

# FCC TEST REPORT

## (PART 22)

|            |                                             |
|------------|---------------------------------------------|
| Applicant: | HMD Global Oy                               |
| Address:   | Bertel Jungin aukio 9, 02600 Espoo, Finland |

|                           |                                             |
|---------------------------|---------------------------------------------|
| Manufacturer or Supplier: | HMD Global Oy                               |
| Address:                  | Bertel Jungin aukio 9, 02600 Espoo, Finland |
| Product:                  | GSM/WCDMA/LTE Mobile Phone                  |
| Brand Name:               | Nokia                                       |
| Model Name:               | TA-1282                                     |
| FCC ID:                   | 2AJOTTA-1282                                |
| Date of tests:            | Jun. 30, 2020 ~ Jul. 20, 2020               |

The tests have been carried out according to the requirements of the following standard:

- ☒ **FCC PART 22, Subpart H**    ☒ **FCC Part 2**  
☒ **ANSI/TIA/EIA-603-D**    ☒ **ANSI C63.26-2015**  
☒ **ANSI/TIA/EIA-603-E**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

|                                                                                                            |                                                                                                              |
|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Prepared by Alex Chen<br>Engineer / Mobile Department                                                      | Approved by Luke Lu<br>Manager / Mobile Department                                                           |
| <br>Date: Jul. 20, 2020 | <br>Date: Jul. 20, 2020 |

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## RELEASE CONTROL RECORD

| ISSUE NO.      | REASON FOR CHANGE | DATE ISSUED   |
|----------------|-------------------|---------------|
| RF200629W001-2 | Original release  | Jul. 20, 2020 |

# 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 22 & Part 2 |                              |            |
|----------------------------------------|------------------------------|------------|
| STANDARD SECTION                       | TEST TYPE                    | RESULT     |
| 2.1046<br>22.913 (a)                   | Effective Radiated Power     | Compliance |
| 2.1055<br>22.355                       | Frequency Stability          | Compliance |
| 2.1049<br>22.917 (b)                   | Occupied Bandwidth           | Compliance |
| 22.913 (d)                             | Peak to average ratio*       | Compliance |
| 22.917                                 | Band Edge Measurements       | Compliance |
| 2.1051<br>22.917                       | Conducted Spurious Emissions | Compliance |
| 2.1053<br>22.917                       | Radiated Spurious Emissions  | Compliance |

\* Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01.

## 1.1 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:

| MEASUREMENT                         | UNCERTAINTY           |
|-------------------------------------|-----------------------|
| Maximum Peak Output Power           | $\pm 2.06\text{dB}$   |
| Frequency Stability                 | $\pm 76.97\text{Hz}$  |
| Radiated emissions (30MHz~1GMHz)    | $\pm 4.98\text{dB}$   |
| Radiated emissions (1GMHz ~6GMHz)   | $\pm 4.70\text{dB}$   |
| Radiated emissions (6GMHz ~18GMHz)  | $\pm 4.60\text{dB}$   |
| Radiated emissions (18GMHz ~40GMHz) | $\pm 4.12\text{dB}$   |
| Conducted emissions                 | $\pm 4.01\text{dB}$   |
| Occupied Channel Bandwidth          | $\pm 43.58\text{KHz}$ |
| Band Edge Measurements              | $\pm 4.70\text{dB}$   |
| Peak to average ratio               | $\pm 0.76\text{dB}$   |

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

## 1.2 TEST SITE AND INSTRUMENTS

| Equipment                                   | Manufacturer | Model No.                           | Serial No.                      | Last Cal.   | Next Cal.   |
|---------------------------------------------|--------------|-------------------------------------|---------------------------------|-------------|-------------|
| MXE EMI Receiver                            | KEYSIGHT     | N9038A-544                          | MY54450026                      | Apr. 27,20  | Apr. 26,21  |
| EXA Signal Analyzer                         | KEYSIGHT     | N9010A-526                          | MY54510322                      | Feb. 26,20  | Feb. 25,21  |
| Bilog Antenna                               | ETS-LINDGREN | 3143B                               | 00161965                        | Mar. 27,20  | Mar. 26,21  |
| Horn Antenna<br>(1GHz-18GHz)                | ETS-LINDGREN | 3117                                | 00168692                        | Mar. 27,20  | Mar. 26,21  |
| Horn Antenna<br>(18GHz-40GHz)               | N/A          | QWH-SL-18-40<br>-K-SG/QMS-00<br>361 | 15433                           | Nov. 24, 19 | Nov. 23, 20 |
| Radio<br>Communication<br>Analyzer          | ANRITSU      | MT8820C                             | 6201465426                      | Feb. 27,20  | Feb. 26,21  |
| Signal Pre-Amplifier                        | EMSI         | EMC 9135                            | 980249                          | Jun. 02,20  | Jun. 01,21  |
| Signal Pre-Amplifier                        | EMSI         | EMC 012645B                         | 980257                          | Jun. 02,20  | Jun. 01,21  |
| Signal Pre-Amplifier                        | EMSI         | EMC 184045B                         | 980259                          | Apr. 30,20  | Apr. 29,21  |
| 3m Semi-anechoic<br>Chamber                 | ETS-LINDGREN | 9m*6m*6m                            | Euroshieldpn-<br>CT0001143-1216 | May. 19,20  | May. 18,23  |
| Test Software                               | E3           | V 9.160323                          | N/A                             | N/A         | N/A         |
| Test Software                               | ADT          | ADT_Radiated<br>_V7.6.15.9.2        | N/A                             | N/A         | N/A         |
| 10dB Attenuator                             | JFW/USA      | 50HF-010-SM<br>A                    | 1505                            | Jun. 03,20  | Jun. 02,21  |
| Power Meter                                 | Anritsu      | ML2495A                             | 1506002                         | Feb. 26,20  | Feb. 25,21  |
| Power Sensor                                | Anritsu      | MA2411B                             | 1339352                         | Feb. 26,20  | Feb. 25,21  |
| Humid & Temp<br>Programmable Tester         | Juyi         | ITH-120-45-CP<br>-AR                | IAA1504-001                     | Jun. 02,20  | Jun. 01,21  |
| MXG Analog<br>Microwave<br>Signal Generator | KEYSIGHT     | N5183A                              | MY50143024                      | Mar. 11,20  | Mar. 10,21  |
| Power Divider                               | MCLI/USA     | PS2-15                              | 24880                           | N/A         | N/A         |

**NOTE:** 1. The calibration interval of the above test instruments is 12 months or 36 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

2. The test was performed in 3m Semi-anechoic Chamber and RF Oven Room.

3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 525120; The Designation No. is CN1171.



## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

|                            |                                                                |                                 |
|----------------------------|----------------------------------------------------------------|---------------------------------|
| PRODUCT                    | GSM/WCDMA/LTE Mobile Phone                                     |                                 |
| BRAND NAME                 | Nokia                                                          |                                 |
| MODEL NAME                 | TA-1282                                                        |                                 |
| NOMINAL VOLTAGE            | 5.0Vdc (adapter or host equipment)<br>3.7Vdc (Li-ion, battery) |                                 |
| MODULATION TYPE            | GSM/GPRS/EDGE                                                  | GMSK, 8PSK                      |
|                            | WCDMA                                                          | BPSK, QPSK                      |
|                            | LTE                                                            | QPSK, 16QAM                     |
| FREQUENCY RANGE            | GSM/GPRS/EDGE                                                  | 824.2MHz ~ 848.8MHz             |
|                            | WCDMA                                                          | 826.4MHz ~ 846.6MHz             |
|                            | LTE Band 5<br>(Channel Bandwidth: 1.4MHz)                      | 824.7MHz ~ 848.3MHz             |
|                            | LTE Band 5<br>(Channel Bandwidth: 3MHz)                        | 825.5MHz ~ 847.5MHz             |
|                            | LTE Band 5<br>(Channel Bandwidth: 5MHz)                        | 826.5MHz ~ 846.5MHz             |
|                            | LTE Band 5<br>(Channel Bandwidth: 10MHz)                       | 829MHz ~ 844MHz                 |
| MAX. ERP POWER             | GSM                                                            | 425mW                           |
|                            | EDGE                                                           | 86mW                            |
|                            | WCDMA                                                          | 59mW                            |
|                            | LTE Band 5<br>(Channel Bandwidth: 1.4MHz)                      | 51mW                            |
|                            | LTE Band 5<br>(Channel Bandwidth: 3MHz)                        | 51mW                            |
|                            | LTE Band 5<br>(Channel Bandwidth: 5MHz)                        | 51mW                            |
|                            | LTE Band 5<br>(Channel Bandwidth: 10MHz)                       | 52mW                            |
| EMISSION<br>DESIGNATOR GGN | GSM                                                            | 240KGXW                         |
|                            | EDGE                                                           | 240KG7W                         |
|                            | WCDMA                                                          | 4M16F9W                         |
|                            | LTE Band 5<br>(Channel Bandwidth: 1.4MHz)                      | QPSK: 1M09G7D<br>16QAM: 1M09W7D |
|                            | LTE Band 5<br>(Channel Bandwidth: 3MHz)                        | QPSK: 2M70G7D<br>16QAM: 2M69W7D |
|                            | LTE Band 5<br>(Channel Bandwidth: 5MHz)                        | QPSK: 4M49G7D<br>16QAM: 4M49W7D |
|                            | LTE Band 5<br>(Channel Bandwidth: 10MHz)                       | QPSK: 4M49G7D<br>16QAM: 4M49W7D |



|                       |                                                                                             |                                 |
|-----------------------|---------------------------------------------------------------------------------------------|---------------------------------|
|                       | <b>LTE Band 5</b><br><b>(Channel Bandwidth: 10MHz)</b>                                      | QPSK: 8M98G7D<br>16QAM: 8M96W7D |
| <b>ANTENNA TYPE</b>   | Fixed Internal Antenna with -3.9dBi gain for GSM 850/WCDMA B5/LTE Band 5                    |                                 |
| <b>HW VERSION</b>     | 0154                                                                                        |                                 |
| <b>SW VERSION</b>     | 0.2025.11.05                                                                                |                                 |
| <b>I/O PORTS</b>      | Refer to user's manual                                                                      |                                 |
| <b>CABLE SUPPLIED</b> | USB cable: non-shielded, detachable, 1meter<br>Earphone: non-shielded, detachable, 1.5meter |                                 |

**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

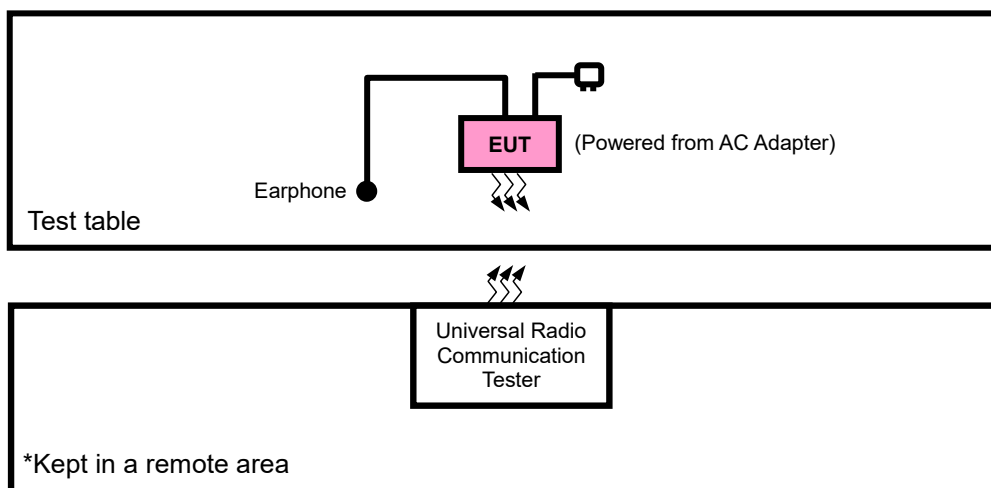
| MODULATION MODE | TX FUNCTION |
|-----------------|-------------|
| GSM/GPRS/EDGE   | 1TX/1RX     |
| WCDMA           | 1TX/1RX     |
| LTE             | 1TX/1RX     |

3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

**List of Accessory:**

| ACCESSORIES  | BRAND | MODEL    | MANUFACTURER | SPECIFICATION                                   |
|--------------|-------|----------|--------------|-------------------------------------------------|
| Battery 1    | Nokia | BL-4WL   | TM           | Power Rating:3.7 Vdc, 1150 mAh                  |
| AC Adapter 1 | Nokia | AC-18U   | DVE          | I/P: 100 - 240 Vac, 100mA,<br>O/P: 5Vdc, 550 mA |
| AC Adapter 2 | Nokia | AC-18U   | Aohai        | I/P: 100 - 240 Vac, 100mA,<br>O/P: 5Vdc, 550 mA |
| Earphone 1   | Nokia | WH-108   | RTF          | 1.5m non-shielded cable w/ core                 |
| USB Cable 1  | Nokia | CA-190CD | RTF          | 1m non-shielded cable w/ core                   |

## 2.2 CONFIGURATION OF SYSTEM UNDER TEST FOR RADIATION EMISSION



## 2.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT   | BRAND    | MODEL NO. | SERIAL NO. | FCC ID |
|-----|-----------|----------|-----------|------------|--------|
| 1   | DC source | LONG WEI | PS-6403D  | 010934269  | N/A    |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|-----------------------------------------------------|
| 1   | DC Line: Unshielded, Detachable 1.8m                |

## 2.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case in ERP and radiated emission was found when positioned on X-plane for GSM /EDGE /WCDMA/LTE. Following channel(s) was (were) selected for the final test as listed below:

| EUT<br>CONFIGURE<br>MODE | DESCRIPTION                                                     |
|--------------------------|-----------------------------------------------------------------|
| A                        | EUT + Adapter + USB Cable+ Earphone with GSM ,WCDMA or LTE link |
| B                        | EUT + Battery with GSM ,WCDMA or LTE link                       |

### GSM MODE

| EUT<br>CONFIGURE<br>MODE | TEST ITEM             | AVAILABLE CHANNEL | TESTED CHANNEL | MODE      |
|--------------------------|-----------------------|-------------------|----------------|-----------|
| B                        | ERP                   | 128 to 251        | 128, 189, 251  | GSM, EDGE |
| B                        | FREQUENCY STABILITY   | 128 to 251        | 128, 251       | GSM, EDGE |
| B                        | OCCUPIED BANDWIDTH    | 128 to 251        | 128, 189, 251  | GSM, EDGE |
| B                        | BAND EDGE             | 128 to 251        | 128, 251       | GSM, EDGE |
| B                        | CONDCUDETED EMISSION  | 128 to 251        | 128, 189, 251  | GSM, EDGE |
| A                        | RADIATED EMISSION     | 128 to 251        | 128, 189, 251  | GSM, EDGE |
| B                        | PEAK TO AVERAGE RATIO | 128 to 251        | 128, 189, 251  | GSM, EDGE |

### WCDMA MODE

| EUT<br>CONFIGURE<br>MODE | TEST ITEM             | AVAILABLE CHANNEL | TESTED CHANNEL   | MODE  |
|--------------------------|-----------------------|-------------------|------------------|-------|
| B                        | ERP                   | 4132 to 4233      | 4132, 4182, 4233 | WCDMA |
| B                        | FREQUENCY STABILITY   | 4132 to 4233      | 4132, 4233       | WCDMA |
| B                        | OCCUPIED BANDWIDTH    | 4132 to 4233      | 4132, 4182, 4233 | WCDMA |
| B                        | BAND EDGE             | 4132 to 4233      | 4132, 4233       | WCDMA |
| B                        | CONDCUDETED EMISSION  | 4132 to 4233      | 4132, 4182, 4233 | WCDMA |
| A                        | RADIATED EMISSION     | 4132 to 4233      | 4132, 4182, 4233 | WCDMA |
| B                        | PEAK TO AVERAGE RATIO | 4132 to 4233      | 4132, 4182, 4233 | WCDMA |

# LTE BAND 5 MODE

| TEST ITEM           | Available Channel | Tested Channel      | Channel bandwidth | modulation | mode                |
|---------------------|-------------------|---------------------|-------------------|------------|---------------------|
| ERP                 | 20407 to 20643    | 20407, 20525, 20643 | 1.4MHz            | QPSK,16QAM | 1 RB / 0 RB Offset  |
|                     | 20415 to 20635    | 20415, 20525, 20635 | 3MHz              | QPSK,16QAM | 1 RB / 0 RB Offset  |
|                     | 20425 to 20625    | 20425, 20525, 20625 | 5MHz              | QPSK,16QAM | 1 RB / 0 RB Offset  |
|                     | 20450 to 20600    | 20450, 20525, 20600 | 10MHz             | QPSK,16QAM | 1 RB / 0 RB Offset  |
| FREQUENCY STABILITY | 20407 to 20643    | 20407, 20643        | 1.4MHz            | QPSK       | 1 RB / 0 RB Offset  |
|                     | 20415 to 20635    | 20415, 20635        | 3MHz              | QPSK       | 1 RB / 0 RB Offset  |
|                     | 20425 to 20625    | 20425, 20625        | 5MHz              | QPSK       | 1 RB / 0 RB Offset  |
|                     | 20450 to 20600    | 20450, 20600        | 10MHz             | QPSK       | 1 RB / 0 RB Offset  |
| OCCUPIED BANDWIDTH  | 20407 to 20643    | 20407, 20525, 20643 | 1.4MHz            | QPSK,16QAM | 6 RB / 0 RB Offset  |
|                     | 20415 to 20635    | 20415, 20525, 20635 | 3MHz              | QPSK,16QAM | 15 RB / 0 RB Offset |
|                     | 20425 to 20625    | 20425, 20525, 20625 | 5MHz              | QPSK,16QAM | 25 RB / 0 RB Offset |
|                     | 20450 to 20600    | 20450, 20525, 20600 | 10MHz             | QPSK,16QAM | 50 RB / 0 RB Offset |
| BAND EDGE           | 20407 to 20643    | 20407               | 1.4 MHz           | QPSK,16QAM | 1 RB / 0 RB Offset  |
|                     |                   |                     |                   |            | 6 RB / 0 RB Offset  |
|                     | 20407 to 20643    | 20643               | 1.4 MHz           | QPSK,16QAM | 1 RB / 5 RB Offset  |
|                     |                   |                     |                   |            | 6 RB / 0 RB Offset  |
|                     | 20415 to 20635    | 20415               | 3 MHz             | QPSK,16QAM | 1 RB / 0 RB Offset  |
|                     |                   |                     |                   |            | 15 RB / 0 RB Offset |
|                     | 20415 to 20635    | 20635               | 3 MHz             | QPSK,16QAM | 1 RB / 14 RB Offset |
|                     |                   |                     |                   |            | 15 RB / 0 RB Offset |
|                     | 20425 to 20625    | 20425               | 5MHz              | QPSK,16QAM | 1 RB / 0 RB Offset  |
|                     |                   |                     |                   |            | 25 RB / 0 RB Offset |
|                     | 20425 to 20625    | 20625               | 5MHz              | QPSK,16QAM | 1 RB / 24 RB Offset |
|                     |                   |                     |                   |            | 25 RB / 0 RB Offset |
|                     | 20450 to 20600    | 20450               | 10MHz             | QPSK,16QAM | 1 RB / 0 RB Offset  |
|                     |                   |                     |                   |            | 50 RB / 0 RB Offset |
|                     | 20450 to 20600    | 20600               | 10MHz             | QPSK,16QAM | 1 RB / 49 RB Offset |
|                     |                   |                     |                   |            | 50 RB / 0 RB Offset |



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|                       |                |                     |        |             |                    |
|-----------------------|----------------|---------------------|--------|-------------|--------------------|
| CONDCUDED EMISSION    | 20407 to 20643 | 20407, 20525, 20643 | 1.4MHz | QPSK        | 1 RB / 0 RB Offset |
|                       | 20415 to 20635 | 20415, 20525, 20635 | 3MHz   | QPSK        | 1 RB / 0 RB Offset |
|                       | 20425 to 20625 | 20425, 20525, 20625 | 5MHz   | QPSK        | 1 RB / 0 RB Offset |
|                       | 20450 to 20600 | 20450, 20525, 20600 | 10MHz  | QPSK        | 1 RB / 0 RB Offset |
| RADIATED EMISSION     | 20407 to 20643 | 20525               | 1.4MHz | QPSK        | 1 RB / 0 RB Offset |
|                       | 20415 to 20635 | 20525               | 3MHz   | QPSK        | 1 RB / 0 RB Offset |
|                       | 20425 to 20625 | 20525               | 5MHz   | QPSK        | 1 RB / 0 RB Offset |
|                       | 20450 to 20600 | 20450, 20525, 20600 | 10MHz  | QPSK        | 1 RB / 0 RB Offset |
| PEAK TO AVERAGE RATIO | 20407 to 20643 | 20407, 20525, 20643 | 1.4MHz | QPSK, 16QAM | 1 RB / 0 RB Offset |
|                       | 20415 to 20635 | 20415, 20525, 20635 | 3MHz   | QPSK, 16QAM | 1 RB / 0 RB Offset |
|                       | 20425 to 20625 | 20425, 20525, 20625 | 5MHz   | QPSK, 16QAM | 1 RB / 0 RB Offset |
|                       | 20450 to 20600 | 20450, 20525, 20600 | 10MHz  | QPSK, 16QAM | 1 RB / 0 RB Offset |

**Note:** This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

| TEST ITEM             | ENVIRONMENTAL CONDITIONS | INPUT POWER        | TESTED BY   |
|-----------------------|--------------------------|--------------------|-------------|
| ERP                   | 23deg. C, 70%RH          | DC 5V By Adapter   | Star Le     |
| FREQUENCY STABILITY   | 23deg. C, 70%RH          | DC 3.6V/3.7V/4.2V  | Kevin Zhang |
| OCCUPIED BANDWIDTH    | 23deg. C, 70%RH          | DC 3.7V By Battery | Kevin Zhang |
| BAND EDGE             | 23deg. C, 70%RH          | DC 3.7V By Battery | Kevin Zhang |
| CONDCUDED EMISSION    | 23deg. C, 70%RH          | DC 3.7V By Battery | Kevin Zhang |
| RADIATED EMISSION     | 23deg. C, 70%RH          | DC 5V By Adapter   | Star Le     |
| PEAK TO AVERAGE RATIO | 23deg. C, 70%RH          | DC 3.7V By Battery | Kevin Zhang |

## 2.5 EUT OPERATING CONDITIONS

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency



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## 2.6 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 22**

**KDB 971168 D01 Power Meas License Digital Systems v03r01**

**ANSI/TIA/EIA-603-D**

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

**ANSI C63.26-2015**

**NOTE:** All test items have been performed and recorded as per the above standards.

### 3 TEST TYPES AND RESULTS

#### 3.1 OUTPUT POWER MEASUREMENT

##### 3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Mobile / Portable station are limited to 7 watts e.r.p.

##### 3.1.2 TEST PROCEDURES

###### **EIRP / ERP MEASUREMENT:**

Per KDB 971168 D01 Power Meas License Digital Systems v03r01 or subclause 5.2.5.5 of ANSI C63.26-2015, the relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_{\text{T}} - L_{\text{C}}$$

Where:

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

(expressed in the same units as  $P_{\text{Meas}}$ , typically dBW or dBm);

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

$G_{\text{T}}$  = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

$L_{\text{C}}$  = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

###### **CONDUCTED POWER MEASUREMENT:**

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

### 3.1.3 TEST SETUP

EIRP / ERP Measurement:

CONDUCTED POWER MEASUREMENT:



### 3.1.4 TEST RESULTS

#### CONDUCTED OUTPUT POWER (dBm)

| Band                  | GSM850       |       |       | Max.<br>Tune-up<br>Power |
|-----------------------|--------------|-------|-------|--------------------------|
| Channel               | 128          | 189   | 251   |                          |
| Frequency             | 824.2        | 836.4 | 848.8 |                          |
| GSM (GMSK, 1Tx-slot)  | 32.32        | 32.25 | 32.22 | 33.5                     |
| GPRS (GMSK, 1Tx-slot) | <b>32.33</b> | 32.24 | 32.21 | 33.5                     |
| GPRS (GMSK, 2Tx-slot) | 29.96        | 29.89 | 29.77 | 30.5                     |
| GPRS (GMSK, 3Tx-slot) | 27.99        | 27.97 | 27.90 | 28.7                     |
| GPRS (GMSK, 4Tx-slot) | 25.80        | 25.78 | 25.75 | 27.5                     |
| EDGE (8PSK, 1Tx-slot) | 25.12        | 25.38 | 24.86 | 26.0                     |
| EDGE (8PSK, 2Tx-slot) | 24.10        | 24.36 | 24.05 | 25.0                     |
| EDGE (8PSK, 3Tx-slot) | 21.30        | 21.48 | 21.14 | 22.0                     |
| EDGE (8PSK, 4Tx-slot) | 18.94        | 19.36 | 18.97 | 20.0                     |

| Band            | WCDMA V |       |              | Max.<br>Tune-up<br>Power |
|-----------------|---------|-------|--------------|--------------------------|
| TX Channel      | 4132    | 4182  | 4233         |                          |
| Rx Channel      | 4357    | 4407  | 4458         |                          |
| Frequency       | 826.4   | 836.4 | 846.6        | 25.0                     |
| RMC 12.2K       | 23.65   | 23.70 | <b>23.77</b> |                          |
| HSDPA Subtest-1 | 22.59   | 22.63 | 22.65        | 24.0                     |
| HSDPA Subtest-2 | 22.56   | 22.57 | 22.59        | 24.0                     |
| HSDPA Subtest-3 | 22.08   | 22.12 | 22.15        | 23.5                     |
| HSDPA Subtest-4 | 22.04   | 22.08 | 22.10        | 23.5                     |
| HSUPA Subtest-1 | 22.57   | 22.59 | 22.61        | 24.0                     |
| HSUPA Subtest-2 | 20.52   | 20.52 | 20.54        | 22.0                     |
| HSUPA Subtest-3 | 21.56   | 21.56 | 21.58        | 23.0                     |
| HSUPA Subtest-4 | 20.49   | 20.51 | 20.47        | 22.0                     |
| HSUPA Subtest-5 | 22.62   | 22.64 | 22.60        | 24.0                     |
| HSPA+ Subtest-1 | 23.65   | 23.70 | <b>23.77</b> | 25.0                     |

**LTE Band 5**

| Band/BW | Modulation | RB Size | RB Offset | Low CH 20407        | Mid CH 20525        | High CH 20643       | MPR |
|---------|------------|---------|-----------|---------------------|---------------------|---------------------|-----|
|         |            |         |           | Frequency 824.7 MHz | Frequency 836.5 MHz | Frequency 848.3 MHz |     |
| 5/ 1.4  | QPSK       | 1       | 0         | 23.10               | 22.87               | 22.98               | 0   |
|         |            | 1       | 2         | 23.14               | 22.84               | 23.00               | 0   |
|         |            | 1       | 5         | 23.11               | 22.79               | 22.93               | 0   |
|         |            | 3       | 0         | 22.87               | 22.58               | 22.76               | 0   |
|         |            | 3       | 1         | 22.89               | 22.61               | 22.67               | 0   |
|         |            | 3       | 3         | 22.86               | 22.56               | 22.70               | 0   |
|         |            | 6       | 0         | 21.91               | 21.59               | 21.75               | 1   |
|         | 16QAM      | 1       | 0         | 21.77               | 21.48               | 21.62               | 1   |
|         |            | 1       | 2         | 21.82               | 21.49               | 21.67               | 1   |
|         |            | 1       | 5         | 21.74               | 21.44               | 21.63               | 1   |
|         |            | 3       | 0         | 22.30               | 22.02               | 22.14               | 1   |
|         |            | 3       | 1         | 21.94               | 21.74               | 21.82               | 1   |
|         |            | 3       | 3         | 22.07               | 21.79               | 21.95               | 1   |
|         |            | 6       | 0         | 20.79               | 20.56               | 20.65               | 2   |

| Band/BW | Modulation | RB Size | RB Offset | Low CH 20415        | Mid CH 20525        | High CH 20635       | MPR |
|---------|------------|---------|-----------|---------------------|---------------------|---------------------|-----|
|         |            |         |           | Frequency 825.5 MHz | Frequency 836.5 MHz | Frequency 847.5 MHz |     |
| 5/ 3    | QPSK       | 1       | 0         | 23.12               | 22.89               | 22.97               | 0   |
|         |            | 1       | 7         | 23.10               | 22.85               | 23.00               | 0   |
|         |            | 1       | 14        | 23.07               | 22.79               | 22.93               | 0   |
|         |            | 8       | 0         | 21.86               | 21.61               | 21.76               | 1   |
|         |            | 8       | 3         | 21.82               | 21.61               | 21.69               | 1   |
|         |            | 8       | 7         | 21.83               | 21.63               | 21.74               | 1   |
|         |            | 15      | 0         | 21.88               | 21.60               | 21.69               | 1   |
|         | 16QAM      | 1       | 0         | 21.74               | 21.54               | 21.65               | 1   |
|         |            | 1       | 7         | 21.79               | 21.52               | 21.65               | 1   |
|         |            | 1       | 14        | 21.77               | 21.44               | 21.63               | 1   |
|         |            | 8       | 0         | 21.26               | 21.03               | 21.14               | 2   |
|         |            | 8       | 3         | 20.99               | 20.69               | 20.85               | 2   |
|         |            | 8       | 7         | 21.09               | 20.77               | 20.91               | 2   |
|         |            | 15      | 0         | 20.79               | 20.50               | 20.68               | 2   |

| Band/BW | Modulation | RB Size | RB Offset | Low CH<br>20425        | Mid CH<br>20525        | High CH<br>20625       | MPR |
|---------|------------|---------|-----------|------------------------|------------------------|------------------------|-----|
|         |            |         |           | Frequency<br>826.5 MHz | Frequency<br>836.5 MHz | Frequency<br>846.5 MHz |     |
| 5/ 5    | QPSK       | 1       | 0         | 23.13                  | 22.84                  | 22.98                  | 0   |
|         |            | 1       | 12        | 23.15                  | 22.82                  | 23.00                  | 0   |
|         |            | 1       | 24        | 23.08                  | 22.78                  | 22.97                  | 0   |
|         |            | 12      | 0         | 21.89                  | 21.61                  | 21.73                  | 1   |
|         |            | 12      | 6         | 21.82                  | 21.62                  | 21.70                  | 1   |
|         |            | 12      | 13        | 21.87                  | 21.59                  | 21.75                  | 1   |
|         |            | 25      | 0         | 21.86                  | 21.63                  | 21.72                  | 1   |
|         | 16QAM      | 1       | 0         | 21.75                  | 21.50                  | 21.65                  | 1   |
|         |            | 1       | 12        | 21.76                  | 21.55                  | 21.64                  | 1   |
|         |            | 1       | 24        | 21.77                  | 21.44                  | 21.62                  | 1   |
|         |            | 12      | 0         | 21.26                  | 21.01                  | 21.11                  | 2   |
|         |            | 12      | 6         | 20.96                  | 20.73                  | 20.81                  | 2   |
|         |            | 12      | 13        | 21.04                  | 20.79                  | 20.94                  | 2   |
|         |            | 25      | 0         | 20.79                  | 20.51                  | 20.65                  | 2   |

| Band/BW | Modulation | RB Size | RB Offset | Low CH<br>20450      | Mid CH<br>20525        | High CH<br>20600     | MPR |
|---------|------------|---------|-----------|----------------------|------------------------|----------------------|-----|
|         |            |         |           | Frequency<br>829 MHz | Frequency<br>836.5 MHz | Frequency<br>844 MHz |     |
| 5/ 10   | QPSK       | 1       | 0         | <b>23.18</b>         | 22.91                  | 23.03                | 0   |
|         |            | 1       | 24        | 23.17                | 22.90                  | 23.02                | 0   |
|         |            | 1       | 49        | 23.13                | 22.86                  | 22.98                | 0   |
|         |            | 25      | 0         | 21.93                | 21.66                  | 21.78                | 1   |
|         |            | 25      | 12        | 21.90                | 21.63                  | 21.75                | 1   |
|         |            | 25      | 25        | 21.91                | 21.64                  | 21.76                | 1   |
|         |            | 50      | 0         | 21.92                | 21.65                  | 21.77                | 1   |
|         | 16QAM      | 1       | 0         | 21.82                | 21.55                  | 21.67                | 1   |
|         |            | 1       | 24        | 21.84                | 21.57                  | 21.69                | 1   |
|         |            | 1       | 49        | 21.79                | 21.52                  | 21.64                | 1   |
|         |            | 25      | 0         | 21.34                | 21.07                  | 21.19                | 2   |
|         |            | 25      | 12        | 21.02                | 20.75                  | 20.87                | 2   |
|         |            | 25      | 25        | 21.11                | 20.84                  | 20.96                | 2   |
|         |            | 50      | 0         | 20.85                | 20.58                  | 20.70                | 2   |

