# FCC Test Report

# (PART 27)

| | |
|---|---|
| **Report No.:** | RF180112C19-2 |
| **FCC ID:** | XIA-NTC100 |
| **Test Model:** | NTC-100, NTC-100G |
| **Received Date:** | Jan. 12, 2018 |
| **Test Date:** | Jun. 20, 2018 ~ Jul. 31, 2018 |
| **Issued Date:** | Sep. 20, 2018 |
| **Applicant:** | NetComm Wireless Limited |
| **Address:** | 18-20 Orion Road, Lane Cove, NSW 2066, Sydney Australia |
| **Issued By:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch |
| **Lab Address:** | No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan ( R.O.C ) |
| **Test Location:** | No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C) |
| **FCC Registration / Designation Number:** | 788550 / TW0003 |

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## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| RF180112C19-2 | Original Release | Sep. 20, 2018 |

## 1 Certificate of Conformity

| | |
|---|---|
| **Product:** | 4G LTE Cat M1 / NB1 Industrial IoT Serial Modem |
| **Brand:** | NetCommWireless |
| **Test Model:** | NTC-100, NTC-100G |
| **Applicant:** | NetComm Wireless Limited |
| **Test Date:** | Jun. 20, 2018 ~ Jul. 31, 2018 |
| **Standards:** | FCC Part 27, Subpart C, H, F, L |

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

**Prepared by :** Evonne Liu , **Date:** Sep. 20, 2018

Evonne Liu / Specialist

**Approved by :** , **Date:** Sep. 20, 2018

Dylan Chiou / Project Engineer

## 2 Summary of Test Results

| Applied Standard: FCC Part 27 & Part 2 (LTE 4) | | | |
|---|---|---|---|
| **FCC Clause** | **Test Item** | **Result** | **Remarks** |
| 2.1046<br>27.50(d)(4) | Maximum Peak Output Power | Pass | Meet the requirement of limit. |
| 2.1047 | Modulation Characteristics | Pass | Meet the requirement. |
| 2.1055<br>27.54 | Frequency Stability | Pass | Meet the requirement of limit. |
| 2.1049 | Occupied Bandwidth | Pass | Meet the requirement of limit. |
| 27.50(d)(5) | Peak to Average Ratio | Pass | Meet the requirement of limit. |
| 27.53(h) | Band Edge Measurements | Pass | Meet the requirement of limit. |
| 2.1051<br>27.53(h) | Conducted Spurious Emissions | Pass | Meet the requirement of limit. |
| 2.1053<br>27.53(h) | Radiated Spurious Emissions | Pass | Meet the requirement of limit.<br>Minimum passing margin is -19.46 dB at 3508.6 MHz. |

| Applied Standard: FCC Part 27 & Part 2 (LTE 12) | | | |
|---|---|---|---|
| **FCC Clause** | **Test Item** | **Result** | **Remarks** |
| 2.1046<br>27.50(c)(10) | Maximum Peak Output Power | Pass | Meet the requirement of limit. |
| 2.1047 | Modulation Characteristics | Pass | Meet the requirement. |
| 2.1055<br>27.54 | Frequency Stability | Pass | Meet the requirement of limit. |
| 2.1049 | Occupied Bandwidth | Pass | Meet the requirement of limit. |
| 27.50(d)(5) | Peak to Average Ratio | Pass | Meet the requirement of limit. |
| 27.53(g) | Band Edge Measurements | Pass | Meet the requirement of limit. |
| 2.1051<br>27.53(g) | Conducted Spurious Emissions | Pass | Meet the requirement of limit. |
| 2.1053<br>27.53(g) | Radiated Spurious Emissions | Pass | Meet the requirement of limit.<br>Minimum passing margin is -25.97 dB at 1399.40 MHz. |

| Applied Standard: FCC Part 27 & Part 2 (LTE 13) | | | |
|---|---|---|---|
| **FCC Clause** | **Test Item** | **Result** | **Remarks** |
| 2.1046<br>27.50(b)(10) | Maximum Peak Output Power | Pass | Meet the requirement of limit. |
| 2.1047 | Modulation Characteristics | Pass | Meet the requirement. |
| 2.1055<br>27.54 | Frequency Stability | Pass | Meet the requirement of limit. |
| 2.1049 | Occupied Bandwidth | Pass | Meet the requirement of limit. |
| 27.50(d)(5) | Peak to Average Ratio | Pass | Meet the requirement of limit. |
| 27.53(g) | Band Edge Measurements | Pass | Meet the requirement of limit. |
| 2.1051<br>27.53(g) | Conducted Spurious Emissions | Pass | Meet the requirement of limit. |
| 2.1053<br>27.53(g)(f) | Radiated Spurious Emissions | Pass | Meet the requirement of limit.<br>Minimum passing margin is -27.91 dB at 2346 MHz. |

## 2.1 Measurement Uncertainty

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

| Measurement | Frequency | Expended Uncertainty (k=2) (±) |
|---|---|---|
| Radiated Emissions up to 1 GHz | 30 MHz ~ 200 MHz | 2.93 dB |
| | 200 MHz ~ 1000 MHz | 2.95 dB |
| Radiated Emissions above 1 GHz | 1 GHz ~ 18 GHz | 2.26 dB |
| | 18 GHz ~ 40 GHz | 1.94 dB |

## 2.2 Test Site and Instruments

| Description & Manufacturer | Model No. | Serial No. | Date of Calibration | Due Date of Calibration |
|---|---|---|---|---|
| Test Receiver Agilent | N9038A | MY51210129 | Feb. 06, 2018 | Feb. 05, 2019 |
| Spectrum Analyzer Agilent | N9010A | MY52220314 | Nov. 24, 2017 | Nov. 23, 2018 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSU43 | 100115 | Nov. 23, 2017 | Nov. 22, 2018 |
| Horn Antenna SCHWARZBECK | BBHA 9120D | 9120D-969 | Dec. 12, 2017 | Dec. 11, 2018 |
| BILOG Antenna SCHWARZBECK | VULB 9168 | 9168-472 | Dec. 06, 2017 | Dec. 05, 2018 |
| MXG Vector signal generator Agilent | N5182B | MY53050430 | Oct. 24, 2017 | Oct. 23, 2018 |
| Preamplifier EMCI | EMC 012645 | 980115 | Oct. 20, 2017 | Oct. 19, 2018 |
| Preamplifier EMCI | EMC 184045 | 980116 | Oct. 20, 2017 | Oct. 19, 2018 |
| Preamplifier EMCI | EMC 330H | 980112 | Oct. 13, 2017 | Oct. 12, 2018 |
| Power Meter Anritsu | ML2495A | 1012010 | Aug. 15, 2017 | Aug. 14, 2018 |
| Power Sensor Anritsu | MA2411B | 1315050 | Aug. 15, 2017 | Aug. 14, 2018 |
| RF Coaxial Cable HUBER+SUHNNER | EMC104-SM-SM-8000&3000 | 140811+170717 | Oct. 20, 2017 | Oct. 19, 2018 |
| RF Coaxial Cable HUBER+SUHNNER | SUCOFLEX 104 | EMC104-SM-SM-1000(140807) | Oct. 20, 2017 | Oct. 19, 2018 |
| RF Coaxial Cable Worken | 8D-FB | Cable-Ch10-01 | Oct. 20, 2017 | Oct. 19, 2018 |
| Software BV ADT | E3 6.120103 | NA | NA | NA |
| Antenna Tower MF | MFA-440H | NA | NA | NA |
| Turn Table MF | MFT-201SS | NA | NA | NA |
| Antenna Tower &Turn Table Controller MF | MF-7802 | NA | NA | NA |
| Radio Communication Analyzer | MT8821C | 6261786083 | Dec. 21, 2017 | Dec. 20, 2018 |
| Temperature & Humidity Chamber | GTH-120-40-CP-AR | MAA1306-019 | Sep. 08, 2017 | Sep. 07, 2018 |
| DC Power Supply Topward | 33010D | 807748 | Oct. 25, 2016 | Oct. 24, 2018 |
| Digital Multimeter Fluke | 87-III | 70360742 | Jun. 29, 2018 | Jun. 28, 2019 |

Note:
1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450F-10.

## 3 General Information

### 3.1 General Description of EUT

| | | | |
|---|---|---|---|
| **Product** | 4G LTE Cat M1 / NB1 Industrial IoT Serial Modem | | |
| **Brand** | NetCommWireless | | |
| **Test Model** | NTC-100, NTC-100G | | |
| **EUT Rating** | Rated Voltage :4.5~36VDC<br>Rated Current :0.23~0.03A | | |
| **Modulation Type** | **Cat-M1** | QPSK, 16QAM | |
| | **NB-IOT** | BPSK, QPSK | |
| **Frequency Range** | **Cat-M1** | LTE Band 4 (Channel Bandwidth: 1.4 MHz) | 1710.7 ~ 1754.3 MHz |
| | | LTE Band 4 (Channel Bandwidth: 3 MHz) | 1711.5 ~ 1753.5 MHz |
| | | LTE Band 4 (Channel Bandwidth: 5 MHz) | 1712.5 ~ 1752.5 MHz |
| | | LTE Band 4 (Channel Bandwidth: 10 MHz) | 1715.0 ~ 1750.0 MHz |
| | | LTE Band 4 (Channel Bandwidth: 15 MHz) | 1717.5 ~ 1747.5 MHz |
| | | LTE Band 4 (Channel Bandwidth: 20 MHz) | 1720.0 ~ 1745.0 MHz |
| | | LTE Band 12 (Channel Bandwidth: 1.4 MHz) | 699.7 ~ 715.3 MHz |
| | | LTE Band 12 (Channel Bandwidth: 3 MHz) | 700.5 ~ 714.5 MHz |
| | | LTE Band 12 (Channel Bandwidth: 5 MHz) | 701.5 ~ 713.5 MHz |
| | | LTE Band 12 (Channel Bandwidth: 10 MHz) | 704.0 ~ 711.0 MHz |
| | | LTE Band 13 (Channel Bandwidth: 5 MHz) | 779.5 ~ 784.5 MHz |
| | | LTE Band 13 (Channel Bandwidth: 10 MHz) | 782.0 MHz |
| | **NB-IOT** | LTE Band 4 | 1710.1 ~ 1754.9 MHz |
| | | LTE Band 12 | 699.1 ~ 715.9 MHz |
| | | LTE Band 13 | 777.1 ~ 786.9 MHz |
| **Emission Designator** | **Cat-M1** | LTE Band 4 (Channel Bandwidth: 1.4 MHz) | 1M09G7D |
| | | LTE Band 4 (Channel Bandwidth: 3 MHz) | 1M09G7D |
| | | LTE Band 4 (Channel Bandwidth: 5 MHz) | 1M09G7D |
| | | LTE Band 4 (Channel Bandwidth: 10 MHz) | 1M09G7D |
| | | LTE Band 4 (Channel Bandwidth: 15 MHz) | 1M10G7D |
| | | LTE Band 4 (Channel Bandwidth: 20 MHz) | 1M09G7D |
| | | LTE Band 12 (Channel Bandwidth: 1.4 MHz) | 1M09G7D |
| | | LTE Band 12 (Channel Bandwidth: 3 MHz) | 1M09G7D |
| | | LTE Band 12 (Channel Bandwidth: 5 MHz) | 1M09G7D |
| | | LTE Band 12 (Channel Bandwidth: 10 MHz) | 1M09G7D |
| | | LTE Band 13 (Channel Bandwidth: 5 MHz) | 1M08G7D |
| | | LTE Band 13 (Channel Bandwidth: 10 MHz) | 1M09G7D |
| | **NB-IOT** | LTE Band 4 | 1K96G7D |
| | | LTE Band 12 | 1K90G7D |
| | | LTE Band 13 | 1K86G7D |

| | | | |
|---|---|---|---|
| **Max. ERP Power** | **Cat-M1** | LTE Band 12 (Channel Bandwidth: 1.4 MHz) | 389.94 mW |
| | | LTE Band 12 (Channel Bandwidth: 3 MHz) | 368.13 mW |
| | | LTE Band 12 (Channel Bandwidth: 5 MHz) | 350.75 mW |
| | | LTE Band 12 (Channel Bandwidth: 10 MHz) | 334.20 mW |
| | | LTE Band 13 (Channel Bandwidth: 5 MHz) | 356.45 mW |
| | | LTE Band 13 (Channel Bandwidth: 10 MHz) | 299.23 mW |
| | **NB-IOT** | LTE Band 12 | 659.17 mW |
| | | LTE Band 13 | 415.91 mW |
| **Max. EIRP Power** | **Cat-M1** | LTE Band 4 (Channel Bandwidth: 1.4 MHz) | 341.19 mW |
| | | LTE Band 4 (Channel Bandwidth: 3 MHz) | 324.34 mW |
| | | LTE Band 4 (Channel Bandwidth: 5 MHz) | 304.79 mW |
| | | LTE Band 4 (Channel Bandwidth: 10 MHz) | 287.08 mW |
| | | LTE Band 4 (Channel Bandwidth: 15 MHz) | 272.90 mW |
| | | LTE Band 4 (Channel Bandwidth: 20 MHz) | 258.82 mW |
| | **NB-IOT** | 394.46 mW | |
| **Antenna Type** | Dipole Antenna | | |
| **Antenna Gain** | LTE B4 with 3.28 dBi gain<br>LTE B12,B13 with 4.71 dBi gain | | |

Note:

1. The models as below are identical to each other except for the following.

| Brand | Model | Difference(s) |
|---|---|---|
| NetCommWireless | NTC-100 | Without GPS |
| | NTC-100G | With GPS |

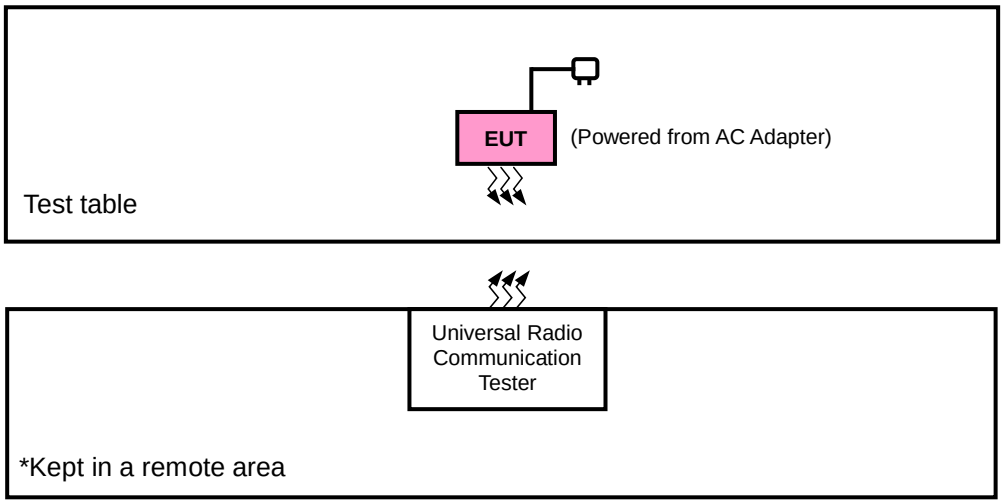
2. The EUT contains following accessory devices.

| | |
|---|---|
| Accessory | Within the box:<br>1.Y-cable(Nano-fit to DE-9 and DC power input) :0.15M ,w/o core<br>2.DIN rail mounting bracket<br><br>Optional Accessory<br>1.GPS Active Patch Antenna : 3M , w/o core<br>2.LTE Tube Antenna :<br>Type:Dipole<br>3.adaptor:<br>Brand: Ten Pao International Inc.<br>Model: S018KM1200150(1.5M/0core)<br>Input: 100-240V~50/60Hz 500mA<br>Output: 12.0V / 1500mA |

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

## 3.2 Configuration of System under Test

**<Radiated Emission Test / E.R.P. / E.I.R.P. Test >**




### 3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

### 3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, and antenna ports

The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

| Band | ERP / EIRP | Radiated Emission |
|---|---|---|
| **LTE Band 4** | X-plane | Z-axis |
| **LTE Band 12** | X-plane | X-axis |
| **LTE Band 13** | X-plane | X-axis |

**Cat-M1**

**LTE Band 4**

| EUT Configure Mode | Test Item | Available Channel | Tested Channel | Channel Bandwidth | Modulation | Mode |
|---|---|---|---|---|---|---|
| - | EIRP | 19957 to 20393 | 19957, 20175, 20393 | 1.4 MHz | QPSK, 16QAM | 1 RB / 5 RB Offset |
| | | 19965 to 20385 | 19965, 20175, 20385 | 3 MHz | QPSK, 16QAM | 1 RB / 5 RB Offset |
| | | 19975 to 20375 | 19975, 20175, 20375 | 5 MHz | QPSK, 16QAM | 1 RB / 5 RB Offset |
| | | 20000 to 20350 | 20000, 20175, 20350 | 10 MHz | QPSK, 16QAM | 1 RB / 5 RB Offset |
| | | 20025 to 20325 | 20025, 20175, 20325 | 15 MHz | QPSK, 16QAM | 1 RB / 5 RB Offset |
| | | 20050 to 20300 | 20050, 20175, 20300 | 20 MHz | QPSK, 16QAM | 1 RB / 5 RB Offset |
| - | Modulation Characteristics | 19975 to 20375 | 20175 | 5 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset, 5 RB / 0 RB Offset |
| - | Frequency Stability | 19957 to 20393 | 19957, 20393 | 1.4 MHz | QPSK | 1 RB / 5 RB Offset |
| | | 19965 to 20385 | 19965, 20385 | 3 MHz | QPSK | 1 RB / 5 RB Offset |
| | | 19975 to 20375 | 19975, 20375 | 5 MHz | QPSK | 1 RB / 5 RB Offset |
| | | 20000 to 20350 | 20000, 20350 | 10 MHz | QPSK | 1 RB / 5 RB Offset |
| | | 20025 to 20325 | 20025, 20325 | 15 MHz | QPSK | 1 RB / 5 RB Offset |
| | | 20050 to 20300 | 20050, 20300 | 20 MHz | QPSK | 1 RB / 5 RB Offset |
| - | Occupied Bandwidth | 19957 to 20393 | 19957, 20175, 20393 | 1.4 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| | | 19965 to 20385 | 19965, 20175, 20385 | 3 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| | | 19975 to 20375 | 19975, 20175, 20375 | 5 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| | | 20000 to 20350 | 20000, 20175, 20350 | 10 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| | | 20025 to 20325 | 20025, 20175, 20325 | 15 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| | | 20050 to 20300 | 20050, 20175, 20300 | 20 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| - | Peak to Average Ratio | 19957 to 20393 | 19957, 20175, 20393 | 1.4 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 19965 to 20385 | 19965, 20175, 20385 | 3 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 19975 to 20375 | 19975, 20175, 20375 | 5 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 20000 to 20350 | 20000, 20175, 20350 | 10 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 20025 to 20325 | 20025, 20175, 20325 | 15 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 20050 to 20300 | 20050, 20175, 20300 | 20 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |

| EUT Configure Mode | Test Item | Available Channel | Tested Channel | Channel Bandwidth | Modulation | Mode |
|---|---|---|---|---|---|---|
| - | Band Edge | 19957 to 20393 | 19957 | 1.4 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 20393 | 1.4 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | 19965 to 20385 | 19965 | 3 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 20385 | 3 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | 19975 to 20375 | 19975 | 5 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 20375 | 5 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | 20000 to 20350 | 20000 | 10 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 20350 | 10 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | 20025 to 20325 | 20025 | 15 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 20325 | 15 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | 20050 to 20300 | 20050 | 20 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 20300 | 20 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| - | Conducted Emission | 19957 to 20393 | 19957, 20175, 20393 | 1.4 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 19965 to 20385 | 19965, 20175, 20385 | 3 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 19975 to 20375 | 19975, 20175, 20375 | 5 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 20000 to 20350 | 20000, 20175, 20350 | 10 MHz | QPSK | 6 RB / 0 RB Offset |
| | | 20025 to 20325 | 20025, 20175, 20325 | 15 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 20050 to 20300 | 20050, 20175, 20300 | 20 MHz | QPSK | 6 RB / 0 RB Offset |
| - | Radiated Emission Above 1 GHz | 19957 to 20393 | 19957, 20175, 20393 | 1.4 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 19965 to 20385 | 19965, 20175, 20385 | 3 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 19975 to 20375 | 19975, 20175, 20375 | 5 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 20000 to 20350 | 20000, 20175, 20350 | 10 MHz | QPSK | 6 RB / 0 RB Offset |
| | | 20025 to 20325 | 20025, 20175, 20325 | 15 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 20050 to 20300 | 20050, 20175, 20300 | 20 MHz | QPSK | 6 RB / 0 RB Offset |
| - | Radiated Emission Below 1 GHz | 19957 to 20393 | 20393 | 1.4 MHz | QPSK | 1 RB / 0 RB Offset |

**Note:** This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

## LTE Band 12

| EUT Configure Mode | Test Item | Available Channel | Tested Channel | Channel Bandwidth | Modulation | Mode |
|---|---|---|---|---|---|---|
| - | ERP | 23017 to 23173 | 23017, 23095, 23173 | 1.4 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 23025 to 23165 | 23025, 23095, 23165 | 3 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 23035 to 23155 | 23035, 23095, 23155 | 5 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 23060 to 23130 | 23060, 23095, 23130 | 10 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| - | Modulation Characteristics | 23035 to 23155 | 23095 | 5 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset, 5 RB / 0 RB Offset |
| ,- | Frequency Stability | 23017 to 23173 | 23017, 23173 | 1.4 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23025 to 23165 | 23025, 23165 | 3 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23035 to 23155 | 23035, 23155 | 5 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23060 to 23130 | 23060, 23130 | 10 MHz | QPSK | 1 RB / 0 RB Offset |
| - | Occupied Bandwidth | 23017 to 23173 | 23017, 23095, 23173 | 1.4 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| | | 23025 to 23165 | 23025, 23095, 23165 | 3 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| | | 23035 to 23155 | 23035, 23095, 23155 | 5 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| | | 23060 to 23130 | 23060, 23095, 23130 | 10 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| - | Peak to Average Ratio | 23017 to 23173 | 23017, 23095, 23173 | 1.4 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 23025 to 23165 | 23025, 23095, 23165 | 3 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 23035 to 23155 | 23035, 23095, 23155 | 5 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 23060 to 23130 | 23060, 23095, 23130 | 10 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| - | Band Edge | 23017 to 23173 | 23017 | 1.4 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 23173 | 1.4 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | 23025 to 23165 | 23025 | 3 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 23165 | 3 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | 23035 to 23155 | 23035 | 5 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 23155 | 5 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | 23060 to 23130 | 23060 | 10 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 23130 | 10 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| - | Conducted Emission | 23017 to 23173 | 23017, 23095, 23173 | 1.4 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23025 to 23165 | 23025, 23095, 23165 | 3 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23035 to 23155 | 23035, 23095, 23155 | 5 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23060 to 23130 | 23060, 23095, 23130 | 10 MHz | QPSK | 1 RB / 0 RB Offset |
| - | Radiated Emission Above 1 GHz | 23017 to 23173 | 23017, 23095, 23173 | 1.4 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23025 to 23165 | 23025, 23095, 23165 | 3 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23035 to 23155 | 23035, 23095, 23155 | 5 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23060 to 23130 | 23060, 23095, 23130 | 10 MHz | QPSK | 1 RB / 0 RB Offset |
| - | Radiated Emission Below 1 GHz | 23017 to 23173 | 23017 | 1.4 MHz | QPSK | 1 RB / 0 RB Offset |

**Note:** This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

## LTE Band 13

| EUT Configure Mode | Test Item | Available Channel | Tested Channel | Channel Bandwidth | Modulation | Mode |
|---|---|---|---|---|---|---|
| - | ERP | 23205 to 23255 | 23205, 23230, 23255 | 5 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 23230 | 23230 | 10 MHz | QPSK, 16QAM | 1 RB / 5 RB Offset |
| - | Modulation Characteristics | 23230 | 23230 | 5 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset, 5 RB / 0 RB Offset |
| - | Frequency Stability | 23205 to 23255 | 23205, 23255 | 5 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23230 | 23230 | 10 MHz | QPSK | 1 RB / 5 RB Offset |
| - | Occupied Bandwidth | 23205 to 23255 | 23205, 23230, 23255 | 5 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| | | 23230 | 23230 | 10 MHz | QPSK, 16QAM | 6 RB / 0 RB Offset |
| - | Peak to Average Ratio | 23205 to 23255 | 23205, 23230, 23255 | 5 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| | | 23230 | 23230 | 10 MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
| - | Band Edge | 23205 to 23255 | 23205 | 5 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 23255 | 5 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | 23230 | 23230 | 10 MHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| | | | 23230 | 10 MHz | QPSK | 1 RB / 5 RB Offset |
| | | | | | | 6 RB / 0 RB Offset |
| - | Conducted Emission | 23205 to 23255 | 23205, 23230, 23255 | 5 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23230 | 23230 | 10 MHz | QPSK | 1 RB / 0 RB Offset |
| - | Radiated Emission Above 1 GHz | 23205 to 23255 | 23205, 23230, 23255 | 5 MHz | QPSK | 1 RB / 0 RB Offset |
| | | 23230 | 23230 | 10 MHz | QPSK | 1 RB / 0 RB Offset |
| - | Radiated Emission Below 1 GHz | 23205 to 23255 | 23230 | 5 MHz | QPSK | 1 RB / 0 RB Offset |

**Note:** This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

## NB-IOT

### LTE Band 4

| EUT Configure Mode | Test Item | Available Channel | Tested Channel | Sub-carrier spacing | Modulation | Mode |
|---|---|---|---|---|---|---|
| - | ERP | 19951 to 20399 | 19951, 20175, 20399 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | 19951 to 20399 | 19951, 20175, 20399 | 15 kHz | QPSK | 3 RB / 3 RB Offset |
| - | Frequency Stability | 19951 to 20399 | 19951, 20175, 20399 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | 19951 to 20399 | 19951, 20175, 20399 | 15 kHz | QPSK | 3 RB / 3 RB Offset |
| - | Occupied Bandwidth | 19951 to 20399 | 19951, 20175, 20399 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | 19951 to 20399 | 19951, 20175, 20399 | 15 kHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 3 RB / 3 RB Offset |
| | | | | | | 12 RB / 0 RB Offset |
| - | Band Edge | 19951 to 20399 | 19951, 20399 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | | 19951, 20399 | 15 kHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 3 RB / 3 RB Offset |
| - | Peak to Average Ratio | 19951 to 20399 | 20175 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | | 20175 | 15 kHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 3 RB / 3 RB Offset |
| - | Conducted Emission | 19951 to 20399 | 19951, 20175, 20399 | 15 kHz | QPSK | 3 RB / 3 RB Offset |
| - | Radiated Emission | 19951 to 20399 | 19951, 20175, 20399 | 15 kHz | QPSK | 3 RB / 3 RB Offset |

**NOTE:**
Selection is tested with Stand-alone, In-band and Guard-band, The worst case was found in Stand-alone.

### LTE Band 12

| EUT Configure Mode | Test Item | Available Channel | Tested Channel | Sub-carrier spacing | Modulation | Mode |
|---|---|---|---|---|---|---|
| - | ERP | 23011 to 23179 | 23011, 23095, 23179 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | 23011 to 23179 | 23011, 23095, 23179 | 15 kHz | QPSK | 3 RB / 3 RB Offset |
| - | Frequency Stability | 23011 to 23179 | 23011, 23095, 23179 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | 23011 to 23179 | 23011, 23095, 23179 | 15 kHz | QPSK | 3 RB / 3 RB Offset |
| - | Occupied Bandwidth | 23011 to 23179 | 23011, 23095, 23179 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | 23011 to 23179 | 23011, 23095, 23179 | 15 kHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 3 RB / 3 RB Offset |
| | | | | | | 12 RB / 0 RB Offset |
| - | Band Edge | 23011 to 23179 | 23011, 23179 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | | 23011, 23179 | 15 kHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 3 RB / 3 RB Offset |
| - | Peak to Average Ratio | 23011 to 23179 | 23095 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | | 23095 | 15 kHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 3 RB / 3 RB Offset |
| - | Conducted Emission | 23011 to 23179 | 23011, 23095, 23179 | 15 kHz | QPSK | 3 RB / 3 RB Offset |
| - | Radiated Emission | 23011 to 23179 | 23011, 23095, 23179 | 15 kHz | QPSK | 3 RB / 3 RB Offset |

**NOTE:**
Selection is tested with Stand-alone, In-band and Guard-band, The worst case was found in Stand-alone.

## LTE Band 13

| EUT Configure Mode | Test Item | Available Channel | Tested Channel | Sub-carrier spacing | Modulation | Mode |
|---|---|---|---|---|---|---|
| - | ERP | 23181 to 23279 | 23181, 23230, 23279 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | 23181 to 23279 | 23181, 23230, 23279 | 15 kHz | QPSK | 3 RB / 3 RB Offset |
| - | Frequency Stability | 23181 to 23279 | 23181, 23230, 23279 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | 23181 to 23279 | 23181, 23230, 23279 | 15 kHz | QPSK | 3 RB / 3 RB Offset |
| - | Occupied Bandwidth | 23181 to 23279 | 23181, 23230, 23279 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | 23181 to 23279 | 23181, 23230, 23279 | 15 kHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 3 RB / 3 RB Offset |
| | | | | | | 12 RB / 0 RB Offset |
| - | Band Edge | 23181 to 23279 | 23181, 23279 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | | 23181, 23279 | 15 kHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 3 RB / 3 RB Offset |
| - | Peak to Average Ratio | 23181 to 23279 | 23230 | 3.75 kHz | BPSK | 1 RB / 0 RB Offset |
| | | | 23230 | 15 kHz | QPSK | 1 RB / 0 RB Offset |
| | | | | | | 3 RB / 3 RB Offset |
| - | Conducted Emission | 23181 to 23279 | 23181, 23230, 23279 | 15 kHz | QPSK | 3 RB / 3 RB Offset |
| - | Radiated Emission | 23181 to 23279 | 23181, 23230, 23279 | 15 kHz | QPSK | 3 RB / 3 RB Offset |

**NOTE:**
Selection is tested with Stand-alone, In-band and Guard-band, The worst case was found in Stand-alone.

**Test Condition:**

| Test Item | Environmental Conditions | Input Power | Tested By |
|---|---|---|---|
| ERP / EIRP | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Jisyong Wang |
| Modulation Characteristics | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Getaz Yang |
| Frequency Stability | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Getaz Yang |
| Occupied Bandwidth | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Getaz Yang |
| Band Edge | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Getaz Yang |
| Peak to Average Ratio | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Getaz Yang |
| Conducted Emission | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Getaz Yang |
| Radiated Emission | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Jisyong Wang |

### 3.4 EUT Operating Conditions

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

### 3.5 General Description of Applied Standards

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

**FCC 47 CFR Part 2**
**FCC 47 CFR Part 27**
**KDB 971168 D01 Power Meas License Digital Systems v03r01**
**ANSI/TIA/EIA-603-E 2016**
**ANSI 63.26-2015**

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

# 4 Test Types and Results

## 4.1 Output Power Measurement

### 4.1.1 Limits of Output Power Measurement

Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

Control and mobile stations in the 698-746 MHz band are limited to 30 watts ERP.
Portable stations (hand-held devices) operating in the 698-746 MHz band, and fixed and mobile stations are limited to 3 watts ERP

Control stations and mobile stations transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands and fixed stations transmitting in the 787-788 MHz and 805-806 MHz bands are limited to 30 watts ERP.
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.

