------------------------------------------|----|
| Introduction.....                                          | 1  |
| Contents.....                                              | 1  |
| Features.....                                              | 1  |
| 1. Evaluation Kit Specifications.....                      | 4  |
| 1.1. Safety Recommendations.....                           | 4  |
| 1.2. Electrical and Board Characteristics.....             | 4  |
| 2. Getting Started.....                                    | 5  |
| 2.1. Code and Technical Support.....                       | 5  |
| 3. PIC32CXMTG-EK Board.....                                | 6  |
| 3.1. Overview.....                                         | 6  |
| 3.2. Block Diagram.....                                    | 7  |
| 3.3. Interface Connection.....                             | 7  |
| 3.4. Hardware Description – System.....                    | 11 |
| 3.5. Hardware Description – Interface and QSPI Memory..... | 16 |
| 3.6. Hardware Description – Expansion Connectors.....      | 18 |
| 3.7. Hardware Description – J-Link Debugger.....           | 22 |
| 4. Ordering Information.....                               | 25 |
| 5. Appendix. Schematics and Layouts.....                   | 26 |
| 5.1. PIC32CXMTG-EK Board Schematics.....                   | 26 |
| 5.2. PIC32CXMTG-EK Layout.....                             | 32 |
| 6. References.....                                         | 36 |
| 7. Revision History.....                                   | 37 |
| 7.1. Rev F - 07/2024.....                                  | 37 |
| 7.2. Rev E - 09/2022.....                                  | 37 |
| 7.3. Rev D - 04/2022.....                                  | 37 |
| 7.4. Rev C - 11/2021.....                                  | 37 |
| 7.5. Rev B - 08/2021.....                                  | 37 |
| 7.6. Rev A - 11/2020.....                                  | 37 |
| Microchip Information.....                                 | 38 |
| The Microchip Website.....                                 | 38 |
| Product Change Notification Service.....                   | 38 |
| Customer Support.....                                      | 38 |
| Microchip Devices Code Protection Feature.....             | 38 |
| Legal Notice.....                                          | 38 |
| Trademarks.....                                            | 39 |
| Quality Management System.....                             | 40 |
| Worldwide Sales and Service.....                           | 41 |

# 1. Evaluation Kit Specifications

## 1.1 Safety Recommendations

The PIC32CXMTG-EK Evaluation Board is intended for engineering, development, demonstration, or evaluation purposes only. It is not a finished product, unless otherwise noted on the board/kit. It must only be used by expert technicians. The PIC32CXMTG-EK board is powered from an external DC or a USB Micro AB power supply, so the risk of electric shock is minimized.

For any hardware components and/or jumper configuration changes, it is required to switch off the board and disconnect it from the electrical network.

The board must not be subjected to high electrostatic potentials.

This board can be used with lithium coin batteries, which are highly contaminating products. Used batteries must always be recycled or safely treated and disposed.



**Important:** Microchip does not assume any responsibility for the consequences arising from any improper use of this board.

## 1.2 Electrical and Board Characteristics

This section contains information about the PIC32CXMTG-EK power supply requirements. The board can be powered from the DC Jack connector or from the USB Micro AB connector. For additional information about the power supply system, refer to the [3.4.4. Power Supply System](#).

**Table 1-1.** Power Supply Requirements

| Electrical Parameter | Power Source                | Value |
|----------------------|-----------------------------|-------|
| Input Voltage        | DC Jack Connector, J17      | 5V    |
| Input Voltage        | USB Micro AB connector, J14 | 5V    |

**Table 1-2.** Board Characteristics

| Characteristic    | Specification                                      |
|-------------------|----------------------------------------------------|
| Temperature       | Operating: 0°C to +70°C<br>Storage: -40°C to +85°C |
| Relative Humidity | 0 to 85% (non-condensing)                          |
| Board Dimensions  | 87 mm × 72 mm × 14.35 mm                           |
| Power Supply      | External DC or USB Micro AB power supply           |
| RoHS Status       | RoHS 3 Compliant                                   |
| China RoHS Status | EFUP50                                             |
| REACH Status      | REACH Compliant                                    |

## 2. Getting Started

### 2.1 Code and Technical Support

Firmware developers can run the given example code and also implement their own applications based on the provided firmware stacks.

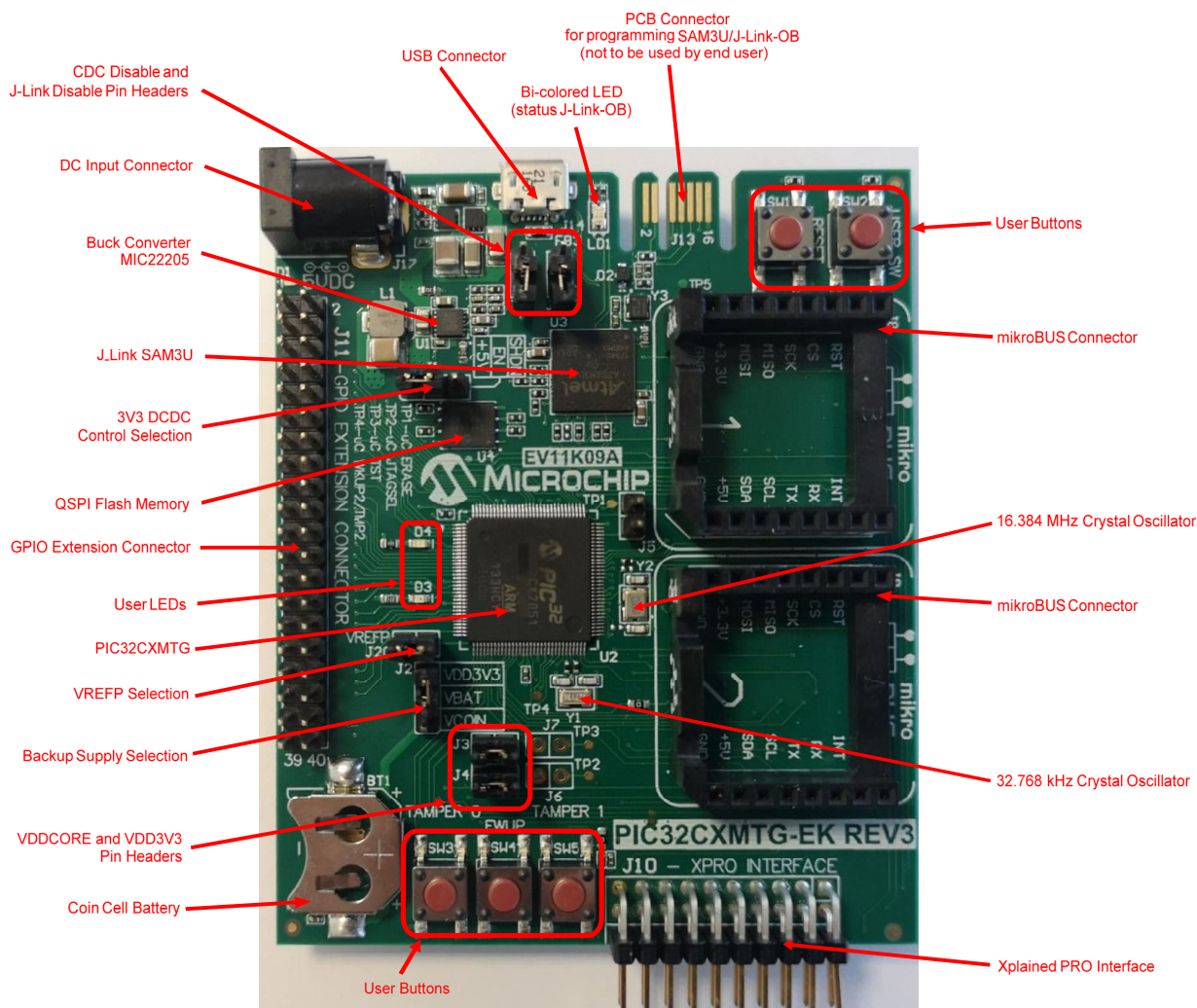
Note that the latest software code, documentation, and support materials are available for download at [www.microchip.com](http://www.microchip.com). For any technical support requests, visit [support.microchip.com](http://support.microchip.com).

## 3. PIC32CXMTG-EK Board

### 3.1 Overview

This section summarizes the PIC32CXMTG-EK board design. It provides a high-level description of the board, such as power supply, MCU, memory, peripherals, and interface board. This document is not intended to provide detailed documentation about the processor or any other component used. It is expected that the user will refer to the appropriate documents of those devices to access detailed information.

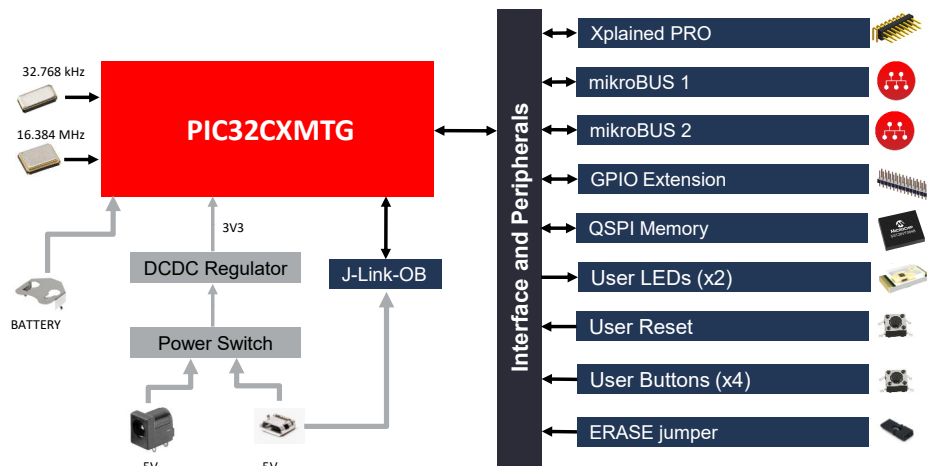
**Figure 3-1.** PIC32CXMTG-EK Board Description



## 3.2 Block Diagram

The following figure shows the block diagram of the PIC32CXMTG-EK board.

**Figure 3-2.** PIC32CXMTG-EK Block Diagram

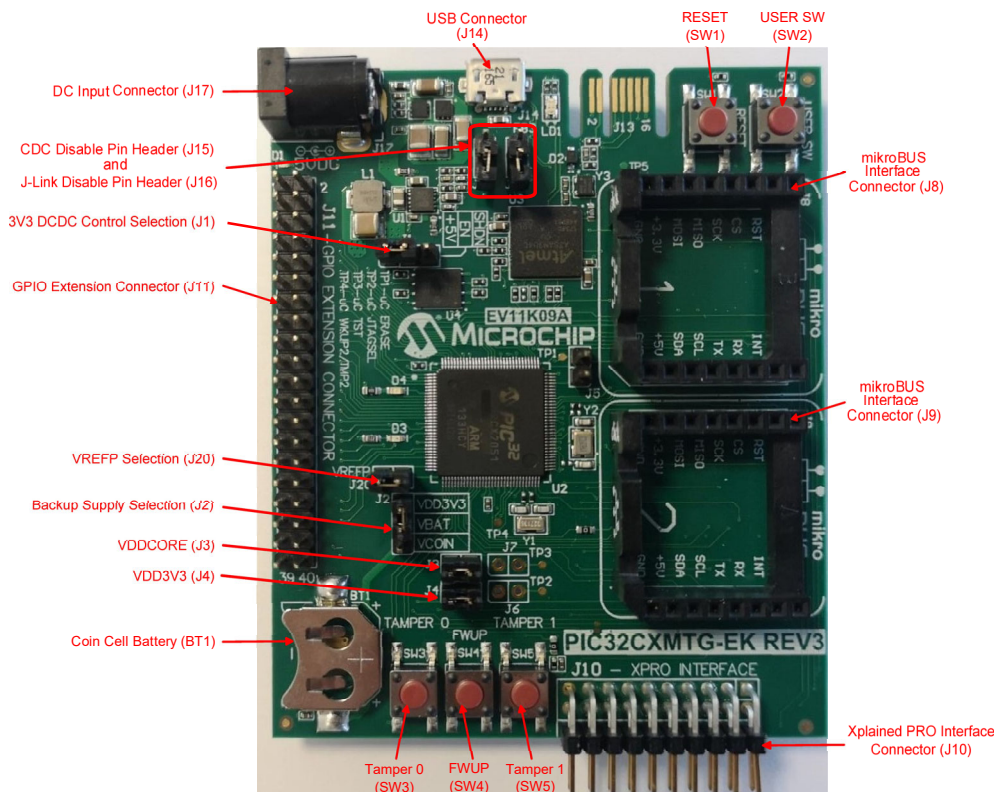


## 3.3 Interface Connection

The PIC32CXMTG-EK board includes hardware interfaces, such as jumpers, connectors, and buttons.

The following figure shows an overview of the connectors, jumpers, and buttons of the PIC32CXMTG-EK board.

**Figure 3-3.** PIC32CXMTG-EK Connectors, Button and Jumpers Overview



### 3.3.1 Connectors

The PIC32CXMTG-EK board includes the following connectors:

1. mikroBUS add-on Board Connectors, J8 and J9.

