

EVM User's Guide: CC2662RQ1-BCU-EVM

CC2662RQ1-BCU-EVM User's Guide



Description

The Dual Main Battery Control Unit (BCU) Board was designed to provide customers with a dual main reference design that can be used for WBMS hardware and software development. It's equipped with 2 [CC2662R-Q1](#) devices configured to provide the user with the ability to evaluate either a single main or dual main WBMS architecture with this one module. When combined with the [CC2662RQ1-CSU-EVM](#) module, users can quickly and easily evaluate and develop a WBMS system using TI's [CC2662R-Q1](#) device. Additionally, the [SIMPLELINK Wireless BMS Software Development Kit \(SDK\)](#) provides software support and example projects for full system evaluation.

Get Started

1. Order the [CC2662RQ1-BCU-EVM](#) and either the LP-XDS110 or the LP-XDS110ET launch pad.
2. Download the latest [software development kit \(SDK\)](#)
3. Download the comprehensive reference design files from the TI reference design page.
4. See the latest [CC2662R-Q1](#) product page

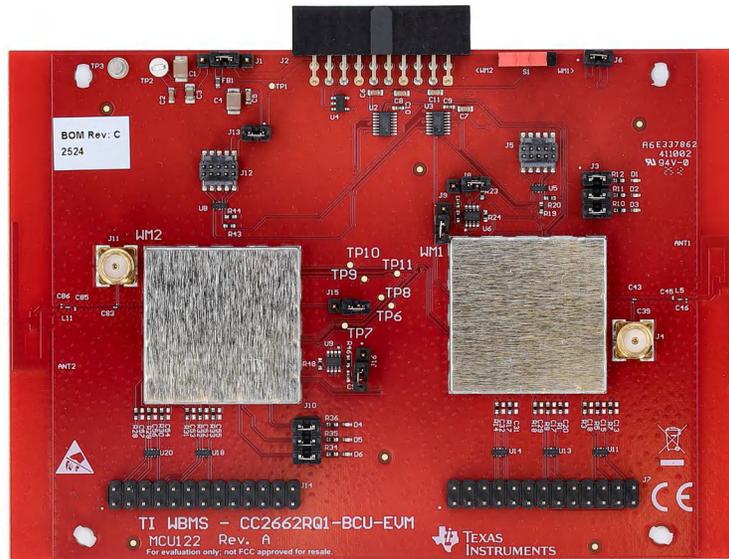
Features

- 2 x [CC2662R-Q1](#) wireless MCUs configured in a Dual Main Configuration

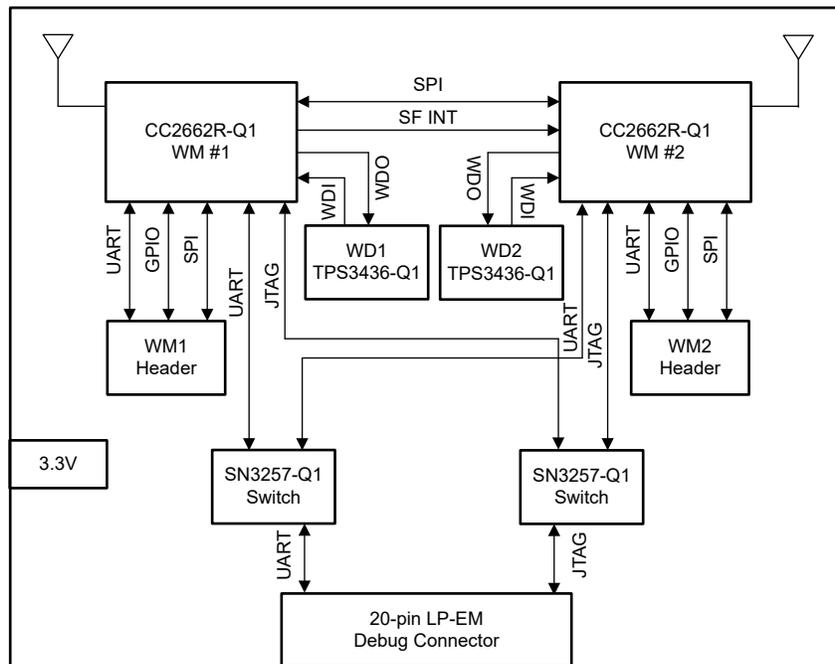
- Each wireless MCU capable of up to +5dBm output power
- 2 x [TPS3436-Q1](#) watchdog device (1 per wireless MCU)
- 2 x 2.4GHz PCB antenna with SMA connector for external antennas and conducted measurements (1 per wireless MCU)
- 2 x 10-pin Arm® Cortex® connectors (1 per wireless MCU)
- 2 x RF shield frames and covers (1 per wireless MCU, not required but included as an example layout to pass stringent EMI requirements)
- 20-pin LP-EM Debug connector for a LaunchPad XDS110 Debugger ([LP-XDS110](#) or [LP-XDS110ET](#), sold separately and required for software development and RF evaluation)
- Switch for LaunchPad XDS110 Debugger to wireless MCU interface selection
- 6 LEDs (3 per wireless MCU)
- Access to all I/O signals via dedicated 26 pin header (1 per wireless MCU)
- I/O ESD protection [TPD4E05U06-Q1](#)
- External power lugs

Applications

- [Automotive](#)
 - Wireless Battery Management System (WBMS)
- [Industrial](#)
 - [Energy Storage Systems](#) (WBMS)



CC2662RQ1-BCU-EVM Hardware Image



CC2662RQ1-BCU-EVM Block Diagram

1 Evaluation Module Overview

1.1 Introduction

The Dual Main Battery Control Unit (BCU) EVM provides an easy to use platform for WBMS evaluation and development. It provides a robust, easily configurable HW solution for the Wireless Main (WM) role in a WBMS system. It gives the user the option to evaluate a single main architecture and dual main architecture without the need for additional hardware or daughter cards. The EVM is supported by the [SIMPLELINK-WBMS-SDK](#).

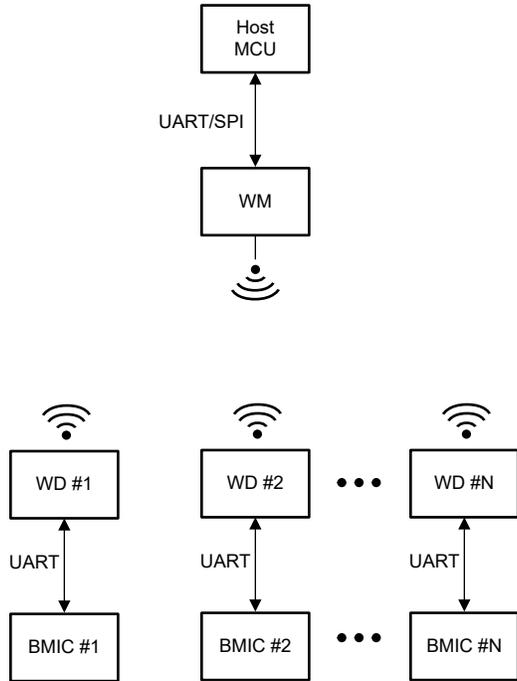


Figure 1-1. WBMS Single Main Architecture

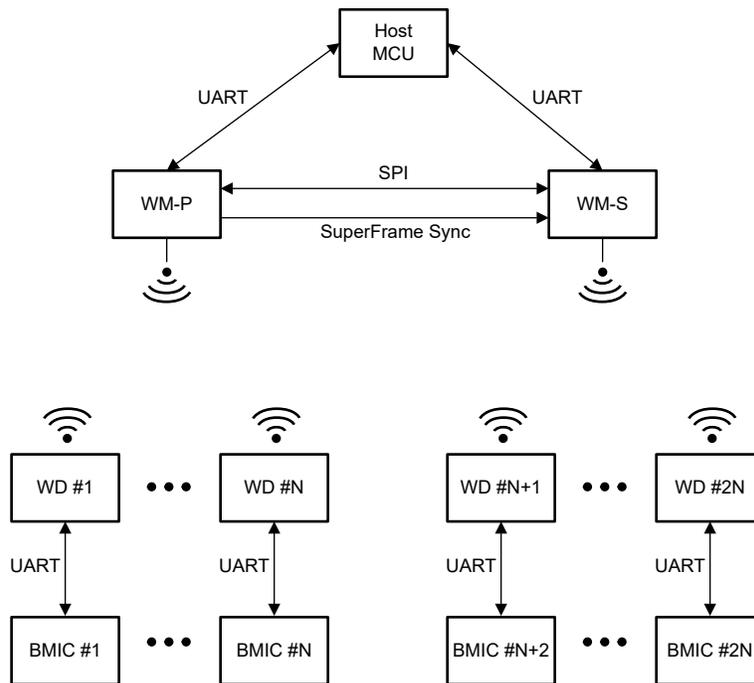


Figure 1-2. WBMS Dual Main Architecture

1.2 Kit Contents

- [CC2662RQ1-BCU-EVM](#)
- 10-pin flat ribbon cable
- [Standard Terms and Conditions for EVMs](#)
- [Abbreviated Terms and Conditions for EVMs](#)

1.3 Specification

The Dual Main BCU EVM is equipped with 2 [CC2662R-Q1](#) devices. These devices are connected via GPIO pins to enable a SPI interface for communication and control. Each wireless MCU device has a dedicated watchdog device [TPS3436-Q1](#) that can be enabled and disabled using a dedicated header per device and can be controlled by its respective wireless MCU device. The board is equipped with a 20-pin connector that allows for interfacing with a [XDS110](#) launch pad (LP) for easy control via USB from a PC. The board allows for manual switching of JTAG and UART lines between wireless MCU devices when interfacing via an XDS110 LP. If an XDS110 LP is not available, each wireless MCU device has a dedicated 10-pin JTAG header that can be used for programming and control. The EVM is equipped with standoffs for powering the board using an external power supply, or can be powered up via the XDS110 connector, or the JTAG headers. All available unused GPIO of each wireless MCU device is routed to a dedicated 26-pin header to allow for custom applications and configurations. Each wireless MCU device utilizes an inverted F antenna for wireless communication and is equipped with an SMA test connector that can be utilized for performing conducted RF measurements. In addition the EVM can support:

- 1 additional SPI interface
- 1 additional UART interface for Host MCU communication
- 1 x I²C
- 1 x I²S
- Real-time clock (RTC)
- 12-bit ADC, 200 kSamples/s, 8 channels
- 8-bit DAC
- Four 32-bit or eight 16-bit general-purpose timers

1.4 Device Information

The SimpleLink™ 2.4 GHz CC2662R-Q1 device is an AEC-Q100 compliant wireless microcontroller (MCU) targeting wireless automotive applications. The device is optimized for low-power wireless communication in applications such as [battery management systems \(BMS\)](#) and cable replacement. The highlighted features of this device include:

- Support for [TI's SimpleLink wireless BMS \(WBMS\) protocol](#) for robust, low latency and high throughput communication.
- [Functional Safety Quality-Managed](#) classification including TI quality-managed development process and forthcoming functional safety FIT rate calculation, FMEDA and functional safety documentation.
- AEC-Q100 qualified for Grade 2 temperature range (–40 °C to +105 °C) and is offered in a 7-mm x 7-mm VQFN package with wettable flanks.
- Low standby current of 0.94 µA with full RAM retention.
- Excellent radio link budget of 97 dBm.

