



RF Exposure Evaluation Report

Application No.: HR/2019/50006
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
Factory: Quectel Wireless Solutions Co., Ltd.
Address of Factory: 7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China
EUT Description: LTE Module
Model No.: SC600Y-NA, SC600T-NA
Trade Mark: Quectel
FCC ID: XMR2019SC600NA
Standards: 47 CFR Part 2
47 CFR Part 22 subpart H
47 CFR Part 24 subpart E
47 CFR Part 27 subpart C
47 CFR Part 90 subpart R
47 CFR Part 90 subpart S
47 CFR Part 15 subpart C
Date of Receipt: 2019/5/29
Date of Test: 2019/5/30 to 2019/7/3
Date of Issue: 2019/7/3

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



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch (Testing Laboratory)

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1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2019/7/3		Original

Authorized for issue by:			
		 Mike Hu /Project Engineer	2019/7/3
		 David Chen /Reviewer	2019/7/3

Remark:

The difference between SC600Y-NA and SC600T-NA showed as following:

SC600Y-NA and SC600T-NA are all LTE modules. They share the same software & hardware design (the chip component is pin-for-pin compatible ; have the same basic function ; no change in radio parameters has occurred.) . The difference is on chipset with different CPU frequency. The Chipset SDM450 is a de-rated version of the MSM8953. We hereby state that two models are identical in interior structure and components.

The detail is shown as following table.

Module	Chipset	frequency
SC600T-NA	Qualcomm MSM8953	2.0GHz
SC600Y-NA	Qualcomm SDM450	1.8GHz

According to the difference above, all the test were performed on SC600T-NA, and spot check the worst case Conducted power and RSE on SC600Y-NA, the conducted and RSE data shown in the report is the worst data.. and other data of SC600Y-NA can refer to SC600T-NA.





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2 General Information

2.1 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
Factory:	Quectel Wireless Solutions Co., Ltd.
Address of Factory:	7th Floor, Hongye Building, No.1801 Hongmei Road, Xuhui District, Shanghai 200233, China

2.2 Test Location

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
Post code:	518057
Telephone:	+86 (0) 755 2601 2053
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E-mail:	ee.shenzhen@sgs.com

2.3 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.



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2.4 General Description of EUT

EUT Description::	LTE Module
Model No.:	SC600Y-NA, SC600T-NA
Trade Mark:	Quectel
Hardware Version:	R1.0
Software Version:	SC600YNAPAR05A02
Antenna Gain:	WCDMA Band II:4.0dBi; WCDMA Band IV: 4.0dBi; WCDMA Band V: 4.0dBi; LTE Band 2: 4.0dBi; LTE Band 4: 4.0dBi; LTE Band 5: 4.0dBi; LTE Band 7: 4.0dBi; LTE Band 12: 4.0dBi; LTE Band 13: 4.0dBi; LTE Band 14: 4.0dBi; LTE Band 17: 4.0dBi; LTE Band 25: 4.0dBi; LTE Band 26: 4.0dBi; LTE Band 41: 4.0dBi; LTE Band 66: 4.0dBi; LTE Band 71: 4.0dBi Bluetooth/2.4G WiFi: 5dBi 5G WiFi: 5dBi



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.

3.1.2 Test Procedure

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



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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:

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	4.00	25.00	29.00	33.00	316.2278	0.1580	1.0000	8.00	12.01	8.00	Pass
WCDMA B4	1712.4	4.00	25.00	29.00	30.00	316.2278	0.1580	1.0000	5.00	12.01	5.00	Pass
WCDMA B5	826.4	4.00	25.00	26.85	38.45	316.2278	0.1580	0.5509	15.60	9.42	9.42	Pass
LTE B2	1850.7	4.00	25.00	29.00	33.00	316.2278	0.1580	1.0000	8.00	12.01	8.00	Pass
LTE B4	1710.7	4.00	25.00	29.00	30.00	316.2278	0.1580	1.0000	5.00	12.01	5.00	Pass
LTE B5	824.70	4.00	25.00	26.85	38.45	316.2278	0.1580	0.5498	15.60	9.41	9.41	Pass
LTE B7	2502.50	4.00	25.00	29.00	33.00	316.2278	0.1580	1.0000	8.00	12.01	8.00	Pass
LTE B12	699.70	4.00	25.00	26.85	34.77	316.2278	0.1580	0.4665	11.92	8.70	8.70	Pass
LTE B13	779.50	4.00	25.00	26.85	34.77	316.2278	0.1580	0.5197	11.92	9.16	9.16	Pass
LTE B14	790.5	4.00	25.00	26.85	34.77	316.2278	0.1580	0.5270	11.92	9.23	9.23	Pass
LTE B17	706.5	4.00	25.00	26.85	34.77	316.2278	0.1580	0.4710	11.92	8.74	8.74	Pass
LTE B25	1850.7	4.00	25.00	29.00	33.00	316.2278	0.1580	1.0000	8.00	12.01	8.00	Pass
LTE B26(814-824)	814.7	4.00	25.00	26.85	50.00	316.2278	0.1580	0.5431	27.15	9.36	9.36	Pass
LTE B26(824-849)	824.7	4.00	25.00	26.85	38.45	316.2278	0.1580	0.5498	15.60	9.41	9.41	Pass
LTE B41	2498.5	4.00	25.00	29.00	33.00	316.2278	0.1580	1.0000	8.00	12.01	8.00	Pass
LTE B66	1710.7	4.00	25.00	29.00	30.00	316.2278	0.1580	1.0000	5.00	12.01	5.00	Pass
LTE B71	665.5	4.00	25.00	26.85	30.00	316.2278	0.1580	0.4437	7.15	8.48	7.15	Pass
Bluetooth	2402	5.00	11.00	16.00	20.97	12.5893	0.0079	1.0000				Pass
2.4G WiFi	2412	5.00	18.50	23.50	20.97	70.7946	0.0445	1.0000				Pass
5G WiFi	5180	5.00	15.50	20.50	20.97	35.4813	0.0223	1.0000				Pass

Remark: Refer to report No. HR/2019/5000601 for EUT test Max Conducted Output Power value.

