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## WFI32-IoT Board User's Guide

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### Introduction

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The WFI32-IoT board is a compact, stand-alone and easy-to-use board that helps the user to develop the Internet-of-Things (IoT) applications with the WFI32E01PC module, a highly integrated Wi-Fi<sup>®</sup> MCU module that supports smart Wi-Fi functionalities and premium MCU features. The WFI32E01PC module has a PCB antenna and Trust&GO hardware secure element, which is pre-provisioned to popular cloud platforms.

The WFI32-IoT board:

- Provides an easy way to connect the embedded application to cloud IoT platforms, such as AWS and Azure
- Includes a PICKit On-board 4 (PKOB4) debugger interface, and requires no external hardware to program and debug the WFI32E01PC module
- Includes a mikroBUS<sup>™</sup> Click<sup>™</sup> header, which helps the users to expand the functionalities by connecting to various MikroElektronika mikroBUS<sup>™</sup> Click<sup>™</sup> adapter boards
- Requires only a Micro USB cable to power up and program the board

### Features

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- Certified WFI32E01PC Module
- Four User LEDs
- Two User Configurable Switch
- One Reset Switch
- On-board Temperature Sensor
- On-board Light Sensor
- 32-Mbit External SPI Flash Memory
- mikroBUS<sup>™</sup> Socket to Expand Functionality using MikroElektronika Click Boards
- Li-Ion/LiPo Battery Charger with Power Path Management

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## 1. Quick References

### 1.1 Reference Documentation

For further details, refer to the following:

- *PIC32MZ1025W104 MCU and WFI32E01 Module with Wi-Fi® and Hardware-based Security Accelerator Data Sheet* ([DS70005425](#))
- *PIC32MZ W1 Software User's Guide* ([DS50003034](#))
- *PIC32MZ1025W104 MCU and WFI32E01 Module with Wi-Fi® and Hardware-based Security Accelerator Errata* ([DS80000912](#))
- *MCP1727 1.5A, Low Voltage, Low Quiescent Current LDO Regulator Data Sheet* ([DS21999](#))
- *MCP9808 ±0.5°C Maximum Accuracy Digital Temperature Sensor* ([DS20005095](#))
- *MPLAB® XC32 C/C++ Compiler User's Guide* ([DS50001686](#))
- *MPLAB® X IDE User's Guide* ([DS50002027](#))
- *MPLAB® Snap In-Circuit Debugger User's Guide* ([DS50002787](#))
- *MPLAB® PICkit™ 4 In-Circuit Debugger User's Guide* ([DS50002751](#))
- *SST26VF032B/SST26VF032BA 2.5V/3.0V 32-Mbit Serial Quad I/O™ (SQI™) Flash Memory Data Sheet* ([DS20005218](#)).
- *Stand-Alone System Load Sharing and Li-Ion/Li-Polymer Battery Charge Management Controller Data Sheet* ([DS20002090](#))
- *Universal Serial Bus Specification and Associated Documents* ([www.usb.org](http://www.usb.org))
- *mikroBUS™ Specification* ([www.mikroe.com/mikrobus](http://www.mikroe.com/mikrobus))

### 1.2 Hardware Prerequisites

- EV36W50A (WFI32-IoT board) kit

### 1.3 Software Prerequisites

- MPLAB® Integrated Development Environment ([MPLAB X IDE](#)) tool (version 5.50 or later)
- [MPLAB XC32](#) Compiler (version 2.40 or later)
- MPLAB Snap – [www.microchip.com/PG164100](http://www.microchip.com/PG164100)
- Released Out of Box (OOB) demo – [www.github.com/MicrochipTech/WFI32-IoT](https://www.github.com/MicrochipTech/WFI32-IoT)

### 1.4 Acronyms and Abbreviations

Acronyms and Abbreviations	Description
ADC	Analog-to-Digital Converter
BOM	Bill of Material
CVD	Capacitive Voltage Divider
GPIO	General Purpose Input Output
I2C	Inter-Integrated Circuit
ICD	In-Circuit Debugger

.....continued	
Acronyms and Abbreviations	Description
ICSP	In-Circuit Serial Programming
IoT	Internet of Things
JTAG	Joint Test Action Group
LDO	Low-Dropout
LED	Light Emitting Diode
MCU	Microcontroller
NC	Not Connected
OOB	Out of Box
OTG	On-The-Go
PCB	Printed Circuit Board
PKOB	PICKit On-Board
PPS	Peripheral Pin Select
PWM	Pulse Width Modulation
RMII	Reduced Media Independent Interface
RTCC	Real Time Clock and Calendar
RTOS	Real-Time Operating System
RX	Receiver
SCL	Serial Clock
SDA	Serial Data
SMD	Surface Mount
SoC	System-on-Chip
SPI	Serial Peripheral Interface
TX	Transmitter
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus

## 2. Kit Overview

The WFI32-IoT board has a single-chip Wi-Fi module that supports rapid prototyping of IoT devices and demonstrates cloud connectivity.

The WFI32-IoT board:

- Offers various types of on-board sensors, such as a temperature sensor and ambient light sensor to build their own applications
- Provides on-board sensors that help the user to collect the sensor data and transmit to the cloud
- Provides the WFI32E01PC module, which has a built-in crypto device that helps to make a secure and authenticated cloud connection

Figure 2-1. WFI32-IoT Board (EV36W50A) – Top View

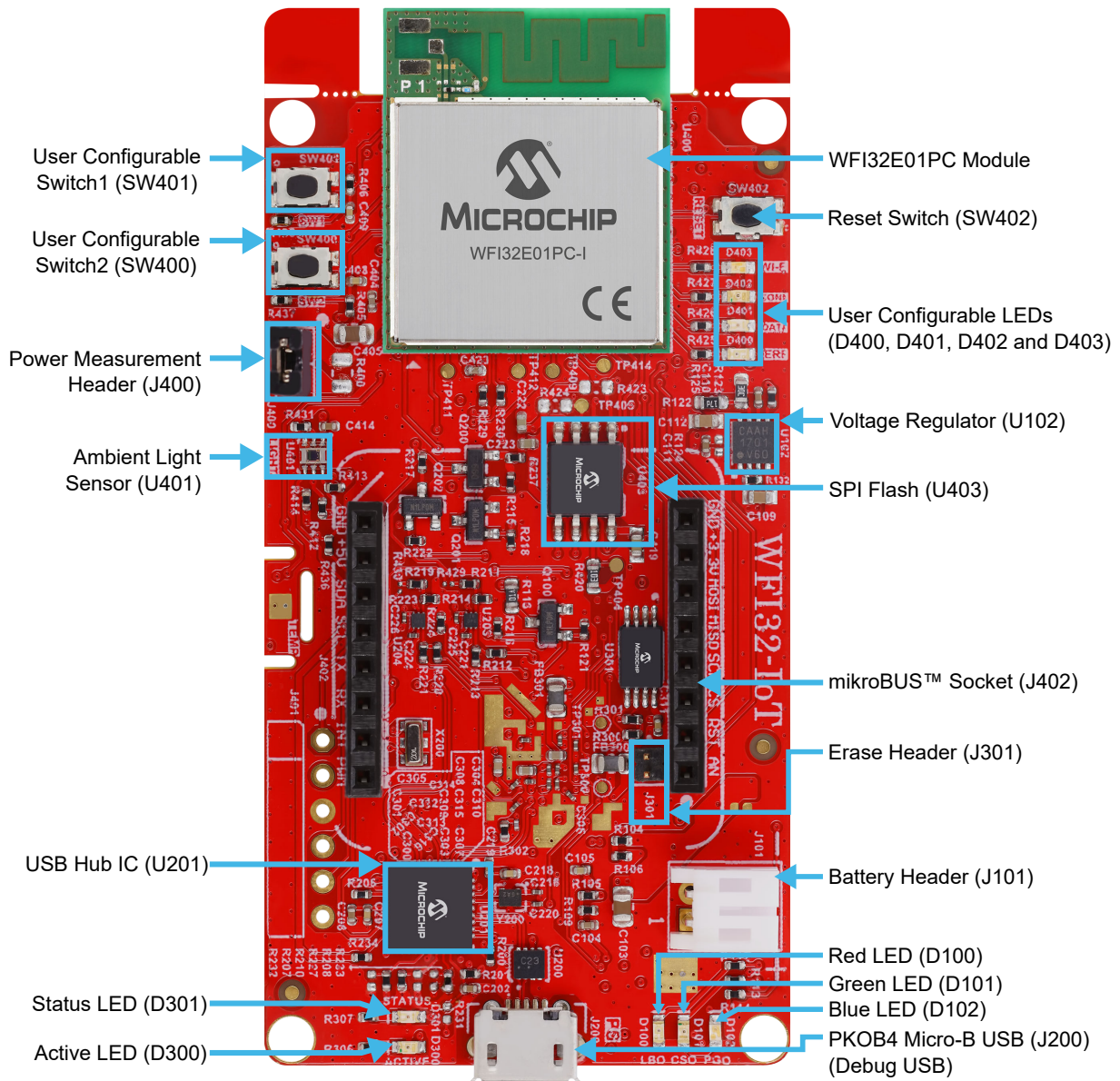
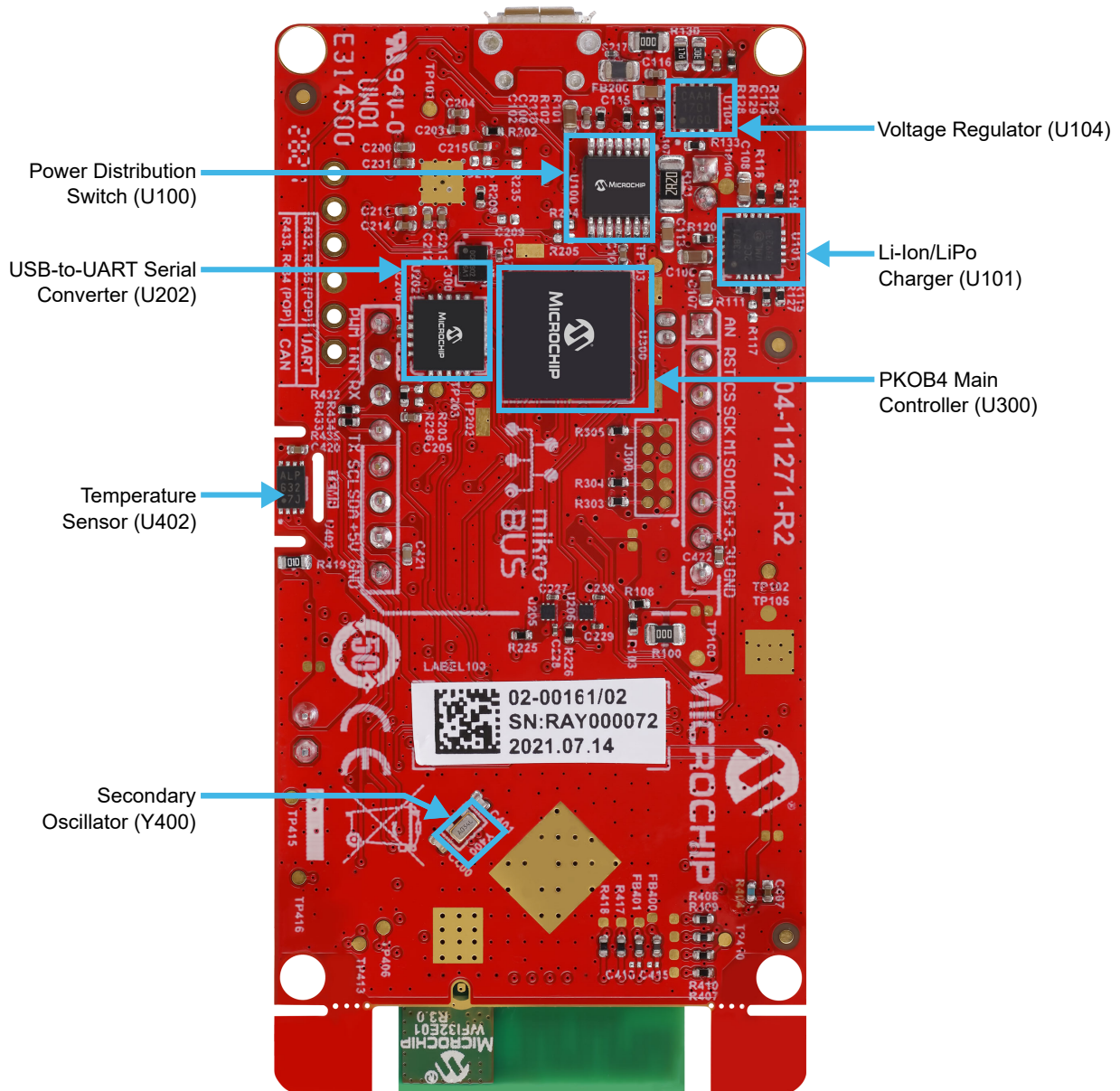


