# FCC Test Report

## Part 15 subpart C

### Client Information:

| | |
|---|---|
| Applicant: | SHENZHEN HAISHENGWEI ELECTRONICS CO.,LTD |
| Applicant add.: | R722,Building Huafeng Jinyuan Commerce Mansion No.300,Xixiang Road,Bao'an District Shenzhen City |

### Product Information:

| | |
|---|---|
| Product Name: | Bone Conduction Sports Headphone |
| Model No.: | YKL-701, BDS-662 |
| Brand Name: | YAKLEE |
| FCC ID: | 2AM5LYKL-701 |
| Standards: | CFR 47 FCC PART 15 SUBPART C:2017 section 15.247 |

### Prepared By:

**Dongguan Yaxu (AiT) Technology Limited**

Add. : No.22, Jinqianling Third Street, Jitigang, Huangjiang, Dongguan, Guangdong, China

| | | | |
|---|---|---|---|
| Date of Receipt: | Jun. 04, 2017 | Date of Test: | Jun. 10~21, 2017 |
| Date of Issue: | Jun. 23, 2017 | Test Result: | Pass |

This device described above has been tested by Dongguan Yaxu(AiT) Technology Limited, 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 report shall not be reproduced except in full, without the written approval of Dongguan Yaxu (AiT) Technology Limited.

**Reviewed by:** Seal-Chen **Approved by:**

# 1 Contents

# 2 Test Summary

## 2.1 Compliance with FCC Part 15 subpart C

| Test | Test Requirement | Standard Paragraph | Result |
|---|---|---|---|
| Antenna Requirement | FCC Part 15 C:2017 | Section 15.247(c) | **PASS** |
| Conduction Emissions | FCC Part 15 C:2017 | Section 15.207(a) | **PASS** |
| Radiated Emissions | FCC Part 15 C:2017 | Section 15.247(d) | **PASS** |
| Carrier Frequencies Separated | FCC Part 15 C:2017 | Section 15.247(a)(1) | **PASS** |
| Hopping Channel Number | FCC Part 15 C:2017 | Section 15.247(a)(1) (iii) | **PASS** |
| Dwell Time | FCC Part 15 C:2017 | Section 15.247(a)(1) (iii) | **PASS** |
| Maximum Peak Output Power | FCC Part 15 C:2017 | Section 15.247(b) | **PASS** |
| Band edge | FCC Part 15 C:2017 | Section 15.247(d) | **PASS** |
| Conducted Spurious Emissions | FCC Part 15 C:2017 | Section 15.247(d) | **PASS** |
| Note: | | | |
| | (1) Reference to the ANSI C63.10:2013. | | |

## 2.2 Test Location

All tests were performed at:

Dongguan Yaxu (AiT) Technology Limited
No.22, Jinqianling Third Street, Jitigang, Huangjiang,Dongguan, Guangdong, China
Tel.: +86.769.82020499 Fax.: +86.769.82020495

## 2.3 Measurement Uncertainty

All measurements involve certain levels of uncertainties, the maximum value of the uncertainty as below:

| No. | Item | Uncertainty |
|---|---|---|
| 1 | Conducted Emission Test | 1.20dB |
| 2 | Radiated Emission Test | 3.30dB |
| 3 | RF power,conducted | 0.16dB |
| 4 | RF power density,conducted | 0.24dB |
| 5 | Spurious emissions,conducted | 0.21dB |
| 6 | All emissions,radiated(<1G) | 4.68dB |
| 7 | All emissions,radiated(>1G) | 4.89dB |

# 3 Test Facility

**The test facility is recognized, certified or accredited by the following organizations:**

**.CNAS- Registration No: L6177**

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2005 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Apr. 18, 2013

**.FCC- Registration No: 248337**

The 3m Semi-Anechoic Chamber, 3m/10m Open Area Test Site and Shielding Room of Dongguan Yaxu (AiT) Technology Limited have been registered by Federal Communications Commission (FCC) on Aug.29, 2014.

**.Industry Canada(IC)-Registration No: IC6819A-1**

The 3m Semi-Anechoic Chamber and 3m/10m Open Area Test Site of Dongguan Yaxu (AiT) Technology Limited have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing on Oct. 12, 2014.

## 3.1 Deviation from standard

None

## 3.2 Abnormalities from standard conditions

None

# 4 General Information

## 4.1 General Description of EUT

| | |
|---|---|
| Manufacturer: | SHENZHEN HAISHENGWEI ELECTRONICS CO.,LTD |
| Manufacturer Address: | R722,Building Huafeng Jinyuan Commerce Mansion No.300,Xixiang Road,Bao'an District Shenzhen City |
| EUT Name: | Bone Conduction Sports Headphone |
| Model No: | YKL-701 |
| Derivative model No.: | BDS-662 |
| Brand Name: | YAKLEE |
| Serial No: | N/A |
| Operation frequency: | 2402 MHz to 2480 MHz |
| NUMBER OF CHANNEL: | 79 |
| Modulation Technology: | GFSK, π/4-DQPSK, 8DPSK(1/2/3Mbps) |
| Bluetooth version: | BT 3.0 |
| H/W No.: | V1.0 |
| S/W No.: | V1.0 |
| Antenna Type: | PCB antenna |
| Antenna Gain: | Maximum 2.61dBi |
| Power Supply Range: | USB DC 5V or DC 3.7V from battery |
| Power Supply: | The same as above. |
| Power Cord: | N/A |
| Output power（max）: | 1Mbps: 1.68dBm |
| | 2Mbps: -0.25dBm |
| | 3Mbps: 0.18dBm |
| Note: | |
| 1. | For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. |
| 2. | Model YKL-701, BDS-662 are identical except the model number. |

| Description of Channel: | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 00 | 2402 | 27 | 2429 | 54 | 2456 |
| 01 | 2403 | 28 | 2430 | 55 | 2457 |
| 02 | 2404 | 29 | 2431 | 56 | 2458 |
| 03 | 2405 | 30 | 2432 | 57 | 2459 |
| 04 | 2406 | 31 | 2433 | 58 | 2460 |
| 05 | 2407 | 32 | 2434 | 59 | 2461 |
| 06 | 2408 | 33 | 2435 | 60 | 2462 |
| 07 | 2409 | 34 | 2436 | 61 | 2463 |
| 08 | 2410 | 35 | 2437 | 62 | 2464 |
| 09 | 2411 | 36 | 2438 | 63 | 2465 |
| 10 | 2412 | 37 | 2439 | 64 | 2466 |
| 11 | 2413 | 38 | 2440 | 65 | 2467 |
| 12 | 2414 | 39 | 2441 | 66 | 2468 |
| 13 | 2415 | 40 | 2442 | 67 | 2469 |
| 14 | 2416 | 41 | 2443 | 68 | 2470 |
| 15 | 2417 | 42 | 2444 | 69 | 2471 |
| 16 | 2418 | 43 | 2445 | 70 | 2472 |
| 17 | 2419 | 44 | 2446 | 71 | 2473 |
| 18 | 2420 | 45 | 2447 | 72 | 2474 |
| 19 | 2421 | 46 | 2448 | 73 | 2475 |
| 20 | 2422 | 47 | 2449 | 74 | 2476 |
| 21 | 2423 | 48 | 2450 | 75 | 2477 |
| 22 | 2424 | 49 | 2451 | 76 | 2478 |
| 23 | 2425 | 50 | 2452 | 77 | 2479 |
| 24 | 2426 | 51 | 2453 | 78 | 2480 |
| 25 | 2427 | 52 | 2454 | | |
| 26 | 2428 | 53 | 2455 | | |

## 4.2 Description of Test conditions

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

1. Block diagram of EUT configuration(TX Mode)


Note:
1. The EUT was used fully-charged battery and programmed to be in continuously transmitting mode with fully-charged battery and the transmit duty cycle is not less than 98%.
2. Using the notebook and the transform board to control the fixed transmitting frequency and other test mode. After finishing the test setting, the notebook and the transform board will be removed during measurements.

(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.

(5) Pre-test the EUT in all transmitting mode at the lowest (2402 MHz), middle (2441 MHz) and highest (2480 MHz) channel with different data packet and conducted to determine the worst-case mode, only the worst-case results(1Mbps/3Mbps) are recorded in this report.

## 4.3 Test Peripheral List

| No. | Equipment | Manufacturer | EMC Compliance | Model No. | Serial No. | Power cord | signal cable |
|---|---|---|---|---|---|---|---|
| 1 | Notebook | ASUS | N/A | X401A | X16-96072 | N/A | N/A |
| 2 | USB line | N/A | N/A | N/A | N/A | 0.3m/unshielded /detachable | N/A |
| 3 | Transform board | N/A | N/A | N/A | N/A | N/A | N/A |

## 4.4 EUT Peripheral List

| No. | Equipment | Manufacturer | EMC Compliance | Model No. | Serial No. | Power cord | Remark |
|---|---|---|---|---|---|---|---|
| 1 | USB line | N/A | N/A | N/A | N/A | 0.3m/unshielded /detachable | N/A |

# 5 Equipments List for All Test Items

| No | Test Equipment | Manufacturer | Model No | Serial No | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| 1 | SIGNAL ANALYZER | R&S | FSV40 | 101470 | 2016.06.29 | 2017.06.28 |
| 2 | EMI Measuring Receiver | R&S | ESR | 101660 | 2016.06.29 | 2017.06.28 |
| 3 | Low Noise Pre Amplifier | Tsj | MLA-10K01-B01-27 | 1205323 | 2016.06.29 | 2017.06.28 |
| 4 | Low Noise Pre Amplifier | Tsj | MLA-0120-A02-34 | 2648A04738 | 2016.06.29 | 2017.06.28 |
| 5 | TRILOG Super Broadband test Antenna | SCHWARZBECK | VULB9160 | 9160-3206 | 2016.06.29 | 2017.06.28 |
| 6 | Broadband Horn Antenna | SCHWARZBECK | BBHA9120D | 452 | 2016.06.29 | 2017.06.28 |
| 7 | SHF-EHF Horn | SCHWARZBECK | BBHA9170 | BBHA9170367 | 2016.06.29 | 2017.06.28 |
| 8 | 50Ω Coaxial Switch | Anritsu | MP59B | 6200264416 | 2016.06.29 | 2017.06.28 |
| 9 | EMI Test Receiver | R&S | ESCI | 100124 | 2016.06.29 | 2017.06.28 |
| 10 | LISN | Kyoritsu | KNW-242 | 8-837-4 | 2016.06.29 | 2017.06.28 |
| 11 | LISN | Kyoritsu | KNW-407 | 8-1789-3 | 2016.06.29 | 2017.06.28 |
| 12 | 50Ω Coaxial Switch | Anritsu | MP59B | 6200264417 | 2016.06.29 | 2017.06.28 |
| 13 | Loop Antenna | ETS | 6512 | 00165355 | 2016.06.29 | 2017.06.28 |
| 14 | Radiated Cable 1# (30MHz-1GHz) | FUJIKURA | 5D-2W | 01 | 2016.12.25 | 2017.12.24 |
| 15 | Radiated Cable 2# (1GHz -25GHz) | FUJIKURA | 10D2W | 02 | 2016.12.25 | 2017.12.24 |
| 16 | Conducted Cable 1#(9KHz-30MHz) | FUJIKURA | 1D-2W | 01 | 2016.12.25 | 2017.12.24 |
| 17 | SMA Antenna connector | Dosin | Dosin-SMA | N/A | N/A | N/A |
| Note: The SMA antenna connector is soldered on the PCB board in order to perform conducted tests and this SMA antenna connector is listed in the equipment list. | | | | | | |

# 6 Test Result

## 6.1 Antenna Requirement

### 6.1.1 Standard requirement

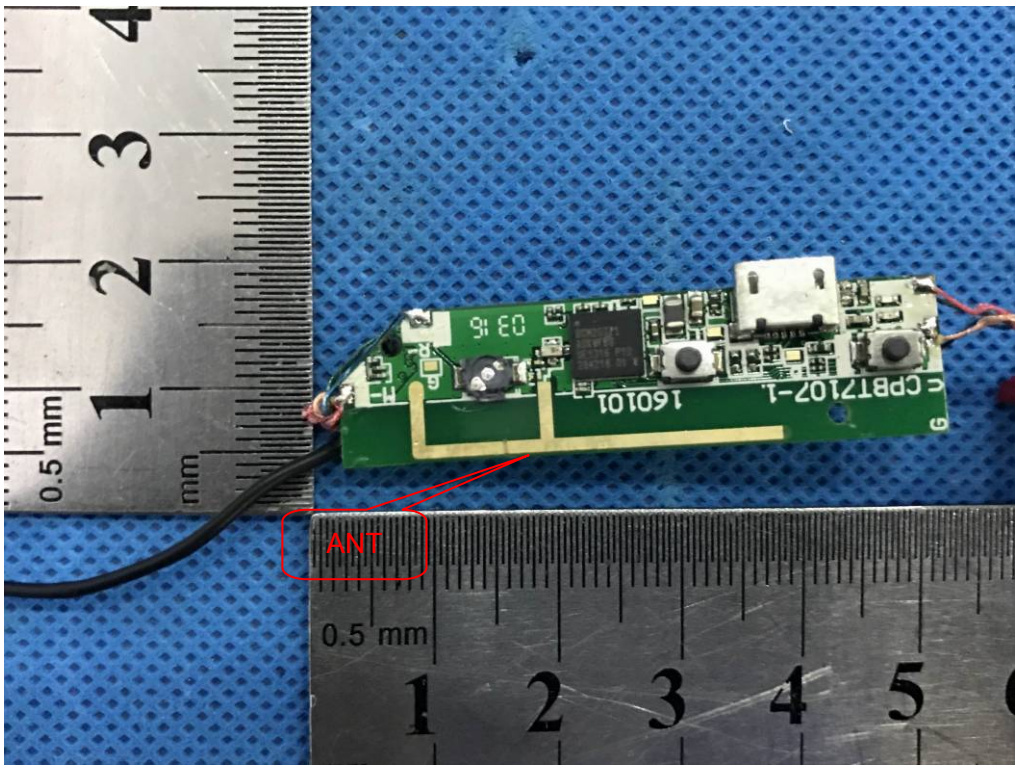
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

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.

### 6.1.2 EUT Antenna

The antenna is PCB antenna and no consideration of replacement. Antenna gain is Max. 2.61dBi from 2.4GHz to 2.5GHz.

Antenna RF Port



## 6.2 Conduction Emissions Measurement

### 6.2.1 Applied procedures / Limit

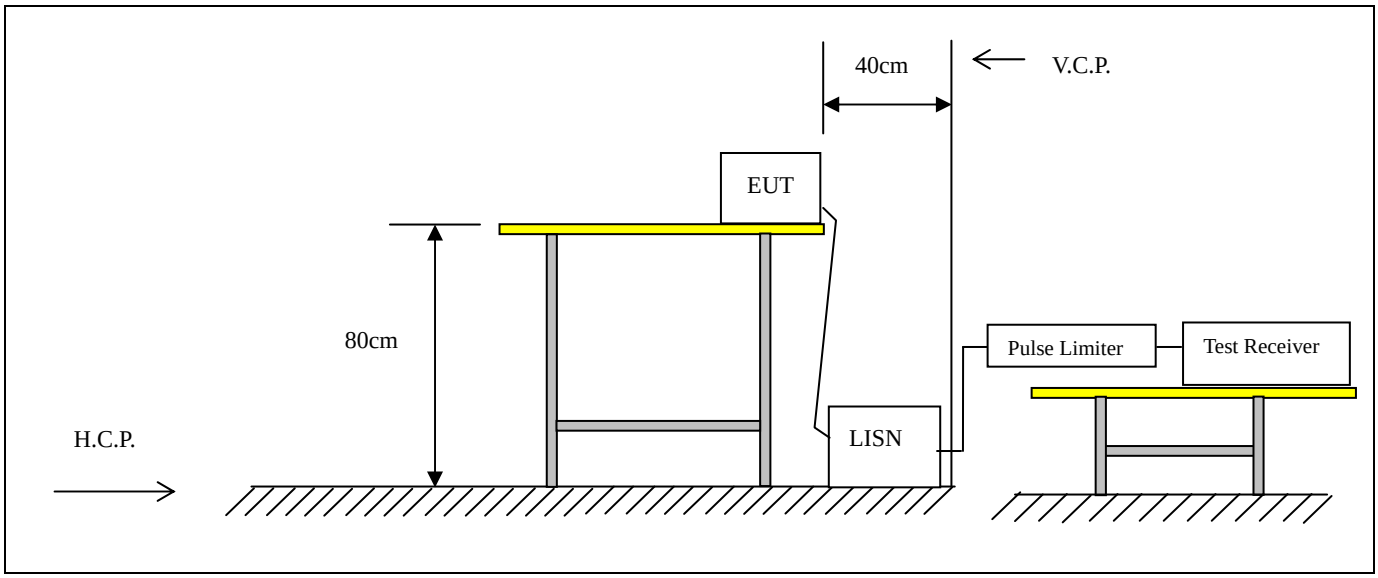
| Frequency of Emission (MHz) | Conducted Limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 * | 56 to 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

Note: Decreases with the logarithm of the frequency.

