# RF TEST REPORT

| | |
|---|---|
| **Applicant** | Quectel Wireless Solutions Co., Ltd |
| **FCC ID** | XMR201910BG95M3 |
| **Product** | LTE Cat M1 & Cat NB2 & EGPRS Module |
| **Brand** | Quectel |
| **Model** | BG95-M3, BG95-M3 MINIPCIE |
| **Report No.** | R2108A0735-R6 |
| **Issue Date** | September 10, 2021 |

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2020)/ FCC CFR47 Part 27C (2020)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

| | |
|---|---|
| *Prepared by: Peng Tao* | *Approved by: Kai Xu* |


## TA Technology (Shanghai) Co., Ltd.

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# Summary of Measurement Results

| Number | Test Case | Clause in FCC rules | Verdict |
|---|---|---|---|
| 1 | RF power output | 2.1046 | PASS |
| 2 | Effective Isotropic Radiated power | 27.50(d)(4)/27.50(b)(10)/27.50(c)(10) | PASS |
| 3 | Occupied Bandwidth | 2.1049 | PASS |
| 4 | Band Edge Compliance | 27.53(h)/27.53(g) /27.53(f) /27.53(c) | PASS |
| 5 | Peak-to-Average Power Ratio | 27.50(d)/KDB971168 D01(5.7) | PASS |
| 6 | Frequency Stability | 2.1055 / 27.54 | PASS |
| 7 | Spurious Emissions at Antenna Terminals | 2.1051 /27.53(h) /27.53(g) /27.53(f) /27.53(c) | PASS |
| 8 | Radiates Spurious Emission | 2.1053 /27.53(h) /27.53(g) /27.53(f) /27.53(c) | PASS |
| Date of Testing: (Original) August 12, 2019~ September 5, 2019 and March 5, 2020 ~March 30, 2020 and June 6, 2020 ~ June 8, 2020<br>(Variant) August 23, 2021~ August 26, 2021 | | | |
| Date of Sample Received: (Variant) August 13, 2021 | | | |
| Note: PASS: The EUT complies with the essential requirements in the standard.<br>FAIL: The EUT does not comply with the essential requirements in the standard.<br>All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. | | | |

**BG95-M3, BG95-M3 MINIPCIE (Report No.: R2108A0735-R6) is a variant model of BG95-M3, BG95-M3 MINIPCIE (Report No.: R2006A0361-R6V1). There is only changed the Power Amplifier of product. Power of new variant is varied due to measurement uncertainty, and sample tolerance of the acceptance range for variant in this report. Test values partial duplicated from Original for variant. There is only tested Band Edge Compliance and Occupied Bandwidth. The detailed product change description please refers to the Difference Declaration Letter.**


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# 1 Test Laboratory

## 1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

## 1.2 Test facility

**FCC (Designation number: CN1179, Test Firm Registration Number: 446626)**

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

**A2LA (Certificate Number: 3857.01)**

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

## 1.3 Testing Location

| | |
|---|---|
| Company: | TA Technology (Shanghai) Co., Ltd. |
| Address: | No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China |
| City: | Shanghai |
| Post code: | 201201 |
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| Telephone: | +86-021-50791141/2/3 |
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| E-mail: | xukai@ta-shanghai.com |


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# 2 General Description of Equipment under Test

**Client Information**

| | |
|---|---|
| **Applicant** | Quectel Wireless Solutions Co., Ltd |
| **Applicant address** | Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233 |
| **Manufacturer** | Quectel Wireless Solutions Co., Ltd |
| **Manufacturer address** | Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233 |

**General information**

| **EUT Description** | | |
|---|---|---|
| Model | BG95-M3, BG95-M3 MINIPCIE | |
| IMEI | Original | 864475040001736 for BG95-M3<br>864475040484106 for BG95-M3 MINIPCIE |
| | Variant | 864475040989633 for BG95-M3<br>864200055095708 for BG95-M3 MINIPCIE |
| Hardware Version | R2.1 | |
| Software Version | BG95M3LAR02A03 | |
| Power Supply | External Power Supply | |
| Antenna Type | External Antenna | |
| Antenna Gain | NB-IoT 4: 1.9dBi<br>NB-IoT 12: 4dBi<br>NB-IoT 13: 4.5dBi<br>NB-IoT 66: 2dBi<br>NB-IoT 71: 3dBi<br>NB-IoT 85: 4dBi | |
| Test Mode(s) | NB-IoT Band 4/12/13/66/71/85 | |
| Test Modulation | BPSK, QPSK | |
| Category | NB2 | |
| Deployment | stand-alone | |
| Sub-carrier spacing | 3.75KHz, 15KHz | |
| Ntones | single-tone, multi-tone | |
| Maximum E.I.R.P. | NB-IoT 4: | 22.09dBm |
| | NB-IoT 66: | 22.08dBm |
| Maximum E.R.P. | NB-IoT 12: | 22.51dBm |
| | NB-IoT 13: | 22.97dBm |
| | NB-IoT 71: | 21.39dBm |
| | NB-IoT 85: | 22.70dBm |
| Rated Power Supply Voltage: | 3.8V | |


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| | | | |
|---|---|---|---|
| Extreme Voltage | Minimum: 3.3V Maximum: 4.3V | | |
| Extreme Temperature | Lowest: -40°C Highest: +85°C | | |
| Frequency Range(s) | Mode | Tx (MHz) | Rx (MHz) |
| | NB-IoT Band 4 | 1710 ~ 1755 | 2110 ~ 2155 |
| | NB-IoT Band 12 | 699 ~ 716 | 729 ~ 746 |
| | NB-IoT Band 13 | 777 ~ 787 | 746 ~ 756 |
| | NB-IoT Band 66 | 1710 ~ 1780 | 2110 ~ 2180 |
| | NB-IoT Band 71 | 663 ~ 698 | 617 ~ 652 |
| | NB-IoT Band 85 | 698 ~ 716 | 728 ~ 746 |
| Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.<br>2. The series model number is: BG95-M3 MINIPCIE. The difference of these models are have different marketing requirement. | | | |


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# 3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**Test standards:**

**FCC CFR47 Part 27C (2020)**

**ANSI C63.26 (2015)**

**Reference standard:**

**FCC CFR47 Part 2 (2020)**

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


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# 4 Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (X axis, horizontal polarization) and the worst case was recorded.

All modes as Subcarrier Spacing, modulations, Channel were investigated.
Subsequently, only the worst case emissions are reported.
The following testing in NB-IoT is set based on the maximum RF Output Power.
The following testing in different mode is set to detail in the following table:

Test modes are chosen to be reported as the worst case configuration below for NB-IoT Band 4/12/13/66/71/85:

| Test items | Deployment mode | Subcarrier Spacing (kHz) | | Modulation | | Test Channel | | |
|---|---|---|---|---|---|---|---|---|
| | Stand-alone | 3.75 | 15 | BPSK | QPSK | L | M | H |
| RF power output | O | O | O | O | O | O | O | O |
| Effective Isotropic Radiated power | O | O | O | O | O | O | O | O |
| Occupied Bandwidth | O | O | O | O | O | O | O | O |
| Band Edge Compliance | O | O | O | O | O | O | - | O |
| Peak-to-Average Power Ratio | O | O | O | O | O | - | O | - |
| Frequency Stability | O | O | O | O | O | O | O | O |
| Conducted Spurious Emissions | O | - | O | - | O | O | O | O |
| Radiates Spurious Emission | O | - | O | - | O | O | O | O |

Note
1. The mark “O” means that this configuration is chosen for testing.
2. The mark “-” means that this configuration is not testing.


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# 5 Test Case Results

## 5.1 RF Power Output

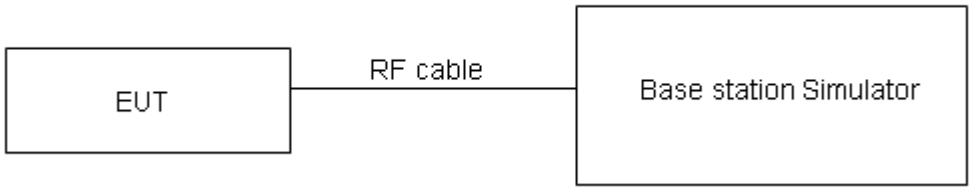
**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Methods of Measurement**

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

**Test Setup**




The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.

**Limits**

No specific RF power output requirements in part 2.1046.

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k$ = 2, $U$=0.4 dB.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**Test Results**

| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Conducted Power (dBm) for low/mid/high channel | | |
|---|---|---|---|---|---|---|
| | | | | 19952/1710.2 | 20175/1732.5 | 20398/1754.8 |
| NB-IoT Band 4 Standalone | BPSK | 3.75 | 1@0 | 20.18 | 20.19 | 20.19 |
| | | | 1@47 | 20.16 | 20.08 | 20.12 |
| | | 15 | 1@0 | 20.18 | 20.12 | 20.15 |
| | | | 1@11 | 20.13 | 20.11 | 20.11 |
| | QPSK | 3.75 | 1@0 | 20.14 | 20.14 | 20.14 |
| | | | 1@47 | 20.13 | 20.17 | 20.12 |
| | | 15 | 1@0 | 20.12 | 20.16 | 20.13 |
| | | | 1@11 | 20.15 | 20.15 | 20.19 |
| | | 15 | 12@0 | 18.97 | 18.69 | 18.97 |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Conducted Power (dBm) for low/mid/high channel | | |
| | | | | 23012/699.2 | 23095/707.5 | 23178/715.8 |
| NB-IoT Band 12 Standalone | BPSK | 3.75 | 1@0 | 20.65 | 20.61 | 20.66 |
| | | | 1@47 | 20.47 | 20.51 | 20.56 |
| | | 15 | 1@0 | 20.34 | 20.66 | 20.66 |
| | | | 1@11 | 20.26 | 20.64 | 20.54 |
| | QPSK | 3.75 | 1@0 | 20.47 | 20.52 | 20.53 |
| | | | 1@47 | 20.49 | 20.38 | 20.64 |
| | | 15 | 1@0 | 20.30 | 20.61 | 20.65 |
| | | | 1@11 | 20.29 | 20.63 | 20.66 |
| | | 15 | 12@0 | 19.03 | 18.95 | 19.35 |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Conducted Power (dBm) for low/mid/high channel | | |
| | | | | 23182/777.2 | 23230/782 | 23278/786.8 |
| NB-IoT Band 13 Standalone | BPSK | 3.75 | 1@0 | 20.34 | 20.61 | 20.51 |
| | | | 1@47 | 20.23 | 20.49 | 20.49 |
| | | 15 | 1@0 | 20.45 | 20.59 | 20.21 |
| | | | 1@11 | 20.41 | 20.56 | 20.14 |
| | QPSK | 3.75 | 1@0 | 20.35 | 20.44 | 20.62 |
| | | | 1@47 | 20.33 | 20.46 | 20.35 |
| | | 15 | 1@0 | 20.45 | 20.55 | 20.51 |
| | | | 1@11 | 20.43 | 20.54 | 20.54 |
| | | 15 | 12@0 | 19.42 | 19.52 | 19.45 |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Conducted Power (dBm) for low/mid/high channel | | |
| | | | | 131974/1710.2 | 132322/1745 | 132670/1779.8 |
| NB-IoT Band 66 Standalone | BPSK | 3.75 | 1@0 | 19.60 | 20.01 | 20.08 |
| | | | 1@47 | 19.61 | 19.98 | 20.07 |
| | | 15 | 1@0 | 19.62 | 20.08 | 20.01 |


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| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 1@11 | 19.57 | 20.01 | 19.99 |
| | QPSK | 3.75 | 1@0 | 19.53 | 19.95 | 20.03 |
| | | | 1@47 | 19.54 | 19.93 | 20.02 |
| | | 15 | 1@0 | 19.53 | 20.07 | 20.07 |
| | | | 1@11 | 19.57 | 20.06 | 20.06 |
| | | 15 | 12@0 | 18.75 | 18.86 | 18.88 |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Conducted Power (dBm) for low/mid/high channel | | |
| | | | | 133124/663.2 | 133297/680.5 | 133470/697.8 |
| NB-IoT Band 71 Standalone | BPSK | 3.75 | 1@0 | 20.44 | 20.33 | 20.54 |
| | | | 1@47 | 20.43 | 20.24 | 20.51 |
| | | 15 | 1@0 | 20.54 | 20.28 | 20.43 |
| | | | 1@11 | 20.53 | 20.27 | 20.47 |
| | QPSK | 3.75 | 1@0 | 20.49 | 20.20 | 20.52 |
| | | | 1@47 | 20.43 | 20.19 | 20.42 |
| | | 15 | 1@0 | 20.50 | 20.27 | 20.41 |
| | | | 1@11 | 20.54 | 20.28 | 20.54 |
| | | 15 | 12@0 | 19.45 | 19.10 | 19.08 |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Conducted Power (dBm) for low/mid/high channel | | |
| | | | | 134004/698.2 | 134092/707 | 134180/715.8 |
| NB-IoT Band 85 Standalone | BPSK | 3.75 | 1@0 | 20.24 | 20.71 | 20.38 |
| | | | 1@47 | 20.13 | 20.58 | 20.26 |
| | | 15 | 1@0 | 20.22 | 20.85 | 20.80 |
| | | | 1@11 | 20.20 | 20.84 | 20.82 |
| | QPSK | 3.75 | 1@0 | 20.17 | 20.81 | 20.34 |
| | | | 1@47 | 20.27 | 20.83 | 20.24 |
| | | 15 | 1@0 | 20.24 | 20.80 | 20.83 |
| | | | 1@11 | 20.16 | 20.79 | 20.84 |
| | | 15 | 12@0 | 18.36 | 18.99 | 18.89 |


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## 5.2 Effective Isotropic Radiated Power

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Methods of Measurement**

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI C63.26 (2015).

a) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.

b) Key the transmitter, then rotate the EUT 360° azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).

c) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.

d) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading.LOSS = Generator Output Power (dBm) – Analyzer reading (dBm)

e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation:ERP (dBm) = LVL (dBm) + LOSS (dB)

f) The maximum ERP is the maximum value determined in the preceding step.

g) When calculating ERP, in addition to knowing the antenna radiation and matching characteristics, it is necessary to know the loss values of all elements (e.g.transmission line attenuation, mismatches, filters, combiners) interposed between the point where transmitter output power is measured, and the point where power is applied to the antenna. ERP can then be calculated as follows:

EIRP (dBm) = Output Power (dBm) - Losses (dB) + Antenna Gain (dBi)

where:dBd refers to gain relative to an ideal dipole.

EIRP (dBm ) = ERP (dBm) + 2.15 (dB.)

The RB allocation refers to section 5.1, using the maximum output power configuration.


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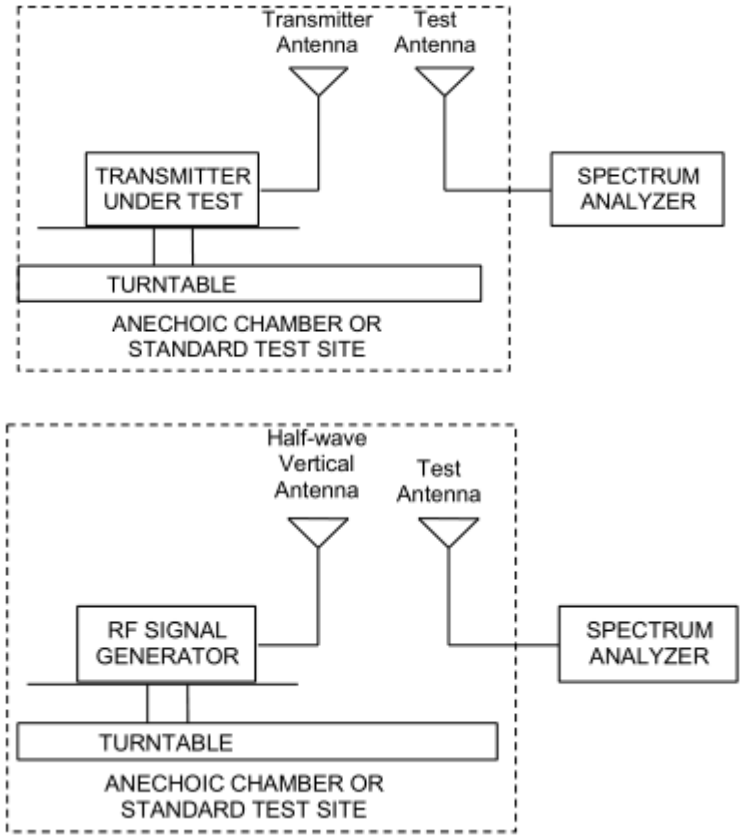
**Test setup**




Note: Area side:2.4mX3.6m

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.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**Limits**

Rule Part 27.50(b) (10) specifies that “Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP”

Rule Part 27.50(c) (10) specifies that “Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP”

Rule Part 27.50(d) (4) specifies that “Fixed, mobile and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”

| | |
|---|---|
| Part 27.50(b)(10)Limit | ≤ 3 W (34.77 dBm) |
| Part 27.50(c)(10)Limit | ≤ 3 W (34.77 dBm) |
| Part 27.50(d)(4)Limit | ≤ 1 W (30 dBm) |

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k$ = 2, $U$= 1.19 dB


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**Test Results**

The measurement is performed for both of horizontal and vertical antenna Polarization, and only the data of worst mode is recorded in this report.

| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | EIRP(dBm) | | | Limit (dBm) | Conclusion |
|---|---|---|---|---|---|---|---|---|
| | | | | 19952/1710.2 | 20175/1732.5 | 20398/1754.8 | | |
| NB-IoT Band 4 Standalone | BPSK | 3.75 | 1@0 | 22.08 | 22.09 | 22.09 | 30 | Pass |
| | | | 1@47 | 22.06 | 21.98 | 22.02 | 30 | Pass |
| | | 15 | 1@0 | 22.08 | 22.02 | 22.05 | 30 | Pass |
| | | | 1@11 | 22.03 | 22.01 | 22.01 | 30 | Pass |
| | QPSK | 3.75 | 1@0 | 22.04 | 22.04 | 22.04 | 30 | Pass |
| | | | 1@47 | 22.03 | 22.07 | 22.02 | 30 | Pass |
| | | 15 | 1@0 | 22.02 | 22.06 | 22.03 | 30 | Pass |
| | | | 1@11 | 22.05 | 22.05 | 22.09 | 30 | Pass |
| | | 15 | 12@0 | 20.87 | 20.59 | 20.87 | 30 | Pass |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | ERP(dBm) | | | Limit (dBm) | Conclusion |
| | | | | 23012/699.2 | 23095/707.5 | 23178/715.8 | | |
| NB-IoT Band 12 Standalone | BPSK | 3.75 | 1@0 | 22.50 | 22.46 | 22.51 | 34.77 | Pass |
| | | | 1@47 | 22.32 | 22.36 | 22.41 | 34.77 | Pass |
| | | 15 | 1@0 | 22.19 | 22.51 | 22.51 | 34.77 | Pass |
| | | | 1@11 | 22.11 | 22.49 | 22.39 | 34.77 | Pass |
| | QPSK | 3.75 | 1@0 | 22.32 | 22.37 | 22.38 | 34.77 | Pass |
| | | | 1@47 | 22.34 | 22.23 | 22.49 | 34.77 | Pass |
| | | 15 | 1@0 | 22.15 | 22.46 | 22.50 | 34.77 | Pass |
| | | | 1@11 | 22.14 | 22.48 | 22.51 | 34.77 | Pass |
| | | 15 | 12@0 | 20.88 | 20.80 | 21.20 | 34.77 | Pass |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | ERP (dBm) | | | Limit (dBm) | Conclusion |
| | | | | 23182/777.2 | 23230/782 | 23278/786.8 | | |
| NB-IoT Band 13 Standalone | BPSK | 3.75 | 1@0 | 22.69 | 22.96 | 22.86 | 34.77 | Pass |
| | | | 1@47 | 22.58 | 22.84 | 22.84 | 34.77 | Pass |
| | | 15 | 1@0 | 22.80 | 22.94 | 22.56 | 34.77 | Pass |
| | | | 1@11 | 22.76 | 22.91 | 22.49 | 34.77 | Pass |
| | QPSK | 3.75 | 1@0 | 22.70 | 22.79 | 22.97 | 34.77 | Pass |
| | | | 1@47 | 22.68 | 22.81 | 22.70 | 34.77 | Pass |
| | | 15 | 1@0 | 22.80 | 22.90 | 22.86 | 34.77 | Pass |
| | | | 1@11 | 22.78 | 22.89 | 22.89 | 34.77 | Pass |
| | | 15 | 12@0 | 21.77 | 21.87 | 21.80 | 34.77 | Pass |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | EIRP(dBm) | | | Limit (dBm) | Conclusion |
| | | | | 131974/1710.2 | 132322/1745 | 132670/1779.8 | | |


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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NB-IoT Band 66 Standalone | BPSK | 3.75 | 1@0 | 21.60 | 22.01 | 22.08 | 30 | Pass |
| | | | 1@47 | 21.61 | 21.98 | 22.07 | 30 | Pass |
| | | 15 | 1@0 | 21.62 | 22.08 | 22.01 | 30 | Pass |
| | | | 1@11 | 21.57 | 22.01 | 21.99 | 30 | Pass |
| | QPSK | 3.75 | 1@0 | 21.53 | 21.95 | 22.03 | 30 | Pass |
| | | | 1@47 | 21.54 | 21.93 | 22.02 | 30 | Pass |
| | | 15 | 1@0 | 21.53 | 22.07 | 22.07 | 30 | Pass |
| | | | 1@11 | 21.57 | 22.06 | 22.06 | 30 | Pass |
| | | 15 | 12@0 | 20.75 | 20.86 | 20.88 | 30 | Pass |

| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | ERP(dBm) | | | Limit (dBm) | Conclusion |
|---|---|---|---|---|---|---|---|---|
| | | | | 133124/663.2 | 133297/680.5 | 133470/697.8 | | |
| NB-IoT Band 71 Standalone | BPSK | 3.75 | 1@0 | 21.29 | 21.18 | 21.39 | 34.77 | Pass |
| | | | 1@47 | 21.28 | 21.09 | 21.36 | 34.77 | Pass |
| | | 15 | 1@0 | 21.39 | 21.13 | 21.28 | 34.77 | Pass |
| | | | 1@11 | 21.38 | 21.12 | 21.32 | 34.77 | Pass |
| | QPSK | 3.75 | 1@0 | 21.34 | 21.05 | 21.37 | 34.77 | Pass |
| | | | 1@47 | 21.28 | 21.04 | 21.27 | 34.77 | Pass |
| | | 15 | 1@0 | 21.35 | 21.12 | 21.26 | 34.77 | Pass |
| | | | 1@11 | 21.39 | 21.13 | 21.39 | 34.77 | Pass |
| | | 15 | 12@0 | 20.30 | 19.95 | 19.93 | 34.77 | Pass |

| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | ERP(dBm) | | | Limit (dBm) | Conclusion |
|---|---|---|---|---|---|---|---|---|
| | | | | 134004/698.2 | 134092/707 | 134180/715.8 | | |
| NB-IoT Band 85 Standalone | BPSK | 3.75 | 1@0 | 22.09 | 22.56 | 22.23 | 34.77 | Pass |
| | | | 1@47 | 21.98 | 22.43 | 22.11 | 34.77 | Pass |
| | | 15 | 1@0 | 22.07 | 22.70 | 22.65 | 34.77 | Pass |
| | | | 1@11 | 22.05 | 22.69 | 22.67 | 34.77 | Pass |
| | QPSK | 3.75 | 1@0 | 22.02 | 22.66 | 22.19 | 34.77 | Pass |
| | | | 1@47 | 22.12 | 22.68 | 22.09 | 34.77 | Pass |
| | | 15 | 1@0 | 22.09 | 22.65 | 22.68 | 34.77 | Pass |
| | | | 1@11 | 22.01 | 22.64 | 22.69 | 34.77 | Pass |
| | | 15 | 12@0 | 20.21 | 20.84 | 20.74 | 34.77 | Pass |

Note: 1. EIRP= E.R.P+2.15


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## 5.3 Occupied Bandwidth

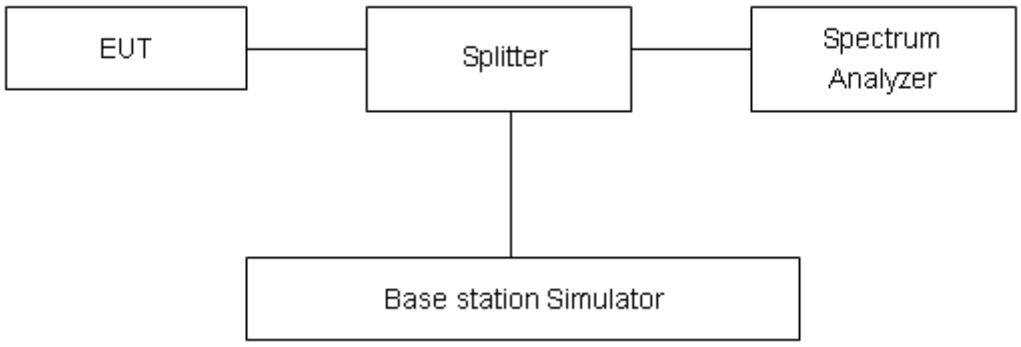
**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.
RBW is set to 2kHz, VBW is set to 6.2kHz for NB-IoT Band 4/12/13/66/71/85.
99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

**Test Setup**




**Limits**

No specific occupied bandwidth requirements in part 2.1049.

