

RF Exposure Evaluation Report

APPLICANT : Quectel Wireless Solutions Co., Ltd.
EQUIPMENT : Smart LTE Module
BRAND NAME : Quectel
MODEL NAME : SC200E-AU
FCC ID : XMR2024SC200EAU
STANDARD : 47 CFR Part 2.1091
FCC KDB 447498 D01 v06

The product evaluation date was started from Nov. 25, 2024 and completed on Nov. 25, 2024. 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
FA480203	Rev. 01	Initial issue of report.	Nov. 29, 2024



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		
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	Smart LTE Module
Brand Name	Quectel
Model Name	SC200E-AU
FCC ID	XMR2024SC200EAU
Wireless Technology and Frequency Range	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2 : 1850 MHz ~ 1910 MHz LTE Band 4 : 1710 MHz ~ 1755 MHz LTE Band 5 : 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 38: 2570 MHz ~ 2620 MHz 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 ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+(16QAM uplink is supported) LTE: QPSK, 16QAM WLAN 2.4GHz 802.11b/g WLAN 2.4GHz 802.11n HT20/HT40 WLAN 5GHz 802.11a WLAN 5GHz 802.11n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
Antenna Gain	WLAN2.4GHz/Bluetooth: 0.2 dBi WLAN5.2GHz: -0.7 dBi WLAN5.3GHz: -0.8 dBi WLAN5.5GHz: -1.2 dBi WLAN5.8GHz: -1.5 dBi
Antenna Type	WLAN/Bluetooth: Dipole Antenna
HW Version	R1.0
SW Version	SC200EAUDAR12A01
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****<GSM>**

Mode	Burst average power(dBm)	
	GSM 850	GSM 1900
GSM (GMSK, 1 Tx slot)	35.00	32.00
GPRS (GMSK, 1 Tx slot)	35.00	32.00
GPRS (GMSK, 2 Tx slots)	32.00	29.00
GPRS (GMSK, 3 Tx slots)	31.00	28.00
GPRS (GMSK, 4 Tx slots)	29.00	26.00
EDGE (8PSK, 1 Tx slot)	29.00	29.00
EDGE (8PSK, 2 Tx slots)	28.00	27.00
EDGE (8PSK, 3 Tx slots)	27.00	26.00
EDGE (8PSK, 4 Tx slots)	25.00	24.00

<WCDMA>

Mode		Maximum Average power(dBm)
WCDMA	Band II	25.00
	Band IV	25.00
	Band V	25.00

<LTE>

Mode		Maximum Average power(dBm)
LTE	Band 2	25.00
	Band 4	25.00
	Band 5	25.00
	Band 7	25.00
	Band 38	25.00

**<2.4GHz WLAN >**

	Mode	Maximum Average Power (dBm)
2.4GHz	802.11b	18.00
	802.11g	18.00
	802.11n-HT20	17.00
	802.11n-HT40	17.00

<Bluetooth>

	Mode	Maximum Average power(dBm)
Bluetooth	BR/EDR	9.00
	LE	1.00

<5GHz WLAN >

	Mode	Maximum Average Power (dBm)
5.2GHz	802.11a	17.00
	802.11n-HT20	17.00
	802.11n-HT40	18.00
	802.11ac-VHT20	17.00
	802.11ac-VHT40	18.00
	802.11ac-VHT80	15.00
5.3GHz	802.11a	17.00
	802.11n-HT20	17.00
	802.11n-HT40	18.00
	802.11ac-VHT20	17.00
	802.11ac-VHT40	18.00
	802.11ac-VHT80	13.00
5.5GHz	802.11a	17.00
	802.11n-HT20	17.00
	802.11n-HT40	18.00
	802.11ac-VHT20	17.00
	802.11ac-VHT40	18.00
	802.11ac-VHT80	16.00
5.8GHz	802.11a	17.00
	802.11n-HT20	17.00
	802.11n-HT40	18.00
	802.11ac-VHT20	17.00
	802.11ac-VHT40	18.00
	802.11ac-VHT80	16.50