**Table 3-1.** mikroBUS Connectors, J8 and J9

| Pin | Mnemonic | Description                  |
|-----|----------|------------------------------|
| 1   | AN       | Analog Input                 |
| 2   | RST      | Reset Input                  |
| 3   | CS       | SPI Chip Select              |
| 4   | SCK      | SPI Clock                    |
| 5   | MISO     | SPI Host Input Client Output |
| 6   | MOSI     | SPI Host Output Client Input |
| 7   | +3.3V    | VDD: 3.3V power              |
| 8   | GND      | Reference Ground             |
| 9   | GND      | Reference Ground             |
| 10  | +5V      | VDD: 5V power                |
| 11  | SDA      | I <sup>2</sup> C Data        |
| 12  | SCL      | I <sup>2</sup> C Clock       |
| 13  | TX       | UART Transmit                |
| 14  | RX       | UART Receive                 |
| 15  | INT      | Hardware Interrupt Output    |
| 16  | PWM      | Pulse-Width Modulation Input |

2. Xplained Pro Connector, J10.

**Table 3-2.** Xplained Pro Connector, J10

| Pin | Mnemonic | Description                                                                   |
|-----|----------|-------------------------------------------------------------------------------|
| 1   | ID       | Not Connected                                                                 |
| 2   | GND      | Reference Ground                                                              |
| 3   | ADC      | Analog-to-Digital Converter (ADC)                                             |
| 4   | ADC      | Analog-to-Digital Converter (ADC)                                             |
| 5   | GPIO1    | General purpose I/O                                                           |
| 6   | GPIO2    | General purpose I/O                                                           |
| 7   | PWM+     | Pulse-Width Modulation (PWM), alternatively positive part of differential PWM |
| 8   | PWM-     | Pulse-Width Modulation (PWM), alternatively negative part of differential PWM |
| 9   | IRQ/GPIO | Interrupt request line and/or general purpose I/O                             |
| 10  | SS/GPIO  | Chip Select for SPI and/or general purpose I/O                                |
| 11  | TWD      | I <sup>2</sup> C Data                                                         |
| 12  | TWCK     | I <sup>2</sup> C Clock                                                        |
| 13  | RXD      | UART Receiver                                                                 |
| 14  | TXD      | UART Transmitter                                                              |
| 15  | SS       | SPI Chip Select                                                               |
| 16  | MOSI     | SPI Host Output Client Input                                                  |
| 17  | MISO     | SPI Host Input Client Output                                                  |
| 18  | SCK      | SPI Clock                                                                     |
| 19  | GND      | Reference Ground                                                              |
| 20  | VDD      | 3.3V power for extension board                                                |

## 3. GPIO Extension Connector, J11.

**Table 3-3.** GPIO Extension Connector, J11

| Pin | Mnemonic | Description                    |
|-----|----------|--------------------------------|
| 1   | GND      | Reference Ground               |
| 2   | 5V_MAIN  | 5V power for extension board   |
| 3   | GND      | Reference Ground               |
| 4   | 5V_MAIN  | 5V power for extension board   |
| 5   | PB18     | General purpose I/O            |
| 6   | PB19     | General purpose I/O            |
| 7   | PB20     | General purpose I/O            |
| 8   | PB21     | General purpose I/O            |
| 9   | PB22     | General purpose I/O            |
| 10  | PB23     | General purpose I/O            |
| 11  | PC4      | General purpose I/O            |
| 12  | PC5      | General purpose I/O            |
| 13  | PC6      | General purpose I/O            |
| 14  | PC20     | General purpose I/O            |
| 15  | PC21     | General purpose I/O            |
| 16  | PC22     | General purpose I/O            |
| 17  | PD0      | General purpose I/O            |
| 18  | PD4      | General purpose I/O            |
| 19  | PD5      | General purpose I/O            |
| 20  | PD6      | General purpose I/O            |
| 21  | PD7      | General purpose I/O            |
| 22  | PD8      | General purpose I/O            |
| 23  | PD9      | General purpose I/O            |
| 24  | PD10     | General purpose I/O            |
| 25  | PD11     | General purpose I/O            |
| 26  | PD14     | General purpose I/O            |
| 27  | PC16     | General purpose I/O            |
| 28  | PC17     | General purpose I/O            |
| 29  | PC18     | General purpose I/O            |
| 30  | PC19     | General purpose I/O            |
| 31  | PA20     | General purpose I/O            |
| 32  | PA15     | General purpose I/O            |
| 33  | PA14     | General purpose I/O            |
| 34  | PA10     | General purpose I/O            |
| 35  | PA11     | General purpose I/O            |
| 36  | PA6      | General purpose I/O            |
| 37  | GND      | Reference Ground               |
| 38  | 3V3      | 3.3V power for extension board |
| 39  | GND      | Reference Ground               |
| 40  | 3V3      | 3.3V power for extension board |

## 4. Micro-B Female USB Connector, J14.

**Table 3-4.** USB Device Connector, J14

| Pin | Signal Name | Description        |
|-----|-------------|--------------------|
| 0   | EARTH       | Shield             |
| 1   | VUSB        | 5V power           |
| 2   | D-          | Data Minus         |
| 3   | D+          | Data Plus          |
| 4   | ID          | Not Connected      |
| 5   | GND         | Isolated Reference |

## 5. DC Input Connector, J17.

**Table 3-5.** DC Input Connector, J17

| Pin | Signal Name | Description            |
|-----|-------------|------------------------|
| 1   | DC_IN       | DC Input voltage (+5V) |
| 2   | GND         | Ground                 |
| 3   | —           | —                      |

**3.3.2 Jumper Configurations**

The following table provides the functionality of the jumpers.

**Table 3-6.** Jumper Configuration

| Jumper | Label           | Default Setting | Function                                                                                                                                                                                                         |
|--------|-----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| J1     | J1              | 1-2             | 3V3 DCDC Enable Control Selection (1-2: Always On, 2-3: under SHDN signal control)                                                                                                                               |
| J2     | J2              | 2-3             | VBAT backup supply voltage selection (1-2: Coin Cell, 2-3: VDD3V3)                                                                                                                                               |
| J3     | VDDCORE         | Closed          | VDDCORE current measurement                                                                                                                                                                                      |
| J4     | VDD3V3          | Closed          | VDD3V3 current measurement                                                                                                                                                                                       |
| J5     | ERASE           | Open            | PIC32CXMTG Erase pin                                                                                                                                                                                             |
| J6     | JTAGSEL         | Open            | JTAGSEL pin configuration                                                                                                                                                                                        |
| J7     | TST             | Open            | TST pin configuration                                                                                                                                                                                            |
| J15    | DIS_CDC         | Open            | Disable UART communication (CDC) between microcontroller and J-Link-OB.<br><ul style="list-style-type: none"> <li>Opened = Enable UART communication</li> <li>Closed = Disable UART communication</li> </ul>     |
| J16    | DIS_JLINK       | Open            | Disable J-Link on-board interface.<br><ul style="list-style-type: none"> <li>Opened = Enable J-Link on-board interface</li> <li>Closed = Disable J-Link on-board interface</li> </ul>                            |
| J20    | VREFP Selection | Closed          | VREFP selection between internal or external voltage reference.<br><ul style="list-style-type: none"> <li>Opened = Internal voltage reference (See Note)</li> <li>Closed = External voltage reference</li> </ul> |

- Note:** If the ADC is configured (through SW) to use the internal voltage regulator as a positive reference (VREFP), the jumper must be removed to avoid a short circuit.

**3.3.3 Test Points**

Several Test Points are available to provide test measurement capabilities to some of the nets in the board. A list of accessible Test Points is described below:

**Table 3-7. Test Point Pads**

| Reference | Function         |
|-----------|------------------|
| TP1       | PIC32CXMTG ERASE |
| TP2       | JTAGSEL          |
| TP3       | TST              |
| TP4       | WKUP2/TMP2       |

## 3.4 Hardware Description – System

### 3.4.1 PIC32CXMTG

The Microchip PIC32CXMTG series is a family of system-on-chip (SoC) solutions well suited for applications, such as communication modules and split meter systems.

The PIC32CXMTG is a seamless extension of the Microchip PIC32CX device. It belongs to a family of microcontrollers and solutions for smart grid security and communication applications. These devices offer an unprecedented level of integration and flexibility around single Cortex-M4F processors running at a maximum speed of 200 MHz. It includes up to 2048 Kbytes of embedded Flash, 512 Kbytes of embedded SRAM as well as 16 Kb of Instruction and 8 Kb of Data Cache/Tightly Coupled Memory (TCM) on-chip.

The peripheral set includes an extensive set of embedded cryptographic features, anti-tamper, Floating Point Unit (FPU), Memory Protection Unit (MPU), FLEXCOM peripherals supporting I<sup>2</sup>C, SPI, UART/USART interfaces, three PWMs for pulse output functions, 12-channel general purpose 32-bit timers, 12-bit ADC, analog comparators, and a battery backed-up RTC.

The PIC32CXMTG-EK is equipped with a PIC32CX2051MTG128 device in 128-pin EP-TQFP (14 mm x 14 mm x 1.0 mm, 0.4 mm pitch).

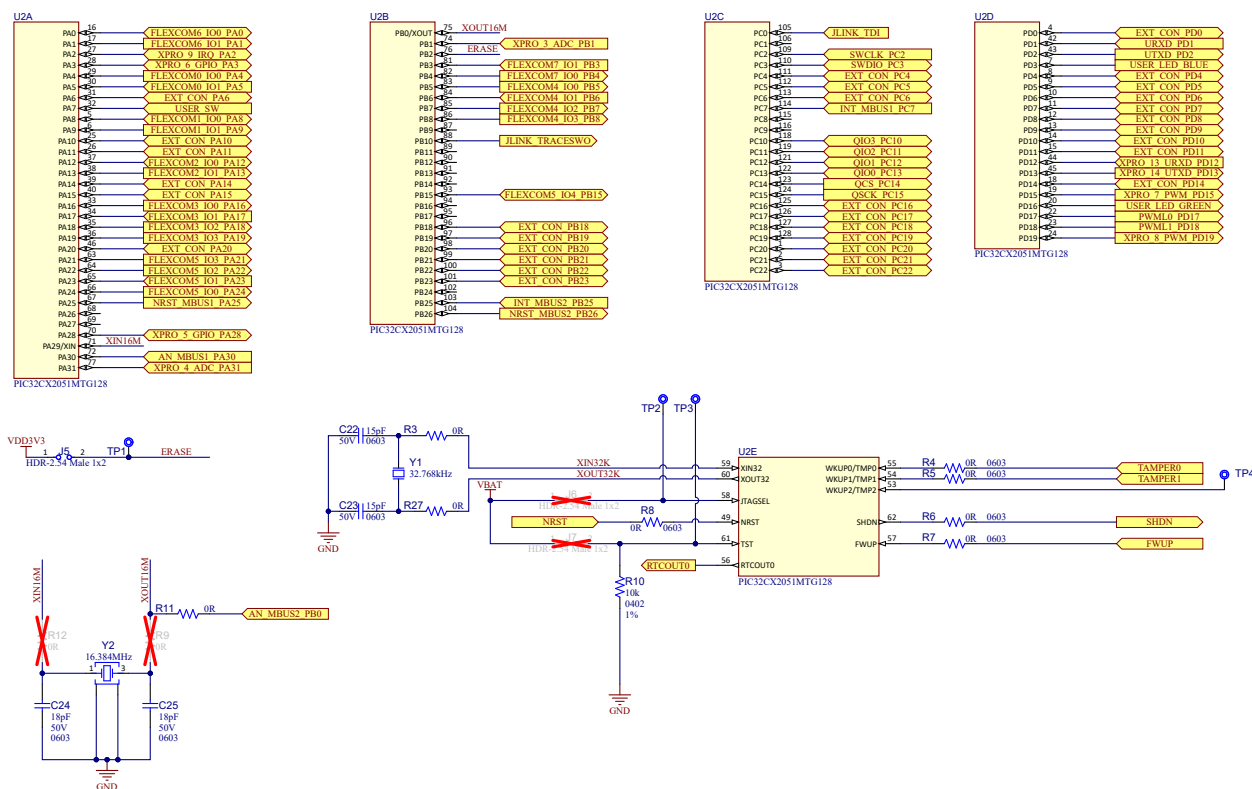
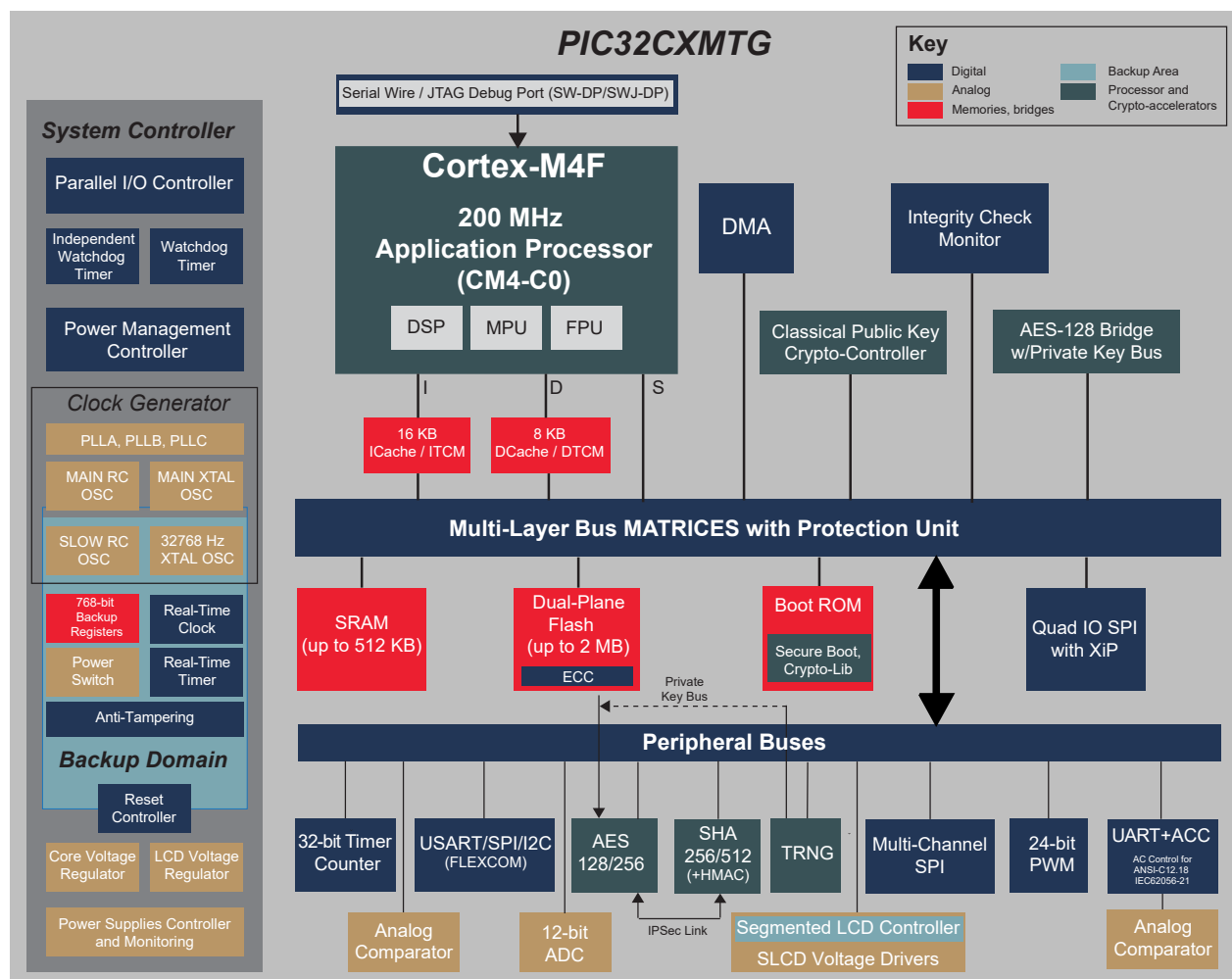
**Figure 3-4. PIC32CXMTG Microcontroller Schematic**

Figure 3-5. PIC32CXMTG Block Diagram



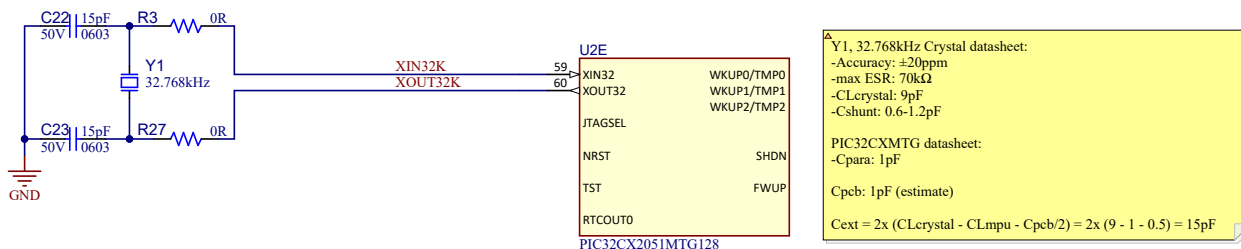
For additional information, refer to the “PIC32CXMTG Data Sheet” (*DS60001780*) which is available for download at the Microchip website: [www.microchip.com](http://www.microchip.com).

### 3.4.2 Clock Circuitry

#### 3.4.2.1 32.768 kHz Crystal

The PIC32CXMTG generates its necessary clocks based on a slow clock (SLCK) oscillator running at 32.768 kHz. By default, a low-power 32.768 kHz crystal oscillator, Y1, is assembled. For additional information about this crystal, refer to the “VMK3-9001-32K7680000 Data Sheet” (*DS20006440*) available at [product webpage](#).

