# FCC Test Report

## (Part 27_C2PC (Class II Permissive Change))

| | |
|---|---|
| **Report No.:** | RF160112E05E |
| **FCC ID:** | 2AD8UFW2IADPM01 |
| **Test Model:** | FW2IADPM01 |
| **Received Date:** | Nov. 09, 2018 |
| **Test Date:** | Nov. 27, 2018 ~ Feb. 23, 2019 |
| **Issued Date:** | Feb. 26, 2019 |
| **Applicant:** | Nokia Solutions and Networks |
| **Address:** | 2000 W. Lucent Lane, Naperville, IL 60563, USA |
| **Issued By:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory |
| **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.) |

## Table of Contents

## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| RF160112E05E | Original release. | Feb. 26, 2019 |

## 1 Certificate of Conformity

| | |
|---|---|
| **Product:** | Nokia FW2IA LTE Module |
| **Brand:** | Nokia |
| **Test Model:** | FW2IADPM01 |
| **Sample Status:** | MASS-PRODUCTION |
| **Applicant:** | Nokia Solutions and Networks |
| **Test Date:** | Nov. 27, 2018 ~ Feb. 23, 2019 |
| **Standards:** | FCC Part 27, Subpart C,L<br>FCC Part 2, Subpart J |

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:** Feb. 26, 2019

Pettie Chen / Senior Specialist

**Approved by :** Bruce Chen , **Date:** Feb. 26, 2019

Bruce Chen / Project Engineer

## 2 Summary of Test Results

| Applied Standard: FCC Part 27 & Part 2 | | | |
|---|---|---|---|
| FCC Clause | Test Item | Result | Remarks |
| 2.1046<br>27.50 (d)(2) | Equivalent Isotropically Radiated Power | Pass | Meet the requirement of limit. |
| 2.1047 | Modulation Characteristics | Pass | Meet the requirement of limit. |
| 27.50(d)(5) | Peak To Average Ratio | Pass | Meet the requirement of limit. |
| 2.1055<br>27.54 | Frequency Stability<br>Stay with the authorized bands of operation | Pass | Meet the requirement of limit. |
| 2.1049<br>27.53(h)(3) | Emission Bandwidth | Pass | Meet the requirement of limit. |
| 2.1051<br>27.53(h) | Band Edge Measurements | Pass | Meet the requirement of limit. |
| 2.1051<br>27.53(h) | Conducted Spurious Emissions | Pass | Meet the requirement of limit. |
| 2.1053<br>27.53(h) | Radiated Spurious Emissions | Pass | Meet the requirement of limit.<br>Minimum passing margin is -19.1dB at 6435.00MHz. |

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) (±) |
|---|---|---|
| Radiated Emissions up to 1 GHz | 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. 11, 2018 | Apr. 10, 2019 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSP40 | 100269 | May 29, 2018 | May 28, 2019 |
| 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 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | 9170-480 | Nov. 25, 2018 | Nov. 24, 2019 |
| Loop Antenna TESEQ | HLA 6121 | 45745 | Jun. 14, 2018 | Jun. 13, 2019 |
| Pre-Amplifier EMCI | EMC 184045 | 980116 | Oct. 12, 2018 | Oct. 11, 2019 |
| Preamplifier Agilent (Below 1GHz) | 8447D | 2944A10638 | Aug. 08, 2018 | Aug. 07, 2019 |
| Preamplifier Agilent (Above 1GHz) | 8449B | 3008A01924 | Feb. 22, 2018 | Feb. 21, 2019 |
| | | | Feb. 21, 2019 | Feb. 20, 2020 |
| RF signal cable HUBER+SUHNER&EMCI | SUCOFLEX 104 & EMC104-SM-SM8000 | CABLE-CH9-02 (248780+171006) | Jan. 15, 2018 | Jan. 14, 2019 |
| | | | Jan. 19, 2019 | Jan. 18, 2020 |
| RF signal cable HUBER+SUHNER | SUCOFLEX 104 | CABLE-CH9-(250795/4) | Aug. 08, 2018 | Aug. 07, 2019 |
| RF signal cable Woken | 8D-FB | Cable-CH9-01 | Jul. 31, 2018 | Jul. 30, 2019 |
| 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 |
| JFW 20dB attenuation | 50HF-020-SMA | NA | NA | NA |
| Radio Communication Analyzer | MT8821C | 6261786083 | Dec. 21, 2017 | Dec. 20, 2018 |
| | | | Dec. 11, 2018 | Dec. 10, 2019 |
| WIT Standard Temperature And Humidity Chamber | TH-4S-C | W981030 | Jun. 04, 2018 | Jun. 03, 2019 |
| DC Power Supply Topward | 6306A | 727263 | NA | NA |
| True RMS Clamp Meter / Fluke | 325 | 31130711WS | May 22, 2018 | May 21, 2019 |

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. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
4. The IC Site Registration No. is IC 7450F-9.

## 3 General Information

### 3.1 General Description of EUT

| | | |
|---|---|---|
| Product | Nokia FW2IA LTE Module | |
| Brand | Nokia | |
| Test Model | FW2IADPM01 | |
| FCC ID | 2AD8UFW2IADPM01 | |
| Status of EUT | MASS-PRODUCTION | |
| Power Supply Rating | 12Vdc | |
| Modulation Type | QPSK, 16QAM, 64QAM, 256QAM | |
| Modulation Technology | OFDM, OFDMA, SC-FDMA | |
| Transfer Rate | Uplink: 75Mbps, Downlink: 300Mbps | |
| Operating Frequency | Channel Bandwidth: 5MHz | 2112.5MHz~2177.5MHz |
| | Channel Bandwidth: 10MHz | 2115.0MHz~2175.0MHz |
| | Channel Bandwidth: 15MHz | 2117.5MHz~2172.5MHz |
| | Channel Bandwidth: 20MHz | 2120.0MHz~2170.0MHz |
| Output Power | **NB-IOT In-band:** | |
| | Channel Bandwidth: 5MHz | 437.522mW (26.41dBm) (QPSK) |
| | Channel Bandwidth: 10MHz | 435.512mW (26.39dBm) (QPSK) |
| | Channel Bandwidth: 15MHz | 434.510mW (26.38dBm) (QPSK) |
| | Channel Bandwidth: 20MHz | 437.522mW (26.41dBm) (QPSK) |
| | **NB-IOT Guard Band:** | |
| | Channel Bandwidth: 10MHz | 439.542mW (26.43dBm) (QPSK) |
| | Channel Bandwidth: 15MHz | 434.510mW (26.38dBm) (QPSK) |
| | Channel Bandwidth: 20MHz | 442.588mW (26.46dBm) (QPSK) |
| Antenna Type | Refer to note as below | |
| Antenna Connector | Refer to user's manual | |
| Accessory Device | NA | |
| Data Cable Supplied | NA | |

Note:

1. This report is prepared for FCC class II permissive change. This is a supplementary report of Report No.: RF160112E05A. The differences between them are as below information:
   - ◆ LTE B66 add NB-IOT In-band
   - ◆ LTE B66 add NB-IOT Guard Band
2. For above changes, only NB-IOT In-band and NB-IOT Guard Band test results has to be performed. The other test items were copied from the original test report (Report No.: RF160112E05, RF160112E05A) and all data was verified to meet the requirements.
3. There is LTE technology used for the EUT, which supports 2110~2180MHz frequency band.
4. The EUT incorporates a MIMO function for LTE mode

| Channel Bandwidth | Modulation | TX & RX configuration | |
|---|---|---|---|
| 5MHz | BPSK, QPSK, 16QAM, 64QAM, 256QAM | 2TX | 2RX |
| 10MHz | BPSK, QPSK, 16QAM, 64QAM, 256QAM | 2TX | 2RX |
| 15MHz | BPSK, QPSK, 16QAM, 64QAM, 256QAM | 2TX | 2RX |
| 20MHz | BPSK, QPSK, 16QAM, 64QAM, 256QAM | 2TX | 2RX |

5. The EUT's spec. as below table:

| Model name | LTE | | | | |
|---|---|---|---|---|---|
| | Freq.(MHz) | | Freq.(MHz) | | Band |
| FW2IADPM01 | UL | BW 5MHz : 1712.5~1777.5 | DL | BW 5MHz : 2112.5~2177.5 | AWS |
| | | BW 10MHz : 1715~1775 | | BW 10MHz : 2115~2175 | |
| | | BW 15MHz : 1717.5~1772.5 | | BW 15MHz : 2117.5~2172.5 | |
| | | BW 20MHz : 1720~1770 | | BW 20MHz : 2120~2170 | |

6. The antennas provided to the EUT, please refer to the following table:

**Antenna Spec.**

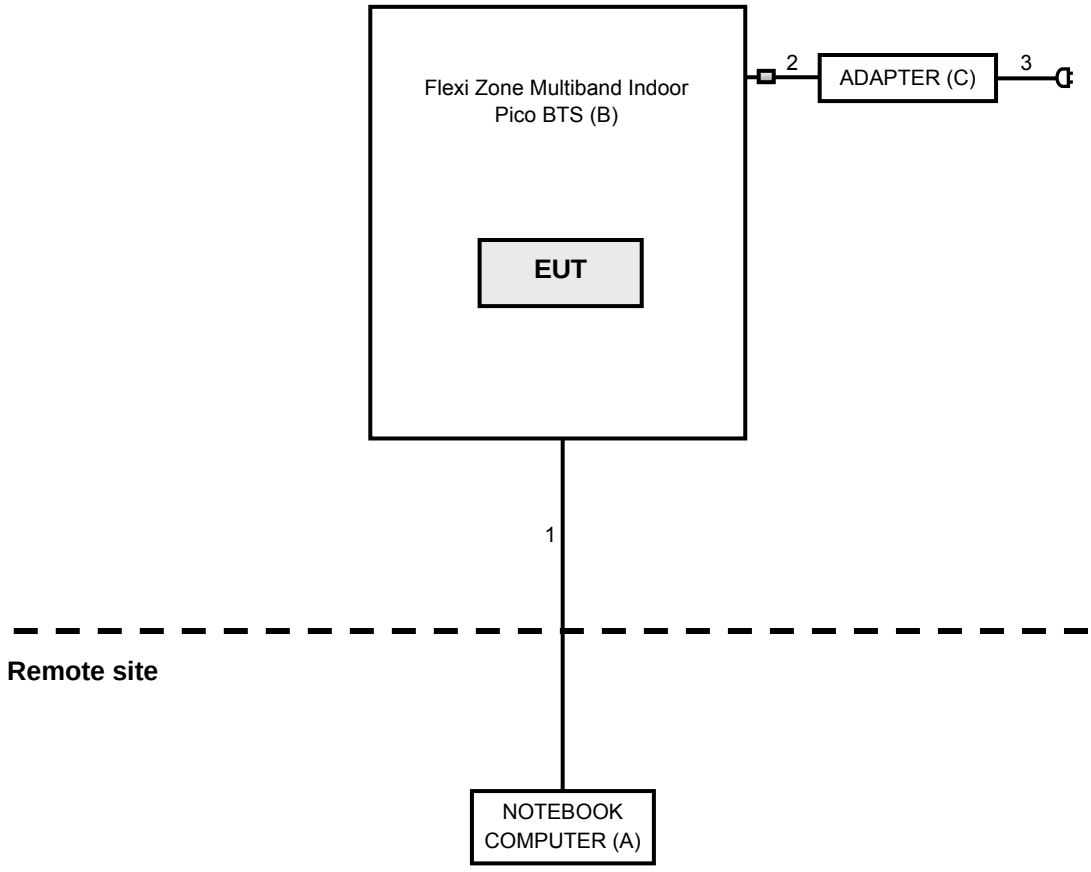
| Antenna No | Brand | Model | Antenna Type | Gain(dBi) | Frequency (GHz) |
|---|---|---|---|---|---|
| LTE Ant1(Main) | Nokia | FW2IADPM01 | Slot Antenna | 6.03 | 1.7~2.7 |
| Antenna No | Brand | Model | Antenna Type | Gain(dBi) | Frequency (GHz) |
| LTE Ant2(Aux) | Nokia | FW2IADPM01 | Slot Antenna | 4.64 | 1.7~2.7 |

**Cable Spec.**

| Brand | Model | Connector Type | Cable Loss(dB) | Cable Length (mm) |
|---|---|---|---|---|
| NA | NA | Right angle MMCX Plug | peak gain included | 287 |

7. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

## 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.

| No. | Product | Brand | Model No. | Serial No. | FCC ID | Remark |
|---|---|---|---|---|---|---|
| A | Notebook Computer | DELL | D531 | CN-0XM006-48643-86L-4472 | QDS-BRCM1019 | Provided by Lab |
| B | Flexi Zone Multiband Indoor Pico BTS | Nokia | FW2IRA | NA | NA | Supplied by Client |
| C | Adapter | DVE | DSA-60PFE-12 | NA | NA | Supplied by Client |

**NOTE:**

1. All power cords of the above support units are non-shielded (1.8 m).

| No. | Cable | Qty. | Length (m) | Shielded (Yes/ No) | Cores (Number) | Remark |
|---|---|---|---|---|---|---|
| 1 | RJ-45 | 1 | 10 | No | 0 | Provided by Lab |
| 2 | DC | 1 | 1.2 | No | 1 | Supplied by Client |
| 3 | AC | 1 | 1.8 | No | 0 | Supplied by Client |

**NOTE:**

1. The core(s) is(are) originally attached to the cable(s).

### 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 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:

LTE Band 66
**For NB-IOT In-band:**

| Test Item | Available Frequency (MHz) | Tested Frequency (MHz) | Channel Bandwidth | Modulation |
|---|---|---|---|---|
| Modulation Characteristics | 2110 to 2180 | CH 66461 (2112.5MHz) | 5MHz | QPSK |
| Output Power | 2110 to 2180 | CH 66461 (2112.5MHz), CH 66786 (2145.0MHz), CH 67111 (2177.5MHz) | 5MHz | QPSK |
| | | CH 66486 (2115.0MHz), CH 66786 (2145.0MHz), CH 67086 (2175.0MHz) | 10MHz | QPSK |
| | | CH 66511 (2117.5MHz), CH 66786 (2145.0MHz), CH 67061 (2172.5MHz) | 15MHz | QPSK |
| | | CH 66536 (2120.0MHz), CH 66786 (2145.0MHz), CH 67036 (2170.0MHz) | 20MHz | QPSK |
| Emission Bandwidth | 2110 to 2180 | CH 66461 (2112.5MHz), CH 66786 (2145.0MHz), CH 67111 (2177.5MHz) | 5MHz | QPSK |
| | | CH 66536 (2120.0MHz), CH 66786 (2145.0MHz), CH 67036 (2170.0MHz) | 20MHz | QPSK |
| Conducted Emission | 2110 to 2180 | CH 66461 (2112.5MHz), CH 66786 (2145.0MHz), CH 67111 (2177.5MHz) | 5MHz | QPSK |
| | | CH 66536 (2120.0MHz), CH 66786 (2145.0MHz), CH 67036 (2170.0MHz) | 20MHz | QPSK |
| Radiated Emission Below 1GHz | 2110 to 2180 | CH 66461 (2112.5MHz) | 5MHz | QPSK |
| Radiated Emission Above 1GHz | 2110 to 2180 | CH 66461 (2112.5MHz), CH 66786 (2145.0MHz), CH 67111 (2177.5MHz) | 5MHz | QPSK |

*****This module is based on FW2XXXX host assembly provide base band data during testing.

**NOTE:**
1. All supported modulation types were evaluated.The Worst case emaission of QPSK was selected. Therefore, the EIRP power was presented under QPSK mode only.

**For NB-IOT Guard Band:**

| Test Item | Available Frequency (MHz) | Tested Frequency (MHz) | Channel Bandwidth | Modulation |
|---|---|---|---|---|
| Output Power | 2110 to 2180 | CH 66486 (2115.0MHz), CH 66786 (2145.0MHz), CH 67086 (2175.0MHz) | 10MHz | QPSK |
| | | CH 66511 (2117.5MHz), CH 66786 (2145.0MHz), CH 67061 (2172.5MHz) | 15MHz | QPSK |
| | | CH 66536 (2120.0MHz), CH 66786 (2145.0MHz), CH 67036 (2170.0MHz) | 20MHz | QPSK |
| Modulation Characteristics | 2110 to 2180 | CH 66786 (2145.0MHz) | 10MHz | QPSK |
| Frequency Stability | 2110 to 2180 | CH 66786 (2145.0MHz) | 10MHz | QPSK |
| Emission Bandwidth | 2110 to 2180 | CH 66486 (2115.0MHz), CH 66786 (2145.0MHz), CH 67086 (2175.0MHz) | 10MHz | QPSK |
| | | CH 66511 (2117.5MHz), CH 66786 (2145.0MHz), CH 67061 (2172.5MHz) | 15MHz | QPSK |
| | | CH 66536 (2120.0MHz), CH 66786 (2145.0MHz), CH 67036 (2170.0MHz) | 20MHz | QPSK |
| Channel Edge | 2110 to 2180 | CH 66486 (2115.0MHz), CH 67086 (2175.0MHz) | 10MHz | QPSK |
| | | CH 66511 (2117.5MHz), CH 67061 (2172.5MHz) | 15MHz | QPSK |
| | | CH 66536 (2120.0MHz), CH 67036 (2170.0MHz) | 20MHz | QPSK |
| Peak to Average Ratio | 2110 to 2180 | CH 66486 (2115.0MHz), CH 66786 (2145.0MHz), CH 67086 (2175.0MHz) | 10MHz | QPSK |
| | | CH 66511 (2117.5MHz), CH 66786 (2145.0MHz), CH 67061 (2172.5MHz) | 15MHz | QPSK |
| | | CH 66536 (2120.0MHz), CH 66786 (2145.0MHz), CH 67036 (2170.0MHz) | 20MHz | QPSK |
| Conducted Emission | 2110 to 2180 | CH 66536 (2120.0MHz), CH 66786 (2145.0MHz), CH 67036 (2170.0MHz) | 20MHz | QPSK |
| Radiated Emission Below 1GHz | 2110 to 2180 | CH 66486 (2115.0MHz) | 10MHz | QPSK |
| | | CH 66511 (2117.5MHz) | 15MHz | QPSK |
| | | CH 66536 (2120.0MHz) | 20MHz | QPSK |
| Radiated Emission Above 1GHz | 2110 to 2180 | CH 66486 (2115.0MHz), CH 66786 (2145.0MHz), CH 67086 (2175.0MHz) | 10MHz | QPSK |
| | | CH 66511 (2117.5MHz), CH 66786 (2145.0MHz), CH 67061 (2172.5MHz) | 15MHz | QPSK |
| | | CH 66536 (2120.0MHz), CH 66786 (2145.0MHz), CH 67036 (2170.0MHz) | 20MHz | QPSK |

**Test Condition:**

| Test Item | Environmental Conditions | Input Power (System) | Tested By |
|---|---|---|---|
| EIRP | 20deg. C, 62%RH | 120Vac, 60Hz | James Yang |
| Modulation characteristics | 20deg. C, 62%RH | 120Vac, 60Hz | James Yang |
| Frequency Stability | 20deg. C, 62%RH | 120Vac, 60Hz | James Yang |
| Occupied Bandwidth | 20deg. C, 62%RH | 120Vac, 60Hz | James Yang |
| Band Edge | 20deg. C, 62%RH | 120Vac, 60Hz | James Yang |
| Peak To Average Ratio | 20deg. C, 62%RH | 120Vac, 60Hz | James Yang |
| Conducted Emission | 20deg. C, 62%RH | 120Vac, 60Hz | James Yang |
| Radiated Emission | 23deg. C, 68%RH | 120Vac, 60Hz | Greg Lin |

### 3.4 EUT Operating Conditions

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 27**

**KDB 971168 D01 Power Meas License Digital Systems v03r01**

**ANSI/TIA/EIA-603-E 2016**

**ANSI 63.26-2015**

**NOTE:** 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 radiated peak output power shall be according to the specific rule Part 27.50(d)(2) that are limited to EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

4.1.2 Test Procedures

Conducted Power Measurement:

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW = 100kHz and VBW = 300kHz (Channel Bandwidth: 5MHz), RBW = 200kHz and VBW = 620kHz (Channel Bandwidth: 10MHz), RBW = 300kHz and VBW = 1MHz (Channel Bandwidth: 15MHz), RBW = 430kHz and VBW = 1.2MHz (Channel Bandwidth: 20MHz). Record the power level.

EIRP / ERP Measurement:

a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5MHz for LTE Mode.

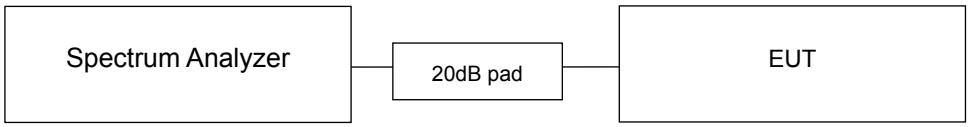
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and 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 - 2.15dBi.

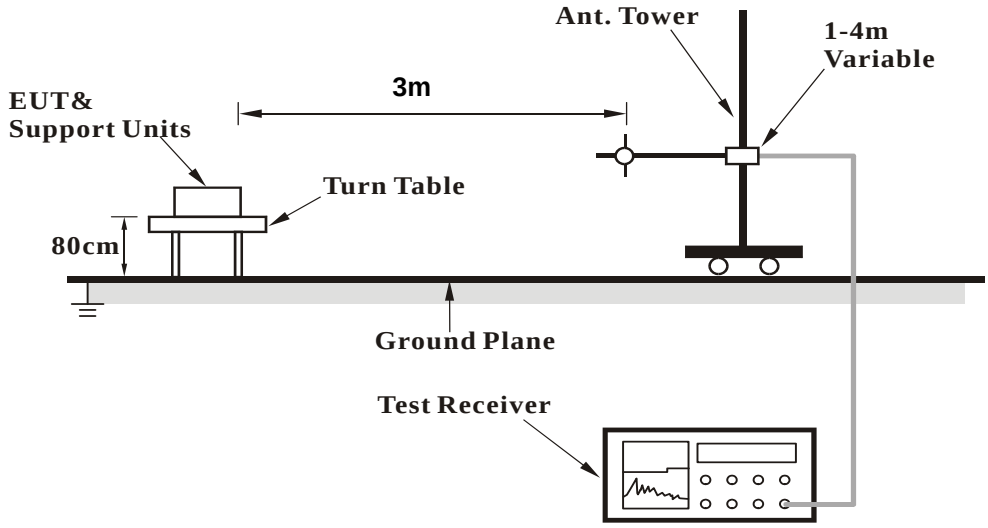
4.1.3 Test Setup

Conducted Power Measurement:

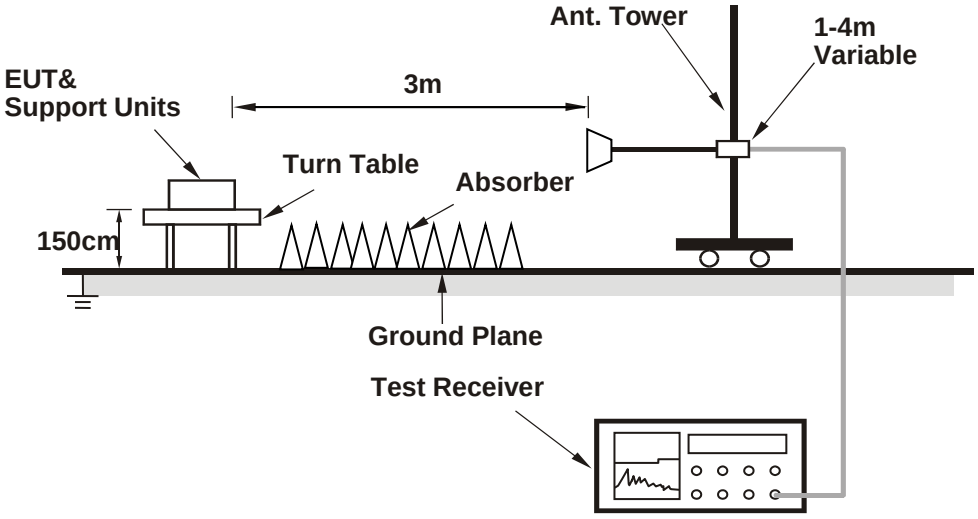



EIRP / ERP MEASUREMENT:

**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).

### 4.1.4 Test Results

Conducted Output Power (dBm)

**For NB-IOT In-band:**

| Band / BW | RB Size | RB Offset | Chain | NB-IoT Carrier RB offset=0 | | | NB-IoT Carrier RB offset=24 | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Low CH 66461 2112.5 MHz | Mid CH 66786 2145 MHz | High CH 67111 2177.5 MHz | Low CH 66461 2112.5 MHz | Mid CH 66786 2145 MHz | High CH 67111 2177.5 MHz |
| 66 / 5M | 25 | 0 | 0 | 23.35 | **23.39** | 23.37 | 23.33 | **23.38** | 23.36 |
| | | | 1 | 23.36 | **23.40** | 23.37 | **23.38** | 23.36 | 23.34 |
| | | | Total | 26.37 | **26.41** | 26.38 | 26.37 | 26.38 | 26.36 |

| Band / BW | RB Size | RB Offset | Chain | NB-IoT Carrier RB offset=0 | | | NB-IoT Carrier RB offset=24 | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Low CH 66486 2115 MHz | Mid CH 66786 2145 MHz | High CH 67086 2175 MHz | Low CH 66486 2115 MHz | Mid CH 66786 2145 MHz | High CH 67086 2175 MHz |
| 66 / 10M | 50 | 0 | 0 | **23.36** | 23.31 | 23.35 | **23.34** | 23.32 | 23.30 |
| | | | 1 | 23.39 | 23.39 | **23.40** | **23.40** | 23.35 | 23.36 |
| | | | Total | **26.39** | 26.36 | **26.39** | **26.38** | 26.35 | 26.34 |

| Band / BW | RB Size | RB Offset | Chain | NB-IoT Carrier RB offset=0 | | | NB-IoT Carrier RB offset=24 | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Low CH 66511 2117.5 MHz | Mid CH 66786 2145 MHz | High CH 67061 2172.5 MHz | Low CH 66511 2117.5 MHz | Mid CH 66786 2145 MHz | High CH 67061 2172.5 MHz |
| 66 / 15M | 75 | 0 | 0 | 23.35 | **23.37** | 23.32 | 23.28 | 23.32 | **23.35** |
| | | | 1 | **23.38** | 23.36 | 23.36 | 23.35 | **23.39** | 23.36 |
| | | | Total | **26.38** | 26.35 | 26.37 | 26.36 | **26.37** | 26.34 |

| Band / BW | RB Size | RB Offset | Chain | NB-IoT Carrier RB offset=0 | | | NB-IoT Carrier RB offset=24 | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Low CH 66536 2120 MHz | Mid CH 66786 2145 MHz | High CH 67036 2170 MHz | Low CH 66536 2120 MHz | Mid CH 66786 2145 MHz | High CH 67036 2170 MHz |
| 66 / 20M | 100 | 0 | 0 | **23.39** | 23.34 | 23.29 | **23.37** | 23.33 | 23.32 |
| | | | 1 | **23.40** | 23.36 | 23.26 | **23.39** | 23.37 | 23.24 |
| | | | Total | **26.41** | 26.36 | 26.27 | **26.39** | 26.36 | 26.24 |

## For NB-IOT Guard Band:

### 1TX

| Band / BW | Chain | QPSK_IoT Signal at Bottom | | | QPSK_IoT Signal at Top | | |
|---|---|---|---|---|---|---|---|
| | | Low CH | Mid CH | High CH | Low CH | Mid CH | High CH |
| | | 66486 | 66786 | 67086 | 66486 | 66786 | 67086 |
| | | 2115 MHz | 2145 MHz | 2175 MHz | 2115 MHz | 2145 MHz | 2175 MHz |
| 66 / 10M | 0 | 23.39 | 23.38 | **23.41** | 23.38 | 23.36 | **23.40** |
| | 1 | 23.18 | 23.08 | 23.25 | 23.33 | 23.12 | 23.34 |

| Band / BW | Chain | QPSK_IoT Signal at Bottom | | | QPSK_IoT Signal at Top | | |
|---|---|---|---|---|---|---|---|
| | | Low CH | Mid CH | High CH | Low CH | Mid CH | High CH |
| | | 66511 | 66786 | 67061 | 66511 | 66786 | 67061 |
| | | 2117.5 MHz | 2145 MHz | 2172.5 MHz | 2117.5 MHz | 2145 MHz | 2172.5 MHz |
| 66 / 15M | 0 | 23.36 | **23.38** | 23.33 | **23.37** | **23.37** | 23.33 |
| | 1 | 23.19 | 23.13 | 23.22 | 23.27 | 23.09 | 23.22 |

| Band / BW | Chain | QPSK_IoT Signal at Bottom | | | QPSK_IoT Signal at Top | | |
|---|---|---|---|---|---|---|---|
| | | Low CH | Mid CH | High CH | Low CH | Mid CH | High CH |
| | | 66536 | 66786 | 67036 | 66536 | 66786 | 67036 |
| | | 2120 MHz | 2145 MHz | 2170 MHz | 2120 MHz | 2145 MHz | 2170 MHz |
| 66 / 20M | 0 | **23.41** | 23.36 | 23.25 | **23.40** | 23.37 | 23.26 |
| | 1 | 23.39 | 23.08 | 23.14 | 23.36 | 23.10 | 23.12 |

### 2TX

| Band / BW | Chain | QPSK_IoT Signal at Bottom | | | QPSK_IoT Signal at Top | | |
|---|---|---|---|---|---|---|---|
| | | Low CH | Mid CH | High CH | Low CH | Mid CH | High CH |
| | | 66486 | 66786 | 67086 | 66486 | 66786 | 67086 |
| | | 2115 MHz | 2145 MHz | 2175 MHz | 2115 MHz | 2145 MHz | 2175 MHz |
| 66 / 10M | 2TX | 26.35 | 26.29 | 26.39 | 26.42 | 26.30 | **26.43** |

| Band / BW | Chain | QPSK_IoT Signal at Bottom | | | QPSK_IoT Signal at Top | | |
|---|---|---|---|---|---|---|---|
| | | Low CH | Mid CH | High CH | Low CH | Mid CH | High CH |
| | | 66511 | 66786 | 67061 | 66511 | 66786 | 67061 |
| | | 2117.5 MHz | 2145 MHz | 2172.5 MHz | 2117.5 MHz | 2145 MHz | 2172.5 MHz |
| 66 / 15M | 2TX | 26.34 | 26.32 | 26.34 | **26.38** | 26.29 | 26.34 |

| Band / BW | Chain | QPSK_IoT Signal at Bottom | | | QPSK_IoT Signal at Top | | |
|---|---|---|---|---|---|---|---|
| | | Low CH | Mid CH | High CH | Low CH | Mid CH | High CH |
| | | 66536 | 66786 | 67036 | 66536 | 66786 | 67036 |
| | | 2120 MHz | 2145 MHz | 2170 MHz | 2120 MHz | 2145 MHz | 2170 MHz |
| 66 / 20M | 2TX | **26.46** | 26.28 | 26.26 | 26.44 | 26.30 | 26.25 |

EIRP

LTE Band 66

**For NB-IOT In-band:**

Channel Bandwidth: 5MHz

| MODE | | TX channel 66461 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2112.50 | -17.2 | 24.5 | -0.3 | 24.2 | 62.14 | -37.94 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2112.50 | -13.6 | 28.9 | -0.3 | 28.6 | 62.14 | -33.54 |

| MODE | | TX channel 66786 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -16.5 | 25.4 | -0.3 | 25.1 | 62.14 | -37.04 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -13.1 | 29.4 | -0.3 | 29.1 | 62.14 | -33.04 |

| MODE | | TX channel 67111 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2177.50 | -16.8 | 25.2 | -0.2 | 25.0 | 62.14 | -37.14 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2177.50 | -13.2 | 29.1 | -0.2 | 28.9 | 62.14 | -33.24 |

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Channel Bandwidth: 10MHz

| MODE | | TX channel 66486 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2115.00 | -17.4 | 24.3 | -0.3 | 24.0 | 62.14 | -38.14 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2115.00 | -13.7 | 28.8 | -0.3 | 28.5 | 62.14 | -33.64 |

| MODE | | TX channel 66786 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -16.3 | 25.6 | -0.3 | 25.3 | 62.14 | -36.84 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -13.2 | 29.3 | -0.3 | 29.0 | 62.14 | -33.14 |

| MODE | | TX channel 67086 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2175.00 | -16.8 | 25.2 | -0.2 | 25.0 | 62.14 | -37.14 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2175.00 | -13.0 | 29.3 | -0.2 | 29.1 | 62.14 | -33.04 |

