



RF Exposure Evaluation Report

Application No.: HR/2019/30001
Applicant: Quectel Wireless Solutions Co., Ltd.
Address of Applicant 7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China
Manufacturer: Quectel Wireless Solutions Co., Ltd.
Address of Manufacturer 7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China
Product Name: LTE-A Cat6 Module
Model No.(EUT): EM06-A
Trade Mark: Quectel
FCC ID: XMR201906EM06A
Standards: 47 CFR Part 2
47 CFR Part 22 subpart H
47 CFR Part 24 subpart E
47 CFR Part 27 subpart C
Date of Receipt: 2019-03-01
Date of Test: 2018-03-04 to 2018-03-11
Date of Issue: 2019-03-11

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

Authorized Signature:

Derek Yang
Wireless Laboratory Manager



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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-03-11		Original

Authorized for issue by:				
				2019-03-11
		Mike Hu /Project Engineer		
				2019-03-11
		David Chen /Reviewer		





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3 General Information

3.1 Client Information

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

3.2 General Description of EUT

Product Name:	LTE-A Cat6 Module
Model No.:	EM06-A
Trade Mark:	Quectel
HW Version (Product)	R1.0
SW Version (Product)	EM06ALAR03A03M4G
Sample Type:	LTE Module
Antenna Type:	external antenna,
Antenna Gain:	WCDMA Band2: 2dBi ; WCDMA Band4: 2dBi ; WCDMA Band5: 3dBi ;LTE B2:2dBi; LTE B4:2dBi; LTE B5:3dBi; LTE B7:2dBi; LTE B12:3dBi; LTE B13:3dBi; LTE B25:2dBi; LTE B26:3dBi; LTE B30:0dBi; LTE BAND41:2dBi; LTE B66:2dBi

3.3 Test Mode

Test Mode	Test Modes Description
UMTS/TM1	UMTS system, WCDMA, QPSK modulation
UMTS/TM2	UMTS system, WCDMA, 16QAM modulation
LTE/TM1	LTE system, QPSK modulation
LTE/TM2	LTE system, 16QAM modulation
LTE/TM3	LTE system, 64QAM modulation

NOTE: The test mode(s) are selected according to relevant radio technology specifications.





3.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

3.5 Test Facility

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

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC

Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 3816.01.

• **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

3.6 Deviation from Standards

None.

3.7 Abnormalities from Standard Conditions

None.

3.8 Other Information Requested by the Customer

None.



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4 RF Exposure Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 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.

4.1.2 Test Procedure

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



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4.1.3 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:

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
WCDMA B2	1852.4	2.00	24.00	26.00	33.00	251.1886	0.0792	1.0000	9.00	13.01	9.00	Pass
WCDMA B4	1712.4	2.00	24.00	26.00	30.00	251.1886	0.0792	1.0000	6.00	13.01	6.00	Pass
WCDMA B5	826.4	3.00	24.00	24.85	38.45	251.1886	0.0997	0.5509	16.60	10.42	10.42	Pass
LTE B2	1850.7	2.00	24.00	26.00	33.00	251.1886	0.0792	1.0000	9.00	13.01	9.00	Pass
LTE B4	1710.7	2.00	24.00	26.00	30.00	251.1886	0.0792	1.0000	6.00	13.01	6.00	Pass
LTE B5	824.70	3.00	24.00	24.85	38.45	251.1886	0.0997	0.5498	16.60	10.41	10.41	Pass
LTE B7	2502.50	2.00	24.00	26.00	33.00	251.1886	0.0792	1.0000	9.00	13.01	9.00	Pass
LTE B12	699.70	3.00	24.00	24.85	34.77	251.1886	0.0997	0.4665	12.92	9.70	9.70	Pass
LTE B13	779.50	3.00	24.00	24.85	34.77	251.1886	0.0997	0.5197	12.92	10.16	10.16	Pass
LTE B25	1850.7	2.00	24.00	26.00	33.00	251.1886	0.0792	1.0000	9.00	13.01	9.00	Pass
LTE B26(814-824)	814.7	3.00	24.00	24.85	50.00	251.1886	0.0997	0.5431	28.15	10.36	10.36	Pass
LTE B26(824-849)	824.70	3.00	24.00	24.85	38.45	251.1886	0.0997	0.5498	16.60	10.41	10.41	Pass
LTE B30	2307.5	0.00	24.00	24.00	24.00	251.1886	0.0500	1.0000	0.00	13.01	0.00	Pass
LTE B41	2498.5	2.00	24.00	26.00	33.00	251.1886	0.0792	1.0000	9.00	13.01	9.00	Pass
LTE B66	1710.7	2.00	24.00	26.00	30.00	251.1886	0.0792	1.0000	6.00	13.01	6.00	Pass

The Max allowed antenna gain is as following table showed:

Note: Refer to report No. HR/2019/3000101 for EUT test Max Conducted Peak Output Power value.

The distancer (6th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.



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