## ERP POWER (dBm)

### GSM

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | ERP (dBm) | ERP (mW)      | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|-----------|---------------|-----------|
| 128     | 824.2           | 32.33                 | -3.90                               | 26.28     | <b>424.62</b> | 7         |
| 189     | 836.4           | 32.25                 | -3.90                               | 26.20     | 416.87        | 7         |
| 251     | 848.8           | 32.22                 | -3.90                               | 26.17     | 414           | 7         |

**REMARKS:** ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

### EDGE

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | ERP (dBm) | ERP (mW)    | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|-----------|-------------|-----------|
| 128     | 824.2           | 25.12                 | -3.90                               | 19.07     | 80.72       | 7         |
| 189     | 836.4           | 25.38                 | -3.90                               | 19.33     | <b>85.7</b> | 7         |
| 251     | 848.8           | 24.86                 | -3.90                               | 18.81     | 76.03       | 7         |

**REMARKS:** ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

### WCDMA

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | ERP (dBm) | ERP (mW)     | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|-----------|--------------|-----------|
| 4132    | 826.4           | 23.65                 | -3.90                               | 17.60     | 57.54        | 7         |
| 4182    | 836.4           | 23.70                 | -3.90                               | 17.65     | 58.21        | 7         |
| 4233    | 846.6           | 23.77                 | -3.90                               | 17.72     | <b>59.16</b> | 7         |

**REMARKS:** ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).



## LTE BAND 5

### CHANNEL BANDWIDTH: 1.4MHz QPSK

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | ERP (dBm) | ERP (mW)     | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|-----------|--------------|-----------|
| 20407   | 824.7           | 23.14                 | -3.90                               | 17.09     | <b>51.17</b> | 7         |
| 20525   | 836.5           | 22.87                 | -3.90                               | 16.82     | 48.08        | 7         |
| 20643   | 848.3           | 23.00                 | -3.90                               | 16.95     | 49.55        | 7         |

### CHANNEL BANDWIDTH: 1.4MHz 16QAM

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | ERP (dBm) | ERP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|-----------|----------|-----------|
| 20407   | 824.7           | 22.30                 | -3.90                               | 16.25     | 42.17    | 7         |
| 20525   | 836.5           | 22.02                 | -3.90                               | 15.97     | 39.54    | 7         |
| 20643   | 848.3           | 22.14                 | -3.90                               | 16.09     | 40.64    | 7         |

### CHANNEL BANDWIDTH: 3MHz QPSK

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | ERP (dBm) | ERP (mW)     | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|-----------|--------------|-----------|
| 20415   | 825.5           | 23.12                 | -3.90                               | 17.07     | <b>50.93</b> | 7         |
| 20525   | 836.5           | 22.89                 | -3.90                               | 16.84     | 48.31        | 7         |
| 20635   | 847.5           | 23.00                 | -3.90                               | 16.95     | 49.55        | 7         |

### CHANNEL BANDWIDTH: 3MHz 16QAM

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | ERP (dBm) | ERP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|-----------|----------|-----------|
| 20415   | 825.5           | 21.79                 | -3.90                               | 15.74     | 37.5     | 7         |
| 20525   | 836.5           | 21.54                 | -3.90                               | 15.49     | 35.4     | 7         |
| 20635   | 847.5           | 21.65                 | -3.90                               | 15.60     | 36.31    | 7         |



## LTE BAND 5

## CHANNEL BANDWIDTH: 5MHz QPSK

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | ERP (dBm) | ERP (mW)     | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|-----------|--------------|-----------|
| 20425   | 826.5           | 23.15                 | -3.90                               | 17.10     | <b>51.29</b> | 7         |
| 20525   | 836.5           | 22.82                 | -3.90                               | 16.77     | 47.53        | 7         |
| 20625   | 846.5           | 23.00                 | -3.90                               | 16.95     | 49.55        | 7         |

## CHANNEL BANDWIDTH: 5MHz 16QAM

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | ERP (dBm) | ERP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|-----------|----------|-----------|
| 20425   | 826.5           | 21.77                 | -3.90                               | 15.72     | 37.33    | 7         |
| 20525   | 836.5           | 21.55                 | -3.90                               | 15.50     | 35.48    | 7         |
| 20625   | 846.5           | 21.65                 | -3.90                               | 15.60     | 36.31    | 7         |

## CHANNEL BANDWIDTH: 10MHz QPSK

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | ERP (dBm) | ERP (mW)     | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|-----------|--------------|-----------|
| 20450   | 829.0           | 23.18                 | -3.90                               | 17.13     | <b>51.64</b> | 7         |
| 20525   | 836.5           | 22.91                 | -3.90                               | 16.86     | 48.53        | 7         |
| 20600   | 844.0           | 23.03                 | -3.90                               | 16.98     | 49.89        | 7         |

## CHANNEL BANDWIDTH: 10MHz 16QAM

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | ERP (dBm) | ERP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|-----------|----------|-----------|
| 20450   | 829.0           | 21.84                 | -3.90                               | 15.79     | 37.93    | 7         |
| 20525   | 836.5           | 21.57                 | -3.90                               | 15.52     | 35.65    | 7         |
| 20600   | 844.0           | 21.69                 | -3.90                               | 15.64     | 36.64    | 7         |

**REMARKS:** ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

## 3.2 FREQUENCY STABILITY MEASUREMENT

### 3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

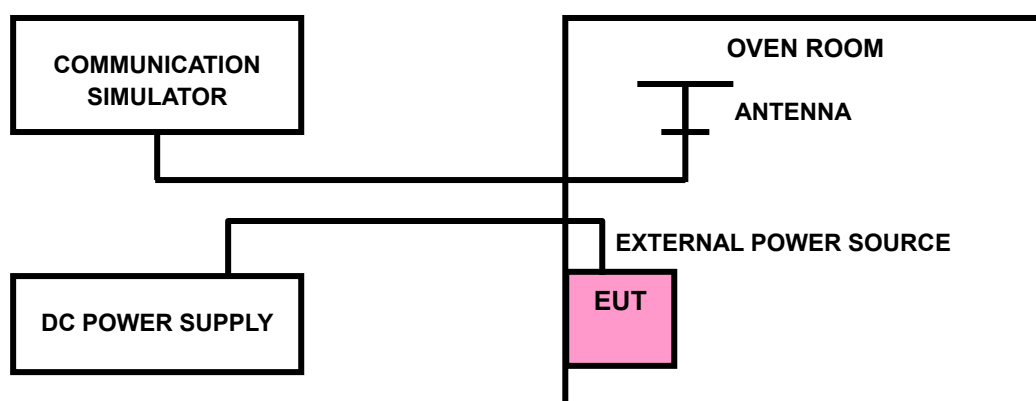
1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

### 3.2.2 TEST PROCEDURE

- 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.

### 3.2.3 TEST SETUP





### 3.2.4 TEST RESULTS

#### GSM 850

##### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | FREQUENCY ERROR (ppm) |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | Low Channel           | High Channel |             |
| $V_{nor}$       | 0.0021                | 0.0023       | 2.5         |
| $V_{min}$       | -0.0023               | -0.0030      | 2.5         |
| $V_{max}$       | 0.0021                | 0.0021       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from  $V_{min}$  to  $V_{max}$ .

##### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | FREQUENCY ERROR (ppm) |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | Low Channel           | High Channel |             |
| -30        | -0.0120               | -0.0114      | 2.5         |
| -20        | -0.0110               | -0.0104      | 2.5         |
| -10        | -0.0081               | -0.0076      | 2.5         |
| 0          | -0.0074               | -0.0068      | 2.5         |
| 10         | -0.0055               | -0.0050      | 2.5         |
| 20         | -0.0041               | -0.0036      | 2.5         |
| 30         | -0.0034               | -0.0029      | 2.5         |
| 40         | -0.0021               | -0.0016      | 2.5         |
| 50         | -0.0005               | 0.0000       | 2.5         |

**EDGE 850****FREQUENCY ERROR VS. VOLTAGE**

| VOLTAGE (Volts) | FREQUENCY ERROR (ppm) |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | Low Channel           | High Channel |             |
| $V_{nor}$       | 0.0021                | 0.0025       | 2.5         |
| $V_{min}$       | -0.0026               | -0.0027      | 2.5         |
| $V_{max}$       | 0.0019                | 0.0021       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from  $V_{min}$  to  $V_{max}$ .

**FREQUENCY ERROR vs. TEMPERATURE.**

| TEMP. (°C) | FREQUENCY ERROR (ppm) |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | Low Channel           | High Channel |             |
| -30        | -0.0120               | -0.0109      | 2.5         |
| -20        | -0.0108               | -0.0093      | 2.5         |
| -10        | -0.0085               | -0.0075      | 2.5         |
| 0          | -0.0075               | -0.0061      | 2.5         |
| 10         | -0.0054               | -0.0045      | 2.5         |
| 20         | -0.0042               | -0.0032      | 2.5         |
| 30         | -0.0026               | -0.0022      | 2.5         |
| 40         | -0.0016               | -0.0011      | 2.5         |
| 50         | -0.0006               | -0.0056      | 2.5         |

## WCDMA Band V

### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | FREQUENCY ERROR (ppm) |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | Low Channel           | High Channel |             |
| $V_{nor}$       | 0.0021                | 0.0024       | 2.5         |
| $V_{min}$       | -0.0026               | -0.0021      | 2.5         |
| $V_{max}$       | 0.0025                | 0.0023       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from  $V_{min}$  to  $V_{max}$ .

### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | FREQUENCY ERROR (ppm) |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | Low Channel           | High Channel |             |
| -30        | -0.0122               | -0.0114      | 2.5         |
| -20        | -0.0112               | -0.0106      | 2.5         |
| -10        | -0.0083               | -0.0081      | 2.5         |
| 0          | -0.0077               | -0.0075      | 2.5         |
| 10         | -0.0046               | -0.0048      | 2.5         |
| 20         | -0.0039               | -0.0038      | 2.5         |
| 30         | -0.0031               | -0.0028      | 2.5         |
| 40         | -0.0019               | -0.0018      | 2.5         |
| 50         | -0.0006               | -0.0005      | 2.5         |



## LTE Band 5

## FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts)  | 1.4MHz                |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0021                | 0.0025       | 2.5         |
| V <sub>min</sub> | -0.0031               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0021                | 0.0021       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is  $V_{min}$  to  $V_{max}$ .

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 1.4MHz                |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0123               | -0.0113      | 2.5         |
| -20        | -0.0102               | -0.0098      | 2.5         |
| -10        | -0.0082               | -0.0082      | 2.5         |
| 0          | -0.0077               | -0.0074      | 2.5         |
| 10         | -0.0052               | -0.0055      | 2.5         |
| 20         | -0.0038               | -0.0040      | 2.5         |
| 30         | -0.0032               | -0.0032      | 2.5         |
| 40         | -0.0017               | -0.0015      | 2.5         |
| 50         | -0.0006               | -0.0002      | 2.5         |

#### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts)  | 3MHz                  |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0021                | 0.0021       | 2.5         |
| V <sub>min</sub> | -0.0021               | -0.0025      | 2.5         |
| V <sub>max</sub> | 0.0018                | 0.0017       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is  $V_{min}$  to  $V_{max}$ .

#### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 3MHz                  |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0120               | -0.0113      | 2.5         |
| -20        | -0.0113               | -0.0108      | 2.5         |
| -10        | -0.0086               | -0.0080      | 2.5         |
| 0          | -0.0077               | -0.0073      | 2.5         |
| 10         | -0.0055               | -0.0046      | 2.5         |
| 20         | -0.0041               | -0.0040      | 2.5         |
| 30         | -0.0038               | -0.0029      | 2.5         |
| 40         | -0.0020               | -0.0021      | 2.5         |
| 50         | -0.0004               | -0.0005      | 2.5         |

#### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts)  | 5MHz                  |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0021                | 0.0023       | 2.5         |
| V <sub>min</sub> | -0.0023               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0021                | 0.0021       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from  $V_{min}$  to  $V_{max}$ .

#### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 5MHz                  |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0116               | -0.0120      | 2.5         |
| -20        | -0.0109               | -0.0102      | 2.5         |
| -10        | -0.0086               | -0.0082      | 2.5         |
| 0          | -0.0078               | -0.0073      | 2.5         |
| 10         | -0.0046               | -0.0044      | 2.5         |
| 20         | -0.0038               | -0.0039      | 2.5         |
| 30         | -0.0037               | -0.0025      | 2.5         |
| 40         | -0.0021               | -0.0019      | 2.5         |
| 50         | -0.0001               | -0.0003      | 2.5         |

#### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts)  | 10MHz                 |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0026                | 0.0025       | 2.5         |
| V <sub>min</sub> | -0.0031               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0026                | 0.0025       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from  $V_{min}$  to  $V_{max}$ .

#### FREQUENCY ERROR vs. TEMPERATURE.

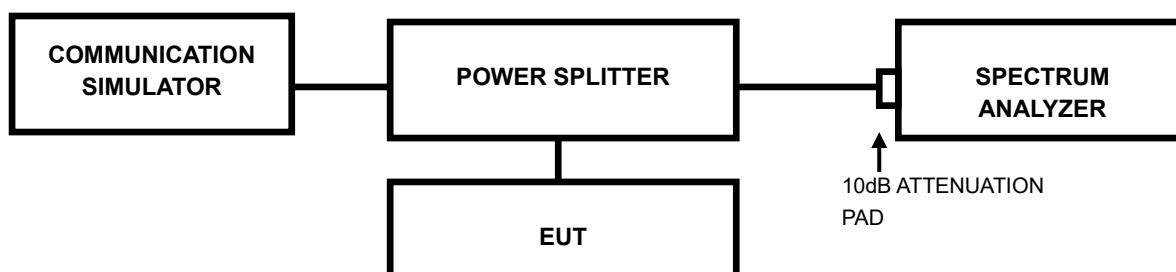
| TEMP. (°C) | 10MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0120               | -0.0113      | 2.5         |
| -20        | -0.0098               | -0.0098      | 2.5         |
| -10        | -0.0084               | -0.0083      | 2.5         |
| 0          | -0.0077               | -0.0074      | 2.5         |
| 10         | -0.0047               | -0.0049      | 2.5         |
| 20         | -0.0043               | -0.0042      | 2.5         |
| 30         | -0.0041               | -0.0030      | 2.5         |
| 40         | -0.0020               | -0.0021      | 2.5         |
| 50         | -0.0005               | -0.0003      | 2.5         |

### 3.3 OCCUPIED BANDWIDTH MEASUREMENT

#### 3.3.1 TEST PROCEDURES

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

#### 3.3.2 TEST SETUP



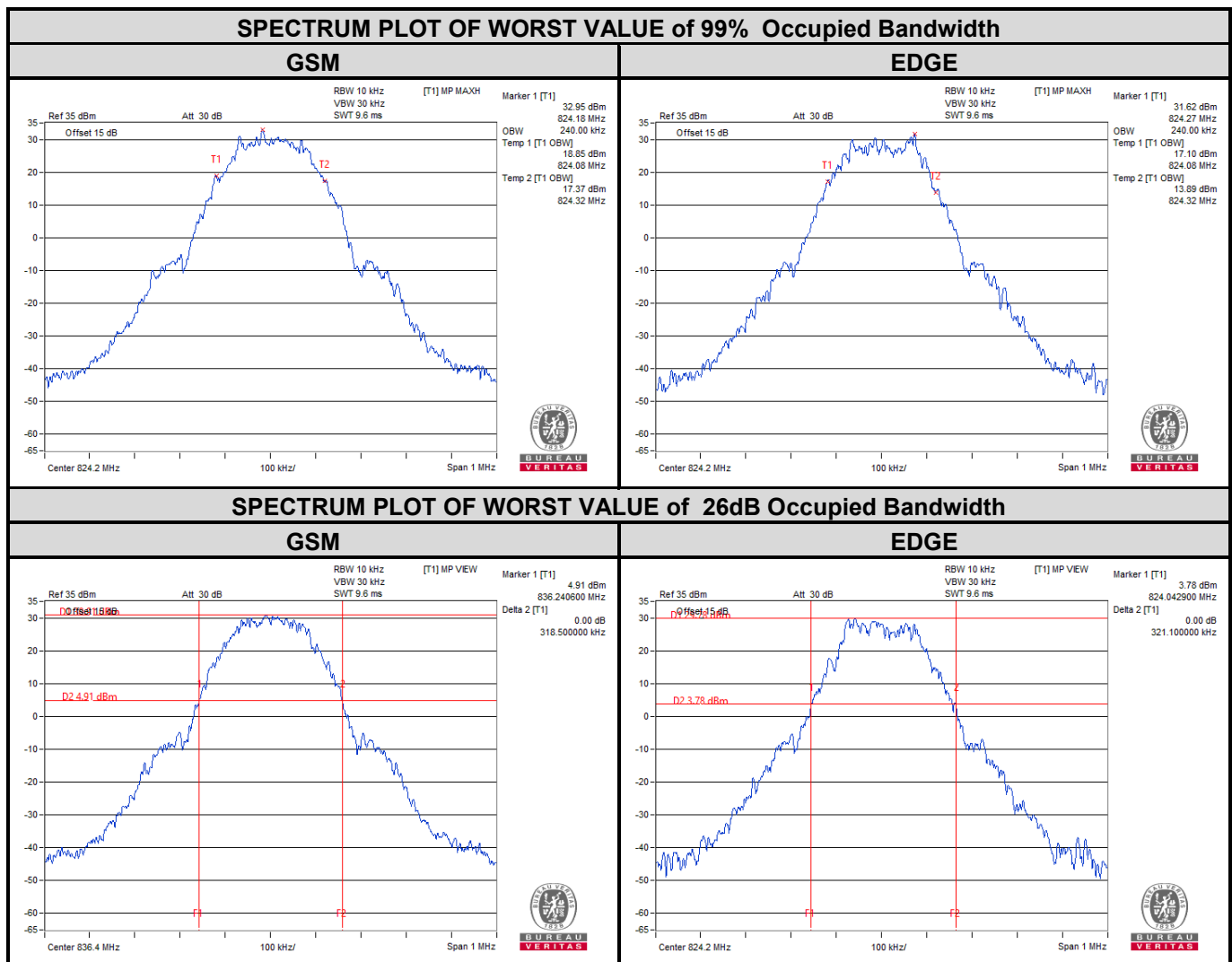


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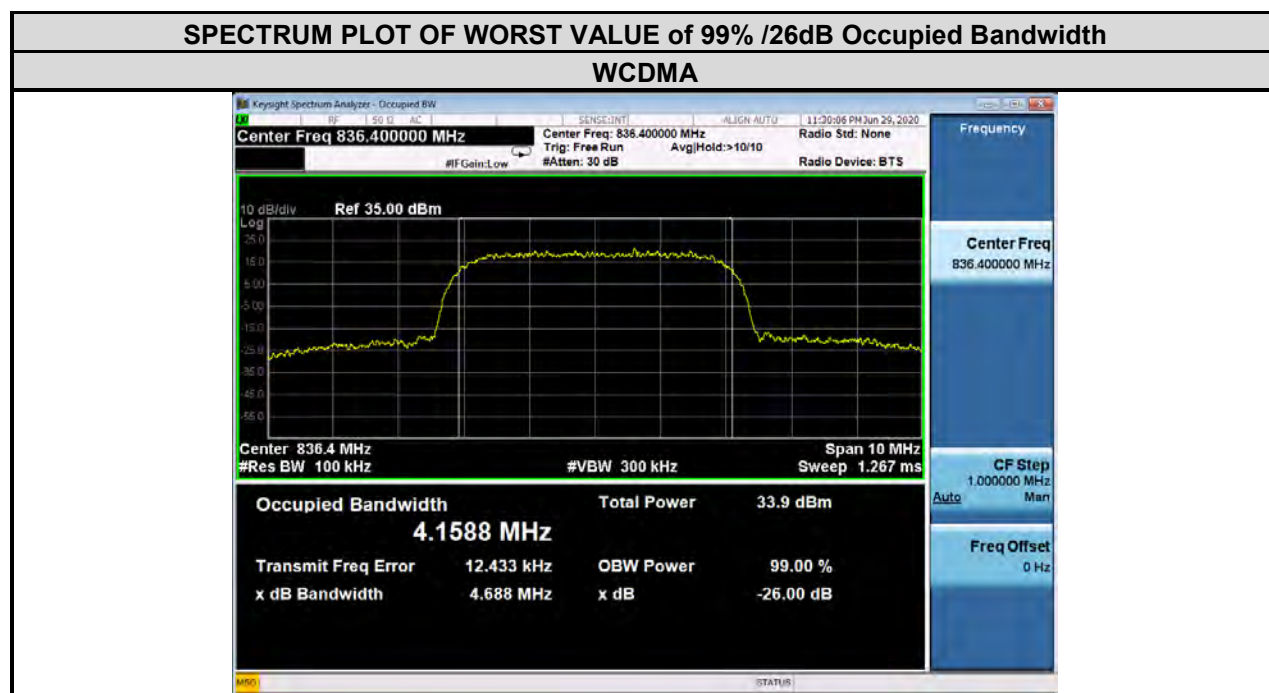
Test Report No.: RF200629W001-2

### 3.3.3 TEST RESULTS

| CHANNEL | Frequency (MHz) | 99% OCCUPIED Bandwidth (kHz) |       | CHANNEL | Frequency (MHz) | 26dB Bandwidth (kHz) |       |
|---------|-----------------|------------------------------|-------|---------|-----------------|----------------------|-------|
|         |                 | GSM                          | EDGE  |         |                 | GSM                  | EDGE  |
| 128     | 824.2           | 240.0                        | 240.0 | 128     | 824.2           | 314.4                | 321.1 |
| 189     | 836.4           | 240.0                        | 240.0 | 189     | 836.4           | 318.5                | 313.4 |
| 251     | 848.8           | 240.0                        | 230.0 | 251     | 848.8           | 308.2                | 311.9 |



| CHANNEL | Frequency (MHz) | 99% OCCUPIED Bandwidth (MHz) | CHANNEL | Frequency (MHz) | 26dB Bandwidth (MHz) |
|---------|-----------------|------------------------------|---------|-----------------|----------------------|
|         |                 | WCDMA                        |         |                 | WCDMA                |
| 4132    | 826.4           | 4.143                        | 4132    | 826.4           | 4.677                |
| 4182    | 836.4           | 4.159                        | 4182    | 836.4           | 4.688                |
| 4233    | 846.6           | 4.151                        | 4233    | 846.6           | 4.695                |



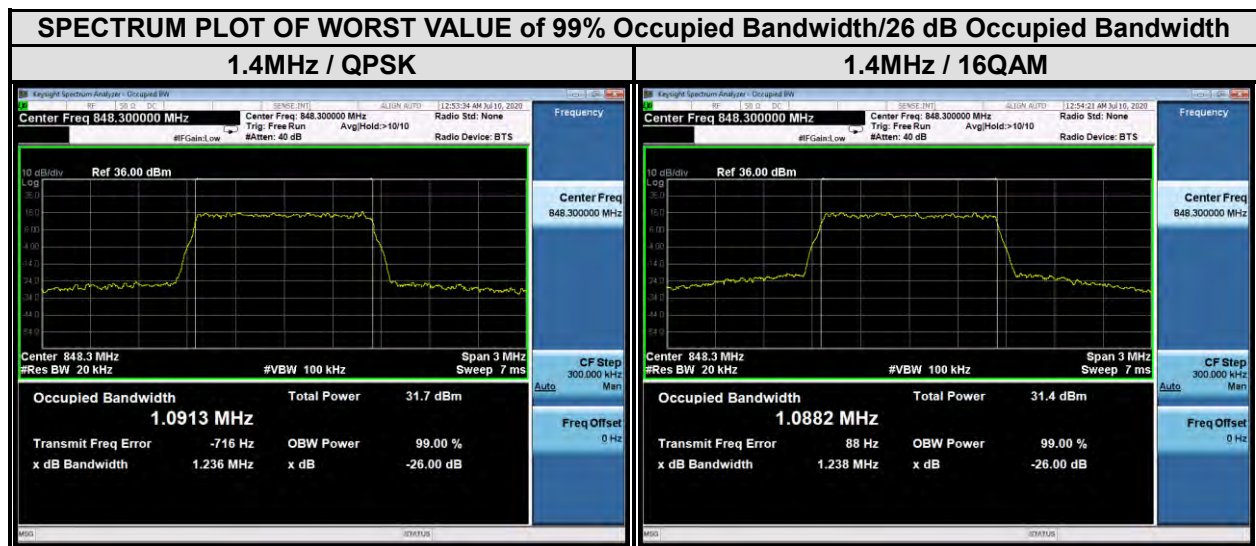


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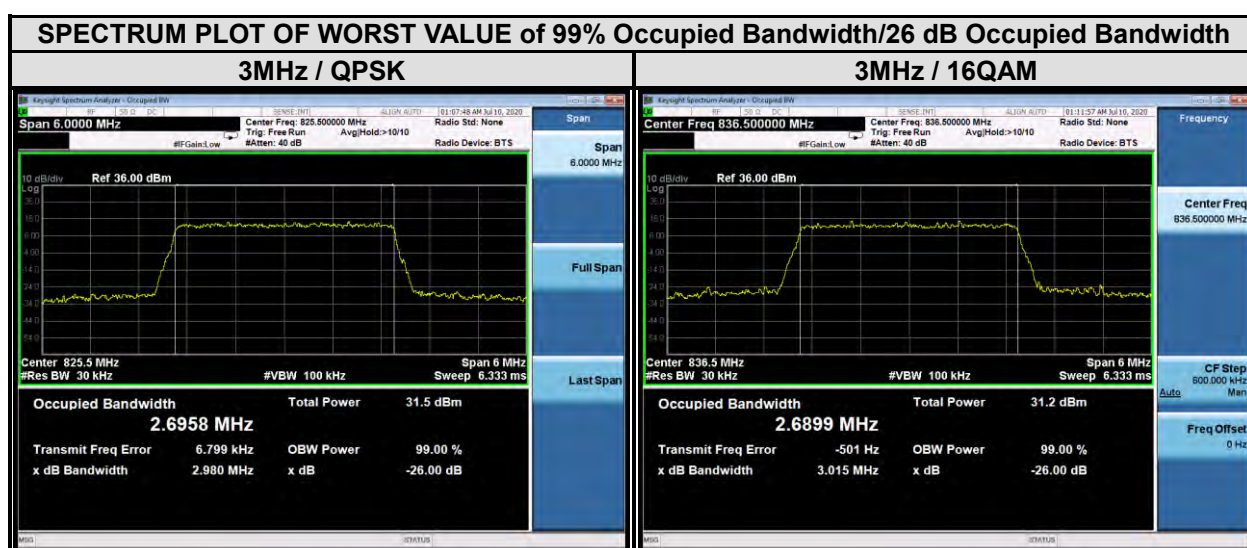
Test Report No.: RF200629W001-2

## LTE BAND 5

| CHANNEL BANDWIDTH: 1.4MHz |                 |                              |       |                       |       |
|---------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| CHANNEL                   | Frequency (MHz) | 99% OCCUPIED Bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                           |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 20407                     | 824.7           | 1.09                         | 1.09  | 1.24                  | 1.23  |
| 20525                     | 836.5           | 1.09                         | 1.09  | 1.24                  | 1.24  |
| 20643                     | 848.3           | 1.09                         | 1.09  | 1.24                  | 1.24  |



| CHANNEL BANDWIDTH: 3MHz |                 |                              |       |                       |       |
|-------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| CHANNEL                 | Frequency (MHz) | 99% OCCUPIED Bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                         |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 20415                   | 825.5           | 2.70                         | 2.69  | 2.98                  | 2.98  |
| 20525                   | 836.5           | 2.69                         | 2.69  | 3.00                  | 3.02  |
| 20635                   | 847.5           | 2.69                         | 2.69  | 2.98                  | 3.00  |

