# TEST REPORT

FCC LTE B7 Test for TM19FNNAHD2
Certification

**APPLICANT**
LG Electronics Inc.

**REPORT NO.**
HCT-RF-2412-FC025

**DATE OF ISSUE**
December 13, 2024

**Tested by**
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HCT CO., LTD.
BongJai Huh / CEO



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# TEST REPORT

REPORT NO.
HCT-RF-2412-FC025

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| | |
|---|---|
| Applicant | **LG Electronics Inc.**<br>128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea |
| Product Name<br>Model Name | Telematics<br>TM19FNNAHD2 |
| Date of Test | September 30, 2024 ~ December 10, 2024 |
| FCC ID | BEJTM19FNNAHD2 |
| Location of Test | ■ Permanent Testing Lab ☐ On Site Testing<br>(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea) |
| FCC Classification: | PCB Licensed Transmitter (PCB) |
| Test Standard Used | FCC Rule Part: § 27 |
| Test Results | PASS |

## REVISION HISTORY

The revision history for this test report is shown in table.

| Revision No. | Date of Issue | Description |
|---|---|---|
| 0 | December 13, 2024 | Initial Release |

## Notice

| Content |
|---|
| The measurements shown in this report were made in accordance with the procedures specified in CFR47 section § 2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.<br>HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a) |
| The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated.<br>The test results have only been applied with the test methods required by the standard(s). |
| The laboratory is not accredited for the test results marked *.<br>Information provided by the applicant is marked **.<br>Test results provided by external providers are marked ***. |
| When confirmation of authenticity of this test report is required, please contact www.hct.co.kr |
| The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA). |

## CONTENTS

# MEASUREMENT REPORT

## 1. GENERAL INFORMATION

| | |
|---|---|
| **Applicant Name:** | LG Electronics Inc. |
| **Address:** | 128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea |
| **FCC ID:** | BEJTM19FNNAHD2 |
| **Application Type:** | Certification |
| **FCC Classification:** | PCS Licensed Transmitter (PCB) |
| **FCC Rule Part(s):** | § 27 |
| **EUT Type:** | Telematics |
| **Model(s):** | TM19FNNAHD2 |
| **Tx Frequency:** | 2502.5 – 2567.5 : 5 MHz<br>2505.0 – 2565.0 : 10 MHz<br>2507.5 – 2562.5 : 15 MHz<br>2510.0 – 2560.0 : 20 MHz |
| **Date(s) of Tests:** | September 30, 2024 ~ December 10, 2024 |
| **Serial number:** | Radiated : Honda MY26 #03<br>Conducted : Honda MY26 #01 |
| **Antenna Information** | Please refer to the Antenna Approval Specification document. |

## 1.1. MAXIMUM OUTPUT POWER

| Mode (MHz) | Tx Frequency (MHz) | Emission Designator | Modulation | Conducted Output Power | |
|---|---|---|---|---|---|
| | | | | Max. Power (W) | Max. Power (dBm) |
| LTE – Band 7 (5) | 2502.5 – 2567.5 | 4M51G7D | QPSK | 0.213 | 23.29 |
| | | 4M51W7D | 16QAM | 0.184 | 22.65 |
| | | 4M51W7D | 64QAM | 0.146 | 21.63 |
| | | 4M51W7D | 256QAM | 0.072 | 18.55 |
| LTE – Band 7 (10) | 2505.0 – 2565.0 | 8M99G7D | QPSK | 0.212 | 23.26 |
| | | 8M95W7D | 16QAM | 0.185 | 22.67 |
| | | 9M00W7D | 64QAM | 0.142 | 21.52 |
| | | 8M97W7D | 256QAM | 0.072 | 18.60 |
| LTE – Band 7 (15) | 2507.5 – 2562.5 | 13M5G7D | QPSK | 0.216 | 23.34 |
| | | 13M5W7D | 16QAM | 0.185 | 22.68 |
| | | 13M5W7D | 64QAM | 0.145 | 21.62 |
| | | 13M5W7D | 256QAM | 0.072 | 18.58 |
| LTE – Band 7 (20) | 2510.0 – 2560.0 | 17M9G7D | QPSK | 0.215 | 23.33 |
| | | 17M9W7D | 16QAM | 0.184 | 22.65 |
| | | 17M9W7D | 64QAM | 0.146 | 21.64 |
| | | 18M0W7D | 256QAM | 0.071 | 18.50 |

# 2. INTRODUCTION

## 2.1. DESCRIPTION OF EUT

The EUT was a Telematics with LTE, Sub 6..

## 2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

## 2.3. TEST FACILITY

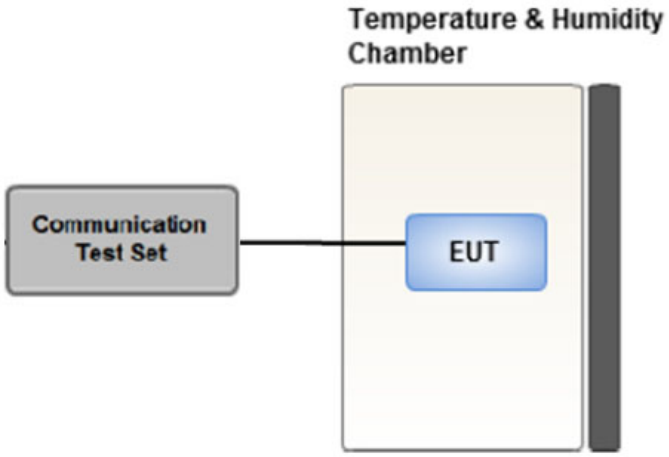
The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea**

# 3. DESCRIPTION OF TESTS

## 3.1 TEST PROCEDURE

| Test Description | Test Procedure Used |
|---|---|
| Occupied Bandwidth | - KDB 971168 D01 v03r01 – Section 4.3<br>- ANSI C63.26-2015 – Section 5.4.4 |
| Band Edge | - KDB 971168 D01 v03r01 – Section 6.0<br>- ANSI C63.26-2015 – Section 5.7 |
| Spurious and Harmonic Emissions at Antenna Terminal | - KDB 971168 D01 v03r01 – Section 6.0<br>- ANSI C63.26-2015 – Section 5.7 |
| Conducted Output Power | - KDB 971168 D01 v03r01 - Section 5.2.4<br>- ANSI C63.26-2015 - Section 5.2.1 & 5.2.4.2 |
| Peak- to- Average Ratio | - KDB 971168 D01 v03r01 – Section 5.7<br>- ANSI C63.26-2015 – Section 5.2.3.4 |
| Frequency stability | - ANSI C63.26-2015 – Section 5.6 |
| Radiated Power | - ANSI C63.26-2015 – Section 5.2.4.4<br>- KDB 971168 D01 v03r01 – Section 5.8 |
| Radiated Spurious and Harmonic Emissions | - ANSI C63.26-2015 – Section 5.5.3<br>- KDB 971168 D01 v03r01 – Section 5.8 |

## 3.2 CONDUCTED OUTPUT POWER




Test setup

Test Overview

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurements be performed only over durations of active transmissions at maximum output power level applies.

Conducted Output Power was tested in accordance with KDB971168 D01 Power Meas License Digital Systems v03r01, Section 5.2.

## 3.3 RADIATED POWER

**Test Overview**

Radiated tests are performed in the Fully-anechoic chamber.
The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna.

**Test Settings**

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5 % of the expected OBW, not to exceed 1 MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points > 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

**Test Note**

1. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission.
2. A half wave dipole is then substituted in place of the EUT. For emissions above 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.
   The power is calculated by the following formula;

$$P_{d\ (dBm)} = Pg_{\ (dBm)} - \text{cable loss}_{\ (dB)} + \text{antenna gain}_{\ (dB)}$$

   Where: $P_d$ is the dipole equivalent power and $P_g$ is the generator output power into the substitution antenna.
3. The maximum value is calculated by adding the forward power to the calibrated source plus its appropriate gain value.
   These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration
4. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
5. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

## 3.4 RADIATED SPURIOUS EMISSIONS

**Test Overview**

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method.

**Test Settings**

1. RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points > 2 x span / RBW
5. Detector = Peak
6. Trace mode = Max Hold
7. The trace was allowed to stabilize
8. Test channel : Low/ Middle/ High
9. Frequency range : We are performed all frequency to $10^{th}$ harmonics from 9 kHz.

**Test Note**

1. Measurements value show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
2. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data
3. For spurious emissions above 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.
   The spurious emissions is calculated by the following formula;

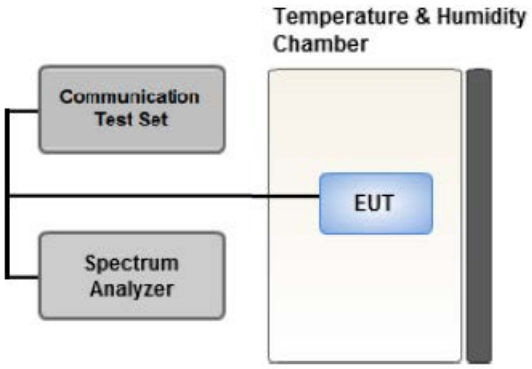
$$\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   Where: $P_g$ is the generator output power into the substitution antenna.

   If the fundamental frequency is below 1 GHz, RF output power has been converted to EIRP.

$$\text{EIRP}_{(dBm)} = \text{ERP}_{(dBm)} + 2.15$$

## 3.5 PEAK- TO- AVERAGE RATIO




**Test setup**

**① CCDF Procedure for PAPR**

**Test Settings**

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Set the measurement interval as follows:
   .- for continuous transmissions, set to 1 ms,
   .- or burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
4. Record the maximum PAPR level associated with a probability of 0.1 %.

**② Alternate Procedure for PAPR**

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as as $P_{Pk}$.

Use one of the applicable procedures presented 5.2(ANSI C63.26-2015) to measure the total average power and record as $P_{Avg}$. Determine the P.A.R. from:

$$P.A.R_{(dB)} = P_{Pk(dBm)} - P_{Avg(dBm)} \quad (P_{Avg} = \text{Average Power} + \text{Duty cycle Factor})$$

**Test Settings(Peak Power)**

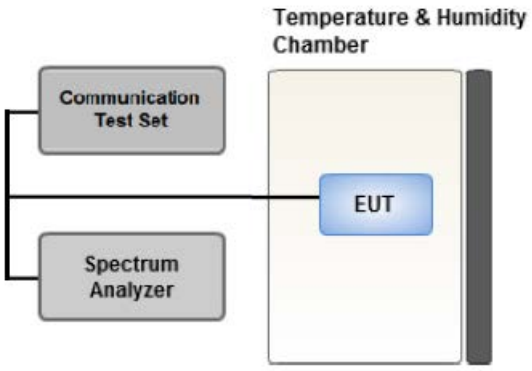
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

1. Set the RBW ≥ OBW.
2. Set VBW ≥ 3 × RBW.
3. Set span ≥ 2 × OBW.
4. Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period).
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the peak amplitude level.

**Test Settings(Average Power)**

1. Set span to 2 × to 3 × the OBW.
2. Set RBW ≥ OBW.
3. Set VBW ≥ 3 × RBW.
4. Set number of measurement points in sweep ≥ 2 × span / RBW.
5. Sweep time:
   Set ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. The transmission period is the (on + off) time.
6. Detector = power averaging (rms).
7. Set sweep trigger to "free run."
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. (To accurately determine the average power over the on and off period of the transmitter, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.)
9. Use the peak marker function to determine the maximum amplitude level.
10. Add [10 log (1/duty cycle)] to the measured maximum power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25 %.

## 3.6 OCCUPIED BANDWIDTH.



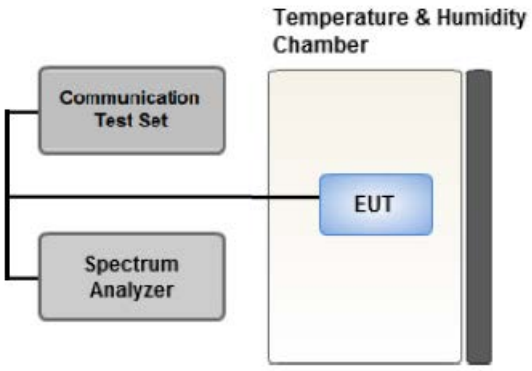

**Test setup**

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 EUT makes a call to the communication simulator.
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
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

**Test Settings**

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5 % of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5 % of the 99 % occupied bandwidth observed in Step 7

## 3.7 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL




Test setup

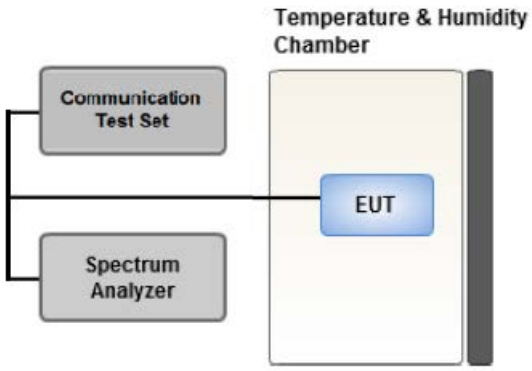
Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = Peak
4. Trace Mode = Max Hold
5. Sweep time = auto
6. Number of points in sweep ≥ 2 x Span / RBW

## 3.8 CHANNEL EDGE




**Test setup**

**Test Overview**

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum power and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

**Test Settings**

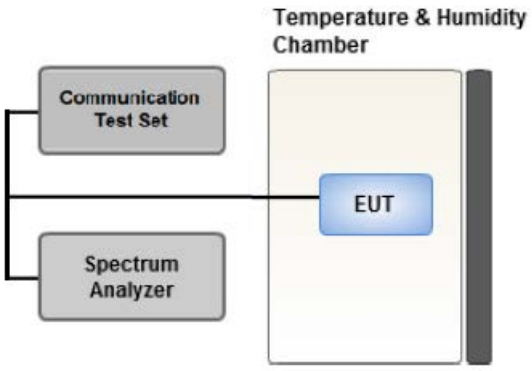
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. Within 1MHz of the channel edge the RBW should be 2% of EBW, then 1 MHz after that.
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

**Test Notes**

1. The attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge,
2. 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge.
3. 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge.
4. The attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz.
5. 55 + 10 log (P) dB at or below 2490.5 MHz.
6. X is the greater of 6MHz or the actual emission bandwidth
7. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer

Where Margin < 1 dB the emission level is either corrected by 10 log(1 MHz/ RB) or the emission is integrated over a 1 MHz bandwidth to determine the final result. When using the integration method the integration window is either centered on the emission or, for emissions at the band edge, centered by an offset of 500 kHz from the block edge so that the integration window is the 1 MHz adjacent to the block edge.

## 3.9 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE




Test setup

**Test Overview**

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015.
The frequency stability of the transmitter is measured by:

1. Temperature:
   The temperature is varied from -30 °C to +50 °C in 10 °C increments using an environmental chamber.
2. Primary Supply Voltage:
   .- Unless otherwise specified, vary primary supply voltage from 85 % to 115 % of the nominal value for other than hand carried battery equipment.
   .- For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

**Test Settings**

1. The carrier frequency of the transmitter is measured at room temperature (20 °C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter.
   Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

## 3.10 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
- All simultaneous transmission scenarios of operation were investigated, and the test results showed no additional significant emissions relative to the least restrictive limit were observed.
  Therefore, only the worst case(stand-alone) results were reported.
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data
- Please refer to the table below.

[ Worst case ]

| Test Description | Modulation | RB size | RB offset | Axis |
|---|---|---|---|---|
| Effective Isotropic Radiated Power | QPSK, 16QAM, 64QAM, 256QAM | See Section 8.2 | | Z |
| Radiated Spurious and Harmonic Emissions | QPSK | See Section 8.3 | | X |

### 3.11 WORST CASE(CONDUCTED TEST)

- All modes of operation were investigated and the worst case configuration results are reported.

[ Worst case ]

| Test Description | Modulation | Bandwidth (MHz) | Frequency | RB size | RB offset |
|---|---|---|---|---|---|
| **Occupied Bandwidth** | QPSK, 16QAM, 64QAM, 256QAM | 5, 10, 15, 20 | Mid | Full RB | 0 |
| **Peak-To-Average Ratio** | QPSK, 16QAM, 64QAM, 256QAM | 5, 10, 15, 20 | Mid | Full RB | 0 |
| **Band Edge** | QPSK | 5 | Low | 1 | 0 |
| | | | High | 1 | 24 |
| | | 10 | Low | 1 | 0 |
| | | | High | 1 | 49 |
| | | 15 | Low | 1 | 0 |
| | | | High | 1 | 74 |
| | | 20 | Low | 1 | 0 |
| | | | High | 1 | 99 |
| | | 5, 10, 15, 20 | Low, High | Full RB | 0 |
| **Spurious and Harmonic Emissions at Antenna Terminal** | QPSK | 5, 10, 15, 20 | Low, Mid, High | 1 | 0 |

## 4. LIST OF TEST EQUIPMENT

| Equipment | Model | Manufacturer | Serial No. | Due to Calibration | Calibration Interval |
|---|---|---|---|---|---|
| RF Switching System | Switch box(1.2 G HPF+LNA) | HCT CO., LTD., | F1L1 | 11/11/2025 | Annual |
| RF Switching System | Switch box(3.3 G HPF+LNA) | HCT CO., LTD., | F1L2 | 11/11/2025 | Annual |
| RF Switching System | Switch box(LNA) | HCT CO., LTD., | F1L4 | 11/11/2025 | Annual |
| RF Switching System | Switch box(6 G HPF+LNA) | HCT CO., LTD., | F1L7 | 11/11/2025 | Annual |
| Power Splitter(DC ~ 26.5 GHz) | 11667B | Hewlett Packard | 5001 | 04/17/2025 | Annual |
| DC Power Supply | E3632A | Agilent | MY40010147 | 08/06/2025 | Annual |
| Dipole Antenna | UHAP | Schwarzbeck | 01274 | 03/10/2026 | Biennial |
| Dipole Antenna | UHAP | Schwarzbeck | 01288 | 08/07/2026 | Biennial |
| Chamber | SU-642 | ESPEC | 93008124 | 02/19/2025 | Annual |
| Horn Antenna(1 ~ 18 GHz) | BBHA 9120D | Schwarzbeck | 147 | 08/17/2025 | Biennial |
| Horn Antenna(1 ~ 18 GHz) | BBHA 9120D | Schwarzbeck | 9120D-1298 | 09/11/2025 | Biennial |
| Horn Antenna(15 ~ 40 GHz) | BBHA 9170 | Schwarzbeck | BBHA9170342 | 09/20/2026 | Biennial |
| Horn Antenna(15 ~ 40 GHz) | BBHA 9170 | Schwarzbeck | BBHA9170124 | 03/28/2025 | Biennial |
| Signal Analyzer(10 Hz ~ 26.5 GHz) | N9020A | Agilent | MY52090906 | 04/19/2025 | Annual |
| ATTENUATOR(20 dB) | 8493C | Hewlett Packard | 17280 | 04/17/2025 | Annual |
| Spectrum Analyzer(10 Hz ~ 40 GHz) | FSV40 | REOHDE & SCHWARZ | 100931 | 08/06/2025 | Annual |
| Base Station | 8960 (E5515C) | Agilent | MY48360800 | 08/05/2025 | Annual |
| Loop Antenna(9 kHz ~ 30 MHz) | FMZB1513 | Schwarzbeck | 1513-333 | 03/07/2026 | Biennial |
| Trilog Broadband Antenna | VULB9168 | Schwarzbeck | 895 | 08/28/2026 | Biennial |
| Trilog Broadband Antenna | VULB9168 | Schwarzbeck | 1135 | 08/19/2026 | Biennial |
| Wideband Radio Communication Tester | MT8821C | Anritsu Corp. | 6262094331 | 11/13/2025 | Annual |
| Wideband Radio Communication Tester | MT8820C | Anritsu Corp. | 6201026545 | 12/11/2024 | Annual |
| SIGNAL GENERATOR (100 kHz ~ 40 GHz) | SMB100A | REOHDE & SCHWARZ | 177633 | 07/26/2025 | Annual |
| Signal Analyzer(5 Hz ~ 40.0 GHz) | N9030B | KEYSIGHT | MY55480167 | 05/17/2025 | Annual |
| FCC LTE Mobile Conducted RF Automation Test Software | - | HCT CO., LTD., | - | - | - |

Note:

1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
2. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

## 5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the $U_{CISPR}$ measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

| Parameter | Expanded Uncertainty (±dB) |
|---|---|
| Conducted Disturbance (150 kHz ~ 30 MHz) | 1.98 (Confidence level about 95 %, $k$=2) |
| Radiated Disturbance (9 kHz ~ 30 MHz) | 4.36 (Confidence level about 95 %, $k$=2) |
| Radiated Disturbance (30 MHz ~ 1 GHz) | 5.70 (Confidence level about 95 %, $k$=2) |
| Radiated Disturbance (1 GHz ~ 18 GHz) | 5.52 (Confidence level about 95 %, $k$=2) |
| Radiated Disturbance (18 GHz ~ 40 GHz) | 5.66 (Confidence level about 95 %, $k$=2) |
| Radiated Disturbance (Above 40 GHz) | 5.58 (Confidence level about 95 %, $k$=2) |

# 6. SUMMARY OF TEST RESULTS

## 6.1 Test Condition: Conducted Test

| Test Description | FCC Part Section(s) | Test Limit | Test Result |
|---|---|---|---|
| Occupied Bandwidth | § 2.1049 | N/A | PASS |
| Band Edge / Spurious and Harmonic Emissions at Antenna Terminal. | § 2.1051, § 27.53(m)(4) | ■ < 40 + 10log10 (P[Watts]) at Channel edges<br>■ < 43 + 10log10 (P[Watts]) between 5 and X MHz from Channel edges<br>■ < 55 + 10log10 (P[Watts]) beyond X MHz beyond from Channel edges<br>■ < 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz | PASS |
| Conducted Output Power | § 2.1046 | N/A | PASS |
| Frequency stability / variation of ambient temperature | § 2.1055, § 27.54 | Emission must remain in band | PASS |

## 6.2 Test Condition: Radiated Test

| Test Description | FCC Part Section(s) | Test Limit | Test Result |
|---|---|---|---|
| Equivalent Isotropic Radiated Power | § 27.50(h)(2) | < 2 Watts max. EIRP | PASS |
| Radiated Spurious and Harmonic Emissions | § 2.1053, § 27.53(m)(4) | < 55 + 10log10 (P[Watts]) | PASS |

6.3. Data Referencing

| Rule Part | Test item | Data Referencing | Comments |
|---|---|---|---|
| §2.1049 | Occupied Bandwidth | Y | - |
| §2.1051, §27.53(m)(4) | Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.. | Y | - |
| §2.1055, §27.54 | Frequency stability / variation of ambient temperature | Y | - |
| §27.50(h)(2) | Equivalent Isotropic Radiated Power | Y | Spot-check |
| §2.1053, §27.53(m)(4) | Radiated Spurious and Harmonic Emissions | Y | Spot-check |
| §2.1046 | Conducted Output Power | Y | - |

**Spot-Check Result**

1. Data was leveraged from model TM19FNNAHD4 for the certification of TM19FNNAHD2.
2. Please refer to the [FCC Evaluation] Report.

## 7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

| Ch./ Freq. | | Measured Level (dBm) | Substitute Level (dBm) | Ant. Gain (dBd) | C.L | Pol. | ERP | |
|---|---|---|---|---|---|---|---|---|
| channel | Freq.(MHz) | | | | | | W | dBm |
| 128 | 824.20 | -21.37 | 38.40 | -10.61 | 0.95 | H | 0.483 | 26.84 |

ERP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
2) During the test, the turn table is rotated until the maximum signal is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power.

7.2 EIRP Sample Calculation

| Ch./ Freq. | | Measured Level (dBm) | Substitute Level (dBm) | Ant. Gain (dBi) | C.L | Pol. | EIRP | |
|---|---|---|---|---|---|---|---|---|
| channel | Freq.(MHz) | | | | | | W | dBm |
| 20175 | 1,732.50 | -15.75 | 18.45 | 9.90 | 1.76 | H | 0.456 | 26.59 |

EIRP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
2) During the test, the turn table is rotated until the maximum signal is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with Ant. Gain and cable loss are the rating of equivalent isotropic radiated power.

7.3. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW
GSM BW = 249 kHz
G = Phase Modulation
X = Cases not otherwise covered
W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W
GSM BW = 249 kHz
G = Phase Modulation
7 = Quantized/Digital Info
W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W
WCDMA BW = 4.17 MHz
F = Frequency Modulation
9 = Composite Digital Info
W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 4M48G7D
LTE BW = 4.48 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission; telemetry; telecommand

QAM Modulation

Emission Designator = 4M48W7D
LTE BW = 4.48 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data transmission; telemetry; telecommand

# 8. TEST DATA

## 8.1 Conducted Output Power

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | | Target MPR (dB) | Target Power |
|---|---|---|---|---|---|---|---|---|
| | | | | 20775 | 21100 | 21425 | | |
| | | | | 2502.5 MHz | 2535 MHz | 2567.5 MHz | | |
| 5 MHz | QPSK | 1 | 0 | 23.16 | 23.13 | 23.14 | 0 | 23 |
| | | 1 | 12 | 23.18 | 23.21 | 23.29 | 0 | 23 |
| | | 1 | 24 | 23.25 | 23.12 | 23.18 | 0 | 23 |
| | | 12 | 0 | 22.36 | 22.22 | 22.28 | 1 | 22 |
| | | 12 | 6 | 22.31 | 22.16 | 22.28 | 1 | 22 |
| | | 12 | 11 | 22.34 | 22.24 | 22.29 | 1 | 22 |
| | | 25 | 0 | 22.36 | 22.25 | 22.25 | 1 | 22 |
| | 16QAM | 1 | 0 | 22.65 | 22.47 | 22.55 | 1 | 22 |
| | | 1 | 12 | 22.60 | 22.54 | 22.54 | 1 | 22 |
| | | 1 | 24 | 22.57 | 22.50 | 22.54 | 1 | 22 |
| | | 12 | 0 | 21.43 | 21.31 | 21.28 | 2 | 21 |
| | | 12 | 6 | 21.41 | 21.24 | 21.32 | 2 | 21 |
| | | 12 | 11 | 21.34 | 21.25 | 21.33 | 2 | 21 |
| | | 25 | 0 | 21.37 | 21.29 | 21.28 | 2 | 21 |
| | 64QAM | 1 | 0 | 21.41 | 21.34 | 21.46 | 2 | 21 |
| | | 1 | 12 | 21.63 | 21.38 | 21.57 | 2 | 21 |
| | | 1 | 24 | 21.38 | 21.51 | 21.50 | 2 | 21 |
| | | 12 | 0 | 20.40 | 20.29 | 20.38 | 3 | 20 |
| | | 12 | 6 | 20.39 | 20.22 | 20.34 | 3 | 20 |
| | | 12 | 11 | 20.40 | 20.26 | 20.36 | 3 | 20 |
| | | 25 | 0 | 20.37 | 20.31 | 20.29 | 3 | 20 |
| | 256QAM | 1 | 0 | 18.27 | 18.55 | 18.48 | 5 | 18 |
| | | 1 | 12 | 18.20 | 18.48 | 18.48 | 5 | 18 |
| | | 1 | 24 | 18.21 | 18.48 | 18.50 | 5 | 18 |
| | | 12 | 0 | 18.17 | 18.35 | 18.35 | 5 | 18 |
| | | 12 | 6 | 18.17 | 18.32 | 18.34 | 5 | 18 |
| | | 12 | 11 | 18.16 | 18.33 | 18.45 | 5 | 18 |
| | | 25 | 0 | 18.15 | 18.38 | 18.32 | 5 | 18 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | | Target MPR (dB) | Target Power |
|---|---|---|---|---|---|---|---|---|
| | | | | 20800 | 21100 | 21400 | | |
| | | | | 2505 MHz | 2535 MHz | 2565 MHz | | |
| 10 MHz | QPSK | 1 | 0 | 23.19 | 23.13 | 23.13 | 0 | 23 |
| | | 1 | 24 | 23.05 | 23.10 | 23.04 | 0 | 23 |
| | | 1 | 49 | 23.26 | 23.21 | 23.07 | 0 | 23 |
| | | 25 | 0 | 22.35 | 22.28 | 22.28 | 1 | 22 |
| | | 25 | 12 | 22.37 | 22.35 | 22.38 | 1 | 22 |
| | | 25 | 24 | 22.39 | 22.26 | 22.34 | 1 | 22 |
| | | 50 | 0 | 22.30 | 22.29 | 22.33 | 1 | 22 |
| | 16QAM | 1 | 0 | 22.65 | 22.48 | 22.50 | 1 | 22 |
| | | 1 | 24 | 22.67 | 22.43 | 22.46 | 1 | 22 |
| | | 1 | 49 | 22.52 | 22.51 | 22.54 | 1 | 22 |
| | | 25 | 0 | 21.43 | 21.31 | 21.27 | 2 | 21 |
| | | 25 | 12 | 21.41 | 21.35 | 21.48 | 2 | 21 |
| | | 25 | 24 | 21.47 | 21.15 | 21.36 | 2 | 21 |
| | | 50 | 0 | 21.41 | 21.30 | 21.36 | 2 | 21 |
| | 64QAM | 1 | 0 | 21.44 | 21.29 | 21.50 | 2 | 21 |
| | | 1 | 24 | 21.52 | 21.42 | 21.41 | 2 | 21 |
| | | 1 | 49 | 21.51 | 21.31 | 21.51 | 2 | 21 |
| | | 25 | 0 | 20.36 | 20.27 | 20.42 | 3 | 20 |
| | | 25 | 12 | 20.49 | 20.31 | 20.45 | 3 | 20 |
| | | 25 | 24 | 20.48 | 20.28 | 20.33 | 3 | 20 |
| | | 50 | 0 | 20.44 | 20.20 | 20.36 | 3 | 20 |
| | 256QAM | 1 | 0 | 18.36 | 18.46 | 18.46 | 5 | 18 |
| | | 1 | 24 | 18.31 | 18.45 | 18.39 | 5 | 18 |
| | | 1 | 49 | 18.51 | 18.60 | 18.46 | 5 | 18 |
| | | 25 | 0 | 18.24 | 18.29 | 18.38 | 5 | 18 |
| | | 25 | 12 | 18.38 | 18.44 | 18.40 | 5 | 18 |
| | | 25 | 24 | 18.36 | 18.30 | 18.38 | 5 | 18 |
| | | 50 | 0 | 18.25 | 18.38 | 18.44 | 5 | 18 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | | Target MPR (dB) | Target Power |
|---|---|---|---|---|---|---|---|---|
| | | | | 20825 | 21100 | 21375 | | |
| | | | | 2507.5 MHz | 2535 MHz | 2562.5 MHz | | |
| 15 MHz | QPSK | 1 | 0 | 23.24 | 23.22 | 23.34 | 0 | 23 |
| | | 1 | 36 | 23.28 | 23.13 | 23.33 | 0 | 23 |
| | | 1 | 74 | 23.17 | 23.02 | 23.16 | 0 | 23 |
| | | 36 | 0 | 22.33 | 22.26 | 22.38 | 1 | 22 |
| | | 36 | 18 | 22.44 | 22.20 | 22.30 | 1 | 22 |
| | | 36 | 39 | 22.33 | 22.27 | 22.33 | 1 | 22 |
| | | 75 | 0 | 22.39 | 22.31 | 22.40 | 1 | 22 |
| | 16QAM | 1 | 0 | 22.57 | 22.60 | 22.67 | 1 | 22 |
| | | 1 | 36 | 22.50 | 22.52 | 22.60 | 1 | 22 |
| | | 1 | 74 | 22.66 | 22.51 | 22.68 | 1 | 22 |
| | | 36 | 0 | 21.38 | 21.27 | 21.40 | 2 | 21 |
| | | 36 | 18 | 21.49 | 21.30 | 21.29 | 2 | 21 |
| | | 36 | 39 | 21.43 | 21.32 | 21.28 | 2 | 21 |
| | | 75 | 0 | 21.38 | 21.32 | 21.42 | 2 | 21 |
| | 64QAM | 1 | 0 | 21.42 | 21.41 | 21.62 | 2 | 21 |
| | | 1 | 36 | 21.42 | 21.37 | 21.50 | 2 | 21 |
| | | 1 | 74 | 21.54 | 21.49 | 21.58 | 2 | 21 |
| | | 36 | 0 | 20.33 | 20.32 | 20.27 | 3 | 20 |
| | | 36 | 18 | 20.47 | 20.28 | 20.36 | 3 | 20 |
| | | 36 | 39 | 20.48 | 20.35 | 20.33 | 3 | 20 |
| | | 75 | 0 | 20.45 | 20.30 | 20.38 | 3 | 20 |
| | 256QAM | 1 | 0 | 18.43 | 18.48 | 18.31 | 5 | 18 |
| | | 1 | 36 | 18.44 | 18.39 | 18.40 | 5 | 18 |
| | | 1 | 74 | 18.46 | 18.43 | 18.58 | 5 | 18 |
| | | 36 | 0 | 18.37 | 18.37 | 18.39 | 5 | 18 |
| | | 36 | 18 | 18.35 | 18.29 | 18.38 | 5 | 18 |
| | | 36 | 39 | 18.58 | 18.31 | 18.40 | 5 | 18 |
| | | 75 | 0 | 18.37 | 18.35 | 18.46 | 5 | 18 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | | Target MPR (dB) | Target Power |
|---|---|---|---|---|---|---|---|---|
| | | | | 20850 | 21100 | 21350 | | |
| | | | | 2510 MHz | 2535 MHz | 2560 MHz | | |
| 20 MHz | QPSK | 1 | 0 | 23.27 | 23.28 | 23.33 | 0 | 23 |
| | | 1 | 49 | 23.01 | 23.11 | 23.00 | 0 | 23 |
| | | 1 | 99 | 23.12 | 23.12 | 23.16 | 0 | 23 |
| | | 50 | 0 | 22.37 | 22.21 | 22.28 | 1 | 22 |
| | | 50 | 25 | 22.40 | 22.30 | 22.32 | 1 | 22 |
| | | 50 | 49 | 22.38 | 22.26 | 22.26 | 1 | 22 |
| | | 100 | 0 | 22.39 | 22.30 | 22.28 | 1 | 22 |
| | 16QAM | 1 | 0 | 22.52 | 22.64 | 22.63 | 1 | 22 |
| | | 1 | 49 | 22.59 | 22.46 | 22.51 | 1 | 22 |
| | | 1 | 99 | 22.65 | 22.39 | 22.52 | 1 | 22 |
| | | 50 | 0 | 21.36 | 21.31 | 21.31 | 2 | 21 |
| | | 50 | 25 | 21.41 | 21.37 | 21.33 | 2 | 21 |
| | | 50 | 49 | 21.40 | 21.29 | 21.38 | 2 | 21 |
| | | 100 | 0 | 21.38 | 21.37 | 21.29 | 2 | 21 |
| | 64QAM | 1 | 0 | 21.64 | 21.56 | 21.57 | 2 | 21 |
| | | 1 | 49 | 21.48 | 21.50 | 21.53 | 2 | 21 |
| | | 1 | 99 | 21.60 | 21.35 | 21.46 | 2 | 21 |
| | | 50 | 0 | 20.43 | 20.30 | 20.30 | 3 | 20 |
| | | 50 | 25 | 20.45 | 20.32 | 20.26 | 3 | 20 |
| | | 50 | 49 | 20.40 | 20.28 | 20.40 | 3 | 20 |
| | | 100 | 0 | 20.40 | 20.33 | 20.35 | 3 | 20 |
| | 256QAM | 1 | 0 | 18.28 | 18.36 | 18.36 | 5 | 18 |
| | | 1 | 49 | 18.20 | 18.43 | 18.38 | 5 | 18 |
| | | 1 | 99 | 18.37 | 18.41 | 18.50 | 5 | 18 |
| | | 50 | 0 | 18.33 | 18.33 | 18.37 | 5 | 18 |
| | | 50 | 25 | 18.25 | 18.40 | 18.43 | 5 | 18 |
| | | 50 | 49 | 18.42 | 18.30 | 18.37 | 5 | 18 |
| | | 100 | 0 | 18.46 | 18.41 | 18.45 | 5 | 18 |