### 4.1.2 Test Procedures

**EIRP / ERP Measurement:**

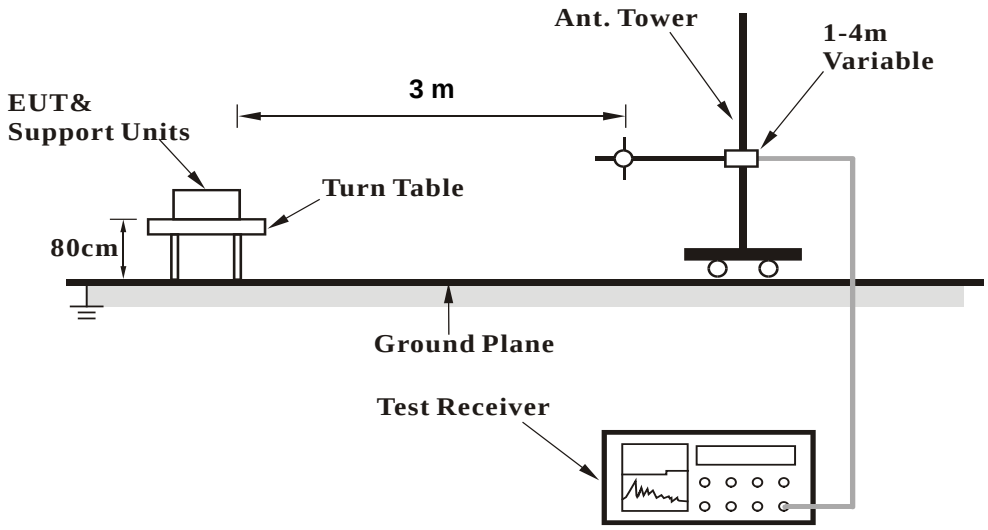
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table,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

**Conducted Power Measurement:**

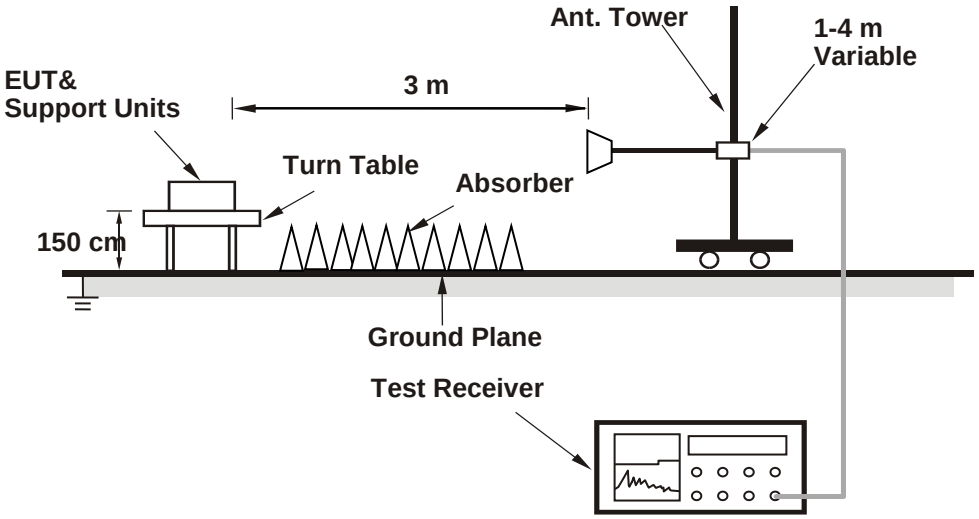
a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 Test Setup

**EIRP / ERP Measurement:**
**<Radiated Emission below or equal 1 GHz>**




**<Radiated Emission above 1 GHz>**




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

**Conducted Power Measurement:**

## 4.1.4 Test Results

### Conducted Output Power (dBm)

**Cat-M1**

| eMTC | Band 4 | Region(s): | FCC | Power: | Class 3 | 23 | Tolerance: | 3.2 | maximum: | 22.66 |
|---|---|---|---|---|---|---|---|---|---|---|

| BW(MHz): | 1.4 |
|---|---|

| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 19957 | 1710.7 | 1957 | 2110.7 | QPSK | 1 | 0 | 0 | -85 | 21.91 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.74 |
| | | | | | QPSK | 3 | 3 | 0 | -85 | 20.42 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 19.88 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.19 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 20.71 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 20.02 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.21 |
| Mid Range | 20175 | 1732.5 | 2175 | 2132.5 | QPSK | 1 | 0 | 0 | -85 | 21.94 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.8 |
| | | | | | QPSK | 3 | 3 | 0 | -85 | 20.87 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 19.95 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 20.81 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 20.9 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 20.61 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.32 |
| High Range | 20393 | 1754.3 | 2393 | 2154.3 | | | | | | |
| | | | | | QPSK | 1 | 0 | 0 | -85 | 22.66 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.11 |
| | | | | | QPSK | 3 | 3 | 0 | -85 | 20.86 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 19.92 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 20.94 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 20.97 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 20.45 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.51 |

| BW(MHz): | 3 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 19965 | 1711.5 | 1965 | 2111.5 | QPSK | 1 | 0 | 0 | -85 | 21.51 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.74 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 21.61 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 21.53 |
| | | | | | QPSK | 3 | 3 | 0 | -85 | 20.57 |
| | | | | | QPSK | 3 | 3 | 1 | -85 | 20.61 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 19.95 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 19.92 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 20.82 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 20.86 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 20.88 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 20.83 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 19.96 |
| | | | | | 16QAM | 3 | 3 | 1 | -85 | 19.97 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.19 |
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 20.14 |
| Mid Range | 20175 | 1732.5 | 2175 | 2132.5 | QPSK | 1 | 0 | 0 | -85 | 21.88 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.91 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 21.87 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 21.86 |
| | | | | | QPSK | 3 | 3 | 0 | -85 | 20.98 |
| | | | | | QPSK | 3 | 3 | 1 | -85 | 21.97 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 19.95 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 19.92 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.23 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 21.22 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 21.21 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 21.23 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.21 |
| | | | | | 16QAM | 3 | 3 | 1 | -85 | 20.33 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.31 |
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 20.4 |
| High Range | 20385 | 1753.5 | 2385 | 2153.5 | | | | | -85 | |
| | | | | | QPSK | 1 | 0 | 0 | -85 | 22.06 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.14 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 21.97 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 22.01 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | QPSK | 3 | 3 | 0 | -85 | 20.97 |
| | | | | | QPSK | 3 | 3 | 1 | -85 | 21.01 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 19.97 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 19.99 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.35 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 21.38 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 21.34 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 21.29 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 20.32 |
| | | | | | 16QAM | 3 | 3 | 1 | -85 | 20.34 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.61 |
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 20.48 |

| BW(MHz): | 5 |
|---|---|

| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 19975 | 1712.5 | 1975 | 2112.5 | QPSK | 1 | 0 | 0 | -85 | 21.71 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.76 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 21.74 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 21.52 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 21.85 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 21.72 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 20.64 |
| | | | | | QPSK | 3 | 3 | 3 | -85 | 20.72 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 20.61 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 20.47 |
| | | | | | QPSK | 6 | 0 | 3 | -85 | 20.68 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.11 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.08 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 21.72 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 21.52 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.04 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.01 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 20.93 |
| | | | | | 16QAM | 3 | 3 | 3 | -85 | 20.96 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 19.92 |
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 19.88 |
| | | | | | 16QAM | 5 | 0 | 3 | -85 | 19.88 |
| Mid Range | 20175 | 1732.5 | 2175 | 2132.5 | QPSK | 1 | 0 | 0 | -85 | 21.88 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.97 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | QPSK | 1 | 0 | 1 | -85 | 21.92 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 21.89 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 21.96 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 21.86 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 20.95 |
| | | | | | QPSK | 3 | 3 | 3 | -85 | 20.92 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 20.91 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 20.99 |
| | | | | | QPSK | 6 | 0 | 3 | -85 | 20.95 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.97 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.07 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 22.15 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 22.01 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.03 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.11 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.18 |
| | | | | | 16QAM | 3 | 3 | 3 | -85 | 21.34 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.11 |
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 20.06 |
| | | | | | 16QAM | 5 | 0 | 3 | -85 | 20.17 |
| High Range | 20375 | 1752.5 | 2375 | 2152.5 | | | | | -85 | |
| | | | | | QPSK | 1 | 0 | 0 | -85 | 22.03 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.37 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 22.13 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 22.34 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.06 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.13 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.21 |
| | | | | | QPSK | 3 | 3 | 3 | -85 | 21.02 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.22 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 21.23 |
| | | | | | QPSK | 6 | 0 | 3 | -85 | 21.04 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.26 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.51 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 22.07 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 22.19 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.22 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.08 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.51 |
| | | | | | 16QAM | 3 | 3 | 3 | -85 | 21.43 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.51 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 20.36 |
| | | | | | 16QAM | 5 | 0 | 3 | -85 | 20.21 |

| BW(MHz): | 10 |
|---|---|

| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 20000 | 1715 | 2000 | 2115 | QPSK | 1 | 0 | 0 | -85 | 21.67 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.71 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 21.78 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 21.67 |
| | | | | | QPSK | 1 | 0 | 7 | -85 | 21.75 |
| | | | | | QPSK | 1 | 5 | 7 | -85 | 21.92 |
| | | | | | QPSK | 4 | 0 | 0 | -85 | 21.72 |
| | | | | | QPSK | 4 | 2 | 7 | -85 | 21.97 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 20.58 |
| | | | | | QPSK | 6 | 0 | 7 | -85 | 20.92 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.63 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 21.97 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.01 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.01 |
| | | | | | 16QAM | 1 | 0 | 7 | -85 | 22.01 |
| | | | | | 16QAM | 1 | 5 | 7 | -85 | 22.02 |
| | | | | | 16QAM | 4 | 2 | 0 | -85 | 20.81 |
| | | | | | 16QAM | 4 | 2 | 7 | -85 | 20.91 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.88 |
| | | | | | 16QAM | 5 | 0 | 7 | -85 | 21.09 |
| Mid Range | 20175 | 1732.5 | 2175 | 2132.5 | QPSK | 1 | 0 | 0 | -85 | 21.86 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.97 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.02 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.09 |
| | | | | | QPSK | 1 | 0 | 7 | -85 | 22.04 |
| | | | | | QPSK | 1 | 5 | 7 | -85 | 21.97 |
| | | | | | QPSK | 4 | 0 | 0 | -85 | 21.9 |
| | | | | | QPSK | 4 | 2 | 7 | -85 | 21.92 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 20.87 |
| | | | | | QPSK | 6 | 0 | 7 | -85 | 20.98 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.32 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.15 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.21 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.11 |
| | | | | | 16QAM | 1 | 0 | 7 | -85 | 22.32 |
| | | | | | 16QAM | 1 | 5 | 7 | -85 | 22.26 |
| | | | | | 16QAM | 4 | 2 | 0 | -85 | 21.1 |
| | | | | | 16QAM | 4 | 2 | 7 | -85 | 21.04 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.07 |
| | | | | | 16QAM | 5 | 0 | 7 | -85 | 21.24 |
| High Range | 20350 | 1750 | 2350 | 2150 | | | | | -85 | |
| | | | | | QPSK | 1 | 0 | 0 | -85 | 22.17 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.03 |
| | | | | | QPSK | 1 | 5 | 7 | -85 | 22.01 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.17 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.25 |
| | | | | | QPSK | 1 | 0 | 7 | -85 | 22.13 |
| | | | | | QPSK | 4 | 0 | 0 | -85 | 22.16 |
| | | | | | QPSK | 4 | 2 | 7 | -85 | 22.04 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.13 |
| | | | | | QPSK | 6 | 0 | 7 | -85 | 21.03 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.47 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.35 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.04 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.51 |
| | | | | | 16QAM | 1 | 0 | 7 | -85 | 22.39 |
| | | | | | 16QAM | 1 | 5 | 7 | -85 | 22.45 |
| | | | | | 16QAM | 4 | 2 | 0 | -85 | 21.37 |
| | | | | | 16QAM | 4 | 2 | 7 | -85 | 21.89 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.38 |
| | | | | | 16QAM | 5 | 0 | 7 | -85 | 21.15 |

| BW(MHz): | 15 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 20025 | 1717.5 | 2025 | 2117.5 | QPSK | 1 | 0 | 0 | -85 | 21.78 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.69 |
| | | | | | QPSK | 1 | 0 | 5 | -85 | 21.77 |
| | | | | | QPSK | 1 | 5 | 5 | -85 | 21.72 |
| | | | | | QPSK | 1 | 0 | 11 | -85 | 21.91 |
| | | | | | QPSK | 1 | 5 | 11 | -85 | 21.72 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.72 |
| | | | | | QPSK | 3 | 3 | 11 | -85 | 21.75 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.71 |
| | | | | | QPSK | 6 | 0 | 11 | -85 | 21.79 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.41 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.09 |
| | | | | | 16QAM | 1 | 0 | 5 | -85 | 22.19 |
| | | | | | 16QAM | 1 | 5 | 5 | -85 | 22.17 |
| | | | | | 16QAM | 1 | 0 | 11 | -85 | 22.13 |
| | | | | | 16QAM | 1 | 5 | 11 | -85 | 22.02 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 22.17 |
| | | | | | 16QAM | 3 | 3 | 11 | -85 | 22.28 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.97 |
| | | | | | 16QAM | 5 | 0 | 11 | -85 | 21.62 |
| Mid Range | 20175 | 1732.5 | 2175 | 2132.5 | QPSK | 1 | 0 | 0 | -85 | 21.96 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.93 |
| | | | | | QPSK | 1 | 0 | 5 | -85 | 21.94 |
| | | | | | QPSK | 1 | 5 | 5 | -85 | 21.91 |
| | | | | | QPSK | 1 | 0 | 11 | -85 | 22.01 |
| | | | | | QPSK | 1 | 5 | 11 | -85 | 22.05 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.93 |
| | | | | | QPSK | 3 | 3 | 11 | -85 | 21.95 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.89 |
| | | | | | QPSK | 6 | 0 | 11 | -85 | 21.97 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.39 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.14 |
| | | | | | 16QAM | 1 | 0 | 5 | -85 | 22.25 |
| | | | | | 16QAM | 1 | 5 | 5 | -85 | 22.32 |
| | | | | | 16QAM | 1 | 0 | 11 | -85 | 22.23 |
| | | | | | 16QAM | 1 | 5 | 11 | -85 | 22.41 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 22.12 |
| | | | | | 16QAM | 3 | 3 | 11 | -85 | 22.18 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 22.09 |
| | | | | | 16QAM | 5 | 0 | 11 | -85 | 22.2 |
| High Range | 20325 | 1747.5 | 2325 | 2147.5 | | | | | -85 | |
| | | | | | QPSK | 1 | 0 | 0 | -85 | 22.13 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.03 |
| | | | | | QPSK | 1 | 0 | 5 | -85 | 22.1 |
| | | | | | QPSK | 1 | 5 | 5 | -85 | 22.23 |
| | | | | | QPSK | 1 | 0 | 11 | -85 | 22.13 |
| | | | | | QPSK | 1 | 5 | 11 | -85 | 22.11 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 22.04 |
| | | | | | QPSK | 3 | 3 | 11 | -85 | 22.12 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.87 |
| | | | | | QPSK | 6 | 0 | 11 | -85 | 22.01 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.03 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.16 |
| | | | | | 16QAM | 1 | 0 | 5 | -85 | 22.41 |
| | | | | | 16QAM | 1 | 5 | 5 | -85 | 22.47 |
| | | | | | 16QAM | 1 | 0 | 11 | -85 | 22.43 |
| | | | | | 16QAM | 1 | 5 | 11 | -85 | 22.34 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 22.13 |
| | | | | | 16QAM | 3 | 3 | 11 | -85 | 22.61 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 22.22 |
| | | | | | 16QAM | 5 | 0 | 11 | -85 | 22.3 |

| BW(MHz): | 20 |
|---|---|

| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 20050 | 1720 | 2050 | 2120 | QPSK | 1 | 0 | 0 | -85 | 21.75 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.67 |
| | | | | | QPSK | 1 | 0 | 7 | -85 | 22.02 |
| | | | | | QPSK | 1 | 5 | 7 | -85 | 21.91 |
| | | | | | QPSK | 1 | 0 | 15 | -85 | 21.96 |
| | | | | | QPSK | 1 | 5 | 15 | -85 | 21.86 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.68 |
| | | | | | QPSK | 3 | 3 | 15 | -85 | 21.82 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.64 |
| | | | | | QPSK | 6 | 0 | 15 | -85 | 21.83 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.15 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 21.93 |
| | | | | | 16QAM | 1 | 0 | 7 | -85 | 21.91 |
| | | | | | 16QAM | 1 | 5 | 7 | -85 | 22.02 |
| | | | | | 16QAM | 1 | 0 | 15 | -85 | 22.03 |
| | | | | | 16QAM | 1 | 5 | 15 | -85 | 22.14 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.97 |
| | | | | | 16QAM | 3 | 3 | 15 | -85 | 22.06 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 22.06 |
| | | | | | 16QAM | 5 | 0 | 15 | -85 | 22.07 |
| Mid Range | 20175 | 1732.5 | 2175 | 2132.5 | QPSK | 1 | 0 | 0 | -85 | 22.05 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.92 |
| | | | | | QPSK | 1 | 0 | 7 | -85 | 21.95 |
| | | | | | QPSK | 1 | 5 | 7 | -85 | 22.03 |
| | | | | | QPSK | 1 | 0 | 15 | -85 | 22.21 |
| | | | | | QPSK | 1 | 5 | 15 | -85 | 21.96 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.84 |
| | | | | | QPSK | 3 | 3 | 15 | -85 | 21.87 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.99 |
| | | | | | QPSK | 6 | 0 | 15 | -85 | 21.94 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.11 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.26 |
| | | | | | 16QAM | 1 | 0 | 7 | -85 | 22.1 |
| | | | | | 16QAM | 1 | 5 | 7 | -85 | 22.12 |
| | | | | | 16QAM | 1 | 0 | 15 | -85 | 22.18 |
| | | | | | 16QAM | 1 | 5 | 15 | -85 | 22.14 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 22.12 |
| | | | | | 16QAM | 3 | 3 | 15 | -85 | 22.23 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 22.14 |
| | | | | | 16QAM | 5 | 0 | 15 | -85 | 22.23 |
| High Range | 20300 | 1745 | 2300 | 2145 | | | | | -85 | |
| | | | | | QPSK | 1 | 0 | 0 | -85 | 22.02 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 21.95 |
| | | | | | QPSK | 1 | 0 | 7 | -85 | 22.25 |
| | | | | | QPSK | 1 | 5 | 7 | -85 | 22.17 |
| | | | | | QPSK | 1 | 0 | 15 | -85 | 22.05 |
| | | | | | QPSK | 1 | 5 | 15 | -85 | 22.06 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.91 |
| | | | | | QPSK | 3 | 3 | 15 | -85 | 21.99 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.9 |
| | | | | | QPSK | 6 | 0 | 15 | -85 | 22.01 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.39 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.1 |
| | | | | | 16QAM | 1 | 0 | 7 | -85 | 22.25 |
| | | | | | 16QAM | 1 | 5 | 7 | -85 | 22.26 |
| | | | | | 16QAM | 1 | 0 | 15 | -85 | 22.19 |
| | | | | | 16QAM | 1 | 5 | 15 | -85 | 22.37 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 22.27 |
| | | | | | 16QAM | 3 | 3 | 15 | -85 | 22.15 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 22.25 |
| | | | | | 16QAM | 5 | 0 | 15 | -85 | 22.35 |

| eMTC | Band 12 | Region(s): | FCC | Power: | Class 3 | 23 | Tolerance: | 2.7 | maximum: | 23.24 |
|---|---|---|---|---|---|---|---|---|---|---|

| BW(MHz): | 1.4 |
|---|---|

| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23017 | 699.7 | 5017 | 729.7 | QPSK | 1 | 0 | 0 | -85 | 22.69 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.42 |
| | | | | | QPSK | 3 | 3 | 0 | -85 | 21.58 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 20.56 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.97 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 21.41 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.16 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.11 |
| Mid Range | 23095 | 707.5 | 5095 | 737.5 | QPSK | 1 | 0 | 0 | -85 | 23.24 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.55 |
| | | | | | QPSK | 3 | 3 | 0 | -85 | 21.58 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 20.67 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.49 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 21.57 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.19 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.25 |
| High Range | 23173 | 715.3 | 5173 | 745.3 | | | | | -85 | |
| | | | | | QPSK | 1 | 0 | 0 | -85 | 22.85 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.46 |
| | | | | | QPSK | 3 | 3 | 0 | -85 | 21.49 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 20.46 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.42 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 21.57 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.01 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.19 |

| BW(MHz): | 3 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23025 | 700.5 | 5025 | 730.5 | QPSK | 1 | 0 | 0 | -85 | 22.56 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.46 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 22.64 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 22.69 |
| | | | | | QPSK | 3 | 3 | 0 | -85 | 21.67 |
| | | | | | QPSK | 3 | 3 | 1 | -85 | 21.64 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 20.63 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 20.68 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.77 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 21.91 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 21.89 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 21.91 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.01 |
| | | | | | 16QAM | 3 | 3 | 1 | -85 | 21.05 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.08 |
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 21.22 |
| Mid Range | 23095 | 707.5 | 5095 | 737.5 | QPSK | 1 | 0 | 0 | -85 | 22.68 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.61 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 22.39 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 22.41 |
| | | | | | QPSK | 3 | 3 | 0 | -85 | 21.54 |
| | | | | | QPSK | 3 | 3 | 1 | -85 | 21.51 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 20.72 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 20.71 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.94 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 21.82 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 21.92 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 21.85 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 20.96 |
| | | | | | 16QAM | 3 | 3 | 1 | -85 | 21.12 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.25 |
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 20.91 |
| High Range | 23165 | 714.5 | 5165 | 744.5 | | | | | -85 | |
| | | | | | QPSK | 1 | 0 | 0 | -85 | 22.43 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.31 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 22.56 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 22.32 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | QPSK | 3 | 3 | 0 | -85 | 21.62 |
| | | | | | QPSK | 3 | 3 | 1 | -85 | 21.56 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 20.57 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 20.52 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.84 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 21.73 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 22.49 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 22.47 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 20.89 |
| | | | | | 16QAM | 3 | 3 | 1 | -85 | 21.41 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.88 |
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 21.56 |

| BW(MHz): | 5 |
|---|---|

| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23035 | 701.5 | 5035 | 731.5 | QPSK | 1 | 0 | 0 | -85 | 22.56 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.58 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 22.71 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 22.61 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.85 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.92 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.71 |
| | | | | | QPSK | 3 | 3 | 3 | -85 | 21.71 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.66 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 21.64 |
| | | | | | QPSK | 6 | 0 | 3 | -85 | 21.64 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 23.12 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 23.14 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 22.97 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 22.83 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.84 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 23.01 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.98 |
| | | | | | 16QAM | 3 | 3 | 3 | -85 | 21.91 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.84 |
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 20.67 |
| | | | | | 16QAM | 5 | 0 | 3 | -85 | 20.75 |
| Mid Range | 23095 | 707.5 | 5095 | 737.5 | QPSK | 1 | 0 | 0 | -85 | 22.91 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.82 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | QPSK | 1 | 0 | 1 | -85 | 22.74 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 22.67 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.76 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.77 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.75 |
| | | | | | QPSK | 3 | 3 | 3 | -85 | 21.61 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.77 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 21.72 |
| | | | | | QPSK | 6 | 0 | 3 | -85 | 21.42 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 23.19 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 23.21 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 22.81 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 22.77 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 23.11 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.98 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 22.03 |
| | | | | | 16QAM | 3 | 3 | 3 | -85 | 21.87 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.11 |
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 21.62 |
| | | | | | 16QAM | 5 | 0 | 3 | -85 | 20.82 |
| High Range | 23155 | 713.5 | 5155 | 743.5 | | | | | -85 | |
| | | | | | QPSK | 1 | 0 | 0 | -85 | 22.6 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.74 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 22.48 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 22.51 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.56 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.59 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.55 |
| | | | | | QPSK | 3 | 3 | 3 | -85 | 21.45 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.51 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 21.65 |
| | | | | | QPSK | 6 | 0 | 3 | -85 | 21.58 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.97 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 23.17 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 22.86 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 22.89 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.98 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.81 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.78 |
| | | | | | 16QAM | 3 | 3 | 3 | -85 | 21.97 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 20.98 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 16QAM | 5 | 0 | 1 | -85 | 20.87 |
| | | | | | 16QAM | 5 | 0 | 3 | -85 | 20.73 |

| BW(MHz): | 10 |
|---|---|

| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23060 | 704 | 5060 | 734 | QPSK | 1 | 0 | 0 | -85 | 22.23 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.19 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.17 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.09 |
| | | | | | QPSK | 1 | 0 | 7 | -85 | 22.09 |
| | | | | | QPSK | 1 | 5 | 7 | -85 | 22.16 |
| | | | | | QPSK | 4 | 0 | 0 | -85 | 22.51 |
| | | | | | QPSK | 4 | 2 | 7 | -85 | 22.49 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.53 |
| | | | | | QPSK | 6 | 0 | 7 | -85 | 21.45 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.11 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.03 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 21.99 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 21.89 |
| | | | | | 16QAM | 1 | 0 | 7 | -85 | 21.99 |
| | | | | | 16QAM | 1 | 5 | 7 | -85 | 21.92 |
| | | | | | 16QAM | 4 | 2 | 0 | -85 | 21.7 |
| | | | | | 16QAM | 4 | 2 | 7 | -85 | 21.68 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.48 |
| | | | | | 16QAM | 5 | 0 | 7 | -85 | 21.35 |
| Mid Range | 23095 | 707.5 | 5095 | 737.5 | QPSK | 1 | 0 | 0 | -85 | 22.55 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.41 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.43 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.32 |
| | | | | | QPSK | 1 | 0 | 7 | -85 | 22.51 |
| | | | | | QPSK | 1 | 5 | 7 | -85 | 22.28 |
| | | | | | QPSK | 4 | 0 | 0 | -85 | 22.42 |
| | | | | | QPSK | 4 | 2 | 7 | -85 | 22.32 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.53 |
| | | | | | QPSK | 6 | 0 | 7 | -85 | 21.43 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.03 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.06 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.01 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 21.97 |
| | | | | | 16QAM | 1 | 0 | 7 | -85 | 21.95 |
| | | | | | 16QAM | 1 | 5 | 7 | -85 | 21.98 |
| | | | | | 16QAM | 4 | 2 | 0 | -85 | 21.32 |
| | | | | | 16QAM | 4 | 2 | 7 | -85 | 21.18 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.66 |
| | | | | | 16QAM | 5 | 0 | 7 | -85 | 21.55 |
| | | | | | | | | | -85 | |
| | | | | | QPSK | 1 | 0 | 0 | -85 | 22.47 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.43 |
| | | | | | QPSK | 1 | 5 | 7 | -85 | 22.35 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.34 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.35 |
| | | | | | QPSK | 1 | 0 | 7 | -85 | 22.3 |
| | | | | | QPSK | 4 | 0 | 0 | -85 | 22.59 |
| | | | | | QPSK | 4 | 2 | 7 | -85 | 22.5 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.57 |
| High Range | 23130 | 711 | 5130 | 741 | QPSK | 6 | 0 | 7 | -85 | 21.52 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 21.89 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 21.83 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 21.76 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 21.71 |
| | | | | | 16QAM | 1 | 0 | 7 | -85 | 21.81 |
| | | | | | 16QAM | 1 | 5 | 7 | -85 | 21.79 |
| | | | | | 16QAM | 4 | 2 | 0 | -85 | 21.59 |
| | | | | | 16QAM | 4 | 2 | 7 | -85 | 21.55 |
| | | | | | 16QAM | 5 | 0 | 0 | -85 | 21.83 |
| | | | | | 16QAM | 5 | 0 | 7 | -85 | 21.77 |

