

Introduction

The PIC32 WFI32E Curiosity Board enables the user to evaluate and demonstrate the functionality of the PIC32MZ1025W104 System-on-Chip (SoC) and the WFI32E01 Wi-Fi® Module with up to 200 MHz CPU clock frequency. The PIC32 WFI32E Curiosity Board is a development platform that supports rapid prototyping using on-chip Microcontroller (MCU) peripherals. This board offers integrated programming/debugging features using the PICkit™ On- Board (PKOB3) debugger, requiring only a micro-USB cable to power-up and program the board. The PIC32 WFI32E Curiosity Board supports a variety of applications, such as Internet of Things (IoT) and other Wi-Fi-enabled applications.

Features

- Certified WFI32E01PC: Wi-Fi single band (2.4 GHz) Module Mounted on the WFI32E01 Carrier Board
- One mikroBUS™ Socket to Expand Functionality using MikroElektronika Click Boards
- Support for Multiple Microchip Ethernet PHY Daughter Boards
- Two User LEDs
- One User Configurable Switch
- One Reset Switch
- One GPIO Expansion Header
- On-Board Temperature Sensor
- 20-Pin Xplained Pro (XPRO) Header
- 32-Mb External SPI Flash Memory
- PICkit On-Board 3 (PKOB3) Support
- In-Circuit Serial Programming™ (ICSP) Header for External Debugger, Such as MPLAB® ICD 5, MPLAB PICkit 4, MPLAB PICkit 5 and MPLAB Snap
- On-Board 32 KHz Secondary Oscillator Mounted on WFI32E01 Carrier Board

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1. Quick References

1.1 Reference Documentation

For further details, refer to the following:

- *PIC32MZ W1 MCU and WFI32 Module with Wi-Fi® and Hardware-Based Security Accelerator Data Sheet* (DS70005425)
- *PIC32MZ W1 Software User's Guide* (DS50003034)
- *PIC32MZ W1 MCU and WFI32 Module with Wi-Fi® and Hardware-based Security Accelerator Errata* (DS80000912)
- *MPLAB® XC32 C/C++ Compiler User's Guide* (DS50001686)
- *MPLAB® X IDE User's Guide* (DS50002027)
- *MPLAB® Snap In-Circuit Debugger Information Sheet* (DS50002787)
- *Universal Serial Bus Specification and Associated Documents* (www.usb.org/)
- *mikroBUS™ Specification* (www.mikroe.com/mikrobus)

1.2 Hardware Prerequisites

- PIC32 WFI32E Curiosity Board kit
- Any of the following in-circuit debugger or programmers:
 - MPLAB Snap
 - MPLAB PICKit 4/MPLAB PICKit 5
 - MPLAB ICD 4/MPLAB ICD 5

1.3 Software Prerequisites

- MPLAB Integrated Development Environment (MPLAB X IDE) tool (version 6.00 or later)
- MPLAB XC32 compiler (version 4.00 or later)
- MPLAB Snap ([PG164100](#))
- [Out of Box \(OOB\) demo](#)

1.4 Acronyms/Abbreviations

Table 1-1. Acronyms/Abbreviations

Acronyms	Abbreviations
ADC	Analog-to-Digital Converter
BOM	Bill of Material
CAN	Controller Area Network
CVD	Capacitive Voltage Divider
DNP	Do Not Populate
GPIO	General Purpose Input Output
I ² C	Inter-Integrated Circuit
ICD	In-Circuit Debugger
ICSP™	In-Circuit Serial Programming™
IoT	Internet of Things
JTAG	Joint Test Action Group
LDO	Low-Dropout
LED	Light Emitting Diode
MCU	Microcontroller

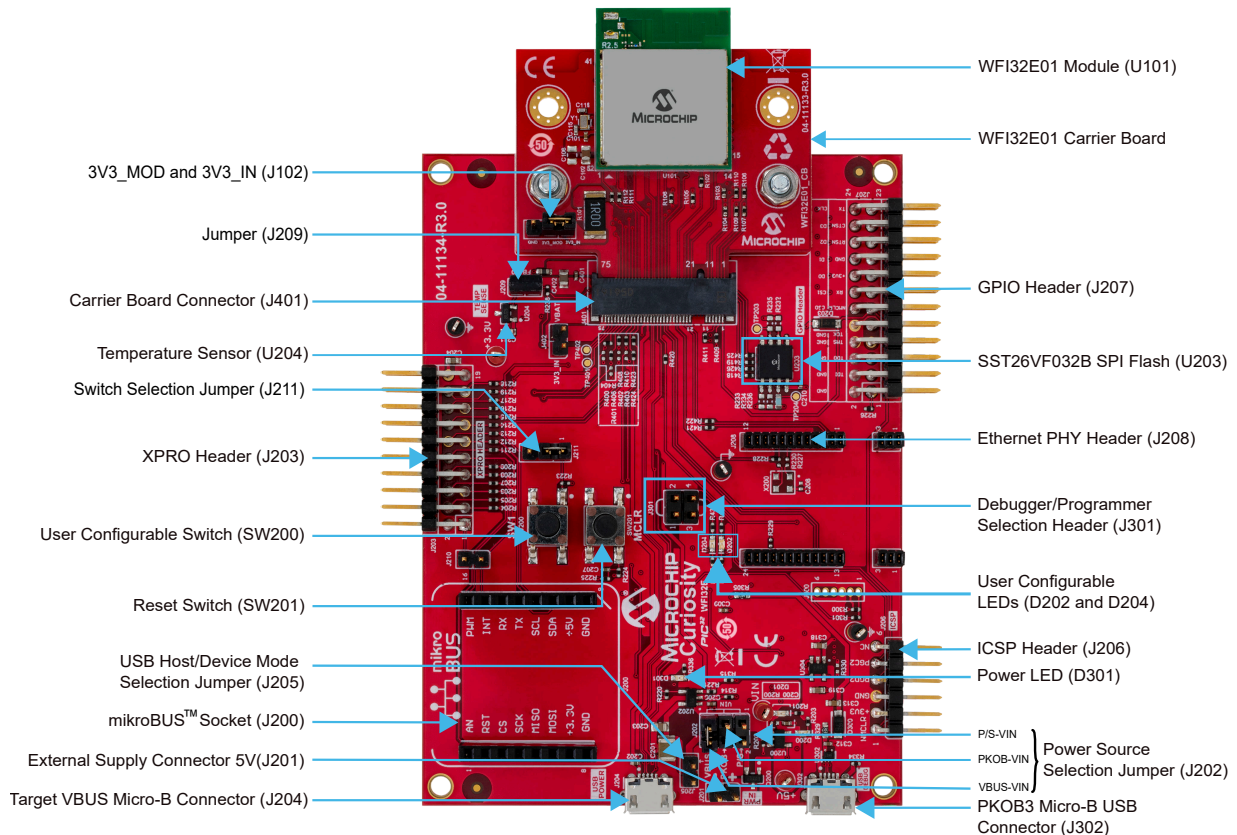
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Acronyms	Abbreviations
NC	Not Connected
OOB	Out of Box
OTG	On-The-Go
PCB	Printed Circuit Board
PKOB3	PICKit™ On-Board 3
PPS	Peripheral Pin Select
PTA	Packet Atraffic Arbitration
PWM	Pulse Width Modulation
RMII	Reduced Media Independent Interface
RTCC	Real Time Clock and Calendar
RX	Receiver
SCL	Serial Clock
SDA	Serial Data
SMD	Surface Mount Device
SoC	System-on-Chip
SPI	Serial Peripheral Interface
TX	Transmitter
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus
XPRO	Xplained PRO Expansion Header

2. Kit Overview

The PIC32 WFI32E Curiosity Board contains a WFI32E01PC Module mounted on the carrier board. All the signals from the module are brought onto the Curiosity board, where they are connected to on-board peripherals or terminated onto headers for rapid prototyping or evaluation.

Figure 2-1. PIC32 WFI32E Curiosity Board (EV12F11A)



2.1 Kit Contents

The PIC32 WFI32E Curiosity Board kit contains the following:

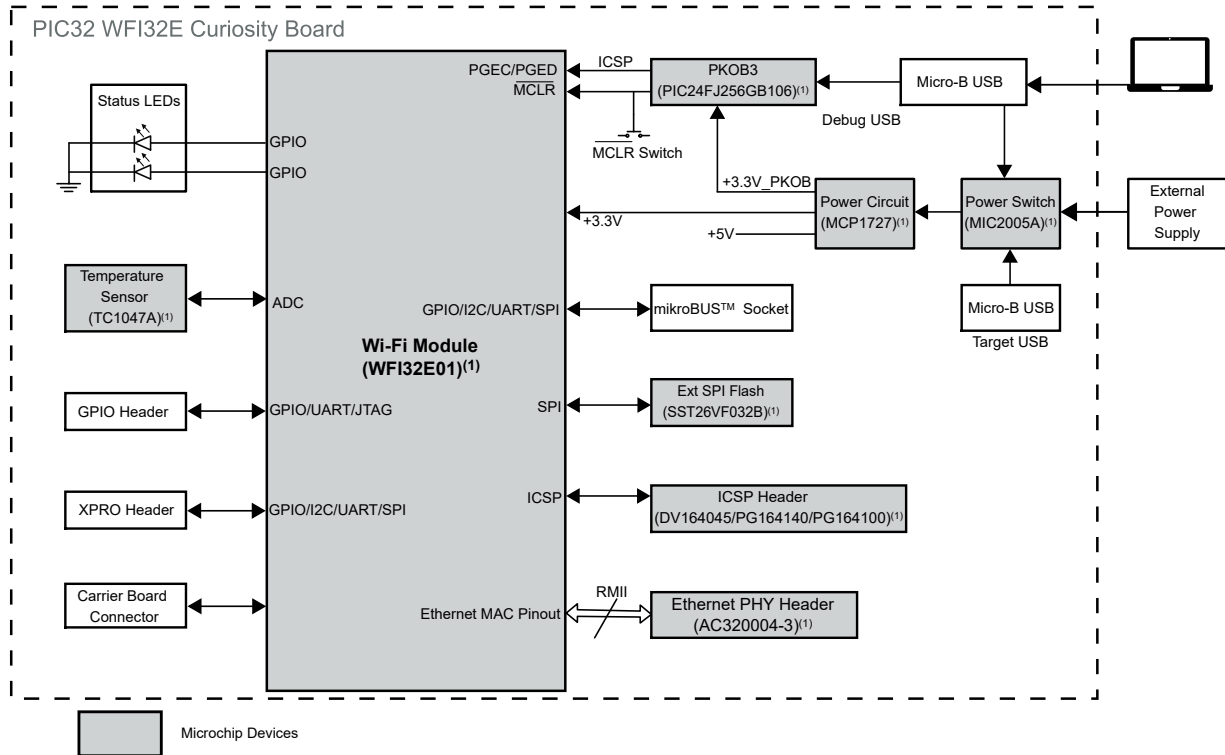
- PIC32 WFI32E Curiosity Board that contains a WFI32E01PC Module mounted on a WFI32E01 Carrier Board
- Type-A male to Micro-B USB cable

Note: If any of the above items are missing in the kit, go to support.microchip.com or contact your local Microchip sales office. A list of Microchip office for sales and services is provided on the last page of this document.

