QC-IOT4

Combo Wireless Pmod Module Evaluation Board

The QCIOT4-DA16600POCZ is a combo wireless Pmod™ module having Wi-Fi and Bluetooth® Low Energy (BLE) connectivity. The QC-IOT4 Pmod module is designed based on highly integrated ultra-low-power Wi-Fi + Bluetooth Low Energy using a DA16600 combo module solution. Two Pmod connectors are available for Wi-Fi and BLE communication with SPI and UART interfaces, respectively. All of the Pmod signals are also made available when the QC-IOT4 module is interfaced with an Arduino shield connector.

Board Contents

- QCIOT4-DA16600POCZ Evaluation Board

Features

- Support both RTOS and Linux operating systems:
  - Linux: SPI→Wi-Fi, UART→BLE
  - RTOS (optional): SPI→Wi-Fi/BLE, UART→Wi-Fi/BLE Low power single-band Wi-Fi and BLE communication
- Low power single-band Wi-Fi and BLE communication
- 3.3V power operated
- 4-layer PCB
- Applications include IIoT, Gateways, etc.
- Standardized type 2A/3A Pmod™ connector supports SPI/UART extended interface
- Standard Arduino connector supports SPI and UART
- Dual connectors allow pass-through signals for daisy-chained solutions in RTOS system mode

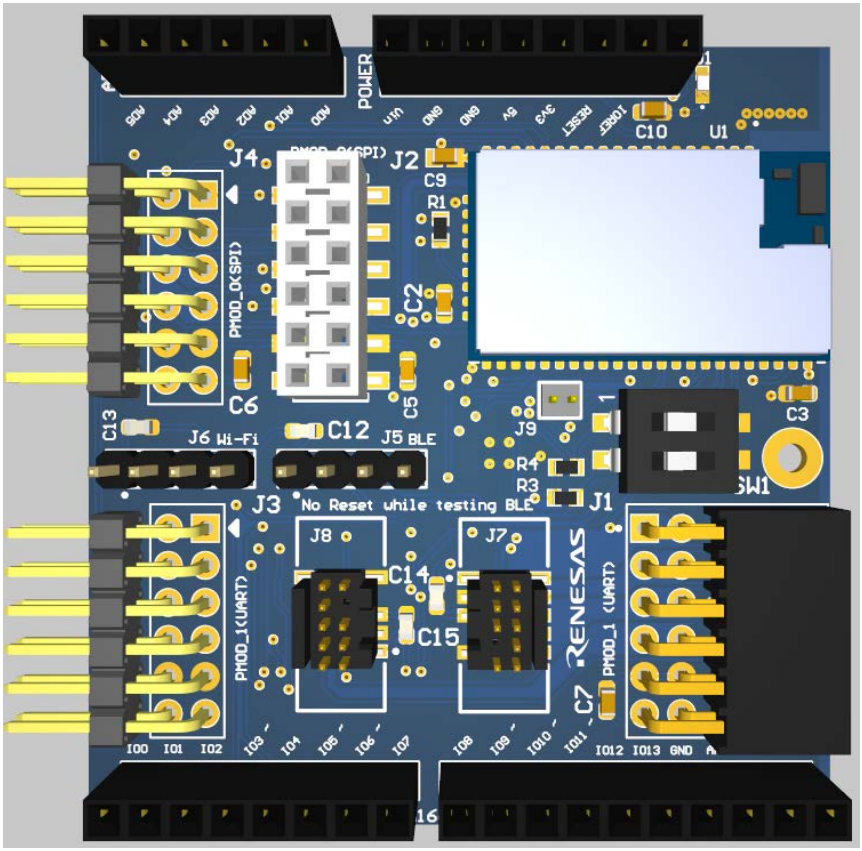

Figure 1. QCIOT4-DA16600POCZ Pmod Evaluation Board (top)

Contents

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1. Functional Description

The QC-IOT4 Pmod is a Wi-Fi/BLE-enabled module for any SPI/UART MPU/MCUs. The module can connect to an MCU board through Arduino shield or to an RZ family/MPU carrier board through Pmod. The QC-IOT4 uses the DA16600MOD Wi-Fi/BLE module, providing ultra-low power Wi-Fi IEEE802.11b/g/n, 1×1, 20MHz channel bandwidth 2.4GHz, and Bluetooth v5.1.

