# TEST REPORT

| | |
|---|---|
| **Application No.:** | SEWA2304000051RG |
| **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, China 200233 |
| **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, China 200233 |
| **EUT Description:** | LTE-A Cat 6 M.2 Module |
| **Model No.:** | EM060K-NA |
| **Trade Mark:** | Quectel |
| **FCC ID:** | XMR202307EM060KNA |
| **Standards:** | 47 CFR Part 2<br>47 CFR Part 22<br>47 CFR Part 24<br>47 CFR Part 27<br>47 CFR Part 90 |
| **Date of Receipt:** | 2023/05/12 |
| **Date of Test:** | 2023/05/25 to 2023/08/29 |
| **Date of Issue:** | 2023/08/30 |
| **Test Result :** | **PASS *** |

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Well Wei
Wireless Laboratory Manager



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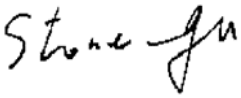
# 1 Version

| Revision Record | | | | |
|---|---|---|---|---|
| **Version** | **Chapter** | **Date** | **Modifier** | **Remark** |
| 01 | | 2023/08/30 | | Original |

| | | |
|---|---|---|
| **Prepared By** | |  **(Levi Li) / Test Engineer** |
| **Checked By** | |  **(Stone Gu) / Reviewer** |

# Contents

# 2 Test Summary

## 2.1 LTE Band 5/26(824~849 MHz)

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046, §22.913(a)(5) | ERP ≤ 7 W | Section 1 of Appendix B.3&B.11 | Pass |
| Peak-Average Ratio | §22.913(d) | Limit≤13 dB | Section 2 of Appendix B.3&B.11 | Pass |
| Bandwidth | §2.1049 | OBW: No limit.<br>EBW: No limit. | Section 3 of Appendix B.3&B.11 | Pass |
| Band Edges Compliance | §2.1051, §22.917(a) | ≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. | Section 4 of Appendix B.3&B.11 | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §22.917(a) | FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. | Section 5 of Appendix B.3&B.11 | Pass |
| Field Strength of Spurious Radiation | §2.1053, §22.917(a) | FCC: ≤ -13 dBm/100 kHz. | Section 6 of Appendix B.3&B.11 | Pass |
| Frequency Stability | §2.1055(a)(1)(b) §2.1055(d)(1)§22.355 | ≤ ±2.5ppm. | Section 7 of Appendix B.3&B.11 | Pass |

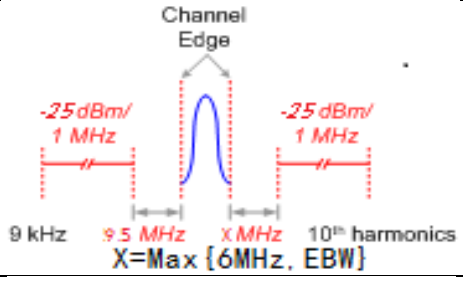
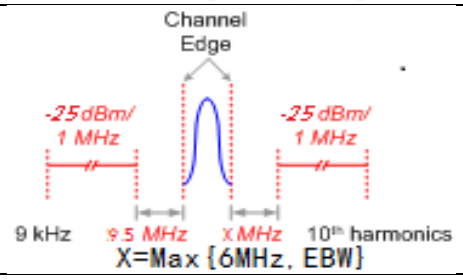
## 2.2 LTE Band 2 /25

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046, §24.232(c) | EIRP ≤ 2 W | Section 1 of Appendix B.1&B.9 | Pass |
| Peak-Average Ratio | §24.232(d) | Limit≤13 dB | Section 2 of Appendix B.1&B.9 | Pass |
| Bandwidth | §2.1049 | OBW: No limit.<br>EBW: No limit. | Section 3 of Appendix B.1&B.9 | Pass |
| Band Edges Compliance | §2.1051, §24.238(a) | ≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. | Section 4 of Appendix B.1&B.9 | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §24.238(a) | ≤ -13 dBm/1 MHz, from 9 kHz to 10$^{th}$ harmonics but outside authorized operating frequency ranges. | Section 5 of Appendix B.1&B.9 | Pass |
| Field Strength of Spurious Radiation | §2.1053, §24.238(a) | ≤ -13 dBm/1 MHz. | Section 6 of Appendix B.1&B.9 | Pass |
| Frequency Stability | §2.1055(a)(1)(b) §2.1055(d)(1)§24.235 | Within authorized bands of operation/frequency block. | Section 7 of Appendix B.1&B.9 | Pass |

## 2.3 LTE Band 4 /66

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046, §27.50(d)(4) | EIRP ≤ 1 W | Section 1 of Appendix B.2&B.18 | Pass |
| Peak-Average Ratio | §27.50(d)(5) | Limit≤13 dB | Section 2 of Appendix B.2&B.18 | Pass |
| Bandwidth | §2.1049 | OBW: No limit.<br>EBW: No limit. | Section 3 of Appendix B.2&B.18 | Pass |
| Band Edges Compliance | §2.1051, §27.53(h) | ≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. | Section 4 of Appendix B.2&B.18 | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §27.53(h) | ≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. | Section 5 of Appendix B.2&B.18 | Pass |
| Field Strength of Spurious Radiation | §2.1053, §27.53(h) | ≤ -13 dBm/1 MHz. | Section 6 of Appendix B.2&B.18 | Pass |
| Frequency Stability | §2.1055(a)(1)(b) §2.1055(d)(1)§27.54 | Within authorized bands of operation/frequency block. | Section 7 of Appendix B.2&B.18 | Pass |

## 2.4 LTE Band 7/41

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046, §27.50(h)(2) | EIRP ≤ 2W | Section 1 of Appendix B.4&B.13 | Pass |
| Peak-Average Ratio | --- | ≤13 dB | Section 2 of Appendix B.4&B.13 | Pass |
| Bandwidth | §2.1049 | OBW: No limit.<br>EBW: No limit. | Section 3 of Appendix B.4&B.13 | Pass |
| Band Edges Compliance | §2.1051, §27.53(m4) | For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. | Section 4 of Appendix B.4&B.13 | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §27.53(m) |  | Section 5 of Appendix B.4&B.13 | Pass |
| Field Strength of Spurious Radiation | §2.1053, §27.53(m) |  | Section 6 of Appendix B.4&B.13 | Pass |
| Frequency Stability | §2.1055(a)(1)(b) §2.1055(d)(1)§27.54 | Within authorized bands of operation/frequency block. | Section 7 of Appendix B.4&B.13 | Pass |

## 2.5 LTE Band 12/17

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046 §27.50(c)(10) | ERP ≤ 3 W. | Section 1 of Appendix B.5&B.8 | Pass |
| Peak-Average Ratio | --- | Limit≤13 dB | Section 2 of Appendix B.5&B.8 | Pass |
| Bandwidth | §2.1049 | OBW: No limit. EBW: No limit. | Section 3 of Appendix B.5&B.8 | Pass |
| Band Edges Compliance | §2.1051, §27.53(g) | ≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. | Section 4 of Appendix B.5&B.8 | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §27.53(g) | FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10$^{th}$ harmonics but outside authorized operating frequency ranges. | Section 5 of Appendix B.5&B.8 | Pass |
| Field Strength of Spurious Radiation | §2.1053, §27.53(g) | FCC: ≤ -13 dBm/100 kHz. | Section 6 of Appendix B.5&B.8 | Pass |
| Frequency Stability | §2.1055(a)(1)(b) §2.1055(d)(1)§27.54 | Within authorized bands of operation/frequency block. | Section 7 of Appendix B.5&B.8 | Pass |

## 2.6 LTE Band 13

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046, §27.50(b)(10) | ERP ≤ 3 W. | Section 1 of Appendix B.6 | Pass |
| Peak-Average Ratio | --- | Limit≤13 dB | Section 2 of Appendix B.6 | Pass |
| Bandwidth | §2.1049, | OBW: No limit.<br>EBW: No limit. | Section 3 of Appendix B.6 | Pass |
| Band Edges Compliance | §2.1051, §27.53(c) | ≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. | Section 4 of Appendix B.6 | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §27.53(c) §27.53(f) | ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.<br>On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.<br>For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. | Section 5 of Appendix B.6 | Pass |
| Field Strength of Spurious Radiation | §2.1053, §27.53(c) §27.53(f) | FCC: ≤ -13 dBm/100 kHz.<br>For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. | Section 6 of Appendix B.6 | Pass |
| Frequency Stability | §2.1055(a)(1)(b) §2.1055(d)(1) §27.54 | Within authorized bands of operation/frequency block. | Section 7 of Appendix B.6 | Pass |

