

EVM User's Guide: CC2662RQ1-CSU-EVM

CC266RQ1-CSU-EVM User's Guide



Description

The Cell Supervisor Unit (CSU) evaluation module was designed to provide internal TI teams and customers with a wireless device reference design that can be used for WBMS hardware and software development. The CSU integrates TI's [BQ79718B-Q1](#), a precise 18-cell automotive-grade battery monitor, with the [CC2662R-Q1](#) wireless Battery Monitoring System (BMS) micro-control unit. When combined with the [CC2662RQ1-BCU-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

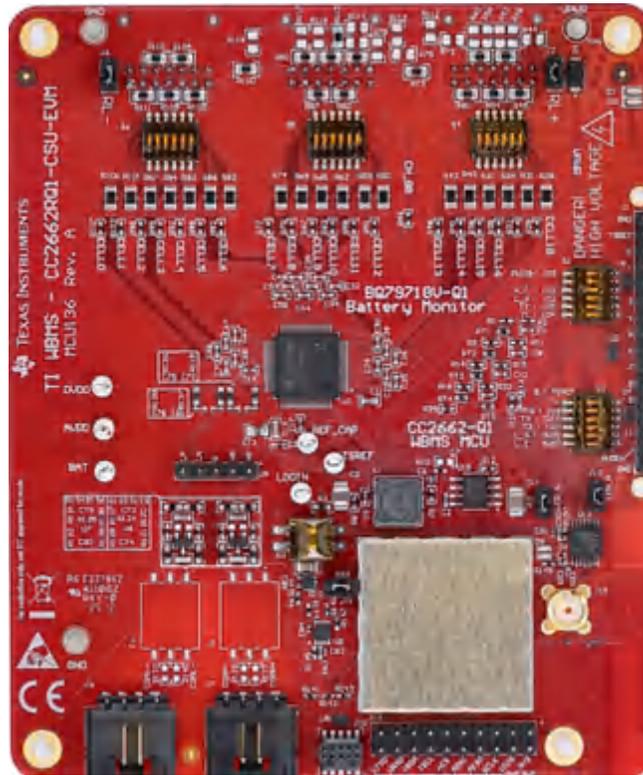
1. Order the [CC2662RQ1-BCU-EVM](#) EVM and either the [LP-XDS110](#) or the [LP-XDS110ET](#) launch pad.
2. Download the latest [software development kit \(SDK\)](#)
3. Download the comprehensive [reference design files](#) from the TI reference design page.
4. See the latest [CC2662R-Q1](#) product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

Features

- [CC2662R-Q1](#) wireless MCU
 - Capable of up to +5dBm output power
 - 2.4GHz PCB antenna with SMA connector for external antennas and conducted measurements
 - 10-pin Arm® Cortex® connectors
 - RF shield frame and cover (not required but included as an example layout to pass stringent EMI requirements)
 - [TPS3436-Q1](#) watchdog device connected to the MCU
 - [TPS715-Q1](#) LDO
 - [TXU0204-Q1](#) Level Shifter
 - [TPD4E05U06-Q1](#) I/O ESD protection
 - 2 Status LEDs
 - Access to I/O signals via 20 pin header
- [BQ79718B-Q1](#) precise 18-cell automotive-grade battery monitor
 - [LM5168-Q1](#) Buck converter for lowest keep alive power consumption
 - Daisy Chain/ Vertical Interface (VIF) connectors
 - Resistor Ladder for battery pack simulation
 - Access to I/O signals via 16 pin header
 - Voltage Test points (BAT, LDOIN, AVDD, DVDD, TSREF, and REF_CAP)
 - 2 Status LEDs
 - Busbar monitoring capable

Applications

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



CC2662RQ1-CSU-EVM Hardware Image

1 Evaluation Module Overview

1.1 Introduction

The Cell Supervisor Unit (CSU) EVM provides an easy-to-use platform for WBMS evaluation and development. It provides a robust, easily configurable HW solution for the wireless device role in a WBMS system. It gives the user the ability to simulate a battery pack with its built-in resistor ladder and is equipped with optional wired interface for daisy chaining of multiple [BQ79718B-Q1](#) devices.

1.2 Kit Contents

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

1.3 Specification

The CSU EVM is equipped with a [CC2662R-Q1](#) wireless MCU and a [BQ79718B-Q1](#) cell monitoring IC. These devices are connected via UART interface through a level shifter ([TXU0204-Q1](#)). The UART interface allows for cell monitoring data from the BQ device to be transferred to the wireless MCU device for wireless transmission to the wireless main (WM) device in the WBMS network.

The wireless MCU portion of the EVM is equipped with a 20-pin header to provide an interface with an external board via UART, I2C, or SPI if needed. A 10 pin JTAG debug connector is also tied to the wireless MCU device to allow for programming and debugging. Additionally, an SMA connector is included to allow for conducted RF testing when configured for conducted testing. The wireless MCU device is also equipped with an external watchdog whose “Watchdog Out” (WDO) signal is tied to the RESET line of the wireless MCU device. This connection can be disabled via an onboard jumper (J11). Power to the wireless MCU device from the BQ device can be enabled/disabled via on board switch (S3) this. In addition, the wireless MCU portion of the EVM can support:

- 1 additional SPI interface
- 1 additional UART interface
- 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

The BQ portion of the EVM is equipped with Vertical Interface (VIF) connectors to allow for daisy chaining of additional BQ devices. It comes equipped with a 16-pin header connector for access to the GPIO of the BQ device. Additionally, the EVM is equipped with a resistor ladder to allow for on-board cell emulation.

1.4 Device Information

1.4.1 CC2662R-Q1

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](#).

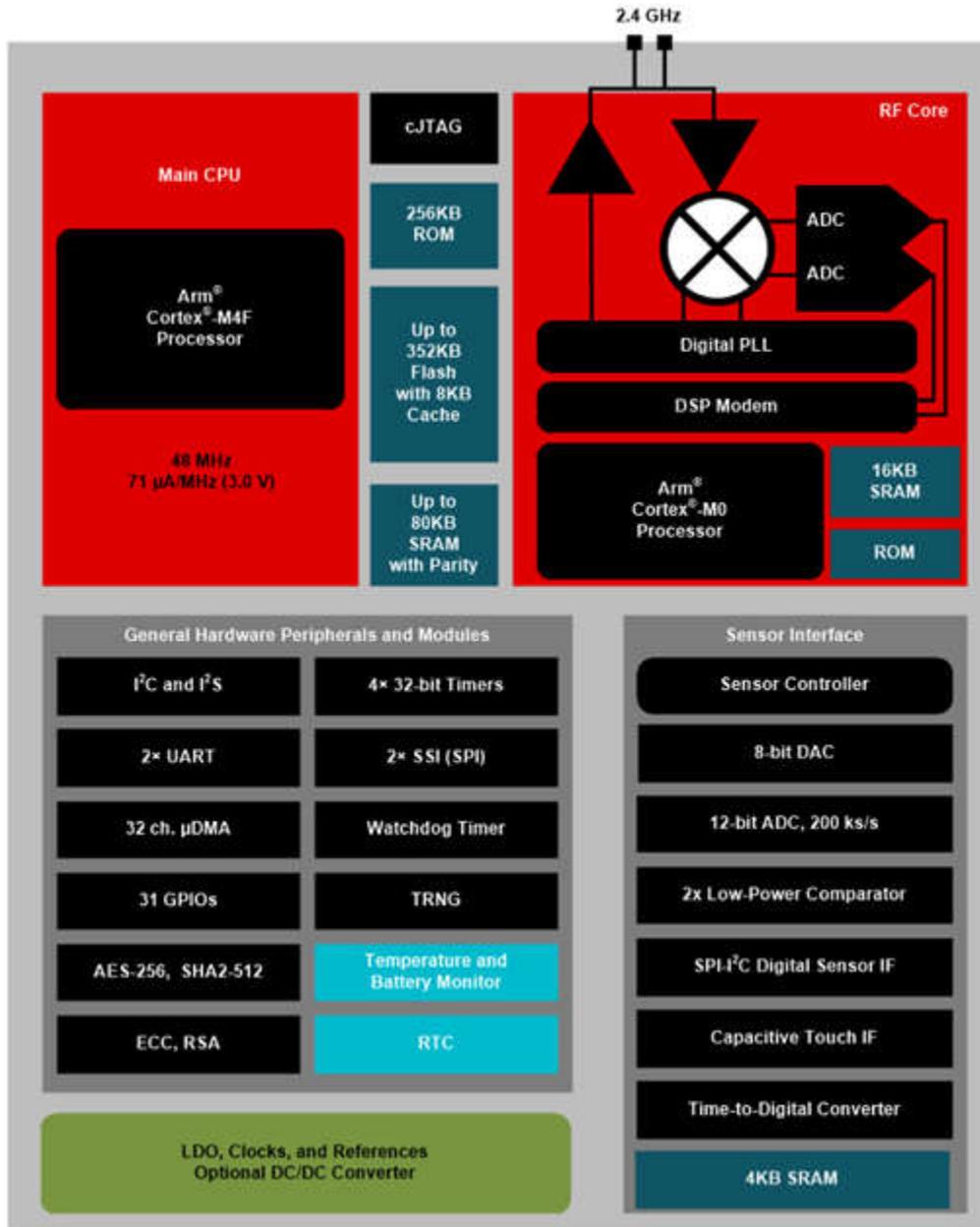


Figure 1-1. CC2662R-Q1 Block Diagram

1.4.2 BQ79718B-Q1

The [BQ79718B-Q1](#) provides high-accuracy cell voltage measurements for up to 18S battery modules in high-voltage battery management systems in xEV/EV. The family of monitors offers different channel options in the same package type, providing pin-to-pin compatibility and supporting high reuse of the established software and hardware across any platform. With the daisy chain isolated by transformer (or capacitor), the device is designed for centralized or distributed architectures in xEV powertrain.

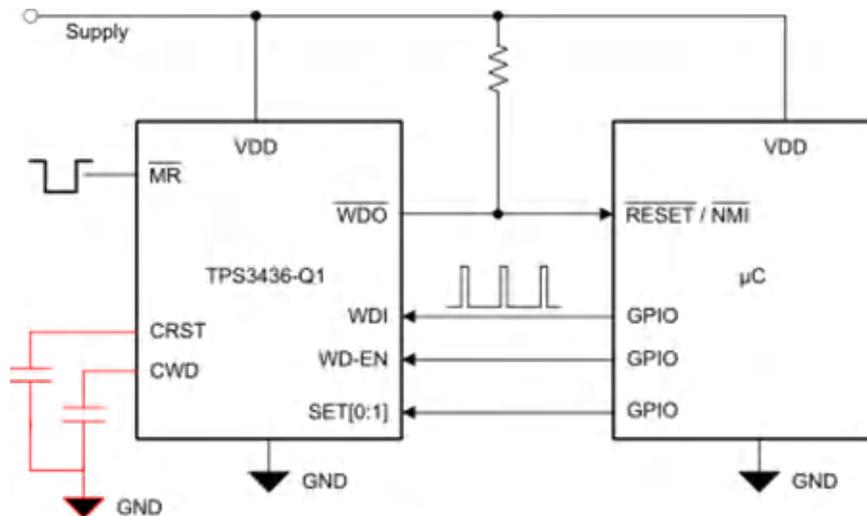
Key features of the [BQ79718B-Q1](#) include:

- AECQ100 qualified with the following results:

- Device temperature grade 1: –40°C to +125°C ambient operating temperature range
- Device HBM ESD classification level 2
- Device CDM ESD classification level C1
- Functional Safety-Compliant
 - Documentation to aid ISO 26262 system design
 - Systematic capability up to ASIL D
 - Hardware capability up to ASIL D
- Measure 9 to 18 batteries in series per device, stackable up to 64 devices
- Dedicated ADC with typical $\pm 1\text{mV}$ accuracy
- Cell voltage and battery pack current measurement synchronized to 64 μs
- Support limp home mode with full redundancy
- Integrated post-ADC configurable digital low-pass filters
- Supports busbar without affecting measurement accuracy
- 12 GPIOs for temp sensor/analog/digital/I2C controller/SPI controller
- Internal cell balancing
 - Balancing at 300mA
 - User controlled PWM adjustment cell balancing current
 - Built-in balancing thermal management with automatic pause and resume control
- Robust daisy chain communication and support Ring Architecture
- Hardware reset by host simulates POR-like event without battery removal
- Support transformer and capacitive isolation
- On chip memory for one time custom programming
- Low power mode current $6\mu\text{A}$
- Compatible with [BQ79600-Q1](#) with SPI/UART interface

1.4.3 TPS3436-Q1

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 1-2. TPS3436-Q1 Block Diagram

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: $V_{DD} = 1.04\text{V}$ to 6.0V
- Ultra low supply current: $I_{DD} = 250\text{nA}$ (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

1.4.4 TPS715-Q1

The [TPS715-Q1](#) low-dropout (LDO) linear voltage regulator is a low quiescent current device that offers the benefits of a wide input voltage range and low-power operation in miniaturized packaging. Thus, the [TPS715-Q1](#) is designed for battery-powered applications and as a power-management attachment to low-power microcontrollers. The [TPS715-Q1](#) is available in both fixed and adjustable versions. For more flexibility or higher output voltages, the adjustable version uses feedback resistors to set the output voltage from 1.2V to 15V. The [TPS715-Q1](#) LDO supports a low dropout of typically 415mV at 50mA of load current. The low quiescent current (3.2 μA typically) is stable over the entire range of output load current (0mA to 50mA). The [TPS715-Q1](#) also features an internal soft-start to lower the inrush current. The built-in overcurrent limit helps protect the regulator in the event of a load short or fault. The [TPS715-Q1](#) is available in a 2.00mm \times 1.25mm, 5-pin SC-70 (DCK) package for fixed and adjustable outputs.