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k$ = 2, $U$=624Hz.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**Test Result**

| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Bandwidth(KHz) for low/mid/high channel | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 19952/1710.2 | | 20175/1732.5 | | 20398/1754.8 | |
| | | | | 99% Power | -26dBc | 99% Power | -26dBc | 99% Power | -26dBc |
| NB-IoT Band 4 Standalone | BPSK | 3.75 | 1@0 | 60.27 | 41.26 | 58.50 | 41.14 | 59.65 | 41.38 |
| | QPSK | 3.75 | 1@0 | 66.35 | 40.25 | 67.24 | 40.25 | 66.79 | 42.40 |
| | BPSK | 15 | 1@0 | 127.40 | 112.50 | 118.69 | 102.40 | 127.09 | 115.60 |
| | QPSK | 15 | 1@0 | 115.60 | 116.30 | 114.90 | 114.20 | 118.37 | 113.30 |
| | QPSK | 15 | 12@0 | 183.21 | 261.50 | 183.46 | 241.90 | 184.34 | 242.80 |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Bandwidth(KHz) for low/mid/high channel | | | | | |
| | | | | 23012/699.2 | | 23095/707.5 | | 23178/715.8 | |
| | | | | 99% Power | -26dBc | 99% Power | -26dBc | 99% Power | -26dBc |
| NB-IoT Band 12 Standalone | BPSK | 3.75 | 1@0 | 57.75 | 41.11 | 57.55 | 41.20 | 57.75 | 41.50 |
| | QPSK | 3.75 | 1@0 | 68.69 | 40.35 | 68.71 | 39.59 | 68.13 | 39.80 |
| | BPSK | 15 | 1@0 | 125.13 | 115.80 | 119.54 | 104.40 | 129.62 | 118.70 |
| | QPSK | 15 | 1@0 | 121.44 | 130.30 | 120.25 | 103.80 | 123.74 | 116.50 |
| | QPSK | 15 | 12@0 | 185.10 | 252.20 | 186.75 | 246.20 | 184.10 | 247.00 |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Bandwidth(KHz) for low/mid/high channel | | | | | |
| | | | | 23182/777.2 | | 23230/782 | | 23278/786.8 | |
| | | | | 99% Power | -26dBc | 99% Power | -26dBc | 99% Power | -26dBc |
| NB-IoT Band 13 Standalone | BPSK | 3.75 | 1@0 | 57.17 | 41.30 | 58.55 | 41.68 | 57.59 | 41.17 |
| | QPSK | 3.75 | 1@0 | 66.36 | 39.23 | 67.57 | 40.66 | 66.11 | 40.03 |
| | BPSK | 15 | 1@0 | 128.61 | 112.60 | 129.71 | 117.40 | 124.80 | 103.20 |
| | QPSK | 15 | 1@0 | 115.91 | 116.10 | 118.58 | 116.10 | 117.80 | 116.60 |
| | QPSK | 15 | 12@0 | 186.97 | 250.50 | 184.12 | 244.60 | 183.28 | 256.30 |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Bandwidth(KHz) for low/mid/high channel | | | | | |
| | | | | 131974/1710.2 | | 132322/1745 | | 132670/1779.8 | |
| | | | | 99% Power | -26dBc | 99% Power | -26dBc | 99% Power | -26dBc |
| NB-IoT Band 66 Standalone | BPSK | 3.75 | 1@0 | 59.90 | 41.21 | 61.14 | 41.31 | 60.44 | 40.69 |
| | QPSK | 3.75 | 1@0 | 67.40 | 40.32 | 67.40 | 39.94 | 68.21 | 39.82 |
| | BPSK | 15 | 1@0 | 118.87 | 101.20 | 126.80 | 104.00 | 123.19 | 115.00 |
| | QPSK | 15 | 1@0 | 117.91 | 115.90 | 116.60 | 115.00 | 118.12 | 118.50 |
| | QPSK | 15 | 12@0 | 185.31 | 238.10 | 183.21 | 258.10 | 184.37 | 257.90 |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Bandwidth(KHz) for low/mid/high channel | | | | | |
| | | | | 133124/663.2 | | 133297/680.5 | | 133470/697.8 | |
| | | | | 99% Power | -26dBc | 99% Power | -26dBc | 99% Power | -26dBc |


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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NB-IoT Band 71 Standalone | BPSK | 3.75 | 1@0 | 58.01 | 41.31 | 57.01 | 41.59 | 62.80 | 43.27 |
| | QPSK | 3.75 | 1@0 | 69.85 | 42.44 | 70.03 | 40.73 | 66.71 | 39.76 |
| | BPSK | 15 | 1@0 | 133.50 | 119.50 | 113.82 | 104.70 | 123.36 | 103.80 |
| | QPSK | 15 | 1@0 | 133.31 | 128.70 | 128.82 | 130.10 | 128.44 | 131.00 |
| | QPSK | 15 | 12@0 | 187.82 | 258.40 | 184.01 | 264.90 | 186.96 | 139.40 |
| Mode | Modulation | Sub-carrier spacing (KHz) | Ntones | Bandwidth(KHz) for low/mid/high channel | | | | | |
| | | | | 134004/698.2 | | 134092/707 | | 134180/715.8 | |
| | | | | 99% Power | -26dBc | 99% Power | -26dBc | 99% Power | -26dBc |
| NB-IoT Band 85 Standalone | BPSK | 3.75 | 1@0 | 58.11 | 41.35 | 57.76 | 40.96 | 56.72 | 41.41 |
| | QPSK | 3.75 | 1@0 | 71.52 | 43.05 | 69.95 | 39.36 | 71.27 | 43.59 |
| | BPSK | 15 | 1@0 | 127.72 | 118.40 | 132.97 | 117.60 | 118.08 | 103.20 |
| | QPSK | 15 | 1@0 | 120.66 | 130.70 | 120.30 | 103.70 | 125.72 | 117.00 |
| | QPSK | 15 | 12@0 | 187.12 | 257.80 | 183.77 | 238.80 | 186.21 | 237.50 |


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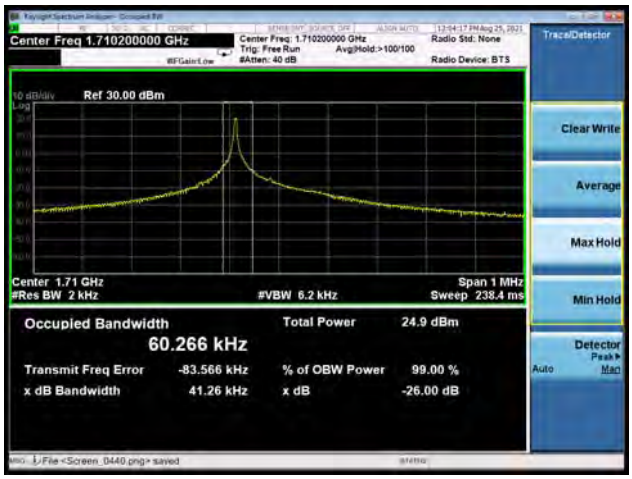
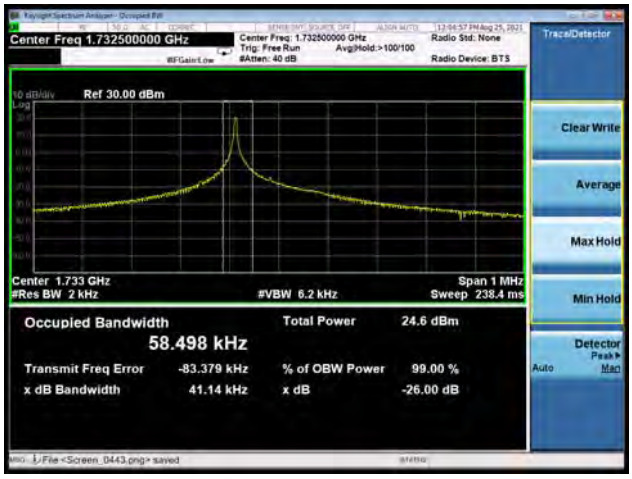
NB-IoT Band 4 BPSK 3.75kHz 1@0 CH-Low



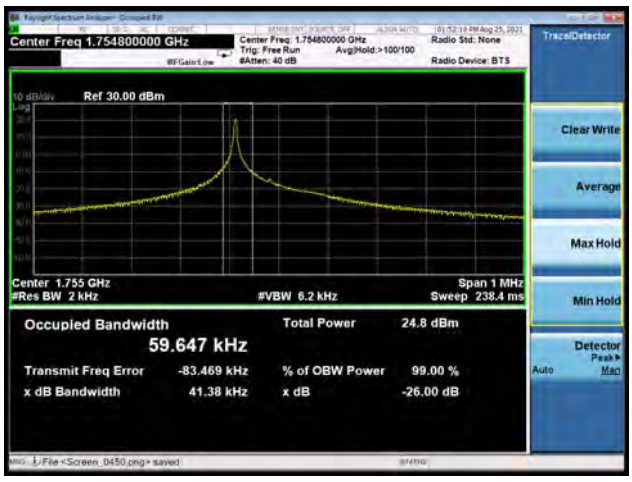

NB-IoT Band 4 BPSK 15kHz 1@0 CH-Low

NB-IoT Band 4 BPSK 3.75kHz 1@0 CH-Middle




NB-IoT Band 4 BPSK 15kHz 1@0 CH-Middle

NB-IoT Band 4 BPSK 3.75kHz 1@0 CH-High




NB-IoT Band 4 BPSK 15kHz 1@0 CH-High

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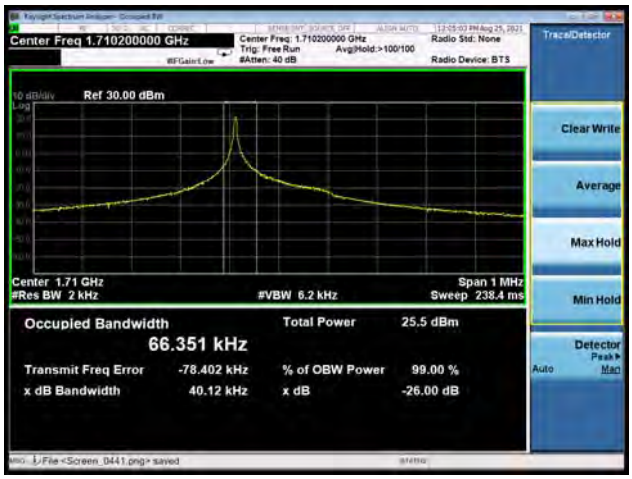
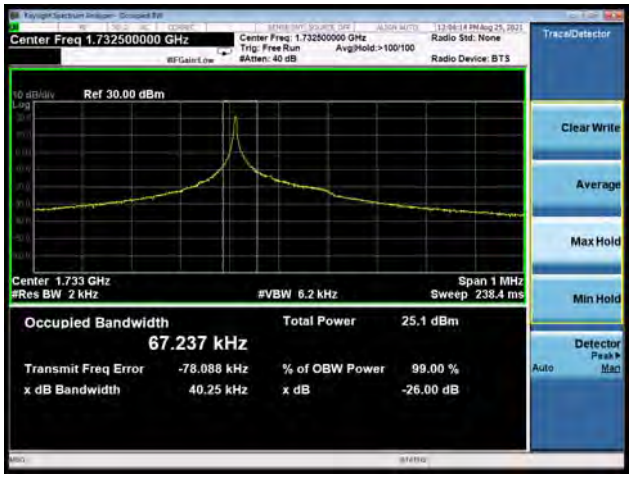
NB-IoT Band 4 QPSK 3.75kHz 1@0 CH-Low



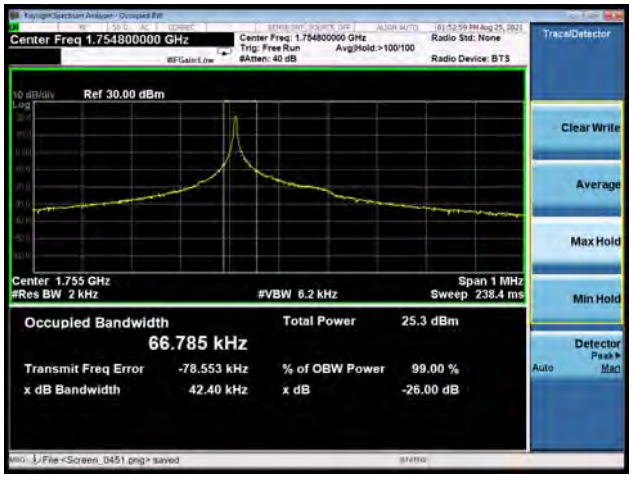

NB-IoT Band 4 QPSK 15kHz 1@0 CH-Low

NB-IoT Band 4 QPSK 3.75kHz 1@0 CH-Middle




NB-IoT Band 4 QPSK 15kHz 1@0 CH-Middle

NB-IoT Band 4 QPSK 3.75kHz 1@0 CH-High




NB-IoT Band 4 QPSK 15kHz 1@0 CH-High

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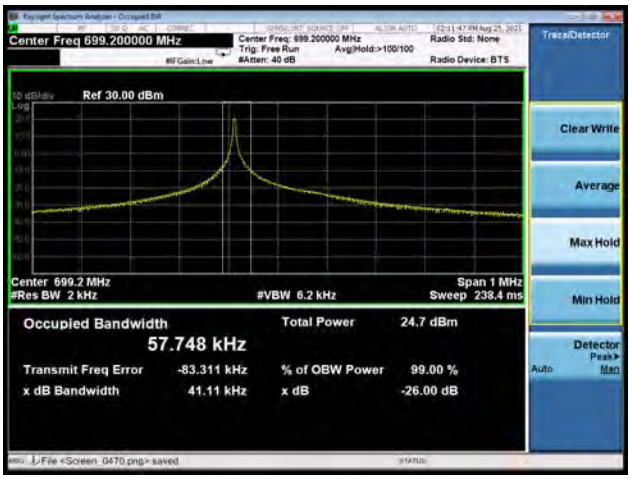
NB-IoT Band 4 QPSK 15kHz 12@0 CH-Low

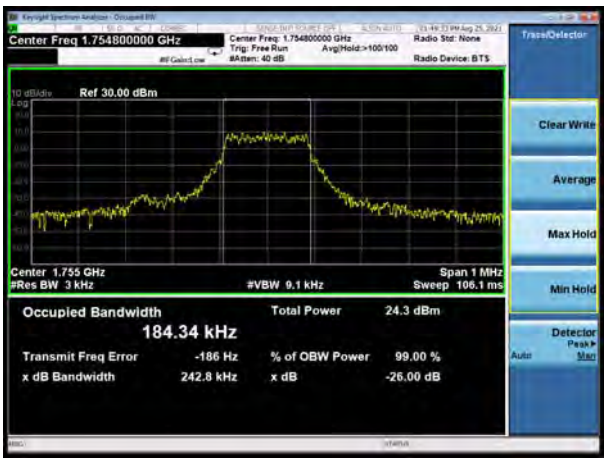
NB-IoT Band 12 BPSK 3.75kHz 1@0 CH-Low



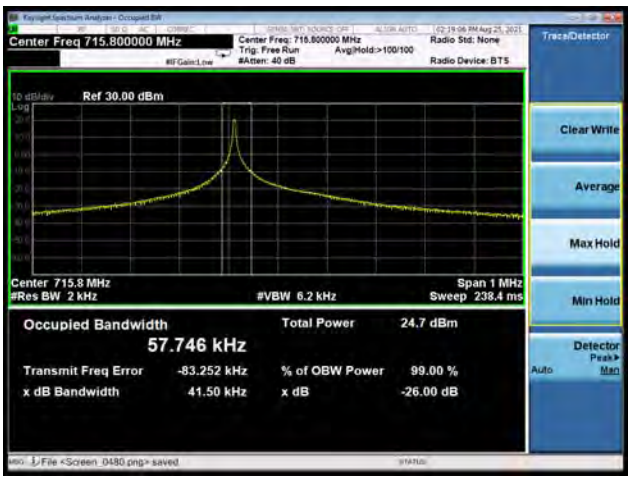

NB-IoT Band 4 QPSK 15kHz 12@0 CH-Middle

NB-IoT Band 12 BPSK 3.75kHz 1@0 CH-Middle

NB-IoT Band 4 QPSK 15kHz 12@0 CH-High




NB-IoT Band 12 BPSK 3.75kHz 1@0 CH-High





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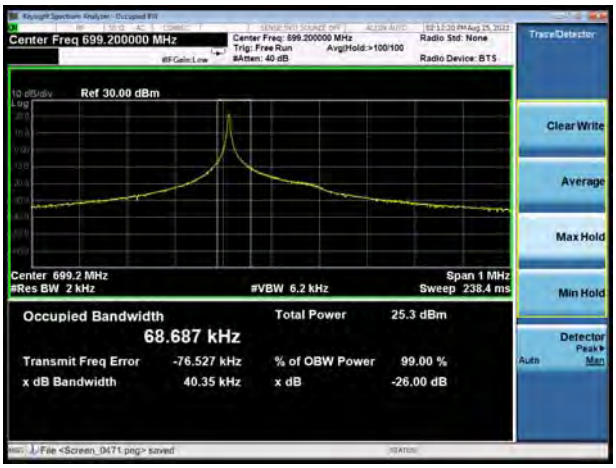
NB-IoT Band 12 BPSK 15kHz 1@0 CH-Low

NB-IoT Band 12 QPSK 3.75kHz 1@0 CH-Low

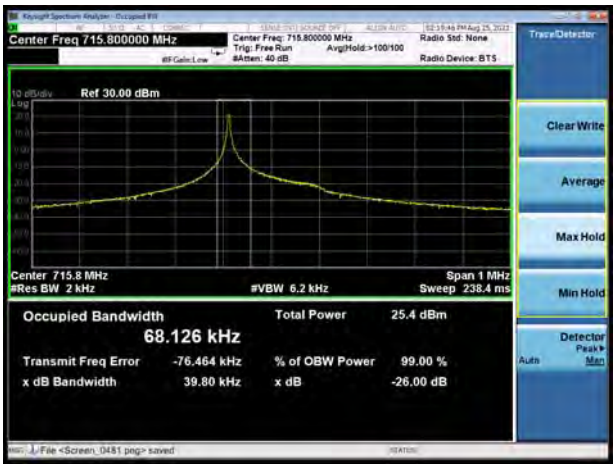



NB-IoT Band 12 BPSK 15kHz 1@0 CH-Middle

NB-IoT Band 12 QPSK 3.75kHz 1@0 CH-Middle

NB-IoT Band 12 BPSK 15kHz 1@0 CH-High

NB-IoT Band 12 QPSK 3.75kHz 1@0 CH-High





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NB-IoT Band 12 QPSK 15kHz 1@0 CH-Low

NB-IoT Band 12 QPSK 15kHz 12@0 CH-Low

NB-IoT Band 12 QPSK 15kHz 1@0 CH-Middle

NB-IoT Band 12 QPSK 15kHz 12@0 CH-Middle

NB-IoT Band 12 QPSK 15kHz 1@0 CH-High

NB-IoT Band 12 QPSK 15kHz 12@0 CH-High

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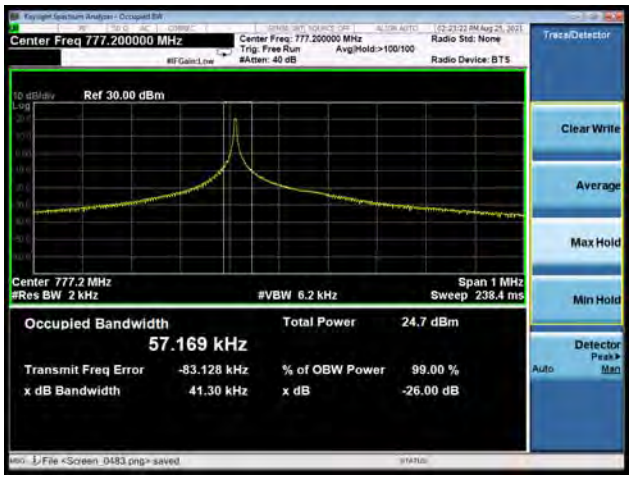
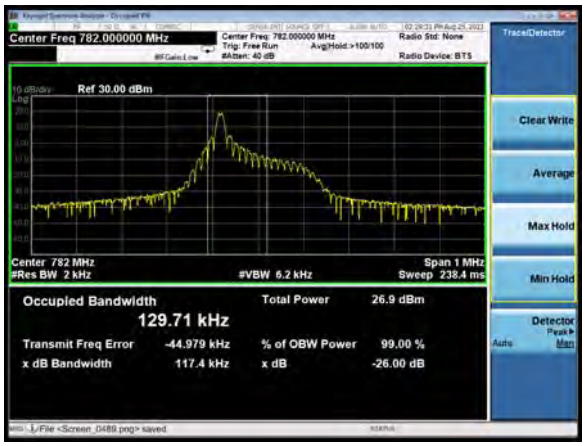
NB-IoT Band 13 BPSK 3.75kHz 1@0 CH-Low



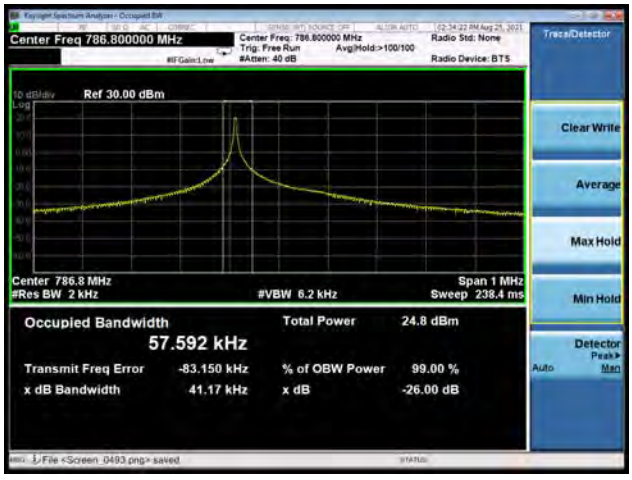

NB-IoT Band 13 BPSK 15kHz 1@0 CH-Low

NB-IoT Band 13 BPSK 3.75kHz 1@0 CH-Middle

NB-IoT Band 13 BPSK 15kHz 1@0 CH-Middle




NB-IoT Band 13 BPSK 3.75kHz 1@0 CH-High




NB-IoT Band 13 BPSK 15kHz 1@0 CH-High

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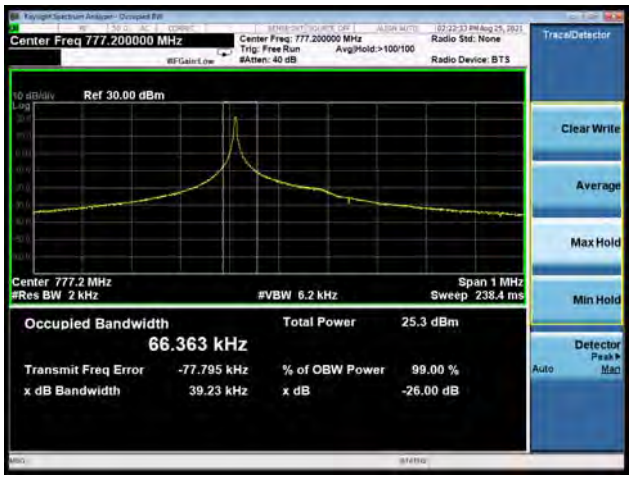
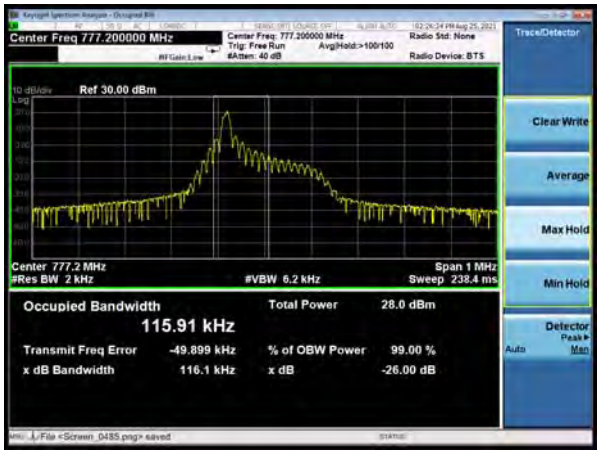
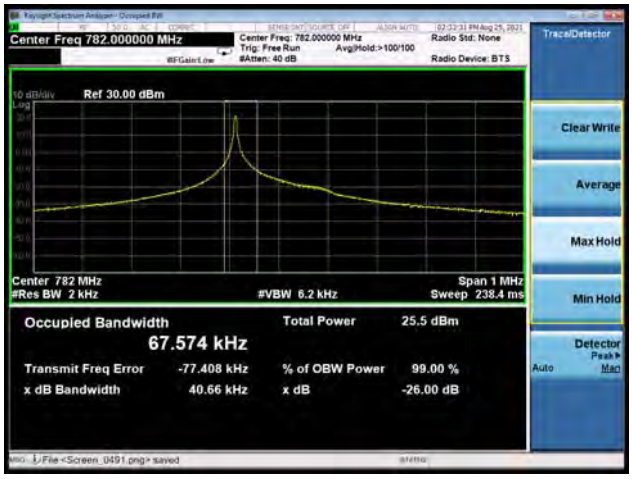
NB-IoT Band 13 QPSK 3.75kHz 1@0 CH-Low




NB-IoT Band 13 QPSK 15kHz 1@0 CH-Low

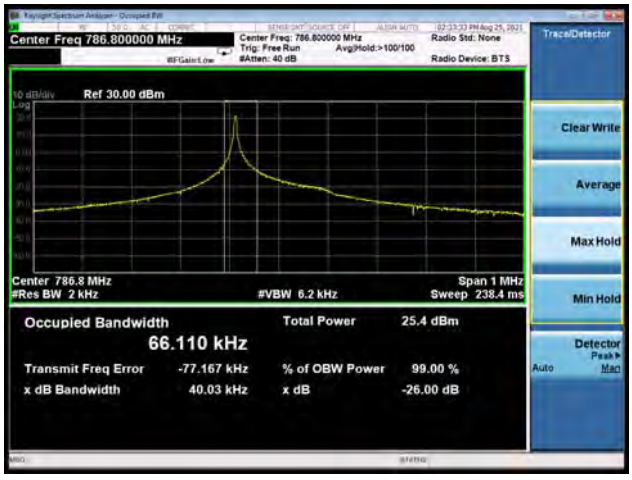



NB-IoT Band 13 QPSK 3.75kHz 1@0 CH-Middle




NB-IoT Band 13 QPSK 15kHz 1@0 CH-Middle

NB-IoT Band 13 QPSK 3.75kHz 1@0 CH-High




NB-IoT Band 13 QPSK 15kHz 1@0 CH-High

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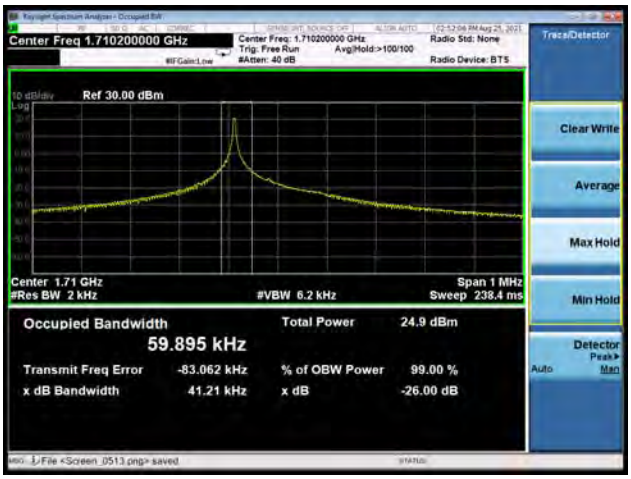
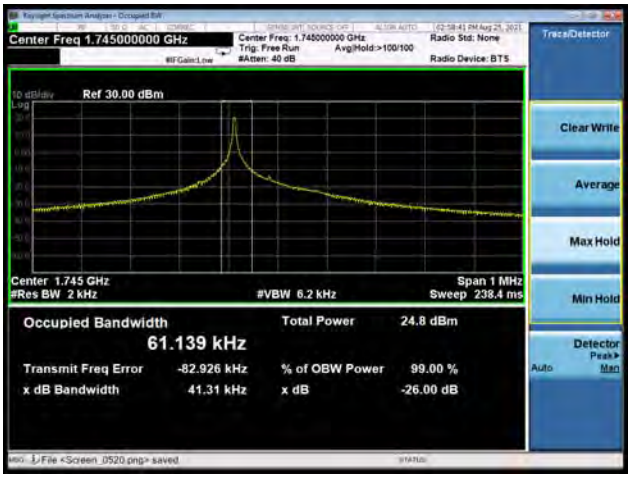
NB-IoT Band 13 QPSK 15kHz 12@0 CH-Low

NB-IoT Band 66 BPSK 3.75kHz 1@0 CH-Low

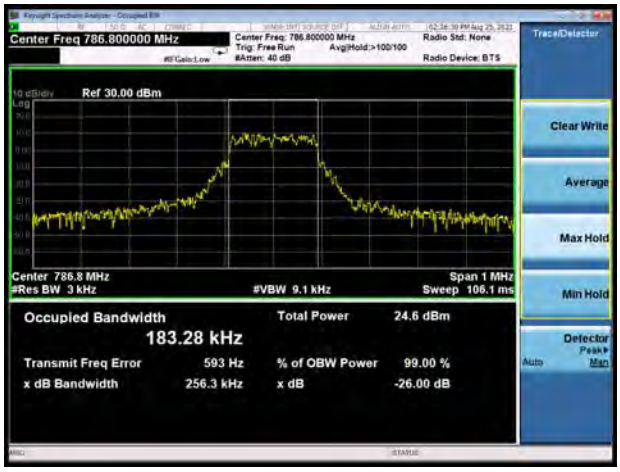



NB-IoT Band 13 QPSK 15kHz 12@0 CH-Middle

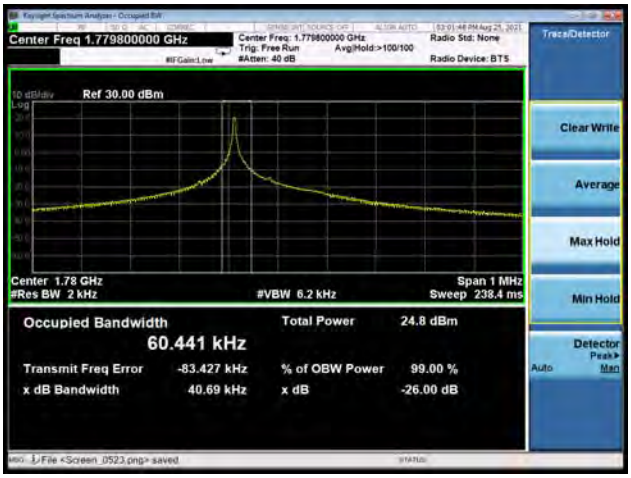
NB-IoT Band 66 BPSK 3.75kHz 1@0 CH-Middle




NB-IoT Band 13 QPSK 15kHz 12@0 CH-High




NB-IoT Band 66 BPSK 3.75kHz 1@0 CH-High





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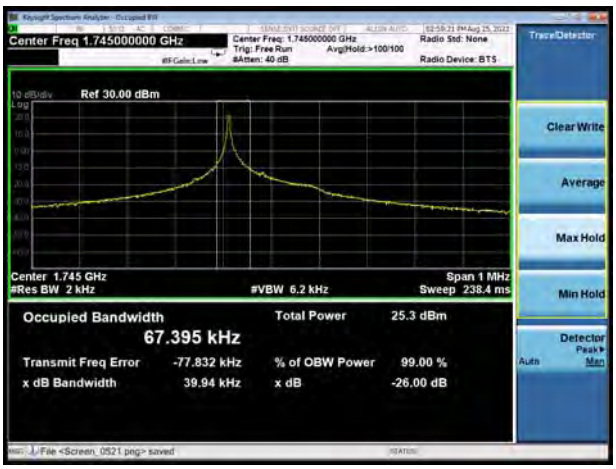
NB-IoT Band 66 BPSK 15kHz 1@0 CH-Low