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)	Maximum Power (dBm)	MPE evaluation distance (cm)	FCC ERP/EIRP Limit (W)	Power Density for Max Gain to meet FCC ERP/EIRP and MPE limit (mW/cm ²)	Power Density for Max gain allowed (mW/cm ²)	FCC MPE Limit (mW)/cm ²	FCC MPE Result / FCC MPE Limit Ratio	Ant Gain to meet FCC MPE limit (dBi)	Ant Gain to meet FCC ERP/EIRP limit (dBi)	Max Gain to meet FCC ERP/EIRP and MPE limit (dBi)	Max Gain to consider same Frequency or MPE collocated	Max gain allowed (dBi)
GSM 850 (1 Tx slot)	824	35.00	20.00	7.000	0.548	0.446	0.549	0.811	8.4	12.4	8.4	7.5	7.5
GPRS 850 (1 Tx slot)	824	35.00	20.00	7.000	0.548	0.446	0.549	0.811	8.4	12.4	8.4	7.5	7.5
GPRS 850 (2 Tx slots)	824	32.00	20.00	7.000	0.548	0.446	0.549	0.811	8.4	12.4	8.4	7.5	7.5
GPRS 850 (3 Tx slots)	824	31.00	20.00	7.000	0.541	0.528	0.549	0.962	7.6	11.7	7.6	7.5	7.5
GPRS 850 (4 Tx slots)	824	29.00	20.00	7.000	0.548	0.446	0.549	0.811	8.4	12.4	8.4	7.5	7.5
EGPRS 850 (1 Tx slot)	824	29.00	20.00	7.000	0.548	0.112	0.549	0.204	14.4	18.4	14.4	7.5	7.5
EGPRS 850 (2 Tx slots)	824	28.00	20.00	7.000	0.548	0.177	0.549	0.323	12.4	16.4	12.4	7.5	7.5
EGPRS 850 (3 Tx slots)	824	27.00	20.00	7.000	0.541	0.210	0.549	0.383	11.6	15.7	11.6	7.5	7.5
EGPRS 850 (4 Tx slots)	824	25.00	20.00	7.000	0.548	0.177	0.549	0.323	12.4	16.4	12.4	7.5	7.5
GSM 1900 (1 Tx slot)	1850	32.00	20.00	2.000	0.397	0.330	1.000	0.330	14.0	10.0	10.0	9.2	9.2
GPRS 1900 (1 Tx slot)	1850	32.00	20.00	2.000	0.397	0.330	1.000	0.330	14.0	10.0	10.0	9.2	9.2
GPRS 1900 (2 Tx slots)	1850	29.00	20.00	2.000	0.397	0.330	1.000	0.330	14.0	10.0	10.0	9.2	9.2
GPRS 1900 (3 Tx slots)	1850	28.00	20.00	2.000	0.392	0.392	1.000	0.392	13.2	9.2	9.2	9.2	9.2
GPRS 1900 (4 Tx slots)	1850	26.00	20.00	2.000	0.397	0.330	1.000	0.330	14.0	10.0	10.0	9.2	9.2
EGPRS 1900 (1 Tx slot)	1850	29.00	20.00	2.000	0.397	0.166	1.000	0.166	17.0	13.0	13.0	9.2	9.2
EGPRS 1900 (2 Tx slots)	1850	27.00	20.00	2.000	0.397	0.208	1.000	0.208	16.0	12.0	12.0	9.2	9.2
EGPRS 1900 (3 Tx slots)	1850	26.00	20.00	2.000	0.392	0.247	1.000	0.247	15.2	11.2	11.2	9.2	9.2
EGPRS 1900 (4 Tx slots)	1850	24.00	20.00	2.000	0.397	0.208	1.000	0.208	16.0	12.0	12.0	9.2	9.2
WCDMA Band 2	1850	25.00	20.00	2.000	0.397	0.397	1.000	0.397	12.0	8.0	8.0	8.0	8.0
WCDMA Band 4	1710	25.00	20.00	1.000	0.199	0.199	1.000	0.199	12.0	5.0	5.0	5.0	5.0
WCDMA Band 5	824	25.00	20.00	7.000	0.548	0.500	0.549	0.910	9.4	13.4	9.4	9.0	9.0
LTE Band 2	1850	25.00	20.00	2.000	0.397	0.397	1.000	0.397	12.0	8.0	8.0	8.0	8.0
LTE Band 4	1710	25.00	20.00	1.000	0.199	0.199	1.000	0.199	12.0	5.0	5.0	5.0	5.0
LTE Band 5	824	25.00	20.00	7.000	0.548	0.500	0.549	0.910	9.4	13.4	9.4	9.0	9.0
LTE Band 7	2500	25.00	20.00	2.000	0.397	0.397	1.000	0.397	12.0	8.0	8.0	8.0	8.0
LTE Band 38	2570	25.00	20.00	2.000	0.397	0.397	1.000	0.397	12.0	8.0	8.0	8.0	8.0

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)	Power Density / Limit
2.4GHz WLAN	2412.0	0.20	18.00	18.200	66.069	0.013	1.000	0.013
5.2GHz WLAN	5180.0	-0.70	18.00	17.300	53.703	0.011	1.000	0.011
5.3GHz WLAN	5260.0	-0.80	18.00	17.200	52.481	0.010	1.000	0.010
5.5GHz WLAN	5500.0	-1.20	18.00	16.800	47.863	0.010	1.000	0.010
5.8GHz WLAN	5745.0	-1.50	18.00	16.500	44.668	0.009	1.000	0.009
Bluetooth	2402.0	0.20	9.00	9.200	8.318	0.002	1.000	0.002

Note:

- For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
- Chose the maximum power to do MPE analysis.

**5.2. Collocated Power Density Calculation**

WWAN Power Density / Limit	WLAN 2.4GHz Power Density / Limit	Σ (Power Density / Limit) of WWAN + WLAN 2.4GHz
0.962	0.013	0.975

WWAN Power Density / Limit	WLAN 5GHzPower Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WWAN + WLAN 5GHz + Bluetooth
0.962	0.011	0.002	0.975

Note:

1. According to the EUT characteristic, WLAN 2.4GHz and WLAN 5GHz can't transmit simultaneously.
2. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + WLAN2.4GHz or WWAN + WLAN5GHz + Bluetooth.
3. Considering all transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE collocated transmitters is compliant.

Conclusion:

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

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