

# TEST REPORT

## CERTIFICATE OF CONFORMITY

**Standard:** 47 CFR FCC Part 96  
47 CFR FCC Part 2

**Report No.:** RFBCM-N-WTW-P23100614-12

**FCC ID:** Q3N-RS38

**Product:** Mobile Computer

**Brand:** CIPHERLAB

**Model No.:** RS38

**Received Date:** 2023/11/12

**Test Date:** 2024/1/8 ~ 2024/8/1

**Issued Date:** 2024/8/14

**Applicant:** Cipherlab Co., Ltd.

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
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**FCC Registration /** 788550 / TW0003 for Test Location(1)

**Designation Number:** 281270 / TW0032 for Test Location(2)

**Approved by:** Jeremy Lin, **Date:** 2024/8/14  
Jeremy Lin / Project Engineer

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Prepared by : Polly Chien / Specialist



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## Release Control Record

| Issue No.                | Description       | Date Issued |
|--------------------------|-------------------|-------------|
| RFBCMNI-WTW-P23100614-12 | Original release. | 2024/8/14   |

## 1 Certificate

**Product:** Mobile Computer

**Brand:** CIPHERLAB

**Test Model:** RS38

**Sample Status:** Engineering sample

**Applicant:** Cipherlab Co., Ltd.

**Test Date:** 2024/1/8 ~ 2024/8/1

**Standard:** 47 CFR FCC Part 96  
47 CFR FCC Part 2

**Measurement** ANSI/TIA/EIA-603-E 2016

**procedure:** ANSI C63.26-2015

KDB 971168 D01 Power Meas License Digital Systems v03r01

KDB 940660 D01 Part 96 CBRS Eqpt v03

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

## 2 Summary of Test Results

| Standard / Clause            | Test Item                              | Result | Remark                                            |
|------------------------------|----------------------------------------|--------|---------------------------------------------------|
| Part 2.1046<br>Part 96.41(b) | Maximum EIRP                           | Pass   | Meet the requirement of limit.                    |
| Part 2.1047                  | Modulation Characteristics             | Pass   | Meet the requirement of limit.                    |
| Part 2.1046<br>Part 96.41(b) | Maximum Power Spectral Density         | N/A    | This device is End User Device.                   |
| Part 96.41(g)                | Peak to Average Ratio                  | Pass   | Meet the requirement of limit.                    |
| Part 2.1049                  | Bandwidth                              | Pass   | Meet the requirement of limit.                    |
| Part 2.1051<br>Part 96.41(e) | Conducted Spurious Emissions           | Pass   | Meet the requirement of limit.                    |
| Part 2.1053<br>Part 96.41(e) | Radiated Spurious Emissions below 1GHz | Pass   | Minimum passing margin is -0.66 dB at 36.79 MHz   |
| Part 2.1053<br>Part 96.41(e) | Radiated Spurious Emissions above 1GHz | Pass   | Minimum passing margin is -0.24 dB at 7380.00 MHz |
| Part 2.1055                  | Frequency Stability                    | Pass   | Meet the requirement of limit.                    |

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

### 2.1 Measurement Uncertainty

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

| Parameter                                                            | Specification   | Uncertainty (±) |
|----------------------------------------------------------------------|-----------------|-----------------|
| Effective Radiated Power and Equivalent Isotropically Radiated Power | -               | 1.371 dB        |
| Bandwidth                                                            | -               | 960 Hz          |
| Conducted Spurious Emissions                                         | -               | 2.12 dB         |
| Radiated Spurious Emissions below 1GHz                               | 9 kHz ~ 30 MHz  | 3 dB            |
|                                                                      | 30 MHz ~ 1 GHz  | 2.93 dB         |
| Radiated Spurious Emissions above 1GHz                               | 1 GHz ~ 18 GHz  | 1.76 dB         |
|                                                                      | 18 GHz ~ 40 GHz | 1.77 dB         |
| Frequency Stability                                                  | -               | 0.176 ppm       |

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

### 2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

|                     |                                                                   |                       |
|---------------------|-------------------------------------------------------------------|-----------------------|
| Product             | Mobile Computer                                                   |                       |
| Brand               | CIPHERLAB                                                         |                       |
| Test Model          | RS38                                                              |                       |
| Status of EUT       | Engineering sample                                                |                       |
| Power Supply Rating | 3.87 Vdc (from battery)<br>5 Vdc (from adapter or host equipment) |                       |
| Operating Frequency | LTE Band 42 (Channel Bandwidth 5MHz)                              | 3552.5MHz ~ 3597.5MHz |
|                     | LTE Band 42 (Channel Bandwidth 10MHz)                             | 3555.0MHz ~ 3595.0MHz |
|                     | LTE Band 42 (Channel Bandwidth 15MHz)                             | 3557.5MHz ~ 3592.5MHz |
|                     | LTE Band 42 (Channel Bandwidth 20MHz)                             | 3560.0MHz ~ 3590.0MHz |
|                     | LTE Band 43 (Channel Bandwidth 5MHz)                              | 3652.5MHz ~ 3672.5MHz |
|                     | LTE Band 43 (Channel Bandwidth 10MHz)                             | 3655.0MHz ~ 3670.0MHz |
|                     | LTE Band 43 (Channel Bandwidth 15MHz)                             | 3657.5MHz ~ 3667.5MHz |
|                     | LTE Band 43 (Channel Bandwidth 20MHz)                             | 3660.0MHz ~ 3665.0MHz |
|                     | LTE Band 48 (Channel Bandwidth 5MHz)                              | 3552.5MHz ~ 3697.5MHz |
|                     | LTE Band 48 (Channel Bandwidth 10MHz)                             | 3555.0MHz ~ 3695.0MHz |
|                     | LTE Band 48 (Channel Bandwidth 15MHz)                             | 3557.5MHz ~ 3692.5MHz |
|                     | LTE Band 48 (Channel Bandwidth 20MHz)                             | 3560.0MHz ~ 3690.0MHz |
| EUT Category        | End User Device                                                   |                       |

Note:

#### 1. EUT Overview

| Mode        | Bandwidth | TX Frequency Range (MHz) | Modulation | Max. EIRP (W) | Max. EIRP (dBm) | Emission Designator |
|-------------|-----------|--------------------------|------------|---------------|-----------------|---------------------|
| LTE Band 48 | 5 MHz     | 3552.5 ~ 3697.5          | QPSK       | 0.121         | 20.81           | 4M49G7D             |
|             |           |                          | 16QAM      | 0.096         | 19.82           | 4M50D7W             |
|             |           |                          | 64QAM      | 0.077         | 18.84           | 4M50D7W             |
|             |           |                          | 256QAM     | 0.038         | 15.85           | 4M51D7W             |
|             | 10 MHz    | 3555 ~ 3695              | QPSK       | 0.12          | 20.8            | 8M98G7D             |
|             |           |                          | 16QAM      | 0.096         | 19.82           | 8M99D7W             |
|             |           |                          | 64QAM      | 0.075         | 18.76           | 8M98D7W             |
|             |           |                          | 256QAM     | 0.039         | 15.88           | 8M98D7W             |
|             | 15 MHz    | 3557.5 ~ 3692.5          | QPSK       | 0.124         | 20.93           | 13M5G7D             |
|             |           |                          | 16QAM      | 0.097         | 19.85           | 13M5D7W             |
|             |           |                          | 64QAM      | 0.078         | 18.91           | 13M5D7W             |
|             |           |                          | 256QAM     | 0.039         | 15.87           | 13M5D7W             |
|             | 20 MHz    | 3560 ~ 3690              | QPSK       | 0.124         | 20.95           | 18M0G7D             |
|             |           |                          | 16QAM      | 0.098         | 19.91           | 18M0D7W             |
|             |           |                          | 64QAM      | 0.079         | 18.96           | 18M0D7W             |
|             |           |                          | 256QAM     | 0.039         | 15.91           | 18M0D7W             |

2. LTE Band 48 overlaps the entire frequency range of LTE Band 42 and LTE Band 43. Therefore, test data provided in this report covers LTE Band 48 as well as LTE Band 42 and LTE Band 43.

3. The EUT uses following accessories.

| Item                | Brand                              | Model         | Specification                                                                |
|---------------------|------------------------------------|---------------|------------------------------------------------------------------------------|
| Adapter             | Channel WELL Technology            | 2AEA010BC3D   | AC Input: 100-240 Vac, 50/60 Hz, 0.35 A<br>DC Output: 5.0 Vdc, 2.0 A, 10.0 W |
| Reader 1            | Zebra                              | SE4770        | -                                                                            |
| Reader 2            | Zebra                              | SE4100        | -                                                                            |
| Reader 3            | Zebra                              | SE5500        | -                                                                            |
| 1st Battery         | CIPHERLAB                          | BA-0174A5     | 3.87 Vdc, 4500 mAh, 17.42 Wh                                                 |
| 2nd Battery         | Chongqing VDL Electronics Co., Ltd | 341322PM4     | 3.85 Vdc, 90 mAh                                                             |
| USB To Type C Cable | SUNCA CO., LTD                     | 1Q11512211-XJ | 0.9 m                                                                        |

\* After pretesting, Reader 1 and 1st Battery were the worst case and chosen for final test.

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

### 3.2 Antenna Description of EUT

1. The antenna information is listed as below.

| Antenna Type      | LDS         |                   |            |        |        |        |
|-------------------|-------------|-------------------|------------|--------|--------|--------|
| Antenna Connector | spring      |                   |            |        |        |        |
| Item              | Band        | Freq. Range (MHz) | Gain (dBi) |        |        |        |
|                   |             |                   | Ant. 0     | Ant. 5 | Ant. 6 | Ant. 7 |
|                   | LTE Band 42 | 3400~3600         |            | -1     |        | -2.5   |
|                   | LTE Band 43 | 2600~3800         |            | -1     |        | -2.5   |
|                   | LTE Band 48 | 3550~3700         |            | -1     |        | -2.5   |

\*The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.



### 3.3 Test Mode Applicability and Tested Channel Detail

|             |                                                                                                                                                |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Pre-Scan:   | EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition. |
| Worst Case: | X-axis/ Y-axis/ Z-axis Worst Condition: Z-axis                                                                                                 |

#### 3.3.1 LTE Band 48

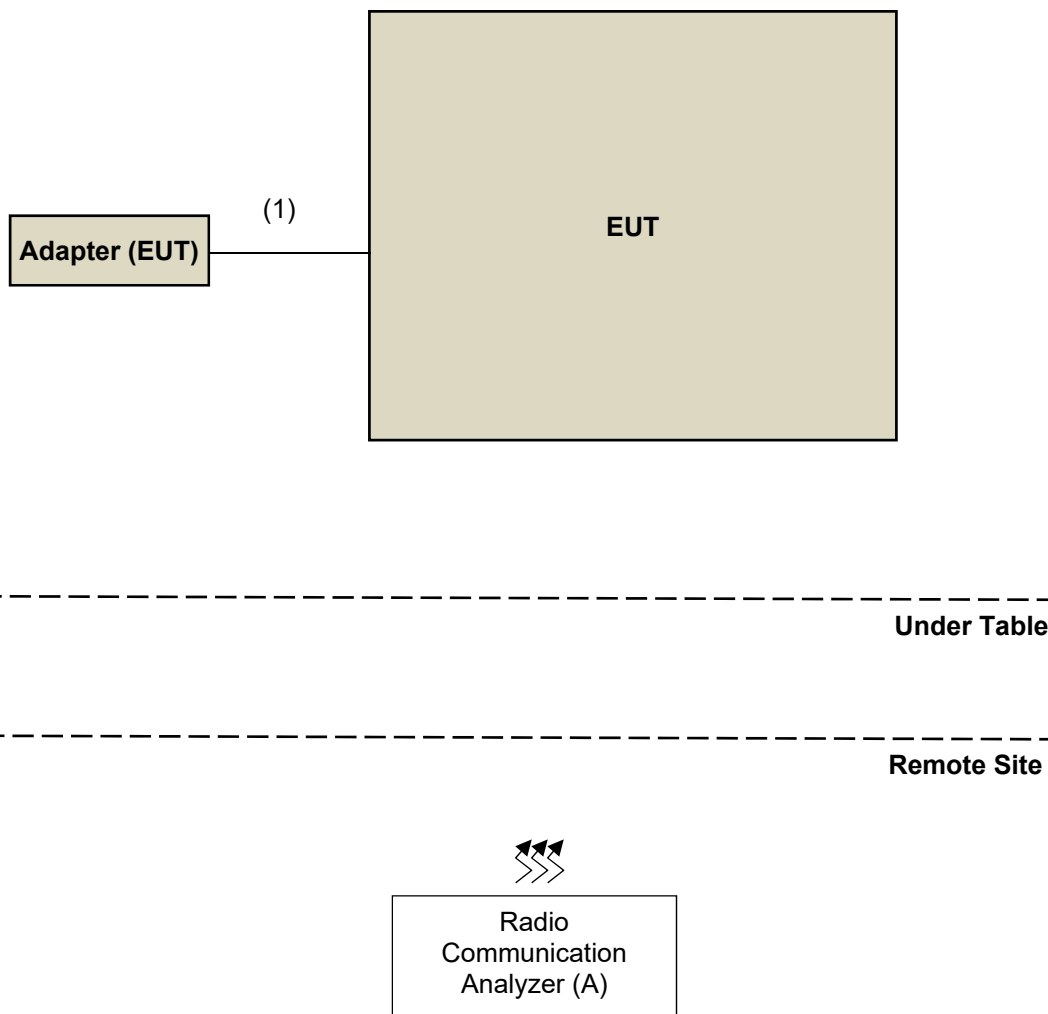
| Test Item                  | Tested Channel                                                 | Channel Bandwidth | Modulation                       | Mode                       |
|----------------------------|----------------------------------------------------------------|-------------------|----------------------------------|----------------------------|
| Maximum EIRP               | 55265(3552.50 MHz)<br>55990(3625.00 MHz)<br>56715(3697.50 MHz) | 5 MHz             | QPSK / 16QAM /<br>64QAM / 256QAM | 1 RB<br>Half RB<br>Full RB |
|                            | 55290(3555.00 MHz)<br>55990(3625.00 MHz)<br>56690(3695.00 MHz) | 10 MHz            | QPSK / 16QAM /<br>64QAM / 256QAM | 1 RB<br>Half RB<br>Full RB |
|                            | 55315(3557.50 MHz)<br>55990(3625.00 MHz)<br>56665(3692.50 MHz) | 15 MHz            | QPSK / 16QAM /<br>64QAM / 256QAM | 1 RB<br>Half RB<br>Full RB |
|                            | 55340(3560.00 MHz)<br>55990(3625.00 MHz)<br>56640(3690.00 MHz) | 20 MHz            | QPSK / 16QAM /<br>64QAM / 256QAM | 1 RB<br>Half RB<br>Full RB |
| Modulation Characteristics | 55990(3625.00 MHz)                                             | 20 MHz            | QPSK / 16QAM /<br>64QAM / 256QAM | Full RB                    |
| Peak to Average Ratio      | 55265(3552.50 MHz)<br>55990(3625.00 MHz)<br>56715(3697.50 MHz) | 5 MHz             | QPSK / 16QAM /<br>64QAM / 256QAM | 1 RB                       |
|                            | 55290(3555.00 MHz)<br>55990(3625.00 MHz)<br>56690(3695.00 MHz) | 10 MHz            | QPSK / 16QAM /<br>64QAM / 256QAM | 1 RB                       |
|                            | 55315(3557.50 MHz)<br>55990(3625.00 MHz)<br>56665(3692.50 MHz) | 15 MHz            | QPSK / 16QAM /<br>64QAM / 256QAM | 1 RB                       |
|                            | 55340(3560.00 MHz)<br>55990(3625.00 MHz)<br>56640(3690.00 MHz) | 20 MHz            | QPSK / 16QAM /<br>64QAM / 256QAM | 1 RB                       |
| Bandwidth                  | 55265(3552.50 MHz)<br>55990(3625.00 MHz)<br>56715(3697.50 MHz) | 5 MHz             | QPSK / 16QAM /<br>64QAM / 256QAM | Full RB                    |
|                            | 55290(3555.00 MHz)<br>55990(3625.00 MHz)<br>56690(3695.00 MHz) | 10 MHz            | QPSK / 16QAM /<br>64QAM / 256QAM | Full RB                    |
|                            | 55315(3557.50 MHz)<br>55990(3625.00 MHz)<br>56665(3692.50 MHz) | 15 MHz            | QPSK / 16QAM /<br>64QAM / 256QAM | Full RB                    |
|                            | 55340(3560.00 MHz)<br>55990(3625.00 MHz)<br>56640(3690.00 MHz) | 20 MHz            | QPSK / 16QAM /<br>64QAM / 256QAM | Full RB                    |

| Test Item                                                                              | Tested Channel                                                 | Channel Bandwidth | Modulation | Mode            |
|----------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------|------------|-----------------|
| Conducted Spurious Emissions                                                           | 55265(3552.50 MHz)<br>55990(3625.00 MHz)<br>56715(3697.50 MHz) | 5 MHz             | QPSK       | 1 RB<br>Full RB |
|                                                                                        | 55290(3555.00 MHz)<br>55990(3625.00 MHz)<br>56690(3695.00 MHz) | 10 MHz            | QPSK       | 1 RB<br>Full RB |
|                                                                                        | 55315(3557.50 MHz)<br>55990(3625.00 MHz)<br>56665(3692.50 MHz) | 15 MHz            | QPSK       | 1 RB<br>Full RB |
|                                                                                        | 55340(3560.00 MHz)<br>55990(3625.00 MHz)<br>56640(3690.00 MHz) | 20 MHz            | QPSK       | 1 RB<br>Full RB |
| Radiated Spurious Emissions below 1GHz                                                 | 56640(3690.00 MHz)                                             | 20 MHz            | QPSK       | 1 RB            |
| Radiated Spurious Emissions above 1GHz                                                 | 55265(3552.50 MHz)<br>55990(3625.00 MHz)<br>56715(3697.50 MHz) | 5 MHz             | QPSK       | 1 RB            |
|                                                                                        | 55340(3560.00 MHz)<br>55990(3625.00 MHz)<br>56640(3690.00 MHz) | 20 MHz            | QPSK       | 1 RB            |
| Frequency Stability                                                                    | 55265(3552.50 MHz)<br>56715(3697.50 MHz)                       | 5 MHz             | QPSK       | Full RB         |
|                                                                                        | 55290(3555.00 MHz)<br>56690(3695.00 MHz)                       | 10 MHz            | QPSK       | Full RB         |
|                                                                                        | 55315(3557.50 MHz)<br>56665(3692.50 MHz)                       | 15 MHz            | QPSK       | Full RB         |
|                                                                                        | 55340(3560.00 MHz)<br>56640(3690.00 MHz)                       | 20 MHz            | QPSK       | Full RB         |
| Note 1. LTE B42 (3550~3600MHz) and LTE B43 (3600~3700MHz) are also covered by LTE B48. |                                                                |                   |            |                 |

### 3.4 Test Program Used and Operation Descriptions

There is no need to controlling software during the test, and the EUT can be paired with the Radio Communication Analyzer to test the connection when it is powered on.

### 3.5 Connection Diagram of EUT and Peripheral Devices



### 3.6 Configuration of Peripheral Devices and Cable Connections

| ID | Product                      | Brand   | Model No. | Serial No. | FCC ID | Remarks         |
|----|------------------------------|---------|-----------|------------|--------|-----------------|
| A  | Radio Communication Analyzer | Anritsu | MT8821C   | 6201462755 | N/A    | Provided by Lab |

| ID | Cable Descriptions  | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks          |
|----|---------------------|------|------------|--------------------|--------------|------------------|
| 1  | USB To Type C Cable | 1    | 0.9        | Y                  | 0            | Accessory of EUT |

## 4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.1 Maximum EIRP

| Description<br>Manufacturer             | Model No.                        | Serial No. | Calibrated<br>Date     | Calibrated<br>Until    |
|-----------------------------------------|----------------------------------|------------|------------------------|------------------------|
| PXA Signal Analyzer<br>Keysight         | N9030B                           | MY57140938 | 2023/3/16<br>2024/3/20 | 2024/3/15<br>2025/3/19 |
| Radio Communication Analyzer<br>Anritsu | MT8821C                          | 6201462755 | 2023/3/3<br>2024/3/13  | 2024/3/2<br>2025/3/12  |
| Software<br>BV                          | ADT_RF Test Software<br>V7.6.5.4 | N/A        | N/A                    | N/A                    |

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/1/23 ~ 2024/6/30

### 4.2 Modulation Characteristics

Refer to section 4.1 to get the tested date and information of the instruments.

### 4.3 Peak to Average Ratio

Refer to section 4.1 to get the tested date and information of the instruments.

### 4.4 Bandwidth

Refer to section 4.1 to get the tested date and information of the instruments.

### 4.5 Conducted Spurious Emissions

Refer to section 4.1 to get the tested date and information of the instruments.

#### 4.6 Radiated Spurious Emissions below 1GHz

| Description<br>Manufacturer       | Model No.                    | Serial No.       | Calibrated<br>Date | Calibrated<br>Until |
|-----------------------------------|------------------------------|------------------|--------------------|---------------------|
| Antenna Tower<br>Max-Full         | MFT-151SS-0.5T               | N/A              | N/A                | N/A                 |
| Bi_Log Antenna<br>Schwarzbeck     | VULB 9168                    | 9168-1213        | 2023/10/13         | 2024/10/12          |
| EMI Test Receiver<br>R&S          | ESR3                         | 102782           | 2023/12/7          | 2024/12/6           |
| Loop Antenna<br>Electro-Metrics   | EM-6879                      | 269              | 2023/9/23          | 2024/9/22           |
| Loop Antenna<br>TESEQ             | HLA 6121                     | 45745            | 2023/8/8           | 2024/8/7            |
| MXA Signal Analyzer<br>Keysight   | N9020B                       | MY60110513       | 2023/12/22         | 2024/12/21          |
| Preamplifier<br>EMCI              | EMC330N                      | 980782           | 2023/1/16          | 2024/1/15           |
|                                   | EMC001340                    | 980201           | 2023/9/27          | 2024/9/26           |
| RF Coaxial Cable<br>EMCI          | EMCCFD400-NM-NM-500          | 201233           | 2023/1/16          | 2024/1/15           |
|                                   | EMCCFD400-NM-NM-3000         | 201235           | 2023/1/16          | 2024/1/15           |
|                                   | EMCCFD400-NM-NM-9000         | 201236(with PAD) | 2023/1/16          | 2024/1/15           |
| Software<br>BV ADT                | ADT_Radiated_<br>V7.6.15.9.5 | N/A              | N/A                | N/A                 |
| Turn Table<br>Max-Full            | MF-7802BS                    | N/A              | N/A                | N/A                 |
| Turn Table Controller<br>Max-Full | MF-7802BS                    | MF780208674      | N/A                | N/A                 |

**Notes:**

1. The test was performed in WM - 966 chamber 8.
2. Tested Date: 2024/1/8

#### 4.7 Radiated Spurious Emissions above 1GHz

| Description<br>Manufacturer       | Model No.                    | Serial No.  | Calibrated<br>Date | Calibrated<br>Until |
|-----------------------------------|------------------------------|-------------|--------------------|---------------------|
| Antenna Tower<br>Max-Full         | MFT-151SS-0.5T               | N/A         | N/A                | N/A                 |
| EMI Test Receiver<br>R&S          | ESR3                         | 102782      | 2023/12/7          | 2024/12/6           |
| Horn Antenna<br>RFSPIN            | DRH18-E                      | 210103A18E  | 2023/11/12         | 2024/11/11          |
| Horn Antenna<br>Schwarzbeck       | BBHA 9170                    | 9170-1049   | 2023/11/12         | 2024/11/11          |
| MXA Signal Analyzer<br>Keysight   | N9020B                       | MY60110513  | 2023/12/22         | 2024/12/21          |
| Preamplifier<br>EMCI              | EMC118A45SE                  | 980808      | 2023/12/28         | 2024/12/27          |
|                                   | EMC184045SE                  | 980788      | 2024/1/15          | 2025/1/14           |
| RF Coaxial Cable<br>EMCI          | EMC101G-KM-KM-2000           | 201254      | 2024/1/15          | 2025/1/14           |
|                                   | EMC101G-KM-KM-3000           | 201258      | 2024/1/15          | 2025/1/14           |
|                                   | EMC101G-KM-KM-5000           | 201261      | 2024/1/15          | 2025/1/14           |
|                                   | EMC104-SM-SM-1000            | 210102      | 2024/1/15          | 2025/1/14           |
|                                   | EMC104-SM-SM-3000            | 201231      | 2024/1/15          | 2025/1/14           |
|                                   | EMC104-SM-SM-9000            | 201243      | 2024/1/15          | 2025/1/14           |
| Software<br>BV ADT                | ADT_Radiated_<br>V7.6.15.9.5 | N/A         | N/A                | N/A                 |
| Turn Table<br>Max-Full            | MF-7802BS                    | N/A         | N/A                | N/A                 |
| Turn Table Controller<br>Max-Full | MF-7802BS                    | MF780208674 | N/A                | N/A                 |

Notes:

1. The test was performed in WM - 966 chamber 8.
2. Tested Date: 2024/2/6

#### 4.8 Frequency Stability

| Description<br>Manufacturer                     | Model No.                        | Serial No.     | Calibrated<br>Date | Calibrated<br>Until |
|-------------------------------------------------|----------------------------------|----------------|--------------------|---------------------|
| 3-channel DC power supply<br>JIN YIH Technology | ODP3033                          | ODP30332128138 | N/A                | N/A                 |
| Digital Multimeter<br>Fluke                     | 8050A                            | 4660081        | 2024/6/14          | 2025/6/13           |
| PXA Signal Analyzer<br>Keysight                 | N9030B                           | MY57140938     | 2024/3/20          | 2025/3/19           |
| Radio Communication Analyzer<br>Anritsu         | MT8821C                          | 6261806803     | 2024/2/15          | 2025/2/14           |
| Software<br>BV                                  | ADT_RF Test Software<br>V7.6.5.4 | N/A            | N/A                | N/A                 |
| Temperature & Humidity Chamber<br>Terchy        | HRM-120RF                        | 931022         | 2023/12/19         | 2024/12/18          |

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/8/1

## 5 Limits of Test Items

### 5.1 Maximum EIRP

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

### 5.2 Modulation Characteristics

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

### 5.3 Peak to Average Ratio

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

### 5.4 Bandwidth

According to FCC 47 CFR part 2.1049, the occupied bandwidth, that 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% of the total mean power radiated by a given emission.

### 5.5 Conducted Spurious Emissions

The conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed  $-13$  dBm/MHz within 0 to B MHz (where B is the bandwidth in MHz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B MHz below the lower CBSD-assigned channel edge. At all frequencies greater than B MHz above the upper CBSD assigned channel edge and less than B MHz below the lower CBSD-assigned channel edge, the conducted power of any end user device emission shall not exceed  $-25$  dBm/MHz.

Additional protection levels: 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.

### 5.6 Radiated Spurious Emissions below 1GHz

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

### 5.7 Radiated Spurious Emissions above 1GHz

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

### 5.8 Frequency Stability

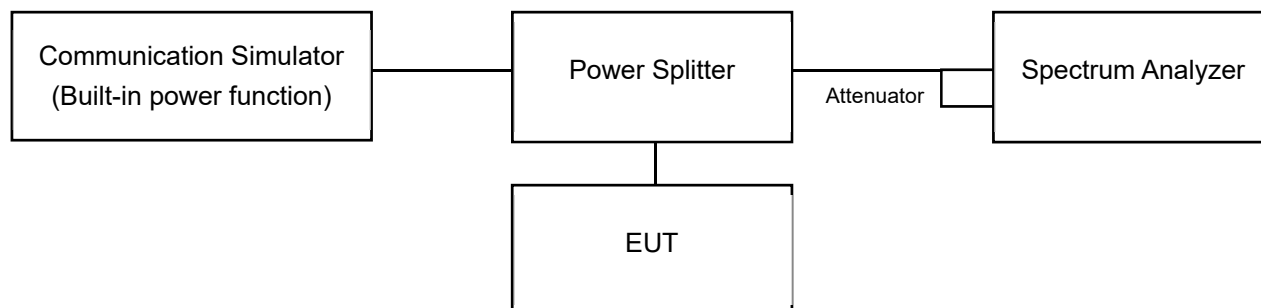
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation (authorized frequency block).

## 6 Test Arrangements

### 6.1 Maximum EIRP

#### 6.1.1 Test Setup

##### Conducted Power Measurement:



#### 6.1.2 Test Procedure

##### Conducted Power Measurement:

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology and link to spectrum analyzer measurements. Set the EUT to transmit under low, middle and high channel and record the power level shown on spectrum analyzer. Power measurements use detector average (rms).

Measurement method refers to ANSI C63.26 section 5.2.4.4.

- Set span to 2 × to 3 × the OBW.
- Set RBW = 1% to 5% of the OBW.
- Set VBW ≥ 3 × RBW.
- Set number of measurement points in sweep ≥ 2 × span / RBW.
- Set Sweep time = auto-couple.
- Detector = power averaging (rms).
- Set sweep trigger to “free run.”
- Trace average at least 100 traces in power averaging (rms) mode.
- Use the Band/Channel Power function to determine the integrated power per 10 MHz bandwidth and full bandwidth, according to the 47 CFR FCC Part 96 standard.
- If Duty cycle < 98%, Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission.