2. Setup

2.1 Required Equipment

The following additional lab equipment (sold separately) is required for using the board:

- Any MPU board that supports both Type 2A and 3A Pmod
- Any MCU board that supports Arduino connection (see Table 1)

Table 1. Renesas MPU and MCU Evaluation Kits Capable of Supporting Type 2A/3A Pmods/Arduino Connector Using the QC-IOT4-DA16600POCZ

RZ	RA	RL78
EK-RZ/G2L	EK-RA4W1	RL78/G23-FPB
EK-RZ/V2L	EK-RA2A1	RL78/G22-FPB
EK-RZ/G2UL	EK-RA4M1	RL78/G14-FPB
EK-RZ/A3UL	EK-RA6M1	RL78/G15-FPB
EK-RZ/Five	EK-RA6M2	-
-	EK-RA6M3	-
-	EK-RA6M3G	-

Note: The table above is not a comprehensive list of supporting MPU and MCU Kits. See the respective evaluation kit hardware manual to confirm Pmod/Arduino pinout.

2.2 Software Tools and Versions

2.2.1 MPU Platform

1. For Host details and RZ BSP versions, refer to the *Operating Environment* section in the software manual.
2. Port the DA16600 Linux driver to RZ/G2L Kernel 5.10 latest BSP.
3. Add the Linux driver to the RZ family BSP to support all RZ devices (RZ/G2L tested only).
4. Connect to the board following the hardware connection section (see Figure 2).
5. Visit Renesas Quick-Connect IoT Platform for more information about creating your customized system solution.

Important: Do not use the reset button (blue button) while BLE testing.

Note: The RZ/G2L is currently the only solution available. Other MPU software is in development.

2.2.2 MCU Platform

1. Download AT CMD binary from the webpage.
2. Flash the binary to the QC-IOT4 board.
3. Reflash MCU software.
4. Connect the QC-IOT4 board to the MCU board (see Figure 3).

Note: Refer to the “QC-IOT4 DA16600 AT-CMD Test Manual” for detailed descriptions of how to flash:

- AT-CMD (SPI and UART) binary in DA16600
- Firmware in RA6M4 MCU for AT-CMD test

2.3 On-board Switches

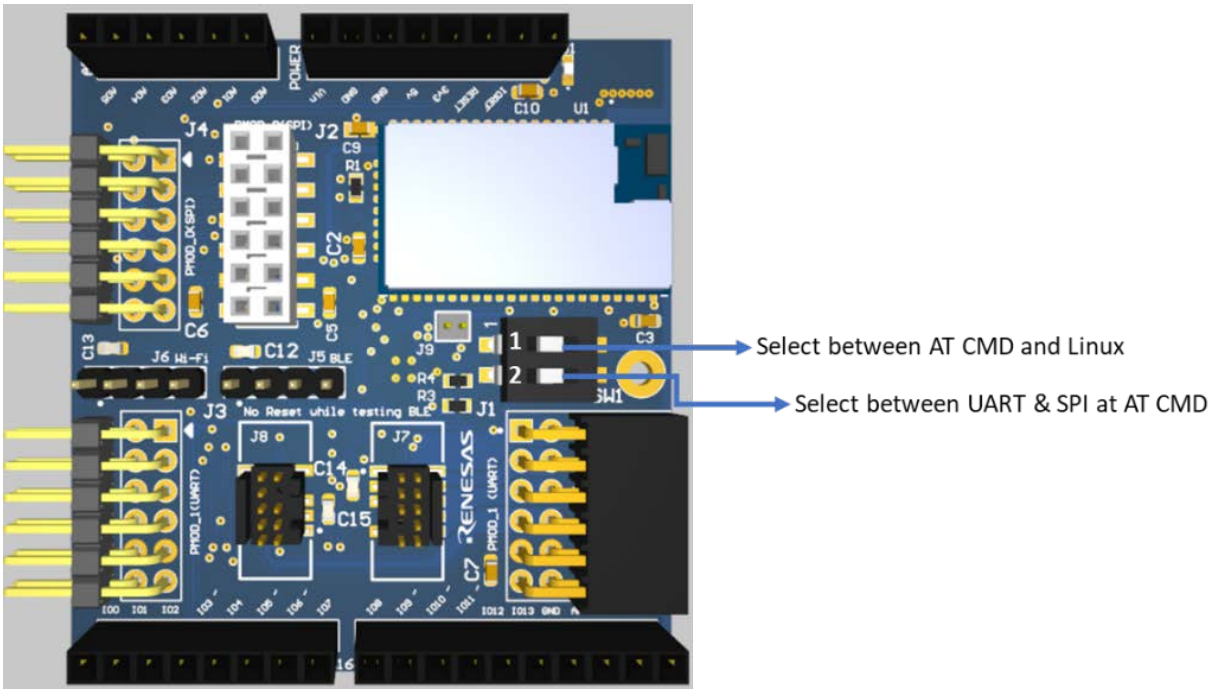

Table 2. Truth Table for On-board Switches

SW1	SW2	Function
0	0	UART AT CMD
0	1	SPI AT CMD
1	x	Linux

Note: The “ON” label written on the switch means that the switch is closed and the line is pulled to ground. GP will read it as a logic 0 or Low. Vice versa for the other switch positions.

