

Introduction

The WINCS02 Add On Board is an efficient, low-cost development platform to evaluate and demonstrate the features and functionalities of Microchip's low-power Wi-Fi® WINCS02PC Module. This is compliant to the mikroBUS™ Standard. The Add On Board can be plugged easily on the host MCU board and can be controlled by the host Microcontroller Unit (MCU) with functional APIs/drivers through SPI.

The WINCS02 Add On Board offers:

- Easy-to-use platform to speed up design concepts to revenue with the low-power Wi-Fi WINCS02PC Module:
 - Host board supporting mikroBUS socket
- WINCS02PC Module, which includes a crypto device for a secure and authenticated cloud connection
- WINCS02PC Module mounted on the WINCS02 Add On Board as a pre-programmed device

Features

- WINCS02PC Low-Power 2.4 GHz IEEE® 802.11b/g/n-compliant Wi-Fi® Module
- Powered by 3.3V from Host Board through mikroBUS™ Connector (Default Supply) or by USB Type-C™ from a PC
- Host Companion Mode Using mikroBUS Socket
- Exposes Microchip Trust&Go CryptoAuthentication IC through mikroBUS Interface for Secure Applications
- LED for Power Status Indication
- Hardware Support for Three-Wire PTA Interface to Support Bluetooth® Co-Existence
- USB-to-UART Converter using Microchip MCP2200 for Debug UART

Table of Contents

Introduction	1
Features.....	1
1. Quick References.....	3
1.1. Reference Documentation	3
1.2. Hardware Prerequisites	3
1.3. Software Prerequisites.....	3
1.4. Acronyms and Abbreviations	3
2. Kit Overview.....	5
2.1. Kit Contents.....	6
3. Hardware.....	7
3.1. Power Supply.....	7
3.2. Firmware Update	8
3.3. Mode of Operation.....	9
3.4. Debug UART.....	9
3.5. PTA Interface (J203)	10
3.6. LED.....	10
3.7. RTCC Oscillator (Optional).....	10
4. Out of Box Demo.....	11
5. Appendix A: Reference Circuit.....	12
5.1. WINCS02 Add On Board Schematics.....	12
5.2. WINCS02 Add On Board Bill of Materials.....	14
6. Appendix B: Regulatory Approval.....	15
6.1. United States.....	15
6.2. Canada.....	16
6.3. Europe.....	16
7. Document Revision History.....	17
Microchip Information.....	18
The Microchip Website.....	18
Product Change Notification Service.....	18
Customer Support.....	18
Microchip Devices Code Protection Feature.....	18
Legal Notice.....	18
Trademarks.....	19
Quality Management System.....	20
Worldwide Sales and Service.....	21

1. Quick References

1.1 Reference Documentation

For further details, refer to the following:

- *MCP1727 1.5A, Low Voltage, Low Quiescent Current LDO Regulator Data Sheet* ([DS21999](#))
- mikroBUS™ Specification (www.mikroe.com/mikrobus)
- *MCP2200 USB 2.0 to UART Protocol Converter with GPIO* ([DS20002228](#))
- [WINCS02 Application Developer's Guide](#)
- *WINCS02 Family Data Sheet* ([DS70005577](#))

1.2 Hardware Prerequisites

- WINCS02 Add On Board ([EV68G27A](#))
- USB Type-C® compliant cable
- SQI SUPERFLASH® Kit 1^(1a) ([AC243009](#))
- For 8-bit Host MCU:
 - AVR128DB48 Curiosity Nano Evaluation Kit⁽¹⁾ ([EV35L43A](#))
 - Curiosity Nano Base for Click Boards⁽¹⁾ ([AC164162](#))
- For 32-bit Host MCU:
 - SAM E54 Xplained Pro Evaluation Kit⁽¹⁾ ([ATSAME54-XPRO](#))
 - mikroBUS™ Xplained Pro⁽¹⁾ ([ATMBUSADAPTER-XPRO](#))

Note:

1. For Host Companion mode
 - a. OTA Demo

1.3 Software Prerequisites

- MPLAB® X IDE (v6.15 and later)
- MPLAB® Code Configurator (MCC v5.4.1) with MCC Harmony Content Manager Tool (CMT)
- MPLAB® XC32 Compiler (v4.35 and later)

1.4 Acronyms and Abbreviations

Table 1-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Description
BOM	Bill of Material
DFU	Device Firmware Update
DPS	Device Provisioning Service
GPIO	General Purpose Input Output
I ² C	Inter-Integrated Circuit
LDO	Low-Dropout
LED	Light Emitting Diode
MCU	Microcontroller Unit
NC	Not Connected
OOB	Out of the Box
OSC	Oscillator
PTA	Packet Traffic Arbitration

.....continued

Acronyms and Abbreviations	Description
PWM	Pulse Width Modulation
RTCC	Real Time Clock and Calendar
RX	Receiver
SCL	Serial Clock
SDA	Serial Data
SMD	Surface Mount
SPI	Serial Peripheral Interface
TX	Transmitter
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus

2. Kit Overview

The WINCS02 Add On Board is a plug-in board containing the low-power WINCS02PC Module. The signals required for control interface are connected to the on-board connectors of the Add On Board for flexibility and rapid prototyping.