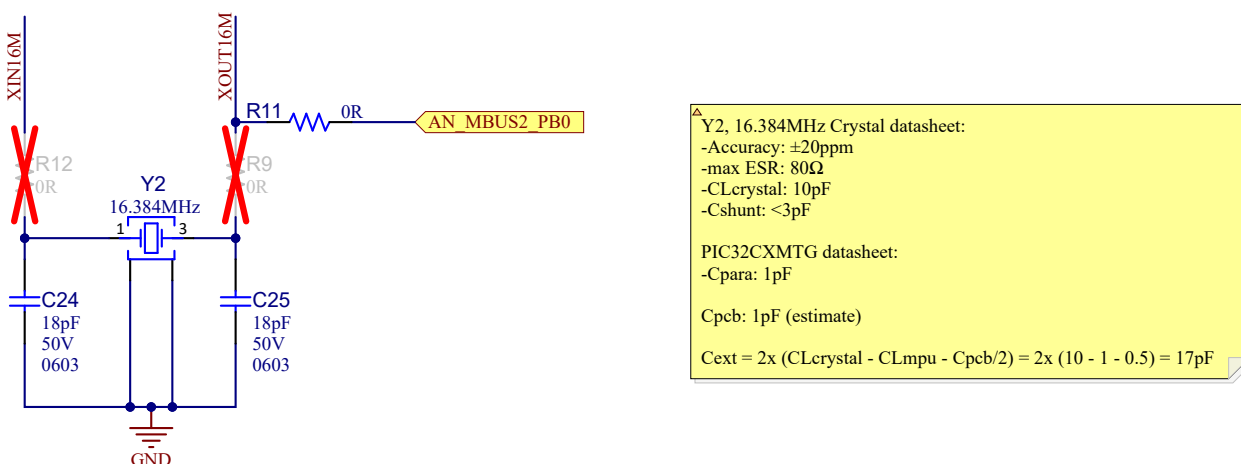
**Figure 3-6.** 32.768 kHz Crystal Oscillators Scheme



### 3.4.2.2 16.384 MHz Crystal

The PIC32CXMTG-EK board embeds a high-speed crystal set at 16.384 MHz, Y2. By default, the crystal pins are not connected to the PIC32CXMTG. For additional information about this crystal, refer to the “VXM7-9060-16M3840000 Data Sheet” available for download at [product webpage](#).

**Figure 3-7.** 16.384 MHz Crystal Scheme



**Note:** To use the 16.384 MHz crystal, users must unsolder R11 and solder R9 and R12.

### 3.4.3 Reset

The following reset sources for the PIC32CXMTG-EK are available:

- Power-on Reset (POR) function, embedded in the PIC32CXMTG device
- Reset button, SW1, mounted directly on the board. When the Reset button is pressed, it will drive the PIC32CXMTG reset line (NRST) to GND
- J-Link Debugger reset

### 3.4.4 Power Supply System

The PIC32CXMTG-EK board can be powered from several power sources as shown in the following table.

**Table 3-8.** Power Sources for PIC32CXMTG-EK Board

| Power Input                       | Voltage Requirements | Minimum Power Requirements |
|-----------------------------------|----------------------|----------------------------|
| Auxiliar DC Input connector (J17) | +5V ( $\pm 5\%$ )    | 2.5W                       |
| USB Micro AB connector (J14)      | +5V                  | 2.5W                       |

The PIC32CXMTG-EK board has two main voltage rails:

- +5V to supply power to the 3.3V regulator, Xplained Pro, GPIO expander and mikroBUS connectors

- +3.3V to power the IC devices, such as PIC32CXMTG, SST26VF064B, and some interfaces

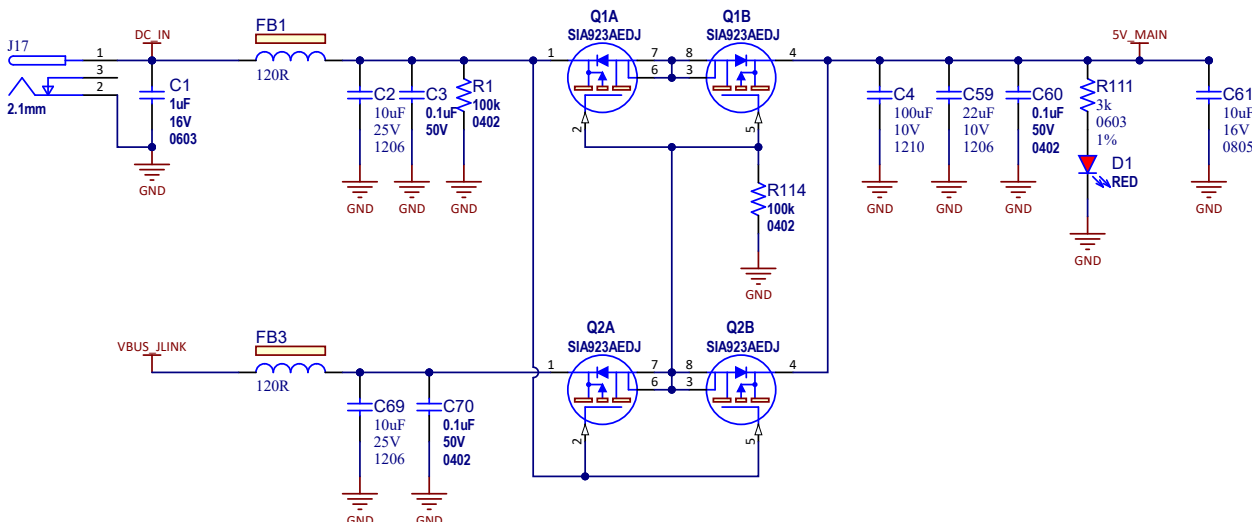
### 3.4.4.1 Automatic Power Switch

The PIC32CXMTG-EK board can be powered by a DC Input Connector or by a USB device supply.

The selection of the input supply is automatic and gives priority to the DC Input Connector. The automatic switch is made with discrete components, as shown in the figure below.

One LED, D1, is connected to the voltage rail to check whether the power supply is connected.

**Figure 3-8. Automatic Power Switch Schematic**



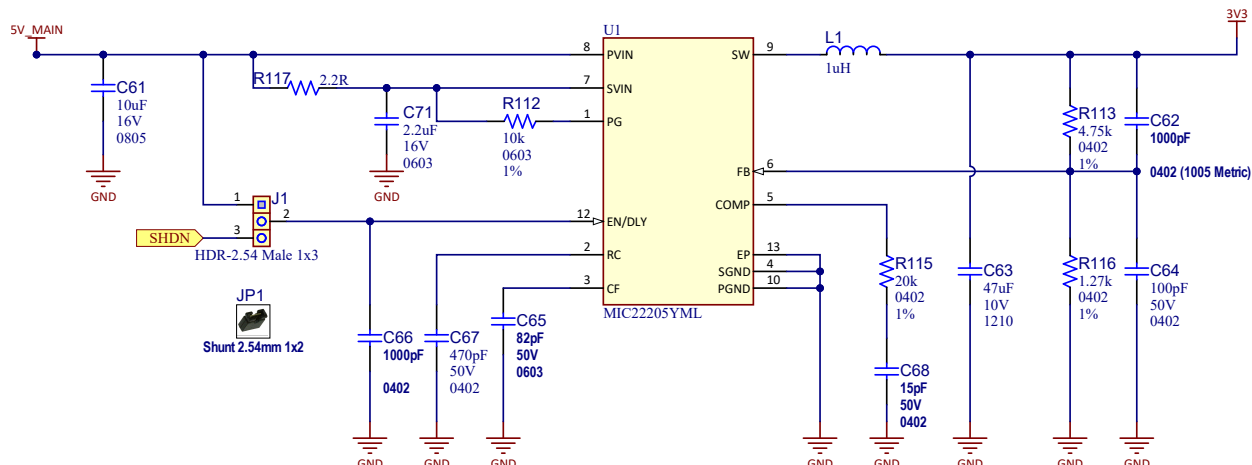
### 3.4.4.2 5.0V to 3.3V Supply

The +3.3V voltage rail is obtained from the Microchip MIC22205 buck converter. The MIC22205 is a high-efficiency, 2A, integrated switch, synchronous buck (step-down) regulator. The MIC22205 is optimized for highest efficiency, achieving up to 95% efficiency while still switching at 1 MHz. The ultra-high speed control loop keeps the output voltage within regulation even under extreme transient load swings.

This converter is used due to its high switching frequency (> 500 kHz) to avoid working in the same band as the power line communication.

For more information, refer to the [MIC22205 product webpage](#).

**Figure 3-9. 3.3V Buck Converter Design**

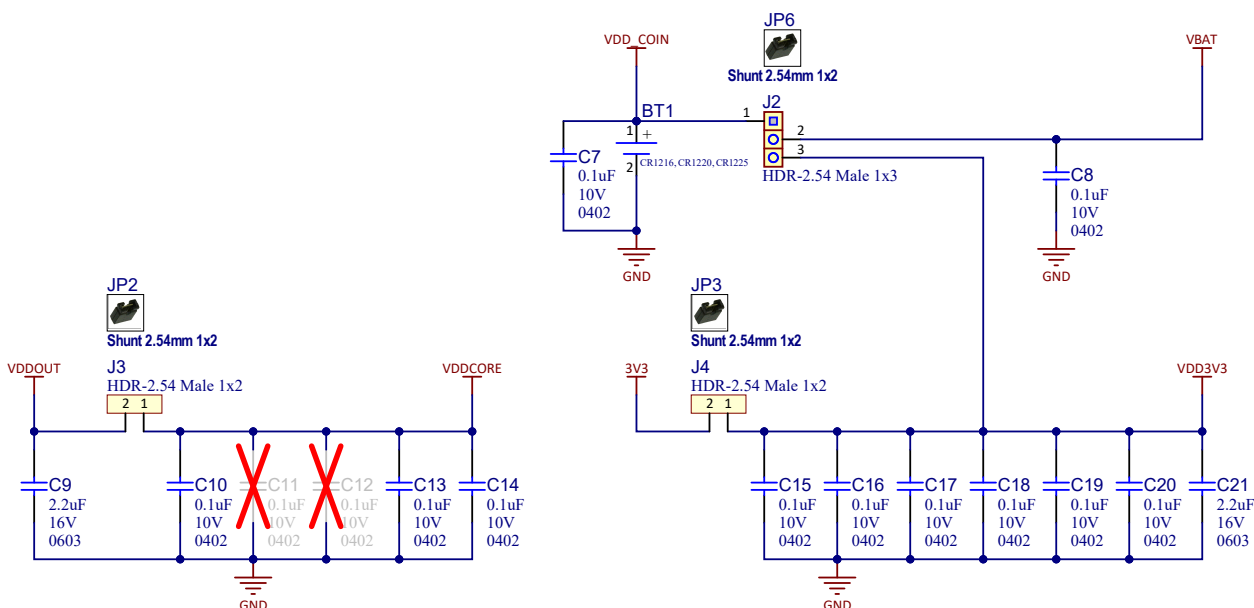


The processor can assert the SHDN signal to shut down the buck converter and make it enter the Power-Down mode. This is done by pulling the Enable pin (EN) of the buck converter to GND.

### 3.4.4.3 Backup Supply

A 3V coin battery holder, BT1, is included to insert a battery to supply VBAT voltage. It allows the microcontroller to be supplied even if a Brown-out event occurs. The embedded firmware may switch to a Low-Power mode to reduce power consumption to a minimum. While in Backup mode, the board can be woken up by action on the SW4 button (force wakeup) or SW3 and SW5 buttons (tamper0 and tamper1), which signals the MCU to resume operations.

Figure 3-10. Backup Design

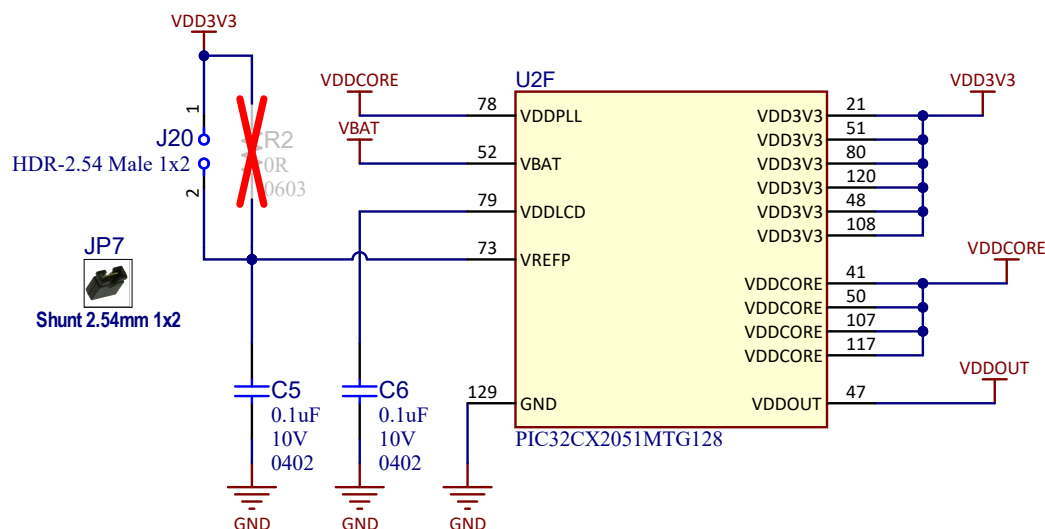


**Attention:** The coin battery is not provided with the kit.

### 3.4.4.4 MCU32 Supplies

MCU32 supplies are shown in the following schematic.

Figure 3-11. MCU32 Supplies Schematic



The function of J20 is to allow selection of the applied VREFP voltage between the internal or external voltage reference.

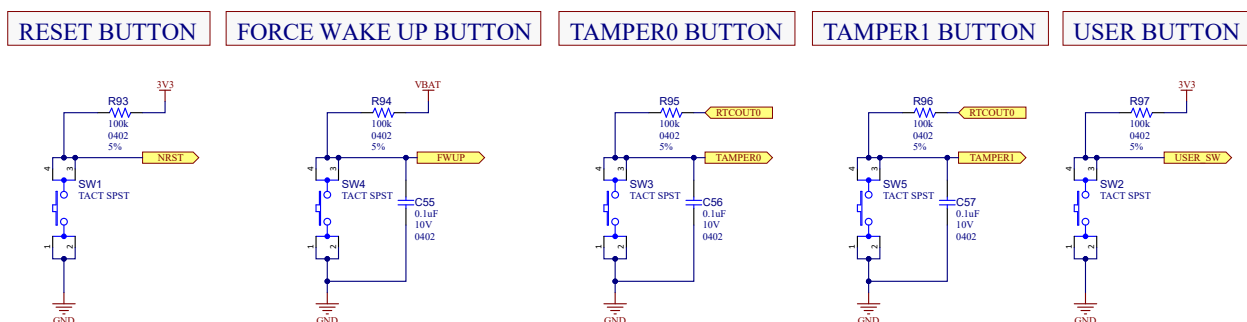
### 3.5 Hardware Description – Interface and QSPI Memory

#### 3.5.1 User Buttons

The PIC32CXMTG-EK board is equipped with five buttons. The push buttons consist of momentary push button switches mounted on the board. When any switch is pressed, it will cause low (zero) to appear at the associated input pin.

