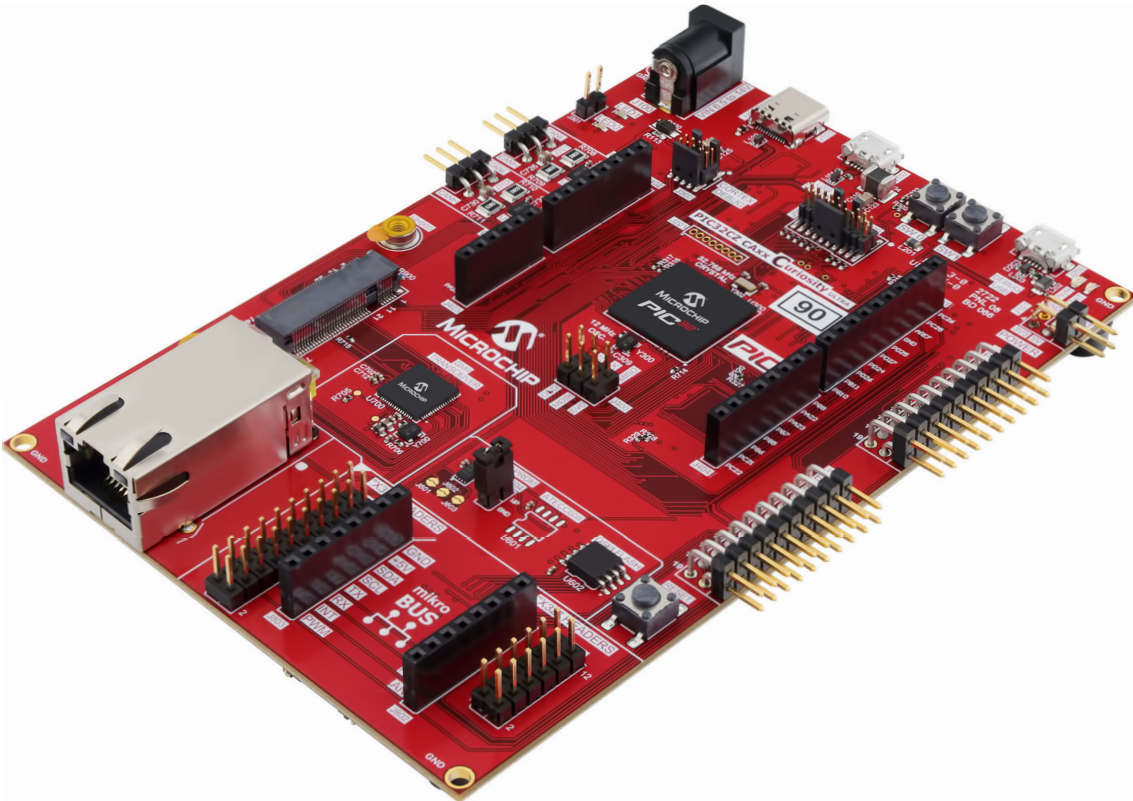


## EV61X20A/EV16W43A



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## 1. Introduction

This document describes the Microchip PIC32CZ CA80/CA90 Curiosity Ultra development board (EV61X20A/EV16W43A) features, functionality, and schematics. The PIC32CZ CA80/CA90 Curiosity Ultra development board includes an integrated programmer or debugger, and requires no additional hardware to get started. Users can expand functionality through Arduino Uno R3, MikroE Bus, or Xplained Pro compatible expansion boards.

With expansion boards, the PIC32CZ CA80/CA90 Curiosity Ultra development board provides the freedom to develop a variety of applications, including Bluetooth® audio, Internet of Things (IoT), robotics development, and proof-of-concept designs.

### 1.1 PIC32CZ CA80/CA90 Curiosity Ultra Features

The following are key features of the PIC32CZ CA80/CA90 Curiosity Ultra development board:

- PIC32CZ8110CA80208 or PIC32CZ8110CA90208, 300 MHz, 8M Flash, 1M SRAM
- On-board debugger (PKoB4)
  - Real time programming and debugging
  - Virtual COM port (VCOM)
  - Data Gateway Interface (DGI)
- Arduino Uno R3 compatible interface
- Xplained pro extension compatible interface
- MikroBus™Socket
- On-board temperature sensor
- User button
- User LED
- Graphics interface
- G-bit Ethernet
- 2 high-speed USB (Type-C and Micro A/B)

### 1.2 Kit Contents

The kit contains one PIC32CZ CA80/CA90 Curiosity Ultra development board, EV61X20A/EV16W43A, and an AC/DC “wall wart” power supply.

**Note:** If you are missing any part of a kit, contact a Microchip sales office for assistance. A list of Microchip offices for sales and service is provided on the last page of this document.

## 2. Development Board Functionality and Features

### 2.1 Board Feature Location

Figure 2-1. PIC32CZ CA80/CA90 Curiosity Ultra Development Board Layout (Top View)

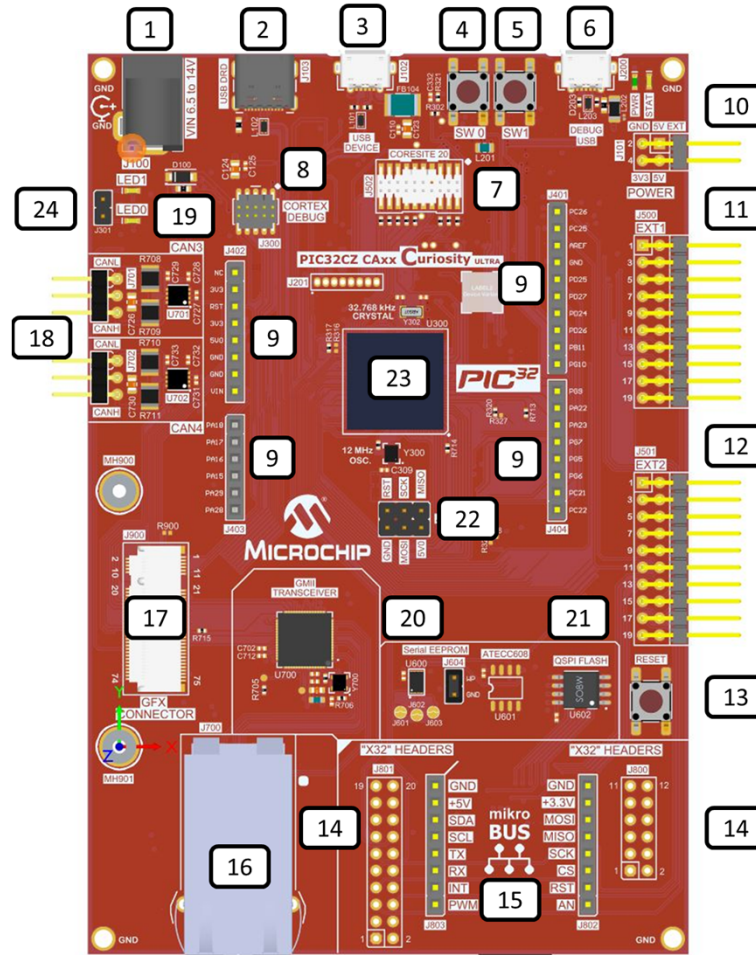


Table 2-1. PIC32CZ CA80/CA90 Curiosity Ultra Board Features and Location

Number	Description of item
1	2.5 mm Barrel 6.5V-14V Power Input
2	USB Type C Host/Device DRD
3	USB Micro A/B Host/Device DRD
4	User Switch 0
5	User Switch 1
6	PKoB USB
7	Coresite 20-pin Debug Interface
8	Cortex 10-pin Debug Interface
9	Arduino Shield Headers
10	External Power Header
11	EXT1 Header

.....continued	
Number	Description of Item
12	EXT2 Header
13	Reset Switch
14	X32 Audio Headers
15	mikroBUS Headers
16	G-bit Ethernet Interface
17	Graphics Interface
18	CAN Interface Headers
19	User LED0/LED1
20	Serial EEPROM
21	QSPI Flash
22	UNO SPI Header
23	PIC32CZ
24	Tamper Header

**Table 2-2.** PIC32CZ CA Microchip Total System Solutions (TSS)

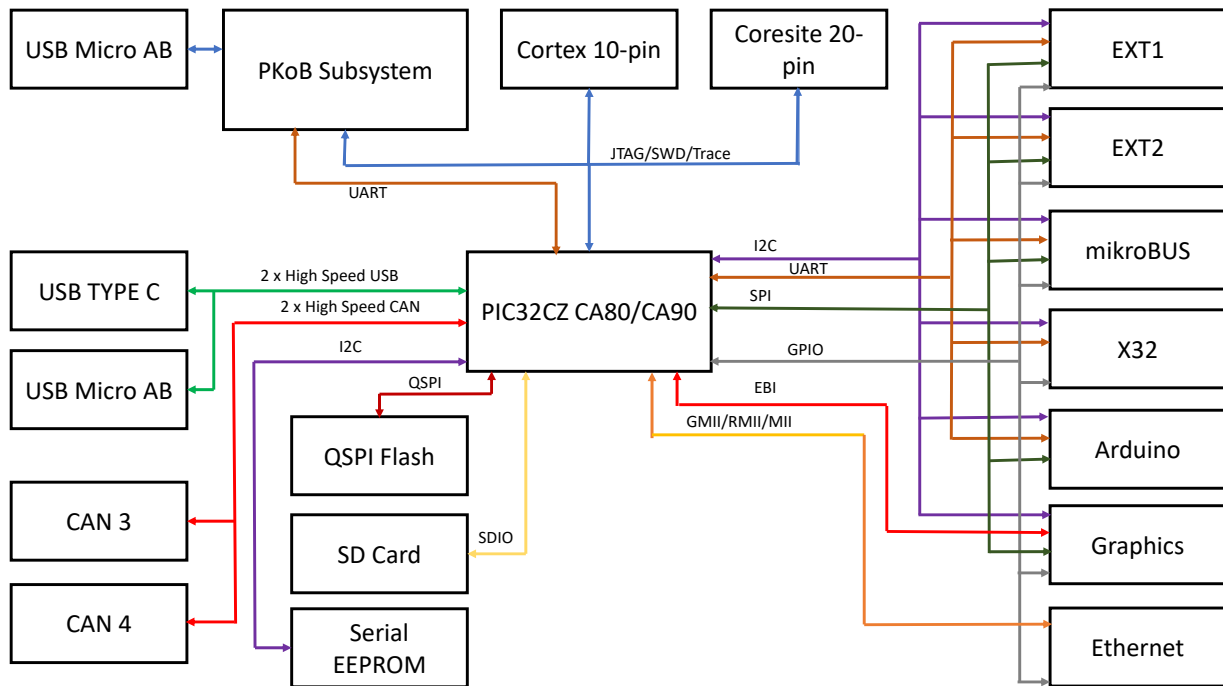
TSS Component	Qty (per board)	Function
TN2106K1-G	1	N-Channel MOSFET
MIC24052YJL-TR	1	SMPS Buck Regulator
MIC5355-G4YMME	1	Dual Rail LDO
MCP1727T-3302E/MF	1	3.3V LDO
MIC2026-2YM-TR	1	Power Switch
ATSAME70N21B-ANT	1	PKoB MCU
24LC256T-I/MS	1	Serial EEPROM
PIC32CZ8110CA80208-I/8MX or PIC32CZ8110CA90208-I/8MX	1	Target MCU
AT24MAC402-MAHM-T	1	Serial EEPROM
SST26VF032BAT-104I/SM	1	QSPI Flash
KSZ9031MNXIC	1	G-bit Ethernet PHY
ATA6561-GBQW	2	CAN Transceiver
DSC6011J12B-012.0000	2	Oscillator 12.0000 MHz
VMK3-9005-32K7680000	1	XTAL 32.768 kHz
DSC1001DI5-025.0000 <sup>(1)</sup>	1	Oscillator 25.0000 MHz

**Note:**

1. For designs that are targeting Ethernet compliance testing, a very low jitter solution, such as the Microchip MEMS Oscillator DSC1101DI5-025.0000 is recommended.