Figure 2-2. WFI32-IoT Board (EV36W50A) – Bottom View



## 2.1 Kit Contents

The EV36W50A (WFI32-IoT board) kit contains the following:

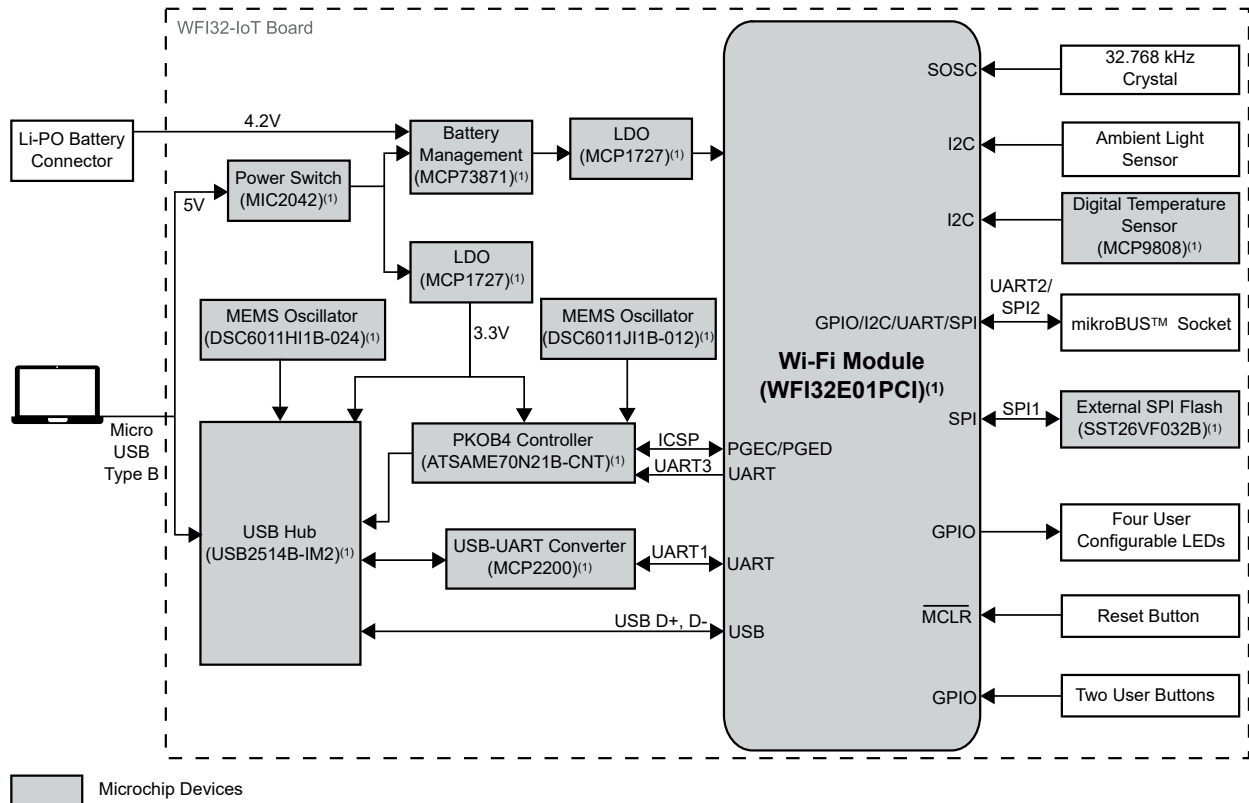
- A WFI32E01PC module mounted on the WFI32-IoT board
- A Type-A male to Micro-B USB cable

**Note:** If any of the above items are missing in the kit, go to [support.microchip.com](https://support.microchip.com) or contact your local Microchip Sales office. In this user guide, there is a list of Microchip offices for sales and services provided on the last page.

### 3. Hardware

This chapter describes the hardware features of the WFI32-IoT board.

Figure 3-1. WFI32-IoT 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 WFI32-IoT boards. For more details, go to [support.microchip.com](http://support.microchip.com) or contact your local Microchip Sales office.

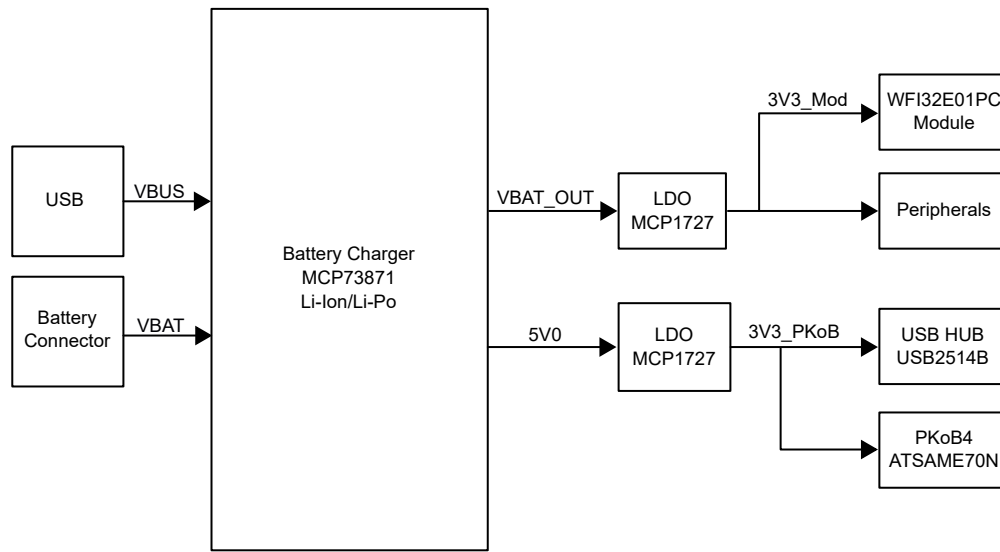
#### 3.1 Power Supply

The following are the power supply sources to power the WFI32-IoT board; see the following figure:

- PKOB4 Micro-B USB (Debug USB) ([J200](#))
- Battery Header ([J101](#))



Figure 3-2. WFI32-IoT Board Power Supply Block Diagram



### PKoB4 Micro-B USB (Debug USB) (J200)

The Debug USB (J200) supplies power to the WFI32-IoT board from the host PC using Type-A male to Micro-B USB cable.

**Note:** The maximum available current from the Debug USB (J200) is limited to 500 mA. The current is shared between charging the external battery (if connected) and the target application section.

### Battery Header (J101)

Connect a 4.2V Li-ion/Li-Po battery to the battery header (J101).