NB-IoT Band 66 QPSK 3.75kHz 1@0 CH-Low

NB-IoT Band 66 BPSK 15kHz 1@0 CH-Middle

NB-IoT Band 66 QPSK 3.75kHz 1@0 CH-Middle




NB-IoT Band 66 BPSK 15kHz 1@0 CH-High

NB-IoT Band 66 QPSK 3.75kHz 1@0 CH-High

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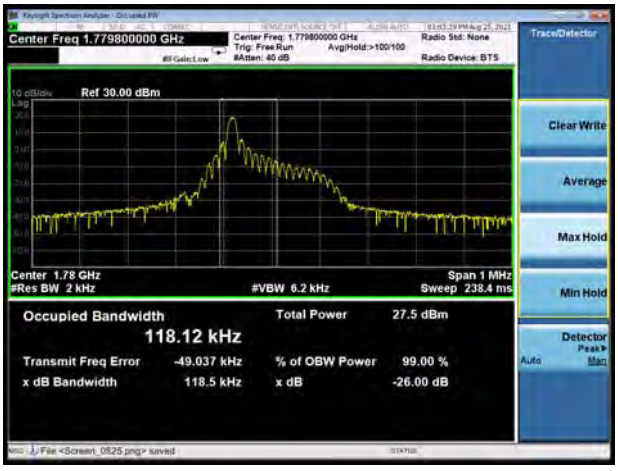
NB-IoT Band 66 QPSK 15kHz 1@0 CH-Low

NB-IoT Band 66 QPSK 15kHz 12@0 CH-Low

NB-IoT Band 66 QPSK 15kHz 1@0 CH-Middle

NB-IoT Band 66 QPSK 15kHz 12@0 CH-Middle

NB-IoT Band 66 QPSK 15kHz 1@0 CH-High




NB-IoT Band 66 QPSK 15kHz 12@0 CH-High

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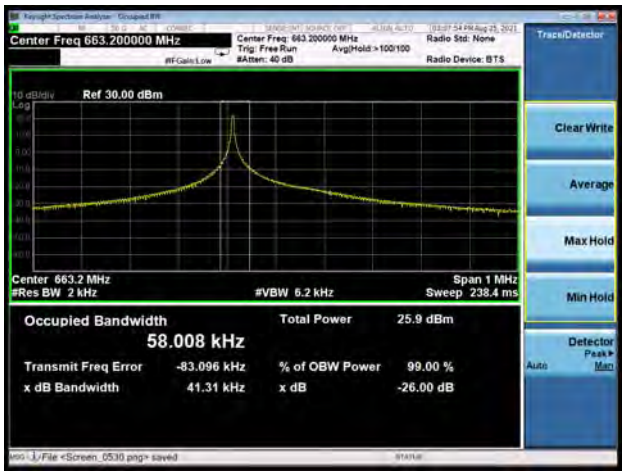
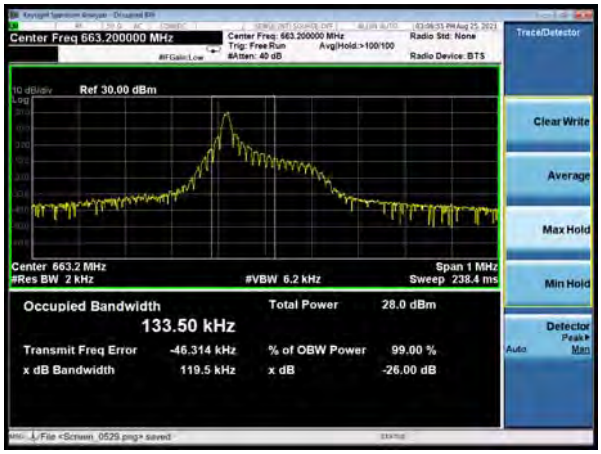
NB-IoT Band 71 BPSK 3.75kHz 1@0 CH-Low

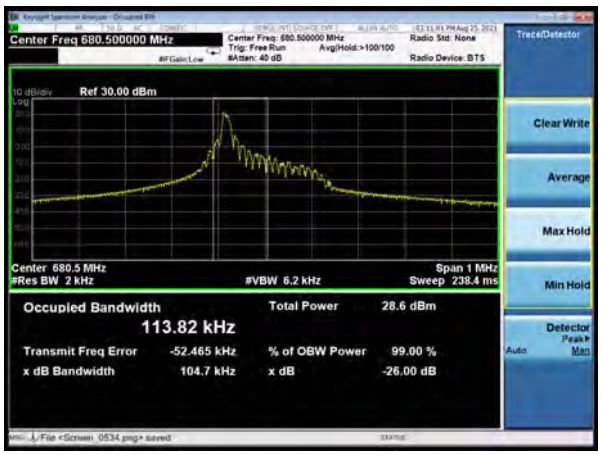



NB-IoT Band 71 BPSK 15kHz 1@0 CH-Low

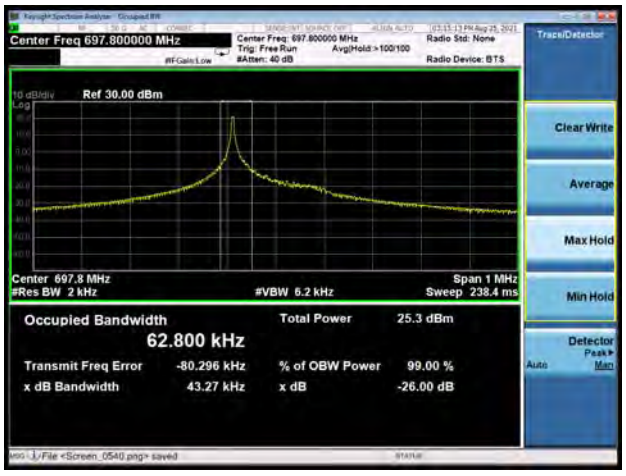



NB-IoT Band 71 BPSK 3.75kHz 1@0 CH-Middle

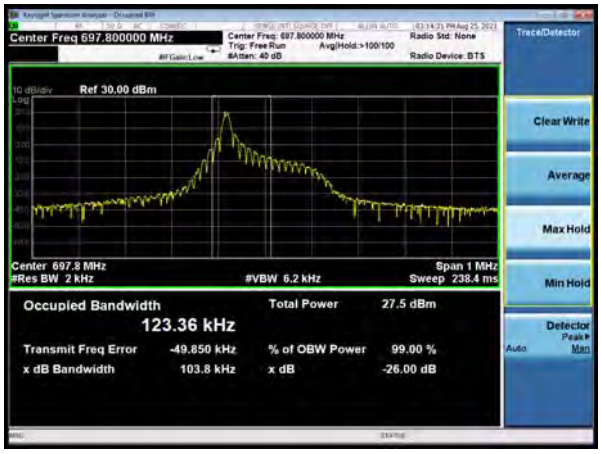
NB-IoT Band 71 BPSK 15kHz 1@0 CH-Middle




NB-IoT Band 71 BPSK 3.75kHz 1@0 CH-High




NB-IoT Band 71 BPSK 15kHz 1@0 CH-High





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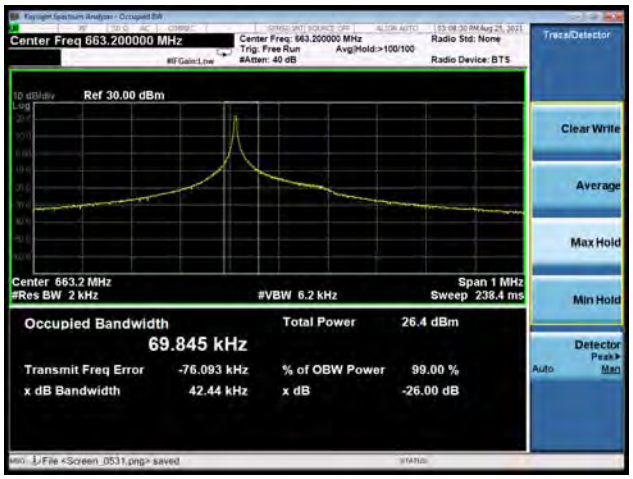
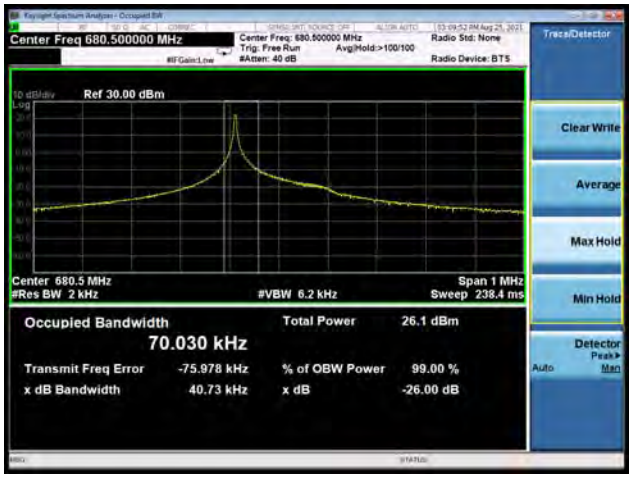
NB-IoT Band 71 QPSK 3.75kHz 1@0 CH-Low

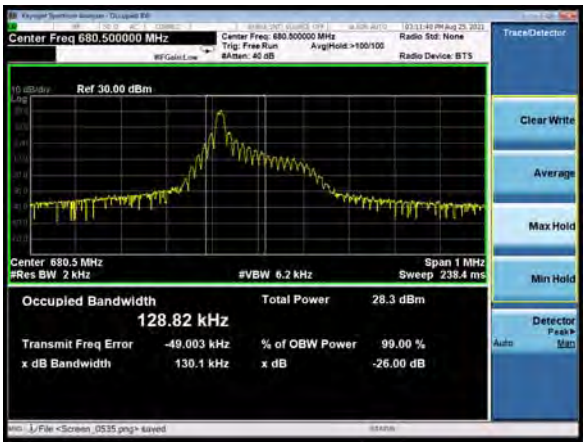



NB-IoT Band 71 QPSK 15kHz 1@0 CH-Low

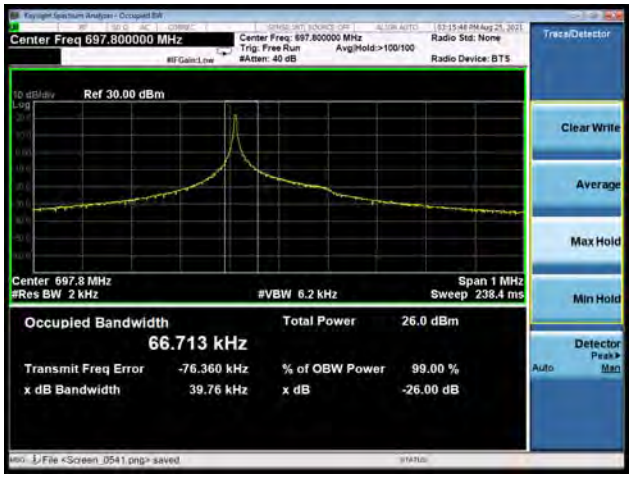
NB-IoT Band 71 QPSK 3.75kHz 1@0 CH-Middle




NB-IoT Band 71 QPSK 15kHz 1@0 CH-Middle




NB-IoT Band 71 QPSK 3.75kHz 1@0 CH-High




NB-IoT Band 71 QPSK 15kHz 1@0 CH-High

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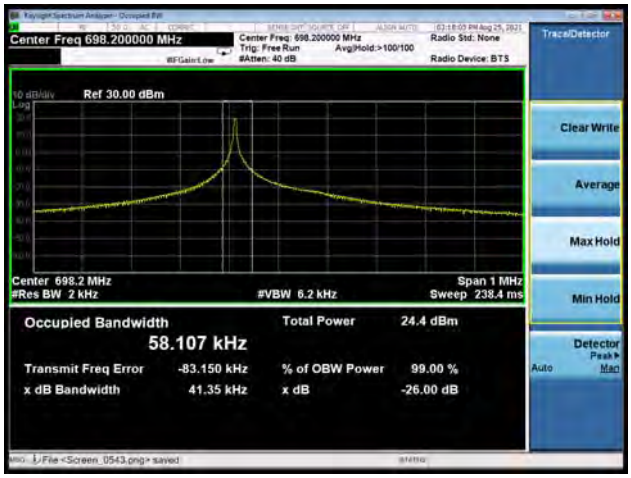
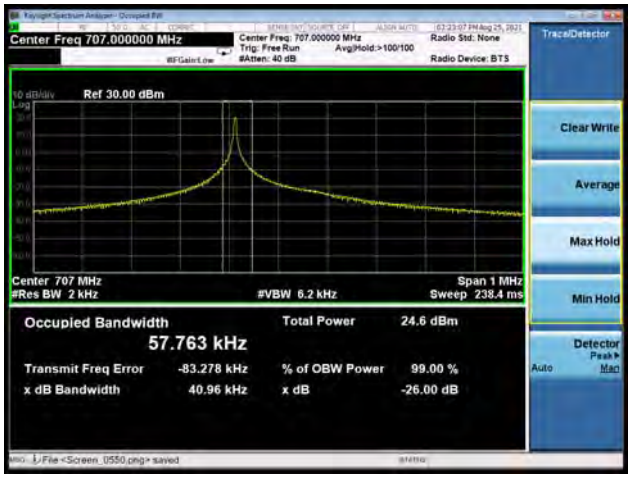
NB-IoT Band 71 QPSK 15kHz 12@0 CH-Low

NB-IoT Band 85 BPSK 3.75kHz 1@0 CH-Low

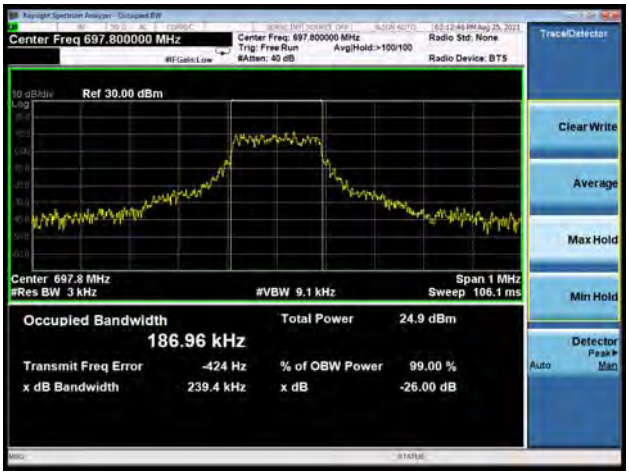



NB-IoT Band 71 QPSK 15kHz 12@0 CH-Middle

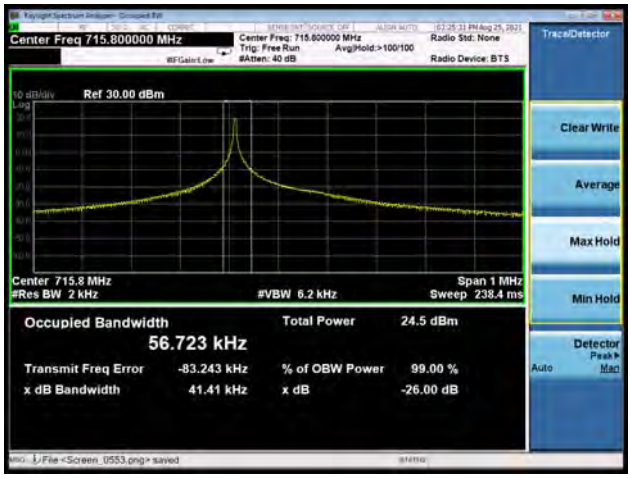
NB-IoT Band 85 BPSK 3.75kHz 1@0 CH-Middle




NB-IoT Band 71 QPSK 15kHz 12@0 CH-High




NB-IoT Band 85 BPSK 3.75kHz 1@0 CH-High





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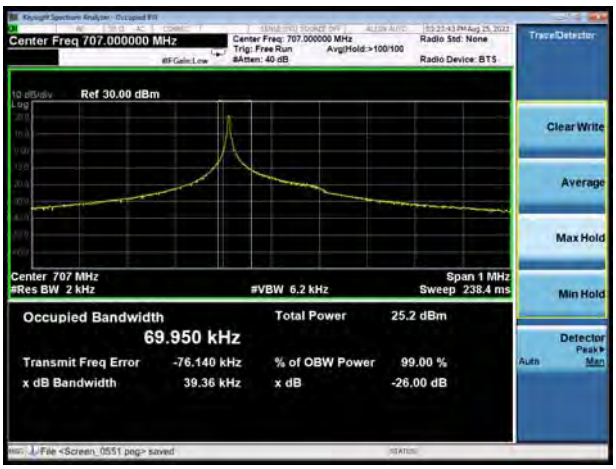
NB-IoT Band 85 BPSK 15kHz 1@0 CH-Low

NB-IoT Band 85 QPSK 3.75kHz 1@0 CH-Low

NB-IoT Band 85 BPSK 15kHz 1@0 CH-Middle

NB-IoT Band 85 QPSK 3.75kHz 1@0 CH-Middle




NB-IoT Band 85 BPSK 15kHz 1@0 CH-High

NB-IoT Band 85 QPSK 3.75kHz 1@0 CH-High

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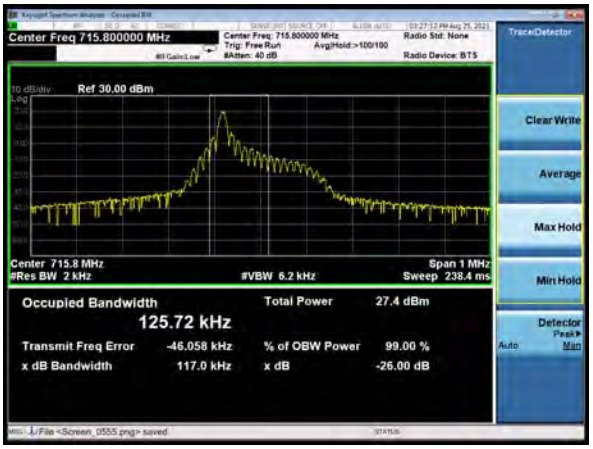
NB-IoT Band 85 QPSK 15kHz 1@0 CH-Low

NB-IoT Band 85 QPSK 15kHz 12@0 CH-Low

NB-IoT Band 85 QPSK 15kHz 1@0 CH-Middle

NB-IoT Band 85 QPSK 15kHz 12@0 CH-Middle

NB-IoT Band 85 QPSK 15kHz 1@0 CH-High




NB-IoT Band 85 QPSK 15kHz 12@0 CH-High

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## 5.4 Band Edge Compliance

**Ambient condition**

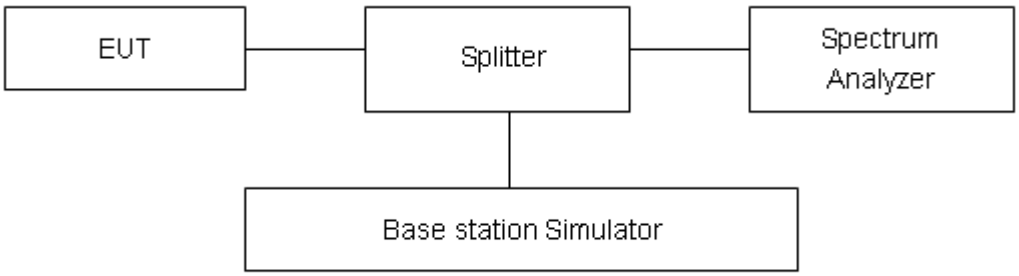
| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured.
The testing follows KDB 971168 D01 v03r01 Section 6.0
The EUT was connected to spectrum analyzer and system simulator via a power divider.
The band edges of low and high channels for the highest RF powers were measured.
RBW is set to 750Hz, VBW is set to 2.4kHz for NB-IoT Band 4/66 with 3.75KHz single carrier,
RBW is set to 1.3kHz, VBW is set to 3.9kHz for NB-IoT Band 4/66 with 15KHz single carrier,
RBW is set to 2kHz, VBW is set to 6.2KHz for NB-IoT Band 4/66 with 15KHz full carrier.
RBW is set to 30kHz, VBW is set to 100kHz for NB-IoT Band 12/13/71/85.

Set spectrum analyzer with RMS detector.
The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
Checked that all the results comply with the emission limit line.

**Test Setup**




**Limits**

Rule Part 27.53(h) specifies that " 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 $\log_{10}$ (P) dB"

Rule Part 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any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emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Rule Part 27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Rule Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;
(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k$ = 1.96, $U$=0.684dB.


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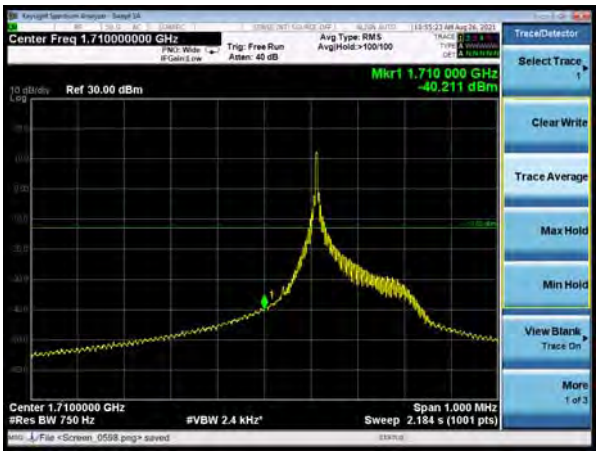
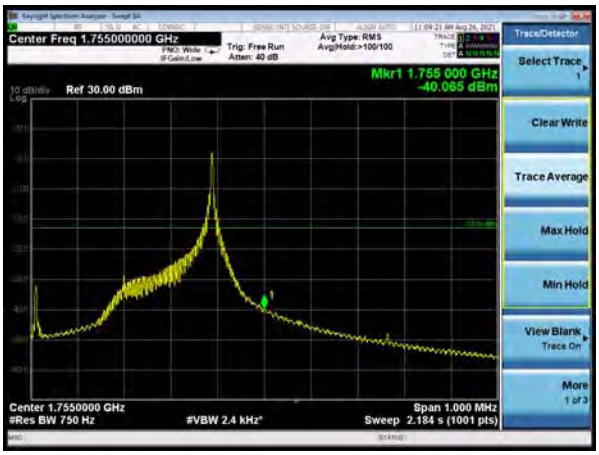
## Test Result

All the test traces in the plots shows the test results clearly.

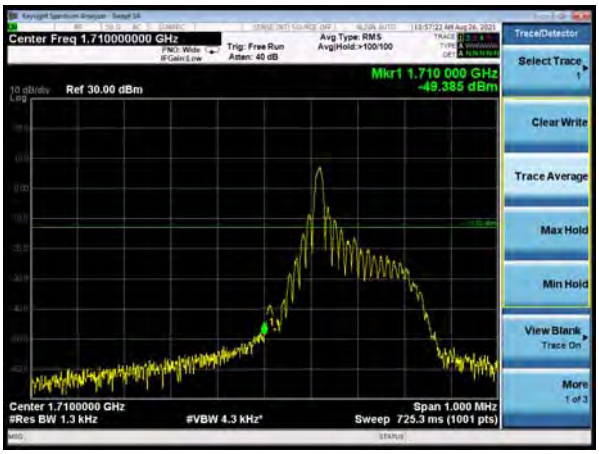
NB-IoT Band 4 BPSK 3.75kHz 1@0 CH-Low




NB-IoT Band 4 BPSK 3.75kHz 1@47 CH-High

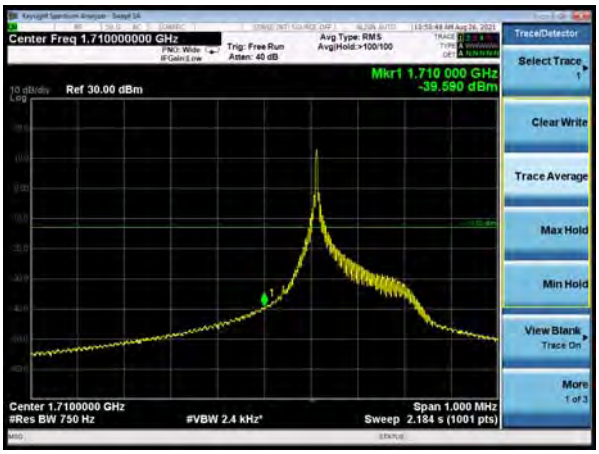



NB-IoT Band 4 BPSK 15kHz 1@0 CH-Low

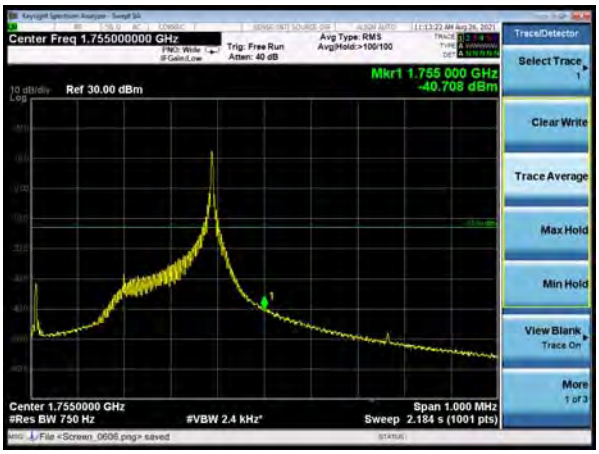



NB-IoT Band 4 BPSK 15kHz 1@11 CH-High

NB-IoT Band 4 QPSK 3.75kHz 1@0 CH-Low




NB-IoT Band 4 QPSK 3.75kHz 1@47 CH-High





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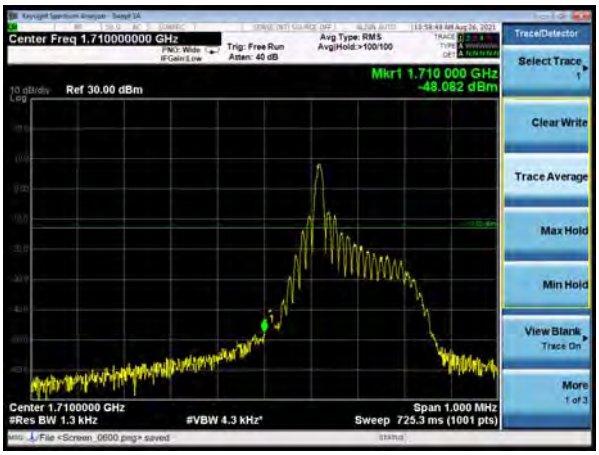
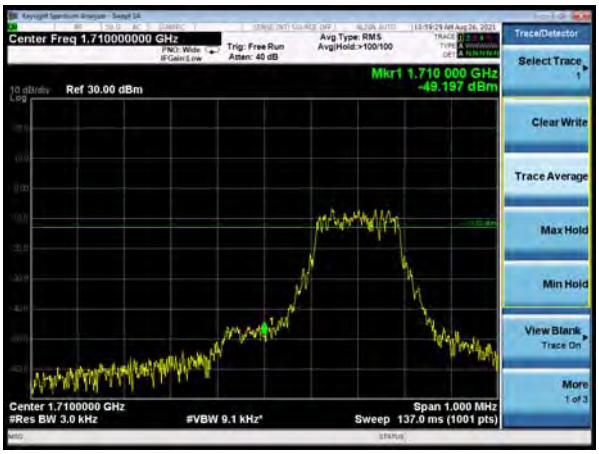
NB-IoT Band 4 QPSK 15kHz 1@0 CH-Low




NB-IoT Band 4 QPSK 15kHz 1@11 CH-High

NB-IoT Band 4 QPSK 15kHz 12@0 CH-Low




NB-IoT Band 4 QPSK 15kHz 12@0 CH-High

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NB-IoT Band 12 BPSK 3.75kHz 1@0 CH-Low

NB-IoT Band 12 BPSK 3.75kHz 1@47 CH-High

NB-IoT Band 12 BPSK 15kHz 1@0 CH-Low

NB-IoT Band 12 BPSK 15kHz 1@11 CH-High

NB-IoT Band 12 QPSK 3.75kHz 1@0 CH-Low

NB-IoT Band 12 QPSK 3.75kHz 1@47 CH-High

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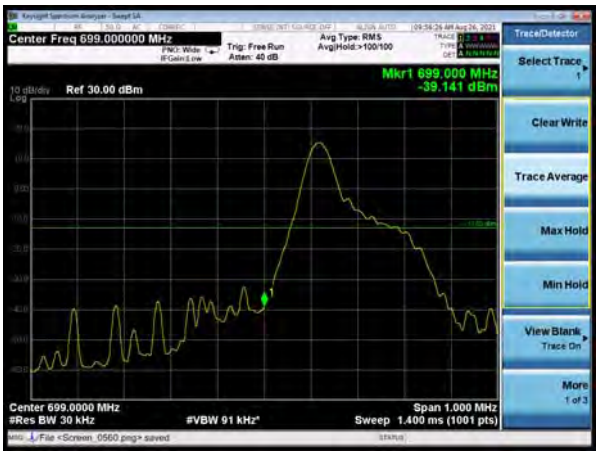
NB-IoT Band 12 QPSK 15kHz 1@0 CH-Low




