

## FCC Test Report

### (PART 27)

**Report No.:** RF160601C39-3

**FCC ID:** MSQZ01BDC

**Test Model:** ASUS\_Z01BDC, ASUS\_Z01BDB

**Received Date:** Jun. 01, 2016

**Test Date:** Jun. 09, 2016 ~ Jul. 28, 2016

**Issued Date:** Aug. 01, 2016

**Applicant:** ASUSTek COMPUTER INC.

**Address:** 4F, No. 150, LI-TE Rd., PEITOU, TAIPEI 112, TAIWAN

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan  
( R.O.C )

**Test Location (1):** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan  
Hsien 333, Taiwan, R.O.C.



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### Release Control Record

| Issue No.     | Description      | Date Issued   |
|---------------|------------------|---------------|
| RF160601C39-3 | Original Release | Aug. 01, 2016 |

## 1 Certificate of Conformity

**Product:** ASUS phone

**Brand:** ASUS

**Test Model:** ASUS\_Z01BDC, ASUS\_Z01BDB

**Sample Status:** Identical Prototype

**Applicant:** ASUSTek COMPUTER INC.

**Test Date:** Jun. 09, 2016 ~ Jul. 28, 2016

**Standards:** FCC Part 27, Subpart C, M

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

**Prepared by :**

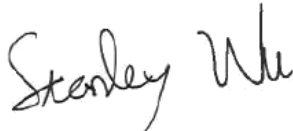


**, Date:**

Aug. 01, 2016

Ivonne Wu / Supervisor

**Approved by :**



**, Date:**

Aug. 01, 2016

Stanley Wu / Assistant Manager

## 2 Summary of Test Results

| Applied Standard: FCC Part 27 & Part 2 |                                     |        |                                                                                       |
|----------------------------------------|-------------------------------------|--------|---------------------------------------------------------------------------------------|
| FCC Clause                             | Test Item                           | Result | Remarks                                                                               |
| 2.1046<br>27.50(h)                     | Equivalent Isotropic Radiated Power | Pass   | Meet the requirement of limit.                                                        |
| 2.1055<br>27.54                        | Frequency Stability                 | Pass   | Meet the requirement of limit.                                                        |
| 2.1049                                 | Occupied Bandwidth                  | Pass   | Meet the requirement of limit.                                                        |
| --                                     | Peak to Average Ratio               | Pass   | Meet the requirement of limit.                                                        |
| 2.1051<br>27.53(l)                     | Band Edge Measurements              | Pass   | Meet the requirement of limit.                                                        |
| 2.1051<br>27.53(m)                     | Conducted Spurious Emissions        | Pass   | Meet the requirement of limit.                                                        |
| 2.1053<br>27.53(m)                     | Radiated Spurious Emissions         | Pass   | Meet the requirement of limit.<br>Minimum passing margin is -18.33 dB at 5070.00 MHz. |

### 2.1 Measurement Uncertainty

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

| Measurement                        | Frequency          | Expanded Uncertainty (k=2) ( $\pm$ ) |
|------------------------------------|--------------------|--------------------------------------|
| Conducted Emissions at mains ports | 150 kHz ~ 30 MHz   | 2.44 dB                              |
| Radiated Emissions up to 1 GHz     | 30 MHz ~ 200 MHz   | 2.93 dB                              |
|                                    | 200 MHz ~ 1000 MHz | 2.95 dB                              |
| Radiated Emissions above 1 GHz     | 1 GHz ~ 18 GHz     | 2.26 dB                              |
|                                    | 18 GHz ~ 40 GHz    | 1.94 dB                              |

## 2.2 Test Site and Instruments

| Description & Manufacturer                     | Model No.      | Serial No.          | Date of Calibration | Due Date of Calibration |
|------------------------------------------------|----------------|---------------------|---------------------|-------------------------|
| Test Receiver<br>Agilent                       | N9038A         | MY51210203          | Jan. 21, 2016       | Jan. 20, 2017           |
| Spectrum Analyzer<br>Agilent                   | N9010A         | MY52220314          | Sep. 03, 2015       | Sep. 02, 2016           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ           | FSU43          | 101261              | Dec. 17, 2015       | Dec. 16, 2016           |
| BILOG Antenna<br>SCHWARZBECK                   | VULB9168       | 9168-472            | Jan. 07, 2016       | Jan. 06, 2017           |
| HORN Antenna<br>SCHWARZBECK                    | BBHA 9120 D    | 9120D-969           | Jan. 04, 2016       | Jan. 03, 2017           |
| Double Ridge Guide Horn<br>Antenna EMCO        | 3115           | 5619                | Jan. 04, 2016       | Jan. 03, 2017           |
| BILOG Antenna<br>SCHWARZBECK                   | VULB 9168      | 9168-153            | Jan. 07, 2016       | Jan. 06, 2017           |
| Agilent Communications<br>Tester-Wireless      | 8960 Series 10 | MY53201073          | Jul. 03, 2015       | Jul. 02, 2017           |
| Preamplifier<br>EMCI                           | EMC 012645     | 980115              | Dec. 21, 2015       | Dec. 20, 2016           |
| Preamplifier<br>EMCI                           | EMC 184045     | 980116              | Dec. 21, 2015       | Dec. 20, 2016           |
| Preamplifier<br>EMCI                           | EMC 330H       | 980112              | Dec. 28, 2015       | Dec. 27, 2016           |
| Power Meter<br>Anritsu                         | ML2495A        | 1232002             | Sep. 21, 2015       | Sep. 20, 2016           |
| Power Sensor<br>Anritsu                        | MA2411B        | 1207325             | Sep. 21, 2015       | Sep. 20, 2016           |
| RF signal cable<br>HUBER+SUHNNER               | SUCOFLEX 104   | 309219/4<br>2950114 | Oct. 12, 2015       | Oct. 11, 2016           |
| RF signal cable<br>HUBER+SUHNNER               | SUCOFLEX 104   | 250130/4            | Oct. 12, 2015       | Oct. 11, 2016           |
| RF Coaxial Cable<br>Worken                     | 8D-FB          | Cable-Ch10-01       | Oct. 12, 2015       | Oct. 11, 2016           |
| Software<br>BV ADT                             | E3<br>6.120103 | NA                  | NA                  | NA                      |
| Antenna Tower<br>MF                            | MFA-440H       | NA                  | NA                  | NA                      |
| Turn Table<br>MF                               | MFT-201SS      | NA                  | NA                  | NA                      |
| Antenna Tower & Turn<br>Table Controller<br>MF | MF-7802        | NA                  | NA                  | NA                      |
| Communications<br>Tester-Wireless<br>Agilent   | 8960 Series 10 | MY53201073          | Jul. 03, 2015       | Jul. 02, 2017           |
| Radio Communication<br>Analyzer<br>Anritsu     | MT8820C        | 6201300640          | Aug. 10, 2015       | Aug. 09, 2017           |

- Note:
1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Chamber 10.
  3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
  4. The FCC Site Registration No. is 690701.
  5. The IC Site Registration No. is IC7450F-10.

### 3 General Information

#### 3.1 General Description of EUT

|                            |                                                                  |                     |
|----------------------------|------------------------------------------------------------------|---------------------|
| <b>Product</b>             | ASUS phone                                                       |                     |
| <b>Brand</b>               | ASUS                                                             |                     |
| <b>Test Model</b>          | ASUS_Z01BDC, ASUS_Z01BDB                                         |                     |
| <b>Status of EUT</b>       | Identical Prototype                                              |                     |
| <b>Power Supply Rating</b> | 5.2 Vdc (adapter or host equipment)<br>3.85 Vdc (Li-ion battery) |                     |
| <b>Modulation Type</b>     | QPSK, 16QAM                                                      |                     |
| <b>Frequency Range</b>     | LTE Band 7 (Channel Bandwidth: 5 MHz)                            | 2502.5 ~ 2567.5 MHz |
|                            | LTE Band 7 (Channel Bandwidth: 10 MHz)                           | 2505 ~ 2565 MHz     |
|                            | LTE Band 7 (Channel Bandwidth: 15 MHz)                           | 2507.5 ~ 2562.5 MHz |
|                            | LTE Band 7 (Channel Bandwidth: 20 MHz)                           | 2510 ~ 2560 MHz     |
| <b>Max. EIRP Power</b>     | LTE Band 7 (Channel Bandwidth: 5 MHz)                            | 88.47 mW            |
|                            | LTE Band 7 (Channel Bandwidth: 10 MHz)                           | 96.36 mW            |
|                            | LTE Band 7 (Channel Bandwidth: 15 MHz)                           | 97.45 mW            |
|                            | LTE Band 7 (Channel Bandwidth: 20 MHz)                           | 103.23 mW           |
| <b>Emission Designator</b> | LTE Band 7 (Channel Bandwidth: 5 MHz)                            | 4M49G7D             |
|                            | LTE Band 7 (Channel Bandwidth: 10 MHz)                           | 8M96G7D             |
|                            | LTE Band 7 (Channel Bandwidth: 15 MHz)                           | 13M4G7D             |
|                            | LTE Band 7 (Channel Bandwidth: 20 MHz)                           | 17M9W7D             |
| <b>Antenna Type</b>        | Fixed Internal Antenna                                           |                     |
| <b>Accessory Device</b>    | Refer to Note as below                                           |                     |
| <b>Data Cable Supplied</b> | Refer to Note as below                                           |                     |

Note:

1. There're 2 configurations for the EUT listed as below.

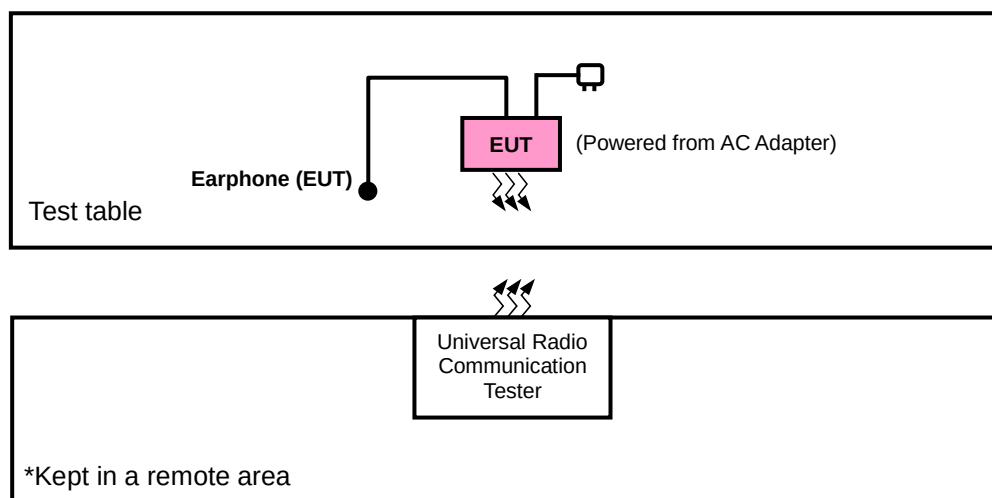
| Sample                 | Difference                                         |
|------------------------|----------------------------------------------------|
| Main Sample            | Panel 1 + Front Camer 1 + Real Camera 1 + Battery1 |
| 2 <sup>nd</sup> Sample | Panel 2 + Front Camer 2 + Real Camera 2 + Battery2 |

✧ Only the worst test data was presented in the report.

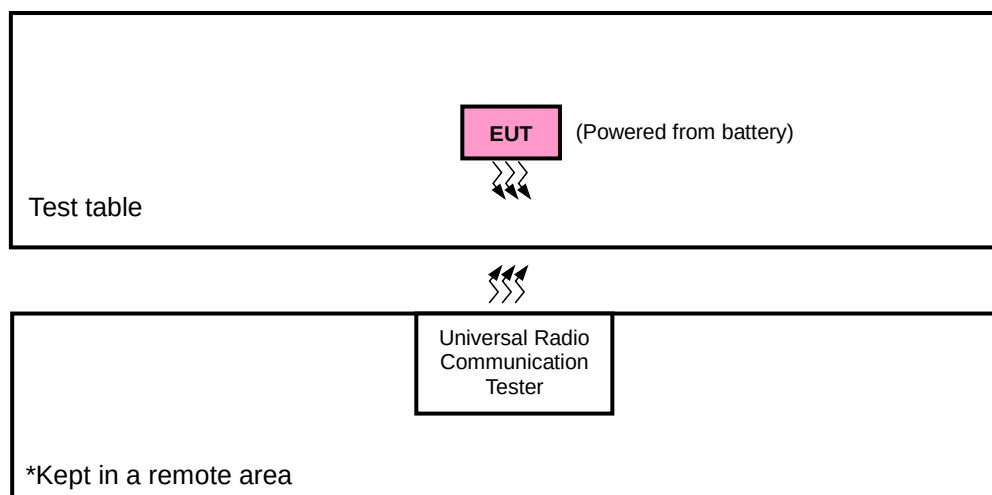
2. The EUT's accessories list refers to Ext. Pho.
3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

## 3.2 Configuration of System under Test

### <Radiated Emission Test>



### <E.I.R.P. Test>



#### 3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

### 3.3 Test Mode Applicability and Tested Channel Detail

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 was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

| EUT Configure Mode | Description            |
|--------------------|------------------------|
| A                  | Main Sample            |
| B                  | 2 <sup>nd</sup> Sample |

| Band       | EIRP    | Radiated Emission |
|------------|---------|-------------------|
| LTE Band 7 | X-plane | Z-axis            |

#### LTE Band 7

| EUT Configure Mode | Test Item             | Available Channel | Tested Channel      | Channel Bandwidth | Modulation  | Mode                 |
|--------------------|-----------------------|-------------------|---------------------|-------------------|-------------|----------------------|
| A                  | EIRP                  | 20775 to 21425    | 20775, 21100, 21425 | 5 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20800 to 21400    | 20800, 21100, 21400 | 10 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20825 to 21375    | 20825, 21100, 21375 | 15 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20850 to 21350    | 20850, 21100 21350  | 20 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset   |
| B                  | EIRP                  | 20850 to 21350    | 20850, 21100 21350  | 20 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset   |
| A                  | Frequency Stability   | 20775 to 21425    | 21100               | 5 MHz             | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20800 to 21400    | 21100               | 10 MHz            | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20825 to 21375    | 21100               | 15 MHz            | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20850 to 21350    | 21100               | 20 MHz            | QPSK        | 1 RB / 0 RB Offset   |
| A                  | Occupied Bandwidth    | 20775 to 21425    | 20775, 21100, 21425 | 5 MHz             | QPSK, 16QAM | 25 RB / 0 RB Offset  |
|                    |                       | 20800 to 21400    | 20800, 21100, 21400 | 10 MHz            | QPSK, 16QAM | 50 RB / 0 RB Offset  |
|                    |                       | 20825 to 21375    | 20825, 21100, 21375 | 15 MHz            | QPSK, 16QAM | 75 RB / 0 RB Offset  |
|                    |                       | 20850 to 21350    | 20850, 21100 21350  | 20 MHz            | QPSK, 16QAM | 100 RB / 0 RB Offset |
| A                  | Peak to Average Ratio | 20775 to 21425    | 20775, 21100, 21425 | 5 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20800 to 21400    | 20800, 21100, 21400 | 10 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20825 to 21375    | 20825, 21100, 21375 | 15 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20850 to 21350    | 20850, 21100 21350  | 20 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset   |
| A                  | Band Edge             | 20775 to 21425    | 20775, 21425        | 5 MHz             | QPSK, 16QAM | 25 RB / 0 RB Offset  |
|                    |                       | 20800 to 21400    | 20800, 21400        | 10 MHz            | QPSK, 16QAM | 50 RB / 0 RB Offset  |
|                    |                       | 20825 to 21375    | 20825, 21375        | 15 MHz            | QPSK, 16QAM | 75 RB / 0 RB Offset  |
|                    |                       | 20850 to 21350    | 20850, 21350        | 20 MHz            | QPSK, 16QAM | 100 RB / 0 RB Offset |
| A                  | Conducted Emission    | 20775 to 21425    | 21100               | 5 MHz             | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20800 to 21400    | 21100               | 10 MHz            | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20825 to 21375    | 21100               | 15 MHz            | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20850 to 21350    | 21100               | 20 MHz            | QPSK        | 1 RB / 0 RB Offset   |
| A, B               | Radiated Emission     | 20850 to 21350    | 21100               | 20 MHz            | QPSK        | 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 Condition:**

| Test Item             | Environmental Conditions | Input Power    | Tested By            |
|-----------------------|--------------------------|----------------|----------------------|
| EIRP                  | 25 deg. C, 65 % RH       | 3.85 Vdc       | Gavin Wu             |
| Frequency Stability   | 25 deg. C, 65 % RH       | 3.85 Vdc       | Carlos Chen          |
| Occupied Bandwidth    | 25 deg. C, 65 % RH       | 3.85 Vdc       | Carlos Chen          |
| Band Edge             | 25 deg. C, 65 % RH       | 3.85 Vdc       | Carlos Chen          |
| Peak to Average Ratio | 25 deg. C, 65 % RH       | 3.85 Vdc       | Carlos Chen          |
| Conducuted Emission   | 25 deg. C, 65 % RH       | 3.85 Vdc       | Carlos Chen          |
| Radiated Emission     | 25 deg. C, 65 % RH       | 120 Vac, 60 Hz | Gavin Wu & Toby Tian |

