

# FCC RADIO TEST REPORT

## FCC 47 CFR PART 27

|               |                                                                              |
|---------------|------------------------------------------------------------------------------|
| Test Standard | FCC Part 27                                                                  |
| FCC ID        | QI3BIL-7820NZ-4G                                                             |
| Product name  | 3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N VPN Firewall Router |
| Brand name    | BILLION, BEC                                                                 |
| Test Result   | Pass                                                                         |
| Function      | LTE Band 4                                                                   |

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in TIA/EIA-603D:2012 and compliance standards.

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

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.( Wugu Laboratory)

The sample selected for test was production product and was provided by manufacturer.



Approved by:

Reviewed by:

Handwritten signature of Sam Chuang in black ink.

Handwritten signature of Zeus Chen in black ink.

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Sam Chuang  
Manager

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Zeus Chen  
Supervisor

## **Revision History**

| Rev. | Issue Date       | Revisions                                                                    | Revised By  |
|------|------------------|------------------------------------------------------------------------------|-------------|
| 00   | January 18, 2017 | Initial Issue                                                                | Angel Cheng |
| 01   | March 24, 2017   | 1. Modify antenna gain in page 6.                                            | Angel Cheng |
| 02   | April 25, 2017   | 1. Modify EIRP data in page 21-22.<br>2. Modify Bandedge data in page 39-50. | Angel Cheng |
| 03   | May 03, 2017     | 1. Add 16QAM Frequency Stability                                             | Angel Cheng |

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### APPENDIX 1 - PHOTOGRAPHS OF EUT

## 1. GENERAL INFORMATION

### 1.1 EUT INFORMATION

|                   |                                                                                                                                                                                                                                                                                                                     |               |             |               |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------|---------------|
| Applicant         | Billion Electric Co., Ltd.                                                                                                                                                                                                                                                                                          |               |             |               |
| Applicant Address | 8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist.,<br>New Taipei City 231, Taiwan (R.O.C.)                                                                                                                                                                                                                          |               |             |               |
| Equipment         | 3G/4G LTE Embedded with Dual-SIM Slots ADSL2+ Wireless-N<br>VPN Firewall Routerr                                                                                                                                                                                                                                    |               |             |               |
| Model No.         | BiPAC 7820NZ                                                                                                                                                                                                                                                                                                        | BiPAC 7820NZL | BiPAC6820NZ | BiPAC 6820NZL |
|                   | BEC 7820NZ                                                                                                                                                                                                                                                                                                          | BEC 7820NZL   | BEC 6820NZ  | BEC 6820NZL   |
|                   | BiPAC 7800NZ                                                                                                                                                                                                                                                                                                        | BiPAC 7800NZL | BiPAC6800NZ | BiPAC 6800NZL |
|                   | BEC 7800NZ                                                                                                                                                                                                                                                                                                          | BEC 7800NZL   | BEC 6800NZ  | BEC 6800NZL   |
| EUT Functions     | LTE Band 4                                                                                                                                                                                                                                                                                                          |               |             |               |
| Received Date     | Dec 19, 2016                                                                                                                                                                                                                                                                                                        |               |             |               |
| Date of Test      | Dec 27, 2016 ~ April 11, 2017                                                                                                                                                                                                                                                                                       |               |             |               |
| Power Operation   | <input checked="" type="checkbox"/> AC 120V/60Hz<br><input checked="" type="checkbox"/> Adapter<br><input type="checkbox"/> PoE(Not for sale)<br><input type="checkbox"/> DC Type :<br><input type="checkbox"/> Battery<br><input type="checkbox"/> DC Power Supply<br><input type="checkbox"/> External DC adapter |               |             |               |

**Model Discrepancy:**

| Model Name       | BiPAC 7820NZ                   | BiPAC 7820NZL                  | BiPAC 6820NZ                   | BiPAC 6820NZL                  | BEC 7820NZ                      | BEC 7820NZL                     |
|------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|---------------------------------|
| Trade Name       | Billion                        | Billion                        | Billion                        | Billion                        | BEC                             | BEC                             |
| External Feature | Wide-band Antenna              | Wide-band Antenna              | Wide-band Antenna              | Wide-band Antenna              | Wide-band Antenna               | Wide-band Antenna               |
| External Color   | Upper/lower Casing: blue/white | Upper/lower Casing: blue/white | Upper/lower Casing: blue/white | Upper/lower Casing: blue/white | Upper/lower Casing: gray/silver | Upper/lower Casing: gray/silver |
| Housing Drawing  | D3-1                           | D3-1                           | D3-1                           | D3-1                           | D3-1                            | D3-1                            |
| Dual-SIM Slots   | ○                              | ○                              | ○                              | ○                              | ○                               | ○                               |
| VPN              | ○                              | ×                              | ○                              | ×                              | ○                               | ×                               |
| ADSL Function    | ○                              | ○                              | ×                              | ×                              | ○                               | ○                               |
| Power Adaptor    | DC12V/1.2A                     | DC12V/1.2A                     | DC12V/1.2A                     | DC12V/1.2A                     | DC12V/1.2A                      | DC12V/1.2A                      |

**Notes:**

1. "○" means all the same
2. Please refer to the difference between the actual product differences in the case of changes in the instructions.
3. N represents the models support 802.11n, there are Z represents the 4G LTE Function.

| Model Name       | BEC 6820NZ                      | BEC 6820NZL                     | BiPAC 7800NZ                   | BiPAC 7800NZL                  | BiPAC 6800NZ                   | BiPAC 6800NZL                  |
|------------------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Trade Name       | BEC                             | BEC                             | Billion                        | Billion                        | Billion                        | Billion                        |
| External Feature | Wide-band Antenna               | Wide-band Antenna               | Wide-band Antenna              | Wide-band Antenna              | Wide-band Antenna              | Wide-band Antenna              |
| External Color   | Upper/lower Casing: gray/silver | Upper/lower Casing: gray/silver | Upper/lower Casing: blue/white | Upper/lower Casing: blue/white | Upper/lower Casing: blue/white | Upper/lower Casing: blue/white |
| Housing Drawing  | D3-1                            | D3-1                            | D3-1                           | D3-1                           | D3-1                           | D3-1                           |
| Dual-SIM Slots   | ○                               | ○                               | ×                              | ×                              | ×                              | ×                              |
| VPN              | ○                               | ×                               | ○                              | ×                              | ○                              | ×                              |
| ADSL Function    | ×                               | ×                               | ○                              | ○                              | ×                              | ×                              |
| Power Adaptor    | DC12V/1.2A                      | DC12V/1.2A                      | DC12V/1.2A                     | DC12V/1.2A                     | DC12V/1.2A                     | DC12V/1.2A                     |

**Notes:**

1. "○" means all the same
2. Please refer to the difference between the actual product differences in the case of changes in the instructions.
3. N represents the models support 802.11n, there are Z represents the 4G LTE Function.

|                  |                                 |                                 |                                 |                                 |  |  |
|------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|--|--|
| Model Name       | BEC 7800NZ                      | BEC 7800NZL                     | BEC 6800NZ                      | BEC 6800NZL                     |  |  |
| Trade Name       | BEC                             | BEC                             | BEC                             | BEC                             |  |  |
| External Feature | Wide-band Antenna               | Wide-band Antenna               | Wide-band Antenna               | Wide-band Antenna               |  |  |
| External Color   | Upper/lower Casing: gray/silver | Upper/lower Casing: gray/silver | Upper/lower Casing: gray/silver | Upper/lower Casing: gray/silver |  |  |
| Housing Drawing  | D3-1                            | D3-1                            | D3-1                            | D3-1                            |  |  |
| Dual-SIM Slots   | ×                               | ×                               | ×                               | ×                               |  |  |
| VPN              | ○                               | ×                               | ○                               | ×                               |  |  |
| ADSL Function    | ○                               | ○                               | ×                               | ×                               |  |  |
| Power Adaptor    | DC12V/1.2A                      | DC12V/1.2A                      | DC12V/1.2A                      | DC12V/1.2A                      |  |  |

**Notes:**

1. "○" means all the same
2. Please refer to the difference between the actual product differences in the case of changes in the instructions.
3. N represents the models support 802.11n, there are Z represents the 4G LTE Function.

## 1.2 EUT CHANNEL INFORMATION

| Frequency Range |         |                 |         |                 |         |                 |
|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| Channel         | 1.4MHz  |                 | 3MHz    |                 | 5MHz    |                 |
|                 | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| Low CH          | 19957   | 1710.7          | 19965   | 1711.5          | 19975   | 1712.5          |
| Middle CH       | 20175   | 1732.5          | 20175   | 1732.5          | 20175   | 1732.5          |
| High CH         | 20392   | 1754.2          | 20384   | 1753.4          | 20375   | 1752.5          |
| Channel         | 10MHz   |                 | 15MHz   |                 | 20MHz   |                 |
|                 | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| Low CH          | 20000   | 1715.0          | 20025   | 1717.5          | 20050   | 1720.0          |
| Middle CH       | 20175   | 1732.5          | 20175   | 1732.5          | 20175   | 1732.5          |
| High CH         | 20350   | 1750.0          | 20325   | 1747.5          | 20300   | 1745.0          |

## 1.3 EMISSION DESIGNATOR

| Emission Designator |                       |          |                     |                  |                     |                  |
|---------------------|-----------------------|----------|---------------------|------------------|---------------------|------------------|
| Band                | Frequency Range(MHz)  | BW (MHz) | QPSK                |                  | 16QAM               |                  |
|                     |                       |          | Emission Designator | Maximum EIRP (W) | Emission Designator | Maximum EIRP (W) |
| 4                   | 1710.7MHz ~1754.2MHz  | 1.4      | 1M08G7D             | 0.519            | 1M08W7D             | 0.500            |
|                     | 1711.5MHz ~1753.4MHz  | 3        | 2M67G7D             | 0.473            | 2M68W7D             | 0.537            |
|                     | 1712.5MHz ~1752.5MHz  | 5        | 4M45G7D             | 0.485            | 4M45W7D             | 0.492            |
|                     | 1715.0MHz ~1750.0MHz  | 10       | 8M91G7D             | 0.505            | 8M91W7D             | 0.539            |
|                     | 1717.5MHz ~1747.50MHz | 15       | 13M4G7D             | 0.487            | 13M4W7D             | 0.497            |
|                     | 1720MHz ~1745MHz      | 20       | 18M0G7D             | 0.474            | 18M0W7D             | 0.467            |

## 1.4 ANTENNA INFORMATION

|                         |                                                                                                                                                                                                  |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Antenna Category</b> | <input type="checkbox"/> Integral: antenna permanently attached<br><input type="checkbox"/> External dedicated antennas<br><input checked="" type="checkbox"/> External Unique antenna connector |
| <b>Antenna Type</b>     | <input type="checkbox"/> PIFA<br><input type="checkbox"/> PCB for<br><input checked="" type="checkbox"/> Dipole<br><input type="checkbox"/> Printed<br><input type="checkbox"/> Coils            |
| <b>Antenna Gain</b>     | 2.26 (dBi)                                                                                                                                                                                       |

## 1.5 MEASUREMENT UNCERTAINTY

| PARAMETER                             | UNCERTAINTY |
|---------------------------------------|-------------|
| AC Powerline Conducted Emission       | +/- 1.2575  |
| Emission bandwidth, 20dB bandwidth    | +/- 1.4003  |
| RF output power, conducted            | +/- 1.1372  |
| Power density, conducted              | +/- 1.4003  |
| 3M Semi Anechoic Chamber / 30M~200M   | +/- 4.0138  |
| 3M Semi Anechoic Chamber / 200M~1000M | +/- 3.9483  |
| 3M Semi Anechoic Chamber / 1G~8G      | +/- 2.5975  |
| 3M Semi Anechoic Chamber / 8G~18G     | +/- 2.6112  |
| 3M Semi Anechoic Chamber / 18G~26G    | +/- 2.7389  |
| 3M Semi Anechoic Chamber / 26G~40G    | +/- 2.9683  |
| 3M Semi Anechoic Chamber / 40G~60G    | +/- 1.8509  |
| 3M Semi Anechoic Chamber / 60G~75G    | +/- 1.9869  |
| 3M Semi Anechoic Chamber / 75G~110G   | +/- 2.9651  |
| 3M Semi Anechoic Chamber / 110G~170G  | +/- 2.7807  |
| 3M Semi Anechoic Chamber / 170G~220G  | +/- 3.6437  |
| 3M Semi Anechoic Chamber / 220G~325G  | +/- 4.2982  |

**Remark:**

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

## 1.6 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at  
No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

| Test site          | Test Engineer | Remark |
|--------------------|---------------|--------|
| AC Conduction Room | -             | -      |
| Radiation          | Rondo Raw     | -      |
| RF Conducted       | Ian Tu        | -      |

**Remark:** The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

## 1.7 INSTRUMENT CALIBRATION

| RF Conducted Test Site |              |          |            |            |            |
|------------------------|--------------|----------|------------|------------|------------|
| Equipment              | Manufacturer | Model    | S/N        | Cal Date   | Cal Due    |
| Spectrum Analyzer      | R&S          | FSV 40   | 101073     | 05/11/2016 | 05/10/2017 |
| Communication Analyzer | Anritsu      | MT-8820C | 6201240043 | 02/18/2016 | 02/17/2017 |
| Communication Analyzer | Anritsu      | MT-8820C | 6200938900 | 07/26/2017 | 07/25/2017 |

| 3M 966 Chamber Test Site |                    |                     |             |            |            |
|--------------------------|--------------------|---------------------|-------------|------------|------------|
| Equipment                | Manufacturer       | Model               | S/N         | Cal Date   | Cal Due    |
| Spectrum Analyzer        | Agilent            | E4446A              | US42510252  | 12/07/2016 | 12/04/2017 |
| Loop Ant                 | COM-POWER          | AL-130              | 121051      | 02/25/2016 | 02/24/2017 |
| Bilog Antenna            | Sunol Sciences     | JB3                 | A030105     | 07/03/2016 | 07/02/2017 |
| Pre-Amplifier            | EMEC               | EM330               | 60609       | 06/08/2016 | 06/07/2017 |
| Horn Antenna             | ETC                | MCTD 1209           | DRH13M02003 | 08/30/2016 | 09/01/2017 |
| Pre-Amplifier            | MITEQ              | AMF-6F-260400-40-8P | 985646      | 01/14/2016 | 01/13/2017 |
| Horn Antenna             | EMCO               | 3116                | 26370       | 01/15/2016 | 01/14/2017 |
| Antenna Tower            | CCS                | CC-A-1F             | N/A         | N.C.R      | N.C.R      |
| Controller               | CCS                | CC-C-1F             | N/A         | N.C.R      | N.C.R      |
| Turn Table               | CCS                | CC-T-1F             | N/A         | N.C.R      | N.C.R      |
| Software                 | EZ-EMC (CCS-3A1RE) |                     |             |            |            |

**Remark:** Each piece of equipment is scheduled for calibration once a year.

## 1.8 SUPPORT AND EUT ACCESSORIES EQUIPMENT

| EUT Accessories Equipment |           |       |                   |            |        |
|---------------------------|-----------|-------|-------------------|------------|--------|
| No.                       | Equipment | Brand | Model             | Series No. | FCC ID |
| 1                         | Adapter   | Ktec  | KSASB0241500160HU | N/A        | N/A    |

| Support Equipment |           |       |       |            |        |
|-------------------|-----------|-------|-------|------------|--------|
| No.               | Equipment | Brand | Model | Series No. | FCC ID |
|                   | N/A       |       |       |            |        |

## 1.9 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with TIA/EIA-603-D:2010 and Part 27.

### 1.10 TABLE OF ACCREDITATIONS AND LISTINGS

| Country | Agency          | Scope of Accreditation                                                         | Logo                                                                                                              |
|---------|-----------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| USA     | FCC             | 3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements | <br>FCC MRA: TW1039           |
| Canada  | Industry Canada | 3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform                  | <br>IC 2324G-1<br>IC 2324G-2 |

## 2. DESCRIPTION OF TEST MODES

### 2.1 THE WORST MODE OF OPERATING CONDITION

| Operation mode | Channel   | 1.4MHz  |                 | 3MHz    |                 | 5MHz    |                 |
|----------------|-----------|---------|-----------------|---------|-----------------|---------|-----------------|
|                |           | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|                | Low CH    | 19957   | 1710.7          | 19965   | 1711.5          | 19975   | 1712.5          |
|                | Middle CH | 20175   | 1732.5          | 20175   | 1732.5          | 20175   | 1732.5          |
|                | High CH   | 20392   | 1754.2          | 20384   | 1753.4          | 20375   | 1752.5          |
|                | Channel   | 10MHz   |                 | 15MHz   |                 | 20MHz   |                 |
|                |           | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|                | Low CH    | 20000   | 1715.0          | 20025   | 1717.5          | 20050   | 1720.0          |
|                | Middle CH | 20175   | 1732.5          | 20175   | 1732.5          | 20175   | 1732.5          |
|                | High CH   | 20350   | 1750.0          | 20325   | 1747.5          | 20300   | 1745.0          |

Remark:

1. EUT pre-scanned the output power for each mode, the worst data rate were recorded in this report.
2. Client consigns only one model sample to test (Model Number: BiPAC 7820NZ).

## 2.2 THE WORST MODE OF MEASUREMENT

| Radiated Emission Measurement Above 1G |                                                                                                                                                                                                                                                                                               |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Condition                         | Band edge, Emission for Unwanted and Fundamental                                                                                                                                                                                                                                              |
| Voltage/Hz                             | 120V/60Hz                                                                                                                                                                                                                                                                                     |
| Test Mode                              | Mode 1:EUT power by AC adapter                                                                                                                                                                                                                                                                |
| Worst Mode                             | <input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4                                                                                                                                                    |
| Worst Position                         | <input type="checkbox"/> Placed in fixed position.<br><input type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane)<br><input checked="" type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane)<br><input type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane) |
| Worst Polarity                         | <input checked="" type="checkbox"/> Horizontal <input type="checkbox"/> Vertical                                                                                                                                                                                                              |

| Radiated Emission Measurement Below 1G |                                                                                                                                            |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Test Condition                         | Radiated Emission Below 1G                                                                                                                 |
| Voltage/Hz                             | 120V/60Hz                                                                                                                                  |
| Test Mode                              | Mode 1:EUT power by AC adapter                                                                                                             |
| Worst Mode                             | <input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4 |

**Remark:**

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis, X, Y, Z and two polarity, Horizontal and Vertical for radiated measurement. The worst case(X-Plane and Horizontal) were recorded in this report.
3. For below 1G AC power line conducted emission and radiation emission were performed the EUT transmit at the highest output power channel as worse case.

### **3. TEST RESULT**

#### **3.1 OUTPUT POWER MEASUREMENT**

##### **3.1.1 Test Procedure**

Conducted Power Measurement

1. The transmitter output power was connected to the call box.
2. Set EUT at maximum output power via call box.
3. Set Call box at lowest, middle and highest channels for each band and modulation.

##### **3.1.2 Test Result**

## LTE Band 4

| Band | BW (MHz) | Channel | Frequency (MHz) | Mode  | UL RB Allocation | UL RB Offset | MPR | Average Power (dBm) | Average Power (W) |
|------|----------|---------|-----------------|-------|------------------|--------------|-----|---------------------|-------------------|
| 4    | 1.4      | 19957   | 1710.7          | QPSK  | 1                | 0            | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 1                | 2            | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 1                | 5            | 0   | 22.3                | 0.1698            |
|      |          |         |                 |       | 3                | 0            | 0   | 22.7                | 0.1862            |
|      |          |         |                 |       | 3                | 1            | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 3                | 2            | 0   | 22.3                | 0.1698            |
|      |          |         |                 |       | 6                | 0            | 1   | 21.5                | 0.1413            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 1                | 2            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 1                | 5            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 3                | 0            | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 3                | 1            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 3                | 2            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 6                | 0            | 2   | 20.5                | 0.1122            |
|      |          | 20175   | 1732.5          | QPSK  | 1                | 0            | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 1                | 2            | 0   | 22.3                | 0.1698            |
|      |          |         |                 |       | 1                | 5            | 0   | 22.3                | 0.1698            |
|      |          |         |                 |       | 3                | 0            | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 3                | 1            | 0   | 22.3                | 0.1698            |
|      |          |         |                 |       | 3                | 2            | 0   | 22.3                | 0.1698            |
|      |          |         |                 |       | 6                | 0            | 1   | 21.4                | 0.1380            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 1                | 2            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 1                | 5            | 1   | 21.4                | 0.1380            |
|      |          |         |                 |       | 3                | 0            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 3                | 1            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 3                | 2            | 1   | 21.4                | 0.1380            |
|      |          |         |                 |       | 6                | 0            | 2   | 20.5                | 0.1122            |
|      |          | 20392   | 1754.2          | QPSK  | 1                | 0            | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 1                | 2            | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 1                | 5            | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 3                | 0            | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 3                | 1            | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 3                | 2            | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 6                | 0            | 1   | 21.5                | 0.1413            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 1                | 2            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 1                | 5            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 3                | 0            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 3                | 1            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 3                | 2            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 6                | 0            | 2   | 20.6                | 0.1148            |

## LTE Band 4

| Band | BW (MHz) | Channel | Frequency (MHz) | Mode  | UL RB Allocation | UL RB Offset | MPR | Average Power (dBm) | Average Power (W) |
|------|----------|---------|-----------------|-------|------------------|--------------|-----|---------------------|-------------------|
| 4    | 3        | 19965   | 1711.5          | QPSK  | 1                | 0            | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 1                | 7            | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 1                | 14           | 0   | 22.3                | 0.1698            |
|      |          |         |                 |       | 8                | 0            | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 8                | 4            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 8                | 7            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 15               | 0            | 1   | 21.5                | 0.1413            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 1                | 7            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 1                | 14           | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 8                | 0            | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 8                | 4            | 2   | 20.6                | 0.1148            |
|      |          |         |                 |       | 8                | 7            | 2   | 20.6                | 0.1148            |
|      |          |         |                 |       | 15               | 0            | 2   | 20.5                | 0.1122            |
|      |          | 20175   | 1732.5          | QPSK  | 1                | 0            | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 1                | 7            | 0   | 22.3                | 0.1698            |
|      |          |         |                 |       | 1                | 14           | 0   | 22.3                | 0.1698            |
|      |          |         |                 |       | 8                | 0            | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 8                | 4            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 8                | 7            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 15               | 0            | 1   | 21.4                | 0.1380            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 1                | 7            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 1                | 14           | 1   | 21.4                | 0.1380            |
|      |          |         |                 |       | 8                | 0            | 2   | 20.6                | 0.1148            |
|      |          |         |                 |       | 8                | 4            | 2   | 20.4                | 0.1096            |
|      |          |         |                 |       | 8                | 7            | 2   | 20.5                | 0.1122            |
|      |          |         |                 |       | 15               | 0            | 2   | 20.4                | 0.1096            |
|      |          | 20384   | 1753.4          | QPSK  | 1                | 0            | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 1                | 7            | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 1                | 14           | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 8                | 0            | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 8                | 4            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 8                | 7            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 15               | 0            | 1   | 21.5                | 0.1413            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 1                | 7            | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 1                | 14           | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 8                | 0            | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 8                | 4            | 2   | 20.6                | 0.1148            |
|      |          |         |                 |       | 8                | 7            | 2   | 20.6                | 0.1148            |
|      |          |         |                 |       | 15               | 0            | 2   | 20.5                | 0.1122            |

## LTE Band 4

| Band | BW (MHz) | Channel | Frequency (MHz) | Mode  | UL RB Allocation | UL RB Offset | MPR | Average Power (dBm) | Average Power (W) |
|------|----------|---------|-----------------|-------|------------------|--------------|-----|---------------------|-------------------|
| 4    | 5        | 19975   | 1712.5          | QPSK  | 1                | 0            | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 1                | 12           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 1                | 24           | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 12               | 0            | 1   | 21.9                | 0.1549            |
|      |          |         |                 |       | 12               | 6            | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 12               | 11           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 25               | 0            | 1   | 21.6                | 0.1445            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.9                | 0.1549            |
|      |          |         |                 |       | 1                | 12           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 1                | 24           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 12               | 0            | 2   | 20.9                | 0.1230            |
|      |          |         |                 |       | 12               | 6            | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 12               | 11           | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 25               | 0            | 2   | 20.6                | 0.1148            |
|      |          | 20175   | 1732.5          | QPSK  | 1                | 0            | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 1                | 12           | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 1                | 24           | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 12               | 0            | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 12               | 6            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 12               | 11           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 25               | 0            | 1   | 21.5                | 0.1413            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 1                | 12           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 1                | 24           | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 12               | 0            | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 12               | 6            | 2   | 20.5                | 0.1122            |
|      |          |         |                 |       | 12               | 11           | 2   | 20.6                | 0.1148            |
|      |          |         |                 |       | 25               | 0            | 2   | 20.5                | 0.1122            |
|      |          | 20375   | 1752.5          | QPSK  | 1                | 0            | 0   | 22.7                | 0.1862            |
|      |          |         |                 |       | 1                | 12           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 1                | 24           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 12               | 0            | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 12               | 6            | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 12               | 11           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 25               | 0            | 1   | 21.6                | 0.1445            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 1                | 12           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 1                | 24           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 12               | 0            | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 12               | 6            | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 12               | 11           | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 25               | 0            | 2   | 20.6                | 0.1148            |

## LTE Band 4

| Band | BW (MHz) | Channel | Frequency (MHz) | Mode  | UL RB Allocation | UL RB Offset | MPR | Average Power (dBm) | Average Power (W) |
|------|----------|---------|-----------------|-------|------------------|--------------|-----|---------------------|-------------------|
| 4    | 10       | 20000   | 1715.0          | QPSK  | 1                | 0            | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 1                | 24           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 1                | 49           | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 25               | 0            | 1   | 21.9                | 0.1549            |
|      |          |         |                 |       | 25               | 12           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 25               | 24           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 50               | 0            | 1   | 21.6                | 0.1445            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.9                | 0.1549            |
|      |          |         |                 |       | 1                | 24           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 1                | 49           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 25               | 0            | 2   | 20.9                | 0.1230            |
|      |          |         |                 |       | 25               | 12           | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 25               | 24           | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 50               | 0            | 2   | 20.6                | 0.1148            |
|      |          | 20175   | 1732.5          | QPSK  | 1                | 0            | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 1                | 24           | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 1                | 49           | 0   | 22.4                | 0.1738            |
|      |          |         |                 |       | 25               | 0            | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 25               | 12           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 25               | 24           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 50               | 0            | 1   | 21.5                | 0.1413            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 1                | 24           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 1                | 49           | 1   | 21.5                | 0.1413            |
|      |          |         |                 |       | 25               | 0            | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 25               | 12           | 2   | 20.5                | 0.1122            |
|      |          |         |                 |       | 25               | 24           | 2   | 20.6                | 0.1148            |
|      |          |         |                 |       | 50               | 0            | 2   | 20.5                | 0.1122            |
|      |          | 20350   | 1750.0          | QPSK  | 1                | 0            | 0   | 22.7                | 0.1862            |
|      |          |         |                 |       | 1                | 24           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 1                | 49           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 25               | 0            | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 25               | 12           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 25               | 24           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 50               | 0            | 1   | 21.6                | 0.1445            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 1                | 24           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 1                | 49           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 25               | 0            | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 25               | 12           | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 25               | 24           | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 50               | 0            | 2   | 20.6                | 0.1148            |

## LTE Band 4

| Band | BW (MHz) | Channel | Frequency (MHz) | Mode  | UL RB Allocation | UL RB Offset | MPR | Average Power (dBm) | Average Power (W) |
|------|----------|---------|-----------------|-------|------------------|--------------|-----|---------------------|-------------------|
| 4    | 15       | 20025   | 1717.5          | QPSK  | 1                | 0            | 0   | 22.7                | 0.1862            |
|      |          |         |                 |       | 1                | 37           | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 1                | 74           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 36               | 0            | 1   | 22.0                | 0.1585            |
|      |          |         |                 |       | 36               | 18           | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 36               | 35           | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 75               | 0            | 1   | 21.7                | 0.1479            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 22.0                | 0.1585            |
|      |          |         |                 |       | 1                | 37           | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 1                | 74           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 36               | 0            | 2   | 21.0                | 0.1259            |
|      |          |         |                 |       | 36               | 18           | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 36               | 35           | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 75               | 0            | 2   | 20.7                | 0.1175            |
|      |          | 20175   | 1732.5          | QPSK  | 1                | 0            | 0   | 22.7                | 0.1862            |
|      |          |         |                 |       | 1                | 37           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 1                | 74           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 36               | 0            | 1   | 21.9                | 0.1549            |
|      |          |         |                 |       | 36               | 18           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 36               | 35           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 75               | 0            | 1   | 21.6                | 0.1445            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 1                | 37           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 1                | 74           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 36               | 0            | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 36               | 18           | 2   | 20.6                | 0.1148            |
|      |          |         |                 |       | 36               | 35           | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 75               | 0            | 2   | 20.6                | 0.1148            |
|      |          | 20325   | 1747.5          | QPSK  | 1                | 0            | 0   | 22.8                | 0.1905            |
|      |          |         |                 |       | 1                | 37           | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 1                | 74           | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 36               | 0            | 1   | 21.9                | 0.1549            |
|      |          |         |                 |       | 36               | 18           | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 36               | 35           | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 75               | 0            | 1   | 21.7                | 0.1479            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 1                | 37           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 1                | 74           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 36               | 0            | 2   | 20.9                | 0.1230            |
|      |          |         |                 |       | 36               | 18           | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 36               | 35           | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 75               | 0            | 2   | 20.7                | 0.1175            |