#### Notes:

1. The 4.2V Li-ion/Li-Po battery is not a part of the EV36W50A kit.
2. The minimum recommended battery capacity is 400 mAh with a battery charge voltage of 4.2V.
3. Uses a standard battery connector, which is a 2 pin, 2 mm pitch and right angle male battery header.

### 3.1.1 Li-ion/Li-Po Battery Charger (U101)

The WFI32-IoT board features an on-board MCP73871 Li-ion/Li-Po battery charger. The battery management circuit automatically handles the selection between the USB power supply and battery supply. The current is shared between charging the battery (if connected) and the target application section. For more details on the MCP73871 Li-ion/Li-Po battery charger, refer to the *Stand-Alone System Load Sharing and Li-Ion/Li-Polymer Battery Charge Management Controller Data Sheet (DS20002090)*.

**Note:** The charger is configured to limit the charge current to 100 mA to prevent the overcharging of small capacity batteries.



The MCP73871 has a battery charge voltage of 4.2V and ensures that the battery has the same charge voltage.

### 3.1.2 Voltage Regulators (U102 and U104)

The following are the two on-board MCP1727 voltage regulators on the WFI32-IoT board that generate +3.3V power supply:

- **U102** – Generates +3.3V that powers the WFI32E01PC module along with the associated circuits

- **U104** – Generates +3.3V that powers the USB hub IC (**U201**), PKOB4 micro controller (**U300**), along with the associated circuits that connect the PKOB4 debugger to a host PC

For more details on the **U102** and **U104** voltage regulators, refer to the *MCP1727 1.5A, Low Voltage, Low Quiescent Current LDO Regulator Data Sheet (DS21999)*.

### 3.1.3 Power Measurement Header (J400)

The current measurement header (**J400**) measures the total current consumed by the WFI32E01PC module using a multimeter. To measure the total current consumption of the WFI32E01PC module, remove the jumper (**JP401**) from the **J400** header and connect a voltmeter across its pins. A 1Ω resistor option available on-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 the **J400** pin 1-2 and connect a current clamp probe, for example, the TEKTRONIX TCP0030A current probe. The normal probes 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, mount the R400 with 0.1Ω resistor for Active mode and 1Ω resistor for Sleep mode current consumption using a voltage probe or multimeter.

## 3.2 MPLAB PICKit On-Board 4 (PKOB4)

The MPLAB PICKit On-Board 4 (PKOB4) is a new generation of in-circuit debugger. The MPLAB PKOB4 programs faster than its predecessor and is designed to use a high-speed USB 2.0 interface, providing a feature-rich debugging experience via one USB cable. The MPLAB PKOB4 is intended to support the programming and debugging interface. For more details on the MPLAB PKOB4, refer to the *MPLAB Snap In-Circuit Debugger User's Guide (DS50002787)*.

### Features

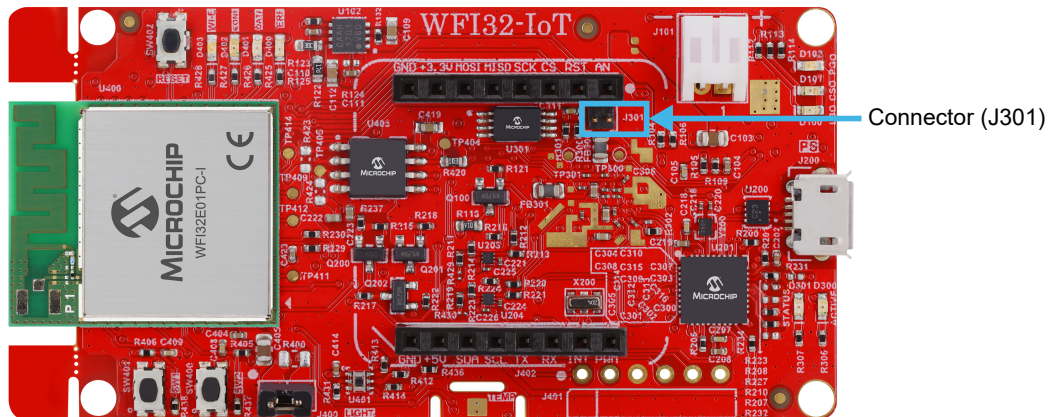
- Connects to a computer through a Micro-B USB cable
- Programs devices using MPLAB X IDE or MPLAB X IPE
- Supports multiple hardware and software breakpoints, stopwatch and source code file debugging
- Debugs the application in real time
- Sets breakpoints based on internal events
- Monitors internal file registers
- Debugs at full speed
- Configures pin drivers
- Field-upgradeable through an MPLAB X IDE firmware download
- Adds new device support and features by installing the latest version of MPLAB X IDE  
**Note:** The MPLAB X IDE is available for free at [www.microchip.com/mplab-x-ide](http://www.microchip.com/mplab-x-ide).
- Indicates debugger status using on-board LEDs

### 3.2.1 Recovery Method

When the MPLAB PKOB4 is unresponsive, use the MPLAB X IDE tool to recover the WFI32-IoT board through the following recovery method:

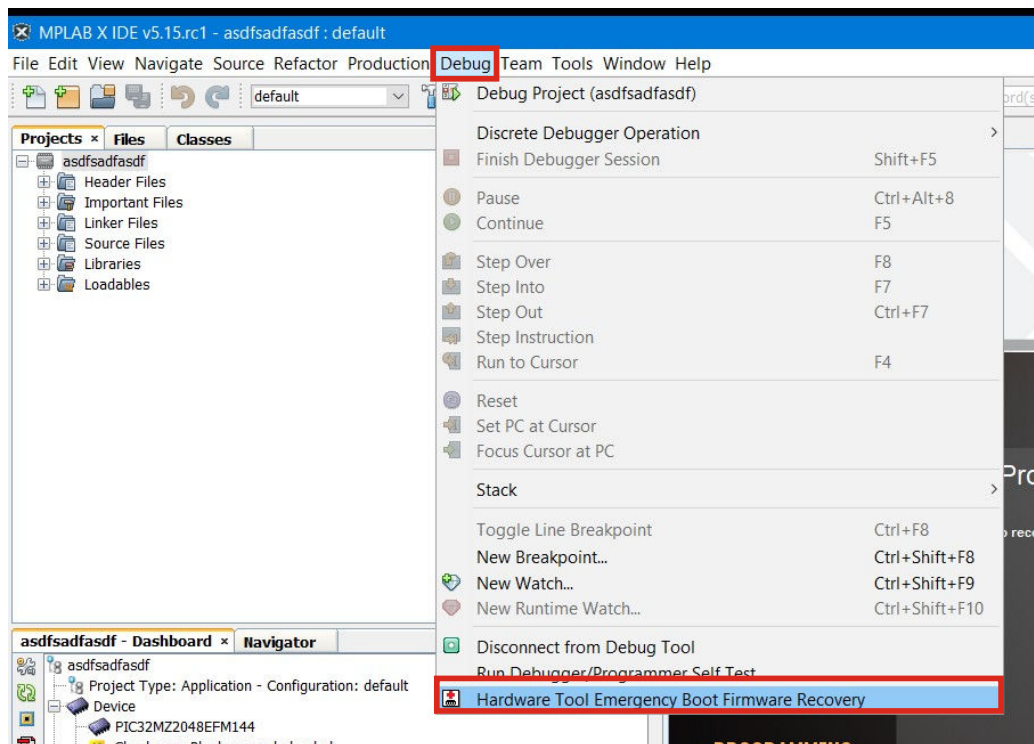
1. Short the pin1 and pin2 of the connector (**J301**) to the ground for approximately 15 seconds; see the following figure.  
**Note:** Ensure that the WFI32-IoT board is turned ON to perform the recovery method.

Figure 3-3. WFI32-IoT Board (EV36W50A) – Recovery Method



2. Open the latest version of MPLAB X IDE.
3. The following figure illustrates the opening window of the MPLAB X IDE. From the “Debug” drop-down list, select *Hardware Tool Emergency Boot Firmware Recovery*.

Figure 3-4. MPLAB® X IDE Opening Window



4. Follow the instructions shown in the preceding figure to bring the tool back to factory condition. For additional information on the MPLAB PKOB4, refer to the *MPLAB® PICKit™ 4 In-Circuit Debugger User's Guide (DS50002751)* and *MPLAB Snap In-Circuit Debugger User's Guide (DS50002787)*.

### 3.3 USB Connectivity

The WFI32E01PC module has an integrated full-speed USB peripheral. This feature enables the user to implement USB functionality through the Micro-AB USB connector (J200) on the WFI32-IoT board.

### 3.4 mikroBUS Socket

A mikroBUS socket (J402) expands the functionality of the WFI32-IoT board using the MikroElektronika mikroBUS™ Click™ adapter boards. The mikroBUS connector consists of the following:

- 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 and 5V power lines

**Table 3-1. mikroBUS Socket Pinout Details**

Pin Number	Pin on mikroBUS Socket	Pin Description of mikroBUS Socket	Pin on WFI32E01PC Module <sup>(1)</sup>
1	AN	Analog input	AN14/ANN0/CVD14/CVDR14/RPA14/RA14
2	RST	Reset	ETH_CLK_OUT/CVDT10/RPC12/RC12
3	CS	SPI Chip Select	CVDT13/ETXD0/RPC15/RC15
4	SCK	SPI Clock	SCK2/RPA11/RA11
5	MISO	SPI Host Input Client Output	PTA_WLAN_ACTIVE/RPK5/RK5
6	MOSI	SPI Host Input Client Input	BT_CLK_OUT/RPK4/RK4
7	+3.3V	3.3V power	+3.3V
8	GND	Ground	GND
9	GND	Ground	GND
10	+5V	5V power	+5V
11	SDA	I2C Data	SDA1/RPA5/RA5
12	SCL	I2C Clock	SCL1/RPA4/RA4
13	TX	UART transmit	PTA_BT_ACTIVE/RPK7/RK7
14	RX	UART receive	TDI/PGD4/AN9/CVD9/CVDR9/RPB9/RB9
15	INT	Hardware interrupt	ANN1/CVD15/CVDR15/RPA13
16	PWM	PWM output	ANA0/RPB12/RB12

**Notes:**

1. For more details on the WFI32E01PC module pins, refer to the *PIC32MZ1025W104 MCU and WFI32E01 module with Wi-Fi® and Hardware-based Security Accelerator Data Sheet (DS70005425)*.
2. The SPI interface on the click board can operate up to 12.5 MHz, and the WFI32E01PC module supports up to 20 MHz.
3. To have a fully functional UART click board, the R432 and R435 (default) resistors are populated on the WFI32-IoT board.
4. To have a fully functional CAN click board, populate the R433 and R434 resistors on the WFI32-IoT board.
5. To have a fully functional OLED click board, depopulate the R436 resistor on the WFI32-IoT board.

