

FCC Test Report

(Part 22_C2PC (Class II Permissive Change))

Report No.: RF180905C04C

FCC ID: 2AD8UAHCE01

Test Model: AHCE

Received Date: Jan. 30, 2019

Test Date: Aug. 08 ~ Aug. 14, 2019

Issued Date: Aug. 15, 2019

Applicant: Nokia Solutions and Networks, OY

Address: 2000 W. Lucent Lane, Naperville, IL 60563, USA

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

FCC Registration / Designation Number: 788550 / TW0003



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

| | |
|---|-----------|
| Release Control Record | 4 |
| 1 Certificate of Conformity..... | 5 |
| 2 Summary of Test Results..... | 6 |
| 2.1 Measurement Uncertainty | 6 |
| 2.2 Test Site and Instruments..... | 7 |
| 3 General Information..... | 8 |
| 3.1 General Description of EUT | 8 |
| 3.2 Configuration of System under Test..... | 9 |
| 3.2.1 Description of Support Units..... | 9 |
| 3.3 Test Mode Applicability and Tested Channel Detail | 10 |
| 3.4 EUT Operating Conditions | 11 |
| 3.5 General Description of Applied Standards | 11 |
| 4 Test Types and Results | 12 |
| 4.1 Output Power Measurement | 12 |
| 4.1.1 Limits of Output Power Measurement..... | 12 |
| 4.1.2 Test Procedures..... | 12 |
| 4.1.3 Test Setup..... | 13 |
| 4.1.4 Test Results | 14 |
| 4.2 Modulation Characteristics Measurement..... | 16 |
| 4.2.1 Limits of Modulation Characteristics..... | 16 |
| 4.2.2 Test Procedure | 16 |
| 4.2.3 Test Setup..... | 16 |
| 4.2.4 Test Results | 16 |
| 4.3 Frequency Stability Measurement | 17 |
| 4.3.1 Limits of Frequency Stability Measurement | 17 |
| 4.3.2 Test Procedure | 17 |
| 4.3.3 Test Setup..... | 17 |
| 4.3.4 Test Results | 18 |
| 4.4 Occupied Bandwidth Measurement..... | 19 |
| 4.4.1 Test Procedure | 19 |
| 4.4.2 Test Setup..... | 19 |
| 4.4.3 Test Result..... | 20 |
| 4.5 Band Edge Measurement | 22 |
| 4.5.1 Limits of Band Edge Measurement | 22 |
| 4.5.2 Test Setup..... | 22 |
| 4.5.3 Test Procedures..... | 22 |
| 4.5.4 Test Results | 23 |
| 4.6 Peak to Average Ratio | 27 |
| 4.6.1 Limits of Peak to Average Ratio Measurement | 27 |
| 4.6.2 Test Setup..... | 27 |
| 4.6.3 Test Procedures..... | 27 |
| 4.6.4 Test Results | 28 |
| 4.7 Conducted Spurious Emissions | 30 |
| 4.7.1 Limits of Conducted Spurious Emissions Measurement | 30 |
| 4.7.2 Test Setup..... | 30 |
| 4.7.3 Test Procedure | 30 |
| 4.7.4 Test Results | 31 |
| 4.8 Radiated Emission Measurement | 39 |
| 4.8.1 Limits of Radiated Emission Measurement | 39 |
| 4.8.2 Test Procedure | 39 |
| 4.8.3 Deviation from Test Standard | 39 |
| 4.8.4 Test Setup..... | 40 |
| 4.8.5 Test Results | 41 |

| | |
|---|-----------|
| 5 Pictures of Test Arrangements..... | 46 |
| Appendix – Information of the Testing Laboratories | 47 |

Release Control Record

| Issue No. | Description | Date Issued |
|--------------|------------------|---------------|
| RF180905C04C | Original release | Aug. 15, 2019 |

1 Certificate of Conformity

Product: AirScale Micro Remote Radio Head

Brand: Nokia

Test Model: AHCE

Sample Status: Engineering sample

Applicant: Nokia Solutions and Networks, OY

Test Date: Aug. 08 ~ Aug. 14, 2019

Standards: FCC Part 22, Subpart H

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Pettie Chen, **Date:** Aug. 15, 2019

Pettie Chen / Senior Specialist

Approved by : Bruce Chen, **Date:** Aug. 15, 2019

Bruce Chen / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 22 & Part 2

| FCC Clause | Test Item | Result | Remarks |
|----------------------|------------------------------|--------|---|
| 2.1046 22.913 (a) | Effective radiated power | Pass | Meet the requirement of limit. |
| 2.1047 | Modulation characteristics | Pass | Meet the requirement |
| --- | Peak To Average Ratio | Pass | Meet the requirement of limit. |
| 2.1055 22.355 | Frequency Stability | Pass | Meet the requirement of limit. |
| 2.1049 | Occupied Bandwidth | Pass | Meet the requirement of limit. |
| 22.917 | Band Edge Measurements | Pass | Meet the requirement of limit. |
| 2.1051 22.917 | Conducted Spurious Emissions | Pass | Meet the requirement of limit. |
| 2.1053 22.917 | Radiated Spurious Emissions | Pass | Meet the requirement of limit. Minimum passing margin is -6.8dB at 38.73MHz. |

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement | Frequency | Expanded Uncertainty (k=2) (\pm) |
|--------------------------------|------------------|--------------------------------------|
| Radiated Emissions up to 1 GHz | 9kHz ~ 30MHz | 3.04 dB |
| | 30MHz ~ 200MHz | 3.59 dB |
| | 200MHz ~ 1000MHz | 3.60 dB |
| Radiated Emissions above 1 GHz | 1GHz ~ 18GHz | 2.29 dB |
| | 18GHz ~ 40GHz | 2.29 dB |

2.2 Test Site and Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|--|--|---------------------------------|---------------|---------------|
| Test Receiver KEYSIGHT | N9038A | MY55420137 | Apr. 15, 2019 | Apr. 14, 2020 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSP40 | 100269 | Jun. 04, 2019 | Jun. 03, 2020 |
| BILOG Antenna SCHWARZBECK | VULB9168 | 9168-160 | Nov. 21, 2018 | Nov. 20, 2019 |
| HORN Antenna SCHWARZBECK | BBHA 9120 D | 9120D-1169 | Nov. 25, 2018 | Nov. 24, 2019 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | BBHA9170241 | Nov. 25, 2018 | Nov. 24, 2019 |
| Loop Antenna TESEQ | HLA 6121 | 45745 | Jul. 01, 2019 | Jun. 30, 2020 |
| Preamplifier Agilent (Below 1GHz) | 8447D | 2944A10638 | Jul. 11, 2019 | Jul. 10, 2020 |
| Preamplifier Agilent (Above 1GHz) | 8449B | 3008A02367 | Feb. 19, 2019 | Feb. 18, 2020 |
| RF signal cable HUBER+SUHNER&EMCI | SUCOFLEX 104 & EMC104-SM- SM8000 | CABLE-CH9-02 (248780+171006) | Jan. 19, 2019 | Jan. 18, 2020 |
| RF signal cable HUBER+SUHNER | SUCOFLEX 104 | CABLE-CH9-(250795/4) | Jul. 11, 2019 | Jul. 10, 2020 |
| RF signal cable Woken | 8D-FB | Cable-CH9-01 | Jul. 30, 2019 | Jul. 29, 2020 |
| Software BV ADT | ADT_Radiated_ V7.6.15.9.5 | NA | NA | NA |
| Antenna Tower EMCO | 2070/2080 | 512.835.4684 | NA | NA |
| Turn Table EMCO | 2087-2.03 | NA | NA | NA |
| Antenna Tower & Turn BV ADT | AT100 | AT93021705 | NA | NA |
| Turn Table BV ADT | TT100 | TT93021705 | NA | NA |
| Turn Table Controller BV ADT | SC100 | SC93021705 | NA | NA |
| Boresight Antenna Fixture | FBA-01 | FBA-SIP01 | NA | NA |
| WIT Standard Temperature And Humidity Chamber | TH-4S-C | W981030 | Jun. 03, 2019 | Jun. 02, 2020 |
| JFW 20dB attenuation | 50HF-020-SMA | NA | NA | NA |
| Radio Communication Analyzer | MT8821C | 6261786083 | Dec. 11, 2018 | Dec. 10, 2019 |
| WIT Standard Temperature And Humidity Chamber | TH-4S-C | W981030 | Jun. 03, 2019 | Jun. 02, 2020 |
| True RMS Clamp Meter Fluke | 325 | 31130711WS | May 21, 2019 | May 20, 2020 |

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 9.

3 General Information

3.1 General Description of EUT

| | | |
|---------------------|---|------------------------|
| Product | AirScale Micro Remote Radio Head | |
| Brand | Nokia | |
| Test Model | AHCE | |
| FCC ID | 2AD8UAHCE01 | |
| Sample Status | Engineering sample | |
| Power Supply Rating | I/P: 100-240Vac, 50/60Hz, 3A MAX O/P: -54Vdc, 3A MAX | |
| Modulation Type | QPSK | |
| Operating Frequency | LTE Band 5 (Channel Bandwidth 5MHz) | 871.5MHz ~ 891.5MHz |
| Max. ERP Power | LTE Band 5 (Channel Bandwidth 5MHz) NB-IoT In-Band | 94406.087mW (49.75dBm) |
| Emission Designator | LTE Band 5 (Channel Bandwidth 5MHz) NB-IoT In-Band | QPSK 4M49G7D |
| Antenna Gain | 8dBi | |
| S/N | 474044A | |
| HW Version | X21 | |
| SW Version | FDD-LTE 18A | |
| Accessory Device | Refer to Note as below | |
| Cable Supplied | NA | |

Note:

1. This report is prepared for FCC class II permissive change. This is a supplementary report of Report No.: RF180905C04A. The differences between them are as below information:
 - ◆ LTE B5 add NB-IoT In-Band (Bandwidth: 5MHz)
 For above changes, only In-Band (Bandwidth: 5MHz) mode test results has to be performed.

2. The EUT contains following accessory devices.

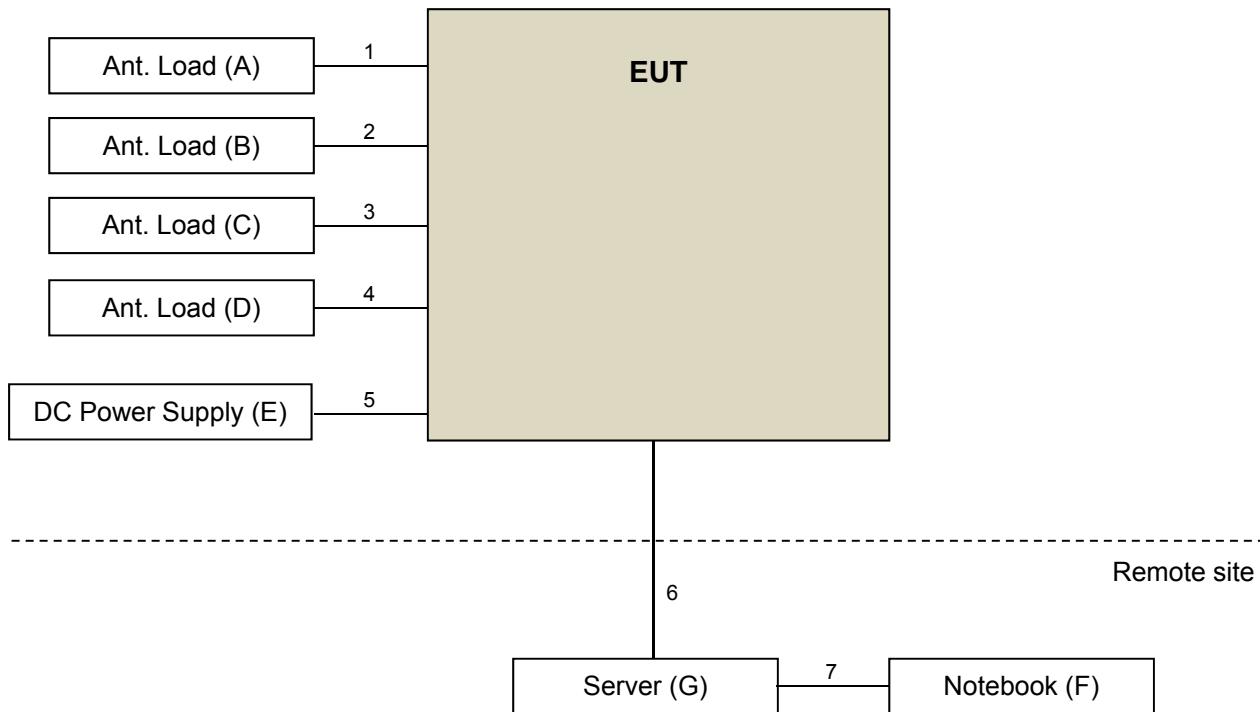
| | |
|-------------------|-----------------------------|
| AC PSU (Optional) | |
| Brand | Nokia |
| Model | APAB |
| Sales Item | 474130A.102 |
| S/N | U7174800066 |
| Remark | SUPLET/S818A160-220S54W |
| Input Power | 100-240Vac, 50-60Hz, 3A MAX |
| Output Power | -54Vdc, 3A MAX |

