

# FCC Test Report

## Part 15 subpart C

### Client Information:

Applicant : AL SUN TECHNOLOGY(HONGKONG) LIMITED.  
Applicant add.: Room 1209,huichao technology building, jinhai road, yantian community,xixiang street,Bao'an district,shenzhen.

### EUT Information:

EUT Name : Bluetooth glasses  
Model No. : AL-A2  
Brand Name : N/A  
FCC ID : 2AE2YAL-A2

### Prepared By:

Shenzhen HCtest PRODUCT SERVICE CO.,LTD.  
Add. : Second floor A, A5 building, North yongfa technology Park, Heyijincheng Road, Shajing street, Bao'an district, Shenzhen City, China

Date of Receipt: May. 24, 2015

Date of Test: May. 24~27, 2015

Date of Issue: May. 28, 2015

Test Result: **Pass**

**Test procedure used:** ANSI C63.4-2009

This device described above has been tested by Shenzhen HCtest PRODUCT SERVICE CO.,LTD., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

\*This test report must not be used by the client to claim product endorsement by any agency of the U.S. government.

Reviewed by:

*Jerome Luo*

Jerome Luo



Approved by:

*Back Huang*

Back Huang

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## 2 Test Summary

### 2.1 Compliance with FCC Part 15 subpart C

| Test                                   | Test Requirement   | Standard Paragraph                    | Result      |
|----------------------------------------|--------------------|---------------------------------------|-------------|
| Antenna Requirement                    | FCC Part 15 C:2013 | section 15.247 (c) and Section 15.203 | <b>PASS</b> |
| 6 dB Bandwidth                         | FCC Part 15 C:2013 | section 15.247 (a)(2)                 | <b>PASS</b> |
| Maximum Peak Output Power              | FCC Part 15 C:2013 | section 15.247(b)(3)                  | <b>PASS</b> |
| Peak Power Spectral Density            | FCC Part 15 C:2013 | section 15.247(e)                     | <b>PASS</b> |
| Conducted Spurious Emission            | FCC Part 15 C:2013 | section 15.209 &15.247(d)             | <b>PASS</b> |
| Radiated Spurious Emission             | FCC Part 15 C:2013 | section 15.209 &15.247(d)             | <b>PASS</b> |
| Band Edges Measurement                 | FCC Part 15 C:2013 | section 15.247 (d) &15.205            | <b>PASS</b> |
| Conducted Emissions at Mains Terminals | FCC Part 15 C:2013 | section 15.207                        | <b>PASS</b> |

### 2.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, The following measurements uncertainty Levels have estimated based on ANSI C63.4:2009, the maximum value of the uncertainty as below

| No. | Item                    | Uncertainty         |
|-----|-------------------------|---------------------|
| 1   | Conducted Emission Test | $\pm 1.38\text{dB}$ |
| 2   | Radiated Emission Test  | $\pm 3.57\text{dB}$ |

### 3 General Information

#### 3.1 General Description of EUT

|                                                   |                                              |
|---------------------------------------------------|----------------------------------------------|
| <b>EUT Name:</b>                                  | Bluetooth glasses                            |
| <b>Model No:</b>                                  | AL-A2                                        |
| <b>Operation frequency:</b>                       | 2402MHz to 2480MHz                           |
| <b>Channel Number:</b>                            | 40                                           |
| <b>Modulation Technology:</b>                     | GFSK                                         |
| <b>AntennaType:</b>                               | Integral                                     |
| <b>Antenna Gain:</b>                              | 0 dBi                                        |
| <b>Brand Name:</b>                                | N/A                                          |
| <b>Serial No:</b>                                 | N/A                                          |
| <b>Power Supply Range:</b>                        | DC 5V from Host unit<br>DC 3.7V from Battery |
| <b>Power Supply:</b>                              | DC 5V from Host unit<br>DC 3.7V from Battery |
| <b>Power Cord:</b>                                | N/A                                          |
| <b>Effective Isotropic Radiated Power (max) :</b> | -5.04 dBm                                    |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

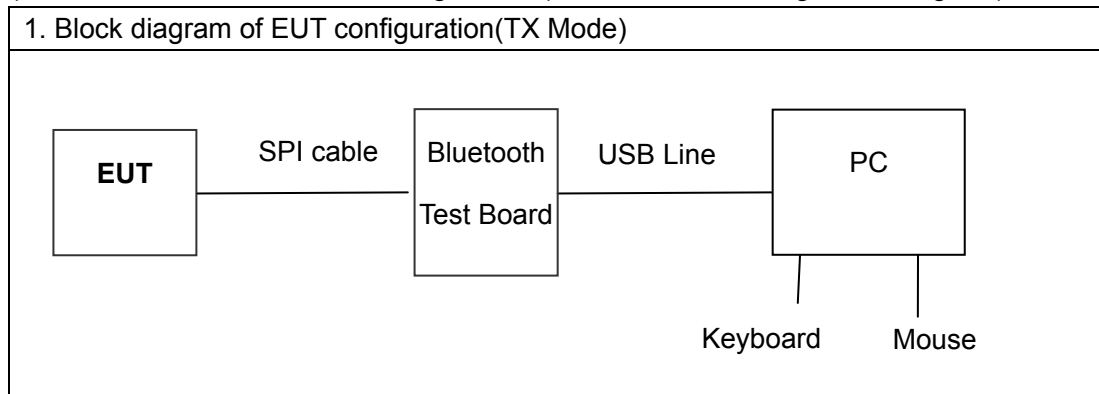
2. EUT channels and frequencies list:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 0       | 2402            | 27      | 2456            |
| 1       | 2404            | 28      | 2458            |
| 2       | 2406            | 29      | 2460            |
| 3       | 2408            | 30      | 2462            |
| 4       | 2410            | 31      | 2464            |
| 5       | 2412            | 32      | 2466            |
| 6       | 2414            | 33      | 2468            |
| 7       | 2416            | 34      | 2470            |
| 8       | 2418            | 35      | 2472            |
| 9       | 2420            | 36      | 2474            |
| 10      | 2422            | 37      | 2476            |
| 11      | 2424            | 38      | 2478            |
| 12      | 2426            | 39      | 2480            |
| 13      | 2428            | 40      | /               |
| 14      | 2430            | 41      | /               |
| 15      | 2432            | 42      | /               |
| 16      | 2434            | 43      | /               |
| 17      | 2436            | 44      | /               |
| 18      | 2438            | 45      | /               |
| 19      | 2440            | 46      | /               |
| 20      | 2442            | 47      | /               |
| 21      | 2444            | 48      | /               |
| 22      | 2446            | 49      | /               |
| 23      | 2448            | 50      | /               |
| 24      | 2450            | 51      | /               |
| 25      | 2452            | 52      | /               |
| 26      | 2454            | 53      | /               |

3. The USB cable only can connect to PC for charging. It can't transfer data.

## 3.2 Description of Test conditions

- (1) EUT was tested in normal configuration (Please See following Block diagram)



- (2) E.U.T. test conditions:

15.31(e): For intentional radiators, measurements of the variation of the input power or the adiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

- (3) Test frequencies:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. If required reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

| Frequency range over which device operates | Number of frequencies | Location in the range of operation          |
|--------------------------------------------|-----------------------|---------------------------------------------|
| 1 MHz or less                              | 1                     | Middle                                      |
| 1 to 10 MHz                                | 2                     | 1 near top and 1 near bottom                |
| More than 10 MHz                           | 3                     | 1 near top, 1 near middle and 1 near bottom |

- (4) Frequency range of radiated measurements:

According to the 15.33, The test range will be up to the tenth harmonic of the highest fundamental frequency .

### 3.3 EUT Peripheral List

| No. | Equipment | Manufacturer | Model No. | Serial No. | Power cord | signal cable |
|-----|-----------|--------------|-----------|------------|------------|--------------|
| 1   | N/A       | N/A          | N/A       | N/A        | N/A        | N/A          |

### 3.4 Test Peripheral List

| No. | Equipment         | Manufacturer | EMC Compliance | Model No. | Serial No.                | Power cord                  | signal cable                  |
|-----|-------------------|--------------|----------------|-----------|---------------------------|-----------------------------|-------------------------------|
| 1   | Personal computer | H P          | CE 、 FCC       | DX2310    | CNG8250MZ3                | 1.8m/unshielded /detachable | N/A                           |
| 2   | Keyboard          | DELL         | CE             | SK-8115   | CN-ONM432-71616-81M-OLK B | N/A                         | 1.5m/unshielded /undetachable |
| 3   | Mouse             | Microsoft    | CE             | X800898   | 30603                     | N/A                         | 1.5m/unshielded /undetachable |

## 4 Equipments List for All Test Items

| No | Test Equipment                      | Manufacturer    | Model No         | Serial No  | Cal. Date  | Cal. Due Date |
|----|-------------------------------------|-----------------|------------------|------------|------------|---------------|
| 1  | Spectrum Analyzer                   | ADVANTEST       | R3182            | 150900201  | 2014.10.16 | 2015.10.15    |
| 2  | EMI Measuring Receiver              | Schaffner       | SCR3501          | 235        | 2014.10.16 | 2015.10.15    |
| 3  | Low Noise Pre Amplifier             | Tsj             | MLA-10K01-B01-27 | 1205323    | 2014.09.08 | 2015.09.07    |
| 4  | Low Noise Pre Amplifier             | Tsj             | MLA-0120-A02-34  | 2648A04738 | 2015.04.08 | 2016.04.07    |
| 5  | TRILOG Super Broadband test Antenna | SCHWARZBECK     | VULB9160         | 9160-3206  | 2014.07.05 | 2015.07.04    |
| 6  | Broadband Horn Antenna              | SCHWARZBECK     | BBHA9120A        | 451        | 2014.07.05 | 2015.07.04    |
| 7  | 50Ω Coaxial Switch                  | Anritsu         | MP59B            | 6200264416 | 2014.09.08 | 2015.09.07    |
| 8  | EMI Test Receiver                   | R&S             | ESCI             | 100124     | 2014.12.29 | 2015.12.28    |
| 9  | LISN                                | Kyoritsu        | KNW-242          | 8-837-4    | 2015.04.08 | 2016.04.07    |
| 10 | LISN                                | Kyoritsu        | KNW-407          | 8-1789-3   | 2015.04.08 | 2016.04.07    |
| 11 | 50Ω Coaxial Switch                  | Anritsu         | MP59B            | 6200264417 | 2015.04.08 | 2016.04.07    |
| 12 | Loop Antenna                        | ARA             | PLA-1030/B       | 1029       | 2015.04.08 | 2016.04.07    |
| 13 | Power Meter                         | R&S             | NRVS             | 101336     | 2015.04.08 | 2016.04.07    |
| 14 | EMI Test Receiver                   | Rohde & Schwarz | ESIB26           | 100394     | 2015.04.08 | 2016.04.07    |

## **5 Test Result**

### **5.1 Antenna Requirement**

#### **5.1.1 Standard requirement**

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

#### **5.1.2 EUT Antenna**

The antenna is integrated on the main PCB and no consideration of replacement. Antenna gain is max 0 dBi from 2.4GHz to 2.5GHz.

## 5.2 Conduction Emissions Measurement

### 5.2.1 Applied procedures / Limit

| Frequency of Emission (MHz) | Conducted Limit (dBμV) |            |
|-----------------------------|------------------------|------------|
|                             | Quasi-peak             | Average    |
| 0.15-0.5                    | 66 to 56 *             | 56 to 46 * |
| 0.5-5                       | 56                     | 46         |
| 5-30                        | 60                     | 50         |

Note: Decreases with the logarithm of the frequency.

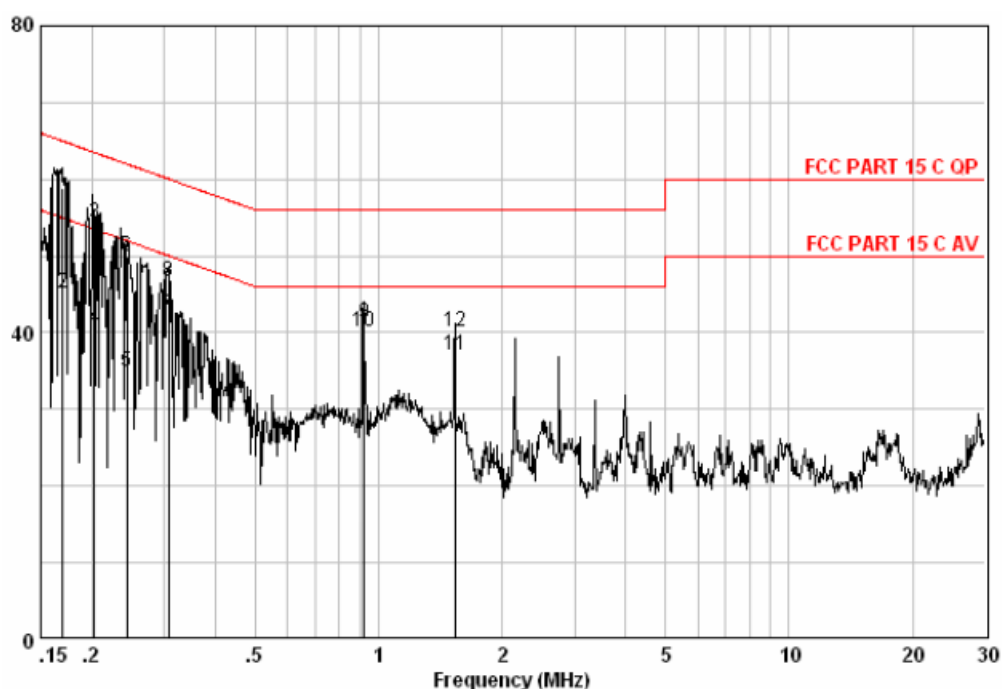
### 5.2.2 Test procedure

EUT was placed upon a wooden test table 0.8m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and placed at a distance of 10cm from each other. A spectrum and receiver was connected to the RF output port of the AMN. Both average and quasi-peak value were detected.