3. Hardware

This chapter describes the hardware features of the PIC32 WFI32E Curiosity Board.

Figure 3-1. PIC32 WFI32E Curiosity Board Block Diagram



Note:

- Using Microchip's total system solution, which includes complementary devices, software drivers and reference designs, is highly recommended to ensure the proven performance of the PIC32 WFI32E Curiosity Board. For more details, go to support.microchip.com or contact your local Microchip Sales office.

Table 3-1. Microchip Components Used in PIC32 WFI32E Curiosity Board

S.No.	Designator	Manufacturer Part Number	Description
1	U200, U202, U304	MIC2005A-1YM5-TR	MCHP Analog Power Switch 5.5V 500 mA MIC2005A-1YM5-TR SOT-23-5
2	U203	SST26VF032B-104I/SM	MCHP Memory Serial Flash SST26VF032B-104I/SM SOIJ-8
3	U204	TC1047AVNBTR	MCHP Analog Temperature Sensor -40°C to +125°C TC1047AVNBTR SOT-23-3
4	U300	PIC24FJ256GB106T-I/PT	MCHP MCU 16-BIT 32 MHz 256 kB 16 kB PIC24FJ256GB106-I/PT TQFP-64
5	U301	25LC256T-E/SN	MCHP Memory Serial EEPROM 256k SPI 25LC256-E/SN SOIC-8
6	U303	MCP1727T-ADJE/MF	MCHP Analog LDO 0.8V-5V MCP1727T-ADJE/MF DFN-8
7	U101	WFI32E01PC	WiFi Module with PCB Antenna and IC ECC608

3.1 Power Supply

The following are the list of sources to power the PIC32 WFI32E Curiosity Board:

- External supply connector 5V (J201)
- PKOB3 Micro-B USB connector (J302)
- Target V_{BUS} Micro-B connector (J204)

The following table lists the power supply source details and its jumper positions.

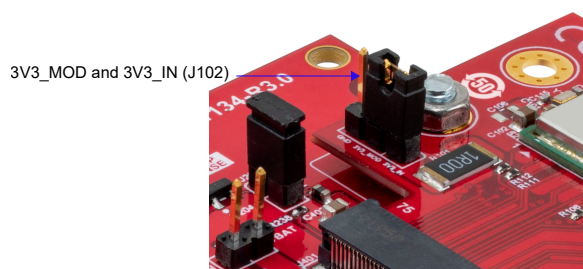
Table 3-2. Power Supply Sources

Power Input	Description	Jumper Position (J202) ⁽¹⁾
External supply connector 5V (J201)	Connect the PIC32 WFI32E Curiosity Board to an external 5V power supply	P/S-VIN (2-1)
PKOB3 Micro-B USB connector (J302)	Connect the Type-A male to micro-B USB cable to the USB debug port for power supply	PKOB-VIN (4-3)
Target V _{BUS} Micro-B connector (J204)	Connect the Type-A male to micro-B USB cable to the USB power port for power supply	V _{BUS} -VIN (6-5)

Note:
1. Jumper (J202) in [Figure 3-3](#)

The following figure illustrates the jumper positions that power the PIC32 WFI32E Curiosity Board.

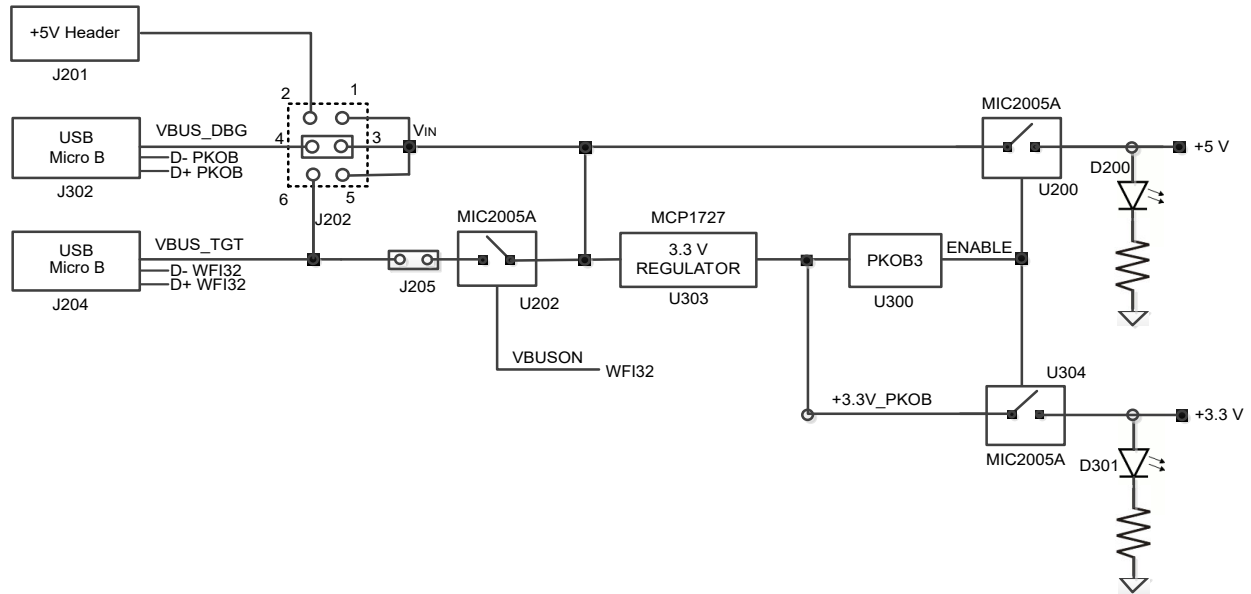
Figure 3-2. Jumper Configuration for Power Input



Note: Ensure that the 3V3_MOD and 3V3_IN (J102) are connected on the WFI32E01 carrier board.

Use the jumper (J202) to select the voltage source for the Curiosity board. The MCP1727 voltage regulator generates a +3.3V power supply for the MCU. PKOB3 turns on the board power (+5V and +3.3V rails) by driving the TARGET_POWER_ENABLE signal high to enable the MIC2005A switches (U200 and U304).

Figure 3-3. Power Tree Diagram



3.2 Debugger/Programmer Selection

By default, the external debugger is selected using (J301) jumper settings for the programming pins (PGEC2 and PGED2) of the WFI32E01 Module. The [Table 3-3](#) lists the details of the debugger/programmer selection using the (J301) header.

Note: Use an external debugger such as MPLAB ICD 5, MPLAB PICKit 4, MPLAB PICKit 5 or MPLAB Snap for the best programming and debugging experience.

The PIC32 WFI32E Curiosity Board has an on-board debugger (PKOB3) based on the PIC24FJ256GB106 MCU. The on-board debugger enables the user to power, program and debug through the PKOB3 Micro-B USB connector (J302).

Table 3-3. Debugger/Programmer Selection Header

Header Position (J301) ⁽¹⁾	Debugger Used	Description
Pins 1-2 and 3-4 shorted	On-board	Selects the on-board debugger
Pins 1-2 and 3-4 open	External	Selects the external debugger (for more details, refer to 3.3. ICSP Header (J206))

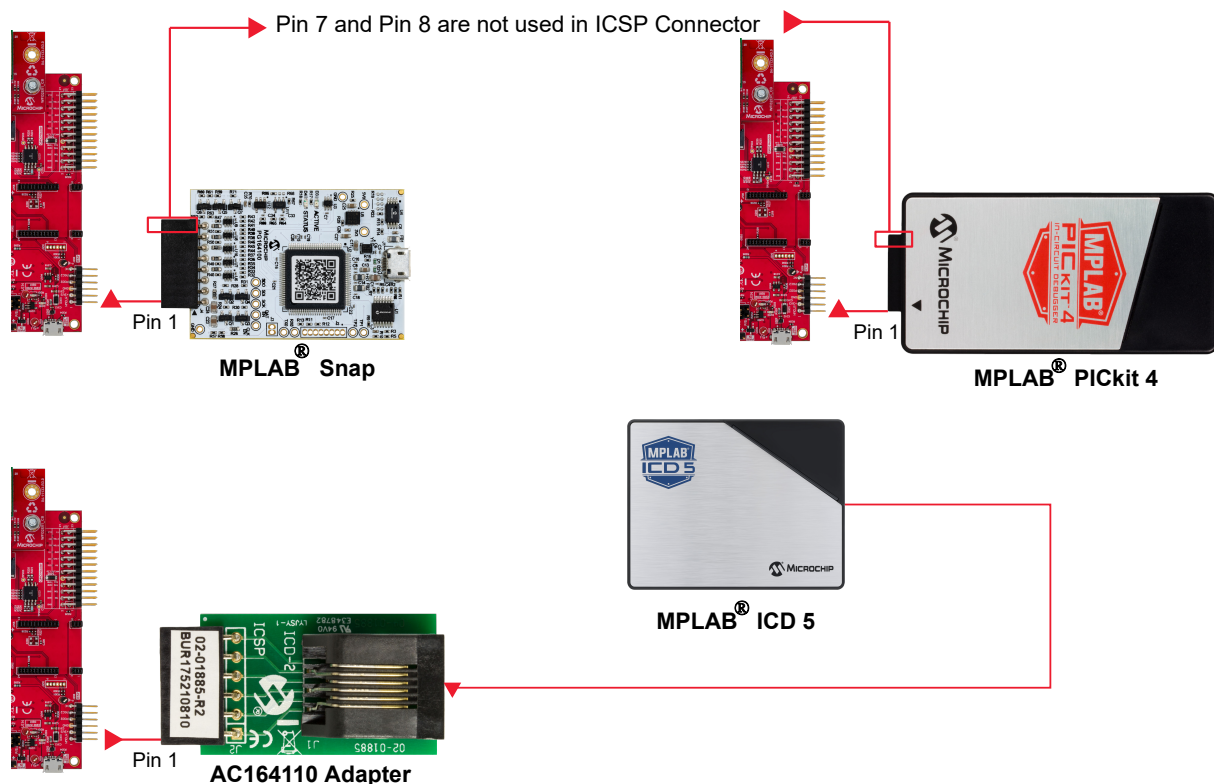
Note:

1. Jumper (J301) in [Figure 2-1](#)

3.3 ICSP Header (J206)

The ICSP header (J206) is a standard 6-pin staggered header. It allows in-circuit emulation and debugging using Microchip's in-circuit emulator tools, and it allows direct programming of the WFI32E01 Module. The ICSP header supports external debuggers, such as MPLAB ICD 5, MPLAB PICKit 4, MPLAB PICKit 5 and MPLAB Snap. Use the standard ICSP header to connect an MPLAB programmer or debugger to the PIC32 WFI32E Curiosity Board. The following figure illustrates the connection between the ICSP header, external debuggers and the PIC32 WFI32E Curiosity Board.