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Channel Bandwidth: 15MHz

| MODE | | TX channel 66511 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2117.50 | -16.4 | 25.3 | -0.3 | 25.0 | 62.14 | -37.14 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2117.50 | -13.6 | 28.9 | -0.3 | 28.6 | 62.14 | -33.54 |

| MODE | | TX channel 66786 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -16.8 | 25.1 | -0.3 | 24.8 | 62.14 | -37.34 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -13.0 | 29.5 | -0.3 | 29.2 | 62.14 | -32.94 |

| MODE | | TX channel 67061 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2172.50 | -16.8 | 25.3 | -0.3 | 25.0 | 62.14 | -37.14 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2172.50 | -13.6 | 28.8 | -0.3 | 28.5 | 62.14 | -33.64 |

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Channel Bandwidth: 20MHz

| MODE | | TX channel 66536 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2120.00 | -17.0 | 24.8 | -0.3 | 24.5 | 62.14 | -37.64 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2120.00 | -13.0 | 29.5 | -0.3 | 29.2 | 62.14 | -32.94 |

| MODE | | TX channel 66786 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -17.2 | 24.7 | -0.3 | 24.4 | 62.14 | -37.74 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -13.7 | 28.8 | -0.3 | 28.5 | 62.14 | -33.64 |

| MODE | | TX channel 67036 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2170.00 | -17.3 | 24.8 | -0.3 | 24.5 | 62.14 | -37.64 |
| Antenna Polarity & Test Distance: Vertical at 3 m | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2170.00 | -13.9 | 28.5 | -0.3 | 28.2 | 62.14 | -33.94 |

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

**For NB-IOT Guard Band:**

**QPSK_IoT Signal at Bottom**

Channel Bandwidth: 10MHz

| MODE | | TX channel 66486 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2115.00 | -16.3 | 25.4 | -0.3 | 25.1 | 62.14 | -37.04 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2115.00 | -13.6 | 28.9 | -0.3 | 28.6 | 62.14 | -33.54 |

| MODE | | TX channel 66786 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -16.1 | 25.8 | -0.3 | 25.5 | 62.14 | -36.64 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -13.4 | 29.1 | -0.3 | 28.8 | 62.14 | -33.34 |

| MODE | | TX channel 67086 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2175.00 | -16.2 | 25.8 | -0.2 | 25.6 | 62.14 | -36.54 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2175.00 | -12.6 | 29.7 | -0.2 | 29.5 | 62.14 | -32.64 |

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Channel Bandwidth: 15MHz

| MODE | | TX channel 66511 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2117.50 | -16.0 | 25.7 | -0.3 | 25.4 | 62.14 | -36.74 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2117.50 | -13.5 | 29.0 | -0.3 | 28.7 | 62.14 | -33.44 |

| MODE | | TX channel 66786 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -15.7 | 26.2 | -0.3 | 25.9 | 62.14 | -36.24 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -12.9 | 29.6 | -0.3 | 29.3 | 62.14 | -32.84 |

| MODE | | TX channel 67061 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2172.50 | -16.3 | 25.8 | -0.3 | 25.5 | 62.14 | -36.64 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2172.50 | -13.5 | 28.9 | -0.3 | 28.6 | 62.14 | -33.54 |

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Channel Bandwidth: 20MHz

| MODE | | TX channel 66536 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2120.00 | -16.2 | 25.6 | -0.3 | 25.3 | 62.14 | -36.84 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2120.00 | -12.9 | 29.6 | -0.3 | 29.3 | 62.14 | -32.84 |

| MODE | | TX channel 66786 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -15.8 | 26.1 | -0.3 | 25.8 | 62.14 | -36.34 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -13.4 | 29.1 | -0.3 | 28.8 | 62.14 | -33.34 |

| MODE | | TX channel 67036 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2170.00 | -16.1 | 26.0 | -0.3 | 25.7 | 62.14 | -36.44 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2170.00 | -13.6 | 28.8 | -0.3 | 28.5 | 62.14 | -33.64 |

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

**QPSK_IoT Signal at Top**

Channel Bandwidth: 10MHz

| MODE | | TX channel 66486 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2115.00 | -16.3 | 25.4 | -0.3 | 25.1 | 62.14 | -37.04 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2115.00 | -13.5 | 29.0 | -0.3 | 28.7 | 62.14 | -33.44 |

| MODE | | TX channel 66786 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -15.7 | 26.2 | -0.3 | 25.9 | 62.14 | -36.24 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -13.2 | 29.3 | -0.3 | 29.0 | 62.14 | -33.14 |

| MODE | | TX channel 67086 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2175.00 | -16.1 | 25.9 | -0.2 | 25.7 | 62.14 | -36.44 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2175.00 | -12.7 | 29.6 | -0.2 | 29.4 | 62.14 | -32.74 |

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Channel Bandwidth: 15MHz

| MODE | | TX channel 66511 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2117.50 | -17.0 | 24.7 | -0.3 | 24.4 | 62.14 | -37.74 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2117.50 | -13.6 | 28.9 | -0.3 | 28.6 | 62.14 | -33.54 |

| MODE | | TX channel 66786 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -16.5 | 25.4 | -0.3 | 25.1 | 62.14 | -37.04 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -13.1 | 29.4 | -0.3 | 29.1 | 62.14 | -33.04 |

| MODE | | TX channel 67061 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2172.50 | -16.9 | 25.2 | -0.3 | 24.9 | 62.14 | -37.24 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2172.50 | -13.9 | 28.5 | -0.3 | 28.2 | 62.14 | -33.94 |

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Channel Bandwidth: 20MHz

| MODE | | TX channel 66536 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2120.00 | -16.9 | 24.9 | -0.3 | 24.6 | 62.14 | -37.54 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2120.00 | -13.0 | 29.5 | -0.3 | 29.2 | 62.14 | -32.94 |

| MODE | | TX channel 66786 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -16.1 | 25.8 | -0.3 | 25.5 | 62.14 | -36.64 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2145.00 | -13.5 | 29.0 | -0.3 | 28.7 | 62.14 | -33.44 |

| MODE | | TX channel 67036 | | | | | |
|---|---|---|---|---|---|---|---|
| Antenna Polarity & Test Distance: Horizontal at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2170.00 | -16.0 | 26.1 | -0.3 | 25.8 | 62.14 | -36.34 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 2170.00 | -13.8 | 28.6 | -0.3 | 28.3 | 62.14 | -33.84 |

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

## 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

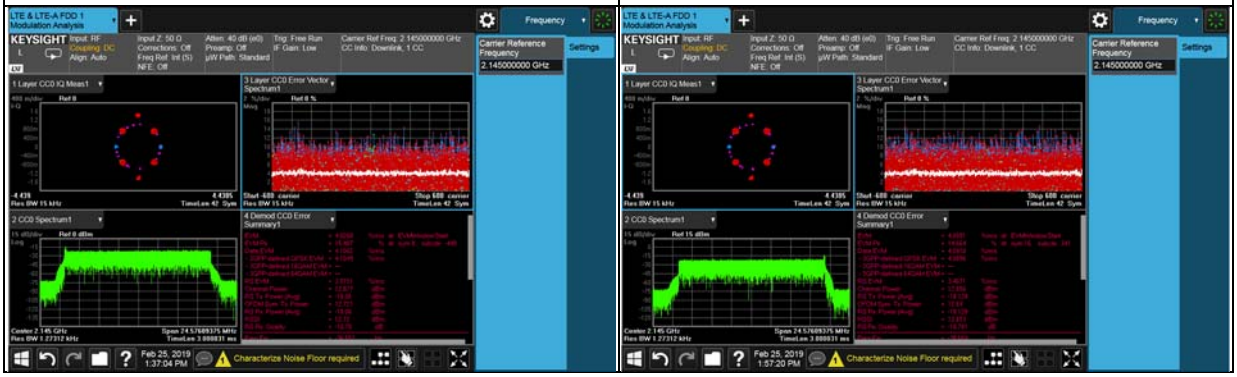
4.2.4 Test Results

**For NB-IOT In-band:**

| LTE Band 66 |
|---|
| Spectrum Plot of Measurement Value |
| Channel: 66461 / Frequency (MHz): 2112.5MHz |
| Channel Bandwidth: 5MHz / QPSK |


**For NB-IOT Guard Band:**

| LTE Band 66 | |
|---|---|
| Spectrum Plot of Measurement Value | |
| Channel: 66786 / Frequency (MHz): 2145MHz | |
| Channel Bandwidth: 10MHz / QPSK | |
| QPSK_IoT Signal at Bottom | QPSK_IoT Signal at Top |



## 4.3 Frequency Stability Measurement

### 4.3.1 Limits of Frequency Stability Measurement

According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT -30℃ ~ 50℃.

### 4.3.2 Test Procedure

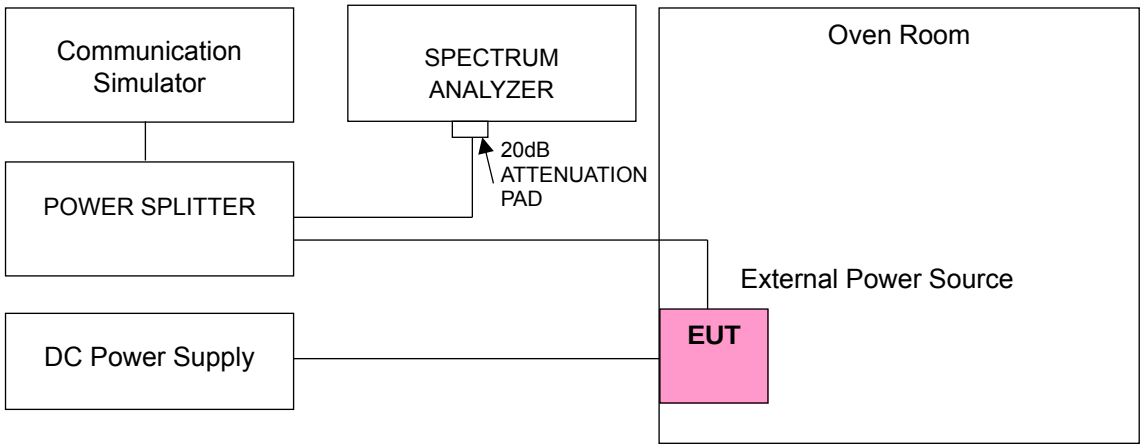
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

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 ±0.5 ℃ 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 Guard Band:**

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 66 | Limit (ppm) |
|---|---|---|
| | Frequency error (ppm) | |
| 13.2 | 0.07851 | 2.5 |
| 12 | 0.00307 | 2.5 |
| 10.8 | 0.08978 | 2.5 |

Note: The applicant defined the normal working voltage is from 10.8Vdc to 13.2Vdc.

| TEMP. (℃) | LTE Band 66 | Limit (ppm) |
|---|---|---|
| | Frequency error (ppm) | |
| 50 | 0.03818 | 2.5 |
| 40 | 0.12732 | 2.5 |
| 30 | 0.00895 | 2.5 |
| 20 | 0.00307 | 2.5 |
| 10 | 0.11836 | 2.5 |
| 0 | 0.09032 | 2.5 |
| -10 | 0.14847 | 2.5 |
| -20 | 0.06566 | 2.5 |
| -30 | 0.14562 | 2.5 |

## 4.4 Emission Bandwidth Measurement

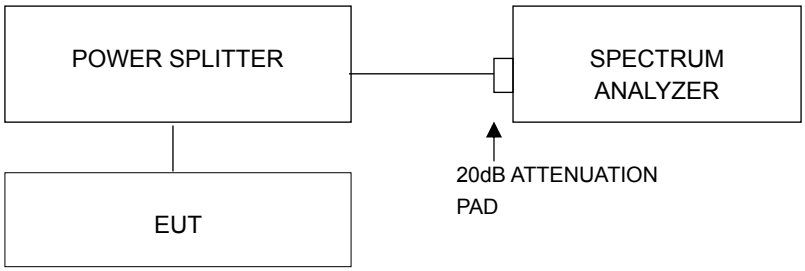
### 4.4.1 Limits of Emission Bandwidth Measurement

According to FCC 27.53(m)(6) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

### 4.4.2 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW = 30kHz and VBW = 100kHz (Channel Bandwidth: 1.4MHz), RBW = 51kHz and VBW = 150kHz (Channel Bandwidth: 3MHz and 5MHz), RBW = 100kHz and VBW = 300kHz (Channel Bandwidth: 10MHz), RBW = 200kHz and VBW = 620kHz (Channel Bandwidth: 15MHz) and RBW = 430kHz and VBW = 1.2MHz (Channel Bandwidth: 20MHz). The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

### 4.4.3 Test Setup



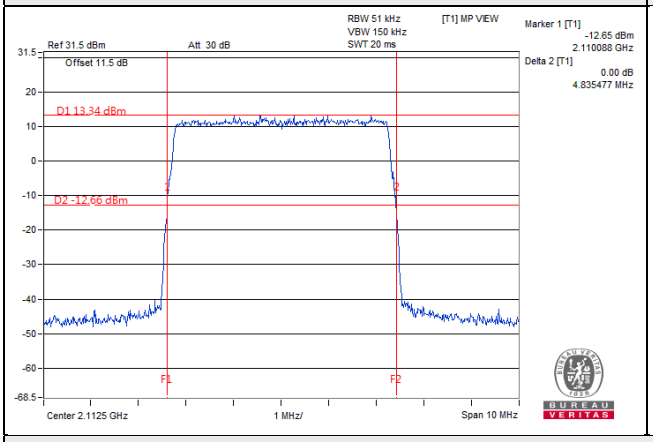
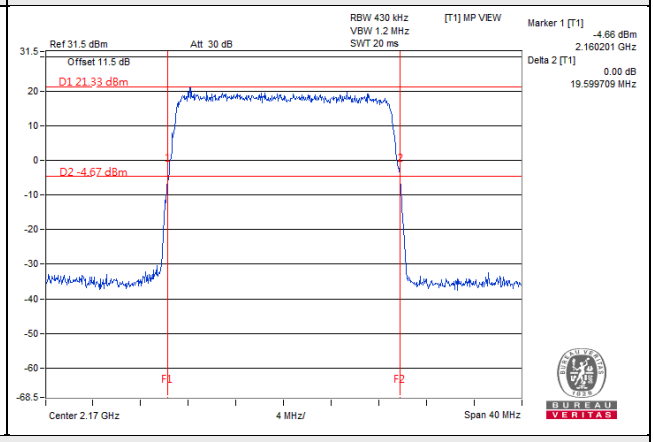
### 4.4.4 Test Result

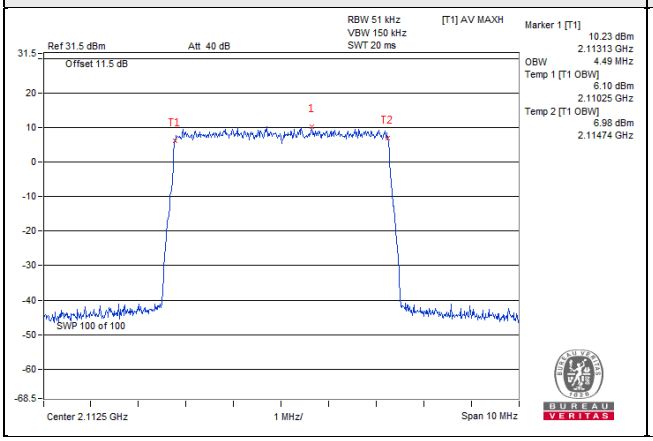
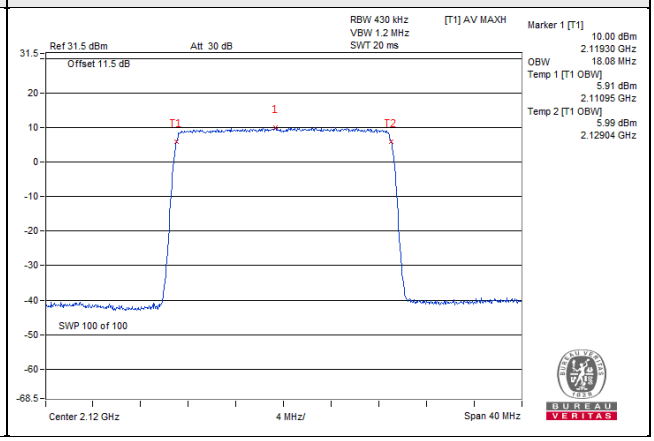
LTE Band 66

**For NB-IOT In-band:**

| Channel Bandwidth: 5MHz | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | 26dBc Bandwidth (MHz) | | Occupied Bandwidth (MHz) | |
| | | Chain 0 | Chain 1 | Chain 0 | Chain 1 |
| 66461 | 2112.5 | 4.810 | 4.835 | 4.49 | 4.49 |
| 66786 | 2145.0 | 4.808 | 4.789 | 4.49 | 4.49 |
| 67111 | 2177.5 | 4.794 | 4.811 | 4.49 | 4.49 |

| Channel Bandwidth: 20MHz | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | 26dBc Bandwidth (MHz) | | Occupied Bandwidth (MHz) | |
| | | Chain 0 | Chain 1 | Chain 0 | Chain 1 |
| 66536 | 2120.0 | 19.487 | 19.579 | 18.08 | 18.08 |
| 66786 | 2145.0 | 19.513 | 19.559 | 18.08 | 18.08 |
| 67036 | 2170.0 | 19.600 | 19.481 | 18.08 | 18.02 |

| 26dBc Bandwidth | |
|---|---|
| Spectrum Plot of Worst Value | |
| 5MHz / Chain 1 | 20MHz / Chain 0 |
|  |  |

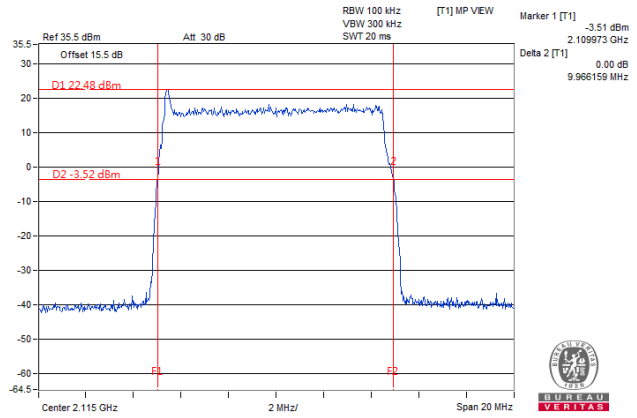
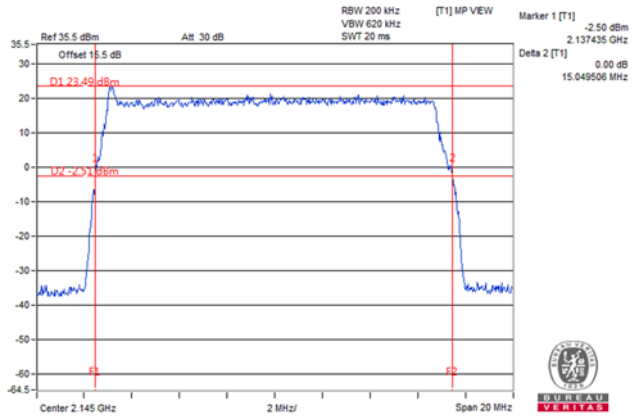
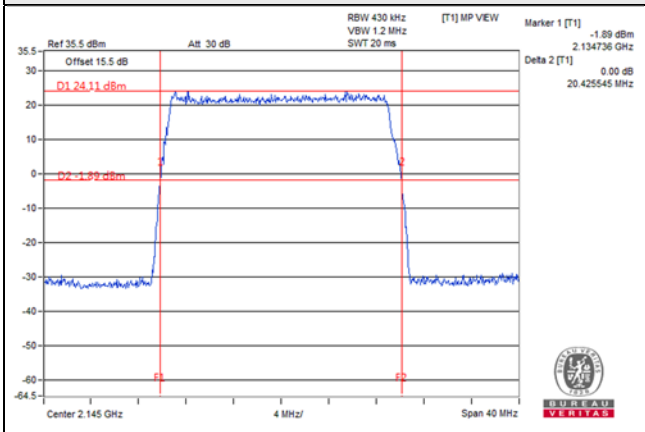
| Occupied Bandwidth | |
|---|---|
| Spectrum Plot of Worst Value | |
| 5MHz / Chain 0 | 20MHz / Chain 0 |
|  |  |

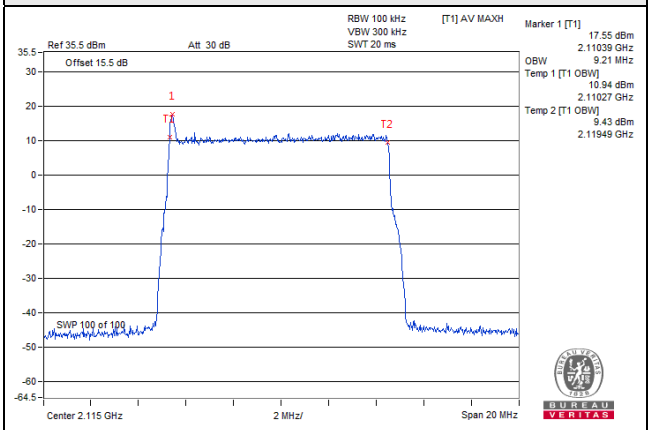
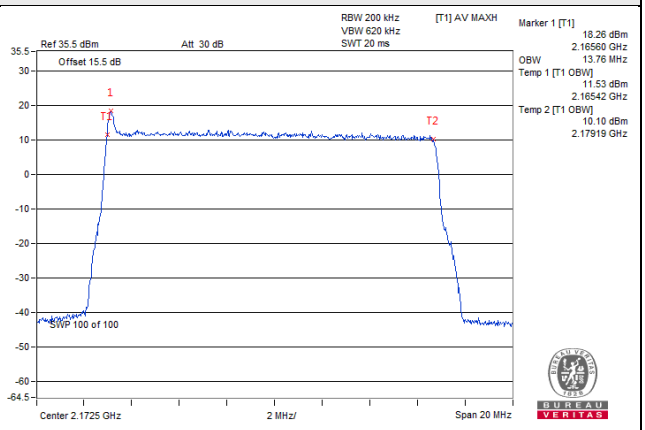
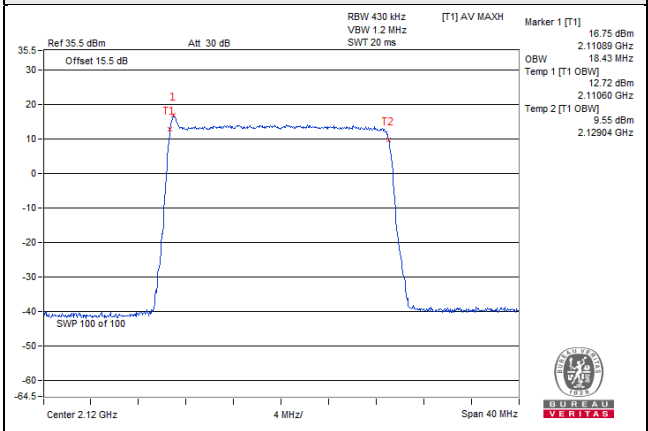
**For NB-IOT Guard Band:**
**QPSK_IoT Signal at Bottom**

| Channel Bandwidth: 10MHz | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | 26dBc Bandwidth (MHz) | | Occupied Bandwidth (MHz) | |
| | | Chain 0 | Chain 1 | Chain 0 | Chain 1 |
| 66486 | 2115.0 | 9.966 | 9.953 | 9.18 | 9.21 |
| 66786 | 2145.0 | 9.914 | 9.928 | 9.18 | 9.18 |
| 67086 | 2175.0 | 9.891 | 9.838 | 9.18 | 9.18 |

| Channel Bandwidth: 15MHz | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | 26dBc Bandwidth (MHz) | | Occupied Bandwidth (MHz) | |
| | | Chain 0 | Chain 1 | Chain 0 | Chain 1 |
| 66511 | 2117.5 | 15.047 | 15.046 | 13.76 | 13.76 |
| 66786 | 2145.0 | 15.050 | 15.030 | 13.76 | 13.76 |
| 67061 | 2172.5 | 14.890 | 14.903 | 13.76 | 13.76 |

| Channel Bandwidth: 20MHz | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | 26dBc Bandwidth (MHz) | | Occupied Bandwidth (MHz) | |
| | | Chain 0 | Chain 1 | Chain 0 | Chain 1 |
| 66536 | 2120.0 | 20.403 | 20.336 | 18.43 | 18.43 |
| 66786 | 2145.0 | 20.426 | 20.368 | 18.43 | 18.43 |
| 67036 | 2170.0 | 20.235 | 20.253 | 18.43 | 18.37 |

| 26dBc Bandwidth | |
|---|---|
| Spectrum Plot of Worst Value | |
| 10MHz / Chain 0 | 15MHz / Chain 0 |
|  |  |
| 20MHz / Chain 0 | |
|  | |

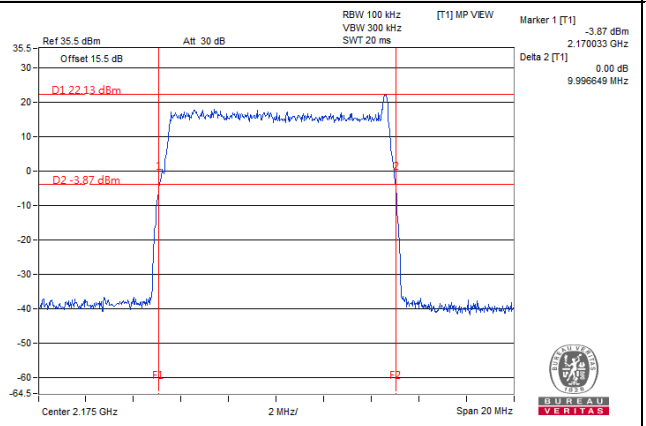
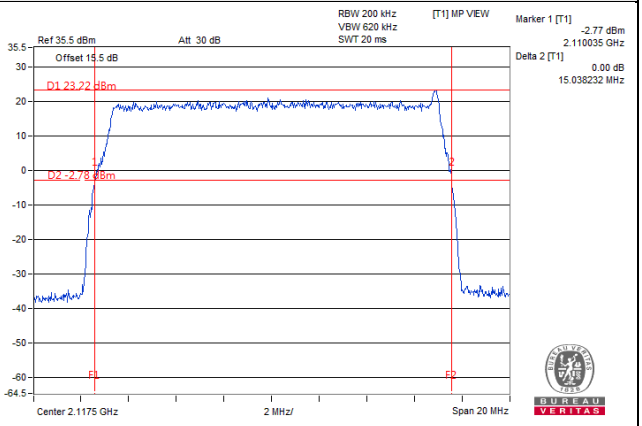
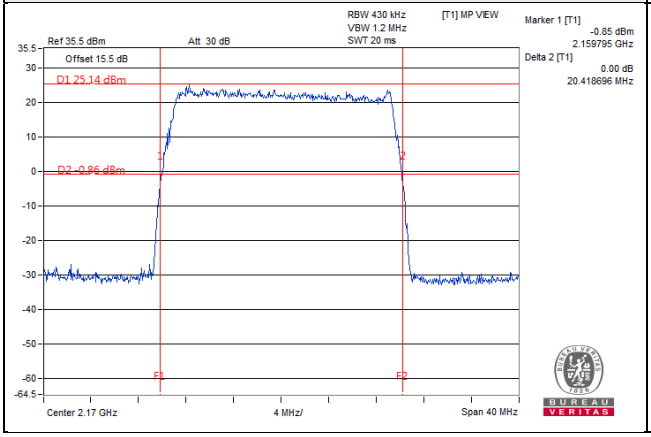
| Occupied Bandwidth | |
|---|---|
| Spectrum Plot of Worst Value | |
| 10MHz / Chain 1 | 15MHz / Chain 0 |
|  |  |
| 20MHz / Chain 0 | |
|  | |

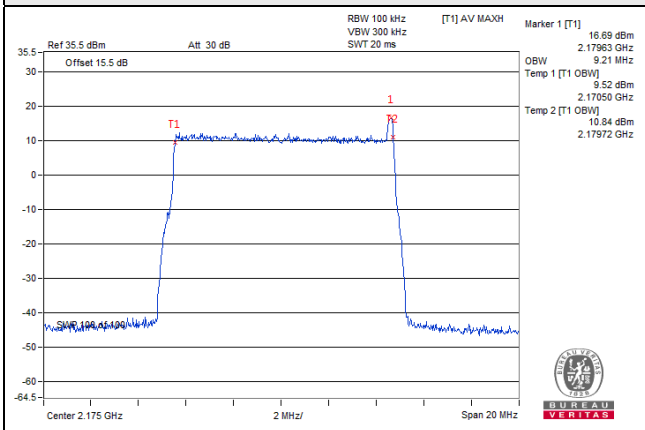
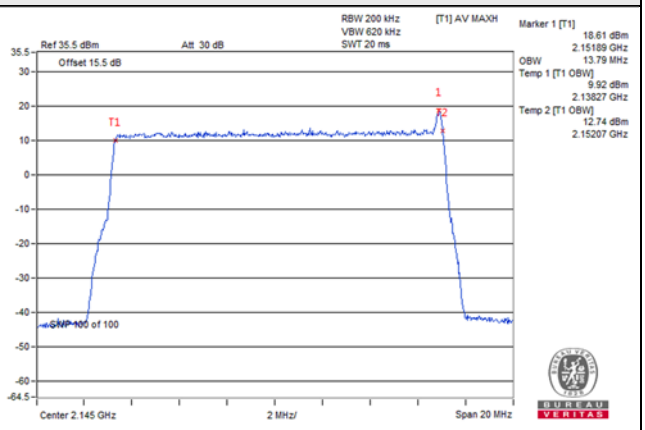
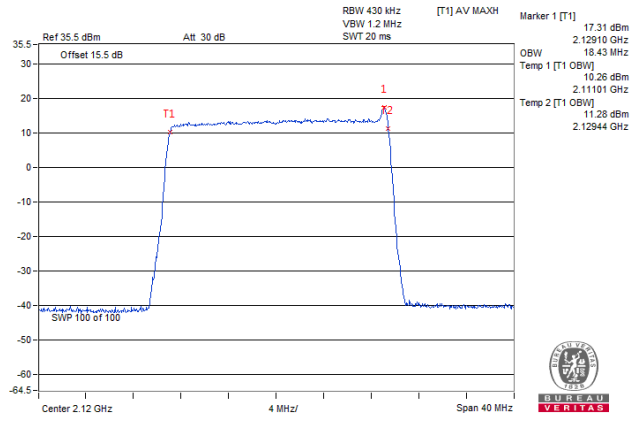
**For NB-IOT Guard Band:**
**QPSK_IoT Signal at Top**

| Channel Bandwidth: 10MHz | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | 26dBc Bandwidth (MHz) | | Occupied Bandwidth (MHz) | |
| | | Chain 0 | Chain 1 | Chain 0 | Chain 1 |
| 66486 | 2115.0 | 9.930 | 9.915 | 9.18 | 9.18 |
| 66786 | 2145.0 | 9.871 | 9.961 | 9.18 | 9.18 |
| 67086 | 2175.0 | 9.997 | 9.952 | 9.21 | 9.21 |

| Channel Bandwidth: 15MHz | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | 26dBc Bandwidth (MHz) | | Occupied Bandwidth (MHz) | |
| | | Chain 0 | Chain 1 | Chain 0 | Chain 1 |
| 66511 | 2117.5 | 15.038 | 14.861 | 13.73 | 13.76 |
| 66786 | 2145.0 | 14.968 | 14.953 | 13.79 | 13.79 |
| 67061 | 2172.5 | 14.994 | 15.002 | 13.76 | 13.76 |

| Channel Bandwidth: 20MHz | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | 26dBc Bandwidth (MHz) | | Occupied Bandwidth (MHz) | |
| | | Chain 0 | Chain 1 | Chain 0 | Chain 1 |
| 66536 | 2120.0 | 20.306 | 20.305 | 18.43 | 18.43 |
| 66786 | 2145.0 | 20.223 | 20.270 | 18.43 | 18.43 |
| 67036 | 2170.0 | 20.345 | 20.419 | 18.43 | 18.43 |

| 26dBc Bandwidth | |
|---|---|
| Spectrum Plot of Worst Value | |
| 10MHz / Chain 0 | 15MHz / Chain 0 |
|  |  |
| 20MHz / Chain 1 | |
|  | |

| Occupied Bandwidth | |
|---|---|
| Spectrum Plot of Worst Value | |
| 10MHz / Chain 0 | 15MHz / Chain 0 |
|  |  |
| 20MHz / Chain 0 | |
|  | |

## 4.5 Band Edge Measurement

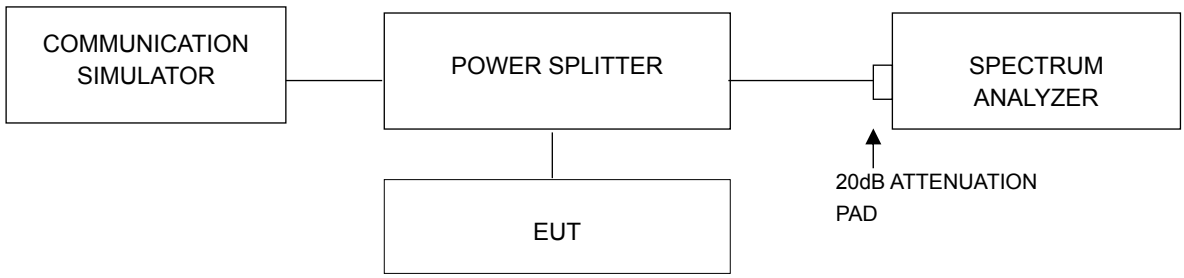
### 4.5.1 Limits of Band Edge Measurement

According to FCC 27.53(h) for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, 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 log (P) dB.