## LTE Band 4

| Band | BW (MHz) | Channel | Frequency (MHz) | Mode  | UL RB Allocation | UL RB Offset | MPR | Average Power (dBm) | Average Power (W) |
|------|----------|---------|-----------------|-------|------------------|--------------|-----|---------------------|-------------------|
| 4    | 20       | 20050   | 1720.0          | QPSK  | 1                | 0            | 0   | 22.7                | 0.1862            |
|      |          |         |                 |       | 1                | 49           | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 1                | 99           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 50               | 0            | 1   | 22.0                | 0.1585            |
|      |          |         |                 |       | 50               | 24           | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 50               | 49           | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 100              | 0            | 1   | 21.7                | 0.1479            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 22.0                | 0.1585            |
|      |          |         |                 |       | 1                | 49           | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 1                | 99           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 50               | 0            | 2   | 21.0                | 0.1259            |
|      |          |         |                 |       | 50               | 24           | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 50               | 49           | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 100              | 0            | 2   | 20.7                | 0.1175            |
|      |          | 20175   | 1732.5          | QPSK  | 1                | 0            | 0   | 22.7                | 0.1862            |
|      |          |         |                 |       | 1                | 49           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 1                | 99           | 0   | 22.5                | 0.1778            |
|      |          |         |                 |       | 50               | 0            | 1   | 21.9                | 0.1549            |
|      |          |         |                 |       | 50               | 24           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 50               | 49           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 100              | 0            | 1   | 21.6                | 0.1445            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 1                | 49           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 1                | 99           | 1   | 21.6                | 0.1445            |
|      |          |         |                 |       | 50               | 0            | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 50               | 24           | 2   | 20.6                | 0.1148            |
|      |          |         |                 |       | 50               | 49           | 2   | 20.7                | 0.1175            |
|      |          |         |                 |       | 100              | 0            | 2   | 20.6                | 0.1148            |
|      |          | 20300   | 1745.0          | QPSK  | 1                | 0            | 0   | 22.8                | 0.1905            |
|      |          |         |                 |       | 1                | 49           | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 1                | 99           | 0   | 22.6                | 0.1820            |
|      |          |         |                 |       | 50               | 0            | 1   | 21.9                | 0.1549            |
|      |          |         |                 |       | 50               | 24           | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 50               | 49           | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 100              | 0            | 1   | 21.7                | 0.1479            |
|      |          |         |                 | 16QAM | 1                | 0            | 1   | 21.8                | 0.1514            |
|      |          |         |                 |       | 1                | 49           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 1                | 99           | 1   | 21.7                | 0.1479            |
|      |          |         |                 |       | 50               | 0            | 2   | 20.9                | 0.1230            |
|      |          |         |                 |       | 50               | 24           | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 50               | 49           | 2   | 20.8                | 0.1202            |
|      |          |         |                 |       | 100              | 0            | 2   | 20.7                | 0.1175            |

**LTE Band 4****BW: 1.4MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 4    | 1.4      | Lowest  | QPSK   | 1                | 0            | 10.68      | 0.011    | 27.16      | 0.519    |
|      |          | Middle  |        | 1                | 0            | 10.72      | 0.011    | 25.44      | 0.349    |
|      |          | Highest |        | 1                | 0            | 10.46      | 0.011    | 26.25      | 0.421    |
|      |          | Lowest  | 16 QAM | 1                | 0            | 10.27      | 0.010    | 26.99      | 0.500    |
|      |          | Middle  |        | 1                | 0            | 10.12      | 0.010    | 25.36      | 0.343    |
|      |          | Highest |        | 1                | 0            | 10.09      | 0.010    | 26.22      | 0.418    |

**BW: 3MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 4    | 3        | Lowest  | QPSK   | 1                | 0            | 10.42      | 0.011    | 26.75      | 0.473    |
|      |          | Middle  |        | 1                | 0            | 9.67       | 0.009    | 25.14      | 0.326    |
|      |          | Highest |        | 1                | 0            | 10.68      | 0.011    | 26.42      | 0.438    |
|      |          | Lowest  | 16 QAM | 1                | 0            | 10.40      | 0.010    | 27.30      | 0.537    |
|      |          | Middle  |        | 1                | 0            | 9.92       | 0.009    | 25.01      | 0.316    |
|      |          | Highest |        | 1                | 0            | 10.54      | 0.011    | 26.70      | 0.467    |

**BW: 5MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 4    | 5        | Lowest  | QPSK   | 1                | 0            | 10.39      | 0.010    | 26.68      | 0.465    |
|      |          | Middle  |        | 1                | 0            | 9.48       | 0.008    | 25.12      | 0.325    |
|      |          | Highest |        | 1                | 0            | 11.13      | 0.012    | 26.86      | 0.485    |
|      |          | Lowest  | 16 QAM | 1                | 0            | 10.24      | 0.010    | 26.92      | 0.492    |
|      |          | Middle  |        | 1                | 0            | 9.65       | 0.009    | 25.01      | 0.316    |
|      |          | Highest |        | 1                | 0            | 11.17      | 0.013    | 26.84      | 0.483    |

**BW: 10MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 4    | 10       | Lowest  | QPSK   | 1                | 0            | 10.21      | 0.010    | 26.98      | 0.498    |
|      |          | Middle  |        | 1                | 0            | 9.44       | 0.008    | 25.06      | 0.320    |
|      |          | Highest |        | 1                | 0            | 11.45      | 0.013    | 27.04      | 0.505    |
|      |          | Lowest  | 16 QAM | 1                | 0            | 10.52      | 0.011    | 27.12      | 0.515    |
|      |          | Middle  |        | 1                | 0            | 9.44       | 0.008    | 24.93      | 0.311    |
|      |          | Highest |        | 1                | 0            | 11.59      | 0.014    | 27.32      | 0.539    |

**BW: 15MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 4    | 15       | Lowest  | QPSK   | 1                | 0            | 9.82       | 0.009    | 26.87      | 0.486    |
|      |          | Middle  |        | 1                | 0            | 9.55       | 0.009    | 24.97      | 0.314    |
|      |          | Highest |        | 1                | 0            | 10.34      | 0.010    | 26.88      | 0.487    |
|      |          | Lowest  | 16 QAM | 1                | 0            | 9.76       | 0.009    | 26.83      | 0.481    |
|      |          | Middle  |        | 1                | 0            | 9.10       | 0.008    | 24.86      | 0.306    |
|      |          | Highest |        | 1                | 0            | 10.88      | 0.012    | 26.97      | 0.497    |

**BW: 20MHz / RB=1, RB Offset=0**

| Band | BW (MHz) | Channel | Mode   | UL RB Allocation | UL RB offset | Vertical   |          | Horizontal |          |
|------|----------|---------|--------|------------------|--------------|------------|----------|------------|----------|
|      |          |         |        |                  |              | EIRP (dBm) | EIRP (W) | EIRP (dBm) | EIRP (W) |
| 4    | 20       | Lowest  | QPSK   | 1                | 0            | 10.22      | 0.010    | 26.76      | 0.474    |
|      |          | Middle  |        | 1                | 0            | 9.46       | 0.008    | 24.98      | 0.314    |
|      |          | Highest |        | 1                | 0            | 10.26      | 0.010    | 26.07      | 0.404    |
|      |          | Lowest  | 16 QAM | 1                | 0            | 10.04      | 0.010    | 26.70      | 0.467    |
|      |          | Middle  |        | 1                | 0            | 9.19       | 0.008    | 24.96      | 0.313    |
|      |          | Highest |        | 1                | 0            | 9.85       | 0.009    | 26.06      | 0.403    |

## 3.2 OCCUPIED BANDWIDTH(99%)

### 3.2.1 Test Limit

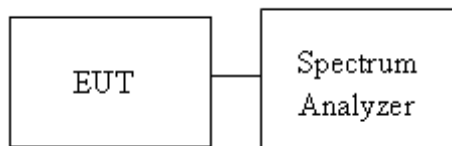
**Occupied Bandwidth(99%)** : For reporting purposes only.

### 3.2.2 Test Procedure

KDB 971168 D01 v02r02 - Section 4..2,

1. The occupied bandwidth was measured with the spectrum analyzer at the lowest, middle and highest channels in each band and different modulation. The 99% and -26dB bandwidth was measured and recorded.
2. RBW = 1-5% of the expected OBW, VBW  $\geq 3 \times$  RBW, Detector = Peak, Trace mode = max. hold

### 3.2.3 Test Setup

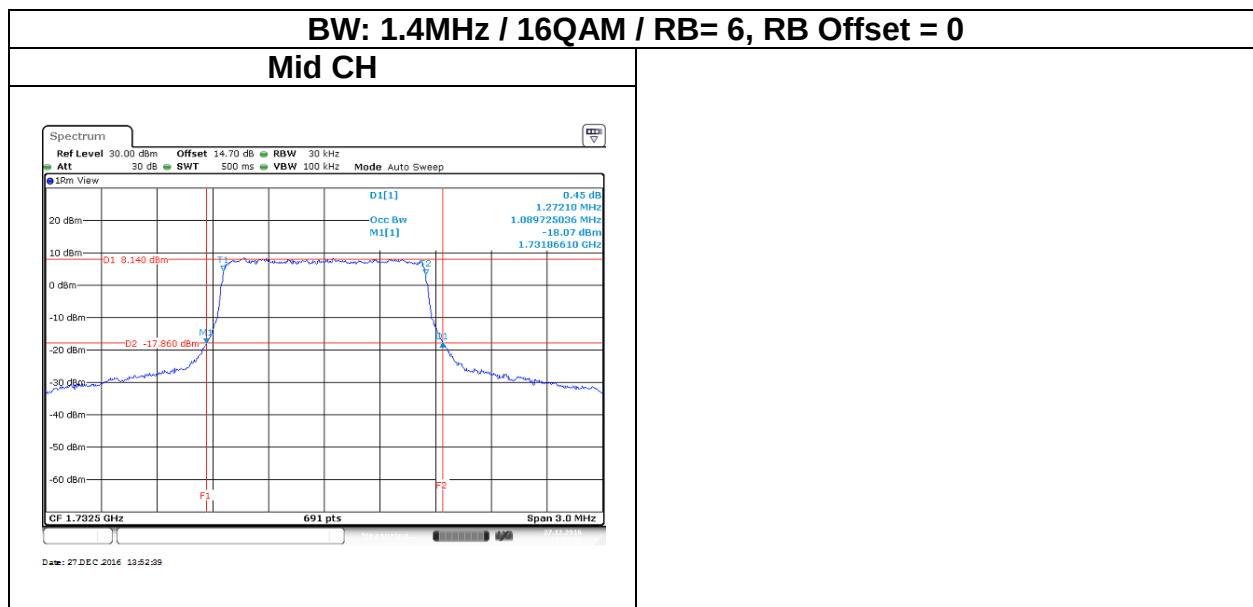
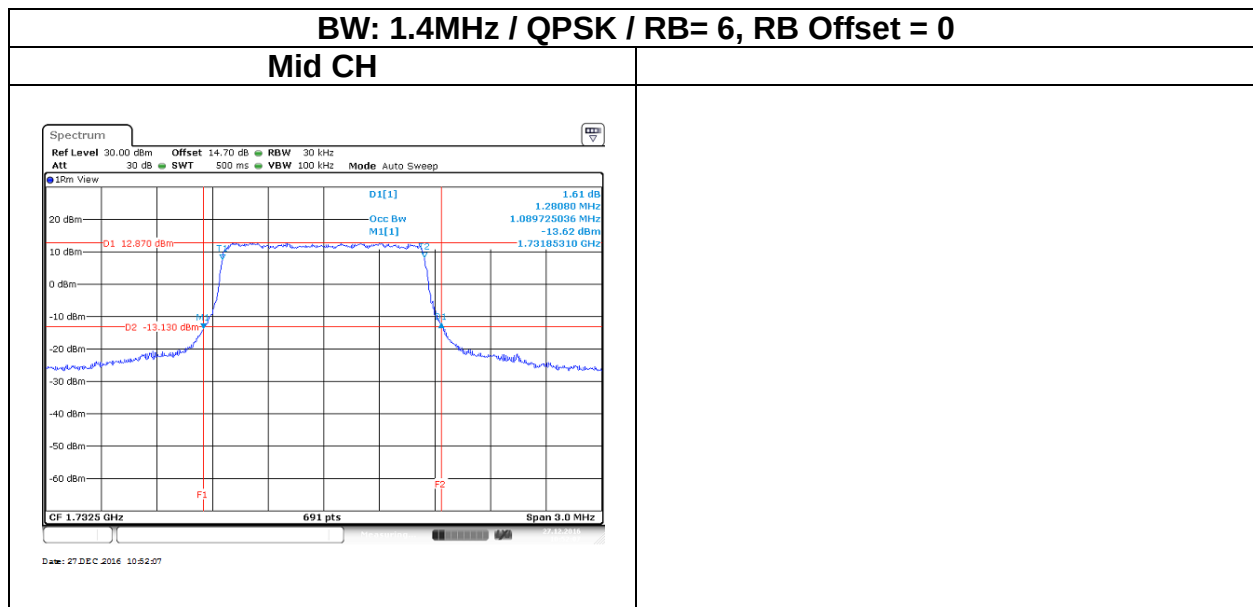


### 3.2.4 Test Result

#### LTE Band 4

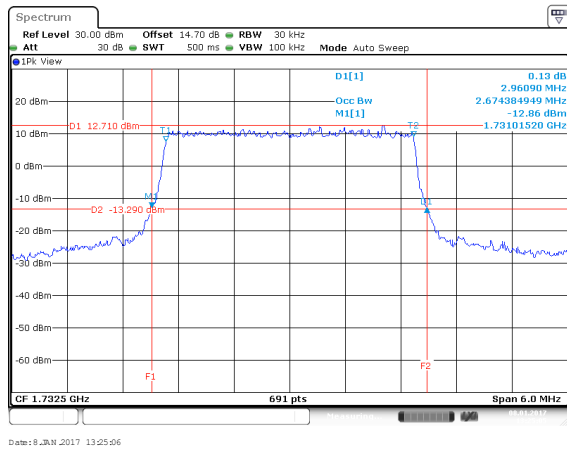
| Band | BW (MHz) | Channel | Mode  | UL RB Allocation | UL RB offset | OBW(99%)(MHz) | 26 dB Bandwidth(MHz) |
|------|----------|---------|-------|------------------|--------------|---------------|----------------------|
| 4    | 1.4      | Middle  | QPSK  | 6                | 0            | 1.0897        | 1.2808               |
|      |          | Middle  | 16QAM | 6                | 0            | 1.0897        | 1.2721               |
|      | 3        | Middle  | QPSK  | 15               | 0            | 2.6743        | 2.9609               |
|      |          | Middle  | 16QAM | 15               | 0            | 2.6830        | 2.9783               |
|      | 5        | Middle  | QPSK  | 25               | 0            | 4.4573        | 4.8050               |
|      |          | Middle  | 16QAM | 25               | 0            | 4.4573        | 4.7900               |
|      | 10       | Middle  | QPSK  | 50               | 0            | 8.9146        | 9.3490               |
|      |          | Middle  | 16QAM | 50               | 0            | 8.9146        | 9.4970               |
|      | 15       | Middle  | QPSK  | 75               | 0            | 13.4587       | 14.7610              |
|      |          | Middle  | 16QAM | 75               | 0            | 13.4159       | 14.8910              |
|      | 20       | Middle  | QPSK  | 100              | 0            | 18.0028       | 19.2220              |
|      |          | Middle  | 16QAM | 100              | 0            | 18.0028       | 19.2800              |

## Test Data



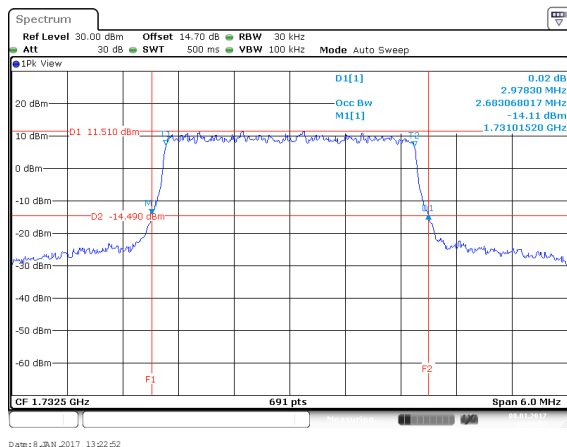
**BW: 3MHz / QPSK / RB= 15, RB Offset = 0**

**Mid CH**



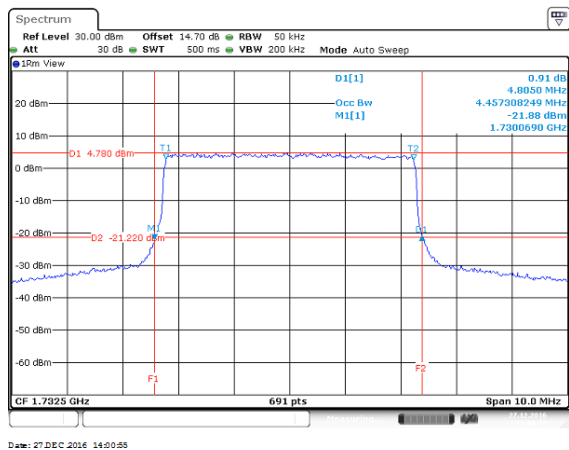
**BW: 3MHz / 16QAM / RB= 15, RB Offset = 0**

**Mid CH**



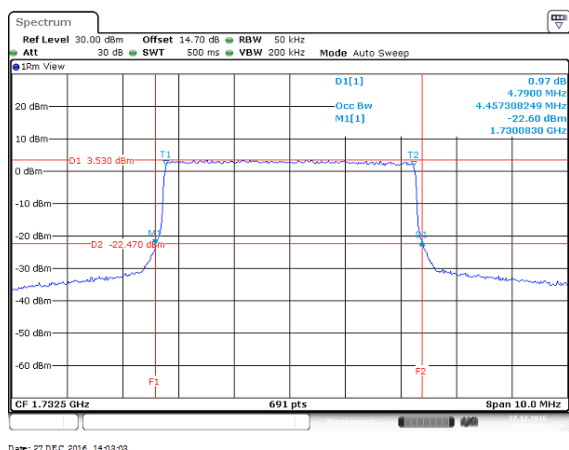
**BW: 5MHz / QPSK / RB= 25, RB Offset = 0**

**Mid CH**



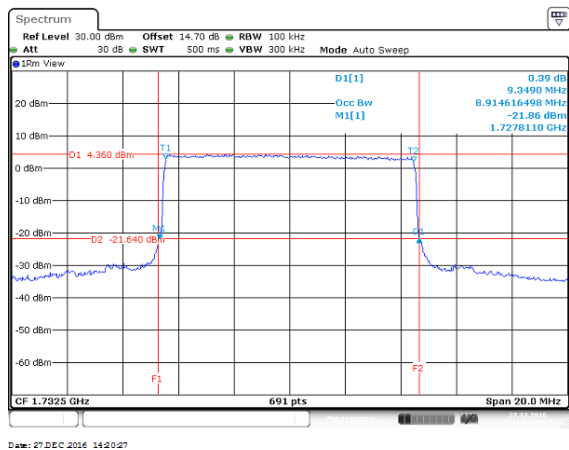
**BW: 5MHz / 16QAM / RB= 25, RB Offset = 0**

**Mid CH**



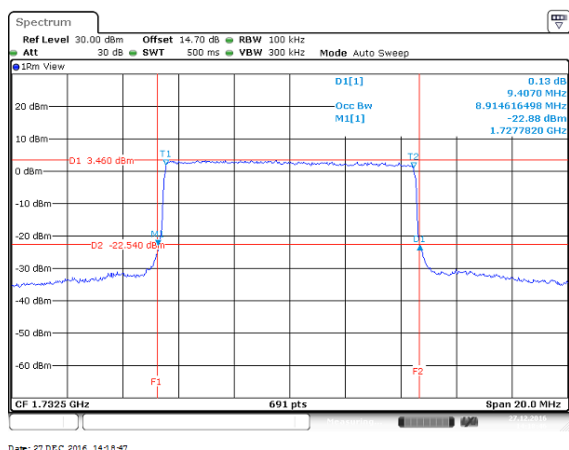
**BW: 10MHz / QPSK / RB= 50, RB Offset = 0**

**Mid CH**



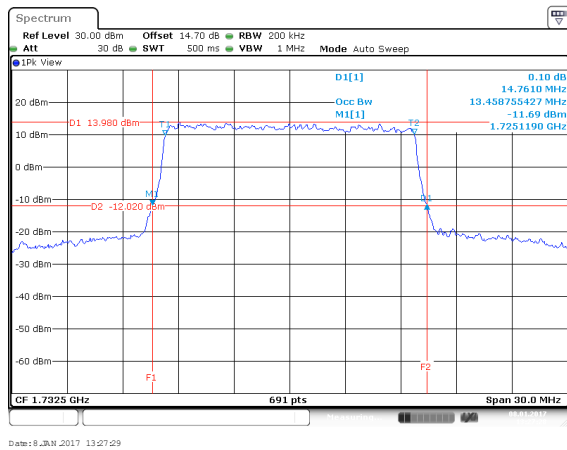
**BW: 10MHz / 16QAM / RB= 50, RB Offset = 0**

**Mid CH**



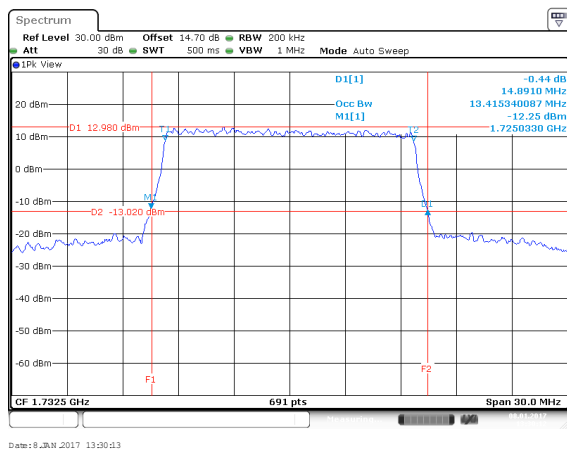
**BW: 15MHz / QPSK / RB= 75, RB Offset = 0**

**Mid CH**



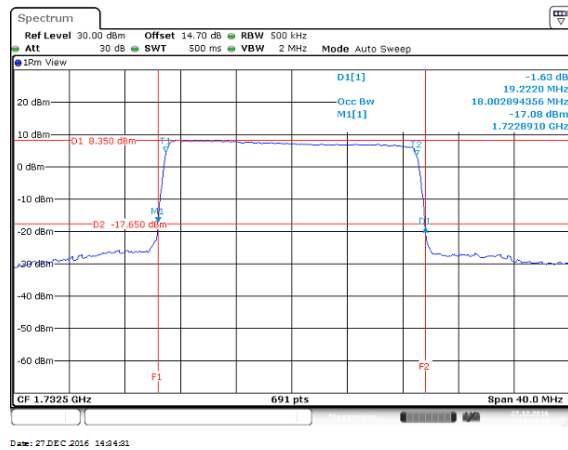
**BW: 15MHz / 16QAM / RB= 75, RB Offset = 0**

**Mid CH**



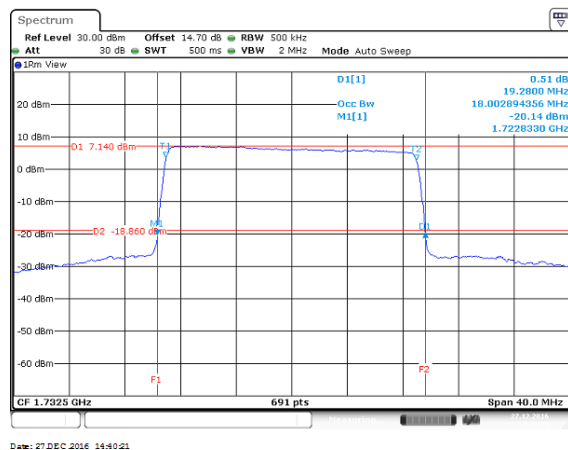
**BW: 20MHz / QPSK / RB= 100, RB Offset = 0**

**Mid CH**



**BW: 20MHz / 16QAM / RB= 100, RB Offset = 0**

**Mid CH**



### **3.3 PEAK TO AVERAGE POWER RATIO**

#### **3.3.1 Test Limit**

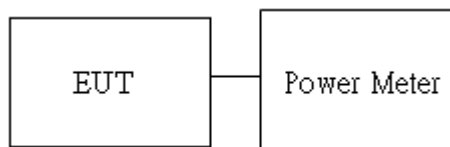
In measuring transmissions in this band using an average power technique, peak-to-average power ratio (PAPR) of the transmission may not exceed 13 dB

#### **3.3.2 Test Procedure**

According to KDB 971168 D01, section. 5.7.1.

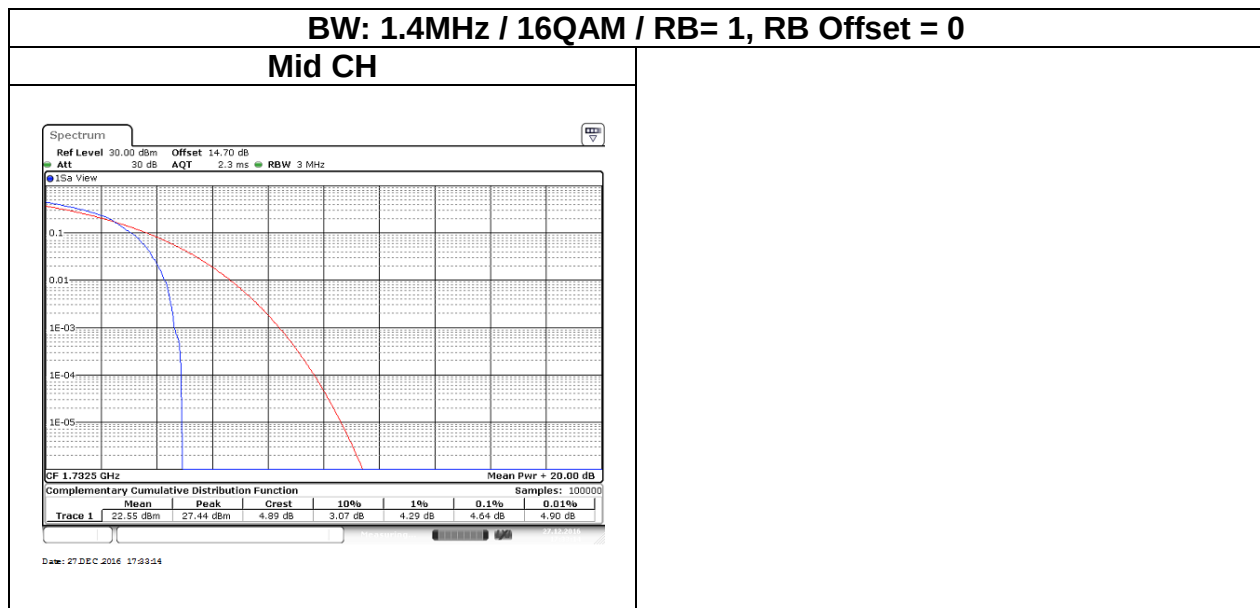
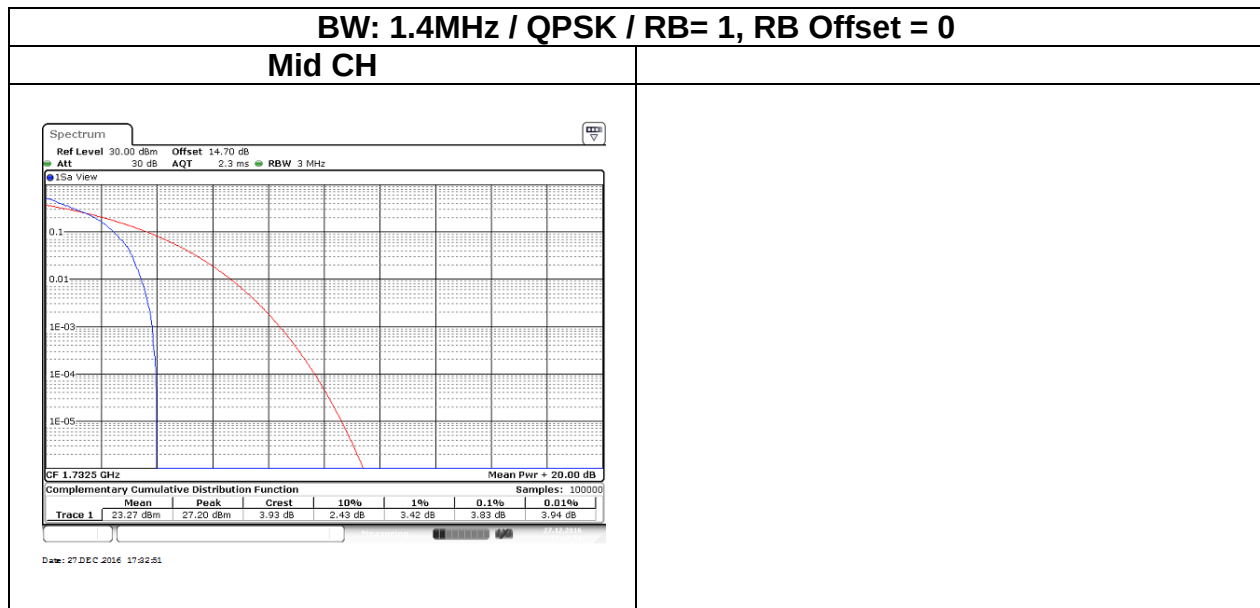
1. The EUT was connect to spectrum analyzer and call box..
2. Set the CCDF function in spectrum analyzer.
3. The highest RF output power were measured and recorded the maximum PAPR level associated with a probability of 0.1%.
4. Record the Peak to Average Power Ratio.

