

CQM730 Micro-Power Wi-Fi Module

– Powered by Qualcomm QCC730

Documentation Title	Documentation No	Revision	Classification	Status	Date
CQM730 Micro-Power Wi-Fi Module Data Sheet		V1.3	Public	Release	Mar 18, 2025

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1 Product Overview

Powered by Qualcomm game changing micro walt ultra-low power Wi-Fi technology, CQM730 IoT connectivity LGA module portfolio is purposely-designed to pack processing capabilities, embedded memory, Wi-Fi connectivity, on-module flash, and most of all ultra-low power technology into a single 36-pin LGA form factor with flexible choices of Pin, PCB and U.FL antenna. All variant antenna modules are pin compatible, allowing easy swap among modules. Its 1.27mm (0.05") pitch design enables seamless LGA pad into standard 1.27mm (0.05") header conversion to allow field replaceable header module portfolio if needed. Its compact size and on-chip SRAM and RRAM (NVM) contribute to reduced costs and enhanced performance, making it an attractive choice for space-constrained IoT devices requiring battery power.

Unlike many other Wi-Fi modules on the market, CQM730 has integrated 60MHz Arm Cortex-M4 processor with on-chip 640KB SRAM and 1.5MB RRAM to be capable of handling all protocol stacks all the way to cloud level. It has built-in Resistive RAM (RRAM), the industry latest Non-volatile Memory (NVM) technology, eliminating need for externally attached NOR flash for more streamlined and cost-effective system. Furthermore, CQM730 portfolio can be powered directly by a battery with only 1.8V input, making it suitable for battery-operated devices.

CQM730 has a variant supporting external power amplifier both on 2.4GHz and 5GHz to extend Wi-Fi range for an improved coverage.

CQM730 can operate in hostless mode, capable of running both the protocol stack and applications without requiring an external MCU. It can also be used as a Wi-Fi transceiver in hosted mode, offloading all the protocol stack to enable the external MCU to concentrate on IoT applications as well as managing system power consumption.

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CQM730 includes the following configurations:

Module	Form Factor	Antenna
CQM730-0-50-1P	13.46 x 13.46 x 2.2 mm, 1.27 mm pitch, 36-pin, LGA, iPA	Pin Antenna
CQM730-0-50-1B	13.46 x 18.46 x 2.2 mm, 1.27 mm pitch, 36-pin, LGA, iPA	PCB Antenna
CQM730-0-50-1U	13.46 x 13.46 x 2.2 mm, 1.27 mm pitch, 36-pin, LGA, iPA	U.FL Antenna
CQM730-0-50-2P	13.46 x 16.5 x 2.2 mm, 1.27 mm pitch, 36-pin, LGA, xPA	Pin Antenna
CQM730-0-50-2B	13.46 x 21.5 x 2.2 mm, 1.27 mm pitch, 36-pin, LGA, xPA	PCB Antenna
CQM730-0-50-2U	13.46 x 16.5 x 2.2 mm, 1.27 mm pitch, 36-pin, LGA, xPA	U.FL Antenna

CQM730 is graphically illustrated below:

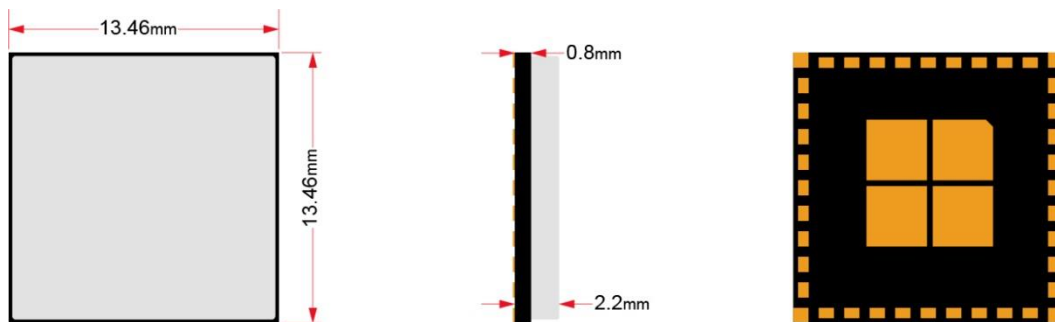


Figure 1: CQM730-0-50-1P Module View

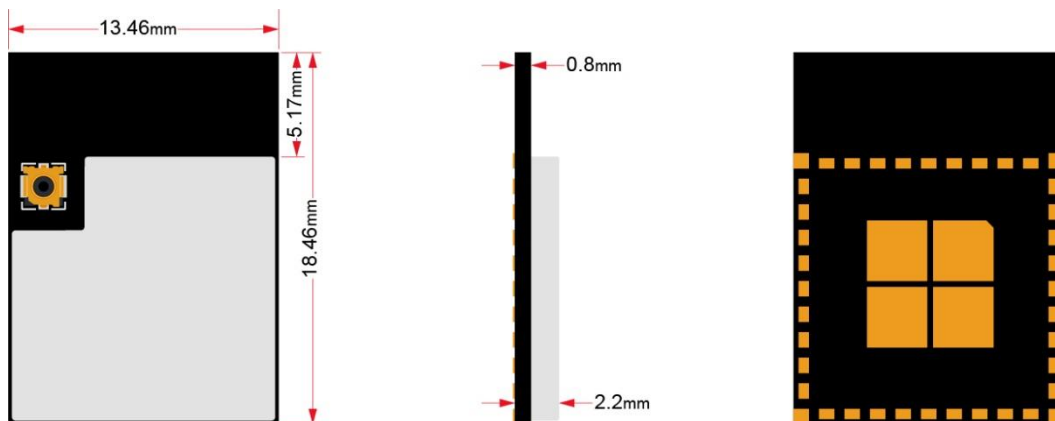


Figure 2: CQM730-0-50-1B Module View

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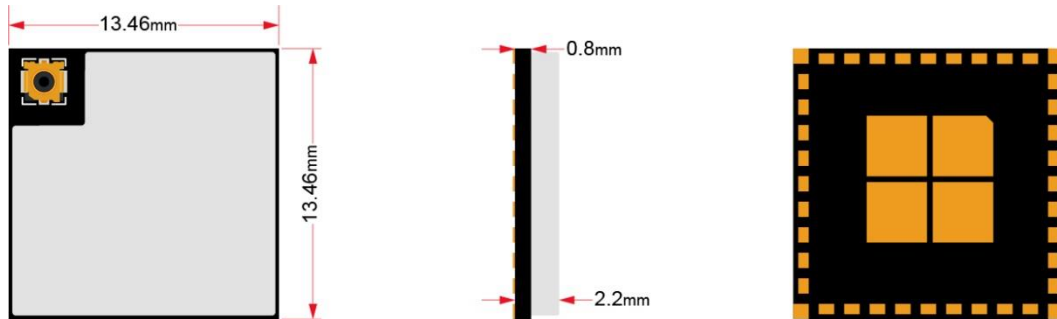