## 8.2 EQUIVALENT ISOTROPIC RADIATED POWER

| Freq (MHz) | Mod/ Bandwidth | Modulation | Measured Level (dBm) | Substitute Level (dBm) | Ant. Gain (dBi) | C.L | Pol | Limit | EIRP | | RB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | W | W | dBm | Size | Offset |
| 2502.5 | LTE B7/ 5 MHz | QPSK | -20.38 | 16.64 | 10.70 | 2.51 | H | < 2.00 | 0.304 | 24.83 | 1 | 0 |
| | | 16-QAM | -21.06 | 15.96 | 10.70 | 2.51 | H | | 0.260 | 24.15 | | |
| | | 64-QAM | -22.07 | 14.95 | 10.70 | 2.51 | H | | 0.206 | 23.14 | | |
| | | 256-QAM | -25.01 | 12.01 | 10.70 | 2.51 | H | | 0.105 | 20.20 | | |
| 2535.0 | | QPSK | -21.02 | 15.80 | 10.70 | 2.54 | H | | 0.249 | 23.96 | 1 | 0 |
| | | 16-QAM | -21.63 | 15.19 | 10.70 | 2.54 | H | | 0.216 | 23.35 | | |
| | | 64-QAM | -22.68 | 14.14 | 10.70 | 2.54 | H | | 0.170 | 22.30 | | |
| | | 256-QAM | -25.65 | 11.17 | 10.70 | 2.54 | H | | 0.086 | 19.33 | | |
| 2567.5 | | QPSK | -21.22 | 15.99 | 10.66 | 2.65 | H | | 0.251 | 24.00 | 1 | 0 |
| | | 16-QAM | -21.90 | 15.31 | 10.66 | 2.65 | H | | 0.215 | 23.32 | | |
| | | 64-QAM | -22.91 | 14.30 | 10.66 | 2.65 | H | | 0.170 | 22.31 | | |
| | | 256-QAM | -25.93 | 11.28 | 10.66 | 2.65 | H | | 0.085 | 19.29 | | |

| Freq (MHz) | Mod/ Bandwidth | Modulation | Measured Level (dBm) | Substitute Level (dBm) | Ant. Gain (dBi) | C.L | Pol | Limit | EIRP | | RB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | W | W | dBm | Size | Offset |
| 2505.0 | LTE B7/ 10 MHz | QPSK | -20.40 | 16.62 | 10.70 | 2.51 | H | < 2.00 | 0.303 | 24.81 | 1 | 0 |
| | | 16-QAM | -21.05 | 15.97 | 10.70 | 2.51 | H | | 0.261 | 24.16 | | |
| | | 64-QAM | -22.15 | 14.87 | 10.70 | 2.51 | H | | 0.202 | 23.06 | | |
| | | 256-QAM | -25.10 | 11.92 | 10.70 | 2.51 | H | | 0.103 | 20.11 | | |
| 2535.0 | | QPSK | -20.74 | 16.08 | 10.70 | 2.54 | H | | 0.265 | 24.24 | 1 | 0 |
| | | 16-QAM | -21.43 | 15.39 | 10.70 | 2.54 | H | | 0.226 | 23.55 | | |
| | | 64-QAM | -22.51 | 14.31 | 10.70 | 2.54 | H | | 0.177 | 22.47 | | |
| | | 256-QAM | -25.51 | 11.31 | 10.70 | 2.54 | H | | 0.089 | 19.47 | | |
| 2565.0 | | QPSK | -21.18 | 16.05 | 10.67 | 2.62 | H | | 0.257 | 24.10 | 1 | 0 |
| | | 16-QAM | -21.85 | 15.38 | 10.67 | 2.62 | H | | 0.220 | 23.43 | | |
| | | 64-QAM | -22.90 | 14.33 | 10.67 | 2.62 | H | | 0.173 | 22.38 | | |
| | | 256-QAM | -25.93 | 11.30 | 10.67 | 2.62 | H | | 0.086 | 19.35 | | |

| Freq (MHz) | Mod/ Bandwidth | Modulation | Measured Level (dBm) | Substitute Level (dBm) | Ant. Gain (dBi) | C.L | Pol | Limit | EIRP | | RB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | W | W | dBm | Size | Offset |
| 2507.5 | LTE B7/ 15 MHz | QPSK | -20.31 | 16.76 | 10.70 | 2.51 | H | < 2.00 | 0.313 | 24.95 | 1 | 0 |
| | | 16-QAM | -20.95 | 16.12 | 10.70 | 2.51 | H | | 0.270 | 24.31 | | |
| | | 64-QAM | -22.04 | 15.03 | 10.70 | 2.51 | H | | 0.210 | 23.22 | | |
| | | 256-QAM | -25.08 | 11.99 | 10.70 | 2.51 | H | | 0.104 | 20.18 | | |
| 2535.0 | | QPSK | -20.56 | 16.26 | 10.70 | 2.54 | H | | 0.277 | 24.42 | 1 | 0 |
| | | 16-QAM | -21.29 | 15.53 | 10.70 | 2.54 | H | | 0.234 | 23.69 | | |
| | | 64-QAM | -22.36 | 14.46 | 10.70 | 2.54 | H | | 0.183 | 22.62 | | |
| | | 256-QAM | -25.39 | 11.43 | 10.70 | 2.54 | H | | 0.091 | 19.59 | | |
| 2562.5 | | QPSK | -21.10 | 16.13 | 10.67 | 2.62 | H | | 0.262 | 24.18 | 1 | 0 |
| | | 16-QAM | -21.78 | 15.45 | 10.67 | 2.62 | H | | 0.224 | 23.50 | | |
| | | 64-QAM | -22.83 | 14.40 | 10.67 | 2.62 | H | | 0.176 | 22.45 | | |
| | | 256-QAM | -25.88 | 11.35 | 10.67 | 2.62 | H | | 0.087 | 19.40 | | |

| Freq (MHz) | Mod/ Bandwidth | Modulation | Measured Level (dBm) | Substitute Level (dBm) | Ant. Gain (dBi) | C.L | Pol | Limit | EIRP | | RB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | W | W | dBm | Size | Offset |
| 2510.0 | LTE B7/ 20 MHz | QPSK | -20.29 | 16.78 | 10.70 | 2.51 | H | < 2.00 | 0.314 | 24.97 | 1 | 0 |
| | | 16-QAM | -20.95 | 16.12 | 10.70 | 2.51 | H | | 0.270 | 24.31 | | |
| | | 64-QAM | -21.98 | 15.09 | 10.70 | 2.51 | H | | 0.213 | 23.28 | | |
| | | 256-QAM | -25.07 | 12.00 | 10.70 | 2.51 | H | | 0.104 | 20.19 | | |
| 2535.0 | | QPSK | -20.65 | 16.17 | 10.70 | 2.54 | H | | 0.271 | 24.33 | 1 | 0 |
| | | 16-QAM | -21.35 | 15.47 | 10.70 | 2.54 | H | | 0.231 | 23.63 | | |
| | | 64-QAM | -22.35 | 14.47 | 10.70 | 2.54 | H | | 0.183 | 22.63 | | |
| | | 256-QAM | -25.42 | 11.40 | 10.70 | 2.54 | H | | 0.090 | 19.56 | | |
| 2560.0 | | QPSK | -20.86 | 16.40 | 10.68 | 2.59 | H | | 0.281 | 24.49 | 1 | 0 |
| | | 16-QAM | -21.51 | 15.75 | 10.68 | 2.59 | H | | 0.242 | 23.84 | | |
| | | 64-QAM | -22.59 | 14.67 | 10.68 | 2.59 | H | | 0.189 | 22.76 | | |
| | | 256-QAM | -25.62 | 11.64 | 10.68 | 2.59 | H | | 0.094 | 19.73 | | |

## 8.3 RADIATED SPURIOUS EMISSIONS

▣ MODE: LTE B7

▣ MODULATION SIGNAL: 5 MHz QPSK

▣ DISTANCE: 1 meters

▣ LIMIT: -25 dBm

| Ch | Freq (MHz) | Measured Level (dBm) | Ant. Gain (dBi) | Substitute Level (dBm) | C.L | Pol | Result (dBm) | RB | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Size | Offset |
| 20775 (2502.5) | 5 005.00 | -53.04 | 12.55 | -64.54 | 3.71 | H | -55.70 | 1 | 0 |
| | 7 507.50 | -55.93 | 10.98 | -55.86 | 4.60 | H | -49.48 | | |
| | 10 010.00 | -56.79 | 10.61 | -51.79 | 5.47 | H | -46.65 | | |
| 21100 (2535.0) | 5 070.00 | -52.71 | 12.35 | -62.53 | 3.80 | H | -53.98 | 1 | 0 |
| | 7 605.00 | -55.26 | 11.33 | -55.57 | 4.64 | H | -48.88 | | |
| | 10 140.00 | -56.29 | 10.71 | -51.33 | 5.48 | H | -46.10 | | |
| 21425 (2567.5) | 5 135.00 | -53.24 | 12.15 | -65.07 | 3.81 | H | -56.73 | 1 | 0 |
| | 7 702.50 | -56.07 | 11.55 | -56.40 | 4.66 | H | -49.51 | | |
| | 10 270.00 | -57.23 | 10.69 | -50.03 | 5.57 | H | -44.91 | | |

▣ MODE: LTE B7

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 1 meters

▣ LIMIT: -25 dBm

| Ch | Freq (MHz) | Measured Level (dBm) | Ant. Gain (dBi) | Substitute Level (dBm) | C.L | Pol | Result (dBm) | RB | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Size | Offset |
| 20800 (2505.0) | 5 010.00 | -52.88 | 12.55 | -64.64 | 3.72 | H | -55.81 | 1 | 0 |
| | 7 515.00 | -55.06 | 10.98 | -54.93 | 4.60 | H | -48.55 | | |
| | 10 020.00 | -58.17 | 10.61 | -53.73 | 5.47 | H | -48.59 | | |
| 21100 (2535.0) | 5 070.00 | -53.46 | 12.35 | -63.28 | 3.80 | H | -54.73 | 1 | 0 |
| | 7 605.00 | -55.65 | 11.33 | -55.96 | 4.64 | H | -49.27 | | |
| | 10 140.00 | -57.74 | 10.71 | -52.78 | 5.48 | H | -47.55 | | |
| 21400 (2565.0) | 5 130.00 | -53.13 | 12.15 | -65.18 | 3.81 | H | -56.84 | 1 | 0 |
| | 7 695.00 | -55.61 | 11.51 | -56.35 | 4.66 | H | -49.50 | | |
| | 10 260.00 | -57.08 | 10.69 | -50.24 | 5.56 | H | -45.11 | | |

▣ MODE: LTE B7

▣ MODULATION SIGNAL: 15 MHz QPSK

▣ DISTANCE: 1 meters

▣ LIMIT: -25 dBm

| Ch | Freq (MHz) | Measured Level (dBm) | Ant. Gain (dBi) | Substitute Level (dBm) | C.L | Pol | Result (dBm) | RB | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Size | Offset |
| 20825 (2507.5) | 5 015.00 | -53.46 | 12.55 | -65.45 | 3.70 | H | -56.60 | 1 | 0 |
| | 7 522.50 | -55.83 | 10.98 | -55.68 | 4.61 | H | -49.31 | | |
| | 10 030.00 | -57.26 | 10.61 | -52.93 | 5.47 | H | -47.79 | | |
| 21100 (2535.0) | 5 070.00 | -53.58 | 12.35 | -63.40 | 3.80 | H | -54.85 | 1 | 0 |
| | 7 605.00 | -55.27 | 11.33 | -55.58 | 4.64 | H | -48.89 | | |
| | 10 140.00 | -57.50 | 10.71 | -52.54 | 5.48 | H | -47.31 | | |
| 21375 (2562.5) | 5 125.00 | -53.12 | 12.15 | -65.27 | 3.81 | H | -56.93 | 1 | 0 |
| | 7 687.50 | -55.75 | 11.47 | -56.71 | 4.66 | H | -49.90 | | |
| | 10 250.00 | -57.48 | 10.69 | -50.60 | 5.54 | H | -45.45 | | |

▣ MODE: LTE B7

▣ MODULATION SIGNAL: 20 MHz QPSK

▣ DISTANCE: 1 meters

▣ LIMIT: -25 dBm

| Ch | Freq (MHz) | Measured Level (dBm) | Ant. Gain (dBi) | Substitute Level (dBm) | C.L | Pol | Result (dBm) | RB | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Size | Offset |
| 20850 (2510.0) | 5 020.00 | -52.46 | 12.55 | -64.66 | 3.69 | V | -55.80 | 1 | 0 |
| | 7 530.00 | -54.03 | 10.98 | -53.92 | 4.60 | V | -47.54 | | |
| | 10 040.00 | -56.69 | 10.61 | -52.04 | 5.49 | H | -46.92 | | |
| 21100 (2535.0) | 5 070.00 | -53.16 | 12.35 | -62.98 | 3.80 | V | -54.43 | 1 | 0 |
| | 7 605.00 | -53.51 | 11.33 | -53.82 | 4.64 | V | -47.13 | | |
| | 10 140.00 | -56.96 | 10.71 | -52.00 | 5.48 | V | -46.77 | | |
| 21350 (2560.0) | 5 070.00 | -53.16 | 12.35 | -62.98 | 3.80 | V | -54.43 | 1 | 0 |
| | 7 605.00 | -53.51 | 11.33 | -53.82 | 4.64 | V | -47.13 | | |
| | 10 140.00 | -56.96 | 10.71 | -52.00 | 5.48 | V | -46.77 | | |

## 8.4 PEAK-TO-AVERAGE RATIO

| Band | Band Width | Frequency (MHz) | Modulation | Resource Block Size | Resource Block Offset | Data ( dB ) |
|---|---|---|---|---|---|---|
| 7 | 5 MHz | 2535.0 | QPSK | 25 | 0 | 5.32 |
| | | | 16-QAM | | | 6.05 |
| | | | 64-QAM | | | 6.60 |
| | | | 256-QAM | | | 6.67 |
| | 10 MHz | | QPSK | 50 | | 5.35 |
| | | | 16-QAM | | | 6.04 |
| | | | 64-QAM | | | 6.61 |
| | | | 256-QAM | | | 6.64 |
| | 15 MHz | | QPSK | 75 | | 5.34 |
| | | | 16-QAM | | | 6.06 |
| | | | 64-QAM | | | 6.60 |
| | | | 256-QAM | | | 6.66 |
| | 20 MHz | | QPSK | 100 | | 5.30 |
| | | | 16-QAM | | | 6.02 |
| | | | 64-QAM | | | 6.58 |
| | | | 256-QAM | | | 6.66 |

**Note:**

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 53 ~ 68.

## 8.5 OCCUPIED BANDWIDTH

| Band | Band Width | Frequency (MHz) | Modulation | Resource Block Size | Resource Block Offset | Data ( MHz ) |
|---|---|---|---|---|---|---|
| 7 | 5 MHz | 2535.0 | QPSK | 25 | 0 | 4.5075 |
| | | | 16-QAM | | | 4.5096 |
| | | | 64-QAM | | | 4.5084 |
| | | | 256-QAM | | | 4.5058 |
| | 10 MHz | | QPSK | 50 | | 8.9867 |
| | | | 16-QAM | | | 8.9460 |
| | | | 64-QAM | | | 8.9993 |
| | | | 256-QAM | | | 8.9743 |
| | 15 MHz | | QPSK | 75 | | 13.474 |
| | | | 16-QAM | | | 13.481 |
| | | | 64-QAM | | | 13.460 |
| | | | 256-QAM | | | 13.479 |
| | 20 MHz | | QPSK | 100 | | 17.933 |
| | | | 16-QAM | | | 17.911 |
| | | | 64-QAM | | | 17.921 |
| | | | 256-QAM | | | 17.970 |

**Note:**

1. Plots of the EUT's Occupied Bandwidth are shown Page 69 ~ 84.

## 8.6 CONDUCTED SPURIOUS EMISSIONS

| Band | Band Width (MHz) | Frequency (MHz) | Frequency of Maximum Harmonic (GHz) | Factor (dB) | Measurement Maximum Data (dBm) | Result (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| 7 | 5 | 2502.5 | 26.1670 | 30.210 | -66.359 | -36.149 | -25.00 |
| | | 2535.0 | 26.3200 | 30.210 | -66.869 | -36.659 | |
| | | 2567.5 | 25.7080 | 30.210 | -67.031 | -36.821 | |
| | 10 | 2505.0 | 25.9290 | 30.210 | -66.824 | -36.614 | |
| | | 2535.0 | 26.4560 | 30.210 | -66.896 | -36.686 | |
| | | 2565.0 | 25.2150 | 30.210 | -66.835 | -36.625 | |
| | 15 | 2507.5 | 25.7930 | 30.210 | -67.322 | -37.112 | |
| | | 2535.0 | 3.6890 | 28.112 | -66.638 | -38.526 | |
| | | 2562.5 | 3.1706 | 28.112 | -65.427 | -37.315 | |
| | 20 | 2510.0 | 26.1670 | 30.210 | -66.294 | -36.084 | |
| | | 2535.0 | 5.6132 | 28.634 | -66.199 | -37.565 | |
| | | 2560.0 | 26.3710 | 30.210 | -66.632 | -36.422 | |

**Note:**

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 85 ~ 108.
2. Conducted Spurious Emissions was Tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0
3. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
4. Factor(dB) = Cable Loss + Attenuator + Power Splitter

| Frequency Range (GHz) | Factor [dB] |
|---|---|
| 0.03 – 1 | 27.500 |
| 1 – 5 | 28.112 |
| 5 – 10 | 28.634 |
| 10 – 15 | 29.245 |
| 15 – 20 | 29.511 |
| Above 20(26.5) | 30.210 |

## 8.7 CHANNEL EDGE

| Band Width (Modulation) | Frequency (MHz) | RB Size / Offset | C.E ~ (C.E ± 1 MHz) | | 2 496 MHz ~ 2 499 MHz | (C.E + 1 MHz) ~ (C.E + 5 MHz) | 2 490.5 MHz ~ 2 496 MHz | (C.E + 5 MHz) ~ (C.E + X MHz) | Below 2 490.5 MHz | Above (C.E + X MHz) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lower | Upper | Lower | Upper | Lower | Upper | Lower | Upper |
| 5 MHz (QPSK) | 2502.5 | 25 / 0 | -27.52 | -26.33 | -25.68 | -25.12 | -32.67 | -35.90 | -38.75 | -36.46 |
| 10 MHz (QPSK) | 2505.0 | 50 / 0 | -30.07 | -28.79 | -26.16 | -26.39 | -28.28 | -31.20 | -38.54 | -36.44 |
| 15 MHz (QPSK) | 2507.5 | 75 / 0 | -31.01 | -29.25 | -29.40 | -27.59 | -31.66 | -30.59 | -35.45 | -38.11 |
| 20 MHz (QPSK) | 2510.0 | 100 / 0 | -31.62 | -30.82 | -31.30 | -30.73 | -32.79 | -32.90 | -34.06 | -38.44 |
| Limit(dBm) | | | -10.0 | | -10.0 | | -13.0 | | -25.0 | |

| Band Width (Modulation) | Frequency (MHz) | RB Size / Offset | C.E ~ (C.E ± 1 MHz) | | (C.E ± 1 MHz) ~ (C.E ± 5 MHz) | |
|---|---|---|---|---|---|---|
| | | | Lower | Upper | Lower | Upper |
| 5 MHz | 2535.0 | 25 / 0 | -28.07 | -27.21 | -29.69 | -28.68 |
| (QPSK) | 2567.5 | 25 / 0 | -27.89 | -27.64 | -28.90 | -31.74 |
| 10 MHz | 2535.0 | 50 / 0 | -30.46 | -30.32 | -29.38 | -30.40 |
| (QPSK) | 2565.0 | 50 / 0 | -30.96 | -30.83 | -31.29 | -31.26 |
| 15 MHz | 2535.0 | 75 / 0 | -31.15 | -30.51 | -29.91 | -29.79 |
| (QPSK) | 2562.5 | 75 / 0 | -30.68 | -31.67 | -29.96 | -30.06 |
| 20 MHz | 2535.0 | 100 / 0 | -29.98 | -30.38 | -28.53 | -29.59 |
| (QPSK) | 2560.0 | 100 / 0 | -30.93 | -31.07 | -30.98 | -29.66 |
| Limit(dBm) | | | -10.0 | | -10.0 | |

| Band Width (Modulation) | Frequency (MHz) | Resource Block Size | (C.E ± 5 MHz) ~ (C.E ± X MHz) | | Above (C.E ± X MHz) | |
|---|---|---|---|---|---|---|
| | | | Lower | Upper | Lower | Upper |
| 5 MHz | 2535.0 | 25 / 0 | -36.70 | -37.53 | -36.08 | -37.94 |
| (QPSK) | 2567.5 | 25 / 0 | -37.35 | -36.96 | -37.22 | -37.22 |
| 10 MHz | 2535.0 | 50 / 0 | -32.88 | -36.02 | -38.07 | -38.42 |
| (QPSK) | 2565.0 | 50 / 0 | -35.43 | -35.08 | -40.76 | -40.44 |
| 15 MHz | 2535.0 | 75 / 0 | -33.54 | -32.78 | -41.58 | -41.18 |
| (QPSK) | 2562.5 | 75 / 0 | -33.75 | -33.09 | -42.26 | -42.20 |
| 20 MHz | 2535.0 | 100 / 0 | -31.34 | -32.28 | -42.43 | -41.85 |
| (QPSK) | 2560.0 | 100 / 0 | -33.41 | -32.93 | -42.17 | -43.42 |
| Limit(dBm) | | | -13.0 | | -25.0 | |

**Note:**

1. C.E = Channel Edge
2. X = X is the greater of 6 MHz or the actual emission bandwidth.
3. X = 6 MHz(5 MHz Bandwidth), 10 MHz(10 MHz Bandwidth), 15 MHz(15 MHz Bandwidth), 20 MHz(20 MHz Bandwidth)
4. Plots of the EUT's Channel Edge are shown Page 109 ~ 132.