#### **3.3.3 Test Setup**



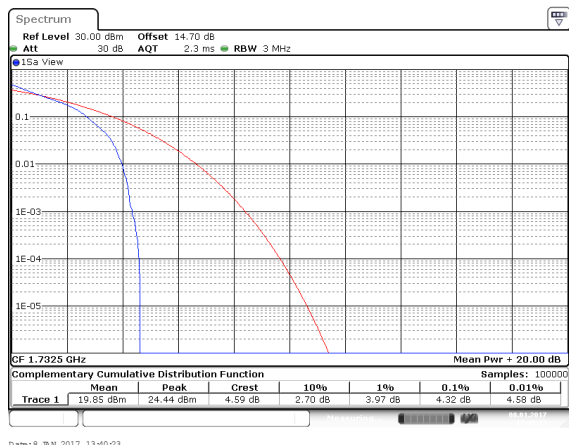
### 3.3.4 Test Result

#### Test Data



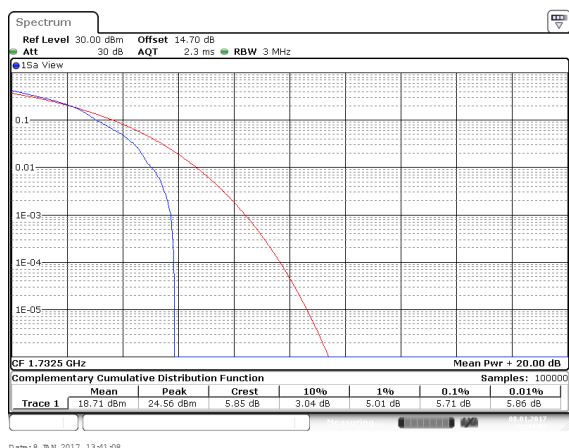
**BW: 3MHz / QPSK / RB= 1, RB Offset = 0**

**Mid CH**



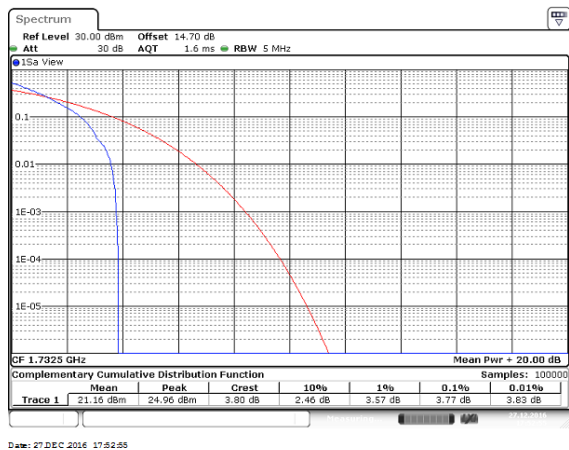
**BW: 3MHz / 16QAM / RB= 1, RB Offset = 0**

**Mid CH**



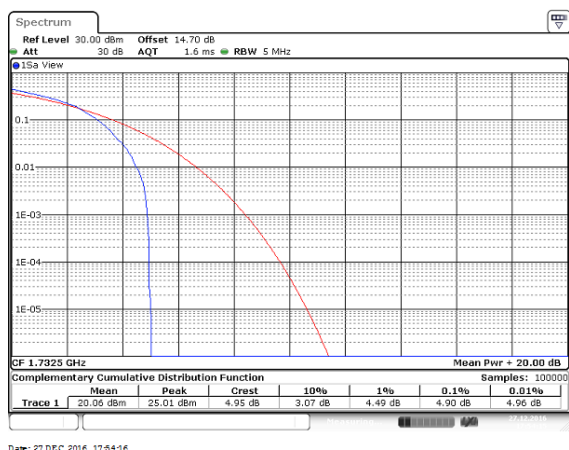
BW: 5MHz / QPSK / RB= 1, RB Offset = 0

Mid CH



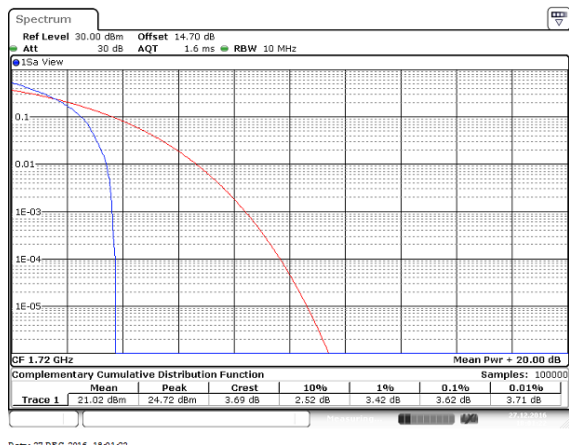
BW: 5MHz / 16QAM / RB= 1, RB Offset = 0

Mid CH



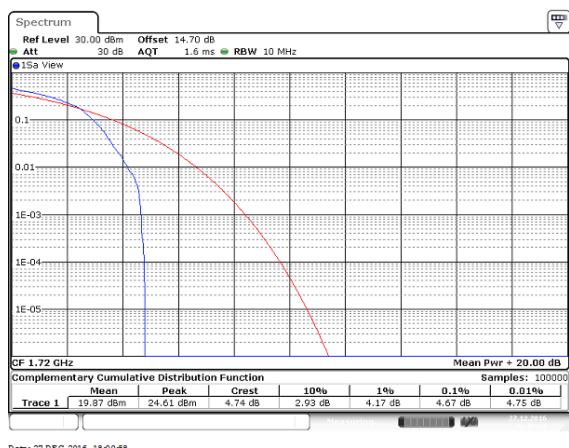
**BW: 10MHz / QPSK / RB= 1, RB Offset = 0**

**Mid CH**



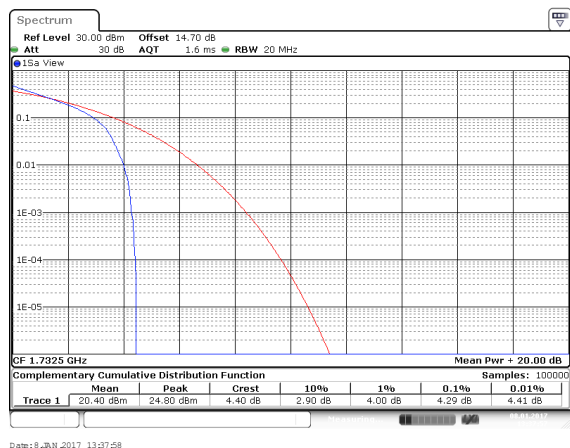
**BW: 10MHz / 16QAM / RB= 1, RB Offset = 0**

**Mid CH**



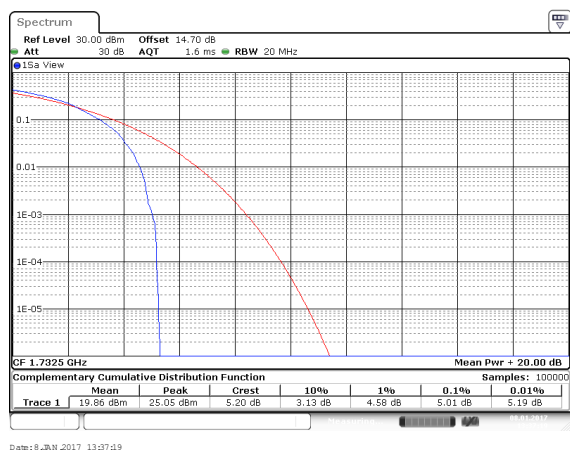
**BW: 15MHz / QPSK / RB= 1, RB Offset = 0**

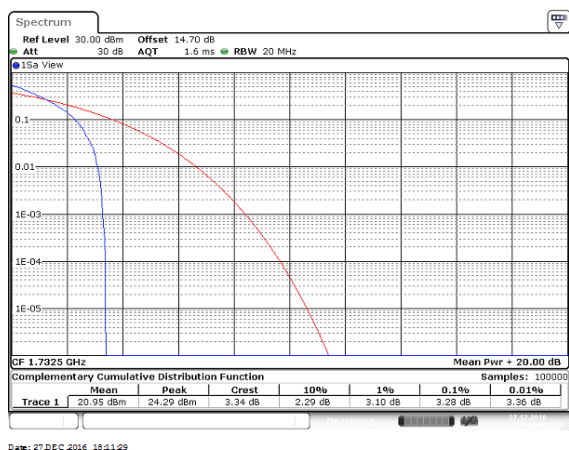
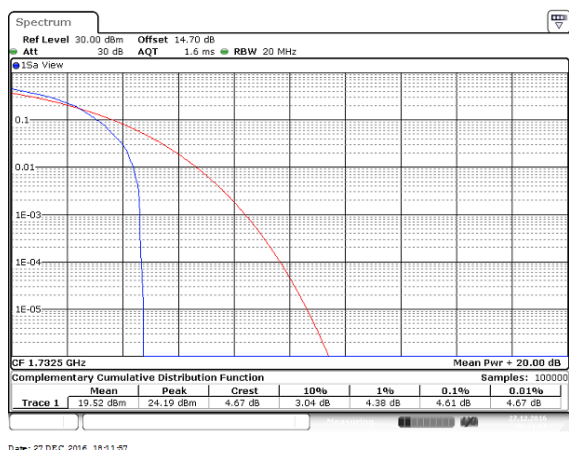
**Mid CH**



**BW: 15MHz / 16QAM / RB= 1, RB Offset = 0**

**Mid CH**



**BW: 20MHz / QPSK / RB= 1, RB Offset = 0****Mid CH****BW: 20MHz / 16QAM / RB= 1, RB Offset = 0****Mid CH**

### **3.4 BANEDGE MEASUREMENT**

#### **3.4.1 Test Limit**

##### **FCC §27.53(h), Band 4**

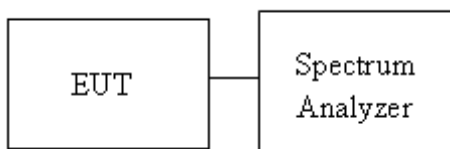
For operations in the, 1710-1755 MHz band, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

#### **3.4.2 Test Procedure**

KDB 971168 D01 v02r02 - Section 6.0

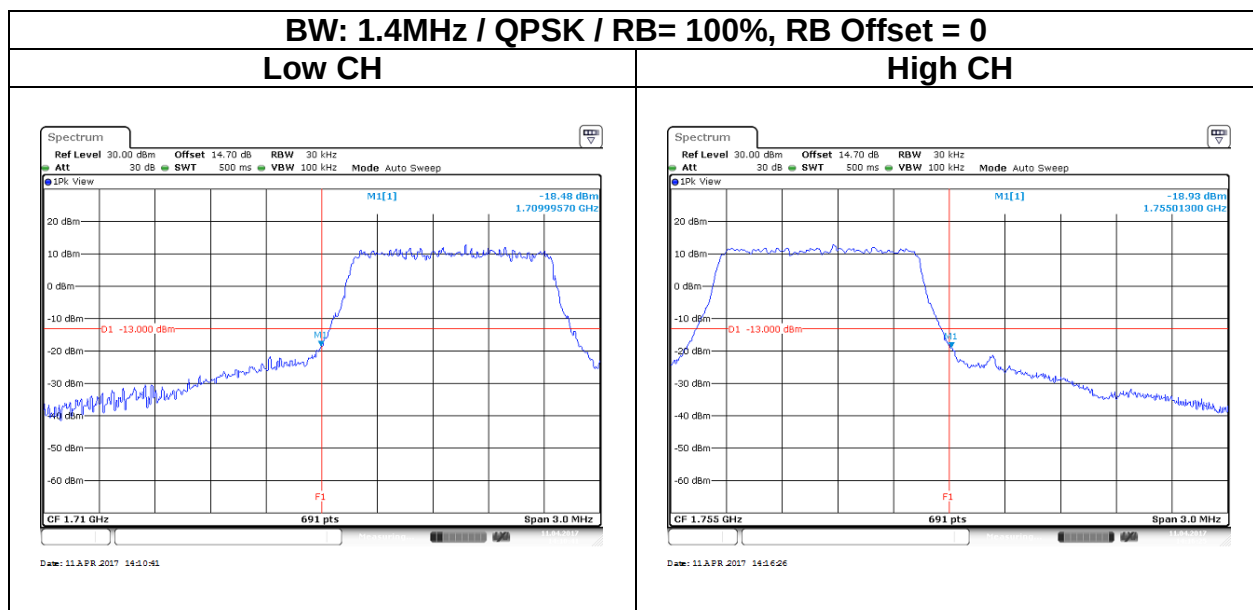
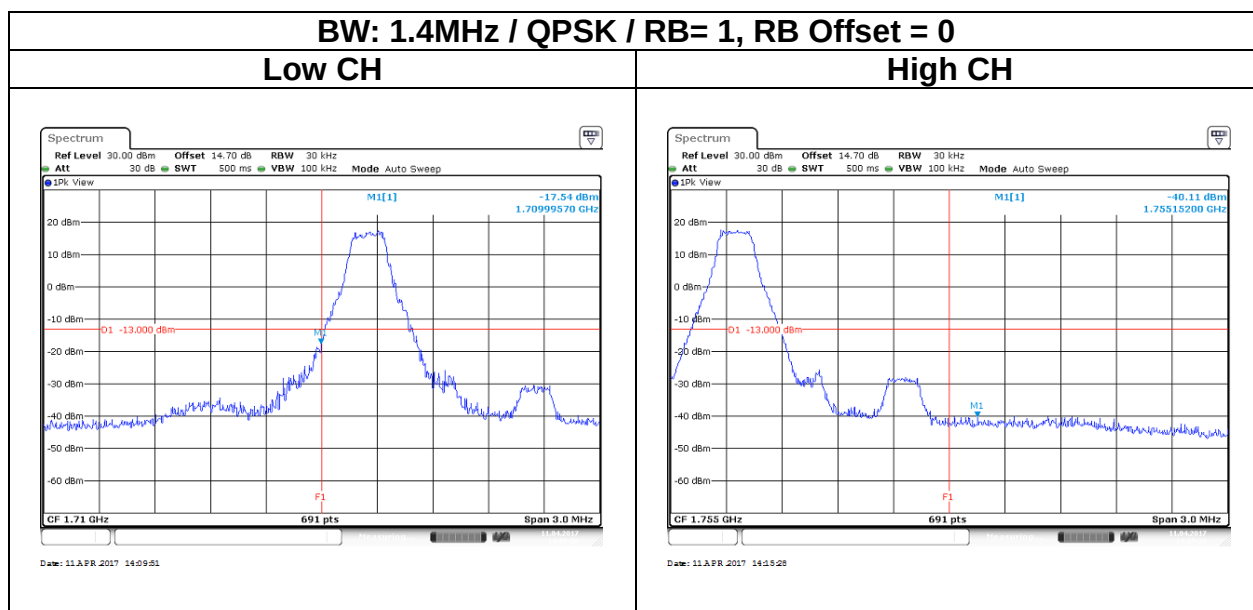
1.  $RBW \geq 1\%$  of the emission bandwidth.
2.  $VBW \geq 3 \times RBW$
3. Span was set large enough so as to capture all out of emissions near the band edge.

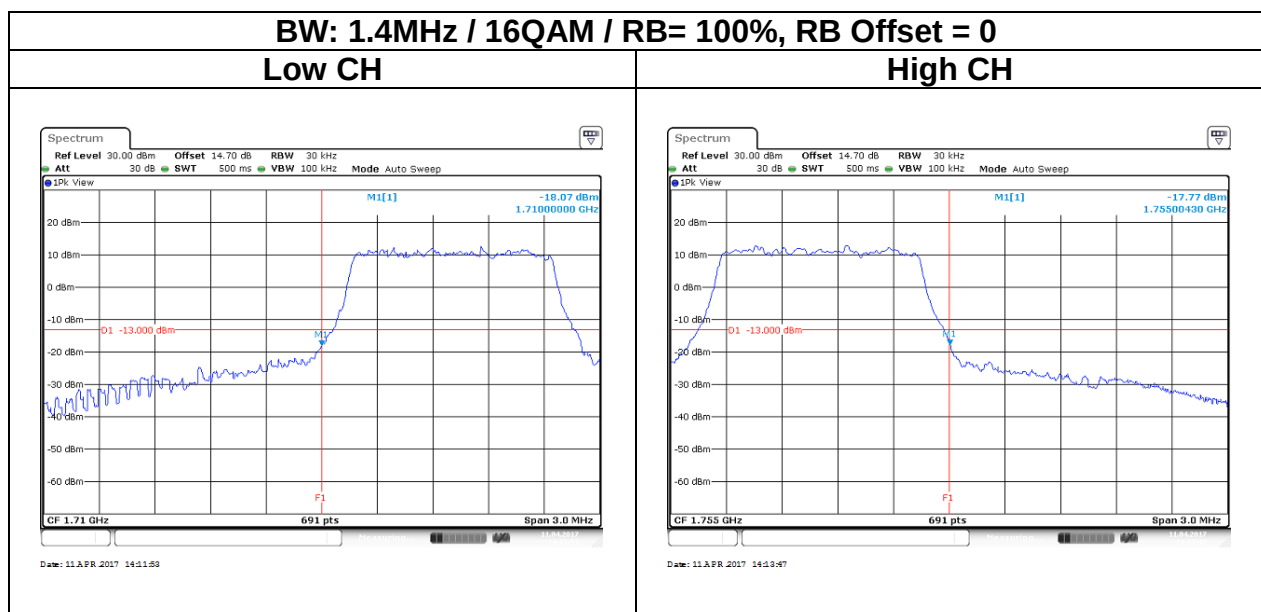
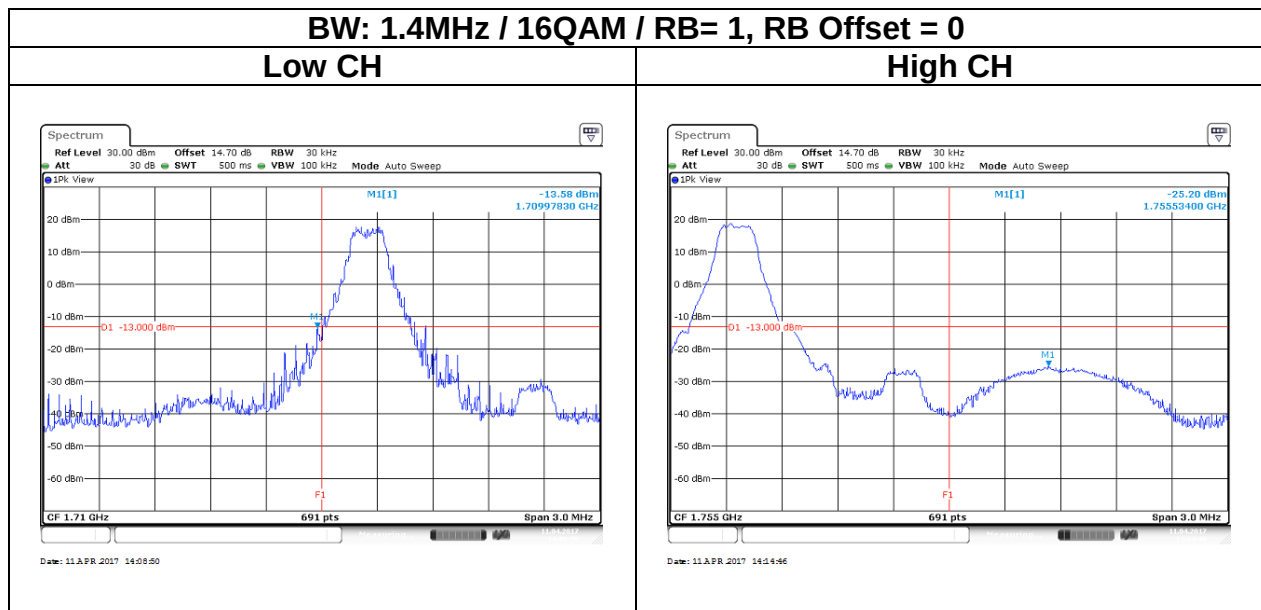
#### **3.4.3 Test Setup**

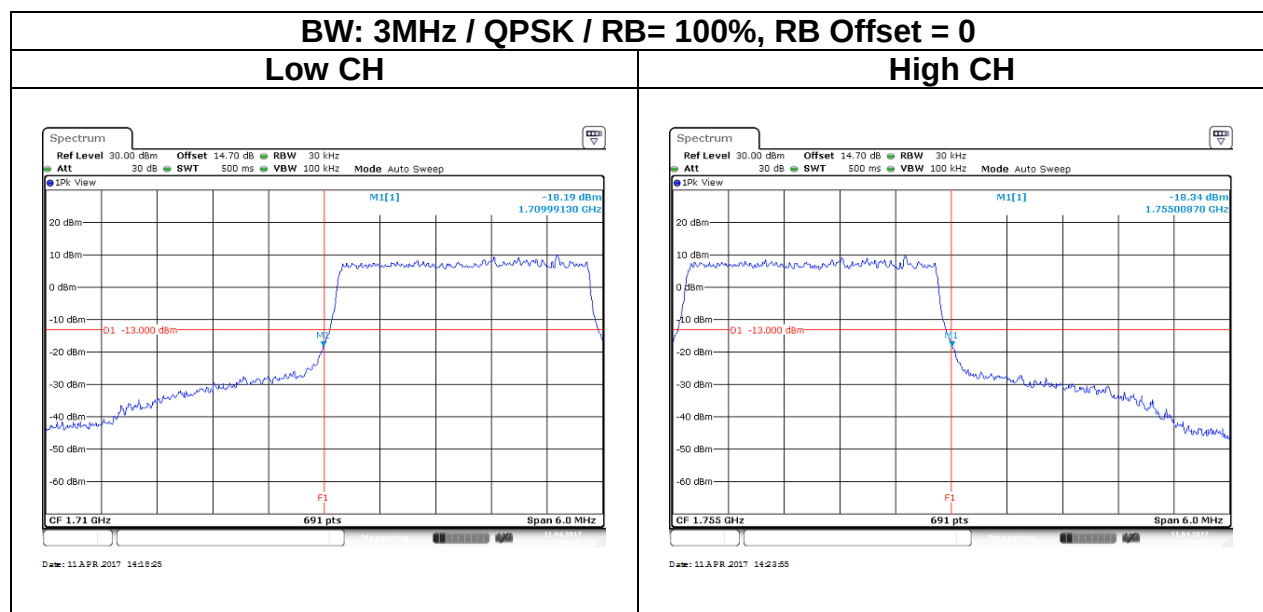
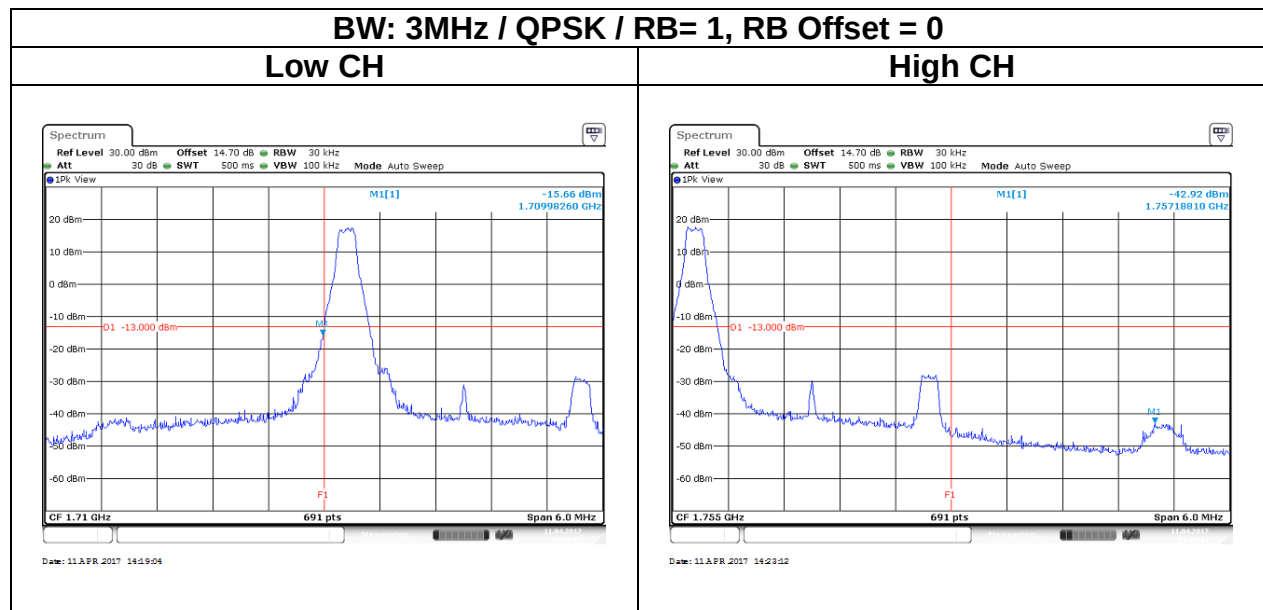


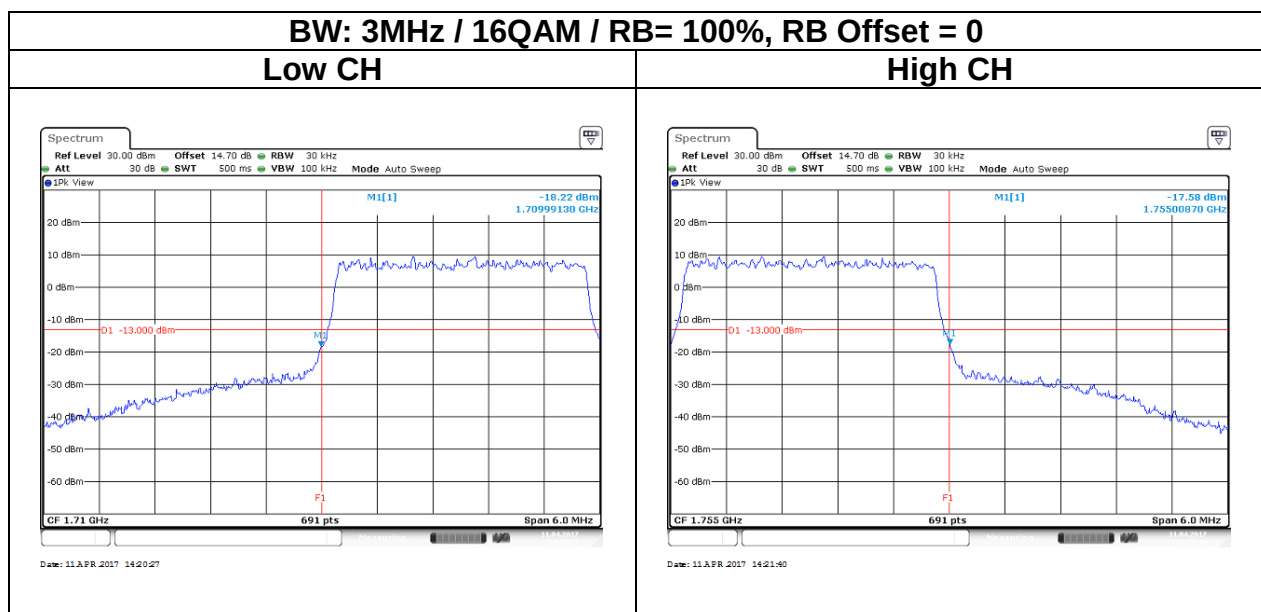
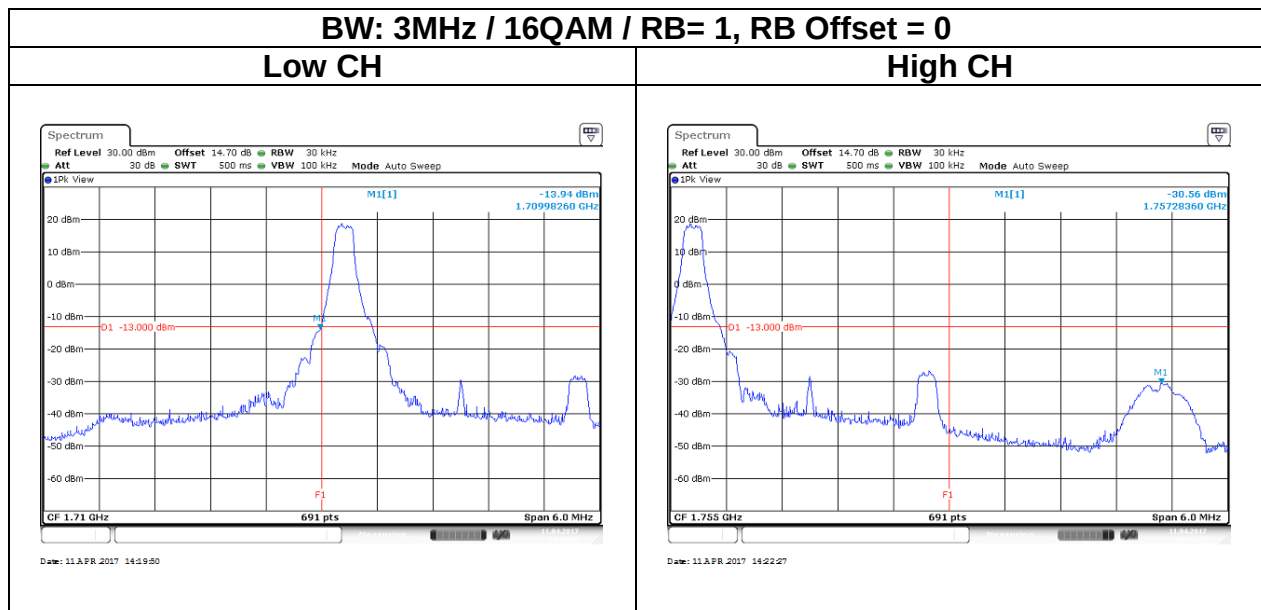
### 3.4.4 Test Result