## 2.7 LTE Band 14

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046 §90.542(a) | ERP ≤ 3 W. | Section 1 of Appendix B.7 | Pass |
| Peak-Average Ratio | --- | Limit≤13 dB | Section 2 of Appendix B.7 | Pass |
| Bandwidth | §2.1049 | OBW: No limit. EBW: No limit. | Section 3 of Appendix B.7 | Pass |
| Emission Mask | §2.1051 §90.210(b) | Transmitters designed for operation under this part on frequencies other than listed in this section must meet the emission mask requirements of Emission Mask B. Equipment operating under this part on frequencies allocated to but shared with the Federal Government, must meet the applicable Federal Government technical standards (b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows: (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB..(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB. | Section 4 of Appendix B.7 | Pass |
| Band Edges Compliance | §2.1051 §90.543(e)(2)(3) | (1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not | Section 5 of Appendix B.7 | Pass |

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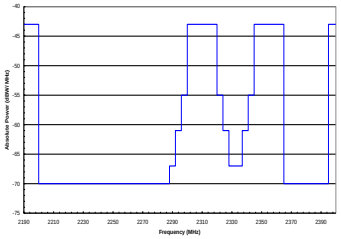
|---|---|---|---|---|
| | | less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB. | | |
| Spurious Emission at Antenna Terminals | §2.1051, §90.543(c) §90.543(f) | FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/ MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. | Section 6 of Appendix B.7 | Pass |
| Field Strength of Spurious Radiation | §2.1053, §90.543(c) §90.543(f) | FCC: ≤ -13 dBm/100 kHz. For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/ MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. | Section 7 of Appendix B.7 | Pass |
| Frequency Stability | §2.1055(a)(1)(b) §2.1055(d)(1)§90.213 | Within authorized bands of operation/frequency block. | Section 8 of Appendix B.7 | Pass |

## 2.8 LTE Band 26(814~824 MHz)

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Transmitter Conducted Power Output | §2.1046, §90.635(b) | < 100 W. | Section 1 of Appendix B.10 | Pass |
| Peak-Average Ratio | --- | Limit≤13 dB | Section 2 of Appendix B.10 | Pass |
| Bandwidth | §2.1049 | OBW: No limit.<br>EBW: No limit. | Section 3 of Appendix B.10 | Pass |
| Emission Mask | §2.1051<br>§ 90.691(a) | For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50+10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz. | Section 4 of Appendix B.10 | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §90.691 | < 43 + 10Log10(P[Watts]) for all out-of-band emissions | Section 5 of Appendix B.10 | Pass |
| Field Strength of Spurious Radiation | §2.1053, §90.691 | < 43 + 10Log10(P[Watts]) for all out-of-band emissions | Section 6 of Appendix B.10 | Pass |
| Frequency Stability | §2.1055(a)(1)(b)<br>§2.1055(d)(1)§90.213 | Within authorized bands of operation/frequency block. | Section 7 of Appendix B.10 | Pass |

## 2.9 LTE Band 30

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046, §27.50(a)(3) | EIRP ≤ 50mW/1MHz<br>EIRP ≤ 250mW/5MHz | Section 1 of Appendix B.12 | Pass |
| Peak-Average Ratio | --- | FCC: Limit≤13 dB | Section 2 of Appendix B.12 | Pass |
| Bandwidth | §2.1049, | OBW: No limit.<br>EBW: No limit. | Section 3 of Appendix B.12 | Pass |
| Band Edges Compliance | §2.1051, §27.53(a)(4) | ≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. | Section 4 of Appendix B.12 | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §27.53(a)(4) | Figure 1: Unwanted Emissions for Mobile, Portable, and Low Power Fixed Subscriber Equipment<br>  <br>For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:<br>(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;<br>(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 | Section 5 of Appendix B.12 | Pass |

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|---|---|---|---|---|
| | | + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz. | | |
| Field Strength of Spurious Radiation | §2.1053, §27.53(a)(4) | ≤ -40 dBm/MHz. | Section 6 of Appendix B.12 | Pass |
| Frequency Stability | §2.1055(a)(1)(b) §2.1055(d)(1)§27.54 | within the range of the operating frequency blocks | Section 7 of Appendix B.12 | Pass |



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## 2.10 LTE Band 42

**3450-3550MHz:**

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046, §27.50(k)(3) | EIRP ≤ 30dBm | Section 1 of Appendix B.14 | Pass |
| Peak-Average Ratio | §27.50(k)(4) | Limit≤13 dB | Section 2 of Appendix B.14 | Pass |
| Bandwidth | §2.1049 | OBW: No limit.<br>EBW: No limit. | Section 3 of Appendix B.14 | Pass |
| Band Edges Compliance | §2.1051, §27.53(n)(2) | For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. | Section 4 of Appendix B.14 | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §27.53(n)(2) | For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. | Section 5 of Appendix B.14 | Pass |
| Field Strength of Spurious Radiation | §2.1053, §27.53(n)(2) | For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz. | Section 6 of Appendix B.14 | Pass |
| Frequency Stability | §2.1055(a)(1)(b) §2.1055(d)(1)§27.54 | Within authorized bands of operation/ frequency block. | Section 7 of Appendix B.14 | Pass |

## 2.11 LTE Band 71

| Test Item | FCC Rule No. | Requirements | Test Result | Verdict |
|---|---|---|---|---|
| Effective (Isotropic) Radiated Power Output Data | §2.1046 §27.50(c)(10) | ERP ≤ 3 W | Section 1 of Appendix B.19 | Pass |
| Peak-Average Ratio | --- | Limit≤13 dB | Section 2 of Appendix B.19 | Pass |
| Bandwidth | §2.1049 | OBW: No limit. EBW: No limit. | Section 3 of Appendix B.19 | Pass |
| Band Edges Compliance | §2.1051, §27.53(g) | ≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block. | Section 4 of Appendix B.19 | Pass |
| Spurious Emission at Antenna Terminals | §2.1051, §27.53(g) | ≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. | Section 5 of Appendix B.19 | Pass |
| Field Strength of Spurious Radiation | §2.1053, §27.53(g) | ≤ -13 dBm/1 MHz. | Section 6 of Appendix B.19 | Pass |
| Frequency Stability | §2.1055(a)(1)(b) §2.1055(d)(1)§27.54 | within the authorized bands of operation. | Section 7 of Appendix B.19 | Pass |

# 3 General Information

## 3.1 Details of Client

| | |
|---|---|
| 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, China 200233 |
| 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, China 200233 |

## 3.2 Test Location

| | |
|---|---|
| Company: | SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd. |
| Address: | South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone |
| Post code: | 215000 |
| Test engineer: | Levi Li, King-p Li,Tizzy Song |

## 3.3 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

## 3.4 General Description of EUT

| | | | | |
|---|---|---|---|---|
| EUT Description: | LTE-A Cat 6 M.2 Module | | | |
| Model No.: | EM060K-NA | | | |
| Trade Mark: | Quectel | | | |
| Hardware Version: | R1.0 | | | |
| Software Version: | EM060KNAAAR01A02M2G | | | |
| Power Supply: | 3.8V(DC Supply) | | | |
| IMEI: | RF Conducted | Sample1:863550060001682<br>Sample2:863550060002383 | | |
| | RSE | IMEI1:863550060001658<br>IMEI2:863550060002060 | | |
| Antenna Type: | ☒ External, ☐ Integrated | | | |
| Antenna Gain: | LTE Band 2: | 0.06dBi | LTE Band 4: | 1.47dBi |
| | LTE Band 5: | 2.26dBi | LTE Band 7: | 0.55dBi |
| | LTE Band 12: | -0.33dBi | LTE Band 13: | 0.08dBi |
| | LTE Band 14: | 1.54dBi | LTE Band 17: | -0.33dBi |
| | LTE Band 25: | 0.09dBi | LTE Band 26: | 2.26dBi |
| | LTE Band 30: | -5.7dBi | LTE Band 41: | -0.71dBi |
| | LTE Band 42: | -2.00dBi | LTE Band 66: | 0.95dBi |
| | LTE Band 71: | 0.43dBi | | |
| | Note:<br>The antenna gain are derived from the gain information report provided by the manufacturer. | | | |
| RF Cable: | 4.2dB(Below 1GHz) | 4.5dB(1.0~2.4GHz) | 4.8dB(2.4~3.4GHz) | |
| Remark:<br>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. | | | | |

## 3.5 Test Mode

| Test Mode | Test Modes Description |
|---|---|
| LTE/TM1 | LTE system, QPSK modulation |
| LTE/TM2 | LTE system, 16QAM modulation |
| Remark: The test mode(s) are selected according to relevant radio technology specifications. | |

## 3.6 Test Environment

| Environment Parameter | 101 kPa Selected Values During Tests | |
|---|---|---|
| Relative Humidity | 44-46 % RH Ambient | |
| Value | Temperature(℃) | Voltage(V) |
| NTNV | 22~23 | 3.7 |
| LTLV | -30 | 3.135 |
| LTHV | -30 | 4.4 |
| HTLV | 50 | 3.135 |
| HTHV | 50 | 4.4 |
| Remark: | | |
| NV: Normal Voltage | LV: Low Extreme Test Voltage | HV: High Extreme Test Voltage |
| NT: Normal Temperature | LT: Low Extreme Test Temperature | HT: High Extreme Test Temperature |