- Reset (NRST) Button: Besides the reset conditions managed by the Reset Controller peripheral of the PIC32CXMTG, such as Power-on Reset (POR) and Brown-out event monitor, users can manually reset the PIC32CXMTG by using the Reset push button, SW1.
- Force Wake-Up (FWUP) Button: Wake-up from Backup mode can be done through the Force Wake-Up (FWUP) pin by pushing the push button, SW4.
- Tamper Buttons (TAMPER0 Button, pin WKUP0/TMP0 and TAMPER1 Button, pin WKUP1/TMP1): Tamper buttons, SW3 and SW5, allow simulating a tampering event. These pins can also be used as a wake-up function.
- User Button (User\_SW, pin PA7): The SW2 does not have a specific function associated to it, therefore it can be used freely from the user application.

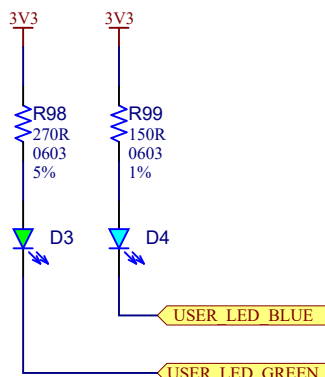
Figure 3-12. Push Button Schematic



### 3.5.2 User LEDs

The PIC32CXMTG-EK embeds two LEDs, D3 (green) and D4 (blue), connected to PD16 and PD3 respectively, which are free for the user application purposes.

**Figure 3-13.** User LEDs Schematic



### 3.5.3 Chip Erase

The 1x2 pin-header, J5, labelled as 'ERASE' is connected to the PIC32CXMTG Erase pin (PB2) and VDD3V3. This header can be used to reinitialize the Flash content (and some of its NVM bits) to an erased state (all bits read as logic level 1) by placing a shunt on the header and pressing the reset switch button (SW1). After a while, the erase jumper must be removed and the PCBA must be turned off and turned on by disconnecting and connecting it again to the selected power supply. For additional information, refer to the "PIC32CXMTG Data Sheet" (DS60001780) which is available for download at the Microchip website: [www.microchip.com](http://www.microchip.com).

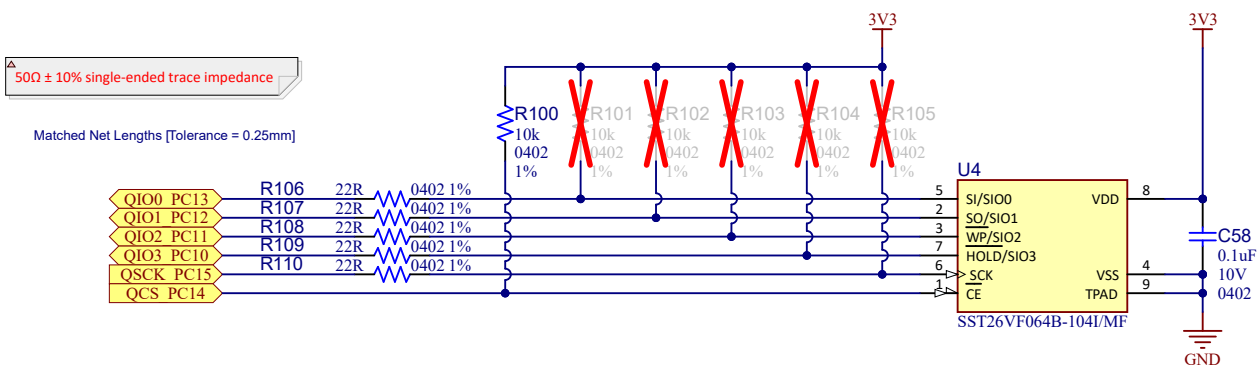
### 3.5.4 QSPI Memory

The PIC32CXMTG-EK board features one Quad Serial Peripheral Interface (QSPI), 64-Mbit Flash memory SST26VF064B-104I/MF, U4. The SST26VF064B SQI Flash device utilizes a 4-bit multiplexed I/O serial interface to boost performance at low power while maintaining full command-set compatibility to traditional Serial Peripheral Interface (SPI) protocols. The four bus signals are a clock input (SCK), a serial data input (SI), a serial data output (SO), and a chip select (CE).

The QSPI bus is a synchronous serial data link that provides communication with external devices in Host mode. The QSPI can be used in SPI mode to interface with serial peripherals, such as ADCs, DACs, LCD controllers, CAN controllers, and sensors, or in Serial Memory mode to interface with serial Flash memories. With the support of the Quad SPI protocol, the QSPI allows the system to use high-performance serial Flash memories, which are small and inexpensive, instead of larger and more expensive parallel Flash memories.

For additional information about SST26VF064B, refer to the [SST26VF064B product webpage](#).

Figure 3-14. QSPI Memory Schematic



## 3.6 Hardware Description – Expansion Connectors

### 3.6.1 mikroBUS Connectors

The PIC32CXMTG-EK hosts two mikroBUS sockets (J8 and J9). The [mikroBUS Standard Specifications](#) defines the main board sockets and add-on boards used for interfacing the microprocessor with integrated modules having a proprietary pin configuration. For details, refer to the [mikroBUS Standard Specifications](#).

Figure 3-15. mikroBUS 1 Interface Schematic

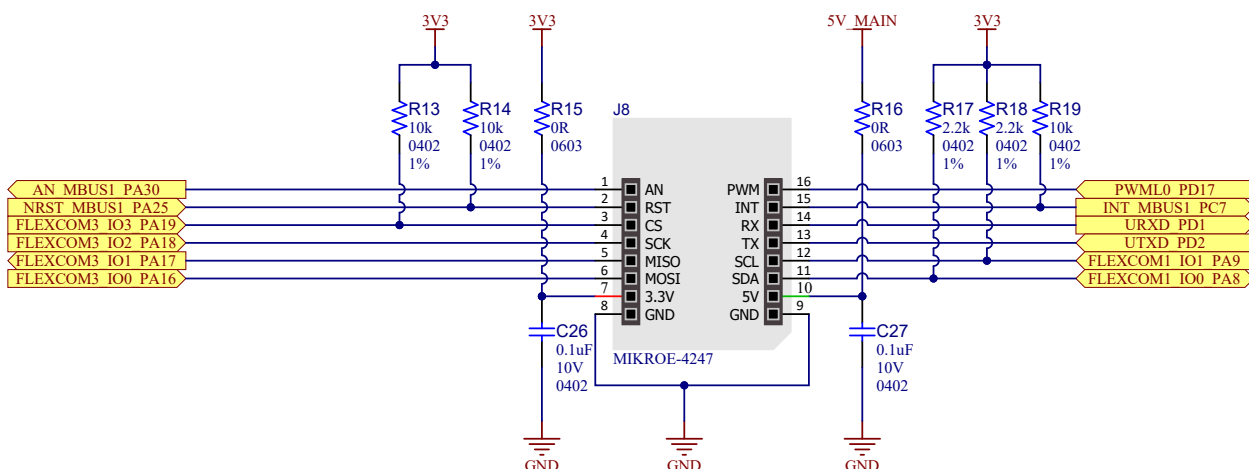
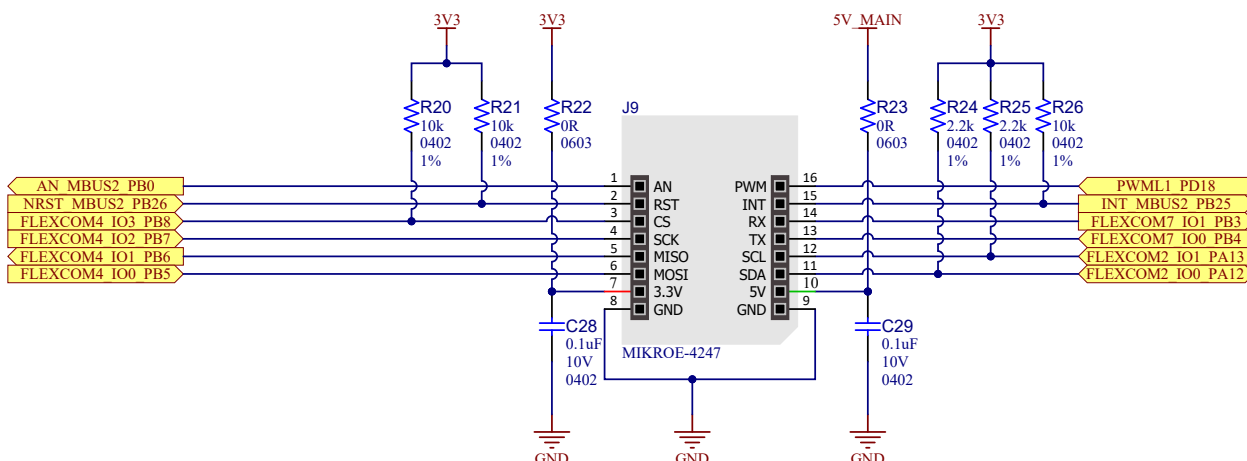


Table 3-9. mikroBUS 1 Connector Pin Assignment

| Pin | PIO         | Net Name          | Pin | PIO       | Net Name         |
|-----|-------------|-------------------|-----|-----------|------------------|
| 1   | PA30        | AN_MBUS1_PA30     | 16  | PD17      | PWML0_PD17       |
| 2   | PA25        | NRST_MBUS1_PA25   | 15  | PC7       | INT_MBUS1_PC7    |
| 3   | PA19        | FLEXCOM3_IO3_PA19 | 14  | PD1       | URXD_PD1         |
| 4   | PA18        | FLEXCOM3_IO2_PA18 | 13  | PD2       | UTXD_PD2         |
| 5   | PA17        | FLEXCOM3_IO1_PA17 | 12  | PA9       | FLEXCOM1_IO1_PA9 |
| 6   | PA16        | FLEXCOM3_IO0_PA16 | 11  | PA8       | FLEXCOM1_IO0_PA8 |
| 7   | 3.3V Supply | 3V3               | 10  | 5V Supply | 5V_MAIN          |
| 8   | GND         | GND               | 9   | GND       | GND              |

**Figure 3-16.** mikroBUS 2 Interface Schematic**Table 3-10.** mikroBUS 2 Connector Pin Assignment

| Pin | PIO         | Net Name         | Pin | PIO       | Net Name          |
|-----|-------------|------------------|-----|-----------|-------------------|
| 1   | PB0         | AN_MBUS2_PB0     | 16  | PD18      | PWML1_PD18        |
| 2   | PB26        | NRST_MBUS2_PB26  | 15  | PB25      | INT_MBUS2_PB25    |
| 3   | PB8         | FLEXCOM4_IO3_PB8 | 14  | PB3       | FLEXCOM7_IO1_PB3  |
| 4   | PB7         | FLEXCOM4_IO2_PB7 | 13  | PB4       | FLEXCOM7_IO0_PB4  |
| 5   | PB6         | FLEXCOM4_IO1_PB6 | 12  | PA13      | FLEXCOM2_IO1_PA13 |
| 6   | PB5         | FLEXCOM4_IO0_PB5 | 11  | PA12      | FLEXCOM2_IO0_PA12 |
| 7   | 3.3V Supply | 3V3              | 10  | 5V Supply | 5V_MAIN           |
| 8   | GND         | GND              | 9   | GND       | GND               |

The mikroBUS connector allows for the connection of a wide range of modules for communications, sensing, or power management applications out of the main scope for this board.

### 3.6.2 Xplained Pro Interface

The PIC32CXMTG-EK embeds one connector to interface with Xplained Pro wings.

The design ensures that the lower connector pin row is used for power and ground. This row will provide the shortest connection with the least inductance. This header is implemented as 20-pin (J10) 100-mil right-angled headers that are male on the MCU boards (extension boards use a female 20-pin right-angled header).

All connected pins follow the defined pinout description provided in [Table 3-2](#).

The extension headers can be used to connect a variety of Xplained Pro extensions to Xplained Pro MCU boards or to access the pins of the target MCU on Xplained Pro MCU boards directly.

