

RF Exposure Evaluation Report

APPLICANT : Quectel Wireless Solutions Co., Ltd.
EQUIPMENT : Wi-Fi & Bluetooth Module
BRAND NAME : Quectel
MODEL NAME : FCS850R
FCC ID : XMR2023FCS850R
STANDARD : 47 CFR Part 2.1091

The product evaluation date was started from Jun. 02, 2023 and completed on Jun. 02, 2023. We, Sporton International Inc. (Kunshan), would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.



Approved by: Si Zhang

Sporton International Inc. (Kunshan)

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China**



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**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA330102	Rev. 01	Initial issue of report.	Jun. 08, 2023



1. Administration Data

1.1. Testing Laboratory

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR01-KS	CN1257	314309

Applicant	
Company Name	Quectel Wireless Solutions Co., Ltd.
Address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Manufacturer	
Company Name	Quectel Wireless Solutions Co., Ltd.
Address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Wi-Fi & Bluetooth Module
Brand Name	Quectel
Model Name	FCS850R
FCC ID	XMR2023FCS850R
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
Antenna Gain	Bluetooth: 0.73 dBi <ANT1> WLAN2.4GHz: 0.73 dBi WLAN5.2GHz: 1.14 dBi WLAN5.3GHz: 1.00 dBi WLAN5.5GHz: 0.60 dBi WLAN5.8GHz: 0.95 dBi <ANT2> WLAN2.4GHz: 0.73 dBi WLAN5.2GHz: 1.14 dBi WLAN5.3GHz: 1.00 dBi WLAN5.5GHz: 0.60 dBi WLAN5.8GHz: 0.95 dBi
Antenna Type	WLAN/Bluetooth: Dipole Antenna
HW Version	R1.0
SW Version	NA
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Comments and Explanations:

1. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.
2. The maximum RF output tune up power, antenna gain also the safe distance used for evaluate RF exposure were declared by manufacturer.



3. Maximum RF average output tune up power among production units

<2.4GHz WLAN >

Mode		Maximum Average Power (dBm)
		ANT1+2
2.4GHz	802.11b	22.0
	802.11g	21.0
	802.11n-HT20	21.0
	802.11n-HT40	19.0

<Bluetooth>

Mode		Maximum Average power(dBm)
Bluetooth	BR/EDR	8.0
	LE	6.0

<5GHz WLAN >

Mode		Maximum Average Power (dBm)
		ANT1+2
5.2GHz	802.11a	20.0
	802.11n-HT20	21.0
	802.11n-HT40	21.5
	802.11ac-VHT20	21.5
	802.11ac-VHT40	21.5
	802.11ac-VHT80	16.0
5.3GHz	802.11a	22.0
	802.11n-HT20	22.0
	802.11n-HT40	21.5
	802.11ac-VHT20	22.0
	802.11ac-VHT40	21.5
	802.11ac-VHT80	21.0
5.5GHz	802.11a	22.5
	802.11n-HT20	22.0
	802.11n-HT40	21.5
	802.11ac-VHT20	22.0
	802.11ac-VHT40	21.5
	802.11ac-VHT80	21.0
5.8GHz	802.11a	22.5
	802.11n-HT20	21.5
	802.11n-HT40	21.5
	802.11ac-VHT20	21.5
	802.11ac-VHT40	21.5
	802.11ac-VHT80	21.5

Note: WLAN2.4GHz/WLAN5GHz all support MIMO mode only.



4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
Bluetooth	2402.0	0.73	8.00	8.730	7.464	0.001	1.000
2.4GHz WLAN	2412.0	0.73	22.00	22.730	187.499	0.037	1.000
5.2GHz WLAN	5180.0	1.14	21.50	22.640	183.654	0.037	1.000
5.3GHz WLAN	5260.0	1.00	22.00	23.000	199.526	0.040	1.000
5.5GHz WLAN	5500.0	0.60	22.50	23.100	204.174	0.041	1.000
5.8GHz WLAN	5745.0	0.95	22.50	23.450	221.309	0.044	1.000

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power to do MPE analysis.
3. According to the EUT characteristic, WLAN 2.4GHz and WLAN 5GHz cannot transmit simultaneously.
4. According to the EUT characteristic, WLAN and Bluetooth cannot transmit simultaneously.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

-----THE END-----