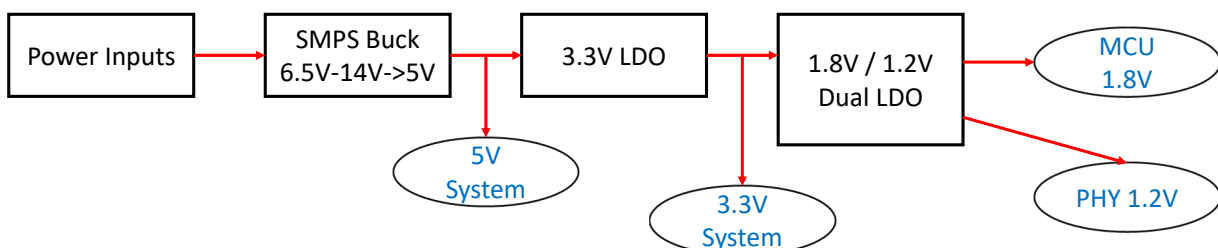
## 2.2 System Block Diagram

The following figure illustrates a high-level block diagram of the PIC32CZ CA80/CA90 Curiosity Ultra development board.

**Figure 2-2.** PIC32CZ CA80/CA90 Curiosity Ultra System Block Diagram

## 2.3 Power Block Diagram

The following figure illustrates a high-level block diagram of the power system on the PIC32CZ CA80/CA90 Curiosity Ultra development board. The development board is powered through the barrel connector using the wall-mount power supply provided in the kit, or any 6.5-14V DC > 750 mA power supply.

**Figure 2-3.** PIC32CZ CA80/CA90 Curiosity Ultra Power Block Diagram

## 2.4 mikroBUS™ Socket

One mikroBUS socket, J503-J504, is available on the development board. This socket can be used to expand the functionality using the MikroElektronika Click adapter boards. The mikroBUS connector consists of two 1x8 female headers with SPI, I<sup>2</sup>C, UART, RST, PWM, analog, and interrupt lines as well as 3.3V, 5V, and GND power lines.

**Table 2-3.** mikroBUS Socket Pinout

mikroBUS Pin Number	mikroBUS Pin Name	Description	Port
1	AN	Analog	PA14
2	RST	Reset	PB27
3	CS	SPI Chip Select	PC14

.....continued

mikroBUS Pin Number	mikroBUS Pin Name	Description	Port
4	SCK	SPI Clock	PC13
5	MISO	SPI Host In Client Out	PC15
6	MOSI	SPI Host Out Client In	PC12
7	+3.3V	VCC-3.3V power	VCC_P3V3
8	GND	Reference Ground	GND
9	GND	Reference Ground	GND
10	+5V	VCC-5V power	P5V0
11	SDA	I <sup>2</sup> C Data	PC25
12	SCL	I <sup>2</sup> C Clock	PC26
13	TX	UART Transmit	PC21
14	RX	UART Receive	PC22
15	INT	Hardware Interrupt	PA8
16	PWM	PWM Output	PA22

## 2.5 Xplained Pro Standard Extension Header

The PIC32CZ CA80/CA90 Curiosity Ultra development board has two Xplained Pro compatible interfaces that enable the use of existing expansion boards. Each interface consists of a dual-row, 30-pin, 100 mil, 90 degree extension male header, while Xplained Pro extensions have their female counterparts. The extension headers can be used to connect a variety of Xplained Pro extension boards or to access the pins of the target MCU directly.

**Note:** All pins are not always connected.

The Pinout description for the Xplained Pro Standard Extension Header1 and Header 2 are listed in the following tables.

**Note:** Due to a component footprint error, the pin-out of the External Power Connector (J101) is not compatible with the standard for extension boards. If an extender board is used that requires this header, an adapter must be used. See the schematic section of this document for the pinout of J101.

**Table 2-4.** EXT 1 Header Pinout

Pin number	Name	Description	Port
1	ID_EXT1	Communication line to the ID chip on an extension board	Connected to PKoB4
2	GND	Ground	-
3	ADC0(+)	Analog-to-digital converter (ADC), alternatively positive part of differential ADC	PA18
4	ADC0(-)	Analog-to-digital converter, alternatively negative part of differential ADC	PA17
5	GPIO1	General purpose I/O	PB25
6	GPIO2	General purpose I/O	PB26
7	PWMH1	High-Side PWM	PB10
8	PWML1	Low-Side PWM	PB11
9	GPIO3	General purpose I/O	PA7
10	GPIO4	General purpose I/O	PC24
11	SDA2	Data line for I <sup>2</sup> C interface. Always implemented, bus type	PC0
12	SCL2	Clock line for I <sup>2</sup> C interface. Always implemented, bus type.	PC1
13	RX2	Receiver line of target device UART	PC7
14	TX2	Transmitter line of target device UART.	PC4
15	SS2	SPI Select or General purpose I/O	PC10
16	MOSI	Host Out Client In (MOSI) line of serial peripheral interface. Always implemented, bus type.	PC8

.....continued

Pin number	Name	Description	Port
17	MISO	Host In Client Out (MISO) line of serial peripheral interface. Always implemented, bus type.	PC11
18	SCK2	Clock for serial peripheral interface. Always implemented, bus type	PC9
19	GND	Ground	-
20	VCC	Power for extension boards (3.3V)	-

**Table 2-5.** EXT 2 Header Pinout

Pin number	Name	Description	Port/Pin
1	ID_EXT2	Communication line to the ID chip on an extension board	Connected to PKoB4
2	GND	Ground	-
3	ADC1(+)	Analog-to-digital converter, alternatively positive part of differential ADC	PA14
4	ADC1(-)	Analog-to-digital converter, alternatively negative part of differential ADC	PA13
5	GPIO5	General purpose I/O	PB27
6	GPIO6	General purpose I/O	PB28
7	PWMH2	High-Side PWM	PA22
8	PWML2	Low-Side PWM	PA23
9	GPIO7	General purpose I/O	PA8
10	GPIO8	General purpose I/O	PE10
11	SDA2	Data line for I <sup>2</sup> C interface. Always implemented, bus type	PC25
12	SCL2	Clock line for I <sup>2</sup> C interface. Always implemented, bus type.	PC26
13	RX2	Receiver line of target device UART	PC22
14	TX2	Transmitter line of target device UART.	PC21
15	SS3	SPI Client Select or General purpose I/O	PC14
16	MOSI	Host Out Client In (MOSI) line of serial peripheral interface. Always implemented, bus type.	PC12
17	MISO	Host In Client Out (MISO) line of serial peripheral interface. Always implemented, bus type.	PC15
18	SCK2	Clock for serial peripheral interface. Always implemented, bus type	PC13
19	GND	Ground	-
20	VCC	Power for extension boards (3.3V)	-

## 2.6 Dual CAN Interface

The PIC32CZ CA80/CA90 Curiosity Ultra development board offers access to two of the CAN interfaces on connectors: J701 and J702.

**Table 2-6.** CAN3 Interface J701

Pin	Name	CAN Function
1	CANL	CAN High signal
2	GND	GND
3	CANH	CAN Low signal

**Table 2-7.** CAN4 Interface J702

Pin	Name	CAN Function
1	CANL	CAN High signal
2	GND	GND
3	CANH	CAN Low signal



## 2.7 Graphics Connectors or GFX Card Interface

The PIC32CZ CA80/CA90 Curiosity Ultra development board is designed with a modular graphics interface. This interface enables using several graphics cards, which allow for expandability and different use cases. A 565 adapter card can be purchased separately, which takes 16-bit parallel LCD data and converts it to 24-bit data. This card also provides access to ADC for resistive touch-screens, therefore an external controller is not needed. Refer to the following table for pin descriptions.

**Table 2-8.** Graphics Interface Pinout

Pin Number	Name	Description	Port/Pin
1	GND	Ground	-
2	GND	Ground	-
3	MCLR	Host Clear, Controlled by the debuggers. Allows for a complete system reboot.	TARGET_RESETh
4	IRQ1 (LCD Touch)	Interrupt request line for cap touch device	PF1
5	5.0V VCC	5.0V	-
6	IRQ2 (Q Touch)	Interrupt request line for Q touch devices	PF2
7	LCDEN	LCD Data Enable	PC5
8	IRQ3 (Display Controllers)	Interrupt request line for external display controllers	PF3
9	LCDHSYNC/NCS3	LCD Horizontal Sync	PC27
10	IRQ4 (Resistive touch)	Interrupt request line for resistive touch controllers	PF4
11	LCDVSYNC/nWE	LEC Vertical Sync or Write enable (active-low)	PG4
12-19	non-pop	-	-
20	5.0V VCC	+5.0V	-
21	LCDPCK/nRD	LCD pixel Clock or Read Enable (active-low)	PC6
22	I2C SDA	Data line for I <sup>2</sup> C interface. Always implemented, bus type.	PC0
23	LCD D0	LCD Data bit 0	PD13
24	I2C SCL	Clock line for I <sup>2</sup> C interface. Always implemented, bus type.	PC1
25	LCD D1	LCD Data bit 1	PD23
26	SPI SCK	Clock for serial peripheral interface. Always implemented, bus type.	PD25
27	LCD D2	LCD Data bit 2	PD14
28	SPI MOSI	Host Out Client In (MOSI) line of Serial Peripheral Interface.	PD24
29	LCD D3	LCD Data bit 3	PD23
30	SPI MISO	Host In Client Out (MISO) line of Serial Peripheral Interface.	PD27
31	LCD D4	LCD Data bit 4	PD15
32	SPI SS	SPI Client Select	PD26
33	LCD D5	LCD Data bit 5	PD3
34	UART RX	Receiver line of target device UART (Not Implemented on this design)	-
35	LCD D6	LCD Data bit 6	PD16
36	UART TX	Transmitter line of target device UART. (Not Implemented on this design)	-
37	LCD D7	LCD Data bit 7	PD17
38	UART RTS	UART Ready To Send (Not Implemented on this design)	-
39	LCD D8	LCD Data bit 8	PD4
40	UART CTS	UART Clear To Send (Not Implemented on this design)	-
41	LCD D9	LCD Data bit 9	PD18
42	LCD PWM	LCD PWM back light control	PG5
43	LCD D10	LCD Data bit 10	PD19

