

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT****INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 96 SUBPART E REQUIREMENT**

OF

**Applicant:** Compal Electronics, Inc  
No.581 & 581-1, Ruiguang Rd., Neihu District, Taipei,  
(114) Taiwan  
**Product Name:** 5G M.2 Module  
**Brand Name:** Compal  
**Model No.:** RXM-G1  
**Model Difference:** N/A  
**FCC ID:** GKRRXMG1  
**Report Number:** E2/2019/A0030  
**Issue Date:** Jul. 02, 2020  
**Date of Test:** Nov. 28, 2019 ~ Jun. 22, 2020  
**Date of EUT Received:** Oct. 31, 2019

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.26-2015 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

**Approved By:**

CHUN-CHIEH, CHEN  
Chun Chieh Chen / Supervisor



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## Revision History

| Report Number | Revision | Description | Issue Date    | Remark                  |
|---------------|----------|-------------|---------------|-------------------------|
| E2/2019/A0030 | Rev.00   | Original.   | Jul. 02, 2020 | Revised By: Karen Huang |

### Note:

#### 1、Disclaimer

Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

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## 1. GENERAL PRODUCT INFORMATION

### 1.1. Product Description

General:

|                   |                 |
|-------------------|-----------------|
| Product Name:     | 5G M.2 Module   |
| Brand Name:       | Compal          |
| Model No.:        | RXM-G1          |
| Model Difference: | N/A             |
| Hardware Version: | DVT-1           |
| Software Version: | RXMG1.00.00.036 |
| Power Supply:     | DC 3.3V         |
| IMEI:             | 359047100009060 |

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## 1.2. LTE: Cellular Phone Standards Frequency Range 3500~3700Mhz

| LTE Band | BW (MHz) | Operation Frequency (MHz) |
|----------|----------|---------------------------|
| 48       | 5        | 3552.5 - 3697.5           |
|          | 10       | 3555.0 - 3695.0           |
|          | 15       | 3557.5 - 3692.5           |
|          | 20       | 3560.0 - 3690.0           |

### Antenna Designation

| Vendor | Type | Model Name | Modulation  | Frequency (MHz) |   |      | Peak Antenna Gain (dBi) |
|--------|------|------------|-------------|-----------------|---|------|-------------------------|
| Pulse  | PIFA | ANT2       | LTE Band 48 | 3550            | ~ | 3700 | -2dBi                   |

## 1.3. Type of Emission & Max ERP/EIRP Power Measurement Result:

| LTE Band | BW | Frequency |        | Modulation | ERP / EIRP (dBm/10MHz) |      | (W)          | 99%    | Type of Emission |
|----------|----|-----------|--------|------------|------------------------|------|--------------|--------|------------------|
| 48       | 5  | 3552.5    | 3697.5 | QPSK       | 21.82                  | EIRP | 0.152        | 4.5348 | 4M53G7D          |
|          |    |           |        | 16QAM      | 20.86                  | EIRP | 0.122        | 4.5177 | 4M52D7W          |
|          |    |           |        | 64QAM      | 20.12                  | EIRP | 0.103        | 4.5197 | 4M52D7W          |
|          |    |           |        | 256QAM     | 16.83                  | EIRP | 0.048        | 4.5669 | 4M57D7W          |
| 48       | 10 | 3555.0    | 3695.0 | QPSK       | 21.94                  | EIRP | 0.156        | 9.0583 | 9M06G7D          |
|          |    |           |        | 16QAM      | 21.13                  | EIRP | 0.130        | 9.0627 | 9M06D7W          |
|          |    |           |        | 64QAM      | 20.07                  | EIRP | 0.102        | 9.0342 | 9M03D7W          |
|          |    |           |        | 256QAM     | 16.95                  | EIRP | 0.050        | 9.8718 | 9M87D7W          |
| 48       | 15 | 3557.5    | 3692.5 | QPSK       | 22.92                  | EIRP | <b>0.196</b> | 13.504 | 13M5G7D          |
|          |    |           |        | 16QAM      | 22.04                  | EIRP | 0.160        | 13.582 | 13M6D7W          |
|          |    |           |        | 64QAM      | 21.00                  | EIRP | 0.126        | 13.475 | 13M5D7W          |
|          |    |           |        | 256QAM     | 17.17                  | EIRP | 0.052        | 13.609 | 13M6D7W          |
| 48       | 20 | 3560.0    | 3690.0 | QPSK       | 22.62                  | EIRP | 0.183        | 18.017 | 18M0G7D          |
|          |    |           |        | 16QAM      | 22.09                  | EIRP | <b>0.162</b> | 18.044 | 18M0D7W          |
|          |    |           |        | 64QAM      | 21.02                  | EIRP | <b>0.126</b> | 18.039 | 18M0D7W          |
|          |    |           |        | 256QAM     | 16.74                  | EIRP | 0.047        | 19.302 | 19M3D7W          |

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#### 1.4. Test Methodology of Applied Standards

FCC 47 CFR Part 2, Part 96E

ANSI C63.26-2015

ANSI/ITA C603-E.2016

KDB 971168 D01 Power Meas license Digital System v03r01

KDB 940660 D01 Part 96 CBRS Eqpt v02

KDB 412172 D01 Determining ERP and EIRP V01r01

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

#### 1.5. Test Facility

SGS Taiwan Ltd. Central RF Lab (TAF code 3702)

No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

FCC Registration Numbers: TW0028

#### 1.6. Special Accessories

No special accessories were used during testing.

#### 1.7. Equipment Modifications

There were no modifications incorporated into the EUT.

#### 1.8. Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m\*9m\*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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## 2. SYSTEM TEST CONFIGURATION

### 2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2. EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

### 2.3. Test Procedure

#### 2.3.1 Conducted Measurement at Antenna Port

According to measurement procured ANSI C63.26-2015, the EUT is placed on a turn table which is 0.8 m above ground plane. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

#### 2.3.2 Radiated Emissions (ERP/EIRP)

According to measurement procured ANSI C63.26-2015, The EUT is a placed on as turn table, for emission measurements below 1 GHz is 0.8 m above ground plane, for emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna according to the requirements in Section 8 and 13.

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## 2.4. Measurement Results Explanation Example

### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

### Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Following shows an offset computation in physical test.

|                         | RF cable loss (dB) | Attenuation factor(dB) | offset(dB) |
|-------------------------|--------------------|------------------------|------------|
| Low Band (Below 1GHz)   | 3.6                | 10                     | 13.6       |
| High Band (Above 1 GHz) | 3.8                | 10                     | 13.8       |

## 2.5. Final Amplifier Voltage and Current Information:

| Test Mode            | DC voltage (V) | DC current (mA) |
|----------------------|----------------|-----------------|
| LTE Band B48 3625Mhz | 3.3            | 490             |

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## 2.6. Configuration of Tested System

Fig. 2-1 Configuration of Tested System (Fixed Channel-Conducted)

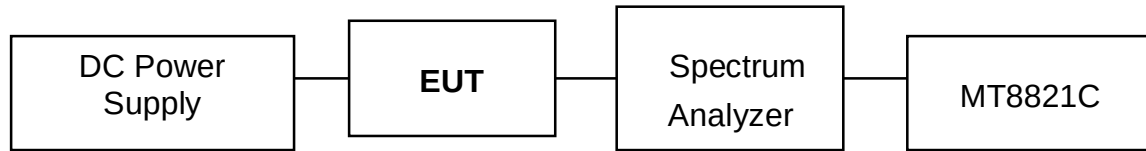
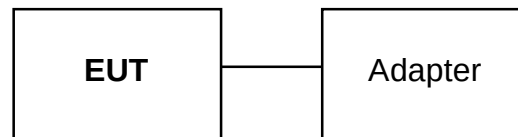


Fig. 2-2 Configuration of Tested System (Fixed Channel-Radiated)



Remote Side

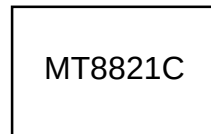


Table 2-1 Equipment Used in

| Item | Equipment                   | Mfr/Brand | Model/<br>Type No. | Series No. | Data Cable | Power Cord  |
|------|-----------------------------|-----------|--------------------|------------|------------|-------------|
| 1.   | Radio Communication Analyer | Anritsu   | MT8821C            | 6262044739 | shielded   | Un-shielded |

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### 3. SUMMARY OF TEST RESULTS

#### 3.1. Decision rules

Reported measurement data comply with ANSI C63.26-2015:

Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

#### 3.2. Summary of test results

| FCC Rules               | Description Of Test                       | Result    |
|-------------------------|-------------------------------------------|-----------|
| §2.1046(a)<br>§96.41(b) | Maximum Power Output                      | Compliant |
| §2.1046,<br>§96.41(b)   | Maximum Power Density                     | Compliant |
| §2.1053,<br>§96.41(e)   | FIELD STRENGTH OF SPU-<br>RIOUS RADIATION | Compliant |
| §2.1051<br>§96.41(e)    | OUT OF BAND EMISSION AT<br>ANTENNA        | Compliant |
| §2.1049,(h)             | OCCUPIED BANDWIDTH                        | Compliant |
| §2.1055(a)              | Frequency Stability                       | Compliant |
| §96.41(g)               | Peak to Average Ratio                     | Compliant |

#### 3.3. Reporting statements of conformity

The conformity statement in this report is based solely on the test results, measurement uncertainty is excluded.

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## 4. DESCRIPTION OF TEST MODES

### 4.1. The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X(E1)Y(E2)Z(H) axis and antenna ports. The worst case was found as listed below. Following channel(s) was (were) selected for the final test as listed below:

| BAND       | RADIATED EMISSION |
|------------|-------------------|
| LTE Band48 | E2-plane          |

**Note:** The device does not support MIMO transmitting mode.

### 4.2. Measurement Configuration

#### LTE Band 48 MODE

| TEST ITEM               | AVAILABLE CHANNEL | TESTED CHANNEL      | CHANNEL BANDWIDTH | MODULATION                 | MODE                            |
|-------------------------|-------------------|---------------------|-------------------|----------------------------|---------------------------------|
| EIRP                    | 56765 to 58215    | 56765, 55990, 58215 | 5MHz              | QPSK, 16QAM, 64QAM, 256QAM | Full RB                         |
|                         | 55290 to 56690    | 55290, 55990, 56690 | 10MHz             | QPSK, 16QAM, 64QAM, 256QAM | Full RB                         |
|                         | 55315 to 56665    | 55315, 55990, 56665 | 15MHz             | QPSK, 16QAM, 64QAM, 256QAM | Full RB                         |
|                         | 55340 to 56640    | 55340, 55990, 56640 | 20MHz             | QPSK, 16QAM, 64QAM, 256QAM | Full RB                         |
| FREQUENCY STABILITY     | 55290 to 56690    | 55290, 55990, 56690 | 10MHz             | QPSK                       | Full RB                         |
| OCCUPIED BANDWIDTH      | 56765 to 58215    | 56765, 55990, 58215 | 5MHz              | QPSK, 16QAM, 64QAM, 256QAM | Full RB                         |
|                         | 55290 to 56690    | 55290, 55990, 56690 | 10MHz             | QPSK, 16QAM, 64QAM, 256QAM | Full RB                         |
|                         | 55315 to 56665    | 55315, 55990, 56665 | 15MHz             | QPSK, 16QAM, 64QAM, 256QAM | Full RB                         |
|                         | 55340 to 56640    | 55340, 55990, 56640 | 20MHz             | QPSK, 16QAM, 64QAM, 256QAM | Full RB                         |
| PEAK TO AVERAGE RATIO   | 56765 to 58215    | 56765, 55990, 58215 | 5MHz              | 256QAM                     | Full RB                         |
|                         | 55290 to 56690    | 55290, 55990, 56690 | 10MHz             | 256QAM                     | Full RB                         |
|                         | 55315 to 56665    | 55315, 55990, 56665 | 15MHz             | 256QAM                     | Full RB                         |
|                         | 55340 to 56640    | 55340, 55990, 56640 | 20MHz             | 256QAM                     | Full RB                         |
| BAND EDGE               | 56765 to 58215    | 56765, 58215        | 5MHz              | QPSK                       | 1 RB/ 0,24 RB Offset<br>Full RB |
|                         | 55290 to 56690    | 55290, 56690        | 10MHz             | QPSK                       | 1 RB/ 0,49 RB Offset<br>Full RB |
|                         | 55315 to 56665    | 55315, 56665        | 15MHz             | QPSK                       | 1 RB/ 0,74 RB Offset<br>Full RB |
|                         | 55340 to 56640    | 55340, 56640        | 20MHz             | QPSK                       | 1 RB/ 0,99 RB Offset<br>Full RB |
| CONDCUDEDTED EMIS- SION | 56765 to 58215    | 56765, 55990, 58215 | 5MHz              | QPSK                       | 1 RB, 0 RB Offset               |
|                         | 55290 to 56690    | 55290, 55990, 56690 | 10MHz             | QPSK                       | 1 RB, 0 RB Offset               |
|                         | 55315 to 56665    | 55315, 55990, 56665 | 15MHz             | QPSK                       | 1 RB, 0 RB Offset               |
|                         | 55340 to 56640    | 55340, 55990, 56640 | 20MHz             | QPSK                       | 1 RB, 0 RB Offset               |
| RADIATED EMISSION       | 56765 to 58215    | 56765, 55990, 58215 | 20MHz             | QPSK                       | 1 RB, 0 RB Offset               |

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## 5. MEASUREMENT UNCERTAINTY

| Test Items                                 | Uncertainty                |
|--------------------------------------------|----------------------------|
| Maximum Power Output                       | +/- 1.10 dB                |
| Maximum Power Density                      | +/- 1.10 dB                |
| Occupied Bandwidth                         | +/- 5.19 Hz                |
| Out of Band Emissions at Antenna Terminals | +/- 0.70 dB                |
| Frequency Stability vs. Temperature        | +/- 5.19 Hz                |
| Frequency Stability vs. Voltage            | +/- 5.19 Hz                |
| Temperature                                | +/- 0.65 °C                |
| Humidity                                   | +/- 4.6 %                  |
| DC / AC Power Source                       | DC= +/- 0.13%, AC=+/- 0.2% |

### Radiated Spurious Emission:

|                                                              |                            |
|--------------------------------------------------------------|----------------------------|
| Measurement uncertainty<br>(Polarization : <b>Vertical</b> ) | 9kHz – 30MHz: +/- 2.87 dB  |
|                                                              | 30MHz - 180MHz: +/- 3.37dB |
|                                                              | 180MHz -417MHz: +/- 3.19dB |
|                                                              | 0.417GHz-1GHz: +/- 3.19dB  |
|                                                              | 1GHz - 18GHz: +/- 4.04dB   |
|                                                              | 18GHz - 40GHz: +/- 4.04dB  |

|                                                                |                            |
|----------------------------------------------------------------|----------------------------|
| Measurement uncertainty<br>(Polarization : <b>Horizontal</b> ) | 9kHz – 30MHz: +/- 2.87 dB  |
|                                                                | 30MHz - 167MHz: +/- 4.22dB |
|                                                                | 167MHz -500MHz: +/- 3.44dB |
|                                                                | 0.5GHz-1GHz: +/- 3.39dB    |
|                                                                | 1GHz - 18GHz: +/- 4.08dB   |
|                                                                | 18GHz - 40GHz: +/- 4.08dB  |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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## 6. MAXIMUM OUTPUT POWER MEASUREMENT

### 6.1. Standard Applicable

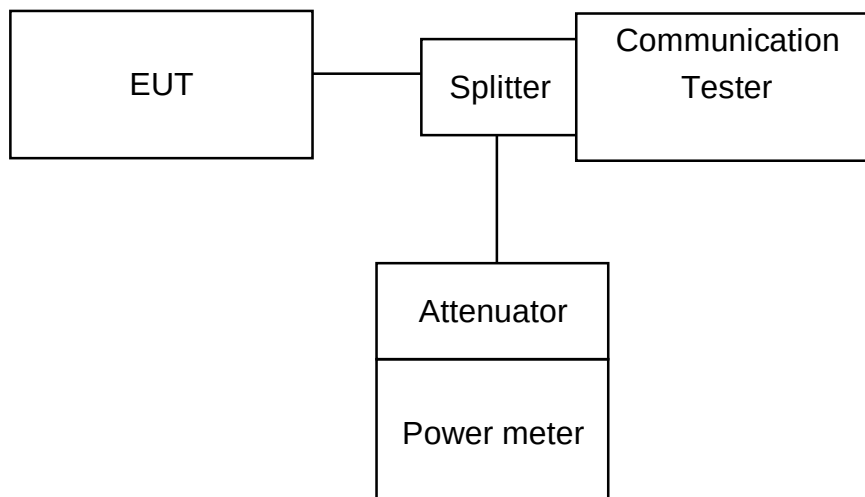
FCC §2.1046 & 96.41

- (a) FCC 96.41(a) Digital modulation. Systems operating in the Citizens Broadband Radio Service must use digital modulation techniques.
- (b) FCC 96.41(b) Power limits. Unless otherwise specified in this section, the maximum effective isotropic radiated power (EIRP) of any CBSD and End User Device must comply with the limits shown in the table in this paragraph (b):

| Device                       | Maximum EIRP (dBm/10 megahertz) |
|------------------------------|---------------------------------|
| End User Device              | 23                              |
| Category A CBSD              | 30                              |
| Category B CBSD <sup>1</sup> | 47                              |

Category B CBSDs will only be authorized for use after an ESC is approved and commercially deployed consistent with §§96.15 and 96.67.

### 6.2. Test Set-up



**Note:** Measurement setup for testing on Antenna connector

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### 6.3. Measurement Procedure

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

#### Determining ERP and/or EIRP from conducted RF output power measurements

$$\text{ERP/EIRP} = \text{PMeas} + \text{GT-LC}$$

Where:

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);

PMeas = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

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

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

### 6.4. Measurement Equipment Used

| EQUIPMENT TYPE               | MFR       | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|------------------------------|-----------|-----------------|---------------|------------|------------|
| Spectrum Analyzer            | KEYSIGHT  | N9010A          | MY57120200    | 03/06/2019 | 03/05/2020 |
| Radio Communication Analyser | Anritsu   | MT8821C         | 6262044739    | 12/06/2019 | 12/05/2020 |
| Attenuator                   | Marvelous | MVE2213-10      | RF30          | 11/20/2019 | 11/19/2020 |
| DC Block                     | PASTERNAK | PE8210          | RF32          | 11/20/2019 | 11/19/2020 |
| Splitter                     | Woken     | DOM35LW1 A2     | RF83          | 11/20/2019 | 11/19/2020 |
| Coaxial Cables               | Woken     | 00100A1F1A 185C | RF229         | 11/20/2019 | 11/19/2020 |

| EQUIPMENT TYPE    | MFR      | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|----------|--------------|---------------|------------|------------|
| Spectrum Analyzer | KEYSIGHT | N9010A       | MY57120200    | 03/17/2020 | 03/16/2021 |

*Note: The measurement was taken place with the long duration of the time, and additional equipment list as shown above indicate those equipment of which has been subject to undertake the calibration in intermediate period of time of the measurement.*

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## 6.5. Measurement Result

### RF Conducted Output Power

#### LTE MODE: Results:

Antenna gain (dBi) -2

| LTE Band 48 Uplink frequency band : 3550 to 3700 MHz |            |                 |            |         |           |                               |                          |                        |                    |
|------------------------------------------------------|------------|-----------------|------------|---------|-----------|-------------------------------|--------------------------|------------------------|--------------------|
| BW (MHz)                                             | UL Channel | Frequency (MHz) | Modulation | RB Size | RB Offset | Conducted Average (dBm/10MHz) | EIRP Average (dBm/10MHz) | EIRP Limit (dBm/10MHz) | Margin (dBm/10MHz) |
| 5                                                    | 56765      | 3552.5          | QPSK       | 1       | 0         | 23.01                         | 21.01                    | 23                     | -1.99              |
|                                                      |            |                 |            | 1       | 24        | 22.90                         | 20.90                    | 23                     | -2.1               |
|                                                      |            |                 |            | 12      | 6         | 22.06                         | 20.06                    | 23                     | -2.94              |
|                                                      |            |                 |            | 25      | 0         | 21.96                         | 19.96                    | 23                     | -3.04              |
|                                                      | 55990      | 3625            | QPSK       | 1       | 0         | 23.76                         | 21.76                    | 23                     | -1.24              |
|                                                      |            |                 |            | 1       | 24        | 23.82                         | 21.82                    | 23                     | -1.18              |
|                                                      |            |                 |            | 12      | 6         | 22.88                         | 20.88                    | 23                     | -2.12              |
|                                                      |            |                 |            | 25      | 0         | 22.90                         | 20.90                    | 23                     | -2.1               |
|                                                      | 58215      | 3697.5          | QPSK       | 1       | 0         | 23.56                         | 21.56                    | 23                     | -1.44              |
|                                                      |            |                 |            | 1       | 24        | 23.51                         | 21.51                    | 23                     | -1.49              |
|                                                      |            |                 |            | 12      | 6         | 22.61                         | 20.61                    | 23                     | -2.39              |
|                                                      |            |                 |            | 25      | 0         | 22.63                         | 20.63                    | 23                     | -2.37              |
|                                                      | 56765      | 3552.5          | 16QAM      | 1       | 0         | 22.26                         | 20.26                    | 23                     | -2.74              |
|                                                      |            |                 |            | 1       | 24        | 22.23                         | 20.23                    | 23                     | -2.77              |
|                                                      |            |                 |            | 12      | 6         | 21.08                         | 19.08                    | 23                     | -3.92              |
|                                                      |            |                 |            | 25      | 0         | 21.06                         | 19.06                    | 23                     | -3.94              |
|                                                      | 55990      | 3625            | 16QAM      | 1       | 0         | 22.63                         | 20.63                    | 23                     | -2.37              |
|                                                      |            |                 |            | 1       | 24        | 22.63                         | 20.63                    | 23                     | -2.37              |
|                                                      |            |                 |            | 12      | 6         | 21.93                         | 19.93                    | 23                     | -3.07              |
|                                                      |            |                 |            | 25      | 0         | 21.45                         | 19.45                    | 23                     | -3.55              |
|                                                      | 58215      | 3697.5          | 16QAM      | 1       | 0         | 22.86                         | 20.86                    | 23                     | -2.14              |
|                                                      |            |                 |            | 1       | 24        | 22.79                         | 20.79                    | 23                     | -2.21              |
|                                                      |            |                 |            | 12      | 6         | 21.70                         | 19.70                    | 23                     | -3.3               |
|                                                      |            |                 |            | 25      | 0         | 21.63                         | 19.63                    | 23                     | -3.37              |
|                                                      | 56765      | 3552.5          | 64QAM      | 1       | 0         | 22.12                         | 20.12                    | 23                     | -2.88              |
|                                                      |            |                 |            | 1       | 24        | 22.08                         | 20.08                    | 23                     | -2.92              |
|                                                      |            |                 |            | 12      | 6         | 21.08                         | 19.08                    | 23                     | -3.92              |
|                                                      |            |                 |            | 25      | 0         | 21.02                         | 19.02                    | 23                     | -3.98              |
|                                                      | 55990      | 3625            | 64QAM      | 1       | 0         | 21.84                         | 19.84                    | 23                     | -3.16              |
|                                                      |            |                 |            | 1       | 24        | 21.93                         | 19.93                    | 23                     | -3.07              |
|                                                      |            |                 |            | 12      | 6         | 21.36                         | 19.36                    | 23                     | -3.64              |
|                                                      |            |                 |            | 25      | 0         | 21.34                         | 19.34                    | 23                     | -3.66              |
|                                                      | 58215      | 3697.5          | 64QAM      | 1       | 0         | 21.59                         | 19.59                    | 23                     | -3.41              |
|                                                      |            |                 |            | 1       | 24        | 21.53                         | 19.53                    | 23                     | -3.47              |
|                                                      |            |                 |            | 12      | 6         | 20.80                         | 18.80                    | 23                     | -4.2               |
|                                                      |            |                 |            | 25      | 0         | 20.75                         | 18.75                    | 23                     | -4.25              |
|                                                      | 56765      | 3552.5          | 256QAM     | 1       | 0         | 18.57                         | 16.57                    | 23                     | -6.43              |
|                                                      |            |                 |            | 1       | 24        | 18.50                         | 16.50                    | 23                     | -6.5               |
|                                                      |            |                 |            | 12      | 6         | 18.67                         | 16.67                    | 23                     | -6.33              |
|                                                      |            |                 |            | 25      | 0         | 18.48                         | 16.48                    | 23                     | -6.52              |
|                                                      | 55990      | 3625            | 256QAM     | 1       | 0         | 18.25                         | 16.25                    | 23                     | -6.75              |
|                                                      |            |                 |            | 1       | 24        | 18.22                         | 16.22                    | 23                     | -6.78              |
|                                                      |            |                 |            | 12      | 6         | 18.45                         | 16.45                    | 23                     | -6.55              |
|                                                      |            |                 |            | 25      | 0         | 18.29                         | 16.29                    | 23                     | -6.71              |
|                                                      | 58215      | 3697.5          | 256QAM     | 1       | 0         | 18.77                         | 16.77                    | 23                     | -6.23              |
|                                                      |            |                 |            | 1       | 24        | 18.79                         | 16.79                    | 23                     | -6.21              |
|                                                      |            |                 |            | 12      | 6         | 18.83                         | 16.83                    | 23                     | -6.17              |
|                                                      |            |                 |            | 25      | 0         | 18.73                         | 16.73                    | 23                     | -6.27              |

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Antenna gain (dBi) -2

| LTE Band 48 Uplink frequency band : 3550 to 3700 MHz |            |                 |            |         |           |                               |                          |                        |                    |
|------------------------------------------------------|------------|-----------------|------------|---------|-----------|-------------------------------|--------------------------|------------------------|--------------------|
| BW (MHz)                                             | UL Channel | Frequency (MHz) | Modulation | RB Size | RB Offset | Conducted Average (dBm/10MHz) | EIRP Average (dBm/10MHz) | EIRP Limit (dBm/10MHz) | Margin (dBm/10MHz) |
| 10                                                   | 55290      | 3555            | QPSK       | 1       | 0         | 23.23                         | 21.23                    | 23                     | -1.77              |
|                                                      |            |                 |            | 1       | 49        | 23.12                         | 21.12                    | 23                     | -1.88              |
|                                                      |            |                 |            | 25      | 12        | 22.37                         | 20.37                    | 23                     | -2.63              |
|                                                      |            |                 |            | 50      | 0         | 22.38                         | 20.38                    | 23                     | -2.62              |
|                                                      | 55990      | 3625            | QPSK       | 1       | 0         | 23.86                         | 21.86                    | 23                     | -1.14              |
|                                                      |            |                 |            | 1       | 49        | 23.94                         | 21.94                    | 23                     | -1.06              |
|                                                      |            |                 |            | 25      | 12        | 22.91                         | 20.91                    | 23                     | -2.09              |
|                                                      |            |                 |            | 50      | 0         | 22.95                         | 20.95                    | 23                     | -2.05              |
|                                                      | 56690      | 3695            | QPSK       | 1       | 0         | 23.50                         | 21.50                    | 23                     | -1.5               |
|                                                      |            |                 |            | 1       | 49        | 23.46                         | 21.46                    | 23                     | -1.54              |
|                                                      |            |                 |            | 25      | 12        | 22.70                         | 20.70                    | 23                     | -2.3               |
|                                                      |            |                 |            | 50      | 0         | 22.69                         | 20.69                    | 23                     | -2.31              |
|                                                      | 55290      | 3555            | 16QAM      | 1       | 0         | 22.62                         | 20.62                    | 23                     | -2.38              |
|                                                      |            |                 |            | 1       | 49        | 22.47                         | 20.47                    | 23                     | -2.53              |
|                                                      |            |                 |            | 25      | 12        | 21.48                         | 19.48                    | 23                     | -3.52              |
|                                                      |            |                 |            | 50      | 0         | 21.52                         | 19.52                    | 23                     | -3.48              |
|                                                      | 55990      | 3625            | 16QAM      | 1       | 0         | 23.13                         | 21.13                    | 23                     | -1.87              |
|                                                      |            |                 |            | 1       | 49        | 22.93                         | 20.93                    | 23                     | -2.07              |
|                                                      |            |                 |            | 25      | 12        | 22.01                         | 20.01                    | 23                     | -2.99              |
|                                                      |            |                 |            | 50      | 0         | 21.98                         | 19.98                    | 23                     | -3.02              |
|                                                      | 56690      | 3695            | 16QAM      | 1       | 0         | 23.09                         | 21.09                    | 23                     | -1.91              |
|                                                      |            |                 |            | 1       | 49        | 22.85                         | 20.85                    | 23                     | -2.15              |
|                                                      |            |                 |            | 25      | 12        | 21.49                         | 19.49                    | 23                     | -3.51              |
|                                                      |            |                 |            | 50      | 0         | 21.72                         | 19.72                    | 23                     | -3.28              |
|                                                      | 55290      | 3555            | 64QAM      | 1       | 0         | 21.56                         | 19.56                    | 23                     | -3.44              |
|                                                      |            |                 |            | 1       | 49        | 21.48                         | 19.48                    | 23                     | -3.52              |
|                                                      |            |                 |            | 25      | 12        | 20.45                         | 18.45                    | 23                     | -4.55              |
|                                                      |            |                 |            | 50      | 0         | 20.49                         | 18.49                    | 23                     | -4.51              |
|                                                      | 55990      | 3625            | 64QAM      | 1       | 0         | 22.07                         | 20.07                    | 23                     | -2.93              |
|                                                      |            |                 |            | 1       | 49        | 22.04                         | 20.04                    | 23                     | -2.96              |
|                                                      |            |                 |            | 25      | 12        | 21.06                         | 19.06                    | 23                     | -3.94              |
|                                                      |            |                 |            | 50      | 0         | 21.04                         | 19.04                    | 23                     | -3.96              |
|                                                      | 56690      | 3695            | 64QAM      | 1       | 0         | 21.80                         | 19.80                    | 23                     | -3.2               |
|                                                      |            |                 |            | 1       | 49        | 21.71                         | 19.71                    | 23                     | -3.29              |
|                                                      |            |                 |            | 25      | 12        | 20.74                         | 18.74                    | 23                     | -4.26              |
|                                                      |            |                 |            | 50      | 0         | 20.63                         | 18.63                    | 23                     | -4.37              |
|                                                      | 55290      | 3555            | 256QAM     | 1       | 0         | 18.61                         | 16.61                    | 23                     | -6.39              |
|                                                      |            |                 |            | 1       | 49        | 18.34                         | 16.34                    | 23                     | -6.66              |
|                                                      |            |                 |            | 25      | 12        | 18.67                         | 16.67                    | 23                     | -6.33              |
|                                                      |            |                 |            | 50      | 0         | 18.72                         | 16.72                    | 23                     | -6.28              |
|                                                      | 55990      | 3625            | 256QAM     | 1       | 0         | 18.22                         | 16.22                    | 23                     | -6.78              |
|                                                      |            |                 |            | 1       | 49        | 18.26                         | 16.26                    | 23                     | -6.74              |
|                                                      |            |                 |            | 25      | 12        | 18.26                         | 16.26                    | 23                     | -6.74              |
|                                                      |            |                 |            | 50      | 0         | 18.41                         | 16.41                    | 23                     | -6.59              |
|                                                      | 56690      | 3695            | 256QAM     | 1       | 0         | 18.68                         | 16.68                    | 23                     | -6.32              |
|                                                      |            |                 |            | 1       | 49        | 18.95                         | 16.95                    | 23                     | -6.05              |
|                                                      |            |                 |            | 25      | 12        | 18.77                         | 16.77                    | 23                     | -6.23              |
|                                                      |            |                 |            | 50      | 0         | 18.86                         | 16.86                    | 23                     | -6.14              |