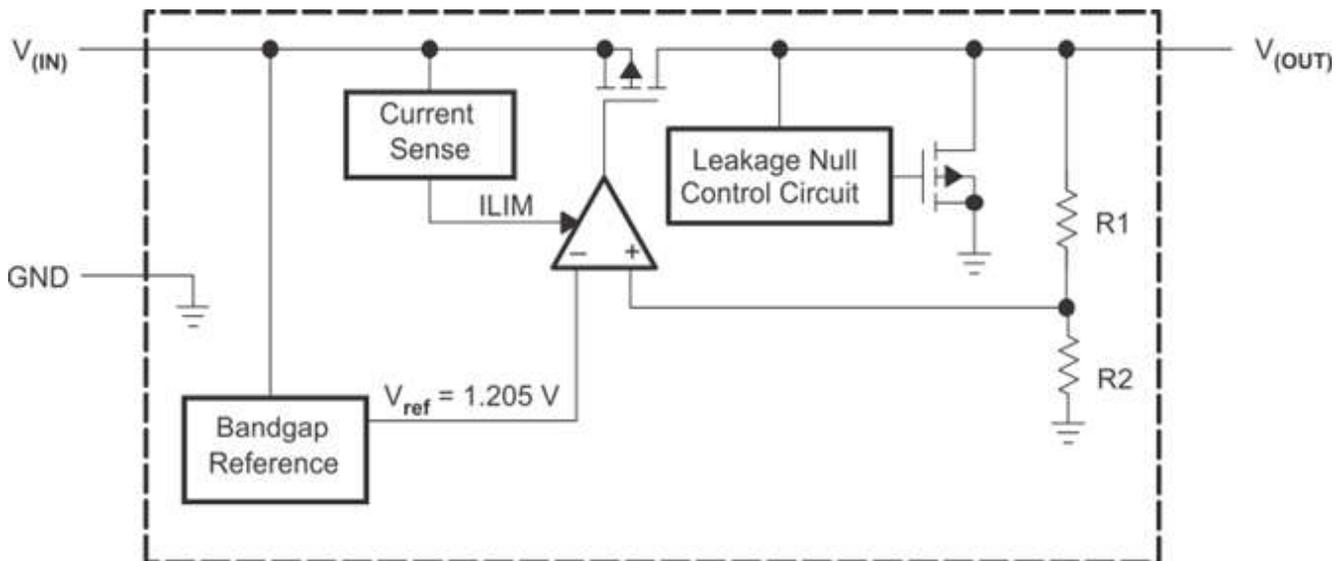


Figure 1-3. TPS715-Q1 Block Diagram

Key features of the [TPS715-Q1](#) include:

- AEC-Q100 qualified for automotive applications:
 - Temperature grade 1: -40°C to $+125^{\circ}\text{C}$, TA
 - Device HBM ESD classification level H2

- Device CDM ESD classification level C4B for legacy chip and C5 for new chip
- Input voltage range: 2.5V to 24V
- Available output voltage options:
 - Fixed: 1.8V to 5V
 - Adjustable: 1.2V to 15V
- Output current: Up to 50mA
- Very low IQ: 3.2 μ A at 50mA load current
- Stable with output capacitor $\geq 0.47\mu$ F
- Overcurrent protection
- Package: 5-pin SC70 (DCK)

1.4.5 TXU0204-Q1

TXU0204-Q1 is a 4-bit, dual-supply non-inverting fixed direction voltage level translation device. Ax pins are referenced to VCCA logic level, OE pin can be referenced to either VCCA or VCCB logic levels, and Bx pins are referenced to VCCB logic levels. The A port is able to accept input voltages ranging from 1.1V to 5.5V, while the B port can also accept input voltages from 1.1V to 5.5V. Fixed direction data transmission can occur from A to B or B to A when OE is set to high in reference to either supply. When OE is set to low, all output pins are in the high-impedance state.

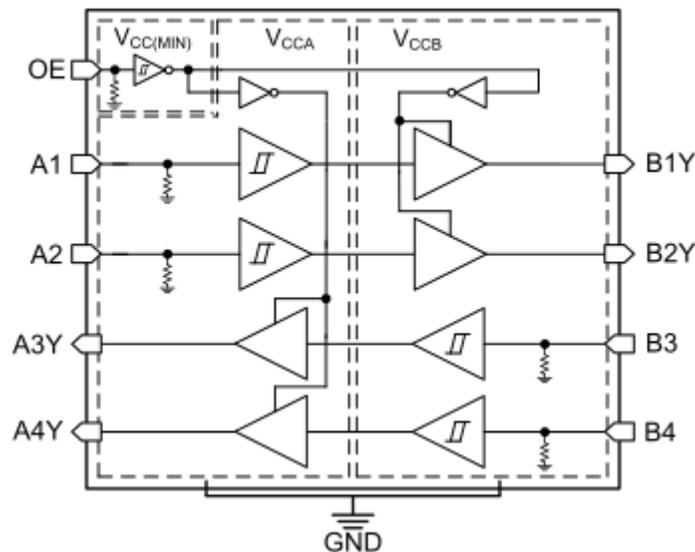


Figure 1-4. TXU0204-Q1 Block Diagram

Key features of the **TXU0204-Q1** include:

- AEC-Q100 qualified for automotive applications
- Available in wettable flank QFN (WBQA) package
- Fully configurable dual-rail design allows each port to operate from 1.1V to 5.5V
- Up to 200Mbps support for 3.3V to 5.0V
- Schmitt-trigger inputs allows for slow and noisy inputs
- Inputs with integrated static pull-down resistors prevent channels from floating
- High drive strength (up to 12mA at 5V)
- Low power consumption
 - 3 μ A maximum (25°C)
 - 6 μ A maximum (–40°C to 125°C)
- VCC isolation and VCC disconnect (loff-float) feature
 - If either VCC input is <100 mV or disconnected, all outputs are disabled and become high-impedance
- loff supports partial-power-down mode operation
- Control logic (OE) with VCC(MIN) circuitry allows for control from either A or B port

- Pinout compatible with TXB family level shifters
- Available in other variants that support common applications: TXU0104-Q1, TXU0304-Q1
- Operating temperature from -40°C to $+125^{\circ}\text{C}$
- Latch-up performance exceeds 100mA per JESD 78, class II
- ESD protection exceeds JESD 22
 - 2500V human-body model
 - 1500V charged-device model

1.4.6 LM5168-Q1

The LM5169-Q1 and [LM5168-Q1](#) synchronous buck converters are designed to regulate over a wide input voltage range, minimizing the need for external surge suppression components. A minimum controllable on time of 50ns facilitates large step-down conversion ratios, enabling the direct step-down from a 48V nominal input to low-voltage rails for reduced system complexity and design cost. The LM516x-Q1 operates during input voltage dips as low as 6V, at nearly 100% duty cycle if needed, making LM516x-Q1 an excellent choice for wide input supply range industrial and high cell count battery pack applications.

With integrated high-side and low-side power MOSFETs, the LM5169-Q1 delivers up to 0.65A of output current and the [LM5168-Q1](#) delivers up to 0.3A of output current. A constant on-time (COT) control architecture provides nearly constant switching frequency with excellent load and line transient response. The LM516x-Q1 is available in FPWM or auto mode versions. FPWM mode provides forced CCM operation across the entire load range supporting isolated fly-buck converter applications. Auto mode enables ultra-low IQ and diode emulation mode operation for high light-load efficiency.

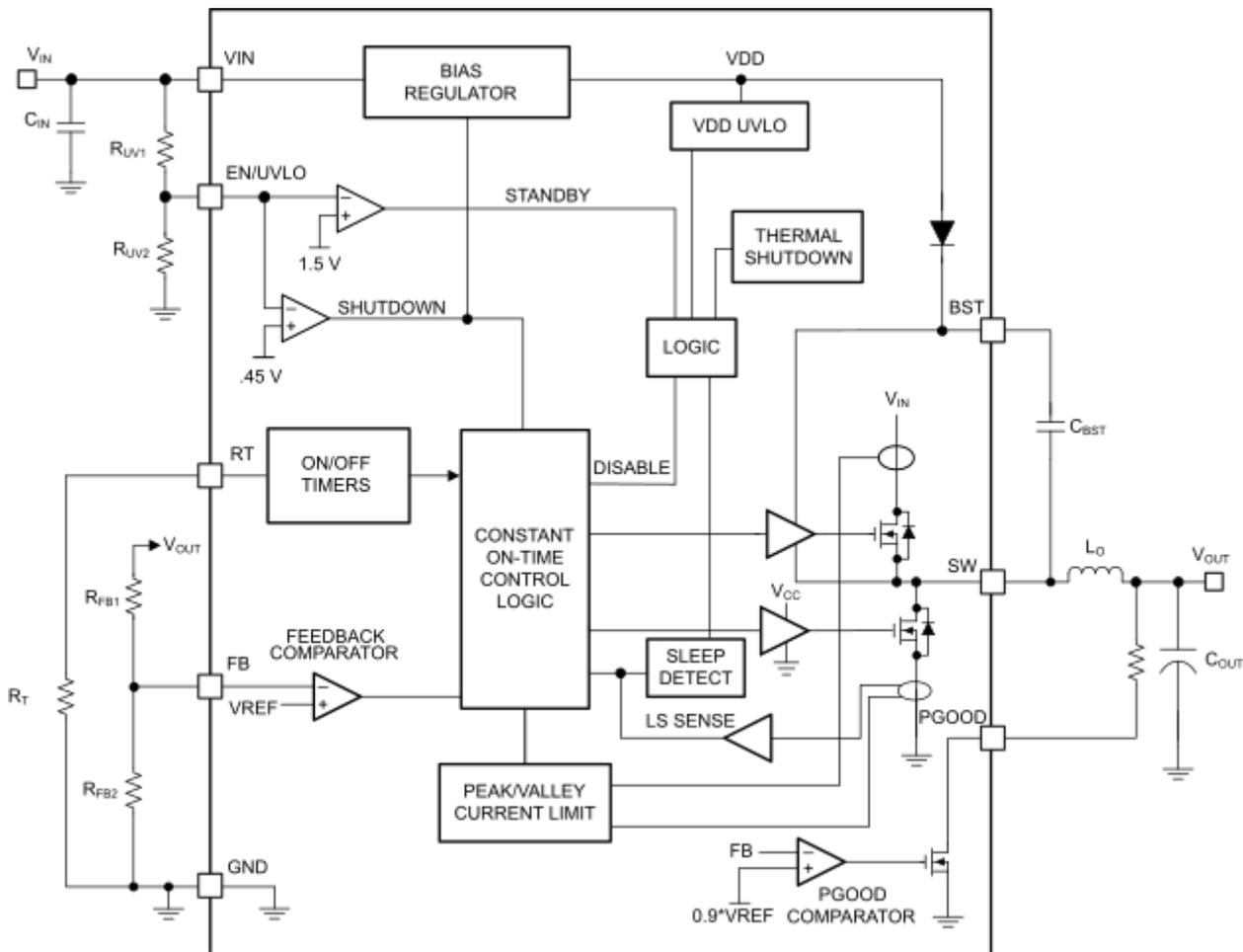


Figure 1-5. LM5168-Q1 Block Diagram

Key features of the [LM5168-Q1](#) include:

- AEC-Q100-qualified for automotive applications
 - Device temperature grade 1: -40°C to $+125^{\circ}\text{C}$, ambient temperature range
- Designed for reliability in rugged applications
 - Wide input voltage range of 6V to 120V
 - Junction temperature range: -40°C to $+150^{\circ}\text{C}$
 - Fixed 3ms internal soft-start timer
 - Peak and valley current-limit protection
 - Input UVLO and thermal shutdown protection
- Designed for scalable automotive HEV/EV power supplies
 - Low minimum on and off times of 50ns
 - Adjustable switching frequency up to 1MHz
 - Diode emulation for high light-load efficiency
 - Auto mode with low-quiescent current ($< 10\mu\text{A}$)
 - FPWM for fly-buck converter capability
 - $3\mu\text{A}$ shutdown quiescent current
 - Pin-to-pin compatible with LM5164-Q1, LM5163-Q1, LM5017, LM5013-Q1 and LM34927
- Integration reduces design size and cost
 - COT mode control architecture
 - Integrated 1.9Ω NFET buck switch
 - Integrated 0.71Ω NFET synchronous rectifier
 - 1.2V internal voltage reference
 - No loop compensation components
 - Internal VCC bias regulator and boot diode
 - Open-drain power-good indicator
 - SOIC PowerPAD™ integrated circuit package