Figure 2-1. WINCS02 Add On Board (EV68G27A) – Top View

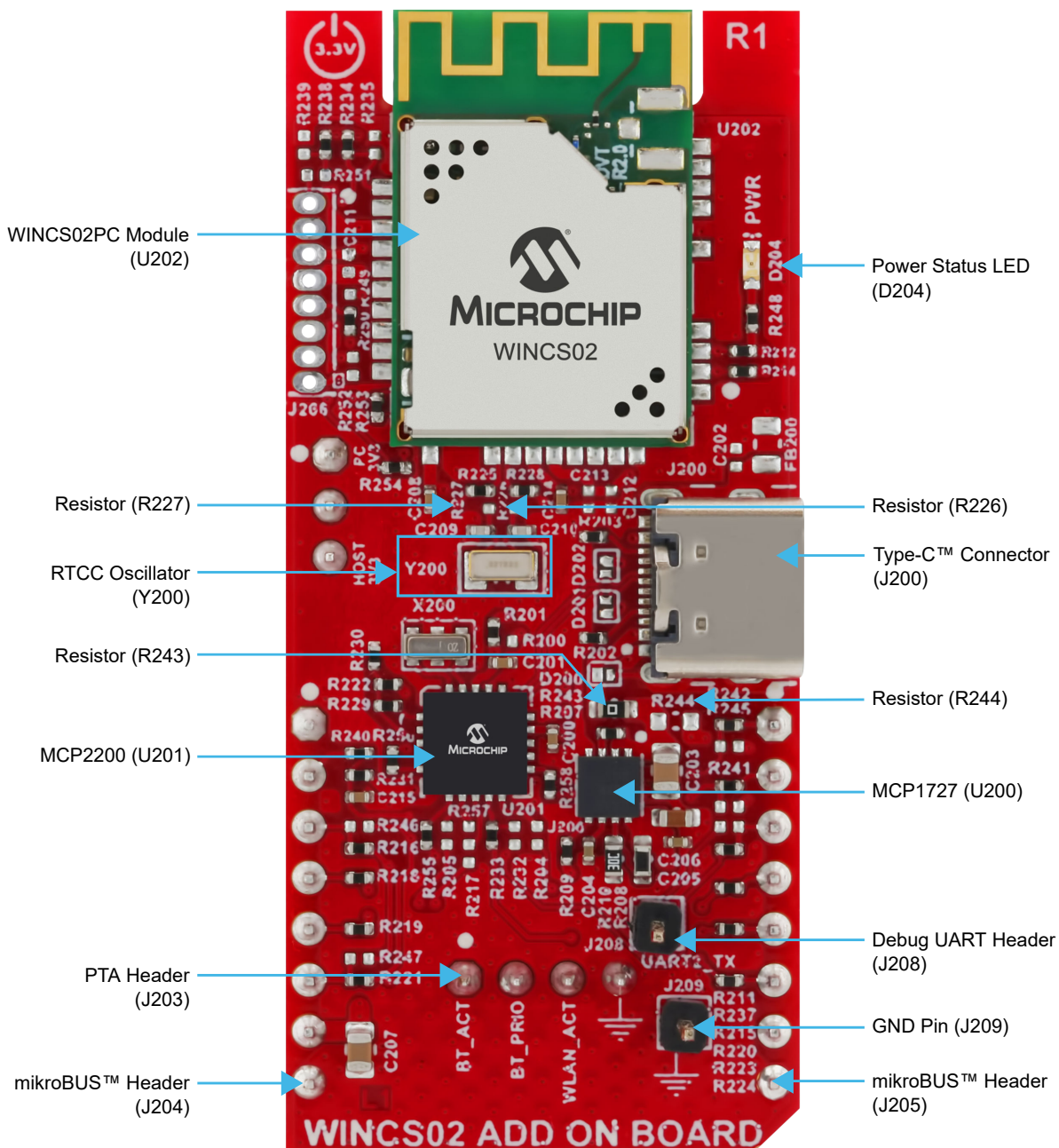
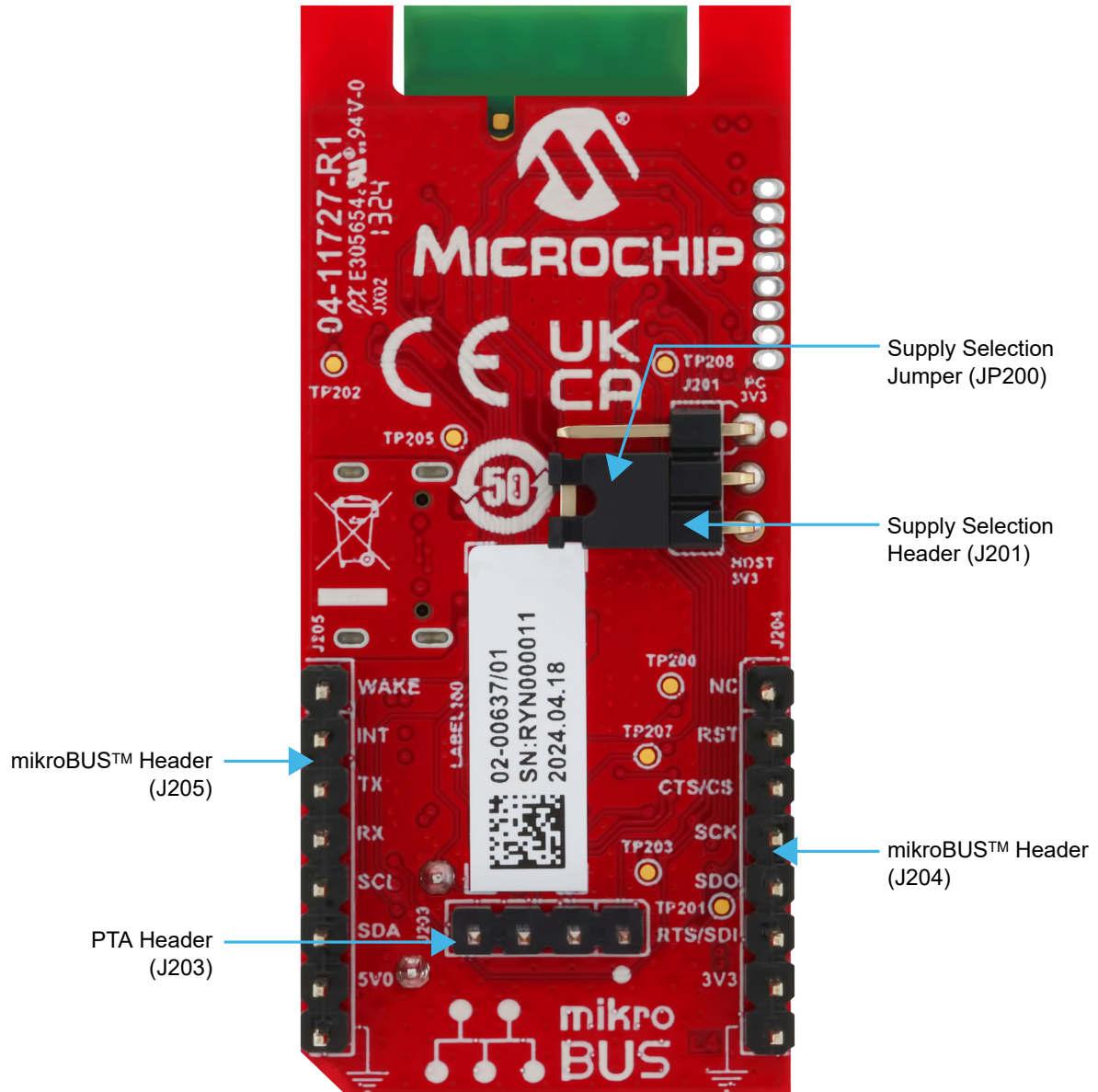