## 3.7 Description of Support Units

| Description | Manufacturer | Model No. |
|---|---|---|
| Mother board | Quectel | N/A |
| Remark: all above the information of table are provided by client. | | |

## 3.8 Technical Specification

| Characteristics | Description | | | |
|---|---|---|---|---|
| Radio System Type | ☒ LTE | | | |
| Supported Frequency Range | Band | TX | RX | |
| | LTE Band 2 | 1850 to 1910 MHz | 1930 to 1990 MHz | |
| | LTE Band 4 | 1710 to 1755 MHz | 2110 to 2155 MHz | |
| | LTE Band 5 | 824 to 849 MHz | 869 to 894 MHz | |
| | LTE Band 7 | 2500 to 2570 MHz | 2620 to 2690 MHz | |
| | LTE Band 12 | 699 to 716 MHz | 729 to 746 MHz | |
| | LTE Band 13 | 777 to 787 MHz | 746 to 756 MHz | |
| | LTE Band 14 | 788 to 798 MHz | 758 to 768 MHz | |
| | LTE Band 17 | 704 to 716 MHz | 734 to 746 MHz | |
| | LTE Band 25 | 1850 to 1915MHz | 1930 to 1995 MHz | |
| | LTE Band 26 (814 to 824 MHz ) | 814 to 824MHz | 859 to 869 MHz | |
| | LTE Band 26 (824 to 849 MHz ) | 824 to 849 MHz | 869 to 894 MHz | |
| | LTE Band 30 | 2305 to 2315 MHz | 2350 to 2360 MHz | |
| | LTE Band 41 | 2496 to 2690MHz | 2496 to 2690MHz | |
| | LTE Band 42 (3450 to 3550 MHz) | 3450 to 3550 MHz | 3450 to 3550 MHz | |
| | LTE Band 66 | 1710 to 1780 MHz | 2110 to 2200 MHz | |
| | LTE Band 71 | 663 to 698 MHz | 617 to 652 MHz | |
| Supported Channel Bandwidth | LTE Band 2 | ☒1.4 MHz | ☒3 MHz | ☒5 MHz | ☒10 MHz |
| | | ☒15 MHz | ☒20 MHz | | |
| | LTE Band 4 | ☒1.4 MHz | ☒3 MHz | ☒5 MHz | ☒10 MHz |
| | | ☒15 MHz | ☒20 MHz | | |
| | LTE Band 5 | ☒1.4 MHz | ☒3 MHz | ☒5 MHz | ☒10 MHz |
| | LTE Band 7 | ☒5 MHz | ☒10 MHz | ☒15 MHz | ☒20 MHz |
| | LTE Band 12 | ☒1.4 MHz | ☒3 MHz | ☒5 MHz | ☒10 MHz |
| | LTE Band 13 | ☒5 MHz | ☒10 MHz | | |
| | LTE Band 14 | ☒5 MHz | ☒10 MHz | | |
| | LTE Band 17 | ☒5 MHz | ☒10 MHz | | |
| | LTE Band 25 | ☒1.4 MHz | ☒3 MHz | ☒5 MHz | ☒10 MHz |

| | | | | | |
|---|---|---|---|---|---|
| | | ☒15 MHz | ☒20 MHz | | |
| | LTE Band 26(814-824) | ☒1.4 MHz | ☒3 MHz | ☒5 MHz | ☒10 MHz |
| | LTE Band 26(824-849) | ☒1.4 MHz | ☒3 MHz | ☒5 MHz | ☒10 MHz |
| | | ☒15 MHz | | | |
| | LTE Band30 | ☒5 MHz | ☒10 MHz | | |
| | LTE Band41 | ☒5 MHz | ☒10 MHz | ☒15 MHz | ☒20 MHz |
| | LTE Band42(3450-3550) | ☒5 MHz | ☒10 MHz | ☒15 MHz | ☒20 MHz |
| | LTE Band66 | ☒1.4 MHz | ☒3 MHz | ☒5 MHz | ☒10 MHz |
| | | ☒15MHz | ☒20MHz | | |
| | LTE Band71 | ☒5MHz | ☒10MHz | ☒15MHz | ☒20MHz |

| Characteristics | Description | | | | |
|---|---|---|---|---|---|
| Designation of Emissions (Remark: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.) | E-UTRA: | QPSK | 16QAM | | |
| | LTE Band 2 | 1M09G7D | 1M09W7D | | |
| | | 2M70G7D | 2M69W7D | | |
| | | 4M47G7D | 4M47W7D | | |
| | | 8M94G7D | 8M92W7D | | |
| | | 13M5G7D | 13M5W7D | | |
| | | 17M9G7D | 17M9W7D | | |
| | LTE Band 4 | 1M09G7D | 1M09W7D | | |
| | | 2M70G7D | 2M69W7D | | |
| | | 4M48G7D | 4M47W7D | | |
| | | 8M94G7D | 8M92W7D | | |
| | | 13M5G7D | 13M5W7D | | |
| | | 17M9G7D | 17M9W7D | | |
| | LTE Band 5 | 1M09G7D | 1M10W7D | | |
| | | 2M70G7D | 2M70W7D | | |
| | | 4M47G7D | 4M47W7D | | |
| | | 8M94G7D | 8M92W7D | | |
| | LTE Band 7 | 4M48G7D | 4M47W7D | | |
| | | 8M94G7D | 8M92W7D | | |
| | | 13M5G7D | 13M5W7D | | |
| | | 17M9G7D | 17M9W7D | | |
| | LTE Band 12 | 1M09G7D | 1M09W7D | | |
| | | 2M70G7D | 2M69W7D | | |


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| | | | | | |
|---|---|---|---|---|---|
| | | 4M48G7D | 4M47W7D | | |
| | | 8M95G7D | 8M92W7D | | |
| | LTE Band13 | 4M48G7D | 4M47W7D | | |
| | | 8M93G7D | 8M90W7D | | |
| | LTE Band 14 | 4M48G7D | 4M48W7D | | |
| | | 8M95G7D | 8M93W7D | | |
| | LTE Band 17 | 4M48G7D | 4M48W7D | | |
| | | 8M96G7D | 8M94W7D | | |
| | LTE Band 25 | 1M09G7D | 1M09W7D | | |
| | | 2M70G7D | 2M69W7D | | |
| | | 4M47G7D | 4M47W7D | | |
| | | 8M95G7D | 8M92W7D | | |
| | | 13M5G7D | 13M5W7D | | |
| | | 17M9G7D | 17M9W7D | | |
| | LTE Band 26 (814-824) | 1M09G7D | 1M09W7D | | |
| | | 2M70G7D | 2M69W7D | | |
| | | 4M47G7D | 4M47W7D | | |
| | | 8M94G7D | 8M91W7D | | |
| | LTE Band 26 (824-849) | 1M09G7D | 1M10W7D | | |
| | | 2M70G7D | 2M69W7D | | |
| | | 4M48G7D | 4M47W7D | | |
| | | 8M94G7D | 8M93W7D | | |
| | | 13M5G7D | 13M5W7D | | |
| | LTE Band 30 | 4M50G7D | 4M50W7D | | |
| | | 8M99G7D | 8M99W7D | | |
| | LTE Band 41 | 4M48G7D | 4M47W7D | | |
| | | 8M94G7D | 8M92W7D | | |
| | | 13M5G7D | 13M5W7D | | |
| | | 17M9G7D | 17M9W7D | | |
| | LTE Band 42 (3450-3550) | 4M46G7D | 4M47W7D | | |
| | | 8M95G7D | 8M95W7D | | |
| | | 13M4G7D | 13M4W7D | | |
| | | 17M9G7D | 17M9W7D | | |
| | LTE Band 66 | 1M09G7D | 1M09W7D | | |



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| | | | | | |
|---|---|---|---|---|---|
| | | 2M69G7D | 2M69W7D | | |
| | | 4M48G7D | 4M47W7D | | |
| | | 8M94G7D | 8M92W7D | | |
| | | 13M5G7D | 13M5W7D | | |
| | | 17M9G7D | 17M9W7D | | |
| | LTE Band 71 | 4M48G7D | 4M47W7D | | |
| | | 8M95G7D | 8M93W7D | | |
| | | 13M5G7D | 13M5W7D | | |
| | | 17M9G7D | 17M9W7D | | |