##### Maximum EIRP / ERP

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$$\text{EIRP} = P_{\text{Meas}} + G_T$$

$$\text{ERP} = P_{\text{Meas}} + G_T - 2.15$$

where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively

(expressed in the same units as  $P_{\text{Meas}}$ , e.g., dBm or dBW)

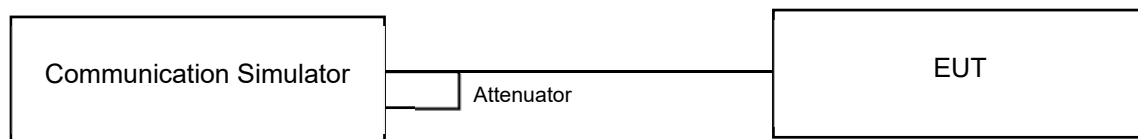
$P_{\text{Meas}}$  measured transmitter output power or PSD, in dBm or dBW

$G_T$  gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)



## 6.2 Modulation Characteristics

### 6.2.1 Test Setup

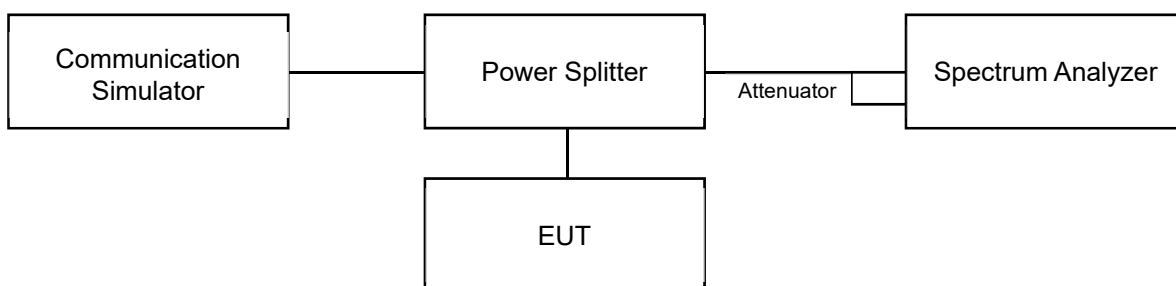


### 6.2.2 Test Procedure

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

## 6.3 Peak to Average Ratio

### 6.3.1 Test Setup

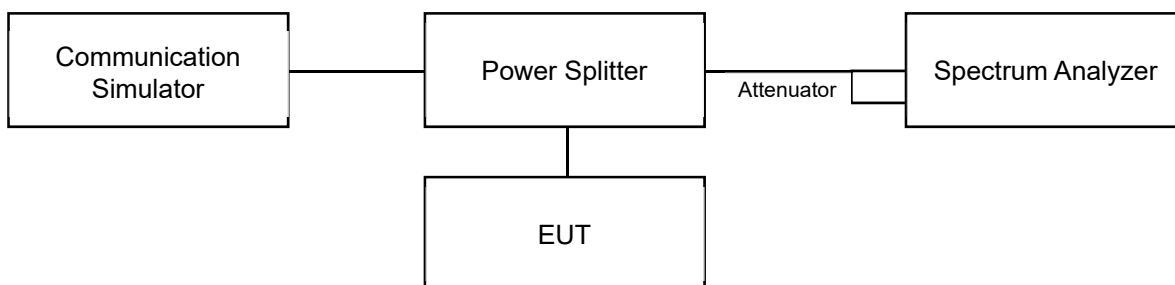


### 6.3.2 Test Procedure

- Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
- Set the number of counts to a value that stabilizes the measured CCDF curve;
- Record the maximum PAPR level associated with a probability of 0.1%.

## 6.4 Bandwidth

### 6.4.1 Test Setup



### 6.4.2 Test Procedure

For the 26 dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

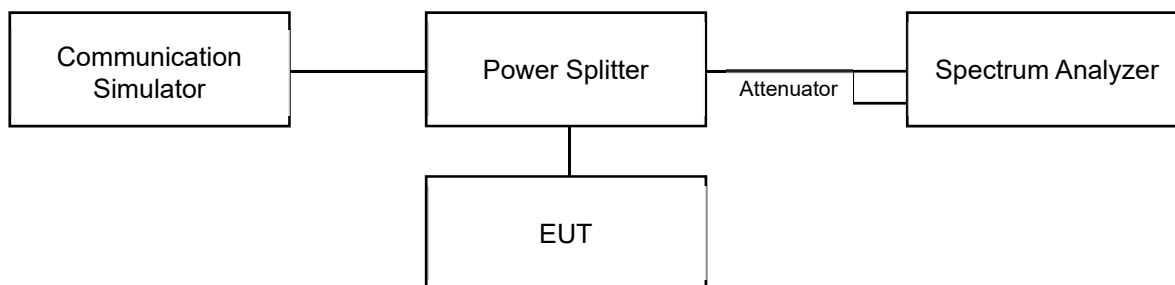
- The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set  $\geq 3 \times$  RBW.
- Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- Determine the following reference values: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- Determine the “-X dB amplitude” as equal to (Reference Value - X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
- Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
- The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

- a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- b. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set  $\geq 3 \times$  RBW.
- c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- d. The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- e. Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- f. Determine the reference value by either of the following:
  - g. 1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
  - h. 2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
- i. Determine the “-X dB amplitude” as equal to (Reference Value - X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
- j. If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).
- k. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers. The spectral envelope can cross the “-X dB amplitude” at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the “-X dB amplitude.”
- l. The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

## 6.5 Conducted Spurious Emissions

### 6.5.1 Test Setup



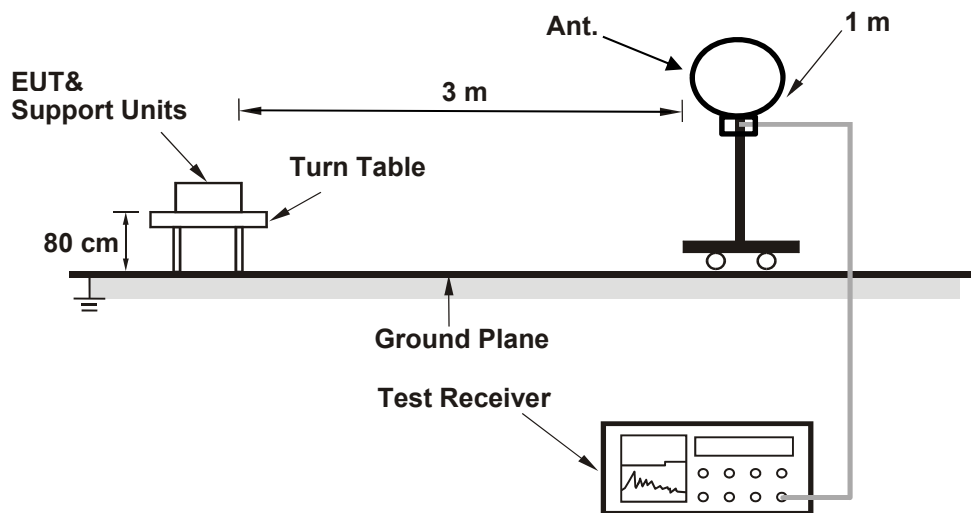
### 6.5.2 Test Procedure

- Measurement refer to ANSI C63.26 section 5.7.
- All measurements were done at 3 channels: low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. 20 dB attenuation pad is connected with spectrum.
- The fundamental frequency above 1 GHz, the spectrum set RBW = 1 MHz, VBW = 3 MHz, Detector = Average.
- The fundamental frequency below 1 GHz, the spectrum set RBW  $\geq$  100 kHz, VBW  $\geq$  3 x RBW, Detector = Average.
- Measuring frequency band edge, narrow RBW (no less than 1% of the OBW) is used for conducted emission measurement.
- For the emissions measurement method, certain channel BW modes demonstrate compliance by integrating with the smaller RBW allowed by the rule.
- e.g. Where Reference RBW = 1 MHz and a smaller RBW = 100 kHz is used, worst-case integrated BW power = [Max Measured Value (dBm) with RBW = 100 kHz] +  $10 \cdot \log(1000/100)$ . To compensate for this integration before comparison to the limit, the limit line was reduced by 10 dB accordingly.
- Record the maximum power value test plot.

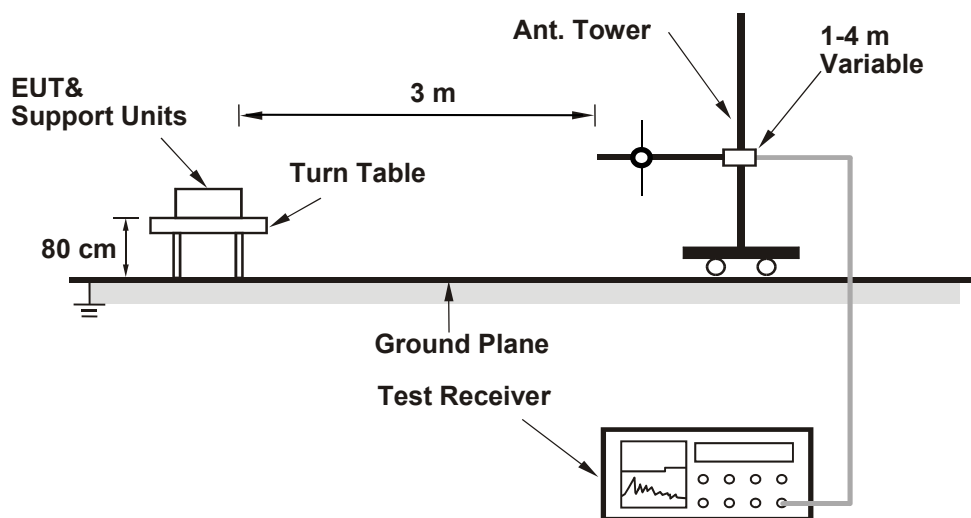
## 6.6 Radiated Spurious Emissions below 1GHz

### 6.6.1 Test Setup

#### For Radiated emission below 30 MHz



#### For Radiated emission above 30 MHz



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

## 6.6.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

- a. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
- d. Following ANSI C63.26 section 5.5 and 5.2.7
- e.  $EIRP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m.
- f.  $ERP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8 - 2.15$ ; where D is the measurement distance (in the far field region) in m.

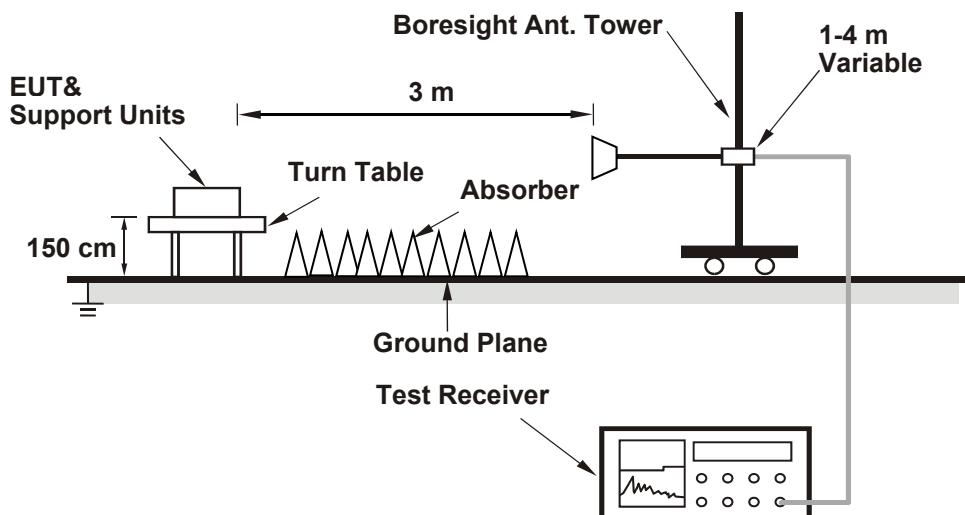
### Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.
2. The amplitude of spurious emissions in the range 9 kHz to 30 MHz which are attenuated more than 20 dB below the permissible value need not be reported.

## 6.7 Radiated Spurious Emissions above 1GHz

### 6.7.1 Test Setup

For radiated emission above 1 GHz



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

### 6.7.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

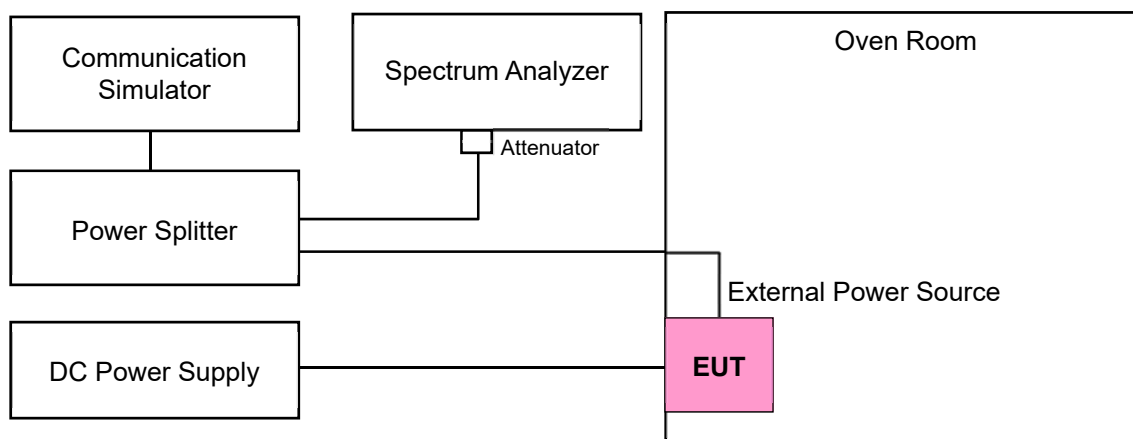
- In the semi-anechoic chamber, EUT placed on the 1.5 m height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
- Following ANSI C63.26 section 5.5 and 5.2.7
- $EIRP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m.
- $ERP (dBm) = E (dB\mu V/m) + 20\log(D) - 104.8 - 2.15$ ; where D is the measurement distance (in the far field region) in m.

Note:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.

## 6.8 Frequency Stability

### 6.8.1 Test Setup



### 6.8.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

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

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



## 7 Test Results of Test Item

### 7.1 Maximum EIRP

|              |          |                           |              |            |            |
|--------------|----------|---------------------------|--------------|------------|------------|
| Input Power: | 3.87 Vdc | Environmental Conditions: | 23°C, 74% RH | Tested By: | Noah Chang |
|--------------|----------|---------------------------|--------------|------------|------------|

#### 7.1.1 LTE Band 48

##### LTE Band 48 - Ant 5, Channel Bandwidth: 5 MHz

| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |            |
|------------|---------|-----------|-----------------------------------|----------|------------|
|            |         |           | CH 55265                          | CH 55990 | CH 56715   |
|            |         |           | 3552.5 MHz                        | 3625 MHz | 3697.5 MHz |
| QPSK       | 1       | 0         | 21.81                             | 21.73    | 21.50      |
|            | 1       | 12        | 21.73                             | 21.65    | 21.34      |
|            | 1       | 24        | 21.72                             | 21.63    | 21.48      |
|            | 12      | 0         | 20.89                             | 20.80    | 20.57      |
|            | 12      | 6         | 20.84                             | 20.69    | 20.54      |
|            | 12      | 13        | 20.75                             | 20.67    | 20.38      |
|            | 25      | 0         | 20.80                             | 20.50    | 20.43      |
| 16QAM      | 1       | 0         | 20.82                             | 20.68    | 20.56      |
|            | 1       | 12        | 20.75                             | 20.56    | 20.41      |
|            | 1       | 24        | 20.72                             | 20.61    | 20.54      |
|            | 12      | 0         | 19.93                             | 19.80    | 19.63      |
|            | 12      | 6         | 19.83                             | 19.64    | 19.56      |
|            | 12      | 13        | 19.75                             | 19.65    | 19.39      |
|            | 25      | 0         | 19.86                             | 19.57    | 19.49      |
| 64QAM      | 1       | 0         | 19.84                             | 19.65    | 19.48      |
|            | 1       | 12        | 19.79                             | 19.59    | 19.41      |
|            | 1       | 24        | 19.74                             | 19.61    | 19.57      |
|            | 12      | 0         | 18.85                             | 18.75    | 18.64      |
|            | 12      | 6         | 18.91                             | 18.68    | 18.57      |
|            | 12      | 13        | 18.80                             | 18.60    | 18.41      |
|            | 25      | 0         | 18.82                             | 18.55    | 18.42      |
| 256QAM     | 1       | 0         | 16.82                             | 16.59    | 16.54      |
|            | 1       | 12        | 16.72                             | 16.70    | 16.56      |
|            | 1       | 24        | 16.74                             | 16.67    | 16.50      |
|            | 12      | 0         | 16.75                             | 16.60    | 16.50      |
|            | 12      | 6         | 16.85                             | 16.51    | 16.45      |
|            | 12      | 13        | 16.73                             | 16.69    | 16.55      |
|            | 25      | 0         | 16.76                             | 16.74    | 16.62      |

**Output Power**

| Modulation | Minimum<br>Cond. Power<br>(dBm) | Maximum<br>Cond. Power<br>(dBm) | Minimum<br>EIRP<br>(dBm) | Maximum<br>EIRP<br>(dBm) | EIRP<br>Limit<br>(dBm) |
|------------|---------------------------------|---------------------------------|--------------------------|--------------------------|------------------------|
| QPSK       | 20.38                           | 21.81                           | 19.38                    | 20.81                    | 23.00                  |
| 16QAM      | 19.39                           | 20.82                           | 18.39                    | 19.82                    | 23.00                  |
| 64QAM      | 18.41                           | 19.84                           | 17.41                    | 18.84                    | 23.00                  |
| 256QAM     | 16.45                           | 16.85                           | 15.45                    | 15.85                    | 23.00                  |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

# LTE Band 48 - Ant 5, Channel Bandwidth: 10 MHz

| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |          |
|------------|---------|-----------|-----------------------------------|----------|----------|
|            |         |           | CH 55290                          | CH 55990 | CH 56690 |
|            |         |           | 3555 MHz                          | 3625 MHz | 3695 MHz |
| QPSK       | 1       | 0         | 21.80                             | 21.68    | 21.51    |
|            | 1       | 24        | 21.77                             | 21.67    | 21.40    |
|            | 1       | 49        | 21.77                             | 21.64    | 21.58    |
|            | 25      | 0         | 20.90                             | 20.74    | 20.64    |
|            | 25      | 12        | 20.76                             | 20.65    | 20.56    |
|            | 25      | 25        | 20.75                             | 20.58    | 20.34    |
|            | 50      | 0         | 20.78                             | 20.53    | 20.51    |
| 16QAM      | 1       | 0         | 20.82                             | 20.60    | 20.56    |
|            | 1       | 24        | 20.75                             | 20.64    | 20.47    |
|            | 1       | 49        | 20.77                             | 20.65    | 20.50    |
|            | 25      | 0         | 19.82                             | 19.83    | 19.59    |
|            | 25      | 12        | 19.78                             | 19.62    | 19.50    |
|            | 25      | 25        | 19.78                             | 19.52    | 19.39    |
|            | 50      | 0         | 19.86                             | 19.55    | 19.48    |
| 64QAM      | 1       | 0         | 19.76                             | 19.68    | 19.48    |
|            | 1       | 24        | 19.74                             | 19.60    | 19.41    |
|            | 1       | 49        | 19.74                             | 19.59    | 19.53    |
|            | 25      | 0         | 18.83                             | 18.79    | 18.62    |
|            | 25      | 12        | 18.77                             | 18.64    | 18.54    |
|            | 25      | 25        | 18.72                             | 18.58    | 18.39    |
|            | 50      | 0         | 18.79                             | 18.55    | 18.44    |
| 256QAM     | 1       | 0         | 16.77                             | 16.59    | 16.60    |
|            | 1       | 24        | 16.78                             | 16.77    | 16.45    |
|            | 1       | 49        | 16.72                             | 16.61    | 16.44    |
|            | 25      | 0         | 16.87                             | 16.58    | 16.57    |
|            | 25      | 12        | 16.88                             | 16.62    | 16.41    |
|            | 25      | 25        | 16.82                             | 16.61    | 16.45    |
|            | 50      | 0         | 16.83                             | 16.81    | 16.66    |

**Output Power**

| Modulation | Minimum<br>Cond. Power<br>(dBm) | Maximum<br>Cond. Power<br>(dBm) | Minimum<br>EIRP<br>(dBm) | Maximum<br>EIRP<br>(dBm) | EIRP<br>Limit<br>(dBm) |
|------------|---------------------------------|---------------------------------|--------------------------|--------------------------|------------------------|
| QPSK       | 20.34                           | 21.8                            | 19.34                    | 20.8                     | 23.00                  |
| 16QAM      | 19.39                           | 20.82                           | 18.39                    | 19.82                    | 23.00                  |
| 64QAM      | 18.39                           | 19.76                           | 17.39                    | 18.76                    | 23.00                  |
| 256QAM     | 16.41                           | 16.88                           | 15.41                    | 15.88                    | 23.00                  |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 48 - Ant 5, Channel Bandwidth: 15 MHz, Output Power: Full Power**

| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |            |
|------------|---------|-----------|-----------------------------------|----------|------------|
|            |         |           | CH 55315                          | CH 55990 | CH 56665   |
|            |         |           | 3557.5 MHz                        | 3625 MHz | 3692.5 MHz |
| QPSK       | 1       | 0         | 21.93                             | 21.72    | 21.51      |
|            | 1       | 37        | 21.79                             | 21.64    | 21.47      |
|            | 1       | 74        | 21.84                             | 21.65    | 21.57      |
|            | 36      | 0         | 20.85                             | 20.83    | 20.70      |
|            | 36      | 19        | 20.84                             | 20.70    | 20.58      |
|            | 36      | 39        | 20.81                             | 20.63    | 20.42      |
|            | 75      | 0         | 20.82                             | 20.58    | 20.57      |
| 16QAM      | 1       | 0         | 20.85                             | 20.69    | 20.58      |
|            | 1       | 37        | 20.79                             | 20.75    | 20.56      |
|            | 1       | 74        | 20.78                             | 20.73    | 20.51      |
|            | 36      | 0         | 19.92                             | 19.67    | 19.53      |
|            | 36      | 19        | 19.83                             | 19.62    | 19.48      |
|            | 36      | 39        | 19.84                             | 19.63    | 19.54      |
|            | 75      | 0         | 19.85                             | 19.84    | 19.59      |
| 64QAM      | 1       | 0         | 19.86                             | 19.73    | 19.61      |
|            | 1       | 37        | 19.91                             | 19.80    | 19.59      |
|            | 1       | 74        | 19.84                             | 19.65    | 19.59      |
|            | 36      | 0         | 18.86                             | 18.80    | 18.61      |
|            | 36      | 19        | 18.83                             | 18.70    | 18.58      |
|            | 36      | 39        | 18.81                             | 18.66    | 18.45      |
|            | 75      | 0         | 18.79                             | 18.69    | 18.56      |
| 256QAM     | 1       | 0         | 16.87                             | 16.72    | 16.58      |
|            | 1       | 37        | 16.82                             | 16.65    | 16.64      |
|            | 1       | 74        | 16.83                             | 16.71    | 16.61      |
|            | 36      | 0         | 16.83                             | 16.69    | 16.59      |
|            | 36      | 19        | 16.82                             | 16.68    | 16.53      |
|            | 36      | 39        | 16.75                             | 16.70    | 16.53      |
|            | 75      | 0         | 16.77                             | 16.67    | 16.57      |

**Output Power**

| Modulation | Minimum<br>Cond. Power<br>(dBm) | Maximum<br>Cond. Power<br>(dBm) | Minimum<br>EIRP<br>(dBm) | Maximum<br>EIRP<br>(dBm) | EIRP<br>Limit<br>(dBm) |
|------------|---------------------------------|---------------------------------|--------------------------|--------------------------|------------------------|
| QPSK       | 20.42                           | 21.93                           | 19.42                    | 20.93                    | 23.00                  |
| 16QAM      | 19.48                           | 20.85                           | 18.48                    | 19.85                    | 23.00                  |
| 64QAM      | 18.45                           | 19.91                           | 17.45                    | 18.91                    | 23.00                  |
| 256QAM     | 16.53                           | 16.87                           | 15.53                    | 15.87                    | 23.00                  |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 48 - Ant 5, Channel Bandwidth: 20 MHz, Output Power: Full Power**

| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |          |
|------------|---------|-----------|-----------------------------------|----------|----------|
|            |         |           | CH 55340                          | CH 55990 | CH 56640 |
|            |         |           | 3560 MHz                          | 3625 MHz | 3690 MHz |
| QPSK       | 1       | 0         | 21.95                             | 21.93    | 21.82    |
|            | 1       | 50        | 21.91                             | 21.86    | 21.75    |
|            | 1       | 99        | 21.89                             | 21.86    | 21.71    |
|            | 50      | 0         | 20.78                             | 20.68    | 20.60    |
|            | 50      | 25        | 20.65                             | 20.56    | 20.59    |
|            | 50      | 50        | 20.57                             | 20.46    | 20.50    |
|            | 100     | 0         | 20.75                             | 20.73    | 20.59    |
| 16QAM      | 1       | 0         | 20.91                             | 20.69    | 20.63    |
|            | 1       | 50        | 20.88                             | 20.80    | 20.61    |
|            | 1       | 99        | 20.87                             | 20.76    | 20.56    |
|            | 50      | 0         | 19.93                             | 19.70    | 19.62    |
|            | 50      | 25        | 19.91                             | 19.68    | 19.53    |
|            | 50      | 50        | 19.85                             | 19.72    | 19.56    |
|            | 100     | 0         | 19.95                             | 19.86    | 19.69    |
| 64QAM      | 1       | 0         | 19.96                             | 19.75    | 19.62    |
|            | 1       | 50        | 19.93                             | 19.81    | 19.59    |
|            | 1       | 99        | 19.92                             | 19.73    | 19.61    |
|            | 50      | 0         | 18.92                             | 18.86    | 18.61    |
|            | 50      | 25        | 18.91                             | 18.74    | 18.63    |
|            | 50      | 50        | 18.88                             | 18.69    | 18.46    |
|            | 100     | 0         | 18.86                             | 18.73    | 18.59    |
| 256QAM     | 1       | 0         | 16.91                             | 16.77    | 16.68    |
|            | 1       | 50        | 16.88                             | 16.75    | 16.65    |
|            | 1       | 99        | 16.87                             | 16.78    | 16.66    |
|            | 50      | 0         | 16.85                             | 16.71    | 16.67    |
|            | 50      | 25        | 16.83                             | 16.72    | 16.63    |
|            | 50      | 50        | 16.81                             | 16.76    | 16.62    |
|            | 100     | 0         | 16.82                             | 16.69    | 16.65    |

| <b>Output Power</b> |                                 |                                 |                          |                          |                        |
|---------------------|---------------------------------|---------------------------------|--------------------------|--------------------------|------------------------|
| Modulation          | Minimum<br>Cond. Power<br>(dBm) | Maximum<br>Cond. Power<br>(dBm) | Minimum<br>EIRP<br>(dBm) | Maximum<br>EIRP<br>(dBm) | EIRP<br>Limit<br>(dBm) |
| QPSK                | 20.46                           | 21.95                           | 19.46                    | 20.95                    | 23.00                  |
| 16QAM               | 19.53                           | 20.91                           | 18.53                    | 19.91                    | 23.00                  |
| 64QAM               | 18.46                           | 19.96                           | 17.46                    | 18.96                    | 23.00                  |
| 256QAM              | 16.62                           | 16.91                           | 15.62                    | 15.91                    | 23.00                  |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)



**LTE Band 48 - Ant 5, Channel Bandwidth: 15 MHz, Output Power: dBm/10 MHz**

| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |            |
|------------|---------|-----------|-----------------------------------|----------|------------|
|            |         |           | CH 55315                          | CH 55990 | CH 56665   |
|            |         |           | 3557.5 MHz                        | 3625 MHz | 3692.5 MHz |
| QPSK       | 1       | 0         | 21.78                             | 21.59    | 21.41      |
|            | 1       | 37        | 21.64                             | 21.52    | 21.36      |
|            | 1       | 74        | 21.72                             | 21.53    | 21.46      |
|            | 36      | 0         | 20.70                             | 20.68    | 20.60      |
|            | 36      | 19        | 20.74                             | 20.57    | 20.43      |
|            | 36      | 39        | 20.64                             | 20.50    | 20.29      |
|            | 75      | 0         | 20.66                             | 20.48    | 20.41      |
| 16QAM      | 1       | 0         | 20.68                             | 20.55    | 20.44      |
|            | 1       | 37        | 20.64                             | 20.61    | 20.43      |
|            | 1       | 74        | 20.62                             | 20.57    | 20.38      |
|            | 36      | 0         | 19.77                             | 19.50    | 19.42      |
|            | 36      | 19        | 19.66                             | 19.46    | 19.36      |
|            | 36      | 39        | 19.70                             | 19.46    | 19.39      |
|            | 75      | 0         | 19.69                             | 19.70    | 19.48      |
| 64QAM      | 1       | 0         | 19.76                             | 19.61    | 19.47      |
|            | 1       | 37        | 19.74                             | 19.70    | 19.48      |
|            | 1       | 74        | 19.71                             | 19.48    | 19.43      |
|            | 36      | 0         | 18.74                             | 18.69    | 18.49      |
|            | 36      | 19        | 18.70                             | 18.53    | 18.43      |
|            | 36      | 39        | 18.71                             | 18.54    | 18.34      |
|            | 75      | 0         | 18.65                             | 18.56    | 18.43      |
| 256QAM     | 1       | 0         | 16.75                             | 16.57    | 16.42      |
|            | 1       | 37        | 16.65                             | 16.53    | 16.51      |
|            | 1       | 74        | 16.73                             | 16.57    | 16.46      |
|            | 36      | 0         | 16.69                             | 16.57    | 16.48      |
|            | 36      | 19        | 16.71                             | 16.53    | 16.39      |
|            | 36      | 39        | 16.65                             | 16.58    | 16.38      |
|            | 75      | 0         | 16.63                             | 16.50    | 16.45      |

**Output Power**

| Modulation | Minimum<br>Cond. Power<br>(dBm) | Maximum<br>Cond. Power<br>(dBm) | Minimum<br>EIRP<br>(dBm) | Maximum<br>EIRP<br>(dBm) | EIRP<br>Limit<br>(dBm) |
|------------|---------------------------------|---------------------------------|--------------------------|--------------------------|------------------------|
| QPSK       | 20.29                           | 21.78                           | 19.29                    | 20.78                    | 23.00                  |
| 16QAM      | 19.36                           | 20.68                           | 18.36                    | 19.68                    | 23.00                  |
| 64QAM      | 18.34                           | 19.76                           | 17.34                    | 18.76                    | 23.00                  |
| 256QAM     | 16.38                           | 16.75                           | 15.38                    | 15.75                    | 23.00                  |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 48 - Ant 5, Channel Bandwidth: 20 MHz, Output Power: dBm/10 MHz**