### 6.2.2 Test procedure

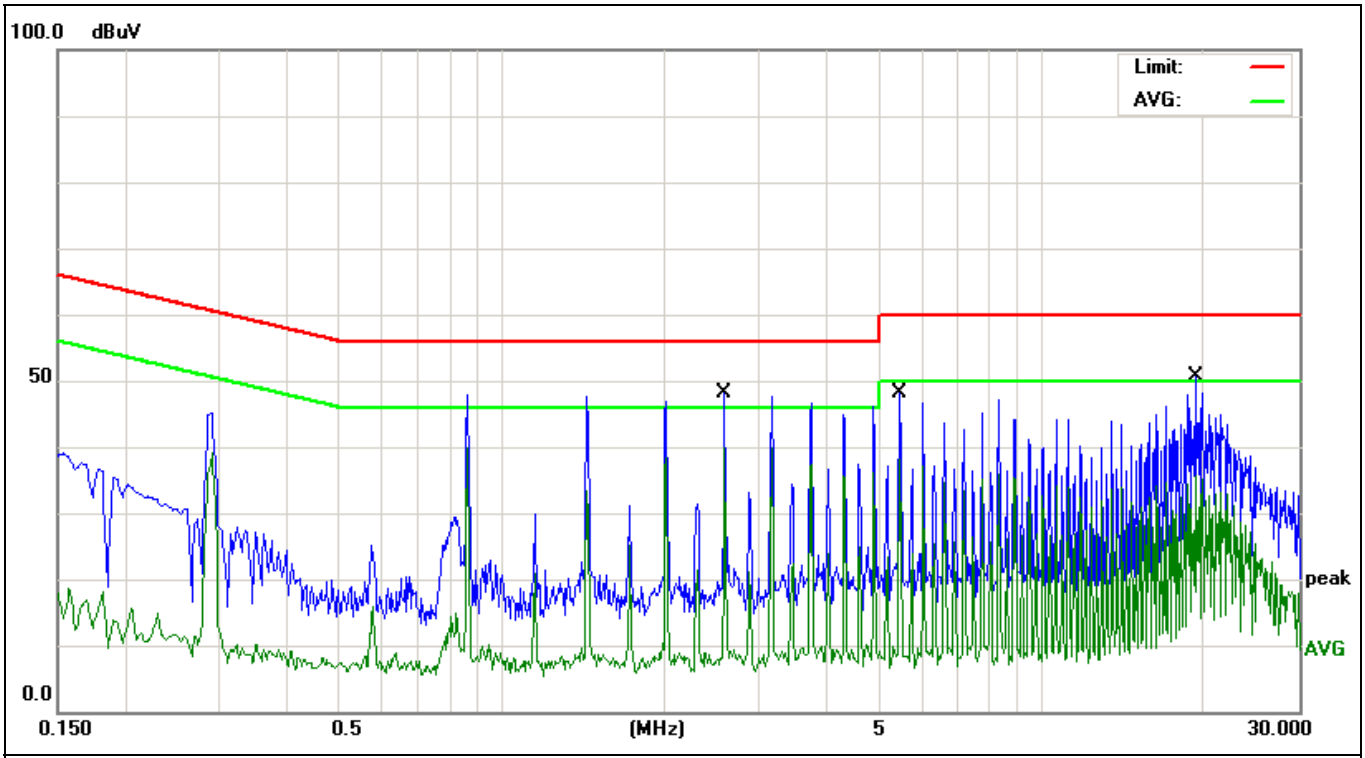
EUT was placed upon a wooden test table 0.8m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and 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.

### 6.2.3 Test setup



### 6.2.4 Test results

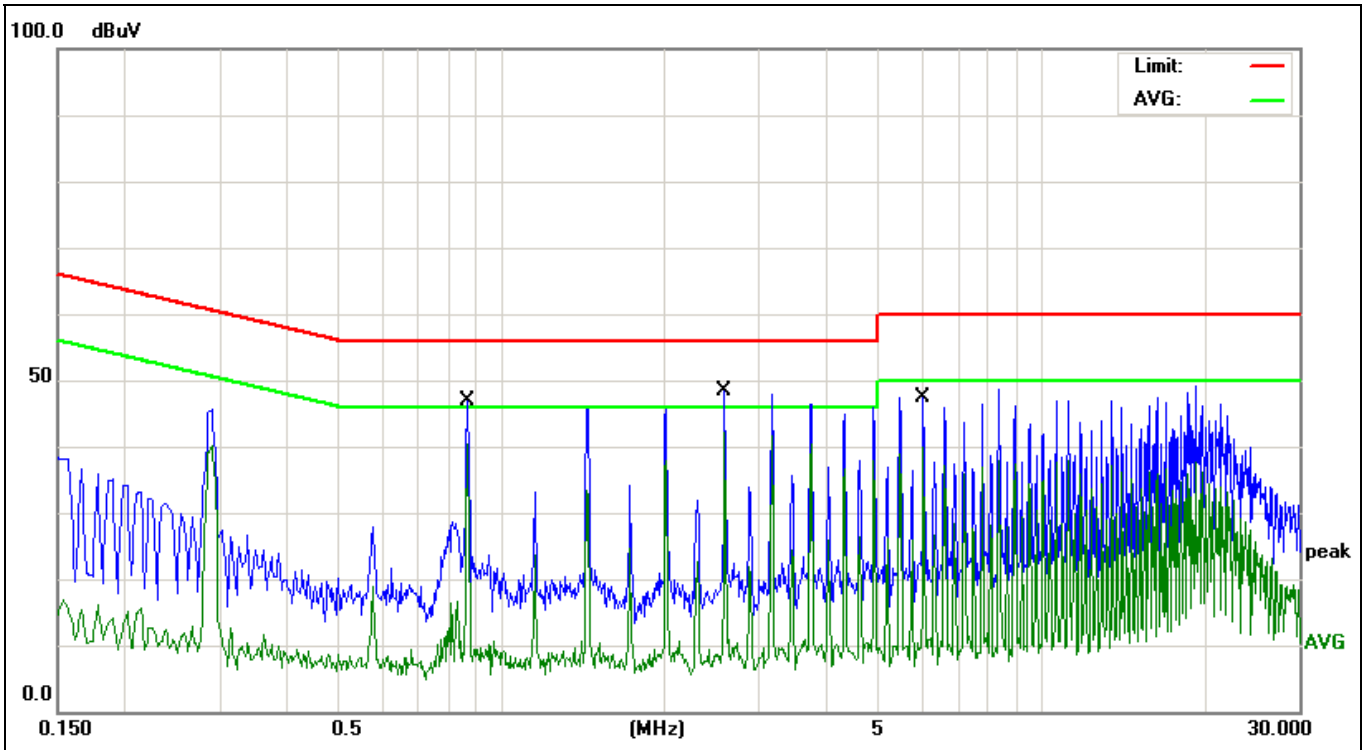
| | | | |
|---|---|---|---|
| EUT: | Bone Conduction Sports Headphone | Model Name. : | YKL-701 |
| Temperature: | 26 ℃ | Relative Humidity: | 54% |
| Pressure: | 1010hPa | Test Date : | 2017-06-20 |
| Test Mode: | TX (1Mbps) CH00 (worst case) | Phase : | Line |
| **Test Voltage** : | DC 5V from adapter, AC 120V/60Hz for adapter | | |




Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector |
| 1 | | 2.5900 | 38.15 | 10.01 | 48.16 | 56.00 | -7.84 | QP |
| 2 | * | 2.5900 | 29.98 | 10.01 | 39.99 | 46.00 | -6.01 | AVG |
| 3 | | 5.4620 | 38.01 | 10.12 | 48.13 | 60.00 | -11.87 | QP |
| 4 | | 5.4620 | 27.90 | 10.12 | 38.02 | 50.00 | -11.98 | AVG |
| 5 | | 19.2700 | 39.55 | 10.99 | 50.54 | 60.00 | -9.46 | QP |
| 6 | | 19.2700 | 24.66 | 10.99 | 35.65 | 50.00 | -14.35 | AVG |

| EUT： | Bone Conduction Sports Headphone | Model Name. ： | YKL-701 |
|---|---|---|---|
| Temperature： | 26 ℃ | Relative Humidity： | 54% |
| Pressure： | 1010hPa | Test Date : | 2017-06-20 |
| Test Mode： | TX (1Mbps) CH00 (worst case) | Phase : | Neutral |
| **Test Voltage** ： | DC 5V from adapter, AC 120V/60Hz for adapter | | |




Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector |
| 1 | | 0.8660 | 36.98 | 9.95 | 46.93 | 56.00 | -9.07 | QP |
| 2 | | 0.8660 | 30.45 | 9.95 | 40.40 | 46.00 | -5.60 | AVG |
| 3 | | 2.5900 | 38.36 | 10.01 | 48.37 | 56.00 | -7.63 | QP |
| 4 | * | 2.5900 | 32.03 | 10.01 | 42.04 | 46.00 | -3.96 | AVG |
| 5 | | 6.0420 | 37.24 | 10.12 | 47.36 | 60.00 | -12.64 | QP |
| 6 | | 6.0420 | 29.63 | 10.12 | 39.75 | 50.00 | -10.25 | AVG |

## 6.3 Radiated Emissions Measurement

### 6.3.1 Applied procedures / Limit

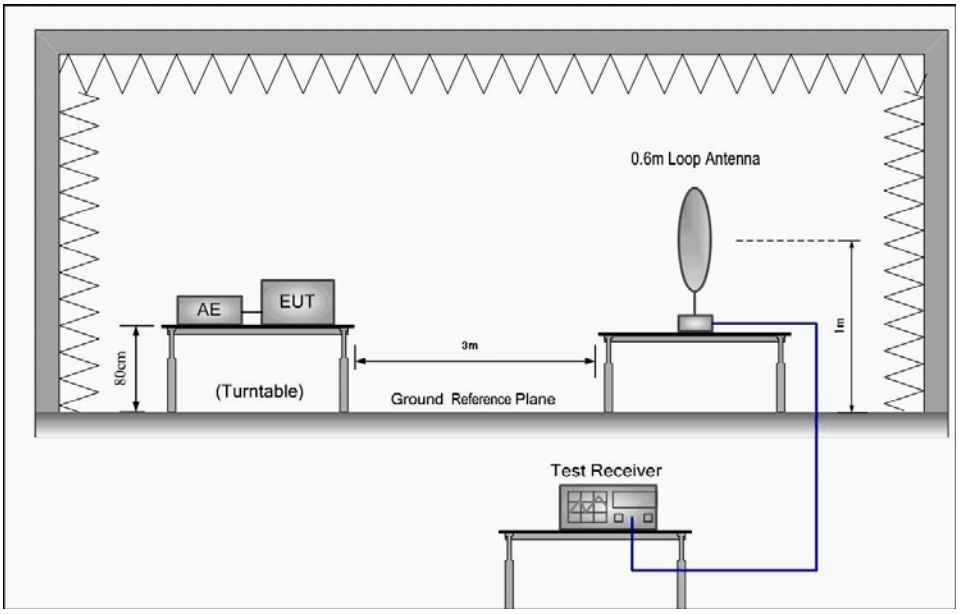
15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that 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) |
|---|---|---|---|
| | μV/m | dBμV/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 |

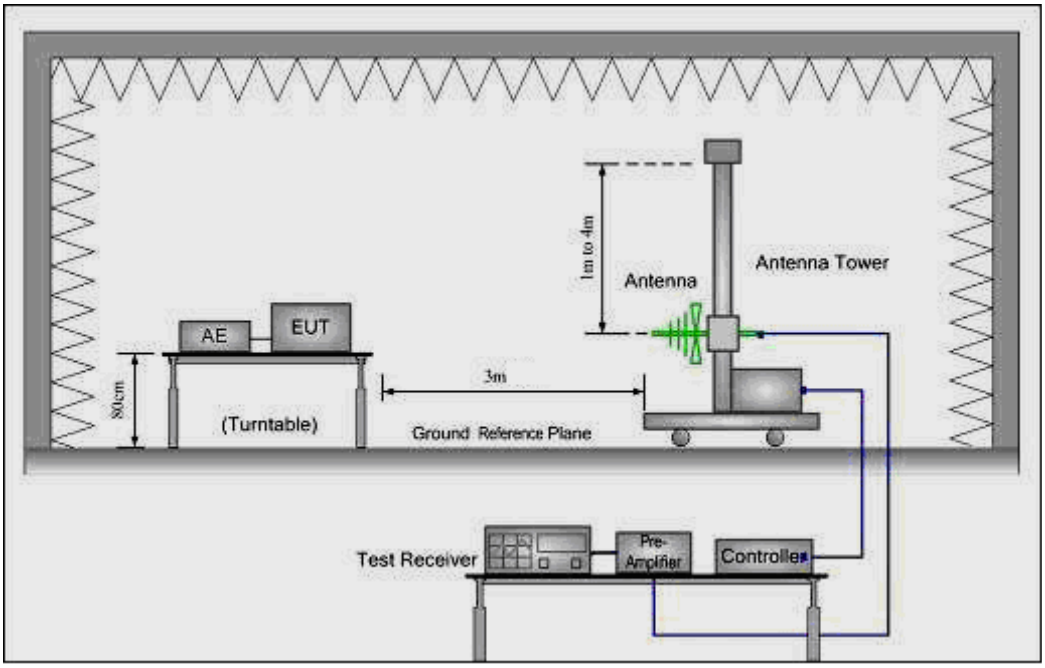
### 6.3.2 Test setup

**Test Configuration:**

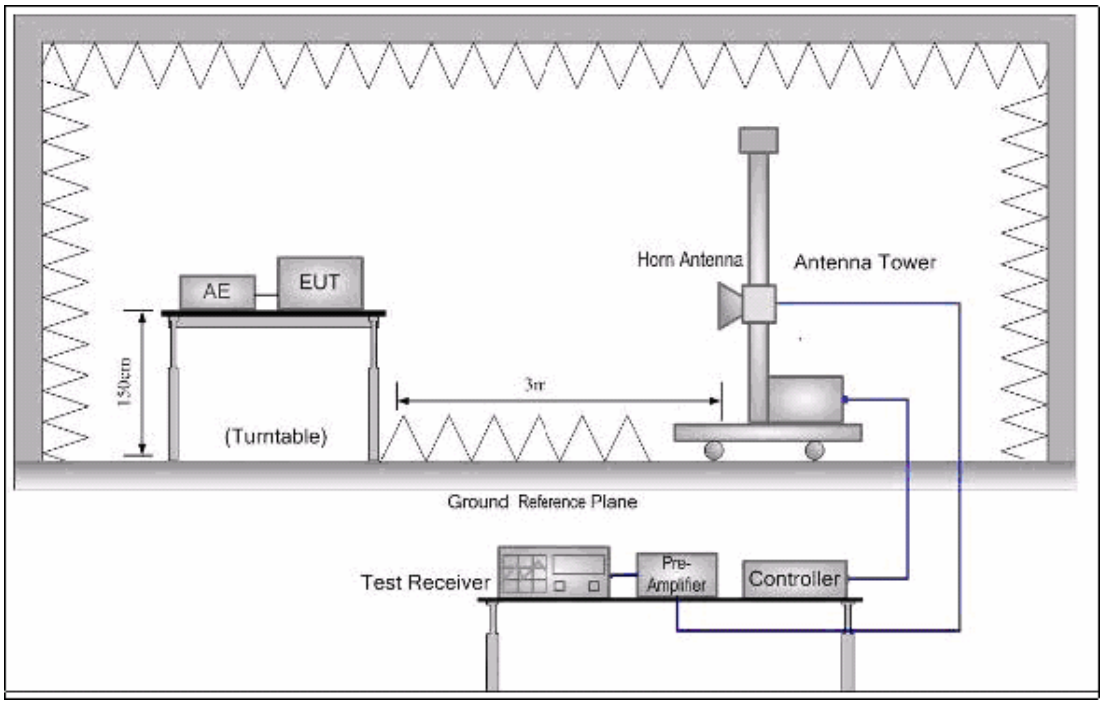
1) 9 kHz to 30 MHz emissions:




2) 30 MHz to 1 GHz emissions:



3) 1 GHz to 25 GHz emissions:



### 6.3.3 Test procedure

a. The EUT was placed on the top of a wooden table 0.8 meters (for measurement at frequency below 1GHz) and a wooden table 1.5 meters (for measurement at frequency above 1GHz) above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter, for the test frequency of above 1GHz, horn antenna opening in the test would have been facing the EUT when rise or fall) and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. The resolution bandwidth and video bandwidth of the test receiver was 1MHz and 1MHz for Peak detection at frequency above 1GHz.
g. Test the EUT in the lowest channel (2402MHz), the middle channel (2440MHz), the Highest channel (2480MHz)
h. Repeat above procedures until all frequencies measured was complete.

For measurement at frequency above 1GHz
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

In 18GHz to 25GHz, The EUT was checked by Horn ANT. But the test result at least have 20dB margin.The EUT was tested in Chamber Site.

### 6.3.4 Test Result

**Radiated Emissions Test Data Below 30MHz**

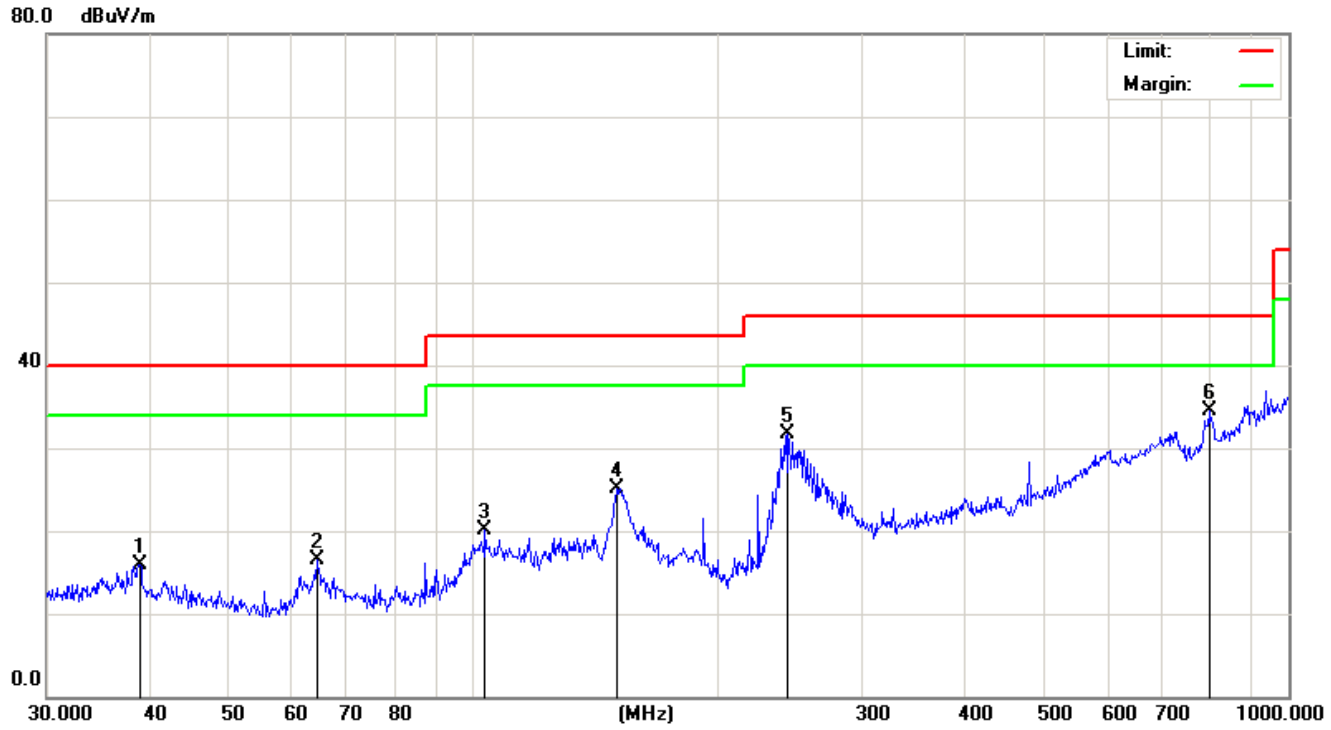
| | | | |
|---|---|---|---|
| EUT： | Bone Conduction Sports Headphone | Model Name ： | YKL-701 |
| Temperature： | 25 ℃ | Test Data | 2017-06-20 |
| Pressure： | 1005 hPa | Relative Humidity： | 60% |
| Test Mode ： | TX | Test Voltage ： | DC 3.7V from battery |
| Measurement Distance | 3 m | Frenqucy Range | 9KHz to 30MHz |
| RBW/VBW | 9KHz~150KHz/RB 200Hz for QP, 150KHz~30MHz/RB 9KHz for QP | | |

No emission found between lowest internal used/generated frequencies to 30MHz.