2 Hardware

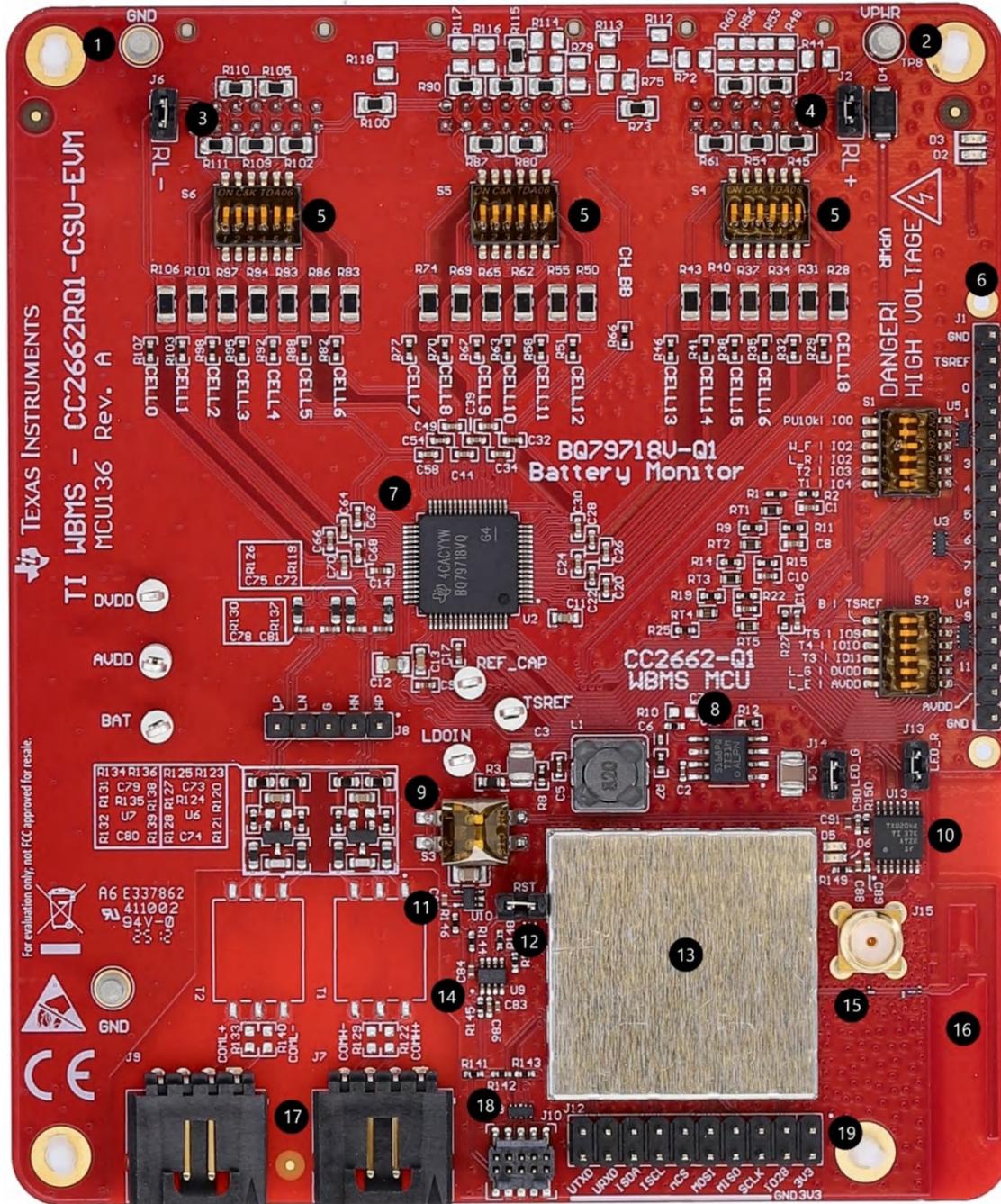


Figure 2-1. CC2662RQ1-CSU-EVM Hardware Layout

1. GND Lug
2. Battery Power
3. Negative end of resistor ladder jumper
4. Positive end of resistor ladder jumper
5. Resistor ladder switches
6. 16-pin BQ79718B-Q1 GPIO header
7. BQ79718B-Q1
8. LM5168-Q1 DCDC for BQ79718B-Q1
9. Switch for CC2662R-Q1 device power

10. [TXU0204-Q1](#) Level Shifter
11. [TPS715-Q1](#) LDO
12. WDO Jumper
13. [CC2662R-Q1](#) (Wireless microcontroller under shield)
14. [TPS3436-Q1](#) (Window watchdog timer)
15. SMA RF Connector
16. Antenna
17. VIF Connectors (BQ Wired Daisy Chain)
18. 10-pin debug connector (Allows external JTAG debug/programming)
19. 20-pin [CC2662R-Q1](#) spare GPIO header

2.1 Power Requirements

When powering the CC2662RQ1-CSU-EVM there are two ways the user can power the board. The user should keep in mind that the recommended operating conditions for the battery range is from 9V to 90V for full functionality.

When powering the board with either option detailed in this section, the BQ device will provide 5V (AVDD) supply to the [TPS715-Q1](#) LDO which will generate the 3.3VDC supply for the [CC2662R-Q1](#) device if the power switch (S3) is enabled.

Additionally, the user can place the power switch S3 in the off position and provide an external 3.3V supply to the [CC2662R-Q1](#) device using either the debug connector J10 or the header J12.

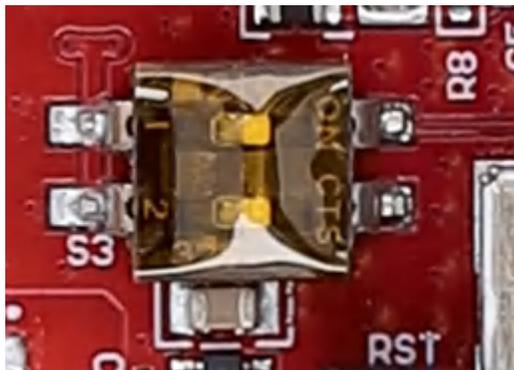


Figure 2-2. S3 Power Switch

2.1.1 Powering with Batteries and Wiring Harness

There are two ways to power this CC2662RQ1-CSU-EVM, the first way is by using a battery module and wiring harness. When power the board with a battery module, the user will connect the wiring harness to the corresponding connectors on the bottom of the board.

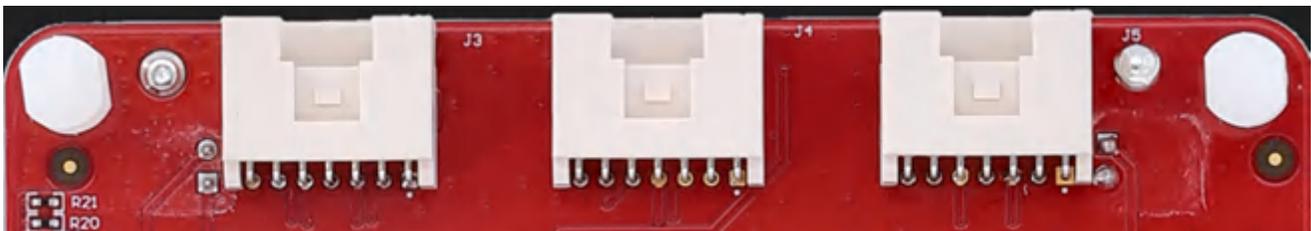


Figure 2-3. Wiring Harness Connectors

The connector closest to the J5 standoff will be used to connect the uppermost cells, the middle connector will be used to connect the middle cells, and the connector closest to the J6 jumper, will be used to connect the bottommost cells.

In the wiring harness, there are two wires on the top of the module and two on the bottom of the module. One of the wires is used to sense cell voltage, and the other is used to power the device. They are separate so no current is drawn on the wire used to measure. Because of this, it is important that the jumpers on J2 (RL+) and J6 (RL-) are removed so the two wires on the top and bottom are not connected.

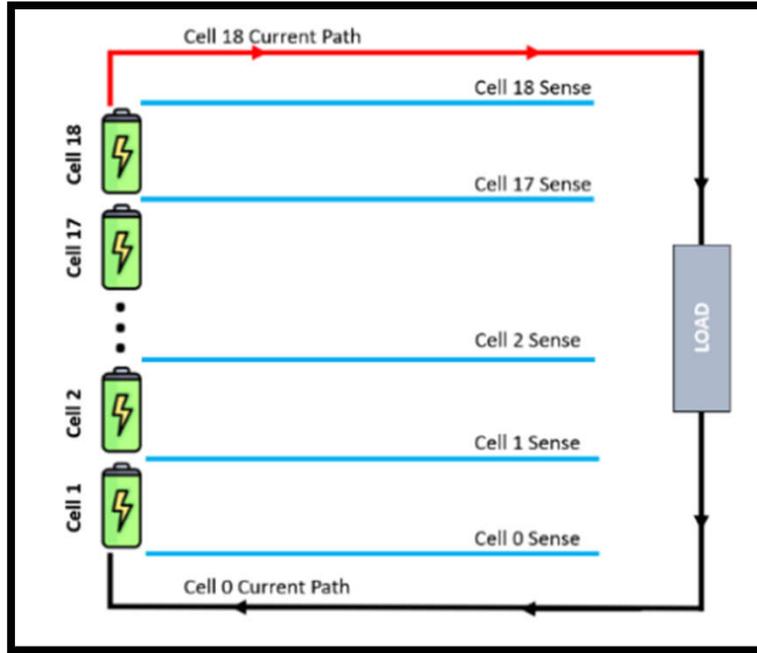
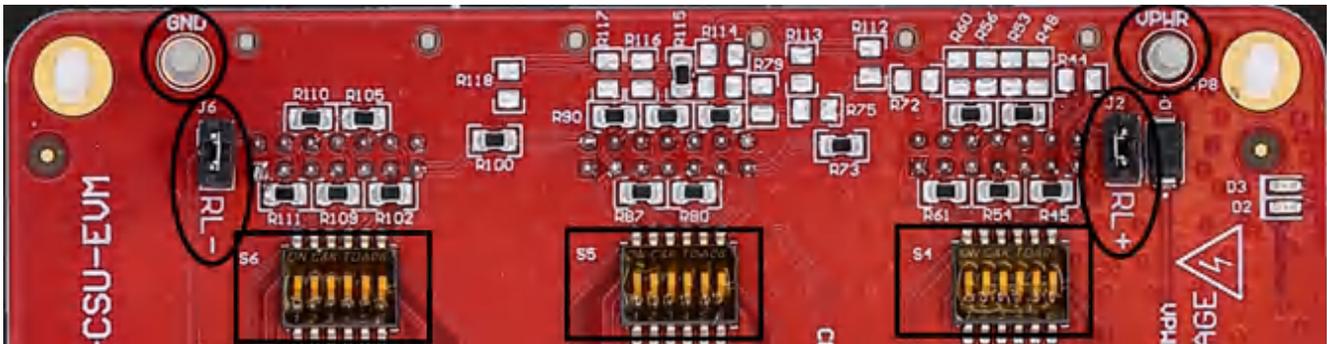


Figure 2-4. Battery Module Cell Sensing

2.1.2 Powering with Source Meter/External Supply and Using the Resistor Ladder

The CC2662RQ1-CSU-EVM is also equipped with standoff test points (VPWR (TP8) and GND (TP1)) to allow the user to apply power from a source meter unit (SMU) or external power supply. To connect the resistor ladder and simulate cell voltages, populate the jumpers of J5 (RL+) and J6 (RL-) and close all the switches of S6, S5, and S2. Otherwise, the VC and CB pins on the device will not see and voltage and cell voltages will read as floating.



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-CSU-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 Generic XDS110 Debug Probe, Including a Separate LaunchPad

On the separate LaunchPad:

- Remove all of the header jumpers except GND and 3V3.

On both Generic XDS110 Debug Probe and Separate LaunchPad:

- Set the power jumper to reflect the scenario. Set the jumper to XDS110 power if the [CC2662R-Q1](#) is to be powered by the XDS110 Debug Probe or 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 the J10 connector.

The final configuration is shown in Connection of CC2662RQ1-CSU-EVM with XDS110 Debug Probe.

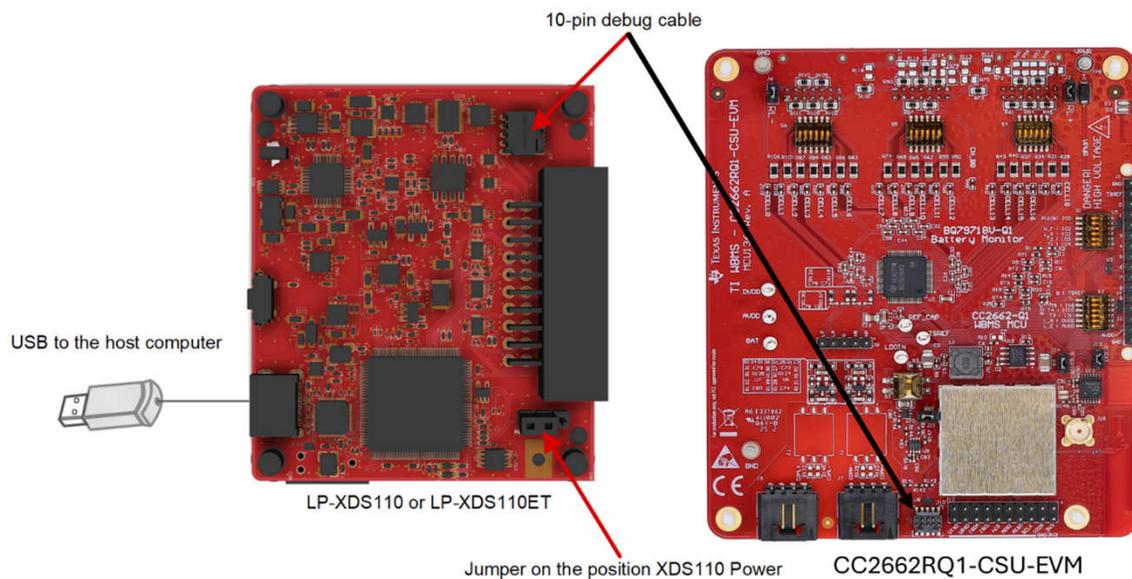


Figure 2-5. Connection of CC2662RQ1-CSU-EVM with XDS110 Debug Probe

2.4 Interfaces

The [CC2662R-Q1](#) device uses the following I/Os for the functions detailed in [Table 2-1](#). For communicating with the [CC2662R-Q1](#) for a custom application, the user can utilize J12. This set of male headers gives the user the capability to directly connect to wireless MCU DIO and communicate via SPI, I2C, or UART. Details of the signals on J12 are found in [Table 2-2](#).