#### Test Data



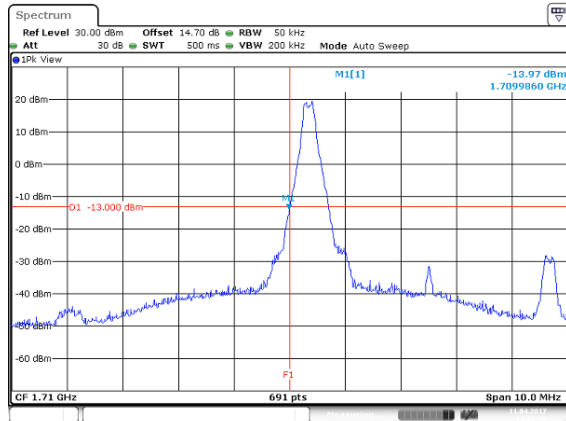




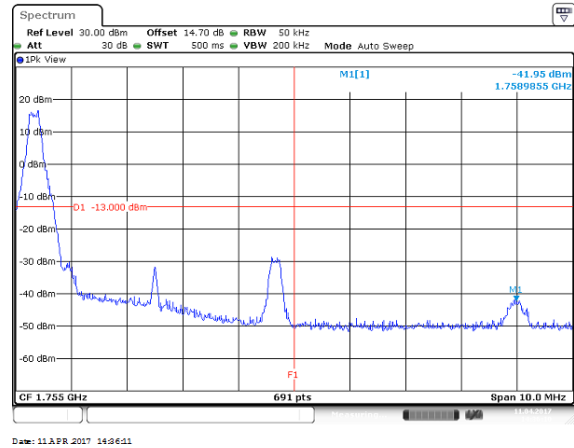


**BW: 5MHz / QPSK / RB= 1, RB Offset = 0**

**Low CH**

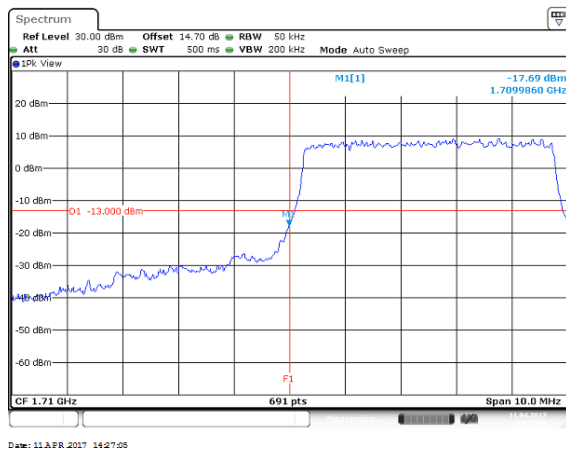


**High CH**

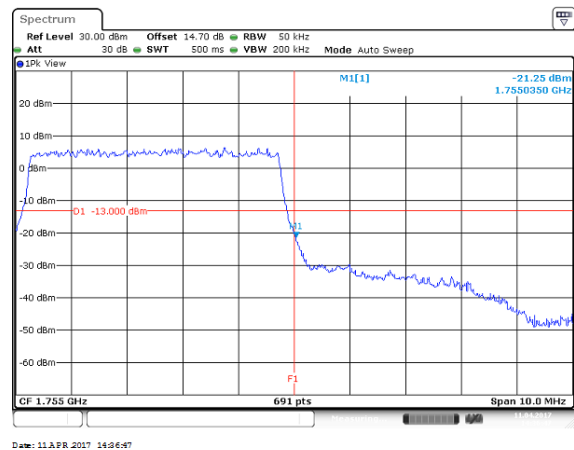


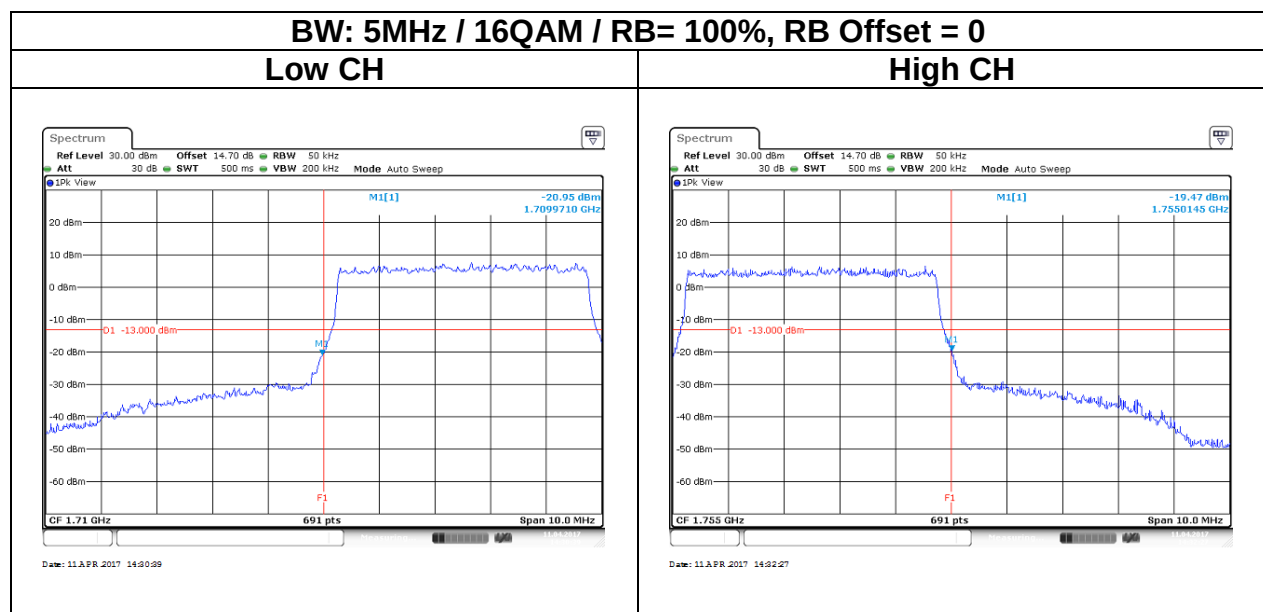
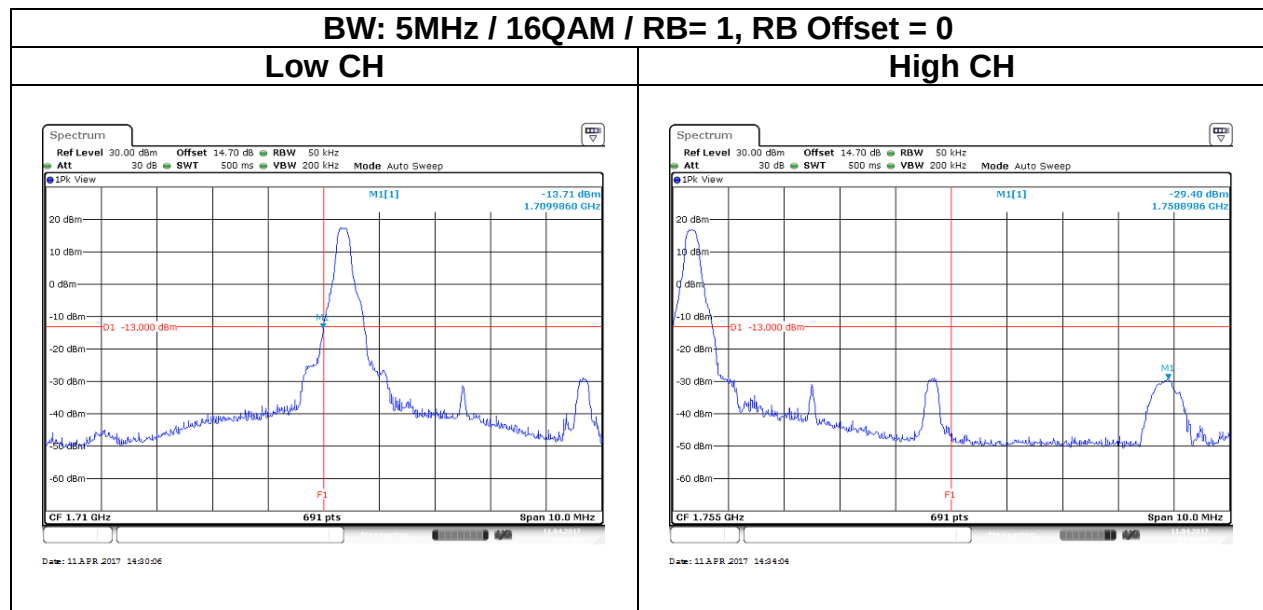
**BW: 5MHz / QPSK / RB= 100%, RB Offset = 0**

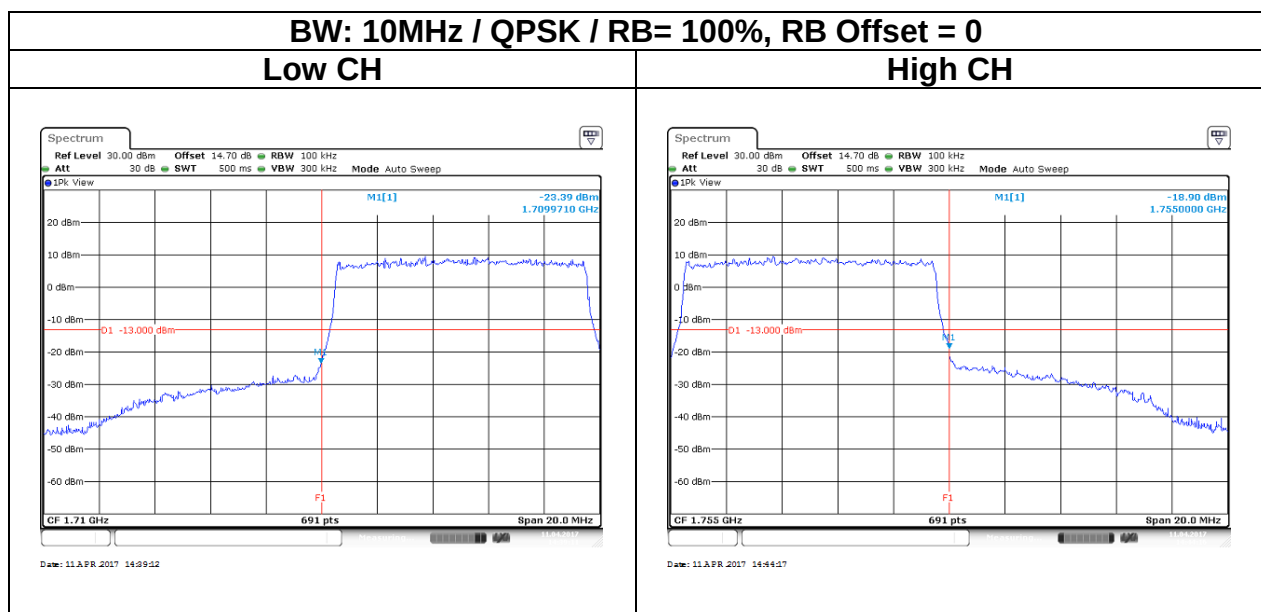
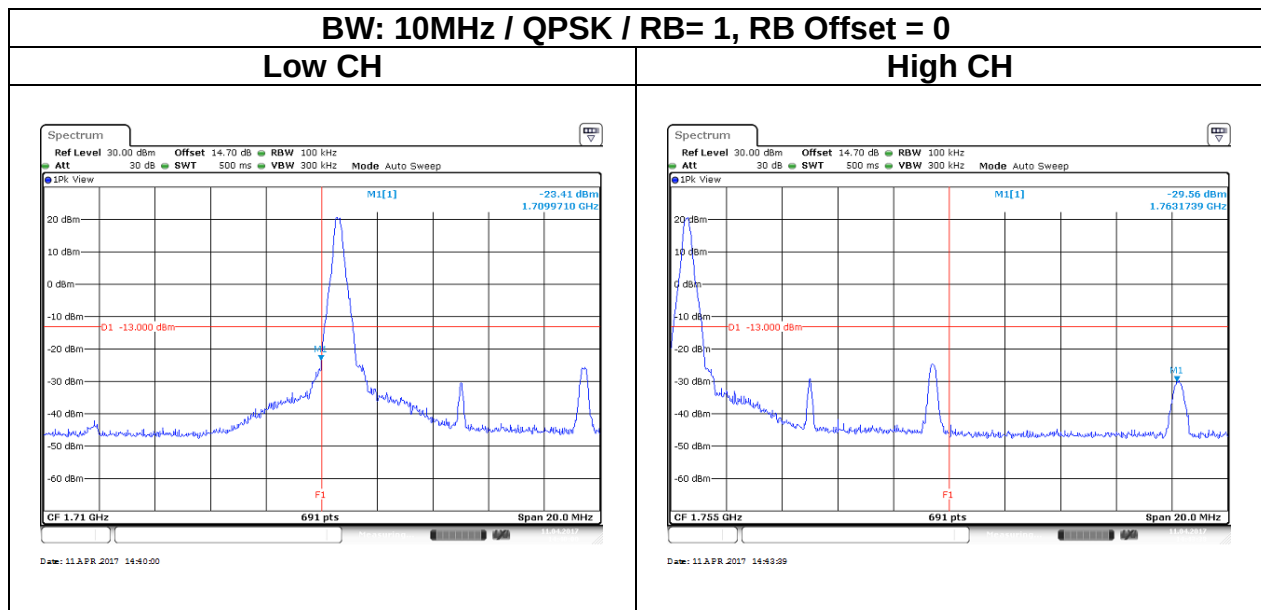
**Low CH**

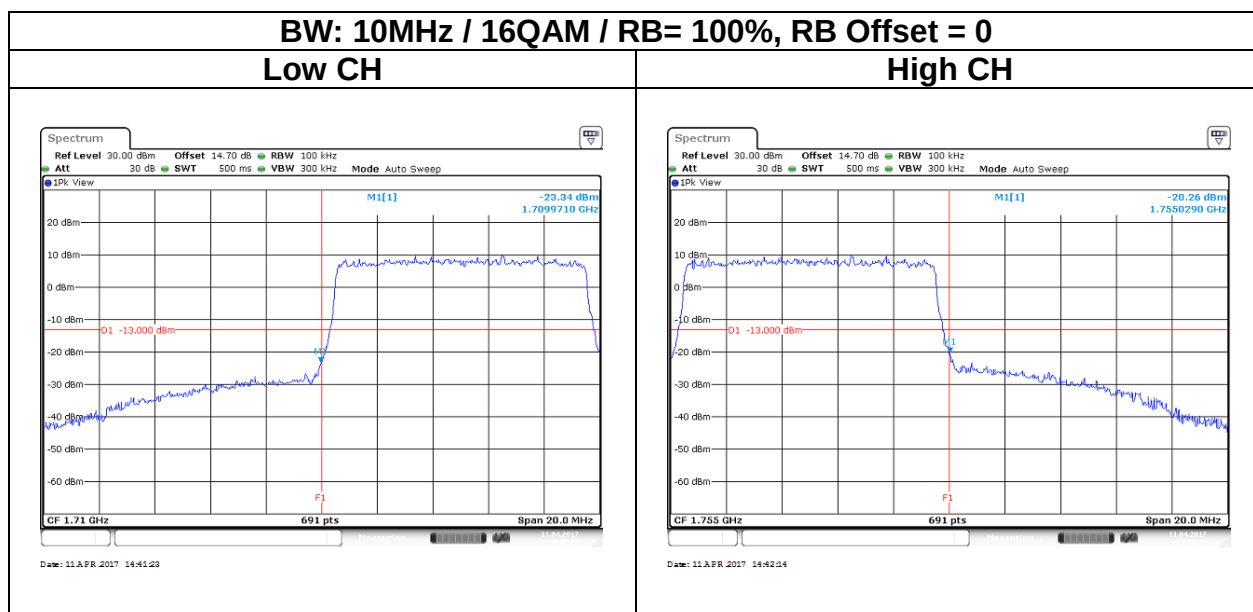
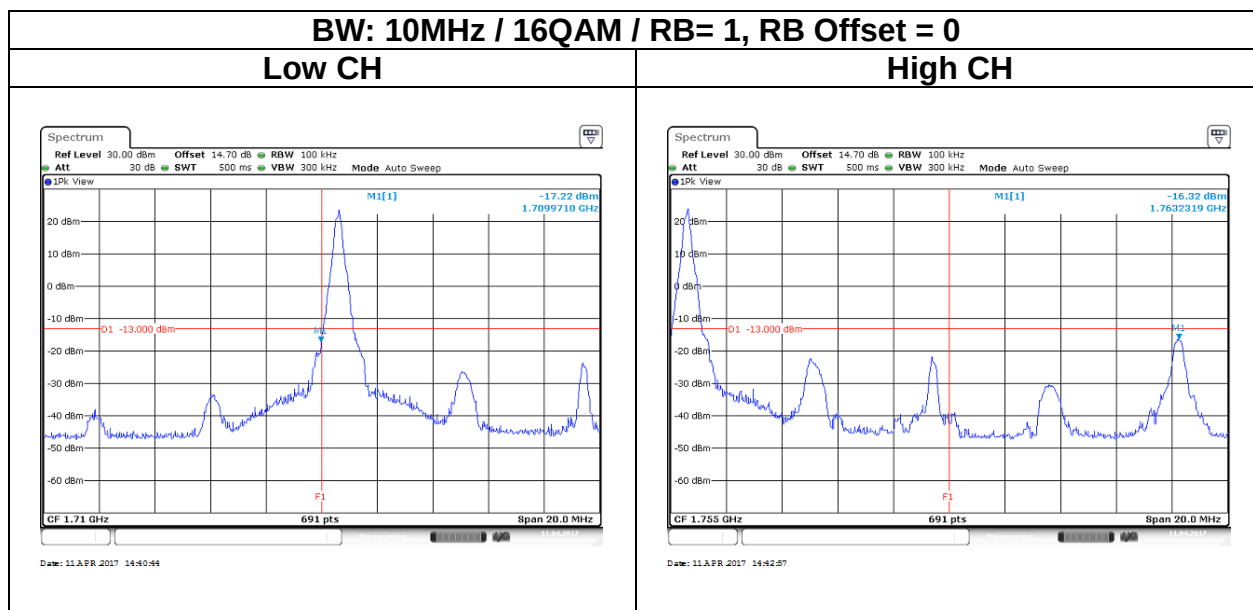


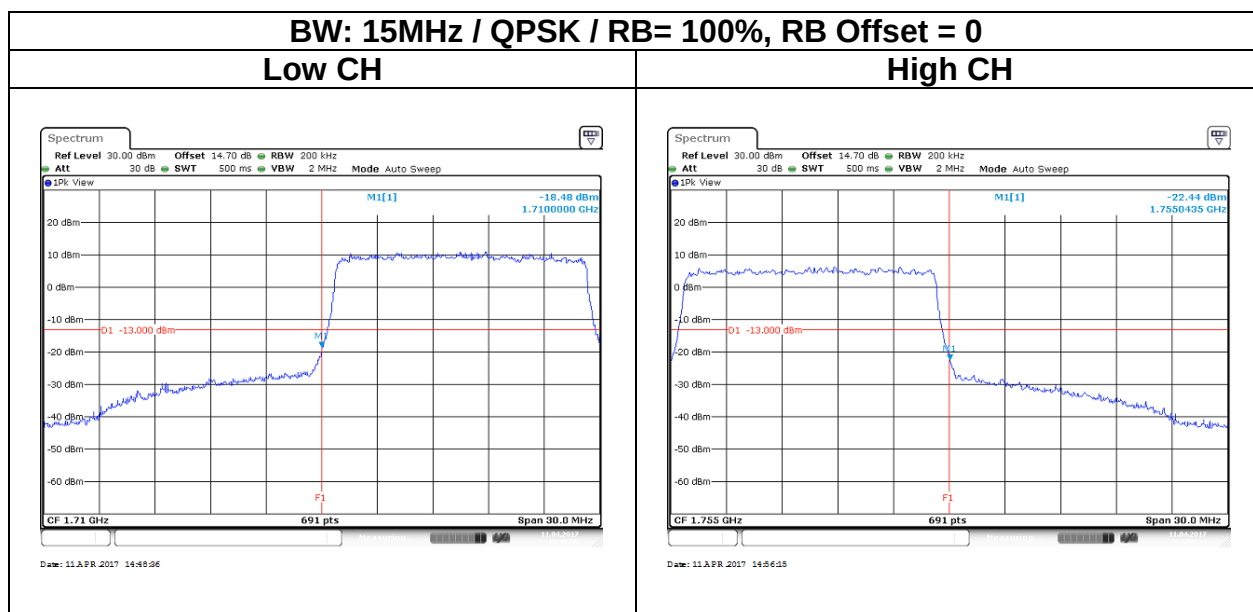
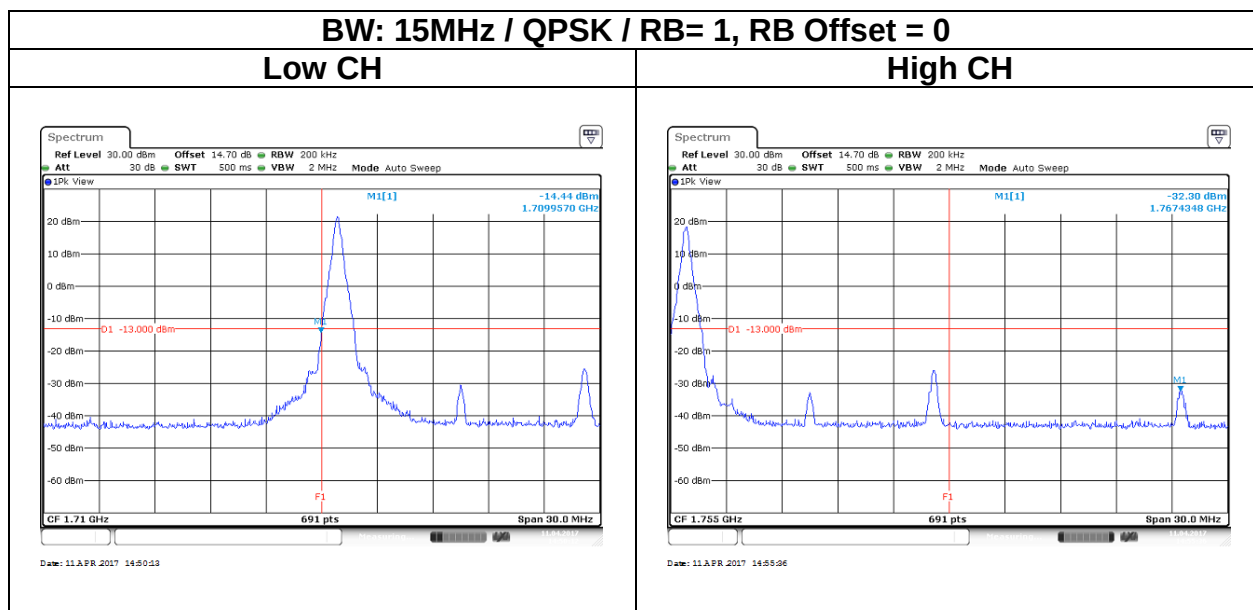
**High CH**

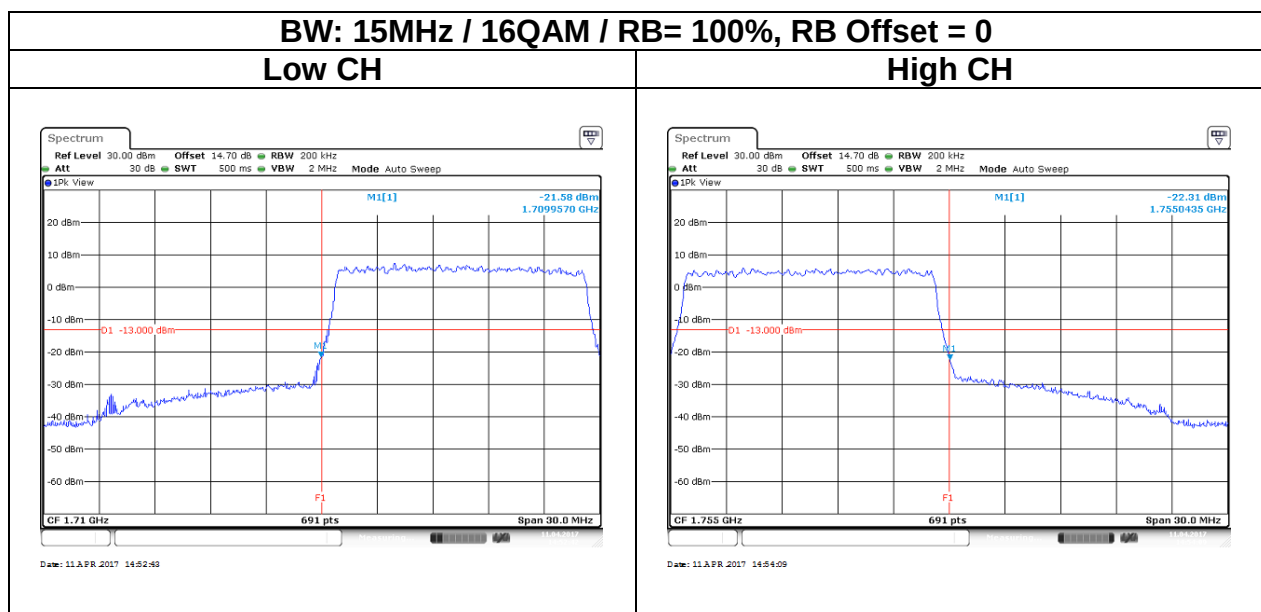
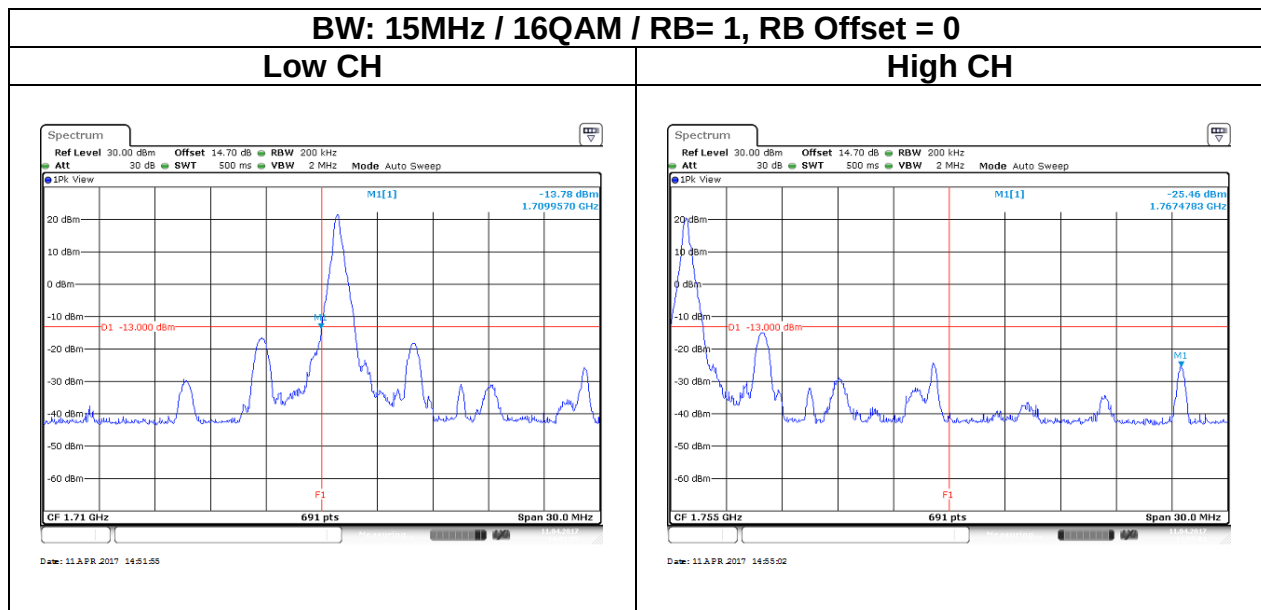