## 8.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ MODE: LTE 7

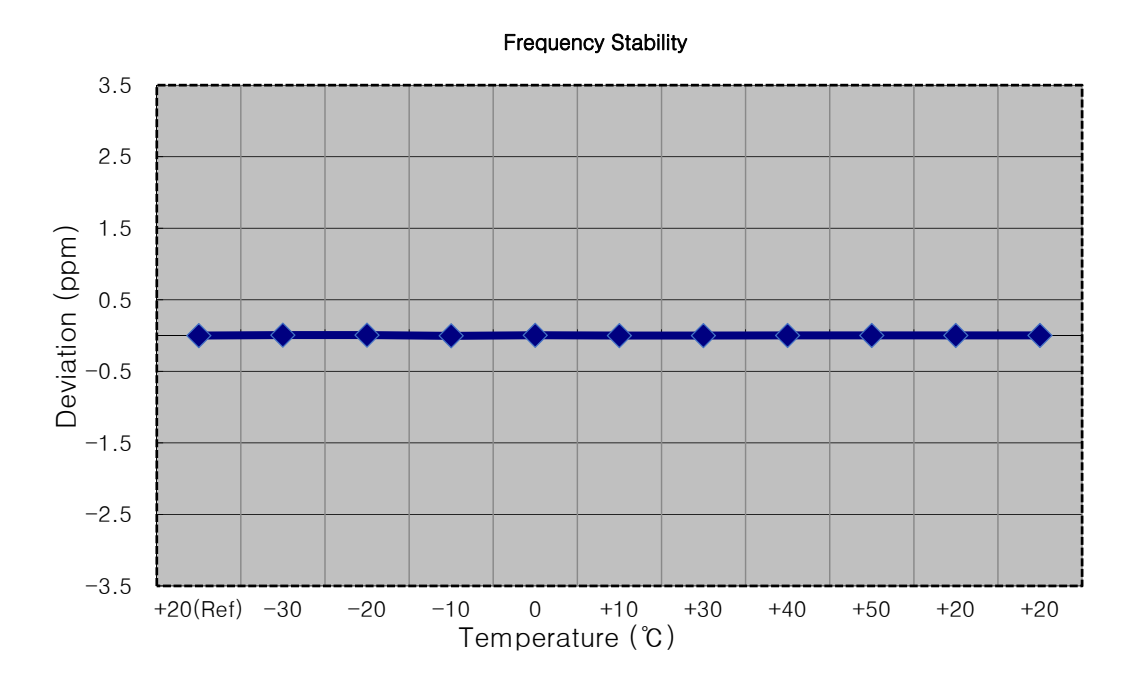
▣ OPERATING FREQUENCY: 2,502,500,000 Hz

▣ CHANNEL: 20775 (5 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2502 500 012 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2502 500 026 | 13.4 | 0.000 001 | 0.005 |
| 100 % | | -20 | 2502 500 029 | 16.4 | 0.000 001 | 0.007 |
| 100 % | | -10 | 2502 500 004 | -8.3 | 0.000 000 | -0.003 |
| 100 % | | 0 | 2502 500 022 | 9.3 | 0.000 000 | 0.004 |
| 100 % | | +10 | 2502 500 009 | -3.4 | 0.000 000 | -0.001 |
| 100 % | | +30 | 2502 500 009 | -3.0 | 0.000 000 | -0.001 |
| 100 % | | +40 | 2502 500 018 | 6.0 | 0.000 000 | 0.002 |
| 100 % | | +50 | 2502 500 015 | 3.1 | 0.000 000 | 0.001 |
| 115 % | | +20 | 2502 500 015 | 2.4 | 0.000 000 | 0.001 |
| 85 % | | +20 | 2502 500 016 | 4.1 | 0.000 000 | 0.002 |



▣ MODE: LTE 7

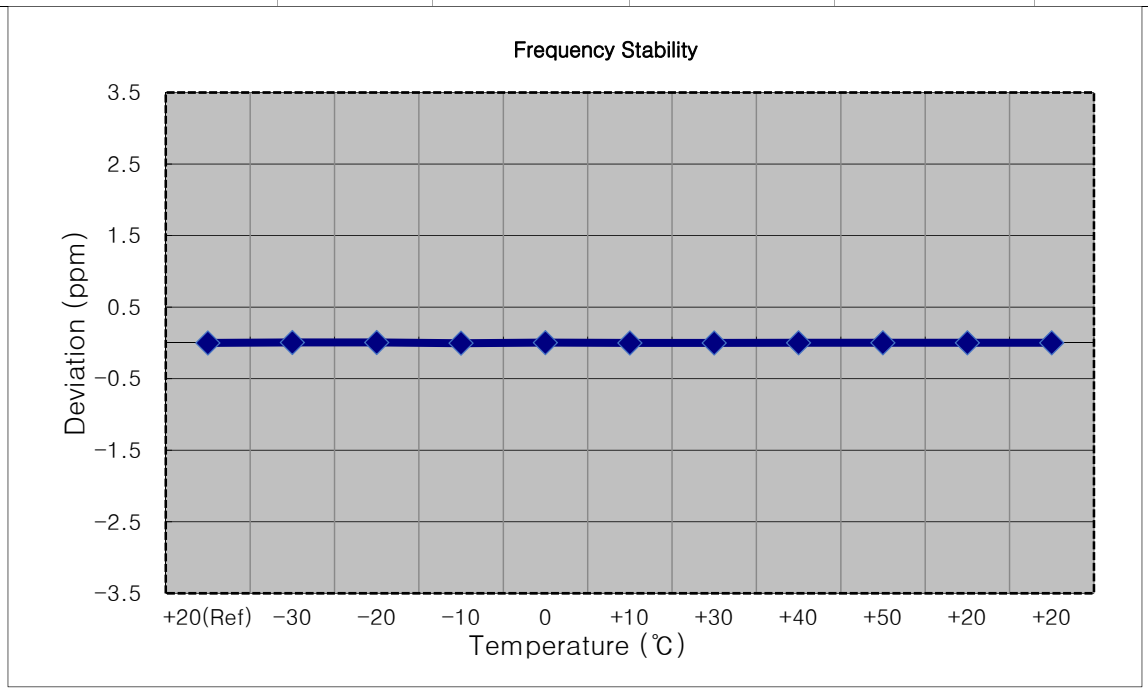
▣ OPERATING FREQUENCY: 2,505,000,000 Hz

▣ CHANNEL: 20800 (10 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (°C) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2504 999 998 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2505 000 004 | 6.4 | 0.000 000 | 0.003 |
| 100 % | | -20 | 2504 999 991 | -6.5 | 0.000 000 | -0.003 |
| 100 % | | -10 | 2504 999 995 | -2.8 | 0.000 000 | -0.001 |
| 100 % | | 0 | 2505 000 007 | 9.6 | 0.000 000 | 0.004 |
| 100 % | | +10 | 2504 999 994 | -4.2 | 0.000 000 | -0.002 |
| 100 % | | +30 | 2505 000 001 | 3.6 | 0.000 000 | 0.001 |
| 100 % | | +40 | 2504 999 993 | -4.4 | 0.000 000 | -0.002 |
| 100 % | | +50 | 2504 999 994 | -4.0 | 0.000 000 | -0.002 |
| 115 % | | +20 | 2504 999 990 | -7.3 | 0.000 000 | -0.003 |
| 85 % | | +20 | 2505 000 004 | 6.5 | 0.000 000 | 0.003 |



▣ MODE: LTE 7

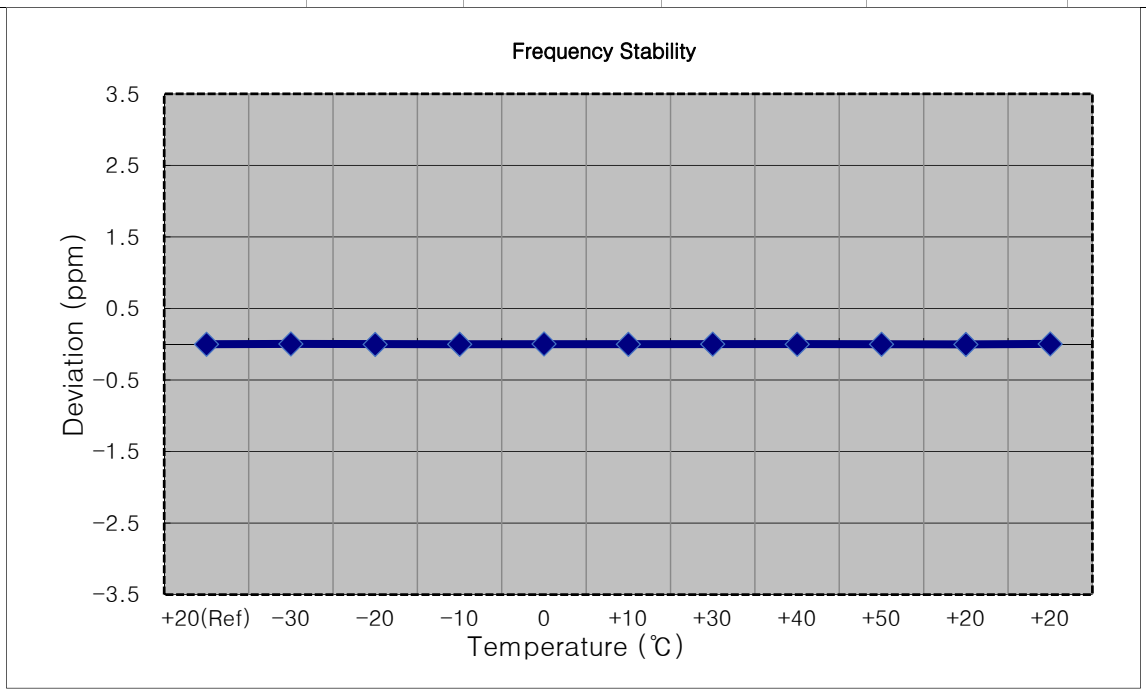
▣ OPERATING FREQUENCY: 2,507,500,000 Hz

▣ CHANNEL: 20825 (15 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (°C) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2507 499 997 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2507 499 994 | -3.1 | 0.000 000 | -0.001 |
| 100 % | | -20 | 2507 499 992 | -4.4 | 0.000 000 | -0.002 |
| 100 % | | -10 | 2507 499 989 | -8.2 | 0.000 000 | -0.003 |
| 100 % | | 0 | 2507 499 993 | -4.1 | 0.000 000 | -0.002 |
| 100 % | | +10 | 2507 499 991 | -6.2 | 0.000 000 | -0.002 |
| 100 % | | +30 | 2507 499 990 | -7.3 | 0.000 000 | -0.003 |
| 100 % | | +40 | 2507 499 990 | -7.0 | 0.000 000 | -0.003 |
| 100 % | | +50 | 2507 499 990 | -6.4 | 0.000 000 | -0.003 |
| 115 % | | +20 | 2507 500 003 | 6.5 | 0.000 000 | 0.003 |
| 85 % | | +20 | 2507 499 987 | -10.1 | 0.000 000 | -0.004 |



▣ MODE: LTE 7

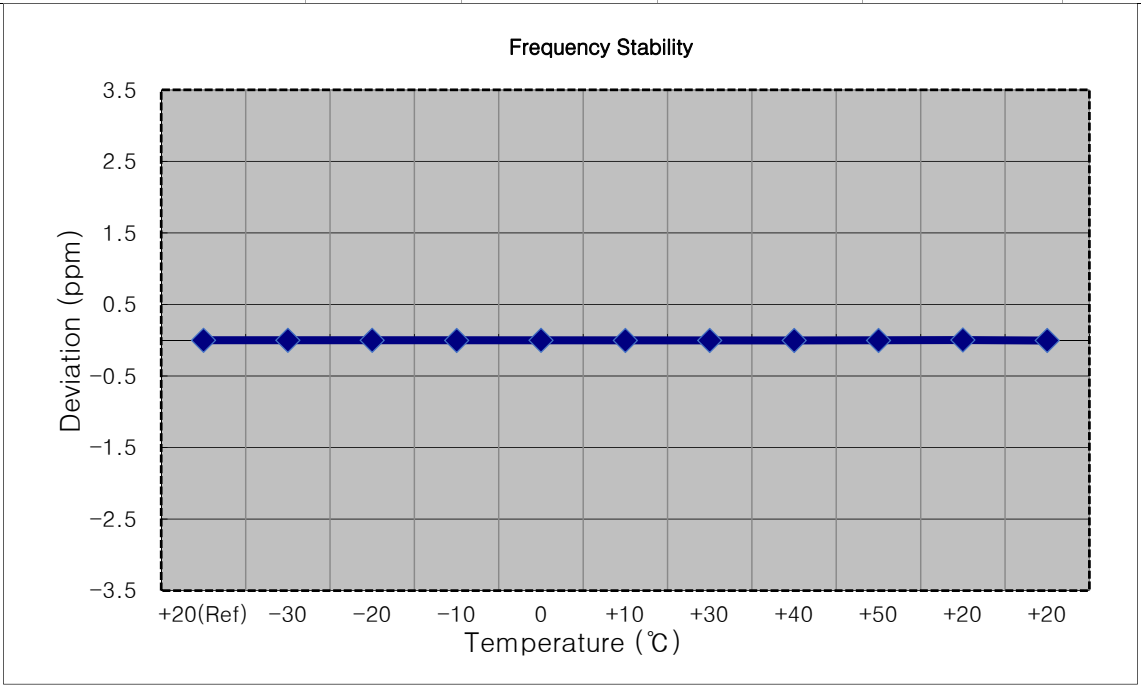
▣ OPERATING FREQUENCY: 2,510,000,000 Hz

▣ CHANNEL: 20850 (20 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (°C) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2509 999 993 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2509 999 987 | -6.4 | 0.000 000 | -0.003 |
| 100 % | | -20 | 2509 999 987 | -6.2 | 0.000 000 | -0.002 |
| 100 % | | -10 | 2509 999 984 | -9.6 | 0.000 000 | -0.004 |
| 100 % | | 0 | 2509 999 988 | -5.3 | 0.000 000 | -0.002 |
| 100 % | | +10 | 2509 999 988 | -5.8 | 0.000 000 | -0.002 |
| 100 % | | +30 | 2509 999 986 | -7.3 | 0.000 000 | -0.003 |
| 100 % | | +40 | 2509 999 984 | -9.2 | 0.000 000 | -0.004 |
| 100 % | | +50 | 2509 999 987 | -6.2 | 0.000 000 | -0.002 |
| 115 % | | +20 | 2509 999 986 | -7.3 | 0.000 000 | -0.003 |
| 85 % | | +20 | 2509 999 985 | -8.1 | 0.000 000 | -0.003 |



▣ MODE: LTE 7

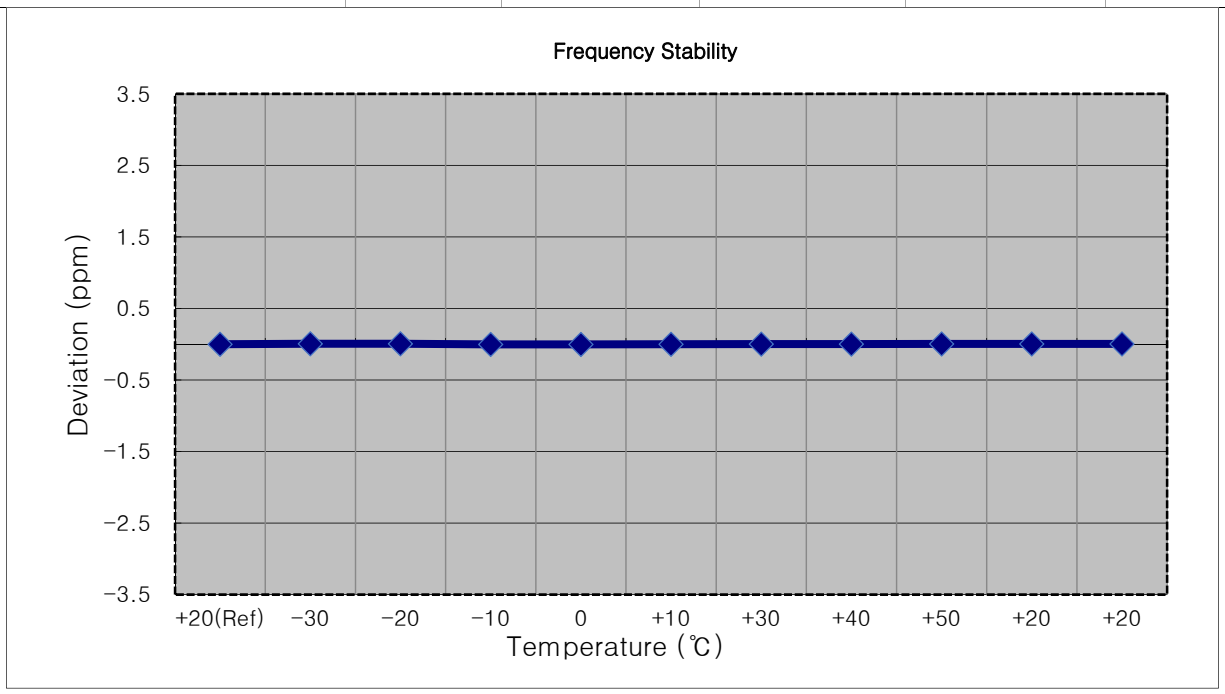
▣ OPERATING FREQUENCY: 2,535,000,000 Hz

▣ CHANNEL: 21100 (5 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (°C) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2535 000 010 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2535 000 023 | 12.3 | 0.000 000 | 0.005 |
| 100 % | | -20 | 2535 000 027 | 16.2 | 0.000 001 | 0.006 |
| 100 % | | -10 | 2535 000 005 | -5.6 | 0.000 000 | -0.002 |
| 100 % | | 0 | 2535 000 004 | -6.2 | 0.000 000 | -0.002 |
| 100 % | | +10 | 2535 000 008 | -2.1 | 0.000 000 | -0.001 |
| 100 % | | +30 | 2535 000 016 | 5.3 | 0.000 000 | 0.002 |
| 100 % | | +40 | 2535 000 016 | 5.7 | 0.000 000 | 0.002 |
| 100 % | | +50 | 2535 000 021 | 10.6 | 0.000 000 | 0.004 |
| 115 % | | +20 | 2535 000 018 | 7.4 | 0.000 000 | 0.003 |
| 85 % | | +20 | 2535 000 020 | 9.9 | 0.000 000 | 0.004 |



▣ MODE: LTE 7

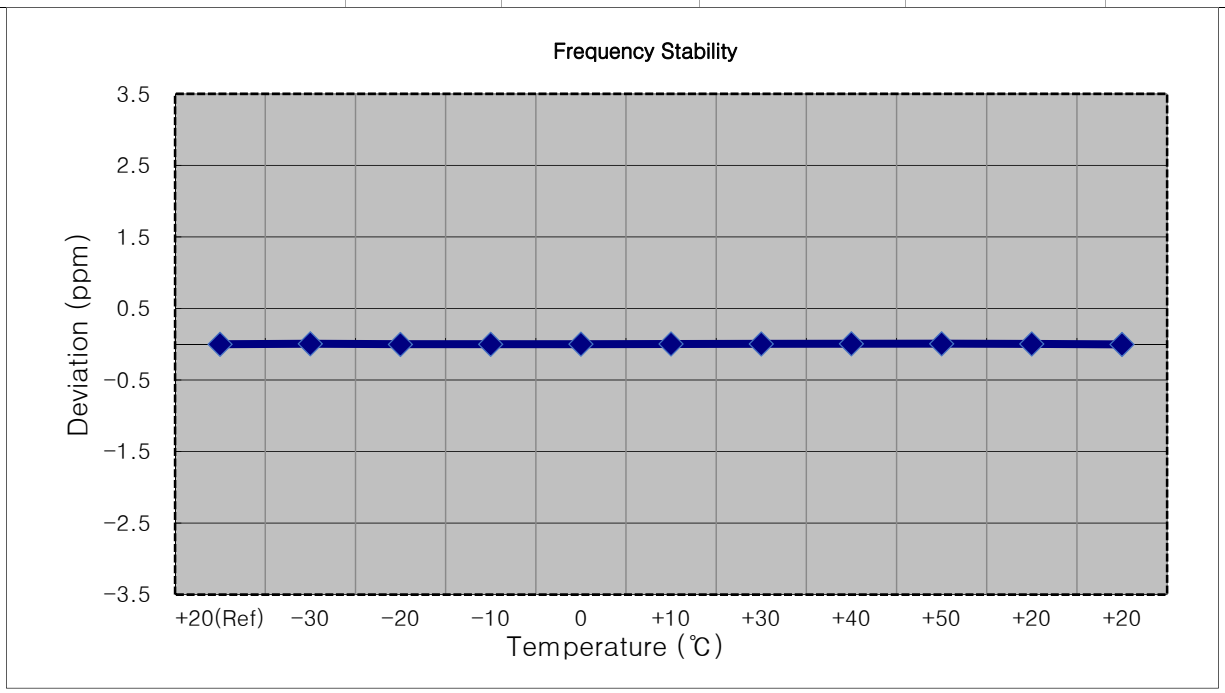
▣ OPERATING FREQUENCY: 2,535,000,000 Hz

▣ CHANNEL: 21100 (10 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (°C) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2535 000 008 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2535 000 020 | 12.1 | 0.000 000 | 0.005 |
| 100 % | | -20 | 2535 000 001 | -6.6 | 0.000 000 | -0.003 |
| 100 % | | -10 | 2535 000 004 | -3.4 | 0.000 000 | -0.001 |
| 100 % | | 0 | 2535 000 013 | 4.8 | 0.000 000 | 0.002 |
| 100 % | | +10 | 2535 000 016 | 8.1 | 0.000 000 | 0.003 |
| 100 % | | +30 | 2535 000 018 | 10.4 | 0.000 000 | 0.004 |
| 100 % | | +40 | 2535 000 025 | 17.3 | 0.000 001 | 0.007 |
| 100 % | | +50 | 2535 000 022 | 14.3 | 0.000 001 | 0.006 |
| 115 % | | +20 | 2535 000 018 | 10.5 | 0.000 000 | 0.004 |
| 85 % | | +20 | 2535 000 001 | -7.3 | 0.000 000 | -0.003 |



▣ MODE: LTE 7

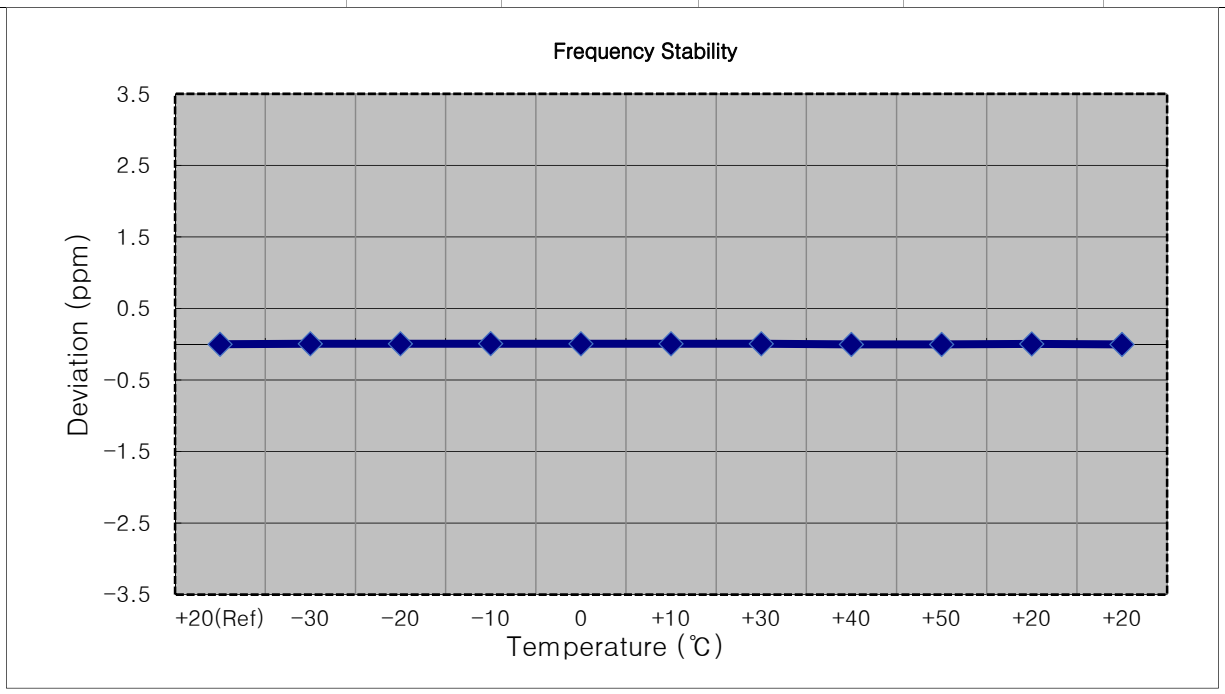
▣ OPERATING FREQUENCY: 2,535,000,000 Hz

▣ CHANNEL: 21100 (15 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (°C) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2535 000 016 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2535 000 029 | 13.7 | 0.000 001 | 0.005 |
| 100 % | | -20 | 2535 000 032 | 16.2 | 0.000 001 | 0.006 |
| 100 % | | -10 | 2535 000 033 | 17.7 | 0.000 001 | 0.007 |
| 100 % | | 0 | 2535 000 033 | 17.2 | 0.000 001 | 0.007 |
| 100 % | | +10 | 2535 000 031 | 15.9 | 0.000 001 | 0.006 |
| 100 % | | +30 | 2535 000 029 | 13.4 | 0.000 001 | 0.005 |
| 100 % | | +40 | 2535 000 008 | -7.9 | 0.000 000 | -0.003 |
| 100 % | | +50 | 2535 000 009 | -6.8 | 0.000 000 | -0.003 |
| 115 % | | +20 | 2535 000 024 | 8.4 | 0.000 000 | 0.003 |
| 85 % | | +20 | 2535 000 008 | -7.2 | 0.000 000 | -0.003 |



▣ MODE: LTE 7

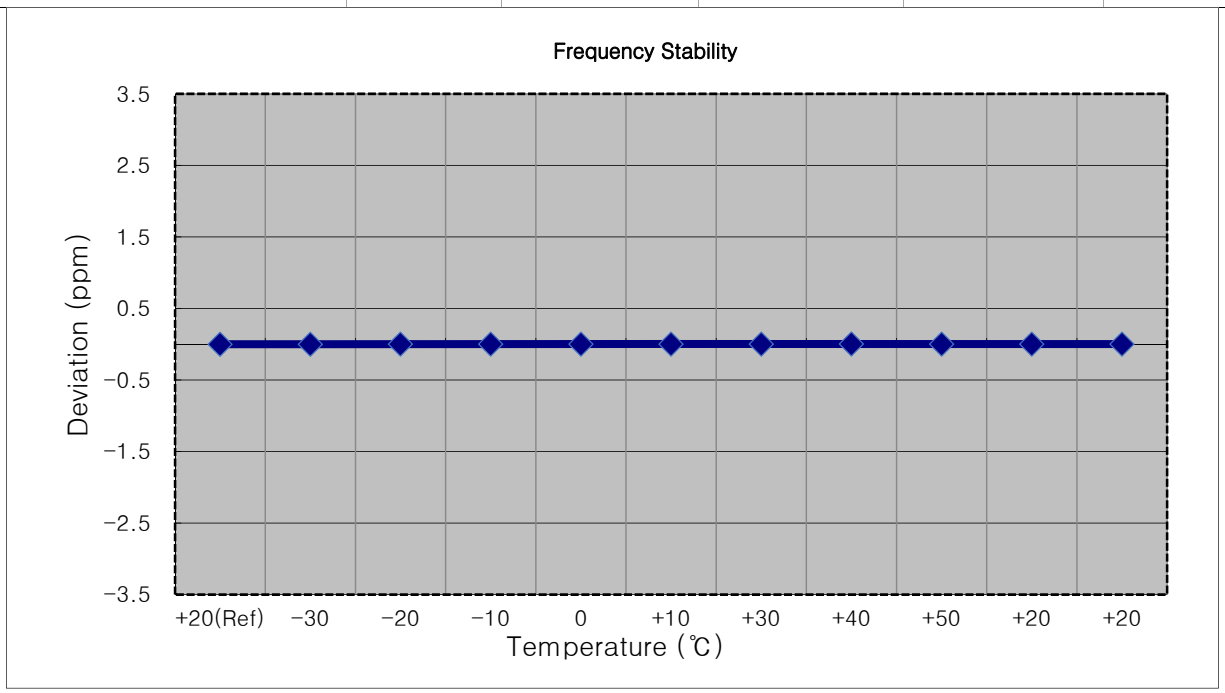
▣ OPERATING FREQUENCY: 2,535,000,000 Hz

▣ CHANNEL: 21100 (20 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (°C) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2535 000 010 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2535 000 008 | -2.4 | 0.000 000 | -0.001 |
| 100 % | | -20 | 2535 000 013 | 2.4 | 0.000 000 | 0.001 |
| 100 % | | -10 | 2535 000 013 | 2.8 | 0.000 000 | 0.001 |
| 100 % | | 0 | 2535 000 012 | 2.1 | 0.000 000 | 0.001 |
| 100 % | | +10 | 2535 000 014 | 3.5 | 0.000 000 | 0.001 |
| 100 % | | +30 | 2535 000 013 | 2.3 | 0.000 000 | 0.001 |
| 100 % | | +40 | 2535 000 021 | 10.2 | 0.000 000 | 0.004 |
| 100 % | | +50 | 2535 000 014 | 4.1 | 0.000 000 | 0.002 |
| 115 % | | +20 | 2535 000 015 | 4.5 | 0.000 000 | 0.002 |
| 85 % | | +20 | 2535 000 015 | 5.1 | 0.000 000 | 0.002 |



▣ MODE: LTE 7

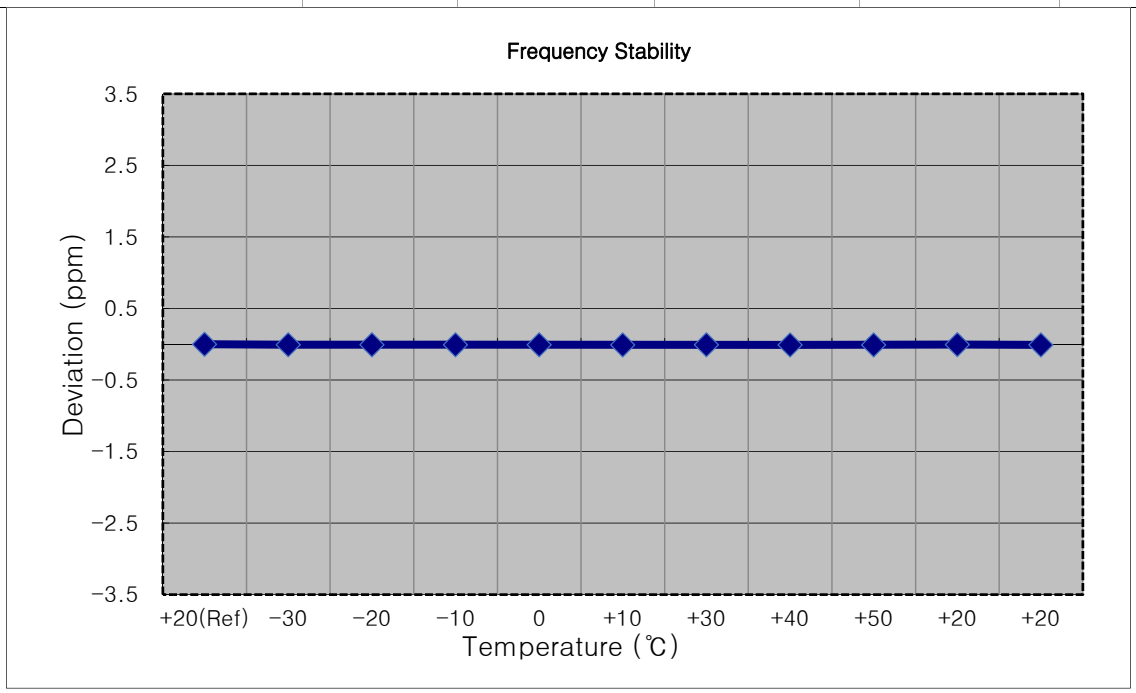
▣ OPERATING FREQUENCY: 2,567,500,000 Hz

▣ CHANNEL: 21425 (5 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (°C) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2567 499 985 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2567 499 967 | -18.6 | -0.000 001 | -0.007 |
| 100 % | | -20 | 2567 499 967 | -17.9 | -0.000 001 | -0.007 |
| 100 % | | -10 | 2567 499 965 | -20.5 | -0.000 001 | -0.008 |
| 100 % | | 0 | 2567 499 967 | -18.5 | -0.000 001 | -0.007 |
| 100 % | | +10 | 2567 499 962 | -22.9 | -0.000 001 | -0.009 |
| 100 % | | +30 | 2567 499 965 | -20.3 | -0.000 001 | -0.008 |
| 100 % | | +40 | 2567 499 962 | -23.5 | -0.000 001 | -0.009 |
| 100 % | | +50 | 2567 499 962 | -23.3 | -0.000 001 | -0.009 |
| 115 % | | +20 | 2567 499 974 | -11.4 | 0.000 000 | -0.004 |
| 85 % | | +20 | 2567 499 962 | -23.4 | -0.000 001 | -0.009 |



▣ MODE: LTE 7

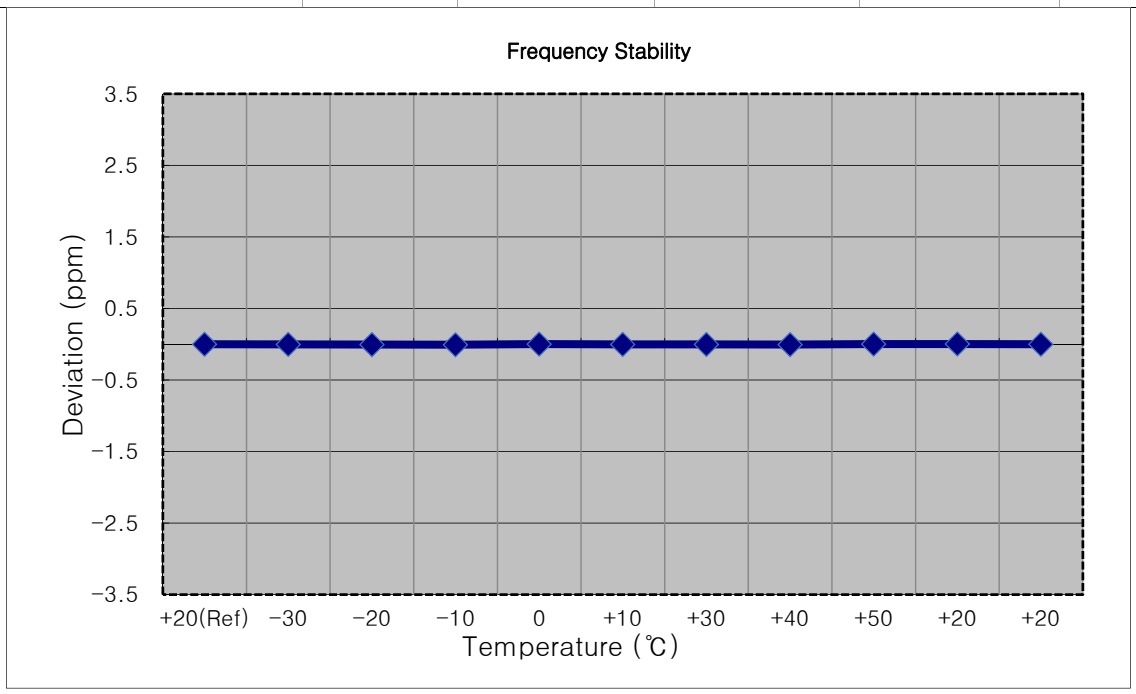
▣ OPERATING FREQUENCY: 2,565,000,000 Hz

▣ CHANNEL: 21400 (10 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (°C) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2564 999 995 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2564 999 986 | -9.3 | 0.000 000 | -0.004 |
| 100 % | | -20 | 2564 999 981 | -14.5 | -0.000 001 | -0.006 |
| 100 % | | -10 | 2564 999 976 | -18.9 | -0.000 001 | -0.007 |
| 100 % | | 0 | 2564 999 998 | 3.3 | 0.000 000 | 0.001 |
| 100 % | | +10 | 2564 999 987 | -8.2 | 0.000 000 | -0.003 |
| 100 % | | +30 | 2564 999 986 | -9.1 | 0.000 000 | -0.004 |
| 100 % | | +40 | 2564 999 979 | -15.9 | -0.000 001 | -0.006 |
| 100 % | | +50 | 2565 000 001 | 6.0 | 0.000 000 | 0.002 |
| 115 % | | +20 | 2565 000 002 | 7.1 | 0.000 000 | 0.003 |
| 85 % | | +20 | 2564 999 993 | -1.8 | 0.000 000 | -0.001 |