Figure 3-4. Connection Diagram



The following table provides the pin details and descriptions of the ICSP header:

Table 3-4. ICSP Header Pin Description

Pin Number	Pin on ICSP Header	Pin Description of ICSP Header	Pin on WFI32E01 Module ⁽¹⁾
J206-1	MCLR	Reset pin	MCLR
J206-2	3V3	3.3V power supply	NC
J206-3	GND	Ground	GND
J206-4	PGD	ICSP™ programming data	PGD2/AN5/CVD5/CVDR5/CVDT2/RTCC/ RPB5/RB5
J206-5	PGC	ICSP programming clock	PGC2/AN4/CVD4/CVDR4/CVDT3/RPB4/RB4
J206-6	NC	Not connected	NC

Notes:

1. For more details on the WFI32E01 pins, refer to the *PIC32MZ W1 MCU and WFI32 Module with Wi-Fi® and Hardware-Based Security Accelerator Data Sheet (DS70005425)*.
2. Use an external debugger such as MPLAB ICD 5, MPLAB PICKit 4, MPLAB PICKit 5 or MPLAB Snap for the best programming and debugging experience.

3.4 USB Connectivity

The WFI32E01 Module has an integrated USB peripheral that supports both Low-speed and Full-speed modes. This feature enables the user to implement USB functionality through the Target V_{BUS} Micro-B connector (J204) on the PIC32 WFI32E Curiosity Board. Connect the board using any one of these modes:

- Device mode:
 - a. Connect the host PC to the Target V_{BUS} Micro-B connector (J204) using a Type-A male USB cable to Micro-B male USB cable.
 - b. Use the (J202) jumper to select the required power source for the board. For more information, refer to [Table 3-2](#).
Note: Do not place the jumper on the (J205) connector.
- Host mode:
 - a. Connect the USB device to the Target V_{BUS} Micro-B connector (J204) using a Type-A female USB cable to Micro-B male USB cable.
Note: A Micro-B male USB cable is not available in the kit.
 - b. Place a jumper in the (J205) header to drive the V_{BUS} line in the Host mode.
 - c. Use the (J202) jumper to select the power source either from the debug USB connector (J302) or the external 5V input (J201).

Note: It is recommended to add a resistor on the customer application board for V_{BUS} signal as recommended in the data sheet. Refer to the *PIC32MZ W1 MCU and WFI32 Module with Wi-Fi® and Hardware-Based Security Accelerator Data Sheet (DS70005425)*.

3.5 mikroBUS Socket (J200)

A mikroBUS socket (J200) expands the functionality of the PIC32 WFI32E Curiosity Board using the MikroElektronika click adapter boards.

The mikroBUS socket (J200) consists of following interfaces:

- Two 1 x 8 female headers with Serial Peripheral Interface (SPI)
- Inter-Integrated Circuit (I²C)
- Universal Asynchronous Receiver-Transmitter (UART)
- Reset (GPIO)
- Pulse Width Modulation (PWM)
- Analog and interrupt lines
- 3.3V, 5V and ground power lines

The following table provides the pinout details of the mikroBUS socket (J200):

Table 3-5. mikroBUS Socket Pinout Details

Pin Number	Pin on mikroBUS™ Socket	Pin Description of mikroBUS Socket	Pin on WFI32E01 Module ⁽¹⁾
1	AN	Analog input	AN14/ANN0/CVD14/CVDR14/RPA14/RA14
2	RST	Reset	TMS/AN6/CVD6/CVDR6/CVDT1/RPB6/RB6
3	\overline{CS}	SPI Chip Select	TDO/AN7/CVD7/CVDR7/CVDT0/RPB7/RB7
4	SCK	SPI Clock	SCK2/RPA11/RA11
5	MISO	SPI Host Input Client Output ⁽³⁾	PTA_WLAN_ACTIVE/RPK5/RK5
6	MOSI	SPI Host Input Client Input ⁽³⁾	BT_CLK_OUT/RPK4/RK4
7	+3.3V	3.3V power	NC
8	GND	Ground	GND
9	GND	Ground	GND
10	+5V	5V power	NC
11	SDA	I2C Data	SDA1/RPA5/RA5
12	SCL	I2C Clock	SCL1/RPA4/RA4
13	TX	UART transmit	PTA_BT_ACTIVE/RPK7/RK7

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Pin Number	Pin on mikroBUS™ Socket	Pin Description of mikroBUS Socket	Pin on WFI32E01 Module ⁽¹⁾
14	RX	UART receive	TDI/PGD4/AN9/CVD9/CVDR9/RPB9/RB9
15	INT	Hardware interrupt	PTA_BT_PRIOR/RPK6/RK6
16	PWM	PWM output	ANA0/RPB12/RB12

Notes:

- For more details on the WFI32E01 pins and PTA signals, refer to the *PIC32MZ W1 MCU and WFI32 Module with Wi-Fi® and Hardware-Based Security Accelerator Data Sheet (DS70005425)*.
- If using the AC243009 daughter board, the maximum frequency limit of the SPI2 interface is 12.5 MHz but the WFI32E01 Module can operate up to 20 MHz.
- Traditional Serial Communication Interface Documentation uses the terminology “Master” and “Slave”. The equivalent Microchip terminology used in this document is “Host” and “Client”, respectively.
- These are Peripheral Pin Select (PPS) pins and can be configured for any of the supported peripheral functions based on the end user application.

3.6 Switches

The following switches are available on the PIC32 WFI32E Curiosity Board:

- User-configurable switch ([SW200](#))
- Reset switch ([SW201](#)) – Connected with $\overline{\text{MCLR}}$ signal of the WFI32E01 Module

In the Idle state, the level of the user-configurable switch is pulled high (+3.3V). After pressing the switch, it drives the I/O line to low (GND).

Table 3-6. Switches Pin Description

Switch Name	Pin on WFI32E01 Module	Description
SW1	AN17/CVD17/CVDR17/INT0/RPA10/RA10	User configurable switch (SW200)
$\overline{\text{MCLR}}$	$\overline{\text{MCLR}}$	Reset switch (SW201)

Note: By default, the SW200 switch is connected to the switch input. Use the ([J211](#)) jumper to configure the board to the switch or external interrupt through XPRO based plugins.

3.7 LEDs

The on-board LEDs are categorized into two types:

- Power LEDs:
 - Vin Green ([D201](#))
 - 5V Green ([D200](#))
 - +3.3V Green ([D301](#))
- User configurable LEDs:
 - Red LED ([D202](#))
 - Green LED ([D204](#))

The following table provides details about the list of LEDs that the user can turn ON or OFF while using the connected GPIO pins:

Table 3-7. LEDs Pin Description

Pin on the WFI32E01 Module	Description	Function
RPK1/RK1	RF front-end control/remappable peripheral/PORTK digital I/O	Red LED (D202)
RPK3/RK3	RF front-end control/remappable peripheral/PORTK digital I/O	Green LED (D204)

3.8 Ethernet PHY Header (J208)

The PIC32 WFI32E Curiosity Board includes headers to mount different Ethernet PHY daughter boards to implement a complete Ethernet node for networking. The PIC32 WFI32E Curiosity Board uses the LAN8720A PHY daughter board (AC320004-3) as an example to demonstrate the Ethernet functionality.

Table 3-8. Ethernet PHY Daughter Board

Daughter Board	Part Number
LAN8720A PHY daughter board	AC320004-3

The Microchip LAN8720A PHY daughter board is populated with a small footprint RMII 10/100 Ethernet transceiver (LAN8720A). This daughter board enables Ethernet communication with a variety of Microchip development boards.

The following table lists the pin details and descriptions of the Ethernet PHY daughter board:

Table 3-9. Ethernet PHY Daughter Board Header Pin Description

Pin Number	Pin on Ethernet PHY Daughter Board	Pin Description of Ethernet PHY Daughter Board	Pin on WFI32E01 Module ⁽¹⁾⁽²⁾
(J208)-1	TX_EN	Ethernet Transmit Enable	CVDT11/ETXEN/RPC13/RC13
(J208)-2	TXD0	Ethernet Transmit Data 0	CVDT13/ETXD0/RPC15/RC15
(J208)-3	TXD1	Ethernet Transmit Data 1	CVDT12/ETXD1/RPC14/RC14
(J208)-4	NC	Not connected	NC
(J208)-5	NC	Not connected	NC
(J208)-6	GND	Ground	GND
(J208)-7	XTALI	Clock output	NC
(J208)-8	CLK_IN	Clock input	ETH_CLK_OUT/CVDT10/RPC12/RC12
(J208)-9	GND	Ground	GND
(J208)-10	+3V3	Input power supply	NC
(J208)-11	NC	Not connected	NC
(J208)-12	NC	Not connected	NC
(J208)-13	NC	Not connected	NC
(J208)-14	NC	Not connected	NC
(J208)-15	RXD1	Ethernet Receive Data 1	CVDT8/ERXD1/RPC10/RC10
(J208)-16	RXD0	Ethernet Receive Data 0	CVDT9/ERXD0/RPC11/RC11
(J208)-17	RX_ER	Ethernet Receive Error	CVDT7/ERXERR/RPC9/RC9
(J208)-18	CRS_DV	Ethernet Rx Data Valid Input	CVDT14/ERXDV/RPK12/RK12
(J208)-19	MDC	Ethernet Management Data Clock Output	CVDT16/EMDC/RPK14/RK14
(J208)-20	MDIO	Ethernet Management Data Input Output	CVDT15/EMDIO/RPK13/RK13
(J208)-21	$\overline{\text{INT}}$	Interrupt output	PTA_BT_PPIO/RPK6/RK6
(J208)-22	$\overline{\text{RST}}$	System Reset	AN14/ANN0/CVD14/CVDR14/RPA14/RA14
(J208)-23	NC	Not connected	NC

.....continued

Pin Number	Pin on Ethernet PHY Daughter Board	Pin Description of Ethernet PHY Daughter Board	Pin on WFI32E01 Module ⁽¹⁾⁽²⁾
(J208)-24	NC	Not connected	NC

Notes:

1. These are Peripheral Pin Select (PPS) pins that can be configured for any of the supported peripheral functions based on the end user application.
2. For more details on the WFI32E01 pins and PTA signals, refer to the *PIC32MZ W1 MCU and WFI32 Module with Wi-Fi® and Hardware-Based Security Accelerator Data Sheet (DS70005425)*.