Note:

This device can be impelement MIMO function, so the limit of spurious emissions needs to be reduced by 10log($Numbers_{Ant}$) according to FCC KDB 662911 D01 guidance.

### 4.5.2 Test Setup




### 4.5.3 Test Procedures

a. The EUT was set up for the rated peak power. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels: low, middle and high operational frequency range.

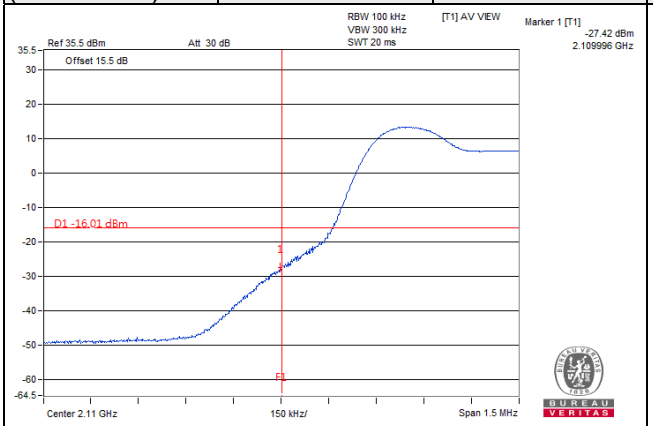
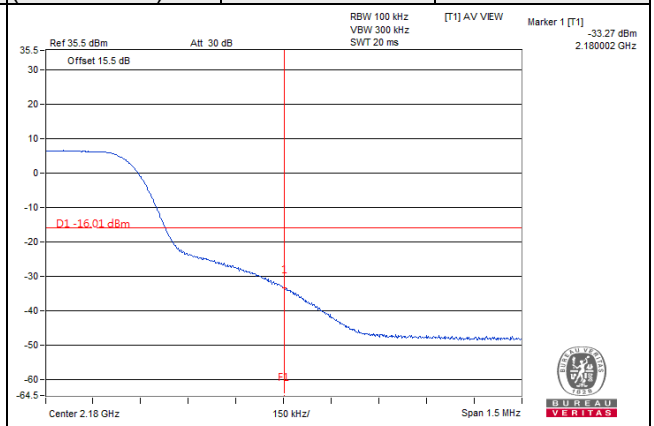
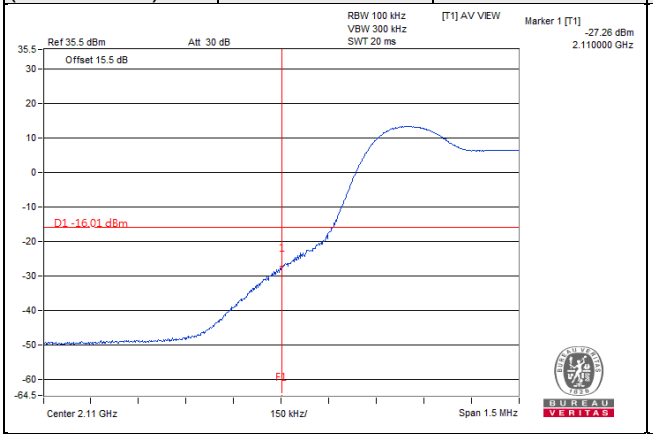
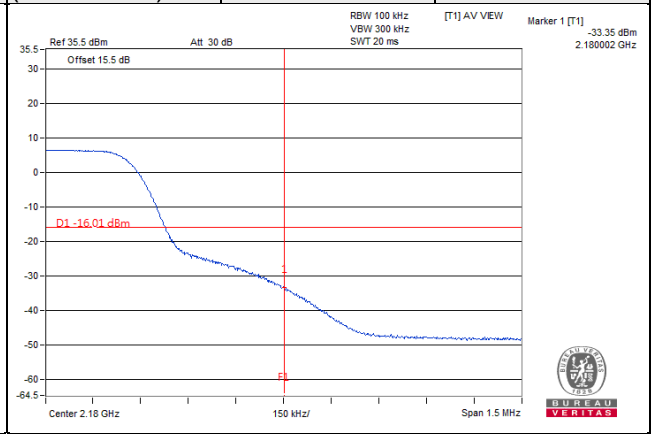
b. The center frequency of spectrum is the band edge frequency and span is 1.5MHz. RBW = 15kHz and VBW = 51kHz (Channel Bandwidth: 1.4MHz), RBW = 30kHz and VBW = 100kHz (Channel Bandwidth: 3MHz), RBW = 62kHz and VBW = 200kHz (Channel Bandwidth: 5MHz), RBW = 100kHz and VBW = 300kHz (Channel Bandwidth: 10MHz), RBW = 150kHz and VBW = 470kHz (Channel Bandwidth: 15MHz) and RBW = 200kHz and VBW = 1MHz (Channel Bandwidth: 20MHz).

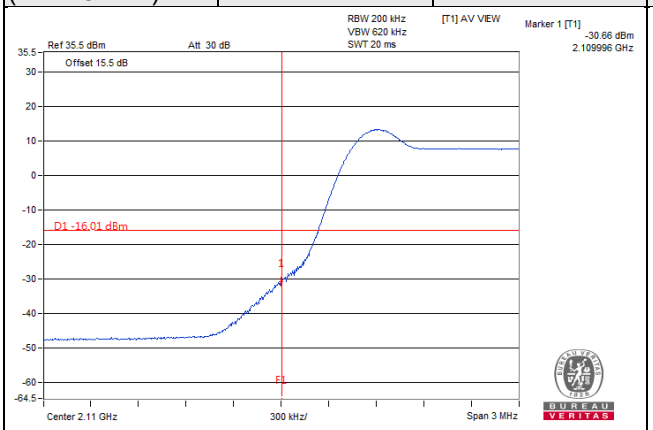
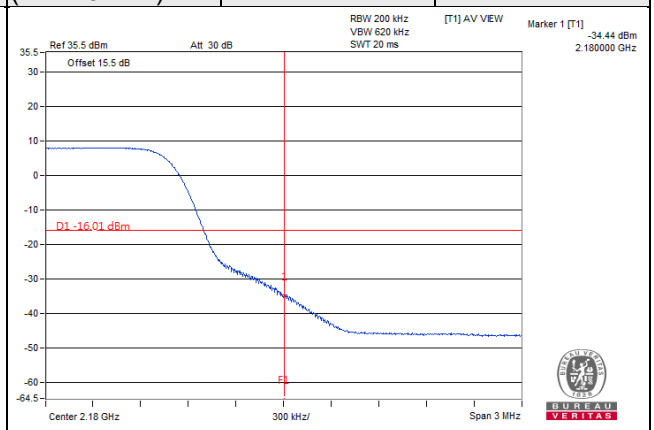
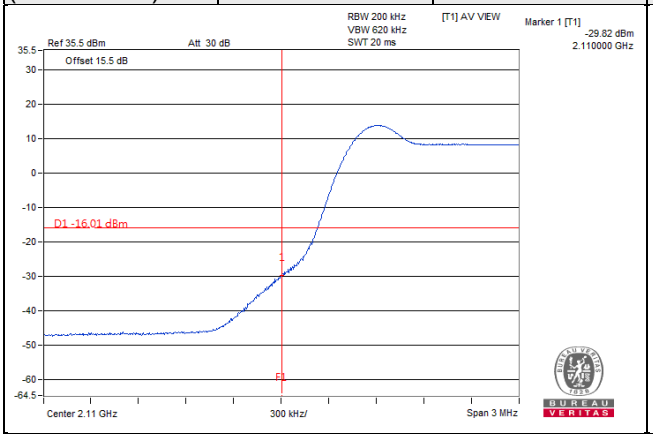
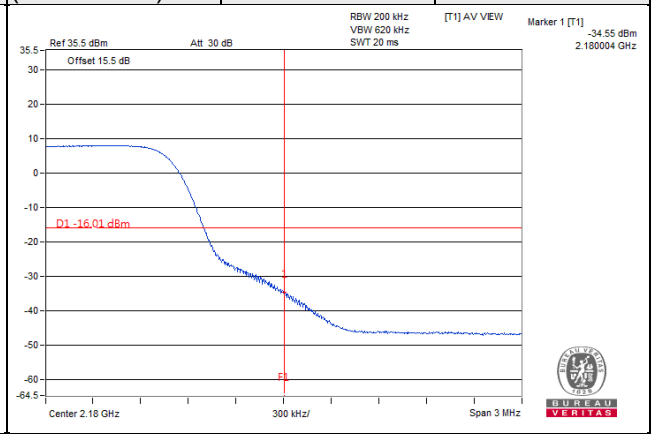
c. Record the max trace plot into the test report.

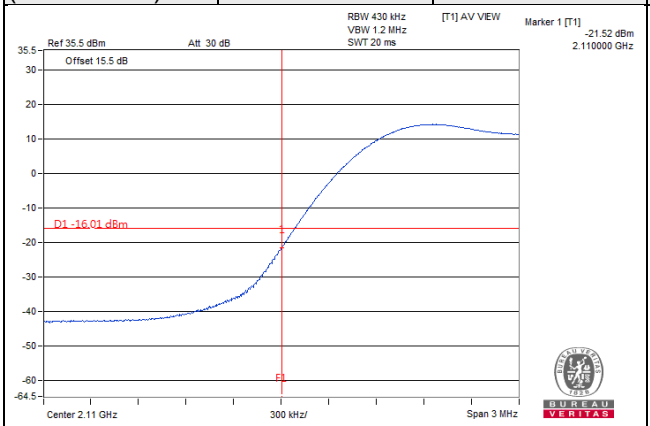
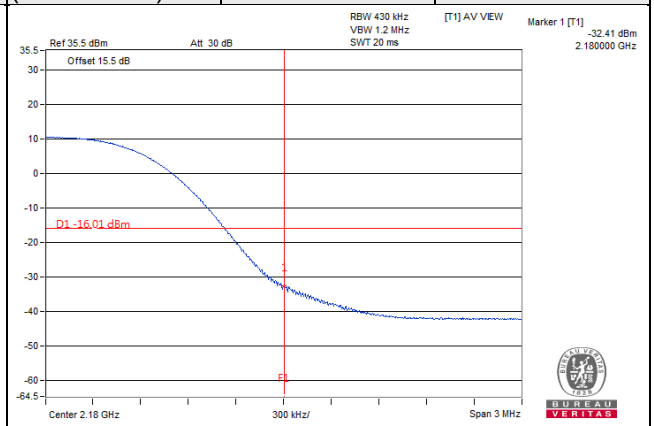
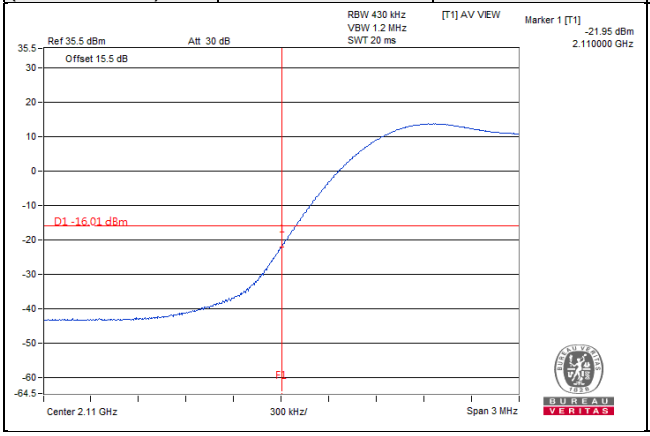
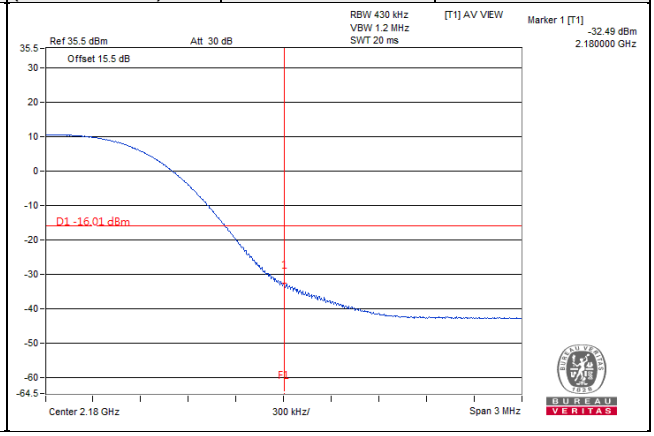
LTE Band 66

**For NB-IOT Guard Band:**

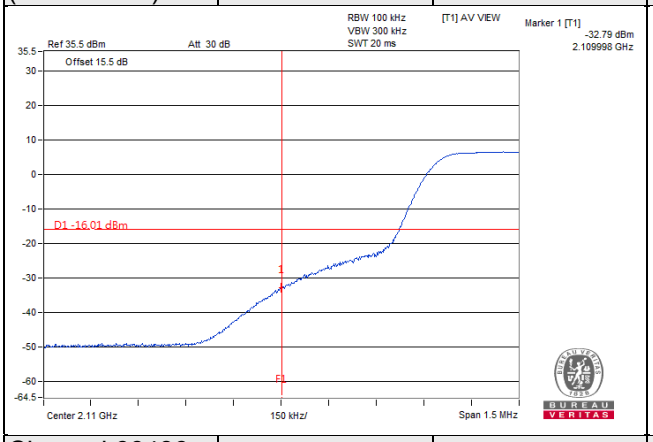
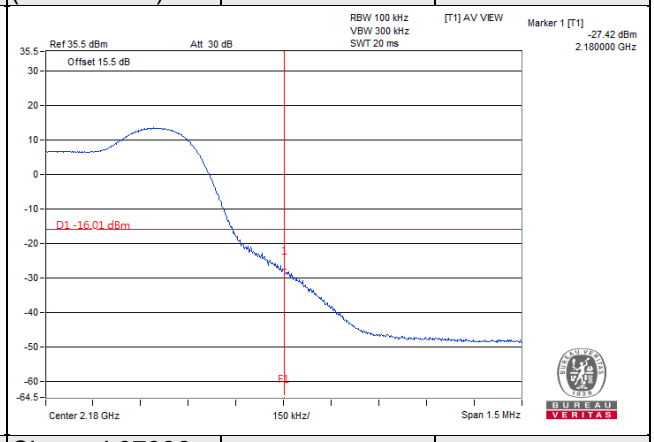
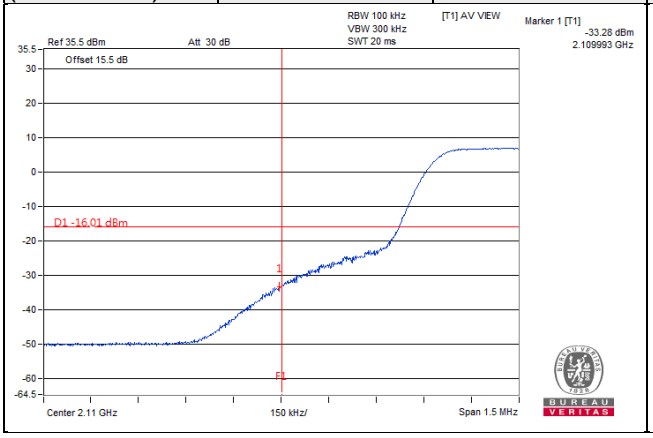
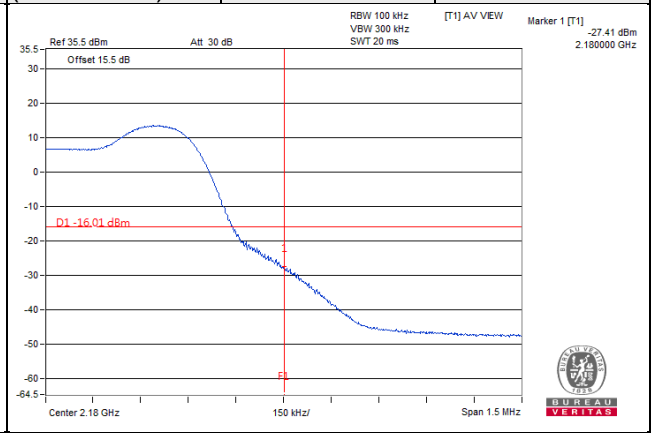
**QPSK_IoT Signal at Bottom**

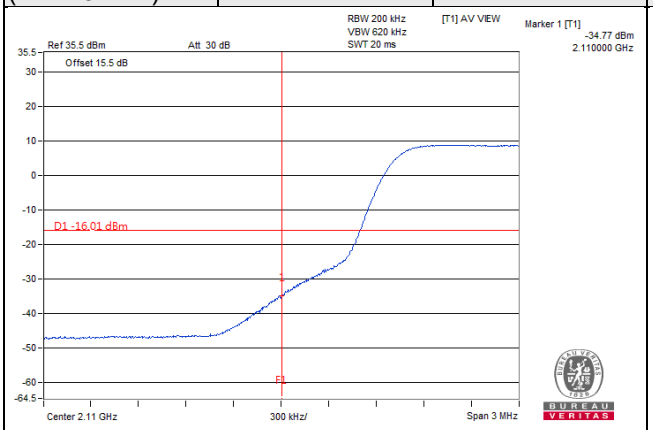
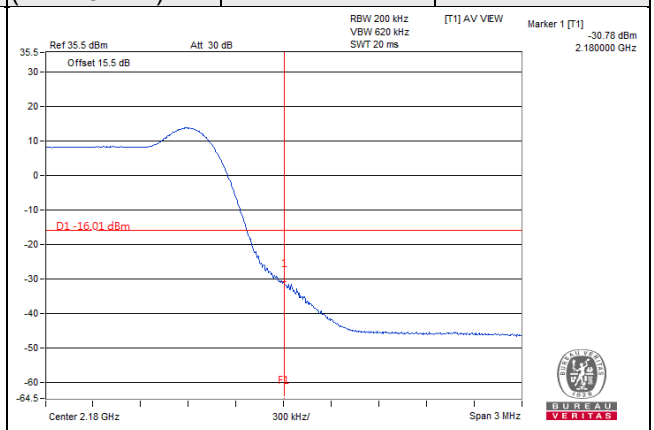
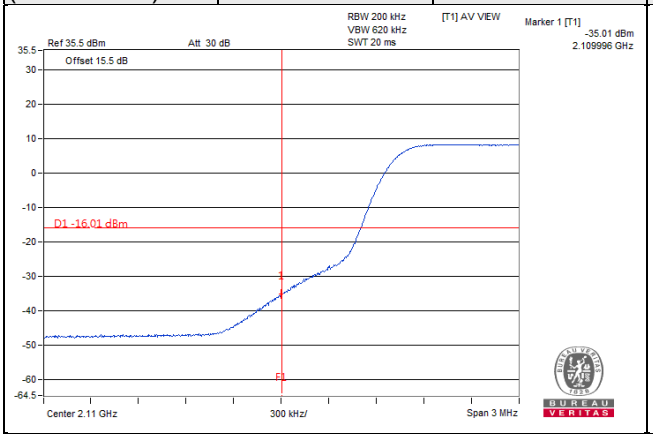
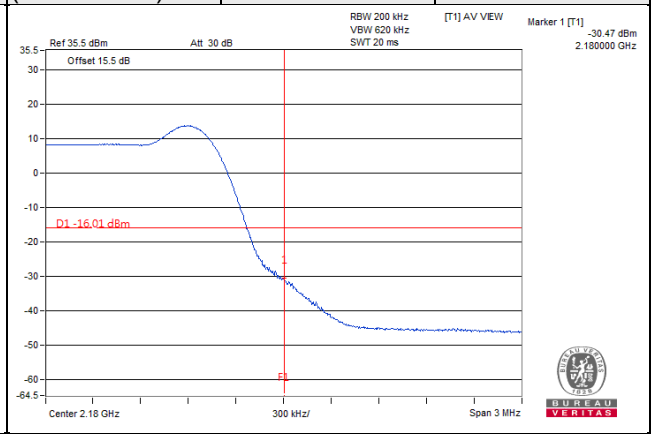
| Channel Bandwidth: 10MHz | | | | | |
|---|---|---|---|---|---|
| Channel 66486 (2115.0MHz) | QPSK | Chain 0 | Channel 67086 (2175.0MHz) | QPSK | Chain 0 |
|  | | |  | | |
| Channel 66486 (2115.0MHz) | QPSK | Chain 1 | Channel 67086 (2175.0MHz) | QPSK | Chain 1 |
|  | | |  | | |

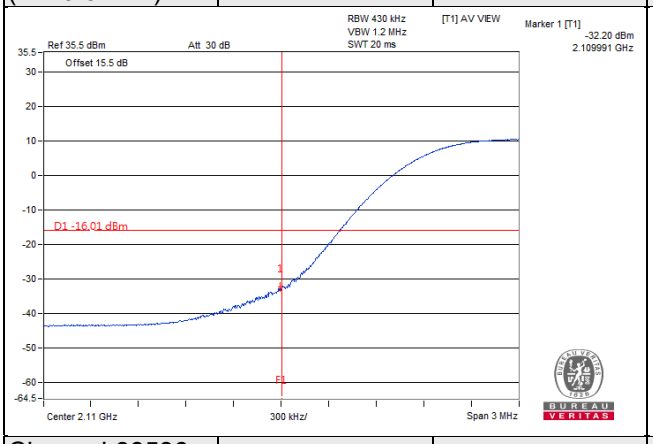
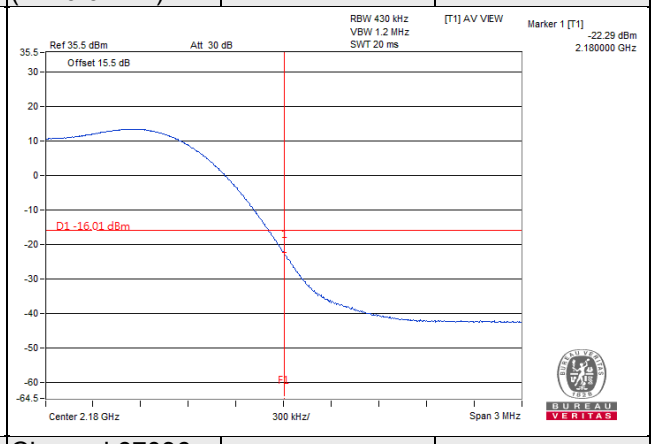
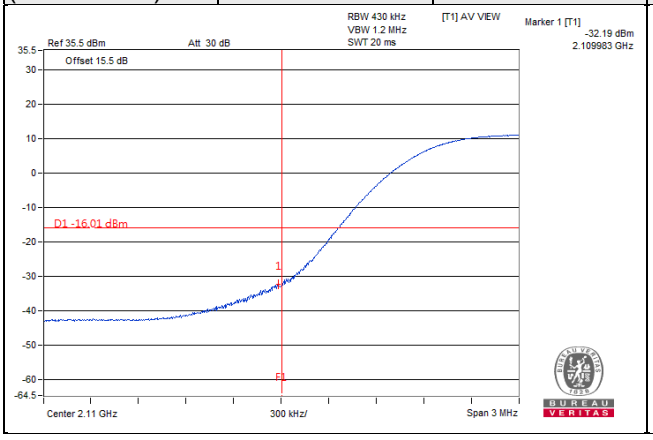
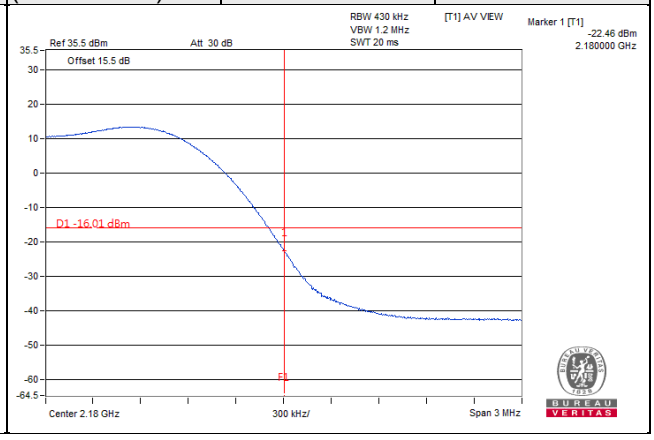
| Channel Bandwidth: 15MHz | | | | | |
|---|---|---|---|---|---|
| Channel 66511 (2117.5MHz) | QPSK | Chain 0 | Channel 67061 (2172.5MHz) | QPSK | Chain 0 |
|  | | |  | | |
| Channel 66511 (2117.5MHz) | QPSK | Chain 1 | Channel 67061 (2172.5MHz) | QPSK | Chain 1 |
|  | | |  | | |

| Channel Bandwidth: 20MHz | | | | | |
|---|---|---|---|---|---|
| Channel 66536 (2120.0MHz) | QPSK | Chain 0 | Channel 67036 (2170.0MHz) | QPSK | Chain 0 |
|  | | |  | | |
| Channel 66536 (2120.0MHz) | QPSK | Chain 1 | Channel 67036 (2170.0MHz) | QPSK | Chain 1 |
|  | | |  | | |

## QPSK_IoT Signal at Top

| Channel Bandwidth: 10MHz | | | | | |
|---|---|---|---|---|---|
| Channel 66486 (2115.0MHz) | QPSK | Chain 0 | Channel 67086 (2175.0MHz) | QPSK | Chain 0 |
|  | | |  | | |
| Channel 66486 (2115.0MHz) | QPSK | Chain 1 | Channel 67086 (2175.0MHz) | QPSK | Chain 1 |
|  | | |  | | |

| Channel Bandwidth: 15MHz | | | | | |
|---|---|---|---|---|---|
| Channel 66511 (2117.5MHz) | QPSK | Chain 0 | Channel 67061 (2172.5MHz) | QPSK | Chain 0 |
|  | | |  | | |
| Channel 66511 (2117.5MHz) | QPSK | Chain 1 | Channel 67061 (2172.5MHz) | QPSK | Chain 1 |
|  | | |  | | |

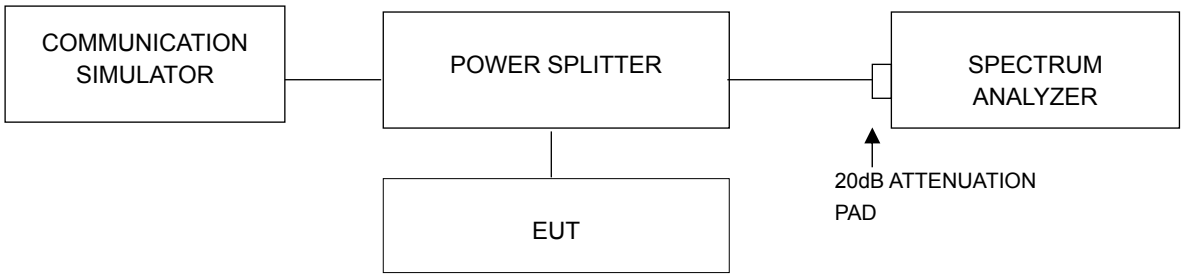
| Channel Bandwidth: 20MHz | | | | | |
|---|---|---|---|---|---|
| Channel 66536 (2120.0MHz) | QPSK | Chain 0 | Channel 67036 (2170.0MHz) | QPSK | Chain 0 |
|  | | |  | | |
| Channel 66536 (2120.0MHz) | QPSK | Chain 1 | Channel 67036 (2170.0MHz) | QPSK | Chain 1 |
|  | | |  | | |

## 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 ≥ 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 Guard Band:**
**QPSK_IoT Signal at Bottom**

| LTE Band 66, Channel Bandwidth: 10MHz | | | |
|---|---|---|---|
| Channel | Frequency (MHz) | Peak To Average Ratio (dB) | |
| | | Chain 0 | Chain 1 |
| 66486 | 2115.0 | 7.05 | 7.05 |
| 66786 | 2145.0 | 7.04 | 7.03 |
| 67086 | 2175.0 | 7.05 | 7.04 |

| LTE Band 66, Channel Bandwidth: 15MHz | | | |
|---|---|---|---|
| Channel | Frequency (MHz) | Peak To Average Ratio (dB) | |
| | | Chain 0 | Chain 1 |
| 66511 | 2117.5 | 7.10 | 7.10 |
| 66786 | 2145.0 | 7.09 | 7.09 |
| 67061 | 2172.5 | 7.08 | 7.08 |

| LTE Band 66, Channel Bandwidth: 20MHz | | | |
|---|---|---|---|
| Channel | Frequency (MHz) | Peak To Average Ratio (dB) | |
| | | Chain 0 | Chain 1 |
| 66536 | 2120.0 | 7.11 | 7.11 |
| 66786 | 2145.0 | 7.12 | 7.11 |
| 67036 | 2170.0 | 7.10 | 7.11 |

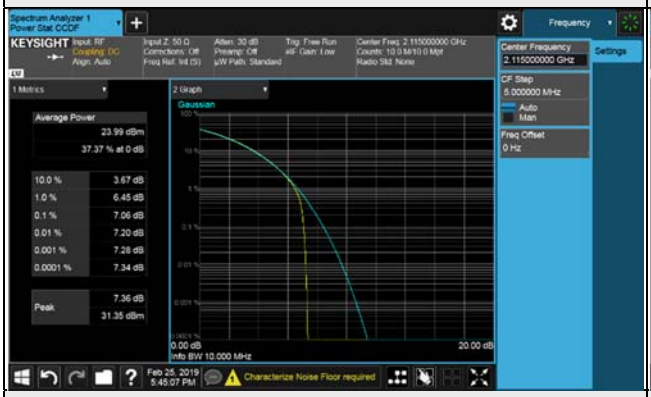
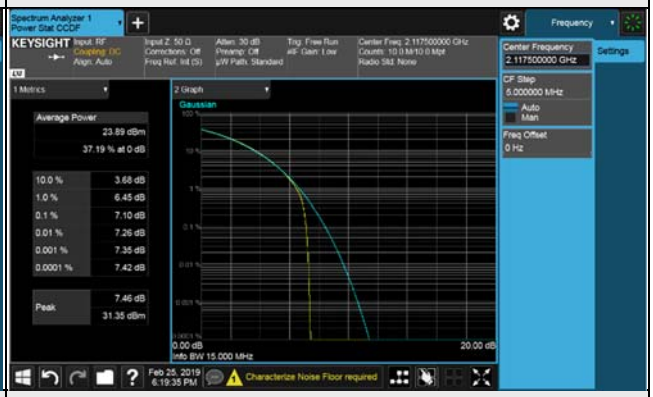
| Spectrum Plot of Worst Value | |
|---|---|
| 10MHz / Chain 0 | 15MHz / Chain 0 |
|  |  |
| 20MHz / Chain 0 | |
|  | |

**QPSK_IoT Signal at Top**

| LTE Band 66, Channel Bandwidth: 10MHz | | | |
|---|---|---|---|
| Channel | Frequency (MHz) | Peak To Average Ratio (dB) | |
| | | Chain 0 | Chain 1 |
| 66486 | 2115.0 | 7.06 | 7.05 |
| 66786 | 2145.0 | 7.03 | 7.04 |
| 67086 | 2175.0 | 7.06 | 7.05 |

| LTE Band 66, Channel Bandwidth: 15MHz | | | |
|---|---|---|---|
| Channel | Frequency (MHz) | Peak To Average Ratio (dB) | |
| | | Chain 0 | Chain 1 |
| 66511 | 2117.5 | 7.10 | 7.10 |
| 66786 | 2145.0 | 7.08 | 7.08 |
| 67061 | 2172.5 | 7.08 | 7.08 |

| LTE Band 66, Channel Bandwidth: 20MHz | | | |
|---|---|---|---|
| Channel | Frequency (MHz) | Peak To Average Ratio (dB) | |
| | | Chain 0 | Chain 1 |
| 66536 | 2120.0 | 7.11 | 7.11 |
| 66786 | 2145.0 | 7.11 | 7.11 |
| 67036 | 2170.0 | 7.10 | 7.10 |

| Spectrum Plot of Worst Value | |
|---|---|
| 10MHz / Chain 0 | 15MHz / Chain 0 |
|  |  |
| 20MHz / Chain 0 | |
|  | |

## 4.7 Conducted Spurious Emissions

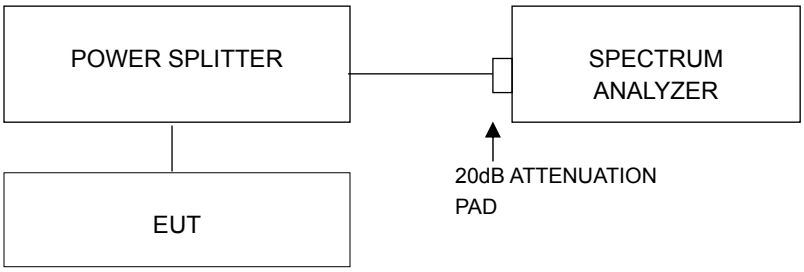
### 4.7.1 Limits of Conducted Spurious Emissions Measurement

In the FCC 27.53(h)(1),On any frequency outside a licensee's frequency block, The power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

Note:

This device can be impelement MIMO function, so the limit of spurious emissions needs to be reduced by 10log($Numbers_{Ant}$) according to FCC KDB 662911 D01 guidance.