### 5.2.3 Test results

|                       |                      |                    |            |
|-----------------------|----------------------|--------------------|------------|
| EUT:                  | Bluetooth glasses    | Model Name. :      | AL-A2      |
| Temperature:          | 26 °C                | Relative Humidity: | 54%        |
| Pressure:             | 1010hPa              | Test Date :        | 2015-05-27 |
| Test Mode:            | TX                   | Phase :            | Line       |
| <b>Test Voltage :</b> | DC 5V from Host unit |                    |            |

Level(dBuV)

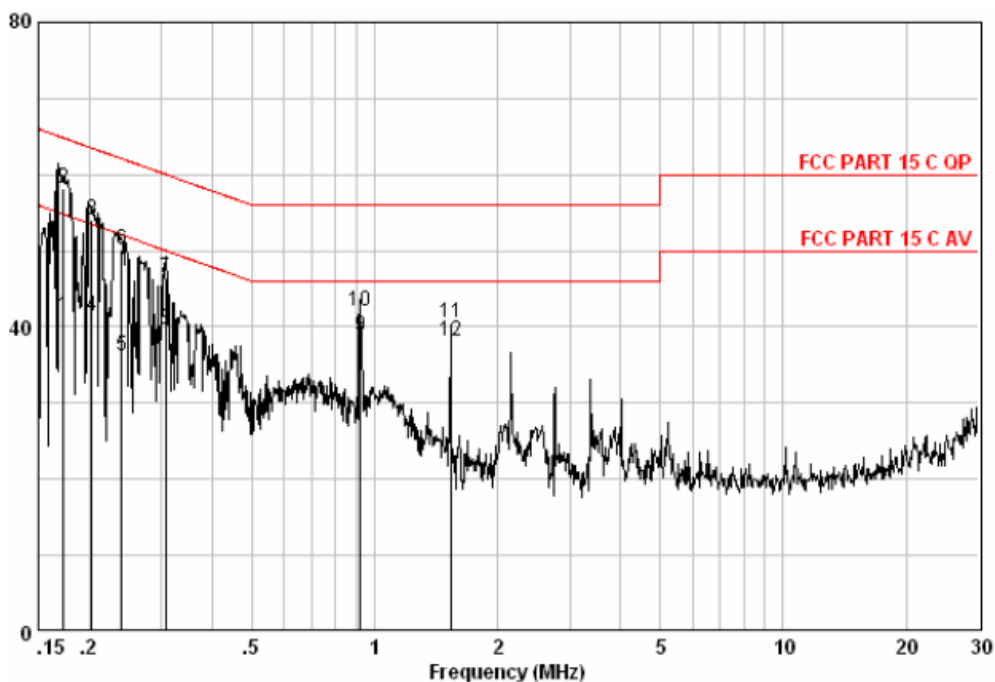


Measure data:

| Freq  | Read Level | Cable Loss | LISN Factor | Level | Limit Line | Over Limit | Remark  |
|-------|------------|------------|-------------|-------|------------|------------|---------|
| MHz   | dBuV       | dB         | dB          | dBuV  | dBuV       | dB         |         |
| 0.169 | 49.06      | 0.09       | 9.64        | 58.79 | 64.99      | -6.20      | QP      |
| 0.169 | 35.34      | 0.09       | 9.64        | 45.07 | 54.99      | -9.92      | AVERAGE |
| 0.203 | 44.50      | 0.13       | 9.64        | 54.27 | 63.49      | -9.22      | QP      |
| 0.203 | 30.67      | 0.13       | 9.64        | 40.44 | 53.49      | -13.05     | AVERAGE |
| 0.243 | 25.22      | 0.11       | 9.64        | 34.97 | 52.00      | -17.03     | AVERAGE |
| 0.243 | 40.20      | 0.11       | 9.64        | 49.95 | 62.00      | -12.05     | QP      |
| 0.307 | 32.62      | 0.08       | 9.63        | 42.33 | 50.06      | -7.73      | AVERAGE |
| 0.307 | 36.90      | 0.08       | 9.63        | 46.61 | 60.06      | -13.45     | QP      |
| 0.922 | 31.48      | 0.04       | 9.69        | 41.21 | 56.00      | -14.79     | QP      |
| 0.922 | 30.35      | 0.04       | 9.69        | 40.08 | 46.00      | -5.92      | AVERAGE |
| 1.535 | 27.39      | 0.04       | 9.71        | 37.14 | 46.00      | -8.86      | AVERAGE |
| 1.535 | 30.30      | 0.04       | 9.71        | 40.05 | 56.00      | -15.95     | QP      |

|                       |                      |                    |            |
|-----------------------|----------------------|--------------------|------------|
| EUT:                  | Bluetooth glasses    | Model Name. :      | AL-A2      |
| Temperature:          | 26 °C                | Relative Humidity: | 54%        |
| Pressure:             | 1010hPa              | Test Date :        | 2015-05-27 |
| Test Mode:            | TX                   | Phase :            | Neutral    |
| <b>Test Voltage :</b> | DC 5V from Host unit |                    |            |

Level(dBμV)



Measure result:

| Freq  | Read Level | Cable Loss | LISN Factor | Level | Limit Line | Over Limit | Remark  |
|-------|------------|------------|-------------|-------|------------|------------|---------|
| MHz   | dBμV       | dB         | dB          | dBμV  | dBμV       | dB         |         |
| 0.173 | 31.67      | 0.09       | 9.63        | 41.39 | 54.81      | -13.42     | AVERAGE |
| 0.173 | 48.46      | 0.09       | 9.63        | 58.18 | 64.81      | -6.63      | QP      |
| 0.203 | 44.40      | 0.13       | 9.62        | 54.15 | 63.49      | -9.34      | QP      |
| 0.203 | 31.61      | 0.13       | 9.62        | 41.36 | 53.49      | -12.13     | AVERAGE |
| 0.240 | 26.48      | 0.11       | 9.63        | 36.22 | 52.08      | -15.87     | AVERAGE |
| 0.240 | 40.30      | 0.11       | 9.63        | 50.04 | 62.08      | -12.05     | QP      |
| 0.307 | 36.68      | 0.08       | 9.64        | 46.40 | 60.06      | -13.66     | QP      |
| 0.307 | 29.92      | 0.08       | 9.64        | 39.64 | 50.06      | -10.42     | AVERAGE |
| 0.923 | 29.09      | 0.04       | 9.64        | 38.77 | 46.00      | -7.23      | AVERAGE |
| 0.923 | 32.34      | 0.04       | 9.64        | 42.02 | 56.00      | -13.98     | QP      |
| 1.535 | 30.92      | 0.04       | 9.61        | 40.57 | 56.00      | -15.43     | QP      |
| 1.535 | 28.60      | 0.04       | 9.61        | 38.25 | 46.00      | -7.75      | AVERAGE |

Remark:

This test item was transferred to Asia Institute Technology (Dongguan) Limited which was confirmed to have enough capacity to perform this subcontract work. The FCC Registration No. of Asia Institute Technology (Dongguan) Limited is 248337.

## 5.3 Radiated Emissions Measurement

### 5.3.1 Applied procedures / Limit

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

| Frequency of Emission (MHz) | Field Strength  |                          | Measurement Distance (meters) |
|-----------------------------|-----------------|--------------------------|-------------------------------|
|                             | $\mu\text{V/m}$ | $\text{dB}\mu\text{V/m}$ |                               |
| 0.009-0.49                  | 2400/F(kHz)     |                          | 300                           |
| 0.49-1.705                  | 24000/F(kHz)    |                          | 30                            |
| 1.705-30                    | 30              |                          | 30                            |
| 30-88                       | 100             | 40                       | 3                             |
| 88-216                      | 150             | 43.5                     | 3                             |
| 216-960                     | 200             | 46                       | 3                             |
| Above 960                   | 500             | 54                       | 3                             |

### 5.3.2 Test procedure

EUT was placed upon a wooden test table which was placed on the turn table 0.8m above the horizontal metal ground plane, and operating in the mode as mentioned above. A receiving antenna was placed 3m away from the EUT. During testing, turn around the turn table and move the antenna from 1m to 4m to find the maximum field-strength reading. All peripherals were placed at a distance of 10cm between each other. Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

### 5.3.3 Test Result

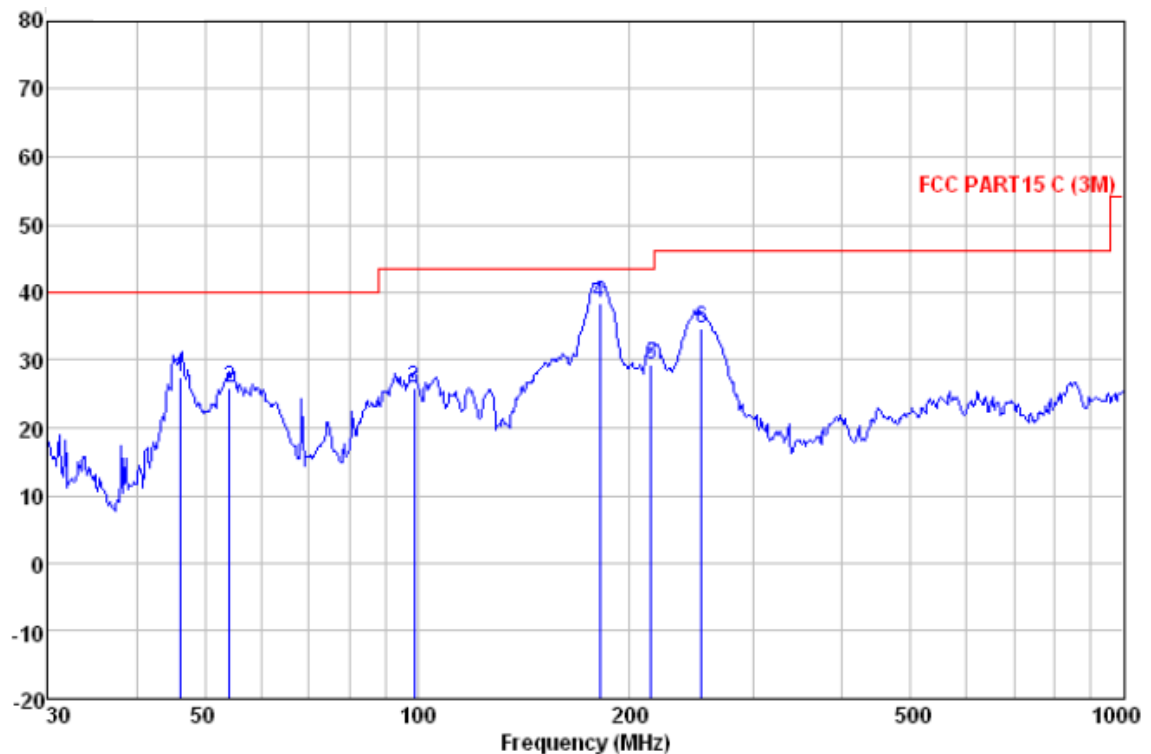
There is not detected blow 30MHz.

|                      |                                                        |                    |                      |
|----------------------|--------------------------------------------------------|--------------------|----------------------|
| EUT:                 | Bluetooth glasses                                      | Model Name :       | AL-A2                |
| Temperature:         | 25 °C                                                  | Test Data          | 2015-05-27           |
| Pressure:            | 1010 hPa                                               | Relative Humidity: | 60%                  |
| Test Mode :          | TX                                                     | Test Voltage :     | DC 3.7V from battery |
| Measurement Distance | 3 m                                                    | Frenqucy Range     | 30MHz to 1GHz        |
| RBW/VBW              | 100KHz / 300KHz for spectrum, RBW=120KHz for receiver. |                    |                      |

(a) Antenna polarization: Horizontal

Peak scan

Level (dBμV/m)