NB-IoT Band 12 QPSK 15kHz 1@11 CH-High

NB-IoT Band 12 QPSK 15kHz 12@0 CH-Low

NB-IoT Band 12 QPSK 15kHz 12@0 CH-High

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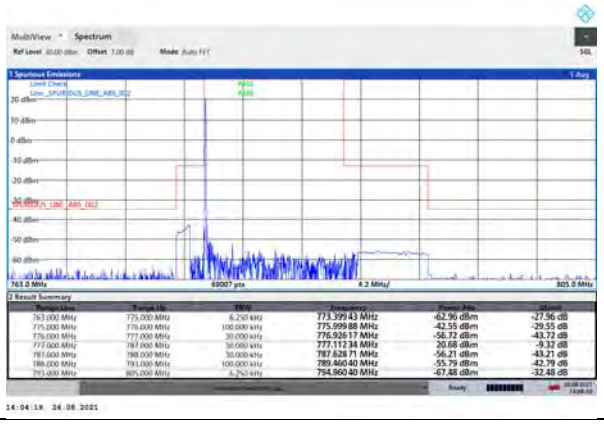
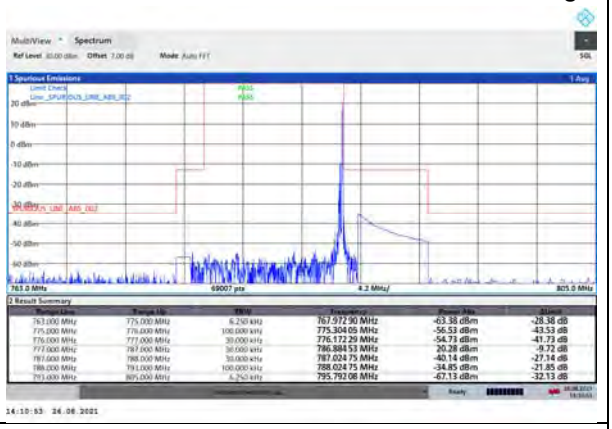
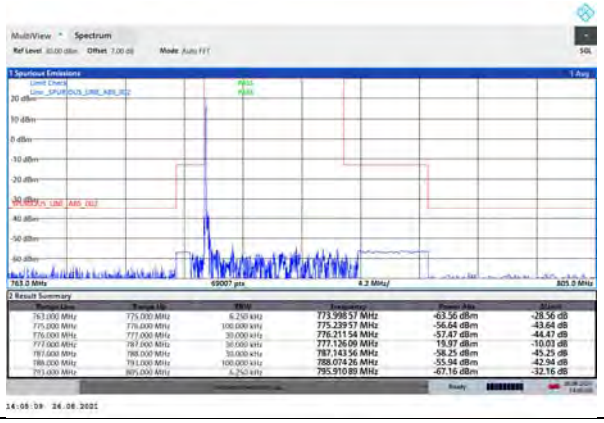
NB-IoT Band 13 BPSK 3.75kHz 1@0 CH-Low



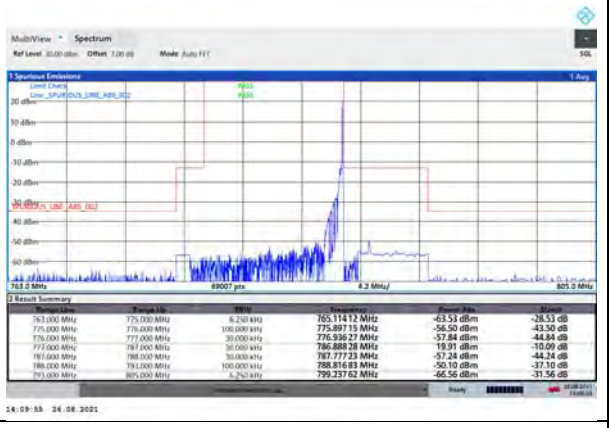
NB-IoT Band 13 BPSK 3.75kHz 1@47 CH-High



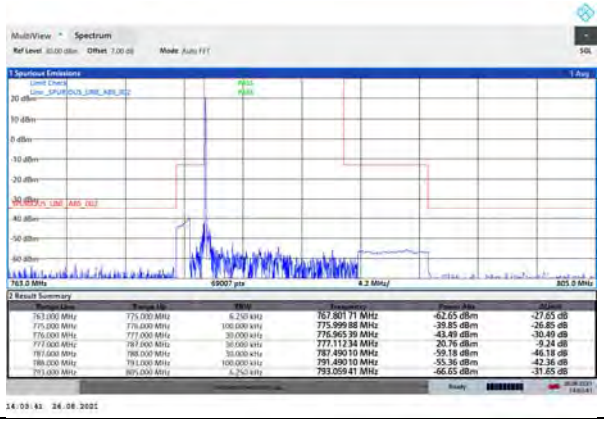
NB-IoT Band 13 BPSK 15kHz 1@0 CH-Low



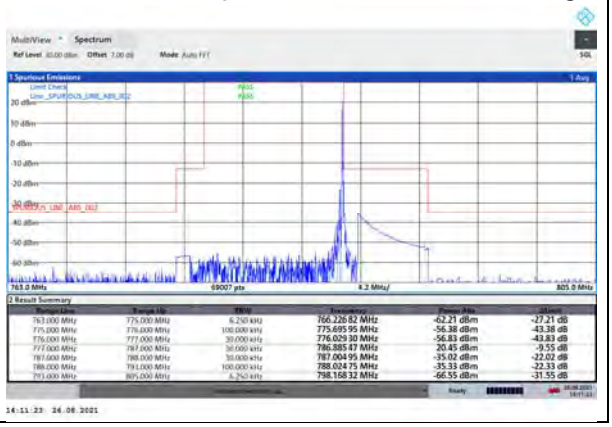
NB-IoT Band 13 BPSK 15kHz 1@11 CH-High



NB-IoT Band 13 QPSK 3.75kHz 1@0 CH-Low



NB-IoT Band 13 QPSK 3.75kHz 1@47 CH-High

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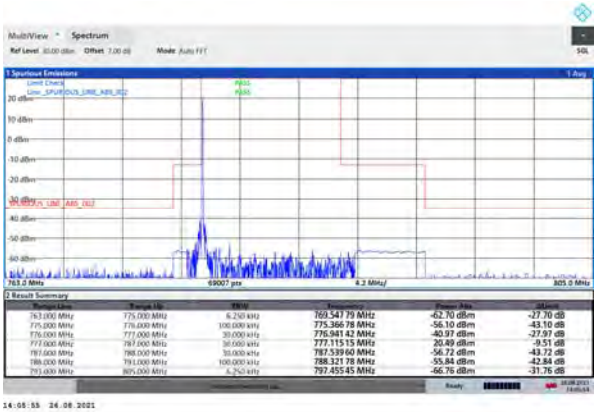
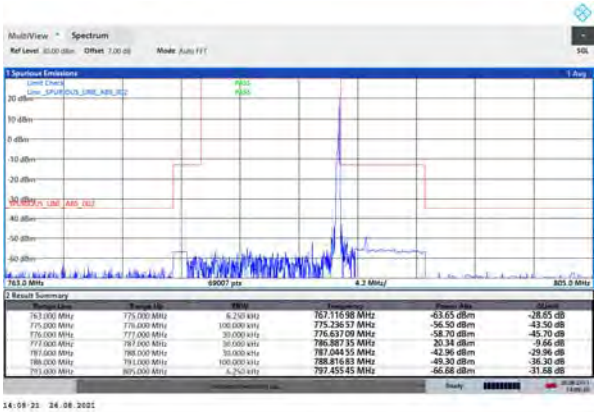
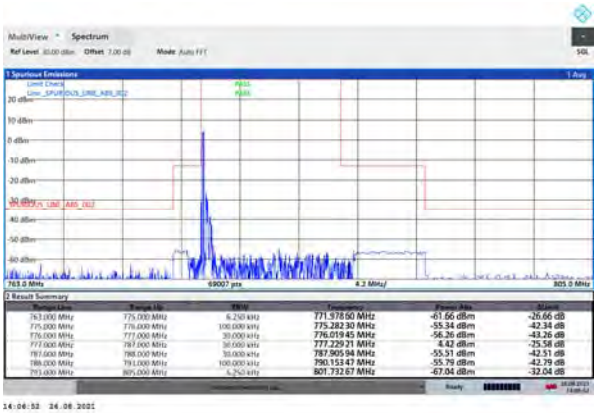
NB-IoT Band 13 QPSK 15kHz 1@0 CH-Low



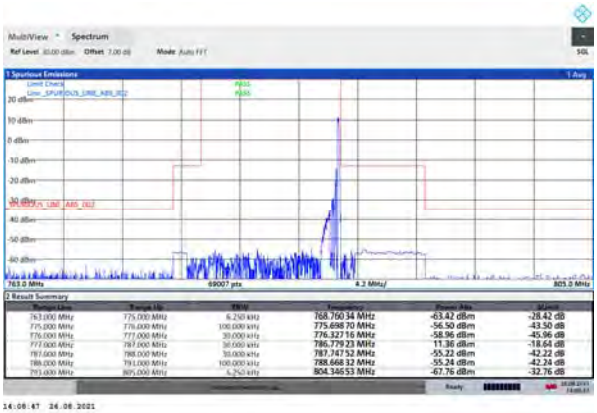
NB-IoT Band 13 QPSK 15kHz 1@11 CH-High



NB-IoT Band 13 QPSK 15kHz 12@0 CH-Low



NB-IoT Band 13 QPSK 15kHz 12@0 CH-High

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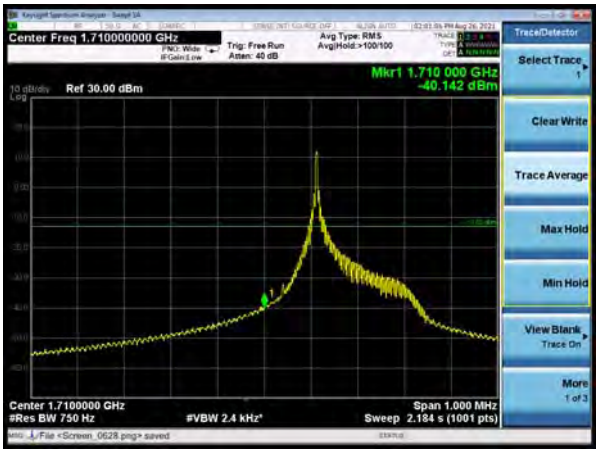
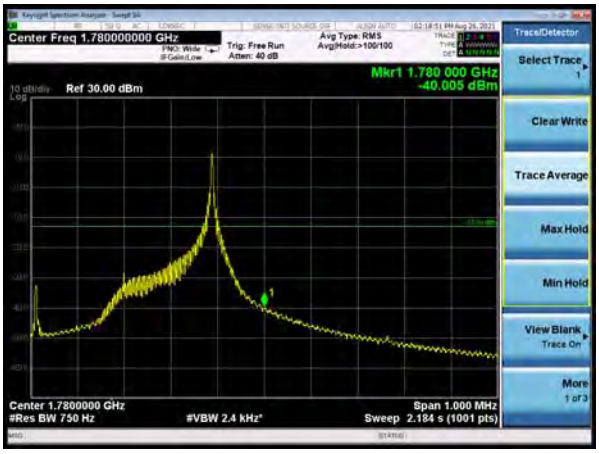
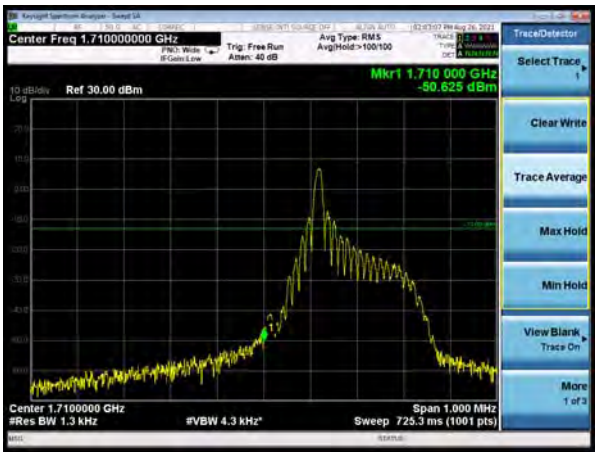
NB-IoT Band 66 BPSK 3.75kHz 1@0 CH-Low




NB-IoT Band 66 BPSK 3.75kHz 1@47 CH-High

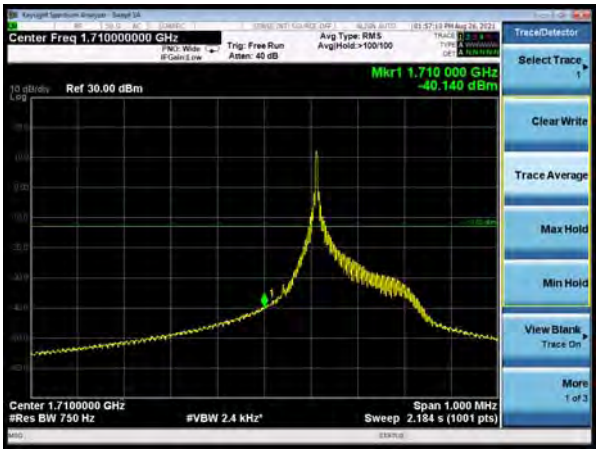



NB-IoT Band 66 BPSK 15kHz 1@0 CH-Low

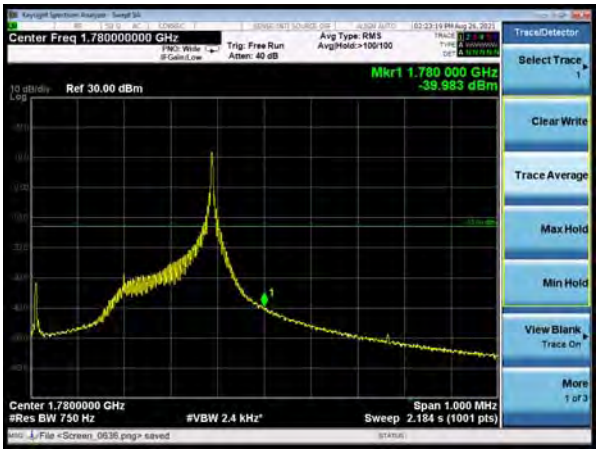



NB-IoT Band 66 BPSK 15kHz 1@11 CH-High

NB-IoT Band 66 QPSK 3.75kHz 1@0 CH-Low




NB-IoT Band 66 QPSK 3.75kHz 1@47 CH-High





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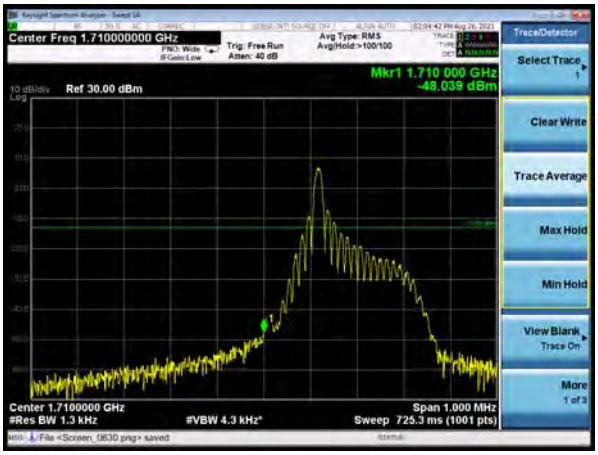
NB-IoT Band 66 QPSK 15kHz 1@0 CH-Low




NB-IoT Band 66 QPSK 15kHz 1@11 CH-High

NB-IoT Band 66 QPSK 15kHz 12@0 CH-Low

NB-IoT Band 66 QPSK 15kHz 12@0 CH-High

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NB-IoT Band 71 BPSK 3.75kHz 1@0 CH-Low

NB-IoT Band 71 BPSK 3.75kHz 1@47 CH-High

NB-IoT Band 71 BPSK 15kHz 1@0 CH-Low

NB-IoT Band 71 BPSK 15kHz 1@11 CH-High

NB-IoT Band 71 QPSK 3.75kHz 1@0 CH-Low

NB-IoT Band 71 QPSK 3.75kHz 1@47 CH-High

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NB-IoT Band 71 QPSK 15kHz 1@0 CH-Low

NB-IoT Band 71 QPSK 15kHz 1@11 CH-High

NB-IoT Band 71 QPSK 15kHz 12@0 CH-Low

NB-IoT Band 71 QPSK 15kHz 12@0 CH-High

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NB-IoT Band 85 BPSK 3.75kHz 1@0 CH-Low

NB-IoT Band 85 BPSK 3.75kHz 1@47 CH-High

NB-IoT Band 85 BPSK 15kHz 1@0 CH-Low

NB-IoT Band 85 BPSK 15kHz 1@11 CH-High

NB-IoT Band 85 QPSK 3.75kHz 1@0 CH-Low

NB-IoT Band 85 QPSK 3.75kHz 1@47 CH-High

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NB-IoT Band 85 QPSK 15kHz 1@0 CH-Low

NB-IoT Band 85 QPSK 15kHz 1@11 CH-High

NB-IoT Band 85 QPSK 15kHz 12@0 CH-Low

NB-IoT Band 85 QPSK 15kHz 12@0 CH-High

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## 5.5 Peak-to-Average Power Ratio (PAPR)

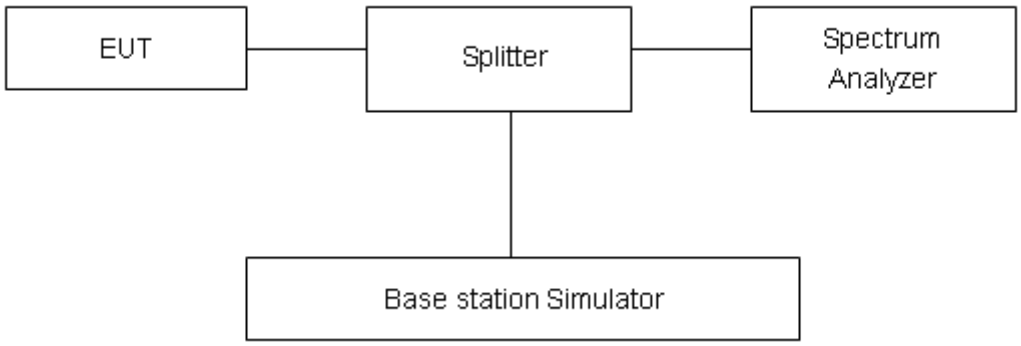
### Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

### Methods of Measurement

Measure the total peak power and record as PPk. And measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (*e.g.*, dBm). Determine the PAPR from:
PAPR (dB) = PPk (dBm) - PAvg (dBm).

### Test Setup




### Limits

Rule Part 27.50(d)(5) Equipment employed must be authorized in accordance with the provisions of 24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. 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.

### Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for thenormal distribution is with the coverage factor k = 2, U= 0.4 dB.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**Test Results**

| Mode | Modulation | Sub-carrier spacing (KHz) | Channel/ Frequency (MHz) | Peak-to-Average Power Ratio (PAPR) | | | Limit (dB) | Conclusion |
|---|---|---|---|---|---|---|---|---|
| | | | | Peak(dBm) | Avg(dBm) | PAPR(dB) | | |
| NB-IoT Band 4 Standalone | BPSK | 3.75 | 20175/1732.5 | 21.82 | 18.00 | 3.82 | ≤13 | PASS |
| | QPSK | 3.75 | 20175/1732.5 | 21.38 | 17.95 | 3.43 | ≤13 | PASS |
| | BPSK | 15 | 20175/1732.5 | 21.59 | 15.12 | 6.47 | ≤13 | PASS |
| | QPSK | 15 | 20175/1732.5 | 21.53 | 15.09 | 6.44 | ≤13 | PASS |
| Mode | Modulation | Sub-carrier spacing (KHz) | Channel/ Frequency (MHz) | Peak-to-Average Power Ratio (PAPR) | | | Limit (dB) | Conclusion |
| | | | | Peak(dBm) | Avg(dBm) | PAPR(dB) | | |
| NB-IoT Band 12 Standalone | BPSK | 3.75 | 23095/707.5 | 22.12 | 18.35 | 3.77 | ≤13 | PASS |
| | QPSK | 3.75 | 23095/707.5 | 21.67 | 18.33 | 3.34 | ≤13 | PASS |
| | BPSK | 15 | 23095/707.5 | 21.98 | 15.51 | 6.47 | ≤13 | PASS |
| | QPSK | 15 | 23095/707.5 | 21.93 | 15.55 | 6.38 | ≤13 | PASS |
| Mode | Modulation | Sub-carrier spacing (KHz) | Channel/ Frequency (MHz) | Peak-to-Average Power Ratio (PAPR) | | | Limit (dB) | Conclusion |
| | | | | Peak(dBm) | Avg(dBm) | PAPR(dB) | | |
| NB-IoT Band 13 Standalone | BPSK | 3.75 | 23230/782 | 22.29 | 18.49 | 3.80 | ≤13 | PASS |
| | QPSK | 3.75 | 23230/782 | 21.90 | 18.50 | 3.40 | ≤13 | PASS |
| | BPSK | 15 | 23230/782 | 22.28 | 15.92 | 6.36 | ≤13 | PASS |
| | QPSK | 15 | 23230/782 | 22.23 | 15.86 | 6.37 | ≤13 | PASS |
| Mode | Modulation | Sub-carrier spacing (KHz) | Channel/ Frequency (MHz) | Peak-to-Average Power Ratio (PAPR) | | | Limit (dB) | Conclusion |
| | | | | Peak(dBm) | Avg(dBm) | PAPR(dB) | | |
| NB-IoT Band 66 Standalone | BPSK | 3.75 | 132322/1745 | 21.67 | 17.83 | 3.84 | ≤13 | PASS |
| | QPSK | 3.75 | 132322/1745 | 21.22 | 17.79 | 3.43 | ≤13 | PASS |
| | BPSK | 15 | 132322/1745 | 21.48 | 15.03 | 6.45 | ≤13 | PASS |
| | QPSK | 15 | 132322/1745 | 21.42 | 15.00 | 6.42 | ≤13 | PASS |
| Mode | Modulation | Sub-carrier spacing (KHz) | Channel/ Frequency (MHz) | Peak-to-Average Power Ratio (PAPR) | | | Limit (dB) | Conclusion |
| | | | | Peak(dBm) | Avg(dBm) | PAPR(dB) | | |
| NB-IoT Band 71 Standalone | BPSK | 3.75 | 133297/680.5 | 21.89 | 18.14 | 3.75 | ≤13 | PASS |
| | QPSK | 3.75 | 133297/680.5 | 21.42 | 18.09 | 3.33 | ≤13 | PASS |
| | BPSK | 15 | 133297/680.5 | 21.85 | 15.44 | 6.41 | ≤13 | PASS |
| | QPSK | 15 | 133297/680.5 | 21.78 | 15.47 | 6.31 | ≤13 | PASS |
| Mode | Modulation | Sub-carrier spacing (KHz) | Channel/ Frequency (MHz) | Peak-to-Average Power Ratio (PAPR) | | | Limit (dB) | Conclusion |
| | | | | Peak(dBm) | Avg(dBm) | PAPR(dB) | | |
| NB-IoT Band 85 Standalone | BPSK | 3.75 | 134092/707 | 22.22 | 18.46 | 3.76 | ≤13 | PASS |
| | QPSK | 3.75 | 134092/707 | 21.76 | 18.44 | 3.32 | ≤13 | PASS |
| | BPSK | 15 | 134092/707 | 22.08 | 15.66 | 6.42 | ≤13 | PASS |
| | QPSK | 15 | 134092/707 | 22.02 | 15.66 | 6.36 | ≤13 | PASS |


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## 5.6 Frequency Stability

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -40°C to +85°C in 10°C step size.

(1)With all power removed, the temperature was decreased to -10°C and permitted to stabilize for three hours.

(2)Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -40°C to +85°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

Frequency Stability (Voltage Variation)

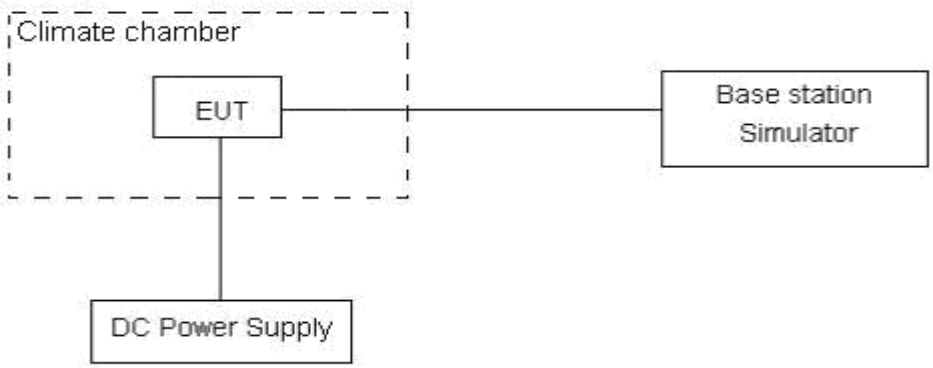
The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 3.3 V and 4.3V, with a nominal voltage of 3.8V.

**Test setup**




**Limits**

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 99.75％ confidence level for the normal distribution is with the coverage factor $k$ = 3,$U$=0.01ppm.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**Test Result**

| NB-IoT Band 4 | | | | | | |
|---|---|---|---|---|---|---|
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability （ppm） | Frequency Stability （ppm） | Verdict |
| Sub-carrier spacing (KHz) | 3.75 | | | | | |
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 7.04 | 9.72 | 0.00375 | 0.00517 | PASS |
| Extreme（85℃） | | 5.40 | 14.61 | 0.00287 | 0.00777 | PASS |
| Extreme（80℃） | | 14.89 | 1.28 | 0.00792 | 0.00068 | PASS |
| Extreme（70℃） | | 4.12 | 11.84 | 0.00219 | 0.00630 | PASS |
| Extreme（60℃） | | 17.89 | 17.67 | 0.00952 | 0.00940 | PASS |
| Extreme（50℃） | | 1.92 | 14.08 | 0.00102 | 0.00749 | PASS |
| Extreme（40℃） | | 3.99 | 3.16 | 0.00212 | 0.00168 | PASS |
| Extreme（30℃） | | 13.06 | 1.42 | 0.00695 | 0.00075 | PASS |
| Extreme（20℃） | | 9.41 | 16.49 | 0.00501 | 0.00877 | PASS |
| Extreme（10℃） | | 9.95 | 14.93 | 0.00529 | 0.00794 | PASS |
| Extreme（0℃） | | 17.43 | 5.69 | 0.00927 | 0.00303 | PASS |
| Extreme（-10℃） | | 10.17 | 11.43 | 0.00541 | 0.00608 | PASS |
| Extreme（-20℃） | | 12.02 | 11.29 | 0.00639 | 0.00600 | PASS |
| Extreme（-30℃） | | 9.81 | 16.27 | 0.00522 | 0.00865 | PASS |
| Extreme（-40℃） | | 4.83 | 9.36 | 0.00257 | 0.00498 | PASS |
| 25℃ | LV | 1.81 | 1.36 | 0.00097 | 0.00072 | PASS |
| | HV | 9.21 | 13.07 | 0.00490 | 0.00695 | PASS |
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability （ppm） | Frequency Stability （ppm） | Verdict |
| Sub-carrier spacing (KHz) | 15 | | | | | |
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 2.21 | 2.23 | 0.00117 | 0.00118 | PASS |
| Extreme（85℃） | | 2.57 | 15.17 | 0.00137 | 0.00807 | PASS |
| Extreme（80℃） | | 5.64 | 15.89 | 0.00300 | 0.00845 | PASS |
| Extreme（70℃） | | 14.69 | 10.05 | 0.00781 | 0.00535 | PASS |
| Extreme（60℃） | | 8.79 | 12.88 | 0.00468 | 0.00685 | PASS |
| Extreme（50℃） | | 16.29 | 1.04 | 0.00867 | 0.00055 | PASS |
| Extreme（40℃） | | 14.19 | 3.85 | 0.00755 | 0.00205 | PASS |
| Extreme（30℃） | | 13.98 | 17.78 | 0.00743 | 0.00946 | PASS |
| Extreme（20℃） | | 12.56 | 16.29 | 0.00668 | 0.00866 | PASS |
| Extreme（10℃） | | 15.45 | 17.62 | 0.00822 | 0.00937 | PASS |
| Extreme（0℃） | | 15.99 | 4.44 | 0.00850 | 0.00236 | PASS |
| Extreme（-10℃） | | 1.63 | 6.62 | 0.00087 | 0.00352 | PASS |
| Extreme（-20℃） | | 12.83 | 6.27 | 0.00683 | 0.00334 | PASS |