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## 3.9 Test Frequencies

| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 2 | 1.4MHz | TX | Channel 18607 | Channel 18900 | Channel 19193 |
| | | | 1850.7 MHz | 1880 MHz | 1909.3 MHz |
| | | RX | Channel 607 | Channel 900 | Channel 1193 |
| | | | 1930.7 MHz | 1960 MHz | 1989.3 MHz |
| | 3MHz | TX | Channel 18615 | Channel 18900 | Channel 19185 |
| | | | 1851.5 MHz | 1880 MHz | 1908.5 MHz |
| | | RX | Channel 615 | Channel 900 | Channel 1185 |
| | | | 1931.5 MHz | 1960 MHz | 1988.5 MHz |
| | 5MHz | TX | Channel 18625 | Channel 18900 | Channel 19175 |
| | | | 1852.5 MHz | 1880 MHz | 1907.5 MHz |
| | | RX | Channel 625 | Channel 900 | Channel1175 |
| | | | 1932.5 MHz | 1960 MHz | 1987.5 MHz |
| | 10MHz | TX | Channel 18650 | Channel 18900 | Channel 19150 |
| | | | 1855 MHz | 1880 MHz | 1905 MHz |
| | | RX | Channel 650 | Channel 900 | Channel 1150 |
| | | | 1935 MHz | 1960 MHz | 1985 MHz |
| | 15MHz | TX | Channel 18675 | Channel 18900 | Channel 19125 |
| | | | 1857.5 MHz | 1880 MHz | 1902.5 MHz |
| | | RX | Channel 675 | Channel 900 | Channel 1125 |
| | | | 1937.5 MHz | 1960 MHz | 1982.5 MHz |
| | 20MHz | TX | Channel 18700 | Channel 18900 | Channel 19100 |
| | | | 1860 MHz | 1880 MHz | 1900 MHz |
| | | RX | Channel 700 | Channel 900 | Channel 1100 |
| | | | 1940 MHz | 1960 MHz | 1980 MHz |

| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 4 | 1.4MHz | TX | Channel 19957 | Channel 20175 | Channel 20393 |
| | | | 1710.7 MHz | 1732.5 MHz | 1754.3 MHz |
| | | RX | Channel 1975 | Channel 2175 | Channel 2375 |
| | | | 2112.5 MHz | 2132.5MHz | 2152.5 MHz |
| | 3MHz | TX | Channel 19965 | Channel 20175 | Channel 20385 |
| | | | 1711.5 MHz | 1732.5 MHz | 1753.5 MHz |
| | | RX | Channel 2000 | Channel 2175 | Channel 2350 |
| | | | 2115 MHz | 2132.5MHz | 2150 MHz |
| | 5MHz | TX | Channel 19975 | Channel 20175 | Channel 20375 |
| | | | 1712.5 MHz | 1732.5 MHz | 1752.5 MHz |
| | | RX | Channel 1975 | Channel 2175 | Channel 2375 |
| | | | 2112.5 MHz | 2132.5MHz | 2152.5 MHz |
| | 10MHz | TX | Channel 20000 | Channel 20175 | Channel 20350 |
| | | | 1715 MHz | 1732.5 MHz | 1750 MHz |
| | | RX | Channel 2000 | Channel 2175 | Channel 2350 |
| | | | 2115 MHz | 2132.5MHz | 2150 MHz |
| | 15MHz | TX | Channel 20025 | Channel 20175 | Channel 20325 |
| | | | 1717.5 MHz | 1732.5 MHz | 1747.5 MHz |
| | | RX | Channel 2025 | Channel 2175 | Channel 2325 |
| | | | 2117.5 MHz | 2132.5MHz | 2147.5 MHz |
| | 20MHz | TX | Channel 20050 | Channel 20175 | Channel 20300 |
| | | | 1720 MHz | 1732.5 MHz | 1745 MHz |
| | | RX | Channel 2050 | Channel 2175 | Channel 2300 |
| | | | 2120 MHz | 2132.5MHz | 2145 MHz |

| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 5 | 1.4MHz | TX | Channel 20407 | Channel 20525 | Channel 20643 |
| | | | 824.7 MHz | 836.5 MHz | 848.3 MHz |
| | | RX | Channel 2407 | Channel 2525 | Channel 2643 |
| | | | 869.7 MHz | 881.5 MHz | 893.3 MHz |
| | 3MHz | TX | Channel 20415 | Channel 20525 | Channel 20635 |
| | | | 825.5 MHz | 836.5 MHz | 847.5 MHz |
| | | RX | Channel 2415 | Channel 2525 | Channel 2635 |
| | | | 870.5 MHz | 881.5 MHz | 892.5 MHz |
| | 5MHz | TX | Channel 20425 | Channel 20525 | Channel 20625 |
| | | | 826.5 MHz | 836.5 MHz | 846.5 MHz |
| | | RX | Channel 2425 | Channel 2525 | Channel 2625 |
| | | | 871.5 MHz | 881.5 MHz | 891.5 MHz |
| | 10MHz | TX | Channel 20450 | Channel 20525 | Channel 20600 |
| | | | 829 MHz | 836.5 MHz | 844 MHz |
| | | RX | Channel 2450 | Channel 2525 | Channel 2600 |
| | | | 874 MHz | 881.5 MHz | 889 MHz |



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| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 7 | 5MHz | TX | Channel 20775 | Channel 21100 | Channel 21425 |
| | | | 2502.5 MHz | 2535 MHz | 2567.5 MHz |
| | | RX | Channel 2775 | Channel 3100 | Channel 5825 |
| | | | 2622.5 MHz | 2655 MHz | 2687.5 MHz |
| | 10MHz | TX | Channel 20800 | Channel 21100 | Channel 21400 |
| | | | 2505 MHz | 2535 MHz | 2565 MHz |
| | | RX | Channel 2800 | Channel 3100 | Channel 3400 |
| | | | 2625 MHz | 2655 MHz | 2685 MHz |
| | 15MHz | TX | Channel 20825 | Channel 21100 | Channel 21375 |
| | | | 2507.5 MHz | 2535 MHz | 2562.5 MHz |
| | | RX | Channel 2825 | Channel 3100 | Channel 3375 |
| | | | 2627.5 MHz | 2655 MHz | 2682.5 MHz |
| | 20MHz | TX | Channel 20850 | Channel 21100 | Channel 21350 |
| | | | 2510 MHz | 2535 MHz | 2560 MHz |
| | | RX | Channel 2850 | Channel 3100 | Channel 3350 |
| | | | 2630 MHz | 2655 MHz | 2680 MHz |

| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 12 | 1.4MHz | TX | Channel 23017 | Channel 23095 | Channel 23173 |
| | | | 699.7 MHz | 707.5 MHz | 715.3 MHz |
| | | RX | Channel 5017 | Channel 5095 | Channel 5173 |
| | | | 729.7 MHz | 737.5 MHz | 745.3 MHz |
| | 3MHz | TX | Channel 23025 | Channel 23095 | Channel 23165 |
| | | | 700.5 MHz | 707.5 MHz | 714.5 MHz |
| | | RX | Channel 5025 | Channel 5095 | Channel 5165 |
| | | | 730.5 MHz | 737.5 MHz | 744.5 MHz |
| | 5MHz | TX | Channel 23035 | Channel 23095 | Channel 23155 |
| | | | 701.5 MHz | 707.5 MHz | 713.5 MHz |
| | | RX | Channel 5035 | Channel 5095 | Channel 5155 |
| | | | 731.5 MHz | 737.5 MHz | 743.5 MHz |
| | 10MHz | TX | Channel 23060 | Channel 23095 | Channel 23130 |
| | | | 704 MHz | 707.5 MHz | 711 MHz |
| | | RX | Channel 5060 | Channel 5095 | Channel 5130 |
| | | | 734 MHz | 737.5 MHz | 741 MHz |



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| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 13 | 5MHz | TX | Channel 23025 | Channel 23230 | Channel 23255 |
| | | | 779.5 MHz | 782 MHz | 784.5 MHz |
| | | RX | Channel 5205 | Channel 5230 | Channel 5255 |
| | | | 748.5 MHz | 751 MHz | 753.5 MHz |
| | 10MHz | TX | Channel 23230 | Channel 23230 | Channel 23230 |
| | | | 782 MHz | 782 MHz | 782 MHz |
| | | RX | Channel 5230 | Channel 5230 | Channel 5230 |
| | | | 751 MHz | 751 MHz | 751 MHz |

| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 14 | 5MHz | TX | Channel 23305 | Channel 23330 | Channel 23355 |
| | | | 790.5 MHz | 793 MHz | 795.5 MHz |
| | | RX | Channel 5305 | Channel 5330 | Channel 5355 |
| | | | 760.5 MHz | 763 MHz | 765.5 MHz |
| | 10MHz | TX | Channel 23330 | Channel 23330 | Channel 23330 |
| | | | 793MHz | 793 MHz | 793 MHz |
| | | RX | Channel 5330 | Channel 5330 | Channel 5330 |
| | | | 763MHz | 763 MHz | 763 MHz |

| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 17 | 5MHz | TX | Channel 23755 | Channel 23790 | Channel 23825 |
| | | | 706.5 MHz | 710 MHz | 713.5 MHz |
| | | RX | Channel 5755 | Channel 5790 | Channel 5825 |
| | | | 736.5 MHz | 740 MHz | 743.5 MHz |
| | 10MHz | TX | Channel 23780 | Channel 23790 | Channel 23800 |
| | | | 709 MHz | 710 MHz | 711 MHz |
| | | RX | Channel 5780 | Channel 5790 | Channel 5800 |
| | | | 739 MHz | 740 MHz | 741 MHz |