Figure 3: CQM730-0-50-1U Module View

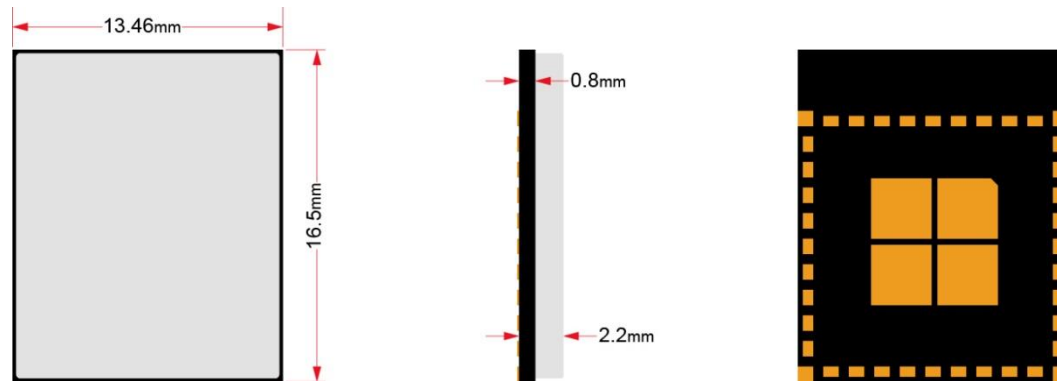


Figure 4: CQM730-0-50-2P Module View

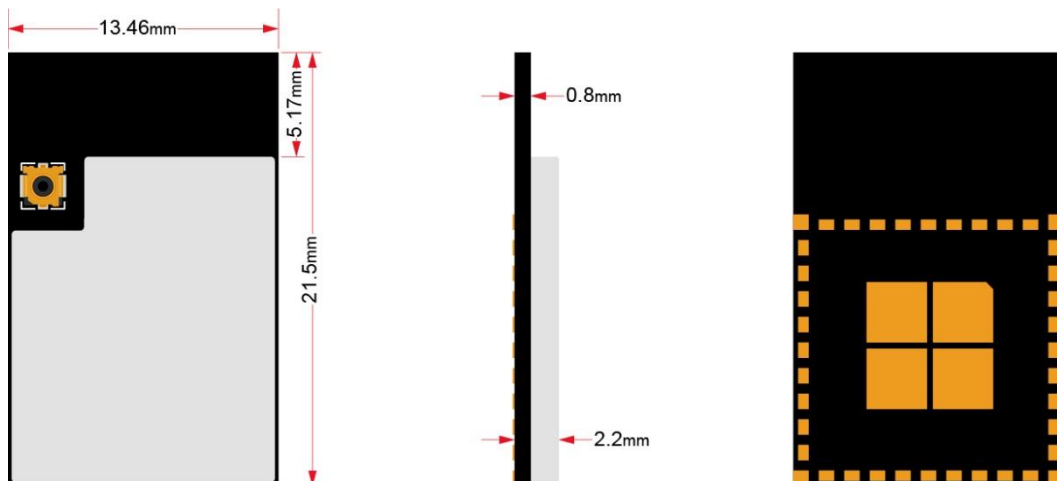


Figure 5: CQM730-0-50-2B Module View

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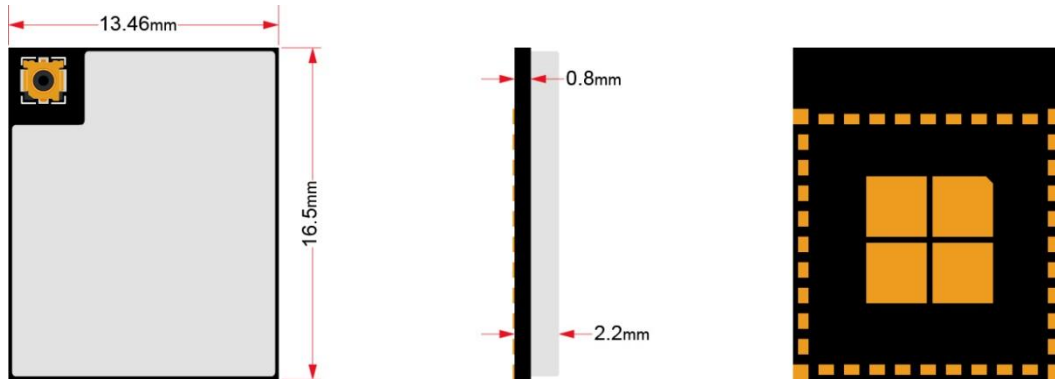


Figure 6: CQM730-0-50-2U Module View

The CQM730 specific development kit to cover both internal PA module and external PA module is provided to facilitate application software development as shown below:

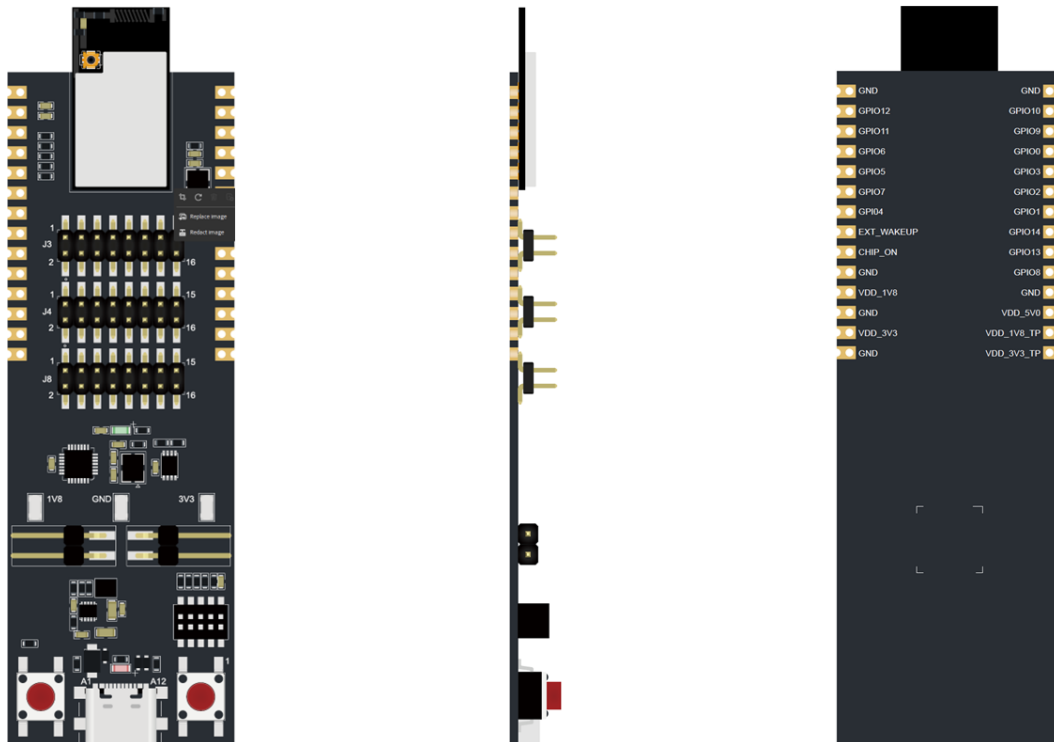


Figure 7: CQM730 Module Development Kit

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2 Hardware Specification

This section provides detailed hardware design and specification of CQM730. CQM730 hardware design has been optimized for small footprint and reduced RBOM cost.

2.1 Block Diagram

CQM730 integrates 4MB NOR flash as stuffing options. The design also supports PCB antenna (CQM730-0-50-1/2B) or simply provides antenna pin (CQM730-0-50-1/2U) to allow customized antenna implementation on motherboard.

CQM730 modules with internal PA block diagram is shown below:

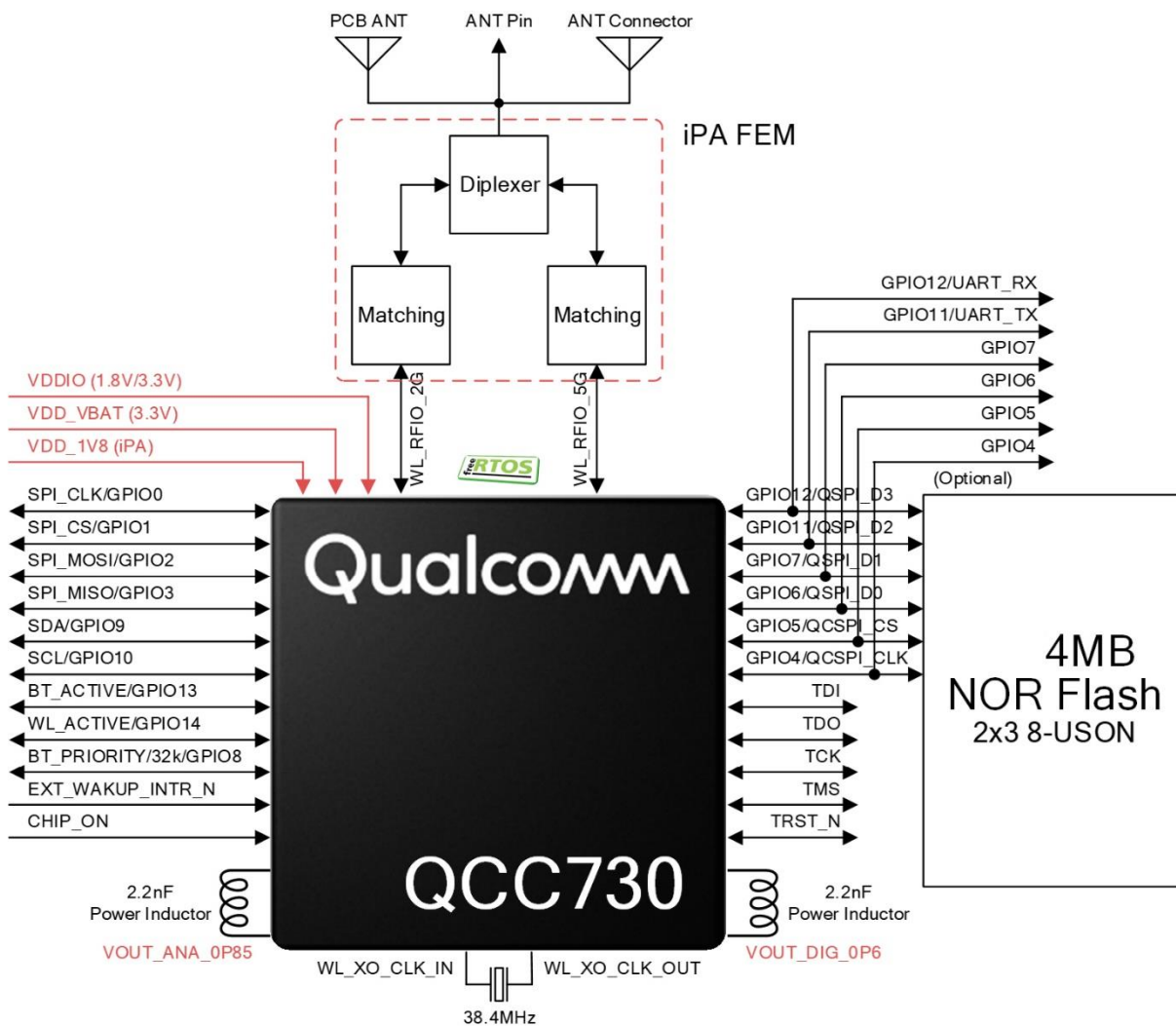


Figure 8: CQM730(internal PA) Module Block Diagram

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CQM730 modules with external PA block diagram is shown below.

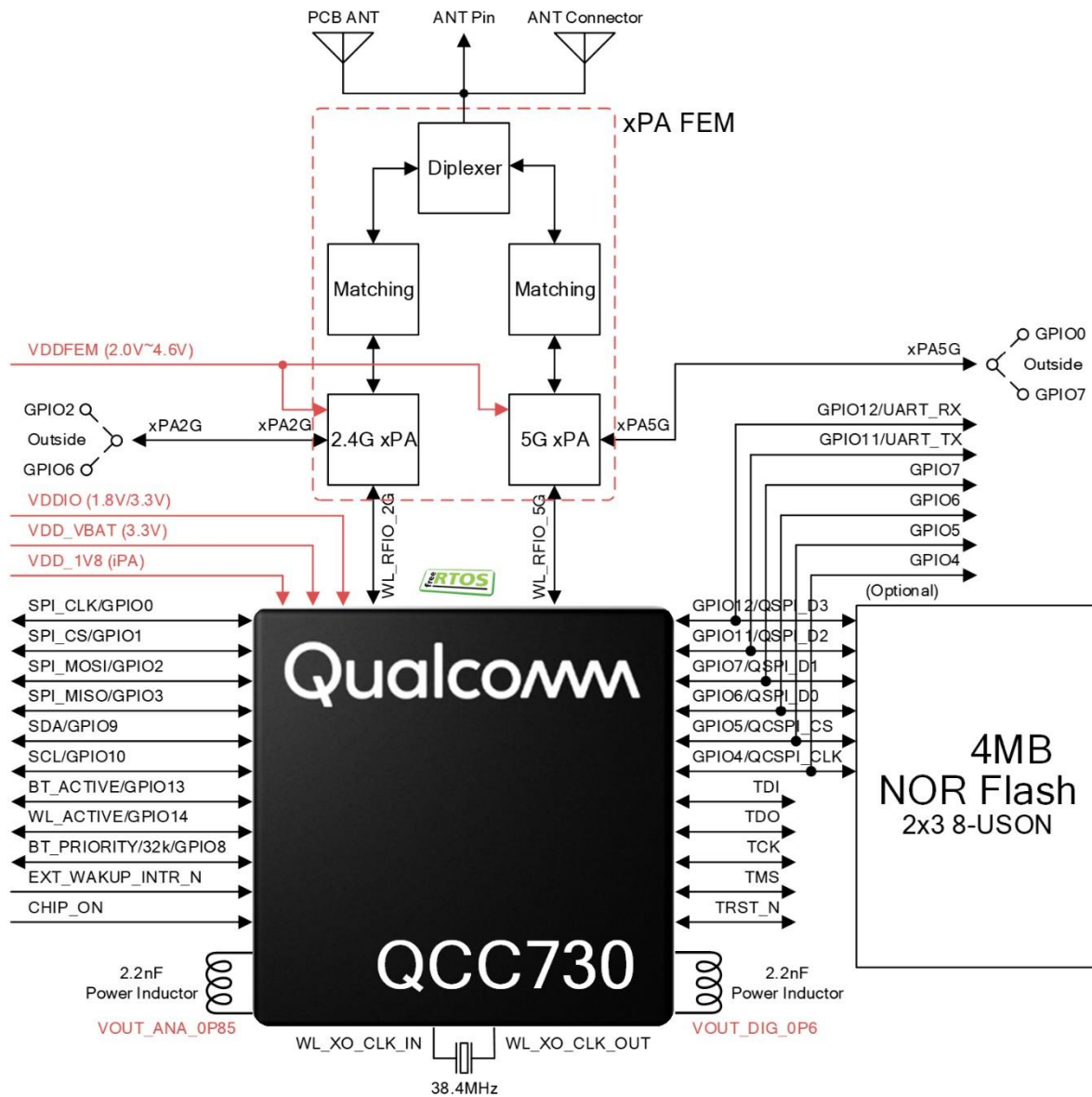


Figure 9: CQM730(external PA) Module Block Diagram

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2.2 Pinout Description

2.2.1 Pin Map

CQM730 internal PA and external PA module pin map is listed below. Since pin antenna and U.FL antenna share the same pin definition, they are grouped together.

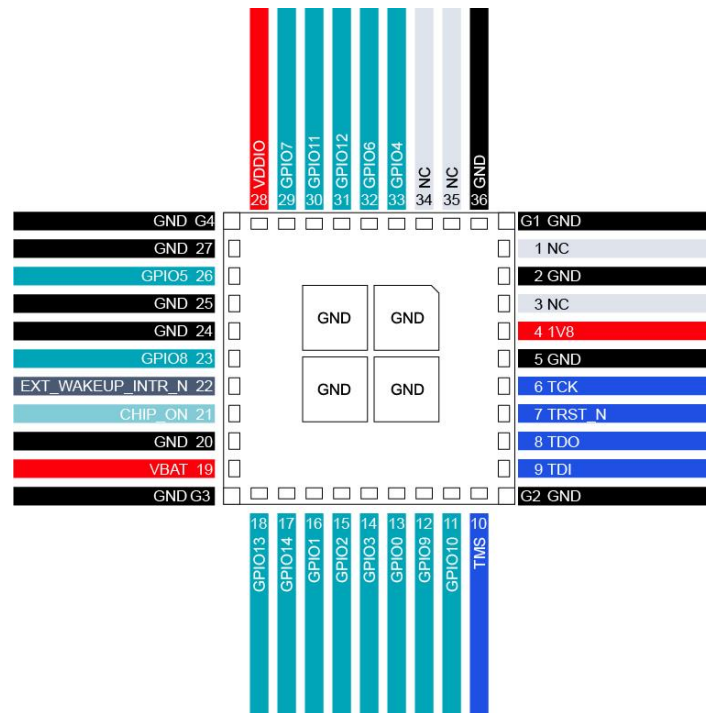


Figure 10: CQM730-0-50-1B/U Module Pin Map

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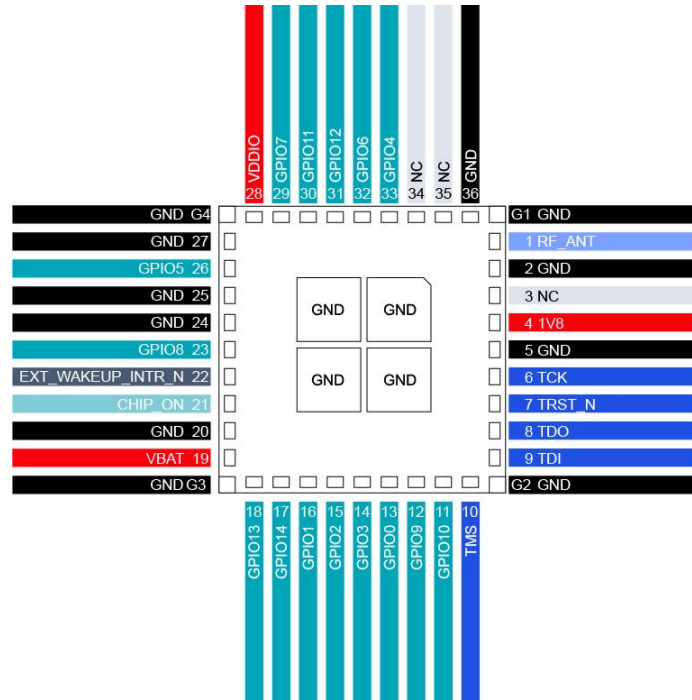