**Radiated Emissions Test Data Below 1GHz**

| | | | |
|---|---|---|---|
| EUT: | Bone Conduction Sports Headphone | Model Name : | YKL-701 |
| Temperature: | 25 ℃ | Test Data | 2017-06-20 |
| Pressure: | 1010 hPa | Relative Humidity: | 60% |
| Test Mode : | TX (1Mbps) CH00 (worst case) | 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. | | |

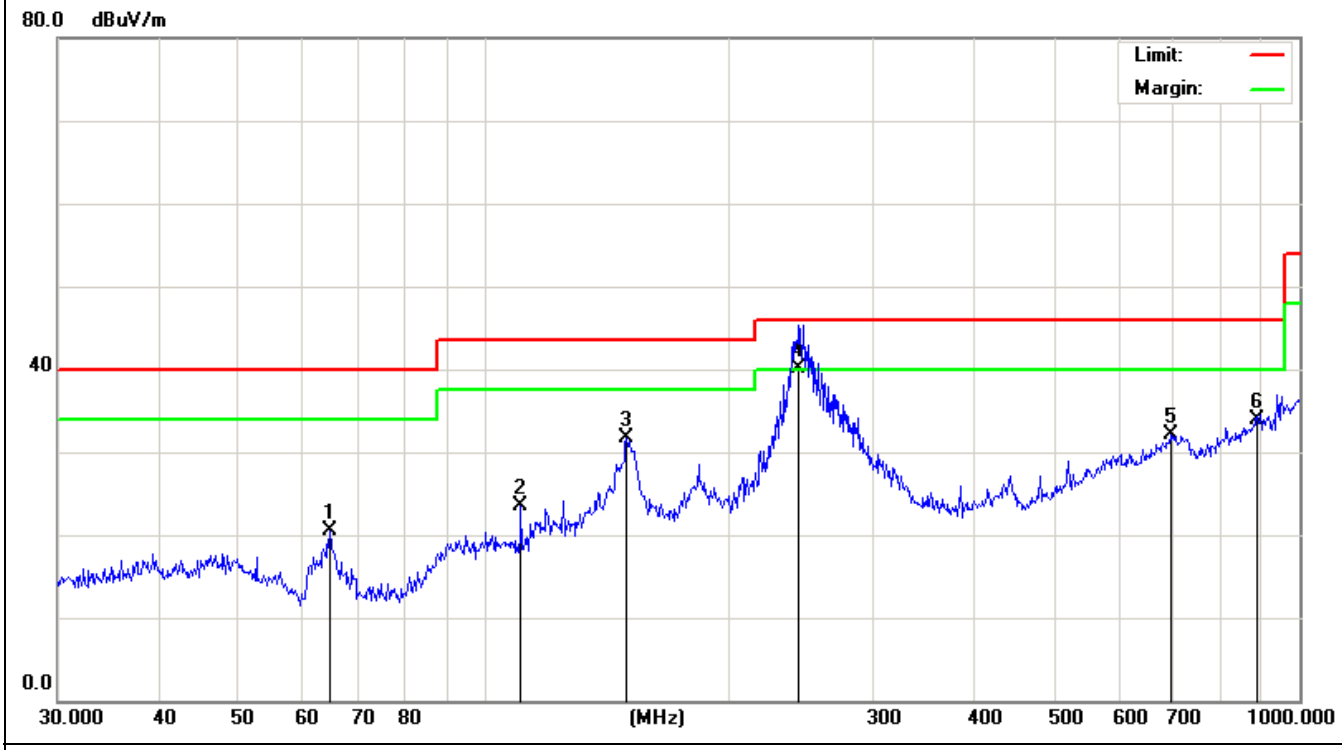
Horizontal




Remark: Factor = Factor= Ant Factor + Cable Loss - Pre-amplifier.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 39.0245 | 32.54 | -16.64 | 15.90 | 40.00 | -24.10 | QP |
| 2 | | 64.4330 | 35.80 | -19.22 | 16.58 | 40.00 | -23.42 | QP |
| 3 | | 103.4421 | 33.72 | -13.69 | 20.03 | 43.50 | -23.47 | QP |
| 4 | | 150.0108 | 40.51 | -15.40 | 25.11 | 43.50 | -18.39 | QP |
| 5 | | 243.3772 | 45.65 | -14.01 | 31.64 | 46.00 | -14.36 | QP |
| 6 | * | 798.9796 | 31.12 | 3.44 | 34.56 | 46.00 | -11.44 | QP |

Vertical




Remark: Factor = Factor= Ant Factor + Cable Loss - Pre-amplifier.

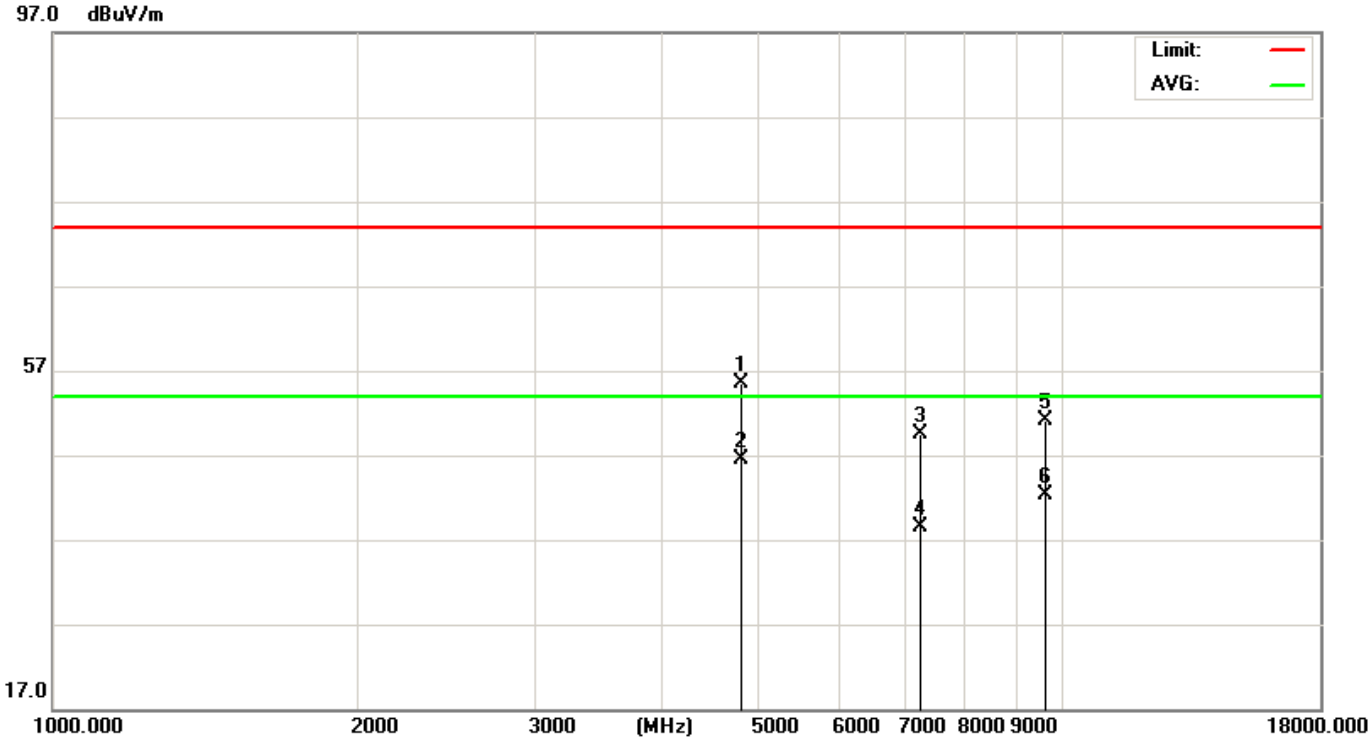
| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 64.6594 | 37.92 | -17.50 | 20.42 | 40.00 | -19.58 | QP |
| 2 | | 110.9571 | 38.94 | -15.36 | 23.58 | 43.50 | -19.92 | QP |
| 3 | | 149.4857 | 47.41 | -15.65 | 31.76 | 43.50 | -11.74 | QP |
| 4 | * | 243.3772 | 54.20 | -14.01 | 40.19 | 46.00 | -5.81 | QP |
| 5 | | 694.4174 | 32.09 | 0.03 | 32.12 | 46.00 | -13.88 | QP |
| 6 | | 884.5029 | 31.43 | 2.57 | 34.00 | 46.00 | -12.00 | QP |

**Radiated Emissions Test Data Above 1GHz**

| | | | |
|---|---|---|---|
| EUT: | Bone Conduction Sports Headphone | Model Name : | YKL-701 |
| Temperature: | 25 ℃ | Test Data | 2017-06-20 |
| Pressure: | 1010 hPa | Relative Humidity: | 60% |
| Test Mode : | 1Mbps | 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. | | |

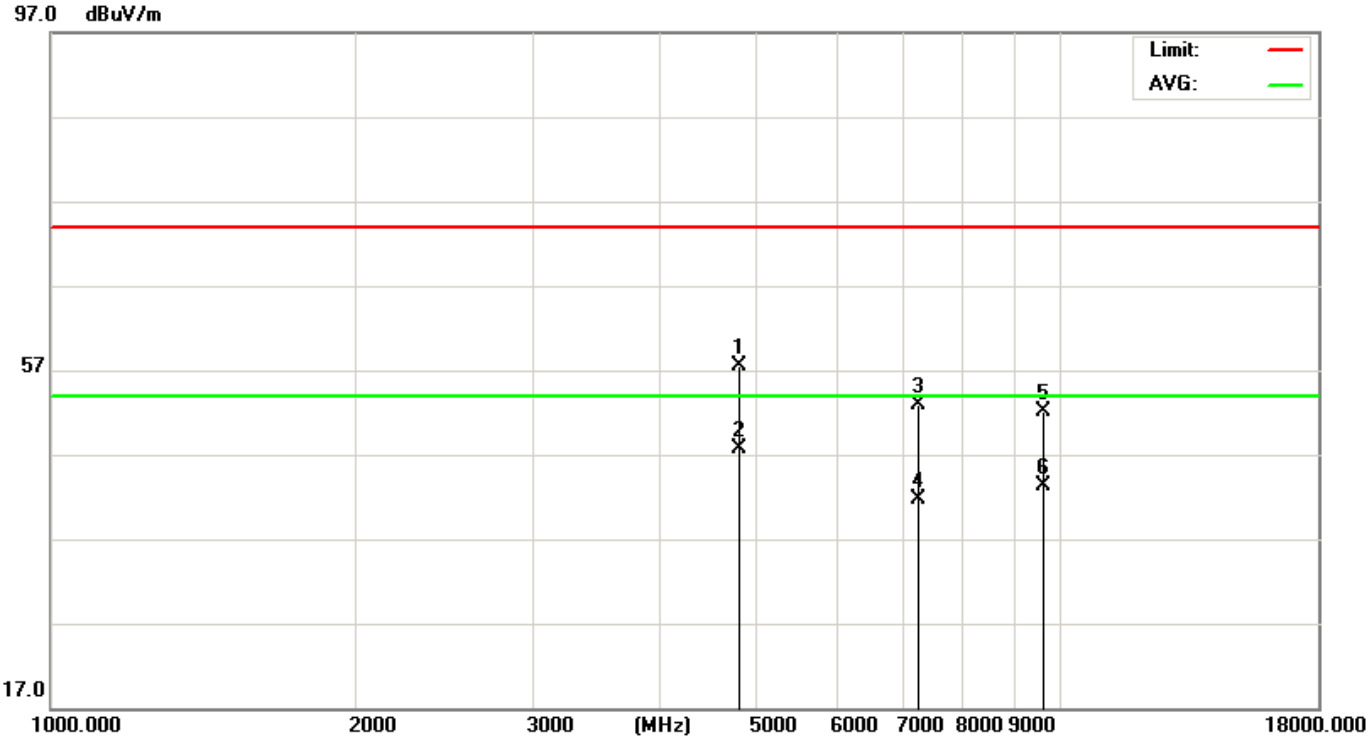
(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4804.000 | 50.51 | 5.06 | 55.57 | 74.00 | -18.43 | PEAK |
| 4804.000 | 41.42 | 5.06 | 46.48 | 54.00 | -7.52 | AVERAGE |
| 7206.000 | 42.41 | 7.03 | 49.44 | 74.00 | -24.56 | PEAK |
| 7206.000 | 31.45 | 7.03 | 38.48 | 54.00 | -15.52 | AVERAGE |
| 9608.000 | 40.45 | 10.63 | 51.08 | 74.00 | -22.92 | PEAK |
| 9608.000 | 31.74 | 10.63 | 42.37 | 54.00 | -11.63 | AVERAGE |



(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4804.000 | 52.45 | 5.06 | 57.51 | 74.00 | -16.49 | PEAK |
| 4804.000 | 42.74 | 5.06 | 47.80 | 54.00 | -6.20 | AVERAGE |
| 7206.000 | 45.86 | 7.03 | 52.89 | 74.00 | -21.11 | PEAK |
| 7206.000 | 34.71 | 7.03 | 41.74 | 54.00 | -12.26 | AVERAGE |
| 9608.000 | 41.44 | 10.63 | 52.07 | 74.00 | -21.93 | PEAK |
| 9608.000 | 32.75 | 10.63 | 43.38 | 54.00 | -10.62 | AVERAGE |




Note:

**10~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

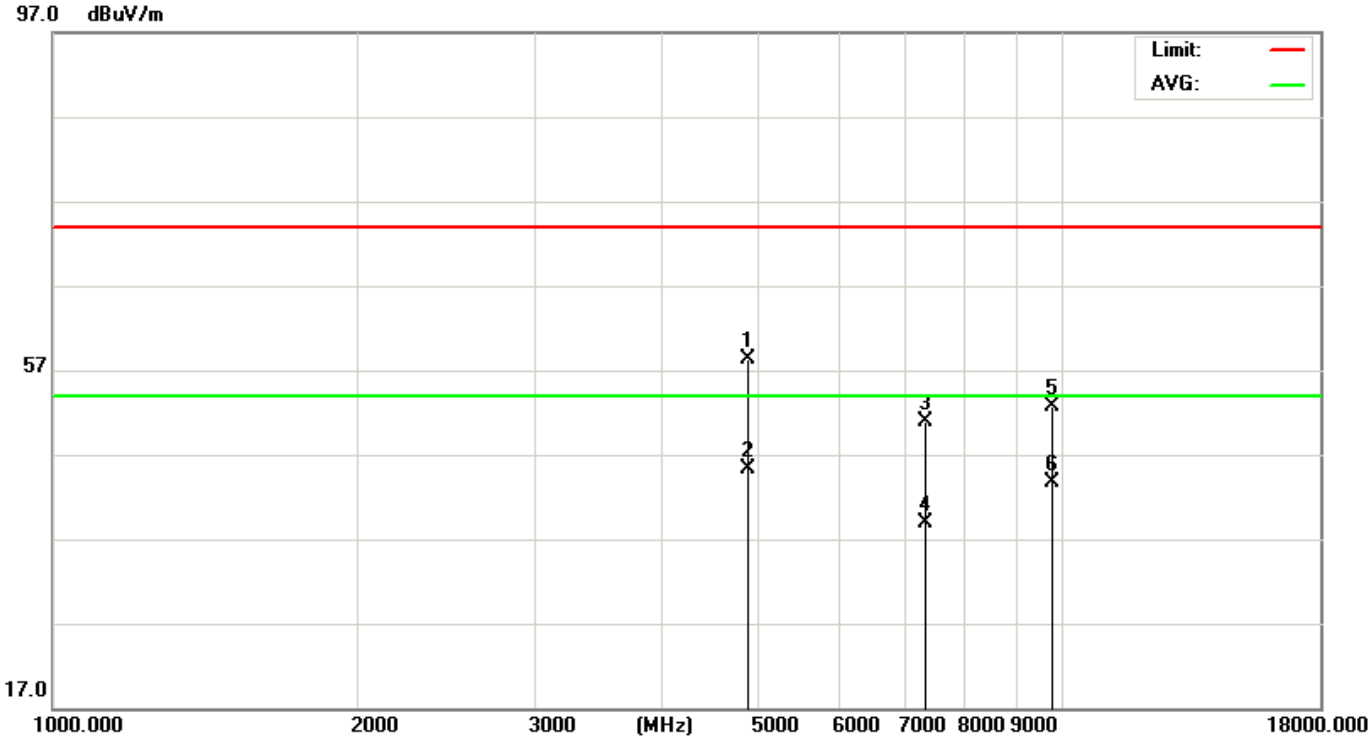
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier

Lowest channel: 2402 MHz

Data rate: 1Mbps

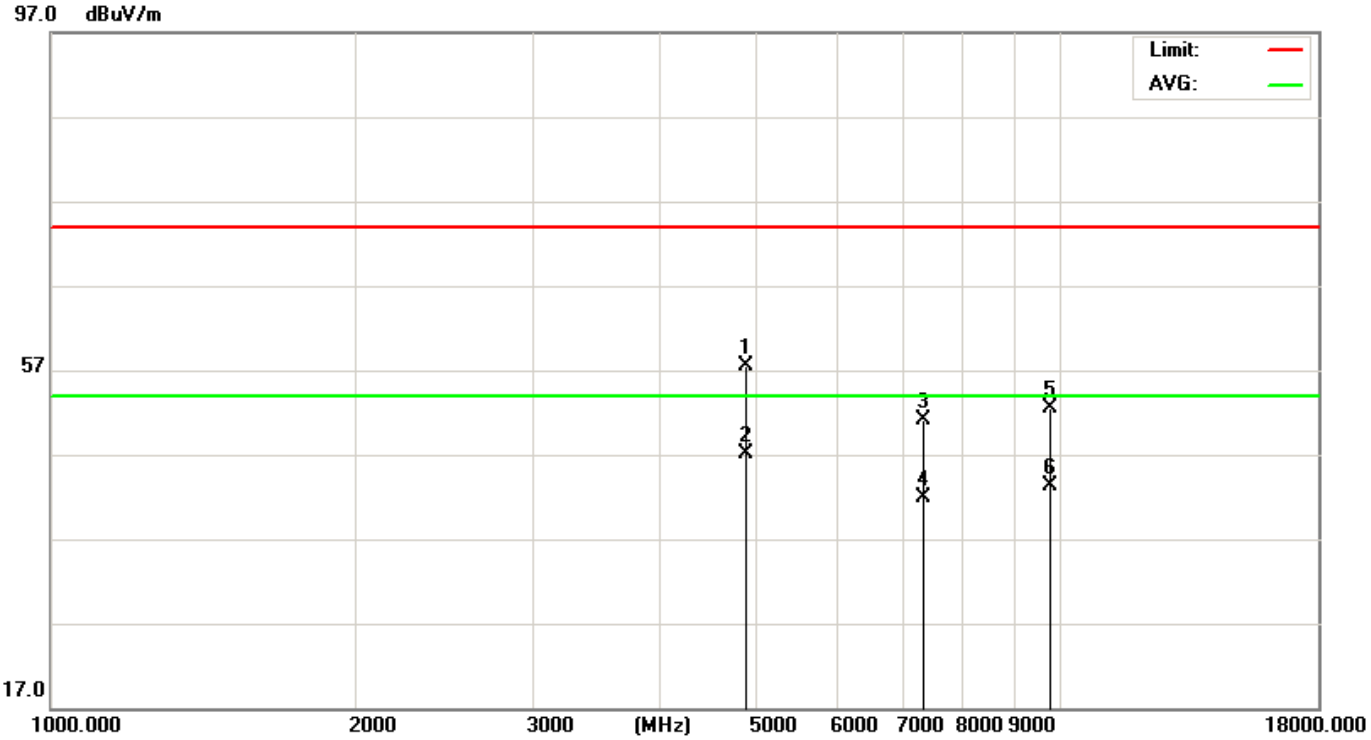
(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4882.000 | 53.12 | 5.14 | 58.26 | 74.00 | -15.74 | PEAK |
| 4882.000 | 40.15 | 5.14 | 45.29 | 54.00 | -8.71 | AVERAGE |
| 7323.000 | 43.46 | 7.54 | 51.00 | 74.00 | -23.00 | PEAK |
| 7323.000 | 31.45 | 7.54 | 38.99 | 54.00 | -15.01 | AVERAGE |
| 9764.000 | 41.37 | 11.39 | 52.76 | 74.00 | -21.24 | PEAK |
| 9764.000 | 32.33 | 11.39 | 43.72 | 54.00 | -10.28 | AVERAGE |



(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4882.000 | 52.44 | 5.14 | 57.58 | 74.00 | -16.42 | PEAK |
| 4882.000 | 41.87 | 5.14 | 47.01 | 54.00 | -6.99 | AVERAGE |
| 7323.000 | 43.65 | 7.54 | 51.19 | 74.00 | -22.81 | PEAK |
| 7323.000 | 34.36 | 7.54 | 41.90 | 54.00 | -12.10 | AVERAGE |
| 9764.000 | 41.08 | 11.39 | 52.47 | 74.00 | -21.53 | PEAK |
| 9764.000 | 32.01 | 11.39 | 43.40 | 54.00 | -10.60 | AVERAGE |




Note:

**10~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

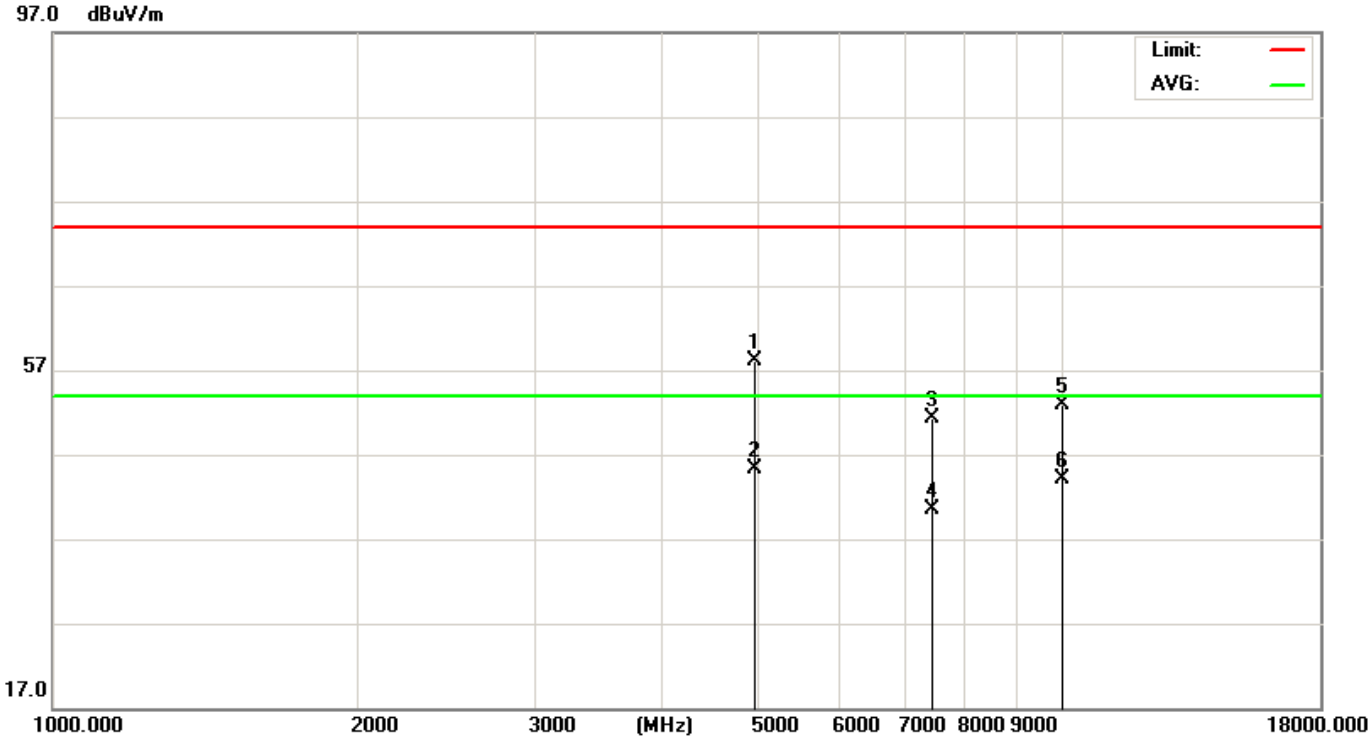
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier

Middle Channel: 2441 MHz

Data rate: 1Mbps

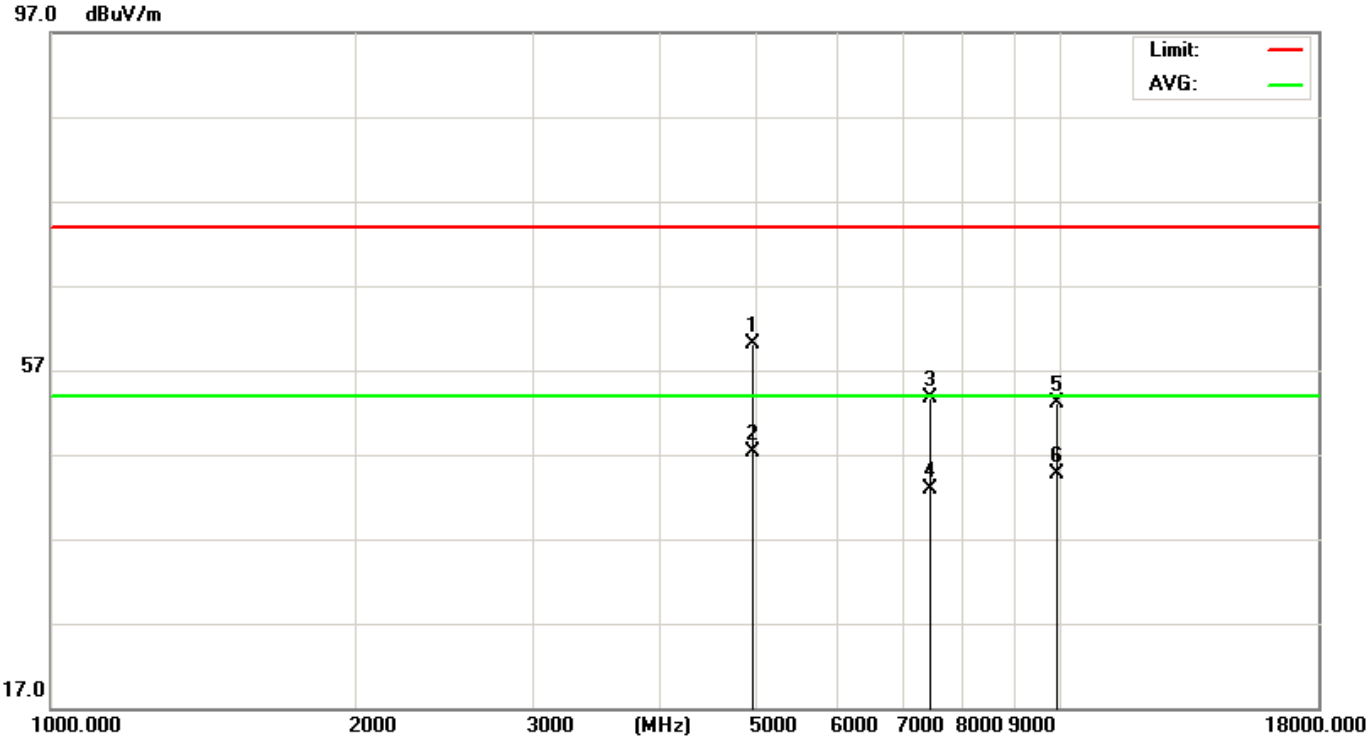
(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4960.000 | 52.97 | 5.22 | 58.19 | 74.00 | -15.81 | PEAK |
| 4960.000 | 40.11 | 5.22 | 45.33 | 54.00 | -8.67 | AVERAGE |
| 7440.000 | 43.17 | 8.06 | 51.23 | 74.00 | -22.77 | PEAK |
| 7440.000 | 32.46 | 8.06 | 40.52 | 54.00 | -13.48 | AVERAGE |
| 9992.000 | 40.63 | 12.29 | 52.92 | 74.00 | -21.08 | PEAK |
| 9992.000 | 31.74 | 12.29 | 44.03 | 54.00 | -9.97 | AVERAGE |



(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4960.000 | 54.85 | 5.22 | 60.07 | 74.00 | -13.93 | PEAK |
| 4960.000 | 42.03 | 5.22 | 47.25 | 54.00 | -6.75 | AVERAGE |
| 7440.000 | 45.65 | 8.06 | 53.71 | 74.00 | -20.29 | PEAK |
| 7440.000 | 34.76 | 8.06 | 42.82 | 54.00 | -11.18 | AVERAGE |
| 9920.000 | 41.05 | 12.10 | 53.15 | 74.00 | -20.85 | PEAK |
| 9920.000 | 32.51 | 12.10 | 44.61 | 54.00 | -9.39 | AVERAGE |




Note:

**10~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier

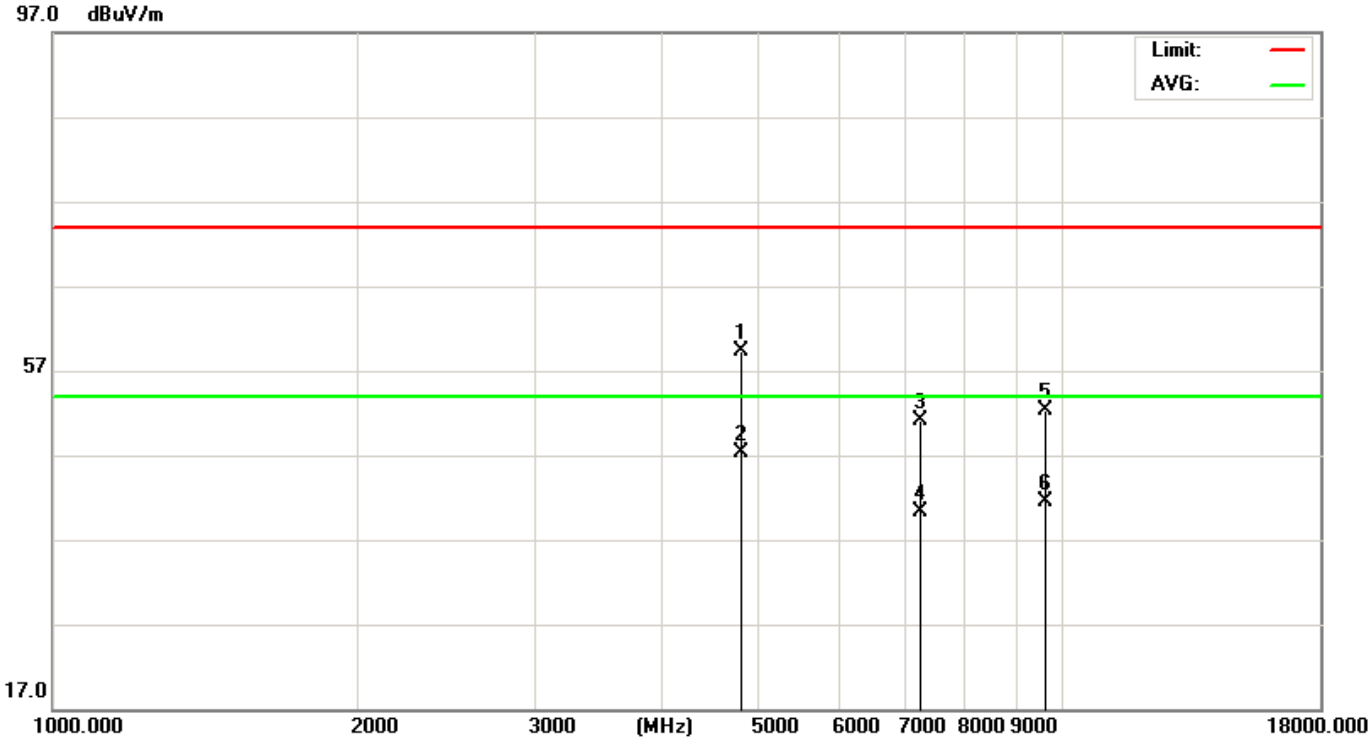
Highest Channel: 2480 MHz

Data rate: 1Mbps

| EUT： | Bone Conduction Sports Headphone | Model Name ： | YKL-701 |
|---|---|---|---|
| Temperature： | 25 ℃ | Test Data | 2017-06-20 |
| Pressure： | 1010 hPa | Relative Humidity： | 60% |
| Test Mode ： | 3Mbps | 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. | | |

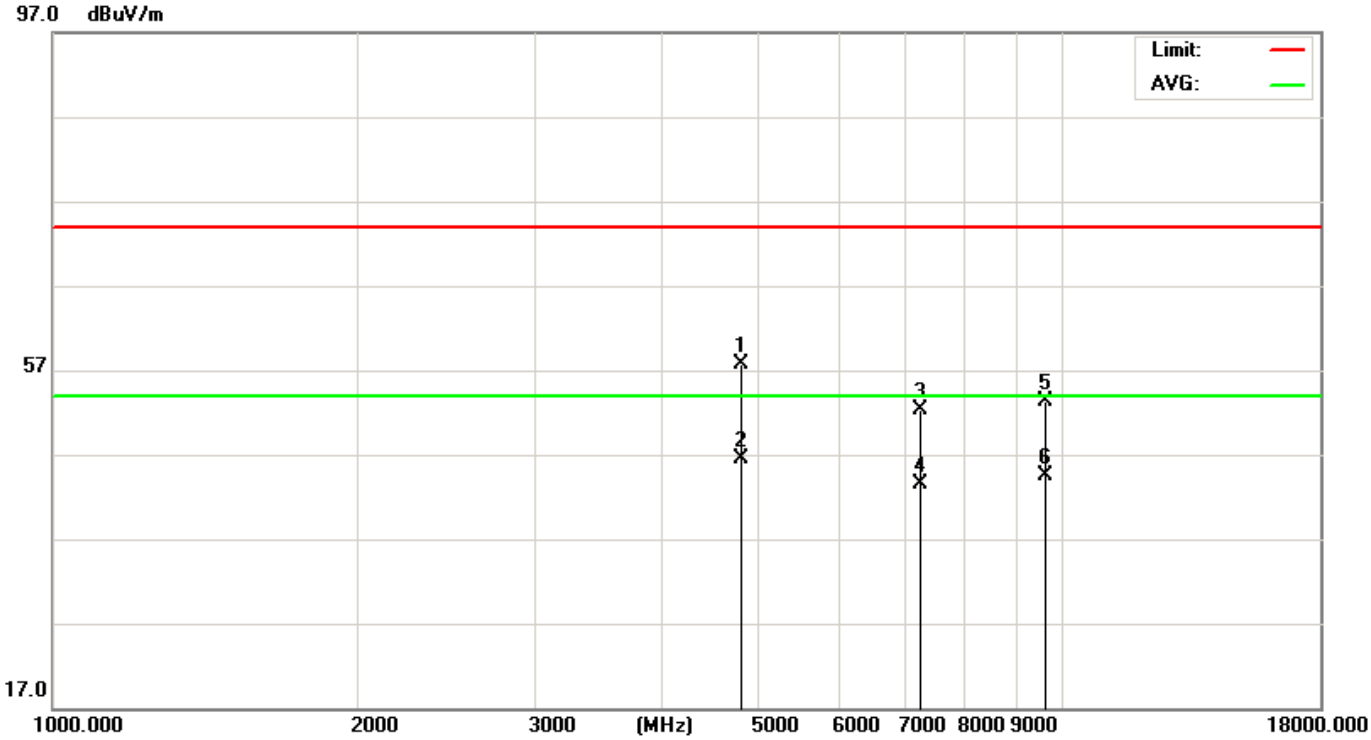
(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4804.000 | 54.32 | 5.06 | 59.38 | 74.00 | -14.62 | PEAK |
| 4804.000 | 42.17 | 5.06 | 47.23 | 54.00 | -6.77 | AVERAGE |
| 7206.000 | 44.17 | 7.03 | 51.20 | 74.00 | -22.80 | PEAK |
| 7206.000 | 33.25 | 7.03 | 40.28 | 54.00 | -13.72 | AVERAGE |
| 9608.000 | 41.75 | 10.63 | 52.38 | 74.00 | -21.62 | PEAK |
| 9608.000 | 30.96 | 10.63 | 41.59 | 54.00 | -12.41 | AVERAGE |