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Antenna gain (dBi) -2

| LTE Band 48 Uplink frequency band : 3550 to 3700 MHz |            |                 |            |         |           |                               |                          |                        |                    |
|------------------------------------------------------|------------|-----------------|------------|---------|-----------|-------------------------------|--------------------------|------------------------|--------------------|
| BW (MHz)                                             | UL Channel | Frequency (MHz) | Modulation | RB Size | RB Offset | Conducted Average (dBm/10MHz) | EIRP Average (dBm/10MHz) | EIRP Limit (dBm/10MHz) | Margin (dBm/10MHz) |
| 15                                                   | 55315      | 3557.5          | QPSK       | 1       | 0         | 24.33                         | 22.33                    | 23                     | -0.67              |
|                                                      |            |                 |            | 1       | 74        | 24.50                         | 22.50                    | 23                     | -0.50              |
|                                                      |            |                 |            | 36      | 18        | 23.69                         | 21.69                    | 23                     | -1.31              |
|                                                      |            |                 |            | 75      | 0         | 22.43                         | 20.43                    | 23                     | -2.57              |
|                                                      | 55990      | 3625            | QPSK       | 1       | 0         | 24.92                         | <b>22.92</b>             | 23                     | -0.08              |
|                                                      |            |                 |            | 1       | 74        | 24.53                         | 22.53                    | 23                     | -0.47              |
|                                                      |            |                 |            | 36      | 18        | 23.82                         | 21.82                    | 23                     | -1.18              |
|                                                      |            |                 |            | 75      | 0         | 22.52                         | 20.52                    | 23                     | -2.48              |
|                                                      | 56665      | 3692.5          | QPSK       | 1       | 0         | 24.91                         | 22.91                    | 23                     | -0.09              |
|                                                      |            |                 |            | 1       | 74        | 24.16                         | 22.16                    | 23                     | -0.84              |
|                                                      |            |                 |            | 36      | 18        | 24.08                         | 22.08                    | 23                     | -0.92              |
|                                                      |            |                 |            | 75      | 0         | 22.74                         | 20.74                    | 23                     | -2.26              |
|                                                      | 55315      | 3557.5          | 16QAM      | 1       | 0         | 24.04                         | <b>22.04</b>             | 23                     | -0.96              |
|                                                      |            |                 |            | 1       | 74        | 24.01                         | 22.01                    | 23                     | -0.99              |
|                                                      |            |                 |            | 36      | 18        | 22.74                         | 20.74                    | 23                     | -2.26              |
|                                                      |            |                 |            | 75      | 0         | 21.47                         | 19.47                    | 23                     | -3.53              |
|                                                      | 55990      | 3625            | 16QAM      | 1       | 0         | 23.76                         | 21.76                    | 23                     | -1.24              |
|                                                      |            |                 |            | 1       | 74        | 23.73                         | 21.73                    | 23                     | -1.27              |
|                                                      |            |                 |            | 36      | 18        | 22.82                         | 20.82                    | 23                     | -2.18              |
|                                                      |            |                 |            | 75      | 0         | 21.64                         | 19.64                    | 23                     | -3.36              |
|                                                      | 56665      | 3692.5          | 16QAM      | 1       | 0         | 23.58                         | 21.58                    | 23                     | -1.42              |
|                                                      |            |                 |            | 1       | 74        | 23.57                         | 21.57                    | 23                     | -1.43              |
|                                                      |            |                 |            | 36      | 18        | 23.20                         | 21.20                    | 23                     | -1.80              |
|                                                      |            |                 |            | 75      | 0         | 21.78                         | 19.78                    | 23                     | -3.22              |
|                                                      | 55315      | 3557.5          | 64QAM      | 1       | 0         | 22.23                         | 20.23                    | 23                     | -2.77              |
|                                                      |            |                 |            | 1       | 74        | 23.00                         | <b>21.00</b>             | 23                     | -2.00              |
|                                                      |            |                 |            | 36      | 18        | 21.79                         | 19.79                    | 23                     | -3.21              |
|                                                      |            |                 |            | 75      | 0         | 20.40                         | 18.40                    | 23                     | -4.60              |
|                                                      | 55990      | 3625            | 64QAM      | 1       | 0         | 22.81                         | 20.81                    | 23                     | -2.19              |
|                                                      |            |                 |            | 1       | 74        | 22.84                         | 20.84                    | 23                     | -2.16              |
|                                                      |            |                 |            | 36      | 18        | 21.91                         | 19.91                    | 23                     | -3.09              |
|                                                      |            |                 |            | 75      | 0         | 20.38                         | 18.38                    | 23                     | -4.62              |
|                                                      | 56665      | 3692.5          | 64QAM      | 1       | 0         | 22.22                         | 20.22                    | 23                     | -2.78              |
|                                                      |            |                 |            | 1       | 74        | 22.68                         | 20.68                    | 23                     | -2.32              |
|                                                      |            |                 |            | 36      | 18        | 22.33                         | 20.33                    | 23                     | -2.67              |
|                                                      |            |                 |            | 75      | 0         | 20.91                         | 18.91                    | 23                     | -4.09              |
|                                                      | 55315      | 3557.5          | 256QAM     | 1       | 0         | 18.56                         | 16.56                    | 23                     | -6.44              |
|                                                      |            |                 |            | 1       | 74        | 18.49                         | 16.49                    | 23                     | -6.51              |
|                                                      |            |                 |            | 36      | 18        | 18.59                         | 16.59                    | 23                     | -6.41              |
|                                                      |            |                 |            | 75      | 0         | 18.62                         | 16.62                    | 23                     | -6.38              |
|                                                      | 55990      | 3625            | 256QAM     | 1       | 0         | 18.29                         | 16.29                    | 23                     | -6.71              |
|                                                      |            |                 |            | 1       | 74        | 18.51                         | 16.51                    | 23                     | -6.49              |
|                                                      |            |                 |            | 36      | 18        | 18.50                         | 16.50                    | 23                     | -6.50              |
|                                                      |            |                 |            | 75      | 0         | 18.48                         | 16.48                    | 23                     | -6.52              |
|                                                      | 56665      | 3692.5          | 256QAM     | 1       | 0         | 18.75                         | 16.75                    | 23                     | -6.25              |
|                                                      |            |                 |            | 1       | 74        | 19.17                         | 17.17                    | 23                     | -5.83              |
|                                                      |            |                 |            | 36      | 18        | 19.09                         | 17.09                    | 23                     | -5.91              |
|                                                      |            |                 |            | 75      | 0         | 18.88                         | 16.88                    | 23                     | -6.12              |

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Antenna gain (dBi) -2

| LTE Band 48 Uplink frequency band : 3550 to 3700 MHz |            |                 |            |         |           |                               |                          |                        |                    |
|------------------------------------------------------|------------|-----------------|------------|---------|-----------|-------------------------------|--------------------------|------------------------|--------------------|
| BW (MHz)                                             | UL Channel | Frequency (MHz) | Modulation | RB Size | RB Offset | Conducted Average (dBm/10MHz) | EIRP Average (dBm/10MHz) | EIRP Limit (dBm/10MHz) | Margin (dBm/10MHz) |
| 20                                                   | 55340      | 3560            | QPSK       | 1       | 0         | 24.49                         | 22.49                    | 23                     | -0.51              |
|                                                      |            |                 |            | 1       | 99        | 24.47                         | 22.47                    | 23                     | -0.53              |
|                                                      |            |                 |            | 50      | 25        | 23.39                         | 21.39                    | 23                     | -1.61              |
|                                                      |            |                 |            | 100     | 0         | 21.19                         | 19.19                    | 23                     | -3.81              |
|                                                      | 55990      | 3625            | QPSK       | 1       | 0         | 24.62                         | <b>22.62</b>             | 23                     | -0.38              |
|                                                      |            |                 |            | 1       | 99        | 24.57                         | 22.57                    | 23                     | -0.43              |
|                                                      |            |                 |            | 50      | 25        | 23.70                         | 21.70                    | 23                     | -1.30              |
|                                                      |            |                 |            | 100     | 0         | 21.35                         | 19.35                    | 23                     | -3.65              |
|                                                      | 56640      | 3690            | QPSK       | 1       | 0         | 24.54                         | 22.54                    | 23                     | -0.46              |
|                                                      |            |                 |            | 1       | 99        | 24.51                         | 22.51                    | 23                     | -0.49              |
|                                                      |            |                 |            | 50      | 25        | 23.53                         | 21.53                    | 23                     | -1.47              |
|                                                      |            |                 |            | 100     | 0         | 21.12                         | 19.12                    | 23                     | -3.88              |
|                                                      | 55340      | 3560            | 16QAM      | 1       | 0         | 23.76                         | 21.76                    | 23                     | -1.24              |
|                                                      |            |                 |            | 1       | 99        | 23.85                         | 21.85                    | 23                     | -1.15              |
|                                                      |            |                 |            | 50      | 25        | 22.43                         | 20.43                    | 23                     | -2.57              |
|                                                      |            |                 |            | 100     | 0         | 20.17                         | 18.17                    | 23                     | -4.83              |
|                                                      | 55990      | 3625            | 16QAM      | 1       | 0         | 23.79                         | 21.79                    | 23                     | -1.21              |
|                                                      |            |                 |            | 1       | 99        | 23.70                         | 21.70                    | 23                     | -1.30              |
|                                                      |            |                 |            | 50      | 25        | 22.74                         | 20.74                    | 23                     | -2.26              |
|                                                      |            |                 |            | 100     | 0         | 20.27                         | 18.27                    | 23                     | -4.73              |
|                                                      | 56640      | 3690            | 16QAM      | 1       | 0         | 23.80                         | 21.80                    | 23                     | -1.20              |
|                                                      |            |                 |            | 1       | 99        | 23.77                         | 21.77                    | 23                     | -1.23              |
|                                                      |            |                 |            | 50      | 25        | 22.52                         | 20.52                    | 23                     | -2.48              |
|                                                      |            |                 |            | 100     | 0         | 24.09                         | <b>22.09</b>             | 23                     | -0.91              |
|                                                      | 55340      | 3560            | 64QAM      | 1       | 0         | 22.66                         | 20.66                    | 23                     | -2.34              |
|                                                      |            |                 |            | 1       | 99        | 23.02                         | <b>21.02</b>             | 23                     | -1.98              |
|                                                      |            |                 |            | 50      | 25        | 21.33                         | 19.33                    | 23                     | -3.67              |
|                                                      |            |                 |            | 100     | 0         | 19.08                         | 17.08                    | 23                     | -5.92              |
|                                                      | 55990      | 3625            | 64QAM      | 1       | 0         | 22.81                         | 20.81                    | 23                     | -2.19              |
|                                                      |            |                 |            | 1       | 99        | 22.93                         | 20.93                    | 23                     | -2.07              |
|                                                      |            |                 |            | 50      | 25        | 21.74                         | 19.74                    | 23                     | -3.26              |
|                                                      |            |                 |            | 100     | 0         | 19.39                         | 17.39                    | 23                     | -5.61              |
|                                                      | 56640      | 3690            | 64QAM      | 1       | 0         | 22.68                         | 20.68                    | 23                     | -2.32              |
|                                                      |            |                 |            | 1       | 99        | 22.76                         | 20.76                    | 23                     | -2.24              |
|                                                      |            |                 |            | 50      | 25        | 21.55                         | 19.55                    | 23                     | -3.45              |
|                                                      |            |                 |            | 100     | 0         | 19.06                         | 17.06                    | 23                     | -5.94              |
|                                                      | 55340      | 3560            | 256QAM     | 1       | 0         | 18.72                         | 16.72                    | 23                     | -6.28              |
|                                                      |            |                 |            | 1       | 99        | 18.43                         | 16.43                    | 23                     | -6.57              |
|                                                      |            |                 |            | 50      | 25        | 18.74                         | 16.74                    | 23                     | -6.26              |
|                                                      |            |                 |            | 100     | 0         | 18.71                         | 16.71                    | 23                     | -6.29              |
|                                                      | 55990      | 3625            | 256QAM     | 1       | 0         | 18.33                         | 16.33                    | 23                     | -6.67              |
|                                                      |            |                 |            | 1       | 99        | 18.47                         | 16.47                    | 23                     | -6.53              |
|                                                      |            |                 |            | 50      | 25        | 18.53                         | 16.53                    | 23                     | -6.47              |
|                                                      |            |                 |            | 100     | 0         | 18.52                         | 16.52                    | 23                     | -6.48              |
|                                                      | 56640      | 3690            | 256QAM     | 1       | 0         | 18.24                         | 16.24                    | 23                     | -6.76              |
|                                                      |            |                 |            | 1       | 99        | 18.31                         | 16.31                    | 23                     | -6.69              |
|                                                      |            |                 |            | 50      | 25        | 18.32                         | 16.32                    | 23                     | -6.68              |
|                                                      |            |                 |            | 100     | 0         | 18.38                         | 16.38                    | 23                     | -6.62              |

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## 7. MAXIMUM POWER DENSITY MEASUREMENT

### 7.1. Standard Applicable

FCC §2.1046 & 96.41

- (a) FCC 96.41(a) Digital modulation. Systems operating in the Citizens Broadband Radio Service must use digital modulation techniques.
- (b) FCC 96.41(b) Power limits. Unless otherwise specified in this section, the maximum effective isotropic radiated power (EIRP) of any CBSD and End User Device must comply with the limits shown in the table in this paragraph (b):

| Device                       | Maximum PSD<br>(dBm/MHz) |
|------------------------------|--------------------------|
| End User Device              | n/a                      |
| Category A CBSD              | 20                       |
| Category B CBSD <sup>1</sup> | 37                       |

Category B CBSDs will only be authorized for use after an ESC is approved and commercially deployed consistent with §§96.15 and 96.67.

- (c) Power management. CBSDs and End User Devices shall limit their operating power to the minimum necessary for successful operations
- (1) CBSDs must support transmit power control capability and the capability to limit their maximum EIRP and the maximum EIRP of associated End User Devices in response to instructions from an SAS.
  - (2) End User Devices shall include transmit power control capability and the capability to limit their maximum EIRP in response to instructions from their associated CBSDs.

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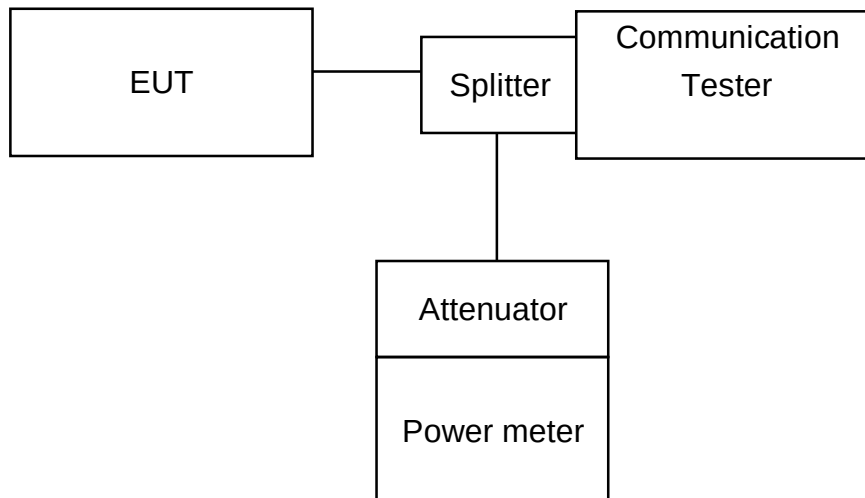
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## 7.2. Test Set-up



**Note:** Measurement setup for testing on Antenna connector

## 7.3. Measurement Procedure

1. Set instrument center frequency to OBW center frequency.
2. Set span to at least 1.5 times the OBW.
3. Set the RBW to the specified reference bandwidth (often 1 MHz).
4. Set VBW  $\geq 3 \times$  RBW.
5. Detector = RMS (power averaging).
6. Ensure that the number of measurement points in the sweep  $\geq 2 \times$  span/RBW.
7. Sweep time = auto couple.
8. Employ trace averaging (RMS) mode over a minimum of 100 traces.
9. Use the peak marker function to determine the maximum amplitude level within the reference bandwidth (PSD).
10. Determine the EIRP by adding the effective antenna gain to the adjusted power level.

## 7.4. Measurement Equipment Used

N/A

## 7.5. Measurement Result

### Peak Power Density Results:

N/A, this is an End user device.

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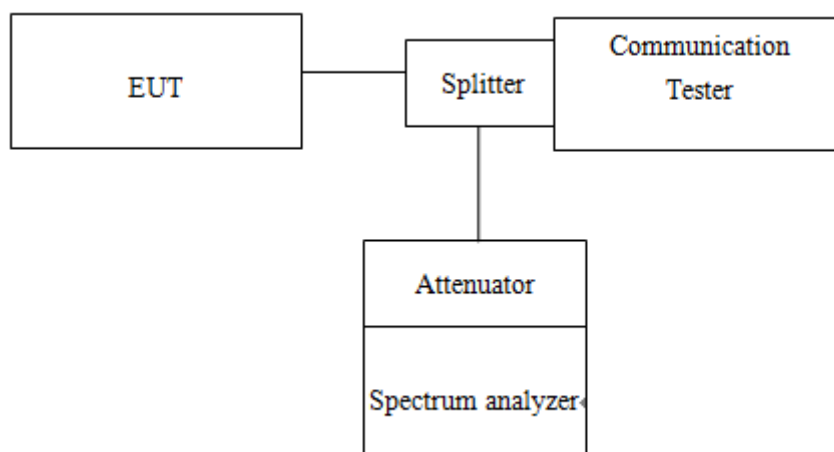
## 8. OCCUPIED BANDWIDTH MEASUREMENT

### 8.1. Standard Applicable

FCC Part 2.1049(h)

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power.

### 8.2. Test Set-up



### 8.3. Measurement Procedure

#### **99% & 26dB Bandwidth with detector peak**

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW= 3 times RBW, -26dBc display line was placed on the screen (or 26dB bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace. Then set RBW to 99% bandwidth, RBW= 1%, VBW= 3 RBW, with span > 2 \* Signal BW, set % Power = 99%.

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#### 8.4. Measurement Equipment Used

| EQUIPMENT TYPE               | MFR       | MODEL NUMBER   | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|------------------------------|-----------|----------------|---------------|------------|------------|
| Spectrum Analyzer            | KEYSIGHT  | N9010A         | MY57120200    | 03/06/2019 | 03/05/2020 |
| Radio Communication Analyzer | Anritsu   | MT8821C        | 6262044739    | 12/06/2019 | 12/05/2020 |
| Attenuator                   | Marvelous | MVE2213-10     | RF30          | 11/20/2019 | 11/19/2020 |
| DC Block                     | PASTERNAK | PE8210         | RF32          | 11/20/2019 | 11/19/2020 |
| Splitter                     | Woken     | DOM35LW1A2     | RF83          | 11/20/2019 | 11/19/2020 |
| Coaxial Cables               | Woken     | 00100A1F1A185C | RF229         | 11/20/2019 | 11/19/2020 |

| EQUIPMENT TYPE    | MFR      | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|----------|--------------|---------------|------------|------------|
| Spectrum Analyzer | KEYSIGHT | N9010A       | MY57120200    | 03/17/2020 | 03/16/2021 |

Note: The measurement was taken place with the long duration of the time, and additional equipment list as shown above indicate those equipment of which has been subject to undertake the calibration in intermediate period of time of the measurement.

#### 8.5. Measurement Result

| LTE BAND 48 Channel bandwidth: 5MHz |       |              |        |        |        |                |       |       |        |
|-------------------------------------|-------|--------------|--------|--------|--------|----------------|-------|-------|--------|
| Freq. (MHz)                         | CH    | 99% BW (MHz) |        |        |        | 26 dB BW (MHz) |       |       |        |
|                                     |       | QPSK         | 16QAM  | 64QAM  | 256QAM | QPSK           | 16QAM | 64QAM | 256QAM |
| 3552.5                              | 56765 | 4.5348       | 4.5035 | 4.4968 | 4.5669 | 4.969          | 4.854 | 4.930 | 7.255  |
| 3625.0                              | 55990 | 4.5134       | 4.5052 | 4.5031 | 4.4907 | 4.902          | 5.013 | 4.901 | 6.167  |
| 3697.5                              | 58215 | 4.4977       | 4.5177 | 4.5197 | 4.4850 | 4.748          | 4.851 | 4.895 | 4.885  |

| LTE BAND 48 Channel bandwidth: 10MHz |       |              |        |        |        |                |         |        |        |
|--------------------------------------|-------|--------------|--------|--------|--------|----------------|---------|--------|--------|
| Freq. (MHz)                          | CH    | 99% BW (MHz) |        |        |        | 26 dB BW (MHz) |         |        |        |
|                                      |       | QPSK         | 16QAM  | 64QAM  | 256QAM | QPSK           | 16QAM   | 64QAM  | 256QAM |
| 3555.0                               | 55290 | 9.0583       | 9.0627 | 9.0342 | 9.8718 | 18.600         | 20.0000 | 14.580 | 14.870 |
| 3625.0                               | 55990 | 8.9956       | 9.0397 | 9.0098 | 8.9771 | 9.491          | 9.8270  | 12.320 | 12.960 |
| 3695.0                               | 56690 | 8.9948       | 9.0236 | 9.0095 | 8.9703 | 9.542          | 10.6800 | 9.579  | 9.644  |

| LTE BAND 48 Channel bandwidth: 15MHz |       |              |        |        |        |                |        |        |        |
|--------------------------------------|-------|--------------|--------|--------|--------|----------------|--------|--------|--------|
| Freq. (MHz)                          | CH    | 99% BW (MHz) |        |        |        | 26 dB BW (MHz) |        |        |        |
|                                      |       | QPSK         | 16QAM  | 64QAM  | 256QAM | QPSK           | 16QAM  | 64QAM  | 256QAM |
| 3557.5                               | 55315 | 13.504       | 13.582 | 13.475 | 13.609 | 14.280         | 14.300 | 14.410 | 22.040 |
| 3625.0                               | 55990 | 13.468       | 13.509 | 13.474 | 13.498 | 14.540         | 14.140 | 14.320 | 19.080 |
| 3692.5                               | 56665 | 13.470       | 13.417 | 13.425 | 13.486 | 14.200         | 14.530 | 14.630 | 14.300 |

| LTE BAND 48 Channel bandwidth: 20MHz |       |              |        |        |        |                |        |        |        |
|--------------------------------------|-------|--------------|--------|--------|--------|----------------|--------|--------|--------|
| Freq. (MHz)                          | CH    | 99% BW (MHz) |        |        |        | 26 dB BW (MHz) |        |        |        |
|                                      |       | QPSK         | 16QAM  | 64QAM  | 256QAM | QPSK           | 16QAM  | 64QAM  | 256QAM |
| 3650.0                               | 55340 | 18.017       | 18.044 | 18.039 | 19.302 | 35.690         | 36.050 | 35.950 | 29.460 |
| 3625.0                               | 55990 | 17.927       | 17.953 | 17.986 | 18.066 | 19.090         | 19.340 | 19.140 | 29.280 |
| 3690.0                               | 56640 | 17.944       | 17.885 | 17.999 | 17.959 | 19.080         | 19.520 | 23.060 | 19.400 |

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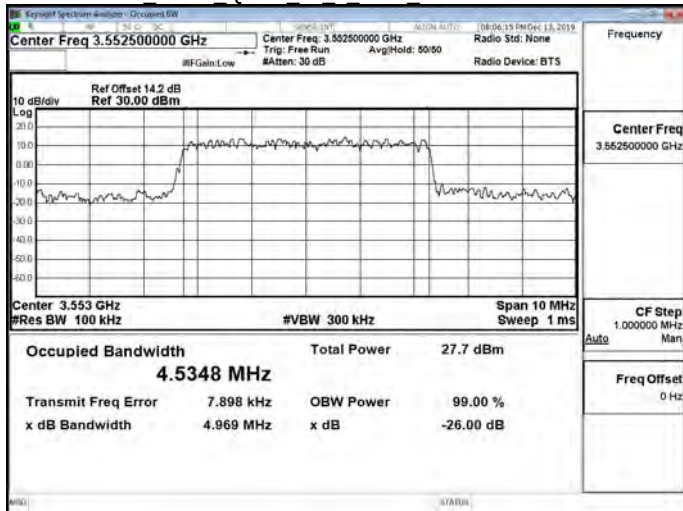
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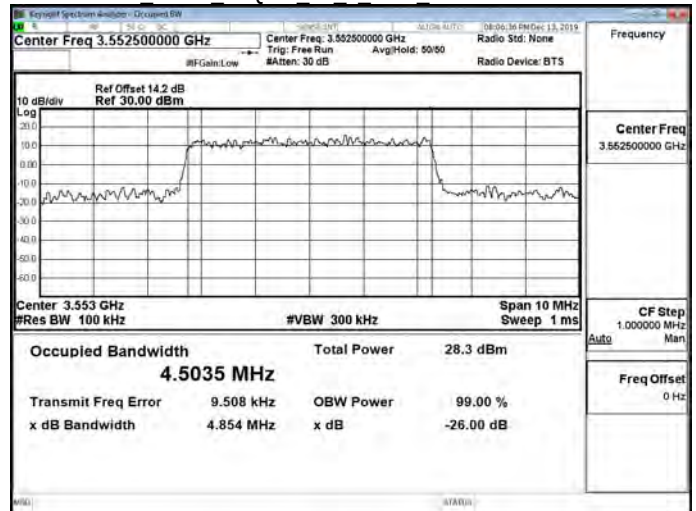
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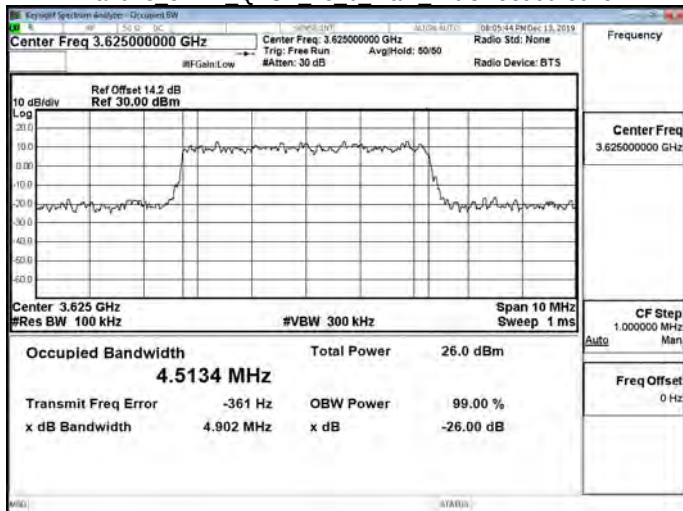
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Band48 5MHz 16QAM 25 0 Main LowCH55265-3552.5



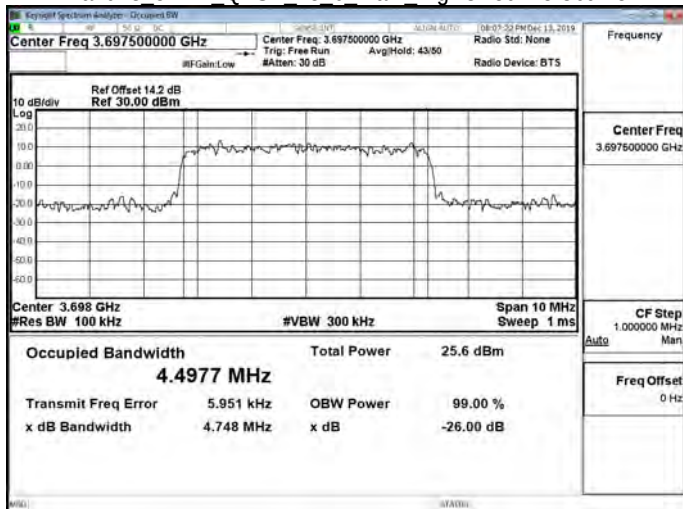
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Band48 5MHz 16QAM 25 0 Main MidCH55990-3625



Band48 5MHz QPSK 25 0 Main HighCH56715-3697.5



Band48 5MHz 16QAM 25 0 Main HighCH56715-3697.5



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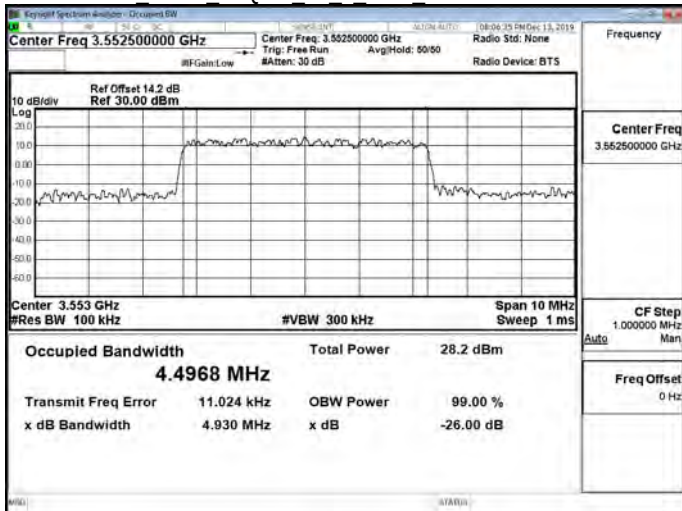
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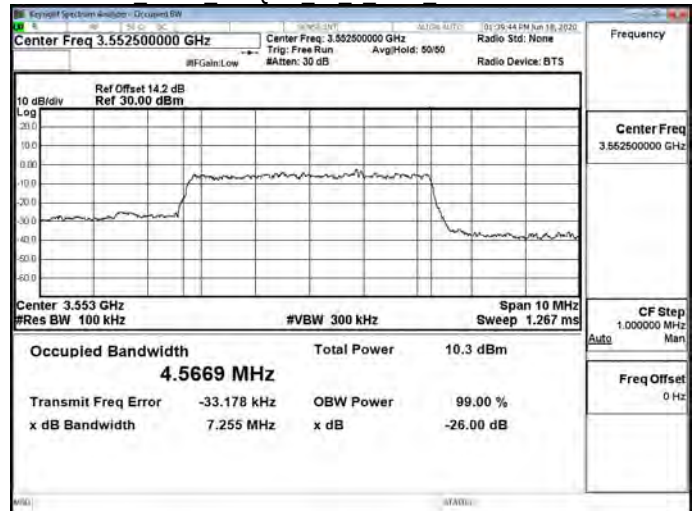
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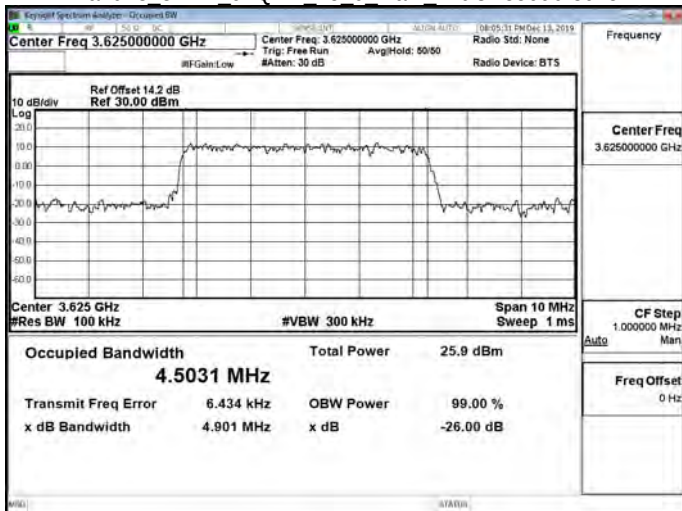
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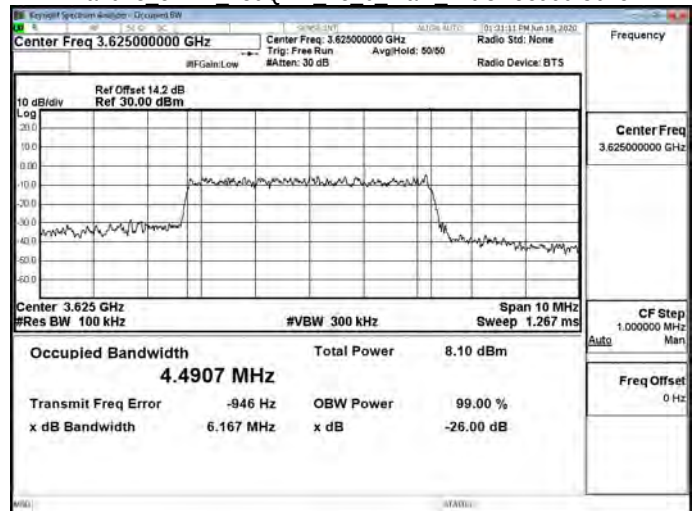
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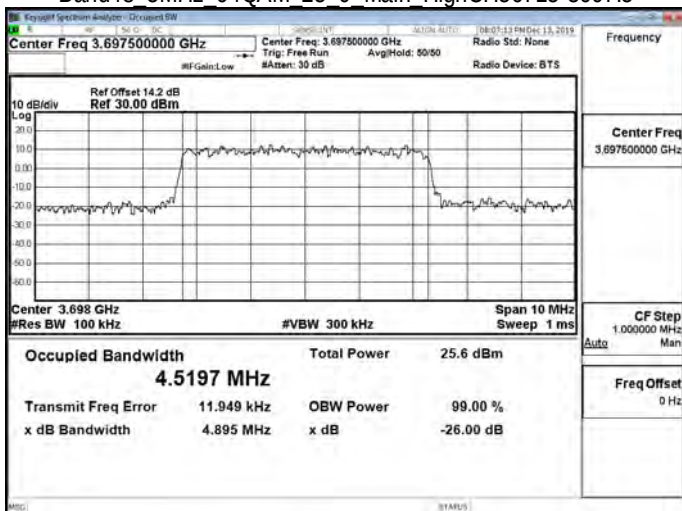
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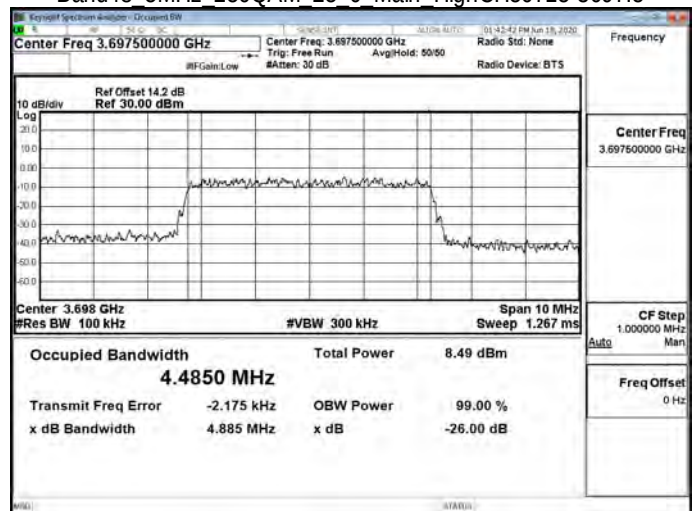
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Band48 5MHz 64QAM 25 0 Main HighCH56715-3697.5