The CC2662R-Q1 device is part of the SimpleLink™ MCU platform, which consists of Wi-Fi, Bluetooth Low Energy, Thread, Zigbee®, Sub-1 GHz MCUs, and host MCUs that all share a common, easy-to-use development environment and rich tool set. For more information, visit [SimpleLink™ MCU platform](#).

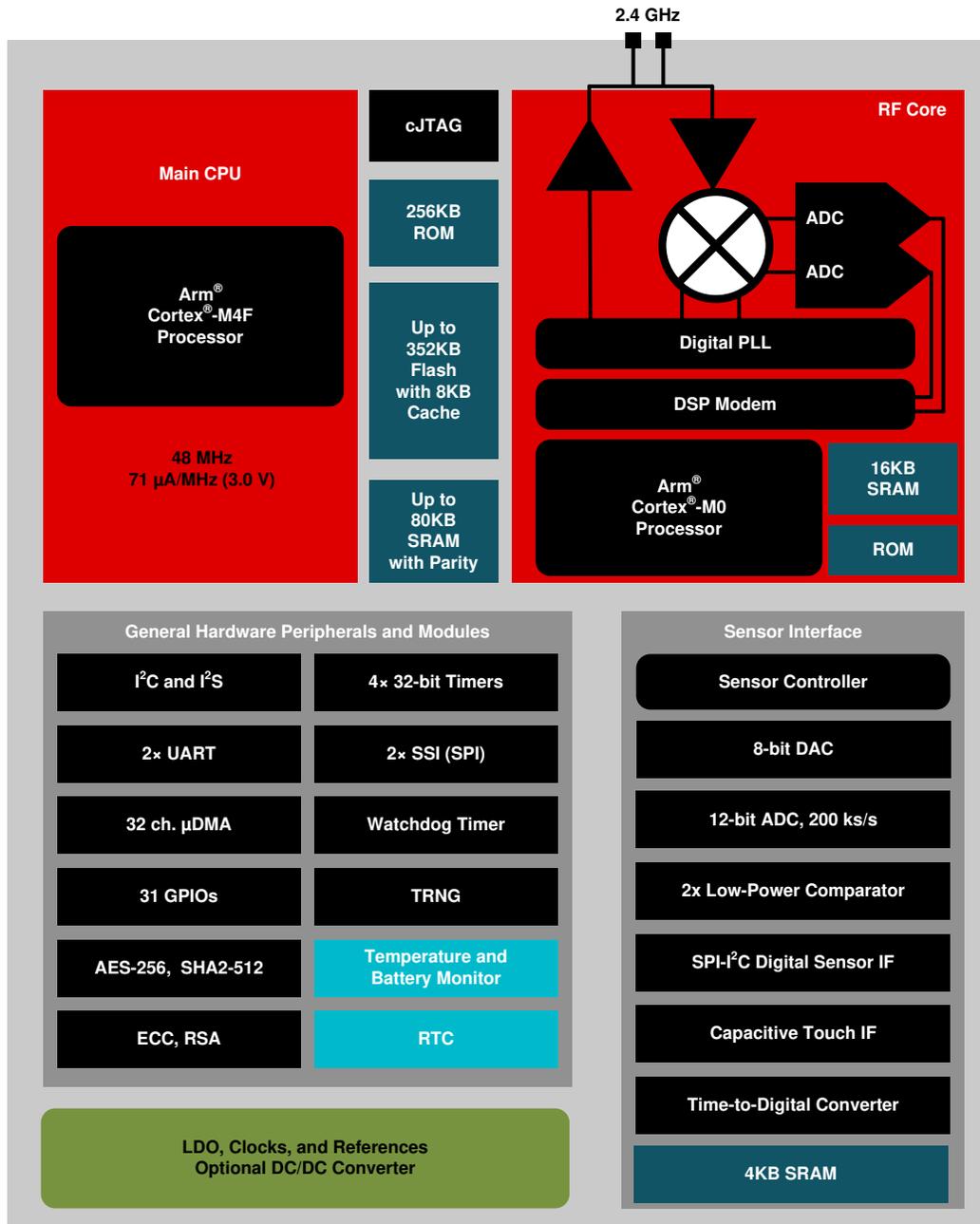
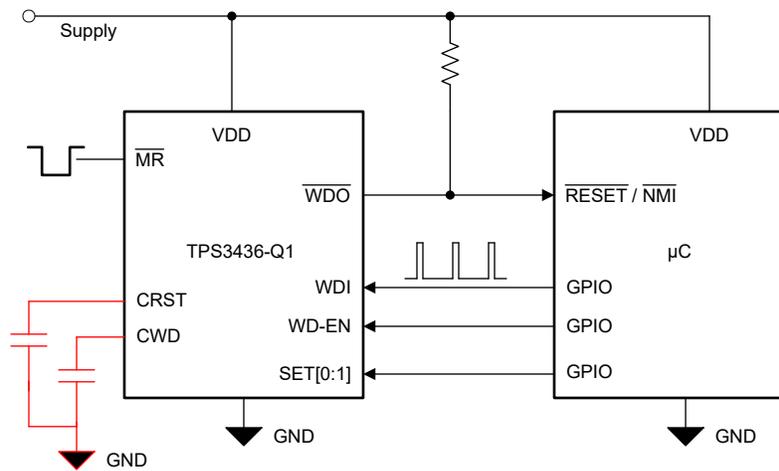


Figure 1-3. CC2662R-Q1 Block Diagram

The TPS3436-Q1 is an ultra-low power consumption (250nA typical) device offering a programmable window watchdog timer. The TPS3436-Q1 offers a high accuracy window watchdog timer with host of features for a wide variety of applications. The close window timer can be factory programmed or user programmed using an external capacitor. The open window to close window ratio can be changed on-the-fly using a combination of logic pins. The watchdog also offers unique features such as enable-disable, start-up delay. The WDO delay can be set by factory-programmed default delay settings or programmed by an external capacitor. The device also offers a latched output operation where the output is latched until the watchdog fault is cleared. The TPS3436-Q1 provides a performance upgrade alternative to TPS3430-Q1 device family. The TPS3436-Q1 is available in a small 8-pin SOT-23 package.



TPS3436-Q1 offers various pinout options to support different features.
Choose suitable pinout based on application needs

Figure 1-4. CC2662R-Q1 TPS3436-Q1 Example Use Case

Key features of the TPS3436-Q1 include:

- AEC-Q100 qualified with the following results:
 - Device temperature grade 1: -40°C to 125°C ambient operating temperature range
- Factory programmed or user-programmable watchdog timeout
 - $\pm 10\%$ Accurate timer (maximum)
 - Factory programmed close window: 1msec to 100 sec
- Factory programmed or user-programmable reset delay
 - $\pm 10\%$ Accurate timer (maximum)
 - Factory programmed option: 2 msec to 10 sec
- Input voltage range: VDD = 1.04V to 6.0V
- Ultra low supply current: $\text{IDD} = 250\text{nA}$ (typical)
- Open-drain, push-pull; active-low outputs
- Various programmability options:
 - Watchdog enable-disable
 - Watchdog startup delay: no delay to 10 sec
 - Open window to close window ratio option: 1X to 511X
 - Latched output option
- MR functionality support

2 Hardware

[CC2662RQ1-BCU-EVM Connector and Interface Layout](#) shows the location of the CC2662RQ1-BCU-EVM connectors, switches, jumpers, power lugs, and LEDs. The CC2662R-Q1 wireless microcontrollers, antennas, and watchdog timers are also shown.

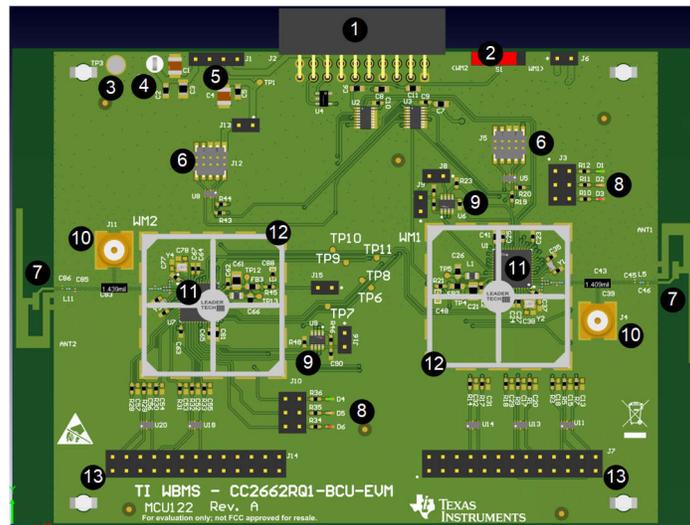


Figure 2-1. CC2662RQ1-BCU-EVM Connector and Interface Layout

1. EVM Debug Connector (LP-XDS110 or LP-XDS110ET connector for debugging, programming, UART communication, and power)
2. Switch (Selects microcontroller LP-XDS110 interfaces with)
3. GND Lug
4. 3.3VDC Lug (External supply input)
5. Header for power source selection (External or LP-XDS110 power)
6. 10-pin debug connector (Allows external JTAG debug/programming)
7. Antenna
8. LEDs (Red (DIO9), Orange (DIO10), Green (DIO13))
9. TPS3436-Q1 (Window watchdog timer)
10. SMA RF Connector
11. CC2662R-Q1 (Wireless microcontroller)
12. RF shield
13. Spare GPIO header

2.1 Power Requirements

The BCU board is equipped with several options for powering up the board. The user can utilize the 20-pin XDS110 LP connector, the 10-pin debug headers, or the standoff test points to apply power from an external source. Please keep in mind that when using an external power source that the voltage applied must stay within the recommended operating supply voltage of the CC2662R-Q1 device at all times. Refer to the [CC2662R-Q1](#) datasheet for details.