### 4.7.2 Test Setup




### 4.7.3 Test Procedure

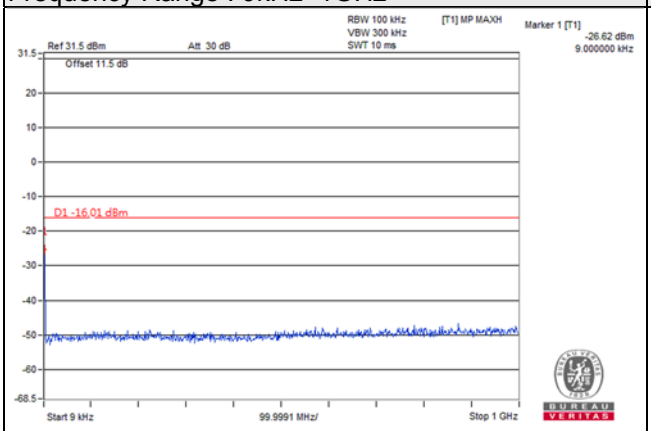
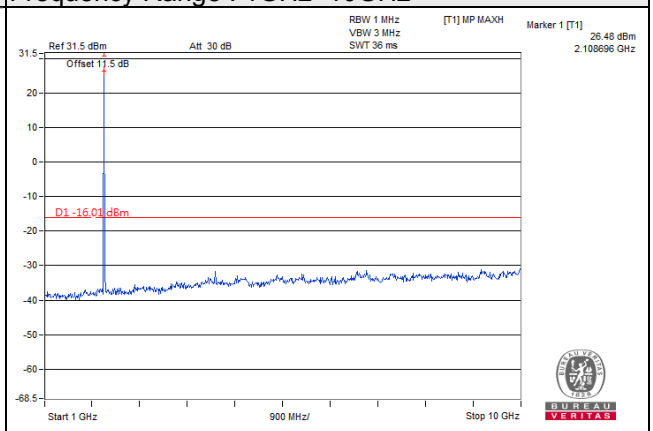
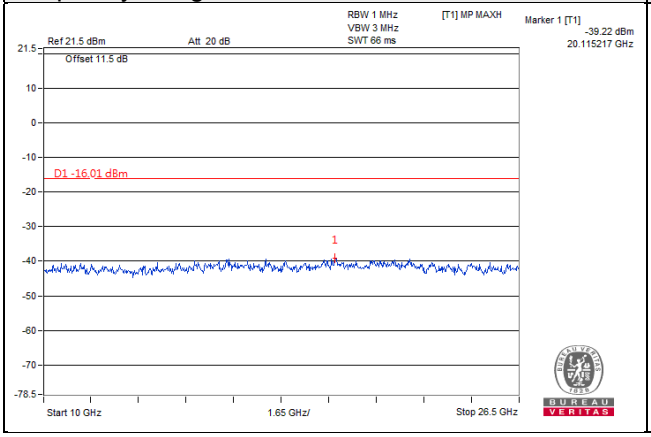
a. All measurements were done at 3 channels: low, middle and high operational frequency range.

b. When the spectrum scanned from 9kHz to 26.5GHz, it shall be connected to the attenuator with the carried frequency.

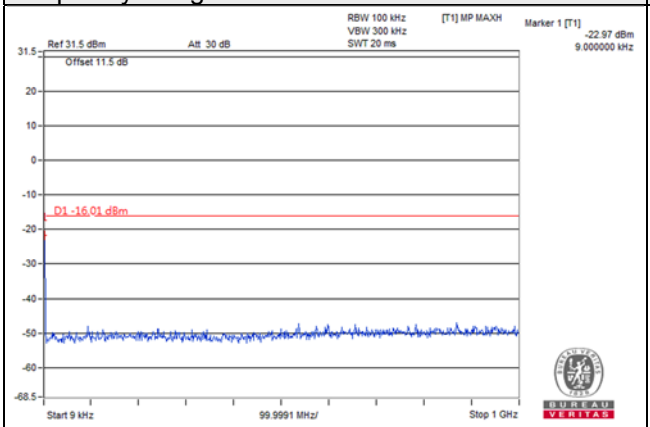
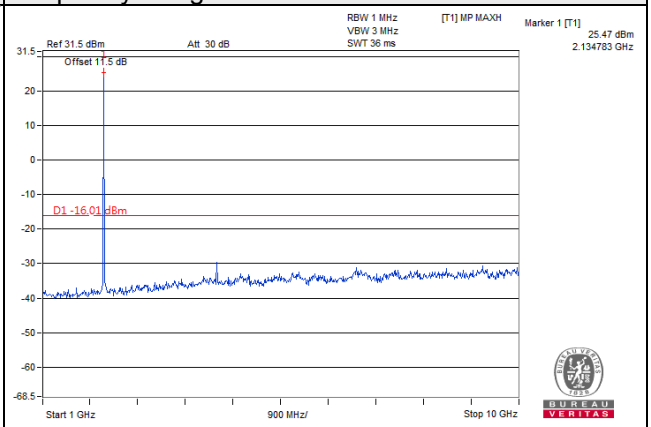
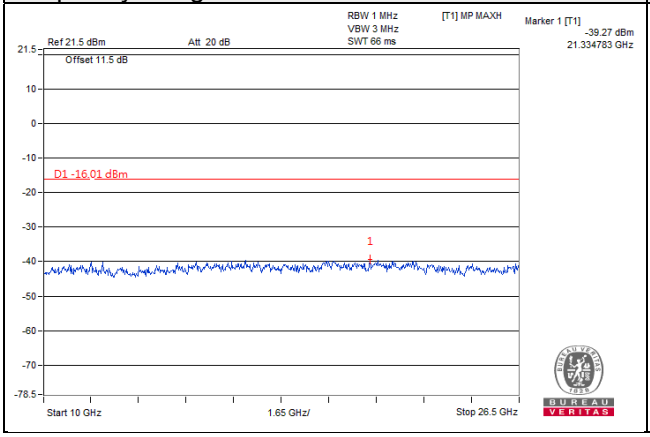
### 4.7.4 Test Results

LTE Band 66

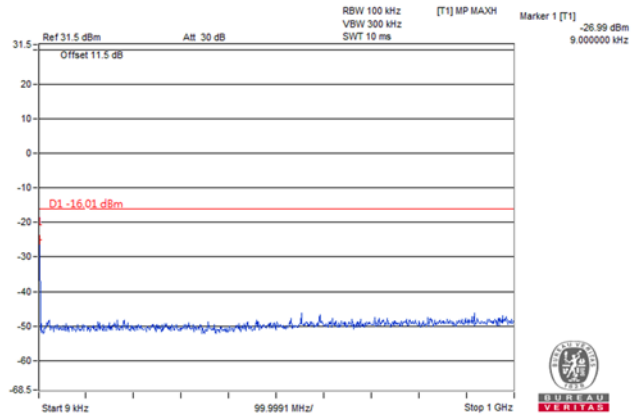
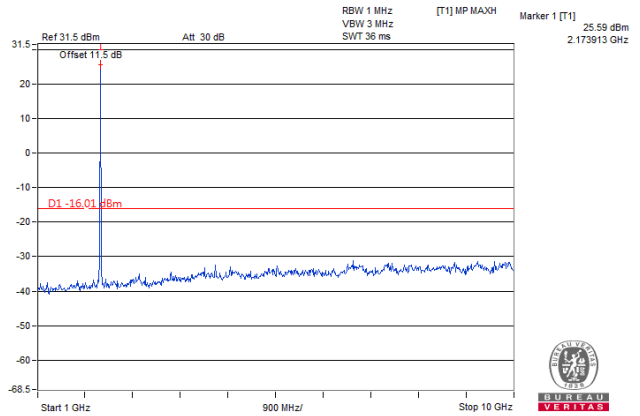
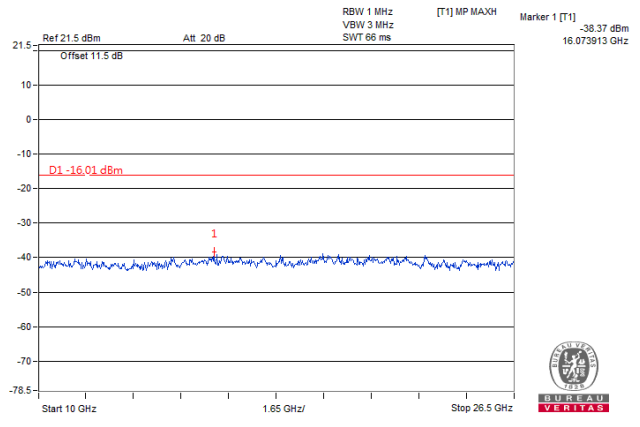
**For NB-IOT In-band:**

| Channel Bandwidth: 5MHz (Chain 0) | |
|---|---|
| Channel 66461 (2112.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

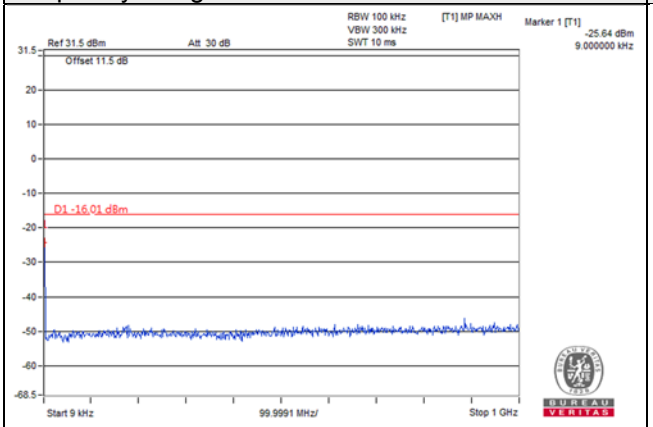
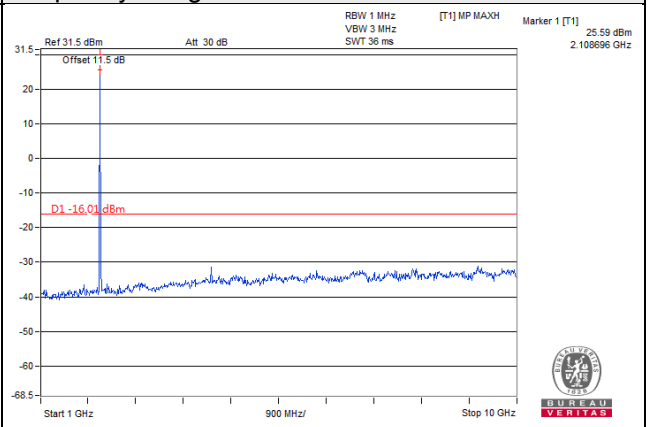
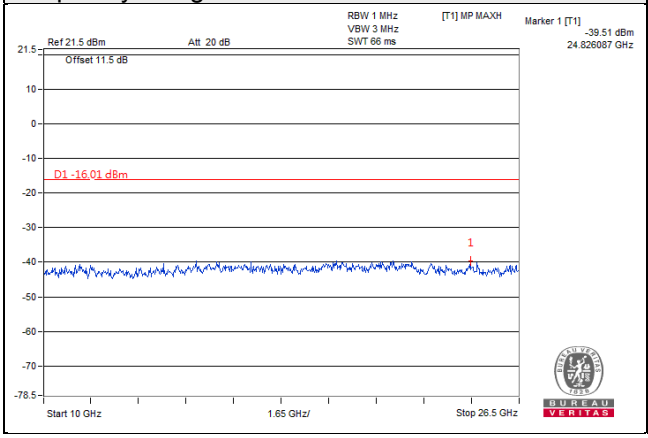
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 5MHz (Chain 0) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

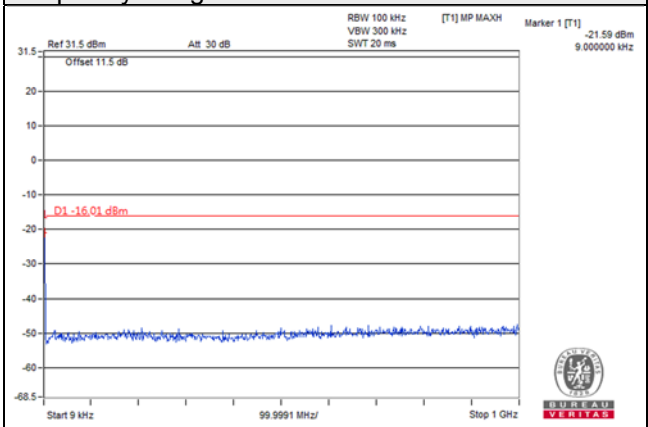
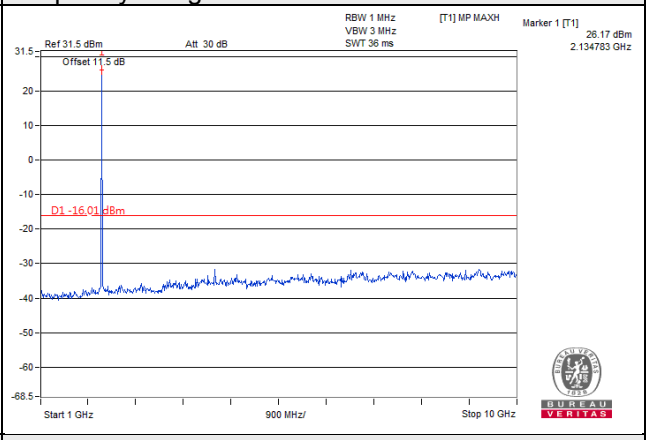
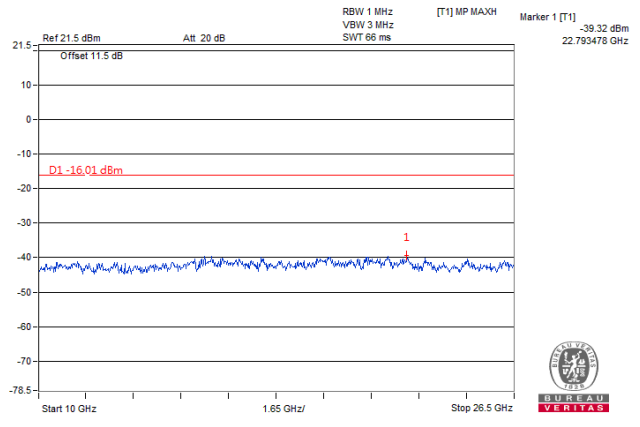
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 5MHz (Chain 0) | |
|---|---|
| Channel 67111 (2177.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

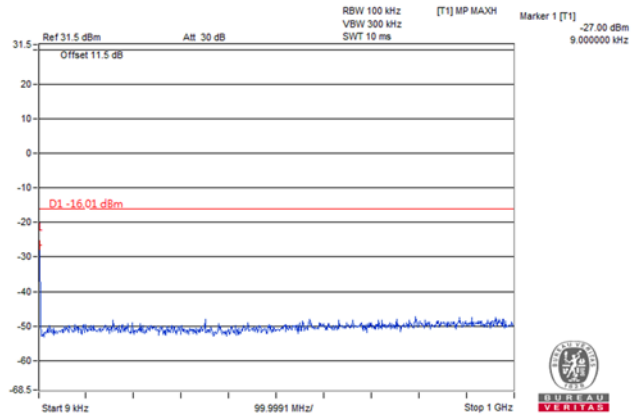
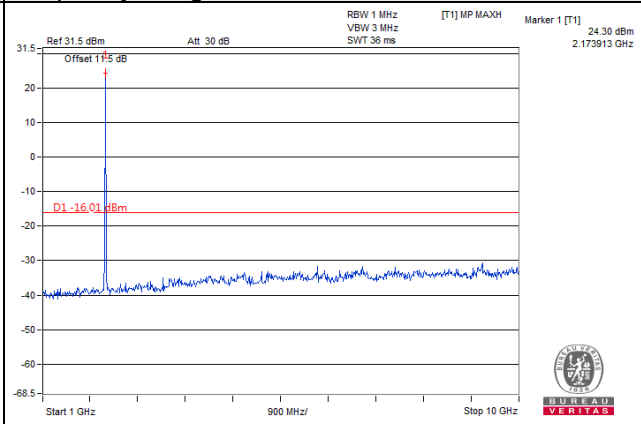
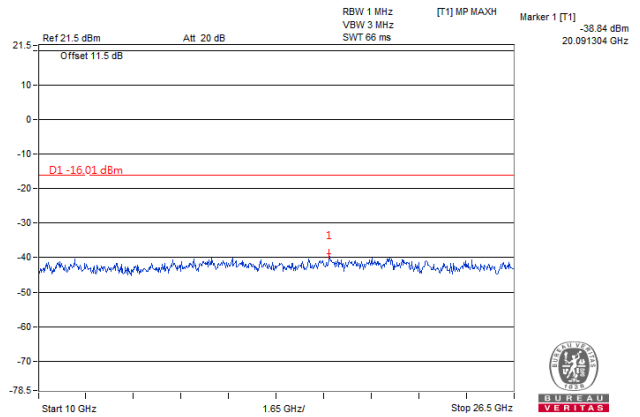
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 5MHz (Chain 1) | |
|---|---|
| Channel 66461 (2112.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

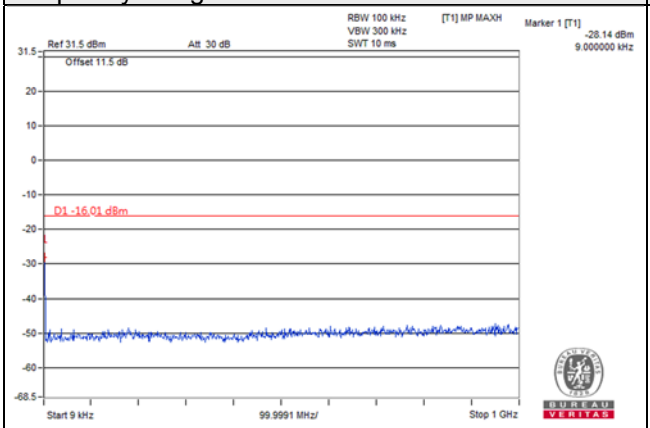
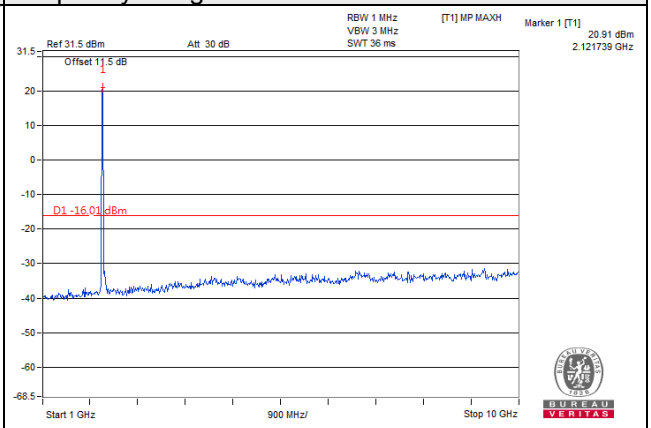
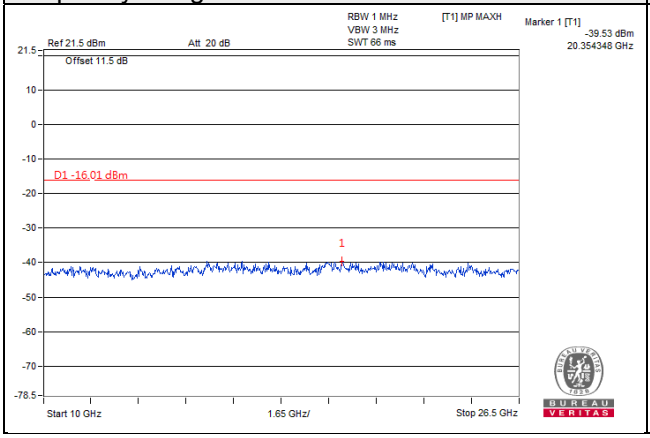
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 5MHz (Chain 1) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

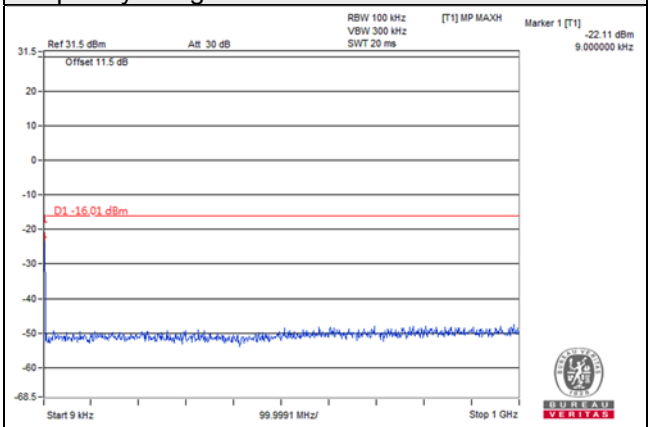
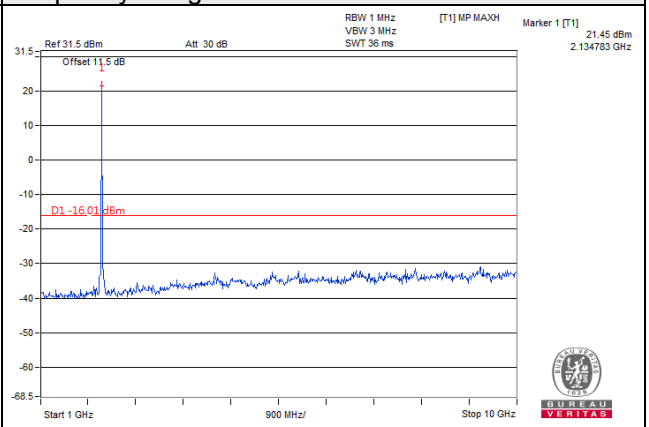
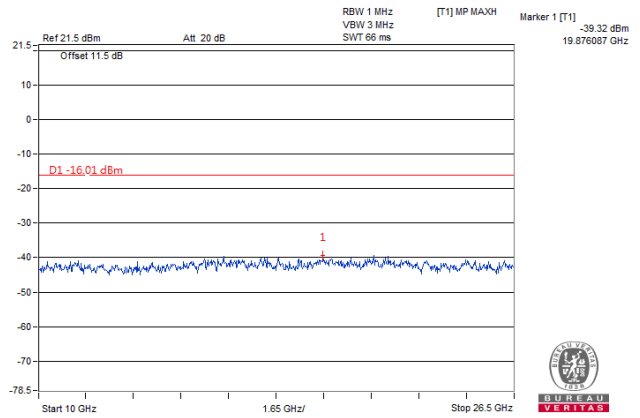
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 5MHz (Chain 1) | |
|---|---|
| Channel 67111 (2177.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

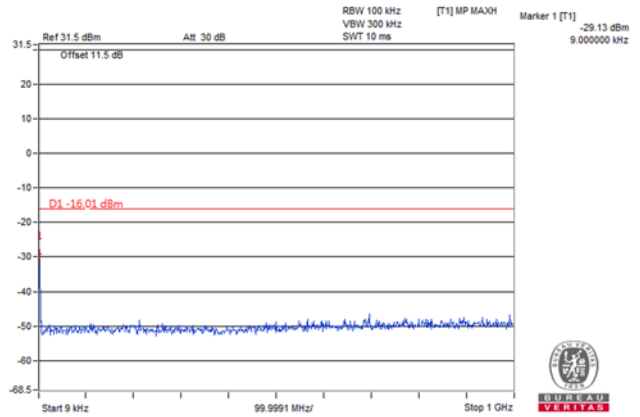
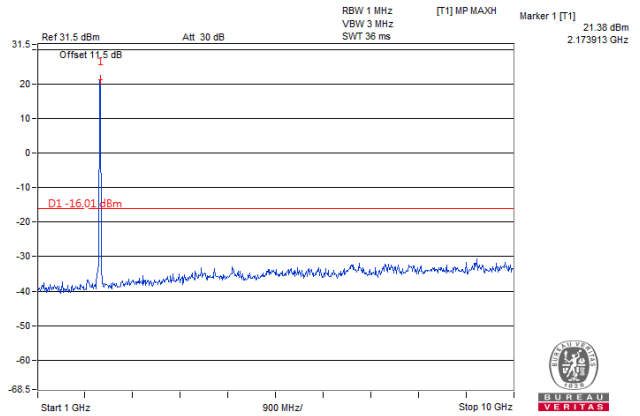
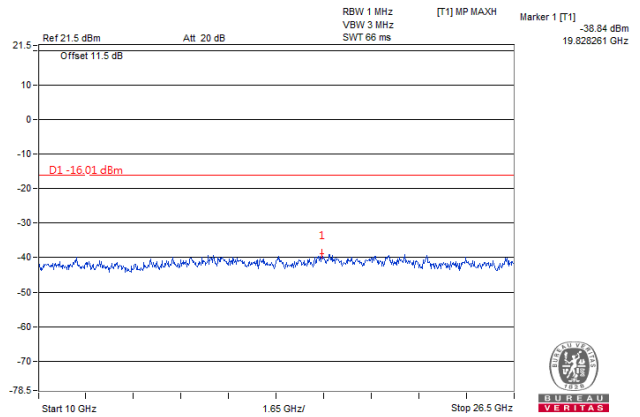
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 0) | |
|---|---|
| Channel 66536 (2120.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

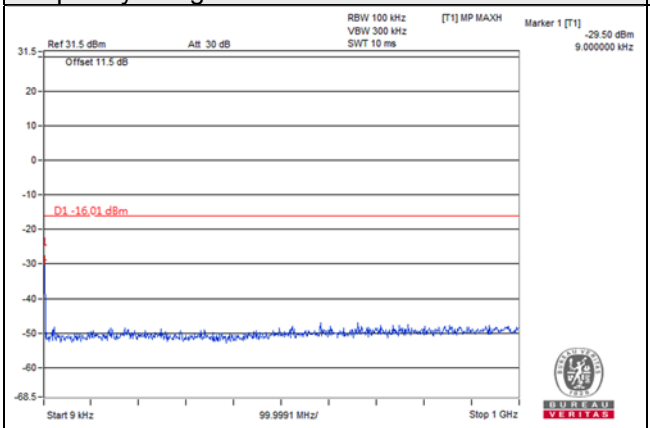
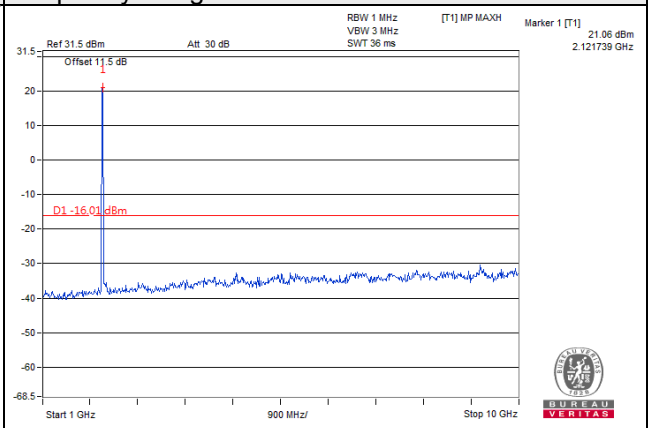
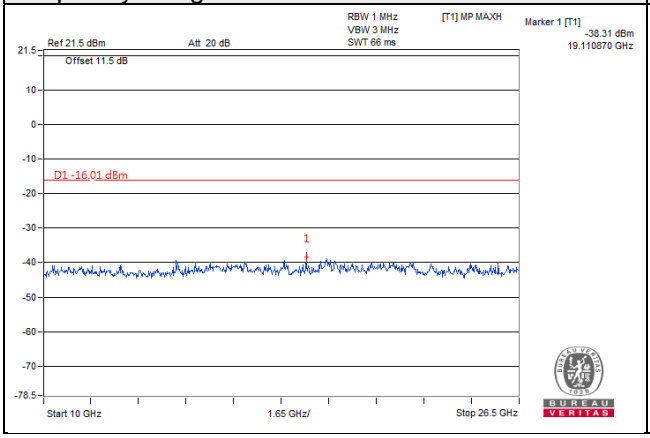
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 0) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

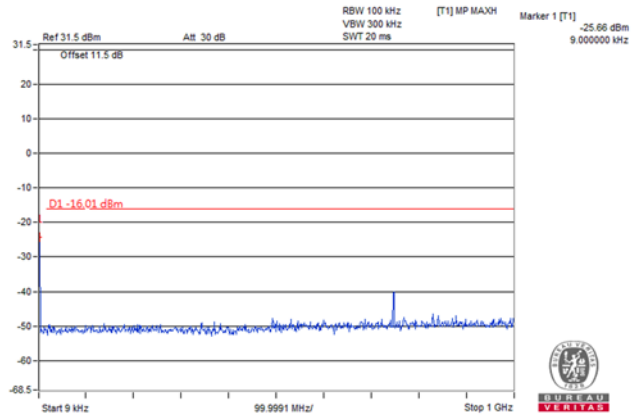
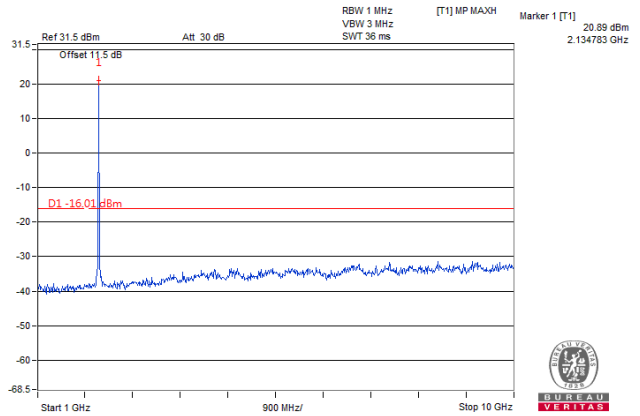
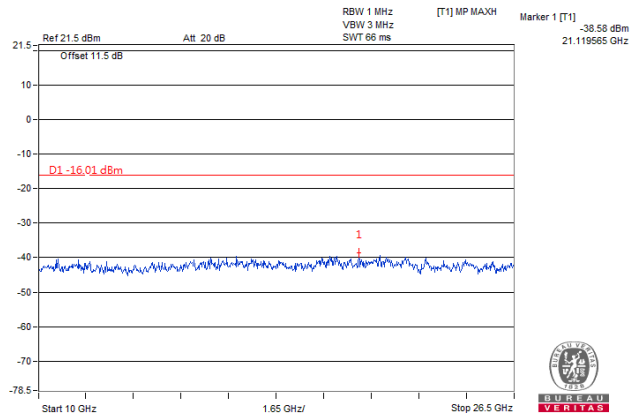
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 0) | |
|---|---|
| Channel 67036 (2170.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

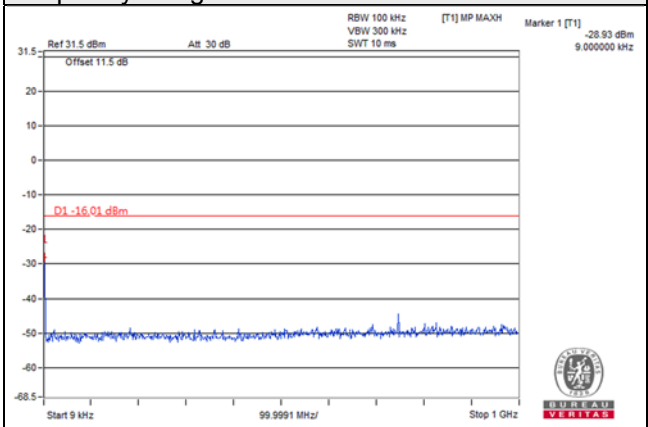
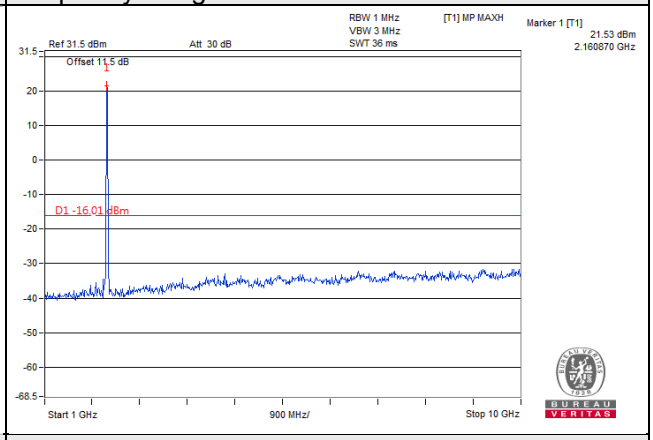
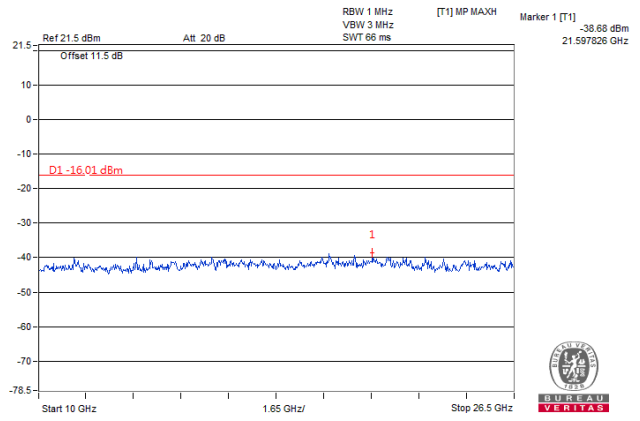
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 1) | |
|---|---|
| Channel 66536 (2120.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

Note: For 9kHz, the signal is from spectrum analyzer.