.....continued			
Pin Number	Name	Description	Port/Pin
44	PWM2	Pulse-Width Modulation (PWM)	PG6
45	LCD D11	LCD Data bit 11	PD5
46	GPIO1	General purpose I/O	PE6
47	LCD D12	LCD Data bit 12	PD6
48	GPIO2	General purpose I/O	PE7
49	LCD D13	LCD Data bit 13	PD20
50	GPIO3	General purpose I/O	PE8
51	LCD D14	LCD Data bit 14	PD21
52	STBY/RST/GPIO4	Standby/Reset or general purpose I/O. For resetting devices attached to the GFX connector.	PE5
53	LCD D15	LCD Data bit 15	PD7
54	STBY/RST/GPIO5	Standby2/Reset2 or general purpose I/O (Not Implemented on this design)	-
55	LCD D16	LCD Data bit 16 (Not Implemented on this design)	-
56	ID pin	Communication line to the ID chip on an extension board	ID4
57	LCD D17	LCD Data bit 17 (Not Implemented on this design)	-
58	ADC 0	Analog-to-Digital Converter to MCU	PB3
59	LCD D18	LCD Data bit 18 (Not Implemented on this design)	-
60	ADC1	Analog-to-Digital Converter to MCU	PB2
61	LCD D19	LCD Data bit 19 (Not Implemented on this design)	-
62	ADC2	Analog-to-Digital Converter to MCU	PB1
63	LCD D20	LCD Data bit 20 (Not Implemented on this design)	-
64	ADC3	Analog-to-Digital Converter to MCU	PB0
65	LCD D21	LCD Data bit 21 (Not Implemented on this design)	-
66	ADC4	Analog-to-Digital Converter to MCU	PA20
67	LCD D22	LCD Data bit 22 (Not Implemented on this design)	-
68	ADC5	Analog-to-Digital Converter to MCU	PA19
69	LCD D23	LCD Data bit 23 (Not Implemented on this design)	-
70	ADC6	Analog-to-Digital Converter to MCU	PB18
71	3.3V VCC	+3.3V VCC	-
72	ADC7	Analog-to-Digital Converter to MCU	PB19
73	GND	Ground	-
74	3.3V VCC	+3.3V VCC	-
75	GND	Ground	-
M1	GND TAB	Mounting Tab	-
M2	GND TAB	Mounting Tab	-

## 2.8 X32 Audio Connectivity

The PIC32CZ CA80/CA90 Curiosity Ultra development board provides an audio connection through the X32 interface to the two main audio modules in the chip, such as the SSC and the I<sup>2</sup>S. On this board the SSC interface is considered the main audio interface as shown in the following figure.

There is a 32-pin interface to the board to support the audio codec, DACs, and Bluetooth radios. This interface has two audio supply interfaces: the SSC and the I<sup>2</sup>S. In addition to this, other control lines and data interfaces are available.

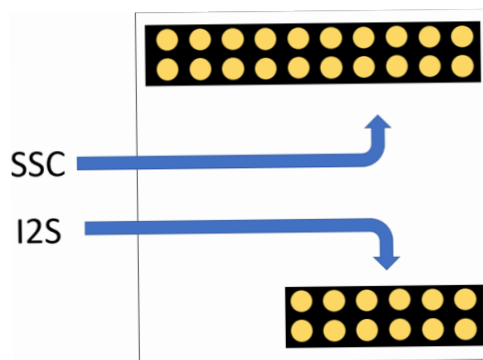
Figure 2-4. SC/I<sup>2</sup>S Block Diagram

Table 2-9. X32 Audio Interface Pin Description

XC-32 Pin Number	XC-32Pin Name	Description	Port
1	GND	GND	-
2	GND	GND	-
3	UART_RX	UART RX, MCU receive from DB	PC9
4	UART_CTS	UART Clear to Send	PC11
5	UART_TX	UART TX, transmit from MCU to DB	PC8
6	UART_RTS	UART Request to Send	PC10
7	I2C_SCL	Clock line for I <sup>2</sup> C interface	PC13
8	STBY/RST_B	Standby/Reset control	PE11
9	I2C_SDA	Data line for I <sup>2</sup> C interface	PC12
10	DMM/I2S_WS	Audio Word Select/ Left Right Clock	PC0
11	I2S0_DIN	Audio into MCU, out from CODEC	PC2
12	I2S0_SCK	Audio clock	PC1
13	I2S0_DOUT	Audio out of MCU, in to CODEC/DAC	PC3
14	I2S0_MCLK	Reference clock #1	PC4
15	GND	GND	-
16	GND	GND	-
17	NC	Legacy hold over	-
18	VCC_P3V3	3.3 VDC Power Rail	-
19	NC	Legacy hold over	-
20	VCC_P5V0	5.0 VDC Power Rail	-
21 (1)	I2S1_WS	Audio Word Select/ Left Right Clock	PA30
22 (2)	ID_3	Analog-to-Digital Converter to read voltage on the daughter card	-
23 (3)	I2S1_SCK	Audio Clock	PE1
24 (4)	ADC	ADC channel	PA18
25 (5)	I2S1_DIN	Audio into MCU, out from CODEC	PE2
26 (6)	NC	-	-
27 (7)	I2S1_DOUT	Audio out of MCU, into CODEC/DAC	PE0
28 (8)	NC	-	-
29 (9)	I2S1_MCLK	Reference clock #2	PA31
30 (10)	NC	-	-
31 (11)	GND	GND	-
32 (12)	GND	GND	-

## 2.9 Arduino Uno R3 Interface

The PIC32CZ CA80/CA90 Curiosity Ultra development board has an Arduino Uno R3 compatible header which enables the use of Arduino shields. Peripherals, such as ADC, SPI, I<sup>2</sup>C, UART, and PWM of the PIC32CZ MCU can be interfaced with Arduino shields using the Arduino Uno R3 interface.

The pin map between the PIC32CZ device and the Arduino Uno R3 interface is given in the following table.

**Table 2-10.** Pin Map for the Arduino Uno R3 Interface

Arduino Uno R3 Pin Name	PIC32CZ CA80/CA90 Pin Name
A0	PA18
A1	PA17
A2	PA16
A3	PA15
A4	PA29
A5	PA28
D0/RX	PC22
D1/TX	PC21
D2	PG6
D3	PG5
D4	PG7
D5	PA23
D6	PA22
D7	PG9
D8	PG10
D9	PB11
D10	PD26
D11	PD24
D12	PD27
D13	PD25
D14/SDA	PC25
D15/SCL	PC26

## 2.10 Ethernet

The PIC32CZ CA80/CA90 Curiosity Ultra kit supports 1000/100/10 base-T Ethernet with an on-board PHY and modular Ethernet jack.

## 2.11 Button and LED

The PIC32CZ CA80/CA90 Curiosity Ultra kit offers a user button and an LED. The following table shows the function, description, and the port on the MCU.

**Table 2-11.** Button and LED Pin Description

Function	Description	Type	Port
User SW0	User Switch 0	Digital Input	RB24
User SW1	User Switch 1	Digital Input	PC23
User LED0	User LED 0	Digital Output	PB21
User LED1	User LED 1	Digital Output	PB22

## 2.12 PICKit™ On-Board 4

The MPLAB® PICKit On-Board 4 (PKoB4) is a new generation In-Circuit Debugger. The MPLAB PKoB4 programs faster than its predecessor and is designed to use a high-speed 2.0 USB interface, which provides a feature rich debugging experience through one USB cable. The PKoB4 is intended to support programming, debugging, and a Data Gateway interface.

The MPLAB PKoB4 In-Circuit Debugger is compatible with these platforms:

- MicrosoftWindows®7 or later
- Linux®
- macOS™

The MPLAB PKoB4 In-Circuit Debugger system provides the following advantages:

### Features/Capabilities:

- Connects to computer through high-speed USB 2.0 (480 Mbits/s) cable
- Programs devices using MPLAB X IDE or MPLAB IPE
- Supports multiple hardware and software breakpoints, stopwatch, and source code file debugging
- Debugs the application in real time
- Sets break points based on internal events
- Monitors internal file registers
- Debugs at full speed
- Configures pin drivers
- Virtual COM Support which can establish UART communication between the Host PC and the target device using the following UART Configuration:
  - Baud rate: 115,200 bps
  - Only 8-bit character format
  - No hardware flow control
  - One stop-bit
- Field-upgradeable through an MPLAB X IDE firmware download
- Adds new device support and features by installing the latest version of MPLAB X IDE (available as a free download at <https://www.microchip.com/mplabx/>)
- Indicates debugger status through on-board LEDs