Additionally, the CC2662RQ1-BCU-EVM gives the user the ability to manually connect and disconnect power from specific devices on the board as well as various power sources through the use of built in jumpers. Detailed information on the use of these jumpers can be found in the [Section 2.5](#).

2.2 Temperature Range

The EVM is designed for operation from -40°C to $+105^{\circ}\text{C}$. When powering the LaunchPad from an external battery, keep the system within its specified temperature operating range.

2.3 Programming, Debug, and Control

The [CC2662RQ1-BCU-EVM](#) does not include an onboard debug probe. Compatible debug probes are the LaunchPad XDS110 debug probe (LP-XDS110 or LP-XDS110ET), standalone XDS110 (TMDSEMU110-U with the optional EnergyTrace HDR adapter TMDSEMU110-ETH), or a LaunchPad with an onboard debug probe.

2.3.1 Using a LaunchPad XDS110 Debug Probe

Before connecting the LP-XDS110 or LP-XDS110ET Debug Probe to the CC2662R-Q1, enable power by setting the TGT VDD jumper on the XDS110 Debug Probe to XDS. In this setting, the device voltage is fixed at 3.3V. If external power is provided to the LaunchPad, then set this jumper on the XDS110 Debug Probe to EXT. Afterward, connect the edge connector of the debugger to the edge connector of the LaunchPad and connect the USB port of the debugger to a computer.

The final configuration for this setup is shown in along with the correct jumper configuration for TGT VDD connected to XDS (as shown in the bottom right corner of the XDS 110 Debug Probe).

The BCU EVM is compatible with the XDS110 LP which provides a JTAG and UART interface from the XDS110 LP to the selected WM device. Selection of the WM device is controlled by the manual S1 switch. Silkscreen markings on the PCB note which WM is selected when the switch position is set to either side. This controls the JTAG and UART switch devices U2 and U3 to allow for the XDS110 LP to communicate with only one WM device at a time.

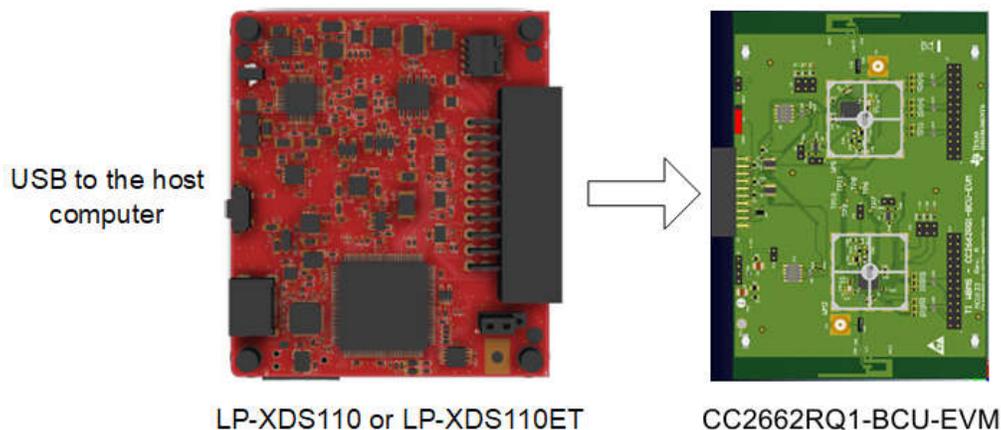


Figure 2-2. Connection of CC2662RQ1-BCU-EVM with XDS110 Debug Probe

2.3.2 Using a Generic XDS110 Debug Probe, Including a Separate LaunchPad

On the separate LaunchPad:

- Remove all of the header jumpers except GND and 3V3.
- Set the power jumper to reflect the scenario. Set the jumper to XDS110 power if the CC2662R-Q1 is to be powered by the separate LaunchPad. Set this to Extern Pwr if external power is to be provided instead. Care must be taken to keep the board voltage within the board's operating range (1.8V to 3.6V).
- Connect one end of the 10-pin Debug Cable to the XDS110 Out connector on the LaunchPad.
- Connect the other end of the 10-pin Debug Cable to either the J5 (WM1) or J12 (WM2) connector depending on which WM is being interfaced with. Two LaunchPads can be used to connect to both wireless mains (one per main).

The final configuration is shown in [Connection of CC2662RQ1-BCU-EVM with XDS110 Debug Probe](#).

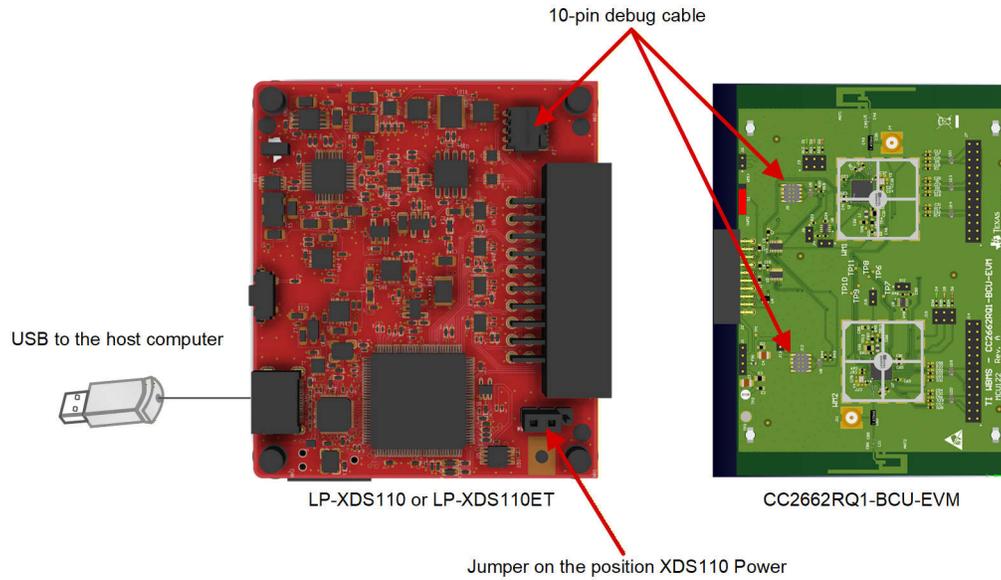


Figure 2-3. Connection of CC2662RQ1-BCU-EVM with XDS110 Debug Probe

2.4 Interfaces

The WM #1 uses the following I/Os for the functions detailed in [Table 2-1](#) and [Table 2-2](#).

Table 2-1. WM #1 I/O Internal Board Interfaces

Pin #	DIO #	Signal Name	Function
17	DIO_11	WM1_UART_TXD	UART Interface to XDS110
18	DIO_12	WM1_UART_RXD	UART Interface to XDS110
20	DIO_14	WM1_WDI	Watch Dog interface
21	DIO_15	WM1_WD_SET1	Watch Dog interface
26	DIO_16	WM2WM_SPI_SCK	SPI Interface with WM2
27	DIO_17	WM1_WD_RESET_L	Watch Dog interface
28	DIO_18	WM2WM_SPI_MOSI	SPI Interface with WM2
29	DIO_19	WM2WM_SPI_CS	SPI Interface with WM2
30	DIO_20	WM1_WD_EN	Watch Dog interface
31	DIO_21	WM1_WD_SET0	Watch Dog interface
36	DIO_23	WM2WM_SF_INT	SPI Interface with WM2
39	DIO_26	WM2WM_SPI_MISO	SPI Interface with WM2
40	DIO_27	WM2WM_SRDY	SPI Interface with WM2

Table 2-2. WM #1 I/O External Board Interfaces (J7)

Pin #	DIO #	Signal Name	J7 Pin #	Function
5	DIO_0	WM1_2HOST_REV	17	Host MCU Interface Wakeup Signal
6	DIO_1	WM1_2HOST_RTC	20	Host MCU Interface Wakeup Signal
7	DIO_2	WM1_UART_RX_HOST	22	Host MCU UART Interface
8	DIO_3	WM1_UART_TX_HOST	19	Host MCU UART Interface
9	DIO_4	WM1_GPIO_4	23	Free GPIO Signal
10	DIO_5	WM1_GPIO_5	1	Free GPIO Signal
11	DIO_6	WM1_GPIO_6	13	Free GPIO Signal
12	DIO_7	WM1_GPIO_7	11	Free GPIO Signal

Table 2-2. WM #1 I/O External Board Interfaces (J7) (continued)

14	DIO_8	WM1_GPIO_8	16	Free GPIO Signal
15	DIO_9	WM1_GPIO_9	9	Free GPIO Signal
16	DIO_10	WM1_GPIO_10	4	Free GPIO Signal
19	DIO_13	WM1_GPIO_13	6	Free GPIO Signal
32	DIO_22	WM1_HOST2WM	24	Host MCU Interface Wakeup Signal
37	DIO_24	WM1_GPIO_24	8	Free GPIO Signal
38	DIO_25	WM1_GPIO_25	3	Free GPIO Signal
41	DIO_28	WM1_GPIO_28	10	Free GPIO Signal
42	DIO_29	WM1_GPIO_29	7	Free GPIO Signal
43	DIO_30	WM1_GPIO_30	14	Free GPIO Signal

The WM #2 uses the following I/Os for the functions detailed in [Table 2-3](#) and [Table 2-4](#).