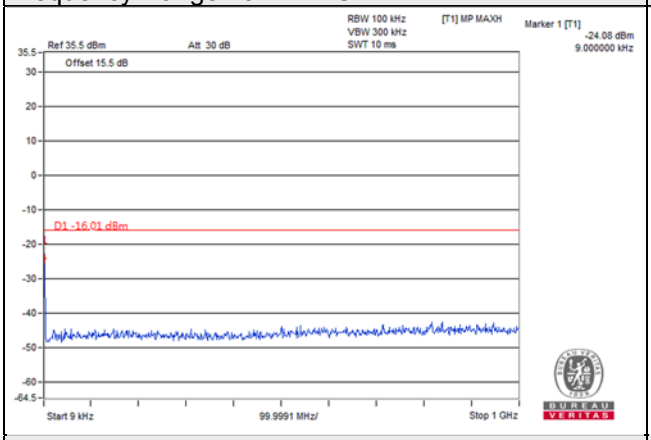
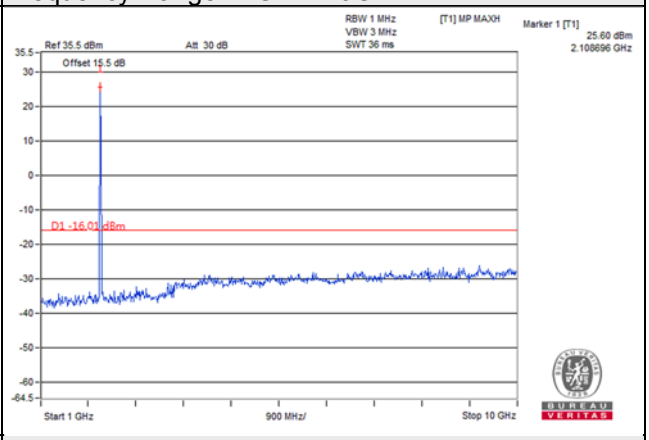
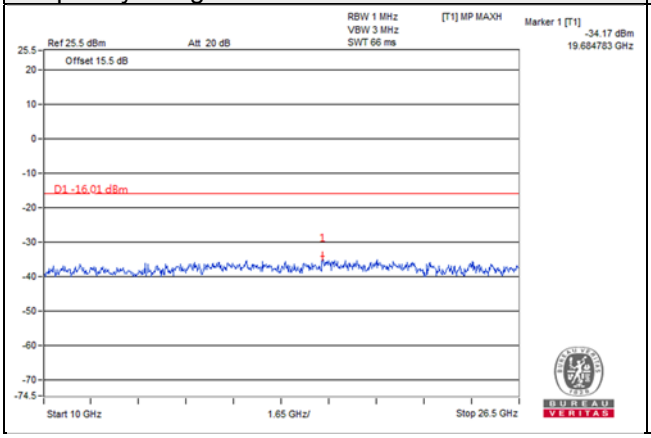
| Channel Bandwidth: 20MHz (Chain 1) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

Note: For 9kHz, the signal is from spectrum analyzer.

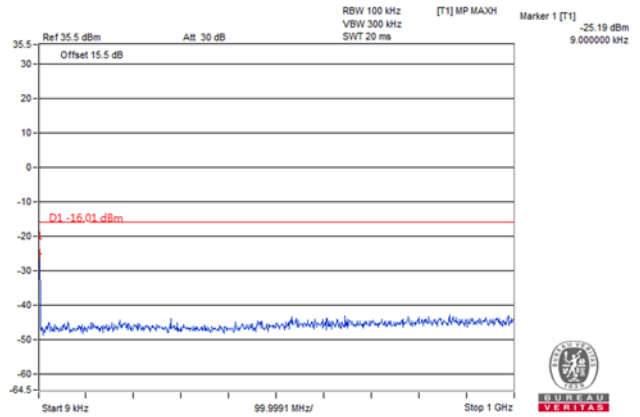
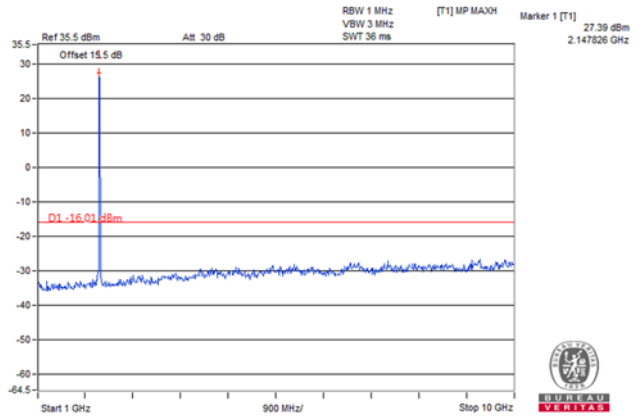
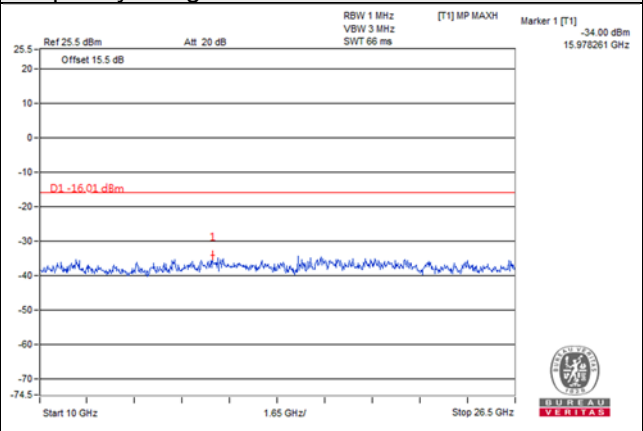
| Channel Bandwidth: 20MHz (Chain 1) | |
|---|---|
| Channel 67036 (2170.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

Note: For 9kHz, the signal is from spectrum analyzer.

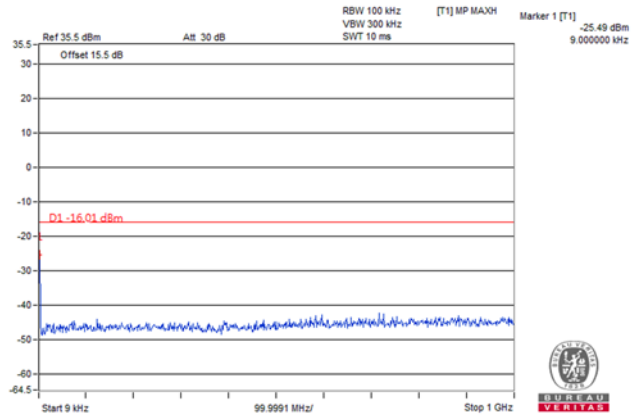
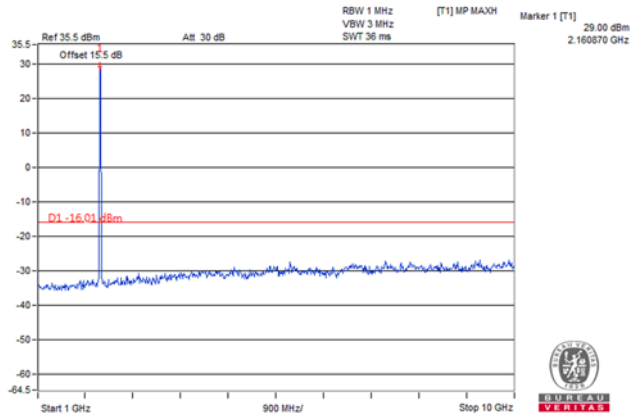
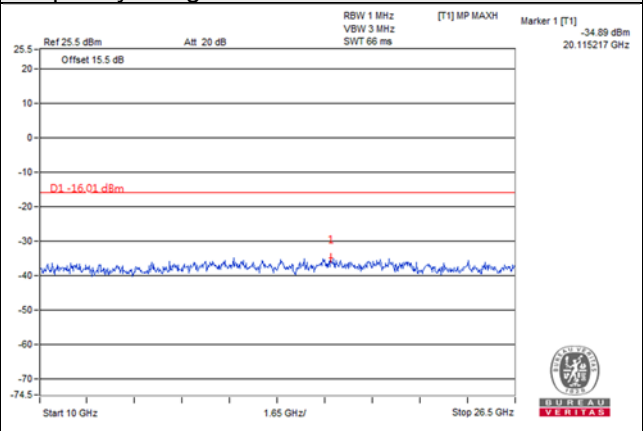
**For NB-IOT Guard Band:**
**QPSK_IoT Signal at Bottom:**

| Channel Bandwidth: 10MHz (Chain 0) | |
|---|---|
| Channel 66486 (2115.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

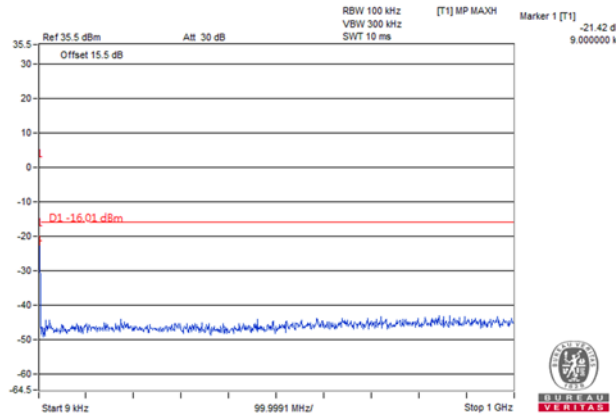
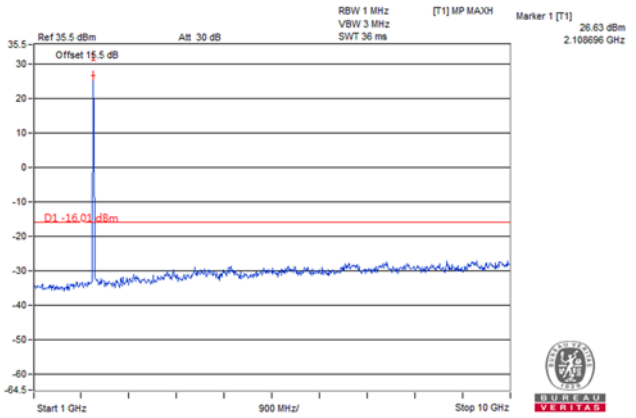
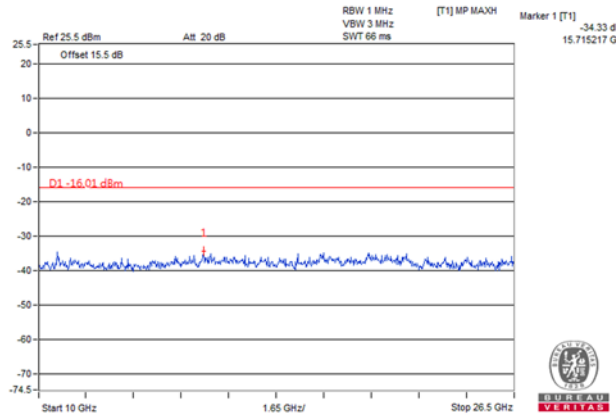
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 10MHz (Chain 0) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

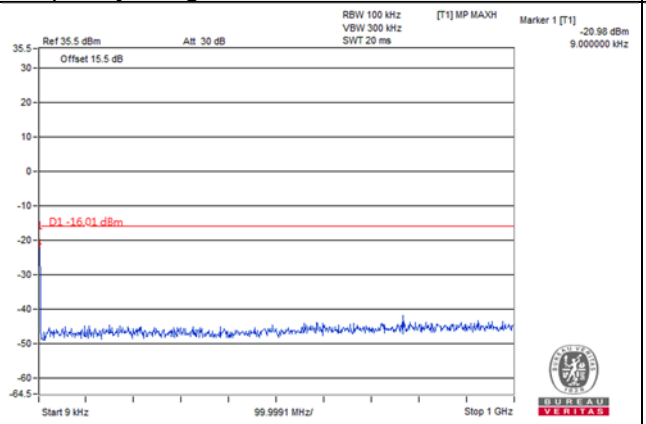
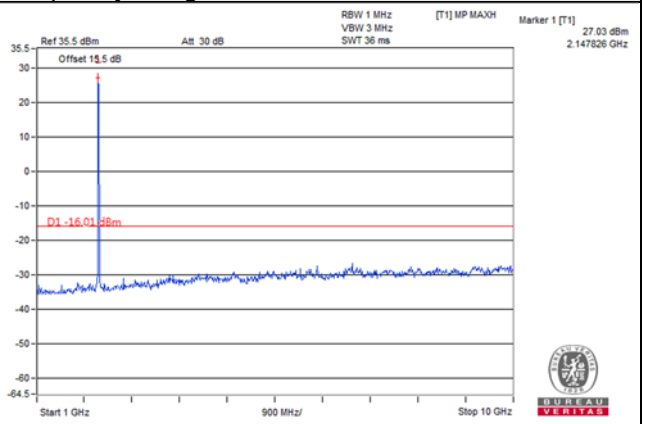
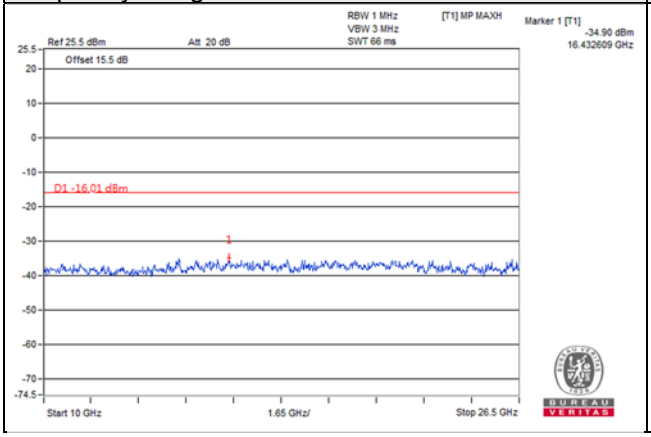
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 10MHz (Chain 0) | |
|---|---|
| Channel 67086 (2175.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

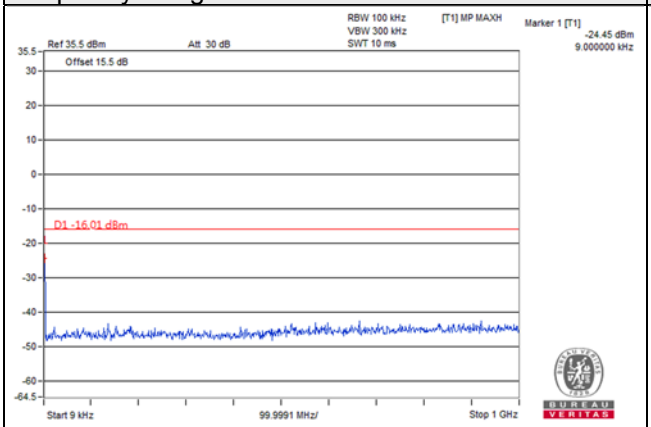
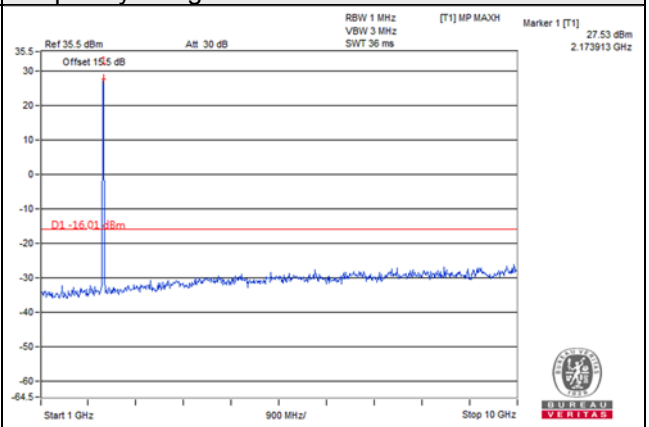
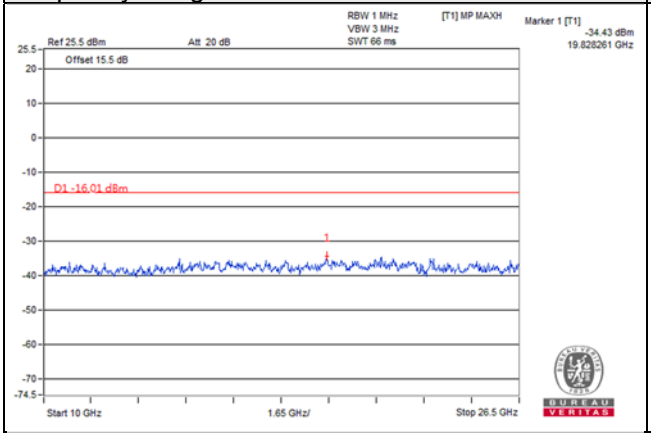
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 10MHz (Chain 1) | |
|---|---|
| Channel 66486 (2115.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

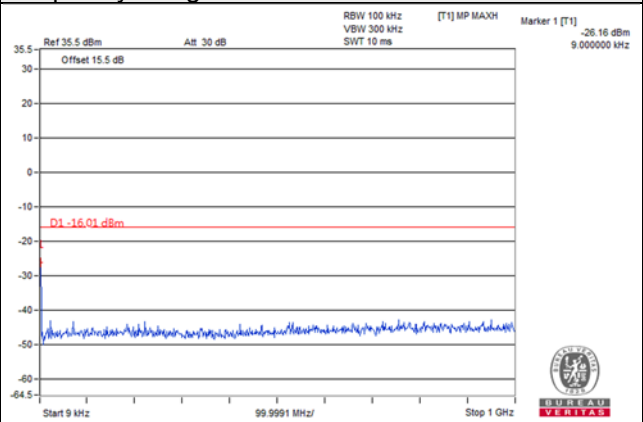
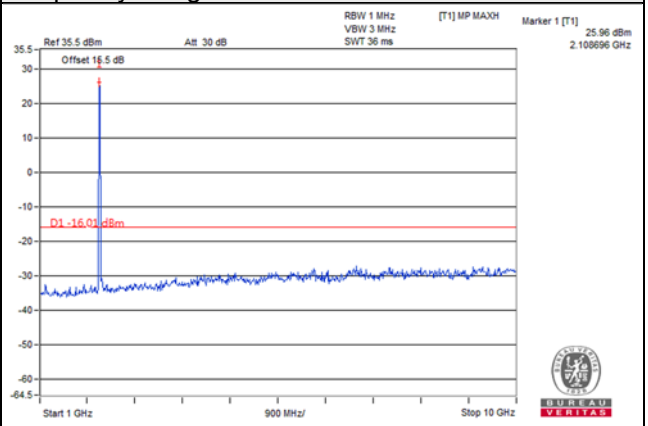
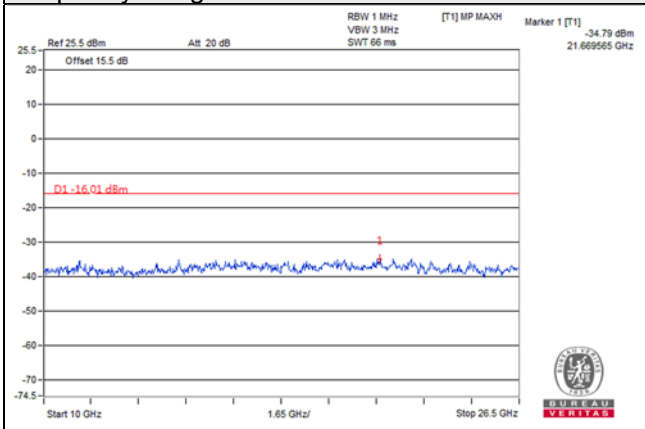
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 10MHz (Chain 1) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

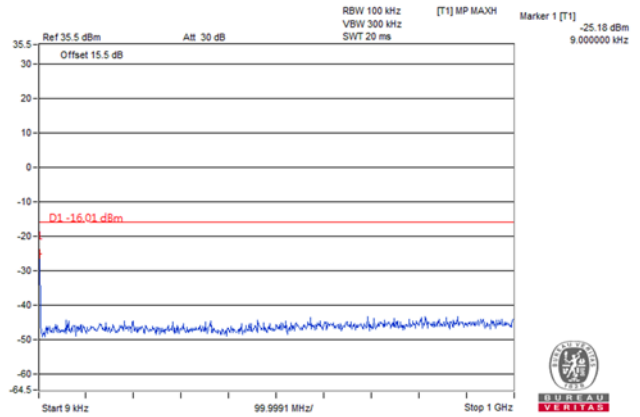
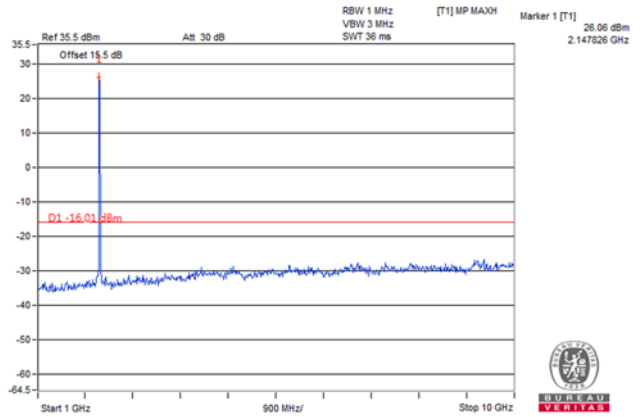
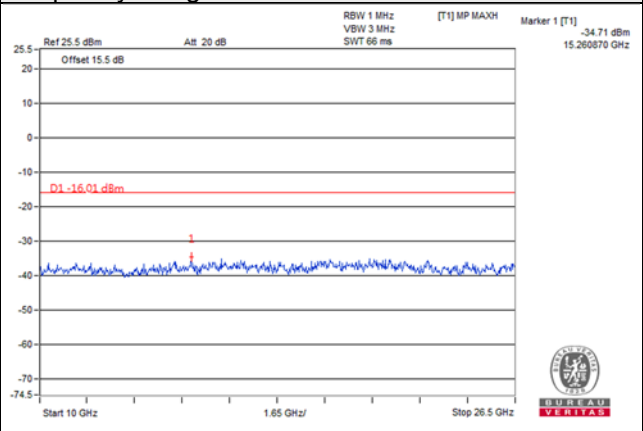
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 10MHz (Chain 1) | |
|---|---|
| Channel 67086 (2175.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

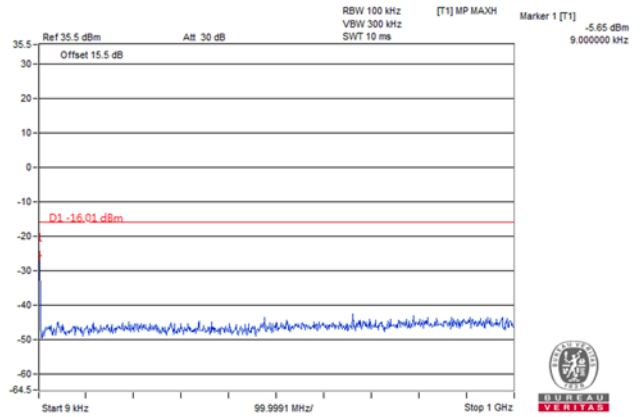
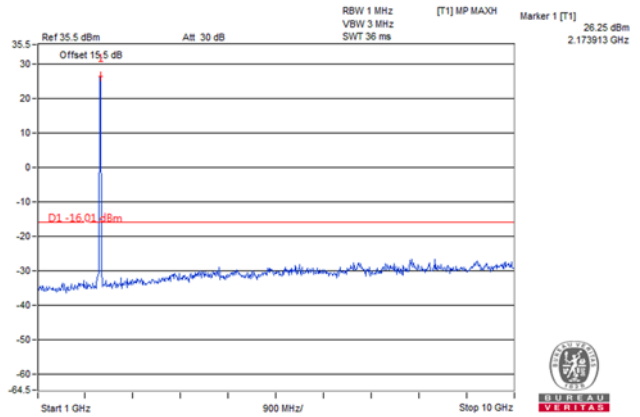
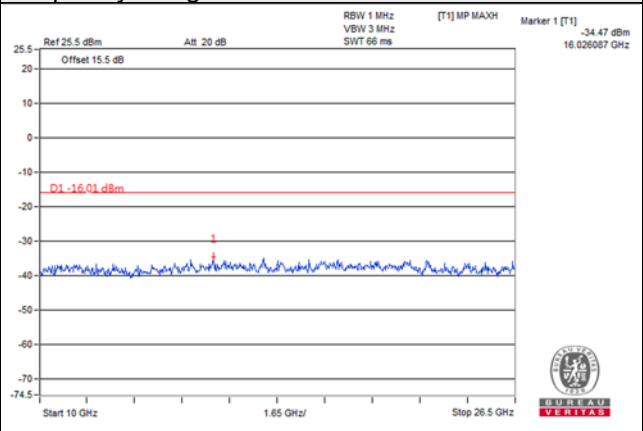
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 0) | |
|---|---|
| Channel 66511 (2117.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

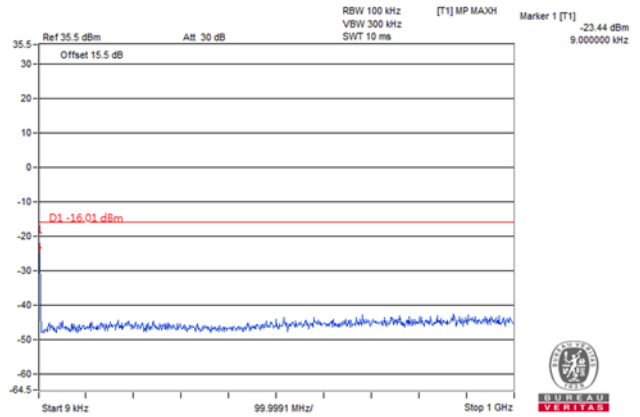
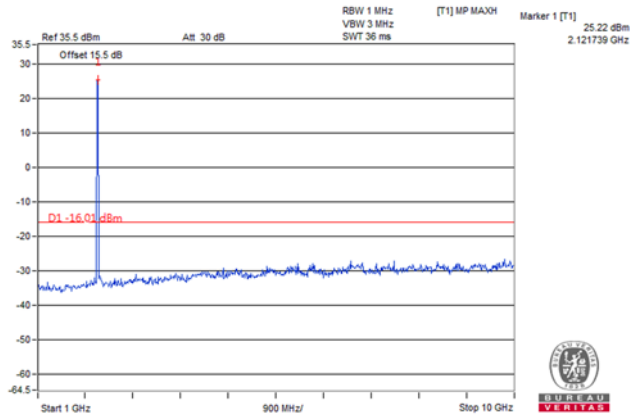
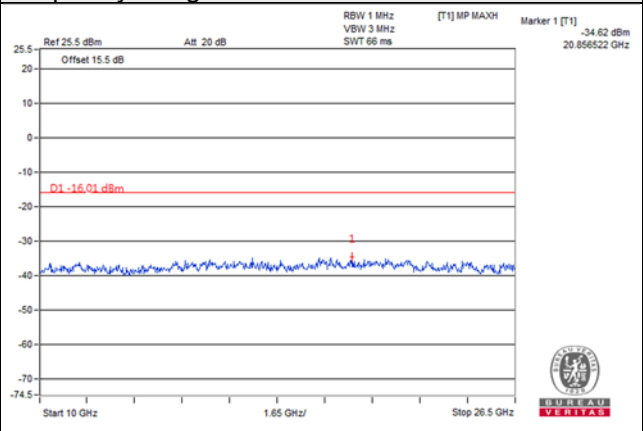
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 0) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

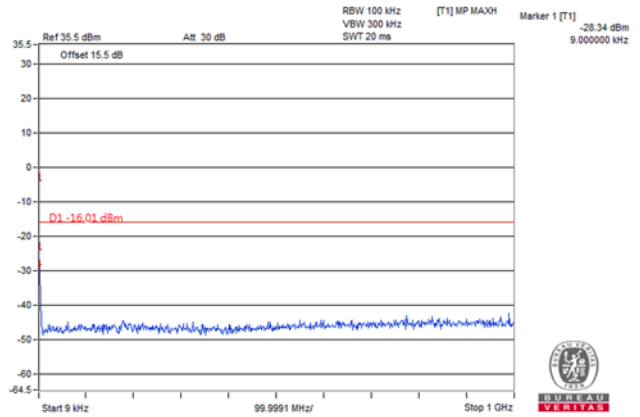
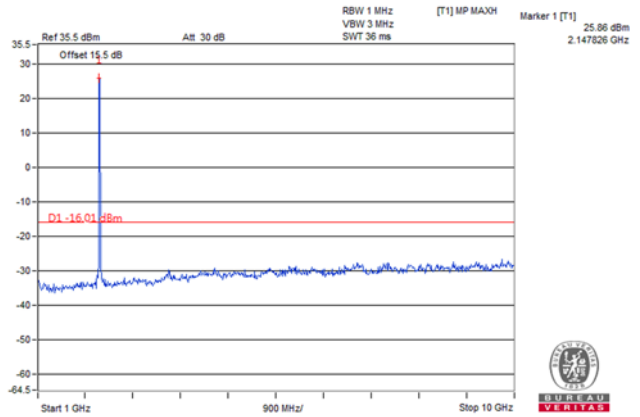
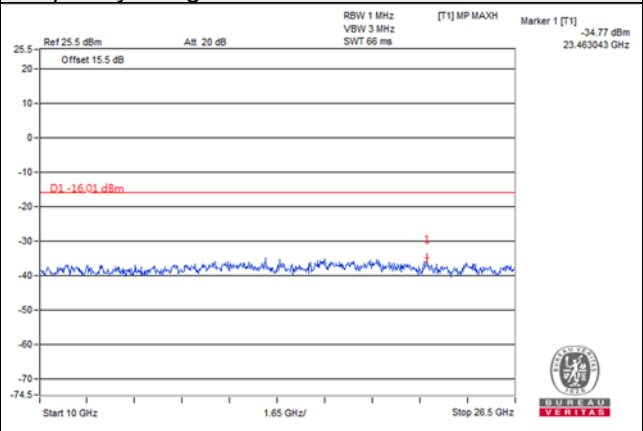
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 0) | |
|---|---|
| Channel 67061 (2172.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