▣ MODE: LTE 7

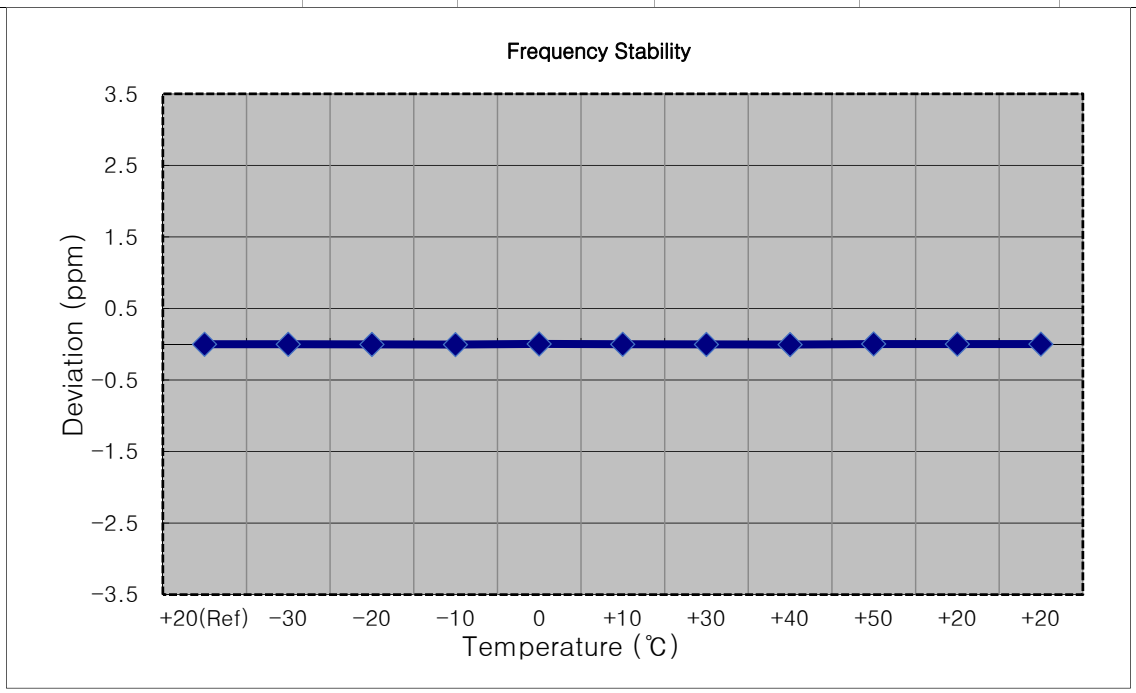
▣ OPERATING FREQUENCY: 2,562,500,000 Hz

▣ CHANNEL: 21375 (15 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (°C) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2562 499 985 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2562 499 981 | -3.9 | 0.000 000 | -0.002 |
| 100 % | | -20 | 2562 499 978 | -7.2 | 0.000 000 | -0.003 |
| 100 % | | -10 | 2562 499 974 | -11.1 | 0.000 000 | -0.004 |
| 100 % | | 0 | 2562 499 991 | 6.5 | 0.000 000 | 0.003 |
| 100 % | | +10 | 2562 499 982 | -3.1 | 0.000 000 | -0.001 |
| 100 % | | +30 | 2562 499 977 | -7.5 | 0.000 000 | -0.003 |
| 100 % | | +40 | 2562 499 972 | -13.0 | -0.000 001 | -0.005 |
| 100 % | | +50 | 2562 499 993 | 8.3 | 0.000 000 | 0.003 |
| 115 % | | +20 | 2562 499 989 | 3.9 | 0.000 000 | 0.002 |
| 85 % | | +20 | 2562 499 988 | 3.1 | 0.000 000 | 0.001 |



▣ MODE: LTE 7

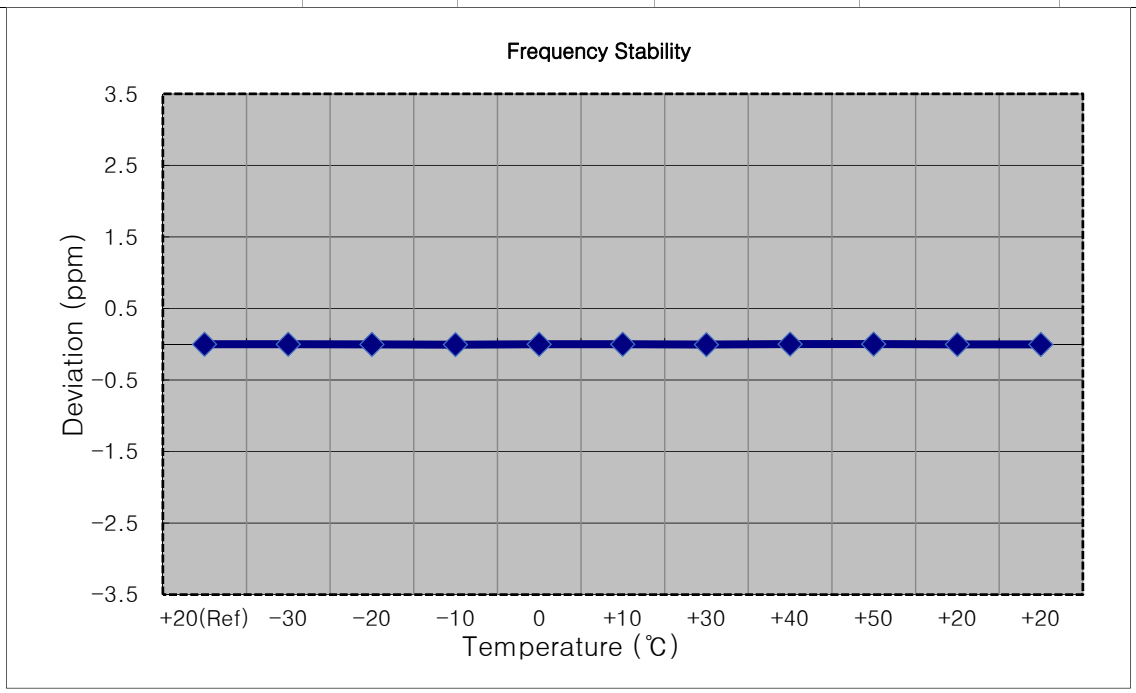
▣ OPERATING FREQUENCY: 2,560,000,000 Hz

▣ CHANNEL: 21350 (20 MHz)

▣ REFERENCE VOLTAGE: 13.200 VDC

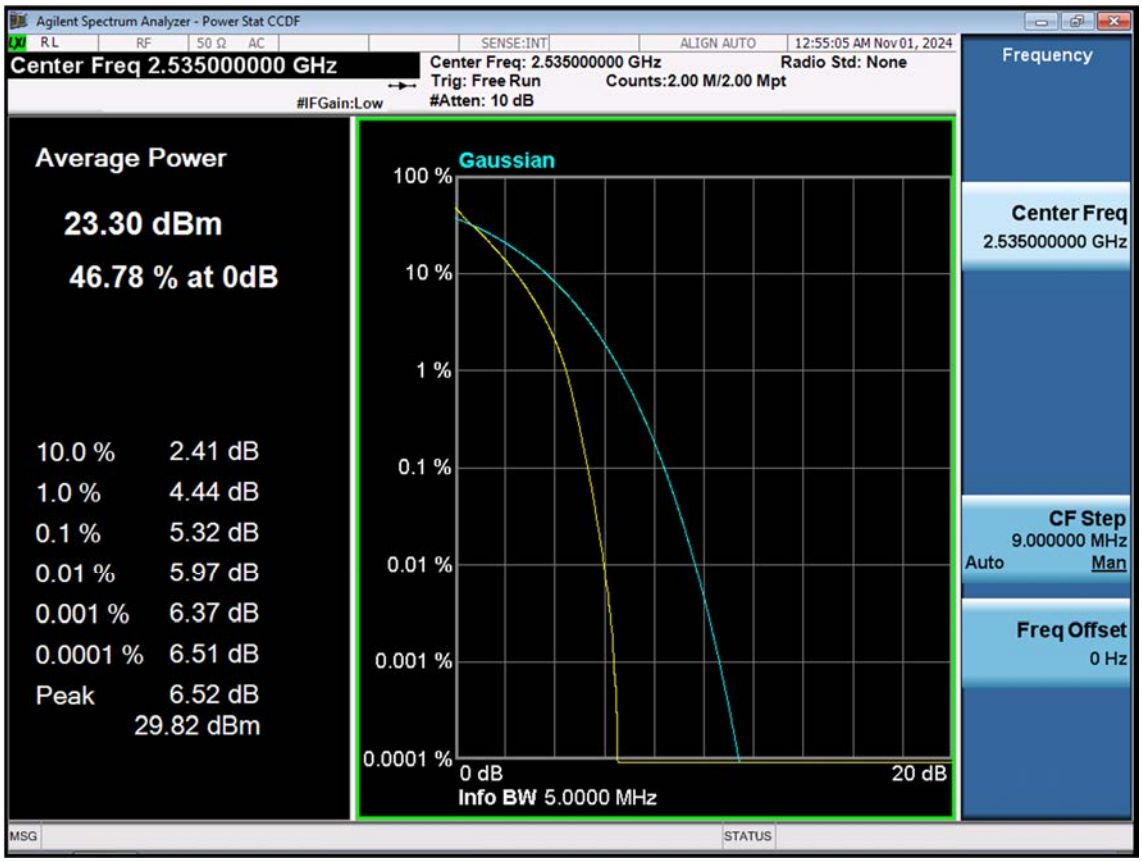
▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (°C) | (Hz) | (Hz) | (%) | |
| 100 % | 13.200 | +20(Ref) | 2560 000 007 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 2560 000 002 | -5.2 | 0.000 000 | -0.002 |
| 100 % | | -20 | 2559 999 997 | -10.5 | 0.000 000 | -0.004 |
| 100 % | | -10 | 2559 999 991 | -16.6 | -0.000 001 | -0.006 |
| 100 % | | 0 | 2560 000 003 | -4.0 | 0.000 000 | -0.002 |
| 100 % | | +10 | 2560 000 003 | -4.0 | 0.000 000 | -0.002 |
| 100 % | | +30 | 2559 999 995 | -12.7 | 0.000 000 | -0.005 |
| 100 % | | +40 | 2560 000 013 | 6.1 | 0.000 000 | 0.002 |
| 100 % | | +50 | 2560 000 011 | 3.8 | 0.000 000 | 0.001 |
| 115 % | | +20 | 2560 000 001 | -6.6 | 0.000 000 | -0.003 |
| 85 % | | +20 | 2559 999 998 | -8.8 | 0.000 000 | -0.003 |