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| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 25 | 1.4MHz | TX | Channel 26047 | Channel 26365 | Channel 26683 |
| | | | 1850.7 MHz | 1882.5 MHz | 1914.3 MHz |
| | | RX | Channel 8047 | Channel 8365 | Channel 8683 |
| | | | 1930.7 MHz | 1962.5 MHz | 1994.3 MHz |
| | 3MHz | TX | Channel 26055 | Channel 26365 | Channel 26675 |
| | | | 1851.5 MHz | 1882.5 MHz | 1913.5 MHz |
| | | RX | Channel 8055 | Channel 8365 | Channel 8675 |
| | | | 1931.5 MHz | 1962.5 MHz | 1993.5 MHz |
| | 5MHz | TX | Channel 26065 | Channel 26365 | Channel 26665 |
| | | | 1852.5 MHz | 1882.5 MHz | 1912.5 MHz |
| | | RX | Channel 8065 | Channel 8365 | Channel 8665 |
| | | | 1932.5 MHz | 1962.5 MHz | 1992.5 MHz |
| | 10MHz | TX | Channel 26090 | Channel 26365 | Channel 26640 |
| | | | 1855 MHz | 1882.5 MHz | 1910 MHz |
| | | RX | Channel 8090 | Channel 8365 | Channel 8640 |
| | | | 1935 MHz | 1962.5 MHz | 1990 MHz |
| | 15MHz | TX | Channel 26115 | Channel 26365 | Channel 26615 |
| | | | 1857.5 MHz | 1882.5 MHz | 1907.5 MHz |
| | | RX | Channel 8115 | Channel 8365 | Channel 8615 |
| | | | 1937.5 MHz | 1962.5 MHz | 1987.5 MHz |
| | 20MHz | TX | Channel 26140 | Channel 26365 | Channel 26590 |
| | | | 1860 MHz | 1882.5 MHz | 1905 MHz |
| | | RX | Channel 8140 | Channel 8365 | Channel 8590 |
| | | | 1940 MHz | 1962.5 MHz | 1985 MHz |



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| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 26 (814-824) | 1.4MHz | TX | Channel 26697 | Channel 26740 | Channel 26783 |
| | | | 814.7 MHz | 819 MHz | 823.3 MHz |
| | | RX | Channel 8697 | Channel 8740 | Channel 8783 |
| | | | 859.7 MHz | 864MHz | 868.3 MHz |
| | 3MHz | TX | Channel 26705 | Channel 26740 | Channel 26775 |
| | | | 815.5 MHz | 819 MHz | 822.5 MHz |
| | | RX | Channel 8705 | Channel 8740 | Channel 8775 |
| | | | 860.5 MHz | 864MHz | 867.5 MHz |
| | 5MHz | TX | Channel 26715 | Channel 26740 | Channel 26765 |
| | | | 816.5 MHz | 819 MHz | 821.5 MHz |
| | | RX | Channel 8715 | Channel 8740 | Channel 8755 |
| | | | 861.5 MHz | 864MHz | 866.5 MHz |
| | 10MHz | TX | Channel 26740 | Channel 26740 | Channel 26740 |
| | | | 819 MHz | 819 MHz | 819 MHz |
| | | RX | Channel 8740 | Channel 8740 | Channel 8740 |
| | | | 864MHz | 864MHz | 864MHz |

| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band26 (824-849) | 1.4MHz | TX | Channel 26797 | Channel 26915 | Channel 27033 |
| | | | 824.7 MHz | 836.5 MHz | 848.3 MHz |
| | | RX | Channel 8697 | Channel 8915 | Channel 9033 |
| | | | 859.7 MHz | 881.5 MHz | 893.3 MHz |
| | 3MHz | TX | Channel 26805 | Channel 26915 | Channel 27025 |
| | | | 825.5 MHz | 836.5 MHz | 847.5 MHz |
| | | RX | Channel 8805 | Channel 8915 | Channel 9025 |
| | | | 860.5 MHz | 881.5 MHz | 892.5 MHz |
| | 5MHz | TX | Channel 26815 | Channel 26915 | Channel 27015 |
| | | | 826.5 MHz | 836.5 MHz | 846.5 MHz |
| | | RX | Channel 8815 | Channel 8915 | Channel 9015 |
| | | | 871.5 MHz | 881.5 MHz | 891.5 MHz |
| | 10MHz | TX | Channel 26840 | Channel 26915 | Channel 26990 |
| | | | 829 MHz | 836.5 MHz | 844 MHz |
| | | RX | Channel 8840 | Channel 8915 | Channel 8990 |
| | | | 874 MHz | 881.5 MHz | 889 MHz |
| | 15MHz | TX | Channel 26865 | Channel 26915 | Channel 26965 |
| | | | 831.5 MHz | 836.5 MHz | 841.5 MHz |
| | | RX | Channel 8865 | Channel 8915 | Channel 8965 |
| | | | 876.5 MHz | 881.5 MHz | 886.5 MHz |



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| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 30 | 5MHz | TX | Channel 27685 | Channel27710 | Channel 27735 |
| | | | 2307.5 MHz | 2310MHz | 2312.5 MHz |
| | | RX | Channel 9795 | Channel 9820 | Channel 9845 |
| | | | 2352.5MHz | 2355 MHz | 2357.5MHz |
| | 10MHz | TX | Channel 27710 | Channel27710 | Channel27710 |
| | | | 2310 MHz | 2310MHz | 2310MHz |
| | | RX | Channel 9820 | Channel 9820 | Channel 9820 |
| | | | 2355 MHz | 2355 MHz | 2355 MHz |

| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 41 (2496-2690) | 5MHz | TX / RX | Channel 39675 | Channel40620 | Channel 41565 |
| | | | 2498.5 MHz | 2593 MHz | 2687.5 MHz |
| | 10MHz | TX / RX | Channel 39700 | Channel40620 | Channel 41540 |
| | | | 2501 MHz | 2593 MHz | 2685 MHz |
| | 15MHz | TX / RX | Channel 39725 | Channel40620 | Channel 41515 |
| | | | 2503.5 MHz | 2593 MHz | 2682.5 MHz |
| | 20MHz | TX / RX | Channel 39750 | Channel40620 | Channel 41490 |
| | | | 2506 MHz | 2593 MHz | 2680 MHz |

| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band 42 (3450-3550) | 5MHz | TX | Channel 42115 | Channel 42590 | Channel 43065 |
| | | | 3452.5 MHz | 3500 MHz | 3547.5 MHz |
| | | RX | Channel 42115 | Channel 42590 | Channel 43065 |
| | | | 3452.5 MHz | 3500 MHz | 3547.5 MHz |
| | 10MHz | TX | Channel 42140 | Channel 42590 | Channel 43040 |
| | | | 3455 MHz | 3500 MHz | 3545 MHz |
| | | RX | Channel 42140 | Channel 42590 | Channel 43040 |
| | | | 3455 MHz | 3500 MHz | 3545 MHz |
| | 15MHz | TX | Channel 42165 | Channel 42590 | Channel 43015 |
| | | | 3457.5 MHz | 3500 MHz | 3542.5 MHz |
| | | RX | Channel 42165 | Channel 42590 | Channel 43015 |
| | | | 3457.5 MHz | 3500 MHz | 3542.5 MHz |
| | 20MHz | TX | Channel 42190 | Channel 42590 | Channel 42990 |
| | | | 3460 MHz | 3500 MHz | 3540 MHz |
| | | RX | Channel 42190 | Channel 42590 | Channel 42990 |
| | | | 3460 MHz | 3500 MHz | 3540 MHz |



