



## 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

|                     |              |
|---------------------|--------------|
| <b>Test Result:</b> | <b>PASS*</b> |
|---------------------|--------------|

\* 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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 No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn  
 中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

## 1 Version

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

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

### 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                                                                       |
| Fax:       | +86 (0) 755 2671 0594                                                                       |
| 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:     | <p>WCDMA Band II:4.0dBi;<br/> WCDMA Band IV: 4.0dBi;<br/> WCDMA Band V: 4.0dBi;<br/> LTE Band 2: 4.0dBi;<br/> LTE Band 4: 4.0dBi;<br/> LTE Band 5: 4.0dBi;<br/> LTE Band 7: 4.0dBi;<br/> LTE Band 12: 4.0dBi;<br/> LTE Band 13: 4.0dBi;<br/> LTE Band 14: 4.0dBi;<br/> LTE Band 17: 4.0dBi;<br/> LTE Band 25: 4.0dBi;<br/> LTE Band 26: 4.0dBi;<br/> LTE Band 41: 4.0dBi;<br/> LTE Band 66: 4.0dBi;<br/> LTE Band 71: 4.0dBi<br/> Bluetooth/2.4G WiFi: 5dBi<br/> 5G WiFi: 5dBi</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 <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 0.3-3.0                                                        | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0-30                                                         | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30-300                                                         | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1500                                                       | /                             | /                             | f/300                               | 6                        |
| 1500-100,000                                                   | /                             | /                             | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                       | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30                                                        | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 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/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

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

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. 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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SGS-CSTC Standards Technical Services Co., Ltd.  
Shenzhen Branch (FCC Laboratory)

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057  
中国·深圳·科技园中区M-10栋一号厂房

t (86-755) 26012053 f (86-755) 26710594  
邮编: 518057 t (86-755) 26012053 f (86-755) 26710594

[www.sgsgroup.com.cn](http://www.sgsgroup.com.cn)  
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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 <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | 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.