Table 2-1. WIRELESS MCU I/O Internal Board Interfaces

Pin #	DIO #	Signal Name	Function
9	DIO_4	WD_SET0	Watchdog Interface
10	DIO_5	WD_SET1	Watchdog Interface
11	DIO_6	UART_RX_CC	UART Interface with BQ
12	DIO_7	UART_TX_CC	UART Interface with BQ
14	DIO_8	BQ_FAULT_CC	Fault Pin from BQ
19	DIO_13	WDI_CC	Watchdog Interface

For communicating with the CC2662R-Q1 for a custom application, the user can utilize J12. This set of male headers gives the user the capability to directly connect to wireless MCU DIO and communicate via SPI, I2C, or UART.



Figure 2-6. J12 Header for Wireless MCU Interfacing

Table 2-2. Wireless MCU I/O External Board Interfaces

Pin #	DIO #	Signal Name	J12 Pin #	Function
11	DIO_6	UART_RX_CC	17	UART Interface with BQ
12	DIO_7	UART_TX_CC	19	UART Interface with BQ
17	DIO_11	CC_I2C_SDA	15	I2C Interface
18	DIO_12	CC_I2C_SCL	13	I2C Interface
37	DIO_24	CC_SPI_CS	11	SPI Interface
38	DIO_25	CC_SPI_MOSI	9	SPI Interface
39	DIO_26	CC_SPI_MISO	7	SPI Interface
40	DIO_27	CC_SPI_SCK	5	SPI Interface
41	DIO_28	CC_EXT_IO	3	EXT Interface

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

Table 2-3. BQ I/O Internal Board Interfaces

Pin #	GPIO #	Signal Name	Function
51	GPIO0	GPIO0 (UART_RX_WL)	UART Interface with wireless MCU
52	GPIO1	GPIO1 (UART_TX_WL)	UART Interface with wireless MCU
53	GPIO2	GPIO2 (FAULT_WL)	BQ Fault
64	GPIO3	GPIO3 (NTC_OB2)	NTC Interface
63	GPIO4	GPIO4 (NTC_OB1)	NTC Interface
58	GPIO9	GPIO9 (NTC_OB5)	NTC Interface
57	GPIO10	GPIO10 (NTC_OB4)	NTC Interface
56	GPIO11	GPIO11 (NTC_OB3)	NTC Interface

The General-Purpose Input Output (GPIO) pins of the BQ devices are routed out to J1 of the EVM. In a BMS system, GPIOs are commonly utilized for temperature monitoring, employing NTC or PTC-type thermistors.

However, their versatility extends beyond this, allowing users to monitor any signal within a 5V range.



Figure 2-7. BQ GPIO Header

Table 2-4. BQ I/O External Board Interfaces

Pin #	DIO #	Signal Name	J1 Pin #	Function
51	GPIO0	GPIO0 (UART_RX_WL)	14	UART Interface with wireless MCU
52	GPIO1	GPIO1 (UART_TX_WL)	13	UART Interface with wireless MCU
53	GPIO2	GPIO2 (FAULT_WL)	12	BQ Fault
64	GPIO3	GPIO3 (NTC_OB2)	11	NTC Interface
63	GPIO4	GPIO4 (NTC_OB1)	10	NTC Interface
62	GPIO5	GPIO5	9	General Purpose
61	GPIO6	GPIO6	8	General Purpose
60	GPIO7	GPIO7	7	General Purpose
59	GPIO8	GPIO8	6	General Purpose
58	GPIO9	GPIO9 (NTC_OB5)	5	NTC Interface
57	GPIO10	GPIO10 (NTC_OB4)	4	NTC Interface
56	GPIO11	GPIO11 (NTC_OB3)	3	NTC Interface
50	TSREF	TSREF	15	TSREF

2.4.1 Debug Interface Connector

The CC2662RQ1-CSU-EVM contains a 10-pin debug connector (J10) that enables the use of an external JTAG Debug Probe to debug/program the device. The pinout information can be found in [Table 2-5](#). For the pin 1 location, refer to Section 5 or the full set of reference design files.

Table 2-5. 10-Pin Debug Interface Connector Pinout

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

Table 2-5. 10-Pin Debug Interface Connector Pinout (continued)

Pin #	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

2.4.2 BQ Daisy Chain Interface

Figure 2-8 shows the Daisy Chain interface, also known as the Vertical Interface (VIF) portion of the EVM. This interface allows the user to connect multiple CSU boards in a daisy chain configuration via daisy chain cables also shown in Figure 2-8.

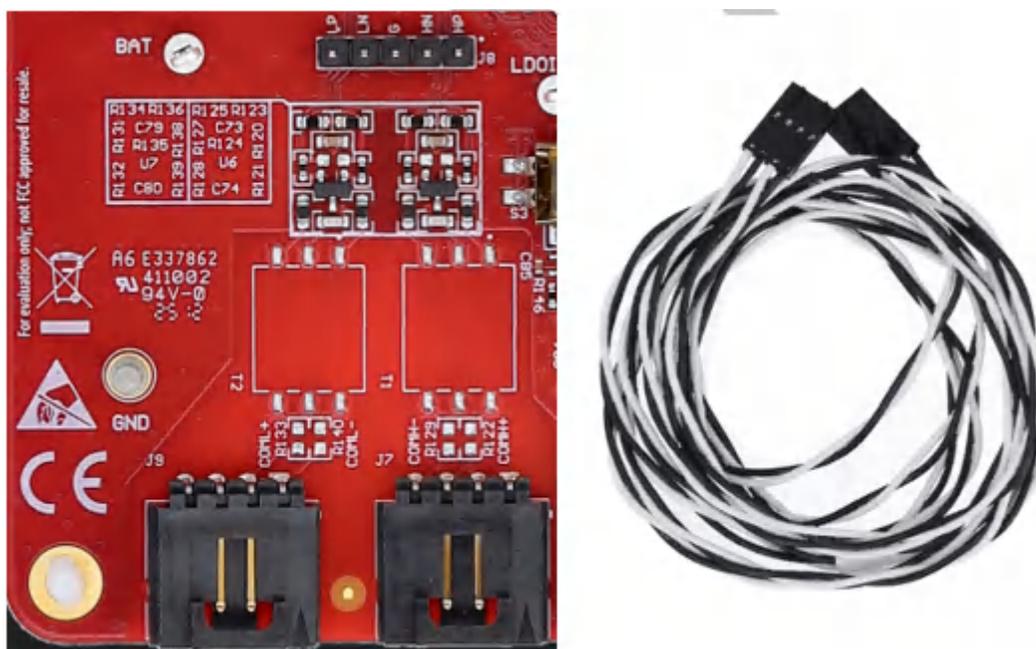


Figure 2-8. BQ Daisy Chain Interface and Cable

The board designated to communicate wirelessly with the wireless main MCU in a WBMS network is considered the base device. This base device is responsible for collecting data from all stacked devices and transmitting the data wirelessly to the wireless main device. The wireless main device can then interface with a host MCU or PC to then transfer the data to the user via a Graphical User Interface (GUI) or through UART/SPI data packets.

To configure multiple boards in a daisy chain configuration, the user will connect the daisy chain cable between COMH of the base device and COML of the next device in the daisy chain, which will be considered stack 1 or “S1”. This COMH to COML connection configuration will continue down the daisy chain between S1 and S2, and so on.

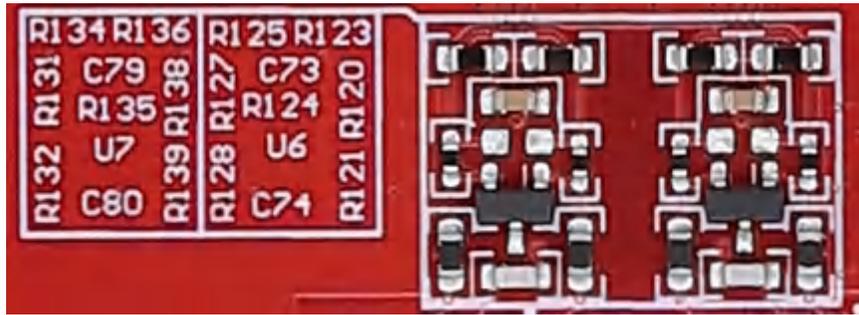


Figure 2-9. BQ Isolation Circuitry for VIF Communication

Figure 2-9 shows the isolation portion of the VIF communication interface. This section contains series and termination resistors, Transient Voltage Suppressor (TVS) diodes, and isolation capacitors to keep the device protected from any noise that may be induced onto the communication lines.

2.5 Jumpers

There are several jumpers included in the CC2662RQ1-CSU-EVM that provide the user with some flexibility. Jumpers J2 and J6 allow the user to connect or disconnect the resistor ladder from the board supply. Having the jumpers installed on both headers enables the resistor ladder and removing the jumpers disables the resistor ladder.

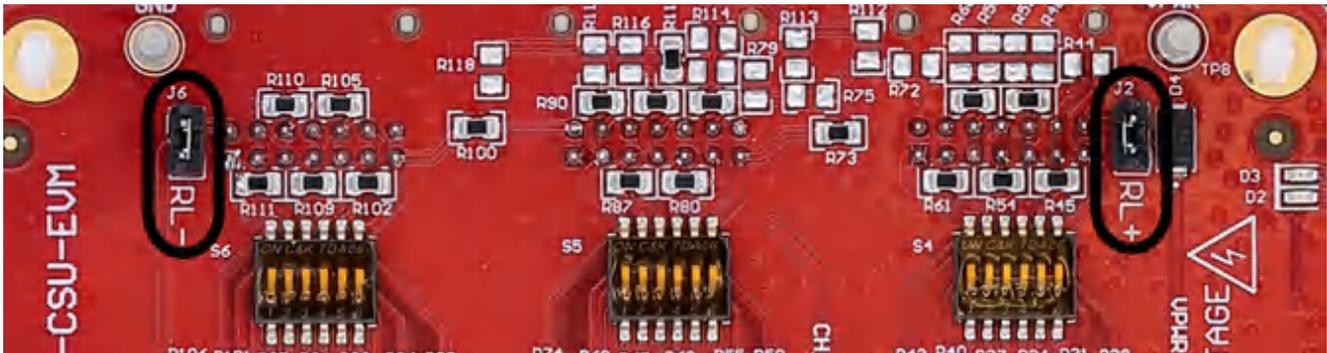


Figure 2-10. Resistor Ladder Jumpers

Jumpers J13 and J14 enable and disable the LED lights D5 and D6 tied to [CC2662R-Q1](#) device DIO_9 and DIO_10. When the jumpers are installed, the LEDs are connected to their respective DIO through series resistor. When the jumpers are removed the LEDs are disconnected and left floating. This can be useful when measuring current consumption of the [CC2662R-Q1](#) device.

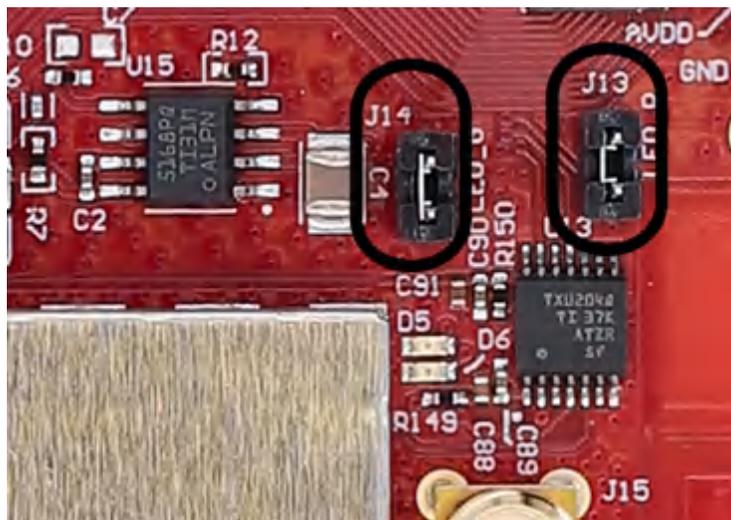


Figure 2-11. LED Jumpers

Jumper J11 connects and disconnects the WDO signal from the RST line of the [CC2662R-Q1](#) device. When the jumper is installed, the WDO pin of the watchdog device can drive the reset line low and reset the device. When the jumper is removed the WDO pin of the watchdog is disconnected and left floating. This can be useful when evaluating the [CC2662R-Q1](#) device when the watchdog feature is not desired.