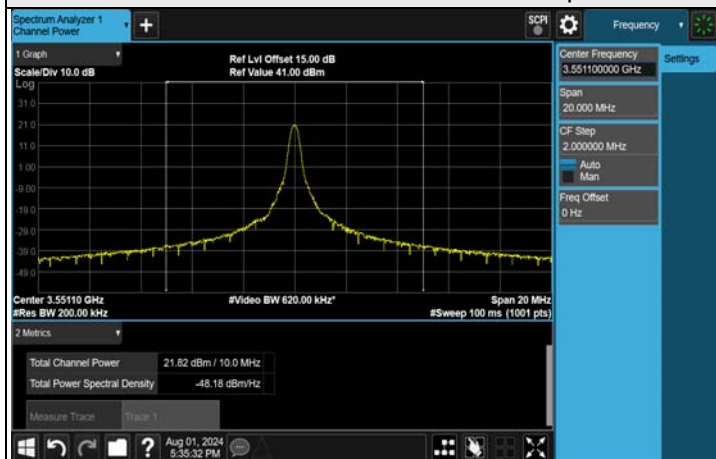
| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |          |
|------------|---------|-----------|-----------------------------------|----------|----------|
|            |         |           | CH 55340                          | CH 55990 | CH 56640 |
|            |         |           | 3560 MHz                          | 3625 MHz | 3690 MHz |
| QPSK       | 1       | 0         | 21.82                             | 21.80    | 21.68    |
|            | 1       | 50        | 21.78                             | 21.73    | 21.62    |
|            | 1       | 99        | 21.75                             | 21.73    | 21.58    |
|            | 50      | 0         | 20.64                             | 20.54    | 20.47    |
|            | 50      | 25        | 20.51                             | 20.43    | 20.45    |
|            | 50      | 50        | 20.43                             | 20.32    | 20.36    |
|            | 100     | 0         | 20.61                             | 20.59    | 20.45    |
| 16QAM      | 1       | 0         | 20.77                             | 20.55    | 20.49    |
|            | 1       | 50        | 20.74                             | 20.67    | 20.47    |
|            | 1       | 99        | 20.74                             | 20.63    | 20.43    |
|            | 50      | 0         | 19.79                             | 19.57    | 19.49    |
|            | 50      | 25        | 19.78                             | 19.54    | 19.39    |
|            | 50      | 50        | 19.72                             | 19.59    | 19.43    |
|            | 100     | 0         | 19.82                             | 19.73    | 19.56    |
| 64QAM      | 1       | 0         | 19.83                             | 19.61    | 19.48    |
|            | 1       | 50        | 19.80                             | 19.67    | 19.46    |
|            | 1       | 99        | 19.79                             | 19.60    | 19.47    |
|            | 50      | 0         | 18.79                             | 18.73    | 18.48    |
|            | 50      | 25        | 18.78                             | 18.60    | 18.50    |
|            | 50      | 50        | 18.75                             | 18.56    | 18.32    |
|            | 100     | 0         | 18.73                             | 18.60    | 18.46    |
| 256QAM     | 1       | 0         | 16.77                             | 16.64    | 16.55    |
|            | 1       | 50        | 16.74                             | 16.61    | 16.52    |
|            | 1       | 99        | 16.73                             | 16.64    | 16.52    |
|            | 50      | 0         | 16.71                             | 16.58    | 16.53    |
|            | 50      | 25        | 16.70                             | 16.58    | 16.50    |
|            | 50      | 50        | 16.67                             | 16.63    | 16.49    |
|            | 100     | 0         | 16.69                             | 16.55    | 16.51    |

### Output Power

| Modulation | Minimum Cond. Power (dBm) | Maximum Cond. Power (dBm) | Minimum EIRP (dBm) | Maximum EIRP (dBm) | EIRP Limit (dBm) |
|------------|---------------------------|---------------------------|--------------------|--------------------|------------------|
| QPSK       | 20.32                     | 21.82                     | 19.32              | 20.82              | 23.00            |
| 16QAM      | 19.39                     | 20.77                     | 18.39              | 19.77              | 23.00            |
| 64QAM      | 18.32                     | 19.83                     | 17.32              | 18.83              | 23.00            |
| 256QAM     | 16.49                     | 16.77                     | 15.49              | 15.77              | 23.00            |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

### Spectrum Plot of Worst Value



QPSK CH 55340 (3560 MHz)

Note: For the channel bandwidth is less than or equal to 10 MHz, the full power test data please refer to the power per 10 MHz corresponding to the channel bandwidth.

# LTE Band 48 - Ant 7, Channel Bandwidth: 5 MHz

| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |            |
|------------|---------|-----------|-----------------------------------|----------|------------|
|            |         |           | CH 55265                          | CH 55990 | CH 56715   |
|            |         |           | 3552.5 MHz                        | 3625 MHz | 3697.5 MHz |
| QPSK       | 1       | 0         | 21.05                             | 20.86    | 20.76      |
|            | 1       | 12        | 20.96                             | 20.81    | 20.81      |
|            | 1       | 24        | 20.92                             | 20.83    | 20.77      |
|            | 12      | 0         | 19.98                             | 19.98    | 19.85      |
|            | 12      | 6         | 19.95                             | 19.88    | 19.91      |
|            | 12      | 13        | 19.92                             | 19.85    | 19.76      |
|            | 25      | 0         | 19.91                             | 19.98    | 19.76      |
| 16QAM      | 1       | 0         | 20.04                             | 19.95    | 19.83      |
|            | 1       | 12        | 19.90                             | 19.86    | 19.79      |
|            | 1       | 24        | 19.96                             | 19.89    | 19.82      |
|            | 12      | 0         | 18.97                             | 18.98    | 18.81      |
|            | 12      | 6         | 19.00                             | 18.88    | 18.85      |
|            | 12      | 13        | 18.93                             | 18.91    | 18.73      |
|            | 25      | 0         | 18.97                             | 18.96    | 18.84      |
| 64QAM      | 1       | 0         | 19.03                             | 18.90    | 18.76      |
|            | 1       | 12        | 18.89                             | 18.83    | 18.79      |
|            | 1       | 24        | 18.89                             | 18.86    | 18.79      |
|            | 12      | 0         | 17.96                             | 17.96    | 17.81      |
|            | 12      | 6         | 17.93                             | 17.94    | 17.87      |
|            | 12      | 13        | 17.90                             | 17.87    | 17.77      |
|            | 25      | 0         | 17.94                             | 17.95    | 17.75      |
| 256QAM     | 1       | 0         | 15.93                             | 15.87    | 15.82      |
|            | 1       | 12        | 16.01                             | 15.90    | 15.75      |
|            | 1       | 24        | 15.85                             | 15.87    | 15.81      |
|            | 12      | 0         | 15.87                             | 15.79    | 15.71      |
|            | 12      | 6         | 15.84                             | 15.79    | 15.60      |
|            | 12      | 13        | 15.84                             | 15.73    | 15.54      |
|            | 25      | 0         | 15.92                             | 15.85    | 15.81      |

**Output Power**

| Modulation | Minimum<br>Cond. Power<br>(dBm) | Maximum<br>Cond. Power<br>(dBm) | Minimum<br>EIRP<br>(dBm) | Maximum<br>EIRP<br>(dBm) | EIRP<br>Limit<br>(dBm) |
|------------|---------------------------------|---------------------------------|--------------------------|--------------------------|------------------------|
| QPSK       | 19.76                           | 21.05                           | 17.26                    | 18.55                    | 23.00                  |
| 16QAM      | 18.73                           | 20.04                           | 16.23                    | 17.54                    | 23.00                  |
| 64QAM      | 17.75                           | 19.03                           | 15.25                    | 16.53                    | 23.00                  |
| 256QAM     | 15.54                           | 16.01                           | 13.04                    | 13.51                    | 23.00                  |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

# LTE Band 48 - Ant 7, Channel Bandwidth: 10 MHz

| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |          |
|------------|---------|-----------|-----------------------------------|----------|----------|
|            |         |           | CH 55290                          | CH 55990 | CH 56690 |
|            |         |           | 3555 MHz                          | 3625 MHz | 3695 MHz |
| QPSK       | 1       | 0         | 21.03                             | 20.93    | 20.82    |
|            | 1       | 24        | 21.01                             | 20.91    | 20.73    |
|            | 1       | 49        | 20.90                             | 20.87    | 20.83    |
|            | 25      | 0         | 20.03                             | 20.01    | 19.83    |
|            | 25      | 12        | 19.98                             | 19.92    | 19.87    |
|            | 25      | 25        | 20.00                             | 19.83    | 19.87    |
|            | 50      | 0         | 19.89                             | 20.05    | 19.85    |
| 16QAM      | 1       | 0         | 20.03                             | 19.94    | 19.77    |
|            | 1       | 24        | 20.07                             | 19.83    | 19.82    |
|            | 1       | 49        | 19.99                             | 19.87    | 19.83    |
|            | 25      | 0         | 19.01                             | 19.02    | 18.85    |
|            | 25      | 12        | 18.98                             | 18.94    | 18.81    |
|            | 25      | 25        | 18.92                             | 18.80    | 18.78    |
|            | 50      | 0         | 18.94                             | 19.04    | 18.81    |
| 64QAM      | 1       | 0         | 19.05                             | 18.94    | 18.80    |
|            | 1       | 24        | 19.05                             | 18.90    | 18.80    |
|            | 1       | 49        | 18.91                             | 18.86    | 18.82    |
|            | 25      | 0         | 17.99                             | 17.98    | 17.80    |
|            | 25      | 12        | 18.02                             | 17.90    | 17.78    |
|            | 25      | 25        | 17.96                             | 17.85    | 17.81    |
|            | 50      | 0         | 17.98                             | 18.01    | 17.78    |
| 256QAM     | 1       | 0         | 15.88                             | 15.81    | 15.78    |
|            | 1       | 24        | 15.95                             | 15.98    | 15.86    |
|            | 1       | 49        | 15.90                             | 15.91    | 15.83    |
|            | 25      | 0         | 15.95                             | 15.87    | 15.75    |
|            | 25      | 12        | 15.74                             | 15.75    | 15.69    |
|            | 25      | 25        | 15.77                             | 15.82    | 15.51    |
|            | 50      | 0         | 15.88                             | 15.90    | 15.83    |

**Output Power**

| Modulation | Minimum<br>Cond. Power<br>(dBm) | Maximum<br>Cond. Power<br>(dBm) | Minimum<br>EIRP<br>(dBm) | Maximum<br>EIRP<br>(dBm) | EIRP<br>Limit<br>(dBm) |
|------------|---------------------------------|---------------------------------|--------------------------|--------------------------|------------------------|
| QPSK       | 19.83                           | 21.03                           | 17.33                    | 18.53                    | 23.00                  |
| 16QAM      | 18.78                           | 20.07                           | 16.28                    | 17.57                    | 23.00                  |
| 64QAM      | 17.78                           | 19.05                           | 15.28                    | 16.55                    | 23.00                  |
| 256QAM     | 15.51                           | 15.98                           | 13.01                    | 13.48                    | 23.00                  |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)



**LTE Band 48 - Ant 7, Channel Bandwidth: 15 MHz, Output Power: Full Power**

| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |            |
|------------|---------|-----------|-----------------------------------|----------|------------|
|            |         |           | CH 55315                          | CH 55990 | CH 56665   |
|            |         |           | 3557.5 MHz                        | 3625 MHz | 3692.5 MHz |
| QPSK       | 1       | 0         | 21.03                             | 20.98    | 20.84      |
|            | 1       | 37        | 21.05                             | 20.95    | 20.78      |
|            | 1       | 74        | 21.05                             | 20.90    | 20.79      |
|            | 36      | 0         | 20.07                             | 20.08    | 19.95      |
|            | 36      | 19        | 20.08                             | 19.92    | 19.88      |
|            | 36      | 39        | 19.96                             | 19.93    | 19.79      |
|            | 75      | 0         | 20.05                             | 20.04    | 19.87      |
| 16QAM      | 1       | 0         | 20.01                             | 19.85    | 19.82      |
|            | 1       | 37        | 20.01                             | 19.95    | 19.84      |
|            | 1       | 74        | 19.88                             | 19.90    | 19.89      |
|            | 36      | 0         | 18.93                             | 18.95    | 18.72      |
|            | 36      | 19        | 18.85                             | 18.74    | 18.66      |
|            | 36      | 39        | 18.86                             | 18.75    | 18.67      |
|            | 75      | 0         | 18.99                             | 18.98    | 18.85      |
| 64QAM      | 1       | 0         | 18.98                             | 18.83    | 18.71      |
|            | 1       | 37        | 18.92                             | 18.91    | 18.76      |
|            | 1       | 74        | 18.82                             | 18.71    | 18.70      |
|            | 36      | 0         | 17.95                             | 17.82    | 17.69      |
|            | 36      | 19        | 17.94                             | 17.91    | 17.80      |
|            | 36      | 39        | 17.81                             | 17.82    | 17.79      |
|            | 75      | 0         | 17.91                             | 17.89    | 17.82      |
| 256QAM     | 1       | 0         | 16.06                             | 16.01    | 15.94      |
|            | 1       | 37        | 16.04                             | 15.97    | 15.96      |
|            | 1       | 74        | 16.06                             | 15.98    | 15.92      |
|            | 36      | 0         | 16.03                             | 16.03    | 15.88      |
|            | 36      | 19        | 16.05                             | 16.04    | 15.99      |
|            | 36      | 39        | 16.00                             | 15.99    | 15.93      |
|            | 75      | 0         | 16.09                             | 15.93    | 15.80      |

**Output Power**

| Modulation | Minimum<br>Cond. Power<br>(dBm) | Maximum<br>Cond. Power<br>(dBm) | Minimum<br>EIRP<br>(dBm) | Maximum<br>EIRP<br>(dBm) | EIRP<br>Limit<br>(dBm) |
|------------|---------------------------------|---------------------------------|--------------------------|--------------------------|------------------------|
| QPSK       | 19.79                           | 21.05                           | 17.29                    | 18.55                    | 23.00                  |
| 16QAM      | 18.66                           | 20.01                           | 16.16                    | 17.51                    | 23.00                  |
| 64QAM      | 17.69                           | 18.98                           | 15.19                    | 16.48                    | 23.00                  |
| 256QAM     | 15.8                            | 16.09                           | 13.3                     | 13.59                    | 23.00                  |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 48 - Ant 7, Channel Bandwidth: 20 MHz, Output Power: Full Power**

| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |          |
|------------|---------|-----------|-----------------------------------|----------|----------|
|            |         |           | CH 55340                          | CH 55990 | CH 56640 |
|            |         |           | 3560 MHz                          | 3625 MHz | 3690 MHz |
| QPSK       | 1       | 0         | 21.12                             | 21.03    | 20.91    |
|            | 1       | 50        | 21.07                             | 20.99    | 20.87    |
|            | 1       | 99        | 21.05                             | 20.96    | 20.89    |
|            | 50      | 0         | 20.11                             | 20.08    | 19.98    |
|            | 50      | 25        | 20.09                             | 20.02    | 19.95    |
|            | 50      | 50        | 20.05                             | 19.99    | 19.88    |
|            | 100     | 0         | 20.08                             | 20.07    | 19.91    |
| 16QAM      | 1       | 0         | 20.05                             | 19.95    | 19.90    |
|            | 1       | 50        | 20.03                             | 20.03    | 19.91    |
|            | 1       | 99        | 19.98                             | 19.98    | 19.92    |
|            | 50      | 0         | 19.03                             | 18.95    | 18.81    |
|            | 50      | 25        | 18.92                             | 18.83    | 18.71    |
|            | 50      | 50        | 18.91                             | 18.85    | 18.69    |
|            | 100     | 0         | 19.01                             | 18.98    | 18.89    |
| 64QAM      | 1       | 0         | 18.98                             | 18.88    | 18.76    |
|            | 1       | 50        | 18.95                             | 18.94    | 18.76    |
|            | 1       | 99        | 18.89                             | 18.81    | 18.70    |
|            | 50      | 0         | 17.96                             | 17.87    | 17.76    |
|            | 50      | 25        | 17.95                             | 17.93    | 17.85    |
|            | 50      | 50        | 17.89                             | 17.83    | 17.81    |
|            | 100     | 0         | 17.98                             | 17.91    | 17.82    |
| 256QAM     | 1       | 0         | 16.16                             | 16.11    | 16.03    |
|            | 1       | 50        | 16.13                             | 16.07    | 15.99    |
|            | 1       | 99        | 16.08                             | 16.07    | 15.96    |
|            | 50      | 0         | 16.12                             | 16.08    | 15.97    |
|            | 50      | 25        | 16.11                             | 16.10    | 16.07    |
|            | 50      | 50        | 16.07                             | 16.03    | 15.97    |
|            | 100     | 0         | 16.09                             | 16.00    | 15.87    |

**Output Power**

| Modulation | Minimum<br>Cond. Power<br>(dBm) | Maximum<br>Cond. Power<br>(dBm) | Minimum<br>EIRP<br>(dBm) | Maximum<br>EIRP<br>(dBm) | EIRP<br>Limit<br>(dBm) |
|------------|---------------------------------|---------------------------------|--------------------------|--------------------------|------------------------|
| QPSK       | 19.88                           | 21.12                           | 17.38                    | 18.62                    | 23.00                  |
| 16QAM      | 18.69                           | 20.05                           | 16.19                    | 17.55                    | 23.00                  |
| 64QAM      | 17.76                           | 18.98                           | 15.26                    | 16.48                    | 23.00                  |
| 256QAM     | 15.87                           | 16.16                           | 13.37                    | 13.66                    | 23.00                  |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 48 - Ant 7, Channel Bandwidth: 15 MHz, Output Power: dBm/10 MHz**

| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |            |
|------------|---------|-----------|-----------------------------------|----------|------------|
|            |         |           | CH 55315                          | CH 55990 | CH 56665   |
|            |         |           | 3557.5 MHz                        | 3625 MHz | 3692.5 MHz |
| QPSK       | 1       | 0         | 20.88                             | 20.86    | 20.69      |
|            | 1       | 37        | 20.94                             | 20.80    | 20.65      |
|            | 1       | 74        | 20.92                             | 20.73    | 20.64      |
|            | 36      | 0         | 19.96                             | 19.94    | 19.79      |
|            | 36      | 19        | 19.94                             | 19.75    | 19.72      |
|            | 36      | 39        | 19.81                             | 19.81    | 19.63      |
|            | 75      | 0         | 19.95                             | 19.90    | 19.76      |
| 16QAM      | 1       | 0         | 19.90                             | 19.73    | 19.72      |
|            | 1       | 37        | 19.90                             | 19.83    | 19.69      |
|            | 1       | 74        | 19.73                             | 19.73    | 19.75      |
|            | 36      | 0         | 18.82                             | 18.85    | 18.62      |
|            | 36      | 19        | 18.69                             | 18.63    | 18.49      |
|            | 36      | 39        | 18.75                             | 18.65    | 18.57      |
|            | 75      | 0         | 18.83                             | 18.86    | 18.71      |
| 64QAM      | 1       | 0         | 18.85                             | 18.67    | 18.61      |
|            | 1       | 37        | 18.75                             | 18.74    | 18.64      |
|            | 1       | 74        | 18.66                             | 18.55    | 18.60      |
|            | 36      | 0         | 17.80                             | 17.69    | 17.52      |
|            | 36      | 19        | 17.82                             | 17.74    | 17.65      |
|            | 36      | 39        | 17.67                             | 17.70    | 17.62      |
|            | 75      | 0         | 17.76                             | 17.75    | 17.70      |
| 256QAM     | 1       | 0         | 15.93                             | 15.90    | 15.82      |
|            | 1       | 37        | 15.88                             | 15.85    | 15.82      |
|            | 1       | 74        | 15.90                             | 15.83    | 15.82      |
|            | 36      | 0         | 15.90                             | 15.86    | 15.77      |
|            | 36      | 19        | 15.89                             | 15.93    | 15.85      |
|            | 36      | 39        | 15.89                             | 15.83    | 15.76      |
|            | 75      | 0         | 15.98                             | 15.81    | 15.68      |

**Output Power**

| Modulation | Minimum<br>Cond. Power<br>(dBm) | Maximum<br>Cond. Power<br>(dBm) | Minimum<br>EIRP<br>(dBm) | Maximum<br>EIRP<br>(dBm) | EIRP<br>Limit<br>(dBm) |
|------------|---------------------------------|---------------------------------|--------------------------|--------------------------|------------------------|
| QPSK       | 19.63                           | 20.94                           | 17.13                    | 18.44                    | 23.00                  |
| 16QAM      | 18.49                           | 19.9                            | 15.99                    | 17.4                     | 23.00                  |
| 64QAM      | 17.52                           | 18.85                           | 15.02                    | 16.35                    | 23.00                  |
| 256QAM     | 15.68                           | 15.98                           | 13.18                    | 13.48                    | 23.00                  |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

**LTE Band 48 - Ant 7, Channel Bandwidth: 20 MHz, Output Power: dBm/10 MHz**

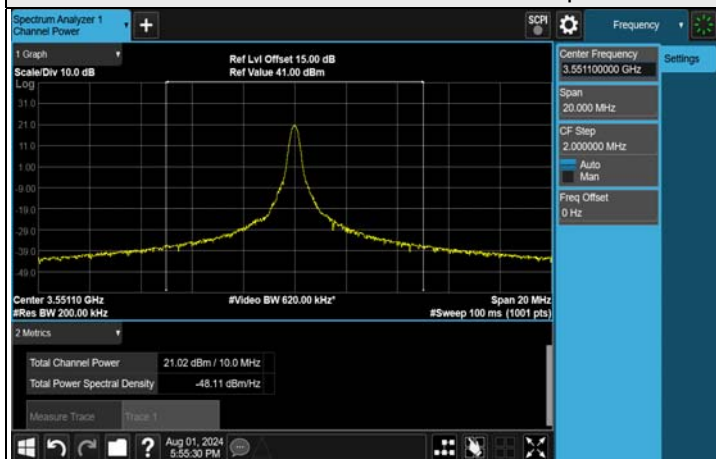
| Modulation | RB Size | RB Offset | Measurement Conducted Power (dBm) |          |          |
|------------|---------|-----------|-----------------------------------|----------|----------|
|            |         |           | CH 55340                          | CH 55990 | CH 56640 |
|            |         |           | 3560 MHz                          | 3625 MHz | 3690 MHz |
| QPSK       | 1       | 0         | 21.02                             | 20.86    | 20.78    |
|            | 1       | 50        | 20.92                             | 20.82    | 20.76    |
|            | 1       | 99        | 20.88                             | 20.86    | 20.73    |
|            | 50      | 0         | 19.95                             | 19.91    | 19.86    |
|            | 50      | 25        | 19.94                             | 19.88    | 19.81    |
|            | 50      | 50        | 19.91                             | 19.86    | 19.77    |
|            | 100     | 0         | 19.96                             | 19.96    | 19.80    |
| 16QAM      | 1       | 0         | 19.89                             | 19.79    | 19.78    |
|            | 1       | 50        | 19.89                             | 19.87    | 19.78    |
|            | 1       | 99        | 19.84                             | 19.87    | 19.75    |
|            | 50      | 0         | 18.90                             | 18.82    | 18.68    |
|            | 50      | 25        | 18.81                             | 18.68    | 18.56    |
|            | 50      | 50        | 18.74                             | 18.73    | 18.56    |
|            | 100     | 0         | 18.88                             | 18.85    | 18.73    |
| 64QAM      | 1       | 0         | 18.82                             | 18.78    | 18.64    |
|            | 1       | 50        | 18.82                             | 18.83    | 18.60    |
|            | 1       | 99        | 18.75                             | 18.66    | 18.56    |
|            | 50      | 0         | 17.81                             | 17.76    | 17.61    |
|            | 50      | 25        | 17.84                             | 17.76    | 17.70    |
|            | 50      | 50        | 17.72                             | 17.66    | 17.69    |
|            | 100     | 0         | 17.82                             | 17.74    | 17.67    |
| 256QAM     | 1       | 0         | 16.03                             | 15.97    | 15.93    |
|            | 1       | 50        | 16.01                             | 15.97    | 15.82    |
|            | 1       | 99        | 15.96                             | 15.94    | 15.85    |
|            | 50      | 0         | 15.96                             | 15.93    | 15.83    |
|            | 50      | 25        | 15.98                             | 15.96    | 15.92    |
|            | 50      | 50        | 15.90                             | 15.90    | 15.83    |
|            | 100     | 0         | 15.98                             | 15.88    | 15.77    |

### Output Power

| Modulation | Minimum Cond. Power (dBm) | Maximum Cond. Power (dBm) | Minimum EIRP (dBm) | Maximum EIRP (dBm) | EIRP Limit (dBm) |
|------------|---------------------------|---------------------------|--------------------|--------------------|------------------|
| QPSK       | 19.77                     | 21.02                     | 17.27              | 18.52              | 23.00            |
| 16QAM      | 18.56                     | 19.89                     | 16.06              | 17.39              | 23.00            |
| 64QAM      | 17.61                     | 18.83                     | 15.11              | 16.33              | 23.00            |
| 256QAM     | 15.77                     | 16.03                     | 13.27              | 13.53              | 23.00            |

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

### Spectrum Plot of Worst Value



QPSK CH 55340 (3560 MHz)

Note: For the channel bandwidth is less than or equal to 10 MHz, the full power test data please refer to the power per 10 MHz corresponding to the channel bandwidth.