3. The EUT incorporates a MIMO function. Physically, the EUT provides 4 completed transmitters and 4 receivers.

| Modulation Mode | TX Function |
|-----------------|-------------|
| N-TM (QPSK) | 1TX |
| N-TM (QPSK) | 2TX |
| N-TM (QPSK) | 3TX |
| N-TM (QPSK) | 4TX |

4. The antenna gain for reference only, the test was done with 50ohm terminator on antenna port.

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|----|-----------------|-----------|------------|------------|------------------|--------------------------|
| A. | Ant. Load | NA | NA | NA | NA | Provided by manufacturer |
| B. | Ant. Load | NA | NA | NA | NA | Provided by manufacturer |
| C. | Ant. Load | NA | NA | NA | NA | Provided by manufacturer |
| D. | Ant. Load | NA | NA | NA | NA | Provided by manufacturer |
| E. | DC Power Supply | MEAN WELL | RSP-500-48 | EB8B336856 | NA | - |
| F. | Notebook | DELL | E5420 | BPQ8MQ1 | FCC DoC Approved | - |
| G. | Server | NA | NA | NA | NA | Provided by manufacturer |

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item E, F, G acted as communication partners to transfer data.

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|----|--------------|------|------------|--------------------|--------------|---------|
| 1. | Ant. Cable | 1 | 1 | Y | 0 | - |
| 2. | Ant. Cable | 1 | 1 | Y | 0 | - |
| 3. | Ant. Cable | 1 | 1 | Y | 0 | - |
| 4. | Ant. Cable | 1 | 1 | Y | 0 | - |
| 5. | DC Cable | 1 | 1 | Y | 0 | - |
| 6. | Fiber Cable | 1 | 5 | N | 0 | - |
| 7. | RJ45 Cable | 1 | 1 | N | 0 | - |

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on X-plane. Following channel(s) was (were) selected for the final test as listed below:

NB-IoT In-Band

| EUT Configure Mode | Test item | Channel | Center Carrier Frequency of E-UTRA channel | Bottom Freq. | Top Freq. | Channel Bandwidth | Modulation | Mode |
|--------------------|------------------------------|--------------|--|--|--|-------------------|------------|------|
| - | ERP | 2425 to 2625 | 871.5 MHz 881.5 MHz 891.5 MHz | 869.70 MHz 879.70 MHz 889.70 MHz | 873.30 MHz 883.30 MHz 893.30 MHz | 5MHz | QPSK | 1RB |
| - | Modulation characteristics | 2450 to 2600 | 881.5 MHz | 879.70 MHz | 883.30 MHz | 5MHz | QPSK | 1RB |
| - | Frequency Stability | 2450 to 2600 | 881.5 MHz | 879.70 MHz | 883.30 MHz | 5MHz | QPSK | 1RB |
| - | Occupied Bandwidth | 2425 to 2625 | 871.5 MHz 881.5 MHz 891.5 MHz | 869.70 MHz 879.70 MHz 889.70 MHz | 873.30 MHz 883.30 MHz 893.30 MHz | 5MHz | QPSK | 1RB |
| - | Band Edge | 2425 to 2625 | 871.5 MHz 891.5 MHz | 869.70 MHz 889.70 MHz | 873.30 MHz 893.30 MHz | 5MHz | QPSK | 1RB |
| - | Peak to Average Ratio | 2425 to 2625 | 871.5 MHz 881.5 MHz 891.5 MHz | 869.70 MHz 879.70 MHz 889.70 MHz | 873.30 MHz 883.30 MHz 893.30 MHz | 5MHz | QPSK | 1RB |
| - | Conducted Emission | 2425 to 2625 | 871.5 MHz 881.5 MHz 891.5 MHz | 869.70 MHz 879.70 MHz 889.70 MHz | 873.30 MHz 883.30 MHz 893.30 MHz | 5MHz | QPSK | 1RB |
| - | Radiated Emission Below 1GHz | 2425 to 2625 | 881.5 MHz | 879.70 MHz | - | 5MHz | QPSK | 1RB |
| - | Radiated Emission Above 1GHz | 2425 to 2625 | 871.5 MHz 881.5 MHz 891.5 MHz | 869.70 MHz 879.70 MHz 889.70 MHz | 873.30 MHz 883.30 MHz 893.30 MHz | 5MHz | QPSK | 1RB |

Test Condition:

| Test Item | Environmental Conditions | Input Power | Tested By |
|----------------------------|------------------------------------|--------------|--------------------|
| ERP | 24deg. C, 64%RH | 120Vac, 60Hz | James Yang |
| Modulation characteristics | 24deg. C, 64%RH | 120Vac, 60Hz | James Yang |
| Frequency Stability | 24deg. C, 64%RH | -54Vdc | James Yang |
| Occupied Bandwidth | 24deg. C, 64%RH | 120Vac, 60Hz | James Yang |
| Band Edge | 24deg. C, 64%RH | 120Vac, 60Hz | James Yang |
| Peak To Average Ratio | 24deg. C, 64%RH | 120Vac, 60Hz | James Yang |
| Conducted Emission | 24deg. C, 64%RH | 120Vac, 60Hz | James Yang |
| Radiated Emission | 25deg. C, 65%RH 22deg. C, 68%RH | 120Vac, 60Hz | Greg Lin Han Wu |

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 22

KDB 971168 D01 Power Meas License Digital Systems v03r01

KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

The ERP of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

- (i) 500 watts per emission; or
- (ii) 400 watts/MHz (PSD) per sector.

4.1.2 Test Procedures

EIRP / ERP Measurement:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G
- d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15dB.

Where:

$$\text{EIRP / ERP} = P_{\text{Meas}} + G_T - L_c$$

P_{Meas} : Measure transmitter output power.

G_T : Gain of the transmitting antenna.

L_c : signal attenuation in the connecting cable between the transmitter and antenna.

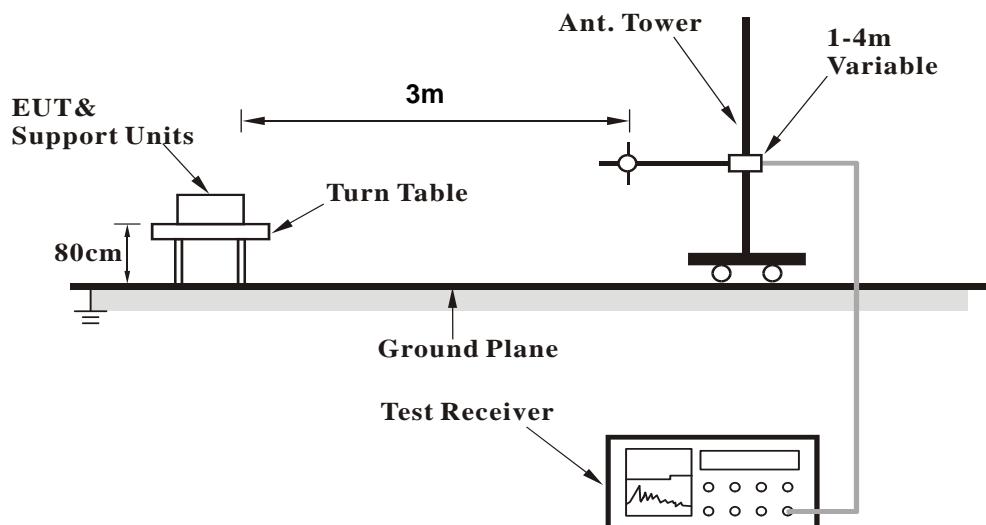
Conducted Power Measurement:

The EUT was set up for the maximum power with LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

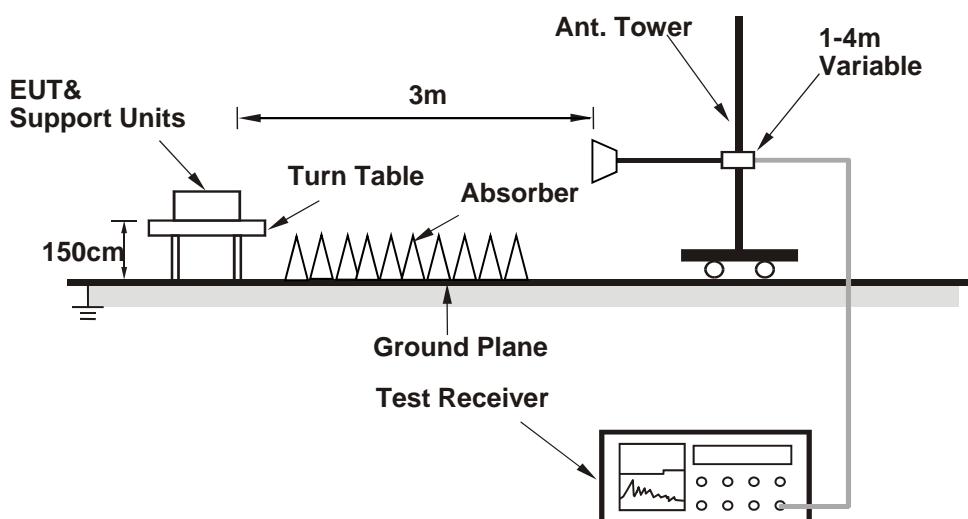
4.1.3 Test Setup

ERP Measurement:

For Radiated Emission below or equal 1GHz

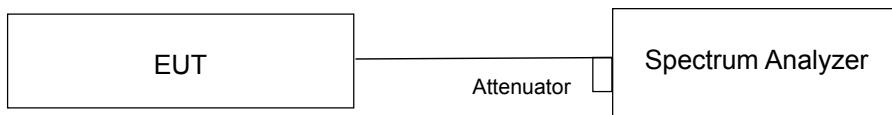


For Radiated Emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Conducted Power Measurement:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.4 Test Results

Conducted Power

For NB-IoT In-Band:

For 1TX:

| Band / BW | Chain | QPSK_IoT Signal at bottom | | | QPSK_IoT Signal at top | | |
|-----------|-------|---------------------------|-------|-------|------------------------|-------|-------|
| | | Low | Mid | High | Low | Mid | High |
| | | 871.5 | 881.5 | 891.5 | 871.5 | 881.5 | 891.5 |
| | | MHz | MHz | MHz | MHz | MHz | MHz |
| 5 / 5M | 0 | 37.40 | 37.92 | 37.75 | 37.88 | 37.60 | 37.81 |
| | 1 | 37.82 | 37.88 | 37.77 | 37.80 | 37.77 | 37.84 |
| | 2 | 37.92 | 37.81 | 37.81 | 37.86 | 37.67 | 37.91 |
| | 3 | 37.82 | 37.76 | 37.79 | 37.96 | 37.81 | 37.83 |

For 2TX:

| Band / BW | Chain | QPSK_IoT Signal at bottom | | | QPSK_IoT Signal at top | | |
|-----------|-------|---------------------------|-------|-------|------------------------|-------|-------|
| | | Low | Mid | High | Low | Mid | High |
| | | 871.5 | 881.5 | 891.5 | 871.5 | 881.5 | 891.5 |
| | | MHz | MHz | MHz | MHz | MHz | MHz |
| 5 / 5M | 0+1 | 40.63 | 40.91 | 40.77 | 40.85 | 40.70 | 40.84 |
| | 2+3 | 40.88 | 40.80 | 40.81 | 40.92 | 40.75 | 40.88 |