(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4804.000 | 52.72 | 5.06 | 57.78 | 74.00 | -16.22 | PEAK |
| 4804.000 | 41.51 | 5.06 | 46.57 | 54.00 | -7.43 | AVERAGE |
| 7206.000 | 45.36 | 7.03 | 52.39 | 74.00 | -21.61 | PEAK |
| 7206.000 | 36.47 | 7.03 | 43.50 | 54.00 | -10.50 | AVERAGE |
| 9608.000 | 42.59 | 10.63 | 53.22 | 74.00 | -20.78 | PEAK |
| 9608.000 | 33.87 | 10.63 | 44.50 | 54.00 | -9.50 | AVERAGE |




Note:

**10~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

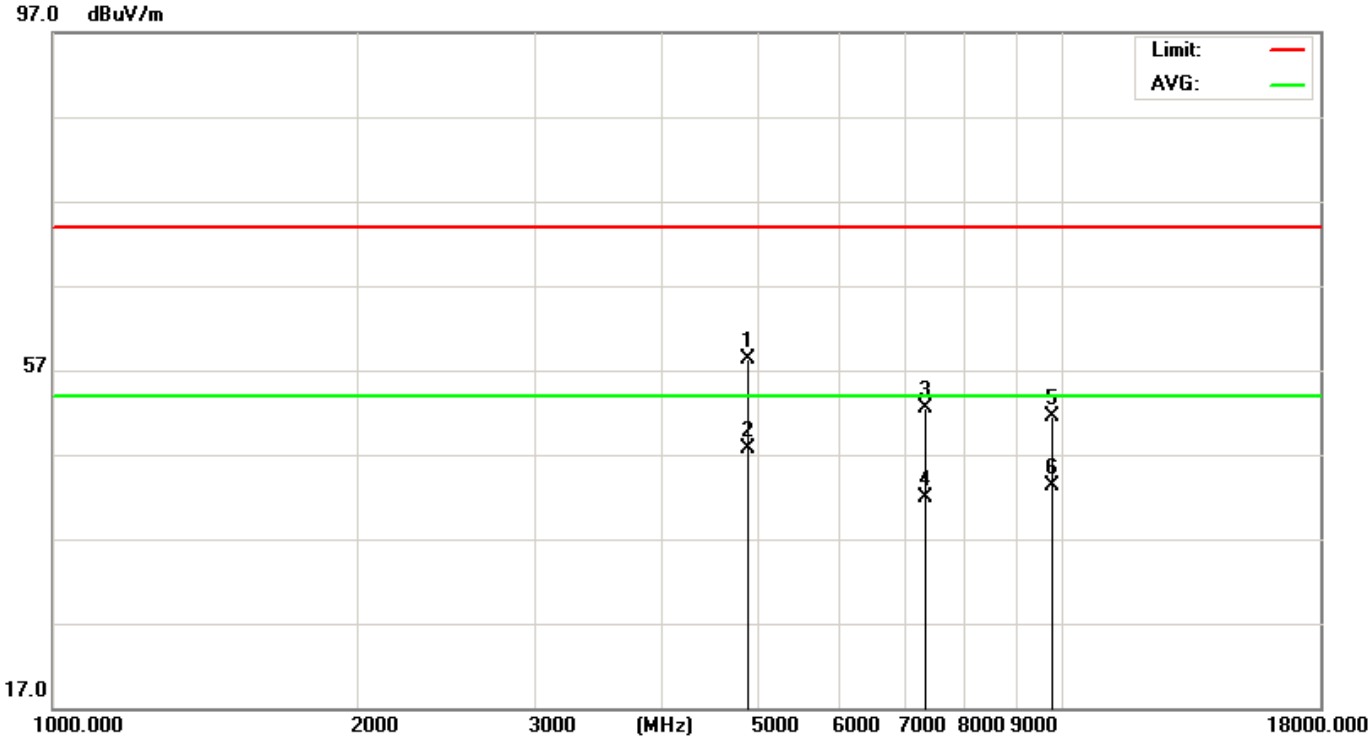
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier

Lowest Channel: 2402 MHz

Data rate: 3Mbps

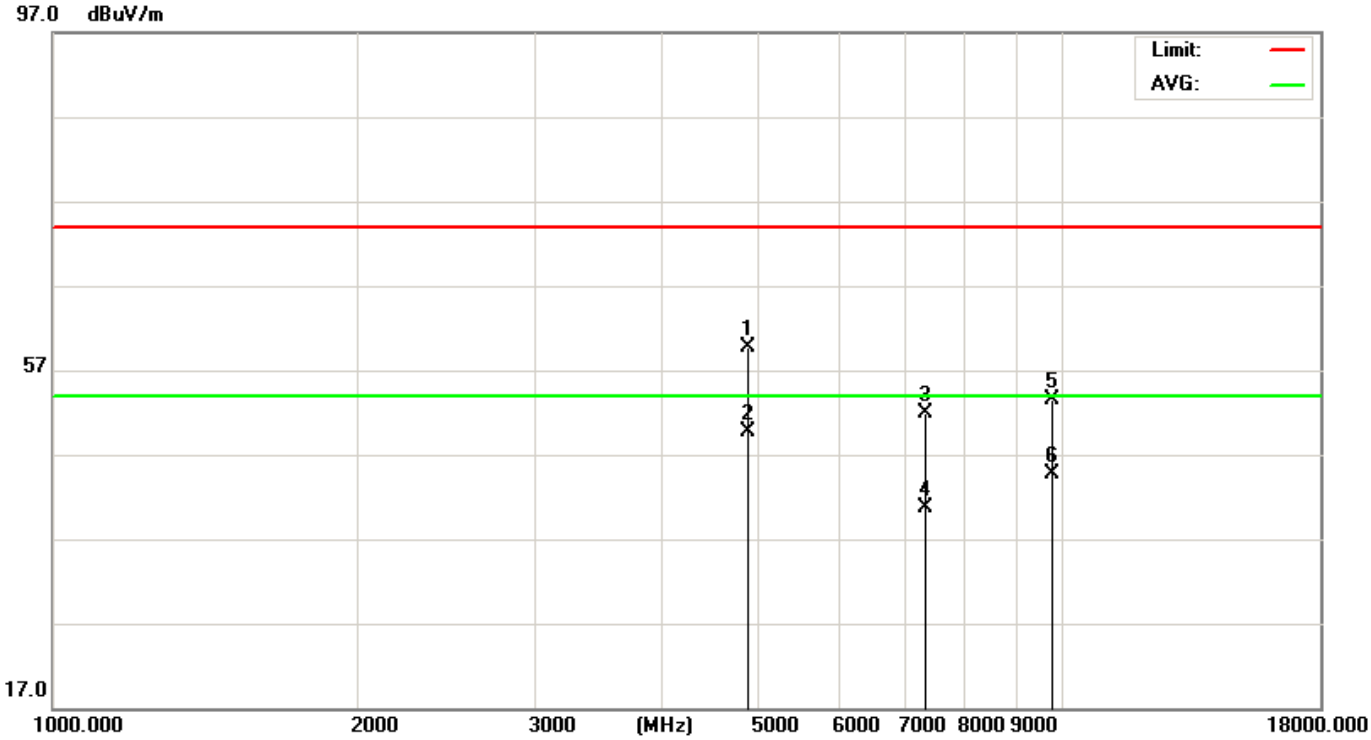
(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4882.000 | 53.18 | 5.14 | 58.32 | 74.00 | -15.68 | PEAK |
| 4882.000 | 42.63 | 5.14 | 47.77 | 54.00 | -6.23 | AVERAGE |
| 7323.000 | 44.87 | 7.54 | 52.41 | 74.00 | -21.59 | PEAK |
| 7323.000 | 34.44 | 7.54 | 41.98 | 54.00 | -12.02 | AVERAGE |
| 9764.000 | 40.11 | 11.39 | 51.50 | 74.00 | -22.50 | PEAK |
| 9764.000 | 31.94 | 11.39 | 43.33 | 54.00 | -10.67 | AVERAGE |



(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4882.000 | 54.51 | 5.14 | 59.65 | 74.00 | -14.35 | PEAK |
| 4882.000 | 44.55 | 5.14 | 49.69 | 54.00 | -4.31 | AVERAGE |
| 7323.000 | 44.32 | 7.54 | 51.86 | 74.00 | -22.14 | PEAK |
| 7323.000 | 33.17 | 7.54 | 40.71 | 54.00 | -13.29 | AVERAGE |
| 9764.000 | 42.02 | 11.39 | 53.41 | 74.00 | -20.59 | PEAK |
| 9764.000 | 33.27 | 11.39 | 44.66 | 54.00 | -9.34 | AVERAGE |




Note:

**10~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

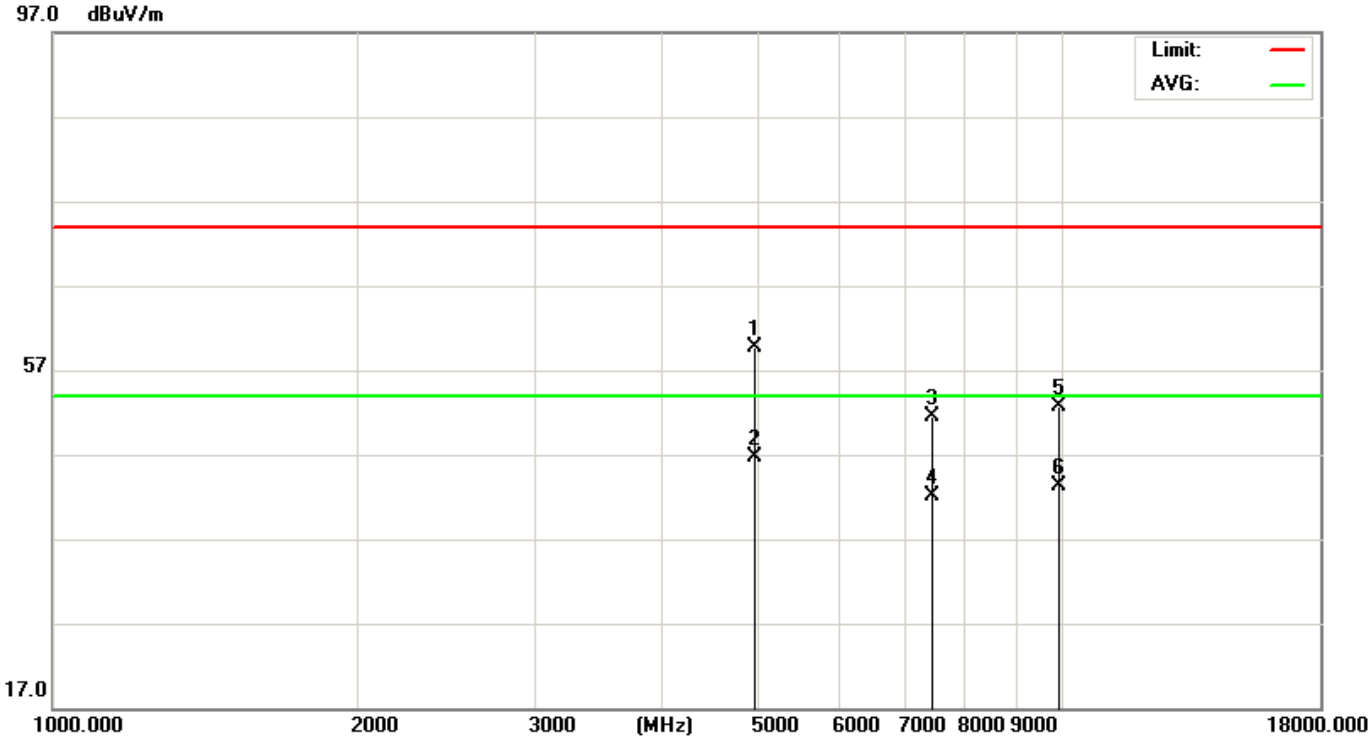
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier

Middle Channel: 2441 MHz

Data rate: 3Mbps

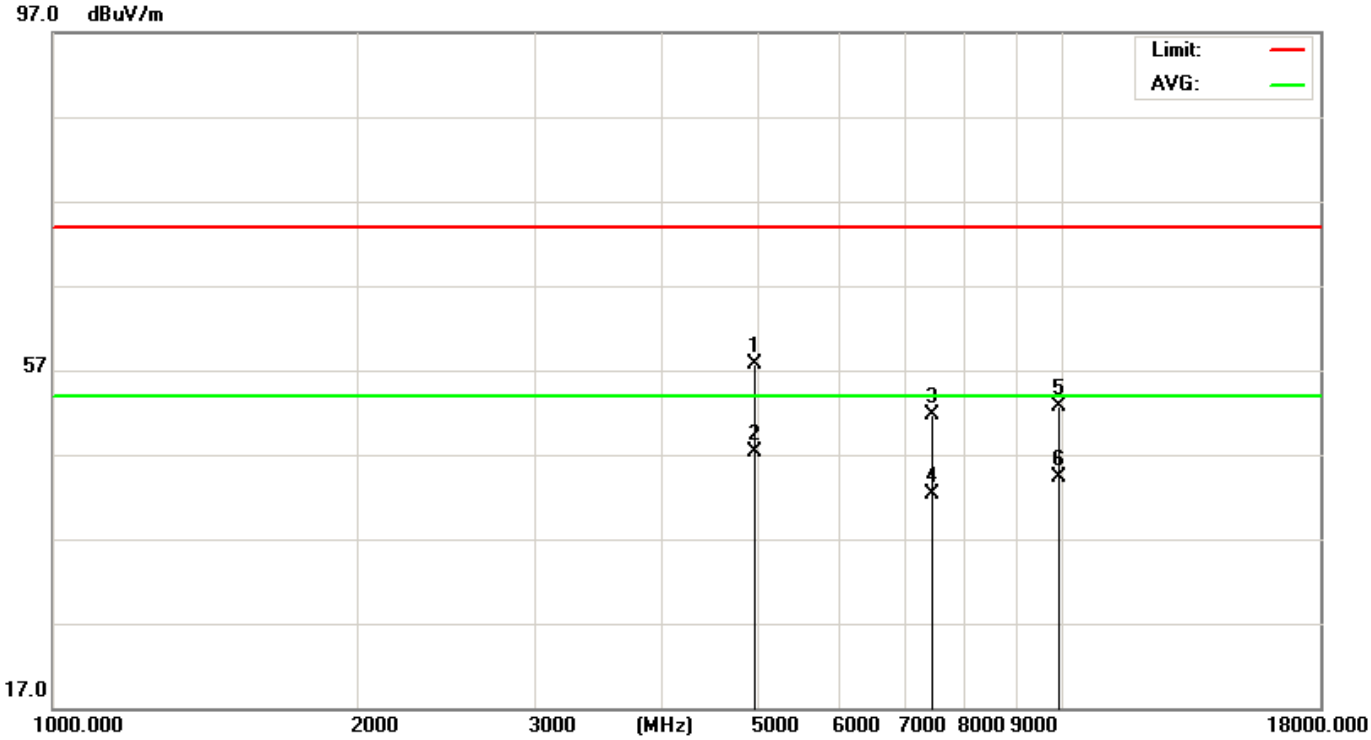
(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4960.000 | 54.50 | 5.22 | 59.72 | 74.00 | -14.28 | PEAK |
| 4960.000 | 41.44 | 5.22 | 46.66 | 54.00 | -7.34 | AVERAGE |
| 7440.000 | 43.45 | 8.06 | 51.51 | 74.00 | -22.49 | PEAK |
| 7440.000 | 34.01 | 8.06 | 42.07 | 54.00 | -11.93 | AVERAGE |
| 9920.000 | 40.51 | 12.10 | 52.61 | 74.00 | -21.39 | PEAK |
| 9920.000 | 31.29 | 12.10 | 43.39 | 54.00 | -10.61 | AVERAGE |



(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4960.000 | 52.45 | 5.22 | 57.67 | 74.00 | -16.33 | PEAK |
| 4960.000 | 42.15 | 5.22 | 47.37 | 54.00 | -6.63 | AVERAGE |
| 7440.000 | 43.66 | 8.06 | 51.72 | 74.00 | -22.28 | PEAK |
| 7440.000 | 34.34 | 8.06 | 42.40 | 54.00 | -11.60 | AVERAGE |
| 9920.000 | 40.63 | 12.10 | 52.73 | 74.00 | -21.27 | PEAK |
| 9920.000 | 32.21 | 12.10 | 44.31 | 54.00 | -9.69 | AVERAGE |




Note:

**10~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier

Highest channel: 2480 MHz

Data rate: 3Mbps

### 6.3.5 TEST RESULTS (Restricted Bands Requirements)

| EUT： | Bone Conduction Sports Headphone | Model Name ： | YKL-701 |
|---|---|---|---|
| Temperature： | 25 ℃ | Test Data | 2017-06-20 |
| Pressure： | 1010 hPa | Relative Humidity： | 60% |
| Test Mode ： | TX 1Mbps/3Mbps | Test Voltage ： | DC 3.7V from battery |
| Note： | 1. The transmitter was setup to transmit at the lowest channel. Then the field strength was measured at 2310-2390 MHz.<br>2. The transmitter was setup to transmit at the highest channel. Then the field strength was measured at 2483.5-2500 MHz.<br>3. The data of 2390MHz and 2483.5MHz was the worst. | | |

| Test Mode | Ant.Pol. H/V | Freq. (MHz) | Reading | | Ant/CF CF(dB) | Act | | Limit | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Peak (dBuv) | AV (dBuv) | | Peak (dBuv/m) | AV (dBuv/m) | Peak (dBuv/m) | AV (dBuv/m) |
| Data rate 1Mbps | V | 2390.00 | 42.54 | 32.62 | -5.79 | 36.75 | 26.83 | 74.00 | 54.00 |
| | H | 2390.00 | 43.96 | 33.16 | -5.79 | 38.17 | 27.37 | 74.00 | 54.00 |
| | V | 2483.50 | 41.99 | 31.81 | -4.98 | 37.01 | 26.83 | 74.00 | 54.00 |
| | H | 2483.50 | 41.86 | 33.02 | -4.98 | 36.88 | 28.04 | 74.00 | 54.00 |
| Data rate 3Mbps | V | 2390.00 | 42.95 | 32.36 | -5.79 | 37.16 | 26.57 | 74.00 | 54.00 |
| | H | 2390.00 | 42.27 | 32.98 | -5.79 | 36.48 | 27.19 | 74.00 | 54.00 |
| | V | 2483.50 | 42.63 | 32.11 | -4.98 | 37.65 | 27.13 | 74.00 | 54.00 |
| | H | 2483.50 | 44.02 | 32.70 | -4.98 | 39.04 | 27.72 | 74.00 | 54.00 |

Remark：

(1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode.