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| | | | | | | |
|---|---|---|---|---|---|---|
| Extreme（-30℃） | | 14.01 | 14.65 | 0.00745 | 0.00779 | PASS |
| Extreme（-40℃） | | 3.80 | 10.64 | 0.00202 | 0.00566 | PASS |
| 25℃ | LV | 17.50 | 5.43 | 0.00931 | 0.00289 | PASS |
| | HV | 7.77 | 4.24 | 0.00413 | 0.00226 | PASS |

| NB-IoT Band 12 | | | | | | |
|---|---|---|---|---|---|---|
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability（ppm） | Frequency Stability（ppm） | Verdict |
| Sub-carrier spacing (KHz) | 3.75 | | | | | |
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 10.27 | 9.91 | 0.00546 | 0.00527 | PASS |
| Extreme（85℃） | | 2.68 | 7.32 | 0.00143 | 0.00390 | PASS |
| Extreme（80℃） | | 9.55 | 6.56 | 0.00508 | 0.00349 | PASS |
| Extreme（70℃） | | 6.00 | 6.33 | 0.00319 | 0.00337 | PASS |
| Extreme（60℃） | | 12.31 | 13.60 | 0.00655 | 0.00724 | PASS |
| Extreme（50℃） | | 12.65 | 3.00 | 0.00673 | 0.00160 | PASS |
| Extreme（40℃） | | 4.76 | 6.31 | 0.00253 | 0.00336 | PASS |
| Extreme（30℃） | | 12.31 | 13.64 | 0.00655 | 0.00726 | PASS |
| Extreme（20℃） | | 9.43 | 5.46 | 0.00502 | 0.00290 | PASS |
| Extreme（10℃） | | 13.95 | 13.15 | 0.00742 | 0.00699 | PASS |
| Extreme（0℃） | | 5.03 | 5.07 | 0.00267 | 0.00270 | PASS |
| Extreme（-10℃） | | 6.49 | 7.28 | 0.00345 | 0.00387 | PASS |
| Extreme（-20℃） | | 12.74 | 9.69 | 0.00678 | 0.00516 | PASS |
| Extreme（-30℃） | | 6.35 | 15.28 | 0.00338 | 0.00813 | PASS |
| Extreme（-40℃） | | 15.94 | 2.76 | 0.00848 | 0.00147 | PASS |
| 25℃ | LV | 14.14 | 17.23 | 0.00752 | 0.00917 | PASS |
| | HV | 10.66 | 9.00 | 0.00567 | 0.00479 | PASS |
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability（ppm） | Frequency Stability（ppm） | Verdict |
| Sub-carrier spacing (KHz) | 15 | | | | | |
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 7.74 | 14.14 | 0.00412 | 0.00752 | PASS |
| Extreme（85℃） | | 8.18 | 12.07 | 0.00435 | 0.00642 | PASS |
| Extreme（80℃） | | 11.41 | 10.24 | 0.00607 | 0.00545 | PASS |
| Extreme（70℃） | | 12.67 | 6.29 | 0.00674 | 0.00334 | PASS |
| Extreme（60℃） | | 15.37 | 12.24 | 0.00817 | 0.00651 | PASS |
| Extreme（50℃） | | 16.71 | 8.15 | 0.00889 | 0.00434 | PASS |
| Extreme（40℃） | | 9.21 | 9.68 | 0.00490 | 0.00515 | PASS |
| Extreme（30℃） | | 11.43 | 10.14 | 0.00608 | 0.00540 | PASS |
| Extreme（20℃） | | 4.09 | 8.16 | 0.00218 | 0.00434 | PASS |


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| | | | | | | |
|---|---|---|---|---|---|---|
| Extreme（10℃） | | 6.71 | 9.46 | 0.00357 | 0.00503 | PASS |
| Extreme（0℃） | | 9.65 | 3.13 | 0.00513 | 0.00166 | PASS |
| Extreme（-10℃） | | 3.42 | 8.06 | 0.00182 | 0.00429 | PASS |
| Extreme（-20℃） | | 1.17 | 14.99 | 0.00062 | 0.00797 | PASS |
| Extreme（-30℃） | | 14.68 | 16.05 | 0.00781 | 0.00854 | PASS |
| Extreme（-40℃） | | 15.54 | 11.48 | 0.00827 | 0.00610 | PASS |
| 25℃ | LV | 10.77 | 7.54 | 0.00573 | 0.00401 | PASS |
| | HV | 17.26 | 11.73 | 0.00918 | 0.00624 | PASS |

| NB-IoT Band 13 | | | | | | |
|---|---|---|---|---|---|---|
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability（ppm） | Frequency Stability（ppm） | Verdict |
| Sub-carrier spacing (KHz) | 3.75 | | | | | |
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 13.29 | 5.53 | 0.00707 | 0.00294 | PASS |
| Extreme（85℃） | | 5.58 | 13.11 | 0.00297 | 0.00697 | PASS |
| Extreme（80℃） | | 2.80 | 12.39 | 0.00149 | 0.00659 | PASS |
| Extreme（70℃） | | 17.39 | 15.24 | 0.00925 | 0.00811 | PASS |
| Extreme（60℃） | | 11.29 | 14.43 | 0.00601 | 0.00768 | PASS |
| Extreme（50℃） | | 17.16 | 7.85 | 0.00913 | 0.00418 | PASS |
| Extreme（40℃） | | 11.50 | 4.01 | 0.00612 | 0.00213 | PASS |
| Extreme（30℃） | | 12.69 | 12.14 | 0.00675 | 0.00646 | PASS |
| Extreme（20℃） | | 11.02 | 13.79 | 0.00586 | 0.00733 | PASS |
| Extreme（10℃） | | 3.17 | 9.52 | 0.00169 | 0.00506 | PASS |
| Extreme（0℃） | | 17.30 | 7.50 | 0.00920 | 0.00399 | PASS |
| Extreme（-10℃） | | 9.35 | 4.93 | 0.00497 | 0.00262 | PASS |
| Extreme（-20℃） | | 5.02 | 3.06 | 0.00267 | 0.00163 | PASS |
| Extreme（-30℃） | | 16.55 | 3.87 | 0.00880 | 0.00206 | PASS |
| Extreme（-40℃） | | 11.00 | 2.61 | 0.00585 | 0.00139 | PASS |
| 25℃ | LV | 8.44 | 8.38 | 0.00449 | 0.00446 | PASS |
| | HV | 5.45 | 7.32 | 0.00290 | 0.00389 | PASS |
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability（ppm） | Frequency Stability（ppm） | Verdict |
| Sub-carrier spacing (KHz) | 15 | | | | | |
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 2.50 | 13.18 | 0.00133 | 0.00701 | PASS |
| Extreme（85℃） | | 17.53 | 13.02 | 0.00933 | 0.00693 | PASS |
| Extreme（80℃） | | 16.26 | 14.89 | 0.00865 | 0.00792 | PASS |
| Extreme（70℃） | | 3.67 | 12.34 | 0.00195 | 0.00657 | PASS |
| Extreme（60℃） | | 17.21 | 12.81 | 0.00916 | 0.00681 | PASS |


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| | | | | | | |
|---|---|---|---|---|---|---|
| Extreme（50℃） | | 14.08 | 2.82 | 0.00749 | 0.00150 | PASS |
| Extreme（40℃） | | 8.49 | 3.50 | 0.00452 | 0.00186 | PASS |
| Extreme（30℃） | | 3.25 | 17.56 | 0.00173 | 0.00934 | PASS |
| Extreme（20℃） | | 9.49 | 9.16 | 0.00505 | 0.00487 | PASS |
| Extreme（10℃） | | 1.21 | 5.71 | 0.00064 | 0.00304 | PASS |
| Extreme（0℃） | | 11.48 | 12.20 | 0.00611 | 0.00649 | PASS |
| Extreme（-10℃） | | 11.37 | 17.73 | 0.00605 | 0.00943 | PASS |
| Extreme（-20℃） | | 4.06 | 12.66 | 0.00216 | 0.00673 | PASS |
| Extreme（-30℃） | | 13.66 | 4.21 | 0.00727 | 0.00224 | PASS |
| Extreme（-40℃） | | 1.34 | 1.70 | 0.00071 | 0.00091 | PASS |
| 25℃ | LV | 16.69 | 14.23 | 0.00888 | 0.00757 | PASS |
| | HV | 13.76 | 14.90 | 0.00732 | 0.00793 | PASS |

| NB-IoT Band 66 | | | | | | |
|---|---|---|---|---|---|---|
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability（ppm） | Frequency Stability（ppm） | Verdict |
| Sub-carrier spacing (KHz) | 3.75 | | | | | |
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 6.50 | 5.92 | 0.00346 | 0.00315 | PASS |
| Extreme（85℃） | | 1.83 | 11.04 | 0.00097 | 0.00587 | PASS |
| Extreme（80℃） | | 2.82 | 12.57 | 0.00150 | 0.00668 | PASS |
| Extreme（70℃） | | 7.34 | 13.37 | 0.00391 | 0.00711 | PASS |
| Extreme（60℃） | | 17.77 | 14.00 | 0.00945 | 0.00745 | PASS |
| Extreme（50℃） | | 14.88 | 4.28 | 0.00791 | 0.00227 | PASS |
| Extreme（40℃） | | 5.67 | 8.65 | 0.00302 | 0.00460 | PASS |
| Extreme（30℃） | | 5.92 | 12.87 | 0.00315 | 0.00684 | PASS |
| Extreme（20℃） | | 10.78 | 15.05 | 0.00573 | 0.00801 | PASS |
| Extreme（10℃） | | 17.23 | 9.03 | 0.00916 | 0.00480 | PASS |
| Extreme（0℃） | | 10.89 | 6.94 | 0.00579 | 0.00369 | PASS |
| Extreme（-10℃） | | 13.39 | 12.40 | 0.00712 | 0.00660 | PASS |
| Extreme（-20℃） | | 14.83 | 17.08 | 0.00789 | 0.00908 | PASS |
| Extreme（-30℃） | | 15.74 | 2.03 | 0.00837 | 0.00108 | PASS |
| Extreme（-40℃） | | 10.76 | 9.80 | 0.00572 | 0.00521 | PASS |
| 25℃ | LV | 3.05 | 14.63 | 0.00162 | 0.00778 | PASS |
| | HV | 4.87 | 10.63 | 0.00259 | 0.00565 | PASS |
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability（ppm） | Frequency Stability（ppm） | Verdict |
| Sub-carrier spacing (KHz) | 15 | | | | | |
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 9.21 | 5.74 | 0.00490 | 0.00305 | PASS |


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| | | | | | | |
|---|---|---|---|---|---|---|
| Extreme（85℃） | | 14.67 | 1.97 | 0.00780 | 0.00105 | PASS |
| Extreme（80℃） | | 13.63 | 4.47 | 0.00725 | 0.00238 | PASS |
| Extreme（70℃） | | 11.46 | 1.49 | 0.00610 | 0.00079 | PASS |
| Extreme（60℃） | | 6.40 | 1.05 | 0.00340 | 0.00056 | PASS |
| Extreme（50℃） | | 7.32 | 1.07 | 0.00389 | 0.00057 | PASS |
| Extreme（40℃） | | 7.83 | 5.64 | 0.00417 | 0.00300 | PASS |
| Extreme（30℃） | | 4.48 | 5.29 | 0.00238 | 0.00281 | PASS |
| Extreme（20℃） | | 8.33 | 2.75 | 0.00443 | 0.00146 | PASS |
| Extreme（10℃） | | 2.34 | 10.44 | 0.00124 | 0.00555 | PASS |
| Extreme（0℃） | | 6.51 | 1.10 | 0.00346 | 0.00059 | PASS |
| Extreme（-10℃） | | 15.20 | 13.13 | 0.00808 | 0.00698 | PASS |
| Extreme（-20℃） | | 17.20 | 2.53 | 0.00915 | 0.00135 | PASS |
| Extreme（-30℃） | | 14.81 | 5.70 | 0.00788 | 0.00303 | PASS |
| Extreme（-40℃） | | 8.60 | 15.33 | 0.00457 | 0.00816 | PASS |
| 25℃ | LV | 12.73 | 10.71 | 0.00677 | 0.00570 | PASS |
| | HV | 13.96 | 12.42 | 0.00743 | 0.00661 | PASS |

| NB-IoT Band 71 | | | | | | |
|---|---|---|---|---|---|---|
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability（ppm） | Frequency Stability（ppm） | Verdict |
| Sub-carrier spacing (KHz) | 3.75 | | | | | |
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 6.73 | 2.28 | 0.00358 | 0.00121 | PASS |
| Extreme（85℃） | | 10.16 | 17.55 | 0.00540 | 0.00934 | PASS |
| Extreme（80℃） | | 16.29 | 6.86 | 0.00866 | 0.00365 | PASS |
| Extreme（70℃） | | 1.56 | 15.12 | 0.00083 | 0.00804 | PASS |
| Extreme（60℃） | | 7.37 | 4.45 | 0.00392 | 0.00237 | PASS |
| Extreme（50℃） | | 9.67 | 14.03 | 0.00514 | 0.00746 | PASS |
| Extreme（40℃） | | 5.58 | 9.51 | 0.00297 | 0.00506 | PASS |
| Extreme（30℃） | | 2.57 | 1.74 | 0.00137 | 0.00093 | PASS |
| Extreme（20℃） | | 1.49 | 10.30 | 0.00079 | 0.00548 | PASS |
| Extreme（10℃） | | 13.41 | 12.74 | 0.00713 | 0.00677 | PASS |
| Extreme（0℃） | | 9.06 | 2.89 | 0.00482 | 0.00154 | PASS |
| Extreme（-10℃） | | 14.66 | 14.78 | 0.00780 | 0.00786 | PASS |
| Extreme（-20℃） | | 9.79 | 16.22 | 0.00521 | 0.00863 | PASS |
| Extreme（-30℃） | | 12.22 | 17.62 | 0.00650 | 0.00937 | PASS |
| Extreme（-40℃） | | 8.93 | 14.90 | 0.00475 | 0.00792 | PASS |
| 25℃ | LV | 17.86 | 8.98 | 0.00950 | 0.00478 | PASS |
| | HV | 1.79 | 13.31 | 0.00095 | 0.00708 | PASS |
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability | Frequency Stability | Verdict |


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| Sub-carrier spacing (KHz) | 15 | | | （ppm） | （ppm） | |
|---|---|---|---|---|---|---|
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 3.57 | 11.40 | 0.00190 | 0.00606 | PASS |
| Extreme（85℃） | | 1.88 | 12.71 | 0.00100 | 0.00676 | PASS |
| Extreme（80℃） | | 13.75 | 16.39 | 0.00731 | 0.00872 | PASS |
| Extreme（70℃） | | 13.84 | 10.06 | 0.00736 | 0.00535 | PASS |
| Extreme（60℃） | | 3.16 | 3.86 | 0.00168 | 0.00205 | PASS |
| Extreme（50℃） | | 4.61 | 7.68 | 0.00245 | 0.00409 | PASS |
| Extreme（40℃） | | 13.04 | 17.78 | 0.00694 | 0.00946 | PASS |
| Extreme（30℃） | | 8.14 | 16.63 | 0.00433 | 0.00885 | PASS |
| Extreme（20℃） | | 3.28 | 5.83 | 0.00175 | 0.00310 | PASS |
| Extreme（10℃） | | 1.10 | 10.57 | 0.00058 | 0.00562 | PASS |
| Extreme（0℃） | | 11.05 | 5.92 | 0.00588 | 0.00315 | PASS |
| Extreme（-10℃） | | 16.58 | 8.80 | 0.00882 | 0.00468 | PASS |
| Extreme（-20℃） | | 2.77 | 2.12 | 0.00147 | 0.00113 | PASS |
| Extreme（-30℃） | | 14.28 | 15.52 | 0.00760 | 0.00825 | PASS |
| Extreme（-40℃） | | 5.52 | 2.62 | 0.00293 | 0.00139 | PASS |
| 25℃ | LV | 7.40 | 1.42 | 0.00394 | 0.00076 | PASS |
| | HV | 6.92 | 8.05 | 0.00368 | 0.00428 | PASS |

| NB-IoT Band 85 | | | | | | |
|---|---|---|---|---|---|---|
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability （ppm） | Frequency Stability （ppm） | Verdict |
| Sub-carrier spacing (KHz) | 3.75 | | | | | |
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 11.97 | 16.48 | 0.00637 | 0.00876 | PASS |
| Extreme（85℃） | | 1.79 | 3.66 | 0.00095 | 0.00195 | PASS |
| Extreme（80℃） | | 12.10 | 6.42 | 0.00644 | 0.00342 | PASS |
| Extreme（70℃） | | 11.28 | 2.87 | 0.00600 | 0.00153 | PASS |
| Extreme（60℃） | | 12.25 | 7.57 | 0.00652 | 0.00402 | PASS |
| Extreme（50℃） | | 10.35 | 9.74 | 0.00550 | 0.00518 | PASS |
| Extreme（40℃） | | 15.11 | 17.84 | 0.00804 | 0.00949 | PASS |
| Extreme（30℃） | | 15.42 | 3.59 | 0.00820 | 0.00191 | PASS |
| Extreme（20℃） | | 2.45 | 8.47 | 0.00130 | 0.00451 | PASS |
| Extreme（10℃） | | 7.43 | 14.54 | 0.00395 | 0.00774 | PASS |
| Extreme（0℃） | | 7.68 | 14.09 | 0.00409 | 0.00750 | PASS |
| Extreme（-10℃） | | 3.64 | 6.01 | 0.00194 | 0.00320 | PASS |
| Extreme（-20℃） | | 12.48 | 4.89 | 0.00664 | 0.00260 | PASS |
| Extreme（-30℃） | | 10.01 | 12.87 | 0.00532 | 0.00684 | PASS |
| Extreme（-40℃） | | 6.72 | 13.37 | 0.00357 | 0.00711 | PASS |


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| | | | | | | |
|---|---|---|---|---|---|---|
| 25℃ | LV | 4.57 | 2.11 | 0.00243 | 0.00112 | PASS |
| | HV | 9.02 | 3.10 | 0.00480 | 0.00165 | PASS |
| Condition | | Freq.Error (Hz) | Freq.Error (Hz) | Frequency Stability （ppm） | Frequency Stability （ppm） | Verdict |
| Sub-carrier spacing (KHz) | 15 | | | | | |
| Temperature | Voltage | BPSK | QPSK | BPSK | QPSK | |
| Normal（25℃） | Normal | 7.10 | 12.23 | 0.00378 | 0.00650 | PASS |
| Extreme（85℃） | | 7.96 | 6.53 | 0.00424 | 0.00347 | PASS |
| Extreme（80℃） | | 4.46 | 8.21 | 0.00237 | 0.00437 | PASS |
| Extreme（70℃） | | 12.43 | 2.17 | 0.00661 | 0.00115 | PASS |
| Extreme（60℃） | | 2.15 | 17.19 | 0.00114 | 0.00914 | PASS |
| Extreme（50℃） | | 1.59 | 1.05 | 0.00084 | 0.00056 | PASS |
| Extreme（40℃） | | 7.37 | 1.24 | 0.00392 | 0.00066 | PASS |
| Extreme（30℃） | | 8.53 | 16.49 | 0.00454 | 0.00877 | PASS |
| Extreme（20℃） | | 16.93 | 6.52 | 0.00901 | 0.00347 | PASS |
| Extreme（10℃） | | 16.95 | 8.74 | 0.00901 | 0.00465 | PASS |
| Extreme（0℃） | | 10.58 | 1.18 | 0.00563 | 0.00063 | PASS |
| Extreme（-10℃） | | 8.55 | 8.03 | 0.00455 | 0.00427 | PASS |
| Extreme（-20℃） | | 7.95 | 6.14 | 0.00423 | 0.00327 | PASS |
| Extreme（-30℃） | | 5.83 | 17.76 | 0.00310 | 0.00945 | PASS |
| Extreme（-40℃） | | 12.60 | 14.44 | 0.00670 | 0.00768 | PASS |
| 25℃ | LV | 14.80 | 6.83 | 0.00787 | 0.00364 | PASS |
| | HV | 11.89 | 5.35 | 0.00633 | 0.00285 | PASS |


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## 5.7 Spurious Emissions at Antenna Terminals

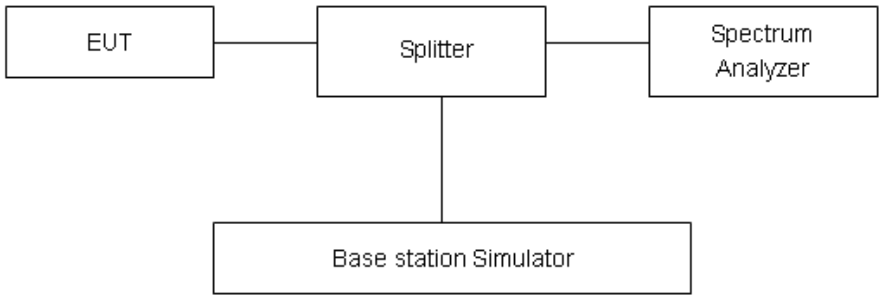
**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.
RBW is set to 100kHz, VBW is set to 300kHz for 30MHz~1GHz
RBW is set to 1MHz, VBW is set to 3MHz for above 1GHz, Sweep is set to ATUO.
Of those disturbances below (limit – 20 dB), the mark is not required for the EUT.
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

**Test setup**




**Limits**

Rule Part 27.53(h) specifies that “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..”

Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Rule Part 27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically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radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;
(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

| | | |
|---|---|---|
| Part 27.53 (h)/(g) Limit | | -13 dBm |
| Part 27.53(f) Limit | Limit out of the band 1559-1610 MHz | -13 dBm |
| | Limit in the band 1559-1610 MHz | -40 dBm |

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 99.75％ confidence level for the normal distribution is with the coverage factor *k* = 1.96.

| Frequency | Uncertainty |
|---|---|
| 30MHz-1GHz | 0.684 dB |
| 1GHz-27GHz | 1.407 dB |


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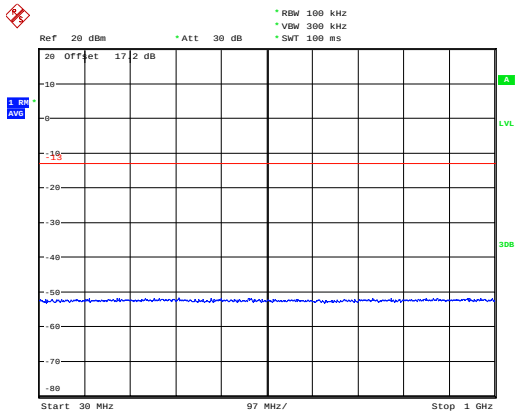
## Test Result

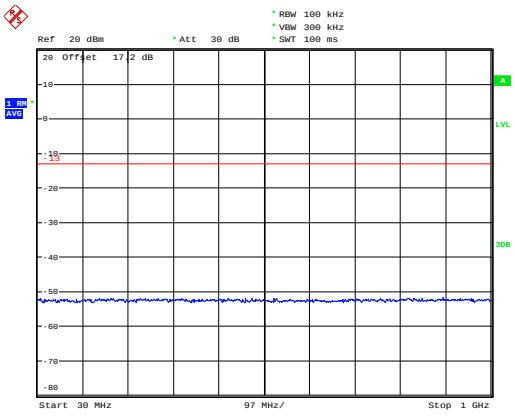
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.

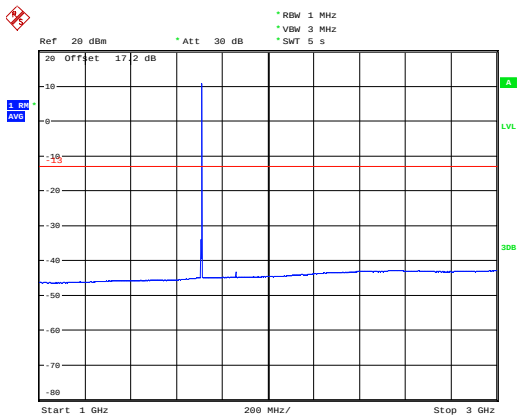
NB-IoT Band 4 CH-Low 30MHz~1GHz



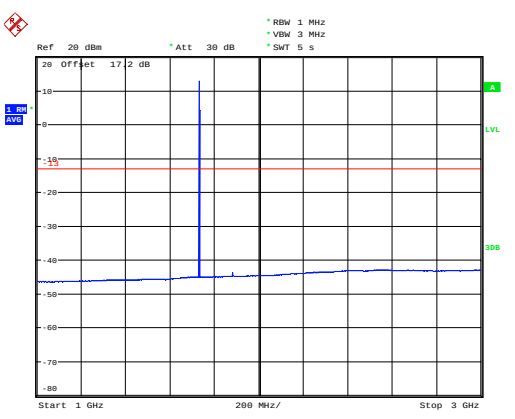

NB-IoT Band 4 CH-Middle 30MHz~1GHz



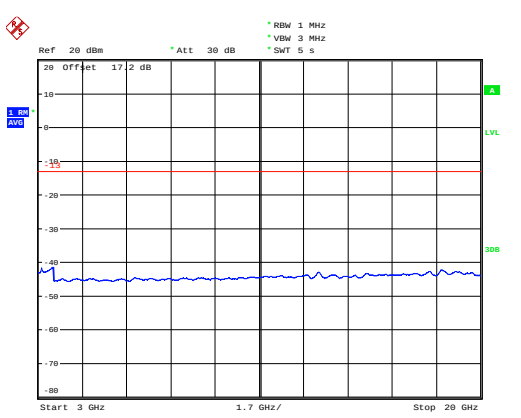

NB-IoT Band 4 CH-Low 1GHz~3GHz



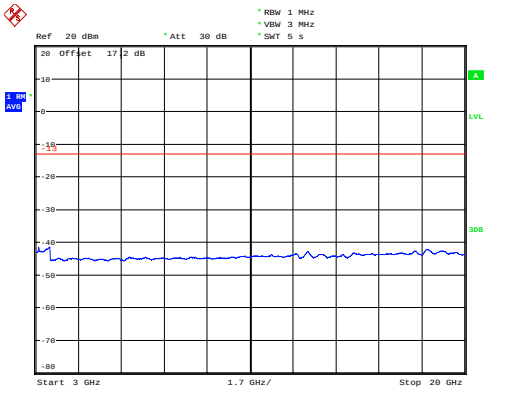

NB-IoT Band 4 CH-Middle 1GHz~3GHz




NB-IoT Band 4 CH-Low 3GHz~20GHz




NB-IoT Band 4 CH-Middle 3GHz~20GHz





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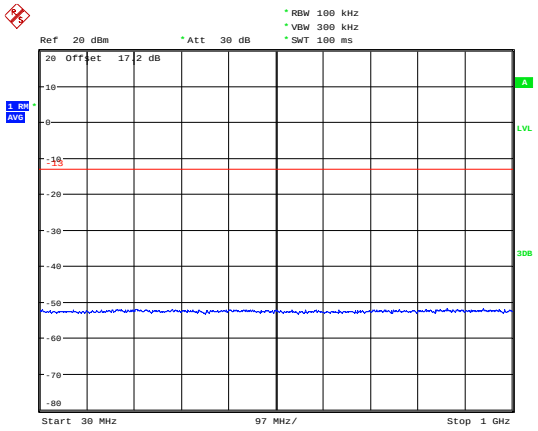
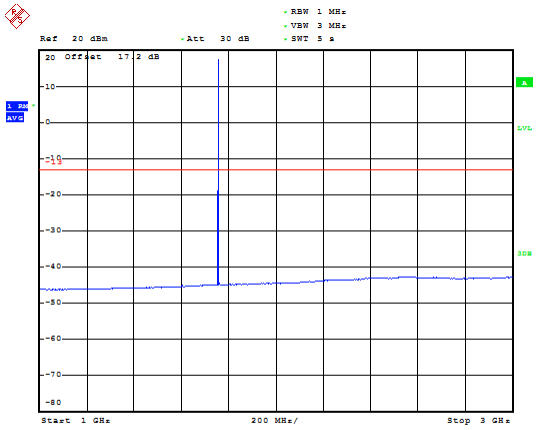
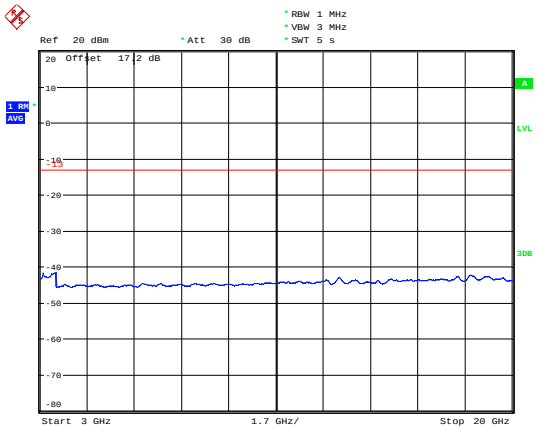
NB-IoT Band 4 CH-High 30MHz~1GHz




NB-IoT Band 4 CH-High 1GHz~3GHz




NB-IoT Band 4 CH-High 3GHz~20GHz





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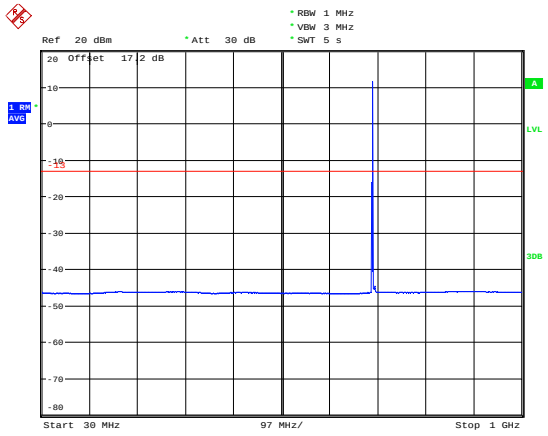
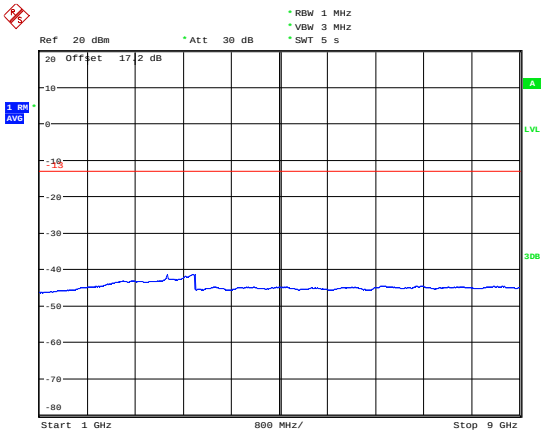
NB-IoT Band 12 CH-Low 30MHz-1GHz




