# FCC TEST REPORT

| | | |
|---|---|---|
| Applicant | : | Atop Technologies, Inc. |
| Address | : | 1F, No. 30 R&D Rd. II, Science-Based Industrial Park, Hsinchu 30076, Taiwan, R.O.C. |
| Equipment | : | Industrial LTE Cat M1 Low Power IoT Gateway |
| Model No. | : | SE5201B-Q-T-M1-DB-US<br>SE5201B-Q-T-M1-TB-US |
| Trade Name | : | ATOP |
| FCC ID | : | RPV-SE5201B-M1 |

**I HEREBY CERTIFY THAT :**

**The sample was received on Mar. 12, 2024 and the testing was completed on May. 17, 2024 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.**

Approved by:

Mark Liao / Supervisor

Laboratory Accreditation:

Cerpass Technology Corporation Test Laboratory

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## History of this test report

| Report No. | Issued Date | Description |
|---|---|---|
| 24010312-TRFCC04 | May. 23, 2024 | Original |
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# 1. Summary of Test Procedure and Test Results

**FCC 47 CFR PART 27**

**ANSI C63.26: 2015**

**KDB 971168 Power Meas License Digital Systems**

For Band IV (1710MHz ~ 1755MHz)

| FCC Rules | Test items | Measured | Result |
|---|---|---|---|
| 2.1046 / 27.50 (d)(4) | Equivalent Isotropically Radiated Poiwer | Meet the requirement of limit | PASS |
| 2.1053 / 27.53 (h) | Radiated Emissions | Meet the requirement of limit | PASS |
| 2.1051 / 27.53 (h) | Conducted Emissions | Meet the requirement of limit | PASS |
| 27.53 (h) | Band Edge Measurement | Meet the requirement of limit | PASS |
| 2.1049 / 27.53 (h) | Emission Bandwidth & Occupied Bandwidth | Meet the requirement of limit | PASS |
| 27.50 (d)(5) | Peak to Average Ratio | Meet the requirement of limit | PASS |
| 2.1055 / 27.54 | Frequency Stability | Meet the requirement of limit | PASS |

For Band 12 (699MHz ~ 716MHz)

| FCC Rules | Test items | Measured | Result |
|---|---|---|---|
| 2.1046 / 27.50 (c)(10) | Effective Radiated Poiwer | Meet the requirement of limit | PASS |
| 2.1053 / 27.53 (g) | Radiated Emissions | Meet the requirement of limit | PASS |
| 2.1051 / 27.53 (g) | Conducted Emissions | Meet the requirement of limit | PASS |
| 27.53 (g) | Band Edge | Meet the requirement of limit | PASS |
| 2.1049 / 27.53 (g) | Emission Bandwidth & Occupied Bandwidth | Meet the requirement of limit | PASS |
| 2.1055 / 27.54 | Frequency Stability | Meet the requirement of limit | PASS |
| 27.50 (d)(5) | Peak to Average Ratio | Meet the requirement of limit | PASS |

For Band 13 (777 MHz ~ 787MHz)

| FCC Rules | Test items | Measured | Result |
|---|---|---|---|
| 27.50 | Effective Radiated Poiwer | Meet the requirement of limit | PASS |
| 2.1055<br>27.54 | Frequency Stability | Meet the requirement of limit | PASS |
| 2.1049 | Emission Bandwidth &<br>Occupied Bandwidth | Meet the requirement of limit | PASS |
| 27.50 | Peak to average ratio | Meet the requirement of limit | PASS |
| 27.53 | Band Edge | Meet the requirement of limit | PASS |
| 2.1051<br>27.53 | Conducted Spurious<br>Emissions | Meet the requirement of limit | PASS |
| 2.1053<br>27.53 | Radiated Spurious Emissions | Meet the requirement of limit | PASS |

For Band 66 (1710MHz~ 1780MHz)

| FCC Rules | Test items | Measured | Result |
|---|---|---|---|
| 2.1046 /<br>27.50 (d)(4) | Equivalent Isotropically<br>Radiated Poiwer | Meet the requirement of limit | PASS |
| 2.1053 /<br>27.53 (h) | Radiated Emissions | Meet the requirement of limit | PASS |
| 2.1051 /<br>27.53 (h) | Conducted Emissions | Meet the requirement of limit | PASS |
| 27.53 (h) | Band Edge Measurement | Meet the requirement of limit | PASS |
| 2.1049 /<br>27.53 (h) | Emission Bandwidth &<br>Occupied Bandwidth | Meet the requirement of limit | PASS |
| 27.50 (d)(5) | Peak to Average Ratio | Meet the requirement of limit | PASS |
| 2.1055 /<br>27.54 | Frequency Stability | Meet the requirement of limit | PASS |

For Band 85 (698 MHz ~ 716MHz)

| FCC Rules | Test items | Measured | Result |
|---|---|---|---|
| 27.50 | Effective Radiated Poiwer | Meet the requirement of limit | PASS |
| 2.1055<br>27.54 | Frequency Stability | Meet the requirement of limit | PASS |
| 2.1049 | Emission Bandwidth &<br>Occupied Bandwidth | Meet the requirement of limit | PASS |
| 27.50 | Peak to average ratio | Meet the requirement of limit | PASS |
| 27.53 | Band Edge | Meet the requirement of limit | PASS |
| 2.1051<br>27.53 | Conducted Spurious<br>Emissions | Meet the requirement of limit | PASS |
| 2.1053<br>27.53 | Radiated Spurious Emissions | Meet the requirement of limit | PASS |

# 2. Test Configuration of Equipment under Test

## 2.1. Feature of Equipment under Test

| | |
|---|---|
| Band | B2, B4, B5, B12, B13, B25, B26, B66, B85 |
| Antenna Type | Dipole |
| Antenna Gain | LTE Cat M1 Band 2: 0.46dBi<br>LTE Cat M1 Band 4: 0.46dBi<br>LTE Cat M1 Band 5: -0.89dBi<br>LTE Cat M1 Band 12: -0.89dBi<br>LTE Cat M1 Band 13: -0.89dBi<br>LTE Cat M1 Band 25: 0.46dBi<br>LTE Cat M1 Band 26: -0.89dBi<br>LTE Cat M1 Band 66: 0.46dBi<br>LTE Cat M1 Band 85: -0.89dBi |
| Antenna Cable Loss | 0.67dB |
| Antenna | Brand: Quectel /Model: YE0042AA |

Note: For more details, please refer to the User's manual of the EUT.

Difference description

| Model | 4G LTE Module | ANT Qty | GPS | LAN Ports | SIM Slot | Serial Port | SD |
|---|---|---|---|---|---|---|---|
| SE5201B-Q-T-M1-DB-US | BG95-M2 | 1 | N/A | 2 | 2 | 1*DB | 1 |
| SE5201B-Q-T-M1-TB-US | BG95-M2 | 1 | N/A | 2 | 2 | 1*TB | 1 |

## 2.2. Carrier Frequency of Channels

| Band | UL Frequency (MHz) | Modulation |
|---|---|---|
| LTE Cat M1 Band 4 | 1710.7 ~ 1754.3 | QPSK, 16QAM |
| LTE Cat M1 Band 12 | 699 ~ 716 | QPSK, 16QAM |
| LTE Cat M1 Band 13 | 777 ~ 787 | QPSK, 16QAM |
| LTE Cat M1 Band 66 | 1710.7~1779.3 | QPSK, 16QAM |
| LTE Cat M1 Band 85 | 698~716 | QPSK, 16QAM |

## 2.3. Test Mode and Test Software

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.26.
b. The complete test system included Remote workstation and EUT for RF test. The Remote workstation included Notebook.
c. The following test modes were performed for the test:

| Test Mode | Operating Description |
|---|---|
| 1 | LTE Cat M1 Band 4 |
| 2 | LTE Cat M1 Band 12 |
| 3 | LTE Cat M1 Band 13 |
| 4 | LTE Cat M1 Band 66 |
| 5 | LTE Cat M1 Band 85 |

## 2.4. Description of Test System

| Radiated Emissions | | | | |
|---|---|---|---|---|
| Equipment | Brand | Model | Length/Type | Power cord/Length/Type |
| Power Supply | MEAN WELL | SDR-120-24 | N/A | N/A |

## 2.5. General Information of Test

| | | |
|---|---|---|
| Test Site | **Cerpass Technology Corporation Test Laboratory**<br>Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.)<br>Tel: +886-3-3226-888<br>Fax: +886-3-3226-881 | |
| | FCC | TW1439, TW1079 |
| | IC | 4934E-1, 4934E-2 |
| Frequency Range Investigated: | Radiation: from 30 MHz to 20,000MHz | |
| Test Distance: | The test distance of radiated emission from antenna to EUT is 3 M. | |

| Test Item | Test Site | Test Period | Environmental Conditions | Tested By |
|---|---|---|---|---|
| RF Conducted | RFCON01-NK | 2024/04/25 | 25.6°C / 49% | Bart Tsai |
| RF Conducted | RFCON01-NK | 2024/05/17 | 23.7°C / 37% | Bart Tsai |
| Radiated Emissions | 3M02-NK | 2024/05/03 | 21.9°C / 46% | Park Chen |

## 2.6. Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

| Measurement Item | Uncertainty |
|---|---|
| Equivalent Isotropically Radiated Power (Radiated) | ±5.6dB |
| Conducted Spurious Emission | ±2.2dB |
| Output Power(Conducted) | ±1.07dB |
| Frequency Error | ±0.22KHz |
| Occupied Channel Bandwidth | ±4.4% |
| 26dB Bandwidth | ±4.4% |
| Peak to average ratio | ±2.0dB |
| Temperature | ±1.4°C |
| Humidity | ±2.8% |
| Voltages(DC) | ±2mV/V |

## 3. Test Equipment and Ancillaries Used for Tests

| Test Item | Radiated Emissions | | | | |
|---|---|---|---|---|---|
| Test Site | Semi Anechoic Room(3M02-NK) | | | | |
| Instrument | Manufacturer | Model No | Serial No | Calibration Date | Valid Date |
| Bilog Antenna | Schwarzbeck | VULB9168 | 369 | 2024/02/19 | 2025/02/18 |
| Active Loop Antenna | Schwarzbeck | FMZB 1513 | 414 | 2024/01/16 | 2025/01/15 |
| Horn Antenna | EMCO | 3115 | 31601 | 2023/10/18 | 2024/10/17 |
| Horn Antenna | EMCO | 3116 | 31974 | 2023/10/16 | 2024/10/15 |
| EMI Receiver | ROHDE & SCHWARZ | ESCI | 101423 | 2023/07/05 | 2024/07/04 |
| Spectrum Analyzer | ROHDE & SCHWARZ | FSV 40-N | 102151 | 2023/08/15 | 2024/08/14 |
| Preamplifier | Agilent | 8449B | 3008A01954 | 2024/03/01 | 2025/02/28 |
| Preamplifier | EMC INSTRUMENTS | EMC184045 | 980065 | 2023/10/13 | 2024/10/12 |
| Preamplifier | EM Electronics corp. | EM330 | 60659 | 2024/02/17 | 2025/02/16 |
| Cable-6m(9k~300M) | NA | EMC5D-BM-BM-6 | 130606 | 2024/03/13 | 2025/03/12 |
| Cable-3in1(30M-1G) | HARBOUR INDUSTRIES | LL142 | CCE1315 | 2024/02/23 | 2025/02/22 |
| Cable-0.5m(1G-40G) | HUBER SUHNER | SUCOFLEX 104 | 805443/4 | 2024/03/05 | 2025/03/04 |
| Cable-3m(1G-40G) | HUBER SUHNER | SUCOFLEX 104 | 805796/4 | 2024/03/05 | 2025/03/04 |
| Cable-8m(1G-26.5G) | WOKEN | WCBA-WCA203SM | CCE1374 | 2024/03/05 | 2025/03/04 |
| Cable-1m(1G-40G) | HUBER SUHNER | HUBER SUHNER / SF102 | 552450 | 2023/06/08 | 2024/06/07 |
| Cable-3m(1G-40G) | HUBER SUHNER | HUBER SUHNER / SF102 | 552451 | 2023/06/08 | 2024/06/07 |
| E3 | AUDIX | v8.2014-8-6 | RK-000529 | NA | NA |
| Highpass Filter | WOKEN | WFIL-H1400-10000F | WR866WC2B1 | 2023/10/17 | 2024/10/16 |
| Radio Comnunication Analyzer | Anritsu | MT8821C | 6261830569 | 2024/02/17 | 2025/02/16 |

| Test Item | RF Conducted | | | | |
|---|---|---|---|---|---|
| Test Site | RFCON01-NK | | | | |
| Instrument | Manufacturer | Model No | Serial No | Calibration Date | Valid Date |
| CAX Signal Analyzer | KEYSIGHT | N9000B | MY57100339 | 2023/11/06 | 2024/11/05 |
| Radio Comnunication Analyzer | Anritsu | MT8821C | 6261830569 | 2024/02/17 | 2025/02/16 |
| TEMP & HUMI CHAMBER | T-MACHINE | TMJ-9712 | T-12-040111 | 2023/08/07 | 2024/08/06 |

# 4. RF Output Power Test

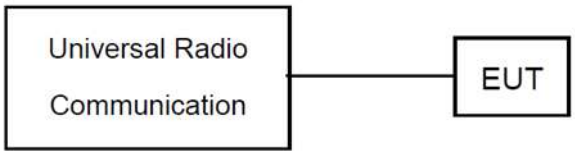
## 4.1 Test Limit

N/A

## 4.2 Test Procedures

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

## 4.3 Test Setup



## 4.4 Test Result and Data

| LTE Cat M1 Cat M1 Band 4 | | | | | | |
|---|---|---|---|---|---|---|
| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 1.4 | 19957/1710.7 | 0 | 1 | 0 | 18.29 | 17.71 |
| | | 0 | 6 | 0 | 16.35 | 16.2 |
| | 20175/1732.5 | 0 | 1 | 0 | 18.22 | 17.36 |
| | | 0 | 6 | 0 | 16.28 | 16.16 |
| | 20393/1754.3 | 0 | 1 | 5 | 18.26 | 17.55 |
| | | 0 | 6 | 0 | 16.24 | 16.26 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
|---|---|---|---|---|---|---|
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 3 | 19965/1711.5 | 0 | 1 | 0 | 18.45 | 17.78 |
| | | 0 | 3 | 0 | 17.32 | 16.78 |
| | 20175/1732.5 | 0 | 1 | 0 | 18.26 | 17.29 |
| | | 0 | 3 | 0 | 17.2 | 16.19 |
| | 20385/1753.5 | 1 | 1 | 5 | 18.31 | 17.58 |
| | | 1 | 3 | 0 | 17.23 | 16.34 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
|---|---|---|---|---|---|---|
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 5 | 19975/1712.5 | 0 | 1 | 0 | 18.46 | 18.32 |
| | | 0 | 6 | 0 | 17.41 | 17.24 |
| | 20175/1732.5 | 0 | 1 | 0 | 18.27 | 18.14 |
| | | 0 | 6 | 0 | 17.22 | 17.11 |
| | 20375/1752.5 | 3 | 1 | 5 | 18.36 | 18.22 |
| | | 3 | 6 | 0 | 17.31 | 17.21 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
|---|---|---|---|---|---|---|
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 10 | 20000/1715 | 0 | 1 | 0 | 18.31 | 18.7 |
| | | 0 | 5 | 0 | 18.32 | 18.4 |
| | 20175/1732.5 | 0 | 1 | 0 | 18.33 | 18.25 |
| | | 0 | 5 | 0 | 18.18 | 18.11 |
| | 20350/1750 | 7 | 1 | 5 | 18.39 | 18.42 |
| | | 7 | 5 | 1 | 18.25 | 18.26 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
|---|---|---|---|---|---|---|
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 15 | 20025/1717.5 | 0 | 1 | 0 | 18.47 | 18.62 |
| | | 0 | 6 | 0 | 18.37 | 18.18 |
| | 20175/1732.5 | 0 | 1 | 0 | 18.36 | 18.24 |
| | | 0 | 6 | 0 | 18.25 | 18.29 |
| | 20325/1747.5 | 11 | 1 | 5 | 18.41 | 18.42 |
| | | 11 | 6 | 0 | 18.33 | 18.21 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
|---|---|---|---|---|---|---|
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 20 | 20050/1720 | 0 | 1 | 0 | 18.42 | 18.28 |
| | | 0 | 6 | 0 | 18.33 | 18.22 |
| | 20175/1732.5 | 0 | 1 | 0 | 18.3 | 18.29 |
| | | 0 | 6 | 0 | 18.16 | 17.9 |
| | 20300/1745 | 15 | 1 | 5 | 18.36 | 18.22 |
| | | 15 | 6 | 0 | 18.23 | 18.03 |

| LTE Cat M1 Cat M1 Band 12 | | | | | | |
|---|---|---|---|---|---|---|
| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 1.4 | 23017/699.7 | 0 | 1 | 0 | 20.86 | 19.65 |
| | | 0 | 6 | 0 | 18.62 | 18.57 |
| | 23095/707.5 | 0 | 1 | 0 | 20.98 | 19.83 |
| | | 0 | 6 | 0 | 18.89 | 18.71 |
| | 23173/715.3 | 0 | 1 | 5 | 20.81 | 19.73 |
| | | 0 | 6 | 0 | 18.77 | 18.64 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
|---|---|---|---|---|---|---|
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 3 | 23025/700.5 | 0 | 1 | 0 | 20.81 | 19.68 |
| | | 0 | 6 | 0 | 18.67 | 18.51 |
| | 23095/707.5 | 0 | 1 | 0 | 20.87 | 19.7 |
| | | 0 | 6 | 0 | 18.77 | 18.7 |
| | 23165/714.5 | 1 | 1 | 5 | 20.82 | 19.65 |
| | | 1 | 6 | 0 | 18.69 | 19.71 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
|---|---|---|---|---|---|---|
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 5 | 23035/701.5 | 3 | 1 | 0 | 20.7 | 21.01 |
| | | 0 | 6 | 0 | 19.7 | 19.79 |
| | 23095/707.5 | 0 | 1 | 0 | 20.72 | 21.06 |
| | | 0 | 6 | 0 | 19.93 | 19.76 |
| | 23155/713.5 | 0 | 1 | 5 | 20.75 | 21.13 |
| | | 3 | 6 | 0 | 19.82 | 19.72 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
|---|---|---|---|---|---|---|
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 10 | 23060/704 | 3 | 1 | 0 | 20.72 | 20.97 |
| | | 0 | 5 | 0 | 20.67 | 20.89 |
| | 23095/707.5 | 0 | 1 | 0 | 20.73 | 20.9 |
| | | 0 | 5 | 0 | 20.7 | 20.83 |
| | 23130/711 | 4 | 1 | 5 | 20.77 | 20.95 |
| | | 7 | 5 | 1 | 20.69 | 20.81 |

| LTE Cat M1 Cat M1 Band 13 | | | | | | |
|---|---|---|---|---|---|---|
| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 5 | 23205/779.5 | 0 | 1 | 0 | 21.16 | 21.15 |
| | | 0 | 6 | 0 | 20.03 | 20.19 |
| | 23230/782 | 0 | 1 | 0 | 21.16 | 21.54 |
| | | 0 | 6 | 0 | 20.16 | 20.09 |
| | 23255/784.5 | 3 | 1 | 5 | 21.12 | 21.37 |
| | | 3 | 6 | 0 | 20.13 | 20.15 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
|---|---|---|---|---|---|---|
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 10 | 23230/782 | 0 | 1 | 0 | 20.99 | 21.36 |
| | | 0 | 5 | 0 | 21.08 | 21.03 |

