# TEST REPORT

FCC LTE B48 Test for GCM4701NA
Certification

**APPLICANT**
CM PARTNER INC.

**REPORT NO.**
HCT-RF-2406-FC007-R1

**DATE OF ISSUE**
June 27, 2024

**Tested by**
Jae Ryang Do

**Technical Manager**
Jong Seok Lee

HCT CO., LTD.
BongJai Huh / CEO



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| | |
|---|---|
| Applicant | **CM PARTNER INC.**<br>479-11, Gyeonggidong-ro, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, 17121, South Korea |
| Product Name<br>Model Name | LTE Module<br>GCM4701NA |
| Date of Test | May 16, 2024 ~ June 18, 2024 |
| Location of Test | ■ Permanent Testing Lab ☐ On Site Testing<br>(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 Republic of Korea) |
| FCC ID | 2BGOOGCM4701NA |
| FCC Classification: | Citizens Band End User Devices (CBE) |
| Test Standard Used | FCC Rule Part(s) : § 96 |
| Test Results | PASS |

## REVISION HISTORY

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

| Revision No. | Date of Issue | Description |
|---|---|---|
| 0 | June 21, 2024 | Initial Release |
| 0 | June 27, 2024 | Revised the 19&20 page. (Added note) |

## 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). |

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# MEASUREMENT REPORT

## 1. GENERAL INFORMATION

| | |
|---|---|
| **Applicant Name:** | CM PARTNER INC. |
| **Address:** | 479-11, Gyeonggidong-ro, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, 17121, South Korea |
| **FCC ID:** | 2BGOOGCM4701NA |
| **Application Type:** | Certification |
| **FCC Classification:** | Citizens Band End User Devices (CBE) |
| **FCC Rule Part(s):** | § 96 |
| **EUT Type:** | LTE Module |
| **Model(s):** | GCM4701NA |
| **Additional Model(s)** | - |
| **Tx Frequency:** | 3552.5 – 3697.5 : 5 MHz<br>3555.0 – 3695.0 : 10 MHz<br>3557.5 – 3692.5 : 15 MHz<br>3560.0 – 3690.0 : 20 MHz |
| **Date(s) of Tests:** | May 13, 2024 ~ June 18, 2024 |
| **Antenna gain** | -2.7 dBi |
| **Serial number:** | 351951100001832 |

### 1.1. MAXIMUM OUTPUT POWER

| Mode (MHz) | Tx Frequency (MHz) | Emission Designator | Modulation | Conducted power | |
|---|---|---|---|---|---|
| | | | | Max. Power (W) | Max. Power (dBm) |
| LTE – Band 48 (5) | 3552.5 – 3697.5 | 4M50G7D | QPSK | 0.170 | 22.31 |
| | | 4M48W7D | 16QAM | 0.142 | 21.52 |
| | | 4M50W7D | 64QAM | 0.109 | 20.37 |
| LTE – Band 48 (10) | 3555.0 – 3695.0 | 8M99G7D | QPSK | 0.169 | 22.29 |
| | | 8M92W7D | 16QAM | 0.146 | 21.63 |
| | | 8M95W7D | 64QAM | 0.110 | 20.43 |
| LTE – Band 48 (15) | 3557.5 – 3692.5 | 13M5G7D | QPSK | 0.161 | 22.06 |
| | | 13M5W7D | 16QAM | 0.141 | 21.50 |
| | | 13M4W7D | 64QAM | 0.107 | 20.30 |
| LTE – Band 48 (20) | 3560.0 – 3690.0 | 17M9G7D | QPSK | 0.169 | 22.27 |
| | | 17M9W7D | 16QAM | 0.143 | 21.55 |
| | | 18M0W7D | 64QAM | 0.109 | 20.37 |

# 2. INTRODUCTION

## 2.1. DESCRIPTION OF EUT

The EUT was a LTE Module with LTE

## 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, 17383, Rep. 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<br>- KDB 940660 D01 v01 |
| Channel Edge/ ACLR | - KDB 971168 D01 v03r01 – Section 6.0<br>- ANSI C63.26-2015 – Section 5.7<br>- KDB 940660 D01 v01 |
| Spurious and Harmonic Emissions at Antenna Terminal | - KDB 971168 D01 v03r01 – Section 6.0<br>- ANSI C63.26-2015 – Section 5.7<br>- KDB 940660 D01 v01 |
| 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<br>- KDB 940660 D01 v01 |
| Frequency stability | - ANSI C63.26-2015 – Section 5.6<br>- KDB 940660 D01 v01 |
| Effective Radiated Power/ Effective Isotropic Radiated Power | - KDB 971168 D01 v03r01 – Section 5.2 & 5.8<br>- ANSI/TIA-603-E-2016 – Section 2.2.17<br>- KDB 940660 D01 v01 |
| Radiated Spurious and Harmonic Emissions | - KDB 971168 D01 v03r01 – Section 6.2<br>- ANSI/TIA-603-E-2016 – Section 2.2.12<br>- KDB 940660 D01 v01 |
| End User Device Additional Requirement (CBSD Protocol) | - KDB 940660 D01 v01<br>- WINNF-TS-0122 V1.0.2 |

## 3.2 RF OUTPUT POWER

**Test Overview**

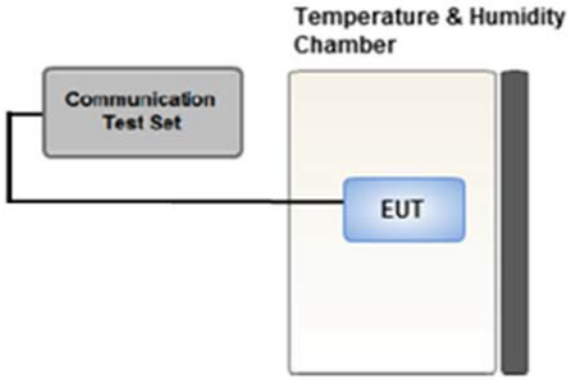
According to ANSI C63.26-2015 Section 5.2.1 when measuring the maximum RF output power from such devices, control over the EUT must be provided either through special test software (provided by manufacturer specifically for compliance testing, but not accessible by an end user) or through use of a base station emulator, communications test set, call box, or similar instrumentation that is capable of establishing a communications link with the EUT to enable control over variable parameters (e.g., output power, OBW, etc.).

In some cases, these instruments also include basic digital spectrum analyzer and/or power meter capabilities that can be utilized to measure the RF output power if the specified detectors and requirements can be realized and the measurement functions have been calibrated.

**Test Procedure**

1. The RF port of the EUT was connected to the Communication Tester via an RF cable.
2. Conducted average power was measured using a calibrated Radio Communication Tester.
3. EIRP $_{(dBm)}$ = Conducted Power $_{(dBm)}$ + antenna gain $_{(dBi)}$

**Test setup**



## 3.3 RADIATED SPURIOUS EMISSIONS

**Test Overview**

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA-603-E-2016.

**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;

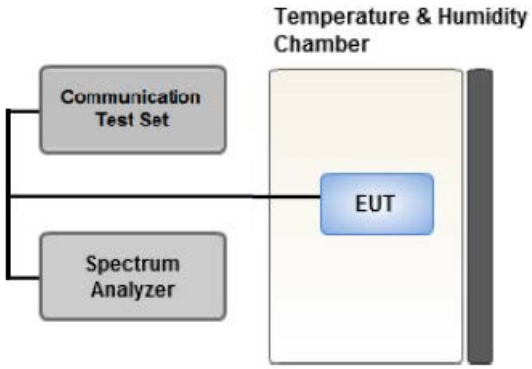
$$\text{Result}_{(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dBi)}$$

   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.

$$EIRP_{(dBm)} = ERP_{(dBm)} + 2.15$$

## 3.4 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:

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

**Test Settings(Peak Power)**

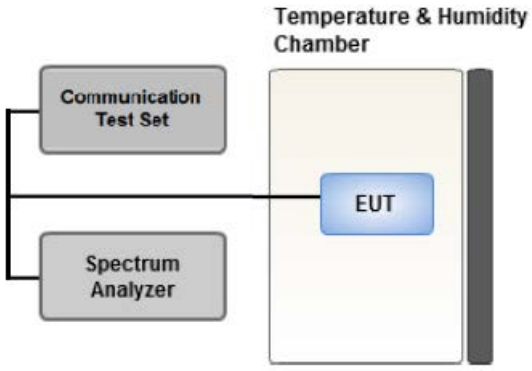
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

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 %.

## 3.5 OCCUPIED BANDWIDTH.



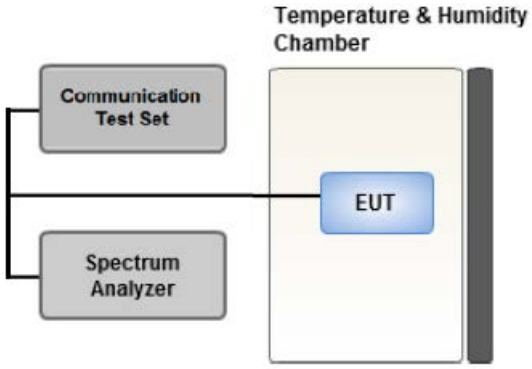

**Test setup**

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

## 3.6 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.

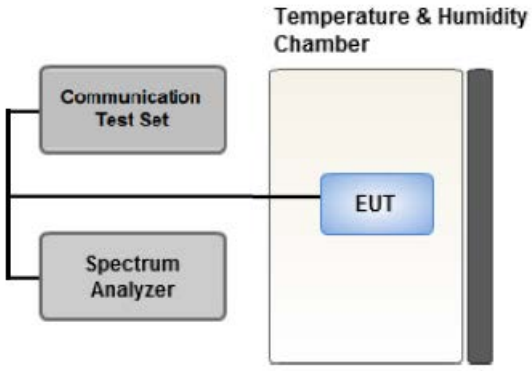
All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

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 = RMS
4. Trace Mode = trace average
5. Sweep time = auto
6. Number of points in sweep ≥ 2 x Span / RBW

## 3.7 CHANNEL EDGE




**Test setup**

**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 1 MHz 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

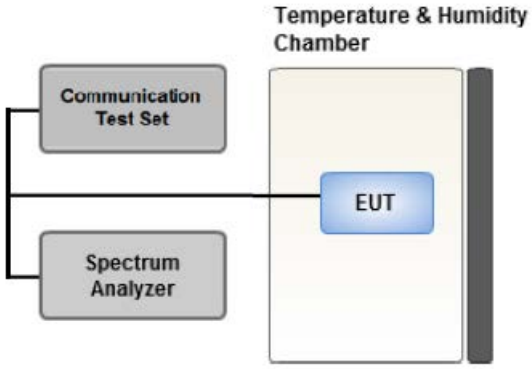
**Test Notes**

The conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed −25 dBm/MHz.

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/Mhz

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.

### 3.8 Adjacent Channel Leakage Ratio




Test setup

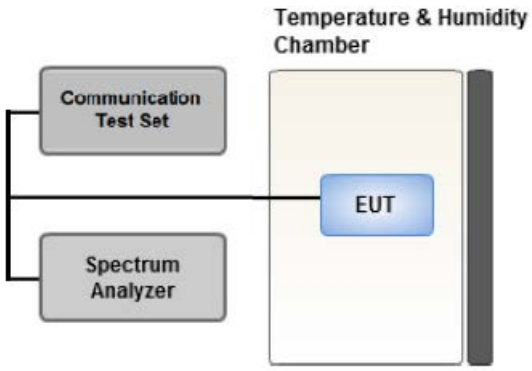
Test Settings

1. Use ACP measurement function of Spectrum analyzer to measure adjacent channel leakage ratio
2. Integ BW = Assigned channel bandwidth
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average
8. Sweep time = 1 s
9. The trace was allowed to stabilize

Test Notes

the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

## 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:

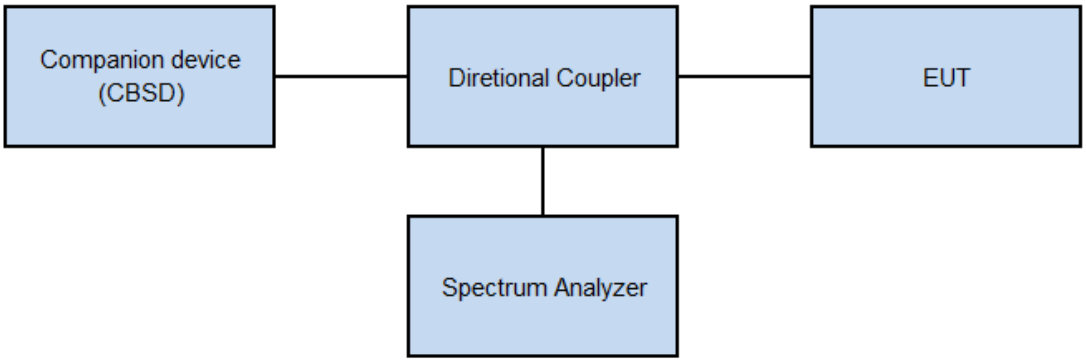
   .- Unless otherwise specified, vary primary supply voltage from 85 % to 115 % of the nominal value for other than hand carried battery equipment.

   .- 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 End User Device Additional Requirement (CBSD Protocol)




Test setup

Test Overview

End user device additional requirements (CBSD Protocol) are tested per the test procedures listed below. During testing, the EUT is connected to a certified CBSD (FCC ID: 2AS48SC-220) as a companion device to show compliance with Part 96.47.

End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation.

Test Settings

a. Setup companion device with 3570 MHz & 3610 MHz.

b. Enable AP service from companion device.

c. EUT is connected to a companion device.

c. Check EUT Tx frequency and power.

d. Disable AP service from companion device and check EUT stop transmission within 10 s.

### 3.11 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.
- JIG was used to test the EUT. (EUT + JIG)
- The R.S.E TEST was tested by combined a term to the antenna port.
- 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,<br>16QAM,<br>64QAM, | - | | - |
| Radiated Spurious and Harmonic Emissions | QPSK | See Section 8.2 | | X |

### 3.12 WORST CASE(CONDUCTED TEST)

- All modes of operation were investigated and the worst case configuration results are reported.
- JIG was used to test the EUT. (EUT + JIG)

[ Worst case ]

| Test Description | Modulation | Bandwidth (MHz) | Frequency | RB size | RB offset |
|---|---|---|---|---|---|
| **Occupied Bandwidth** | QPSK, 16QAM, 64QAM, | 5, 10, 15, 20 | Mid | Full RB | 0 |
| **Peak-To-Average Radio** | QPSK, 16QAM, 64QAM, | 5, 10, 15, 20 | Mid | Full RB | 0 |
| **Channel 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, Mid, 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 | Manufacture | Serial No. | Due to Calibration | Calibration Interval |
|---|---|---|---|---|---|
| Precision Dipole Antenna | UHAP | Schwarzbeck | 01273 | 03/10/2026 | Biennial |
| Precision Dipole Antenna | UHAP | Schwarzbeck | 01274 | 03/10/2026 | Biennial |
| Horn Antenna(1~18 GHz) | BBHA 9120D | Schwarzbeck | 02289 | 02/14/2026 | Biennial |
| Horn Antenna(1~18 GHz) | BBHA 9120D | Schwarzbeck | 9120D-1299 | 04/27/2025 | Biennial |
| Horn Antenna(15~40 GHz) | BBHA 9170 | Schwarzbeck | BBHA9170342 | 09/29/2024 | Biennial |
| Horn Antenna(15~40 GHz) | BBHA 9170 | Schwarzbeck | BBHA9170124 | 03/28/2025 | Biennial |
| Loop Antenna(9 kHz~30 MHz) | FMZB1513 | Rohde & Schwarz | 1513-175 | 01/16/2025 | Biennial |
| Bilog Antenna | VULB9160 | Schwarzbeck | 3150 | 03/09/2025 | Biennial |
| Hybrid Antenna | VULB9160 | Schwarzbeck | 760 | 02/24/2025 | Biennial |
| RF Switching System | FBSR-06B (1G HPF + LNA) | T&M SYSTEM | F3L1 | 05/14/2025 | Annual |
| RF Switching System | FBSR-06B (3G HPF + LNA) | T&M SYSTEM | F3L2 | 05/14/2025 | Annual |
| RF Switching System | FBSR-06B (6G HPF + LNA) | T&M SYSTEM | F3L3 | 05/14/2025 | Annual |
| RF Switching System | FBSR-06B (LNA) | T&M SYSTEM | F3L4 | 05/14/2025 | Annual |
| Power Amplifier | CBL18265035 | CERNEX | 22966 | 11/17/2024 | Annual |
| Power Amplifier | CBL26405040 | CERNEX | 25956 | 02/26/2025 | Annual |
| DC Power Supply | E3632A | Hewlett Packard | MY40004427 | 08/25/2024 | Annual |
| Power Splitter(DC~26.5 GHz) | 11667B | Hewlett Packard | 11275 | 02/29/2025 | Annual |
| Chamber | SU-642 | ESPEC | 93008124 | 02/19/2025 | Annual |
| Signal Analyzer(10 Hz~26.5 GHz) | N9020A | Agilent | MY51110063 | 04/04/2025 | Annual |
| ATTENUATOR(20 dB) | 8493C | Hewlett Packard | 17280 | 04/17/2025 | Annual |
| Spectrum Analyzer(10 Hz~40 GHz) | FSV40 | REOHDE & SCHWARZ | 101436 | 02/13/2025 | Annual |
| Wideband Radio Communication Tester | MT8821C | Anritsu Corp. | 6262287701 | 05/16/2025 | Annual |
| SIGNAL GENERATOR (100 kHz~40 GHz) | SMB100A | REOHDE & SCHWARZ | 177633 | 06/22/2024 | Annual |
| Signal Analyzer(5 Hz~40.0 GHz) | N9030B | KEYSIGHT | MY55480167 | 05/17/2025 | Annual |
| 4-Way Divider | ZC4PD-K1844+ | Mini-Circuits | 942907 | 09/19/2024 | 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, § 96.41(e) | ■ -13 dBm/MHz at frequencies within 0-10 MHz of channel edge<br>■ -25 dBm/MHz at frequencies greater than 10 MHz above and below channel edge<br>■ -40 dBm/MHz at frequencies below 3530 MHz and above 3720 MHz | PASS |
| Adjacent Channel Leakage Ratio | § 96.41(e) | At least 30 dB. | PASS |
| Conducted Output Power | § 2.1046 | N/A | - |
| Peak- to- Average Ratio | § 96.41(g) | < 13 dB | PASS |
| Frequency stability / variation of ambient temperature | § 2.1055, | Emission must remain in band | PASS |
| End User Device Additional Requirements (CBSD Protocol) | § 96.47 | End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation.<br>An End User Device must discontinue operations, change frequencies, or change its operational power level within 10 seconds of receiving instructions from its associated CBSD. | PASS |

Note:

1. The EUT is an End User Device

6.2 Test Condition: Radiated Test

| Test Description | FCC Part Section(s) | Test Limit | Test Result |
|---|---|---|---|
| Equivalent Isotropic Radiated Power | § 96.41(b) | 23 dBm/10 MHz | PASS |
| Radiated Spurious and Harmonic Emissions | § 2.1053, § 96.41(e) | -40 dBm/MHz | PASS |

## 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 RF OUTPUT POWER

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | | Target MPR (dB) | Target Power |
|---|---|---|---|---|---|---|---|---|
| | | | | 55265 | 55990 | 56715 | | |
| | | | | 3552.5 MHz | 3625 MHz | 3697.5 MHz | | |
| 5 MHz | QPSK | 1 | 0 | 21.81 | 21.59 | 21.45 | 0 | 23 |
| | | 1 | 12 | 22.20 | 22.03 | **22.31** | 0 | 23 |
| | | 1 | 24 | 21.64 | 21.36 | 21.60 | 0 | 23 |
| | | 12 | 0 | 21.65 | 21.40 | 21.46 | 1 | 22 |
| | | 12 | 6 | 21.33 | 21.03 | 21.32 | 1 | 22 |
| | | 12 | 11 | 21.25 | 20.92 | 21.20 | 1 | 22 |
| | | 25 | 0 | 21.19 | 20.93 | 21.24 | 1 | 22 |
| | 16QAM | 1 | 0 | 21.03 | 20.58 | 20.44 | 1 | 22 |
| | | 1 | 12 | 21.52 | 21.22 | 21.44 | 1 | 22 |
| | | 1 | 24 | 20.91 | 20.54 | 20.72 | 1 | 22 |
| | | 12 | 0 | 20.83 | 20.42 | 20.37 | 2 | 21 |
| | | 12 | 6 | 20.49 | 20.04 | 20.23 | 2 | 21 |
| | | 12 | 11 | 20.39 | 19.93 | 20.10 | 2 | 21 |
| | | 25 | 0 | 20.33 | 19.97 | 20.14 | 2 | 21 |
| | 64QAM | 1 | 0 | 19.88 | 19.44 | 19.38 | 2 | 21 |
| | | 1 | 12 | 20.37 | 20.10 | 20.32 | 2 | 21 |
| | | 1 | 24 | 19.75 | 19.44 | 19.50 | 2 | 21 |
| | | 12 | 0 | 19.81 | 19.59 | 19.54 | 3 | 20 |
| | | 12 | 6 | 19.48 | 19.26 | 19.51 | 3 | 20 |
| | | 12 | 11 | 19.39 | 19.16 | 19.39 | 3 | 20 |
| | | 25 | 0 | 19.43 | 19.20 | 19.43 | 3 | 20 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | | Target MPR (dB) | Target Power |
|---|---|---|---|---|---|---|---|---|
| | | | | 55290 | 55990 | 56690 | | |
| | | | | 3555 MHz | 3625 MHz | 3695 MHz | | |
| 10 MHz | QPSK | 1 | 0 | 22.12 | 21.85 | 21.64 | 0 | 23 |
| | | 1 | 24 | **22.29** | 22.09 | 22.13 | 0 | 23 |
| | | 1 | 49 | 22.08 | 21.80 | 22.09 | 0 | 23 |
| | | 25 | 0 | 21.35 | 21.22 | 20.92 | 1 | 22 |
| | | 25 | 12 | 21.58 | 21.20 | 21.12 | 1 | 22 |
| | | 25 | 24 | 21.46 | 21.22 | 21.25 | 1 | 22 |
| | | 50 | 0 | 21.38 | 21.15 | 21.07 | 1 | 22 |
| | 16QAM | 1 | 0 | 21.41 | 21.15 | 20.83 | 1 | 22 |
| | | 1 | 24 | 21.63 | 21.32 | 21.30 | 1 | 22 |
| | | 1 | 49 | 21.33 | 21.16 | 21.40 | 1 | 22 |
| | | 25 | 0 | 20.49 | 20.21 | 19.88 | 2 | 21 |
| | | 25 | 12 | 20.60 | 20.21 | 20.13 | 2 | 21 |
| | | 25 | 24 | 20.47 | 20.22 | 20.23 | 2 | 21 |
| | | 50 | 0 | 20.56 | 20.16 | 20.06 | 2 | 21 |
| | 64QAM | 1 | 0 | 20.37 | 19.94 | 19.52 | 2 | 21 |
| | | 1 | 24 | 20.43 | 20.06 | 20.10 | 2 | 21 |
| | | 1 | 49 | 20.28 | 19.90 | 20.15 | 2 | 21 |
| | | 25 | 0 | 19.58 | 19.27 | 19.10 | 3 | 20 |
| | | 25 | 12 | 19.68 | 19.30 | 19.35 | 3 | 20 |
| | | 25 | 24 | 19.56 | 19.23 | 19.35 | 3 | 20 |
| | | 50 | 0 | 19.55 | 19.11 | 19.22 | 3 | 20 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | | Target MPR (dB) | Target Power |
|---|---|---|---|---|---|---|---|---|
| | | | | 55315 | 55990 | 56665 | | |
| | | | | 3557.5 MHz | 3625 MHz | 3692.5 MHz | | |
| 15 MHz | QPSK | 1 | 0 | 21.90 | 21.73 | 21.36 | 0 | 23 |
| | | 1 | 36 | **22.06** | **22.06** | 21.95 | 0 | 23 |
| | | 1 | 74 | 21.77 | 21.80 | 21.93 | 0 | 23 |
| | | 36 | 0 | 21.25 | 21.02 | 20.32 | 1 | 22 |
| | | 36 | 18 | 21.33 | 20.99 | 20.80 | 1 | 22 |
| | | 36 | 39 | 21.22 | 20.89 | 21.04 | 1 | 22 |
| | | 75 | 0 | 21.31 | 21.11 | 20.89 | 1 | 22 |
| | 16QAM | 1 | 0 | 21.24 | 21.16 | 20.31 | 1 | 22 |
| | | 1 | 36 | 21.50 | 21.25 | 21.08 | 1 | 22 |
| | | 1 | 74 | 21.14 | 20.99 | 21.27 | 1 | 22 |
| | | 36 | 0 | 20.17 | 19.95 | 19.34 | 2 | 21 |
| | | 36 | 18 | 20.26 | 19.95 | 19.84 | 2 | 21 |
| | | 36 | 39 | 20.17 | 19.85 | 19.98 | 2 | 21 |
| | | 75 | 0 | 20.30 | 20.11 | 19.86 | 2 | 21 |
| | 64QAM | 1 | 0 | 20.17 | 19.82 | 19.25 | 2 | 21 |
| | | 1 | 36 | 20.30 | 20.00 | 19.89 | 2 | 21 |
| | | 1 | 74 | 19.92 | 19.61 | 19.98 | 2 | 21 |
| | | 36 | 0 | 19.17 | 18.95 | 18.39 | 3 | 20 |
| | | 36 | 18 | 19.26 | 19.00 | 18.78 | 3 | 20 |
| | | 36 | 39 | 19.19 | 18.91 | 19.04 | 3 | 20 |
| | | 75 | 0 | 19.21 | 19.08 | 18.93 | 3 | 20 |