### Performance/Speed:

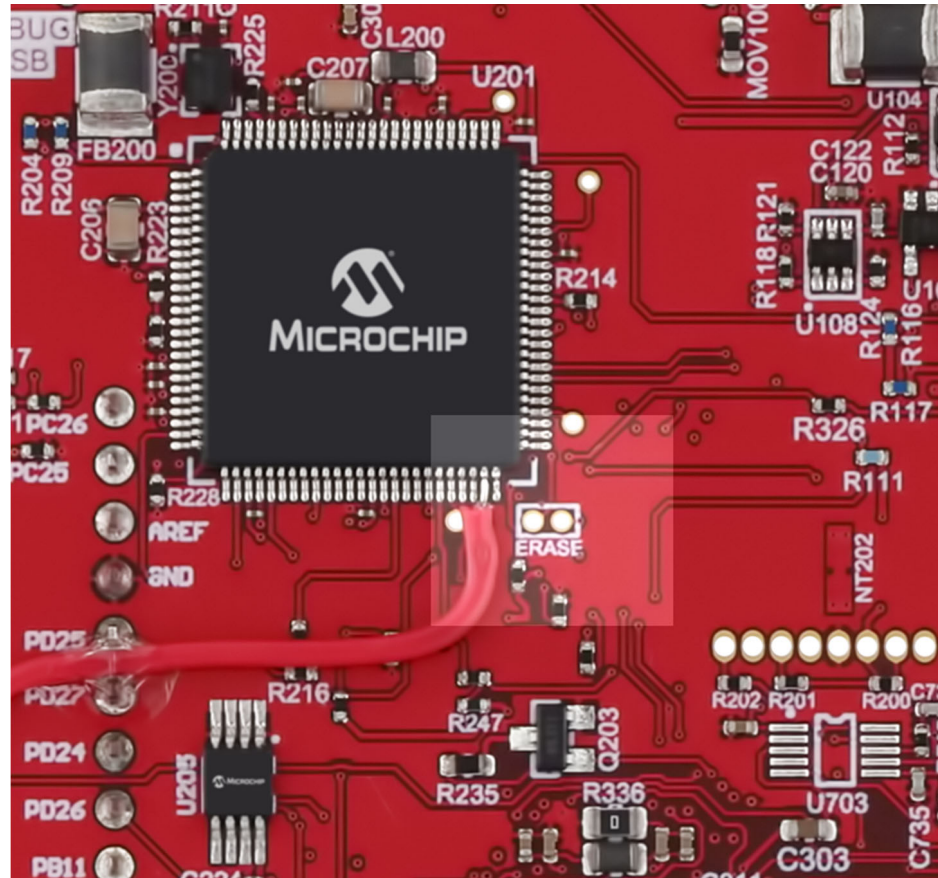
- More and faster memory
- A Real-Time Operating System (RTOS)
- No firmware download delays incurred when switching devices
- A 32-bit MCU running at 300 MHz

## 2.13 Recovery Method

If PKoB4 becomes unresponsive, follow these steps to recover the tool:

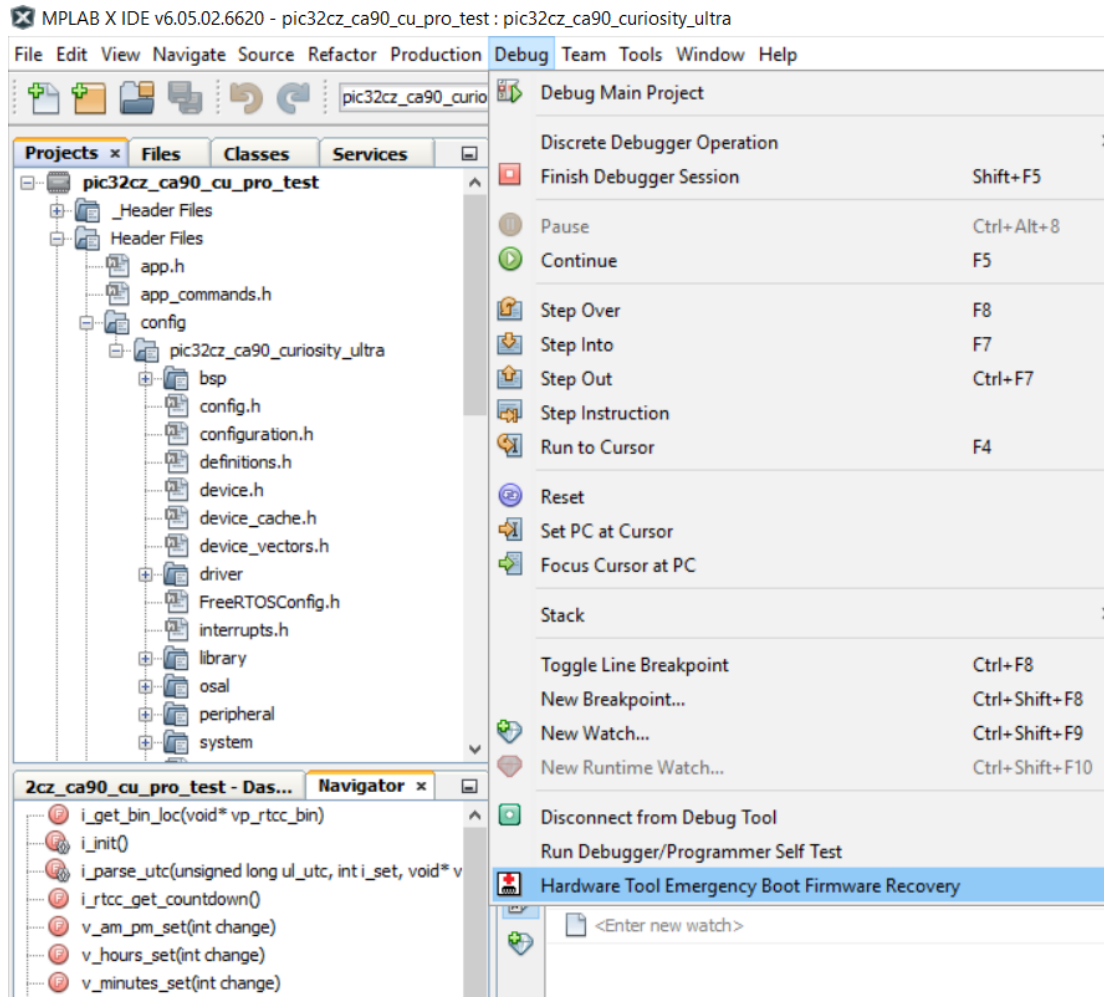
1. With the PIC32CZ CA80/CA90 Curiosity Ultra development board still powered, short the 2 pads for approximately 10 seconds.

Figure 2-5. PKoB EBR Reset



2. Open the latest version of MPLAB X IDE.
3. Click **Debug**. The Debug Main Project window will be displayed.
4. Select **Hardware Tool Emergency Boot Firmware Recovery**.

Figure 2-6. MPLAB X IDE Interface



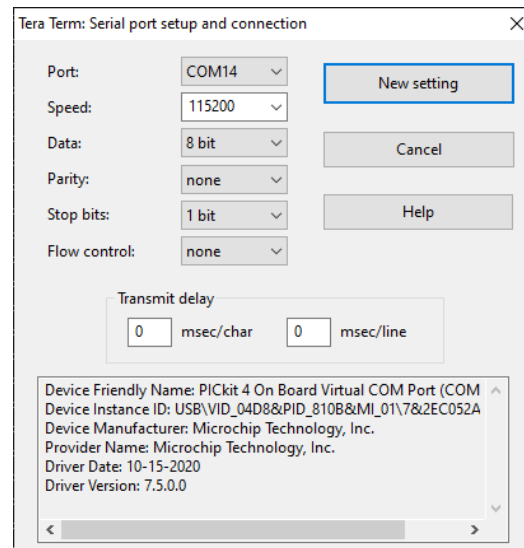
5. Follow onscreen instructions to reset the tool to factory conditions.

For additional information on PKoB4, refer to the "MPLAB® PICkit™ 4 User's Guide" (DS50002751), which is available for download at the following location: [ww1.microchip.com/downloads/en/DeviceDoc/MPLAB%20PICkit%204%20ICD%20Users%20Guide%20DS50002751C.pdf](http://ww1.microchip.com/downloads/en/DeviceDoc/MPLAB%20PICkit%204%20ICD%20Users%20Guide%20DS50002751C.pdf).

## 2.14 Demonstration Firmware Application

The demonstration firmware application comes programmed on the Curiosity Pro board. The project is also available in the downloadable materials. Some general functions of the board are available to exercise in the programmed version.

1. Connect to the VCP using a terminal application, such as Tera Term.
2. Perform the Serial Port set up, as shown below:

**Figure 2-7.** Tera Term Serial Port Setup

- Once connected to the terminal application, a list of available commands and functions can be listed by typing the code `help<enter>`. Additional materials and information can be found on the product web page.



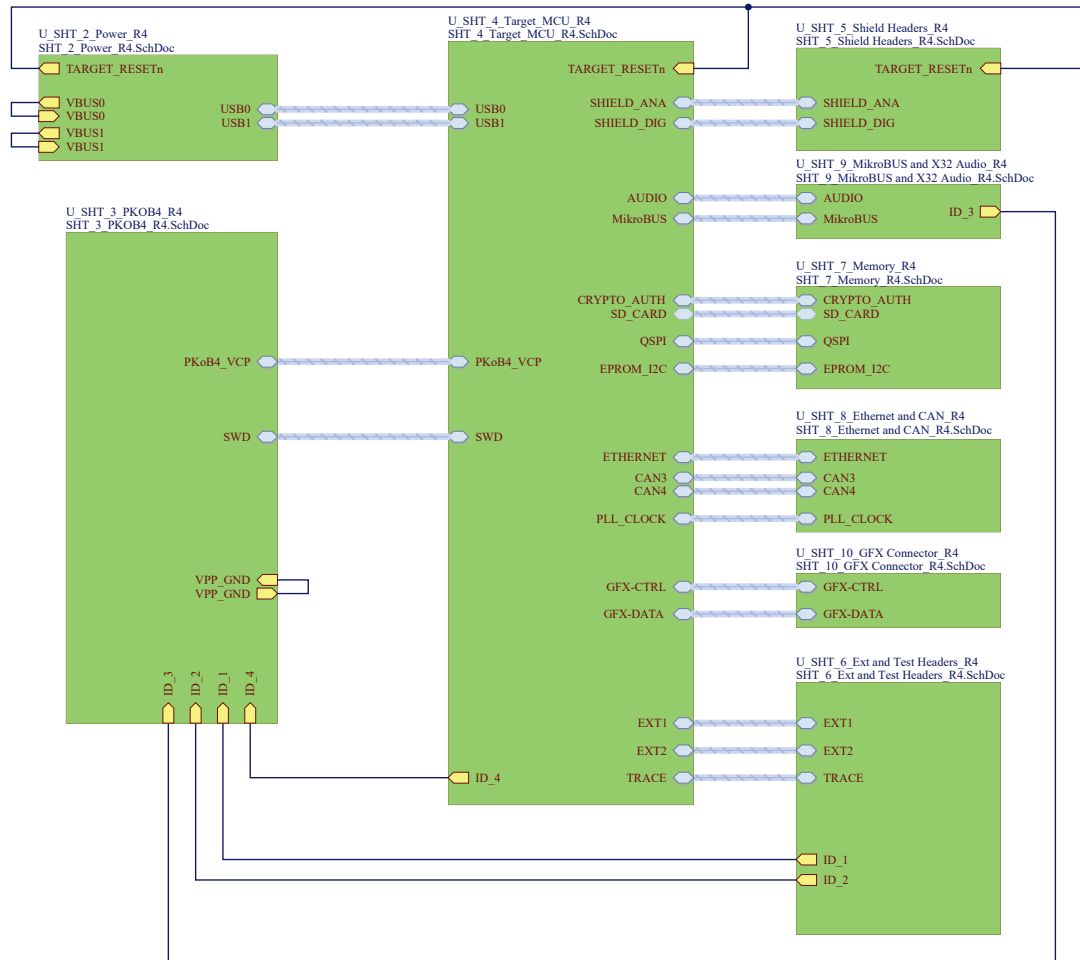
### 3. Hardware

The following sections provide the PIC32CZ CA80/CA90 Curiosity Ultra development board schematics.