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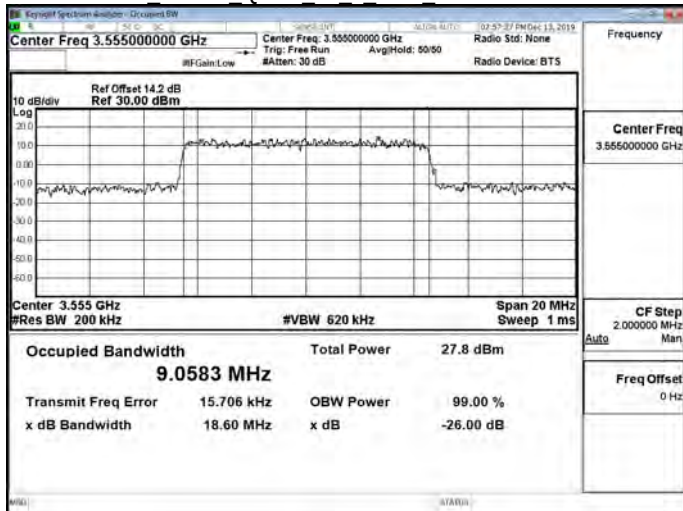


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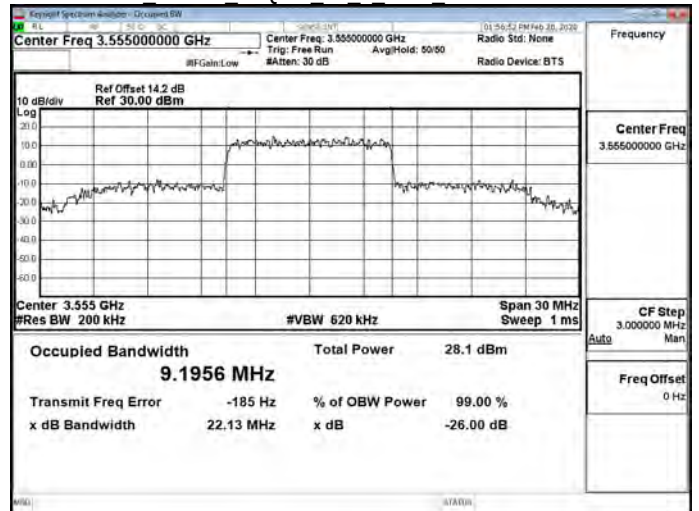
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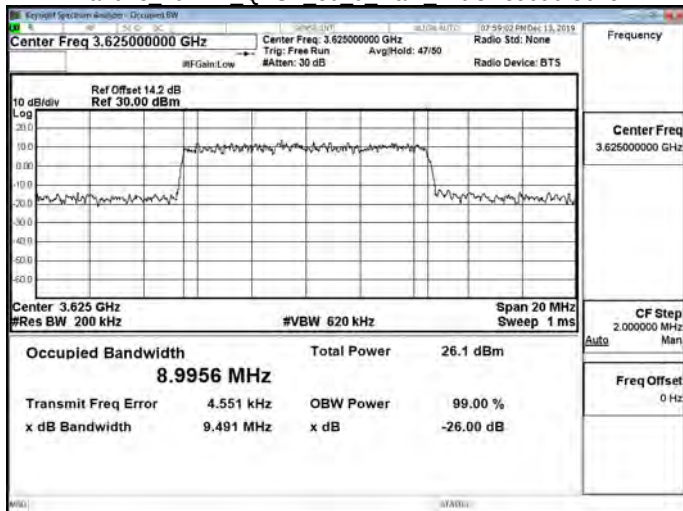
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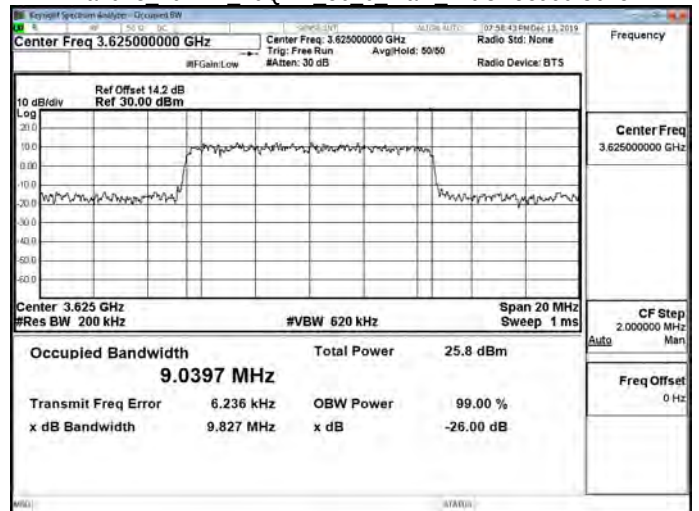
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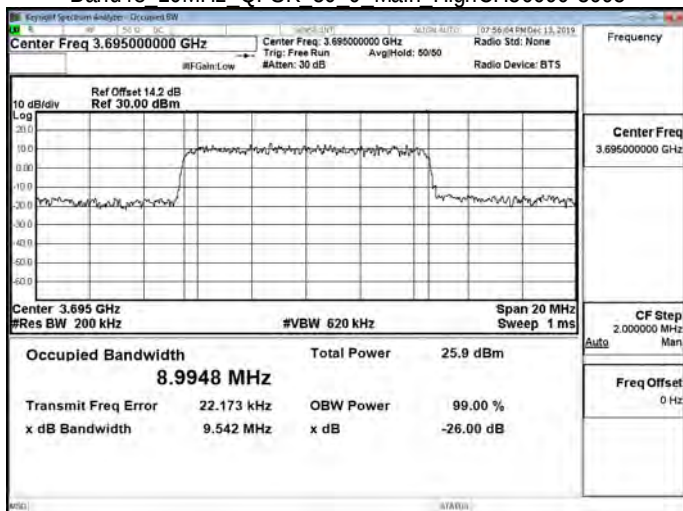
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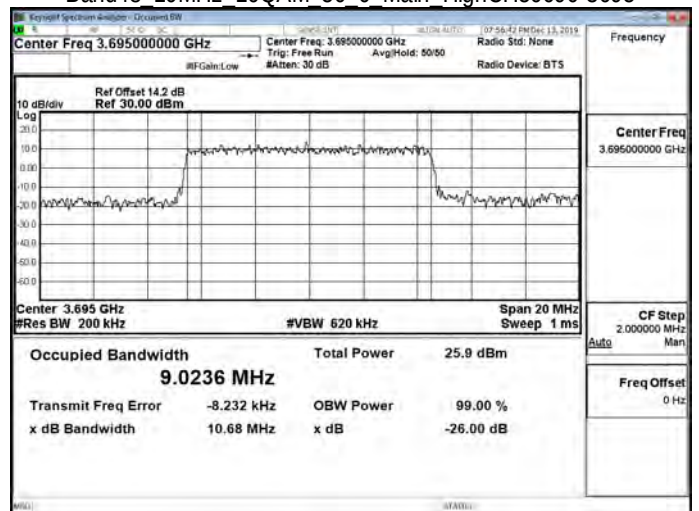
Band48 10MHz 16QAM 50 0 Main MidCH55990-3625



Band48 10MHz QPSK 50 0 Main HighCH56690-3695



Band48 10MHz 16QAM 50 0 Main HighCH56690-3695



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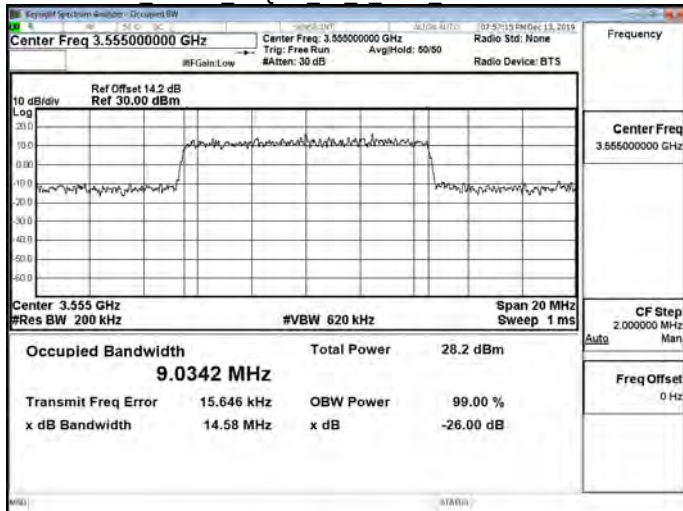
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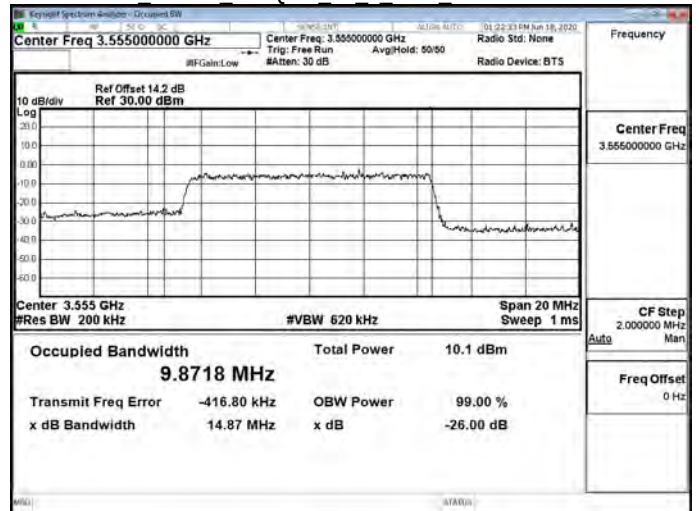
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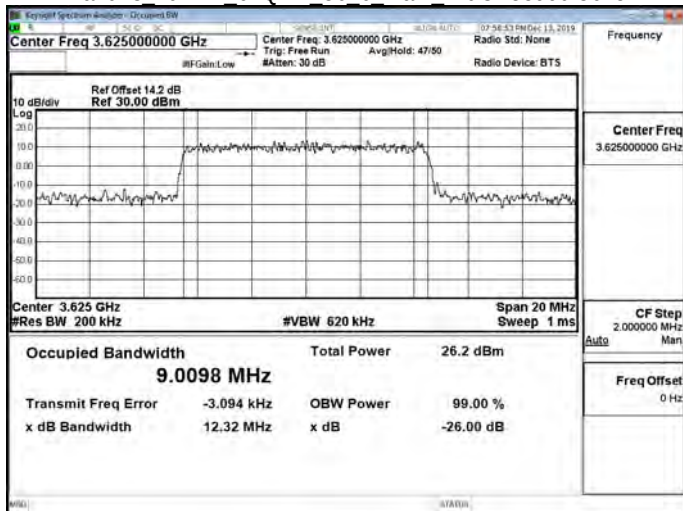
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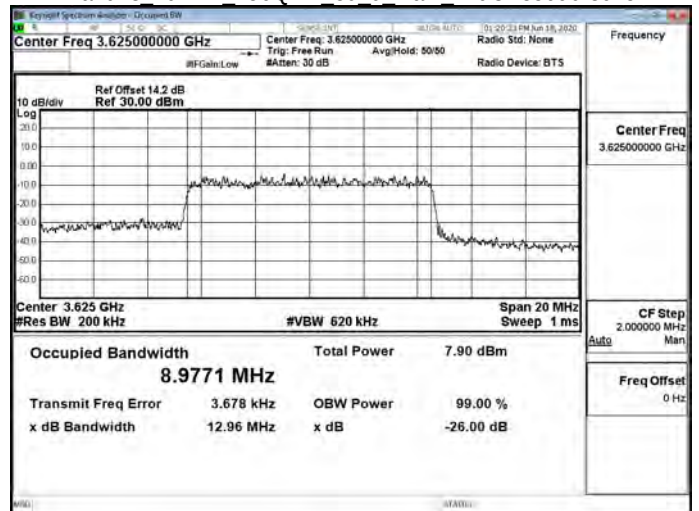
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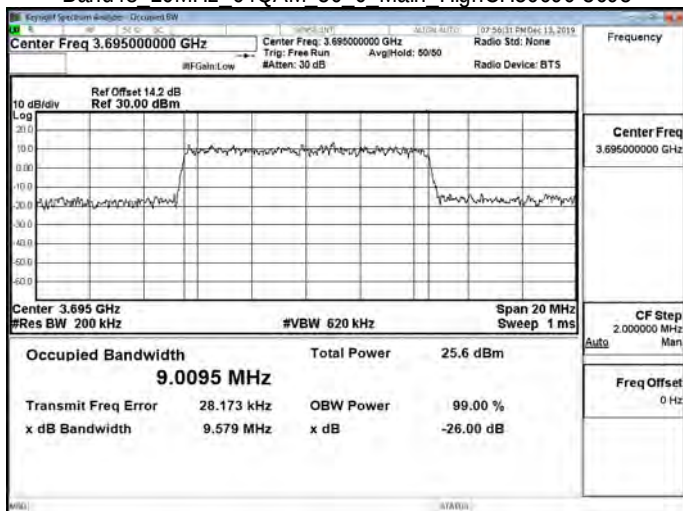
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Band48 10MHz 256QAM 50 0 Main MidCH55990-3625



Band48 10MHz 64QAM 50 0 Main HighCH56690-3695



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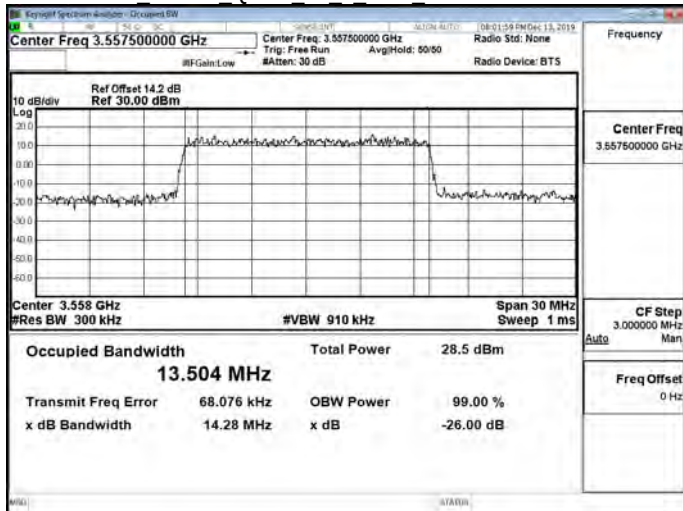
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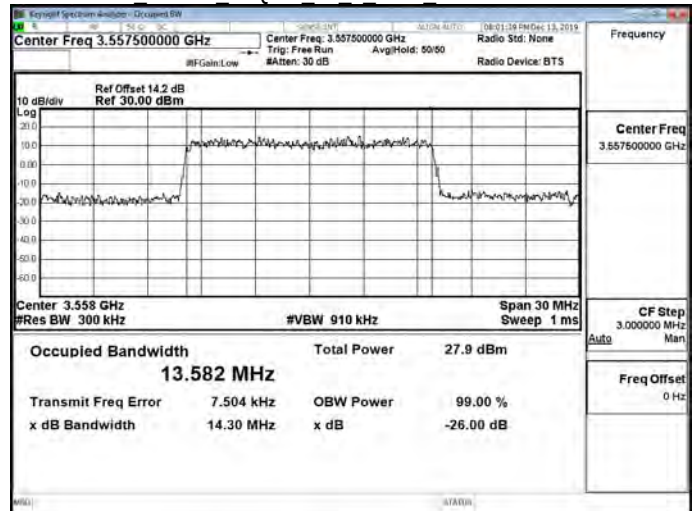
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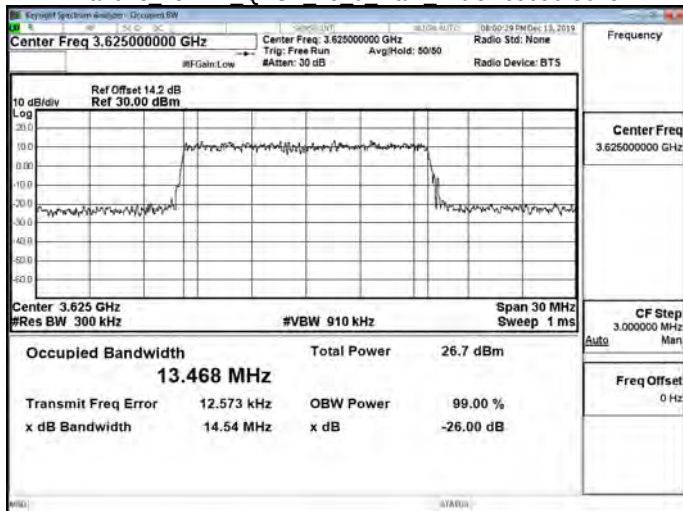
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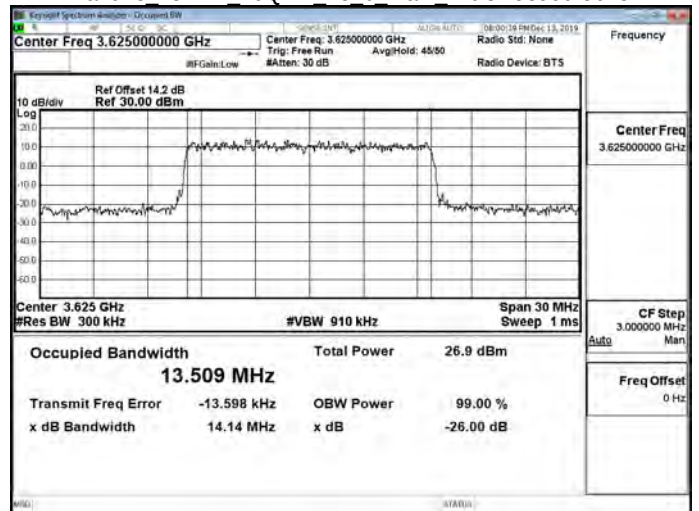
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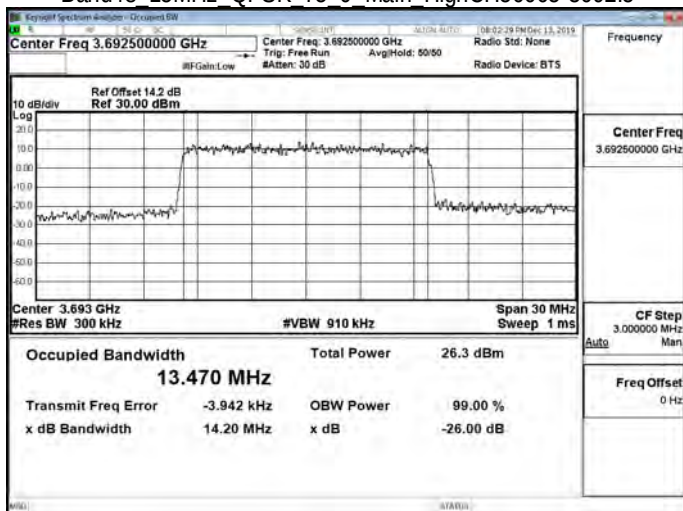
Band48 15MHz QPSK 75 0 Main MidCH55990-3625



Band48 15MHz 16QAM 75 0 Main MidCH55990-3625



Band48 15MHz QPSK 75 0 Main HighCH56665-3692.5



Band48 15MHz 16QAM 75 0 Main HighCH56665-3692.5



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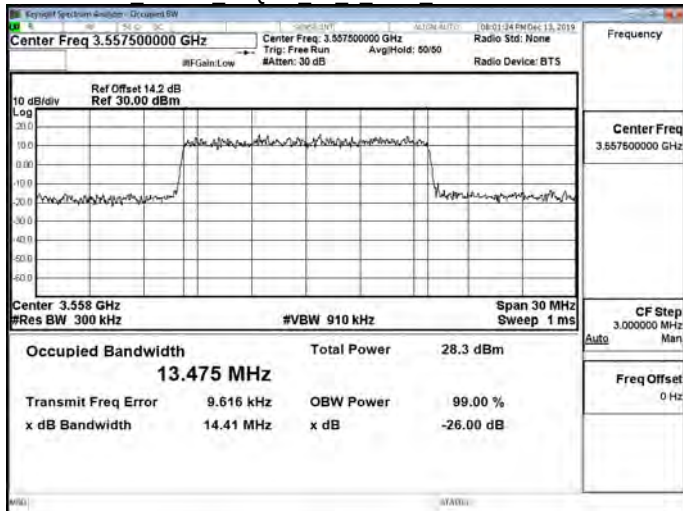
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f (886-2) 2298-0488

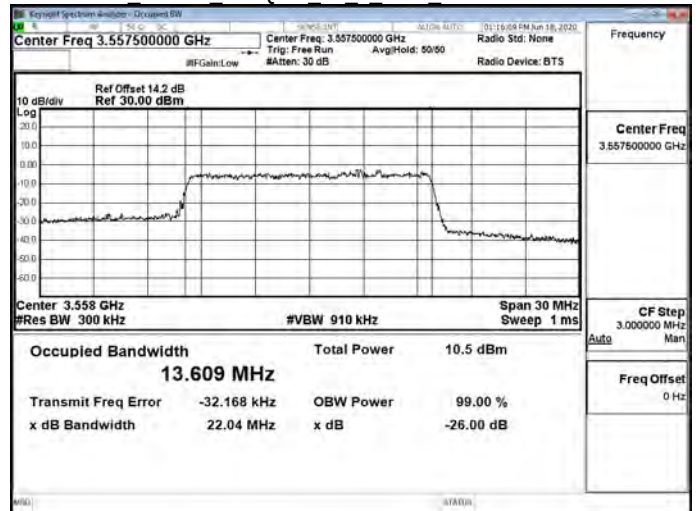
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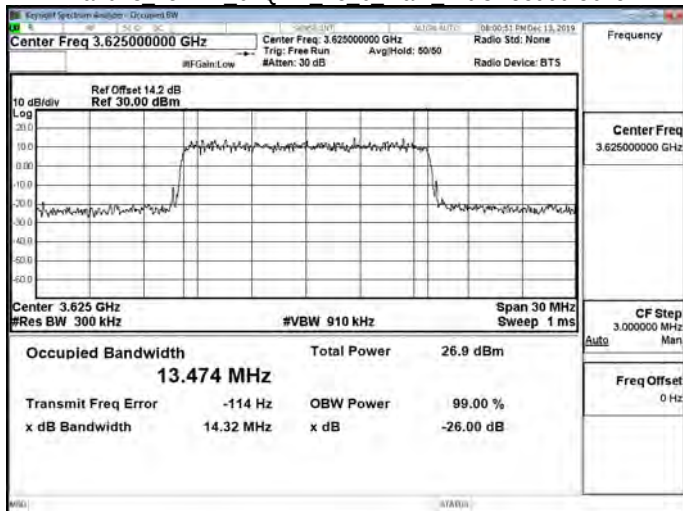
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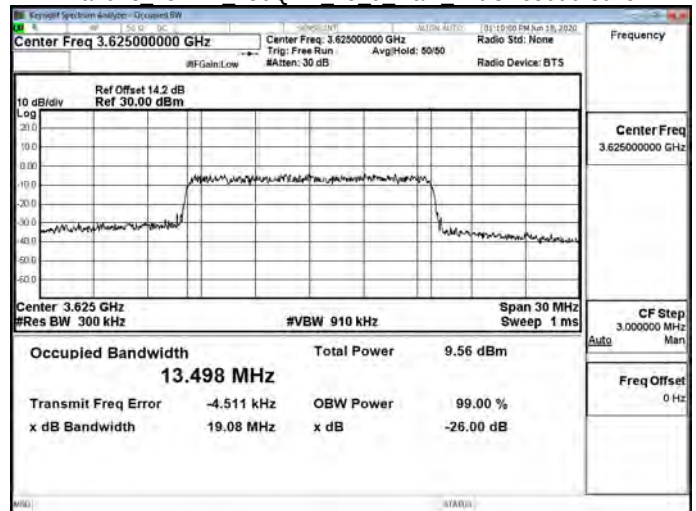
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Band48 15MHz 64QAM 75 0 Main MidCH55990-3625



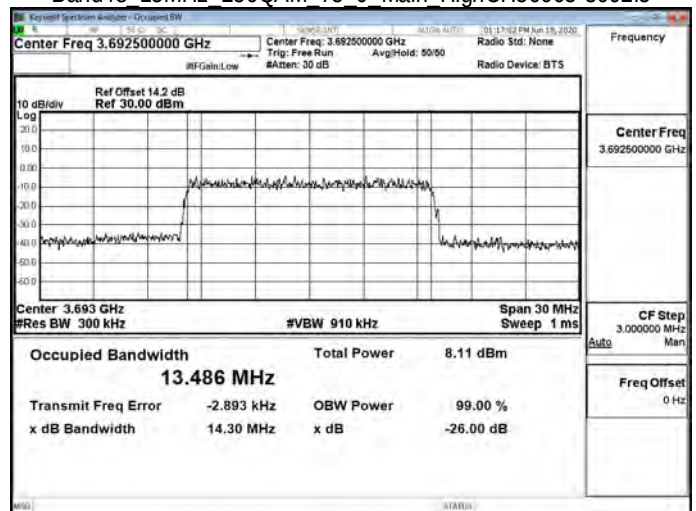
Band48 15MHz 256QAM 75 0 Main MidCH55990-3625



Band48 15MHz 64QAM 75 0 Main HighCH56665-3692.5



Band48 15MHz 256QAM 75 0 Main HighCH56665-3692.5

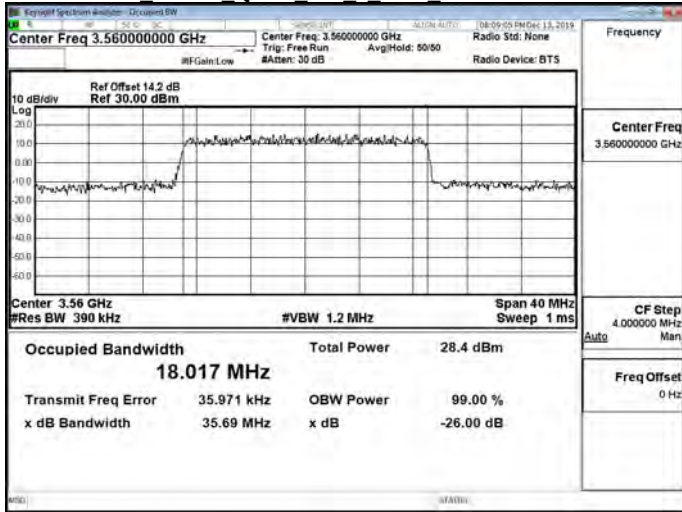


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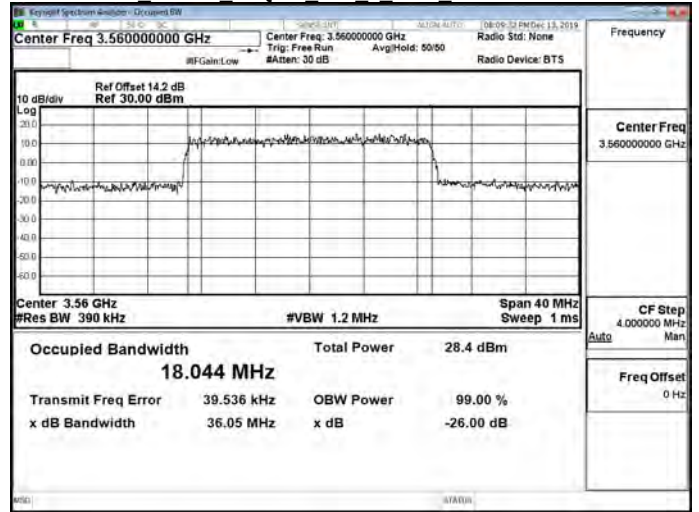
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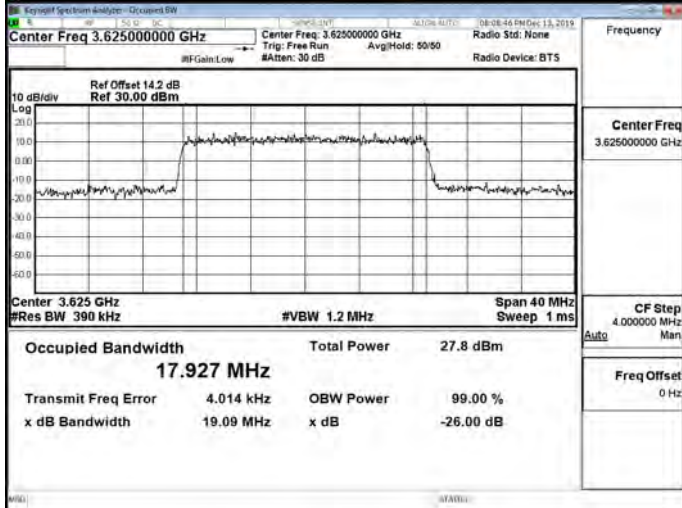
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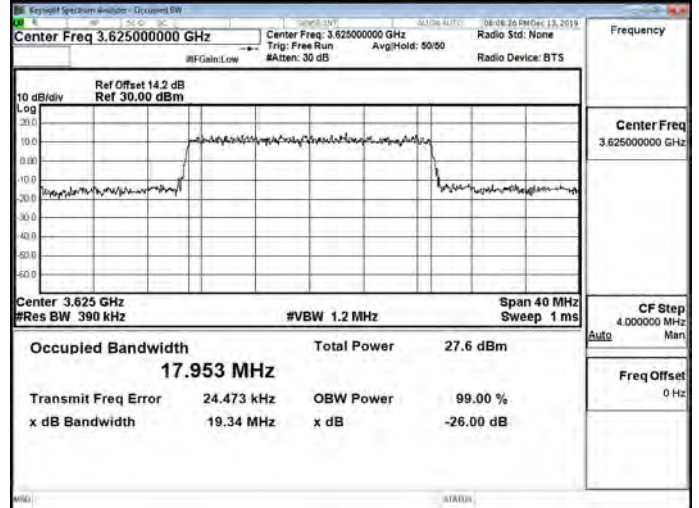
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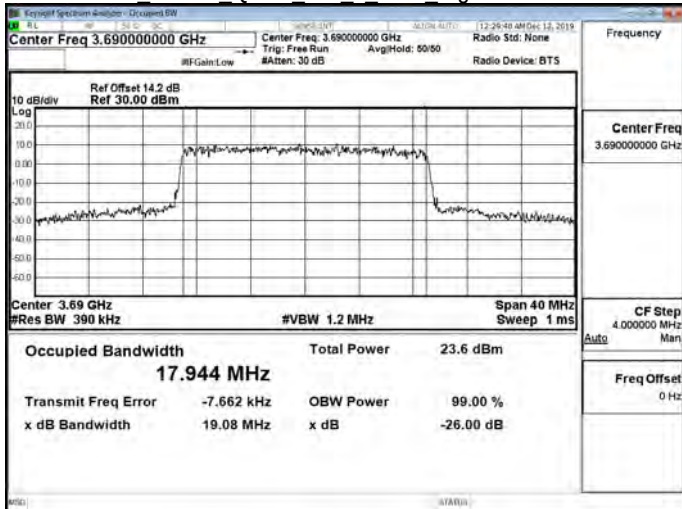
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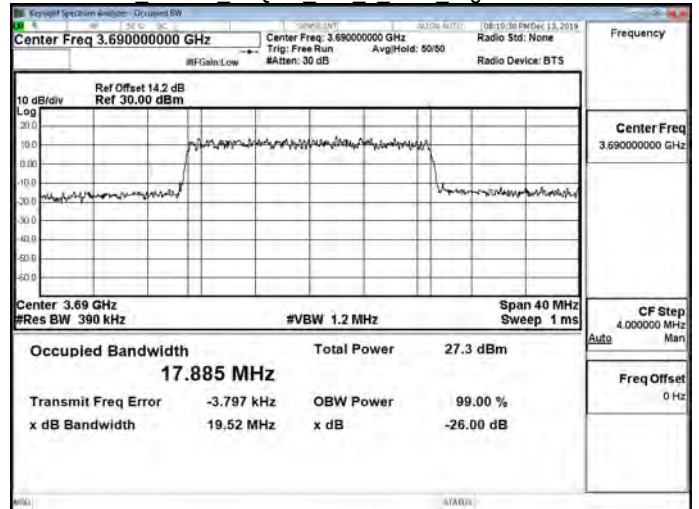
Band48 20MHz 16QAM 100 0 Main MidCH55990-3625PNG