| eMTC | Band 13 | Region(s): | FCC | Power: | Class 3 | 23 | Tolerance: | 2.7 | maximum: | 23.01 |
|---|---|---|---|---|---|---|---|---|---|---|

| BW(MHz): | 5 |
|---|---|

| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23205 | 779.5 | 5205 | 748.5 | QPSK | 1 | 0 | 0 | -85 | 23.01 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.67 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 22.6 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 22.53 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.67 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.53 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.71 |
| | | | | | QPSK | 3 | 3 | 3 | -85 | 21.62 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.68 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 21.66 |
| | | | | | QPSK | 6 | 0 | 3 | -85 | 21.56 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.66 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.71 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 22.56 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 22.68 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.59 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.63 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.99 |
| | | | | | 16QAM | 3 | 3 | 3 | -85 | 21.86 |
| | | | | | 16QAM | 6 | 0 | 0 | -85 | 21.33 |
| | | | | | 16QAM | 6 | 0 | 1 | -85 | 21.28 |
| | | | | | 16QAM | 6 | 0 | 3 | -85 | 21.22 |
| Mid Range | 23230 | 782 | 5230 | 751 | QPSK | 1 | 0 | 0 | -85 | 22.55 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.59 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 22.47 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 22.48 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.5 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.52 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.74 |
| | | | | | QPSK | 3 | 3 | 3 | -85 | 21.66 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.71 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 21.6 |
| | | | | | QPSK | 6 | 0 | 3 | -85 | 21.57 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.81 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.86 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 22.7 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 22.77 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.79 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.84 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 21.98 |
| | | | | | 16QAM | 3 | 3 | 3 | -85 | 21.95 |
| | | | | | 16QAM | 6 | 0 | 0 | -85 | 21.1 |
| | | | | | 16QAM | 6 | 0 | 1 | -85 | 21.02 |
| | | | | | 16QAM | 6 | 0 | 3 | -85 | 21.04 |
| High Range | 23255 | 784.5 | 5255 | 753.5 | | | | | -85 | |
| | | | | | QPSK | 1 | 0 | 0 | -85 | 22.66 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.62 |
| | | | | | QPSK | 1 | 0 | 1 | -85 | 22.61 |
| | | | | | QPSK | 1 | 5 | 1 | -85 | 22.49 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.57 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.51 |
| | | | | | QPSK | 3 | 0 | 0 | -85 | 21.66 |
| | | | | | QPSK | 3 | 3 | 3 | -85 | 21.56 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.67 |
| | | | | | QPSK | 6 | 0 | 1 | -85 | 21.59 |
| | | | | | QPSK | 6 | 0 | 3 | -85 | 21.6 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.79 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.78 |
| | | | | | 16QAM | 1 | 0 | 1 | -85 | 22.77 |
| | | | | | 16QAM | 1 | 5 | 1 | -85 | 22.76 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.66 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.74 |
| | | | | | 16QAM | 3 | 0 | 0 | -85 | 22.03 |
| | | | | | 16QAM | 3 | 3 | 3 | -85 | 22 |
| | | | | | 16QAM | 6 | 0 | 0 | -85 | 21.06 |
| | | | | | 16QAM | 6 | 0 | 1 | -85 | 21.02 |
| | | | | | 16QAM | 6 | 0 | 3 | -85 | 20.92 |

| BW(MHz): | 10 |
|---|---|

| Test Frequency ID | $N_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Modulation | RB Size | RB Offset | Narrowband Index | Cell power (dBm/15kHz) | power (dBm) |
| Mid Range | 23230 | 782 | 5230 | 751 | QPSK | 1 | 0 | 0 | -85 | 22.99 |
| | | | | | QPSK | 1 | 5 | 0 | -85 | 22.87 |
| | | | | | QPSK | 1 | 0 | 3 | -85 | 22.96 |
| | | | | | QPSK | 1 | 5 | 3 | -85 | 22.82 |
| | | | | | QPSK | 1 | 0 | 7 | -85 | 22.86 |
| | | | | | QPSK | 1 | 5 | 7 | -85 | 22.8 |
| | | | | | QPSK | 4 | 0 | 0 | -85 | 22.59 |
| | | | | | QPSK | 4 | 2 | 7 | -85 | 22.55 |
| | | | | | QPSK | 6 | 0 | 0 | -85 | 21.79 |
| | | | | | QPSK | 6 | 0 | 7 | -85 | 21.73 |
| | | | | | 16QAM | 1 | 0 | 0 | -85 | 22.94 |
| | | | | | 16QAM | 1 | 5 | 0 | -85 | 22.75 |
| | | | | | 16QAM | 1 | 0 | 3 | -85 | 22.89 |
| | | | | | 16QAM | 1 | 5 | 3 | -85 | 22.68 |
| | | | | | 16QAM | 1 | 0 | 7 | -85 | 22.81 |
| | | | | | 16QAM | 1 | 5 | 7 | -85 | 22.64 |
| | | | | | 16QAM | 4 | 2 | 0 | -85 | 21.66 |
| | | | | | 16QAM | 4 | 2 | 7 | -85 | 21.52 |
| | | | | | 16QAM | 6 | 0 | 0 | -85 | 22.04 |
| | | | | | 16QAM | 6 | 0 | 7 | -85 | 22 |

## NB-IOT

| NB-IoT | Band 4 | Region(s): | FCC | Power: | Class 3 | 23 | Tolerance: | 2.7 | maximum: | 23.15 |
|---|---|---|---|---|---|---|---|---|---|---|

Stand-alone

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 19951 | 0 | 1710.1 | 1951 | -0.5 | 2110.1 | BPSK | 1@0 | 3.75 | -110 | 21.56 |
| | | | | | | | QPSK | 1@0 | 15 | -110 | 21.68 |
| | | | | | | | QPSK | 3@3 | 15 | -110 | 22.75 |
| | | | | | | | QPSK | 12@0 | 15 | -110 | 20.49 |
| Mid Range | 20175 | 0 | 1732.5 | 2175 | -0.5 | 2132.5 | BPSK | 1@0 | 3.75 | -110 | 21.83 |
| | | | | | | | BPSK | 1@47 | 3.75 | -110 | 21.73 |
| | | | | | | | QPSK | 1@0 | 15 | -110 | 21.94 |
| | | | | | | | QPSK | 1@11 | 15 | -110 | 21.93 |
| | | | | | | | QPSK | 3@3 | 15 | -110 | 23.02 |
| | | | | | | | QPSK | 12@0 | 15 | -110 | 20.87 |
| High Range | 20399 | 0 | 1754.9 | 2399 | -0.5 | 2154.9 | BPSK | 1@47 | 3.75 | -110 | 21.96 |
| | | | | | | | QPSK | 1@11 | 15 | -110 | 22.06 |
| | | | | | | | QPSK | 3@3 | 15 | -110 | 23.15 |
| | | | | | | | QPSK | 12@0 | 15 | -110 | 21.05 |

| In-band | BW(MHz): | 3 |
|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 19956 | 0 | 1710.6 | 1956 | -2 | 2110.593 | 1965 | 2111.5 | -5 | BPSK | 1@0 | 3.75 | -110 | 21.42 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 21.63 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 22.42 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 20.46 |
| Mid Range | 20166 | 0 | 1731.6 | 2166 | -2 | 2131.593 | 2175 | 2132.5 | -5 | BPSK | 1@0 | 3.75 | -110 | 21.84 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 21.82 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 22.01 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 22.02 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.02 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.16 |
| High Range | 20394 | 0 | 1754.4 | 2394 | 1 | 2154.408 | 2385 | 2153.5 | 5 | BPSK | 1@47 | 3.75 | -110 | 21.86 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 22.12 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.01 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.03 |

| In-band | BW(MHz): | 10 | NB-IoT PRB: | 30 |
|---|---|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 20010 | -2 | 1715.99 | 2010 | -1 | 2115.998 | 2000 | 2115 | 5 | BPSK | 1@0 | 3.75 | -110 | 20.49 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 21.49 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 22.91 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 20.74 |
| Mid Range | 20185 | -2 | 1733.49 | 2185 | -1 | 2133.498 | 2175 | 2132.5 | 5 | BPSK | 1@0 | 3.75 | -110 | 20.62 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 22.08 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 21.77 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 22.08 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.01 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 20.89 |
| High Range | 20360 | -2 | 1750.99 | 2360 | -1 | 2150.998 | 2350 | 2150 | 5 | BPSK | 1@47 | 3.75 | -110 | 22.06 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 22.29 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.11 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.37 |

| In-band | BW(MHz): | 10 | NB-IoT PRB: | 35 |
|---|---|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 20019 | -2 | 1716.89 | 2019 | -1 | 2116.898 | 2000 | 2115 | 10 | BPSK | 1@0 | 3.75 | -110 | 20.31 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 21.24 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 22.59 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 20.63 |
| Mid Range | 20194 | -2 | 1734.39 | 2194 | -1 | 2134.398 | 2175 | 2132.5 | 10 | BPSK | 1@0 | 3.75 | -110 | 20.53 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 21.63 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 21.75 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 22.06 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.11 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.06 |
| High Range | 20369 | -2 | 1751.89 | 2369 | -1 | 2151.898 | 2350 | 2150 | 10 | BPSK | 1@47 | 3.75 | -110 | 22.1 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 22.32 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.13 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.13 |

| Guard-band | BW(MHz): | 5 |
|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 19951 | 0 | 1710.1 | 1951 | 1 | 2110.108 | 1975 | 2112.5 | -24 | BPSK | 1@0 | 3.75 | -110 | 21.7 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 21.74 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 22.61 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 20.31 |
| Mid Range | 20151 | 0 | 1730.1 | 2151 | 1 | 2130.108 | 2175 | 2132.5 | -24 | BPSK | 1@0 | 3.75 | -110 | 21.94 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 22.18 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 21.94 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 20.3 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.02 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 20.83 |
| High Range | 20399 | 0 | 1754.9 | 2399 | -2 | 2154.893 | 2375 | 2152.5 | 24 | BPSK | 1@47 | 3.75 | -110 | 22.04 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 22.02 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.05 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.38 |
| NB-IoT | Band 12 | Region(s): | FCC | Power: | Class 3 | 23 | Tolerance: | 2.7 | | | | | maximum: | 24.19 |

Stand-alone

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23011 | 0 | 699.1 | 5011 | -0.5 | 729.1 | BPSK | 1@0 | 3.75 | -110 | 23.12 |
| | | | | | | | QPSK | 1@0 | 15 | -110 | 23.13 |
| | | | | | | | QPSK | 3@3 | 15 | -110 | 24.19 |
| | | | | | | | QPSK | 12@0 | 15 | -110 | 22.02 |
| Mid Range | 23095 | 0 | 707.5 | 5095 | -0.5 | 737.5 | BPSK | 1@0 | 3.75 | -110 | 22.91 |
| | | | | | | | BPSK | 1@47 | 3.75 | -110 | 22.94 |
| | | | | | | | QPSK | 1@0 | 15 | -110 | 23.04 |
| | | | | | | | QPSK | 1@11 | 15 | -110 | 23.05 |
| | | | | | | | QPSK | 3@3 | 15 | -110 | 23.88 |
| | | | | | | | QPSK | 12@0 | 15 | -110 | 21.94 |
| High Range | 23179 | 0 | 715.9 | 5179 | -0.5 | 745.9 | BPSK | 1@47 | 3.75 | -110 | 22.76 |
| | | | | | | | QPSK | 1@11 | 15 | -110 | 22.88 |
| | | | | | | | QPSK | 3@3 | 15 | -110 | 23.78 |
| | | | | | | | QPSK | 12@0 | 15 | -110 | 21.65 |

| In-band | BW(MHz) : | 3 |
|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23016 | 0 | 699.6 | 5016 | -2 | 729.5925 | 5025 | 730.5 | -5 | BPSK | 1@0 | 3.75 | -110 | 23.19 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 23.15 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 24.14 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.97 |
| Mid Range | 23086 | 0 | 706.6 | 5086 | -2 | 736.5925 | 5095 | 737.5 | -5 | BPSK | 1@0 | 3.75 | -110 | 22.99 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 22.83 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 22.78 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 23.01 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.96 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 22.14 |
| High Range | 23174 | 0 | 715.4 | 5174 | 1 | 745.4075 | 5165 | 744.5 | 5 | BPSK | 1@47 | 3.75 | -110 | 22.7 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 23.02 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.77 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.76 |

| In-band | BW(MHz) : | 10 | NB-IoT PRB: | 30 |
|---|---|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23070 | -2 | 704.99 | 5070 | -1 | 734.9975 | 5060 | 734 | 5 | BPSK | 1@0 | 3.75 | -110 | 21.51 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 22.83 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 24.01 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 22.05 |
| Mid Range | 23105 | -2 | 708.49 | 5105 | -1 | 738.4975 | 5095 | 737.5 | 5 | BPSK | 1@0 | 3.75 | -110 | 21.84 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 23.15 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 22.74 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 23.21 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 24.14 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 22.03 |
| High Range | 23140 | -2 | 711.99 | 5140 | -1 | 741.9975 | 5130 | 741 | 5 | BPSK | 1@47 | 3.75 | -110 | 21.57 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 23.12 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 24.18 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 24.11 |

| In-band | BW(MHz): | 10 | NB-IoT PRB: | 35 |
|---|---|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23079 | -2 | 705.89 | 5079 | -1 | 735.8975 | 5060 | 734 | 10 | BPSK | 1@0 | 3.75 | -110 | 21.57 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 22.68 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.92 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 20.95 |
| Mid Range | 23114 | -2 | 709.39 | 5114 | -1 | 739.3975 | 5095 | 737.5 | 10 | BPSK | 1@0 | 3.75 | -110 | 21.5 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 23.22 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 22.81 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 23.13 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 24.11 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 22.17 |
| High Range | 23149 | -2 | 712.89 | 5149 | -1 | 742.8975 | 5130 | 741 | 10 | BPSK | 1@47 | 3.75 | -110 | 22.9 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 23.01 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.74 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.96 |

| Guard-band | BW(MHz): | 5 |
|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23011 | 0 | 699.1 | 5011 | 1 | 729.1075 | 5035 | 731.5 | -24 | BPSK | 1@0 | 3.75 | -110 | 23.13 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 23.22 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 24.08 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 22.19 |
| Mid Range | 23071 | 0 | 705.1 | 5071 | 1 | 735.1075 | 5095 | 737.5 | -24 | BPSK | 1@0 | 3.75 | -110 | 22.98 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 22.55 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 23.07 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 20.95 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 24.12 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 22.03 |
| High Range | 23179 | 0 | 715.9 | 5179 | -2 | 745.8925 | 5155 | 743.5 | 24 | BPSK | 1@47 | 3.75 | -110 | 22.81 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 22.87 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.91 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 22.05 |

| NB-IoT | Band 13 | Region(s): | FCC | Power: | Class 3 | 23 | Tolerance: | 2.7 |
|---|---|---|---|---|---|---|---|---|

| maximum: | 24.1 |
|---|---|

Stand-alone

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23181 | 0 | 777.1 | 5181 | -0.5 | 746.1 | BPSK | 1@0 | 3.75 | -110 | 22.95 |
| | | | | | | | QPSK | 1@0 | 15 | -110 | 22.97 |
| | | | | | | | QPSK | 3@3 | 15 | -110 | 24.1 |
| | | | | | | | QPSK | 12@0 | 15 | -110 | 21.79 |
| Mid Range | 23230 | 0 | 782 | 5230 | -0.5 | 751 | BPSK | 1@0 | 3.75 | -110 | 23.01 |
| | | | | | | | BPSK | 1@47 | 3.75 | -110 | 22.99 |
| | | | | | | | QPSK | 1@0 | 15 | -110 | 23.15 |
| | | | | | | | QPSK | 1@11 | 15 | -110 | 23.09 |
| | | | | | | | QPSK | 3@3 | 15 | -110 | 24.07 |
| | | | | | | | QPSK | 12@0 | 15 | -110 | 21.91 |
| High Range | 23279 | 0 | 786.9 | 5279 | -0.5 | 755.9 | BPSK | 1@47 | 3.75 | -110 | 23.09 |
| | | | | | | | QPSK | 1@11 | 15 | -110 | 23.27 |
| | | | | | | | QPSK | 3@3 | 15 | -110 | 24.06 |
| | | | | | | | QPSK | 12@0 | 15 | -110 | 21.93 |

| In-band | BW(MHz): | 5 |
|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23187 | 0 | 777.7 | 5187 | -2 | 746.6925 | 5205 | 748.5 | -10 | BPSK | 1@0 | 3.75 | -110 | 23.07 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 23.11 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 24.01 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.94 |
| Mid Range | 23221 | 0 | 781.1 | 5221 | -2 | 750.0925 | 5230 | 751 | -5 | BPSK | 1@0 | 3.75 | -110 | 22.88 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 22.74 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 23.04 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 22.98 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.94 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.77 |
| High Range | 23273 | 0 | 786.3 | 5273 | 1 | 755.3075 | 5255 | 753.5 | 10 | BPSK | 1@47 | 3.75 | -110 | 23.11 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 23.19 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 24.01 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.91 |

| In-band | BW(MHz): | 10 | NB-IoT PRB: | 30 |
|---|---|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23240 | -2 | 782.99 | 5240 | -1 | 751.9975 | 5230 | 751 | 5 | BPSK | 1@0 | 3.75 | -110 | 21.44 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 23.14 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 22.61 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 23.05 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.99 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.87 |

| In-band | BW(MHz): | 10 | NB-IoT PRB: | 35 |
|---|---|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23249 | -2 | 783.89 | 5249 | -1 | 752.8975 | 5230 | 751 | 10 | BPSK | 1@0 | 3.75 | -110 | 21.51 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 22.97 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 22.77 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 23.05 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 24.09 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.76 |

| Guard-band | BW(MHz): | 5 |
|---|---|---|

| Test Frequency ID | $N_{UL}$ | $M_{UL}$ | Frequency of Uplink [MHz] | $N_{DL}$ | $M_{DL}$ | Frequency of Downlink [MHz] | LTE Host Cell | | | Test Configuration Initial of Power | | | EUT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | NDL | Frequency of Downlink [MHz] | DL PRB Location | Modulation | Ntones | Sub-carrier spacing (kHz) | Cell power (dBm/15kHz) | power (dBm) |
| Low Range | 23181 | 0 | 777.1 | 5181 | 1 | 746.1075 | 5205 | 748.5 | -24 | BPSK | 1@0 | 3.75 | -110 | 22.88 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 22.91 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.97 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.77 |
| Mid Range | 23206 | 0 | 779.6 | 5206 | 1 | 748.6075 | 5230 | 751 | -24 | BPSK | 1@0 | 3.75 | -110 | 23.04 |
| | | | | | | | | | | BPSK | 1@47 | 3.75 | -110 | 21.08 |
| | | | | | | | | | | QPSK | 1@0 | 15 | -110 | 22.97 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 21.67 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.87 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.92 |
| High Range | 23279 | 0 | 786.9 | 5279 | -2 | 755.8925 | 5255 | 753.5 | 24 | BPSK | 1@47 | 3.75 | -110 | 23.07 |
| | | | | | | | | | | QPSK | 1@11 | 15 | -110 | 23.26 |
| | | | | | | | | | | QPSK | 3@3 | 15 | -110 | 23.97 |
| | | | | | | | | | | QPSK | 12@0 | 15 | -110 | 21.56 |

**ERP Power (dBm)**

**Cat-M1**

| LTE Band 12 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Channel Bandwidth: 1.4 MHz / QPSK** | | | | | | | |
| **Plane** | **Channel** | **Frequency (MHz)** | **Reading (dBm)** | **Correction Factor (dB)** | **ERP (dBm)** | **ERP (mW)** | **Polarization (H/V)** |
| **X** | 23017 | 699.7 | -2.80 | 30.36 | 25.41 | 347.54 | H |
| | 23095 | 707.5 | -2.11 | 30.17 | 25.91 | 389.94 | |
| | 23173 | 715.3 | -2.40 | 30.17 | 25.62 | 364.75 | |
| | 23017 | 699.7 | -8.79 | 32.03 | 21.09 | 128.53 | V |
| | 23095 | 707.5 | -8.20 | 31.98 | 21.63 | 145.55 | |
| | 23173 | 715.3 | -8.56 | 32.06 | 21.35 | 136.46 | |
| **Channel Bandwidth: 1.4 MHz / 16QAM** | | | | | | | |
| **X** | 23017 | 699.7 | -3.79 | 30.36 | 24.42 | 276.69 | H |
| | 23095 | 707.5 | -3.10 | 30.17 | 24.92 | 310.46 | |
| | 23173 | 715.3 | -3.39 | 30.17 | 24.63 | 290.40 | |
| | 23017 | 699.7 | -9.78 | 32.03 | 20.10 | 102.33 | V |
| | 23095 | 707.5 | -9.19 | 31.98 | 20.64 | 115.88 | |
| | 23173 | 715.3 | -9.55 | 32.06 | 20.36 | 108.64 | |

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

| LTE Band 12 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 3 MHz / QPSK | | | | | | | |
| Plane | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | ERP (dBm) | ERP (mW) | Polarization (H/V) |
| X | 23025 | 700.5 | -2.86 | 30.17 | 25.16 | 328.10 | H |
| | 23095 | 707.5 | -2.36 | 30.17 | 25.66 | 368.13 | |
| | 23165 | 714.5 | -2.66 | 30.18 | 25.37 | 344.35 | |
| | 23025 | 700.5 | -8.97 | 31.96 | 20.84 | 121.34 | V |
| | 23095 | 707.5 | -8.45 | 31.98 | 21.38 | 137.40 | |
| | 23165 | 714.5 | -8.78 | 32.03 | 21.10 | 128.82 | |
| Channel Bandwidth: 3 MHz / 16QAM | | | | | | | |
| X | 23025 | 700.5 | -3.88 | 30.17 | 24.14 | 259.42 | H |
| | 23095 | 707.5 | -3.38 | 30.17 | 24.64 | 291.07 | |
| | 23165 | 714.5 | -3.68 | 30.18 | 24.35 | 272.27 | |
| | 23025 | 700.5 | -9.99 | 31.96 | 19.82 | 95.94 | V |
| | 23095 | 707.5 | -9.47 | 31.98 | 20.36 | 108.64 | |
| | 23165 | 714.5 | -9.80 | 32.03 | 20.08 | 101.86 | |

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

| LTE Band 12 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 5 MHz / QPSK | | | | | | | |
| Plane | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | ERP (dBm) | ERP (mW) | Polarization (H/V) |
| X | 23035 | 701.5 | -3.07 | 30.17 | 24.95 | 312.61 | H |
| | 23095 | 707.5 | -2.57 | 30.17 | 25.45 | 350.75 | |
| | 23155 | 713.5 | -2.87 | 30.18 | 25.16 | 328.10 | |
| | 23035 | 701.5 | -9.18 | 31.96 | 20.63 | 115.61 | V |
| | 23095 | 707.5 | -8.66 | 31.98 | 21.17 | 130.92 | |
| | 23155 | 713.5 | -8.99 | 32.03 | 20.89 | 122.74 | |
| Channel Bandwidth: 5 MHz / 16QAM | | | | | | | |
| X | 23035 | 701.5 | -4.09 | 30.17 | 23.93 | 247.17 | H |
| | 23095 | 707.5 | -3.59 | 30.17 | 24.43 | 277.33 | |
| | 23155 | 713.5 | -3.89 | 30.18 | 24.14 | 259.42 | |
| | 23035 | 701.5 | -10.20 | 31.96 | 19.61 | 91.41 | V |
| | 23095 | 707.5 | -9.68 | 31.98 | 20.15 | 103.51 | |
| | 23155 | 713.5 | -10.01 | 32.03 | 19.87 | 97.05 | |

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

| LTE Band 12 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 10 MHz / QPSK | | | | | | | |
| Plane | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | ERP (dBm) | ERP (mW) | Polarization (H/V) |
| X | 23060 | 704.0 | -3.28 | 30.17 | 24.74 | 297.85 | H |
| | 23095 | 707.5 | -2.78 | 30.17 | 25.24 | 334.20 | |
| | 23130 | 711.0 | -3.08 | 30.18 | 24.95 | 312.61 | |
| | 23060 | 704.0 | -9.39 | 31.96 | 20.42 | 110.15 | V |
| | 23095 | 707.5 | -8.87 | 31.98 | 20.96 | 124.74 | |
| | 23130 | 711.0 | -9.20 | 32.03 | 20.68 | 116.95 | |
| Channel Bandwidth: 10 MHz / 16QAM | | | | | | | |
| X | 23060 | 704.0 | -4.43 | 30.17 | 23.59 | 228.56 | H |
| | 23095 | 707.5 | -3.93 | 30.17 | 24.09 | 256.45 | |
| | 23130 | 711.0 | -4.23 | 30.18 | 23.80 | 239.88 | |
| | 23060 | 704.0 | -10.54 | 31.96 | 19.27 | 84.53 | V |
| | 23095 | 707.5 | -10.02 | 31.98 | 19.81 | 95.72 | |
| | 23130 | 711.0 | -10.35 | 32.03 | 19.53 | 89.74 | |

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

| LTE Band 13 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 5 MHz / QPSK | | | | | | | |
| Plane | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | ERP (dBm) | ERP (mW) | Polarization (H/V) |
| X | 23205 | 779.5 | -4.57 | 32.24 | 25.52 | 356.45 | H |
| | 23230 | 782.0 | -5.01 | 32.17 | 25.01 | 316.96 | |
| | 23255 | 784.5 | -4.57 | 32.11 | 25.39 | 345.94 | |
| | 23205 | 779.5 | -10.20 | 32.43 | 20.08 | 101.86 | V |
| | 23230 | 782.0 | -10.68 | 32.42 | 19.59 | 90.99 | |
| | 23255 | 784.5 | -10.56 | 32.46 | 19.75 | 94.41 | |
| Channel Bandwidth: 5 MHz / 16QAM | | | | | | | |
| X | 23205 | 779.5 | -5.59 | 32.24 | 24.50 | 281.84 | H |
| | 23230 | 782.0 | -6.03 | 32.17 | 23.99 | 250.61 | |
| | 23255 | 784.5 | -5.59 | 32.11 | 24.37 | 273.53 | |
| | 23205 | 779.5 | -11.22 | 32.43 | 19.06 | 80.54 | V |
| | 23230 | 782.0 | -11.70 | 32.42 | 18.57 | 71.94 | |
| | 23255 | 784.5 | -11.58 | 32.46 | 18.73 | 74.64 | |

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

| LTE Band 13 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 10 MHz / QPSK | | | | | | | |
| Plane | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | ERP (dBm) | ERP (mW) | Polarization (H/V) |
| X | 23230 | 782.0 | -5.26 | 32.17 | 24.76 | 299.23 | H |
| | 23230 | 782.0 | -10.93 | 32.42 | 19.34 | 85.90 | V |
| Channel Bandwidth: 10 MHz / 16QAM | | | | | | | |
| X | 23230 | 782.0 | -6.37 | 32.17 | 23.65 | 231.74 | H |
| | 23230 | 782.0 | -12.04 | 32.42 | 18.23 | 66.53 | V |