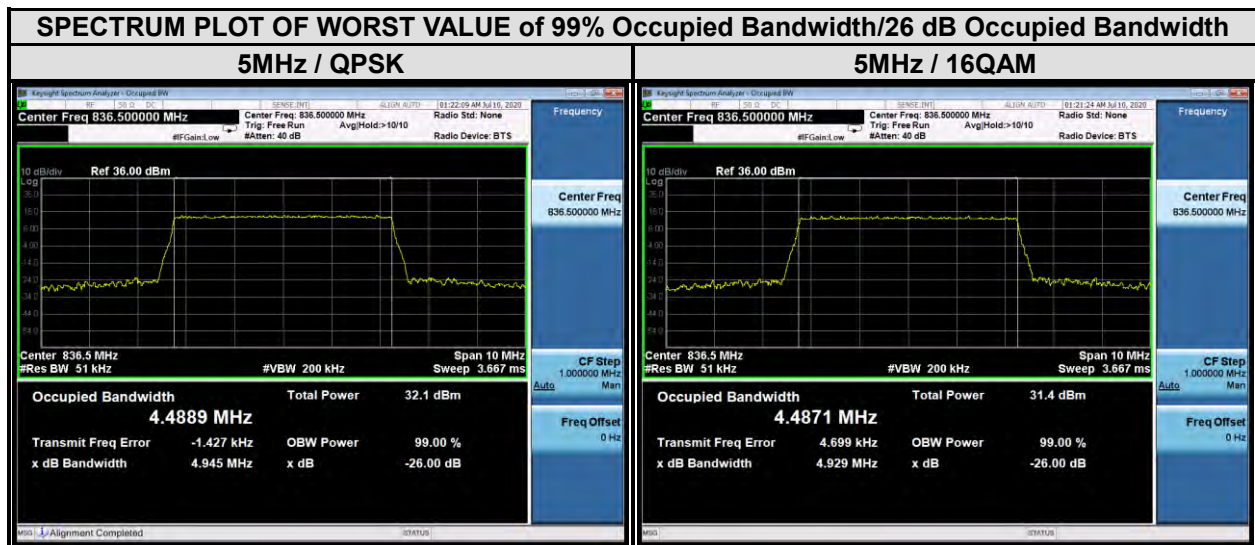




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| CHANNEL BANDWIDTH: 5MHz |                 |                              |       |                       |       |
|-------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| CHANNEL                 | Frequency (MHz) | 99% OCCUPIED Bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                         |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 20425                   | 826.5           | 4.49                         | 4.47  | 4.92                  | 4.89  |
| 20525                   | 836.5           | 4.49                         | 4.49  | 4.95                  | 4.93  |
| 20625                   | 846.5           | 4.46                         | 4.48  | 4.86                  | 4.92  |

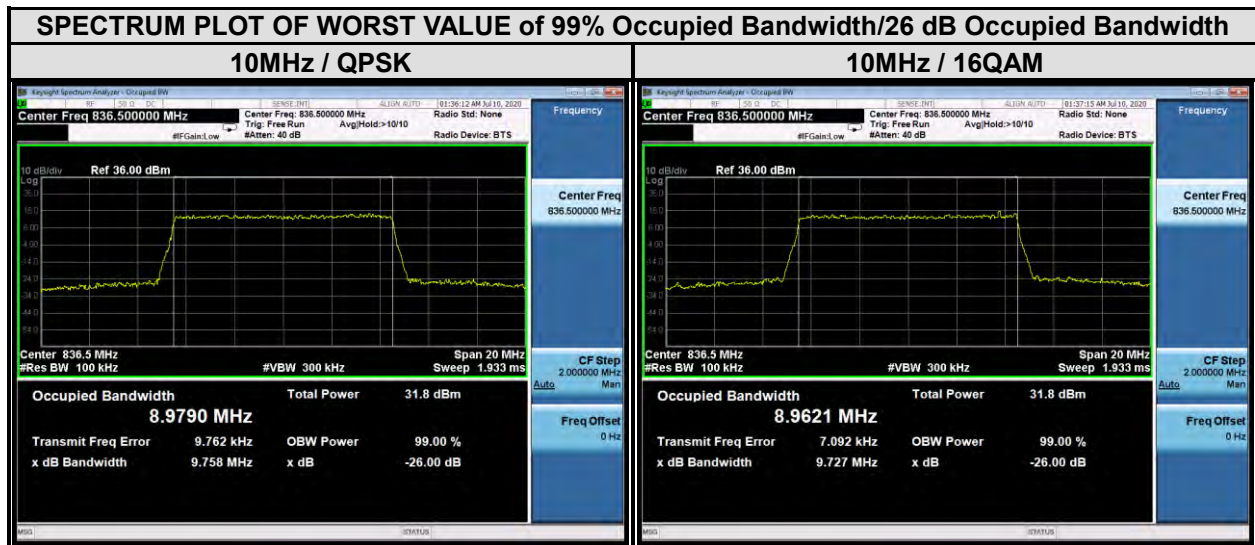




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| CHANNEL BANDWIDTH: 10MHz |                 |                              |       |                       |       |
|--------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| CHANNEL                  | Frequency (MHz) | 99% OCCUPIED Bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                          |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 20450                    | 829             | 8.94                         | 8.94  | 9.74                  | 9.81  |
| 20525                    | 836.5           | 8.98                         | 8.96  | 9.76                  | 9.73  |
| 20600                    | 844             | 8.95                         | 8.94  | 9.76                  | 9.74  |

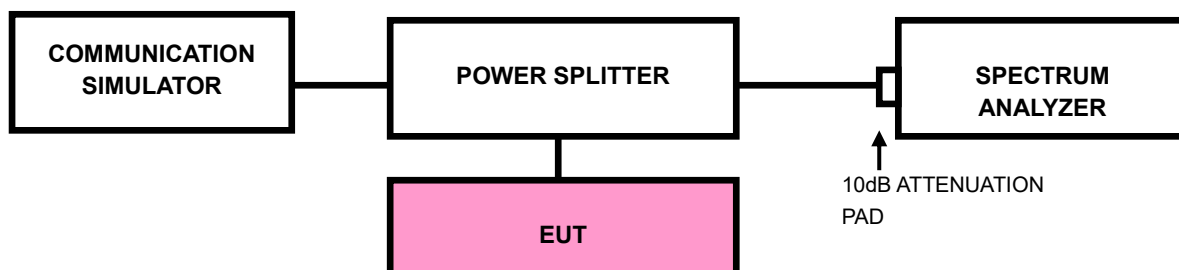


### 3.4 BAND EDGE MEASUREMENT

#### 3.4.1 LIMITS OF BAND EDGE MEASUREMENT

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

#### 3.4.2 TEST SETUP



### 3.4.3 TEST PROCEDURES

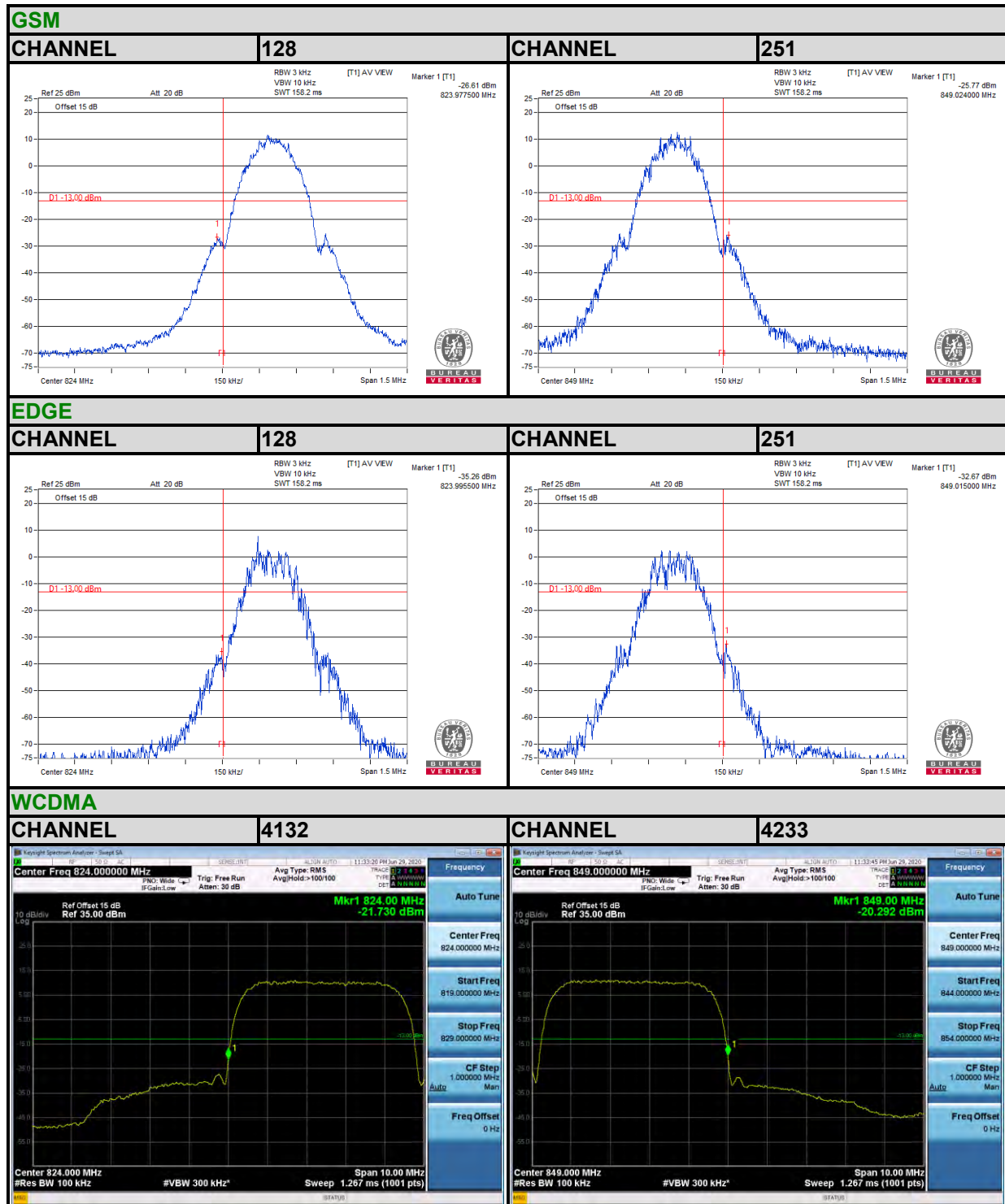
- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 1.5MHz.  
RBW of the spectrum is 10kHz and VBW of the spectrum is 30kHz (GSM/GPRS/EDGE).
- c. The center frequency of spectrum is the band edge frequency and span is 10MHz.  
RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz (WCDMA).
- d. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz.  
RBW of the spectrum is 20kHz and VBW of the spectrum is 100 kHz. (LTE bandwidth 1.4MHz).
- e. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz.  
RBW of the spectrum is 30kHz and VBW of the spectrum is 100kHz. (LTE bandwidth 3MHz)
- f. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz.  
RBW of the spectrum is 50kHz and VBW of the spectrum is 200kHz. (LTE bandwidth 5MHz)
- g. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz.  
RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz. (LTE bandwidth 10MHz)
- h. Record the max trace plot into the test report.



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### 3.4.4 TEST RESULTS



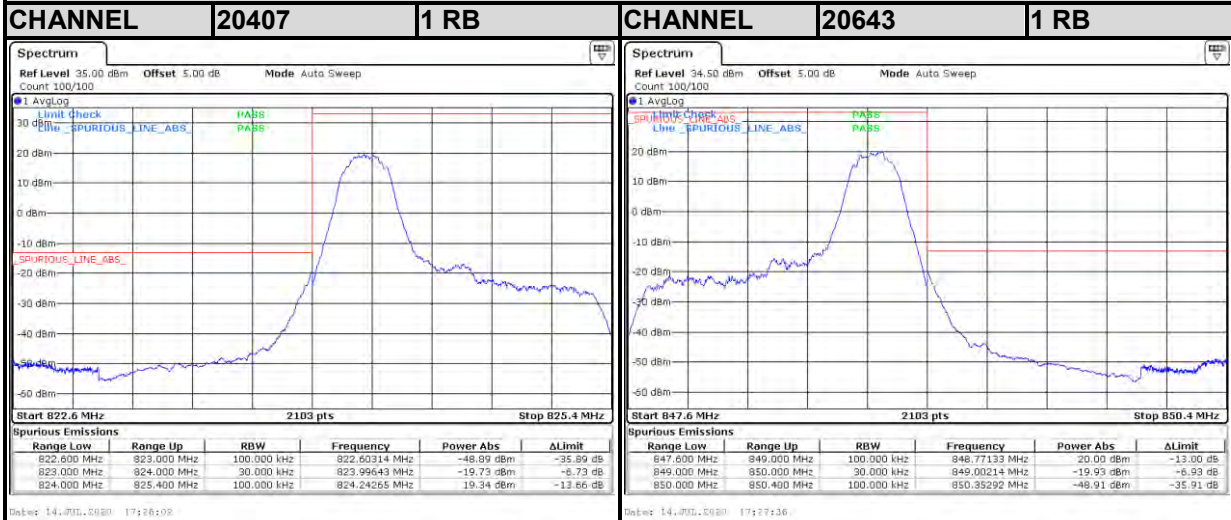


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Test Report No.: RF200629W001-2

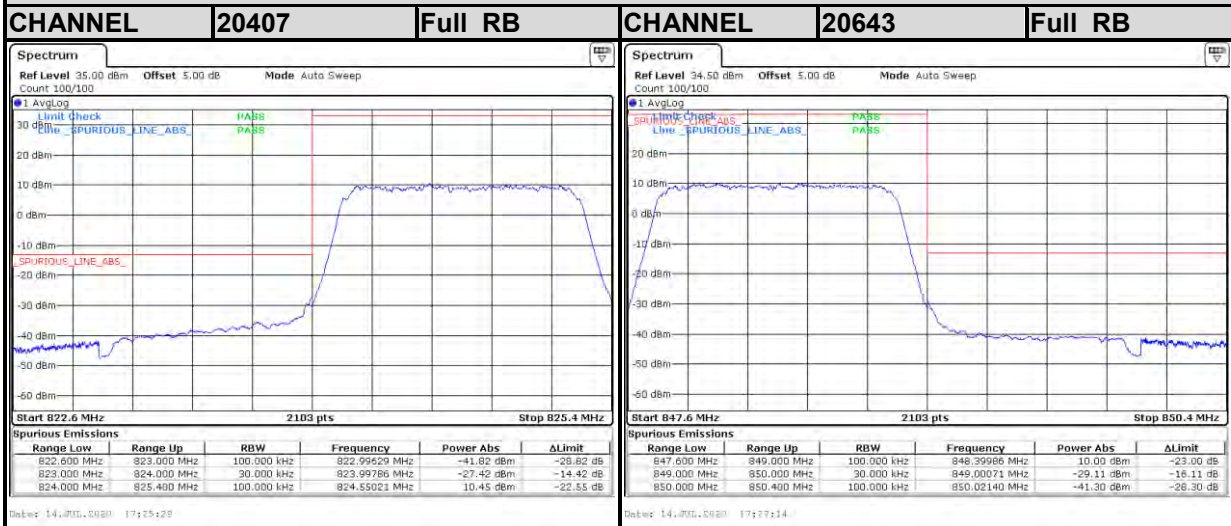
## LTE Band5

Channel Bandwidth: 1.4MHz QPSK



## LTE Band5

Channel Bandwidth: 1.4MHz QPSK



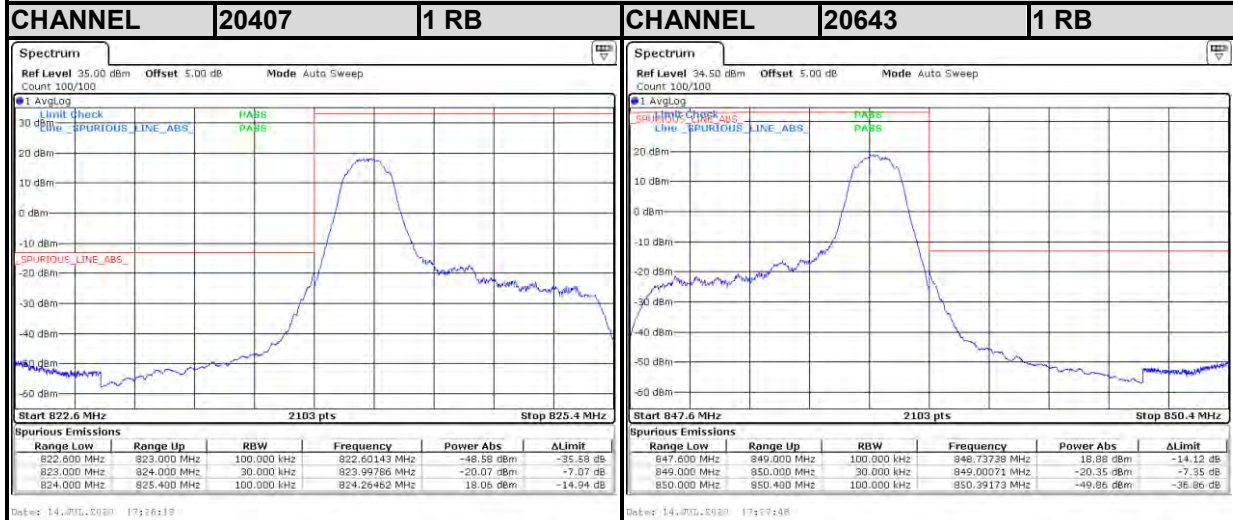


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Test Report No.: RF200629W001-2

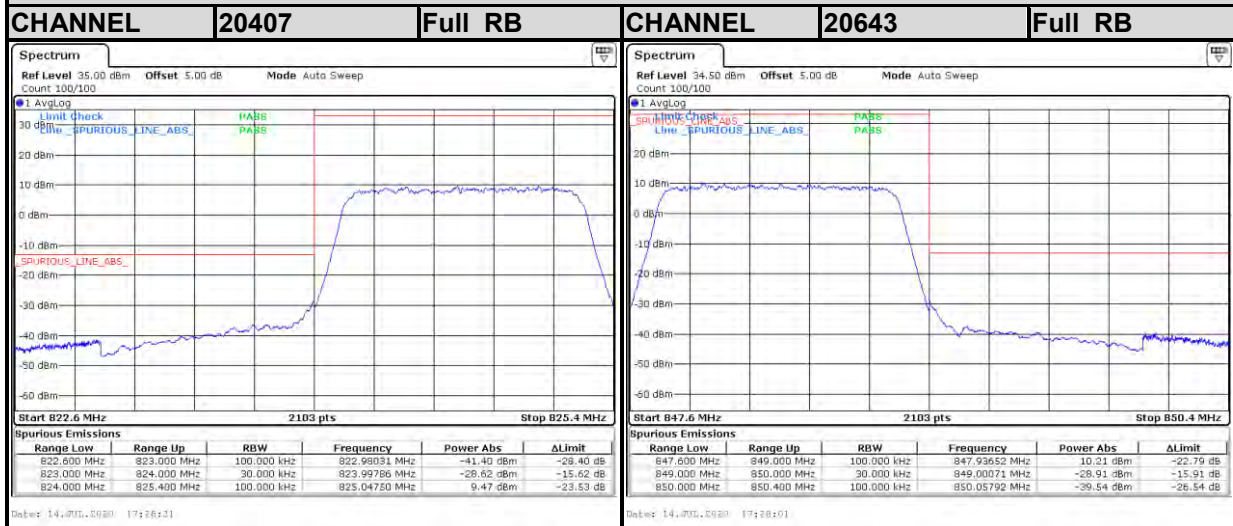
## LTE Band5

Channel Bandwidth: 1.4MHz 16QAM



## LTE Band5

Channel Bandwidth: 1.4MHz 16QAM



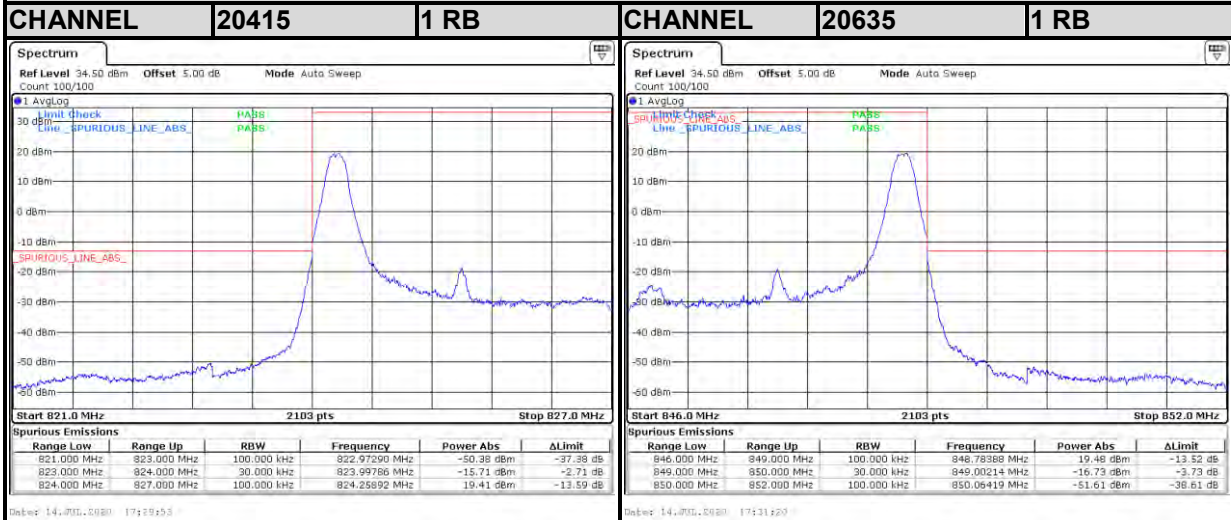


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Test Report No.: RF200629W001-2

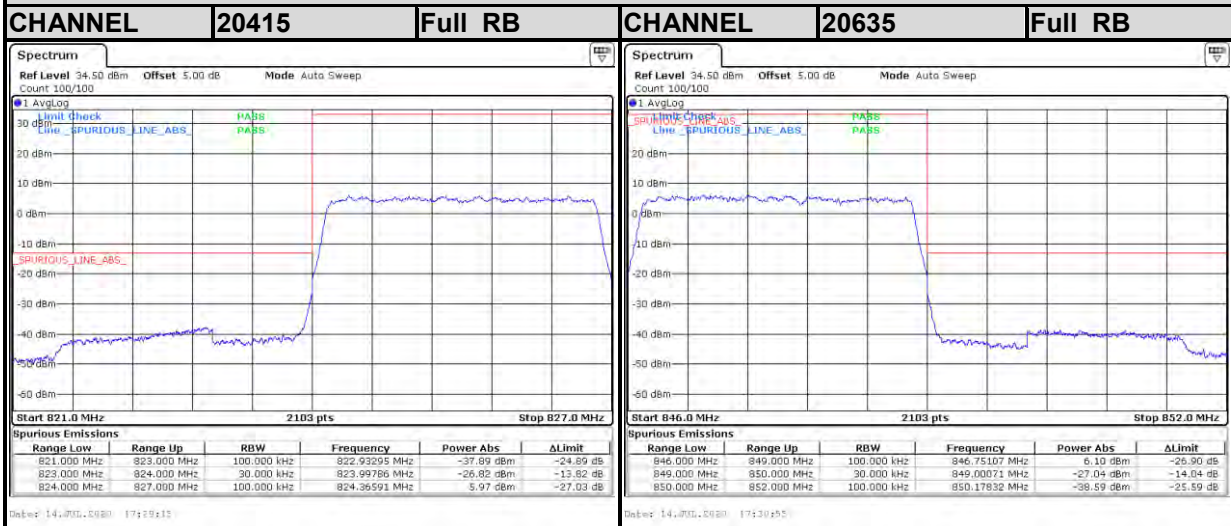
## LTE Band5

Channel Bandwidth: 3MHz QPSK



## LTE Band5

Channel Bandwidth: 3MHz QPSK



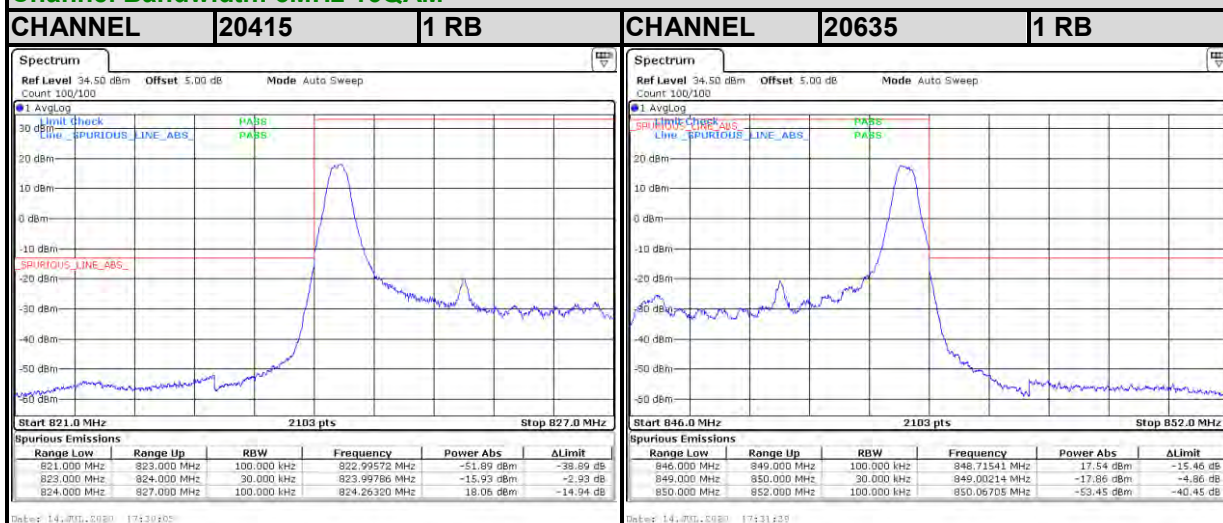


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Test Report No.: RF200629W001-2

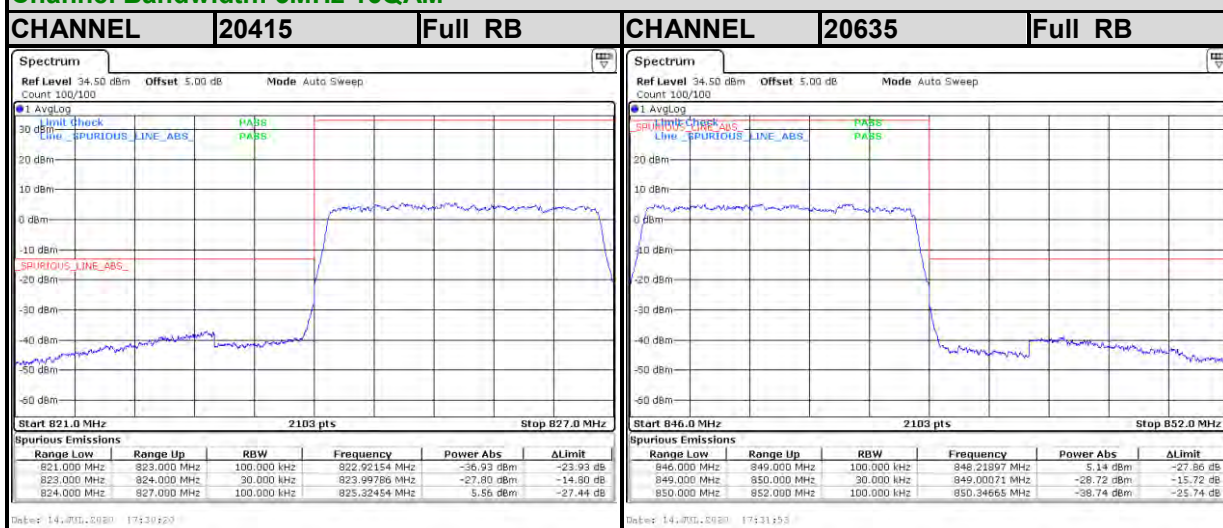
## LTE Band5

Channel Bandwidth: 3MHz 16QAM



## LTE Band5

Channel Bandwidth: 3MHz 16QAM



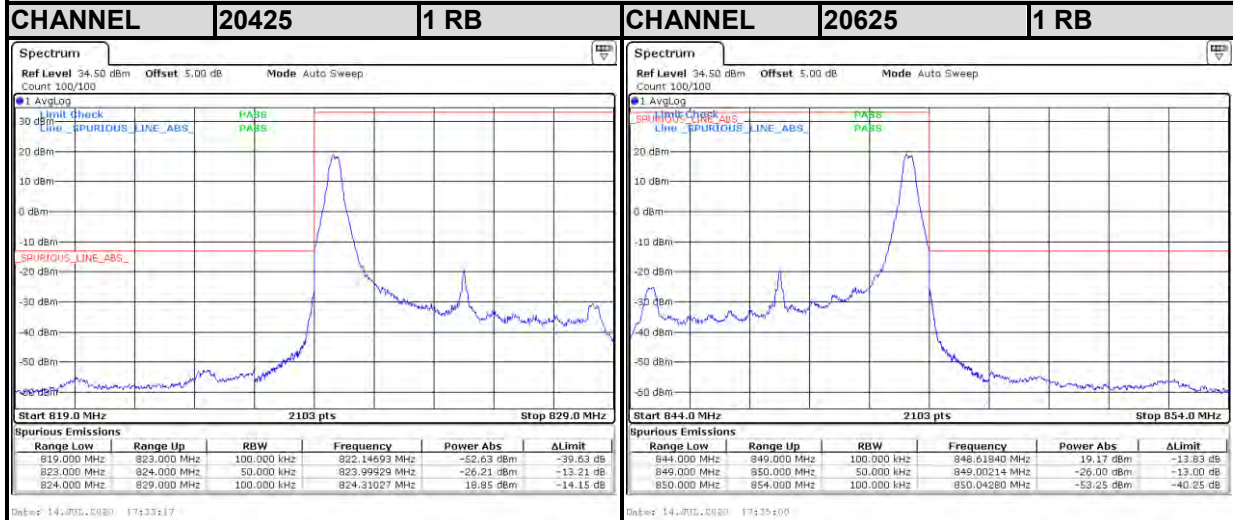


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Test Report No.: RF200629W001-2