| Bandwidth | Modulation | RB Size | RB Offset | Max.Average Power (dBm) | | | Target MPR (dB) | Target Power |
|---|---|---|---|---|---|---|---|---|
| | | | | 55340 | 55990 | 56640 | | |
| | | | | 3560 MHz | 3625 MHz | 3690 MHz | | |
| 20 MHz | QPSK | 1 | 0 | **22.27** | 22.07 | 21.36 | 0 | 23 |
| | | 1 | 49 | 22.21 | 22.05 | 21.79 | 0 | 23 |
| | | 1 | 99 | 22.02 | 21.73 | 22.10 | 0 | 23 |
| | | 50 | 0 | 21.36 | 21.24 | 20.38 | 1 | 22 |
| | | 50 | 25 | 21.44 | 21.07 | 20.57 | 1 | 22 |
| | | 50 | 49 | 21.32 | 21.09 | 21.09 | 1 | 22 |
| | | 100 | 0 | 21.34 | 21.19 | 20.86 | 1 | 22 |
| | 16QAM | 1 | 0 | 21.43 | 21.27 | 20.40 | 1 | 22 |
| | | 1 | 49 | 21.55 | 21.26 | 20.93 | 1 | 22 |
| | | 1 | 99 | 21.25 | 21.02 | 21.39 | 1 | 22 |
| | | 50 | 0 | 20.52 | 20.23 | 19.38 | 2 | 21 |
| | | 50 | 25 | 20.45 | 20.07 | 19.68 | 2 | 21 |
| | | 50 | 49 | 20.35 | 20.09 | 20.07 | 2 | 21 |
| | | 100 | 0 | 20.49 | 20.22 | 19.84 | 2 | 21 |
| | 64QAM | 1 | 0 | 20.37 | 20.17 | 19.50 | 2 | 21 |
| | | 1 | 49 | 20.35 | 20.01 | 19.90 | 2 | 21 |
| | | 1 | 99 | 20.16 | 19.79 | 20.15 | 2 | 21 |
| | | 50 | 0 | 19.52 | 19.24 | 18.53 | 3 | 20 |
| | | 50 | 25 | 19.45 | 19.24 | 18.69 | 3 | 20 |
| | | 50 | 49 | 19.33 | 19.17 | 19.13 | 3 | 20 |
| | | 100 | 0 | 19.50 | 19.20 | 18.90 | 3 | 20 |

| Bandwidth | Modulation | Max.Average Power (dBm) | | | ANT Gain (dBi) | E.I.R.P (dBm/10 MHz) | | | Limit (dBm/ 10 MHz) |
|---|---|---|---|---|---|---|---|---|---|
| | | 55265 | 55990 | 56715 | | 55265 | 55990 | 56715 | |
| | | 3552.5 MHz | 3625 MHz | 3697.5 MHz | | 3552.5 MHz | 3625 MHz | 3697.5 MHz | |
| 5 MHz | QPSK | 22.20 | 22.03 | 22.31 | -2.7 | 19.50 | 19.33 | 19.61 | 23.00 |
| | 16QAM | 21.52 | 21.22 | 21.44 | | 18.82 | 18.52 | 18.74 | |
| | 64QAM | 20.37 | 20.10 | 20.32 | | 17.67 | 17.40 | 17.62 | |

| Bandwidth | Modulation | Max.Average Power (dBm) | | | ANT Gain (dBi) | E.I.R.P (dBm/10 MHz) | | | Limit (dBm/ 10 MHz) |
|---|---|---|---|---|---|---|---|---|---|
| | | 55290 | 55990 | 56690 | | 55290 | 55990 | 56690 | |
| | | 3555 MHz | 3625 MHz | 3695 MHz | | 3555 MHz | 3625 MHz | 3695 MHz | |
| 10 MHz | QPSK | 22.29 | 22.09 | 22.13 | -2.7 | 19.59 | 19.39 | 19.43 | 23.00 |
| | 16QAM | 21.63 | 21.32 | 21.40 | | 18.93 | 18.62 | 18.70 | |
| | 64QAM | 20.43 | 20.06 | 20.15 | | 17.73 | 17.36 | 17.45 | |

| Bandwidth | Modulation | Max.Average Power (dBm) | | | ANT Gain (dBi) | E.I.R.P (dBm/10 MHz) | | | Limit (dBm/ 10 MHz) |
|---|---|---|---|---|---|---|---|---|---|
| | | 55315 | 55990 | 56665 | | 55315 | 55990 | 56665 | |
| | | 3557.5 MHz | 3625 MHz | 3692.5 MHz | | 3557.5 MHz | 3625 MHz | 3692.5 MHz | |
| 15 MHz | QPSK | 22.06 | 22.06 | 21.95 | -2.7 | 19.36 | 19.36 | 19.25 | 23.00 |
| | 16QAM | 21.50 | 21.25 | 21.27 | | 18.80 | 18.55 | 18.57 | |
| | 64QAM | 20.30 | 20.00 | 19.98 | | 17.60 | 17.30 | 17.28 | |

| Bandwidth | Modulation | Max.Average Power (dBm) | | | ANT Gain (dBi) | E.I.R.P (dBm/10 MHz) | | | Limit (dBm/ 10 MHz) |
|---|---|---|---|---|---|---|---|---|---|
| | | 55340 | 55990 | 56640 | | 55340 | 55990 | 56640 | |
| | | 3560 MHz | 3625 MHz | 3690 MHz | | 3560 MHz | 3625 MHz | 3690 MHz | |
| 20 MHz | QPSK | 22.27 | 22.07 | 22.10 | -2.7 | 19.57 | 19.37 | 19.40 | 23.00 |
| | 16QAM | 21.55 | 21.27 | 21.39 | | 18.85 | 18.57 | 18.69 | |
| | 64QAM | 20.37 | 20.17 | 20.15 | | 17.67 | 17.47 | 17.45 | |

Note:

EIRP $_{(dBm)}$ = Conducted Power $_{(dBm)}$ + antenna gain $_{(dBi)}$

## 8.2 RADIATED SPURIOUS EMISSIONS

▣ MODE: LTE B48

▣ MODULATION SIGNAL: 5 MHz QPSK

▣ DISTANCE: 1 meters

| Ch | Freq (MHz) | Measured Level (dBm) | Ant. Gain (dBi) | Substitute Level (dBm) | C.L | Pol | Result (dBm) | Limit (dBm) | Detector | RB | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Size | Offset |
| 55265 (3552.5) | 7 105.00 | -56.47 | 10.50 | -49.43 | 4.36 | H | -43.29 | -40.00 | Average | 1 | 0 |
| | 10 657.50 | -63.87 | 11.10 | -51.74 | 5.49 | H | -46.13 | -40.00 | Peak | | |
| | 14 210.00 | -61.81 | 12.40 | -52.64 | 6.45 | H | -46.69 | -40.00 | Peak | | |
| 55990 (3625.0) | 7 250.00 | -58.56 | 10.10 | -50.64 | 4.42 | H | -44.96 | -40.00 | Peak | 1 | 0 |
| | 10 875.00 | -64.59 | 11.20 | -53.33 | 5.53 | H | -47.66 | -40.00 | Peak | | |
| | 14 500.00 | -57.77 | 12.90 | -50.96 | 6.49 | H | -44.55 | -40.00 | Peak | | |
| 56715 (3697.5) | 7 395.00 | -56.95 | 10.70 | -49.42 | 4.47 | V | -43.18 | -40.00 | Peak | 1 | 0 |
| | 11 092.50 | -63.58 | 11.30 | -52.25 | 5.58 | H | -46.53 | -40.00 | Peak | | |
| | 14 790.00 | -57.25 | 13.10 | -51.26 | 6.56 | H | -44.72 | -40.00 | Peak | | |

▣ MODE: LTE B48

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 1 meters

| Ch | Freq (MHz) | Measured Level (dBm) | Ant. Gain (dBi) | Substitute Level (dBm) | C.L | Pol | Result (dBm) | Limit (dBm) | Detector | RB | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Size | Offset |
| 55290 (3555.0) | 7 110.00 | -56.25 | 10.50 | -49.18 | 4.35 | H | -43.03 | -40.00 | Average | 1 | 0 |
| | 10 665.00 | -63.54 | 11.00 | -51.94 | 5.48 | H | -46.42 | -40.00 | Peak | | |
| | 14 220.00 | -60.48 | 12.40 | -51.25 | 6.44 | H | -45.29 | -40.00 | Peak | | |
| 55990 (3625.0) | 7 250.00 | -56.90 | 10.10 | -48.98 | 4.42 | H | -43.30 | -40.00 | Peak | 1 | 0 |
| | 10 875.00 | -64.52 | 11.20 | -53.26 | 5.53 | H | -47.59 | -40.00 | Peak | | |
| | 14 500.00 | -56.91 | 12.90 | -50.10 | 6.49 | H | -43.69 | -40.00 | Peak | | |
| 56690 (3695.0) | 7 390.00 | -57.75 | 10.60 | -50.17 | 4.46 | V | -44.03 | -40.00 | Peak | 1 | 0 |
| | 11 085.00 | -64.33 | 11.30 | -53.19 | 5.59 | V | -47.48 | -40.00 | Peak | | |
| | 14 780.00 | -57.60 | 13.10 | -51.50 | 6.56 | V | -44.96 | -40.00 | Peak | | |

▣ MODE: LTE B48

▣ MODULATION SIGNAL: 15 MHz QPSK

▣ DISTANCE: 1 meters

| Ch | Freq (MHz) | Measured Level (dBm) | Ant. Gain (dBi) | Substitute Level (dBm) | C.L | Pol | Result (dBm) | Limit (dBm) | Detector | RB | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Size | Offset |
| 55315 (3557.5) | 7 115.00 | -56.25 | 10.50 | -49.19 | 4.37 | H | -43.06 | -40.00 | Average | 1 | 0 |
| | 10 672.50 | -62.81 | 11.10 | -51.64 | 5.47 | H | -46.01 | -40.00 | Peak | | |
| | 14 230.00 | -60.06 | 12.40 | -51.26 | 6.44 | H | -45.30 | -40.00 | Peak | | |
| 55990 (3625.0) | 7 250.00 | -59.65 | 10.10 | -51.73 | 4.42 | H | -46.05 | -40.00 | Average | 1 | 0 |
| | 10 875.00 | -64.50 | 11.20 | -53.24 | 5.53 | H | -47.57 | -40.00 | Peak | | |
| | 14 500.00 | -57.75 | 12.90 | -50.94 | 6.49 | H | -44.53 | -40.00 | Peak | | |
| 56665 (3692.5) | 7 385.00 | -57.73 | 10.60 | -50.07 | 4.45 | V | -43.92 | -40.00 | Peak | 1 | 0 |
| | 11 077.50 | -65.54 | 11.30 | -54.22 | 5.60 | H | -48.52 | -40.00 | Peak | | |
| | 14 770.00 | -58.40 | 13.10 | -52.30 | 6.58 | H | -45.78 | -40.00 | Peak | | |

▣ MODE: LTE B48

▣ MODULATION SIGNAL: 20 MHz QPSK

▣ DISTANCE: 1 meters

| Ch | Freq (MHz) | Measured Level (dBm) | Ant. Gain (dBi) | Substitute Level (dBm) | C.L | Pol | Result (dBm) | Limit (dBm) | Detector | RB | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Size | Offset |
| 55340 (3560.0) | 7,120.00 | -56.29 | 10.50 | -49.18 | 4.39 | H | -43.07 | -40.00 | Average | 1 | 0 |
| | 10,680.00 | -63.86 | 11.10 | -52.39 | 5.46 | H | -46.75 | -40.00 | Peak | | |
| | 14,240.00 | -58.76 | 12.40 | -49.90 | 6.44 | H | -43.94 | -40.00 | Peak | | |
| 55990 (3625.0) | 7,250.00 | -57.95 | 10.10 | -50.03 | 4.42 | H | -44.35 | -40.00 | Peak | 1 | 0 |
| | 10,875.00 | -63.07 | 11.20 | -51.81 | 5.53 | V | -46.14 | -40.00 | Peak | | |
| | 14,500.00 | -56.87 | 12.90 | -50.06 | 6.49 | V | -43.65 | -40.00 | Peak | | |
| 56640 (3690.0) | 7,380.00 | -57.56 | 10.60 | -49.80 | 4.45 | V | -43.65 | -40.00 | Peak | 1 | 0 |
| | 11,070.00 | -64.32 | 11.30 | -52.60 | 5.61 | V | -46.91 | -40.00 | Peak | | |
| | 14,760.00 | -58.52 | 13.10 | -52.55 | 6.58 | V | -46.03 | -40.00 | Peak | | |

## 8.3 PEAK-TO-AVERAGE RATIO

| Band | Band Width | Frequency (MHz) | Modulation | Resource Block Size | Resource Block Offset | Data (dB ) |
|---|---|---|---|---|---|---|
| 48 | 5 MHz | 3625.0 | QPSK | 25 | 0 | 5.18 |
| | | | 16-QAM | | | 5.89 |
| | | | 64-QAM | | | 6.12 |
| | 10 MHz | | QPSK | 50 | | 5.24 |
| | | | 16-QAM | | | 5.96 |
| | | | 64-QAM | | | 6.12 |
| | 15 MHz | | QPSK | 75 | | 5.06 |
| | | | 16-QAM | | | 5.89 |
| | | | 64-QAM | | | 6.13 |
| | 20 MHz | | QPSK | 100 | | 4.95 |
| | | | 16-QAM | | | 5.78 |
| | | | 64-QAM | | | 6.07 |

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 72~ 83.

## 8.4 OCCUPIED BANDWIDTH

| Band | Band Width | Frequency (MHz) | Modulation | Resource Block Size | Resource Block Offset | Data ( MHz ) |
|---|---|---|---|---|---|---|
| 48 | 5 MHz | 3625.0 | QPSK | 25 | 0 | 4.5003 |
| | | | 16-QAM | | | 4.4781 |
| | | | 64-QAM | | | 4.4962 |
| | 10 MHz | | QPSK | 50 | | 8.9926 |
| | | | 16-QAM | | | 8.9221 |
| | | | 64-QAM | | | 8.9540 |
| | 15 MHz | | QPSK | 75 | | 13.506 |
| | | | 16-QAM | | | 13.463 |
| | | | 64-QAM | | | 13.433 |
| | 20 MHz | | QPSK | 100 | | 17.944 |
| | | | 16-QAM | | | 17.865 |
| | | | 64-QAM | | | 17.964 |

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 60 ~ 71.

## 8.5 CONDUCTED SPURIOUS EMISSIONS

| Band | Band Width (MHz) | Frequency (MHz) | Frequency of Maximum Harmonic (GHz) | Factor (dB) | Measurement Maximum Data (dBm) | Result (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|---|
| 48 | 5 | 3552.5 | 35.7525 | 32.510 | -78.554 | -46.044 | -40.00 |
| | | 3625.0 | 36.3630 | 32.510 | -79.070 | -46.560 | |
| | | 3697.5 | 35.9225 | 32.510 | -78.652 | -46.142 | |
| | 10 | 3555.0 | 36.1925 | 32.510 | -78.659 | -46.149 | |
| | | 3625.0 | 36.4080 | 32.510 | -78.701 | -46.191 | |
| | | 3695.0 | 36.4080 | 32.510 | -78.567 | -46.057 | |
| | 15 | 3557.5 | 36.1240 | 32.510 | -78.847 | -46.337 | |
| | | 3625.0 | 36.4085 | 32.510 | -78.839 | -46.329 | |
| | | 3692.5 | 36.4190 | 32.510 | -78.799 | -46.289 | |
| | 20 | 3560.0 | 36.4185 | 32.510 | -77.908 | -45.398 | |
| | | 3625.0 | 36.2725 | 32.510 | -78.209 | -45.699 | |
| | | 3690.0 | 36.4795 | 32.510 | -78.072 | -45.562 | |

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 140 ~ 163.
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 | 27.600 |
| 1 – 5 | 30.243 |
| 5 – 10 | 30.965 |
| 10 – 15 | 31.571 |
| 15 – 20 | 31.935 |
| Above 20(26.5) | 32.510 |

## 8.6 CHANNEL EDGE

| BW (MHz) | RB (Size/ Offset) | Freq. (MHz) | Outside of the authorized band (dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lower Side(MHz) | | | | Upper Side(MHz) | | | |
| | | | Below 3530 MHz | -[B]MHz ~ 3530 MHz | -1 MHz ~ -[B]MHz | 0 MHz ~ -1 MHz | 0 MHz ~ +1 MHz | 1 MHz ~ +[B]MHz | +[B]MHz ~ 3720 MHz | Above 3720 MHz |
| 5 | 25/0 | 3552.5 | -53.71 | -36.22 | -17.82 | -23.41 | -24.30 | -17.49 | -36.18 | - |
| | | 3625.0 | - | -36.72 | -20.54 | -25.15 | -25.40 | -20.12 | -36.78 | - |
| | | 3697.5 | - | -37.09 | -23.11 | -25.52 | -25.83 | -22.29 | -37.22 | -51.61 |
| 10 | 50/0 | 3555.0 | -50.12 | -41.60 | -19.62 | -27.47 | -27.26 | -19.91 | -41.47 | - |
| | | 3625.0 | - | -42.89 | -22.67 | -29.77 | -29.39 | -22.15 | -43.17 | - |
| | | 3695.0 | - | -42.36 | -24.70 | -31.31 | -31.31 | -24.00 | -41.10 | -51.40 |
| 15 | 75/0 | 3557.5 | -46.28 | -32.34 | -22.28 | -28.80 | -28.68 | -21.66 | -44.57 | - |
| | | 3625.0 | - | -44.19 | -24.13 | -30.90 | -30.77 | -24.26 | -44.67 | - |
| | | 3692.5 | - | -43.71 | -27.07 | -33.67 | -33.48 | -27.02 | -35.54 | -49.88 |
| 20 | 100/0 | 3560.0 | -46.26 | -29.45 | -21.79 | -28.51 | -28.93 | -22.57 | -45.82 | - |
| | | 3625.0 | - | -45.80 | -24.49 | -30.34 | -30.50 | -24.44 | -45.92 | - |
| | | 3690.0 | - | -44.08 | -27.26 | -33.40 | -33.78 | -27.68 | -32.07 | -46.21 |
| Limit (dBm) | | | -40.00 | -25.00 | -13.00 | -13.00 | -13.00 | -13.00 | -25.00 | -40.00 |

| BW (MHz) | RB (Size/ Offset) | Freq. (MHz) | Outside of the authorized band (dBm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Lower Side(MHz) | | | | Upper Side(MHz) | | | |
| | | | Below 3530 MHz | -[B]MHz ~ 3530 MHz | -1 MHz ~ -[B]MHz | 0 MHz ~ -1 MHz | 0 MHz ~ +1 MHz | 1 MHz ~ +[B]MHz | +[B]MHz ~ 3720 MHz | Above 3720 MHz |
| 5 | Lower Side: 1/0 Upper Side: 1/24 | 3552.5 | -52.11 | -35.71 | -24.02 | -18.43 | -19.21 | -24.51 | -36.46 | - |
| | | 3625.0 | - | -36.32 | -24.42 | -19.13 | -19.87 | -24.60 | -36.74 | - |
| | | 3697.5 | - | -36.41 | -24.62 | -19.39 | -19.81 | -24.47 | -36.07 | -51.15 |
| 10 | Lower Side: 1/0 Upper Side: 1/49 | 3555.0 | -52.22 | -41.42 | -21.66 | -16.32 | -16.70 | -22.55 | -41.39 | - |
| | | 3625.0 | - | -41.70 | -22.61 | -17.41 | -17.41 | -23.14 | -41.62 | - |
| | | 3695.0 | - | -41.15 | -21.13 | -17.79 | -17.44 | -22.91 | -40.48 | -50.65 |
| 15 | Lower Side: 1/0 Upper Side: 1/74 | 3557.5 | -51.41 | -41.53 | -24.75 | -21.20 | -20.85 | -24.90 | -41.79 | - |
| | | 3625.0 | - | -41.88 | -25.31 | -21.91 | -22.10 | -25.59 | -41.22 | - |
| | | 3692.5 | - | -42.08 | -25.94 | -22.52 | -21.72 | -25.03 | -40.78 | -50.78 |
| 20 | Lower Side: 1/0 Upper Side: 1/99 | 3560.0 | -48.58 | -41.22 | -25.18 | -25.03 | -25.90 | -26.41 | -50.10 | - |
| | | 3625.0 | - | -52.00 | -25.76 | -25.52 | -26.77 | -26.49 | -50.48 | - |
| | | 3690.0 | - | -51.88 | -26.23 | -25.62 | -26.06 | -25.79 | -39.87 | -48.87 |
| Limit (dBm) | | | -40.00 | -25.00 | -13.00 | -13.00 | -13.00 | -13.00 | -25.00 | -40.00 |

Note:

1. C.E = Channel Edge
2. Plots of the EUT's Channel Edge are shown Page 96 ~ 139.

## 8.7 Adjacent Channel Leakage Ratio(ACLR)

| Band Width | RB (Size/ Offset) | Frequency (MHz) | Adjacent Channel Leakage Ratio(dB) | |
|---|---|---|---|---|
| | | | Lower Side | Upper Side |
| 5 MHz | 25/0 | 3552.5 | 35.37 | 34.85 |
| | | 3625.0 | 36.37 | 35.85 |
| | | 3697.5 | 38.13 | 37.64 |
| 10 MHz | 50/0 | 3555.0 | 35.92 | 35.69 |
| | | 3625.0 | 37.61 | 37.26 |
| | | 3695.0 | 40.25 | 40.04 |
| 15 MHz | 75/0 | 3557.5 | 36.53 | 36.36 |
| | | 3625.0 | 37.91 | 37.54 |
| | | 3692.5 | 40.50 | 40.45 |
| 20 MHz | 100/0 | 3560.0 | 36.07 | 35.78 |
| | | 3625.0 | 37.80 | 37.17 |
| | | 3690.0 | 40.45 | 40.08 |
| Limit (dB) | | | ACLR > 30 dB | ACLR > 30 dB |

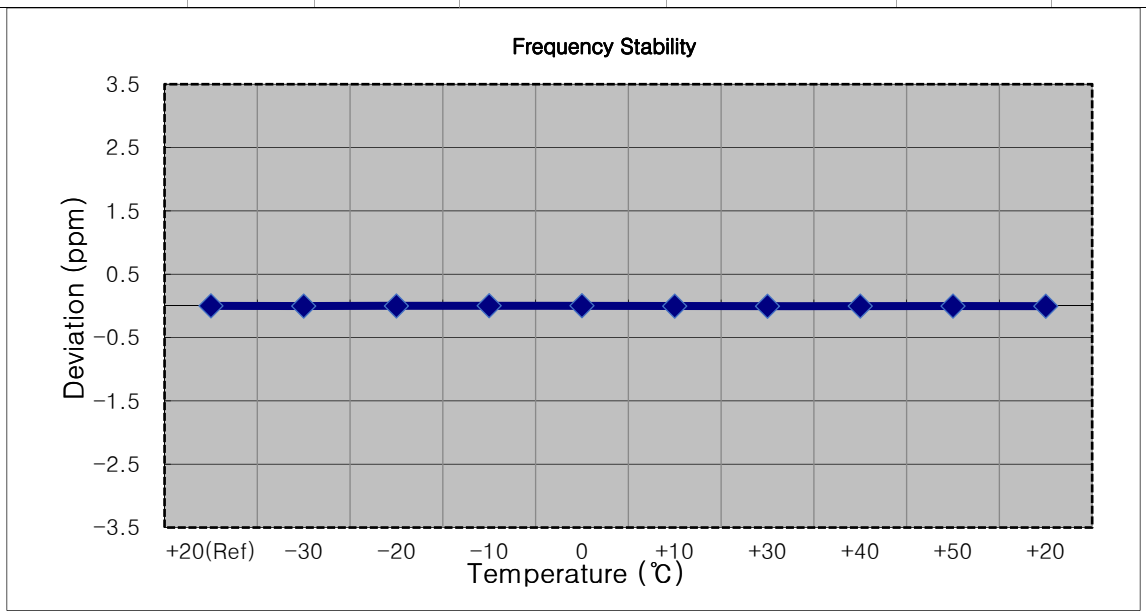
Note:

1. Duty Cycle factor already applied on the factor.
 - Duty Cycle factor(dB) = 3.979
 - Factor(dB) = Duty Cycle factor + Cable Loss + Ext. Attenuator + Power Splitter
2. Plots of the EUT's Adjacent Channel Leakage Ratio(ACLR) are shown Page 84 ~ 95.