Table 2-3. WM #2 I/O Internal Board Interfaces

Pin #	DIO #	Signal Name	Function
17	DIO_11	WM2_UART_TXD	UART Interface to XDS110
18	DIO_12	WM2_UART_RXD	UART Interface to XDS110
20	DIO_14	WM2_WDI	Watch Dog interface
21	DIO_15	WM2_WD_SET1	Watch Dog interface
26	DIO_16	WM2WM_SPI_SCK	SPI Interface with WM1
27	DIO_17	WM2_WD_RESET_L	Watch Dog interface
28	DIO_18	WM2WM_SPI_MOSI	SPI Interface with WM1
29	DIO_19	WM2WM_SPI_CS	SPI Interface with WM1
30	DIO_20	WM2_WD_EN	Watch Dog interface
31	DIO_21	WM2_WD_SET0	Watch Dog interface
36	DIO_23	WM2WM_SF_INT	SPI Interface with WM1
39	DIO_26	WM2WM_SPI_MISO	SPI Interface with WM1
40	DIO_27	WM2WM_SRDY	SPI Interface with WM1

Table 2-4. WM #2 I/O External Board Interfaces (J14)

Pin #	DIO #	Signal Name	J14 Pin #	Function
5	DIO_0	WM2_2HOST_REV	16	Host MCU Interface Wakeup Signal
6	DIO_1	WM2_2HOST_RTC	13	Host MCU Interface Wakeup Signal
7	DIO_2	WM2_UART_RX_HOST	11	Host MCU UART Interface
8	DIO_3	WM2_UART_TX_HOST	1	Host MCU UART Interface
9	DIO_4	WM2_GPIO_4	4	Free GPIO Signal
10	DIO_5	WM2_GPIO_5	9	Free GPIO Signal
11	DIO_6	WM2_GPIO_6	8	Free GPIO Signal
12	DIO_7	WM2_GPIO_7	10	Free GPIO Signal
14	DIO_8	WM2_GPIO_8	14	Free GPIO Signal
15	DIO_9	WM2_GPIO_9	19	Free GPIO Signal
16	DIO_10	WM2_GPIO_10	20	Free GPIO Signal
19	DIO_13	WM2_GPIO_13	22	Free GPIO Signal
32	DIO_22	WM2_HOST2WM	24	Host MCU Interface Wakeup Signal
37	DIO_24	WM2_GPIO_24	3	Free GPIO Signal

Table 2-4. WM #2 I/O External Board Interfaces (J14) (continued)

38	DIO_25	WM2_GPIO_25	23	Free GPIO Signal
41	DIO_28	WM2_GPIO_28	17	Free GPIO Signal
42	DIO_29	WM2_GPIO_29	6	Free GPIO Signal
43	DIO_30	WM2_GPIO_30	7	Free GPIO Signal

The BCU was designed to be compatible with [SIMPLELINK-WBMS-SDK](#) and the IO assignments should be out of the box compatible with the WBMS SDK 2.0 and above.

2.4.1 XDS110 Interface Connector

If programming/debugging only one of the WM devices, the XDS110 LP interface can be utilized. If both WM devices are to be programmed/debugged, the user can use the XDS110 LP interface for one WM and the 10-pin debug interface for the other WM. The CC2662R-Q1 J2 connector pinout is shown in [Table 2-5](#). For the pin 1 location, refer to Schematic section or the full set of reference design files.

Table 2-5. XDS110 Interface Connector (J2) Pinout Description

Pin Number	Pin Name	Pin Description
1	GND	Ground Connection
2	NC	No Connect
3	XDS_GPIO1	Connection to GPIO1 of XDS board
4	NC	No Connect
5	XDS_GPIO2	Connection to GPIO2 of XDS board
6	WMCU_SWDCCK	SWDCCK connection to WMCU device
7	GND	Ground Connection
8	WMCU_SWDIO	SWDIO connection to WMCU device
9	XDS_GPIO3	Connection to GPIO3 of XDS board
10	WMCU_RESET	RESET connection to WMCU Device
11	NC	No Connect
12	WMCU_TXD	TXD connection to WMCU device
13	GND	Ground Connection
14	WMCU_RXD	RXD connection to WMCU device
15	XDS_BoardID_SCL	XDS SCL connection to LaunchPad board ID
16	WMCU_VDD	VDD connection to WMCU device
17	XDS_BoardID_SDA	XDS SDA connection to LaunchPad board ID
18	5V0_BP	5V connection
19	GND	Ground Connection
20	GND	Ground Connection

2.4.2 Debug Interface Connector

The CC2662R-Q1 contains two 10-pin debug connectors (J5 or J12) that allows using an external JTAG Debug Probe in order to debug/program the devices. If programming/debugging only one of the WM devices, the 10-pin debug interface can be utilized. If both WM devices are to be programmed/debugged, the user can use the XDS110 LP interface for one WM and the 10-pin debug interface for the other WM. Additionally, the user can utilize the 10-pin debug interface for each WM and not use the XDS110 LP interface if desired. The pinout information can be found in [Table 2-6](#). For the pin 1 location, refer to [Section 5](#) or the full set of reference design files

Table 2-6. 10-Pin Debug Interface Connector Pinout

Pin Number	Pin Name	Pin Description
1	WMCU_VDD	VDD connection to WMCU device
2	WMCU_SWDIO	SWDIO connection to WMCU device

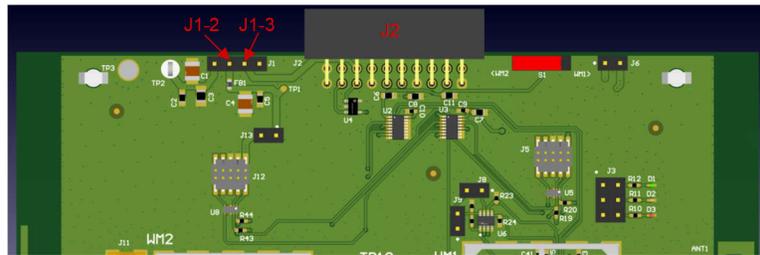
Table 2-6. 10-Pin Debug Interface Connector Pinout (continued)

Pin Number	Pin Name	Pin Description
3	GND	Ground connection
4	WMCU_SWDCK	SWDCK connection to WMCU device
5	GND	Ground connection
6	NC	No connect
7	NC	No connect
8	NC	No connect
9	GND	Ground connection
10	WMCU_RESET	RESET connection to WMCU device

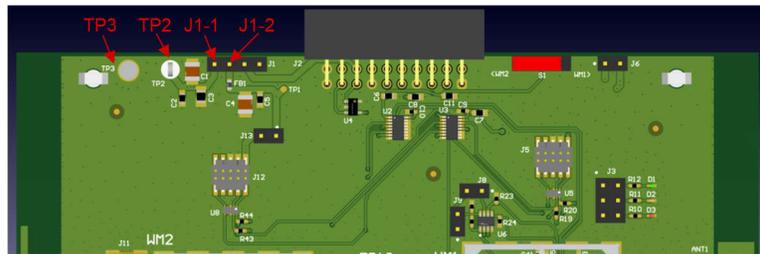
2.5 Jumper Information

The BCU board is equipped with several options for powering up the board that are easily configured using the available jumpers.

- **Option 1** utilizes power from the XDS110 in the case the operator is using an XDS110 LP for programming and control. J2 Pin 16 is the 3.3VDC power pin coming from the XDS110 LP and GND is tied to pins 1, 7, 13, 19, and 20. Header pins 2 and 3 of J1 must be connected with a jumper when using the XDS110 as the power supply for the EVM. Additionally pin 18 of J2 provides the 5.0VDC supply required to power up U4.

**Figure 2-4. Option 1**

- **Option 2** allows for the board to be powered up via an external supply with the use of TP2 (3V3_EXT) and TP3 (GND). Header pins 1 and 2 of J1 must be connected with a jumper when using an external power supply connected to TP2 and TP3.

**Figure 2-5. Option 2**

- **Option 3** allows the user to power up the board via J7 pin 25 (3V3_EXT) and pins 2, 5, 12, 15, 18, 21, and 26 (GND) or via J14 pin 25 (3V3_EXT) and pins 2, 5, 12, 15, 18, 21, and 26 (GND). These pins can be utilized as an input or as an output to supply power to an external device/board. Header pins 1 and 2 of J1 must be connected with a jumper when using an external power supply connected to J7 or J14, 3V3_EXT and GND.

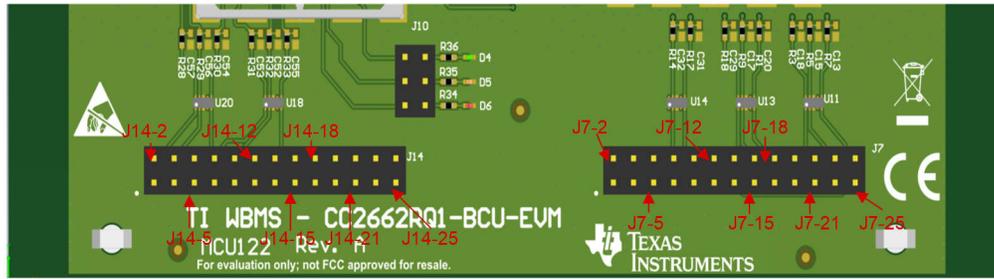


Figure 2-6. Option 3

- Option 4** allows the user to power each individual wireless MCU device via their respective JTAG header. For WM #1 U1, J5 pin 1 (WM1_VDD) and pins 3 and 5 (GND) can be used to power up the device. When using J5 to power up U1, it is recommended that a jumper not be installed on J6. For WM #2 U7, J12 pin 1 (WM2_VDD) and pins 3 and 5 (GND) can be used to power up the device. When using J12 to power up U7, it is recommended that a jumper not be installed on J13.