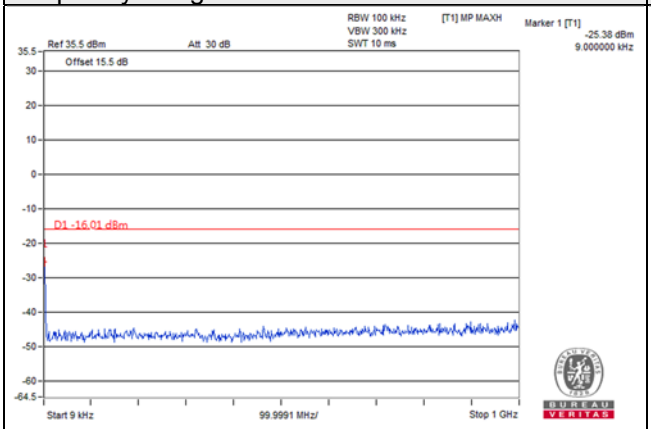
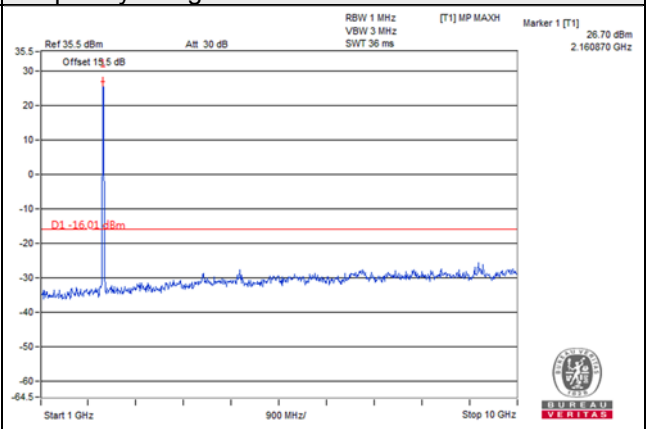
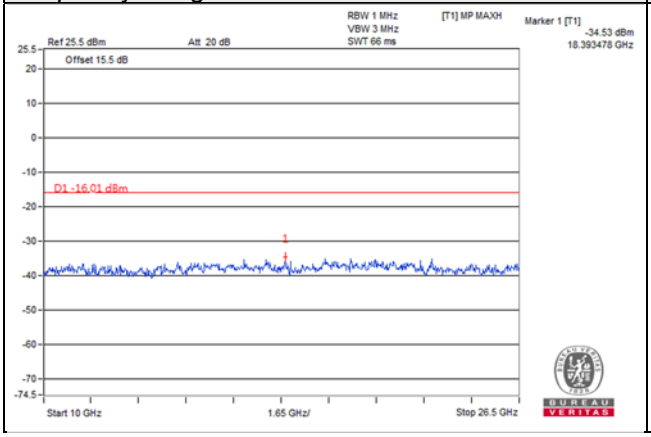
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 1) | |
|---|---|
| Channel 66511 (2117.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

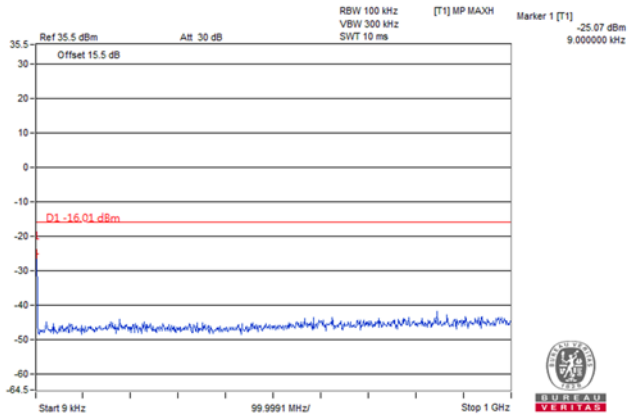
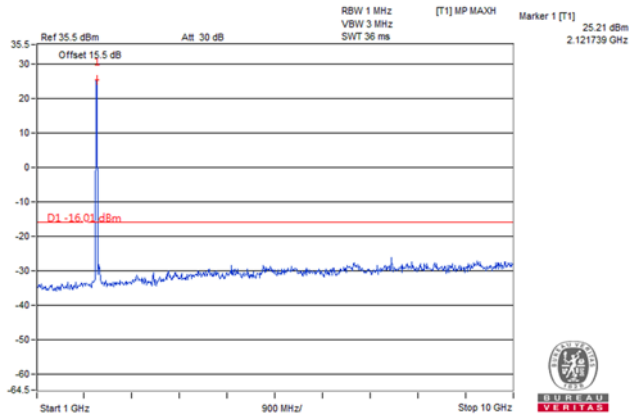
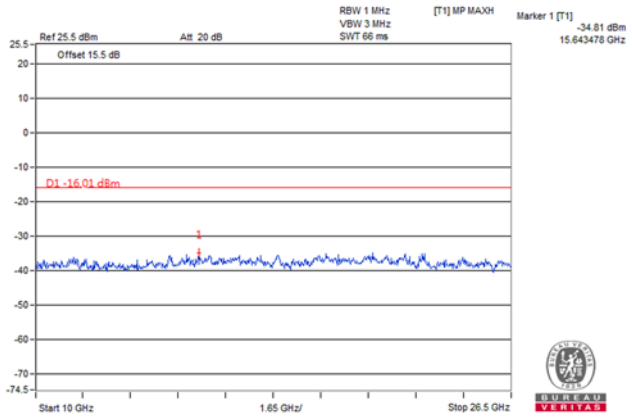
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 1) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

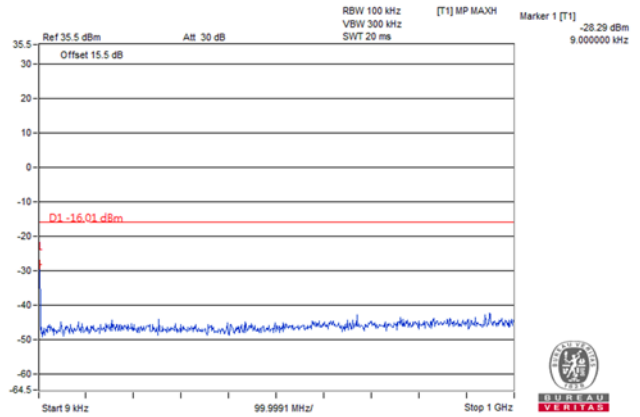
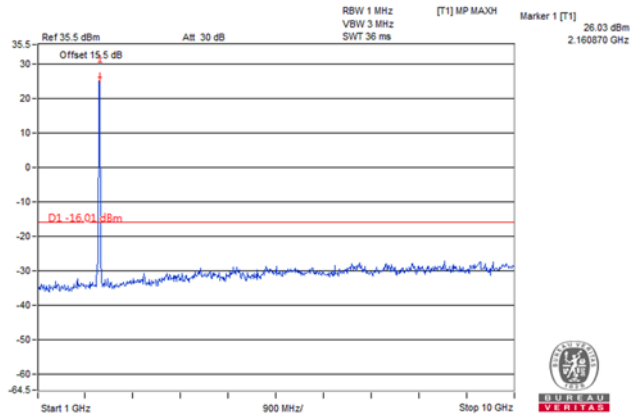
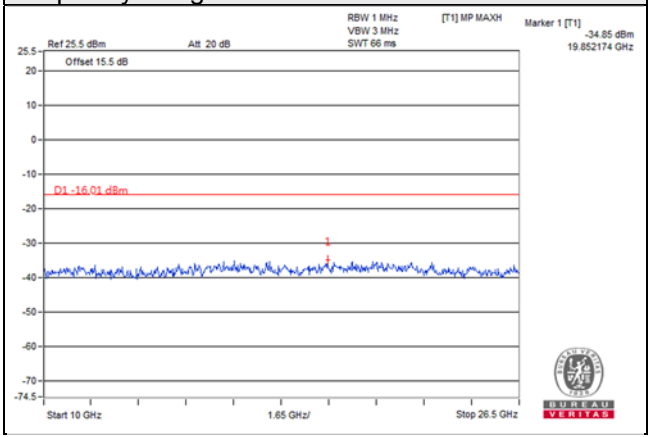
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 1) | |
|---|---|
| Channel 67061 (2172.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

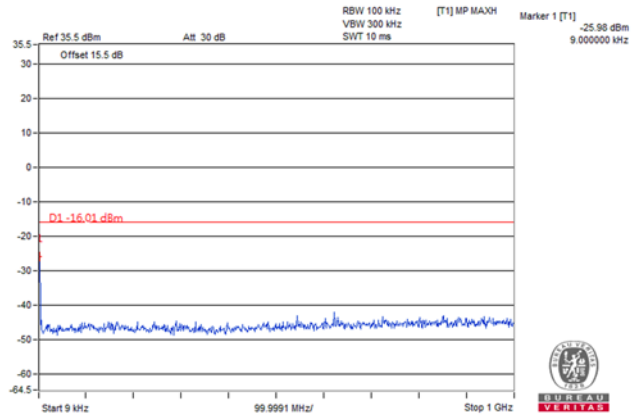
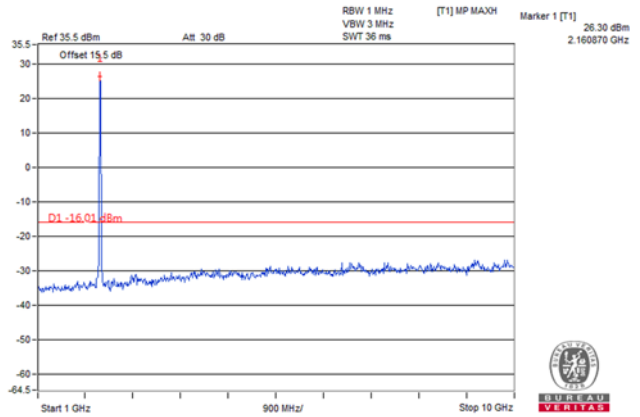
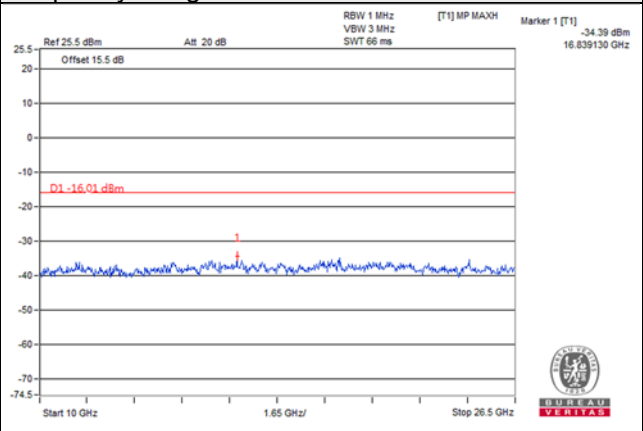
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 0) | |
|---|---|
| Channel 66536 (2120.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

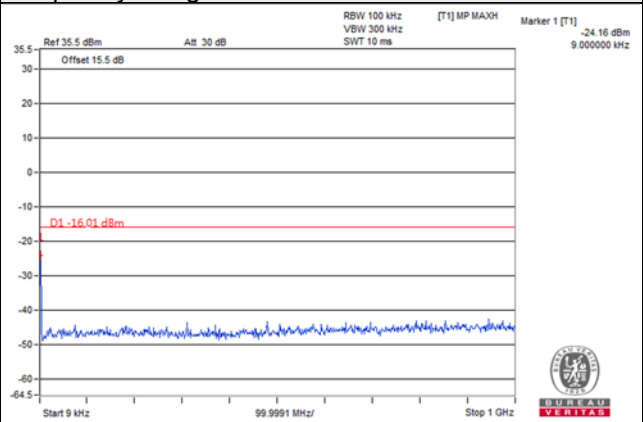
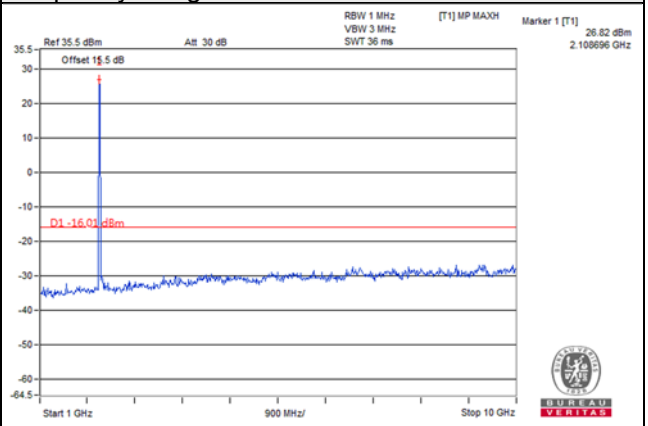
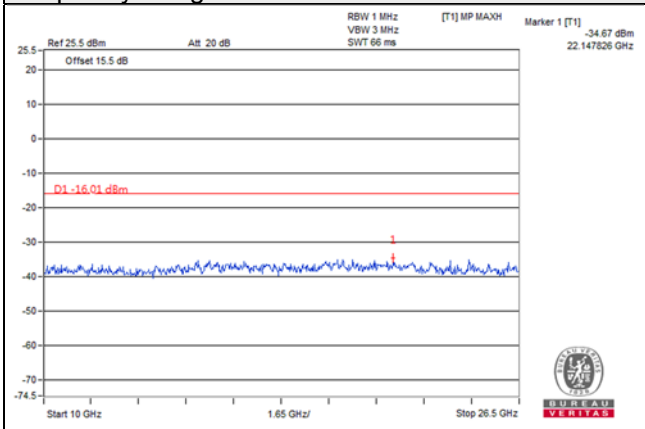
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 0) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

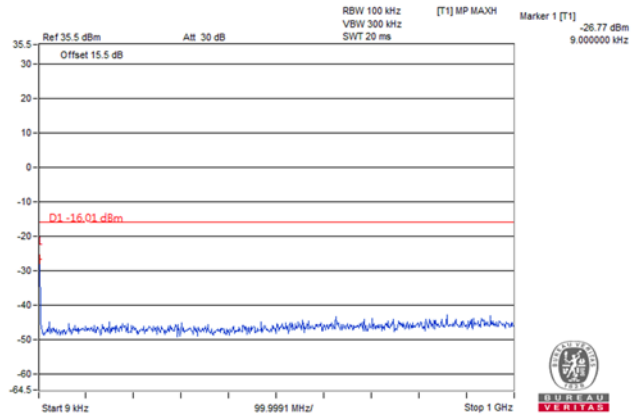
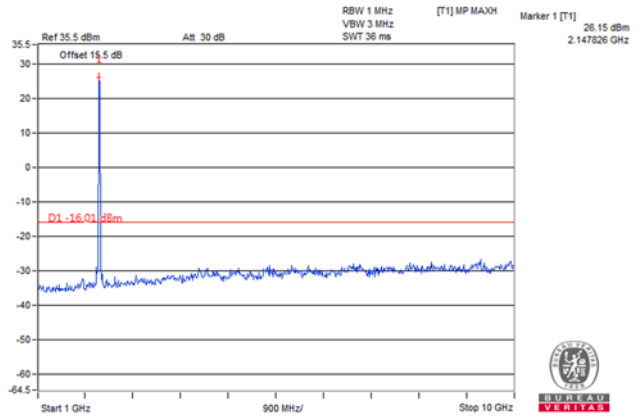
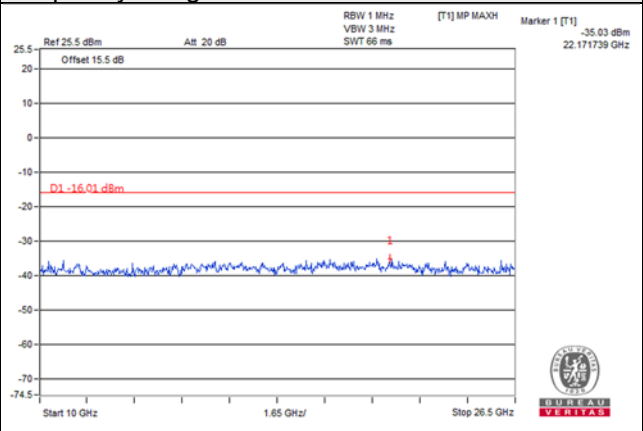
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 0) | |
|---|---|
| Channel 67036 (2170.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

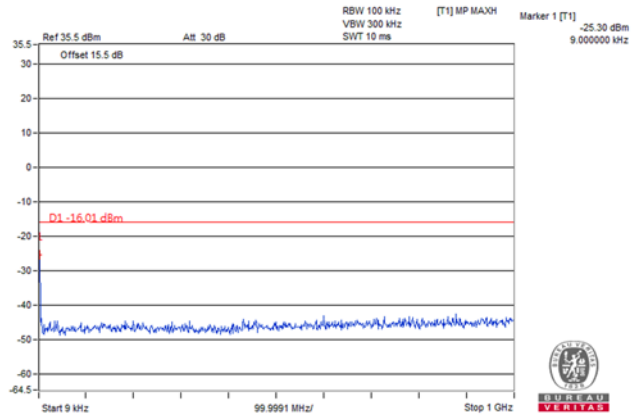
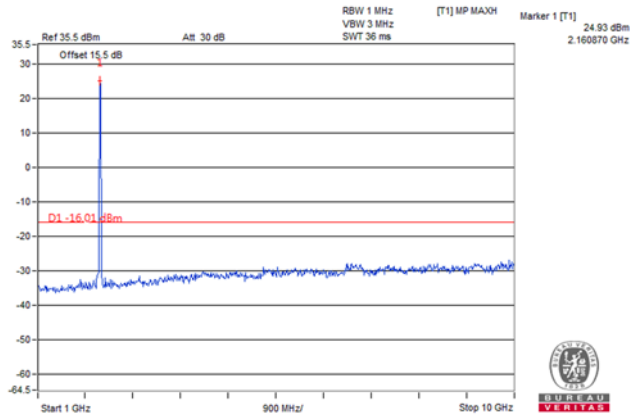
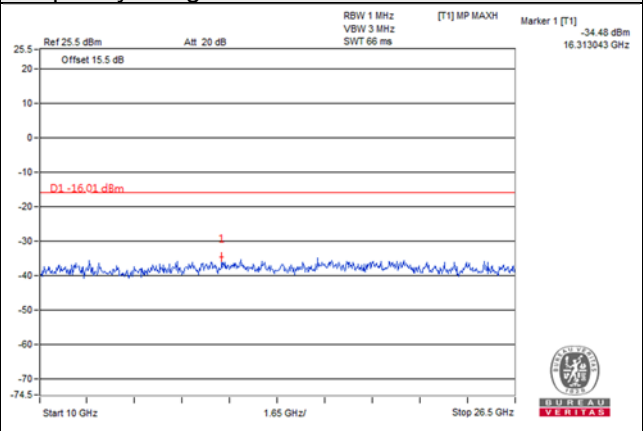
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 1) | |
|---|---|
| Channel 66536 (2120.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

Note: For 9kHz, the signal is from spectrum analyzer.

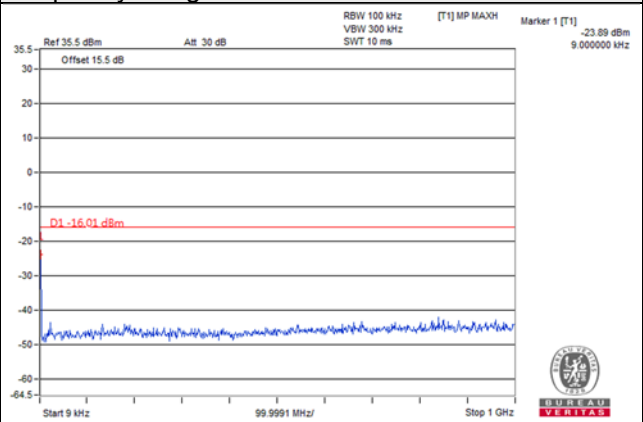
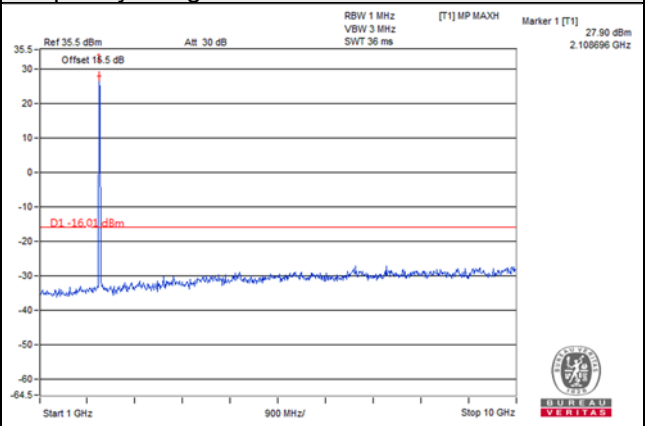
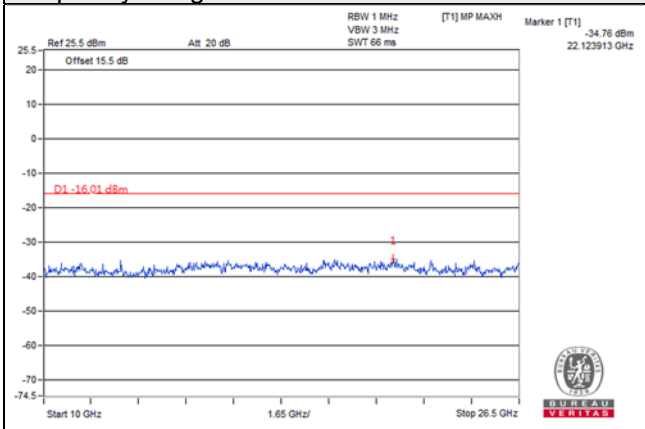
| Channel Bandwidth: 20MHz (Chain 1) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

Note: For 9kHz, the signal is from spectrum analyzer.

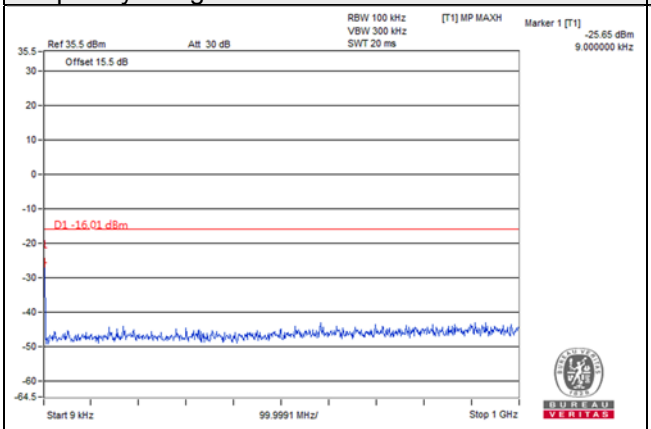
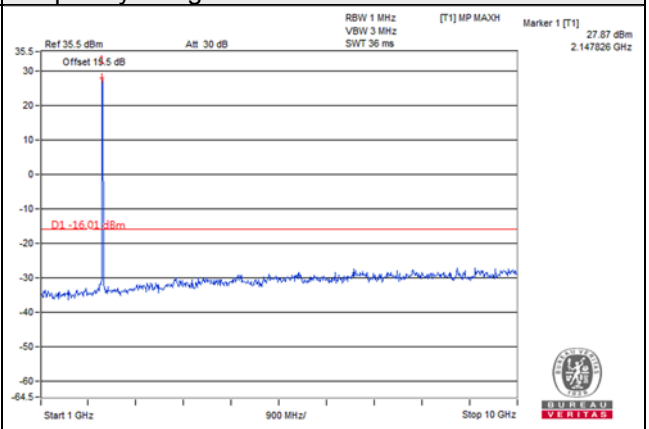
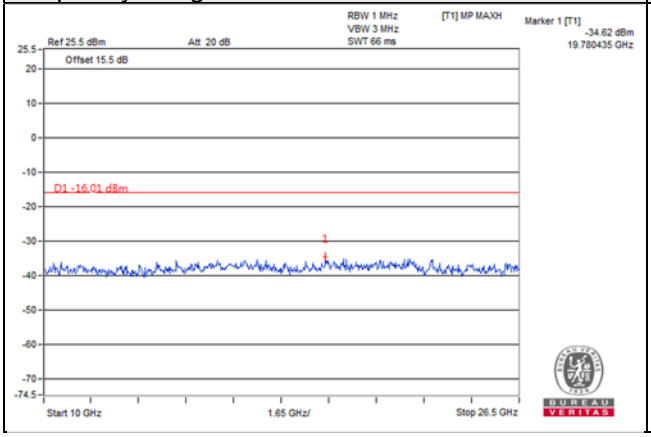
| Channel Bandwidth: 20MHz (Chain 1) | |
|---|---|
| Channel 67036 (2170.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

Note: For 9kHz, the signal is from spectrum analyzer.

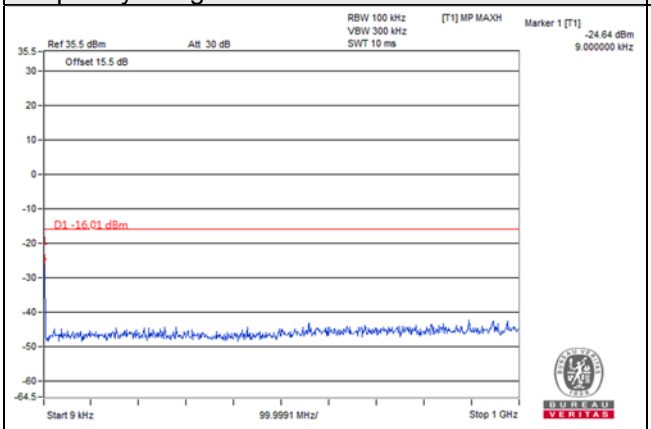
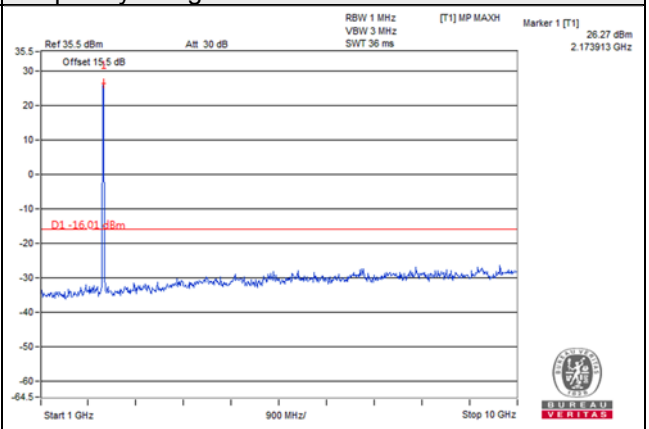
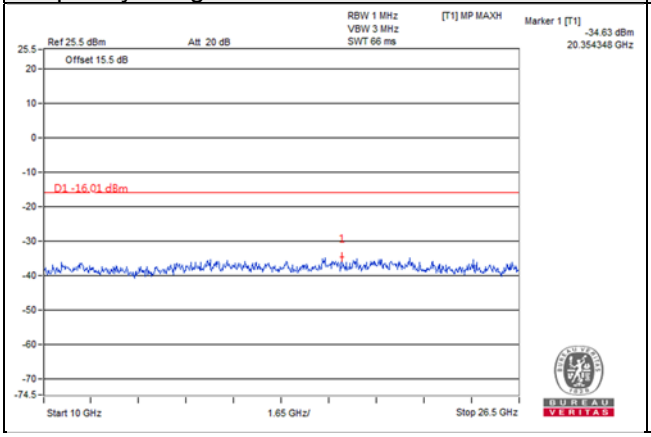
**QPSK_IoT Signal at Top:**

| Channel Bandwidth: 10MHz (Chain 0) | |
|---|---|
| Channel 66486 (2115.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

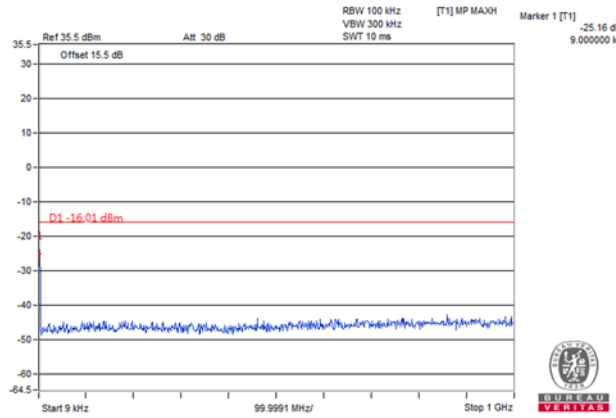
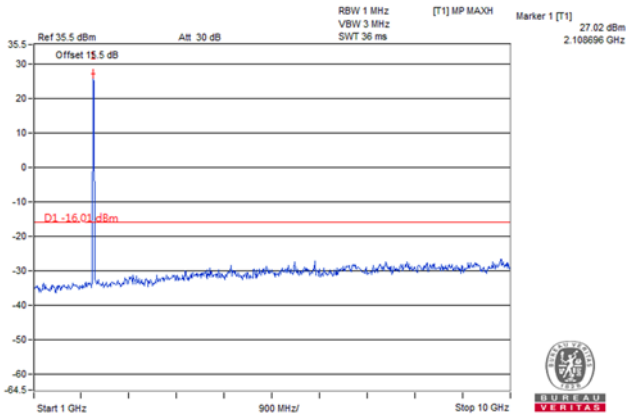
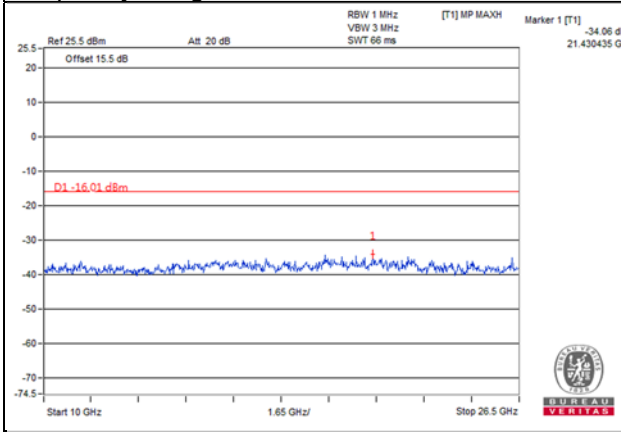
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 10MHz (Chain 0) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

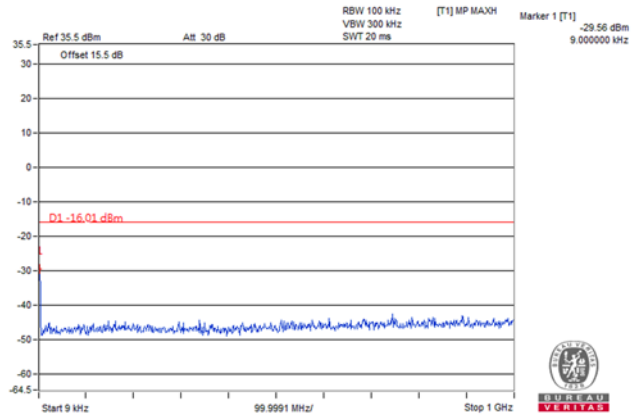
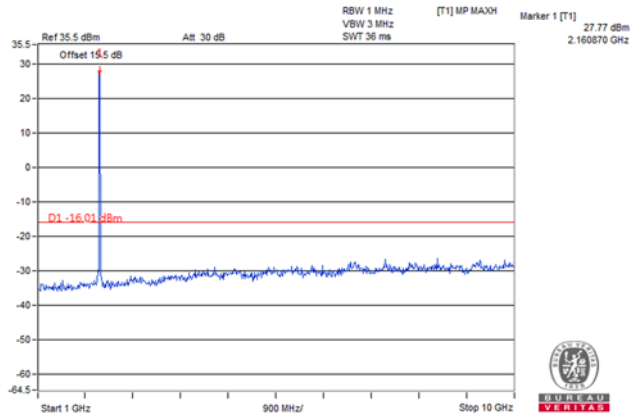
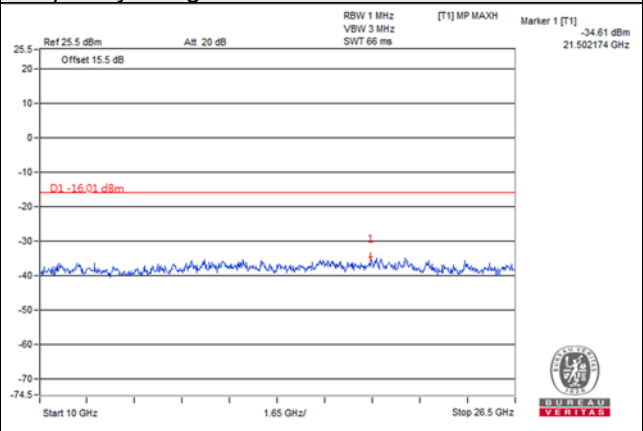
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 10MHz (Chain 0) | |
|---|---|
| Channel 67086 (2175.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