### 3.5 Switches

The following are the available switches on the WFI32-IoT board:

- User-configurable switches – (SW400) and (SW401)
- Reset switch (SW402) – Connected with the  $\overline{\text{MCLR}}$  signal of the WFI32E01PC module

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

**Table 3-2. Switches Description**

Switch Name	Description	Pin on WFI32E01PC Module
SW400	User configurable switch2	PGC4/TCK/AN8/CVD8/CVDR8/RPB8
SW401	User configurable switch1	INT0/AN17/CVD17/CVDR17/RPA10
SW402	Reset switch	$\overline{\text{MCLR}}$

### 3.6 LEDs

The WFI32-IoT on-board LEDs are categorized into three types:

- Power LEDs
  - Green (D101) – Charge indicator
  - Red (D100) – Low battery indicator
  - Blue (D102) – Power indicator
- PKOB4 LEDs
  - Green (D300) – ACTIVE indicator
  - Yellow (D301) – STATUS indicator
- LEDs related to the WFI32E01PC module:
  - Red LED (D400)
  - Yellow LED (D401)
  - Green LED (D402)
  - Blue LED (D403)

The following table lists the LEDs that can be turned ON or OFF using the connected GPIO pins.

**Table 3-3. LEDs Description**

LED Name	Description	Pin on WFI32E01PC Module
Red LED (D400)	User configurable LED1	ERXDV/CVDT14/RPK12
Yellow LED (D401)	User configurable LED2	EMDIO/CVDT15/RPK13
Green LED (D402)	User configurable LED3	EMDC/CVDT16/RPK14
Blue LED (D403)	User configurable LED4	ERXERR/CVDT7/RPC9

### 3.7 Temperature Sensor

The MCP9808 digital temperature sensor converts temperatures between -20°C and +100°C to a digital word with  $\pm 0.25^\circ\text{C}/\pm 0.5^\circ\text{C}$  (typical/maximum) accuracy. For more details, refer to the *MCP9808  $\pm 0.5^\circ\text{C}$  Maximum Accuracy Digital Temperature Sensor* (DS20005095).

The following are the additional features of the MCP9808 digital temperature sensor:

- Accuracy

- $\pm 0.25^{\circ}\text{C}$  (typical) from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- $\pm 0.5^{\circ}\text{C}$  (maximum) from  $-20^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$
- User-Selectable Measurement Resolution
  - $0.5^{\circ}\text{C}$
  - $0.25^{\circ}\text{C}$
  - $0.125^{\circ}\text{C}$
  - $0.0625^{\circ}\text{C}$
- User-Programmable Temperature Limits
  - Temperature Window Limit
  - Critical Temperature Limit
- User-Programmable Temperature Alert Output
- Operating Voltage Range – 2.7-5.5V
- Operating Current – 200  $\mu\text{A}$  (typical)
- Shutdown Current – 0.1  $\mu\text{A}$  (typical)

The MCP9808 temperature sensor is connected to the WFI32E01PC module through I<sup>2</sup>C and a GPIO for the user-configurable alert output.

**Note:** 7-bit I2C address – 0x18

**Table 3-4. MCP9808**

Pin Name	Description	Pin on WFI32E01PC Module
SDA	I2C Data	SDA1/RPA5
SCL	I2C Clock	SCL1/RPA4
Alert	ASYNCR external interrupt	TDO/AN7/CVD7/CVDR7/CVDT0/RPB7

### 3.8 Ambient Light Sensor

A OPT3001 is a sensor that measures the intensity of visible light. The light sensor is mounted on the WFI32-IoT board for measuring the light intensity.

**Table 3-5. Light Sensor**

Pin Name	Description	Pin on WFI32E01PC Module
SDA	I2C Data	SDA1/RPA5
SCL	I2C Clock	SCL1/RPA4
INT	Interrupt output open-drain	TMS/AN6/CVD6/CVDR6/CVDT1/RPB6

### 3.9 Serial Flash

The WFI32-IoT board has an on-board 32-Mbit external SPI Flash (SST26VF032B) memory for the storage of data. For more details on the serial Flash, refer to the *SST26VF032B/SST26VF032BA 2.5V/3.0V 32-Mbit Serial Quad I/O™ (SQI™) Flash Memory Data Sheet (DS20005218)*. The following table describes the details of the serial Flash pin connection.

**Table 3-6. Serial Flash Pin Description**

Pin Number	Pin on Serial Flash (SST26VF032B)	Pin Description of Serial Flash	Pin on WFI32E01PC Module <sup>(1)</sup>
1	$\overline{\text{CE}}$	Chip Enable	SPI1CS/RPA1/RA1
2	SO	Serial Data Output for SPI mode	SDI1/RPC7/RC7

.....continued			
Pin Number	Pin on Serial Flash (SST26VF032B)	Pin Description of Serial Flash	Pin on WFI32E01PC Module <sup>(1)</sup>
3	WP	Write-Protect	Not connected
4	VSS	Ground	GND
5	SI	Serial Data Input for SPI mode	SDO1/RPC8/RC8
6	SCK	Serial Clock	SCK1/RPC6/RC6
7	HOLD	Hold	Not connected
8	VDD	Input power supply	VDD

**Note:**

1. For more details on the WFI32E01PC module pins, refer to the *PIC32MZ1025W104 MCU and WFI32E01 Module with Wi-Fi<sup>®</sup> and Hardware-based Security Accelerator Data Sheet (DS70005425)*.

### 3.10 Secondary Oscillator

The secondary oscillator (Y400) pin has an on-board 32.768-kHz crystal connected to the SOSCO/PK15 and SOSCI/PB15 pins of the WFI32E01PC module for the RTCC application.

### 3.11 WFI32E01PC Module

For more details on the WFI32E01PC module pinout details, refer to the *PIC32MZ1025W104 MCU and WFI32E01 Module with Wi-Fi<sup>®</sup> and Hardware-based Security Accelerator Data Sheet (DS70005425)*.

**Note:** The user can configure the Peripheral Pin Select (PPS) pins for any of the supported peripheral functions based on the end user application.

#### **4. WFI32-IoT Board Out of Box Demo**

The WFI32-IoT board's Out of the Box (OOB) demo is preloaded with a firmware image that enables the user to quickly connect and send data to the AWS cloud using the on-board temperature and light sensors. The users can easily build their own custom projects with software libraries and example codes provided in Harmony v3 framework. The OOB demo connects to the cloud and allows the user to control the WFI32-IoT board via a web-based interface.

For more details about the code and documentation related to the OOB demo, go to [www.github.com/MicrochipTech/WFI32-IoT](https://www.github.com/MicrochipTech/WFI32-IoT).



