

# TEST REPORT

**Application No.:** SZCR2502000689MO  
**Applicant:** Wuerth Elektronik eiSos GmbH & Co KG  
**Address of Applicant:** Max-Eyth-Strasse 1, Waldenburg, 74638 Germany  
**Manufacturer:** Wuerth Elektronik eiSos GmbH & Co KG  
**Address of Manufacturer:** Max-Eyth-Strasse 1, Waldenburg, 74638 Germany  
**Factory:** Wuerth Elektronik eiSos GmbH & Co KG  
**Address of factory:** Max-Eyth-Strasse 1, Waldenburg, 74638 Germany  
**Equipment Under Test (EUT):**  
**Product Name:** LTE-M / NB-IoT Cellular Module  
**Model No.(EUT):** Adrastea-I 2615011136000  
**Trade Mark:** WE  
**FCC ID:** R7T1501113  
**Standard(s) :** 47 CFR Part 2  
47 CFR Part 22 subpart H  
47 CFR Part 24 subpart E  
47 CFR Part 27 subpart C  
**Date of Receipt:** 2025-02-25  
**Date of Test:** 2025-05-28 to 2025-07-01  
**Date of Issue:** 2025-07-04

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

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

*Keny Xu*

Keny Xu  
EMC Laboratory Manager



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Shenzhen Branch, EMC Laboratory

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| Revision Record |         |            |          |          |
|-----------------|---------|------------|----------|----------|
| Version         | Chapter | Date       | Modifier | Remark   |
| 01              |         | 2025-07-04 |          | Original |
|                 |         |            |          |          |
|                 |         |            |          |          |

|                          |  |                            |  |  |
|--------------------------|--|----------------------------|--|--|
| Authorized for issue by: |  |                            |  |  |
|                          |  | <div>Edison Li</div>       |  |  |
|                          |  | Edison Li/Project Engineer |  |  |
|                          |  | <div>Eric Fu</div>         |  |  |
|                          |  | Eric Fu/Reviewer           |  |  |



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## 2 Test Summary

### CatM1 Band 2

| Test Item                                        | FCC Rule No.       | Requirements                                                                                                                                                                      | Verdict |
|--------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Effective (Isotropic) Radiated Power Output Data | §2.1046<br>§24.232 | EIRP≤2W                                                                                                                                                                           | PASS    |
| Peak-Average Ratio                               | §2.1046<br>§24.232 | ≤13dB                                                                                                                                                                             | PASS    |
| Bandwidth                                        | §2.1049(h)         | OBW: No limit<br>EBW: No limit                                                                                                                                                    | PASS    |
| Band Edge Compliance                             | §2.1051<br>§24.238 | ≤ -13dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.                                                                                          | PASS    |
| Spurious emissions at antenna terminals          | §2.1051<br>§24.238 | ≤ -13 dBm, 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 log10 (P) dB. | PASS    |
| Field strength of spurious radiation             | §2.1053<br>§24.238 | ≤ -13 dBm, 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 log10 (P) dB. | PASS    |
| Frequency stability                              | §2.1055<br>§24.235 | ≤ ±2.5ppm                                                                                                                                                                         | PASS    |

### CatM1 Band 4

| Test Item                                        | FCC Rule No.         | Requirements                                                                                                                                                             | Verdict |
|--------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Effective (Isotropic) Radiated Power Output Data | §2.1046<br>§27.50(d) | EIRP≤1W                                                                                                                                                                  | PASS    |
| Peak-Average Ratio                               | §2.1046<br>§27.50(d) | ≤13dB                                                                                                                                                                    | PASS    |
| Bandwidth                                        | §2.1049(h)           | OBW: No limit<br>EBW: No limit                                                                                                                                           | PASS    |
| Band Edge Compliance                             | §2.1051<br>§27.53(h) | ≤ -13dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.                                                                                 | PASS    |
| Spurious emissions at antenna terminals          | §2.1051<br>§27.53(h) | ≤ -13 dBm, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB. | PASS    |
| Field strength of spurious radiation             | §2.1053<br>§27.53(h) | ≤ -13dBm, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB   | PASS    |
| Frequency stability                              | §2.1055<br>§27.54    | ≤ ±2.5ppm                                                                                                                                                                | PASS    |



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## NB-IoT Band 5

| Test Item                                        | FCC Rule No.       | Requirements                                                                                       | Verdict |
|--------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------|---------|
| Effective (Isotropic) Radiated Power Output Data | §2.1046<br>§22.913 | ERP≤7W                                                                                             | PASS    |
| Peak-Average Ratio                               | §2.1046<br>§22.913 | ≤13dB                                                                                              | PASS    |
| Bandwidth                                        | §2.1049(h)         | OBW: No limit<br>EBW: No limit                                                                     | PASS    |
| Band Edge Compliance                             | §2.1051<br>§22.917 | ≤ -13dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.           | PASS    |
| Spurious emissions at antenna terminals          | §2.1051<br>§22.917 | ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges. | PASS    |
| Field strength of spurious radiation             | §2.1053<br>§22.917 | ≤ -13dBm/100KHz                                                                                    | PASS    |
| Frequency stability                              | §2.1055<br>§22.355 | ≤ ±2.5ppm                                                                                          | PASS    |

## CatM1 Band 12

| Test Item                                        | FCC Rule No.         | Requirements                                                                                                                                                             | Verdict |
|--------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Effective (Isotropic) Radiated Power Output Data | §2.1046<br>§27.50(c) | ERP≤3W                                                                                                                                                                   | PASS    |
| Peak-Average Ratio                               | §2.1046<br>§27.50(c) | ≤13dB                                                                                                                                                                    | PASS    |
| Bandwidth                                        | §2.1049(h)           | OBW: No limit<br>EBW: No limit                                                                                                                                           | PASS    |
| Band Edge Compliance                             | §2.1051<br>§27.53(g) | ≤ -13dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.                                                                                 | PASS    |
| Spurious emissions at antenna terminals          | §2.1051<br>§27.53(g) | ≤ -13 dBm, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB. | PASS    |
| Field strength of spurious radiation             | §2.1053<br>§27.53(g) | ≤ -13dBm, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB   | PASS    |
| Frequency stability                              | §2.1055<br>§27.54    | ≤ ±2.5ppm                                                                                                                                                                | PASS    |



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## 4 General Information

### 4.1 Details of E.U.T.

|                           |                                                                                                |
|---------------------------|------------------------------------------------------------------------------------------------|
| Power supply:             | DC 3.6V powered by Mainboard                                                                   |
| Internal Source:          | More than 108MHz                                                                               |
| Sample Type:              | Fixed device                                                                                   |
| Operation Frequency Band: | CatM1 Band 2, 4, 12<br>NB-IoT Band 5                                                           |
| Modulation Type:          | CatM1 Band: QPSK, 16QAM<br>NB-IoT Band: BPSK, QPSK                                             |
| Antenna Type:             | Monopole antenna                                                                               |
| Antenna Gain:             | CatM1 Band 2: 6.0dBi<br>CatM1 Band 4: 6.0dBi<br>CatM1 Band 12: 3.3dBi<br>NB-IoT Band 5: 3.3dBi |
| Extreme temp. Tolerance:  | -30°C to +50°C                                                                                 |
| Extreme vol. Limits:      | 3.1VDC to 4.3VDC (nominal: 3.6VDC)                                                             |

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### 4.2 Test Environment

| Environment Parameter | Selected Values During Tests |       |
|-----------------------|------------------------------|-------|
| Relative Humidity     | 52%                          |       |
| Atmospheric Pressure: | 1015Pa                       |       |
| Temperature:          | TL                           | -30°C |
|                       | TN                           | +20°C |
|                       | TH                           | +50°C |
| Voltage:              | VL                           | 3.1 V |
|                       | VN                           | 3.6 V |
|                       | VH                           | 4.3 V |