Band48 20MHz QPSK 100 0 Main HighCH56640-3690



Band48 20MHz 16QAM 100 0 Main HighCH56640-3690

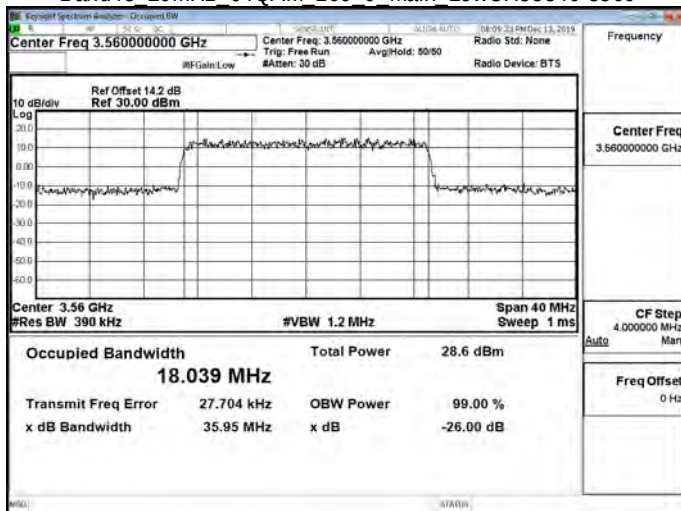


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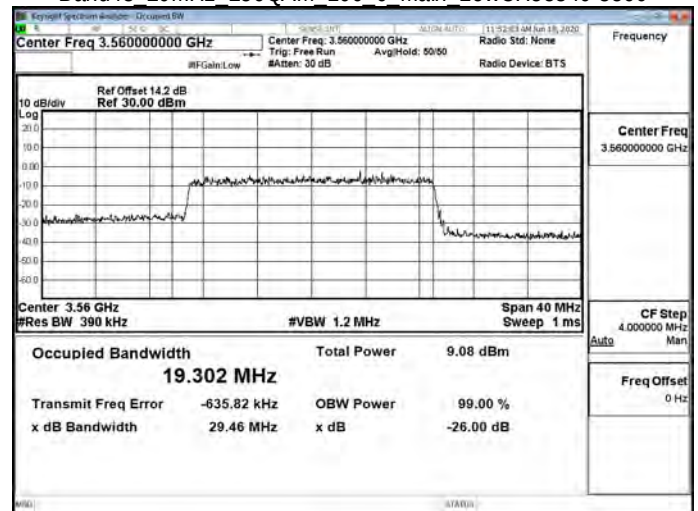
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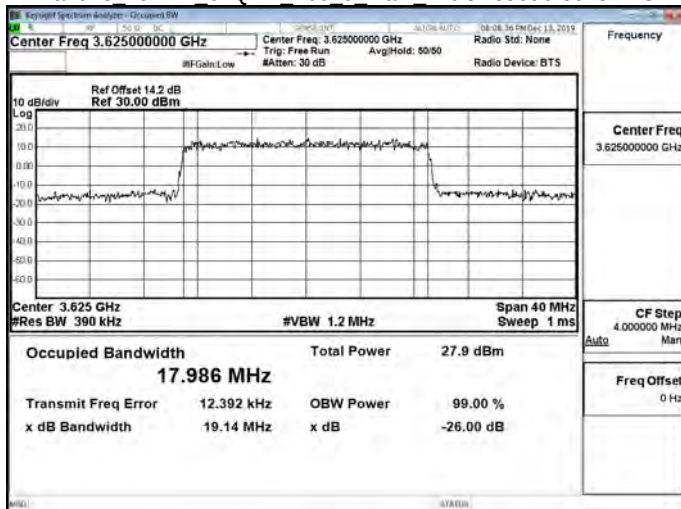
Band48 20MHz 64QAM 100 0 Main LowCH55340-3560



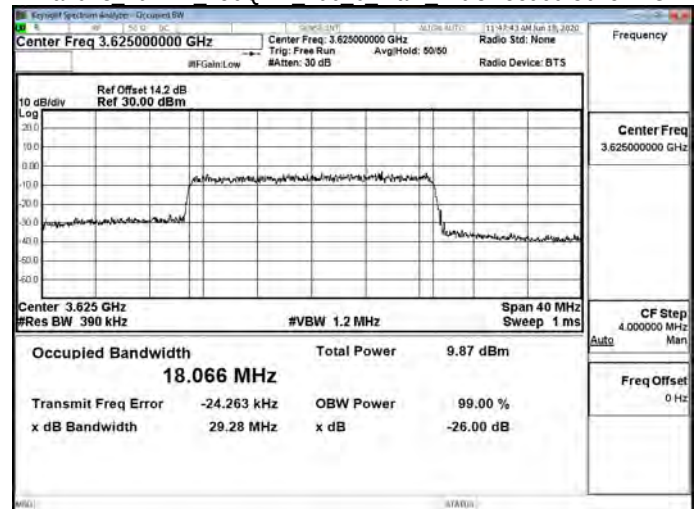
Band48 20MHz 256QAM 100 0 Main LowCH55340-3560



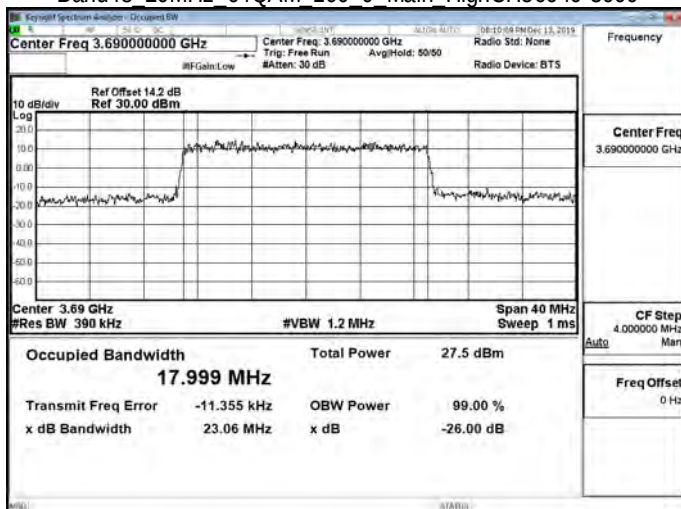
Band48 20MHz 64QAM 100 0 Main MidCH55990-3625PNG



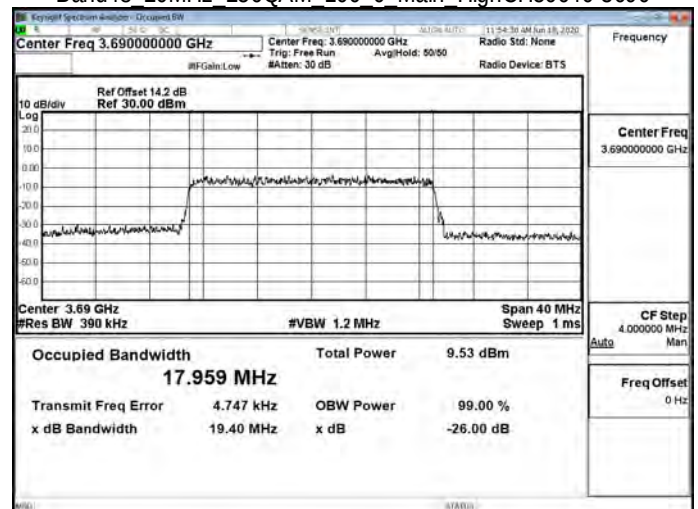
Band48 20MHz 256QAM 100 0 Main MidCH55990-3625PNG



Band48 20MHz 64QAM 100 0 Main HighCH56640-3690



Band48 20MHz 256QAM 100 0 Main HighCH56640-3690



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## 9. OUT OF BAND EMISSION AT ANTENNA TERMINALS

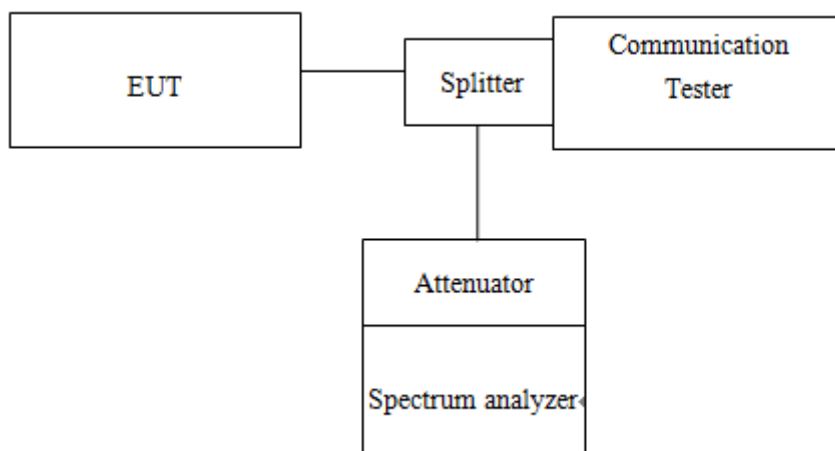
### 9.1. Standard Applicable

FCC Part 2.1051, Part 96.41, C63.26 Clause 5.7.

For channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside 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 CBSD emission shall not exceed  $-25$  dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

For CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed  $-25$  dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed  $-40$  dBm/MHz.

### 9.2. Test SET-UP



### 9.3. Measurement Procedure

#### Conducted Emission

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

To connect Antenna Port of EUT to Spectrum.

Set RBW = 1MHz & VBW = 1MHz on Spectrum.

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Allow trace to fully stabilize

Repeat above procedures until all default test channel measured were complete.

### Band Edge

1. To connect Antenna Port of EUT to Spectrum.
2. The band edge of low and high channels for the highest RF powers was measured. Setting  $RBW \geq 1\% EBW$ .
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

## 9.4. Measurement Equipment Used

| EQUIPMENT TYPE               | MFR       | MODEL NUMBER   | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|------------------------------|-----------|----------------|---------------|------------|------------|
| Spectrum Analyzer            | KEYSIGHT  | N9010A         | MY57120200    | 03/06/2019 | 03/05/2020 |
| Radio Communication Analyser | Anritsu   | MT8821C        | 6262044739    | 12/06/2019 | 12/05/2020 |
| Attenuator                   | Marvelous | MVE2213-10     | RF30          | 11/20/2019 | 11/19/2020 |
| DC Block                     | PASTERNAK | PE8210         | RF32          | 11/20/2019 | 11/19/2020 |
| Splitter                     | Woken     | DOM35LW1A2     | RF83          | 11/20/2019 | 11/19/2020 |
| Coaxial Cables               | Woken     | 00100A1F1A185C | RF229         | 11/20/2019 | 11/19/2020 |

| EQUIPMENT TYPE    | MFR      | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|----------|--------------|---------------|------------|------------|
| Spectrum Analyzer | KEYSIGHT | N9010A       | MY57120200    | 03/17/2020 | 03/16/2021 |

*Note: The measurement was taken place with the long duration of the time, and additional equipment list as shown above indicate those equipment of which has been subject to undertake the calibration in intermediate period of time of the measurement.*

### Measurement Result:

**NOTE: The occurrence of the spike on the conducted emission is the signal of the fundamental emission.**

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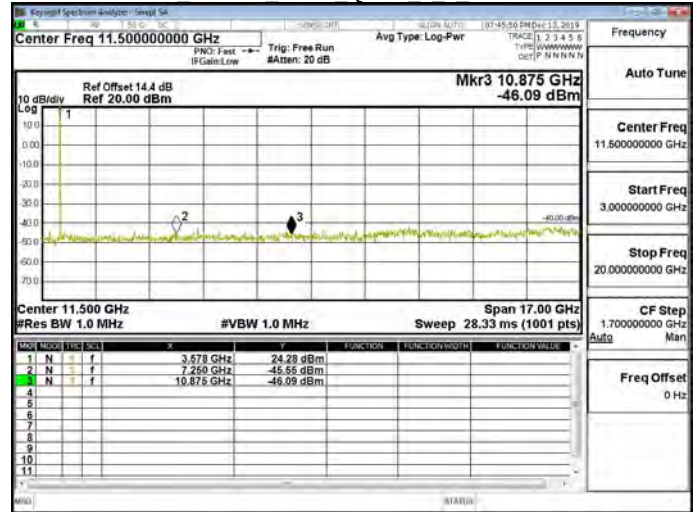
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## Conducted Emission:

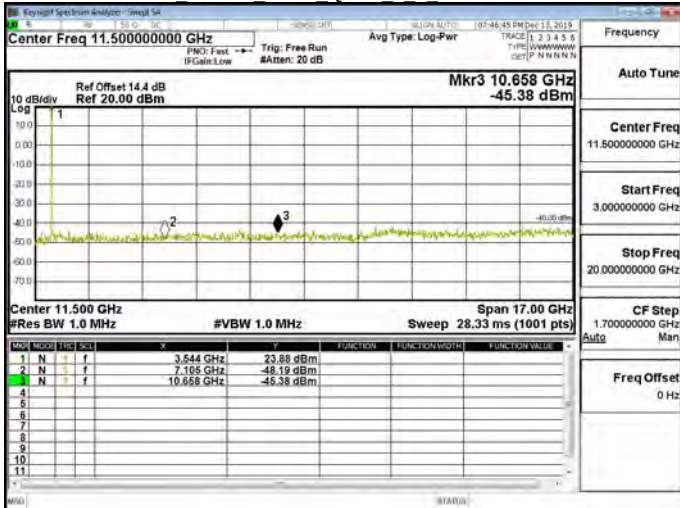
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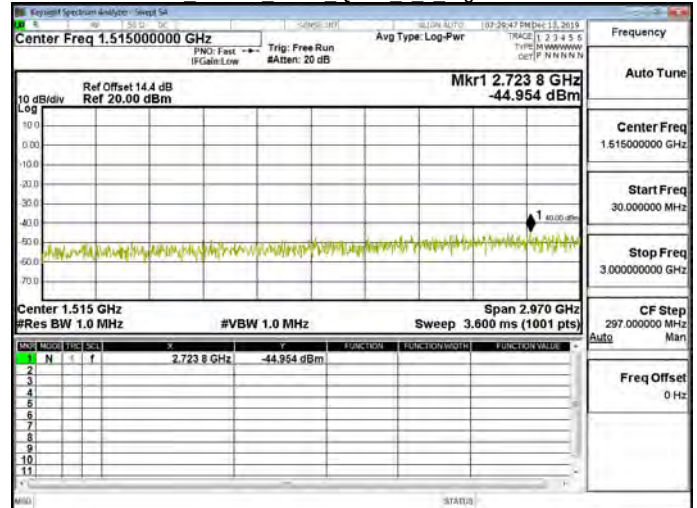
3GHz~10GHz Band48 5MHz QPSK 1 0 MidCH132322-1745



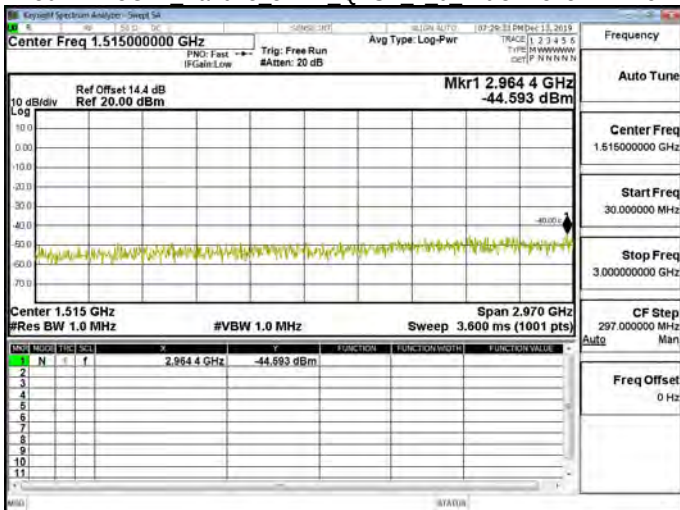
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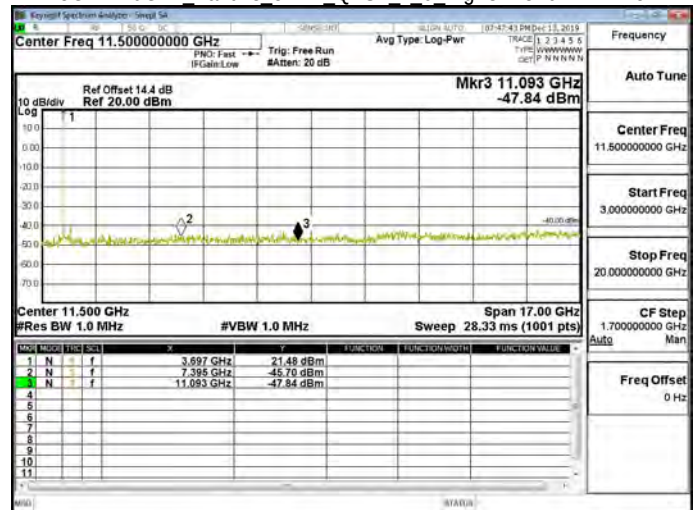
30MHz~3GHz Band48 5MHz QPSK 1 0 HighCH132647-1777.5



30MHz~3GHz Band48 5MHz QPSK 1 0 MidCH132322-1745



3GHz~10GHz Band48 5MHz QPSK 1 0 HighCH132647-1777.5



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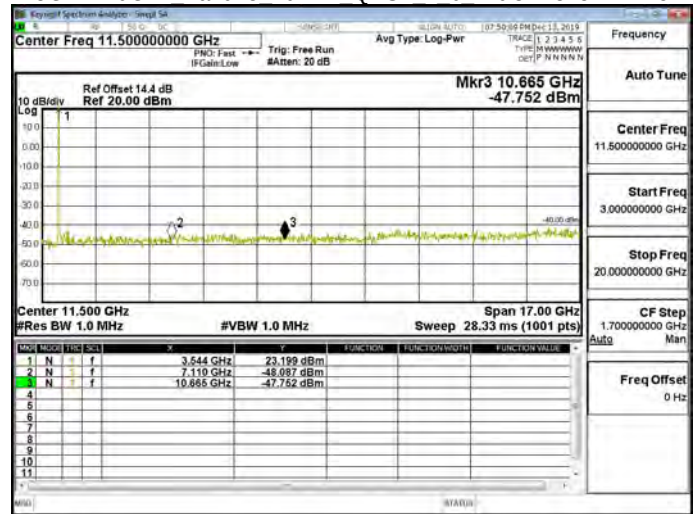
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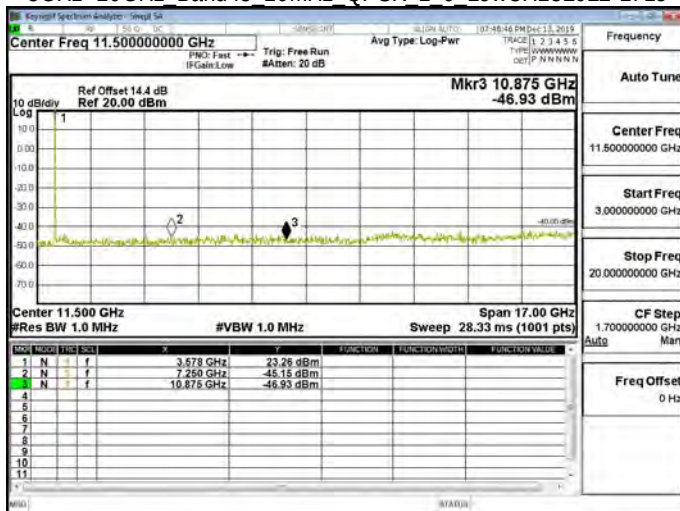
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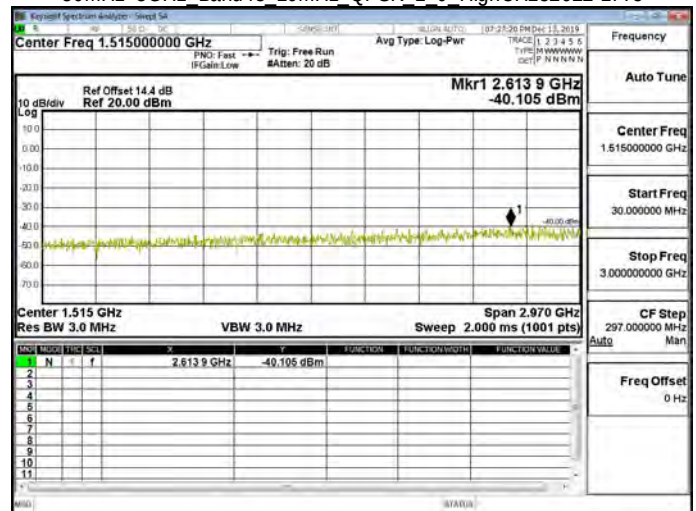
3GHz~10GHz Band48 10MHz QPSK 1 0 MidCH132322-1745



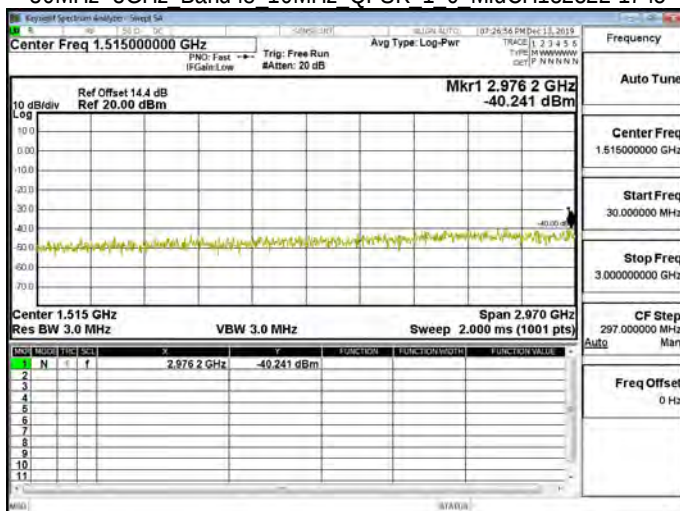
3GHz~10GHz Band48 10MHz QPSK 1 0 LowCH132022-1715



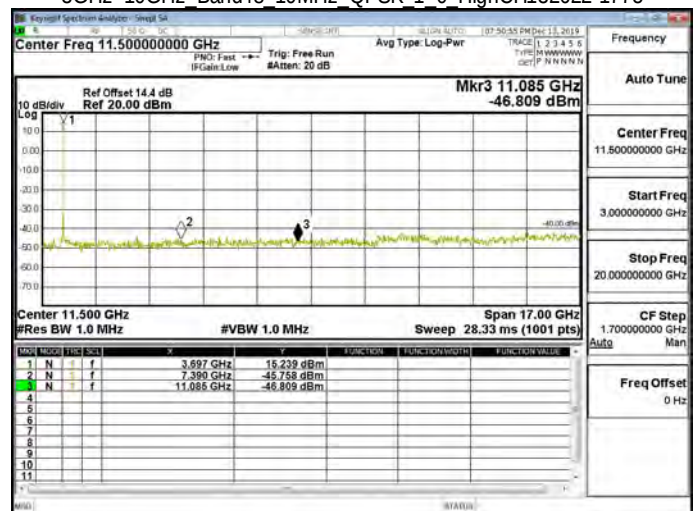
30MHz~3GHz Band48 10MHz QPSK 1 0 HighCH132622-1775



30MHz~3GHz Band48 10MHz QPSK 1 0 MidCH132322-1745



3GHz~10GHz Band48 10MHz QPSK 1 0 HighCH132622-1775



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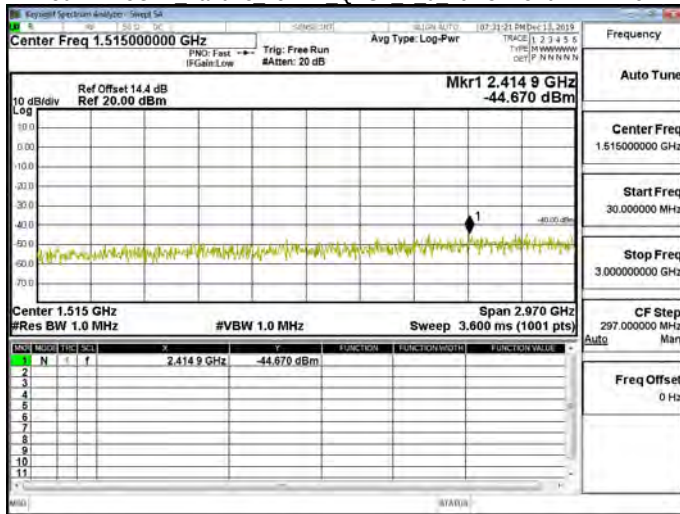
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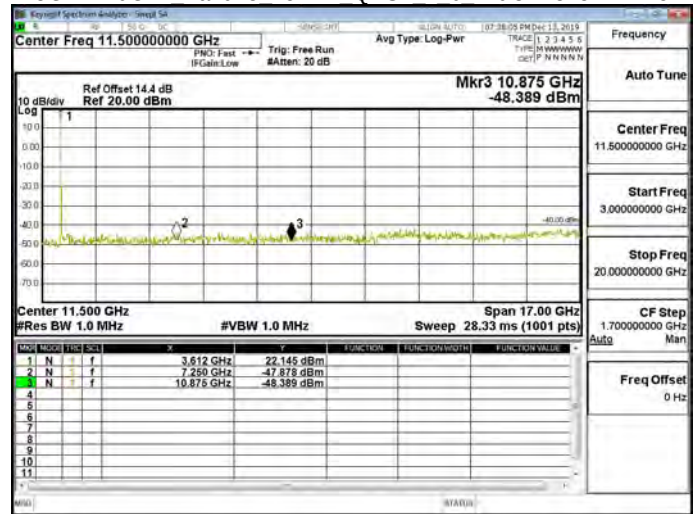
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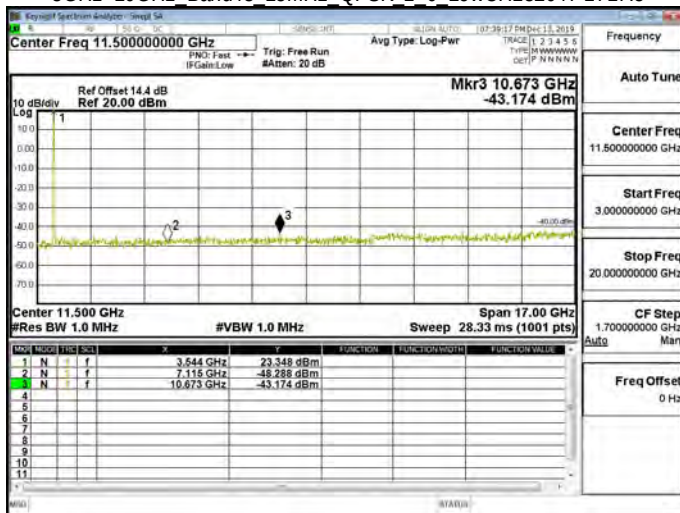
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3GHz~10GHz Band48 15MHz QPSK 1 0 MidCH132322-1745



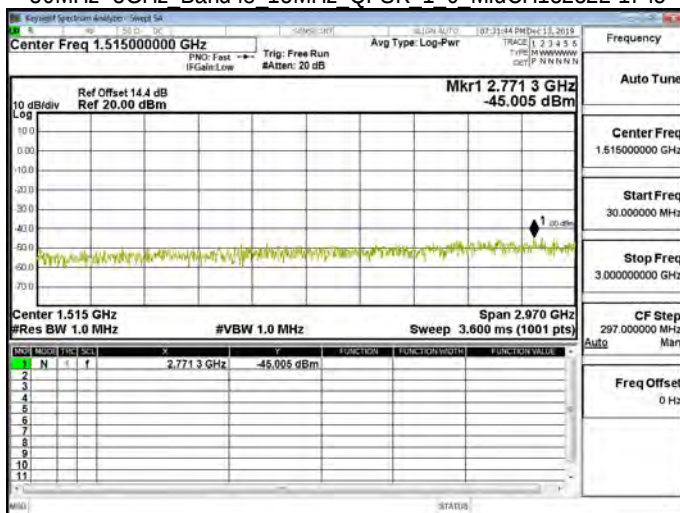
3GHz~10GHz Band48 15MHz QPSK 1 0 LowCH132047-1717.5



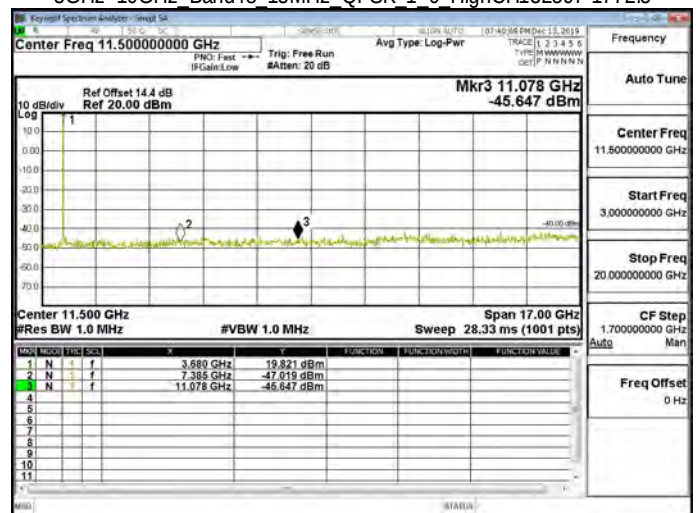
30MHz~3GHz Band48 15MHz QPSK 1 0 HighCH132597-1772.5



30MHz~3GHz Band48 15MHz QPSK 1 0 MidCH132322-1745



3GHz~10GHz Band48 15MHz QPSK 1 0 HighCH132597-1772.5



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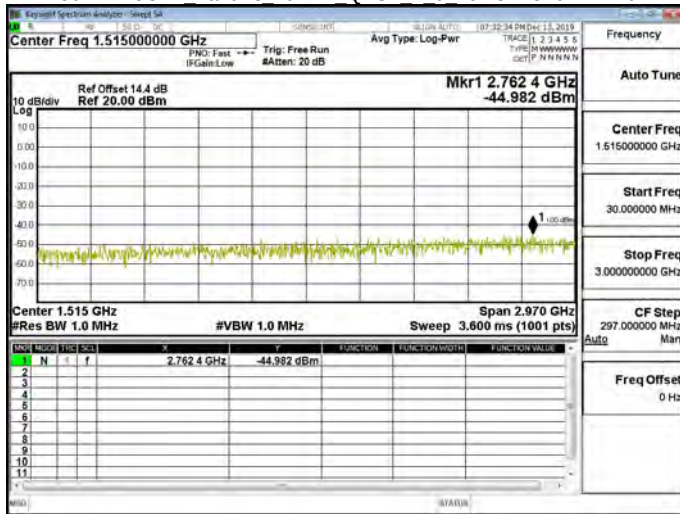
t (886-2) 2299-3279

f (886-2) 2298-0488

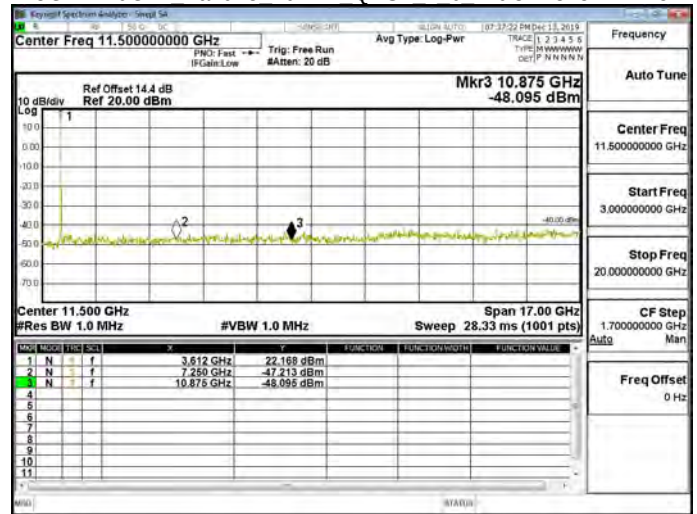
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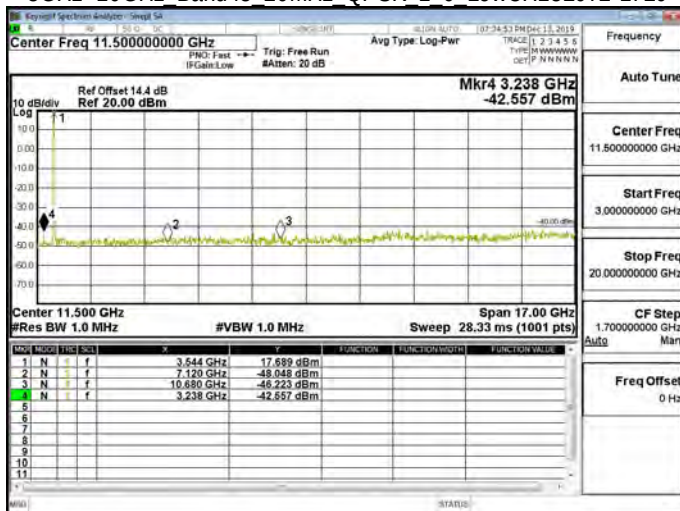
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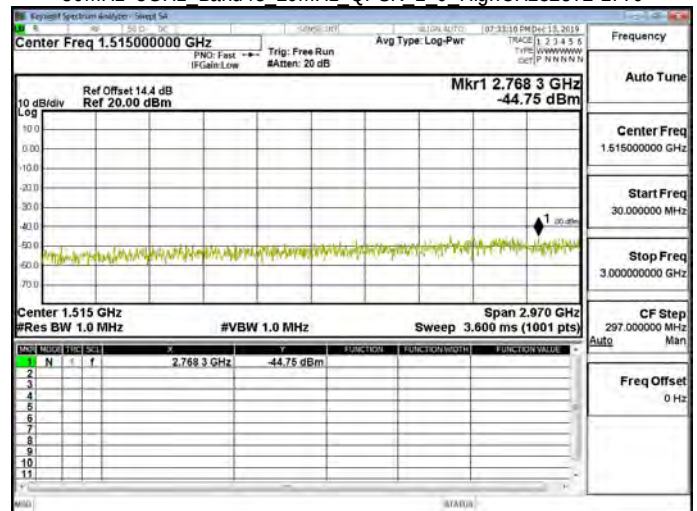
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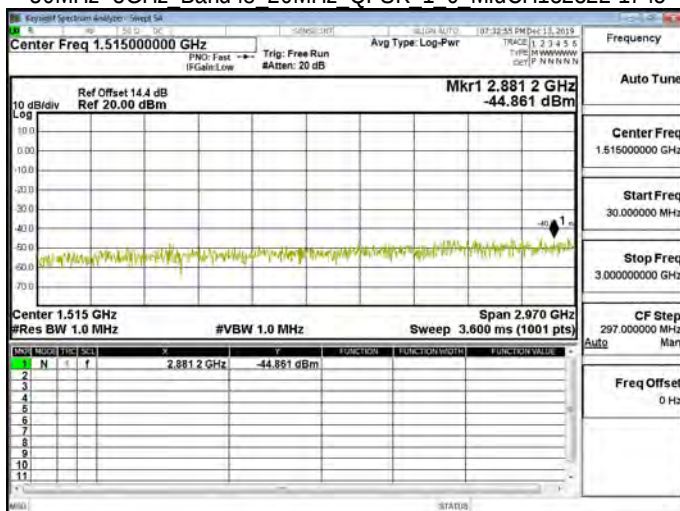
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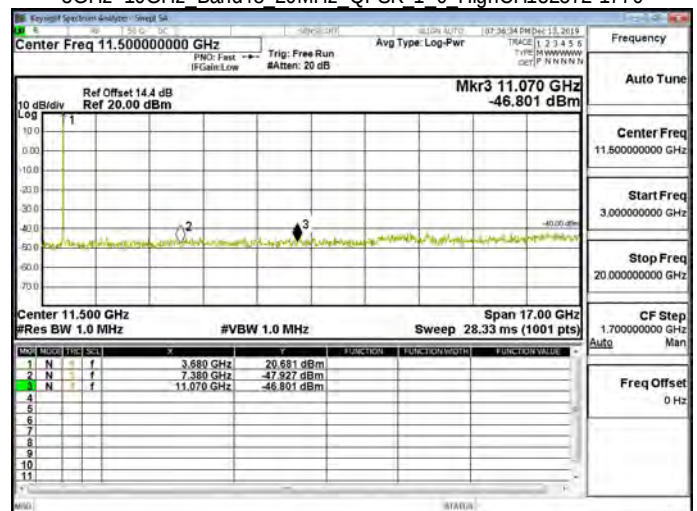
30MHz~3GHz Band48 20MHz QPSK 1 0 HighCH132572-1770