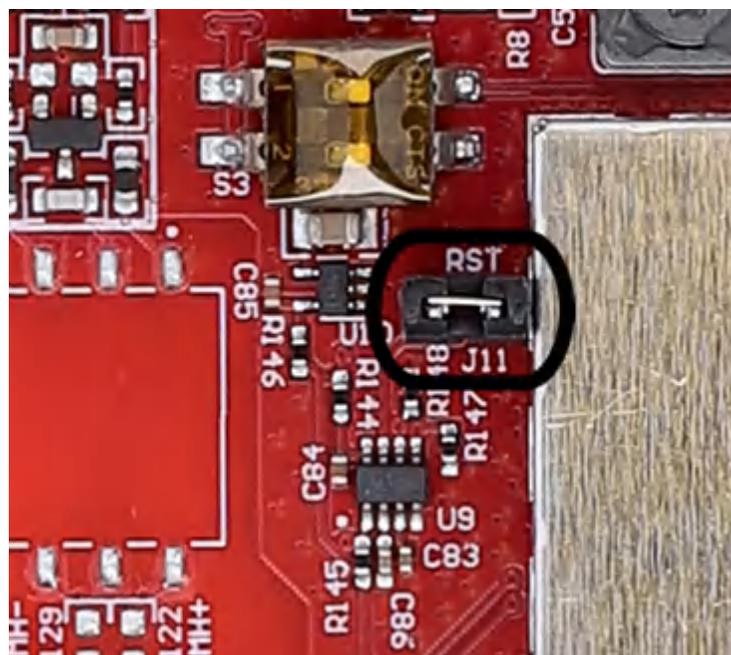


Figure 2-12. Watchdog WDO RST Jumper

2.6 General Features

2.6.1 BQ DCDC Converter (LM5168-Q1)

U15 [LM5168-Q1](#) is a low current consumption external DCDC converter. It is responsible to take the voltage from the battery pack or source meter applied to PWR, and step it down to a voltage in the range of 7.4V-9V, including ripple, for LDOIN to operate properly.

LDOIN is the very first reference that must be powered because all other references are derived from LDOIN. These references include AVDD for the internal analog block, DVDD for the internal digital block, and TSREF/REF_CAP for the GPIO/ADC references.

Note

Rev. A of the CC2662RQ1-CSU-EVM configured the LM5168-Q1 converter to output 6V for LDOIN. This will result in higher current consumption when the wireless MCU device is operating in low power modes. Future revisions of the EVM will be updated to increase the LM5168-Q1 output voltage to 7.4V-9V. Any customer referencing the CC2662RQ1-CSU-EVM for their own custom design should modify the LM5168-Q1 circuit to ensure the output voltage is in the 7.4V-9V range.

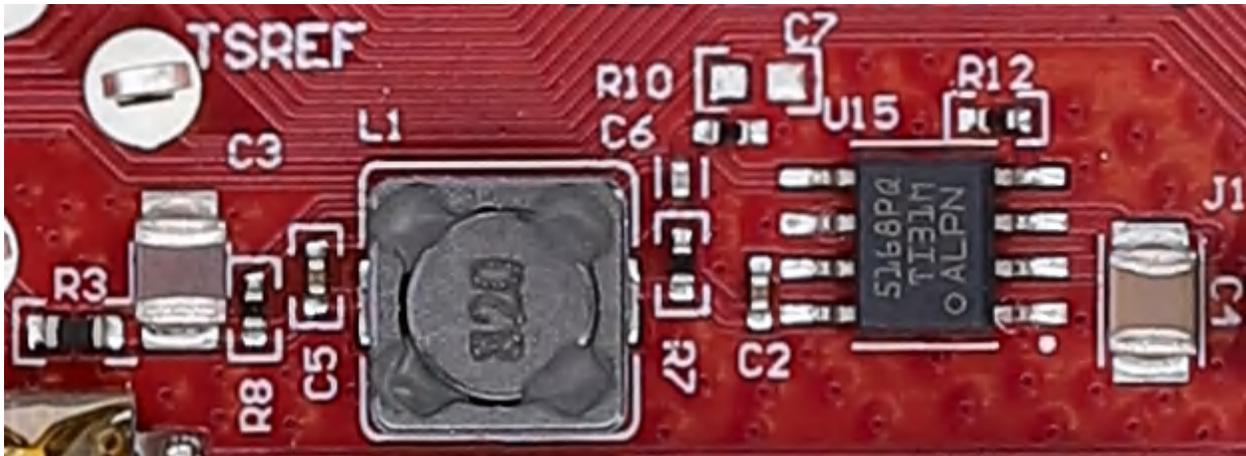


Figure 2-13. U15 LM5168-Q1 DCDC Converter

2.6.2 BQ Voltage References

Figure 2-14 shows the voltage reference portion of the EVM. There are test points for BAT, LDOIN, AVDD, DVDD TSREF, and REF_CAP.

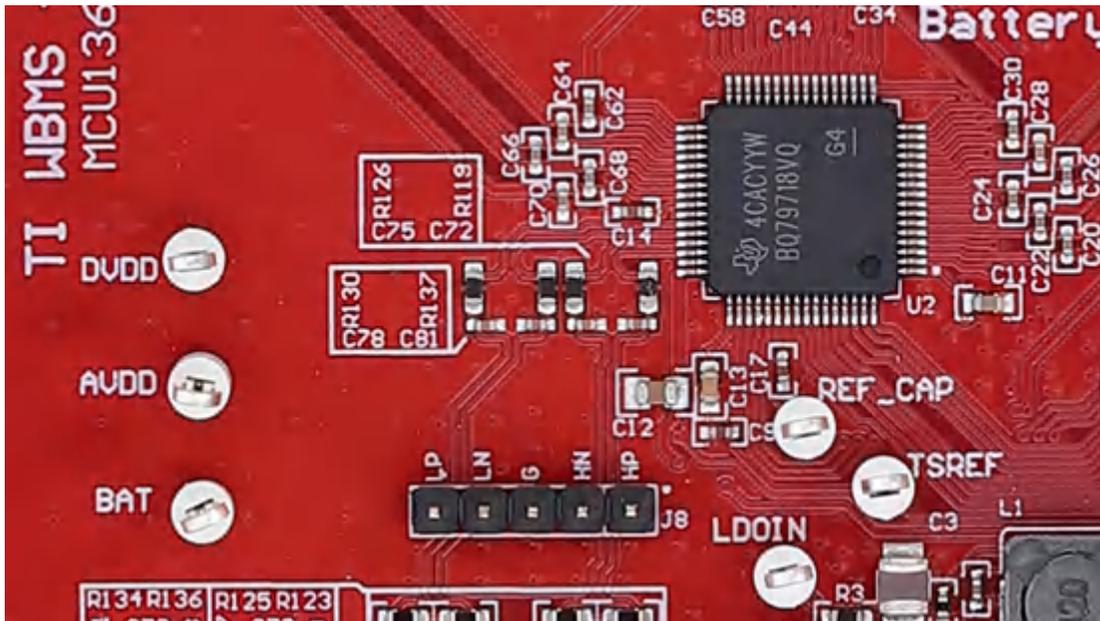


Figure 2-14. BQ Voltage References

The user may use these test points to monitor the state of the device and determine the transition from one mode like active to another mode like shutdown or sleep. These can also be used to make sure all internal blocks of the [BQ79718B-Q1](#) device is being supplied properly.

Table 2-6. BQ79718B Reference Voltage

BQ79718B	Active	Sleep	Shutdown
LDOIN	6V	6V	6V
AVDD	5V	5V	5V (if EN)
DVDD	1.5V	1.5V	0V
TSREF	4V (if EN)	4V (configurable)	0V
REF_CAP	4V	4V	4V (if AVDD EN)

For more details as to the normal operating voltage for each of the voltage references, please refer to the [BQ79718B-Q1](#) datasheet.

2.6.3 BQ Resistor Ladder

[Figure 2-15](#) and [Figure 2-16](#) are the resistor ladder portion of the EVM. This includes all the resistors that can simulate a battery voltage for testing as well as dipswitches to connect and disconnect the resistor ladder from the [BQ79718B-Q1](#) device.

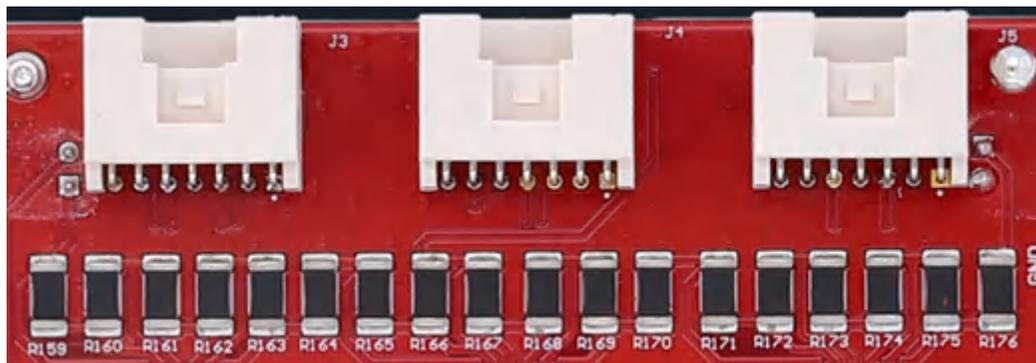


Figure 2-15. Resistor Ladder



Figure 2-16. Resistor Ladder Switches

2.6.4 BQ Busbar

The busbar, typically a metal piece positioned between two battery modules to link them in series, serves as a crucial element that can be monitored by the device. This monitoring enables the assessment of the connection status between battery modules and their evolution over time.

There are two primary methods to connect the busbar to the device:

Initially, it can be monitored using a VC channel by configuring software. Instead of having 18 cells being monitored, one or more of the cells would be monitoring a busbar instead of a battery cell.

Alternatively, a busbar that is between two cells can be monitored using the BB pin on the device. In this configuration, all 18 cells can be monitored in addition to one busbar. The user can configure the busbar to be between various cells by changing some components on the EVM. For detailed instructions on modifying components to adjust the busbar's position, please refer to the *Advanced Use of the EVM Hardware* section.

2.6.5 CC2662R-Q1 LDO

U10 is the [TPS715-Q1](#) soft start LDO. This device is used to step-down AVDD, a 5V supply on the [BQ79718B-Q1](#) device, from 5V down to 3.3V. This 3.3V output from the soft start LDO will be used as the power supply for the [CC2662R-Q1](#) device. AVDD can support external loads up to 20mA. A soft start LDO is used to reduce the inrush current drawn by the wireless MCU design at turn on and allow the AVDD supply to ramp up to 5V successfully.



Figure 2-17. U10 TPS715-Q1 LDO

2.6.6 CC2662R-Q1 Watchdog

U9 is the [TPS3436-Q1](#) watchdog timer used to monitor the [CC2662R-Q1](#) device. If the [CC2662R-Q1](#) hangs because of a SW error or HW issue, the watchdog timer will drive the [CC2662R-Q1](#) reset line low to reset the device.



Figure 2-18. U9 TPS3436-Q1 Watchdog Timer

2.6.7 BQ to Wireless MCU Level Shifter

U3 is the [TXU0204-Q1](#) level shifter used to allow UART communication between the [BQ79718B-Q1](#) and the [CC2662R-Q1](#). Because the [BQ79718B-Q1](#) device uses 5V logic, and the [CC2662](#) uses 3.3V logic, this level shifter is required to allow communication between the two devices.



Figure 2-19. U3 TXU0204-Q1 Level Shifter

2.6.8 Status LEDs

There are multiple status LEDs on the board that can be used to monitor the current state of the device.

Pictured below a couple of the available status LEDs. D3 is connected to NFAULT or GPIO2 of the [BQ79718B-Q1](#) device. When a fault occurs, NFAULT will get pulled low and D3 will light up red.

D2 is connected to DVDD of the [BQ79718B-Q1](#) device. When the device transitions to an active state, DVDD will go high and D2 will light up green.

Additionally, D5 and D6 are connected to DIO10 and DIO9 of the CC2662 device respectively. The user can define the functionality of DIO9 and DIO10 and use the LEDs to provide their desired status.

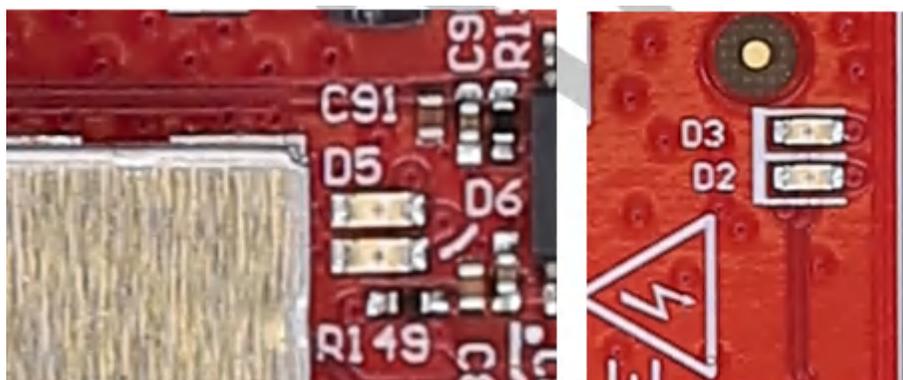


Figure 2-20. Status LEDs

2.7 Advanced Use of the EVM Hardware

Note

The topics in this section can 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 have the expertise to perform these modifications.