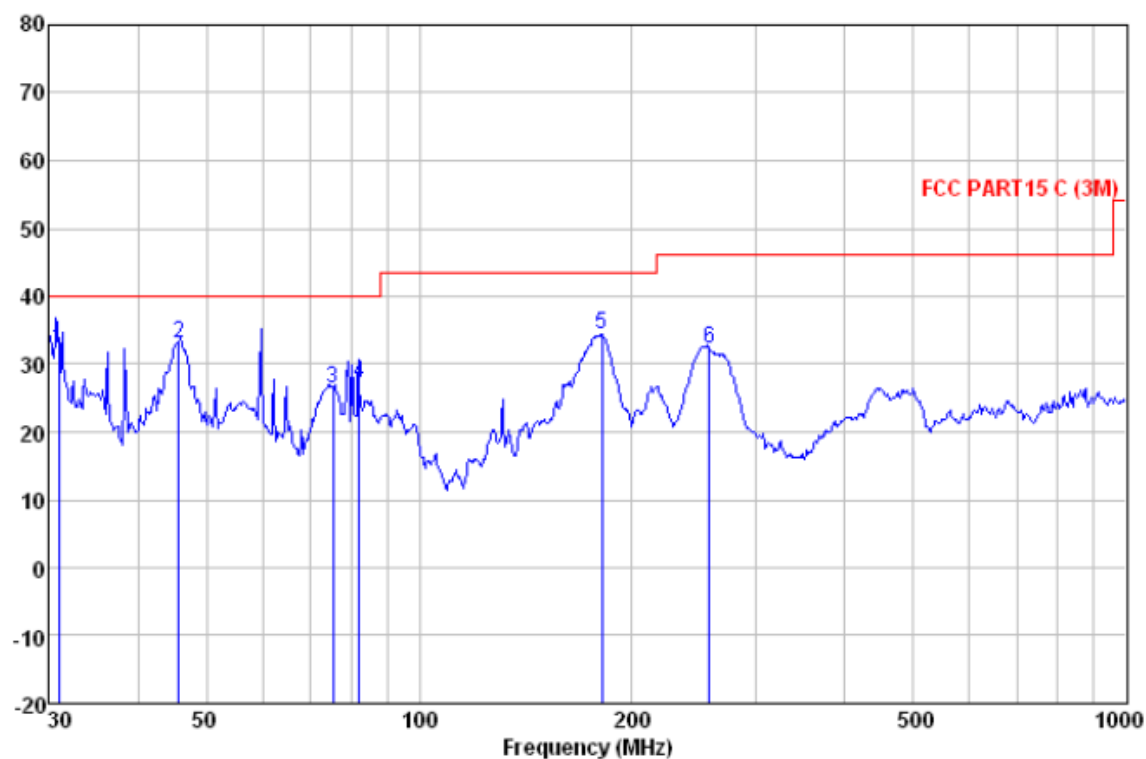
Quasi-peak measurement

| Freq    | ReadAntenna | Cable | Preamp |       | Limit  | Over   |           |
|---------|-------------|-------|--------|-------|--------|--------|-----------|
| Level   | Factor      | Loss  | Factor | Level | Line   | Limit  | Remark    |
| MHz     | dBuV        | dB/m  | dB     | dB    | dBuV/m | dBuV/m | dB        |
| 46.178  | 44.74       | 13.48 | 0.97   | 31.60 | 27.59  | 40.00  | -12.41 QP |
| 54.261  | 43.41       | 13.05 | 1.05   | 31.60 | 25.91  | 40.00  | -14.09 QP |
| 98.833  | 42.95       | 13.10 | 1.42   | 31.60 | 25.87  | 43.50  | -17.63 QP |
| 181.283 | 58.25       | 9.76  | 1.82   | 31.33 | 38.50  | 43.50  | -5.00 QP  |
| 214.514 | 47.59       | 11.03 | 1.96   | 31.30 | 29.28  | 43.50  | -14.22 QP |
| 252.948 | 51.87       | 12.06 | 2.16   | 31.30 | 34.79  | 46.00  | -11.21 QP |

(b) Antenna polarization: vertical

Peak scan

Level (dB $\mu$ V/m)



Quasi-peak measurement

| Freq    | ReadAntenna | Cable | Preamp |       | Limit  | Over   |           |
|---------|-------------|-------|--------|-------|--------|--------|-----------|
| Level   | Factor      | Loss  | Factor | Level | Line   | Limit  | Remark    |
| MHz     | dBuV        | dB/m  | dB     | dB    | dBuV/m | dBuV/m | dB        |
| 30.962  | 50.82       | 12.32 | 0.84   | 31.60 | 32.38  | 40.00  | -7.62 QP  |
| 45.695  | 50.12       | 13.51 | 0.97   | 31.60 | 33.00  | 40.00  | -7.00 QP  |
| 75.446  | 48.86       | 7.91  | 1.26   | 31.60 | 26.43  | 40.00  | -13.57 QP |
| 82.359  | 48.18       | 9.43  | 1.30   | 31.60 | 27.31  | 40.00  | -12.69 QP |
| 181.283 | 54.10       | 9.76  | 1.82   | 31.33 | 34.35  | 43.50  | -9.15 QP  |
| 257.422 | 49.44       | 12.06 | 2.18   | 31.30 | 32.38  | 46.00  | -13.62 QP |

Note: '\*' means the worst case

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss-PreAmplifier

|                      |                                            |                    |                      |
|----------------------|--------------------------------------------|--------------------|----------------------|
| EUT:                 | Bluetooth glasses                          | Model Name :       | AL-A2                |
| Temperature:         | 25 °C                                      | Test Data          | 2015-05-27           |
| Pressure:            | 1010 hPa                                   | Relative Humidity: | 60%                  |
| Test Mode :          | 1Mbps(the worst case)                      | Test Voltage :     | DC 3.7V from battery |
| Measurement Distance | 3 m                                        | Frenqucy Range     | 1GHz to 25GHz        |
| RBW/VBW              | 1MHz/1MHz for Peak, 1MHz/10Hz for Average. |                    |                      |

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

**Vertical Measurement:**

| Frequency (MHz) | Reading Level (dBμV) | factor (dB) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Antenna polarization |
|-----------------|----------------------|-------------|-------------------------|----------------|-------------|----------------------|
| 4804.000        | 51.01                | 5.06        | 56.07                   | 74.00          | -17.93      | peak                 |
| *4804.000       | 36.52                | 5.06        | 41.58                   | 54.00          | -12.42      | AVG                  |
| 7206.000        | 45.82                | 7.03        | 52.85                   | 74.00          | -21.15      | peak                 |
| 7206.000        | 31.65                | 7.03        | 38.68                   | 54.00          | -15.32      | AVG                  |
| 9608.000        | 37.91                | 10.63       | 48.54                   | 74.00          | -25.46      | peak                 |
| 9608.000        | 24.61                | 10.63       | 35.24                   | 54.00          | -18.76      | AVG                  |

**Horizontal Measurement:**

| Frequency (MHz) | Reading Level (dBμV) | factor (dB) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Antenna polarization |
|-----------------|----------------------|-------------|-------------------------|----------------|-------------|----------------------|
| 4804.000        | 52.11                | 5.06        | 57.17                   | 74.00          | -16.83      | peak                 |
| *4804.000       | 37.43                | 5.06        | 42.49                   | 54.00          | -11.51      | AVG                  |
| 7206.000        | 46.69                | 7.03        | 53.72                   | 74.00          | -20.28      | peak                 |
| 7206.000        | 33.43                | 7.03        | 40.46                   | 54.00          | -13.54      | AVG                  |
| 9608.000        | 38.31                | 10.63       | 48.94                   | 74.00          | -25.06      | peak                 |
| 9608.000        | 24.99                | 10.63       | 35.62                   | 54.00          | -18.38      | AVG                  |

Note: '\*' means the worst case

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss-PreAmplifier

Low Channel 00: 2402 MHz

Data rate: 1Mbps

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

**Vertical Measurement:**

| Frequency (MHz) | Reading Level (dBμV) | factor (dB) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Antenna polarization |
|-----------------|----------------------|-------------|-------------------------|----------------|-------------|----------------------|
| 4880.000        | 52.18                | 5.14        | 57.32                   | 74.00          | -16.68      | peak                 |
| *4880.000       | 38.02                | 5.14        | 43.16                   | 54.00          | -10.84      | AVG                  |
| 7320.000        | 45.08                | 7.54        | 52.62                   | 74.00          | -21.38      | peak                 |
| 7320.000        | 31.92                | 7.54        | 39.46                   | 54.00          | -14.54      | AVG                  |
| 9760.000        | 37.88                | 11.39       | 49.27                   | 74.00          | -24.73      | peak                 |
| 9760.000        | 25.14                | 11.39       | 36.53                   | 54.00          | -17.47      | AVG                  |

**Horizontal Measurement:**

| Frequency (MHz) | Reading Level (dBμV) | factor (dB) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Antenna polarization |
|-----------------|----------------------|-------------|-------------------------|----------------|-------------|----------------------|
| 4880.000        | 52.66                | 5.14        | 57.80                   | 74.00          | -16.20      | peak                 |
| *4880.000       | 38.12                | 5.14        | 43.26                   | 54.00          | -10.74      | AVG                  |
| 7320.000        | 45.03                | 7.54        | 52.57                   | 74.00          | -21.43      | peak                 |
| 7320.000        | 32.07                | 7.54        | 39.61                   | 54.00          | -14.39      | AVG                  |
| 9760.000        | 36.95                | 11.39       | 48.34                   | 74.00          | -25.66      | peak                 |
| 9760.000        | 24.44                | 11.39       | 35.83                   | 54.00          | -18.17      | AVG                  |

Note: '\*' means the worst case

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss-PreAmplifier

Middle Channel 19: 2440 MHz

Data rate: 1Mbps

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

**Vertical Measurement:**

| Frequency (MHz) | Reading Level (dBμV) | factor (dB) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Antenna polarization |
|-----------------|----------------------|-------------|-------------------------|----------------|-------------|----------------------|
| 4960.000        | 51.28                | 5.22        | 56.50                   | 74.00          | -17.50      | peak                 |
| *4960.000       | 37.68                | 5.22        | 42.90                   | 54.00          | -11.10      | AVG                  |
| 7440.000        | 44.16                | 8.06        | 52.22                   | 74.00          | -21.78      | peak                 |
| 7440.000        | 31.22                | 8.06        | 39.28                   | 54.00          | -14.72      | AVG                  |
| 9920.000        | 36.02                | 12.10       | 48.12                   | 74.00          | -25.88      | peak                 |
| 9920.000        | 24.12                | 12.10       | 36.22                   | 54.00          | -17.78      | AVG                  |

**Horizontal Measurement:**

| Frequency (MHz) | Reading Level (dBμV) | factor (dB) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Antenna polarization |
|-----------------|----------------------|-------------|-------------------------|----------------|-------------|----------------------|
| 4960.000        | 51.39                | 5.22        | 56.61                   | 74.00          | -17.39      | peak                 |
| *4960.000       | 37.49                | 5.22        | 42.71                   | 54.00          | -11.29      | AVG                  |
| 7440.000        | 45.37                | 8.06        | 53.43                   | 74.00          | -20.57      | peak                 |
| 7440.000        | 32.02                | 8.06        | 40.08                   | 54.00          | -13.92      | AVG                  |
| 9920.000        | 37.34                | 12.10       | 49.44                   | 74.00          | -24.56      | peak                 |
| 9920.000        | 24.37                | 12.10       | 36.47                   | 54.00          | -17.53      | AVG                  |

Note: '\*' means the worst case

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss-PreAmplifier

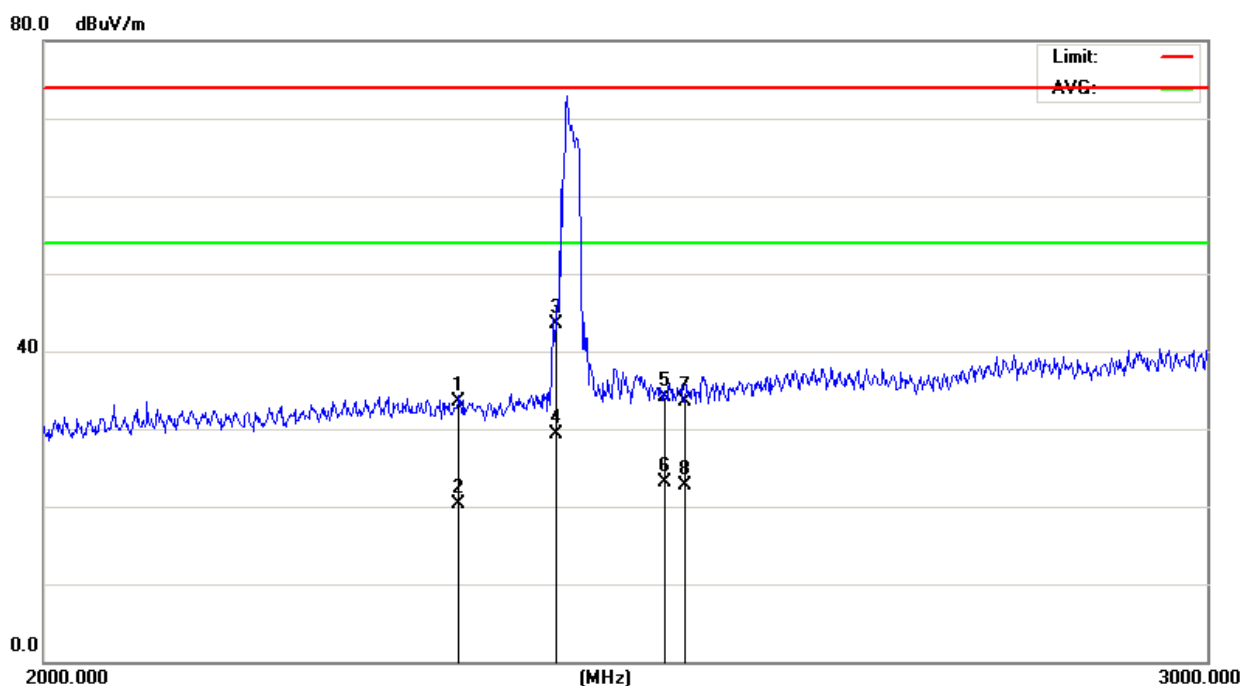
High Channel 39: 2480 MHz

Data rate: 1Mbps

### 5.3.4 TEST RESULTS (Restricted Bands Requirements)

#### 1. Low Channel

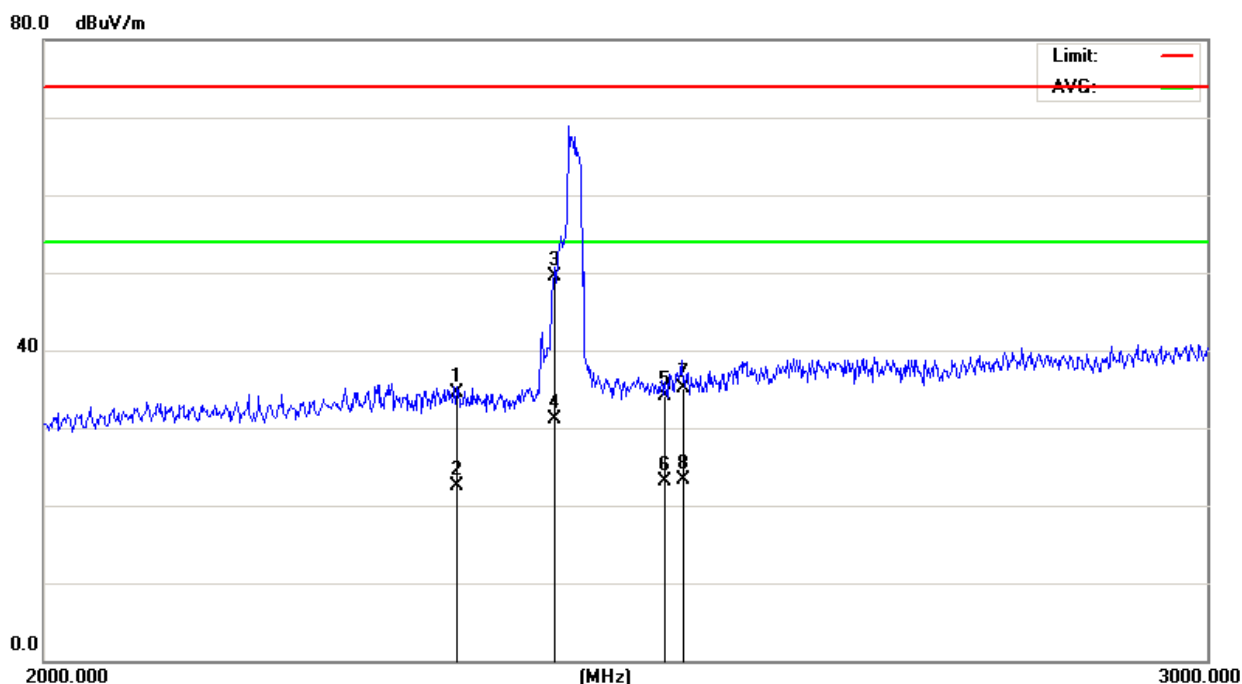
Vertical:



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 2310.000     | 40.02                    | -6.42                   | 33.60                      | 74.00           | -40.40     | peak     |
| 2   |     | 2310.000     | 26.82                    | -6.42                   | 20.40                      | 54.00           | -33.60     | AVG      |
| 3   |     | 2390.000     | 49.39                    | -5.79                   | 43.60                      | 74.00           | -30.40     | peak     |
| 4   | *   | 2390.000     | 35.07                    | -5.79                   | 29.28                      | 54.00           | -24.72     | AVG      |
| 5   |     | 2483.500     | 39.08                    | -4.98                   | 34.10                      | 74.00           | -39.90     | peak     |
| 6   |     | 2483.500     | 28.13                    | -4.98                   | 23.15                      | 54.00           | -30.85     | AVG      |
| 7   |     | 2500.000     | 38.33                    | -4.83                   | 33.50                      | 74.00           | -40.50     | peak     |
| 8   |     | 2500.000     | 27.44                    | -4.83                   | 22.61                      | 54.00           | -31.39     | AVG      |

## 1. Low Channel

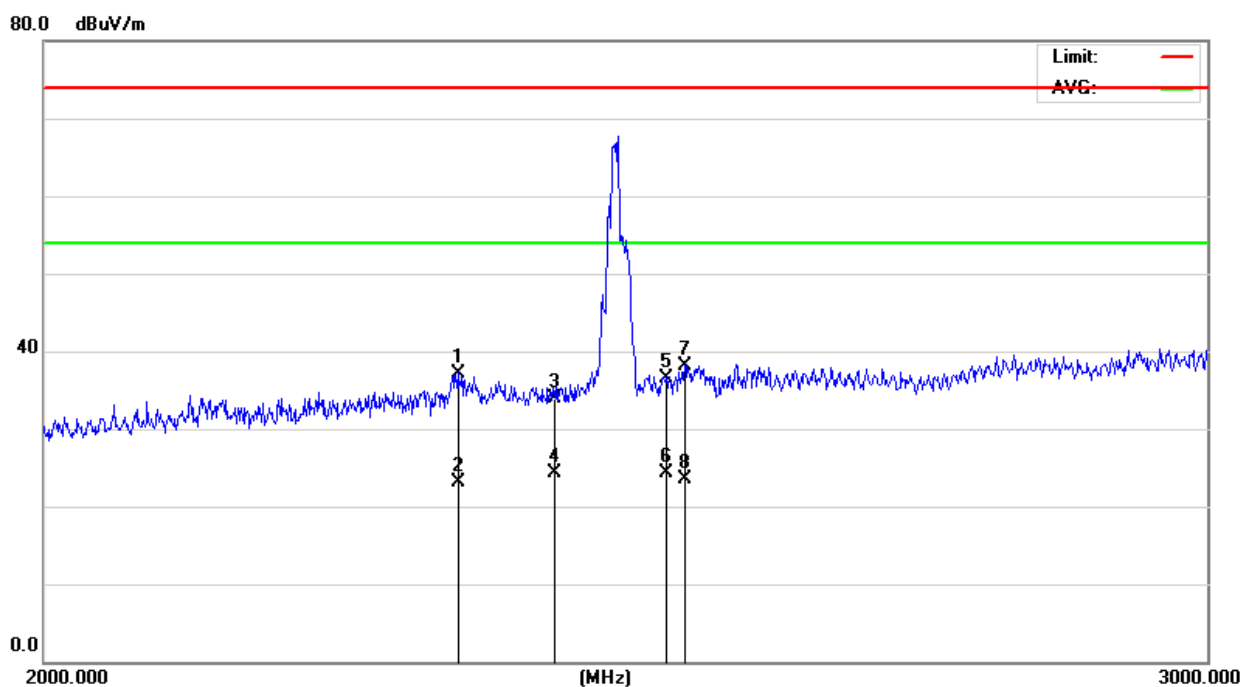
Horizontal:



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 2310.000     | 41.02                    | -6.42                   | 34.60                      | 74.00           | -39.40     | peak     |
| 2   |     | 2310.000     | 28.96                    | -6.42                   | 22.54                      | 54.00           | -31.46     | AVG      |
| 3   |     | 2390.000     | 55.29                    | -5.79                   | 49.50                      | 74.00           | -24.50     | peak     |
| 4   | *   | 2390.000     | 36.83                    | -5.79                   | 31.04                      | 54.00           | -22.96     | AVG      |
| 5   |     | 2483.500     | 39.18                    | -4.98                   | 34.20                      | 74.00           | -39.80     | peak     |
| 6   |     | 2483.500     | 27.99                    | -4.98                   | 23.01                      | 54.00           | -30.99     | AVG      |
| 7   |     | 2500.000     | 40.03                    | -4.83                   | 35.20                      | 74.00           | -38.80     | peak     |
| 8   |     | 2500.000     | 28.07                    | -4.83                   | 23.24                      | 54.00           | -30.76     | AVG      |

## 2. Middle Channel

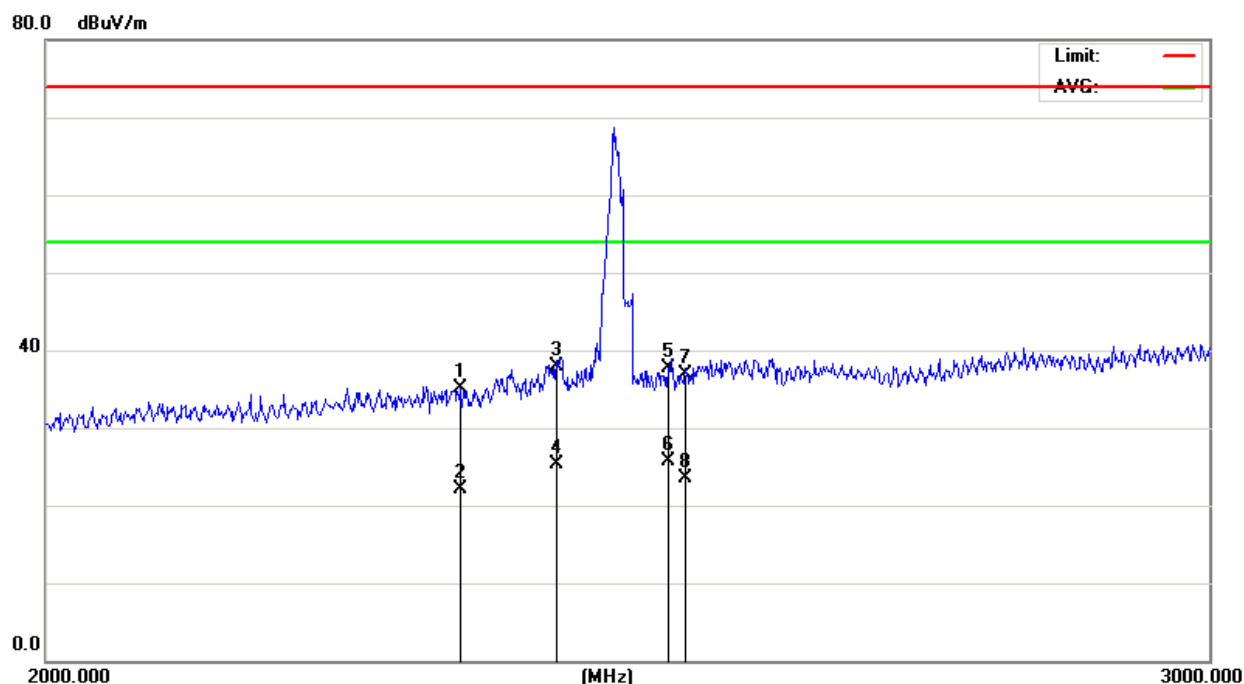
Vertical:



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 2310.000     | 43.62                    | -6.42                   | 37.20                      | 74.00           | -36.80     | peak     |
| 2   |     | 2310.000     | 29.49                    | -6.42                   | 23.07                      | 54.00           | -30.93     | AVG      |
| 3   |     | 2390.000     | 39.69                    | -5.79                   | 33.90                      | 74.00           | -40.10     | peak     |
| 4   |     | 2390.000     | 30.02                    | -5.79                   | 24.23                      | 54.00           | -29.77     | AVG      |
| 5   |     | 2483.500     | 41.58                    | -4.98                   | 36.60                      | 74.00           | -37.40     | peak     |
| 6   | *   | 2483.500     | 29.37                    | -4.98                   | 24.39                      | 54.00           | -29.61     | AVG      |
| 7   |     | 2500.000     | 43.03                    | -4.83                   | 38.20                      | 74.00           | -35.80     | peak     |
| 8   |     | 2500.000     | 28.34                    | -4.83                   | 23.51                      | 54.00           | -30.49     | AVG      |

## 2. Middle Channel

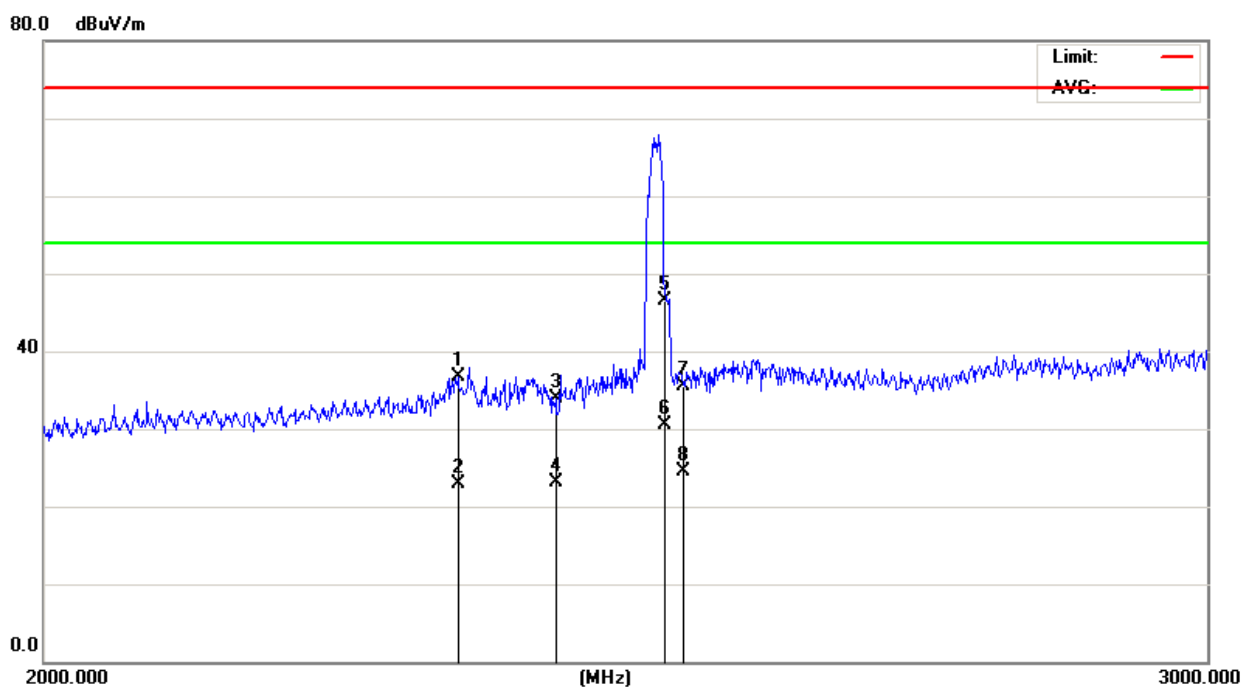
Horizontal:



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 2310.000     | 41.52                    | -6.42                   | 35.10                      | 74.00           | -38.90     | peak     |
| 2   |     | 2310.000     | 28.43                    | -6.42                   | 22.01                      | 54.00           | -31.99     | AVG      |
| 3   |     | 2390.000     | 43.69                    | -5.79                   | 37.90                      | 74.00           | -36.10     | peak     |
| 4   |     | 2390.000     | 31.08                    | -5.79                   | 25.29                      | 54.00           | -28.71     | AVG      |
| 5   |     | 2483.500     | 42.78                    | -4.98                   | 37.80                      | 74.00           | -36.20     | peak     |
| 6   | *   | 2483.500     | 30.72                    | -4.98                   | 25.74                      | 54.00           | -28.26     | AVG      |
| 7   |     | 2500.000     | 41.83                    | -4.83                   | 37.00                      | 74.00           | -37.00     | peak     |
| 8   |     | 2500.000     | 28.43                    | -4.83                   | 23.60                      | 54.00           | -30.40     | AVG      |

### 3. High Channel

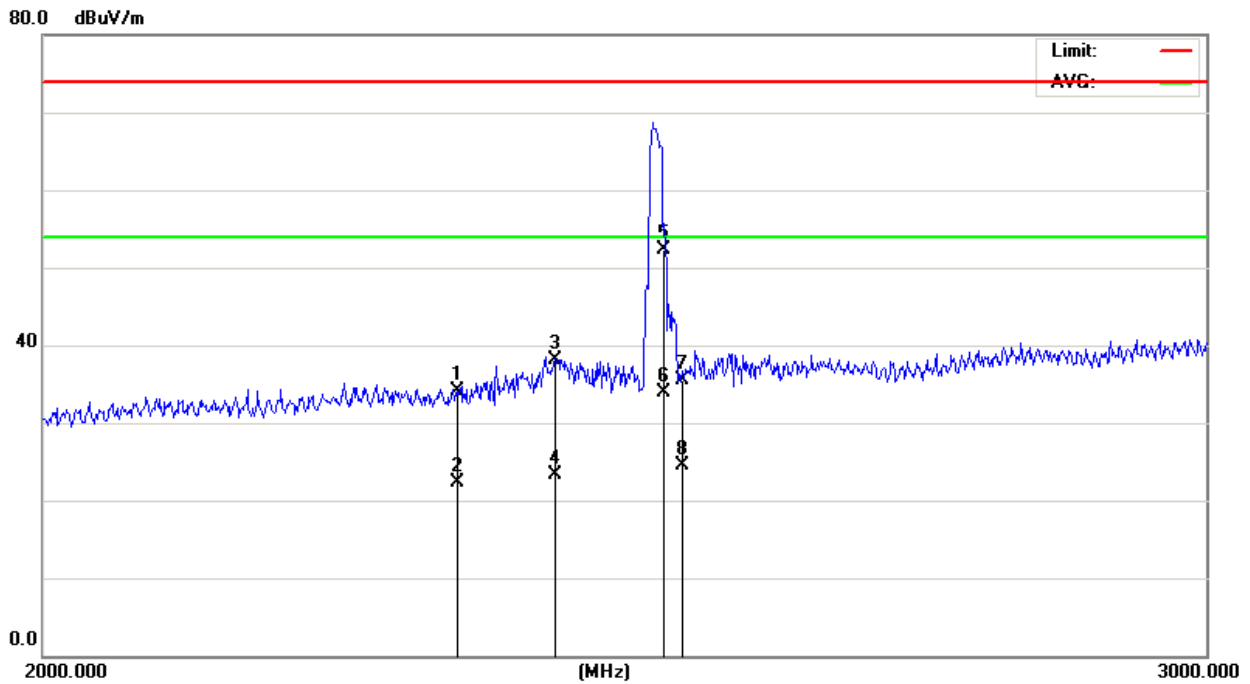
Vertical:



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 2310.000     | 43.22                    | -6.42                   | 36.80                      | 74.00           | -37.20     | peak     |
| 2   |     | 2310.000     | 29.31                    | -6.42                   | 22.89                      | 54.00           | -31.11     | AVG      |
| 3   |     | 2390.000     | 39.69                    | -5.79                   | 33.90                      | 74.00           | -40.10     | peak     |
| 4   |     | 2390.000     | 28.94                    | -5.79                   | 23.15                      | 54.00           | -30.85     | AVG      |
| 5   |     | 2483.500     | 51.48                    | -4.98                   | 46.50                      | 74.00           | -27.50     | peak     |
| 6   | *   | 2483.500     | 35.46                    | -4.98                   | 30.48                      | 54.00           | -23.52     | AVG      |
| 7   |     | 2500.000     | 40.33                    | -4.83                   | 35.50                      | 74.00           | -38.50     | peak     |
| 8   |     | 2500.000     | 29.28                    | -4.83                   | 24.45                      | 54.00           | -29.55     | AVG      |

### 3. High Channel

Horizontal:



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 2310.000     | 40.52                    | -6.42                   | 34.10                      | 74.00           | -39.90     | peak     |
| 2   |     | 2310.000     | 28.67                    | -6.42                   | 22.25                      | 54.00           | -31.75     | AVG      |
| 3   |     | 2390.000     | 43.99                    | -5.79                   | 38.20                      | 74.00           | -35.80     | peak     |
| 4   |     | 2390.000     | 29.03                    | -5.79                   | 23.24                      | 54.00           | -30.76     | AVG      |
| 5   |     | 2483.500     | 57.28                    | -4.98                   | 52.30                      | 74.00           | -21.70     | peak     |
| 6   | *   | 2483.500     | 38.93                    | -4.98                   | 33.95                      | 54.00           | -20.05     | AVG      |
| 7   |     | 2500.000     | 40.43                    | -4.83                   | 35.60                      | 74.00           | -38.40     | peak     |
| 8   |     | 2500.000     | 29.34                    | -4.83                   | 24.51                      | 54.00           | -29.49     | AVG      |

Remark: No any other emission which falls in restricted bands can be detected and be reported.

This test item was transferred to Asia Institute Technology (Dongguan) Limited which was confirmed to have enough capacity to perform this subcontract work. The FCC Registration No. of Asia Institute Technology (Dongguan) Limited is 248337.

**Test result: The unit does meet the FCC requirements.**

## 5.4 BANDWIDTH TEST

### 5.4.1 Applied procedures / Limit

15.247(a)(2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 5.4.2 Test procedure

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW= 100KHz, VBW $\geq$ RBW, Sweep time = Auto.

### 5.4.3 Deviation from standard

No deviation.

### 5.4.4 Test setup



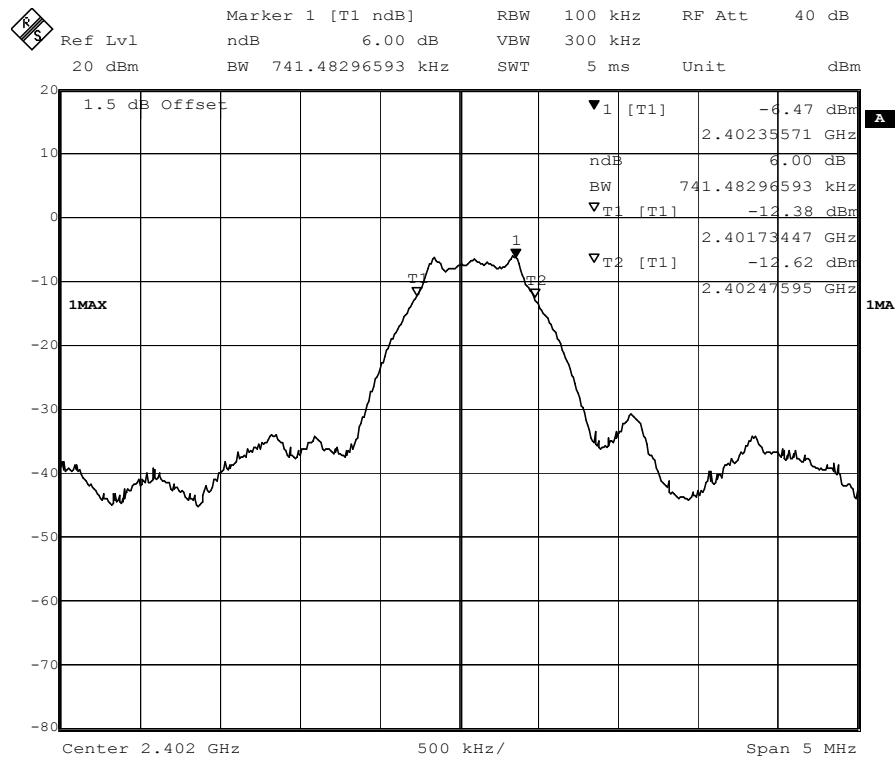
#### 5.4.5 Test results

|              |                   |                    |                      |
|--------------|-------------------|--------------------|----------------------|
| EUT:         | Bluetooth glasses | Model Name :       | AL-A2                |
| Temperature: | 26 °C             | Relative Humidity: | 53%                  |
| Pressure:    | 1010 hPa          | Test Power :       | DC 3.7V from battery |
| Test Mode :  | TX 1Mbps          |                    |                      |

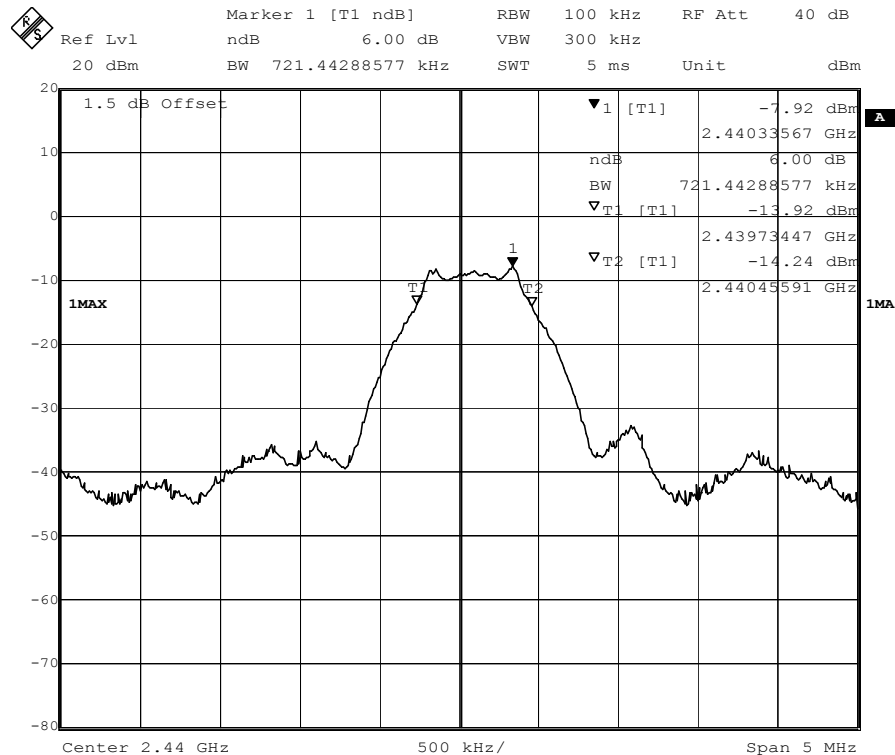
#### Test result:

| Channel No. | Frequency (MHz) | Mode | Data Rate | Measured 6dB bandwidth (kHz) | Limit   | Result |
|-------------|-----------------|------|-----------|------------------------------|---------|--------|
| 0           | 2402            | GFSK | 1 Mbps    | 741.483                      | ≥500KHz | Pass   |
| 19          | 2440            |      | 1 Mbps    | 721.443                      |         | Pass   |
| 39          | 2480            |      | 1 Mbps    | 721.443                      |         | Pass   |

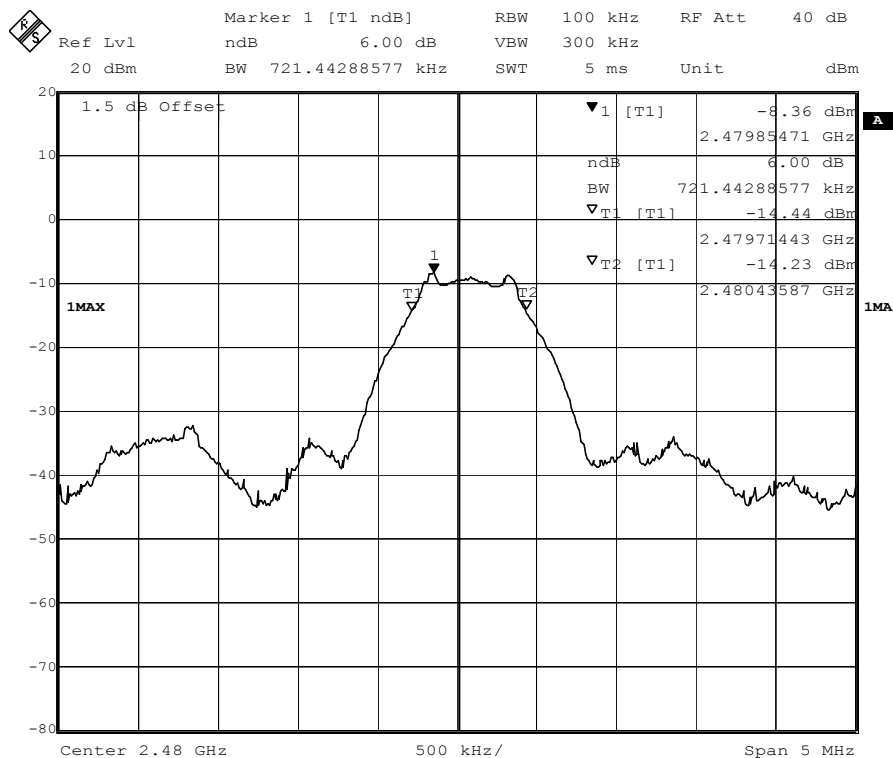
### CH00-1Mbps



### CH 19-1Mbps



### CH 39-1Mbps



## 5.5 Maximum Peak Output Power

### 5.5.1 Applied procedures / Limit

15.247(b)(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

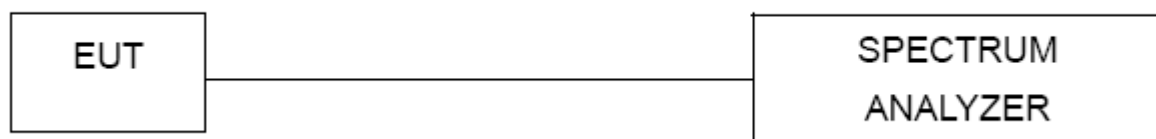
### 5.5.2 Test procedure

- (1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as RBW=3MHz, VBW $\geq$ RBW, Sweep time=Auto, Detector Function=Peak.
- (2) The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.
- (3) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range with modulated mode. also shall be performed at different modes of operation.