2.4 Evaluation Kit Hardware Connections

2.4.1 MPU Platform

Use the following procedures to set up the kit connections with RZ/G2L SMARC EVK as shown in Figure 2.

1. Connect QCIOT4-DA16600POCZ module to Pmod connector of RZ/G2L SMARC EVK platform.
2. Connect the micro-SD Card to the slot present in the carrier board connection (see Figure 2).
3. Connect debug console to the serial terminal application software (see Figure 2)
4. Wi-Fi router that connects wirelessly to QCIOT4-DA16600POCZ module.
5. Wi-Fi router that connects wired/wireless to desktop/laptop.
6. Before powering up the board, check the switch settings on the QCIOT4-DA16600POCZ board. For Linux, SW1 should be 1, irrespective of the position of SW2 (for detailed information, see section 3.3).
7. Power on SMARC EVK using a type C USB cable.

Important: No other Arduino shield on the top of QCIOT4-DA16600POCZ board is recommended.

Note: Pmod female connectors are redundant (not available for use).

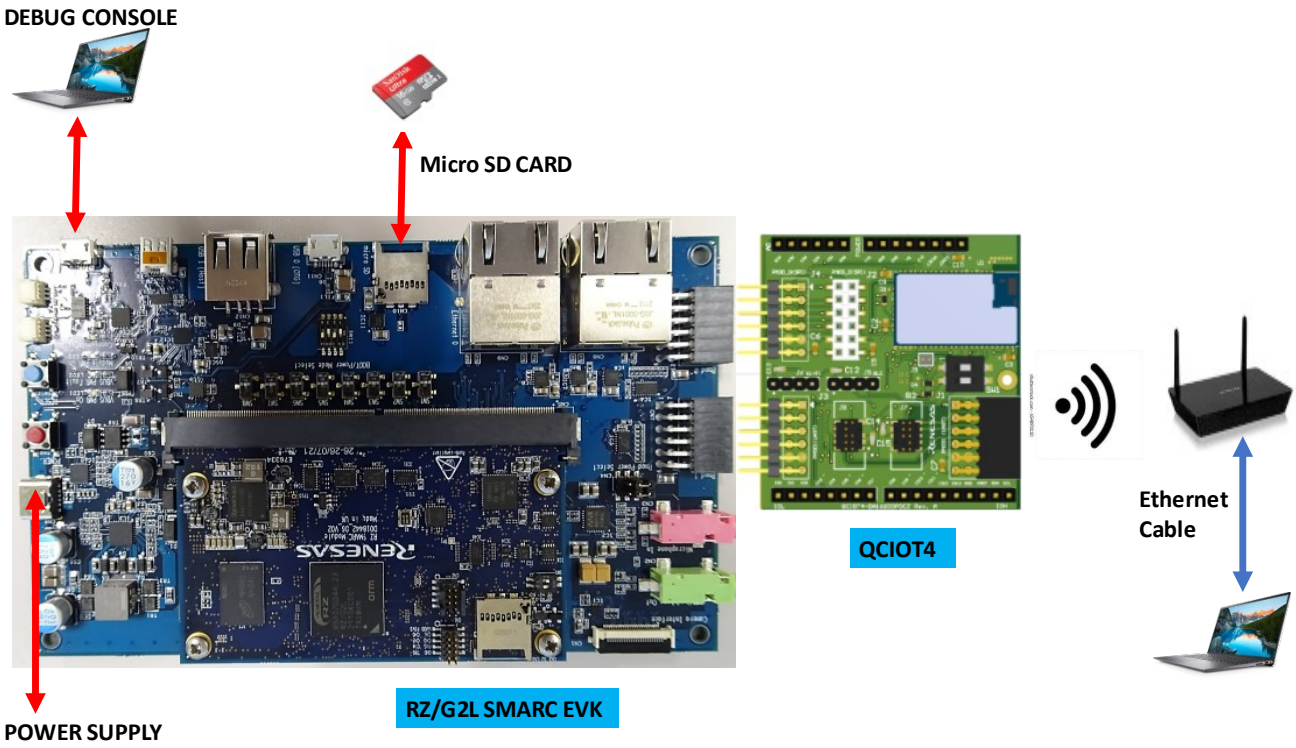

Figure 2. Evaluation Kit Connections with RZ/G2L

2.4.2 MCU Platform

Use the following procedures to set up the kit connections with RA6M4 EVK as shown in Figure 3.