Figure 11: CQM730-0-50-1P Module Pin Map

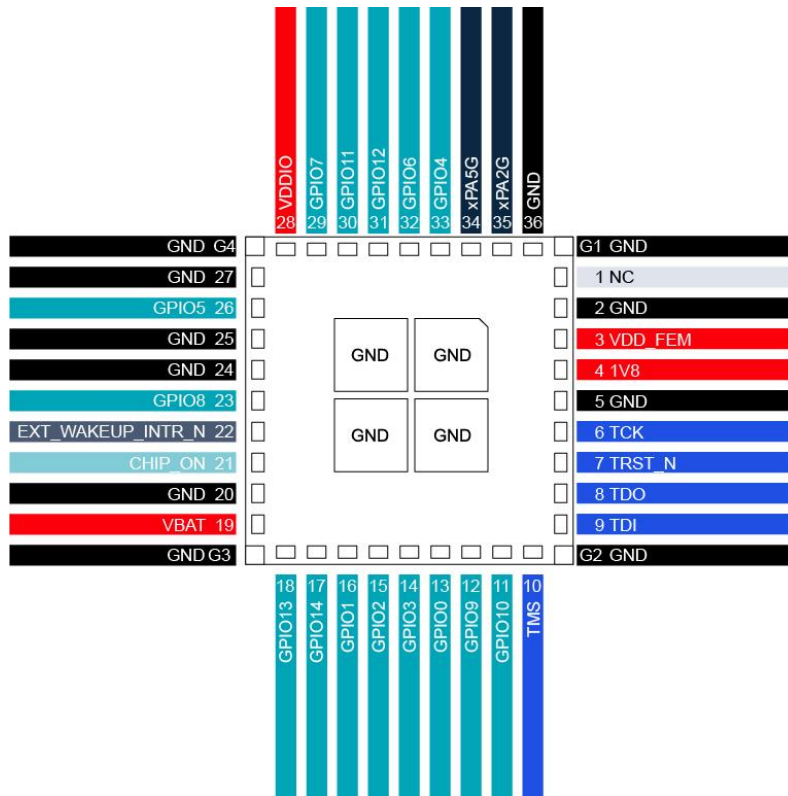


Figure 12: CQM730-0-50-2B/U Module Pin Map

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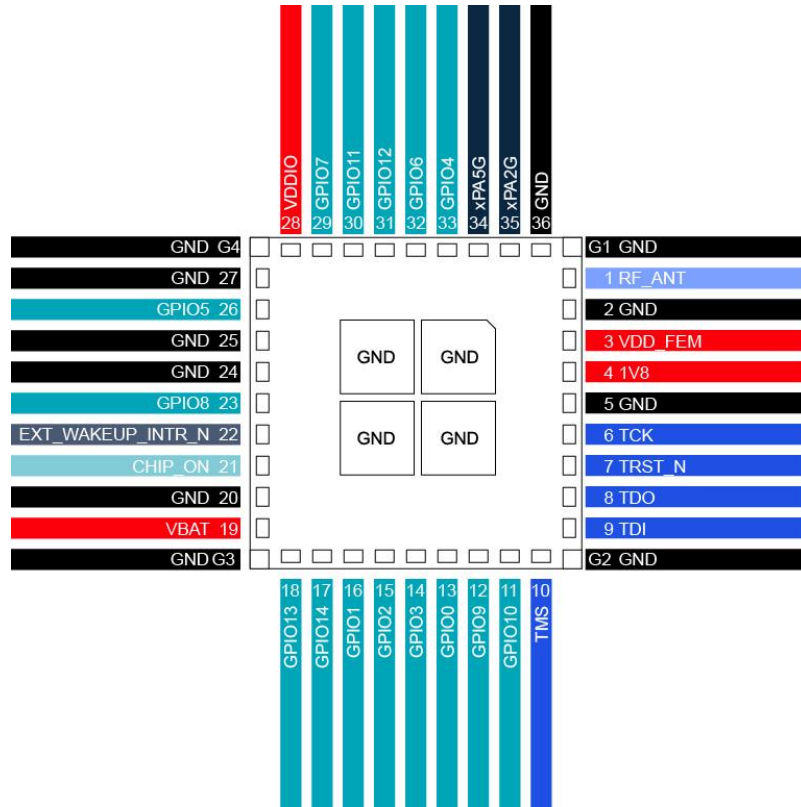


Figure 13: CQM730-0-50-2P Module Pin Map

2.2.2 Pin Definition

Pin definition is listed in the table below:

Pin	Pin Name	Type	Power Domain	Description
19	VBAT	PWR	-	Power input (1.8~3.6V)
28	VDDIO	PWR	-	I/O voltage input 1.8V or 3.3V
4	1V8	PWR	-	Internal PA power input
3	VDD_FEM	PWR	-	External PA power input
1	ANT or N/C	AI/AO	-	Pin antenna or N/C
35	xPA2G	DI	VDDIO	2.4GHz xPA control
34	xPA5G	DI	VDDIO	5GHz xPA control
G1-G4, 2, 20, 24, 25, 27, 36	GND	GND	GND	Ground
22	EXT_WAKEUP	DI	-	External interrupt input
21	CHIP_ON	DI	-	Chip power on
7	TRST_N	DI	-	JTAG
8	TDO	DO	-	JTAG

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9	TDI	DI	-	JTAG
10	TMS	DI	-	JTAG
6	TCK	DI	-	JTAG
13	GPIO0	DI/DO	VDDIO	Generic PIO
16	GPIO1	DI/DO	VDDIO	Generic PIO
15	GPIO2	DI/DO	VDDIO	Generic PIO
14	GPIO3	DI/DO	VDDIO	Generic PIO
33	GPIO4	DI/DO	VDDIO	Generic PIO
26	GPIO5	DI/DO	VDDIO	Generic PIO
32	GPIO6	DI/DO	VDDIO	Generic PIO
29	GPIO7	DI/DO	VDDIO	Generic PIO
23	GPIO8	DI/DO	VDDIO	Generic PIO
12	GPIO9	DI/DO	VDDIO	Generic PIO
11	GPIO10	DI/DO	VDDIO	Generic PIO
30	GPIO11	DI/DO	VDDIO	Generic PIO
31	GPIO12	DI/DO	VDDIO	Generic PIO
18	GPIO13	DI/DO	VDDIO	Generic PIO
17	GPIO14	DI/DO	VDDIO	Generic PIO

2.2.3 External Power Amplifier Pin Control

xPA2G can be controlled by GPIO0 and GPIO2 while xPA5G can be controlled by GPIO6 and GPIO7. The configuration table is shown as below:

xPA2G	xPA5G	Description
GPIO2	GPIO0	No SPI interface
GPIO6	GPIO7	No QSPI (NOR Flash) support

2.2.4 I/O Pin Mux Table

GPIO	QSPI	SPI	I2C	UART	BT	PTA	xPA	FEM	Switch ANT	32k Oscillator
GPIO0		SPI_CLK					xPA5G			
GPIO1		SPI_CS		UART_RX				FEM_ENB5G	ANT_SWITCH_STATUS	
GPIO2		SPI_MOSI					xPA2G			
GPIO3		SPI_MISO		UART_TX				FEM_ENB2G		
GPIO4	QSPI_CLK							FEM_ENB2G	ANT_SWITCH_CTRL	

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GPIO5 (AON)	QSPI_CS						FEM_ENB5G	ANT_SWITCH_STATUS	
GPIO6	QSPI_D0					xPA2G			
GPIO7	QSPI_D1					xPA5G			
GPIO8					BT_PRIORITY			ANT_SWITCH_CTRL	32k_IN
GPIO9 (AON)			SDA	UART_TX					
GPIO10			SCL	UART_RX					
GPIO11	QSPI_D2			UART_TX					
GPIO12	QSPI_D3			UART_RX					
GPIO13				UART_TX	WSI_CLK_BT	BT_ACTIVE			
GPIO14				UART_RX	WSI_DATA_BT	WL_ACTIVE			

2.3 Computing Subsystem

CQM730 modules have Qualcomm QCC730 at his core which integrates Arm Cortex-M3 @60MHz, 1.5MB RRAM and 640KB SRAM as well as on-module NOR flash with size up to 4MB. The code can be executed from flash via Execution-in-Place (XiP).