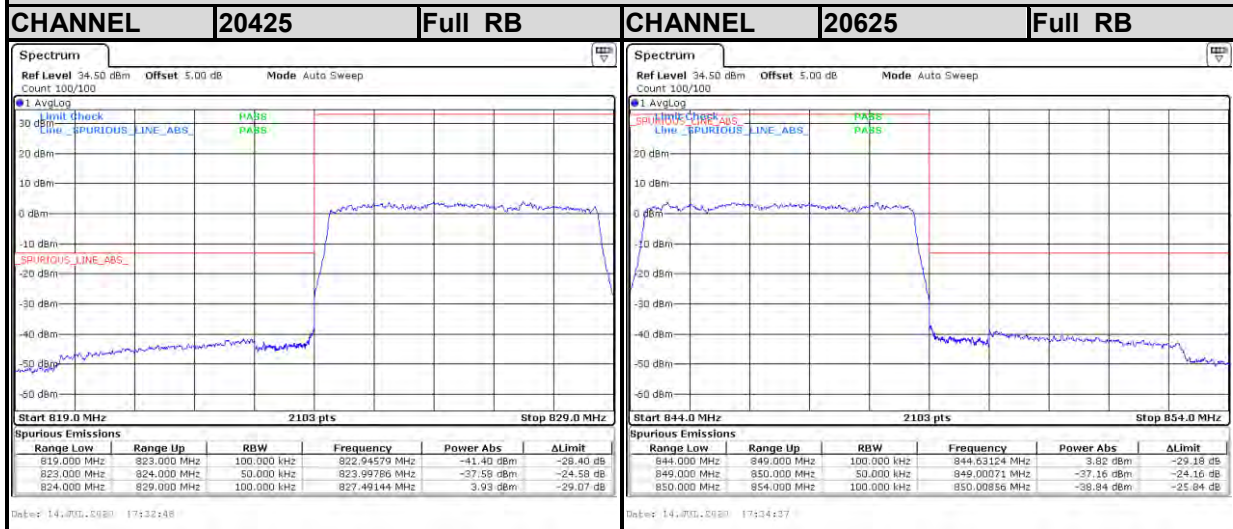
## LTE Band5

Channel Bandwidth: 5MHz QPSK



## LTE Band5

Channel Bandwidth: 5MHz QPSK



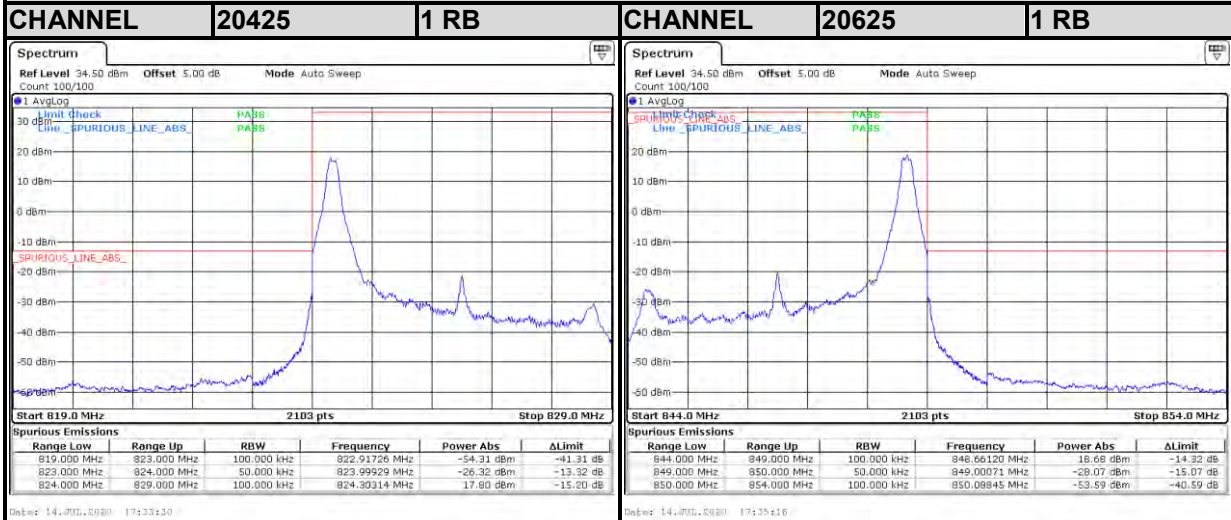


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Test Report No.: RF200629W001-2

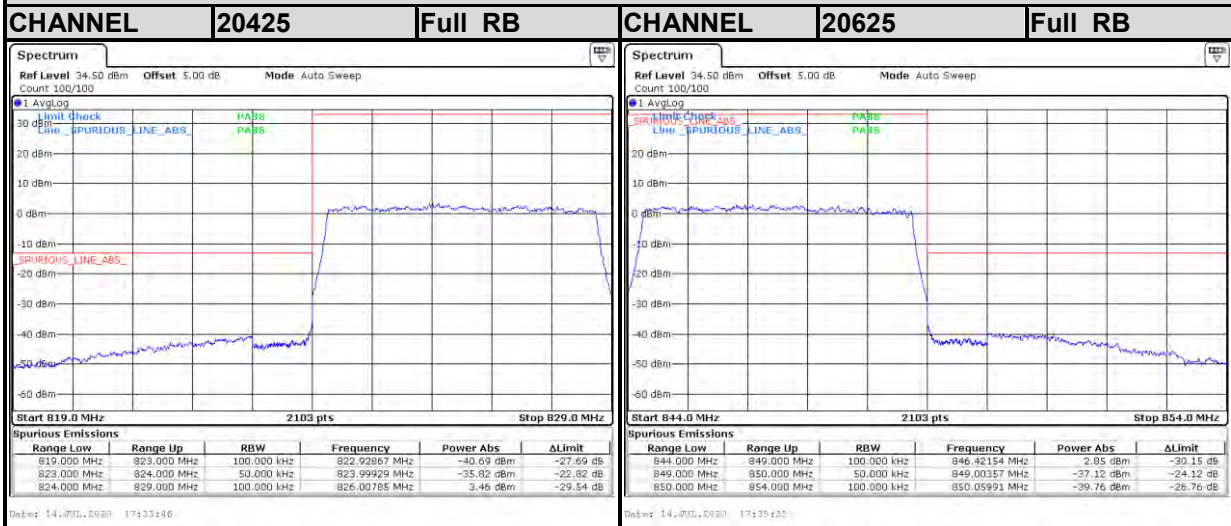
## LTE Band5

Channel Bandwidth: 5MHz 16QAM



## LTE Band5

Channel Bandwidth: 5MHz 16QAM



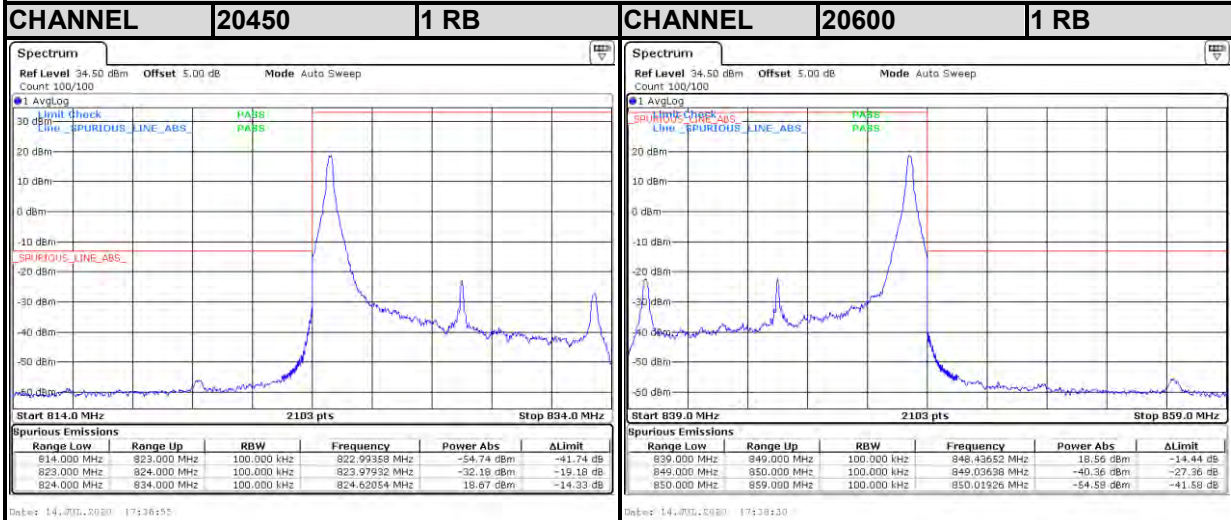


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Test Report No.: RF200629W001-2

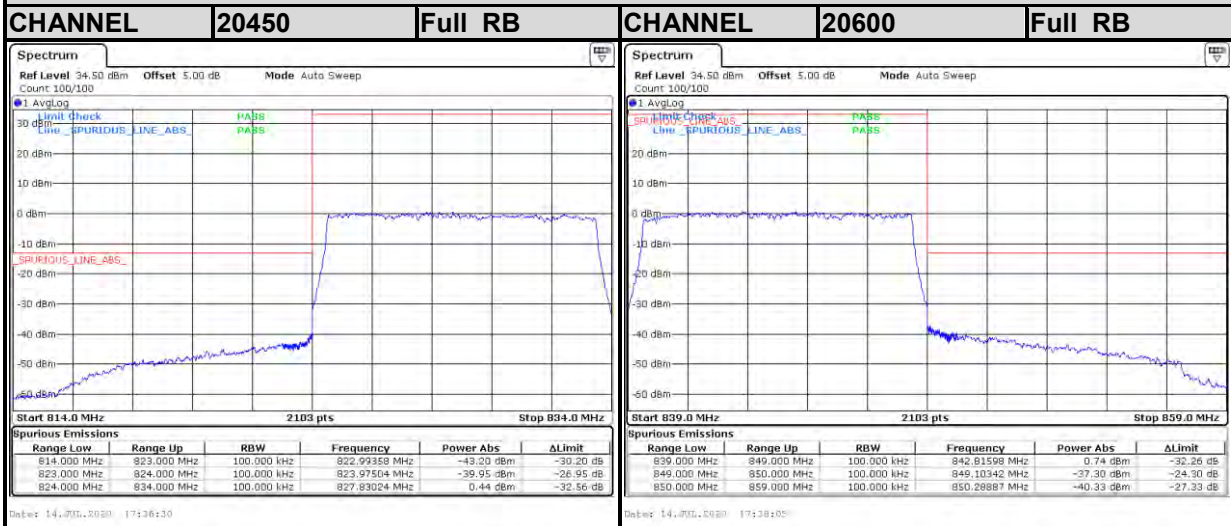
## LTE Band5

Channel Bandwidth: 10MHz QPSK



## LTE Band5

Channel Bandwidth: 10MHz QPSK



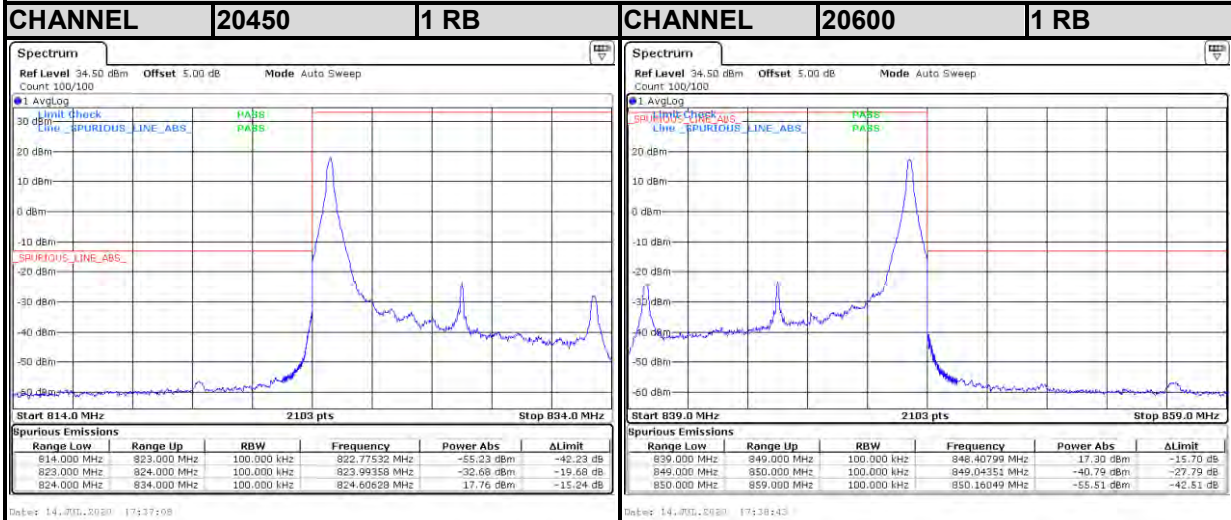


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Test Report No.: RF200629W001-2

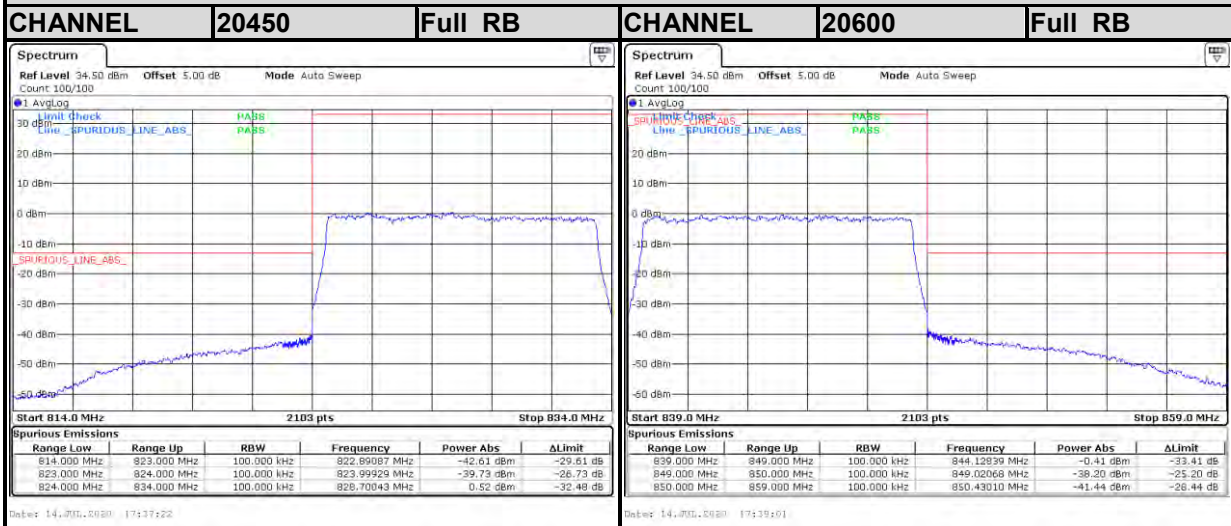
## LTE Band5

Channel Bandwidth: 10MHz 16QAM



## LTE Band5

Channel Bandwidth: 10MHz 16QAM



### 3.5 CONDUCTED SPURIOUS EMISSIONS

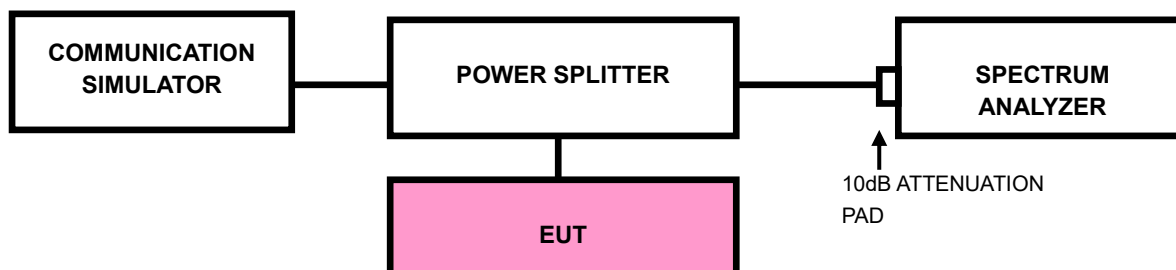
#### 3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13\text{dBm}$ .

#### 3.5.2 TEST PROCEDURE

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to 9GHz. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

#### 3.5.3 TEST SETUP

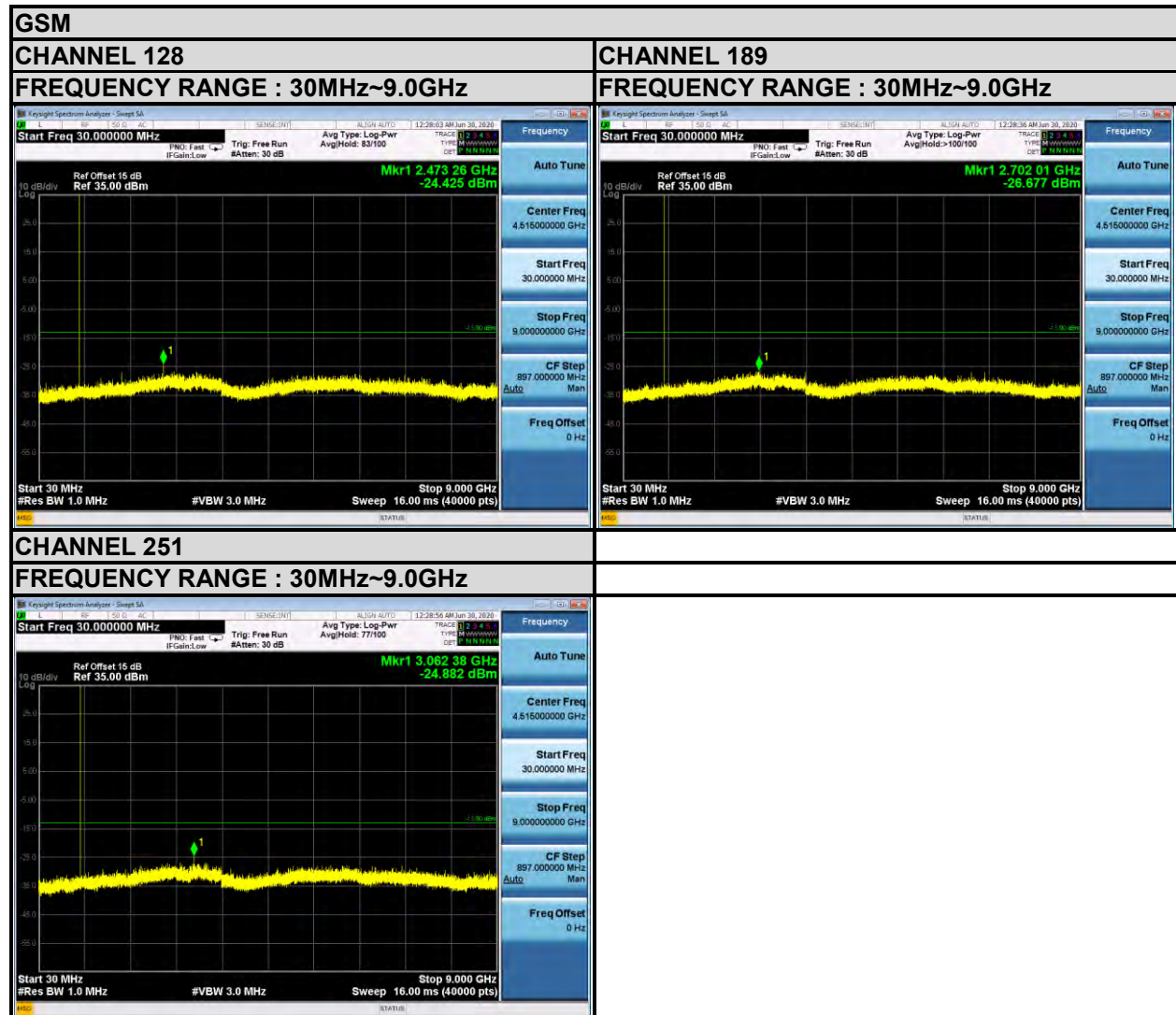




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Test Report No.: RF200629W001-2

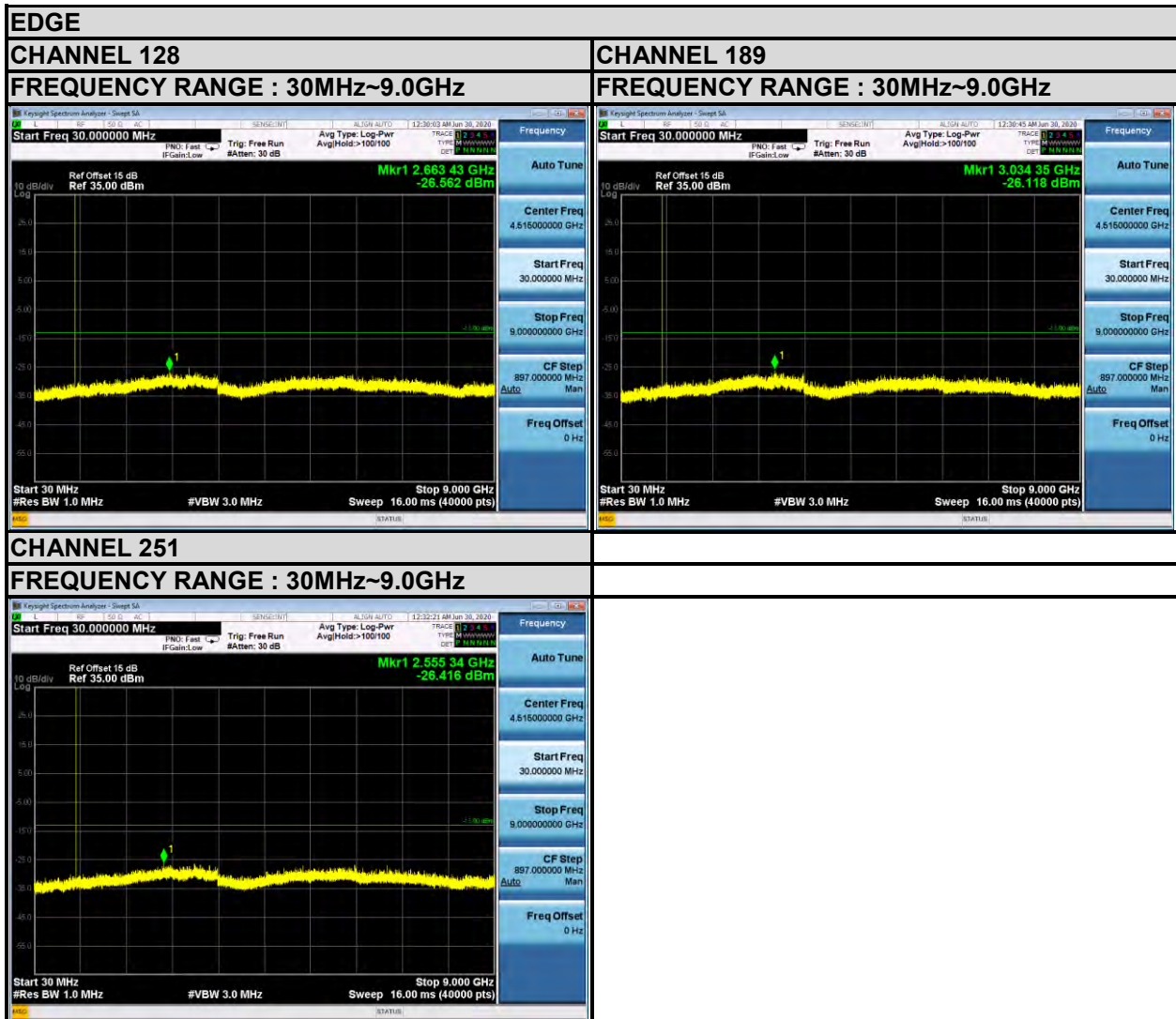
### 3.5.4 TEST RESULTS





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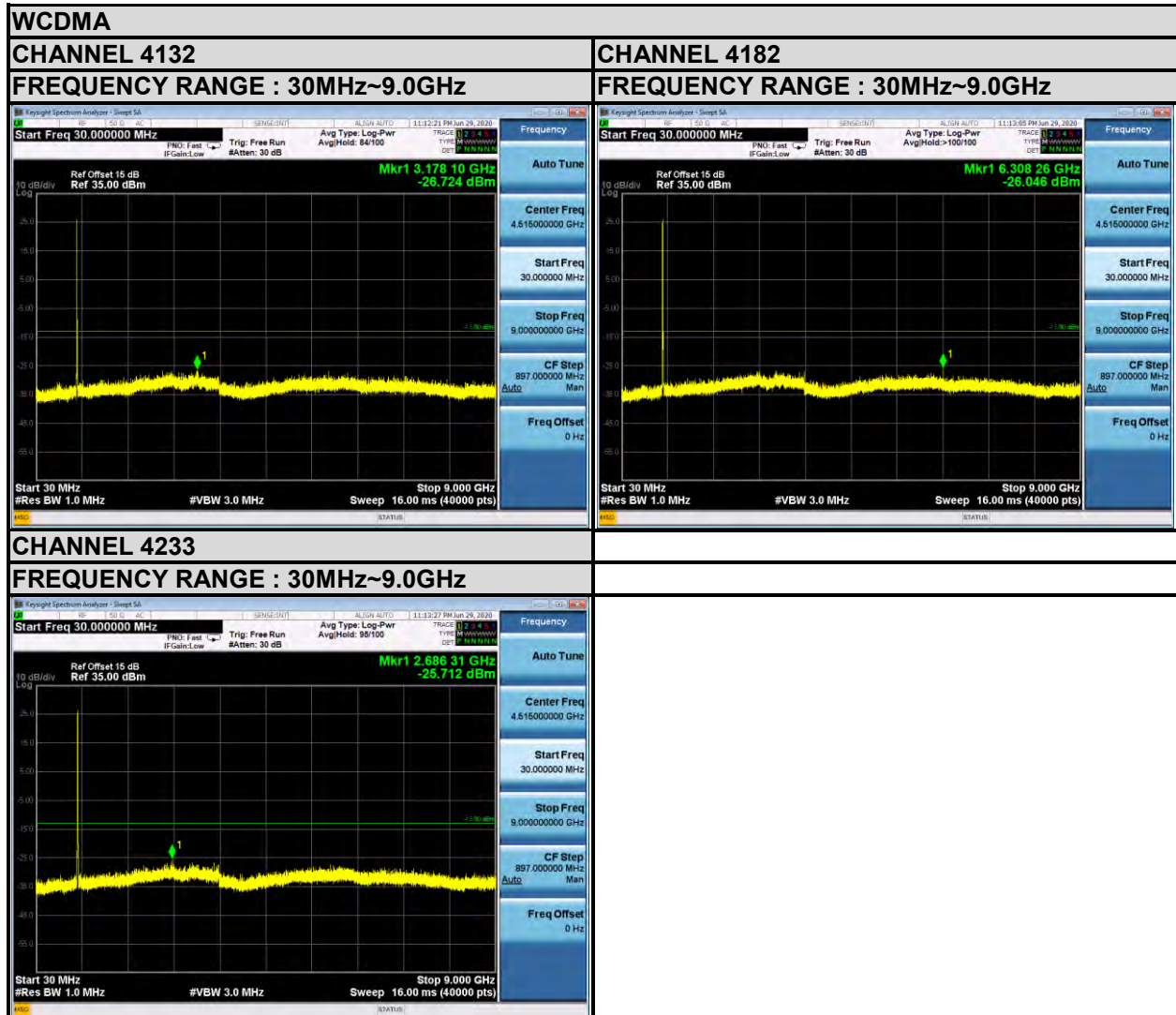
Test Report No.: RF200629W001-2





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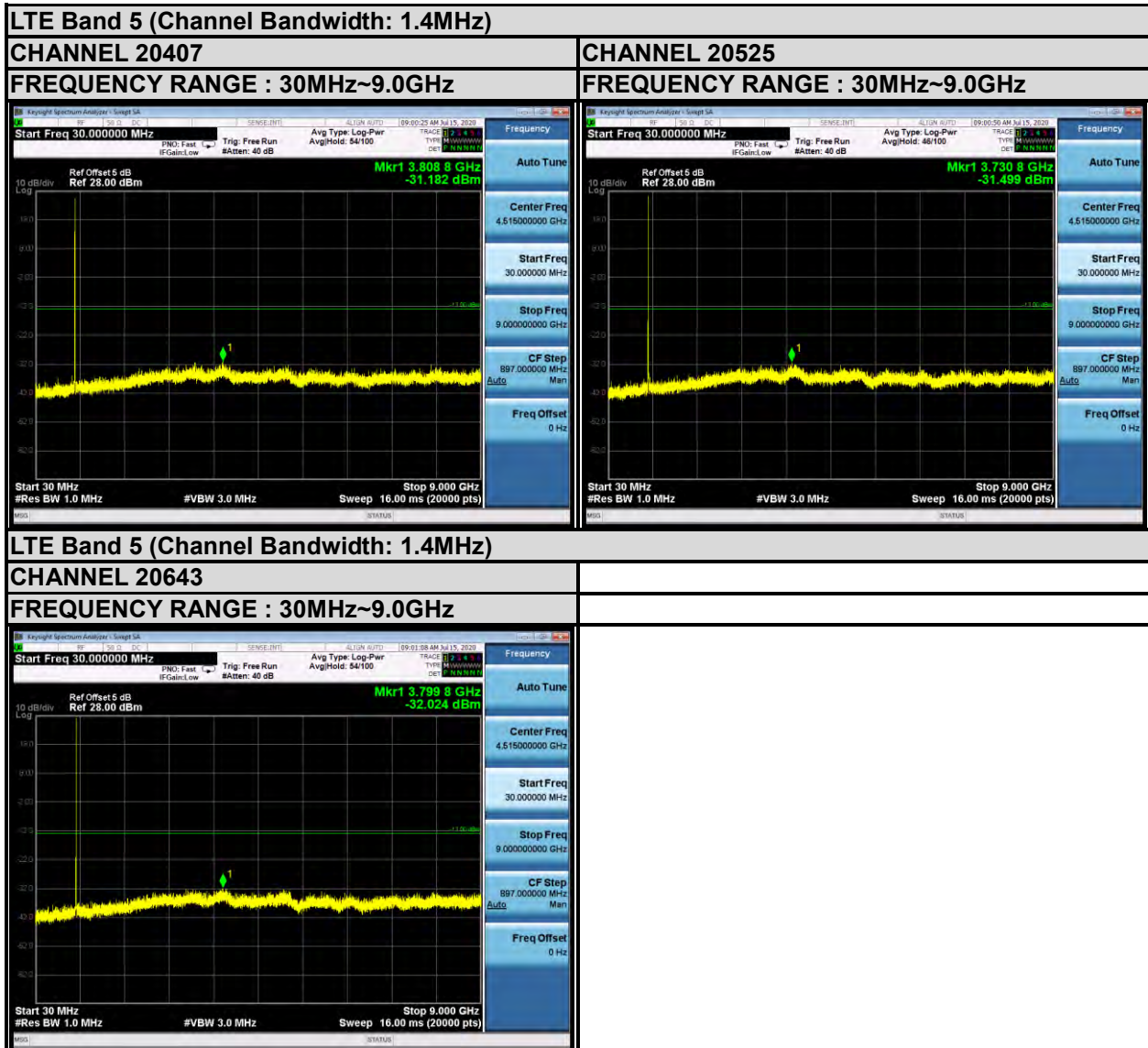
Test Report No.: RF200629W001-2