1. The QCIOT4-DA16600POCZ board can be interfaced with RA6M4 MCU EVK with Arduino connector provision.
2. Connect the QCIOT4-DA16600POCZ board with MCU as shown in Figure 3.
3. Before powering up the board check the switch settings on QCIOT4-DA16600POCZ board (for detailed information, see section 3.3).
4. Connect the USB debug port of RA6M4 to the PC as shown in Figure 3.

Important: No other Arduino shield on the top of QCIOT4-DA16600POCZ board is recommended.

Note: If SPI is in use for Wi-Fi/BLE communication, the UART Pmod (Pmod1) is available, and vice versa

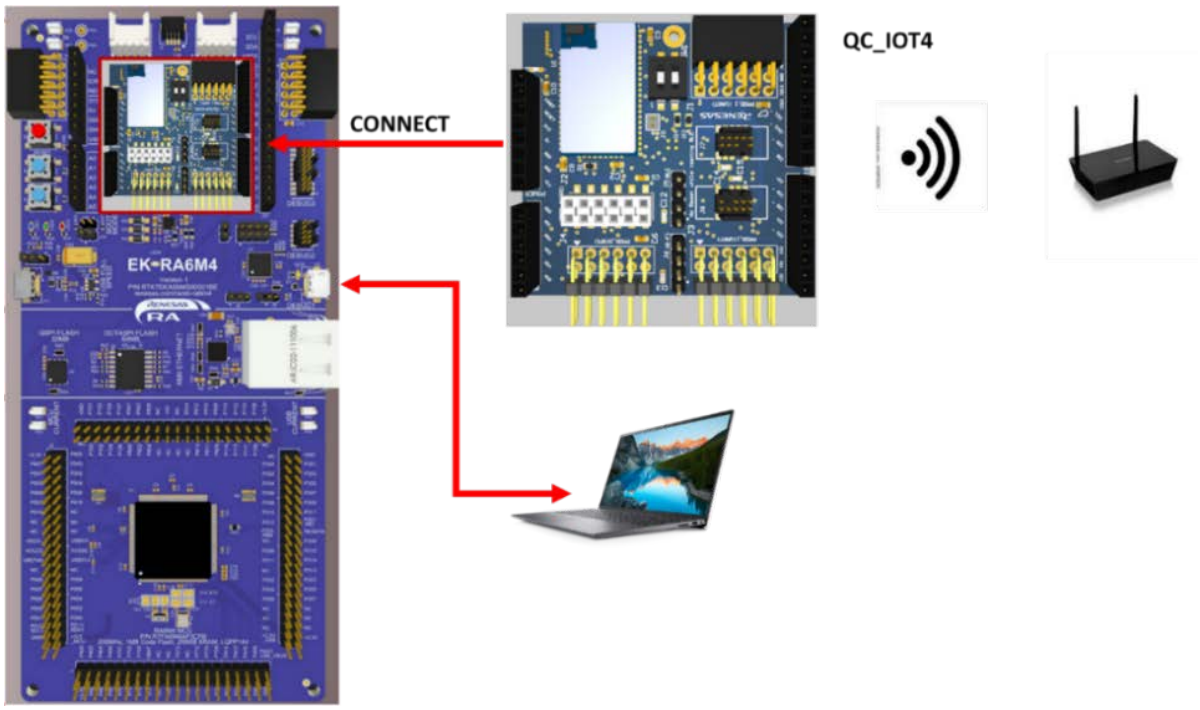

Figure 3. Evaluation Kit Connections with RA6M4 EVK

3. Application Schematic

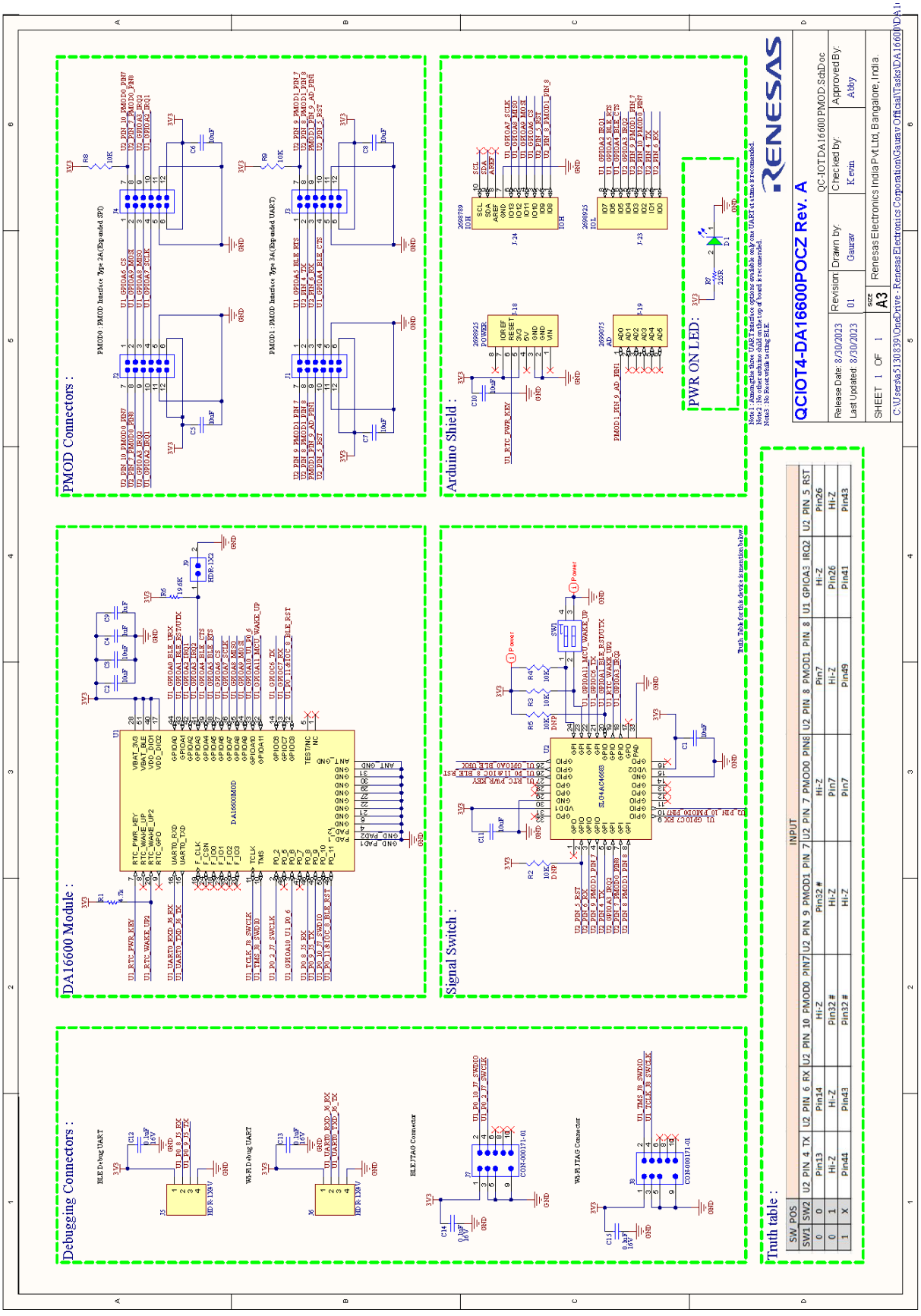

Figure 4. QC-IOT4 Application Schematic

4. Bill-of-Materials (BOM)

Table 3. QC-IOT4 Evaluation Board Bill-of-Materials

Item	Qty	Reference	Description	Value	PCB Footprint	Part Number
1	1	AD	6 Position Receptacle Connector 0.100" (2.54mm) Through Hole Gold	-	TH (P-2.54mm)	SSQ-106-03-G-S
2	9	C1, C2, C3, C5, C6, C7, C8, C10, C11	10µF ±10% 16V Ceramic Capacitor X5R 0603 (1608 Metric)	10µF	0603	885012106031