### 5.5.3 Deviation from standard

No deviation.

### 5.5.4 Test setup



### 5.5.5 Test results

|              |                   |                    |                      |
|--------------|-------------------|--------------------|----------------------|
| EUT:         | Bluetooth glasses | Model Name :       | AL-A2                |
| Temperature: | 22 °C             | Relative Humidity: | 60%                  |
| Pressure:    | 1010 hPa          | Test Voltage :     | DC 3.7V from battery |
| Test Mode :  | TX                |                    |                      |

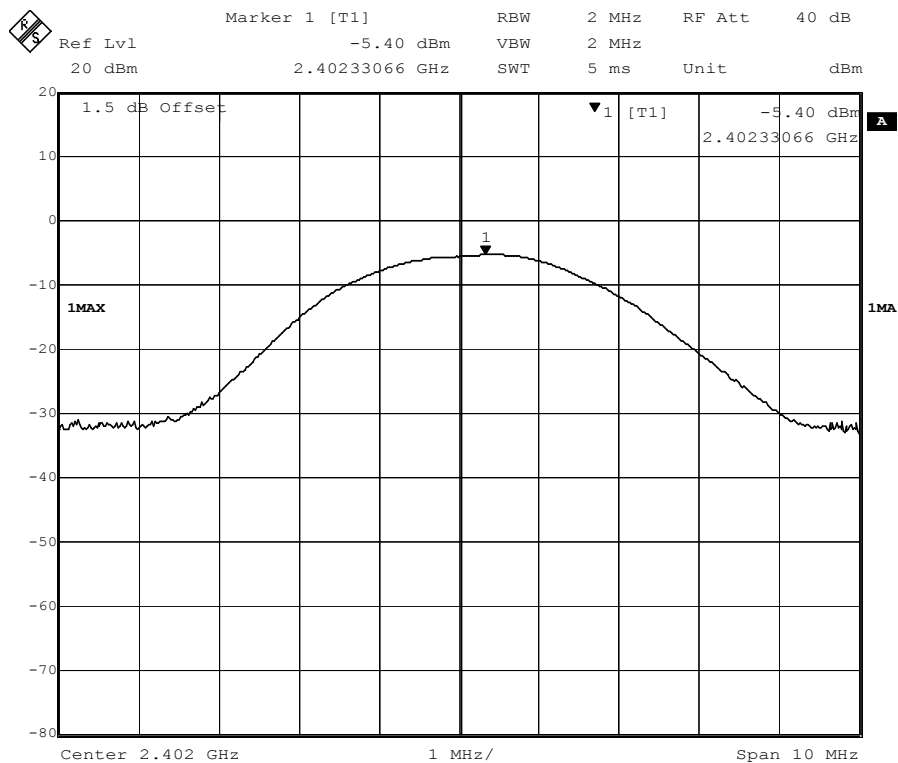
#### Test result:

| Channel No. | Frequency<br>(MHz) | Mode | Data Rate | Measured Channel Power<br>(dBm) | Limit     | Result |
|-------------|--------------------|------|-----------|---------------------------------|-----------|--------|
| 0           | 2402               | GFSK | 1Mbps     | -5.04                           | 1W(30dBm) | Pass   |
| 19          | 2440               |      | 1Mbps     | -7.05                           |           | Pass   |
| 39          | 2480               |      | 1Mbps     | -7.51                           |           | Pass   |

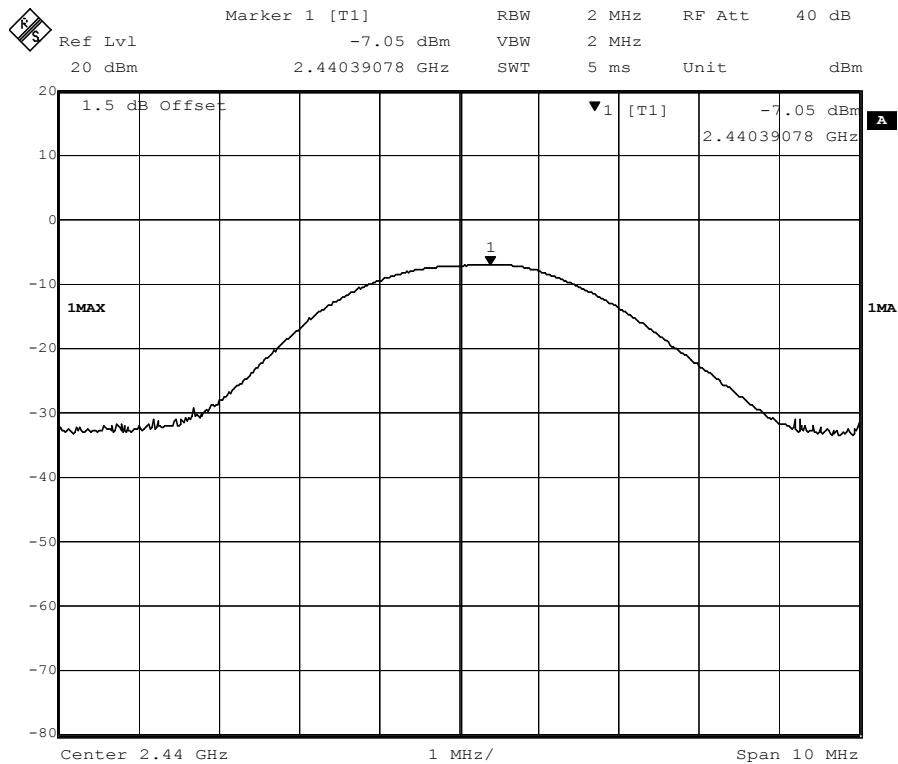
**Remark: cable lose=1.5 dB**

**Test result: The unit does meet the FCC requirements.**

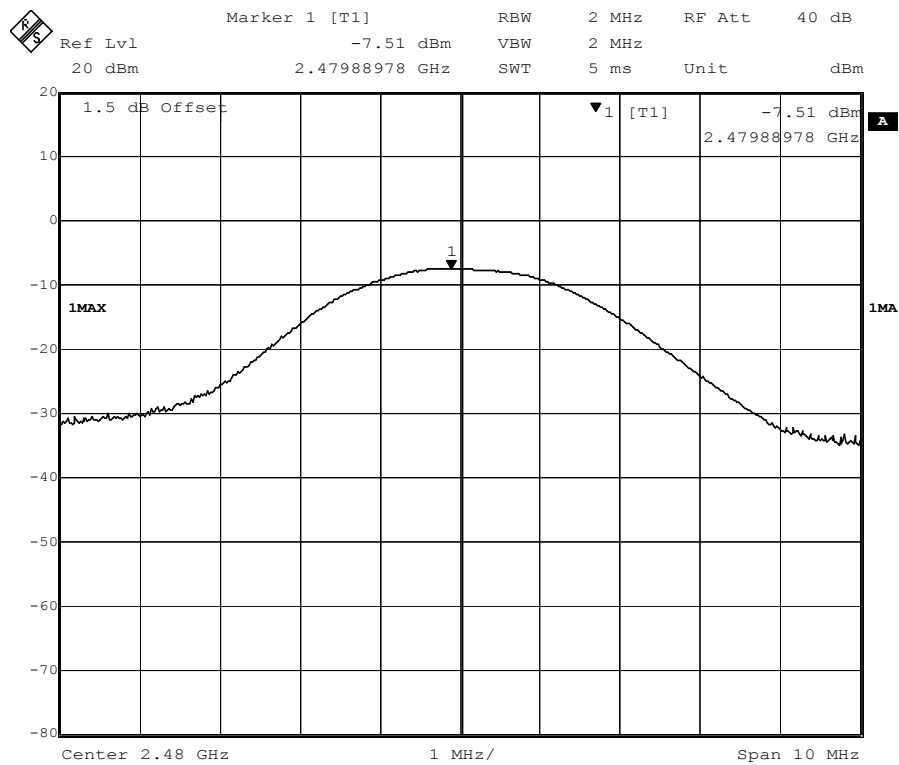
### CH 00-1Mbps



### CH 19-1Mbps



CH 39-1Mbps



## 5.6 Peak Power Density

### 5.6.1 Applied procedures / Limit

15.247(a) (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 5.6.2 Test procedure

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1.5dB) from the antenna port to the spectrum analyzer or power meter.
2. Set the spectrum analyzer:
  - a) Set CENTER FREQUENCY = Frequency from Power Spectral Density Test Matrix (see 6.10.2)
  - b) Set SPAN = 20 MHz (For devices with a nominal 40 MHz BW, 50 MHz span will be needed)
  - c) Set REFERENCE LEVEL = 20 dBm
  - d) Set ATTENUATION = 0 dB (add internal attenuation, if necessary)
  - e) Set SWEEP TIME = Coupled
  - f) Set RBW = 3 kHz
  - g) Set VBW = 10 kHz
  - h) Set DETECTOR = Peak
  - i) Set MKR = Center Frequency
  - j) Set TRACE = CLEAR WRITE

Place the radio in continuous transmit mode. Set the TRACE to MAX HOLD, and after the trace stabilizes, the TRACE to VIEW. Set the marker on the peak of the signal and then adjust the center frequency of the spectrum analyzer to the marker frequency.

After viewing the EUT waveform on the spectrum analyzer, perform the following spectrum analyzer functions to capture the trace:

Set SPAN = 300 kHz

Set SWEEP TIME = 100 s

Set TRACE = MAX HOLD

Set MKR = PEAK SEARCH

3. Measure the Power Spectral Density of the test frequency with special test status.
4. Repeat until all the test status is investigated.

### 5.6.3 Deviation from standard

No deviation.

#### 5.6.4 Test results

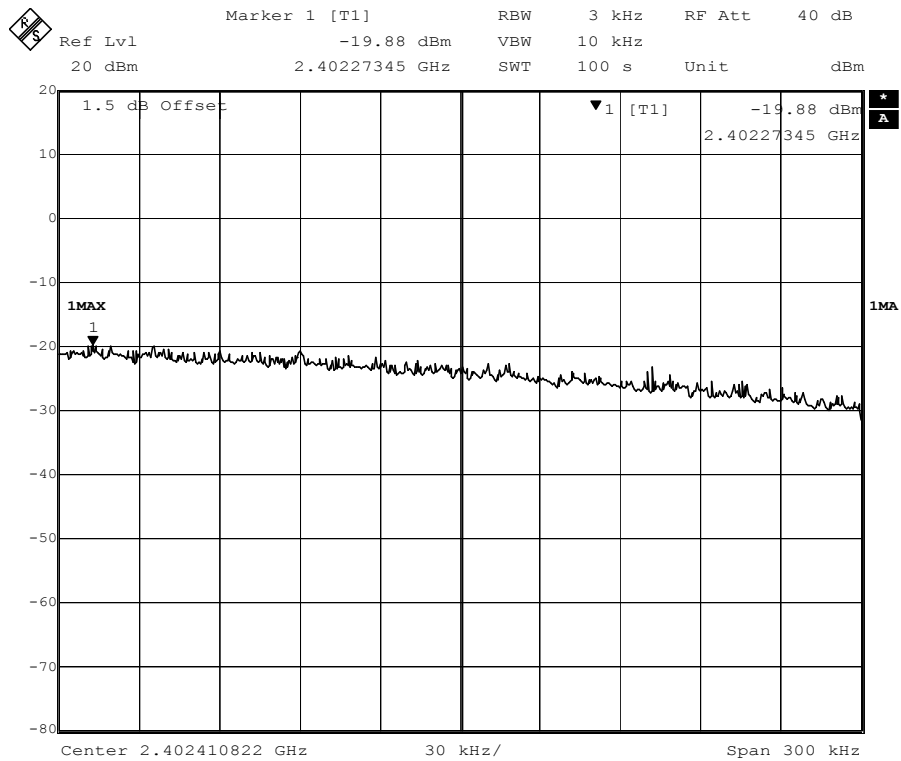
|              |                   |                    |                      |
|--------------|-------------------|--------------------|----------------------|
| EUT:         | Bluetooth glasses | Model Name :       | AL-A2                |
| Temperature: | 22 °C             | Relative Humidity: | 53%                  |
| Pressure:    | 1010 hPa          | Test Power :       | DC 3.7V from battery |
| Test Mode :  | TX 1Mbps          |                    |                      |