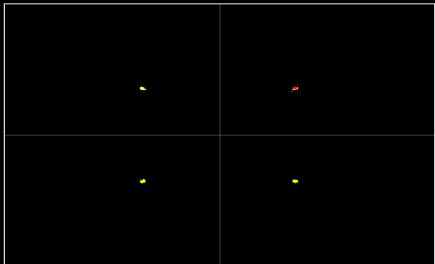
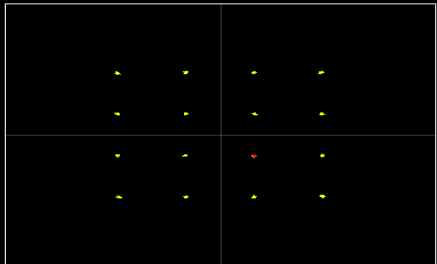
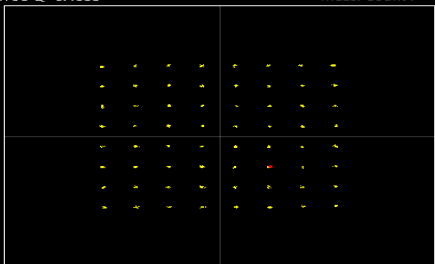
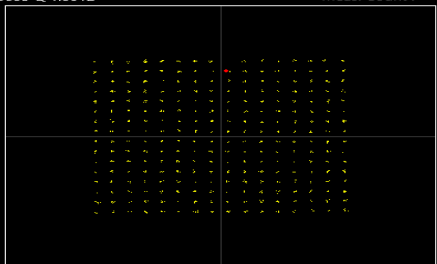


## 7.2 Modulation Characteristics

|              |          |                           |              |            |            |
|--------------|----------|---------------------------|--------------|------------|------------|
| Input Power: | 3.87 Vdc | Environmental Conditions: | 22°C, 68% RH | Tested By: | Noah Chang |
|--------------|----------|---------------------------|--------------|------------|------------|

### 7.2.1 LTE Band 48

#### LTE Band 48 - Ant 5, Channel Bandwidth: 20 MHz

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                            |           |                  |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------|------------------|---------------------|---------------------|-------------------|-------|-------|---------|--|-----------------|--------|--------|------------|--|--------------|--------|--------|---------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------|-----------|------------------|---------------------|-------------------|-------|-------|---------|--|-----------------|--------|--------|------------|--|--------------|--------|--------|---------------|--|
| <div>Fundamental &gt; Constellation</div> <div>31 Symbol<br/>I 0.7079 Q 0.7188</div> <div>Meas. Count : 1/ 1</div> <div></div> <div>Q</div> <div>I</div> <table><tr><td>EVM</td><td>Avg. 1.26</td><td>Max. 1.26</td><td>Min. 1.26 %(rms)</td><td>Limit ≤ 17.5 %(rms)</td></tr><tr><td>Peak Vector Error</td><td>21.91</td><td>21.91</td><td>21.91 %</td><td></td></tr><tr><td>Carrier Leakage</td><td>-47.27</td><td>-47.27</td><td>-47.27 dBc</td><td></td></tr><tr><td>IQ Imbalance</td><td>100.38</td><td>100.38</td><td>100.38 %(I/Q)</td><td></td></tr></table>   | EVM                        | Avg. 1.26 | Max. 1.26        | Min. 1.26 %(rms)    | Limit ≤ 17.5 %(rms) | Peak Vector Error | 21.91 | 21.91 | 21.91 % |  | Carrier Leakage | -47.27 | -47.27 | -47.27 dBc |  | IQ Imbalance | 100.38 | 100.38 | 100.38 %(I/Q) |  | <div>Fundamental &gt; Constellation</div> <div>31 Symbol<br/>I 0.3275 Q -0.3162</div> <div>Meas. Count : 1/ 1</div> <div></div> <div>Q</div> <div>I</div> <table><tr><td>EVM</td><td>Avg. 1.48</td><td>Max. 1.48</td><td>Min. 1.48 %(rms)</td><td>Limit ≤ 12.5 %(rms)</td></tr><tr><td>Peak Vector Error</td><td>29.88</td><td>29.88</td><td>29.88 %</td><td></td></tr><tr><td>Carrier Leakage</td><td>-45.85</td><td>-45.85</td><td>-45.85 dBc</td><td></td></tr><tr><td>IQ Imbalance</td><td>100.37</td><td>100.37</td><td>100.37 %(I/Q)</td><td></td></tr></table> | EVM | Avg. 1.48 | Max. 1.48 | Min. 1.48 %(rms) | Limit ≤ 12.5 %(rms) | Peak Vector Error | 29.88 | 29.88 | 29.88 % |  | Carrier Leakage | -45.85 | -45.85 | -45.85 dBc |  | IQ Imbalance | 100.37 | 100.37 | 100.37 %(I/Q) |  |
| EVM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Avg. 1.26                  | Max. 1.26 | Min. 1.26 %(rms) | Limit ≤ 17.5 %(rms) |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| Peak Vector Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 21.91                      | 21.91     | 21.91 %          |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| Carrier Leakage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -47.27                     | -47.27    | -47.27 dBc       |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| IQ Imbalance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 100.38                     | 100.38    | 100.38 %(I/Q)    |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| EVM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Avg. 1.48                  | Max. 1.48 | Min. 1.48 %(rms) | Limit ≤ 12.5 %(rms) |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| Peak Vector Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 29.88                      | 29.88     | 29.88 %          |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| Carrier Leakage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -45.85                     | -45.85    | -45.85 dBc       |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| IQ Imbalance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 100.37                     | 100.37    | 100.37 %(I/Q)    |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| QPSK CH 55990 (3625 MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 16QAM CH 55990 (3625 MHz)  |           |                  |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| <div>Fundamental &gt; Constellation</div> <div>31 Symbol<br/>I 0.4798 Q -0.4688</div> <div>Meas. Count : 1/ 1</div> <div></div> <div>Q</div> <div>I</div> <table><tr><td>EVM</td><td>Avg. 1.46</td><td>Max. 1.46</td><td>Min. 1.46 %(rms)</td><td>Limit ≤ 8.0 %(rms)</td></tr><tr><td>Peak Vector Error</td><td>18.71</td><td>18.71</td><td>18.71 %</td><td></td></tr><tr><td>Carrier Leakage</td><td>-43.42</td><td>-43.42</td><td>-43.42 dBc</td><td></td></tr><tr><td>IQ Imbalance</td><td>100.35</td><td>100.35</td><td>100.35 %(I/Q)</td><td></td></tr></table> | EVM                        | Avg. 1.46 | Max. 1.46        | Min. 1.46 %(rms)    | Limit ≤ 8.0 %(rms)  | Peak Vector Error | 18.71 | 18.71 | 18.71 % |  | Carrier Leakage | -43.42 | -43.42 | -43.42 dBc |  | IQ Imbalance | 100.35 | 100.35 | 100.35 %(I/Q) |  | <div>Fundamental &gt; Constellation</div> <div>31 Symbol<br/>I 0.0605 Q 1.0012</div> <div>Meas. Count : 1/ 1</div> <div></div> <div>Q</div> <div>I</div> <table><tr><td>EVM</td><td>Avg. 1.41</td><td>Max. 1.41</td><td>Min. 1.41 %(rms)</td><td>Limit</td></tr><tr><td>Peak Vector Error</td><td>9.19</td><td>9.19</td><td>9.19 %</td><td></td></tr><tr><td>Carrier Leakage</td><td>-42.45</td><td>-42.45</td><td>-42.45 dBc</td><td></td></tr><tr><td>IQ Imbalance</td><td>100.36</td><td>100.36</td><td>100.36 %(I/Q)</td><td></td></tr></table>                 | EVM | Avg. 1.41 | Max. 1.41 | Min. 1.41 %(rms) | Limit               | Peak Vector Error | 9.19  | 9.19  | 9.19 %  |  | Carrier Leakage | -42.45 | -42.45 | -42.45 dBc |  | IQ Imbalance | 100.36 | 100.36 | 100.36 %(I/Q) |  |
| EVM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Avg. 1.46                  | Max. 1.46 | Min. 1.46 %(rms) | Limit ≤ 8.0 %(rms)  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| Peak Vector Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 18.71                      | 18.71     | 18.71 %          |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| Carrier Leakage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -43.42                     | -43.42    | -43.42 dBc       |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| IQ Imbalance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 100.35                     | 100.35    | 100.35 %(I/Q)    |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| EVM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Avg. 1.41                  | Max. 1.41 | Min. 1.41 %(rms) | Limit               |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| Peak Vector Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 9.19                       | 9.19      | 9.19 %           |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| Carrier Leakage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -42.45                     | -42.45    | -42.45 dBc       |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| IQ Imbalance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 100.36                     | 100.36    | 100.36 %(I/Q)    |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |
| 64QAM CH 55990 (3625 MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 256QAM CH 55990 (3625 MHz) |           |                  |                     |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |           |           |                  |                     |                   |       |       |         |  |                 |        |        |            |  |              |        |        |               |  |

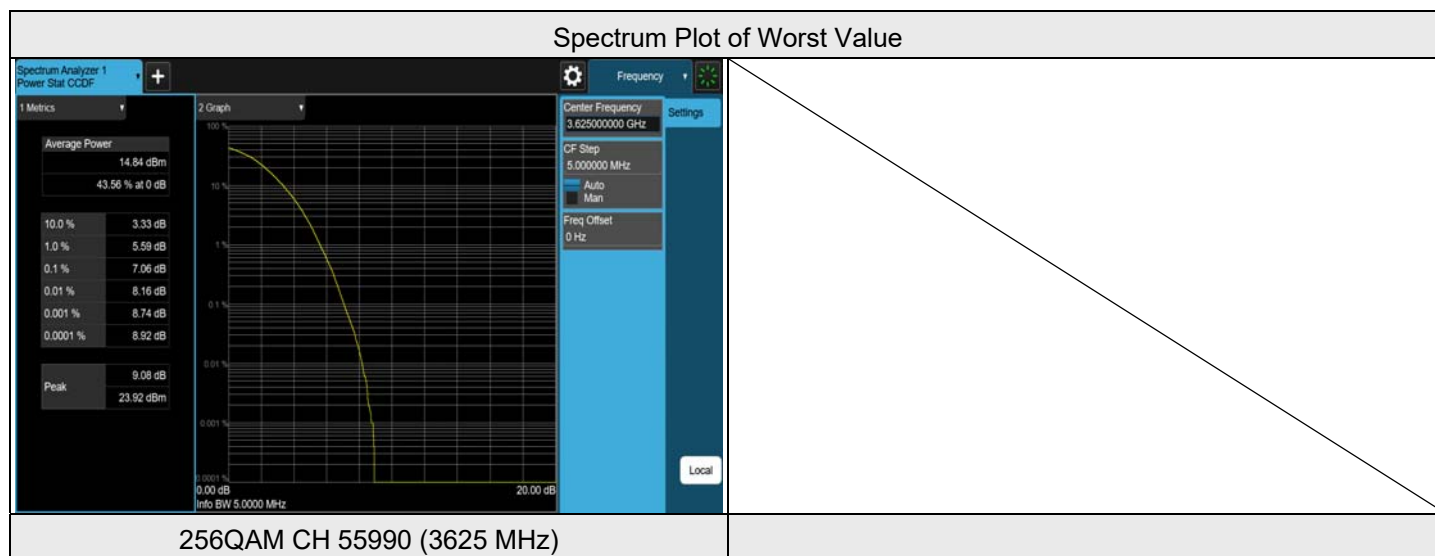
### 7.3 Peak to Average Ratio

|              |          |                           |              |            |            |
|--------------|----------|---------------------------|--------------|------------|------------|
| Input Power: | 3.87 Vdc | Environmental Conditions: | 22°C, 68% RH | Tested By: | Noah Chang |
|--------------|----------|---------------------------|--------------|------------|------------|

#### 7.3.1 LTE Band 48

##### LTE Band 48 - Ant 5, Channel Bandwidth: 5 MHz

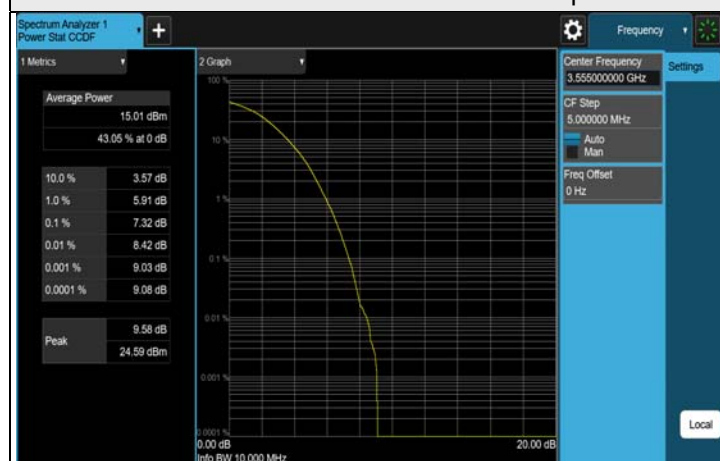
| Modulation | Channel | Frequency (MHz) | Measurement Value(dB) | Limit (dB) | Result |
|------------|---------|-----------------|-----------------------|------------|--------|
| QPSK       | 55265   | 3552.5          | 6.06                  | 13         | PASS   |
| QPSK       | 55990   | 3625            | 5.53                  | 13         | PASS   |
| QPSK       | 56715   | 3697.5          | 6.10                  | 13         | PASS   |
| 16QAM      | 55265   | 3552.5          | 6.81                  | 13         | PASS   |
| 16QAM      | 55990   | 3625            | 6.66                  | 13         | PASS   |
| 16QAM      | 56715   | 3697.5          | 6.92                  | 13         | PASS   |
| 64QAM      | 55265   | 3552.5          | 6.96                  | 13         | PASS   |
| 64QAM      | 55990   | 3625            | 7.02                  | 13         | PASS   |
| 64QAM      | 56715   | 3697.5          | 6.81                  | 13         | PASS   |
| 256QAM     | 55265   | 3552.5          | 7.05                  | 13         | PASS   |
| 256QAM     | 55990   | 3625            | 7.06                  | 13         | PASS   |
| 256QAM     | 56715   | 3697.5          | 6.91                  | 13         | PASS   |



# LTE Band 48 - Ant 5, Channel Bandwidth: 10 MHz

| Modulation | Channel | Frequency (MHz) | Measurement Value(dB) | Limit (dB) | Result |
|------------|---------|-----------------|-----------------------|------------|--------|
| QPSK       | 55290   | 3555            | 6.08                  | 13         | PASS   |
| QPSK       | 55990   | 3625            | 5.76                  | 13         | PASS   |
| QPSK       | 56690   | 3695            | 5.95                  | 13         | PASS   |
| 16QAM      | 55290   | 3555            | 6.66                  | 13         | PASS   |
| 16QAM      | 55990   | 3625            | 6.50                  | 13         | PASS   |
| 16QAM      | 56690   | 3695            | 6.63                  | 13         | PASS   |
| 64QAM      | 55290   | 3555            | 6.87                  | 13         | PASS   |
| 64QAM      | 55990   | 3625            | 7.00                  | 13         | PASS   |
| 64QAM      | 56690   | 3695            | 6.96                  | 13         | PASS   |
| 256QAM     | 55290   | 3555            | 7.32                  | 13         | PASS   |
| 256QAM     | 55990   | 3625            | 7.08                  | 13         | PASS   |
| 256QAM     | 56690   | 3695            | 7.00                  | 13         | PASS   |

Spectrum Plot of Worst Value

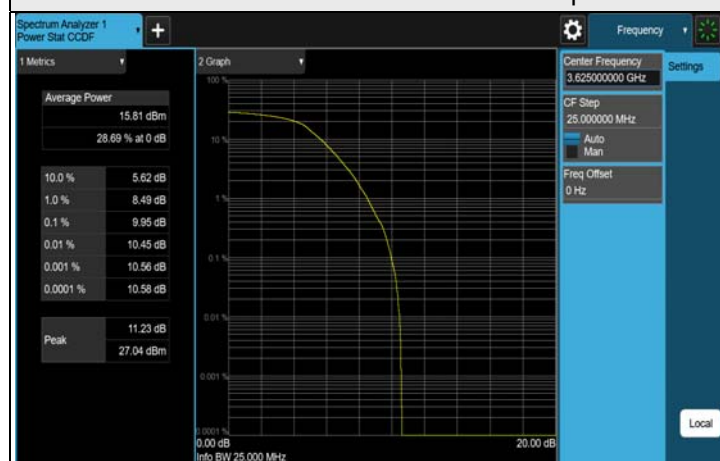


256QAM CH 55290 (3555 MHz)

# LTE Band 48 - Ant 5, Channel Bandwidth: 15 MHz

| Modulation | Channel | Frequency (MHz) | Measurement Value(dB) | Limit (dB) | Result |
|------------|---------|-----------------|-----------------------|------------|--------|
| QPSK       | 55315   | 3557.5          | 5.78                  | 13         | PASS   |
| QPSK       | 55990   | 3625            | 9.95                  | 13         | PASS   |
| QPSK       | 56665   | 3692.5          | 5.91                  | 13         | PASS   |
| 16QAM      | 55315   | 3557.5          | 7.01                  | 13         | PASS   |
| 16QAM      | 55990   | 3625            | 6.34                  | 13         | PASS   |
| 16QAM      | 56665   | 3692.5          | 6.68                  | 13         | PASS   |
| 64QAM      | 55315   | 3557.5          | 6.92                  | 13         | PASS   |
| 64QAM      | 55990   | 3625            | 6.63                  | 13         | PASS   |
| 64QAM      | 56665   | 3692.5          | 6.84                  | 13         | PASS   |
| 256QAM     | 55315   | 3557.5          | 7.08                  | 13         | PASS   |
| 256QAM     | 55990   | 3625            | 7.24                  | 13         | PASS   |
| 256QAM     | 56665   | 3692.5          | 7.26                  | 13         | PASS   |

Spectrum Plot of Worst Value

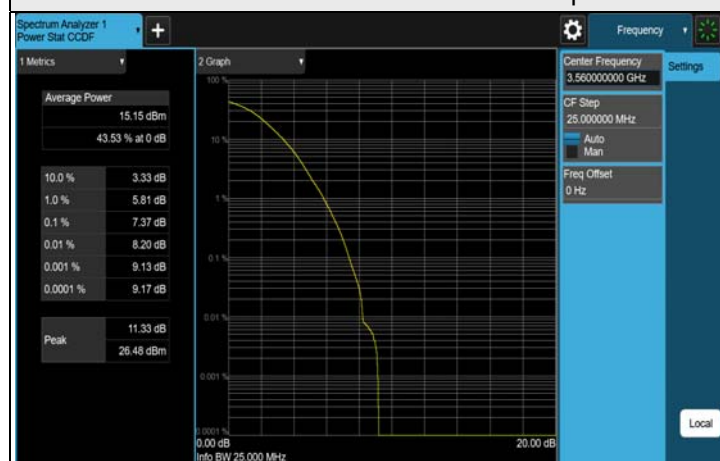


QPSK CH 55990 (3625 MHz)

# LTE Band 48 - Ant 5, Channel Bandwidth: 20 MHz

| Modulation | Channel | Frequency (MHz) | Measurement Value(dB) | Limit (dB) | Result |
|------------|---------|-----------------|-----------------------|------------|--------|
| QPSK       | 55340   | 3560            | 5.92                  | 13         | PASS   |
| QPSK       | 55990   | 3625            | 6.34                  | 13         | PASS   |
| QPSK       | 56640   | 3690            | 6.36                  | 13         | PASS   |
| 16QAM      | 55340   | 3560            | 6.40                  | 13         | PASS   |
| 16QAM      | 55990   | 3625            | 6.34                  | 13         | PASS   |
| 16QAM      | 56640   | 3690            | 6.71                  | 13         | PASS   |
| 64QAM      | 55340   | 3560            | 6.87                  | 13         | PASS   |
| 64QAM      | 55990   | 3625            | 6.91                  | 13         | PASS   |
| 64QAM      | 56640   | 3690            | 6.92                  | 13         | PASS   |
| 256QAM     | 55340   | 3560            | 7.37                  | 13         | PASS   |
| 256QAM     | 55990   | 3625            | 7.09                  | 13         | PASS   |
| 256QAM     | 56640   | 3690            | 7.05                  | 13         | PASS   |

Spectrum Plot of Worst Value



256QAM CH 55340 (3560 MHz)

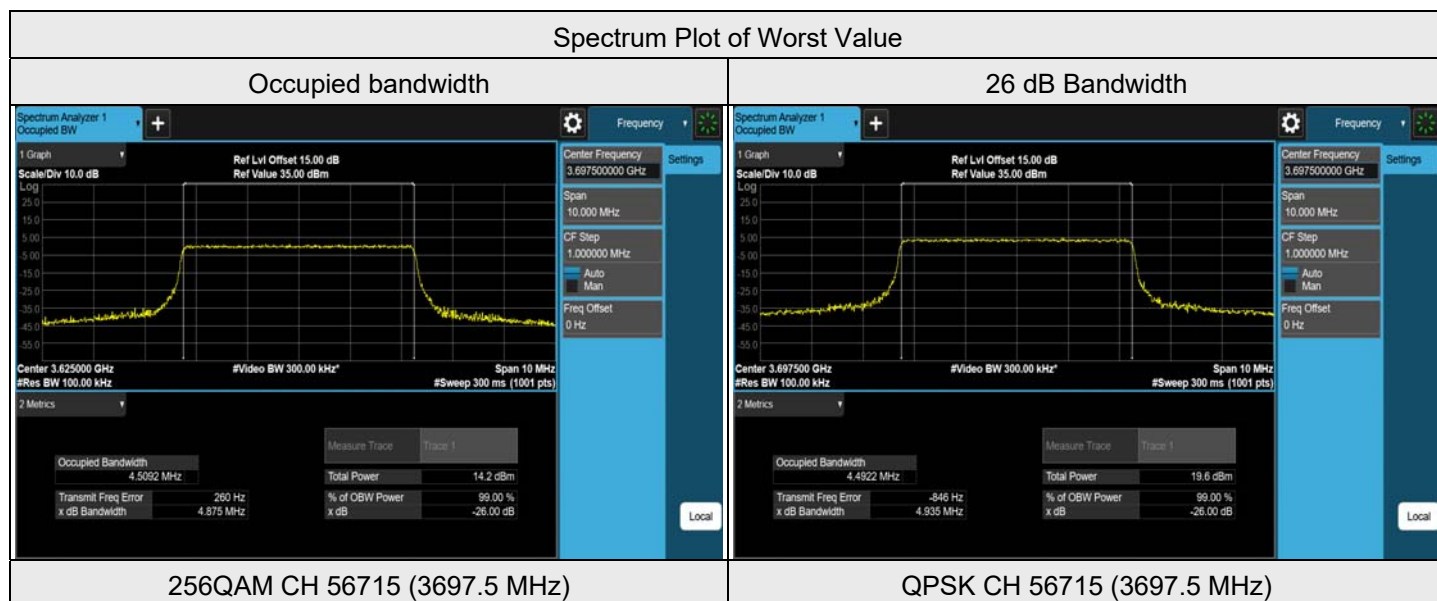
## 7.4 Bandwidth

|              |          |                           |              |            |            |
|--------------|----------|---------------------------|--------------|------------|------------|
| Input Power: | 3.87 Vdc | Environmental Conditions: | 22°C, 68% RH | Tested By: | Noah Chang |
|--------------|----------|---------------------------|--------------|------------|------------|

### 7.4.1 LTE Band 48

#### LTE Band 48 - Ant 5, Channel Bandwidth: 5 MHz

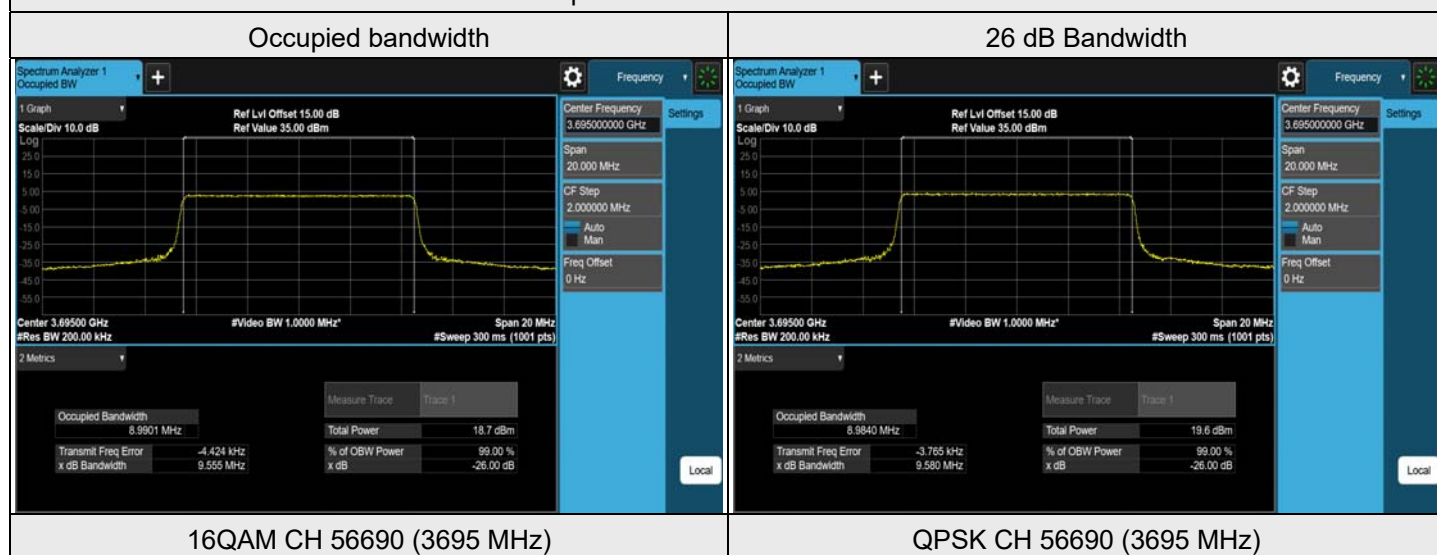
| Modulation | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
|------------|---------|-----------------|--------------------------|-----------------------|
| QPSK       | 55265   | 3552.5          | 4.4886                   | 4.838                 |
| QPSK       | 55990   | 3625            | 4.4918                   | 4.902                 |
| QPSK       | 56715   | 3697.5          | 4.4922                   | 4.935                 |
| 16QAM      | 55265   | 3552.5          | 4.5020                   | 4.867                 |
| 16QAM      | 55990   | 3625            | 4.4869                   | 4.858                 |
| 16QAM      | 56715   | 3697.5          | 4.4892                   | 4.872                 |
| 64QAM      | 55265   | 3552.5          | 4.5009                   | 4.865                 |
| 64QAM      | 55990   | 3625            | 4.4932                   | 4.853                 |
| 64QAM      | 56715   | 3697.5          | 4.5030                   | 4.898                 |
| 256QAM     | 55265   | 3552.5          | 4.4956                   | 4.862                 |
| 256QAM     | 55990   | 3625            | 4.4896                   | 4.890                 |
| 256QAM     | 56715   | 3697.5          | 4.5092                   | 4.875                 |



# LTE Band 48 - Ant 5, Channel Bandwidth: 10 MHz

| Modulation | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
|------------|---------|-----------------|--------------------------|-----------------------|
| QPSK       | 55290   | 3555            | 8.9785                   | 9.542                 |
| QPSK       | 55990   | 3625            | 8.9773                   | 9.539                 |
| QPSK       | 56690   | 3695            | 8.9840                   | 9.580                 |
| 16QAM      | 55290   | 3555            | 8.9822                   | 9.553                 |
| 16QAM      | 55990   | 3625            | 8.9743                   | 9.565                 |
| 16QAM      | 56690   | 3695            | 8.9901                   | 9.555                 |
| 64QAM      | 55290   | 3555            | 8.9811                   | 9.523                 |
| 64QAM      | 55990   | 3625            | 8.9699                   | 9.522                 |
| 64QAM      | 56690   | 3695            | 8.9817                   | 9.536                 |
| 256QAM     | 55290   | 3555            | 8.9757                   | 9.553                 |
| 256QAM     | 55990   | 3625            | 8.9770                   | 9.523                 |
| 256QAM     | 56690   | 3695            | 8.9788                   | 9.512                 |

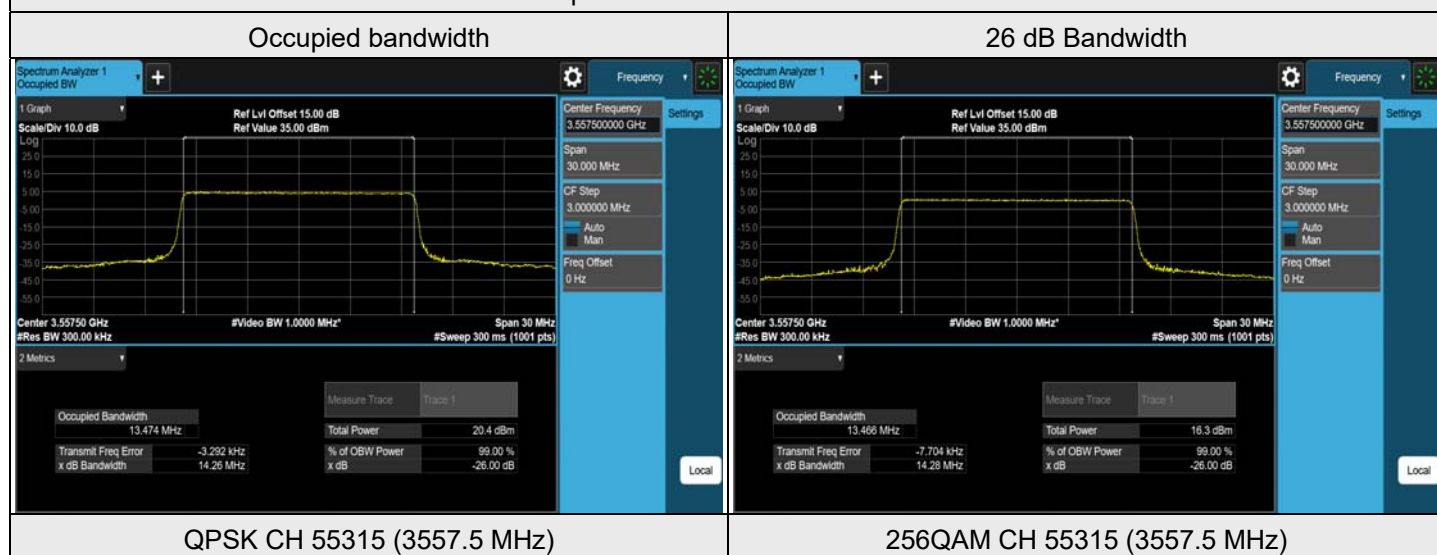
## Spectrum Plot of Worst Value



# LTE Band 48 - Ant 5, Channel Bandwidth: 15 MHz

| Modulation | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
|------------|---------|-----------------|--------------------------|-----------------------|
| QPSK       | 55315   | 3557.5          | 13.4744                  | 14.260                |
| QPSK       | 55990   | 3625            | 13.4639                  | 14.246                |
| QPSK       | 56665   | 3692.5          | 13.4506                  | 14.247                |
| 16QAM      | 55315   | 3557.5          | 13.4578                  | 14.264                |
| 16QAM      | 55990   | 3625            | 13.4584                  | 14.235                |
| 16QAM      | 56665   | 3692.5          | 13.4596                  | 14.257                |
| 64QAM      | 55315   | 3557.5          | 13.4700                  | 14.249                |
| 64QAM      | 55990   | 3625            | 13.4714                  | 14.246                |
| 64QAM      | 56665   | 3692.5          | 13.4582                  | 14.233                |
| 256QAM     | 55315   | 3557.5          | 13.4660                  | 14.279                |
| 256QAM     | 55990   | 3625            | 13.4598                  | 14.233                |
| 256QAM     | 56665   | 3692.5          | 13.4679                  | 14.272                |

## Spectrum Plot of Worst Value

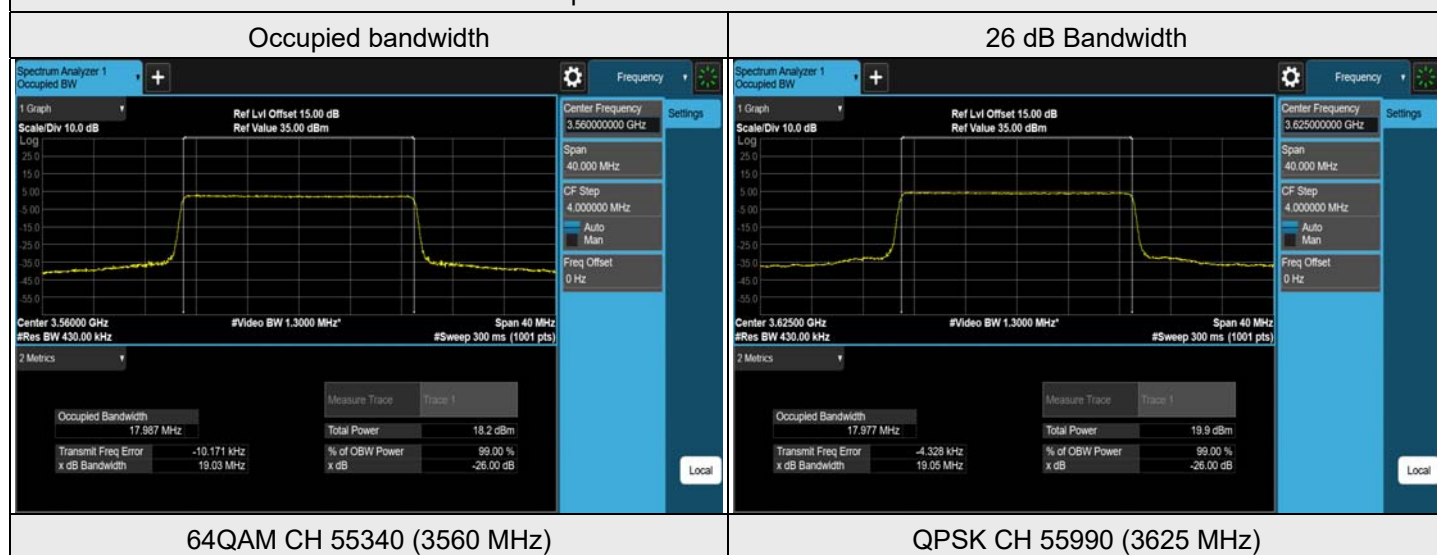




### LTE Band 48 - Ant 5, Channel Bandwidth: 20 MHz

| Modulation | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
|------------|---------|-----------------|--------------------------|-----------------------|
| QPSK       | 55340   | 3560            | 17.9780                  | 19.050                |
| QPSK       | 55990   | 3625            | 17.9774                  | 19.054                |
| QPSK       | 56640   | 3690            | 17.9648                  | 19.034                |
| 16QAM      | 55340   | 3560            | 17.9684                  | 19.053                |
| 16QAM      | 55990   | 3625            | 17.9782                  | 19.028                |
| 16QAM      | 56640   | 3690            | 17.9721                  | 19.033                |
| 64QAM      | 55340   | 3560            | 17.9868                  | 19.025                |
| 64QAM      | 55990   | 3625            | 17.9666                  | 19.025                |
| 64QAM      | 56640   | 3690            | 17.9585                  | 19.029                |
| 256QAM     | 55340   | 3560            | 17.9666                  | 19.030                |
| 256QAM     | 55990   | 3625            | 17.9647                  | 19.031                |
| 256QAM     | 56640   | 3690            | 17.9707                  | 19.039                |