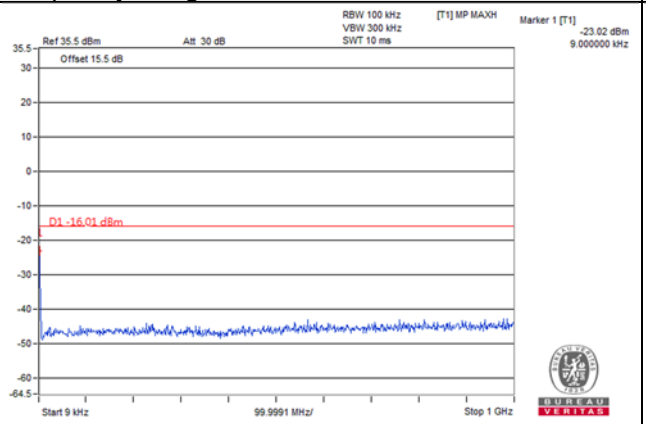
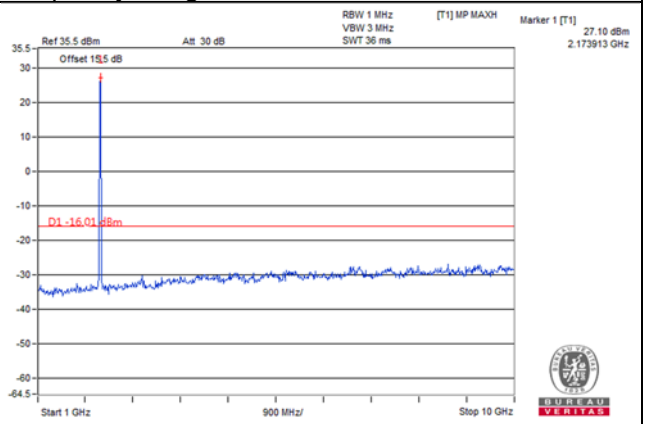
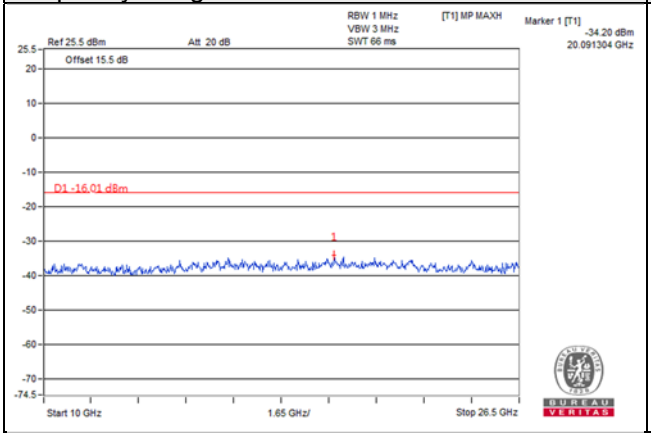
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 10MHz (Chain 1) | |
|---|---|
| Channel 66486 (2115.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

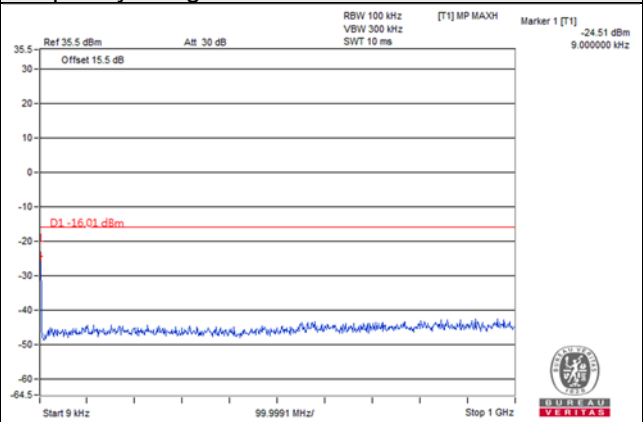
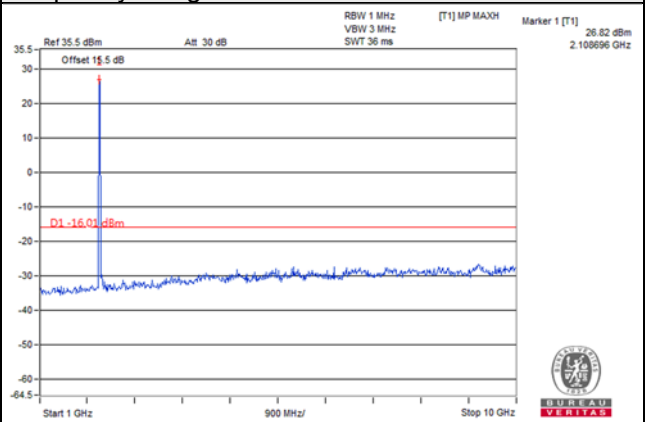
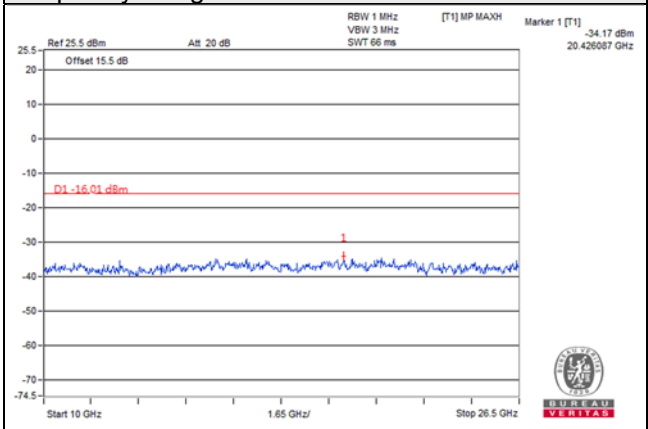
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 10MHz (Chain 1) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

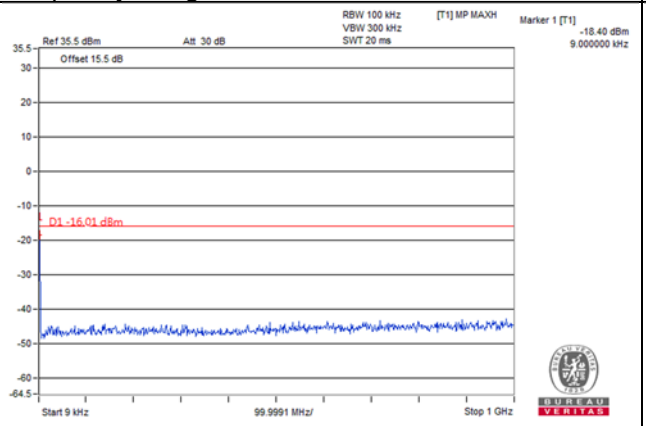
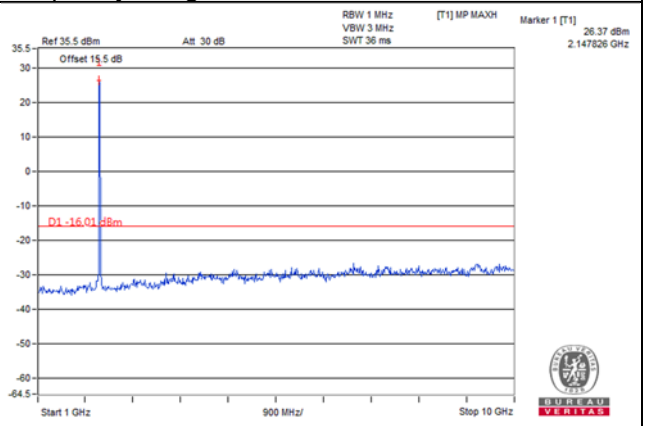
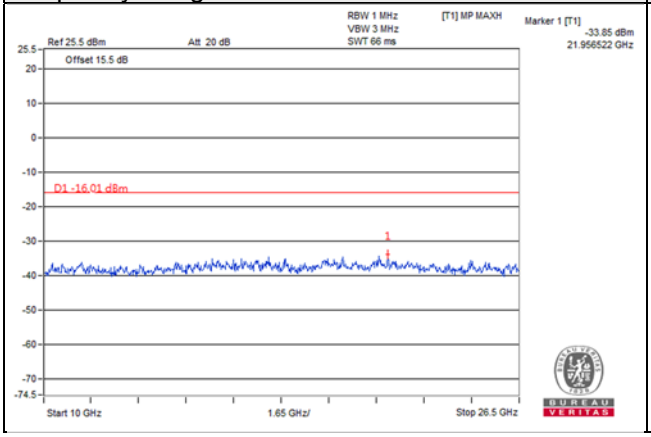
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 10MHz (Chain 1) | |
|---|---|
| Channel 67086 (2175.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

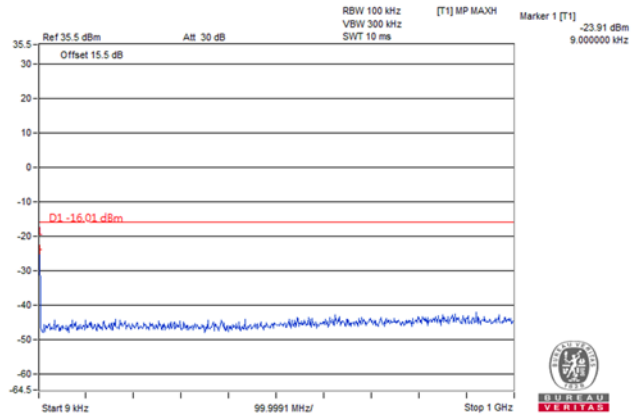
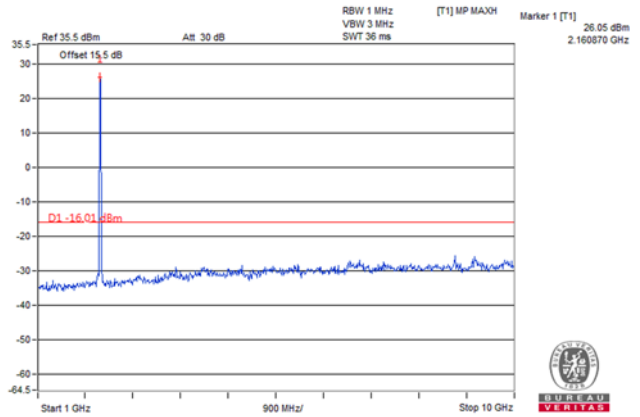
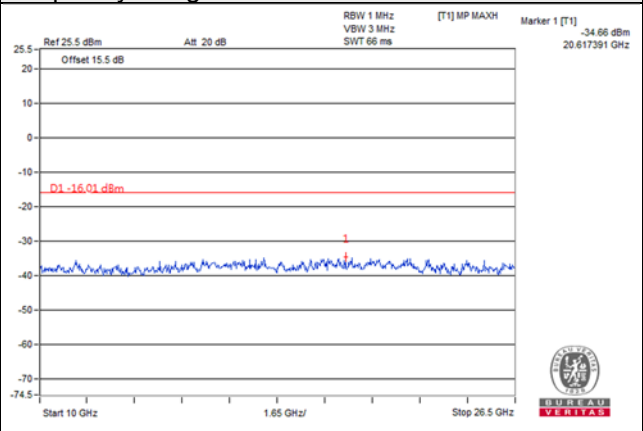
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 0) | |
|---|---|
| Channel 66511 (2117.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

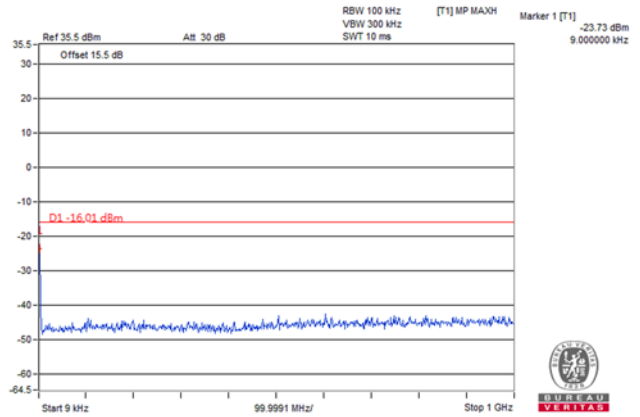
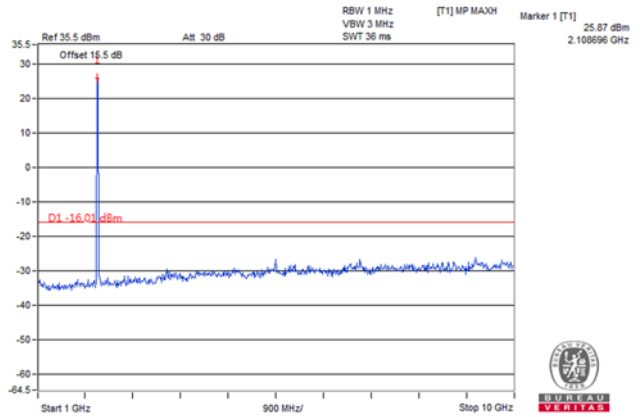
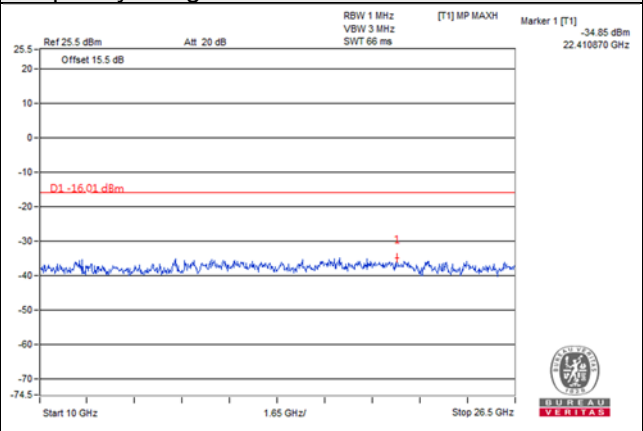
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 0) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

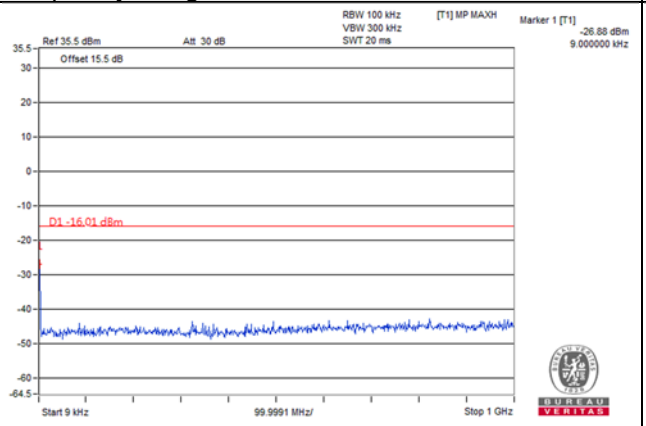
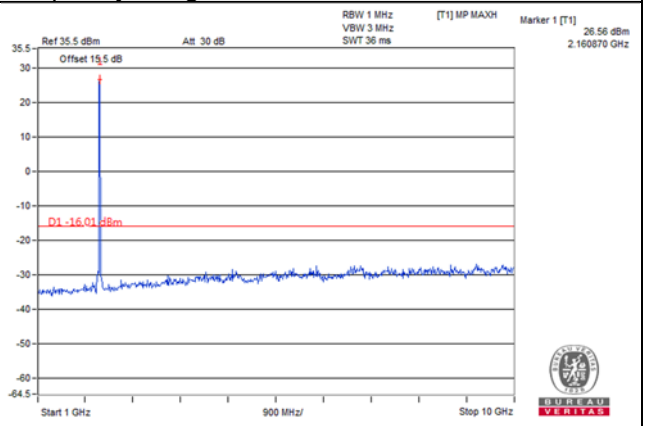
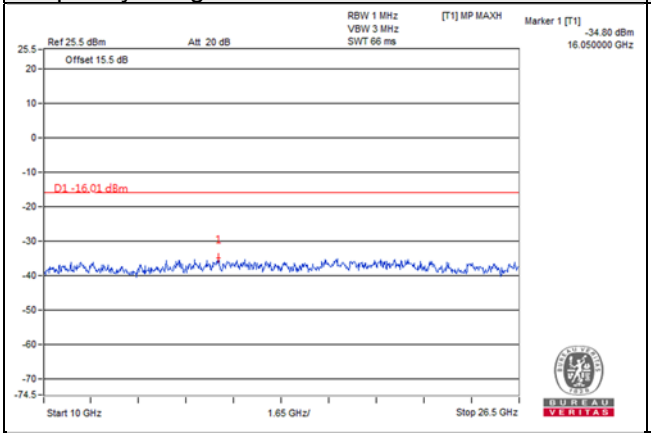
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 0) | |
|---|---|
| Channel 67061 (2172.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

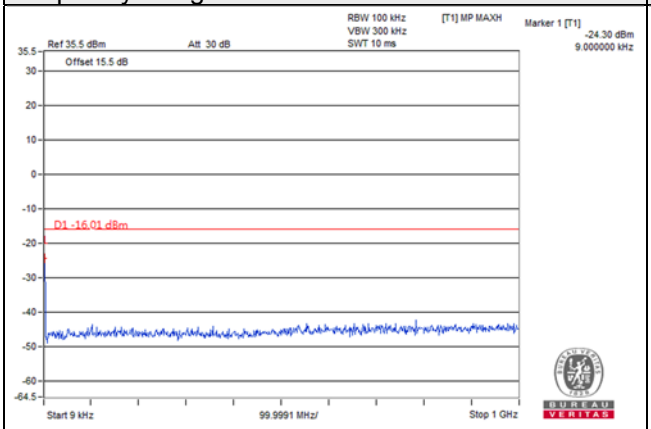
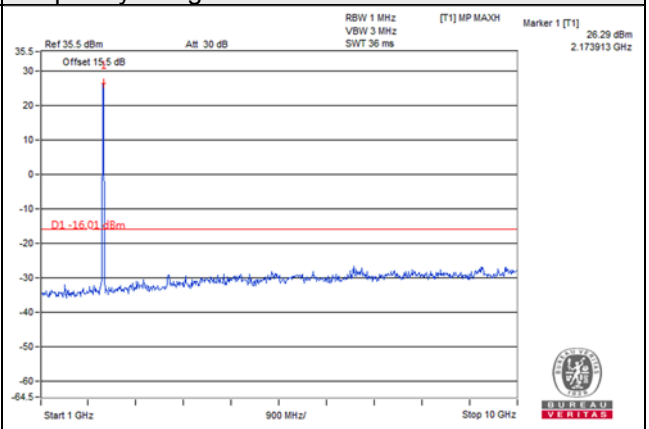
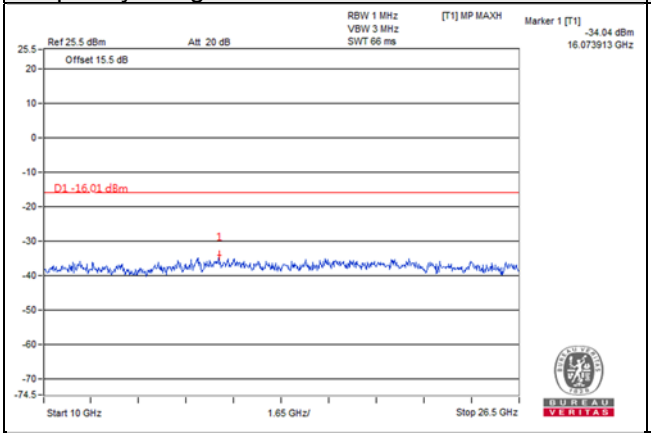
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 1) | |
|---|---|
| Channel 66511 (2117.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

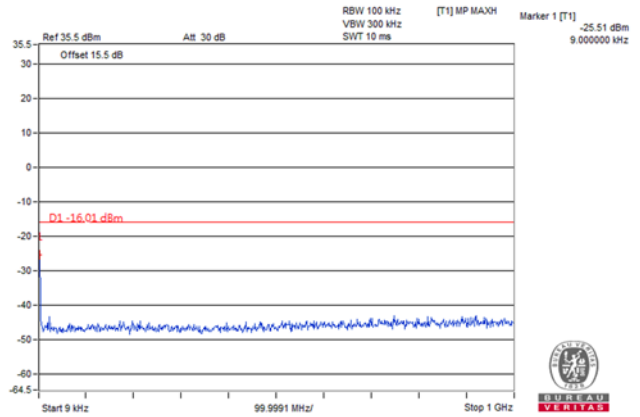
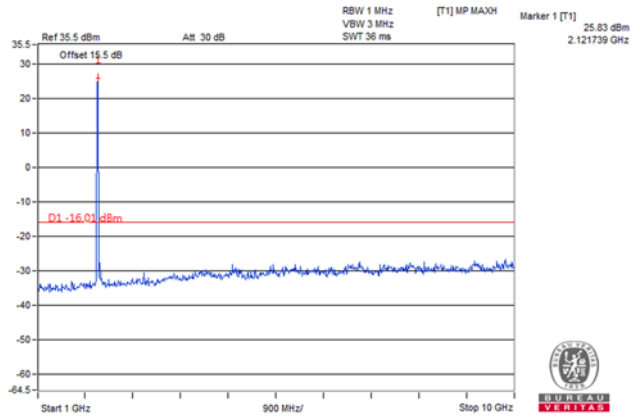
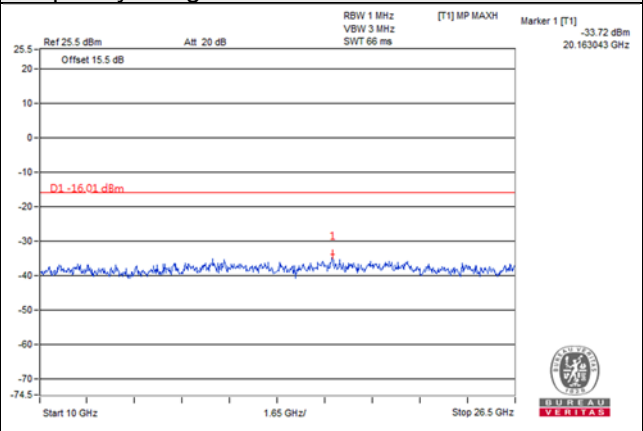
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 1) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

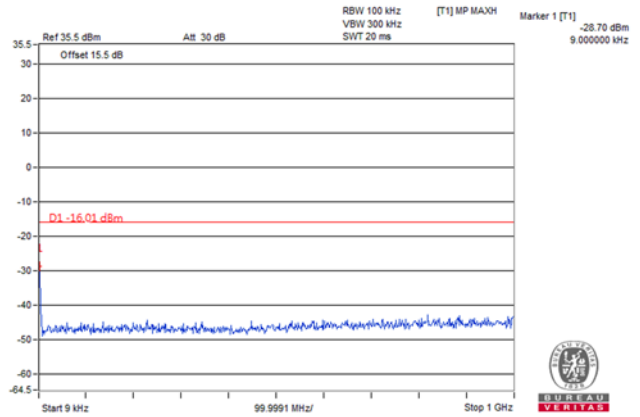
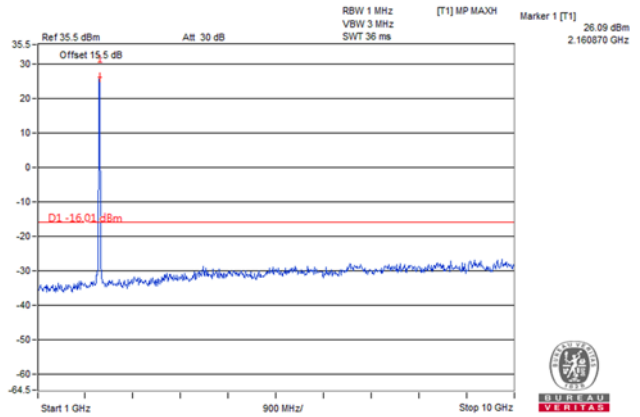
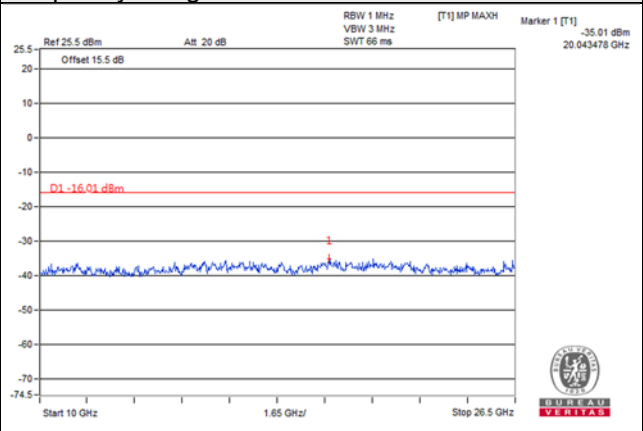
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 15MHz (Chain 1) | |
|---|---|
| Channel 67061 (2172.5MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

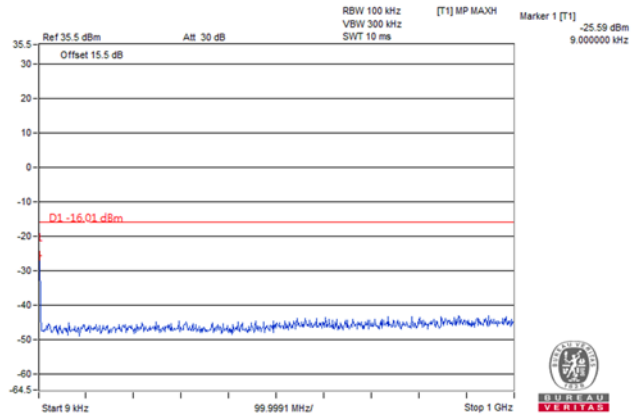
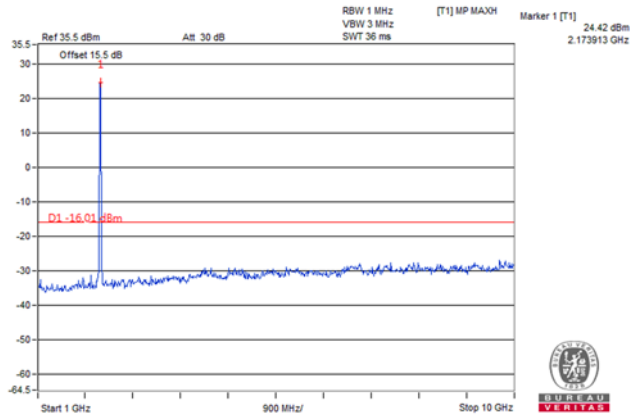
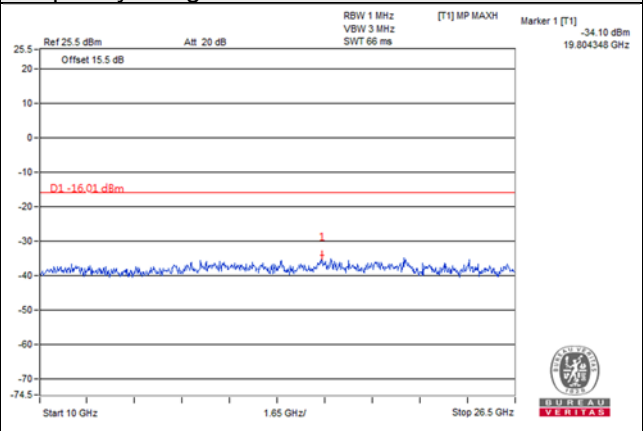
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 0) | |
|---|---|
| Channel 66536 (2120.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

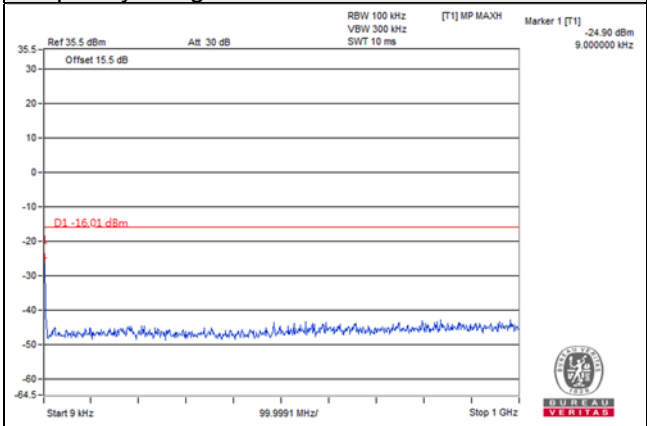
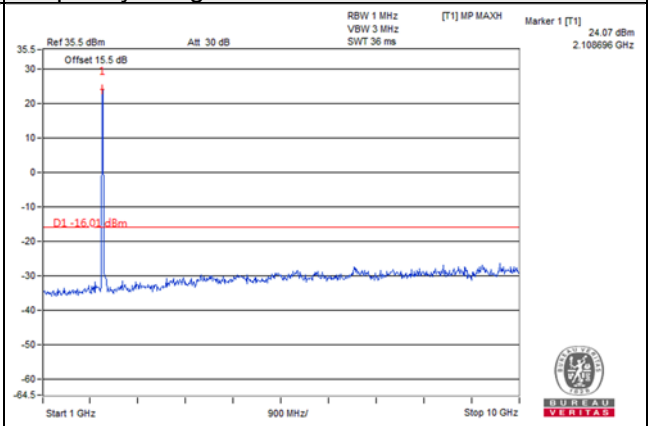
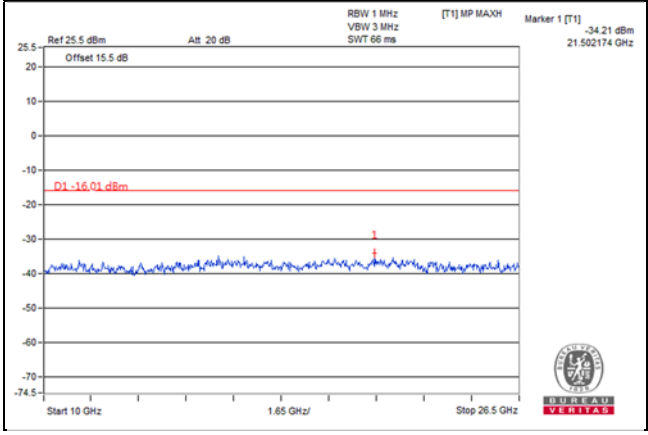
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 0) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

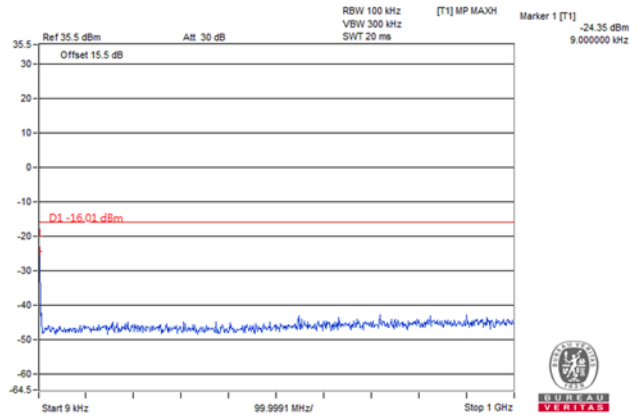
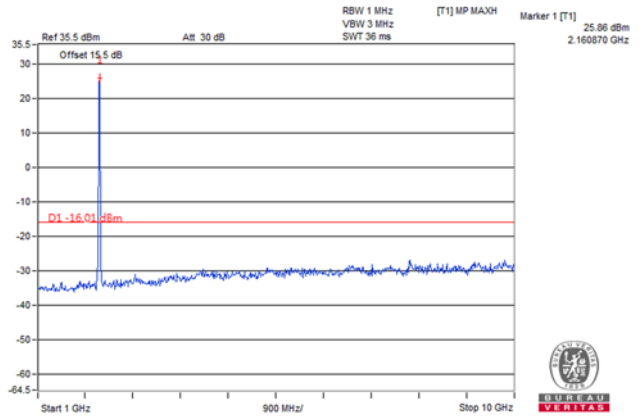
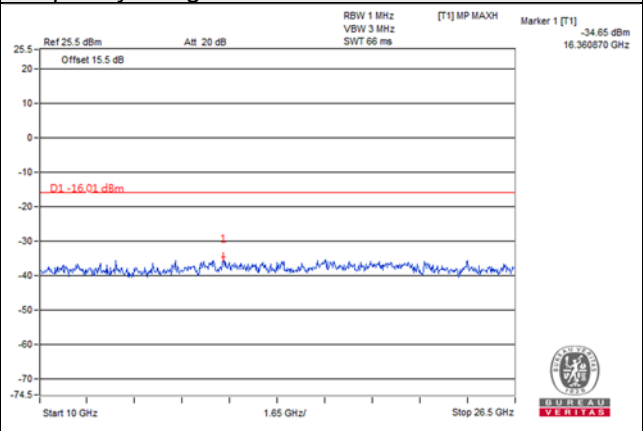
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 0) | |
|---|---|
| Channel 67036 (2170.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

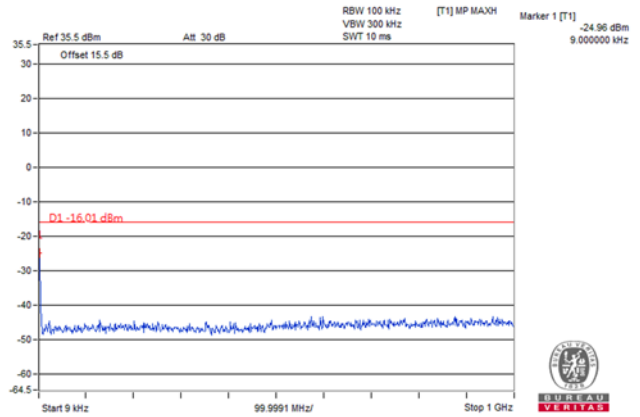
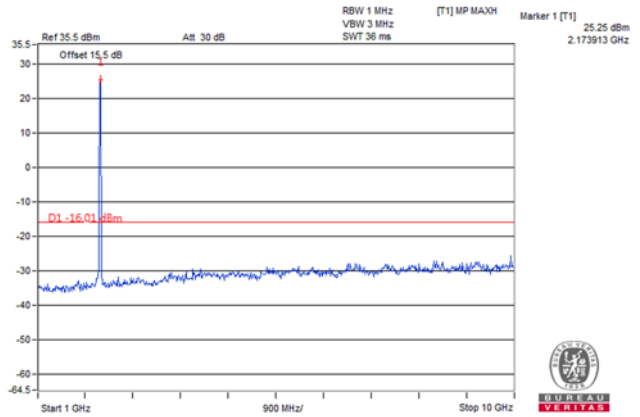
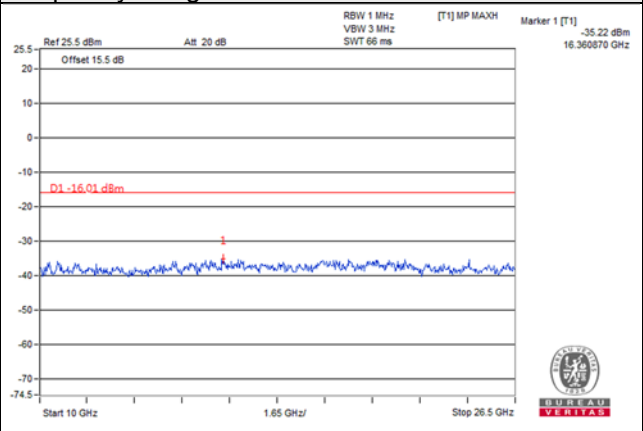
Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 1) | |
|---|---|
| Channel 66536 (2120.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 1) | |
|---|---|
| Channel 66786 (2145.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

Note: For 9kHz, the signal is from spectrum analyzer.

| Channel Bandwidth: 20MHz (Chain 1) | |
|---|---|
| Channel 67036 (2170.0MHz) | |
| Frequency Range : 9kHz~1GHz | Frequency Range : 1GHz~10GHz |
|  |  |
| Frequency Range : 10GHz~26.5GHz | |
|  | |

Note: For 9kHz, the signal is from spectrum analyzer.