Figure 3-17. Xplained Pro Schematic

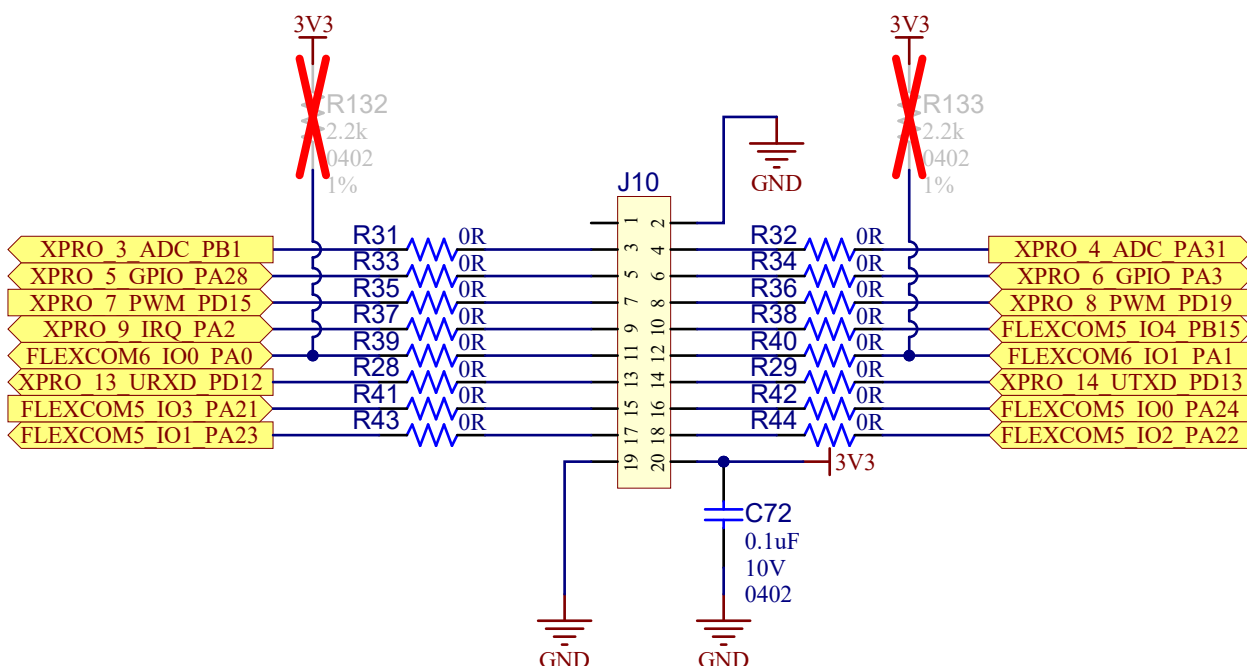


Table 3-11. Xplained Pro Connector Pin Assignment

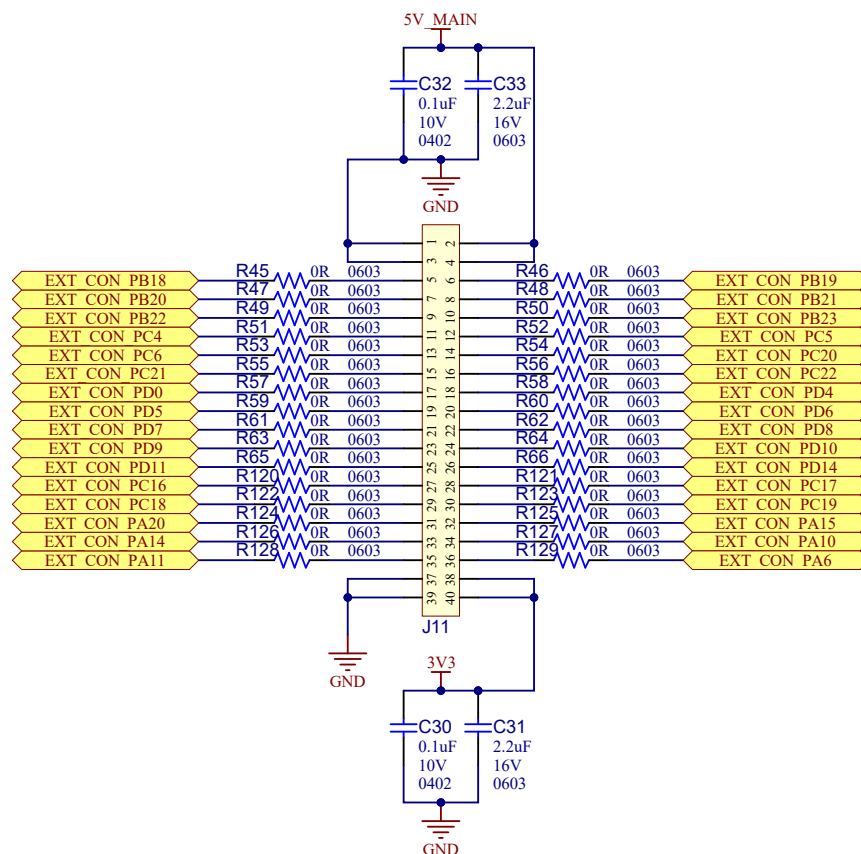
| Pin | PIO  | Net Name          | Pin | PIO         | Net Name          |
|-----|------|-------------------|-----|-------------|-------------------|
| 1   | —    | NC                | 2   | GND         | GND               |
| 3   | PB1  | XPRO_3_ADC_PB1    | 4   | PA31        | XPRO_4_ADC_PA31   |
| 5   | PA28 | XPRO_5_GPIO_PA28  | 6   | PA3         | XPRO_6_GPIO_PA3   |
| 7   | PD15 | XPRO_7_PWM_PD15   | 8   | PD19        | XPRO_8_PWM_PD19   |
| 9   | PA2  | XPRO_9_IRQ_PA2    | 10  | PB15        | FLEXCOM5_IO4_PB15 |
| 11  | PA0  | FLEXCOM6_IO0_PA0  | 12  | PA1         | FLEXCOM6_IO1_PA1  |
| 13  | PD12 | XPRO_13_URXD_PD12 | 14  | PD13        | XPRO_14_UTXD_PD13 |
| 15  | PA21 | FLEXCOM5_IO3_PA21 | 16  | PA24        | FLEXCOM5_IO0_PA24 |
| 17  | PA23 | FLEXCOM5_IO1_PA23 | 18  | PA22        | FLEXCOM5_IO2_PA22 |
| 19  | GND  | GND               | 20  | 3.3V Supply | 3V3               |

The Xplained Pro connector allows the connection of a wide range of modules.

### 3.6.3 GPIO Interface

Some GPIOs are routed to a 40-pin I/O expander. All connected pins follow the defined pinout description provided in the [Table 3-3](#).

**Figure 3-18.** GPIO Extension Connector Schematic



**Table 3-12.** GPIO Extension Connector Pinout

| Pin | PIO  | Net Name     | Pin | PIO         | Net Name     |
|-----|------|--------------|-----|-------------|--------------|
| 1   | GND  | GND          | 2   | 5V Supply   | 5V_MAIN      |
| 3   | GND  | GND          | 4   | 5V Supply   | 5V_MAIN      |
| 5   | PB18 | EXT_CON_PB18 | 6   | PB19        | EXT_CON_PB19 |
| 7   | PB20 | EXT_CON_PB20 | 8   | PB21        | EXT_CON_PB21 |
| 9   | PB22 | EXT_CON_PB22 | 10  | PB23        | EXT_CON_PB23 |
| 11  | PC4  | EXT_CON_PC4  | 12  | PC5         | EXT_CON_PC5  |
| 13  | PC6  | EXT_CON_PC6  | 14  | PC20        | EXT_CON_PC20 |
| 15  | PC21 | EXT_CON_PC21 | 16  | PC22        | EXT_CON_PC22 |
| 17  | PD0  | EXT_CON_PD0  | 18  | PD4         | EXT_CON_PD4  |
| 19  | PD5  | EXT_CON_PD5  | 20  | PD6         | EXT_CON_PD6  |
| 21  | PD7  | EXT_CON_PD7  | 22  | PD8         | EXT_CON_PD8  |
| 23  | PD9  | EXT_CON_PD9  | 24  | PD10        | EXT_CON_PD10 |
| 25  | PD11 | EXT_CON_PD11 | 26  | PD14        | EXT_CON_PD14 |
| 27  | PC16 | EXT_CON_PC16 | 28  | PC17        | EXT_CON_PC17 |
| 29  | PC18 | EXT_CON_PC18 | 30  | PC19        | EXT_CON_PC19 |
| 31  | PA20 | EXT_CON_PA20 | 32  | PA15        | EXT_CON_PA15 |
| 33  | PA14 | EXT_CON_PA14 | 34  | PA10        | EXT_CON_PA10 |
| 35  | PA11 | EXT_CON_PA11 | 36  | PA6         | EXT_CON_PA6  |
| 37  | GND  | GND          | 38  | 3.3V Supply | 3V3          |
| 39  | GND  | GND          | 40  | 3.3V Supply | 3V3          |

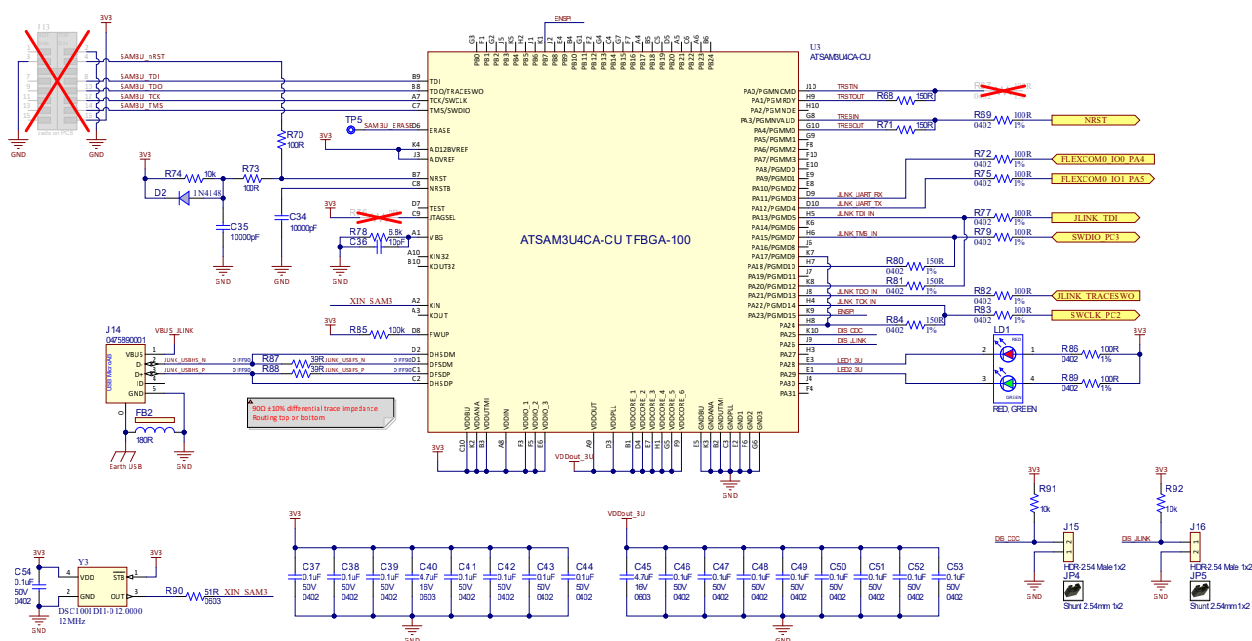
### 3.7 Hardware Description – J-Link Debugger

The PIC32CXMTG-EK includes a built-in SEGGER J-Link-On-Board (J-Link-OB) device. The functionality is implemented with an ATSAM3U4C microcontroller in a TFBGA100 package. The ATSAM3U4C provides the functions of the JTAG interface and a bridge from the USB to the Serial debug port (known as CDC or Communication Device Class). The bicolored LED, LD1, shows the status of the J-Link-On-Board device.

The J-Link-OB device is designed to provide an efficient, low-cost, on-board alternative to the standard J-Link Debug Probe or the Microchip J-32 Debug Probe.

Its own dedicated USB port acts as a power source for this evaluation kit, and provides the communication link to program and debug the MCU.

**Figure 3-19. J-Link-OB Interface**

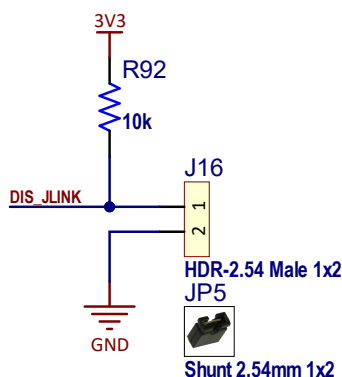


**Table 3-13.** J-Link-OB and J-Link-CDC LED LD1 Status

| LED LD1       | State    | Description                                                           |
|---------------|----------|-----------------------------------------------------------------------|
| Red and Green | Off      | J-Link (SAM3U device) is not programmed, or J15 and J16 are installed |
| Red and Green | On       | Reset button SW1 is pushed                                            |
| Green         | Flashing | J-Link is operational but the USB port is not connected               |
| Green         | On       | J-Link-OB is connected and ready                                      |

The J-Link-OB feature is enabled or disabled by the J16 jumper:

- Shunt JP5 is not installed on J16: The J-Link-OB-ATSAM3U4C is enabled and fully functional.
- Shunt JP5 is installed on J16: The J-Link-OB-ATSAM3U4C is disabled.

**Figure 3-20.** Disable J-Link JTAG

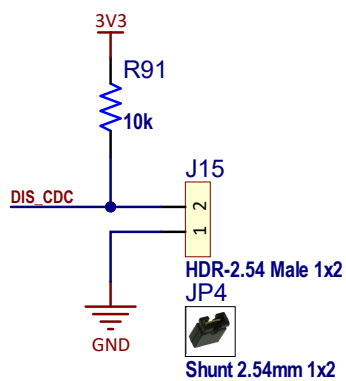
In addition to the J-Link-OB functionality, the ATSAM3U4C microcontroller provides a bridge to a debug serial port of the main board processor. The port is made accessible over the same USB connection used by JTAG by implementing a Communication Device Class (CDC), which allows a terminal communication with the target device.

The CDC feature is enabled or disabled by the J15 jumper:

- Shunt JP4 is not installed on J15: The J-Link-OB CDC function is enabled and fully functional.
- Shunt JP4 is installed on J15: The J-Link-OB CDC function is disabled.

The USB CDC converts the USB device into a serial communication device. The target device running the CDC is recognized by the Host as a serial interface (USB2COM, virtual COM port) without the need of installing a special Host driver (the CDC is standard). All PC software using a COM port works without modifications with this virtual COM port. Under Microsoft® Windows®, the device shows up as a COM port; under Linux®, as a /dev/ACMx device. This enables the user to use Host software that was not designed to be used with a USB, such as a terminal program.

**Figure 3-21.** Disable J-Link CDC



## 4. Ordering Information

**Table 4-1.** Evaluation Kit Ordering Information

| Ordering Code | Board Marking |
|---------------|---------------|
| EV11K09A      | PIC32CXMTG-EK |

## 5. Appendix. Schematics and Layouts

### 5.1 PIC32CXMTG-EK Board Schematics

This section provides the following schematics of the PIC32CXMTG-EK board:

- Block Diagram Schematic, [Figure 5-1](#)
- Power Supply Schematic, [Figure 5-2](#)
- PIC32CXMTG MCU Schematic, [Figure 5-3](#)
- Expansion Connectors Schematic, [Figure 5-4](#)
- Interface and QSPI Memory Schematic, [Figure 5-5](#)
- J-Link-OB Schematic, [Figure 5-6](#)