### 3.4 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

### 3.5 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 27**

**KDB 971168 D01 Power Meas License Digital Systems v02r02**

**ANSI/TIA/EIA-603-D 2010**

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

## 4 Test Types and Results

### 4.1 Output Power Measurement

#### 4.1.1 Limits of Output Power Measurement

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “User stations are limited to 2 watts” and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

#### 4.1.2 Test Procedures

##### **EIRP Measurement:**

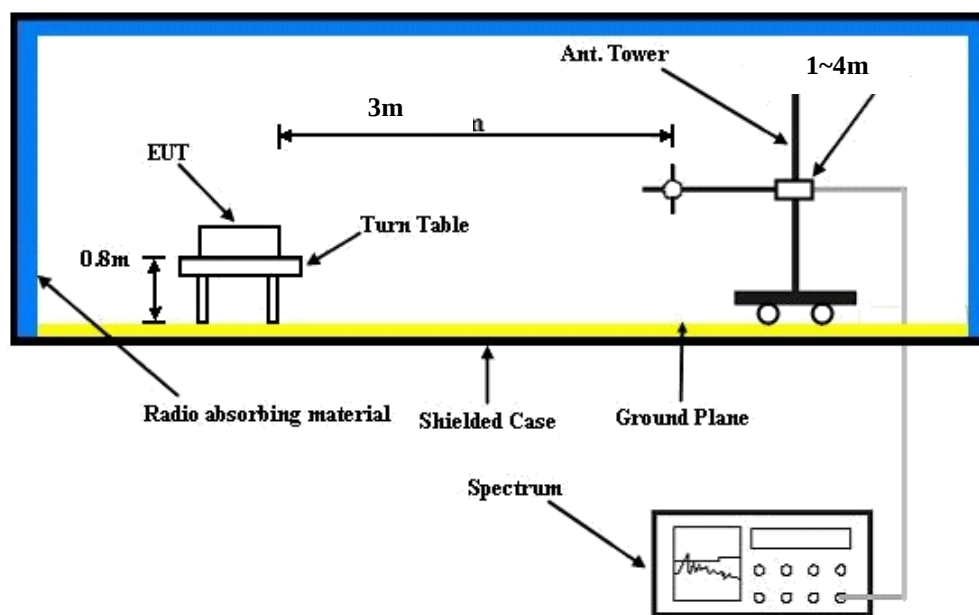
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- c. 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 b. Record the power level of S.G.
- d.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$

##### **Conducted Power Measurement:**

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

#### 4.1.3 Test Setup

##### EIRP / ERP Measurement:



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

##### Conducted Power Measurement:



#### 4.1.4 Test Results

##### Conducted Output Power (dBm)

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 20775 | Mid Ch 21100 | High Ch 21425 |               | Low Ch 20775 | Mid Ch 21100 | High Ch 21425 |               |
|           |         |           | 2502.5 MHz   | 2535.0 MHz   | 2567.5 MHz    |               | 2502.5 MHz   | 2535.0 MHz   | 2567.5 MHz    |               |
| 7 / 5M    | 1       | 0         | 23.01        | 23.13        | 22.91         | 0             | 22.03        | 22.15        | 21.93         | 1             |
|           | 1       | 12        | 22.66        | 22.74        | 22.49         | 0             | 21.67        | 21.79        | 21.53         | 1             |
|           | 1       | 24        | 22.46        | 22.67        | 22.32         | 0             | 21.45        | 21.70        | 21.34         | 1             |
|           | 12      | 0         | 21.98        | 22.24        | 21.85         | 1             | 20.96        | 21.10        | 20.74         | 2             |
|           | 12      | 6         | 21.89        | 22.09        | 21.74         | 1             | 20.87        | 21.09        | 20.70         | 2             |
|           | 12      | 13        | 21.85        | 22.04        | 21.69         | 1             | 20.81        | 21.01        | 20.64         | 2             |
|           | 25      | 0         | 21.93        | 22.09        | 21.79         | 1             | 20.90        | 21.07        | 20.76         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 20800 | Mid Ch 21100 | High Ch 21400 |               | Low Ch 20800 | Mid Ch 21100 | High Ch 21400 |               |
|           |         |           | 2505.0 MHz   | 2535.0 MHz   | 2565.0 MHz    |               | 2505.0 MHz   | 2535.0 MHz   | 2565.0 MHz    |               |
| 7 / 10M   | 1       | 0         | 23.05        | 23.18        | 22.95         | 0             | 22.11        | 22.23        | 22.01         | 1             |
|           | 1       | 24        | 22.67        | 22.88        | 22.60         | 0             | 21.72        | 21.91        | 21.50         | 1             |
|           | 1       | 49        | 22.50        | 22.72        | 22.35         | 0             | 21.50        | 21.72        | 21.36         | 1             |
|           | 25      | 0         | 22.08        | 22.30        | 21.97         | 1             | 21.02        | 21.24        | 20.89         | 2             |
|           | 25      | 12        | 21.99        | 22.19        | 21.89         | 1             | 20.95        | 21.13        | 20.84         | 2             |
|           | 25      | 25        | 21.97        | 22.12        | 21.84         | 1             | 20.92        | 21.05        | 20.80         | 2             |
|           | 50      | 0         | 22.03        | 22.16        | 21.93         | 1             | 20.98        | 21.13        | 20.83         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 20825 | Mid Ch 21100 | High Ch 21375 |               | Low Ch 20825 | Mid Ch 21100 | High Ch 21375 |               |
|           |         |           | 2507.5 MHz   | 2535.0 MHz   | 2562.5 MHz    |               | 2507.5 MHz   | 2535.0 MHz   | 2562.5 MHz    |               |
| 7 / 15M   | 1       | 0         | 23.11        | 23.23        | 23.02         | 0             | 22.14        | 22.28        | 22.05         | 1             |
|           | 1       | 37        | 22.79        | 23.01        | 22.65         | 0             | 21.81        | 22.01        | 21.72         | 1             |
|           | 1       | 74        | 22.61        | 22.73        | 22.41         | 0             | 21.64        | 21.76        | 21.52         | 1             |
|           | 36      | 0         | 22.17        | 22.34        | 22.09         | 1             | 21.18        | 21.34        | 21.04         | 2             |
|           | 36      | 19        | 22.11        | 22.26        | 22.03         | 1             | 21.10        | 21.29        | 20.97         | 2             |
|           | 36      | 39        | 22.09        | 22.17        | 21.99         | 1             | 21.07        | 21.23        | 20.94         | 2             |
|           | 75      | 0         | 22.14        | 22.28        | 22.05         | 1             | 21.13        | 21.29        | 21.00         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 20850 | Mid Ch 21100 | High Ch 21350 |               | Low Ch 20850 | Mid Ch 21100 | High Ch 21350 |               |
|           |         |           | 2510.0 MHz   | 2535.0 MHz   | 2560.0 MHz    |               | 2510.0 MHz   | 2535.0 MHz   | 2560.0 MHz    |               |
| 7 / 20M   | 1       | 0         | 23.16        | 23.28        | 23.07         | 0             | 22.19        | 22.32        | 22.10         | 1             |
|           | 1       | 50        | 22.85        | 23.04        | 22.78         | 0             | 21.88        | 21.96        | 21.77         | 1             |
|           | 1       | 99        | 22.69        | 22.79        | 22.53         | 0             | 21.71        | 21.90        | 21.56         | 1             |
|           | 50      | 0         | 22.30        | 22.46        | 22.25         | 1             | 21.29        | 21.41        | 21.21         | 2             |
|           | 50      | 25        | 22.25        | 22.39        | 22.17         | 1             | 21.24        | 21.38        | 21.15         | 2             |
|           | 50      | 50        | 22.23        | 22.34        | 22.07         | 1             | 21.21        | 21.33        | 21.09         | 2             |
|           | 100     | 0         | 22.27        | 22.41        | 22.18         | 1             | 21.26        | 21.39        | 21.18         | 2             |

# EIRP Power (dBm)

## Mode A

| LTE Band 7                       |         |                 |           |                        |            |           |                    |
|----------------------------------|---------|-----------------|-----------|------------------------|------------|-----------|--------------------|
| Channel Bandwidth: 5 MHz / QPSK  |         |                 |           |                        |            |           |                    |
| Plane                            | Channel | Frequency (MHz) | LVL (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X                                | 20775   | 2502.5          | -19.05    | 38.52                  | 19.47      | 88.47     | H                  |
|                                  | 21100   | 2535.0          | -19.11    | 38.36                  | 19.25      | 84.16     |                    |
|                                  | 21425   | 2567.5          | -19.26    | 38.58                  | 19.32      | 85.57     |                    |
|                                  | 20775   | 2502.5          | -24.32    | 38.92                  | 14.60      | 28.87     | V                  |
|                                  | 21100   | 2535.0          | -24.68    | 39.26                  | 14.58      | 28.71     |                    |
|                                  | 21425   | 2567.5          | -24.93    | 39.22                  | 14.29      | 26.83     |                    |
| Channel Bandwidth: 5 MHz / 16QAM |         |                 |           |                        |            |           |                    |
| X                                | 20775   | 2502.5          | -20.33    | 38.52                  | 18.19      | 65.89     | H                  |
|                                  | 21100   | 2535.0          | -20.46    | 38.36                  | 17.90      | 61.67     |                    |
|                                  | 21425   | 2567.5          | -20.58    | 38.58                  | 18.00      | 63.14     |                    |
|                                  | 20775   | 2502.5          | -25.22    | 38.92                  | 13.70      | 23.46     | V                  |
|                                  | 21100   | 2535.0          | -25.76    | 39.26                  | 13.50      | 22.39     |                    |
|                                  | 21425   | 2567.5          | -25.79    | 39.22                  | 13.43      | 22.01     |                    |

| LTE Band 7                        |         |                 |           |                        |            |           |                    |
|-----------------------------------|---------|-----------------|-----------|------------------------|------------|-----------|--------------------|
| Channel Bandwidth: 10 MHz / QPSK  |         |                 |           |                        |            |           |                    |
| Plane                             | Channel | Frequency (MHz) | LVL (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X                                 | 20800   | 2505.0          | -18.81    | 38.65                  | 19.84      | 96.36     | H                  |
|                                   | 21100   | 2535.0          | -18.86    | 38.36                  | 19.50      | 89.13     |                    |
|                                   | 21400   | 2565.0          | -19.13    | 38.49                  | 19.36      | 86.26     |                    |
|                                   | 20800   | 2505.0          | -24.12    | 38.84                  | 14.72      | 29.66     | V                  |
|                                   | 21100   | 2535.0          | -24.57    | 39.26                  | 14.69      | 29.46     |                    |
|                                   | 21400   | 2565.0          | -24.76    | 39.10                  | 14.34      | 27.16     |                    |
| Channel Bandwidth: 10 MHz / 16QAM |         |                 |           |                        |            |           |                    |
| X                                 | 20800   | 2505.0          | -20.18    | 38.52                  | 18.34      | 68.20     | H                  |
|                                   | 21100   | 2535.0          | -20.21    | 38.36                  | 18.15      | 65.33     |                    |
|                                   | 21400   | 2565.0          | -20.36    | 38.58                  | 18.22      | 66.42     |                    |
|                                   | 20800   | 2505.0          | -24.89    | 38.92                  | 14.03      | 25.32     | V                  |
|                                   | 21100   | 2535.0          | -25.52    | 39.26                  | 13.74      | 23.66     |                    |
|                                   | 21400   | 2565.0          | -25.76    | 39.22                  | 13.46      | 22.17     |                    |

| LTE Band 7                        |         |                 |           |                        |            |           |                    |
|-----------------------------------|---------|-----------------|-----------|------------------------|------------|-----------|--------------------|
| Channel Bandwidth: 15 MHz / QPSK  |         |                 |           |                        |            |           |                    |
| Plane                             | Channel | Frequency (MHz) | LVL (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X                                 | 20825   | 2507.5          | -18.63    | 38.52                  | 19.89      | 97.45     | H                  |
|                                   | 21100   | 2535.0          | -18.75    | 38.36                  | 19.61      | 91.43     |                    |
|                                   | 21375   | 2562.5          | -18.92    | 38.58                  | 19.66      | 92.53     |                    |
|                                   | 20825   | 2507.5          | -23.84    | 38.92                  | 15.08      | 32.24     | V                  |
|                                   | 21100   | 2535.0          | -24.42    | 39.26                  | 14.84      | 30.48     |                    |
|                                   | 21375   | 2562.5          | -24.52    | 39.22                  | 14.70      | 29.49     |                    |
| Channel Bandwidth: 15 MHz / 16QAM |         |                 |           |                        |            |           |                    |
| X                                 | 20825   | 2507.5          | -19.86    | 38.52                  | 18.66      | 73.42     | H                  |
|                                   | 21100   | 2535.0          | -19.97    | 38.36                  | 18.39      | 69.04     |                    |
|                                   | 21375   | 2562.5          | -20.14    | 38.58                  | 18.44      | 69.87     |                    |
|                                   | 20825   | 2507.5          | -24.78    | 38.92                  | 14.14      | 25.97     | V                  |
|                                   | 21100   | 2535.0          | -25.36    | 39.26                  | 13.90      | 24.55     |                    |
|                                   | 21375   | 2562.5          | -25.56    | 39.22                  | 13.66      | 23.21     |                    |

| LTE Band 7                        |         |                 |           |                        |            |           |                    |
|-----------------------------------|---------|-----------------|-----------|------------------------|------------|-----------|--------------------|
| Channel Bandwidth: 20 MHz / QPSK  |         |                 |           |                        |            |           |                    |
| Plane                             | Channel | Frequency (MHz) | LVL (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X                                 | 20850.0 | 2510.0          | -18.38    | 38.52                  | 20.14      | 103.23    | H                  |
|                                   | 21100.0 | 2535.0          | -18.60    | 38.36                  | 19.76      | 94.65     |                    |
|                                   | 21350.0 | 2560.0          | -18.84    | 38.58                  | 19.74      | 94.25     |                    |
|                                   | 20850.0 | 2510.0          | -23.69    | 38.92                  | 15.23      | 33.37     | V                  |
|                                   | 21100.0 | 2535.0          | -24.25    | 39.26                  | 15.01      | 31.70     |                    |
|                                   | 21350.0 | 2560.0          | -24.46    | 39.22                  | 14.76      | 29.90     |                    |
| Channel Bandwidth: 20 MHz / 16QAM |         |                 |           |                        |            |           |                    |
| X                                 | 20850.0 | 2510.0          | -19.75    | 38.52                  | 18.77      | 75.30     | H                  |
|                                   | 21100.0 | 2535.0          | -19.77    | 38.36                  | 18.59      | 72.29     |                    |
|                                   | 21350.0 | 2560.0          | -20.05    | 38.58                  | 18.53      | 71.33     |                    |
|                                   | 20850.0 | 2510.0          | -24.65    | 38.92                  | 14.27      | 26.75     | V                  |
|                                   | 21100.0 | 2535.0          | -25.22    | 39.26                  | 14.04      | 25.35     |                    |
|                                   | 21350.0 | 2560.0          | -25.48    | 39.22                  | 13.74      | 23.64     |                    |