For 3TX:

| Band / BW | Chain | QPSK_IoT Signal at bottom | | | QPSK_IoT Signal at top | | |
|-----------|-------|---------------------------|-------|-------|------------------------|-------|-------|
| | | Low | Mid | High | Low | Mid | High |
| | | 871.5 | 881.5 | 891.5 | 871.5 | 881.5 | 891.5 |
| | | MHz | MHz | MHz | MHz | MHz | MHz |
| 5 / 5M | 0+1+2 | 42.49 | 42.64 | 42.55 | 42.62 | 42.45 | 42.62 |

For 4TX:

| Band / BW | Chain | QPSK_IoT Signal at bottom | | | QPSK_IoT Signal at top | | |
|-----------|---------|---------------------------|-------|-------|------------------------|-------|-------|
| | | Low | Mid | High | Low | Mid | High |
| | | 871.5 | 881.5 | 891.5 | 871.5 | 881.5 | 891.5 |
| | | MHz | MHz | MHz | MHz | MHz | MHz |
| 5 / 5M | 0+1+2+3 | 43.77 | 43.86 | 43.80 | 43.90 | 43.73 | 43.87 |

ERP Power
For NB-IoT In-Band:
For 1TX:

| Band / BW | Chain | QPSK_IoT Signal at bottom | | | QPSK_IoT Signal at top | | |
|-----------|-------|---------------------------|-------|-------|------------------------|-------|-------|
| | | Low | Mid | High | Low | Mid | High |
| | | 871.5 | 881.5 | 891.5 | 871.5 | 881.5 | 891.5 |
| 5 / 5M | 0 | 43.25 | 43.77 | 43.60 | 43.73 | 43.45 | 43.66 |
| | 1 | 43.67 | 43.73 | 43.62 | 43.65 | 43.62 | 43.69 |
| | 2 | 43.77 | 43.66 | 43.66 | 43.71 | 43.52 | 43.76 |
| | 3 | 43.67 | 43.61 | 43.64 | 43.81 | 43.66 | 43.68 |

For 2TX:

| Band / BW | Chain | QPSK_IoT Signal at bottom | | | QPSK_IoT Signal at top | | |
|-----------|-------|---------------------------|-------|-------|------------------------|-------|-------|
| | | Low | Mid | High | Low | Mid | High |
| | | 871.5 | 881.5 | 891.5 | 871.5 | 881.5 | 891.5 |
| 5 / 5M | 0+1 | 46.48 | 46.76 | 46.62 | 46.70 | 46.55 | 46.69 |
| | 2+3 | 46.73 | 46.65 | 46.66 | 46.77 | 46.60 | 46.73 |

For 3TX:

| Band / BW | Chain | QPSK_IoT Signal at bottom | | | QPSK_IoT Signal at top | | |
|-----------|-------|---------------------------|-------|-------|------------------------|-------|-------|
| | | Low | Mid | High | Low | Mid | High |
| | | 871.5 | 881.5 | 891.5 | 871.5 | 881.5 | 891.5 |
| 5 / 5M | 0+1+2 | 48.34 | 48.49 | 48.40 | 48.47 | 48.30 | 48.47 |

For 4TX:

| Band / BW | Chain | QPSK_IoT Signal at bottom | | | QPSK_IoT Signal at top | | |
|-----------|---------|---------------------------|-------|-------|------------------------|-------|-------|
| | | Low | Mid | High | Low | Mid | High |
| | | 871.5 | 881.5 | 891.5 | 871.5 | 881.5 | 891.5 |
| 5 / 5M | 0+1+2+3 | 49.62 | 49.71 | 49.65 | 49.75 | 49.58 | 49.72 |

Note:

1. ERP (dBm) = Conducted Output Power (dBm) + antenna gain (dBi) – 2.15.
2. The 2TX MIMO power was select worst 2 chain total calculation.
3. The 3TX MIMO power was select worst 3 chain total calculation.

4.2 Modulation Characteristics Measurement

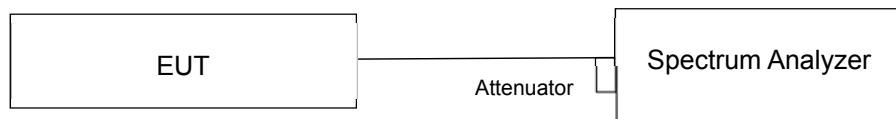
4.2.1 Limits of Modulation Characteristics

N/A

4.2.2 Test Procedure

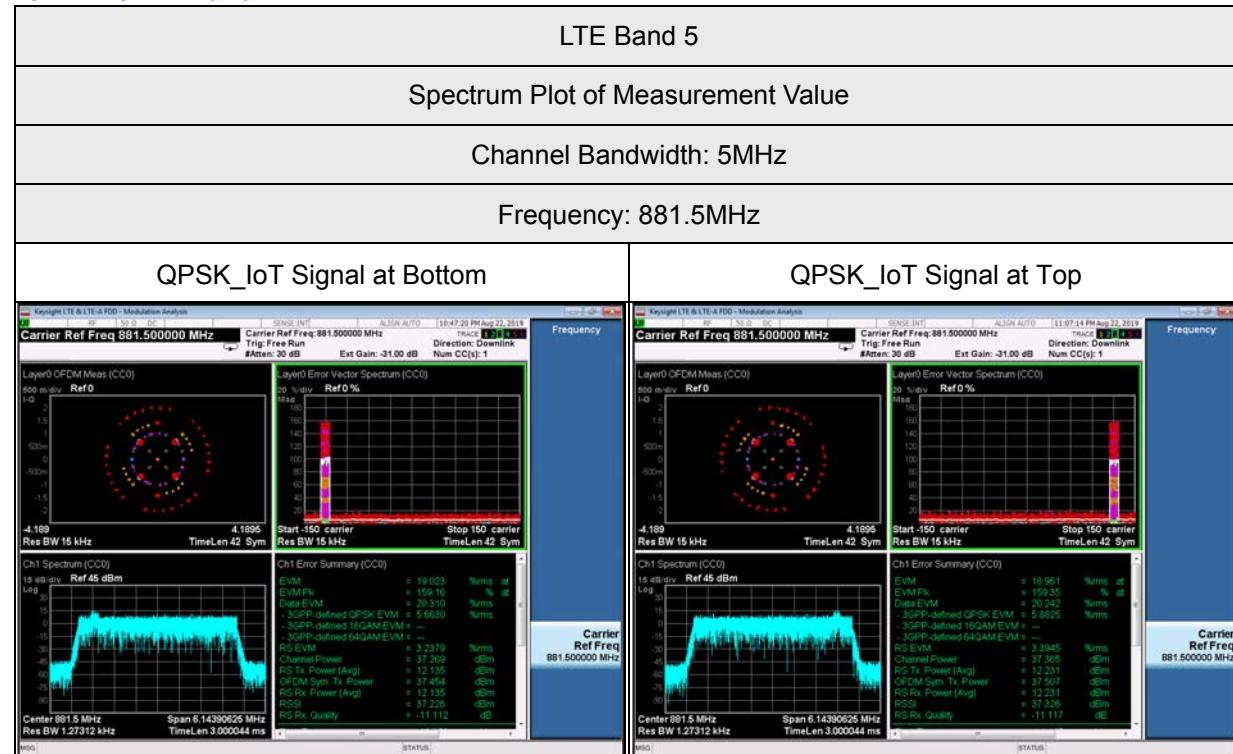
Connect the EUT to Communication Simulator via the antenna connector, the frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

4.2.3 Test Setup



4.2.4 Test Results

For NB-IoT In-Band:



4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

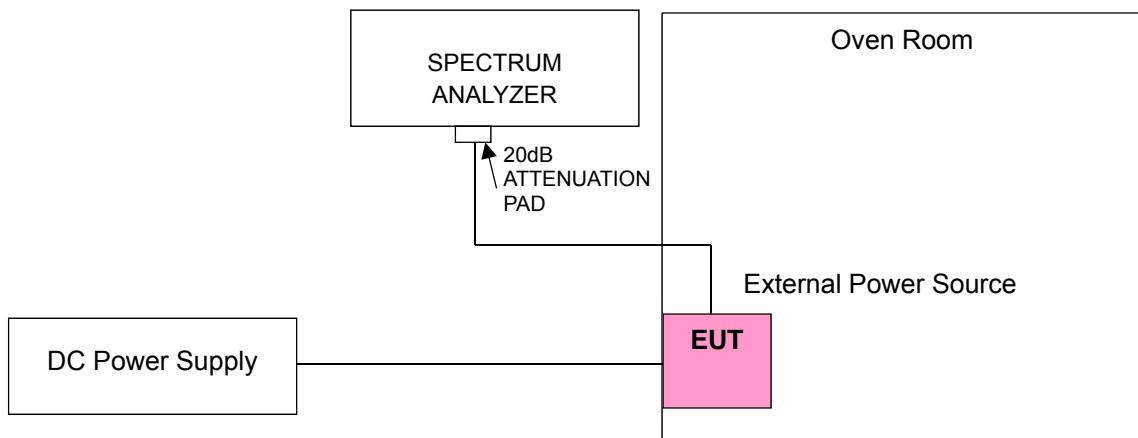
1.5 ppm is for base and fixed station.

4.3.2 Test Procedure

- a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.3.3 Test Setup



4.3.4 Test Results

For NB-IoT In-Band:

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 5 |
|-----------------|-----------------------|
| | Frequency error (ppm) |
| -62.1 | 0.003 |
| -54.0 | 0.004 |
| -45.9 | 0.002 |

Note: The applicant defined the normal working voltage is from -45.9Vdc to -62.1Vdc.

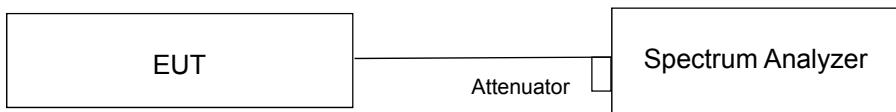
| TEMP. (°C) | LTE Band 5 |
|------------|-----------------------|
| | Frequency error (ppm) |
| 50 | -0.004 |
| 40 | -0.004 |
| 30 | -0.003 |
| 20 | -0.001 |
| 10 | 0.004 |
| 0 | 0.002 |
| -10 | 0.001 |
| -20 | 0.004 |
| -30 | 0.004 |

