

Report No.: SEWM2312000516RG01

Rev.: 01

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TEST REPORT

Application No.: SEWM2312000516RG
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: LTE-A Module
Model No.: EM061K-GL
Trade Mark: QUECTEL
FCC ID: XMR2023EM061KGL
Standards: 47 CFR Part 2.1091
FCC KDB 447498 D01 v06
Date of Receipt: 2023/09/26 (for report SEWM2309000384RG02)
2023/12/19 (for report SEWM2312000516RG01)
Date of Issue: 2023/12/19

Test Result:**PASS***

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Well Wei

Well Wei
Wireless Laboratory Manager

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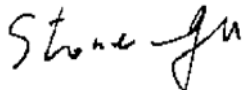
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1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2023/12/19		Original

Prepared By	
	(Nick Hu) / Test Engineer
Checked By	
	(Stone Gu) / Reviewer



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Remark:

This test report (Report No.: SEWM2312000516RG01 issue on 2023/12/19) is based on the original test report (Report No.: SEWM2309000384RG02 issue on 2023/10/10).

Review this report and original report, this report just updated the applicant and manufacture and address of applicant and manufacture.

Therefore in this report all items do not need to recalculated and all test data in this report are based on the previous report with report number SEWM2309000384RG02 issue on 2023/10/10.



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2 General Information

2.1 Client Information

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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

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:	LTE-A Module		
Model No.:	EM061K-GL		
Trade Mark:	QUECTEL		
Hardware Version:	R1.0		
Software Version:	EM061KGLAAR01A02M2G		
Power Supply:	DC 3.7V		
Antenna Type:	External Antenna PIFA Antenna		
Antenna Gain:	WCDMA Band II:	0.25dBi	WCDMA Band IV: 1.47dBi
	WCDMA Band V:	2.68dBi	
	LTE Band 2:	0.25dBi	LTE Band 4: 1.47dBi
	LTE Band 5:	2.68dBi	LTE Band 7: 2.4dBi
	LTE Band 12:	1.3dBi	LTE Band 13: 1.3dBi
	LTE Band 14:	2.42dBi	LTE Band 17: -0.2dBi
	LTE Band 25:	0.25dBi	LTE Band 26: 2.87dBi
	LTE Band 30:	-3dBi	LTE Band 38: 2.4dBi
	LTE Band 41:	2.4dBi	LTE Band 66: 1.47dBi
	LTE Band 71:	1.22dBi	
	Note: The antenna gain are derived from the gain information report provided by the manufacturer.		
Remark: 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.			



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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

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 Power (dBm)	EIRP(ERP) (dBm)	EIRP(ERP) Limit (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Gain according to EIRP(ERP) (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	conclusion
WCDMA Band II	1852.4	0.25	25.00	25.25	33.00	0.0666	1.0000	8.00	12.01	8.00	Pass
WCDMA Band VI	1712.4	1.47	25.00	26.47	30.00	0.0883	1.0000	5.00	12.01	5.00	Pass
WCDMA Band V	828.4	2.68	25.00	25.53	38.50	0.1166	0.5523	15.65	9.43	9.43	Pass
LTE Band 2	1850.7	0.25	24.50	24.75	33.00	0.0594	1.0000	8.50	12.51	8.50	Pass
LTE Band 4	1710.7	1.47	24.50	25.97	30.00	0.0787	1.0000	5.50	12.51	5.50	Pass
LTE Band 5	824.7	2.68	24.50	25.03	38.45	0.1039	0.5498	16.10	9.91	9.91	Pass
LTE Band 7	2502.5	2.40	24.00	26.40	33.00	0.0868	1.0000	9.00	13.01	9.00	Pass
LTE Band 12	699.7	1.30	24.50	23.65	34.77	0.0756	0.4665	12.42	9.20	9.20	Pass
LTE Band 13	779.5	1.30	24.50	23.65	34.77	0.0756	0.5197	12.42	9.66	9.66	Pass
LTE Band 14	790.5	2.42	24.50	24.77	34.77	0.0979	0.5270	12.42	9.73	9.73	Pass
LTE Band 17	706.5	-0.20	24.50	22.15	34.77	0.0535	0.4710	12.42	9.24	9.24	Pass
LTE Band 25	1850.7	0.25	24.50	24.75	33.00	0.0594	1.0000	8.50	12.51	8.50	Pass
LTE Band 26 (814-824)	814.7	2.87	24.50	25.22	NA	0.1086	0.5431	NA	9.86	9.86	Pass
LTE Band 26 (824-849)	824.7	2.87	24.50	25.22	38.45	0.1086	0.5498	16.10	9.91	9.91	Pass
LTE Band 30	2307.5	-3.00	23.00	20.00	23.98	0.0199	1.0000	0.98	14.01	0.98	Pass
LTE Band 38	2572.5	2.40	24.00	26.40	33.00	0.0868	1.0000	9.00	13.01	9.00	Pass
LTE Band 41	2498.5	2.40	24.00	26.40	33.00	0.0868	1.0000	9.00	13.01	9.00	Pass
LTE Band 66	1710.7	1.47	24.50	25.97	30.00	0.0787	1.0000	5.50	12.51	5.50	Pass
LTE Band 71	665.5	1.22	24.50	23.57	34.77	0.0743	0.4437	12.42	8.98	8.98	Pass
Bluetooth	2402.0	5.00	23.00	28.00		0.1255	1.0000				
WLAN2.4GHz	2412.0	5.00	23.00	28.00		0.1255	1.0000				
WLAN5GHz	5180.0	5.00	23.00	28.00		0.1255	1.0000				

Note

1. This MPE analysis is applicable to any collocated transmitters with transmit power for WLAN is less than or equal to 28dBm and for Bluetooth is less than or equal to 28dBm.
2. A maximum antenna gain of 5dBi for WLAN/BT has been assumed for all collocated antennas.



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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	WWAN + WiFi 2.4G + WiFi 5G + Bluetooth

No.	Mode	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	Result Ratio	Total Ratio	Limit	Result
1	WCDMA Band V*	0.1166	0.5523	0.2111	0.5876	1.0000	Pass
	Bluetooth	0.1255	1.0000	0.1255			
	WiFi 2.4G	0.1255	1.0000	0.1255			
	WiFi 5G	0.1255	1.0000	0.1255			

*Remark: This WWAN Band was recalculated on worst Band.

Note:Considering the WWAN module collocation with the WLAN and Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant.

---End of Report---