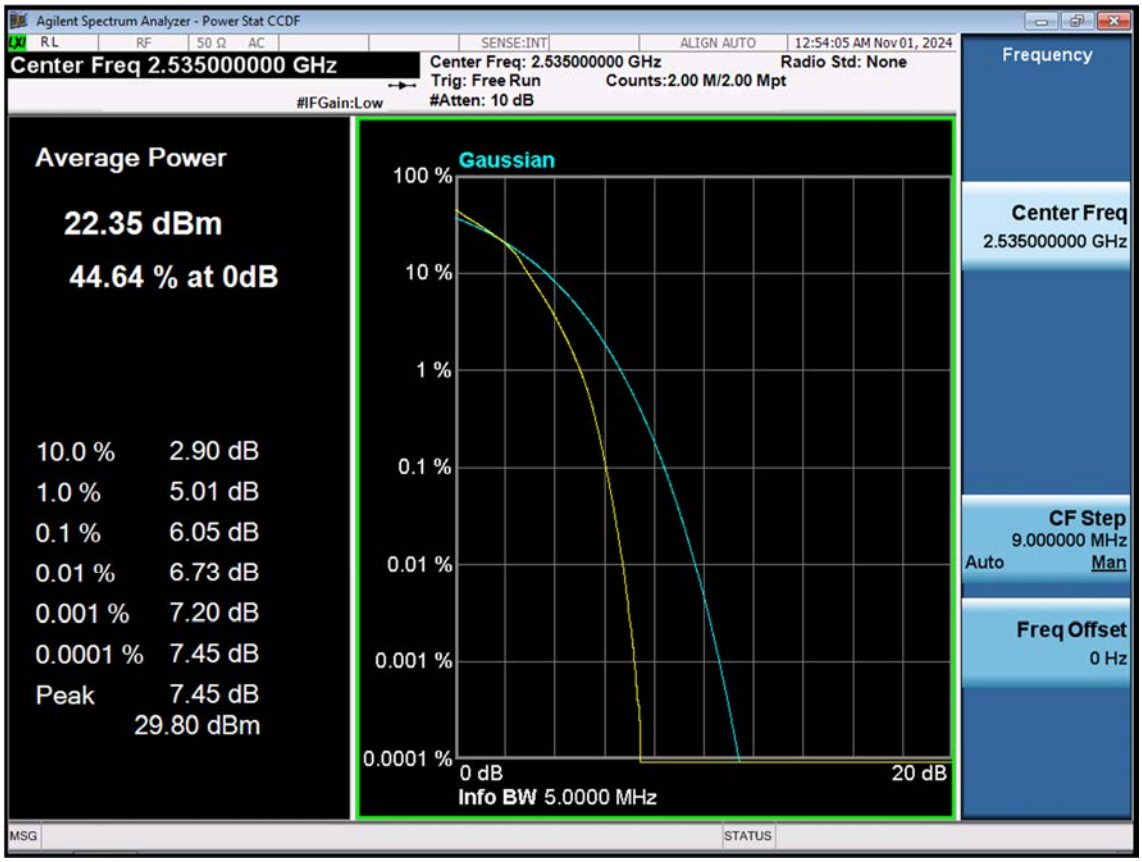


## 9. TEST PLOTS

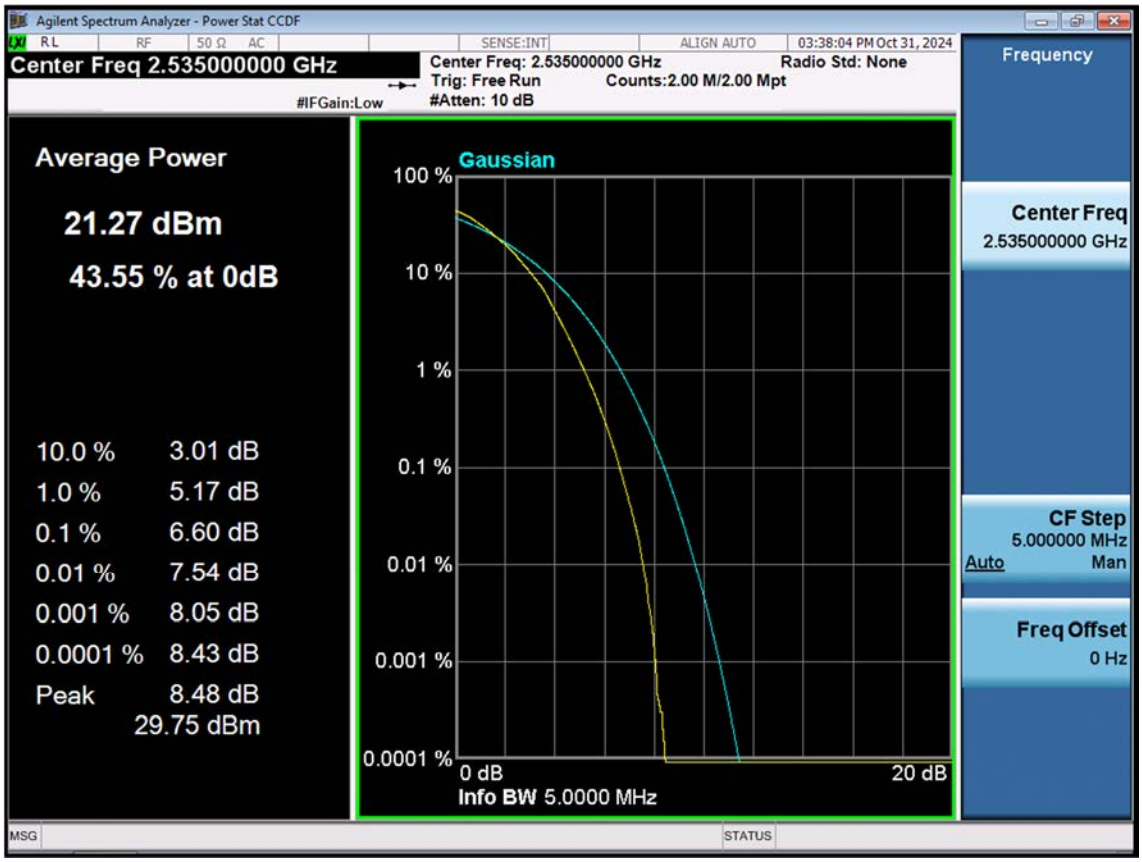
LTE B7_5 M_PAR_Mid_QPSK_FullRB



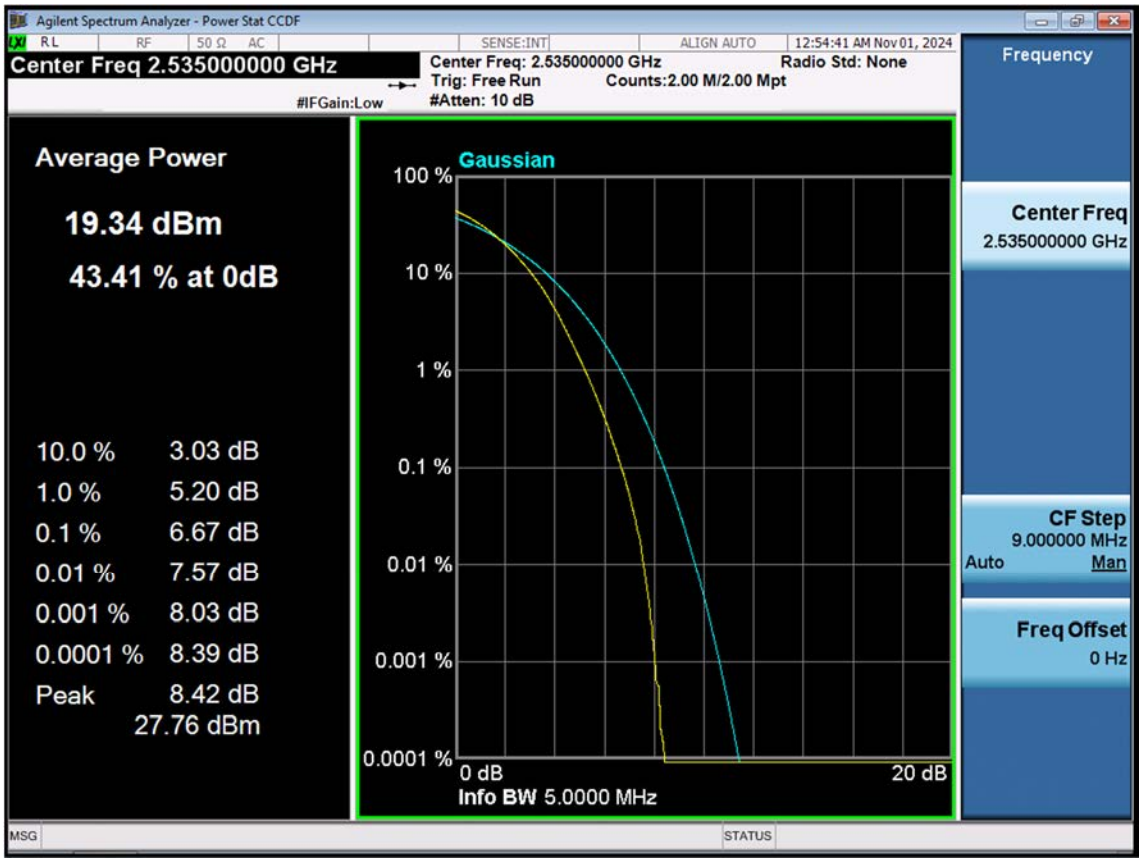
LTE B7_5 M_PAR_Mid_16QAM_FullRB



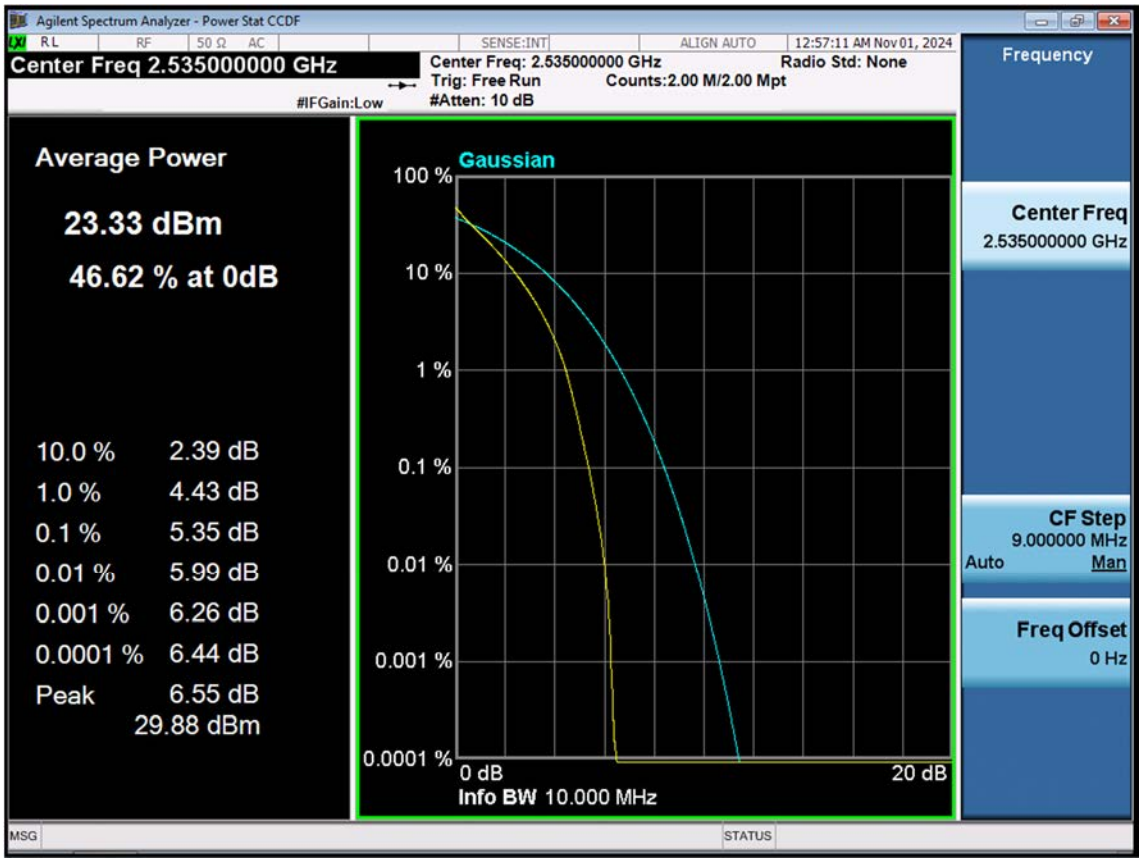
LTE B7_5 M_PAR_Mid_64QAM_FullRB



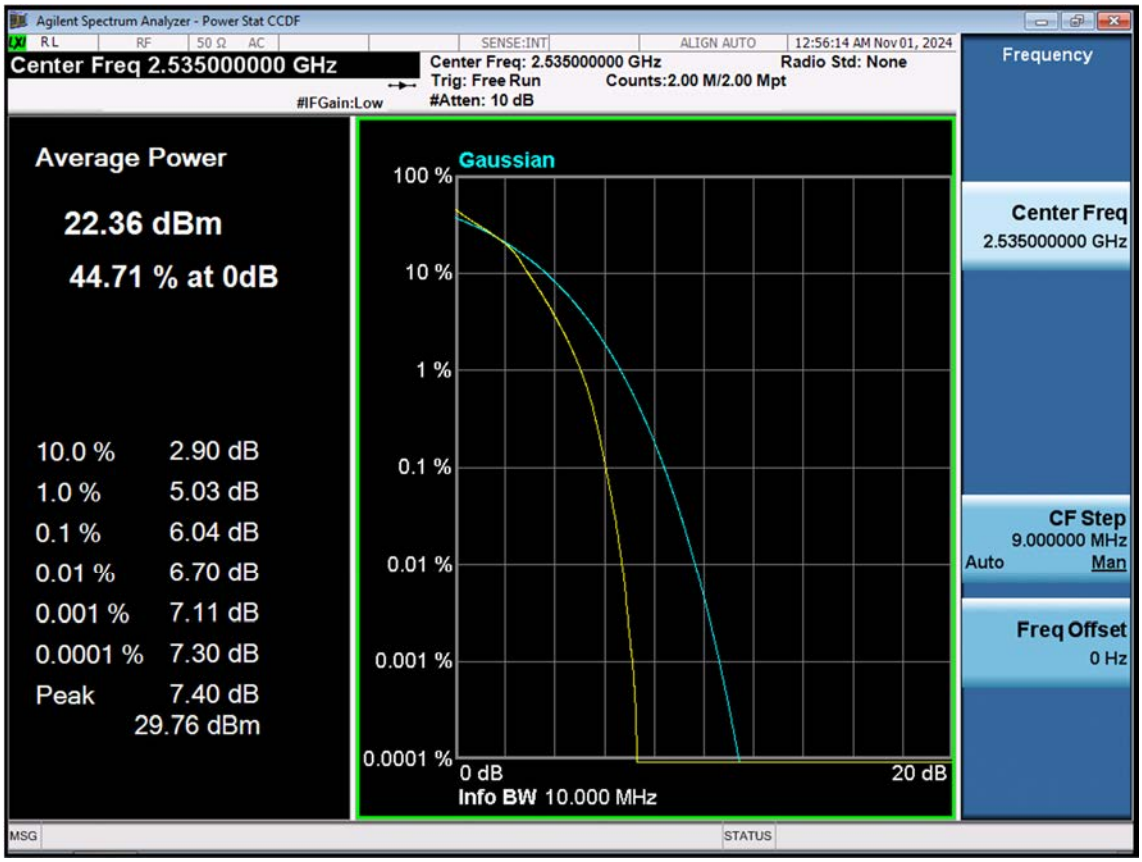
LTE B7_5 M_PAR_Mid_256QAM_FullRB



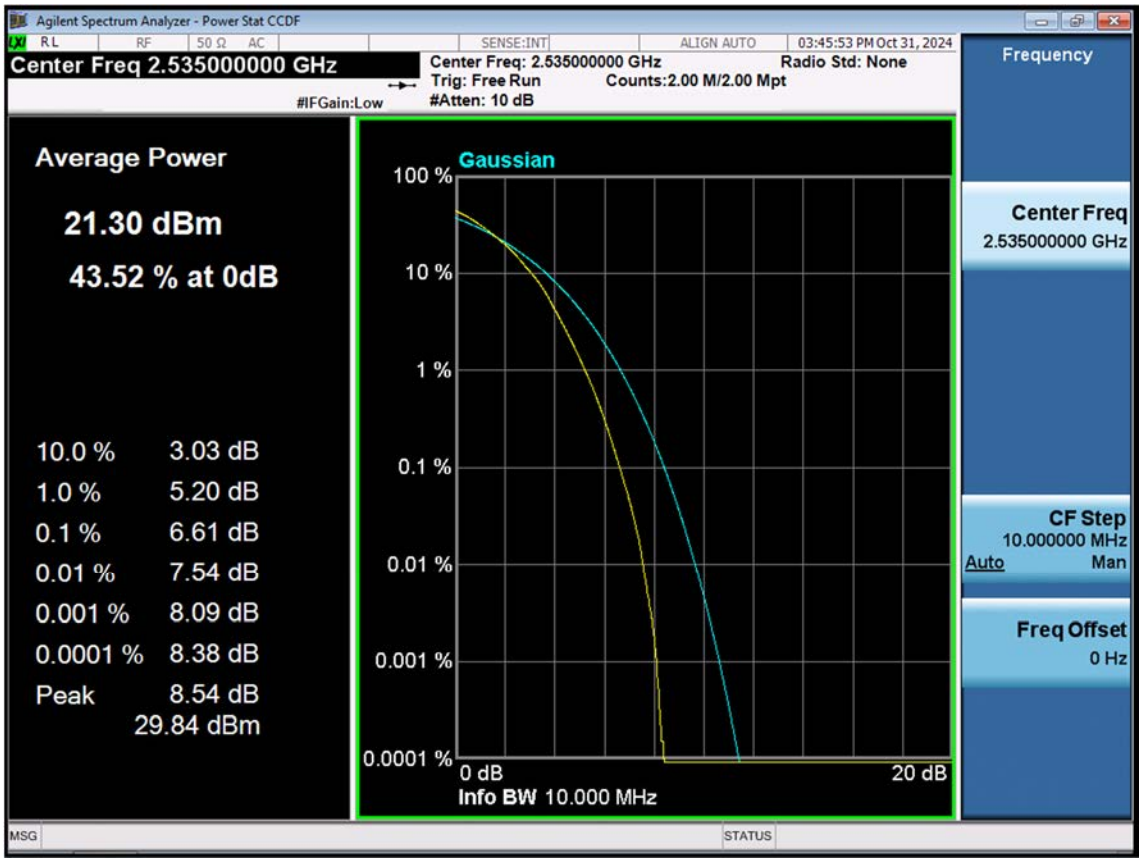
LTE B7_10 M_PAR_Mid_QPSK_FullRB



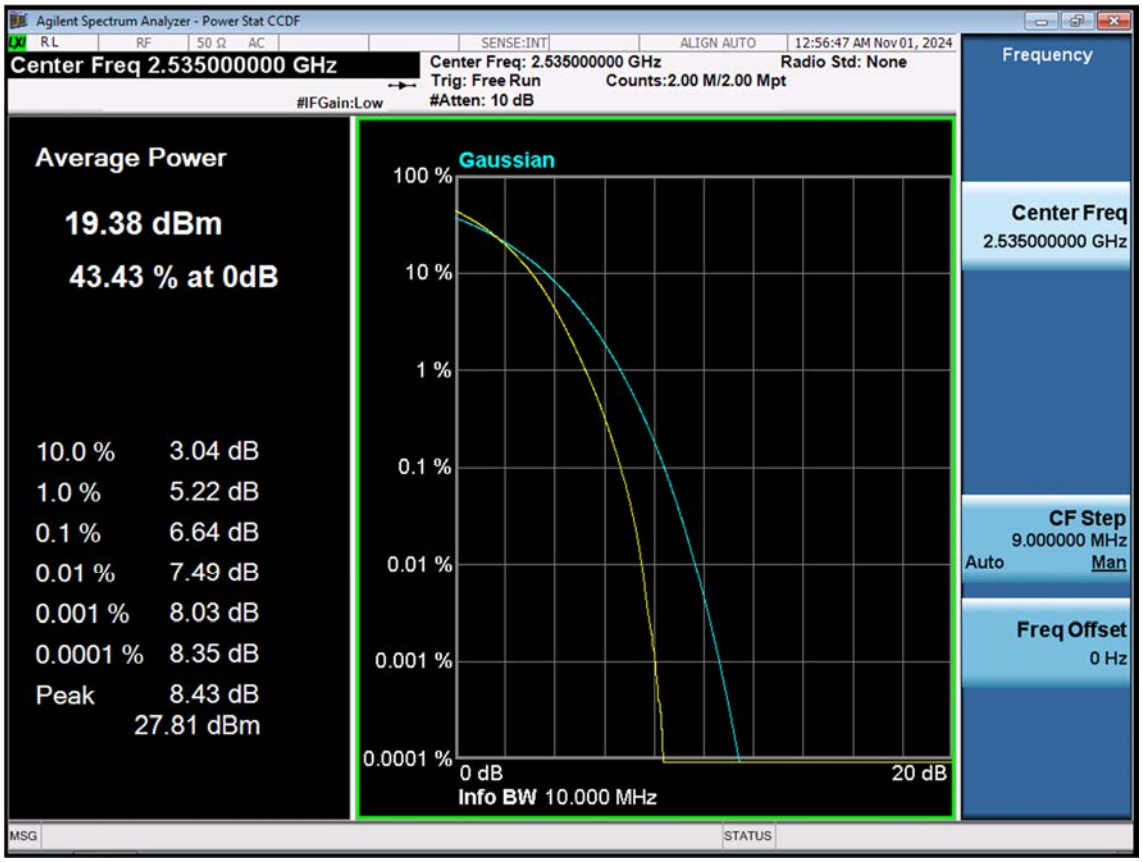
LTE B7_10 M_PAR_Mid_16QAM_FullRB



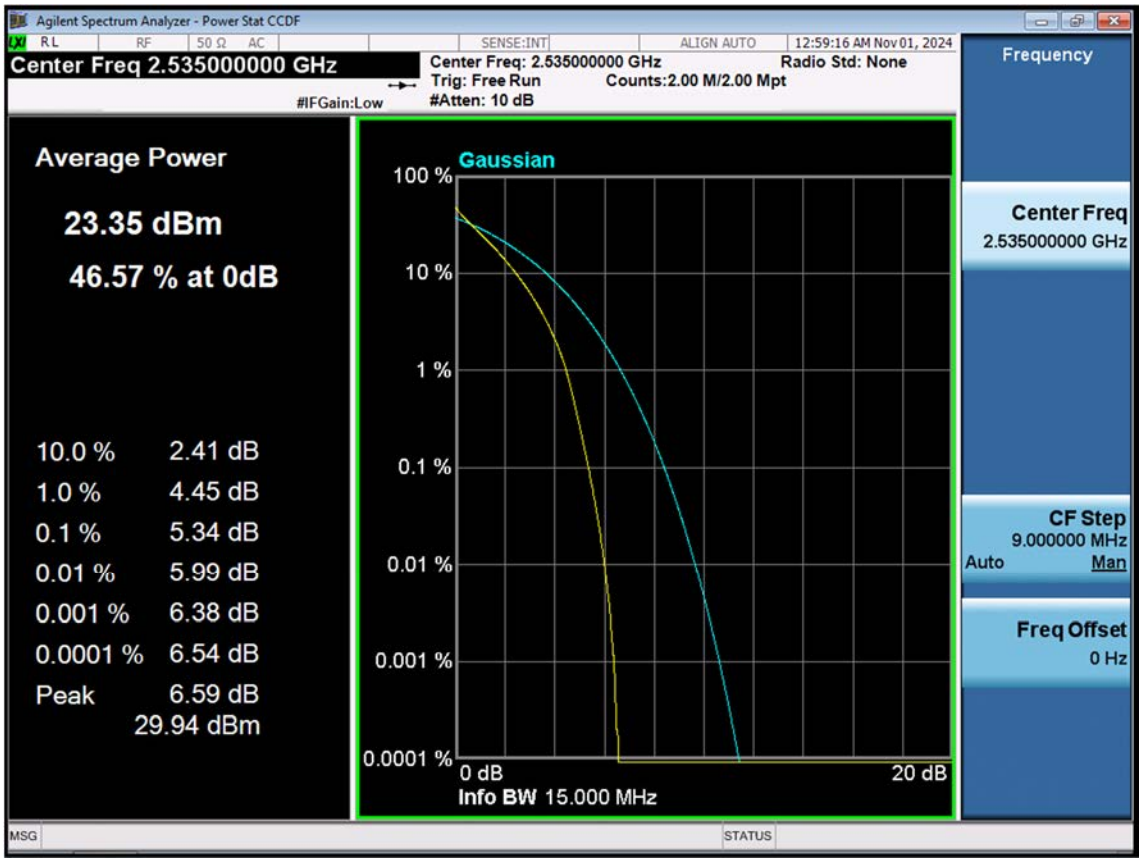
LTE B7_10 M_PAR_Mid_64QAM_FullRB



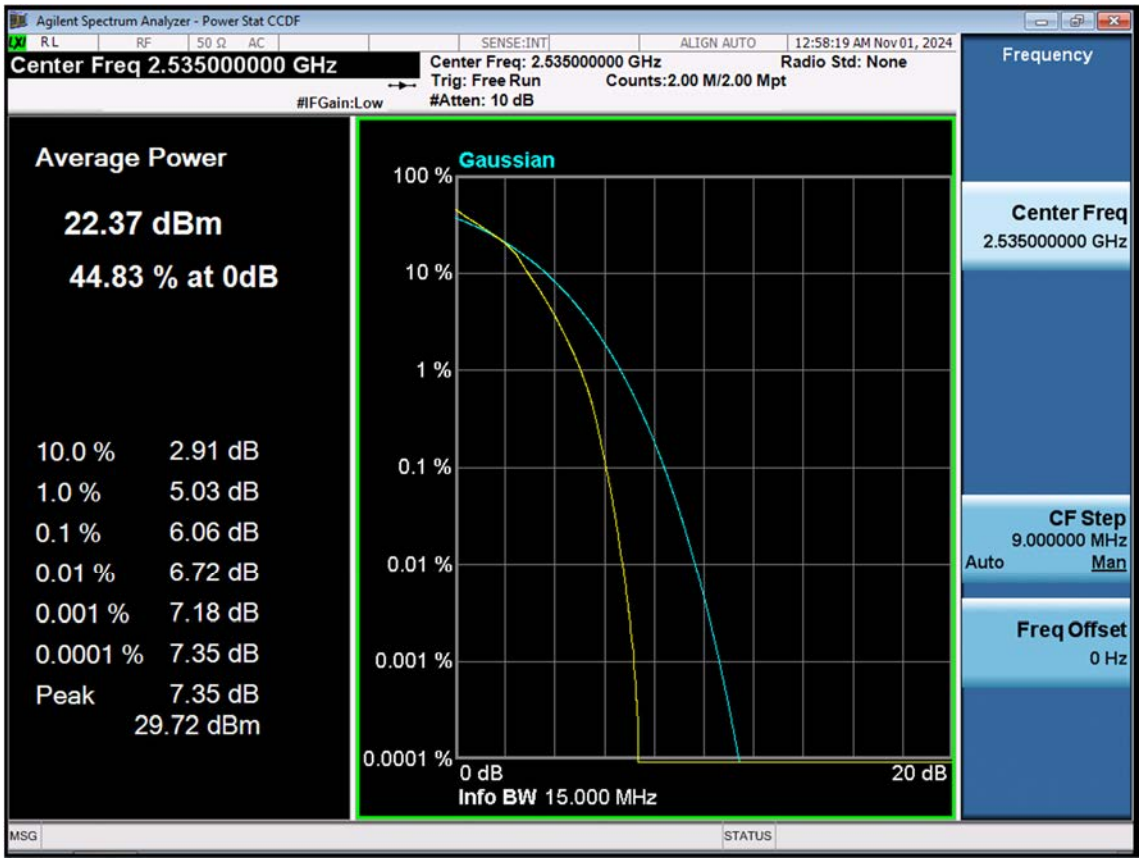
LTE B7_10 M_PAR_Mid_256QAM_FullRB



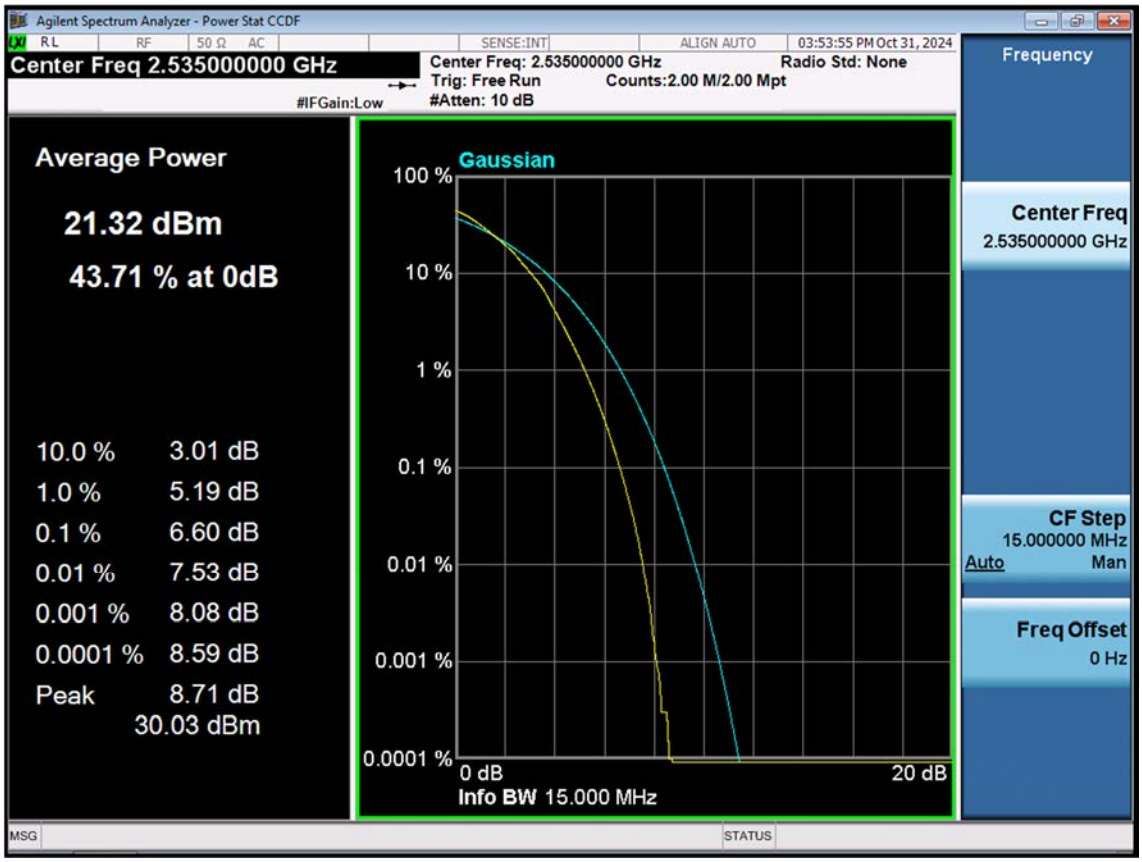
LTE B7_15 M_PAR_Mid_QPSK_FullRB



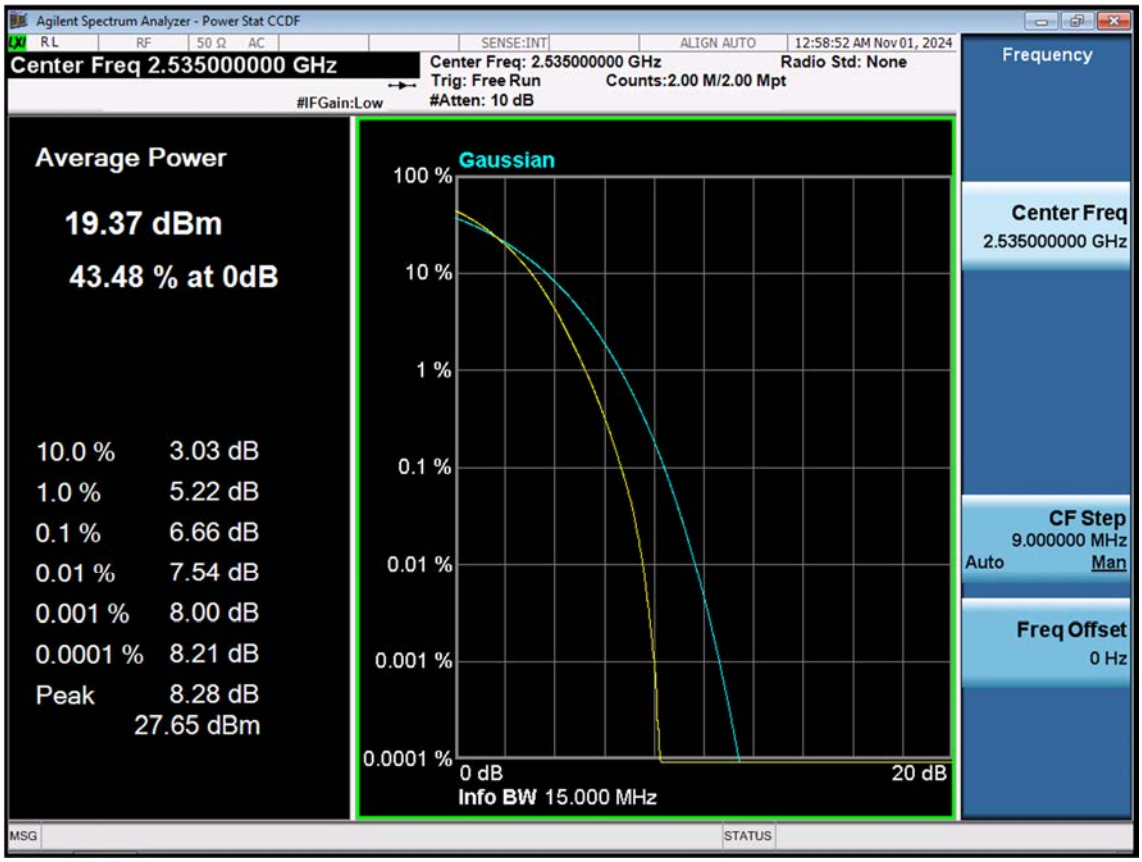
LTE B7_15 M_PAR_Mid_16QAM_FullRB



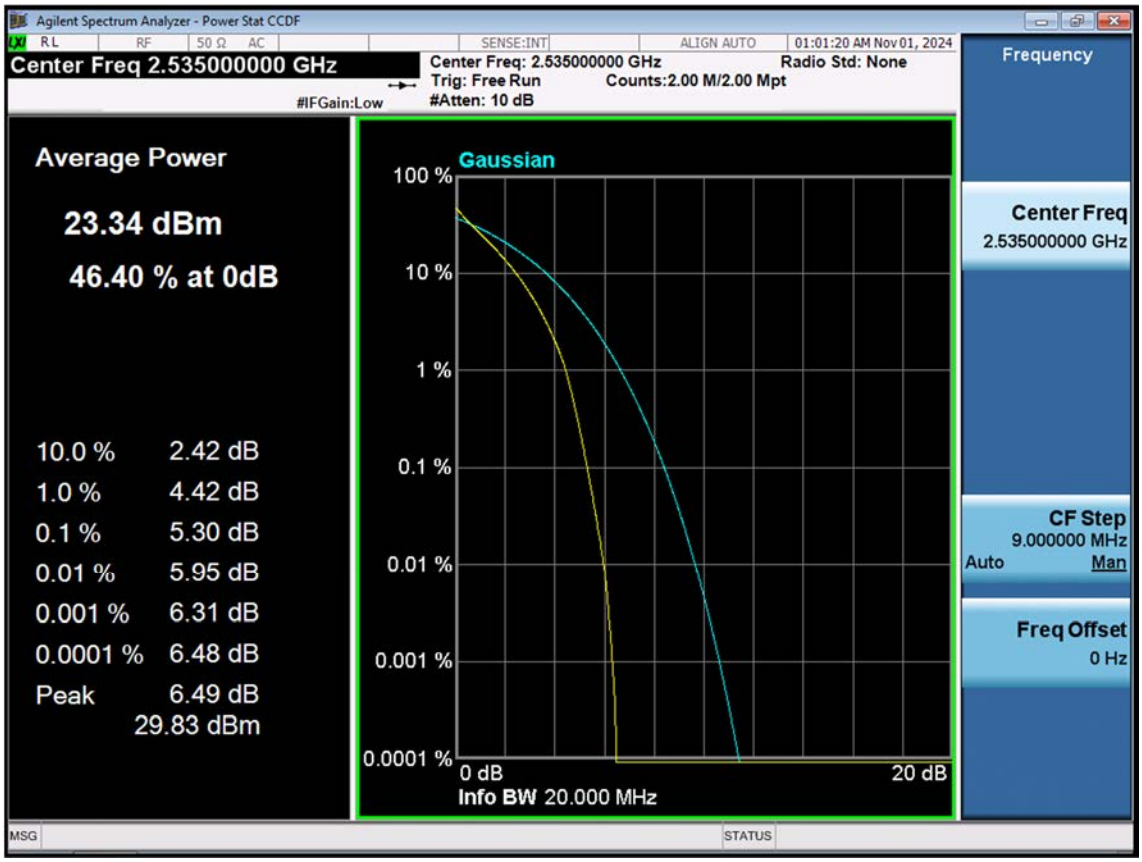
LTE B7_15 M_PAR_Mid_64QAM_FullRB