**Mode B**

| LTE Band 7                        |         |                 |           |                        |            |           |                    |
|-----------------------------------|---------|-----------------|-----------|------------------------|------------|-----------|--------------------|
| Channel Bandwidth: 20 MHz / QPSK  |         |                 |           |                        |            |           |                    |
| Plane                             | Channel | Frequency (MHz) | LVL (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X                                 | 20850.0 | 2510.0          | -18.85    | 38.52                  | 19.67      | 92.64     | H                  |
|                                   | 21100.0 | 2535.0          | -18.92    | 38.36                  | 19.44      | 87.92     |                    |
|                                   | 21350.0 | 2560.0          | -19.32    | 38.58                  | 19.26      | 84.39     |                    |
|                                   | 20850.0 | 2510.0          | -23.99    | 38.92                  | 14.93      | 31.15     | V                  |
|                                   | 21100.0 | 2535.0          | -24.92    | 39.26                  | 14.34      | 27.16     |                    |
|                                   | 21350.0 | 2560.0          | -24.55    | 39.22                  | 14.67      | 29.29     |                    |
| Channel Bandwidth: 20 MHz / 16QAM |         |                 |           |                        |            |           |                    |
| X                                 | 20850.0 | 2510.0          | -20.26    | 38.52                  | 18.26      | 66.96     | H                  |
|                                   | 21100.0 | 2535.0          | -19.95    | 38.36                  | 18.41      | 69.36     |                    |
|                                   | 21350.0 | 2560.0          | -20.25    | 38.58                  | 18.33      | 68.12     |                    |
|                                   | 20850.0 | 2510.0          | -25.78    | 38.92                  | 13.14      | 20.63     | V                  |
|                                   | 21100.0 | 2535.0          | -25.55    | 39.26                  | 13.71      | 23.50     |                    |
|                                   | 21350.0 | 2560.0          | -25.95    | 39.22                  | 13.27      | 21.22     |                    |

## 4.2 Frequency Stability Measurement

### 4.2.1 Limits of Frequency Stability Measurement

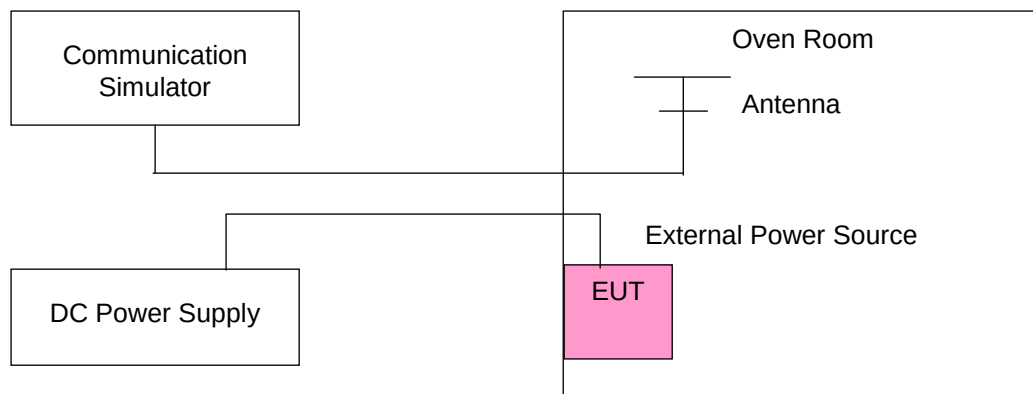
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 4.2.2 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  $\pm 0.5$  °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.

### 4.2.3 Test Setup



#### 4.2.4 Test Results

##### Frequency Error vs. Voltage

| Voltage<br>(Volts) | Frequency Error (ppm) |        |        |        | Limit (ppm) |
|--------------------|-----------------------|--------|--------|--------|-------------|
|                    | LTE Band 7            |        |        |        |             |
|                    | 5 MHz                 | 10 MHz | 15 MHz | 20 MHz |             |
| 3.85               | 0.001                 | 0.001  | 0.001  | 0.001  | 2.5         |
| 3.6                | 0.001                 | 0.001  | 0.002  | 0.001  | 2.5         |
| 4.4                | 0.001                 | 0.001  | 0.001  | 0.001  | 2.5         |

**Note:** The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.4 Vdc.

##### Frequency Error vs. Temperature

| Temp. (°C) | Frequency Error (ppm) |        |        |        | Limit (ppm) |
|------------|-----------------------|--------|--------|--------|-------------|
|            | LTE Band 7            |        |        |        |             |
|            | 5 MHz                 | 10 MHz | 15 MHz | 20 MHz |             |
| -30        | 0.001                 | 0.001  | 0.001  | 0.001  | 2.5         |
| -20        | 0.001                 | 0.001  | 0.001  | 0.001  | 2.5         |
| -10        | 0.001                 | 0.000  | 0.002  | 0.000  | 2.5         |
| 0          | 0.001                 | 0.001  | 0.001  | 0.001  | 2.5         |
| 10         | 0.001                 | 0.001  | 0.001  | 0.001  | 2.5         |
| 20         | -0.001                | -0.001 | -0.001 | -0.001 | 2.5         |
| 30         | -0.001                | 0.000  | -0.001 | -0.001 | 2.5         |
| 40         | -0.001                | -0.002 | -0.001 | -0.001 | 2.5         |
| 50         | -0.001                | -0.001 | -0.001 | -0.001 | 2.5         |
| 55         | -0.001                | -0.001 | -0.002 | -0.001 | 2.5         |

### 4.3 Occupied Bandwidth Measurement

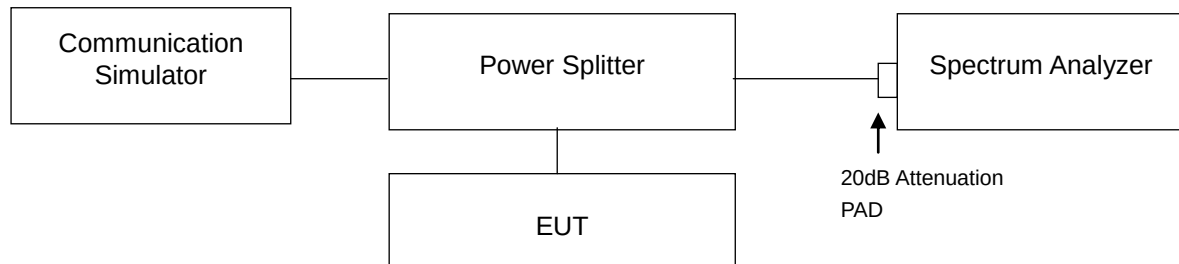
#### 4.3.1 Limits of Occupied Bandwidth Measurement

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

#### 4.3.2 Test Procedure

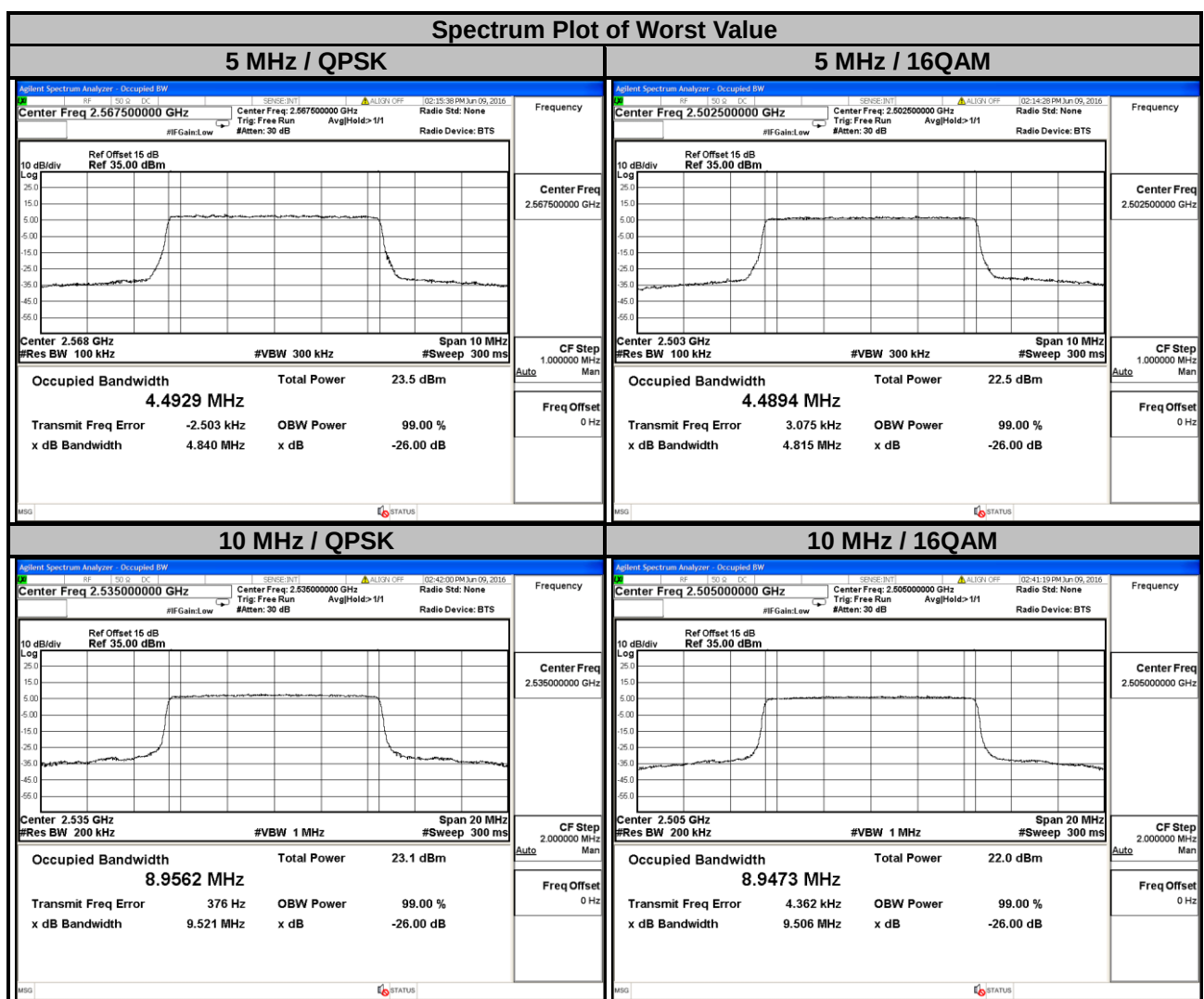
- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

#### 4.3.3 Test Setup



#### 4.3.4 Test Result

| LTE Band 7               |                 |                               |        |                           |                 |                               |        |
|--------------------------|-----------------|-------------------------------|--------|---------------------------|-----------------|-------------------------------|--------|
| Channel Bandwidth: 5 MHz |                 |                               |        | Channel Bandwidth: 10 MHz |                 |                               |        |
| Channel                  | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        |
|                          |                 | QPSK                          | 16QAM  |                           |                 | QPSK                          | 16QAM  |
| 20775                    | 2502.5          | 4.4901                        | 4.4894 | 20800                     | 2505.0          | 8.9490                        | 8.9473 |
| 21100                    | 2535.0          | 4.4901                        | 4.4887 | 21100                     | 2535.0          | 8.9562                        | 8.9447 |
| 21425                    | 2567.5          | 4.4929                        | 4.4878 | 21400                     | 2565.0          | 8.9508                        | 8.9420 |



## LTE Band 7

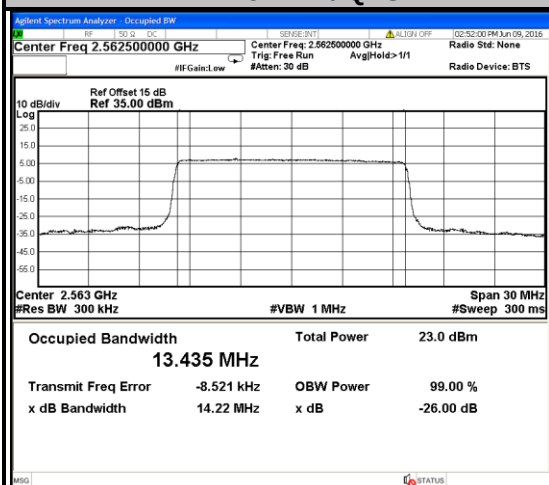
### Channel Bandwidth: 15 MHz

### Channel Bandwidth: 20 MHz

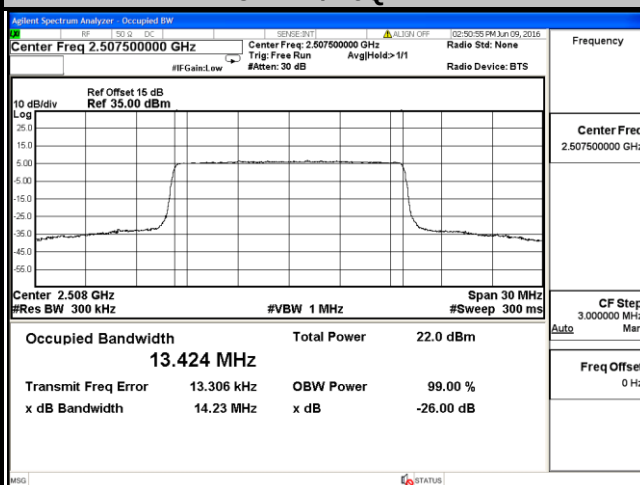
| Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | Channel | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        |
|---------|-----------------|-------------------------------|--------|---------|-----------------|-------------------------------|--------|
|         |                 | QPSK                          | 16QAM  |         |                 | QPSK                          | 16QAM  |
| 20825   | 2507.5          | 13.426                        | 13.424 | 20850   | 2510.0          | 17.881                        | 17.905 |
| 21100   | 2535.0          | 13.429                        | 13.424 | 21100   | 2535.0          | 17.906                        | 17.907 |
| 21375   | 2562.5          | 13.435                        | 13.423 | 21350   | 2560.0          | 17.890                        | 17.896 |

## Spectrum Plot of Worst Value

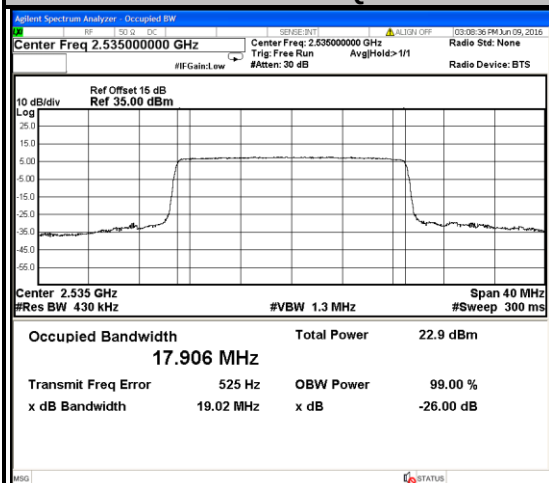
### 15 MHz / QPSK



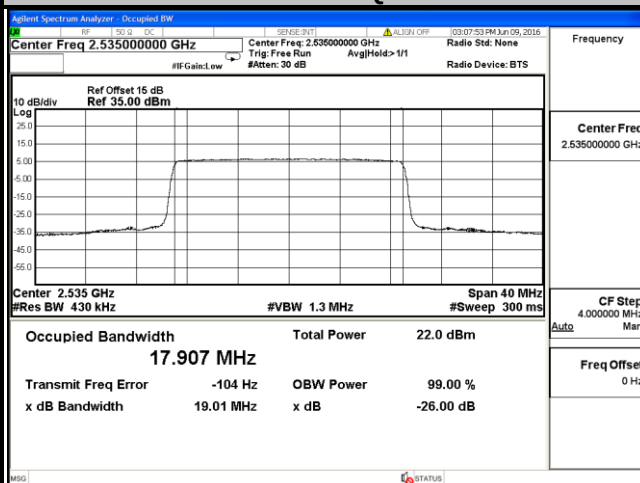
### 15 MHz / 16QAM



### 20 MHz / QPSK



### 20 MHz / 16QAM

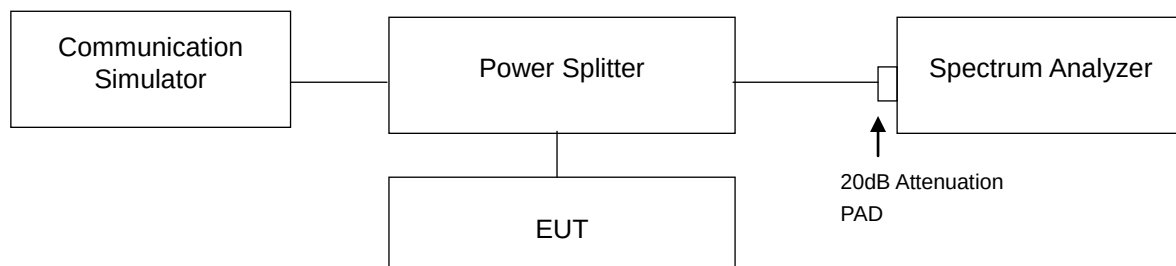


## 4.4 Band Edge Measurement

### 4.4.1 Limits of Band Edge Measurement

According to FCC 27.53(l)(4) specified that power of any emission outside of the channel edge must be attenuated below the transmitting power (P) by a factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed.