Figure 2-2. WINCS02 Add On Board (EV68G27A) – Bottom View



2.1 Kit Contents

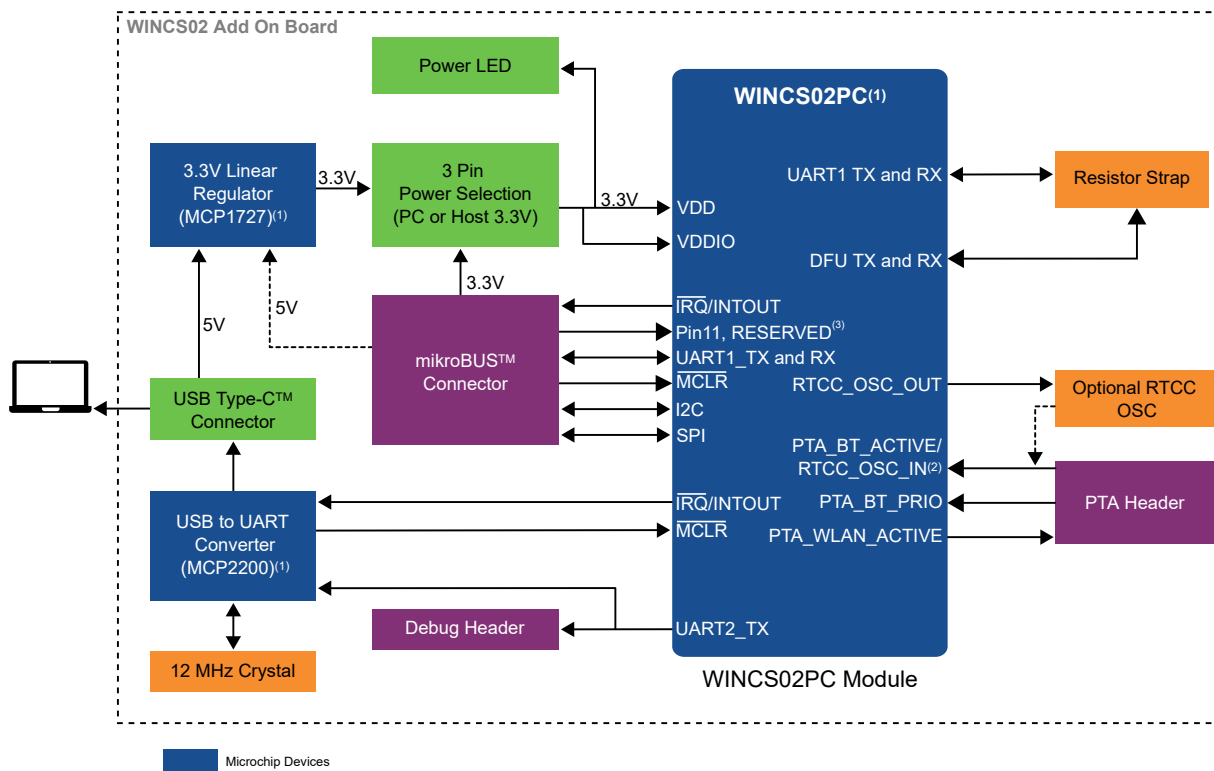
The EV68G27A (WINCS02 Add On Board) kit contains the WINCS02 Add On Board mounted with the WINCS02PC Module.

Note: If any of the above items are missing in the kit, go to 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 section describes the hardware features of the WINCS02 Add On Board.

Figure 3-1. WINCS02 Add On Board Block Diagram



Notes:

1. 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 WINCS02 Add On Board. For more details, go to support.microchip.com or contact your local Microchip Sales office.
2. PTA functionality is not supported while using the RTCC Oscillator.
3. It is recommended to connect this pin with a Tri-State pin on the host board.

Table 3-1. Microchip Components Used in the WINCS02 Add On Board

S.No.	Designator	Manufacturer Part Number	Description
1	U200	MCP1727T-ADJE/MF	MCHP Analog LDO 0.8V-5V MCP1727T-ADJE/MF DFN-8
2	U201	MCP2200-I/MQ	MCHP Interface USB UART MCP2200-I/MQ QFN-20
3	U202	WINCS02PC-I	MCHP RF Wi-Fi® 802.11 b/g/n WINCS02PC-I

3.1 Power Supply

The WINCS02 Add On Board can be powered using any of the following sources, depending on the use case scenario, but the default supply is from the host board 3.3V supply using mikroBUS™ socket:

1. Host board 3.3V supply – Jumper (JP200) is connected between J201-3 and J201-2.

- The host board supplies 3.3V power through the mikroBUS header to the VDD supply pin of the WINCS02PC Module.
2. USB Type-C™ supply – Jumper (JP200) is connected between J201-1 and J201-2.
 - The USB supplies 5V to Low-Dropout (LDO) MCP1727 (U200) to generate 3.3V supply for VDD supply pin of the WINCS02PC Module.
 3. (Optional) Host board 5V supply – There is a provision to supply 5V from the Host board with rework (populate R244 and depopulate R243). When using the host board 5V supply, do not mount jumper (JP200) on the supply selection header (J201).
 - The Host board provides 5V supply through the mikroBUS header to the LDO regulator (MCP1727) (U200) to generate 3.3V supply for VDD supply pin of the WINCS02PC Module.
 - VDD supply derives the VDDIO supply to the WINCS02PC Module.