3.9 GPIO Header (J207)

The PIC32 WFI32E Curiosity Board provides a header (J207) to access the unused WFI32E01 GPIO pins. The $\overline{\text{MCLR}}$ Reset signal is also available on GPIO header (J207).

The following table lists the details of the GPIO header:

Table 3-10. GPIO Header Pin Description

Pin Number	Pin on GPIO Header	Pin Description of GPIO Header	Pin on WFI32E01 Module ⁽¹⁾⁽²⁾
J207-1	GND	Ground	GND
J207-2	GND	Ground	GND
J207-3	TDI	JTAG test data	TDI/PGD4/AN9/CVD9/CVDR9/RPB9/RB9
J207-4	GND	Ground	GND
J207-5	TDO	JTAG test data output	TDO/AN7/CVD7/CVDR7/CVDT0/RPB7/RB7
J207-6	GND	Ground	GND
J207-7	TMS	JTAG Test mode select input	TMS/AN6/CVD6/CVDR6/CVDT1/RPB6/RB6
J207-8	GND	Ground	GND
J207-9	TCK	JTAG test clock	TCK/PGC4/AN8/CVD8/CVDR8/RPB8/RB8
J207-10	GND	Ground	GND
J207-11	$\overline{\text{MCLR}}$	Reset pin	$\overline{\text{MCLR}}$
J207-12	NC	Not connected	NC
J207-13	U1RX	UART1 receive input	U1RX/RA8
J207-14	NC	Not connected	NC
J207-15	+3.3	VCC	NC
J207-16	NC	Not connected	NC
J207-17	GND	Ground	GND
J207-18	NC	Not connected	NC
J207-19	NC	Not connected	NC
J207-20	NC	Not connected	NC
J207-21	NC	Not connected	NC
J207-22	NC	Not connected	NC
J207-23	U1TX	UART1 transmit output	U1TX/RA9
J207-24	NC	Not connected	NC

Notes:

1. These are PPS pins that can be configured for any of the supported peripheral functions based on the end user application.
2. For more details on the WFI32E01 pins, refer to the *PIC32MZ W1 MCU and WFI32 Module with Wi-Fi® and Hardware-Based Security Accelerator Data Sheet (DS70005425)*.

3.10 XPRO Header (J203)

The PIC32 WFI32E Curiosity Board provides the XPRO header (J203) to have a pin-to-pin compatibility for XPRO boards. The following table provides details of the XPRO header pins:

Table 3-11. XPRO Header Pin Description

Pin Number	Pin on XPRO Header	Pin Description of XPRO Header	Pin on WFI32E01 Module ⁽¹⁾⁽²⁾
J203-1	ID ⁽⁴⁾	Communication line to the ID chip on an extension board	PTA_BT_PRIOR/RPK6/RK6
J203-2	GND	Ground	GND
J203-3	ADC(+)	Analog-to-Digital converter, alternatively positive part of differential ADC	TMS/AN6/CVD6/CVDR6/CVDT1/RPB6/RB6
J203-4	ADC(-)	Analog-to-Digital converter, alternatively negative part of differential ADC	AN14/ANN0/CVD14/CVDR14/RPA14/RA14
J203-5	GPIO1	General purpose I/O	ANA0/RPB12/RB12
J203-6	GPIO2	General purpose I/O	PTA_BT_PRIOR/RPK6/RK6
J203-7	PWM(+)	Pulse width modulation, alternatively positive part of differential PWM	TCK/PGC4/AN8/CVD8/CVDR8/RPB8/RB8
J203-8	PWM(-)	Pulse width modulation, alternatively negative part of differential PWM	ANN1/CVD15/CVDR15/RPA13/RA13
J203-9	IRQ/GPIO ⁽⁵⁾	Interrupt request line and/or general purpose I/O	AN17/CVD17/CVDR17/INT0/RPA10/RA10
J203-10	SPI_SS_B/GPIO	Client select for SPI and/or general purpose I/O ⁽⁶⁾	USBID/AN2/CVD2/CVDR2/CVDT5/RPB2/RB2
J203-11	I2C_SDA	Data line for I2C interface	SDA1/RPA5/RA5
J203-12	I2C_SCL	Clock line for I2C interface	SCL1/RPA4/RA4
J203-13	UART_RX	Receiver line of target device UART	TDI/PGD4/AN9/CVD9/CVDR9/RPB9/RB9
J203-14	UART_TX	Transmitter line of target device UART	PTA_BT_ACTIVE/RPK7/RK7
J203-15	SPI_SS_A	Client select for SPI. This pin must be preferably unique ⁽⁶⁾	TDO/AN7/CVD7/CVDR7/CVDT0/RPB7/RB7
J203-16	SPI_MOSI	Host-out, client-in line of serial peripheral interface ⁽⁶⁾	BT_CLK_OUT/RPK4/RK4
J203-17	SPI_MISO	Host-in, client-out line of serial peripheral interface ⁽⁶⁾	PTA_WLAN_ACTIVE/RPK5/RK5
J203-18	SPI_SCK	Clock for serial peripheral interface	SCK2/RPA11/RA11
J203-19	GND	Ground	GND
J203-20	VCC	Power for extension board	NC

Notes:

1. These are PPS pins that can be configured for any of the supported peripheral functions based on the end user application.
2. For more details on the WFI32E01 pins and PTA signals, refer to the *PIC32MZ W1 MCU and WFI32 Module with Wi-Fi® and Hardware-Based Security Accelerator Data Sheet (DS70005425)*.
3. If using the AC243009 daughter board, the maximum frequency limit of the SPI2 interface is 12.5 MHz but the WFI32E01 Module can operate up to 20 MHz
4. A jumper must be mounted on the (J210) connector to use the ID feature.
5. A jumper must be mounted on the (J211) connector pin2 and pin3 to use this feature.
6. Traditional Serial Communication Interface Documentation uses the terminology “Master” and “Slave”. The equivalent Microchip terminology used in this document is “Host” and “Client”, respectively.
7. The user must not use XPRO-based touch boards and on-board temperature sensor (U204) simultaneously.

3.11 Temperature Sensor (U204)

Connect an analog output from the temperature sensor (Microchip TC1047A, U204) to one of the analog pins (ANN1/CVD15/CVDR15/RPA13/RA13) of the module's ADC channel.

Notes:

1. Short the (J209) jumper to enable the temperature sensor.
2. The user must not use XPRO-based touch boards and on-board temperature sensor (U204) simultaneously.

3.12 Serial Flash (U203)

The PIC32 WFI32E Curiosity Board has an on-board 32-Mb external SPI Flash (SST26VF032B) (U203) memory for storage of data. The following table describes the details of the serial Flash pin connection:

Table 3-12. Serial Flash Pin Description

Pin Number	Pin on Serial Flash (SST26VF032B)	Pin Description of Serial Flash	Pin on WFI32E01 Module ⁽¹⁾
U203-1	CE	Chip Enable	SPI1CS/RPA1/RA1
U203-2	SO	Serial Data Output for SPI mode	SDI1/RPC7/RC7
U203-3	WP	Write-Protect	Not Connected
U203-4	VSS	Ground	GND
U203-5	SI	Serial Data Input for SPI mode	SDO1/RPC8/RC8
U203-6	SCK	Serial Clock	SCK1/RPC6/RC6
U203-7	HOLD	Hold	Not Connected
U203-8	VDD	Input power supply	NC

Note:

1. For more details on the WFI32E01 pins, refer to the *PIC32MZ1025W104 MCU and WFI32E01 Module with Wi-Fi® and Hardware-based Security Accelerator Data Sheet (DS70005425)*.

3.13 Carrier Board Interface

The WFI32E01 Module is connected to the carrier board connector (J401). The following table lists the pinout details of the (J401) connector:

Table 3-13. Carrier Board Interface Pin Description

Pin Number	Pin on Carrier Board	Pin Description on Carrier Board	Pin on WFI32E01 Module ⁽¹⁾⁽²⁾
J401-1	MCLR	Reset	MCLR
J401-2	PTA_WLAN_ACTIVE/RPK5	Wi-Fi® and Bluetooth® coexistence/remappable peripheral/PORTK digital I/O	PTA_WLAN_ACTIVE/RPK5/RK5
J401-3	PTA_BT_PRIO/RPK6	Wi-Fi and Bluetooth coexistence/remappable peripheral/PORTK digital I/O	PTA_BT_PRIO/RPK6/RK6
J401-4	PTA_BT_ACTIVE/RPK7	Wi-Fi and Bluetooth coexistence/remappable peripheral/PORTK digital I/O	PTA_BT_ACTIVE/RPK7/RK7
J401-5	BT_CLK_OUT/RPK4	Bluetooth clock out (26 MHz)/remappable peripheral/PORTK digital I/O	BT_CLK_OUT/RPK4/RK4
J401-6	SDI1/RPC7	SPI1 serial data input/remappable peripheral/PORTC digital I/O	SDI1/RPC7/RC7
J401-7	GND	Ground	GND
J401-8	CVDT7/ERXERR/RPC9	ADC CVD controller TX output/Ethernet receive error input/remappable peripheral/PORTC digital I/O	CVDT7/ERXERR/RPC9/RC9
J401-9	SDO1/RPC8	SPI1 serial data output/remappable peripheral/PORTC digital I/O	SDO1/RPC8/RC8
J401-10	CVDT16/EMDC/RPK14	ADC CVD controller TX output/Ethernet management data clock output/remappable peripheral/PORTK digital I/O	CVDT16/EMDC/RPK14/RK14
J401-11	SCK1/RPC6	SPI1 serial clock/remappable peripheral/PORTC digital I/O	SCK1/RPC6/RC6
J401-12	NC	Not connected	NC
J401-13	NC	Not connected	NC
J401-14	NC	Not connected	NC
J401-15	NC	Not connected	NC
J401-16	NC	Not connected	NC
J401-17	NC	Not connected	NC
J401-18	NC	Not connected	NC
J401-19	NC	Not connected	NC
J401-20	CVDT15/EMDIO/RPK13	ADC CVD controller TX output/Ethernet management data bi-directional IO/remappable peripheral/PORTK digital I/O	CVDT15/EMDIO/RPK13/RK13
J401-21	SPI1CS/RPA1	SPI1 client select/chip select/frame sync/remappable peripheral/PORTA digital I/O	SPI1CS/RPA1/RA1
J401-22	CVDT14/ERXDV/RPK12	ADC CVD controller TX output/Ethernet RX data valid input/remappable peripheral/PORTK digital I/O	CVDT14/ERXDV/RPK12/RK12