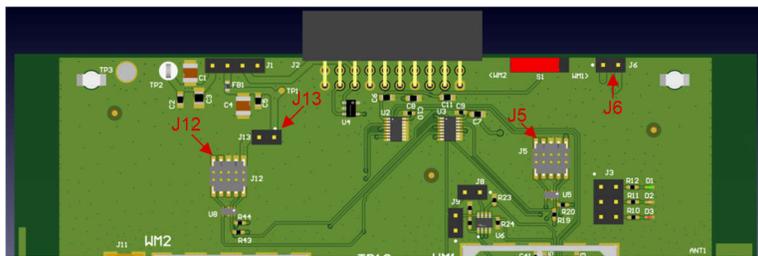


Figure 2-7. Option 4

In addition to the jumpers for the various power sources, the board also allows the user to connect and disconnect power to each wireless MCU device and to each watch dog timer via header jumpers. Installing a jumper on J6 powers up WM #1 U1 and removing the jumper disables the device when configured for power options 1, 2, or 3 above. Installing a jumper on J13 powers up WM #2 U12 and removing the jumper disables the device when configured for power options 1, 2, or 3 above. Installing a jumper on J9 powers up WM #1's watch dog timer U6 and removing the jumper disables the device. Installing a jumper on J16 powers up WM #2's watch dog timer U9 and removing the jumper disables the device. Jumper locations are shown in [Wireless MCU and WD Power Jumpers](#) figure.

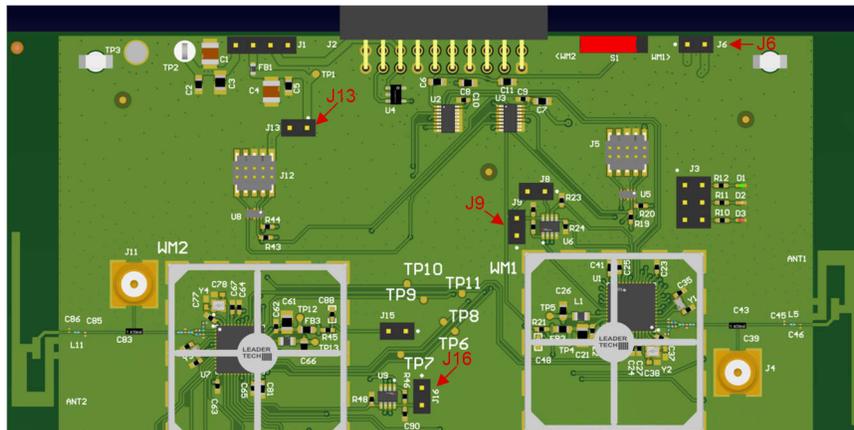


Figure 2-8. Wireless MCU and WD Power Jumpers

Other manual jumper controls available to the user are enabling/disabling of the 3 LEDs and the connecting/disconnecting of the WDO (WM1_RST_L and WM2_RST_L) signal to each WM device. The user may want to disconnect the LEDs from the WMs when taking power consumption measurements or if removing the LEDs is

desired. The user may want to disconnect the WDO from the RESET_L line of a given WM when programming the WM or during development/troubleshooting. Jumper locations are shown in [LED and WDO Jumpers](#) figure.

- Installing a jumper between pins 1 and 2 of J3 enables the D1 LED and removing the jumper disables the LED.
- Installing a jumper between pins 3 and 4 of J3 enables the D2 LED and removing the jumper disables the LED.
- Installing a jumper between pins 5 and 6 of J3 enables the D3 LED and removing the jumper disables the LED.
- Installing a jumper on J8 connects WDO of U6 to WM1_RST_L and removing the jumper disconnects WDO from WM1_RST_L.
- Installing a jumper between pins 1 and 2 of J10 enables the D4 LED and removing the jumper disables the LED.
- Installing a jumper between pins 3 and 4 of J10 enables the D5 LED and removing the jumper disables the LED.
- Installing a jumper between pins 5 and 6 of J10 enables the D6 LED and removing the jumper disables the LED.
- Installing a jumper on J10 connects WDO of U9 to WM2_RST_L and removing the jumper disconnects WDO from WM2_RST_L.

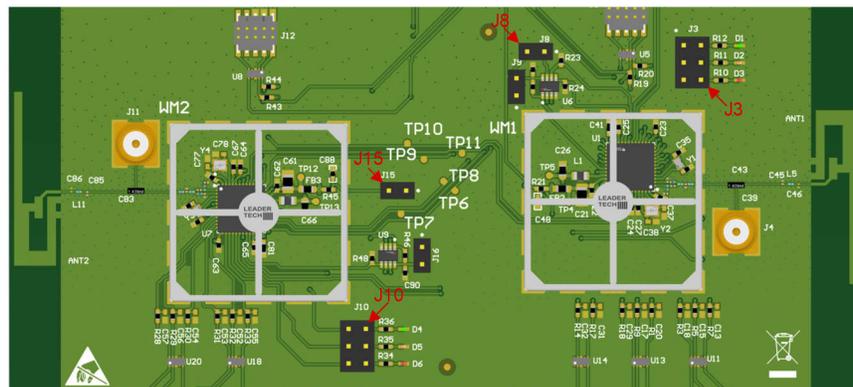


Figure 2-9. LED and WDO Jumpers

3 Advanced Use of the LaunchPad Hardware

Note: the topics in this section involve hardware modifications to your development kit. Your board can be damaged if appropriate soldering equipment is not used and proper ESD mitigation procedures are not followed. Make sure you also have the expertise to perform these modifications.

3.1 Conducted Measurements / External Antenna

The RF path of the two WM devices on the CC2662R-Q1 by default use the Inverted F antenna printed on the PCB. The SMA connector near the PCB antenna of each WM can be used instead, which is useful for tests using an external antenna or for RF-conducted measurements.

For WM#1 capacitor C43 must be desoldered from it's original horizontal position and resoldered vertically (in the C39 position) to connect to the pad routed to the SMA J4. [WM1 Conducted Setup](#) shows the location of the caps and SMA connector J4.

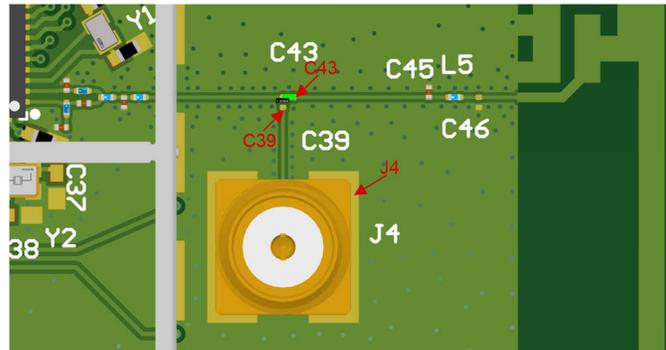


Figure 3-1. WM1 Conducted Setup

For WM#2 capacitor C83 must be desoldered from it's original horizontal position and resoldered vertically (in the C79 position) to connect to the pad routed to the SMA J11. [WM2 Conducted Setup](#) shows the location of the caps and SMA connector J11.

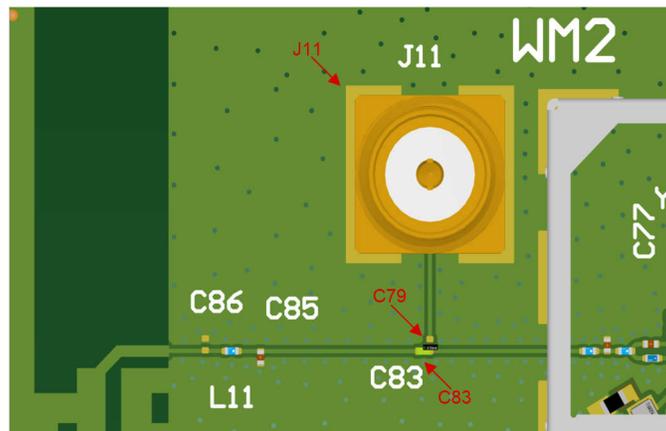


Figure 3-2. WM2 Conducted Setup

4 Software

4.1 Software Development

For software development and example projects, please refer to the user's guide in the [SimpleLink WBMS software development kit](#).

5 Hardware Design Files

5.1 Schematics

Schematic Sheet 1, Schematic Sheet 2, Schematic Sheet 3, Schematic Sheet 4, Schematic Sheet 5, Schematic Sheet 6, Schematic Sheet 7, and Schematic Sheet 8 show the schematic implementation of the CC2662RQ1-BCU-EVM. The full CC2662RQ1-BCU-EVM reference schematic can be downloaded from the [CC2662RQ1-BCU-EVM reference design files](#).