Figure 5-1. Block Diagram Schematic

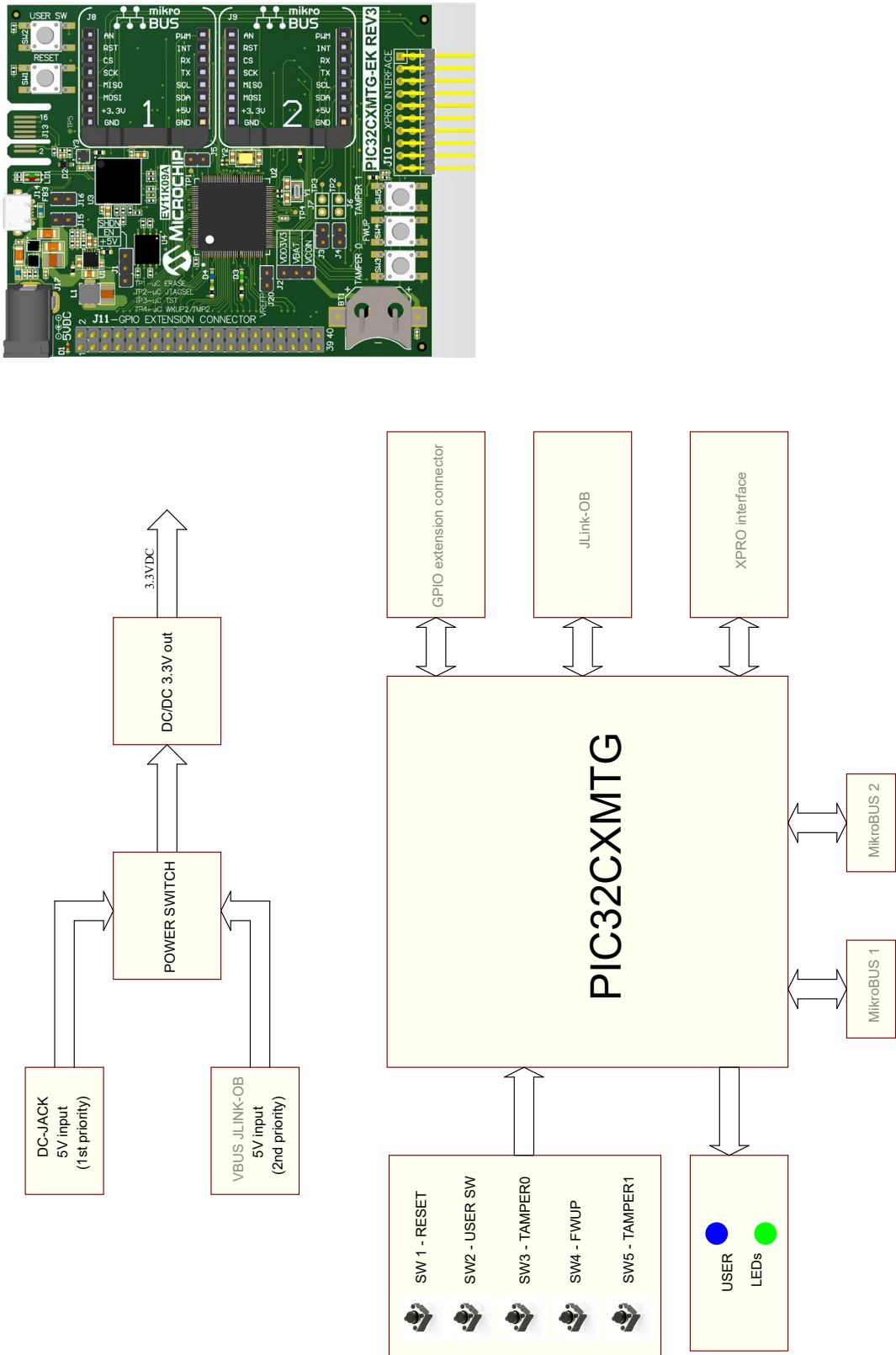
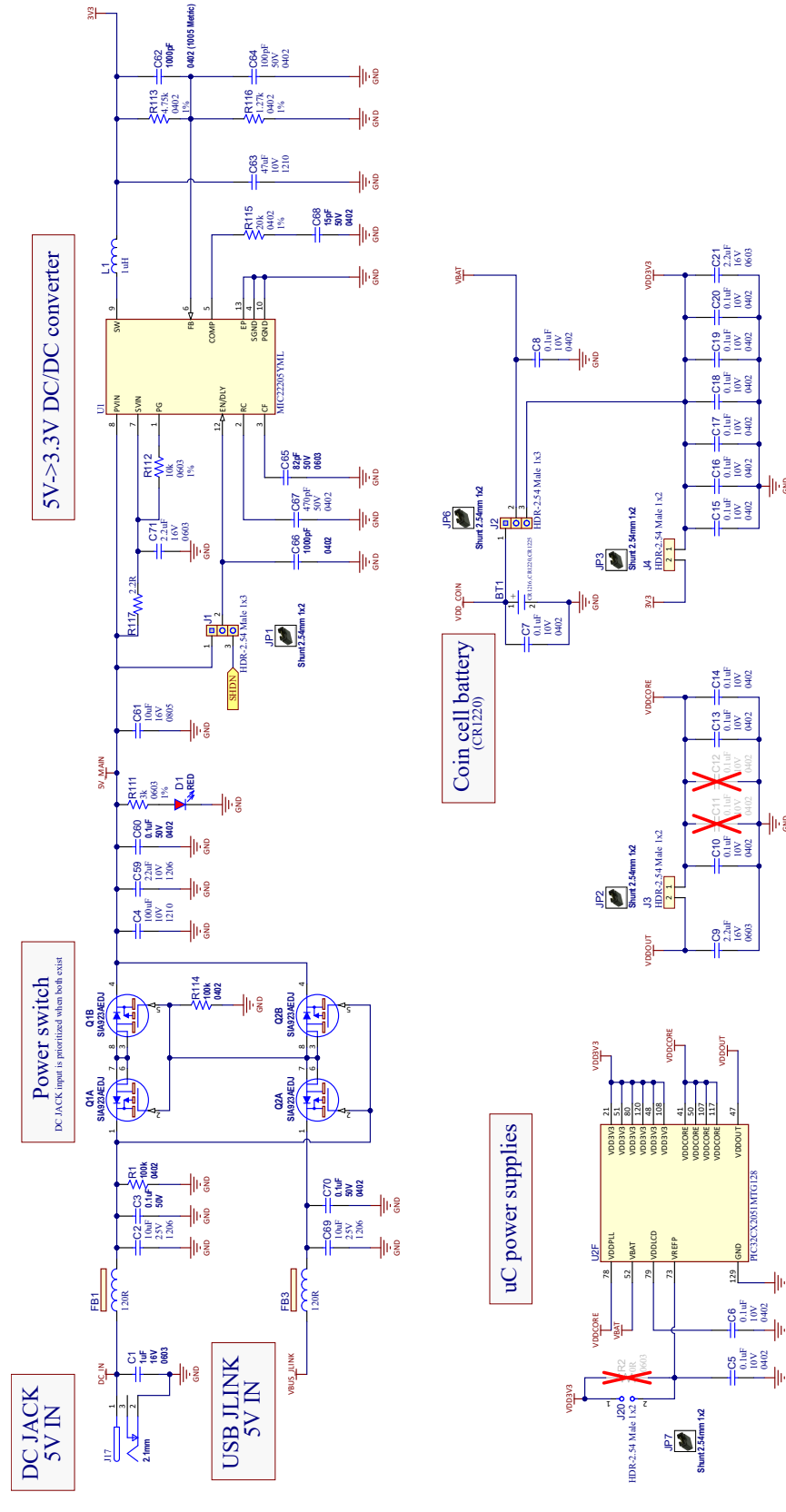
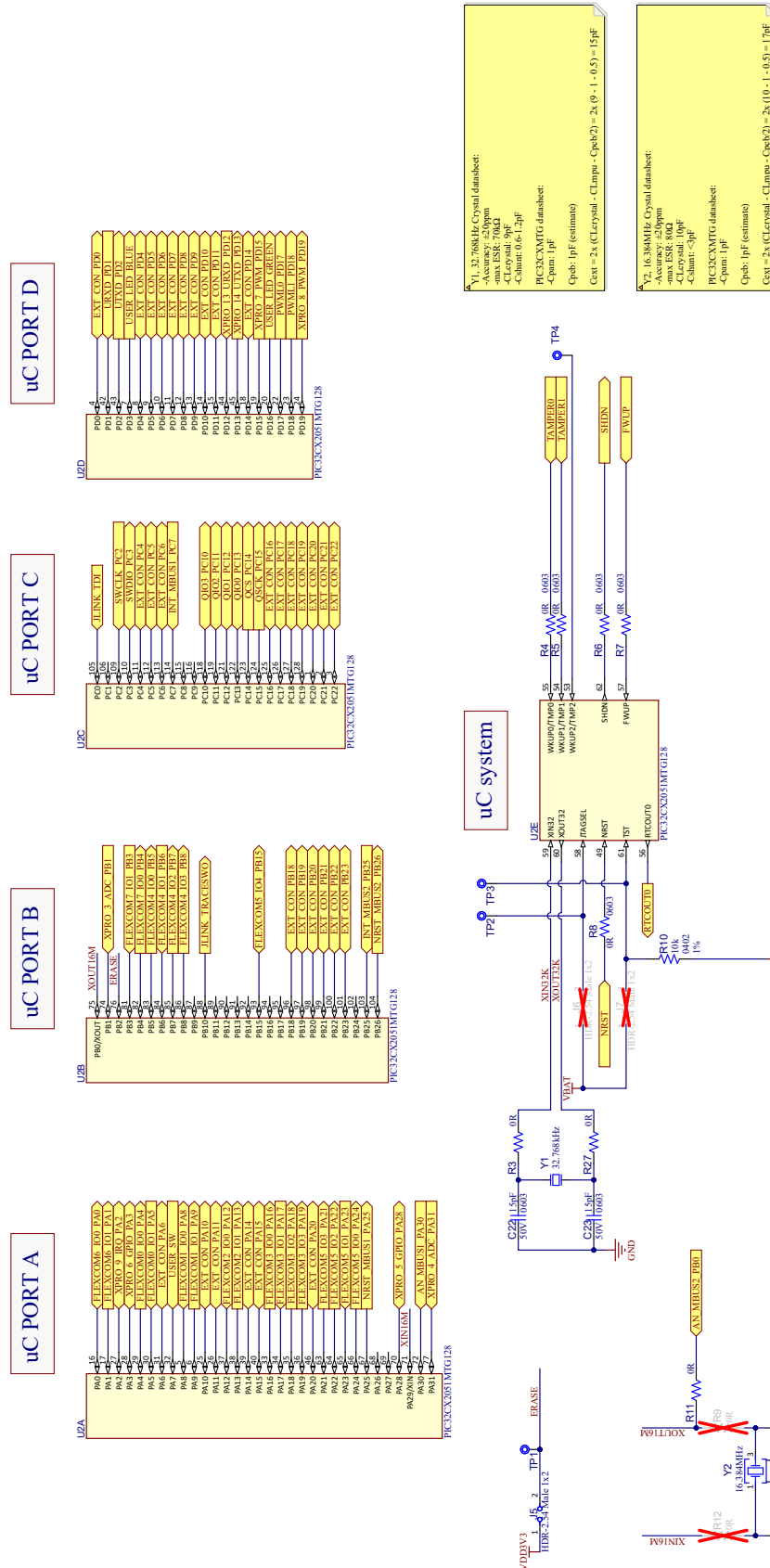
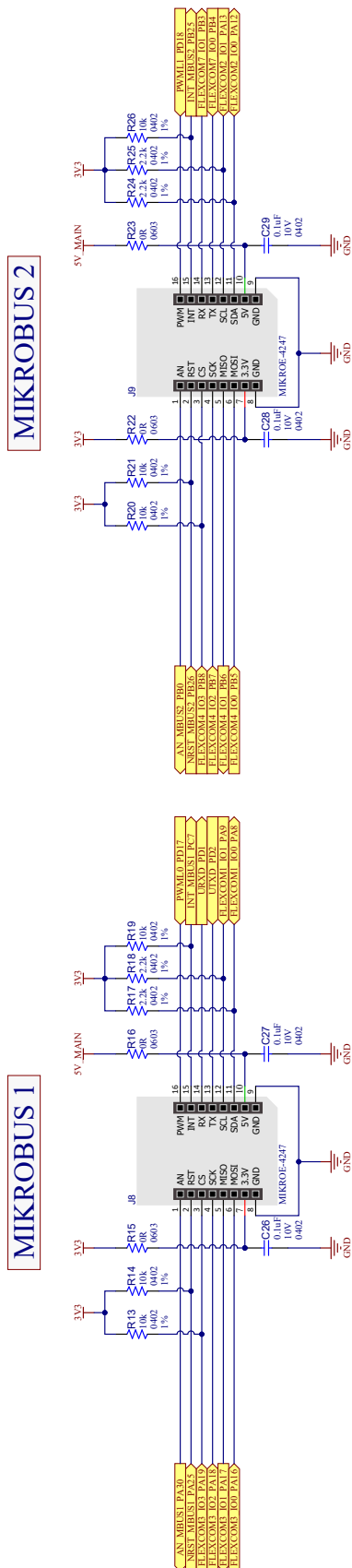


Figure 5-2. Power Supply Schematic

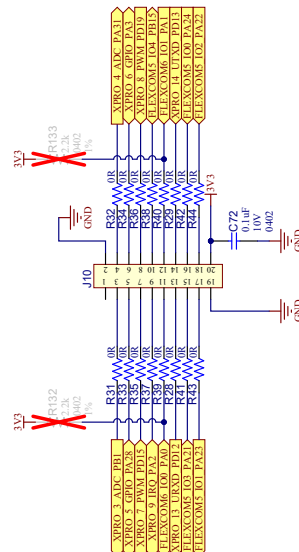




### Figure 5-4. Expansion Connectors Schematic



## Explained Pro Interface



## GPIO EXTENSION CONNECTOR

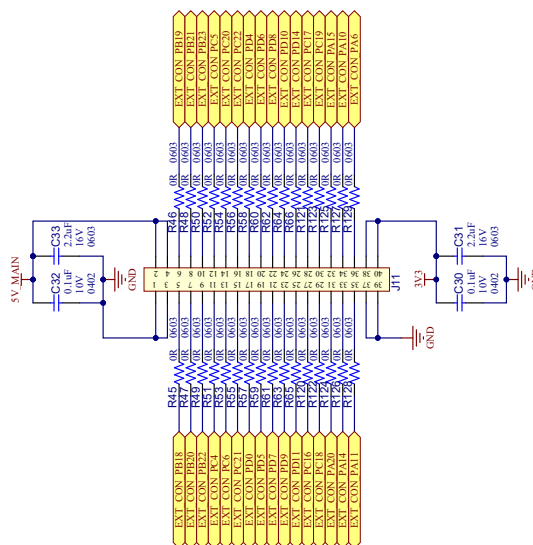
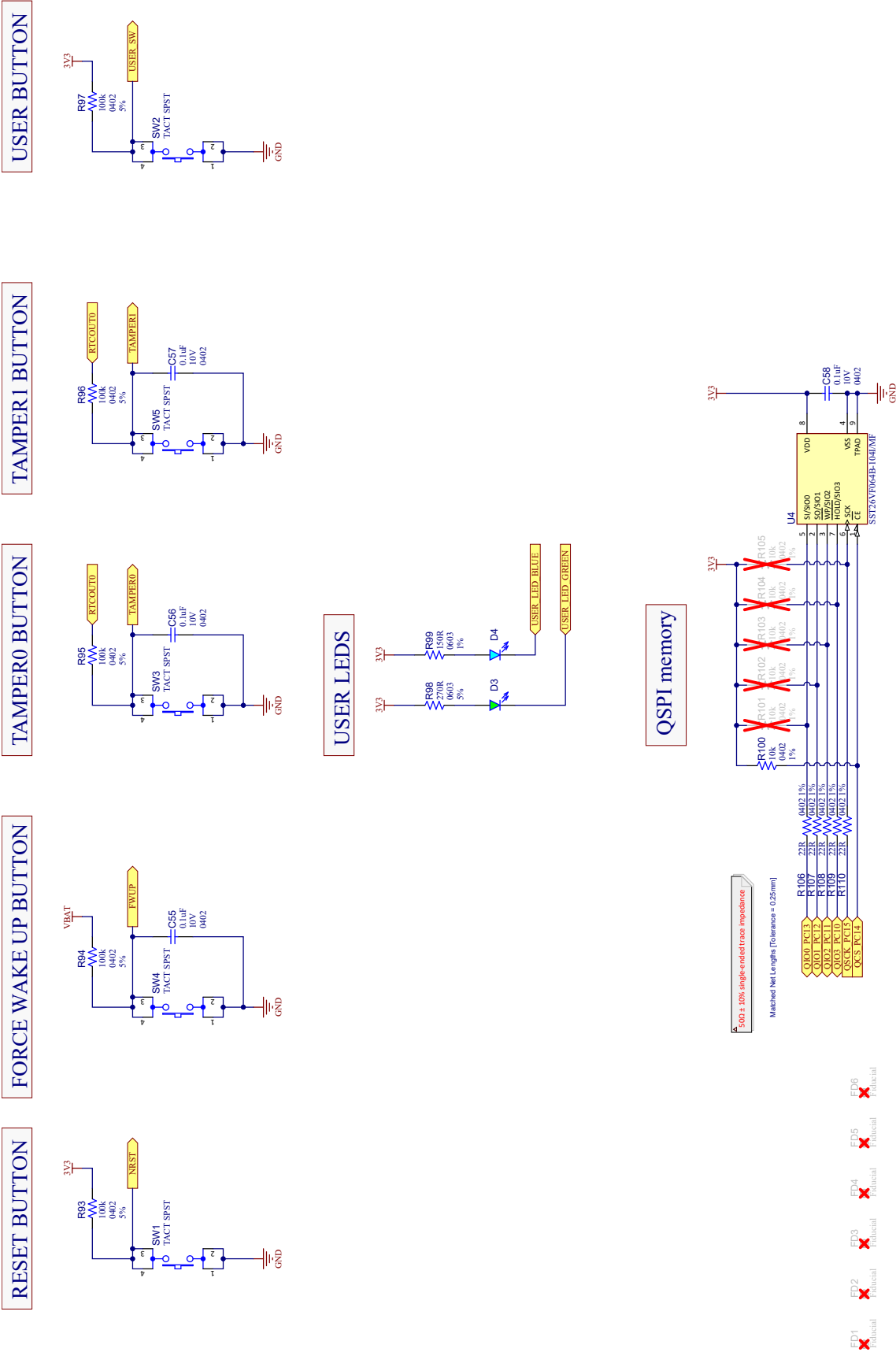


Figure 5-5. Interface and QSPI Memory Schematic



**JLINK-OB INTERFACE**

The schematic diagram illustrates the connection between a JLINK-OB cable and an ATSAM3U4CA-CU TFBGA-100 microcontroller. The microcontroller is shown with its pinout, and the JLINK-OB cable is connected to it via a series of resistors and capacitors. The diagram includes various components like resistors, capacitors, and integrated circuits, along with a detailed pinout for the microcontroller.