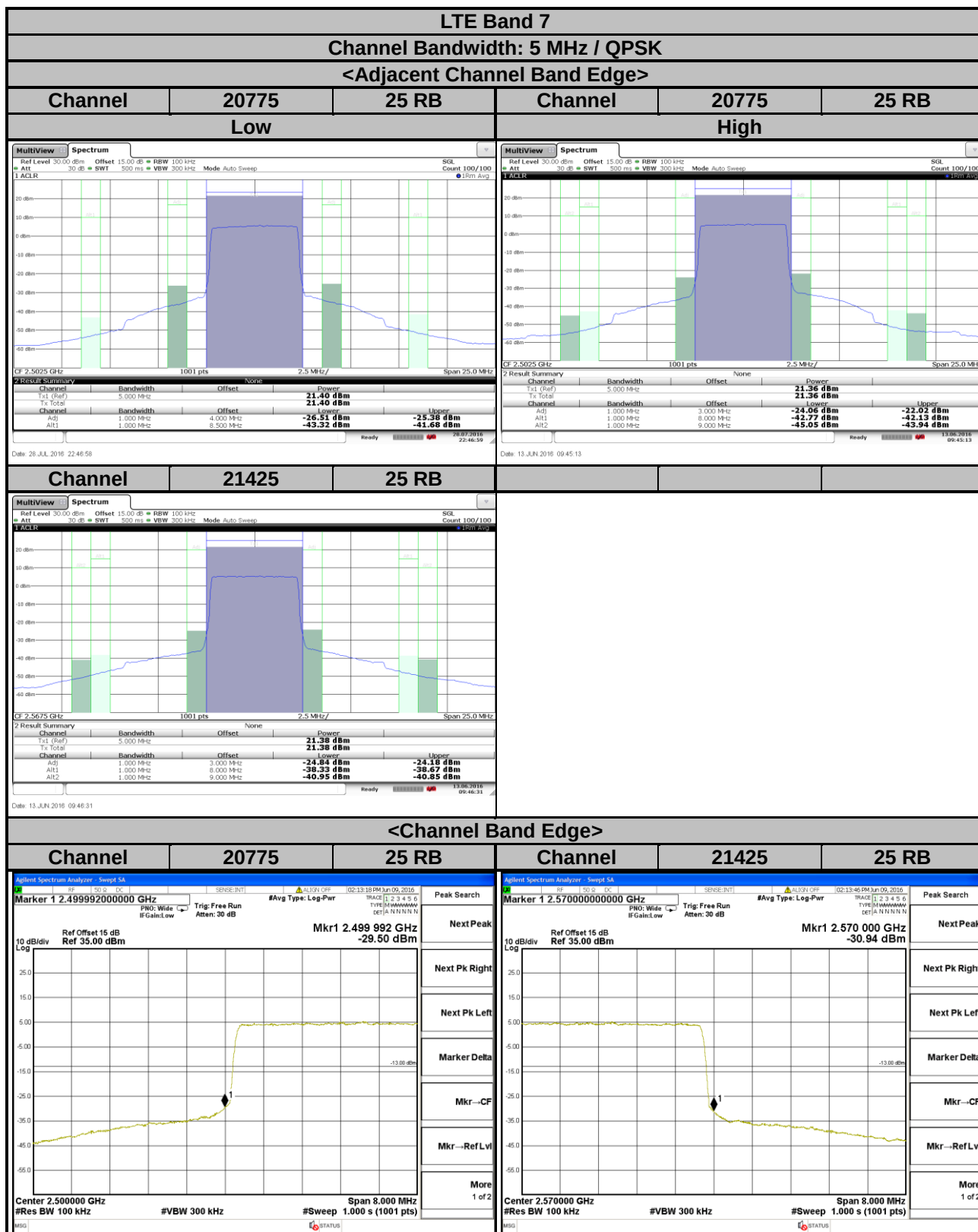
### 4.4.2 Test Setup



### 4.4.3 Test Procedures

- The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).
- The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- The center frequency of spectrum is the band edge frequency and span is 20 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (Channel bandwidth 5 MHz).
- The center frequency of spectrum is the band edge frequency and span is 40 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (Channel bandwidth 10 MHz).
- The center frequency of spectrum is the band edge frequency and span is 60 MHz. RB of the spectrum is 200 kHz and VB of the spectrum is 1 MHz (Channel bandwidth 15 MHz).
- The center frequency of spectrum is the band edge frequency and span is 80 MHz. RB of the spectrum is 200 kHz and VB of the spectrum is 1 MHz (Channel bandwidth 20 MHz).
- Record the max trace plot into the test report.

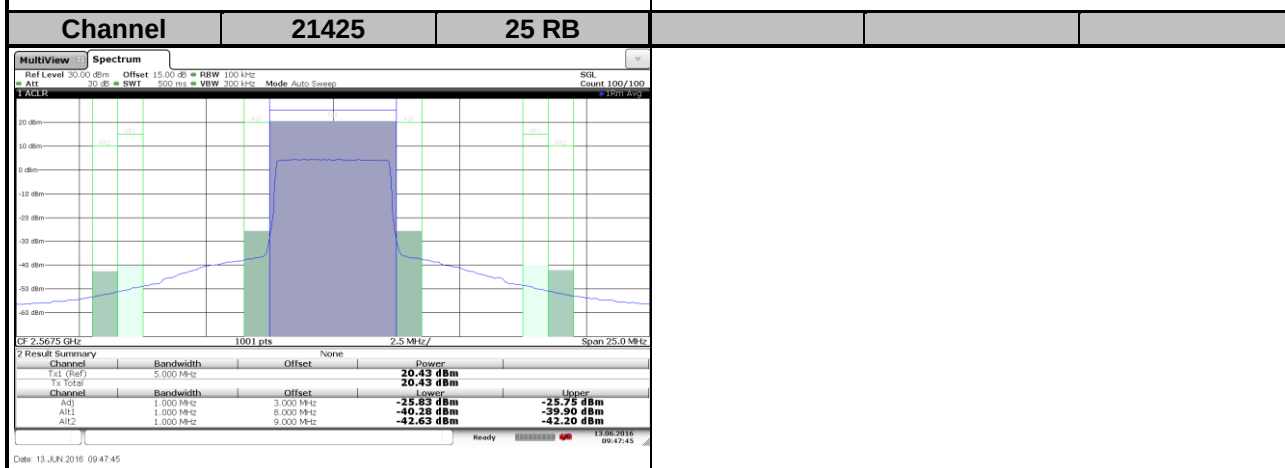
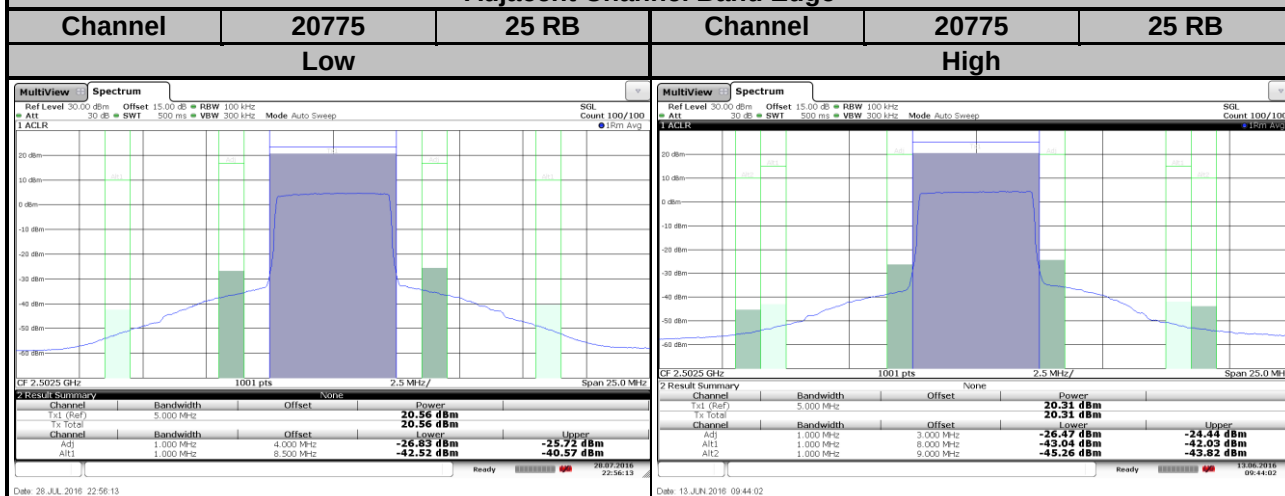
#### 4.4.4 Test Results



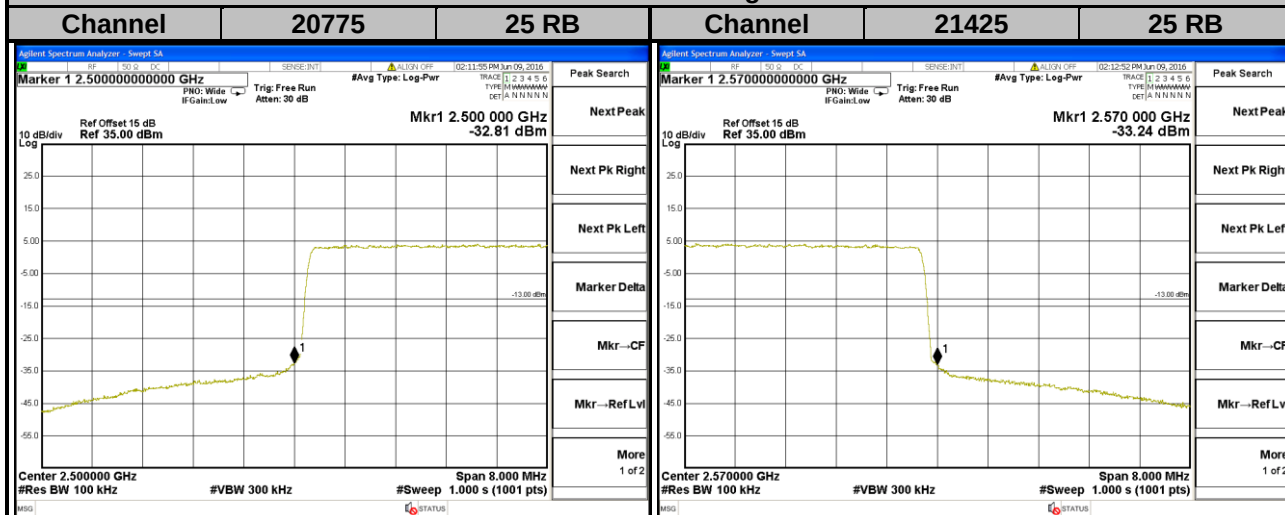
# LTE Band 7

## Channel Bandwidth: 5 MHz / 16QAM

### <Adjacent Channel Band Edge>



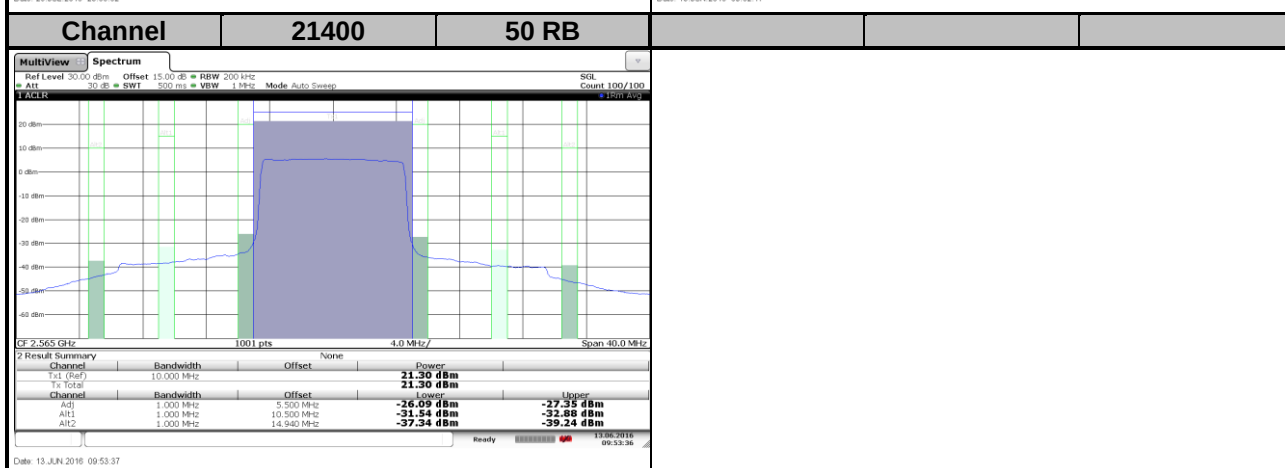
### <Channel Band Edge>



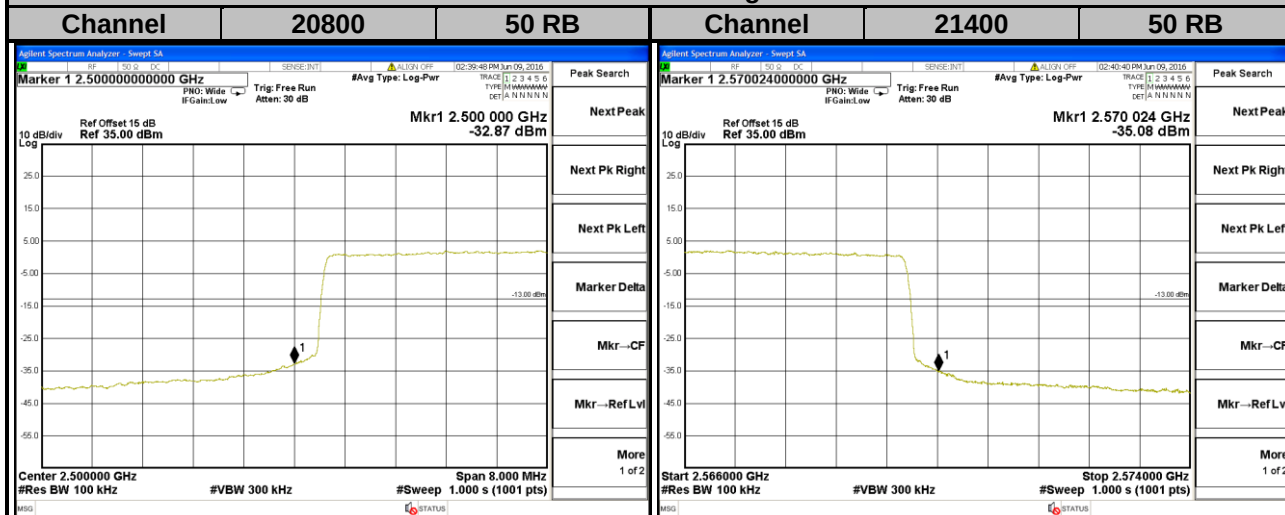
# LTE Band 7

## Channel Bandwidth: 10 MHz / QPSK

### <Adjacent Channel Band Edge>



### <Channel Band Edge>

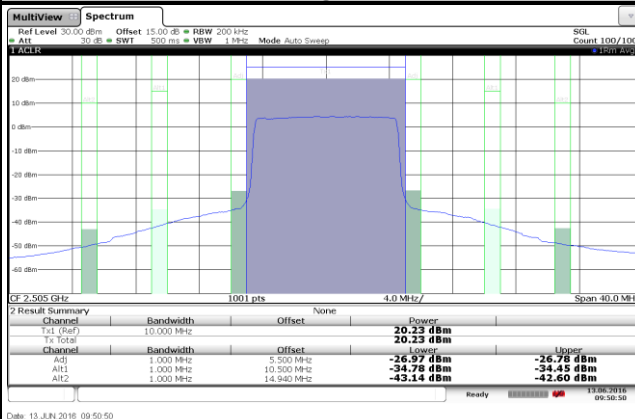
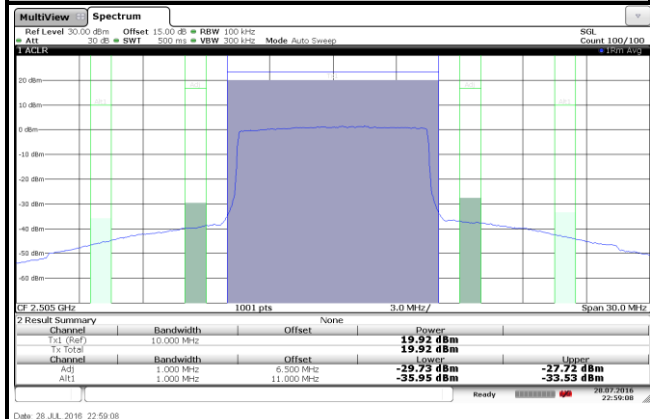