LTE Cat M1 Band 66

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) Opration Channel/Frequency(MHz) | |
|---|---|---|---|---|---|---|
| | | | | | QPSK | 16QAM |
| 1.4 | 131979/1710.7 | 0 | 1 | 0 | 17.89 | 17.08 |
| | | 0 | 6 | 0 | 15.99 | 15.94 |
| | 132322/1745 | 0 | 1 | 0 | 18.06 | 17.14 |
| | | 0 | 6 | 0 | 15.95 | 15.88 |
| | 132665/1779.3 | 0 | 1 | 5 | 18.44 | 17.23 |
| | | 0 | 6 | 0 | 16.47 | 16.3 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) Opration Channel/Frequency(MHz) | |
|---|---|---|---|---|---|---|
| | | | | | QPSK | 16QAM |
| 3 | 131987/1711.5 | 0 | 1 | 0 | 17.91 | 17.09 |
| | | 0 | 3 | 0 | 17.1 | 16.07 |
| | 132322/1745 | 0 | 1 | 0 | 17.89 | 17.1 |
| | | 0 | 3 | 0 | 16.98 | 16.02 |
| | 132657/1778.5 | 1 | 1 | 5 | 17.97 | 17.15 |
| | | 1 | 3 | 0 | 17.06 | 16.13 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) Opration Channel/Frequency(MHz) | |
|---|---|---|---|---|---|---|
| | | | | | QPSK | 16QAM |
| 5 | 131997/1712.5 | 3 | 1 | 0 | 17.94 | 17.78 |
| | | 0 | 6 | 0 | 16.89 | 16.9 |
| | 132322/1745 | 0 | 1 | 0 | 17.92 | 17.83 |
| | | 0 | 6 | 0 | 16.82 | 16.65 |
| | 132647/1777.5 | 0 | 1 | 5 | 17.98 | 17.92 |
| | | 3 | 6 | 0 | 16.75 | 17.03 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) Opration Channel/Frequency(MHz) | |
|---|---|---|---|---|---|---|
| | | | | | QPSK | 16QAM |
| 10 | 132022/1715 | 3 | 1 | 0 | 17.89 | 17.74 |
| | | 0 | 5 | 0 | 16.85 | 17.65 |
| | 132322/1745 | 0 | 1 | 0 | 17.98 | 17.87 |
| | | 0 | 5 | 0 | 16.91 | 17.8 |
| | 132622/1775 | 4 | 1 | 5 | 17.86 | 17.84 |
| | | 7 | 5 | 1 | 16.87 | 17.73 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) Opration Channel/Frequency(MHz) | |
|---|---|---|---|---|---|---|
| | | | | | QPSK | 16QAM |
| 15 | 132047/1717..5 | 3 | 1 | 0 | 17.92 | 17.76 |
| | | 0 | 6 | 0 | 17.84 | 17.65 |
| | 132322/1745 | 0 | 1 | 0 | 17.84 | 17.81 |
| | | 0 | 6 | 0 | 17.91 | 17.8 |
| | 132597/1772.5 | 8 | 1 | 5 | 17.95 | 17.86 |
| | | 11 | 6 | 0 | 17.88 | 17.72 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) Opration Channel/Frequency(MHz) | |
|---|---|---|---|---|---|---|
| | | | | | QPSK | 16QAM |
| 20 | 132072/1720 | 3 | 1 | 0 | 17.96 | 17.82 |
| | | 0 | 6 | 0 | 17.87 | 17.74 |
| | 132322/1745 | 0 | 1 | 0 | 18.1 | 17.72 |
| | | 0 | 6 | 0 | 17.92 | 17.74 |
| | 132572/1770 | 12 | 1 | 5 | 17.91 | 17.77 |
| | | 15 | 6 | 0 | 17.82 | 17.62 |

| LTE Cat M1 Cat M1 Band 85 | | | | | | |
|---|---|---|---|---|---|---|
| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 5 | 134027/700.5 | 0 | 1 | 0 | 20.79 | 21.16 |
| | | 0 | 6 | 0 | 19.75 | 19.88 |
| | 134092/707 | 0 | 1 | 0 | 20.95 | 21.08 |
| | | 0 | 6 | 0 | 19.72 | 19.79 |
| | 134157/713.5 | 3 | 1 | 5 | 20.88 | 21.11 |
| | | 3 | 6 | 0 | 19.78 | 19.76 |

| BW (MHz) | Opration Channel/ Frequency(MHz) | Index | RB size | RB offset | Conducted Power (dBm) | |
|---|---|---|---|---|---|---|
| | | | | | Opration Channel/Frequency(MHz) | |
| | | | | | QPSK | 16QAM |
| 10 | 134052/703 | 3 | 1 | 0 | 20.91 | 21.18 |
| | | 0 | 5 | 0 | 20.88 | 20.92 |
| | 134092/707 | 0 | 1 | 0 | 20.88 | 20.98 |
| | | 0 | 5 | 0 | 20.83 | 20.73 |
| | 134132/711 | 4 | 1 | 5 | 20.81 | 21.06 |
| | | 7 | 5 | 1 | 20.82 | 20.82 |

# 5. Effective Radiated Power / Equivalent Isotropic Radiated Power Test

## 5.1. Test Limit

For FCC Part 27.50(d)(4):Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band and mobile and portable stations operating in the 1695–1710 MHz and 1755–1780 MHz bands are limited to 1 watt EIRP.
For FCC Part 27.50(c)(9):Control and mobile stations in the 698–746 MHz band are limited to 30 watts ERP.
For FCC Part 27.50(b)(9):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.

## 5.2. Test Procedures

For Conducted power measurement:

1. The EUT links up with simulator and is set to maximum output power level at low / middel / high channel.
2. Measure the output power of low / middle / high channel of the EUT.

For ERP measurement:

ERP can be calculated by below formula from ANSI C63.26.

1. EIRP = PT + GT - LC

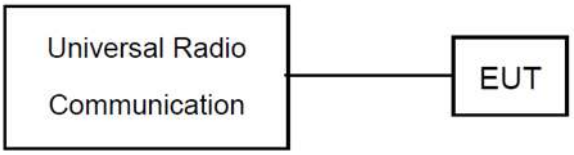
   PT= transmitter output power, in dBm.

   GT= gain of the transmitting antenna, in dBi (EIRP).

   LC= signal attenuation in the connecting cable between the transmitter and antenna, in dB.

3. ERP = EIRP – 2.15 dB.

## 5.3. Test Setup



## 5.4. Test Result and Data

LTE Cat M1 Band4 1.4M

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 19957 | 1710.7 | 1 | 18.29 | 0.46 | 0.67 | 18.08 | 0.06 | 30.00 | -11.92 |
| | | Full | 16.35 | 0.46 | 0.67 | 16.14 | 0.04 | 30.00 | -13.86 |
| 20175 | 1732.5 | 1 | 18.22 | 0.46 | 0.67 | 18.01 | 0.06 | 30.00 | -11.99 |
| | | Full | 16.28 | 0.46 | 0.67 | 16.07 | 0.04 | 30.00 | -13.93 |
| 20393 | 1754.3 | 1 | 18.26 | 0.46 | 0.67 | 18.05 | 0.06 | 30.00 | -11.95 |
| | | Full | 16.24 | 0.46 | 0.67 | 16.03 | 0.04 | 30.00 | -13.97 |

LTE Cat M1 Band4 1.4M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 19957 | 1710.7 | 1 | 17.71 | 0.46 | 0.67 | 17.50 | 0.06 | 30.00 | -12.50 |
| | | Full | 16.2 | 0.46 | 0.67 | 15.99 | 0.04 | 30.00 | -14.01 |
| 20175 | 1732.5 | 1 | 17.36 | 0.46 | 0.67 | 17.15 | 0.05 | 30.00 | -12.85 |
| | | Full | 16.16 | 0.46 | 0.67 | 15.95 | 0.04 | 30.00 | -14.05 |
| 20393 | 1754.3 | 1 | 17.55 | 0.46 | 0.67 | 17.34 | 0.05 | 30.00 | -12.66 |
| | | Full | 16.26 | 0.46 | 0.67 | 16.05 | 0.04 | 30.00 | -13.95 |

LTE Cat M1 Band4 3M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 19965 | 1711.5 | 1 | 18.45 | 0.46 | 0.67 | 18.24 | 0.07 | 30.00 | -11.76 |
| | | Full | 17.32 | 0.46 | 0.67 | 17.11 | 0.05 | 30.00 | -12.89 |
| 20175 | 1732.5 | 1 | 18.26 | 0.46 | 0.67 | 18.05 | 0.06 | 30.00 | -11.95 |
| | | Full | 17.2 | 0.46 | 0.67 | 16.99 | 0.05 | 30.00 | -13.01 |
| 20385 | 1753.5 | 1 | 18.31 | 0.46 | 0.67 | 18.10 | 0.06 | 30.00 | -11.90 |
| | | Full | 17.23 | 0.46 | 0.67 | 17.02 | 0.05 | 30.00 | -12.98 |

LTE Cat M1 Band4 3M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 19965 | 1711.5 | 1 | 17.78 | 0.46 | 0.67 | 17.57 | 0.06 | 30.00 | -12.43 |
| | | Full | 16.78 | 0.46 | 0.67 | 16.57 | 0.05 | 30.00 | -13.43 |
| 20175 | 1732.5 | 1 | 17.29 | 0.46 | 0.67 | 17.08 | 0.05 | 30.00 | -12.92 |
| | | Full | 16.19 | 0.46 | 0.67 | 15.98 | 0.04 | 30.00 | -14.02 |
| 20385 | 1753.5 | 1 | 17.58 | 0.46 | 0.67 | 17.37 | 0.05 | 30.00 | -12.63 |
| | | Full | 16.34 | 0.46 | 0.67 | 16.13 | 0.04 | 30.00 | -13.87 |

LTE Cat M1 Band4 5M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 19975 | 1712.5 | 1 | 18.46 | 0.46 | 0.67 | 18.25 | 0.07 | 30.00 | -11.75 |
| | | Full | 17.41 | 0.46 | 0.67 | 17.20 | 0.05 | 30.00 | -12.80 |
| 20175 | 1732.5 | 1 | 18.27 | 0.46 | 0.67 | 18.06 | 0.06 | 30.00 | -11.94 |
| | | Full | 17.22 | 0.46 | 0.67 | 17.01 | 0.05 | 30.00 | -12.99 |
| 20375 | 1752.5 | 1 | 18.36 | 0.46 | 0.67 | 18.15 | 0.07 | 30.00 | -11.85 |
| | | Full | 17.31 | 0.46 | 0.67 | 17.10 | 0.05 | 30.00 | -12.90 |

LTE Cat M1 Band4 5M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 19975 | 1712.5 | 1 | 18.32 | 0.46 | 0.67 | 18.11 | 0.06 | 30.00 | -11.89 |
| | | Full | 17.24 | 0.46 | 0.67 | 17.03 | 0.05 | 30.00 | -12.97 |
| 20175 | 1732.5 | 1 | 18.14 | 0.46 | 0.67 | 17.93 | 0.06 | 30.00 | -12.07 |
| | | Full | 17.11 | 0.46 | 0.67 | 16.90 | 0.05 | 30.00 | -13.10 |
| 20375 | 1752.5 | 1 | 18.22 | 0.46 | 0.67 | 18.01 | 0.06 | 30.00 | -11.99 |
| | | Full | 17.21 | 0.46 | 0.67 | 17.00 | 0.05 | 30.00 | -13.00 |

LTE Cat M1 Band4 10M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 20000 | 1715 | 1 | 18.31 | 0.46 | 0.67 | 18.10 | 0.06 | 30.00 | -11.90 |
| | | Full | 18.32 | 0.46 | 0.67 | 18.11 | 0.06 | 30.00 | -11.89 |
| 20175 | 1732.5 | 1 | 18.33 | 0.46 | 0.67 | 18.12 | 0.06 | 30.00 | -11.88 |
| | | Full | 18.18 | 0.46 | 0.67 | 17.97 | 0.06 | 30.00 | -12.03 |
| 20350 | 1750 | 1 | 18.39 | 0.46 | 0.67 | 18.18 | 0.07 | 30.00 | -11.82 |
| | | Full | 18.25 | 0.46 | 0.67 | 18.04 | 0.06 | 30.00 | -11.96 |

LTE Cat M1 Band4 10M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 20000 | 1715 | 1 | 18.7 | 0.46 | 0.67 | 18.49 | 0.07 | 30.00 | -11.51 |
| | | Full | 18.4 | 0.46 | 0.67 | 18.19 | 0.07 | 30.00 | -11.81 |
| 20175 | 1732.5 | 1 | 18.25 | 0.46 | 0.67 | 18.04 | 0.06 | 30.00 | -11.96 |
| | | Full | 18.11 | 0.46 | 0.67 | 17.90 | 0.06 | 30.00 | -12.10 |
| 20350 | 1750 | 1 | 18.42 | 0.46 | 0.67 | 18.21 | 0.07 | 30.00 | -11.79 |
| | | Full | 18.26 | 0.46 | 0.67 | 18.05 | 0.06 | 30.00 | -11.95 |

LTE Cat M1 Band4 15M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 20025 | 1717.5 | 1 | 18.47 | 0.46 | 0.67 | 18.26 | 0.07 | 30.00 | -11.74 |
| | | Full | 18.37 | 0.46 | 0.67 | 18.16 | 0.07 | 30.00 | -11.84 |
| 20175 | 1732.5 | 1 | 18.36 | 0.46 | 0.67 | 18.15 | 0.07 | 30.00 | -11.85 |
| | | Full | 18.25 | 0.46 | 0.67 | 18.04 | 0.06 | 30.00 | -11.96 |
| 20325 | 1747.5 | 1 | 18.41 | 0.46 | 0.67 | 18.20 | 0.07 | 30.00 | -11.80 |
| | | Full | 18.33 | 0.46 | 0.67 | 18.12 | 0.06 | 30.00 | -11.88 |

LTE Cat M1 Band4 15M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 20025 | 1717.5 | 1 | 18.62 | 0.46 | 0.67 | 18.41 | 0.07 | 30.00 | -11.59 |
| | | Full | 18.18 | 0.46 | 0.67 | 17.97 | 0.06 | 30.00 | -12.03 |
| 20175 | 1732.5 | 1 | 18.24 | 0.46 | 0.67 | 18.03 | 0.06 | 30.00 | -11.97 |
| | | Full | 18.29 | 0.46 | 0.67 | 18.08 | 0.06 | 30.00 | -11.92 |
| 20325 | 1747.5 | 1 | 18.42 | 0.46 | 0.67 | 18.21 | 0.07 | 30.00 | -11.79 |
| | | Full | 18.21 | 0.46 | 0.67 | 18.00 | 0.06 | 30.00 | -12.00 |

LTE Cat M1 Band4 20M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 20050 | 1720 | 1 | 18.42 | 0.46 | 0.67 | 18.21 | 0.07 | 30.00 | -11.79 |
| | | Full | 18.33 | 0.46 | 0.67 | 18.12 | 0.06 | 30.00 | -11.88 |
| 20175 | 1732.5 | 1 | 18.3 | 0.46 | 0.67 | 18.09 | 0.06 | 30.00 | -11.91 |
| | | Full | 18.16 | 0.46 | 0.67 | 17.95 | 0.06 | 30.00 | -12.05 |
| 20300 | 1745 | 1 | 18.36 | 0.46 | 0.67 | 18.15 | 0.07 | 30.00 | -11.85 |
| | | Full | 18.23 | 0.46 | 0.67 | 18.02 | 0.06 | 30.00 | -11.98 |

LTE Cat M1 Band4 20M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(E.I.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 20050 | 1720 | 1 | 18.28 | 0.46 | 0.67 | 18.07 | 0.06 | 30.00 | -11.93 |
| | | Full | 18.22 | 0.46 | 0.67 | 18.01 | 0.06 | 30.00 | -11.99 |
| 20175 | 1732.5 | 1 | 18.29 | 0.46 | 0.67 | 18.08 | 0.06 | 30.00 | -11.92 |
| | | Full | 17.9 | 0.46 | 0.67 | 17.69 | 0.06 | 30.00 | -12.31 |
| 20300 | 1745 | 1 | 18.22 | 0.46 | 0.67 | 18.01 | 0.06 | 30.00 | -11.99 |
| | | Full | 18.03 | 0.46 | 0.67 | 17.82 | 0.06 | 30.00 | -12.18 |

LTE Cat M1 Band12 1.4M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23017 | 699.7 | 1 | 20.86 | -0.89 | 0.67 | 17.15 | 0.05 | 44.77 | -27.62 |
| | | Full | 18.62 | -0.89 | 0.67 | 14.91 | 0.03 | 44.77 | -29.86 |
| 20525 | 836.5 | 1 | 20.98 | -0.89 | 0.67 | 17.27 | 0.05 | 44.77 | -27.50 |
| | | Full | 18.89 | -0.89 | 0.67 | 15.18 | 0.03 | 44.77 | -29.59 |
| 20600 | 844 | 1 | 20.81 | -0.89 | 0.67 | 17.10 | 0.05 | 44.77 | -27.67 |
| | | Full | 18.77 | -0.89 | 0.67 | 15.06 | 0.03 | 44.77 | -29.71 |
| 23095 | 707.5 | 1 | 20.98 | -0.89 | 0.67 | 17.27 | 0.05 | 44.77 | -27.50 |
| | | Full | 18.89 | -0.89 | 0.67 | 15.18 | 0.03 | 44.77 | -29.59 |
| 23173 | 715.3 | 1 | 20.81 | -0.89 | 0.67 | 17.10 | 0.05 | 44.77 | -27.67 |
| | | Full | 18.77 | -0.89 | 0.67 | 15.06 | 0.03 | 44.77 | -29.71 |

LTE Cat M1 Band12 1.4M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23017 | 699.7 | 1 | 19.65 | -0.89 | 0.67 | 15.94 | 0.04 | 44.77 | -28.83 |
| | | Full | 18.57 | -0.89 | 0.67 | 14.86 | 0.03 | 44.77 | -29.91 |
| 20525 | 836.5 | 1 | 0 | -0.89 | 0.67 | -3.71 | 0.00 | 44.77 | -48.48 |
| | | Full | 21.01 | -0.89 | 0.67 | 17.30 | 0.05 | 44.77 | -27.47 |
| 20600 | 844 | 1 | 19.79 | -0.89 | 0.67 | 16.08 | 0.04 | 44.77 | -28.69 |
| | | Full | 21.06 | -0.89 | 0.67 | 17.35 | 0.05 | 44.77 | -27.42 |
| 23095 | 707.5 | 1 | 19.83 | -0.89 | 0.67 | 16.12 | 0.04 | 44.77 | -28.65 |
| | | Full | 18.71 | -0.89 | 0.67 | 15.00 | 0.03 | 44.77 | -29.77 |
| 23173 | 715.3 | 1 | 19.73 | -0.89 | 0.67 | 16.02 | 0.04 | 44.77 | -28.75 |
| | | Full | 18.64 | -0.89 | 0.67 | 14.93 | 0.03 | 44.77 | -29.84 |

LTE Cat M1 Band12 3M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23025 | 700.5 | 1 | 20.81 | -0.89 | 0.67 | 17.10 | 0.05 | 44.77 | -27.67 |
| | | Full | 18.67 | -0.89 | 0.67 | 14.96 | 0.03 | 44.77 | -29.81 |
| 23095 | 707.5 | 1 | 20.87 | -0.89 | 0.67 | 17.16 | 0.05 | 44.77 | -27.61 |
| | | Full | 18.77 | -0.89 | 0.67 | 15.06 | 0.03 | 44.77 | -29.71 |
| 23165 | 714.5 | 1 | 20.82 | -0.89 | 0.67 | 17.11 | 0.05 | 44.77 | -27.66 |
| | | Full | 18.69 | -0.89 | 0.67 | 14.98 | 0.03 | 44.77 | -29.79 |

LTE Cat M1 Band12 3M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23025 | 700.5 | 1 | 19.68 | -0.89 | 0.67 | 15.97 | 0.04 | 44.77 | -28.80 |
| | | Full | 18.51 | -0.89 | 0.67 | 14.80 | 0.03 | 44.77 | -29.97 |
| 23095 | 707.5 | 1 | 19.7 | -0.89 | 0.67 | 15.99 | 0.04 | 44.77 | -28.78 |
| | | Full | 18.7 | -0.89 | 0.67 | 14.99 | 0.03 | 44.77 | -29.78 |
| 23165 | 714.5 | 1 | 19.65 | -0.89 | 0.67 | 15.94 | 0.04 | 44.77 | -28.83 |
| | | Full | 19.71 | -0.89 | 0.67 | 16.00 | 0.04 | 44.77 | -28.77 |

LTE Cat M1 Band12 5M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23035 | 701.5 | 1 | 20.7 | -0.89 | 0.67 | 16.99 | 0.05 | 44.77 | -27.78 |
| | | Full | 19.7 | -0.89 | 0.67 | 15.99 | 0.04 | 44.77 | -28.78 |
| 23095 | 707.5 | 1 | 20.72 | -0.89 | 0.67 | 17.01 | 0.05 | 44.77 | -27.76 |
| | | Full | 19.93 | -0.89 | 0.67 | 16.22 | 0.04 | 44.77 | -28.55 |
| 23155 | 713.5 | 1 | 20.75 | -0.89 | 0.67 | 17.04 | 0.05 | 44.77 | -27.73 |
| | | Full | 19.82 | -0.89 | 0.67 | 16.11 | 0.04 | 44.77 | -28.66 |

LTE Cat M1 Band12 5M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23035 | 701.5 | 1 | 21.01 | -0.89 | 0.67 | 17.30 | 0.05 | 44.77 | -27.47 |
| | | Full | 19.79 | -0.89 | 0.67 | 16.08 | 0.04 | 44.77 | -28.69 |
| 23095 | 707.5 | 1 | 21.06 | -0.89 | 0.67 | 17.35 | 0.05 | 44.77 | -27.42 |
| | | Full | 19.76 | -0.89 | 0.67 | 16.05 | 0.04 | 44.77 | -28.72 |
| 23155 | 713.5 | 1 | 21.13 | -0.89 | 0.67 | 17.42 | 0.06 | 44.77 | -27.35 |
| | | Full | 19.72 | -0.89 | 0.67 | 16.01 | 0.04 | 44.77 | -28.76 |

LTE Cat M1 Band12 10M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23060 | 704 | 1 | 20.72 | -0.89 | 0.67 | 17.01 | 0.05 | 44.77 | -27.76 |
| | | Full | 20.67 | -0.89 | 0.67 | 16.96 | 0.05 | 44.77 | -27.81 |
| 23095 | 707.5 | 1 | 20.73 | -0.89 | 0.67 | 17.02 | 0.05 | 44.77 | -27.75 |
| | | Full | 20.7 | -0.89 | 0.67 | 16.99 | 0.05 | 44.77 | -27.78 |
| 23130 | 711 | 1 | 20.77 | -0.89 | 0.67 | 17.06 | 0.05 | 44.77 | -27.71 |
| | | Full | 20.69 | -0.89 | 0.67 | 16.98 | 0.05 | 44.77 | -27.79 |

LTE Cat M1 Band12 10M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23035 | 701.5 | 1 | 20.97 | -0.89 | 0.67 | 17.26 | 0.05 | 44.77 | -27.51 |
| | | Full | 20.89 | -0.89 | 0.67 | 17.18 | 0.05 | 44.77 | -27.59 |
| 23095 | 707.5 | 1 | 20.9 | -0.89 | 0.67 | 17.19 | 0.05 | 44.77 | -27.58 |
| | | Full | 20.83 | -0.89 | 0.67 | 17.12 | 0.05 | 44.77 | -27.65 |
| 23155 | 713.5 | 1 | 20.95 | -0.89 | 0.67 | 17.24 | 0.05 | 44.77 | -27.53 |
| | | Full | 20.81 | -0.89 | 0.67 | 17.10 | 0.05 | 44.77 | -27.67 |