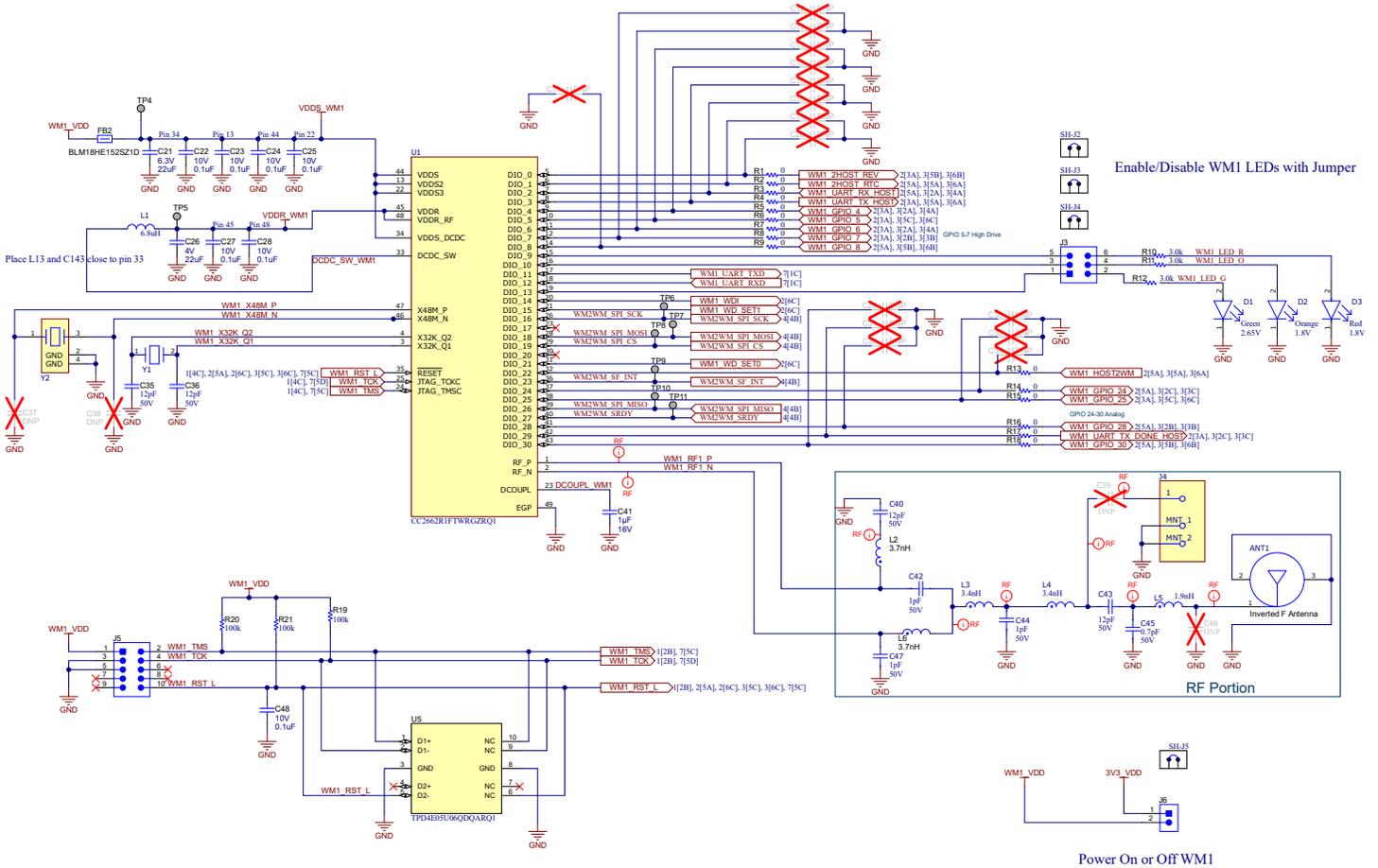


Figure 5-1. Schematic Sheet 1

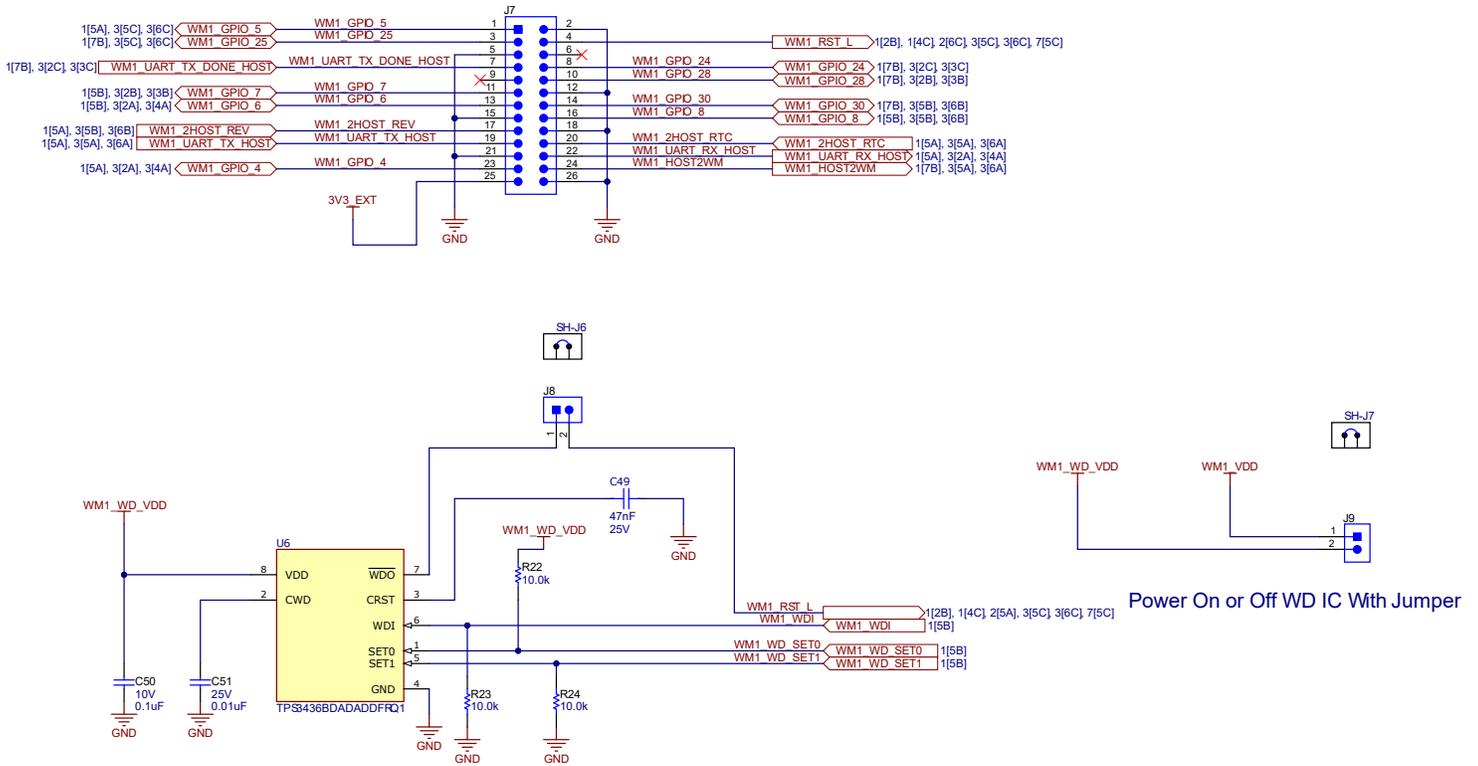


Figure 5-2. Schematic Sheet 2

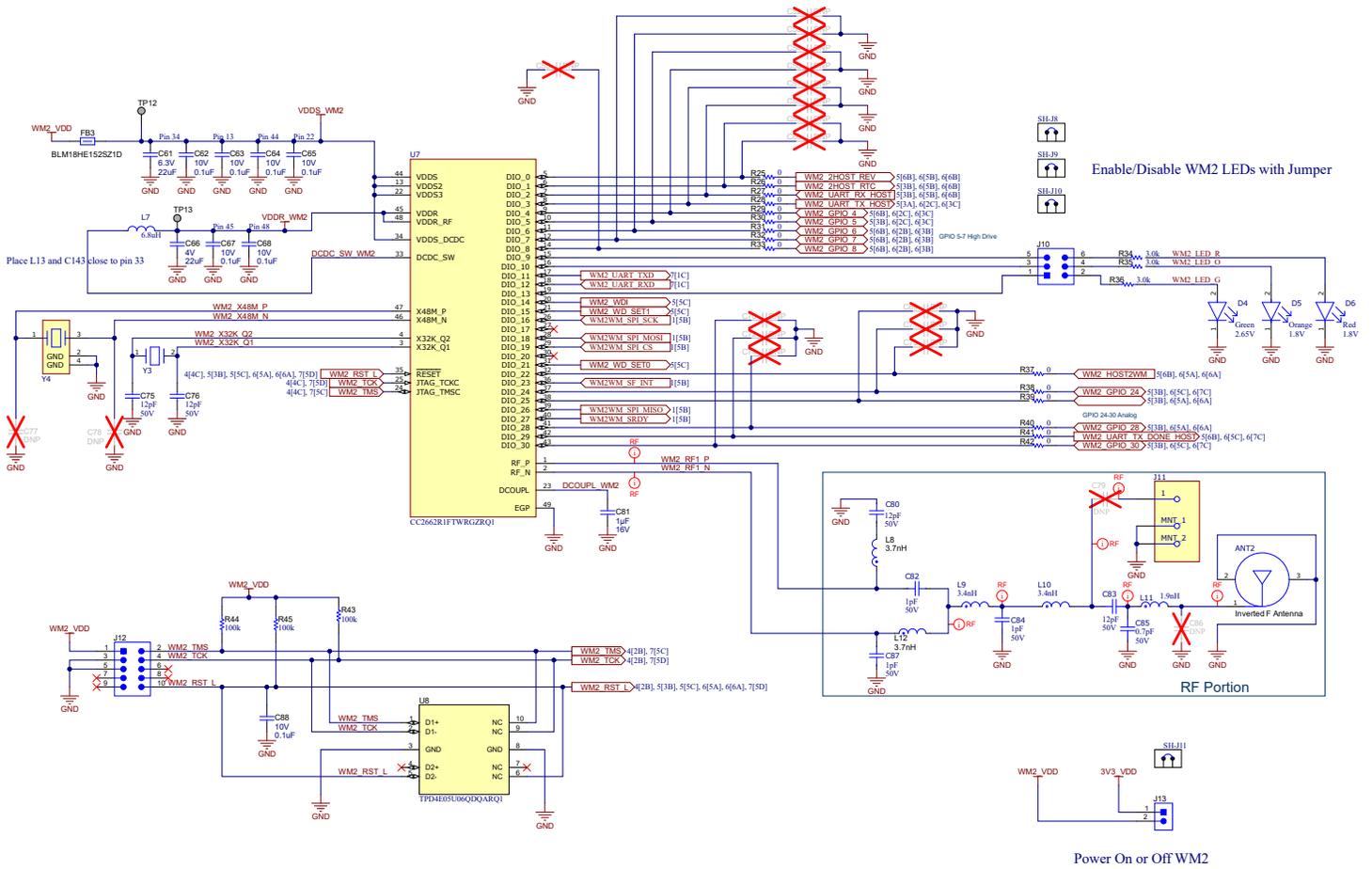


Figure 5-4. Schematic Sheet 4

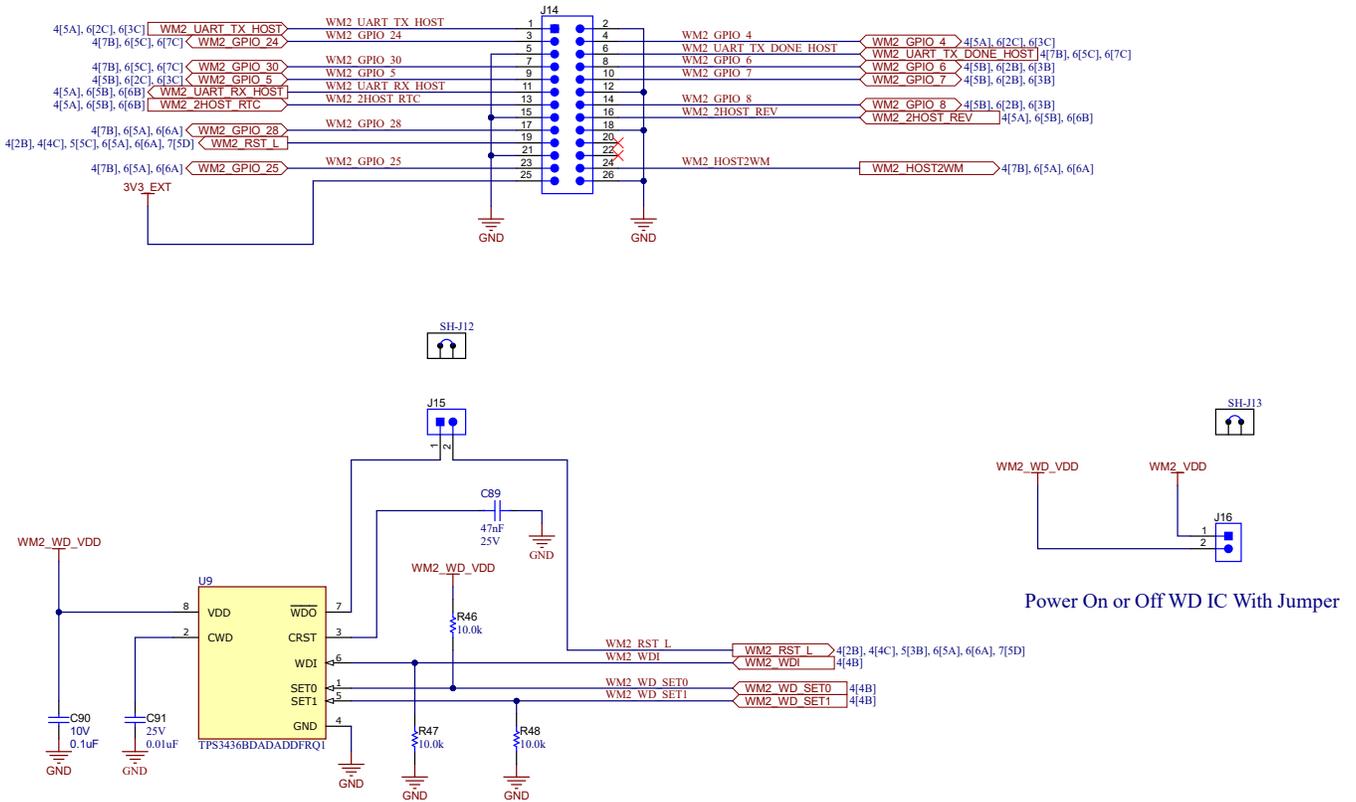


Figure 5-5. Schematic Sheet 5

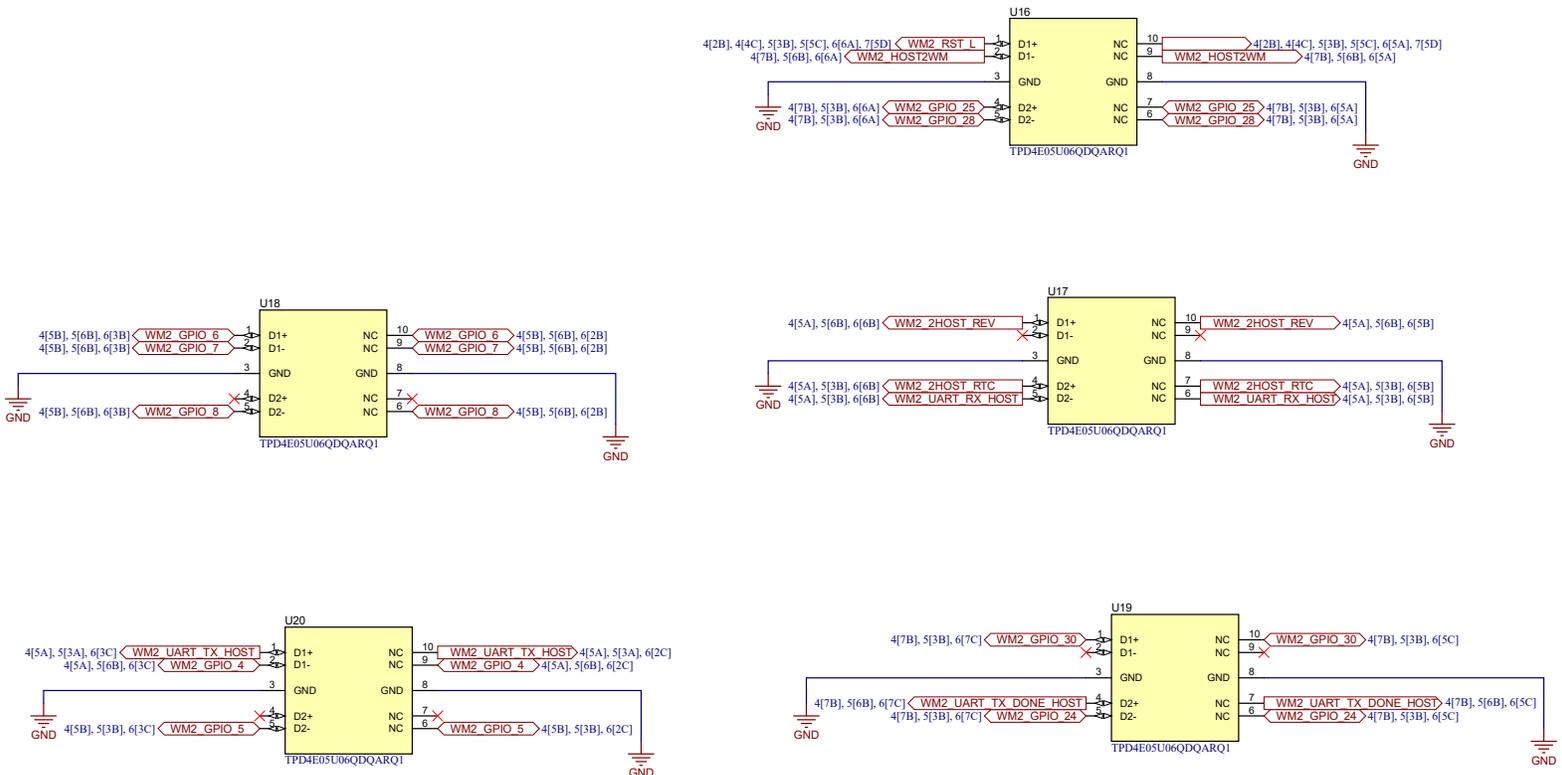
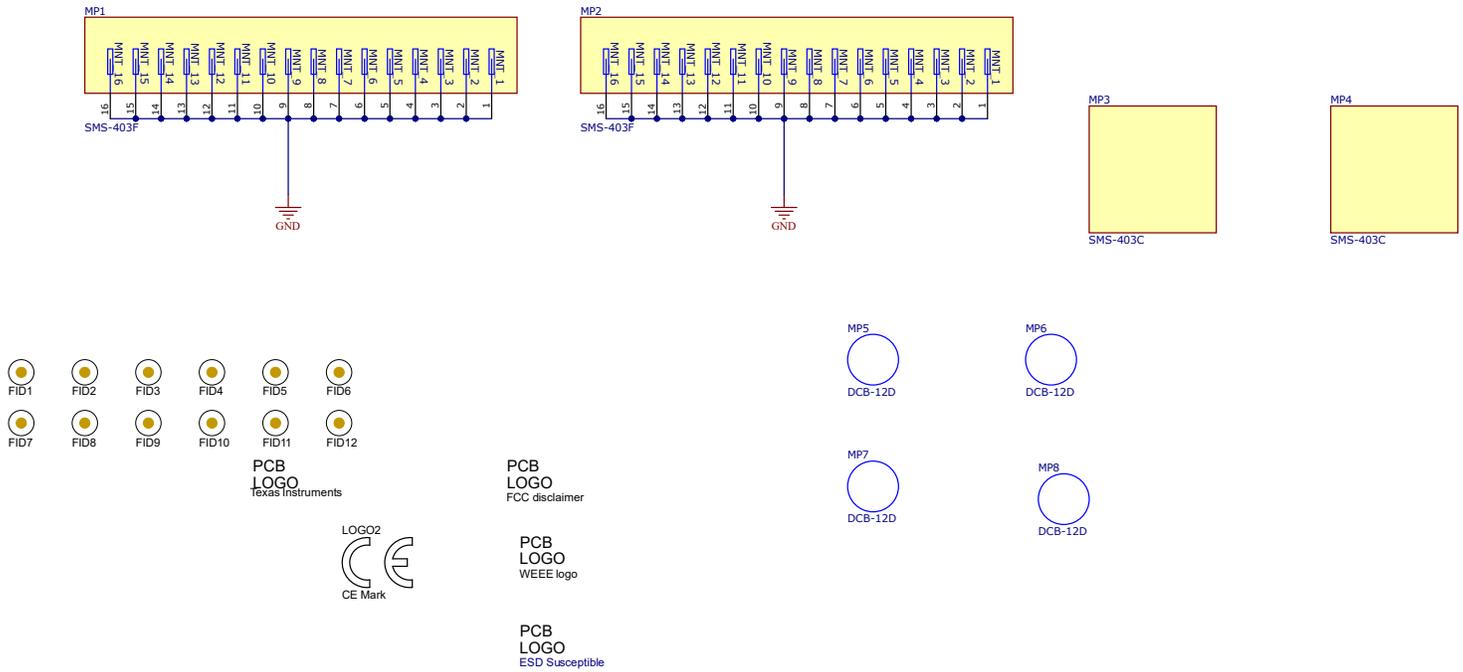


Figure 5-6. Schematic Sheet 6



ZZ1
Assembly Note
These assemblies are ESD sensitive, ESD precautions shall be observed.

ZZ2
Assembly Note
These assemblies must be clean and free from flux and all contaminants. Use of no clean flux is not acceptable.

ZZ3
Assembly Note
These assemblies must comply with workmanship standards IPC-A-610 Class 2, unless otherwise specified.