## 8.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

- ▣ OPERATING FREQUENCY: 3,552,500,000 Hz
- ▣ BANDWIDTH: 5 MHz
- ▣ REFERENCE VOLTAGE: 3.300 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3552 499 992 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3552 499 982 | -10.1 | 0.000 000 | -0.003 |
| 100 % | | -20 | 3552 499 988 | -4.2 | 0.000 000 | -0.001 |
| 100 % | | -10 | 3552 500 001 | 8.7 | 0.000 000 | 0.002 |
| 100 % | | 0 | 3552 500 001 | 8.7 | 0.000 000 | 0.002 |
| 100 % | | +10 | 3552 499 980 | -12.5 | 0.000 000 | -0.004 |
| 100 % | | +30 | 3552 499 974 | -18.4 | -0.000 001 | -0.005 |
| 100 % | | +40 | 3552 499 983 | -9.6 | 0.000 000 | -0.003 |
| 100 % | | +50 | 3552 499 982 | -10.8 | 0.000 000 | -0.003 |
| Batt. Endpoint | 2.800 | +20 | 3552 499 976 | -16.7 | 0.000 000 | -0.005 |



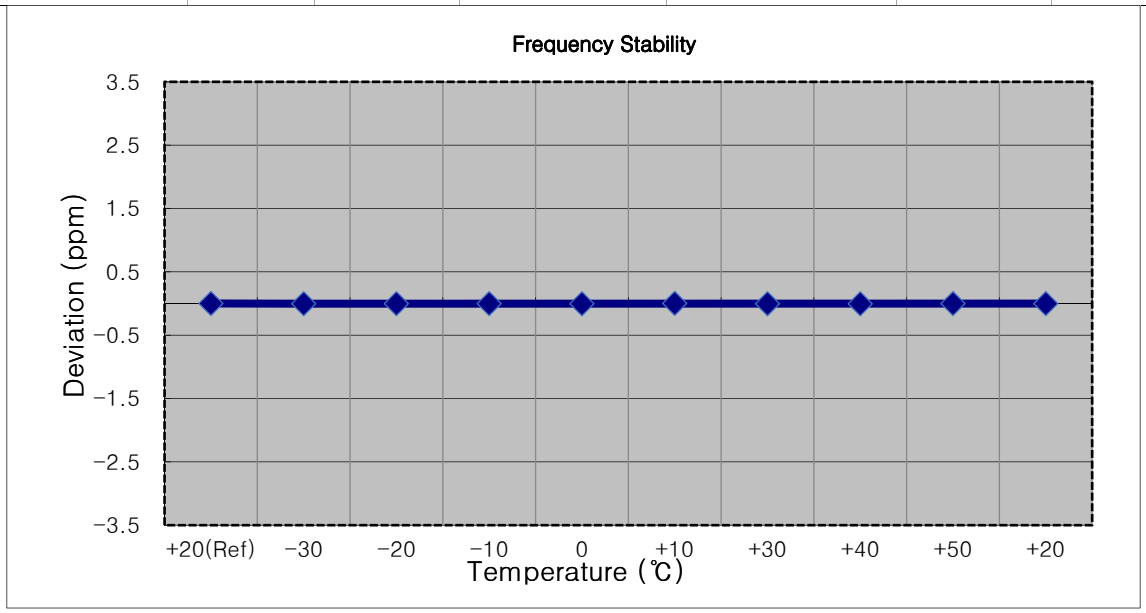
▣ OPERATING FREQUENCY: 3,555,000,000 Hz

▣ BANDWIDTH: 10 MHz

▣ REFERENCE VOLTAGE: 3.300 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3554 999 993 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3554 999 982 | -11.8 | 0.000 000 | -0.003 |
| 100 % | | -20 | 3554 999 984 | -9.5 | 0.000 000 | -0.003 |
| 100 % | | -10 | 3554 999 987 | -6.6 | 0.000 000 | -0.002 |
| 100 % | | 0 | 3554 999 977 | -16.1 | 0.000 000 | -0.005 |
| 100 % | | +10 | 3555 000 000 | 6.3 | 0.000 000 | 0.002 |
| 100 % | | +30 | 3554 999 981 | -12.6 | 0.000 000 | -0.004 |
| 100 % | | +40 | 3554 999 979 | -14.7 | 0.000 000 | -0.004 |
| 100 % | | +50 | 3554 999 989 | -4.4 | 0.000 000 | -0.001 |
| Batt. Endpoint | 2.800 | +20 | 3554 999 988 | -5.3 | 0.000 000 | -0.001 |



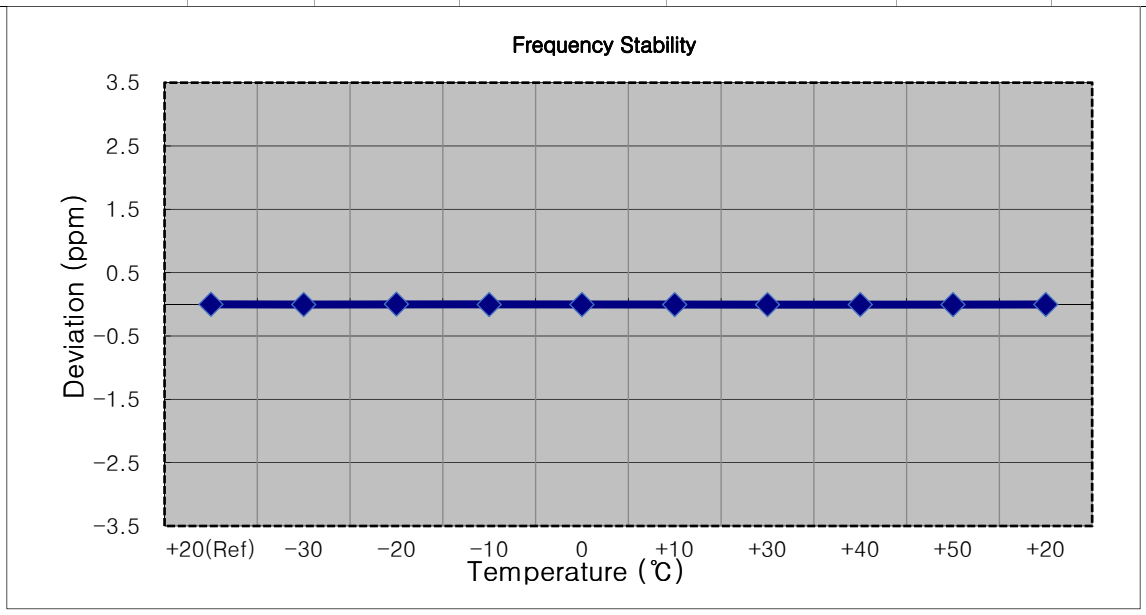
▣ OPERATING FREQUENCY: 3,557,500,000 Hz

▣ BANDWIDTH: 15 MHz

▣ REFERENCE VOLTAGE: 3.300 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3557 499 985 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3557 499 973 | -12.2 | 0.000 000 | -0.003 |
| 100 % | | -20 | 3557 499 997 | 12.0 | 0.000 000 | 0.003 |
| 100 % | | -10 | 3557 499 974 | -11.0 | 0.000 000 | -0.003 |
| 100 % | | 0 | 3557 499 972 | -12.9 | 0.000 000 | -0.004 |
| 100 % | | +10 | 3557 499 969 | -15.7 | 0.000 000 | -0.004 |
| 100 % | | +30 | 3557 499 970 | -14.7 | 0.000 000 | -0.004 |
| 100 % | | +40 | 3557 499 974 | -10.9 | 0.000 000 | -0.003 |
| 100 % | | +50 | 3557 499 970 | -15.2 | 0.000 000 | -0.004 |
| Batt. Endpoint | 2.800 | +20 | 3557 499 976 | -9.1 | 0.000 000 | -0.003 |



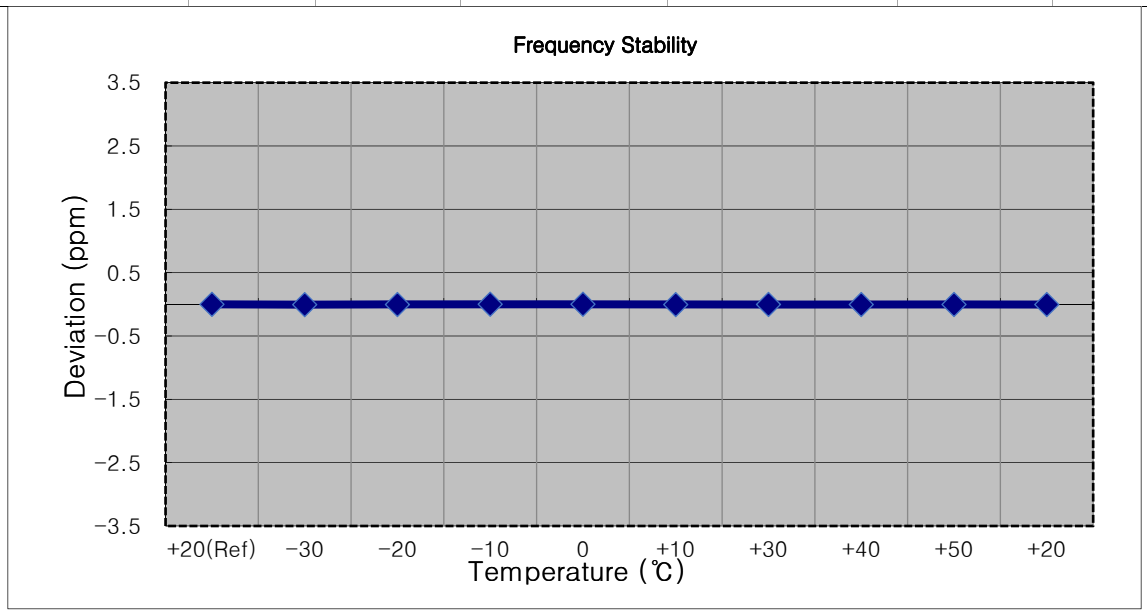
▣ OPERATING FREQUENCY: 3,560,000,000 Hz

▣ BANDWIDTH: 20 MHz

▣ REFERENCE VOLTAGE: 3.300 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3559 999 986 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3559 999 968 | -17.7 | 0.000 000 | -0.005 |
| 100 % | | -20 | 3559 999 975 | -11.2 | 0.000 000 | -0.003 |
| 100 % | | -10 | 3559 999 991 | 5.1 | 0.000 000 | 0.001 |
| 100 % | | 0 | 3559 999 992 | 6.0 | 0.000 000 | 0.002 |
| 100 % | | +10 | 3559 999 971 | -15.2 | 0.000 000 | -0.004 |
| 100 % | | +30 | 3559 999 979 | -6.3 | 0.000 000 | -0.002 |
| 100 % | | +40 | 3559 999 975 | -10.8 | 0.000 000 | -0.003 |
| 100 % | | +50 | 3559 999 978 | -7.5 | 0.000 000 | -0.002 |
| Batt. Endpoint | 2.800 | +20 | 3559 999 973 | -12.8 | 0.000 000 | -0.004 |



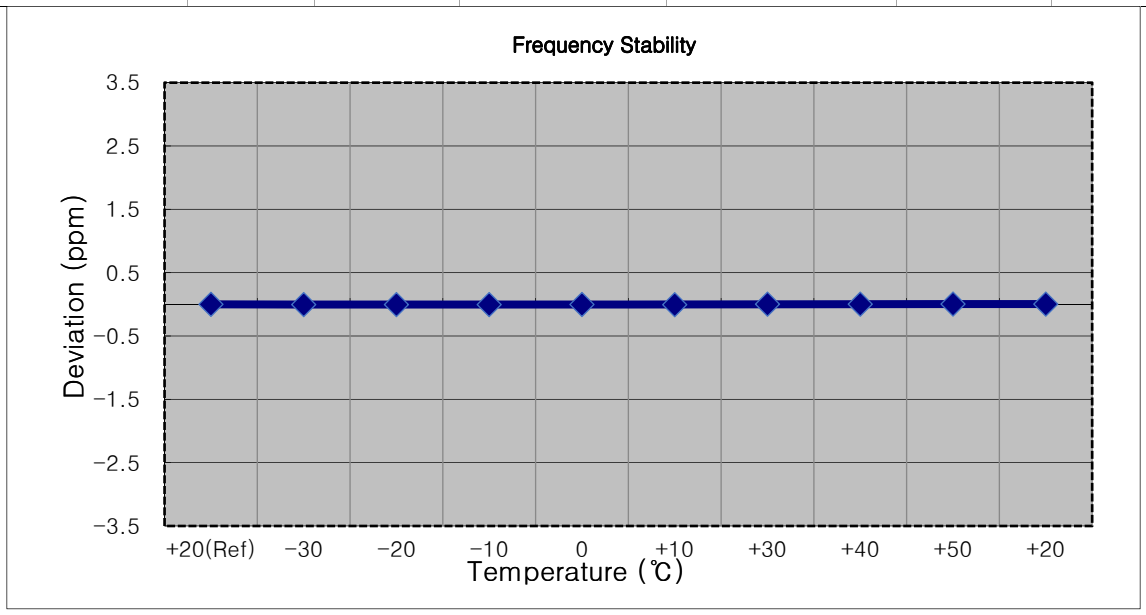
▣ OPERATING FREQUENCY: 3,625,000,000 Hz

▣ BANDWIDTH: 5 MHz

▣ REFERENCE VOLTAGE: 3.300 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3624 999 990 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3624 999 975 | -14.7 | 0.000 000 | -0.004 |
| 100 % | | -20 | 3624 999 976 | -13.9 | 0.000 000 | -0.004 |
| 100 % | | -10 | 3624 999 976 | -13.9 | 0.000 000 | -0.004 |
| 100 % | | 0 | 3624 999 982 | -7.5 | 0.000 000 | -0.002 |
| 100 % | | +10 | 3624 999 970 | -20.3 | -0.000 001 | -0.006 |
| 100 % | | +30 | 3624 999 999 | 8.7 | 0.000 000 | 0.002 |
| 100 % | | +40 | 3624 999 999 | 9.1 | 0.000 000 | 0.003 |
| 100 % | | +50 | 3625 000 005 | 15.4 | 0.000 000 | 0.004 |
| Batt. Endpoint | 2.800 | +20 | 3625 000 003 | 13.3 | 0.000 000 | 0.004 |



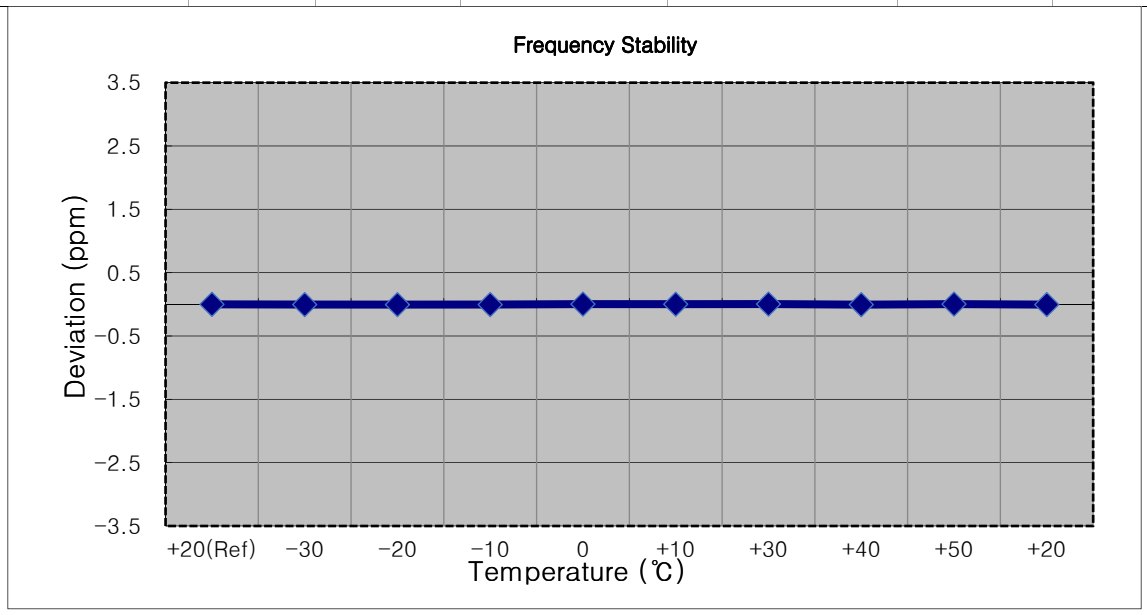
▣ OPERATING FREQUENCY: 3,625,000,000 Hz

▣ BANDWIDTH: 10 MHz

▣ REFERENCE VOLTAGE: 3.300 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3624 999 986 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3624 999 972 | -13.7 | 0.000 000 | -0.004 |
| 100 % | | -20 | 3624 999 968 | -17.3 | 0.000 000 | -0.005 |
| 100 % | | -10 | 3624 999 971 | -14.5 | 0.000 000 | -0.004 |
| 100 % | | 0 | 3624 999 997 | 11.8 | 0.000 000 | 0.003 |
| 100 % | | +10 | 3624 999 993 | 7.4 | 0.000 000 | 0.002 |
| 100 % | | +30 | 3625 000 000 | 14.7 | 0.000 000 | 0.004 |
| 100 % | | +40 | 3624 999 967 | -18.4 | -0.000 001 | -0.005 |
| 100 % | | +50 | 3624 999 998 | 12.0 | 0.000 000 | 0.003 |
| Batt. Endpoint | 2.800 | +20 | 3624 999 971 | -14.8 | 0.000 000 | -0.004 |



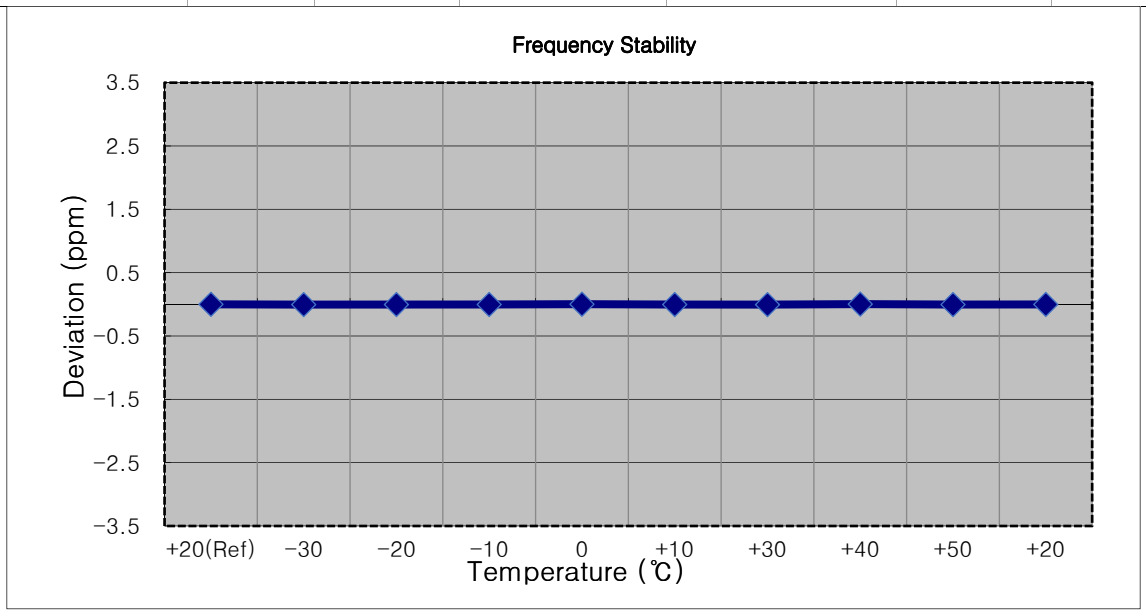
▣ OPERATING FREQUENCY: 3,625,000,000 Hz

▣ BANDWIDTH: 15 MHz

▣ REFERENCE VOLTAGE: 3.300 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3624 999 985 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3624 999 969 | -15.9 | 0.000 000 | -0.004 |
| 100 % | | -20 | 3624 999 972 | -13.2 | 0.000 000 | -0.004 |
| 100 % | | -10 | 3624 999 975 | -9.7 | 0.000 000 | -0.003 |
| 100 % | | 0 | 3624 999 993 | 8.1 | 0.000 000 | 0.002 |
| 100 % | | +10 | 3624 999 972 | -12.8 | 0.000 000 | -0.004 |
| 100 % | | +30 | 3624 999 968 | -16.8 | 0.000 000 | -0.005 |
| 100 % | | +40 | 3624 999 997 | 12.1 | 0.000 000 | 0.003 |
| 100 % | | +50 | 3624 999 971 | -13.8 | 0.000 000 | -0.004 |
| Batt. Endpoint | 2.800 | +20 | 3624 999 979 | -5.6 | 0.000 000 | -0.002 |



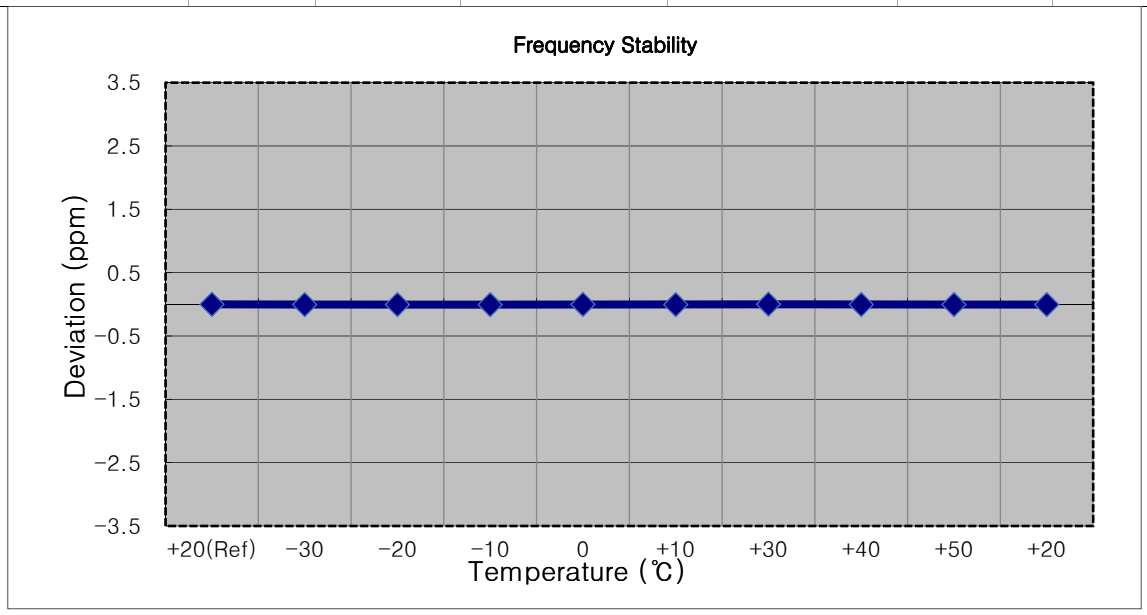
▣ OPERATING FREQUENCY: 3,625,000,000 Hz

▣ BANDWIDTH: 20 MHz

▣ REFERENCE VOLTAGE: 3.300 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3624 999 991 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3624 999 977 | -13.4 | 0.000 000 | -0.004 |
| 100 % | | -20 | 3624 999 975 | -15.5 | 0.000 000 | -0.004 |
| 100 % | | -10 | 3624 999 972 | -19.0 | -0.000 001 | -0.005 |
| 100 % | | 0 | 3624 999 985 | -6.0 | 0.000 000 | -0.002 |
| 100 % | | +10 | 3624 999 975 | -15.6 | 0.000 000 | -0.004 |
| 100 % | | +30 | 3625 000 001 | 10.9 | 0.000 000 | 0.003 |
| 100 % | | +40 | 3624 999 978 | -12.4 | 0.000 000 | -0.003 |
| 100 % | | +50 | 3624 999 979 | -12.0 | 0.000 000 | -0.003 |
| Batt. Endpoint | 2.800 | +20 | 3624 999 975 | -15.2 | 0.000 000 | -0.004 |



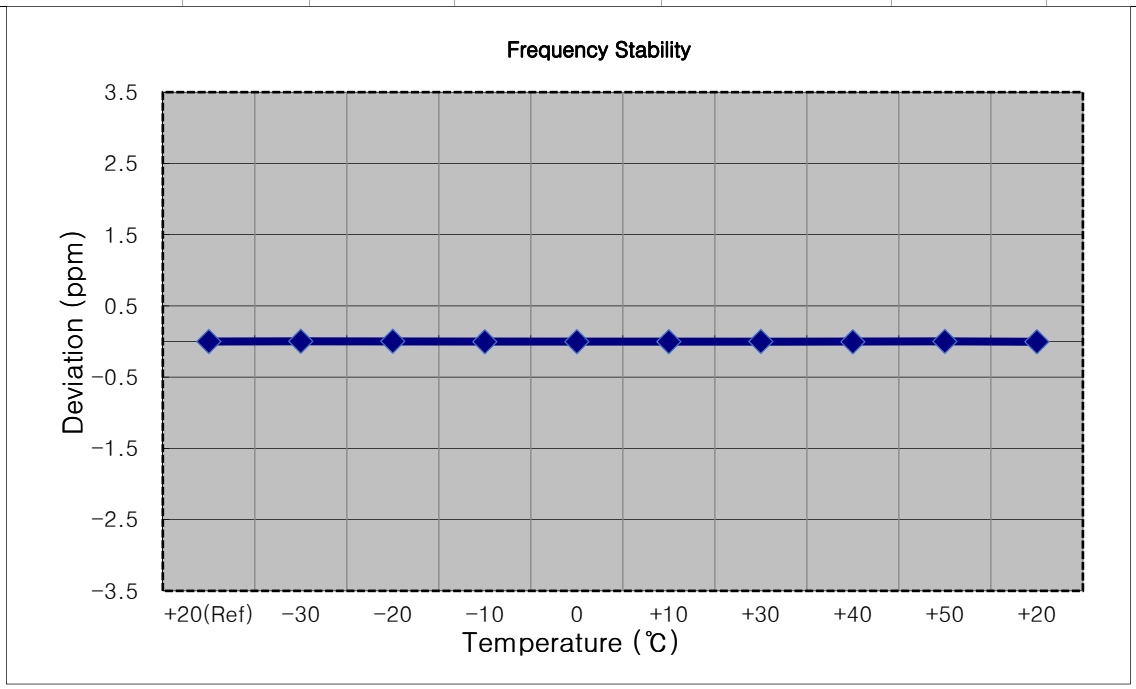
▣ OPERATING FREQUENCY: 3,697,500,000 Hz

▣ BANDWIDTH: 5 MHz

▣ REFERENCE VOLTAGE: 3.300 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3697 499 991 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3697 500 002 | 11.3 | 0.000 000 | 0.003 |
| 100 % | | -20 | 3697 500 005 | 14.2 | 0.000 000 | 0.004 |
| 100 % | | -10 | 3697 499 977 | -13.2 | 0.000 000 | -0.004 |
| 100 % | | 0 | 3697 499 984 | -6.8 | 0.000 000 | -0.002 |
| 100 % | | +10 | 3697 499 983 | -7.9 | 0.000 000 | -0.002 |
| 100 % | | +30 | 3697 499 996 | 5.0 | 0.000 000 | 0.001 |
| 100 % | | +40 | 3697 499 974 | -16.5 | 0.000 000 | -0.004 |
| 100 % | | +50 | 3697 499 999 | 8.0 | 0.000 000 | 0.002 |
| Batt. Endpoint | 2.800 | +20 | 3697 499 977 | -13.2 | 0.000 000 | -0.004 |