3	2	C4, C9	Chip Capacitor, 1µF, ±10%, 16V, 0603 (1608 Metric)	1µF	0603	885012206052
4	4	C12, C13, C14, C15	0.1µF ±10% 16V Ceramic Capacitor X7R 0603 (1608 Metric)	0.1µF	0603	885012206046
5	1	D1	WL-SMCD Mono-color Chip LED Diffused, SMT, size 0603, Bright Green, 2V, 140°	-	0603	150060VS55040
6	1	IOH	10 Position Receptacle Connector 0.100" (2.54mm) Through Hole Gold	-	TH (P-2.54mm)	SSQ-110-03-G-S
7	1	IOL	8 Position Receptacle Connector 0.100" (2.54mm) Through Hole Gold	-	TH (P-2.54mm)	SSQ-108-03-G-S
8	1	J1	12 Position Receptacle Connector 0.100" (2.54mm) Through Hole, Right Angle Gold	-	TH (P-2.54 × 2.54mm)	613012243121
9	1	J2	CONN Socket 12POS 2ROW Vertical SMT	-	SMD (P-2.54 × 2.54mm)	61001221821
10	2	J3, J4	Connector Header Through Hole, Right Angle 12-Position 0.100" (2.54mm)	-	TH (P-2.54 × 2.54mm)	61301221021
11	2	J5, J6	Header, 1 × 4, 0.1"	-	TH (P-2.54mm)	61300411121
12	2	J7, J8	10-Position Shrouded Header 1.27mm Pitch Pin #7 Removed	-	SMD (P-1.27 × 1.27mm)	FTSH-105-01-L-DV-007-K
13	1	J9	CONN Header VERT 2POS 1.27mm	-	TH (P-1.27mm)	FTS-102-01-L-S