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

**EIRP Power (dBm)**

| LTE Band 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 1.4 MHz / QPSK | | | | | | | |
| Plane | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X | 19957 | 1710.7 | -11.53 | 36.45 | 24.92 | 310.46 | H |
| | 20175 | 1732.5 | -11.81 | 36.80 | 24.99 | 315.50 | |
| | 20393 | 1754.3 | -11.61 | 36.94 | 25.33 | 341.19 | |
| | 19957 | 1710.7 | -16.66 | 37.28 | 20.62 | 115.35 | V |
| | 20175 | 1732.5 | -16.78 | 37.63 | 20.85 | 121.62 | |
| | 20393 | 1754.3 | -16.45 | 37.64 | 21.19 | 131.52 | |
| Channel Bandwidth: 1.4 MHz / 16QAM | | | | | | | |
| X | 19957 | 1710.7 | -12.55 | 36.45 | 23.90 | 245.47 | H |
| | 20175 | 1732.5 | -12.83 | 36.80 | 23.97 | 249.46 | |
| | 20393 | 1754.3 | -12.63 | 36.94 | 24.31 | 269.77 | |
| | 19957 | 1710.7 | -17.68 | 37.28 | 19.60 | 91.20 | V |
| | 20175 | 1732.5 | -17.80 | 37.63 | 19.83 | 96.16 | |
| | 20393 | 1754.3 | -17.47 | 37.64 | 20.17 | 103.99 | |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

| LTE Band 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 3 MHz / QPSK | | | | | | | |
| Plane | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X | 19965 | 1711.5 | -11.75 | 36.45 | 24.70 | 295.12 | H |
| | 20175 | 1732.5 | -12.03 | 36.80 | 24.77 | 299.92 | |
| | 20385 | 1753.5 | -11.83 | 36.94 | 25.11 | 324.34 | |
| | 19965 | 1711.5 | -16.88 | 37.28 | 20.40 | 109.65 | V |
| | 20175 | 1732.5 | -17.00 | 37.63 | 20.63 | 115.61 | |
| | 20385 | 1753.5 | -16.67 | 37.64 | 20.97 | 125.03 | |
| Channel Bandwidth: 3 MHz / 16QAM | | | | | | | |
| X | 19965 | 1711.5 | -12.86 | 36.45 | 23.59 | 228.56 | H |
| | 20175 | 1732.5 | -13.14 | 36.80 | 23.66 | 232.27 | |
| | 20385 | 1753.5 | -12.94 | 36.94 | 24.00 | 251.19 | |
| | 19965 | 1711.5 | -17.99 | 37.28 | 19.29 | 84.92 | V |
| | 20175 | 1732.5 | -18.11 | 37.63 | 19.52 | 89.54 | |
| | 20385 | 1753.5 | -17.78 | 37.64 | 19.86 | 96.83 | |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

| LTE Band 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 5 MHz / QPSK | | | | | | | |
| Plane | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X | 19975 | 1712.5 | -12.02 | 36.45 | 24.43 | 277.33 | H |
| | 20175 | 1732.5 | -12.30 | 36.80 | 24.50 | 281.84 | |
| | 20375 | 1752.5 | -12.10 | 36.94 | 24.84 | 304.79 | |
| | 19975 | 1712.5 | -17.15 | 37.28 | 20.13 | 103.04 | V |
| | 20175 | 1732.5 | -17.27 | 37.63 | 20.36 | 108.64 | |
| | 20375 | 1752.5 | -16.94 | 37.64 | 20.70 | 117.49 | |
| Channel Bandwidth: 5 MHz / 16QAM | | | | | | | |
| X | 19975 | 1712.5 | -13.01 | 36.45 | 23.44 | 220.80 | H |
| | 20175 | 1732.5 | -13.29 | 36.80 | 23.51 | 224.39 | |
| | 20375 | 1752.5 | -13.09 | 36.94 | 23.85 | 242.66 | |
| | 19975 | 1712.5 | -18.14 | 37.28 | 19.14 | 82.04 | V |
| | 20175 | 1732.5 | -18.26 | 37.63 | 19.37 | 86.50 | |
| | 20375 | 1752.5 | -17.93 | 37.64 | 19.71 | 93.54 | |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

| LTE Band 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 10 MHz / QPSK | | | | | | | |
| Plane | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X | 20000 | 1715.0 | -12.47 | 36.64 | 24.17 | 261.22 | H |
| | 20175 | 1732.5 | -12.56 | 36.80 | 24.24 | 265.46 | |
| | 20350 | 1750.0 | -12.22 | 36.80 | 24.58 | 287.08 | |
| | 20000 | 1715.0 | -17.57 | 37.44 | 19.87 | 97.05 | V |
| | 20175 | 1732.5 | -17.53 | 37.63 | 20.10 | 102.33 | |
| | 20350 | 1750.0 | -17.20 | 37.64 | 20.44 | 110.66 | |
| Channel Bandwidth: 10 MHz / 16QAM | | | | | | | |
| X | 20000 | 1715.0 | -13.44 | 36.64 | 23.20 | 208.93 | H |
| | 20175 | 1732.5 | -13.53 | 36.80 | 23.27 | 212.32 | |
| | 20350 | 1750.0 | -13.19 | 36.80 | 23.61 | 229.61 | |
| | 20000 | 1715.0 | -18.54 | 37.44 | 18.90 | 77.62 | V |
| | 20175 | 1732.5 | -18.50 | 37.63 | 19.13 | 81.85 | |
| | 20350 | 1750.0 | -18.17 | 37.64 | 19.47 | 88.51 | |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

| LTE Band 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 15 MHz / QPSK | | | | | | | |
| Plane | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X | 20025 | 1717.5 | -12.50 | 36.45 | 23.95 | 248.31 | H |
| | 20175 | 1732.5 | -12.78 | 36.80 | 24.02 | 252.35 | |
| | 20325 | 1747.5 | -12.58 | 36.94 | 24.36 | 272.90 | |
| | 20025 | 1717.5 | -17.63 | 37.28 | 19.65 | 92.26 | V |
| | 20175 | 1732.5 | -17.75 | 37.63 | 19.88 | 97.27 | |
| | 20325 | 1747.5 | -17.42 | 37.64 | 20.22 | 105.20 | |
| Channel Bandwidth: 15 MHz / 16QAM | | | | | | | |
| X | 20025 | 1717.5 | -13.52 | 36.45 | 22.93 | 196.34 | H |
| | 20175 | 1732.5 | -13.80 | 36.80 | 23.00 | 199.53 | |
| | 20325 | 1747.5 | -13.60 | 36.94 | 23.34 | 215.77 | |
| | 20025 | 1717.5 | -18.65 | 37.28 | 18.63 | 72.95 | V |
| | 20175 | 1732.5 | -18.77 | 37.63 | 18.86 | 76.91 | |
| | 20325 | 1747.5 | -18.44 | 37.64 | 19.20 | 83.18 | |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

| LTE Band 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Channel Bandwidth: 20 MHz / QPSK** | | | | | | | |
| **Plane** | **Channel** | **Frequency (MHz)** | **Reading (dBm)** | **Correction Factor (dB)** | **EIRP (dBm)** | **EIRP (mW)** | **Polarization (H/V)** |
| **X** | 20050 | 1720.0 | -12.73 | 36.45 | 23.72 | 235.50 | H |
| | 20175 | 1732.5 | -13.01 | 36.80 | 23.79 | 239.33 | |
| | 20300 | 1745.0 | -12.81 | 36.94 | 24.13 | 258.82 | |
| | 20050 | 1720.0 | -17.86 | 37.28 | 19.42 | 87.50 | V |
| | 20175 | 1732.5 | -17.98 | 37.63 | 19.65 | 92.26 | |
| | 20300 | 1745.0 | -17.65 | 37.64 | 19.99 | 99.77 | |
| **Channel Bandwidth: 20 MHz / 16QAM** | | | | | | | |
| **X** | 20050 | 1720.0 | -13.84 | 36.45 | 22.61 | 182.39 | H |
| | 20175 | 1732.5 | -14.12 | 36.80 | 22.68 | 185.35 | |
| | 20300 | 1745.0 | -13.92 | 36.94 | 23.02 | 200.45 | |
| | 20050 | 1720.0 | -18.97 | 37.28 | 18.31 | 67.76 | V |
| | 20175 | 1732.5 | -19.09 | 37.63 | 18.54 | 71.45 | |
| | 20300 | 1745.0 | -18.76 | 37.64 | 18.88 | 77.27 | |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

**NB-IOT**

| LTE Band 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Channel Bandwidth: QPSK** | | | | | | | |
| **Plane** | **Channel** | **Frequency (MHz)** | **Reading (dBm)** | **Correction Factor (dB)** | **EIRP (dBm)** | **EIRP (mW)** | **Polarization (H/V)** |
| X | 19951 | 1710.1 | -10.69 | 36.45 | 25.76 | 376.70 | H |
| | 20175 | 1732.5 | -10.96 | 36.80 | 25.84 | 383.71 | |
| | 20399 | 1754.9 | -10.98 | 36.94 | 25.96 | 394.46 | |
| | 19951 | 1710.1 | -16.95 | 37.28 | 20.33 | 107.89 | V |
| | 20175 | 1732.5 | -17.05 | 37.63 | 20.58 | 114.29 | |
| | 20399 | 1754.9 | -16.85 | 37.64 | 20.79 | 119.95 | |
| **Channel Bandwidth: BPSK** | | | | | | | |
| X | 19951 | 1710.1 | -11.98 | 36.45 | 24.47 | 279.90 | H |
| | 20175 | 1732.5 | -12.11 | 36.80 | 24.69 | 294.44 | |
| | 20399 | 1754.9 | -12.02 | 36.94 | 24.92 | 310.46 | |
| | 19951 | 1710.1 | -17.97 | 37.28 | 19.31 | 85.31 | V |
| | 20175 | 1732.5 | -18.13 | 37.63 | 19.50 | 89.13 | |
| | 20399 | 1754.9 | -17.97 | 37.64 | 19.67 | 92.68 | |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

| LTE Band 12 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Channel Bandwidth: QPSK** | | | | | | | |
| **Plane** | **Channel** | **Frequency (MHz)** | **Reading (dBm)** | **Correction Factor (dB)** | **EIRP (dBm)** | **EIRP (mW)** | **Polarization (H/V)** |
| X | 23011 | 699.1 | 0.11 | 30.36 | 28.32 | 679.20 | H |
| | 23095 | 707.5 | -0.08 | 30.17 | 27.94 | 622.30 | |
| | 23179 | 715.9 | 0.17 | 30.17 | 28.19 | 659.17 | |
| | 23011 | 699.1 | -7.47 | 32.03 | 22.41 | 174.18 | V |
| | 23095 | 707.5 | -7.75 | 31.98 | 22.08 | 161.44 | |
| | 23179 | 715.9 | -7.65 | 32.06 | 22.26 | 168.27 | |
| **Channel Bandwidth: BPSK** | | | | | | | |
| X | 23011 | 699.1 | -0.90 | 30.36 | 27.31 | 538.27 | H |
| | 23095 | 707.5 | -1.26 | 30.17 | 26.76 | 474.24 | |
| | 23179 | 715.9 | -0.86 | 30.17 | 27.16 | 520.00 | |
| | 23011 | 699.1 | -8.57 | 32.03 | 21.31 | 135.21 | V |
| | 23095 | 707.5 | -9.07 | 31.98 | 20.76 | 119.12 | |
| | 23179 | 715.9 | -8.99 | 32.06 | 20.92 | 123.59 | |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

| LTE Band 13 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Channel Bandwidth: QPSK** | | | | | | | |
| **Plane** | **Channel** | **Frequency (MHz)** | **Reading (dBm)** | **Correction Factor (dB)** | **EIRP (dBm)** | **EIRP (mW)** | **Polarization (H/V)** |
| X | 23181 | 777.1 | -3.90 | 32.24 | 26.19 | 415.91 | H |
| | 23230 | 782.0 | -4.05 | 32.17 | 25.97 | 395.37 | |
| | 23279 | 786.9 | -3.93 | 32.11 | 26.03 | 400.87 | |
| | 23181 | 777.1 | -9.40 | 32.43 | 20.88 | 122.46 | V |
| | 23230 | 782.0 | -9.75 | 32.42 | 20.52 | 112.72 | |
| | 23279 | 786.9 | -9.62 | 32.46 | 20.69 | 117.22 | |
| **Channel Bandwidth: BPSK** | | | | | | | |
| X | 23181 | 777.1 | -4.88 | 32.24 | 25.21 | 331.89 | H |
| | 23230 | 782.0 | -5.33 | 32.17 | 24.69 | 294.44 | |
| | 23279 | 786.9 | -5.05 | 32.11 | 24.91 | 309.74 | |
| | 23181 | 777.1 | -10.37 | 32.43 | 19.91 | 97.95 | V |
| | 23230 | 782.0 | -10.71 | 32.42 | 19.56 | 90.36 | |
| | 23279 | 786.9 | -10.63 | 32.46 | 19.68 | 92.90 | |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

## 4.2 Modulation Characteristics Measurement

### 4.2.1 Limits of Modulation Characteristics

N/A

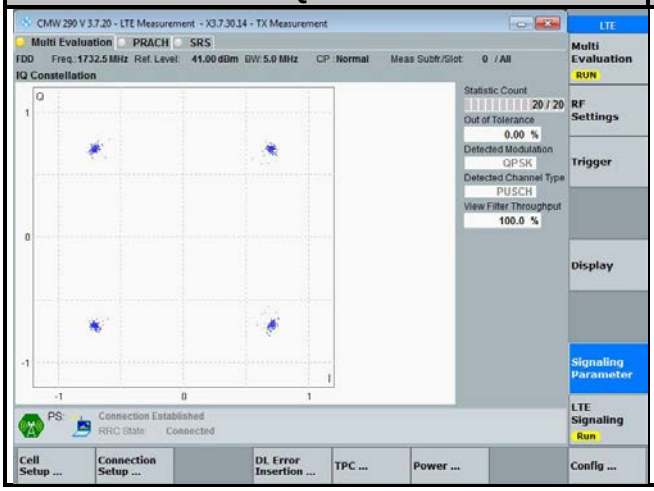
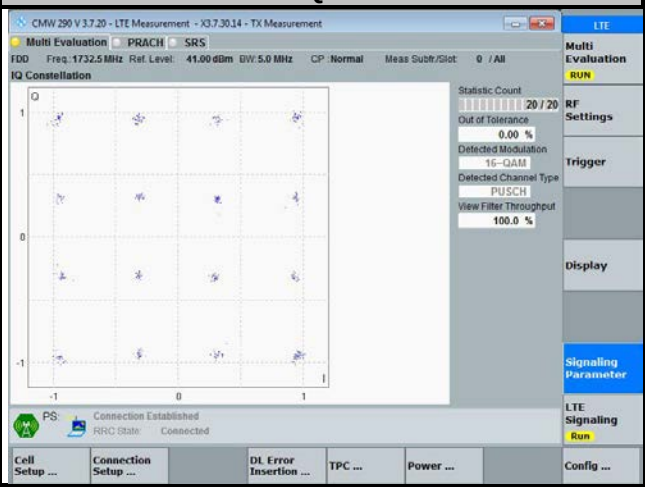
### 4.2.2 Test Setup

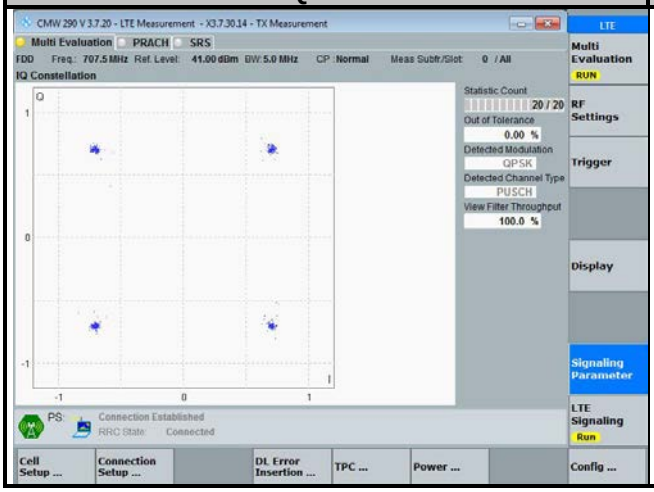
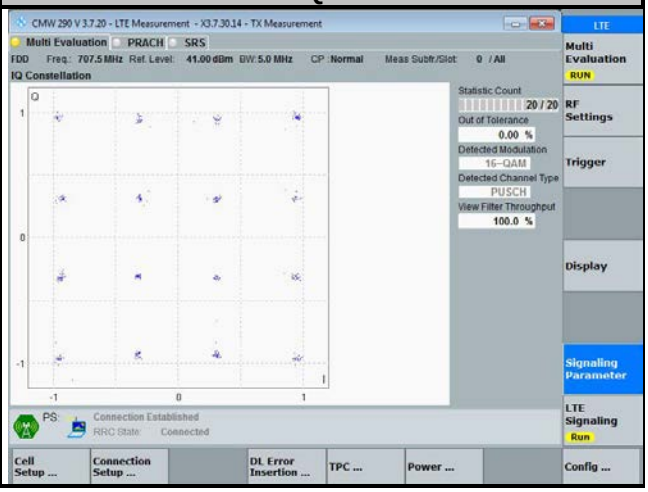

### 4.2.3 Test Procedure

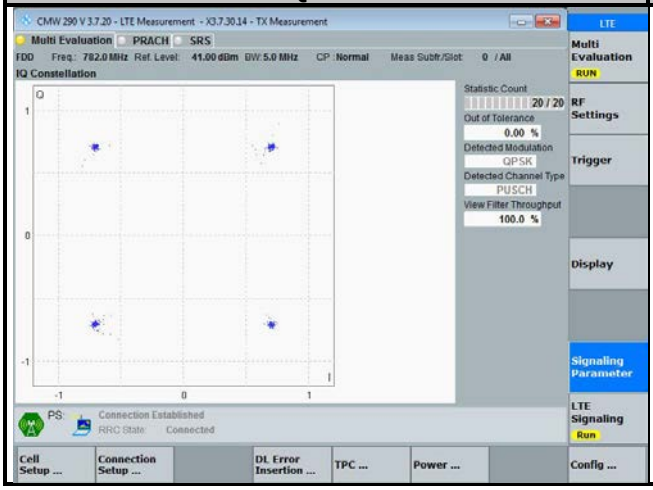
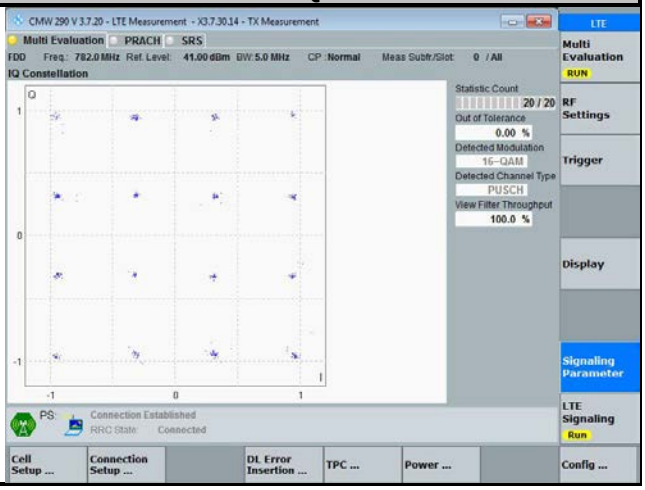
Connect the EUT to Communication Simulator via the antenna connector. The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

4.2.4 Test Results

**Cat-M1**

| Spectrum Plot of Measurement | |
|---|---|
| LTE Band 4 | |
| Channel 20175 | |
| QPSK | 16QAM |
|  |  |

| Spectrum Plot of Measurement | |
|---|---|
| LTE Band 12 | |
| Channel 23095 | |
| QPSK | 16QAM |
|  |  |

| Spectrum Plot of Measurement | |
|---|---|
| LTE Band 13 | |
| Channel 23230 | |
| QPSK | 16QAM |
|  |  |

## 4.3 Frequency Stability Measurement

### 4.3.1 Limits of Frequency Stability Measurement

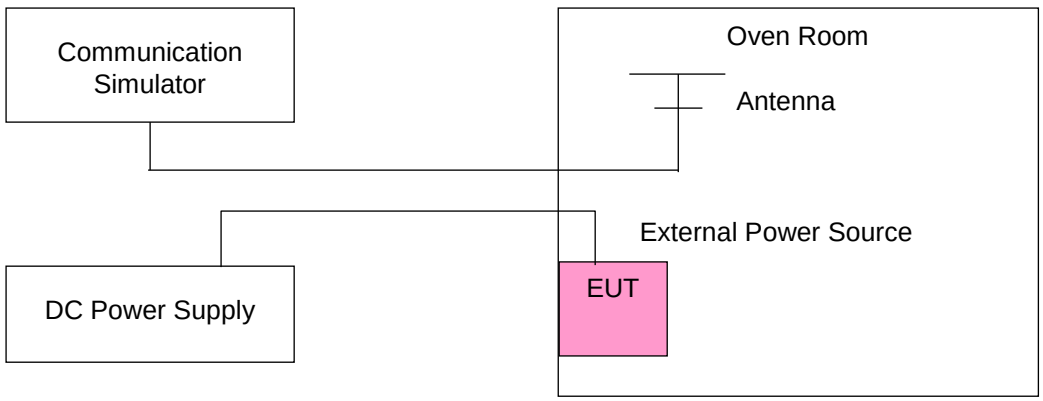
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 4.3.2 Test Procedure

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

**Note:** The frequency error was recorded frequency error from the communication simulator.

### 4.3.3 Test Setup



4.3.4 Test Results

**Cat-M1**

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 1.4 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 1710.700002 | 0.001 | 1754.300003 | 0.001 | 2.5 |
| 12 | 1710.700004 | 0.002 | 1754.300002 | 0.001 | 2.5 |
| 13.8 | 1710.700002 | 0.001 | 1754.300003 | 0.002 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 1.4 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 1710.700001 | 0.001 | 1754.300002 | 0.001 | 2.5 |
| -20 | 1710.700003 | 0.001 | 1754.300002 | 0.001 | 2.5 |
| -10 | 1710.700002 | 0.001 | 1754.300004 | 0.002 | 2.5 |
| 0 | 1710.700002 | 0.001 | 1754.300002 | 0.001 | 2.5 |
| 10 | 1710.700002 | 0.001 | 1754.300004 | 0.002 | 2.5 |
| 20 | 1710.699997 | -0.002 | 1754.299997 | -0.001 | 2.5 |
| 30 | 1710.699997 | -0.002 | 1754.299998 | -0.001 | 2.5 |
| 40 | 1710.699997 | -0.002 | 1754.299998 | -0.001 | 2.5 |
| 50 | 1710.699996 | -0.002 | 1754.299997 | -0.002 | 2.5 |
| 55 | 1710.699998 | -0.001 | 1754.299998 | -0.001 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 3 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 1711.500001 | 0.001 | 1753.500002 | 0.001 | 2.5 |
| 12 | 1711.500003 | 0.001 | 1753.500001 | 0.001 | 2.5 |
| 13.8 | 1711.500002 | 0.001 | 1753.500004 | 0.002 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 3 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 1711.500004 | 0.002 | 1753.500004 | 0.002 | 2.5 |
| -20 | 1711.500002 | 0.001 | 1753.500003 | 0.002 | 2.5 |
| -10 | 1711.500004 | 0.002 | 1753.500003 | 0.002 | 2.5 |
| 0 | 1711.500001 | 0.001 | 1753.500003 | 0.002 | 2.5 |
| 10 | 1711.500001 | 0.001 | 1753.500002 | 0.001 | 2.5 |
| 20 | 1711.499996 | -0.002 | 1753.499996 | -0.002 | 2.5 |
| 30 | 1711.499997 | -0.002 | 1753.499998 | -0.001 | 2.5 |
| 40 | 1711.499998 | -0.001 | 1753.499999 | -0.001 | 2.5 |
| 50 | 1711.499998 | -0.001 | 1753.499996 | -0.002 | 2.5 |
| 55 | 1711.499999 | -0.001 | 1753.499998 | -0.001 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 5 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 1712.500003 | 0.002 | 1752.500003 | 0.002 | 2.5 |
| 12 | 1712.500004 | 0.002 | 1752.500001 | 0.001 | 2.5 |
| 13.8 | 1712.500004 | 0.002 | 1752.500003 | 0.001 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 5 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 1712.500002 | 0.001 | 1752.500001 | 0.001 | 2.5 |
| -20 | 1712.500002 | 0.001 | 1752.500002 | 0.001 | 2.5 |
| -10 | 1712.500002 | 0.001 | 1752.500001 | 0.001 | 2.5 |
| 0 | 1712.500004 | 0.002 | 1752.500001 | 0.001 | 2.5 |
| 10 | 1712.500001 | 0.001 | 1752.500003 | 0.002 | 2.5 |
| 20 | 1712.499997 | -0.002 | 1752.499999 | -0.001 | 2.5 |
| 30 | 1712.499998 | -0.001 | 1752.499997 | -0.002 | 2.5 |
| 40 | 1712.499998 | -0.001 | 1752.499998 | -0.001 | 2.5 |
| 50 | 1712.499996 | -0.002 | 1752.499998 | -0.001 | 2.5 |
| 55 | 1712.499998 | -0.001 | 1752.499997 | -0.002 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 10 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 1715.000002 | 0.001 | 1750.000002 | 0.001 | 2.5 |
| 12 | 1715.000003 | 0.002 | 1750.000004 | 0.002 | 2.5 |
| 13.8 | 1715.000001 | 0.001 | 1750.000002 | 0.001 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 10 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 1715.000002 | 0.001 | 1750.000003 | 0.001 | 2.5 |
| -20 | 1715.000004 | 0.002 | 1750.000003 | 0.002 | 2.5 |
| -10 | 1715.000004 | 0.002 | 1750.000001 | 0.001 | 2.5 |
| 0 | 1715.000003 | 0.002 | 1750.000003 | 0.002 | 2.5 |
| 10 | 1715.000003 | 0.002 | 1750.000002 | 0.001 | 2.5 |
| 20 | 1714.999999 | -0.001 | 1749.999996 | -0.002 | 2.5 |
| 30 | 1714.999999 | -0.001 | 1749.999996 | -0.002 | 2.5 |
| 40 | 1714.999998 | -0.001 | 1749.999999 | -0.001 | 2.5 |
| 50 | 1714.999997 | -0.002 | 1749.999999 | -0.001 | 2.5 |
| 55 | 1714.999997 | -0.002 | 1749.999998 | -0.001 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 15 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 1717.500004 | 0.002 | 1747.500004 | 0.002 | 2.5 |
| 12 | 1717.500002 | 0.001 | 1747.500003 | 0.002 | 2.5 |
| 13.8 | 1717.500001 | 0.001 | 1747.500002 | 0.001 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 15 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 1717.500004 | 0.002 | 1747.500002 | 0.001 | 2.5 |
| -20 | 1717.500001 | 0.001 | 1747.500002 | 0.001 | 2.5 |
| -10 | 1717.500003 | 0.002 | 1747.500004 | 0.002 | 2.5 |
| 0 | 1717.500003 | 0.002 | 1747.500001 | 0.001 | 2.5 |
| 10 | 1717.500003 | 0.002 | 1747.500004 | 0.002 | 2.5 |
| 20 | 1717.499997 | -0.002 | 1747.499998 | -0.001 | 2.5 |
| 30 | 1717.499998 | -0.001 | 1747.499998 | -0.001 | 2.5 |
| 40 | 1717.499996 | -0.002 | 1747.499997 | -0.002 | 2.5 |
| 50 | 1717.499998 | -0.001 | 1747.499996 | -0.002 | 2.5 |
| 60 | 1717.499998 | -0.001 | 1747.499997 | -0.002 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 20 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 1720.000001 | 0.001 | 1745.000001 | 0.001 | 2.5 |
| 12 | 1720.000003 | 0.002 | 1745.000002 | 0.001 | 2.5 |
| 13.8 | 1720.000003 | 0.002 | 1745.000003 | 0.001 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 20 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 1720.000002 | 0.001 | 1745.000001 | 0.001 | 2.5 |
| -20 | 1720.000003 | 0.002 | 1745.000004 | 0.002 | 2.5 |
| -10 | 1720.000002 | 0.001 | 1745.000003 | 0.001 | 2.5 |
| 0 | 1720.000001 | 0.001 | 1745.000004 | 0.002 | 2.5 |
| 10 | 1720.000002 | 0.001 | 1745.000001 | 0.001 | 2.5 |
| 20 | 1719.999999 | -0.001 | 1744.999996 | -0.002 | 2.5 |
| 30 | 1719.999996 | -0.002 | 1744.999996 | -0.002 | 2.5 |
| 40 | 1719.999998 | -0.001 | 1744.999999 | -0.001 | 2.5 |
| 50 | 1719.999999 | -0.001 | 1744.999999 | -0.001 | 2.5 |
| 55 | 1719.999999 | -0.001 | 1744.999997 | -0.002 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 12 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 1.4 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 699.700001 | 0.002 | 715.300003 | 0.004 | 2.5 |
| 12 | 699.700004 | 0.005 | 715.300003 | 0.004 | 2.5 |
| 13.8 | 699.700003 | 0.004 | 715.300002 | 0.002 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 12 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 1.4 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 699.700002 | 0.003 | 715.300002 | 0.003 | 2.5 |
| -20 | 699.700001 | 0.001 | 715.300003 | 0.004 | 2.5 |
| -10 | 699.700003 | 0.005 | 715.300003 | 0.004 | 2.5 |
| 0 | 699.700002 | 0.003 | 715.300004 | 0.005 | 2.5 |
| 10 | 699.700002 | 0.003 | 715.300002 | 0.003 | 2.5 |
| 20 | 699.699998 | -0.003 | 715.299998 | -0.003 | 2.5 |
| 30 | 699.699998 | -0.004 | 715.299999 | -0.002 | 2.5 |
| 40 | 699.699997 | -0.005 | 715.299997 | -0.004 | 2.5 |
| 50 | 699.699997 | -0.004 | 715.299998 | -0.003 | 2.5 |
| 55 | 699.699997 | -0.005 | 715.299999 | -0.002 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 12 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 3 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 700.500003 | 0.004 | 714.500001 | 0.002 | 2.5 |
| 12 | 700.500004 | 0.006 | 714.500003 | 0.004 | 2.5 |
| 13.8 | 700.500003 | 0.004 | 714.500002 | 0.003 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 12 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 3 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 700.500002 | 0.002 | 714.500003 | 0.004 | 2.5 |
| -20 | 700.500002 | 0.003 | 714.500002 | 0.002 | 2.5 |
| -10 | 700.500001 | 0.002 | 714.500004 | 0.005 | 2.5 |
| 0 | 700.500004 | 0.006 | 714.500003 | 0.004 | 2.5 |
| 10 | 700.500002 | 0.002 | 714.500003 | 0.004 | 2.5 |
| 20 | 700.499997 | -0.005 | 714.499997 | -0.004 | 2.5 |
| 30 | 700.499996 | -0.005 | 714.499999 | -0.002 | 2.5 |
| 40 | 700.499999 | -0.002 | 714.499996 | -0.005 | 2.5 |
| 50 | 700.499997 | -0.005 | 714.499998 | -0.002 | 2.5 |
| 55 | 700.499997 | -0.005 | 714.499998 | -0.003 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 12 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 5 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 701.500001 | 0.002 | 713.500003 | 0.004 | 2.5 |
| 12 | 701.500003 | 0.004 | 713.500002 | 0.003 | 2.5 |
| 13.8 | 701.500002 | 0.003 | 713.500003 | 0.004 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 12 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 5 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 701.500001 | 0.002 | 713.500002 | 0.003 | 2.5 |
| -20 | 701.500004 | 0.005 | 713.500004 | 0.005 | 2.5 |
| -10 | 701.500002 | 0.003 | 713.500002 | 0.003 | 2.5 |
| 0 | 701.500001 | 0.002 | 713.500003 | 0.003 | 2.5 |
| 10 | 701.500004 | 0.006 | 713.500004 | 0.005 | 2.5 |
| 20 | 701.499999 | -0.002 | 713.499998 | -0.003 | 2.5 |
| 30 | 701.499997 | -0.004 | 713.499997 | -0.004 | 2.5 |
| 40 | 701.499998 | -0.003 | 713.499999 | -0.002 | 2.5 |
| 50 | 701.499998 | -0.003 | 713.499997 | -0.005 | 2.5 |
| 55 | 701.499997 | -0.004 | 713.499998 | -0.002 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 12 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 10 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 704.000001 | 0.001 | 711.000004 | 0.005 | 2.5 |
| 12 | 704.000003 | 0.004 | 711.000001 | 0.002 | 2.5 |
| 13.8 | 704.000002 | 0.003 | 711.000001 | 0.002 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 12 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 10 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 704.000001 | 0.002 | 711.000002 | 0.003 | 2.5 |
| -20 | 704.000002 | 0.002 | 711.000001 | 0.001 | 2.5 |
| -10 | 704.000003 | 0.004 | 711.000004 | 0.005 | 2.5 |
| 0 | 704.000004 | 0.005 | 711.000001 | 0.002 | 2.5 |
| 10 | 704.000002 | 0.003 | 711.000001 | 0.002 | 2.5 |
| 20 | 703.999997 | -0.004 | 710.999997 | -0.005 | 2.5 |
| 30 | 703.999997 | -0.004 | 710.999999 | -0.002 | 2.5 |
| 40 | 703.999997 | -0.004 | 710.999999 | -0.002 | 2.5 |
| 50 | 703.999999 | -0.002 | 710.999996 | -0.006 | 2.5 |
| 55 | 703.999997 | -0.004 | 710.999996 | -0.005 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 13 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 5 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 779.500004 | 0.005 | 784.500002 | 0.003 | 2.5 |
| 12 | 779.500004 | 0.005 | 784.500003 | 0.004 | 2.5 |
| 13.8 | 779.500002 | 0.002 | 784.500003 | 0.003 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 13 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 5 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 779.500001 | 0.002 | 784.500003 | 0.004 | 2.5 |
| -20 | 779.500004 | 0.005 | 784.500003 | 0.003 | 2.5 |
| -10 | 779.500001 | 0.002 | 784.500004 | 0.005 | 2.5 |
| 0 | 779.500001 | 0.002 | 784.500004 | 0.005 | 2.5 |
| 10 | 779.500003 | 0.003 | 784.500003 | 0.004 | 2.5 |
| 20 | 779.499996 | -0.005 | 784.499998 | -0.003 | 2.5 |
| 30 | 779.499997 | -0.004 | 784.499997 | -0.004 | 2.5 |
| 40 | 779.499997 | -0.004 | 784.499997 | -0.003 | 2.5 |
| 50 | 779.499996 | -0.005 | 784.499997 | -0.004 | 2.5 |
| 55 | 779.499997 | -0.004 | 784.499996 | -0.005 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 13 | | Limit (ppm) |
|---|---|---|---|
| | Channel Bandwidth: 10 MHz | | |
| | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 782.000002 | 0.002 | 2.5 |
| 12 | 782.000002 | 0.002 | 2.5 |
| 13.8 | 782.000004 | 0.005 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 13 | | Limit (ppm) |
|---|---|---|---|
| | Channel Bandwidth: 10 MHz | | |
| | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 782.000002 | 0.002 | 2.5 |
| -20 | 782.000002 | 0.002 | 2.5 |
| -10 | 782.000003 | 0.004 | 2.5 |
| 0 | 782.000001 | 0.001 | 2.5 |
| 10 | 782.000003 | 0.004 | 2.5 |
| 20 | 781.999998 | -0.002 | 2.5 |
| 30 | 781.999997 | -0.004 | 2.5 |
| 40 | 781.999997 | -0.004 | 2.5 |
| 50 | 781.999997 | -0.004 | 2.5 |
| 55 | 781.999997 | -0.003 | 2.5 |