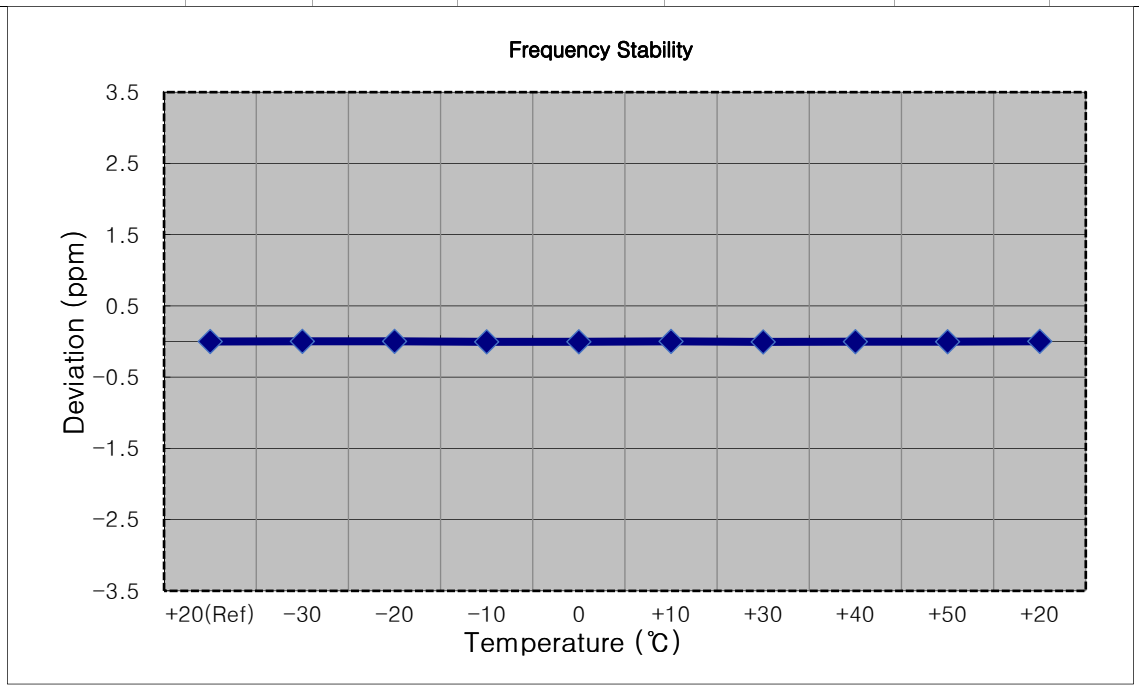
▣ OPERATING FREQUENCY: 3,695,000,000 Hz

▣ BANDWIDTH: 10 MHz

▣ REFERENCE VOLTAGE: 3.300 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3695 000 012 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3695 000 022 | 10.4 | 0.000 000 | 0.003 |
| 100 % | | -20 | 3695 000 021 | 9.7 | 0.000 000 | 0.003 |
| 100 % | | -10 | 3694 999 996 | -15.5 | 0.000 000 | -0.004 |
| 100 % | | 0 | 3694 999 999 | -12.7 | 0.000 000 | -0.003 |
| 100 % | | +10 | 3695 000 020 | 8.2 | 0.000 000 | 0.002 |
| 100 % | | +30 | 3694 999 992 | -19.5 | -0.000 001 | -0.005 |
| 100 % | | +40 | 3695 000 004 | -7.6 | 0.000 000 | -0.002 |
| 100 % | | +50 | 3695 000 003 | -9.1 | 0.000 000 | -0.002 |
| Batt. Endpoint | 2.800 | +20 | 3695 000 023 | 10.9 | 0.000 000 | 0.003 |



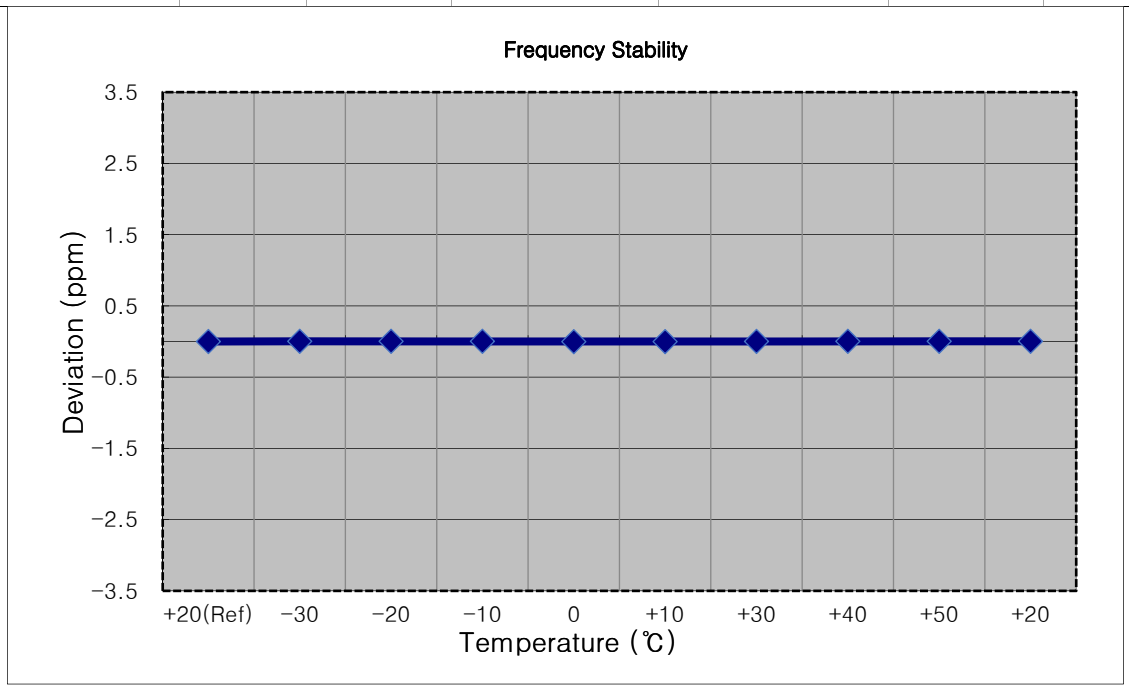
▣ OPERATING FREQUENCY: 3,692,500,000 Hz

▣ BANDWIDTH: 15 MHz

▣ REFERENCE VOLTAGE: 3.300 VDC

▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3692 500 014 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3692 500 026 | 11.3 | 0.000 000 | 0.003 |
| 100 % | | -20 | 3692 500 027 | 12.4 | 0.000 000 | 0.003 |
| 100 % | | -10 | 3692 500 026 | 11.8 | 0.000 000 | 0.003 |
| 100 % | | 0 | 3692 500 006 | -8.0 | 0.000 000 | -0.002 |
| 100 % | | +10 | 3692 500 009 | -5.3 | 0.000 000 | -0.001 |
| 100 % | | +30 | 3692 500 021 | 6.6 | 0.000 000 | 0.002 |
| 100 % | | +40 | 3692 500 028 | 13.2 | 0.000 000 | 0.004 |
| 100 % | | +50 | 3692 500 026 | 11.8 | 0.000 000 | 0.003 |
| Batt. Endpoint | 2.800 | +20 | 3692 500 027 | 12.4 | 0.000 000 | 0.003 |



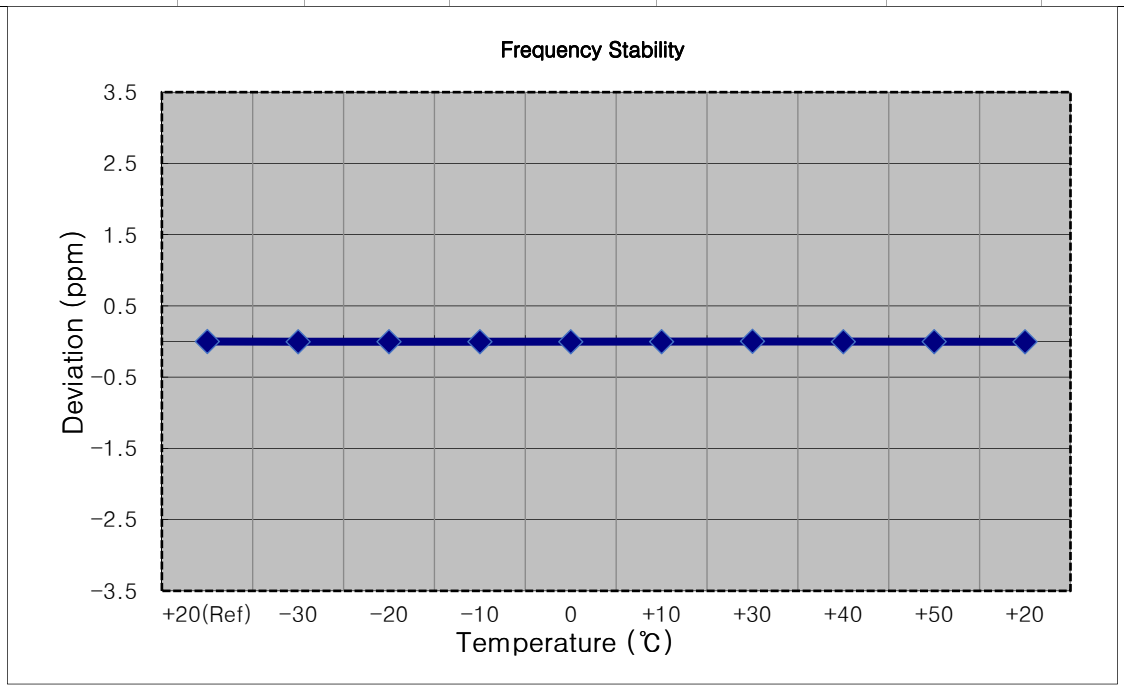
▣ OPERATING FREQUENCY: 3,690,000,000 Hz

▣ BANDWIDTH: 20 MHz

▣ REFERENCE VOLTAGE: 3.300 VDC

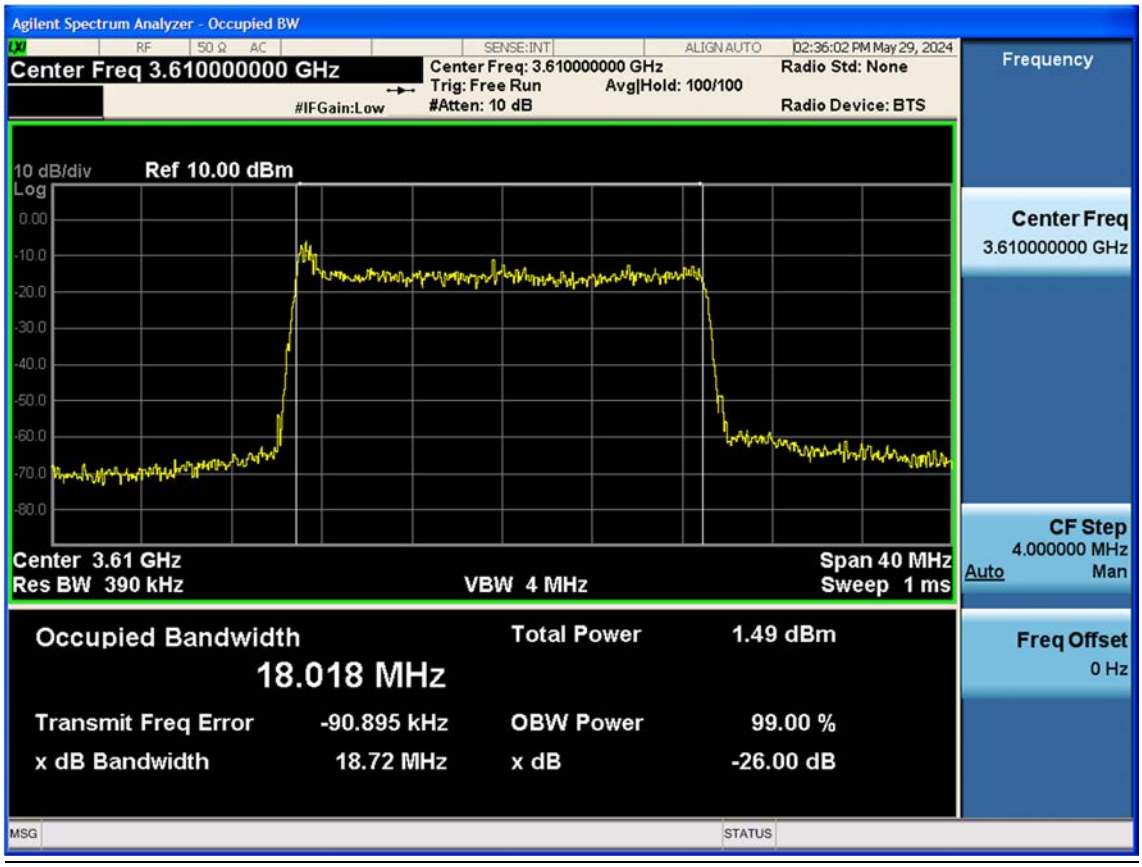
▣ DEVIATION LIMIT: Emission must remain in band

| Voltage | Power | Temp. | Frequency | Frequency Error | Deviation | ppm |
|---|---|---|---|---|---|---|
| (%) | (VDC) | (℃) | (Hz) | (Hz) | (%) | |
| 100 % | 3.300 | +20(Ref) | 3689 999 988 | 0.0 | 0.000 000 | 0.000 |
| 100 % | | -30 | 3689 999 976 | -12.0 | 0.000 000 | -0.003 |
| 100 % | | -20 | 3689 999 978 | -9.2 | 0.000 000 | -0.002 |
| 100 % | | -10 | 3689 999 978 | -9.2 | 0.000 000 | -0.002 |
| 100 % | | 0 | 3689 999 976 | -11.4 | 0.000 000 | -0.003 |
| 100 % | | +10 | 3689 999 980 | -7.4 | 0.000 000 | -0.002 |
| 100 % | | +30 | 3689 999 999 | 11.1 | 0.000 000 | 0.003 |
| 100 % | | +40 | 3689 999 978 | -9.5 | 0.000 000 | -0.003 |
| 100 % | | +50 | 3689 999 980 | -7.4 | 0.000 000 | -0.002 |
| Batt. Endpoint | 2.800 | +20 | 3689 999 975 | -12.5 | 0.000 000 | -0.003 |



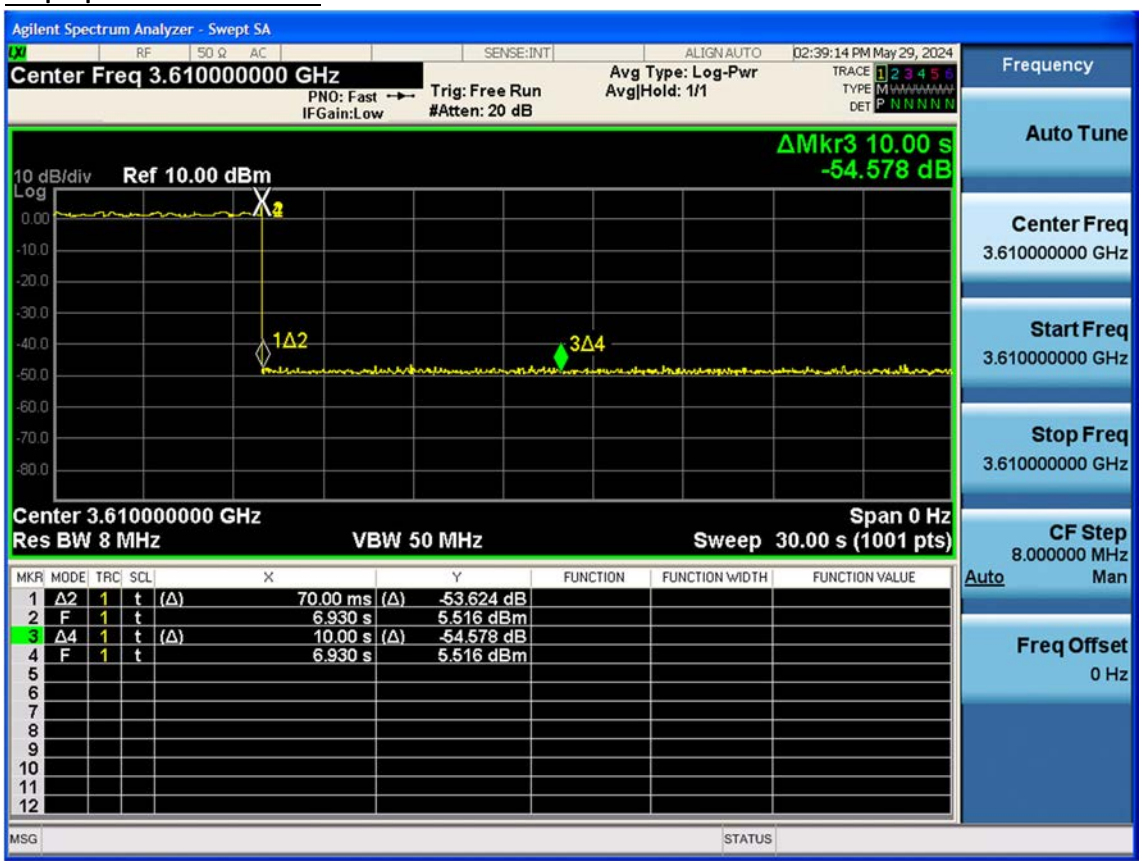
## 8.9 End User Device Additional Requirements (CBSD Protocol)

Test#1: 3610 MHz(BW: 20 MHz)




Operation Mode

**Stop Operation Within 10 s**



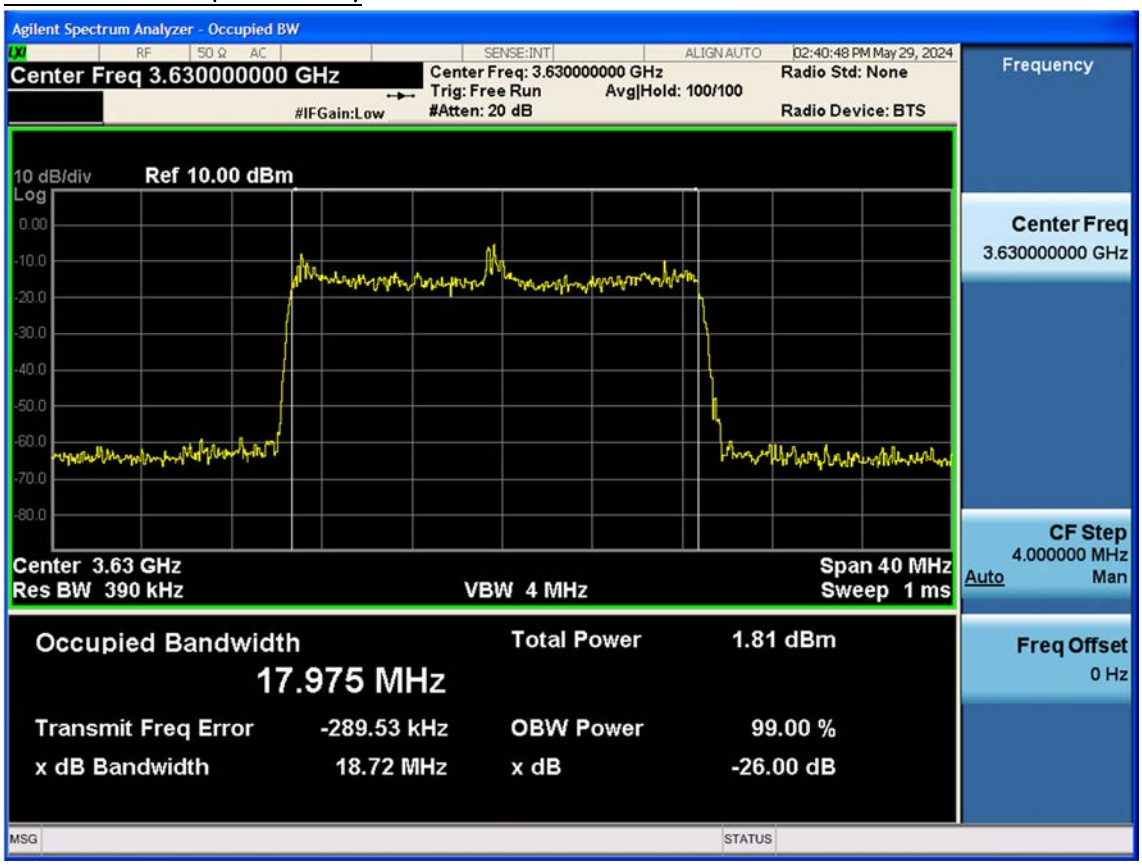

**Note:**

Marker 2: CBSD sends instructions to discontinue LTE operations.

Marker 1△2: EUT discontinues operation. (0.07 s)

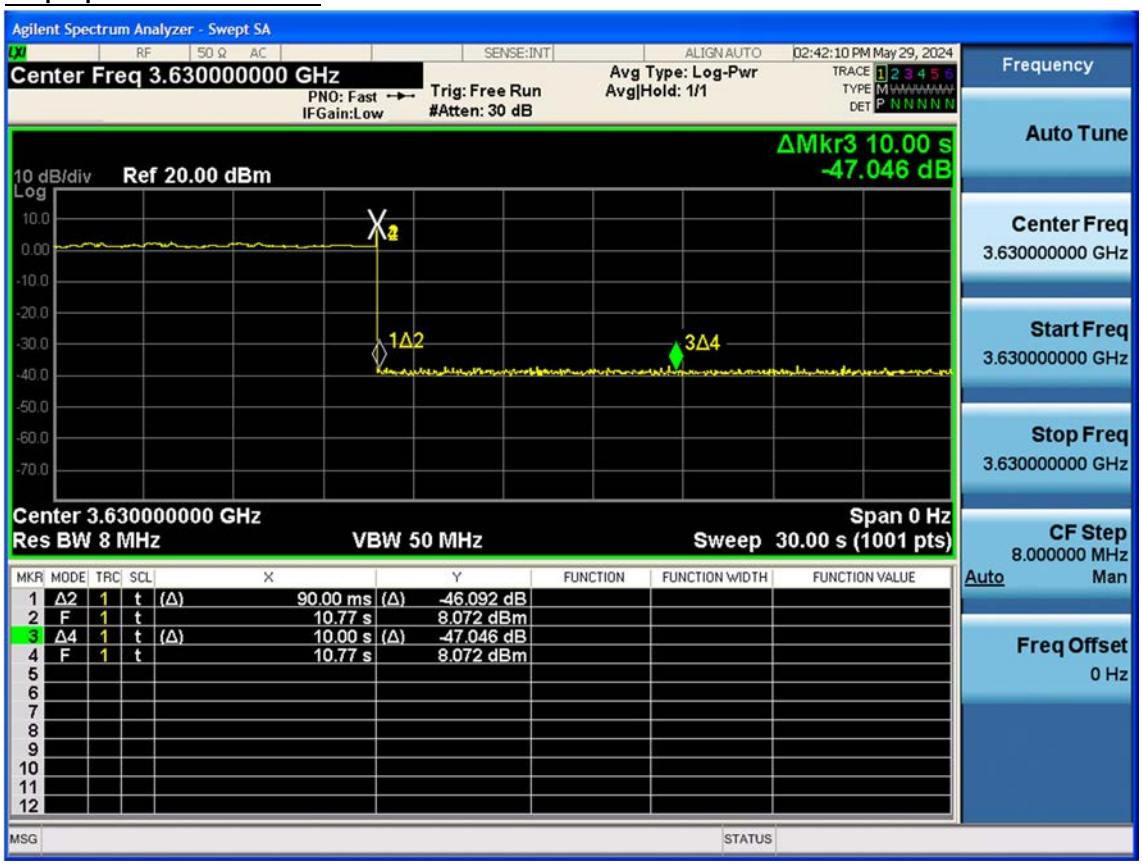
Marker 3△4: 10 seconds elapsed time from CBSD sending instructions to EUT.(10.0 s)

Test#1: 3630 MHz(BW: 20 MHz)




Operation Mode

**Stop Operation Within 10 s**




**Note:**

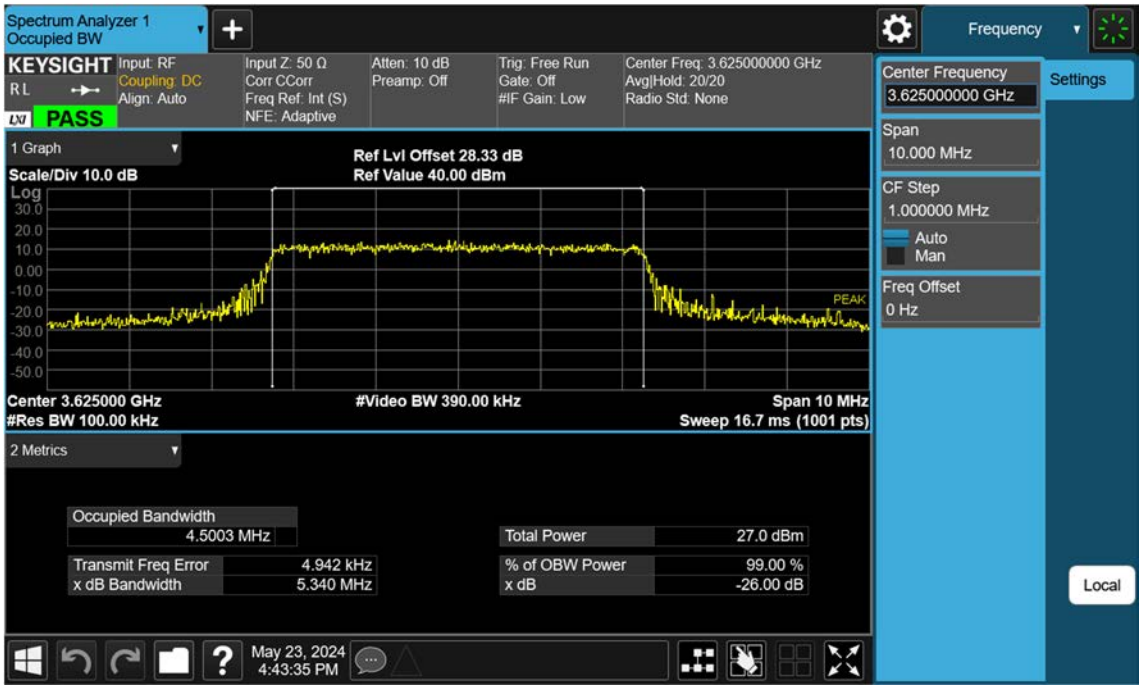
Marker 2: CBSD sends instructions to discontinue LTE operations.