4.4 Occupied Bandwidth Measurement

4.4.1 Test Procedure

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

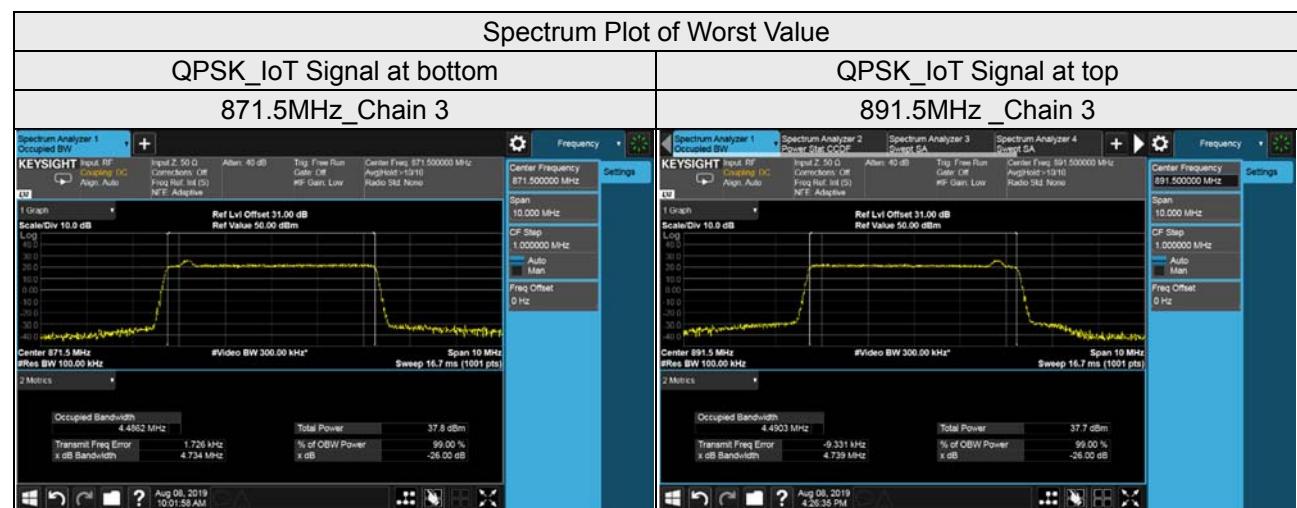
4.4.2 Test Setup



4.4.3 Test Result

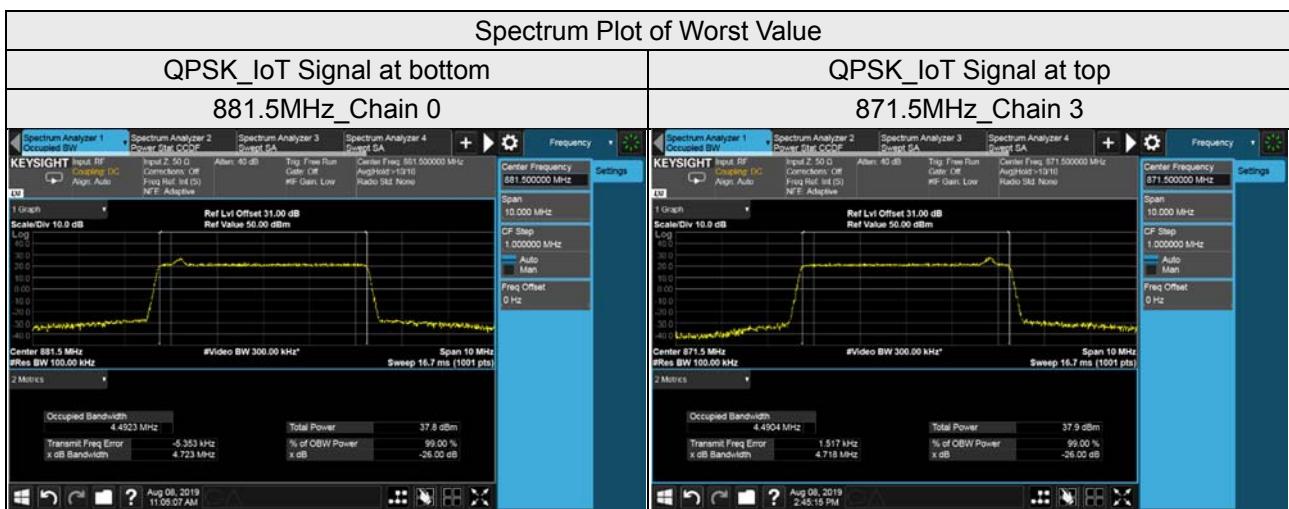
For NB-IoT In-Band:

| Channel Bandwidth: 5MHz | | | | | | | | | |
|---------------------------|---------|---------|---------|--------------|------------------------|---------|---------|---------|--------------|
| 26dBc Bandwidth (MHz) | | | | | | | | | |
| QPSK_IoT Signal at bottom | | | | | QPSK_IoT Signal at top | | | | |
| Freq. (MHz) | Chain 0 | Chain 1 | Chain 2 | Chain 3 | Freq. (MHz) | Chain 0 | Chain 1 | Chain 2 | Chain 3 |
| 871.5 | 4.716 | 4.721 | 4.730 | 4.734 | 871.5 | 4.729 | 4.715 | 4.721 | 4.718 |
| 881.5 | 4.723 | 4.710 | 4.723 | 4.727 | 881.5 | 4.714 | 4.725 | 4.713 | 4.736 |
| 891.5 | 4.714 | 4.718 | 4.724 | 4.714 | 891.5 | 4.726 | 4.724 | 4.721 | 4.739 |



For NB-IoT In-Band:

| Channel Bandwidth: 5MHz | | | | | | | | | |
|---------------------------|---------------|---------|---------|---------|------------------------|---------|---------|---------|---------------|
| Occupied Bandwidth (MHz) | | | | | | | | | |
| QPSK_IoT Signal at bottom | | | | | QPSK_IoT Signal at top | | | | |
| Freq. (MHz) | Chain 0 | Chain 1 | Chain 2 | Chain 3 | Freq. (MHz) | Chain 0 | Chain 1 | Chain 2 | Chain 3 |
| 871.5 | 4.4863 | 4.4848 | 4.4886 | 4.4862 | 871.5 | 4.4845 | 4.4875 | 4.4850 | 4.4904 |
| 881.5 | 4.4923 | 4.4874 | 4.4902 | 4.4869 | 881.5 | 4.4867 | 4.4870 | 4.4889 | 4.4881 |
| 891.5 | 4.4854 | 4.4855 | 4.4852 | 4.4860 | 891.5 | 4.4865 | 4.4829 | 4.4847 | 4.4903 |



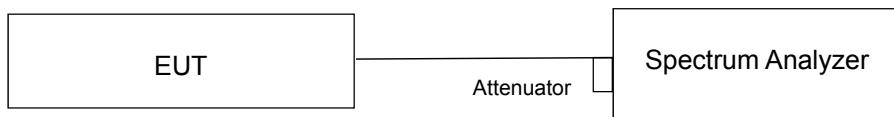
4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. 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.

Note: The device has 4x4 MIMO function, so the limit of spurious emissions needs to be reduced by $-13 - 10 \log(4) = -19.02$ dBm according to FCC KDB 662911 D01 guidance.

4.5.2 Test Setup



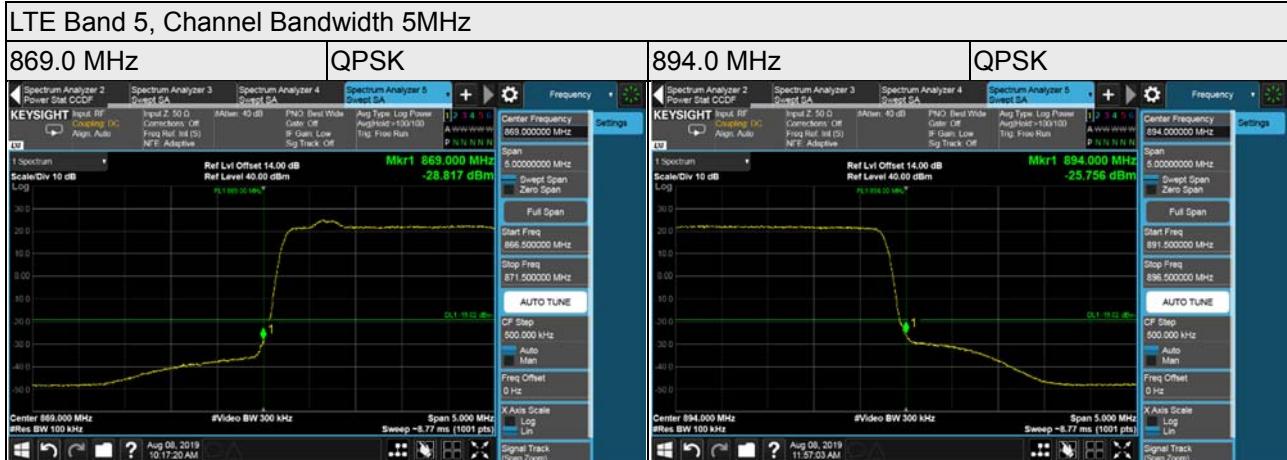
4.5.3 Test Procedures

- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 1.5MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz.
- c. Record the max trace plot into the test report.