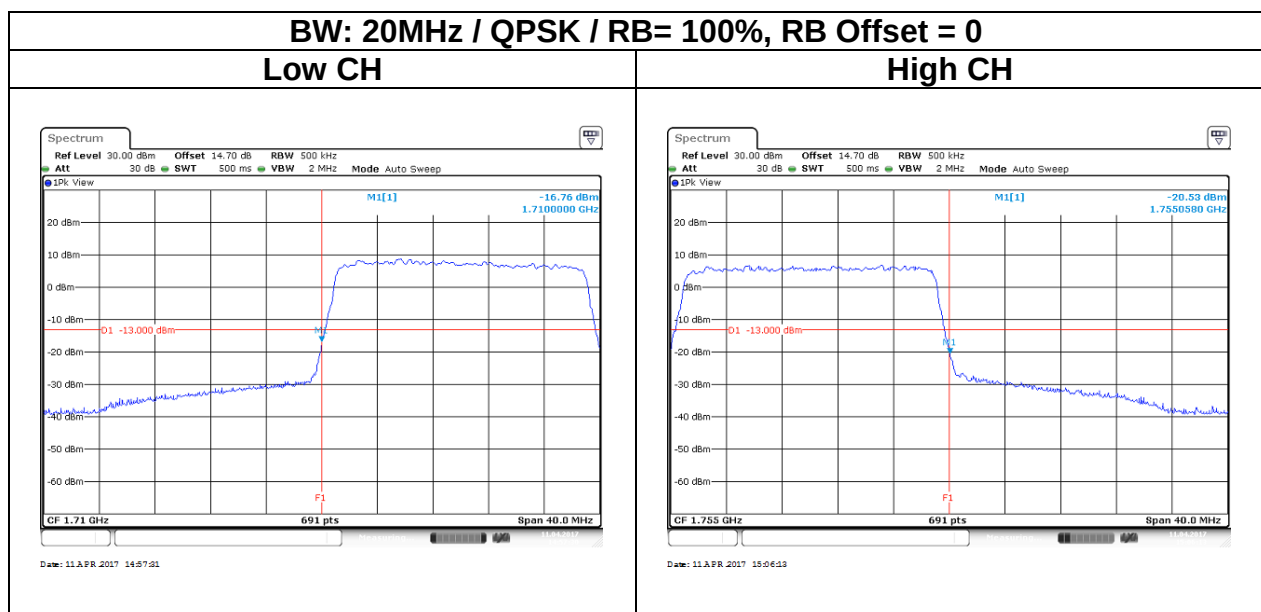
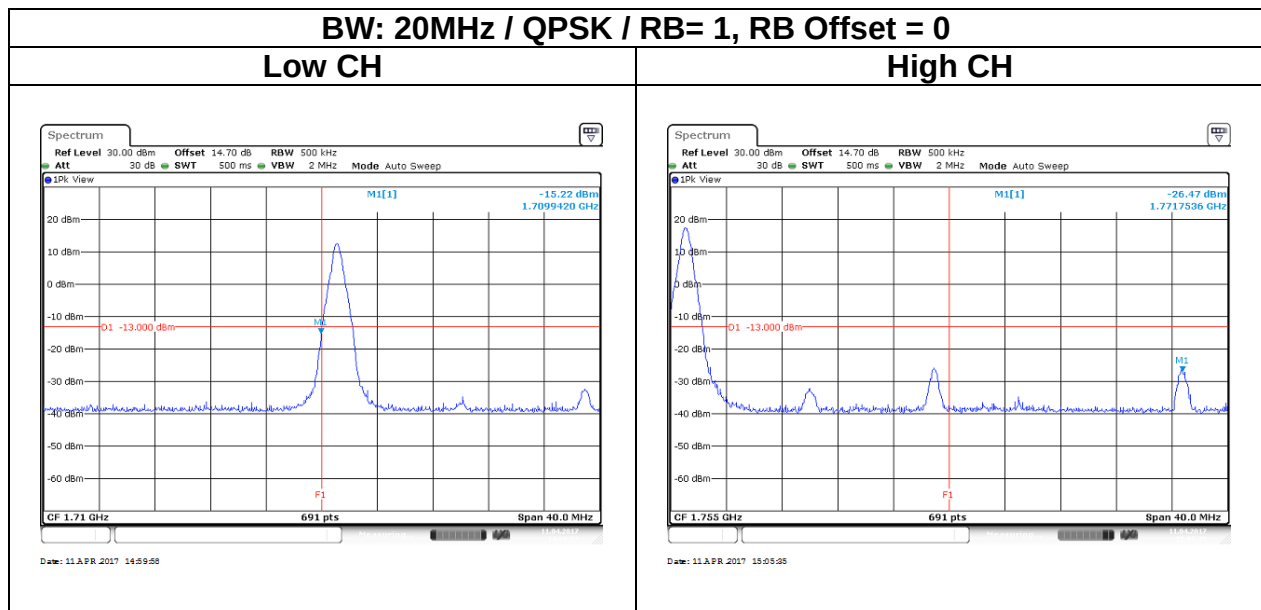


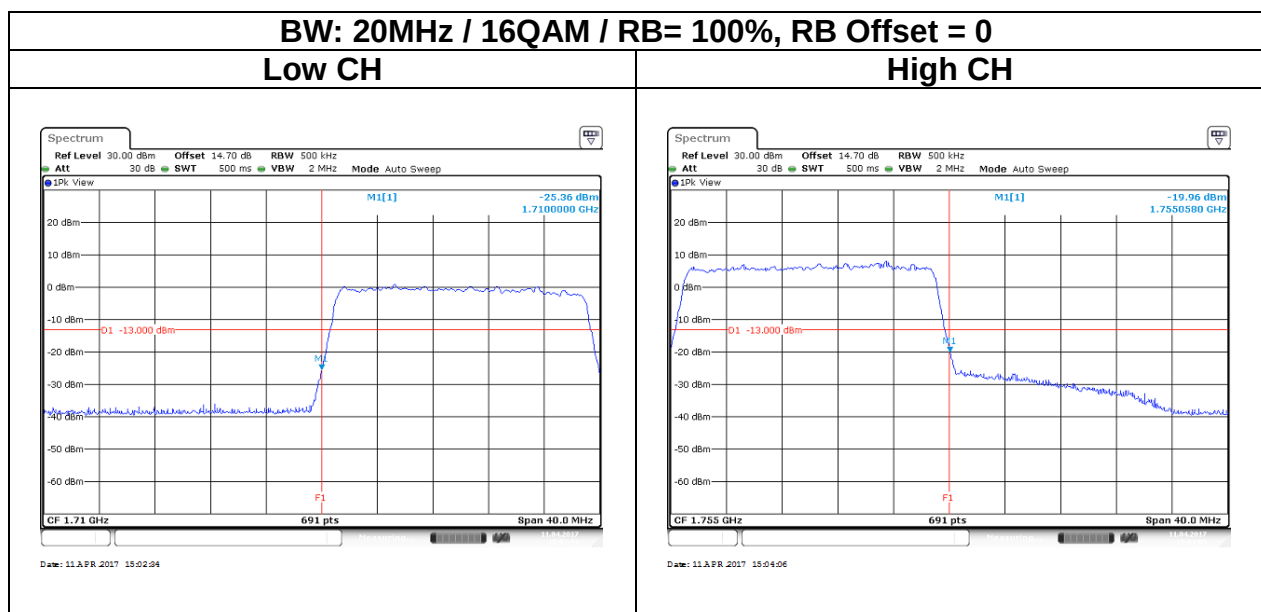
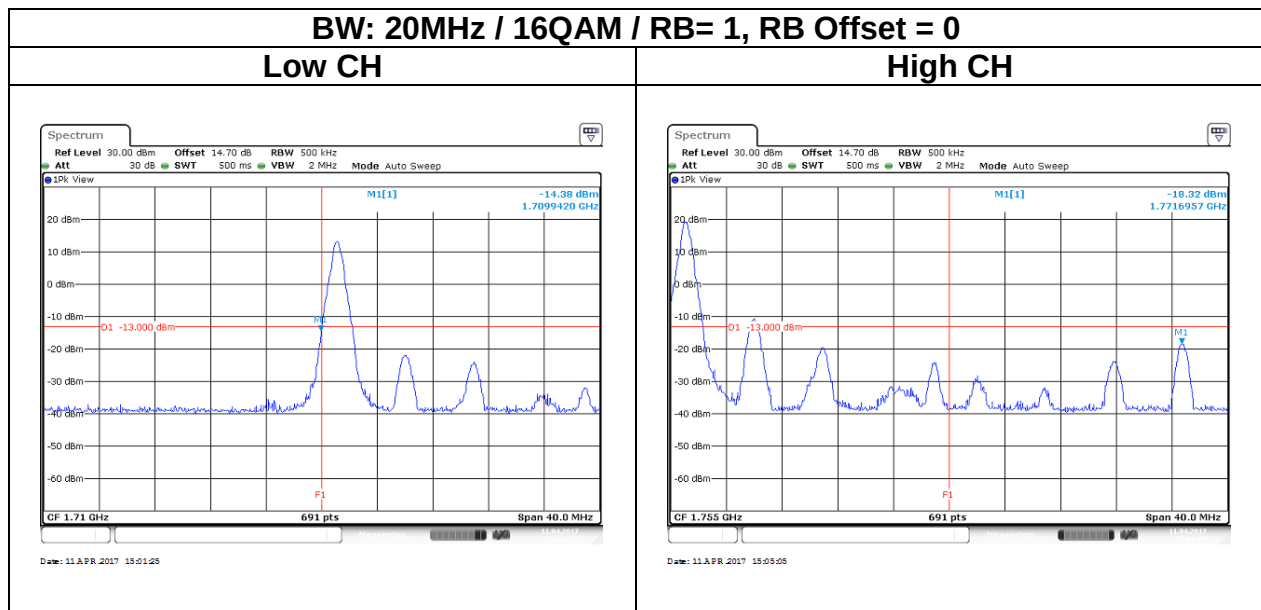












### **3.5 CONDUCTED SPURIOUS EMISSION**

#### **3.5.1 Test Limit**

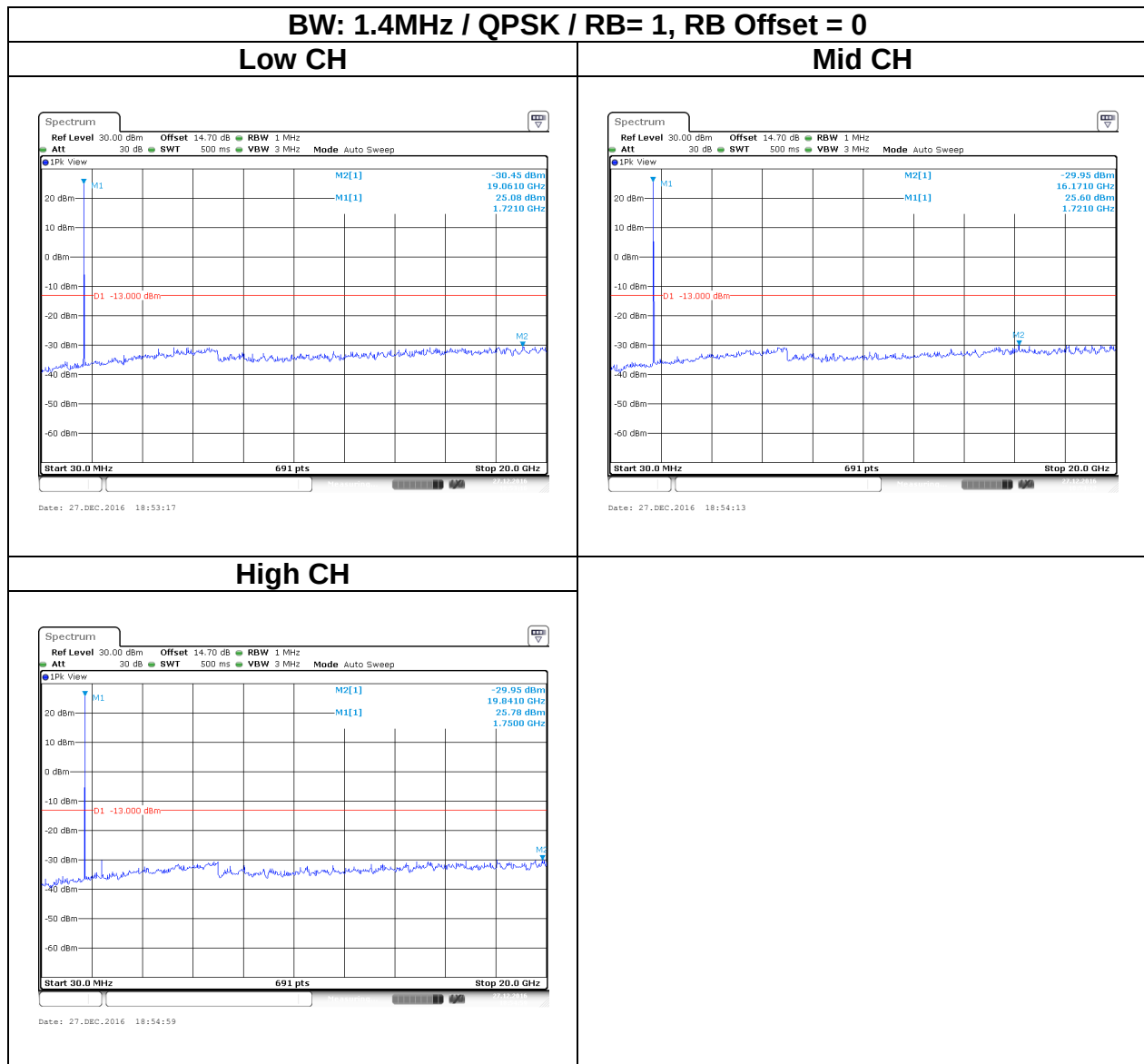
The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB. The limit of emission equal to  $-13\text{dBm}$

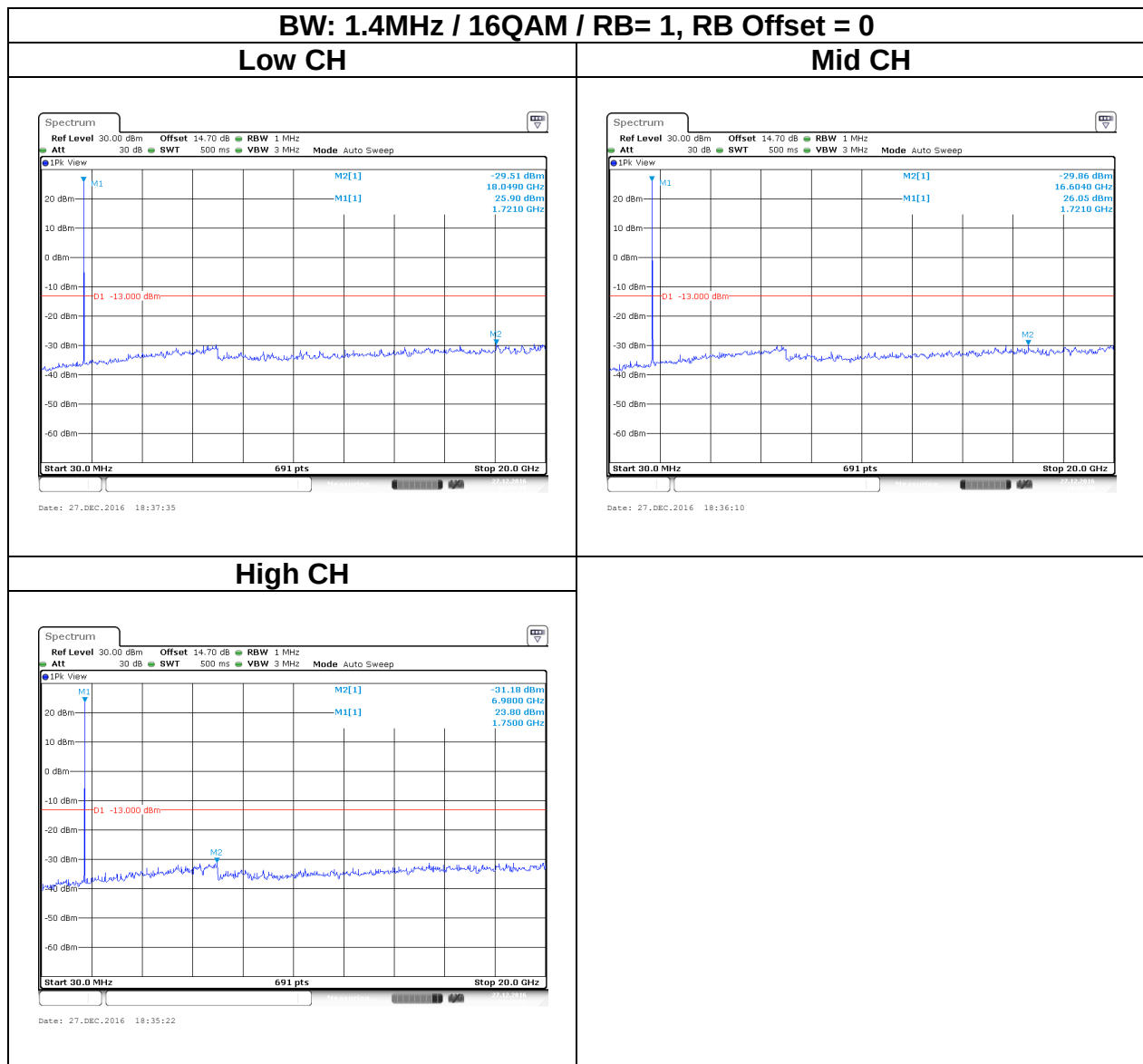
#### **3.5.2 Test Procedure**

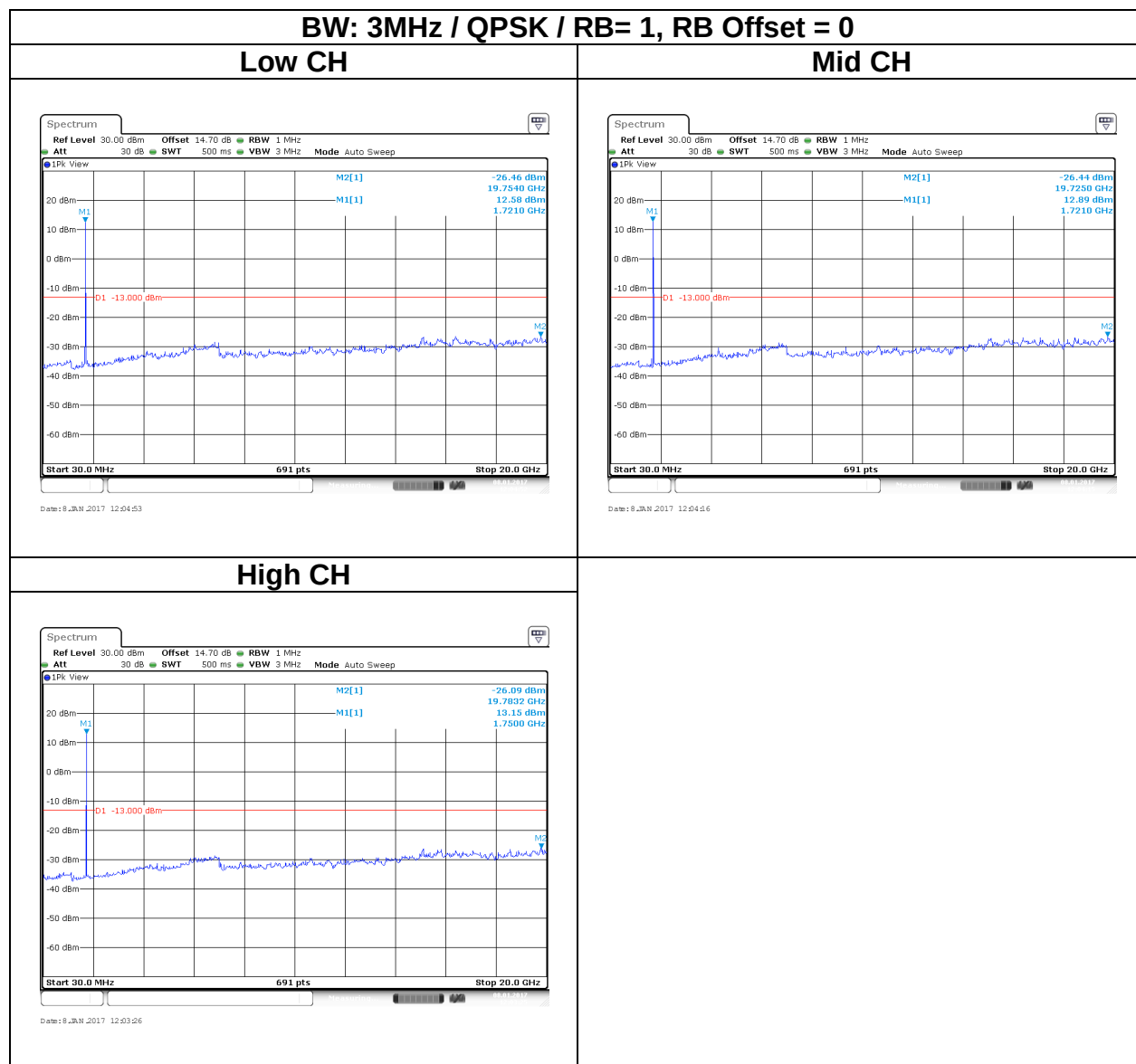
1. According to KDB 971168 D01, section 6.0
  2. The EUT was connect to spectrum analyzer and call box.
  3. The RF output of EUT was connected to the spectrum analyzer.
  4. Set the spectrum analyzer , RBW=1MHz, VBW=3MHz.
  5. Record the maximum spurious emission.
- The fundamental frequency should be excluded against the limit in operating band