.....continued

Pin Number	Pin on Carrier Board	Pin Description on Carrier Board	Pin on WFI32E01 Module ⁽¹⁾⁽²⁾
J401-23	CVDT13/ETXD0/RPC15	ADC CVD controller TX output/Ethernet transmit nibble data output/remappable peripheral/PORTC digital I/O	CVDT13/ETXD0/RPC15/RC15
J401-24	GND	Ground	GND
J401-25	CVDT12/ETXD1/RPC14	ADC CVD controller TX output/Ethernet transmit nibble data output/remappable peripheral/PORTC digital I/O	CVDT12/ETXD1/RPC14/RC14
J401-26	U1TX	UART1 transmit output	U1TX/RA9
J401-27	GND	Ground	GND
J401-28	U1RX	UART1 receive input	U1RX/RA8
J401-29	CVDT10/ETH_CLK_OUT/RPC12	ADC CVD controller TX output/Ethernet clock out/remappable peripheral/PORTC digital I/O	CVDT10/ETH_CLK_OUT/RPC12/RC12
J401-30	NC	Not connected	NC
J401-31	GND	Ground	GND
J401-32	GND	Ground	GND
J401-33	GND	Ground	GND
J401-34	NC	Not connected	NC
J401-35	CVDT8/ERXD1/RPC10	ADC CVD controller TX output/Ethernet transmit nibble data input/remappable peripheral/PORTC digital I/O	CVDT8/ERXD1/RPC10/RC10
J401-36	SDA1/RPA5	I2C1 data/remappable peripheral/PORTA digital I/O	SDA1/RPA5/RA5
J401-37	CVDT9/ERXD0/RPC11	ADC CVD controller TX output/Ethernet transmit nibble data input/remappable peripheral/PORTC digital I/O	CVDT9/ERXD0/RPC11/RC11
J401-38	SCL1/RPA4	I2C1 clock/remappable peripheral/PORTA digital I/O	SCL1/RPA4/RA4
J401-39	CVDT11/ETXEN/RPC13	ADC CVD controller TX output/Ethernet transmit enable output/remappable peripheral/PORTC digital I/O	CVDT11/ETXEN/RPC13/RC13
J401-40	GND	Ground	GND
J401-41	USBID/AN2/CVD2/CVDR2/CVDT5/RPB2	USB OTG ID input	USBID/AN2/CVD2/CVDR2/CVDT5/RPB2/RB2
J401-42	RF_FE_4/RPK1	RF front-end control/remappable peripheral/PORTK digital I/O	RF_FE_4/RPK1/RK1
J401-43	USB_D+	USB data +	USB_D+
J401-44	RF_FE_2/RPK3	RF front-end control/remappable peripheral/PORTK digital I/O	RF_FE_2/RPK3/RK3
J401-45	USB_D-	USB data -	USB_D-
J401-46	GND	Ground	GND

.....continued

Pin Number	Pin on Carrier Board	Pin Description on Carrier Board	Pin on WFI32E01 Module ⁽¹⁾⁽²⁾
J401-47	VBUS	VBUS power input	VBUS
J401-48	ANN0/CVD14/CVDR14/RPA14	Analog input/analog input/ADC CVD controller output/ADC CVD controller RX output/remappable peripheral/PORTA digital I/O	AN14/ANN0/CVD14/CVDR14/RPA14/RA14
J401-49	VBUSON/CVD1/CVDR1/CVDT6/AN1/RPB1	On signal for external VBUS source	VBUSON/CVD1/CVDR1/CVDT6/AN1/RPB1/RB1
J401-50	ANA0/RPB12	Analog input/remappable peripheral/PORTB digital I/O	ANA0/RPB12/RB12
J401-51	GND	Ground	GND
J401-52	ANN1/CVD15/CVDR15/RPA13	Analog input/analog input/ADC CVD controller output/ADC CVD controller RX output/remappable peripheral/PORTA digital I/O	AN15/ANN1/CVD15/CVDR15/RPA13/RA13
J401-53	PGC2/AN4/CVD4/CVDR4/CVDT3/RPB4	In-Circuit Serial Programming (ICSP) [™] programming clock/analog input/ADC CVD controller output/ADC CVD controller RX output/ADC CVD controller TX output/remappable peripheral/PORTB digital I/O	PGC2/AN4/CVD4/CVDR4/CVDT3/RPB4/RB4
J401-54	AN17/CVD17/CVDR17/INT0/RPA10	Analog input/ADC CVD controller output/ADC CVD controller RX output/External interrupt input 0/remappable peripheral/PORTA digital I/O	AN17/CVD17/CVDR17/INT0/RPA10/RA10
J401-55	PGD2/AN5/CVD5/CVDR5/CVDT2/RTCC/RPB5	ICSP programming data/analog input/ADC CVD controller output/ADC CVD controller RX output/ADC CVD controller TX output/RTCC output clock/remappable peripheral/PORTB digital I/O	PGD2/AN5/CVD5/CVDR5/CVDT2/RTCC/RPB5/RB5
J401-56	GND	Ground	GND
J401-57	TDO/AN7/CVD7/CVDR7/RPB7	JTAG test data output/analog input/ADC CVD controller output/ADC CVD controller RX output/remappable peripheral/PORTB digital I/O	TDO/AN7/CVD7/CVDR7/CVDT0/RPB7/RB7
J401-58	NC	Not connected	NC
J401-59	TDI/PGD4/AN9/CVD9/CVDR9/RPB9	JTAG test data/programming data input/ICSP programming data/analog input/ADC CVD controller output/ADC CVD controller RX output/remappable peripheral/PORTB digital I/O	TDI/PGD4/AN9/CVD9/CVDR9/RPB9/RB9
J401-60	NC	Not connected	NC

.....continued

Pin Number	Pin on Carrier Board	Pin Description on Carrier Board	Pin on WFI32E01 Module ⁽¹⁾⁽²⁾
J401-61	TCK/PGC4/AN8/CVD8/CVDR8/RPB8	JTAG test clock/programming clock input/ICSP programming clock/analog input/ADC CVD controller output/ADC CVD controller RX output/remappable peripheral/PORTB digital I/O	TCK/PGC4/AN8/CVD8/CVDR8/RPB8/RB8
J401-62	NC	Not connected	NC
J401-63	TMS/AN6/CVD6/CVDR6/RPB6	JTAG Test mode select input/analog input/ADC CVD controller output/ADC CVD controller RX output/remappable peripheral/PORTB digital I/O	TMS/AN6/CVD6/CVDR6/CVDT1/RPB6/RB6
J401-64	NC	Not connected	NC
J401-65	SCK2/RPA11	SPI2 clock/remappable peripheral/PORTA digital I/O	SCK2/RPA11/RA11
J401-66	NC	Not connected	NC
J401-67	GND	Ground	GND
J401-68	NC	Not connected	NC
J401-69	NC	Not connected	NC
J401-70	NC	Not connected	NC
J401-71	NC	Not connected	NC
J401-72	3V3_IN	3.3V input power supply	3V3_IN
J401-73	VBAT_IN	Power supply	NC
J401-74	3V3_IN	3.3V input power supply	3V3_IN
J401-75	VBAT_IN	Power supply	NC

Notes:

1. These are Peripheral Pin Select (PPS) pins that can be configured for any of the supported peripheral functions based on the end user application.
2. For more details on the WFI32E01 pins and PTA signals, refer to the *PIC32MZ W1 MCU and WFI32 Module with Wi-Fi® and Hardware-Based Security Accelerator Data Sheet (DS70005425)*.

4. PIC32 WFI32E Curiosity Board Out of Box Demo

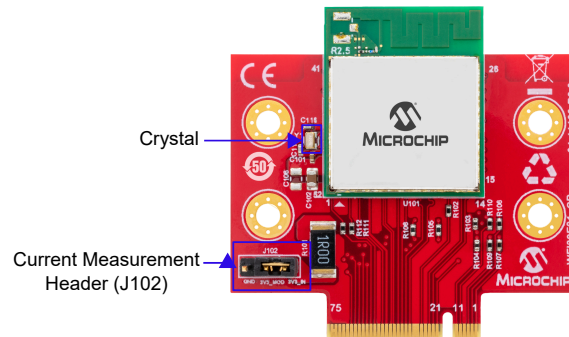
The Out of Box (OOB) demo connects to the cloud and allows the user to control the Curiosity board via a web-based interface. For the firmware and documentation related to OOB demo, go to github.com/MicrochipTech/PIC32MZW1_Curiosity_OOB.

For more details on applications demo and harmony code examples, go to [MPLAB Harmony](#).

5. Appendix A: WFI32E01 Carrier Board

The WFI32E01 carrier board is a plug-in board designed around the WFI32E01 Module. The carrier board brings all the signals from the module onto the Curiosity board for rapid prototyping. The WFI32E01 carrier board has an on-board crystal (32.768 kHz) for RTCC and a header (J102) for the current measurement (see Figure 5-1).

Figure 5-1. WFI32E01 Carrier Board



The current measurement header (J102) helps the user measure the total current consumed by the WFI32E01 Module using a multimeter. To measure the total current consumption of the module, remove the jumper from (J102) and connect a voltmeter across its pins 1-2. A 1Ω resistor (R101) available on the board across the jumper gives a 1:1 relationship between the voltage drop and current consumption.

For the direct current measurement, use a jumper wire to short (J102) pin 1-2, remove the (R101) resistor and current clamp probe (example, TEKTRONIX TCP0030A Current Probe). A normal probe with long wires may add a load to the current path and introduce a voltage drop, which leads to incorrect readings.

For the current measurement in terms of voltage, a resistor (R101) is provided on the board. The user can measure similarly using a voltage probe or multimeter across the resistor (R101).