NOTE: VL= lower extreme test voltage  
VN= nominal voltage  
VH= upper extreme test voltage  
TL= lower extreme test temperature  
TN= normal temperature  
TH= upper extreme test temperature



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## 4.3 Test Frequency

| Test Mode     | Nominal Bandwidth (MHz) | RF Channel |            |          |
|---------------|-------------------------|------------|------------|----------|
|               |                         | Low (L)    | Middle (M) | High (H) |
|               |                         | MHz        | MHz        | MHz      |
| CatM1 Band 2  | 1.4                     | 1850.7     | 1880       | 1909.3   |
|               | 3                       | 1850.87    | 1879.37    | 1909.13  |
|               | 5                       | 1850.79    | 1878.29    | 1909.21  |
|               | 10                      | 1851.22    | 1876.22    | 1908.78  |
|               | 15                      | 1851.47    | 1873.97    | 1908.53  |
|               | 20                      | 1851.9     | 1871.9     | 1908.1   |
| Test Mode     | Nominal Bandwidth (MHz) | RF Channel |            |          |
|               |                         | Low (L)    | Middle (M) | High (H) |
|               |                         | MHz        | MHz        | MHz      |
| CatM1 Band 4  | 1.4                     | 1710.7     | 1732.5     | 1754.3   |
|               | 3                       | 1710.87    | 1731.87    | 1754.13  |
|               | 5                       | 1710.79    | 1730.79    | 1754.21  |
|               | 10                      | 1711.22    | 1728.72    | 1753.78  |
|               | 15                      | 1711.47    | 1726.47    | 1753.53  |
|               | 20                      | 1711.9     | 1724.4     | 1753.1   |
| Test Mode     | Nominal Bandwidth (MHz) | RF Channel |            |          |
|               |                         | Low (L)    | Middle (M) | High (H) |
|               |                         | MHz        | MHz        | MHz      |
| CatM1 Band 12 | 1.4                     | 699.7      | 707.5      | 715.3    |
|               | 3                       | 699.87     | 706.87     | 715.13   |
|               | 5                       | 699.79     | 705.79     | 715.21   |
|               | 10                      | 700.22     | 703.72     | 714.78   |

| Test Mode     | Subcarrier Spacing (KHz) | RF Channel |            |          |
|---------------|--------------------------|------------|------------|----------|
|               |                          | Low (L)    | Middle (M) | High (H) |
|               |                          | MHz        | MHz        | MHz      |
| NB-IoT Band 5 | 3.75                     | 824.2      | 836.5      | 848.8    |
|               | 15                       | 824.2      | 836.5      | 848.8    |



## 4.4 Description of Support Units

| Description                         | Manufacturer       | Model No.                                                      | Serial No.                                                      |
|-------------------------------------|--------------------|----------------------------------------------------------------|-----------------------------------------------------------------|
| Wideband Radio Communication Tester | Rohde & Schwarz    | CMW 500                                                        | SEM010-08                                                       |
| RF Cable                            | SGS                | N/A<br>(B2/B4 Cable loss:1.2dBi,<br>B5/B12 Cable loss:0.8dBi,) | N/A                                                             |
| AC/DC Adapter                       | VOLTCRAFT          | FPPS 5-5W                                                      | Input: AC 100-240V, 50/60Hz, 155mA; Output: DC 5.0V, 1.0A, 5.0W |
| Mainboard                           | Provided by client | HW-V3                                                          | 261512923xxxx                                                   |

## 4.5 Measurement Uncertainty

| No. | Item                            | Measurement Uncertainty         |
|-----|---------------------------------|---------------------------------|
| 1   | Radio Frequency                 | $\pm 5.4 \times 10^{-8}$        |
| 2   | Duty cycle                      | $\pm 0.3\%$                     |
| 3   | Occupied Bandwidth              | $\pm 3\%$                       |
| 4   | RF conducted power              | $\pm 0.8\text{dB}$              |
| 5   | RF power density                | $\pm 0.4\text{dB}$              |
| 6   | Conducted Spurious emissions    | $\pm 2.7\text{dB}$              |
| 7   | Radiated Spurious emission test | $\pm 3.1\text{dB}$ (Below 1GHz) |
|     |                                 | $\pm 4.4\text{dB}$ (Above 1GHz) |
| 8   | Temperature test                | $\pm 1^\circ\text{C}$           |
| 9   | Humidity test                   | $\pm 3\%$                       |
| 10  | Supply voltages                 | $\pm 1.5\%$                     |
| 11  | Time                            | $\pm 3\%$                       |



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### 4.6 Test Location

All tests were performed at:

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No tests were sub-contracted.

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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. Shenzhen EMC laboratory 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: CN1336

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

Designation Number: CN1336. Test Firm Registration Number: 787754.

#### • Innovation, Science and Economic Development Canada

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

CAB identifier: CN0006.

IC#: 4620C.

### 4.8 Deviation from Standards

None

### 4.9 Abnormalities from Standard Conditions

None



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## 5 Equipment List

| Radiated spurious emissions          |                 |                 |              |            |              |
|--------------------------------------|-----------------|-----------------|--------------|------------|--------------|
| Equipment                            | Manufacturer    | Model No        | Inventory No | Cal Date   | Cal Due Date |
| MXE EMI receiver(3Hz-3.6GHz)         | KEYSIGHT        | N9038B          | SEM004-29    | 2024/8/14  | 2025/8/13    |
| Signal &Spectrum Analyzer            | Rohde & Schwarz | FSV             | SZ-WRG-M-048 | 2025/1/7   | 2026/1/6     |
| Pre-amplifier(30MHz-1GHz)            | SGS             | AMP30M1G30      | SEM005-33    | 2025/3/4   | 2026/3/3     |
| Low Noise Amplifier 30M-8GHz         | Tonscend        | TAP30M8G30      | SZ-WRG-M-050 | 2025/1/7   | 2026/1/6     |
| Low Noise Amplifier 1G-18GHz         | Tonscend        | TAP01018050     | SZ-WRG-M-051 | 2025/1/7   | 2026/1/6     |
| Low Noise Amplifier 18G-40GHz        | Tonscend        | TAP18040048     | SZ-WRG-M-052 | 2025/1/8   | 2026/1/7     |
| Active Loop Antenna 9kHz-30MHz       | SCHWARZBECK     | FMZB 1519B      | SZ-WRG-M-053 | 2023/12/25 | 2025/12/24   |
| TRILOG Breitband Antenne 30MHz-1GHz  | SCHWARZBECK     | VULB 9168       | SZ-WRG-M-054 | 2023/12/25 | 2025/12/24   |
| Double Ridge Horn Antenna 1GHz-18GHz | SCHWARZBECK     | BBHA 9120 D     | SZ-WRG-M-055 | 2023/12/21 | 2025/12/20   |
| SHF-EHF Horn 15GHz-40GHz             | SCHWARZBECK     | BBHA 9170       | SZ-WRG-M-056 | 2023/12/25 | 2025/12/24   |
| RSE Test Software                    | Tonscend        | JS32-RSE V4.0.0 | SZ-WRG-M-058 | NCR        | NCR          |
| RE Test Software                     | Tonscend        | JS32-RE V4.0.0  | SZ-WRG-M-059 | NCR        | NCR          |
| Measurement Software                 | AUDIX           | e3 V8.2014-6-27 | NCR          | NCR        | NCR          |
| Chamber                              | CRTSGSSAC966    | N/A             | SZ-WRG-C-063 | 2025/1/6   | 2028/1/5     |
| Humidity/ Temperature Indicator      | Deli            | 8838            | SEM002-46    | 2024/7/24  | 2025/7/23    |
| Spectrum Analyzer                    | Keysight        | N9020A          | SZ-WRG-M-002 | 2024/8/17  | 2025/8/16    |
| Radio Communication Tester           | Anriesu         | MT8821C         | SZ-WRG-M-014 | 2024/8/19  | 2025/8/18    |
| Radio Communication Tester           | STARPOINT       | SP9500          | SZ-WRG-M-083 | 2025/5/22  | 2026/5/21    |