Marker 1△2: EUT discontinues operation. (0.09 s)

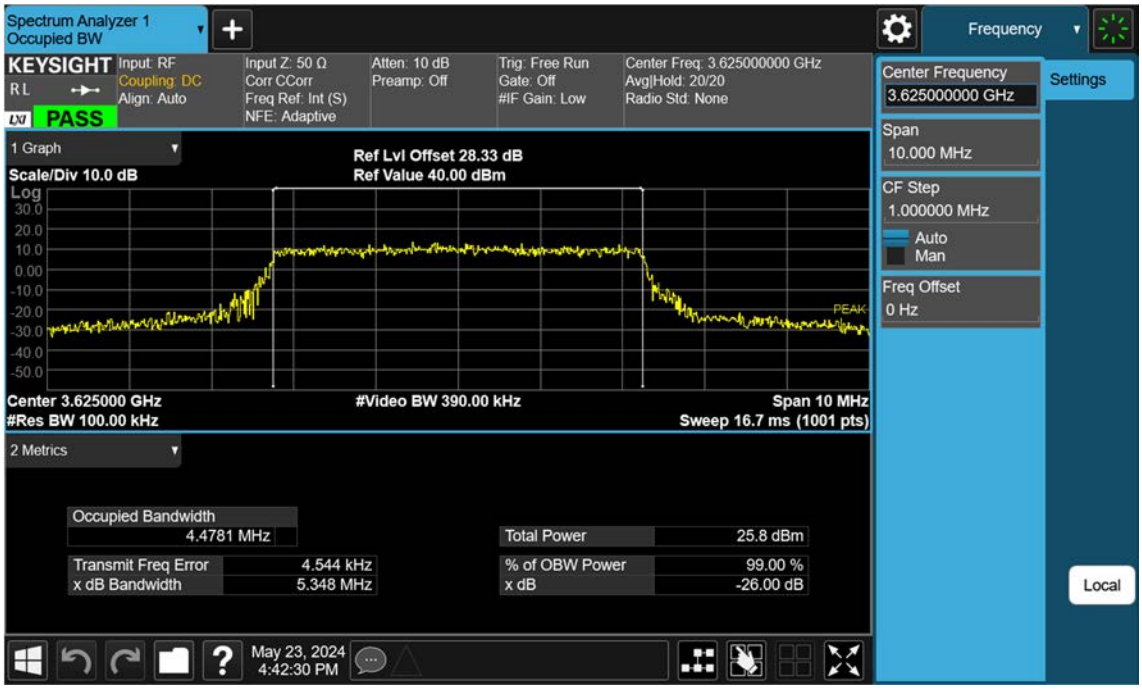
Marker 3△4: 10 seconds elapsed time from CBSD sending instructions to EUT.(10.0 s)

## 9. TEST PLOTS

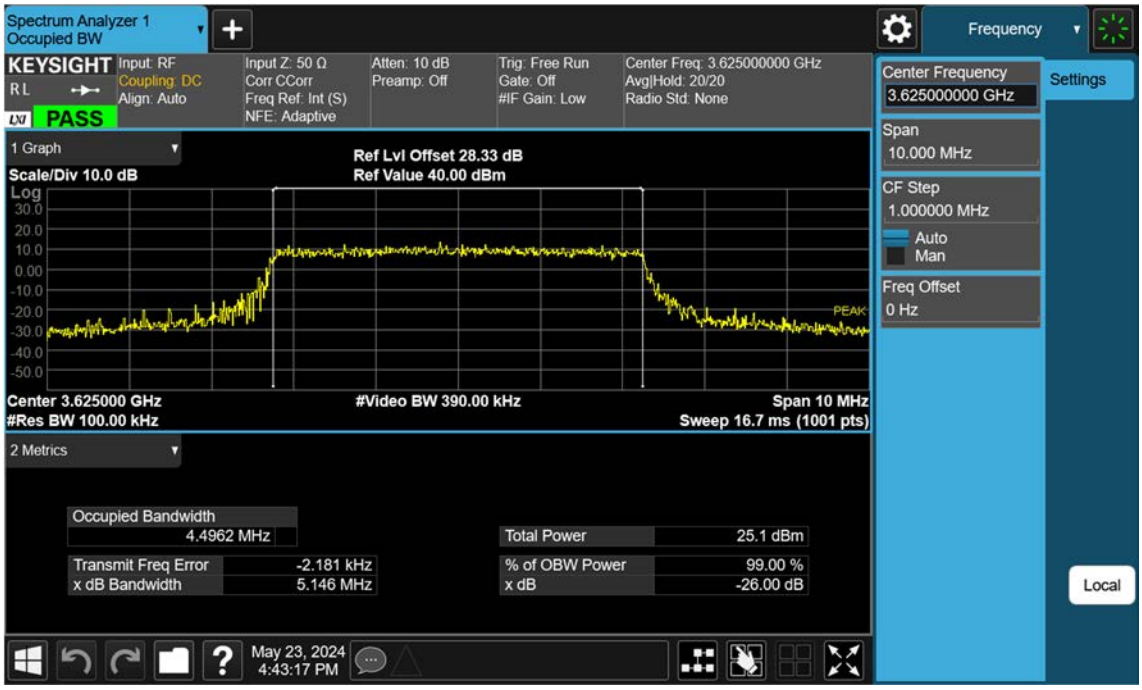
BAND 48. Occupied Bandwidth Plot (5 MHz Ch.55990 QPSK RB 25)



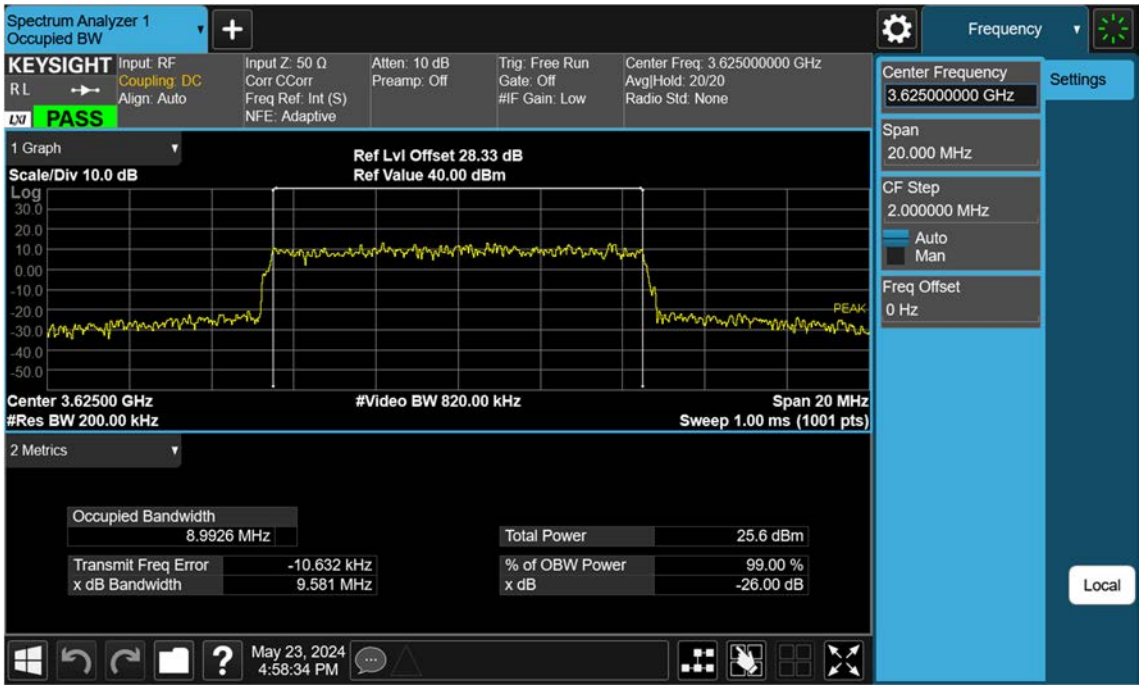
BAND 48. Occupied Bandwidth Plot (5 MHz Ch.55990 16-QAM RB 25)



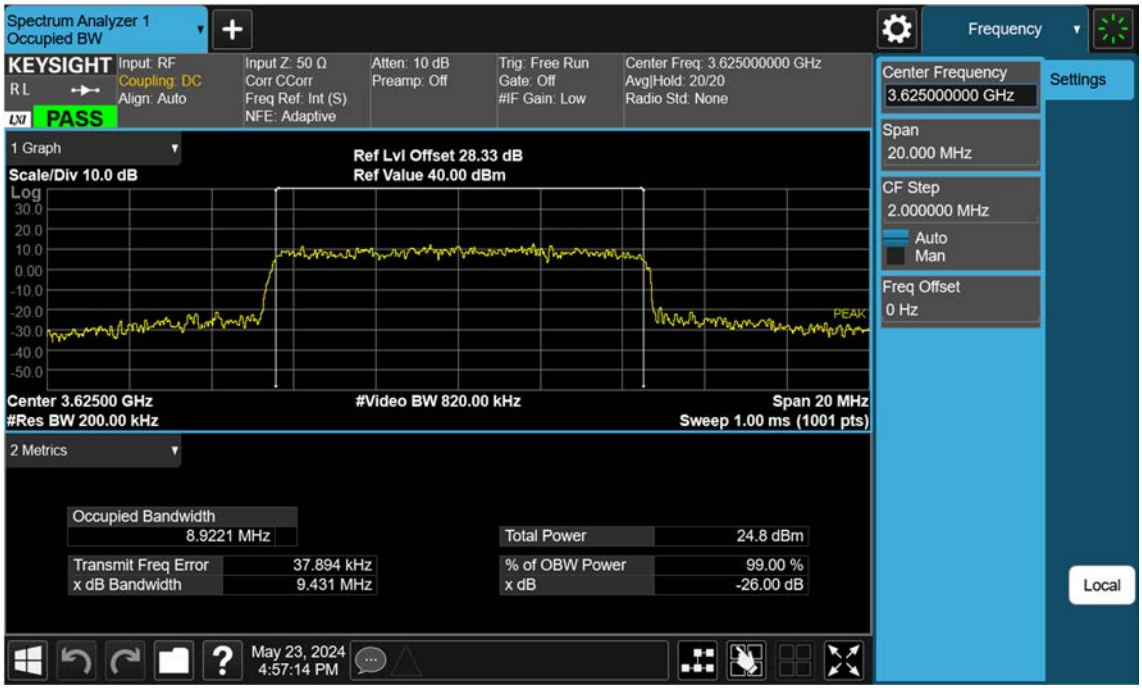
BAND 48. Occupied Bandwidth Plot (5 MHz Ch.55990 64-QAM RB 25)



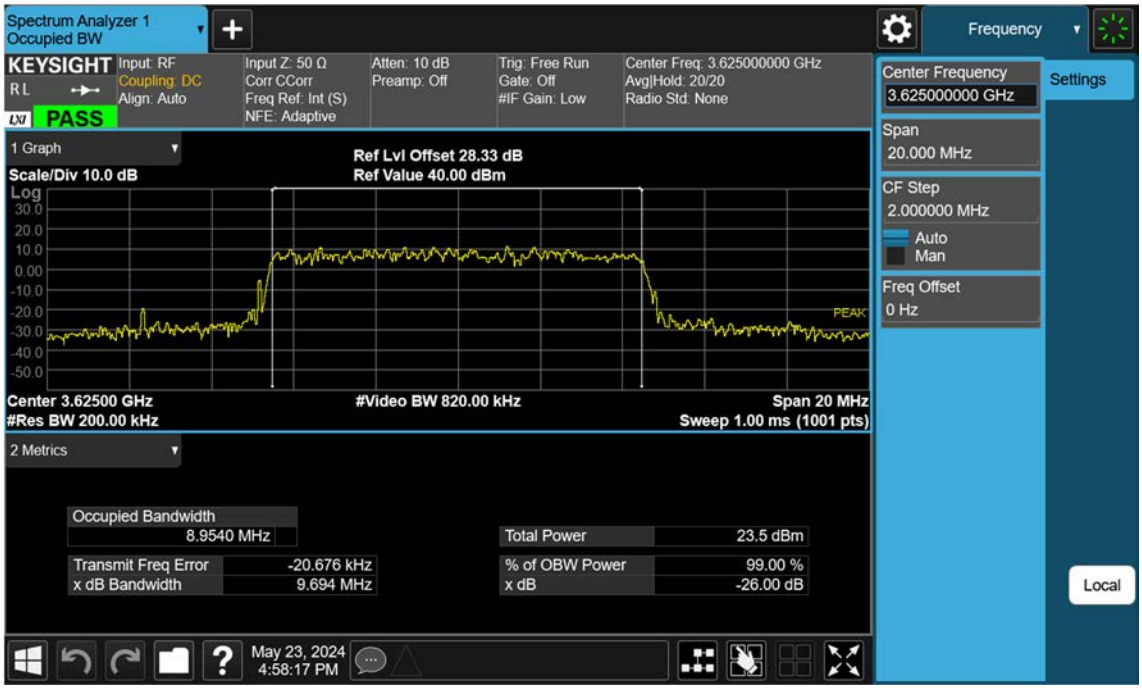
BAND 48. Occupied Bandwidth Plot (10 MHz Ch.55990 QPSK RB 50)



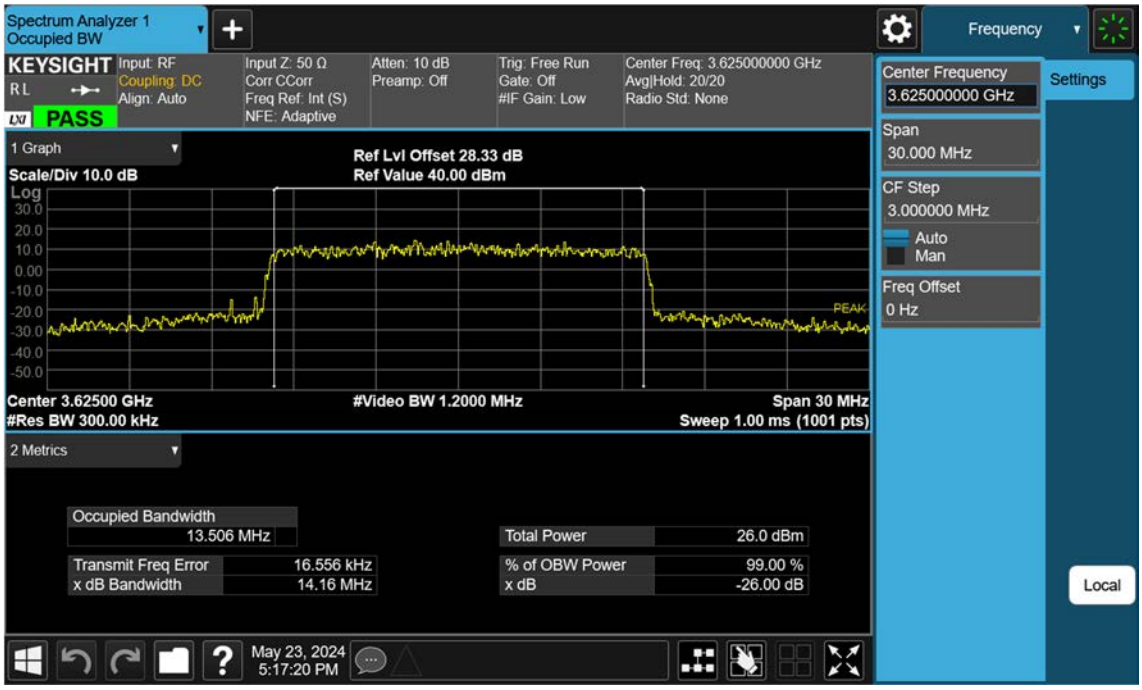
BAND 48. Occupied Bandwidth Plot (10 MHz Ch.55990 16-QAM RB 50)



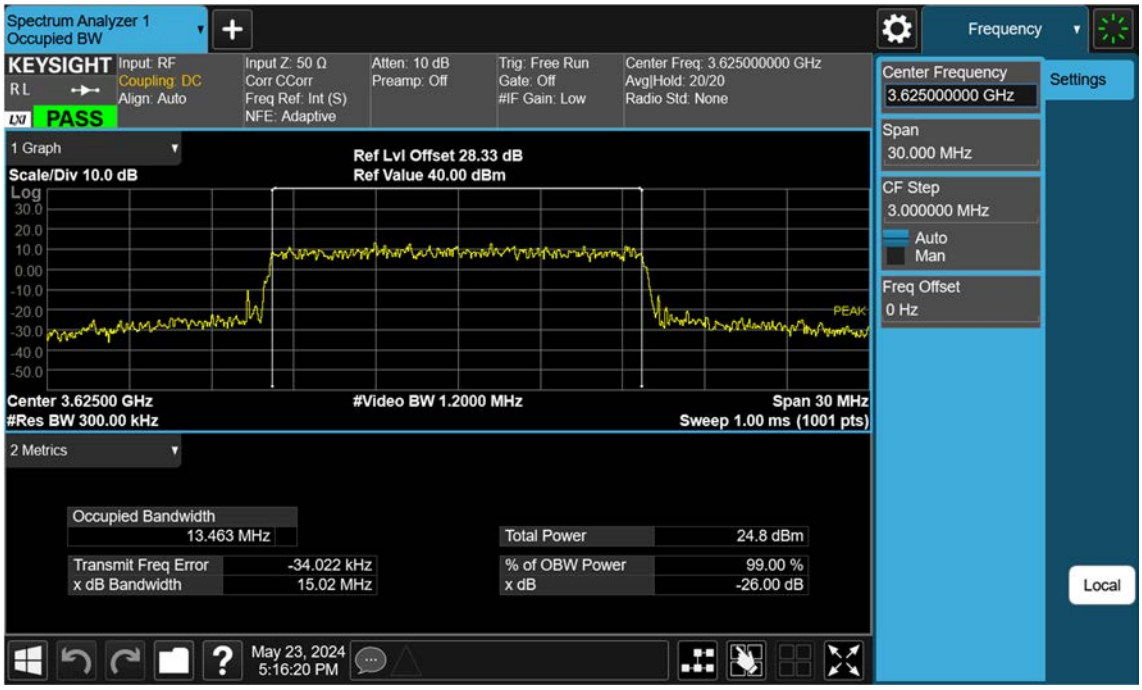
BAND 48. Occupied Bandwidth Plot (10 MHz Ch.55990 64-QAM RB 50)



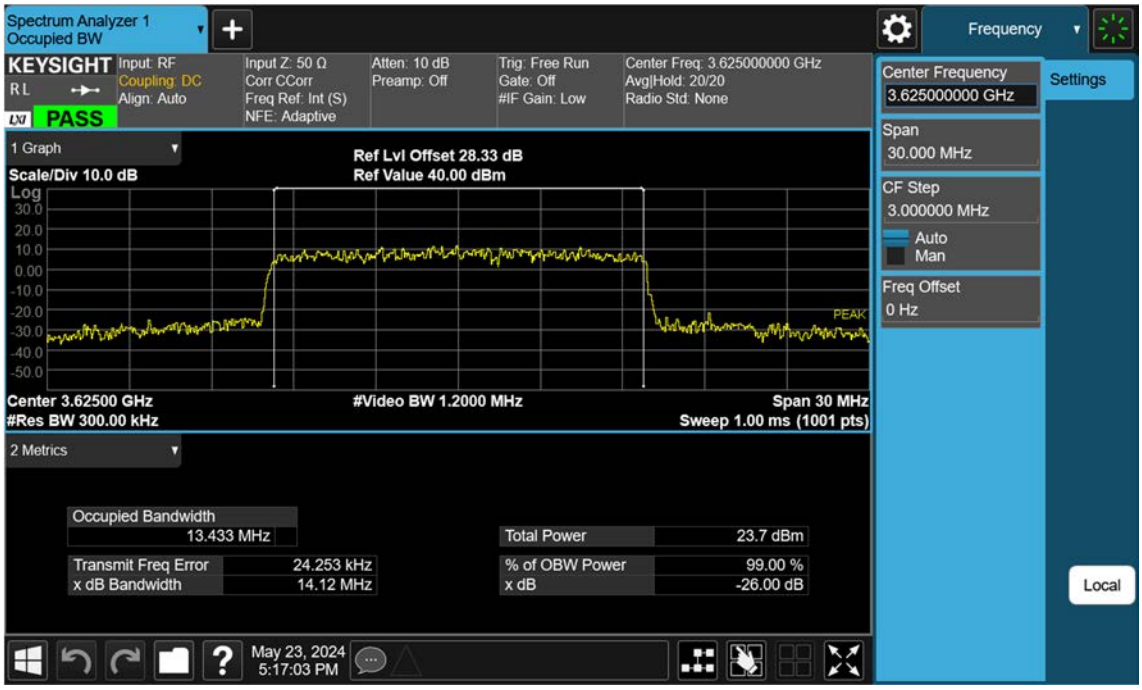
BAND 48. Occupied Bandwidth Plot (15 MHz Ch.55990 QPSK RB 75)



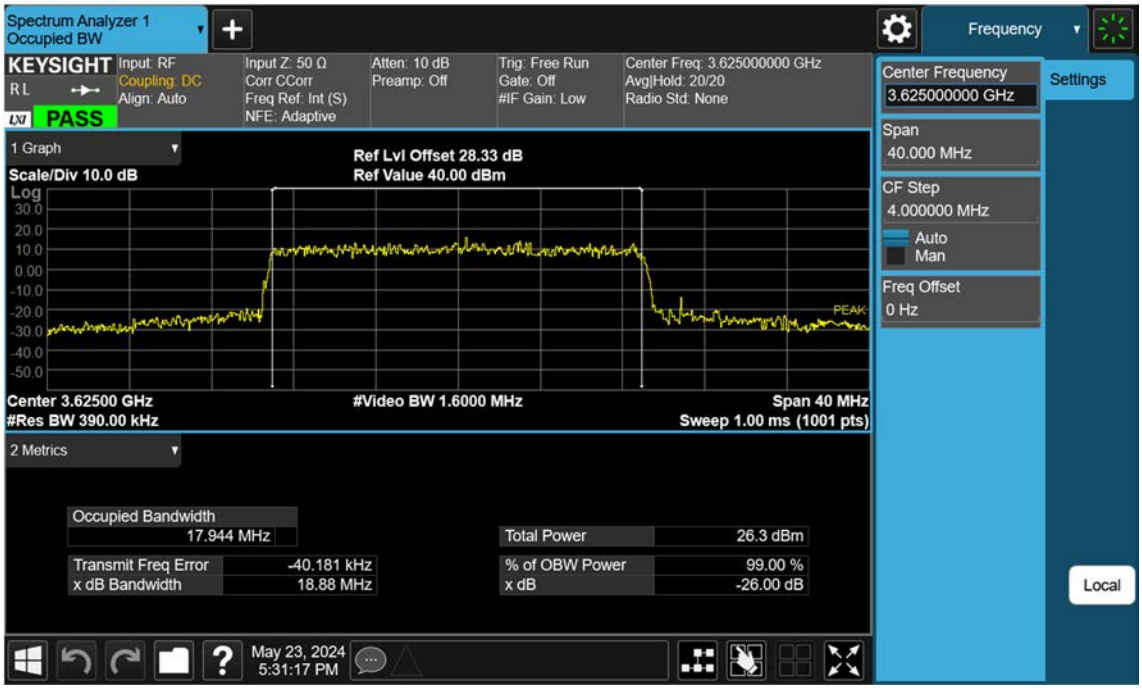
BAND 48. Occupied Bandwidth Plot (15 MHz Ch.55990 16-QAM RB 75)