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Test Report No.: RF200629W001-2





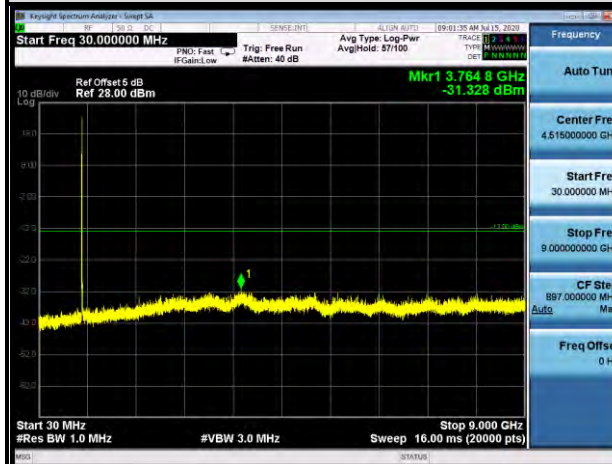
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Test Report No.: RF200629W001-2

LTE Band 5 (Channel Bandwidth: 3MHz)

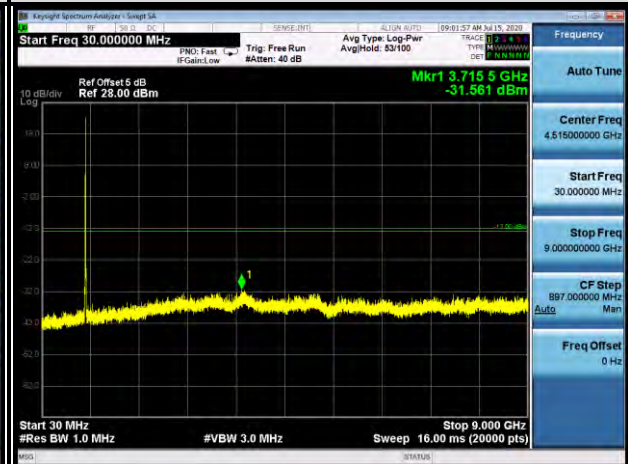
CHANNEL 20415

FREQUENCY RANGE : 30MHz~9.0GHz



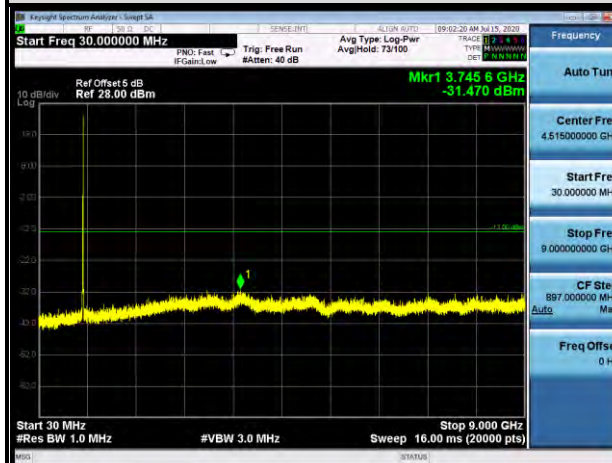
CHANNEL 20525

FREQUENCY RANGE : 30MHz~9.0GHz



CHANNEL 20635

FREQUENCY RANGE : 30MHz~9.0GHz





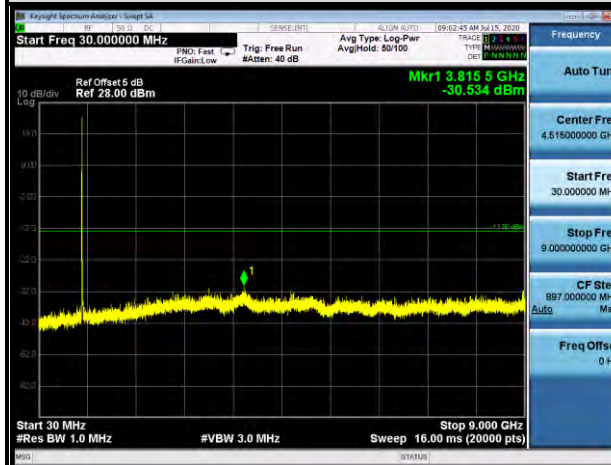
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Test Report No.: RF200629W001-2

**LTE Band 5 (Channel Bandwidth: 5MHz)**

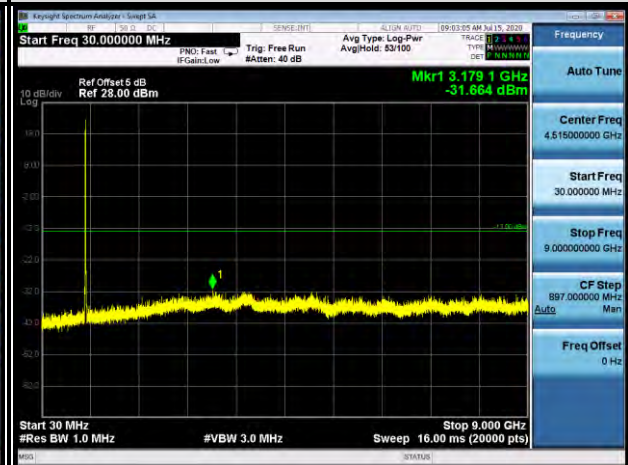
**CHANNEL 20425**

**FREQUENCY RANGE : 30MHz~9.0GHz**



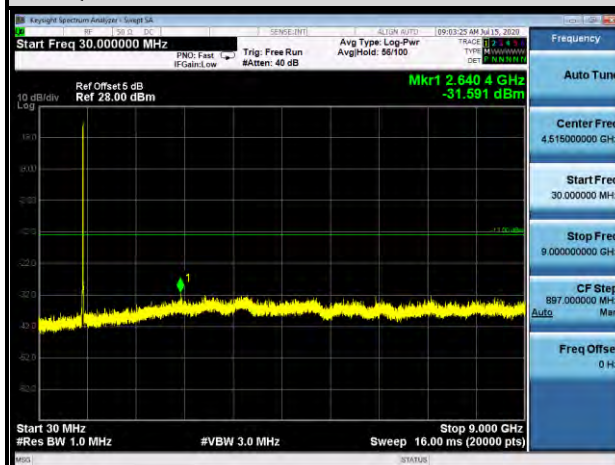
**CHANNEL 20525**

**FREQUENCY RANGE : 30MHz~9.0GHz**



**CHANNEL 20625**

**FREQUENCY RANGE : 30MHz~9.0GHz**





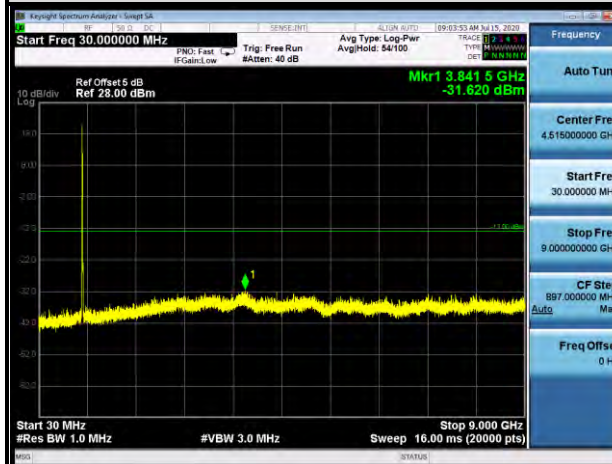
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Test Report No.: RF200629W001-2

LTE Band 5 (Channel Bandwidth: 10MHz)

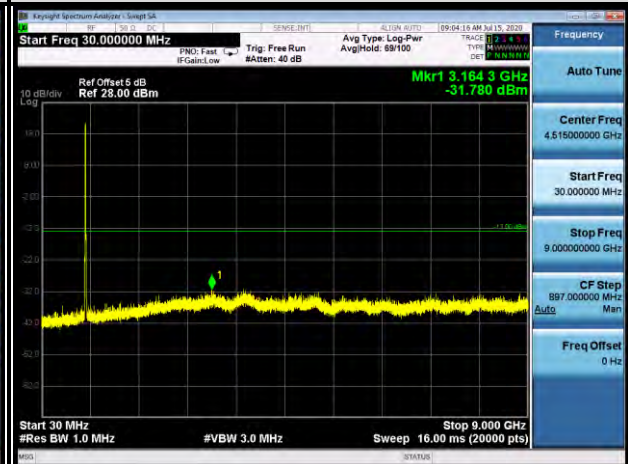
CHANNEL 20450

FREQUENCY RANGE : 30MHz~9.0GHz



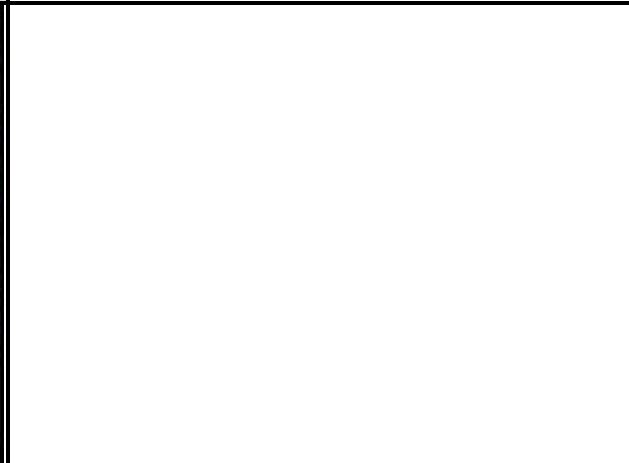
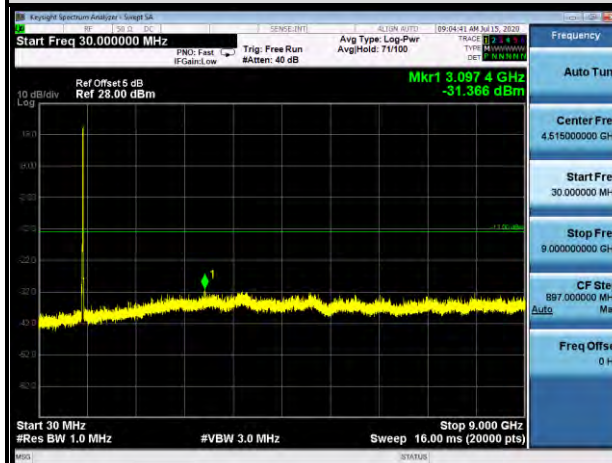
CHANNEL 20525

FREQUENCY RANGE : 30MHz~9.0GHz



CHANNEL 20600

FREQUENCY RANGE : 30MHz~9.0GHz



### 3.6 RADIATED EMISSION MEASUREMENT

#### 3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13\text{dBm}$ .

#### 3.6.2 TEST PROCEDURES

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G
- c.  $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$ .
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,  
 $\text{E.R.P power} = \text{E.I.P.R power} - 2.15\text{dBi}$ .

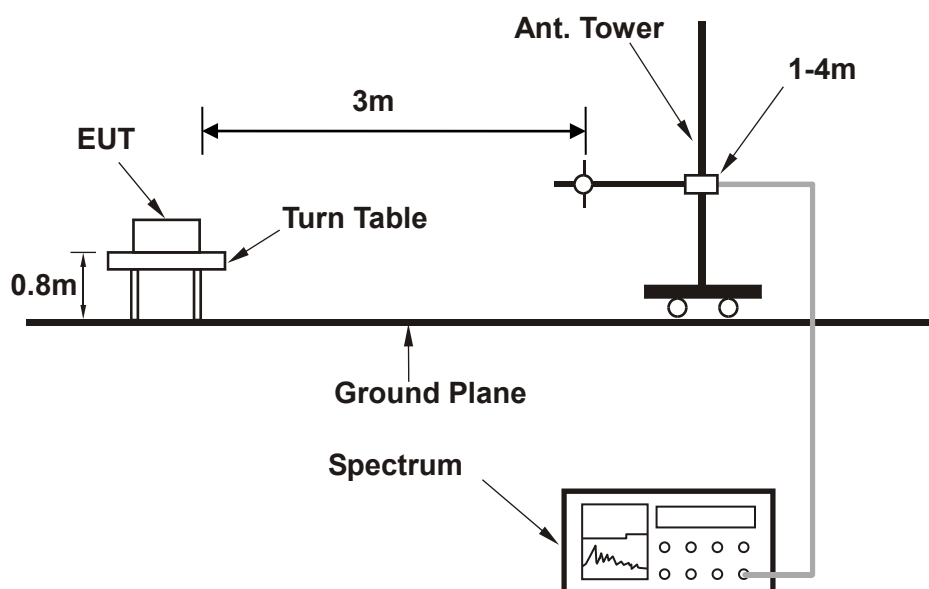
**NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

#### 3.6.3 DEVIATION FROM TEST STANDARD

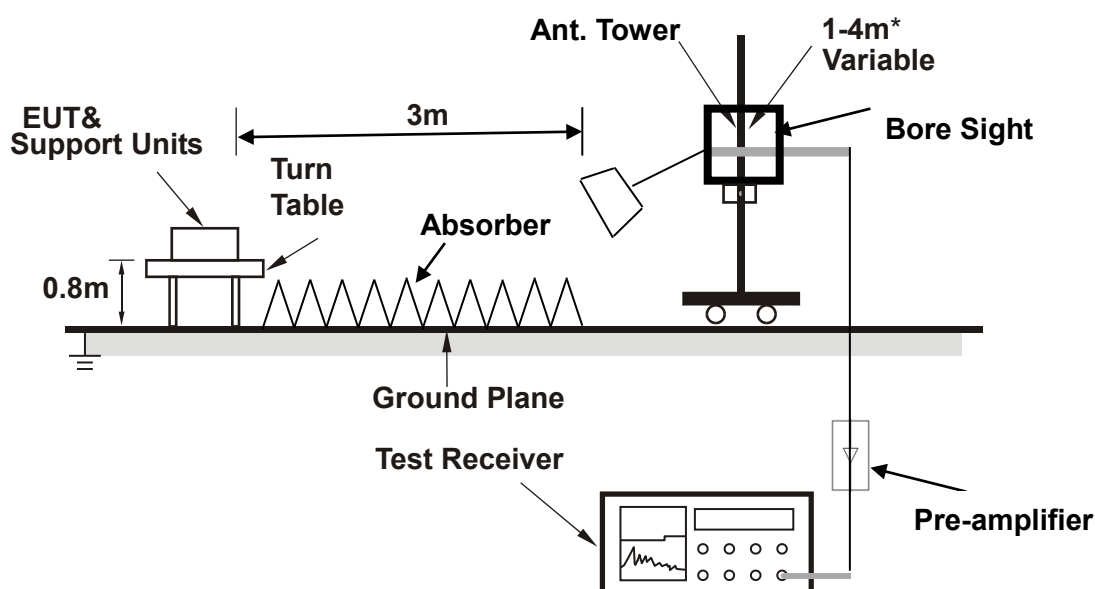
No deviation

### 3.6.4 TEST SETUP

#### < Frequency Range 30MHz~1GHz >



#### <Frequency Range above 1GHz>



**Note:** Above 1G is a directional antenna

Depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

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

### 3.6.5 TEST RESULTS

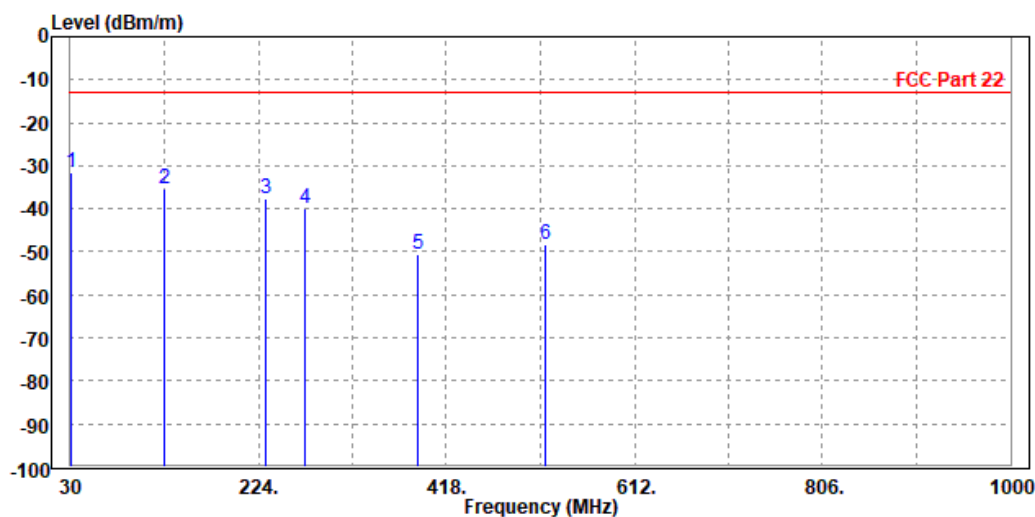
#### BELOW 1GHz WORST-CASE DATA

30 MHz – 1GHz data:

#### EDGE 850

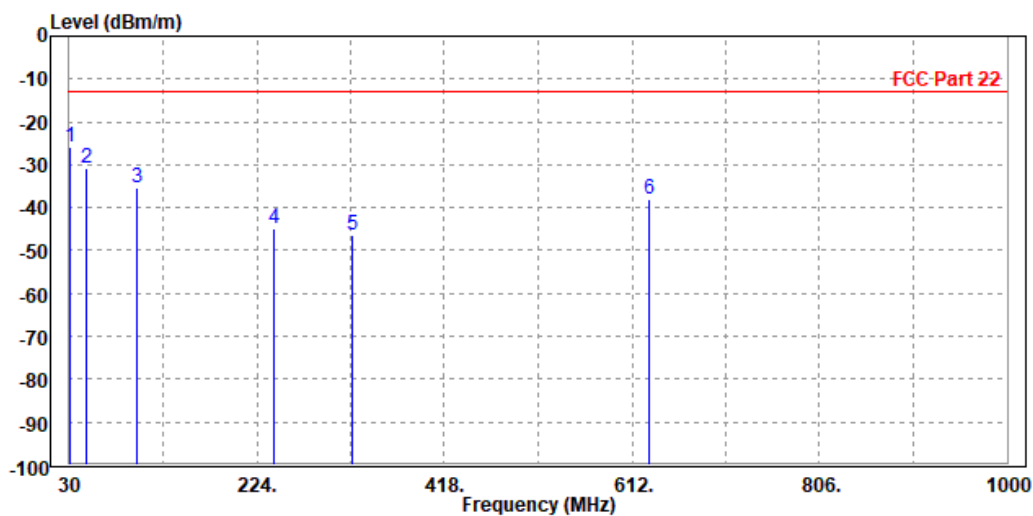
|                                                     |                 |                 |                    |
|-----------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                                | TX channel 189  | FREQUENCY RANGE | Below 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                 |                 |                    |

|      | Freq    | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|---------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz     | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 PP | 31.650  | -31.57 | -51.64     | -13.00     | -18.57     | 20.07  | Peak   | Horizontal |
| 2    | 126.330 | -35.23 | -42.58     | -13.00     | -22.23     | 7.35   | Peak   | Horizontal |
| 3    | 231.220 | -37.49 | -49.68     | -13.00     | -24.49     | 12.19  | Peak   | Horizontal |
| 4    | 272.440 | -39.85 | -53.39     | -13.00     | -26.85     | 13.54  | Peak   | Horizontal |
| 5    | 388.020 | -50.46 | -66.88     | -13.00     | -37.46     | 16.42  | Peak   | Horizontal |
| 6    | 520.140 | -48.35 | -67.69     | -13.00     | -35.35     | 19.34  | Peak   | Horizontal |



|                                                   |                 |                 |                    |
|---------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                              | TX channel 189  | FREQUENCY RANGE | Below 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                 |                 |                    |

|   |    | Freq    | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|----|---------|--------|------------|------------|------------|--------|--------|-----------|
|   |    | MHz     | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 | PP | 30.470  | -25.69 | -46.35     | -13.00     | -12.69     | 20.66  | Peak   | Vertical  |
| 2 |    | 47.220  | -30.76 | -40.52     | -13.00     | -17.76     | 9.76   | Peak   | Vertical  |
| 3 |    | 99.650  | -35.19 | -44.26     | -13.00     | -22.19     | 9.07   | Peak   | Vertical  |
| 4 |    | 241.260 | -44.76 | -57.65     | -13.00     | -31.76     | 12.89  | Peak   | Vertical  |
| 5 |    | 322.140 | -46.29 | -60.60     | -13.00     | -33.29     | 14.31  | Peak   | Vertical  |
| 6 |    | 630.147 | -37.88 | -58.65     | -13.00     | -24.88     | 20.77  | Peak   | Vertical  |





**BUREAU  
VERITAS**

**Test Report No.: RF200629W001-2**

## ABOVE 1GHz DATA

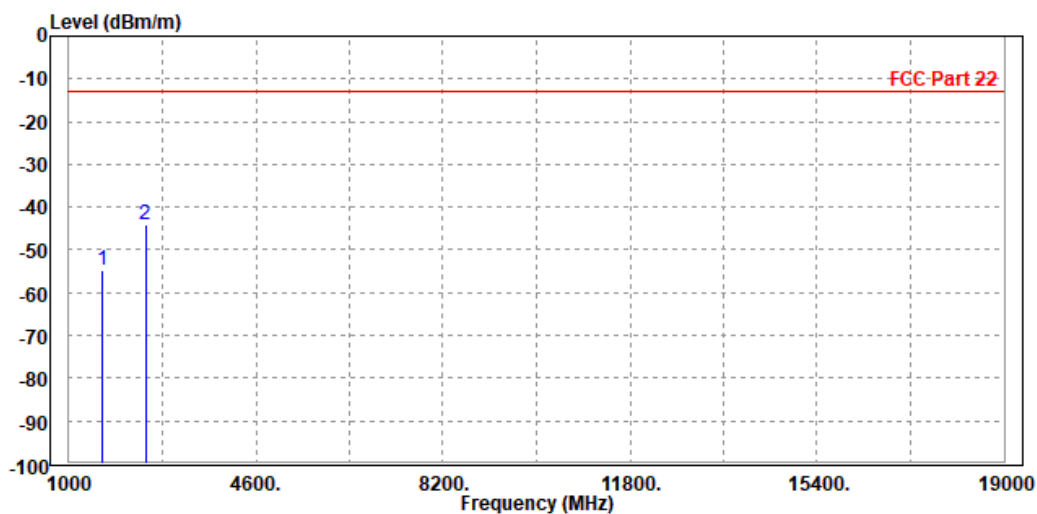
**Note:** For higher frequency, the emission is too low to be detected.

### GSM 850

### CH 128:

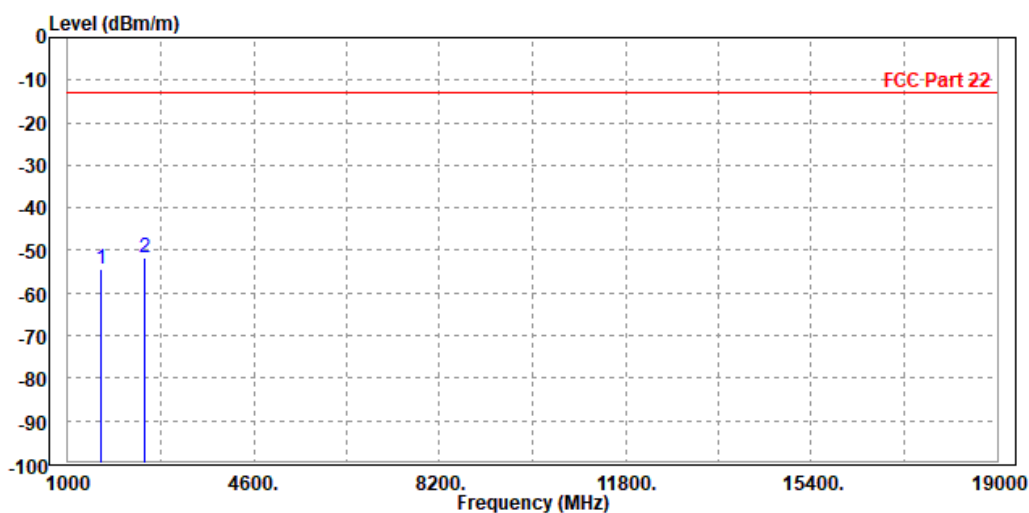
|                                                     |                 |                 |                    |
|-----------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                                | TX channel 128  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                 |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 1648.000 | -54.77 | -58.02     | -13.00     | -41.77     | 3.25   | Peak   | Horizontal |
| 2 PP | 2472.000 | -43.98 | -52.00     | -13.00     | -30.98     | 8.02   | Peak   | Horizontal |



|                                                   |                 |                 |                    |
|---------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                              | TX channel 128  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                 |                 |                    |

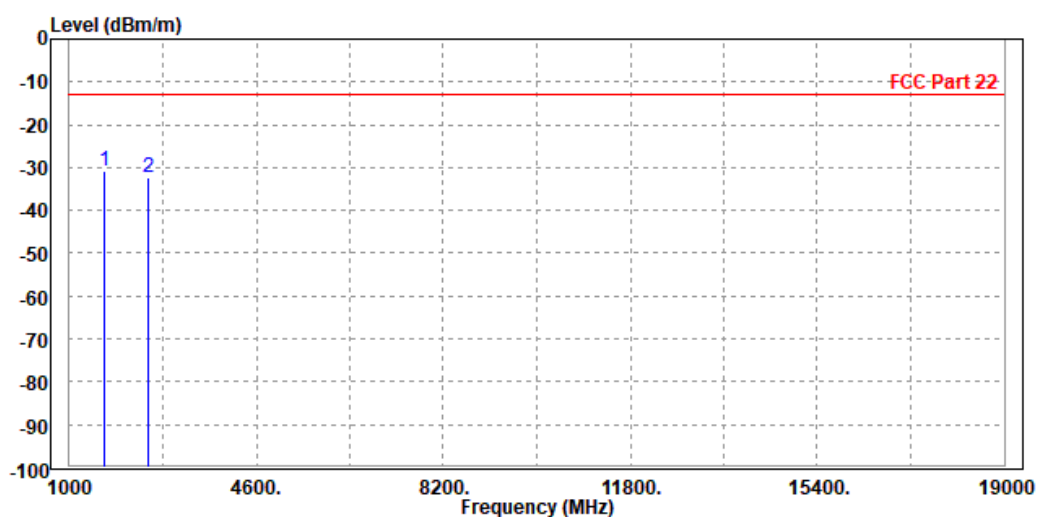
|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 1648.000 | -54.53 | -57.91     | -13.00     | -41.53     | 3.38   | Peak   | Vertical  |
| 2 PP | 2476.000 | -51.63 | -58.67     | -13.00     | -38.63     | 7.04   | Peak   | Vertical  |



CH 189:

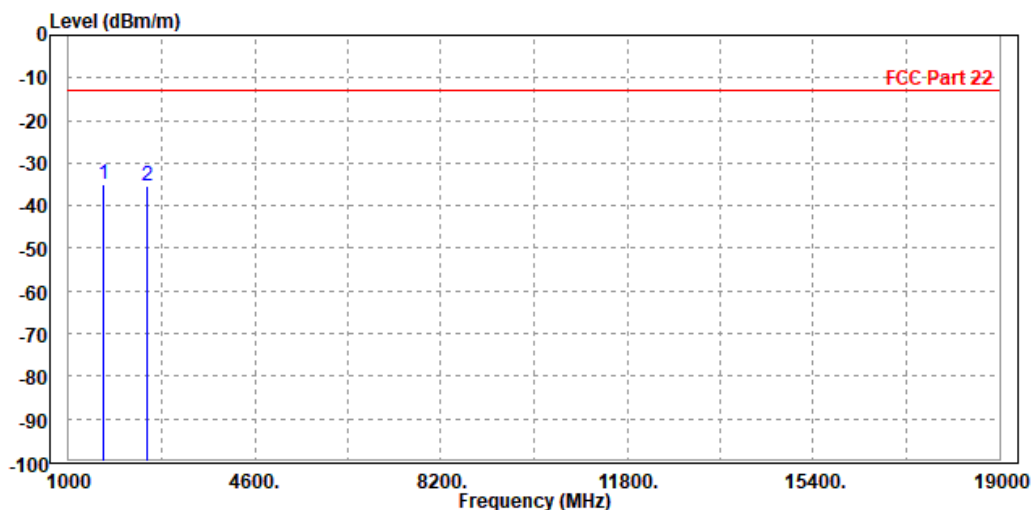
|                                                     |                 |                 |                    |
|-----------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                                | TX channel 189  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                 |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 PP | 1666.000 | -30.87 | -34.34     | -13.00     | -17.87     | 3.47   | Peak   | Horizontal |
| 2    | 2512.000 | -32.47 | -40.53     | -13.00     | -19.47     | 8.06   | Peak   | Horizontal |



|                                                   |                 |                 |                    |
|---------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                              | TX channel 189  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                 |                 |                    |

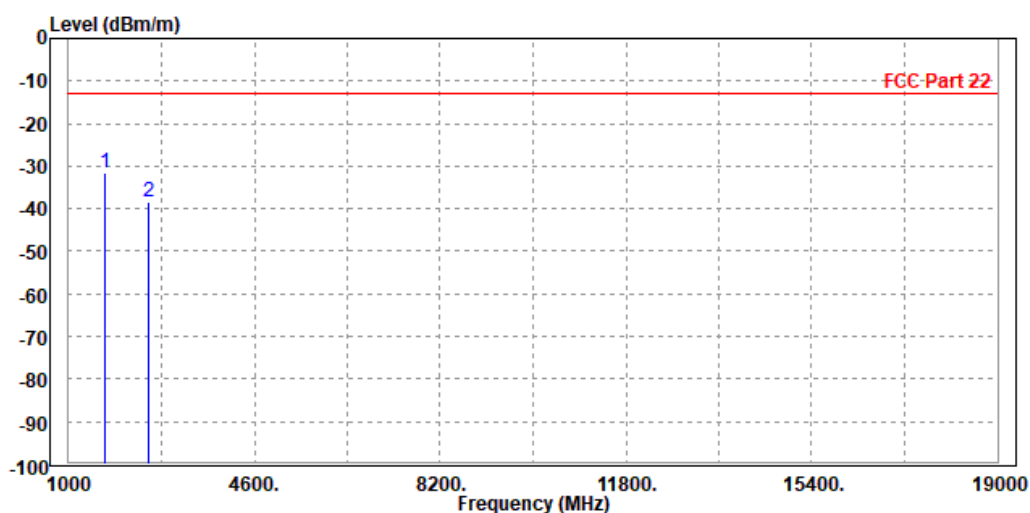
|   |    | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|----|----------|--------|------------|------------|------------|--------|--------|-----------|
|   |    | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 | PP | 1666.000 | -34.86 | -38.40     | -13.00     | -21.86     | 3.54   | Peak   | Vertical  |
| 2 |    | 2512.000 | -35.38 | -42.49     | -13.00     | -22.38     | 7.11   | Peak   | Vertical  |