### Spectrum Plot of Worst Value

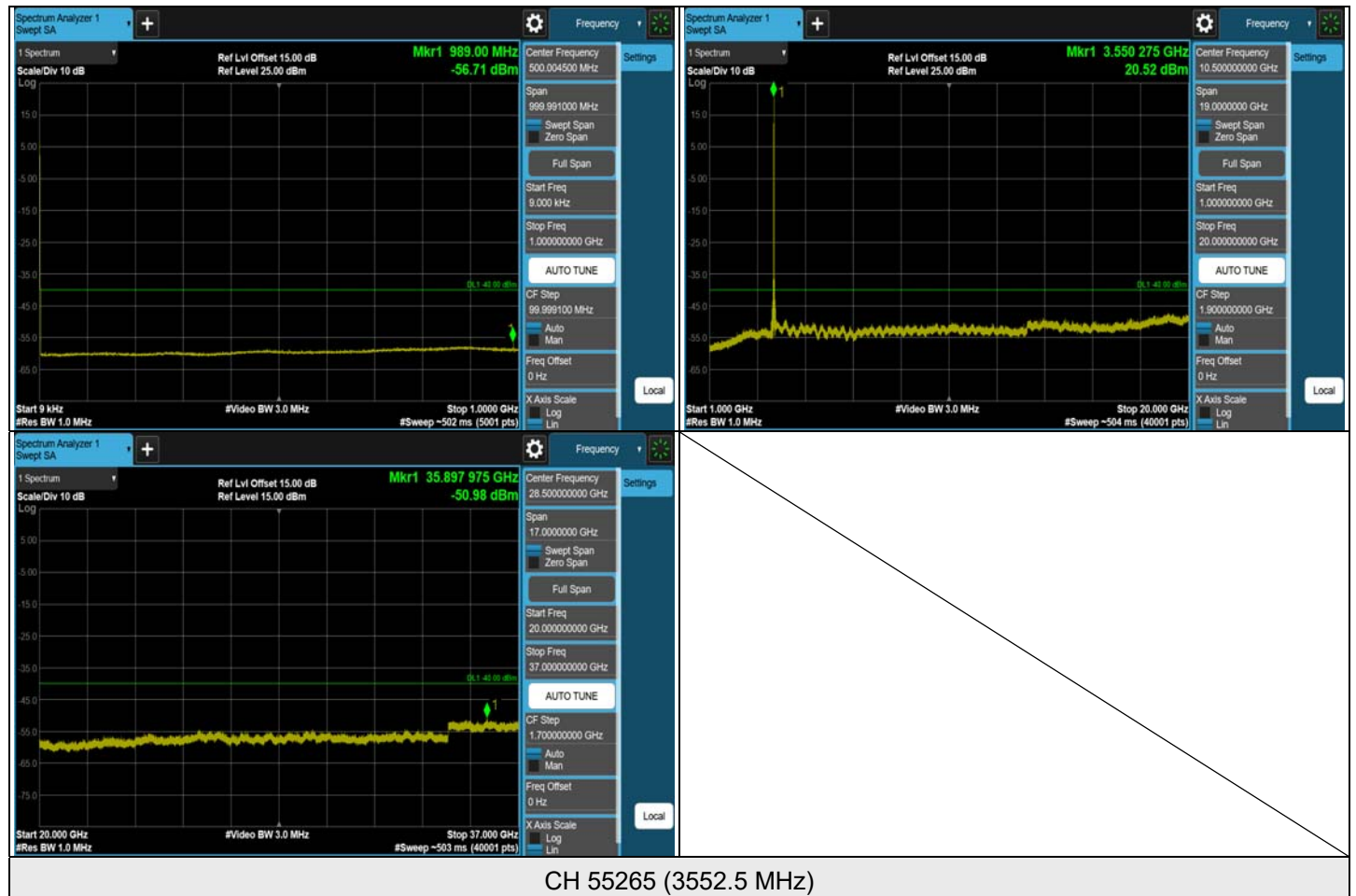


## 7.5 Conducted Spurious Emissions

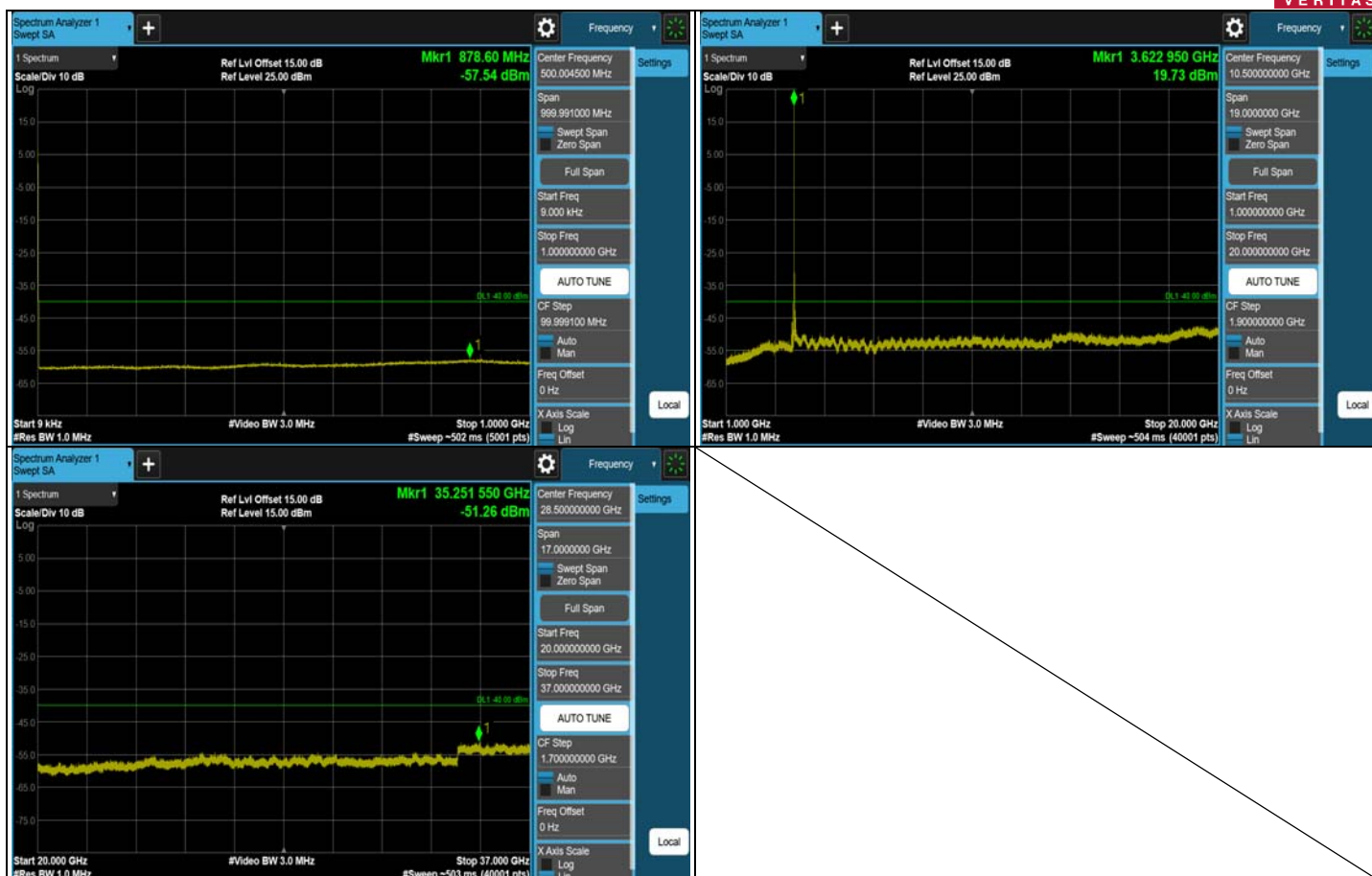
|              |          |                           |              |            |            |
|--------------|----------|---------------------------|--------------|------------|------------|
| Input Power: | 3.87 Vdc | Environmental Conditions: | 22°C, 68% RH | Tested By: | Noah Chang |
|--------------|----------|---------------------------|--------------|------------|------------|

### 7.5.1 LTE Band 48

#### LTE Band 48 - Ant 5, Channel Bandwidth: 5 MHz

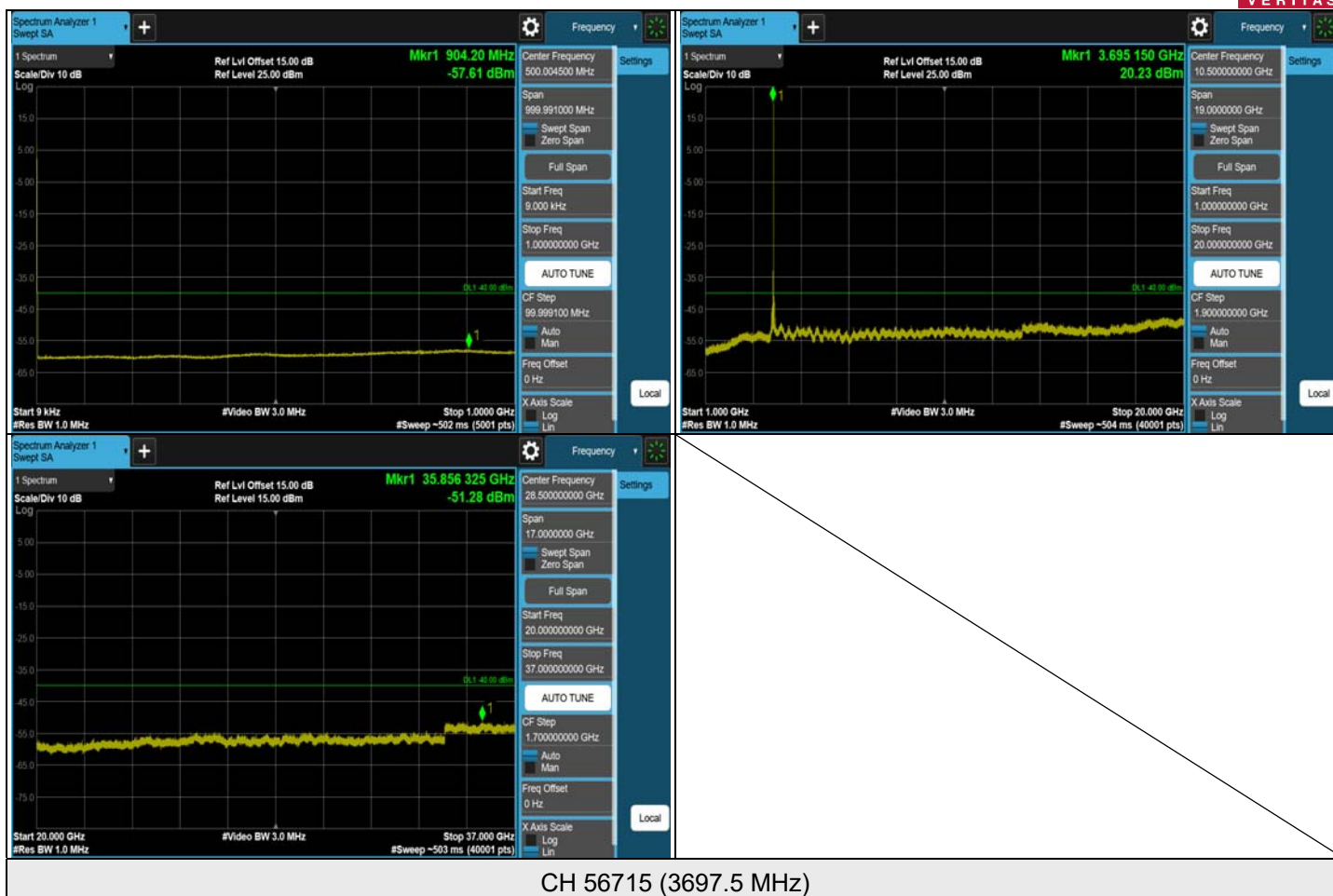


Note: The signal at 9 kHz is IF signal from spectrum analyzer.



CH 55990 (3625 MHz)

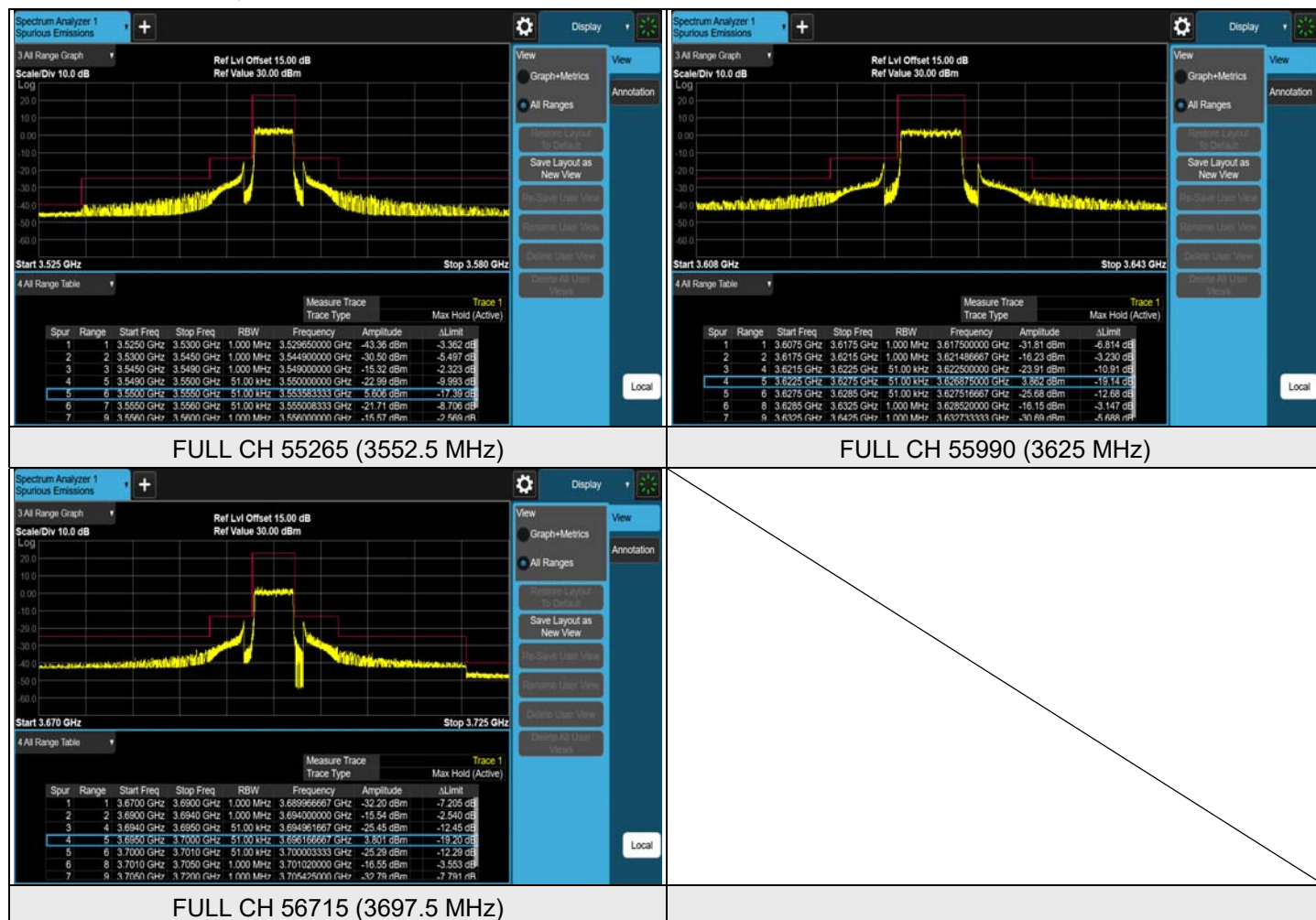
Note: The signal at 9 kHz is IF signal from spectrum analyzer.

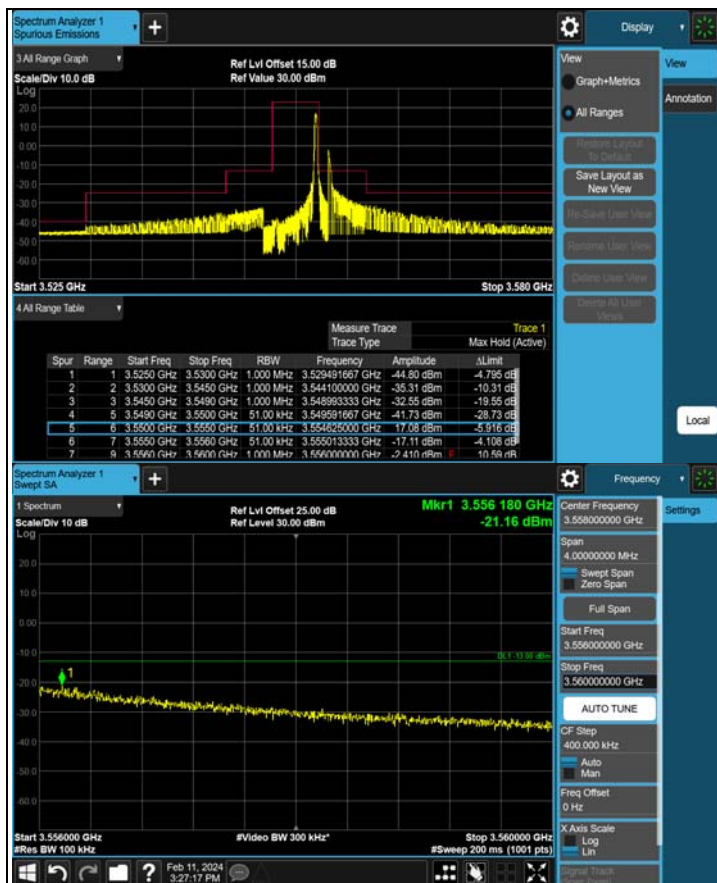


CH 56715 (3697.5 MHz)

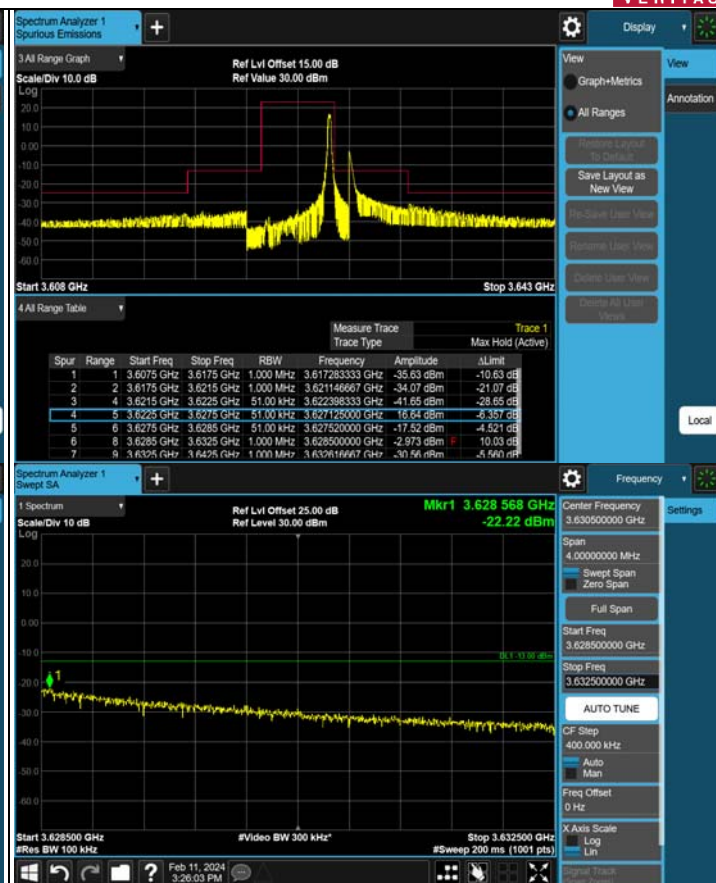
Note: The signal at 9 kHz is IF signal from spectrum analyzer.

## LTE Band 48 - Ant 5, Channel Bandwidth: 5 MHz

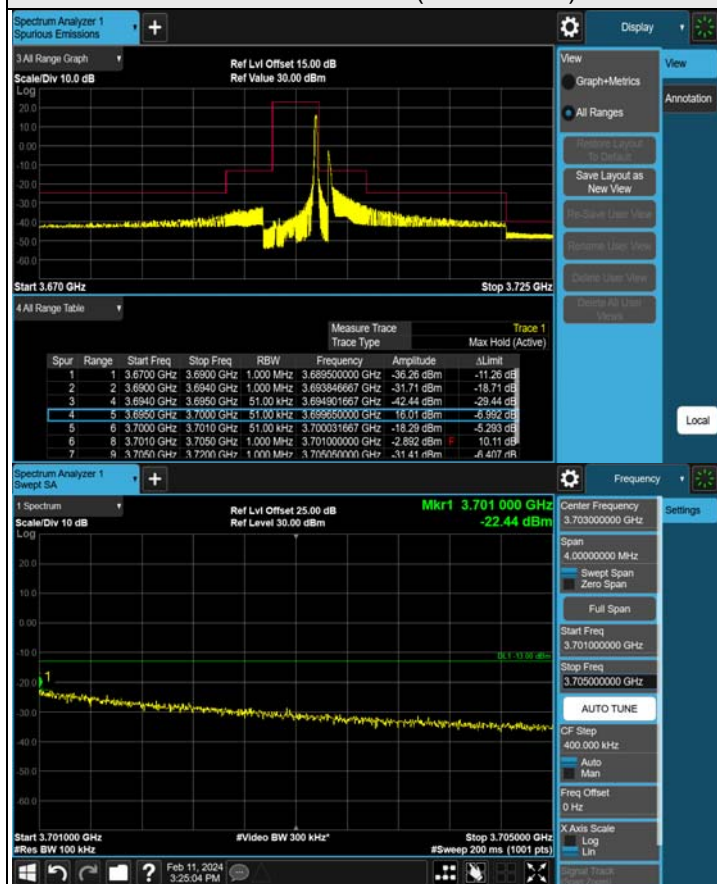




1RB#MAX CH 55265 (3552.5 MHz)

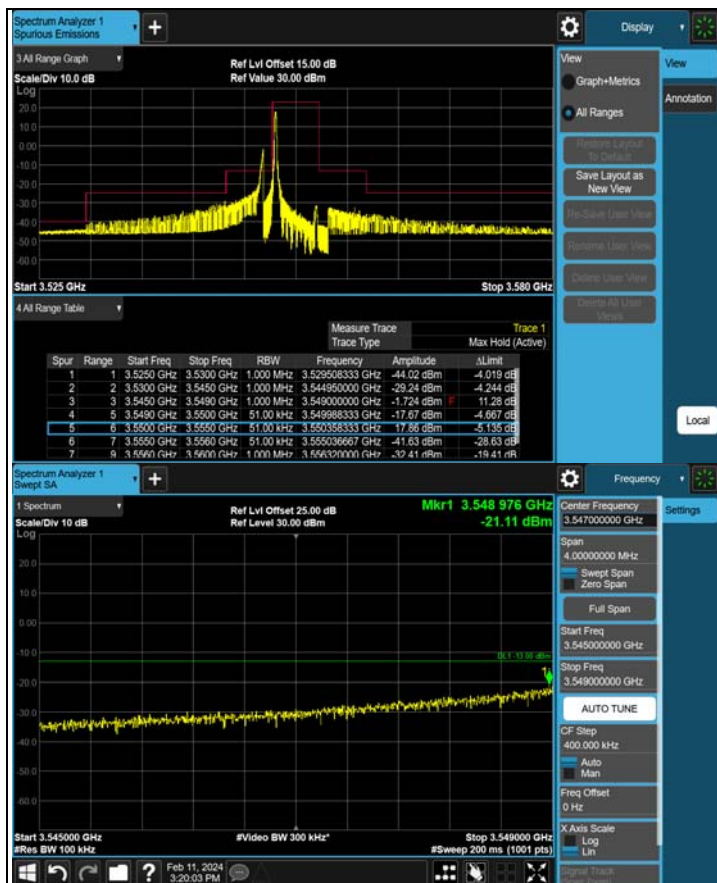


1RB#MAX CH 55990 (3625 MHz)

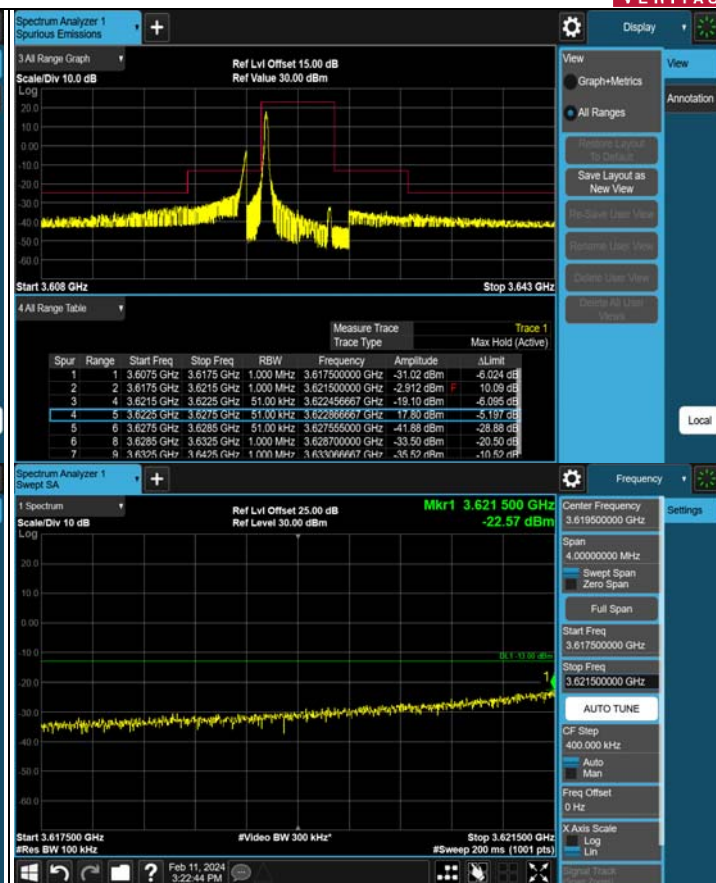


1RB#MAX CH 56715 (3697.5 MHz)

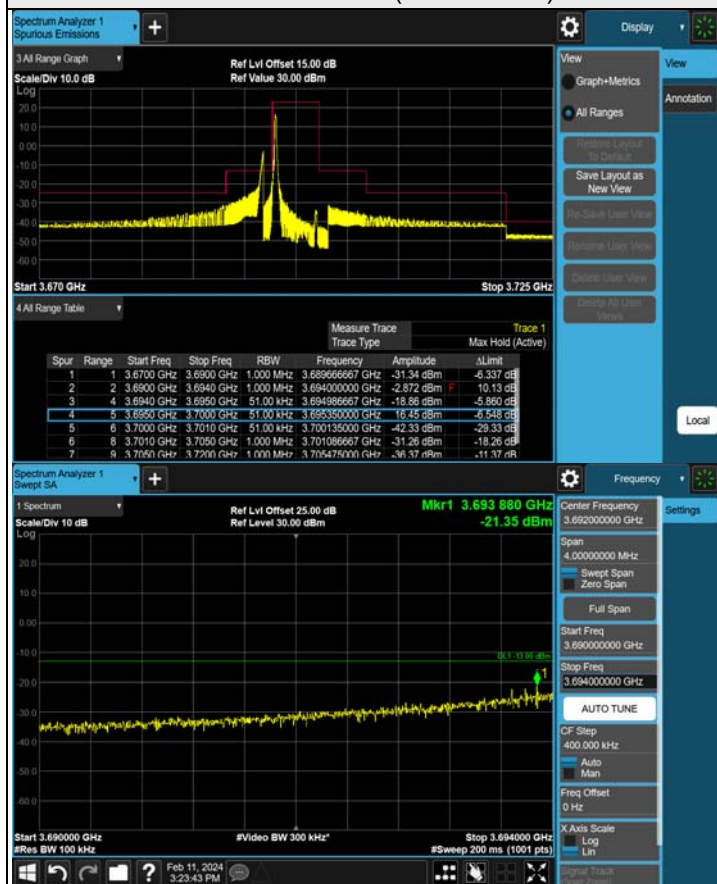




1RB#0 CH 55265 (3552.5 MHz)