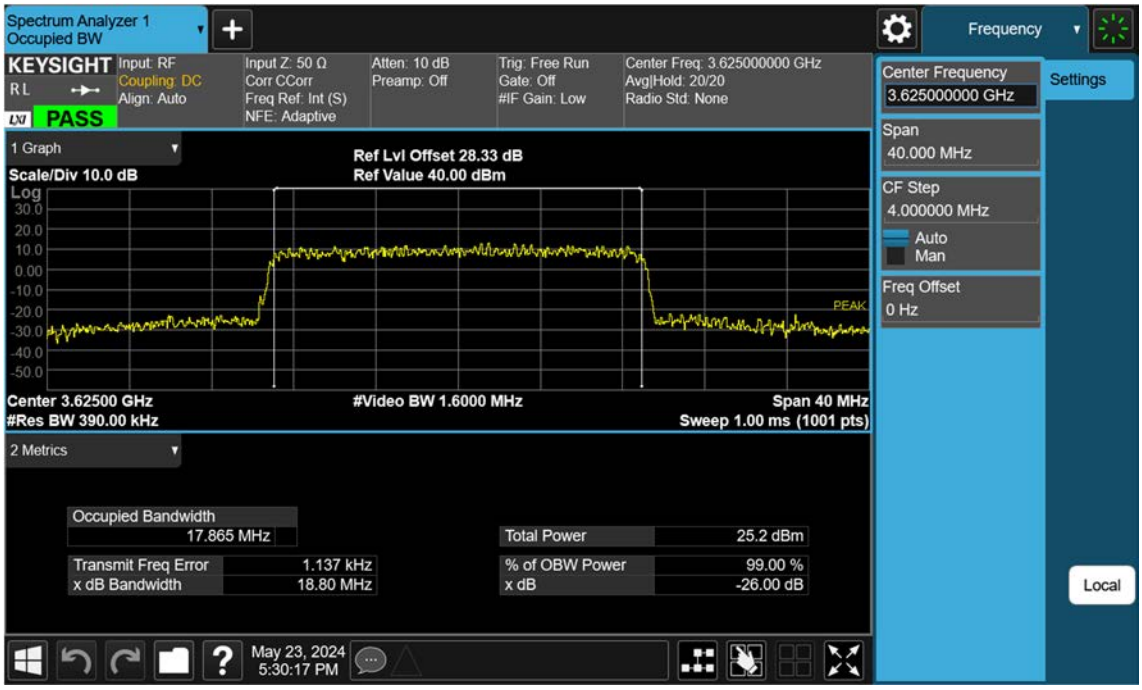
BAND 48. Occupied Bandwidth Plot (15 MHz Ch.55990 64-QAM RB 75)



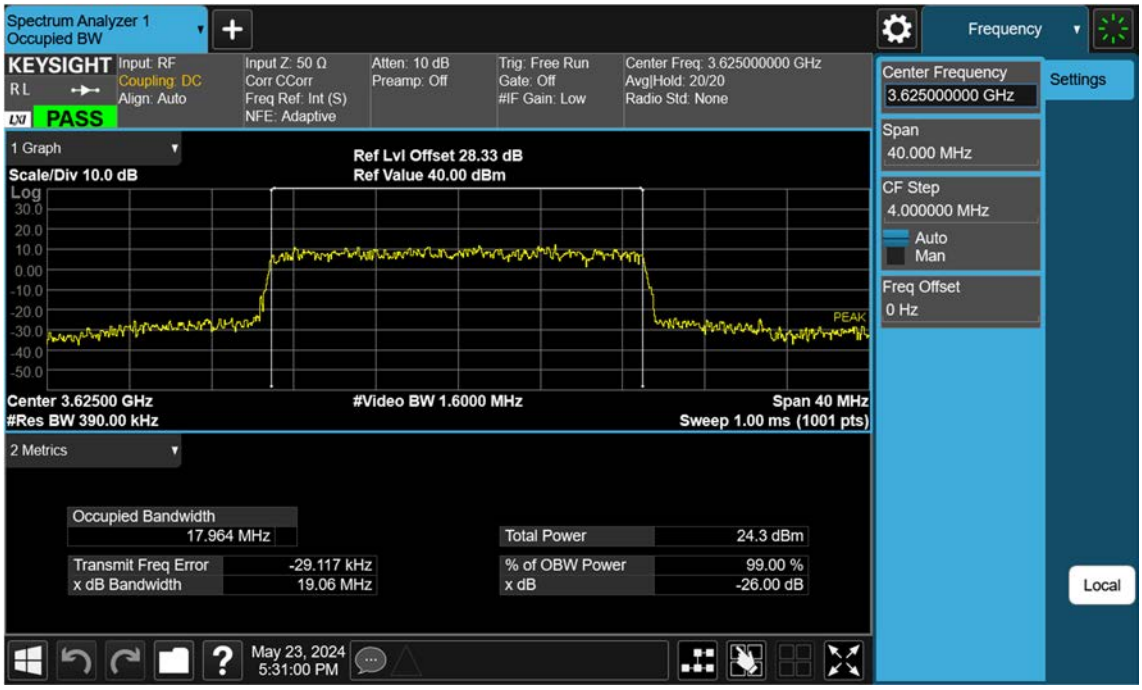
BAND 48. Occupied Bandwidth Plot (20 MHz Ch.55990 QPSK RB 100)



BAND 48. Occupied Bandwidth Plot (20 MHz Ch.55990 16-QAM RB 100)



BAND 48. Occupied Bandwidth Plot (20 MHz Ch.55990 64-QAM RB 100)



BAND 48. PAR Plot (5 M BW_Ch.55990_QPSK_RB25_0)

BAND 48. PAR Plot (5 M BW_Ch.55990_16QAM_RB25_0)

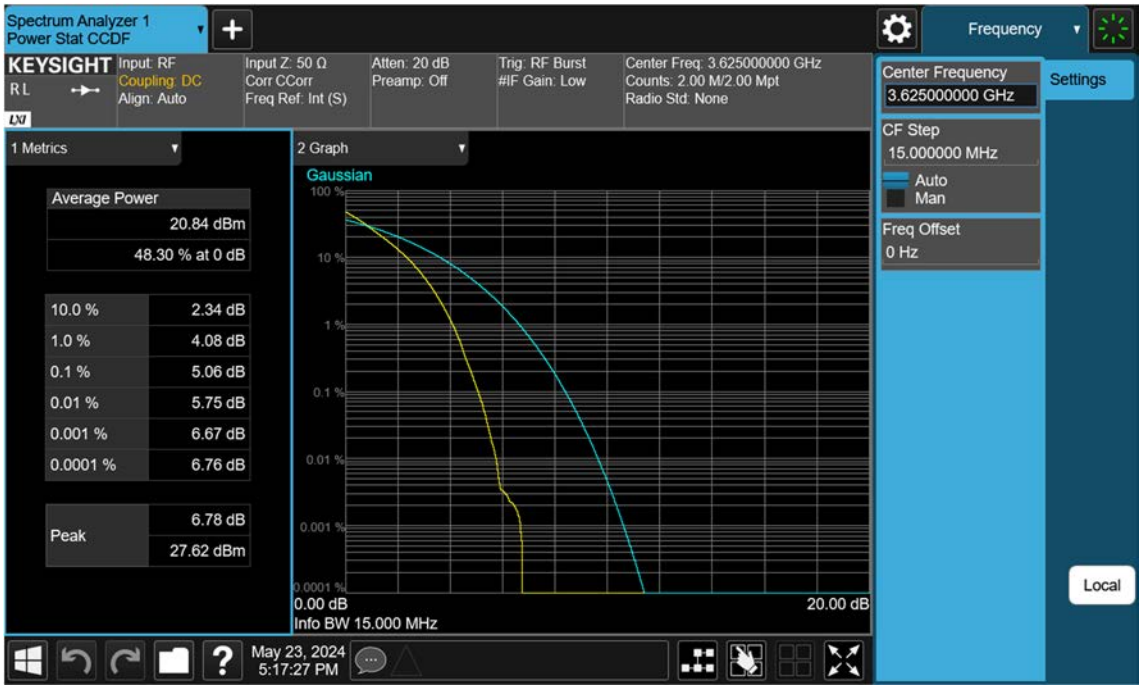
BAND 48. PAR Plot (5 M BW_Ch.55990_64QAM_RB25_0)

BAND 48. PAR Plot (10 M BW_Ch.55990_QPSK_RB50_0)

BAND 48. PAR Plot (10 M BW_Ch.55990_16QAM_RB50_0)

BAND 48. PAR Plot (10 M BW_Ch.55990_64QAM_RB50_0)

BAND 48. PAR Plot (15 M BW_Ch.55990_QPSK_RB75_0)



BAND 48. PAR Plot (15 M BW_Ch.55990_16QAM_RB75_0)

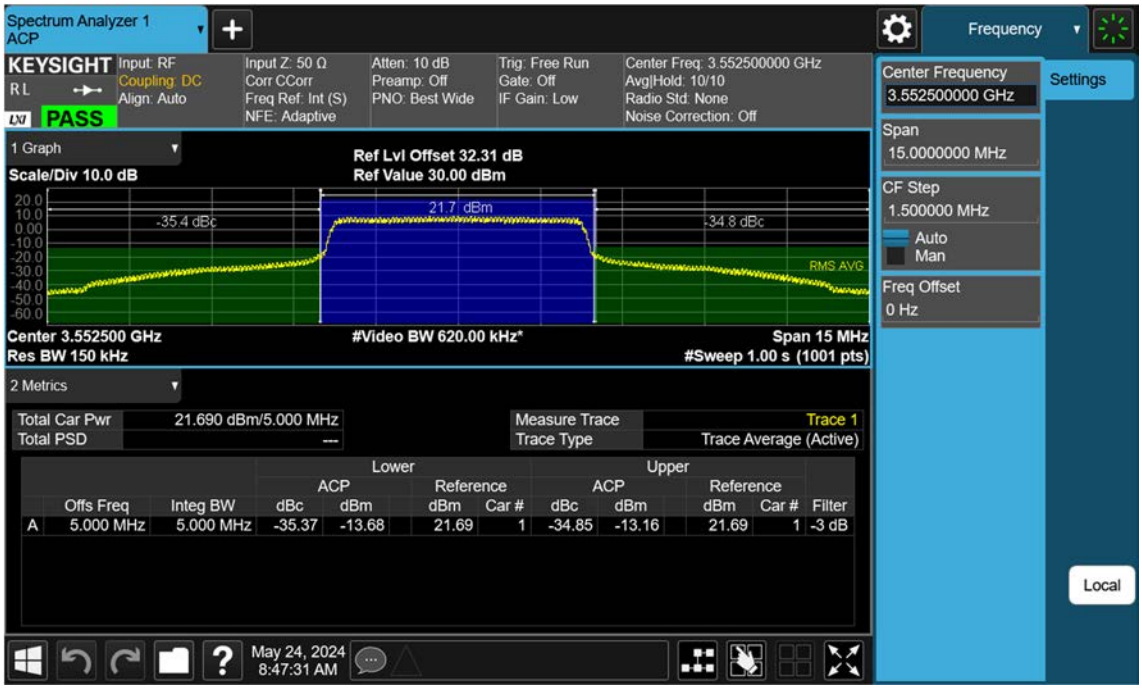
BAND 48. PAR Plot (15 M BW_Ch.55990_64QAM_RB75_0)

BAND 48. PAR Plot (20 M BW_Ch.55990_QPSK_RB100_0)

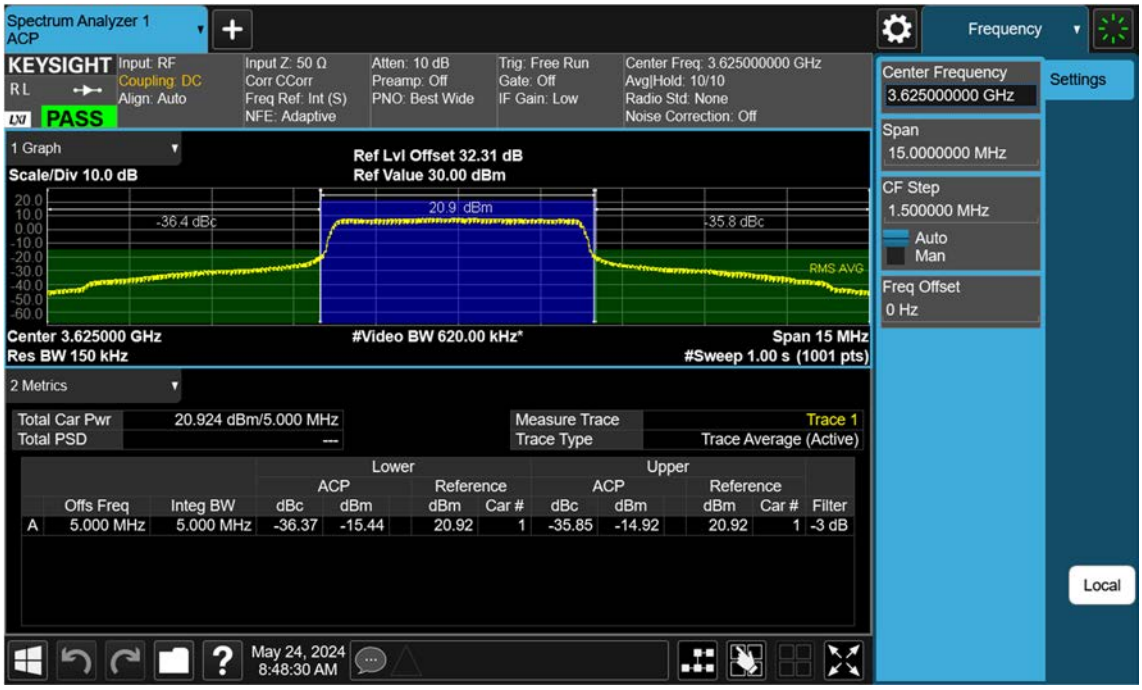
BAND 48. PAR Plot (20 M BW_Ch.55990_16QAM_RB100_0)

BAND 48. PAR Plot (20 M BW_Ch.55990_64QAM_RB100_0)

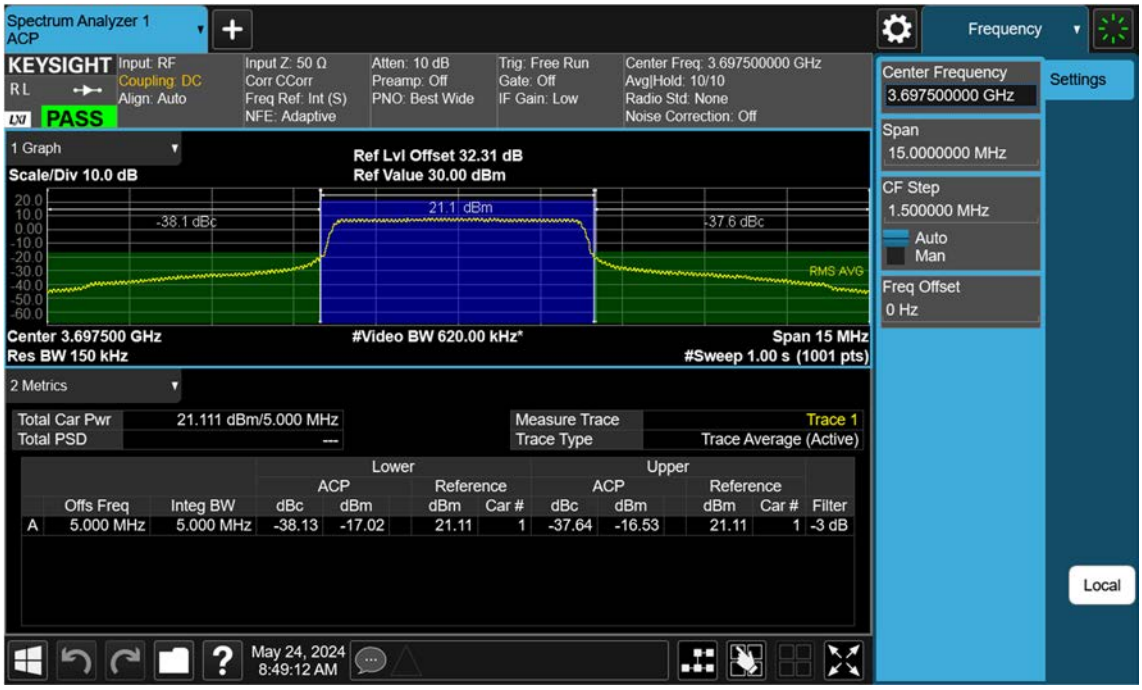
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (5 MHz Ch.55265 QPSK RB 25, Offset 0)



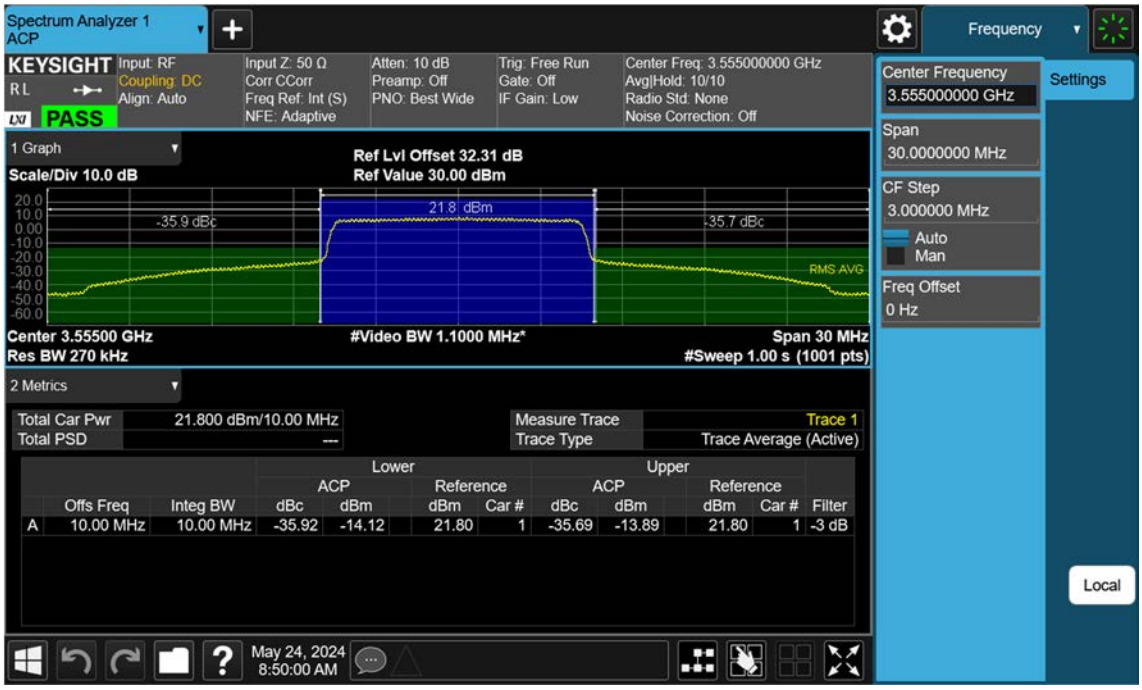
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (5 MHz Ch.55990 QPSK RB 25, Offset 0)



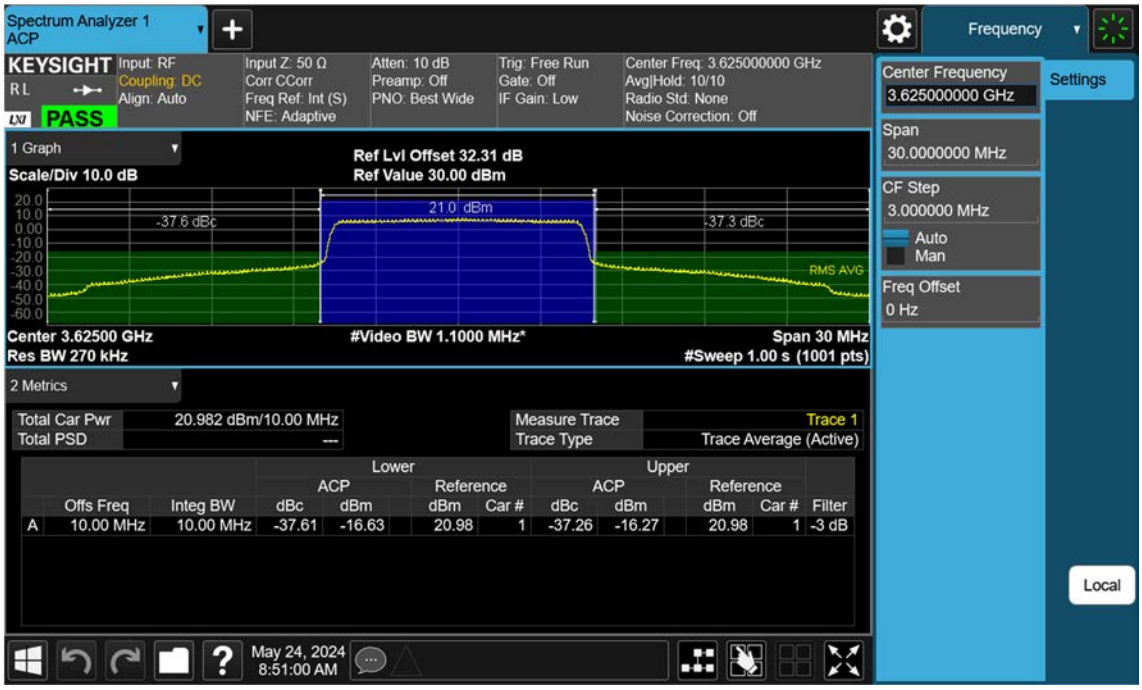
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (5 MHz Ch.56715 QPSK RB 25, Offset 0)



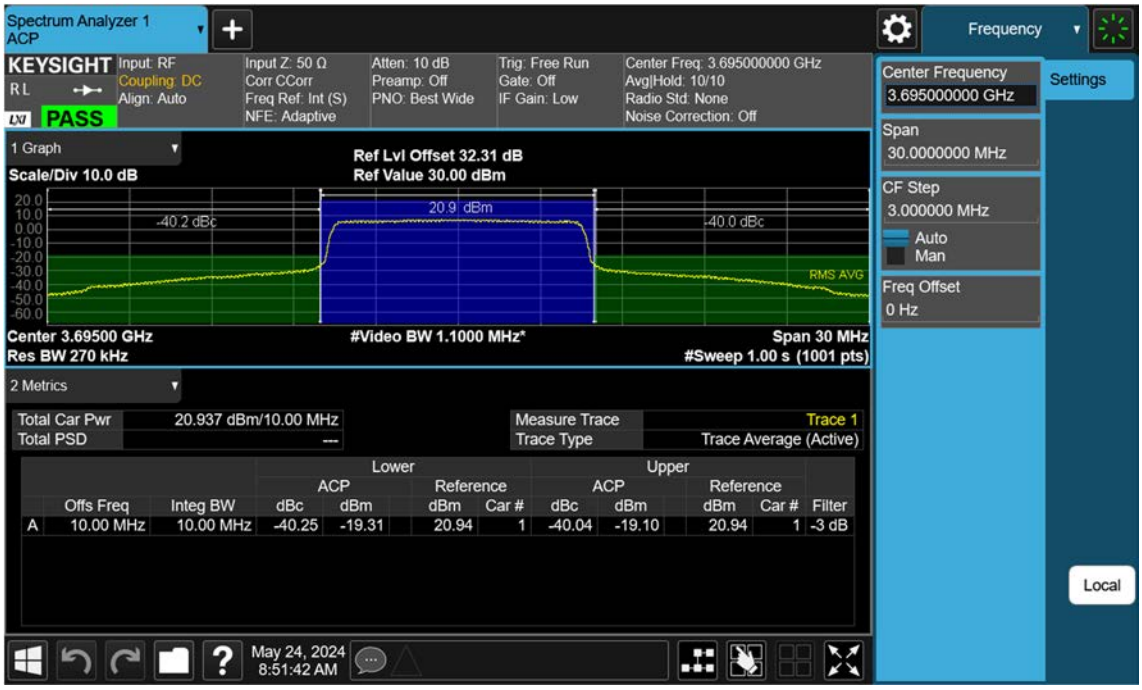
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (10 MHz Ch.55290 QPSK RB 50, Offset 0)