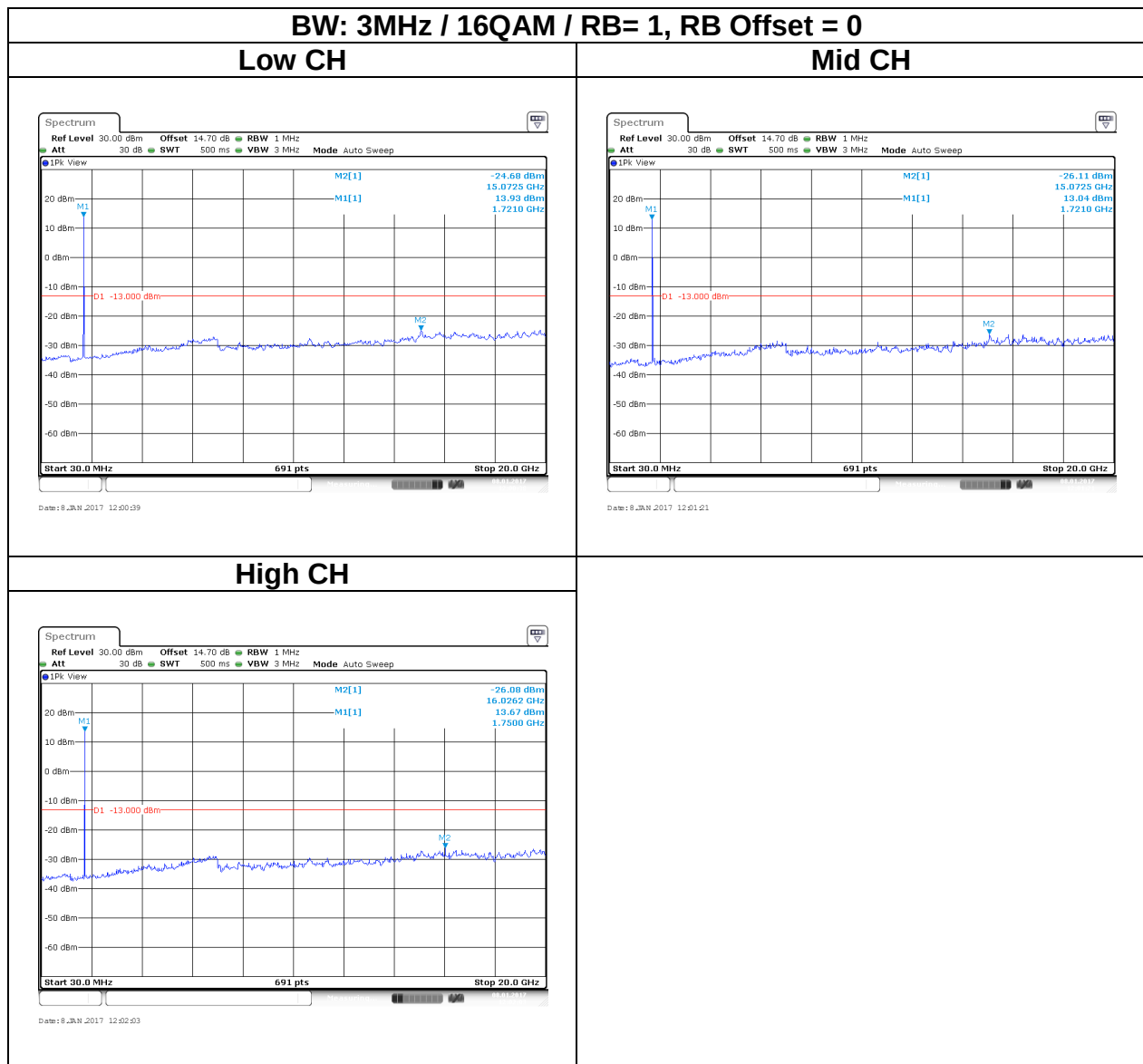
### 3.5.3 Test Result

### Test Data



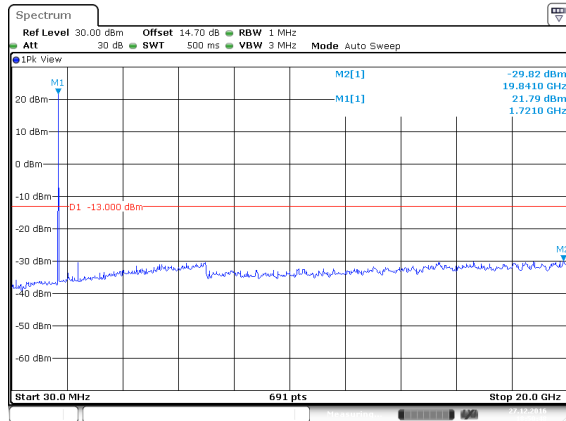




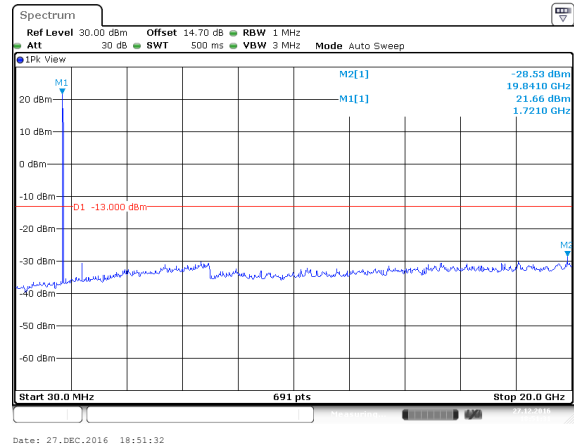


**BW: 5MHz / QPSK / RB= 1, RB Offset = 0**

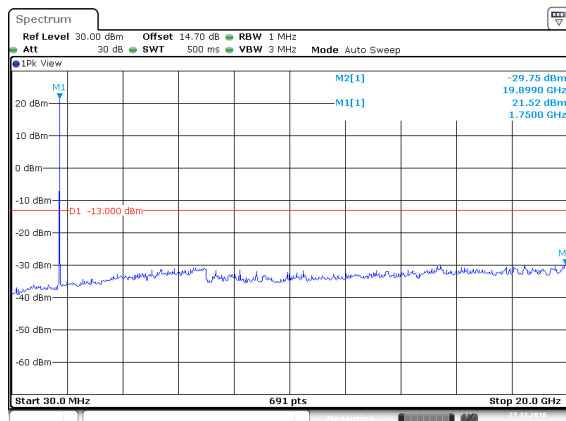
**Low CH**

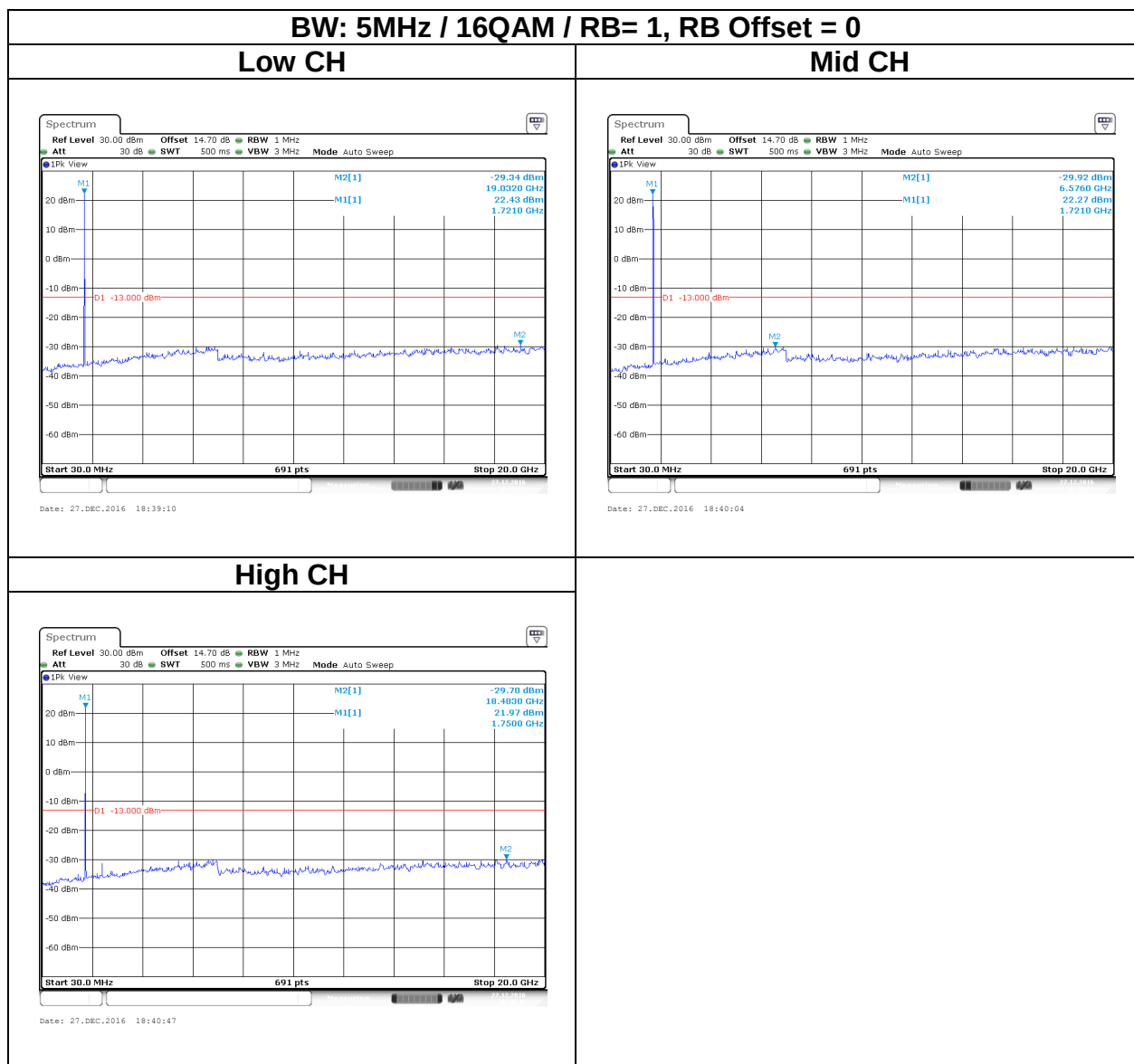


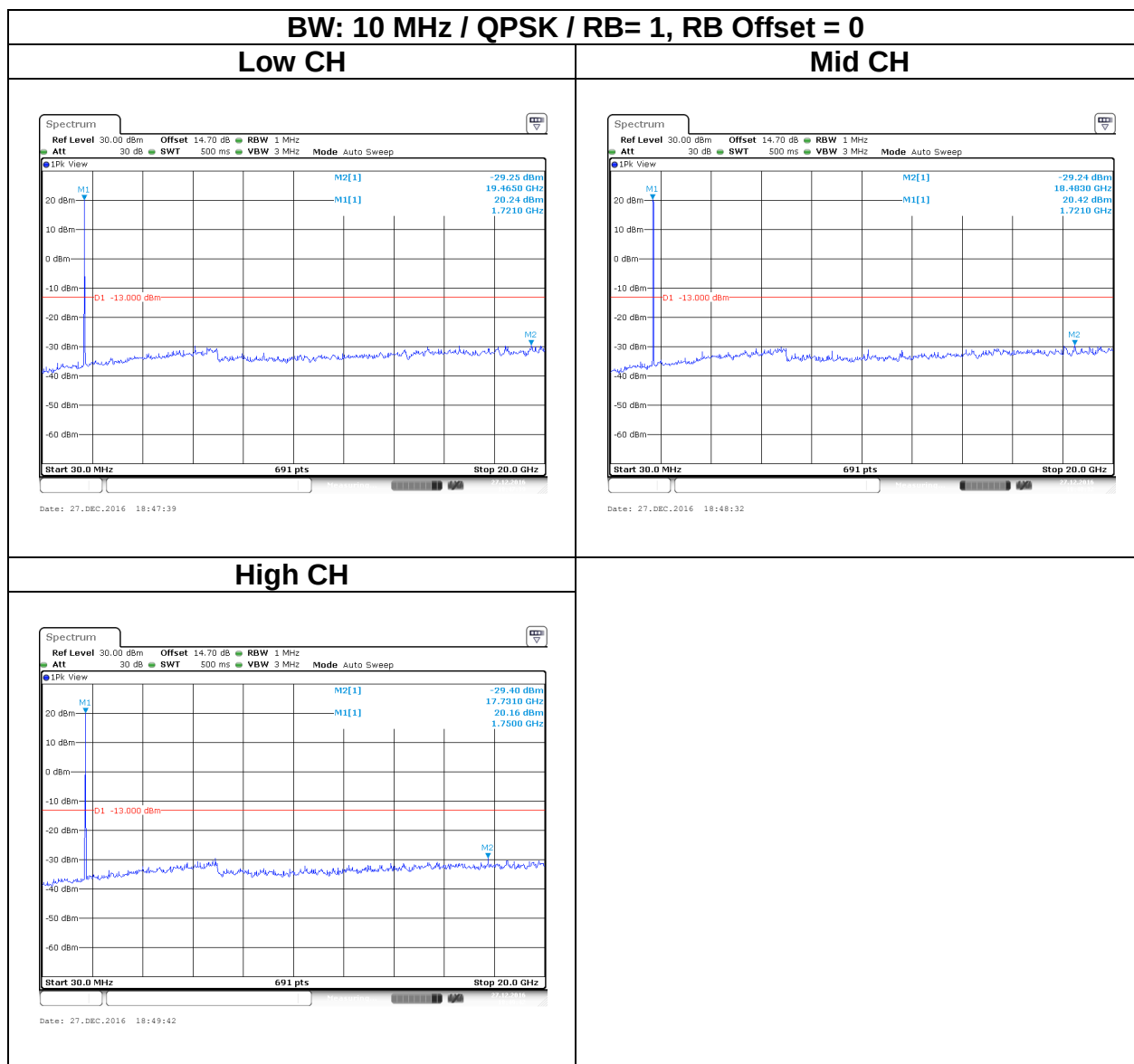
**Mid CH**

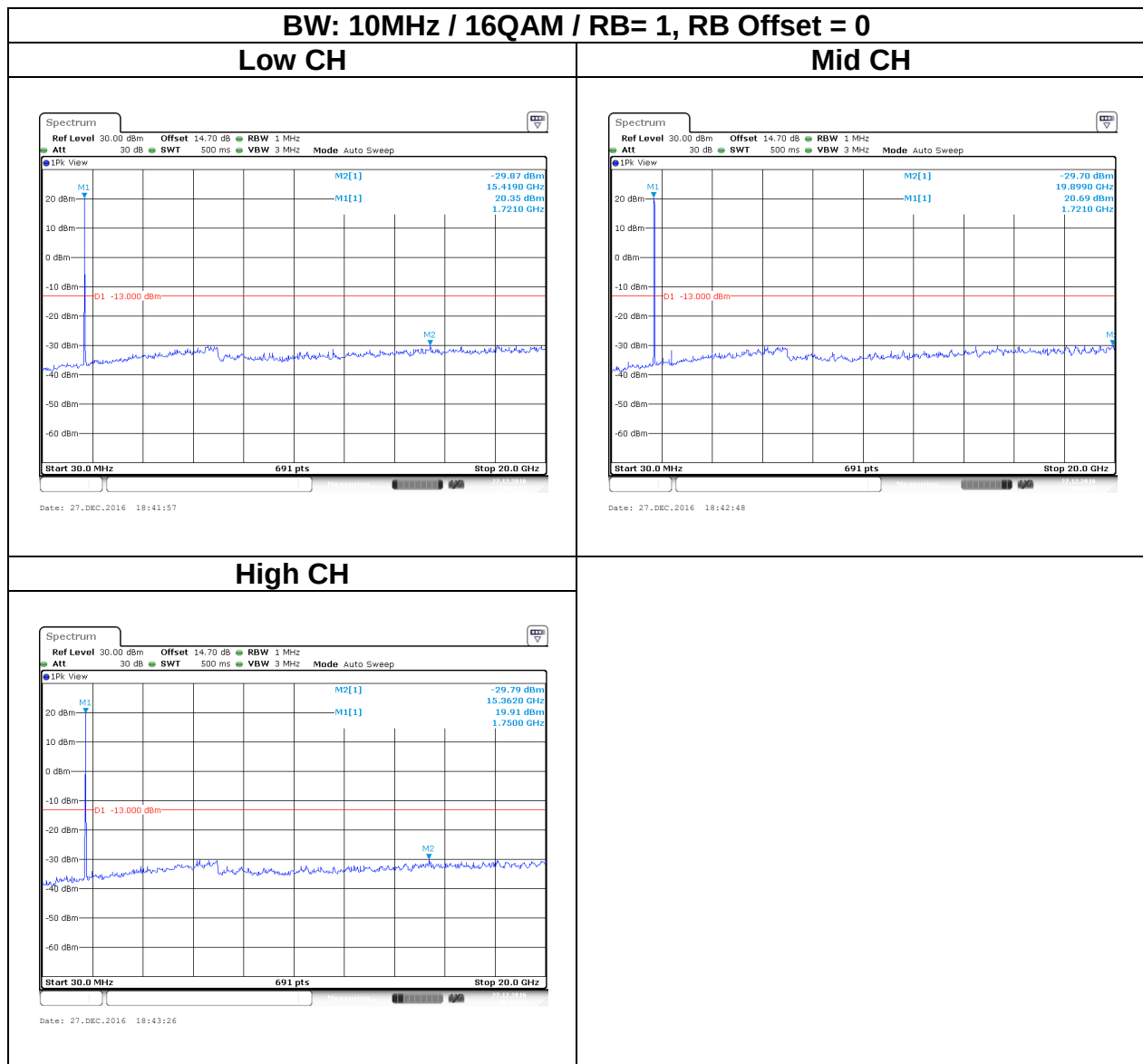


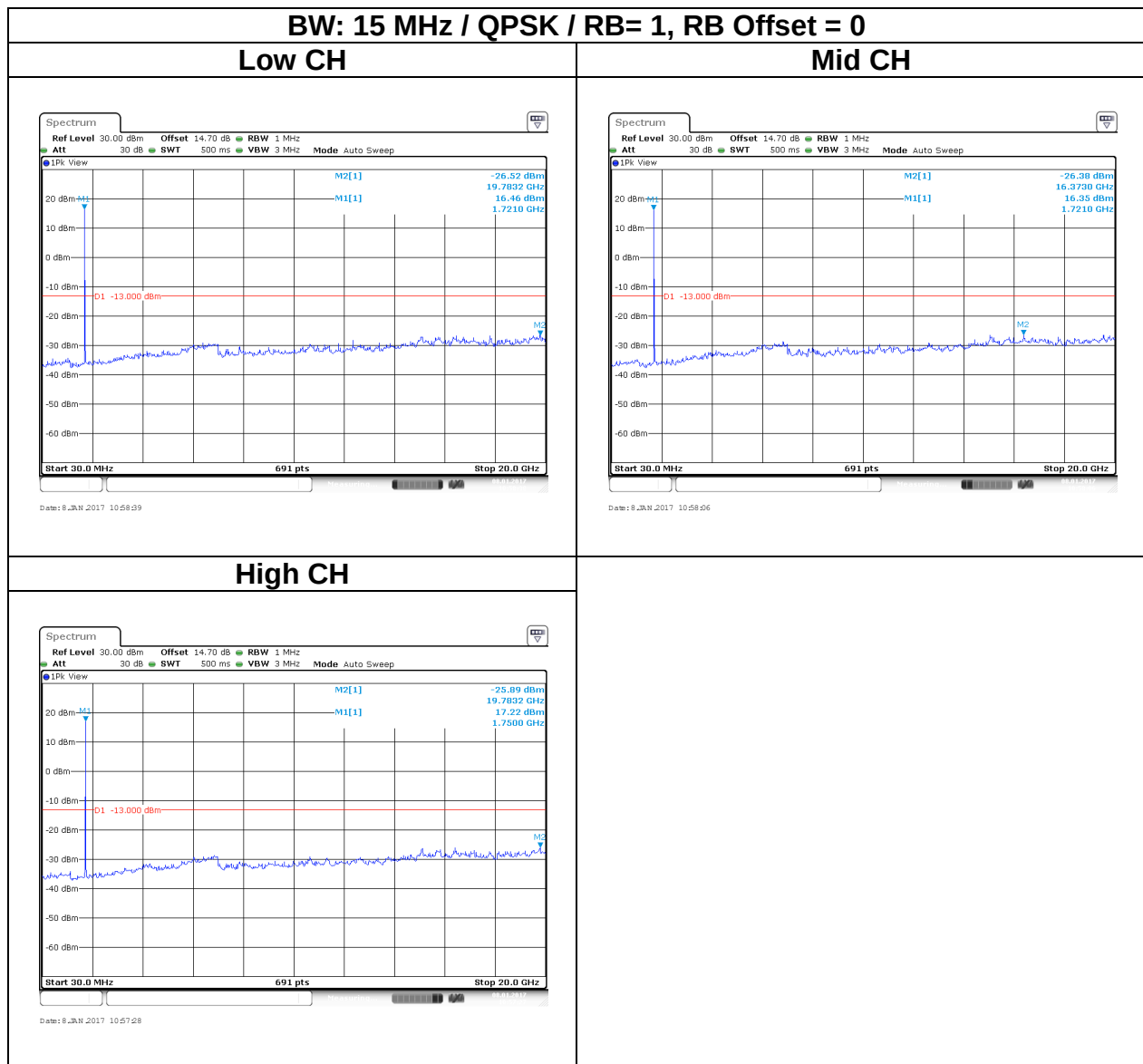
**High CH**





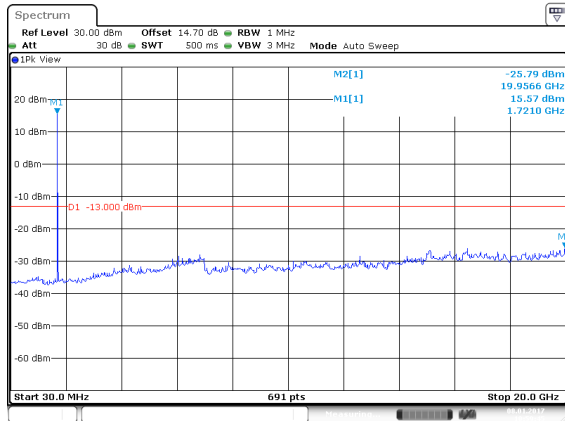






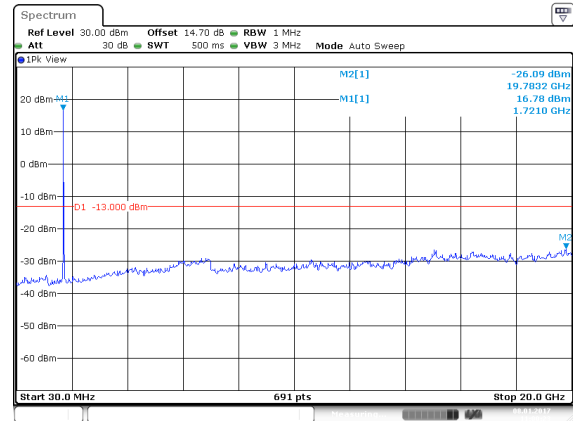
**BW: 15MHz / 16QAM / RB= 1, RB Offset = 0**

**Low CH**



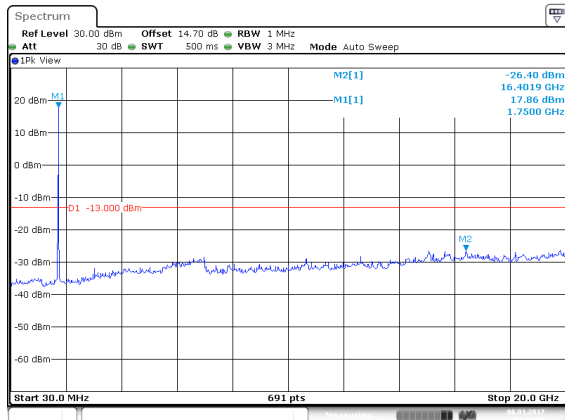
Date: 8 JAN 2017 10:59:46

**Mid CH**

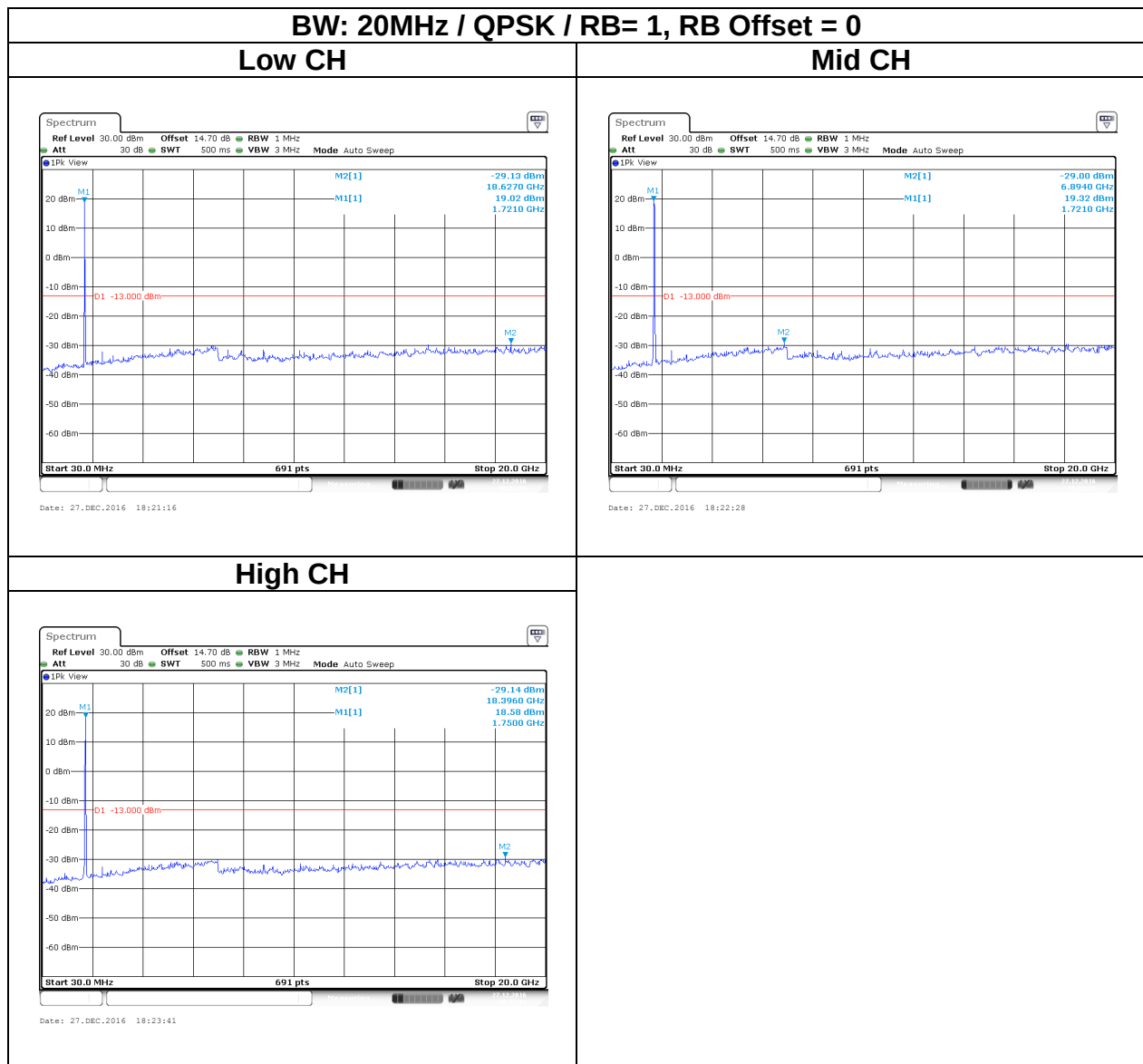


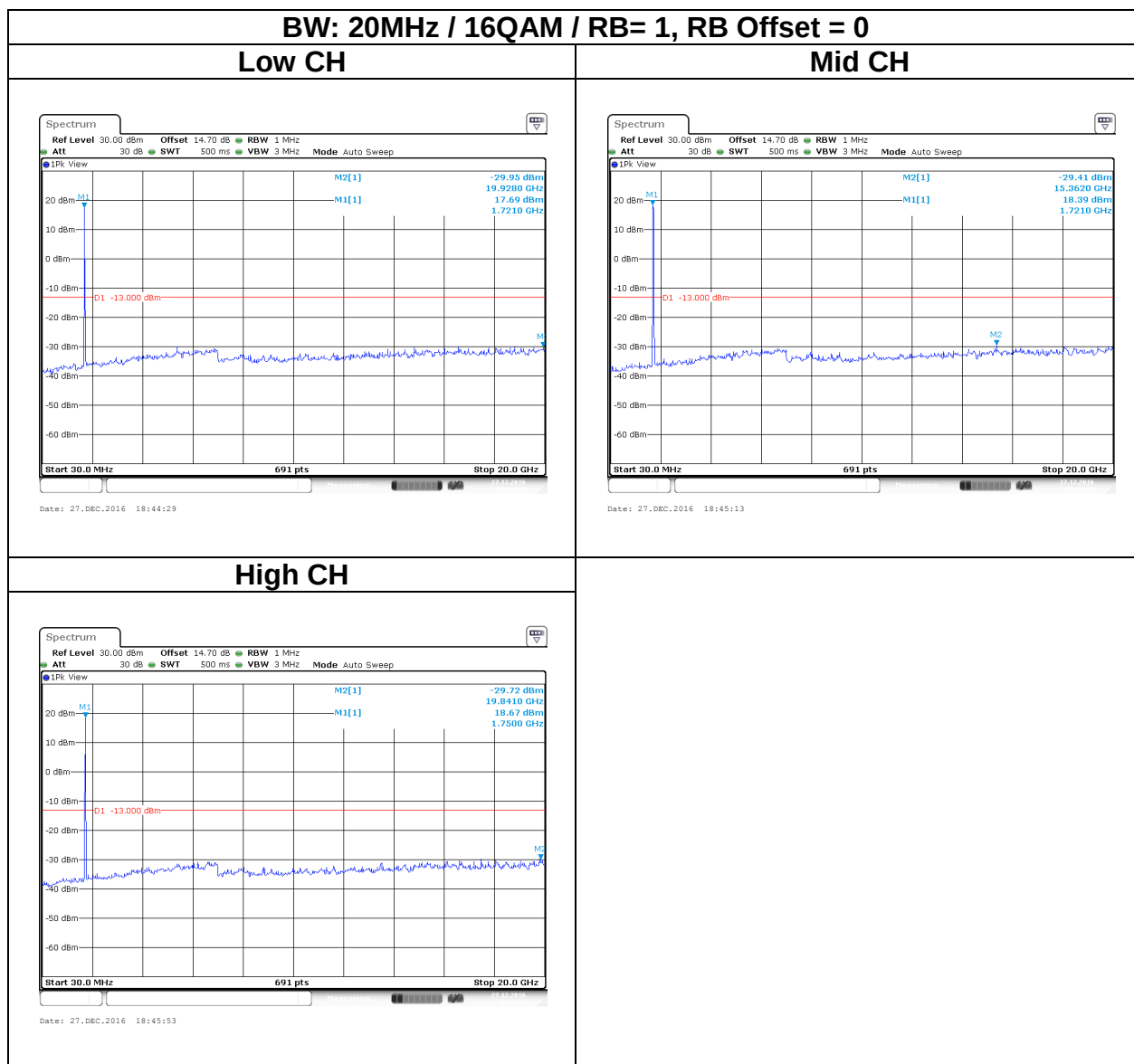
Date: 8 JAN 2017 11:00:23

**High CH**



Date: 8 JAN 2017 11:01:08





## **3.6 RADIATION EMISSION**

### **3.6.1 Test Limit**

According to FCC §27.53(h), Band 4

General protection levels. Except as otherwise specified below, for operations in the 1710-1755MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.

Limit Line: -13dBm

### **3.6.2 Test Procedure**

According to KDB 971168 D01. section 5.8 and TIA-603-D:2010 section 2.2.12,.

1. The EUT was placed on a turntable

(1) Below 1G : 0.8m

(2) Above 1G : 1.5m

(3) EUT set 3m from the receiving antenna

(4) The table was rotated 360 degrees of the highest spurious emission to determine the position.

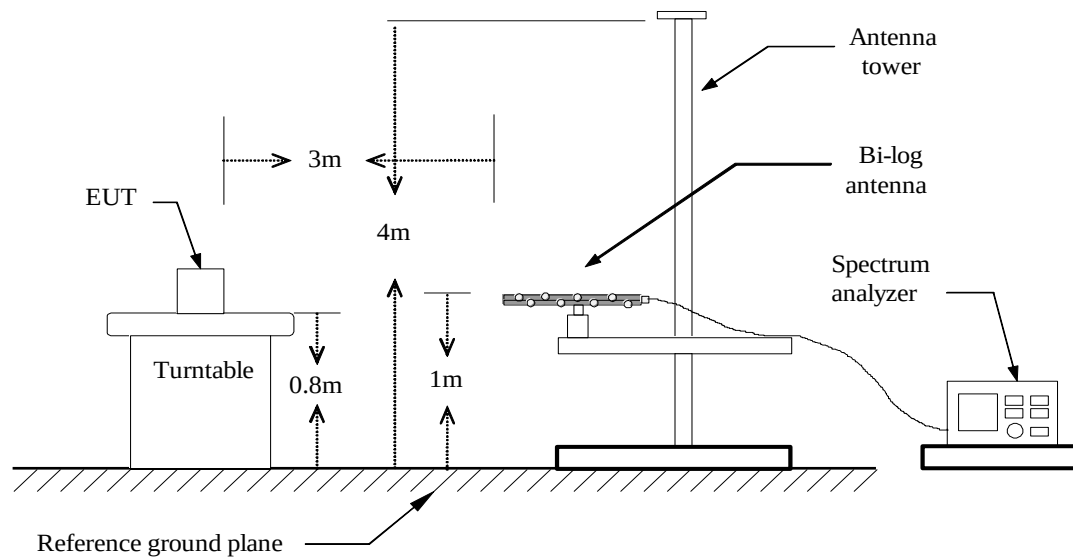
2. Set the spectrum analyzer , RBW=1MHz, VBW=3MHz.