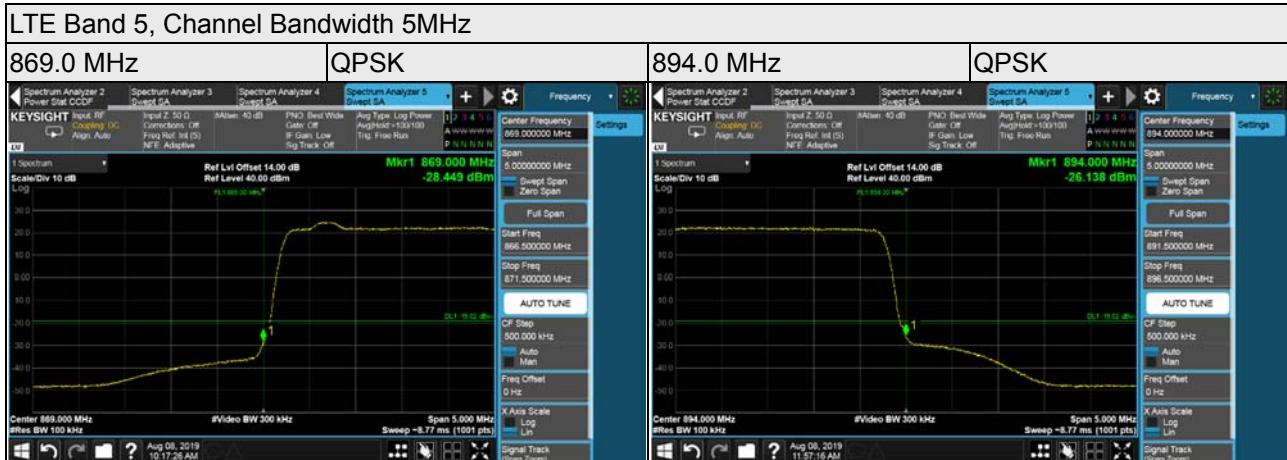
4.5.4 Test Results

For NB-IoT In-Band: QPSK_IoT Signal at Bottom

Chain 0



Chain 1



Chain 2

LTE Band 5, Channel Bandwidth 5MHz



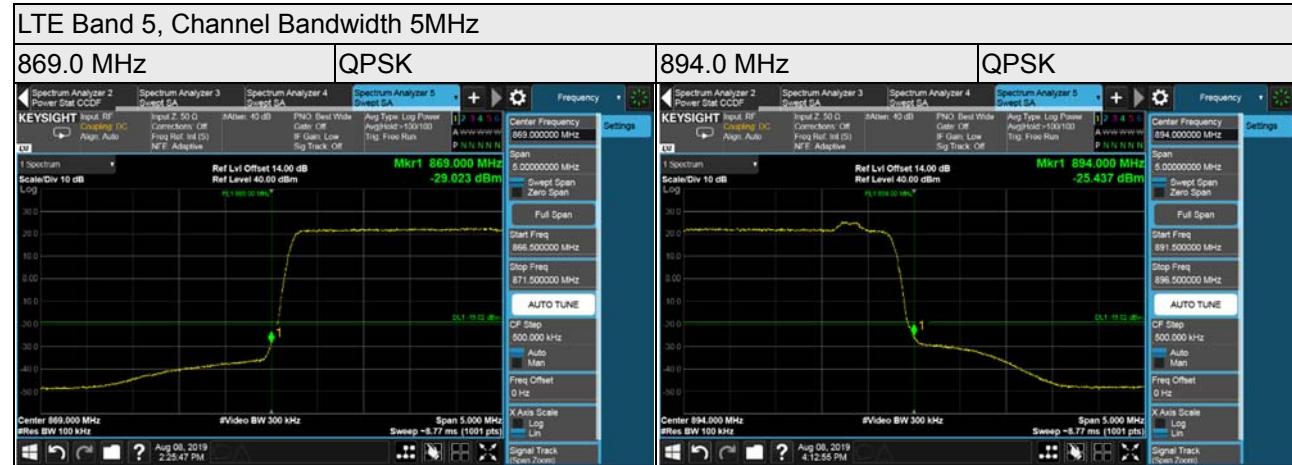
Chain 3

LTE Band 5, Channel Bandwidth 5MHz

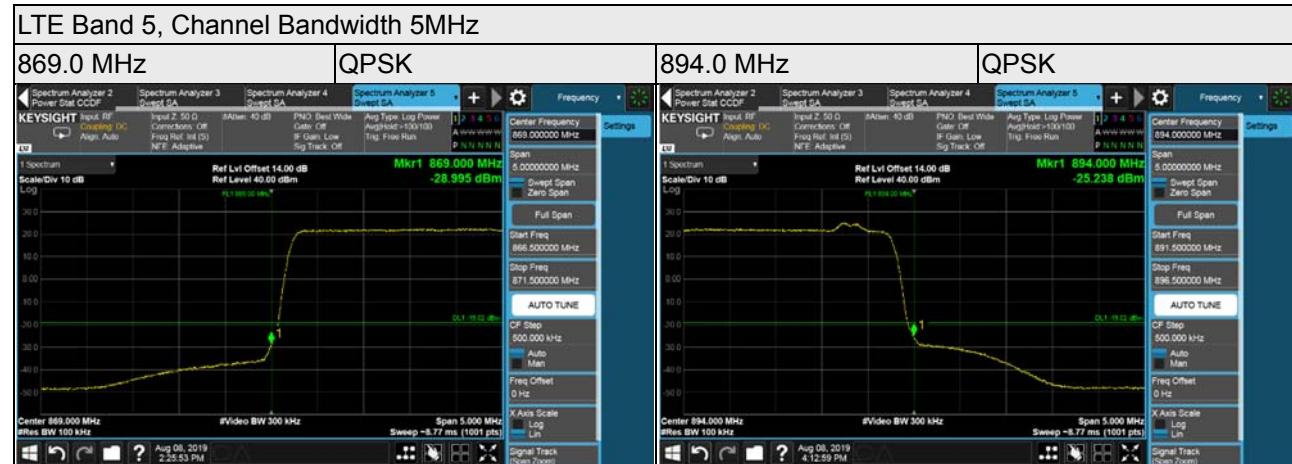


QPSK_IoT Signal at Top

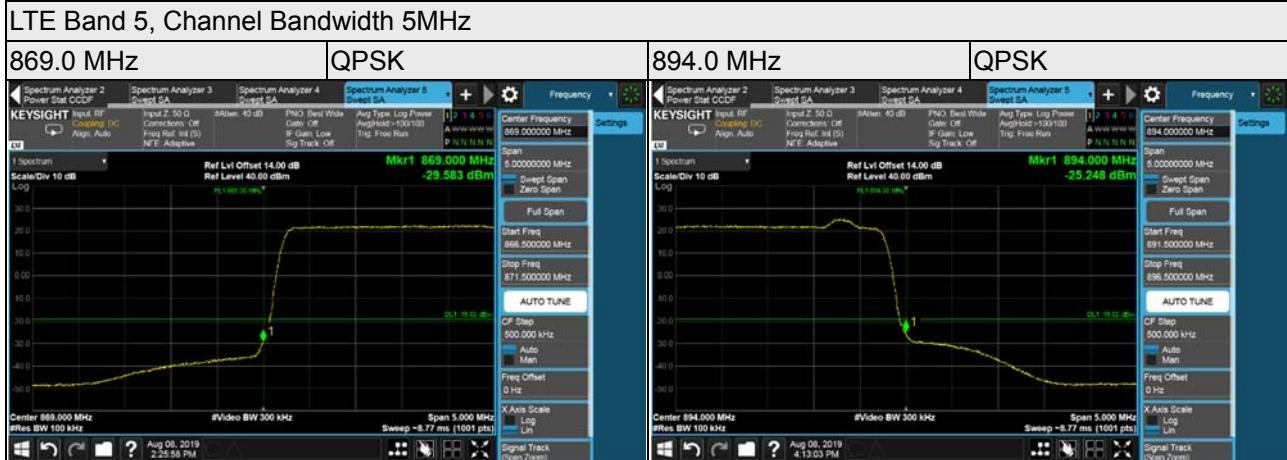
Chain 0



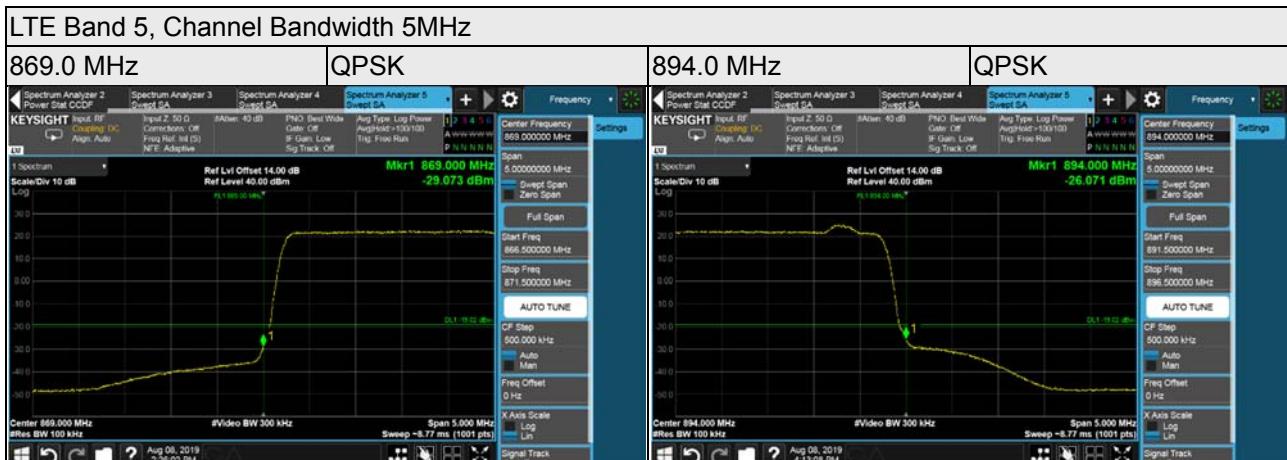
Chain 1



Chain 2



Chain 3

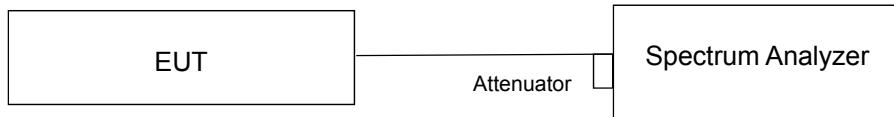


4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

4.6.2 Test Setup



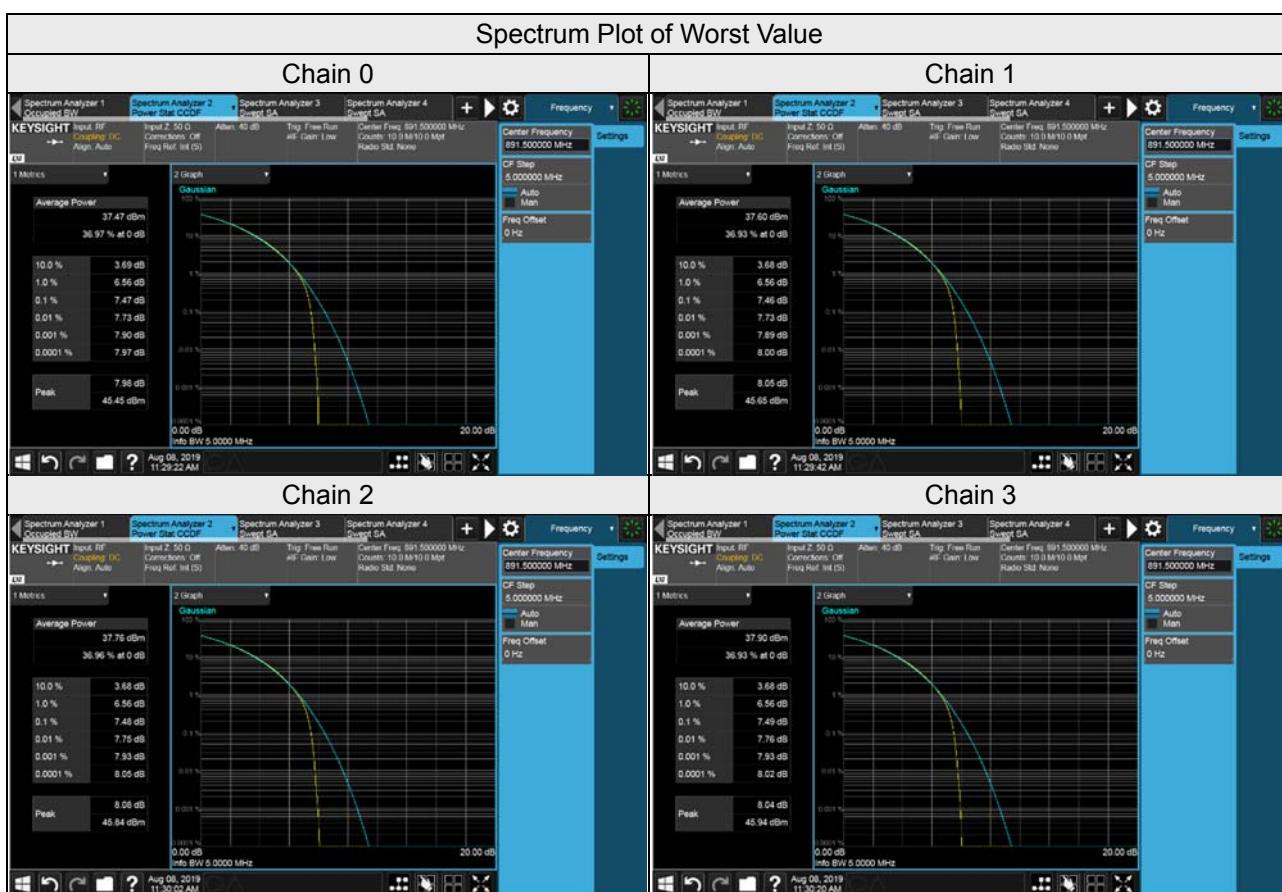
4.6.3 Test Procedures

- a. Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
- b. Set the number of counts to a value that stabilizes the measured CCDF curve;
- c. Record the maximum PAPR level associated with a probability of 0.1%.

4.6.4 Test Results

**For NB-IoT In-Band:
QPSK_IoT Signal at Bottom**

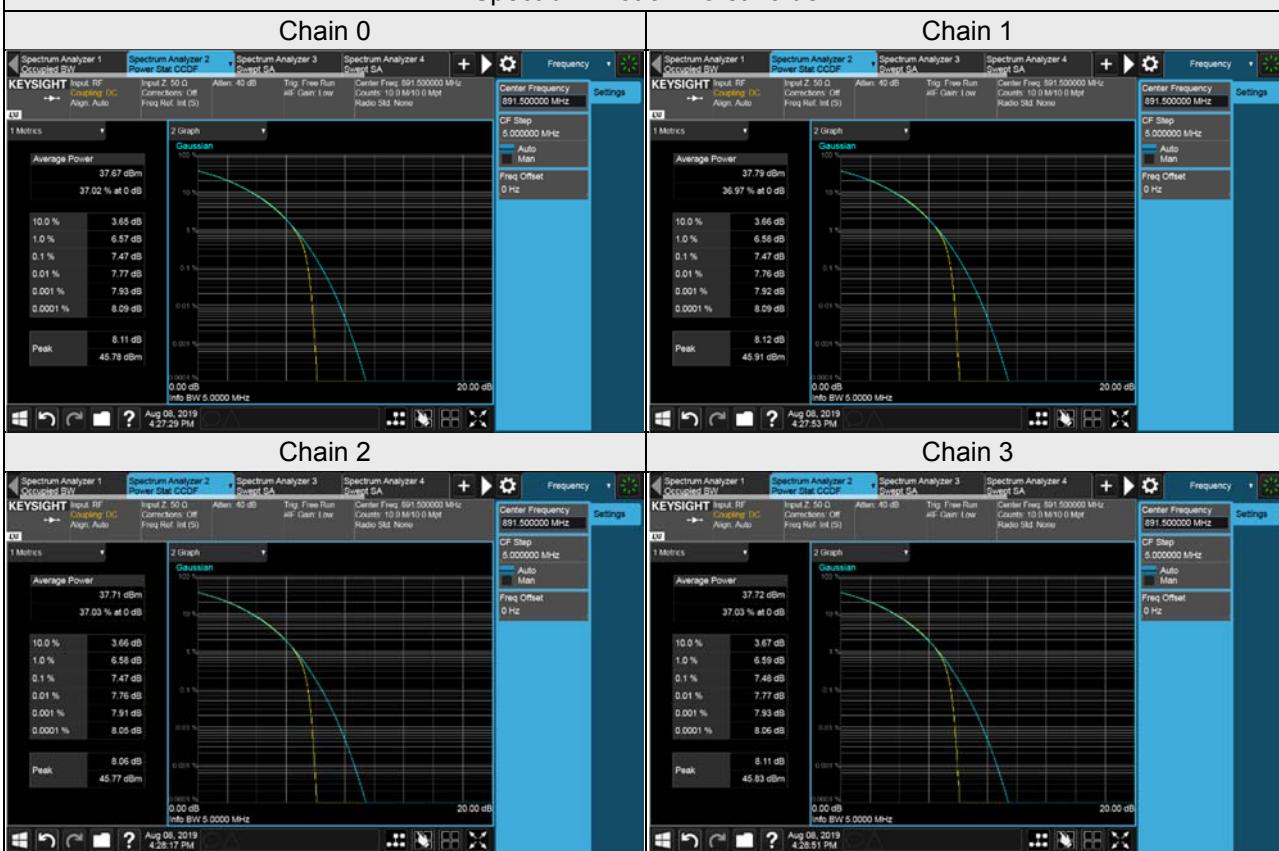
| LTE Band 5, Channel Bandwidth 5MHz | | | | |
|------------------------------------|----------------------------|---------|---------|---------|
| Frequency (MHz) | Peak To Average Ratio (dB) | | | |
| | Chain 0 | Chain 1 | Chain 2 | Chain 3 |
| 871.5 | 7.45 | 7.45 | 7.47 | 7.47 |
| 881.5 | 7.41 | 7.42 | 7.41 | 7.42 |
| 891.5 | 7.47 | 7.46 | 7.48 | 7.49 |