30MHz~3GHz Band48 20MHz QPSK 1 0 MidCH132322-1745



3GHz~10GHz Band48 20MHz QPSK 1 0 HighCH132572-1770



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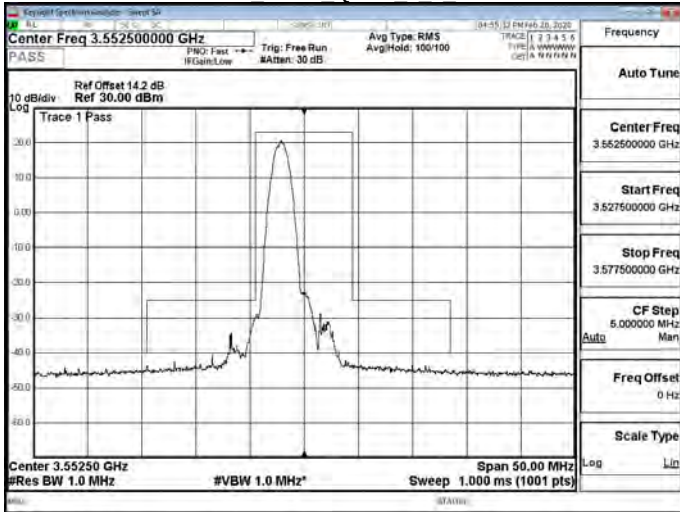
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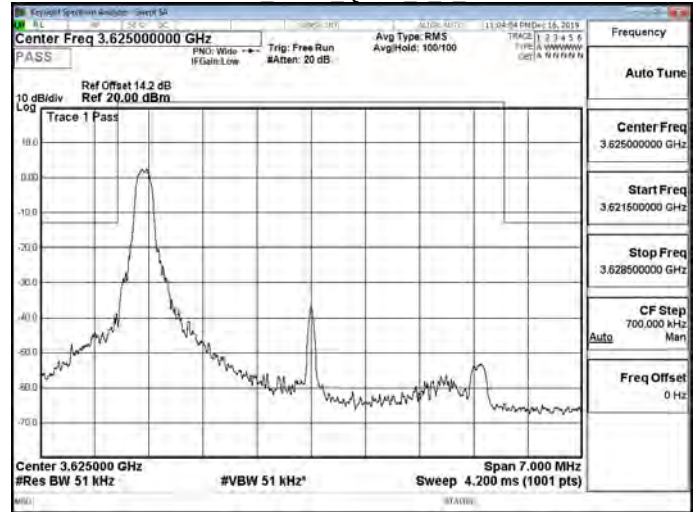
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## Band Edge:

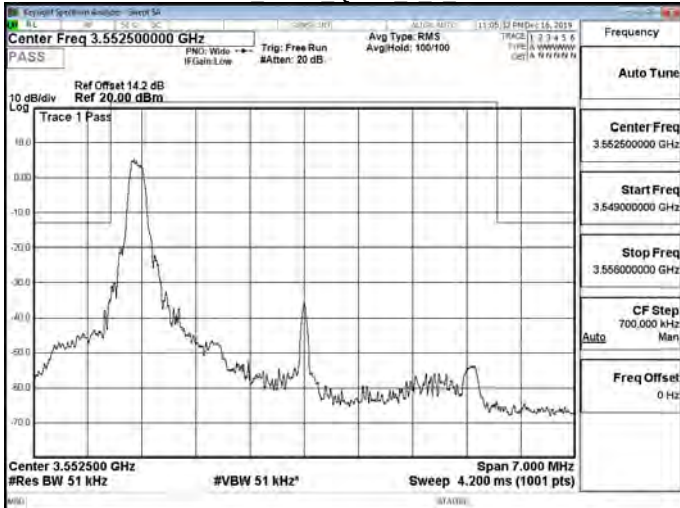
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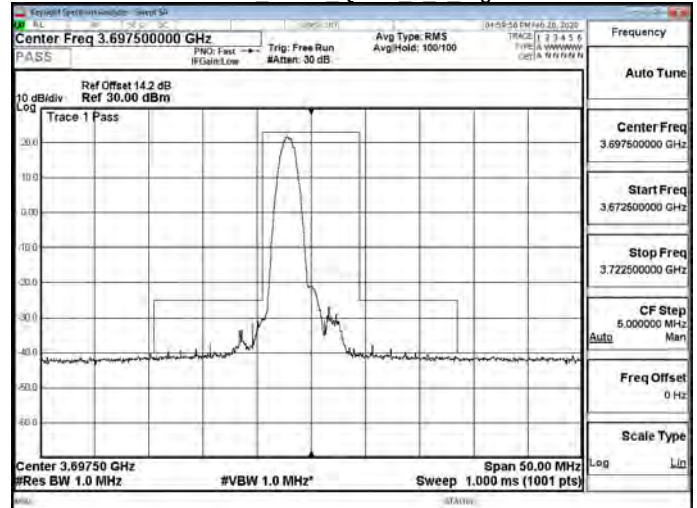
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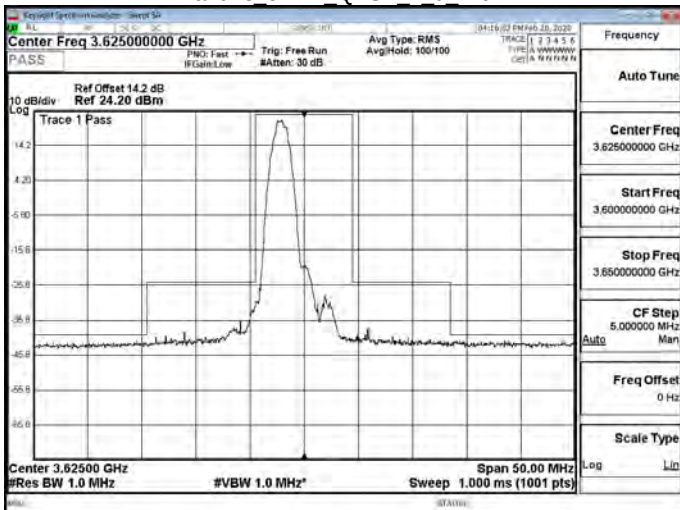
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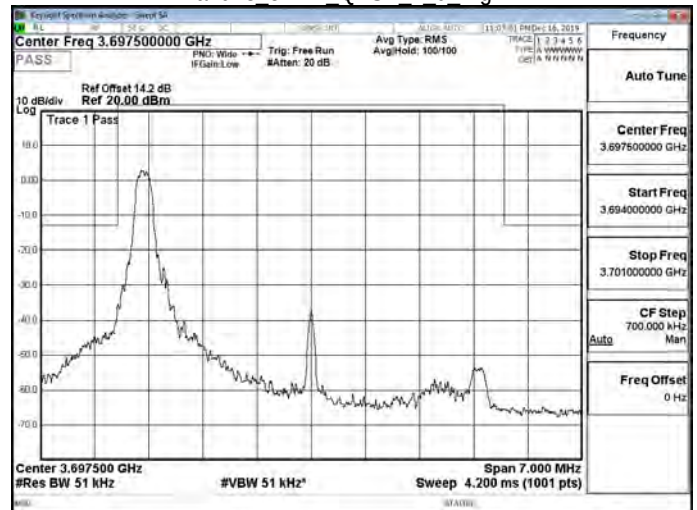
Band48 5MHz QPSK 1 0 High-1



Band48 5MHz QPSK 1 0 Mid-1



Band48 5MHz QPSK 1 0 High-2



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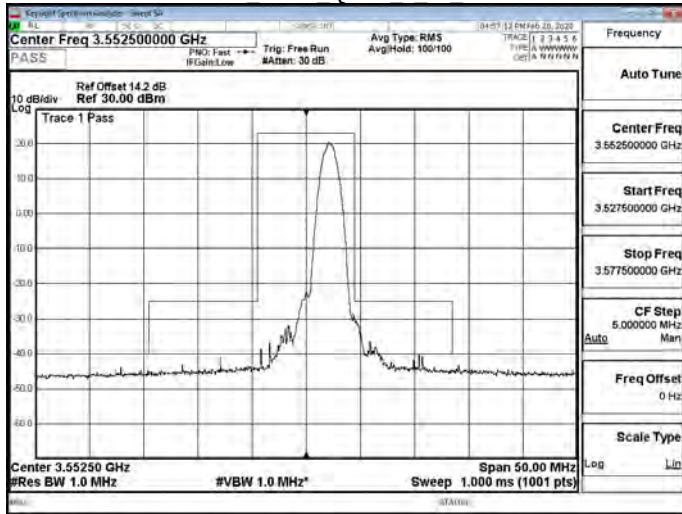
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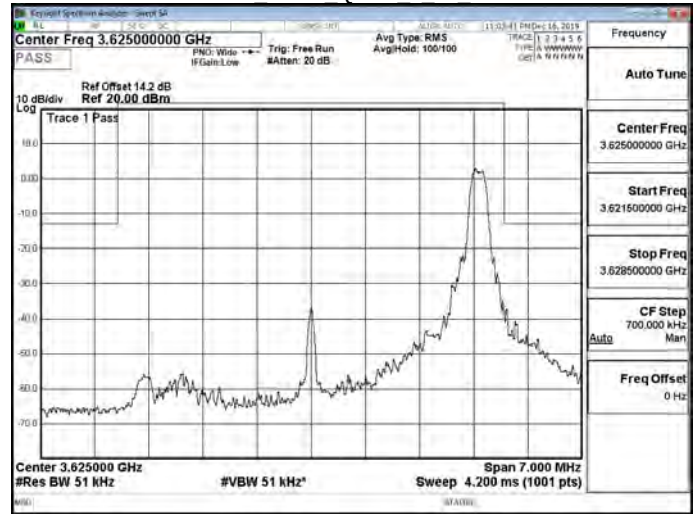
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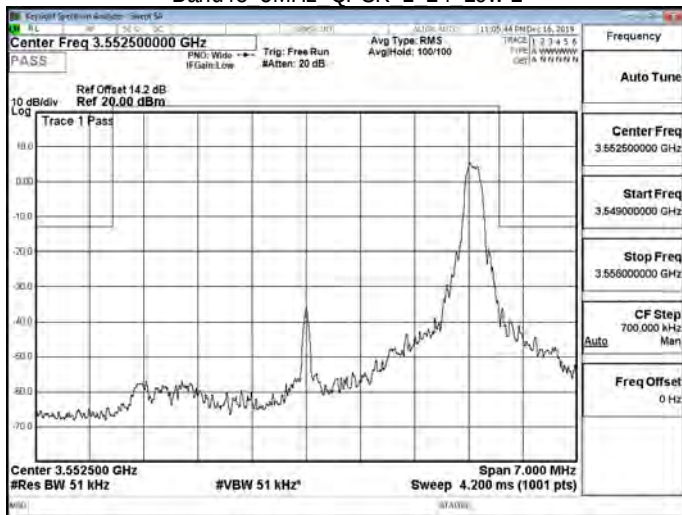
Band48 5MHz QPSK 1 24 Low-1



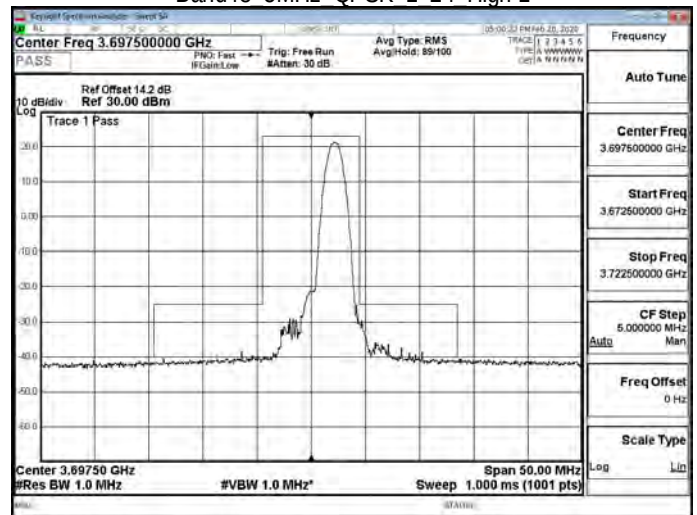
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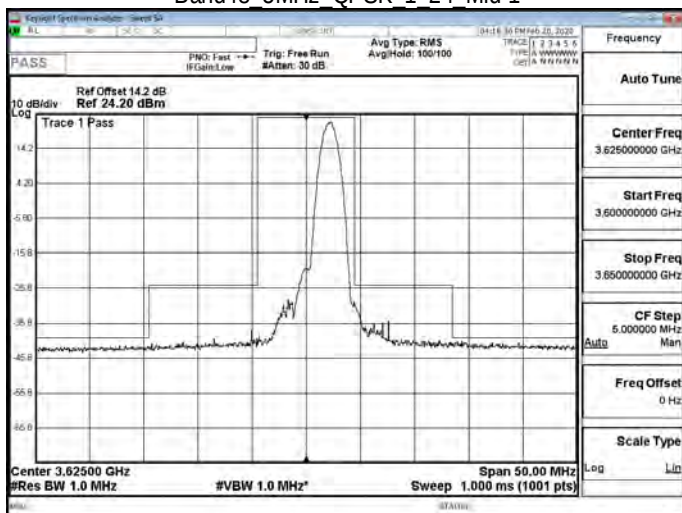
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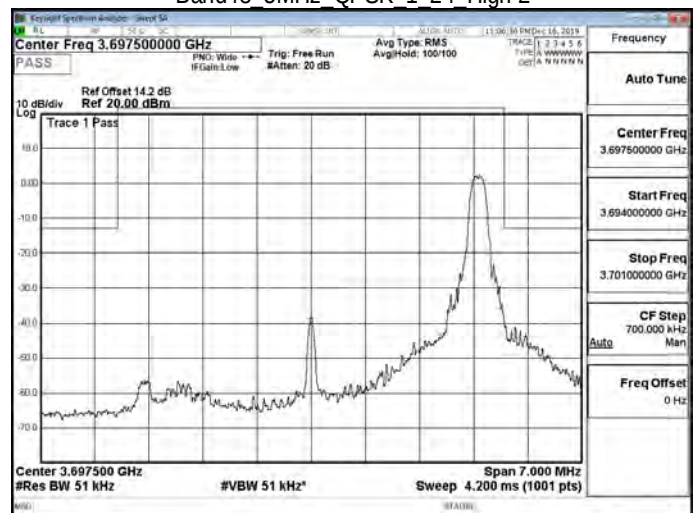
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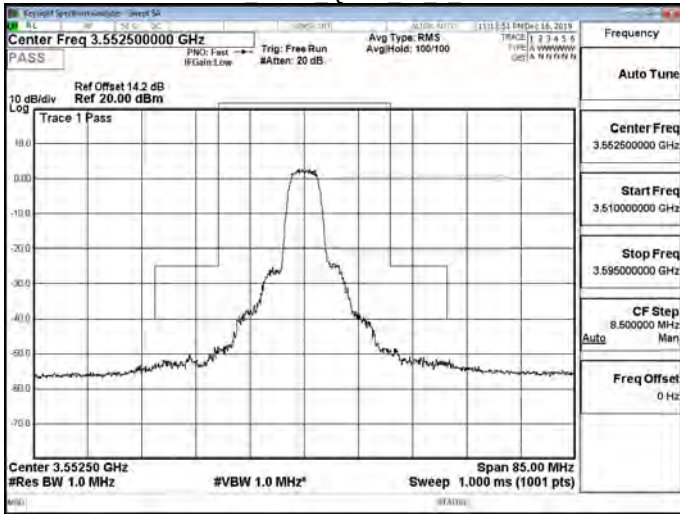


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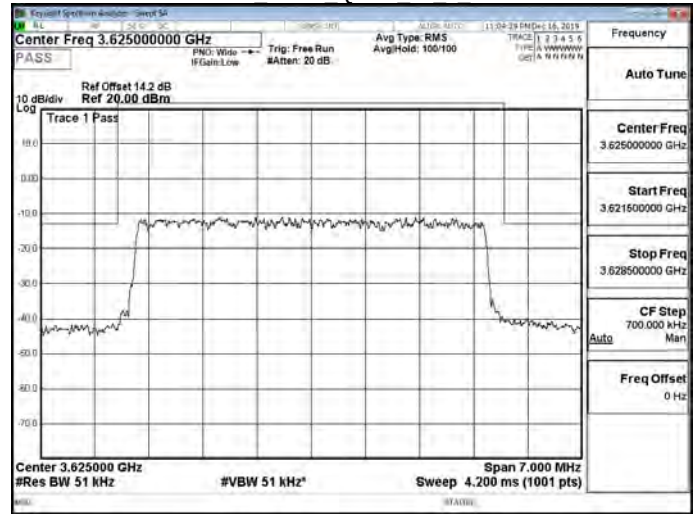
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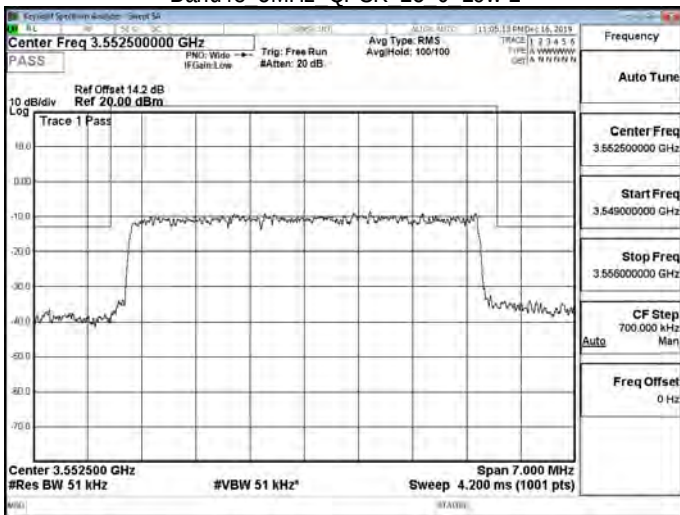
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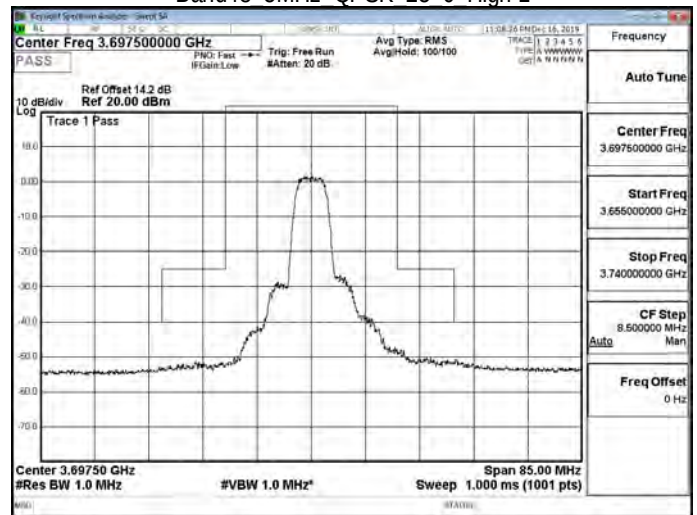
Band48 5MHz QPSK 25 0 Mid-2



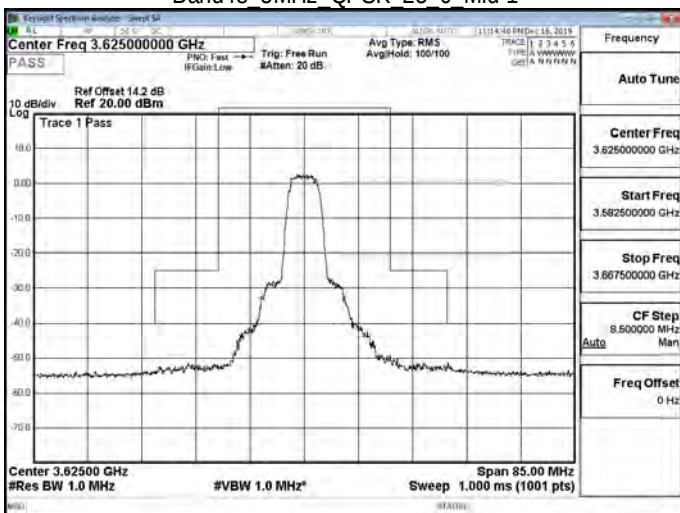
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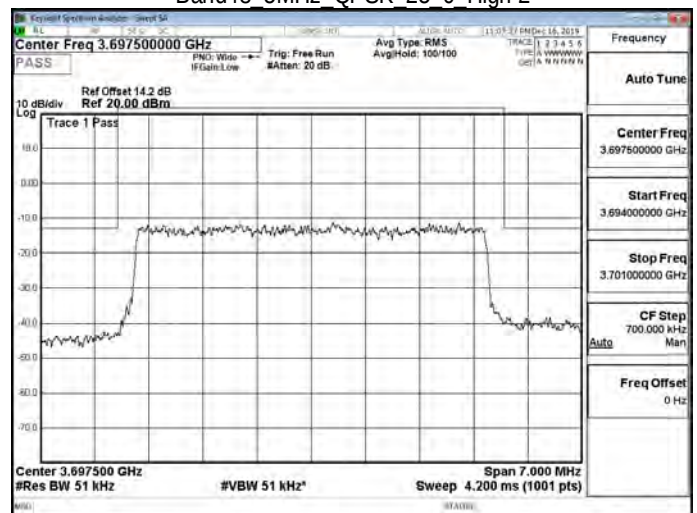
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Band48 5MHz QPSK 25 0 Mid-1



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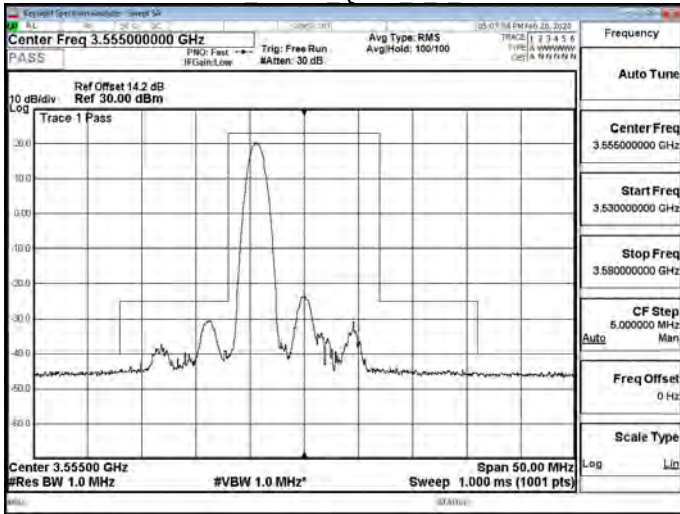


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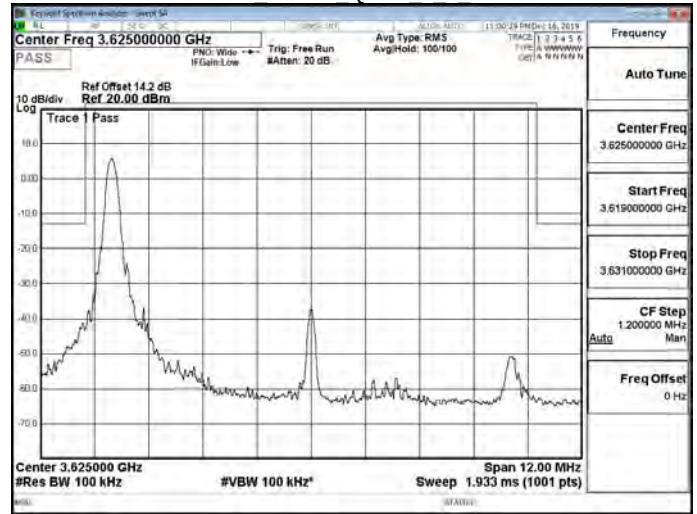
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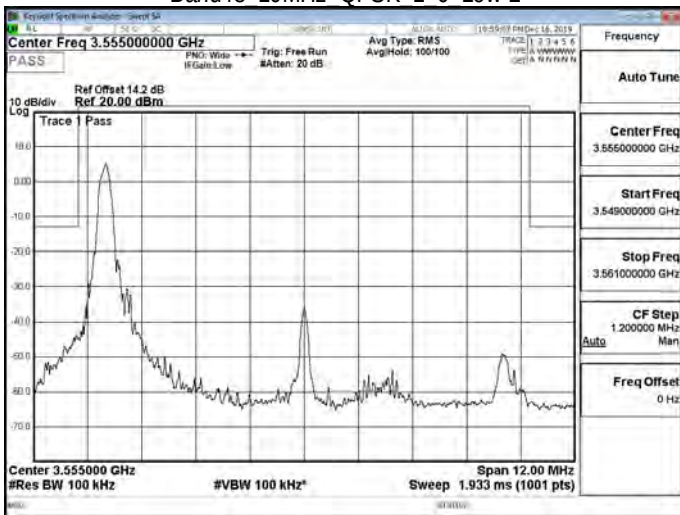
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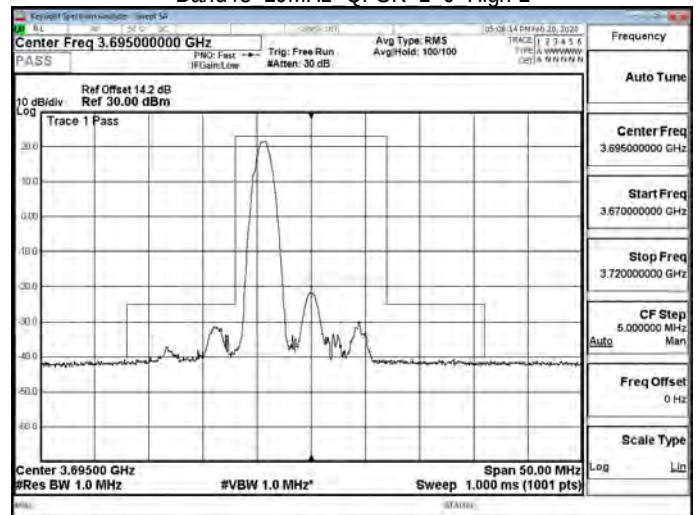
Band48 10MHz QPSK 1 0 Mid-2



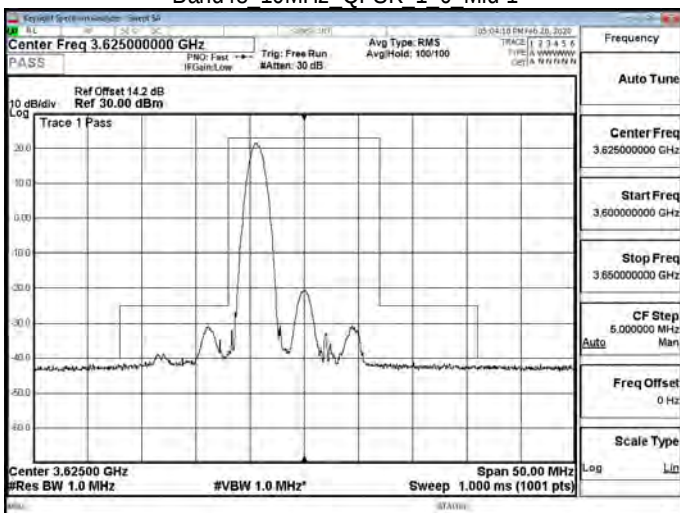
Band48 10MHz QPSK 1 0 Low-2



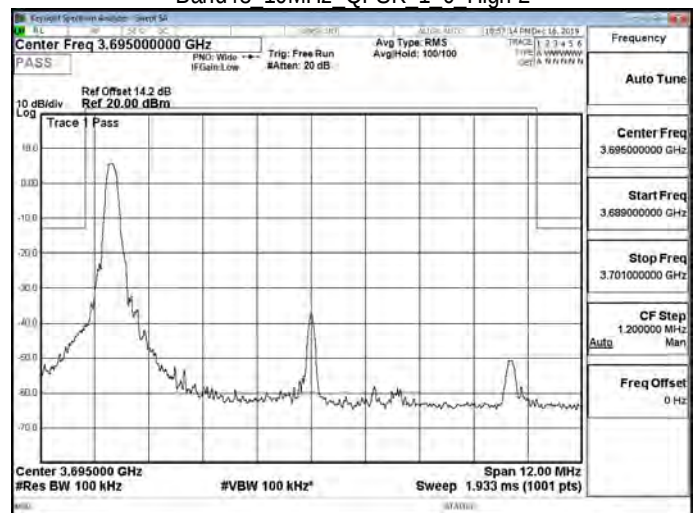
Band48 10MHz QPSK 1 0 High-1



Band48 10MHz QPSK 1 0 Mid-1



Band48 10MHz QPSK 1 0 High-2



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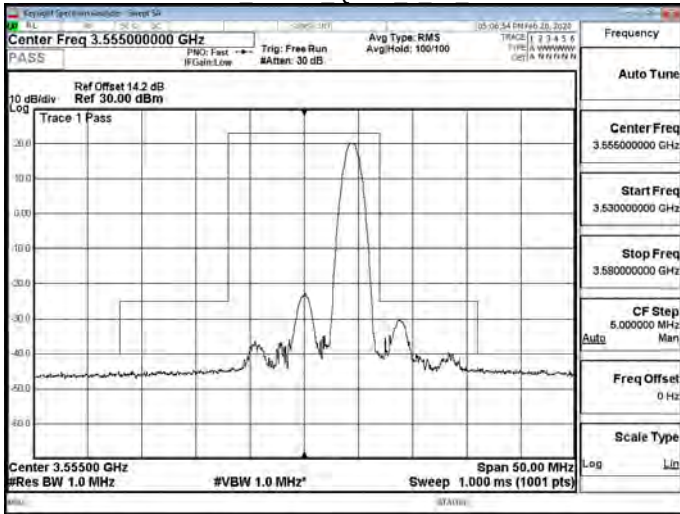
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Band48 10MHz QPSK 1 49 Low-1



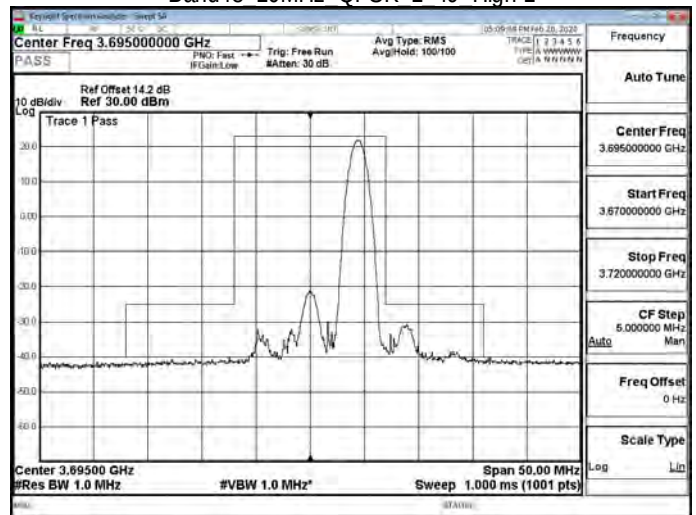
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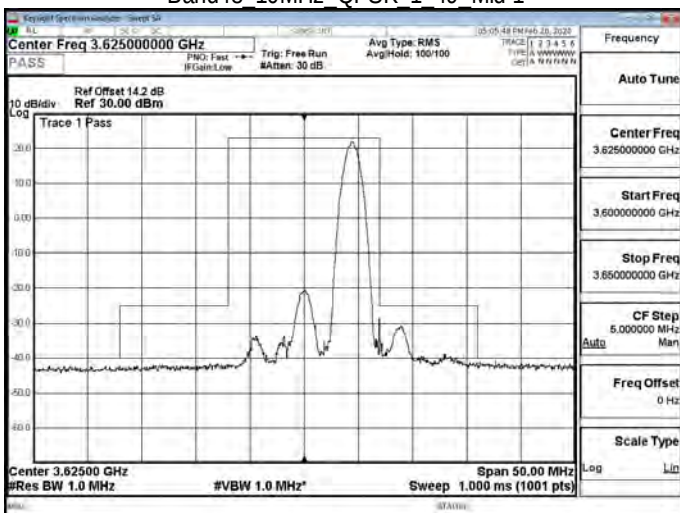
Band48 10MHz QPSK 1 49 Low-2