## 5. Appendix A: Reference Circuit

### 5.1 WFI32-IoT Board Schematics

Figure 5-1. Power Distribution Switch for PKOBA4

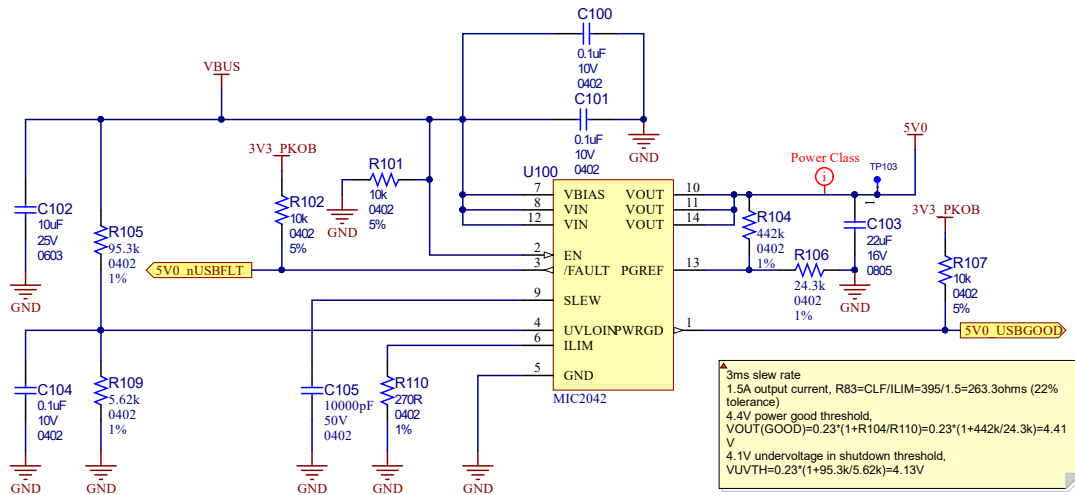


Figure 5-2. Li-Po Battery Connector/Charger

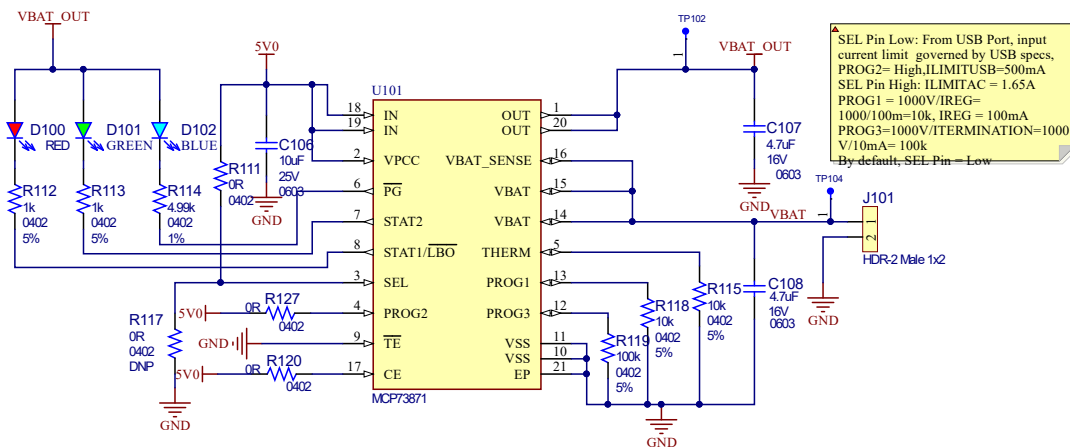




Figure 5-5. USB High Speed Hub

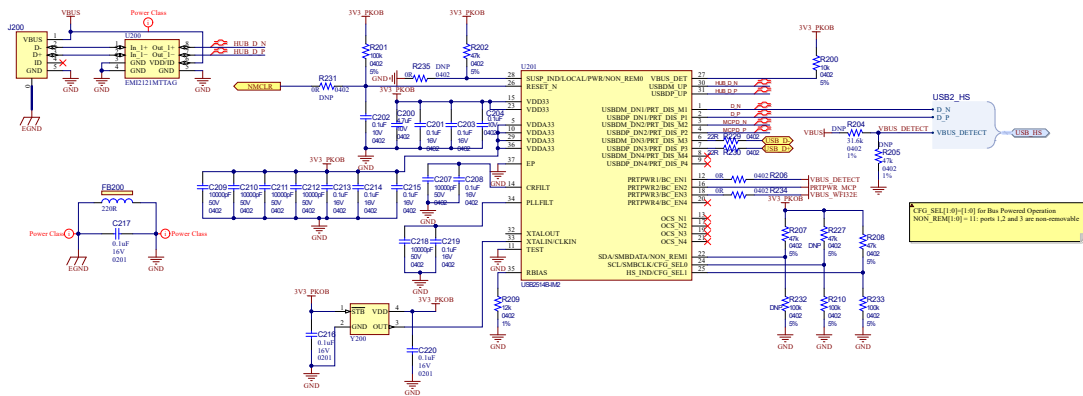


Figure 5-6. MCP2200 USB UART Converter

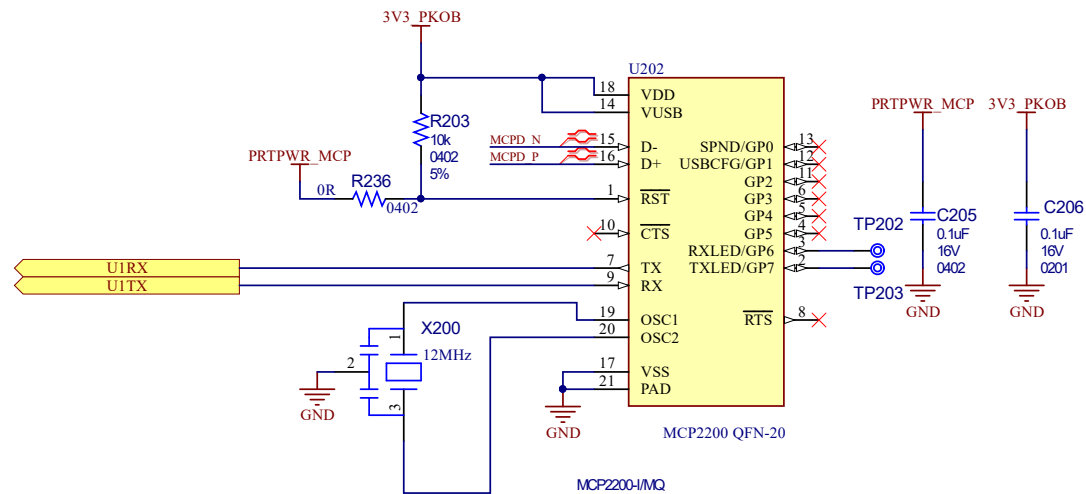


Figure 5-7. ICSP

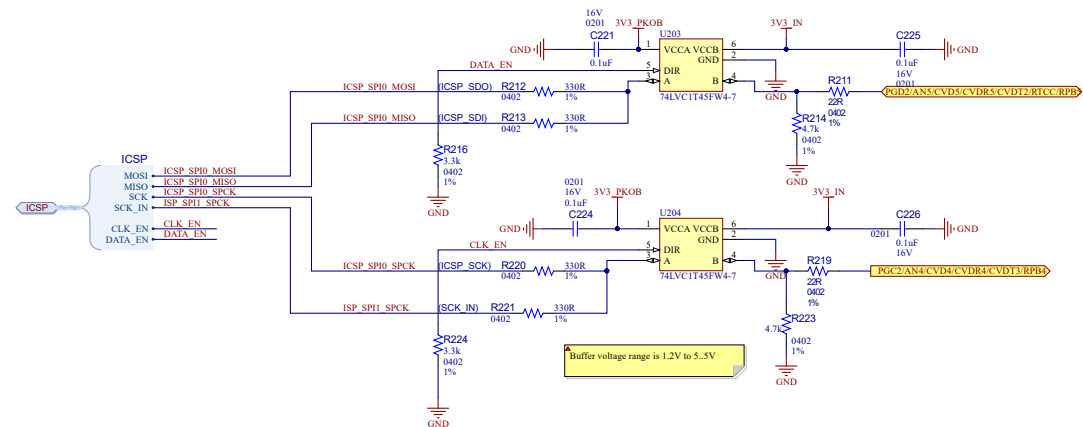


Figure 5-8. VPP Switch

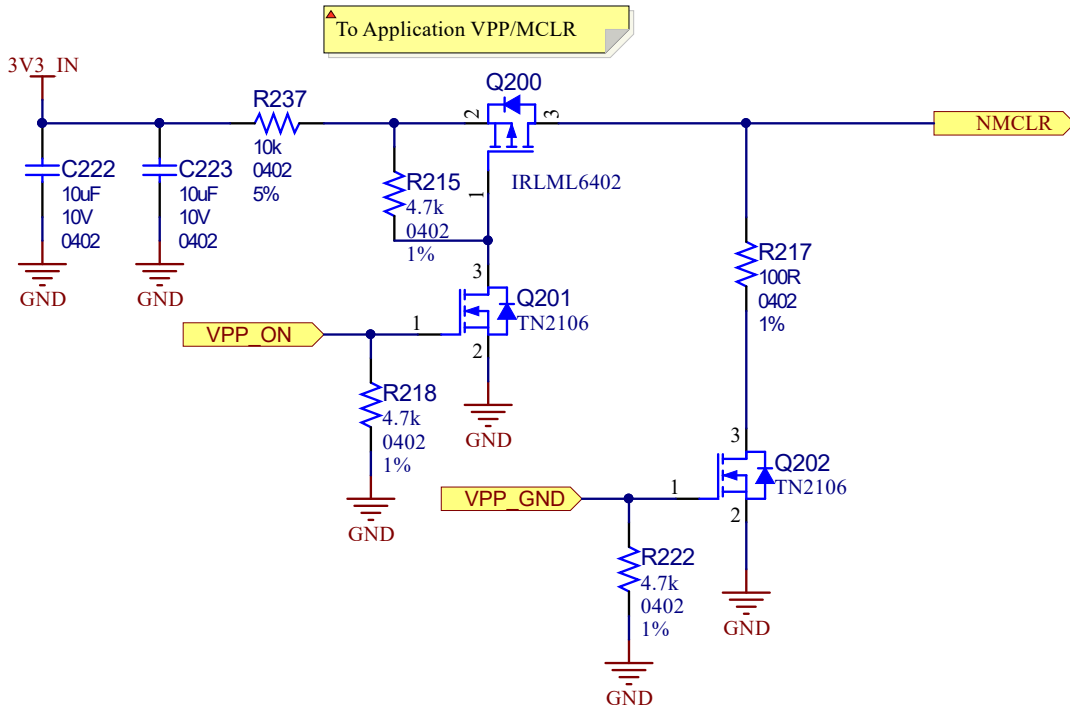


Figure 5-9. UART

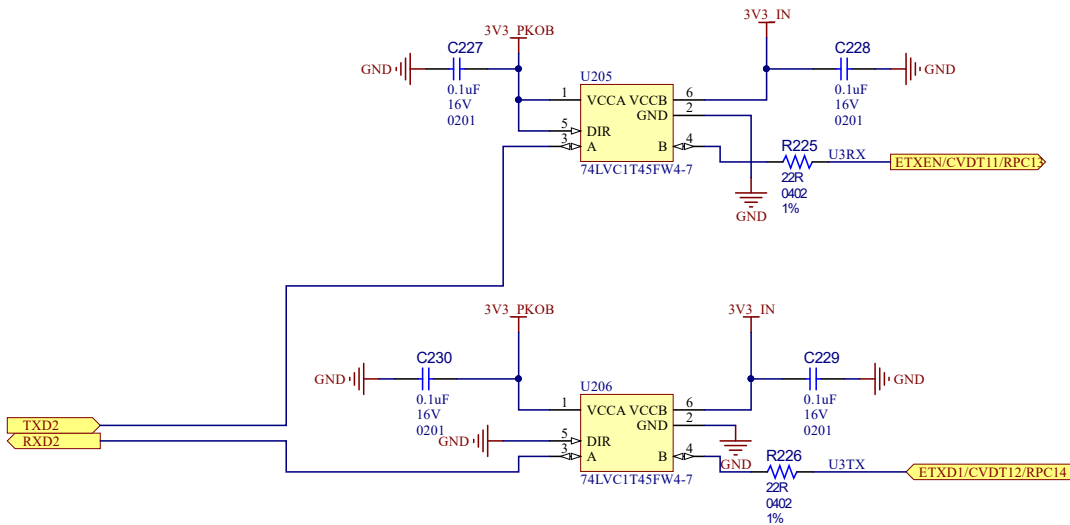




Figure 5-12. TGT Current Measurement Header

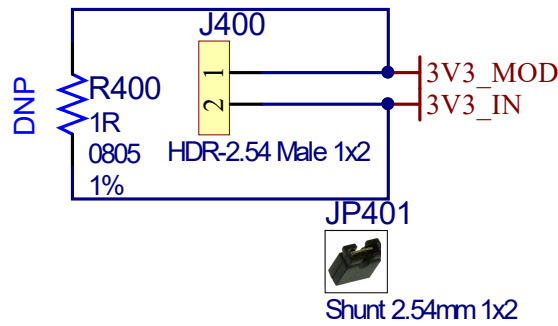


Figure 5-13. Secondary Oscillator

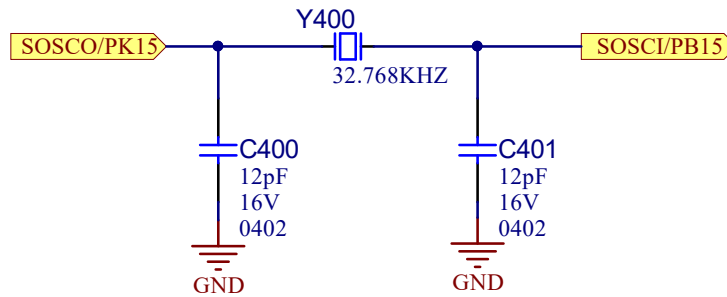


Figure 5-14. Buttons

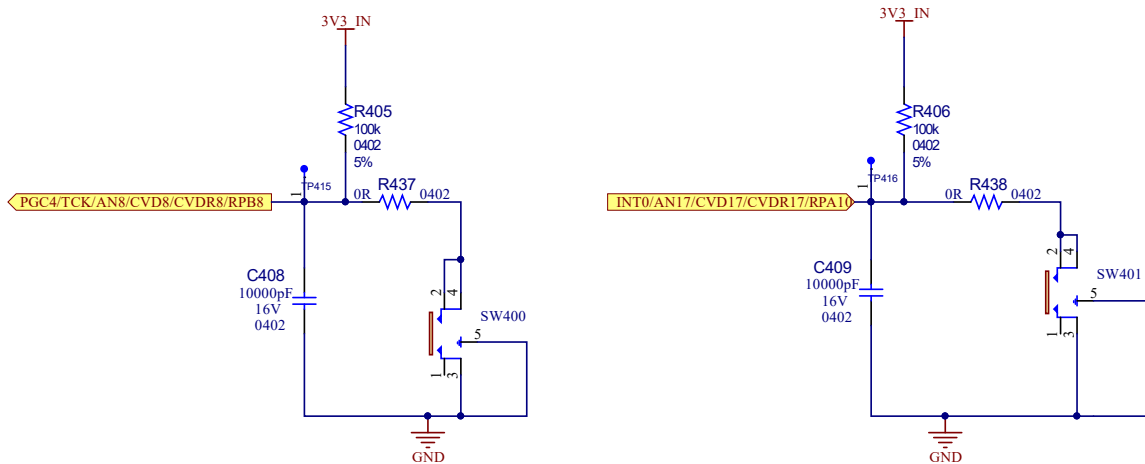


Figure 5-15. Ambient Light Sensor

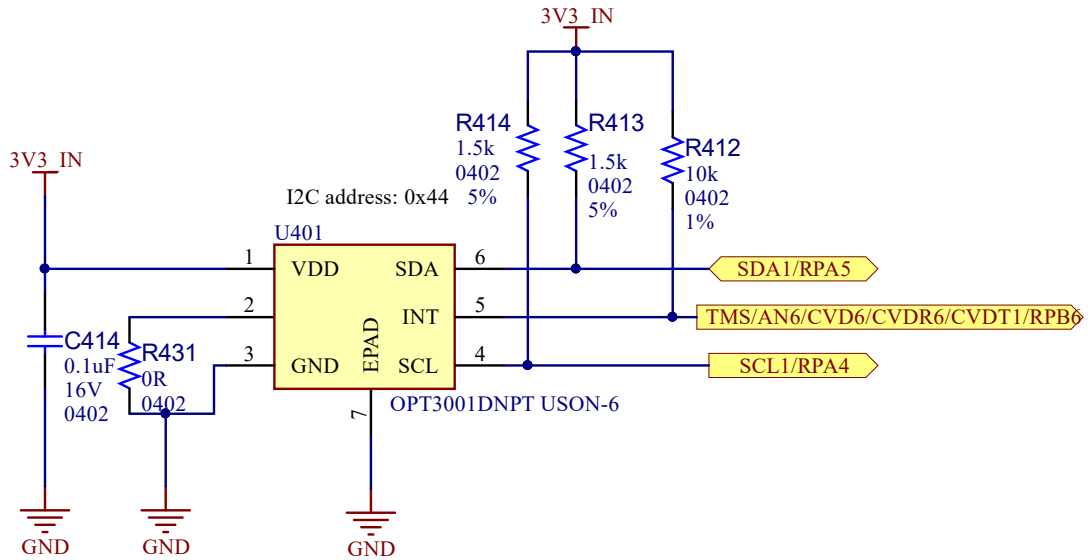


Figure 5-16. Temperature Sensor

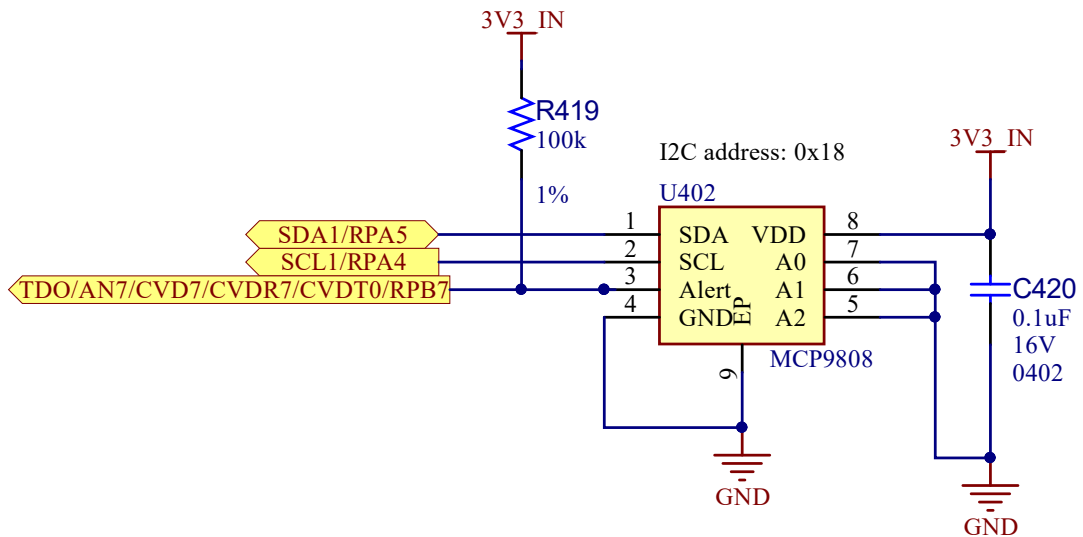


Figure 5-17. ICSP HDR

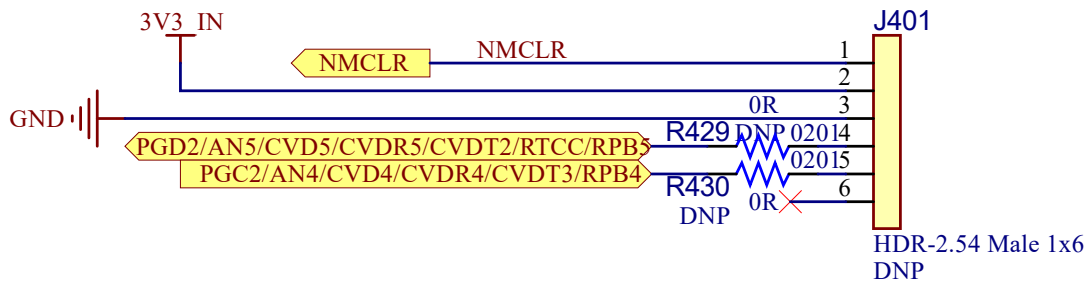


Figure 5-18. Test Points

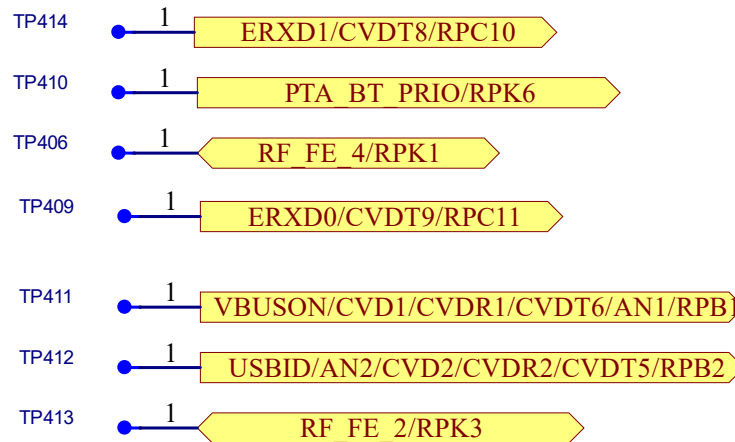


Figure 5-19. SPI Memory

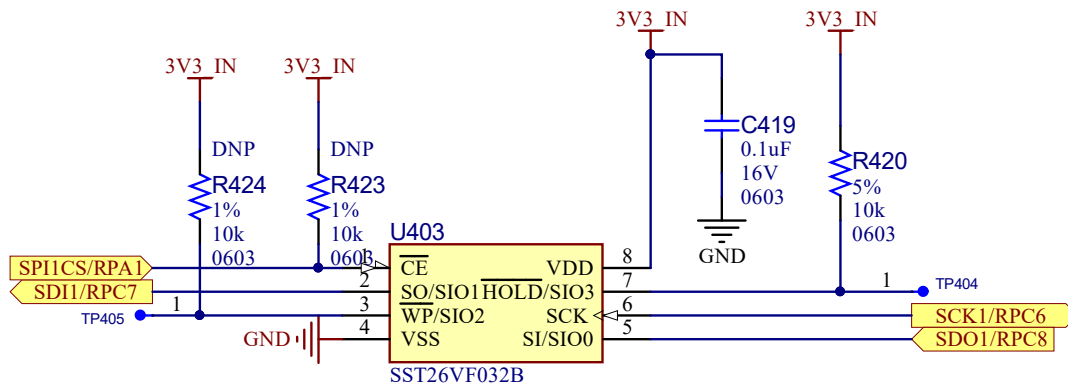


Figure 5-20. MikroBUS Header

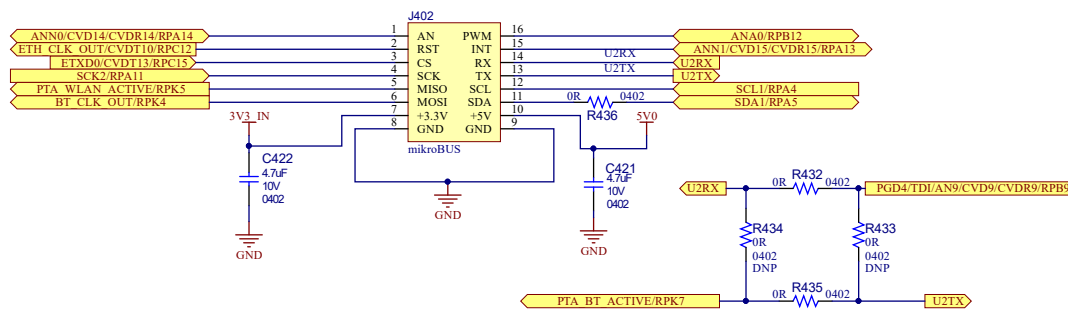
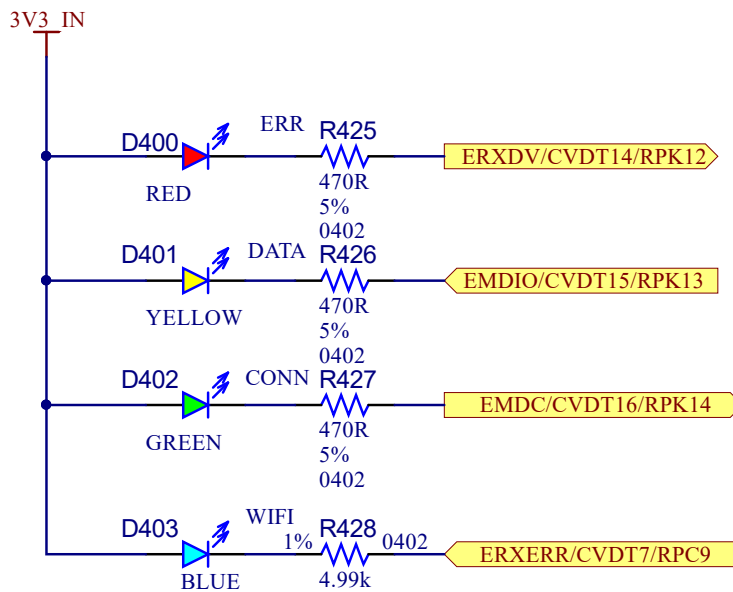




Figure 5-21. User LEDs



## 5.2 WFI32-IoT Board Bill of Materials

The following table provides the Bill of Materials (BOM) of the WFI32-IoT board.

**Table 5-1. WFI32-IoT Board Bill of Materials**

Designator	Description	Manufacturer	Manufacturer Part Number
C100, C101, C104, C202, C204	Capacitor, ceramic, 0.1 uF, 10V, 10%, X5R, SMD, 0402	KEMET	C0402C104K8PACTU
C102, C106	Capacitor, ceramic, 10 uF, 25V, 20%, X5R, SMD, 0603	Murata Electronics North America, Inc.	GRM188R61E106MA73D