**Note:** This Curiosity Ultra development board is designed to provide a demonstration platform for as many of the capabilities of the MCU as possible. Some of the signal multiplexing implemented to accomplish this end is not recommended for use in customer designs. Specifically in this design, the signals for the graphics interface and the Ethernet PHY overlap out of necessity. This is highly discouraged in an end user application.

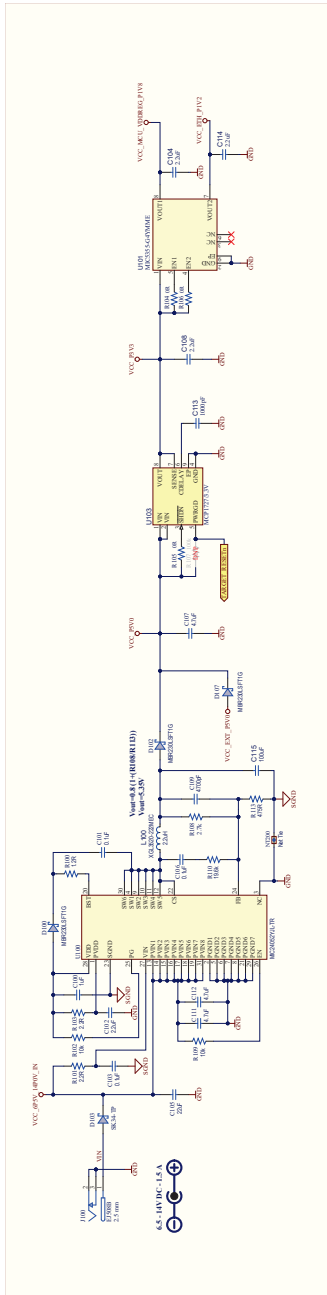
### 3.1 Schematics

## PIC32CZ CA80/90 Curiosity Ultra

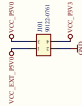


CPN	Board Name
EA61X20A	EA PIC32CZ CA80 Curiosity Ultra
EV51S73A	PIC32CZ CA80 Curiosity Ultra
EA58X56A	EA PIC32CZ CA90 Curiosity Ultra
EVI6W43A	PIC32CZ CA90 Curiosity Ultra

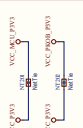
## POWER



Power Header

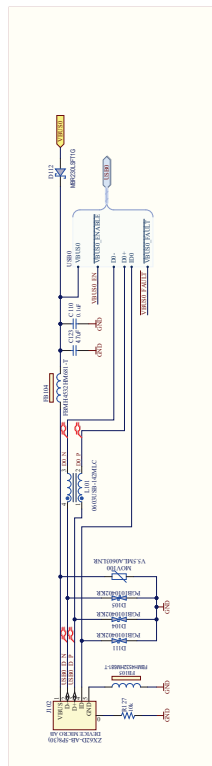


Net lists

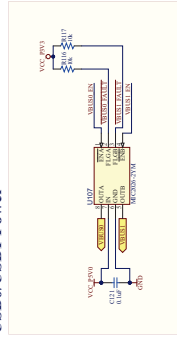


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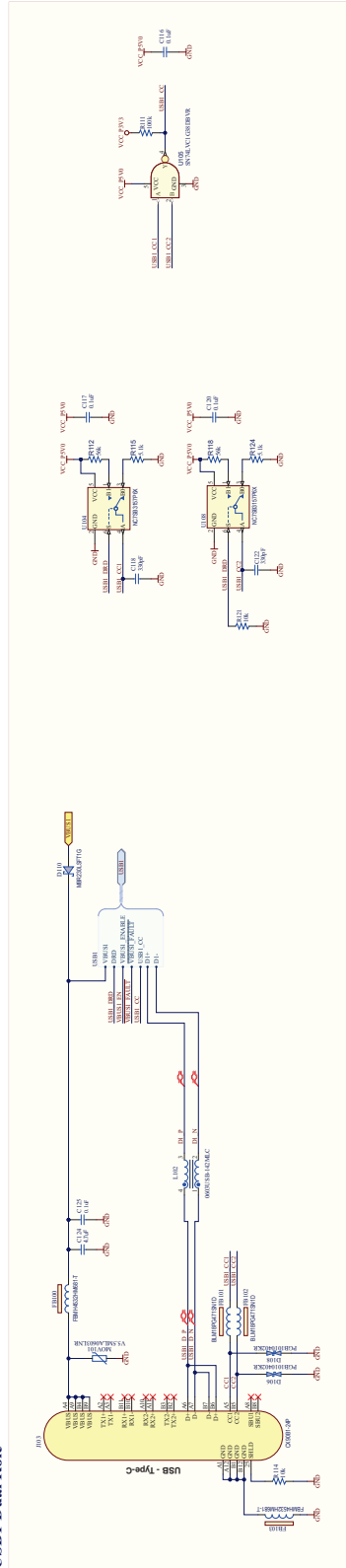
## USB0 Host/Device