The computing subsystem software architecture is shown below:

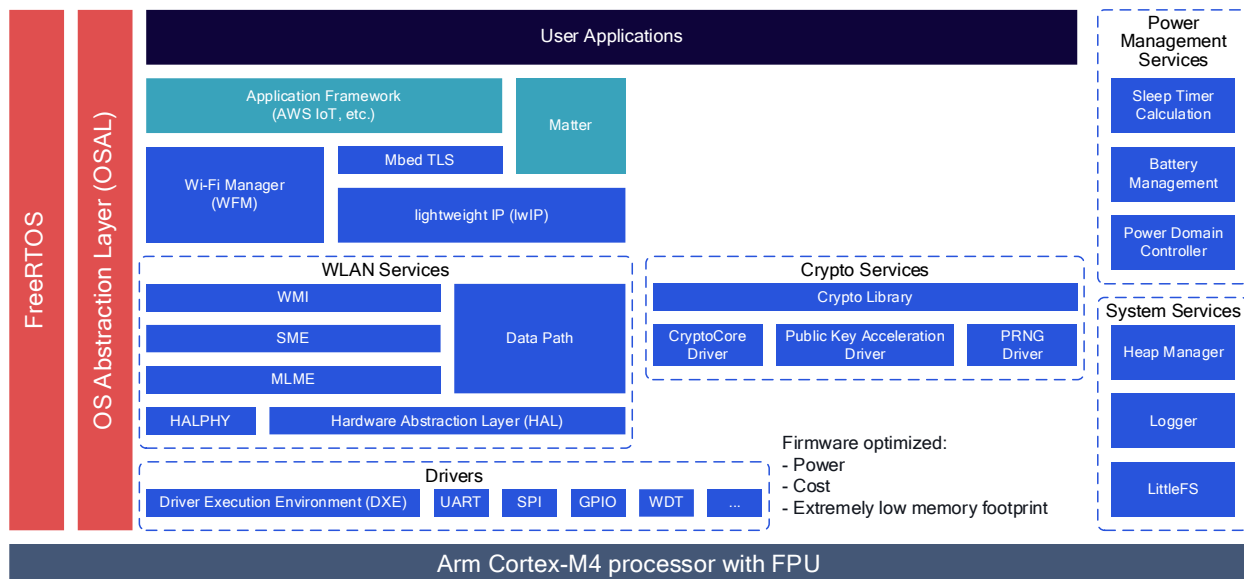


Figure 14: Computing Subsystem Software Architecture

Software SDK will be open sourced at GitHub with blocks in dot line will be offered in binary format inside software SDK package.

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Codelinaro Download Link: <https://git.codelinaro.org/clo/le/qccsdk/oss/>

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3 Electrical Characteristics

3.1 Absolute Maximum Ratings

The absolute maximum ratings provided in this section reflect the stress levels that, if exceeded, may cause permanent damage to the device. No functionality is guaranteed outside the operating specifications. Functionality and reliability are only guaranteed within the operating.

Pin	Parameter	Min	Max	Unit
VBATT	Power input voltage	-0.3	4.0	V
1V8	Internal PA voltage	-0.3	1.98	V
VDDIO	I/O port voltage	-	VDD+0.03	V
VDD_FEM	External PA voltage	2.0	4.6	V
Storage temperature		-55	150	°C

3.2 Recommended Operating Conditions

Pin	Parameter	Min	TYP	Max	Unit
VBATT	Power input voltage	-	3.3	-	V
1V8	Internal PA voltage	1.71	1.8	1.89	V
VDDIO 1.8V	I/O port voltage	1.71	1.8	1.89	V
VDDIO 3.3V	I/O port voltage	-0.3	-	VDD+0.3	V
VDD_FEM	External PA voltage	2.0	3.3	4.6	V
Operating temperature		-20	-	85	°C
Storage temperature		-55	-	150	°C

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4 Radio Performance

The radio performance for both max transmit power and receive sensitivity on both 2.4GHz and 5GHz band is listed in the table below:

4.1.1 2.4GHz Radio Performance

Standard	Channel BW	PHY	Modulation	MCS Index	Data Rate (Mbps)	Max Tx Power (dBm)		Rx Sensitivity (dBm)	
						iPA	xPA	iPA	xPA
802.11b	22MHz	CCK (DSSS)	DBPSK	-	1	11.5	20.5	-96.0	-95.5
		CCK (DSSS)	DQPSK	-	2	11.5	20.5	-92.5	-92.0
		CCK (DSSS)	B/DQPSK	-	5.5	11.0	20.5	-91	-90.5
		CCK (DSSS)	Q/DQPSK	-	11	11.0	20.5	-87.5	-87.0
802.11g	20MHz	OFDM	BPSK	-	6	11.5	20.5	-89.5	-89.0
		OFDM	BPSK	-	9	11.0	20.5	-88	-87.5
		OFDM	QPSK	-	12	10.5	20.5	-86.5	-86.0
		OFDM	QPSK	-	18	10.0	20.5	-84	-83.5
		OFDM	16QAM	-	24	10.0	20.5	-80.5	-80.0
		OFDM	16QAM	-	36	Not Supported			
		OFDM	64QAM	-	48	Not Supported			
		OFDM	64QAM	-	54	Not Supported			
802.11n	20MHz (HT20)	OFDM	BPSK	MCS0	7.2	11.5	20.5	-88.5	-88.0
		OFDM	QPSK	MCS1	14.4	11.0	20.5	-85.5	-85.0
		OFDM	QPSK	MCS2	21.7	10.5	20.5	-83.5	-83.0
		OFDM	16QAM	MCS3	28.9	10.0	20.5	-79.5	-79.0
		OFDM	16QAM	MCS4	43.3	Not Supported			
		OFDM	64QAM	MCS5	57.8	Not Supported			
		OFDM	64QAM	MCS6	65	Not Supported			
		OFDM	64QAM	MCS7	72.2	Not Supported			

4.1.2 5GHz Radio Performance

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Standard	Channel BW	PHY	Modulation	MCS Index	Data Rate (Mbps)	Max Tx Power (dBm)		Rx Sensitivity (dBm)	
						iPA	xPA	iPA	xPA
802.11a	20MHz	OFDM	BPSK	-	6	10.0	19.0	-87.0	-86.0
		OFDM	BPSK	-	9	9.5	19.0	-85.5	-84.5
		OFDM	QPSK	-	12	9.0	19.0	-84.0	-83.0
		OFDM	QPSK	-	18	8.5	19.0	-81.5	-80.5
		OFDM	16QAM	-	24	8.5	19.0	-78.0	-77.0
		OFDM	16QAM	-	36	Not Supported			
		OFDM	64QAM	-	48	Not Supported			
		OFDM	64QAM	-	54	Not Supported			
802.11n	20MHz (HT20)	OFDM	BPSK	MCS0	7.2	10.0	19.0	-86.0	-85.0
		OFDM	QPSK	MCS1	14.4	9.5	19.0	-83.0	-82.0
		OFDM	QPSK	MCS2	21.7	9.0	19.0	-81.0	-80.0
		OFDM	16QAM	MCS3	28.9	8.5	19.0	-77.0	-76.0
		OFDM	16QAM	MCS4	43.3	Not Supported			
		OFDM	64QAM	MCS5	57.8	Not Supported			
		OFDM	64QAM	MCS6	65	Not Supported			
		OFDM	64QAM	MCS7	72.2	Not Supported			

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5 Data Rate

Since CQM730 can support up to MCS3 on 802.11n. The max data rate at UDP/TCP level is listed below:

PAMPDU	Protocol	Rate	MCS Index	Traffic	Throughput	KPI %
No	UDP	28.9 Mbps	MCS3	DL	16.63 Mbps	92.39%
	UDP	28.9 Mbps	MCS3	UL	17.72 Mbps	98.44%
	TCP	28.9 Mbps	MCS3	DL	13.97 Mbps	93.13%
	TCP	28.9 Mbps	MCS3	UL	14.03 Mbps	93.54%
Yes	UDP	28.9 Mbps	MCS3	DL	23.5 Mbps	98.54%
	UDP	28.9 Mbps	MCS3	UL	22.58 Mbps	94.08%
	TCP	28.9 Mbps	MCS3	DL	16.02 Mbps	94.24%
	TCP	28.9 Mbps	MCS3	UL	16.17 Mbps	95.12%

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6 Power Consumption

CQM730 can operate in four power states as shown in the table below:

Power Mode	CPU	MEM	RTC	Wakeup Source	Description	Use Case
Active	On	On	On	N/A	Normal operation	Awake
Sleep	Off	Retained	Off	DTIM timer	- Enter When RTOS is idle, and WLAN is connected* - Maintain WLAN connection - When awake, continue to run from sleep point	WLAN DTIM
Deep Sleep	Off	Off	Off	RTC timer or EXT_WAKEUP_INTR_N	- Enter when RTOS is idle, and WLAN is disconnected* - Nothing maintained - When awake, restart from PBL	Alarm or Shutdown
Indefinite Sleep	Off	Off	Off	EXT_WAKEUP_INTR_N	Same as Deep Sleep, except not waked up by RTC timer	Shutdown

Note: Actual entering condition is complicated, such as considering sleep interval

6.1 Active Power

The active power consumption for both continuous transmitting and receiving on both 2.4GHz and 5GHz band is listed in the table below:

6.1.1 2.4GHz Active Power Consumption

Standard	Channel BW	PHY	Modulation	MCS Index	Data Rate (Mbps)	Continuous Transmit (mW)		Continuous Receive (mW)	
						iPA	xPA	iPA	xPA
802.11b	22MHz	CCK (DSSS)	DBPSK	-	1	≤160	≤750	≤14	≤14
		CCK (DSSS)	DQPSK	-	2	≤160	≤750	≤14	≤14
		CCK (DSSS)	B/DQPSK	-	5.5	≤160	≤750	≤14	≤14
		CCK (DSSS)	Q/DQPSK	-	11	≤160	≤750	≤14	≤14
802.11g	20MHz	OFDM	BPSK	-	6	≤160	≤750	≤14	≤14

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		OFDM	BPSK	-	9	≤160	≤750	≤14	≤14
		OFDM	QPSK	-	12	≤160	≤750	≤14	≤14
		OFDM	QPSK	-	18	≤160	≤750	≤14	≤14
		OFDM	16QAM	-	24	≤160	≤750	≤14	≤14
		OFDM	16QAM	-	36	Not Supported			
		OFDM	64QAM	-	48	Not Supported			
		OFDM	64QAM	-	54	Not Supported			
802.11n	20MHz (HT20)	OFDM	BPSK	MCS0	7.2	≤160	≤750	≤14	≤14
		OFDM	QPSK	MCS1	14.4	≤160	≤750	≤14	≤14
		OFDM	QPSK	MCS2	21.7	≤160	≤750	≤14	≤14
		OFDM	16QAM	MCS3	28.9	≤160	≤750	≤14	≤14
		OFDM	16QAM	MCS4	43.3	Not Supported			
		OFDM	64QAM	MCS5	57.8	Not Supported			
		OFDM	64QAM	MCS6	65	Not Supported			
		OFDM	64QAM	MCS7	72.2	Not Supported			

Note: VBATT = 3.3V, VDDIO = 1.8V

6.1.2 5GHz Active Power Consumption

Standard	Channel BW	PHY	Modulation	MCS Index	Data Rate (Mbps)	Continuous Transmit (mW)		Continuous Receive (mW)	
						iPA	xPA	iPA	xPA
802.11a	20MHz	OFDM	BPSK	-	6	≤170	≤920	≤18	≤18
		OFDM	BPSK	-	9	≤170	≤920	≤18	≤18
		OFDM	QPSK	-	12	≤170	≤920	≤18	≤18
		OFDM	QPSK	-	18	≤170	≤920	≤18	≤18
		OFDM	16QAM	-	24	≤170	≤920	≤18	≤18
		OFDM	16QAM	-	36	Not Supported			
		OFDM	64QAM	-	48	Not Supported			
		OFDM	64QAM	-	54	Not Supported			

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802.11n	20MHz (HT20)	OFDM	BPSK	MCS0	7.2	≤170	≤920	≤18	≤18
		OFDM	QPSK	MCS1	14.4	≤170	≤920	≤18	≤18
		OFDM	QPSK	MCS2	21.7	≤170	≤920	≤18	≤18
		OFDM	16QAM	MCS3	28.9	≤170	≤920	≤18	≤18
		OFDM	16QAM	MCS4	43.3	Not Supported			
		OFDM	64QAM	MCS5	57.8	Not Supported			
		OFDM	64QAM	MCS6	65	Not Supported			
		OFDM	64QAM	MCS7	72.2	Not Supported			

Note: VBATT = 3.3V, VDDIO = 1.8V

6.2 Sleep Power

Power Mode	CPU	Internal Power Amplifier		External Power Amplifier		Unit
		2.4GHz	5GHz	2.4GHz	5GHz	
Standby	Power Down	0	0	0	0	μW
	Deep Sleep	≤35	≤35	≤35	≤35	μW
	Listen	/	/	/	/	μW
	DTIM sleep (128KB RAM Retention)	/	/	/	/	μW
	DTIM sleep (650KB RAM Retention)	/	/	/	/	μW
DTIM	DTIM 1	≤350	≤350	≤350	≤350	μW
	DTIM 3	≤180	≤180	≤180	≤180	μW
	DTIM 5	≤150	≤150	≤150	≤150	μW
	DTIM 10	≤130	≤130	≤130	≤130	μW
	DTIM 100	/	/	/	/	μW