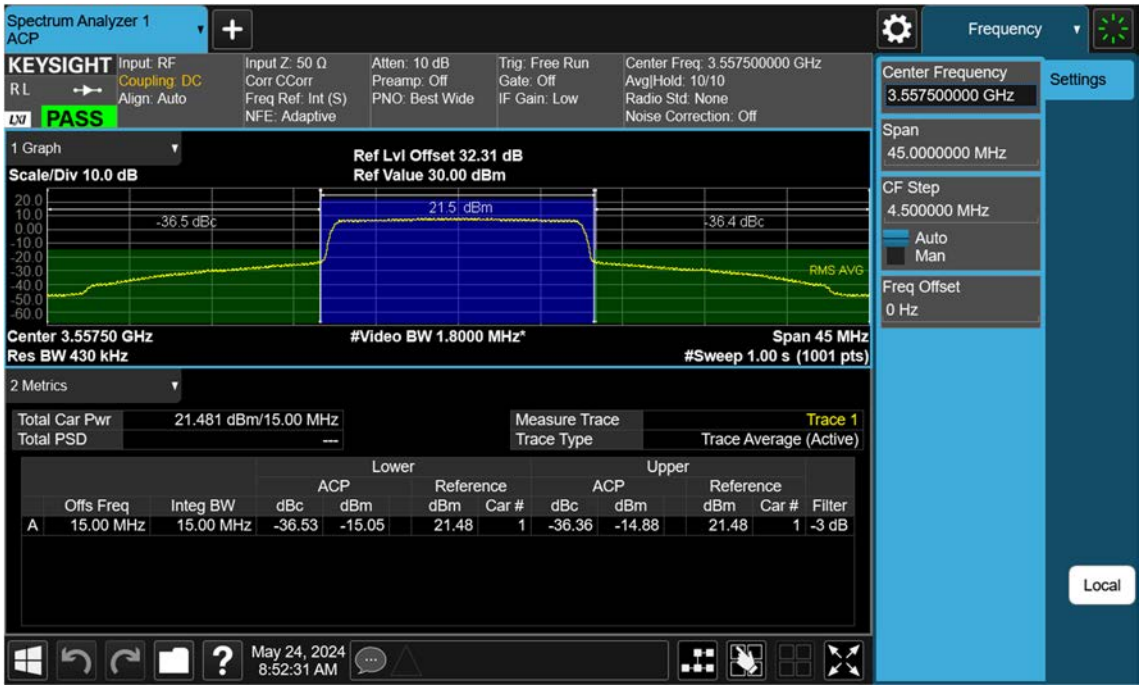
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (10 MHz Ch.55990 QPSK RB 50, Offset 0)



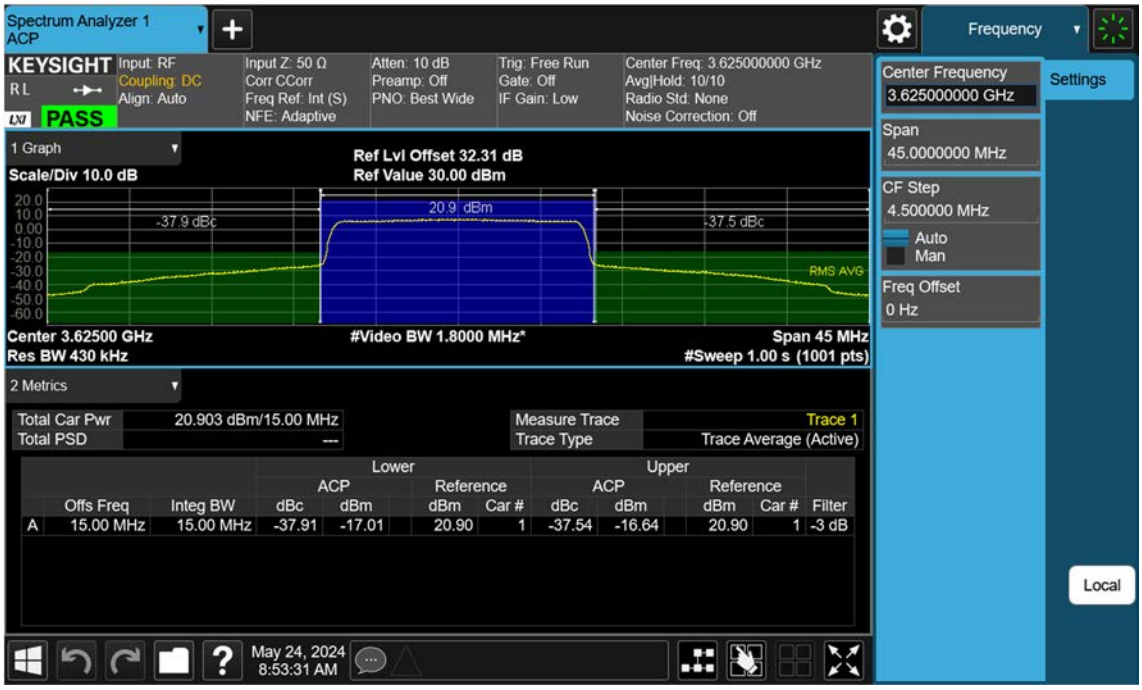
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (10 MHz Ch. 56690 QPSK RB 50, Offset 0)



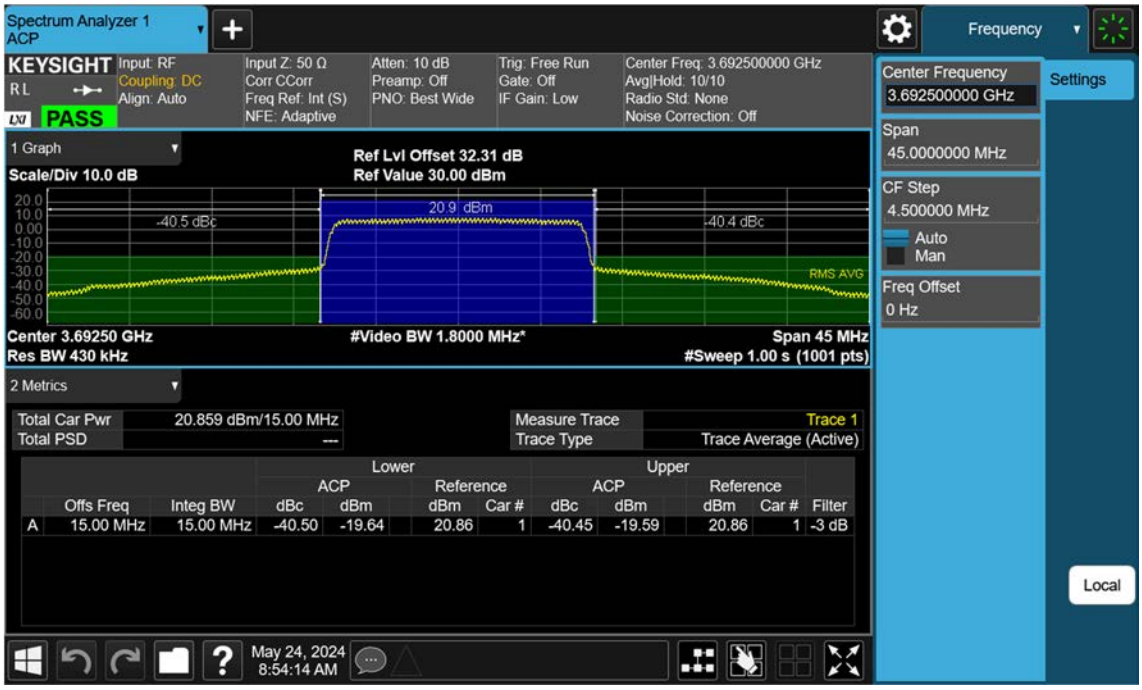
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (15 MHz Ch.55315 QPSK RB 75, Offset 0)



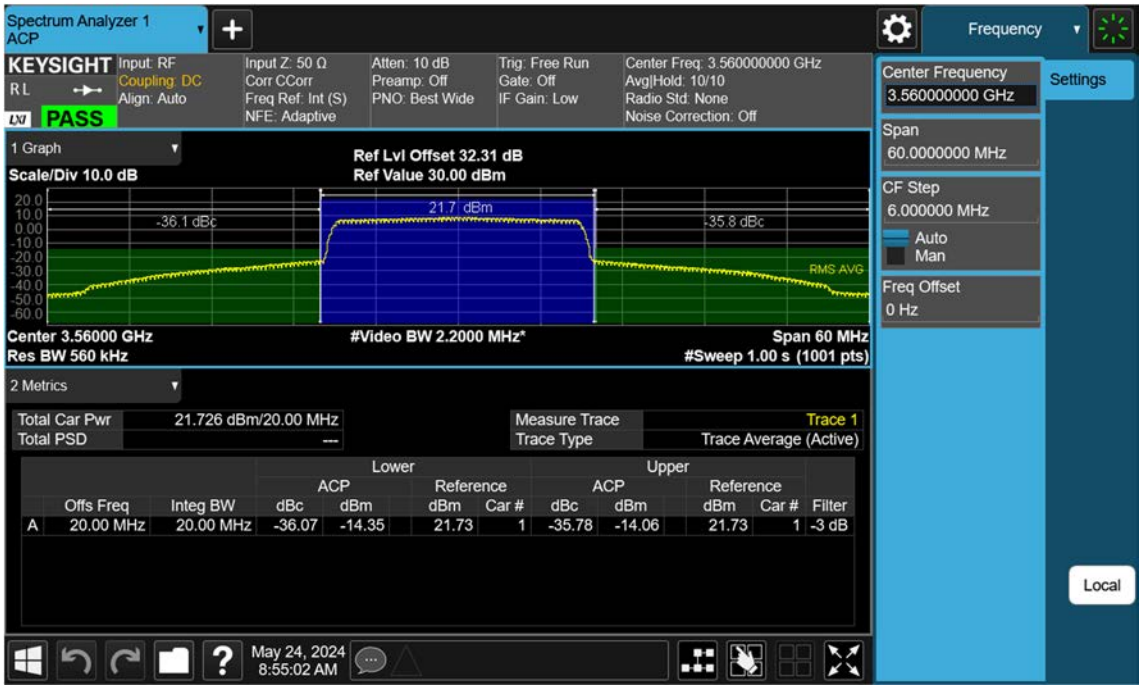
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (15 MHz Ch.55990 QPSK RB 75, Offset 0)



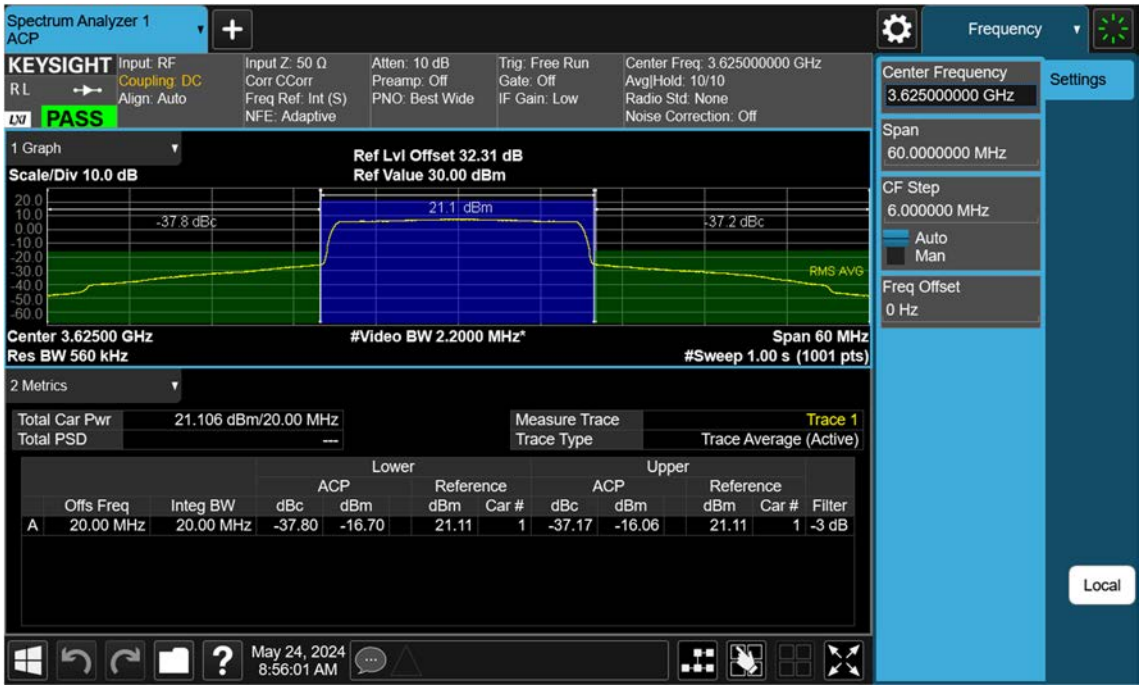
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (15 MHz Ch.56665 QPSK RB 75, Offset 0)



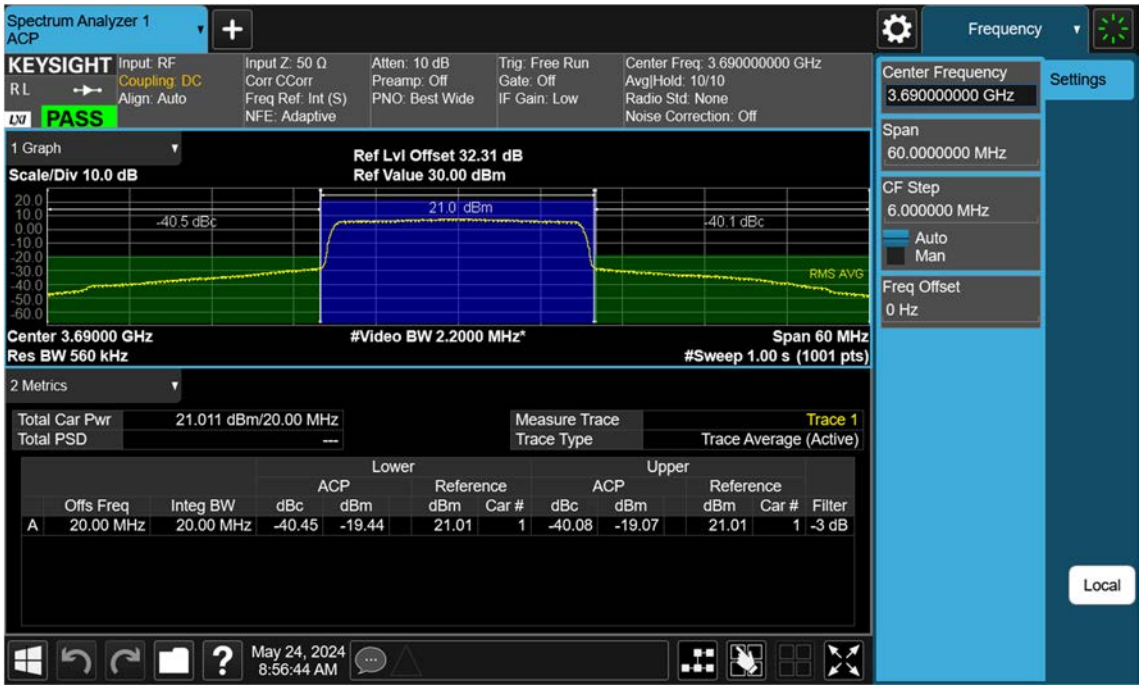
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (20 MHz Ch.55340 QPSK RB 100, Offset 0)



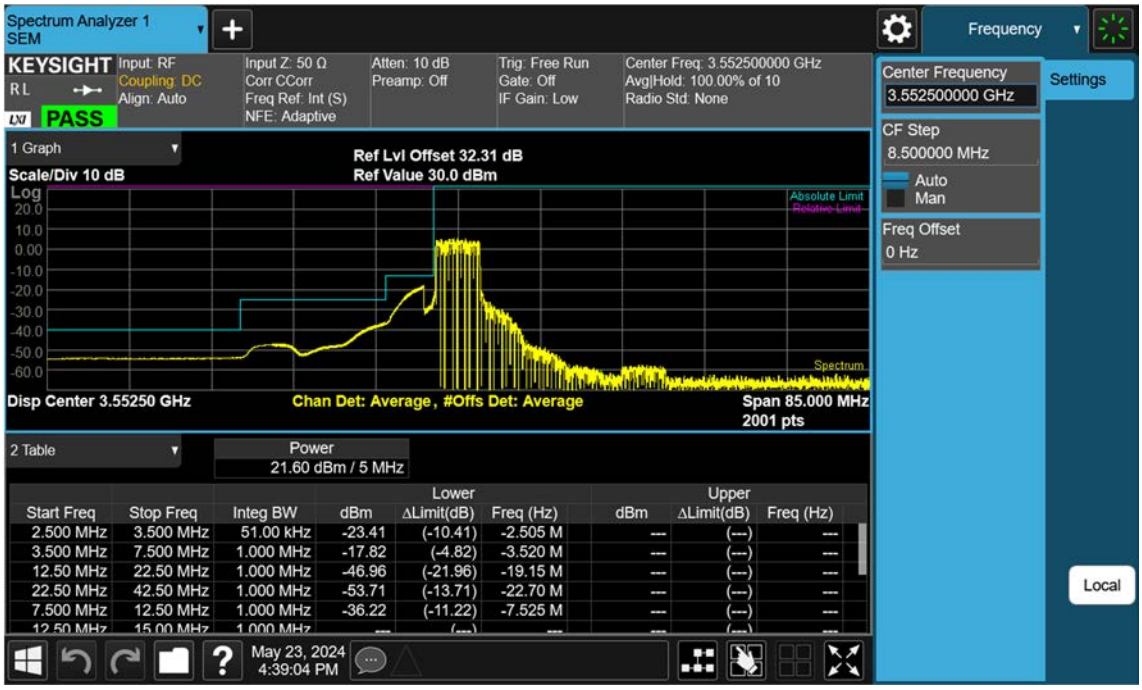
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (20 MHz Ch.55990 QPSK RB 100, Offset 0)



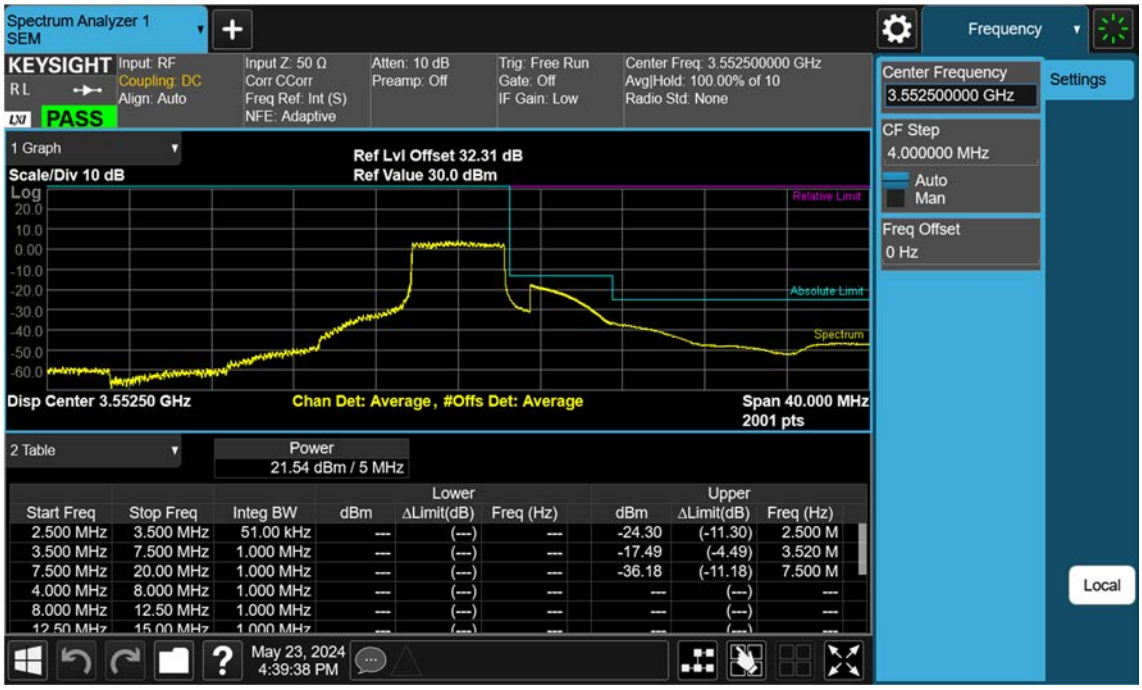
BAND 48. Adjacent Channel Leakage Ratio(ACLR) Plot (20 MHz Ch.56640 QPSK RB 100, Offset 0)



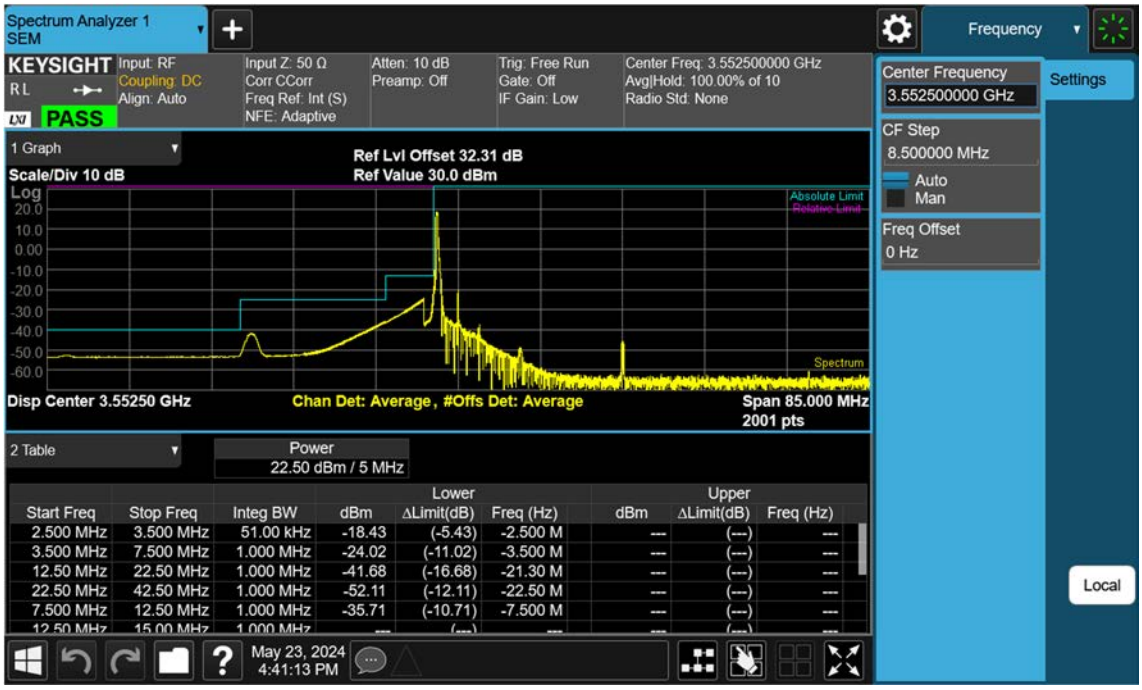
BAND 48. 5 M BandEdge(Lower)_Low_3552.5 MHz_QPSK_Full RB



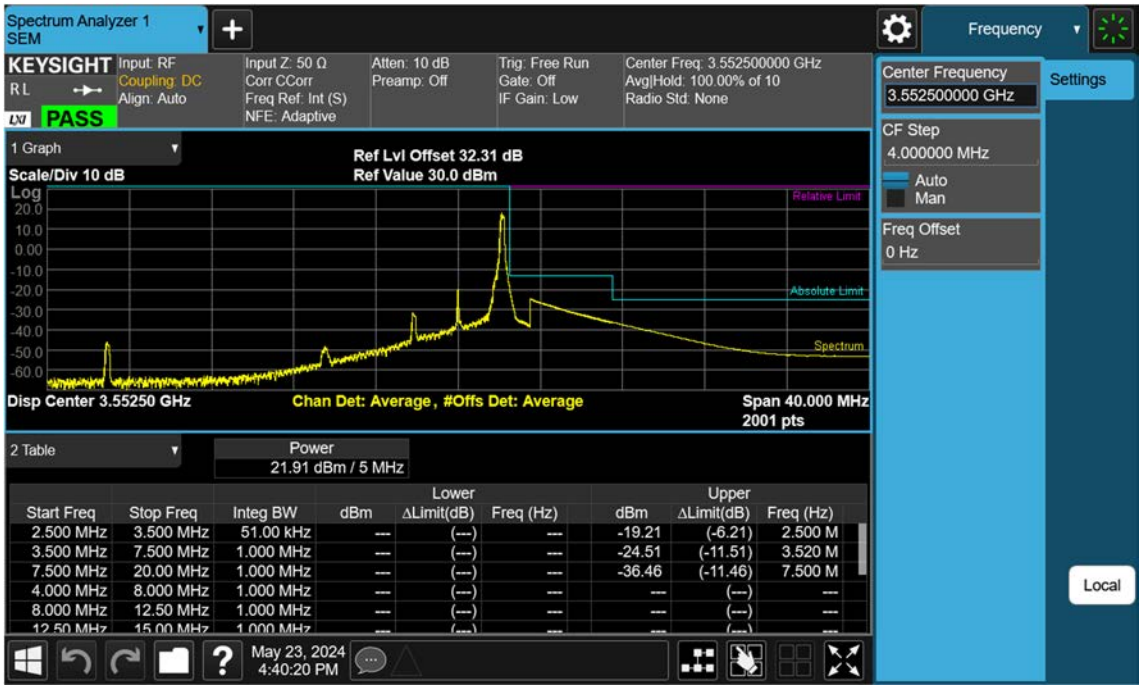
BAND 48. 5 M_BandEdge(Upper)_Low_3552.5 MHz_QPSK_Full RB