Date: 28.AUG.2019 12:35:00

NB-IoT Band 12 CH-Low 1GHz-9GHz

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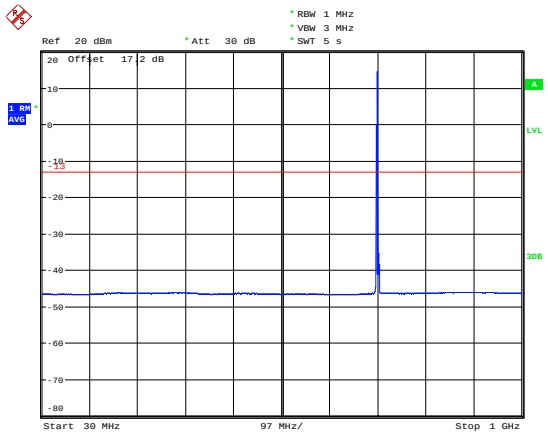
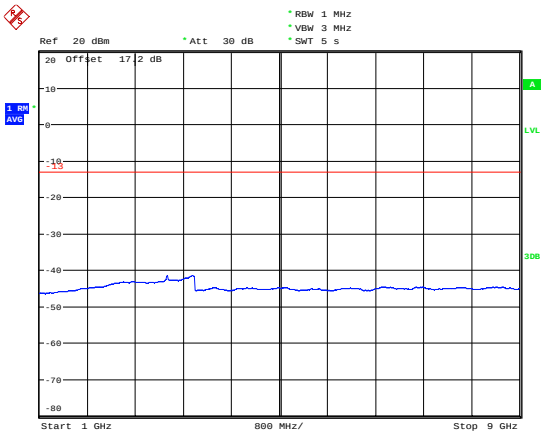
NB-IoT Band 12 CH-Middle 30MHz-1GHz



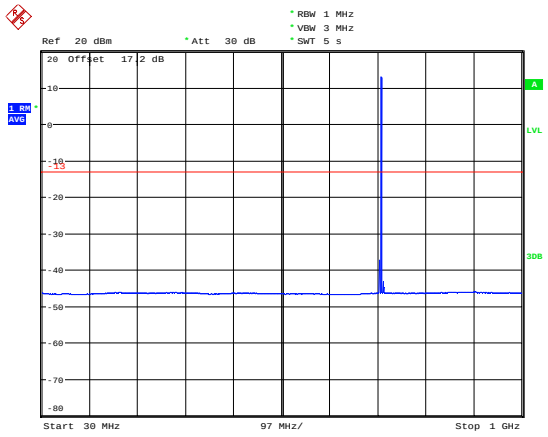

Date: 28.AUG.2019 12:38:10

NB-IoT Band 12 CH-Middle 1GHz-9GHz




Date: 28.AUG.2019 12:49:06

NB-IoT Band 12 CH-High 30MHz-1GHz

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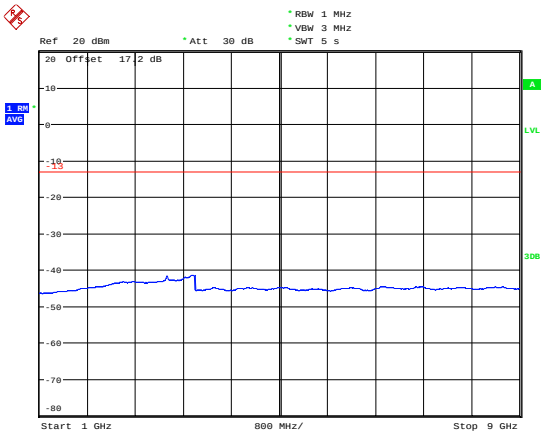
NB-IoT Band 12 CH-High 1GHz-9GHz




Date: 28.AUG.2019 12:50:48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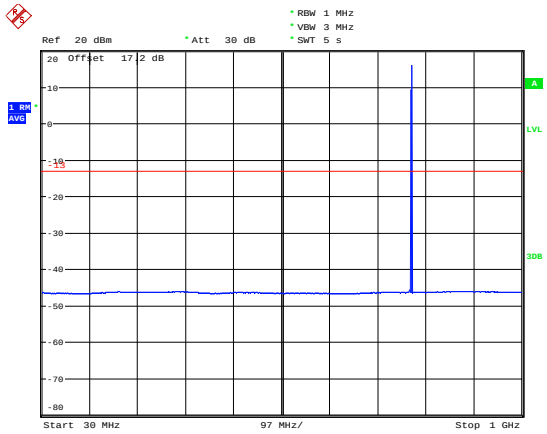
NB-IoT Band 13 CH-Low 30MHz-1GHz

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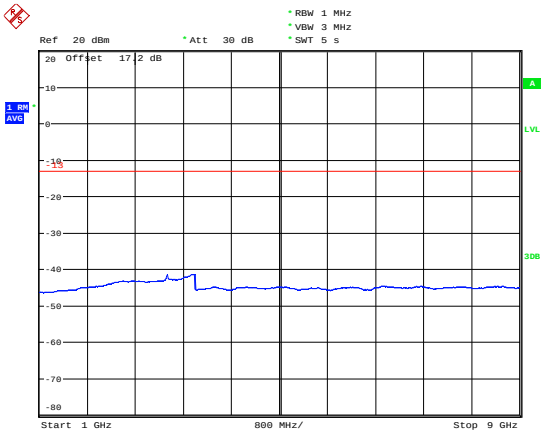
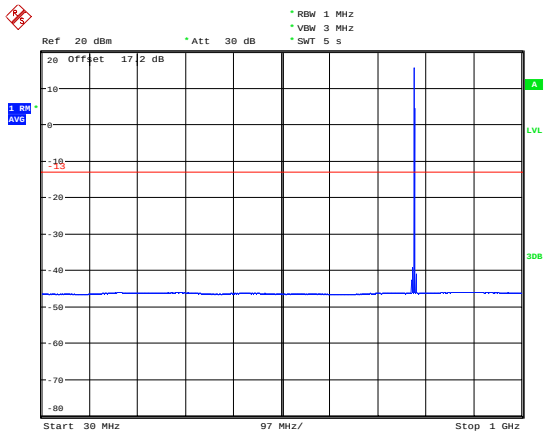
NB-IoT Band 13 CH-Low 1GHz-9GHz



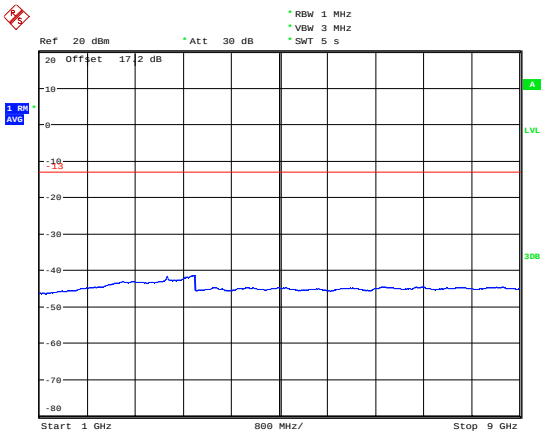

Date: 28.AUG.2019 13:11:41

NB-IoT Band 13 CH-Middle 30MHz-1GHz



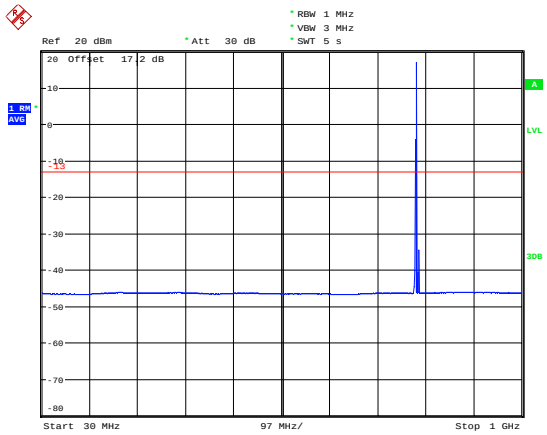

Date: 28.AUG.2019 13:02:59

NB-IoT Band 13 CH-Middle 1GHz-9GHz



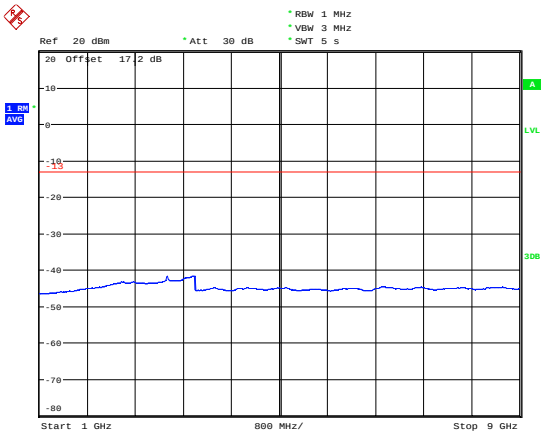

Date: 28.AUG.2019 13:15:47

NB-IoT Band 13 CH-High 30MHz-1GHz




Date: 28.AUG.2019 13:04:21

NB-IoT Band 13 CH-High 1GHz-9GHz




Date: 29.AUG.2019 10:57:02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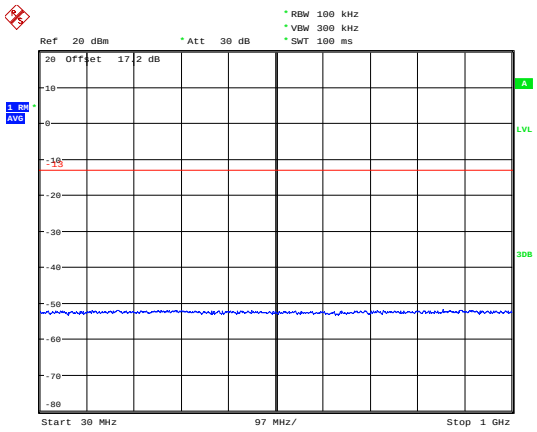
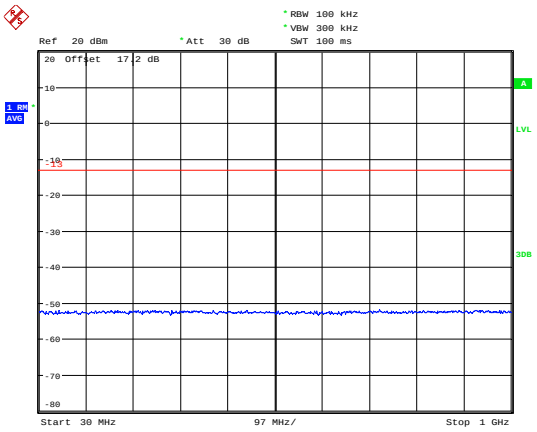
## NB-IoT Band 66 CH-Low 30MHz~1GHz



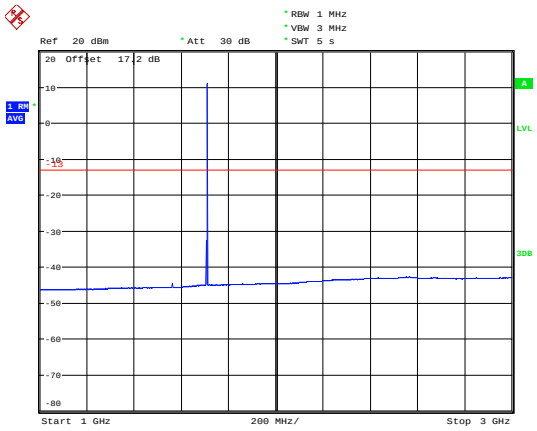

Date: 28.AUG.2019 11:53:58

## NB-IoT Band 66 CH-Middle 30MHz~1GHz



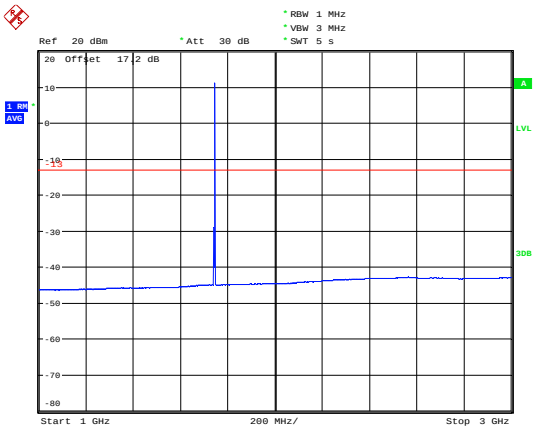

Date: 28.AUG.2019 11:59:29

## NB-IoT Band 66 CH-Low 1GHz~3GHz



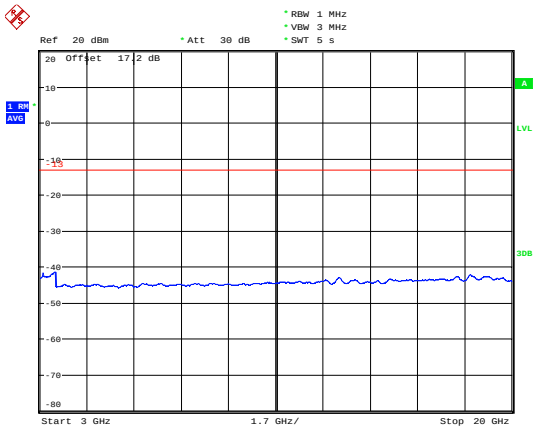

Date: 28.AUG.2019 15:59:44

## NB-IoT Band 66 CH-Middle 1GHz~3GHz



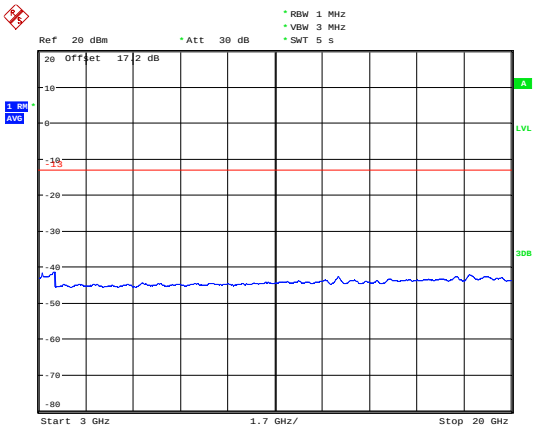

Date: 28.AUG.2019 16:01:53

## NB-IoT Band 66 CH-Low 3GHz~20GHz




Date: 28.AUG.2019 16:04:47

## NB-IoT Band 66 CH-Middle 3GHz~20GHz




Date: 28.AUG.2019 16:08:07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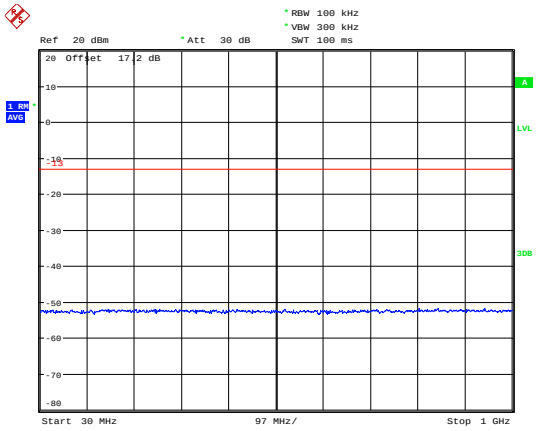
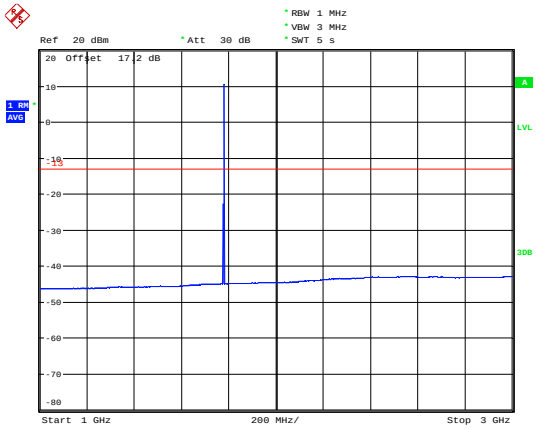
NB-IoT Band 66 CH-High 30MHz~1GHz



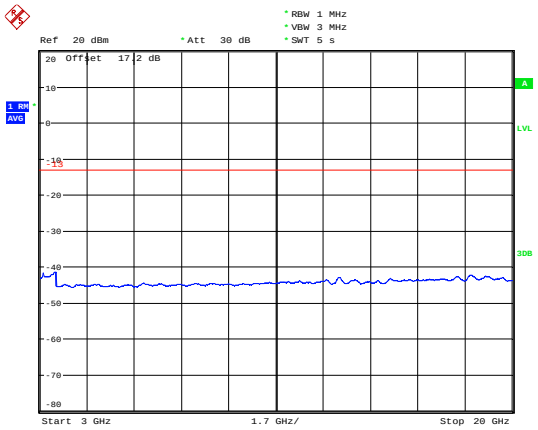

Date: 28.AUG.2019 11:58:44

NB-IoT Band 66 CH-High 1GHz~3GHz




Date: 28.AUG.2019 16:03:53

NB-IoT Band 66 CH-High 3GHz~20GHz




Date: 28.AUG.2019 16:08:49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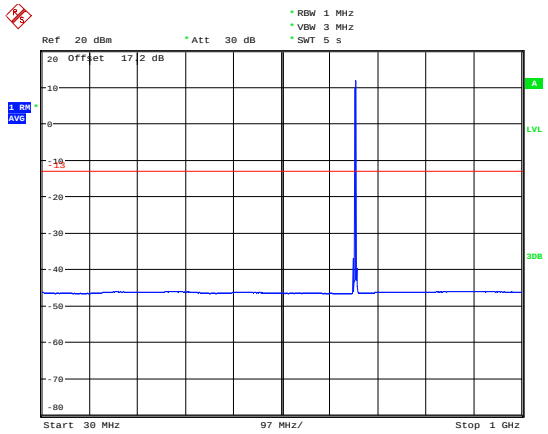
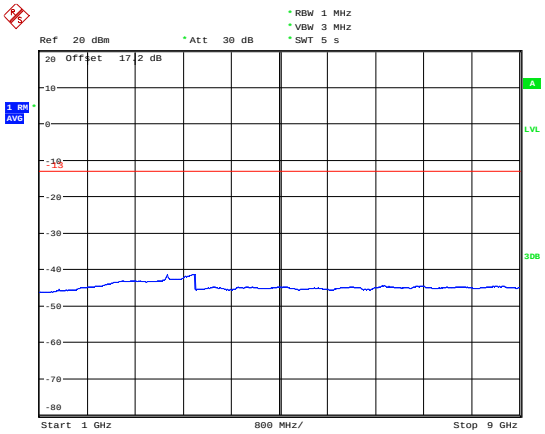
## NB-IoT Band 71 CH-Low 30MHz-1GHz



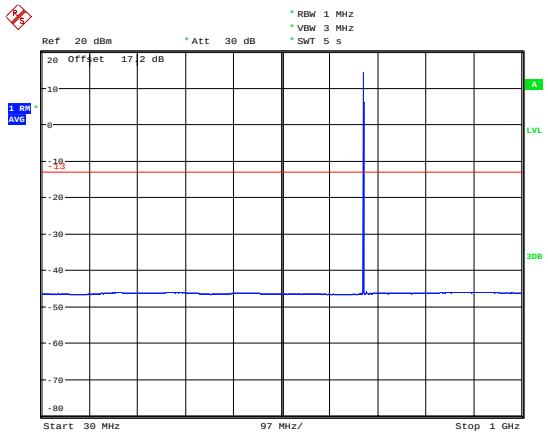

Date: 28.AUG.2019 16:12:57

## NB-IoT Band 71 CH-Low 1GHz-9GHz



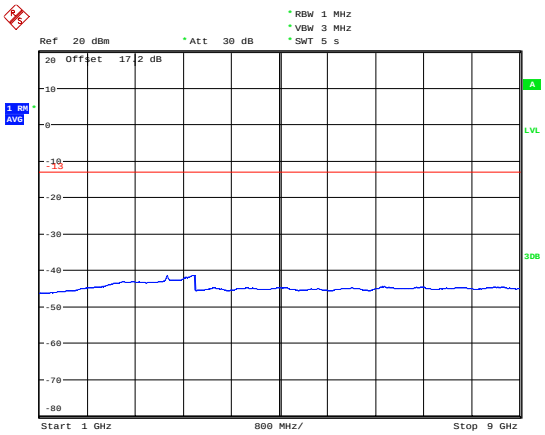

Date: 28.AUG.2019 16:17:20

## NB-IoT Band 71 CH-Middle 30MHz-1GHz



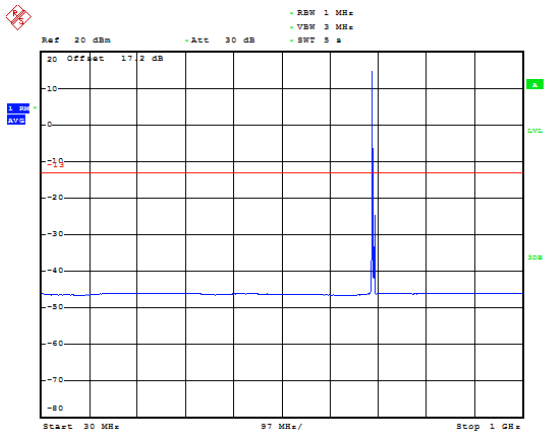

Date: 28.AUG.2019 16:14:45

## NB-IoT Band 71 CH-Middle 1GHz-9GHz



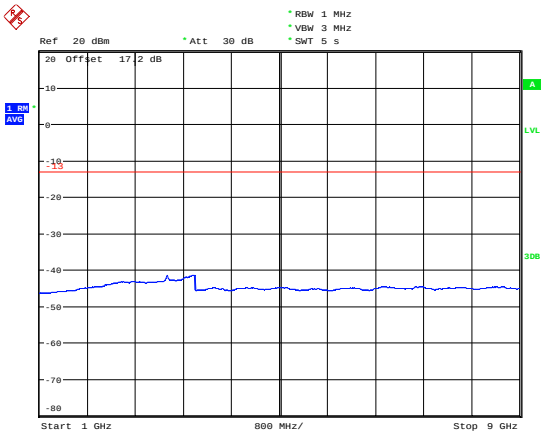

Date: 28.AUG.2019 16:18:50

## NB-IoT Band 71 CH-High 30MHz-1GHz




Date: 28.AUG.2019 16:15:50

## NB-IoT Band 71 CH-High 1GHz-9GHz




Date: 28.AUG.2019 16:20:00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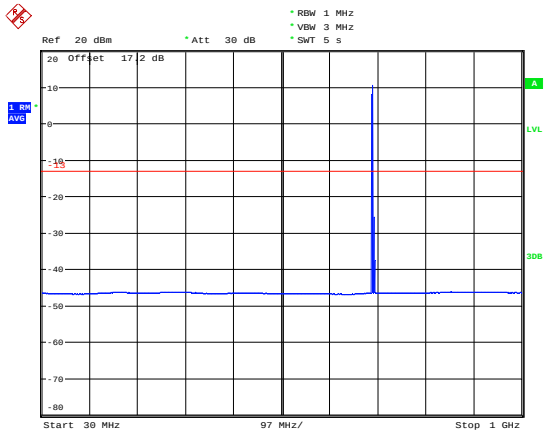
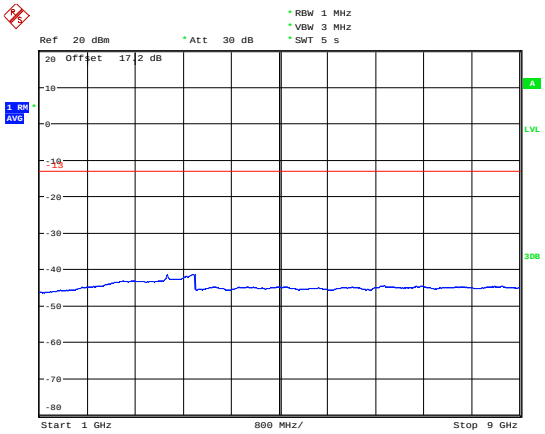
NB-IoT Band 85 CH-Low 30MHz-1GHz



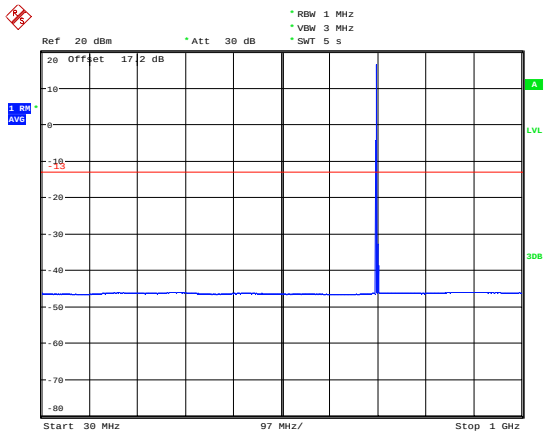

Date: 29.AUG.2019 11:00:34

NB-IoT Band 85 CH-Low 1GHz-9GHz



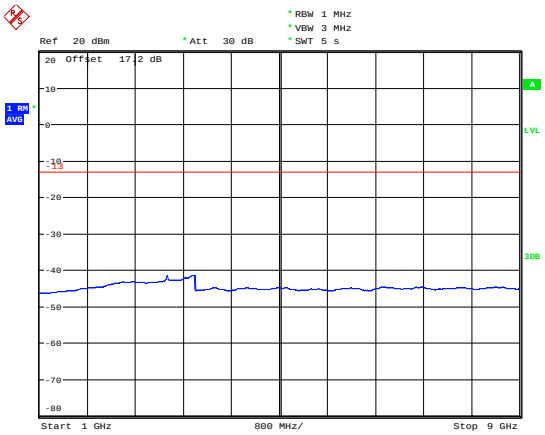

Date: 28.AUG.2019 17:01:58

NB-IoT Band 85 CH-Middle 30MHz-1GHz



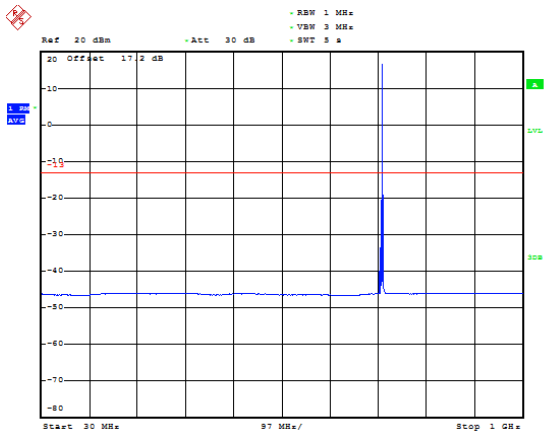

Date: 28.AUG.2019 16:57:53

NB-IoT Band 85 CH-Middle 1GHz-9GHz



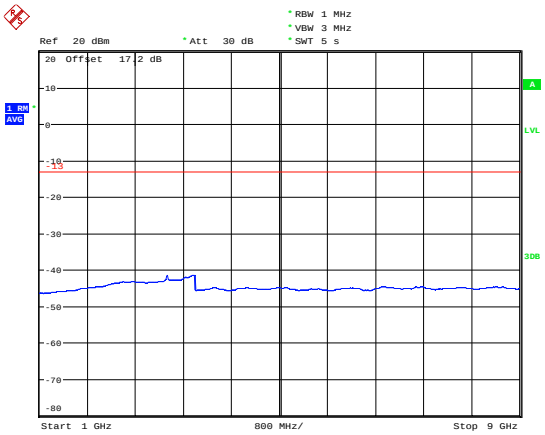

Date: 28.AUG.2019 17:06:19

NB-IoT Band 85 CH-High 30MHz-1GHz




Date: 28.AUG.2019 16:58:58

NB-IoT Band 85 CH-High 1GHz-9GHz




Date: 28.AUG.2019 17:06:28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## 5.8 Radiates Spurious Emission

**Ambient condition**

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 23°C ~25°C | 45%~50% | 101.5kPa |

**Method of Measurement**

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H). Above 1GHz: (Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.) The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).
3. A loop antenna, A log-periodic antenna or horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=200Hz,VBW=600Hz for 9kHz150kHz , RBW=10kHz, VBW=30kHz 150kHz-30MHz ,RBW=100kHz,VBW=300kHz for 30MHz to 1GHz and RBW=1MHz, VBW=3MHz for above 1GHz And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:
Power(EIRP)=PMea- PAg - Pcl + Ga
The measurement results are amend as described below:
Power(EIRP)=PMea- Pcl + Ga
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP


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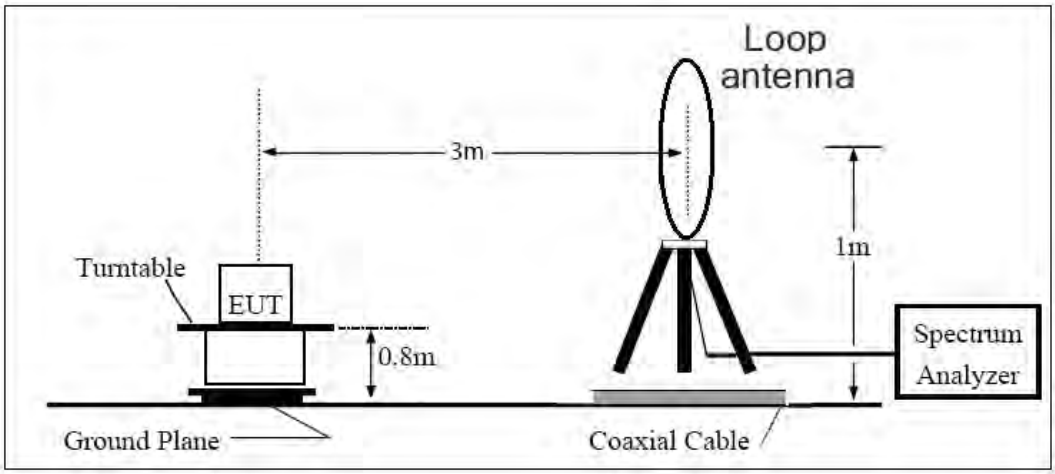
= EIRP-2.15dBi.