#### Test result:

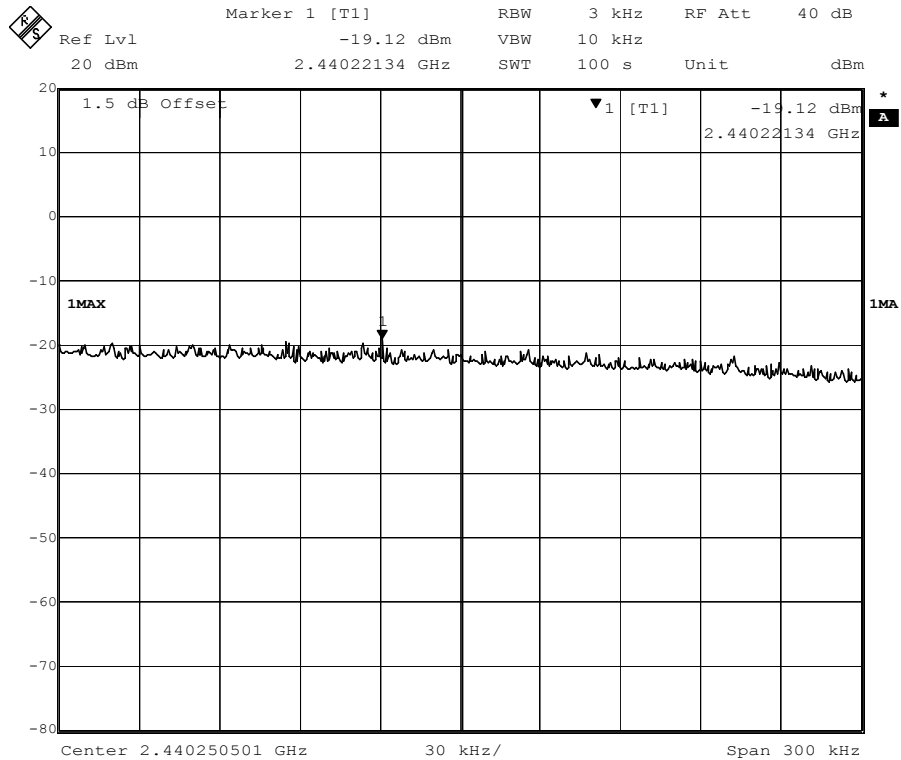
| Channel No. | Frequency (MHz) | Mode | Data Rate | Measured Peak Power Spectral Density (dBm/3KHz) | Limit     | Result |
|-------------|-----------------|------|-----------|-------------------------------------------------|-----------|--------|
| 0           | 2402            | GFSK | 1 Mbps    | -19.88                                          | 8dBm/3KHz | Pass   |
| 19          | 2440            |      | 1 Mbps    | -19.12                                          |           | Pass   |
| 39          | 2480            |      | 1 Mbps    | -19.38                                          |           | Pass   |

**Test result: the unit does meet the FCC requirements.**

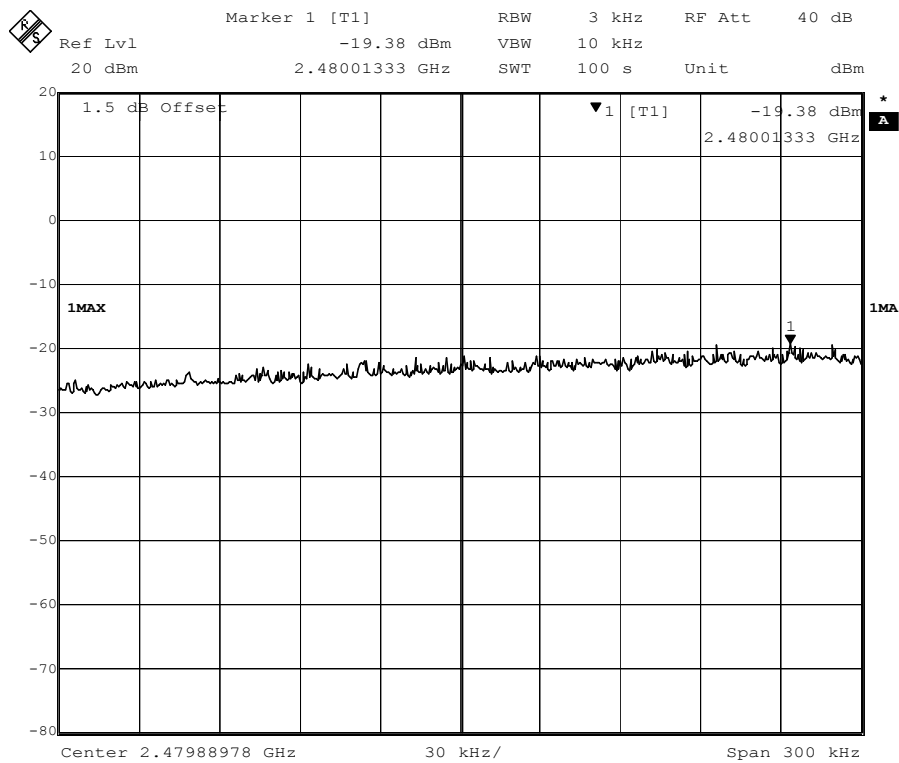
### CH 00-1Mbps



### CH 19-1Mbps



CH 39-1Mbps



Test result: The unit does meet the FCC requirements.

## 5.7 Band edge

### 5.7.1 Applied procedures / Limit

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### 5.7.2 Test procedure

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW=100kHz, VBW $\geq$ RBW, Sweep time=Auto, Detector Function=Peak.

### 5.7.3 Deviation from standard

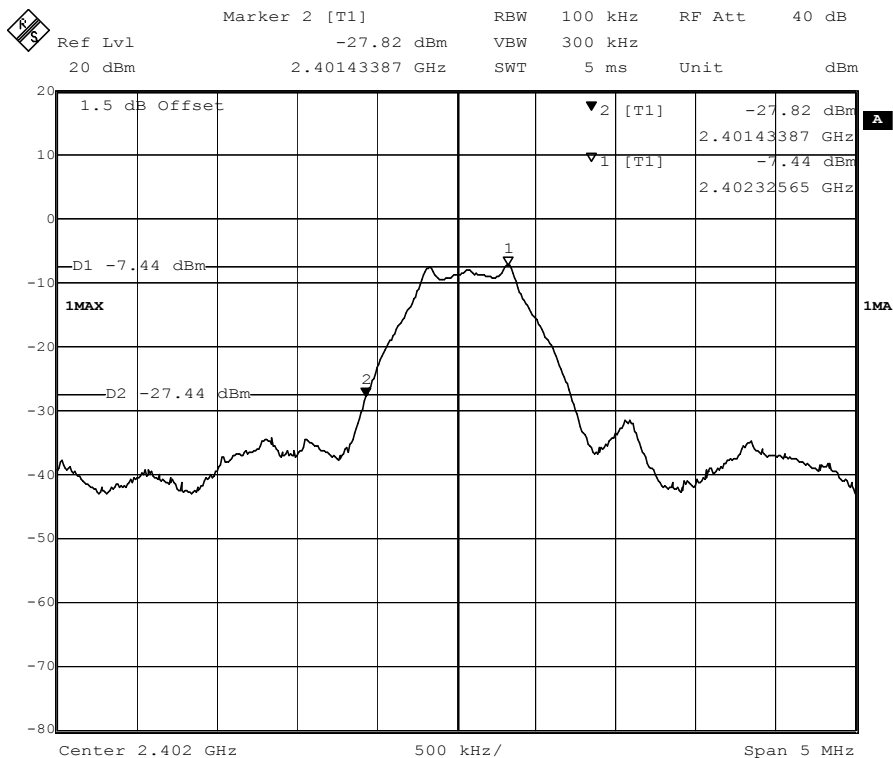
No deviation.

### 5.7.4 Test setup

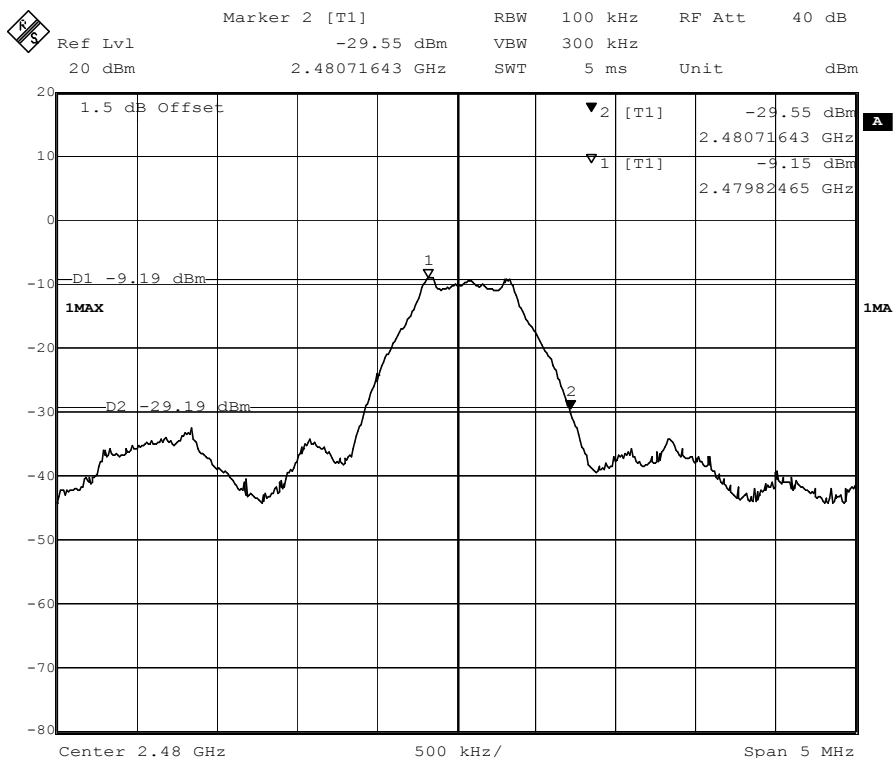


## 5.7.5 Test results

### CH00 (Lower) Data rate 1Mbps



### CH 39 (Upper) Data rate 1Mbps



## 5.8 Conducted Spurious Emissions

### 5.8.1 Applied procedures / Limit

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### 5.8.2 Test procedure

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting: RBW=100kHz, VBW $\geq$ RBW, Sweep time=Auto, Detector Function=Peak.

### 5.8.3 Deviation from standard

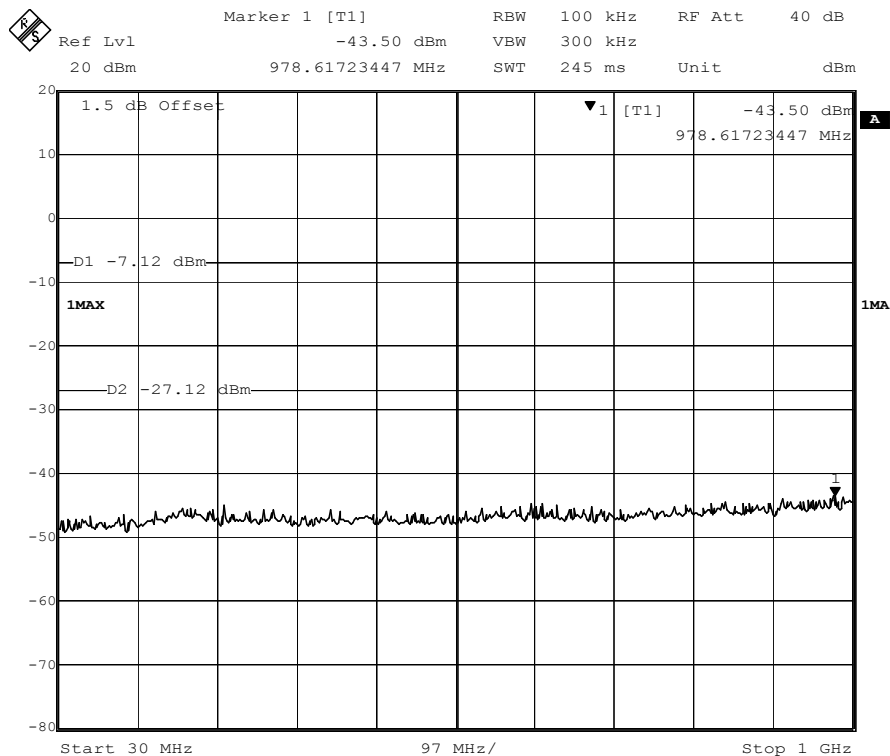
No deviation.