# LTE Band 7

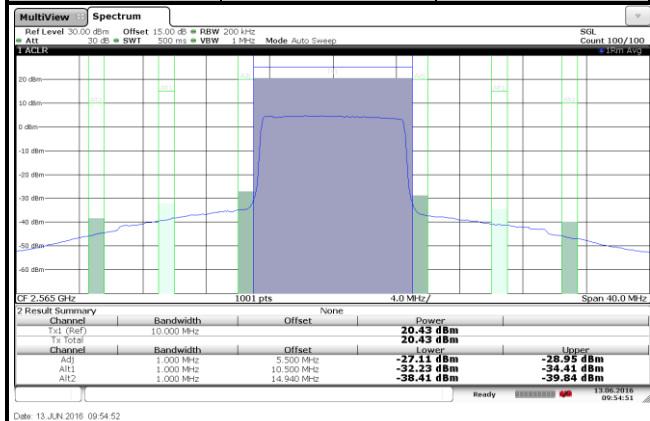
## Channel Bandwidth: 10 MHz / 16QAM

### <Adjacent Channel Band Edge>

| Channel | 20800 | 50 RB | Channel | 20800 | 50 RB |
|---------|-------|-------|---------|-------|-------|
|         | Low   |       |         | High  |       |



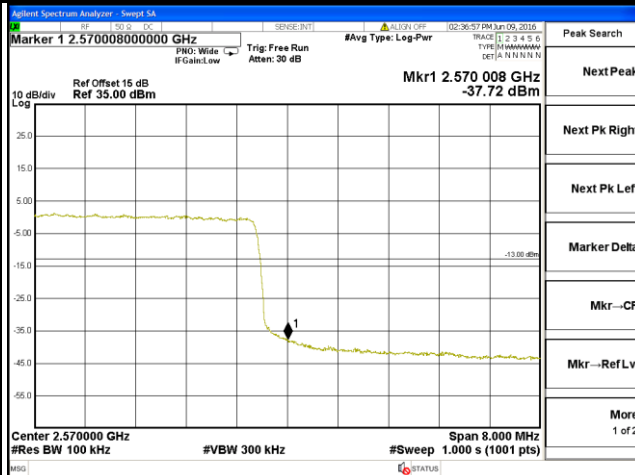
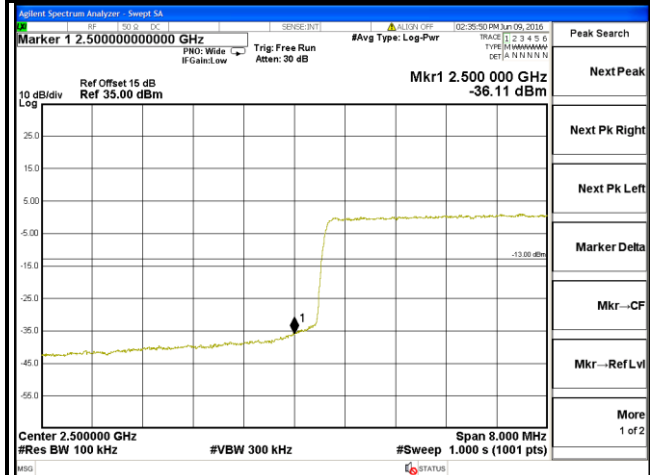
| Channel | 21400 | 50 RB |
|---------|-------|-------|
|---------|-------|-------|



| Channel | 21400 | 50 RB |
|---------|-------|-------|
|---------|-------|-------|

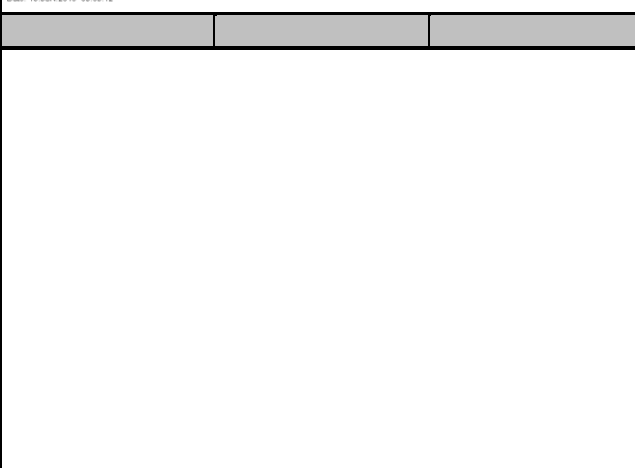
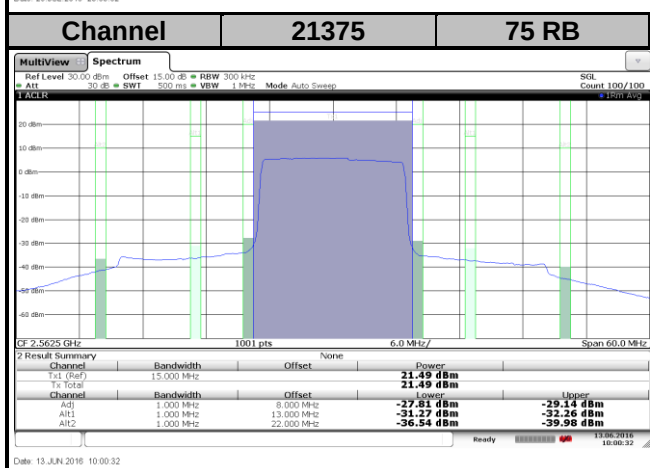
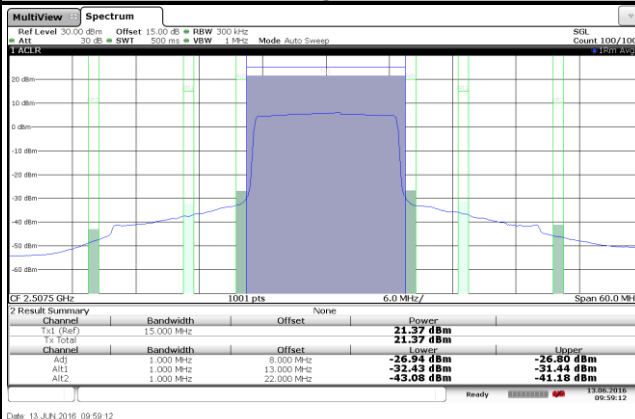
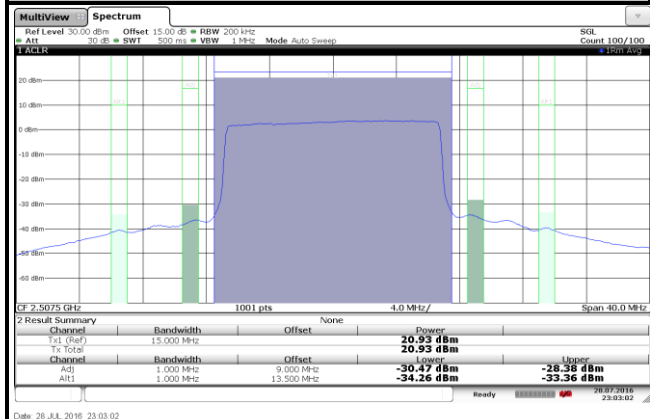
### <Channel Band Edge>

| Channel | 20800 | 50 RB | Channel | 21400 | 50 RB |
|---------|-------|-------|---------|-------|-------|
|---------|-------|-------|---------|-------|-------|



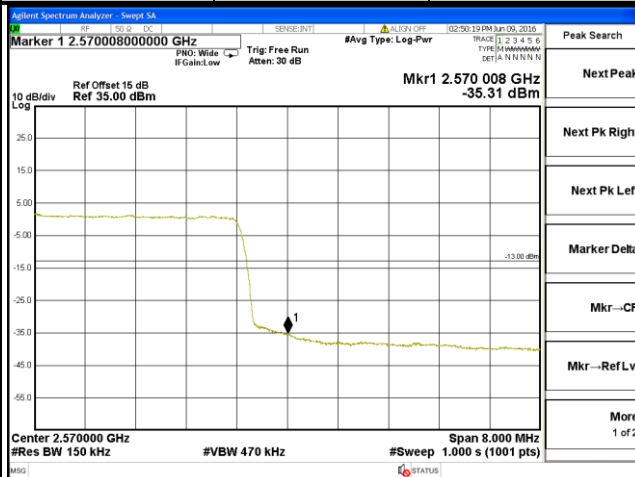
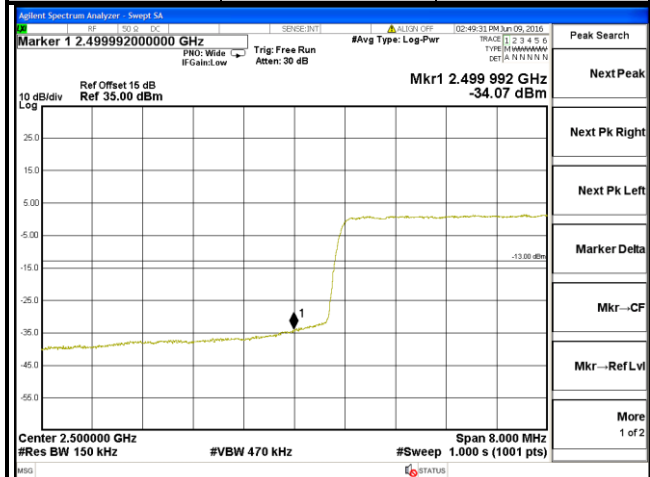
**LTE Band 7**  
**Channel Bandwidth: 15 MHz / QPSK**  
**<Adjacent Channel Band Edge>**

| Channel | 20825 | 75 RB | Channel | 20825 | 75 RB |
|---------|-------|-------|---------|-------|-------|
| Low     |       |       | High    |       |       |



**<Channel Band Edge>**

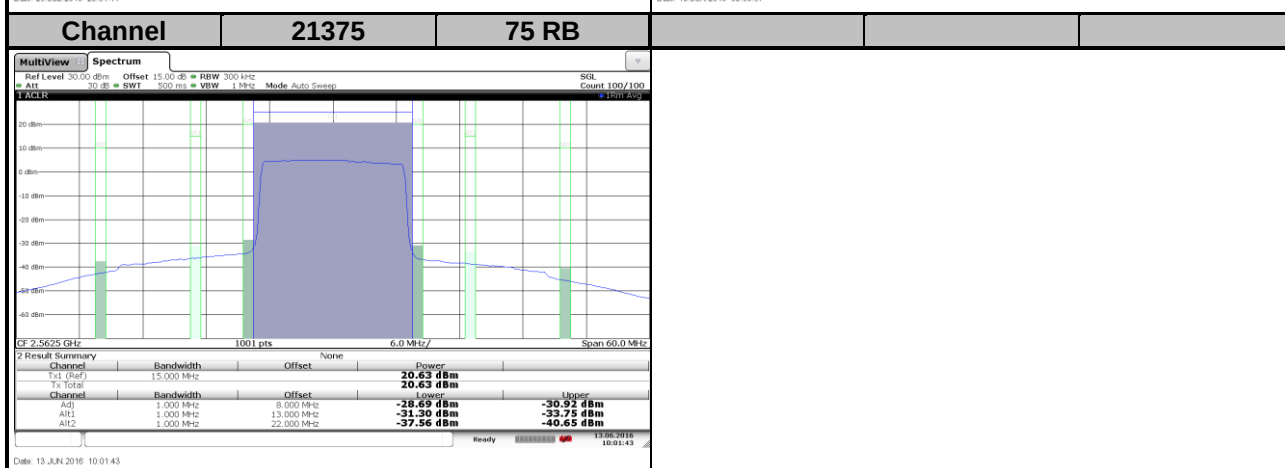
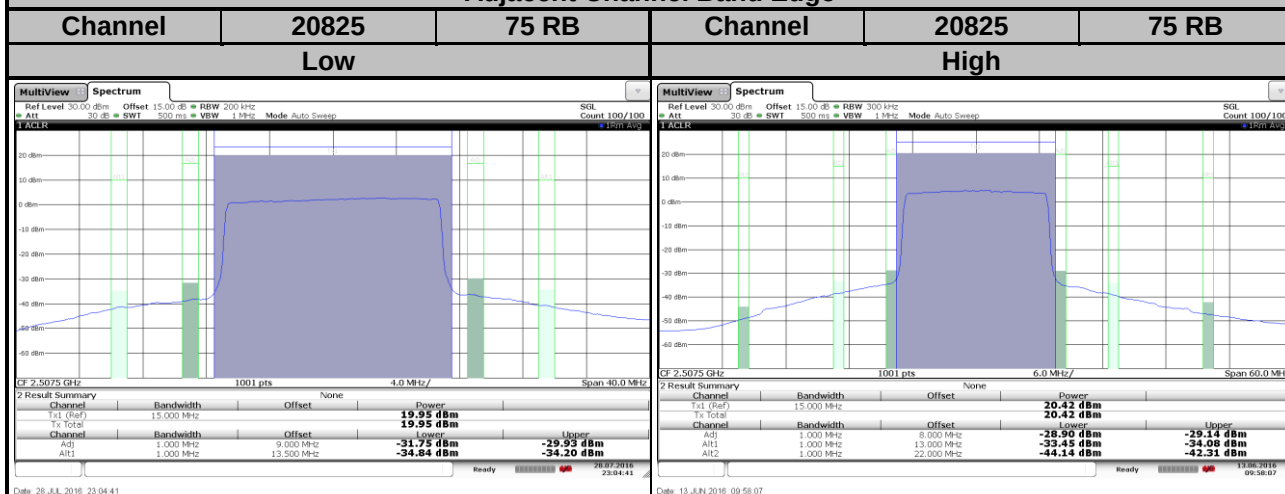
| Channel | 20825 | 75 RB | Channel | 21375 | 75 RB |
|---------|-------|-------|---------|-------|-------|
|---------|-------|-------|---------|-------|-------|