ZZ4
Assembly Note
Via in PADS must be filled

Figure 5-8. Schematic Sheet 8

5.2 PCB Layouts

The top and bottom side PCB layout view of the CC2662RQ1-BCU-EVM can be seen in [Top Side PCB Layout View](#) and [Bottom Side PCB Layout View](#), respectively. The full CC2662RQ1-BCU-EVM layout files can be downloaded from the [CC2662RQ1-BCU-EVM reference design files](#).

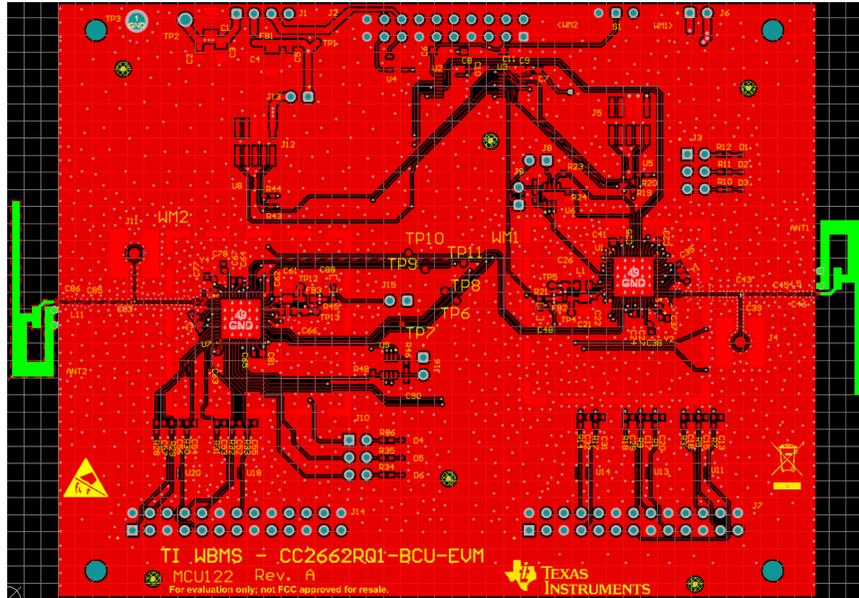


Figure 5-9. Top Side PCB Layout View

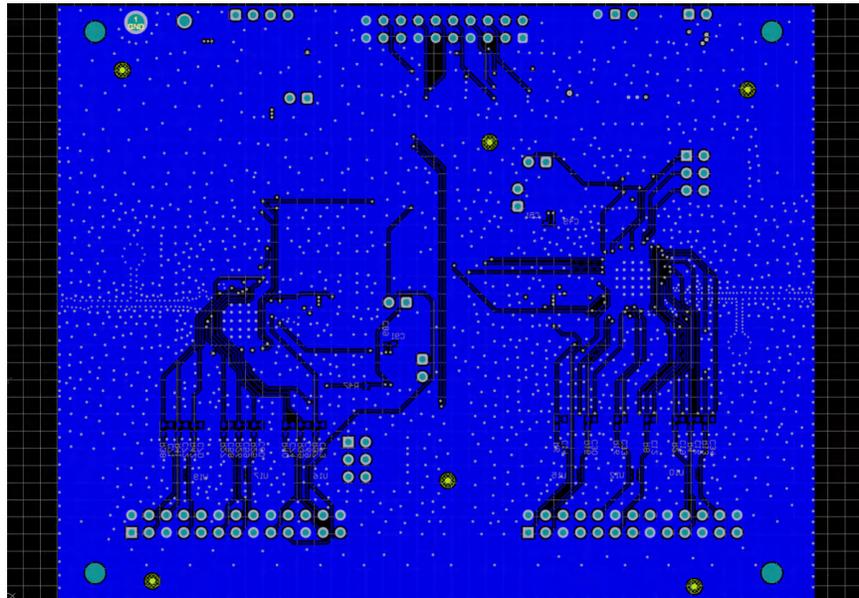


Figure 5-10. Bottom Side PCB Layout View

5.3 Bill of Materials (BOM)

The following table shows the simplified Bill of Materials (BOM) for the CC2662RQ1-BCU-EVM. The full CC2662RQ1-BCU-EVM BOM can be downloaded from the [CC2662RQ1-BCU-EVM](#) reference design files.

Table 5-1. CC2662RQ1-BCU-EVM Bill-of-Materials

Part Reference Designator	Quantity	Value	Vendor Part Number	Vendor
ANT1, ANT2	2		Inverted F Antenna	Texas Instruments
C1, C4	2	10μF	GCM32ER71E106MA57L	Murata
C2, C5, C6, C7, C10, C11, C41, C81	8	1uF	GCM188R71C105KA64D	MuRata

Table 5-1. CC2662RQ1-BCU-EVM Bill-of-Materials (continued)

Part Reference Designator	Quantity	Value	Vendor Part Number	Vendor
C3, C21, C61	3	22uF	GCM21BD70J226ME36L	MuRata
C8, C9, C22, C23, C24, C25, C27, C28, C48, C50, C62, C63, C64, C65, C67, C68, C88, C90	18	0.1uF	GCM155R71A104KA55D	MuRata
C26, C66	2	22uF	AMK107BBJ226MAHT	Taiyo Yuden
C35, C36, C75, C76	4	12pF	GCM1555C1H120JA16J	MuRata
C40, C43, C80, C83	4	12pF	GCQ0335C1H120GB01D	Murata
C42, C44, C47, C82, C84, C87	6	1pF	GCQ0335C1H1R0WB01D	Murata
C45, C85	2	0.7pF	GCQ0335C1HR70WB01D	Murata
C49, C89	2	47nF	GCM155R71E473KA55D	Murata
C51, C91	2	0.01uF	GCM155R71E103KA37D	MuRata
D1, D4	2		APHHS1005LZGCK-V	Kingbright
D2, D5	2		APHHS1005LSECK/J4-PF	Kingbright
D3, D6	2		APHHS1005LSECK/J3-PF	Kingbright
FB1	1		BLM18HE152SH1D	Murata
FB2, FB3	2	1500 ohm	BLM18HE152SZ1D	MuRata
J1	1		TSW-104-07-G-S	Samtec
J2	1		SFH11-PBPC-D10-RA-BK	Sullins Connector Solutions
J3, J10	2		TSW-103-07-G-D	Samtec
J4, J11	2		132134-10	Amphenol Connex
J5, J12	2		FTSH-105-01-F-DV-K	Samtec
J6, J8, J9, J13, J15, J16	6		TSW-102-07-G-S	Samtec
J7, J14	2		TSW-113-07-G-D	Samtec
L1, L7	2	6.8uH	MLZ2012N6R8LTD25	TDK
L2, L6, L8, L12	4	3.7nH	LQP03TN3N7BZ2J	Murata
L3, L4, L9, L10	4	3.4nH	LQP03TN3N4BZ2B	Murata
L5, L11	2	1.9nH	LQP03TN1N9BZ2B	Murata
MP1, MP2	2		SMS-403F	Leader Tech
MP3, MP4	2		SMS-403C	Leader Tech
MP5, MP6, MP7, MP8	4		DCB-12D	Kang Yang USA
R1, R2, R3, R4, R5, R6, R7, R8, R9, R13, R14, R15, R16, R17, R18, R25, R26, R27, R28, R29, R30, R31, R32, R33, R37, R38, R39, R40, R41, R42	30	0	CRCW04020000Z0ED	Vishay-Dale
R10, R11, R12, R34, R35, R36	6	3.0k	CRCW04023K00JNED	Vishay-Dale

Table 5-1. CC2662RQ1-BCU-EVM Bill-of-Materials (continued)

Part Reference Designator	Quantity	Value	Vendor Part Number	Vendor
R19, R20, R21, R43, R44, R45	6	100k	AC0402FR-07100KL	Yageo America
R22, R23, R24, R46, R47, R48	6	10.0k	AC0402FR-0710KL	Yageo America
S1	1		CL-SA-12C-22	NIDEC SEIMITSU
SH-J1, SH-J2, SH-J3, SH-J4, SH-J5, SH-J6, SH-J7, SH-J8, SH-J9, SH-J10, SH-J11, SH-J12, SH-J13	13	1x2	SNT-100-BK-G	Samtec
TP2	1		5012	Keystone Electronics
TP3	1		1598-2	Keystone
U1, U7	2		CC2662R1FTWRGZRQ1	Texas Instruments
U2, U3	2		SN3257QDYRQ1	Texas Instruments
U4	1		CAT24C08TDI-GT3	ON Semiconductor
U5, U8, U10, U11, U12, U13, U14, U15, U16, U17, U18, U19, U20	13		TPD4E05U06QDQARQ1	Texas Instruments
U6, U9	2		TPS3436BDADADDFRQ1	Texas Instruments
Y1, Y3	2		DST1610A 7BG03276AAC	DAISHINKU
Y2, Y4	2		CX2016DB48000C0FRLC 1	KYOCERA AVX
C12, C13, C14, C15, C16, C17, C18, C19, C20, C29, C30, C31, C32, C33, C34, C52, C53, C54, C55, C56, C57, C58, C59, C60, C69, C70, C71, C72, C73, C74	0	DNM	DNM	DNM
C37, C38, C77, C78	0	DNM	DNM	DNM
C39, C46, C79, C86	0	DNM	DNM	DNM

6 Compliance Information

6.1 CE Compliance

This evaluation board is only for development and not an end product. Developers and integrators who incorporate the chipset in any end products are responsible for obtaining applicable regulatory approvals for such end products. See the [EU Declaration of Conformity](#)

6.2 REACH Compliance

Texas Instruments declares that this product is in compliance with the EU REACH regulation.

6.3 Waste Electrical and Electronic Equipment (WEEE) Compliance

	<p>Waste Electrical and Electronic Equipment (WEEE)</p> <p>This symbol means that according to local laws and regulations your product and/or battery shall be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. Proper recycling of your product will protect human health and the environment.</p>
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7 Additional Information

7.1 Trademarks

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8 References

Development tools and software

- [CC2662RQ1-BCU-EVM Development Kit](#)
- [SimpleLink WBMS software development kit](#)
- [SimpleLink Low Power F3 software development kit](#)
- [SmartRF™ Studio](#) for simple radio configuration
- [SysConfig](#) system configuration tool

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