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SZEMC-TRF-01 Rev. A/1

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| RF Conducted Test                         |                              |               |               |            |              |
|-------------------------------------------|------------------------------|---------------|---------------|------------|--------------|
| Equipment                                 | Manufacturer                 | Model No.     | Inventory No. | Cal Date   | Cal Due Date |
| Shielding Room                            | AUDIX                        | N/A           | SEM001-08     | 2025-05-16 | 2028-05-15   |
| EXA Signal Analyzer                       | KEYSIGHT                     | N9010A        | SEM004-09     | 2025-03-03 | 2026-03-02   |
| EXA Signal Analyzer                       | KEYSIGHT                     | N9020B        | SEM004-24     | 2025/3/3   | 2026/3/2     |
| DC Power Supply                           | KEYSIGHT                     | E3642A        | SEM011-07     | 2025-02-26 | 2026-02-25   |
| Manual Step Attenuator                    | KEYSIGHT                     | 8494B         | SEM021-05     | 2025-03-03 | 2026-03-02   |
| Manual Step Attenuator                    | KEYSIGHT                     | 8496B         | SEM021-06     | 2025-03-03 | 2026-03-02   |
| Power Sensor                              | TST PASS                     | TSPS2023R     | SEM009-26     | 2025-03-04 | 2026-03-03   |
| Power Sensor                              | TST PASS                     | TSPS2023R     | SEM009-27     | 2025-03-04 | 2026-03-03   |
| Power Sensor                              | TST PASS                     | TSPS2023R     | SEM009-28     | 2025-03-04 | 2026-03-03   |
| Power Sensor                              | TST PASS                     | TSPS2023R     | SEM009-29     | 2025-03-04 | 2026-03-03   |
| Programmable Temperature&Humidity Chamber | Votsch Industrietechnik GmbH | VT 4002       | SEM002-15     | 2025-02-26 | 2026-02-25   |
| Measurement Software                      | TST PASS                     | TST PASS V2.0 | N/A           | N/A        | N/A          |
| Coaxial Cable                             | SGS                          | N/A           | SEM028-01     | 2024-07-06 | 2025-07-05   |
|                                           |                              |               |               | 2025-07-04 | 2026-07-03   |
| Signal Generator                          | KEYSIGHT                     | N5171B        | SEM006-13     | 2025-03-03 | 2026-03-02   |
| Universal Radio Communication Tester      | Rohde&Schwarz                | CMW500        | SEM010-08     | 2025-03-04 | 2026-03-03   |

| General used equipment          |                                           |           |               |            |              |
|---------------------------------|-------------------------------------------|-----------|---------------|------------|--------------|
| Equipment                       | Manufacturer                              | Model No. | Inventory No. | Cal Date   | Cal Due Date |
| Humidity/ Temperature Indicator | deli                                      | 8838      | SEM002-32     | 2024-07-24 | 2025-07-23   |
| Humidity/ Temperature Indicator | deli                                      | 8838      | SEM002-33     | 2024-07-24 | 2025-07-23   |
| Barometer                       | Changchun Meteorological Industry Factory | DYM3      | SEM002-01     | 2025-03-03 | 2026-03-02   |



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## 6 Radio Spectrum Matter Test Results

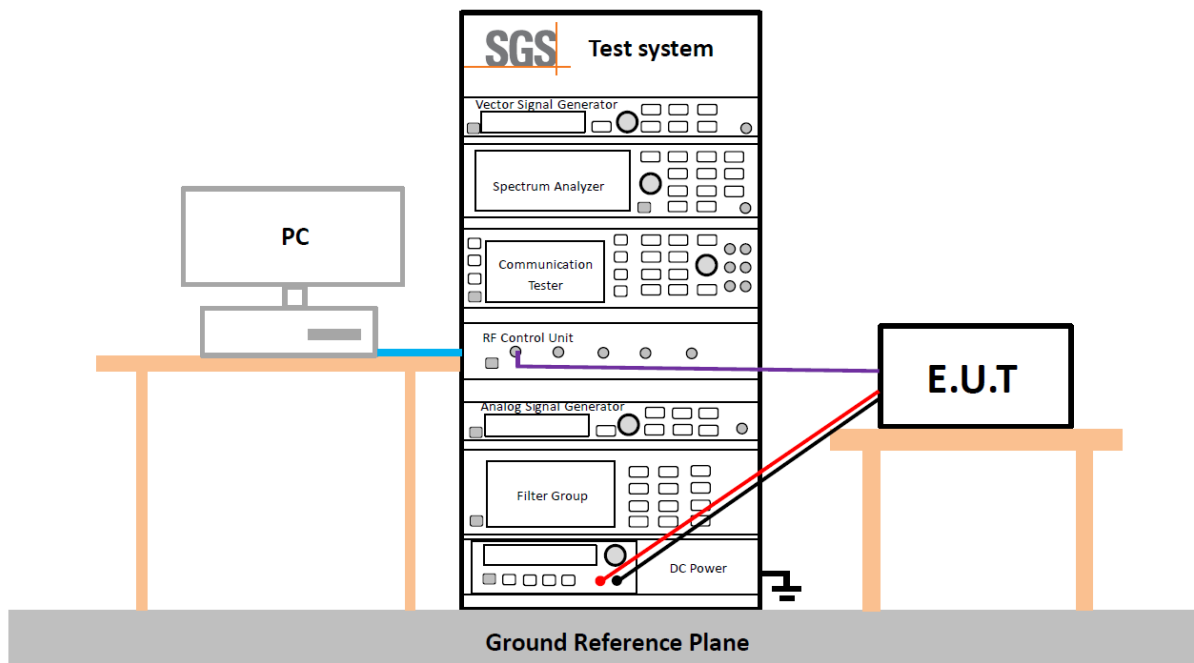
### 6.1 Effective (Isotropic) Radiated Power Output Data

Test Requirement: Reference test summary  
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01  
 Limit: Reference test summary

#### 6.1.1 E.U.T. Operation

Operating Environment:  
 Temperature: 23.1 °C Humidity: 52.7 % RH Atmospheric Pressure: 1020 mbar  
 Test mode: 02: Tx mode, Keep the EUT in transmitting mode.

#### 6.1.2 Test Setup Diagram



## 6.1.3 Measurement Data

KDB 971168 D01 V03r01 Section 5.2.1; ANSI C63.26-2015 Section 5.2

Some radio service rule parts specify the RF output power limits in terms of total average power or total average ERP or EIRP. Total average power is often implied when the limit is stated as average but no reference bandwidth is specified. When average power measurements are permitted, there may also be a limit imposed on the peak-to-average power ratio (PAPR) of the signal.

When average limits are specified, the averaging is to be performed only over durations of active transmissions at maximum output power level (i.e., averaging over the symbol transitions particular to the applied modulation scheme). For licensed digital transmitters, average measurements do not include averaging over periods when the transmitter is quiescent or when operating at reduced power levels.

Thus, for burst transmissions, the EUT must either be configured to transmit continuously at full power while the compliance measurement is performed, or the measurement instrumentation must be configured to acquire data only over durations when the EUT is actively transmitting at full power. A spectrum/signal analyzer, an EMI receiver or an average-reading power meter can be used to perform this measurement as long as the above condition can be realized.

Additionally, when using a spectrum/signal analyzer to perform an average power measurement, the number of measurement points in each sweep must be set greater than or equal to twice the span divided by the RBW (# measurement points  $\geq 2 \times \text{span} / \text{RBW}$ ). This will ensure a bin-to-bin spacing that is less than or equal to the RBW / 2, so that narrowband signals are not lost between frequency bins.