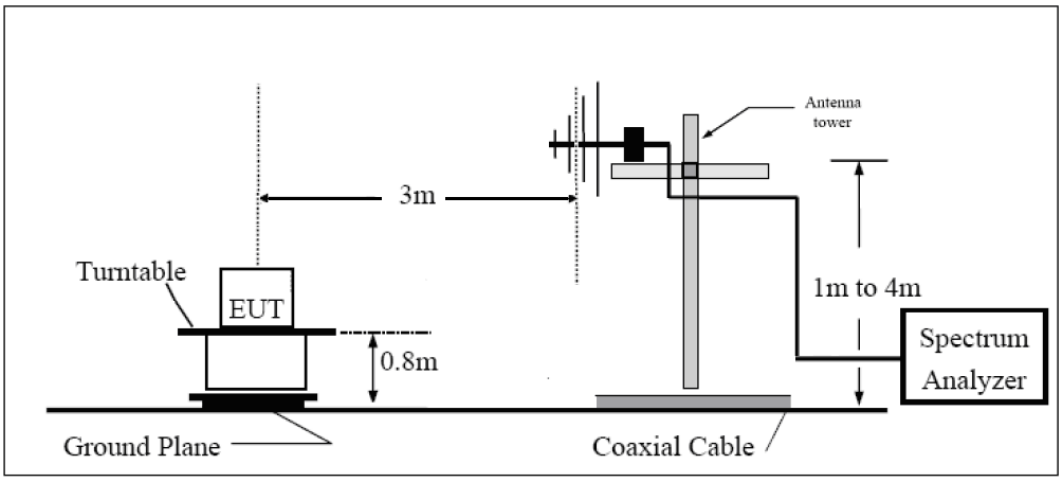
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

**Test setup**

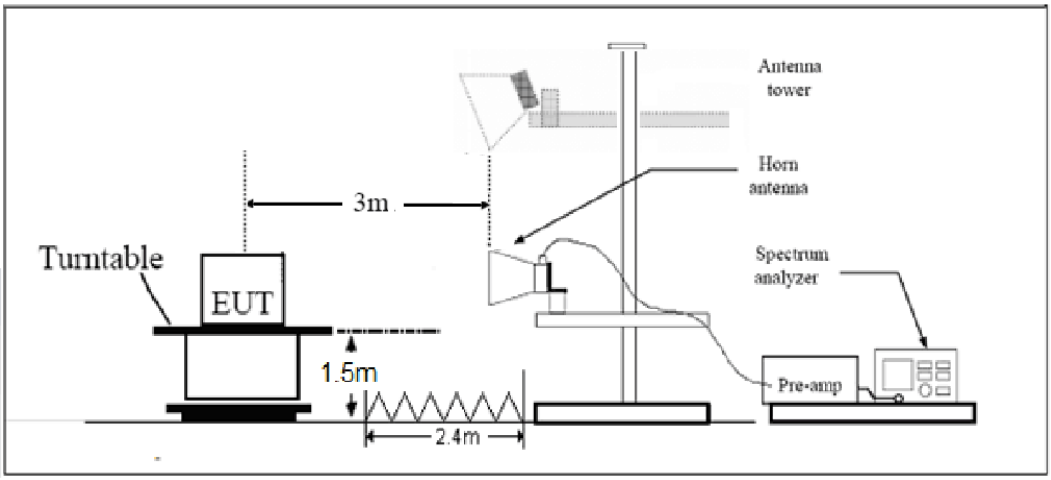
**9KHz ~ 30MHz**




**30MHz ~ 1GHz**




**Above 1GHz**




Note: Area side:2.4mX3.6m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**Limits**

Rule Part 27.53(h) specifies that “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.”

Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Rule Part 27.53(f)For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Rule Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;
(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

| | | |
|---|---|---|
| Part 27.53(a)/(h)/(g) Limit | | -13 dBm |
| Part 27.53(f) Limit | Limit out of the band 1559-1610 MHz | -13 dBm |
| | Limit in the band 1559-1610 MHz | -40 dBm |

**Measurement Uncertainty**


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The assessed measurement uncertainty to ensure 95％ confidence level for the normal distribution is with the coverage factor $k$ = ±1.96, $U$= ±3.55 dB.


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**Test Result**

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

**BG95-M3:**

NB-IoT Band 4 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3420 | -65.08 | 2.6 | 10.15 | Horizontal | -57.53 | -13.00 | 44.53 | 135 |
| 3 | 5130 | -63.53 | 2.4 | 11.35 | Horizontal | -54.58 | -13.00 | 41.58 | 180 |
| 4 | 6840 | -59.40 | 4.5 | 10.85 | Horizontal | -53.05 | -13.00 | 40.05 | 315 |
| 5 | 8550 | -57.11 | 5.1 | 11.35 | Horizontal | -50.86 | -13.00 | 37.86 | 135 |
| 6 | 10260 | -54.23 | 5.3 | 11.95 | Horizontal | -47.58 | -13.00 | 34.58 | 225 |
| 7 | 11970 | -54.17 | 5.5 | 13.55 | Horizontal | -46.12 | -13.00 | 33.12 | 90 |
| 8 | 13680 | -51.84 | 6.3 | 13.75 | Horizontal | -44.39 | -13.00 | 31.39 | 135 |
| 9 | 15390 | -53.29 | 6.7 | 13.85 | Horizontal | -46.14 | -13.00 | 33.14 | 45 |
| 10 | 17100 | -51.57 | 6.8 | 14.25 | Horizontal | -44.12 | -13.00 | 31.12 | 180 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 4 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3461 | -56.96 | 2.6 | 10.75 | Horizontal | -48.81 | -13.00 | 35.81 | 135 |
| 3 | 5191.5 | -58.68 | 2.4 | 11.05 | Horizontal | -50.03 | -13.00 | 37.03 | 180 |
| 4 | 6922 | -58.89 | 4.5 | 11.15 | Horizontal | -52.24 | -13.00 | 39.24 | 315 |
| 5 | 8652.5 | -51.97 | 5.1 | 11.35 | Horizontal | -45.72 | -13.00 | 32.72 | 135 |
| 6 | 10383 | -49.92 | 5.3 | 11.95 | Horizontal | -43.27 | -13.00 | 30.27 | 225 |
| 7 | 12113.5 | -49.60 | 5.5 | 13.55 | Horizontal | -41.55 | -13.00 | 28.55 | 90 |
| 8 | 13844 | -49.44 | 6.3 | 13.75 | Horizontal | -41.99 | -13.00 | 28.99 | 135 |
| 9 | 15574.5 | -49.78 | 6.7 | 13.85 | Horizontal | -42.63 | -13.00 | 29.63 | 45 |
| 10 | 17305 | -47.96 | 6.8 | 14.25 | Horizontal | -40.51 | -13.00 | 27.51 | 180 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 4 CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3509.8 | -58.37 | 2.6 | 10.15 | Horizontal | -50.82 | -13.00 | 37.82 | 135 |
| 3 | 5264.7 | -64.44 | 2.4 | 11.05 | Horizontal | -55.79 | -13.00 | 42.79 | 180 |
| 4 | 7019.6 | -59.61 | 4.5 | 11.15 | Horizontal | -52.96 | -13.00 | 39.96 | 315 |
| 5 | 8774.5 | -56.19 | 5.1 | 11.35 | Horizontal | -49.94 | -13.00 | 36.94 | 135 |
| 6 | 10529.4 | -54.89 | 5.3 | 11.95 | Horizontal | -48.24 | -13.00 | 35.24 | 225 |
| 7 | 12284.3 | -54.10 | 5.5 | 13.55 | Horizontal | -46.05 | -13.00 | 33.05 | 90 |
| 8 | 14039.2 | -52.01 | 6.3 | 13.75 | Horizontal | -44.56 | -13.00 | 31.56 | 135 |
| 9 | 15794.1 | -53.21 | 6.7 | 13.85 | Horizontal | -46.06 | -13.00 | 33.06 | 45 |
| 10 | 17549 | -51.92 | 6.8 | 14.25 | Horizontal | -44.47 | -13.00 | 31.47 | 180 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 12 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1398.2 | -46.83 | 2.00 | 10.15 | Horizontal | -40.83 | -13.00 | 27.83 | 315 |
| 3 | 2097.3 | -57.48 | 2.50 | 11.35 | Horizontal | -50.78 | -13.00 | 37.78 | 90 |
| 4 | 2796.4 | -60.67 | 4.20 | 10.85 | Horizontal | -56.17 | -13.00 | 43.17 | 45 |
| 5 | 3495.5 | -57.47 | 5.20 | 11.35 | Horizontal | -53.47 | -13.00 | 40.47 | 135 |
| 6 | 4194.6 | -59.28 | 5.50 | 11.95 | Horizontal | -54.98 | -13.00 | 41.98 | 180 |
| 7 | 4893.7 | -60.86 | 5.70 | 13.55 | Horizontal | -55.16 | -13.00 | 42.16 | 45 |
| 8 | 5592.8 | -59.80 | 6.30 | 13.75 | Horizontal | -54.50 | -13.00 | 41.50 | 225 |
| 9 | 6291.9 | -57.80 | 6.80 | 13.85 | Horizontal | -52.90 | -13.00 | 39.90 | 180 |
| 10 | 6991.0 | -56.68 | 6.90 | 14.25 | Horizontal | -51.48 | -13.00 | 38.48 | 180 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 12 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1415.0 | -59.85 | 2.00 | 10.75 | Horizontal | -53.25 | -13.00 | 40.25 | 270 |
| 3 | 2122.5 | -60.08 | 2.51 | 11.05 | Horizontal | -53.69 | -13.00 | 40.69 | 315 |
| 4 | 2830.0 | -63.66 | 4.20 | 11.15 | Horizontal | -58.86 | -13.00 | 45.86 | 180 |
| 5 | 3537.5 | -60.07 | 5.20 | 11.15 | Horizontal | -56.27 | -13.00 | 43.27 | 90 |
| 6 | 4245.0 | -61.54 | 5.50 | 11.95 | Horizontal | -57.24 | -13.00 | 44.24 | 45 |
| 7 | 4952.5 | -61.53 | 5.70 | 13.55 | Horizontal | -55.83 | -13.00 | 42.83 | 90 |
| 8 | 5660.0 | -60.89 | 6.30 | 13.75 | Horizontal | -55.59 | -13.00 | 42.59 | 135 |
| 9 | 6367.5 | -58.44 | 6.80 | 13.85 | Horizontal | -53.54 | -13.00 | 40.54 | 180 |
| 10 | 7075.0 | -55.41 | 6.90 | 14.25 | Horizontal | -50.21 | -13.00 | 37.21 | 315 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 12 CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1431.8 | -55.19 | 2.00 | 10.15 | Horizontal | -49.19 | -13.00 | 36.19 | 90 |
| 3 | 2147.7 | -50.65 | 2.51 | 11.05 | Horizontal | -44.26 | -13.00 | 31.26 | 45 |
| 4 | 2863.6 | -64.17 | 4.20 | 11.15 | Horizontal | -59.37 | -13.00 | 46.37 | 90 |
| 5 | 3579.5 | -60.53 | 5.20 | 11.15 | Horizontal | -56.73 | -13.00 | 43.73 | 135 |
| 6 | 4295.4 | -60.92 | 5.50 | 11.95 | Horizontal | -56.62 | -13.00 | 43.62 | 225 |
| 7 | 5011.3 | -60.94 | 5.70 | 13.55 | Horizontal | -55.24 | -13.00 | 42.24 | 90 |
| 8 | 5727.2 | -61.17 | 6.30 | 13.75 | Horizontal | -55.87 | -13.00 | 42.87 | 135 |
| 9 | 6443.1 | -58.78 | 6.80 | 13.85 | Horizontal | -53.88 | -13.00 | 40.88 | 45 |
| 10 | 7159.0 | -55.89 | 6.90 | 14.25 | Horizontal | -50.69 | -13.00 | 37.69 | 225 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 13 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1554.2 | -58.73 | 2.00 | 10.15 | Horizontal | -52.73 | -13.00 | 39.73 | 45 |
| 3 | 2331.3 | -46.36 | 2.50 | 11.35 | Horizontal | -39.66 | -13.00 | 26.66 | 315 |
| 4 | 3108.4 | -57.30 | 4.20 | 10.85 | Horizontal | -52.80 | -13.00 | 39.80 | 180 |
| 5 | 3885.5 | -60.00 | 5.20 | 11.35 | Horizontal | -56.00 | -13.00 | 43.00 | 90 |
| 6 | 4662.6 | -59.99 | 5.50 | 11.95 | Horizontal | -55.69 | -13.00 | 42.69 | 45 |
| 7 | 5439.7 | -60.97 | 5.70 | 13.55 | Horizontal | -55.27 | -13.00 | 42.27 | 90 |
| 8 | 6216.8 | -59.12 | 6.30 | 13.75 | Horizontal | -53.82 | -13.00 | 40.82 | 135 |
| 9 | 6993.9 | -56.12 | 6.80 | 13.85 | Horizontal | -51.22 | -13.00 | 38.22 | 180 |
| 10 | 7771.0 | -54.63 | 6.90 | 14.25 | Horizontal | -49.43 | -13.00 | 36.43 | 45 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 13 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1564.0 | -60.47 | 2.00 | 10.75 | Horizontal | -53.87 | -40.00 | 13.87 | 90 |
| 3 | 2346.0 | -48.12 | 2.51 | 11.05 | Horizontal | -41.73 | -13.00 | 28.73 | 45 |
| 4 | 3128.0 | -58.76 | 4.20 | 11.15 | Horizontal | -53.96 | -13.00 | 40.96 | 225 |
| 5 | 3910.0 | -59.13 | 5.20 | 11.15 | Horizontal | -55.33 | -13.00 | 42.33 | 180 |
| 6 | 4692.0 | -59.96 | 5.50 | 11.95 | Horizontal | -55.66 | -13.00 | 42.66 | 180 |
| 7 | 5474.0 | -59.97 | 5.70 | 13.55 | Horizontal | -54.27 | -13.00 | 41.27 | 90 |
| 8 | 6256.0 | -58.99 | 6.30 | 13.75 | Horizontal | -53.69 | -13.00 | 40.69 | 45 |
| 9 | 7038.0 | -54.87 | 6.80 | 13.85 | Horizontal | -49.97 | -13.00 | 36.97 | 90 |
| 10 | 7820.0 | -54.71 | 6.90 | 14.25 | Horizontal | -49.51 | -13.00 | 36.51 | 135 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 13 CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1573.8 | -62.98 | 2.00 | 10.15 | Horizontal | -56.98 | -40.00 | 16.98 | 270 |
| 3 | 2360.7 | -48.46 | 2.51 | 11.05 | Horizontal | -42.07 | -13.00 | 29.07 | 315 |
| 4 | 3147.6 | -59.64 | 4.20 | 11.15 | Horizontal | -54.84 | -13.00 | 41.84 | 180 |
| 5 | 3934.5 | -59.95 | 5.20 | 11.15 | Horizontal | -56.15 | -13.00 | 43.15 | 315 |
| 6 | 4721.4 | -59.81 | 5.50 | 11.95 | Horizontal | -55.51 | -13.00 | 42.51 | 135 |
| 7 | 5508.3 | -59.78 | 5.70 | 13.55 | Horizontal | -54.08 | -13.00 | 41.08 | 225 |
| 8 | 6295.2 | -56.75 | 6.30 | 13.75 | Horizontal | -51.45 | -13.00 | 38.45 | 90 |
| 9 | 7082.1 | -54.91 | 6.80 | 13.85 | Horizontal | -50.01 | -13.00 | 37.01 | 135 |
| 10 | 7869.0 | -54.22 | 6.90 | 14.25 | Horizontal | -49.02 | -13.00 | 36.02 | 45 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 66 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3420.2 | -54.76 | 2.6 | 10.15 | Horizontal | -47.21 | -13.00 | 34.21 | 45 |
| 3 | 5130.3 | -61.68 | 2.4 | 11.35 | Horizontal | -52.73 | -13.00 | 39.73 | 315 |
| 4 | 6840.4 | -58.21 | 4.5 | 10.85 | Horizontal | -51.86 | -13.00 | 38.86 | 90 |
| 5 | 8550.5 | -56.02 | 5.1 | 11.35 | Horizontal | -49.77 | -13.00 | 36.77 | 45 |
| 6 | 10260.6 | -52.31 | 5.3 | 11.95 | Horizontal | -45.66 | -13.00 | 32.66 | 270 |
| 7 | 11970.7 | -53.22 | 5.5 | 13.55 | Horizontal | -45.17 | -13.00 | 32.17 | 315 |
| 8 | 13680.8 | -52.74 | 6.3 | 13.75 | Horizontal | -45.29 | -13.00 | 32.29 | 180 |
| 9 | 15390.9 | -53.72 | 6.7 | 13.85 | Horizontal | -46.57 | -13.00 | 33.57 | 90 |
| 10 | 17101 | -50.64 | 6.8 | 14.25 | Horizontal | -43.19 | -13.00 | 30.19 | 45 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 66 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3490 | -58.18 | 2.6 | 10.75 | Horizontal | -50.03 | -13.00 | 37.03 | 135 |
| 3 | 5235 | -63.07 | 2.4 | 11.05 | Horizontal | -54.42 | -13.00 | 41.42 | 180 |
| 4 | 6980 | -59.02 | 4.5 | 11.15 | Horizontal | -52.37 | -13.00 | 39.37 | 45 |
| 5 | 8725 | -56.67 | 5.1 | 11.35 | Horizontal | -50.42 | -13.00 | 37.42 | 225 |
| 6 | 10470 | -54.11 | 5.3 | 11.95 | Horizontal | -47.46 | -13.00 | 34.46 | 180 |
| 7 | 12215 | -54.86 | 5.5 | 13.55 | Horizontal | -46.81 | -13.00 | 33.81 | 180 |
| 8 | 13960 | -51.21 | 6.3 | 13.75 | Horizontal | -43.76 | -13.00 | 30.76 | 90 |
| 9 | 15705 | -53.14 | 6.7 | 13.85 | Horizontal | -45.99 | -13.00 | 32.99 | 45 |
| 10 | 17450 | -52.45 | 6.8 | 14.25 | Horizontal | -45.00 | -13.00 | 32.00 | 90 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 66 CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3559.8 | -58.95 | 2.6 | 10.15 | Horizontal | -51.40 | -13.00 | 38.40 | 135 |
| 3 | 5339.7 | -64.34 | 2.4 | 11.05 | Horizontal | -55.69 | -13.00 | 42.69 | 180 |
| 4 | 7119.6 | -56.77 | 4.5 | 11.15 | Horizontal | -50.12 | -13.00 | 37.12 | 315 |
| 5 | 8899.5 | -55.43 | 5.1 | 11.35 | Horizontal | -49.18 | -13.00 | 36.18 | 135 |
| 6 | 10679.4 | -53.28 | 5.3 | 11.95 | Horizontal | -46.63 | -13.00 | 33.63 | 225 |
| 7 | 12459.3 | -53.55 | 5.5 | 13.55 | Horizontal | -45.50 | -13.00 | 32.50 | 90 |
| 8 | 14239.2 | -52.63 | 6.3 | 13.75 | Horizontal | -45.18 | -13.00 | 32.18 | 135 |
| 9 | 16019.1 | -52.93 | 6.7 | 13.85 | Horizontal | -45.78 | -13.00 | 32.78 | 45 |
| 10 | 17799 | -50.77 | 6.8 | 14.25 | Horizontal | -43.32 | -13.00 | 30.32 | 180 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 71 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1331.0 | -45.99 | 2.00 | 10.15 | Horizontal | -39.99 | -13.00 | 26.99 | 0 |
| 3 | 1996.5 | -44.36 | 2.50 | 11.35 | Horizontal | -37.66 | -13.00 | 24.66 | 45 |
| 4 | 2662.0 | -56.41 | 4.20 | 10.85 | Horizontal | -51.91 | -13.00 | 38.91 | 135 |
| 5 | 3327.5 | -54.49 | 5.20 | 11.35 | Horizontal | -50.49 | -13.00 | 37.49 | 270 |
| 6 | 3993.0 | -53.07 | 5.50 | 11.95 | Horizontal | -48.77 | -13.00 | 35.77 | 315 |
| 7 | 4658.5 | -53.21 | 5.70 | 13.55 | Horizontal | -47.51 | -13.00 | 34.51 | 270 |
| 8 | 5324.0 | -52.15 | 6.30 | 13.75 | Horizontal | -46.85 | -13.00 | 33.85 | 45 |
| 9 | 5989.5 | -51.75 | 6.80 | 13.85 | Horizontal | -46.85 | -13.00 | 33.85 | 270 |
| 10 | 6655.0 | -50.00 | 6.90 | 14.25 | Horizontal | -44.80 | -13.00 | 31.80 | 0 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 71 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1361.0 | -47.70 | 2.00 | 10.75 | Horizontal | -41.10 | -13.00 | 28.10 | 90 |
| 3 | 2041.5 | -46.24 | 2.51 | 11.05 | Horizontal | -39.85 | -13.00 | 26.85 | 180 |
| 4 | 2722.0 | -60.49 | 4.20 | 11.15 | Horizontal | -55.69 | -13.00 | 42.69 | 270 |
| 5 | 3402.5 | -61.89 | 5.20 | 11.15 | Horizontal | -58.09 | -13.00 | 45.09 | 0 |
| 6 | 4083.0 | -60.20 | 5.50 | 11.95 | Horizontal | -55.90 | -13.00 | 42.90 | 135 |
| 7 | 4763.5 | -60.82 | 5.70 | 13.55 | Horizontal | -55.12 | -13.00 | 42.12 | 90 |
| 8 | 5444.0 | -60.24 | 6.30 | 13.75 | Horizontal | -54.94 | -13.00 | 41.94 | 45 |
| 9 | 6124.5 | -59.77 | 6.80 | 13.85 | Horizontal | -54.87 | -13.00 | 41.87 | 180 |
| 10 | 6805.0 | -56.01 | 6.90 | 14.25 | Horizontal | -50.81 | -13.00 | 37.81 | 90 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 71 CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1391.0 | -45.06 | 2.00 | 10.15 | Horizontal | -39.06 | -13.00 | 26.06 | 45 |
| 3 | 2086.5 | -54.72 | 2.51 | 11.05 | Horizontal | -48.33 | -13.00 | 35.33 | 9 |
| 4 | 2782.0 | -56.11 | 4.20 | 11.15 | Horizontal | -51.31 | -13.00 | 38.31 | 180 |
| 5 | 3477.5 | -56.09 | 5.20 | 11.15 | Horizontal | -52.29 | -13.00 | 39.29 | 45 |
| 6 | 4173.0 | -59.62 | 5.50 | 11.95 | Horizontal | -55.32 | -13.00 | 42.32 | 0 |
| 7 | 4868.5 | -60.91 | 5.70 | 13.55 | Horizontal | -55.21 | -13.00 | 42.21 | 180 |
| 8 | 5564.0 | -60.75 | 6.30 | 13.75 | Horizontal | -55.45 | -13.00 | 42.45 | 135 |
| 9 | 6259.5 | -59.31 | 6.80 | 13.85 | Horizontal | -54.41 | -13.00 | 41.41 | 270 |
| 10 | 6955.0 | -56.81 | 6.90 | 14.25 | Horizontal | -51.61 | -13.00 | 38.61 | 0 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 85 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1396.2 | -47.06 | 2.00 | 10.15 | Horizontal | -41.06 | -13.00 | 28.06 | 135 |
| 3 | 2094.3 | -53.77 | 2.50 | 11.35 | Horizontal | -47.07 | -13.00 | 34.07 | 12 |
| 4 | 2792.4 | -57.67 | 4.20 | 10.85 | Horizontal | -53.17 | -13.00 | 40.17 | 0 |
| 5 | 3490.5 | -56.56 | 5.20 | 11.35 | Horizontal | -52.56 | -13.00 | 39.56 | 0 |
| 6 | 4188.6 | -60.32 | 5.50 | 11.95 | Horizontal | -56.02 | -13.00 | 43.02 | 135 |
| 7 | 4886.7 | -65.64 | 5.70 | 13.55 | Horizontal | -59.94 | -13.00 | 46.94 | 270 |
| 8 | 5584.8 | -60.83 | 6.30 | 13.75 | Horizontal | -55.53 | -13.00 | 42.53 | 0 |
| 9 | 6282.9 | -58.74 | 6.80 | 13.85 | Horizontal | -53.84 | -13.00 | 40.84 | 180 |
| 10 | 6981.0 | -56.60 | 6.90 | 14.25 | Horizontal | -51.40 | -13.00 | 38.40 | 45 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 85 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1411.8 | -44.92 | 2.00 | 10.75 | Horizontal | -38.32 | -13.00 | 25.32 | 180 |
| 3 | 2117.7 | -49.68 | 2.51 | 11.05 | Horizontal | -43.29 | -13.00 | 30.29 | 270 |
| 4 | 2823.6 | -58.43 | 4.20 | 11.15 | Horizontal | -53.63 | -13.00 | 40.63 | 45 |
| 5 | 3529.5 | -58.99 | 5.20 | 11.15 | Horizontal | -55.19 | -13.00 | 42.19 | 90 |
| 6 | 4235.4 | -60.50 | 5.50 | 11.95 | Horizontal | -56.20 | -13.00 | 43.20 | 135 |
| 7 | 4941.3 | -61.26 | 5.70 | 13.55 | Horizontal | -55.56 | -13.00 | 42.56 | 270 |
| 8 | 5647.2 | -60.37 | 6.30 | 13.75 | Horizontal | -55.07 | -13.00 | 42.07 | 315 |
| 9 | 6353.1 | -59.22 | 6.80 | 13.85 | Horizontal | -54.32 | -13.00 | 41.32 | 180 |
| 10 | 7059.0 | -56.89 | 6.90 | 14.25 | Horizontal | -51.69 | -13.00 | 38.69 | 45 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 85 CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1431.8 | -52.66 | 2.00 | 10.15 | Horizontal | -46.66 | -13.00 | 33.66 | 90 |
| 3 | 2147.7 | -49.92 | 2.51 | 11.05 | Horizontal | -43.53 | -13.00 | 30.53 | 180 |
| 4 | 2863.6 | -60.60 | 4.20 | 11.15 | Horizontal | -55.80 | -13.00 | 42.80 | 45 |
| 5 | 3579.5 | -58.53 | 5.20 | 11.15 | Horizontal | -54.73 | -13.00 | 41.73 | 0 |
| 6 | 4295.4 | -60.14 | 5.50 | 11.95 | Horizontal | -55.84 | -13.00 | 42.84 | 90 |
| 7 | 5011.3 | -60.78 | 5.70 | 13.55 | Horizontal | -55.08 | -13.00 | 42.08 | 45 |
| 8 | 5727.2 | -60.60 | 6.30 | 13.75 | Horizontal | -55.30 | -13.00 | 42.30 | 45 |
| 9 | 6443.1 | -60.05 | 6.80 | 13.85 | Horizontal | -55.15 | -13.00 | 42.15 | 135 |
| 10 | 7159.0 | -55.57 | 6.90 | 14.25 | Horizontal | -50.37 | -13.00 | 37.37 | 315 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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**BG95-M3 MINIPCIE:**