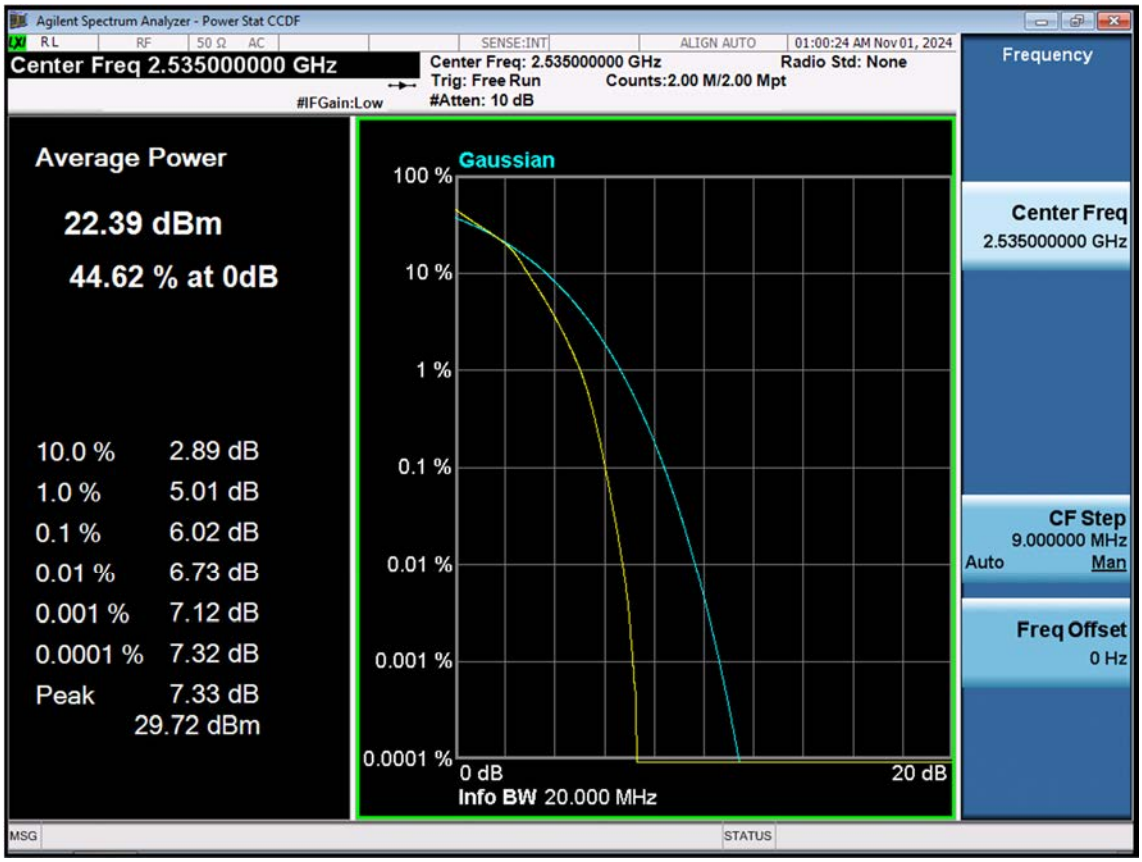
LTE B7_15 M_PAR_Mid_256QAM_FullRB



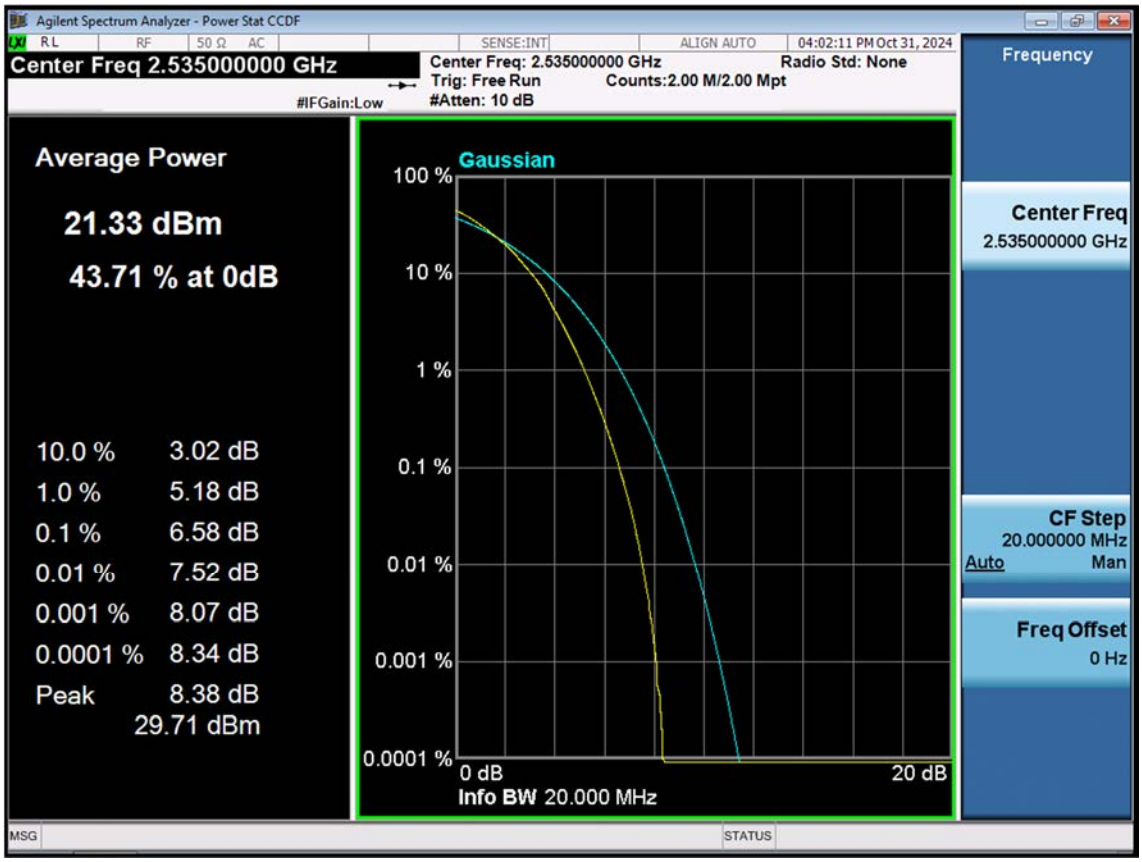
LTE B7_20 M_PAR_Mid_QPSK_FullRB



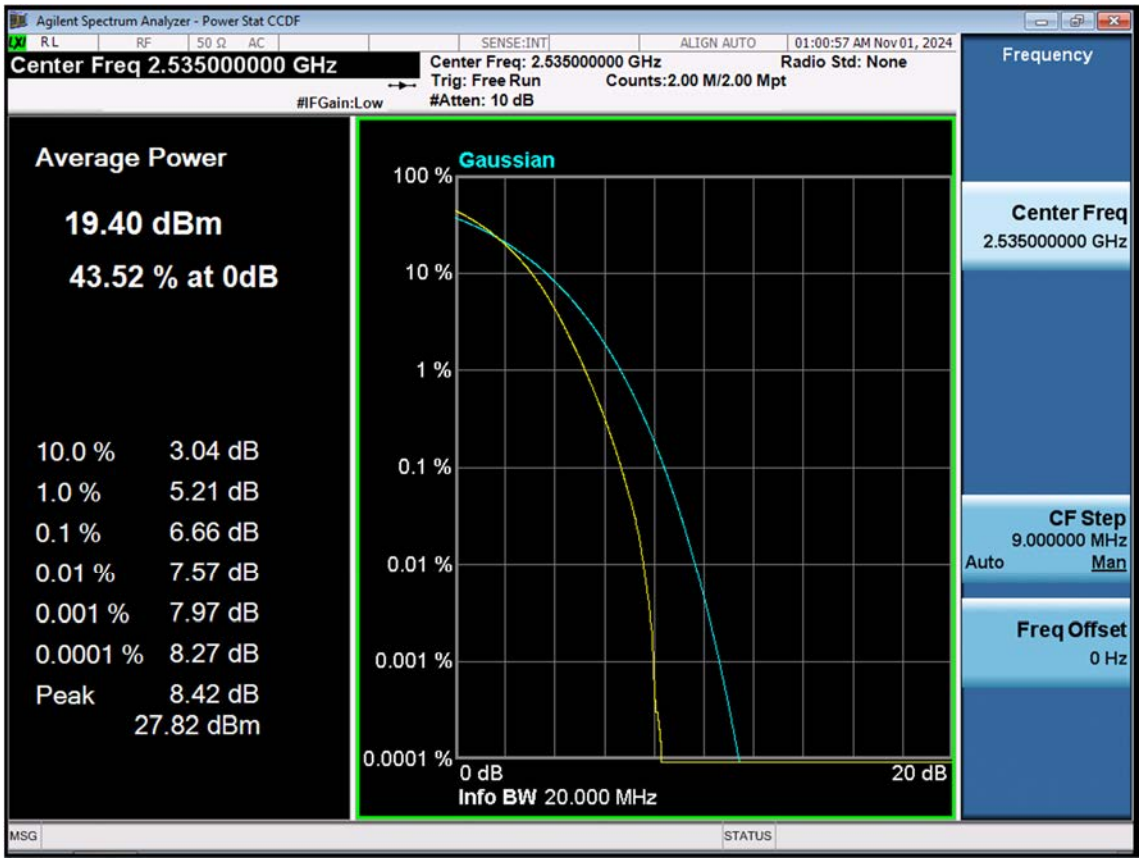
LTE B7_20 M_PAR_Mid_16QAM_FullRB



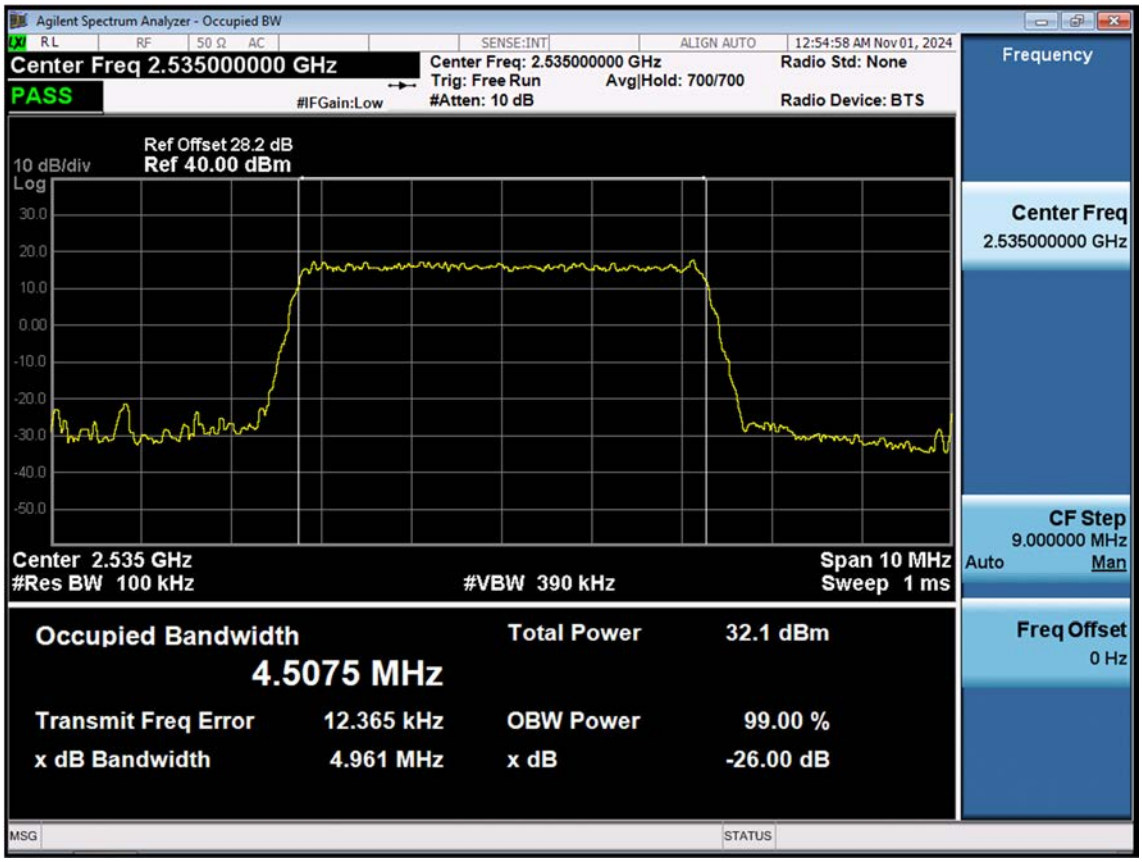
LTE B7_20 M_PAR_Mid_64QAM_FullRB



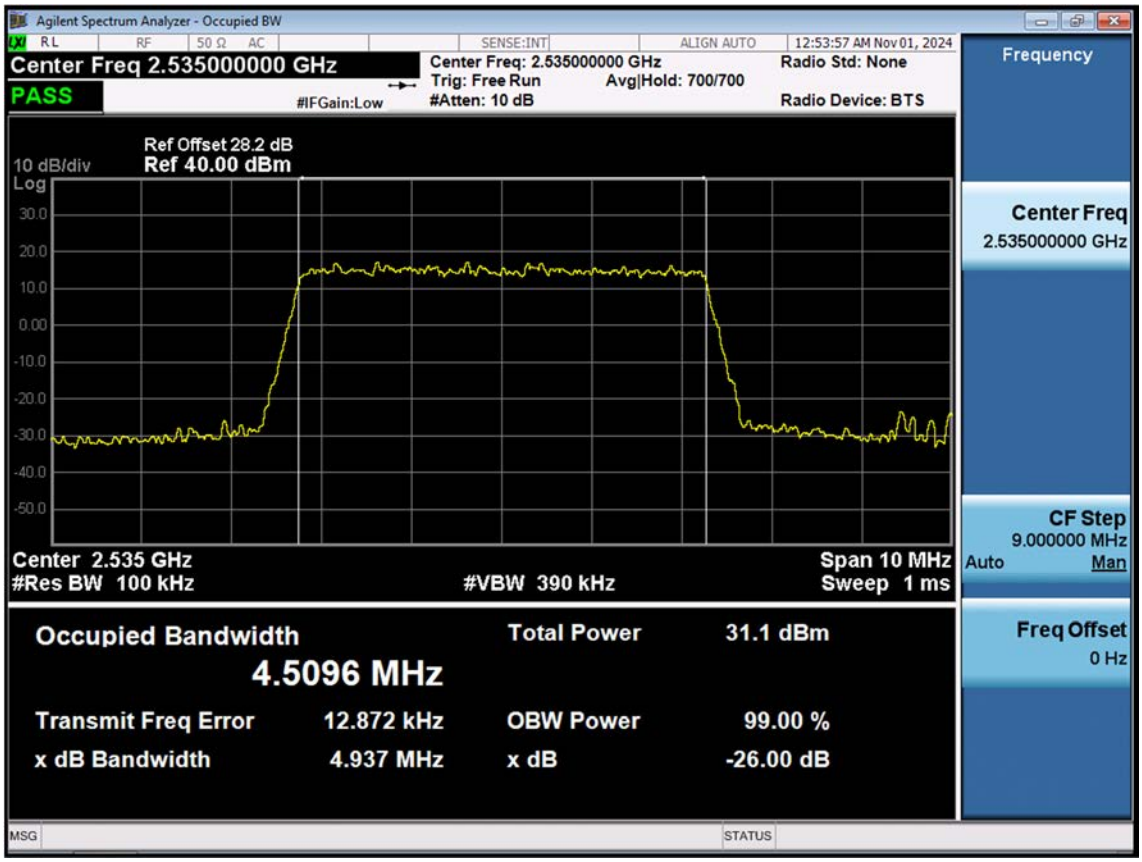
LTE B7_20 M_PAR_Mid_256QAM_FullRB



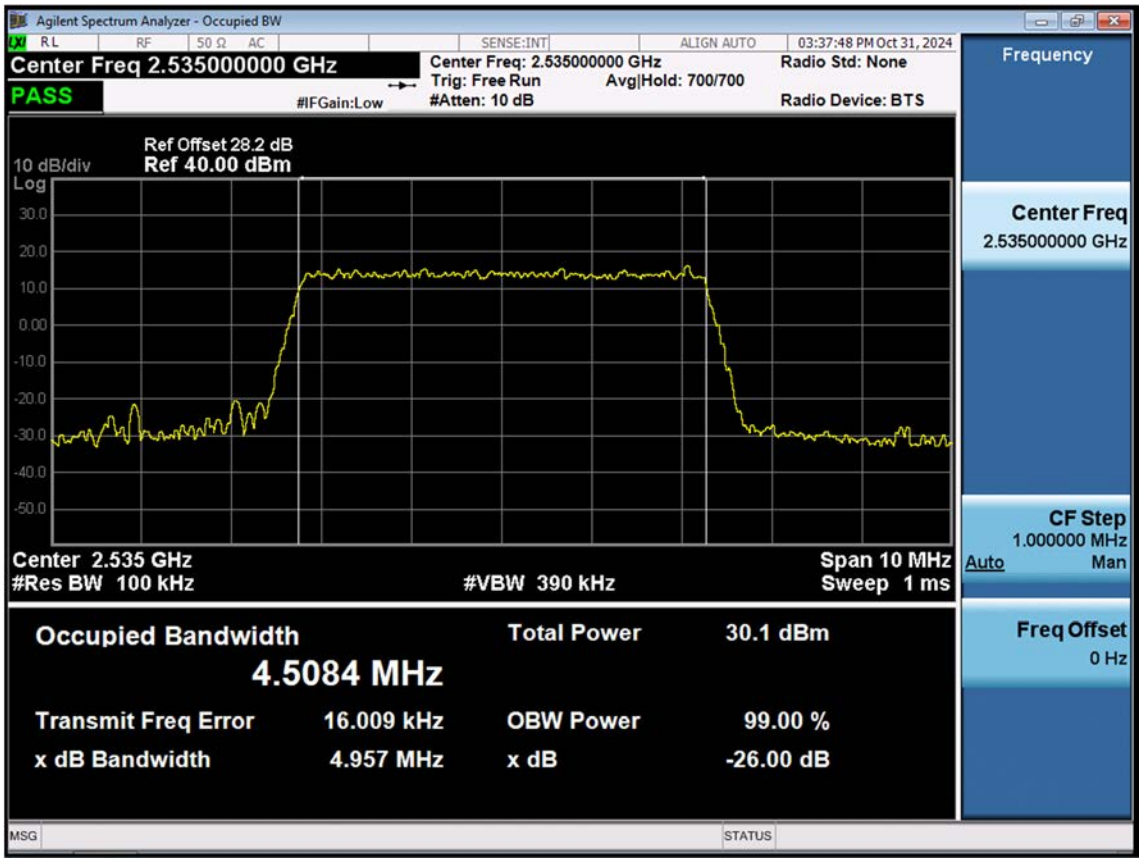
LTE B7_5 M_OBW_Mid_QPSK_FullRB



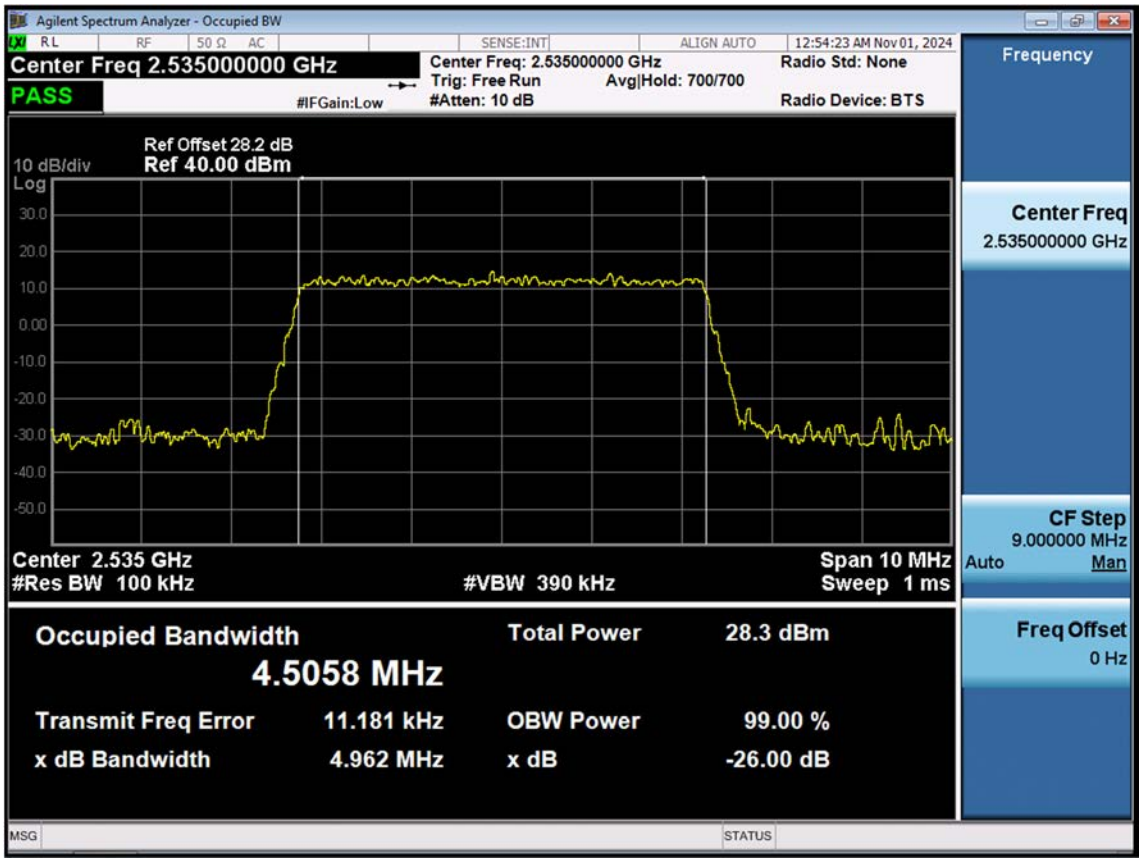
LTE B7_5 M_OBW_Mid_16QAM_FullRB



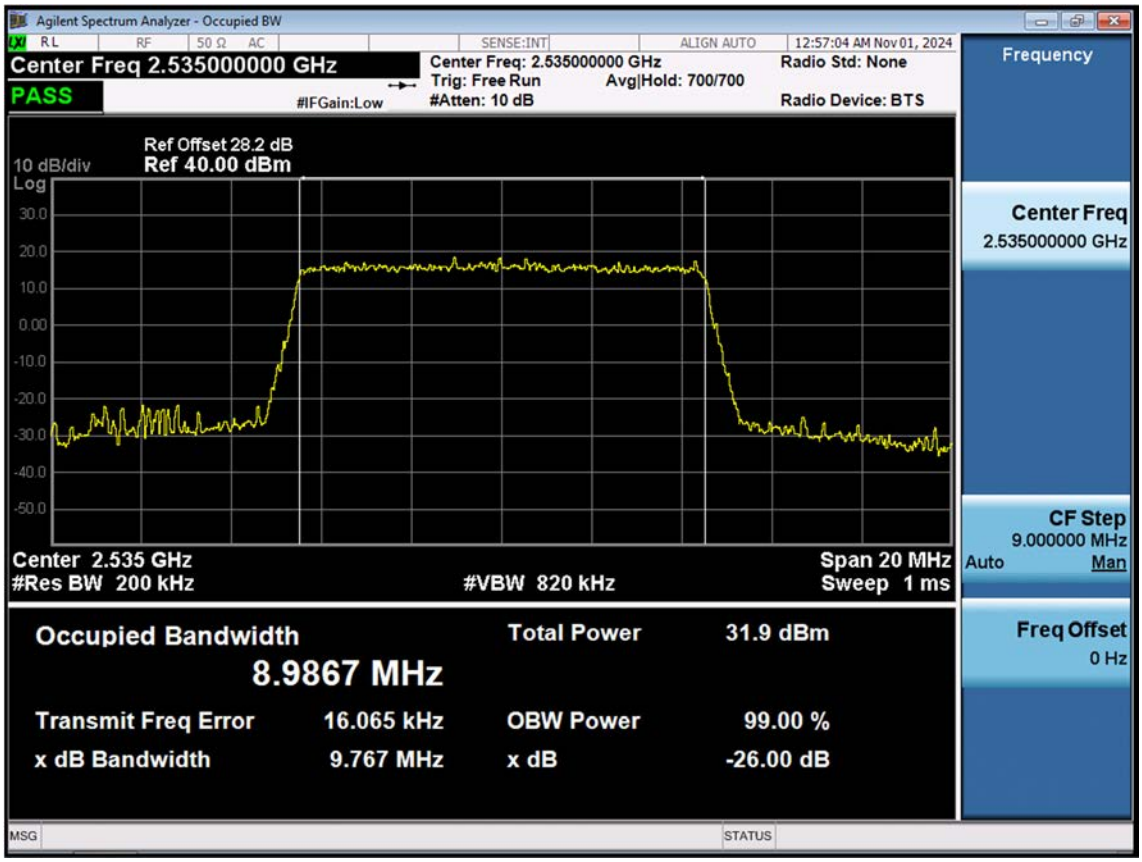
LTE B7_5 M_OBW_Mid_64QAM_FullRB



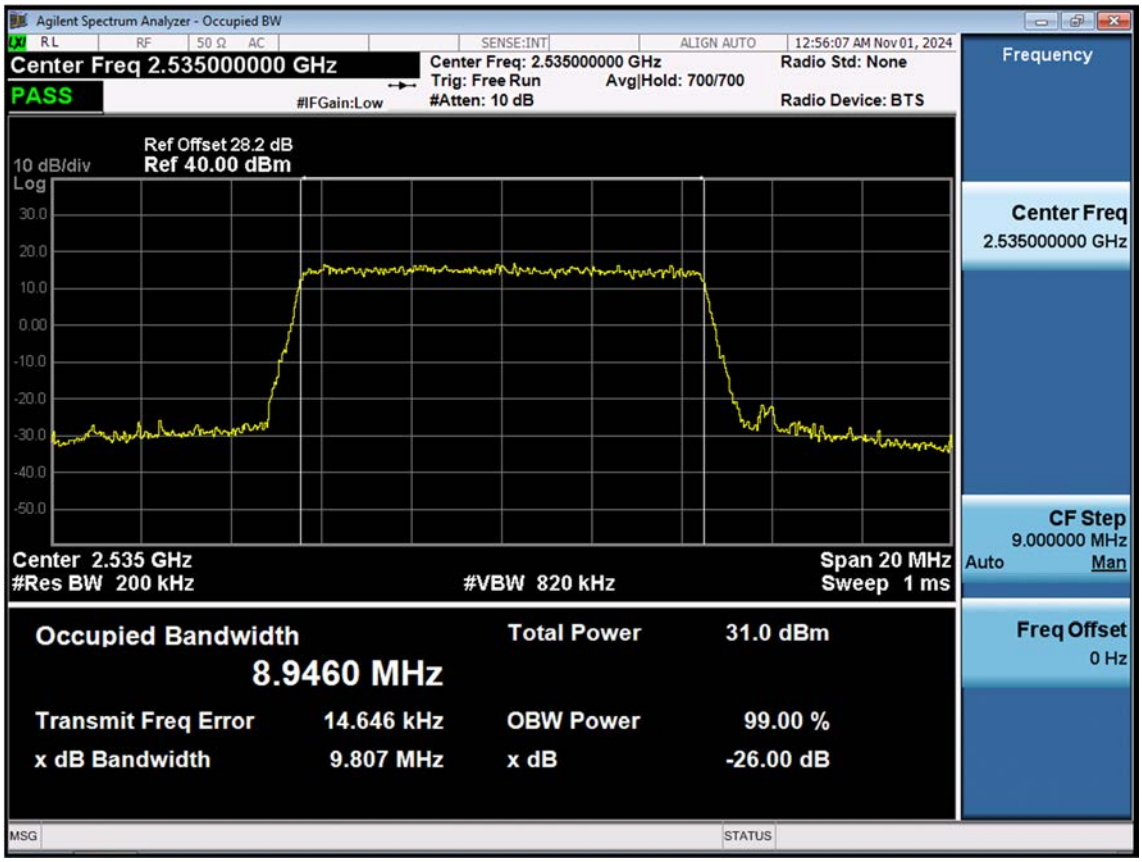
LTE B7_5 M_OBW_Mid_256QAM_FullRB



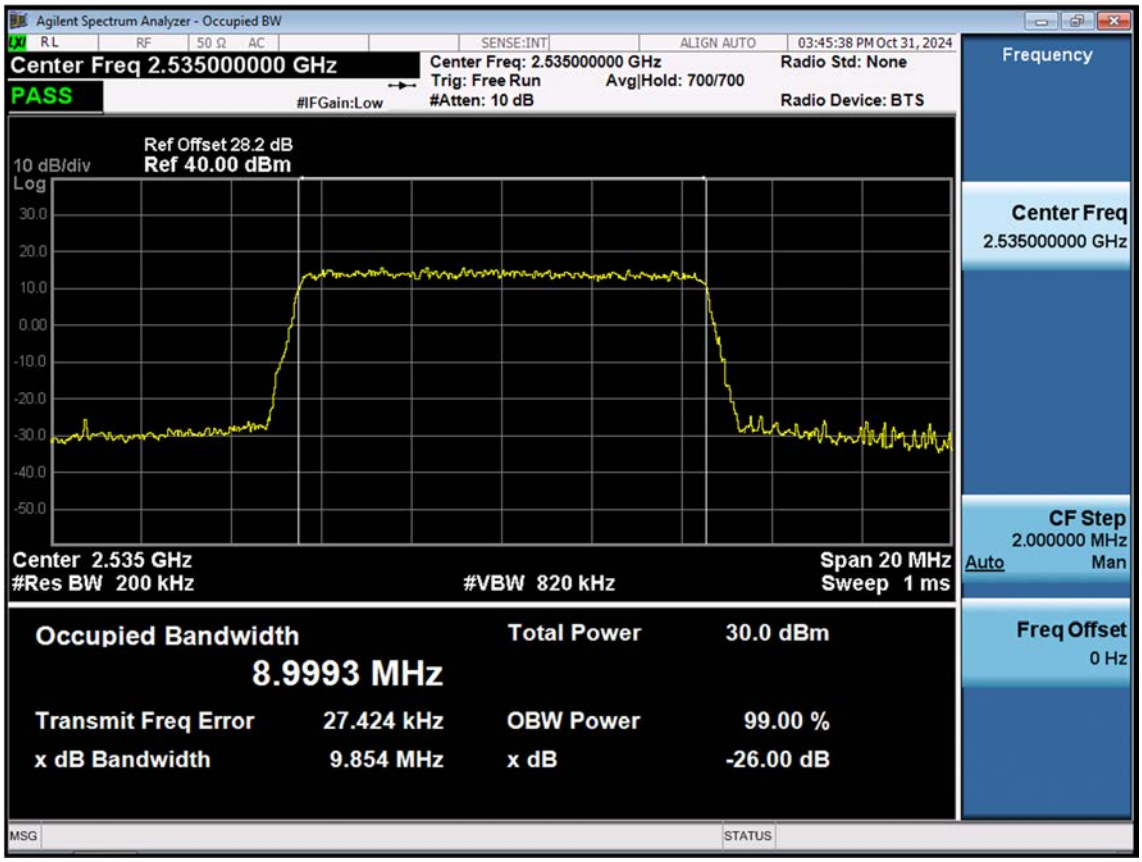
LTE B7_10 M_OBW_Mid_QPSK_FullRB



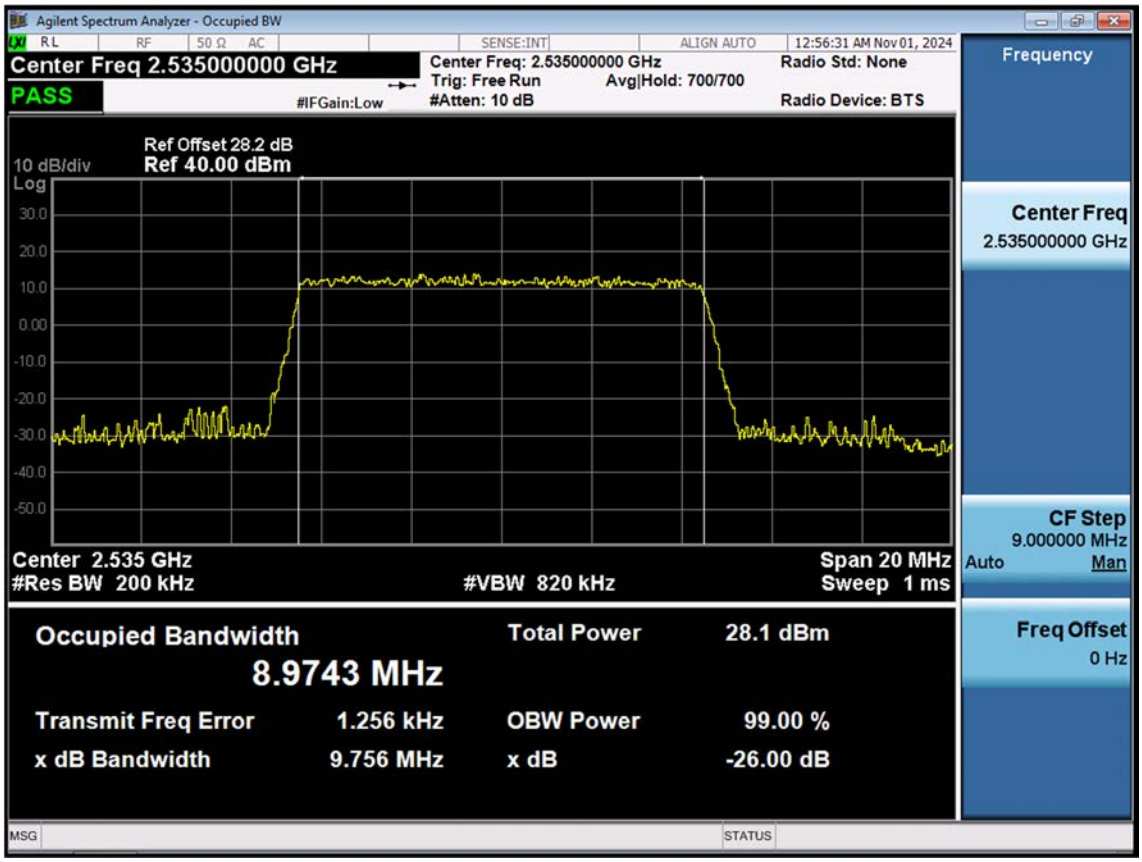
LTE B7_10 M_OBW_Mid_16QAM_FullRB



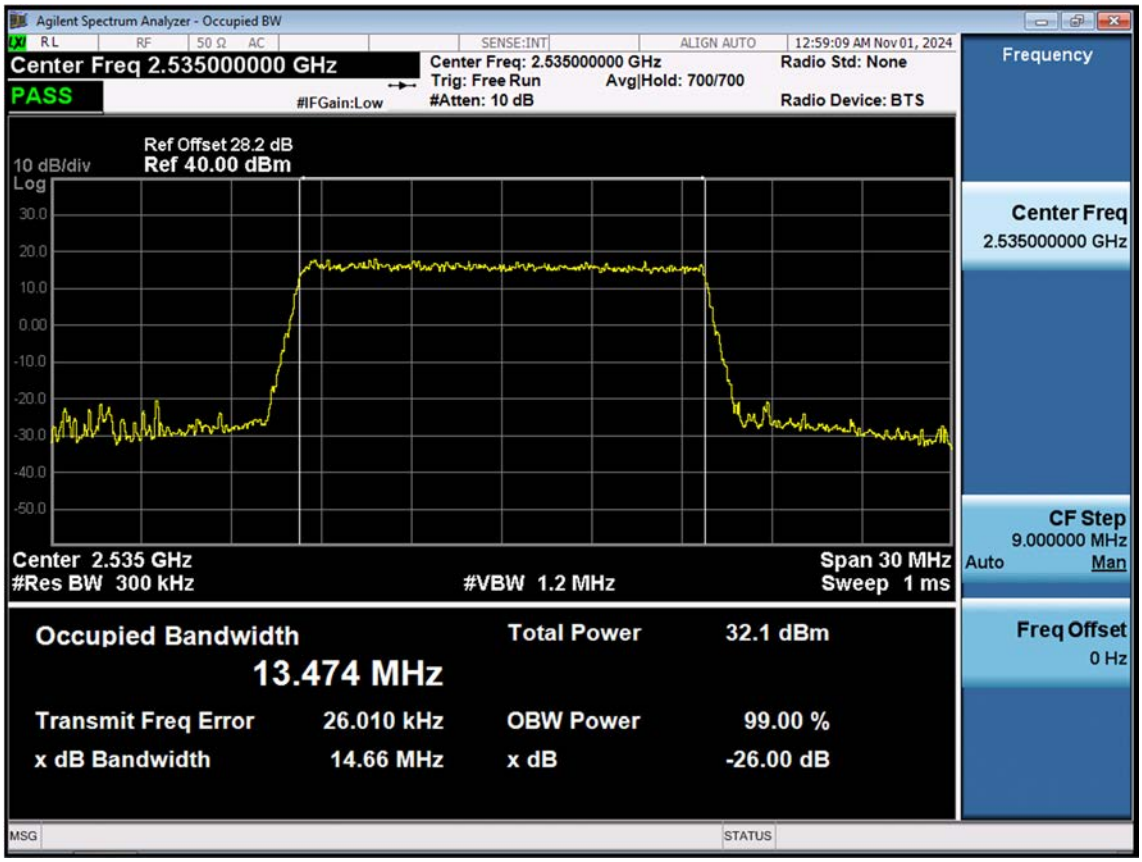
LTE B7_10 M_OBW_Mid_64QAM_FullRB