KDB 971168 D01 V03r01 Section 5.8.4; ANSI C63.26-2015 Section 5.2

It is often more convenient to measure the field strength in a radiated measurement and then mathematically convert the measured level to an equivalent power level for comparison to the applicable limit. The following relationships can be used to facilitate using radiated measurement data to demonstrate compliance to the relevant conducted output power limits (assuming that all radiated data was collected in the far-field region of both transmit and receive antennas):

- a)  $E \text{ (dB}\mu\text{V/m)} = \text{Measured amplitude level (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$ .
- b)  $E \text{ (dB}\mu\text{V/m)} = \text{Measured amplitude level (dBm)} + 107 + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$ .
- c)  $E \text{ (dB}\mu\text{V/m)} = \text{EIRP (dBm)} - 20 \log D + 104.8$ ; where D is the measurement distance in meters.
- d)  $\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20 \log D - 104.8$ ; where D is the measurement distance in meters.
- e)  $\text{ERP} = \text{EIRP} - 2.15 \text{ (dB)}$ ; where ERP and EIRP are expressed in consistent units.
- f)  $\text{EIRP} = \text{ERP} + 2.15 \text{ (dB)}$ ; ERP and EIRP are expressed in consistent units.

Note that the antenna factor is typically only provided for standard measurement distances (e.g., 1 m and/or 3 m), and thus may be a deciding factor in choosing what measurement distance to use.

Please refer to Appendix CatM1 band 2, Appendix CatM1 band 4, Appendix CatM1 band 12, Appendix NB-IoT band 5.



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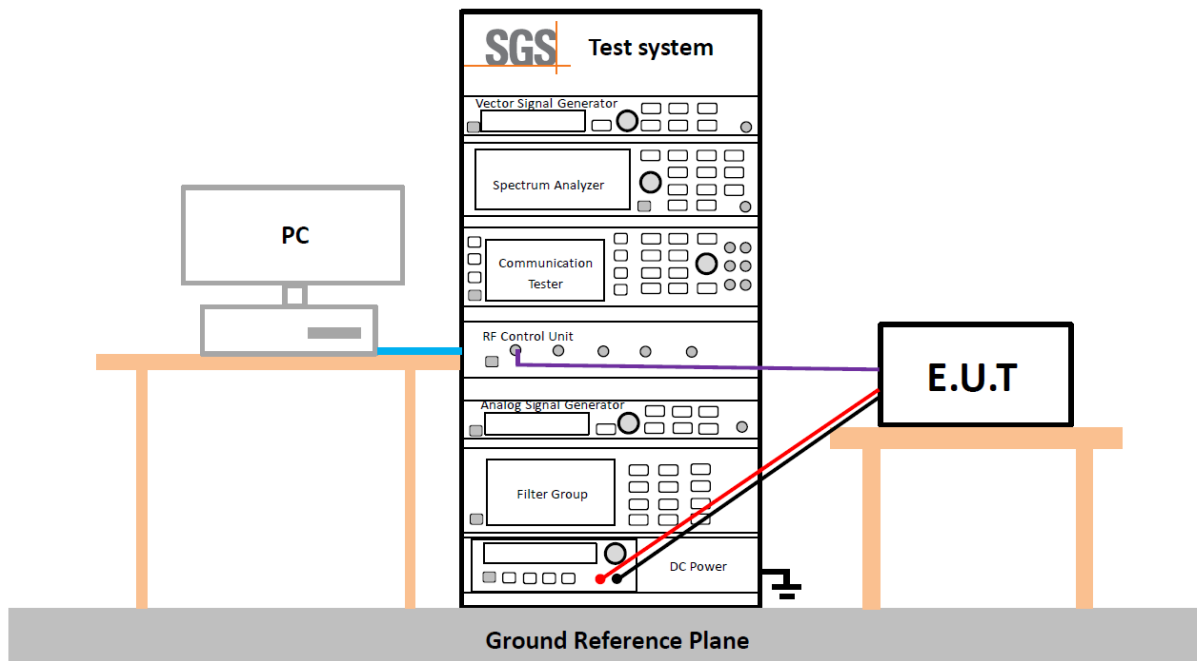
### 6.2 Peak-Average Ratio

Test Requirement: Reference test summary  
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01  
 Limit: ≤13dB

#### 6.2.1 E.U.T. Operation

Operating Environment:  
 Temperature: 23.1 °C Humidity: 52.7 % RH Atmospheric Pressure: 1020 mbar  
 Test mode: 02: Tx mode, Keep the EUT in transmitting mode.

#### 6.2.2 Test Setup Diagram



## 6.2.3 Measurement Data

KDB 971168 D01 V03r01 Section 5.7.2; ANSI C63.26-2015 Section 5.2.3.4

The inherent randomness of the power peaks in a noise-like signal and the wide bandwidths associated with modern technologies makes it difficult to quantify the peak power using traditional measurement techniques. Because the peak power of a noise-like signal is predictable only on a statistical basis, a statistical measurement of the peak power is preferred.

CCDF curves provide a means for characterizing the power peaks of a noise-like signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation offers the capability to produce CCDF curves for a noise-like input signal.

See instrumentation-specific application literature for further guidance regarding use of the CCDF capability. The following guidelines are offered for performing a CCDF measurement.

- a) Set resolution/measurement bandwidth  $\geq$  OBW or specified reference bandwidth.
- b) Set the number of counts to a value that stabilizes the measured CCDF curve.
- c) Set the measurement interval as follows:
  - 1) For continuous transmissions, set to the greater of  $[10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$  or 1 ms.
  - 2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
  - 3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
- d) Record the maximum PAPR level associated with a probability of 0.1%.
- e) The peak power level is calculated from the sum of the PAPR value from step d) to the measured average power.

Please refer to Appendix CatM1 band 2, Appendix CatM1 band 4, Appendix CatM1 band 12, Appendix NB-IoT band 5.

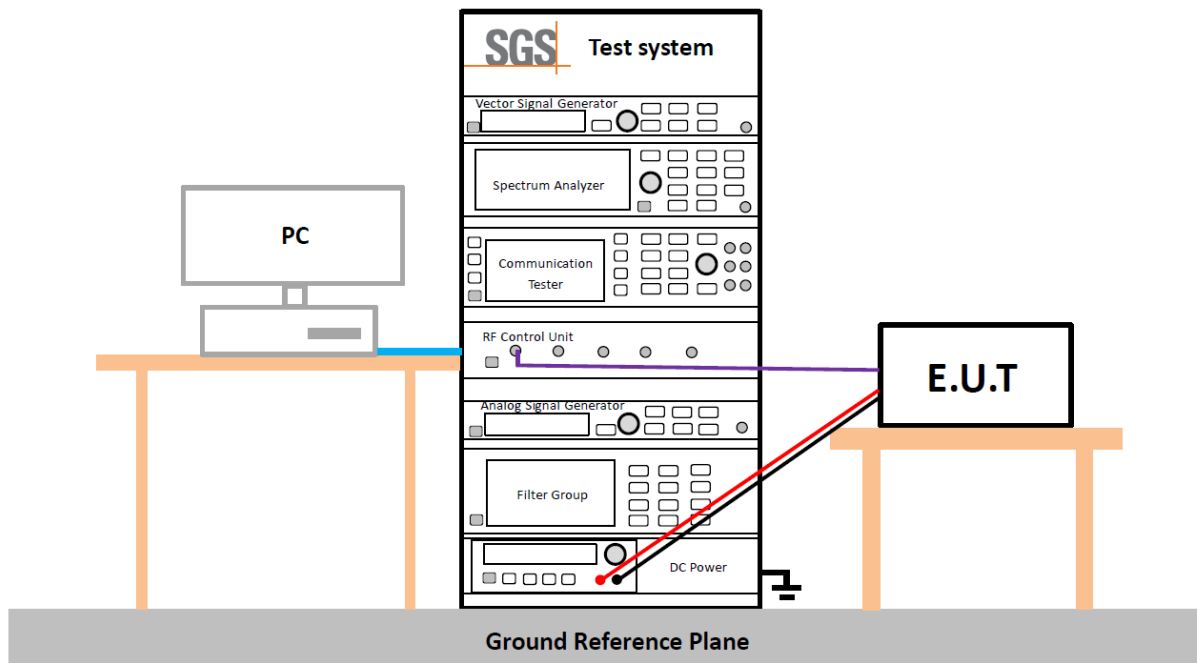
### 6.3 Bandwidth

Test Requirement: Reference test summary  
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01  
 Limit: OBW: No limit  
 EBW: No limit