NB-IoT Band 4 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3420.0 | -53.81 | 2.6 | 10.15 | Horizontal | -46.26 | -13.00 | 33.26 | 270 |
| 3 | 5130.0 | -62.37 | 2.4 | 11.35 | Horizontal | -53.42 | -13.00 | 40.42 | 270 |
| 4 | 6840.0 | -57.83 | 4.5 | 10.85 | Horizontal | -51.48 | -13.00 | 38.48 | 45 |
| 5 | 8550.0 | -53.39 | 5.1 | 11.35 | Horizontal | -47.14 | -13.00 | 34.14 | 90 |
| 6 | 10260.0 | -51.92 | 5.3 | 11.95 | Horizontal | -45.27 | -13.00 | 32.27 | 315 |
| 7 | 11970.0 | -52.36 | 5.5 | 13.55 | Horizontal | -44.31 | -13.00 | 31.31 | 135 |
| 8 | 13680.0 | -51.19 | 6.3 | 13.75 | Horizontal | -43.74 | -13.00 | 30.74 | 270 |
| 9 | 15390.0 | -53.02 | 6.7 | 13.85 | Horizontal | -45.87 | -13.00 | 32.87 | 0 |
| 10 | 17100.0 | -49.48 | 6.8 | 14.25 | Horizontal | -42.03 | -13.00 | 29.03 | 0 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 4 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3465.0 | -53.63 | 2.6 | 10.75 | Horizontal | -45.48 | -13.00 | 32.48 | 90 |
| 3 | 5197.5 | -62.73 | 2.4 | 11.05 | Horizontal | -54.08 | -13.00 | 41.08 | 315 |
| 4 | 6930.0 | -57.27 | 4.5 | 11.15 | Horizontal | -50.62 | -13.00 | 37.62 | 135 |
| 5 | 8662.5 | -54.09 | 5.1 | 11.35 | Horizontal | -47.84 | -13.00 | 34.84 | 0 |
| 6 | 10395.0 | -51.85 | 5.3 | 11.95 | Horizontal | -45.20 | -13.00 | 32.20 | 45 |
| 7 | 12127.5 | -53.13 | 5.5 | 13.55 | Horizontal | -45.08 | -13.00 | 32.08 | 45 |
| 8 | 13860.0 | -49.77 | 6.3 | 13.75 | Horizontal | -42.32 | -13.00 | 29.32 | 270 |
| 9 | 15592.5 | -53.40 | 6.7 | 13.85 | Horizontal | -46.25 | -13.00 | 33.25 | 90 |
| 10 | 17325.0 | -49.29 | 6.8 | 14.25 | Horizontal | -41.84 | -13.00 | 28.84 | 315 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 4 CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3509.8 | -56.66 | 2.6 | 10.15 | Horizontal | -49.11 | -13.00 | 36.11 | 180 |
| 3 | 5264.7 | -63.73 | 2.4 | 11.05 | Horizontal | -55.08 | -13.00 | 42.08 | 135 |
| 4 | 7019.6 | -54.37 | 4.5 | 11.15 | Horizontal | -47.72 | -13.00 | 34.72 | 0 |
| 5 | 8774.5 | -53.86 | 5.1 | 11.35 | Horizontal | -47.61 | -13.00 | 34.61 | 270 |
| 6 | 10529.4 | -52.21 | 5.3 | 11.95 | Horizontal | -45.56 | -13.00 | 32.56 | 45 |
| 7 | 12284.3 | -51.39 | 5.5 | 13.55 | Horizontal | -43.34 | -13.00 | 30.34 | 315 |
| 8 | 14039.2 | -49.21 | 6.3 | 13.75 | Horizontal | -41.76 | -13.00 | 28.76 | 45 |
| 9 | 15794.1 | -52.18 | 6.7 | 13.85 | Horizontal | -45.03 | -13.00 | 32.03 | 90 |
| 10 | 17549.0 | -49.55 | 6.8 | 14.25 | Horizontal | -42.10 | -13.00 | 29.10 | 0 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 12 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1398.2 | -38.81 | 2.00 | 10.15 | Horizontal | -32.81 | -13.00 | 19.81 | 45 |
| 3 | 2097.3 | -54.87 | 2.50 | 11.35 | Horizontal | -48.17 | -13.00 | 35.17 | 45 |
| 4 | 2796.4 | -59.53 | 4.20 | 10.85 | Horizontal | -55.03 | -13.00 | 42.03 | 180 |
| 5 | 3495.5 | -57.97 | 5.20 | 11.35 | Horizontal | -53.97 | -13.00 | 40.97 | 270 |
| 6 | 4194.6 | -57.54 | 5.50 | 11.95 | Horizontal | -53.24 | -13.00 | 40.24 | 45 |
| 7 | 4893.7 | -60.85 | 5.70 | 13.55 | Horizontal | -55.15 | -13.00 | 42.15 | 0 |
| 8 | 5592.8 | -59.57 | 6.30 | 13.75 | Horizontal | -54.27 | -13.00 | 41.27 | 180 |
| 9 | 6291.9 | -58.00 | 6.80 | 13.85 | Horizontal | -53.10 | -13.00 | 40.10 | 135 |
| 10 | 6991.0 | -55.99 | 6.90 | 14.25 | Horizontal | -50.79 | -13.00 | 37.79 | 45 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 12 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1415.0 | -55.37 | 2.00 | 10.75 | Horizontal | -48.77 | -13.00 | 35.77 | 0 |
| 3 | 2122.5 | -52.09 | 2.51 | 11.05 | Horizontal | -45.70 | -13.00 | 32.70 | 270 |
| 4 | 2830.0 | -61.11 | 4.20 | 11.15 | Horizontal | -56.31 | -13.00 | 43.31 | 90 |
| 5 | 3525.5 | -58.67 | 5.20 | 11.15 | Horizontal | -54.87 | -13.00 | 41.87 | 0 |
| 6 | 4230.6 | -59.49 | 5.50 | 11.95 | Horizontal | -55.19 | -13.00 | 42.19 | 270 |
| 7 | 4935.7 | -60.59 | 5.70 | 13.55 | Horizontal | -54.89 | -13.00 | 41.89 | 225 |
| 8 | 5640.8 | -60.23 | 6.30 | 13.75 | Horizontal | -54.93 | -13.00 | 41.93 | 45 |
| 9 | 6345.9 | -55.81 | 6.80 | 13.85 | Horizontal | -50.91 | -13.00 | 37.91 | 90 |
| 10 | 7051.0 | -53.14 | 6.90 | 14.25 | Horizontal | -47.94 | -13.00 | 34.94 | 0 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 12 CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1431.8 | -40.40 | 2.00 | 10.15 | Horizontal | -34.40 | -13.00 | 21.40 | 315 |
| 3 | 2147.7 | -50.60 | 2.51 | 11.05 | Horizontal | -44.21 | -13.00 | 31.21 | 0 |
| 4 | 2863.6 | -61.72 | 4.20 | 11.15 | Horizontal | -56.92 | -13.00 | 43.92 | 180 |
| 5 | 3579.5 | -58.67 | 5.20 | 11.15 | Horizontal | -54.87 | -13.00 | 41.87 | 180 |
| 6 | 4295.4 | -58.90 | 5.50 | 11.95 | Horizontal | -54.60 | -13.00 | 41.60 | 315 |
| 7 | 5011.3 | -58.90 | 5.70 | 13.55 | Horizontal | -53.20 | -13.00 | 40.20 | 90 |
| 8 | 5727.2 | -58.73 | 6.30 | 13.75 | Horizontal | -53.43 | -13.00 | 40.43 | 135 |
| 9 | 6443.1 | -57.96 | 6.80 | 13.85 | Horizontal | -53.06 | -13.00 | 40.06 | 225 |
| 10 | 7159.0 | -52.49 | 6.90 | 14.25 | Horizontal | -47.29 | -13.00 | 34.29 | 270 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 13 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1554.2 | -64.62 | 2.00 | 10.15 | Horizontal | -58.62 | -13.00 | 45.62 | 90 |
| 3 | 2331.3 | -63.28 | 2.50 | 11.35 | Horizontal | -56.58 | -13.00 | 43.58 | 45 |
| 4 | 3108.4 | -57.84 | 4.20 | 10.85 | Horizontal | -53.34 | -13.00 | 40.34 | 225 |
| 5 | 3885.5 | -58.20 | 5.20 | 11.35 | Horizontal | -54.20 | -13.00 | 41.20 | 180 |
| 6 | 4662.6 | -53.00 | 5.50 | 11.95 | Horizontal | -48.70 | -13.00 | 35.70 | 0 |
| 7 | 5439.7 | -56.30 | 5.70 | 13.55 | Horizontal | -50.60 | -13.00 | 37.60 | 0 |
| 8 | 6216.8 | -56.80 | 6.30 | 13.75 | Horizontal | -51.50 | -13.00 | 38.50 | 90 |
| 9 | 6993.9 | -57.80 | 6.80 | 13.85 | Horizontal | -52.90 | -13.00 | 39.90 | 45 |
| 10 | 7771.0 | -54.40 | 6.90 | 14.25 | Horizontal | -49.20 | -13.00 | 36.20 | 315 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 13 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1564.0 | -64.88 | 2.00 | 10.75 | Horizontal | -58.28 | -40.00 | 18.28 | 270 |
| 3 | 2346.0 | -64.37 | 2.51 | 11.05 | Horizontal | -57.98 | -13.00 | 44.98 | 45 |
| 4 | 3128.0 | -58.50 | 4.20 | 11.15 | Horizontal | -53.70 | -13.00 | 40.70 | 90 |
| 5 | 3910.0 | -55.26 | 5.20 | 11.15 | Horizontal | -51.46 | -13.00 | 38.46 | 135 |
| 6 | 4692.0 | -55.34 | 5.50 | 11.95 | Horizontal | -51.04 | -13.00 | 38.04 | 0 |
| 7 | 5474.0 | -56.56 | 5.70 | 13.55 | Horizontal | -50.86 | -13.00 | 37.86 | 315 |
| 8 | 6256.0 | -56.20 | 6.30 | 13.75 | Horizontal | -50.90 | -13.00 | 37.90 | 225 |
| 9 | 7038.0 | -56.17 | 6.80 | 13.85 | Horizontal | -51.27 | -13.00 | 38.27 | 135 |
| 10 | 7820.0 | -53.84 | 6.90 | 14.25 | Horizontal | -48.64 | -13.00 | 35.64 | 45 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 13 CH-High


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| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1573.8 | -66.45 | 2.00 | 10.15 | Horizontal | -60.45 | -40.00 | 20.45 | 45 |
| 3 | 2360.7 | -63.35 | 2.51 | 11.05 | Horizontal | -56.96 | -13.00 | 43.96 | 315 |
| 4 | 3147.6 | -59.04 | 4.20 | 11.15 | Horizontal | -54.24 | -13.00 | 41.24 | 90 |
| 5 | 3934.5 | -57.98 | 5.20 | 11.15 | Horizontal | -54.18 | -13.00 | 41.18 | 90 |
| 6 | 4721.4 | -52.70 | 5.50 | 11.95 | Horizontal | -48.40 | -13.00 | 35.40 | 0 |
| 7 | 5508.3 | -55.60 | 5.70 | 13.55 | Horizontal | -49.90 | -13.00 | 36.90 | 315 |
| 8 | 6295.2 | -56.70 | 6.30 | 13.75 | Horizontal | -51.40 | -13.00 | 38.40 | 225 |
| 9 | 7082.1 | -55.00 | 6.80 | 13.85 | Horizontal | -50.10 | -13.00 | 37.10 | 180 |
| 10 | 7869.0 | -54.70 | 6.90 | 14.25 | Horizontal | -49.50 | -13.00 | 36.50 | 270 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 66 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3420.2 | -51.17 | 2.6 | 10.15 | Horizontal | -43.62 | -13.00 | 30.62 | 0 |
| 3 | 5130.3 | -62.15 | 2.4 | 11.35 | Horizontal | -53.20 | -13.00 | 40.20 | 270 |
| 4 | 6840.4 | -57.23 | 4.5 | 10.85 | Horizontal | -50.88 | -13.00 | 37.88 | 225 |
| 5 | 8550.5 | -53.61 | 5.1 | 11.35 | Horizontal | -47.36 | -13.00 | 34.36 | 90 |
| 6 | 10260.6 | -51.96 | 5.3 | 11.95 | Horizontal | -45.31 | -13.00 | 32.31 | 270 |
| 7 | 11970.7 | -51.45 | 5.5 | 13.55 | Horizontal | -43.40 | -13.00 | 30.40 | 315 |
| 8 | 13680.8 | -50.63 | 6.3 | 13.75 | Horizontal | -43.18 | -13.00 | 30.18 | 45 |
| 9 | 15390.9 | -52.85 | 6.7 | 13.85 | Horizontal | -45.70 | -13.00 | 32.70 | 135 |
| 10 | 17101.0 | -47.78 | 6.8 | 14.25 | Horizontal | -40.33 | -13.00 | 27.33 | 270 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 66 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3490.0 | -58.47 | 2.6 | 10.75 | Horizontal | -50.32 | -13.00 | 37.32 | 0 |
| 3 | 5235.0 | -62.46 | 2.4 | 11.05 | Horizontal | -53.81 | -13.00 | 40.81 | 180 |
| 4 | 6980.0 | -57.20 | 4.5 | 11.15 | Horizontal | -50.55 | -13.00 | 37.55 | 0 |
| 5 | 8725.0 | -53.49 | 5.1 | 11.35 | Horizontal | -47.24 | -13.00 | 34.24 | 225 |
| 6 | 10470.0 | -51.81 | 5.3 | 11.95 | Horizontal | -45.16 | -13.00 | 32.16 | 180 |
| 7 | 12215.0 | -53.09 | 5.5 | 13.55 | Horizontal | -45.04 | -13.00 | 32.04 | 90 |
| 8 | 13960.0 | -50.25 | 6.3 | 13.75 | Horizontal | -42.80 | -13.00 | 29.80 | 315 |
| 9 | 15705.0 | -49.50 | 6.7 | 13.85 | Horizontal | -42.35 | -13.00 | 29.35 | 45 |
| 10 | 17450.0 | -48.20 | 6.8 | 14.25 | Horizontal | -40.75 | -13.00 | 27.75 | 135 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 66 CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | EIRP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 3559.8 | -58.79 | 2.6 | 10.15 | Horizontal | -51.24 | -13.00 | 38.24 | 270 |
| 3 | 5339.7 | -62.57 | 2.4 | 11.05 | Horizontal | -53.92 | -13.00 | 40.92 | 225 |
| 4 | 7119.6 | -54.69 | 4.5 | 11.15 | Horizontal | -48.04 | -13.00 | 35.04 | 45 |
| 5 | 8899.5 | -53.52 | 5.1 | 11.35 | Horizontal | -47.27 | -13.00 | 34.27 | 180 |
| 6 | 10679.4 | -51.94 | 5.3 | 11.95 | Horizontal | -45.29 | -13.00 | 32.29 | 90 |
| 7 | 12459.3 | -52.36 | 5.5 | 13.55 | Horizontal | -44.31 | -13.00 | 31.31 | 315 |
| 8 | 14239.2 | -48.07 | 6.3 | 13.75 | Horizontal | -40.62 | -13.00 | 27.62 | 180 |
| 9 | 16019.1 | -53.16 | 6.7 | 13.85 | Horizontal | -46.01 | -13.00 | 33.01 | 0 |
| 10 | 17799.0 | -48.49 | 6.8 | 14.25 | Horizontal | -41.04 | -13.00 | 28.04 | 135 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 71 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1326.2 | -33.59 | 2.00 | 10.15 | Horizontal | -27.59 | -13.00 | 14.59 | 225 |
| 3 | 1989.3 | -50.85 | 2.50 | 11.35 | Horizontal | -44.15 | -13.00 | 31.15 | 180 |
| 4 | 2652.4 | -55.25 | 4.20 | 10.85 | Horizontal | -50.75 | -13.00 | 37.75 | 315 |
| 5 | 3315.5 | -55.31 | 5.20 | 11.35 | Horizontal | -51.31 | -13.00 | 38.31 | 90 |
| 6 | 3978.6 | -60.05 | 5.50 | 11.95 | Horizontal | -55.75 | -13.00 | 42.75 | 180 |
| 7 | 4641.7 | -60.23 | 5.70 | 13.55 | Horizontal | -54.53 | -13.00 | 41.53 | 225 |
| 8 | 5304.8 | -58.72 | 6.30 | 13.75 | Horizontal | -53.42 | -13.00 | 40.42 | 0 |
| 9 | 5967.9 | -58.78 | 6.80 | 13.85 | Horizontal | -53.88 | -13.00 | 40.88 | 315 |
| 10 | 6631.0 | -56.74 | 6.90 | 14.25 | Horizontal | -51.54 | -13.00 | 38.54 | 45 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 71 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1361.0 | -48.25 | 2.00 | 10.75 | Horizontal | -41.65 | -13.00 | 28.65 | 90 |
| 3 | 2041.5 | -56.96 | 2.51 | 11.05 | Horizontal | -50.57 | -13.00 | 37.57 | 135 |
| 4 | 2722.0 | -58.13 | 4.20 | 11.15 | Horizontal | -53.33 | -13.00 | 40.33 | 0 |
| 5 | 3402.5 | -59.56 | 5.20 | 11.15 | Horizontal | -55.76 | -13.00 | 42.76 | 315 |
| 6 | 4083.0 | -59.01 | 5.50 | 11.95 | Horizontal | -54.71 | -13.00 | 41.71 | 90 |
| 7 | 4763.5 | -59.73 | 5.70 | 13.55 | Horizontal | -54.03 | -13.00 | 41.03 | 0 |
| 8 | 5444.0 | -58.82 | 6.30 | 13.75 | Horizontal | -53.52 | -13.00 | 40.52 | 225 |
| 9 | 6124.5 | -58.42 | 6.80 | 13.85 | Horizontal | -53.52 | -13.00 | 40.52 | 180 |
| 10 | 6805.0 | -56.29 | 6.90 | 14.25 | Horizontal | -51.09 | -13.00 | 38.09 | 45 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 71 CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1395.8 | -39.93 | 2.00 | 10.15 | Horizontal | -33.93 | -13.00 | 20.93 | 315 |
| 3 | 2093.7 | -50.96 | 2.51 | 11.05 | Horizontal | -44.57 | -13.00 | 31.57 | 225 |
| 4 | 2791.6 | -57.52 | 4.20 | 11.15 | Horizontal | -52.72 | -13.00 | 39.72 | 135 |
| 5 | 3489.0 | -56.02 | 5.20 | 11.15 | Horizontal | -52.22 | -13.00 | 39.22 | 315 |
| 6 | 4187.4 | -59.34 | 5.50 | 11.95 | Horizontal | -55.04 | -13.00 | 42.04 | 0 |
| 7 | 4885.3 | -60.21 | 5.70 | 13.55 | Horizontal | -54.51 | -13.00 | 41.51 | 225 |
| 8 | 5583.2 | -58.84 | 6.30 | 13.75 | Horizontal | -53.54 | -13.00 | 40.54 | 90 |
| 9 | 6281.1 | -57.07 | 6.80 | 13.85 | Horizontal | -52.17 | -13.00 | 39.17 | 315 |
| 10 | 6979.0 | -55.91 | 6.90 | 14.25 | Horizontal | -50.71 | -13.00 | 37.71 | 225 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 85 CH-Low

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1396.2 | -56.16 | 2.00 | 10.15 | Horizontal | -50.16 | -13.00 | 37.16 | 180 |
| 3 | 2094.3 | -50.20 | 2.50 | 11.35 | Horizontal | -43.50 | -13.00 | 30.50 | 225 |
| 4 | 2792.4 | -54.32 | 4.20 | 10.85 | Horizontal | -49.82 | -13.00 | 36.82 | 45 |
| 5 | 3490.5 | -54.38 | 5.20 | 11.35 | Horizontal | -50.38 | -13.00 | 37.38 | 180 |
| 6 | 4188.6 | -59.12 | 5.50 | 11.95 | Horizontal | -54.82 | -13.00 | 41.82 | 45 |
| 7 | 4886.7 | -60.04 | 5.70 | 13.55 | Horizontal | -54.34 | -13.00 | 41.34 | 315 |
| 8 | 5584.8 | -59.80 | 6.30 | 13.75 | Horizontal | -54.50 | -13.00 | 41.50 | 90 |
| 9 | 6282.9 | -56.24 | 6.80 | 13.85 | Horizontal | -51.34 | -13.00 | 38.34 | 225 |
| 10 | 6981.0 | -55.03 | 6.90 | 14.25 | Horizontal | -49.83 | -13.00 | 36.83 | 180 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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NB-IoT Band 85 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1411.8 | -52.70 | 2.00 | 10.75 | Horizontal | -46.10 | -13.00 | 33.10 | 315 |
| 3 | 2117.7 | -50.10 | 2.51 | 11.05 | Horizontal | -43.71 | -13.00 | 30.71 | 90 |
| 4 | 2823.6 | -56.58 | 4.20 | 11.15 | Horizontal | -51.78 | -13.00 | 38.78 | 270 |
| 5 | 3529.5 | -57.57 | 5.20 | 11.15 | Horizontal | -53.77 | -13.00 | 40.77 | 315 |
| 6 | 4235.4 | -58.55 | 5.50 | 11.95 | Horizontal | -54.25 | -13.00 | 41.25 | 225 |
| 7 | 4941.3 | -59.91 | 5.70 | 13.55 | Horizontal | -54.21 | -13.00 | 41.21 | 0 |
| 8 | 5647.2 | -59.41 | 6.30 | 13.75 | Horizontal | -54.11 | -13.00 | 41.11 | 180 |
| 9 | 6353.1 | -56.69 | 6.80 | 13.85 | Horizontal | -51.79 | -13.00 | 38.79 | 135 |
| 10 | 7059.0 | -53.86 | 6.90 | 14.25 | Horizontal | -48.66 | -13.00 | 35.66 | 270 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |

NB-IoT Band 85 CH-High

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1431.8 | -51.19 | 2.00 | 10.15 | Horizontal | -45.19 | -13.00 | 32.19 | 180 |
| 3 | 2147.7 | -50.73 | 2.51 | 11.05 | Horizontal | -44.34 | -13.00 | 31.34 | 45 |
| 4 | 2863.6 | -55.78 | 4.20 | 11.15 | Horizontal | -50.98 | -13.00 | 37.98 | 315 |
| 5 | 3579.5 | -57.41 | 5.20 | 11.15 | Horizontal | -53.61 | -13.00 | 40.61 | 90 |
| 6 | 4295.4 | -59.86 | 5.50 | 11.95 | Horizontal | -55.56 | -13.00 | 42.56 | 315 |
| 7 | 5011.3 | -60.44 | 5.70 | 13.55 | Horizontal | -54.74 | -13.00 | 41.74 | 270 |
| 8 | 5727.2 | -60.18 | 6.30 | 13.75 | Horizontal | -54.88 | -13.00 | 41.88 | 45 |
| 9 | 6443.1 | -56.36 | 6.80 | 13.85 | Horizontal | -51.46 | -13.00 | 38.46 | 180 |
| 10 | 7159.0 | -54.58 | 6.90 | 14.25 | Horizontal | -49.38 | -13.00 | 36.38 | 270 |
| Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.<br>2. The worst emission was found in the antenna is Horizontal position. | | | | | | | | | |


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# 6 Main Test Instruments

**Date of Testing**: **August 12, 2019~ September 5, 2019 and March 5, 2020 ~March 30, 2020:**

| Name | Manufacturer | Type | Serial Number | Calibration Date | Expiration Date |
|---|---|---|---|---|---|
| Base Station Simulator | R&S | CMW500 | 113824 | 2019-05-19 | 2020-05-18 |
| Power Splitter | Hua Xiang | SHX-GF2-2-13 | 10120101 | / | / |
| Spectrum Analyzer | Key sight | N9010A | MY50210259 | 2019-05-19 | 2020-05-18 |
| Signal Analyzer | R&S | FSV30 | 100815 | 2018-12-16 | 2019-12-15 |
| Signal Analyzer | R&S | FSV30 | 100815 | 2019-12-15 | 2020-12-14 |
| Loop Antenna | SCHWARZBECK | FMZB1519 | 1519-047 | 2017-09-26 | 2020-09-25 |
| Trilog Antenna | SCHWARZBECK | VUBL 9163 | 9163-201 | 2017-11-18 | 2020-11-17 |
| Horn Antenna | R&S | HF907 | 102723 | 2018-08-11 | 2021-08-10 |
| Horn Antenna | ETS-Lindgren | 3160-09 | 00102643 | 2018-06-20 | 2021-06-19 |
| Signal generator | R&S | SMB 100A | 102594 | 2019-05-19 | 2020-05-18 |
| Climatic Chamber | ESPEC | SU-242 | 93000506 | 2017-12-17 | 2020-12-16 |
| Preampflier | R&S | SCU18 | 102327 | 2019-05-19 | 2020-05-18 |
| MOB COMMS DC SUPPLY | Keysight | 66319D | MY43004105 | 2019-05-19 | 2020-05-18 |
| RF Cable | Agilent | SMA 15cm | 0001 | 2019-06-14 | 2019-12-13 |
| RF Cable | Agilent | SMA 15cm | 0001 | 2019-12-13 | 2020-06-12 |
| Software | R&S | EMC32 | 9.26.0 | / | / |
| Wireless Test Set | StarPoint | SP8315 | SP8315-1202 | 2019-05-19 | 2020-05-18 |
| Wireless Test Set | StarPoint | SP8315 | SP8315-1203 | 2019-05-19 | 2020-05-18 |


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**Date of Testing**: **June 6, 2020 ~ June 8, 2020:**

| Name | Manufacturer | Type | Serial Number | Calibration Date | Expiration Date |
|---|---|---|---|---|---|
| Base Station Simulator | R&S | CMW500 | 113824 | 2020-05-18 | 2021-05-17 |
| Power Splitter | Hua Xiang | SHX-GF2-2-13 | 10120101 | / | / |
| Spectrum Analyzer | Key sight | N9010A | MY50210259 | 2020-05-18 | 2021-05-17 |
| Signal Analyzer | R&S | FSV30 | 100815 | 2019-12-15 | 2020-12-14 |
| Loop Antenna | SCHWARZBECK | FMZB1519 | 1519-047 | 2017-09-26 | 2020-09-25 |
| Trilog Antenna | SCHWARZBECK | VUBL 9163 | 9163-201 | 2017-11-18 | 2020-11-17 |
| Horn Antenna | R&S | HF907 | 102723 | 2018-08-11 | 2021-08-10 |
| Horn Antenna | ETS-Lindgren | 3160-09 | 00102643 | 2018-06-20 | 2021-06-19 |
| Signal generator | R&S | SMB 100A | 102594 | 2020-05-18 | 2021-05-17 |
| Climatic Chamber | ESPEC | SU-242 | 93000506 | 2017-12-17 | 2020-12-16 |
| Preampflier | R&S | SCU18 | 102327 | 2020-05-18 | 2021-05-17 |
| MOB COMMS DC SUPPLY | Keysight | 66319D | MY43004105 | 2020-05-18 | 2021-05-17 |
| RF Cable | Agilent | SMA 15cm | 0001 | 2020-06-12 | 2020-12-11 |
| Software | R&S | EMC32 | 9.26.0 | / | / |
| Wireless Test Set | StarPoint | SP8315 | SP8315-1202 | 2020-05-18 | 2021-05-17 |
| Wireless Test Set | StarPoint | SP8315 | SP8315-1203 | 2020-05-18 | 2021-05-17 |


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**Date of Testing: August 23, 2021~ August 26, 2021**

| Name | Manufacturer | Type | Serial Number | Calibration Date | Expiration Date |
|---|---|---|---|---|---|
| Base Station Simulator | R&S | CMW500 | 113824 | 2021-05-15 | 2022-05-14 |
| Power Splitter | Hua Xiang | SHX-GF2-2-13 | 10120101 | / | / |
| Spectrum Analyzer | Key sight | N9010A | MY50210259 | 2021-05-15 | 2022-05-14 |
| Signal Analyzer | R&S | FSV3030 | 101411 | 2020-12-13 | 2021-12-12 |
| Loop Antenna | SCHWARZBECK | FMZB1519 | 1519-047 | 2020-04-02 | 2023-04-01 |
| TRILOG Broadband Antenna | SCHWARZBECK | VULB 9163 | 391 | 2019-12-16 | 2022-12-15 |
| Horn Antenna | R&S | HF907 | 102723 | 2020-08-11 | 2023-08-10 |
| Horn Antenna | ETS-Lindgren | 3160-09 | 00102643 | 2018-06-20 | 2023-06-19 |
| Signal generator | R&S | SMB 100A | 102594 | 2021-05-15 | 2022-05-14 |
| Climatic Chamber | ESPEC | SU-242 | 93000506 | 2020-12-13 | 2021-12-12 |
| Preampflier | R&S | SCU18 | 102327 | 2021-05-15 | 2022-05-14 |
| MOB COMMS DC SUPPLY | Keysight | 66319D | MY43004105 | 2021-06-09 | 2021-12-08 |
| RF Cable | Agilent | SMA 15cm | 0001 | 2021-06-09 | 2021-12-08 |
| Software | R&S | EMC32 | 9.26.0 | / | / |

********END OF REPORT ********


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# ANNEX A: The EUT Appearance

**The EUT Appearance are submitted separately.**


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# ANNEX B: Test Setup Photos

**The Test Setup Photos are submitted separately.**


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# ANNEX C: Product Change Description

**The Product Change Description are submitted separately.**


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