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| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band66 | 1.4MHz | TX | Channel 131979 | Channel 132322 | Channel 132665 |
| | | | 1710.7 MHz | 1745 MHz | 1779.3 MHz |
| | | RX | Channel 66443 | Channel 66786 | Channel 67329 |
| | | | 2110.7 MHz | 2145MHz | 2199.3 MHz |
| | 3MHz | TX | Channel 131987 | Channel 132322 | Channel 132657 |
| | | | 1711.5 MHz | 1745 MHz | 1778.5MHz |
| | | RX | Channel 66451 | Channel 66786 | Channel 67321 |
| | | | 2111.5 MHz | 2145MHz | 2198.5MHz |
| | 5MHz | TX | Channel 131997 | Channel 132322 | Channel 132647 |
| | | | 1712.5 MHz | 1745 MHz | 1777.5 MHz |
| | | RX | Channel 66461 | Channel 66786 | Channel 67311 |
| | | | 2112.5 MHz | 2145MHz | 2197.5 MHz |
| | 10MHz | TX | Channel 132022 | Channel 132322 | Channel 132622 |
| | | | 1715 MHz | 1745 MHz | 1775 MHz |
| | | RX | Channel 66486 | Channel 66786 | Channel 67286 |
| | | | 2115 MHz | 2145MHz | 2195 MHz |
| | 15MHz | TX | Channel 132047 | Channel 132322 | Channel 132597 |
| | | | 1717.5 MHz | 1745 MHz | 1772.5 MHz |
| | | RX | Channel 66511 | Channel 66786 | Channel 67261 |
| | | | 2117.5 MHz | 2145MHz | 2192.5 MHz |
| | 20MHz | TX | Channel 132072 | Channel 132322 | Channel 132572 |
| | | | 1720 MHz | 1745 MHz | 1770 MHz |
| | | RX | Channel 66536 | Channel 66786 | Channel 67236 |
| | | | 2120 MHz | 2145MHz | 2190 MHz |

| Test Mode | Bandwidth | TX / RX | RF Channel | | |
|---|---|---|---|---|---|
| | | | Low (L) | Middle (M) | High (H) |
| LTE Band71 | 5MHz | TX | Channel 133147 | Channel 133297 | Channel 133447 |
| | | | 665.5 MHz | 680.5 MHz | 695.5 MHz |
| | | RX | Channel 68611 | Channel 68761 | Channel 68911 |
| | | | 619.5 MHz | 634.5 MHz | 649.5 MHz |
| | 10MHz | TX | Channel 133172 | Channel 133297 | Channel 133422 |
| | | | 668 MHz | 680.5 MHz | 693 MHz |
| | | RX | Channel 68636 | Channel 68761 | Channel 68886 |
| | | | 622 MHz | 634.5 MHz | 647 MHz |
| | 15MHz | TX | Channel 133197 | Channel 133297 | Channel 133397 |
| | | | 670.5 MHz | 680.5 MHz | 690.5 MHz |
| | | RX | Channel 68661 | Channel 68761 | Channel 68861 |
| | | | 624.5 MHz | 634.5 MHz | 644.5 MHz |
| | 20MHz | TX | Channel 133222 | Channel 133297 | Channel 133372 |
| | | | 673 MHz | 680.5 MHz | 688 MHz |
| | | RX | Channel 68686 | Channel 68761 | Channel 68836 |
| | | | 627 MHz | 634.5 MHz | 642 MHz |



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# 4 Description of Tests

## 4.1 Conducted Output Power

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.2.1

The transmitter output was connected to a calibrated coaxial cable, attenuator and power meter, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the power reading. The tests were performed at three frequencies (low channel, middle channel and high channel) and on the highest power levels, which can be setup on the transmitters.

**Remark: Reference test setup 1**

## 4.2 Effective (Isotropic) Radiated Power of Transmitter

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.8.4

Calculate power in dBm by the following formula:

ERP (dBm) = Conducted Power (dBm) + antenna gain (dBd)

EIRP(dBm) = Conducted Power (dBm) + antenna gain (dBi)

EIRP=ERP+2.15dB

## 4.3 EIRP Power Density

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.3

**Test Settings**

1. Set instrument center frequency to OBW center frequency.
2. Set span to at least 1.5 times the OBW.
3. Set the RBW to the specified reference bandwidth (often 1 MHz).
4. Set VBW ≥ 3 × RBW.
5. Detector = RMS (power averaging).
6. Ensure that the number of measurement points in the sweep ≥ 2 × span/RBW.
7. Sweep time = auto couple.
8. Employ trace averaging (RMS) mode over a minimum of 100 traces.
9. Use the peak marker function to determine the maximum amplitude level within the reference bandwidth (PSD).

## 4.4 Occupied Bandwidth

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 4.2 & 4.3

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel, middle channel and high channel).The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

**Remark: Reference test setup 1**

**Test Settings**

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

## 4.5 Band Edge at Antenna Terminals

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 6.0

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyser, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at two frequencies (low channel and high channel).in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of 100kHz or 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed. The EUT emission bandwidth is measured as the width of the signal between two points, outside of which all emission are attenuated at least 26dB below the transmitter power. The video bandwidth of the spectrum analyzer was set at thrice the resolution bandwidth. Detector Mode was set to rms.

**Remark: Reference test setup 1**

**Test Settings**

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1% of the emission bandwidth
4. VBW ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

## 4.6 Spurious And Harmonic Emissions at Antenna Terminal

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 6.0

The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyzer, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel and high channel).The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

**Remark: Reference test setup 1**

Test Settings

1. Start frequency was set to 9kHz and stop frequency was set to at least 10* the fundamental frequency(Separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissinos, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

## 4.7 Peak-Average Ratio

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.7.2

A peak to average ratio measurement is performed at the conducted port of the EUT. For WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. The traces are generated with the spectrum analyzer set to zero span mode.

**Remark: Reference test setup 1**

**Test Settings**

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

## 4.8 Field Strength of Spurious Radiation

Measurement Procedure: FCC KDB 971168 D01 V03r01 Section 5.8

**Below 1GHz test procedure as below:**

1). The EUT was powered ON and placed on a 80cm high table in the chamber. The antenna of the transmitter was extended to its maximum length.

2). The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3). Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4). Test the EUT in the lowest channel, the middle channel ,the Highest channel.

5). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.

6). Repeat above procedures until all frequencies measured was complete.

E (dBμV/m) = Measured amplitude level (dBμV) + (Cable Loss (dB) + Antenna Factor (dB/m) – AMP(dB))

EIRP (dBm) = E (dBμV/m) + 20 log D − 104.8; where D is the measurement distance in meters

**Above 1GHz test procedure as below:**

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber

2) Calculate power in dBm by the following formula:

E (dBμV/m) = Measured amplitude level (dBμV) + (Cable Loss (dB) + Antenna Factor (dB/m) – AMP(dB))

EIRP (dBm) = E (dBμV/m) + 20 log D − 104.8; where D is the measurement distance in meters

3). Test the EUT in the lowest channel, the middle channel the Highest channel

4). The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, Only the test worst case mode is recorded in the report.

5). Repeat above procedures until all frequencies measured was complete

Remark1: Reference test setup 2

Remark2: The emission below 18G were measured at a 3m test distance, while emissions above 18GHz were measured at a 1m test distance. At a measurement distance of 1 meter the limit line was increased by 20*LOG(3/1) = 9.54 dB.

**Remark: Reference test setup 2**

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier gain. The basic equation with a sample calculation is as follows:

Level = Reading Level + AF(dB/m) + Factor(dB)

AF = Antenna Factor(dB/m)

Factor = Cable Factor(dB) - Preamplifier gain (dB)

Margin = Limit(dBm) - Level(dBm)

2) Scan from 9kHz to 40GHz, The disturbance between 9KHz to 30MHz and 18GHz to 40GHz was very low, and the harmonics were the highest point could be found when testing, so only the harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3) All modes have been tested, but only the worst case data displayed in this report.

## 4.9 Frequency Stability / Temperature Variation

Measurement Procedure:

Frequency stability testing is performed in accordance with the guidelines of FCC KDB 971168 D01 V03r01; Section 9

. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm ) of the center frequency.