C103, C405	Capacitor, ceramic, 22 uF, 16V, 10%, X5R, SMD, 0805	TDK Corporation	C2012X5R1C226K125AC
C105, C207, C211, C212, C218	Capacitor, ceramic, 10000 pF, 50V, 10%, X7R, SMD, 0402, AEC-Q200	Murata Electronics North America, Inc.	GCM155R71H103KA55D
C107, C108, C109, C112, C113, C115	Capacitor, ceramic, 4.7 uF, 16V, 10%, X5R, SMD, 0603	TDK Corporation	C1608X5R1C475K080AC
C110, C111, C114, C116, C201, C203, C205, C208, C213, C214, C215, C219, C404, C407, C414, C420, C423	Capacitor, ceramic, 0.1 uF, 16V, 10%, X7R, SMD, 0402	KEMET	C0402C104K4RACAUTO
C200, C301, C312, C314, C421, C422	Capacitor, ceramic, 4.7 uF, 10V, 10%, X5R, SMD, 0402	TDK Corporation	C1005X5R1A475K050BC
C206, C216, C217, C220, C221, C224, C225, C226, C227, C228, C229, C230, C302, C303, C304, C305, C306, C307, C308, C309, C310, C313, C315, C316, C317	Capacitor, ceramic, 0.1 uF, 16V, 10%, X5R, SMD, 0201	Murata Electronics North America, Inc.	GRM033R61C104KE84D
C222, C223	Capacitor, ceramic, 10 uF, 10V, X5R, SMD, 0402	Samsung Electro-Mechanics America, Inc.	CL05A106MP8NUB8
C300	Capacitor, ceramic, 10 pF, 25V, 0.5 pF, C0G, SMD, 0201	TDK Corporation	C0603C0G1E100D030BA
C311, C408, C409	Capacitor, ceramic, 10000 pF, 16V, 10%, X7R, SMD, 0402	KEMET	C0402C103K4RACTU
C400, C401	Capacitor, ceramic, 12 pF, 50V, 1%, NP0, SMD, 0402	Murata Electronics North America, Inc.	GRM1555C1H120FA01D
C419	Capacitor, ceramic, 0.1 uF, 16V, 10%, X7R, SMD, 0603	KEMET	C0603X104K4RACTU
D100, D400	Diode, LED, Red, 2V, 30 mA, 2 mcd, Clear, SMD, 0603	Lite-On <sup>®</sup> , Inc.	LTST-C190EKT
D101, D300, D402	Diode, LED, Green, 2V, 30 mA, 35 mcd, Clear, SMD, 0603	Lite-On <sup>®</sup> , Inc.	LTST-C191KGKT

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Designator	Description	Manufacturer	Manufacturer Part Number