LTE Cat M1 Band13 5M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23205 | 779.5 | 1 | 21.16 | -0.89 | 0.67 | 17.45 | 0.06 | 44.77 | -27.32 |
| | | Full | 20.03 | -0.89 | 0.67 | 16.32 | 0.04 | 44.77 | -28.45 |
| 23230 | 782 | 1 | 21.16 | -0.89 | 0.67 | 17.45 | 0.06 | 44.77 | -27.32 |
| | | Full | 20.16 | -0.89 | 0.67 | 16.45 | 0.04 | 44.77 | -28.32 |
| 23255 | 784.5 | 1 | 21.12 | -0.89 | 0.67 | 17.41 | 0.06 | 44.77 | -27.36 |
| | | Full | 20.13 | -0.89 | 0.67 | 16.42 | 0.04 | 44.77 | -28.35 |

LTE Cat M1 Band13 5M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23205 | 779.5 | 1 | 21.15 | -0.89 | 0.67 | 17.44 | 0.06 | 44.77 | -27.33 |
| | | Full | 20.19 | -0.89 | 0.67 | 16.48 | 0.04 | 44.77 | -28.29 |
| 23230 | 782 | 1 | 21.54 | -0.89 | 0.67 | 17.83 | 0.06 | 44.77 | -26.94 |
| | | Full | 20.09 | -0.89 | 0.67 | 16.38 | 0.04 | 44.77 | -28.39 |
| 23255 | 784.5 | 1 | 21.37 | -0.89 | 0.67 | 17.66 | 0.06 | 44.77 | -27.11 |
| | | Full | 20.15 | -0.89 | 0.67 | 16.44 | 0.04 | 44.77 | -28.33 |

LTE Cat M1 Band13 10M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23230 | 782 | 1 | 20.99 | -0.89 | 0.67 | 17.28 | 0.05 | 44.77 | -27.49 |
| | | Full | 21.08 | -0.89 | 0.67 | 17.37 | 0.05 | 44.77 | -27.40 |

LTE Cat M1 Band13 10M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 23230 | 782 | 1 | 21.36 | -0.89 | 0.67 | 17.65 | 0.06 | 44.77 | -27.12 |
| | | Full | 21.03 | -0.89 | 0.67 | 17.32 | 0.05 | 44.77 | -27.45 |

LTE Cat M1 Band66 1.4M

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 131979 | 1710.7 | 1 | 17.89 | 0.46 | 0.67 | 17.68 | 0.06 | 30.00 | -12.32 |
| | | Full | 15.99 | 0.46 | 0.67 | 15.78 | 0.04 | 30.00 | -14.22 |
| 132322 | 1745 | 1 | 18.06 | 0.46 | 0.67 | 17.85 | 0.06 | 30.00 | -12.15 |
| | | Full | 15.95 | 0.46 | 0.67 | 15.74 | 0.04 | 30.00 | -14.26 |
| 132665 | 1779.3 | 1 | 18.44 | 0.46 | 0.67 | 18.23 | 0.07 | 30.00 | -11.77 |
| | | Full | 16.47 | 0.46 | 0.67 | 16.26 | 0.04 | 30.00 | -13.74 |

LTE Cat M1 Band66 1.4M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 131979 | 1710.7 | 1 | 17.08 | 0.46 | 0.67 | 16.87 | 0.05 | 30.00 | -13.13 |
| | | Full | 15.94 | 0.46 | 0.67 | 15.73 | 0.04 | 30.00 | -14.27 |
| 132322 | 1745 | 1 | 17.14 | 0.46 | 0.67 | 16.93 | 0.05 | 30.00 | -13.07 |
| | | Full | 15.88 | 0.46 | 0.67 | 15.67 | 0.04 | 30.00 | -14.33 |
| 132665 | 1779.3 | 1 | 17.23 | 0.46 | 0.67 | 17.02 | 0.05 | 30.00 | -12.98 |
| | | Full | 16.3 | 0.46 | 0.67 | 16.09 | 0.04 | 30.00 | -13.91 |

LTE Cat M1 Band66 3M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 131987 | 1711.5 | 1 | 17.91 | 0.46 | 0.67 | 17.70 | 0.06 | 30.00 | -12.30 |
| | | Full | 17.1 | 0.46 | 0.67 | 16.89 | 0.05 | 30.00 | -13.11 |
| 132322 | 1745 | 1 | 17.89 | 0.46 | 0.67 | 17.68 | 0.06 | 30.00 | -12.32 |
| | | Full | 16.98 | 0.46 | 0.67 | 16.77 | 0.05 | 30.00 | -13.23 |
| 132657 | 1778.5 | 1 | 17.97 | 0.46 | 0.67 | 17.76 | 0.06 | 30.00 | -12.24 |
| | | Full | 17.06 | 0.46 | 0.67 | 16.85 | 0.05 | 30.00 | -13.15 |

LTE Cat M1 Band66 3M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 131987 | 1711.5 | 1 | 17.09 | 0.46 | 0.67 | 16.88 | 0.05 | 30.00 | -13.12 |
| | | Full | 16.07 | 0.46 | 0.67 | 15.86 | 0.04 | 30.00 | -14.14 |
| 132322 | 1745 | 1 | 17.1 | 0.46 | 0.67 | 16.89 | 0.05 | 30.00 | -13.11 |
| | | Full | 16.02 | 0.46 | 0.67 | 15.81 | 0.04 | 30.00 | -14.19 |
| 132657 | 1778.5 | 1 | 17.15 | 0.46 | 0.67 | 16.94 | 0.05 | 30.00 | -13.06 |
| | | Full | 16.13 | 0.46 | 0.67 | 15.92 | 0.04 | 30.00 | -14.08 |

LTE Cat M1 Band66 5M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 131997 | 1712.5 | 1 | 17.94 | 0.46 | 0.67 | 17.73 | 0.06 | 30.00 | -12.27 |
| | | Full | 16.89 | 0.46 | 0.67 | 16.68 | 0.05 | 30.00 | -13.32 |
| 132322 | 1745 | 1 | 17.92 | 0.46 | 0.67 | 17.71 | 0.06 | 30.00 | -12.29 |
| | | Full | 16.82 | 0.46 | 0.67 | 16.61 | 0.05 | 30.00 | -13.39 |
| 132647 | 1777.5 | 1 | 17.98 | 0.46 | 0.67 | 17.77 | 0.06 | 30.00 | -12.23 |
| | | Full | 16.75 | 0.46 | 0.67 | 16.54 | 0.05 | 30.00 | -13.46 |

LTE Cat M1 Band66 5M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 131997 | 1712.5 | 1 | 17.78 | 0.46 | 0.67 | 17.57 | 0.06 | 30.00 | -12.43 |
| | | Full | 16.9 | 0.46 | 0.67 | 16.69 | 0.05 | 30.00 | -13.31 |
| 132322 | 1745 | 1 | 17.83 | 0.46 | 0.67 | 17.62 | 0.06 | 30.00 | -12.38 |
| | | Full | 16.65 | 0.46 | 0.67 | 16.44 | 0.04 | 30.00 | -13.56 |
| 132647 | 1777.5 | 1 | 17.92 | 0.46 | 0.67 | 17.71 | 0.06 | 30.00 | -12.29 |
| | | Full | 17.03 | 0.46 | 0.67 | 16.82 | 0.05 | 30.00 | -13.18 |

LTE Cat M1 Band66 10M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 132022 | 1715 | 1 | 17.89 | 0.46 | 0.67 | 17.68 | 0.06 | 30.00 | -12.32 |
| | | Full | 16.85 | 0.46 | 0.67 | 16.64 | 0.05 | 30.00 | -13.36 |
| 132322 | 1745 | 1 | 17.98 | 0.46 | 0.67 | 17.77 | 0.06 | 30.00 | -12.23 |
| | | Full | 16.91 | 0.46 | 0.67 | 16.70 | 0.05 | 30.00 | -13.30 |
| 132622 | 1775 | 1 | 17.86 | 0.46 | 0.67 | 17.65 | 0.06 | 30.00 | -12.35 |
| | | Full | 16.87 | 0.46 | 0.67 | 16.66 | 0.05 | 30.00 | -13.34 |

LTE Cat M1 Band66 10M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 132022 | 1715 | 1 | 17.74 | 0.46 | 0.67 | 17.53 | 0.06 | 30.00 | -12.47 |
| | | Full | 17.65 | 0.46 | 0.67 | 17.44 | 0.06 | 30.00 | -12.56 |
| 132322 | 1745 | 1 | 17.87 | 0.46 | 0.67 | 17.66 | 0.06 | 30.00 | -12.34 |
| | | Full | 17.8 | 0.46 | 0.67 | 17.59 | 0.06 | 30.00 | -12.41 |
| 132622 | 1775 | 1 | 17.84 | 0.46 | 0.67 | 17.63 | 0.06 | 30.00 | -12.37 |
| | | Full | 17.73 | 0.46 | 0.67 | 17.52 | 0.06 | 30.00 | -12.48 |

LTE Cat M1 Band66 15M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 132047 | 1717.5 | 1 | 17.92 | 0.46 | 0.67 | 17.71 | 0.06 | 30.00 | -12.29 |
| | | Full | 17.84 | 0.46 | 0.67 | 17.63 | 0.06 | 30.00 | -12.37 |
| 132322 | 1745 | 1 | 17.84 | 0.46 | 0.67 | 17.63 | 0.06 | 30.00 | -12.37 |
| | | Full | 17.91 | 0.46 | 0.67 | 17.70 | 0.06 | 30.00 | -12.30 |
| 132597 | 1772.5 | 1 | 17.95 | 0.46 | 0.67 | 17.74 | 0.06 | 30.00 | -12.26 |
| | | Full | 17.88 | 0.46 | 0.67 | 17.67 | 0.06 | 30.00 | -12.33 |

LTE Cat M1 Band66 15M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 132047 | 1717.5 | 1 | 17.76 | 0.46 | 0.67 | 17.55 | 0.06 | 30.00 | -12.45 |
| | | Full | 17.65 | 0.46 | 0.67 | 17.44 | 0.06 | 30.00 | -12.56 |
| 132322 | 1745 | 1 | 17.81 | 0.46 | 0.67 | 17.60 | 0.06 | 30.00 | -12.40 |
| | | Full | 17.8 | 0.46 | 0.67 | 17.59 | 0.06 | 30.00 | -12.41 |
| 132597 | 1772.5 | 1 | 17.86 | 0.46 | 0.67 | 17.65 | 0.06 | 30.00 | -12.35 |
| | | Full | 17.72 | 0.46 | 0.67 | 17.51 | 0.06 | 30.00 | -12.49 |

LTE Cat M1 Band66 20M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 132072 | 1720 | 1 | 17.96 | 0.46 | 0.67 | 17.75 | 0.06 | 30.00 | -12.25 |
| | | Full | 17.87 | 0.46 | 0.67 | 17.66 | 0.06 | 30.00 | -12.34 |
| 132322 | 1745 | 1 | 18.1 | 0.46 | 0.67 | 17.89 | 0.06 | 30.00 | -12.11 |
| | | Full | 17.92 | 0.46 | 0.67 | 17.71 | 0.06 | 30.00 | -12.29 |
| 132572 | 1770 | 1 | 17.91 | 0.46 | 0.67 | 17.70 | 0.06 | 30.00 | -12.30 |
| | | Full | 17.82 | 0.46 | 0.67 | 17.61 | 0.06 | 30.00 | -12.39 |

LTE Cat M1 Band66 20M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.I.R.P. (dBm) | E.I.R.P. (W) | Limit(EIRP) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 132072 | 1720 | 1 | 17.82 | 0.46 | 0.67 | 17.61 | 0.06 | 30.00 | -12.39 |
| | | Full | 17.74 | 0.46 | 0.67 | 17.53 | 0.06 | 30.00 | -12.47 |
| 132322 | 1745 | 1 | 17.72 | 0.46 | 0.67 | 17.51 | 0.06 | 30.00 | -12.49 |
| | | Full | 17.74 | 0.46 | 0.67 | 17.53 | 0.06 | 30.00 | -12.47 |
| 132572 | 1770 | 1 | 17.77 | 0.46 | 0.67 | 17.56 | 0.06 | 30.00 | -12.44 |
| | | Full | 17.62 | 0.46 | 0.67 | 17.41 | 0.06 | 30.00 | -12.59 |

LTE Cat M1 Band85 5M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | | (dB) | (dB) | | (dBm) | (dBm) | (dBm) | (dB) |
| 134027 | 700.5 | 1 | 20.79 | -0.89 | 0.67 | 17.08 | 0.05 | 44.77 | -27.69 |
| | | Full | 19.75 | -0.89 | 0.67 | 16.04 | 0.04 | 44.77 | -28.73 |
| 134092 | 707 | 1 | 20.95 | -0.89 | 0.67 | 17.24 | 0.05 | 44.77 | -27.53 |
| | | Full | 19.72 | -0.89 | 0.67 | 16.01 | 0.04 | 44.77 | -28.76 |
| 134157 | 713.5 | 1 | 20.88 | -0.89 | 0.67 | 17.17 | 0.05 | 44.77 | -27.60 |
| | | Full | 19.78 | -0.89 | 0.67 | 16.07 | 0.04 | 44.77 | -28.70 |

LTE Cat M1 Band85 5M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| | (MHz) | | (dB) | (dB) | | (dBm) | (dBm) | (dBm) | (dB) |
| 134027 | 700.5 | 1 | 21.16 | -0.89 | 0.67 | 17.45 | 0.06 | 44.77 | -27.32 |
| | | Full | 19.88 | -0.89 | 0.67 | 16.17 | 0.04 | 44.77 | -28.60 |
| 134092 | 707 | 1 | 21.08 | -0.89 | 0.67 | 17.37 | 0.05 | 44.77 | -27.40 |
| | | Full | 19.79 | -0.89 | 0.67 | 16.08 | 0.04 | 44.77 | -28.69 |
| 134157 | 713.5 | 1 | 21.11 | -0.89 | 0.67 | 17.40 | 0.05 | 44.77 | -27.37 |
| | | Full | 19.76 | -0.89 | 0.67 | 16.05 | 0.04 | 44.77 | -28.72 |

LTE Cat M1 Band85 10M QPSK

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 134052 | 703 | 1 | 20.91 | -0.89 | 0.67 | 17.20 | 0.05 | 44.77 | -27.57 |
| | | Full | 20.88 | -0.89 | 0.67 | 17.17 | 0.05 | 44.77 | -27.60 |
| 134092 | 707 | 1 | 20.88 | -0.89 | 0.67 | 17.17 | 0.05 | 44.77 | -27.60 |
| | | Full | 20.83 | -0.89 | 0.67 | 17.12 | 0.05 | 44.77 | -27.65 |
| 134132 | 711 | 1 | 20.81 | -0.89 | 0.67 | 17.10 | 0.05 | 44.77 | -27.67 |
| | | Full | 20.82 | -0.89 | 0.67 | 17.11 | 0.05 | 44.77 | -27.66 |

LTE Cat M1 Band85 10M 16QAM

| Channel | Frequency (MHz) | RB size | Conducted Power (dBm) | Gain (dBi) | Cable Loss (dbm) | E.R.P. (dBm) | E.R.P. (W) | Limit(E.R.P.) (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 134052 | 703 | 1 | 21.18 | -0.89 | 0.67 | 17.47 | 0.06 | 44.77 | -27.30 |
| | | Full | 20.92 | -0.89 | 0.67 | 17.21 | 0.05 | 44.77 | -27.56 |
| 134092 | 707 | 1 | 20.98 | -0.89 | 0.67 | 17.27 | 0.05 | 44.77 | -27.50 |
| | | Full | 20.73 | -0.89 | 0.67 | 17.02 | 0.05 | 44.77 | -27.75 |
| 134132 | 711 | 1 | 21.06 | -0.89 | 0.67 | 17.35 | 0.05 | 44.77 | -27.42 |
| | | Full | 20.82 | -0.89 | 0.67 | 17.11 | 0.05 | 44.77 | -27.66 |

# 6. Emission Bandwidth & Occupied Bandwidth Test

## 6.1. Test Limit

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.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

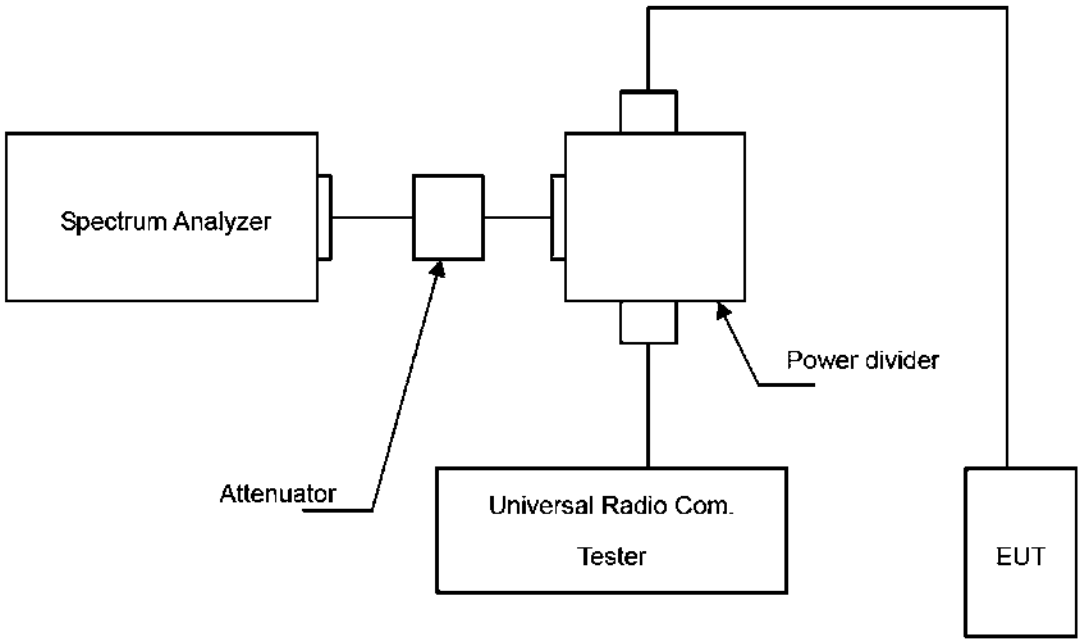
## 6.2. Test Procedures

a. The EUT makes a phone call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels. (low, middle and high operational frequency range.)

b. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

c. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

## 6.3. Test Setup



## 6.4. Test Result and Data

LTE Cat M1 Band4

| Moduration type | RB | Bandwidth (MHz) | Channel No. | Frequency (MHz) | -26dBc Occupied Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|---|---|---|---|---|
| QPSK | 100% | 1.4 | 20175 | 1732.5 | 1.3910 | 1.1211 |
| | | 3 | 20175 | 1732.5 | 1.3990 | 1.1312 |
| | | 5 | 20175 | 1732.5 | 1.3670 | 1.1365 |
| | | 10 | 20175 | 1732.5 | 1.3670 | 1.1307 |
| | | 15 | 20175 | 1732.5 | 1.3840 | 1.1547 |
| | | 20 | 20175 | 1732.5 | 1.3750 | 1.1436 |
| 16QAM | | 1.4 | 20175 | 1732.5 | 1.1570 | 0.9518 |
| | | 3 | 20175 | 1732.5 | 1.1950 | 0.9609 |
| | | 5 | 20175 | 1732.5 | 1.1870 | 0.9641 |
| | | 10 | 20175 | 1732.5 | 1.2040 | 0.9745 |
| | | 15 | 20175 | 1732.5 | 1.2010 | 0.9800 |
| | | 20 | 20175 | 1732.5 | 1.2260 | 0.9866 |

LTE Cat M1 Band12

| Moduration type | RB | Bandwidth (MHz) | Channel No. | Frequency (MHz) | -26dBc Occupied Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|---|---|---|---|---|
| QPSK | 100% | 1.4 | 23095 | 707.5 | 1.2650 | 1.1199 |
| | | 3 | 23095 | 707.5 | 1.3950 | 1.1290 |
| | | 5 | 23095 | 707.5 | 1.3860 | 1.1342 |
| | | 10 | 23095 | 707.5 | 1.4150 | 1.1314 |
| 16QAM | | 1.4 | 23095 | 707.5 | 1.1830 | 0.9511 |
| | | 3 | 23095 | 707.5 | 1.1950 | 0.9621 |
| | | 5 | 23095 | 707.5 | 1.1770 | 0.9619 |
| | | 10 | 23095 | 707.5 | 1.1780 | 0.9703 |

LTE Cat M1 Band13

| Moduration type | RB | Bandwidth (MHz) | Channel No. | Frequency (MHz) | -26dBc Occupied Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|---|---|---|---|---|
| QPSK | 100% | 5 | 23230 | 782 | 1.4230 | 1.1332 |
| | | 10 | 23230 | 782 | 1.4280 | 1.1325 |
| 16QAM | | 5 | 23230 | 782 | 1.1850 | 0.9609 |
| | | 10 | 23230 | 782 | 1.1790 | 0.9657 |