2.7.1 Base or Stack

When the RX line (GPIO0) of the [BQ79718B-Q1](#) device is pulled up to AVDD with a resistor greater than 70k Ω , then ping detection is on, AVDD will be on in shutdown, and the device can be configured as a base device. When ping detection is on, the device can also be configured as a stack device.

When RX (GPIO0) is pulled up to AVDD with a resistor less than 20k Ω , then ping detection is disabled, AVDD will be off in shutdown, and the device can only be configured as a stack device.

By closing the top switch on S1, the user can effectively put a 10kΩ resistor in parallel with a 100kΩ which will make the device a stack device by disabling the UART and make the device only able to communicate via VIF. By opening the switch, the device can be used as both a base or stack by utilizing UART, and VIF communication.

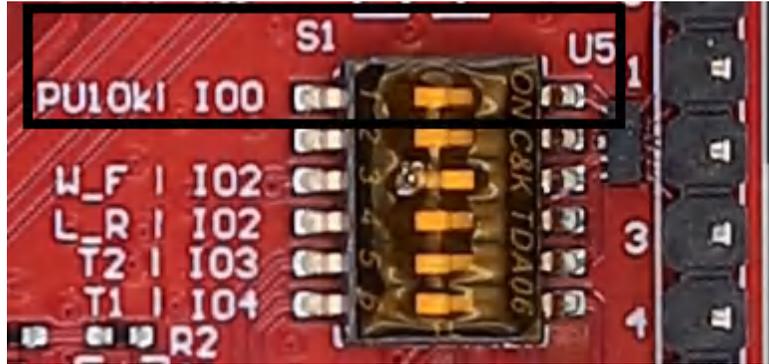


Figure 2-21. S1 Switch For Configuring BQ Device

2.7.2 Ring Architecture

The previous section discussed how to connect two devices in a stack configuration, enabling communication from COMH to COML, known as the "north direction." Alternatively, users can opt for a "Ring Architecture" setup. In this configuration, a daisy chain cable connects COMH of the base to COML of the bottommost stack (S1), while also linking COML of the base to COMH of the topmost stack.

This arrangement facilitates communication in both the north and south directions, ensuring communication from COML to COMH as well. Consequently, even if there's a break in the daisy chain, the base device maintains communication with all devices in the stack.

2.7.3 Busbar Position

Located at the bottom and top of the EVM are multiple capacitors and resistors used to connect the BB pin on the BQ79718B-Q1 device to a specific cell. This device has options ranging from Cell7 to Cell13. Only one pair of these capacitors can be populated at any given time. By default, cell10 is configured. The corresponding busbar cell must be configured in software. Finally, be sure to populate only one of the corresponding 0Ω resistors to connect the CELL_BB node to the appropriate battery cell.

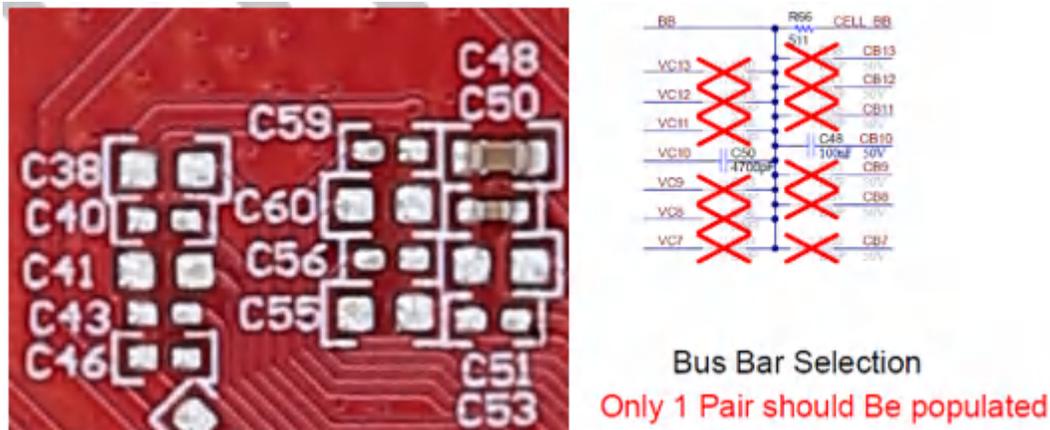


Figure 2-22. Bus Bar Selection Capacitors



Figure 2-23. Bus Bar Selection Resistors

2.7.4 Radiated/Conducted Testing

Radiated Testing: There are two 0201 package 12pF capacitors (C92 and C97) on the board below the SMA connector which determines if the RF signal is routed to the on-board antenna, or the SMA connector. Only one can be populated at any given time. By default, C97 is populated and the RF signal is routed to the on-board antenna seen on the right. This configuration will be used to execute radiated testing.



Figure 2-24. Capacitors for Radiated or Conducted Testing

Conducted Testing: When the 12pF capacitor is rotated and installed in the C92 location, the RF signal is routed to the SMA connector located above C92. This configuration will be used to execute conducted testing.

2.7.5 Communication Isolation

Capacitor Only Isolation: For capacitor only isolation for the VIF communication block, the isolation capacitors (C71, C76, C77 and C82) in the following figure, must all be populated with 2.2nF capacitors. In addition, the series resistors (R122, R129, R133, and R140) in [Figure 2-25](#), must all be populated with 0Ω resistors. These 0Ω resistors will bypass the choke footprint and must be used when the choke is not being used. The L2 and L3, footprints for the choke, should not be populated.

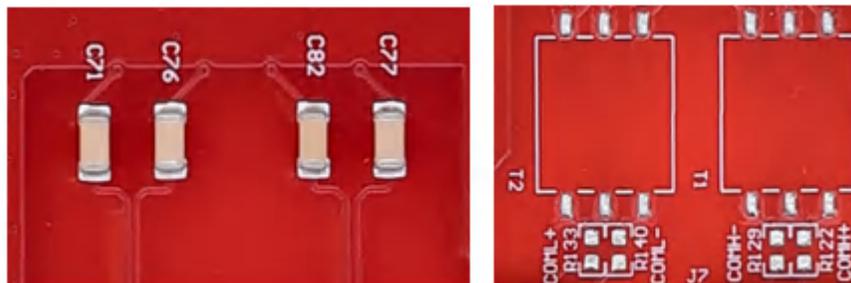


Figure 2-25. Cap Only Isolation

Capacitor and Choke Isolation (Default Configuration): Capacitor and choke isolation for the VIF communication block is configured by default. In this configuration, the isolation capacitors (C71, C76, C77 and C82) in the following figure, must all be populated with 2.2nF capacitors. The choke will be populated at L2 and L3. The series resistors (R122, R129, R133, and R140) must not be populated so the choke is not bypassed.

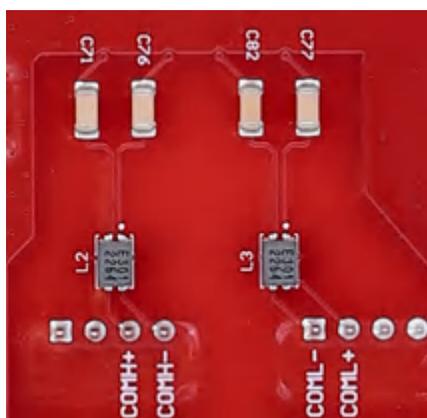


Figure 2-26. Cap and Choke Isolation

Transformer Isolation: For transformer isolation for the VIF communication block, the isolation capacitors (C71, C76, C77 and C82) must not be populated. In addition, the series resistors (R122, R129, R133, and R140) must all be populated with 0Ω resistors. Finally, the transformer will be populated at T1 and T2, pictured in [Figure 2-25](#). These 0Ω resistors will bypass the choke footprint and must be used when the choke is not being used. The L2 and L3 footprints will be left unpopulated.

Below are some transformers recommended for communication isolation that have a minimum recommended inductance of 300μH:

Table 2-7. Recommended Transformers

PART NUMBER	SUPPLIER	INDUCTANCE (OCL) μH	HEIGHT (mm)
SM9152AL	Bourns	300-1000	4.95
ALTW-C18TF	Sunlord	350	3.50
XFBMC29-BA09-E	XFMS	350	5.00

Be aware that not all transformers have the same pinout. This CSU is designed so that pins 2 and 5 of the transformer are the center-taps of the transformer. However, not all transformers follow this same layout. Review the pinout of the transformers before considering implementation.

3 Software

3.1 Software Development

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

4 Hardware Design Files

4.1 Schematics

The following diagrams show the schematic implementation of the [CC2662RQ1-CSU-EVM](#). The full [CC2662RQ1-CSU-EVM](#) reference schematic can be downloaded from the [CC2662RQ1-CSU-EVM](#) reference design files.