#### 6.3.1 E.U.T. Operation

Operating Environment:  
 Temperature: 23.1 °C Humidity: 52.7 % RH Atmospheric Pressure: 1020 mbar  
 Test mode: 02: Tx mode, Keep the EUT in transmitting mode.

#### 6.3.2 Test Setup Diagram



## 6.3.3 Measurement Data

KDB 971168 D01 V03r01 Section 4.2 & 4.3; ANSI C63.26-2015 Section 5.4.3

The OBW is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). The typical ratio for transmitters is -26 dB, corresponding to the 26 dB BW; however, other ratios can be specified. In this subclause, the ratio is designated by “-X dB.”

NOTE—This parameter, when expressed in relative terms, is often referred to in regulations as the EBW.

The reference level is either the amplitude of the unmodulated carrier, or the highest amplitude of the spectral envelope of the modulated signal, as stated by the applicable requirement. Some requirements can specify a particular maximum or minimum value for the “-X dB” bandwidth; other requirements can specify that the “-X dB” bandwidth be entirely contained within the authorized or designated frequency band.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.

b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set  $\geq 3 \times \text{RBW}$ .

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.

e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

f) Determine the reference value by either of the following:

1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.

g) Determine the “-X dB amplitude” as equal to (Reference Value - X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

h) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).

i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.



The spectral envelope can cross the “-X dB amplitude” at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the “-X dB amplitude.”

j) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

## ANSI C63.26-2015 Section 5.4.4

The OBW is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring (99%) power bandwidth:31

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of  $1.5 \times \text{OBW}$  is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set  $\geq 3 \times \text{RBW}$ .

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Please refer to Appendix CatM1 band 2, Appendix CatM1 band 4, Appendix CatM1 band 12, Appendix NB-IoT band 5.



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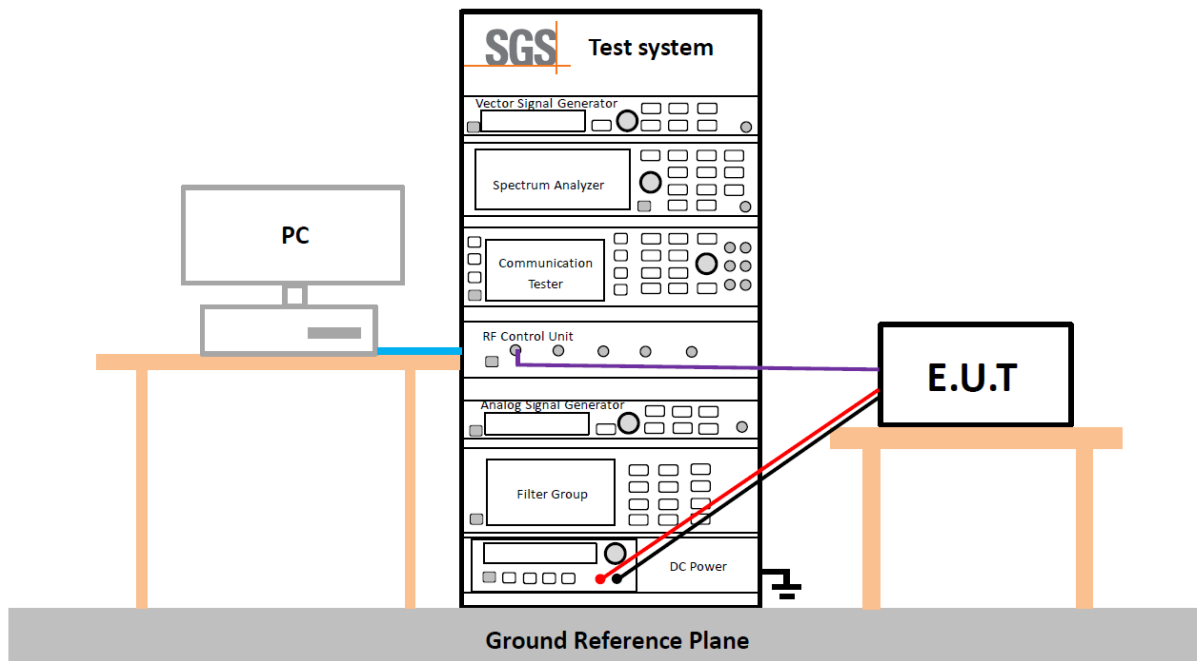
### 6.4 Band Edge Compliance

Test Requirement: Reference test summary  
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01  
 Limit: Reference test summary

#### 6.4.1 E.U.T. Operation

Operating Environment:  
 Temperature: 23.1 °C Humidity: 52.7 % RH Atmospheric Pressure: 1020 mbar  
 Test mode: 02: Tx mode, Keep the EUT in transmitting mode.

#### 6.4.2 Test Setup Diagram



## 6.4.3 Measurement Data

KDB 971168 D01 V03r01 Section 6.0; ANSI C63.26-2015 Section 5.7

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 peak or peak hold power.

### 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.  $RBW \geq 1\%$  of the emission bandwidth
4.  $VBW \geq 3 \times RBW$
5. Detector = RMS
6. Number of sweep points  $\geq 2 \times \text{Span}/RBW$
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

Please refer to Appendix CatM1 band 2, Appendix CatM1 band 4, Appendix CatM1 band 12, Appendix NB-IoT band 5.



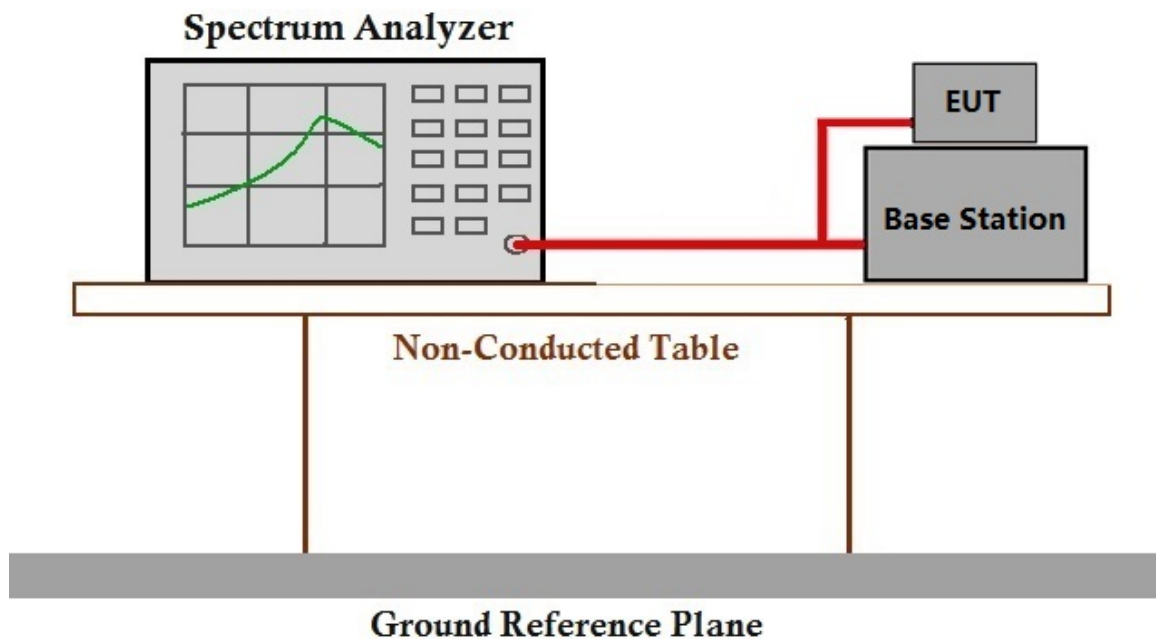
### 6.5 Spurious emissions at antenna terminals