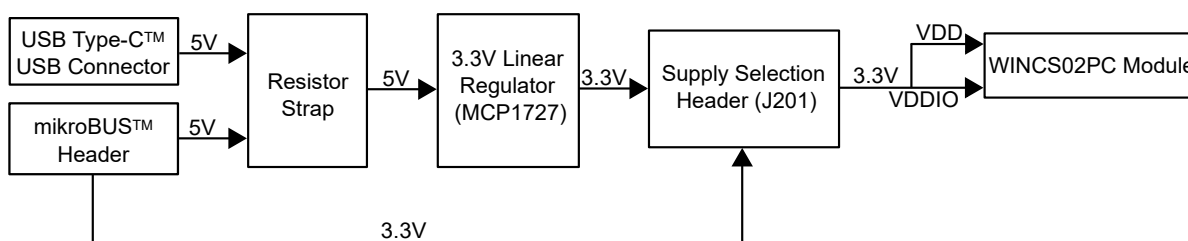
Mount the jumper (JP200) on the supply selection header (J201) for Power selection between the USB power supply or the 3.3V from the mikroBUS interface.

Table 3-2. Power Selection

3.3V Generated from USB Power Supply	3.3V from mikroBUS Interface
JP200 on J201-1 and J201-2	JP200 on J201-3 and J201-2

The following figure illustrates the power supply sources used to power the WINCS02 Add On Board.

Figure 3-2. Power Supply Block Diagram



Notes:

- Remove the supply selection jumper (JP200) present on the Supply Selection Header (J201) and connect an ammeter between J201-2 and J201-3 for external supply current measurement.
- Remove the supply selection jumper (JP200) present on the Supply Selection Header (J201) and connect an ammeter between J201-2 and J201-1 for USB Type-C supply current measurement.

3.1.1 Voltage Regulators (U200)

An on-board voltage regulator (MCP1727) generates 3.3V. This is used only when the Host board or the USB supplies 5V to the WINCS02 Add On Board.

- **U200** – Generates 3.3V that powers the WINCS02PC Module along with the associated circuits

For more details on MCP1727 voltage regulators, refer to the *MCP17271.5A, Low Voltage, Low Quiescent Current LDO Regulator Data Sheet (DS21999)*.

3.2 Firmware Update

The WINCS02PC Module comes with pre-programmed firmware. Microchip periodically releases firmware to fix reported issues or to implement the latest feature support. There are two ways to perform regular firmware updates:

1. Serial DFU command-based update over UART
2. Host assisted Over-the-Air (OTA) update

Note: For serial DFU and OTA programming guidance, refer to the [WINCS02 Application Developer's Guide](#).

3.3 Mode of Operation

The WINCS02 Add On Board supports only Host Companion mode using Host MCU board with mikroBUS socket via mikroBUS interface.

3.3.1 Host MCU Board with mikroBUS Socket via mikroBUS Interface (Host Companion Mode)

The WINCS02 Add On Board can be used with the host MCU boards using mikroBUS™ sockets with the control interface. The following table shows how the pinout on the WINCS02 Add On Board mikroBUS interface corresponds to the pinout on the WINCS02PC Module.

Table 3-3. mikroBUS Socket Pinout Details (J204)

Pin Number J204	Pin on mikroBUS Header	Pin Description of mikroBUS Header	Pin on WINCS02PC Module ⁽¹⁾
Pin1	AN	Analog input	—
Pin2	RST	Reset	Pin4, MCLR
Pin3	\overline{CS}	SPI Chip Select	Pin16, SPI_CS
Pin4	SCK	SPI Clock	Pin18, SPI_SCK
Pin5	MISO	SPI host input client output	Pin17, SPI_SDO
Pin6	MOSI	SPI host output client input	Pin15, SPI_SDI
Pin7	+3.3V	3.3V power	+3.3V from host MCU socket
Pin8	GND	Ground	GND

Table 3-4. mikroBUS Socket Pinout Details (J205)

Pin Number J205	Pin on mikroBUS Header	Pin Description of mikroBUS Header	Pin on WINCS02PC Module ⁽¹⁾
Pin1 ⁽²⁾	PWM	PWM output	Pin11, Reserved
Pin2	INT	Hardware interrupt	Pin13, \overline{IRQ} /INTOUT
Pin3	TX	UART transmit	Pin14, UART1_TX
Pin4	RX	UART receive	Pin19, UART1_RX
Pin5	SCL	I ² C Clock	Pin2, I2C_SCL
Pin6	SDA	I ² C Data	Pin3, I2C_SDA
Pin7	+5V	5V power	NC
Pin8	GND	Ground	GND

Notes:

- For more details on the WINCS02PC Module pins, refer to the *WINCS02 Family Data Sheet (DS70005577)*.
- It is recommended to connect this pin with a Tri-State pin on the host board.