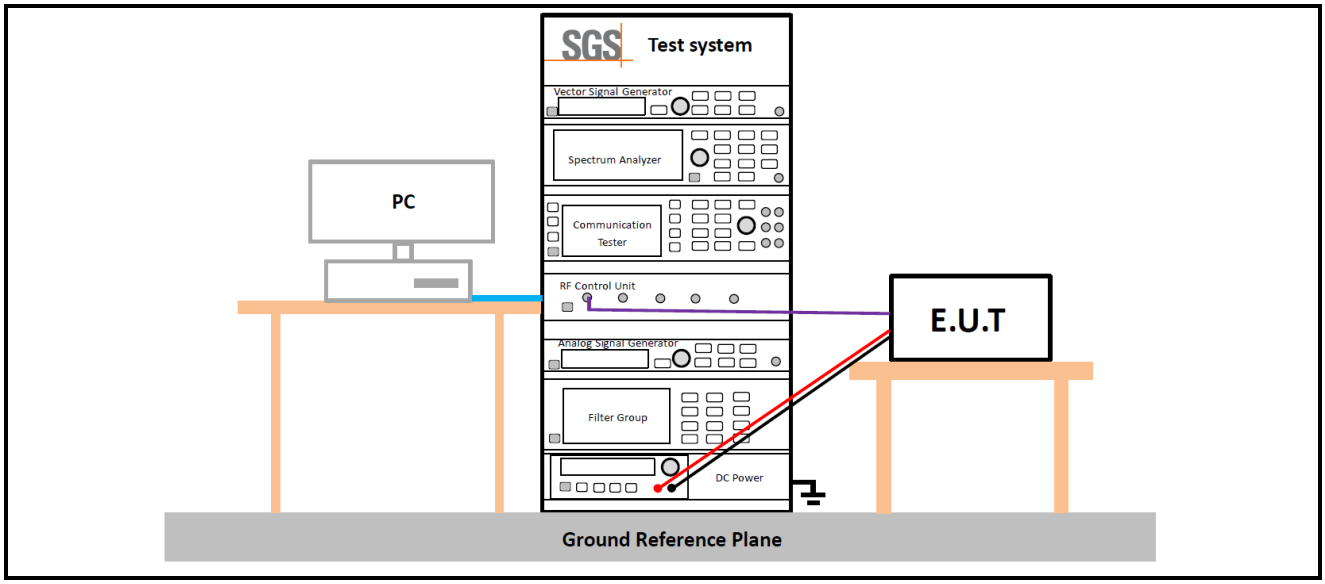
**Time Period and Procedure:**

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

**Remark: Reference test setup 3**

## 4.10Test Setups

### 4.10.1 Test Setup 1




### 4.10.2 Test Setup 2

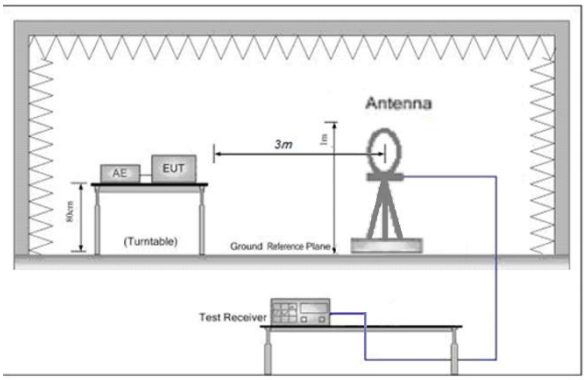



Figure 1. Below 30MHz

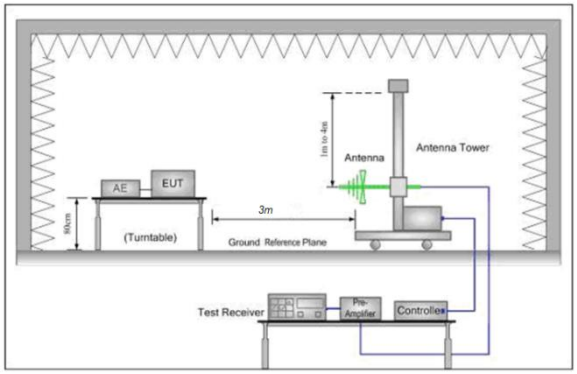



Figure 2. 30MHz to 1GHz

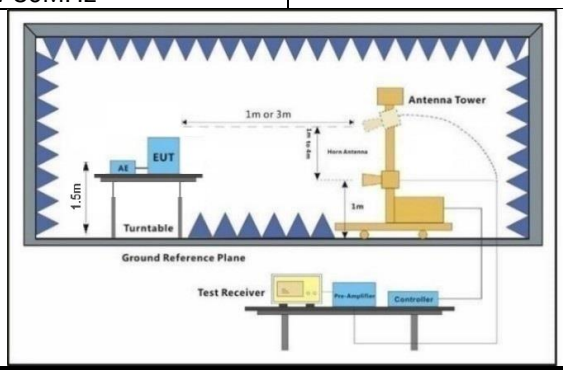
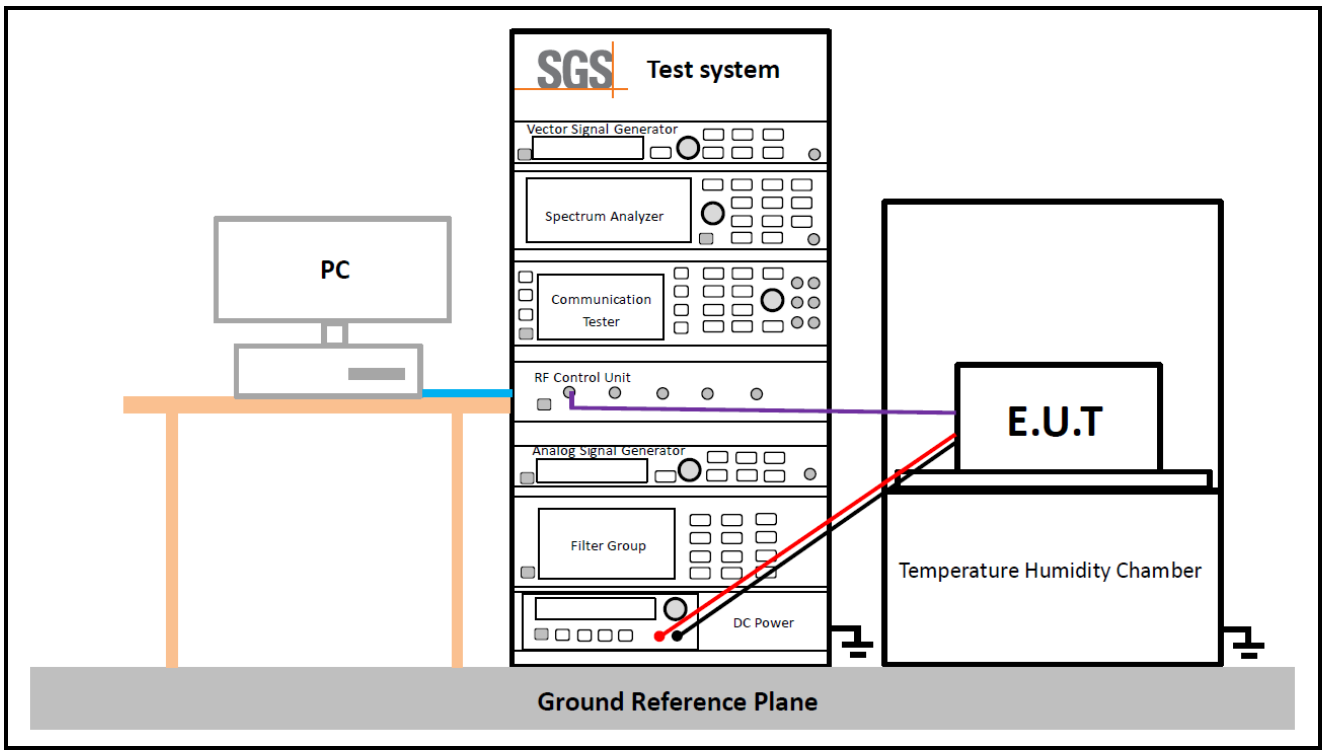


Figure 3. above 1GHz

### 4.10.3 Test Setup 3



## 4.11Test Conditions

| Transmit Output Power Data - Average Power, Total | |
|---|---|
| **Test Case** | **Test Conditions** |
| Test Environment | Ambient Climate & Rated Voltage |
| Test Setup | Test Setup 1 |
| RF Channels (TX) | L, M, H (L= low channel, M= middle channel, H= high channel) |
| Test Mode | LTE/TM1;LTE/TM2 |

| Transmit Output Power Data - Average Power, Spectral Density | |
|---|---|
| **Test Case** | **Test Conditions** |
| Test Environment | Ambient Climate & Rated Voltage |
| Test Setup | Test Setup 1 |
| RF Channels (TX) | L, M, H (L= low channel, M= middle channel, H= high channel) |
| Test Mode | LTE/TM1;LTE/TM2 |

| Peak-to-Average Ratio | |
|---|---|
| **Test Case** | **Test Conditions** |
| Test Environment | Ambient Climate & Rated Voltage |
| Test Setup | Test Setup 1 |
| RF Channels (TX) | L, M, H (L= low channel, M= middle channel, H= high channel) |
| Test Mode | LTE/TM1;LTE/TM2 |

| Bandwidth - Occupied Bandwidth | |
|---|---|
| **Test Case** | **Test Conditions** |
| Test Environment | Ambient Climate & Rated Voltage |
| Test Setup | Test Setup 1 |
| RF Channels (TX) | L, M, H (L= low channel, M= middle channel, H= high channel ) |
| Test Mode | LTE/TM1;LTE/TM2 |

| Bandwidth - Emission Bandwidth | |
|---|---|
| **Test Case** | **Test Conditions** |
| Test Environment | Ambient Climate & Rated Voltage |
| Test Setup | Test Setup 1 |
| RF Channels (TX) | L, M, H (L= low channel, M= middle channel, H= high channel ) |
| Test Mode | LTE/TM1;LTE/TM2 |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| Band Edges Compliance | |
|---|---|
| **Test Case** | **Test Conditions** |
| Test Environment | Ambient Climate & Rated Voltage |
| Test Setup | Test Setup 1 |
| RF Channels (TX) | L, H (L= low channel, H= high channel) |
| Test Mode | LTE/TM1 |

| Spurious Emission at Antenna Terminals | |
|---|---|
| **Test Case** | **Test Conditions** |
| Test Environment | Ambient Climate & Rated Voltage |
| Test Setup | Test Setup 1 |
| RF Channels (TX) | L, M, H (L= low channel, M= middle channel, H= high channel) |
| Test Mode | LTE/TM1 |

| Field Strength of Spurious Radiation | |
|---|---|
| **Test Case** | **Test Conditions** |
| Test Environment | Ambient Climate & Rated Voltage |
| Test Setup | Test Setup 2 |
| RF Channels (TX) | L, M, H (L= low channel, M= middle channel, H= high channel) |
| Test Mode | LTE/TM1<br>Remark: All bandwidth and modulation of LTE have been pre tested, and only the worst results are reflected in the report. |

| Frequency Stability | |
|---|---|
| **Test Case** | **Test Conditions** |
| Test Environment | (1) -30 °C to +50 °C with step 10 °C at Rated Voltage<br>(2) VL, VN and VH of Rated Voltage at Ambient Climate. |
| Test Setup | Test Setup 3 |
| RF Channels (TX) | M (M= middle channel) |
| Test Mode | LTE/TM1<br>The report only show the bandwidth with the worst case. |