**NB-IOT**

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 1732.500002 | 0.001 | 1732.500004 | 0.002 | 2.5 |
| 12 | 1732.500002 | 0.001 | 1732.500002 | 0.001 | 2.5 |
| 13.8 | 1732.500003 | 0.002 | 1732.500002 | 0.001 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 4 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 20 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 1732.500002 | 0.001 | 1732.500002 | 0.001 | 2.5 |
| -20 | 1732.500003 | 0.002 | 1732.500004 | 0.002 | 2.5 |
| -10 | 1732.500002 | 0.001 | 1732.500002 | 0.001 | 2.5 |
| 0 | 1732.500001 | 0.001 | 1732.500004 | 0.002 | 2.5 |
| 10 | 1732.500003 | 0.002 | 1732.500004 | 0.002 | 2.5 |
| 20 | 1732.499996 | -0.002 | 1732.499999 | -0.001 | 2.5 |
| 30 | 1732.499997 | -0.002 | 1732.499997 | -0.002 | 2.5 |
| 40 | 1732.499996 | -0.002 | 1732.499996 | -0.002 | 2.5 |
| 50 | 1732.499997 | -0.002 | 1732.499999 | -0.001 | 2.5 |
| 55 | 1732.499999 | -0.001 | 1732.499997 | -0.002 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 12 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 707.500004 | 0.005 | 707.500003 | 0.004 | 2.5 |
| 12 | 707.500002 | 0.002 | 707.500002 | 0.003 | 2.5 |
| 13.8 | 707.500002 | 0.002 | 707.500004 | 0.006 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 12 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 20 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 707.500001 | 0.002 | 707.500003 | 0.005 | 2.5 |
| -20 | 707.500004 | 0.006 | 707.500003 | 0.004 | 2.5 |
| -10 | 707.500004 | 0.005 | 707.500001 | 0.002 | 2.5 |
| 0 | 707.500004 | 0.005 | 707.500002 | 0.002 | 2.5 |
| 10 | 707.500003 | 0.004 | 707.500002 | 0.003 | 2.5 |
| 20 | 707.499999 | -0.002 | 707.499997 | -0.004 | 2.5 |
| 30 | 707.499996 | -0.006 | 707.499997 | -0.005 | 2.5 |
| 40 | 707.499999 | -0.002 | 707.499997 | -0.004 | 2.5 |
| 50 | 707.499997 | -0.004 | 707.499997 | -0.005 | 2.5 |
| 55 | 707.499996 | -0.005 | 707.499998 | -0.004 | 2.5 |

Frequency Error vs. Voltage

| Voltage (Volts) | LTE Band 13 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| 10.2 | 782.000001 | 0.002 | 782.000003 | 0.004 | 2.5 |
| 12 | 782.000004 | 0.005 | 782.000002 | 0.002 | 2.5 |
| 13.8 | 782.000003 | 0.004 | 782.000003 | 0.004 | 2.5 |

**Note:** The applicant defined the normal working voltage of the adapter is from 10.2 Vdc to 13.8 Vdc.

Frequency Error vs. Temperature

| Temp. (℃) | LTE Band 13 | | | | Limit (ppm) |
|---|---|---|---|---|---|
| | Channel Bandwidth: 20 MHz | | | | |
| | Low Channel | | High Channel | | |
| | Frequency (MHz) | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) | |
| -30 | 782.000001 | 0.001 | 782.000004 | 0.005 | 2.5 |
| -20 | 782.000002 | 0.003 | 782.000004 | 0.005 | 2.5 |
| -10 | 782.000004 | 0.005 | 782.000003 | 0.004 | 2.5 |
| 0 | 782.000002 | 0.003 | 782.000003 | 0.004 | 2.5 |
| 10 | 782.000002 | 0.002 | 782.000003 | 0.004 | 2.5 |
| 20 | 781.999996 | -0.005 | 781.999999 | -0.002 | 2.5 |
| 30 | 781.999998 | -0.003 | 781.999996 | -0.005 | 2.5 |
| 40 | 781.999997 | -0.004 | 781.999997 | -0.004 | 2.5 |
| 50 | 781.999996 | -0.005 | 781.999998 | -0.002 | 2.5 |
| 55 | 781.999999 | -0.001 | 781.999998 | -0.002 | 2.5 |

## 4.4 Occupied Bandwidth Measurement

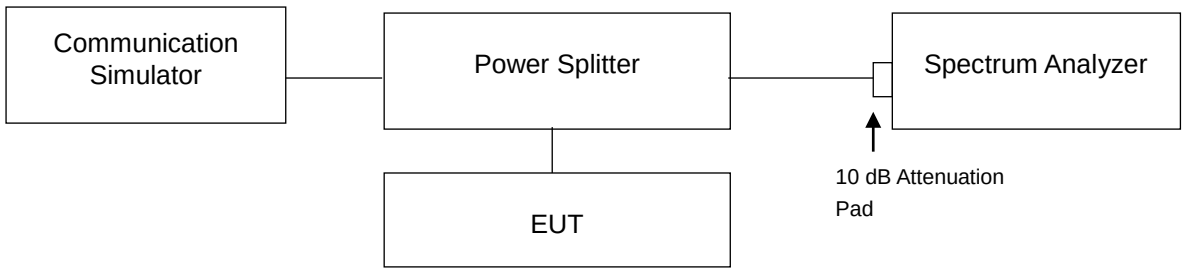
### 4.4.1 Limits of Occupied Bandwidth Measurement

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

### 4.4.2 Test Procedure

a. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
b. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

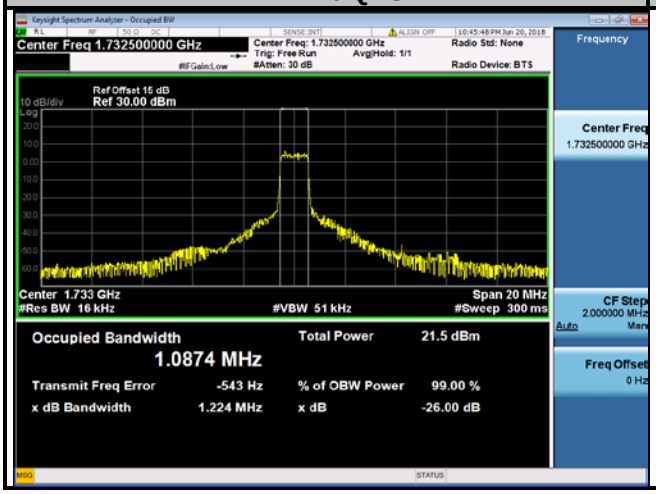
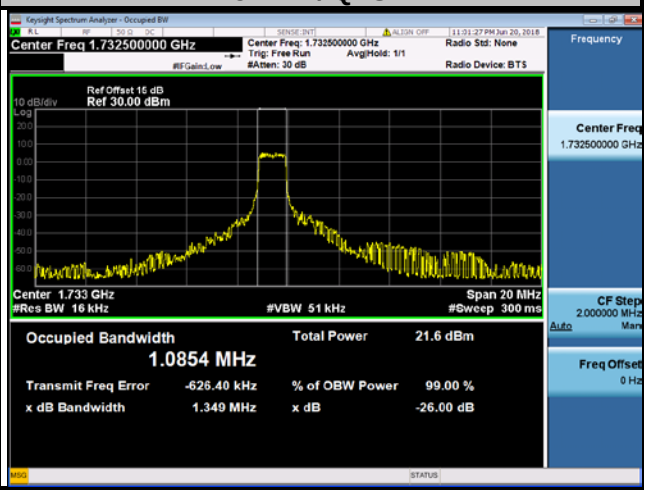
### 4.4.3 Test Setup



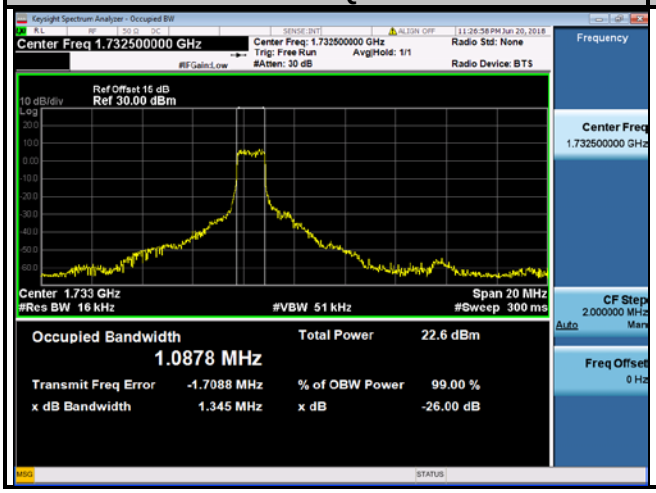
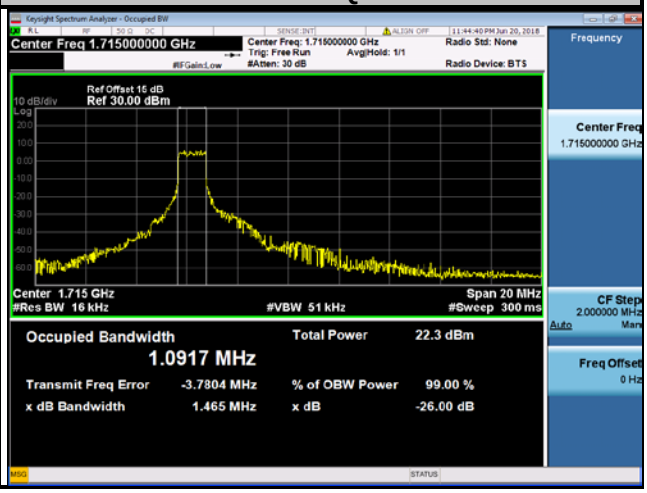
4.4.4 Test Result

**Cat-M1**

| LTE Band 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 1.4 MHz | | | | Channel Bandwidth: 3 MHz | | | |
| Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 19957 | 1710.7 | 1.0860 | 0.9067 | 19965 | 1711.5 | 1.0808 | 0.9122 |
| 20175 | 1732.5 | 1.0874 | 0.9085 | 20175 | 1732.5 | 1.0854 | 0.9066 |
| 20393 | 1754.3 | 1.0846 | 0.9104 | 20385 | 1753.5 | 1.0800 | 0.9119 |

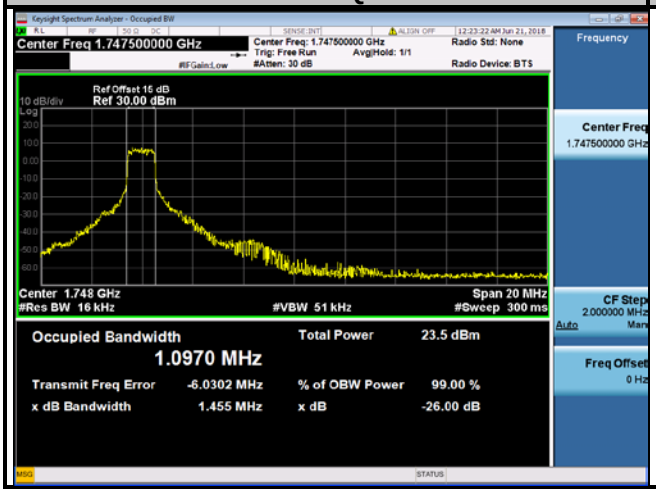
| Spectrum Plot of Worst Value | |
|---|---|
| 1.4 MHz / QPSK | 3 MHz / QPSK |
|  |  |

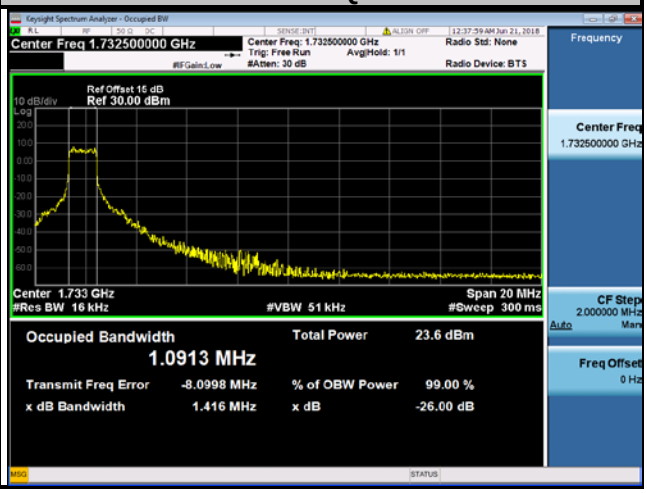
| LTE Band 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 5 MHz | | | | Channel Bandwidth: 10 MHz | | | |
| Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 19975 | 1712.5 | 1.0803 | 0.9160 | 20000 | 1715.0 | 1.0917 | 0.9148 |
| 20175 | 1732.5 | 1.0878 | 0.9167 | 20175 | 1732.5 | 1.0900 | 0.9142 |
| 20375 | 1752.5 | 1.0858 | 0.9039 | 20350 | 1750.0 | 1.0877 | 0.9139 |

| Spectrum Plot of Worst Value | |
|---|---|
| 5 MHz / QPSK | 10 MHz / QPSK |
|  |  |

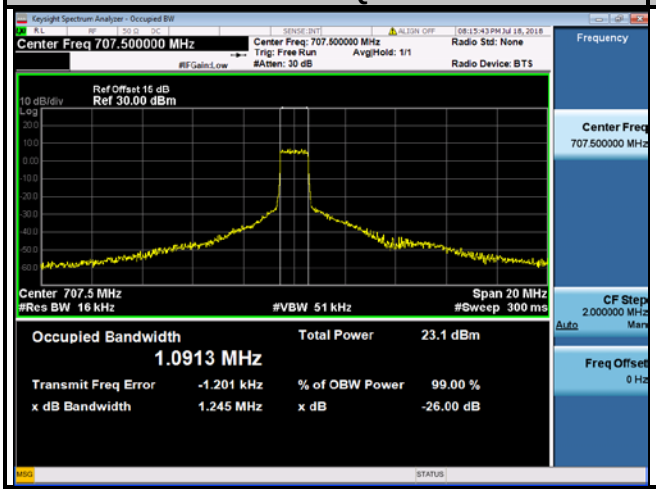
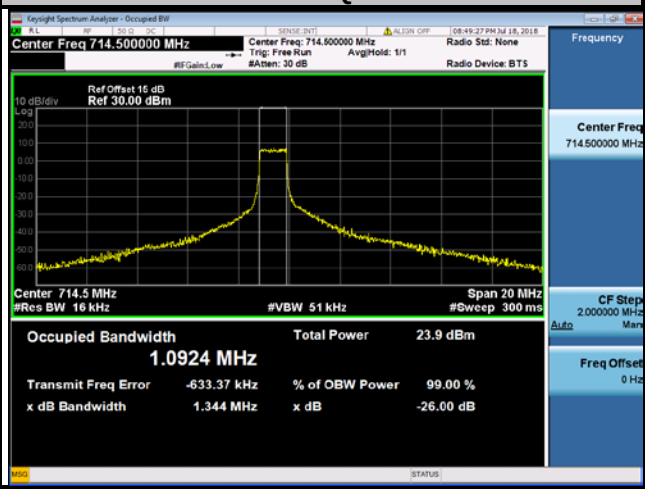
| LTE Band 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 15 MHz | | | | Channel Bandwidth: 20 MHz | | | |
| Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 20025 | 1717.5 | 1.0964 | 0.9212 | 20050 | 1720.0 | 1.0911 | 0.9161 |
| 20175 | 1732.5 | 1.0948 | 0.9232 | 20175 | 1732.5 | 1.0913 | 0.9174 |
| 20325 | 1747.5 | 1.0970 | 0.9197 | 20300 | 1745.0 | 1.0909 | 0.9136 |

| Spectrum Plot of Worst Value | |
|---|---|
| 15 MHz / QPSK | 20 MHz / QPSK |

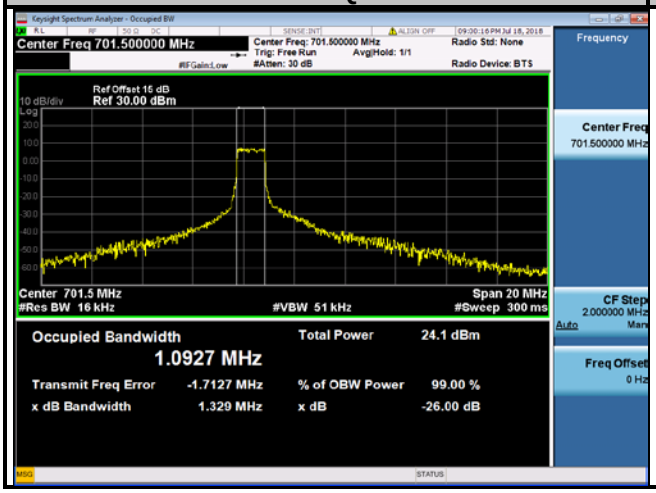
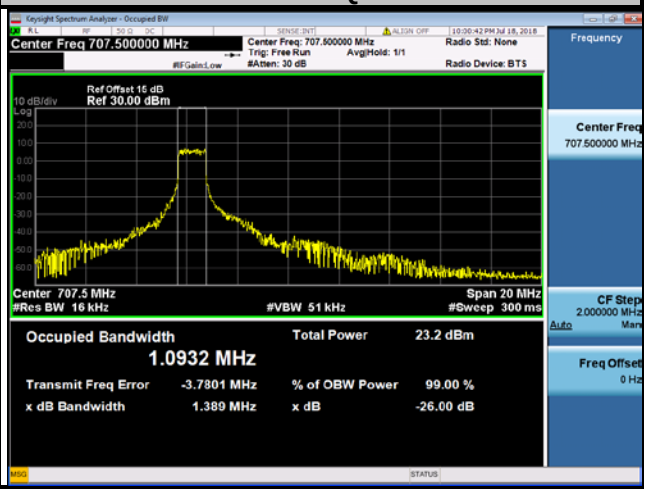


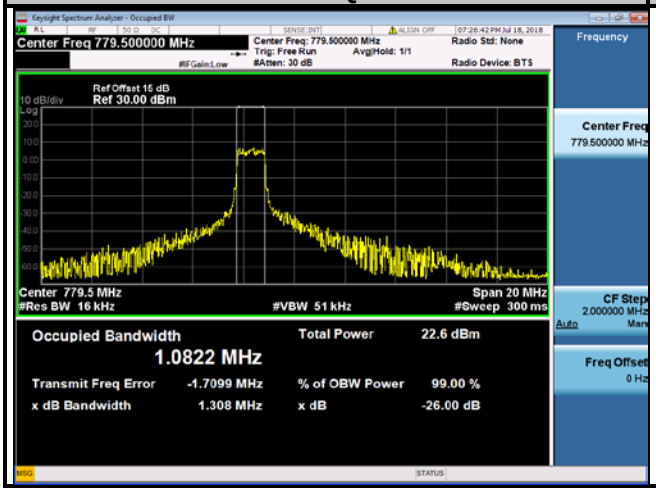
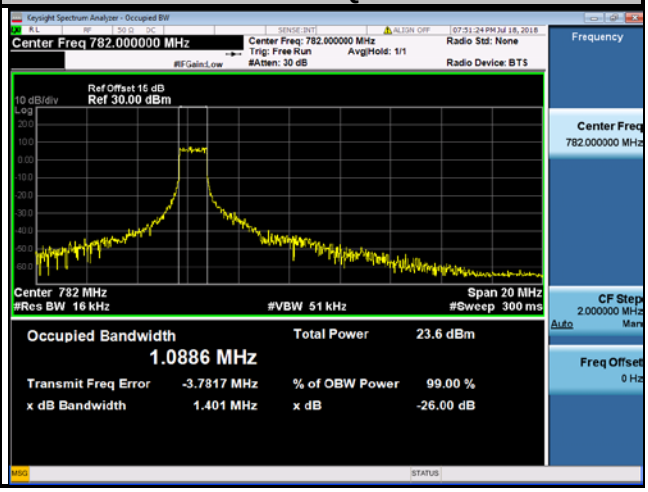
| LTE Band 12 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 1.4 MHz | | | | Channel Bandwidth: 3 MHz | | | |
| Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 23017 | 699.7 | 1.0882 | 0.9114 | 23025 | 700.5 | 1.0836 | 0.9061 |
| 23095 | 707.5 | 1.0913 | 0.9122 | 23095 | 707.5 | 1.0871 | 0.9216 |
| 23173 | 715.3 | 1.0880 | 0.9121 | 23165 | 714.5 | 1.0924 | 0.9097 |

| Spectrum Plot of Worst Value | |
|---|---|
| 1.4 MHz / QPSK | 3 MHz / QPSK |
|  |  |

| LTE Band 12 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 5 MHz | | | | Channel Bandwidth: 10 MHz | | | |
| Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 23035 | 701.5 | 1.0927 | 0.9184 | 23060 | 704.0 | 1.0923 | 0.9158 |
| 23095 | 707.5 | 1.0818 | 0.9140 | 23095 | 707.5 | 1.0932 | 0.9144 |
| 23155 | 713.5 | 1.0868 | 0.9142 | 23130 | 711.0 | 1.0913 | 0.9152 |

| Spectrum Plot of Worst Value | |
|---|---|
| 5 MHz / QPSK | 10 MHz / QPSK |
|  |  |

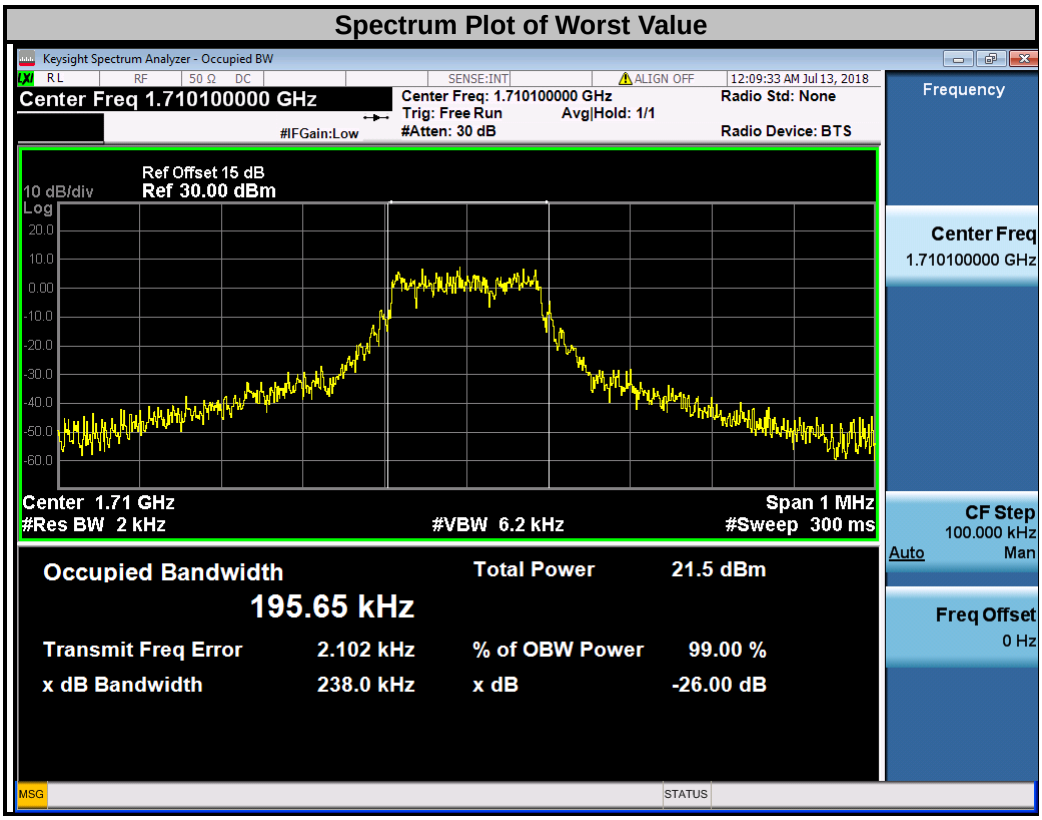
| LTE Band 13 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel Bandwidth: 5 MHz | | | | Channel Bandwidth: 10 MHz | | | |
| Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | | Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) | |
| | | QPSK | 16QAM | | | QPSK | 16QAM |
| 23205 | 779.5 | 1.0822 | 0.9018 | 23230 | 782.0 | 1.0886 | 0.9141 |
| 23230 | 782.0 | 1.0785 | 0.9088 | | | | |
| 23255 | 784.5 | 1.0787 | 0.9135 | | | | |

| Spectrum Plot of Worst Value | |
|---|---|
| 5 MHz / QPSK | 10 MHz / QPSK |
|  |  |