14	1	Power	8-Position Receptacle Connector 0.100" (2.54mm) Through Hole Gold	-	TH (P-2.54mm)	SSQ-108-03-G-S
15	1	R1	Chip Resistor, 4.7kOhms, ±1%, 0.1 W, -55 to 155 °C, 0603 (1608 Metric)	4.7kOhm	0603	RC0603FR-134K7L
16	0	R2, R5, R8, R9	Chip Resistor, 10kOhms, ±1%, 01 W, -55 to 155 °C, 0603 (1608 Metric)	10kOhm	0603	RC0603FR-0710KL
17	2	R3, R4	Chip Resistor, 10kOhms, ±1%, 01 W, -55 to 155 °C, 0603 (1608 Metric)	10kOhm	0603	RC0603FR-0710KL
18	1	R6	19.6kOhms ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric)	19.6kOhms	0603	RC0603FR-0719K6L
19	1	R7	255 Ohms ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Moisture Resistant Thick Film	255 Ohms	0603	RC0603FR-07255RL

Item	Qty	Reference	Description	Value	PCB Footprint	Part Number
20	1	SW1	DIP Switch, 2-Position, SPST	-	2.54 × 6.02 × 4.40 (PxLxH)	418121270802
21	1	U1	DA16600MOD, Wi-Fi, 802.11b/g/n, Bluetooth LE, Combo Module, SM	-	14.3 × 24.3 × 3.0	DA16600MOD-AAC4WA32
22	1	U2	GreenPAK Programmable Mixed-signal Matrix with Asynchronous State Machine and Dual Supply	-	TQFN-32	SLG4AC46683