# 5 Main Test Instruments

| RF conducted test | | | | | |
|---|---|---|---|---|---|
| Test Equipment | Manufacturer | Model No. | Inventory No. | Cal. date (yyyy/mm/dd) | Cal.Due date (yyyy/mm/dd) |
| Shielding Room | Brilliant-emc | N/A | SUWI-04-01-06 | 2021/05/08 | 2024/05/07 |
| Temperature and humidity meter | MingGao | TH101B | SUWI-01-01-07 | 2023/02/06 | 2024/02/05 |
| Signal Analyzer | ROHDE &SCHWARZ | FSV3030 | SUWI-01-02-02 | 2023/05/11 | 2024/05/10 |
| Measurement Software | Tonscend | JS1120-3 Test System V 2.6.88.0336 | SUWI-02-09-09 | NCR | NCR |
| Radio Communication Analyzer | Anritsu | MT8821C | SUWI-01-26-03 | 2022/11/23 | 2023/11/22 |
| Wideband Radio Communication Tester | ROHDE &SCHWARZ | CMW500 | SUWI-01-16-05 | 2023/02/06 | 2024/02/05 |
| DC Power Supply | HYELEC | HY3005B | SUWI-01-18-01 | 2023/02/06 | 2024/02/05 |
| Temperature Chamber | ESPEC | SU-242 | SUWI-01-13-01 | 2023/02/06 | 2024/02/05 |
| Signal Analyzer | ROHDE &SCHWARZ | FSW43 | SUWI-01-02-04 | 2023/05/11 | 2024/05/10 |

| RSE Test System | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal Date (yyyy/mm/dd)** | **Cal Due Date (yyyy/mm/dd)** |
| Semi-Anechoic Chamber | Brilliant-emc | N/A | SUWI-04-02-01 | 2021/05/08 | 2024/05/07 |
| Temperature and humidity meter | MingGao | TH101B | SUWI-01-01-05 | 2023/02/07 | 2024/02/06 |
| Signal Analyzer | ROHDE&SCHWARZ | FSW43 | SUWI-01-02-04 | 2023/05/11 | 2024/05/10 |
| Signal Analyzer | KEYSIGHT | N9020A | SUWI-01-02-05 | 2022/11/23 | 2023/11/22 |
| Test receiver | ROHDE&SCHWARZ | ESR7 | SUWI-01-10-01 | 2023/02/08 | 2024/02/07 |
| Receiving antenna | SCHWRZBECK MESS-ELEKTRONIK | VULB 9163 | SUWI-01-11-01 | 2023/05/13 | 2024/05/12 |
| Receiving antenna | SCHWRZBECK MESS-ELEKTRONIK | BBHA 9120D | SUWI-01-11-02 | 2023/05/13 | 2024/05/12 |
| Receiving antenna | SCHWRZBECK MESS-ELEKTRONIK | BBHA 9170 | SUWI-01-11-03 | 2023/05/12 | 2024/05/11 |
| Active Loop Antenna | SCHWRZBECK MESS-ELEKTRONIK | FMZB 1519B | SUWI-01-21-01 | 2023/05/13 | 2024/05/12 |
| Amplifier | Tonscend | TAP9K3G40 | SUWI-01-14-01 | 2023/02/06 | 2024/02/05 |
| Amplifier | Tonscend | TAP01018050 | SUWI-01-14-02 | 2023/02/06 | 2024/02/05 |
| Amplifier | Tonscend | TAP18040048 | SUWI-01-14-03 | 2023/02/08 | 2024/02/07 |
| Wideband Radio Communication Tester | Anritsu | MT8820C | SUWI-01-16-08 | 2023/02/06 | 2024/02/05 |
| Measurement Software | Tonscend | JS32-RE V4.0.0.1 | SUWI-02-09-04 | NCR | NCR |



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| 966 RSE Test System | | | | | |
|---|---|---|---|---|---|
| **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal. date (yyyy/mm/dd)** | **Cal.Due date (yyyy/mm/dd)** |
| Semi-Anechoic Chamber | Brilliant-emc | N/A | SUWI-04-02-02 | 2021/11/25 | 2024/11/24 |
| Temperature and humidity meter | MingGao | TH101B | SUWI-01-01-13 | 2023/02/07 | 2024/02/06 |
| Signal Analyzer | ROHDE&SCHWARZ | FSW43 | SUWI-01-02-04 | 2023/05/11 | 2024/05/10 |
| Signal Analyzer | KEYSIGHT | N9020A | SUWI-01-02-06 | 2022/11/23 | 2023/11/22 |
| Test receiver | ROHDE&SCHWARZ | ESR7 | SUWI-01-10-01 | 2023/02/08 | 2024/02/07 |
| Receiving antenna | SCHWRZBECK MESS-ELEKTRONIK | VULB 9168 | SUWI-01-11-04 | 2021/12/05 | 2023/12/04 |
| Receiving antenna | SCHWRZBECK MESS-ELEKTRONIK | BBHA 9120D | SUWI-01-11-05 | 2021/12/05 | 2023/12/04 |
| Receiving antenna | SCHWRZBECK MESS-ELEKTRONIK | BBHA 9170 | SUWI-01-11-03 | 2023/05/12 | 2024/05/11 |
| Active Loop Antenna | SCHWRZBECK MESS-ELEKTRONIK | FMZB 1519B | SUWI-01-21-01 | 2023/05/13 | 2024/05/12 |
| Amplifier | Tonscend | TAP9K3G32 | SUWI-01-14-06 | 2022/11/23 | 2023/11/22 |
| Amplifier | Tonscend | TAP01018050 | SUWI-01-14-04 | 2022/11/23 | 2023/11/22 |
| Amplifier | Tonscend | TAP30M7G30 | SUWI-01-14-05 | 2022/11/23 | 2023/11/22 |
| Wideband Radio Communication Tester | Anritsu | MT8820C | SUWI-01-26-03 | 2022/11/23 | 2023/11/22 |
| Measurement Software | Tonscend | JS32-RE V4.0.0.0 | SUWI-02-09-04 | NCR | NCR |



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# 6 Measurement Uncertainty

For a 95% confidence level (k = 2), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | Total RF power, conducted | ±0.54dB |
| 2 | RF power density, conducted | ±1.03dB |
| 3 | Spurious emissions, conducted | ±0.54dB |
| 4 | Radio Frequency | ±1.0 % |
| 5 | Duty Cycle | ±0.37% |
| 6 | Occupied Bandwidth | ±1.0 % |
| 7 | Radiated Emission | ± 3.13dB (9k -30MHz) |
| | | ± 4.8dB (30M -1GHz) |
| | | ± 4.8dB (1GHz to 18 GHz) |
| | | ± 4.80dB (Above 18GHz) |
| 8 | 966 Radiated Emission | ± 3.13dB (9k -30MHz) |
| | | ± 4.88dB (30M -1GHz) |
| | | ± 4.75dB (1GHz to 18GHz) |
| | | ± 4.77dB (Above 18GHz) |

Remark:
The $U_{lab}$ (lab Uncertainty) is less than $U_{cispr/ETSI}$ (CISPR/ETSI Uncertainty), so the test results
– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

# 7 Appendixes

| | |
|---|---|
| Appendix A.2 | WWAN Setup Photos |
| Appendix B.1 | LTE Band 2 |
| Appendix B.2 | LTE Band 4 |
| Appendix B.3 | LTE Band 5 |
| Appendix B.4 | LTE Band 7 |
| Appendix B.5 | LTE Band 12 |
| Appendix B.6 | LTE Band 13 |
| Appendix B.7 | LTE Band 14 |
| Appendix B.8 | LTE Band 17 |
| Appendix B.9 | LTE Band 25 |
| Appendix B.10 | LTE Band 26(814-824) |
| Appendix B.11 | LTE Band 26(824-849) |
| Appendix B.12 | LTE Band 30 |
| Appendix B.13 | LTE Band 41 |
| Appendix B.14 | LTE Band 42(3450-3550) |
| Appendix B.18 | LTE Band 66 |
| Appendix B.19 | LTE Band 71 |

---End of Report---