3. A horn antenna was driven by a signal generator.

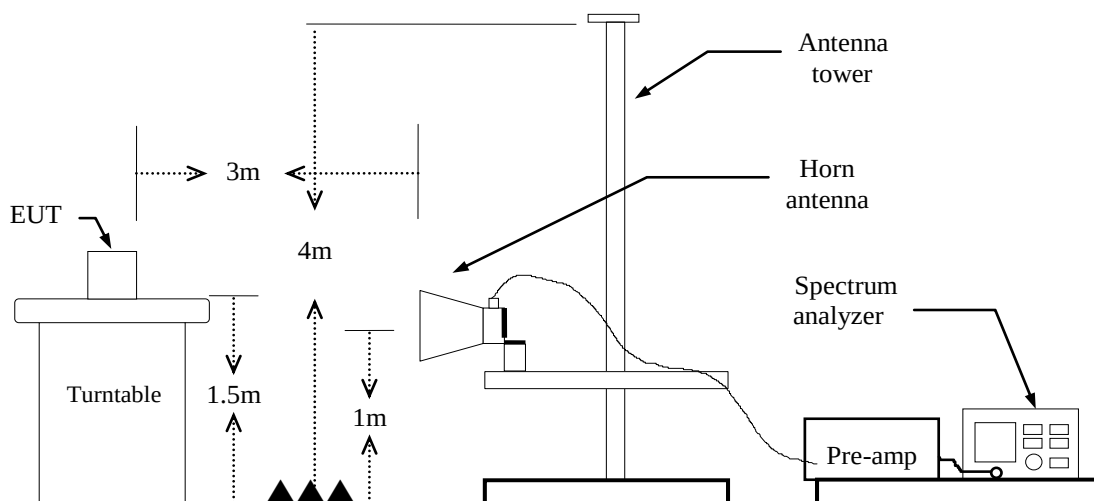
4. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission

### 3.6.3 Test Setup

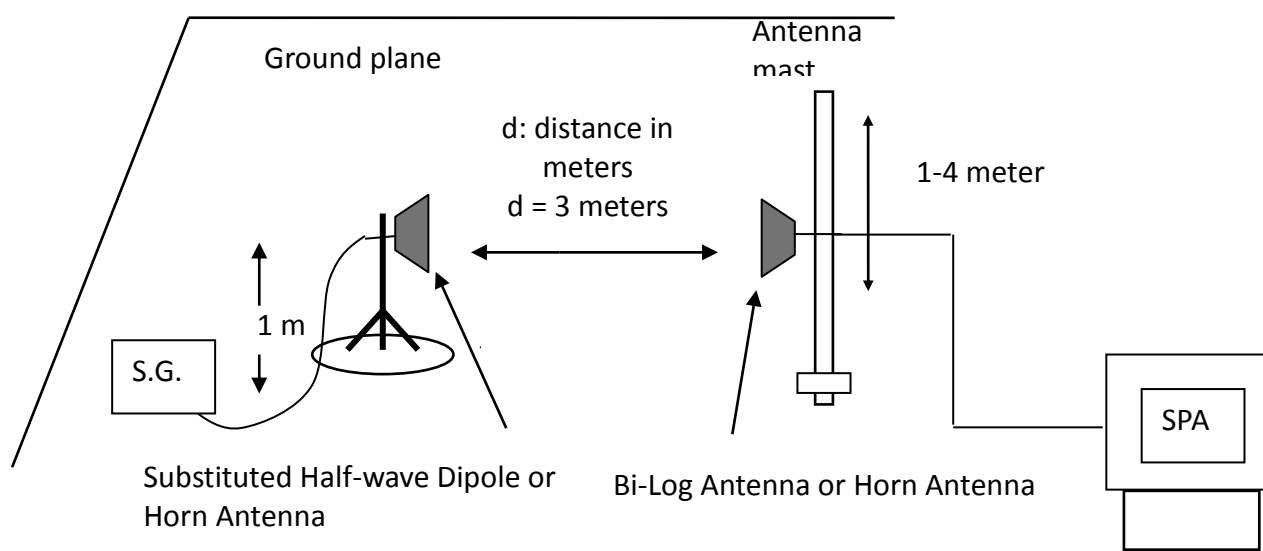
#### Below 1GHz



#### Above 1 GHz



## Substituted Method Test Set-up



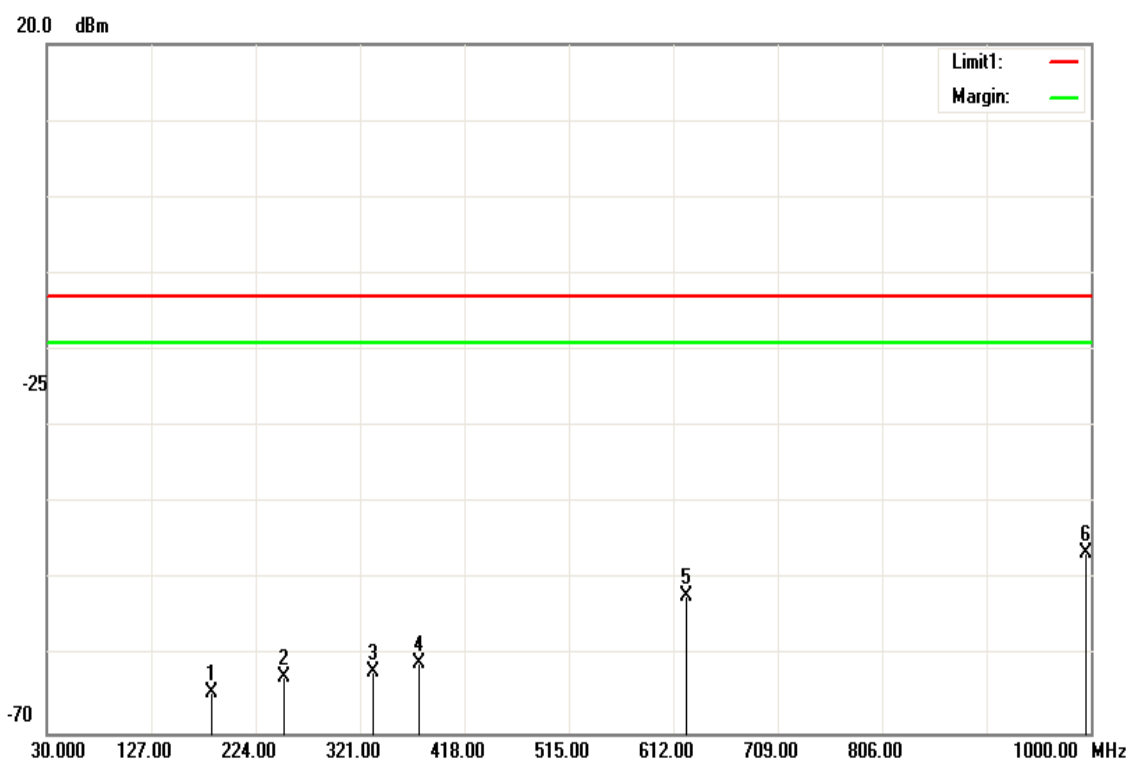
### 3.6.4 Test Result

#### Test Data

#### LTE Band 4

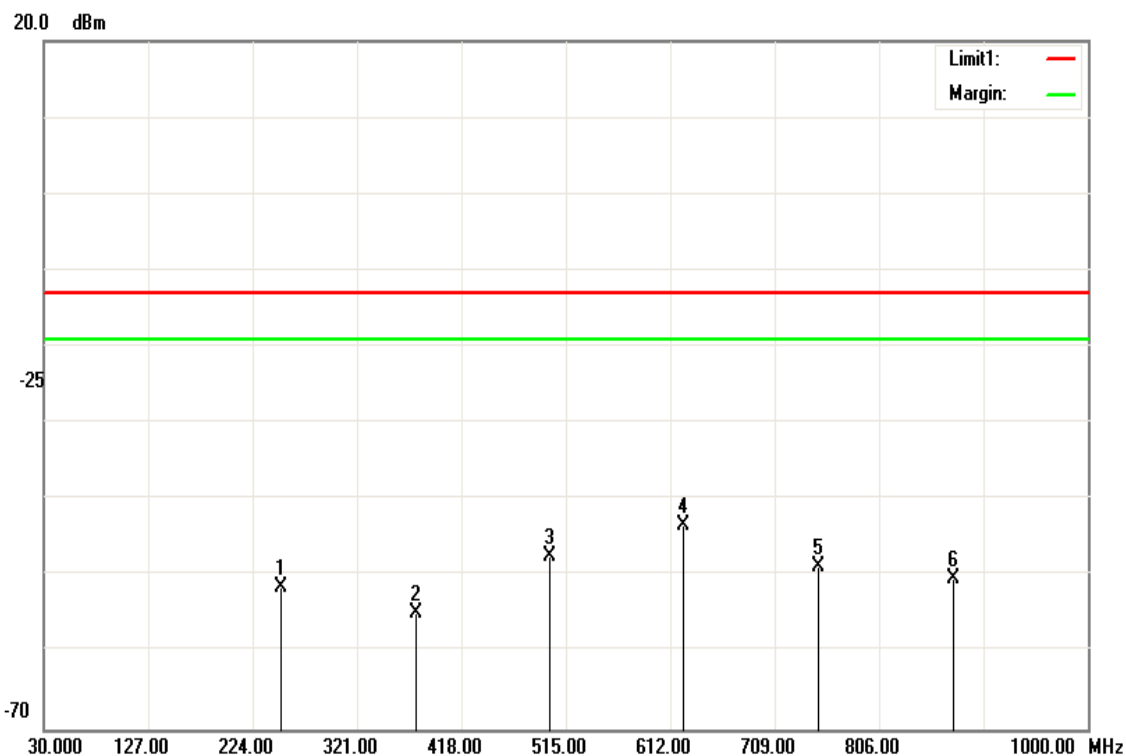
#### Below 1G Test Data

|           |                                                |               |               |
|-----------|------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / QPSK / RB =1, RB Offset = 0 Mid CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Below 1G                                       | Test Date     | Jan 05, 2017  |
| Polarize  | Vertical                                       | Test Engineer | Dennis Li     |
| Detector  | Peak and Qusi-Peak                             | Test Voltage  | 120Vac / 60Hz |



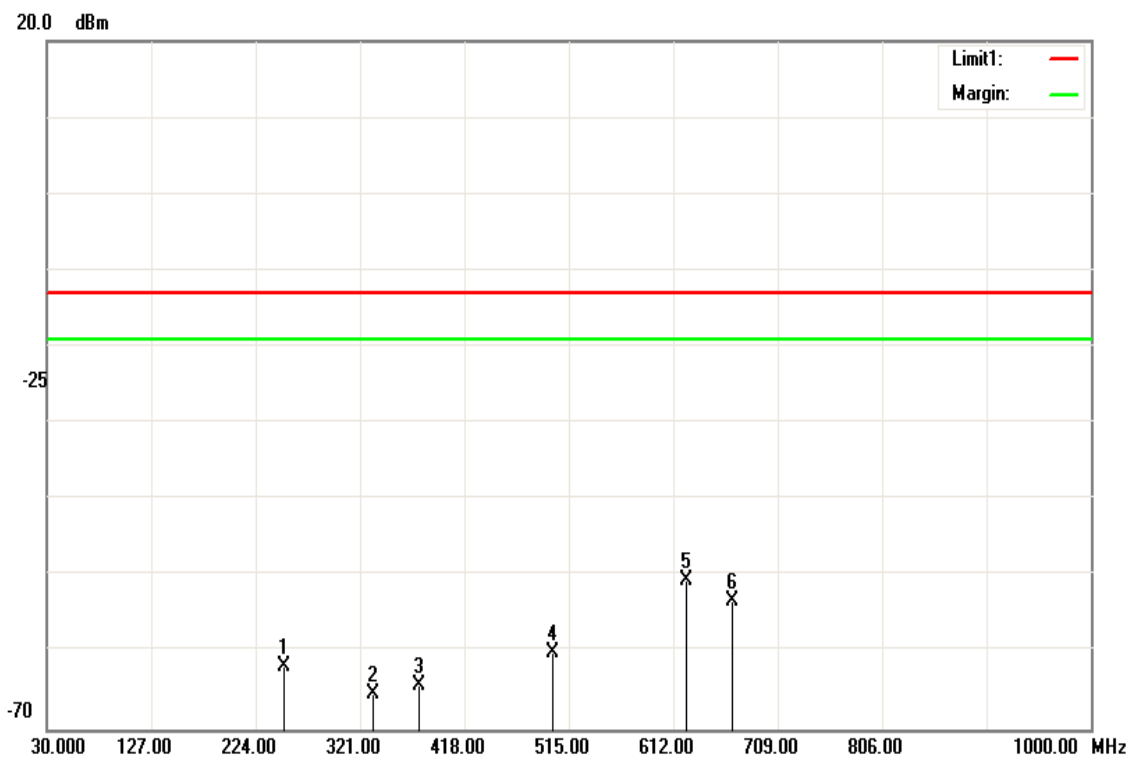
| Frequency (MHz) | S.G. (dBm) | Ant Gain (dBi) | Result (dBm) | Limit (dBm) | Margin (dB) | Remark |
|-----------------|------------|----------------|--------------|-------------|-------------|--------|
| 183.2600        | 68.9       | 4.1            | -64.80       | -13.00      | -51.80      | Peak   |
| 250.1900        | -70.1      | 7.4            | -62.70       | -13.00      | -49.70      | Peak   |
| 333.6100        | -68.95     | 7.03           | -61.92       | -13.00      | -48.92      | Peak   |
| 375.3200        | -68.06     | 7.2            | -60.86       | -13.00      | -47.86      | Peak   |
| 624.6400        | -51.99     | -0.17          | -52.16       | -13.00      | -39.16      | Peak   |
| 995.1500        | -52.58     | 6.09           | -46.49       | -13.00      | -33.49      | Peak   |

|           |                                                |               |               |
|-----------|------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / QPSK / RB =1, RB Offset = 0 Mid CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Below 1G                                       | Test Date     | Jan 05, 2017  |
| Polarize  | Horizontal                                     | Test Engineer | Dennis Li     |
| Detector  | Peak and Qusi-Peak                             | Test Voltage  | 120Vac / 60Hz |



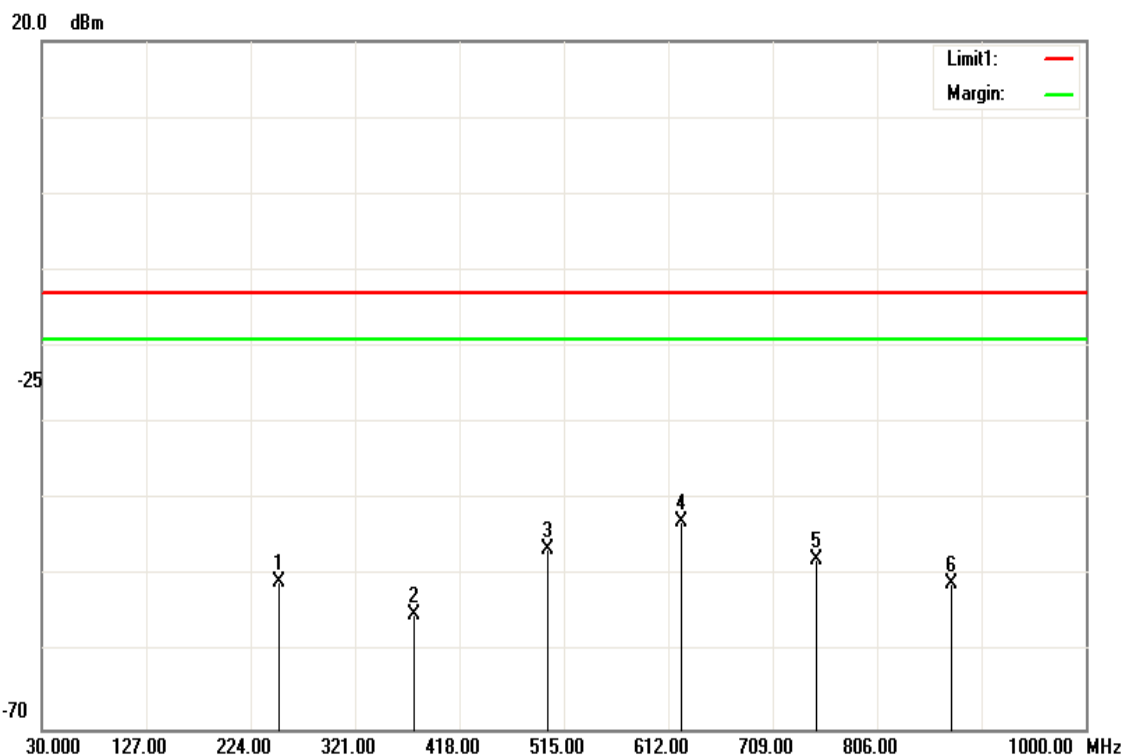
| Frequency (MHz) | S.G. (dBm) | Ant Gain (dBi) | Result (dBm) | Limit (dBm) | Margin (dB) | Remark |
|-----------------|------------|----------------|--------------|-------------|-------------|--------|
| 250.190         | -58.78     | 7.4            | -51.38       | -13.00      | -38.38      | Peak   |
| 375.3200        | -61.97     | 7.2            | -54.77       | -13.00      | -41.77      | Peak   |
| 500.4500        | -54.15     | 6.8            | -47.35       | -13.00      | -34.35      | Peak   |
| 624.6100        | -43.1      | -0.17          | -43.27       | -13.00      | -30.27      | Peak   |
| 749.7400        | -50.35     | 1.67           | -48.68       | -13.00      | -35.68      | Peak   |
| 874.8700        | -51.72     | 1.31           | -50.41       | -13.00      | -37.41      | Peak   |

|           |                                                 |               |               |
|-----------|-------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / 16QAM / RB =1, RB Offset = 0 Mid CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Below 1G                                        | Test Date     | Jan 05, 2017  |
| Polarize  | Vertical                                        | Test Engineer | Dennis Li     |
| Detector  | Peak and Qusi-Peak                              | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | S.G. (dBm) | Ant Gain (dBi) | Result (dBm) | Limit (dBm) | Margin (dB) | Remark |
|-----------------|------------|----------------|--------------|-------------|-------------|--------|
| 250.1900        | -69.3      | 7.4            | -61.90       | -13.00      | -48.90      | Peak   |
| 333.6100        | -72.35     | 7.03           | -65.32       | -13.00      | -52.32      | Peak   |
| 375.3200        | -71.52     | 7.2            | -64.32       | -13.00      | -51.32      | Peak   |
| 500.4500        | -66.8      | 6.8            | -60.00       | -13.00      | -47.00      | Peak   |
| 624.6100        | -50.28     | -0.17          | -50.45       | -13.00      | -37.45      | Peak   |
| 666.3200        | -54.76     | 1.54           | -53.22       | -13.00      | -40.22      | Peak   |

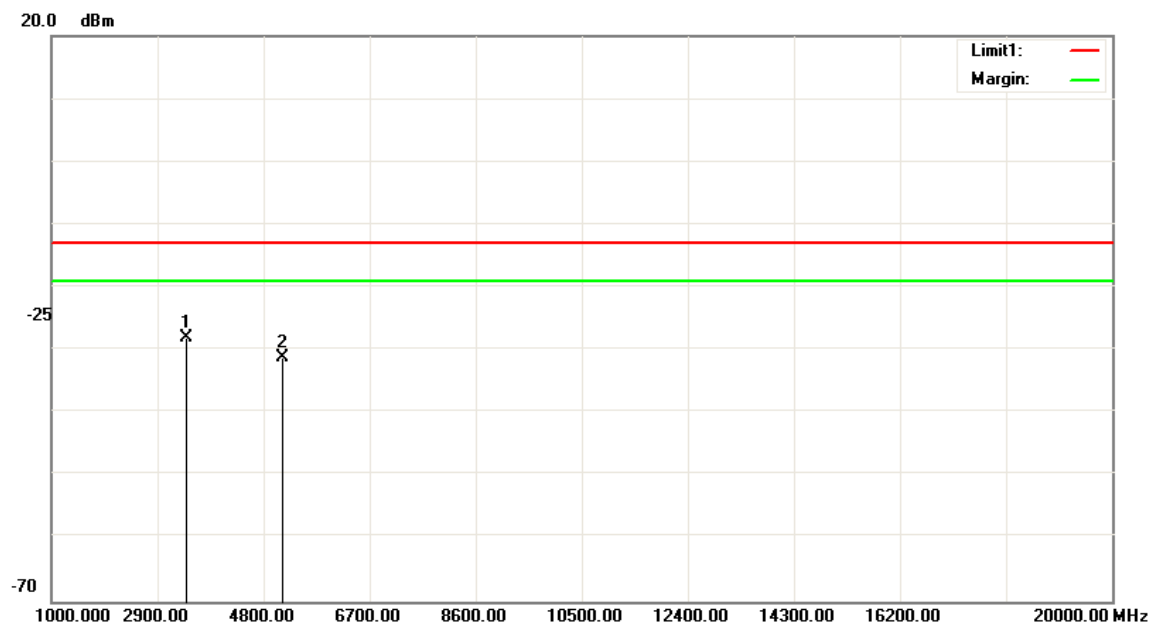
|           |                                                 |               |               |
|-----------|-------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / 16QAM / RB =1, RB Offset = 0 Mid CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Below 1G                                        | Test Date     | Jan 05, 2017  |
| Polarize  | Horizontal                                      | Test Engineer | Dennis Li     |
| Detector  | Peak and Qusi-Peak                              | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | S.G. (dBm) | Ant Gain (dBi) | Result (dBm) | Limit (dBm) | Margin (dB) | Remark |
|-----------------|------------|----------------|--------------|-------------|-------------|--------|
| 250.1900        | -58.07     | 7.4            | -50.67       | -13.00      | -37.67      | Peak   |
| 375.3200        | -62.15     | 7.2            | -54.95       | -13.00      | -41.95      | Peak   |
| 500.4500        | -53.27     | 6.8            | -46.47       | -13.00      | -33.47      | Peak   |
| 624.6100        | -42.8      | -0.17          | -42.97       | -13.00      | -29.97      | Peak   |
| 749.7400        | -49.45     | 1.67           | -47.78       | -13.00      | -34.78      | Peak   |
| 874.8700        | -52.38     | 1.31           | -51.07       | -13.00      | -38.07      | Peak   |

**Above 1G Test Data**

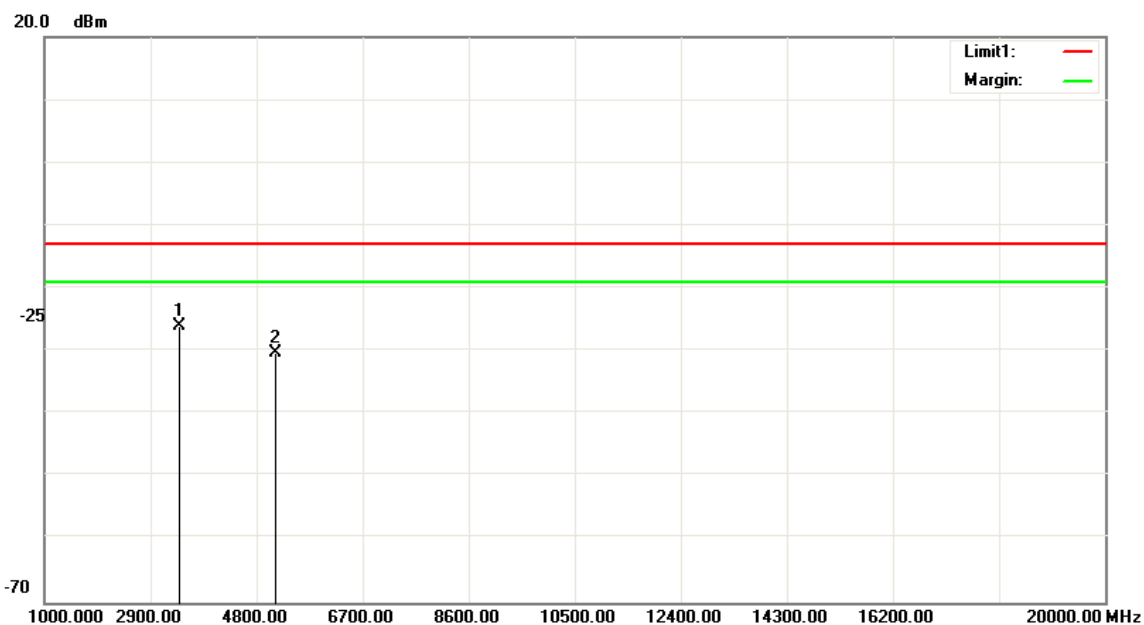
|           |                                                |               |               |
|-----------|------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / QPSK / RB =1, RB Offset = 0 Low CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                       | Test Date     | Jan 05, 2017  |
| Polarize  | Horizontal                                     | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                               | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3422.000        | -40.26         | 12.3                  | -27.96          | -13.00         | -14.96      | Peak   |
| 5130.000        | -43.81         | 12.6                  | -31.21          | -13.00         | -18.21      | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

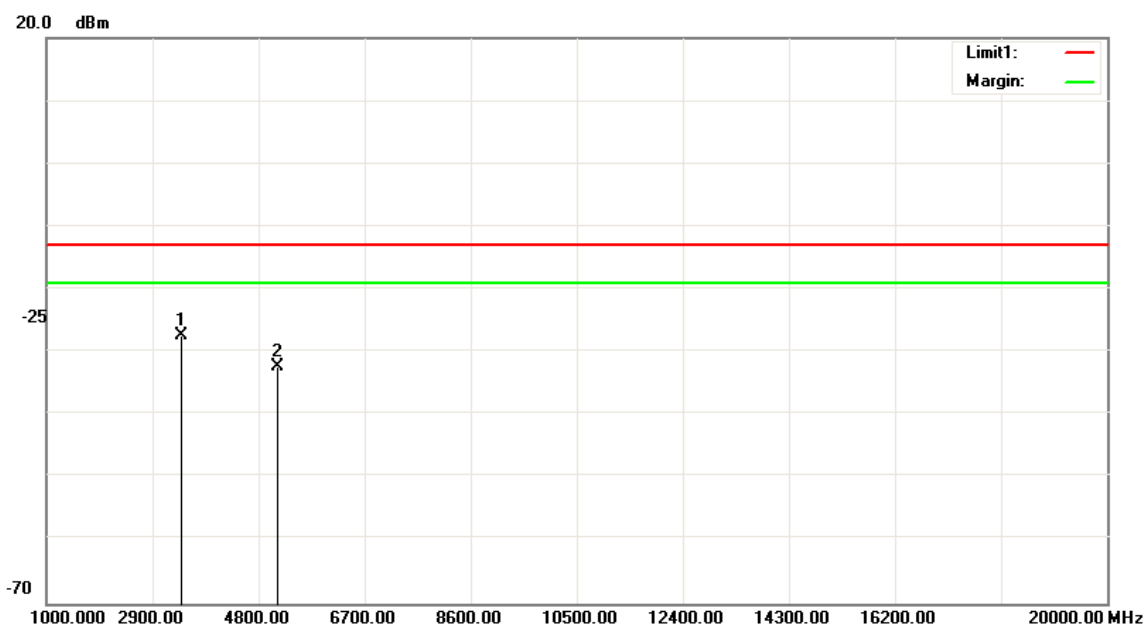
|           |                                                |               |               |
|-----------|------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / QPSK / RB =1, RB Offset = 0 Low CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                       | Test Date     | Jan 05, 2017  |
| Polarize  | Vertical                                       | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                               | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3422.000        | -38.34         | 12.3                  | -26.04          | -13.00         | -13.04      | Peak   |
| 5130.000        | -42.99         | 12.6                  | -30.39          | -13.00         | -17.39      | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

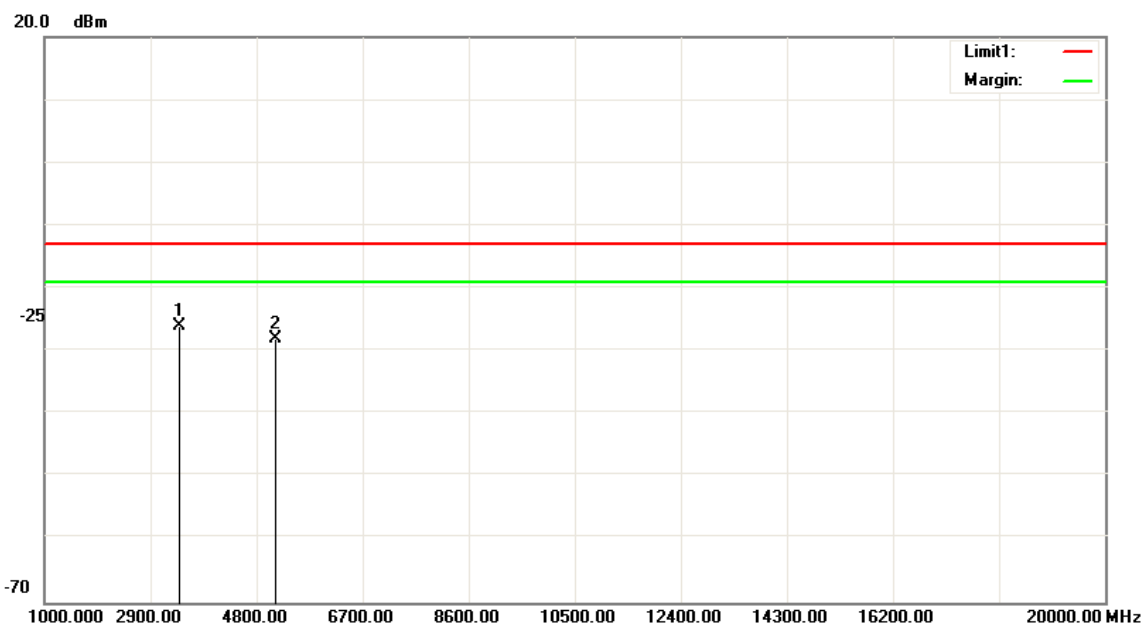
|           |                                                 |               |               |
|-----------|-------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / 16QAM / RB =1, RB Offset = 0 Low CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                        | Test Date     | Jan 05, 2017  |
| Polarize  | Horizontal                                      | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                                | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3422.000        | -39.59         | 12.3                  | -27.29          | -13.00         | -14.29      | Peak   |
| 5130.000        | -44.94         | 12.6                  | -32.34          | -13.00         | -19.34      | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