Test Requirement: Reference test summary  
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01  
 Limit: Reference test summary

#### 6.5.1 E.U.T. Operation

Operating Environment:  
 Temperature: 23.1 °C Humidity: 52.7 % RH Atmospheric Pressure: 1020 mbar  
 Test mode: 02: Tx mode, Keep the EUT in transmitting mode.

#### 6.5.2 Test Setup Diagram



#### 6.5.3 Measurement Data

Please refer to Appendix CatM1 band 2, Appendix CatM1 band 4, Appendix CatM1 band 12, Appendix NB-IoT band 5.

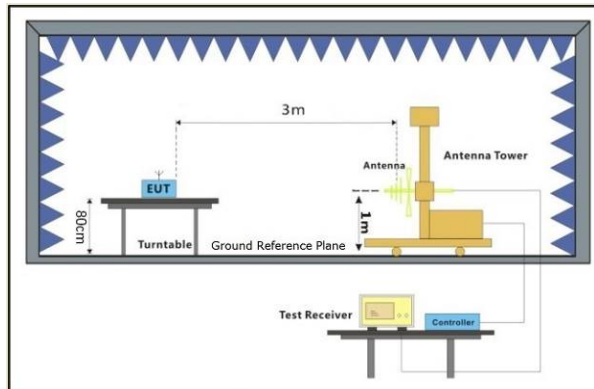
### 6.6 Field strength of spurious radiation

Test Requirement: Reference test summary  
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01  
 Limit: Reference test summary

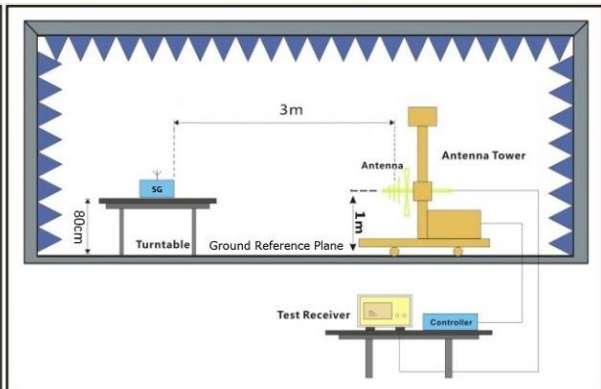
#### 6.6.1 E.U.T. Operation

Operating Environment:  
 Temperature: 23.1 °C Humidity: 52.7 % RH Atmospheric Pressure: 1020 mbar  
 Test mode: 02: Tx mode, Keep the EUT in transmitting mode.

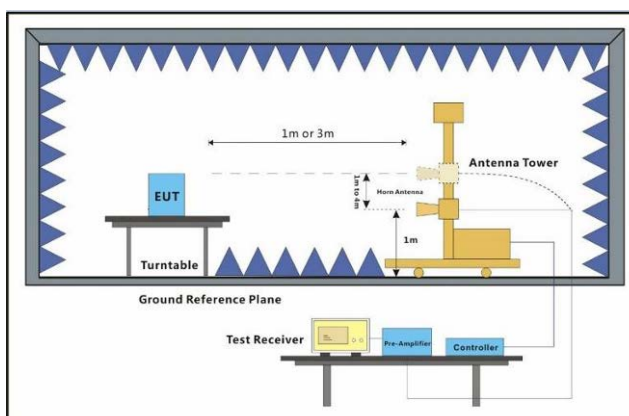
#### 6.6.2 Test Setup Diagram



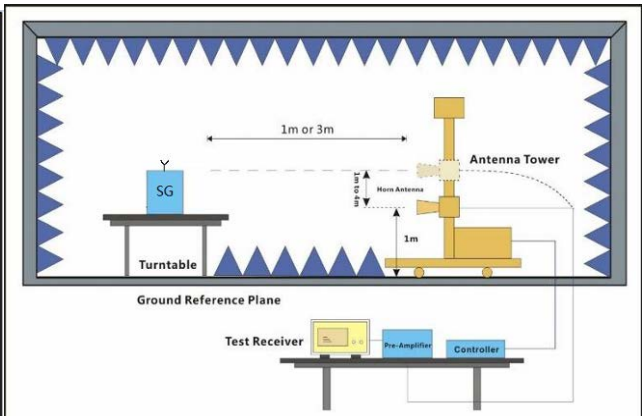
EUT



Substitute Antenna+Signal Generator



EUT



Substitute Antenna+Signal Generator

## 6.6.3 Measurement Procedure and Data

KDB 971168 D01 V03r01 Section 5.8; ANSI C63.26-2015 Section 5.5

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.

$E \text{ (dB}\mu\text{V/m)} = \text{Measured amplitude level (dB}\mu\text{V)} + (\text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)} - \text{AMP(dB)})$

$\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20 \log D - 104.8$ ; 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:  
 $E \text{ (dB}\mu\text{V/m)} = \text{Measured amplitude level (dB}\mu\text{V)} + (\text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)} - \text{AMP(dB)})$   
 $\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20 \log D - 104.8$ ; 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  $20 \cdot \log(3/1) = 9.54 \text{ dB}$ .

Remark: Reference test setup 2

Remark:

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

$\text{AF} = \text{Antenna Factor(dB/m)}$

$\text{Factor} = \text{Cable Factor(dB)} - \text{Preamplifier (dB)}$

$\text{Level} = \text{Reading Level} + \text{AF} + \text{Factor} - 95.26$

$\text{Margin} = \text{Limit} - \text{Level}$



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- 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.



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| LTE CATM1 Band 2-Low channel, Modulation: QPSK, Bandwidth:20MHz, 1RB#0 |            |             |                 |                  |                 |                    |                    |        |
|------------------------------------------------------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)                                                        | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 3702.0                                                                 | -50.48     | -13         | -37.48          | -55.34           | 3.58            | 8.44               | Horizontal         | Pass   |
| 5553.0                                                                 | -61.32     | -13         | -48.32          | -67.03           | 4.74            | 10.45              | Horizontal         | Pass   |
| 7404.0                                                                 | -59.83     | -13         | -46.83          | -66.51           | 4.94            | 11.62              | Horizontal         | Pass   |
| 3702.0                                                                 | -44.63     | -13         | -31.63          | -49.49           | 3.58            | 8.44               | Vertical           | Pass   |
| 5553.0                                                                 | -55.94     | -13         | -42.94          | -61.65           | 4.74            | 10.45              | Vertical           | Pass   |
| 7404.0                                                                 | -57.78     | -13         | -44.78          | -64.46           | 4.94            | 11.62              | Vertical           | Pass   |