## NB-IOT

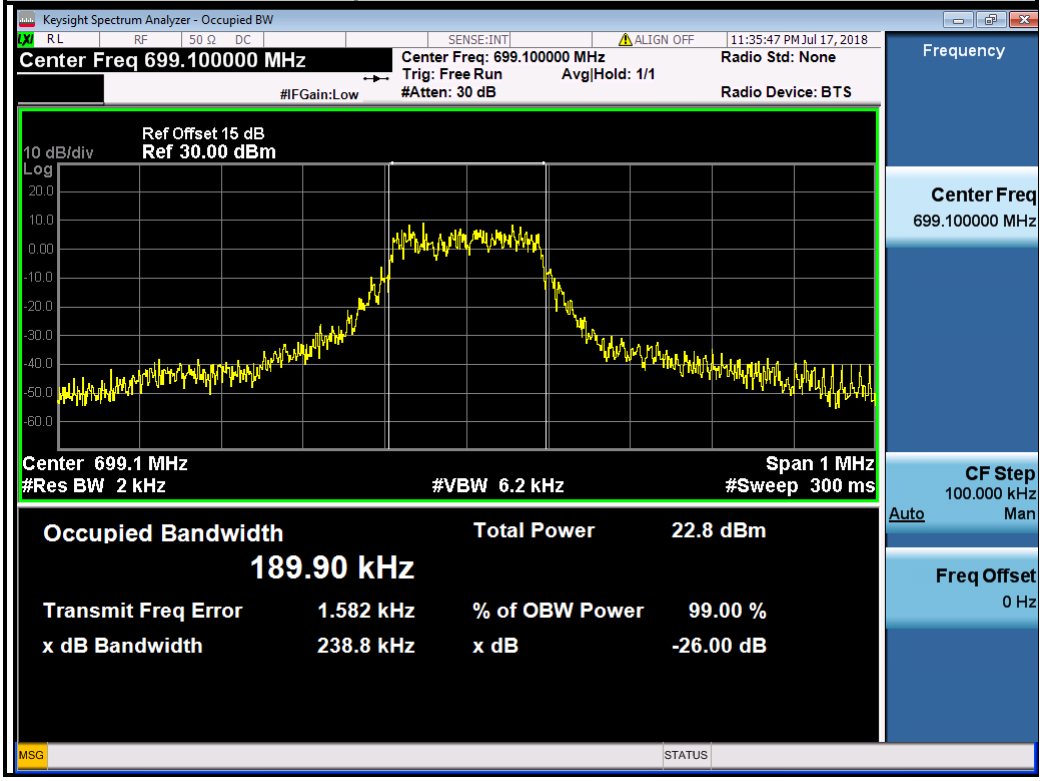
| 99 % Occupied Bandwidth (kHz) | | | | | |
|---|---|---|---|---|---|
| LTE Band 4 | | | | | |
| Channel | Frequency (MHz) | Modulation | Ntones | Sub-carrier spacing (kHz) | 99% |
| 19951 | 1710.1 | BPSK | 1@0 | 3.75 | 59.66 |
| | | QPSK | 1@0 | 15 | 131.88 |
| | | QPSK | 3@3 | 15 | 128.44 |
| | | QPSK | 12@0 | 15 | 195.65 |
| 20175 | 1732.5 | BPSK | 1@0 | 3.75 | 62.36 |
| | | QPSK | 1@0 | 15 | 131.40 |
| | | QPSK | 3@3 | 15 | 127.17 |
| | | QPSK | 12@0 | 15 | 186.73 |
| 20399 | 1754.9 | BPSK | 1@47 | 3.75 | 53.53 |
| | | QPSK | 1@11 | 15 | 122.54 |
| | | QPSK | 3@3 | 15 | 129.29 |
| | | QPSK | 12@0 | 15 | 184.63 |

**Spectrum Plot of Worst Value**



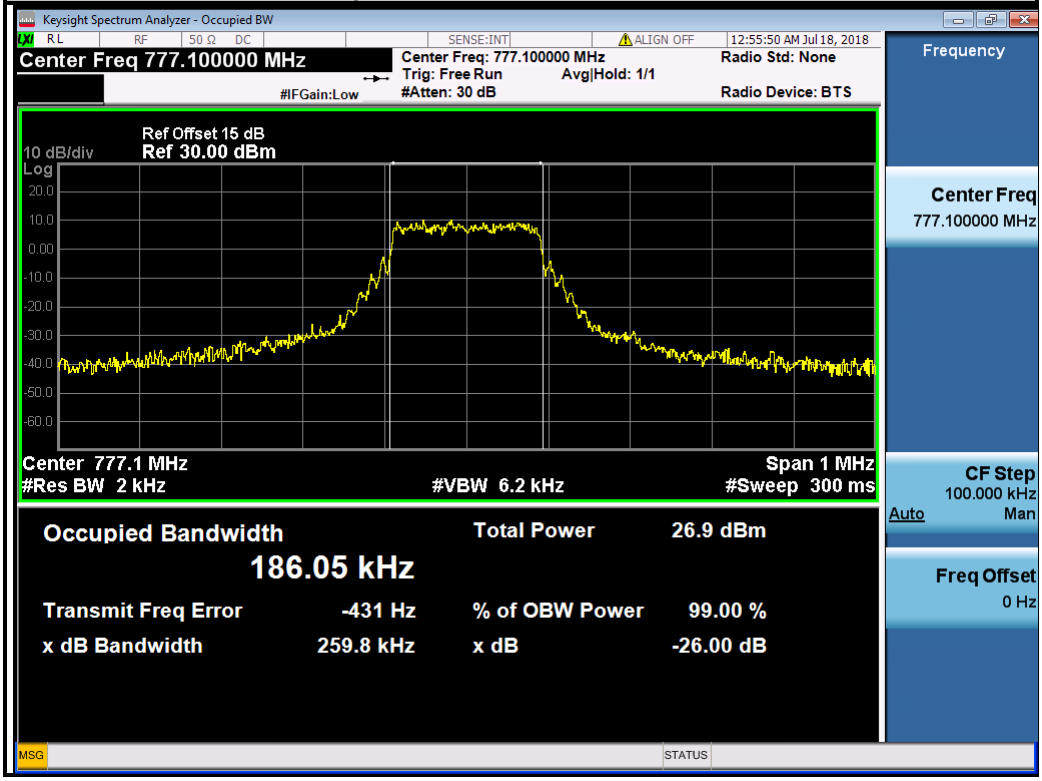
| 99 % Occupied Bandwidth (kHz) | | | | | |
|---|---|---|---|---|---|
| LTE Band 12 | | | | | |
| Channel | Frequency (MHz) | Modulation | Ntones | Sub-carrier spacing (kHz) | 99% |
| 23011 | 699.1 | BPSK | 1@0 | 3.75 | 46.59 |
| | | QPSK | 1@0 | 15 | 120.60 |
| | | QPSK | 3@3 | 15 | 118.83 |
| | | QPSK | 12@0 | 15 | 189.90 |
| 23095 | 707.5 | BPSK | 1@0 | 3.75 | 48.49 |
| | | QPSK | 1@0 | 15 | 115.28 |
| | | QPSK | 3@3 | 15 | 131.92 |
| | | QPSK | 12@0 | 15 | 185.70 |
| 23179 | 715.9 | BPSK | 1@47 | 3.75 | 49.72 |
| | | QPSK | 1@11 | 15 | 127.43 |
| | | QPSK | 3@3 | 15 | 115.38 |
| | | QPSK | 12@0 | 15 | 186.28 |

**Spectrum Plot of Worst Value**



| 99 % Occupied Bandwidth (kHz) | | | | | |
|---|---|---|---|---|---|
| LTE Band 13 | | | | | |
| Channel | Frequency (MHz) | Modulation | Ntones | Sub-carrier spacing (kHz) | 99% |
| 23181 | 777.1 | BPSK | 1@0 | 3.75 | 48.67 |
| | | QPSK | 1@0 | 15 | 125.82 |
| | | QPSK | 3@3 | 15 | 120.52 |
| | | QPSK | 12@0 | 15 | 186.05 |
| 23230 | 782 | BPSK | 1@0 | 3.75 | 49.26 |
| | | QPSK | 1@0 | 15 | 119.66 |
| | | QPSK | 3@3 | 15 | 138.36 |
| | | QPSK | 12@0 | 15 | 185.99 |
| 23279 | 786.9 | BPSK | 1@47 | 3.75 | 49.84 |
| | | QPSK | 1@11 | 15 | 116.15 |
| | | QPSK | 3@3 | 15 | 120.14 |
| | | QPSK | 12@0 | 15 | 183.60 |

**Spectrum Plot of Worst Value**



## 4.5 Band Edge Measurement

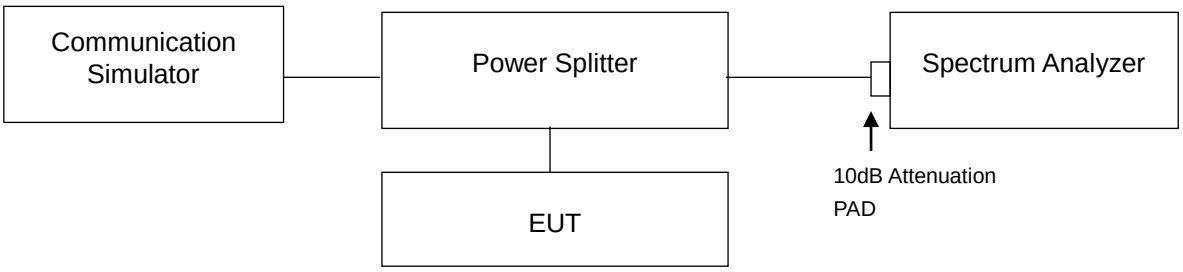
### 4.5.1 Limits of Band Edge Measurement

For operations in the 698-756 MHz and 777-787 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.

For operations in the 746-756 MHz and 777-787 MHz bands shall also comply with the following restrictions:
(a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
(i) 76 + 10 log P (watts), dB, for base and fixed equipment, and
(ii) 65 + 10 log P (watts), dB, for mobile and portable equipment.

For operations in the 1710–1755 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

### 4.5.2 Test Setup

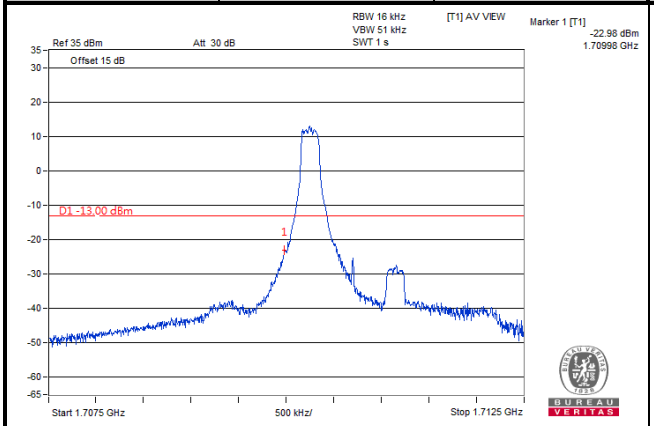
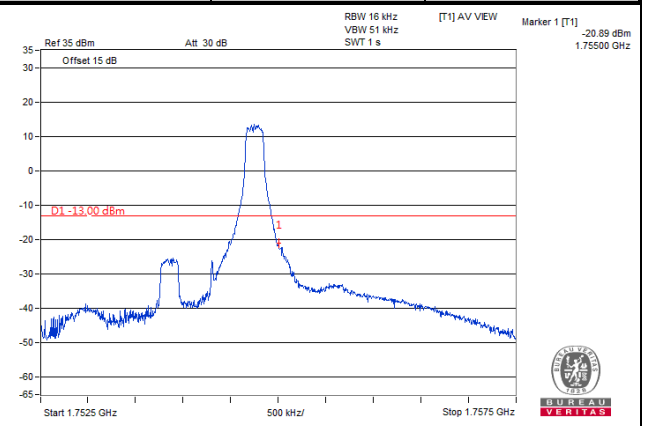
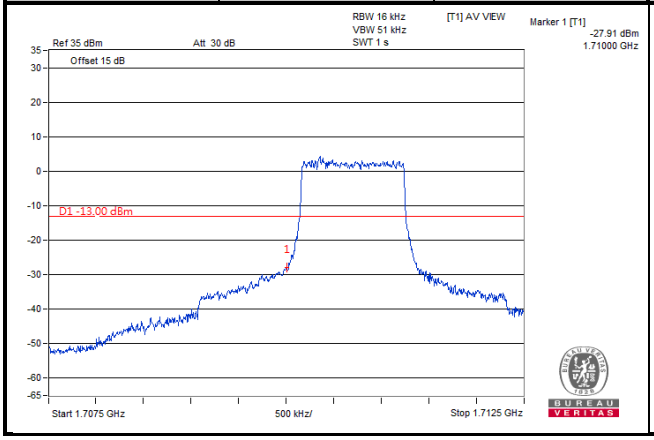
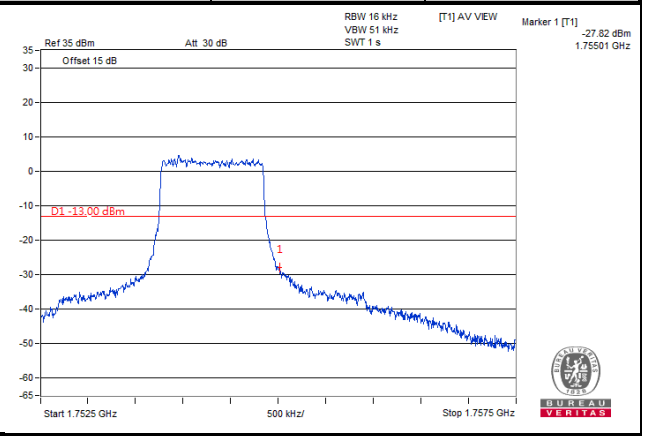


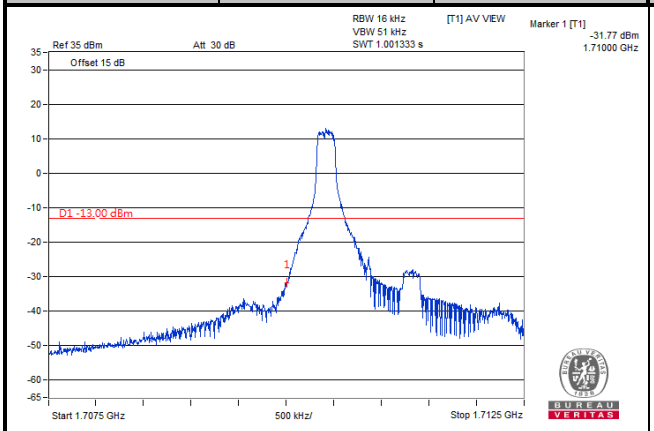
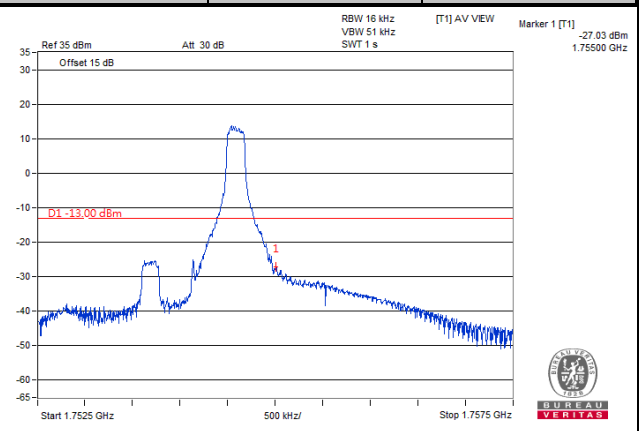
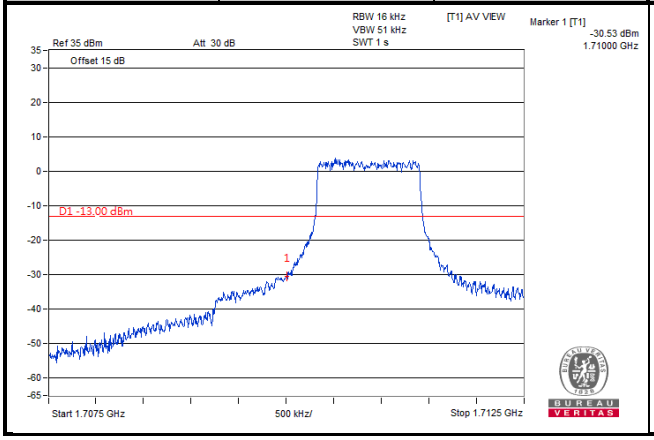
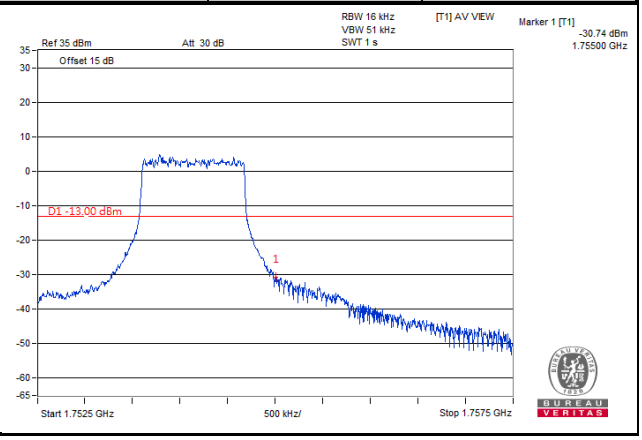

### 4.5.3 Test Procedures

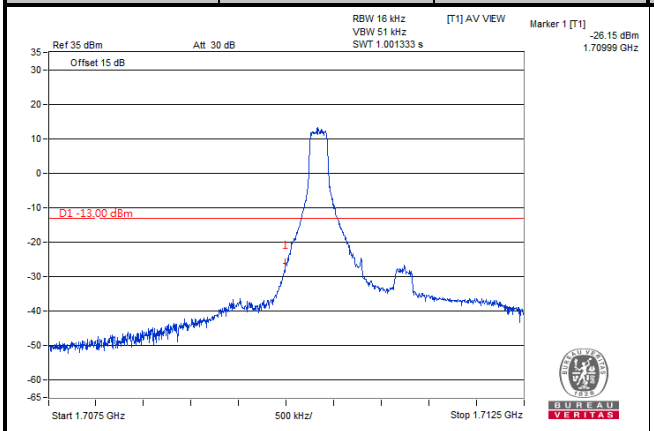
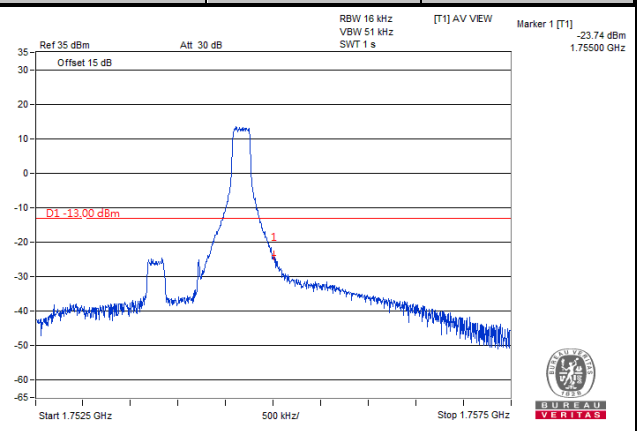
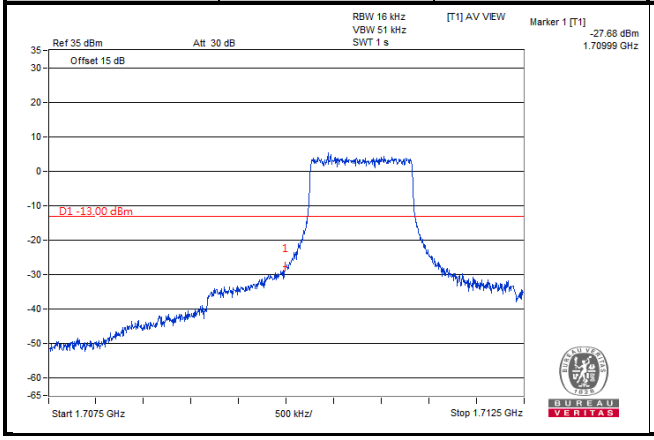
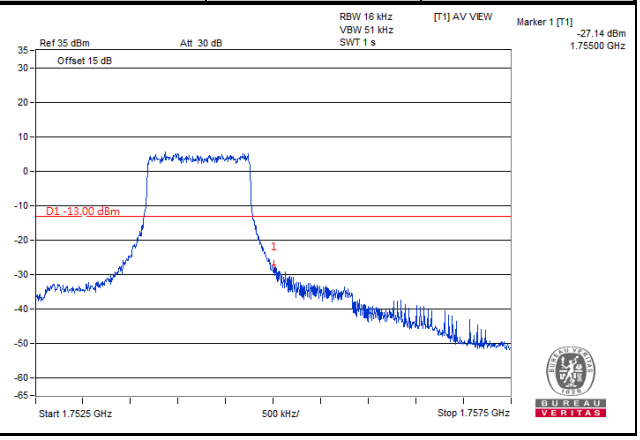
a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 16 kHz and VB of the spectrum is 51 kHz (LTE Bandwidth 1.4 / 3 / 5 / 10 / 15 / 20 MHz) for **Cat-M1**.
c. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 51 Hz and VB of the spectrum is 160 Hz (BPSK) for **NB-IOT**.
d. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 200 Hz and VB of the spectrum is 620 kHz (QPSK) for **NB-IOT**.
e. Record the max. trace plot into the test report.

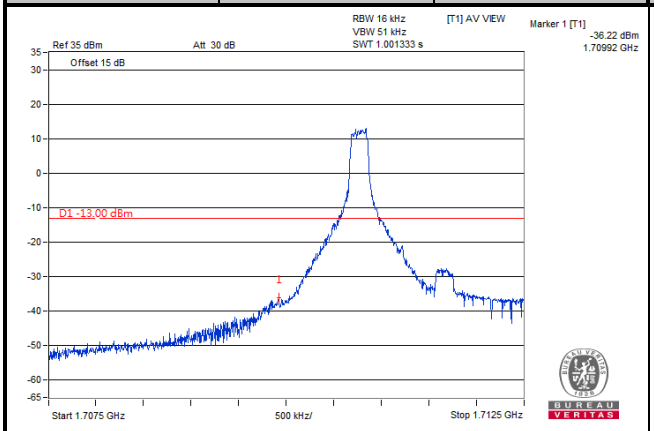
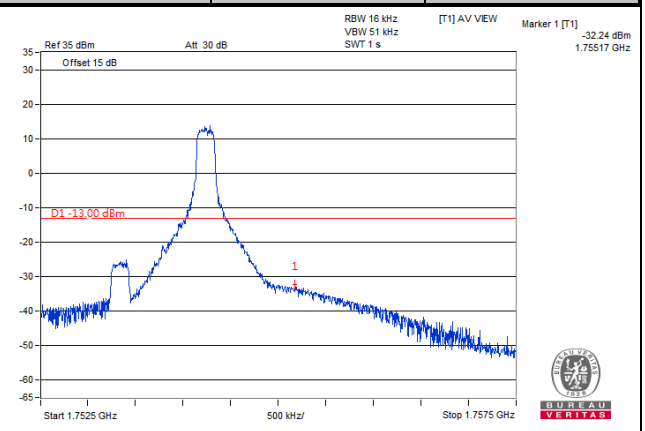
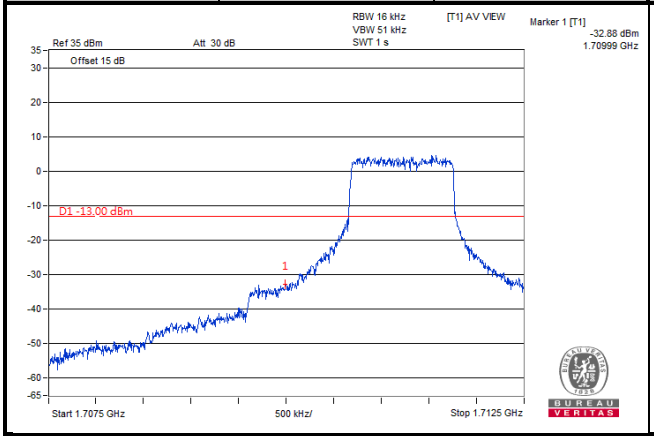
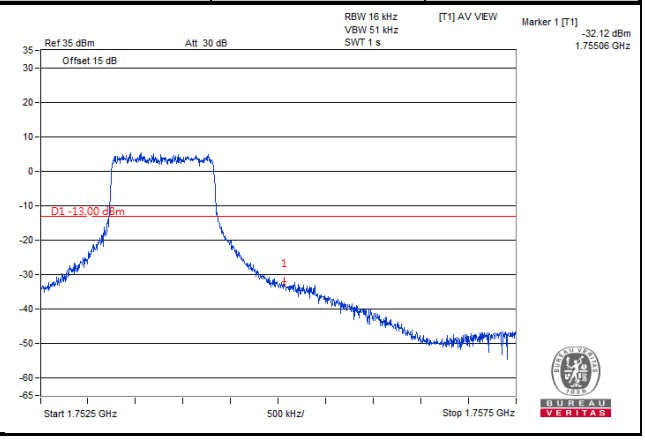
4.5.4 Test Results

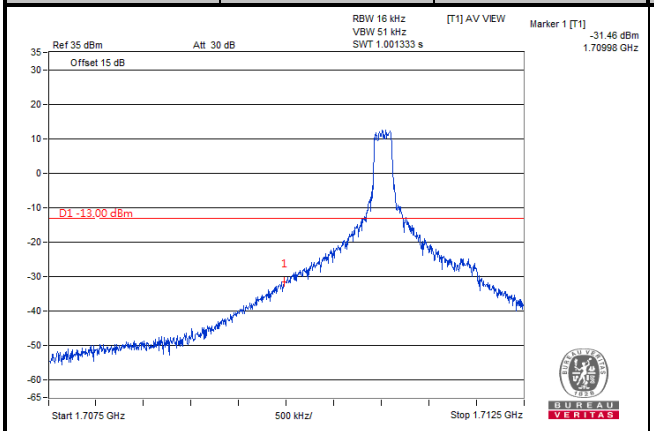
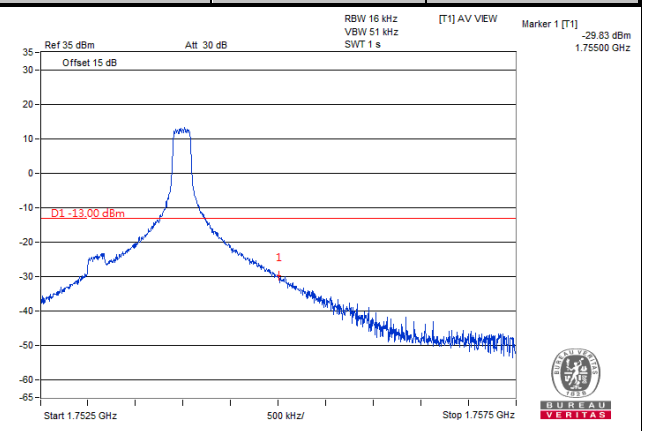
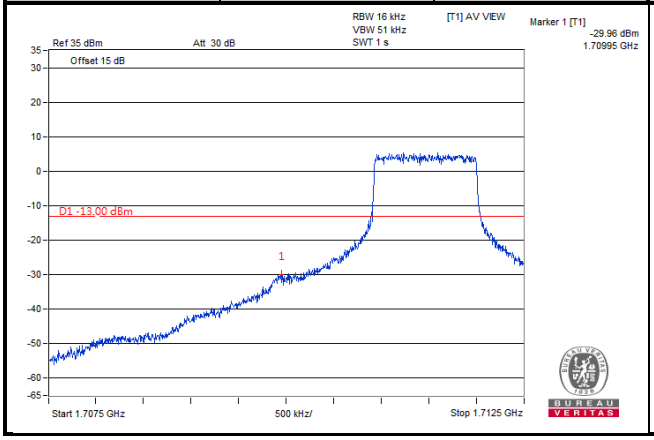
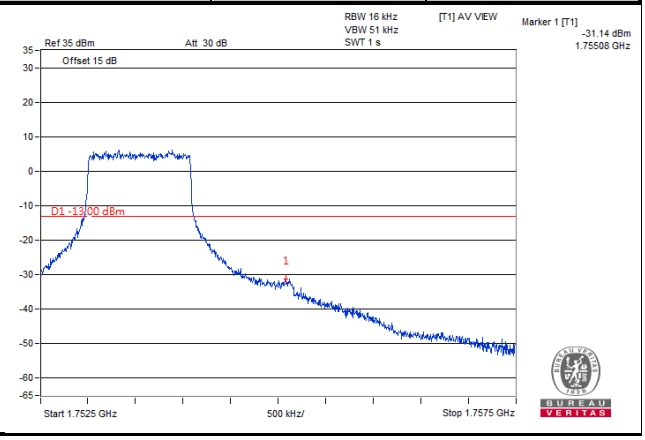
**Cat-M1**