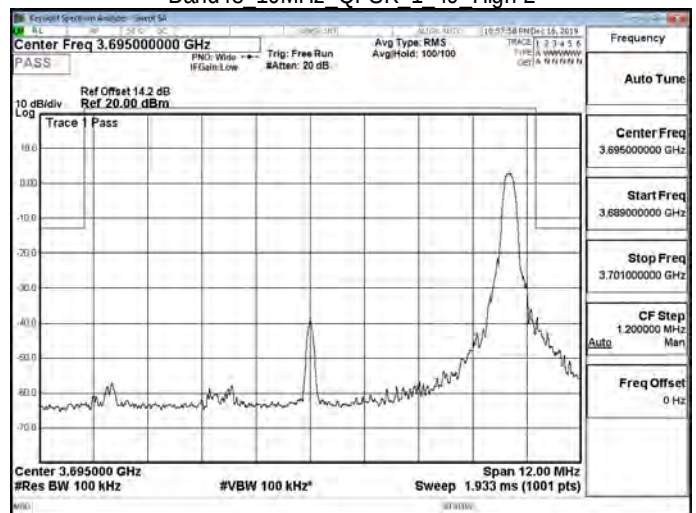
Band48 10MHz QPSK 1 49 High-1



Band48 10MHz QPSK 1 49 Mid-1



Band48 10MHz QPSK 1 49 High-2



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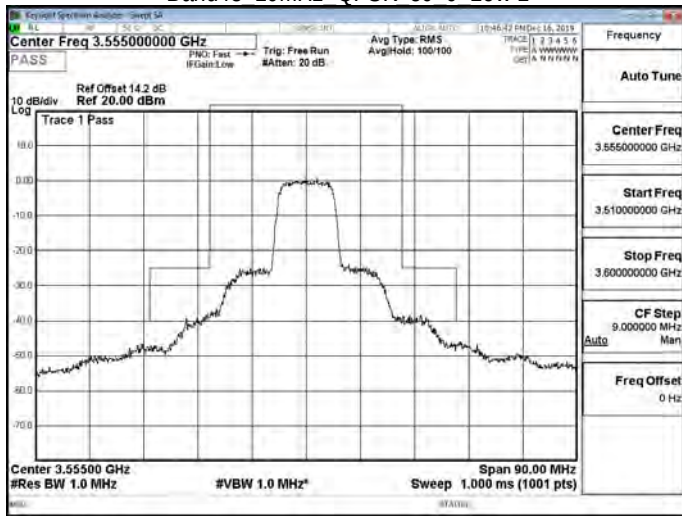
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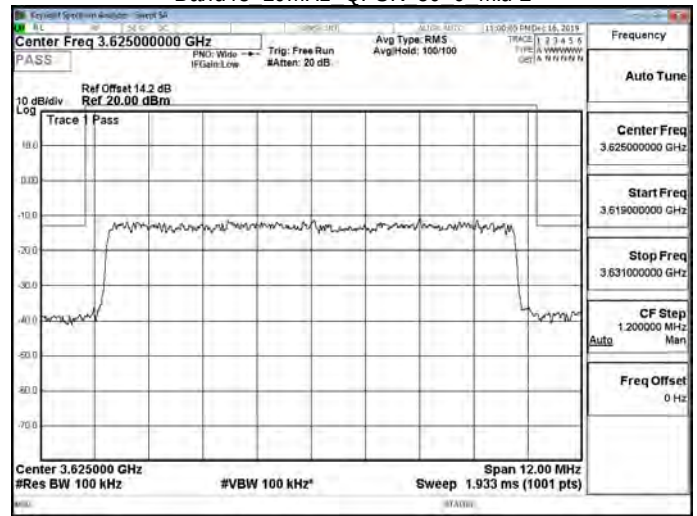
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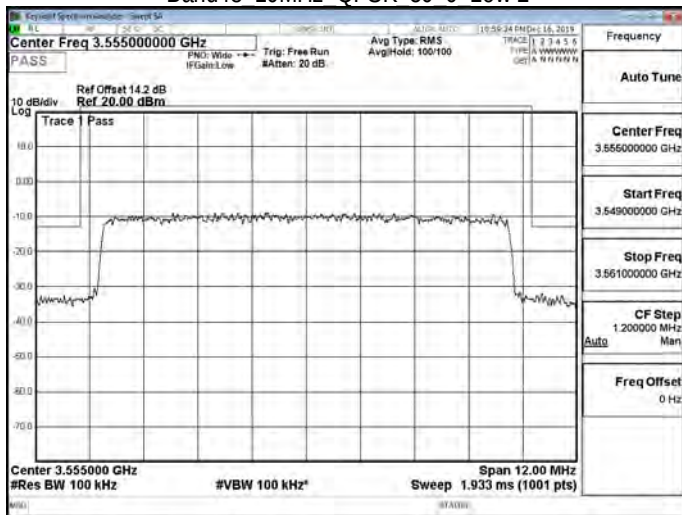
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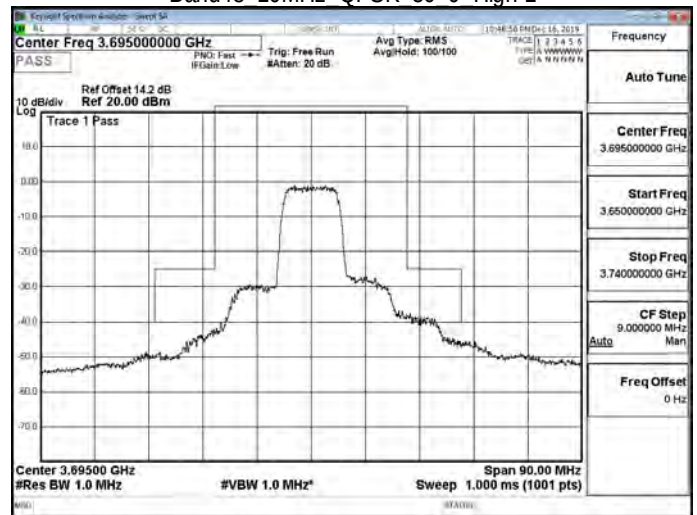
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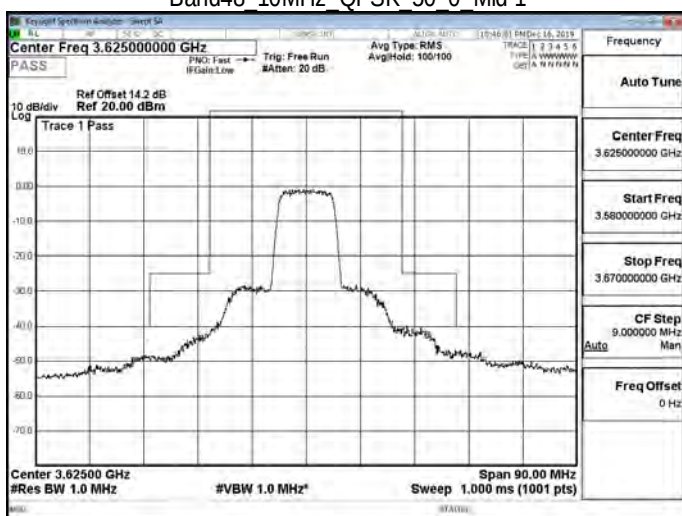
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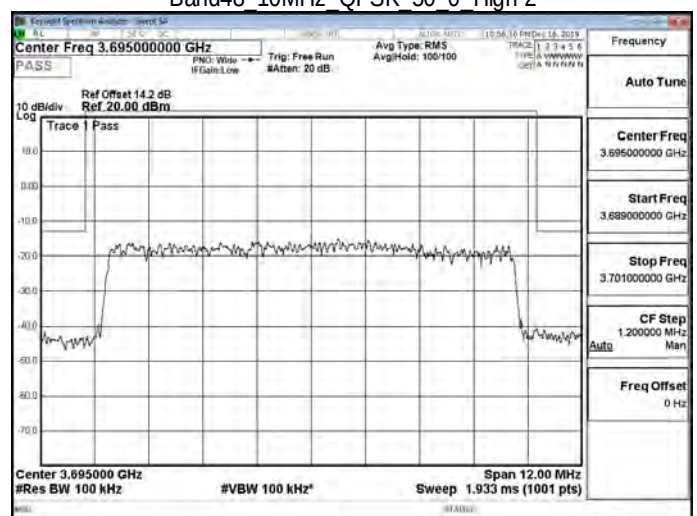
Band48 10MHz QPSK 50 0 High-1



Band48 10MHz QPSK 50 0 Mid-1



Band48 10MHz QPSK 50 0 High-2



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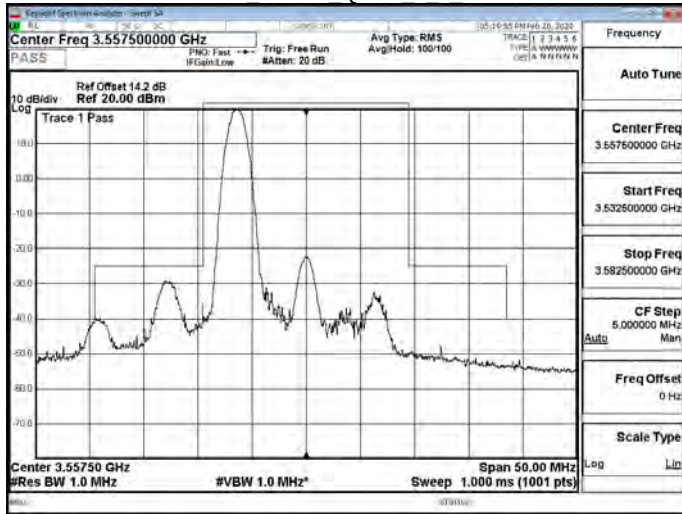
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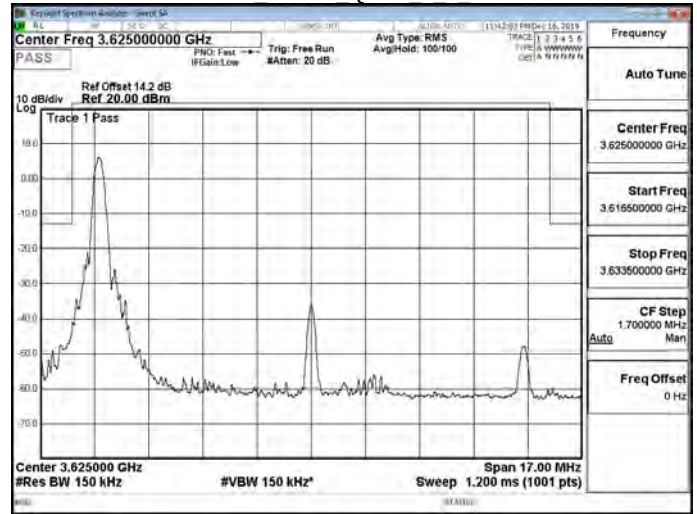
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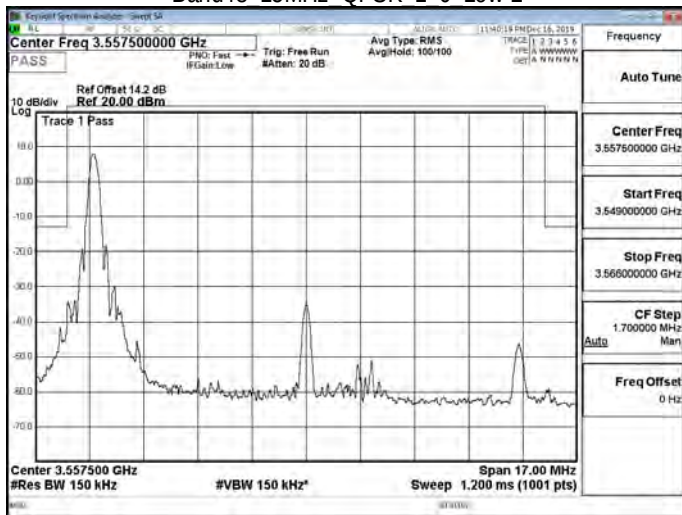
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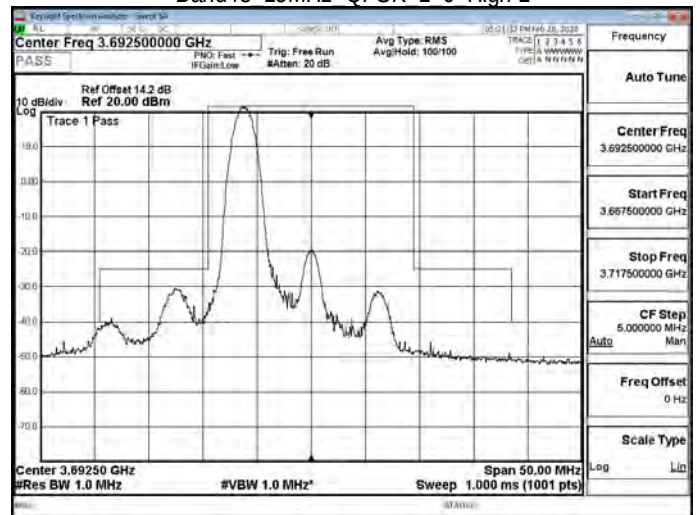
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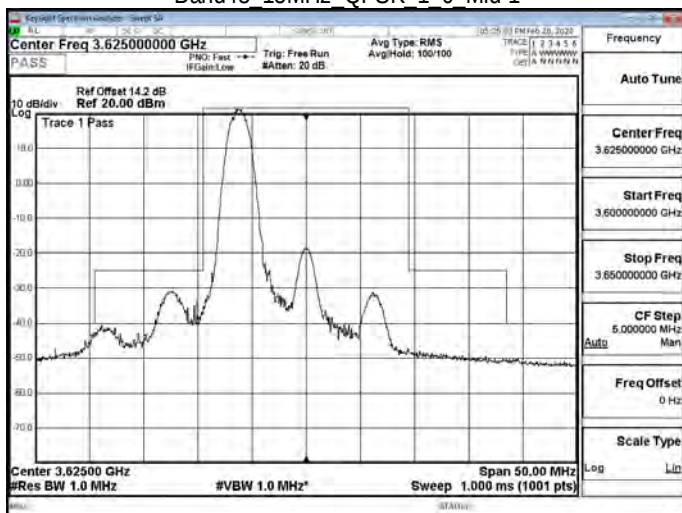
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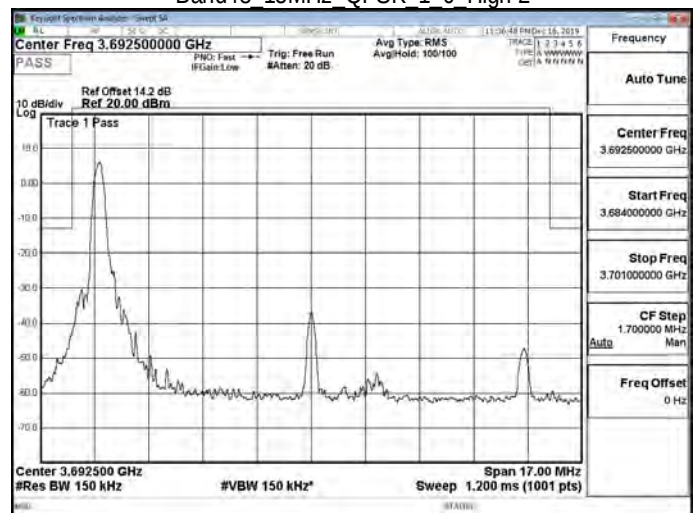
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Band48 15MHz QPSK 1 0 Mid-1



Band48 15MHz QPSK 1 0 High-2



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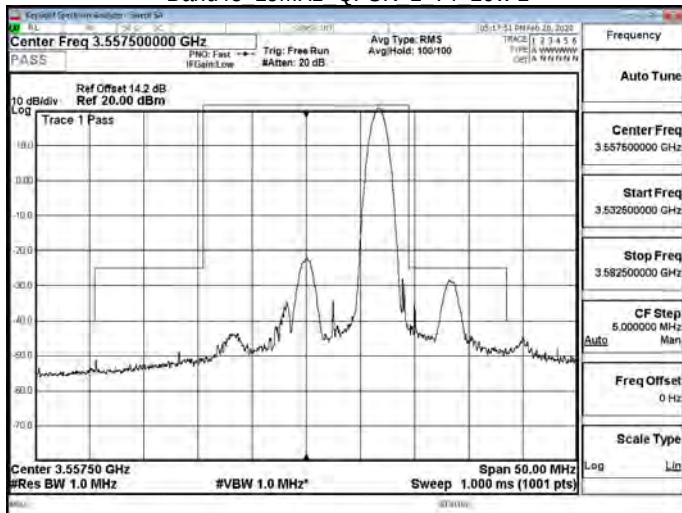
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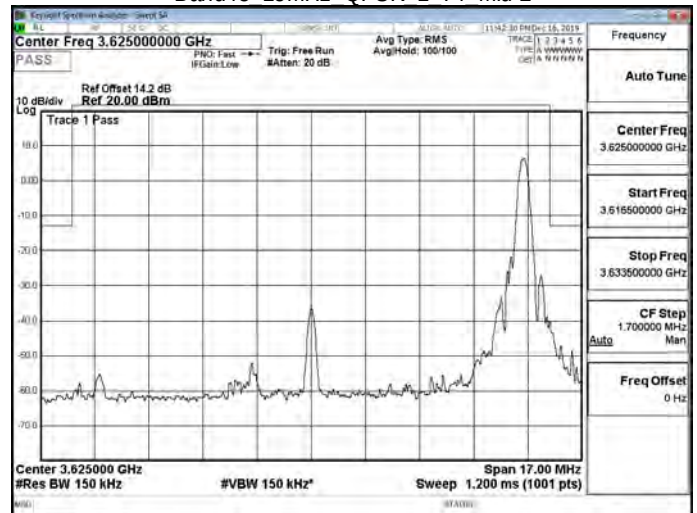
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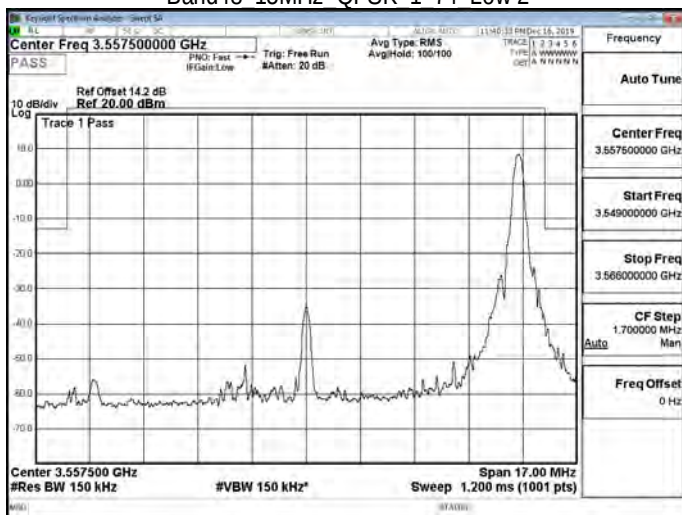
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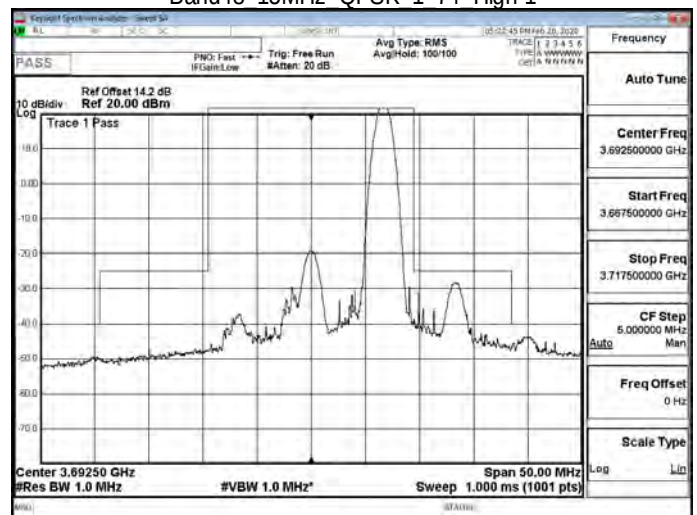
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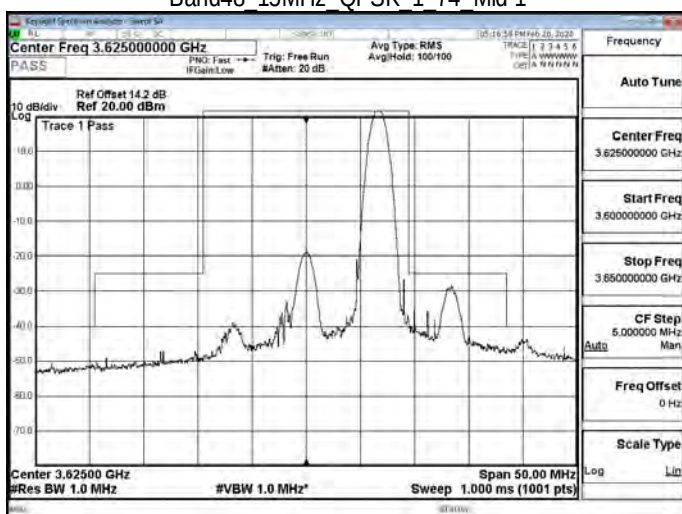
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Band48 15MHz QPSK 1 74 High-1



Band48 15MHz QPSK 1 74 Mid-1



Band48 15MHz QPSK 1 74 High-2



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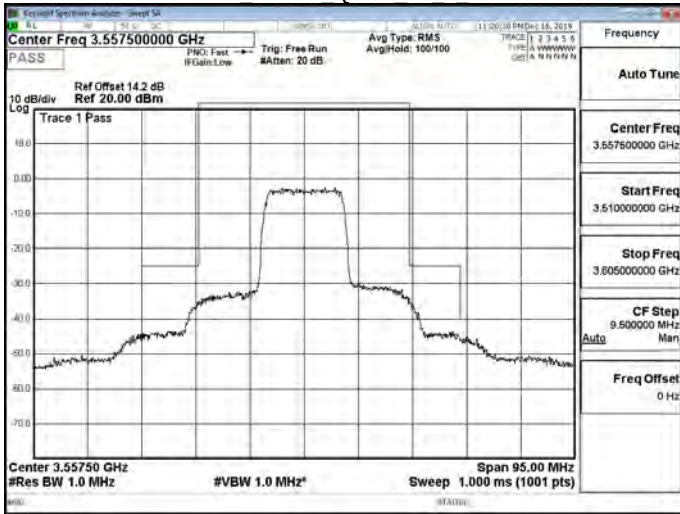
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f (886-2) 2298-0488

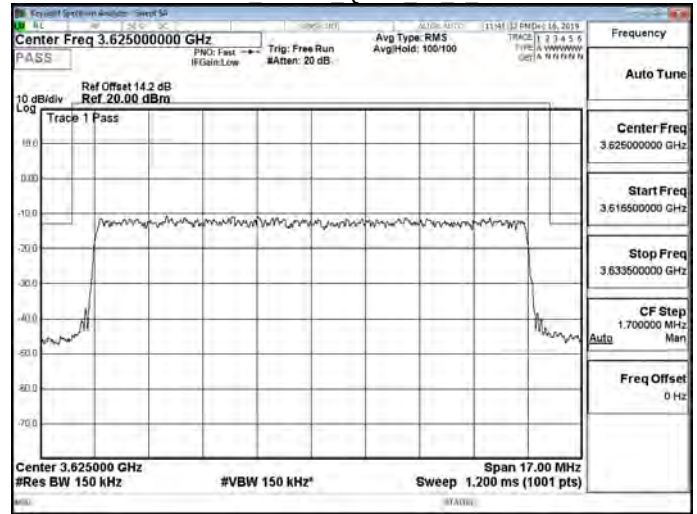
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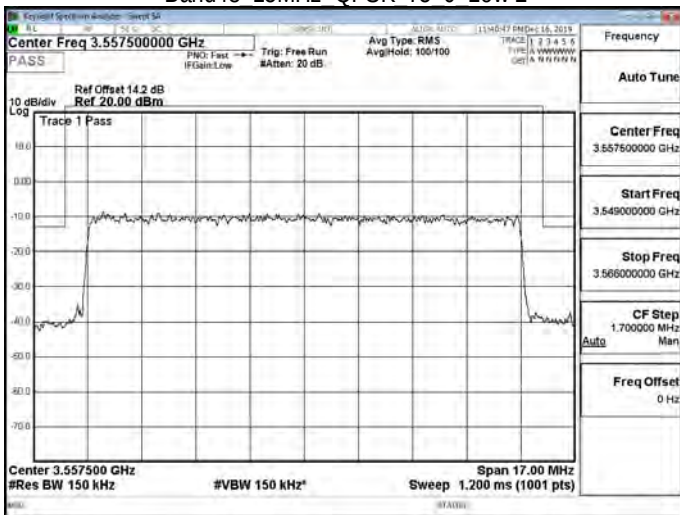
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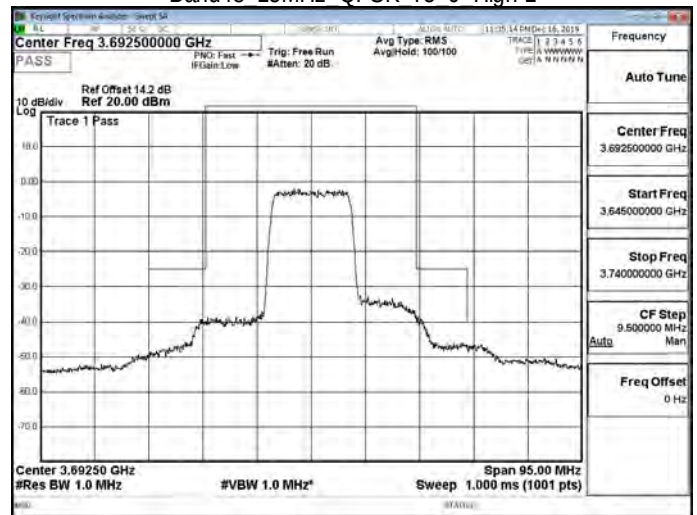
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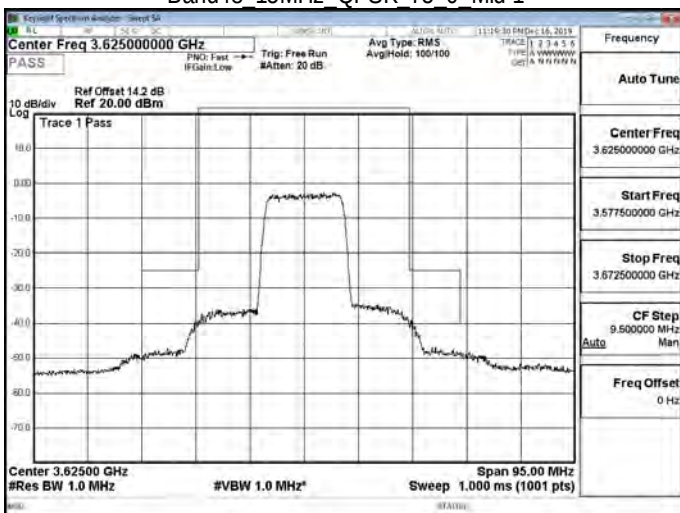
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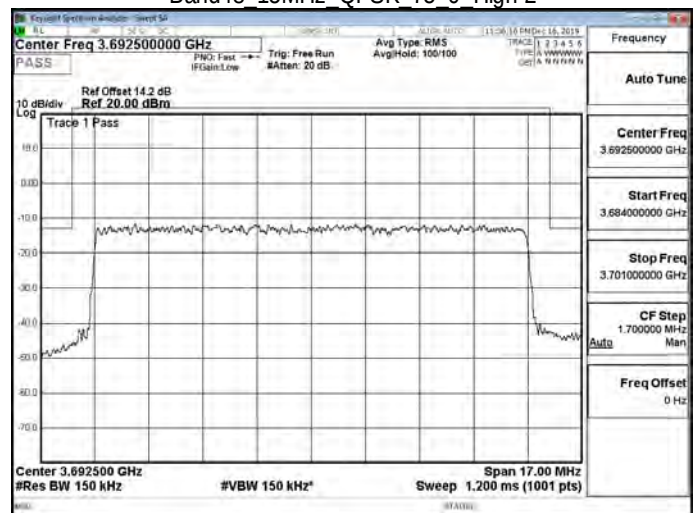
Band48 15MHz QPSK 75 0 High-1



Band48 15MHz QPSK 75 0 Mid-1



Band48 15MHz QPSK 75 0 High-2



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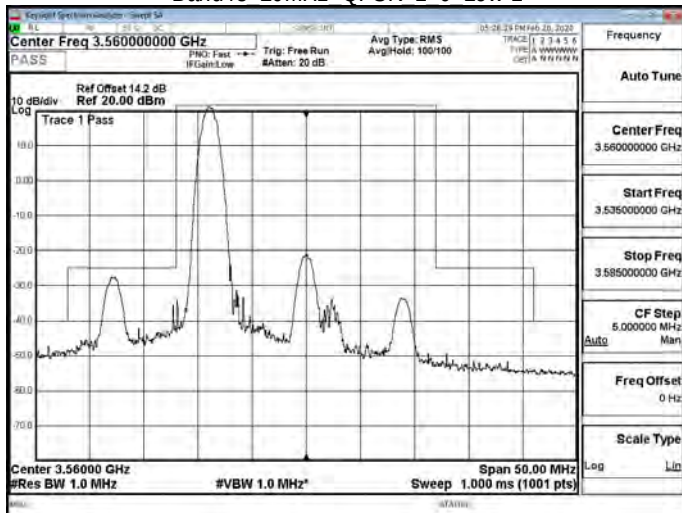
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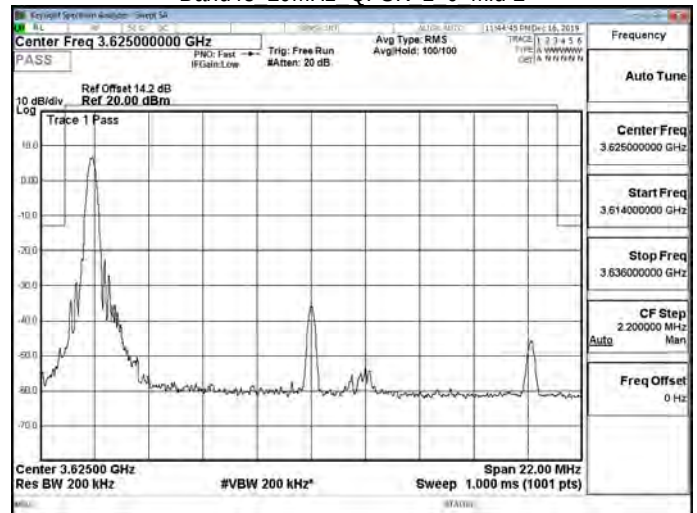
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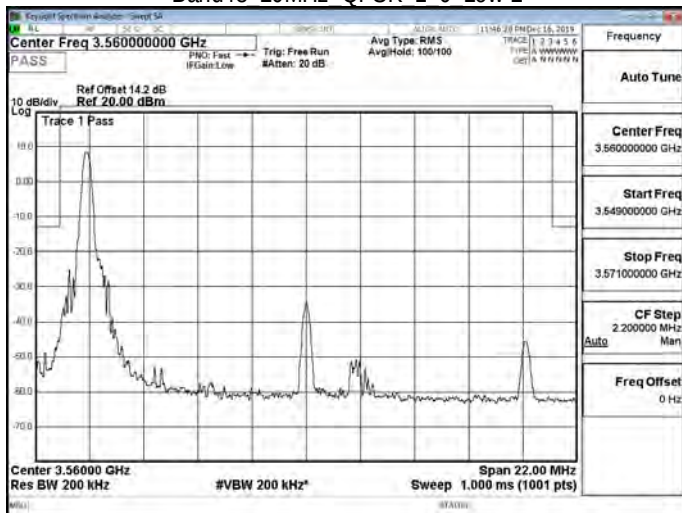
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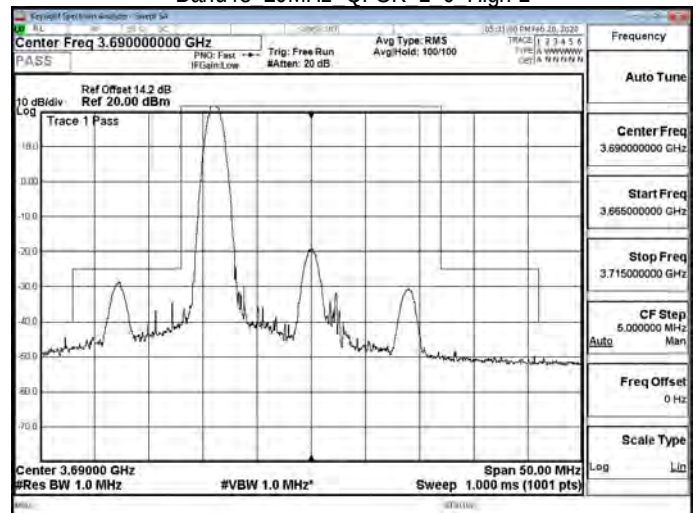
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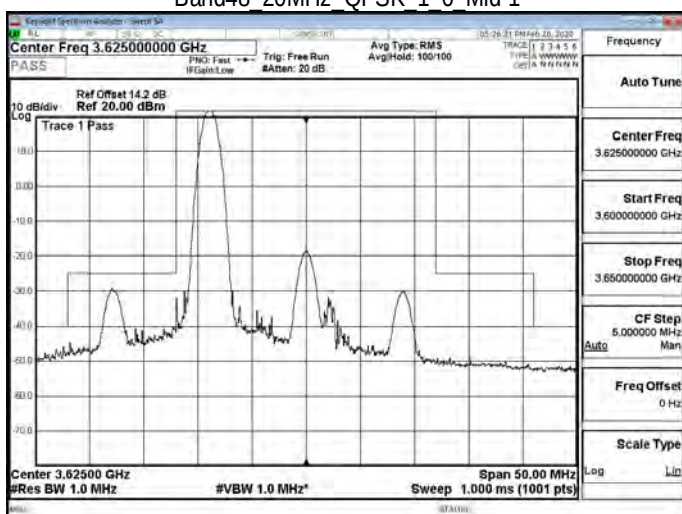
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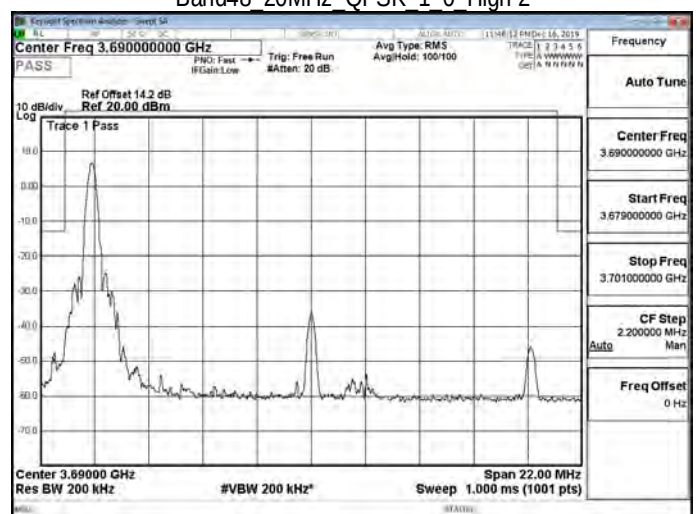
Band48 20MHz QPSK 1 0 High-1