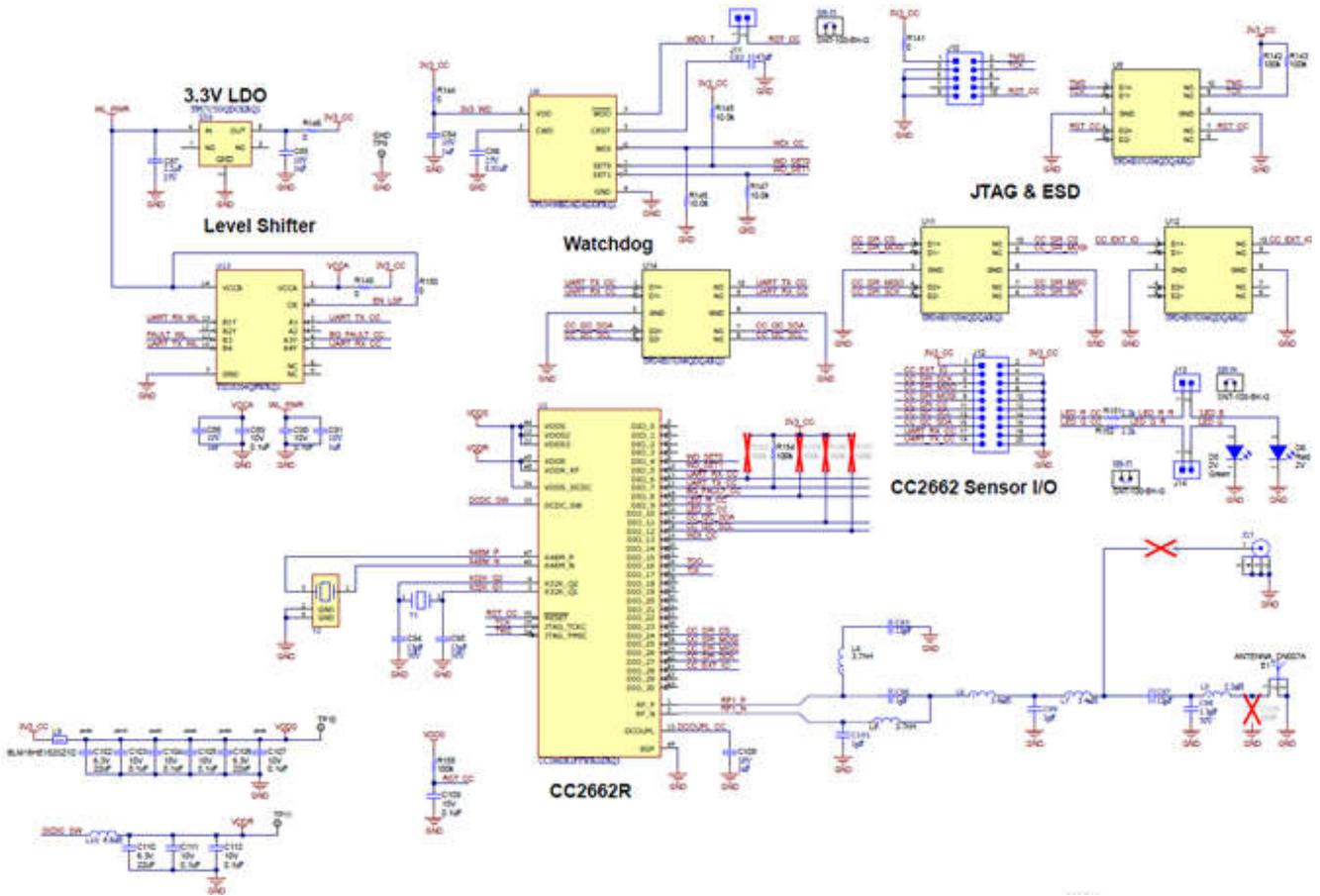


Figure 4-1. Schematic Sheet 1

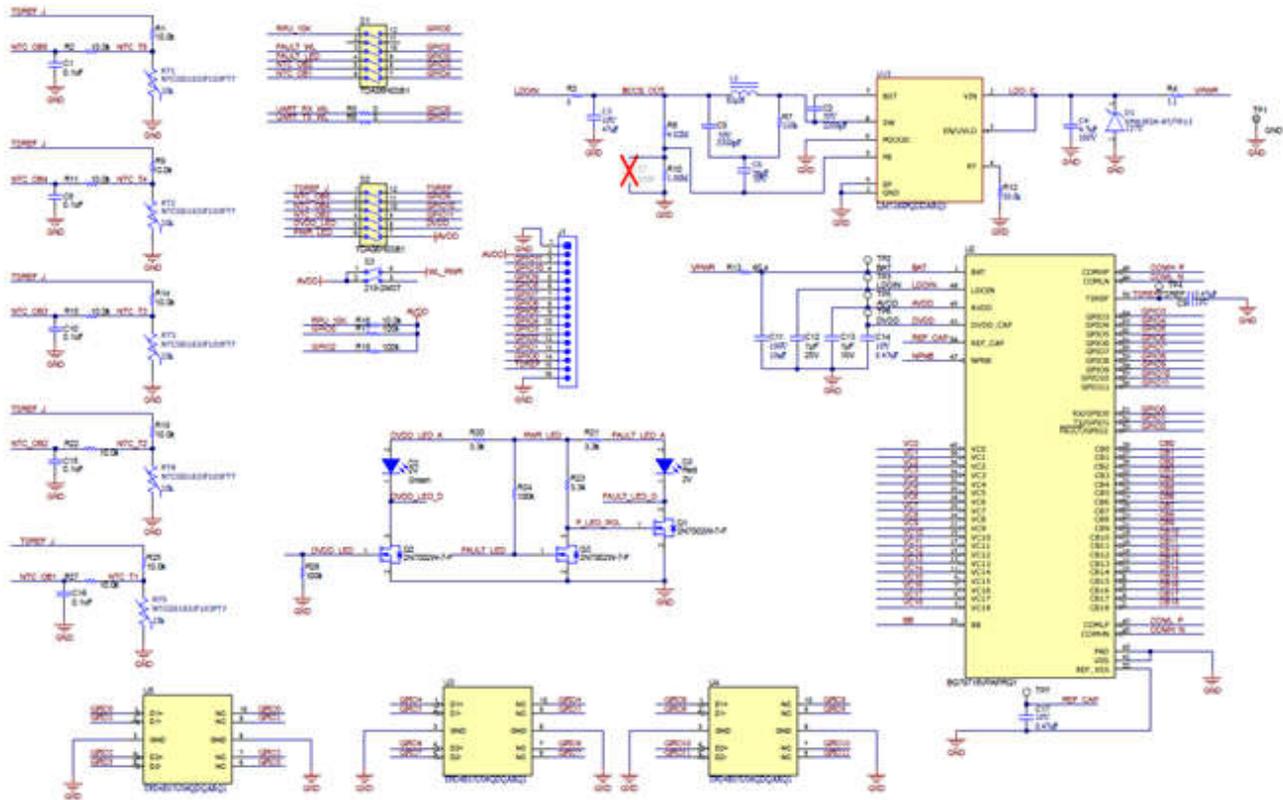


Figure 4-2. Schematic Sheet 2

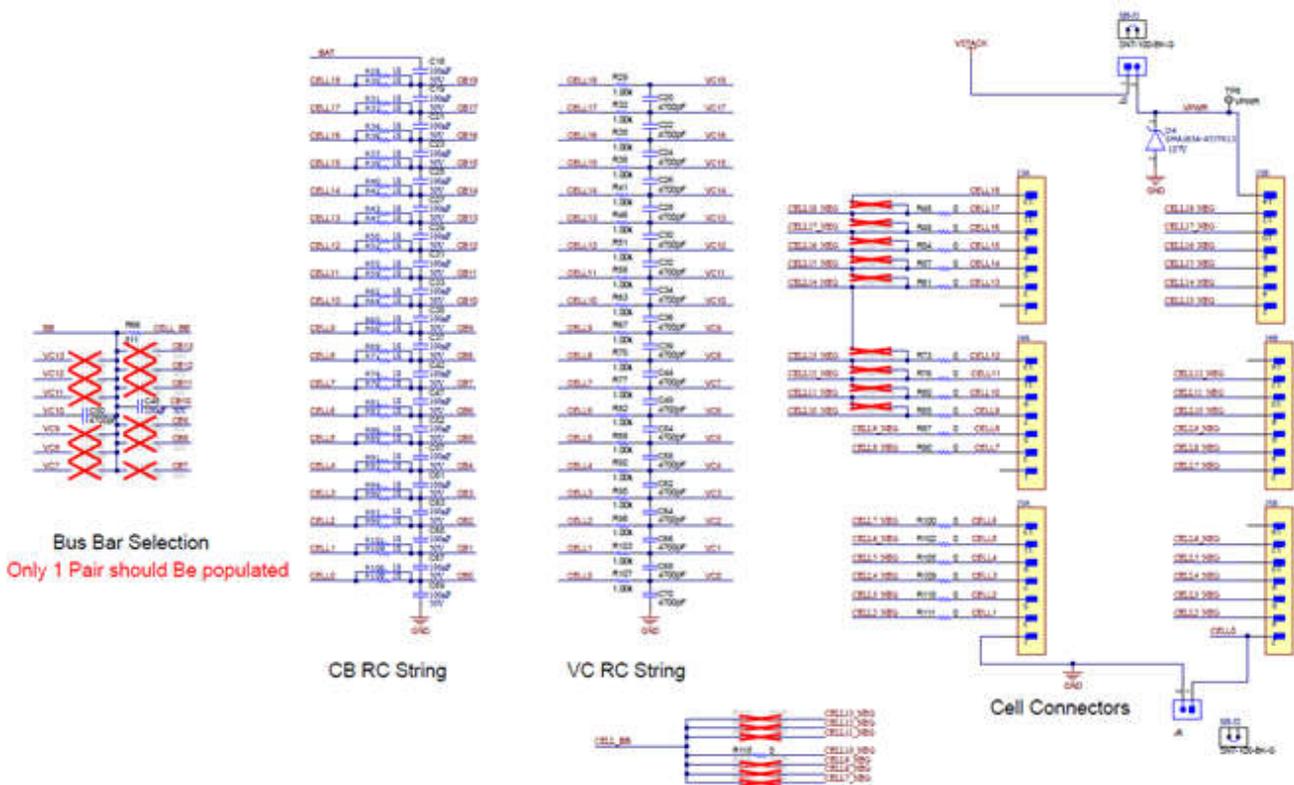


Figure 4-3. Schematic Sheet 3

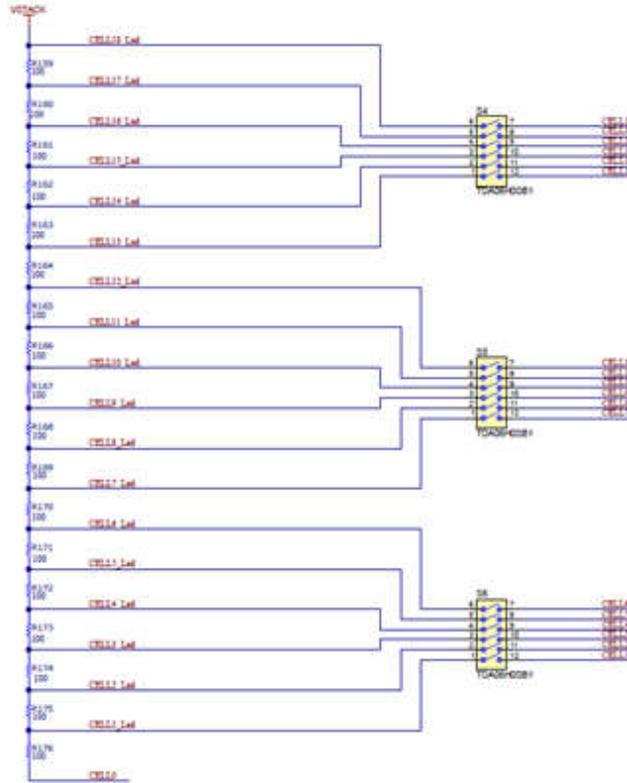


Figure 4-4. Schematic Sheet 4

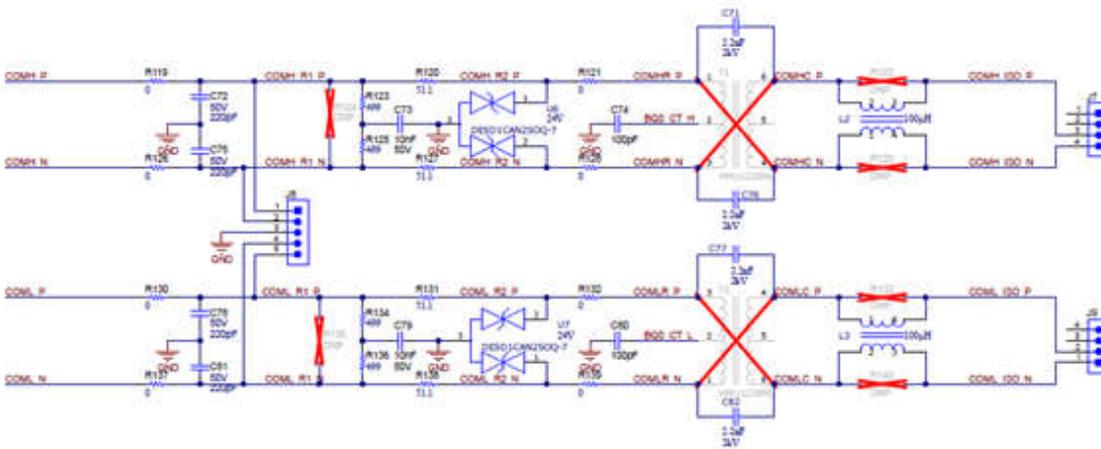


Figure 4-5. Schematic Sheet 5

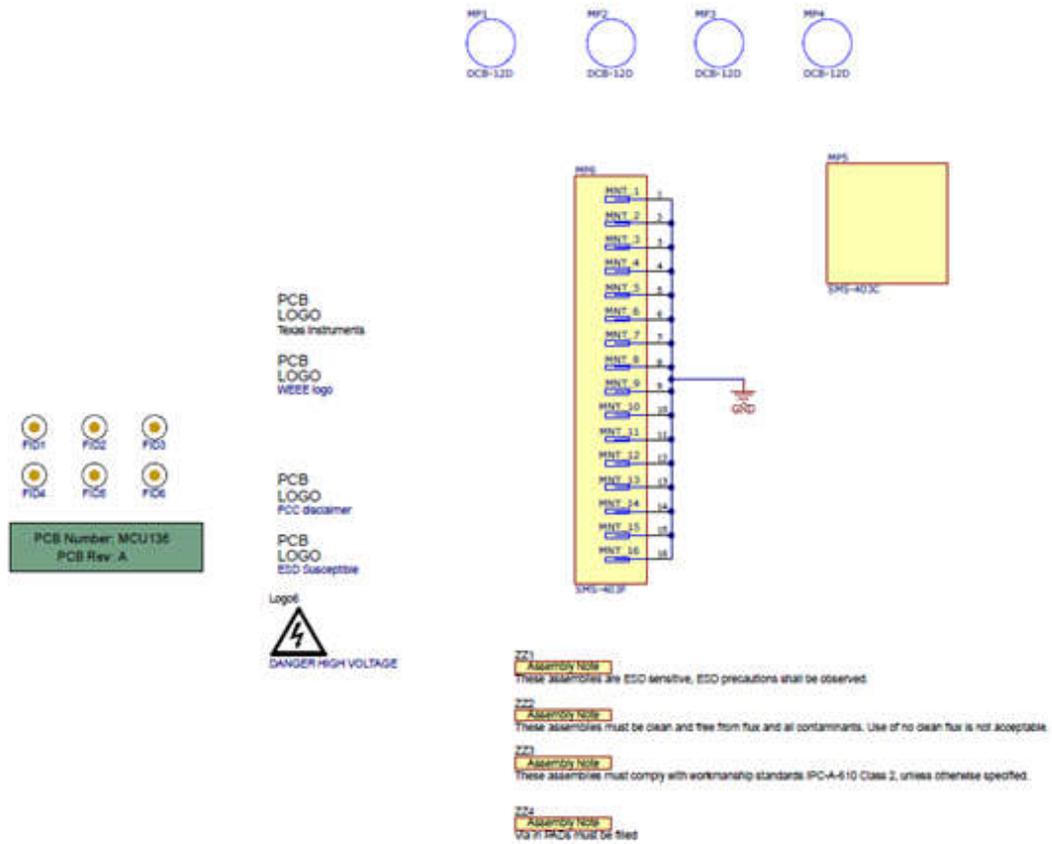


Figure 4-6. Schematic Sheet 6

4.2 PCB Layouts

The top and bottom side PCB layout view of the [CC2662RQ1-CSU-EVM](#) can be seen in [Figure 4-7](#) and [Figure 4-8](#), respectively. The full [CC2662RQ1-CSU-EVM](#) layout files can be downloaded from the [CC2662RQ1-CSU-EVM](#) reference design files.