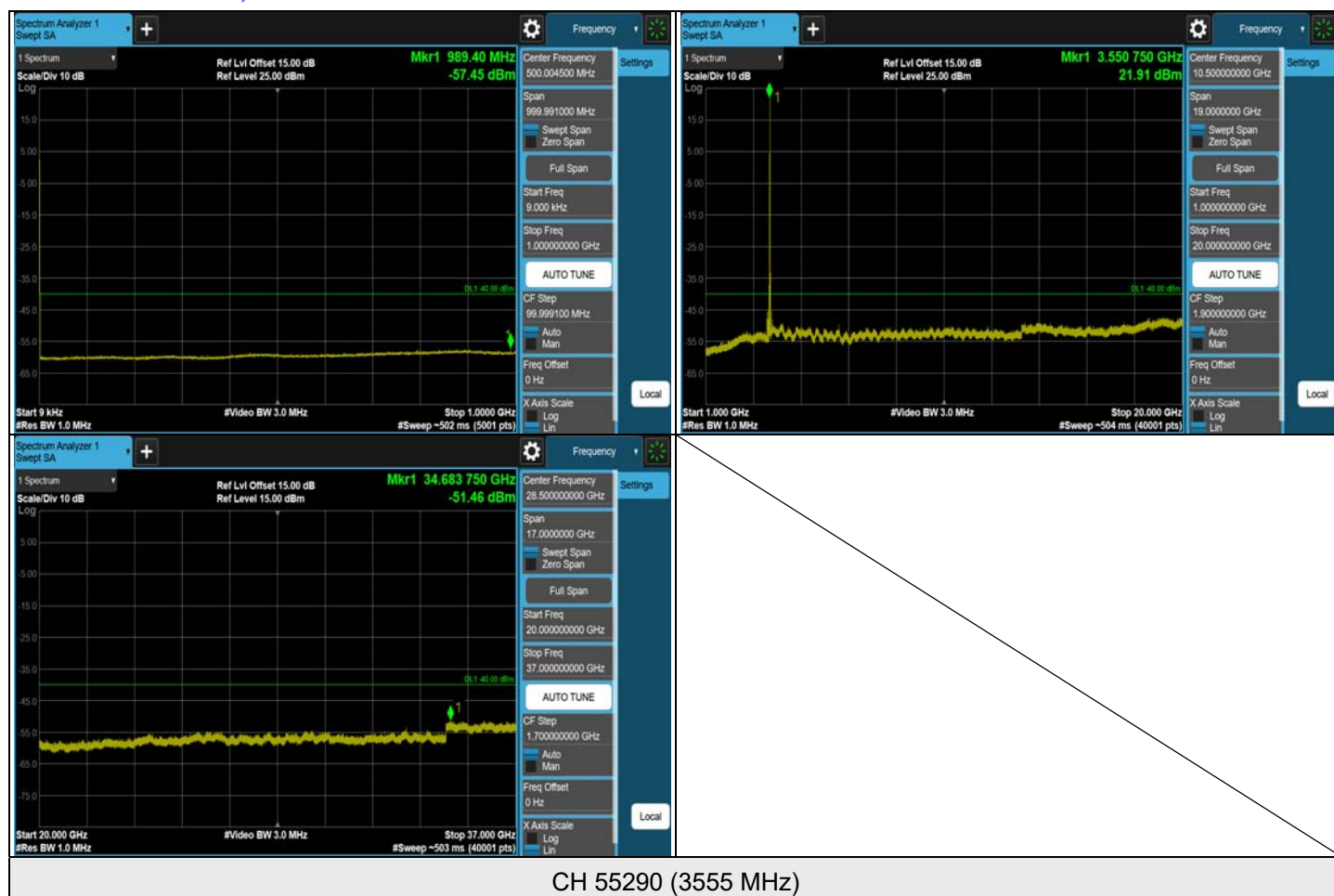


1RB#0 CH 55990 (3625 MHz)



1RB#0 CH 56715 (3697.5 MHz)

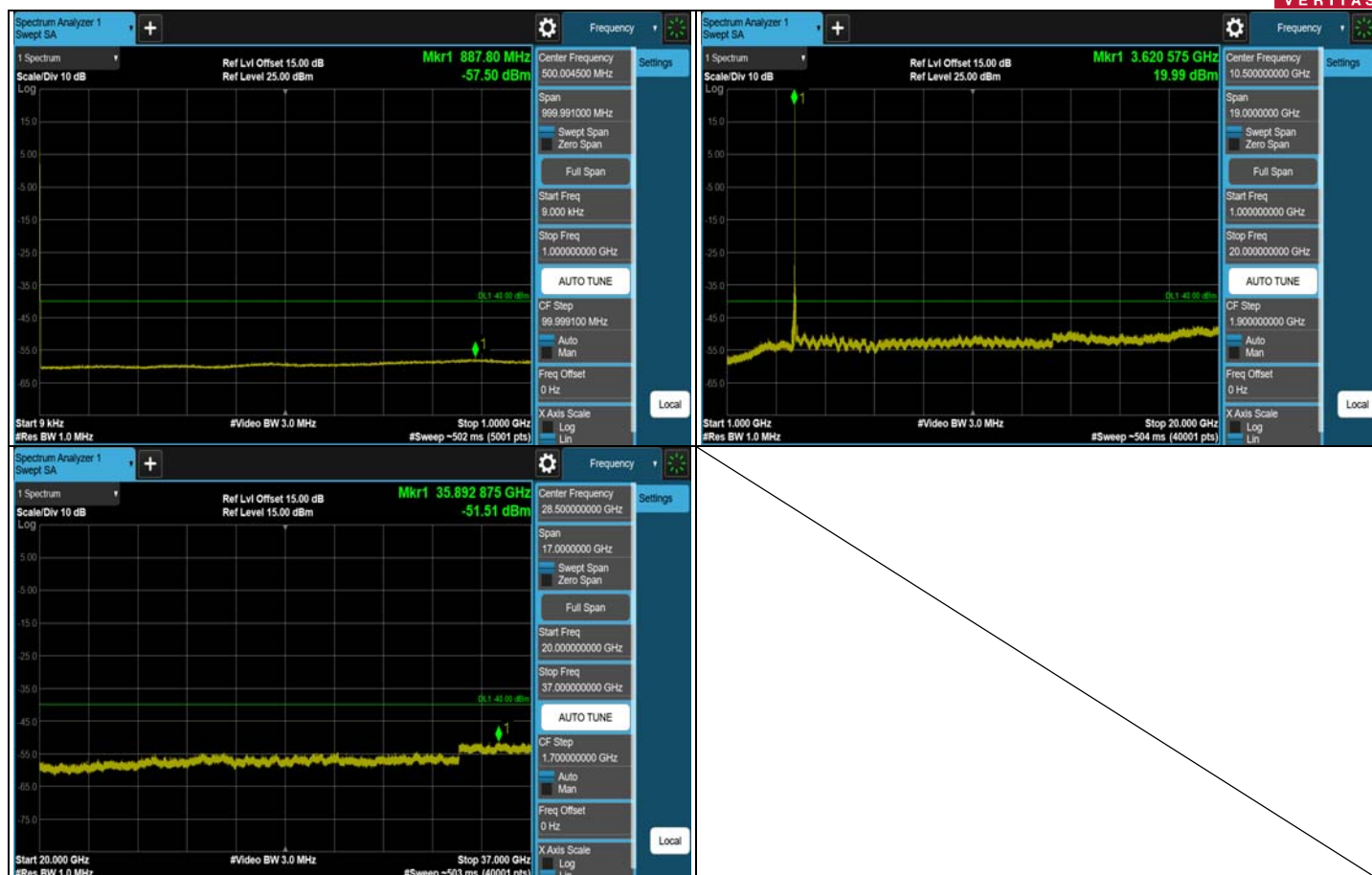
## LTE Band 48 - Ant 5, Channel Bandwidth: 10 MHz



CH 55290 (3555 MHz)

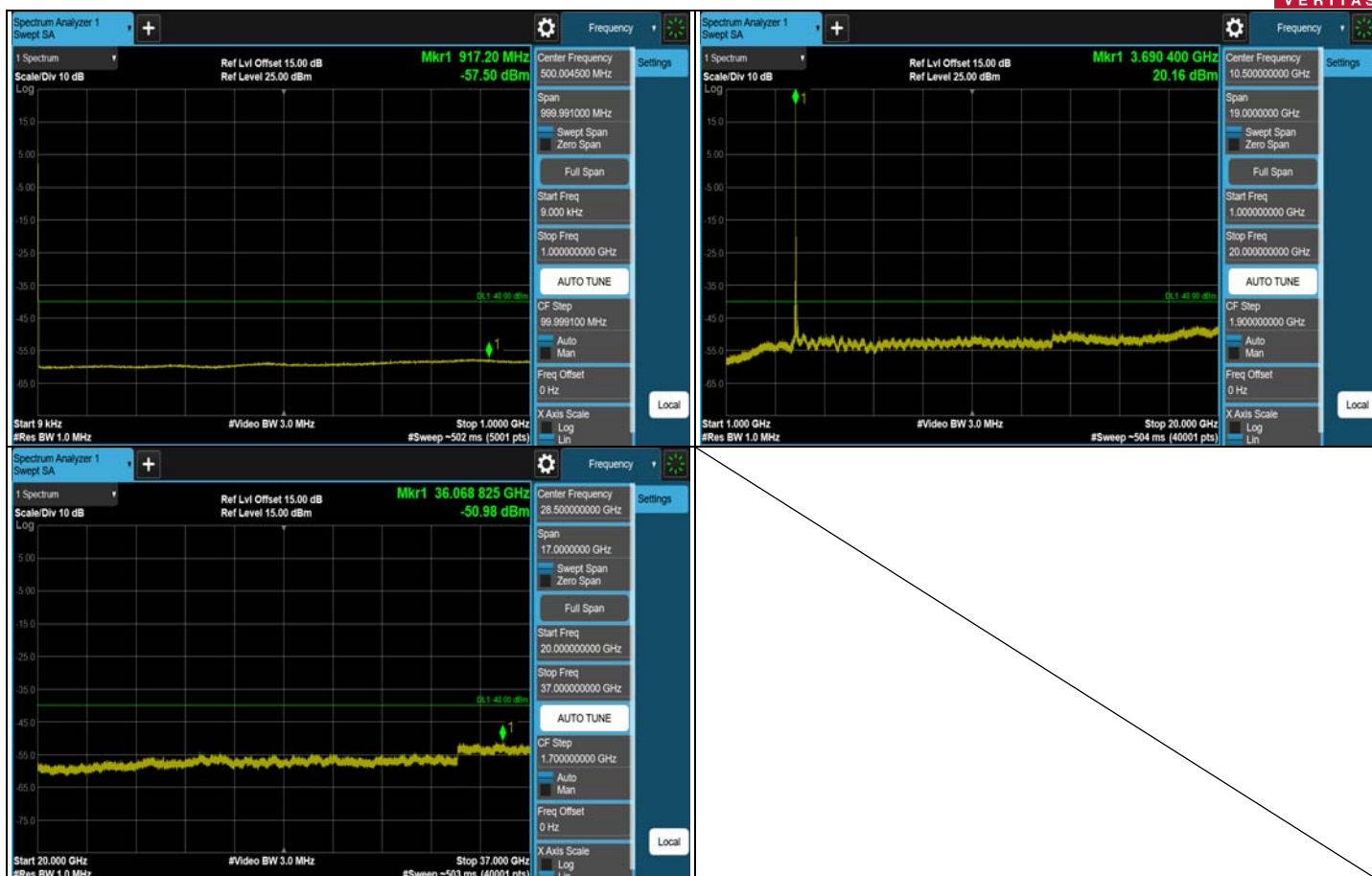
Note: The signal at 9 kHz is IF signal from spectrum analyzer.





CH 55990 (3625 MHz)

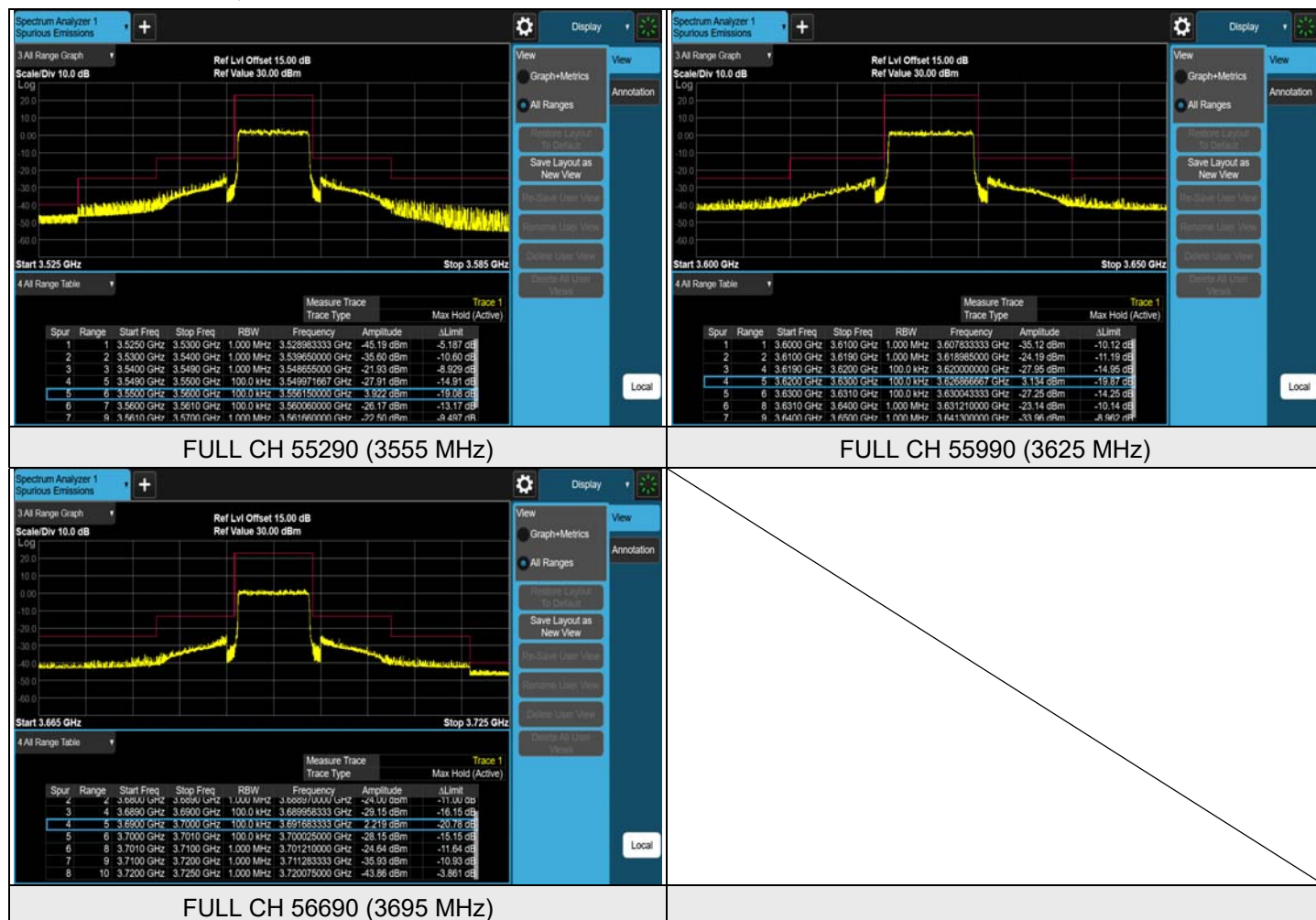
Note: The signal at 9 kHz is IF signal from spectrum analyzer.

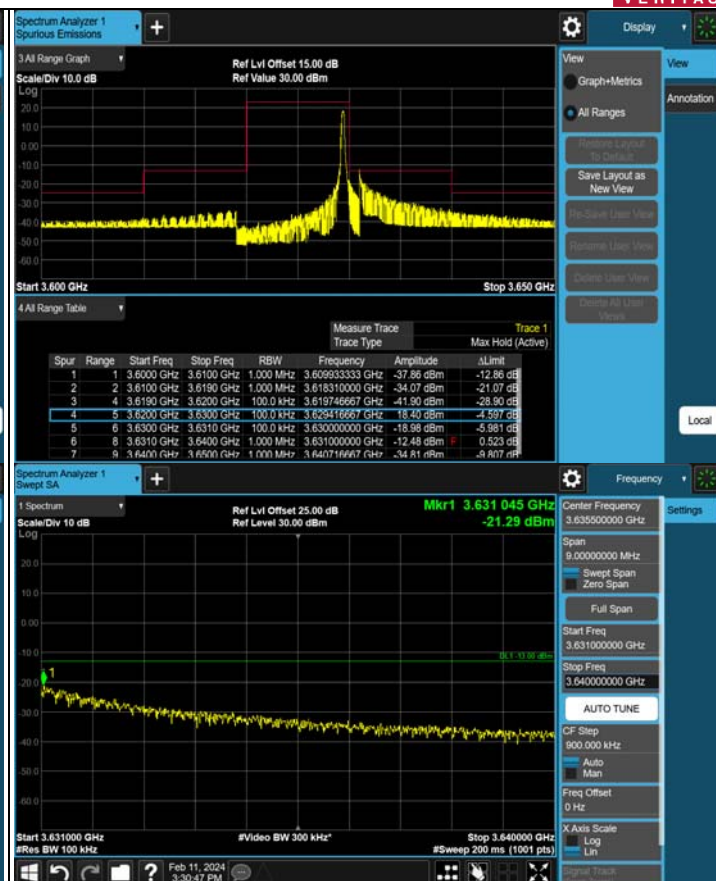
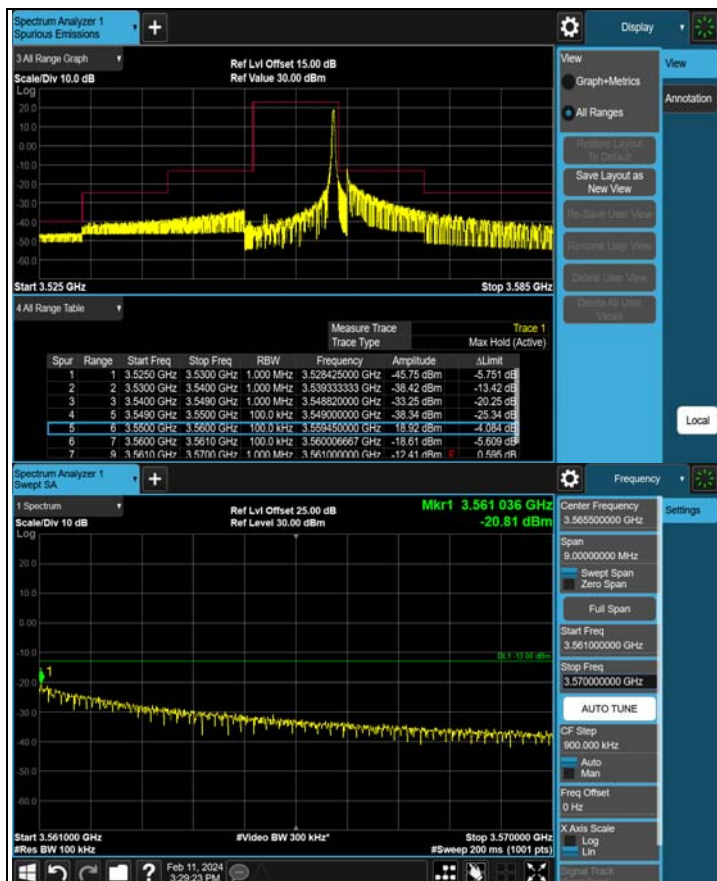


CH 56690 (3695 MHz)

Note: The signal at 9 kHz is IF signal from spectrum analyzer.

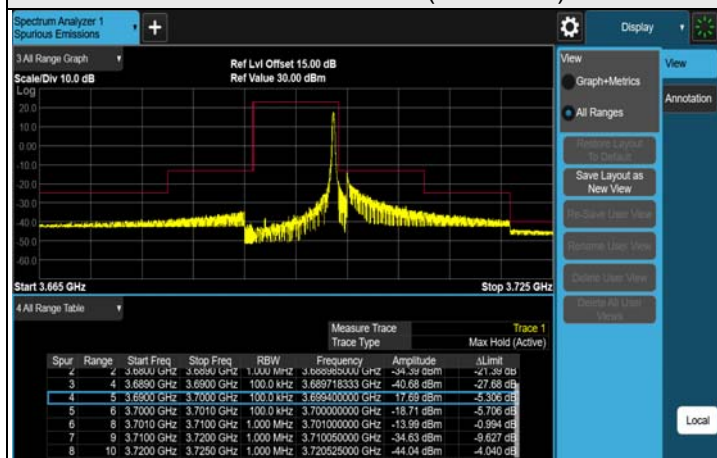
## LTE Band 48 - Ant 5, Channel Bandwidth: 10 MHz



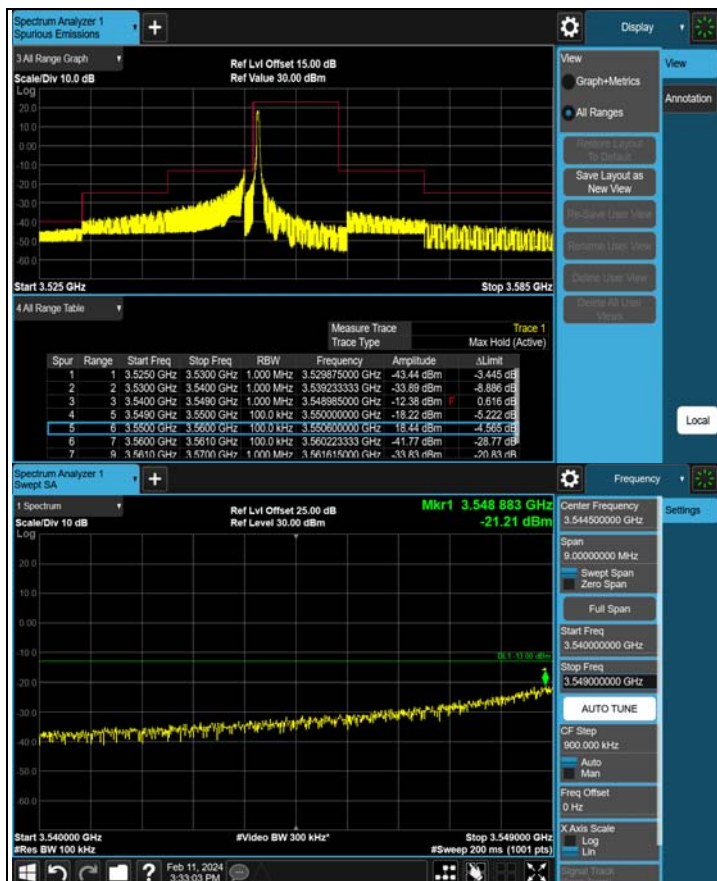


1RB#MAX CH 55290 (3555 MHz)

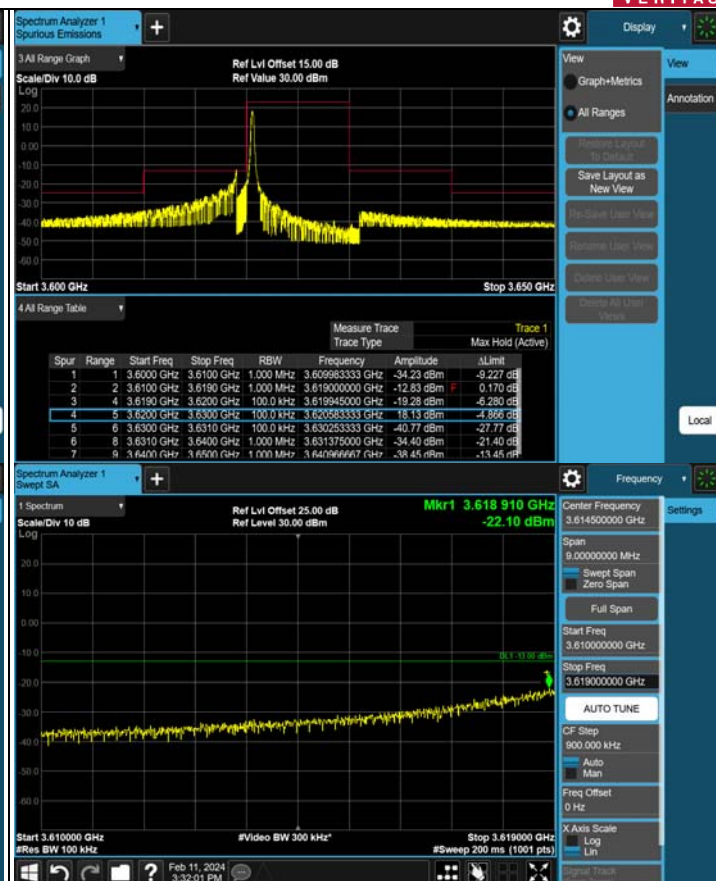
1RB#MAX CH 55990 (3625 MHz)



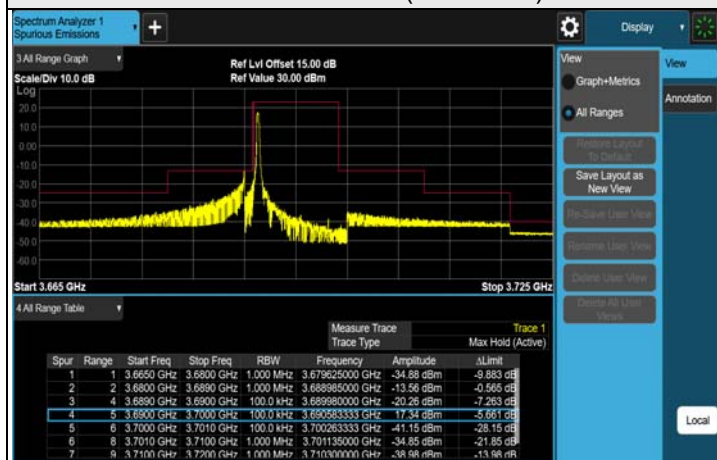
1RB#MAX CH 56690 (3695 MHz)



1RB#0 CH 55290 (3555 MHz)



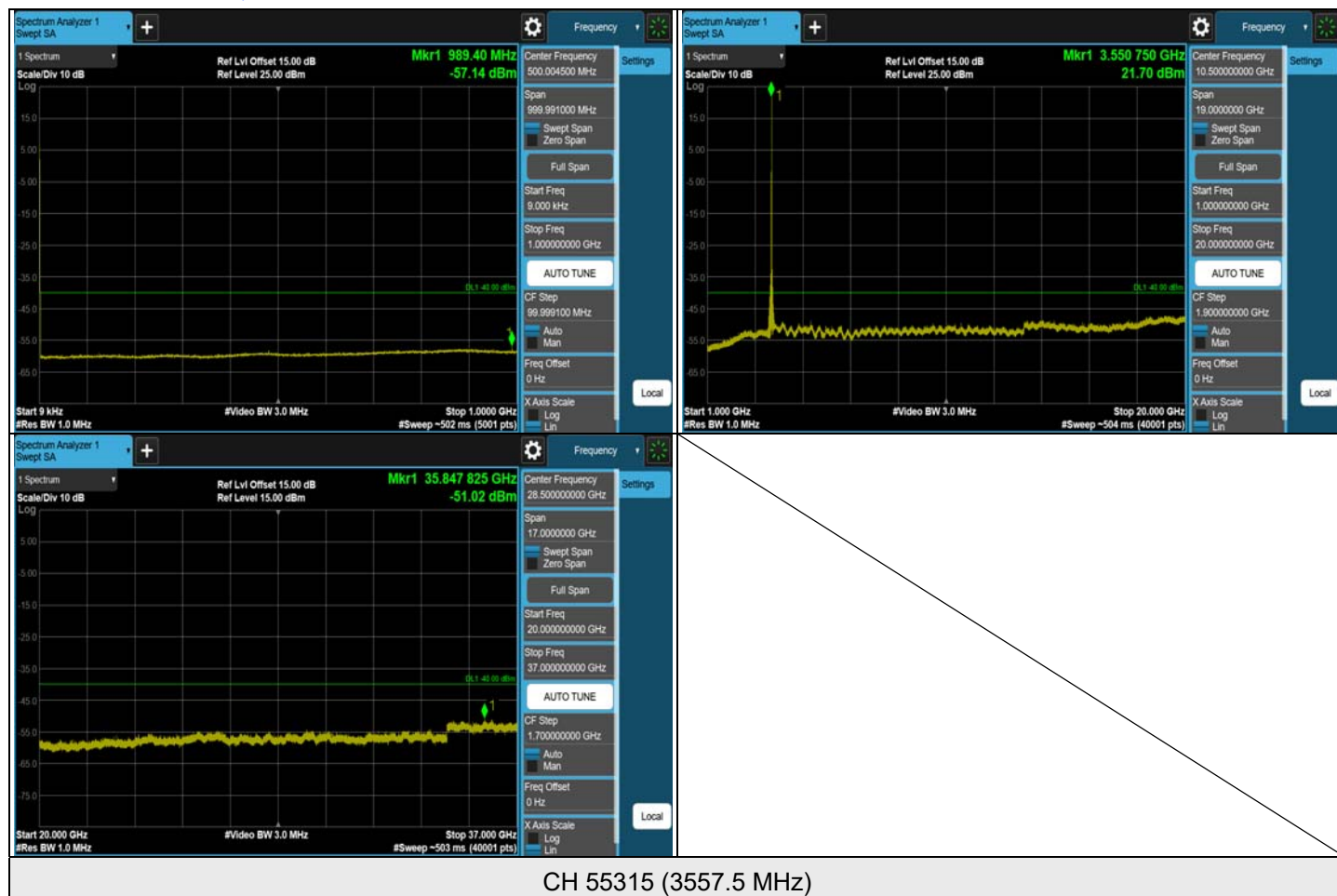
1RB#0 CH 55990 (3625 MHz)