Band48 20MHz QPSK 1 0 Mid-1



Band48 20MHz QPSK 1 0 High-2



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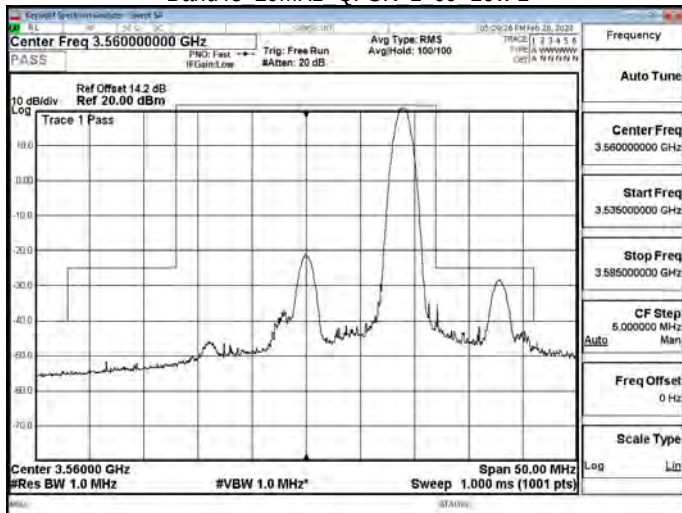
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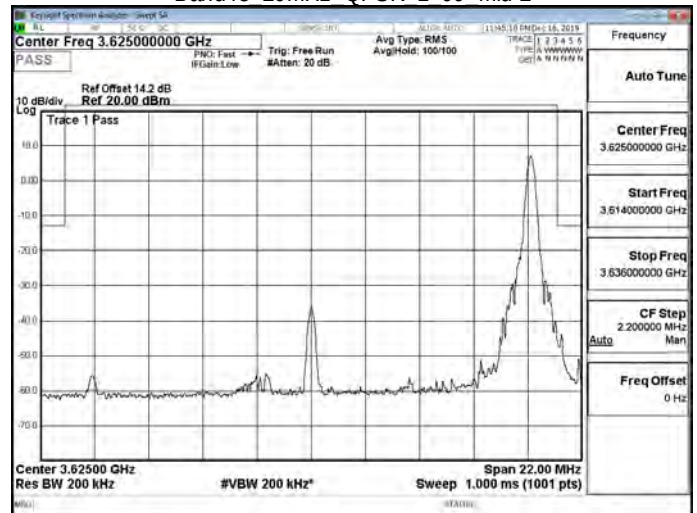
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Band48 20MHz QPSK 1 99 Low-1



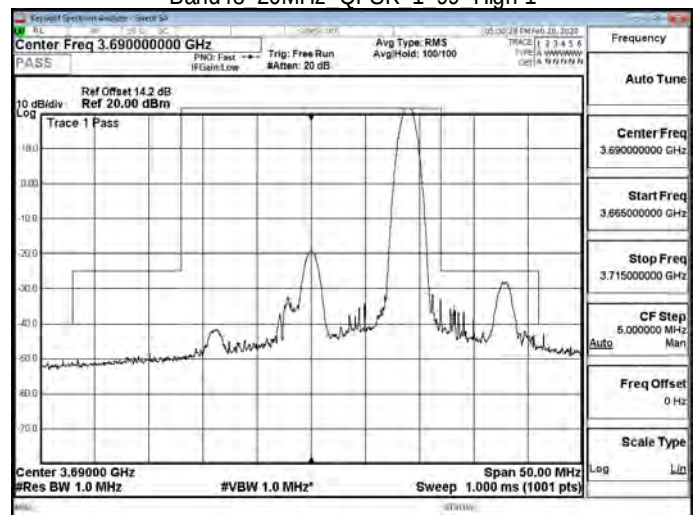
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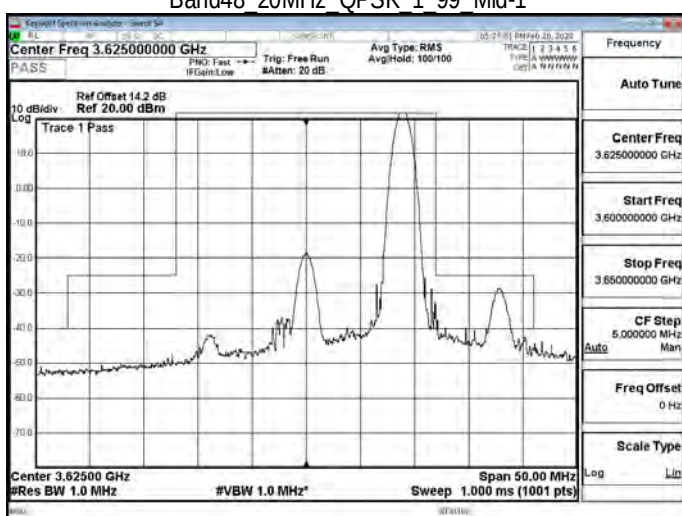
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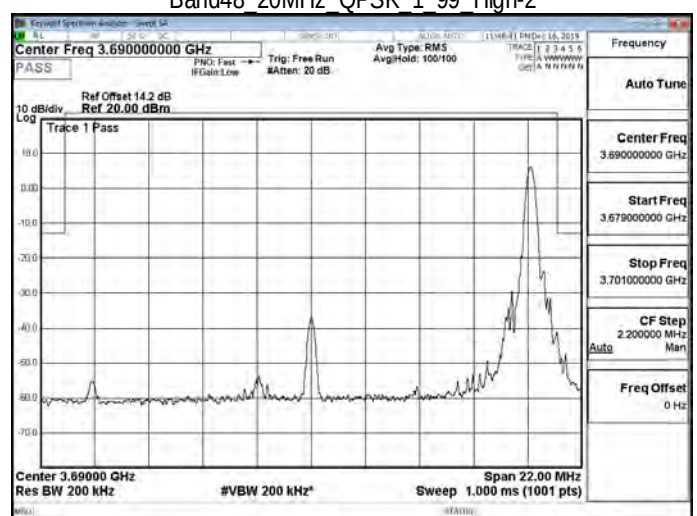
Band48 20MHz QPSK 1 99 High-1



Band48 20MHz QPSK 1 99 Mid-1



Band48 20MHz QPSK 1 99 High-2



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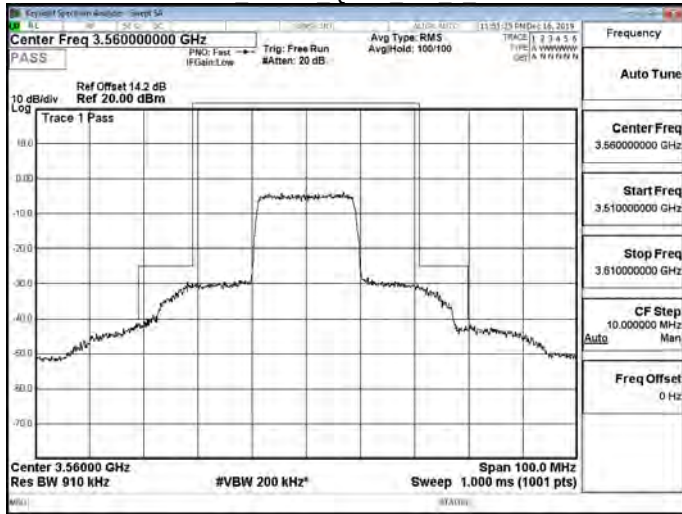
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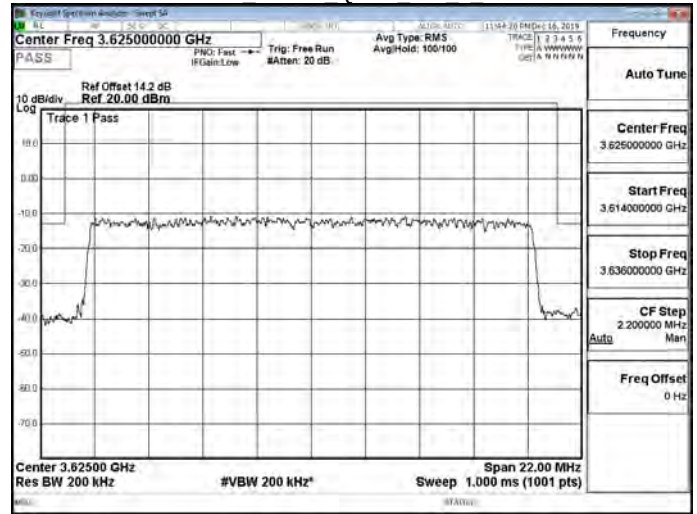
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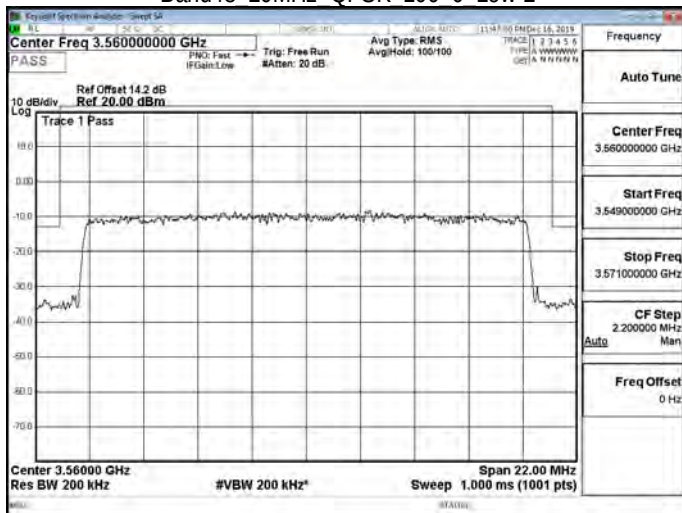
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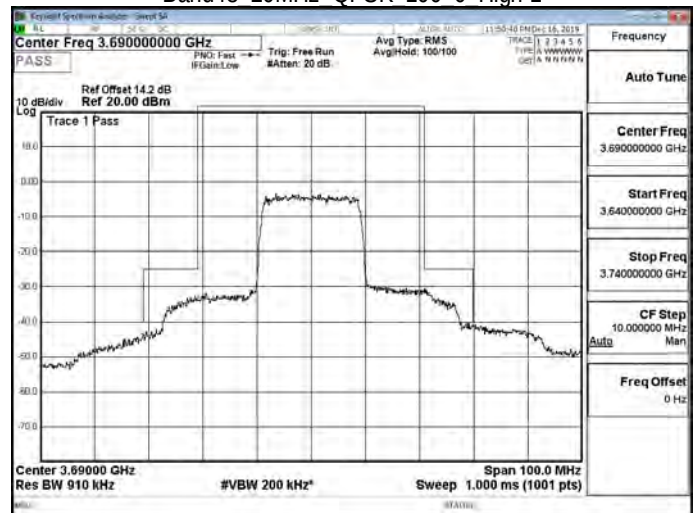
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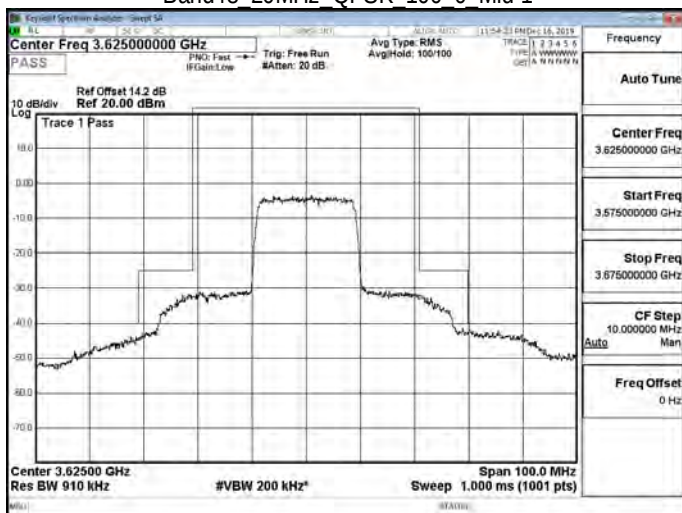
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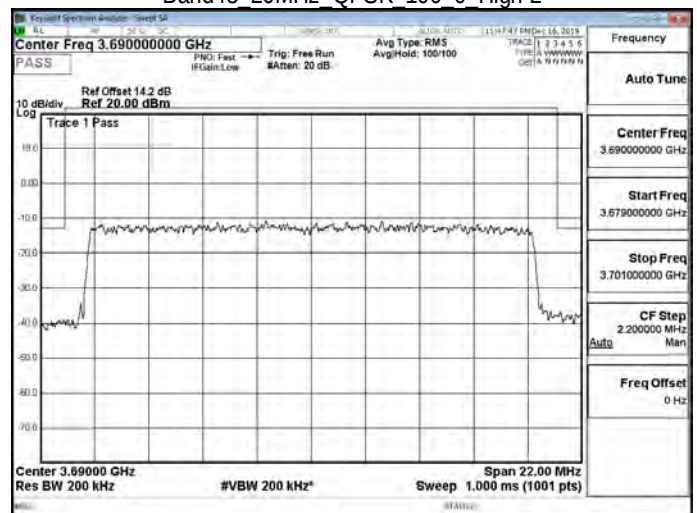
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## 10. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

### 10.1. Standard Applicable

FCC Part 2.1053, Part 96.41, C63.26 Clause 5.7

1. within 0 MHz to 10 MHz above and below the **assigned channel**  $\leq -13$  dBm/MHz
2. greater than 10 MHz above and below the **assigned channel**  $\leq -25$  dBm/MHz
3. any emission below 3530 MHz and above 3720 MHz  $\leq -40$  dBm/MHz

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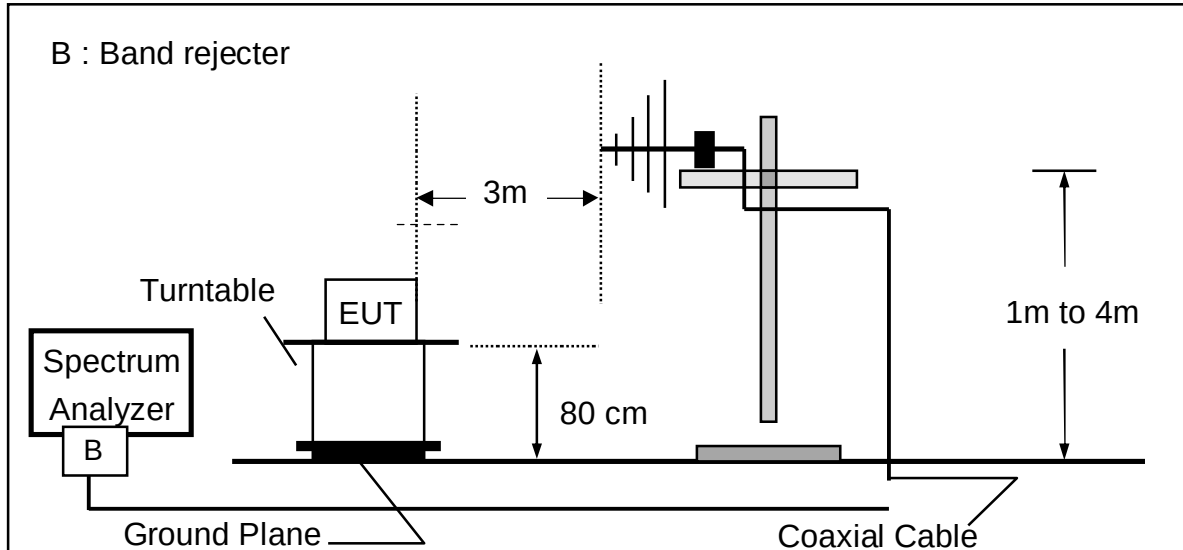
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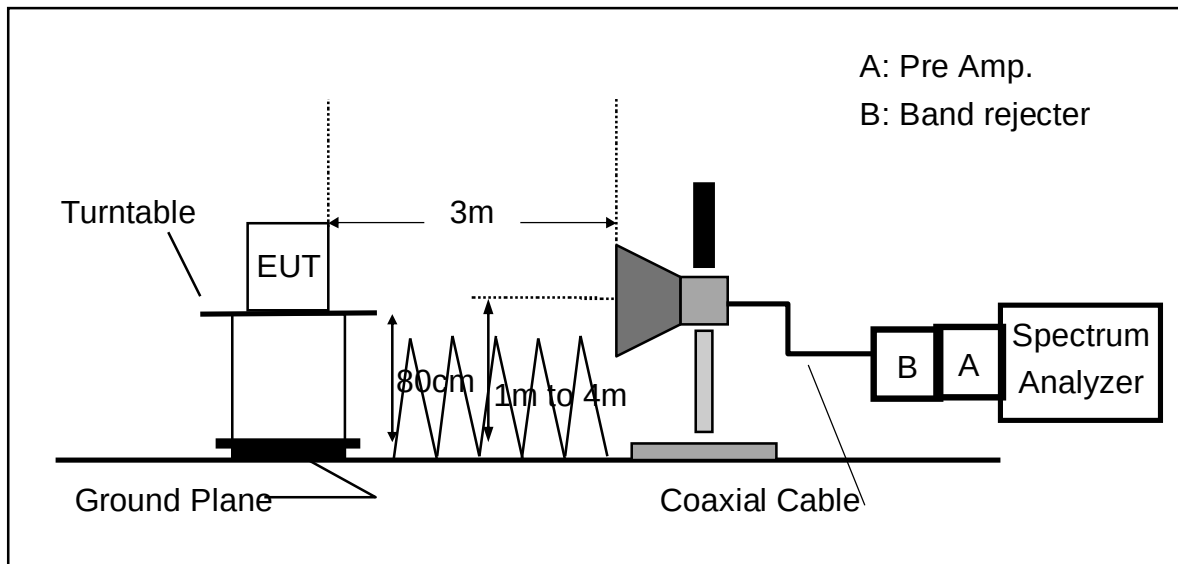
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## 10.2. EUT Setup

### Radiated Emission Test Set-Up, Frequency Below 1000MHz



### Radiated Emission Test Set-UP Frequency Over 1 GHz



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### 10.3. Measurement Procedure:

The EUT was placed on a non-conductive; the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

ERP (dBm) = SG Level(dBm) + Antenna Gain(dBd) + Cable Loss(dB)

EIRP (dBm) = SG Level(dBm) + Antenna Gain(dBi) + Cable Loss(dB)

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#### 10.4. Measurement Equipment Used:

| EQUIPMENT TYPE               | MFR             | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|------------------------------|-----------------|--------------|---------------|------------|------------|
| Broadband Antenna            | TESEQ           | CBL 6112D    | 35240         | 09/09/2019 | 09/08/2020 |
| Horn Antenna                 | Schwarzbeck     | BBHA9120D    | 1187          | 01/09/2019 | 01/08/2020 |
| Horn Antenna                 | SCHWAZBECK      | BBHA9170     | 184           | 12/27/2018 | 12/26/2019 |
| Loop Antenna                 | ETS.LINDGREN    | 6502         | 143303        | 04/25/2019 | 04/24/2020 |
| EMI Test Receiver            | R&S             | ESU 40       | 100363        | 04/15/2019 | 04/14/2020 |
| Radio Communication Analyzer | Anritsu         | MT8821C      | 6262044739    | 12/06/2019 | 12/05/2020 |
| Pre-Amplifier                | EMC Instruments | EMC330       | 980096        | 11/20/2019 | 11/19/2020 |
| Pre-Amplifier                | EMC Instruments | EMC0011830   | 980199        | 11/20/2019 | 11/19/2020 |
| Pre-Amplifier                | EMC Instruments | EMC184045B   | 980135        | 11/20/2019 | 11/19/2020 |
| Notch Filter                 | Woken           | EWT-54-0037  | RF54          | 11/20/2019 | 11/19/2020 |
| Notch Filter                 | Woken           | EWT-54-0038  | RF55          | 11/20/2019 | 11/19/2020 |
| Coaxial Cable                | Huber Suhner    | SUCOFLEX 104 | MY17388/4     | 11/20/2019 | 11/19/2020 |
| Coaxial Cable                | Huber Suhner    | RG 214/U     | W22.03        | 11/20/2019 | 11/19/2020 |
| Coaxial Cable                | Huber Suhner    | SUCOFLEX 104 | MY17413/4     | 11/20/2019 | 11/19/2020 |

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## 10.5. Measurement Result:

### Radiated Spurious Emission Measurement Result: LTE Band 48 3625MHz Mode

Report Number :E2/2019/90045

Test Date :2019-11-28

Operation Mode :LTE B48

Temp./Humi. :22.7/58

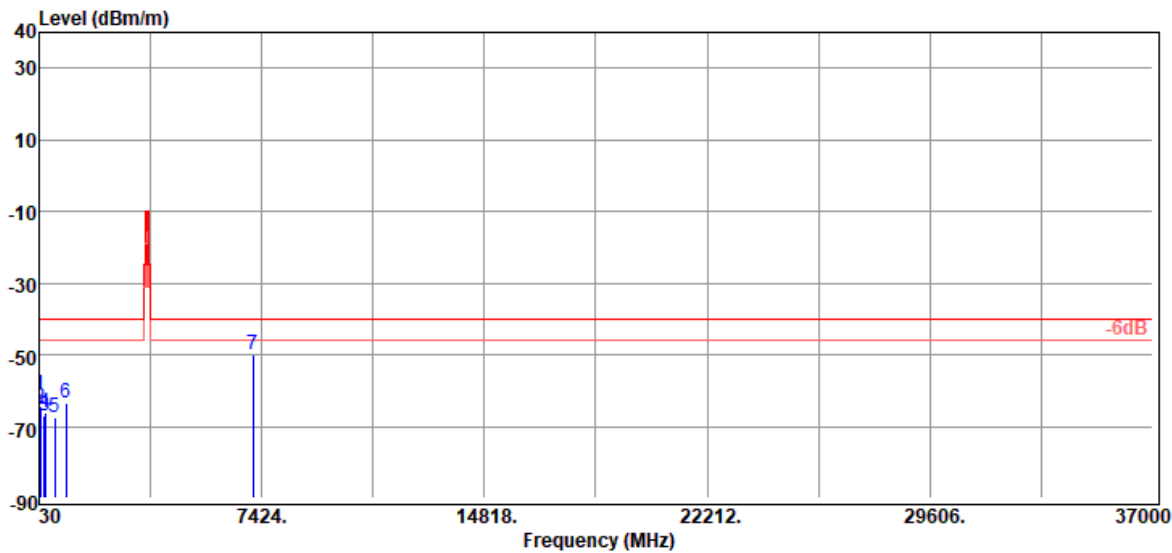
Test Mode :TX CH LOW

Antenna Pol. :VERTICAL

EUT Pol :E2 Plan

Engineer :Ashton

Test Channel :3560 MHz



| Freq.<br>MHz | EIRP/ERP<br>dBm | SG<br>Output Level<br>dBm | Antenna<br>Gain<br>dBi/dBd | Cable<br>Loss<br>dB | Limit<br>dBm | Margin<br>dB |
|--------------|-----------------|---------------------------|----------------------------|---------------------|--------------|--------------|
| 53.28        | -61.20          | -43.38                    | -16.91                     | -0.91               | -40.00       | -21.20       |
| 72.68        | -64.92          | -52.94                    | -10.94                     | -1.04               | -40.00       | -24.92       |
| 203.63       | -66.88          | -62.84                    | -1.96                      | -2.08               | -40.00       | -26.88       |
| 226.91       | -65.96          | -62.49                    | -1.28                      | -2.19               | -40.00       | -25.96       |
| 539.25       | -67.47          | -63.04                    | -1.19                      | -3.24               | -40.00       | -27.47       |
| 929.19       | -63.46          | -56.89                    | -1.68                      | -4.89               | -40.00       | -23.46       |
| 7120.00      | -50.14          | -49.22                    | 11.30                      | -12.22              | -40.00       | -10.14       |

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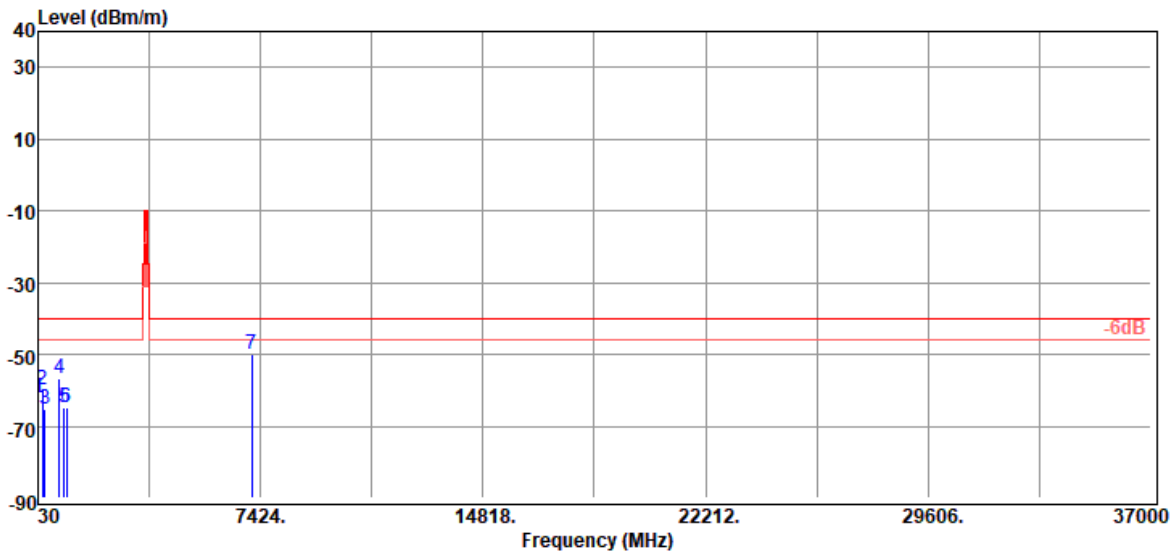
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Report Number :E2/2019/90045  
 Operation Mode :LTE B48  
 Test Mode :TX CH LOW  
 EUT Pol :E2 Plan  
 Test Channel :3560 MHz

Test Date :2019-11-28  
 Temp./Humi. :22.7/58  
 Antenna Pol. :HORIZONTAL  
 Engineer :Ashton



| Freq.<br>MHz | EIRP/ERP<br>dBm | SG<br>Output Level<br>dBm | Antenna<br>Gain<br>dBi/dBd | Cable<br>Loss<br>dB | Limit<br>dBm | Margin<br>dB |
|--------------|-----------------|---------------------------|----------------------------|---------------------|--------------|--------------|
| 31.94        | -62.28          | -41.26                    | -20.36                     | -0.66               | -40.00       | -22.28       |
| 164.83       | -59.69          | -51.38                    | -6.60                      | -1.71               | -40.00       | -19.69       |
| 247.28       | -65.27          | -61.36                    | -1.68                      | -2.23               | -40.00       | -25.27       |
| 729.37       | -56.79          | -51.05                    | -1.46                      | -4.28               | -40.00       | -16.79       |
| 902.03       | -64.66          | -58.65                    | -1.38                      | -4.63               | -40.00       | -24.66       |
| 984.48       | -64.61          | -58.22                    | -1.48                      | -4.91               | -40.00       | -24.61       |
| 7120.00      | -49.80          | -48.88                    | 11.30                      | -12.22              | -40.00       | -9.80        |

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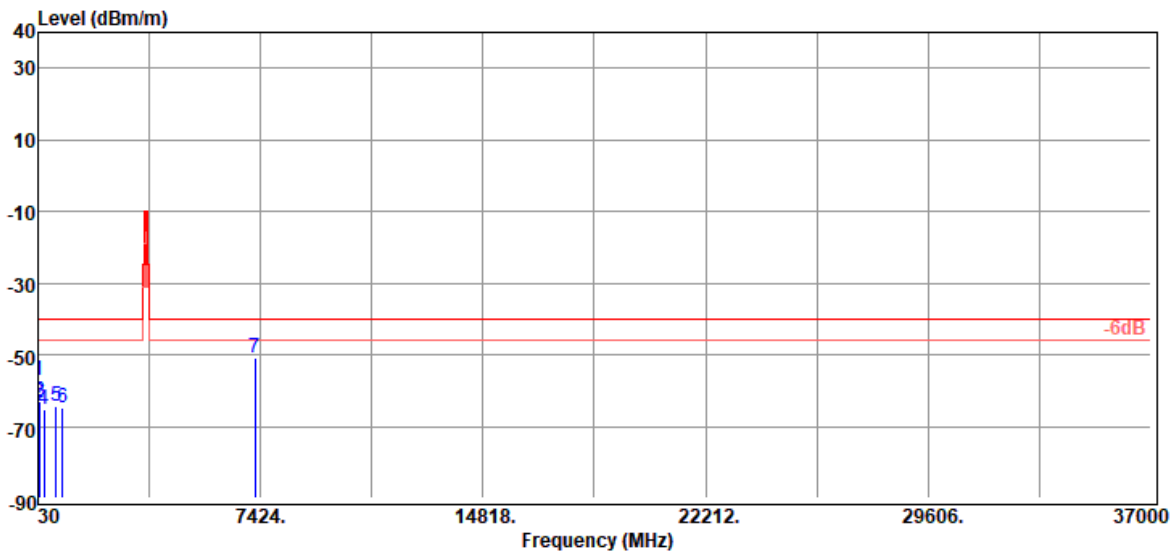
f (886-2) 2298-0488

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Report Number :E2/2019/90045  
Operation Mode :LTE B48  
Test Mode :TX CH MID  
EUT Pol :E2 Plan  
Test Channel :3625 MHz

Test Date :2019-11-28  
Temp./Humi. :22.7/58  
Antenna Pol. :VERTICAL  
Engineer :Ashton



| Freq.<br>MHz | EIRP/ERP<br>dBm | SG<br>Output Level<br>dBm | Antenna<br>Gain<br>dBi/dBd | Cable<br>Loss<br>dB | Limit<br>dBm | Margin<br>dB |
|--------------|-----------------|---------------------------|----------------------------|---------------------|--------------|--------------|
| 53.28        | -57.35          | -39.53                    | -16.91                     | -0.91               | -40.00       | -17.35       |
| 73.65        | -63.32          | -51.76                    | -10.50                     | -1.06               | -40.00       | -23.32       |
| 105.66       | -62.88          | -54.65                    | -6.83                      | -1.40               | -40.00       | -22.88       |
| 229.82       | -65.38          | -61.79                    | -1.40                      | -2.19               | -40.00       | -25.38       |
| 633.34       | -64.26          | -59.01                    | -1.50                      | -3.75               | -40.00       | -24.26       |
| 851.59       | -64.65          | -58.77                    | -1.37                      | -4.51               | -40.00       | -24.65       |
| 7250.00      | -51.04          | -49.84                    | 11.20                      | -12.40              | -40.00       | -11.04       |