The following table lists the details of the carrier board:

Table 5-1. WFI32E01 Carrier Board Details

Item No.	Description	Part Number	Supported Module
1	WFI32E01 carrier board	WFI32E01_CB	WFI32E01PC

6. Appendix B: Reference Circuit

6.1 PIC32 WFI32E Curiosity Board Reference Schematics

Figure 6-1. MikroBUS Header

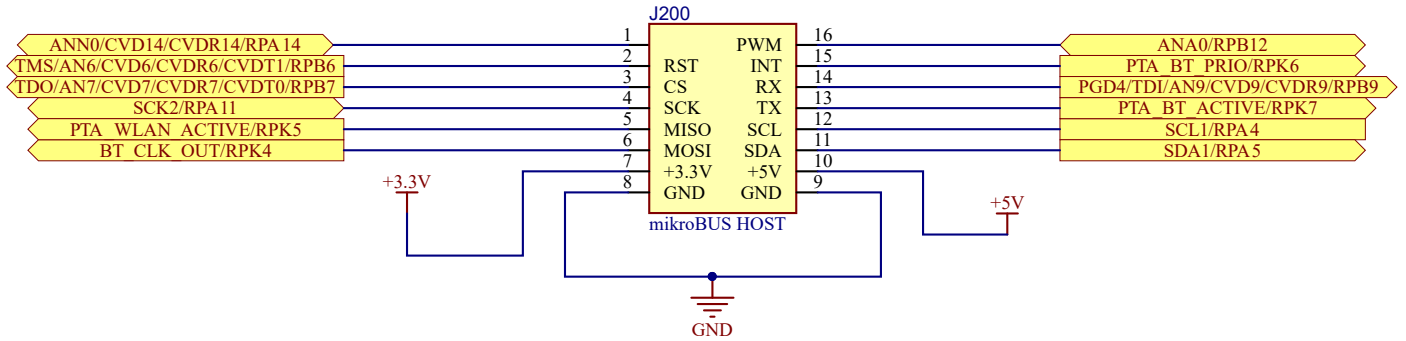


Figure 6-2. Xpro Header

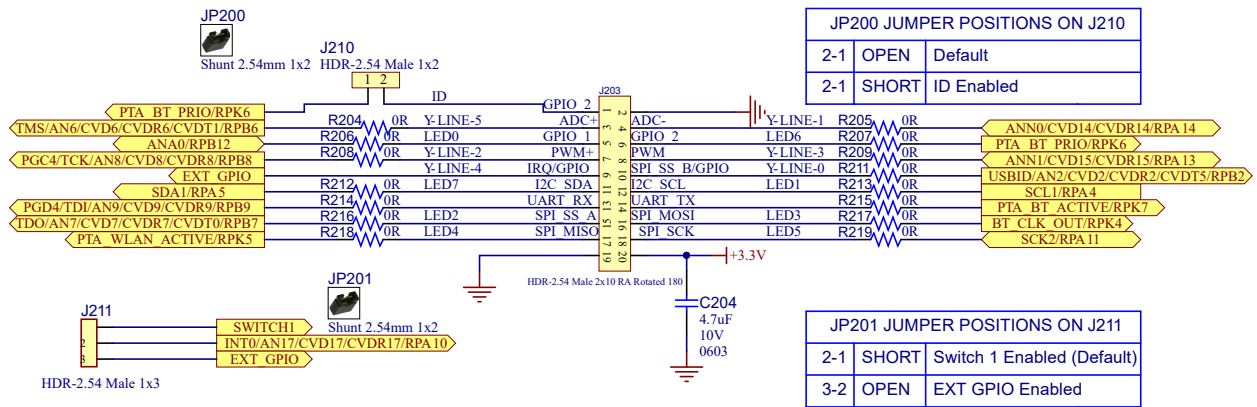


Figure 6-3. Power Circuit

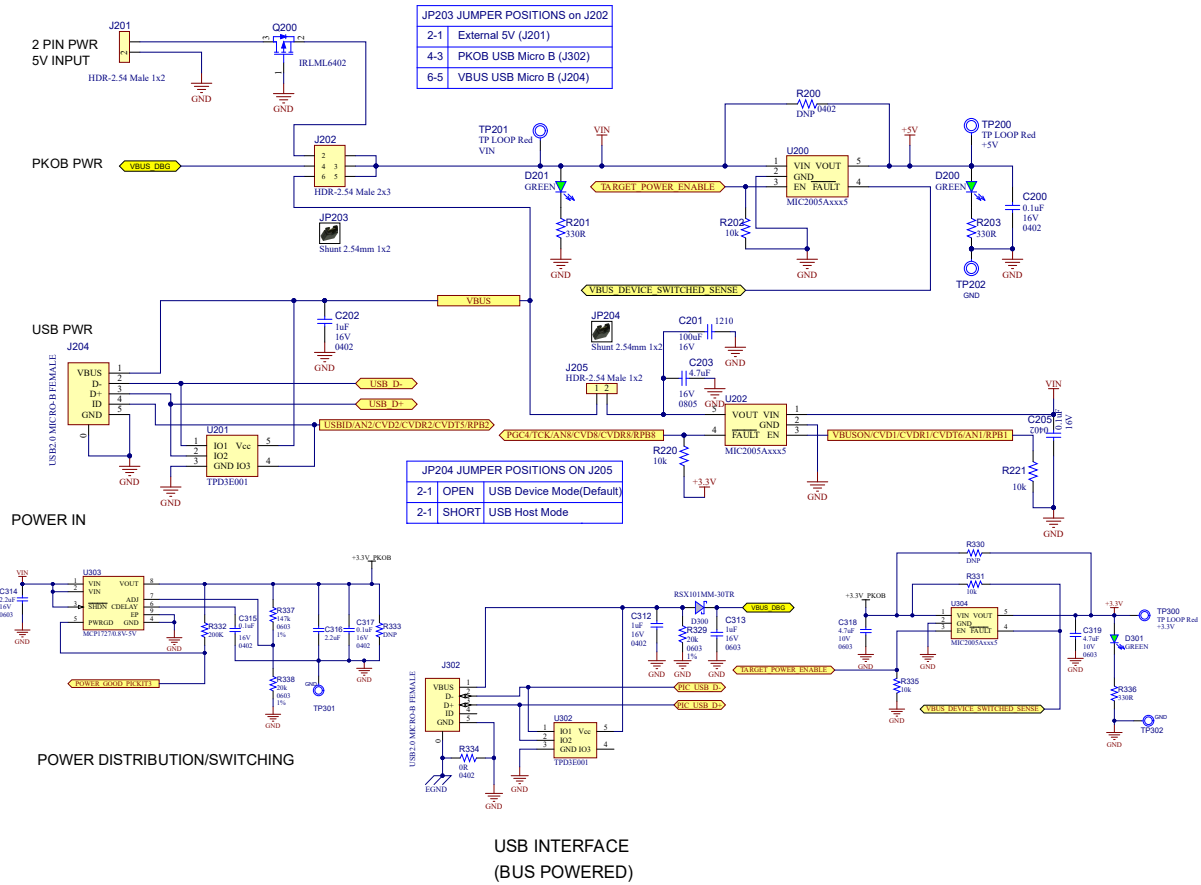


Figure 6-4. GPIO Header