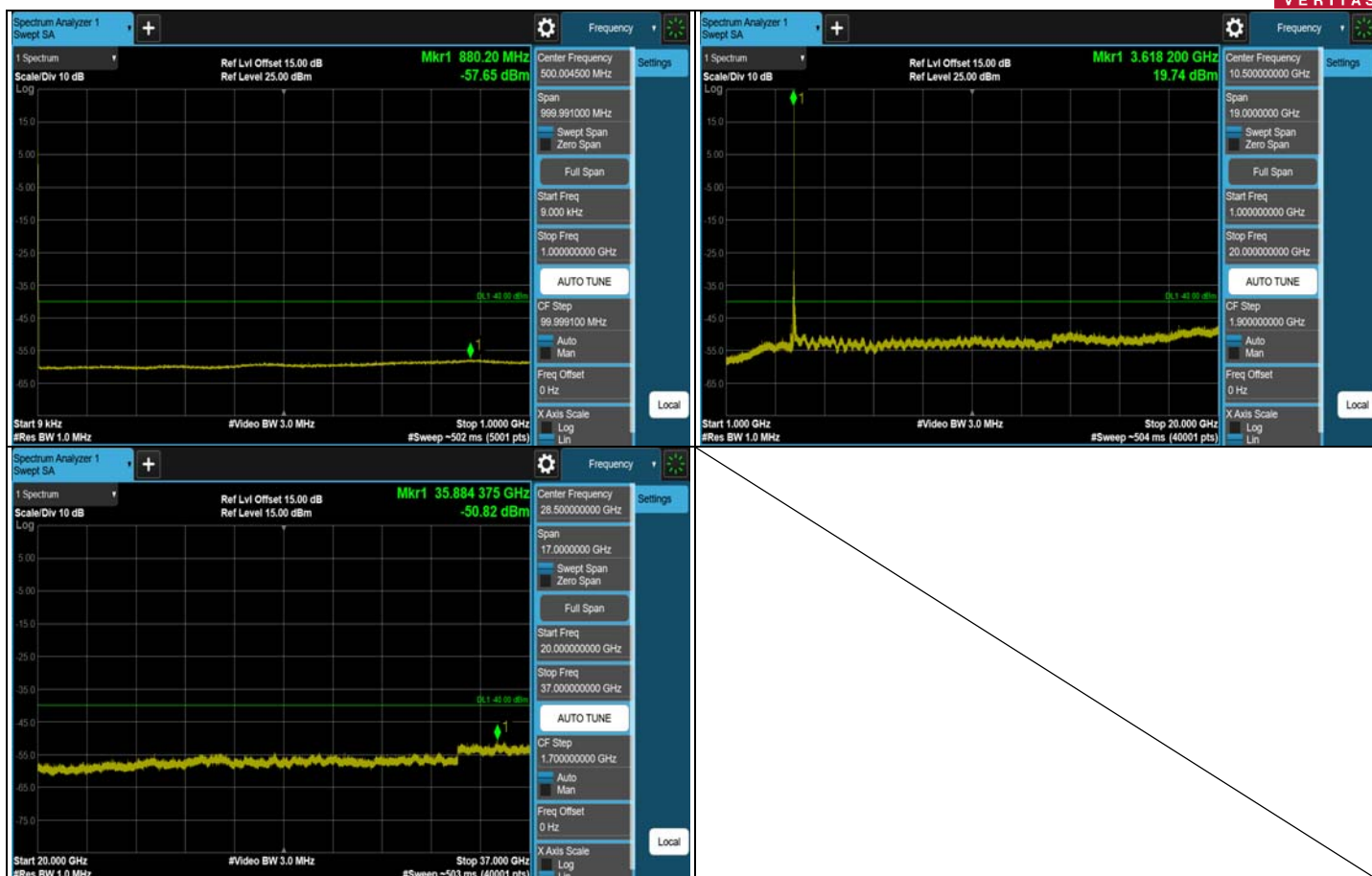
1RB#0 CH 56690 (3695 MHz)



## LTE Band 48 - Ant 5, Channel Bandwidth: 15 MHz

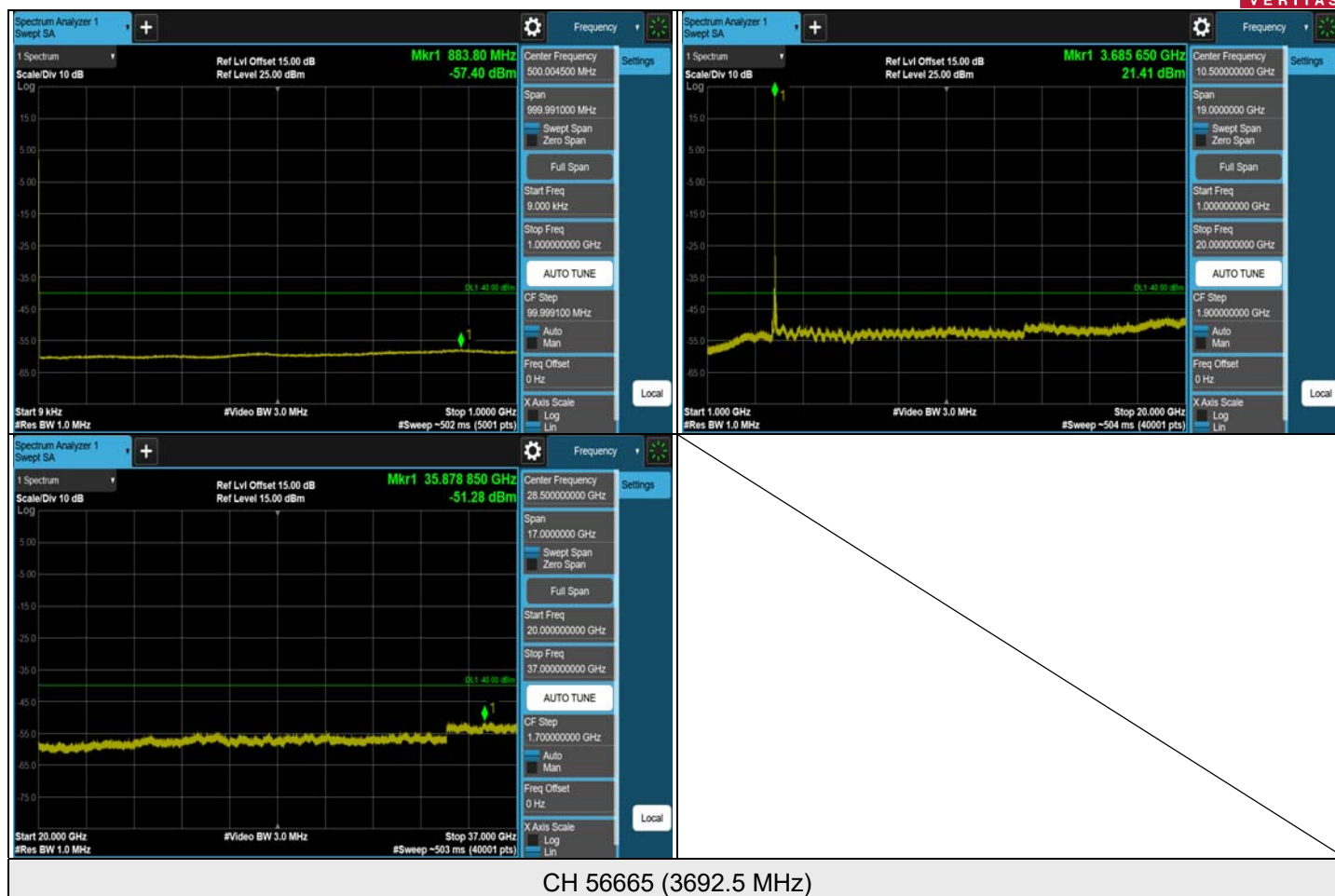


Note: The signal at 9 kHz is IF signal from spectrum analyzer.



CH 55990 (3625 MHz)

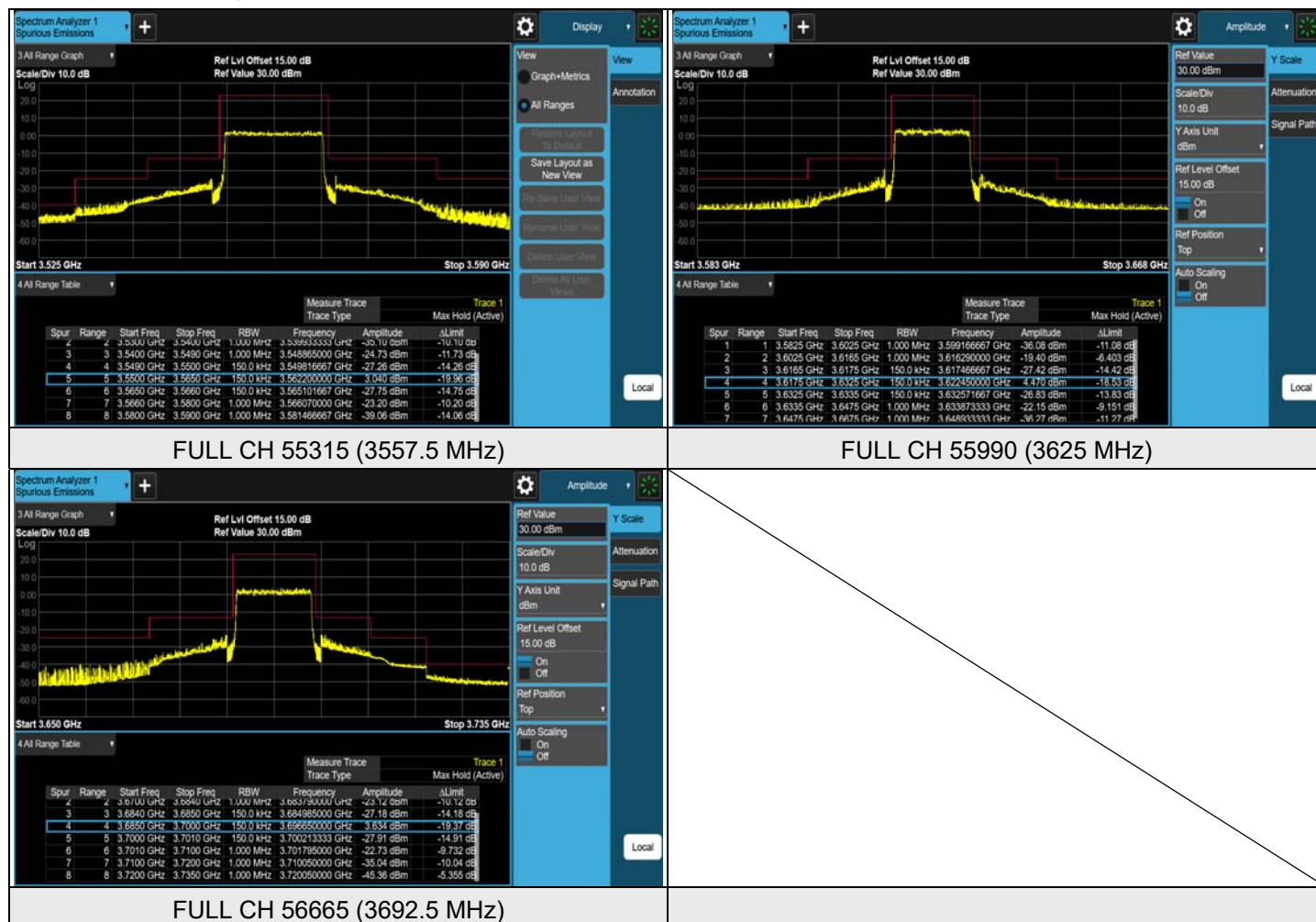
Note: The signal at 9 kHz is IF signal from spectrum analyzer.

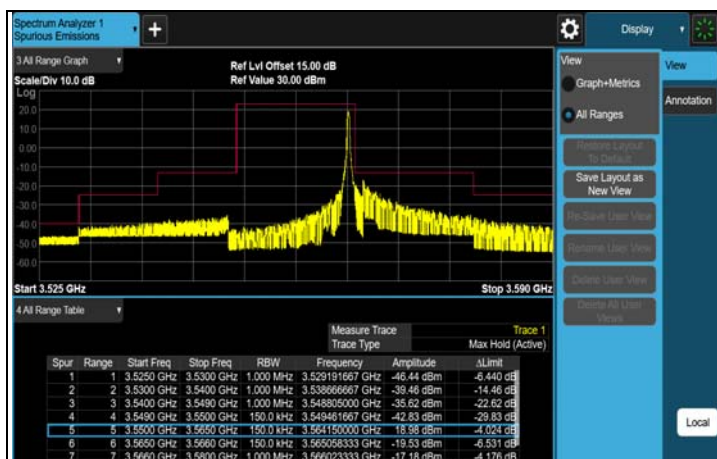


Note: The signal at 9 kHz is IF signal from spectrum analyzer.

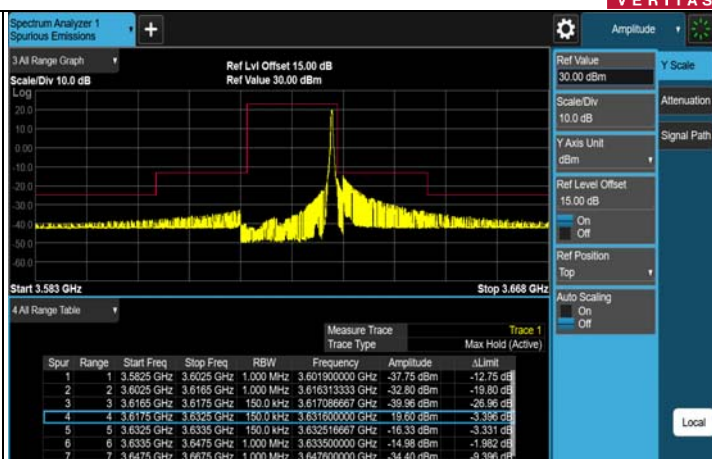


## LTE Band 48 - Ant 5, Channel Bandwidth: 15 MHz

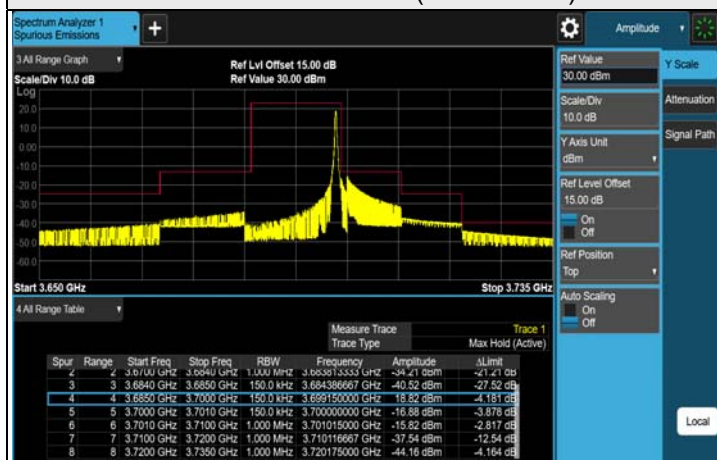




1RB#MAX CH 55315 (3557.5 MHz)



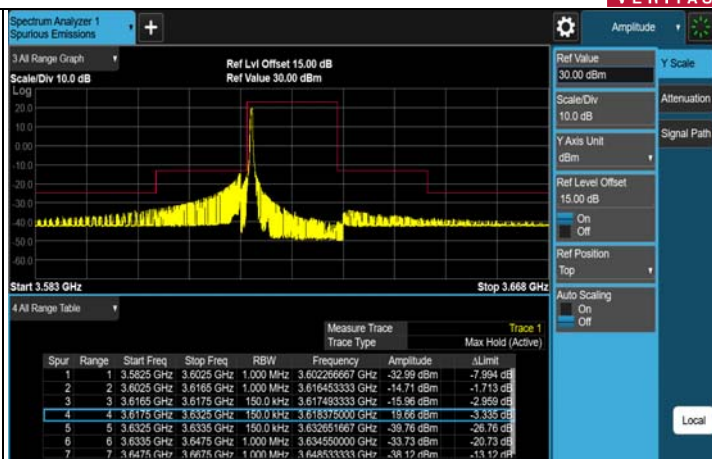
1RB#MAX CH 55990 (3625 MHz)



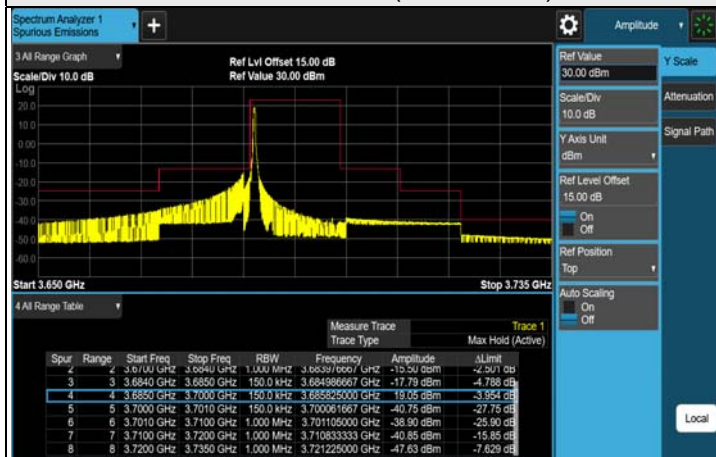
1RB#MAX CH 56665 (3692.5 MHz)



1RB#0 CH 55315 (3557.5 MHz)

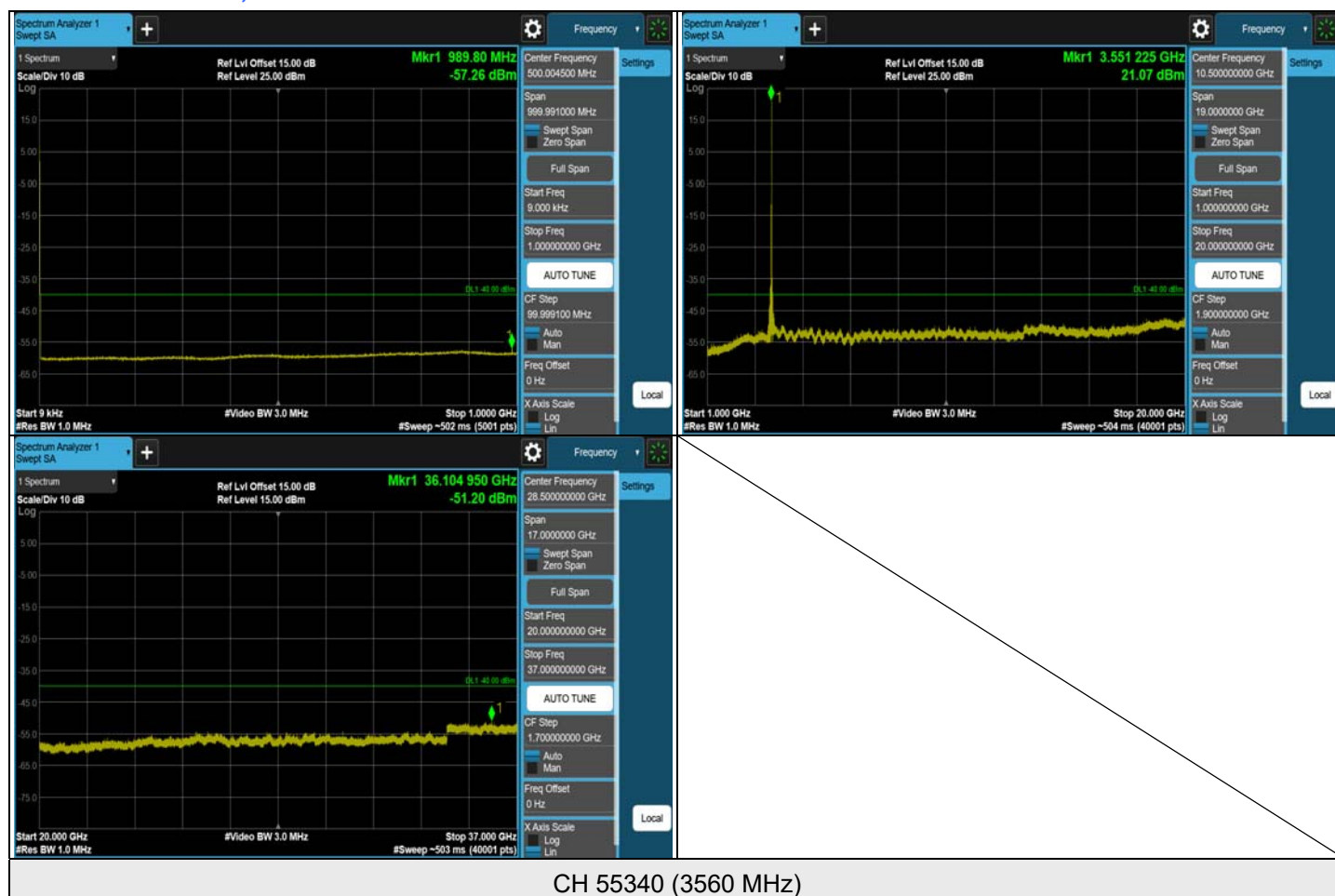


1RB#0 CH 55990 (3625 MHz)



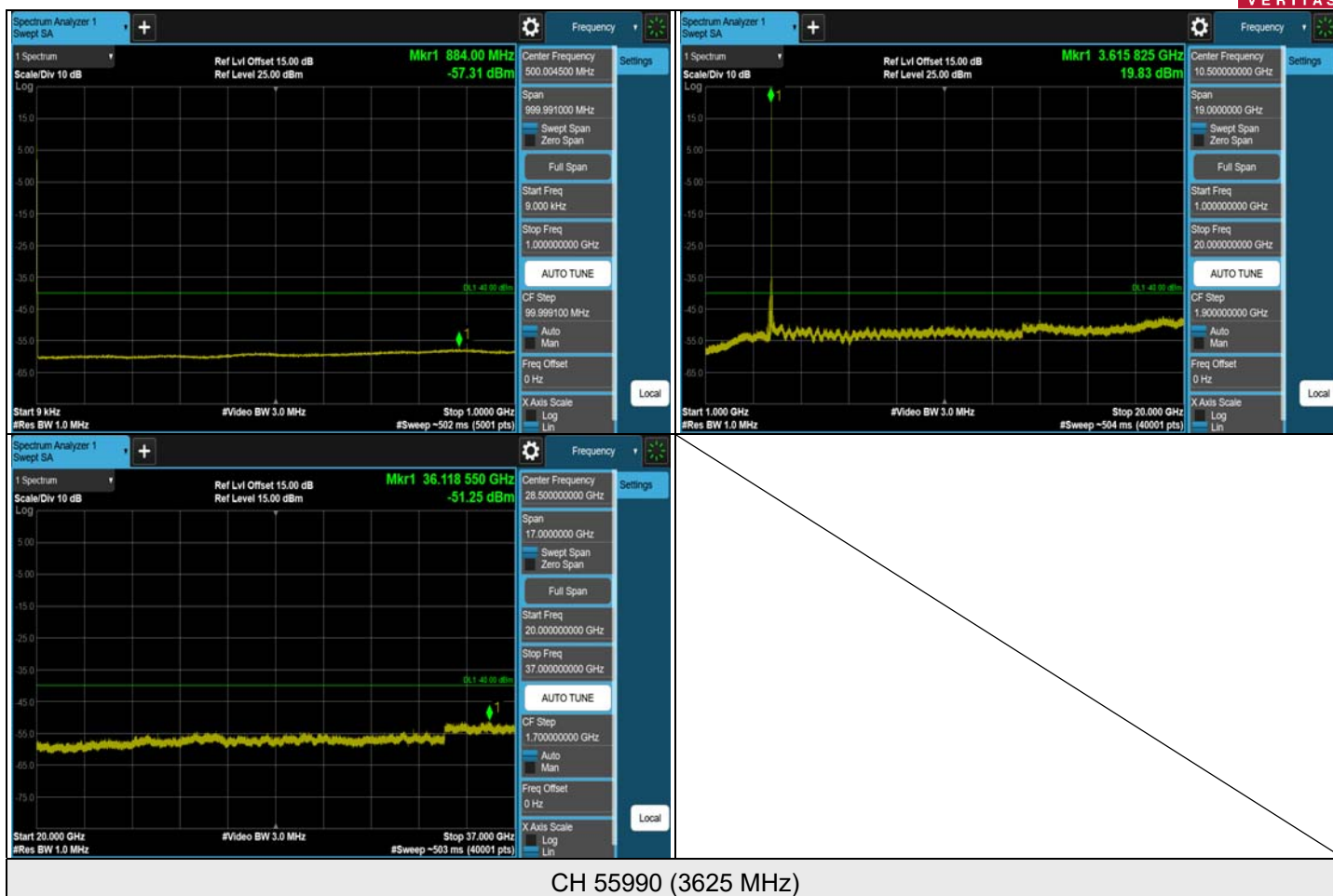
1RB#0 CH 56665 (3692.5 MHz)

## LTE Band 48 - Ant 5, Channel Bandwidth: 20 MHz



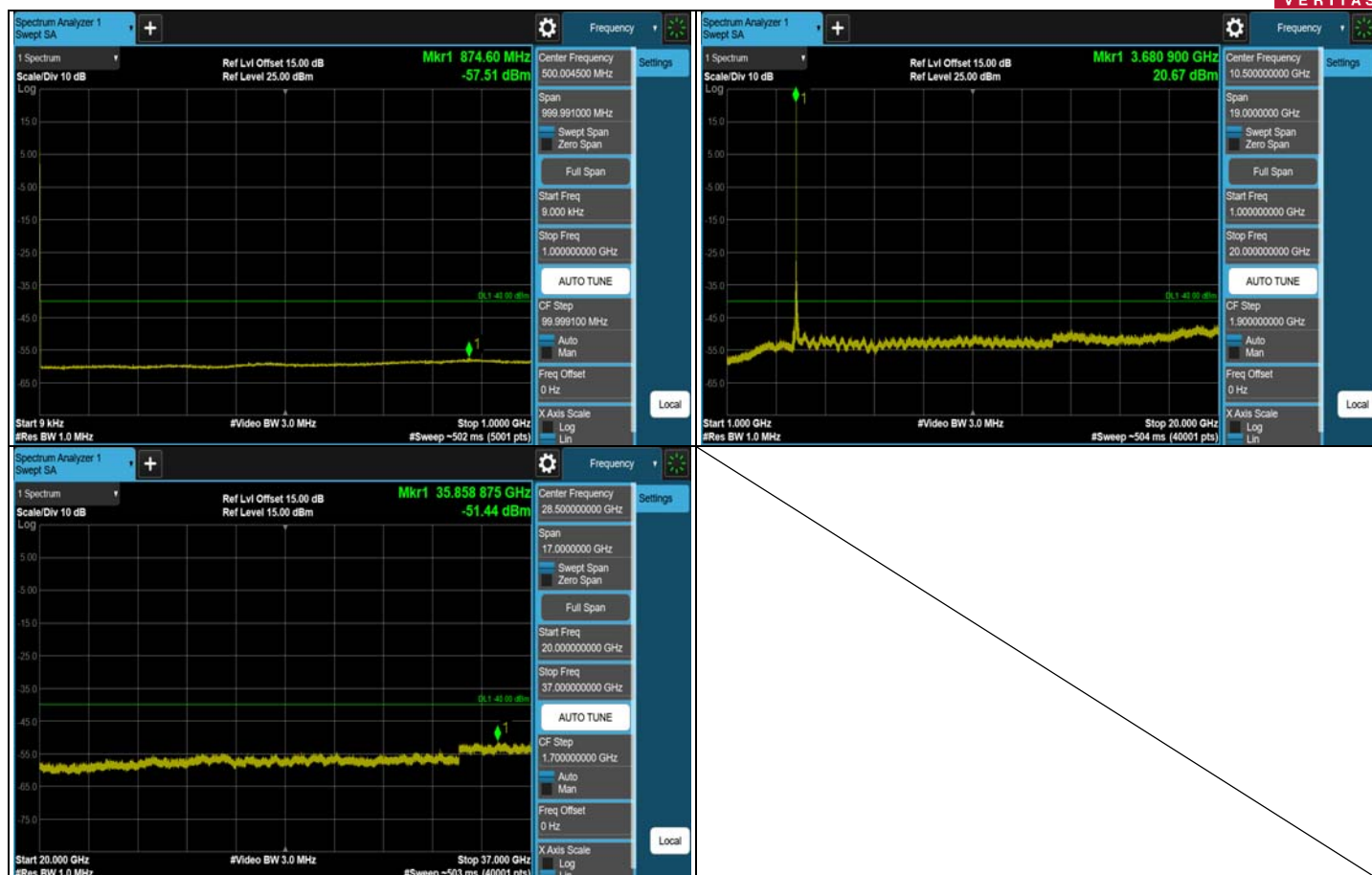
CH 55340 (3560 MHz)

Note: The signal at 9 kHz is IF signal from spectrum analyzer.



CH 55990 (3625 MHz)

Note: The signal at 9 kHz is IF signal from spectrum analyzer.