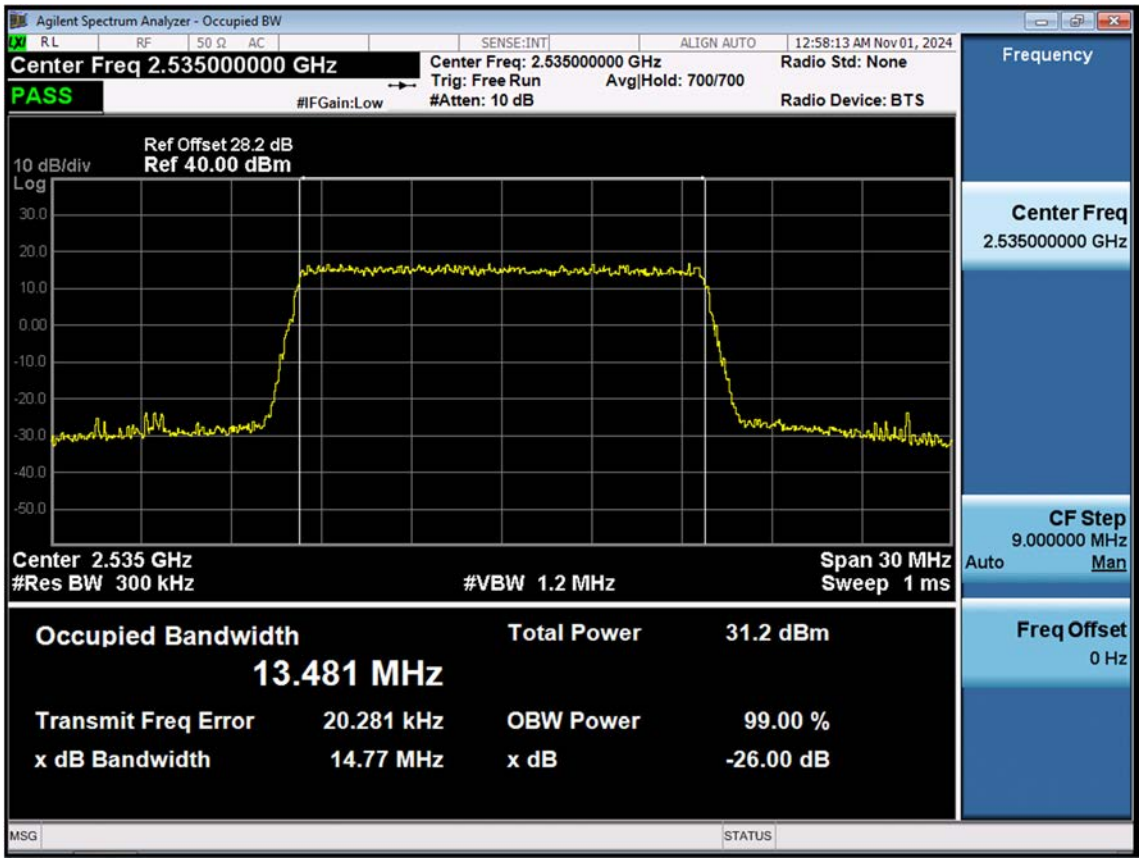
LTE B7_10 M_OBW_Mid_256QAM_FullRB



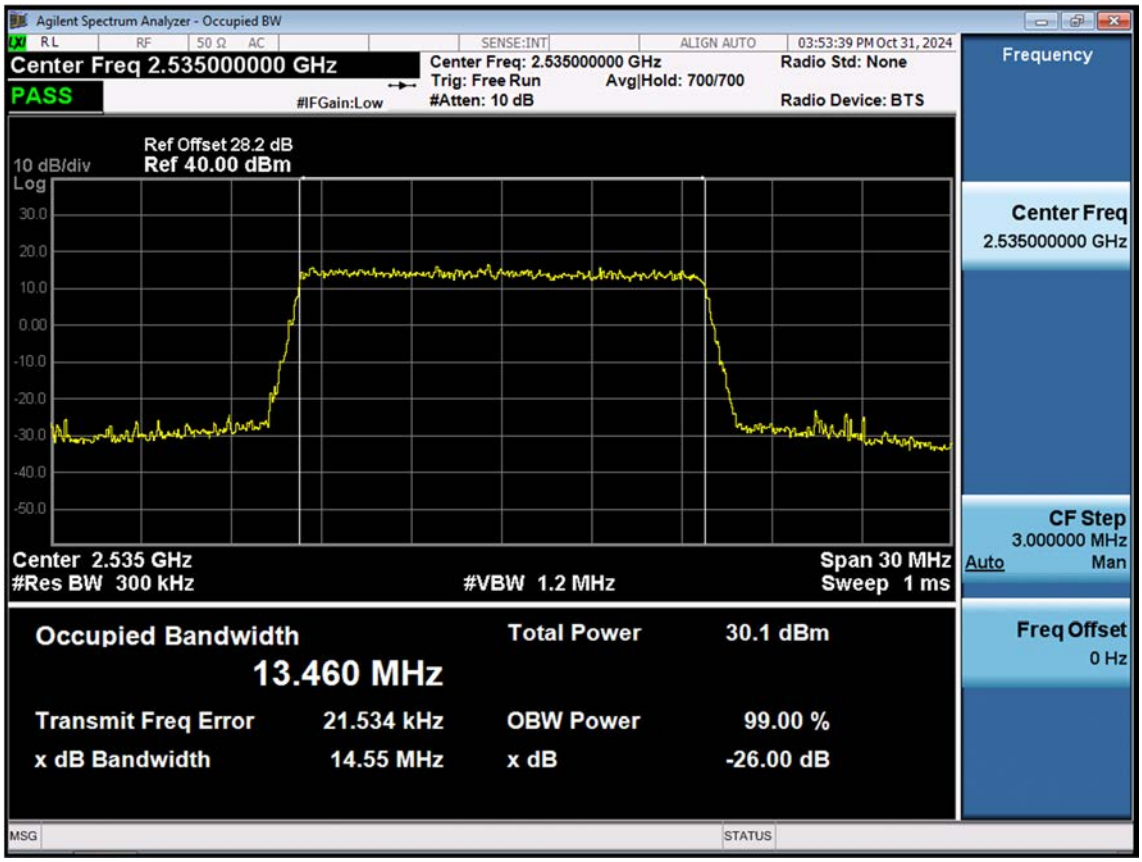
LTE B7_15 M_OBW_Mid_QPSK_FullRB



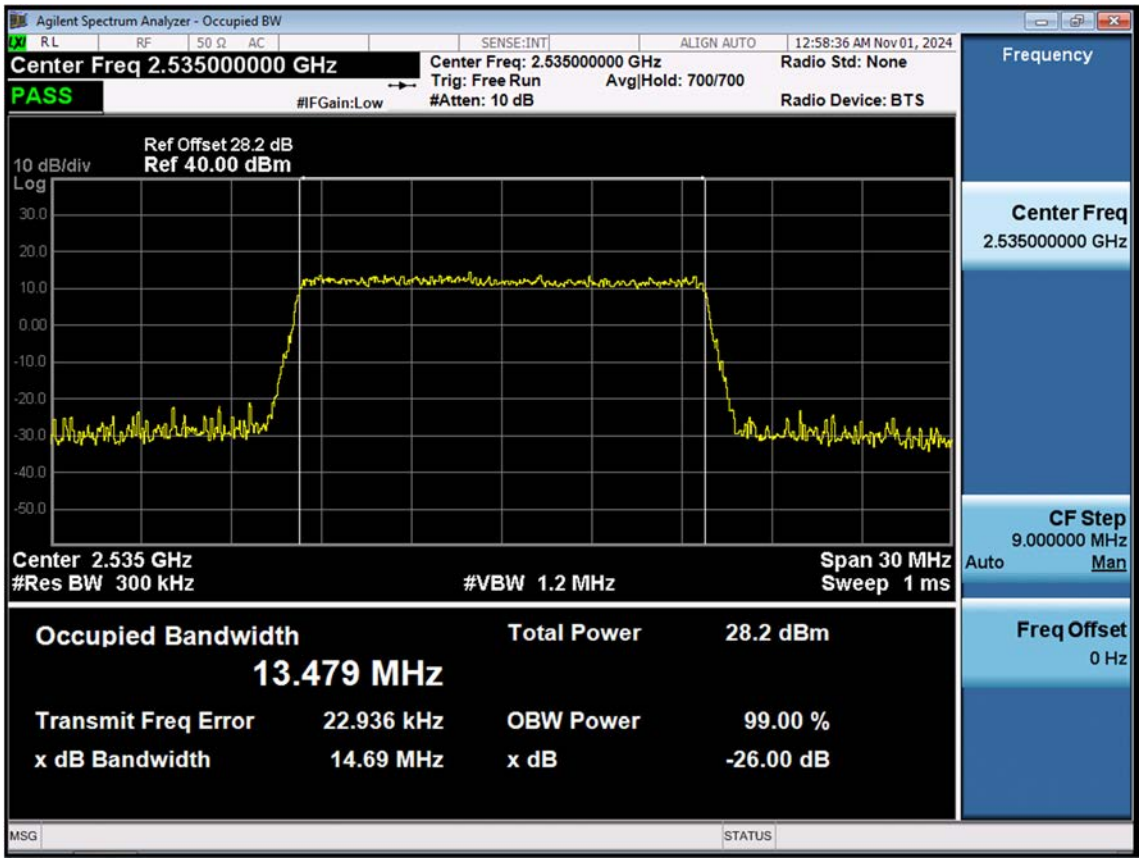
LTE B7_15 M_OBW_Mid_16QAM_FullRB



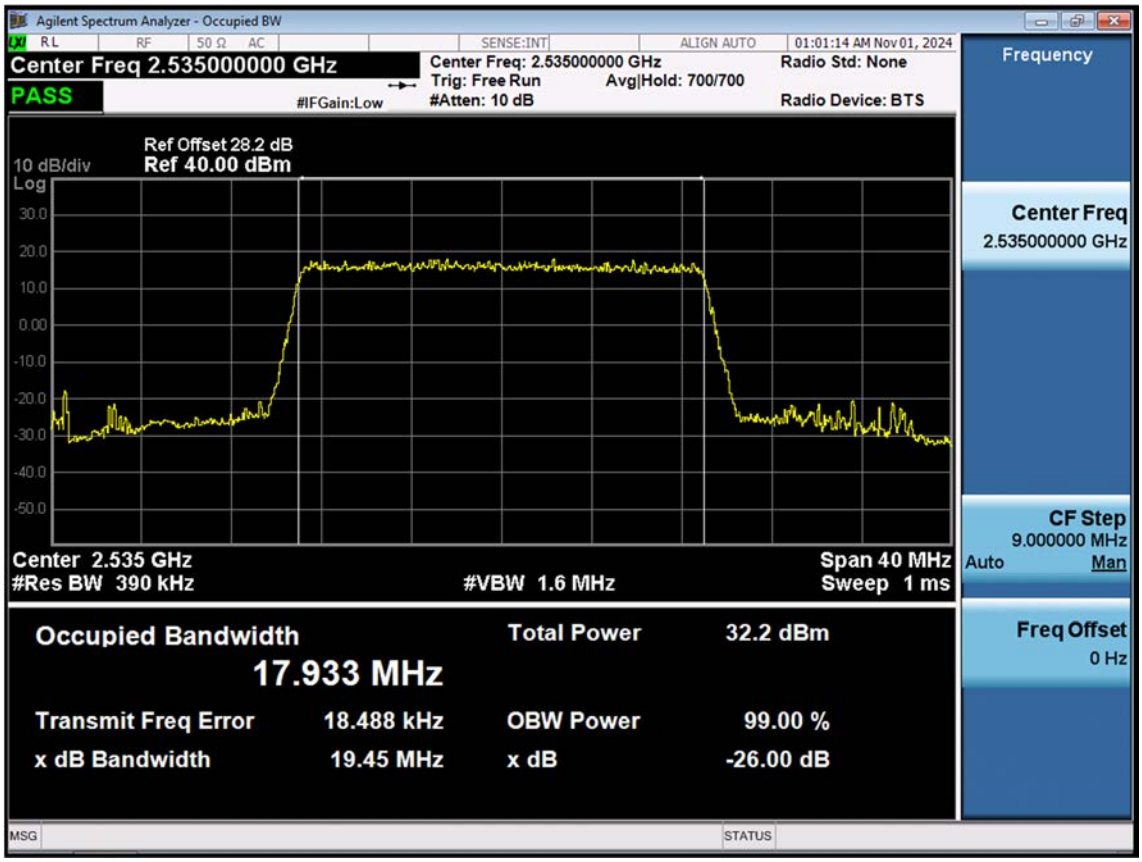
LTE B7_15 M_OBW_Mid_64QAM_FullRB



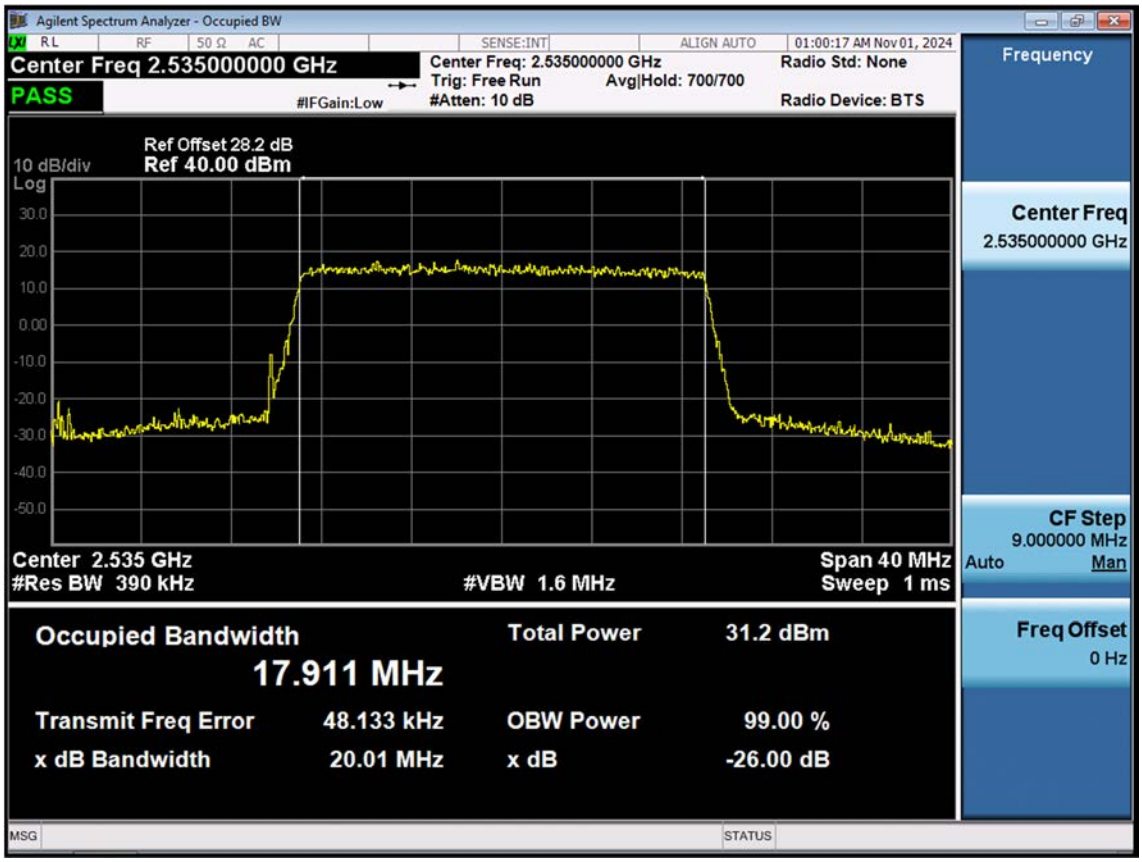
LTE B7_15 M_OBW_Mid_256QAM_FullRB



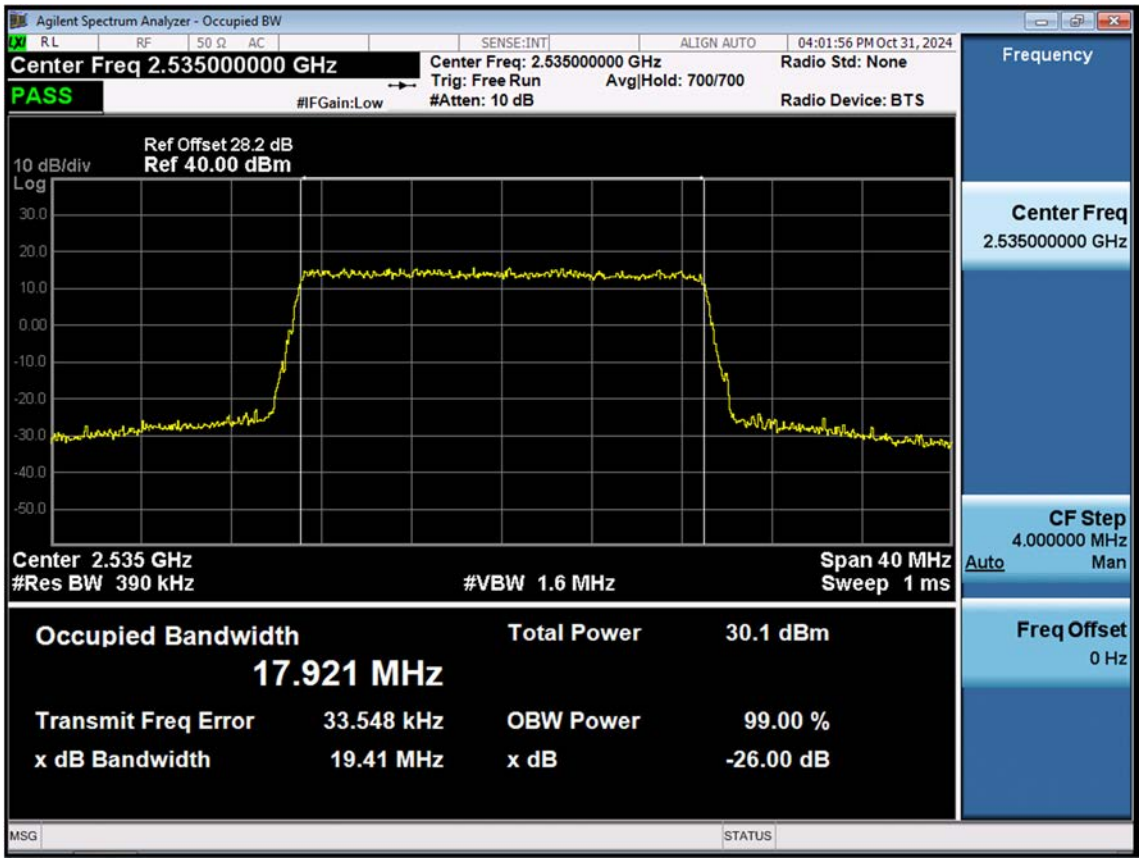
LTE B7_20 M_OBW_Mid_QPSK_FullRB



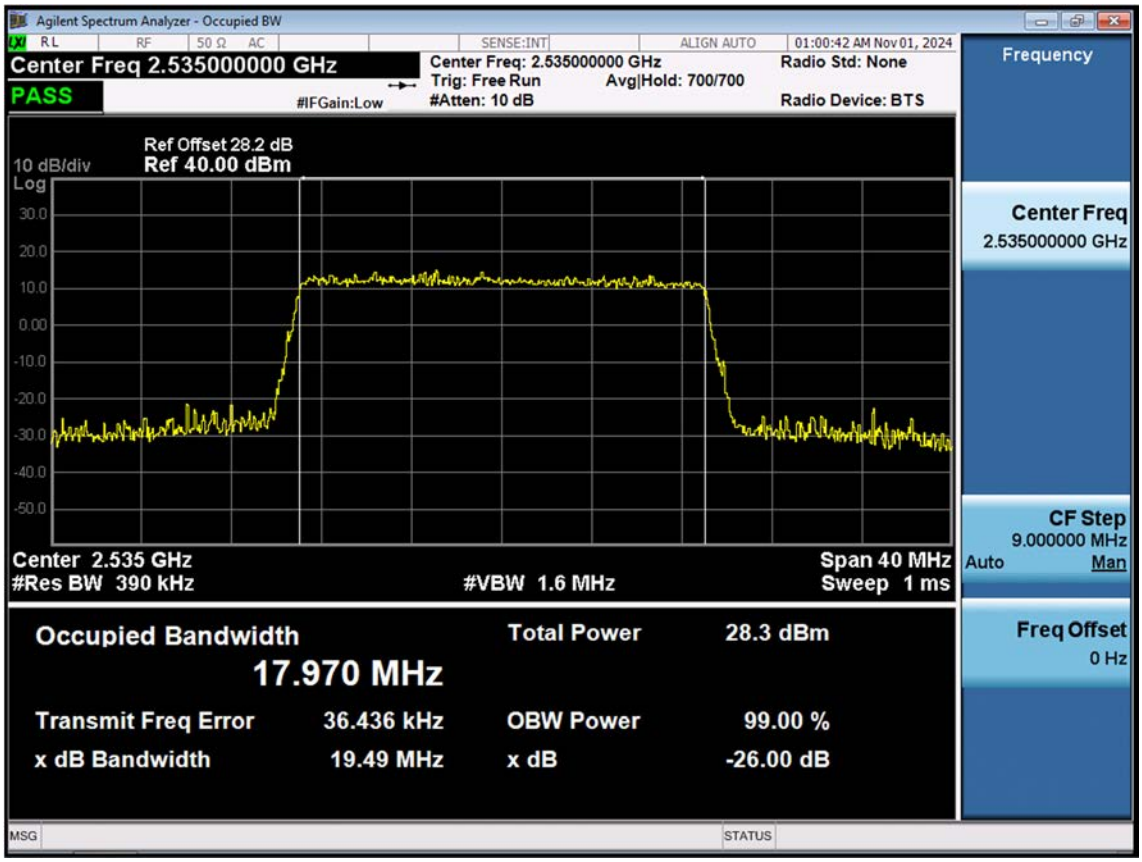
LTE B7_20 M_OBW_Mid_16QAM_FullRB



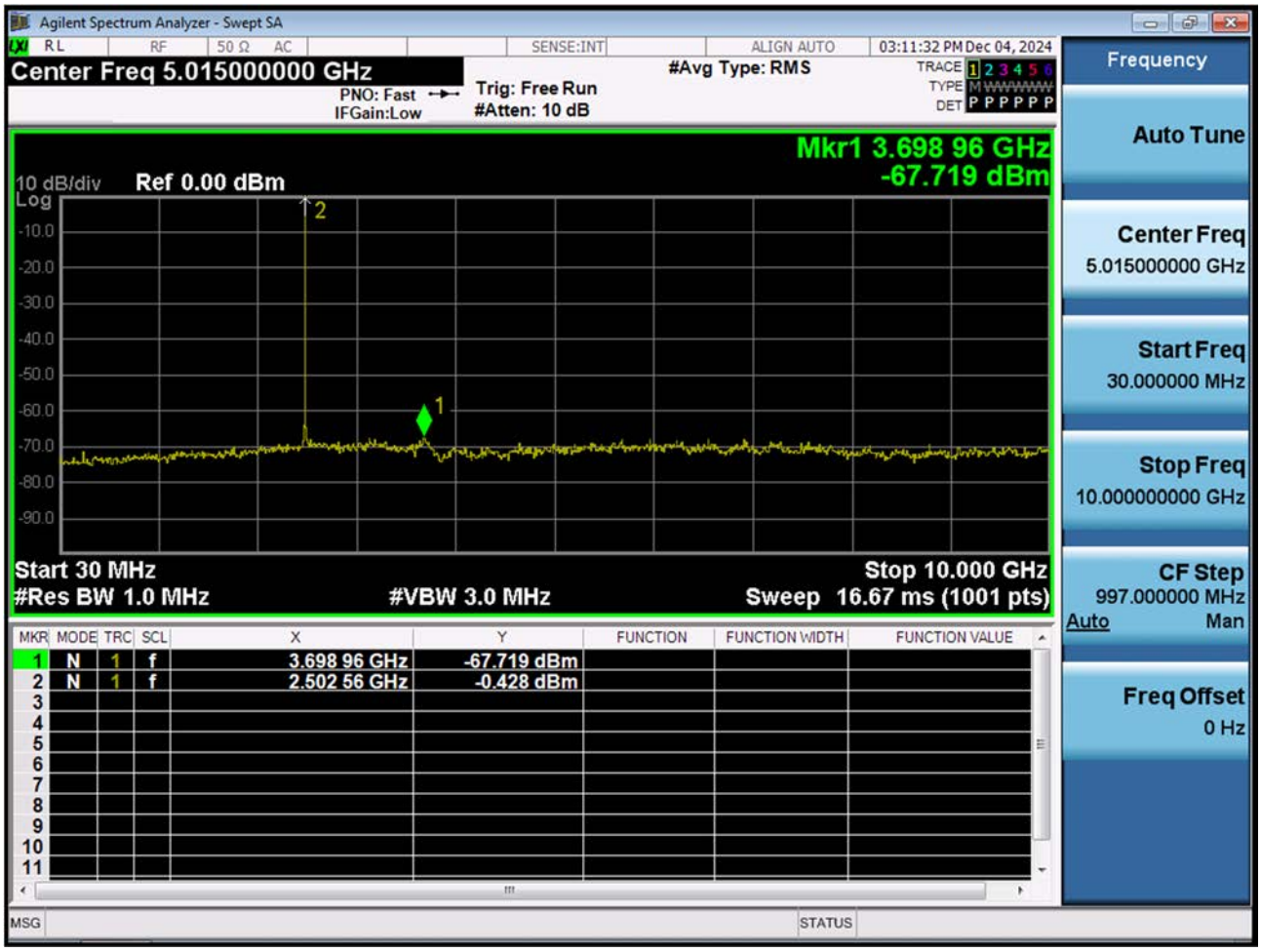
LTE B7_20 M_OBW_Mid_64QAM_FullRB



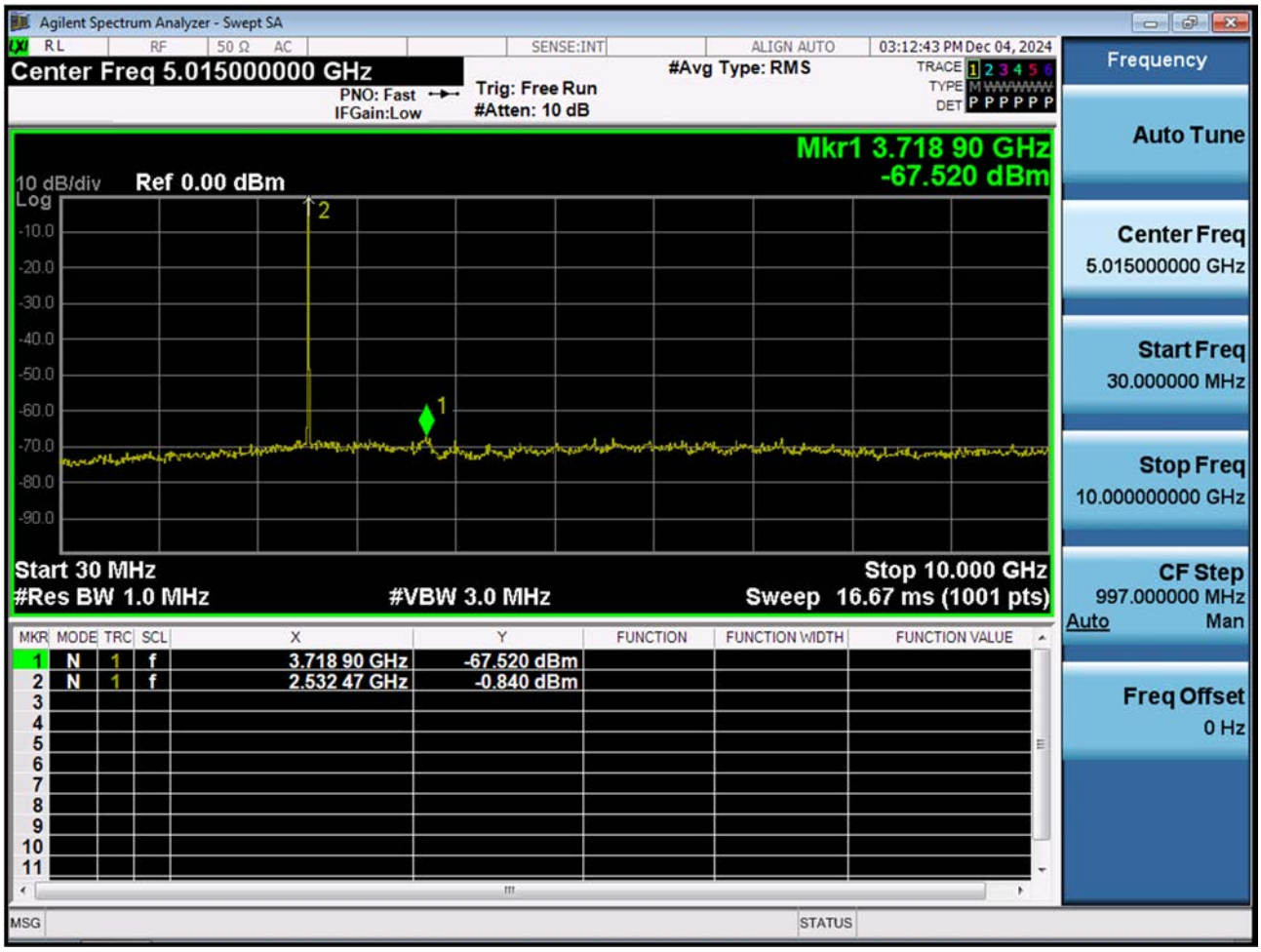
LTE B7_20 M_OBW_Mid_256QAM_FullRB



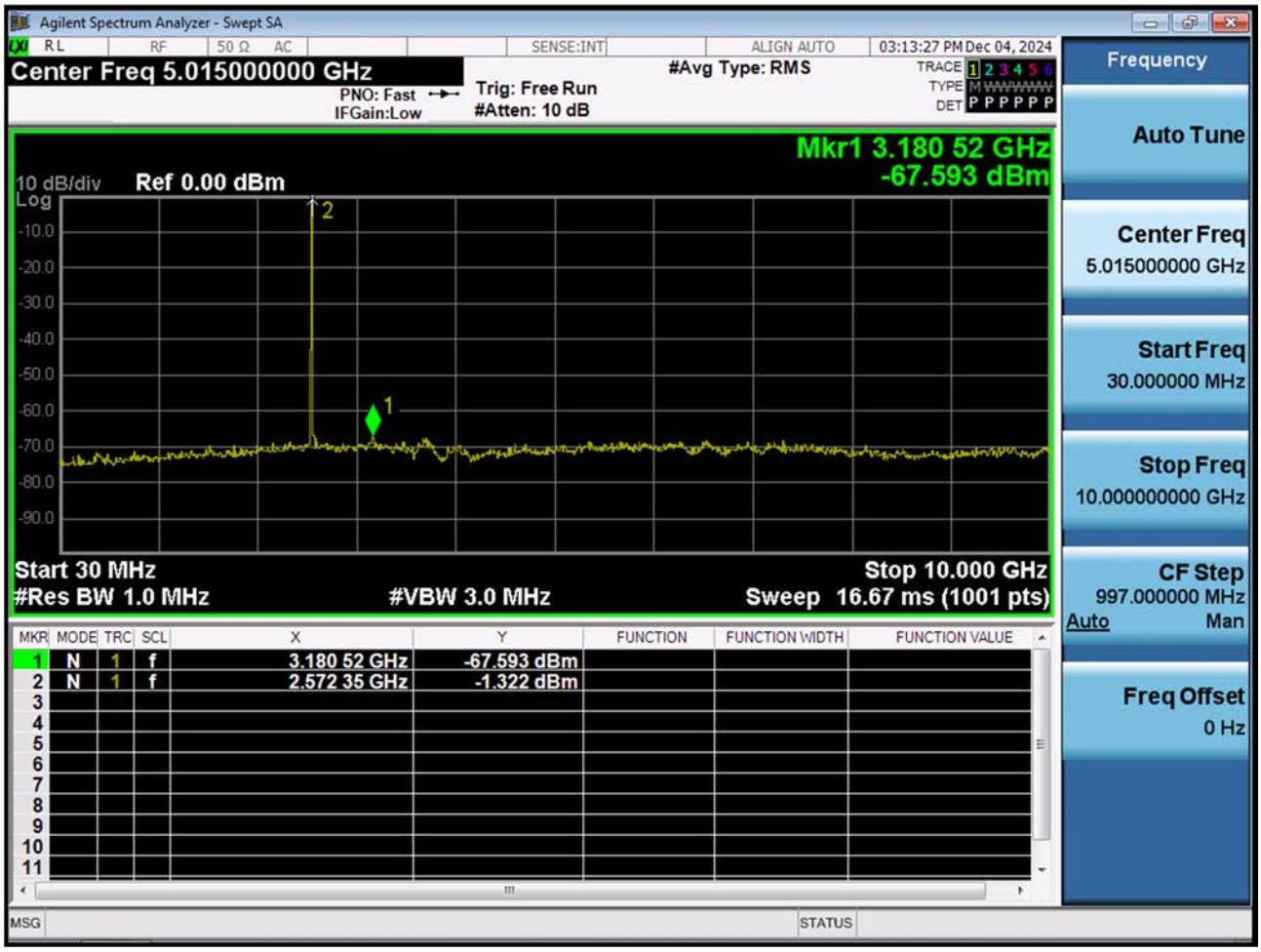
LTE B7_5 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



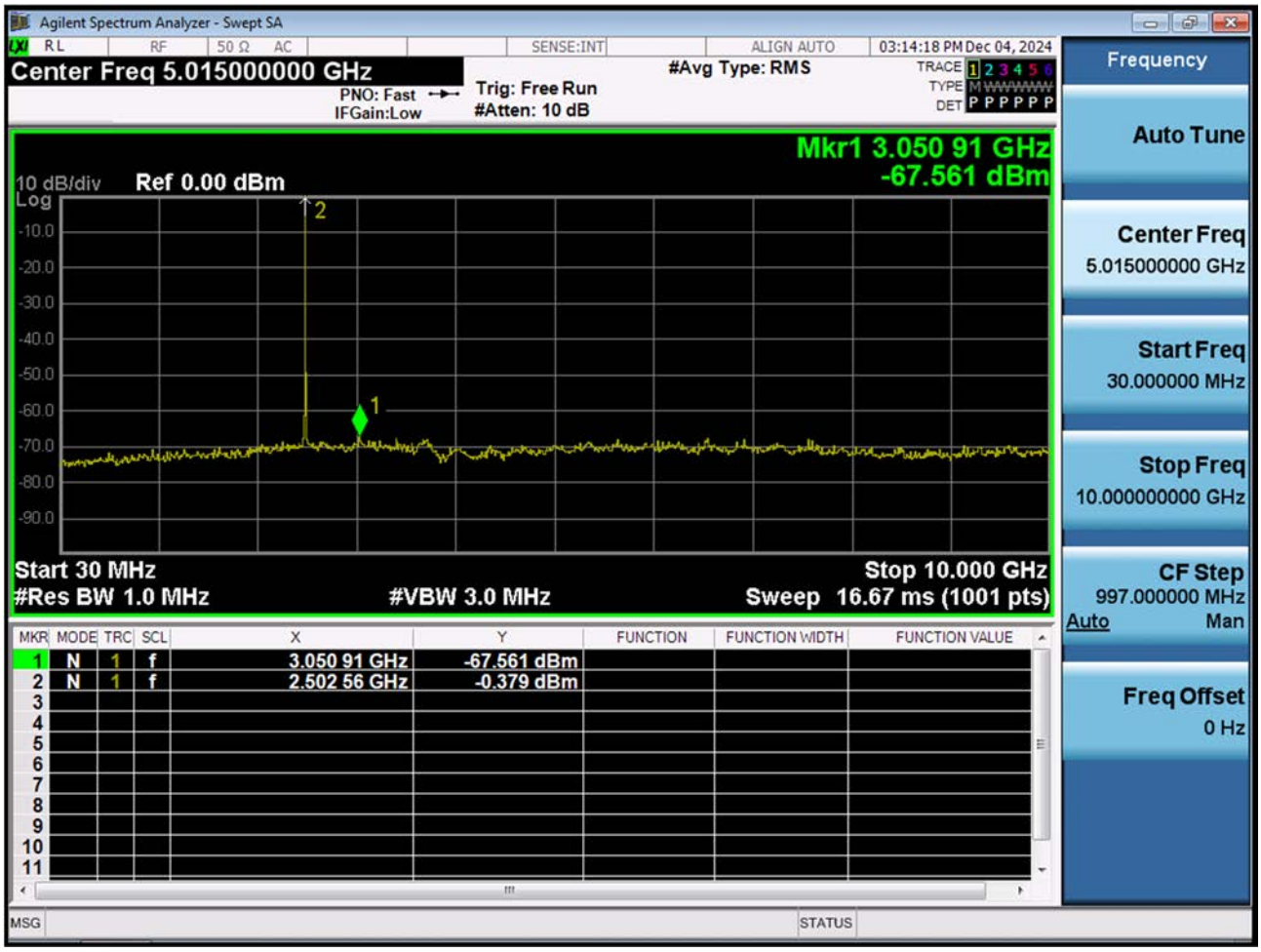
LTE B7_5 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