LTE Cat M1 Band66

| Moduration type | RB | Bandwidth (MHz) | Channel No. | Frequency (MHz) | -26dBc Occupied Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|---|---|---|---|---|
| QPSK | 100% | 1.4 | 132322 | 1745 | 1.3880 | 1.1208 |
| | | 3 | 132322 | 1745 | 1.3820 | 1.1302 |
| | | 5 | 132322 | 1745 | 1.3850 | 1.1392 |
| | | 10 | 132322 | 1745 | 1.3600 | 1.1299 |
| | | 15 | 132322 | 1745 | 1.3860 | 1.1543 |
| | | 20 | 132322 | 1745 | 1.3910 | 1.1421 |
| 16QAM | 100% | 1.4 | 132322 | 1745 | 1.1560 | 0.9524 |
| | | 3 | 132322 | 1745 | 1.1790 | 0.9633 |
| | | 5 | 132322 | 1745 | 1.1830 | 0.9645 |
| | | 10 | 132322 | 1745 | 1.1810 | 0.9723 |
| | | 15 | 132322 | 1745 | 1.1880 | 0.9724 |
| | | 20 | 132322 | 1745 | 1.1740 | 0.9669 |

LTE Cat M1 Band85

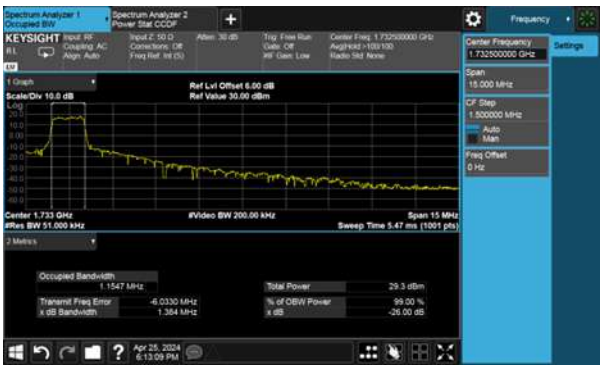
| Moduration type | RB | Bandwidth (MHz) | Channel No. | Frequency (MHz) | -26dBc Occupied Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|---|---|---|---|---|
| QPSK | 100% | 5 | 134092 | 707 | 1.4010 | 1.1329 |
| | | 10 | 134092 | 707 | 1.3880 | 1.1309 |
| 16QAM | | 5 | 134092 | 707 | 1.2020 | 0.9617 |
| | | 10 | 134092 | 707 | 1.1860 | 0.9686 |

Test Mode: Band 4 QPSK 1.4MHz
CH20175

Test Mode: Band 4 QPSK 10MHz
CH20175

Test Mode: Band 4 QPSK 3MHz
CH20175

Test Mode: Band 4 QPSK 15MHz
CH20175



Test Mode: Band 4 QPSK 5MHz
CH20175

Test Mode: Band 4 QPSK 20MHz
CH20175

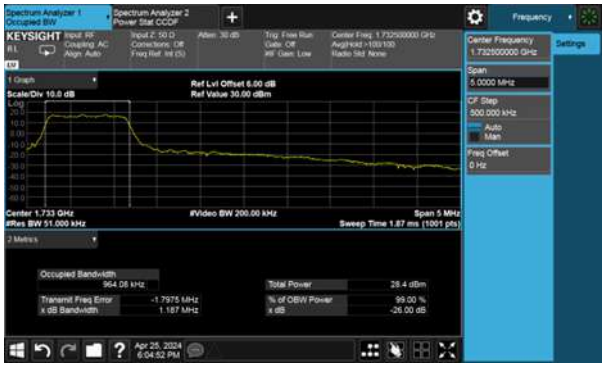
Test Mode: Band 4 16QAM 1.4MHz
CH20175

Test Mode: Band 4 16QAM 10MHz
CH20175

Test Mode: Band 4 16QAM 3MHz
CH20175

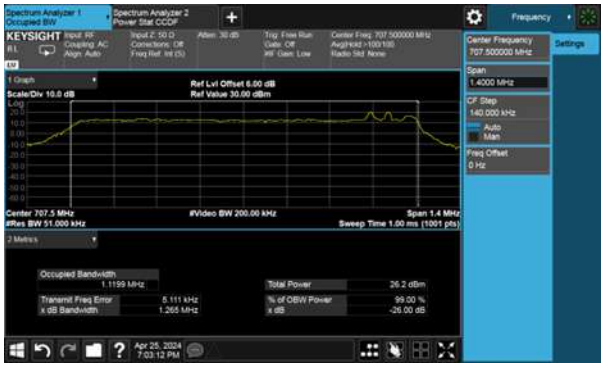
Test Mode: Band 4 16QAM 15MHz
CH20175

Test Mode: Band 4 16QAM 5MHz
CH20175



Test Mode: Band 4 16QAM 20MHz
CH20175

Test Mode: Band 12 QPSK 1.4MHz
CH23095



Test Mode: Band 12 QPSK 10MHz
CH23095

Test Mode: Band 12 QPSK 3MHz
CH23095

Test Mode: Band 12 QPSK 5MHz
CH23095

Test Mode: Band 12 16QAM 1.4MHz
CH23095

Test Mode: Band 12 16QAM 10MHz
CH23095

Test Mode: Band 12 16QAM 3MHz
CH23095

Test Mode: Band 12 16QAM 5MHz
CH23095

Test Mode: Band 13 QPSK 5MHz
CH 23230

Test Mode: Band 13 16QAM 5MHz
CH 23230

Test Mode: Band 13 QPSK 10MHz
CH 23230

Test Mode: Band 13 16QAM 10MHz
CH 23230

Test Mode: Band 66 QPSK 1.4MHz
CH132322

Test Mode: Band 66 QPSK 10MHz
CH132322

Test Mode: Band 66 QPSK 3MHz
CH132322

Test Mode: Band 66 QPSK 15MHz
CH132322

Test Mode: Band 66 QPSK 5MHz
CH132322

Test Mode: Band 66 QPSK 20MHz
CH132322

Test Mode: Band 66 16QAM 1.4MHz
CH132322

Test Mode: Band 66 16QAM 10MHz
CH132322

Test Mode: Band 66 16QAM 3MHz
CH132322

Test Mode: Band 66 16QAM 15MHz
CH132322

Test Mode: Band 66 16QAM 5MHz
CH132322

Test Mode: Band 66 16QAM 20MHz
CH132322

Test Mode: Band 85 QPSK 5MHz
CH 134092


Test Mode: Band 85 16QAM 5MHz
CH 134092


Test Mode: Band 85 QPSK 10MHz
CH 134092


Test Mode: Band 85 16QAM 10MHz
CH 134092

# 7. Peak to Average Ratio Test

## 7.1. Test Limit

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

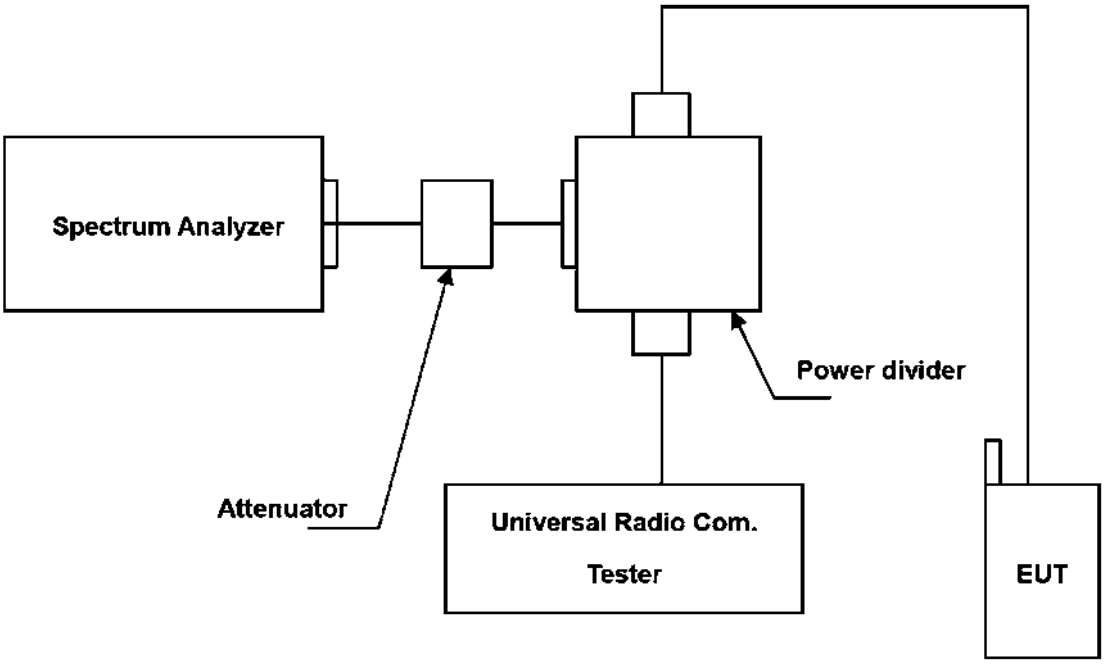
## 7.2. Test Procedures

a. Set resolution/measurement bandwidth signal's occupied bandwidth

b. Set the number of counts to a value that stabilizes the measured CCDF curve

c. Record the maximum PAPR level associated with a probability of 0.1%

## 7.3. Test Setup



## 7.4. Test Result and Data

| Band | Mode | Bandwidth (MHz) | RB size | Channel | Frequency (MHz) | PAR (dB) | Limit | Result |
|---|---|---|---|---|---|---|---|---|
| Band 4 | QPSK | 1.4 | 1RB | 20175 | 1732.5 | 9.99 | 13 | Pass |
| | 16QAM | | | 20175 | 1732.5 | 11.61 | 13 | Pass |
| | QPSK | 3 | | 20175 | 1732.5 | 8.96 | 13 | Pass |
| | 16QAM | | | 20175 | 1732.5 | 10.14 | 13 | Pass |
| | QPSK | 5 | | 20175 | 1732.5 | 8.7 | 13 | Pass |
| | 16QAM | | | 20175 | 1732.5 | 9.76 | 13 | Pass |
| | QPSK | 10 | | 20175 | 1732.5 | 9.55 | 13 | Pass |
| | 16QAM | | | 20175 | 1732.5 | 9.38 | 13 | Pass |
| | QPSK | 15 | | 20175 | 1732.5 | 9.27 | 13 | Pass |
| | 16QAM | | | 20175 | 1732.5 | 9.68 | 13 | Pass |
| | QPSK | 20 | | 20175 | 1732.5 | 9.03 | 13 | Pass |
| | 16QAM | | | 20175 | 1732.5 | 9.26 | 13 | Pass |

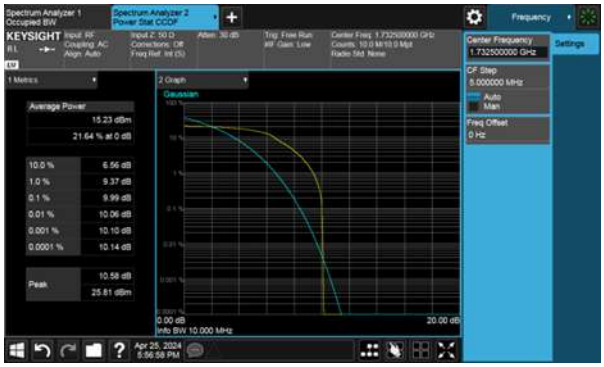
| Band | Mode | Bandwidth (MHz) | RB size | Channel | Frequency (MHz) | PAR (dB) | Limit | Result |
|---|---|---|---|---|---|---|---|---|
| Band 12 | QPSK | 1.4 | 1RB | 23095 | 707.5 | 10.45 | 13 | Pass |
| | 16QAM | | | 23095 | 707.5 | 11.53 | 13 | Pass |
| | QPSK | 3 | | 23095 | 707.5 | 9.31 | 13 | Pass |
| | 16QAM | | | 23095 | 707.5 | 10.33 | 13 | Pass |
| | QPSK | 5 | | 23095 | 707.5 | 9.09 | 13 | Pass |
| | 16QAM | | | 23095 | 707.5 | 9.96 | 13 | Pass |
| | QPSK | 10 | | 23095 | 707.5 | 9.37 | 13 | Pass |
| | 16QAM | | | 23095 | 707.5 | 9.84 | 13 | Pass |

| Band | Mode | Bandwidth (MHz) | RB size | Channel | Frequency (MHz) | PAR (dB) | Limit | Result |
|---|---|---|---|---|---|---|---|---|
| Band 13 | QPSK | 5 | 1RB | 23230 | 782 | 10.3 | 13 | Pass |
| | 16QAM | | | 23230 | 782 | 9.48 | 13 | Pass |
| | QPSK | 10 | | 23230 | 782 | 8.88 | 13 | Pass |
| | 16QAM | | | 23230 | 782 | 9.64 | 13 | Pass |

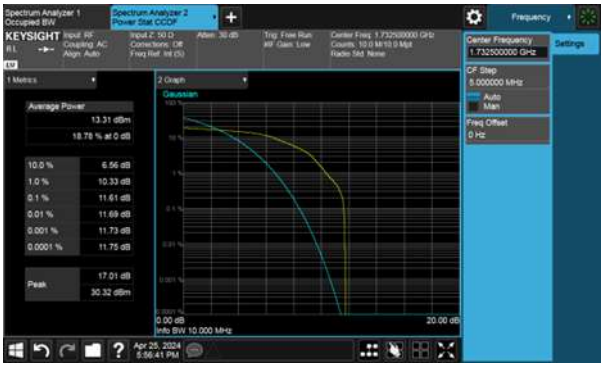
| Band | Mode | Bandwidth (MHz) | RB size | Channel | Frequency (MHz) | PAR (dB) | Limit | Result |
|---|---|---|---|---|---|---|---|---|
| LTE Cat M1 Band 66 | QPSK | 1.4 | 1RB | 132322 | 1745 | 10.1 | 13 | Pass |
| | 16QAM | | | 132322 | 1745 | 11.17 | 13 | Pass |
| | QPSK | 3 | | 132322 | 1745 | 8.56 | 13 | Pass |
| | 16QAM | | | 132322 | 1745 | 10.2 | 13 | Pass |
| | QPSK | 5 | | 132322 | 1745 | 9.65 | 13 | Pass |
| | 16QAM | | | 132322 | 1745 | 10.3 | 13 | Pass |
| | QPSK | 10 | | 132322 | 1745 | 9.67 | 13 | Pass |
| | 16QAM | | | 132322 | 1745 | 9.69 | 13 | Pass |
| | QPSK | 15 | | 132322 | 1745 | 8.88 | 13 | Pass |
| | 16QAM | | | 132322 | 1745 | 9.59 | 13 | Pass |
| | QPSK | 20 | | 132322 | 1745 | 9.33 | 13 | Pass |
| | 16QAM | | | 132322 | 1745 | 9.5 | 13 | Pass |

| Band | Mode | Bandwidth (MHz) | RB size | Channel | Frequency (MHz) | PAR (dB) | Limit | Result |
|---|---|---|---|---|---|---|---|---|
| Band 85 | QPSK | 5 | 1RB | 134092 | 707 | 9.38 | 13 | Pass |
| | 16QAM | | | 134092 | 707 | 10.16 | 13 | Pass |
| | QPSK | 10 | | 134092 | 707 | 9.9 | 13 | Pass |
| | 16QAM | | | 134092 | 707 | 9.54 | 13 | Pass |