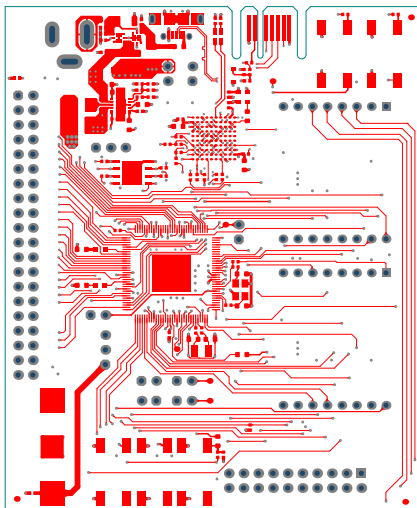
**ATSAM3U4CA-CU TFBGA-100 Pinout:**

- PA0/PGM0MD, PA1/PGM0MD, PA2/PGM0MD, PA3/PGM0MD, PA4/PGM0MD, PA5/PGM0MD, PA6/PGM0MD, PA7/PGM0MD, PA8/PGM0MD, PA9/PGM0MD, PA10/PGM0MD, PA11/PGM0MD, PA12/PGM0MD, PA13/PGM0MD, PA14/PGM0MD, PA15/PGM0MD, PA16/PGM0MD, PA17/PGM0MD, PA18/PGM0MD, PA19/PGM0MD, PA20/PGM0MD, PA21/PGM0MD, PA22/PGM0MD, PA23/PGM0MD, PA24/PGM0MD, PA25/PGM0MD, PA26/PGM0MD, PA27/PGM0MD, PA28/PGM0MD, PA29/PGM0MD, PA30/PGM0MD, PA31/PGM0MD
- PA32/PGM0MD, PA33/PGM0MD, PA34/PGM0MD, PA35/PGM0MD, PA36/PGM0MD, PA37/PGM0MD, PA38/PGM0MD, PA39/PGM0MD, PA40/PGM0MD, PA41/PGM0MD, PA42/PGM0MD, PA43/PGM0MD, PA44/PGM0MD, PA45/PGM0MD, PA46/PGM0MD, PA47/PGM0MD, PA48/PGM0MD, PA49/PGM0MD, PA50/PGM0MD, PA51/PGM0MD, PA52/PGM0MD, PA53/PGM0MD, PA54/PGM0MD, PA55/PGM0MD, PA56/PGM0MD, PA57/PGM0MD, PA58/PGM0MD, PA59/PGM0MD, PA60/PGM0MD, PA61/PGM0MD, PA62/PGM0MD, PA63/PGM0MD, PA64/PGM0MD, PA65/PGM0MD, PA66/PGM0MD, PA67/PGM0MD, PA68/PGM0MD, PA69/PGM0MD, PA70/PGM0MD, PA71/PGM0MD, PA72/PGM0MD, PA73/PGM0MD, PA74/PGM0MD, PA75/PGM0MD, PA76/PGM0MD, PA77/PGM0MD, PA78/PGM0MD, PA79/PGM0MD, PA80/PGM0MD, PA81/PGM0MD, PA82/PGM0MD, PA83/PGM0MD, PA84/PGM0MD, PA85/PGM0MD, PA86/PGM0MD, PA87/PGM0MD, PA88/PGM0MD, PA89/PGM0MD, PA90/PGM0MD, PA91/PGM0MD, PA92/PGM0MD, PA93/PGM0MD, PA94/PGM0MD, PA95/PGM0MD, PA96/PGM0MD, PA97/PGM0MD, PA98/PGM0MD, PA99/PGM0MD, PA100/PGM0MD, PA101/PGM0MD, PA102/PGM0MD, PA103/PGM0MD, PA104/PGM0MD, PA105/PGM0MD, PA106/PGM0MD, PA107/PGM0MD, PA108/PGM0MD, PA109/PGM0MD, PA110/PGM0MD, PA111/PGM0MD, PA112/PGM0MD, PA113/PGM0MD, PA114/PGM0MD, PA115/PGM0MD, PA116/PGM0MD, PA117/PGM0MD, PA118/PGM0MD, PA119/PGM0MD, PA120/PGM0MD, PA121/PGM0MD, PA122/PGM0MD, PA123/PGM0MD, PA124/PGM0MD, PA125/PGM0MD, PA126/PGM0MD, PA127/PGM0MD, PA128/PGM0MD, PA129/PGM0MD, PA130/PGM0MD, PA131/PGM0MD, PA132/PGM0MD, PA133/PGM0MD, PA134/PGM0MD, PA135/PGM0MD, PA136/PGM0MD, PA137/PGM0MD, PA138/PGM0MD, PA139/PGM0MD, PA140/PGM0MD, PA141/PGM0MD, PA142/PGM0MD, PA143/PGM0MD, PA144/PGM0MD, PA145/PGM0MD, PA146/PGM0MD, PA147/PGM0MD, PA148/PGM0MD, PA149/PGM0MD, PA150/PGM0MD, PA151/PGM0MD, PA152/PGM0MD, PA153/PGM0MD, PA154/PGM0MD, PA155/PGM0MD, PA156/PGM0MD, PA157/PGM0MD, PA158/PGM0MD, PA159/PGM0MD, PA160/PGM0MD, PA161/PGM0MD, PA162/PGM0MD, PA163/PGM0MD, PA164/PGM0MD, PA165/PGM0MD, PA166/PGM0MD, PA167/PGM0MD, PA168/PGM0MD, PA169/PGM0MD, PA170/PGM0MD, PA171/PGM0MD, PA172/PGM0MD, PA173/PGM0MD, PA174/PGM0MD, PA175/PGM0MD, PA176/PGM0MD, PA177/PGM0MD, PA178/PGM0MD, PA179/PGM0MD, PA180/PGM0MD, PA181/PGM0MD, PA182/PGM0MD, PA183/PGM0MD, PA184/PGM0MD, PA185/PGM0MD, PA186/PGM0MD, PA187/PGM0MD, PA188/PGM0MD, PA189/PGM0MD, PA190/PGM0MD, PA191/PGM0MD, PA192/PGM0MD, PA193/PGM0MD, PA194/PGM0MD, PA195/PGM0MD, PA196/PGM0MD, PA197/PGM0MD, PA198/PGM0MD, PA199/PGM0MD, PA200/PGM0MD, PA201/PGM0MD, PA202/PGM0MD, PA203/PGM0MD, PA204/PGM0MD, PA205/PGM0MD, PA206/PGM0MD, PA207/PGM0MD, PA208/PGM0MD, PA209/PGM0MD, PA210/PGM0MD, PA211/PGM0MD, PA212/PGM0MD, PA213/PGM0MD, PA214/PGM0MD, PA215/PGM0MD, PA216/PGM0MD, PA217/PGM0MD, PA218/PGM0MD, PA219/PGM0MD, PA220/PGM0MD, PA221/PGM0MD, PA222/PGM0MD, PA223/PGM0MD, PA224/PGM0MD, PA225/PGM0MD, PA226/PGM0MD, PA227/PGM0MD, PA228/PGM0MD, PA229/PGM0MD, PA230/PGM0MD, PA231/PGM0MD, PA232/PGM0MD, PA233/PGM0MD, PA234/PGM0MD, PA235/PGM0MD, PA236/PGM0MD, PA237/PGM0MD, PA238/PGM0MD, PA239/PGM0MD, PA240/PGM0MD, PA241/PGM0MD, PA242/PGM0MD, PA243/PGM0MD, PA244/PGM0MD, PA245/PGM0MD, PA246/PGM0MD, PA247/PGM0MD, PA248/PGM0MD, PA249/PGM0MD, PA250/PGM0MD, PA251/PGM0MD, PA252/PGM0MD, PA253/PGM0MD, PA254/PGM0MD, PA255/PGM0MD, PA256/PGM0MD, PA257/PGM0MD, PA258/PGM0MD, PA259/PGM0MD, PA260/PGM0MD, PA261/PGM0MD, PA262/PGM0MD, PA263/PGM0MD, PA264/PGM0MD, PA265/PGM0MD, PA266/PGM0MD, PA267/PGM0MD, PA268/PGM0MD, PA269/PGM0MD, PA270/PGM0MD, PA271/PGM0MD, PA272/PGM0MD, PA273/PGM0MD, PA274/PGM0MD, PA275/PGM0MD, PA276/PGM0MD, PA277/PGM0MD, PA278/PGM0MD, PA279/PGM0MD, PA280/PGM0MD, PA281/PGM0MD, PA282/PGM0MD, PA283/PGM0MD, PA284/PGM0MD, PA285/PGM0MD, PA286/PGM0MD, PA287/PGM0MD, PA288/PGM0MD, PA289/PGM0MD, PA290/PGM0MD, PA291/PGM0MD, PA292/PGM0MD, PA293/PGM0MD, PA294/PGM0MD, PA295/PGM0MD, PA296/PGM0MD, PA297/PGM0MD, PA298/PGM0MD, PA299/PGM0MD, PA300/PGM0MD, PA301/PGM0MD, PA302/PGM0MD, PA303/PGM0MD, PA304/PGM0MD, PA305/PGM0MD, PA306/PGM0MD, PA307/PGM0MD, PA308/PGM0MD, PA309/PGM0MD, PA310/PGM0MD, PA311/PGM0MD, PA312/PGM0MD, PA313/PGM0MD, PA314/PGM0MD, PA315/PGM0MD, PA316/PGM0MD, PA317/PGM0MD, PA318/PGM0MD, PA319/PGM0MD, PA320/PGM0MD, PA321/PGM0MD, PA322/PGM0MD, PA323/PGM0MD, PA324/PGM0MD, PA325/PGM0MD, PA326/PGM0MD, PA327/PGM0MD, PA328/PGM0MD, PA329/PGM0MD, PA330/PGM0MD, PA331/PGM0MD, PA332/PGM0MD, PA333/PGM0MD, PA334/PGM0MD, PA335/PGM0MD, PA336/PGM0MD, PA337/PGM0MD, PA338/PGM0MD, PA339/PGM0MD, PA340/PGM0MD, PA341/PGM0MD, PA342/PGM0MD, PA343/PGM0MD, PA344/PGM0MD, PA345/PGM0MD, PA346/PGM0MD, PA347/PGM0MD, PA348/PGM0MD, PA349/PGM0MD, PA350/PGM0MD, PA351/PGM0MD, PA352/PGM0MD, PA353/PGM0MD, PA354/PGM0MD, PA355/PGM0MD, PA356/PGM0MD, PA357/PGM0MD, PA358/PGM0MD, PA359/PGM0MD, PA360/PGM0MD, PA361/PGM0MD, PA362/PGM0MD, PA363/PGM0MD, PA364/PGM0MD, PA365/PGM0MD, PA366/PGM0MD, PA367/PGM0MD, PA368/PGM0MD, PA369/PGM0MD, PA370/PGM0MD, PA371/PGM0MD, PA372/PGM0MD, PA373/PGM0MD, PA374/PGM0MD, PA375/PGM0MD, PA376/PGM0MD, PA377/PGM0MD, PA378/PGM0MD, PA379/PGM0MD, PA380/PGM0MD, PA381/PGM0MD, PA382/PGM0MD, PA383/PGM0MD, PA384/PGM0MD, PA385/PGM0MD, PA386/PGM0MD, PA387/PGM0MD, PA388/PGM0MD, PA389/PGM0MD, PA390/PGM0MD, PA391/PGM0MD, PA392/PGM0MD, PA393/PGM0MD, PA394/PGM0MD, PA395/PGM0MD, PA

This section contains the layout graphics for the PIC32CXMGTG-EK board:

- Layer 1: Top Layer, [Figure 5-7](#)
- Layer 2: Mid Layer 1, [Figure 5-8](#)
- Layer 3: Mid Layer 2, [Figure 5-9](#)
- Layer 4: Bottom Layer, [Figure 5-10](#)
- Top Components Placement, [Figure 5-11](#)
- Bottom Components Placement, [Figure 5-12](#)

**Figure 5-7.** PIC32CXMTG-EK Layout: Top Layer



**Figure 5-8.** PIC32CXMTG-EK Layout: Mid Layer1 (Ground)

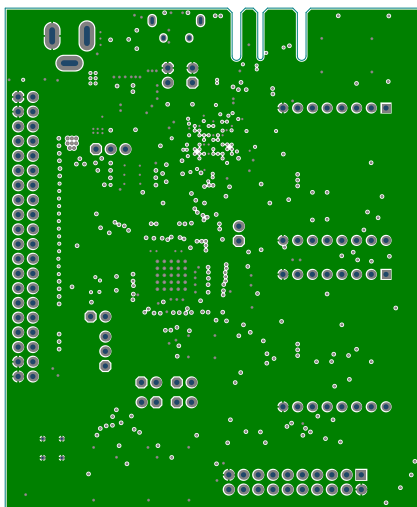


Figure 5-9. PIC32CXMTG-EK Layout: Mid Layer2 (Power Supplies)

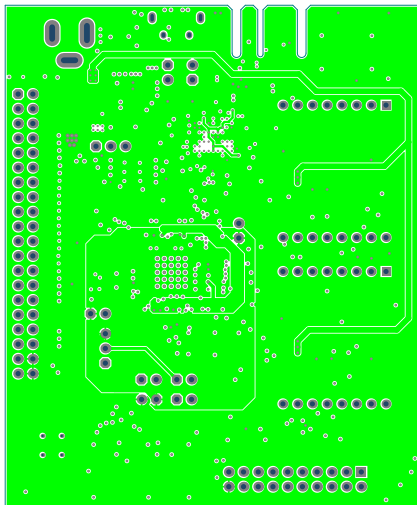


Figure 5-10. PIC32CXMTG-EK Layout: Bottom Layer

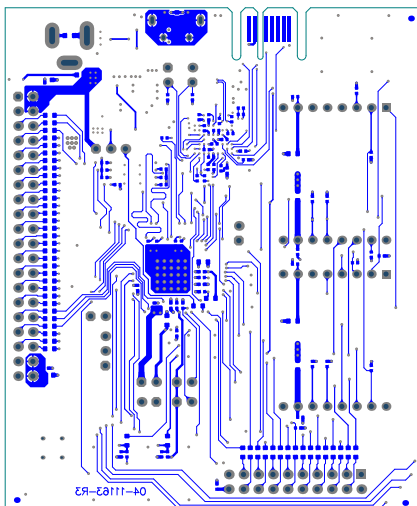
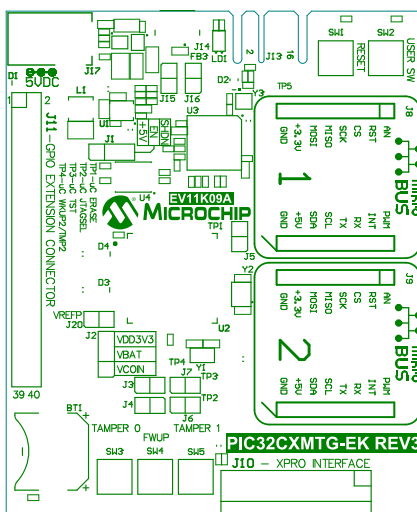
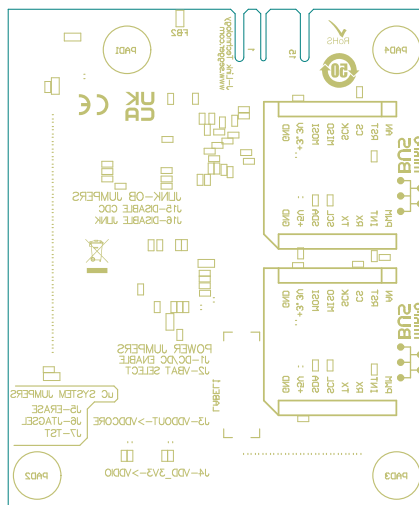