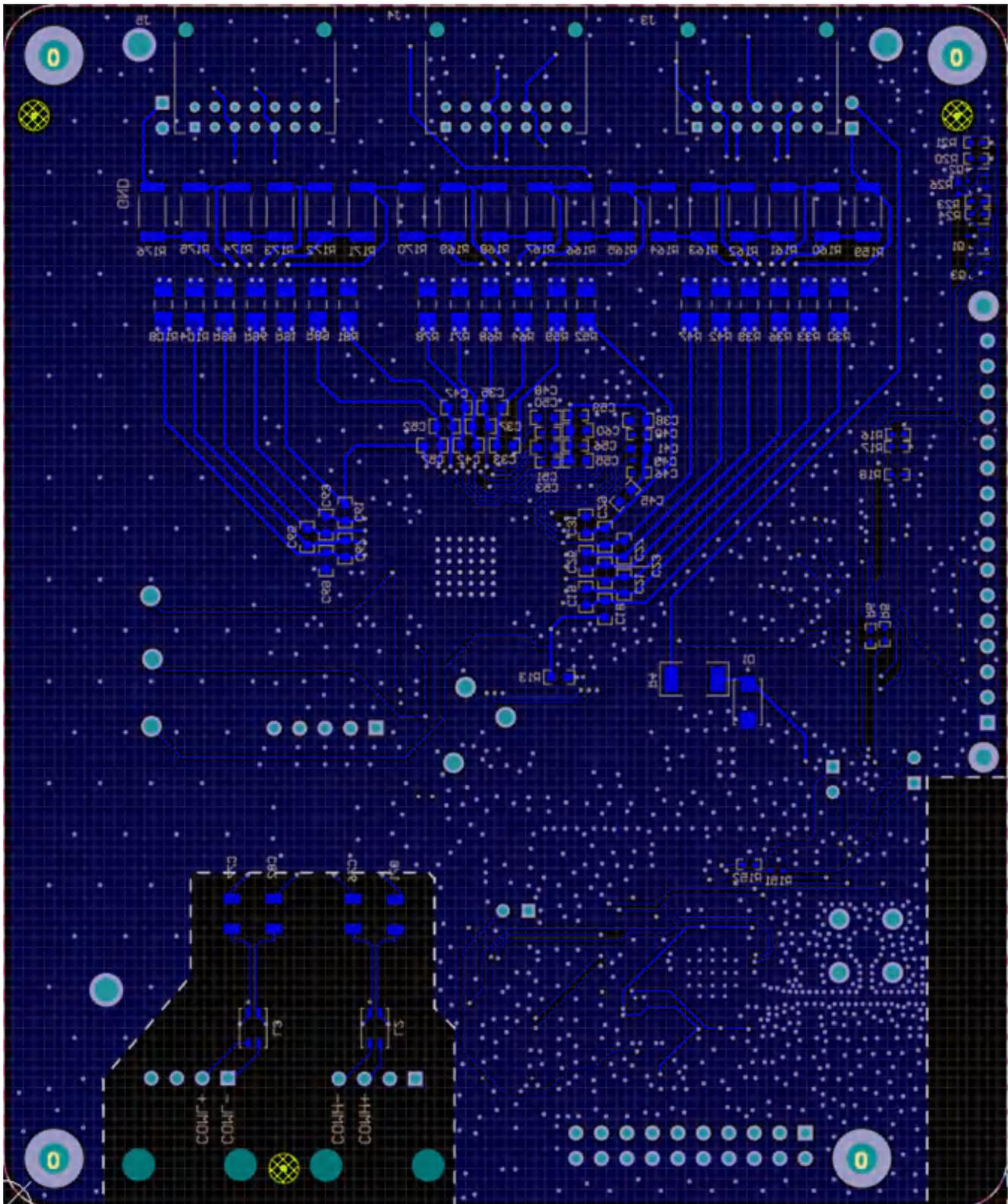


Figure 4-8. Bottom Side PCB Layout View

4.3 Bill of Materials (BOM)

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

Table 4-1. CC2662RQ1-CSU-EVM Bill-of-Materials

Part Reference Designator	Quantity	Value	Vendor Part Number	Vendor
C1, C8, C10, C15, C16	5	0.1uF	GCM155R71H104KE02D	MuRata
C2	1	2200pF	GCM155R71H222KA37D	MuRata
C3	1	47μF	GCM32EC71A476KE02K	Murata
C4	1	4.7μF	GCJ32DC72A475KE01L	Murata
C5	1	3300pF	GCM155R71H332KA37D	MuRata
C6	1	56pF	GCM1555C1H560FA16D	Murata
C9, C14, C17	3	0.47uF	GCM155C71A474KE36D	MuRata
C11	1	0.01uF	GCM188R72A103KA37J	MuRata
C12	1	1uF	GCJ21BL81E105KA01L	MuRata
C13	1	1uF	GCM188R71C105KA64D	MuRata
C18, C19, C21, C23, C25, C27, C29, C31, C33, C35, C37, C42, C47, C48, C52, C57, C61, C63, C65, C67, C69	21	0.1uF	GCM188R71H104KA57D	MuRata
C20, C22, C24, C26, C28, C30, C32, C34, C36, C39, C44, C49, C50, C54, C58, C62, C64, C66, C68, C70	20	4700pF	GCM155R71H472KA37D	MuRata
C71, C76, C77, C82	4	2.2nF	1206Y2K00222KET	Knowles Syfer
C72, C75, C78, C81	4	220pF	CGA2B2X7R1H221K050B A	TDK
C73, C79	2	0.01uF	GCM188R71H103KA37D	MuRata
C74, C80	2	100pF	GCM1885C1H101JA16J	MuRata
C83	1	47nF	GCM155R71E473KA55D	Murata
C84, C85, C88, C91, C108	5	1uF	GCM155C71A105KE38D	MuRata
C86	1	0.01uF	GCM155R71E103KA37D	MuRata
C87	1	2.2uF	GCM21BR71E225KA73L	MuRata
C89, C90, C103, C104, C105, C107, C109, C111, C112	9	0.1uF	GCM155R71A104KA55D	MuRata
C93, C97	2	12pF	GCQ0335C1H120GB01D	Murata
C94, C95	2	12pF	GCM1555C1H120JA16J	MuRata
C96, C99, C101	3	1pF	GCQ0335C1H1R0WB01D	Murata
C98	1	1.1pF	GCQ0335C1H1R1BB01D	Murata
C102, C106, C110	3	22uF	GCM21BD70J226ME36L	MuRata
D1, D4	2		SMAJ85A-AT/TR13	YAGEO
D2, D5	2	Green	150060VS75000	Wurth Elektronik
D3, D6	2	Red	150060RS75000	Wurth Elektronik
E1	1		ANTENNA_DN007A	N/A
J1	1		TSW-116-07-G-S	Samtec
J2, J6, J11, J13, J14	5		PEC02SAAN	Sullins Connector Solutions
J3, J4, J5	3		S14B-PUDSS-1(LF)(SN)	JST
J7, J9	2		70551-0038	Molex
J8	1		TSW-105-07-G-S	Samtec
J10	1		FTSH-105-01-F-DV-K	Samtec
J12	1		TSW-110-07-G-D	Samtec
J15	1		SMA-J-P-H-ST-MT1	Samtec

Table 4-1. CC2662RQ1-CSU-EVM Bill-of-Materials (continued)

Part Reference Designator	Quantity	Value	Vendor Part Number	Vendor
L1	1	82uH	SRR0735HA-820M	Bourns
L2, L3	2		ACT1210R-101-2P-TL00	TDK
L4, L8	2	3.7nH	LQP03TN3N7BZ2J	Murata
L5	1	2.2nH	LQP03TN2N2BZ2B	Murata
L6, L7	2	3.4nH	LQP03TN3N4BZ2B	Murata
L9	1	1500 ohm	BLM18HE152SZ1D	MuRata
L10	1	6.8uH	MLZ2012N6R8LTD25	TDK
MP1, MP2, MP3, MP4	4		DCB-12D	Kang Yang USA
MP5	1		SMS-403C	Leader Tech
MP6	1		SMS-403F	Leader Tech
Q1, Q2, Q3	3	60V	2N7002W-7-F	Diodes Inc.
R1, R2, R9, R11, R14, R15, R16, R19, R22, R25, R27, R145, R147, R148	14	10.0k	CRCW040210K0FKED	Vishay-Dale
R3, R119, R121, R126, R128, R130, R132, R137, R139	9	0	CRCW06030000Z0EA	Vishay-Dale
R4	1	5.1	CRCW20105R10JNEF	Vishay-Dale
R5, R6, R141, R144, R146, R149, R150	7	0	CRCW04020000Z0ED	Vishay-Dale
R7	1	110k	CRCW0402110KFKED	Vishay-Dale
R8	1	4.02Meg	CRCW04024M02FKED	Vishay-Dale
R10	1	1.00Meg	CRCW04021M00FKED	Vishay-Dale
R12	1	30.0k	CRCW040230K0FKED	Vishay-Dale
R13	1	60.4	CRCW060360R4FKEA	Vishay-Dale
R17, R18, R24, R26, R142, R143	6	100k	CRCW0402100KFKED	Vishay-Dale
R20, R21, R23	3	3.3k	CRCW04023K30JNED	Vishay-Dale
R28, R30, R31, R33, R34, R36, R37, R39, R40, R42, R43, R47, R50, R52, R55, R59, R62, R64, R65, R68, R69, R71, R74, R78, R81, R83, R86, R89, R91, R93, R94, R96, R97, R99, R101, R104, R106, R108	38	18	CRCW120618R0FKEA	Vishay
R29, R32, R35, R38, R41, R46, R51, R58, R63, R67, R70, R77, R82, R88, R92, R95, R98, R103, R107	19	1.00k	CRCW04021K00FKED	Vishay-Dale
R45, R49, R54, R57, R61, R73, R76, R80, R85, R87, R90, R100, R102, R105, R109, R110, R111, R115	18	0	CRCW08050000Z0EA	Vishay-Dale
R66	1	511	CRCW0402511RFKED	Vishay-Dale
R120, R127, R131, R138	4	51.1	CRCW040251R1FKED	Vishay-Dale
R123, R125, R134, R136	4	499	CRCW0603499RFKEA	Vishay-Dale
R151, R152	2	2.2k	CRCW04022K20JNED	Vishay-Dale
R154, R158	2	100k	CRCW0402100KJNED	Vishay-Dale

Table 4-1. CC2662RQ1-CSU-EVM Bill-of-Materials (continued)

Part Reference Designator	Quantity	Value	Vendor Part Number	Vendor
R159, R160, R161, R162, R163, R164, R165, R166, R167, R168, R169, R170, R171, R172, R173, R174, R175, R176	18	100	CRCW2010100RFKEFHP	Vishay Dale
RT1, RT2, RT3, RT4, RT5	5	10k	NTCGS163JF103FT7	TDK
S1, S2, S4, S5, S6	5		TDA06H0SB1	C&K Components
S3	1		219-2MST	CTS Electrocomponents
SH-J1, SH-J2, SH-J3, SH-J4, SH-J5	5	1x2	SNT-100-BK-G	Samtec
TP1, TP8, TP9	3		1598-2	Keystone
TP2, TP3, TP4, TP5, TP6, TP7	6		5012	Keystone
U1	1		CC2662R1FTWRGZRQ1	Texas Instruments
U2	1		BQ79718-Q1	Texas Instruments
U3, U4, U5, U8, U11, U12, U14	7		TPD4E05U06QDQARQ1	Texas Instruments
U6, U7	2		DESD1CAN2SOQ-7	Diodes Inc.
U9	1		TPS3436BDADADDFRQ1	Texas Instruments
U10	1		TPS71533QDCKRQ1	Texas Instruments
U13	1		TXU0204QPWRQ1	Texas Instruments
U15	1		LM5168PQDDARQ1	Texas Instruments
Y1	1		DST1610A 7BG03276AAC	DAISHINKU
Y2	1		CX2016DB48000C0FRLC 1	KYOCERA AVX
C7	0	0.01uF	GCM188R72A103KA37J	MuRata
C38, C41, C45, C51, C55, C60	0	0.1uF	GCM188R71H104KA57D	MuRata
C40, C43, C46, C53, C56, C59	0	4700pF	GCM155R71H472KA37D	MuRata
C92	0	12pF	GCQ0335C1H120GB01D	Murata
C100	0	1pF	GCQ0335C1H1R0WB01D	Murata
R44, R48, R53, R56, R60, R72, R75, R79, R84, R112, R113, R114, R116, R117, R118	0	0	CRCW08050000Z0EA	Vishay-Dale
R122, R129, R133, R140	0	0	RC0603JR-070RL	Yageo
R124, R135	0	1.00k	CRCW06031K00FKEA	Vishay-Dale
R153, R155, R156, R157	0	100k	CRCW0402100KFKED	Vishay-Dale
T1, T2	0		HMU1228NL	Pulse

5 Compliance Information

5.1 CE Compliance

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](#).

5.2 REACH Compliance

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

5.3 Waste Electrical and Electronic Equipment (WEEE) Compliance



Waste Electrical and Electronic Equipment (WEEE)

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.

6 Additional Information

6.1 Known Hardware or Software Issues

Rev. A of the CC2662RQ1-CSU-EVM configured the LM5168-Q1 converter to output 6V for LDOIN. This will result in higher current consumption when the wireless MCU device is operating in low power modes. Future revisions of the EVM will be updated to increase the LM5168-Q1 output voltage to 7.4V-9V. Any customer referencing the CC2662RQ1-CSU-EVM for their own custom design should modify the LM5168-Q1 circuit to ensure the output voltage is in the 7.4V-9V range.

6.2 Trademarks

All trademarks are the property of their respective owners.

6.3 Terminology

7 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

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#), [TI's General Quality Guidelines](#), or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2026, Texas Instruments Incorporated

Last updated 10/2025