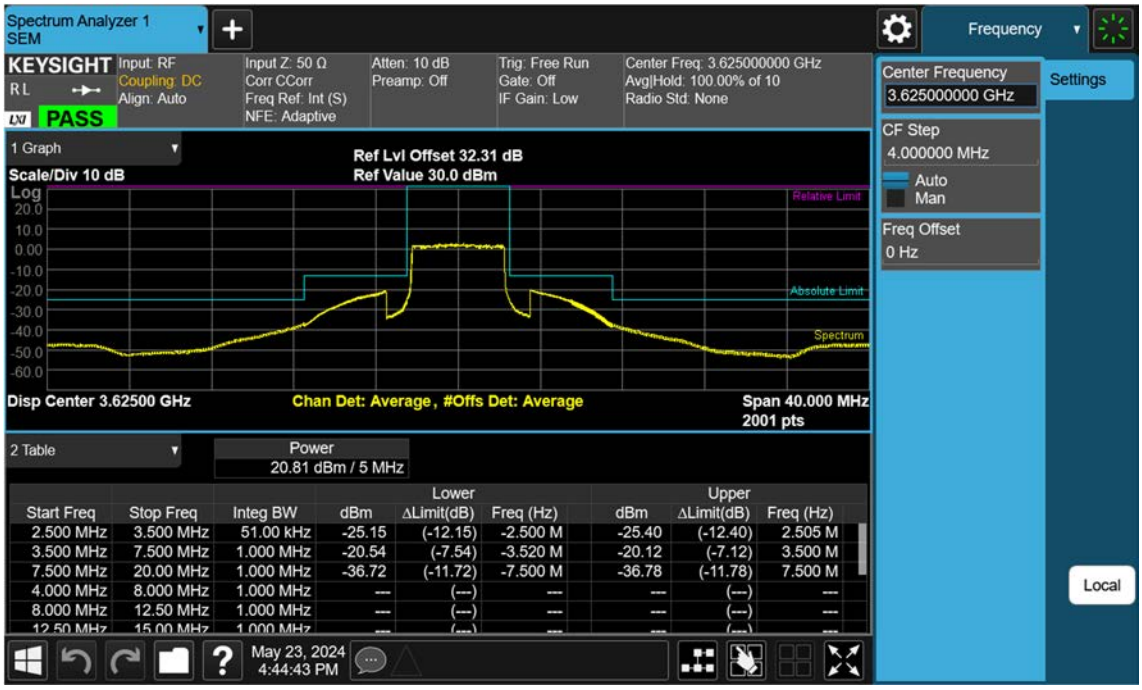
BAND 48. 5 M_BandEdge(Lower)_Low_3552.5 MHz_QPSK_1RB



BAND 48. 5 M_BandEdge(Upper)_Low_3552.5 MHz_QPSK_1RB

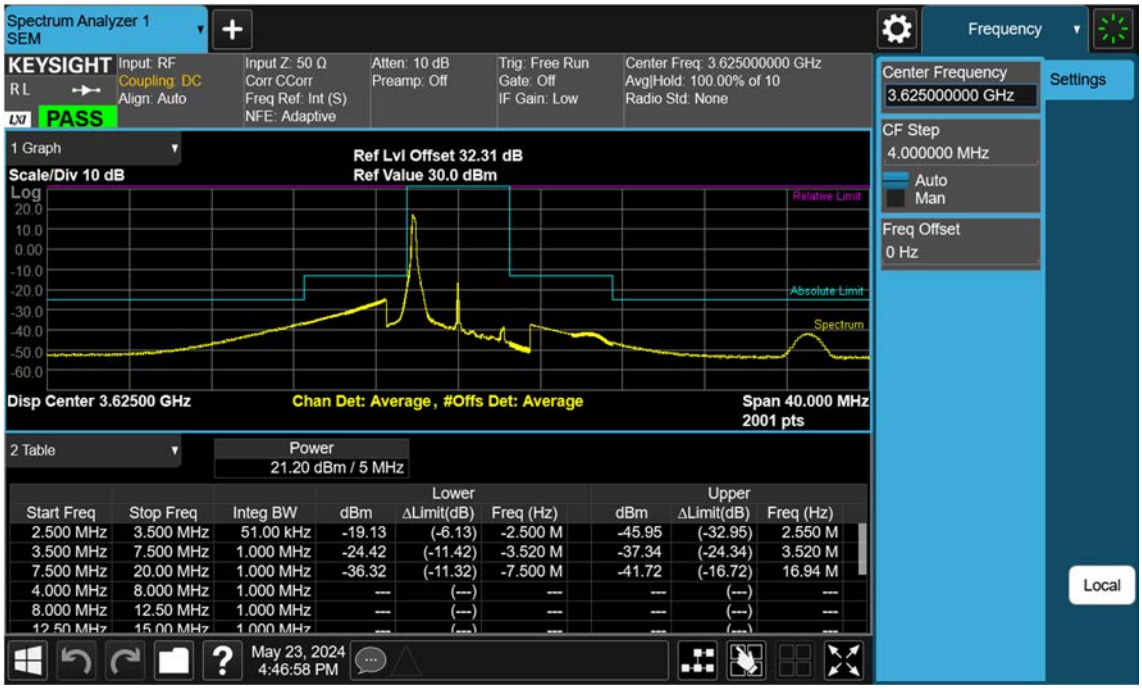


BAND 48. 5 M_BandEdge(Center)_Mid_3625 MHz_QPSK_Full RB

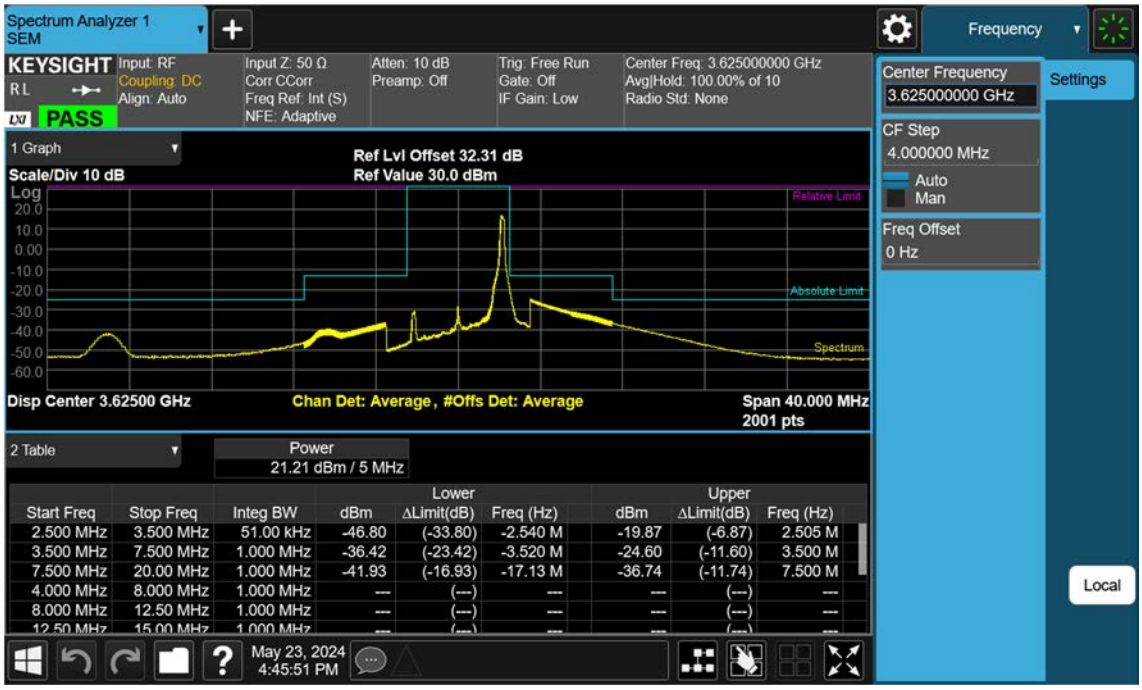



| | | | Lower | | | Upper | | |
|---|---|---|---|---|---|---|---|---|
| Start Freq | Stop Freq | Integ BW | dBm | ΔLimit(dB) | Freq (Hz) | dBm | ΔLimit(dB) | Freq (Hz) |
| 2.500 MHz | 3.500 MHz | 51.00 kHz | -25.15 | (-12.15) | -2.500 M | -25.40 | (-12.40) | 2.505 M |
| 3.500 MHz | 7.500 MHz | 1.000 MHz | -20.54 | (-7.54) | -3.520 M | -20.12 | (-7.12) | 3.500 M |
| 7.500 MHz | 20.00 MHz | 1.000 MHz | -36.72 | (-11.72) | -7.500 M | -36.78 | (-11.78) | 7.500 M |
| 4.000 MHz | 8.000 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 8.000 MHz | 12.50 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

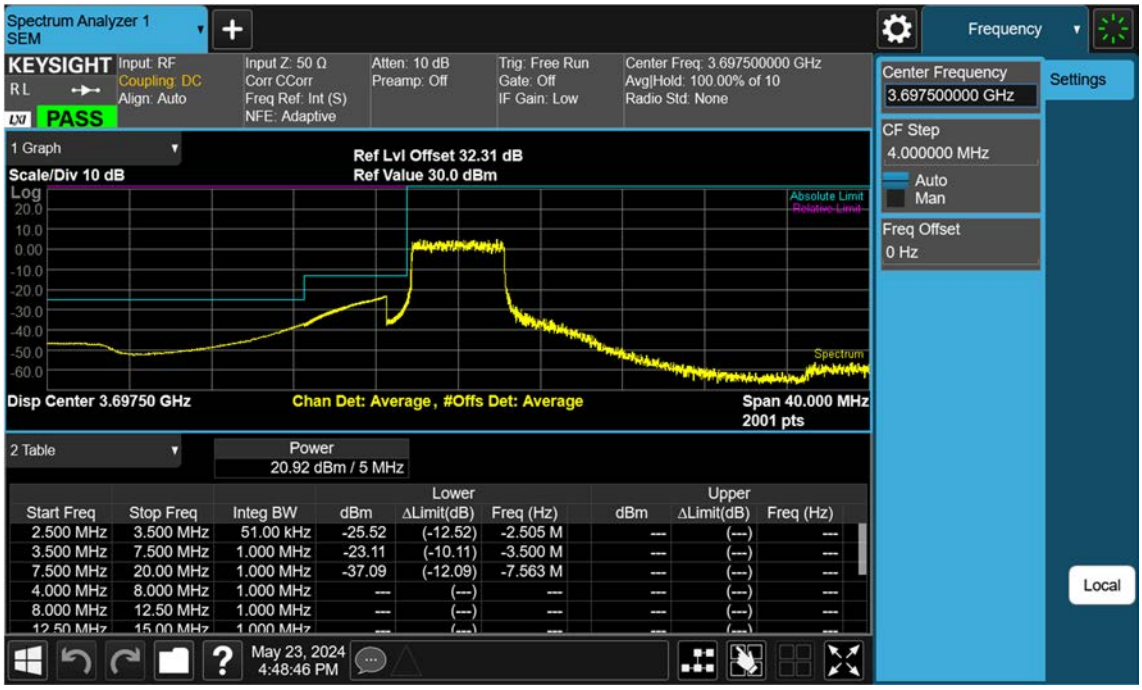
BAND 48. 5 M_BandEdge(Lower)_Mid_3625 MHz_QPSK_1RB



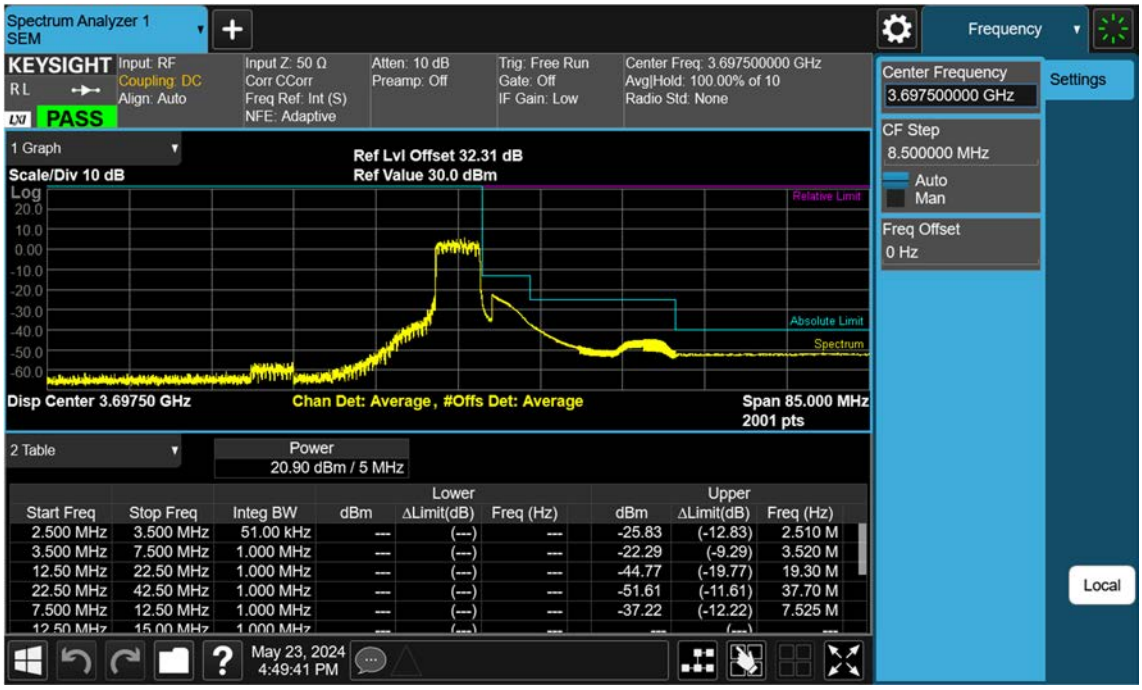
BAND 48. 5 M_BandEdge(Upper)_Mid_3625 MHz_QPSK_1RB



BAND 48. 5 M_BandEdge(Lower)_High_3697.5 MHz_QPSK_Full RB



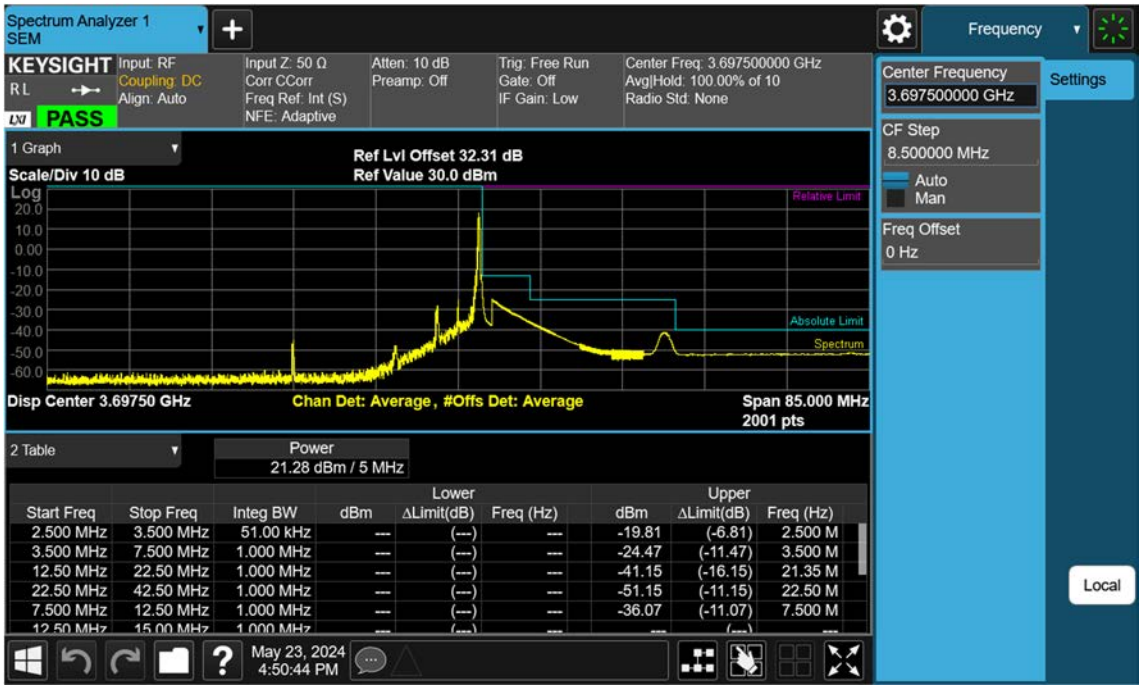
BAND 48. 5 M_BandEdge(Upper)_High_3697.5 MHz_QPSK_Full RB



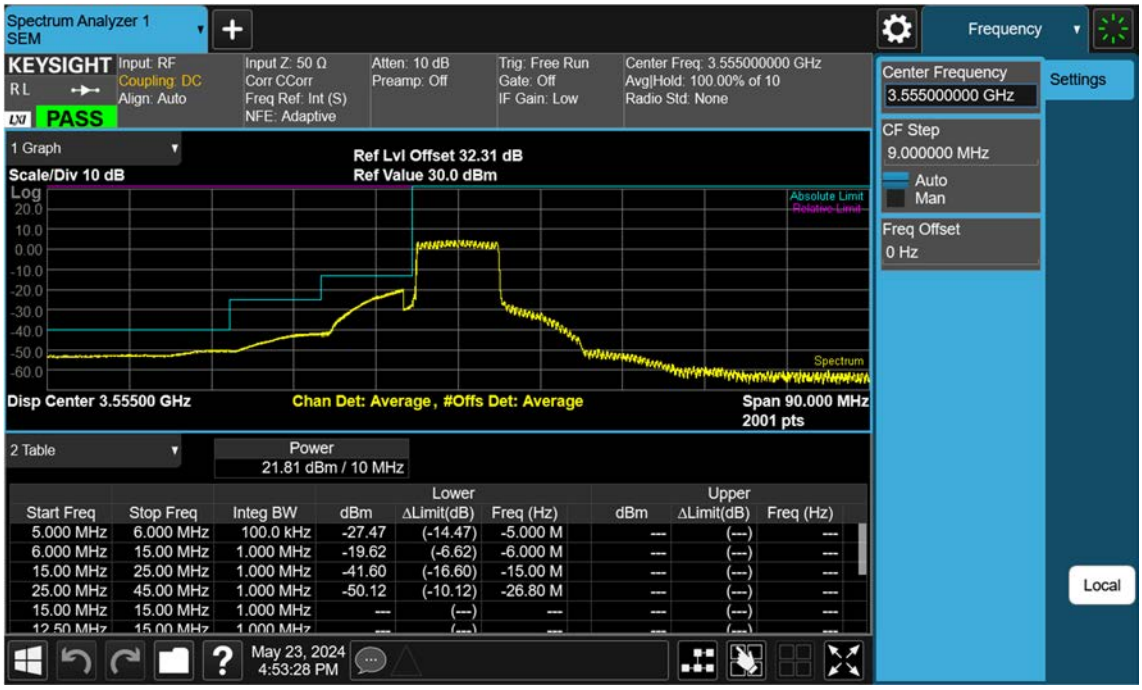

| | | | Lower | | | Upper | | |
|---|---|---|---|---|---|---|---|---|
| Start Freq | Stop Freq | Integ BW | dBm | ΔLimit(dB) | Freq (Hz) | dBm | ΔLimit(dB) | Freq (Hz) |
| 2.500 MHz | 3.500 MHz | 51.00 kHz | --- | (---) | --- | -25.83 | (-12.83) | 2.510 M |
| 3.500 MHz | 7.500 MHz | 1.000 MHz | --- | (---) | --- | -22.29 | (-9.29) | 3.520 M |
| 12.50 MHz | 22.50 MHz | 1.000 MHz | --- | (---) | --- | -44.77 | (-19.77) | 19.30 M |
| 22.50 MHz | 42.50 MHz | 1.000 MHz | --- | (---) | --- | -51.61 | (-11.61) | 37.70 M |
| 7.500 MHz | 12.50 MHz | 1.000 MHz | --- | (---) | --- | -37.22 | (-12.22) | 7.525 M |
| 12.50 MHz | 15.00 MHz | 1.000 MHz | --- | (---) | --- | --- | (---) | --- |

BAND 48. 5 M_BandEdge(Lower)_High_3697.5 MHz_QPSK_1RB

BAND 48. 5 M_BandEdge(Upper)_High_3697.5 MHz_QPSK_1RB

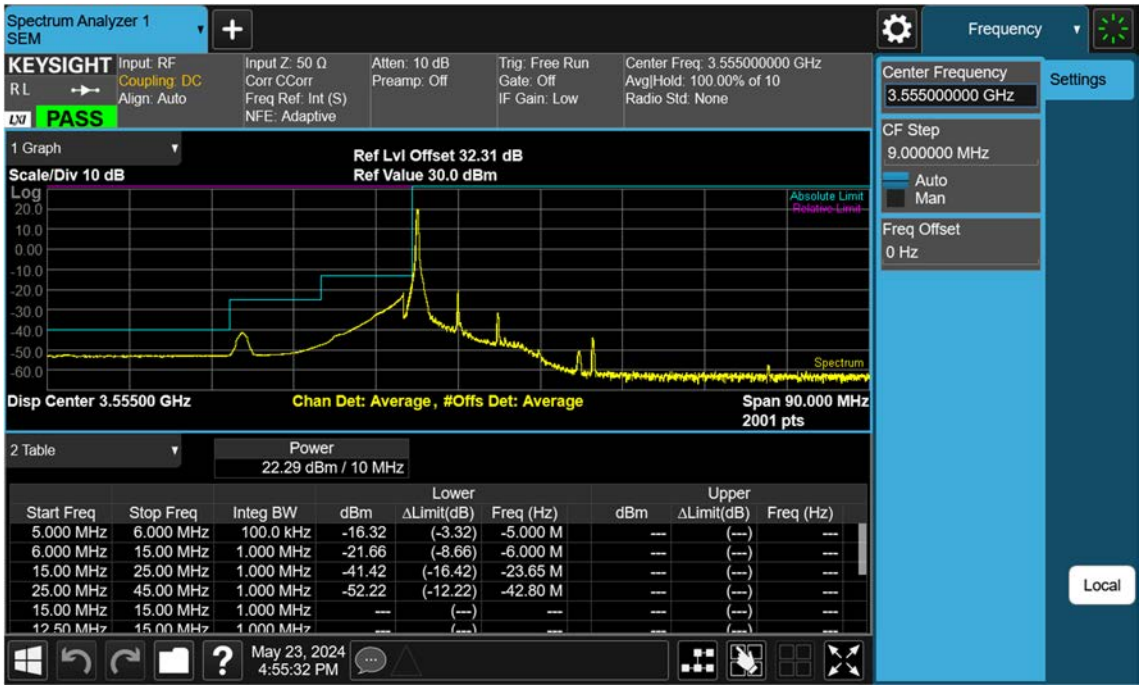


BAND 48. 10 M_BandEdge(Lower)_Low_3555 MHz_QPSK_Full RB

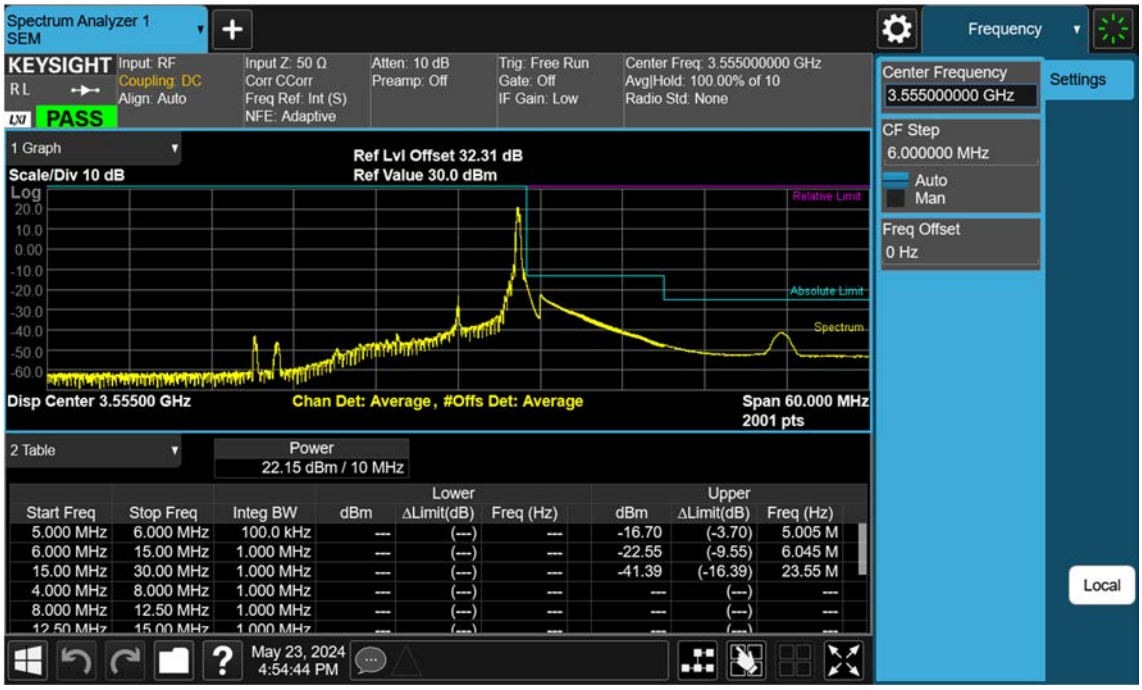


BAND 48. 10 M_BandEdge(Upper)_Low_3555 MHz_QPSK_Full RB

BAND 48. 10 M_BandEdge(Lower)_Low_3555 MHz_QPSK_1RB



BAND 48. 10 M_BandEdge(Upper)_Low_3555 MHz_QPSK_1RB



BAND 48. 10 M_BandEdge(Center)_Mid_3625 MHz_QPSK_Full RB