D102, D403	Diode, LED, Blue, 3.2V, 20 mA, 140 mcd, Clear, SMD, 0603	Dialight Corporation	598-8091-107F
D301, D401	Diode, LED, Yellow, 2.1V, 20 mA, 6 mcd, Clear, SMD, 0603	Lite-On <sup>®</sup> , Inc.	LTST-C190YKT
FB200	Ferrite, 2A, 220R, SMD, 0805	Murata Electronics North America, Inc.	BLM21PG221SN1D
FB300, FB301	Ferrite, 2A, 600R, SMD, 0805	TDK Corporation	MPZ2012S601AT000
FB400, FB401	Ferrite, 120R at 100 MHz, 0.55A, 0.19R, SMD, 0402	Murata Electronics <sup>®</sup>	BLM15AG121SN1D
J101	Connector, HDR-2 Male, 1x2, Shroud, 3.3 MH, TH, R/A	JST Sales America Inc.	S2B-PH-K-S(LF)(SN)
J200	Connector, USB 2.0, Micro-B, Female, TH/SMD, R/A	FCI	10118194-0001LF
J301	Connector, Hardware, 1.27 mm, T/H AU 2POS	Harwin Plc.	M50-3530242
J400	Connector, Hardware, -2.54 Male, 1x2, Gold, 5.84 MH, TH, vertical	FCI	77311-118-02LF
J402	mikroBUS Host	Sullins Connector Solutions	PPTC081LFBN-RC
LABEL100	Label, PCBA, 18x6 mm, Data matrix, Assy#/Rev/ Serial/Date	ACT Logimark AS	505462
Q200	Transistor, FET, P-Channel, IRLML6402 -20V, -3.7A, 1.3W, SOT-23-3	International Rectifier	IRLML6402TRPBF
R100, R130	Resistor, TF, 0R, jumper, 1/8W, SMD, 0805	Yageo Corporation Corporation	RC0805JR-070RP
R102, R107, R115, R118, R132, R133, R200, R237	Resistor, TKF, 10k, 5%, 1/16W, SMD, 0402	Vishay/Dale	CRCW040210K0JNED
R103	Resistor, TKF, 31.6k, 1%, 1/10W, SMD, 0402	Panasonic	ERJ-2RKF3162X
R104	Resistor, TKF, 442K, 1%, 1/16W, AEC-Q200, SMD, 0402	Stackpole Electronics Inc	RMCF0402FT442K
R105	Resistor, TKF, 95.3K, 1%, 1/16W, AEC-Q200 SMD, 0402	Stackpole Electronics, Inc.	RMCF0402FT95K3
R106	Resistor, TKF, 24.3k, 1%, 1/16W, SMD, 0402	Samsung Electro-Mechanics America, Inc.	RC1005F2432CS
R108	Resistor, TKF, 47k, 1%, 1/10W, SMD, 0402	Panasonic <sup>®</sup> - ECG	ERJ-2RKF4702X
R109, R302	Resistor, TKF, 5.62k, 1%, 1/16W, SMD, 0402	Vishay/Dale	CRCW04025K62FKED