5. Board Layout

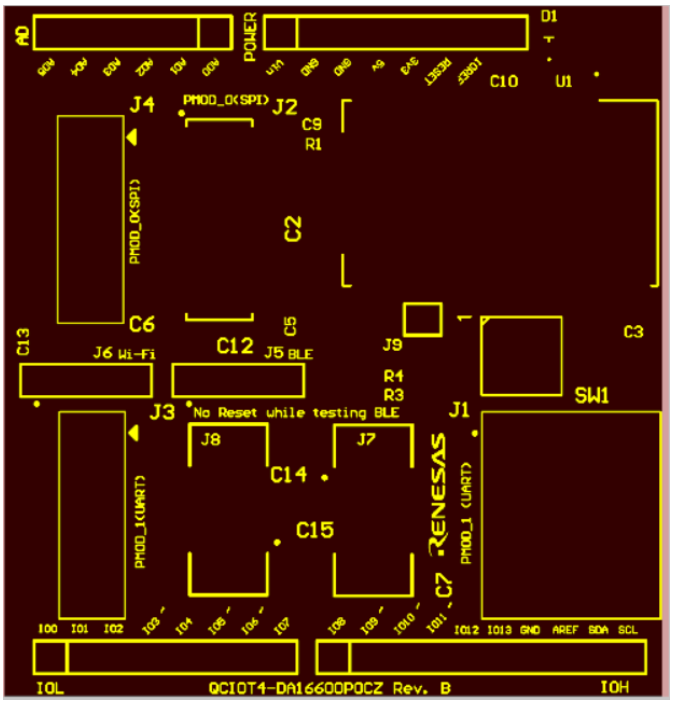

Figure 5. Silkscreen Top

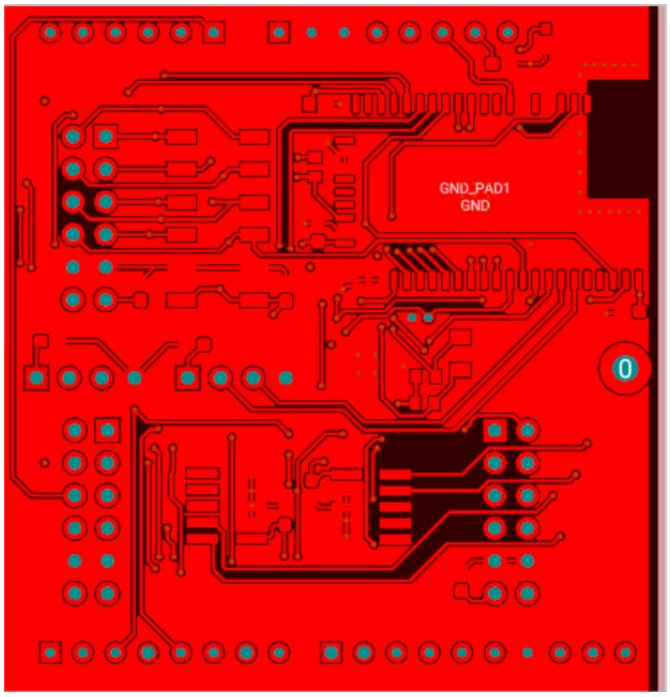

Figure 6. Copper Top

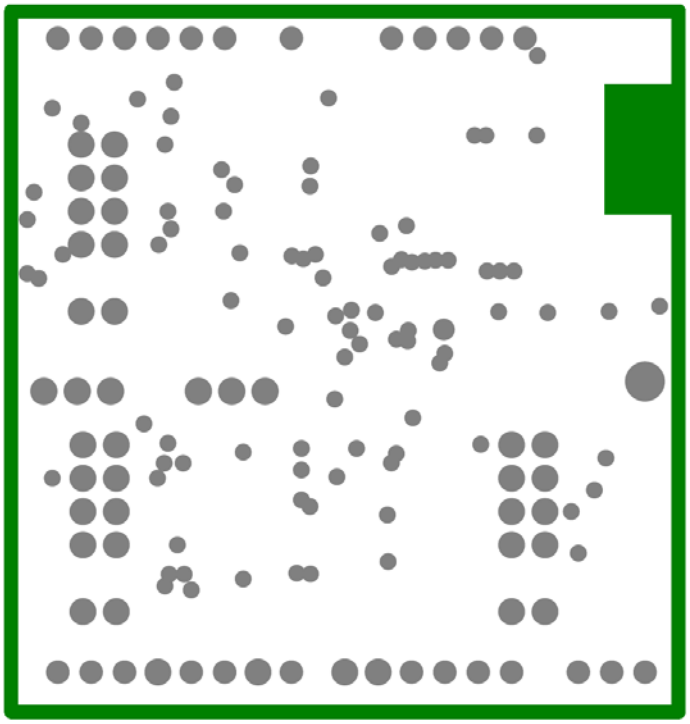

Figure 7. Copper L1 Plane (GND)

