



Report No.: SEWM2203000023RG06

Rev.: 01

Page: 1 of 8

TEST REPORT

Application No.: SEWM2203000023RG
Applicant: Quectel Wireless Solutions Co., Ltd.
Address of Applicant: Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China
Manufacturer: Quectel Wireless Solutions Co., Ltd.
Address of Manufacturer: Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China
EUT Description: Smart Module
Model No.: SG865W-WF
Trade Mark: quectel
FCC ID: XMR2022SG865WWF
Standards: 47 CFR Part 2.1091
FCC KDB 447498 D01 v06
Date of Receipt: 2022/3/20
Date of Issue: 2022/5/26

Test Result:	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Panta Sun

Panta Sun
Wireless Laboratory Manager



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1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2022/5/26		Original

Prepared By	Weller Liu
	(Weller Liu) / Test Supervisor
Checked By	Well Wei
	(Well Wei) / Reviewer



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2 General Information

2.1 Client Information

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

2.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

• **Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

• **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327



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2.3 General Description of EUT

EUT Description:	Smart Module		
Model No.:	SG865W-WF		
Trade Mark:	quectel		
Hardware Version:	R1.0		
Software Version:	SG865WWFPAR01A05		
Antenna Type:	<input checked="" type="checkbox"/> External, <input type="checkbox"/> Integrated		
Antenna Gain*:	<input checked="" type="checkbox"/> Provided by client		
	BT/BLE	0dBi	
	2.4GWIFI:	0dBi (Ant1)	0dBi (Ant2)
	5GWIFI:	0dBi (Ant1)	0dBi (Ant2)
<p>Note: *Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information , SGS is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.</p> <p>Remark:</p> <p>As above information is provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.</p>			



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3 RF Exposure Evaluation

3.1 RF Exposure Compliance Requirement

3.1.1 Limits

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

F=frequency in MHz
 *=Plane-wave equivalent power density
 RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.



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3.1.2 Test Procedure

Software provided by client enabled the EUT to transmit data at lowest, middle and highest channel individually

3.1.3 EUT RF Exposure Evaluation

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.0 / 2.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

This confirmed that the device comply with MPE limit.

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	Max Conducted Average Output Power (dBm)	Output Power to Antenna (dBm)	EIRP(ERP) Limit (dBm)	Output Power to Antenna (mw)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Gain according to EIRP (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	conclusion
Bluetooth	2402	0.00	14.00	14.00	30.00	25.1189	0.0050	1.0000	16.00	23.01	16.00	Pass
2.4G WIFI(MIMO)	2412	0.00	29.50	29.50	30.00	891.2509	0.1773	1.0000	0.50	7.51	0.50	Pass
5G WIFI(MIMO)	5320	0.00	21.50	21.50	30.00	141.2538	0.0281	1.0000	8.50	15.51	8.50	Pass



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3.1.4 Exposure calculations for multiple sources

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE in accordance with the provisions of Table(A) and Table(B). To comply with the MPE, the fraction of the MPE in terms of E2, H2 (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity.

In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

The product also has multiple transmitters The Simultaneous Transmission Possibilities are as below:

Simultaneous Tx Combination	Configuration
1	Bluetooth + WiFi 2.4G(MIMO)
2	Bluetooth + WiFi 5G(MIMO)
3	WiFi 2.4G(MIMO)+WiFi 5G(MIMO)

No.	Mode	Power Density (mW/cm2)	MPE Limit (mW/cm2)	Result Ratio	Total Ratio	Limit	Result
1	Bluetooth	0.0050	1.0000	0.0050	0.1823	1.00	Pass
	WiFi 2.4G(MIMO)	0.1773	1.0000	0.1773			
2	Bluetooth	0.0050	1.0000	0.0050	0.0331	1.00	Pass
	WiFi 5G(MIMO)	0.0281	1.0000	0.0281			
3	WiFi 2.4G(MIMO)	0.1773	1.0000	0.1773	0.2054	1.00	Pass
	WiFi 5G(MIMO)	0.0281	1.0000	0.0281			

The End



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