## USB0/USB1 Power

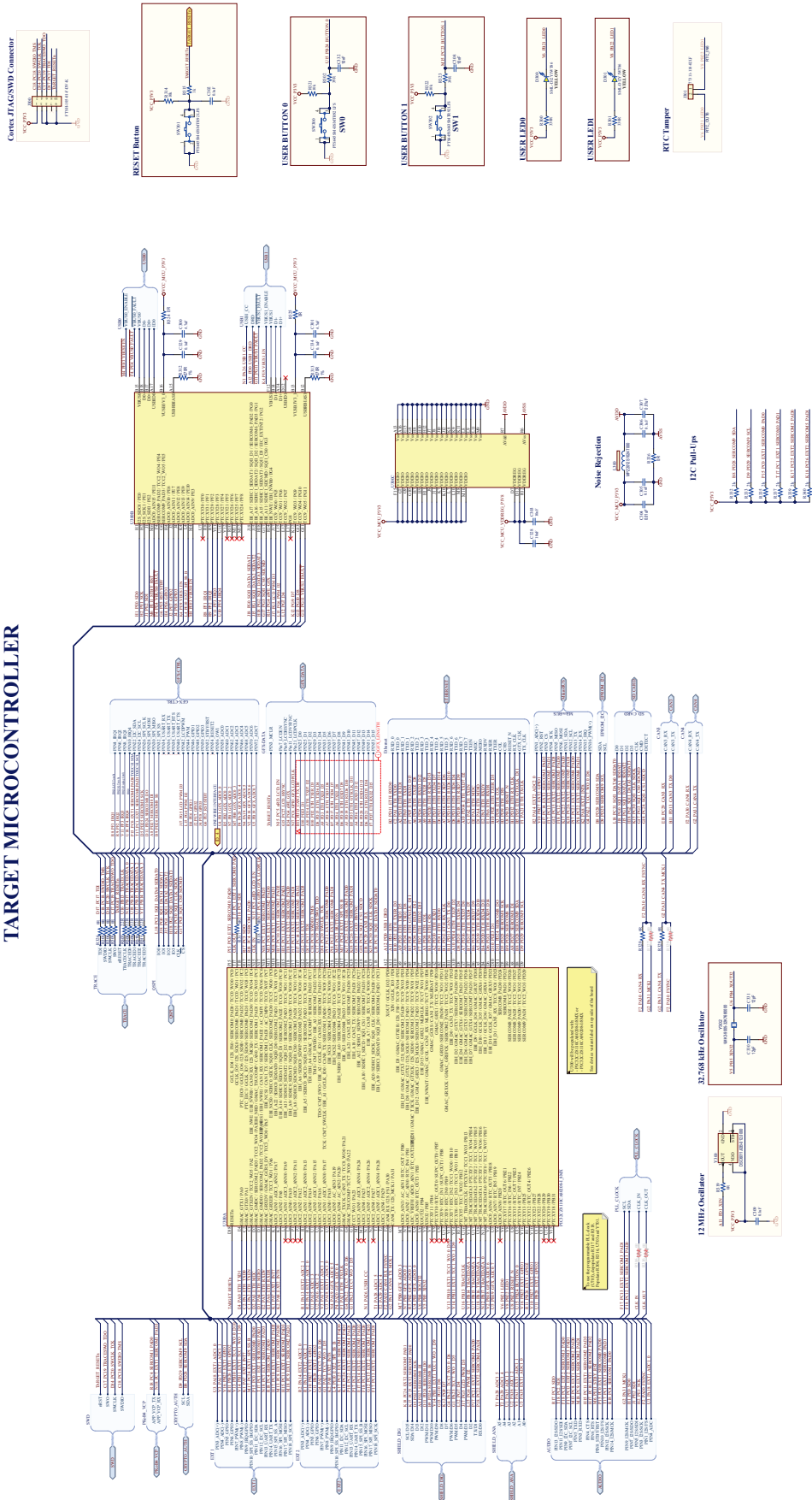


## USB1 Dual Role

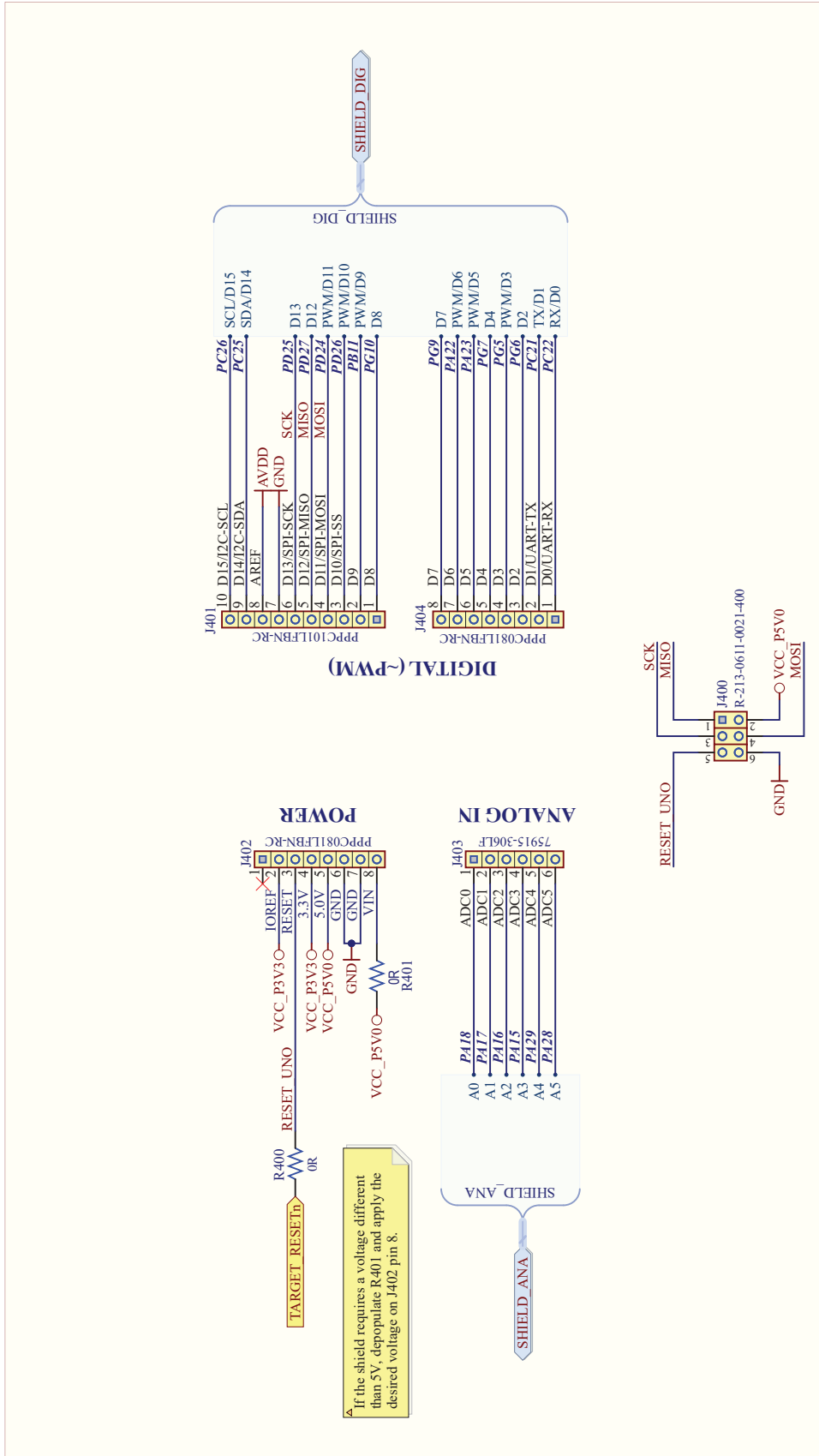




TARGET MICROCONTROLLER

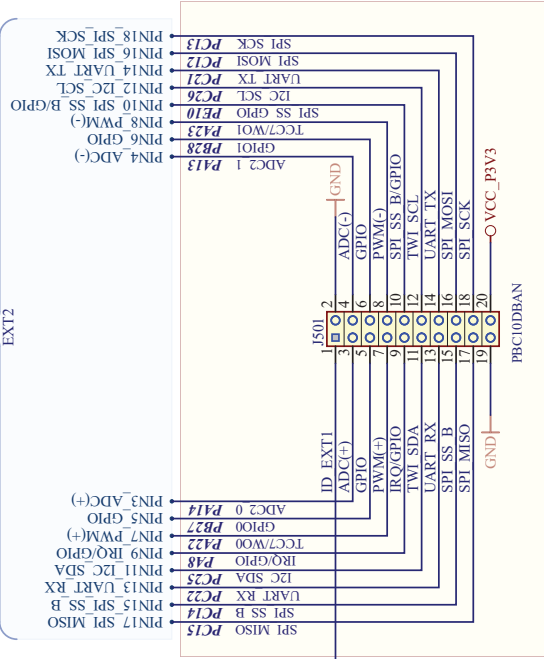


## ARDUINO UNO COMPATIBLE HEADERS



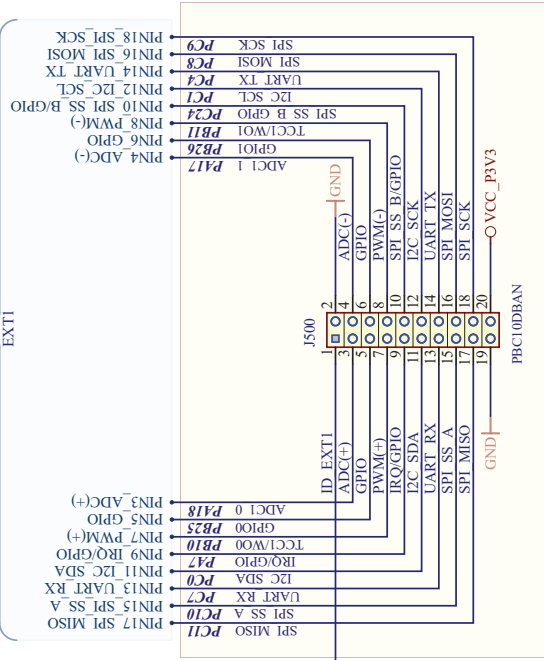
If the shield requires a voltage different than 5V, depopulate R401 and apply the desired voltage on J402 pin 8.

EXT2 Extension Header



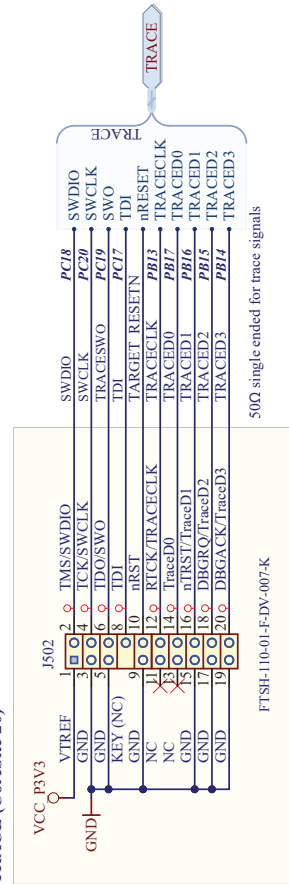
ID 2

EXT1 Extension Header



ID 1

TRACE (CoreSite 20)



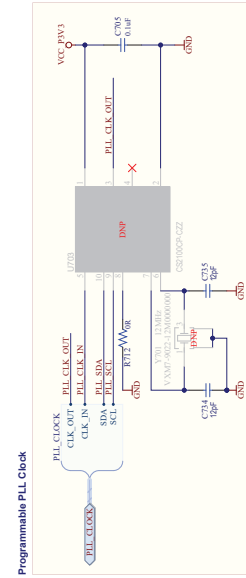
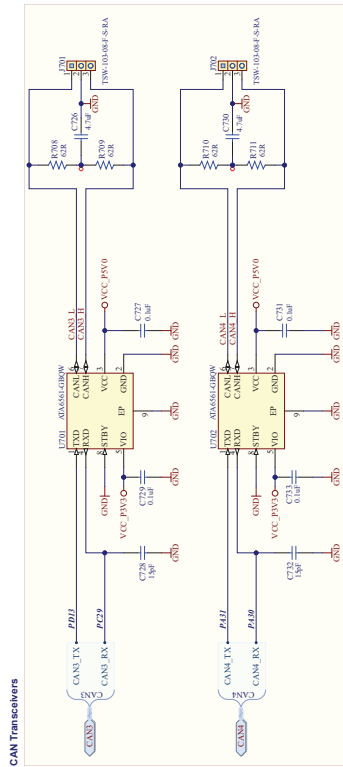
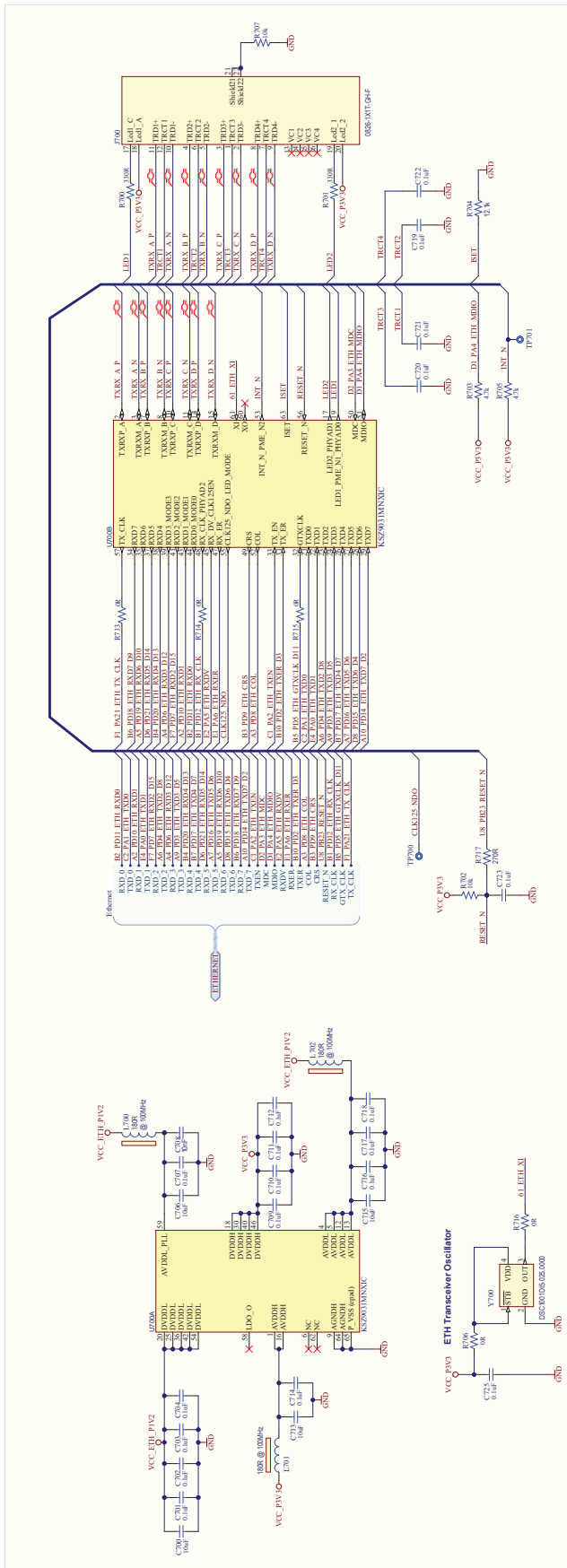
50Ω single-ended for trace signals