### 5.8.4 Test setup

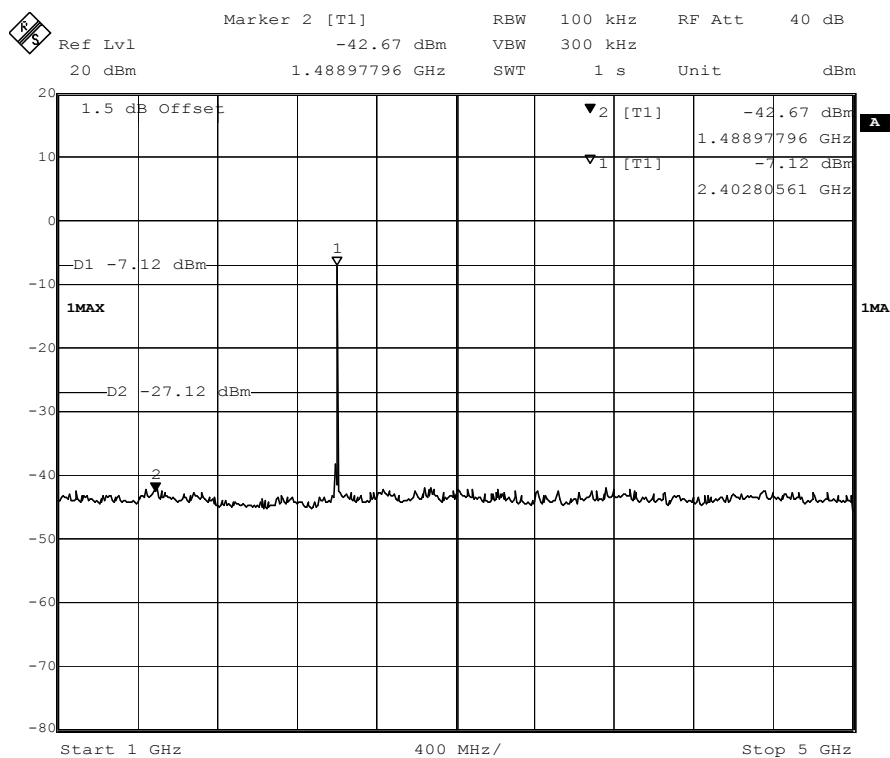


## 5.8.5 Test results

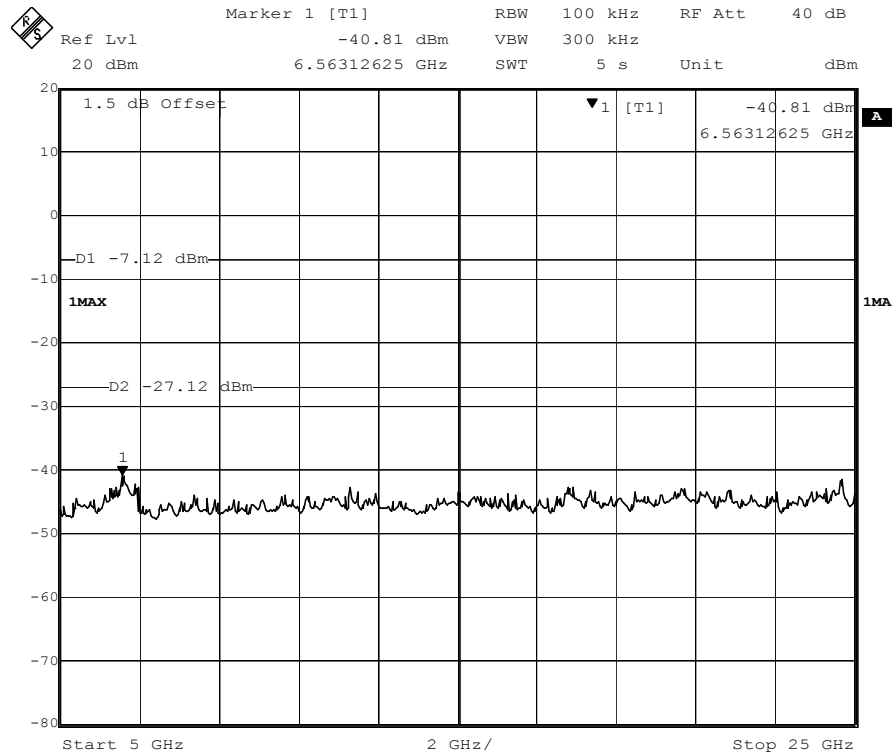
### Lowest Channel: 30 MHz to 1 GHz



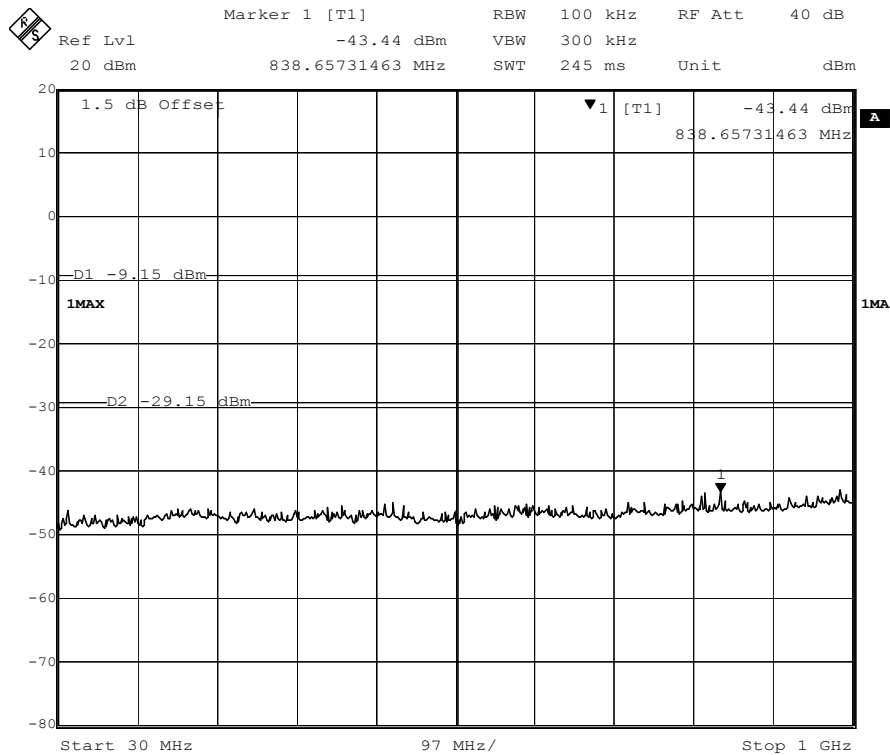
### Lowest Channel: 1 GHz to 5 GHz



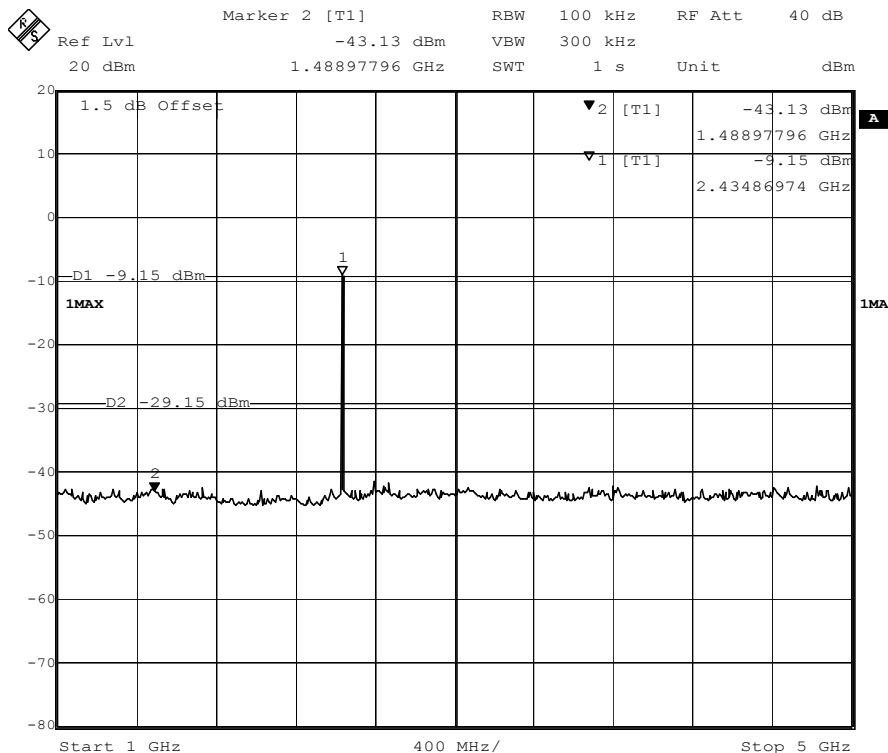
**Lowest Channel: 5 GHz to 25 GHz**



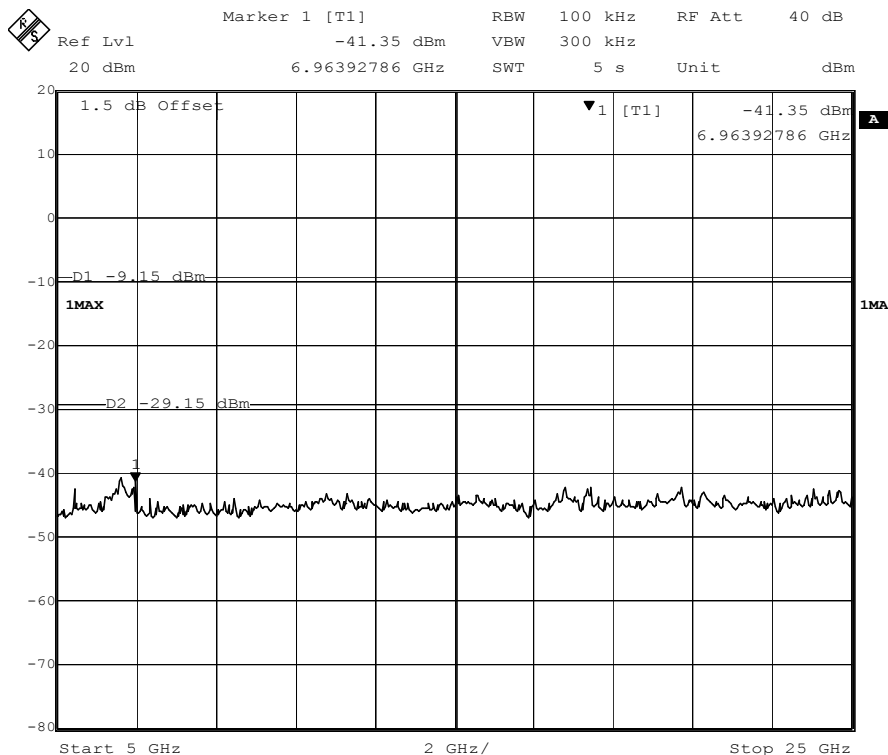
**Middle Channel: 30 MHz to 1 GHz**



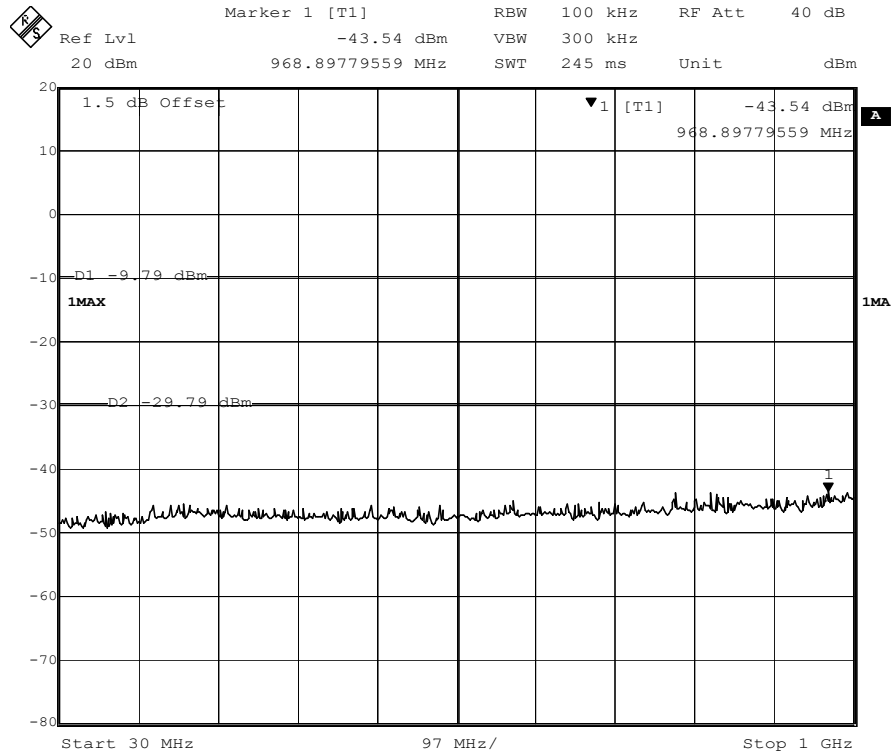
**Middle Channel: 1 GHz to 5 GHz**



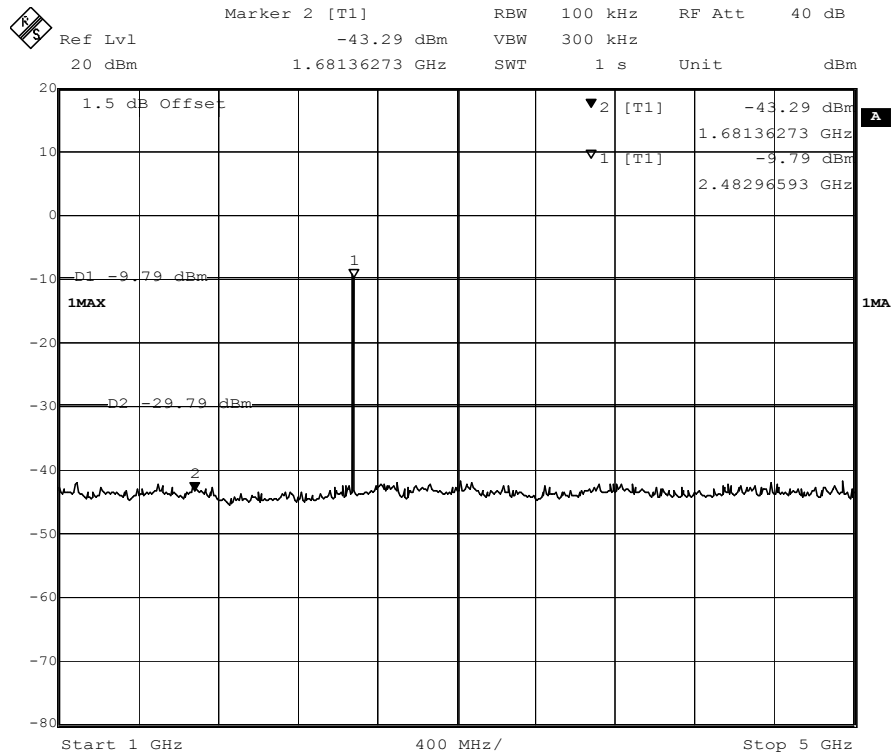
**Middle Channel: 5 GHz to 25 GHz**



### Highest Channel: 30 MHz to 1 GHz



### Highest Channel: 1 GHz to 5 GHz



**Highest Channel: 5 GHz to 25 GHz**