QPSK_IoT Signal at Top

LTE Band 5, Channel Bandwidth 5MHz

| Frequency (MHz) | Peak To Average Ratio (dB) | | | |
|-----------------|----------------------------|---------|---------|---------|
| | Chain 0 | Chain 1 | Chain 2 | Chain 3 |
| 871.5 | 7.45 | 7.45 | 7.45 | 7.46 |
| 881.5 | 7.42 | 7.42 | 7.41 | 7.41 |
| 891.5 | 7.47 | 7.47 | 7.47 | 7.48 |

Spectrum Plot of Worst Value


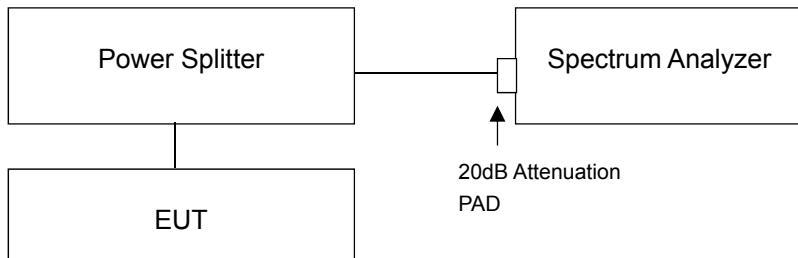
4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

Note: The device has 4x4 MIMO function, so the limit of spurious emissions needs to be reduced by $-13 - 10 \log(4) = -19.02$ dBm according to FCC KDB 662911 D01 guidance.

4.7.2 Test Setup



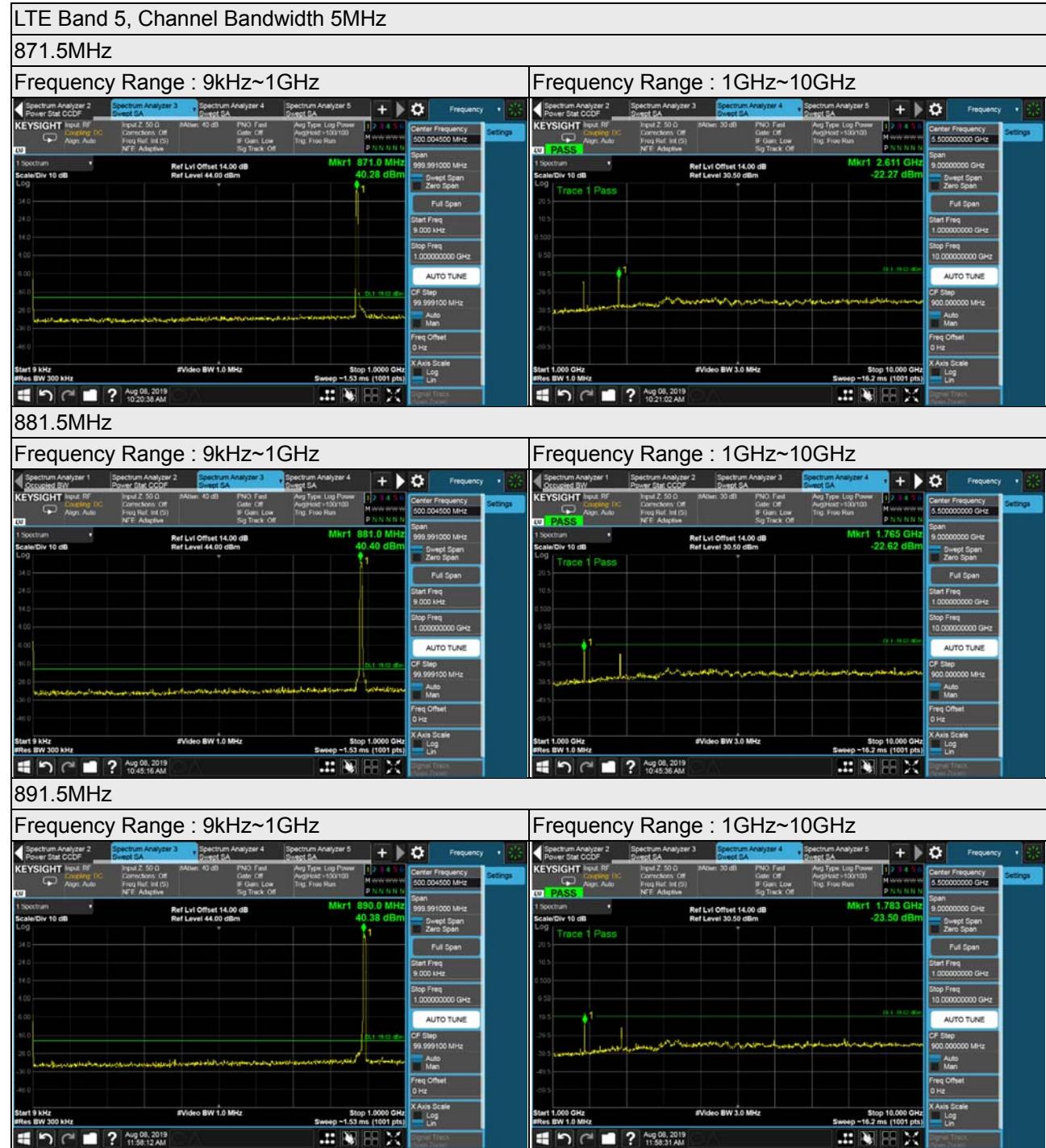
4.7.3 Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to 1GHz. 20dB attenuation pad is connected with spectrum. RBW= 300kHz and VBW= 1MHz is used for conducted emission measurement.
- Measuring frequency range is from 1GHz to 26.5GHz. 20dB attenuation pad is connected with spectrum. RBW= 1MHz and VBW= 3MHz is used for conducted emission measurement.