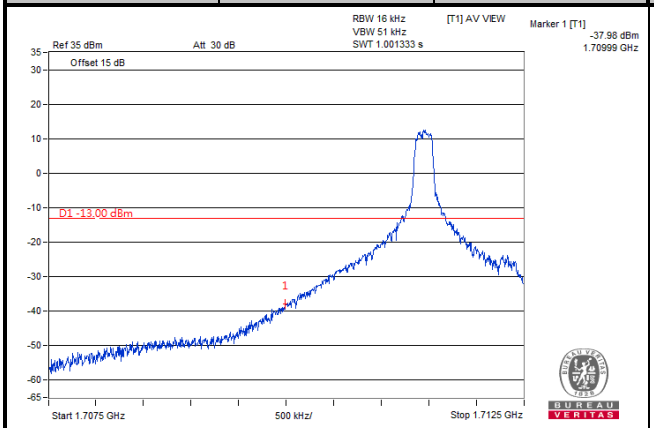
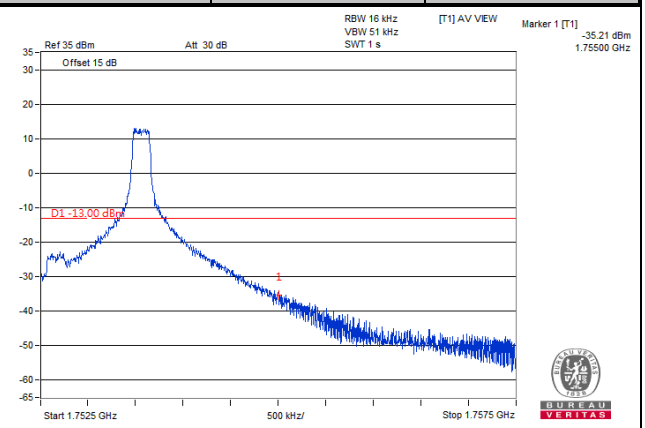
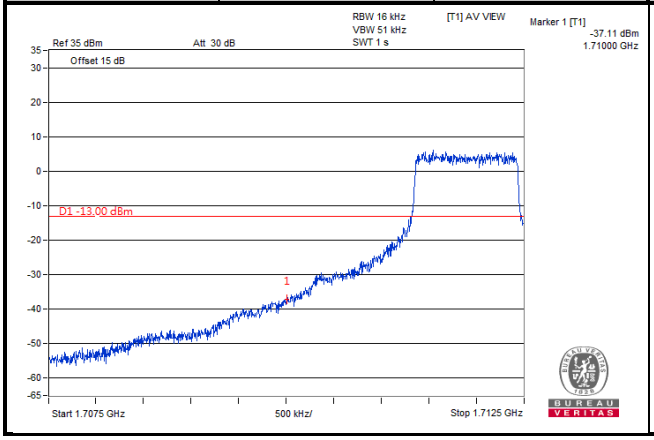
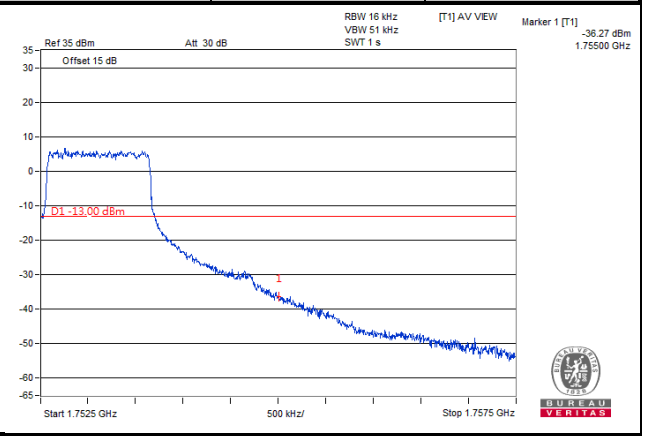
| LTE Band 4 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 1.4 MHz | | | | | |
| Channel | 19957 | 1 RB | Channel | 20393 | 1 RB |
|  | | |  | | |
| Channel | 19957 | 6 RB | Channel | 20393 | 6 RB |
|  | | |  | | |

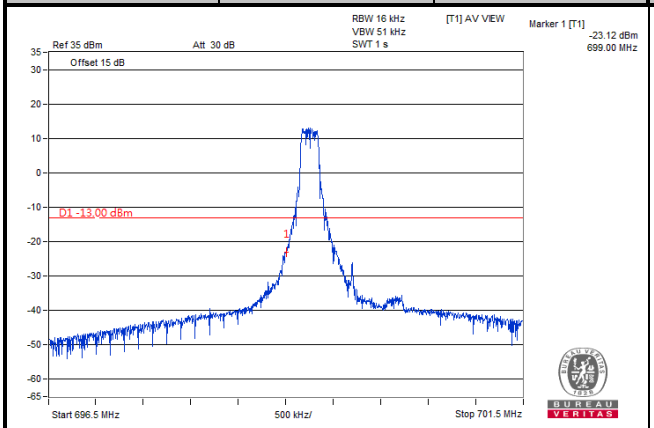
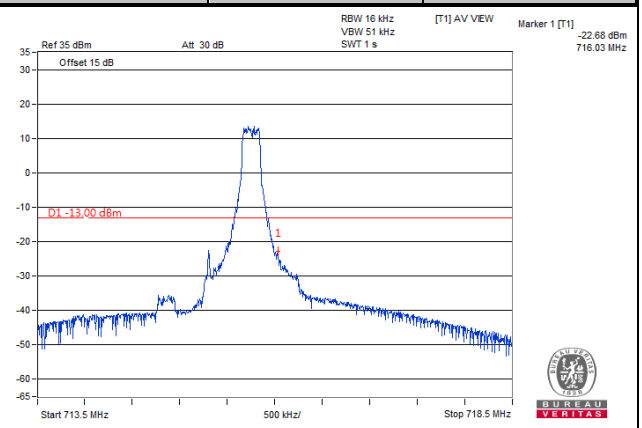
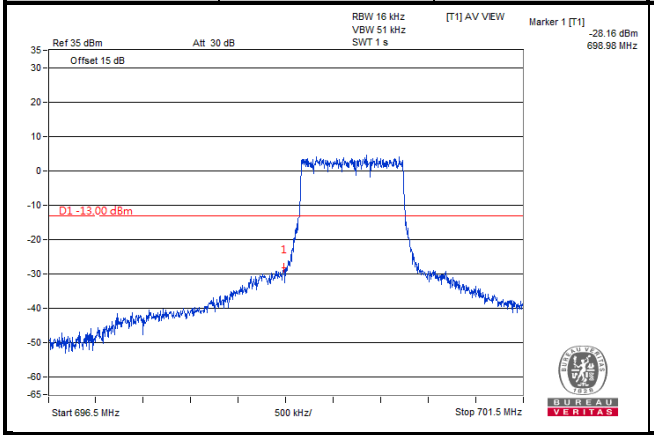
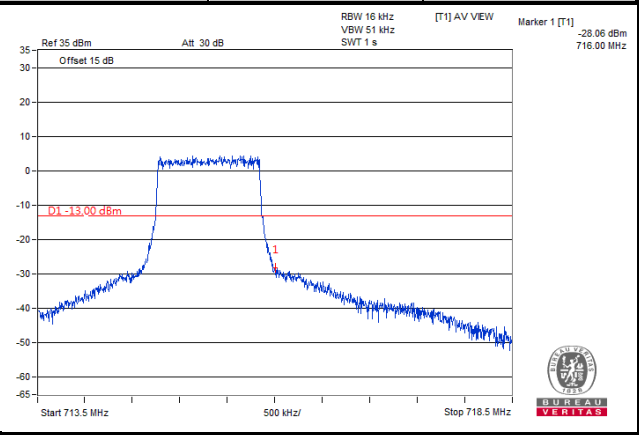
| LTE Band 4 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 3 MHz | | | | | |
| Channel | 19965 | 1 RB | Channel | 20385 | 1 RB |
|  | | |  | | |
| Channel | 19965 | 6 RB | Channel | 20385 | 6 RB |
|  | | |  | | |

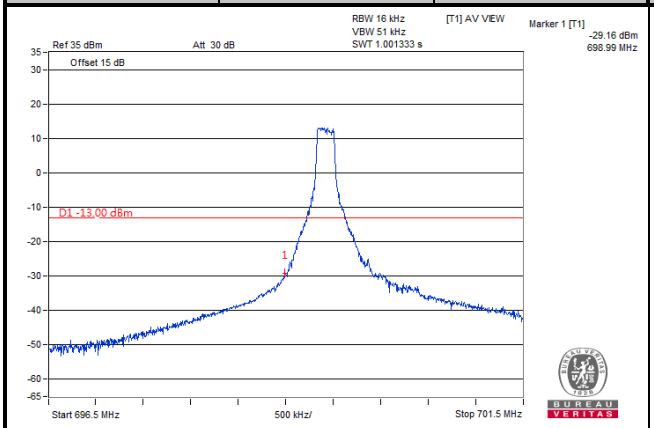
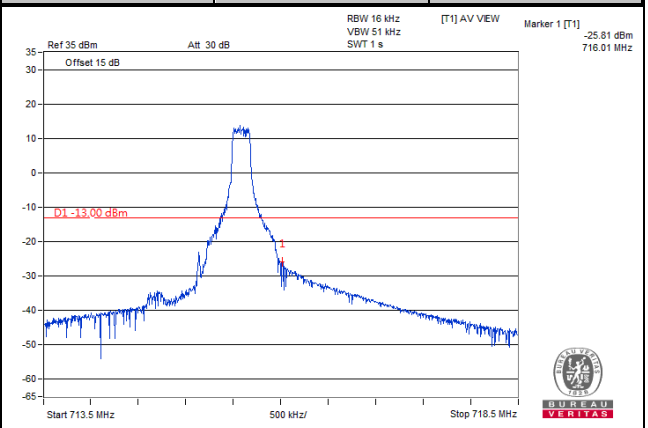
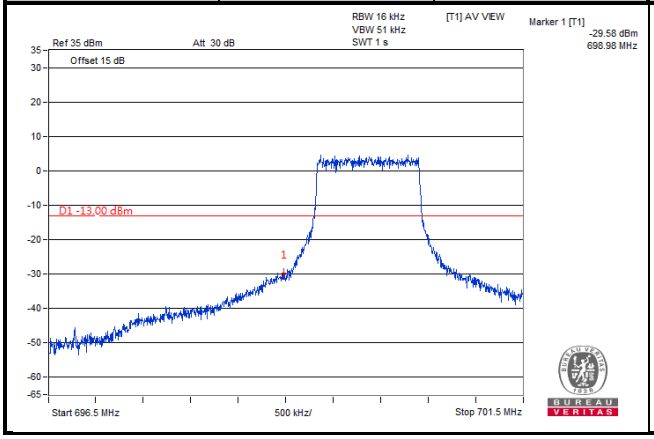
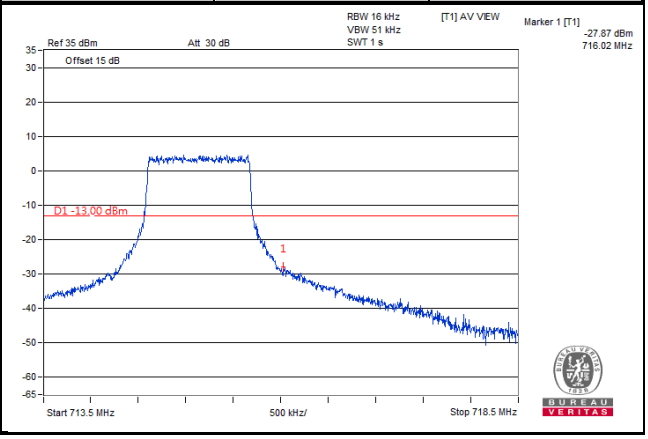
| LTE Band 4 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 5 MHz | | | | | |
| Channel | 19975 | 1 RB | Channel | 20375 | 1 RB |
|  | | |  | | |
| Channel | 19975 | 6 RB | Channel | 20375 | 6 RB |
|  | | |  | | |

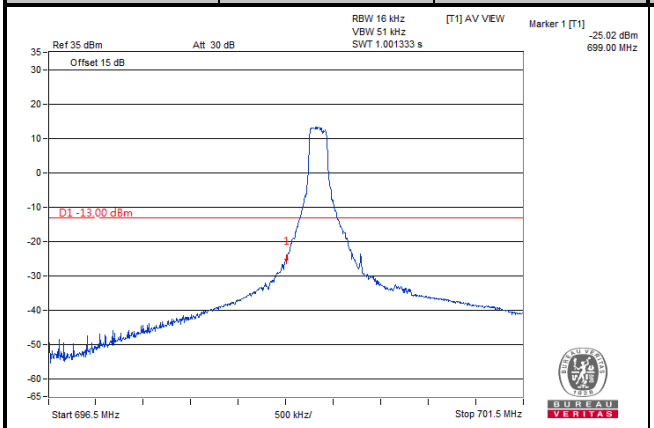
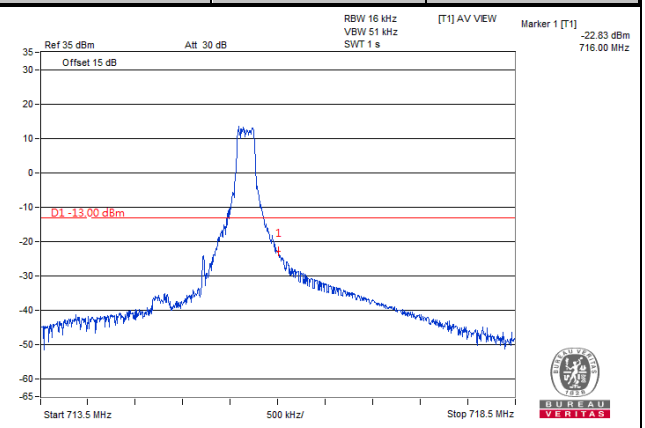
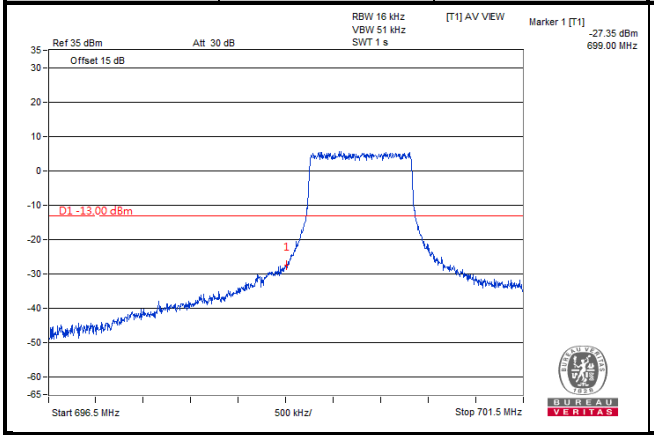
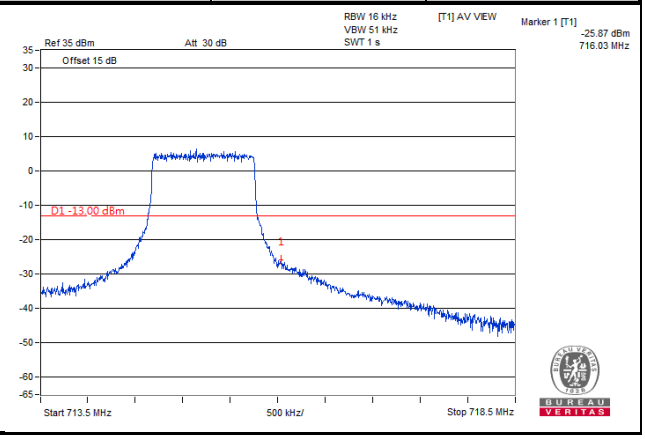
| LTE Band 4 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 10 MHz | | | | | |
| Channel | 20000 | 1 RB | Channel | 20350 | 1 RB |
|  | | |  | | |
| Channel | 20000 | 6 RB | Channel | 20350 | 6 RB |
|  | | |  | | |

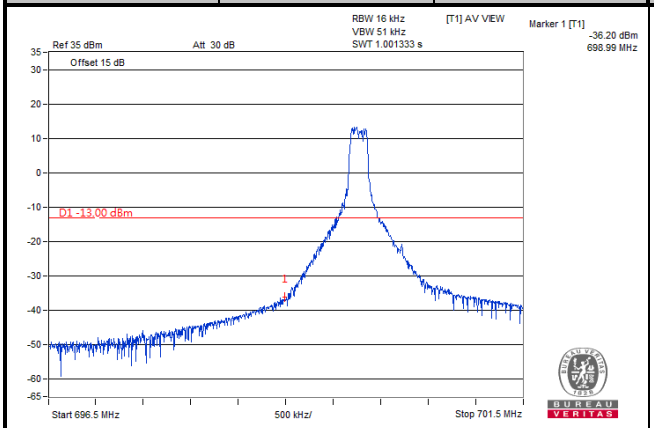
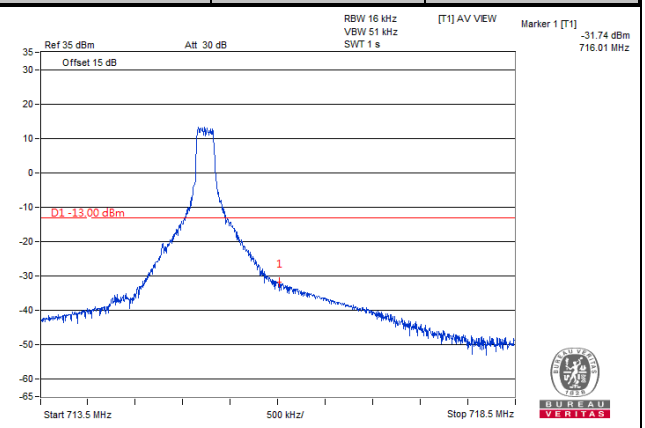
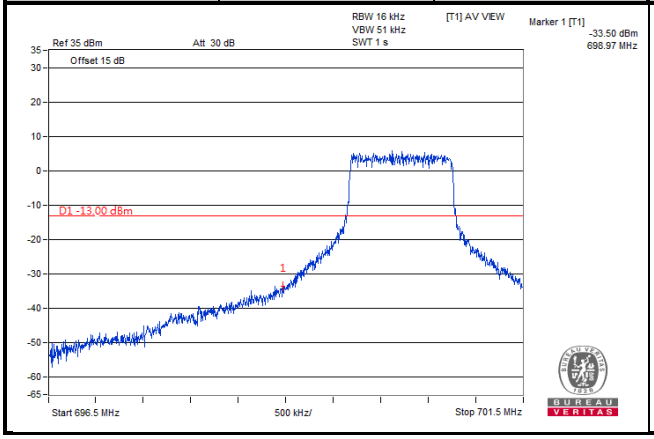
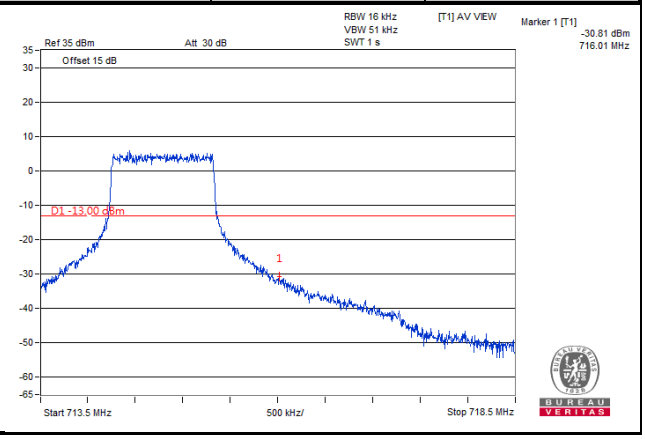
| LTE Band 4 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 15 MHz | | | | | |
| Channel | 20025 | 1 RB | Channel | 20325 | 1 RB |
|  | | |  | | |
| Channel | 20025 | 6 RB | Channel | 20325 | 6 RB |
|  | | |  | | |

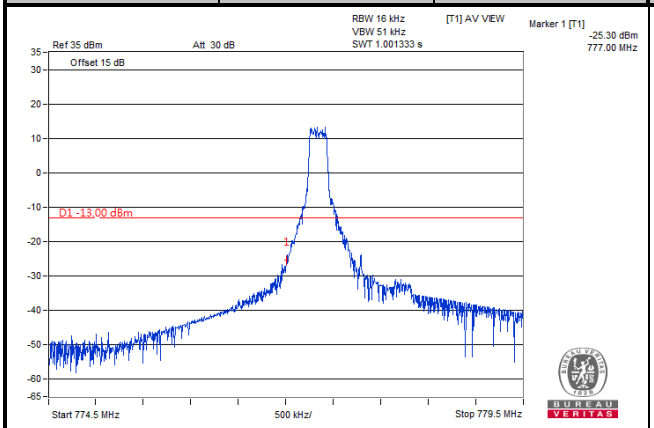
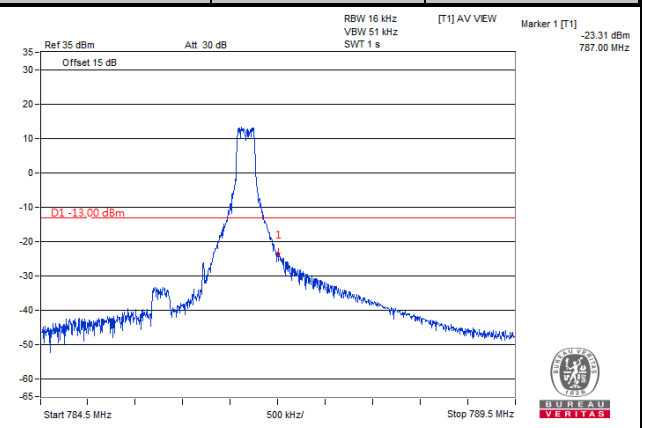
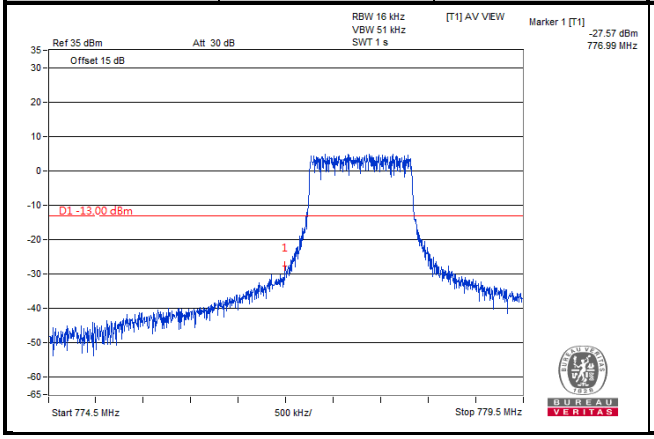
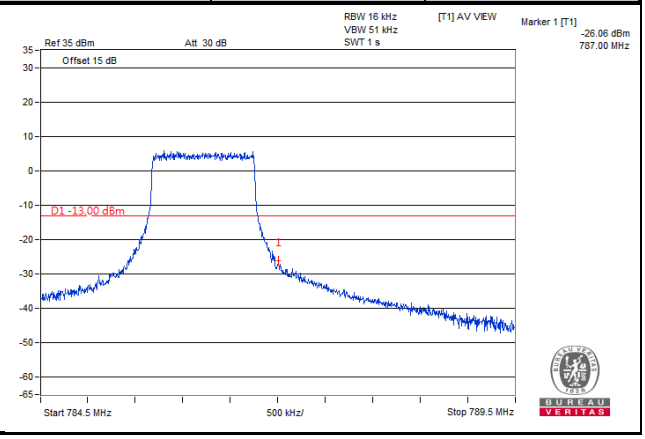
| LTE Band 4 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 20 MHz | | | | | |
| Channel | 20050 | 1 RB | Channel | 20300 | 1 RB |
|  | | |  | | |
| Channel | 20050 | 6 RB | Channel | 20300 | 6 RB |
|  | | |  | | |

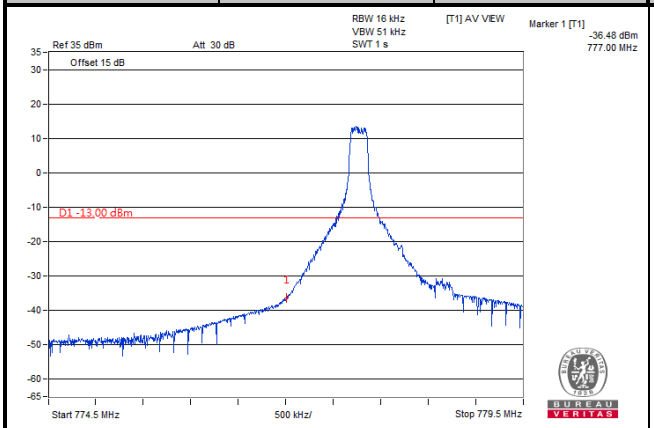
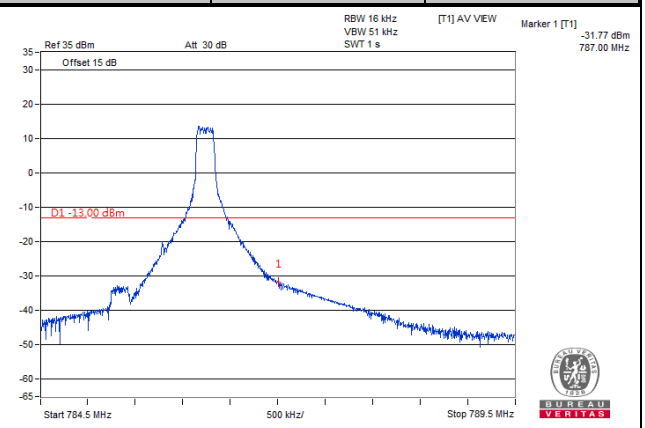
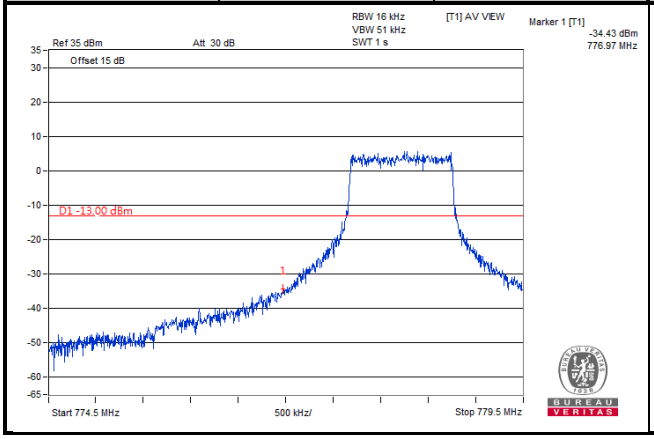
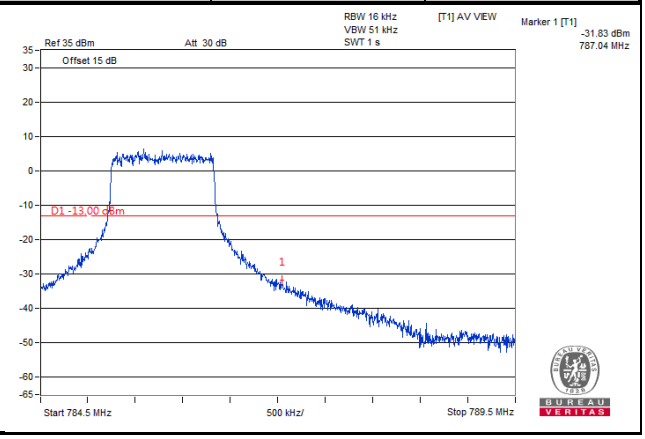
| LTE Band 12 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 1.4 MHz | | | | | |
| Channel | 23017 | 1 RB | Channel | 23173 | 1 RB |
|  | | |  | | |
| Channel | 23017 | 6 RB | Channel | 23173 | 6 RB |
|  | | |  | | |

| LTE Band 12 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 3 MHz | | | | | |
| Channel | 23025 | 1 RB | Channel | 23165 | 1 RB |
|  | | |  | | |
| Channel | 23025 | 6 RB | Channel | 23165 | 6 RB |
|  | | |  | | |

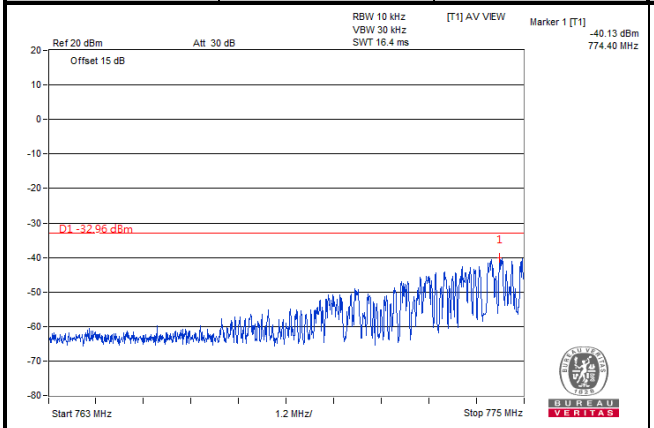
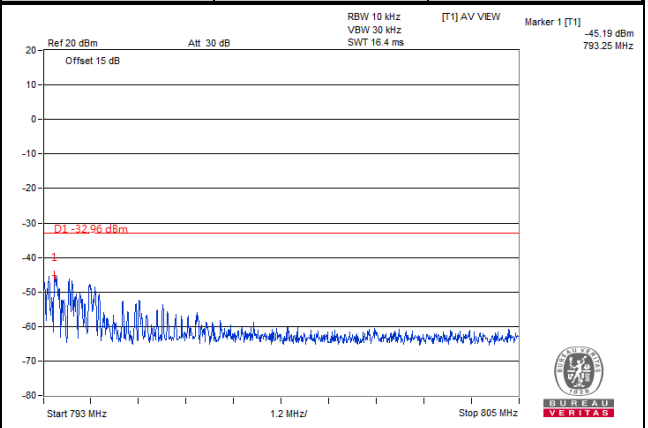
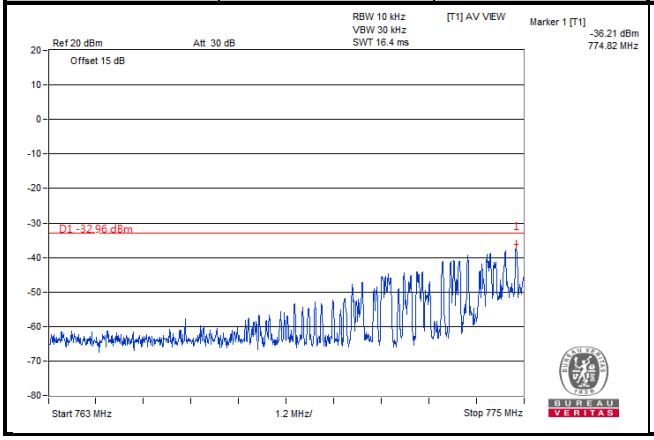
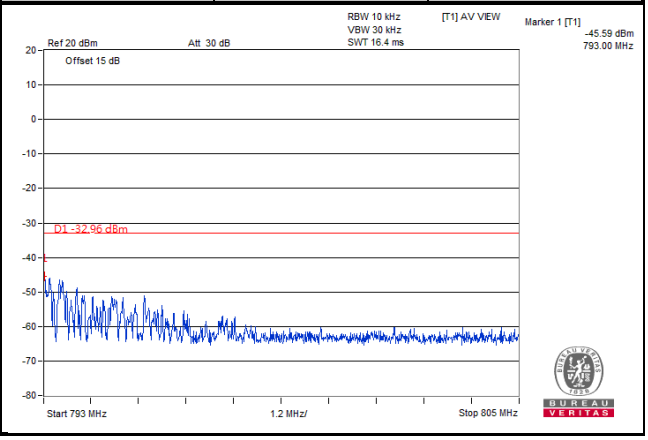
| LTE Band 12 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 5 MHz | | | | | |
| Channel | 23035 | 1 RB | Channel | 23155 | 1 RB |
|  | | |  | | |
| Channel | 23035 | 6 RB | Channel | 23155 | 6 RB |
|  | | |  | | |

| LTE Band 12 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 10 MHz | | | | | |
| Channel | 23060 | 1 RB | Channel | 23130 | 1 RB |
|  | | |  | | |
| Channel | 23060 | 6 RB | Channel | 23130 | 6 RB |
|  | | |  | | |

| LTE Band 13 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 5 MHz | | | | | |
| Channel | 23205 | 1 RB | Channel | 23255 | 1 RB |
|  | | |  | | |
| Channel | 23205 | 6 RB | Channel | 23255 | 6 RB |
|  | | |  | | |

| LTE Band 13 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 10 MHz | | | | | |
| Channel | 23230 | 1 RB | Channel | 23230 | 1 RB |
|  | | |  | | |
| Channel | 23230 | 6 RB | Channel | 23230 | 6 RB |
|  | | |  | | |