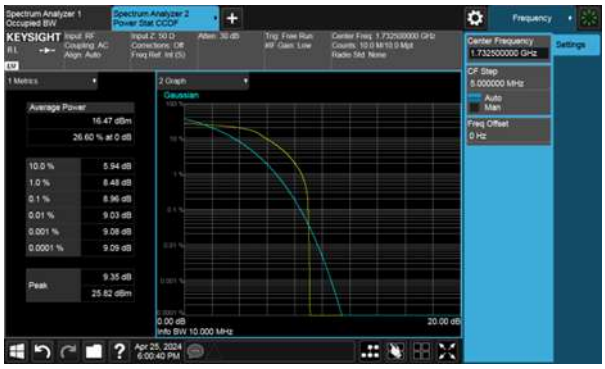
Test Mode: Band 4 QPSK 1.4MHz
CH20175



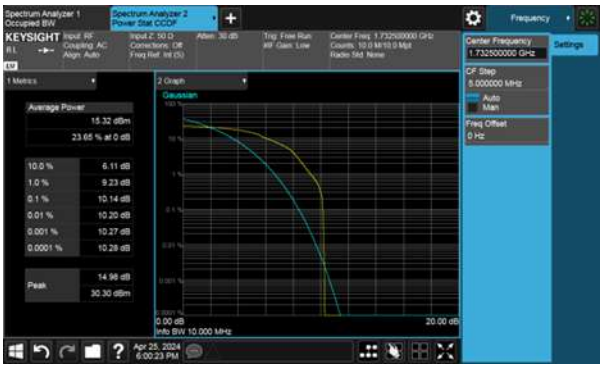
Test Mode: Band 4 16QAM 1.4MHz
CH20175



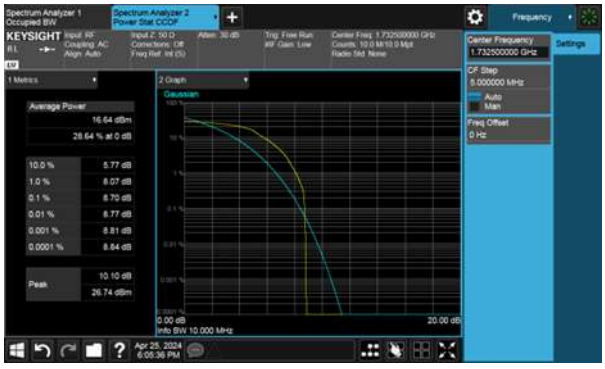
Test Mode: Band 4 QPSK 3MHz
CH20175



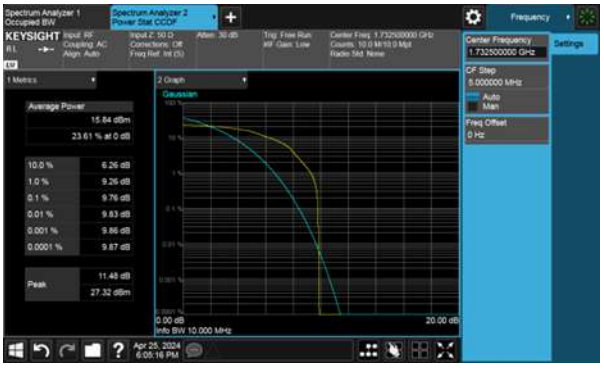
Test Mode: Band 4 16QAM 3MHz
CH20175



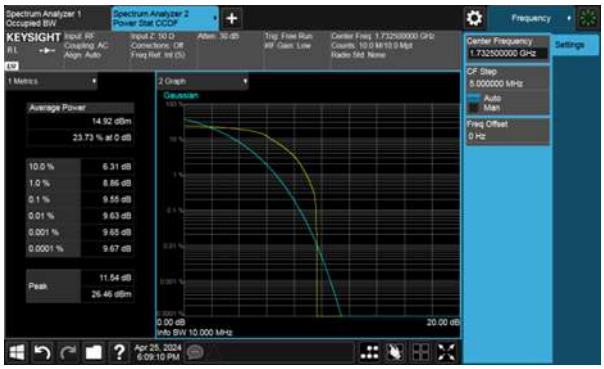
Test Mode: Band 4 QPSK 5MHz
CH20175



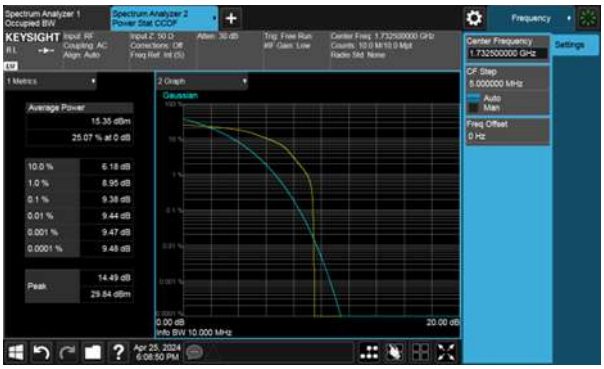
Test Mode: Band 4 16QAM 5MHz
CH20175



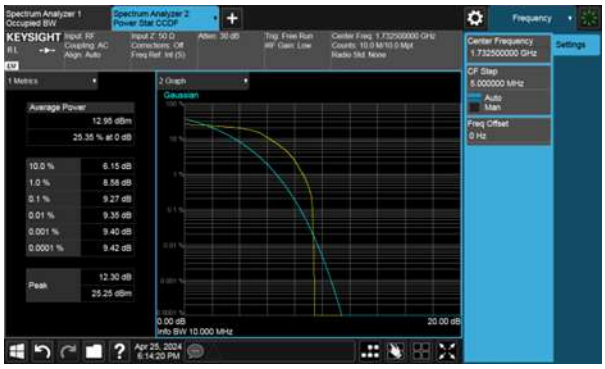
Test Mode: Band 4 QPSK 10MHz
CH20175



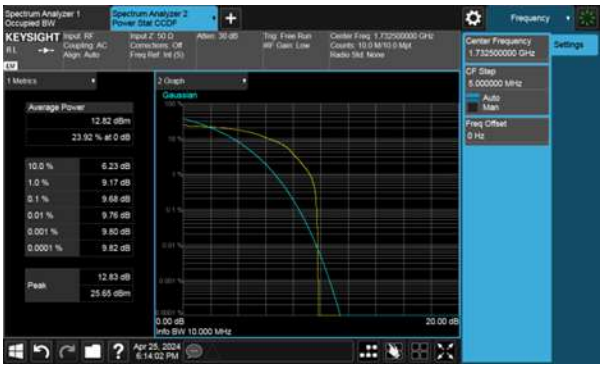
Test Mode: Band 4 16QAM 10MHz
CH20175



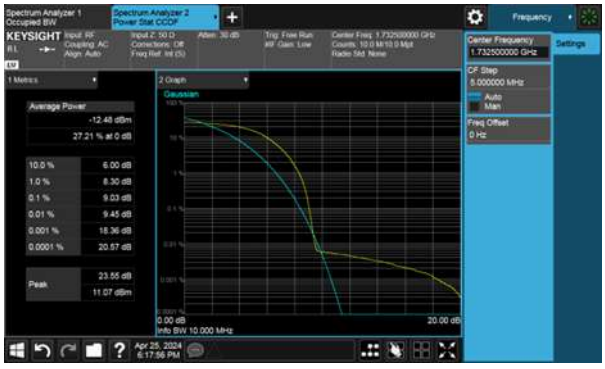
Test Mode: Band 4 QPSK 15MHz
CH20175



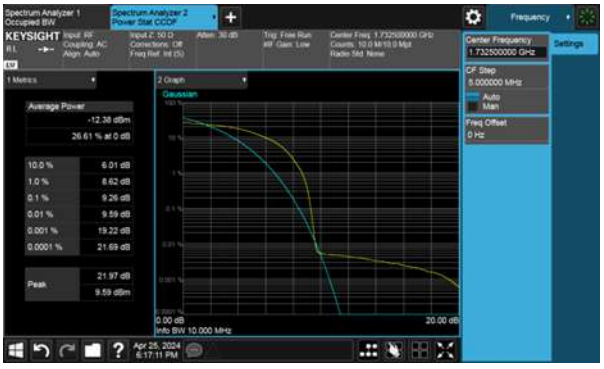
Test Mode: Band 4 16QAM 15MHz
CH20175



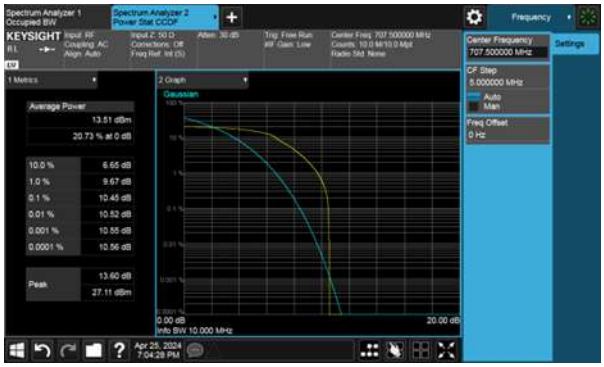
Test Mode: Band 4 QPSK 20MHz
CH20175



Test Mode: Band 4 16QAM 20MHz
CH20175

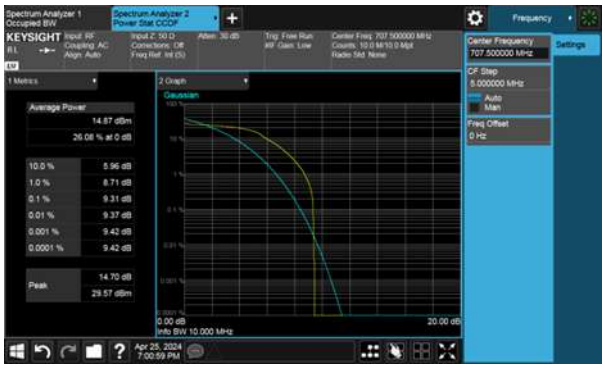


Test Mode: Band 12 QPSK 1.4MHz
CH23095

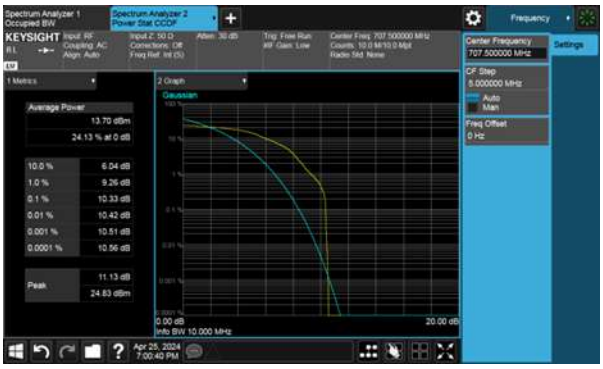


Test Mode: Band 12 16QAM 1.4MHz
CH23095

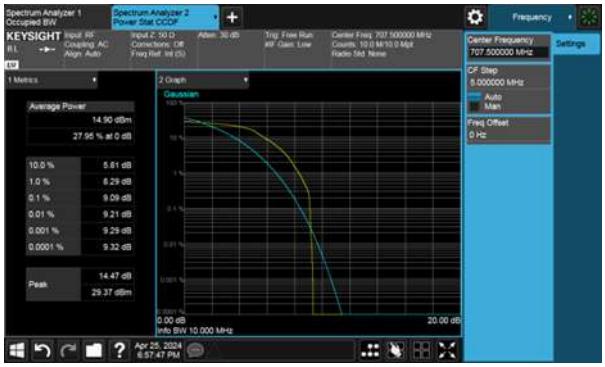
Test Mode: Band 12 QPSK 3MHz
CH23095



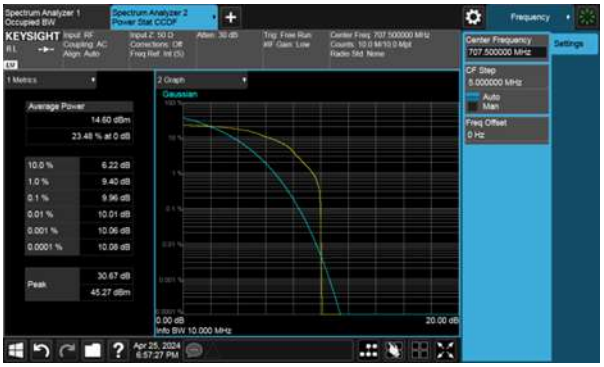
Test Mode: Band 12 16QAM 3MHz
CH23095



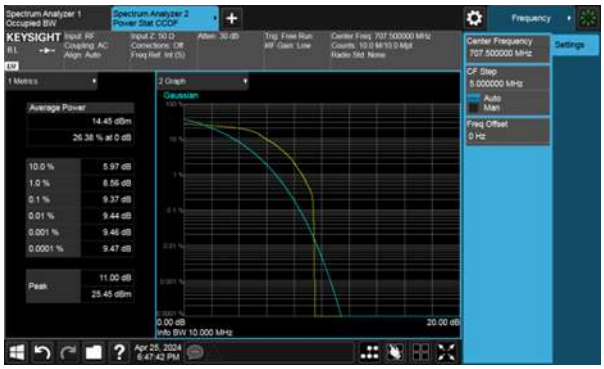
Test Mode: Band 12 QPSK 5MHz
CH23095



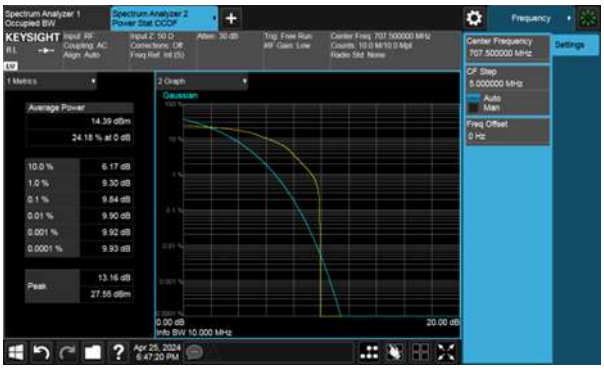
Test Mode: Band 12 16QAM 5MHz
CH23095



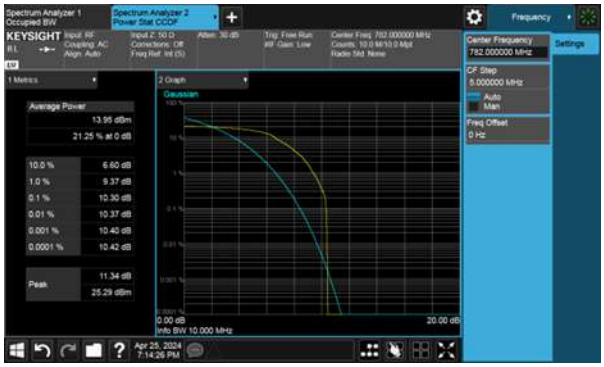
Test Mode: Band 12 QPSK 10MHz
CH23095



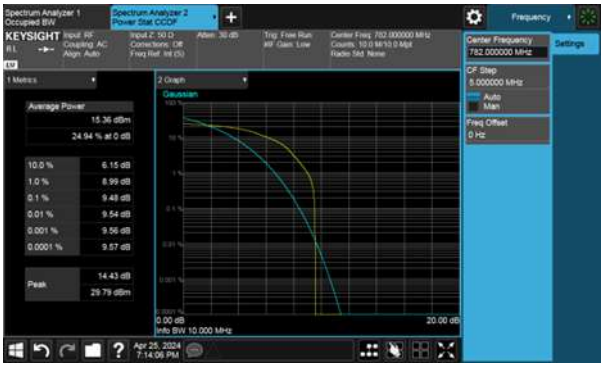
Test Mode: Band 12 16QAM 10MHz
CH23095



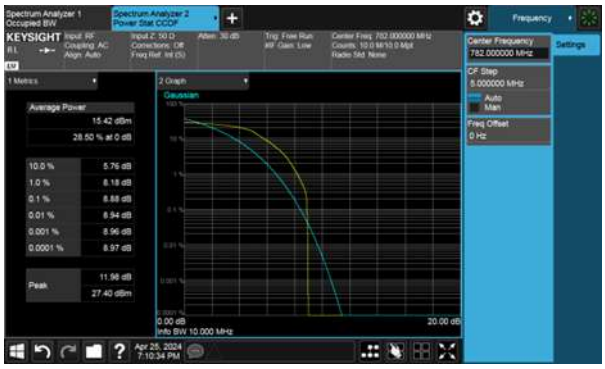
Test Mode: Band 13 QPSK 5MHz
CH23230



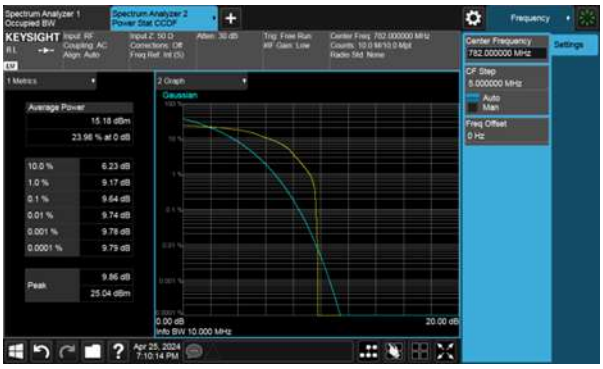
Test Mode: Band 13 16QAM 5MHz
CH23230



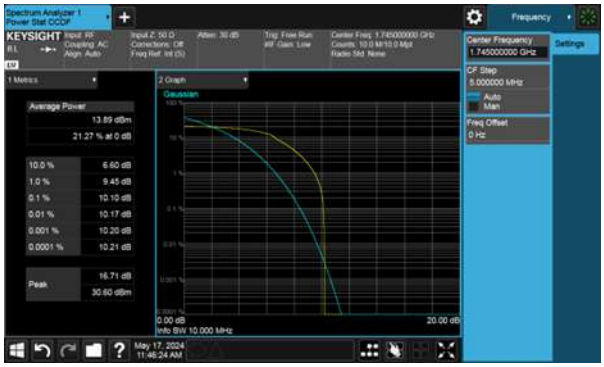
Test Mode: Band 13 QPSK 10MHz
CH23230



Test Mode: Band 13 16QAM 10MHz
CH23230

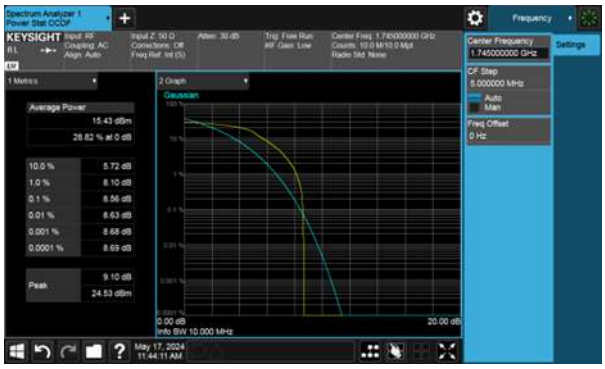


Test Mode: Band 66 QPSK 1.4MHz
CH132322

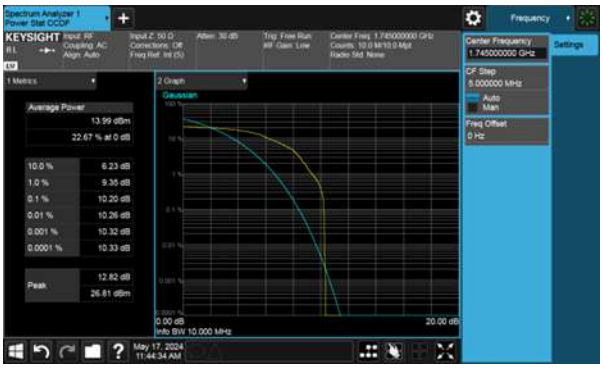


Test Mode: Band 66 16QAM 1.4MHz
CH132322

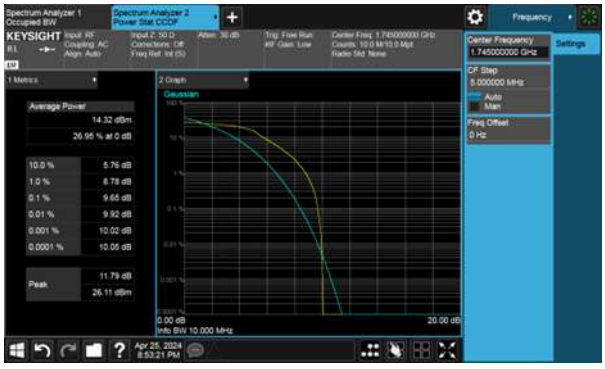
Test Mode: Band 66 QPSK 3MHz
CH132322



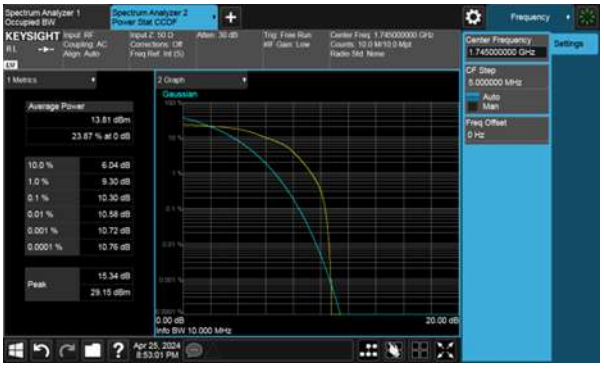
Test Mode: Band 66 16QAM 3MHz
CH132322



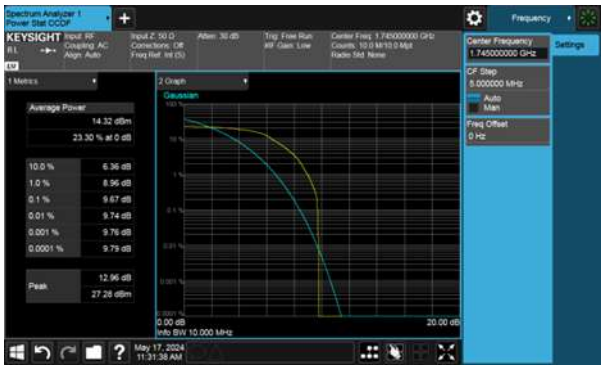
Test Mode: Band 66 QPSK 5MHz
CH132322



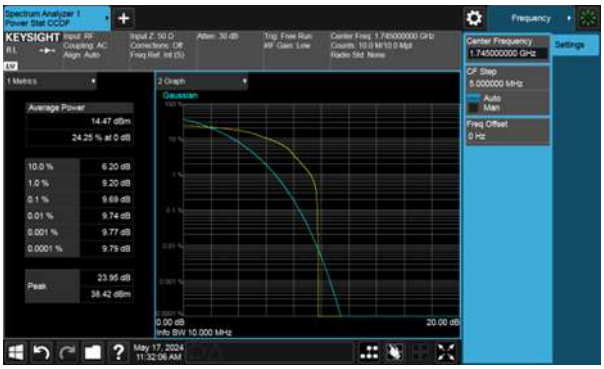
Test Mode: Band 66 16QAM 5MHz
CH132322



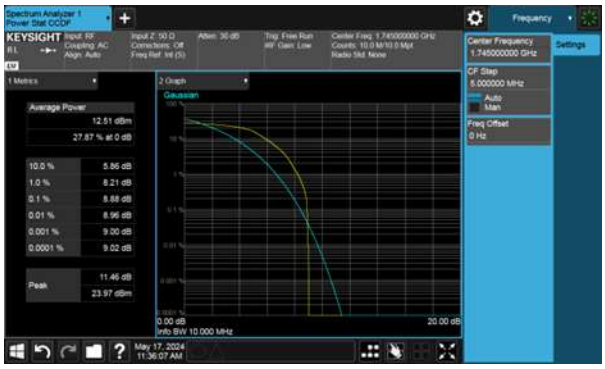
Test Mode: Band 66 QPSK 10MHz
CH132322



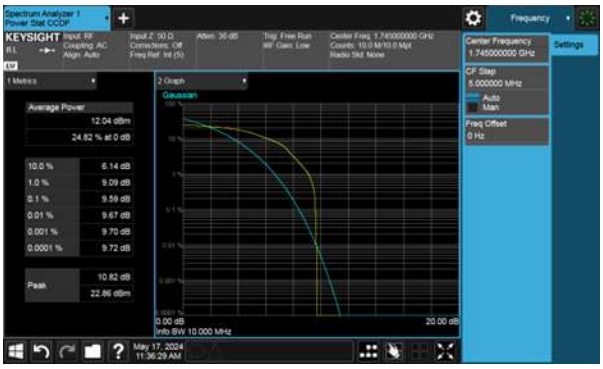
Test Mode: Band 66 16QAM 10MHz
CH132322



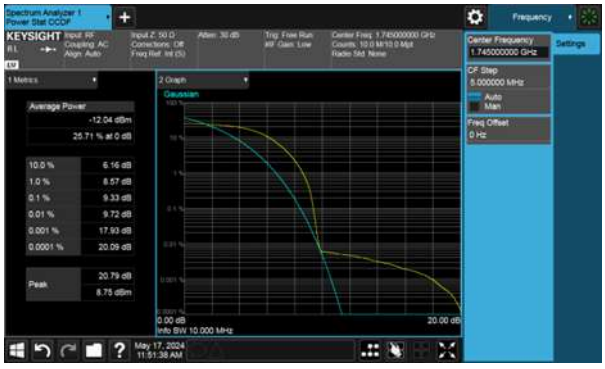
Test Mode: Band 66 QPSK 15MHz
CH132322



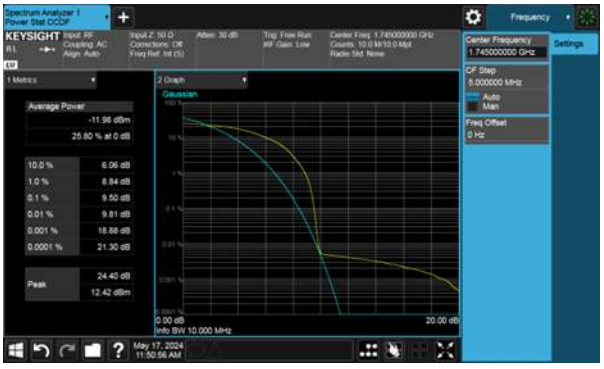
Test Mode: Band 66 16QAM 15MHz
CH132322



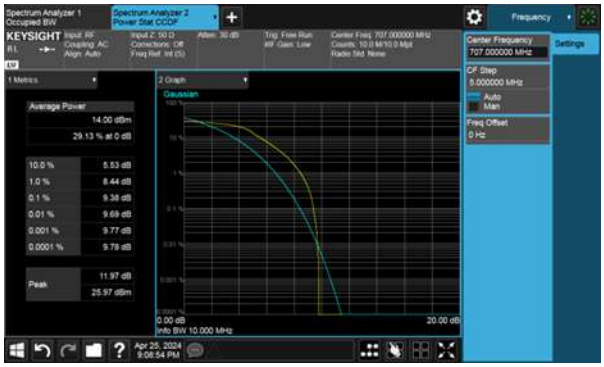
Test Mode: Band 66 QPSK 20MHz
CH132322



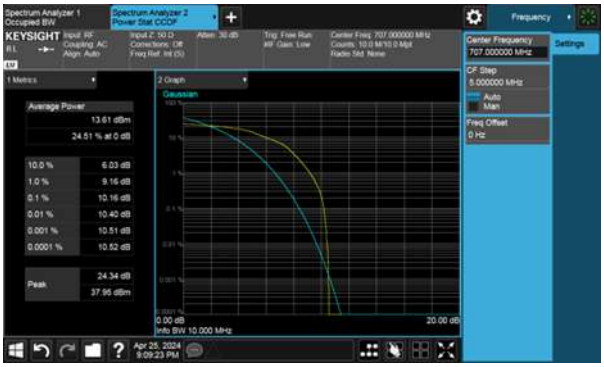
Test Mode: Band 66 16QAM 20MHz
CH132322



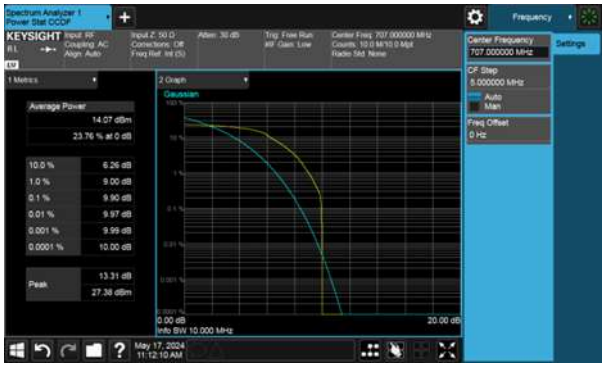
Test Mode: Band 85 QPSK 5MHz
CH134092



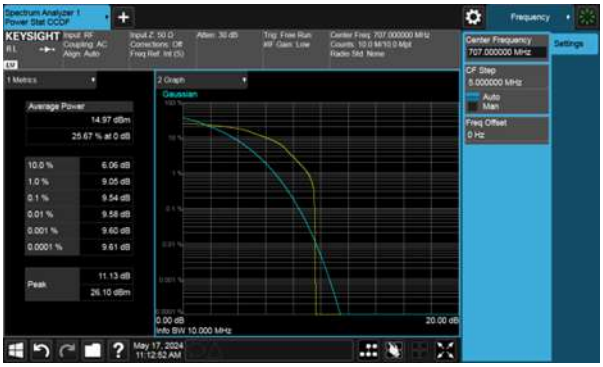
Test Mode: Band 85 16QAM 5MHz
CH134092



Test Mode: Band 85 QPSK 10MHz
CH134092