| LTE CATM1 Band 2-Middle channel, Modulation: QPSK, Bandwidth:20MHz, 1RB#0 |            |             |                 |                  |                 |                    |                    |        |
|---------------------------------------------------------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)                                                           | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 3742.0                                                                    | -44.69     | -13         | -31.69          | -49.57           | 3.61            | 8.49               | Horizontal         | Pass   |
| 5613.0                                                                    | -59.73     | -13         | -46.73          | -65.44           | 4.74            | 10.45              | Horizontal         | Pass   |
| 7484.0                                                                    | -58.8      | -13         | -45.8           | -65.58           | 4.94            | 11.72              | Horizontal         | Pass   |
| 3742.0                                                                    | -44.15     | -13         | -31.15          | -49.03           | 3.61            | 8.49               | Vertical           | Pass   |
| 5613.0                                                                    | -57.1      | -13         | -44.1           | -62.81           | 4.74            | 10.45              | Vertical           | Pass   |
| 7484.0                                                                    | -57.06     | -13         | -44.06          | -63.84           | 4.94            | 11.72              | Vertical           | Pass   |

| LTE CATM1 Band 2-High channel, Modulation: QPSK, Bandwidth:20MHz, 1RB#0 |            |             |                 |                  |                 |                    |                    |        |
|-------------------------------------------------------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)                                                         | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 3782.0                                                                  | -47.08     | -13         | -34.08          | -51.98           | 3.65            | 8.55               | Horizontal         | Pass   |
| 5673.0                                                                  | -61.56     | -13         | -48.56          | -67.26           | 4.75            | 10.45              | Horizontal         | Pass   |
| 7564.0                                                                  | -59.84     | -13         | -46.84          | -66.71           | 4.95            | 11.82              | Horizontal         | Pass   |
| 3782.0                                                                  | -44.95     | -13         | -31.95          | -49.85           | 3.65            | 8.55               | Vertical           | Pass   |
| 5673.0                                                                  | -56.65     | -13         | -43.65          | -62.35           | 4.75            | 10.45              | Vertical           | Pass   |
| 7564.0                                                                  | -59.22     | -13         | -46.22          | -66.09           | 4.95            | 11.82              | Vertical           | Pass   |



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| LTE CATM1 Band 4-Low channel, Modulation: QPSK, Bandwidth:20MHz, 1RB#0 |            |             |                 |                  |                 |                    |                    |        |
|------------------------------------------------------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)                                                        | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 3422.0                                                                 | -51.05     | -13         | -38.05          | -55.67           | 3.36            | 7.98               | Horizontal         | Pass   |
| 5133.0                                                                 | -61.28     | -13         | -48.28          | -66.89           | 4.61            | 10.22              | Horizontal         | Pass   |
| 6844.0                                                                 | -58.44     | -13         | -45.44          | -64.47           | 4.9             | 10.93              | Horizontal         | Pass   |
| 3422.0                                                                 | -43.98     | -13         | -30.98          | -48.6            | 3.36            | 7.98               | Vertical           | Pass   |
| 5133.0                                                                 | -57.23     | -13         | -44.23          | -62.84           | 4.61            | 10.22              | Vertical           | Pass   |
| 6844.0                                                                 | -57.1      | -13         | -44.1           | -63.13           | 4.9             | 10.93              | Vertical           | Pass   |

| LTE CATM1 Band 4-Middle channel, Modulation: QPSK, Bandwidth:20MHz, 1RB#0 |            |             |                 |                  |                 |                    |                    |        |
|---------------------------------------------------------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)                                                           | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 3447.0                                                                    | -50.76     | -13         | -37.76          | -55.43           | 3.37            | 8.04               | Horizontal         | Pass   |
| 5170.5                                                                    | -60.87     | -13         | -47.87          | -66.5            | 4.62            | 10.25              | Horizontal         | Pass   |
| 6894.0                                                                    | -59.49     | -13         | -46.49          | -65.58           | 4.9             | 10.99              | Horizontal         | Pass   |
| 3447.0                                                                    | -45.19     | -13         | -32.19          | -49.86           | 3.37            | 8.04               | Vertical           | Pass   |
| 5170.5                                                                    | -57.55     | -13         | -44.55          | -63.18           | 4.62            | 10.25              | Vertical           | Pass   |
| 6894.0                                                                    | -56.06     | -13         | -43.06          | -62.15           | 4.9             | 10.99              | Vertical           | Pass   |

| LTE CATM1 Band 4-High channel, Modulation: QPSK, Bandwidth:20MHz, 1RB#0 |            |             |                 |                  |                 |                    |                    |        |
|-------------------------------------------------------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)                                                         | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 3472.0                                                                  | -52.63     | -13         | -39.63          | -57.34           | 3.39            | 8.1                | Horizontal         | Pass   |
| 5208.0                                                                  | -60.5      | -13         | -47.5           | -66.13           | 4.64            | 10.27              | Horizontal         | Pass   |
| 6944.0                                                                  | -60.17     | -13         | -47.17          | -66.32           | 4.91            | 11.06              | Horizontal         | Pass   |
| 3472.0                                                                  | -44.38     | -13         | -31.38          | -49.09           | 3.39            | 8.1                | Vertical           | Pass   |
| 5208.0                                                                  | -54.55     | -13         | -41.55          | -60.18           | 4.64            | 10.27              | Vertical           | Pass   |
| 6944.0                                                                  | -56.84     | -13         | -43.84          | -62.99           | 4.91            | 11.06              | Vertical           | Pass   |



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| LTE CATM1 Band 12-Low channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0 |            |             |                 |                  |                 |                    |                    |        |
|-------------------------------------------------------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)                                                         | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 1399.0                                                                  | -48.69     | -13         | -35.69          | -51.46           | 2.47            | 5.24               | Horizontal         | Pass   |
| 2098.5                                                                  | -69.35     | -13         | -56.35          | -71.42           | 2.79            | 4.86               | Horizontal         | Pass   |
| 2798.0                                                                  | -68.42     | -13         | -55.42          | -71.78           | 3.12            | 6.48               | Horizontal         | Pass   |
| 1399.0                                                                  | -53.42     | -13         | -40.42          | -56.19           | 2.47            | 5.24               | Vertical           | Pass   |
| 2098.5                                                                  | -68.77     | -13         | -55.77          | -70.84           | 2.79            | 4.86               | Vertical           | Pass   |
| 2798.0                                                                  | -67.99     | -13         | -54.99          | -71.35           | 3.12            | 6.48               | Vertical           | Pass   |

| LTE CATM1 Band 12-Middle channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0 |            |             |                 |                  |                 |                    |                    |        |
|----------------------------------------------------------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)                                                            | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 1406.0                                                                     | -48.38     | -13         | -35.38          | -51.18           | 2.48            | 5.28               | Horizontal         | Pass   |
| 2109.0                                                                     | -69.53     | -13         | -56.53          | -71.61           | 2.8             | 4.88               | Horizontal         | Pass   |
| 2812.0                                                                     | -68.4      | -13         | -55.4           | -71.79           | 3.12            | 6.51               | Horizontal         | Pass   |
| 1406.0                                                                     | -54.05     | -13         | -41.05          | -56.85           | 2.48            | 5.28               | Vertical           | Pass   |
| 2109.0                                                                     | -69.38     | -13         | -56.38          | -71.46           | 2.8             | 4.88               | Vertical           | Pass   |
| 2812.0                                                                     | -68.21     | -13         | -55.21          | -71.6            | 3.12            | 6.51               | Vertical           | Pass   |

| LTE CATM1 Band 12-High channel, Modulation: QPSK, Bandwidth:10MHz, 1RB#0 |            |             |                 |                  |                 |                    |                    |        |
|--------------------------------------------------------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)                                                          | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 1413.0                                                                   | -69.08     | -13         | -56.08          | -71.92           | 2.49            | 5.33               | Horizontal         | Pass   |
| 2119.5                                                                   | -69.33     | -13         | -56.33          | -71.43           | 2.81            | 4.91               | Horizontal         | Pass   |
| 2826.0                                                                   | -68.13     | -13         | -55.13          | -71.54           | 3.13            | 6.54               | Horizontal         | Pass   |
| 1413.0                                                                   | -68.89     | -13         | -55.89          | -71.73           | 2.49            | 5.33               | Vertical           | Pass   |
| 2119.5                                                                   | -69.27     | -13         | -56.27          | -71.37           | 2.81            | 4.91               | Vertical           | Pass   |
| 2826.0                                                                   | -68.28     | -13         | -55.28          | -71.69           | 3.13            | 6.54               | Vertical           | Pass   |