Note: VBATT = 3.3V, VDDIO = 1.8V

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7 Mechanical Specification

7.1 Internal Power Amplifier Module

7.1.1 Pin Antenna

7.1.1.1 Dimension

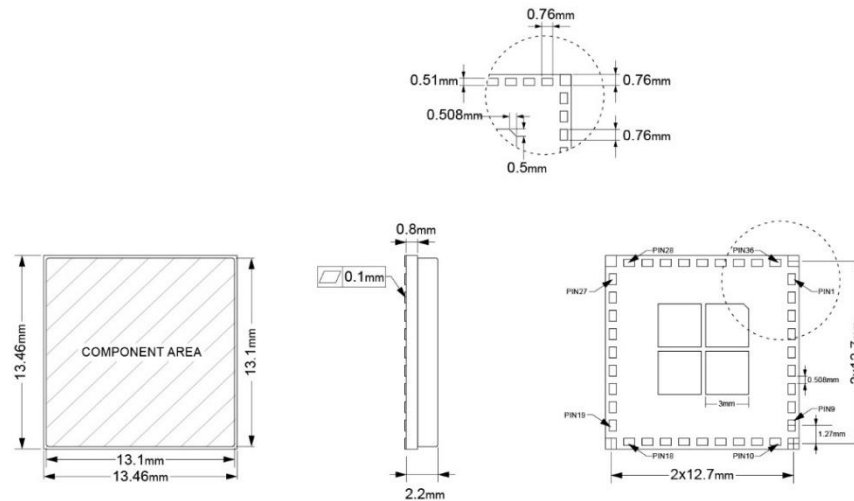


Figure 15: CQM730-0-50-1P Module Dimension

7.1.1.2 Recommended PCB Landing Pattern

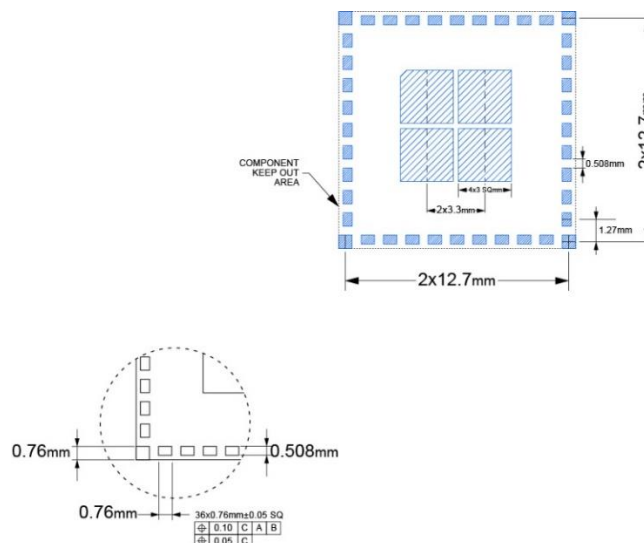


Figure 16: CQM730-0-50-1P Module PCB Landing Pattern

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7.1.2 PCB Antenna

7.1.2.1 Dimension

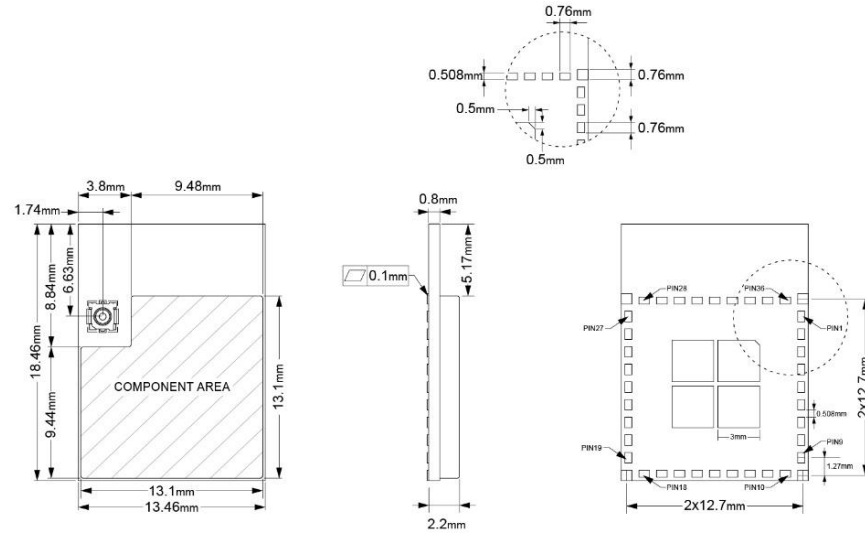


Figure 17: CQM730-0-50-1B Module Dimension

7.1.2.2 Recommended PCB Landing Pattern

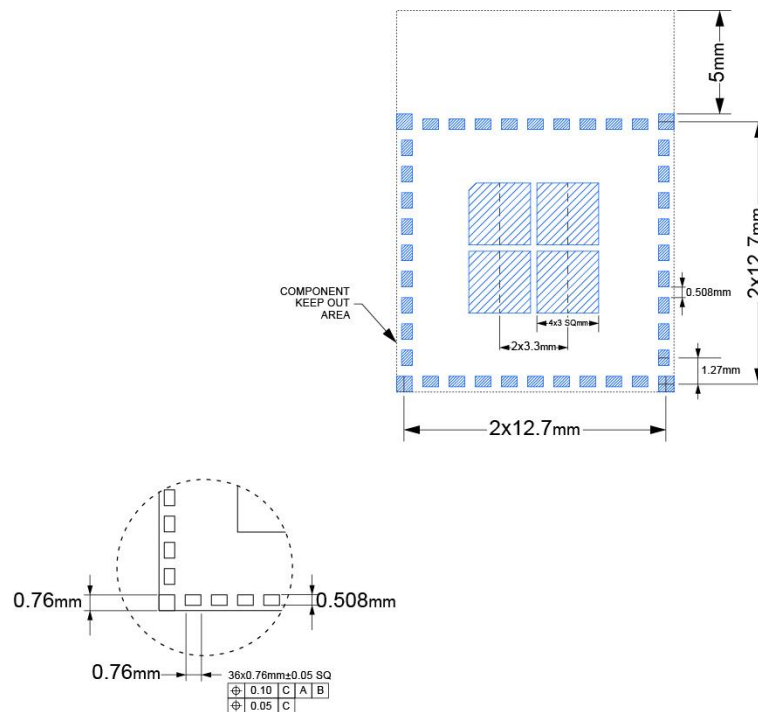


Figure 18: CQM730-0-50-1B Module PCB Landing Pattern

7.1.3.1 Dimension

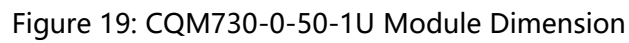


Figure 1: Dimensions of the test specimen. The diagram shows a square specimen with a central 4x3 SQmm area and a surrounding 2x3.3mm border. The overall dimensions are 2x12.7mm. A 'COMPONENT KEEP OUT AREA' is indicated. A detail view shows a 0.508mm dimension.

Figure 20: CQM730-0-50-1U Module PCB Landing Pattern

7.2.1.1 Dimension

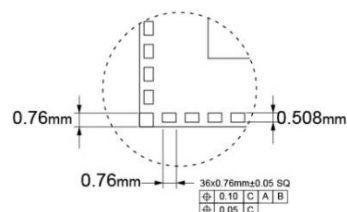
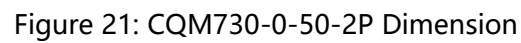