Test Mode: Band 85 16QAM 10MHz
CH134092



# 8. Band Edge

## 8.1. Test Limit

§27.53(h)(1):For operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

§27.53(g):For operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

For operations in the 746–758 MHz band and the 776–788 MHz band

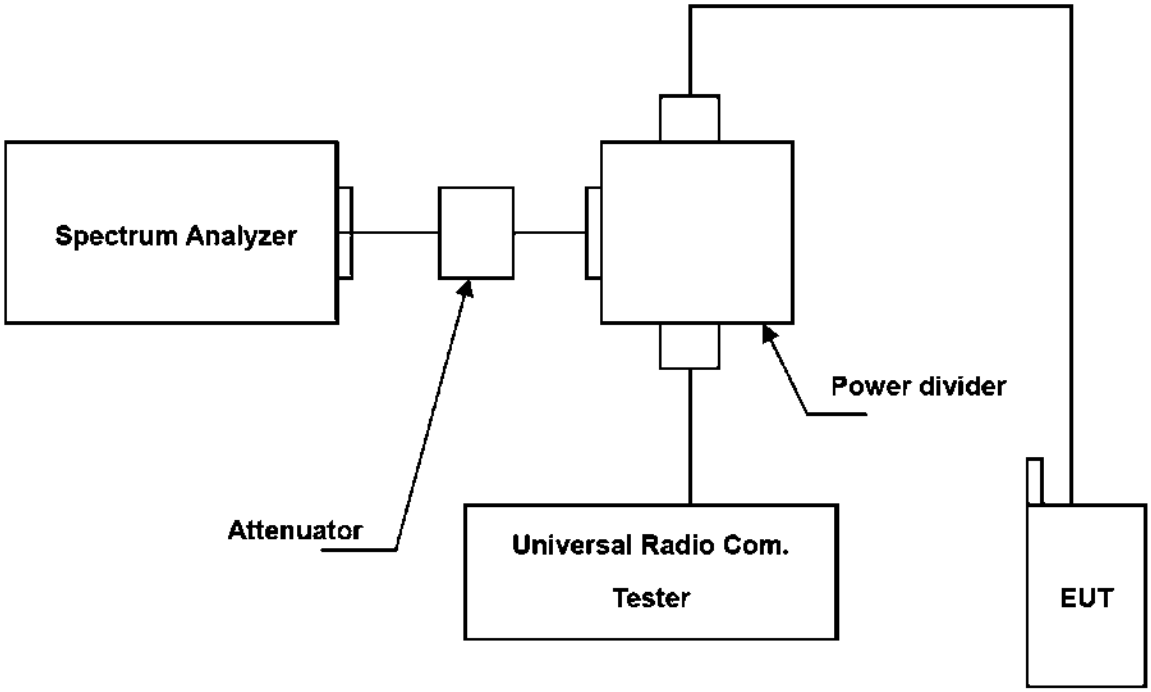
§27.53(c)(2):On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

§27.53(c)(4):On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

## 8.2. Test Procedures

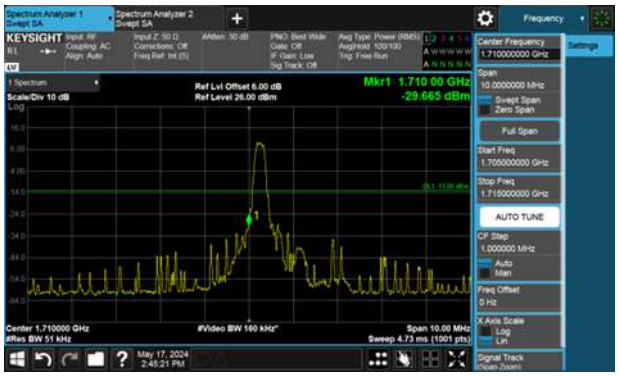
a. The EUT was set up for the maximum peak power with WWAN link data modulation. The power was measured with Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.)
b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss in the transmitted path track.
c. The center frequency of spectrum is the band edge frequency and span is 10 MHz. RB of the resolution bandwidth of at least one percent of the emission bandwidth.
d. Record the max trace plot into the test report.

## 8.3. Test Setup

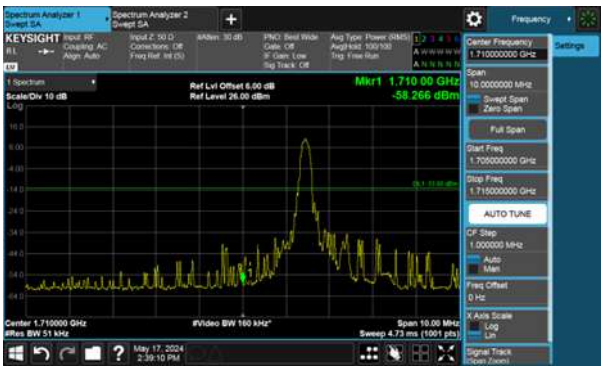


## 8.4. Test Result and Data

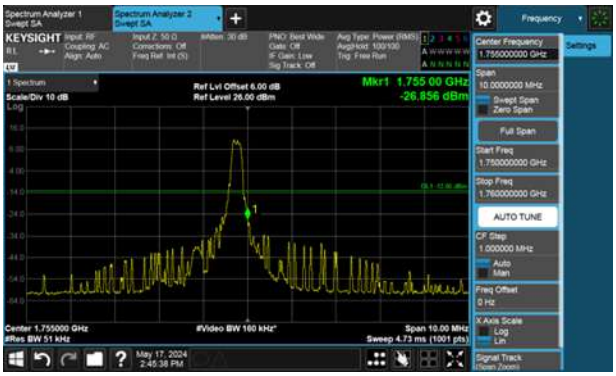
Test Mode: QPSK Band 4 1.4M CH19957-1@0



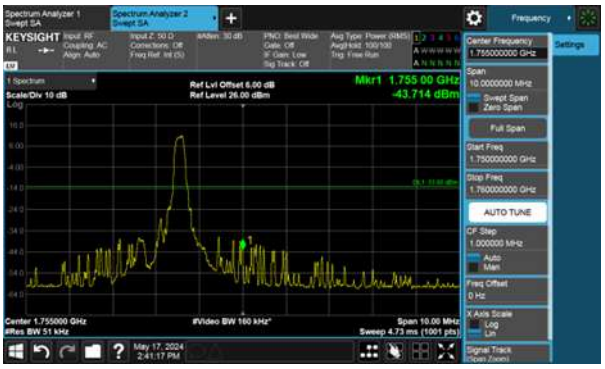

Test Mode: QPSK Band 4 20M CH20050-1@0



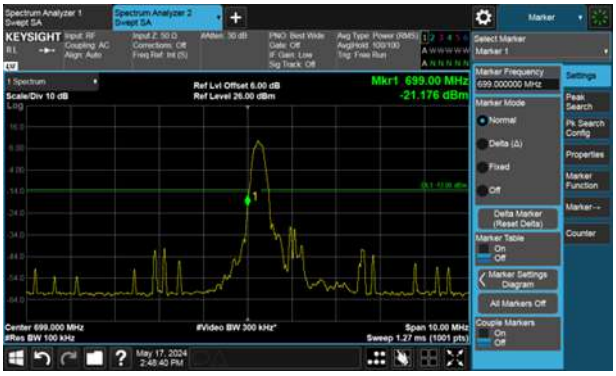

Test Mode: QPSK Band 4 1.4M CH20393-1@MAX




Test Mode: QPSK Band 4 20M CH20300-1@MAX

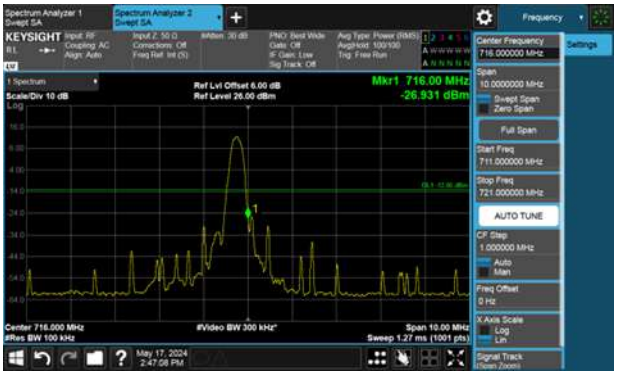


Test Mode: QPSK Band 12 1.4M CH23017-1@0

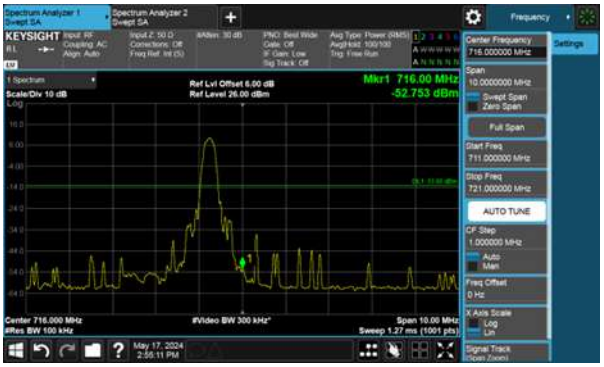



Test Mode: QPSK Band 12 10M CH23060-1@0

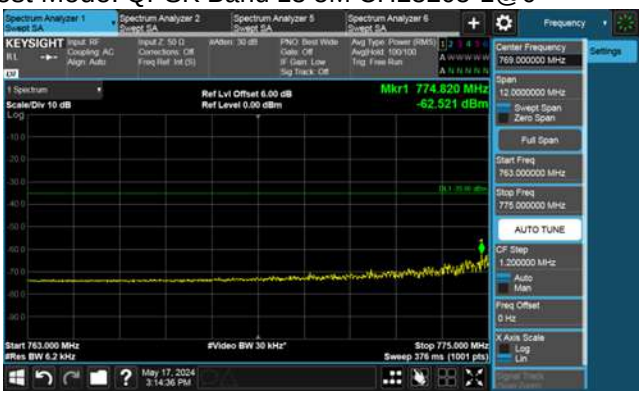

Test Mode: QPSK Band 12 1.4M CH23173-1@MAX

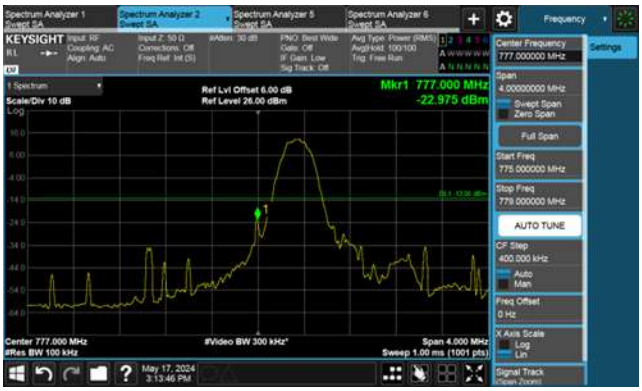



Test Mode: QPSK Band 12 10M CH23130-1@MAX



Test Mode: QPSK Band 13 5M CH23205-1@0



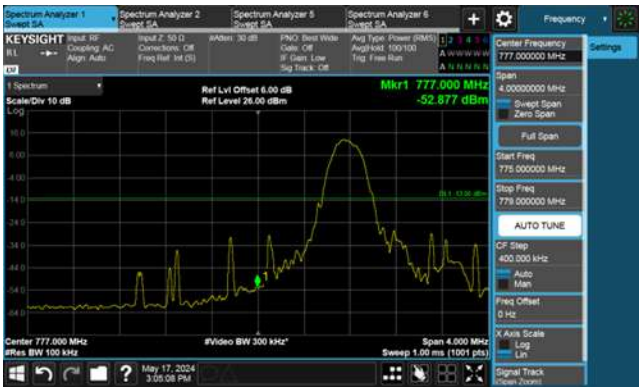





Test Mode:QPSK Band 13 5M CH23255-1@MAX

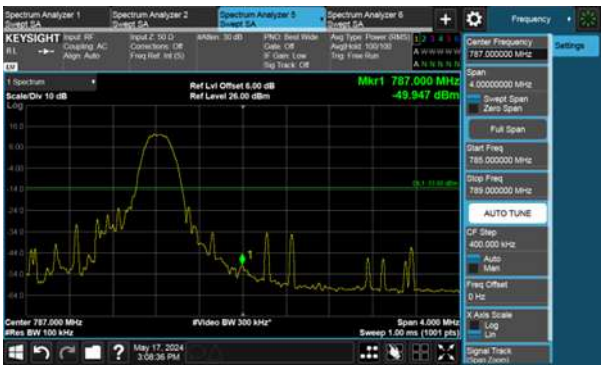


Test Mode: QPSK Band 13 10M CH23230-1@0

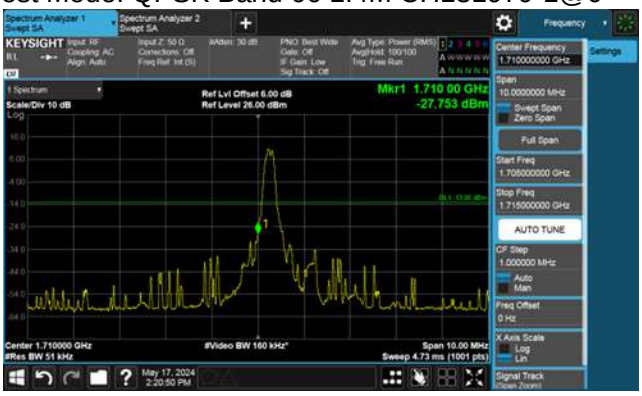





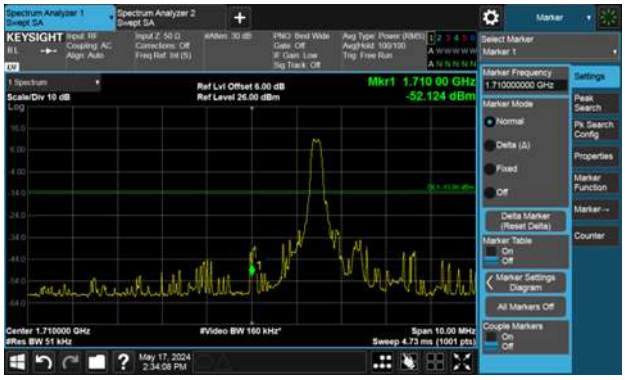
Test Mode: QPSK Band 13 10M CH23230-1@MAX

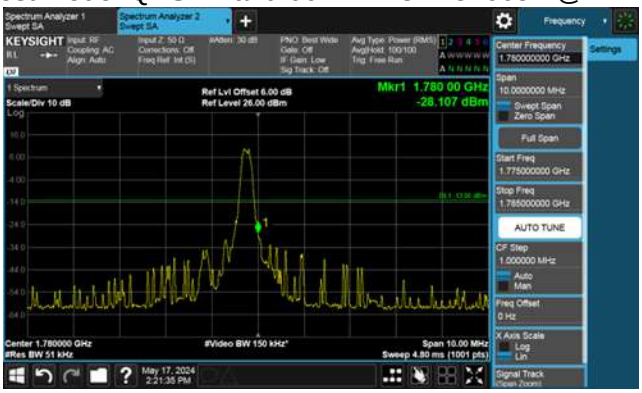

Test Mode: QPSK Band 66 1.4M CH131979-1@0



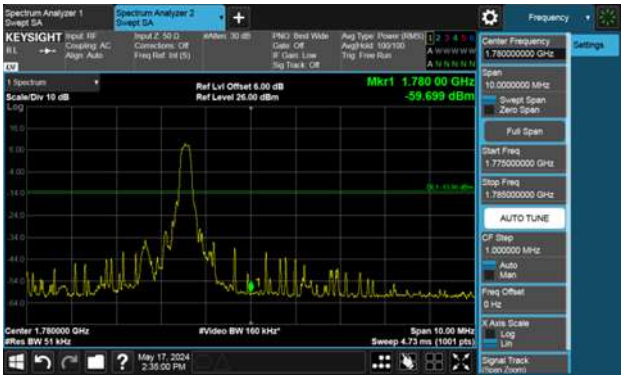

Test Mode: QPSK Band 66 20M CH132072-1@0



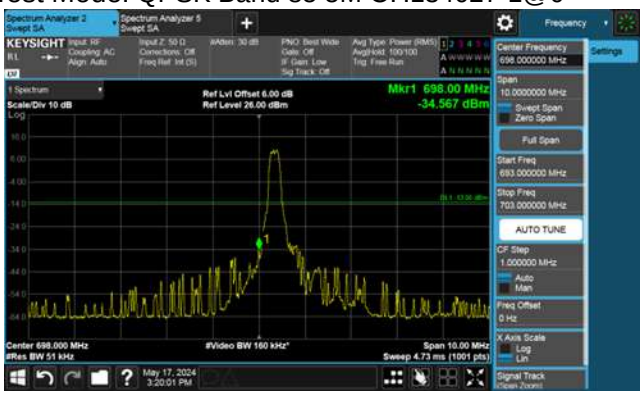

Test Mode: QPSK Band 66 1.4M CH132665-1@MAX



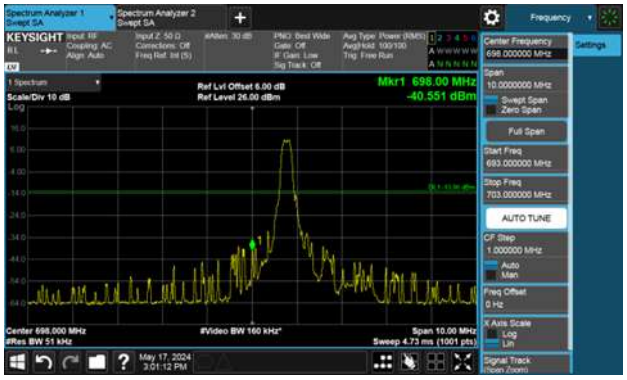

Test Mode: QPSK Band 66 20M CH132572-1@MAX



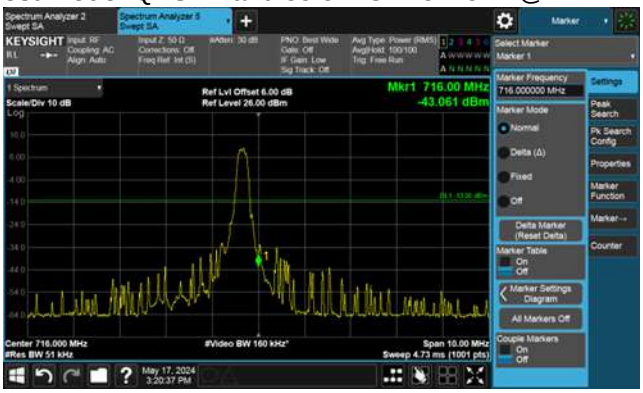
Test Mode: QPSK Band 85 5M CH134027-1@0



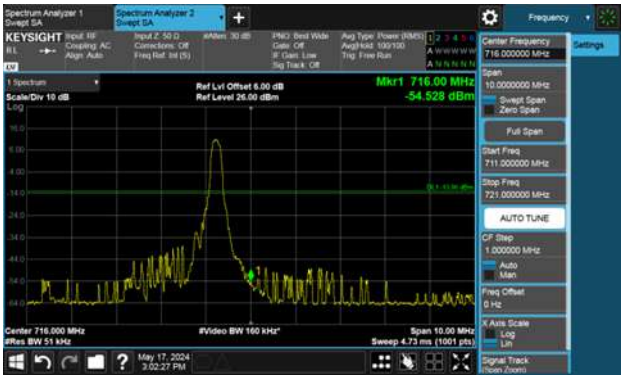

Test Mode: QPSK Band 85 10M CH134052-1@0




Test Mode: QPSK Band 85 5M CH134157-1@MAX




Test Mode: QPSK Band 85 10M CH134132-1@MAX



# 9. Conducted Spurious Emission Test

## 9.1. Test Limit

For LTE Band 4 / Band 66:

In the FCC 27.53(h)(4):for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

For LTE Band 12 / Band 85:

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

For LTE Band 13:

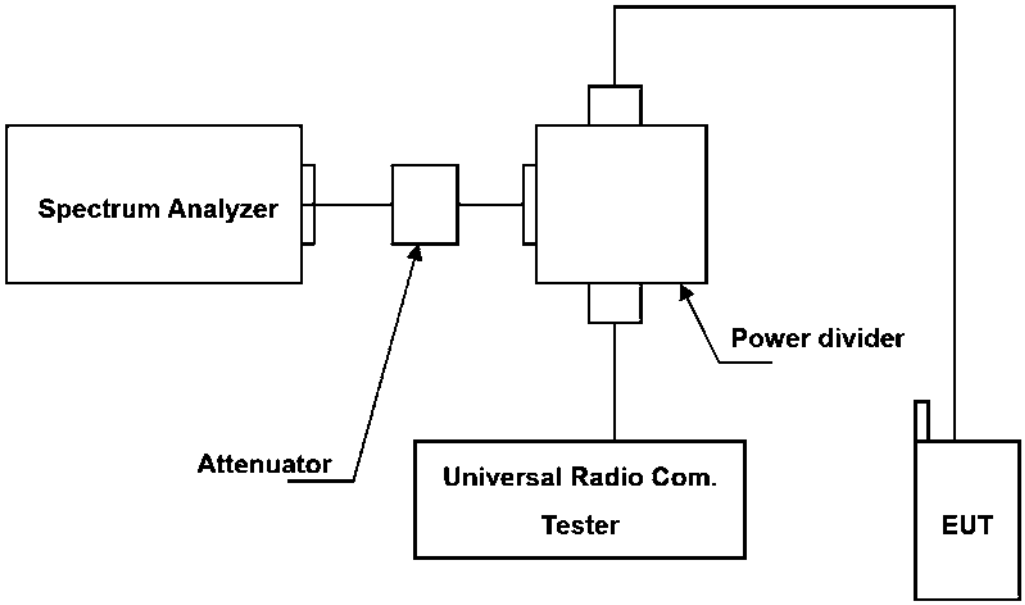
According to FCC 27.53(c)(2) for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB.