**Emission Mask**

| LTE Band 13 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 5 MHz | | | | | |
| Channel | 23205 | 1 RB | Channel | 23255 | 1 RB |
|  | | |  | | |
| Channel | 23205 | 6 RB | Channel | 23255 | 6 RB |
|  | | |  | | |





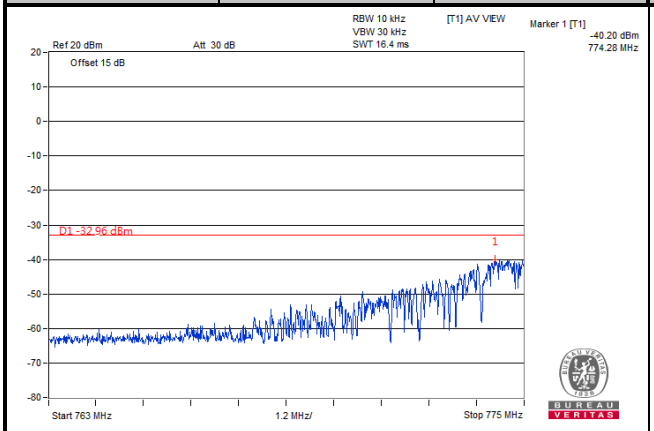
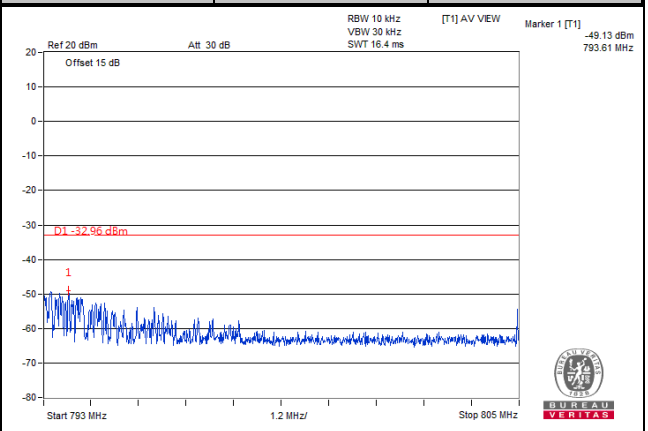
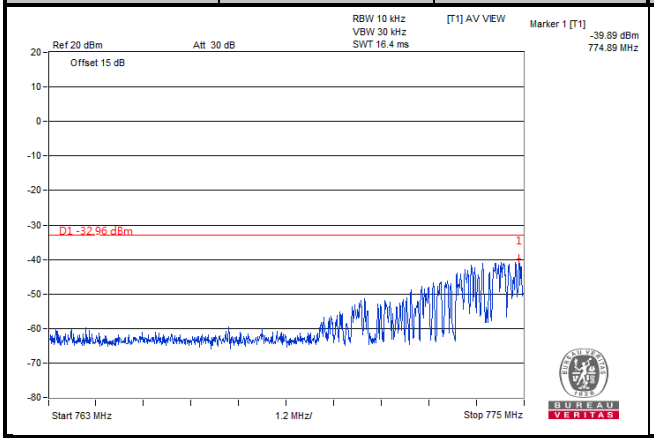
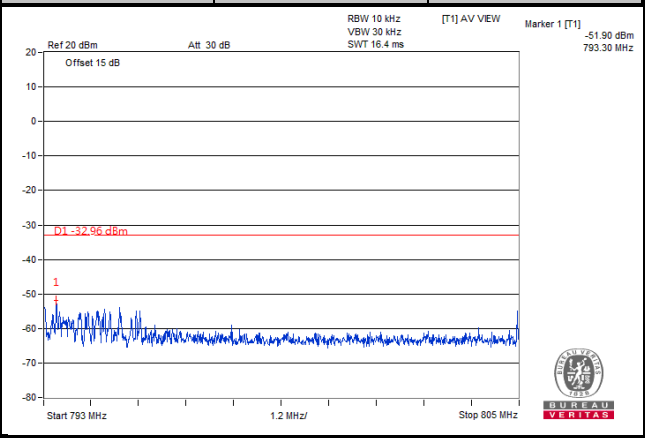




For the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is 65+10log(P[watt]) in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

10log(10kHz/6.25kHz) = 2.04 dB

Limit line = -35 dBm + 2.04 dB = -32.96 dBm

| LTE Band 13 | | | | | |
|---|---|---|---|---|---|
| Channel Bandwidth: 10 MHz | | | | | |
| Channel | 23230 | 1 RB | Channel | 23230 | 1 RB |
|  | | |  | | |
| Channel | 23230 | 6 RB | Channel | 23230 | 6 RB |
|  | | |  | | |







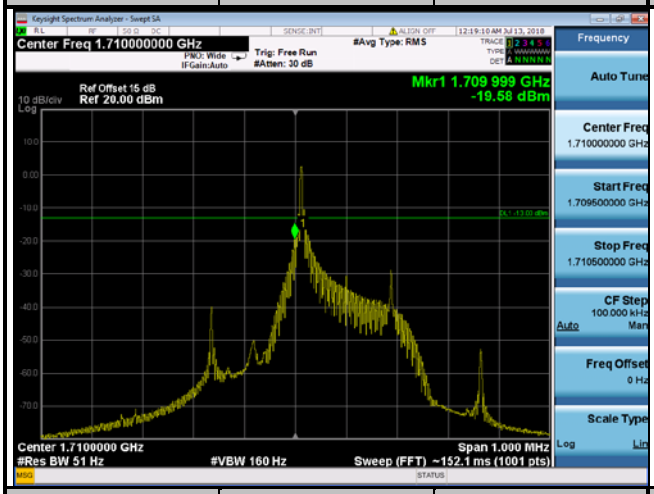
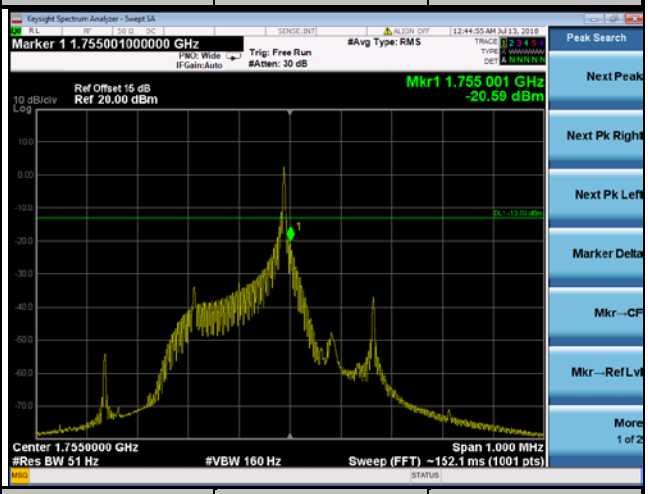
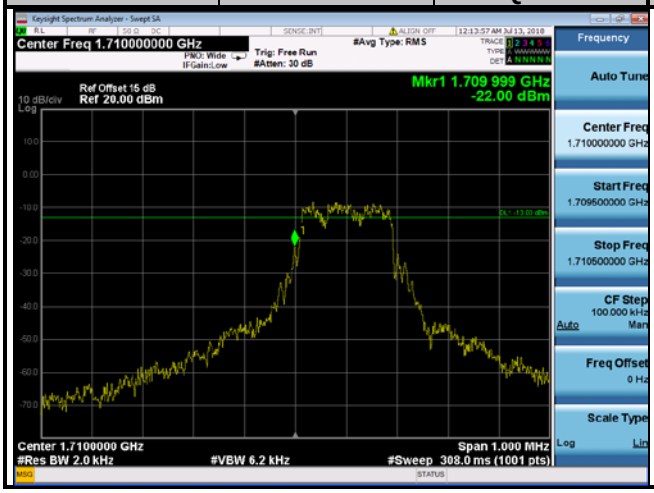


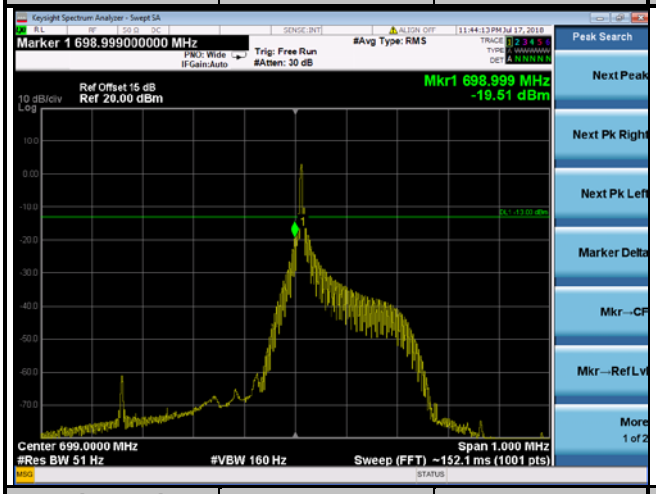
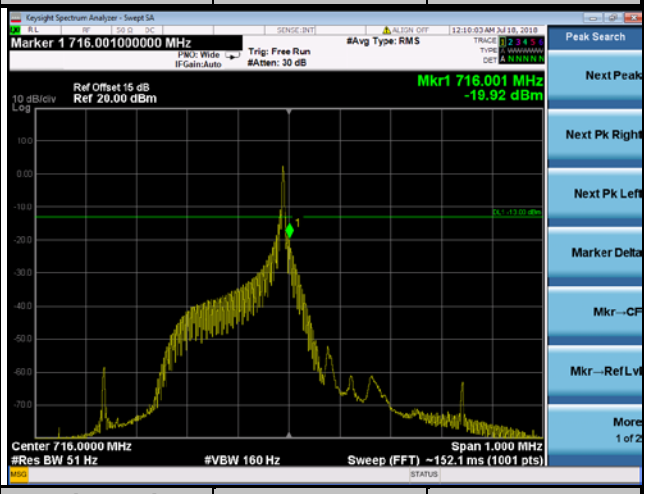
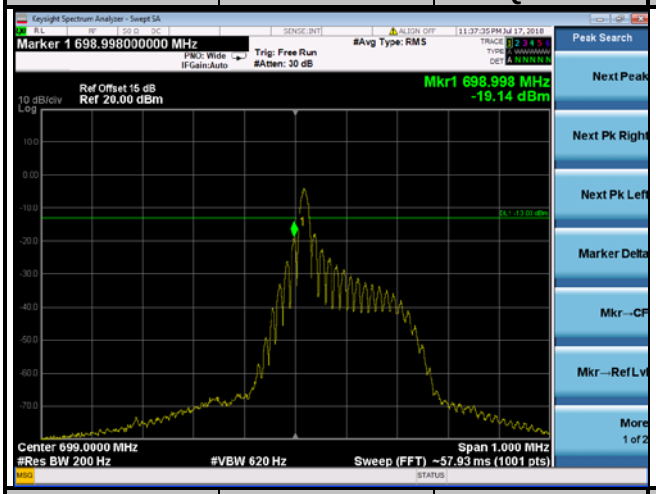
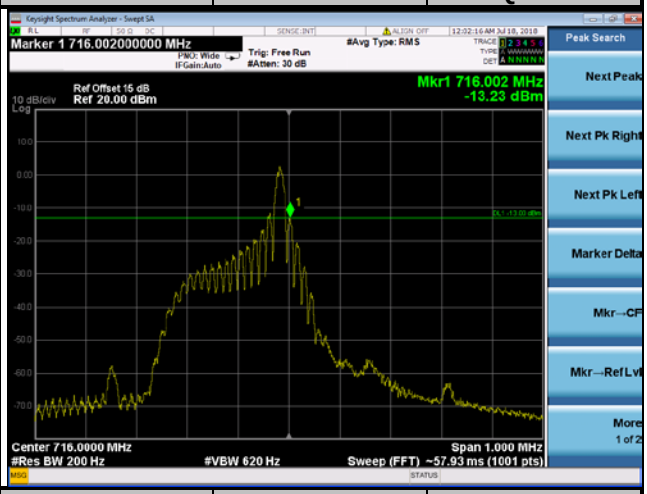
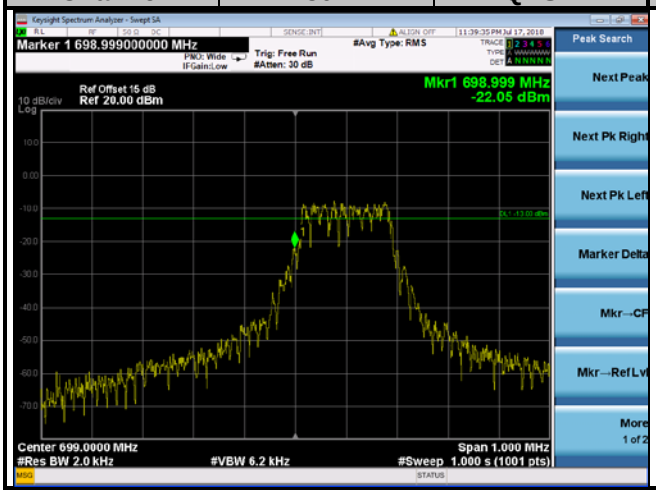
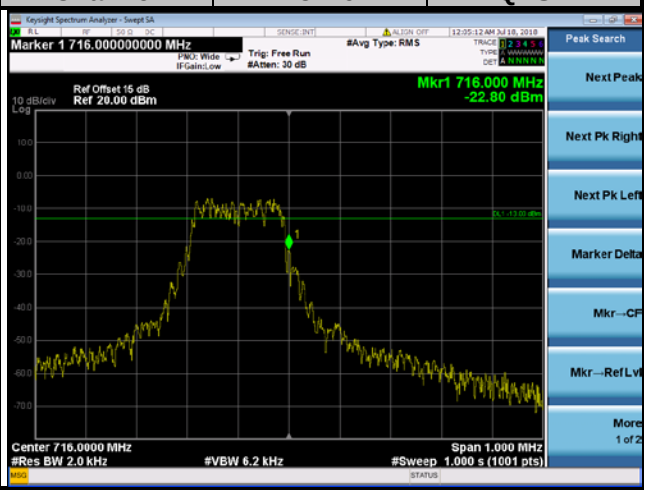
For the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is 65+10log(P[watt]) in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

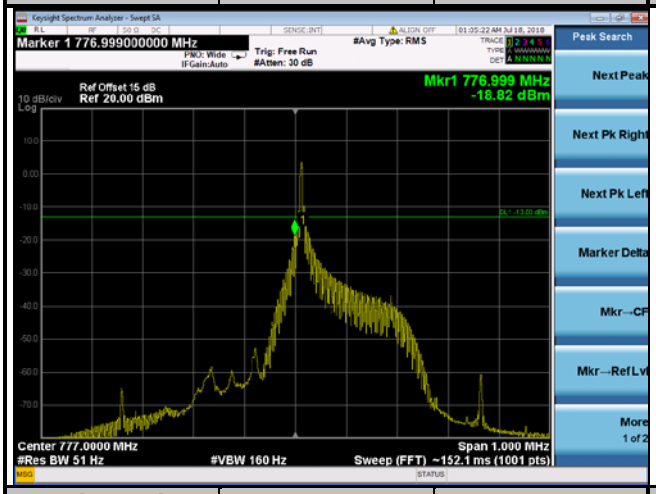
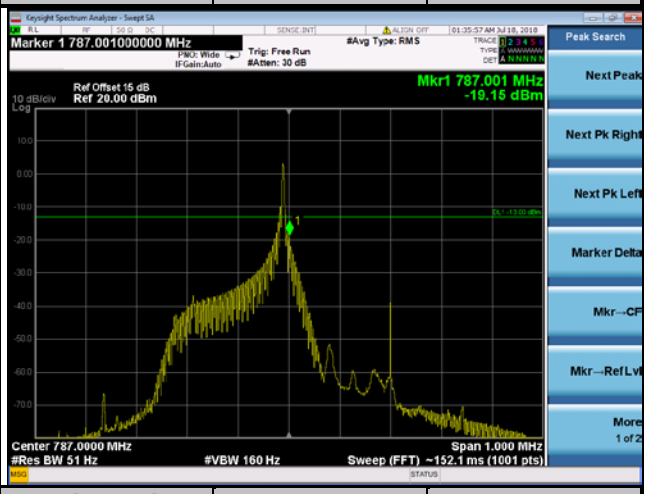
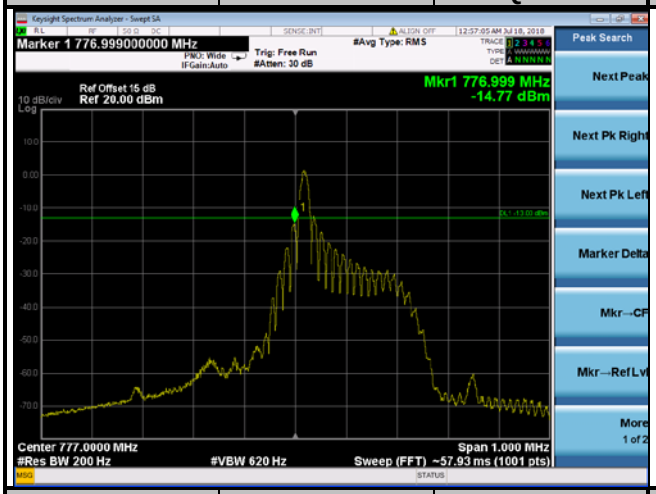
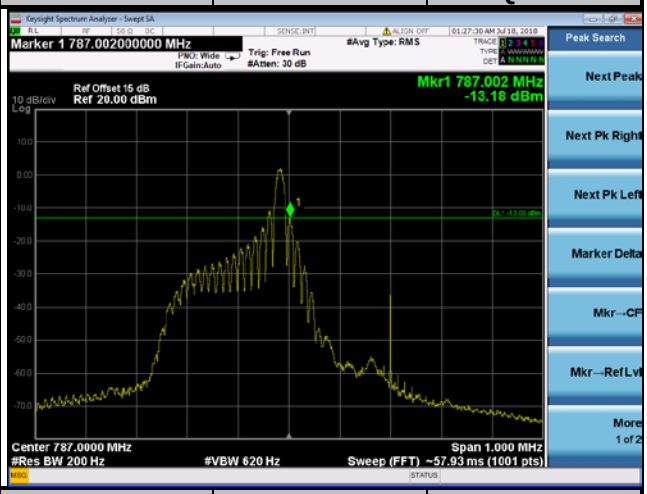
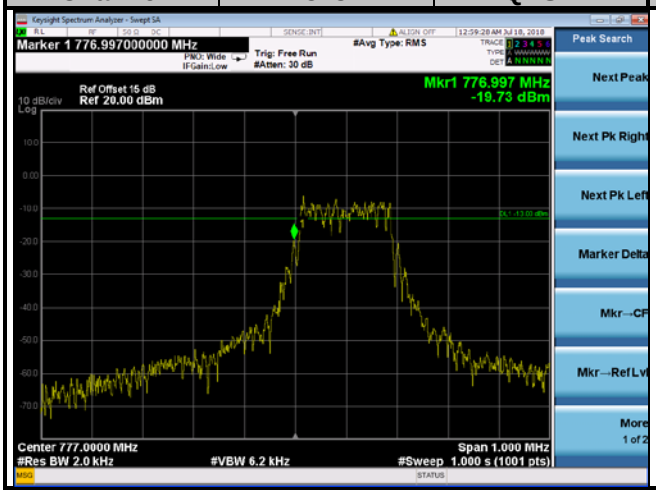
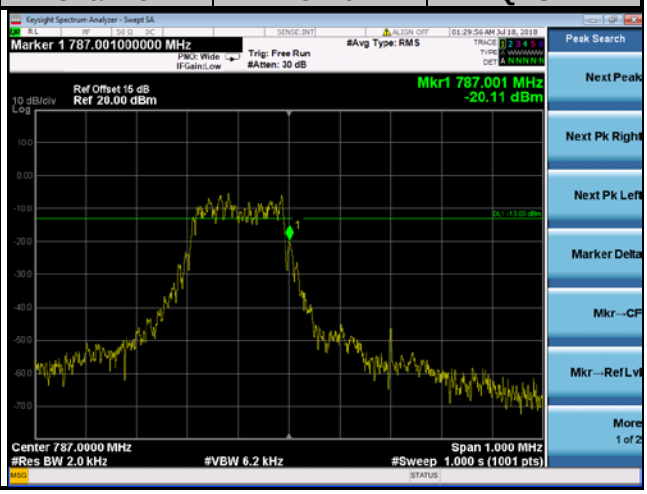
10log(10kHz/6.25kHz) = 2.04 dB

Limit line = -35 dBm + 2.04 dB =-32.96 dBm

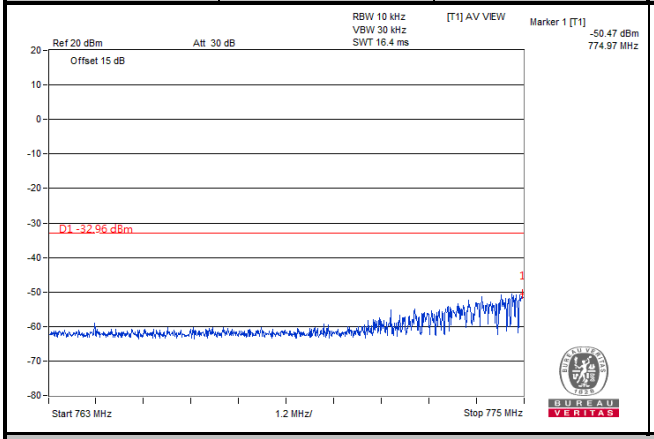
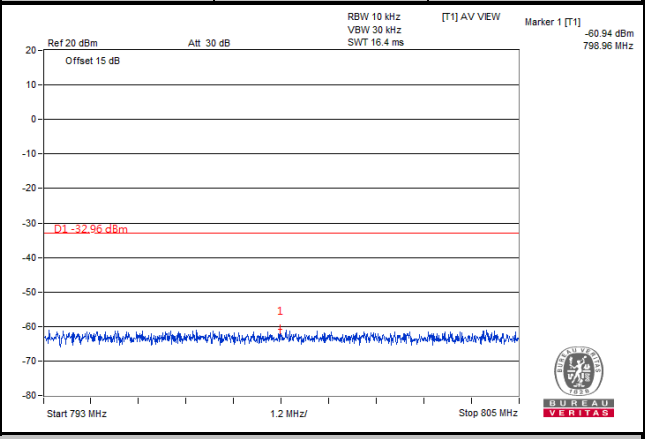
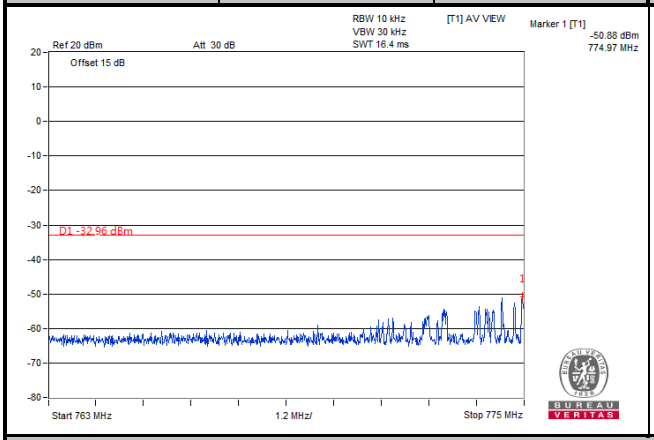
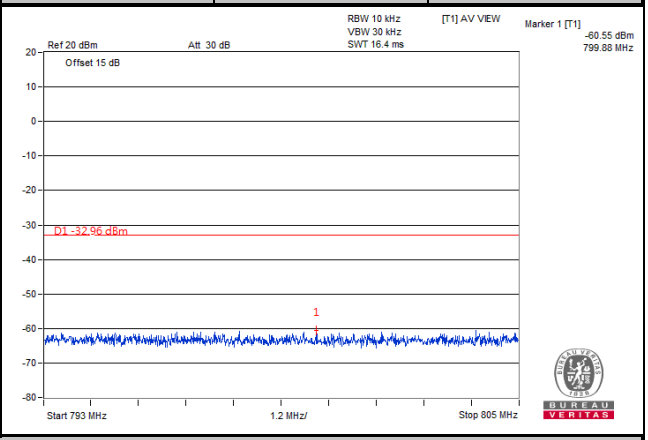
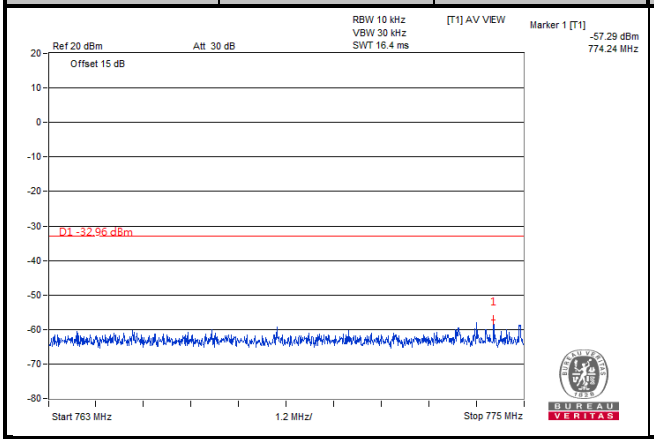
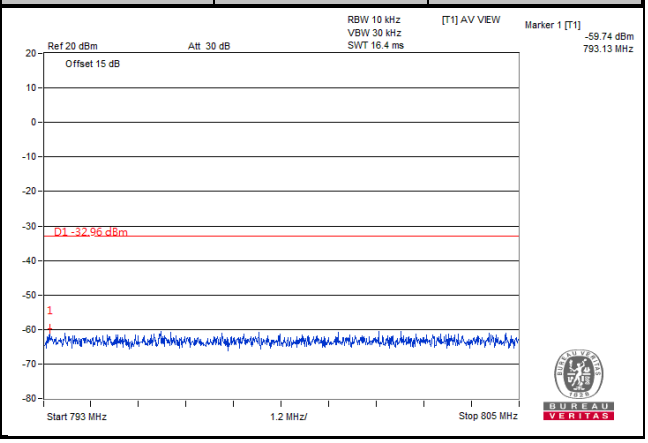
## NB-IOT

| LTE Band 4 | | | | | |
|---|---|---|---|---|---|
| Channel | 19951 | BPSK | Channel | 20399 | BPSK |
|  | | |  | | |
| Channel | 19951 | QPSK | Channel | 20399 | QPSK |
|  | | |  | | |
| Channel | 19951 | QPSK | Channel | 20399 | QPSK |
|  | | |  | | |

| LTE Band 12 | | | | | |
|---|---|---|---|---|---|
| Channel | 23011 | BPSK | Channel | 23179 | BPSK |
|  | | |  | | |
| Channel | 23011 | QPSK | Channel | 23179 | QPSK |
|  | | |  | | |
| Channel | 23011 | QPSK | Channel | 23179 | QPSK |
|  | | |  | | |

| LTE Band 13 | | | | | |
|---|---|---|---|---|---|
| Channel | 23181 | BPSK | Channel | 23279 | BPSK |
|  | | |  | | |
| Channel | 23181 | QPSK | Channel | 23279 | QPSK |
|  | | |  | | |
| Channel | 23181 | QPSK | Channel | 23279 | QPSK |
|  | | |  | | |

**Emission Mask**

| LTE Band 13 | | | | | |
|---|---|---|---|---|---|
| **BPSK** | | | | | |
| **Channel** | **23181** | **1 RB** | **Channel** | **23279** | **1 RB** |
|  | | |  | | |
| **QPSK** | | | | | |
| **Channel** | **23181** | **1 RB** | **Channel** | **23279** | **1 RB** |
|  | | |  | | |
| **QPSK** | | | | | |
| **Channel** | **23205** | **6 RB** | **Channel** | **23255** | **6 RB** |
|  | | |  | | |

For the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is 65+10log(P[watt]) in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

10log(10kHz/6.25kHz) = 2.04 dB

Limit line = -35 dBm + 2.04 dB = -32.96 dBm