4.7.4 Test Results

For NB-IoT In-Band: QPSK_IoT Signal at Bottom

Chain 0

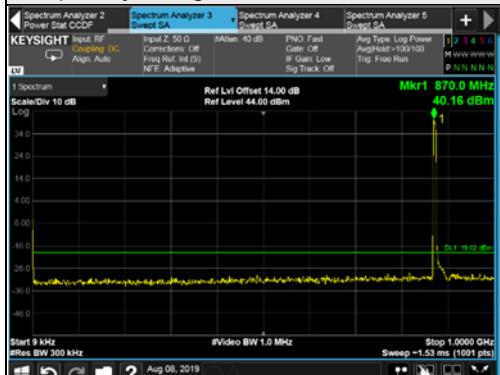


Chain 1

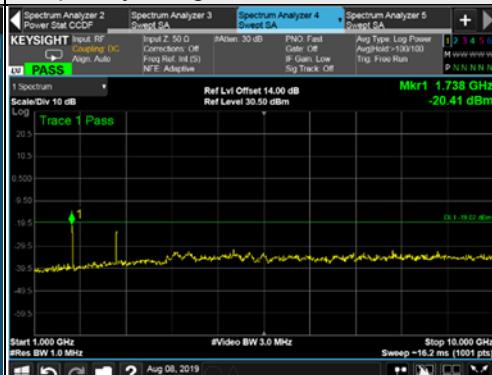
LTE Band 5, Channel Bandwidth 5MHz

871.5MHz

Frequency Range : 9kHz~1GHz

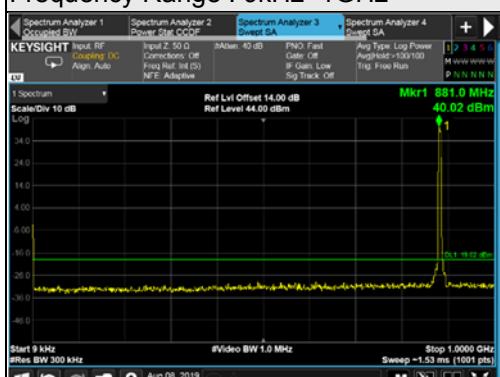


Frequency Range : 1GHz~10GHz



881.5MHz

Frequency Range : 9kHz~1GHz

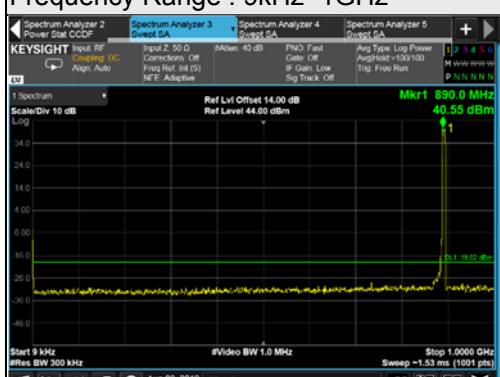


Frequency Range : 1GHz~10GHz

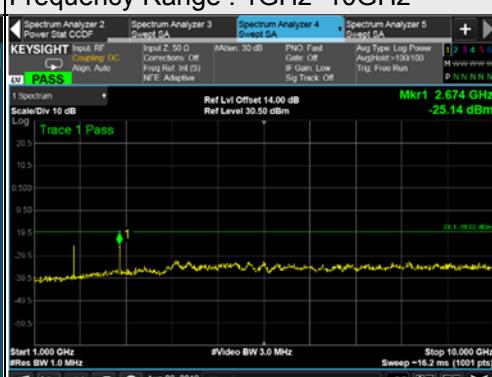


891.5MHz

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~10GHz

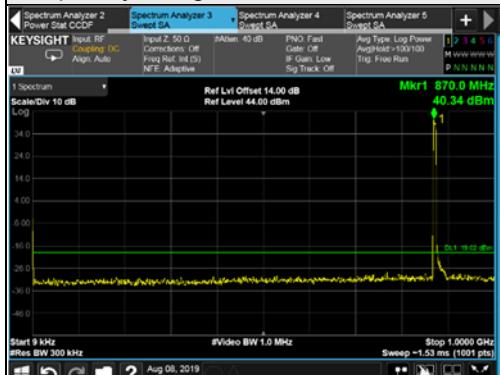


Chain 2

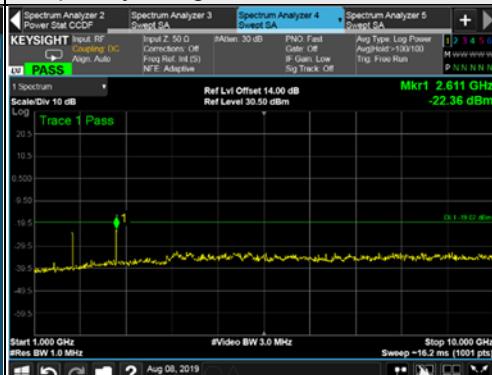
LTE Band 5, Channel Bandwidth 5MHz

871.5MHz

Frequency Range : 9kHz~1GHz

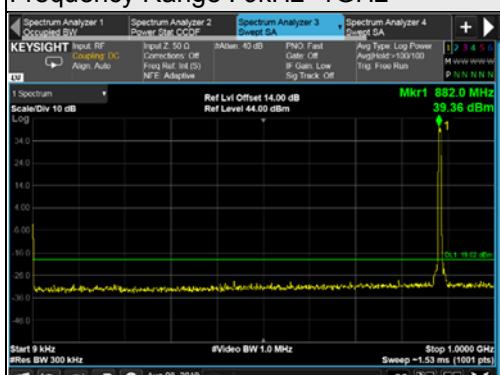


Frequency Range : 1GHz~10GHz

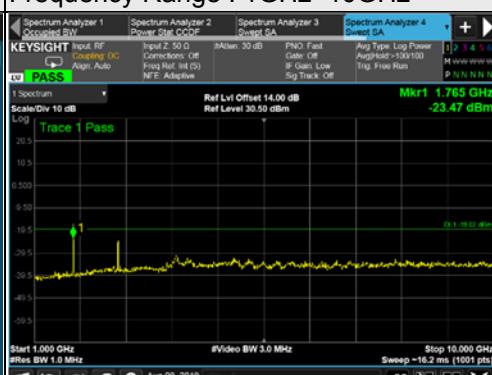


881.5MHz

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~10GHz

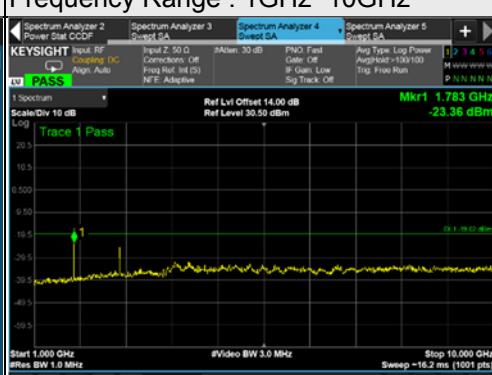


891.5MHz

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~10GHz



Chain 3

LTE Band 5, Channel Bandwidth 5MHz

871.5MHz

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~10GHz



881.5MHz

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~10GHz



891.5MHz

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~10GHz



QPSK_IoT Signal at Top

Chain 0

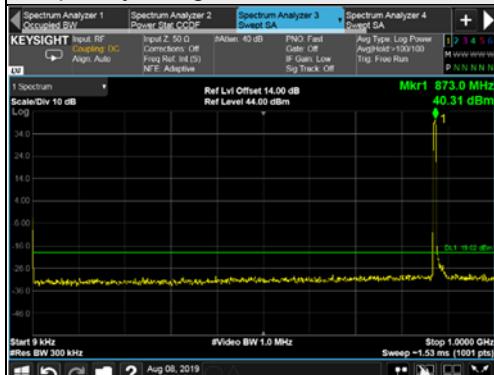


Chain 1

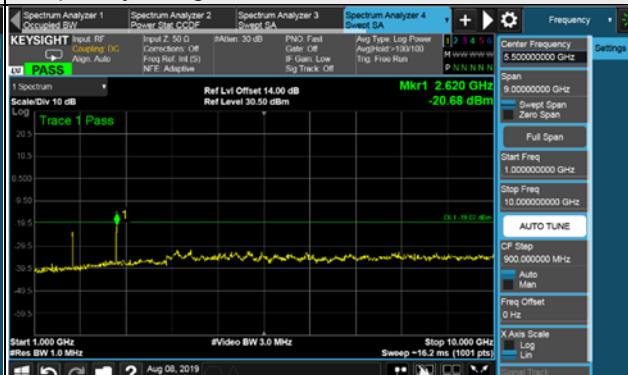
LTE Band 5, Channel Bandwidth 5MHz

871.5MHz

Frequency Range : 9kHz~1GHz

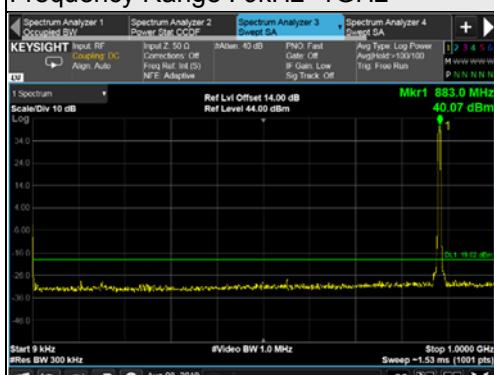


Frequency Range : 1GHz~10GHz



881.5MHz

Frequency Range : 9kHz~1GHz

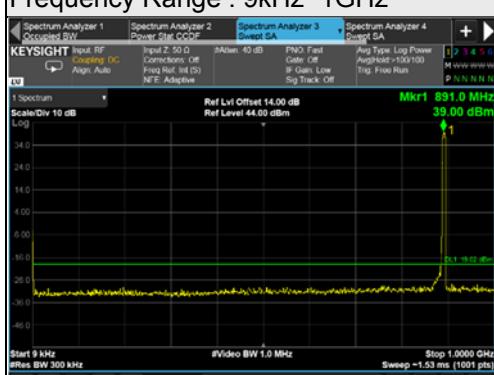


Frequency Range : 1GHz~10GHz



891.5MHz

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~10GHz

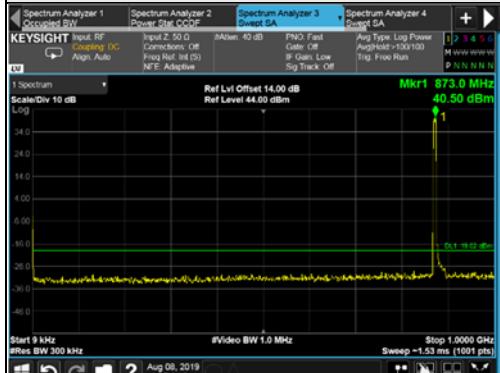


Chain 2

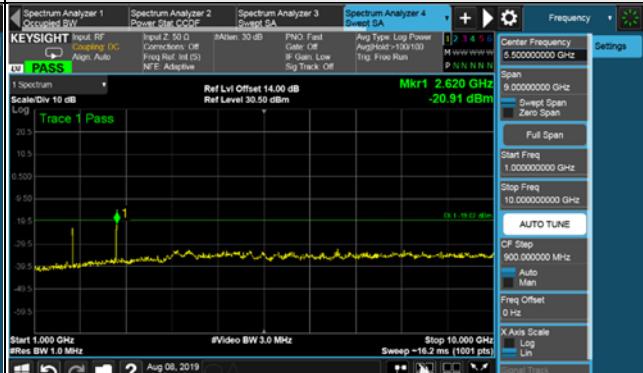
LTE Band 5, Channel Bandwidth 5MHz

871.5MHz

Frequency Range : 9kHz~1GHz

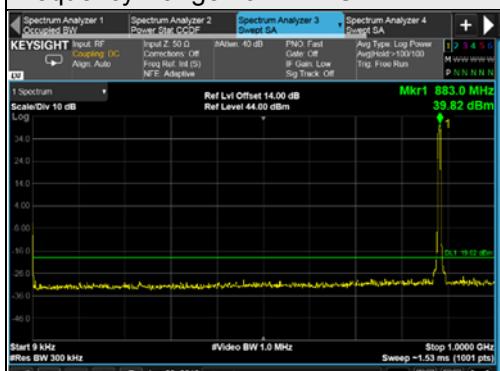


Frequency Range : 1GHz~10GHz

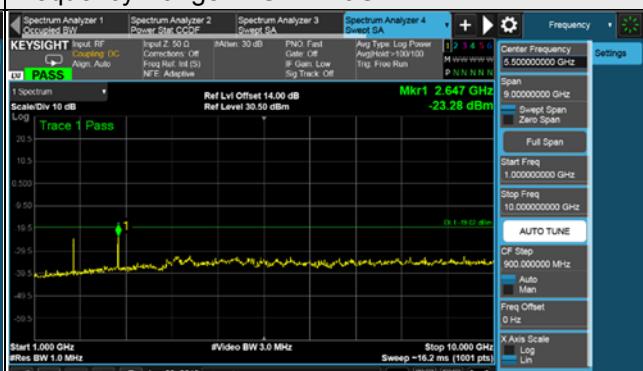


881.5MHz

Frequency Range : 9kHz~1GHz

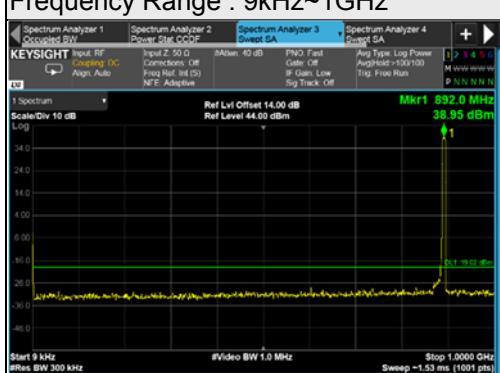


Frequency Range : 1GHz~10GHz



891.5MHz

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~10GHz

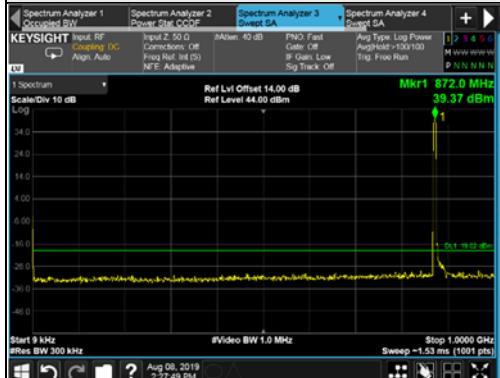


Chain 3

LTE Band 5, Channel Bandwidth 5MHz

871.5MHz

Frequency Range : 9kHz~1GHz

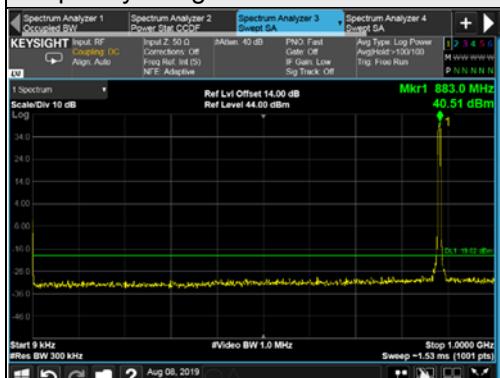


Frequency Range : 1GHz~10GHz



881.5MHz

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~10GHz



891.5MHz

Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~10GHz



4.8 Radiated Emission Measurement

4.8.1 Limits of Radiated Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

4.8.2 Test Procedure

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G
- c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15dBi.