CH 251:

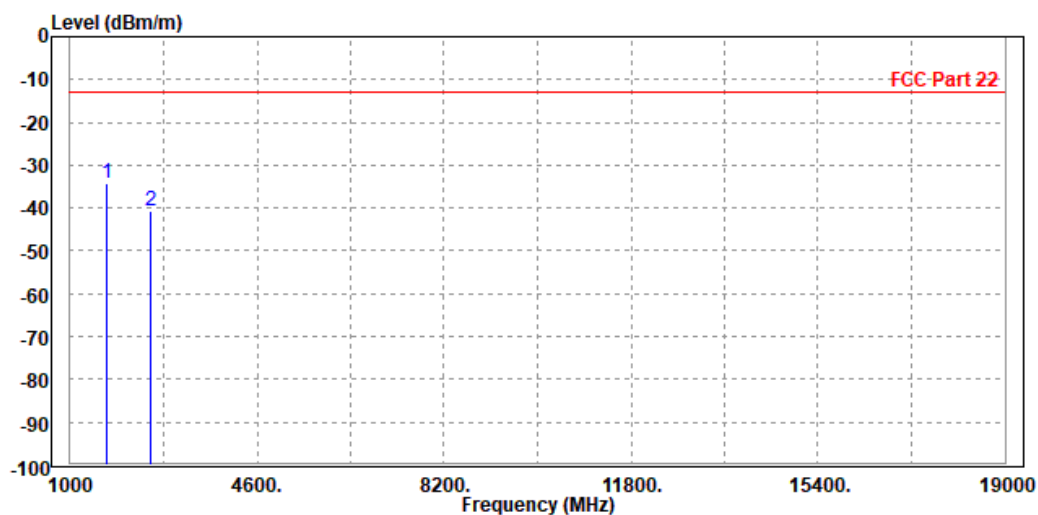
|                                                     |                 |                 |                    |
|-----------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                                | TX channel 251  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                 |                 |                    |

|   |    | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|---|----|----------|--------|------------|------------|------------|--------|--------|------------|
|   |    | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 | PP | 1702.000 | -31.69 | -35.60     | -13.00     | -18.69     | 3.91   | Peak   | Horizontal |
| 2 |    | 2546.000 | -38.47 | -46.58     | -13.00     | -25.47     | 8.11   | Peak   | Horizontal |



|                                                   |                 |                 |                    |
|---------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                              | TX channel 251  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                 |                 |                    |

|   |    | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|----|----------|--------|------------|------------|------------|--------|--------|-----------|
|   |    | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 | PP | 1702.000 | -34.30 | -38.17     | -13.00     | -21.30     | 3.87   | Peak   | Vertical  |
| 2 |    | 2546.000 | -40.71 | -47.93     | -13.00     | -27.71     | 7.22   | Peak   | Vertical  |

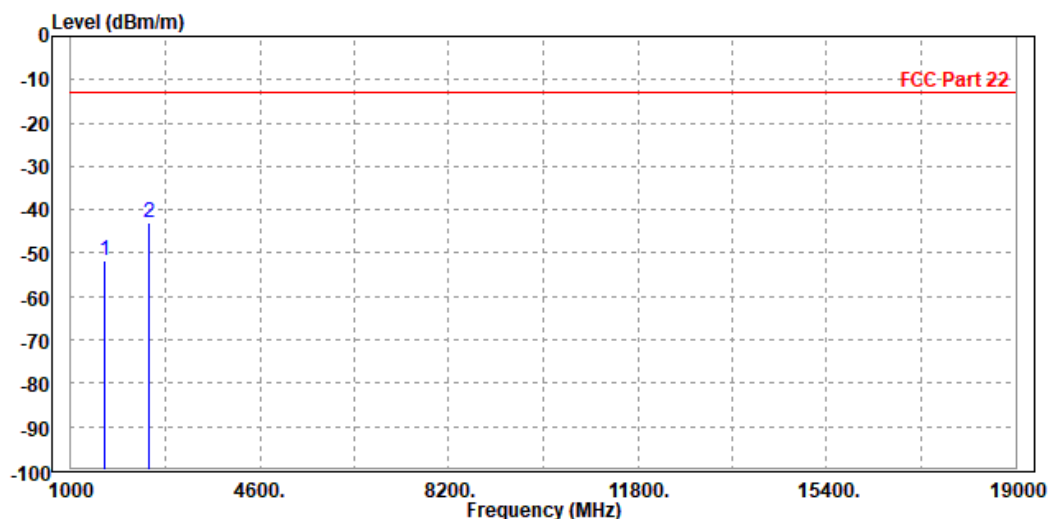


EDGE 850:

CH 128:

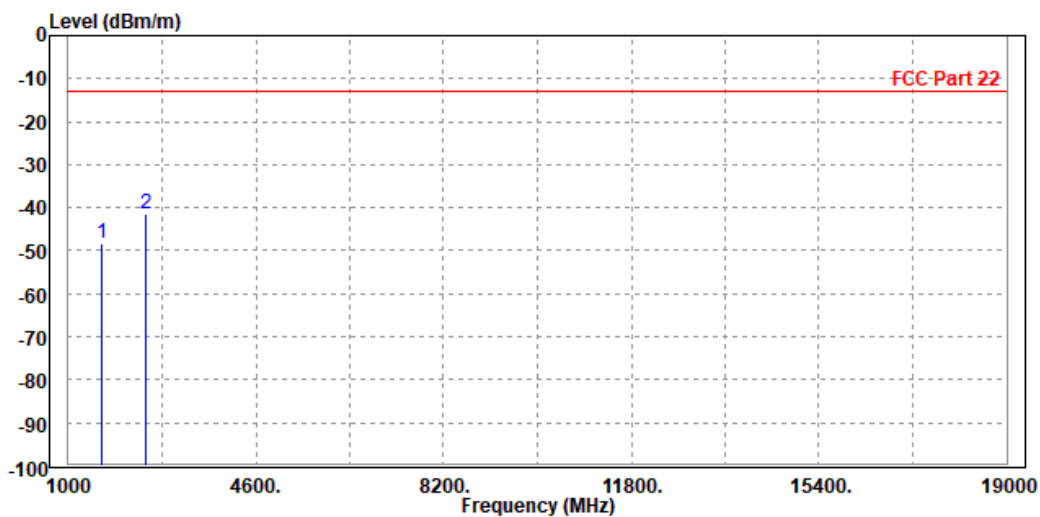
|                                                     |                 |                 |                    |
|-----------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                                | TX channel 128  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                 |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 1648.000 | -51.57 | -54.82     | -13.00     | -38.57     | 3.25   | Peak   | Horizontal |
| 2 PP | 2476.000 | -42.82 | -50.85     | -13.00     | -29.82     | 8.03   | Peak   | Horizontal |



|                                                   |                 |                 |                    |
|---------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                              | TX channel 128  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                 |                 |                    |

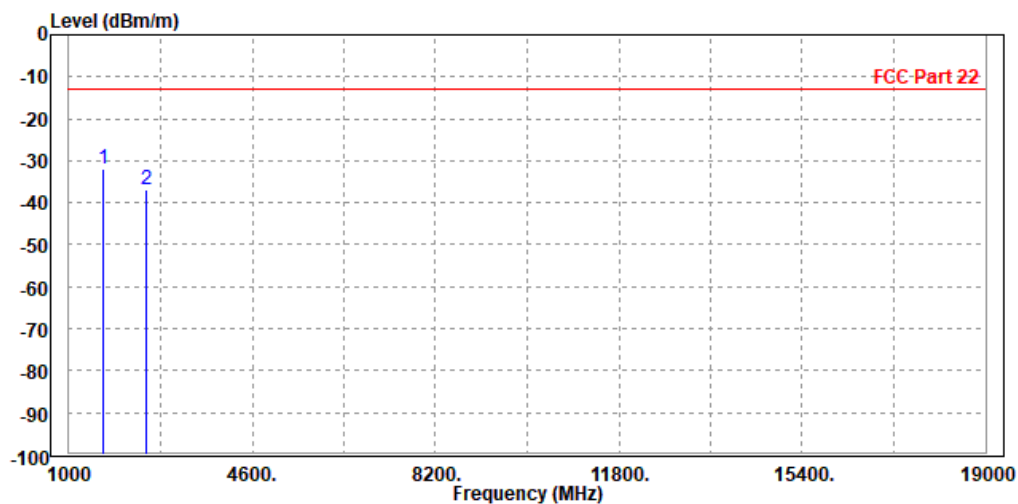
|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 1648.000 | -48.25 | -51.63     | -13.00     | -35.25     | 3.38   | Peak   | Vertical  |
| 2 PP | 2476.000 | -41.58 | -48.62     | -13.00     | -28.58     | 7.04   | Peak   | Vertical  |



CH 189:

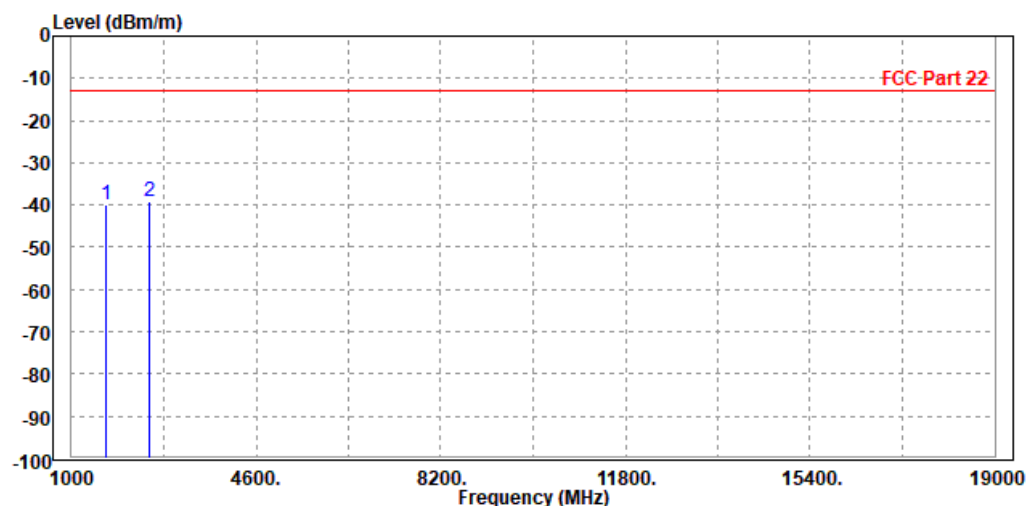
|                                                     |                 |                 |                    |
|-----------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                                | TX channel 189  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                 |                 |                    |

|   |    | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|---|----|----------|--------|------------|------------|------------|--------|--------|------------|
|   |    | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 | PP | 1666.000 | -32.11 | -35.58     | -13.00     | -19.11     | 3.47   | Peak   | Horizontal |
| 2 |    | 2512.000 | -36.78 | -44.84     | -13.00     | -23.78     | 8.06   | Peak   | Horizontal |



|                                                   |                 |                 |                    |
|---------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                              | TX channel 189  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                 |                 |                    |

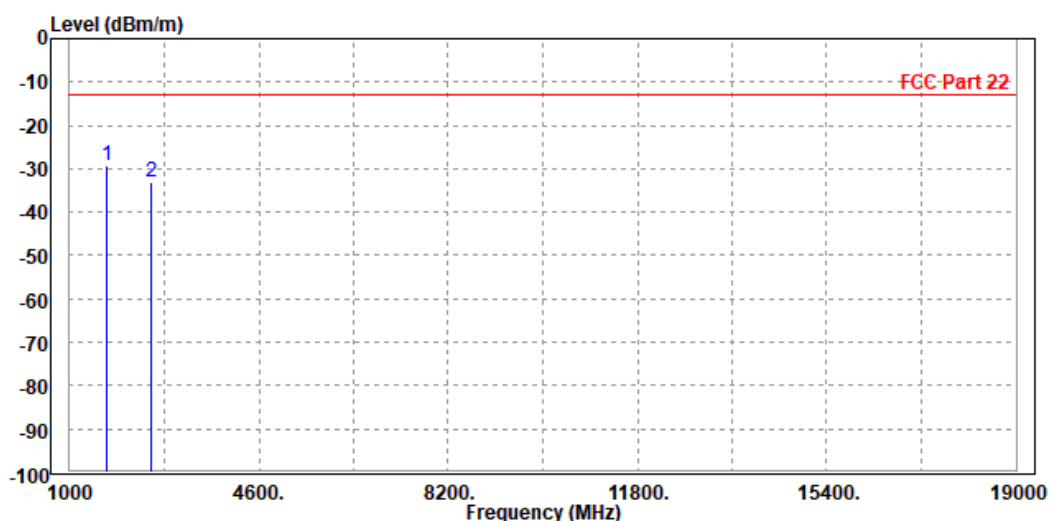
|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 1666.000 | -39.86 | -43.40     | -13.00     | -26.86     | 3.54   | Peak   | Vertical  |
| 2 PP | 2512.000 | -39.00 | -46.11     | -13.00     | -26.00     | 7.11   | Peak   | Vertical  |



CH 251:

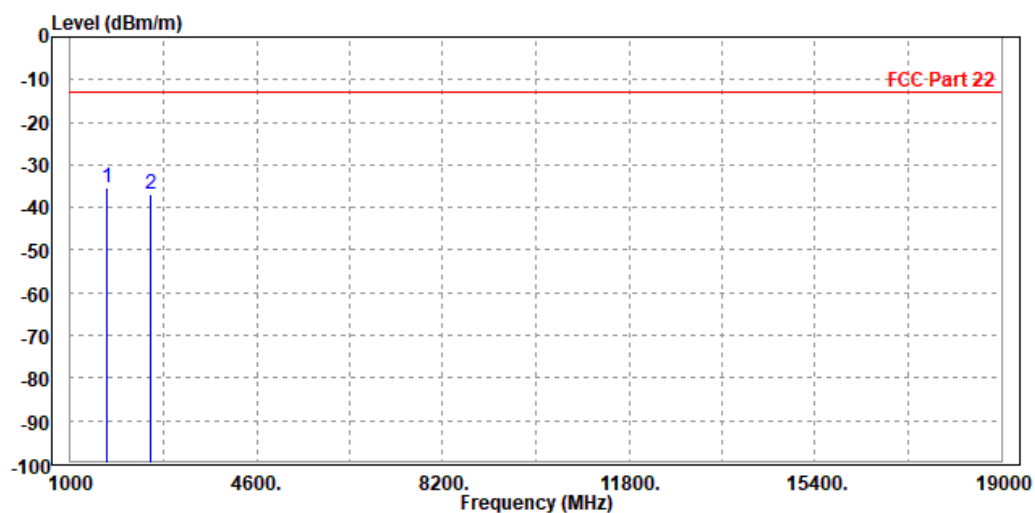
|                                                     |                 |                 |                    |
|-----------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                                | TX channel 251  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                 |                 |                    |

|   | Freq        | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|---|-------------|--------|------------|------------|------------|--------|--------|------------|
|   | MHz         | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 | PP 1702.000 | -29.16 | -33.07     | -13.00     | -16.16     | 3.91   | Peak   | Horizontal |
| 2 | 2546.000    | -33.04 | -41.15     | -13.00     | -20.04     | 8.11   | Peak   | Horizontal |



|                                                   |                 |                 |                    |
|---------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                              | TX channel 251  | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                 |                 |                    |

|   |    | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|----|----------|--------|------------|------------|------------|--------|--------|-----------|
|   |    | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 | PP | 1702.000 | -35.25 | -39.12     | -13.00     | -22.25     | 3.87   | Peak   | Vertical  |
| 2 |    | 2546.000 | -36.91 | -44.13     | -13.00     | -23.91     | 7.22   | Peak   | Vertical  |

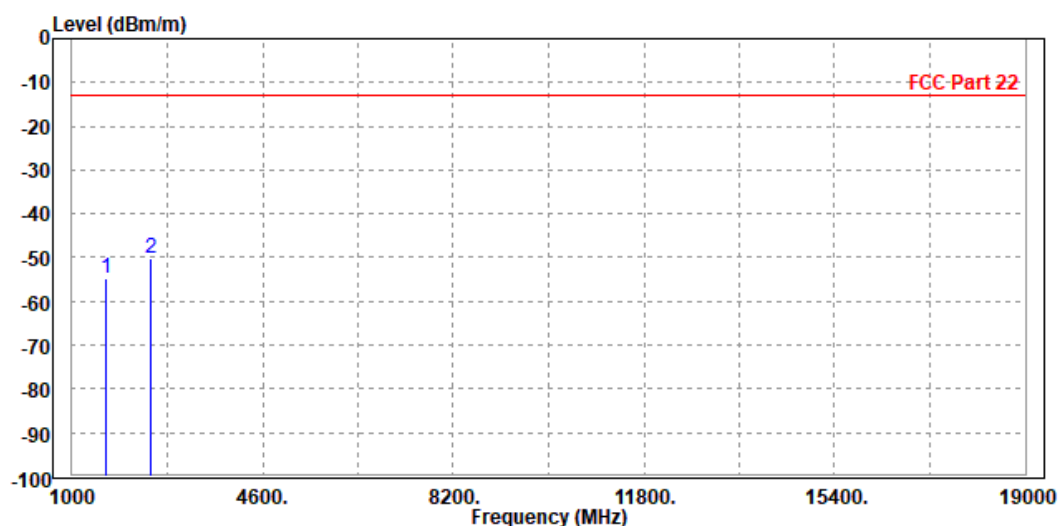


WCDMA Band V:

CH 4132:

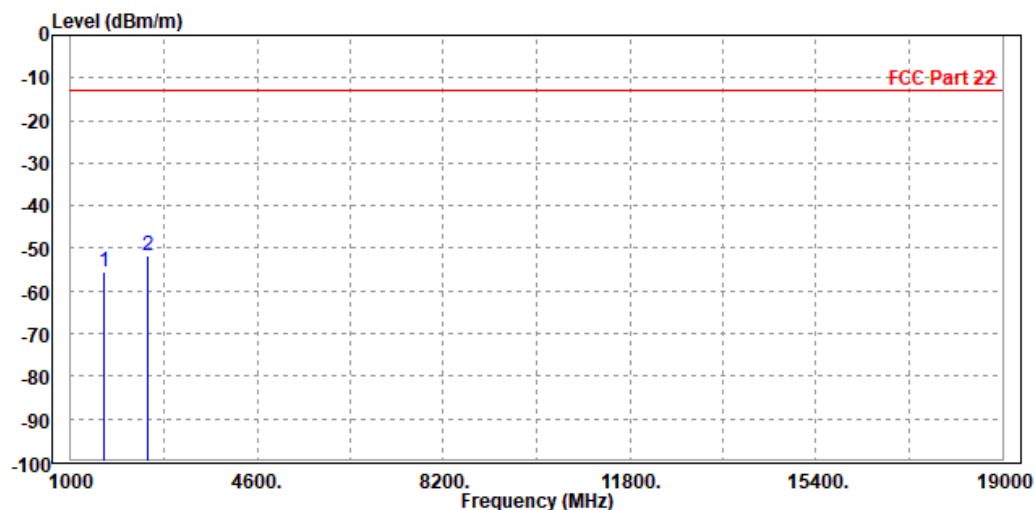
|                                                     |                 |                 |                    |
|-----------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                                | TX channel 4132 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                 |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 1648.000 | -54.82 | -58.07     | -13.00     | -41.82     | 3.25   | Peak   | Horizontal |
| 2 PP | 2479.000 | -50.06 | -58.09     | -13.00     | -37.06     | 8.03   | Peak   | Horizontal |



|                                                   |                 |                 |                    |
|---------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                              | TX channel 4132 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                 |                 |                    |

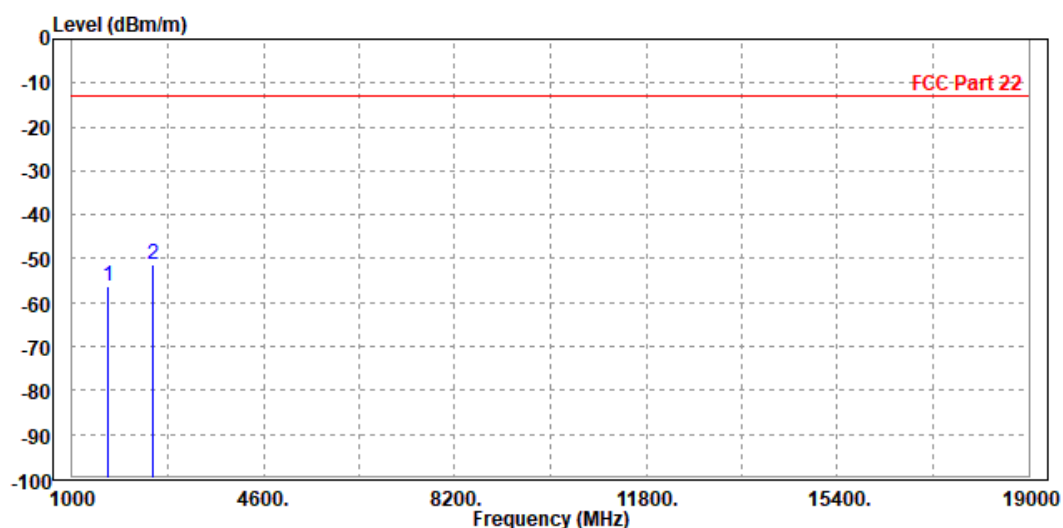
|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 1648.000 | -55.69 | -59.07     | -13.00     | -42.69     | 3.38   | Peak   | Vertical  |
| 2 PP | 2479.000 | -51.58 | -58.62     | -13.00     | -38.58     | 7.04   | Peak   | Vertical  |



CH 4182:

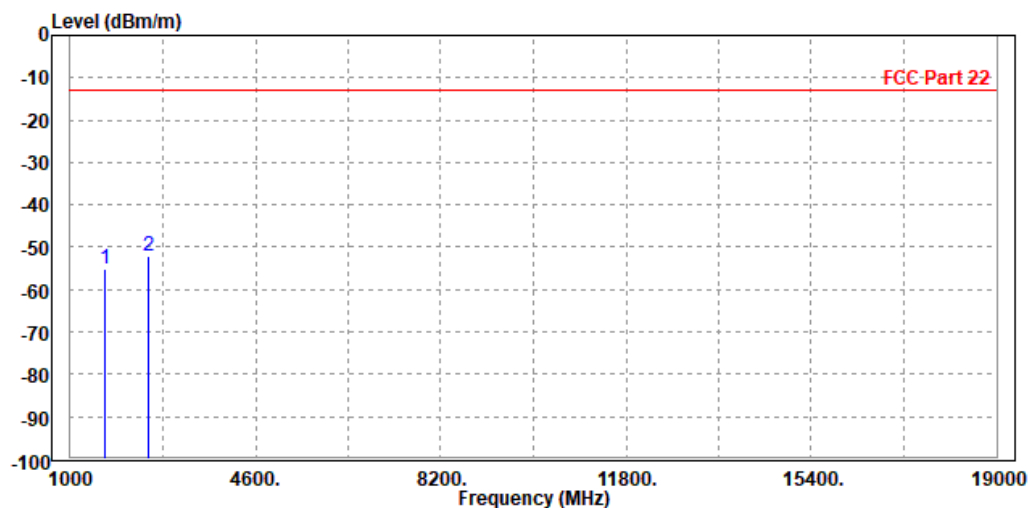
|                                                     |                 |                 |                    |
|-----------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                                | TX channel 4182 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                 |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 1666.000 | -56.35 | -59.82     | -13.00     | -43.35     | 3.47   | Peak   | Horizontal |
| 2 PP | 2512.000 | -51.47 | -59.53     | -13.00     | -38.47     | 8.06   | Peak   | Horizontal |



|                                                   |                 |                 |                    |
|---------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                              | TX channel 4182 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                 |                 |                    |

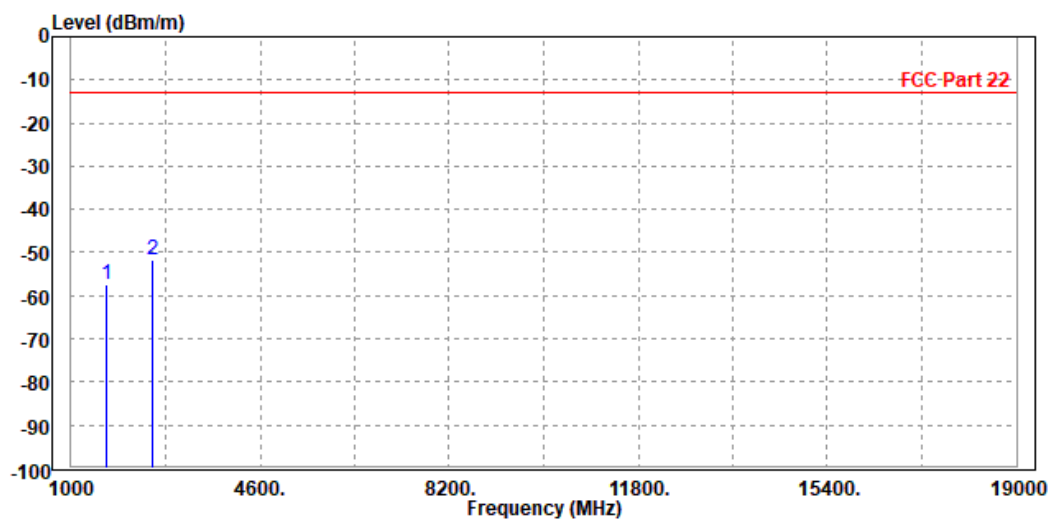
|   | Freq        | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|-------------|--------|------------|------------|------------|--------|--------|-----------|
|   | MHz         | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 | 1666.000    | -55.25 | -58.79     | -13.00     | -42.25     | 3.54   | Peak   | Vertical  |
| 2 | PP 2512.000 | -52.03 | -59.14     | -13.00     | -39.03     | 7.11   | Peak   | Vertical  |



CH 4233:

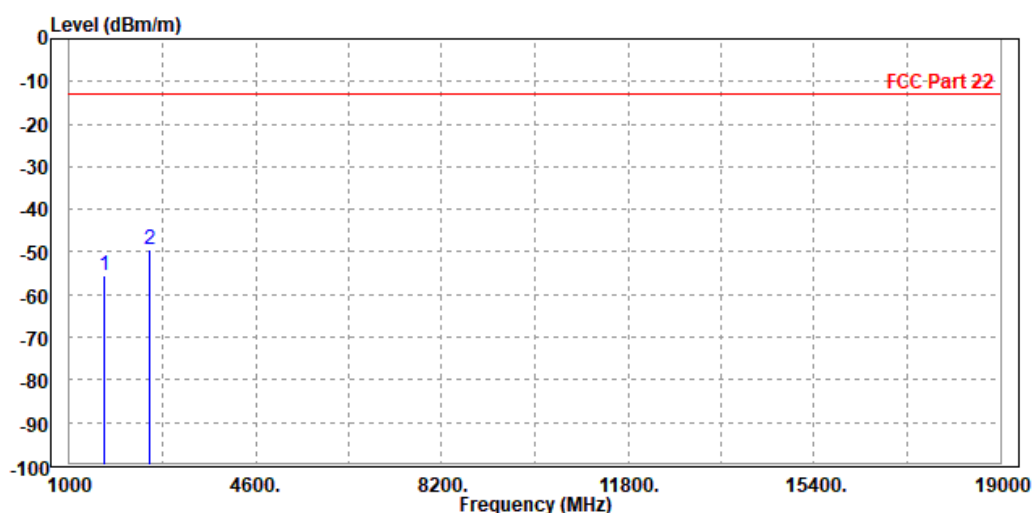
|                                                     |                 |                 |                    |
|-----------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                                | TX channel 4233 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                 |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 1684.000 | -57.47 | -61.16     | -13.00     | -44.47     | 3.69   | Peak   | Horizontal |
| 2 PP | 2539.000 | -51.64 | -59.74     | -13.00     | -38.64     | 8.10   | Peak   | Horizontal |



|                                                   |                 |                 |                    |
|---------------------------------------------------|-----------------|-----------------|--------------------|
| MODE                                              | TX channel 4233 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                 |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 1684.000 | -55.40 | -59.11     | -13.00     | -42.40     | 3.71   | Peak   | Vertical  |
| 2 PP | 2539.000 | -49.58 | -56.77     | -13.00     | -36.58     | 7.19   | Peak   | Vertical  |





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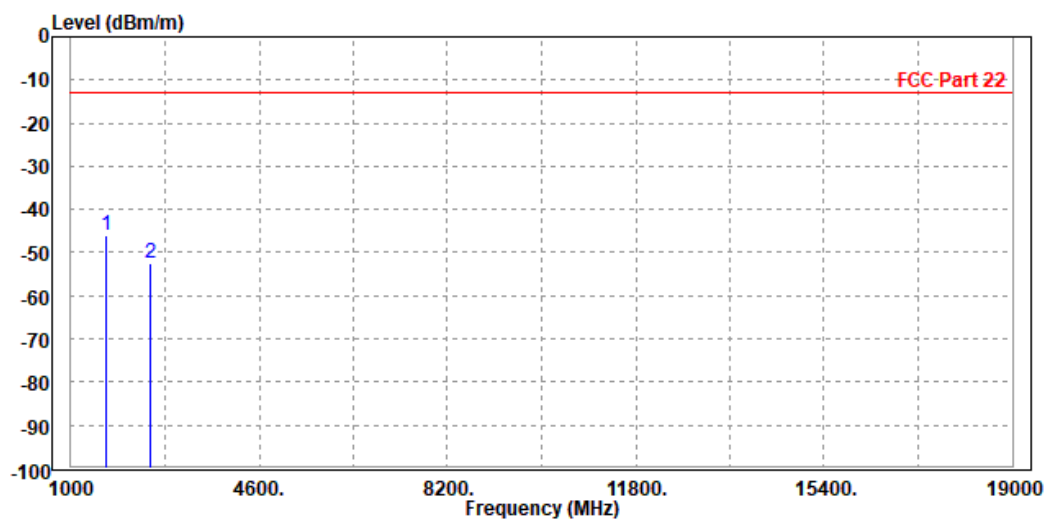
**Test Report No.: RF200629W001-2**