(2) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(3) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

# 6.4 BANDWIDTH TEST

## 6.4.1 Applied procedures / Limit

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

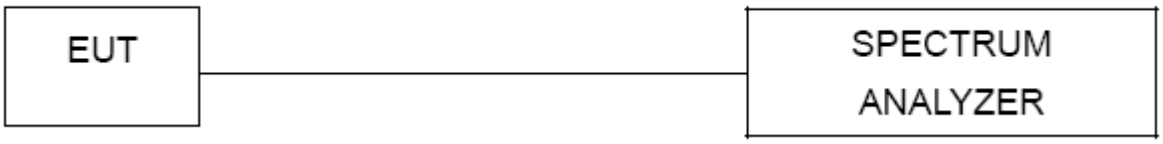
## 6.4.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW, Sweep = auto, Detector function = peak
Trace = max hold

## 6.4.3 Deviation from standard

No deviation.

## 6.4.4 Test setup

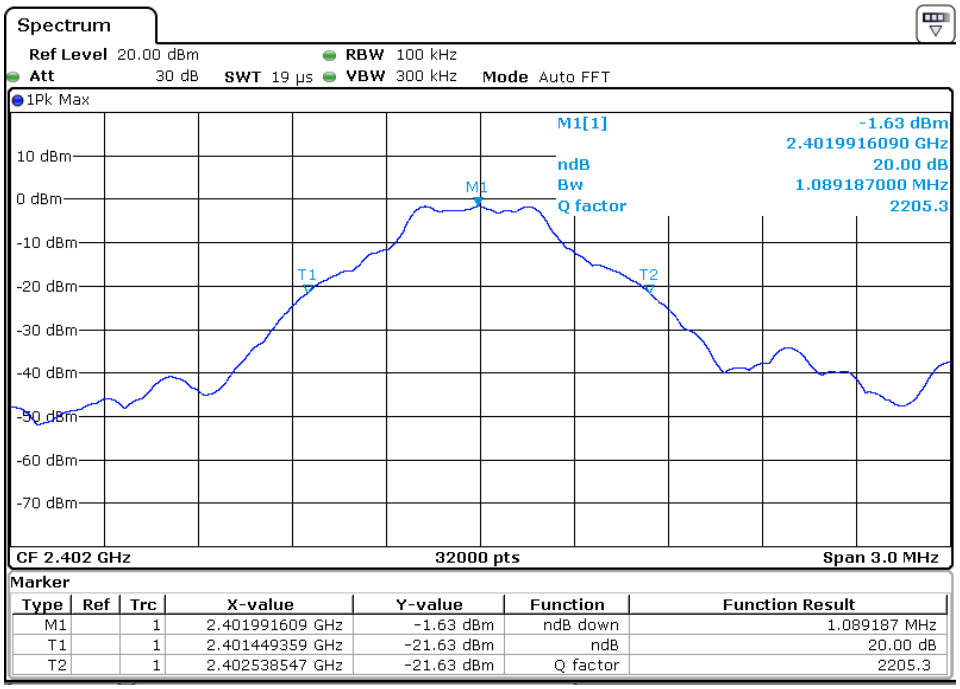


### 6.4.5 Test results

| | | | |
|---|---|---|---|
| EUT： | Bone Conduction Sports Headphone | Model Name ： | YKL-701 |
| Temperature： | 26 ℃ | Relative Humidity： | 53% |
| Pressure： | 1010 hPa | Test Power ： | DC 3.7V from battery |
| Test Mode ： | TX 1Mbps/ 3Mbps | | |

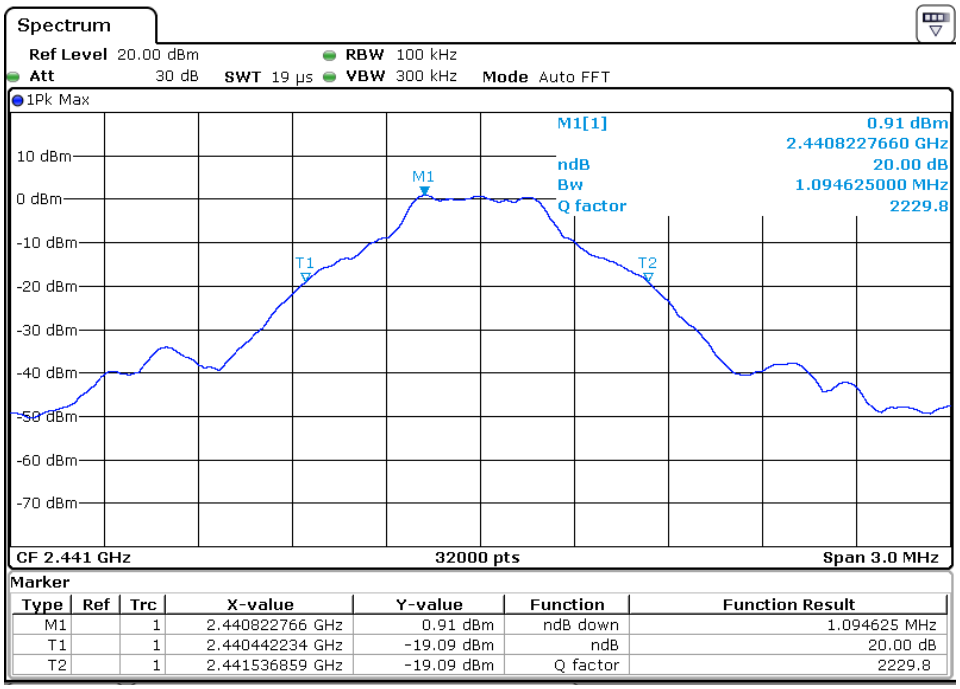
| Channel | | Channel frenqucy (MHz) | 20dB bandwidth (MHz) | Limit (MHz) | Conclusion |
|---|---|---|---|---|---|
| 1Mbps | Low | 2402 | 1.089187 | N/A | Pass |
| | Middle | 2441 | 1.094625 | N/A | Pass |
| | High | 2480 | 1.089844 | N/A | Pass |
| 2Mbps | Low | 2402 | 1.350094 | N/A | Pass |
| | Middle | 2441 | 1.345125 | N/A | Pass |
| | High | 2480 | 1.344656 | N/A | Pass |
| 3Mbps | Low | 2402 | 1.335 | N/A | Pass |
| | Middle | 2441 | 1.337625 | N/A | Pass |
| | High | 2480 | 1.336219 | N/A | Pass |

**CH00-1Mbps**



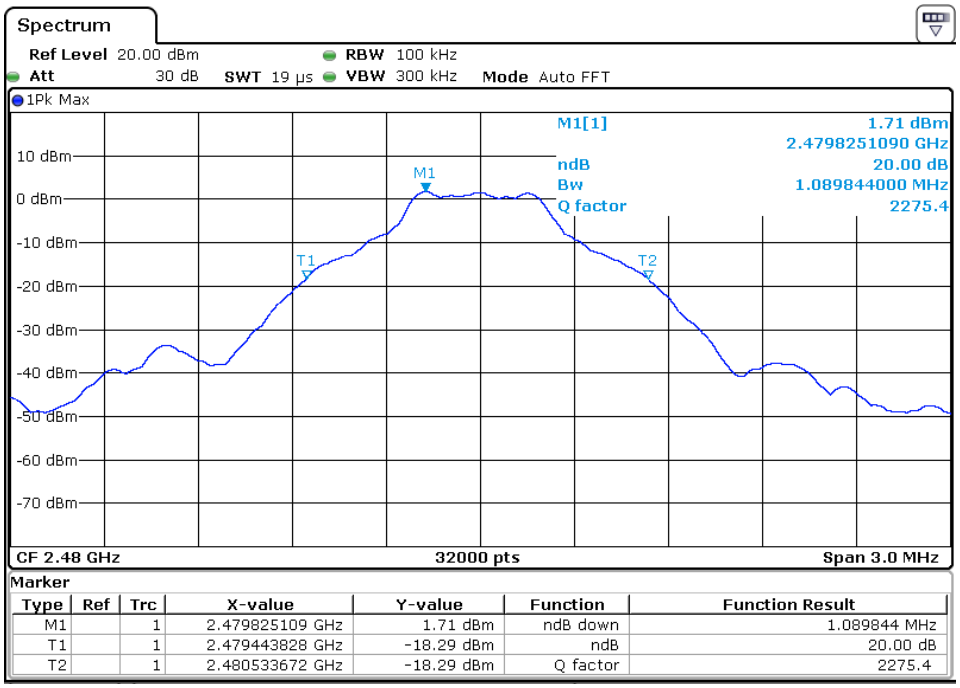

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.401991609 GHz | -1.63 dBm | ndB down | 1.089187 MHz |
| T1 | | 1 | 2.401449359 GHz | -21.63 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.402538547 GHz | -21.63 dBm | Q factor | 2205.3 |

**CH 39-1Mbps**



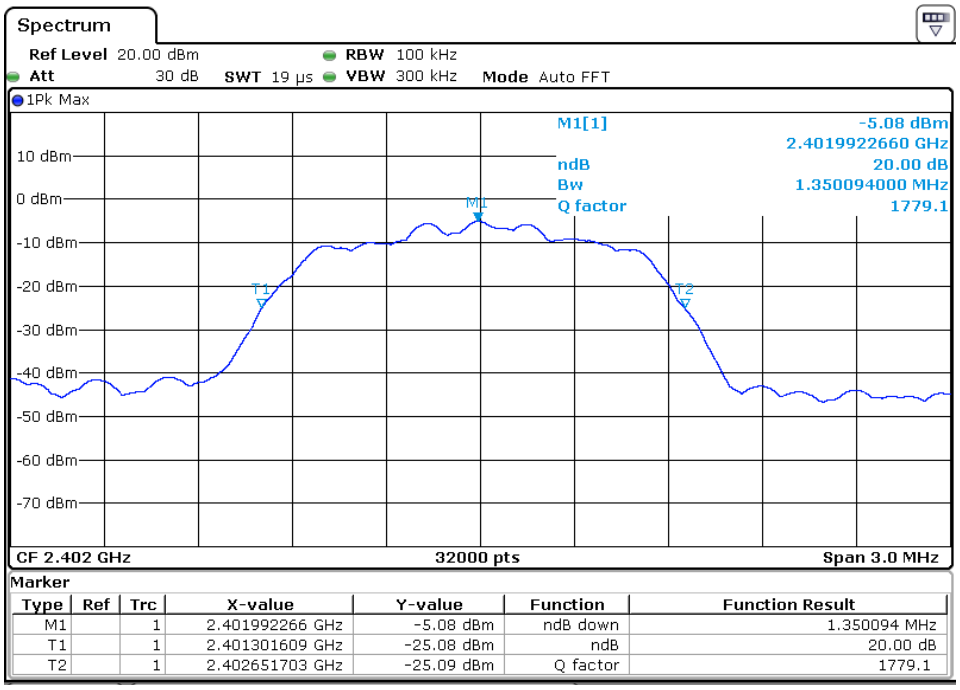

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.440822766 GHz | 0.91 dBm | ndB down | 1.094625 MHz |
| T1 | | 1 | 2.440442234 GHz | -19.09 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.441536859 GHz | -19.09 dBm | Q factor | 2229.8 |

## CH 78-1Mbps



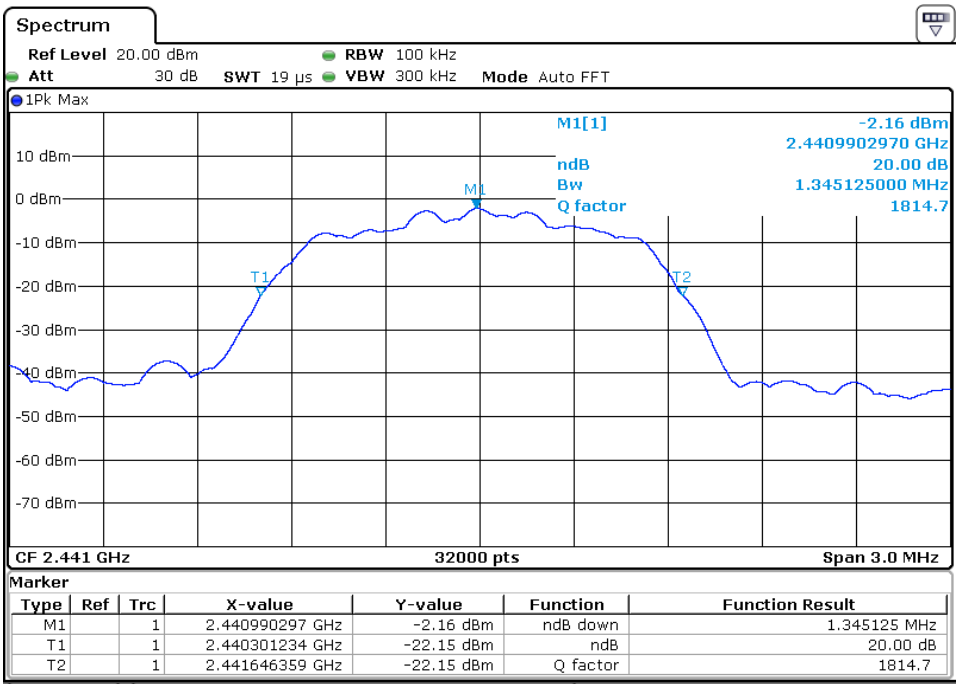

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.479825109 GHz | 1.71 dBm | ndB down | 1.089844 MHz |
| T1 | | 1 | 2.479443828 GHz | -18.29 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.480533672 GHz | -18.29 dBm | Q factor | 2275.4 |

## CH 00-2Mbps




| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.401992266 GHz | -5.08 dBm | ndB down | 1.350094 MHz |
| T1 | | 1 | 2.401301609 GHz | -25.08 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.402651703 GHz | -25.09 dBm | Q factor | 1779.1 |

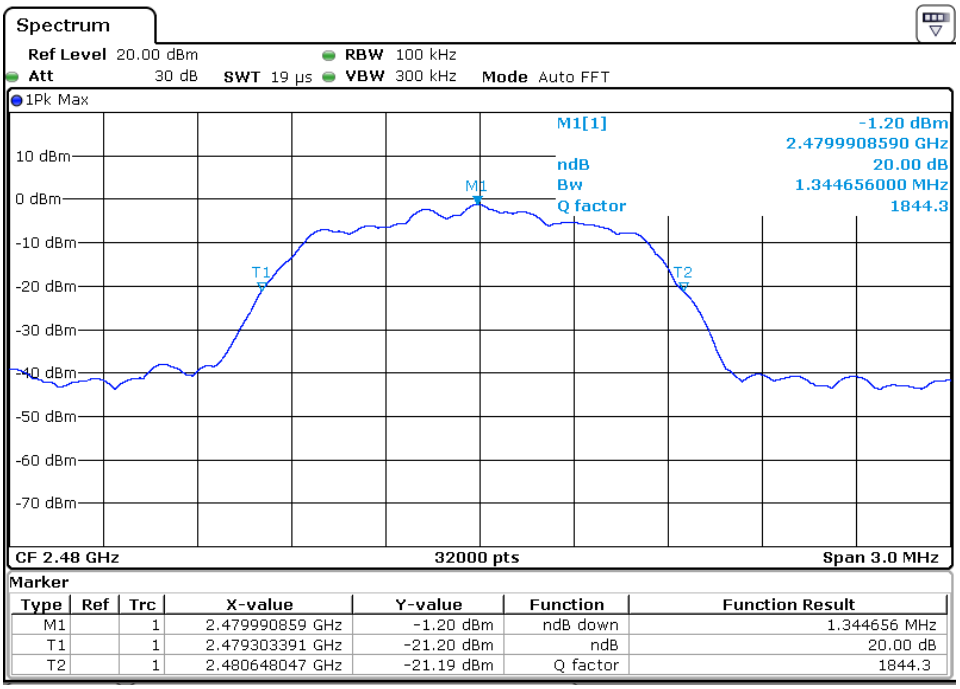
## CH 39-2Mbps




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.440990297 GHz | -2.16 dBm | ndB down | 1.345125 MHz |
| T1 | | 1 | 2.440301234 GHz | -22.15 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.441646359 GHz | -22.15 dBm | Q factor | 1814.7 |