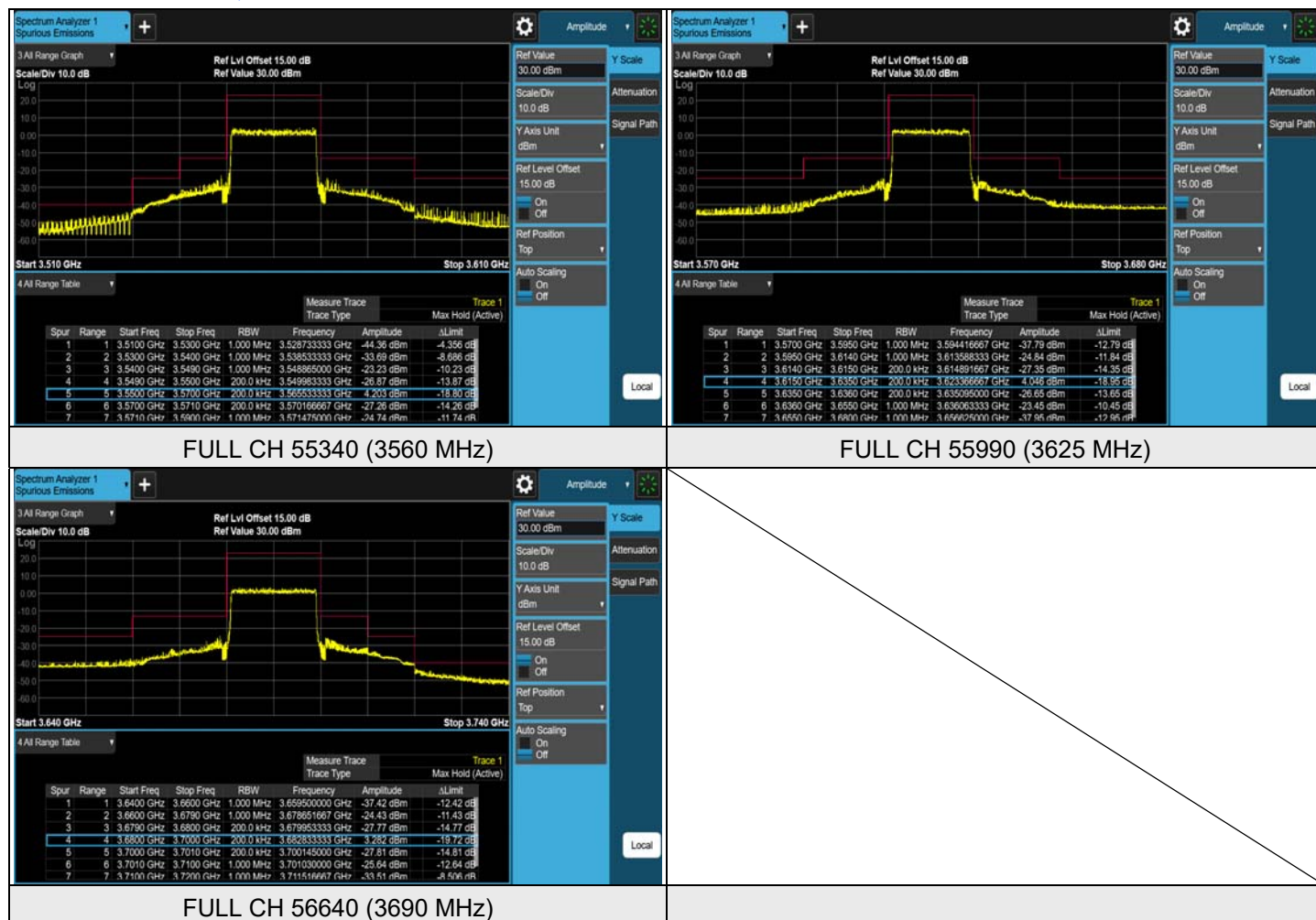


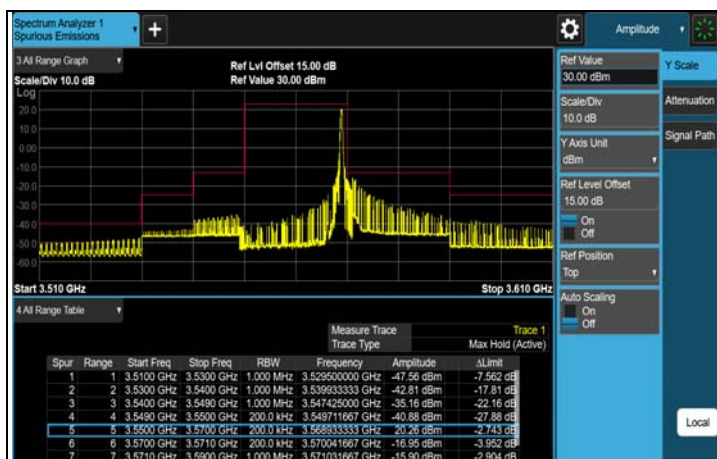
CH 56640 (3690 MHz)

Note: The signal at 9 kHz is IF signal from spectrum analyzer.

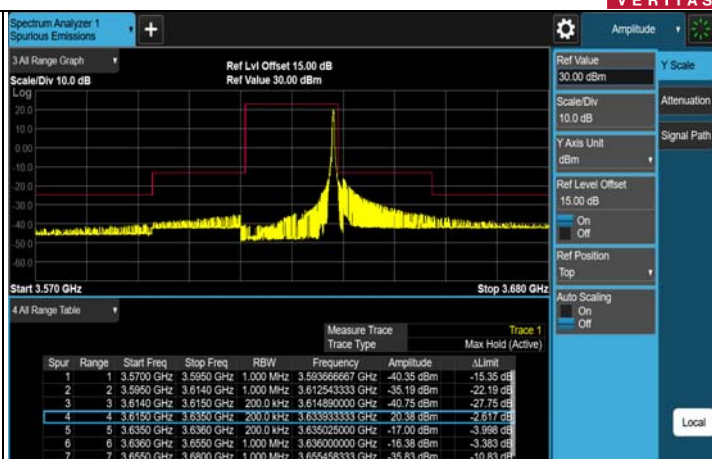


## LTE Band 48 - Ant 5, Channel Bandwidth: 20 MHz

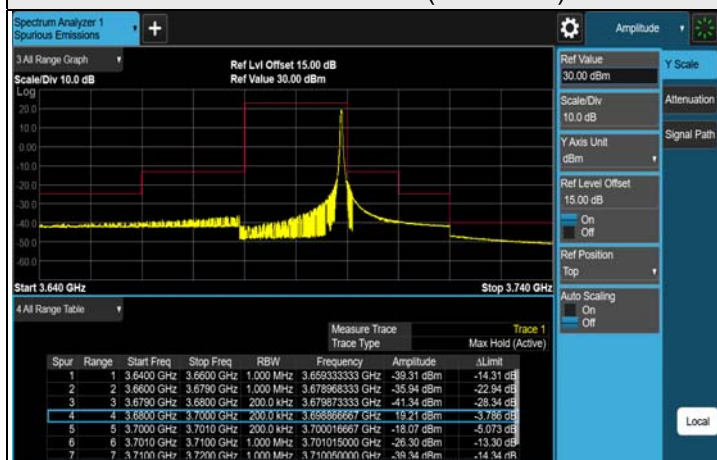




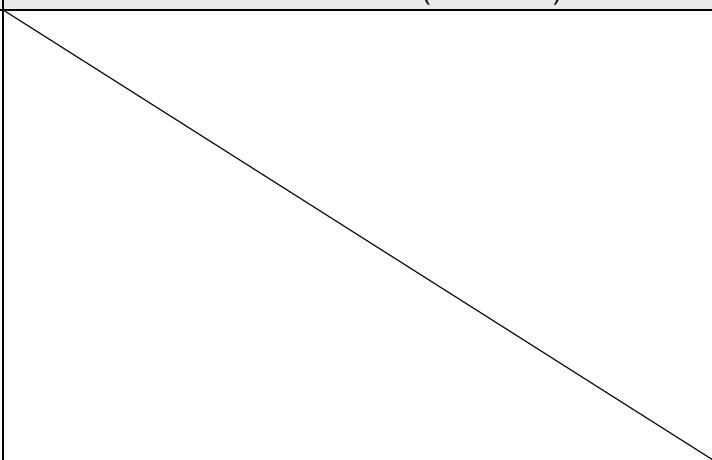
1RB#MAX CH 55340 (3560 MHz)



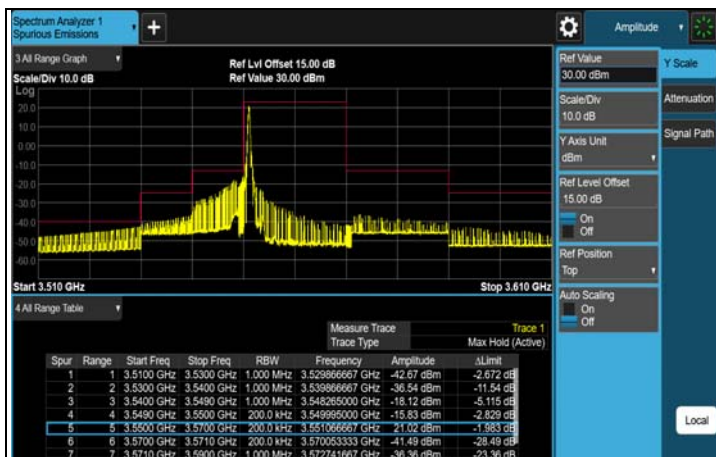
1RB#MAX CH 55990 (3625 MHz)



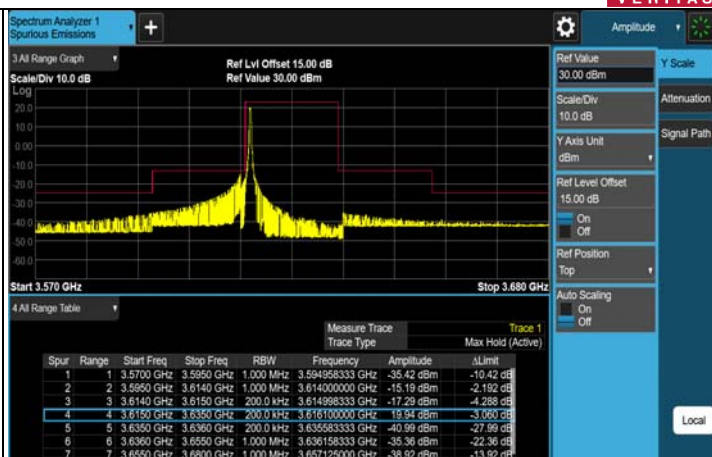
1RB#MAX CH 56640 (3690 MHz)



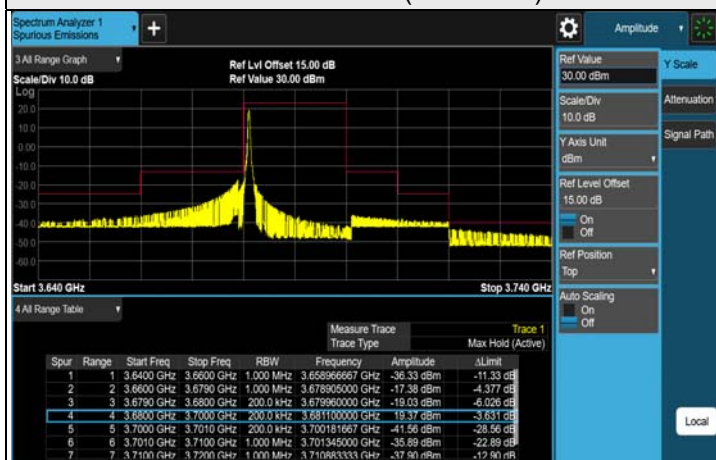




1RB#0 CH 55340 (3560 MHz)



1RB#0 CH 55990 (3625 MHz)



1RB#0 CH 56640 (3690 MHz)

## 7.6 Radiated Spurious Emissions below 1GHz

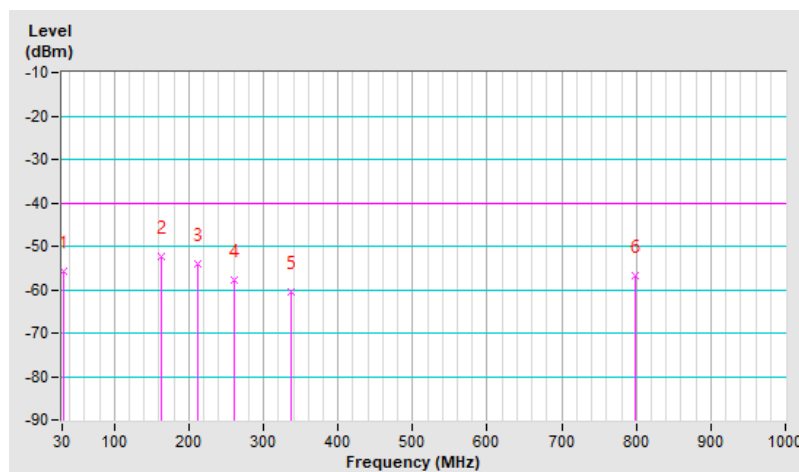
### 7.6.1 LTE Band 48

|                        |                                         |                                          |                     |
|------------------------|-----------------------------------------|------------------------------------------|---------------------|
| <b>RF Mode</b>         | LTE Band 48<br>Channel Bandwidth: 20MHz | <b>Channel</b>                           | CH 56640 : 3690 MHz |
| <b>Frequency Range</b> | 30 MHz ~ 1 GHz                          | <b>Detector Function &amp; Bandwidth</b> | 1 MHz/3 MHz (RMS)   |
| <b>Input Power</b>     | 120 Vac, 60 Hz                          | <b>Environmental Conditions</b>          | 22 °C, 68 % RH      |
| <b>Tested By</b>       | Greg Lin                                |                                          |                     |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 32.91           | -55.71     | -40.00      | -15.71      | 1.00 H             | 18                   | 53.86            | -109.57                  |
| 2                                                    | 163.86          | -52.35     | -40.00      | -12.35      | 1.25 H             | 260                  | 55.86            | -108.21                  |
| 3                                                    | 212.36          | -54.21     | -40.00      | -14.21      | 1.50 H             | 103                  | 57.69            | -111.90                  |
| 4                                                    | 260.86          | -57.64     | -40.00      | -17.64      | 1.00 H             | 90                   | 51.68            | -109.32                  |
| 5                                                    | 336.52          | -60.58     | -40.00      | -20.58      | 1.50 H             | 317                  | 46.19            | -106.77                  |
| 6                                                    | 799.21          | -56.89     | -40.00      | -16.89      | 1.25 H             | 268                  | 40.90            | -97.79                   |

#### Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

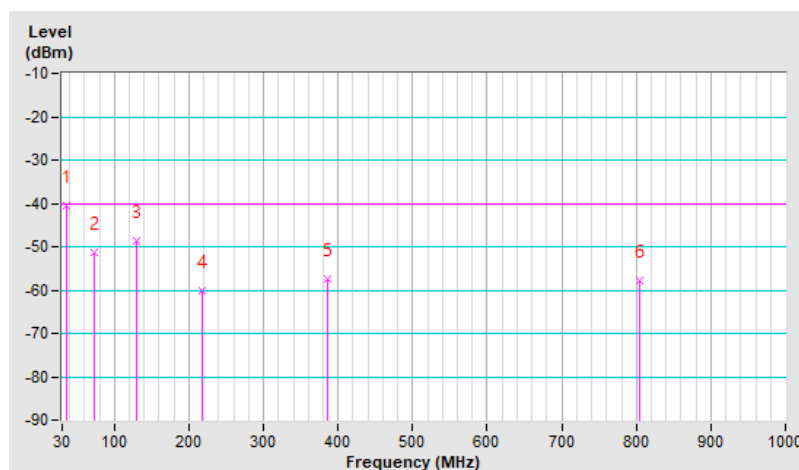


|                        |                                         |                                          |                     |
|------------------------|-----------------------------------------|------------------------------------------|---------------------|
| <b>RF Mode</b>         | LTE Band 48<br>Channel Bandwidth: 20MHz | <b>Channel</b>                           | CH 56640 : 3690 MHz |
| <b>Frequency Range</b> | 30 MHz ~ 1 GHz                          | <b>Detector Function &amp; Bandwidth</b> | 1 MHz/3 MHz (RMS)   |
| <b>Input Power</b>     | 120 Vac, 60 Hz                          | <b>Environmental Conditions</b>          | 22 °C, 68 % RH      |
| <b>Tested By</b>       | Greg Lin                                |                                          |                     |

| Antenna Polarity & Test Distance : Vertical at 3 m |                 |            |             |             |                    |                      |                  |                          |
|----------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                 | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                  | 36.79           | -40.66     | -40.00      | -0.66       | 1.25 V             | 108                  | 68.35            | -109.01                  |
| 2                                                  | 73.65           | -51.37     | -40.00      | -11.37      | 1.00 V             | 246                  | 60.29            | -111.66                  |
| 3                                                  | 128.94          | -48.71     | -40.00      | -8.71       | 1.50 V             | 130                  | 61.06            | -109.77                  |
| 4                                                  | 218.18          | -60.11     | -40.00      | -20.11      | 2.00 V             | 120                  | 51.73            | -111.84                  |
| 5                                                  | 385.02          | -57.32     | -40.00      | -17.32      | 1.00 V             | 193                  | 48.34            | -105.66                  |
| 6                                                  | 805.03          | -57.83     | -40.00      | -17.83      | 1.25 V             | 128                  | 39.85            | -97.68                   |

#### Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



## 7.7 Radiated Spurious Emissions above 1GHz

### 7.7.1 LTE Band 48

|                        |                                        |                                          |                       |
|------------------------|----------------------------------------|------------------------------------------|-----------------------|
| <b>RF Mode</b>         | LTE Band 48<br>Channel Bandwidth: 5MHz | <b>Channel</b>                           | CH 55265 : 3552.5 MHz |
| <b>Frequency Range</b> | 1 GHz ~ 40 GHz                         | <b>Detector Function &amp; Bandwidth</b> | 1 MHz/3 MHz (RMS)     |
| <b>Input Power</b>     | 120 Vac, 60 Hz                         | <b>Environmental Conditions</b>          | 21 °C, 69 % RH        |
| <b>Tested By</b>       | Greg Lin                               |                                          |                       |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7105.00         | -40.47     | -40.00      | -0.47       | 2.15 H             | 226                  | 47.18            | -87.65                   |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7105.00         | -41.77     | -40.00      | -1.77       | 1.96 V             | 209                  | 45.88            | -87.65                   |

#### Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

|                        |                                        |                                          |                     |
|------------------------|----------------------------------------|------------------------------------------|---------------------|
| <b>RF Mode</b>         | LTE Band 48<br>Channel Bandwidth: 5MHz | <b>Channel</b>                           | CH 55990 : 3625 MHz |
| <b>Frequency Range</b> | 1 GHz ~ 40 GHz                         | <b>Detector Function &amp; Bandwidth</b> | 1 MHz/3 MHz (RMS)   |
| <b>Input Power</b>     | 120 Vac, 60 Hz                         | <b>Environmental Conditions</b>          | 21 °C, 69 % RH      |
| <b>Tested By</b>       | Greg Lin                               |                                          |                     |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7250.00         | -40.54     | -40.00      | -0.54       | 2.16 H             | 228                  | 47.19            | -87.73                   |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7250.00         | -41.56     | -40.00      | -1.56       | 1.98 V             | 211                  | 46.17            | -87.73                   |

**Remarks:**

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

|                        |                                        |                                          |                       |
|------------------------|----------------------------------------|------------------------------------------|-----------------------|
| <b>RF Mode</b>         | LTE Band 48<br>Channel Bandwidth: 5MHz | <b>Channel</b>                           | CH 56715 : 3697.5 MHz |
| <b>Frequency Range</b> | 1 GHz ~ 40 GHz                         | <b>Detector Function &amp; Bandwidth</b> | 1 MHz/3 MHz (RMS)     |
| <b>Input Power</b>     | 120 Vac, 60 Hz                         | <b>Environmental Conditions</b>          | 21 °C, 69 % RH        |
| <b>Tested By</b>       | Greg Lin                               |                                          |                       |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7395.00         | -40.31     | -40.00      | -0.31       | 2.24 H             | 225                  | 47.12            | -87.43                   |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7395.00         | -41.49     | -40.00      | -1.49       | 1.95 V             | 211                  | 45.94            | -87.43                   |

**Remarks:**

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

|                        |                                         |                                          |                     |
|------------------------|-----------------------------------------|------------------------------------------|---------------------|
| <b>RF Mode</b>         | LTE Band 48<br>Channel Bandwidth: 20MHz | <b>Channel</b>                           | CH 55340 : 3560 MHz |
| <b>Frequency Range</b> | 1 GHz ~ 40 GHz                          | <b>Detector Function &amp; Bandwidth</b> | 1 MHz/3 MHz (RMS)   |
| <b>Input Power</b>     | 120 Vac, 60 Hz                          | <b>Environmental Conditions</b>          | 21 °C, 69 % RH      |
| <b>Tested By</b>       | Greg Lin                                |                                          |                     |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7120.00         | -40.61     | -40.00      | -0.61       | 2.23 H             | 227                  | 47.07            | -87.68                   |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7120.00         | -41.86     | -40.00      | -1.86       | 1.99 V             | 205                  | 45.82            | -87.68                   |

**Remarks:**

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

|                        |                                         |                                          |                     |
|------------------------|-----------------------------------------|------------------------------------------|---------------------|
| <b>RF Mode</b>         | LTE Band 48<br>Channel Bandwidth: 20MHz | <b>Channel</b>                           | CH 55990 : 3625 MHz |
| <b>Frequency Range</b> | 1 GHz ~ 40 GHz                          | <b>Detector Function &amp; Bandwidth</b> | 1 MHz/3 MHz (RMS)   |
| <b>Input Power</b>     | 120 Vac, 60 Hz                          | <b>Environmental Conditions</b>          | 21 °C, 69 % RH      |
| <b>Tested By</b>       | Greg Lin                                |                                          |                     |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7250.00         | -40.49     | -40.00      | -0.49       | 2.22 H             | 231                  | 47.24            | -87.73                   |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7250.00         | -41.52     | -40.00      | -1.52       | 1.97 V             | 209                  | 46.21            | -87.73                   |

**Remarks:**

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.



|                        |                                         |                                          |                     |
|------------------------|-----------------------------------------|------------------------------------------|---------------------|
| <b>RF Mode</b>         | LTE Band 48<br>Channel Bandwidth: 20MHz | <b>Channel</b>                           | CH 56640 : 3690 MHz |
| <b>Frequency Range</b> | 1 GHz ~ 40 GHz                          | <b>Detector Function &amp; Bandwidth</b> | 1 MHz/3 MHz (RMS)   |
| <b>Input Power</b>     | 120 Vac, 60 Hz                          | <b>Environmental Conditions</b>          | 21 °C, 69 % RH      |
| <b>Tested By</b>       | Greg Lin                                |                                          |                     |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7380.00         | -40.24     | -40.00      | -0.24       | 2.18 H             | 229                  | 47.23            | -87.47                   |
| Antenna Polarity & Test Distance : Vertical at 3 m   |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 7380.00         | -41.54     | -40.00      | -1.54       | 2.05 V             | 206                  | 45.93            | -87.47                   |

**Remarks:**

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

## 7.8 Frequency Stability

|                           |              |            |            |
|---------------------------|--------------|------------|------------|
| Environmental Conditions: | 25°C, 60% RH | Tested By: | Noah Chang |
|---------------------------|--------------|------------|------------|

### 7.8.1 LTE Band 48

#### LTE Band 48, Channel Bandwidth: 5 MHz

| Frequency Stability Versus Voltage |                       |                       |                       |                       |
|------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Voltage (Vdc)                      | CH 55265 (3552.5 MHz) |                       | CH 56715 (3697.5 MHz) |                       |
|                                    | Frequency (MHz)       | Frequency Error (ppm) | Frequency (MHz)       | Frequency Error (ppm) |
| 3.60                               | 3552.499992           | -0.0023               | 3697.499992           | -0.0022               |
| 3.87                               | 3552.499991           | -0.0025               | 3697.499994           | -0.0016               |
| 4.40                               | 3552.499992           | -0.0023               | 3697.499999           | -0.0027               |

Note: The applicant defined the normal working voltage is from 3.60 to 4.40 Vdc.

| Frequency Stability Versus Temperature |                       |                       |                       |                       |
|----------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Temperature (°C)                       | CH 55265 (3552.5 MHz) |                       | CH 56715 (3697.5 MHz) |                       |
|                                        | Frequency (MHz)       | Frequency Error (ppm) | Frequency (MHz)       | Frequency Error (ppm) |
| -30                                    | 3552.50001            | 0.0028                | 3697.500008           | 0.0022                |
| -20                                    | 3552.50001            | 0.0028                | 3697.500009           | 0.0024                |
| -10                                    | 3552.500003           | 0.0008                | 3697.500007           | 0.0019                |
| 0                                      | 3552.500002           | 0.0006                | 3697.500006           | 0.0016                |
| 10                                     | 3552.500003           | 0.0008                | 3697.500005           | 0.0014                |
| 20                                     | 3552.499994           | -0.0017               | 3697.499999           | -0.0003               |
| 30                                     | 3552.500009           | 0.0025                | 3697.500008           | 0.0022                |
| 40                                     | 3552.500001           | 0.0003                | 3697.500006           | 0.0016                |
| 50                                     | 3552.499999           | -0.0003               | 3697.5                | 0                     |

# LTE Band 48, Channel Bandwidth: 10 MHz

| Frequency Stability Versus Voltage |                     |                       |                     |                       |
|------------------------------------|---------------------|-----------------------|---------------------|-----------------------|
| Voltage (Vdc)                      | CH 55290 (3555 MHz) |                       | CH 56690 (3695 MHz) |                       |
|                                    | Frequency (MHz)     | Frequency Error (ppm) | Frequency (MHz)     | Frequency Error (ppm) |
| 3.60                               | 3555                | 0                     | 3695.000002         | 0.0005                |
| 3.87                               | 3555.000004         | 0.0011                | 3695.000009         | 0.0024                |
| 4.40                               | 3554.999998         | -0.0006               | 3694.999997         | -0.0008               |

Note: The applicant defined the normal working voltage is from 3.60 to 4.40 Vdc.

| Frequency Stability Versus Temperature |                     |                       |                     |                       |
|----------------------------------------|---------------------|-----------------------|---------------------|-----------------------|
| Temperature (°C)                       | CH 55290 (3555 MHz) |                       | CH 56690 (3695 MHz) |                       |
|                                        | Frequency (MHz)     | Frequency Error (ppm) | Frequency (MHz)     | Frequency Error (ppm) |
| -30                                    | 3555.000002         | 0.0006                | 3695.000005         | 0.0014                |
| -20                                    | 3555.000004         | 0.0011                | 3695.000002         | 0.0005                |
| -10                                    | 3555.000001         | 0.0003                | 3695.000005         | 0.0014                |
| 0                                      | 3554.999996         | -0.0011               | 3694.999998         | -0.0005               |
| 10                                     | 3555.000001         | 0.0003                | 3695                | 0                     |
| 20                                     | 3555.000001         | 0.0028                | 3695.000007         | 0.0019                |
| 30                                     | 3554.999993         | -0.002                | 3694.999994         | -0.0016               |
| 40                                     | 3555.000009         | 0.0025                | 3695.000001         | 0.0027                |
| 50                                     | 3555                | 0                     | 3695.000003         | 0.0008                |

# LTE Band 48, Channel Bandwidth: 15 MHz

| Frequency Stability Versus Voltage |                       |                       |                       |                       |
|------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Voltage (Vdc)                      | CH 55315 (3557.5 MHz) |                       | CH 56665 (3692.5 MHz) |                       |
|                                    | Frequency (MHz)       | Frequency Error (ppm) | Frequency (MHz)       | Frequency Error (ppm) |
| 3.60                               | 3557.500005           | 0.0014                | 3692.500001           | 0.0003                |
| 3.87                               | 3557.499993           | -0.002                | 3692.49999            | -0.0027               |
| 4.40                               | 3557.499991           | -0.0025               | 3692.499991           | -0.0024               |

Note: The applicant defined the normal working voltage is from 3.60 to 4.40 Vdc.

| Frequency Stability Versus Temperature |                       |                       |                       |                       |
|----------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Temperature (°C)                       | CH 55315 (3557.5 MHz) |                       | CH 56665 (3692.5 MHz) |                       |
|                                        | Frequency (MHz)       | Frequency Error (ppm) | Frequency (MHz)       | Frequency Error (ppm) |
| -30                                    | 3557.500006           | 0.0017                | 3692.500008           | 0.0022                |
| -20                                    | 3557.499997           | -0.0008               | 3692.499992           | -0.0022               |
| -10                                    | 3557.499991           | -0.0025               | 3692.499991           | -0.0024               |
| 0                                      | 3557.500001           | 0.0028                | 3692.500006           | 0.0016                |
| 10                                     | 3557.499997           | -0.0008               | 3692.499998           | -0.0005               |
| 20                                     | 3557.500009           | 0.0025                | 3692.500006           | 0.0016                |
| 30                                     | 3557.500009           | 0.0025                | 3692.500006           | 0.0016                |
| 40                                     | 3557.500006           | 0.0017                | 3692.500003           | 0.0008                |
| 50                                     | 3557.500008           | 0.0022                | 3692.500001           | 0.0027                |

# LTE Band 48, Channel Bandwidth: 20 MHz

| Frequency Stability Versus Voltage |                     |                       |                     |                       |
|------------------------------------|---------------------|-----------------------|---------------------|-----------------------|
| Voltage (Vdc)                      | CH 55340 (3560 MHz) |                       | CH 56640 (3690 MHz) |                       |
|                                    | Frequency (MHz)     | Frequency Error (ppm) | Frequency (MHz)     | Frequency Error (ppm) |
| 3.60                               | 3560.000009         | 0.0025                | 3690.000006         | 0.0016                |
| 3.87                               | 3559.999991         | -0.0025               | 3689.99999          | -0.0027               |
| 4.40                               | 3559.999997         | -0.0008               | 3690                | 0                     |

Note: The applicant defined the normal working voltage is from 3.60 to 4.40 Vdc.

| Frequency Stability Versus Temperature |                     |                       |                     |                       |
|----------------------------------------|---------------------|-----------------------|---------------------|-----------------------|
| Temperature (°C)                       | CH 55340 (3560 MHz) |                       | CH 56640 (3690 MHz) |                       |
|                                        | Frequency (MHz)     | Frequency Error (ppm) | Frequency (MHz)     | Frequency Error (ppm) |
| -30                                    | 3559.999994         | -0.0017               | 3689.999996         | -0.0011               |
| -20                                    | 3560.000001         | 0.0003                | 3690.000001         | 0.0003                |
| -10                                    | 3560.000004         | 0.0011                | 3689.999999         | -0.0003               |
| 0                                      | 3559.999996         | -0.0011               | 3689.999998         | -0.0005               |
| 10                                     | 3560                | 0                     | 3690.000002         | 0.0005                |
| 20                                     | 3559.999992         | -0.0022               | 3689.999997         | -0.0008               |
| 30                                     | 3560.000002         | 0.0006                | 3689.999999         | -0.0003               |
| 40                                     | 3560.000003         | 0.0008                | 3690.000005         | 0.0014                |
| 50                                     | 3560.000008         | 0.0022                | 3690.000001         | 0.0027                |

## 8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

## 9 Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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The address and road map of all our labs can be found in our web site also.

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