According to FCC 27.53(f) for operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm.

## 9.2. Test Procedures

a. The EUT was set up for the maximum peak power with WWAN link data modulation. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high operational frequency range.)
b. The conducted spurious emission used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
c. When the spectrum scanned from 10MHz to 2.5GHz (Band 7and Band 41: scanned from 10MHz to 4GHz), it shall be connected to the band reject filter attenuated the carried frequency. The spectrum set RB=1MHz, VB=1MHz.
d. When the spectrum scanned from 2.5GHz to 10th harmonic (Band 7 and Band 41: scanned from 4GHz to $10^{th}$ harmonic), it shall be connected to the high pass filter attenuated the carried frequency. The spectrum set RB=1MHz, VB=1MHz.

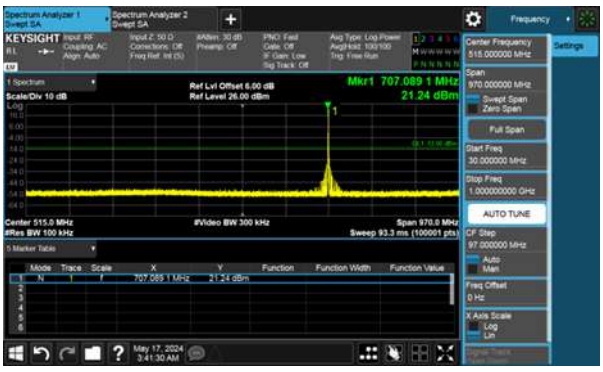
## 9.3. Test Setup



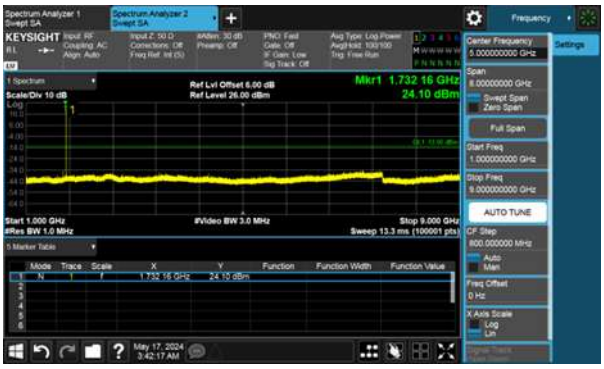
## 9.4. Test Result and Data

Test Mode: Band4 QPSK 1RB 1.4M CH23175-1


Test Mode: Band12 QPSK 1RB 1.4M CH23095-1

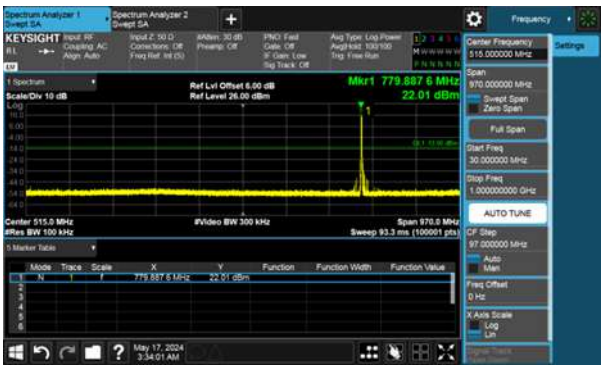



Test Mode: Band4 QPSK 1RB 1.4M CH23175-2




Test Mode: Band12 QPSK 1RB 1.4M CH23095-2

Test Mode: Band13 QPSK 1RB 5M CH23230-1



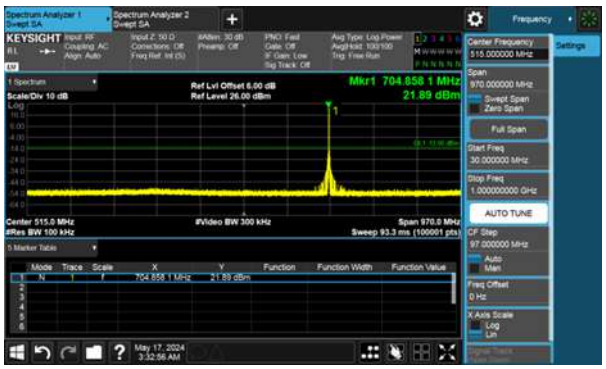

Test Mode: Band66 QPSK 1RB 1.4M CH132322


Test Mode: Band13 QPSK 1RB 5M CH23230-2


Test Mode: Band66 QPSK 1RB 1.4M CH132322-2


Test Mode: Band13 QPSK 1RB 5M CH23230-3

Test Mode: Band85 QPSK 1RB 5M CH134092-1




Test Mode: Band85 QPSK 1RB 5M CH134092-2

# 10. Radiation Emission Test

## 10.1.Test Limit

For LTE Band 4 / Band 66:

In the FCC 27.53(h)(4):for operations in the 1695–1710 MHz, 1710–1755 MHz, 1755–1780 MHz, 1915–1920 MHz, 1995–2000 MHz, 2000–2020 MHz, 2110–2155 MHz, 2155–2180 MHz, and 2180–2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

For LTE Band 12 / Band 85:

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

For LTE Band 13:

According to FCC 27.53(c)(2) for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB.

According to FCC 27.53(f) for operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm.

## 10.2.Test Procedure

a. The EUT was set up for the maximum power with wwan link data modulation. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high operational frequency range).

b. E.I.R.P power measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be otated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. The substitution antenna (Note:1 & 2) is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G.

d. E.I.R.P. = Output power level of S.G - TX cable loss + Antenna gain of substitution horn

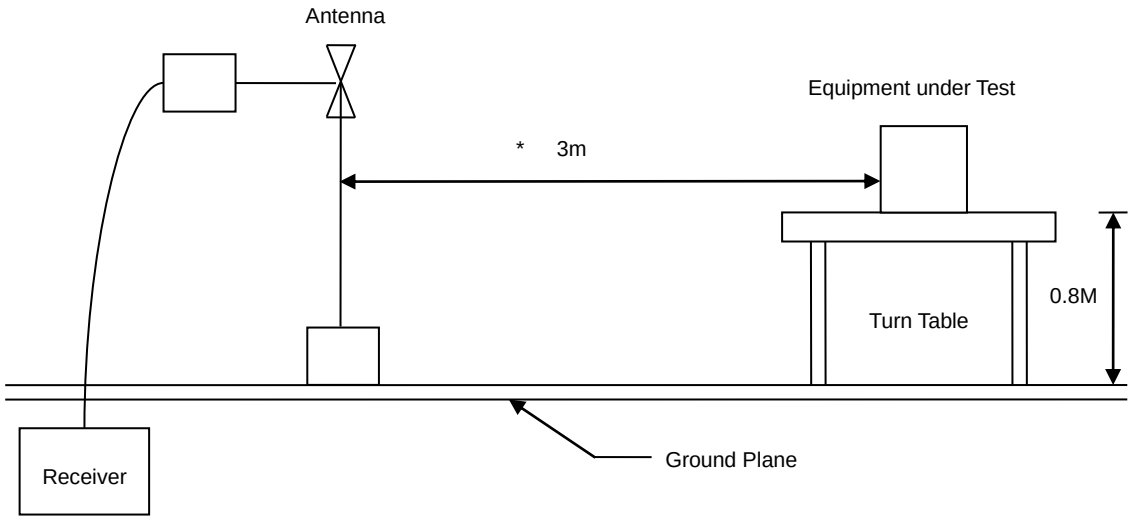
e. E.R.P. = E.I.R.P.- 2.15 dB

Note: 1. Below 1GHz substituted method test: sleeve dipole antenna to Bi-Log Antenna.

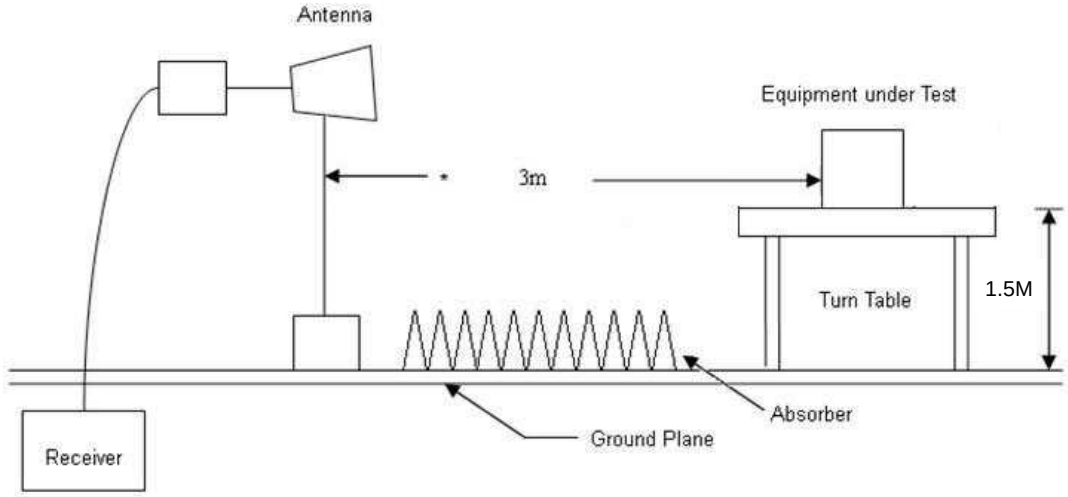
2. Above 1GHz substituted method test: horn antenna to horn antenna.

## 10.3. Test Setup

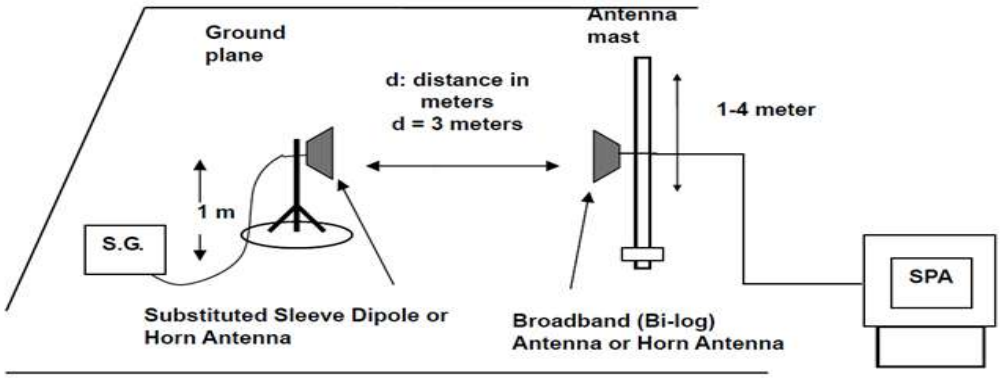
Below 1GHz test setup




Above 1GHz Test Setup

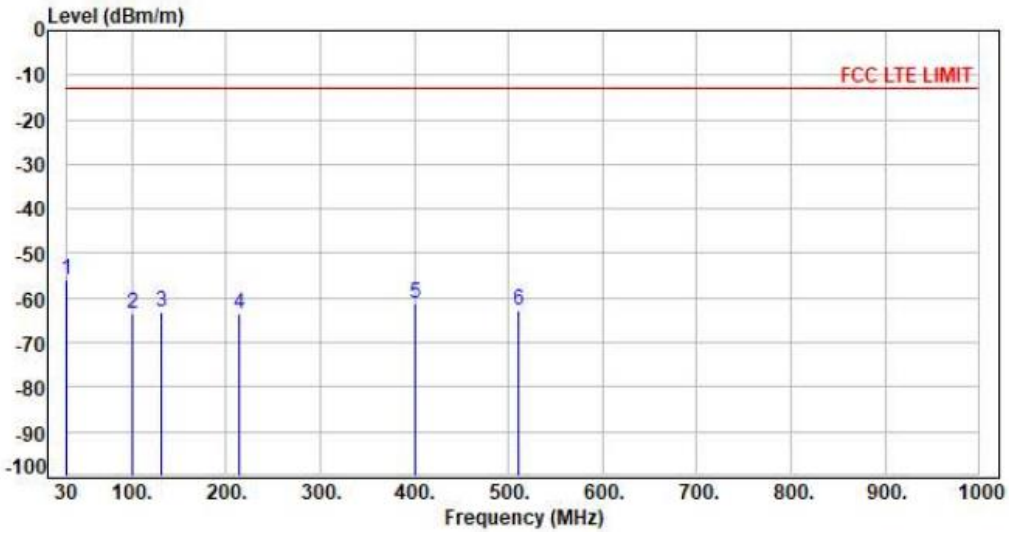



For Substituted Method Test Set-UP



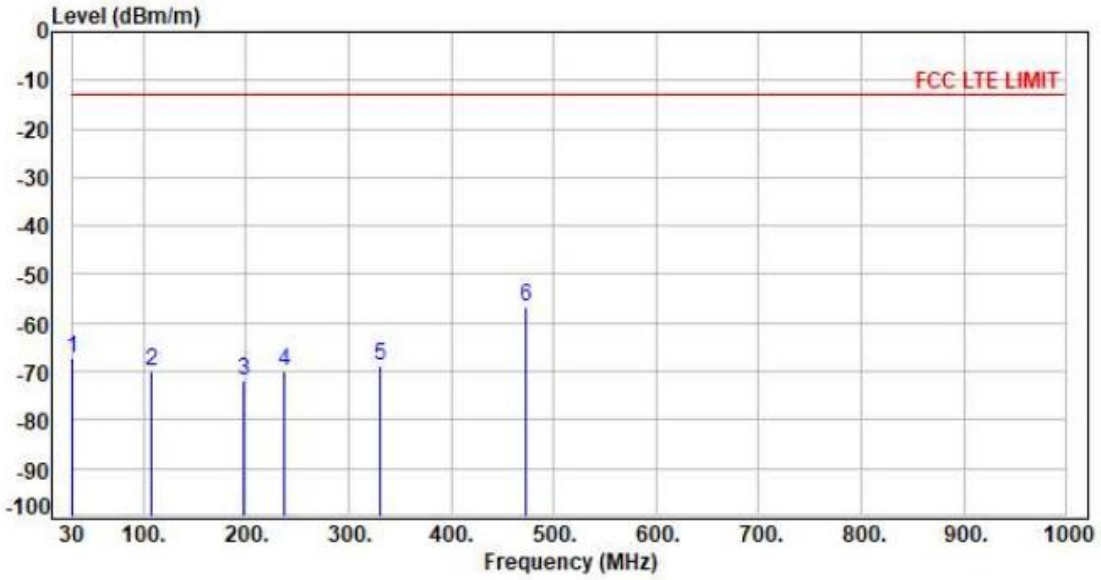
## 10.1. Test Result and Data (30MHz ~ 1GHz)

| Test Mode | Cat M1, Band 13 5MHz, CH 23230 | Pol/Phase | VERTICAL |
|---|---|---|---|
| Power | AC 120V/60Hz | | |




| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | ERP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| 30 | -57.96 | V | -25.41 | 1.07 | -27.45 | -56.08 | -13 |
| 99.84 | -62.73 | V | -54.23 | 1.52 | -5.67 | -63.57 | -13 |
| 130.88 | -62.37 | V | -54.79 | 1.63 | -4.66 | -63.23 | -13 |
| 214.3 | -62.62 | V | -57.61 | 1.94 | -1.95 | -63.65 | -13 |
| 400.54 | -63.95 | V | -57.3 | 2.64 | 0.75 | -61.34 | -13 |
| 511.12 | -66.14 | V | -58.55 | 2.68 | 0.7 | -62.68 | -13 |

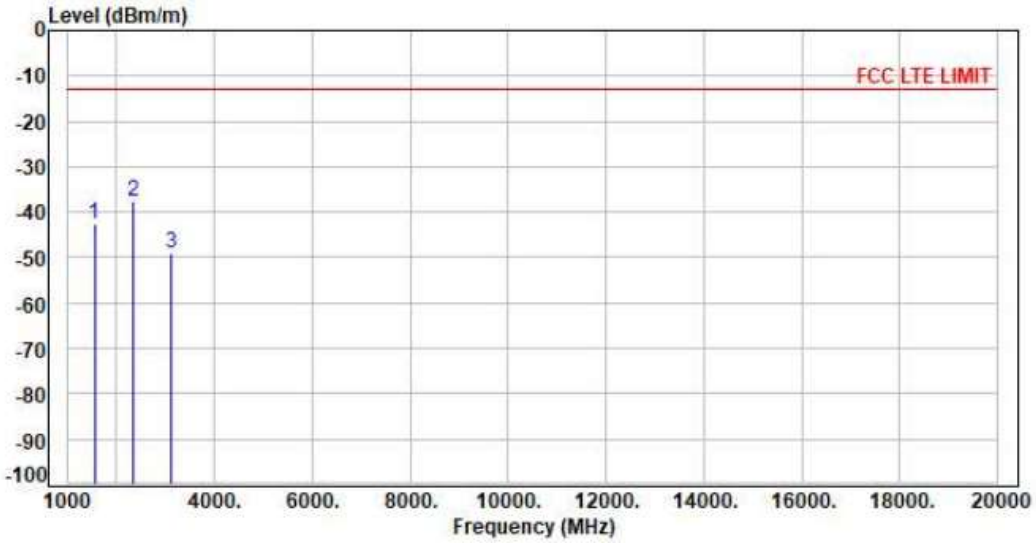
| Test Mode | Cat M1, Band 13 5MHz, CH 23230 | Pol/Phase | HORIZONTAL |
|---|---|---|---|
| Power | AC 120V/60Hz | | |




| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | ERP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| 30 | -76.44 | H | -36.8 | 1.07 | -27.45 | -67.47 | -13 |
| 107.6 | -62.93 | H | -60.68 | 1.55 | -5.44 | -69.82 | -13 |
| 196.84 | -68.65 | H | -65.41 | 1.88 | -2.47 | -71.91 | -13 |
| 237.58 | -67.92 | H | -64.44 | 2.01 | -1.27 | -69.87 | -13 |
| 330.7 | -68.67 | H | -64.87 | 2.28 | 0.61 | -68.69 | -13 |
| 472.32 | -60.5 | H | -52.5 | 2.59 | 0.63 | -56.61 | -13 |

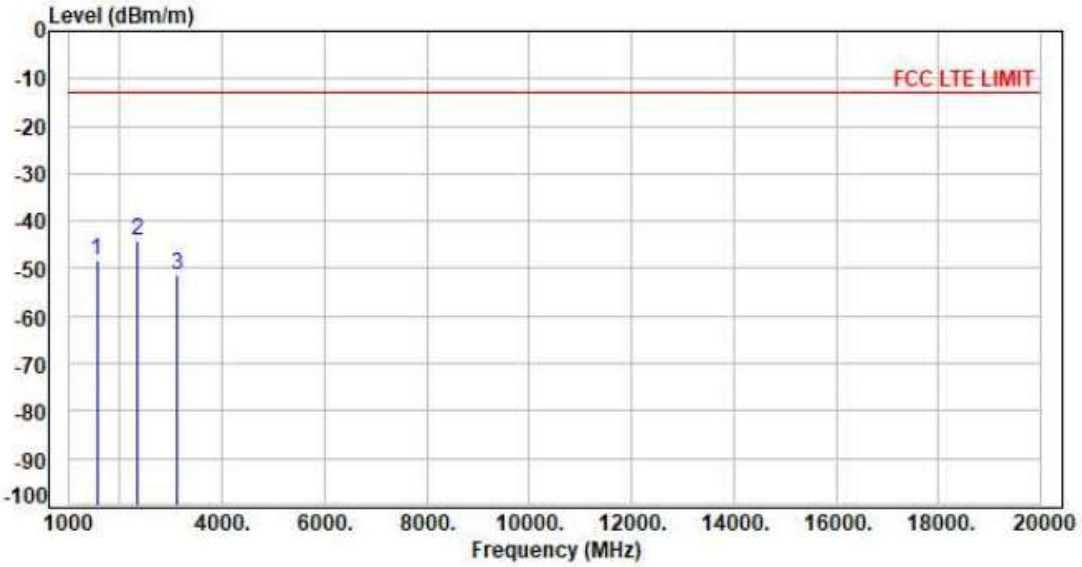
## 10.2. Test Result and Data (1GHz ~ 20GHz)

| Test Mode | Band 13 5MHz, CH 23205 | Pol/Phase | VERTICAL |
|---|---|---|---|
| Power | AC 120V/60Hz | | |