3.4 Debug UART

Use the debug UART2_Tx to monitor the debug logs from the WINCS02PC Module. The user can print debug logs by using the following options:

- Connect USB Type-C™ cable to Type-C Connector (J200).
- Connect the RX pin of the USB-to-UART converter cable to the debug UART header (J208, UART2_Tx) and the GND pin of the USB-to-UART converter cable to GND pin (J209), respectively.

Use the following serial terminal settings:

- Baud rate: 460800 (no flow control)
- Data: 8 bits
- No parity

- Stop: 1 bit

Note: UART2_Rx is not available.

3.5 PTA Interface (J203)

The PTA interface supports a shared antenna between Bluetooth® protocol and Wi-Fi® protocol. It has the hardware-based 802.15.2 compliant Three-Wire PTA interface (J203) to address Wi-Fi/Bluetooth protocol co-existence.

Note: For more details, refer to the *Software Release Notes*.

Table 3-5. PTA Pin Configuration

Header Pin	Pin on WINCS02PC Module	Pin Type	Description
Pin1	Pin21, PTA_BT_ACTIVE/RTCC_OSC_IN	Input	Bluetooth® active
Pin2	Pin6, PTA_BT_PRIORITY	Input	Bluetooth priority
Pin3	Pin5, PTA_WLAN_ACTIVE	Output	WLAN active
Pin4	GND	Power	Ground

3.6 LED

The WINCS02 Add On Board has one red power status LED (D204).

3.7 RTCC Oscillator (Optional)

The optional RTCC Oscillator (Y200) 32.768 kHz crystal is connected to the Pin22, RTCC_OSC_OUT and Pin21, RTCC_OSC_IN/PTA_BT_ACTIVE pins of the WINCS02PC Module for the Real Time Clock and Calendar (RTCC) application. The RTCC oscillator is populated; however, the corresponding resistor jumpers (R227) and (R226) are not populated.

Note: The PTA functionality is not supported while using the RTCC Oscillator. For more details, refer to the *Software Release Notes*.

4. Out of Box Demo

The WINCS02 Add On Board requires a host MCU board to operate. For more details on setting up and executing any of the pre-written examples, refer to the *Example Applications* section in the [WINCS02 Application Developer's Guide](#).

For host companion mode demo examples, go to [Microchip-MPLAB-Harmony/wireless_apps_rnwf](#).