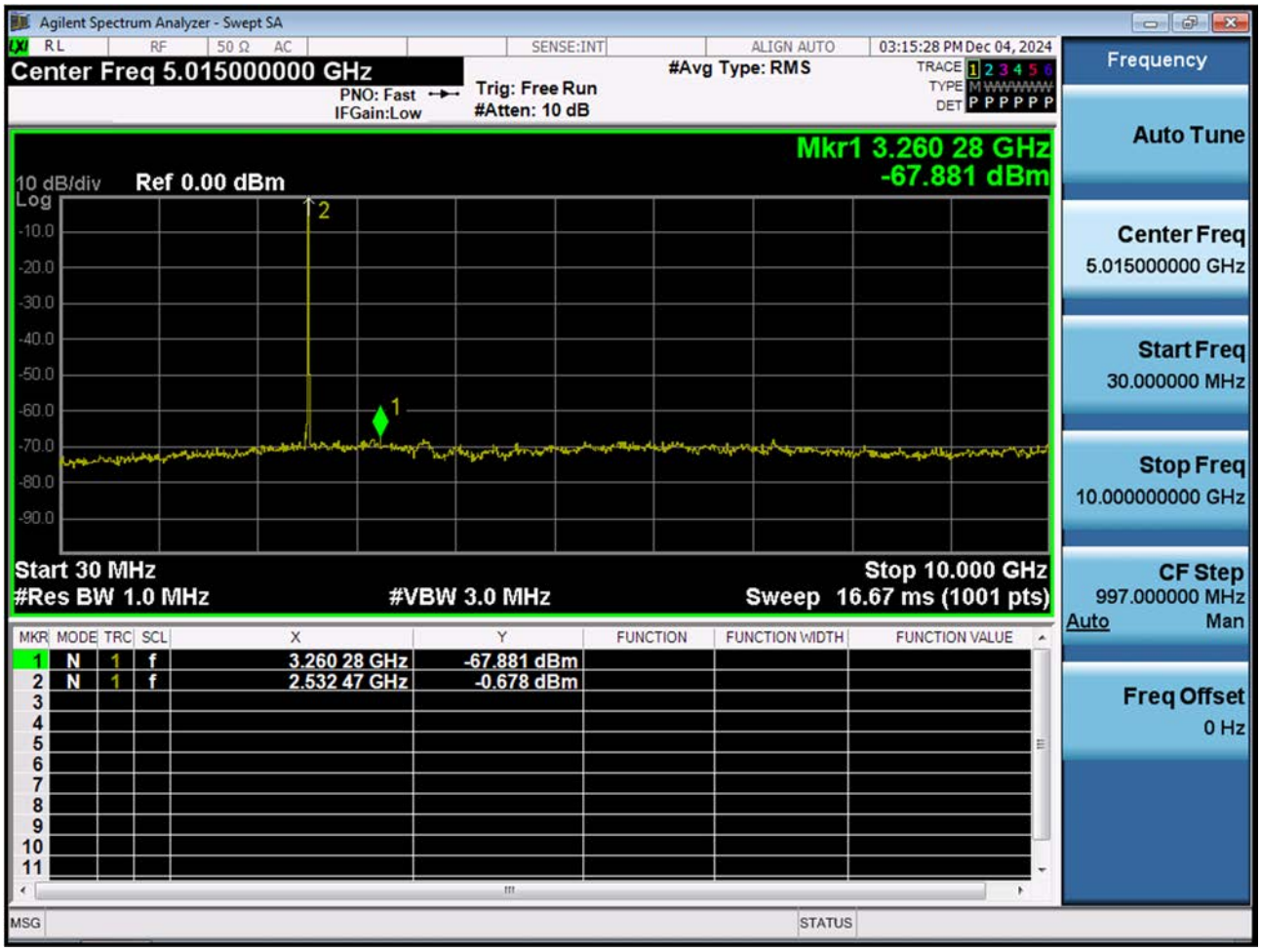
LTE B7_5 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



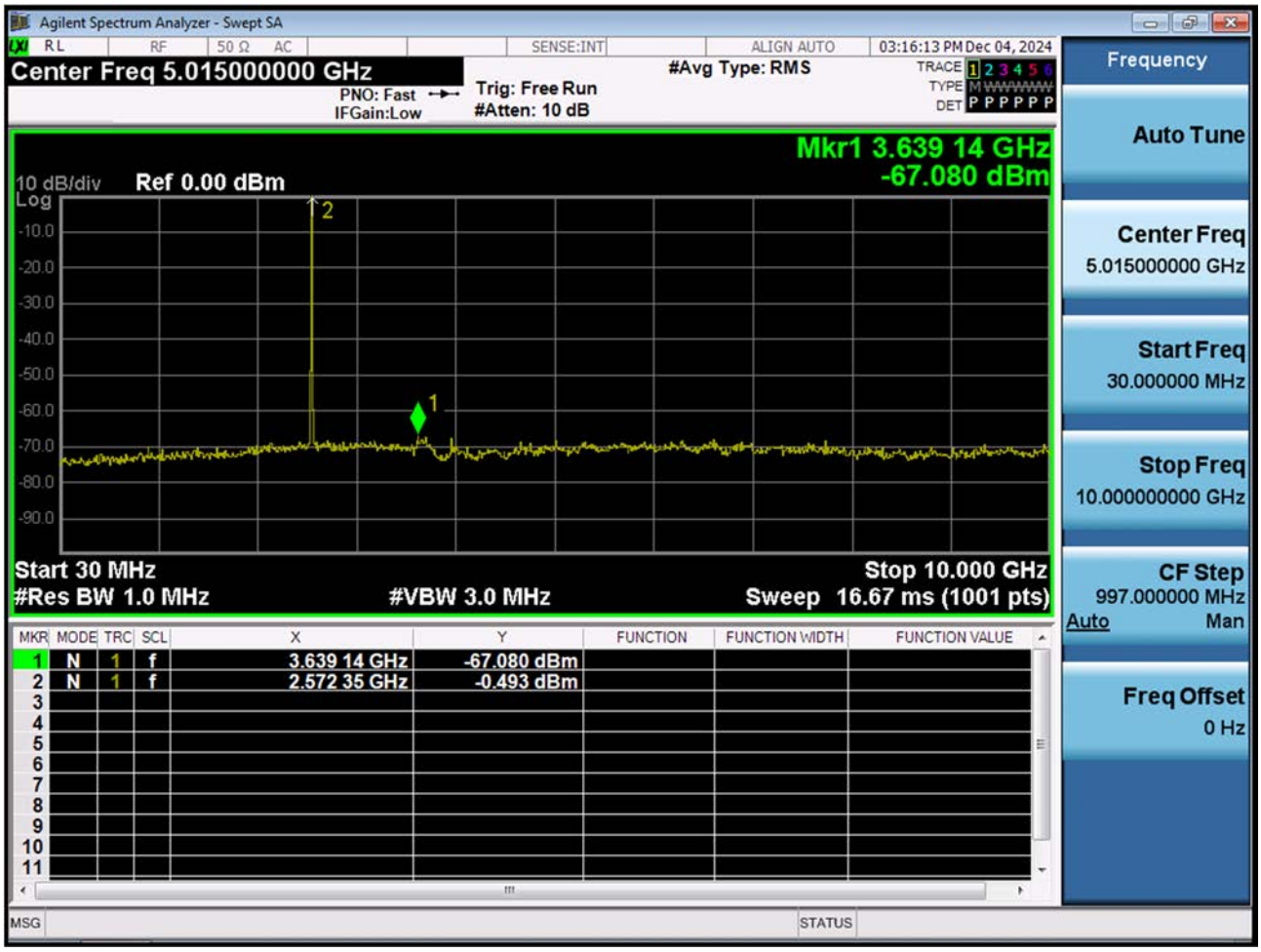
LTE B7_10 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



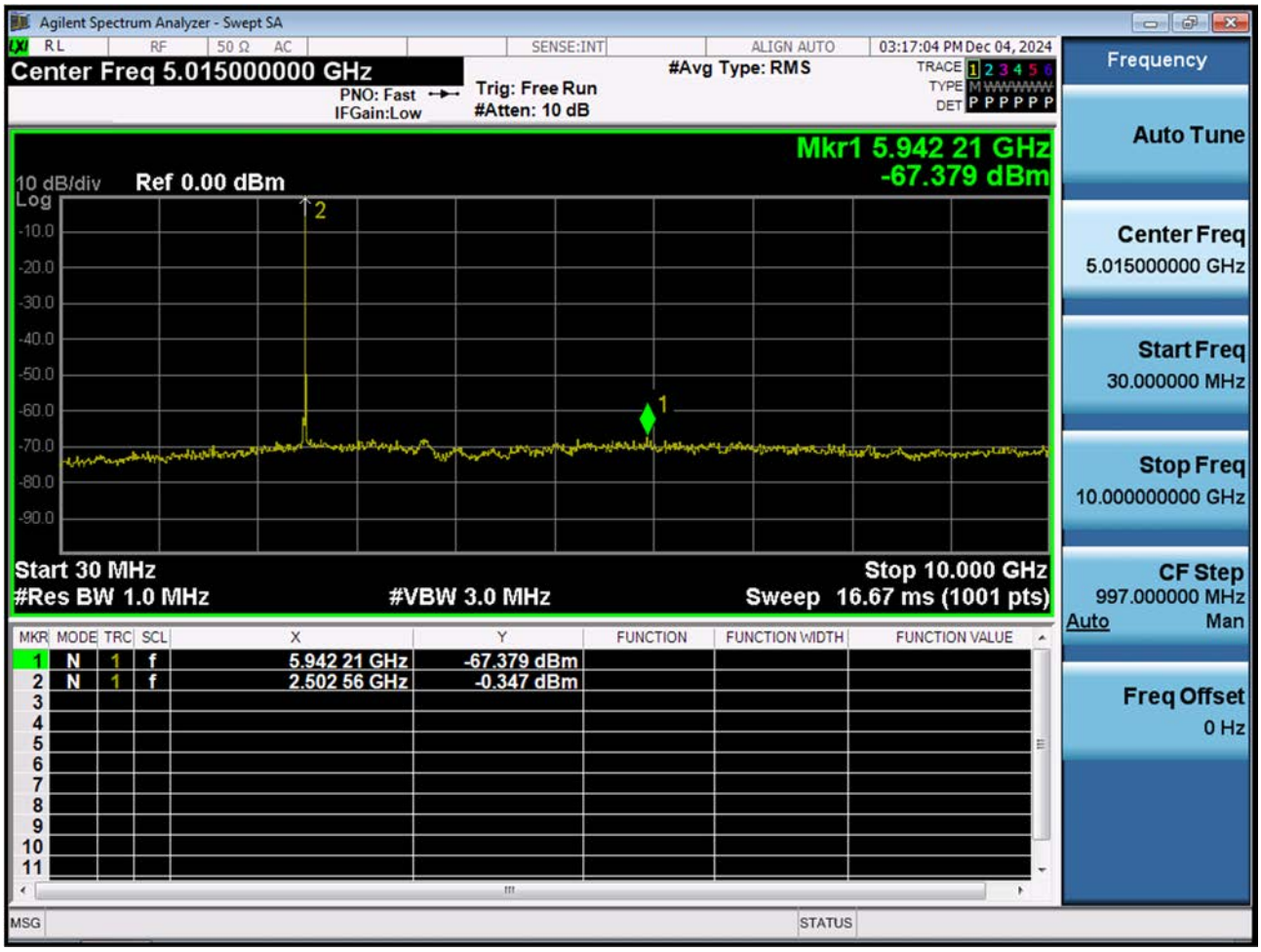
LTE B7_10 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



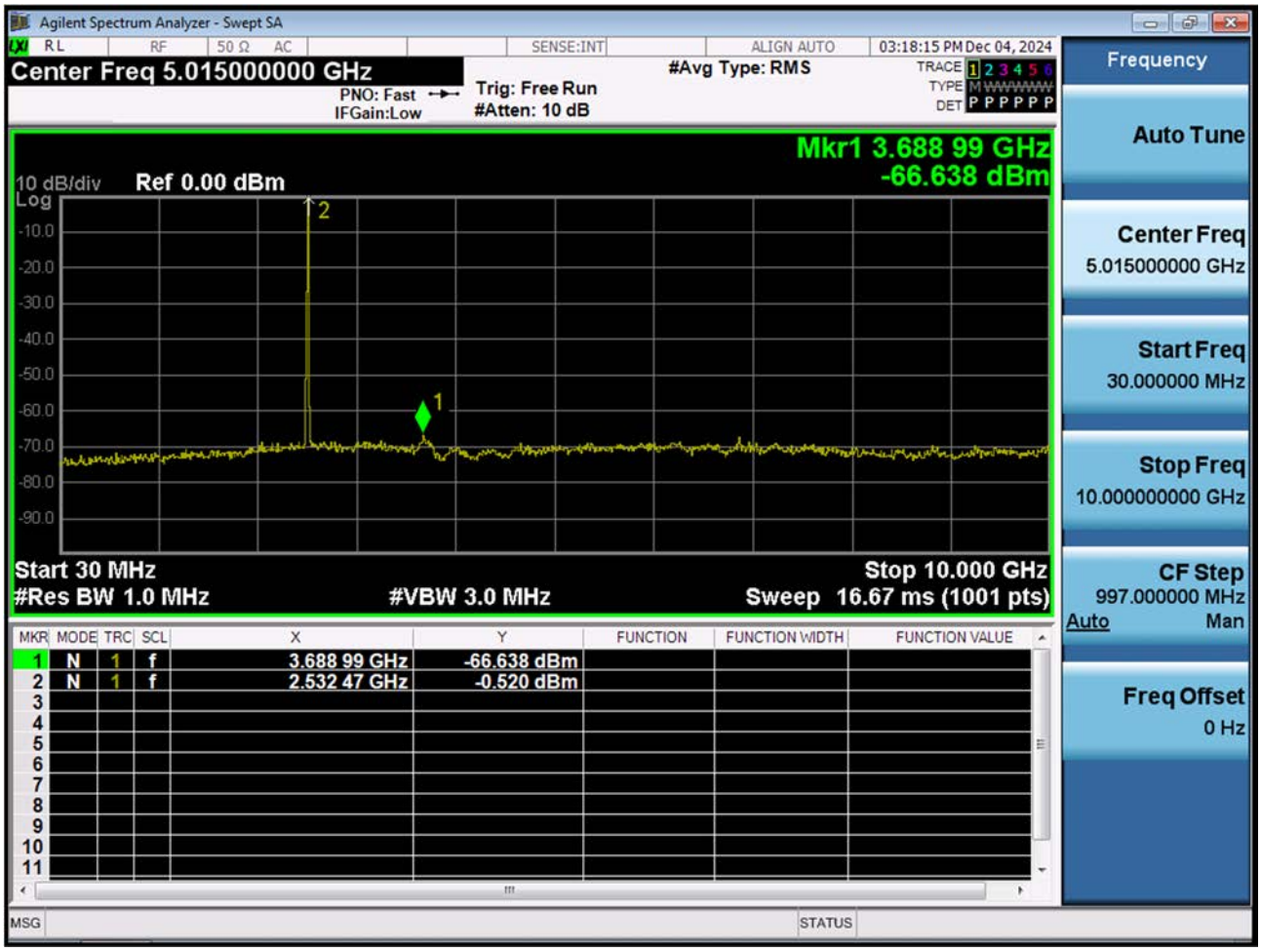
LTE B7_10 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



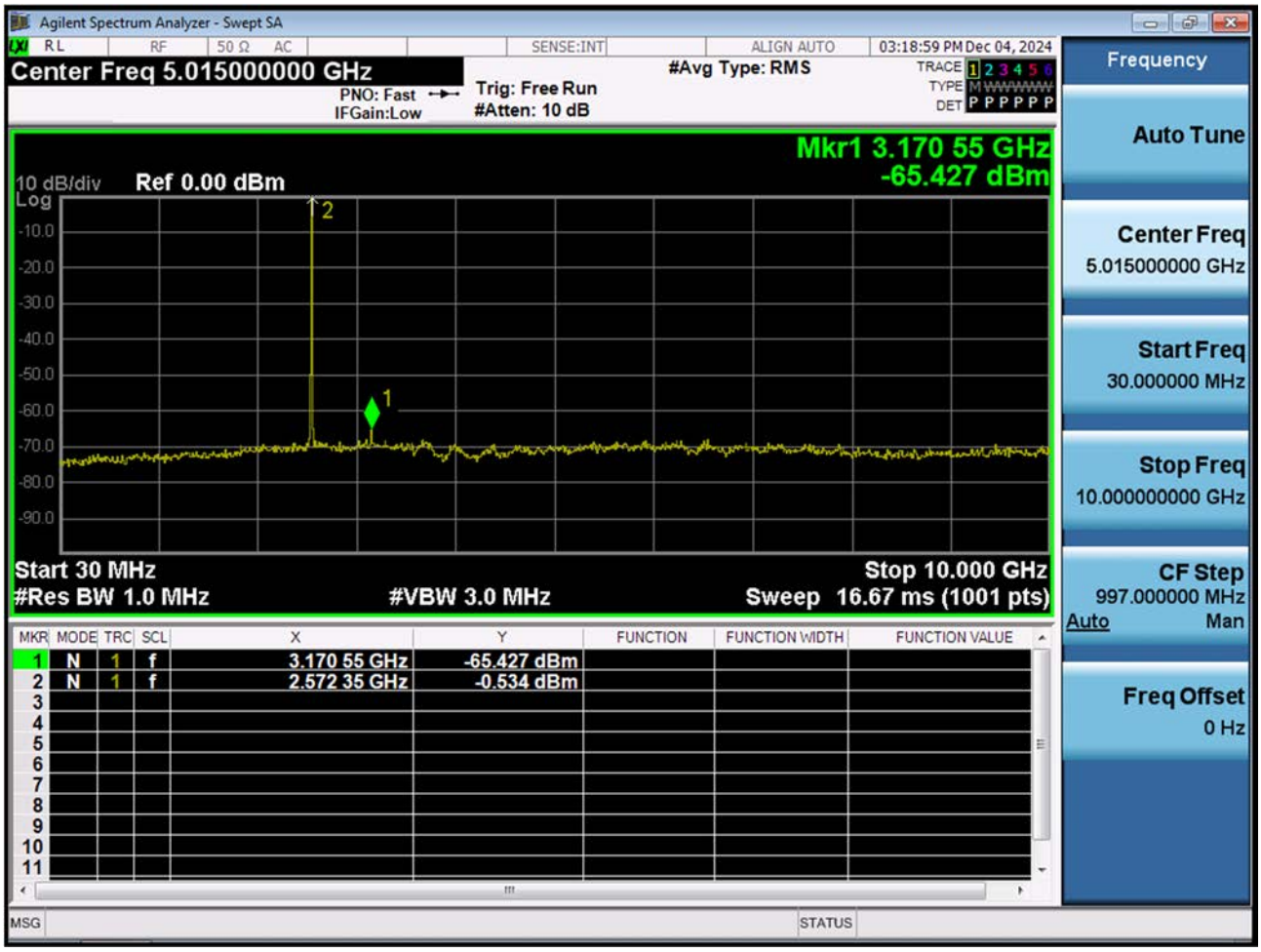
LTE B7_15 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



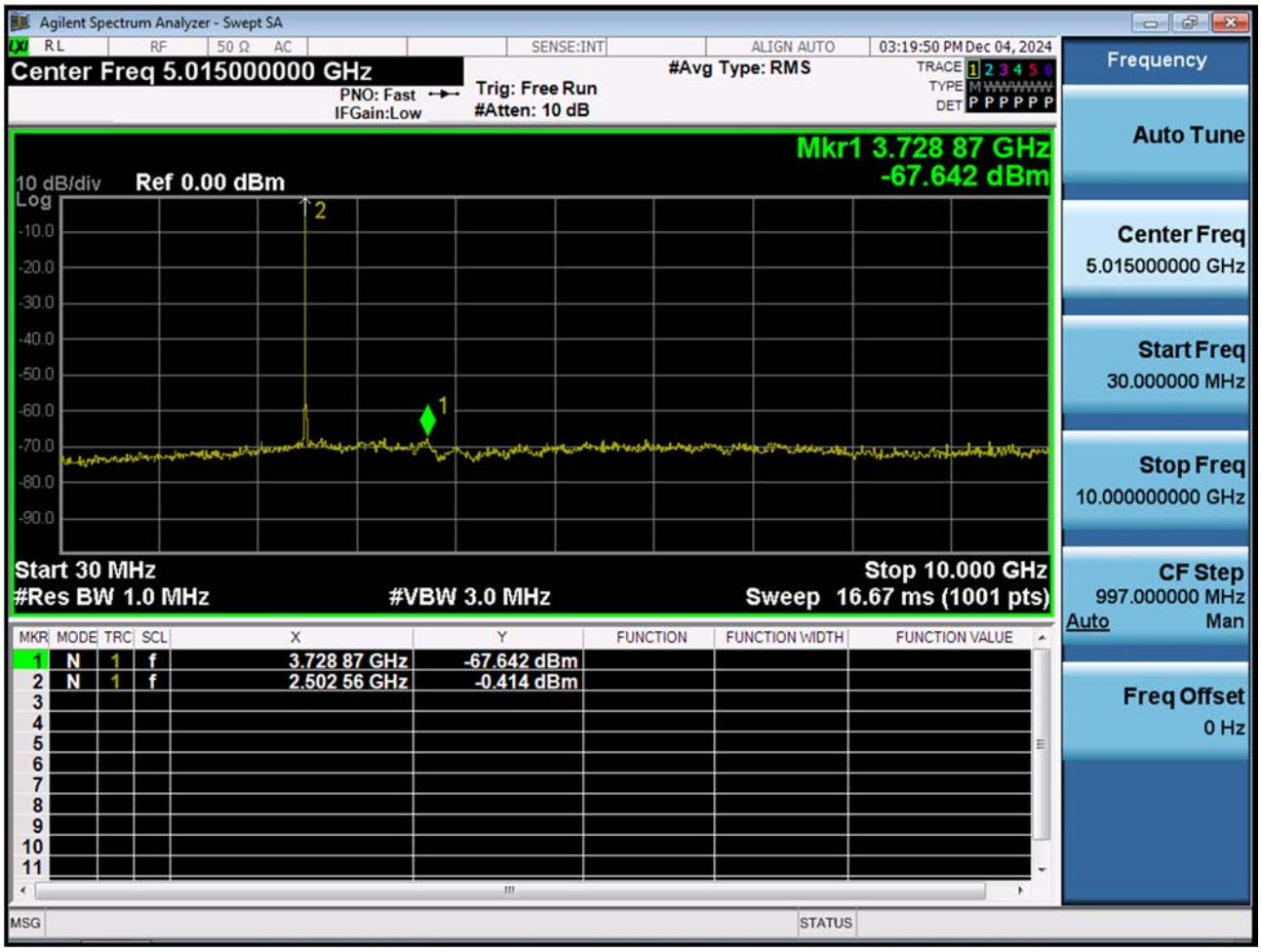
LTE B7_15 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



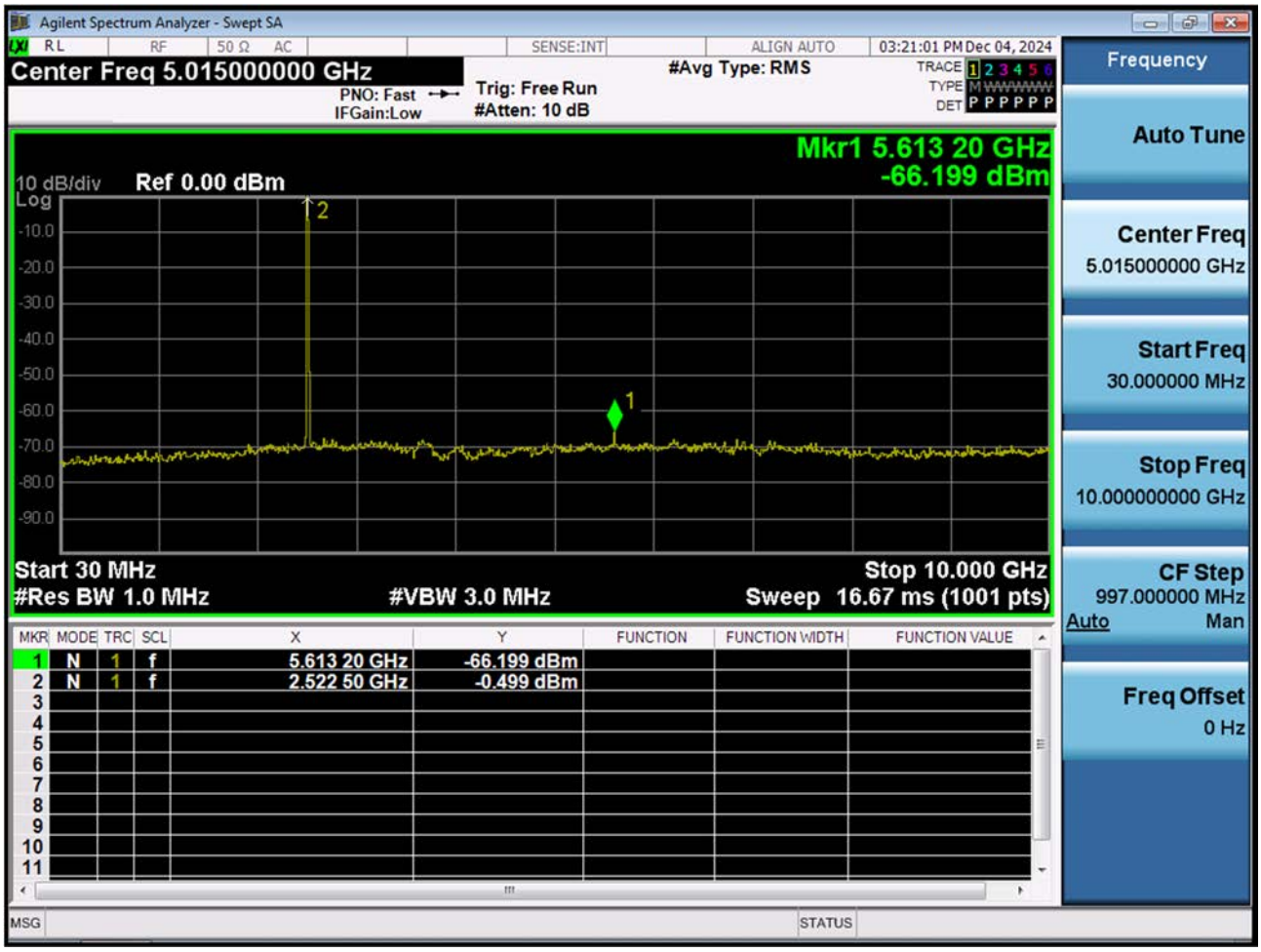
LTE B7_15 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



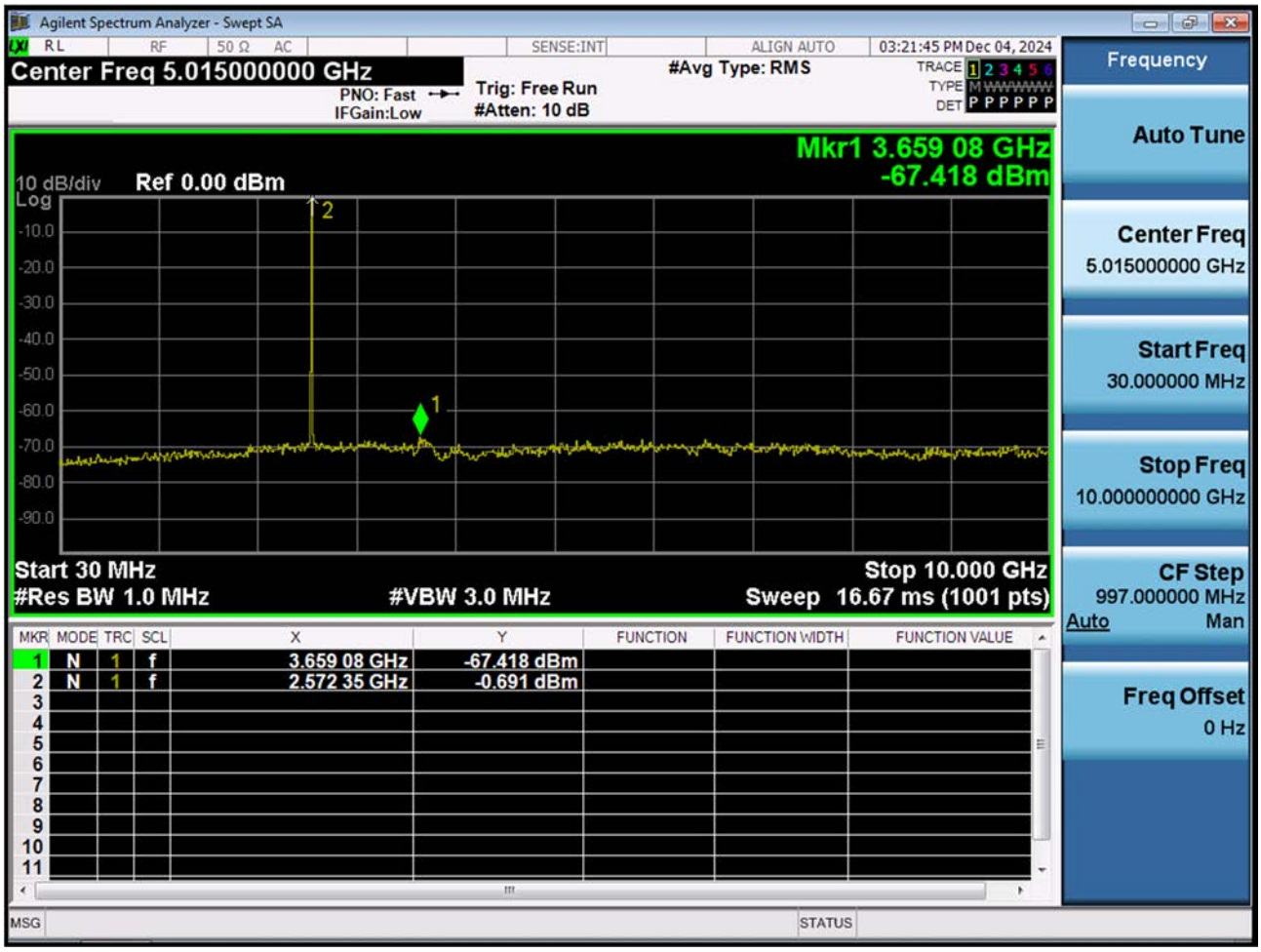
LTE B7_20 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



LTE B7_20 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



LTE B7_20 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



LTE B7_5 M_Conducted Spurious(10 G-26.5 G)_Low_QPSK_1RB

LTE B7_5 M_Conducted Spurious(10 G-26.5 G)_Mid_QPSK_1RB

LTE B7_5 M_Conducted Spurious(10 G-26.5 G)_High_QPSK_1RB

LTE B7_10 M_Conducted Spurious(10 G-26.5 G)_Low_QPSK_1RB

LTE B7_10 M_Conducted Spurious(10 G-26.5 G)_Mid_QPSK_1RB

LTE B7_10 M_Conducted Spurious(10 G-26.5 G)_High_QPSK_1RB

LTE B7_15 M_Conducted Spurious(10 G-26.5 G)_Low_QPSK_1RB

LTE B7_15 M_Conducted Spurious(10 G-26.5 G)_Mid_QPSK_1RB

LTE B7_15 M_Conducted Spurious(10 G-26.5 G)_High_QPSK_1RB

LTE B7_20 M_Conducted Spurious(10 G-26.5 G)_Low_QPSK_1RB

LTE B7_20 M_Conducted Spurious(10 G-26.5 G)_Mid_QPSK_1RB

LTE B7_20 M_Conducted Spurious(10 G-26.5 G)_High_QPSK_1RB

LTE B7_5 M_Channel Edge_Low_QPSK_1RB