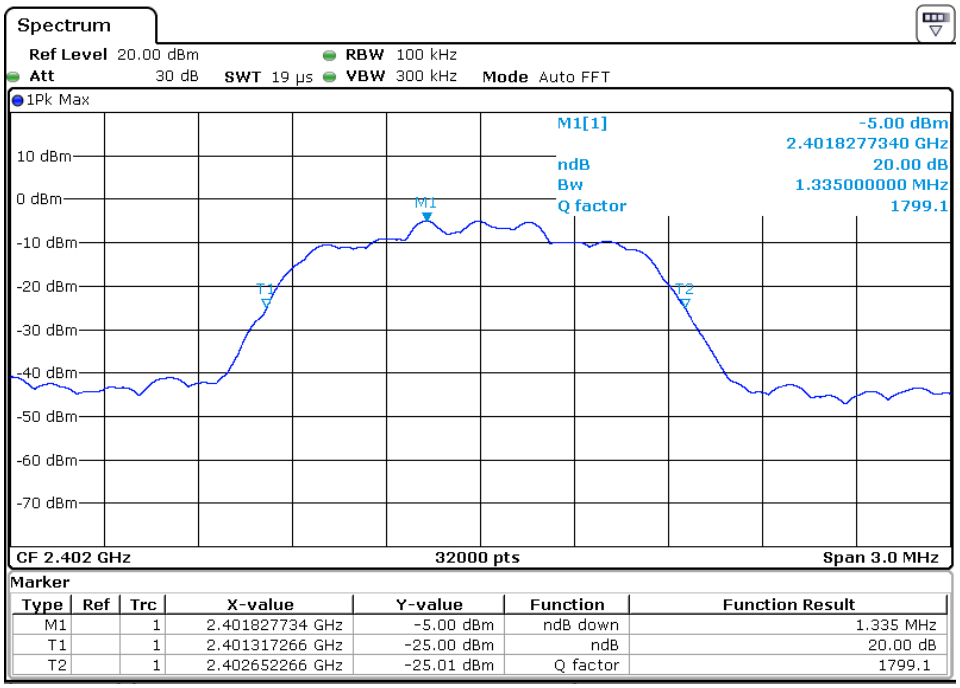
## CH 78-2Mbps




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.479990859 GHz | -1.20 dBm | ndB down | 1.344656 MHz |
| T1 | | 1 | 2.479303391 GHz | -21.20 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.480648047 GHz | -21.19 dBm | Q factor | 1844.3 |

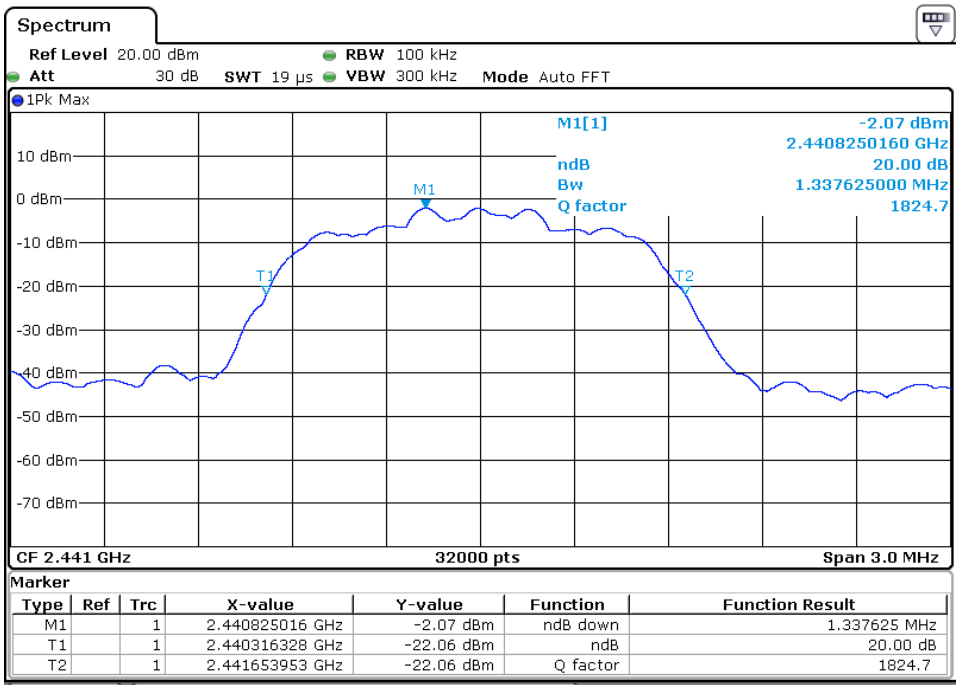
## CH 00-3Mbps




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.401827734 GHz | -5.00 dBm | ndB down | 1.335 MHz |
| T1 | | 1 | 2.401317266 GHz | -25.00 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.402652266 GHz | -25.01 dBm | Q factor | 1799.1 |

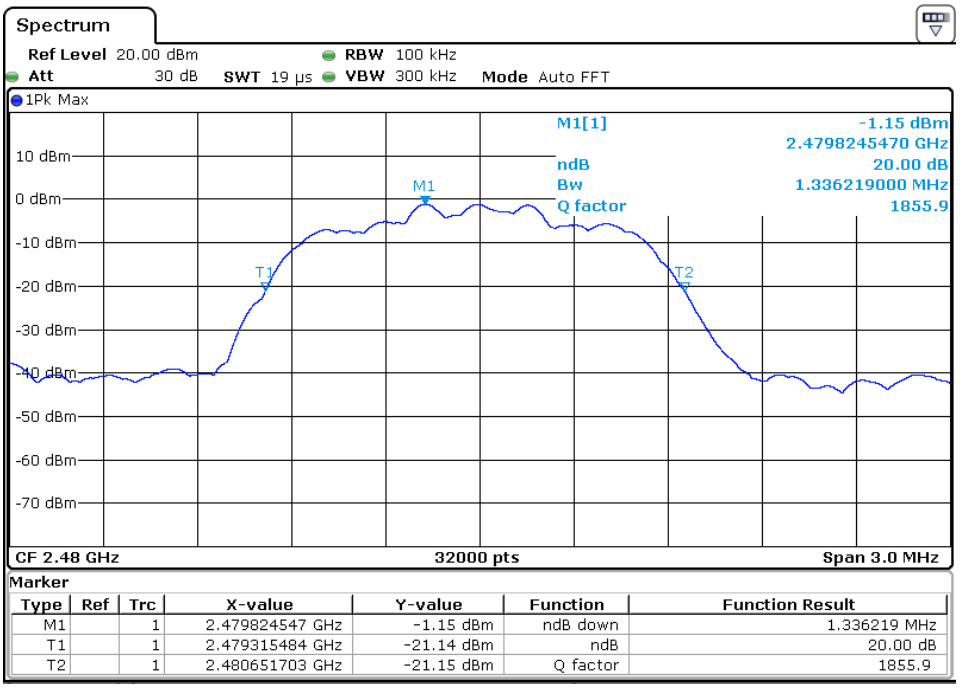
## CH 39-3Mbps




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.440825016 GHz | -2.07 dBm | ndB down | 1.337625 MHz |
| T1 | | 1 | 2.440316328 GHz | -22.06 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.441653953 GHz | -22.06 dBm | Q factor | 1824.7 |

## CH 78-3Mbps


Spectrum
Ref Level 20.00 dBm
RBW 100 kHz
Att 30 dB
SWT 19 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
-1.15 dBm
2.4798245470 GHz
ndB
20.00 dB
Bw
1.336219000 MHz
Q factor
1855.9
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
T1
T2
CF 2.48 GHz
32000 pts
Span 3.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.479824547 GHz -1.15 dBm ndB down 1.336219 MHz
T1 1 2.479315484 GHz -21.14 dBm ndB 20.00 dB
T2 1 2.480651703 GHz -21.15 dBm Q factor 1855.9

# 6.5 Carrier Frequencies Separated

## 6.5.1 Applied procedures / Limit

15.247(a) (1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

## 6.5.2 Test procedure

(1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as Span = wide enough to capture the peaks of two adjacent channels, Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span, Video (or Average) Bandwidth (VBW) ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold

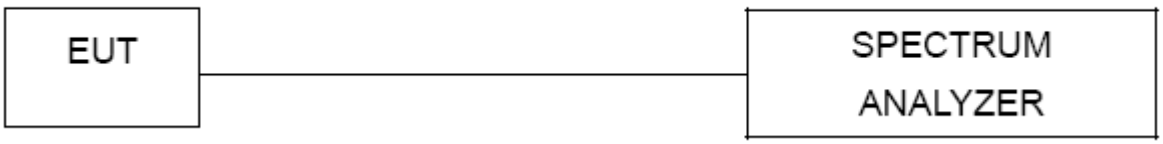
(2) The EUT should be transmitting at its maximum data rate. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

(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.

## 6.5.3 Deviation from standard

No deviation.

## 6.5.4 Test setup



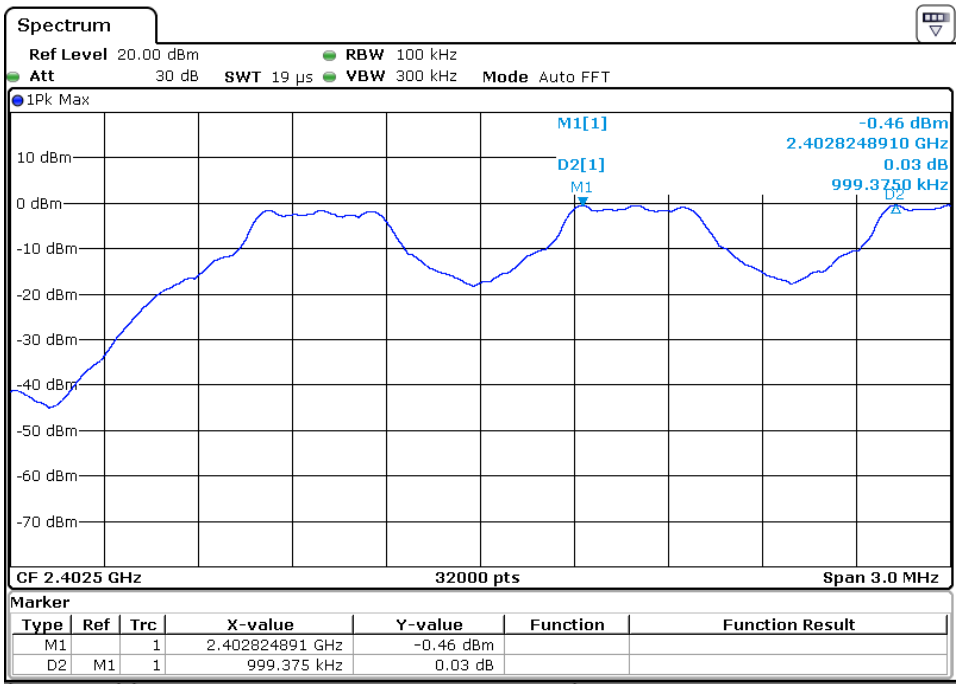
### 6.5.5 Test results

| | | | |
|---|---|---|---|
| EUT： | Bone Conduction Sports Headphone | Model Name ： | YKL-701 |
| Temperature： | 26 ℃ | Relative Humidity： | 53% |
| Pressure： | 1010 hPa | Test Power ： | DC 3.7V from battery |
| Test Mode ： | TX 1Mbps/ 3Mbps | | |

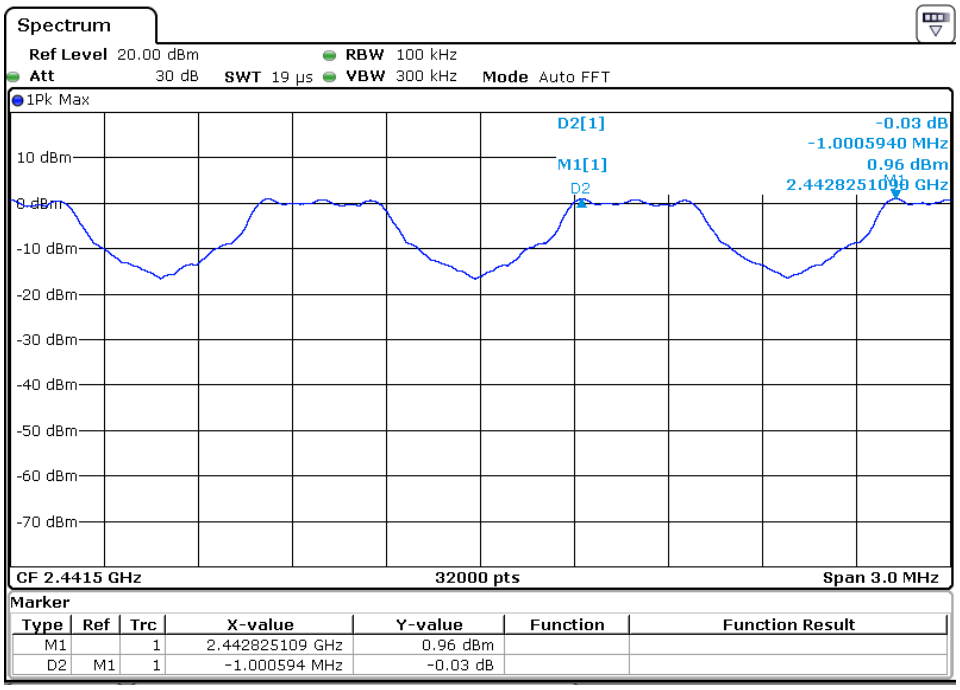
| Channel | | Channel frenqucy (MHz) | Channel Separation (MHz) | Conclusion |
|---|---|---|---|---|
| 1Mbps | Low | 2402 | 0.999375 | Pass |
| | Middle | 2441 | 1.000594 | Pass |
| | Highest | 2480 | 0.997688 | Pass |
| 3Mbps | Low | 2402 | 0.999 | Pass |
| | Middle | 2441 | 1.000031 | Pass |
| | Highest | 2480 | 0.999563 | Pass |