5. Appendix A: Reference Circuit

5.1 WINCS02 Add On Board Schematics

Figure 5-1. VDD Supply Selection Header

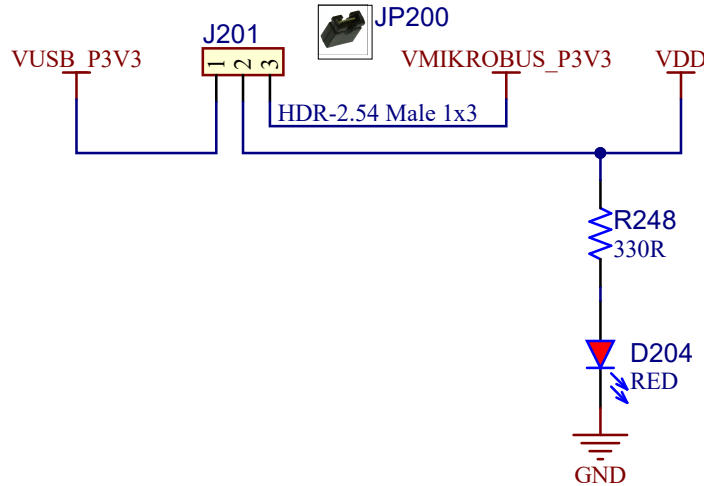


Figure 5-2. 3.3V Voltage Regulator

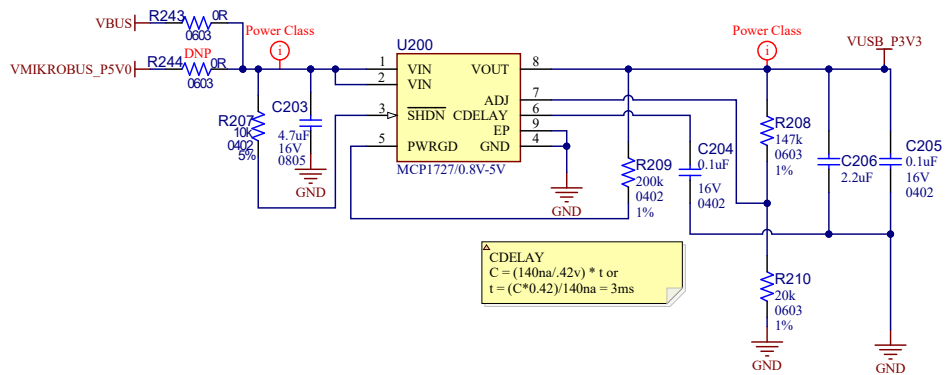


Figure 5-3. Debug UART

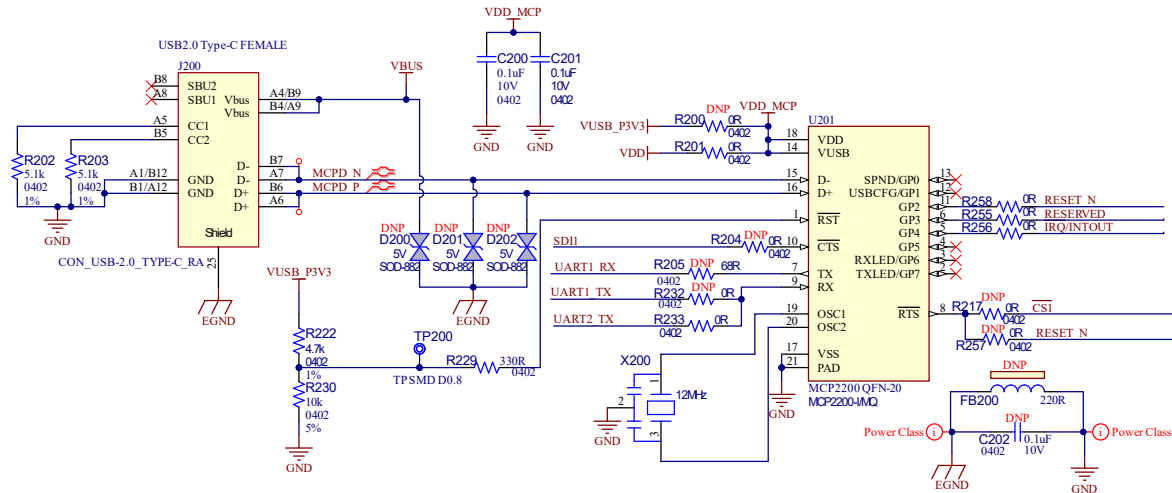


Figure 5-4. mikroBUS Header Section and PTA Header Section

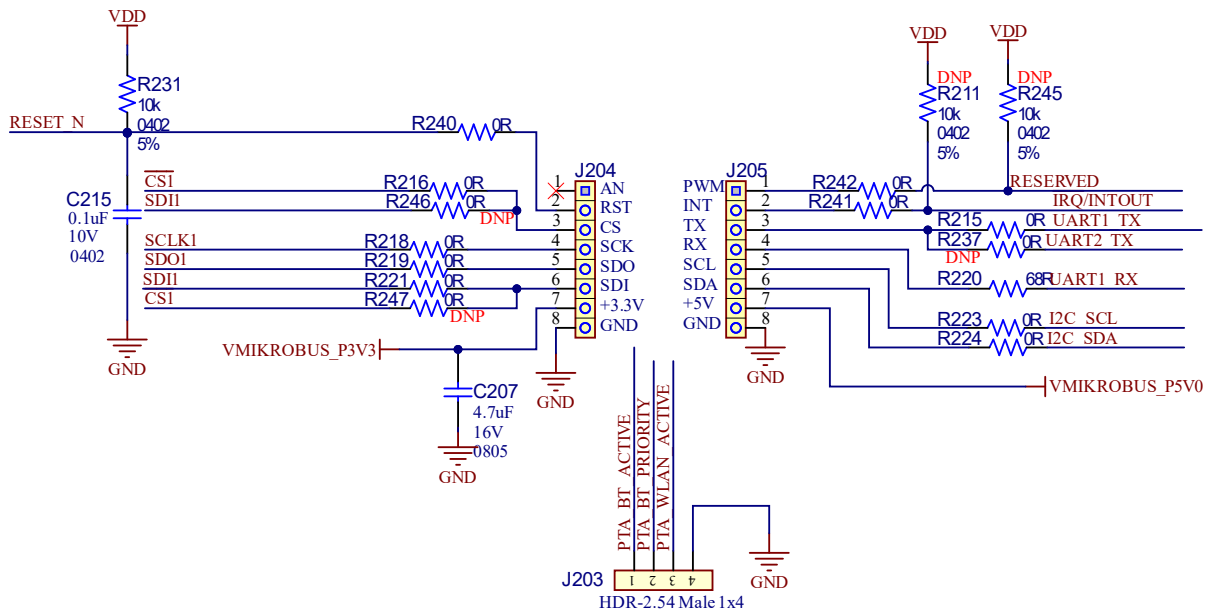
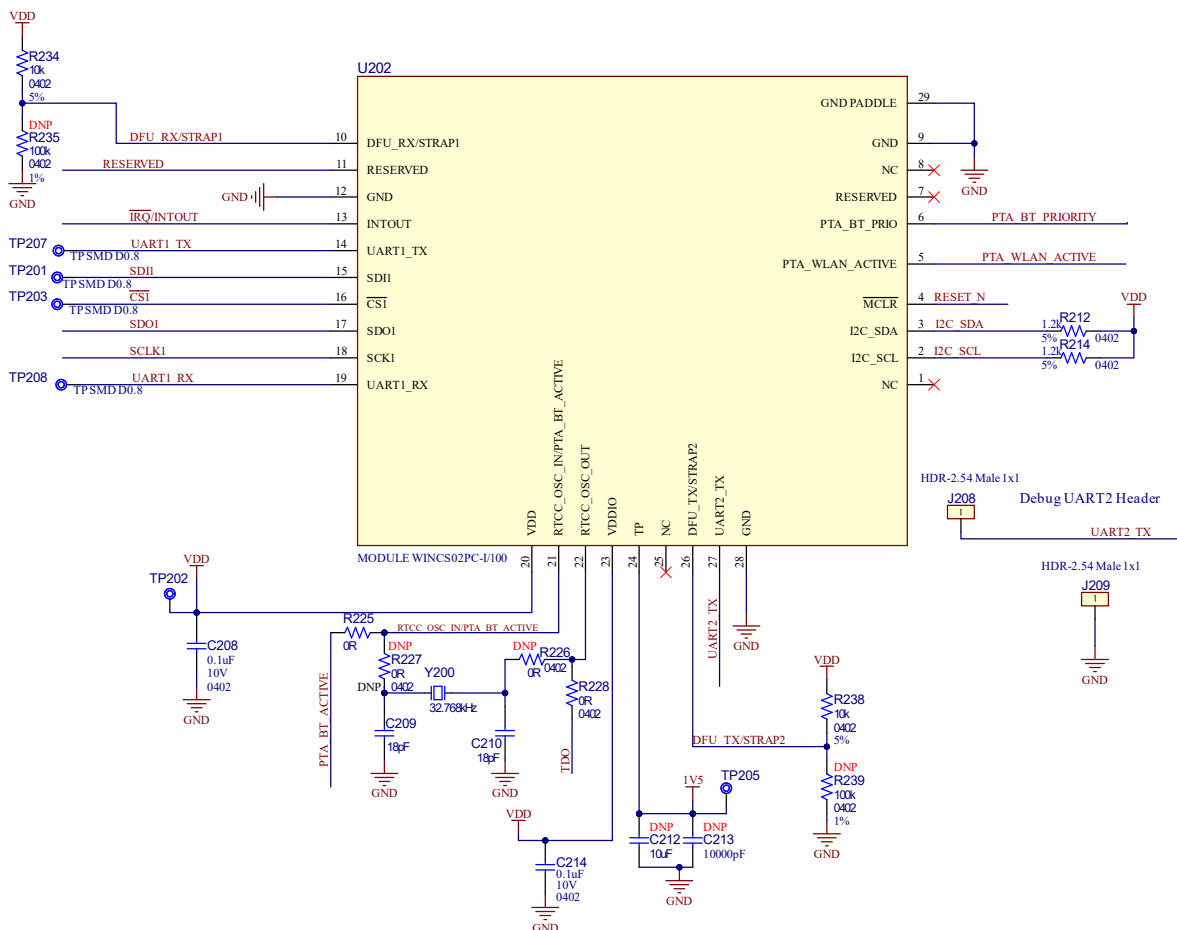


Figure 5-5. WINCS02PC Module Section



5.2 WINCS02 Add On Board Bill of Materials

For the Bill of Materials (BOM) of the WINCS02 Add On Board, go to the [EV68G27A](https://www.microchip.com/ev68g27a) product web page.

6. Appendix B: Regulatory Approval

This equipment (WINCS02 Add On Board/EV68G27A) 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 WINCS02PC module certifications. The following regulatory notices are to cover the requirements under the regulatory approval.

6.1 United States

The WINCS02 Add On Board (EV68G27A) contains the WINCS02PC 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: 2ADHKWIXCS02

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 WINCS02 Add On Board (EV68G27A) contains the WINCS02PC 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-WIXCS02

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.

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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 (EV68G27A) 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 [EV68G27A] is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at [EV68G27A](#) (See *Conformity Documents*).

7. Document Revision History

The document revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Table 7-1. Document Revision History

Revision	Date	Section	Description
A	10/2024	Document	Initial revision

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