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

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| NBIOT Band 5-Low channel |            |             |                 |                  |                 |                    |                    |        |
|--------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)          | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 1649.0                   | -70.45     | -13         | -57.45          | -73.33           | 2.62            | 5.5                | Horizontal         | Pass   |
| 2473.5                   | -52.5      | -13         | -39.5           | -55.2            | 3.06            | 5.76               | Horizontal         | Pass   |
| 3318.471                 | -64.53     | -13         | -51.53          | -68.94           | 3.31            | 7.72               | Horizontal         | Pass   |
| 1649.0                   | -60.69     | -13         | -47.69          | -63.57           | 2.62            | 5.5                | Vertical           | Pass   |
| 2473.5                   | -39.97     | -13         | -26.97          | -42.67           | 3.06            | 5.76               | Vertical           | Pass   |
| 3318.471                 | -59.68     | -13         | -46.68          | -64.09           | 3.31            | 7.72               | Vertical           | Pass   |

| NBIOT Band 5-Middle channel |            |             |                 |                  |                 |                    |                    |        |
|-----------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)             | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 1672.779                    | -69.93     | -13         | -56.93          | -72.74           | 2.63            | 5.44               | Horizontal         | Pass   |
| 2507.129                    | -52.96     | -13         | -39.96          | -55.72           | 3.08            | 5.84               | Horizontal         | Pass   |
| 3347.371                    | -63.09     | -13         | -50.09          | -67.56           | 3.32            | 7.79               | Horizontal         | Pass   |
| 1672.779                    | -63.87     | -13         | -50.87          | -66.68           | 2.63            | 5.44               | Vertical           | Pass   |
| 2507.129                    | -41.66     | -13         | -28.66          | -44.42           | 3.08            | 5.84               | Vertical           | Pass   |
| 3347.371                    | -58.82     | -13         | -45.82          | -63.29           | 3.32            | 7.79               | Vertical           | Pass   |

| NBIOT Band 5-High channel |            |             |                 |                  |                 |                    |                    |        |
|---------------------------|------------|-------------|-----------------|------------------|-----------------|--------------------|--------------------|--------|
| Frequency (MHz)           | EIRP (dBm) | Limit (dBm) | Over Limit (dB) | S.G. Power (dBm) | Cable Loss (dB) | Antenna Gain (dBi) | Polarization (H/V) | Result |
| 1687.347                  | -65.95     | -13         | -52.95          | -68.73           | 2.63            | 5.41               | Horizontal         | Pass   |
| 2528.963                  | -54.1      | -13         | -41.1           | -56.9            | 3.08            | 5.88               | Horizontal         | Pass   |
| 3376.523                  | -62.99     | -13         | -49.99          | -67.51           | 3.34            | 7.86               | Horizontal         | Pass   |
| 1687.347                  | -63.1      | -13         | -50.1           | -65.88           | 2.63            | 5.41               | Vertical           | Pass   |
| 2528.963                  | -43.45     | -13         | -30.45          | -46.25           | 3.08            | 5.88               | Vertical           | Pass   |
| 3376.523                  | -58.83     | -13         | -45.83          | -63.35           | 3.34            | 7.86               | Vertical           | Pass   |

Note: All modes have been tested and we found QPSK test mode has the worst test result. Only record the worst test result.

EIRP= S.G. Power- Cable loss+ Antenna Gain



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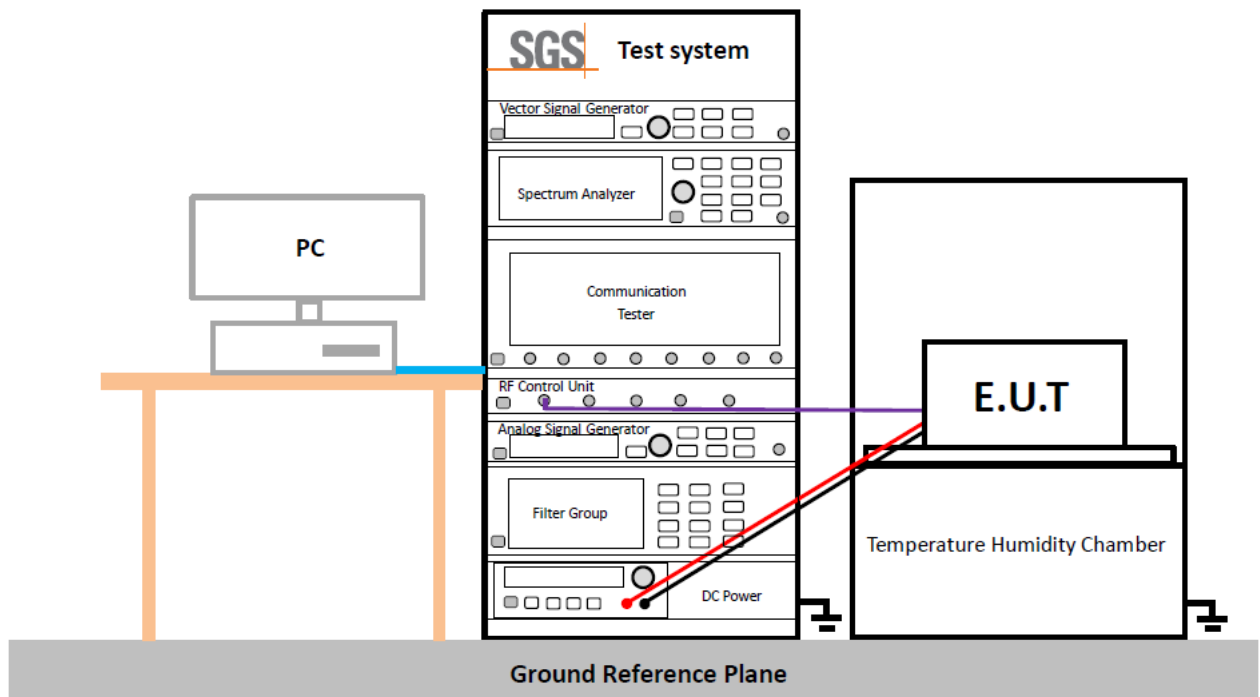
### 6.7 Frequency stability

Test Requirement: Reference test summary  
 Test Method: ANSI C63.26-2015, KDB 971168 D01 v03r01  
 Limit: Reference test summary

#### 6.7.1 E.U.T. Operation

Operating Environment:  
 Temperature: 23.1 °C Humidity: 52.7 % RH Atmospheric Pressure: 1020 mbar  
 Test mode: 02: Tx mode, Keep the EUT in transmitting mode.

#### 6.7.2 Test Setup Diagram



**6.7.3 Measurement Data**

Frequency stability testing is performed in accordance with the guidelines of KDB 971168 D01 V03r01 Section 9; ANSI C63.26-2015 Section 5.6.5

. 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  $\pm 0.00025\%$  ( $\pm 2.5$  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.

Please refer to Appendix CatM1 band 2, Appendix CatM1 band 4, Appendix CatM1 band 12, Appendix NB-IoT band 5.



## 7 Test Setup Photo

Refer to Appendix – Test Setup Photos for SZCR2502000689MO

## 8 EUT Constructional Details (EUT Photos)

Refer to Appendix - External and Internal Photos for SZCR2502000689MO.

- End of the Report -