FTSH-110-01-F-DV-007-K



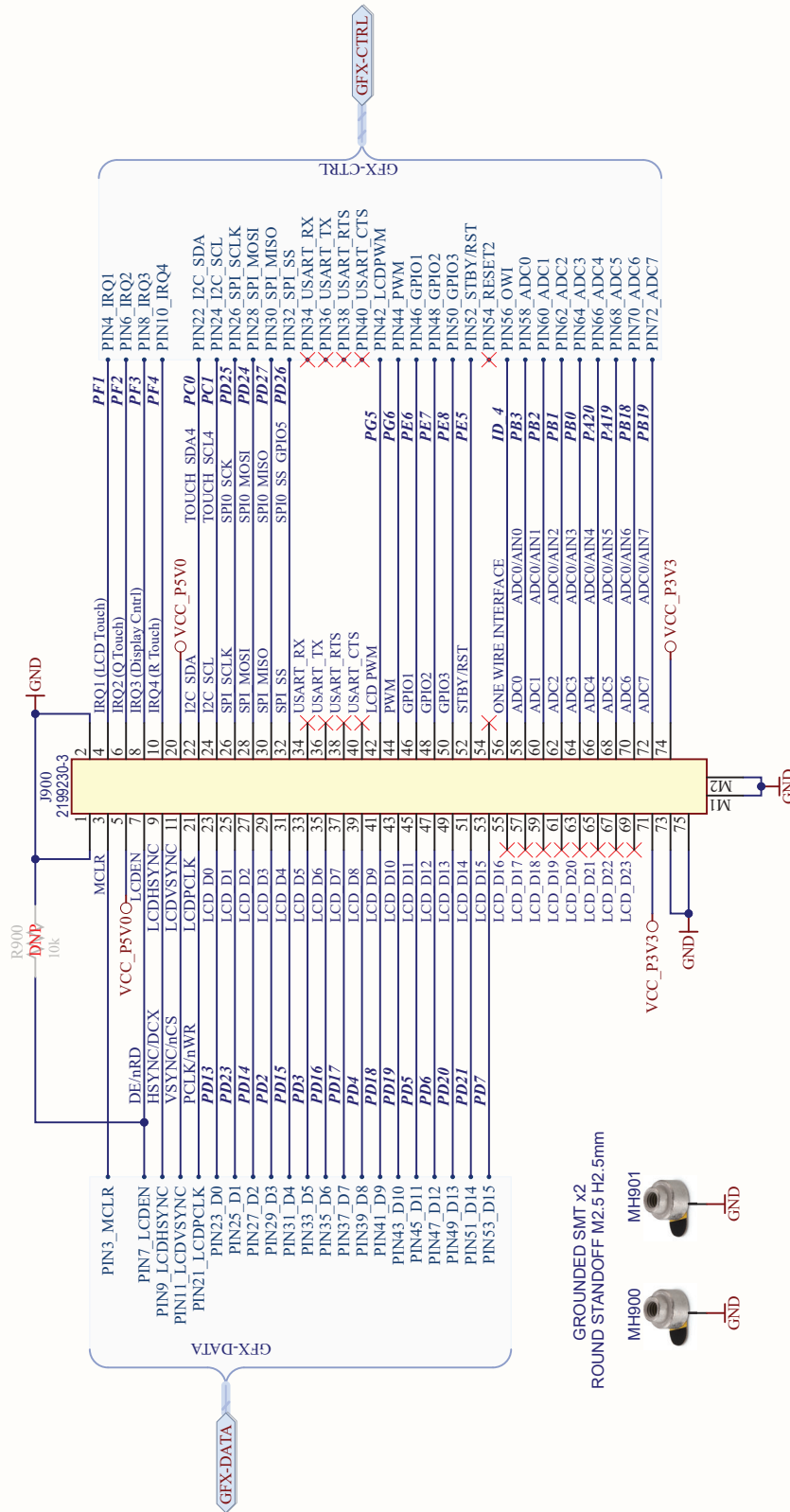


Ethernet - GMI Transceiver and RJ45 Connector





### Graphics Connector



## 3.2 Bill of Materials

Qty	Designator	Description	Manufacturer	Part Number
1	C100	CAP CER 1 uF 16V 10% X7R SMD 0603	Wurth Electronics Inc	885012206052
17	C101, C106, C202, C204, C205, C208, C209, C210, C211, C212, C213, C214, C215, C216, C217, C218, C224	CAP CER 0.1 uF 16V 10% X5R SMD 0201, CAP CER 0.1 uF 16V 10% X5R SMD 0201	Murata Electronics	GRM033R61C104KE84D
1	C102	CAP CER 2.2 uF 16V 10% X7R SMD 0805	Murata	GRM21BR71C225KA12L
1	C103	CAP CER 0.1 uF 50V 10% X7R SMD 0805	AVX Corporation	08055C104KAT2A
3	C104, C108, C114	CAP CER 2.2 uF 10V 10% X7S SMD 0402	Murata	GRM155C71A225KE11J
1	C105	CAP CER 22 uF 25V 10% X5R SMD 1206	Murata Electronics	GRM31CR61E226KE15L
7	C107, C111, C112, C123, C124, C206, C207	CAP CER 4.7 uF 25V 10% X7R SMD 0805	TDK Corporation	C2012X7R1E475K125AB
1	C109	CAP CER 4700 pF 50V 10% X7R SMD 0402	Murata Electronics	GRM155R71H472KA01J
53	C110, C125, C302, C305, C306, C309, C310, C311, C312, C314, C315, C316, C317, C318, C319, C320, C321, C322, C323, C324, C325, C326, C327, C329, C334, C600, C602, C603, C604, C701, C702, C703, C704, C705, C707, C709, C710, C711, C712, C714, C716, C717, C718, C719, C720, C721, C722, C723, C725, C727, C729, C731, C733	CAP CER 0.1 uF 50V 10% X7R SMD 0402	Taiyo Yuden	UMK105B7104KV-FR
1	C113	CAP CER 1000 pF 50V 10% X7R SMD 0402	Samsung Electro-Mechanics	CL05B102KB5NFNC
1	C115	CAP CER 100 uF 10V 20% X5R SMD 1210	Samsung Electro-Mechanics	CL32A107MPVNNNE
4	C116, C117, C120, C121	CAP CER 0.1 uF 10V 10% X5R SMD 0402	KEMET	C0402C104K8PACTU
2	C118, C122	CAP CER 330 pF 50V 5% NP0 SMD 0402	Murata Electronics	GRM1555C1H331JA01D
4	C300, C301, C726, C730	CAP CER 4.7 uF 25V 10% X5R SMD 0805	Murata Electronics	GRM21BR61E475KA12L
8	C303, C313, C328, C601, C700, C706, C713, C715	CAP CER 10 uF 10V 10% X5R SMD 0603	Samsung Electro-Mechanics	CL10A106KP8NNNC
5	C304, C307, C308, C332, C708	CAP CER 10 nF 25V 10% X7R SMD 0402	Murata Electronics	GRM155R71E103KA01D
4	C330, C331, C734, C735	CAP CER 12 pF 50V 1% NP0 SMD 0402	Murata	GRM1555C1H120FA01D
2	C728, C732	CAP CER 15 pF 5% 50V C0G/NP0 SMD 0402 AEC-Q200	Murata	GCM1555C1H150JA16D
5	D100, D102, D107, D110, D112	DIO SCTKY MBR230LSFT1G 430 mV 2A 30V SMD SOD-123FL	ON Semiconductor	MBR230LSFT1G
1	D103	DIO SCTKY SK34-TP 500 mV 3A 40V DO-214AB	Micro Commercial Co	SK34-TP
14	D104, D105, D106, D108, D111, D203, D204, D600, D601, D602, D603, D604, D605, D606	DIO TVS BIDIR PGB101 SMD 0402	Littlefuse	PGB1010402KR, PGB1010402KR x7
1	D201	DIO LED GREEN 2V 30 mA 35mcd Clear SMD 0603	Lite-On Inc	LTST-C191KGKT
1	D202	DIO LED YELLOW 2.1V 20 mA 6mcd Clear SMD 0603	Lite-On	LTST-C190YKT
2	D300, D301	LED YELLOW DIFFUSED 1608 SMD	Rohm Semiconductor	SML-D12Y1WT86

.....continued

Qty	Designator	Description	Manufacturer	Part Number
5	FB100, FB103, FB104, FB105, FB200	FERRITE BEAD 680R@100MHz 4A 0.028R 1LN SMD 1812	Taiyo Yuden	FBMH4532HM681-T
2	FB101, FB102	FERRITE 470R@100 MHz 1A SMD 0603	Murata	BLM18PG471SN1D
2	FB600, L300	FERRITE 1K@100 MHz 1.5A SMD 0805	TDK Corporation	MPZ2012S102AT000
1	J100	CON POWER 2.5 mm 5.5 mm Switch Slotted TH R/A	MPD (Memory Protection Devices)	EJ508B
1	J101	CON HDR-2.54 Male 2x2 Gold 6.75MH TH R/A	Molex Connector Corporation	90122-0761
2	J102, J200	CON USB2.0 Micro-AB Female ZX62D-AB-5P8(30) TOP MOUNT TH R/A	Hirose Connector	ZX62D-AB-5P8(30)
1	J103	CON USB3.1 5200000499 TYPE-C FEMALE SMD R/A	Hirose Electric Co Ltd	CX90B1-24P
1	J300	CON HDR-1.27 Male 2x5 Gold 3.05 MH SMD VERT	Samtec	FTSH-105-01-F-DV-K
2	J301, J604	CON HDR-2.54 Male 1x2 Gold 5.84 MH TH VERT	FCI	77311-118-02LF
1	J400	CON HDR-2.54 Male 2x3 Gold 5.84 MH TH VERT	Nextron	R-213-0611-0021-400
1	J401	CON HDR-2.54 Female 1x10 Gold TH VERT	Sullins Connector Solutions	PPPC101LFBN-RC
2	J402, J404	CON HDR-2.54 Female 1x8 Gold TH	Sullins Connector Solutions	PPPC081LFBN-RC
1	J403	CON HDR-2.54 Female 1x6 Gold TH VERT	FCI	75915-306LF
2	J500, J501	CON HDR-2.54 Male 2x10 Rotated 180Degrees Gold TH RT ANGLE	Sullins Connector Solutions	PBC10DBAN
1	J502	CON HDR-1.27 MALE 2x20 Missing Pin 7 Polarized SMD VERT	Samtec Inc.	FTSH-110-01-F-DV-007-K
1	J600	CON FLASH microSD 8+2P Push-Push SMD	Hirose Electric Co Ltd	DM3AT-SF-PEJM5
1	J700	CON MODULAR JACK RJ45 1000 MAGNETICS 2xLEDs SHIELD TH	Bel Fuse Inc	0826-1X1T-GH-F
2	J701, J702	CON HDR-2.54 Male 1x3 Gold 5.84 MH TH R/A	Samtec	TSW-103-08-F-S-RA
2	J802, J803	CON HDR-2.54 Female 1x8 Tin TH VERT	Sullins	PPTC081LFBN-RC
1	J900	CON EDGE MINI 0.5 mm 67P Female SMD R/A	TE Connectivity AMP Connectors	2199230-3
1	L100	INDUCTOR 2.2 uH 5.5A 20% SMD XGL3520 AEC-Q200 L3.2W3.5H2	Coilcraft	XGL3520-222MEC
3	L101, L102, L203	INDUCTOR CHOKE COMMON MODE USB3.0 0.42K@1.9 GHz OHM SMD L1.52W0.76H1.07	Coilcraft	0603USB-142MLC
2	L200, L201	FERRITE 2A 600R SMD 0805	TDK Corporation	MPZ2012S601AT000
1	L202	FERRITE 500R@100 MHz 2A 60 mOhm SMD 1206	Laird-Signal Integrity Products	MI1206L501R-10
3	L700, L701, L702	FERRITE 180R 1.5A SMD 0603	WURTH ELEKTRONIK	742792624
1	LABEL2	LABEL PCBA 6x6mm Info Text	ACT Logimark AS	505462
2	MH900, MH901	MECH HW STAND-OFF M2.5x2 mm 5.1 mm Steel TH Solderable	Würth Elektronik	9774020151R
3	MOV100, MOV101, MOV200	RES VARISTOR 8.2V 30A V5.5MLA0603LNR SMD 0603	Littlefuse	V5.5MLA0603LNR
1	R100	RES TKF 1.2R 1% 1/10W SMD 0603	Panasonic	CRCW06031R20FNEA
2	R101, R103	RES TKF 2.2R 1% 1/8W SMD 0805 AEC-Q200	Vishay Dale	CRCW08052R20FKEA
6	R102, R109, R204, R209, R212, R707	RES TKF 10k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1002X