Figure 5-11. PIC32CXMTG-EK Layout: Top Silkscreen



**Figure 5-12.** PIC32CXMTG-EK Layout: Bottom Silkscreen

## 6. References

The following documents are recommended as supplemental reference resources:

- PIC32CXMTG Data Sheet, reference DS60001780, on the [Microchip website](#)
- VMK3/VMK4 Data Sheet, reference DS20006440, on the [Microchip website](#)
- [VXM7](#) Data Sheet, on the Microchip website
- [MIC22205](#) Data Sheet, on the Microchip website
- SST26VF064B Data Sheet, reference DS20005119, on the [Microchip website](#)
- [mikroBUS Standard Specifications, 2015](#)

## 7. Revision History

### 7.1 Rev F - 07/2024

|                                        |                                                                                                 |
|----------------------------------------|-------------------------------------------------------------------------------------------------|
| <a href="#">Introduction</a>           | Minor updates.                                                                                  |
| <a href="#">3. PIC32CXMTG-EK Board</a> | Updated pins 3 and 4 in <a href="#">Table 3-2</a> in <a href="#">3.3.1. Connectors</a> section. |

### 7.2 Rev E - 09/2022

|                                                     |                                                                      |
|-----------------------------------------------------|----------------------------------------------------------------------|
| Document                                            | Minor updates throughout.<br>Added ordering code.                    |
| <a href="#">3. PIC32CXMTG-EK Board</a>              | Updated <a href="#">Figure 3-19</a> and <a href="#">Table 3-13</a> . |
| <a href="#">5. Appendix. Schematics and Layouts</a> | Updated <a href="#">Figure 5-6</a> .                                 |
| <a href="#">4. Ordering Information</a>             | Added section.                                                       |

### 7.3 Rev D - 04/2022

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Document                               | Minor changes in the document.<br>Updated all the figures according to PIC32CXMTG-EK Rev 3.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <a href="#">3. PIC32CXMTG-EK Board</a> | Updated <a href="#">Table 3-3</a> and <a href="#">Table 3-6</a> .<br>Updated <a href="#">3.3.1. Connectors</a> , <a href="#">3.3.2. Jumper Configurations</a> , <a href="#">3.4.1. PIC32CXMTG</a> , <a href="#">3.4.2.1. 32.768 kHz Crystal</a> , <a href="#">3.5.2. User LEDs</a> , <a href="#">3.5.3. Chip Erase</a> , <a href="#">3.6.1. mikroBUS Connectors</a> , <a href="#">3.6.2. Xplained Pro Interface</a> and <a href="#">3.6.3. GPIO Interface</a> sections.<br>Deleted Shared GPIO and Standards Compliance sections. |

### 7.4 Rev C - 11/2021

|                                                     |                                                                                                                                                                                                                     |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">3. PIC32CXMTG-EK Board</a>              | Updated <a href="#">Figure 3-1</a> , <a href="#">Figure 3-2</a> , <a href="#">Figure 3-3</a> , <a href="#">Figure 3-4</a> , <a href="#">Figure 3-6</a> , <a href="#">Figure 3-7</a> and <a href="#">Figure 3-11</a> |
| <a href="#">5. Appendix. Schematics and Layouts</a> | Updated <a href="#">Figure 5-1</a> , <a href="#">Figure 5-2</a> , <a href="#">Figure 5-3</a> , <a href="#">Figure 5-4</a> , <a href="#">Figure 5-5</a> , <a href="#">Figure 5-6</a>                                 |

### 7.5 Rev B - 08/2021

|                                                  |                                                                                                                                |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Document                                         | Minor changes of format<br>Updated the document according to PIC32CXMTG-EK Rev 2; modified the figures of schematic and layout |
| <a href="#">1. Evaluation Kit Specifications</a> | Updated <a href="#">Table 1-1</a> , and added <a href="#">Table 1-2</a>                                                        |
| <a href="#">6. References</a>                    | Added two references                                                                                                           |

### 7.6 Rev A - 11/2020

|          |                  |
|----------|------------------|
| Document | Initial release. |
|----------|------------------|

## Microchip Information

### The Microchip Website

Microchip provides online support via our website at [www.microchip.com/](http://www.microchip.com/). This website is used to make files and information easily available to customers. Some of the content available includes:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip design partner program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

### Product Change Notification Service

Microchip's product change notification service helps keep customers current on Microchip products. Subscribers will receive email notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, go to [www.microchip.com/pcn](http://www.microchip.com/pcn) and follow the registration instructions.

### Customer Support

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Embedded Solutions Engineer (ESE)
- Technical Support

Customers should contact their distributor, representative or ESE for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in this document.

Technical support is available through the website at: [www.microchip.com/support](http://www.microchip.com/support)

### Microchip Devices Code Protection Feature

Note the following details of the code protection feature on Microchip products:

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner, within operating specifications, and under normal conditions.
- Microchip values and aggressively protects its intellectual property rights. Attempts to breach the code protection features of Microchip product is strictly prohibited and may violate the Digital Millennium Copyright Act.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is "unbreakable". Code protection is constantly evolving. Microchip is committed to continuously improving the code protection features of our products.

### Legal Notice

This publication and the information herein may be used only with Microchip products, including to design, test, and integrate Microchip products with your application. Use of this information in any other manner violates these terms. Information regarding device applications is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure

that your application meets with your specifications. Contact your local Microchip sales office for additional support or, obtain additional support at [www.microchip.com/en-us/support/design-help/client-support-services](http://www.microchip.com/en-us/support/design-help/client-support-services).

THIS INFORMATION IS PROVIDED BY MICROCHIP "AS IS". MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTIES RELATED TO ITS CONDITION, QUALITY, OR PERFORMANCE.

IN NO EVENT WILL MICROCHIP BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, OR CONSEQUENTIAL LOSS, DAMAGE, COST, OR EXPENSE OF ANY KIND WHATSOEVER RELATED TO THE INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROCHIP HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROCHIP'S TOTAL LIABILITY ON ALL CLAIMS IN ANY WAY RELATED TO THE INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, THAT YOU HAVE PAID DIRECTLY TO MICROCHIP FOR THE INFORMATION.

Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

## Trademarks

The Microchip name and logo, the Microchip logo, Adaptec, AVR, AVR logo, AVR Freaks, BesTime, BitCloud, CryptoMemory, CryptoRF, dsPIC, flexPWR, HELDO, IGLOO, JukeBlox, KeeLoq, Kleer, LANCheck, LinkMD, maXStylus, maXTouch, MediaLB, megaAVR, Microsemi, Microsemi logo, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, PolarFire, Prochip Designer, QTouch, SAM-BA, SenGenuity, SpyNIC, SST, SST Logo, SuperFlash, Symmetricom, SyncServer, Tachyon, TimeSource, tinyAVR, UNI/O, Vectron, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

AgileSwitch, ClockWorks, The Embedded Control Solutions Company, EtherSynch, Flashtec, Hyper Speed Control, HyperLight Load, Libero, motorBench, mTouch, Powermite 3, Precision Edge, ProASIC, ProASIC Plus, ProASIC Plus logo, Quiet-Wire, SmartFusion, SyncWorld, TimeCesium, TimeHub, TimePictra, TimeProvider, and ZL are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, Augmented Switching, BlueSky, BodyCom, Clockstudio, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, Espresso T1S, EtherGREEN, EyeOpen, GridTime, IdealBridge, IGaT, In-Circuit Serial Programming, ICSP, INICnet, Intelligent Paralleling, IntelliMOS, Inter-Chip Connectivity, JitterBlocker, Knob-on-Display, MarginLink, maxCrypto, maxView, memBrain, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, mSiC, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICKit, PICtail, Power MOS IV, Power MOS 7, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, RTAX, RTG4, SAM-ICE, Serial Quad I/O, simpleMAP, SimpliPHY, SmartBuffer, SmartHLS, SMART-I.S., storClad, SQL, SuperSwitcher, SuperSwitcher II, Switchtec, SynchroPHY, Total Endurance, Trusted Time, TSHARC, Turing, USBCheck, VariSense, VectorBlox, VeriPHY, ViewSpan, WiperLock, XpressConnect, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

The Adaptec logo, Frequency on Demand, Silicon Storage Technology, and Symmcom are registered trademarks of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2020-2022, Microchip Technology Incorporated and its subsidiaries. All Rights Reserved.

ISBN: 978-1-6683-0031-2

AMBA, Arm, Arm7, Arm7TDMI, Arm9, Arm11, Artisan, big.LITTLE, Cordio, CoreLink, CoreSight, Cortex, DesignStart, DynamIQ, Jazelle, Keil, Mali, Mbed, Mbed Enabled, NEON, POP, RealView, SecurCore, Socrates, Thumb, TrustZone, ULINK, ULINK2, ULINK-ME, ULINK-PLUS, ULINKpro,  $\mu$ Vision, Versatile are trademarks or registered trademarks of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

## Quality Management System

For information regarding Microchip's Quality Management Systems, please visit [www.microchip.com/quality](http://www.microchip.com/quality).

## Worldwide Sales and Service

| AMERICAS                                                                                                                                                                                                                                                                                               | ASIA/PACIFIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ASIA/PACIFIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | EUROPE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Corporate Office</b><br>2355 West Chandler Blvd.<br>Chandler, AZ 85224-6199<br>Tel: 480-792-7200<br>Fax: 480-792-7277<br>Technical Support:<br><a href="http://www.microchip.com/support">www.microchip.com/support</a><br>Web Address:<br><a href="http://www.microchip.com">www.microchip.com</a> | <b>Australia - Sydney</b><br>Tel: 61-2-9868-6733<br><b>China - Beijing</b><br>Tel: 86-10-8569-7000<br><b>China - Chengdu</b><br>Tel: 86-28-8665-5511<br><b>China - Chongqing</b><br>Tel: 86-23-8980-9588<br><b>China - Dongguan</b><br>Tel: 86-769-8702-9880<br><b>China - Guangzhou</b><br>Tel: 86-20-8755-8029<br><b>China - Hangzhou</b><br>Tel: 86-571-8792-8115<br><b>China - Hong Kong SAR</b><br>Tel: 852-2943-5100<br><b>China - Nanjing</b><br>Tel: 86-25-8473-2460<br><b>China - Qingdao</b><br>Tel: 86-532-8502-7355<br><b>China - Shanghai</b><br>Tel: 86-21-3326-8000<br><b>China - Shenyang</b><br>Tel: 86-24-2334-2829<br><b>China - Shenzhen</b><br>Tel: 86-755-8864-2200<br><b>China - Suzhou</b><br>Tel: 86-186-6233-1526<br><b>China - Wuhan</b><br>Tel: 86-27-5980-5300<br><b>China - Xian</b><br>Tel: 86-29-8833-7252<br><b>China - Xiamen</b><br>Tel: 86-592-2388138<br><b>China - Zhuhai</b><br>Tel: 86-756-3210040 | <b>India - Bangalore</b><br>Tel: 91-80-3090-4444<br><b>India - New Delhi</b><br>Tel: 91-11-4160-8631<br><b>India - Pune</b><br>Tel: 91-20-4121-0141<br><b>Japan - Osaka</b><br>Tel: 81-6-6152-7160<br><b>Japan - Tokyo</b><br>Tel: 81-3-6880-3770<br><b>Korea - Daegu</b><br>Tel: 82-53-744-4301<br><b>Korea - Seoul</b><br>Tel: 82-2-554-7200<br><b>Malaysia - Kuala Lumpur</b><br>Tel: 60-3-7651-7906<br><b>Malaysia - Penang</b><br>Tel: 60-4-227-8870<br><b>Philippines - Manila</b><br>Tel: 63-2-634-9065<br><b>Singapore</b><br>Tel: 65-6334-8870<br><b>Taiwan - Hsin Chu</b><br>Tel: 886-3-577-8366<br><b>Taiwan - Kaohsiung</b><br>Tel: 886-7-213-7830<br><b>Taiwan - Taipei</b><br>Tel: 886-2-2508-8600<br><b>Thailand - Bangkok</b><br>Tel: 66-2-694-1351<br><b>Vietnam - Ho Chi Minh</b><br>Tel: 84-28-5448-2100 | <b>Austria - Wels</b><br>Tel: 43-7242-2244-39<br>Fax: 43-7242-2244-393<br><b>Denmark - Copenhagen</b><br>Tel: 45-4485-5910<br>Fax: 45-4485-2829<br><b>Finland - Espoo</b><br>Tel: 358-9-4520-820<br><b>France - Paris</b><br>Tel: 33-1-69-53-63-20<br>Fax: 33-1-69-30-90-79<br><b>Germany - Garching</b><br>Tel: 49-8931-9700<br><b>Germany - Haan</b><br>Tel: 49-2129-3766400<br><b>Germany - Heilbronn</b><br>Tel: 49-7131-72400<br><b>Germany - Karlsruhe</b><br>Tel: 49-721-625370<br><b>Germany - Munich</b><br>Tel: 49-89-627-144-0<br>Fax: 49-89-627-144-44<br><b>Germany - Rosenheim</b><br>Tel: 49-8031-354-560<br><b>Israel - Hod Hasharon</b><br>Tel: 972-9-775-5100<br><b>Italy - Milan</b><br>Tel: 39-0331-742611<br>Fax: 39-0331-466781<br><b>Italy - Padova</b><br>Tel: 39-049-7625286<br><b>Netherlands - Drunen</b><br>Tel: 31-416-690399<br>Fax: 31-416-690340<br><b>Norway - Trondheim</b><br>Tel: 47-72884388<br><b>Poland - Warsaw</b><br>Tel: 48-22-3325737<br><b>Romania - Bucharest</b><br>Tel: 40-21-407-87-50<br><b>Spain - Madrid</b><br>Tel: 34-91-708-08-90<br>Fax: 34-91-708-08-91<br><b>Sweden - Gothenberg</b><br>Tel: 46-31-704-60-40<br><b>Sweden - Stockholm</b><br>Tel: 46-8-5090-4654<br><b>UK - Wokingham</b><br>Tel: 44-118-921-5800<br>Fax: 44-118-921-5820 |