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Designator	Description	Manufacturer	Manufacturer Part Number
R110	Resistor, TKF, 270R, 1%, 1/10W, SMD, 0402	Panasonic Electronic Components	ERJ-2RKF2700X
R111, R120, R127, R206, R234, R236, R408, R409, R410, R431, R432, R435, R436, R437, R438	Resistor, TKF0R, 1/16W, SMD, 0402	Yageo Corporation	RC0402JR-070RL
R112, R113, R306	Resistor, TKF, 1k, 5%, 1/16W, SMD, 0402	Yageo Corporation	RC0402JR-071KL
R114, R428	Resistor, TKF, 4.99k, 1%, 1/16W, SMD, 0402	Stackpole Electronics Inc.	RMCF0402FT4K99
R116	Resistor, TKF, 100R, 1%, 1/10W, SMD, 0603	Stackpole Electronics Inc	RMCF0603FT100R
R119, R201, R210, R233, R303, R304, R305, R405, R406	Resistor, TKF, 100k, 5%, 1/10W, SMD, 0402	Panasonic	ERJ-2GEJ104X
R121, R214, R215, R218, R222, R223, R300, R301	Resistor, TKF, 4.7k, 1%, 1/16W, SMD, 0402	Yageo Corporation	RC0402FR-074K7L
R122, R128	Resistor, TKF, 147k, 1%, 1/10W, SMD, 0603	Panasonic	ERJ-3EKF1473V
R123, R126	Resistor, TKF, 200k, 1%, 1/10W, SMD, 0402	Panasonic	ERJ-2RKF2003X
R125, R129	Resistor, TKF, 20k, 1%, 1/10W, SMD, 0603	Panasonic	ERJ-3EKF2002V
R131	Resistor, TF, 2.2R, 1%, 1/2W, SMD, 1206	Susumu Co., LTD.	RL1632R-2R20-F
R202, R207	Resistor, TKF, 47k, 5%, 1/10W, SMD, 0402	Panasonic	ERJ-2GEJ473X
R209	Resistor, TKF, 12k, 1%, 1/16W, SMD, 0402	Yageo Corporation	RC0402FR-0712KL
R211, R219, R225, R226, R229, R230	Resistor, TKF, 22R, 1%, 1/16W, SMD, 0402	Yageo Corporation	RC0402FR-0722RL
R212, R213, R220, R221	Resistor, TKF, 330R, 1%, 1/16W, SMD, 0402	Yageo Corporation	RC0402FR-07330RL
R216, R224	Resistor, TKF, 3.3k, 1%, 1/10W, SMD, 0402	Panasonic® - ECG	ERJ-2RKF3301X
R217	Resistor, TKF, 100R, 1%, 1/16W, SMD, 0402	Yageo Corporation	RC0402FR-07100RL
R307, R425, R426, R427	Resistor, TKF, 470R, 5%, 1/16W, SMD, 0402	Yageo Corporation	RC0402JR-07470RL
R404, R412	Resistor, TKF, 10k, 1%, 1/10W, SMD, 0402	Panasonic	ERJ-2RKF1002X

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Designator	Description	Manufacturer	Manufacturer Part Number
R407	Resistor, TKF, 1k, 1%, 1/10W, SMD, 0402	Panasonic	ERJ-2RKF1001X
R413, R414	Resistor, TKF, 1.5k, 5%, 1/16W, SMD, 0402	ROHM Semiconductor	MCR01MRTJ152
R417, R418	Resistor, TKF, 200R, 1%, 1/10W, SMD, 0402	Panasonic	ERJ-2RKF2000X
R419	Resistor, TF, 100k, 1%, 1/8W, SMD, 0603	Vishay Beyschlag	MCT06030C1003FP500
R420	Resistor, TKF, 10k, 5%, 1/10W, SMD, 0603	Panasonic	ERJ-3GEYJ103V
SW400, SW401, SW402	Switch, Tactile, SPST-NO, 32V, 0.05A, KMR221GLFS	C&K Components	KMR221GLFS
U200	IC, Filter, EMI2121MTTAG, Common mode, ESD, WDFN-8	ON Semiconductor®	EMI2121MTTAG
U203, U204, U205, U206	IC, Voltage translator, Bidirectional, 1 Circuit, 74LVC1T45FW4-7, X2-DFN1010-6	Diodes Incorporated®	74LVC1T45FW4-7
U401	IC, Ambient light sensor, 6USON	Texas Instruments	OPT3001DNPT
X200	Resonator, 12 MHz, 0.2%, SMD, CSTNE12M0G550000R0	Murata Electronics®	CSTNE12M0G550000R0
Y400	Crystal, 32.768 KHz, 12.5 pF, SMD, 2-SMD, No Lead	Epson	FC-12M32.7680KA-A5
Q100, Q201, Q202	Microchip, Analog, Mosfet, N-Channel, TN2106, 60V, 280 mA, 360 mW, 2.5R, SOT23-3	Microchip Technology Inc.	TN2106K1-G
U100	Microchip, Analog power switch, 5.5V, 3A, MIC2042-1YTS, TSSOP-14	Microchip Technology Inc.	MIC2042-1YTS
U101	Microchip, Analog battery charger, MCP73871-2CCI/ML, QFN-20	Microchip Technology Inc.	MCP73871-2CCI/ML
U102, U104	Microchip, Analog, LDO, 0.8V-5V, MCP1727T-ADJE/MFDFN-8	Microchip Technology Inc.	MCP1727T-ADJE/MF
U201	Microchip, Interface, USB 2.0, HS, HUB, CTRLRUSB2514B-I/M2, SQFN-36	Microchip Technology Inc.	USB2514B-I/M2
U202	Microchip, Interface, USB, UART, MCP, 2200, I/MQQFN-20	Microchip Technology Inc.	MCP2200-I/MQ
U300	Microchip, MCU, 32-bit, 300 MHz, 2 MB, 384K x 8, ATSAME70N21B-CNT, TFBGA-100	Microchip Technology Inc.	ATSAME70N21B-CNT
U301	Microchip, Memory serial, EEPROM, 256k, I <sup>2</sup> C, 24LC256T-E/ST, TSSOP-8	Microchip Technology Inc.	24LC256T-E/ST
U400	MOD, Wi-Fi, WFI32E01PCI	Microchip Technology Inc.	WFI32E01PCI

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Designator	Description	Manufacturer	Manufacturer Part Number
U402	Microchip, Analog, Temperature sensor, -40C to +125C, MCP9808T-E/MC, DFN-8	Microchip Technology Inc.	MCP9808T-E/MC
U403	Microchip, Memory serial Flash, SST26VF032B-104I/SM, SOIJ-8	Microchip Technology Inc.	SST26VF032B-104I/SM
Y200	Microchip, CMOS oscillator, 24 MHz, DSC6011HI1B-024.0000, SMD, VFLGA-4	Microchip Technology Inc.	DSC6011HI1B-024.0000
Y300	Microchip, Clock oscillator, single, 12.000 MHz, DSC6011JI1B-012.0000, VLGA	Microchip Technology Inc.	DSC6011JI1B-012.0000
CBL100	Mechanical, hardware, cable USB, Male-A to Male Micro-B, Clear, 4'	Dongguan Zhanxin Electronic Technology Co., Ltd	A006ZX027
JP401	Mechanical, hardware, jumper, 2.54 mm, 1x2, Gold	Wurth Elektronik	60900213421
NUT100, NUT101, NUT102, NUT103	Mechanical, hardware, Nut, M3, Nylon	Keystone® Electronics Corp.	4688
STANDOFF100, STANDOFF101, STANDOFF102, STANDOFF103	Mechanical, hardware, Stand-off, M, 3x10 mm, M/F, Thread, 6 mm Hex, 5.5 mm Nylon	Duratool™	D01496

## 6. Appendix: B Regulatory Approval

This equipment (WFI32-IoT Board/EV36W50A) 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 WFI32E01PC module certifications. The following regulatory notices are to cover the requirements under the regulatory approval.

### 6.1 United States

The WFI32-IoT Board (EV36W50A) contains the WFI32E01PC 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.

### 6.2 Canada

The WFI32-IoT Board (EV36W50A) contains the WFI32E01PC 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.

## 6.3 Europe

This equipment (EV36W50A) 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 [EV36W50A] is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at [www.microchip.com/en-us/development-tool/EV36W50A](http://www.microchip.com/en-us/development-tool/EV36W50A) (See *Conformity Documents*).



**7. Document Revision History**

Revision	Date	Section	Description
A	02/2022	Document	Initial Revision

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## **Quality Management System**

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