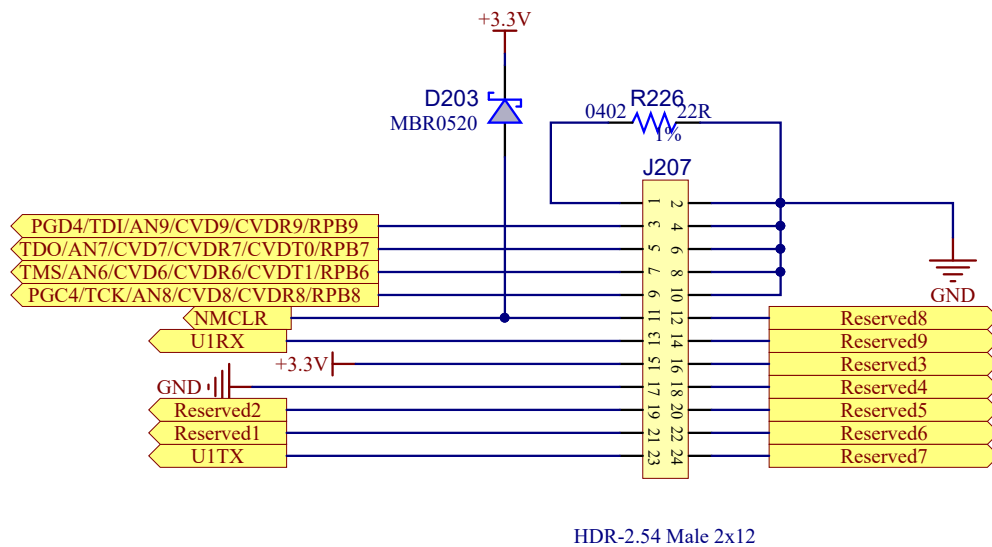


Figure 6-5. Temperature Sensor

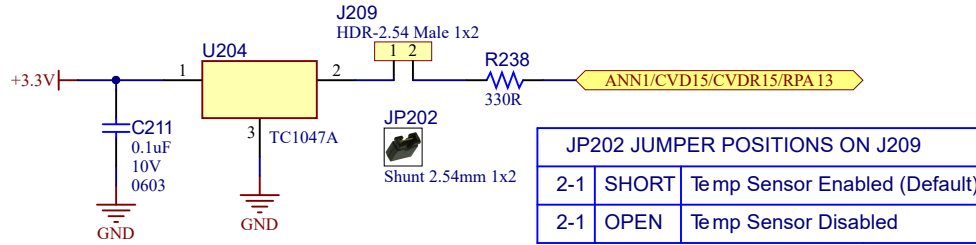


Figure 6-6. Switches

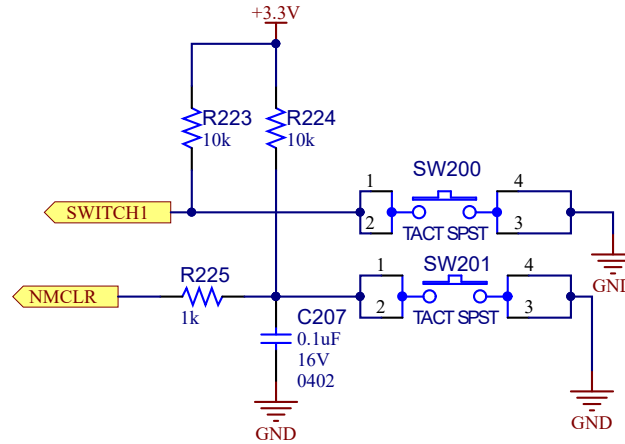


Figure 6-7. ICSP Header

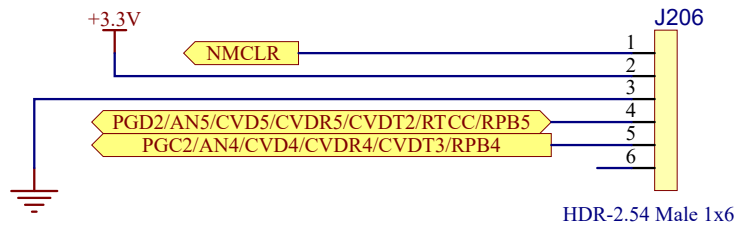


Figure 6-8. User LEDs

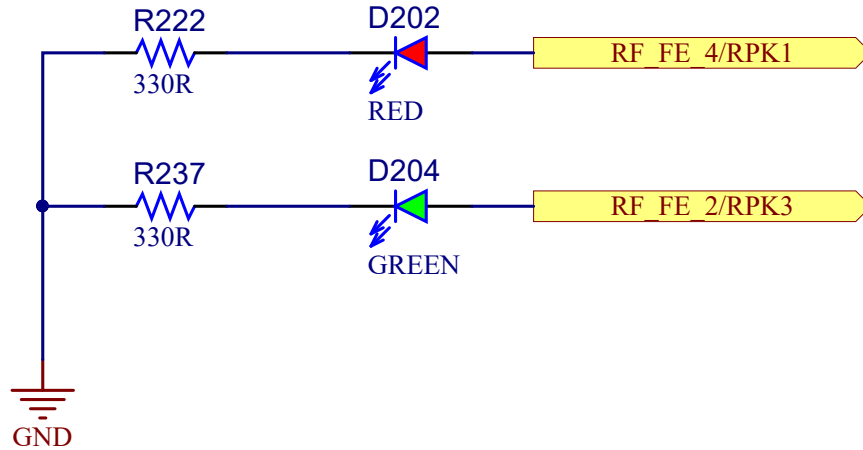


Figure 6-9. SPI Memory

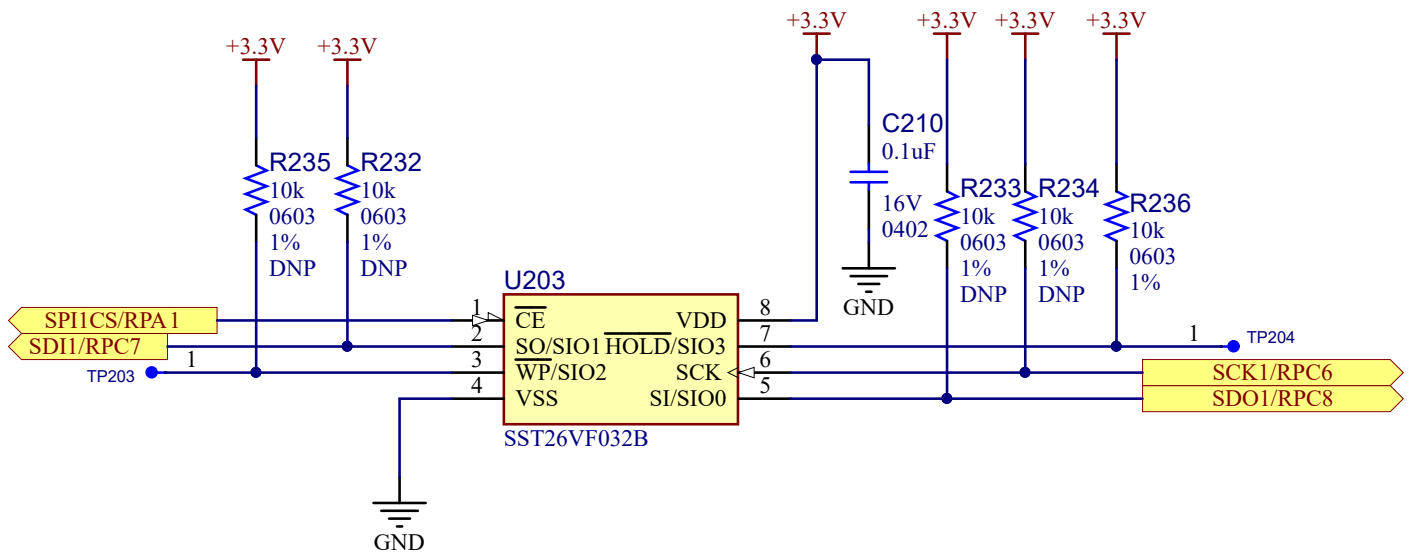


Figure 6-12. Carrier Board Connector

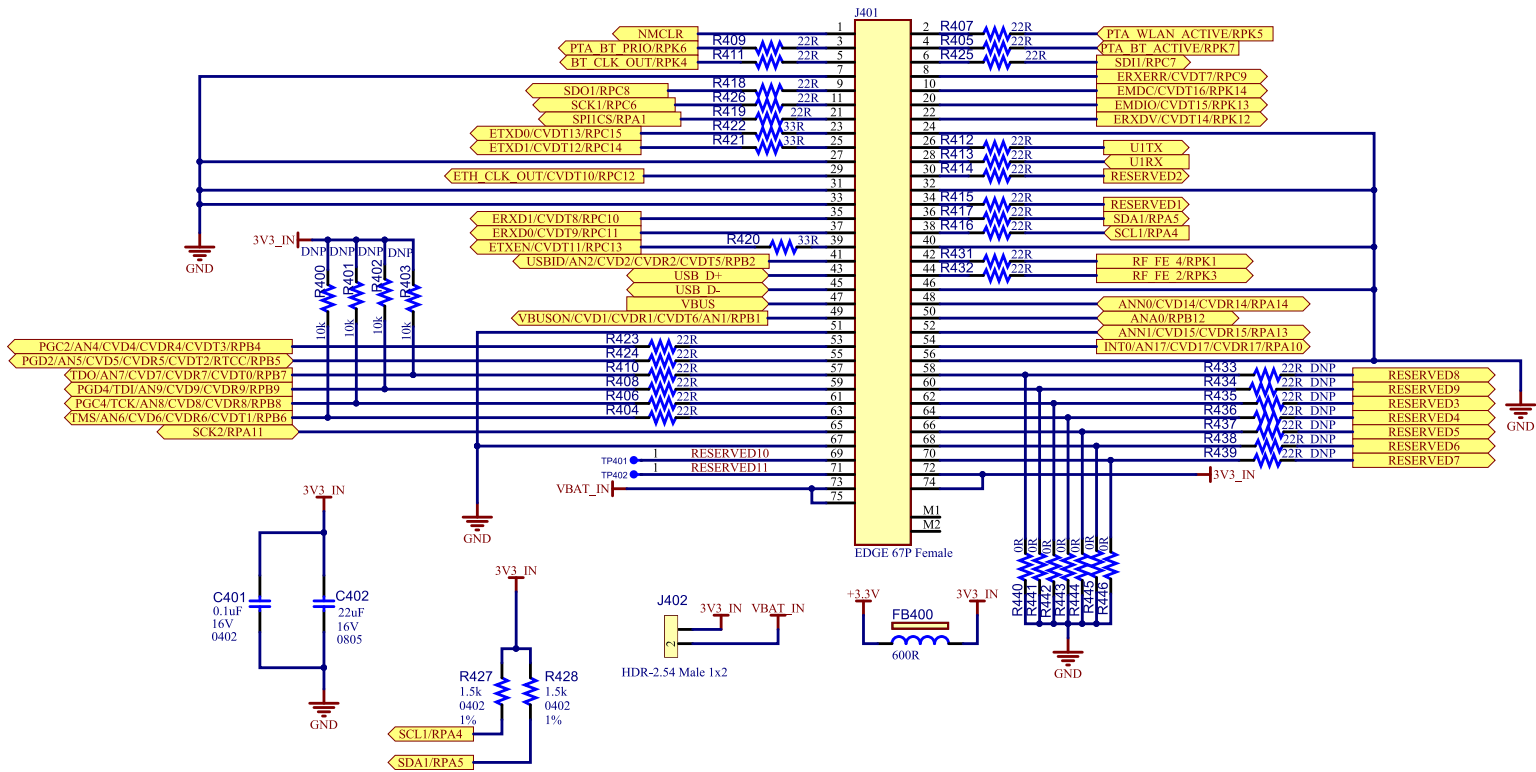
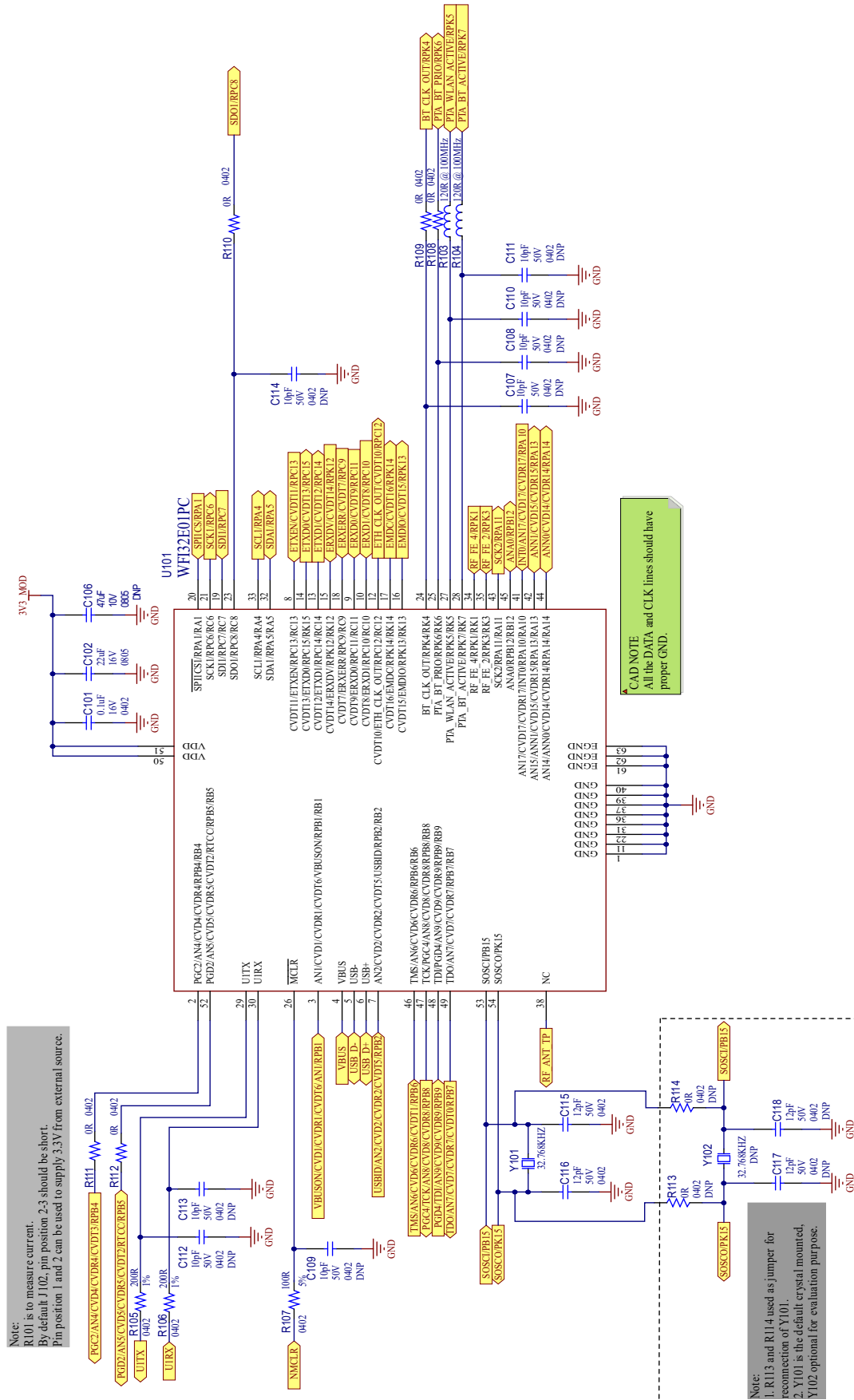