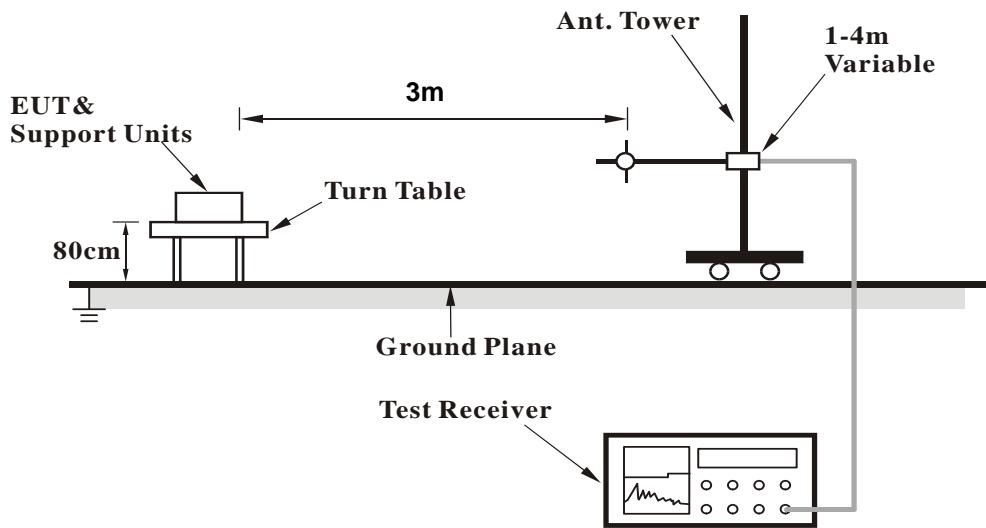
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.8.3 Deviation from Test Standard

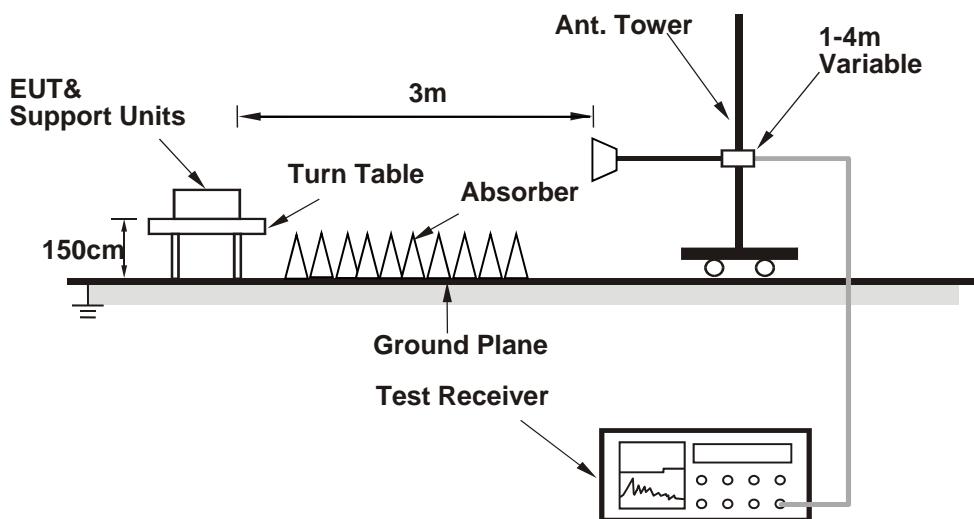
No deviation.

4.8.4 Test Setup

For Radiated Emission below or equal 1GHz



For Radiated Emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.8.5 Test Results

Below 1GHz

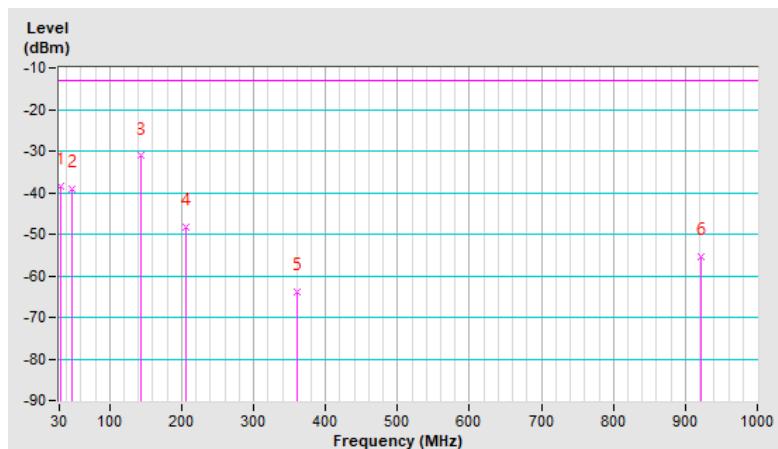
For NB-IoT In-Band:

Channel Bandwidth: 5MHz

| | | | |
|--------------------------|-----------------|-----------------|----------------|
| Mode | 881.5MHz | Frequency Range | Below 1000 MHz |
| Environmental Conditions | 22deg. C, 68%RH | Input Power | 120Vac, 60Hz |
| Tested By | Greg Lin | | |

| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
|---|-------------|---------------|-----------------------|------------------------|-----------|-------------|-------------|
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 31.94 | -39.6 | -20.1 | -18.3 | -38.4 | -13.0 | -25.4 |
| 2 | 48.43 | -37.1 | -30.5 | -8.7 | -39.2 | -13.0 | -26.2 |
| 3 | 143.49 | -23.9 | -28.1 | -3.1 | -31.2 | -13.0 | -18.2 |
| 4 | 205.57 | -38.0 | -46.2 | -2.0 | -48.2 | -13.0 | -35.2 |
| 5 | 359.80 | -59.0 | -67.9 | 4.0 | -63.9 | -13.0 | -50.9 |
| 6 | 921.43 | -61.2 | -58.9 | 3.6 | -55.3 | -13.0 | -42.3 |

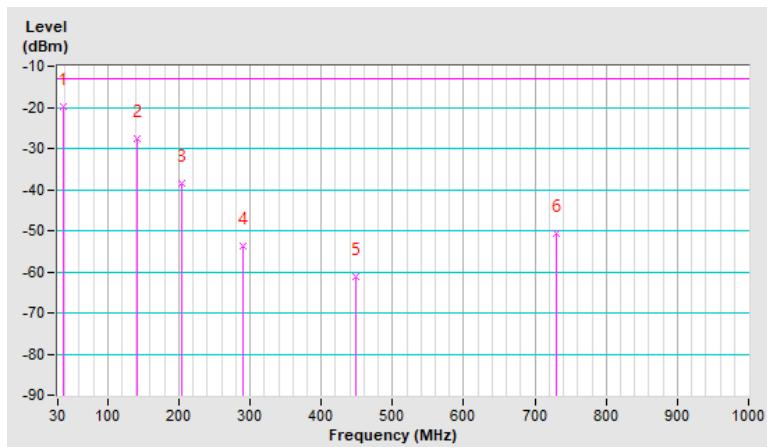
Remarks: ERP (dBm)= S.G Value (dBm) + Correction Factor (dB).



| | | | |
|--------------------------|-----------------|-----------------|----------------|
| Mode | 881.5MHz | Frequency Range | Below 1000 MHz |
| Environmental Conditions | 22deg. C, 68%RH | Input Power | 120Vac, 60Hz |
| Tested By | Greg Lin | | |

| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
|---|--------------|---------------|-----------------------|------------------------|--------------|--------------|-------------|
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 38.73 | -8.2 | -5.6 | -14.2 | -19.8 | -13.0 | -6.8 |
| 2 | 140.58 | -22.9 | -24.6 | -3.0 | -27.6 | -13.0 | -14.6 |
| 3 | 204.60 | -34.5 | -36.5 | -2.0 | -38.5 | -13.0 | -25.5 |
| 4 | 289.96 | -52.8 | -52.1 | -1.7 | -53.8 | -13.0 | -40.8 |
| 5 | 449.04 | -58.6 | -64.5 | 3.4 | -61.1 | -13.0 | -48.1 |
| 6 | 729.37 | -55.0 | -54.4 | 3.6 | -50.8 | -13.0 | -37.8 |

Remarks: ERP (dBm)= S.G Value (dBm) + Correction Factor (dB).



Above 1GHz

For NB-IoT In-Band:

QPSK_IoT Signal at Bottom

Channel Bandwidth: 5MHz

| | | | |
|--------------------------|-----------------|-----------------|--------------|
| Mode | 871.5MHz | Frequency Range | 1GHz ~ 18GHz |
| Environmental Conditions | 22deg. C, 68%RH | Input Power | 120Vac, 60Hz |
| Tested By | Han Wu | | |

Antenna Polarity & Test Distance: Horizontal at 3 M

| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
|-----|-------------|---------------|-----------------------|------------------------|-----------|-------------|-------------|
| 1 | 1743.00 | -56.8 | -49.9 | 0.5 | -49.4 | -13.0 | -36.4 |

Antenna Polarity & Test Distance: Vertical at 3 M

| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
|-----|-------------|---------------|-----------------------|------------------------|-----------|-------------|-------------|
| 1 | 1743.00 | -58.1 | -51.7 | 0.5 | -51.2 | -13.0 | -38.2 |

Remarks: ERP (dBm)= S.G Value (dBm) + Correction Factor (dB).

| | | | |
|--------------------------|-----------------|-----------------|--------------|
| Mode | 881.5MHz | Frequency Range | 1GHz ~ 18GHz |
| Environmental Conditions | 22deg. C, 68%RH | Input Power | 120Vac, 60Hz |
| Tested By | Han Wu | | |

Antenna Polarity & Test Distance: Horizontal at 3 M

| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
|-----|-------------|---------------|-----------------------|------------------------|-----------|-------------|-------------|
| 1 | 1763.00 | -56.8 | -50.4 | 0.5 | -49.9 | -13.0 | -36.9 |

Antenna Polarity & Test Distance: Vertical at 3 M

| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
|-----|-------------|---------------|-----------------------|------------------------|-----------|-------------|-------------|
| 1 | 1763.00 | -58.2 | -52.4 | 0.5 | -51.9 | -13.0 | -38.9 |

Remarks: ERP (dBm)= S.G Value (dBm) + Correction Factor (dB).

| | | | |
|--------------------------|-----------------|-----------------|--------------|
| Mode | 891.5MHz | Frequency Range | 1GHz ~ 18GHz |
| Environmental Conditions | 22deg. C, 68%RH | Input Power | 120Vac, 60Hz |
| Tested By | Han Wu | | |

| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
|---|-------------|---------------|-----------------------|------------------------|-----------|-------------|-------------|
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 1783.00 | -57.1 | -51.0 | 0.4 | -50.6 | -13.0 | -37.6 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 1783.00 | -58.4 | -53.0 | 0.4 | -52.6 | -13.0 | -39.6 |

Remarks: ERP (dBm)= S.G Value (dBm) + Correction Factor (dB).

QPSK_IoT Signal at Top

Channel Bandwidth: 5MHz

| | | | |
|--------------------------|-----------------|-----------------|--------------|
| Mode | 871.5MHz | Frequency Range | 1GHz ~ 18GHz |
| Environmental Conditions | 22deg. C, 68%RH | Input Power | 120Vac, 60Hz |
| Tested By | Han Wu | | |

Antenna Polarity & Test Distance: Horizontal at 3 M

| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
|--|-------------|---------------|-----------------------|------------------------|-----------|-------------|-------------|
| 1 | 1743.00 | -56.5 | -49.6 | 0.5 | -49.1 | -13.0 | -36.1 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 1743.00 | -57.8 | -51.4 | 0.5 | -50.9 | -13.0 | -37.9 |

Remarks: ERP (dBm)= S.G Value (dBm) + Correction Factor (dB).

| | | | |
|--------------------------|-----------------|-----------------|--------------|
| Mode | 881.5MHz | Frequency Range | 1GHz ~ 18GHz |
| Environmental Conditions | 22deg. C, 68%RH | Input Power | 120Vac, 60Hz |
| Tested By | Han Wu | | |

Antenna Polarity & Test Distance: Horizontal at 3 M

| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
|--|-------------|---------------|-----------------------|------------------------|-----------|-------------|-------------|
| 1 | 1763.00 | -56.3 | -49.9 | 0.5 | -49.4 | -13.0 | -36.4 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 1763.00 | -57.6 | -51.7 | 0.5 | -51.2 | -13.0 | -38.2 |

Remarks: ERP (dBm)= S.G Value (dBm) + Correction Factor (dB).

| | | | |
|--------------------------|-----------------|-----------------|--------------|
| Mode | 891.5MHz | Frequency Range | 1GHz ~ 18GHz |
| Environmental Conditions | 22deg. C, 68%RH | Input Power | 120Vac, 60Hz |
| Tested By | Han Wu | | |

Antenna Polarity & Test Distance: Horizontal at 3 M

| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
|--|-------------|---------------|-----------------------|------------------------|-----------|-------------|-------------|
| 1 | 1783.00 | -56.6 | -50.5 | 0.4 | -50.1 | -13.0 | -37.1 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | ERP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 1783.00 | -57.9 | -52.5 | 0.4 | -52.1 | -13.0 | -39.1 |

Remarks: ERP (dBm)= S.G Value (dBm) + Correction Factor (dB).

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC/RF Lab

Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

--- END ---