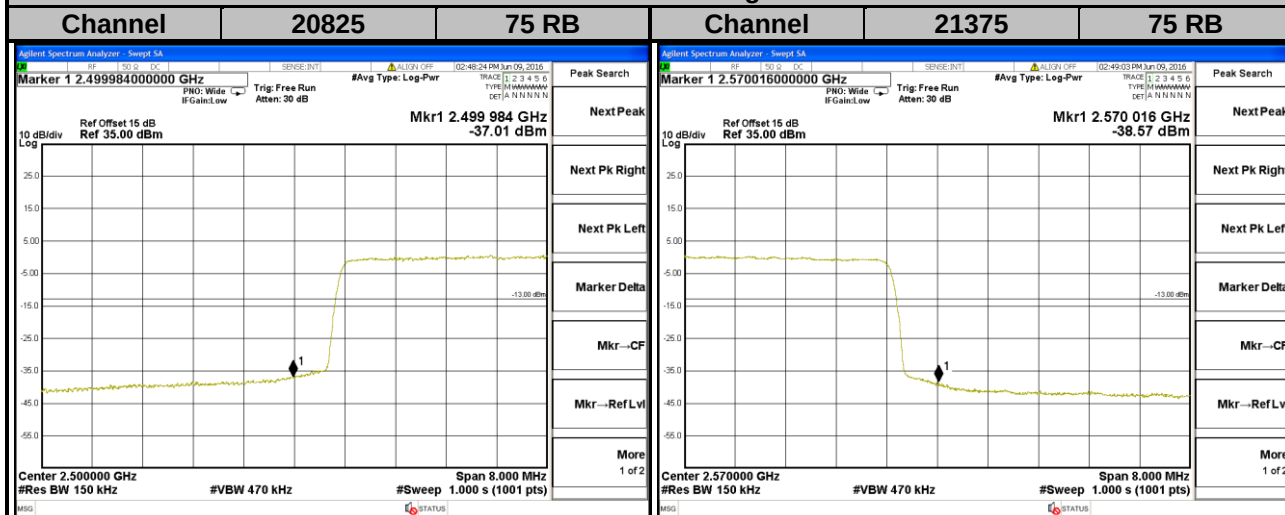
# LTE Band 7

## Channel Bandwidth: 15 MHz / 16QAM

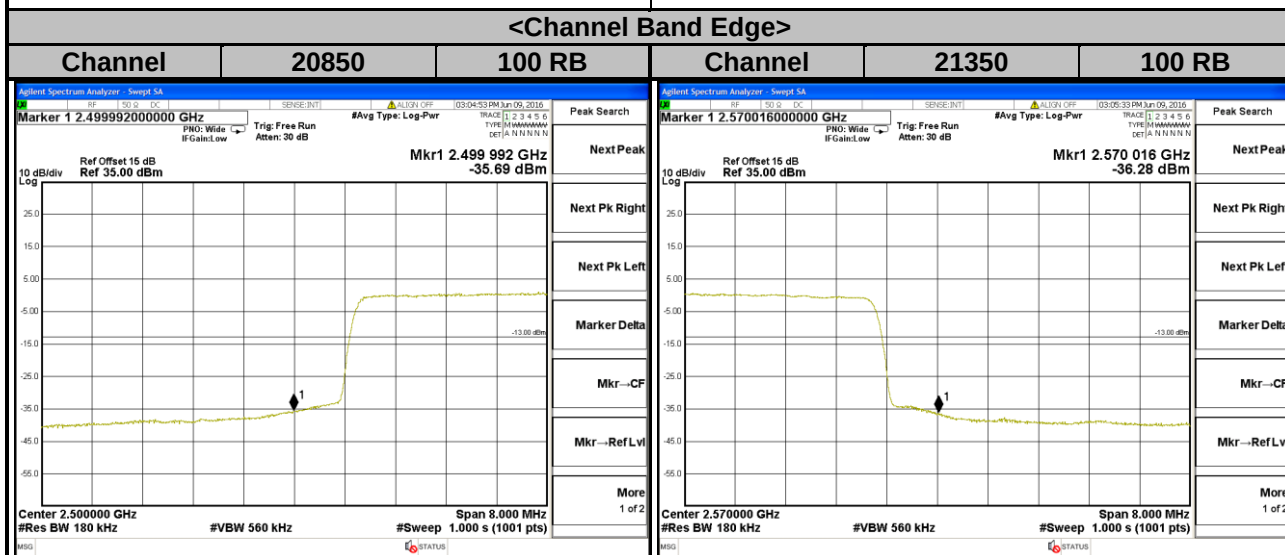
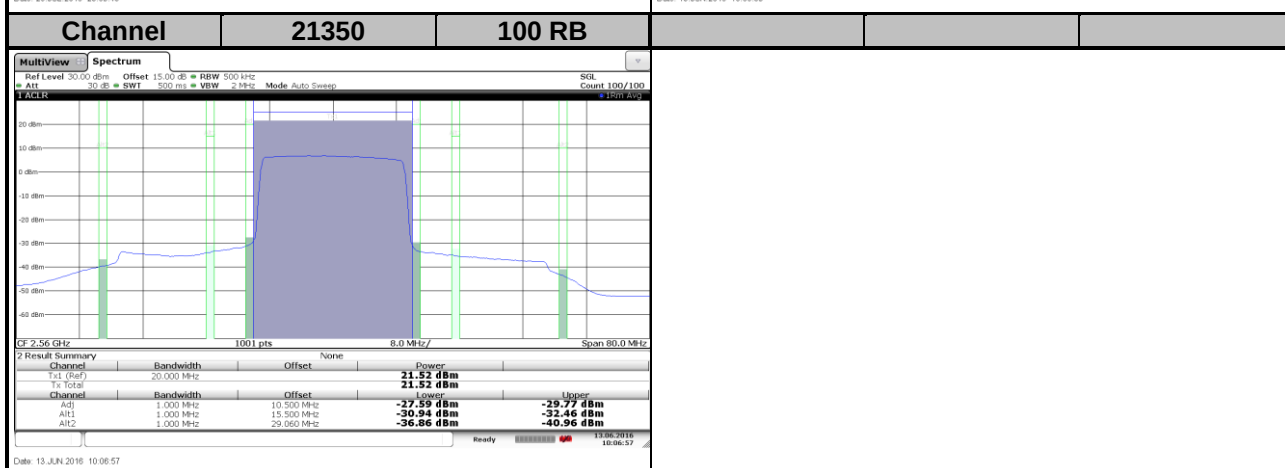
### <Adjacent Channel Band Edge>



### <Channel Band Edge>

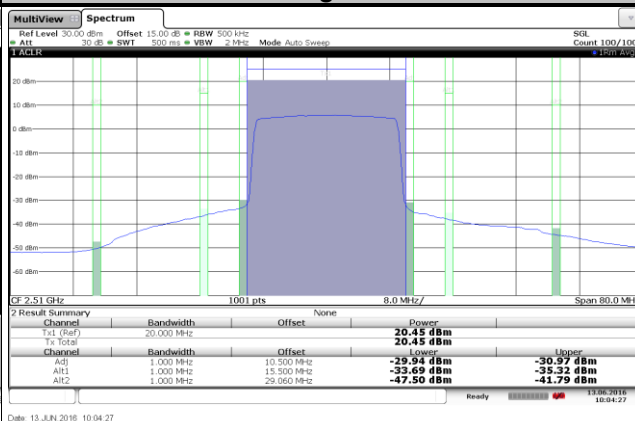
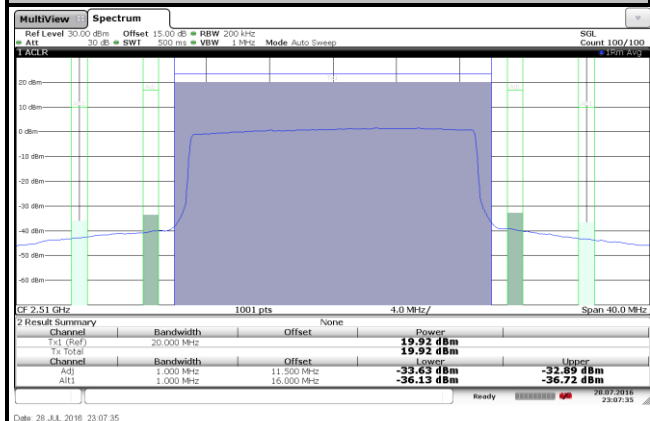


# **LTE Band 7** **Channel Bandwidth: 20 MHz / QPSK** **<Adjacent Channel Band Edge>**

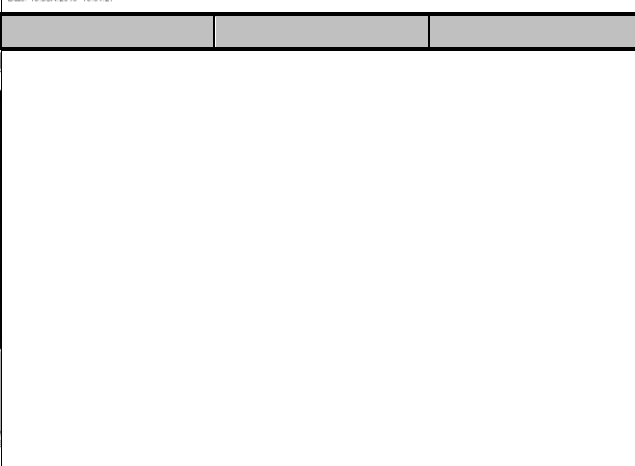
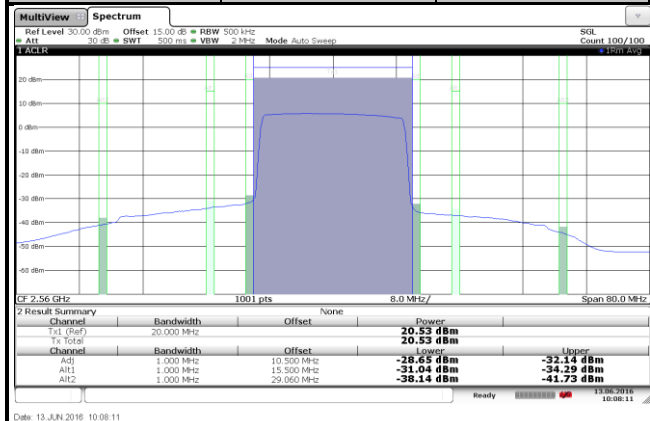


# **LTE Band 7** **Channel Bandwidth: 20 MHz / 16QAM** **<Adjacent Channel Band Edge>**

| Channel | 20850 | 100 RB | Channel | 20850 | 100 RB |
|---------|-------|--------|---------|-------|--------|
| Low     |       |        | High    |       |        |

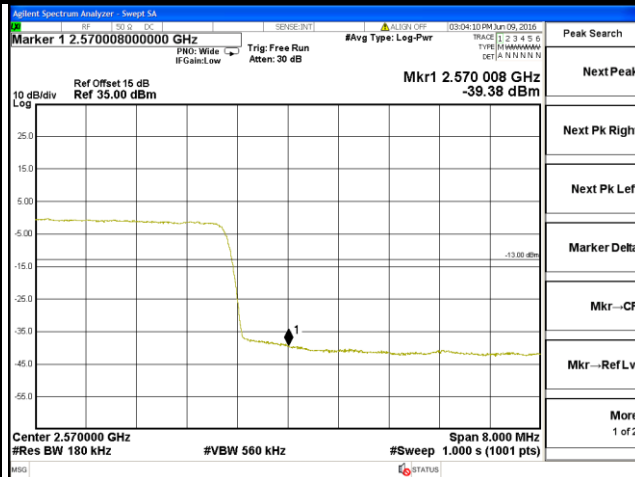
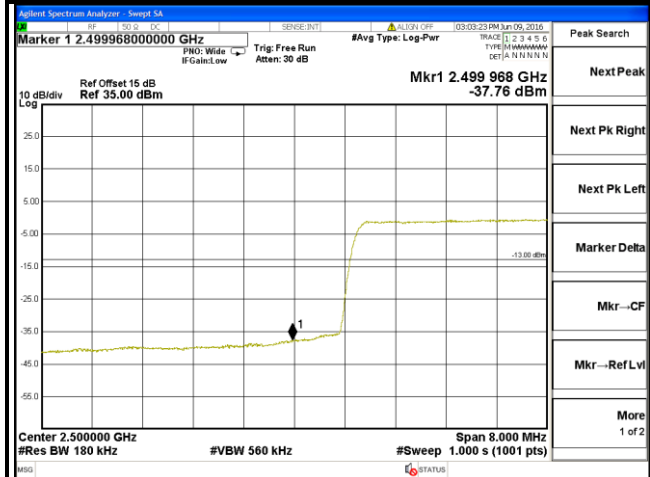


| Channel | 21350 | 100 RB |
|---------|-------|--------|
|---------|-------|--------|



## **<Channel Band Edge>**

| Channel | 20850 | 100 RB | Channel | 21350 | 100 RB |
|---------|-------|--------|---------|-------|--------|
|---------|-------|--------|---------|-------|--------|

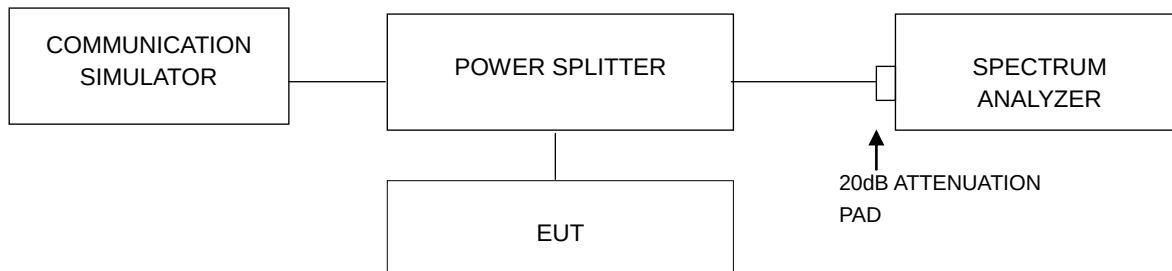


## 4.5 Peak to Average Ratio

### 4.5.1 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.

### 4.5.2 Test Setup

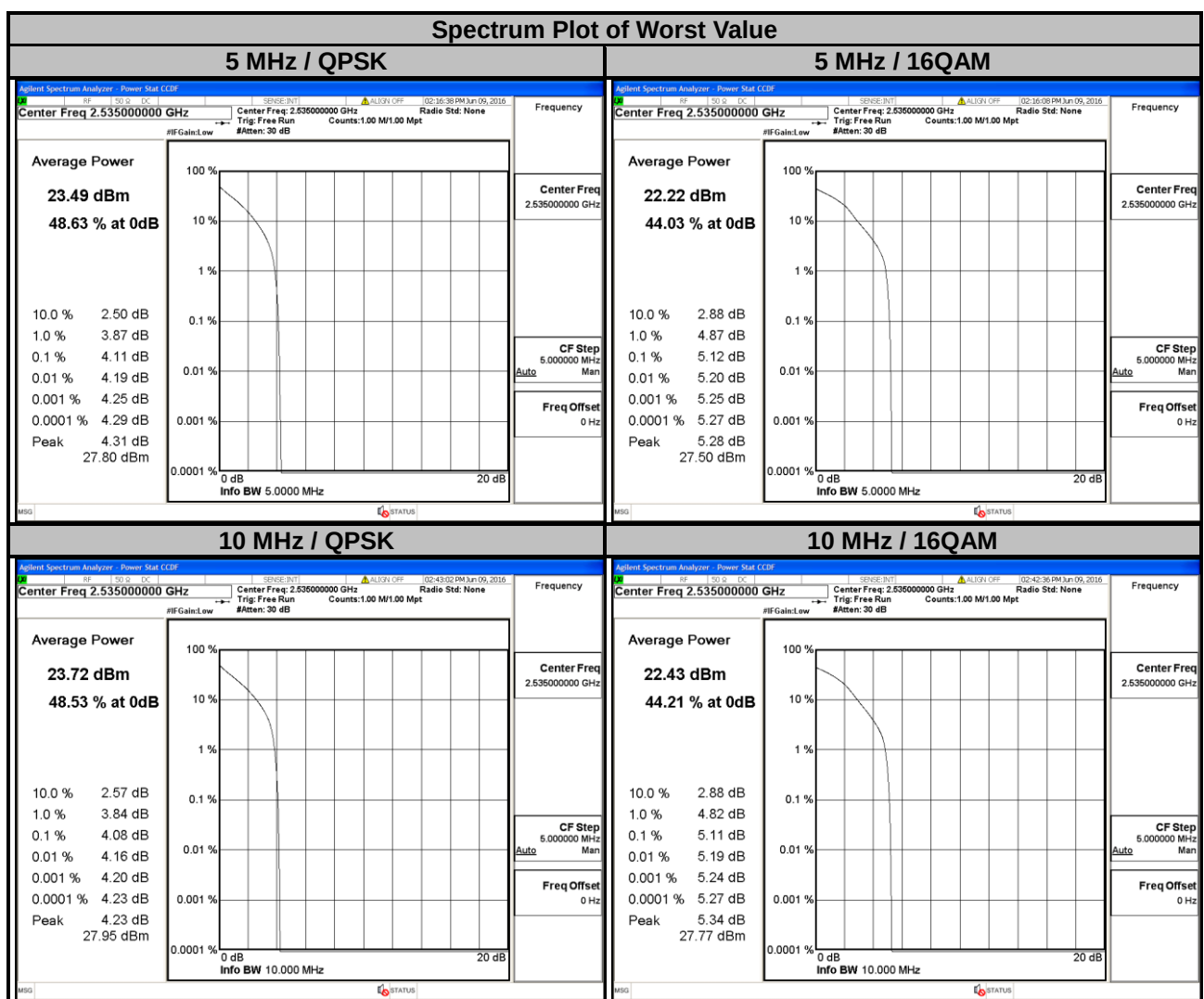


### 4.5.3 Test Procedures

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 %.

