RF Exposure Evaluation Report

APPLICANT	:	**Quectel Wireless Solutions Co., Ltd.**
EQUIPMENT	:	**Smart Module**
BRAND NAME	:	**Quectel**
MODEL NAME	:	**SC20-W**
FCC ID	:	**XMR201709SC20W**
STANDARD	:	**47 CFR Part 2.1091**

We, Sporton International (KunShan) INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of Sporton International (KunShan) INC., the test report shall not be reproduced except in full.

Mark Qu

Reviewed by: Mark Qu / Manager

Jones Tsai

Approved by: Jones Tsai / Manager

Sporton International (KunShan) INC.
No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA741007-02	Rev. 01	Initial issue of report	Aug. 30, 2017

1. Administration Data

1.1. Testing Laboratory

Testing Laboratory	
Test Site	Sporton International (KunShan) INC.
Test Site Location	No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958

Applicant	
Company Name	Quectel Wireless Solutions Co., Ltd.
Address	7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

Manufacturer	
Company Name	Quectel Wireless Solutions Co., Ltd.
Address	7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Smart Module
Brand Name	Quectel
Model Name	SC20-W
FCC ID	XMR201709SC20W
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	802.11b/g/n HT20/HT40 802.11a/n HT20/HT40 Bluetooth v3.0 + EDR, Bluetooth v4.0 LE, Bluetooth v4.1 LE
Antenna Type	WLAN: Dipole Antenna Bluetooth: Dipole Antenna
HW Version	R1.0
SW Version	SC20WSCR04A01H8G
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.	

3. Maximum RF average output power among production units

<2.4GHz WLAN>

Frequency	Mode	Maximum Average Power (dBm)
WLAN 2.4GHz	802.11b	16.50
	802.11g	14.50
	802.11n-HT20	14.00
	802.11n-HT40	14.00

<5GHz WLAN>

Frequency	Mode	Maximum Average Power (dBm)
WLAN 5.2GHz	802.11a	13.00
	802.11n-HT20	14.00
	802.11n-HT40	13.50
WLAN 5.3GHz	802.11a	13.50
	802.11n-HT20	14.00
	802.11n-HT40	13.50
WLAN 5.5GHz	802.11a	13.00
	802.11n-HT20	13.50
	802.11n-HT40	12.50
WLAN 5.8GHz	802.11a	12.50
	802.11n-HT20	12.00
	802.11n-HT40	11.00

<Bluetooth>

Frequency	Mode	Maximum Average Power (dBm)
Bluetooth	v3.0+EDR	8.00
	v4.0/4.1 LE	3.00

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/f2)	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/f2)	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)	Maximum EIRP (W)	Maximum Output Power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
WLAN2.4GHz 802.11b	2412	3.0	16.5	19.50	0.089	1.000	89.125	0.018	1.000	0.018
WLAN2.4GHz 802.11g	2412	3.0	14.5	17.50	0.056	1.000	56.234	0.011	1.000	0.011
WLAN2.4GHz 802.11n-HT20	2412	3.0	14.0	17.00	0.050	1.000	50.119	0.010	1.000	0.010
WLAN2.4GHz 802.11n-HT40	2422	3.0	14.0	17.00	0.050	1.000	50.119	0.010	1.000	0.010
WLAN5.2GHz 802.11a	5180	4.0	13.0	17.00	0.050	0.250	50.119	0.010	1.000	0.010
WLAN5.2GHz 802.11n-HT20	5180	4.0	14.0	18.00	0.063	0.250	63.096	0.013	1.000	0.013
WLAN5.2GHz 802.11n-HT40	5190	4.0	13.5	17.50	0.056	0.250	56.234	0.011	1.000	0.011
WLAN5.3GHz 802.11a	5260	4.0	13.5	17.50	0.056	0.250	56.234	0.011	1.000	0.011
WLAN5.3GHz 802.11n-HT20	5260	4.0	14.0	18.00	0.063	0.250	63.096	0.013	1.000	0.013
WLAN5.3GHz 802.11n-HT40	5270	4.0	13.5	17.50	0.056	0.250	56.234	0.011	1.000	0.011
WLAN5.5GHz 802.11a	5500	4.0	13.0	17.00	0.050	0.250	50.119	0.010	1.000	0.010
WLAN5.5GHz 802.11n-HT20	5500	4.0	13.5	17.50	0.056	0.250	56.234	0.011	1.000	0.011
WLAN5.5GHz 802.11n-HT40	5510	4.0	12.5	16.50	0.045	0.250	44.668	0.009	1.000	0.009
WLAN5.8GHz 802.11a	5745	4.0	12.5	16.50	0.045	1.000	44.668	0.009	1.000	0.009
WLAN5.8GHz 802.11n-HT20	5745	4.0	12.0	16.00	0.040	1.000	39.811	0.008	1.000	0.008
WLAN5.8GHz 802.11n-HT40	5755	4.0	11.0	15.00	0.032	1.000	31.623	0.006	1.000	0.006
Bluetooth v3.0+EDR	2402	3.0	8.0	11.00	0.013	0.125	12.589	0.003	1.000	0.003
Bluetooth v4.0/4.1 LE	2402	3.0	3.0	6.00	0.004	1.000	3.981	0.001	1.000	0.001

Note: For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.

5.2. Collocated Power Density Calculation

Power Density / Limit			Σ (Power Density / Limit) of 2.4GHz WLAN+5GHz WLAN+Bluetooth
1	2	3	1+2+3
2.4GHz WLAN	5GHz WLAN	Bluetooth	
0.018	0.013	0.003	0.034

Note: ∑(Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)].

Conclusion:

Based on 47 CFR §2.1091, the analysis concludes that this product is compliant with the FCC RF exposure requirements in mobile exposure condition.