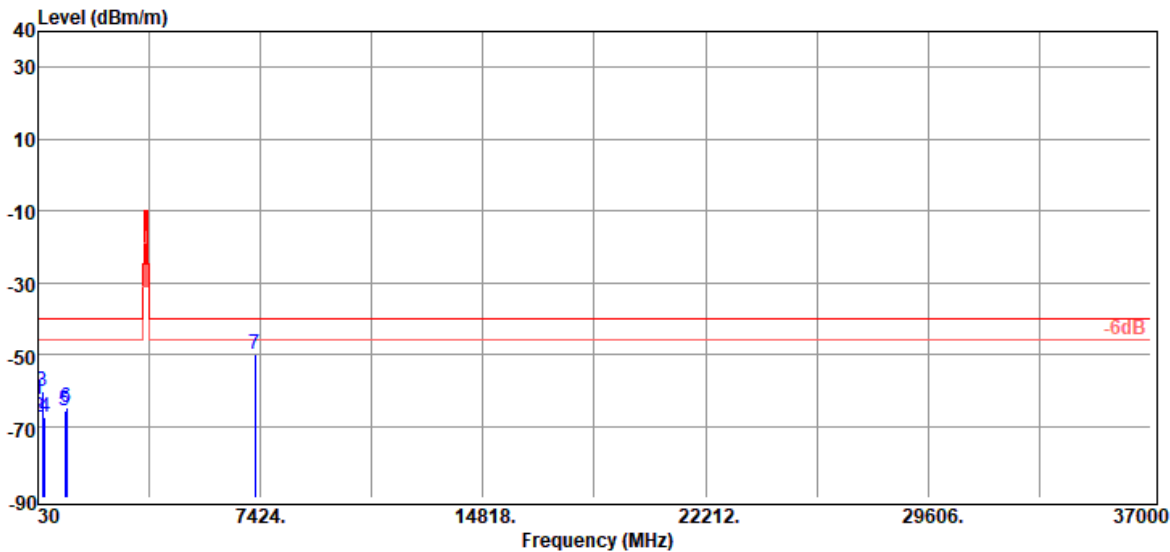
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Report Number :E2/2019/90045  
Operation Mode :LTE B48  
Test Mode :TX CH MID  
EUT Pol :E2 Plan  
Test Channel :3625 MHz

Test Date :2019-11-28  
Temp./Humi. :22.7/58  
Antenna Pol. :HORIZONTAL  
Engineer :Ashton



| Freq.<br>MHz | EIRP/ERP<br>dBm | SG<br>Output Level<br>dBm | Antenna<br>Gain<br>dBi/dBd | Cable<br>Loss<br>dB | Limit<br>dBm | Margin<br>dB |
|--------------|-----------------|---------------------------|----------------------------|---------------------|--------------|--------------|
| 39.70        | -62.52          | -42.53                    | -19.14                     | -0.85               | -40.00       | -22.52       |
| 53.28        | -67.51          | -49.69                    | -16.91                     | -0.91               | -40.00       | -27.51       |
| 164.83       | -60.22          | -51.91                    | -6.60                      | -1.71               | -40.00       | -20.22       |
| 261.83       | -67.47          | -63.65                    | -1.55                      | -2.27               | -40.00       | -27.47       |
| 931.13       | -65.83          | -59.27                    | -1.68                      | -4.88               | -40.00       | -25.83       |
| 981.57       | -65.01          | -58.60                    | -1.50                      | -4.91               | -40.00       | -25.01       |
| 7250.00      | -50.02          | -48.82                    | 11.20                      | -12.40              | -40.00       | -10.02       |

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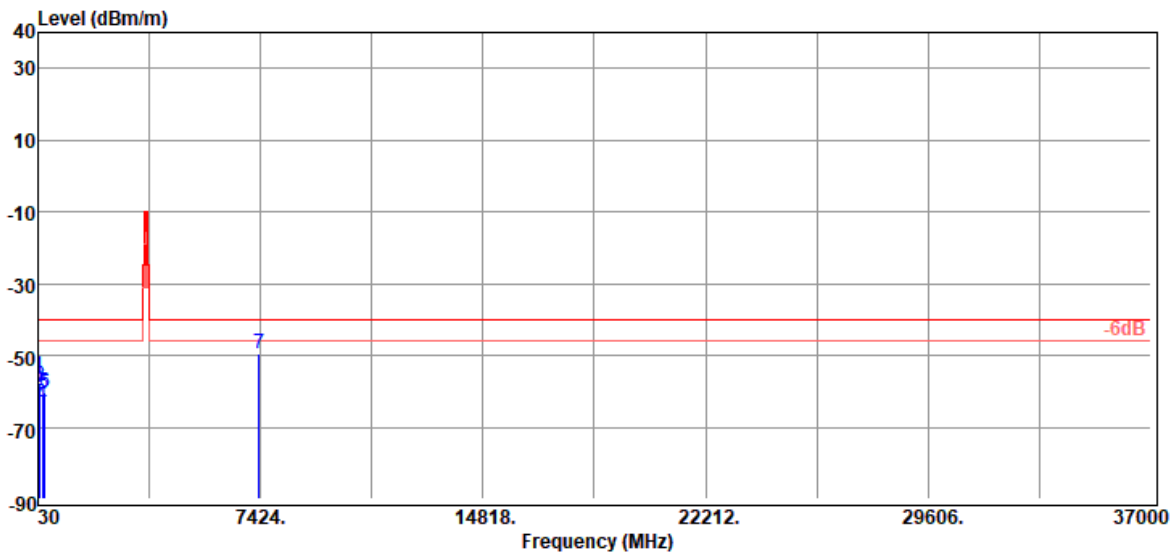
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Report Number :E2/2019/90045  
Operation Mode :LTE B48  
Test Mode :TX CH HIGH  
EUT Pol :E2 Plan  
Test Channel :3690 MHz

Test Date :2019-11-28  
Temp./Humi. :22.7/58  
Antenna Pol. :VERTICAL  
Engineer :Ashton



| Freq.<br>MHz | EIRP/ERP<br>dBm | SG<br>Output Level<br>dBm | Antenna<br>Gain<br>dBi/dBd | Cable<br>Loss<br>dB | Limit<br>dBm | Margin<br>dB |
|--------------|-----------------|---------------------------|----------------------------|---------------------|--------------|--------------|
| 52.31        | -56.00          | -37.97                    | -17.14                     | -0.89               | -40.00       | -16.00       |
| 73.65        | -59.83          | -48.27                    | -10.50                     | -1.06               | -40.00       | -19.83       |
| 104.69       | -58.66          | -50.49                    | -6.78                      | -1.39               | -40.00       | -18.66       |
| 164.83       | -63.95          | -55.64                    | -6.60                      | -1.71               | -40.00       | -23.95       |
| 211.39       | -60.88          | -57.24                    | -1.54                      | -2.10               | -40.00       | -20.88       |
| 245.34       | -60.26          | -56.28                    | -1.75                      | -2.23               | -40.00       | -20.26       |
| 7380.00      | -49.35          | -47.79                    | 11.16                      | -12.72              | -40.00       | -9.35        |

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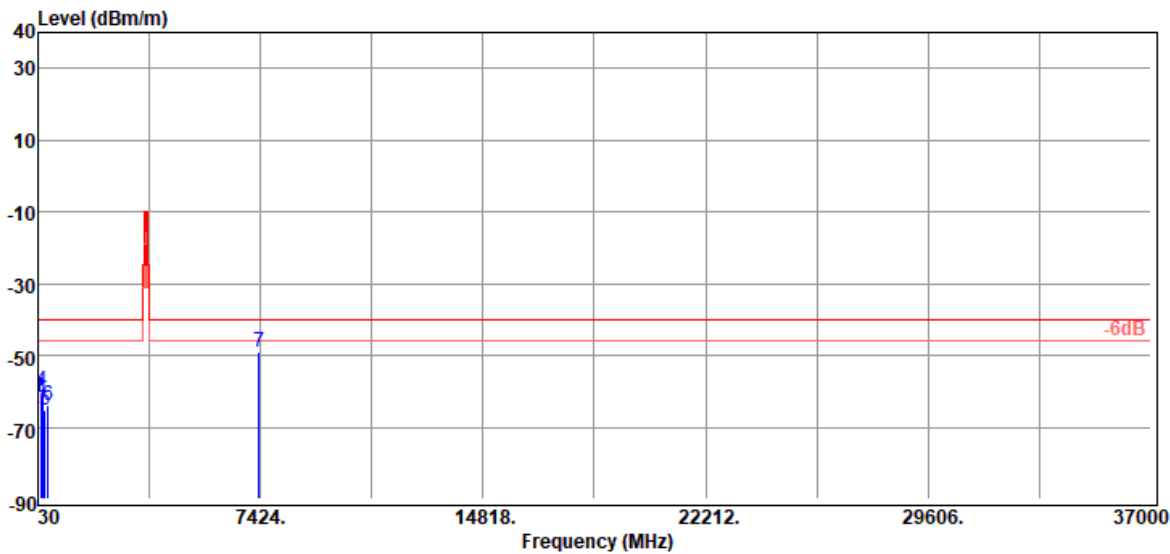
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Report Number :E2/2019/90045  
Operation Mode :LTE B48  
Test Mode :TX CH HIGH  
EUT Pol :E2 Plan  
Test Channel :3690 MHz

Test Date :2019-11-28  
Temp./Humi. :22.7/58  
Antenna Pol. :HORIZONTAL  
Engineer :Ashton



| Freq.<br>MHz | EIRP/ERP<br>dBm | SG<br>Output Level<br>dBm | Antenna<br>Gain<br>dBi/dBd | Cable<br>Loss<br>dB | Limit<br>dBm | Margin<br>dB |
|--------------|-----------------|---------------------------|----------------------------|---------------------|--------------|--------------|
| 39.70        | -61.86          | -41.87                    | -19.14                     | -0.85               | -40.00       | -21.86       |
| 53.28        | -61.76          | -43.94                    | -16.91                     | -0.91               | -40.00       | -21.76       |
| 131.85       | -61.68          | -52.70                    | -7.32                      | -1.66               | -40.00       | -21.68       |
| 166.77       | -59.71          | -51.49                    | -6.50                      | -1.72               | -40.00       | -19.71       |
| 247.28       | -65.13          | -61.22                    | -1.68                      | -2.23               | -40.00       | -25.13       |
| 355.92       | -63.83          | -59.90                    | -1.35                      | -2.58               | -40.00       | -23.83       |
| 7380.00      | -49.15          | -47.59                    | 11.16                      | -12.72              | -40.00       | -9.15        |

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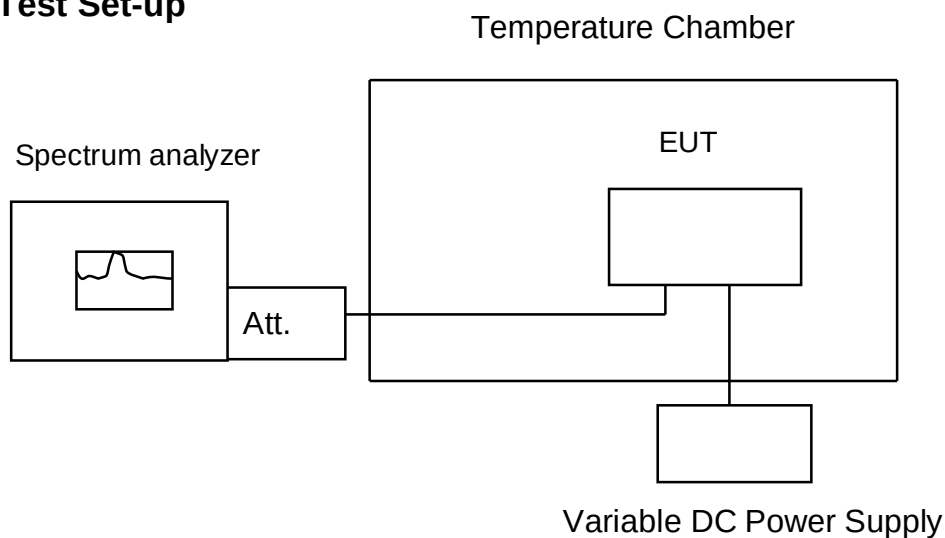
## 11. FREQUENCY STABILITY MEASUREMENT

### 11.1. Standard Applicable

FCC §2.1055(a)

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency band. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency.

### 11.2. Test Set-up



**Note:** Measurement setup for testing on Antenna connector

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### 11.3. Measurement Procedure

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Set chamber temperature to 25°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint as declared by the manufacturer, record the maximum frequency change.

### 11.4. Measurement Equipment Used

| EQUIPMENT TYPE               | MFR       | MODEL NUMBER   | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|------------------------------|-----------|----------------|---------------|------------|------------|
| Spectrum Analyzer            | KEYSIGHT  | N9010A         | MY57120200    | 03/06/2019 | 03/05/2020 |
| Radio Communication Analyser | Anritsu   | MT8821C        | 6262044739    | 12/06/2019 | 12/05/2020 |
| Attenuator                   | Marvelous | MVE2213-10     | RF30          | 11/20/2019 | 11/19/2020 |
| DC Block                     | PASTERNAK | PE8210         | RF32          | 11/20/2019 | 11/19/2020 |
| Splitter                     | Woken     | DOM35LW1A2     | RF83          | 11/20/2019 | 11/19/2020 |
| Coaxial Cables               | Woken     | 00100A1F1A185C | RF229         | 11/20/2019 | 11/19/2020 |

| EQUIPMENT TYPE    | MFR      | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|----------|--------------|---------------|------------|------------|
| Spectrum Analyzer | KEYSIGHT | N9010A       | MY57120200    | 03/17/2020 | 03/16/2021 |

*Note: The measurement was taken place with the long duration of the time, and additional equipment list as shown above indicate those equipment of which has been subject to undertake the calibration in intermediate period of time of the measurement.*

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## 11.5. Measurement Result

|                                |            |                     |            |                            |
|--------------------------------|------------|---------------------|------------|----------------------------|
| Reference Freq.:               |            | LTE B48 Mid Channel |            | 3625 MHz 10M QPSK CH 55990 |
| Power Supply Vdc               | Temp. (°C) | Freq. (MHz)         | Delta (Hz) | Limit = +/- 2.5 ppm (Hz)   |
| <b>Freq. ERROR vs. VOLTAGE</b> |            |                     |            |                            |
| 3.465                          | 25         | 3625.000009         | 9          | 6488                       |
| 3.3                            | 25         | 3625.000012         | 12         | 6488                       |
| 3.135                          | 25         | 3625.000008         | 8          | 6488                       |
| 2.9<br>(End Point)             | 25         | 3625.000006         | 6          | 6488                       |
| <b>Freq. ERROR vs. Temp.</b>   |            |                     |            |                            |
| 3.3                            | -30        | 3624.999987         | -13        | 6488                       |
| 3.3                            | -20        | 3624.999991         | -9         | 6488                       |
| 3.3                            | -10        | 3624.999996         | -4         | 6488                       |
| 3.3                            | 0          | 3625.000001         | 1          | 6488                       |
| 3.3                            | 10         | 3625.000005         | 5          | 6488                       |
| 3.3                            | 20         | 3625.000007         | 7          | 6488                       |
| 3.3                            | 30         | 3625.000012         | 12         | 6488                       |
| 3.3                            | 40         | 3625.000016         | 16         | 6488                       |
| 3.3                            | 50         | 3625.000007         | 7          | 6488                       |

**Note:** The battery is rated 3.3Vdc

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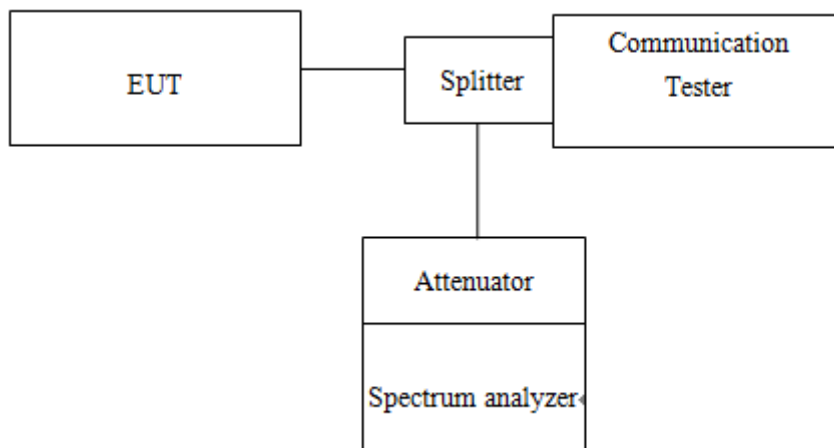
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## 12. PEAK TO AVERAGE RATIO

### 12.1. Standard Applicable

The peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

### 12.2. Test SET-UP



### 12.3. Measurement Procedure

1. KDB 971168 D01 is employed as the following procedure is proper adjusted accordingly:
2. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth; & internal = 1ms
3. Set the number of counts to a value that stabilizes the measured CCDF curve.

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#### 12.4. Measurement Equipment Used

| Conducted Emission (measured at antenna port) Test Site |           |                 |               |            |            |
|---------------------------------------------------------|-----------|-----------------|---------------|------------|------------|
| EQUIPMENT TYPE                                          | MFR       | MODEL NUMBER    | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Spectrum Analyzer                                       | KEYSIGHT  | N9010A          | MY57120200    | 03/06/2019 | 03/05/2020 |
| Radio Communication Analyzer                            | Anritsu   | MT8821C         | 6262044739    | 12/06/2019 | 12/05/2020 |
| Attenuator                                              | Marvelous | MVE2213-10      | RF30          | 11/20/2019 | 11/19/2020 |
| DC Block                                                | PASTERNAK | PE8210          | RF32          | 11/20/2019 | 11/19/2020 |
| Splitter                                                | Woken     | DOM35LW1 A2     | RF83          | 11/20/2019 | 11/19/2020 |
| Coaxial Cables                                          | Woken     | 00100A1F1A 185C | RF229         | 11/20/2019 | 11/19/2020 |

| EQUIPMENT TYPE    | MFR      | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
|-------------------|----------|--------------|---------------|------------|------------|
| Spectrum Analyzer | KEYSIGHT | N9010A       | MY57120200    | 03/17/2020 | 03/16/2021 |

*Note: The measurement was taken place with the long duration of the time, and additional equipment list as shown above indicate those equipment of which has been subject to undertake the calibration in intermediate period of time of the measurement.*

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## 12.5. Measurement Result

| LTE BAND 48             |       |           |       |                          |       |           |       |
|-------------------------|-------|-----------|-------|--------------------------|-------|-----------|-------|
| Channel bandwidth: 5MHz |       |           |       | Channel bandwidth: 10MHz |       |           |       |
| Freq.<br>(MHz)          | CH    | PAPR (dB) |       | Freq.<br>(MHz)           | CH    | PAPR (dB) |       |
|                         |       | 256QAM    | Limit |                          |       | 256QAM    | Limit |
| 3552.5                  | 56765 | 7.70      | 13    | 3555.0                   | 55290 | 7.14      | 13    |
| 3625.0                  | 55990 | 7.69      | 13    | 3625.0                   | 55990 | 7.70      | 13    |
| 3697.5                  | 58215 | 7.16      | 13    | 3695.0                   | 56690 | 7.51      | 13    |

| LTE BAND 48              |       |           |       |                          |       |           |       |
|--------------------------|-------|-----------|-------|--------------------------|-------|-----------|-------|
| Channel bandwidth: 15MHz |       |           |       | Channel bandwidth: 20MHz |       |           |       |
| Freq.<br>(MHz)           | CH    | PAPR (dB) |       | Freq.<br>(MHz)           | CH    | PAPR (dB) |       |
|                          |       | 256QAM    | Limit |                          |       | 256QAM    | Limit |
| 3557.5                   | 55315 | 7.15      | 13    | 3650.0                   | 55340 | 8.32      | 13    |
| 3625.0                   | 55990 | 7.95      | 13    | 3625.0                   | 55990 | 8.11      | 13    |
| 3692.5                   | 56665 | 7.55      | 13    | 3690.0                   | 56640 | 8.19      | 13    |

Please refer to next page.

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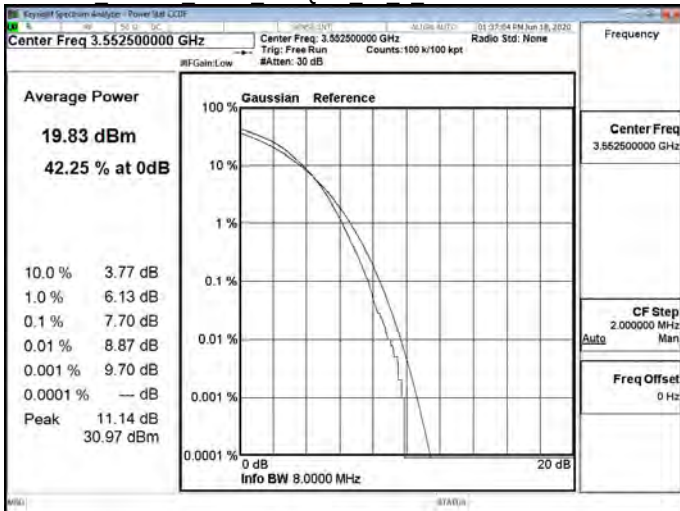
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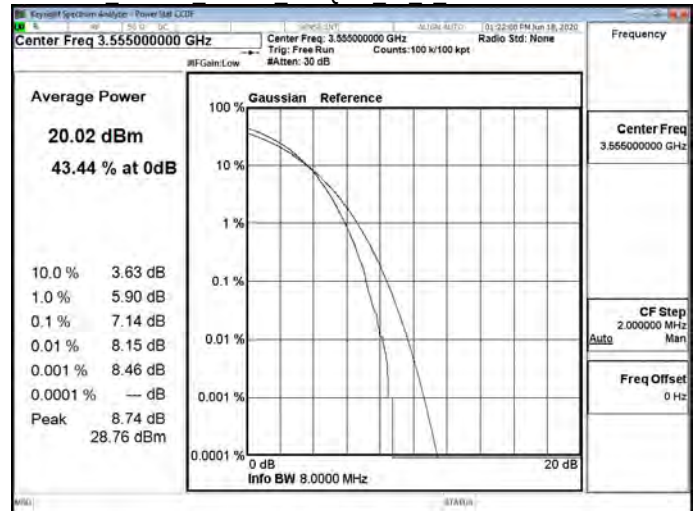
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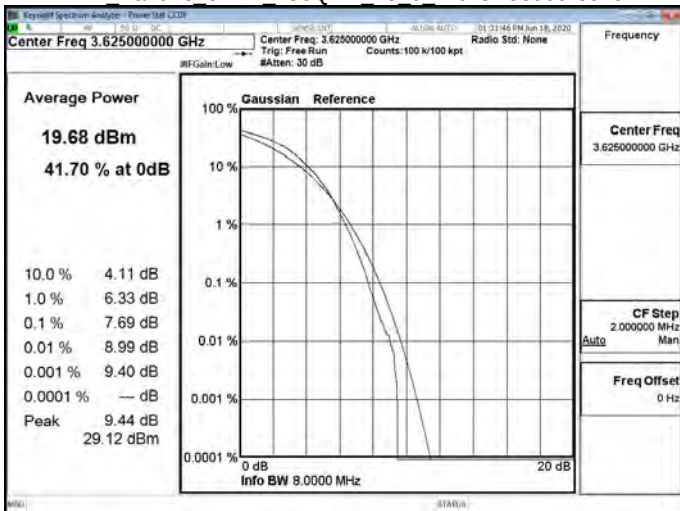
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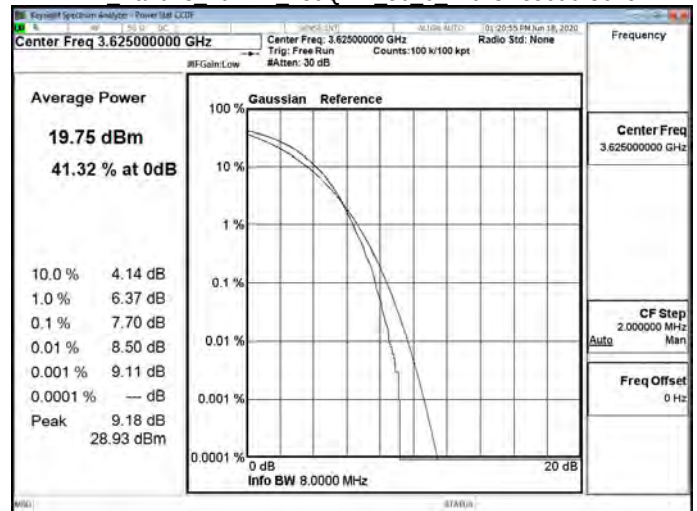
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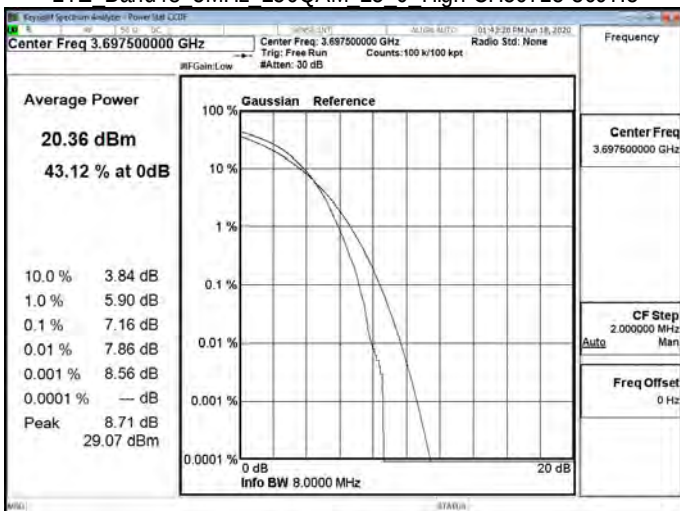
LTE Band48 5MHz 256QAM 25 0 Mid CH55990-3625



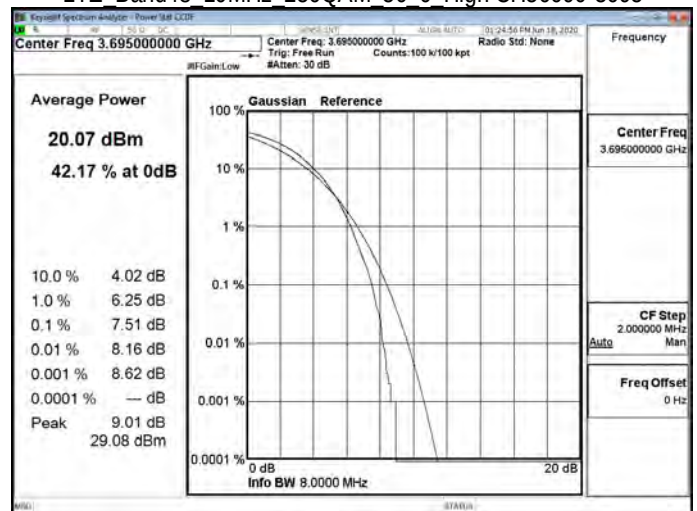
LTE Band48 10MHz 256QAM 50 0 Mid CH55990-3625



LTE Band48 5MHz 256QAM 25 0 High CH56715-3697.5



LTE Band48 10MHz 256QAM 50 0 High CH56690-3695

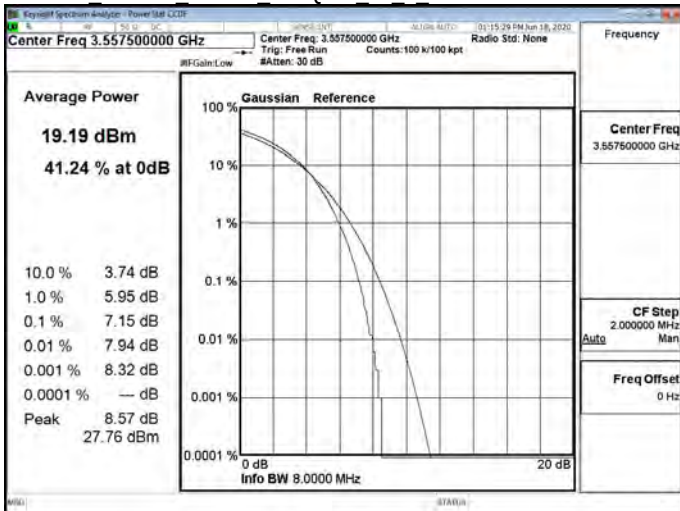


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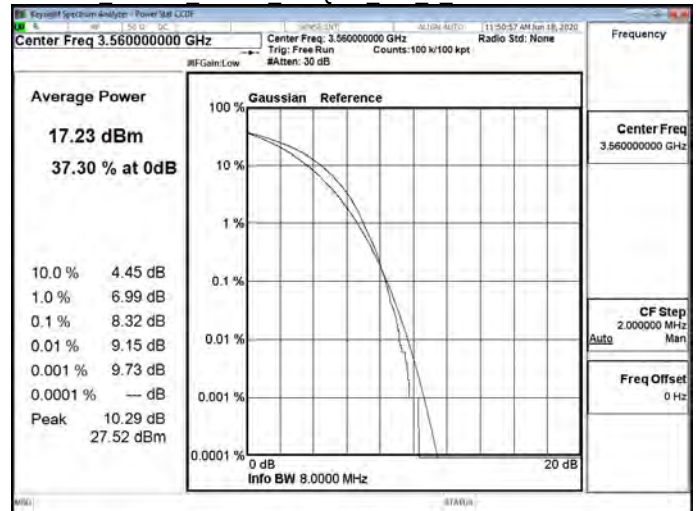
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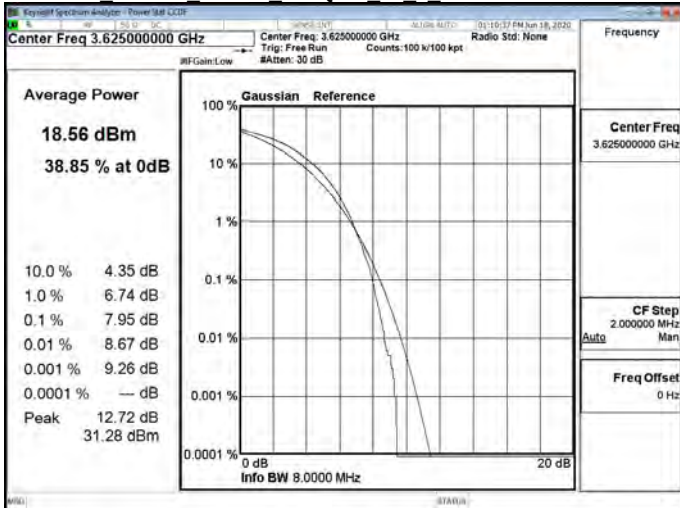
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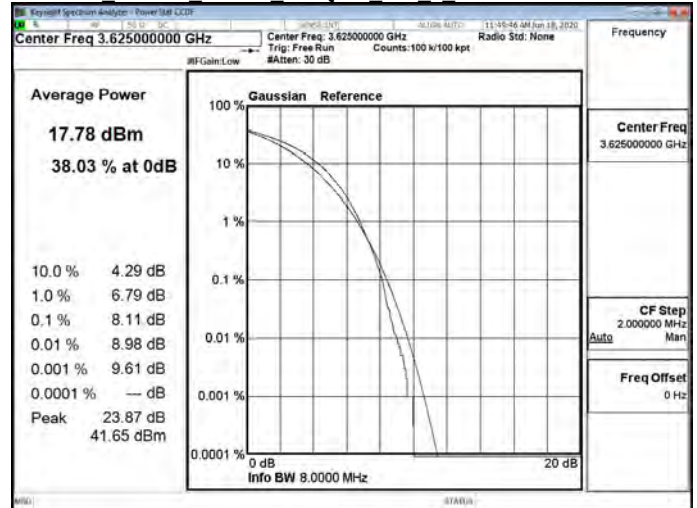
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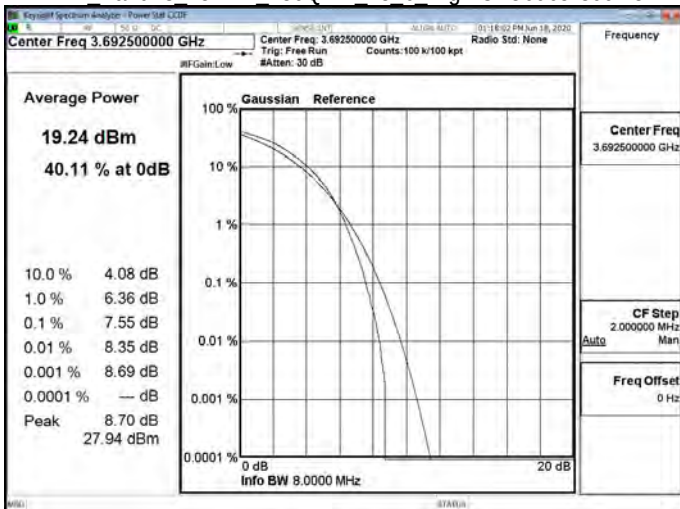
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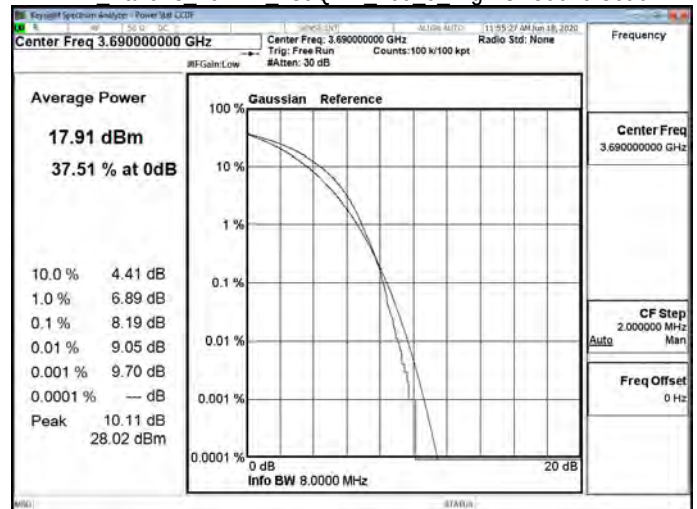
LTE Band48 20MHz 256QAM 100 0 Mid CH55990-3625



LTE Band48 15MHz 256QAM 75 0 High CH56665-3692.5



LTE Band48 20MHz 256QAM 100 0 High CH56640-3690



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