#### 4.5.4 Test Results

| LTE Band 7               |                 |                            |       |                           |                 |                            |       |
|--------------------------|-----------------|----------------------------|-------|---------------------------|-----------------|----------------------------|-------|
| Channel Bandwidth: 5 MHz |                 |                            |       | Channel Bandwidth: 10 MHz |                 |                            |       |
| Channel                  | Frequency (MHz) | Peak to Average Ratio (dB) |       | Channel                   | Frequency (MHz) | Peak to Average Ratio (dB) |       |
|                          |                 | QPSK                       | 16QAM |                           |                 | QPSK                       | 16QAM |
| 20775                    | 2502.5          | 4.01                       | 4.98  | 20800                     | 2505.0          | 3.99                       | 4.89  |
| 21100                    | 2535.0          | 4.11                       | 5.12  | 21100                     | 2535.0          | 4.08                       | 5.11  |
| 21425                    | 2567.5          | 4.00                       | 5.12  | 21400                     | 2565.0          | 3.94                       | 5.01  |

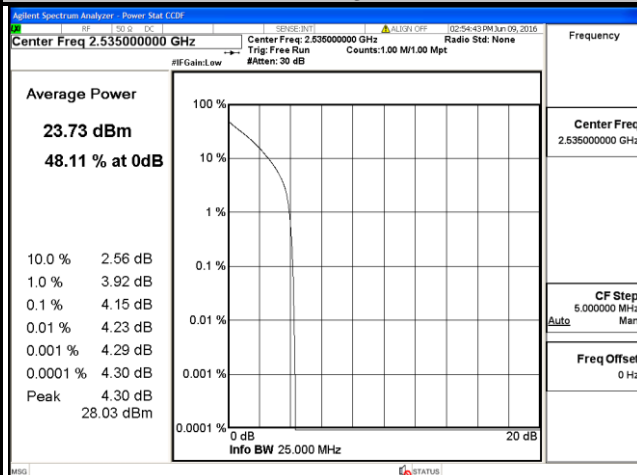


### LTE Band 7

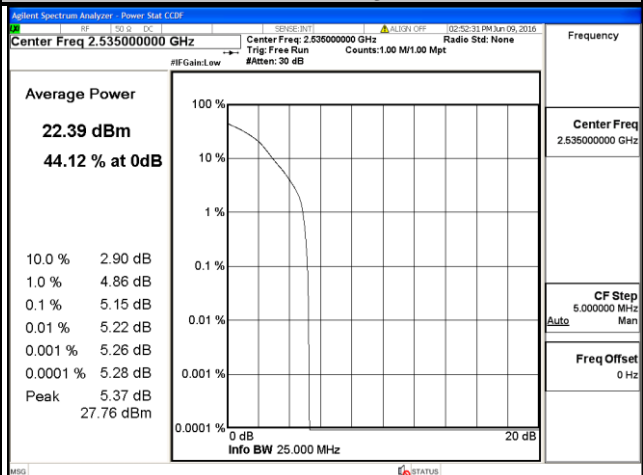
| Channel Bandwidth: 15 MHz |                 |                            |       | Channel Bandwidth: 20 MHz |                 |                            |       |
|---------------------------|-----------------|----------------------------|-------|---------------------------|-----------------|----------------------------|-------|
| Channel                   | Frequency (MHz) | Peak to Average Ratio (dB) |       | Channel                   | Frequency (MHz) | Peak to Average Ratio (dB) |       |
|                           |                 | QPSK                       | 16QAM |                           |                 | QPSK                       | 16QAM |
| 20825                     | 2507.5          | 3.98                       | 4.88  | 20850                     | 2510.0          | 4.04                       | 4.97  |
| 21100                     | 2535.0          | 4.15                       | 5.15  | 21100                     | 2535.0          | 4.21                       | 5.22  |
| 21375                     | 2562.5          | 3.97                       | 5.03  | 21350                     | 2560.0          | 4.06                       | 5.00  |

### Spectrum Plot of Worst Value

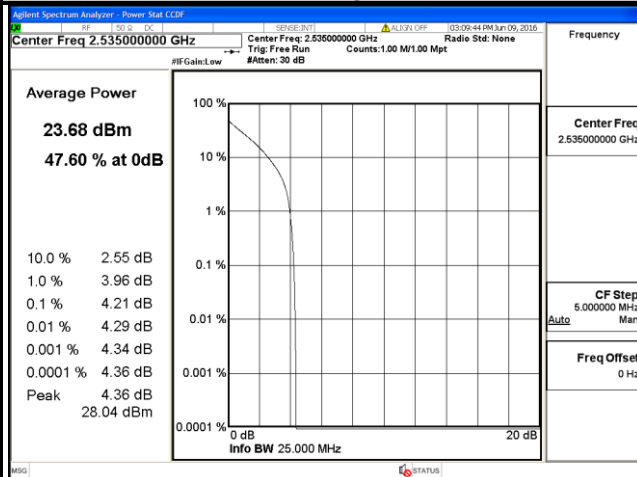
#### 15 MHz / QPSK



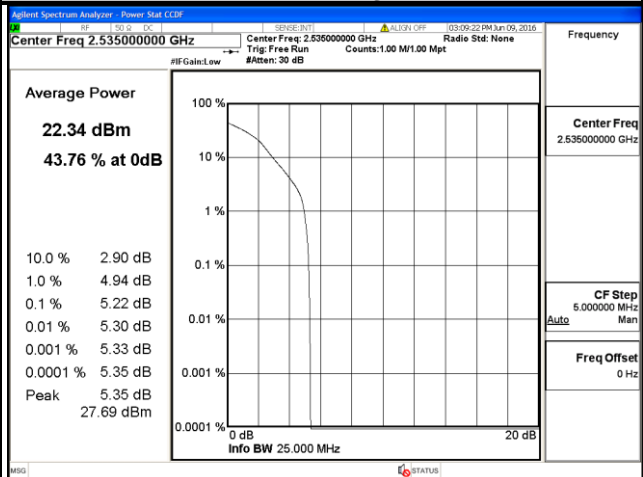
#### 15 MHz / 16QAM



#### 20 MHz / QPSK



#### 20 MHz / 16QAM

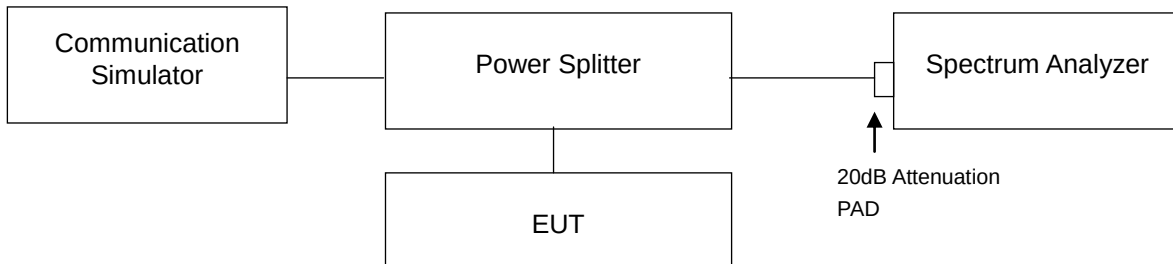


## 4.6 Conducted Spurious Emissions

### 4.6.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $55 + 10 \log_{10}(P)$  dB. The limit of emission is equal to -25 dBm.

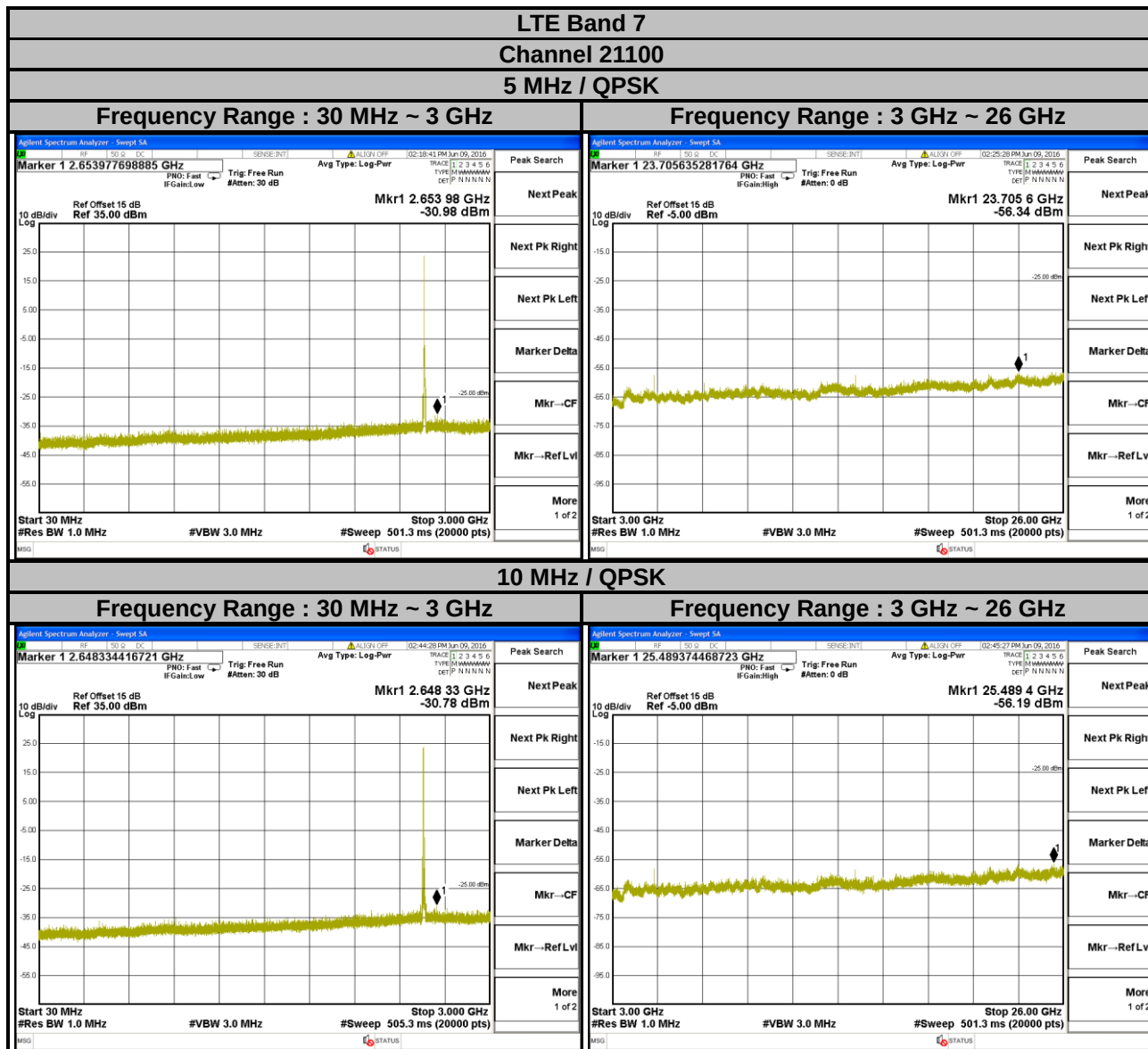
### 4.6.2 Test Setup



### 4.6.3 Test Procedure

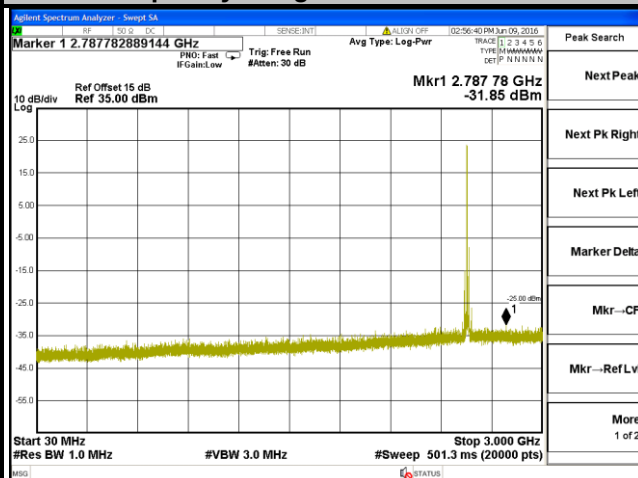
- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 30 MHz to 26 GHz. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

#### 4.6.4 Test Results

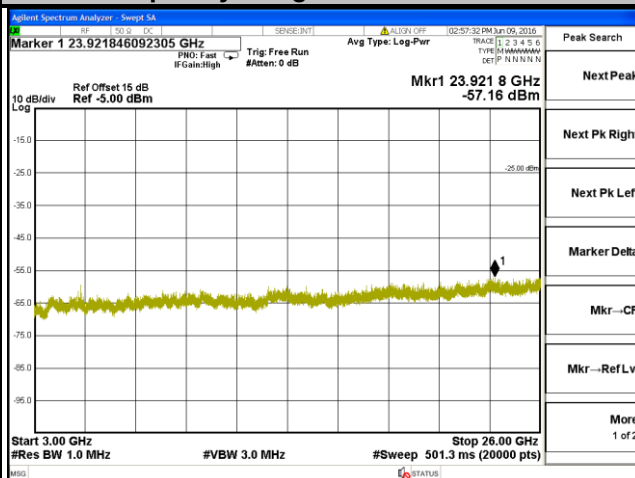


**LTE Band 7**  
**Channel 21100**  
**15 MHz / QPSK**

**Frequency Range : 30 MHz ~ 3 GHz**

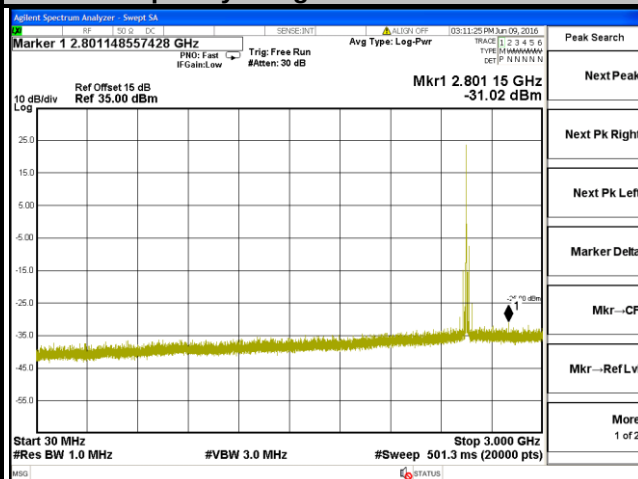


**Frequency Range : 3 GHz ~ 26 GHz**

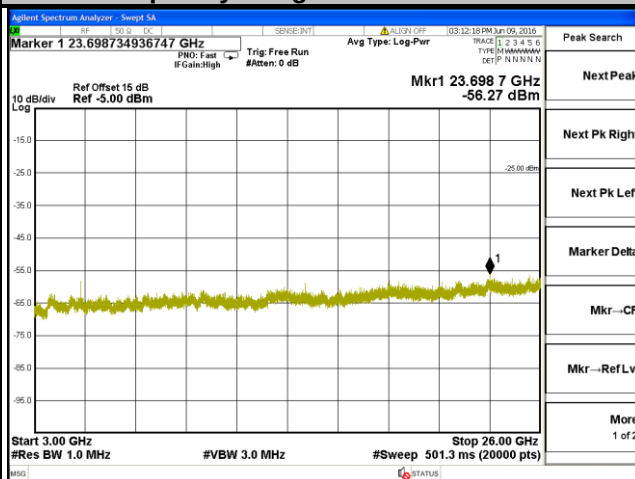


**20 MHz / QPSK**

**Frequency Range : 30 MHz ~ 3 GHz**



**Frequency Range : 3 GHz ~ 26 GHz**



## 4.7 Radiated Emission Measurement

### 4.7.1 Limits of Radiated Emission Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $55 + 10 \log_{10}(P)$  dB. The limit of emission is equal to -25 dBm.