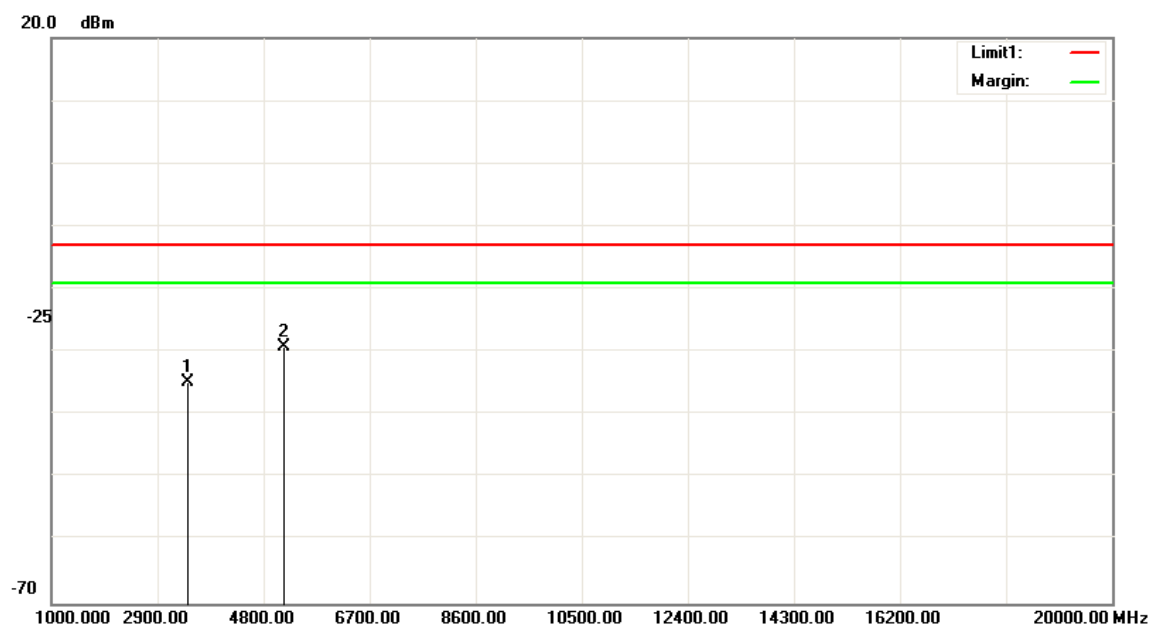
|           |                                                 |               |               |
|-----------|-------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / 16QAM / RB =1, RB Offset = 0 Low CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                        | Test Date     | Jan 05, 2017  |
| Polarize  | Vertical                                        | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                                | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3422.000        | -38.23         | 12.3                  | -25.93          | -13.00         | -12.93      | Peak   |
| 5130.000        | -40.56         | 12.6                  | -27.96          | -13.00         | -14.96      | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

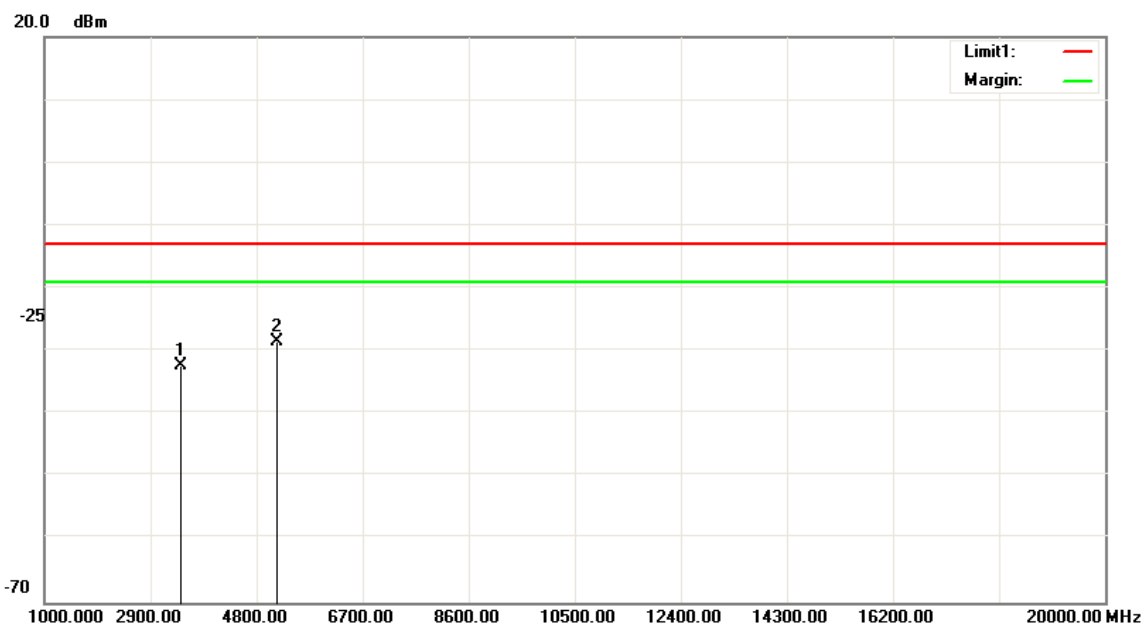
|           |                                                |               |               |
|-----------|------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / QPSK / RB =1, RB Offset = 0 Mid CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                       | Test Date     | Jan 05, 2017  |
| Polarize  | Horizontal                                     | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                               | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3450.000        | -47.23         | 12.37                 | -34.86          | -13.00         | -21.86      | Peak   |
| 5172.000        | -41.89         | 12.64                 | -29.25          | -13.00         | -16.25      | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

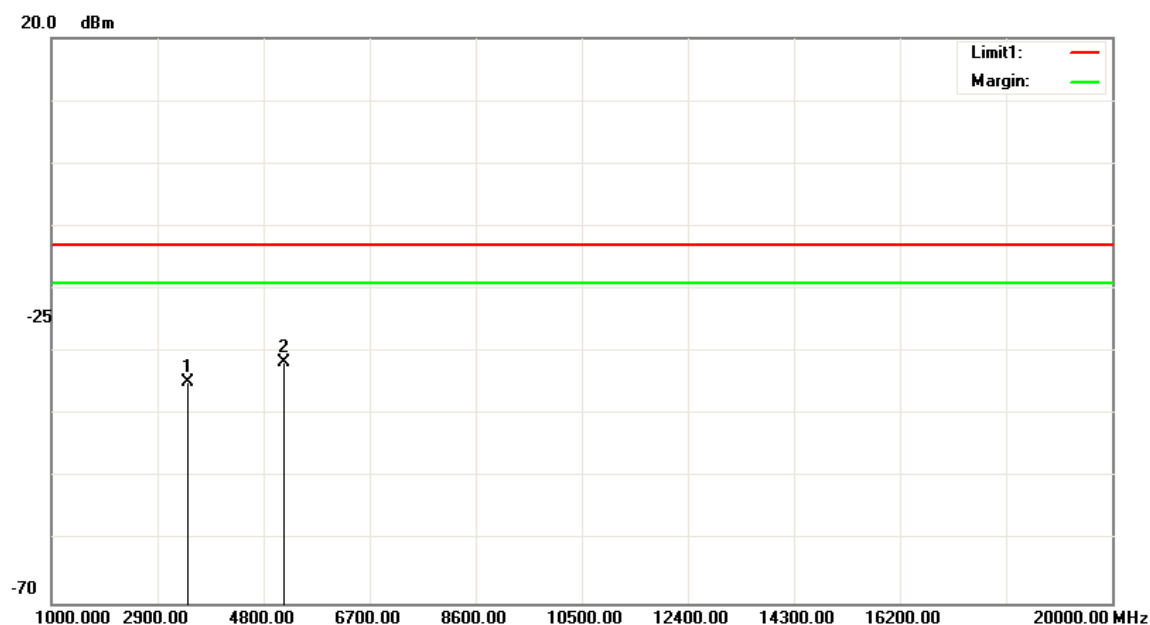
|           |                                                |               |               |
|-----------|------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / QPSK / RB =1, RB Offset = 0 Mid CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                       | Test Date     | Jan 05, 2017  |
| Polarize  | Vertical                                       | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                               | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3450.000        | -44.65         | 12.37                 | -32.28          | -13.00         | -19.28      | Peak   |
| 5172.000        | -41.14         | 12.64                 | -28.50          | -13.00         | -15.50      | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

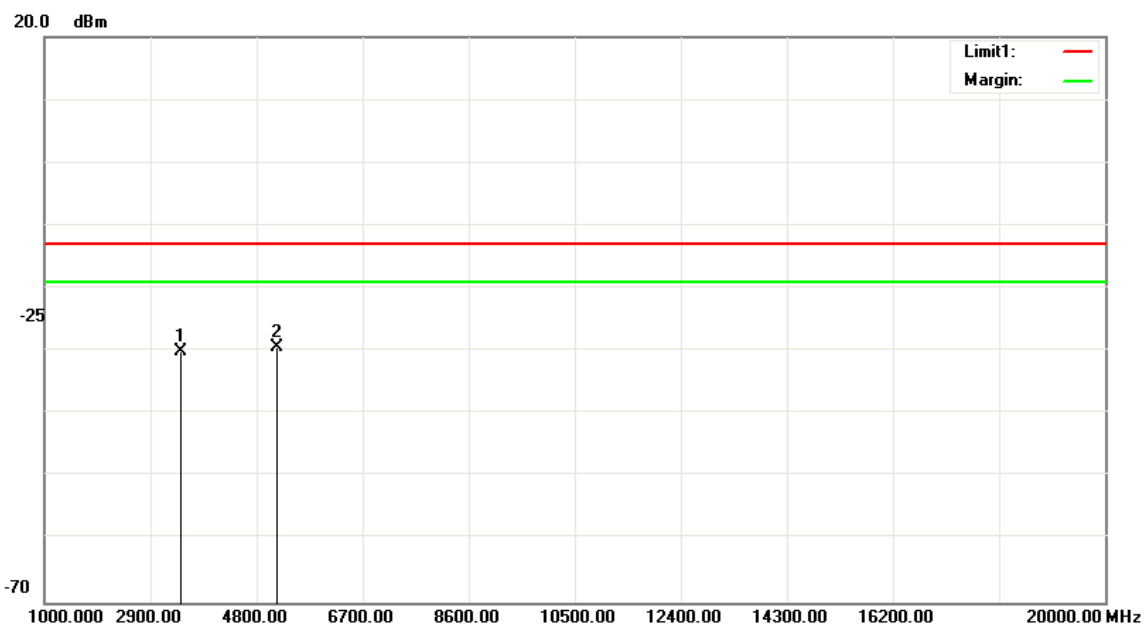
|           |                                                 |               |               |
|-----------|-------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / 16QAM / RB =1, RB Offset = 0 Mid CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                        | Test Date     | Jan 05, 2017  |
| Polarize  | Horizontal                                      | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                                | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3450.000        | -47.09         | 12.37                 | -34.72          | -13.00         | -21.72      | Peak   |
| 5172.000        | -44.31         | 12.64                 | -31.67          | -13.00         | -18.67      | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

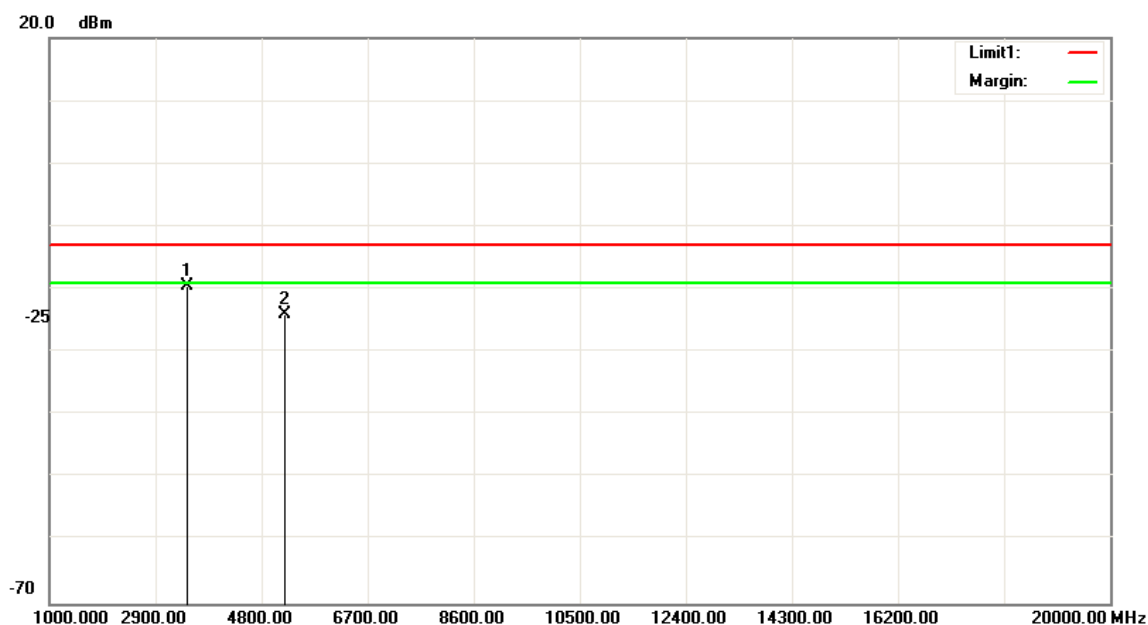
|           |                                                 |               |               |
|-----------|-------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / 16QAM / RB =1, RB Offset = 0 Mid CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                        | Test Date     | Jan 05, 2017  |
| Polarize  | Vertical                                        | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                                | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3450.000        | -42.39         | 12.37                 | -30.02          | -13.00         | -17.02      | Peak   |
| 5172.000        | -42.12         | 12.64                 | -29.48          | -13.00         | -16.48      | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

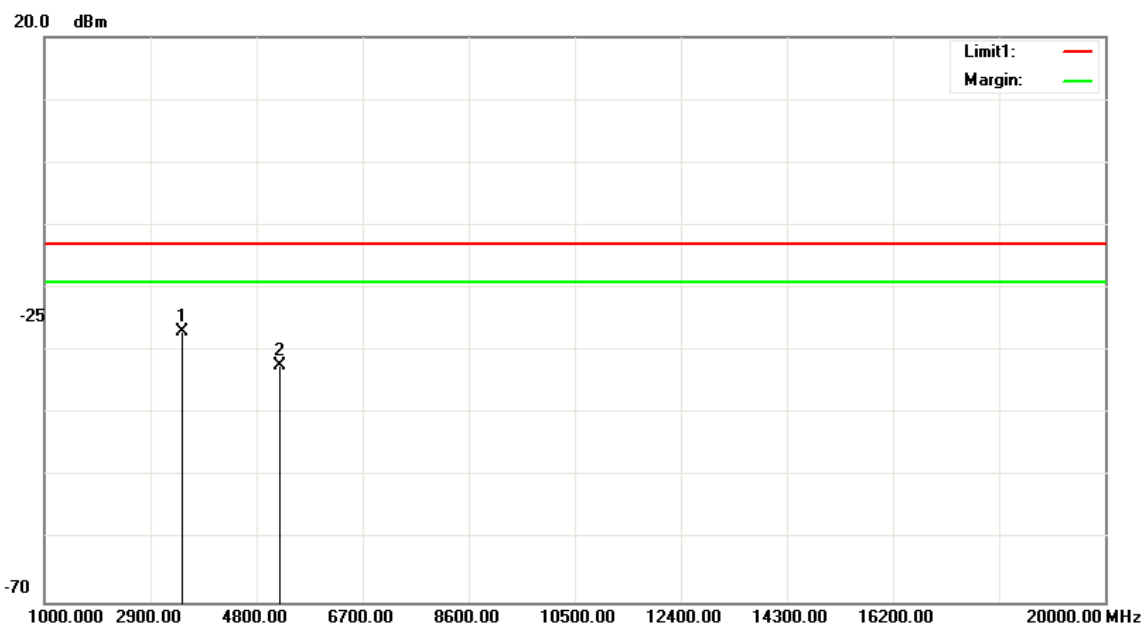
|           |                                                 |               |               |
|-----------|-------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / QPSK / RB =1, RB Offset = 0 High CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                        | Test Date     | Jan 05, 2017  |
| Polarize  | Horizontal                                      | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                                | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3471.000        | -32            | 12.42                 | -19.58          | -13.00         | -6.58       | Peak   |
| 5207.000        | -36.56         | 12.67                 | -23.89          | -13.00         | -10.89      | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

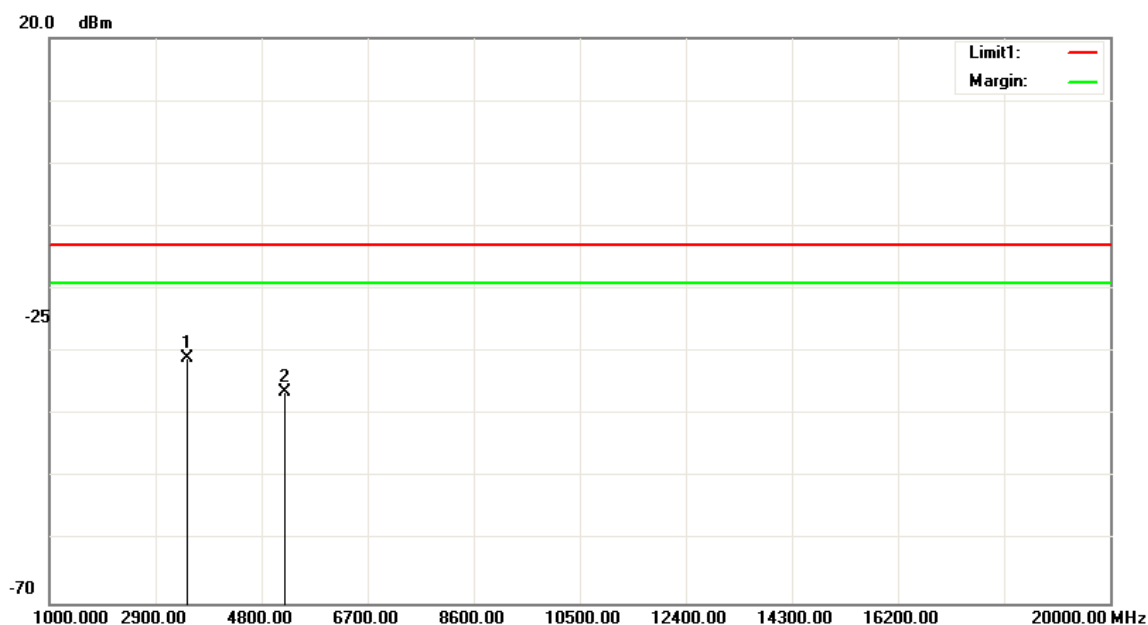
|           |                                                 |               |               |
|-----------|-------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / QPSK / RB =1, RB Offset = 0 High CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                        | Test Date     | Jan 05, 2017  |
| Polarize  | Vertical                                        | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                                | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3471.000        | -39.38         | 12.42                 | -26.96          | -13.00         | -13.96      | Peak   |
| 5207.000        | -45.05         | 12.67                 | -32.38          | -13.00         | -19.38      | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

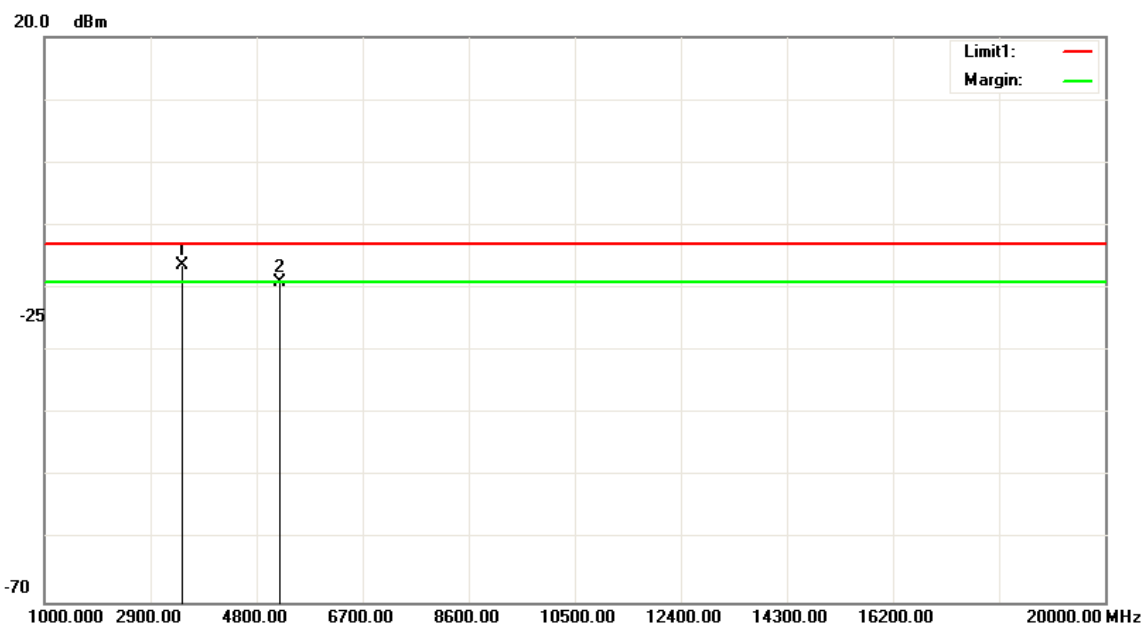
|           |                                                  |               |               |
|-----------|--------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / 16QAM / RB =1, RB Offset = 0 High CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                         | Test Date     | Jan 05, 2017  |
| Polarize  | Horizontal                                       | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                                 | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3471.000        | -43.28         | 12.42                 | -30.86          | -13.00         | -17.86      | Peak   |
| 5207.000        | -49.03         | 12.67                 | -36.36          | -13.00         | -23.36      | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

|           |                                                  |               |               |
|-----------|--------------------------------------------------|---------------|---------------|
| Test Mode | BW: 20MHz / 16QAM / RB =1, RB Offset = 0 High CH | Temp/Hum      | 27(°C)/ 53%RH |
| Test Item | Above 1G                                         | Test Date     | Jan 05, 2017  |
| Polarize  | Vertical                                         | Test Engineer | Dennis Li     |
| Detector  | Peak and Average                                 | Test Voltage  | 120Vac / 60Hz |



| Frequency (MHz) | Reading (dBuV) | Correct Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|-----------------|----------------|-------------|--------|
| 3471.000        | -28.78         | 12.42                 | -16.36          | -13.00         | -3.36       | Peak   |
| 5207.000        | -31.7          | 12.67                 | -19.03          | -13.00         | -6.03       | Peak   |

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

## 3.7 FREQUENCY STABILITY

### 3.7.1 Test Limit

According to the FCC part 27.54 shall be tested the frequency stability. The rule is defined that "The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation."

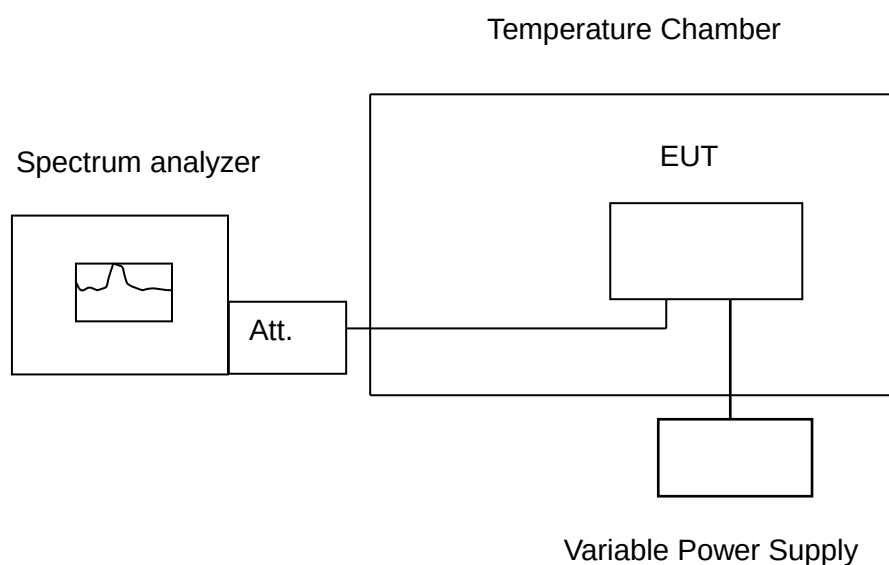
### 3.7.2 Test Procedure

Use Anritsu 8820 with frequency Error measurement capability

Temp = -30 to +50°C

Voltage= 85% to 115% of the nominal value for AC powered equipment The equipment.

### 3.7.3 Test Setup



### 3.7.4 Test Result

We selected the worst-case mode to perform the test.

#### **FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT:**

| Reference Frequency: LTE Band 4, 1732.5 MHz_QPSK |                              |                             |                       |             |
|--------------------------------------------------|------------------------------|-----------------------------|-----------------------|-------------|
| Limit: 2.5 ppm = 4331.25Hz                       |                              |                             |                       |             |
| Power Supply (Vac)                               | Environment Temperature (°C) | BW: 20M Frequency Error(Hz) | Frequency Error (ppm) | Limit (ppm) |
| 120                                              | 50                           | -2.98                       | -0.0017               | +/- 2.5     |
| 120                                              | 40                           | -2.39                       | -0.0014               |             |
| 120                                              | 30                           | -3.36                       | -0.0019               |             |
| 120                                              | 20                           | -2.10                       | -0.0012               |             |
| 120                                              | 10                           | -3.70                       | -0.0021               |             |
| 120                                              | 0                            | -2.07                       | -0.0012               |             |
| 120                                              | -10                          | -2.43                       | -0.0014               |             |
| 120                                              | -20                          | -5.22                       | -0.0030               |             |
| 120                                              | -30                          | -2.98                       | -0.0017               |             |

#### **FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT:**

| Reference Frequency: LTE Band 4, 1732.5 MH_QPSK |                              |                             |                       |             |
|-------------------------------------------------|------------------------------|-----------------------------|-----------------------|-------------|
| Limit: 2.5 ppm = 4331.25Hz                      |                              |                             |                       |             |
| Power Supply (Vac)                              | Environment Temperature (°C) | BW: 20M Frequency Error(Hz) | Frequency Error (ppm) | Limit (ppm) |
| 138                                             | 20                           | -4.13                       | -0.0024               | +/- 2.5     |
| 120                                             |                              | -2.10                       | -0.0012               |             |
| 102                                             |                              | -3.95                       | -0.0023               |             |

**FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT:**

| Reference Frequency: LTE Band 4, 1732.5 MHz_16QAM |                              |                             |                       |             |
|---------------------------------------------------|------------------------------|-----------------------------|-----------------------|-------------|
| Limit: 2.5 ppm = 4331.25Hz                        |                              |                             |                       |             |
| Power Supply (Vac)                                | Environment Temperature (°C) | BW: 20M Frequency Error(Hz) | Frequency Error (ppm) | Limit (ppm) |
| 120                                               | 50                           | -2.93                       | -0.0017               | +/- 2.5     |
| 120                                               | 40                           | -2.32                       | -0.0014               |             |
| 120                                               | 30                           | -3.33                       | -0.0019               |             |
| 120                                               | 20                           | -2.05                       | -0.0012               |             |
| 120                                               | 10                           | -3.66                       | -0.0021               |             |
| 120                                               | 0                            | -2.02                       | -0.0012               |             |
| 120                                               | -10                          | -2.39                       | -0.0014               |             |
| 120                                               | -20                          | -5.18                       | -0.0030               |             |
| 120                                               | -30                          | -2.93                       | -0.0017               |             |

**FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT:**

| Reference Frequency: LTE Band 4, 1732.5 MH_16QAM |                              |                             |                       |             |
|--------------------------------------------------|------------------------------|-----------------------------|-----------------------|-------------|
| Limit: 2.5 ppm = 4331.25Hz                       |                              |                             |                       |             |
| Power Supply (Vac)                               | Environment Temperature (°C) | BW: 20M Frequency Error(Hz) | Frequency Error (ppm) | Limit (ppm) |
| 138                                              | 20                           | -4.09                       | -0.0024               | +/- 2.5     |
| 120                                              |                              | -2.05                       | -0.0012               |             |
| 102                                              |                              | -3.89                       | -0.0023               |             |