## 4.8 Radiated Emission Measurement

### 4.8.1 Limits of Radiated Emission Measurement

According to FCC 27.53(h) for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, 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.

### 4.8.2 Test Procedure

a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high channel of operational frequency range.)

b. 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.

c. The substitution 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 antenna.

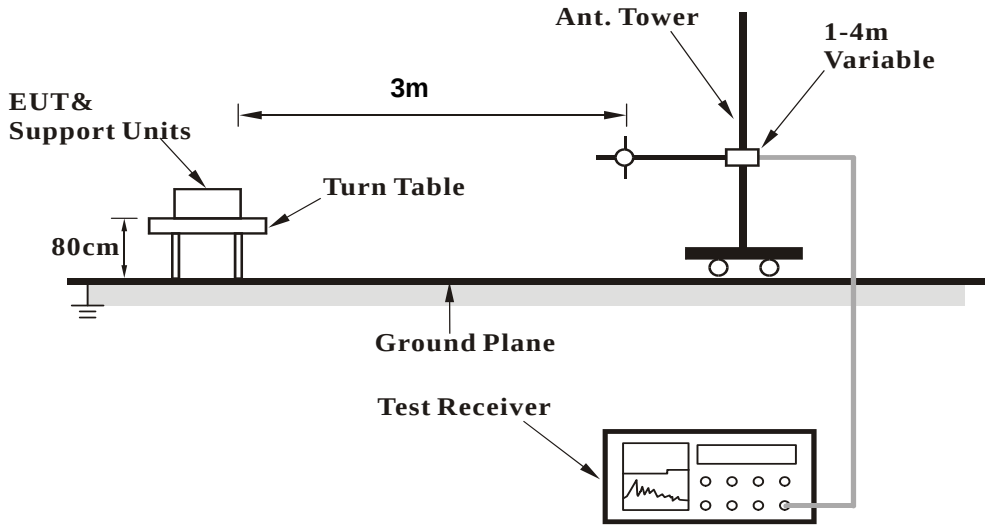
**Note:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

### 4.8.3 Deviation from Test Standard

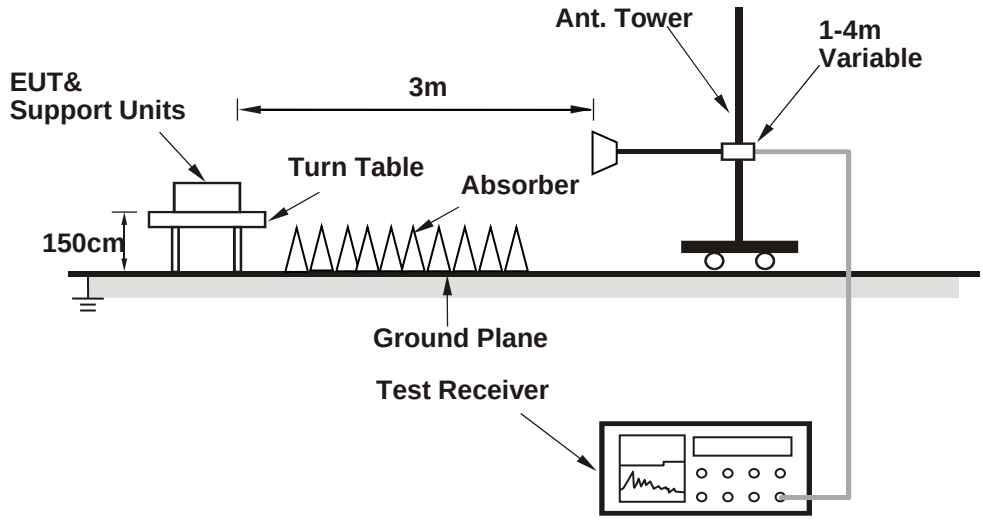
No deviation.

### 4.8.4 Test Setup

**For Radiated emission 30MHz to 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

LTE Band 66

**For NB-IOT In-band:**

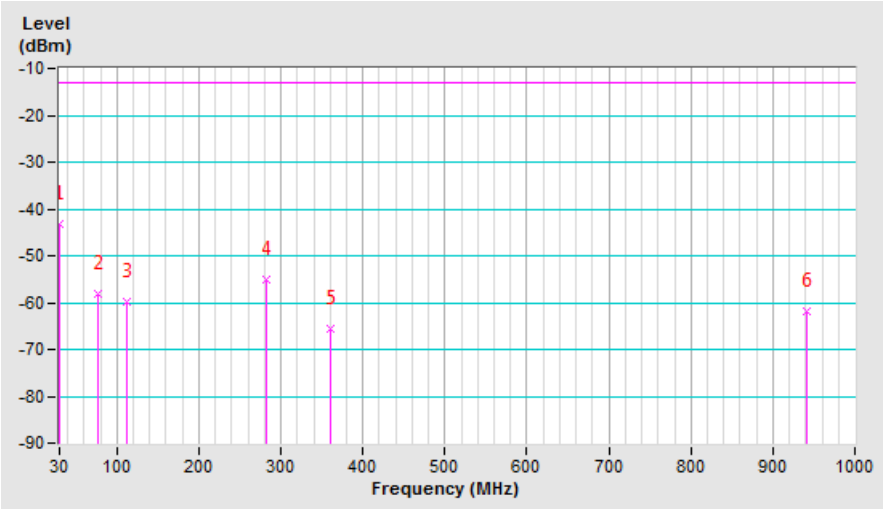
Channel Bandwidth: 5MHz

| Mode | TX channel 66461 (2112.5MHz) | Frequency Range | Below 1000 MHz |
|---|---|---|---|
| Environmental Conditions | 25deg. C, 65%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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 30.00 | -47.2 | -23.8 | -19.4 | -43.2 | -13.0 | -30.2 |
| 2 | 76.56 | -52.4 | -58.3 | 0.3 | -58.0 | -13.0 | -45.0 |
| 3 | 111.48 | -52.0 | -57.2 | -2.5 | -59.7 | -13.0 | -46.7 |
| 4 | 282.20 | -50.8 | -53.3 | -1.7 | -55.0 | -13.0 | -42.0 |
| 5 | 360.77 | -62.8 | -69.5 | 4.0 | -65.5 | -13.0 | -52.5 |
| 6 | 941.80 | -70.3 | -65.7 | 3.8 | -61.9 | -13.0 | -48.9 |

Remarks:

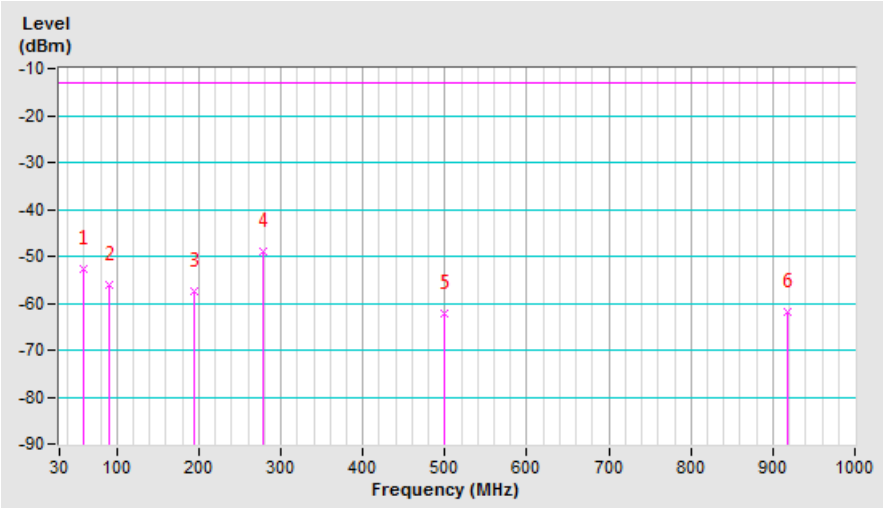
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



| Mode | TX channel 66461 (2112.5MHz) | Frequency Range | Below 1000 MHz |
|---|---|---|---|
| Environmental Conditions | 25deg. C, 65%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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 59.10 | -45.8 | -48.8 | -3.8 | -52.6 | -13.0 | -39.6 |
| 2 | 90.14 | -49.7 | -55.8 | -0.2 | -56.0 | -13.0 | -43.0 |
| 3 | 194.90 | -56.4 | -54.9 | -2.6 | -57.5 | -13.0 | -44.5 |
| 4 | 278.32 | -52.4 | -47.5 | -1.6 | -49.1 | -13.0 | -36.1 |
| 5 | 499.48 | -62.1 | -65.9 | 3.8 | -62.1 | -13.0 | -49.1 |
| 6 | 917.55 | -70.5 | -65.6 | 3.6 | -62.0 | -13.0 | -49.0 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



**For NB-IOT Guard Band:**

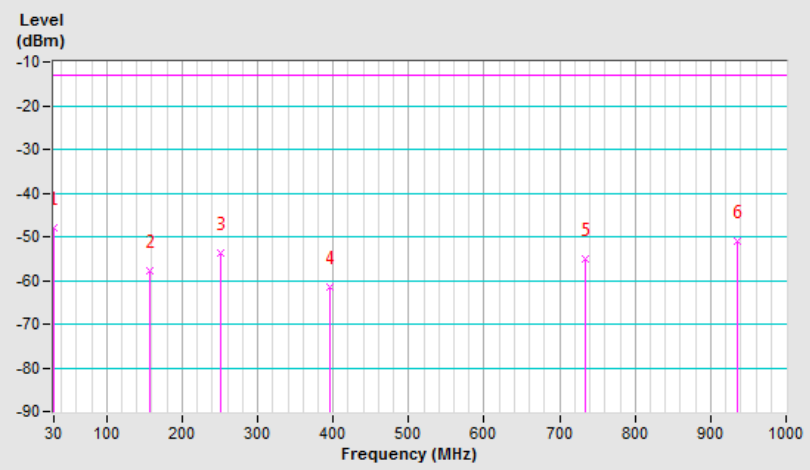
Channel Bandwidth: 10MHz

| Mode | TX channel 66486 (2115.0MHz) | Frequency Range | Below 1000 MHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 30.00 | -51.9 | -28.5 | -19.4 | -47.9 | -13.0 | -34.9 |
| 2 | 157.07 | -52.9 | -54.9 | -2.8 | -57.7 | -13.0 | -44.7 |
| 3 | 251.16 | -47.6 | -52.4 | -1.4 | -53.8 | -13.0 | -40.8 |
| 4 | 396.66 | -60.9 | -64.9 | 3.3 | -61.6 | -13.0 | -48.6 |
| 5 | 734.22 | -59.2 | -58.7 | 3.7 | -55.0 | -13.0 | -42.0 |
| 6 | 935.98 | -59.2 | -54.7 | 3.7 | -51.0 | -13.0 | -38.0 |

Remarks:

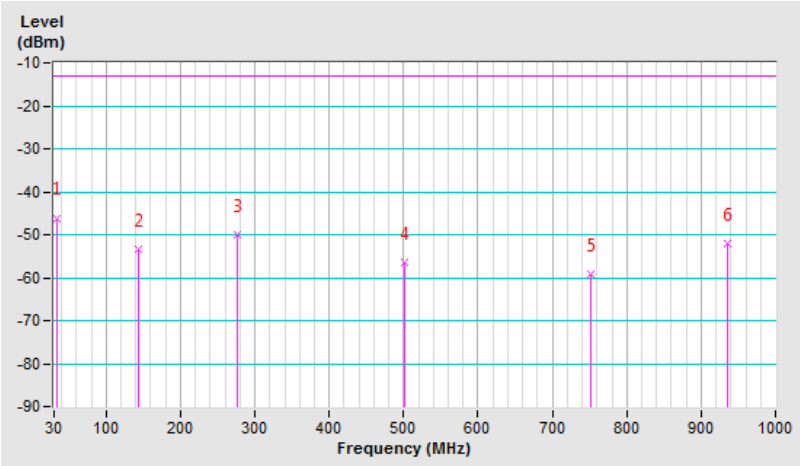
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



| Mode | TX channel 66486 (2115.0MHz) | Frequency Range | Below 1000 MHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 33.88 | -35.5 | -29.0 | -17.1 | -46.1 | -13.0 | -33.1 |
| 2 | 143.49 | -51.1 | -50.2 | -3.1 | -53.3 | -13.0 | -40.3 |
| 3 | 277.35 | -53.4 | -48.5 | -1.6 | -50.1 | -13.0 | -37.1 |
| 4 | 500.45 | -56.3 | -60.2 | 3.8 | -56.4 | -13.0 | -43.4 |
| 5 | 750.71 | -66.2 | -62.9 | 3.7 | -59.2 | -13.0 | -46.2 |
| 6 | 935.98 | -61.1 | -55.9 | 3.7 | -52.2 | -13.0 | -39.2 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

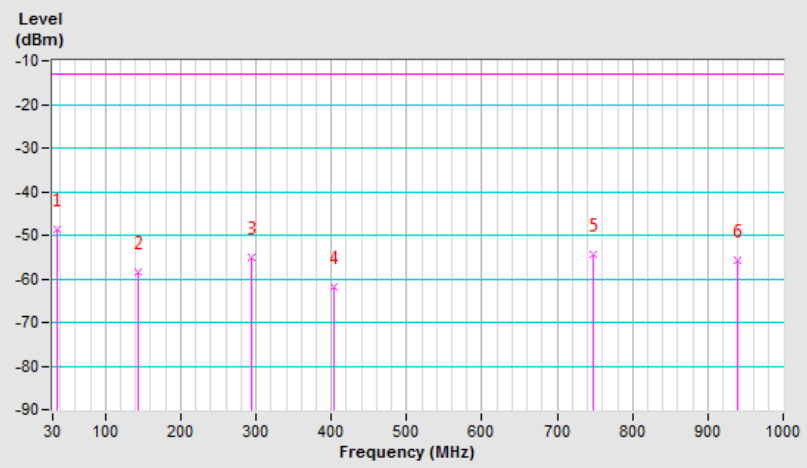


Channel Bandwidth: 15MHz

| Mode | TX channel 66511 (2117.5MHz) | Frequency Range | Below 1000 MHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 35.82 | -52.2 | -32.8 | -15.9 | -48.7 | -13.0 | -35.7 |
| 2 | 143.49 | -53.4 | -55.5 | -3.1 | -58.6 | -13.0 | -45.6 |
| 3 | 293.84 | -52.0 | -53.4 | -1.8 | -55.2 | -13.0 | -42.2 |
| 4 | 404.42 | -61.4 | -65.3 | 3.3 | -62.0 | -13.0 | -49.0 |
| 5 | 746.83 | -58.5 | -58.2 | 3.7 | -54.5 | -13.0 | -41.5 |
| 6 | 939.86 | -64.0 | -59.4 | 3.7 | -55.7 | -13.0 | -42.7 |

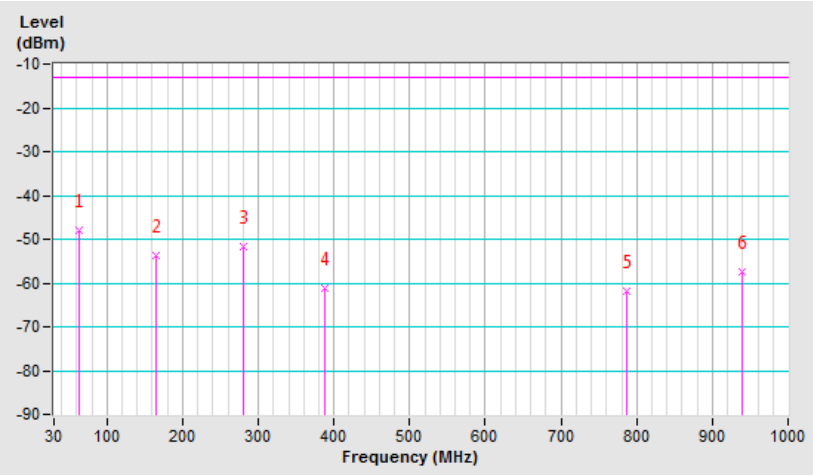
Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



| Mode | TX channel 66511 (2117.5MHz) | Frequency Range | Below 1000 MHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 62.98 | -41.4 | -45.7 | -2.4 | -48.1 | -13.0 | -35.1 |
| 2 | 164.83 | -50.5 | -50.8 | -2.9 | -53.7 | -13.0 | -40.7 |
| 3 | 280.26 | -54.8 | -50.0 | -1.6 | -51.6 | -13.0 | -38.6 |
| 4 | 386.96 | -60.7 | -64.8 | 3.5 | -61.3 | -13.0 | -48.3 |
| 5 | 786.60 | -68.8 | -65.9 | 4.0 | -61.9 | -13.0 | -48.9 |
| 6 | 939.86 | -66.6 | -61.3 | 3.7 | -57.6 | -13.0 | -44.6 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

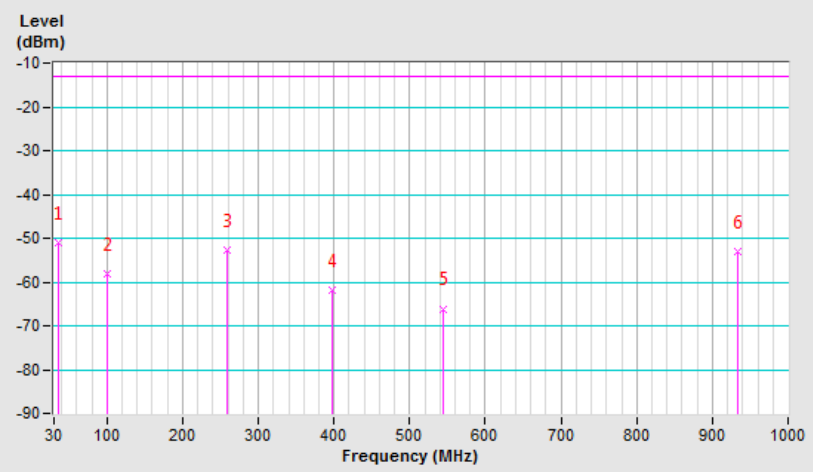


Channel Bandwidth: 20MHz

| Mode | TX channel 66536 (2120.0MHz) | Frequency Range | Below 1000 MHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 35.82 | -54.5 | -35.1 | -15.9 | -51.0 | -13.0 | -38.0 |
| 2 | 99.84 | -49.8 | -56.7 | -1.5 | -58.2 | -13.0 | -45.2 |
| 3 | 258.92 | -47.6 | -51.1 | -1.5 | -52.6 | -13.0 | -39.6 |
| 4 | 398.60 | -61.3 | -65.3 | 3.3 | -62.0 | -13.0 | -49.0 |
| 5 | 544.10 | -66.6 | -69.9 | 3.8 | -66.1 | -13.0 | -53.1 |
| 6 | 933.07 | -61.1 | -56.8 | 3.7 | -53.1 | -13.0 | -40.1 |

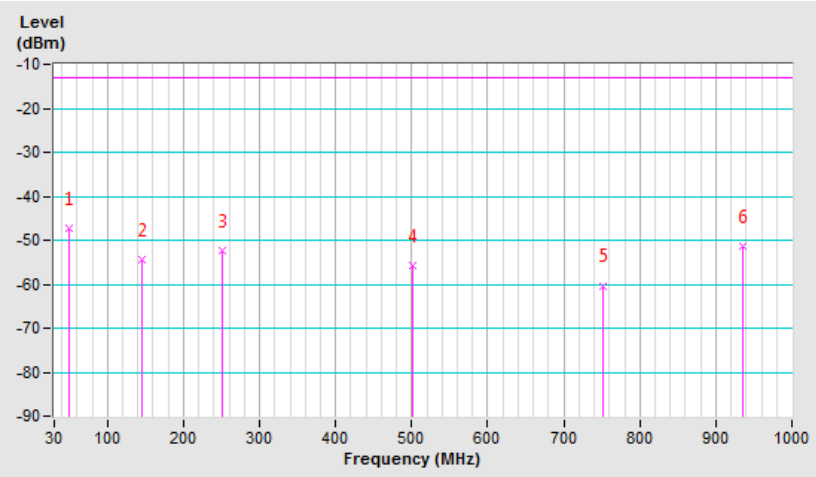
Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



| Mode | TX channel 66536 (2120.0MHz) | Frequency Range | Below 1000 MHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 50.37 | -39.8 | -39.3 | -7.9 | -47.2 | -13.0 | -34.2 |
| 2 | 145.43 | -52.4 | -51.3 | -3.1 | -54.4 | -13.0 | -41.4 |
| 3 | 250.19 | -52.3 | -51.0 | -1.3 | -52.3 | -13.0 | -39.3 |
| 4 | 500.45 | -55.6 | -59.5 | 3.8 | -55.7 | -13.0 | -42.7 |
| 5 | 750.71 | -67.3 | -64.0 | 3.7 | -60.3 | -13.0 | -47.3 |
| 6 | 935.01 | -60.3 | -55.1 | 3.7 | -51.4 | -13.0 | -38.4 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



Above 1GHz
LTE Band 66
**For NB-IOT In-band:**
Channel Bandwidth: 5MHz

| Mode | TX channel 66461 (2112.5MHz) | Frequency Range | 1GHz~26GHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4225.00 | -46.6 | -38.0 | 1.0 | -37.0 | -13.0 | -24.0 |
| 2 | 6337.50 | -53.2 | -37.3 | 0.6 | -36.7 | -13.0 | -23.7 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4225.00 | -43.7 | -34.0 | 1.0 | -33.0 | -13.0 | -20.0 |
| 2 | 6337.50 | -48.3 | -33.1 | 0.6 | -32.5 | -13.0 | -19.5 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| Mode | TX channel 66786 (2145.0MHz) | Frequency Range | 1GHz~26GHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -48.3 | -39.3 | 1.1 | -38.2 | -13.0 | -25.2 |
| 2 | 6435.00 | -52.6 | -36.6 | 0.5 | -36.1 | -13.0 | -23.1 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -44.7 | -35.3 | 1.1 | -34.2 | -13.0 | -21.2 |
| **2** | **6435.00** | **-48.2** | **-32.6** | **0.5** | **-32.1** | **-13.0** | **-19.1** |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| Mode | TX channel 67111 (2177.5MHz) | Frequency Range | 1GHz~26GHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4355.00 | -48.7 | -39.0 | 1.0 | -38.0 | -13.0 | -25.0 |
| 2 | 6532.50 | -52.9 | -36.9 | 0.5 | -36.4 | -13.0 | -23.4 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4355.00 | -44.3 | -35.0 | 1.0 | -34.0 | -13.0 | -21.0 |
| 2 | 6532.50 | -48.5 | -32.9 | 0.5 | -32.4 | -13.0 | -19.4 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

**For NB-IOT Guard Band:**
**QPSK_IoT Signal at Bottom**

Channel Bandwidth: 10MHz

| | | | |
|---|---|---|---|
| Mode | TX channel 66486 (2115.0MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4230.00 | -56.2 | -47.5 | 1.0 | -46.5 | -13.0 | -33.5 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4230.00 | -54.2 | -44.5 | 1.0 | -43.5 | -13.0 | -30.5 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| | | | |
|---|---|---|---|
| Mode | TX channel 66786 (2145.0MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -55.5 | -46.5 | 1.1 | -45.4 | -13.0 | -32.4 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -53.8 | -44.4 | 1.1 | -43.3 | -13.0 | -30.3 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| Mode | TX channel 67086 (2175.0MHz) | Frequency Range | 1GHz~26GHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4350.00 | -56.1 | -46.4 | 1.0 | -45.4 | -13.0 | -32.4 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4350.00 | -54.1 | -44.8 | 1.0 | -43.8 | -13.0 | -30.8 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Channel Bandwidth: 15MHz

| | | | |
|---|---|---|---|
| Mode | TX channel 66511 (2117.5MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4235.00 | -56.4 | -47.7 | 1.0 | -46.7 | -13.0 | -33.7 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4235.00 | -54.8 | -45.1 | 1.0 | -44.1 | -13.0 | -31.1 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| | | | |
|---|---|---|---|
| Mode | TX channel 66786 (2145.0MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -56.1 | -47.1 | 1.1 | -46.0 | -13.0 | -33.0 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -54.5 | -45.1 | 1.1 | -44.0 | -13.0 | -31.0 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| Mode | TX channel 67061 (2172.5MHz) | Frequency Range | 1GHz~26GHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4345.00 | -56.2 | -46.6 | 1.0 | -45.6 | -13.0 | -32.6 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4345.00 | -54.5 | -45.1 | 1.0 | -44.1 | -13.0 | -31.1 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Channel Bandwidth: 20MHz

| | | | |
|---|---|---|---|
| Mode | TX channel 66536 (2120.0MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4240.00 | -53.6 | -44.9 | 1.0 | -43.9 | -13.0 | -30.9 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4240.00 | -51.8 | -42.2 | 1.0 | -41.2 | -13.0 | -28.2 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| | | | |
|---|---|---|---|
| Mode | TX channel 66786 (2145.0MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -53.5 | -44.5 | 1.1 | -43.4 | -13.0 | -30.4 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -52.1 | -42.7 | 1.1 | -41.6 | -13.0 | -28.6 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| Mode | TX channel 67036 (2170.0MHz) | Frequency Range | 1GHz~26GHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4340.00 | -53.6 | -44.0 | 1.0 | -43.0 | -13.0 | -30.0 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4340.00 | -51.7 | -42.3 | 1.0 | -41.3 | -13.0 | -28.3 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

**QPSK_IoT Signal at Top**

Channel Bandwidth: 10MHz

| | | | |
|---|---|---|---|
| Mode | TX channel 66486 (2115.0MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4230.00 | -56.3 | -47.6 | 1.0 | -46.6 | -13.0 | -33.6 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4230.00 | -54.9 | -45.2 | 1.0 | -44.2 | -13.0 | -31.2 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| | | | |
|---|---|---|---|
| Mode | TX channel 66786 (2145.0MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -55.9 | -46.9 | 1.1 | -45.8 | -13.0 | -32.8 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -54.7 | -45.3 | 1.1 | -44.2 | -13.0 | -31.2 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| Mode | TX channel 67086 (2175.0MHz) | Frequency Range | 1GHz~26GHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4350.00 | -56.5 | -46.8 | 1.0 | -45.8 | -13.0 | -32.8 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4350.00 | -56.1 | -46.8 | 1.0 | -45.8 | -13.0 | -32.8 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Channel Bandwidth: 15MHz

| | | | |
|---|---|---|---|
| Mode | TX channel 66511 (2117.5MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4235.00 | -56.1 | -47.4 | 1.0 | -46.4 | -13.0 | -33.4 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4235.00 | -54.5 | -44.8 | 1.0 | -43.8 | -13.0 | -30.8 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| | | | |
|---|---|---|---|
| Mode | TX channel 66786 (2145.0MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -55.8 | -46.8 | 1.1 | -45.7 | -13.0 | -32.7 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -54.2 | -44.8 | 1.1 | -43.7 | -13.0 | -30.7 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| Mode | TX channel 67061 (2172.5MHz) | Frequency Range | 1GHz~26GHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4345.00 | -55.8 | -46.2 | 1.0 | -45.2 | -13.0 | -32.2 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4345.00 | -53.9 | -44.5 | 1.0 | -43.5 | -13.0 | -30.5 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Channel Bandwidth: 20MHz

| | | | |
|---|---|---|---|
| Mode | TX channel 66536 (2120.0MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4240.00 | -53.3 | -44.6 | 1.0 | -43.6 | -13.0 | -30.6 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4240.00 | -51.6 | -42.0 | 1.0 | -41.0 | -13.0 | -28.0 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| | | | |
|---|---|---|---|
| Mode | TX channel 66786 (2145.0MHz) | Frequency Range | 1GHz~26GHz |
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -53.3 | -44.3 | 1.1 | -43.2 | -13.0 | -30.2 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4290.00 | -51.8 | -42.4 | 1.1 | -41.3 | -13.0 | -28.3 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

| Mode | TX channel 67036 (2170.0MHz) | Frequency Range | 1GHz~26GHz |
|---|---|---|---|
| Environmental Conditions | 23deg. 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) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4340.00 | -53.4 | -43.8 | 1.0 | -42.8 | -13.0 | -29.8 |
| Antenna Polarity & Test Distance: Vertical at 3 M | | | | | | | |
| No. | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1 | 4340.00 | -51.4 | -42.0 | 1.0 | -41.0 | -13.0 | -28.0 |

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (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 accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following: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The address and road map of all our labs can be found in our web site also.

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