Figure 6-13. WFI32E01 Carrier Board (1 of 2)

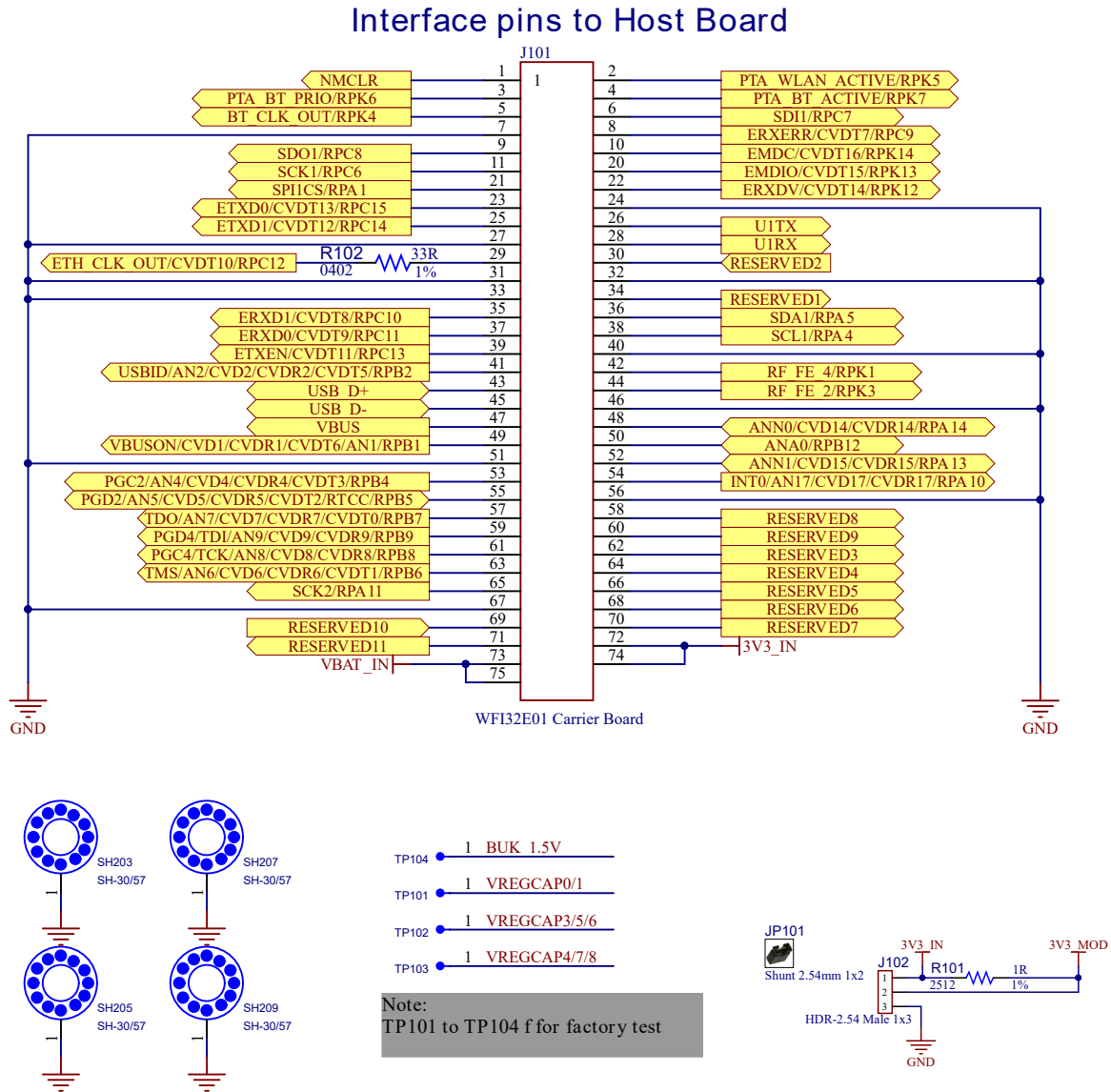


Note:
 R101 is to measure current.
 By default J102, pin position 2-3 should be short.
 Pin position 1 and 2 can be used to supply 3.3V from external source.

CAD NOTE
 All the DATA and CLK lines should have proper GND.

Note:
 L1R13 and R114 used as jumper for reconnection of Y101.
 Y101 is the default crystal mounted.
 Y102 optional for evaluation purpose.

Figure 6-14. WFI32E01 Carrier Board (2 of 2)



6.2 Bill of Materials

This section provides the Bill of Materials (BOM) of the PIC32 WFI32E Curiosity Board and the WFI32E01 Carrier Board.

6.2.1 PIC32 WFI32E Curiosity Board Bill of Materials

For the Bill of Materials (BOM) of PIC32 WFI32E Curiosity Board, go to the [EV12F11A](#) product web page.

6.2.2 WFI32E01 Carrier Board Bill of Materials

For the Bill of Materials (BOM) of WFI32E01 Carrier Board, go to the [EV12F11A](#) product web page.

7. Regulatory Approval

This equipment (PIC32 WFI32E Curiosity Board/EV12F11A) is an evaluation kit and not a finished product. It is intended for laboratory evaluation purposes only. It is not directly marketed or sold to the general public through retail; it is only sold through authorized distributors or through Microchip. Using this requires a significant engineering expertise towards understanding of the tools and relevant technology, which can be expected only from a person who is professionally trained in the technology.

Regulatory compliance settings have to follow the WFI32E01 module certifications. The following regulatory notices are to cover the requirements under the regulatory approval.

7.1 United States

The PIC32 WFI32E Curiosity Board (EV12F11A) contains the WFI32E01 module, which has received Federal Communications Commission (FCC) CFR47 Telecommunications, Part 15 Subpart C "Intentional Radiators" single-modular approval in accordance with Part 15.212 Modular Transmitter approval.

Contains FCC ID: 2ADHKWFI32E01

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



Important: FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for uncontrolled environment. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 8 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. This transmitter is restricted for use with the specific antenna(s) tested in this application for certification.



Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

7.2 Canada

The PIC32 WFI32E Curiosity Board (EV12F11A) contains the WFI32E01 module, which has been certified for use in Canada under Innovation, Science and Economic Development Canada (ISED, formerly Industry Canada) Radio Standards Procedure (RSP) RSP-100, Radio Standards Specification (RSS) RSS-Gen and RSS-247.

Contains IC: 20266-WFI32E01

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference;
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.



This equipment complies with radio frequency exposure limits set forth by Innovation, Science and Economic Development Canada for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the device and the user or bystanders.

Cet équipement est conforme aux limites d'exposition aux radiofréquences définies par d'Innovation, Sciences et Développement économique Canada pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre le dispositif et l'utilisateur ou des tiers.

7.3 Europe

This equipment (EV12F11A) has been assessed under the Radio Equipment Directive (RED) for use in European Union countries. The product does not exceed the specified power ratings, antenna specifications and/or installation requirements as specified in the user manual. A Declaration of Conformity is issued for each of these standards and kept on file as described in Radio Equipment Directive (RED).

Simplified EU Declaration of Conformity

Hereby, Microchip Technology Inc. declares that the radio equipment type [EV12F11A] is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at www.microchip.com/developmenttools/ProductDetails/PartNO/EV12F11A.

8. Document Revision History

Revision	Date	Section	Description
B	09/2023	Document	
		Introduction	Minor edits
		Features	Minor edits
		1.1. Reference Documentation	Updated name of the data sheet and errata
		1.2. Hardware Prerequisites	Updated the version of ICD and PICKit
		1.3. Software Prerequisites	<ul style="list-style-type: none"> Minor edits Updated the version
		1.4. Acronyms/Abbreviations	<ul style="list-style-type: none"> Added few abbreviations
		2. Kit Overview	<ul style="list-style-type: none"> Minor edits Updated the curiosity board image
		2.1. Kit Contents	Minor edits
		3. Hardware	Updated the TSS information in the block diagram
		3.1. Power Supply	Minor edits
		3.2. Debugger/Programmer Selection	Updated the version of ICD and PICKit
		3.3. ICSP Header (J206)	<ul style="list-style-type: none"> Updated the version of ICD and PICKit Updated name of the data sheet
		3.4. USB Connectivity	<ul style="list-style-type: none"> Minor edits Updated name of the data sheet
		3.5. mikroBUS Socket (J200)	<ul style="list-style-type: none"> Updated the column "Pin on WFI32E01 Module" Updated name of the data sheet
		3.6. Switches	Minor edits
		3.7. LEDs	Minor edits
		3.8. Ethernet PHY Header (J208)	<ul style="list-style-type: none"> Minor edits Updated name of the data sheet
		3.9. GPIO Header (J207)	Updated name of the data sheet
		3.10. XPRO Header (J203)	<ul style="list-style-type: none"> Updated the column "Pin on WFI32E01 Module" Updated name of the data sheet
		3.11. Temperature Sensor (U204)	Added the part number reference
		3.12. Serial Flash (U203)	Added the part number reference
		3.13. Carrier Board Interface	Minor edits
		4. PIC32 WFI32E Curiosity Board Out of Box Demo	Updated the demo related information
		5. Appendix A: WFI32E01 Carrier Board	Minor edits
		6.1. PIC32 WFI32E Curiosity Board Reference Schematics	Updated all the images based on new version
		6.2.1. PIC32 WFI32E Curiosity Board Bill of Materials	Removed the Bill of Materials (BOM) table and added the reference
6.2.2. WFI32E01 Carrier Board Bill of Materials	Removed the Bill of Materials (BOM) table and added the reference		
A	09/2020	Document	Initial revision

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ISBN: 978-1-6683-3070-8

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