.....continued

Qty	Designator	Description	Manufacturer	Part Number
22	R104, R105, R106, R211, R230, R303, R304, R305, R317, R318, R319, R320, R326, R328, R400, R706, R712, R713, R714, R715, R716, R800	RES TKF 0R 1/10W SMD 0402	Panasonic Electronic Components	ERJ-2GE0R00X
1	R108	RES TKF 2.7k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF2701X
1	R110	RES TKF 19.6k 1% 1/10W SMD 0603	Yageo	RC0603FR-0719K6L
3	R111, R610, R612	RES TKF 100k 1% 1/16W SMD 0402	KOA Speer	RK73H1ETTP1003F
2	R112, R118	RES TKF 56k 1% 1/10W SMD 0402 AEC-Q200	Panasonic Electronic Components	ERJ-2RKF5602X
1	R113	RES TKF 475R 1% 1/10W SMD 0603	Panasonic Electronic Components	ERJ-3EKF4750V
18	R114, R116, R117, R127, R314, R321, R322, R601, R602, R603, R604, R605, R606, R607, R608, R609, R611, R702	RES TF 10k 1% 1/10W SMD 0402 AEC-Q200	Vishay Beyschlag	MCS0402MC1002FE000
2	R115, R124	RES TKF 5.1k 1% 1/10W SMD 0402	Panasonic Electronic Components	ERJ-2RKF5101X
1	R121	RES TKF 36k 1% 1/16W SMD 0402	ROHM	MCR01MRTF3602
3	R200, R201, R202	RES TKF 100k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1003X
4	R214, R215, R315, R600	RES TKF 1k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF1001X
11	R216, R220, R221, R227, R238, R244, R251, R300, R301, R700, R701	RES TKF 330R 1% 1/16W SMD 0402	Yageo	RC0402FR-07330RL
3	R217, R240, R247	RES TKF 15k 1% 1/10W SMD 0402	Panasonic Electronic Components	ERJ-2RKF1502X
2	R219, R223	RES TKF 31.6k 1% 1/10W SMD 0402	Panasonic	ERJ-2RKF3162X
3	R222, R232, R242	RES TKF 3.3k 5% 1/10W SMD 0402	Panasonic - ECG	ERJ-2GEJ332X
2	R224, R228	RES TKF 47k 5% 1/10W SMD 0402	Panasonic	ERJ-2GEJ473X
1	R225	RES TKF 5.62k 1% 1/16W SMD 0402	Vishay Dale	CRCW04025K62FKED
1	R235	RES TKF 100R 5% 1/10W SMD 0603	Vishay	CRCW0603100RJNEA
3	R241, R703, R705	RES TKF 4.7k 1% 1/16W SMD 0402	Yageo	RC0402FR-074K7L
2	R302, R323	RES TKF 39R 1% 1/16W SMD 0402	Yageo	RC0402FR-0739RL
5	R307, R308, R309, R310, R311	RES TKF 22R 1% 1/16W SMD 0402	Yageo	RC0402FR-0722RL
3	R312, R313, R717	RES TKF 270R 1% 1/10W SMD 0402	Panasonic Electronic Components	ERJ-2RKF2700X
3	R324, R325, R401	RES TKF 0R 1/10W AEC-Q200 SMD 0603	Panasonic Electronic Components	ERJ-3GEY0R00V
6	R332, R333, R335, R337, R339, R340	RES TKF 2k 1% 1/10W SMD 0402	Panasonic Electronic Components	ERJ-2RKF2001X
1	R336	RES TKF 0R 1/8W SMD 0805	Panasonic	ERJ-6GEY0R00V
1	R704	RES TKF 12.1k 1% 1/16W SMD 0402	Rohm Semiconductor	MCR01MRTF1212
4	R708, R709, R710, R711	RES TKF 62R 1% 1/2W SMD 1210 AEC-Q200	Panasonic	ERJ-14NF62R0U
3	SW300, SW301, SW302	SWITCH TACT SPST 12V 50mA PTS645SM43SMTR92 LFS SMD	Würth Electronics Inc	430182043816
2	U104, U108	IC SWITCHER SPDT 2:1 NC7SB3157P6X 150Ohm SC-70-6	onsemi	NC7SB3157P6X
1	U105	IC LOGIC SINGLE NAND GATE OD 1CH-2IN SN74LVC1G38DBVR SOT-23-5	Texas Instruments	SN74LVC1G38DBVR

.....continued

Qty	Designator	Description	Manufacturer	Part Number
<b>Microchip Parts listed below</b>				
1	Q203	MCHP ANALOG MOSFET N-CH TN2106 60V 280 mA 360 mW 2.5R SOT23-3	Microchip Technology	TN2106K1-G
1	U100	MCHP ANALOG SWITCHER Buck 12V 6A MIC24052YJL-TR QFN-28	Microchip Technology	MIC24052YJL-TR
1	U101	MCHP ANALOG LDO 1.2V/1.8V MIC5355-G4YMME MSOP-8	Microchip Technology	MIC5355-G4YMME
1	U103	MCHP ANALOG LDO 3.3V MCP1727T-3302E/MF DFN-8	Microchip Technology	MCP1727T-3302E/MF
1	U107	MCHP ANALOG POWER SWITCH 5.5V MIC2026-2YM SOIC-8	Microchip Technology	MIC2026-2YM-TR
1	U201	MCHP MCU 32-BIT 300 MHz 2 MB 384 kB ATSAME70N21B-ANT LQFP-100	Microchip Technology	ATSAME70N21B-ANT
1	U205	MCHP MEMORY SERIAL EEPROM 256k I2C 24LC256T-I/MS MSOP-8	Microchip Technology	24LC256T-I/MS
1	U300	MCHP MCU 32-BIT 300MHz 8MB 1MB PIC32CZ8110CA80208-I/8MX BGA-209	Microchip Technology	PIC32CZ8110CA80208-I/8MX
1	U600	MCHP MEMORY SERIAL EEPROM 2kB I2C EUI-64 AT24MAC402-MAHM DFN-8	Microchip Technology/ Atmel	AT24MAC402-MAHM-T
1	U602	IC FLASH 32 MBIT SST26VF032BAT-104I/SM	Microchip Technology Inc	SST26VF032BAT-104I/SM
1	U700	MCHP INTERFACE ETHERENT KSZ9031MNXIC QFN-64	Microchip Technology	KSZ9031MNXIC
2	U701, U702	MCHP INTERFACE CAN ATA6561-GBQW VDFN-8	Microchip Technology	ATA6561-GBQW
2	Y200, Y300	MCHP CLOCK OSCILLATOR SINGLE 12.00MHZ DSC6011J12B-012.0000 SMD VLGA	Microchip Technology	DSC6011J12B-012.0000
1	Y302	MCHP CRYSTAL 32.768 kHz 12.5 pF VMK3-9005-32K7680000 SMD L3.2W1.5H0.9	Microchip Technology	VMK3-9005-32K7680000
1	Y700	MCHP CLOCK OSCILLATOR SINGLE 25 MHz DSC1001DI5-025.0000 DFN-4	Microchip Technology	DSC1001DI5-025.0000
<b>Mechanical Parts</b>				
1	JS604	MECH HW JUMPER 2.54 mm 1x2 GOLD	Sullins Connector Solutions	QPC02SXGN-RC
1	LABEL1	LABEL PCBA 18x6mm Datamatrix Assy# / Rev/ Serial/Date	ACT Logimark AS	505462
4	PAD1, PAD2, PAD3, PAD4	MECH HW RUBBER PAD CYLINDRICAL D7.9 H5.3 BLACK	3M	SJ61A11
<b>PCB</b>				
1	PCB1	Printed Circuit Board	-	04-11634-R4

## 4. Revision History

### Revision C - August 2023

The following changes or updates were made in this revision:

- Added a new note regarding a footprint error to the [Xplained Pro Standard Extension Header](#) section
- Added a new note regarding signal multiplexing to the [Hardware](#) section

### Revision B - February 2023

The following changes or updates were made in this revision:

- Updated [EV61X20A/EV16W43A](#) with a new board image
- Updated the first paragraph in [Power Block Diagram](#) with new verbiage for powering the board
- Updated [Figure 2-5](#) in [Recovery Method](#) with a new image

### Revision A - December 2022

This is the initial released version of this document.



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- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip design partner program member listing
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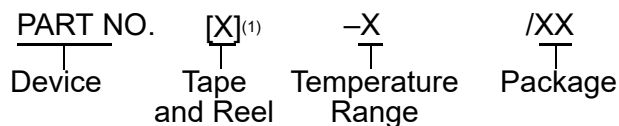
- Distributor or Representative
- Local Sales Office
- Embedded Solutions Engineer (ESE)
- Technical Support

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Device:	Device A, Feature A, (Package A) Device B, Feature B, (Package B)	
Tape & Reel Option:	Blank	= Tube
	T	= Tape & Reel
Temperature Range:	I	= -40°C to +85°C (Industrial)
	E	= -40°C to +125°C (Extended)
Package:	AA	= Package AA
	BB	= Package BB

Examples:

- MCPXXXXXAT-E/AA: Tape and Reel, Extended temperature, XAA package
- MCPXXXXXBT-E/BB: Tape and Reel Extended temperature, XBB package

### Notes:

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2. Small form-factor packaging options may be available. Please check [www.microchip.com/packaging](http://www.microchip.com/packaging) for small-form factor package availability, or contact your local Sales Office.

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