### 4.7.2 Test Procedure

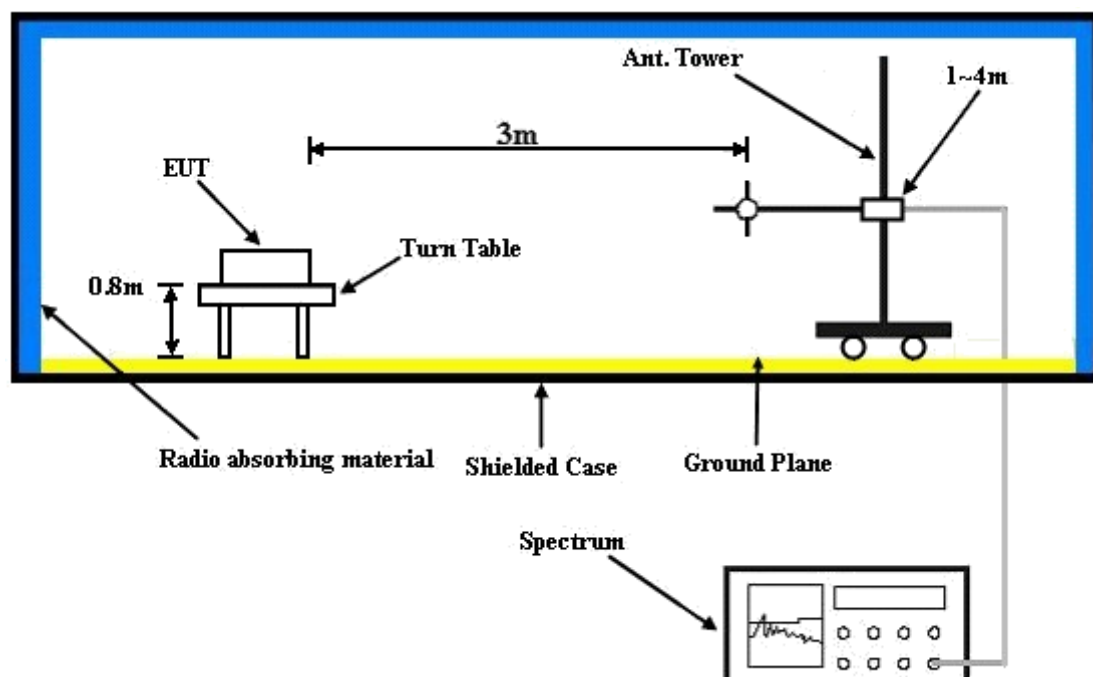
- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- The 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.
- EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
- E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15 dBi.

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

### 4.7.3 Deviation from Test Standard

No deviation.

### 4.7.4 Test Setup



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

#### 4.7.5 Test Results

Mode A

LTE Band 7

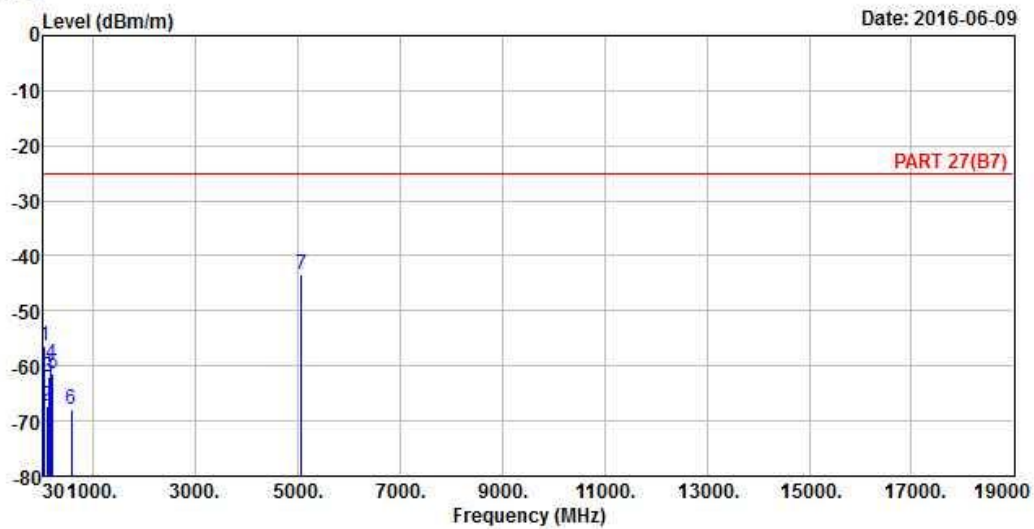
Channel Bandwidth: 20 MHz / QPSK



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 7



Site : 966 Chamber 5  
Condition: PART 27(B7) HORIZONTAL  
Remak : LTE Band 7 QPSK\_20M Link  
Tested by: Toby Tian

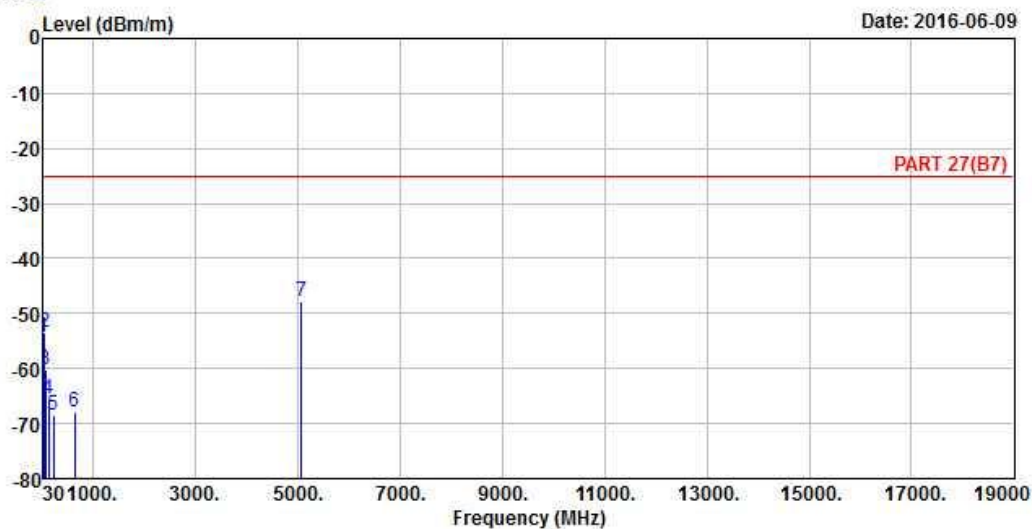
|      |         |        | Read   | Limit  | Over   |        |        |
|------|---------|--------|--------|--------|--------|--------|--------|
|      | Freq    | Level  | Level  | Line   | Limit  | Factor | Remark |
|      | MHz     | dBm/m  | dBm    | dBm/m  | dB     | dB/m   |        |
| 1    | 54.25   | -56.52 | -50.45 | -25.00 | -31.52 | -6.07  | Peak   |
| 2    | 99.84   | -67.25 | -56.69 | -25.00 | -42.25 | -10.56 | Peak   |
| 3    | 125.06  | -61.95 | -52.68 | -25.00 | -36.95 | -9.27  | Peak   |
| 4    | 183.26  | -59.56 | -52.25 | -25.00 | -34.56 | -7.31  | Peak   |
| 5    | 216.24  | -61.45 | -54.09 | -25.00 | -36.45 | -7.36  | Peak   |
| 6    | 572.23  | -67.96 | -66.04 | -25.00 | -42.96 | -1.92  | Peak   |
| 7 pp | 5070.00 | -43.33 | -40.21 | -25.00 | -18.33 | -3.12  | Peak   |



# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 8



Site : 966 Chamber 5  
Condition: PART 27(B7) VERTICAL  
Remak : LTE Band 7 QPSK\_20M Link  
Tested by: Toby Tian

|      | Freq    | Level  | Read Level | Limit Line | Over Limit | Factor | Remark |
|------|---------|--------|------------|------------|------------|--------|--------|
|      | MHz     | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |
| 1    | 37.76   | -54.20 | -53.76     | -25.00     | -29.20     | -0.44  | Peak   |
| 2    | 44.55   | -53.53 | -51.54     | -25.00     | -28.53     | -1.99  | Peak   |
| 3    | 60.07   | -60.12 | -52.46     | -25.00     | -35.12     | -7.66  | Peak   |
| 4    | 131.85  | -65.55 | -56.87     | -25.00     | -40.55     | -8.68  | Peak   |
| 5    | 228.85  | -68.56 | -61.71     | -25.00     | -43.56     | -6.85  | Peak   |
| 6    | 642.07  | -67.78 | -66.92     | -25.00     | -42.78     | -0.86  | Peak   |
| 7 pp | 5070.00 | -47.95 | -44.83     | -25.00     | -22.95     | -3.12  | Peak   |

Mode B

LTE Band 7

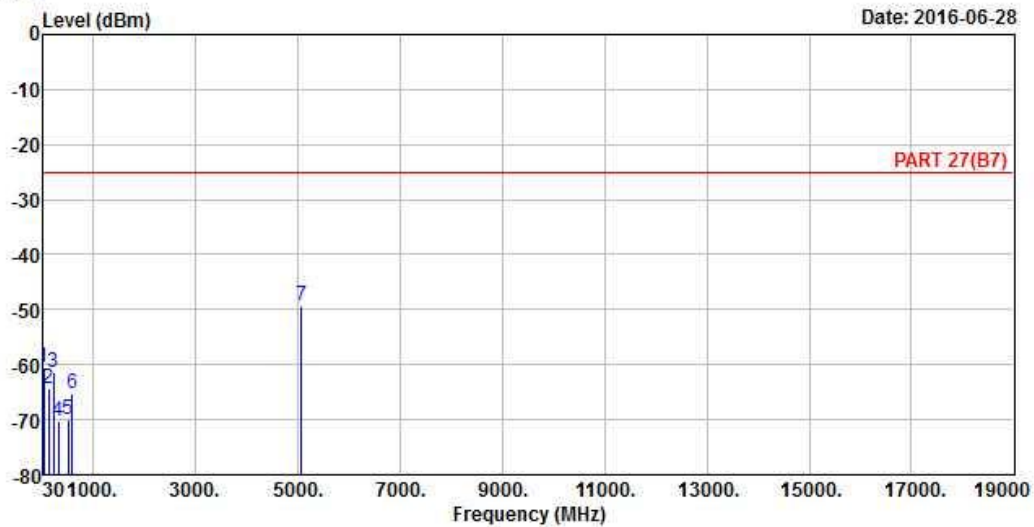
Channel Bandwidth: 20 MHz / QPSK



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 7



Site : 966 Chamber 5  
 Condition: PART 27(B7) HORIZONTAL  
 Remak : LTE Band 7 QPSK\_20M Link  
 Tested by: Gavin Wu

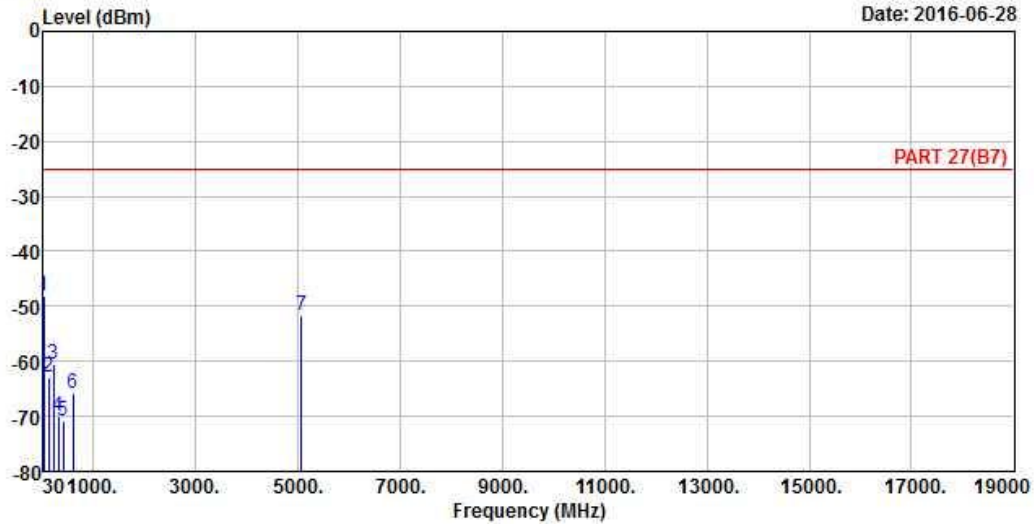
|      | Freq    | Level  | Read Level | Limit Line | Over Limit | Factor | Remark |
|------|---------|--------|------------|------------|------------|--------|--------|
|      | MHz     | dBm    | dBm        | dBm        | dB         | dB     |        |
| 1    | 39.70   | -60.56 | -61.20     | -25.00     | -35.56     | 0.64   | Peak   |
| 2    | 128.94  | -64.45 | -55.64     | -25.00     | -39.45     | -8.81  | Peak   |
| 3    | 231.76  | -61.33 | -54.60     | -25.00     | -36.33     | -6.73  | Peak   |
| 4    | 321.97  | -70.21 | -63.54     | -25.00     | -45.21     | -6.67  | Peak   |
| 5    | 508.21  | -69.84 | -65.51     | -25.00     | -44.84     | -4.33  | Peak   |
| 6    | 586.78  | -65.32 | -64.00     | -25.00     | -40.32     | -1.32  | Peak   |
| 7 pp | 5070.00 | -49.42 | -46.30     | -25.00     | -24.42     | -3.12  | Peak   |



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 8



Site : 966 Chamber 5  
 Condition: PART 27(B7) VERTICAL  
 Remak : LTE Band 7 QPSK\_20M Link  
 Tested by: Gavin Wu

|      | Freq    | Level  | Read Level | Limit Line | Over Limit | Factor | Remark |
|------|---------|--------|------------|------------|------------|--------|--------|
|      | MHz     | dBm    | dBm        | dBm        | dB         | dB     |        |
| 1 pp | 40.67   | -48.06 | -48.18     | -25.00     | -23.06     | 0.12   | Peak   |
| 2    | 128.94  | -62.76 | -53.95     | -25.00     | -37.76     | -8.81  | Peak   |
| 3    | 224.00  | -60.49 | -53.44     | -25.00     | -35.49     | -7.05  | Peak   |
| 4    | 328.76  | -69.98 | -63.41     | -25.00     | -44.98     | -6.57  | Peak   |
| 5    | 418.00  | -70.85 | -65.05     | -25.00     | -45.85     | -5.80  | Peak   |
| 6    | 603.27  | -65.98 | -65.22     | -25.00     | -40.98     | -0.76  | Peak   |
| 7    | 5070.00 | -51.70 | -48.58     | -25.00     | -26.70     | -3.12  | Peak   |

## 5 Pictures of Test Arrangements

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

## Appendix – Information on the Testing Laboratories

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

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

**Linko EMC/RF Lab**

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Fax: 886-2-26051924

**Hsin Chu EMC/RF/Telecom Lab**

Tel: 886-3-6668565

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**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

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

--- END ---