**LTE Band 5**

**CHANNEL BANDWIDTH: 1.4MHz / QPSK**

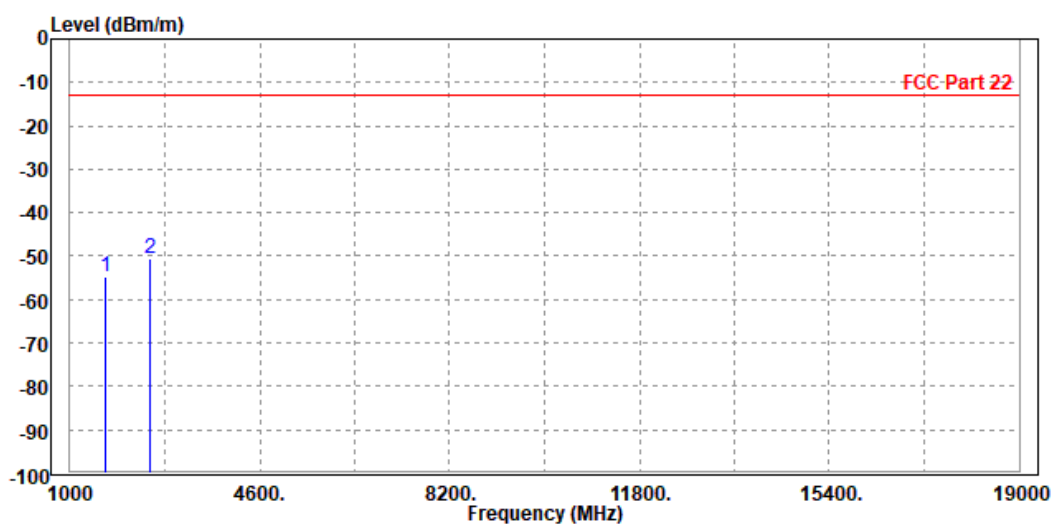
|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 20525 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|   |    | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|---|----|----------|--------|------------|------------|------------|--------|--------|------------|
|   |    | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 | PP | 1666.000 | -45.91 | -49.38     | -13.00     | -32.91     | 3.47   | Peak   | Horizontal |
| 2 |    | 2512.000 | -52.45 | -60.51     | -13.00     | -39.45     | 8.06   | Peak   | Horizontal |



|                                                   |                  |                 |                    |
|---------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                              | TX channel 20525 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                  |                 |                    |

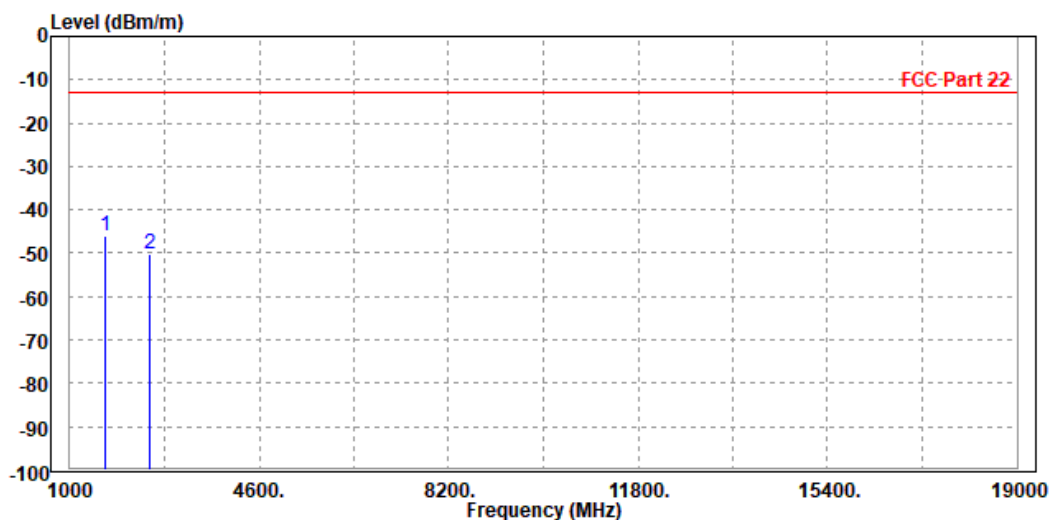
|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 1666.000 | -54.68 | -58.22     | -13.00     | -41.68     | 3.54   | Peak   | Vertical  |
| 2 PP | 2512.000 | -50.70 | -57.81     | -13.00     | -37.70     | 7.11   | Peak   | Vertical  |



**CHANNEL BANDWIDTH: 3MHz / QPSK**

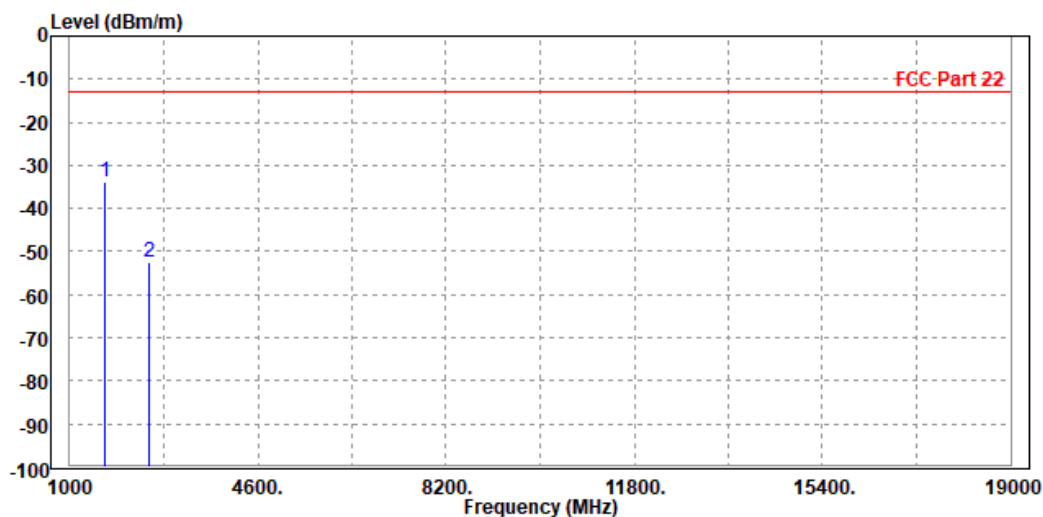
|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 20525 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 PP | 1666.000 | -45.99 | -49.46     | -13.00     | -32.99     | 3.47   | Peak   | Horizontal |
| 2    | 2512.000 | -50.16 | -58.22     | -13.00     | -37.16     | 8.06   | Peak   | Horizontal |



|                                                   |                  |                 |                    |
|---------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                              | TX channel 20525 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                  |                 |                    |

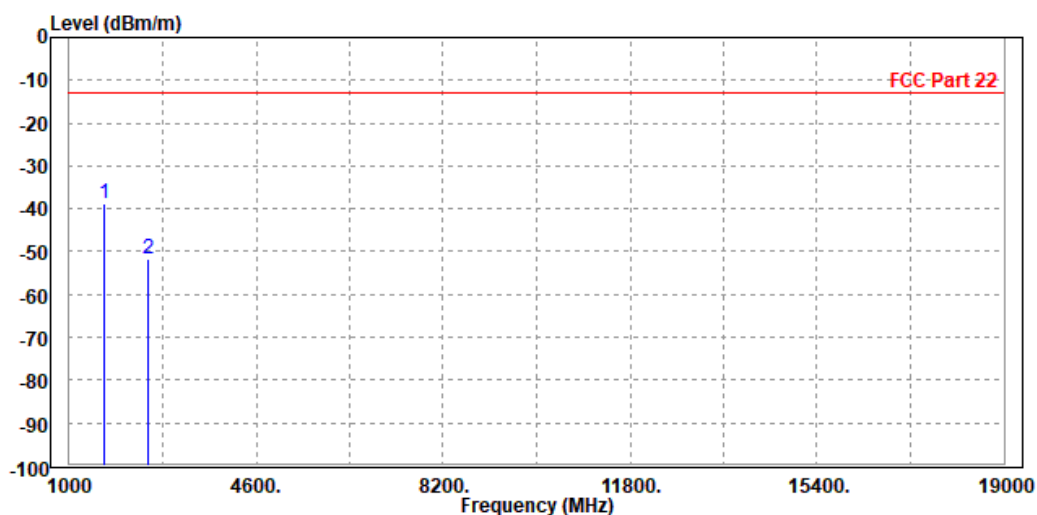
|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 PP | 1666.000 | -34.03 | -37.57     | -13.00     | -21.03     | 3.54   | Peak   | Vertical  |
| 2    | 2512.000 | -52.60 | -59.71     | -13.00     | -39.60     | 7.11   | Peak   | Vertical  |



**CHANNEL BANDWIDTH: 5MHz / QPSK**

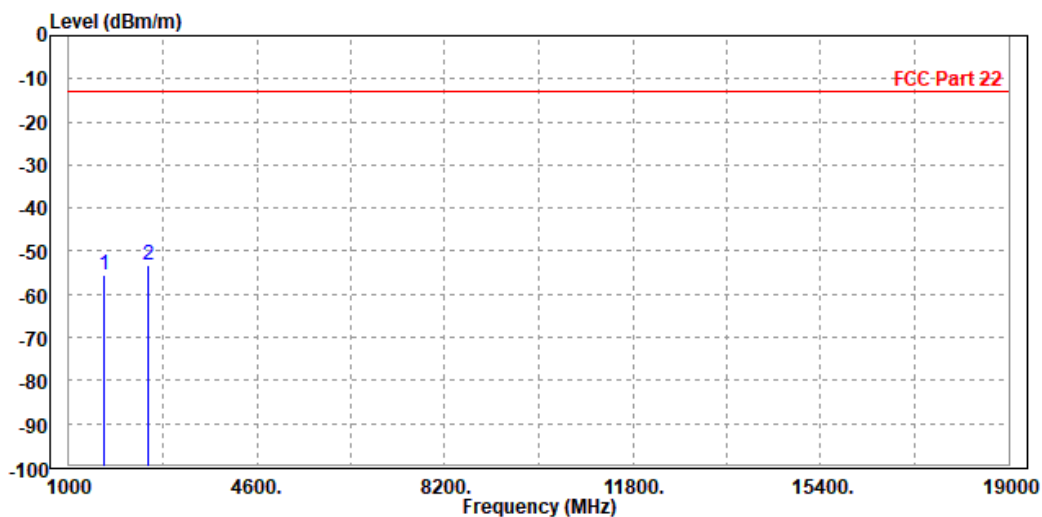
|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 20525 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 PP | 1666.000 | -38.83 | -42.30     | -13.00     | -25.83     | 3.47   | Peak   | Horizontal |
| 2    | 2512.000 | -51.73 | -59.79     | -13.00     | -38.73     | 8.06   | Peak   | Horizontal |



|                                                   |                  |                 |                    |
|---------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                              | TX channel 20525 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 1666.000 | -55.54 | -59.08     | -13.00     | -42.54     | 3.54   | Peak   | Vertical  |
| 2 PP | 2512.000 | -53.27 | -60.38     | -13.00     | -40.27     | 7.11   | Peak   | Vertical  |

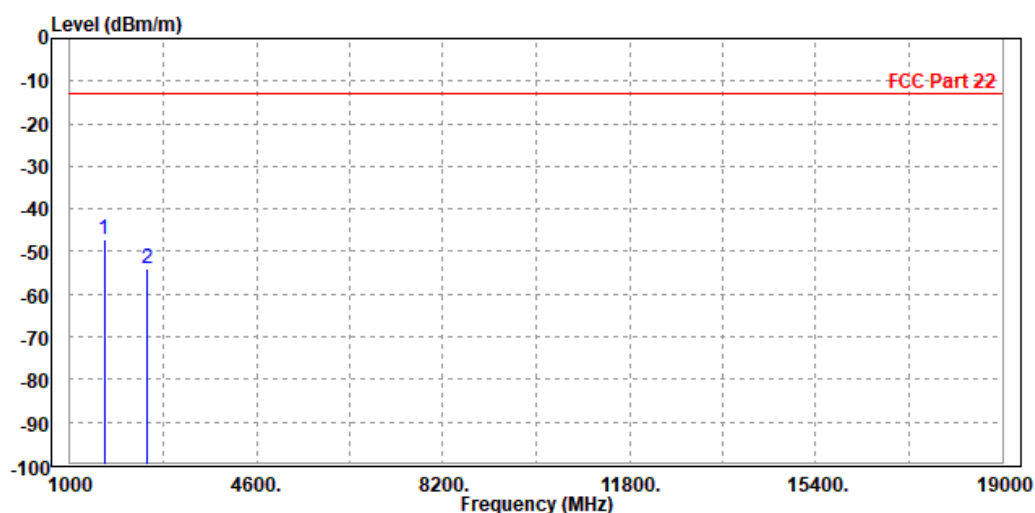


CHANNEL BANDWIDTH: 10MHz / QPSK

CH 20450

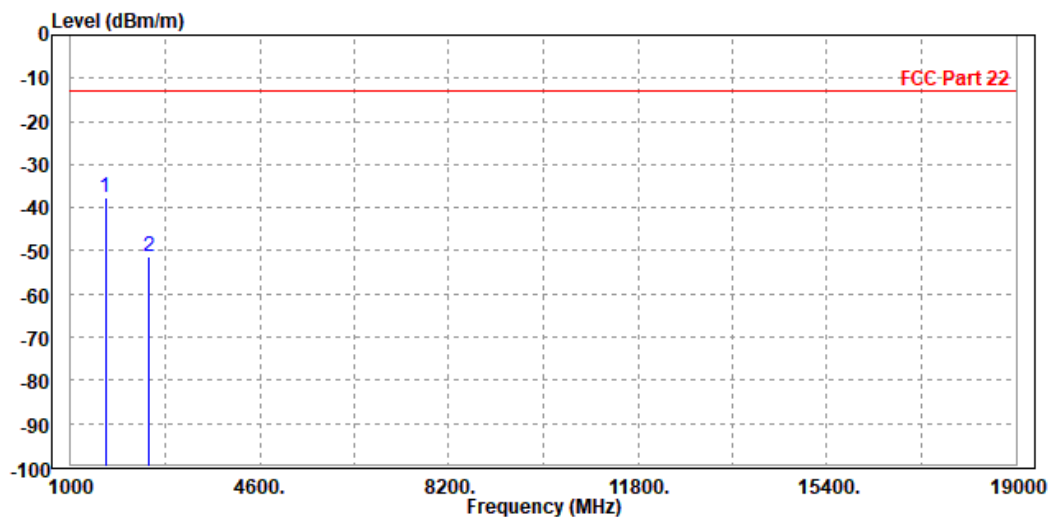
|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 20450 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|   |    | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|---|----|----------|--------|------------|------------|------------|--------|--------|------------|
|   |    | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 | PP | 1658.000 | -47.21 | -50.58     | -13.00     | -34.21     | 3.37   | Peak   | Horizontal |
| 2 |    | 2487.000 | -53.81 | -61.85     | -13.00     | -40.81     | 8.04   | Peak   | Horizontal |



|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 20450 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|   |    | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|----|----------|--------|------------|------------|------------|--------|--------|-----------|
|   |    | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 | PP | 1658.000 | -37.60 | -41.07     | -13.00     | -24.60     | 3.47   | Peak   | Vertical  |
| 2 |    | 2487.000 | -51.26 | -58.31     | -13.00     | -38.26     | 7.05   | Peak   | Vertical  |





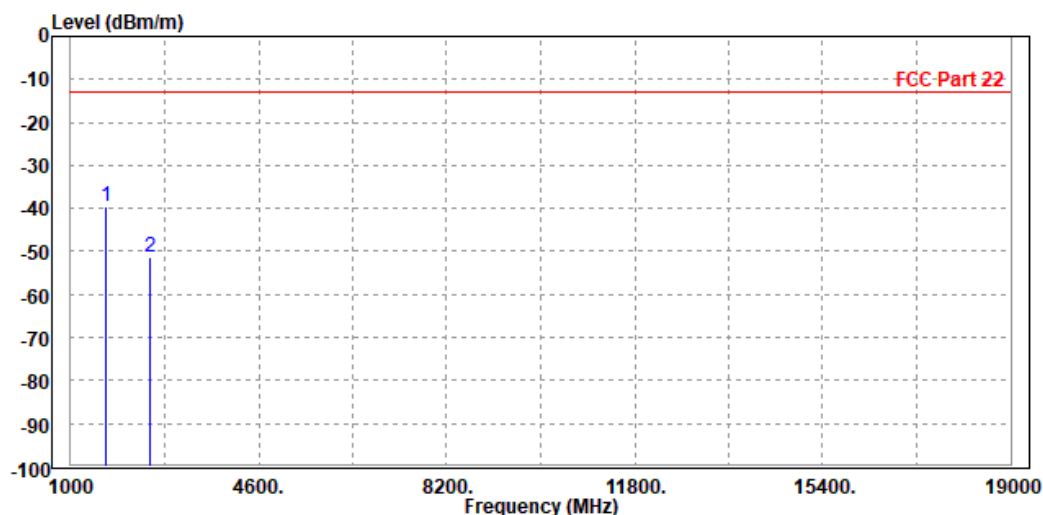
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Test Report No.: RF200629W001-2

# CH 20525

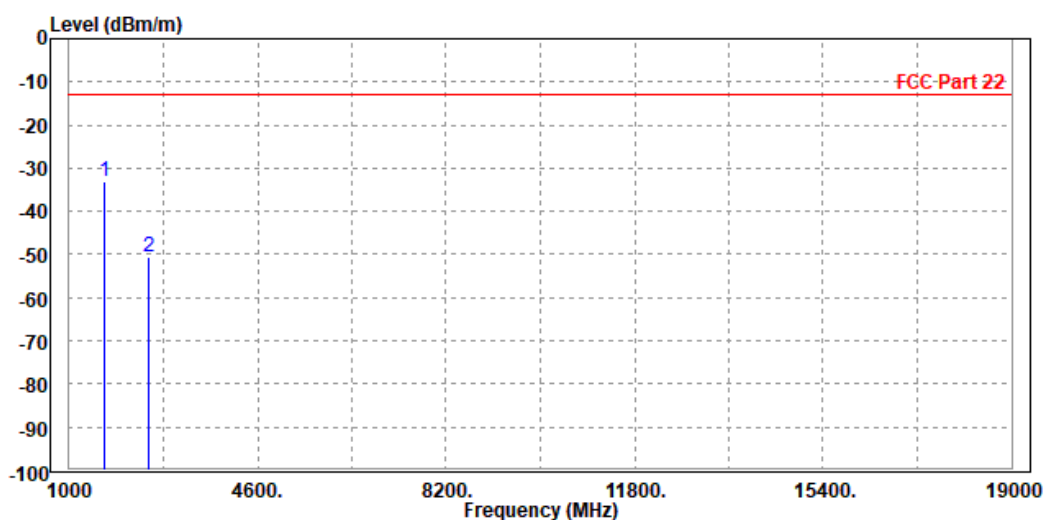
|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 20525 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|   |    | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|---|----|----------|--------|------------|------------|------------|--------|--------|------------|
|   |    | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 | PP | 1666.000 | -39.65 | -43.12     | -13.00     | -26.65     | 3.47   | Peak   | Horizontal |
| 2 |    | 2512.000 | -51.42 | -59.48     | -13.00     | -38.42     | 8.06   | Peak   | Horizontal |



|                                                   |                  |                 |                    |
|---------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                              | TX channel 20525 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                  |                 |                    |

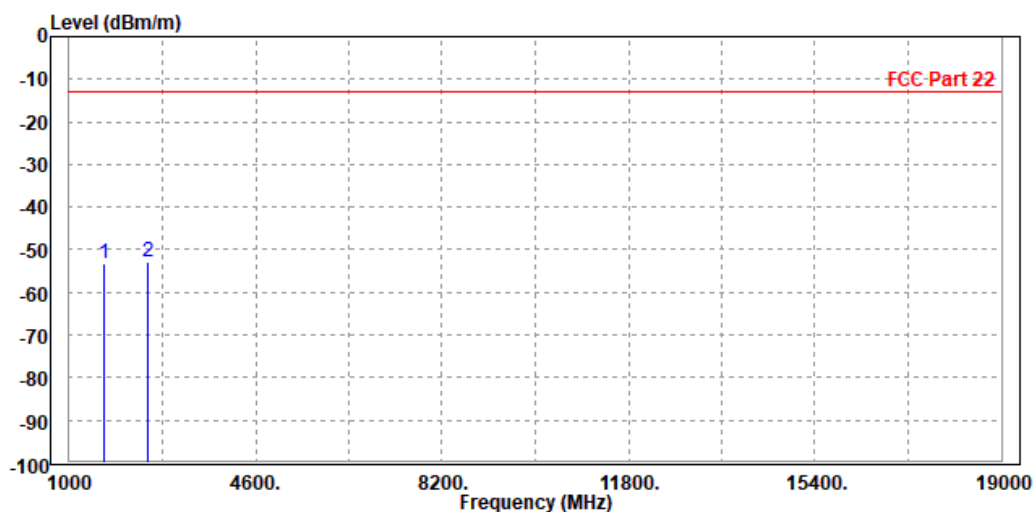
|   | Freq        | Level  | Read Level | Limit  | Over Limit | Factor | Remark | Pol/Phase |
|---|-------------|--------|------------|--------|------------|--------|--------|-----------|
|   | MHz         | dBm/m  | dBm        | dBm/m  | dB         | dB/m   |        |           |
| 1 | PP 1666.000 | -32.93 | -36.47     | -13.00 | -19.93     | 3.54   | Peak   | Vertical  |
| 2 | 2512.000    | -50.58 | -57.69     | -13.00 | -37.58     | 7.11   | Peak   | Vertical  |



CH 20600

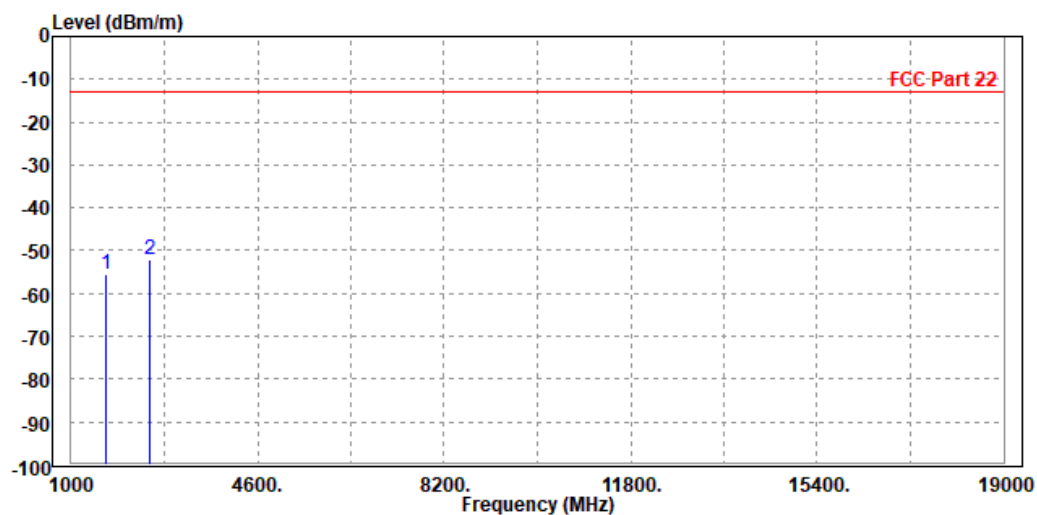
|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 20525 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 1684.000 | -53.10 | -56.79     | -13.00     | -40.10     | 3.69   | Peak   | Horizontal |
| 2 PP | 2532.000 | -52.92 | -61.01     | -13.00     | -39.92     | 8.09   | Peak   | Horizontal |



|                                                   |                  |                 |                    |
|---------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                              | TX channel 20525 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 23deg. C, 70%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Star Le          |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 1684.000 | -55.43 | -59.14     | -13.00     | -42.43     | 3.71   | Peak   | Vertical  |
| 2 PP | 2532.000 | -51.94 | -59.11     | -13.00     | -38.94     | 7.17   | Peak   | Vertical  |

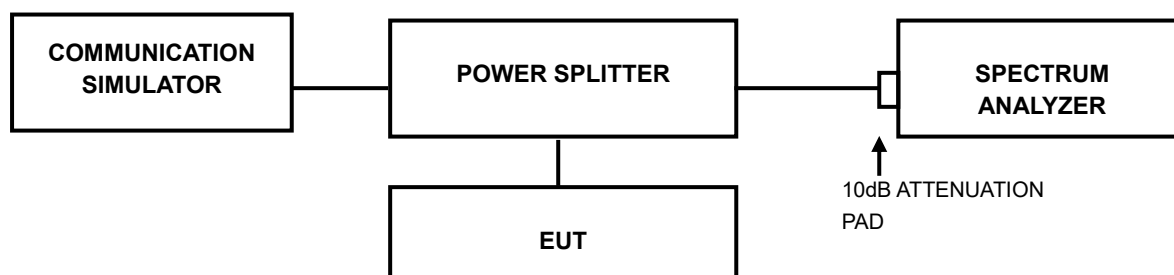


### 3.7 PEAK TO AVERAGE RATIO

#### 3.7.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT

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

#### 3.7.2 TEST SETUP



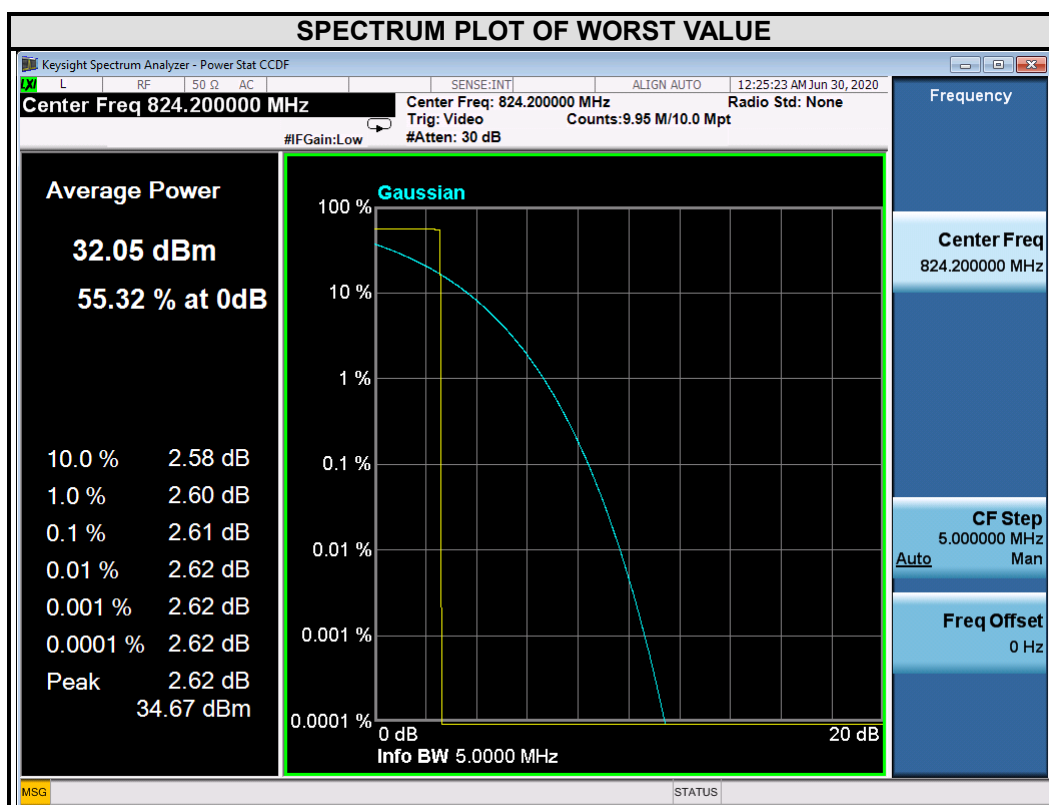
#### 3.7.3 TEST PROCEDURES

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

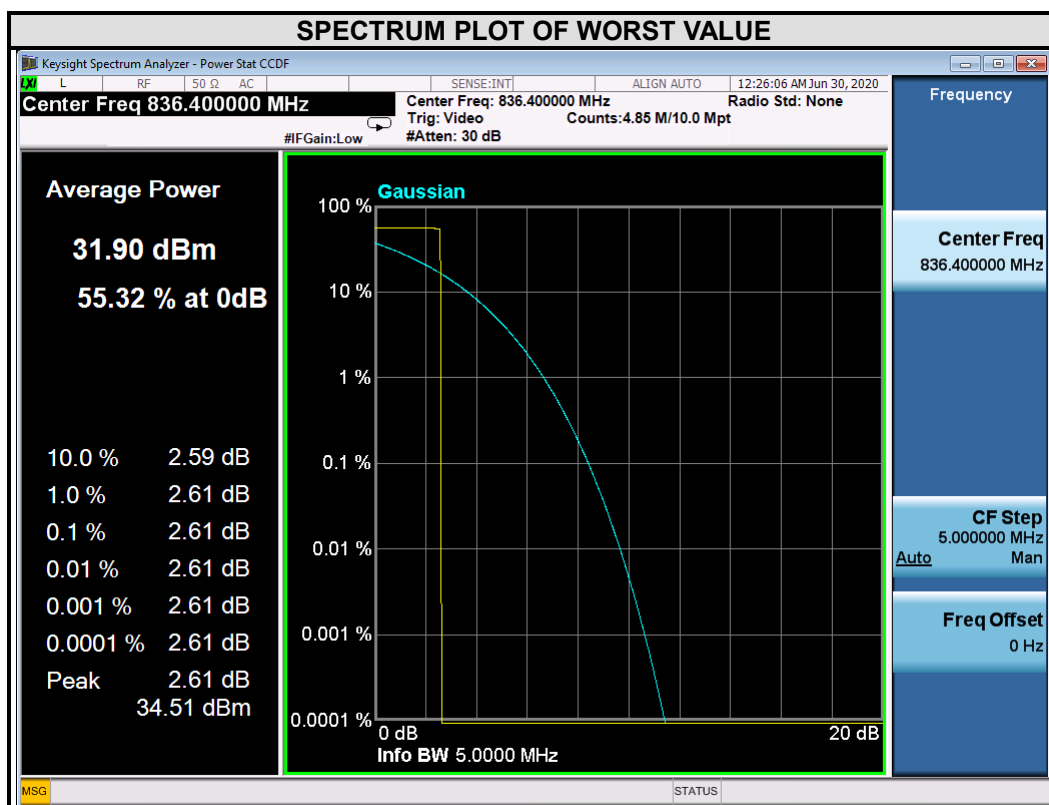
### 3.7.4 TEST RESULTS

#### GSM

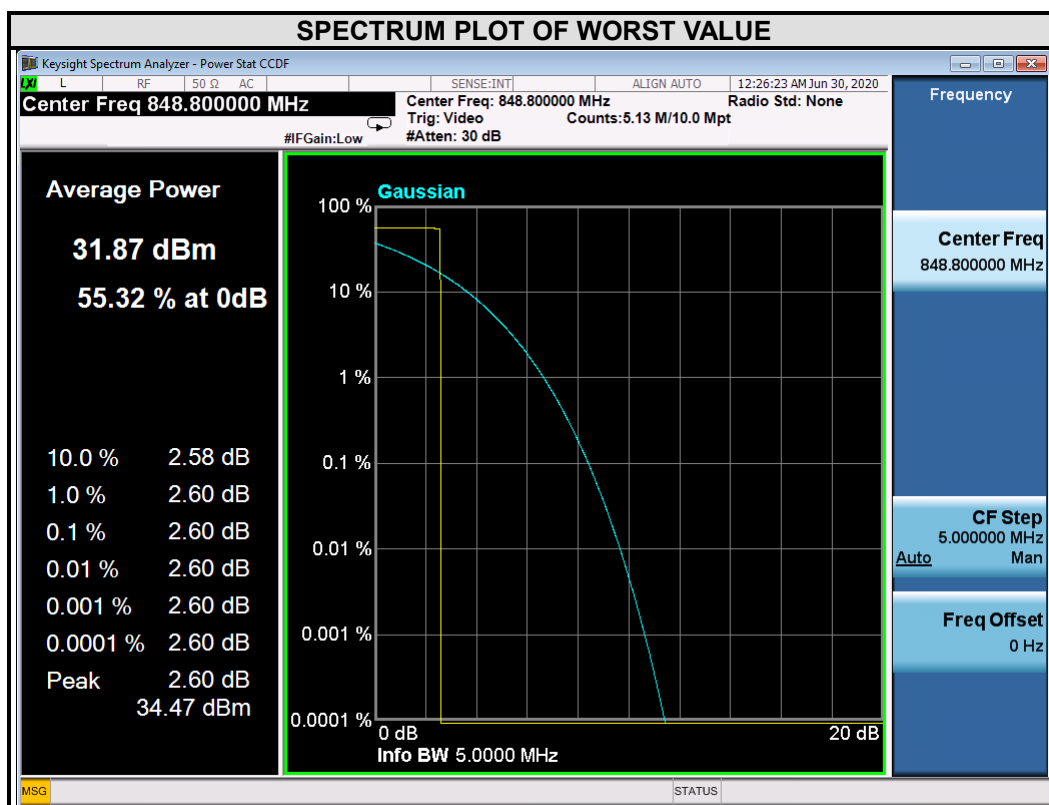
| CHANNEL | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |
|---------|-----------------|----------------------------|
| 128     | 824.2           | 2.61                       |



| CHANNEL | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |
|---------|-----------------|----------------------------|
| 189     | 836.4           | 2.61                       |