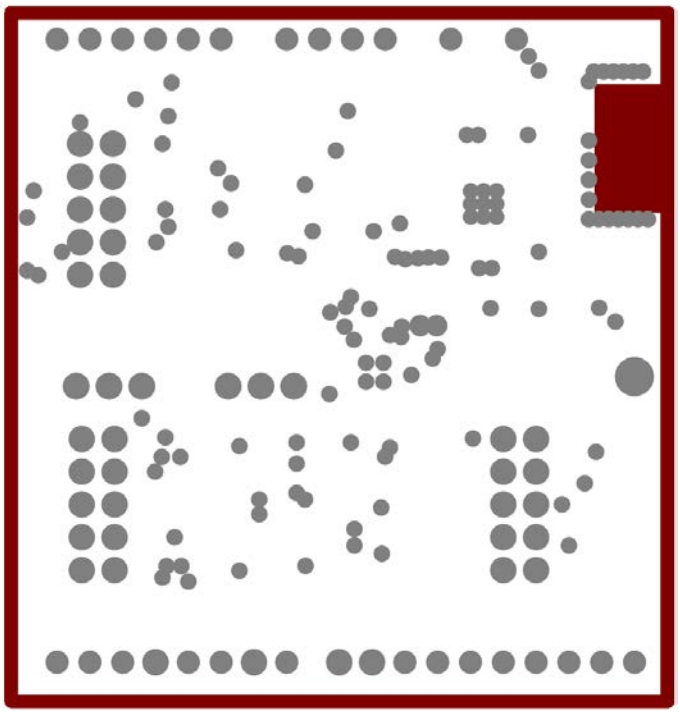

Figure 8. Copper L2 Plane (PWR)

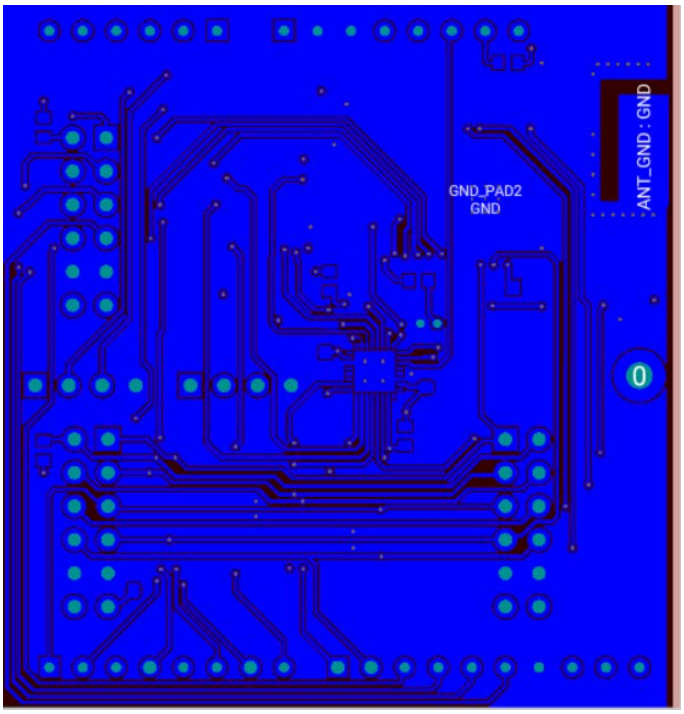

Figure 9. Copper Bottom

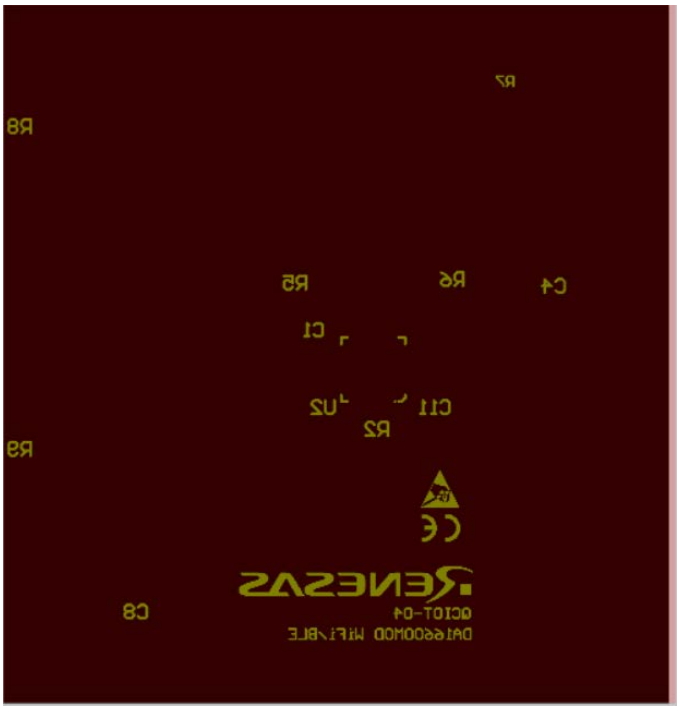

Figure 10. Silkscreen Bottom

6. Ordering Information

Part Number	Description
QCIOT4-DA16600POCZ	QC-IOT04- DA16600 Pmod™ Evaluation Board

7. Revision History

Revision	Date	Description
1.00	Sep 13, 2023	Initial release.

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