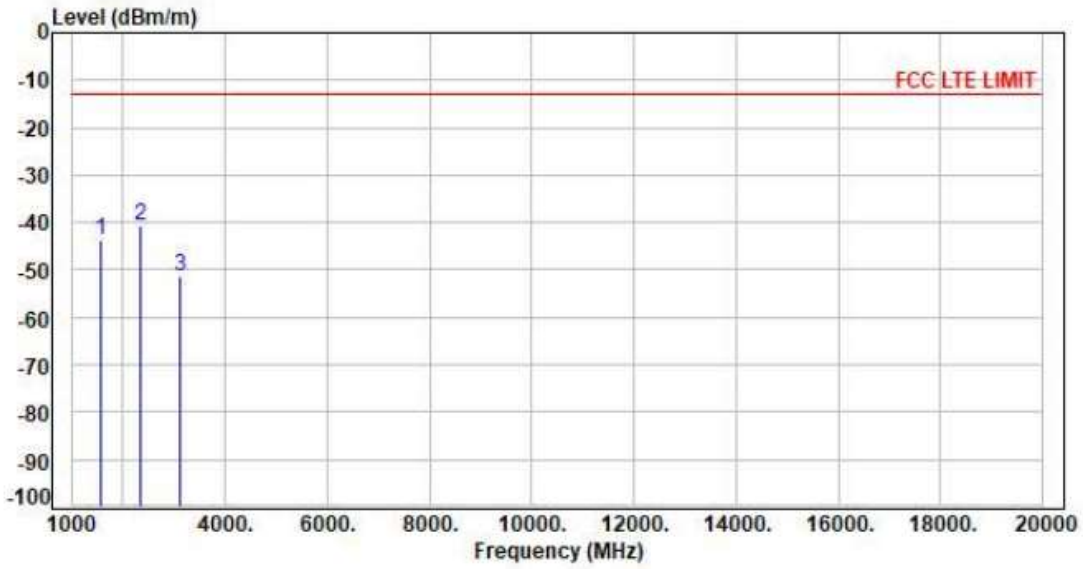

| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | ERP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| 1554.7 | -47.61 | V | -44.96 | 4.39 | 8.8 | -42.7 | -13 |
| 2332.05 | -46.61 | V | -39.44 | 5.37 | 9.4 | -37.56 | -13 |
| 3109.4 | -61.3 | V | -50.25 | 6.35 | 9.79 | -48.96 | -13 |

| Test Mode | Band 13 5MHz, CH 23205 | Pol/Phase | HORIZONTAL |
|---|---|---|---|
| Power | AC 120V/60Hz | | |



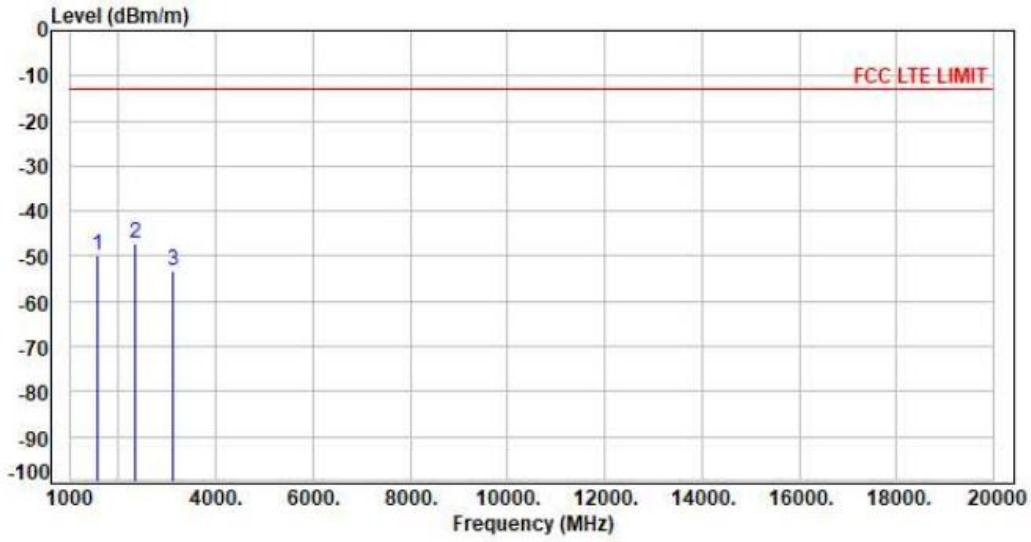

| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | ERP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| 1554.7 | -53.79 | H | -50.71 | 4.39 | 8.8 | -48.45 | -13 |
| 2332.05 | -53.29 | H | -45.91 | 5.37 | 9.4 | -44.03 | -13 |
| 3109.4 | -64.21 | H | -52.55 | 6.35 | 9.79 | -51.26 | -13 |

| Test Mode | Band 13 5MHz, CH 23230 | Pol/Phase | VERTICAL |
|---|---|---|---|
| Power | AC 120V/60Hz | | |



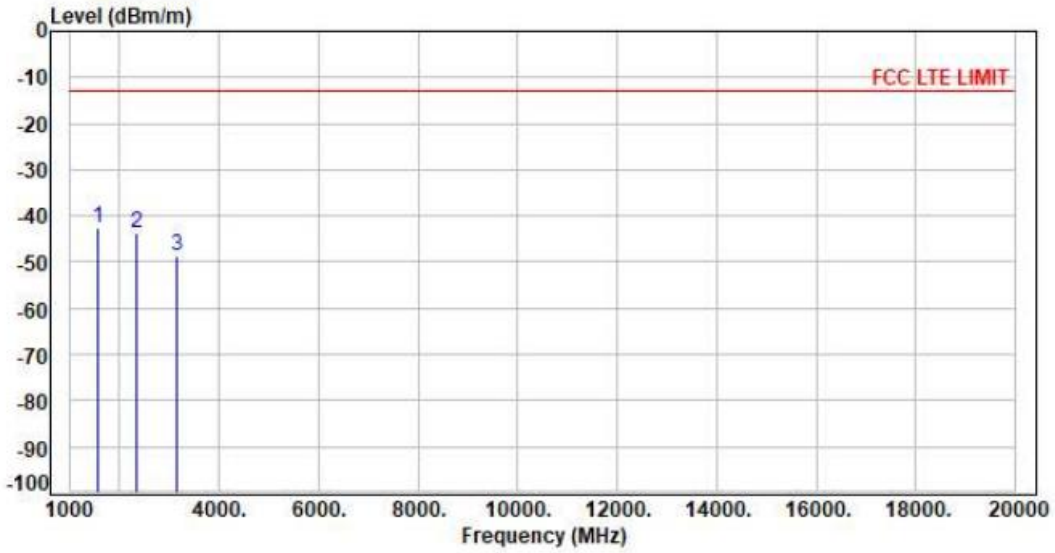

| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | ERP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| 1559.7 | -48.73 | V | -46.05 | 4.4 | 8.8 | -43.8 | -13 |
| 2339.55 | -49.57 | V | -42.39 | 5.37 | 9.41 | -40.5 | -13 |
| 3119.4 | -63.55 | V | -52.46 | 6.37 | 9.8 | -51.18 | -13 |

| Test Mode | Band 13 5MHz, CH 23230 | Pol/Phase | HORIZONTAL |
|---|---|---|---|
| Power | AC 120V/60Hz | | |



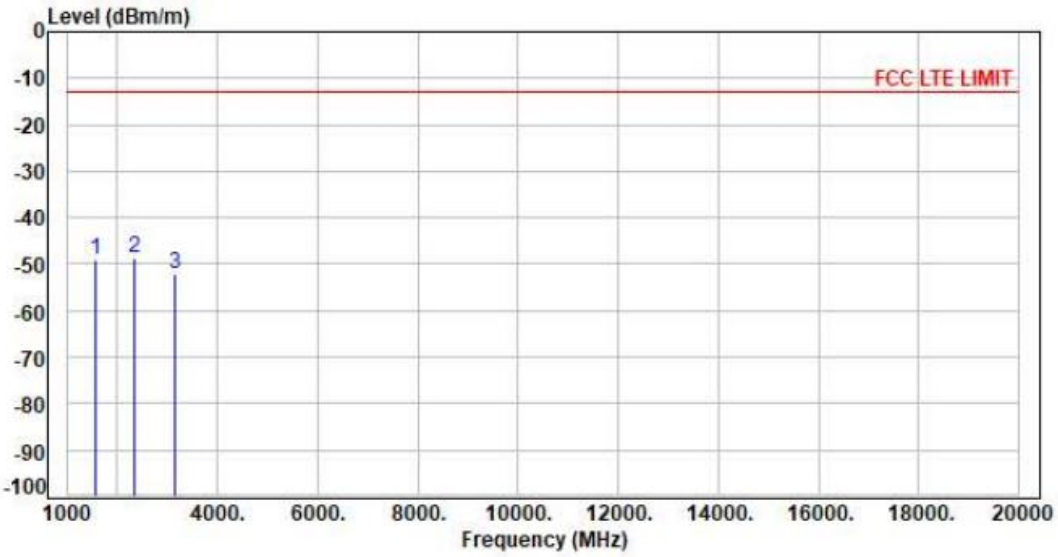

| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | ERP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| 1559.7 | -55.11 | H | -52 | 4.4 | 8.8 | -49.75 | -13 |
| 2339.55 | -56.6 | H | -49.21 | 5.37 | 9.41 | -47.32 | -13 |
| 3119.4 | -66.18 | H | -54.47 | 6.37 | 9.8 | -53.19 | -13 |

| Test Mode | Band 13 5MHz, CH 23255 | Pol/Phase | VERTICAL |
|---|---|---|---|
| Power | AC 120V/60Hz | | |




| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | ERP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| 1573.3 | -47.67 | V | -44.87 | 4.41 | 8.8 | -42.63 | -13 |
| 2359.95 | -52.99 | V | -45.77 | 5.4 | 9.45 | -43.87 | -13 |
| 3146.6 | -60.96 | V | -49.78 | 6.4 | 9.82 | -48.51 | -13 |

| Test Mode | Band 13 5MHz, CH 23255 | Pol/Phase | HORIZONTAL |
|---|---|---|---|
| Power | AC 120V/60Hz | | |




| Frequency (MHz) | SA Reading (dBm) | Ant.Pol. (H/V) | SG Reading (dBm) | Cable Loss (dB) | Gain (dBi) | ERP (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| 1573.3 | -54.33 | H | -51.11 | 4.41 | 8.8 | -48.87 | -13 |
| 2359.95 | -57.84 | H | -50.41 | 5.4 | 9.45 | -48.51 | -13 |
| 3146.6 | -65.38 | H | -53.54 | 6.4 | 9.82 | -52.27 | -13 |

# 11. Frequency Stability (Temperature & Voltage Variation) Test

## 11.1. Test Limit

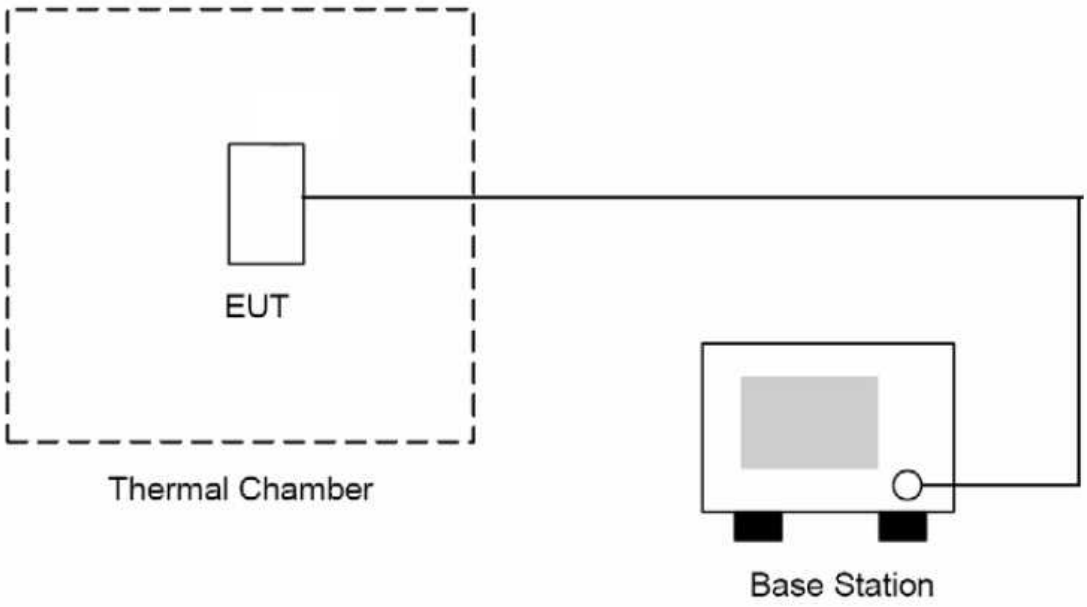
Mobile:
The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

Fixed or Base:
The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the ransmitter shall be maintained within ±0.00015% (±1.5ppm) of the center frequency.

## 11.2. Test Procedure

1. The EUT and test equipment were set up as shown on the following section.
2. With all power removed, the temperature was decreased to -30℃ and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was note within one minute.
3. With power OFF, the temperature was raised in 10℃ steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.
4. The EUT was placed in a temperature chamber at 25 ±5℃ and connected as the following section.
5. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
6. The temperature tests were performed for the worst case.
7. Test data was recorded.

## 11.3. Test Setup



## 11.4. Test Result and Data

LTE Cat M1 Band 4 QPSK 20M middle channel

| Frequency Stability under Temperature | | | | |
|---|---|---|---|---|
| Temperature Interval (℃) | Test Frequency (MHz) | Deviation (Hz) | Frequency error ( ppm ) | Limit ( ppm ) |
| 75 | 1732.5 | -11.5 | -0.007 | 2.5 |
| 60 | 1732.5 | -10.8 | -0.006 | 2.5 |
| 50 | 1732.5 | -11.2 | -0.006 | 2.5 |
| 40 | 1732.5 | 1.6 | 0.001 | 2.5 |
| 30 | 1732.5 | 5.7 | 0.003 | 2.5 |
| 20 | 1732.5 | 1.7 | 0.001 | 2.5 |
| 10 | 1732.5 | 2.4 | 0.001 | 2.5 |
| 0 | 1732.5 | 6.5 | 0.004 | 2.5 |
| -10 | 1732.5 | 4.1 | 0.002 | 2.5 |
| -20 | 1732.5 | 7.7 | 0.004 | 2.5 |
| -30 | 1732.5 | 8.3 | 0.005 | 2.5 |

LTE Cat M1 Band 4 QPSK 20M middle channel

| Frequency Stability under Voltage at 20°C | | | | |
|---|---|---|---|---|
| DC Voltage (V) | Test Frequency (MHz) | Deviation (Hz) | Frequency error ( ppm ) | Limit ( ppm ) |
| 55.2 | 1732.5 | 0.4 | 0.000 | 2.5 |
| 48 | 1732.5 | 3.7 | 0.002 | 2.5 |
| 40.8 | 1732.5 | 4.7 | 0.003 | 2.5 |

LTE Cat M1 Band 12 QPSK 10M middle channel

| Frequency Stability under Temperature | | | | |
|---|---|---|---|---|
| Temperature Interval (℃) | Test Frequency (MHz) | Deviation (Hz) | Frequency error ( ppm ) | Limit ( ppm ) |
| 75 | 707.5 | -2.21 | -0.003 | 2.5 |
| 60 | 707.5 | -2.1 | -0.003 | 2.5 |
| 50 | 707.5 | -1.9 | -0.003 | 2.5 |
| 40 | 707.5 | -3.1 | -0.004 | 2.5 |
| 30 | 707.5 | 4.5 | 0.006 | 2.5 |
| 20 | 707.5 | -2.6 | -0.004 | 2.5 |
| 10 | 707.5 | -1.3 | -0.002 | 2.5 |
| 0 | 707.5 | -3 | -0.004 | 2.5 |
| -10 | 707.5 | -2.2 | -0.003 | 2.5 |
| -20 | 707.5 | 0.1 | 0.000 | 2.5 |
| -30 | 707.5 | 4.4 | 0.006 | 2.5 |

LTE Cat M1 Band 12 QPSK 10M middle channel

| Frequency Stability under Voltage at 20°C | | | | |
|---|---|---|---|---|
| DC Voltage (V) | Test Frequency (MHz) | Deviation (Hz) | Frequency error ( ppm ) | Limit ( ppm ) |
| 55.2 | 707.5 | -0.8 | -0.001 | 2.5 |
| 48 | 707.5 | -0.3 | 0.000 | 2.5 |
| 40.8 | 707.5 | -2.2 | -0.003 | 2.5 |

LTE Cat M1 Band 13 QPSK 10M middle channel

| Frequency Stability under Temperature | | | | |
|---|---|---|---|---|
| Temperature Interval (℃) | Test Frequency (MHz) | Deviation (Hz) | Frequency error ( ppm ) | Limit ( ppm ) |
| 75 | 782 | -3.62 | -0.005 | 2.5 |
| 60 | 782 | -3.42 | -0.004 | 2.5 |
| 50 | 782 | -3.3 | -0.004 | 2.5 |
| 40 | 782 | 0.7 | 0.001 | 2.5 |
| 30 | 782 | 3.4 | 0.004 | 2.5 |
| 20 | 782 | -3.1 | -0.004 | 2.5 |
| 10 | 782 | -3.3 | -0.004 | 2.5 |
| 0 | 782 | -6.1 | -0.008 | 2.5 |
| -10 | 782 | -0.4 | -0.001 | 2.5 |
| -20 | 782 | -2.1 | -0.003 | 2.5 |
| -30 | 782 | -3.3 | -0.004 | 2.5 |

LTE Cat M1 Band 13 QPSK 10M middle channel

| Frequency Stability under Voltage at 20°C | | | | |
|---|---|---|---|---|
| DC Voltage (V) | Test Frequency (MHz) | Deviation (Hz) | Frequency error ( ppm ) | Limit ( ppm ) |
| 55.2 | 782 | -2.6 | -0.003 | 2.5 |
| 48 | 782 | -3.6 | -0.005 | 2.5 |
| 40.8 | 782 | -2.3 | -0.003 | 2.5 |

LTE Cat M1 Band 66 QPSK 20M middle channel

| Frequency Stability under Temperature | | | | |
|---|---|---|---|---|
| Temperature Interval (℃) | Test Frequency (MHz) | Deviation (Hz) | Frequency error ( ppm ) | Limit ( ppm ) |
| 75 | 1745 | -4.1 | -0.002 | 2.5 |
| 60 | 1745 | -4.5 | -0.003 | 2.5 |
| 50 | 1745 | -3.9 | -0.002 | 2.5 |
| 40 | 1745 | -7.5 | -0.004 | 2.5 |
| 30 | 1745 | 0 | 0.000 | 2.5 |
| 20 | 1745 | -10.8 | -0.006 | 2.5 |
| 10 | 1745 | 0.2 | 0.000 | 2.5 |
| 0 | 1745 | 7.9 | 0.005 | 2.5 |
| -10 | 1745 | -5.1 | -0.003 | 2.5 |
| -20 | 1745 | 1.1 | 0.001 | 2.5 |
| -30 | 1745 | 6.1 | 0.003 | 2.5 |

LTE Cat M1 Band 2 QPSK 20M middle channel

| Frequency Stability under Voltage at 20°C | | | | |
|---|---|---|---|---|
| DC Voltage (V) | Test Frequency (MHz) | Deviation (Hz) | Frequency error ( ppm ) | Limit ( ppm ) |
| 55.2 | 1745 | -13.5 | -0.008 | 2.5 |
| 48 | 1745 | 4 | 0.002 | 2.5 |
| 40.8 | 1745 | -3.4 | -0.002 | 2.5 |

LTE Cat M1 Band 85 QPSK 10M middle channel

| Frequency Stability under Temperature | | | | |
|---|---|---|---|---|
| Temperature Interval (℃) | Test Frequency (MHz) | Deviation (Hz) | Frequency error ( ppm ) | Limit ( ppm ) |
| 75 | 707 | 3.57 | 0.005 | 2.5 |
| 60 | 707 | 2.8 | 0.004 | 2.5 |
| 50 | 707 | 2.5 | 0.004 | 2.5 |
| 40 | 707 | 4.6 | 0.007 | 2.5 |
| 30 | 707 | -0.7 | -0.001 | 2.5 |
| 20 | 707 | 4.1 | 0.006 | 2.5 |
| 10 | 707 | 4.4 | 0.006 | 2.5 |
| 0 | 707 | 7.1 | 0.010 | 2.5 |
| -10 | 707 | 6 | 0.008 | 2.5 |
| -20 | 707 | 3.5 | 0.005 | 2.5 |
| -30 | 707 | 6.9 | 0.010 | 2.5 |

LTE Cat M1 Band 85 QPSK 10M middle channel

| Frequency Stability under Voltage at 20°C | | | | |
|---|---|---|---|---|
| DC Voltage (V) | Test Frequency (MHz) | Deviation (Hz) | Frequency error ( ppm ) | Limit ( ppm ) |
| 55.2 | 707 | 2.2 | 0.003 | 2.5 |
| 48 | 707 | 3 | 0.004 | 2.5 |
| 40.8 | 707 | 4.3 | 0.006 | 2.5 |