Figure 22: CQM730-0-50-2P PCB Landing Pattern

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7.2.2 PCB Antenna

7.2.2.1 Dimension

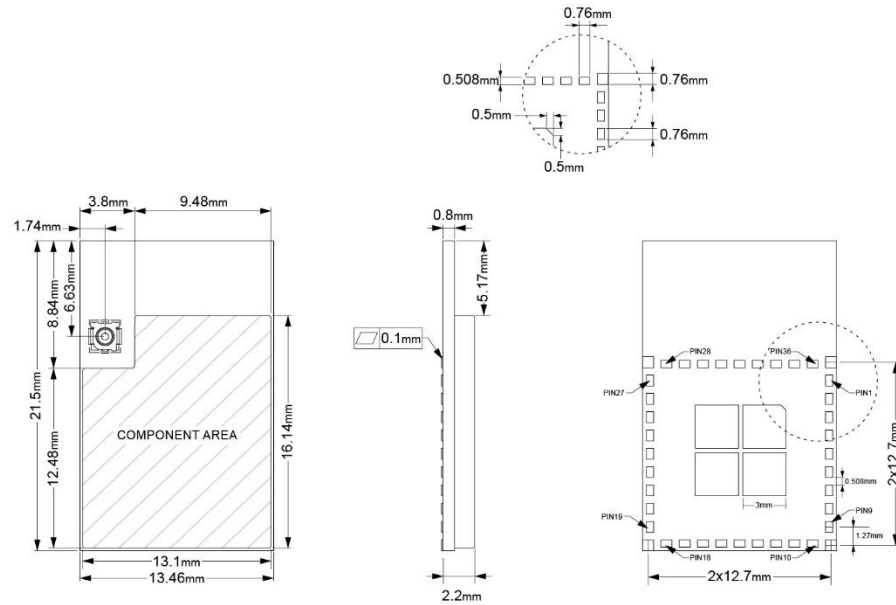


Figure 23: CQM730-0-50-2B Dimension

7.2.2.2 Recommended PCB Landing Pattern

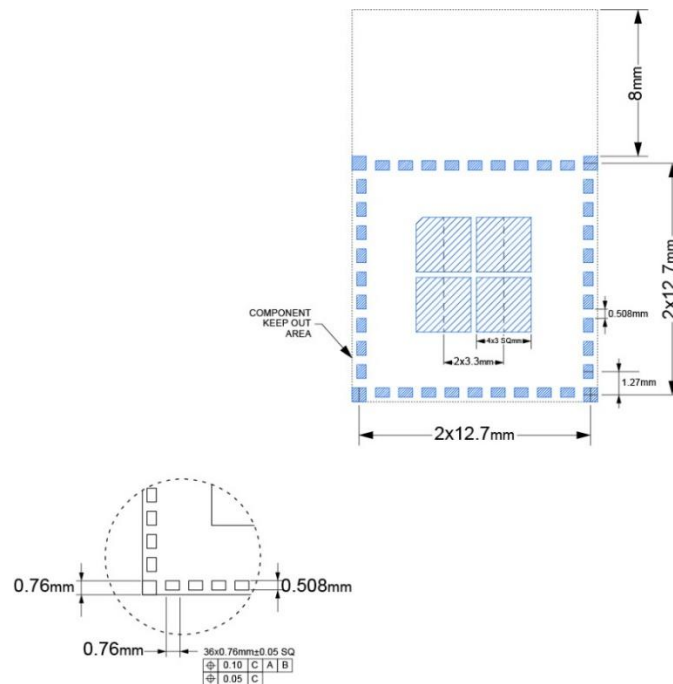


Figure 24: CQM730-0-50-2B PCB Landing Pattern

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7.2.3 Connector Antenna

7.2.3.1 Dimension

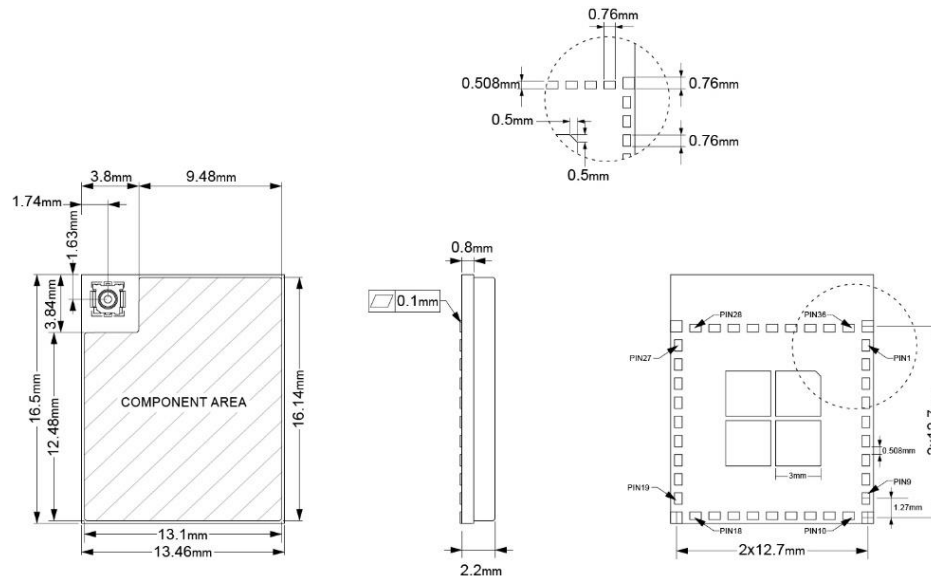


Figure 25: CQM730-0-50-2U Dimension

7.2.3.2 Recommended PCB Landing Pattern

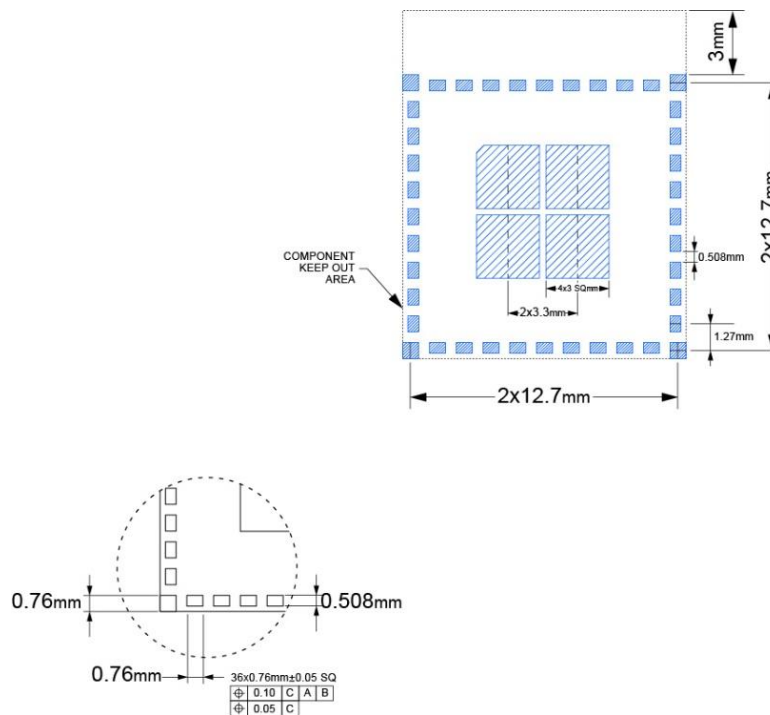


Figure 26: CQM730-0-50-2U PCB Landing Pattern

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8 Manufacturing Recommendation

8.1 Power Layout Guideline

CQM730 is powered by either 3V battery or DC 3.3V. Power pin connection capacitor is as close as possible to chip and pin. Decoupling the power supply from the chip using a capacitor. Use capacitors to prevent noise from coupling back to the power plane.

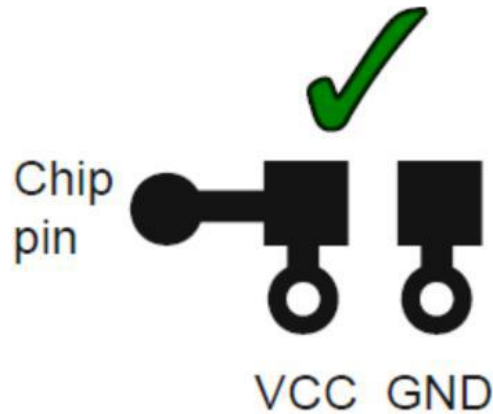


Figure 27: Power Layout Guideline

8.2 Soldering Recommendations

CQM730 can be SMT on the board following the temperature curve graph:

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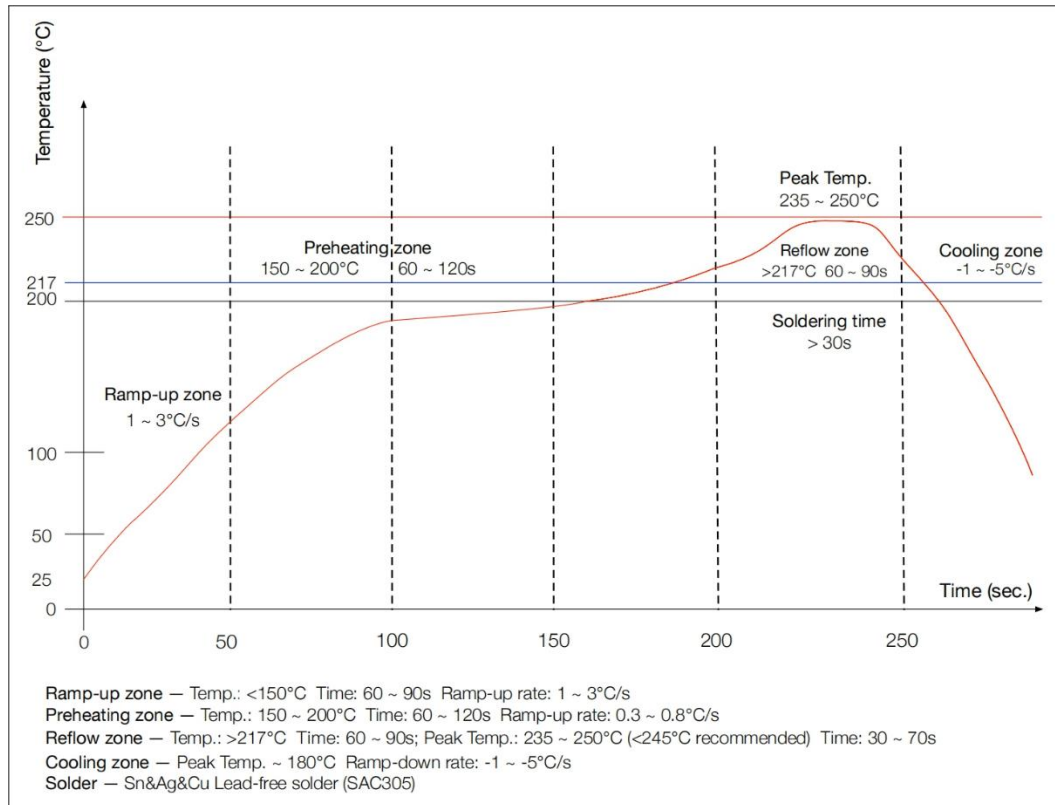


Figure 28: Soldering Guideline

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Revision History

Revision	Description	Date
1.0	Initial draft	July 1, 2024
1.1	Adding radio performance data Adding power consumption data	Sept 29, 2024
1.2	Update size and pin map	Jan 14, 2025
1.3	Update Module name	Mar 18, 2025

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