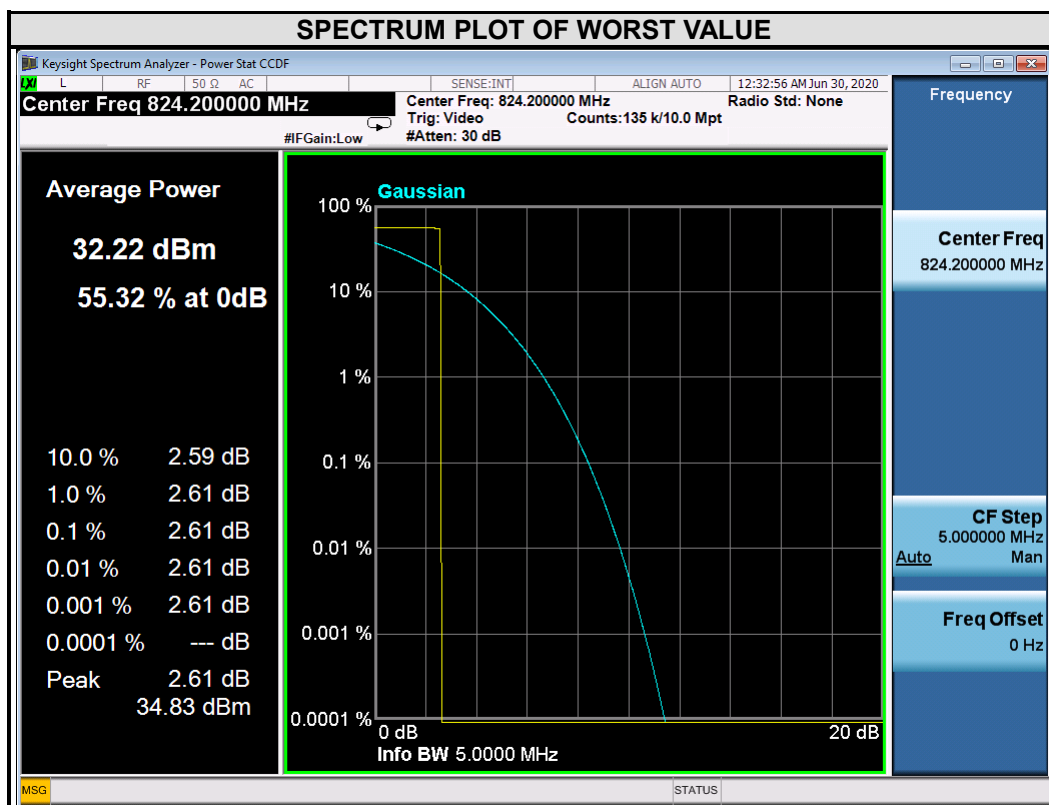


| CHANNEL | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |
|---------|-----------------|----------------------------|
| 251     | 848.8           | 2.60                       |

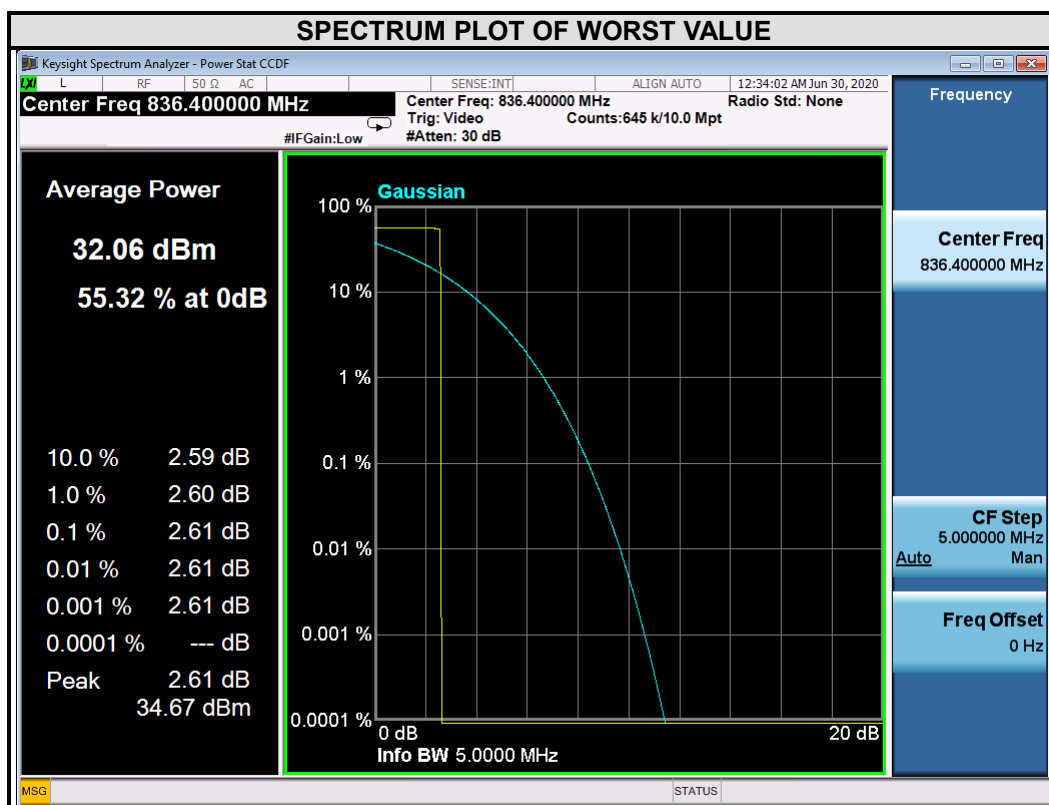


EDGE

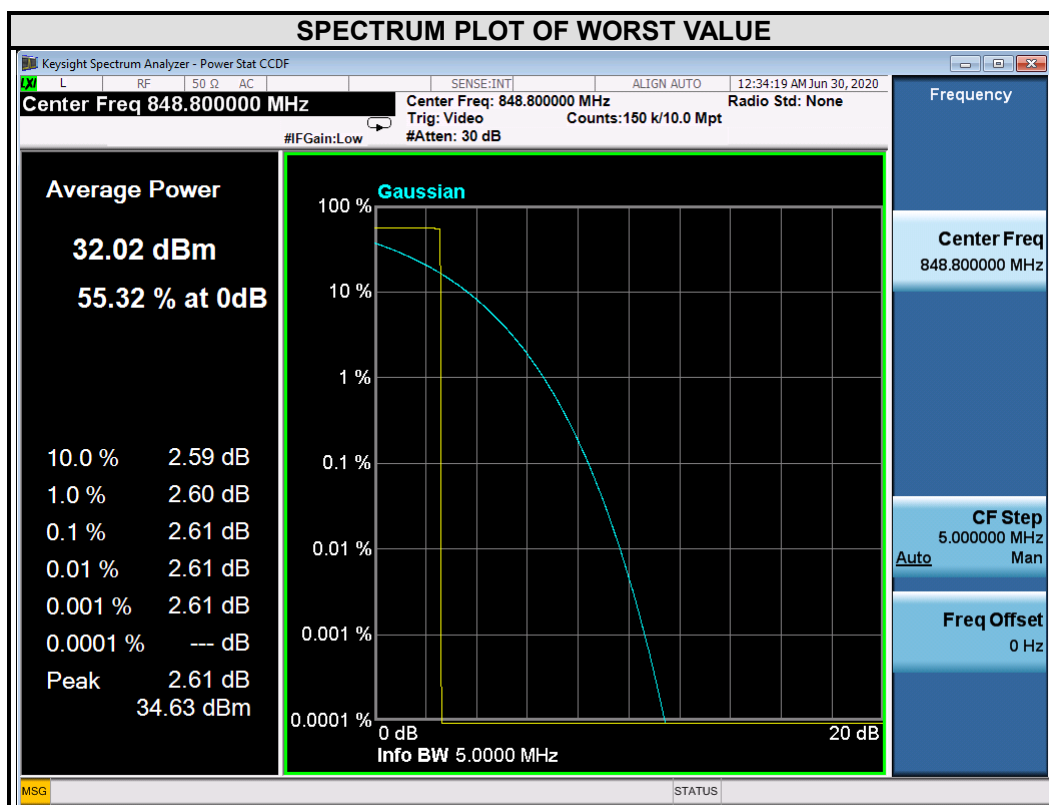
| CHANNEL | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |
|---------|-----------------|----------------------------|
| 128     | 824.2           | 2.61                       |



| CHANNEL | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |
|---------|-----------------|----------------------------|
| 189     | 836.4           | 2.61                       |

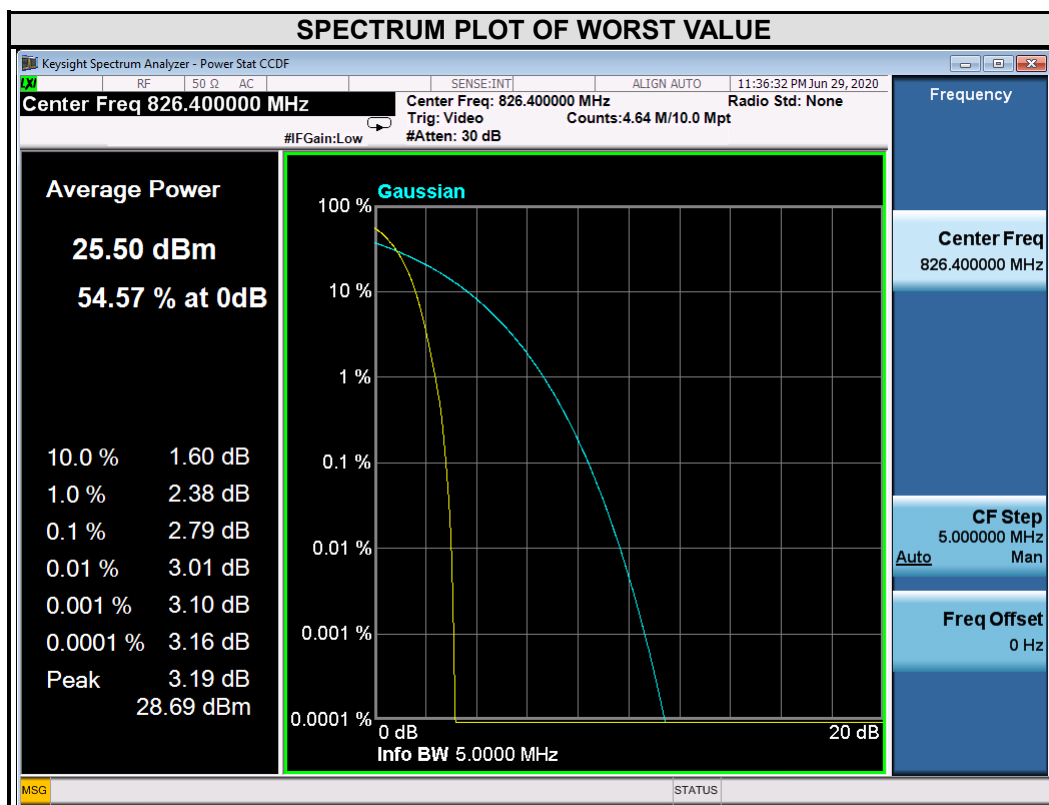


| CHANNEL | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |
|---------|-----------------|----------------------------|
| 251     | 848.8           | 2.61                       |

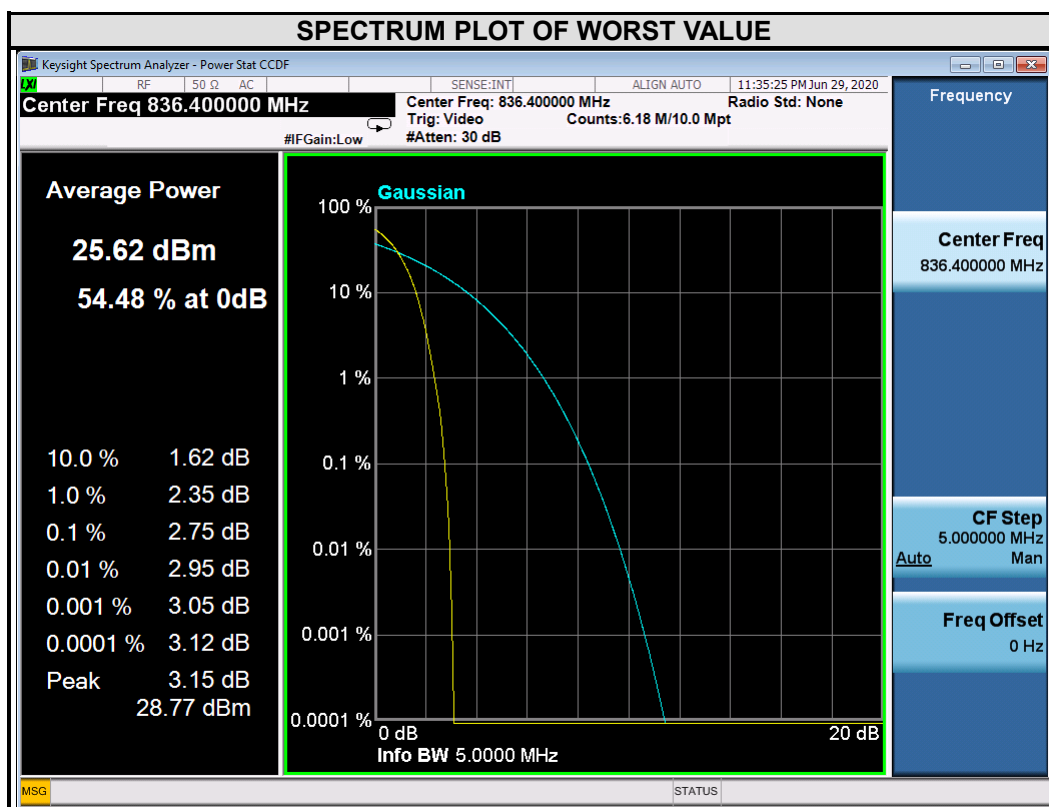


WCDMA

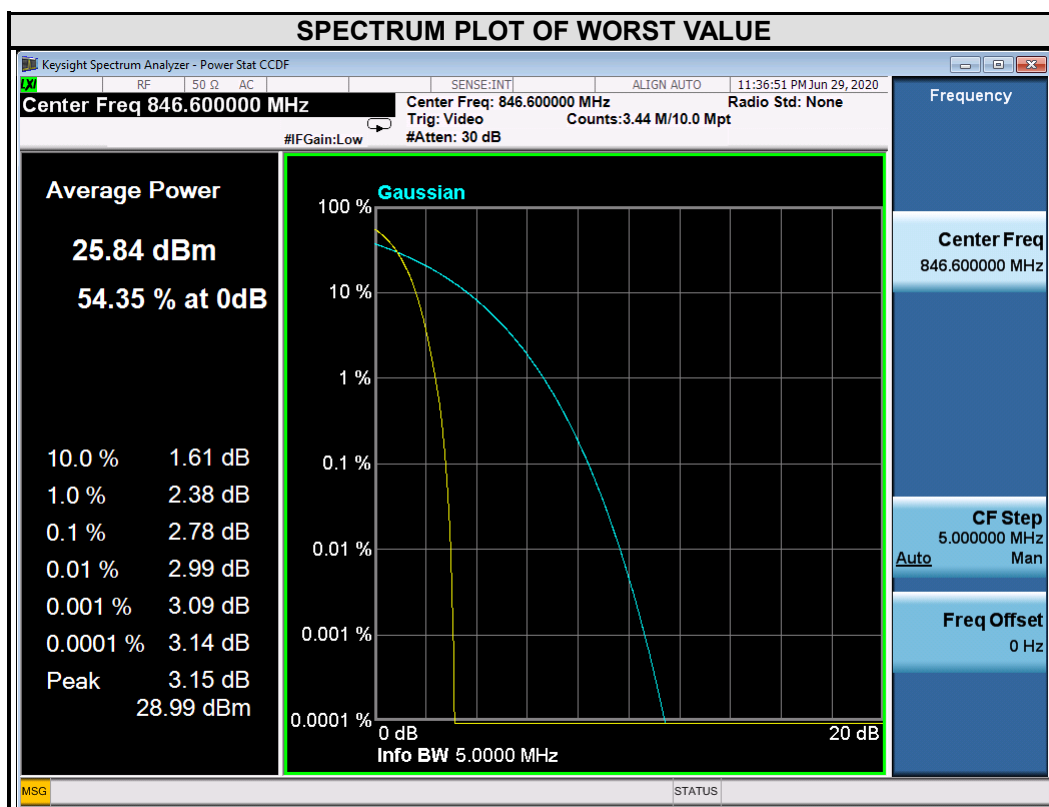
| CHANNEL | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |
|---------|-----------------|----------------------------|
| 4132    | 826.4           | 2.79                       |



| CHANNEL | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |
|---------|-----------------|----------------------------|
| 4182    | 836.4           | 2.75                       |

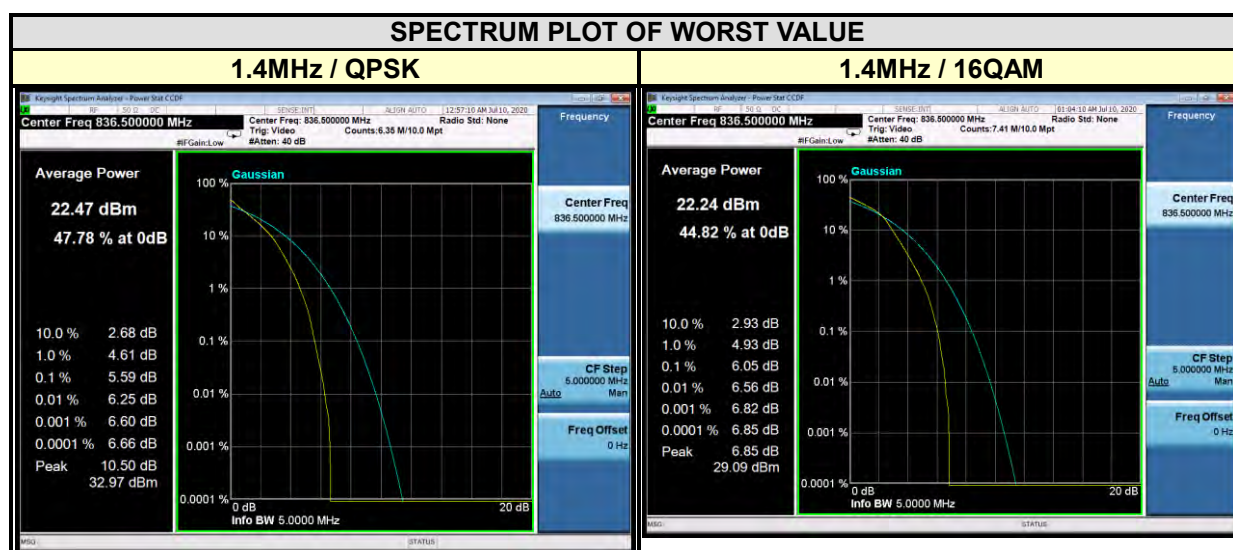


| CHANNEL | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |
|---------|-----------------|----------------------------|
| 4233    | 846.6           | 2.78                       |

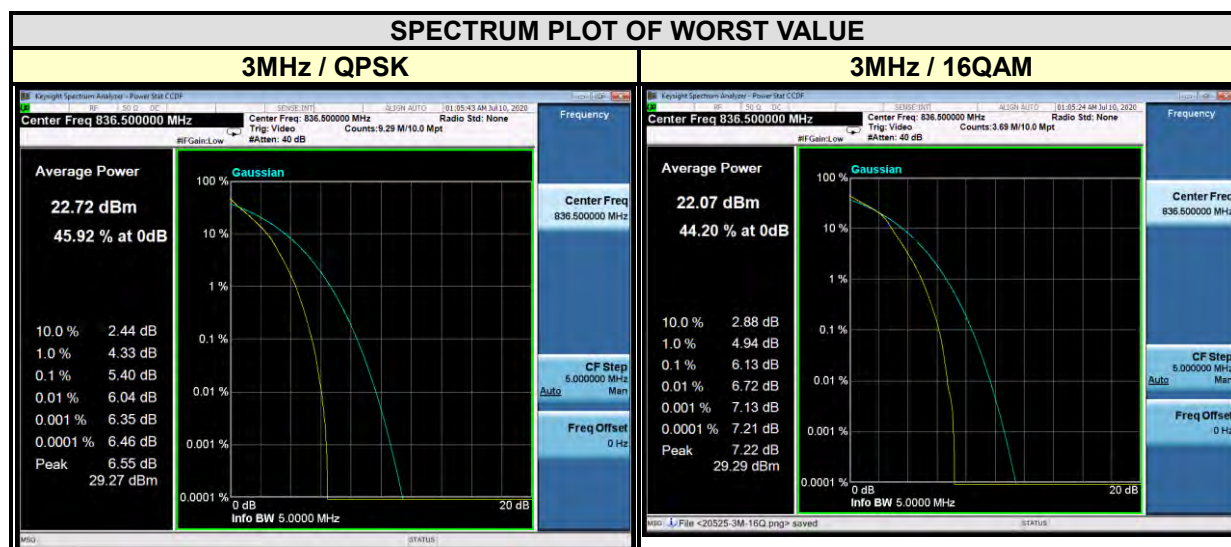


## LTE BAND 5

| CHANNEL BANDWIDTH: 1.4MHz |                 |                            |       |
|---------------------------|-----------------|----------------------------|-------|
| CHANNEL                   | Frequency (MHz) | PEAK TO AVERAGE RATIO (dB) |       |
|                           |                 | QPSK                       | 16QAM |
| 20407                     | 824.7           | 5.03                       | 5.75  |
| 20525                     | 836.5           | 5.59                       | 6.05  |
| 20643                     | 848.3           | 5.28                       | 5.76  |



| CHANNEL BANDWIDTH: 3MHz |                 |                            |       |
|-------------------------|-----------------|----------------------------|-------|
| CHANNEL                 | Frequency (MHz) | PEAK TO AVERAGE RATIO (dB) |       |
|                         |                 | QPSK                       | 16QAM |
| 20415                   | 825.5           | 5.27                       | 5.97  |
| 20525                   | 836.5           | 5.40                       | 6.13  |
| 20635                   | 847.5           | 5.21                       | 6.07  |

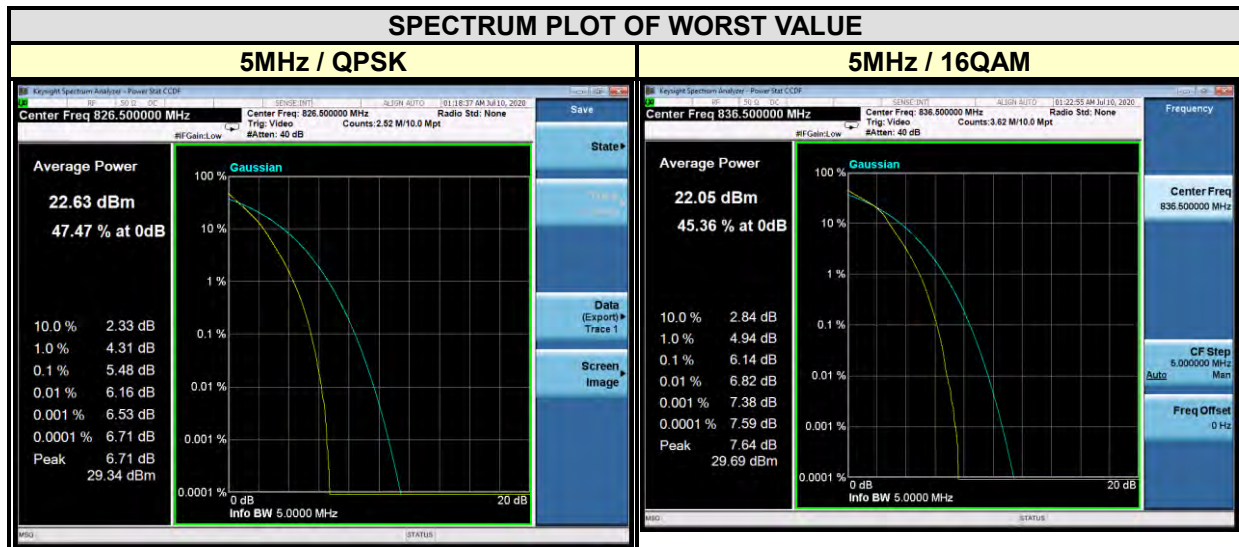




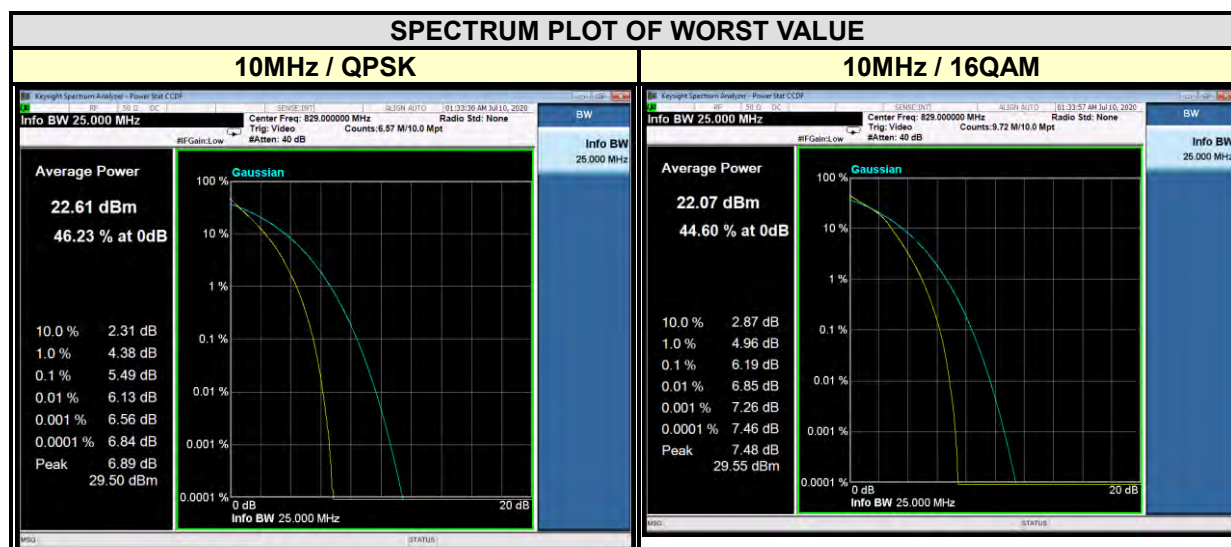
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VERITAS**

Test Report No.: RF200629W001-2

| CHANNEL BANDWIDTH: 5MHz |                    |                            |       |
|-------------------------|--------------------|----------------------------|-------|
| CHANNEL                 | Frequency<br>(MHz) | PEAK TO AVERAGE RATIO (dB) |       |
|                         |                    | QPSK                       | 16QAM |
| 20425                   | 826.5              | 5.48                       | 6.01  |
| 20525                   | 836.5              | 5.47                       | 6.14  |
| 20625                   | 846.5              | 5.20                       | 5.96  |



| CHANNEL BANDWIDTH: 10MHz |                 |                            |       |
|--------------------------|-----------------|----------------------------|-------|
| CHANNEL                  | Frequency (MHz) | PEAK TO AVERAGE RATIO (dB) |       |
|                          |                 | QPSK                       | 16QAM |
| 20450                    | 829             | 5.49                       | 6.19  |
| 20525                    | 836.5           | 5.41                       | 6.06  |
| 20600                    | 844             | 5.06                       | 5.84  |





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## 4 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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## 5 INFORMATION ON THE TESTING LABORATORIES

We, BV 7LAYERS COMMUNICATIONS TECHNOLOGY (SHENZHEN) CO. LTD., were founded in 2015 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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

## **6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**