**Ch. Separation >2/3(20dB bandwidth)**

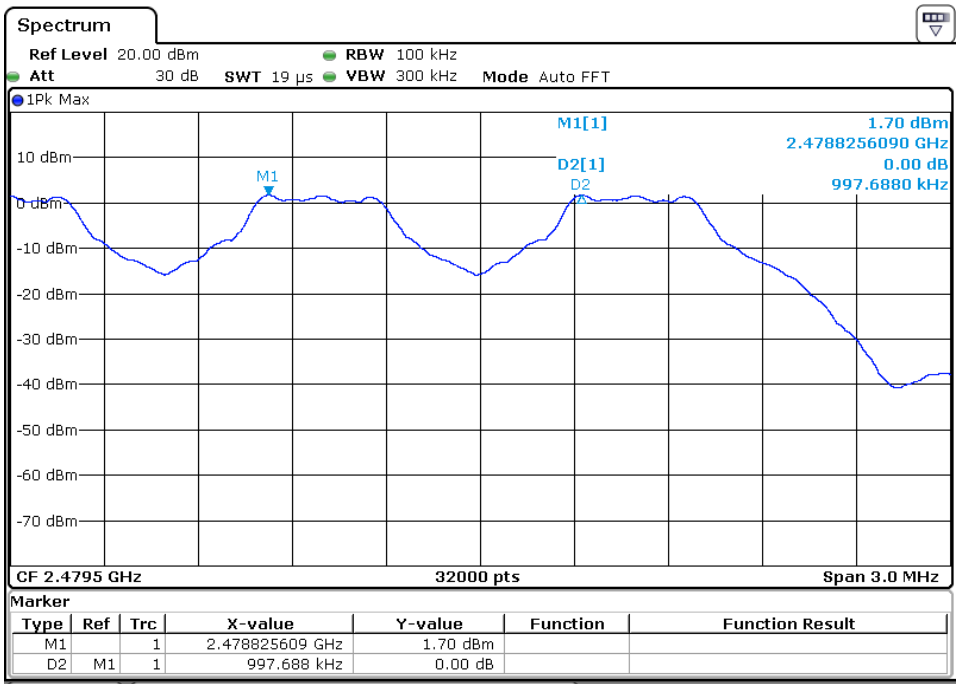
## CH 00-1Mbps



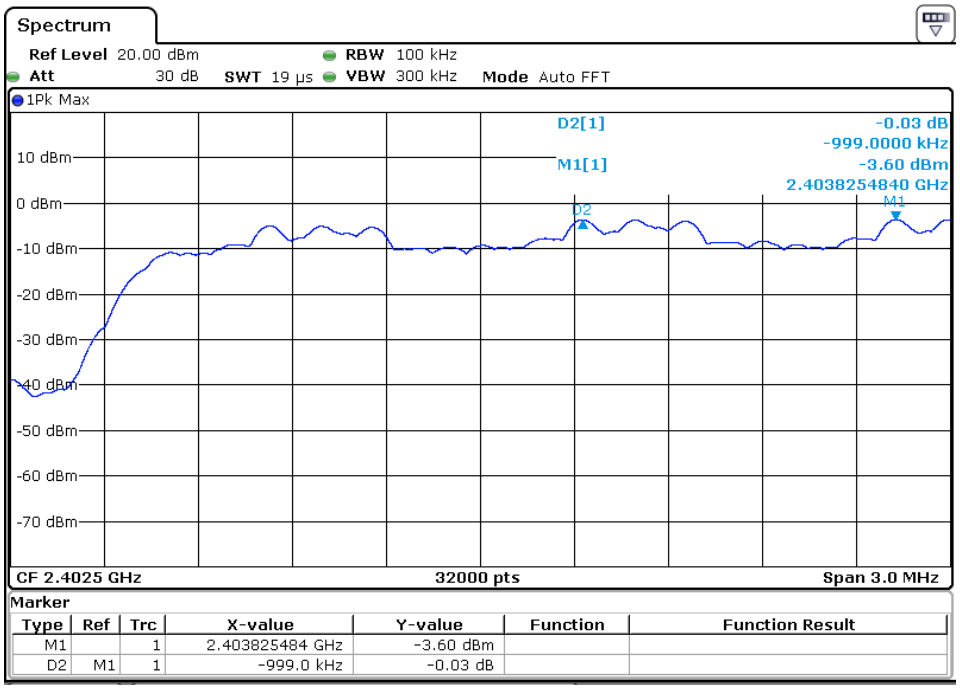

## CH 39-1Mbps



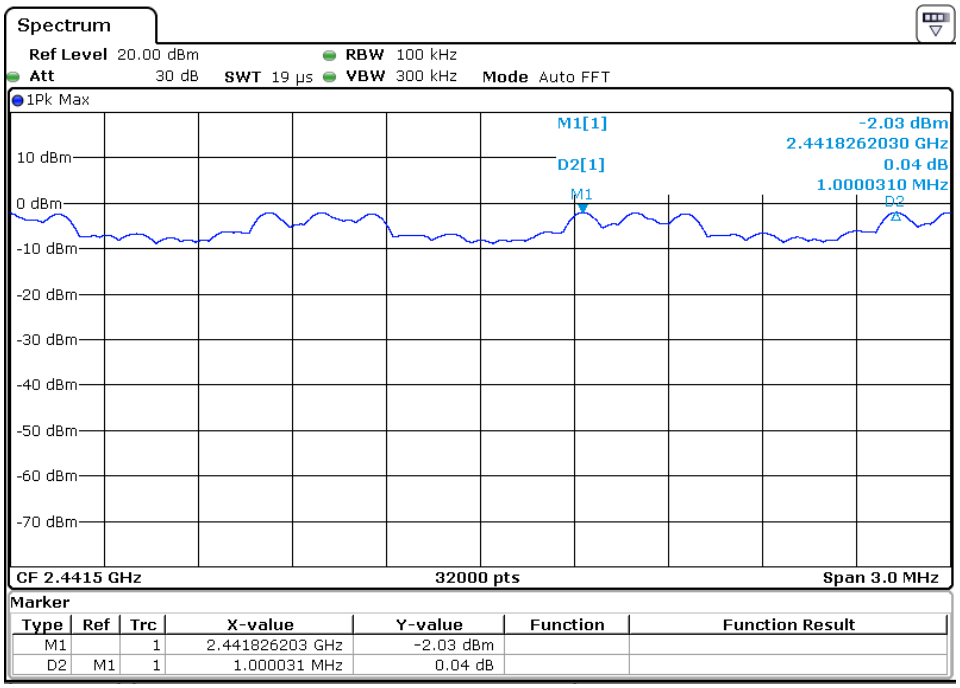
## CH 78-1Mbps



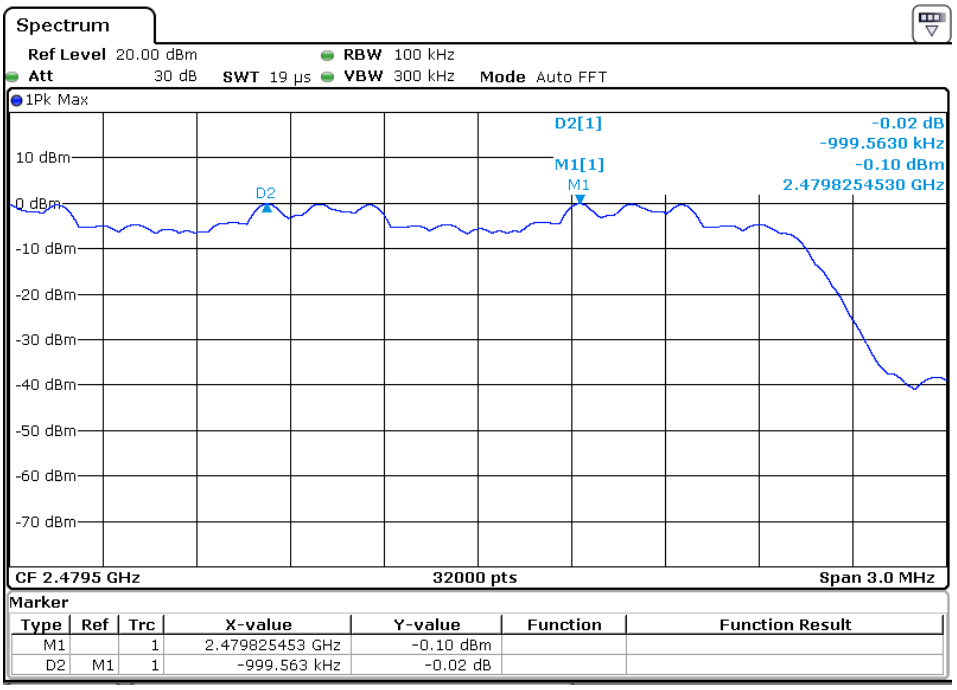

## CH 00-3Mbps



## CH 39-3Mbps




## CH 78-3Mbps



## 6.6 Hopping Channel Number

### 6.6.1 Applied procedures / Limit

15.247(a) (1) (iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

### 6.6.2 Test procedure

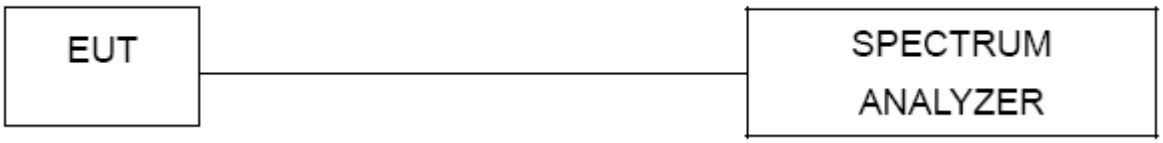
(1) Connected the antenna port to the Spectrum Analyzer , set the Spectrum Analyzer as Span = the frequency band of operation, RBW ≥ 1% of the span, VBW ≥ RBW Sweep = auto Detector function = peak, Trace = max hold

(2) The EUT should be have its hopping function enabled. Maxhold and record hopping channels It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

### 6.6.3 Deviation from standard

No deviation.

### 6.6.4 Test setup

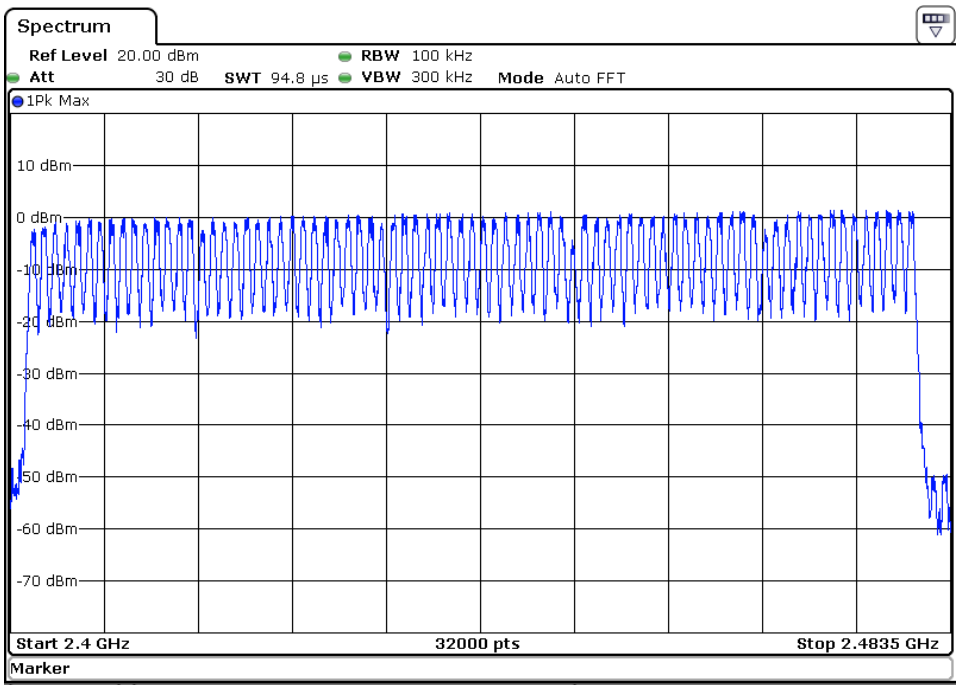


### 6.6.5 Test result

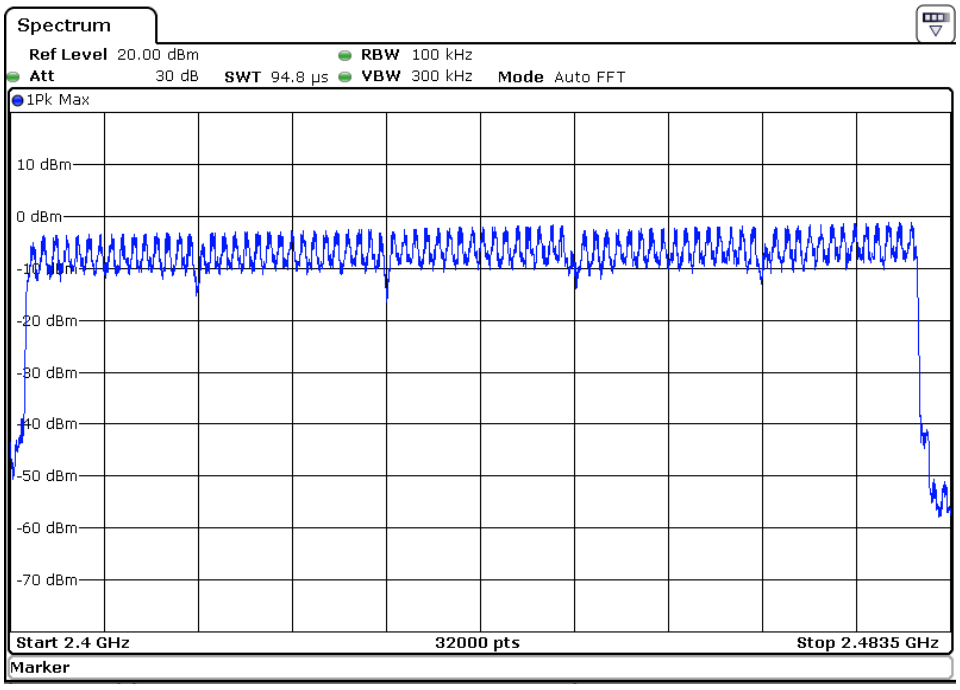
| Hopping Channel Number result | | |
|---|---|---|
| Operating Mode: 1Mbps/ 3Mbps Mode | Test date:2017-06-20 | |
| Result | Limit | Conclusion |
| 79 | 15 | Pass |

| EUT： | Bone Conduction Sports Headphone | Model Name ： | YKL-701 |
|---|---|---|---|
| Temperature： | 26 ℃ | Relative Humidity： | 53% |
| Pressure： | 1010 hPa | Test Power ： | DC 3.7V from battery |
| Test Mode ： | TX 1Mbps/3Mbps | | |

1Mbps




3Mbps



## 6.7 Dwell time

### 6.7.1 Applied procedures / Limit

15.247(a) (1) (iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

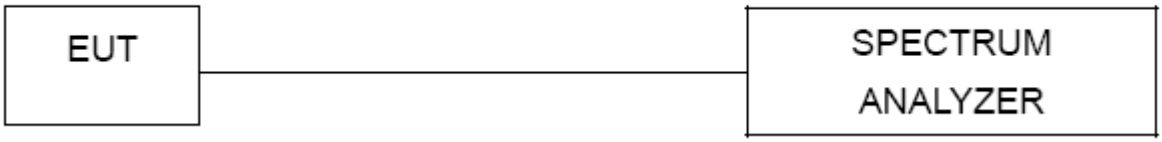
### 6.7.2 Test procedure

(1) Place the EUT on the table in the chamber or connect the antenna port of the EUT to spectrum analyzer and set it in transmitting mode.
(2) Set RBW of spectrum analyzer to 1MHz, VBW ≥ RBW
(3) Use a video trigger with the trigger level set to enable triggering only on full pulses.
(4) Sweep Time is more than once pulse time.
(5) Set the center frequency on any frequency would be measure and set the frequency span to zero span.
(6) Measure the maximum time duration of one single pulse.
(7) Set the EUT for DH5, DH3 and DH1 packet transmitting.
(8) Measure the maximum time duration of one single pulse.
(9) A Period Time = 79*0.4=31.6 S
DH1 Time Slot: Reading * (1600/2)*31.6/79
DH3 Time Slot: Reading * (1600/4)*31.6/79
DH5 Time Slot: Reading * (1600/6)*31.6/79

### 6.7.3 Deviation from standard

No deviation.

### 6.7.4 Test setup

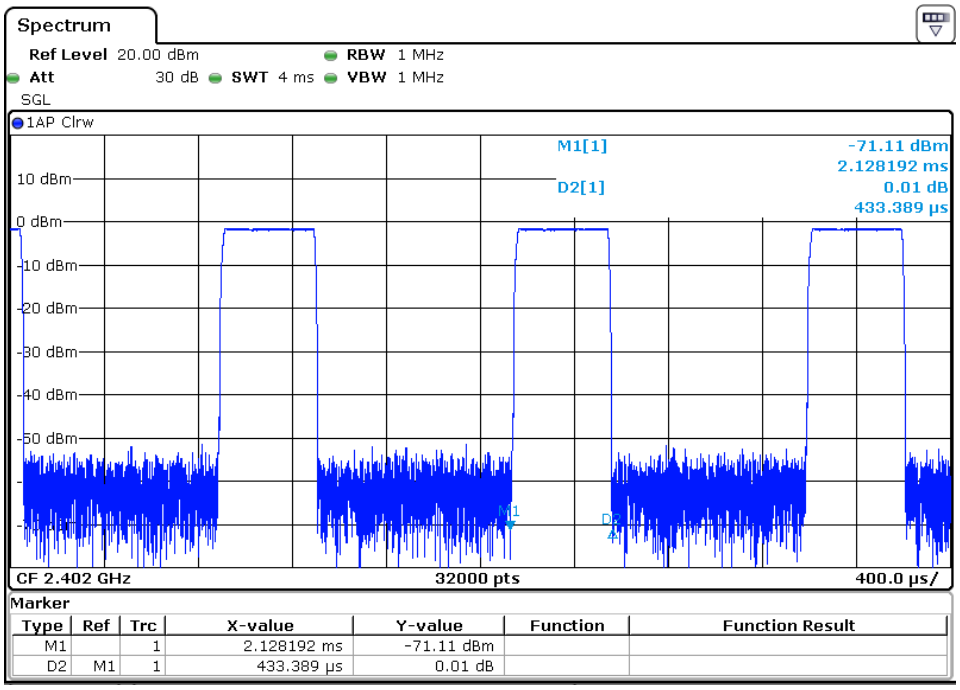


### 6.7.5 Test result

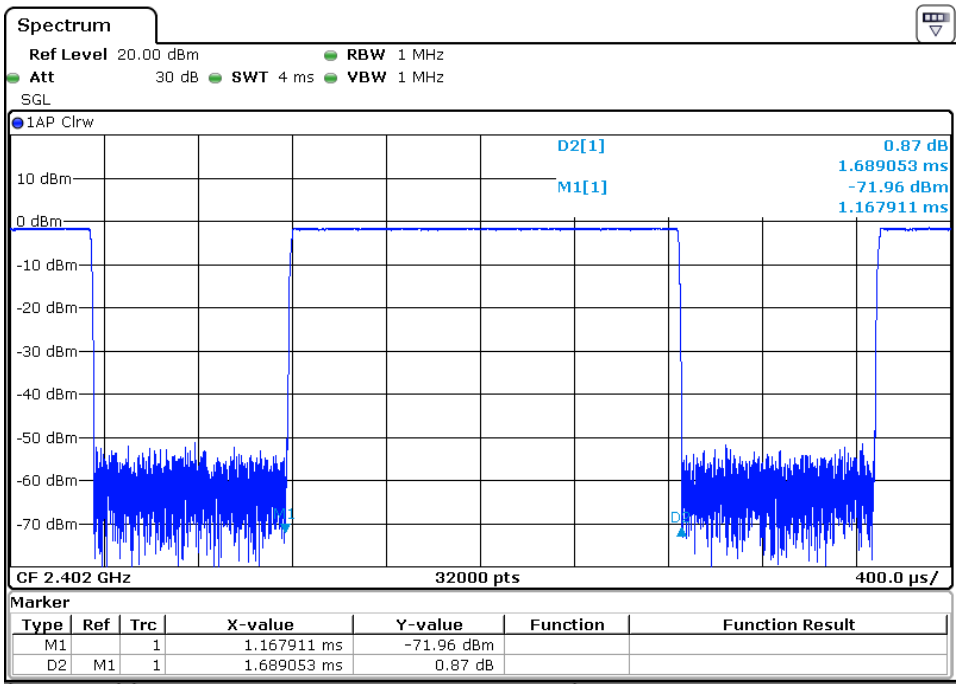
| EUT： | Bone Conduction Sports Headphone | Model Name ： | YKL-701 |
|---|---|---|---|
| Temperature： | 26 ℃ | Relative Humidity： | 53% |
| Pressure： | 1010 hPa | Test Power ： | DC 3.7V from battery |
| Test Mode ： | CH00-DH1/DH3/DH5 (1Mbps Mode) | | |

| Data Packet | Frequency | Pulse Duration (ms) | Dwell Time (ms) | Limits (s) |
|---|---|---|---|---|
| DH1 | 2402 MHz | 0.433 | 138.56 | 0.4000 |
| DH3 | 2402 MHz | 1.689 | 270.24 | 0.4000 |
| DH5 | 2402 MHz | 2.938 | 313.3867 | 0.4000 |

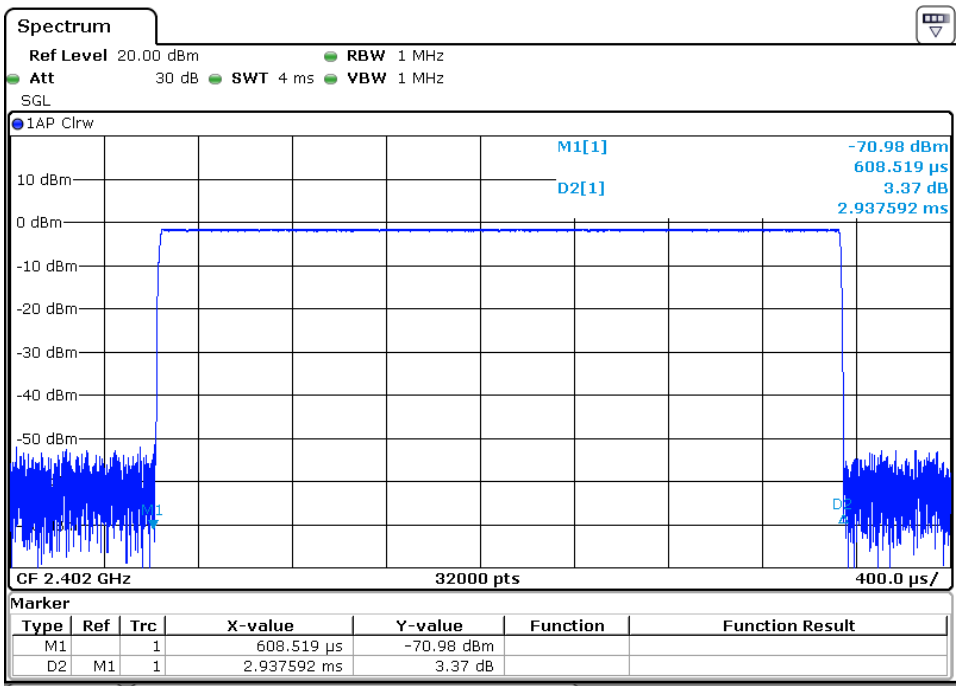
**CH 00- DH1**



**CH 00- DH3**



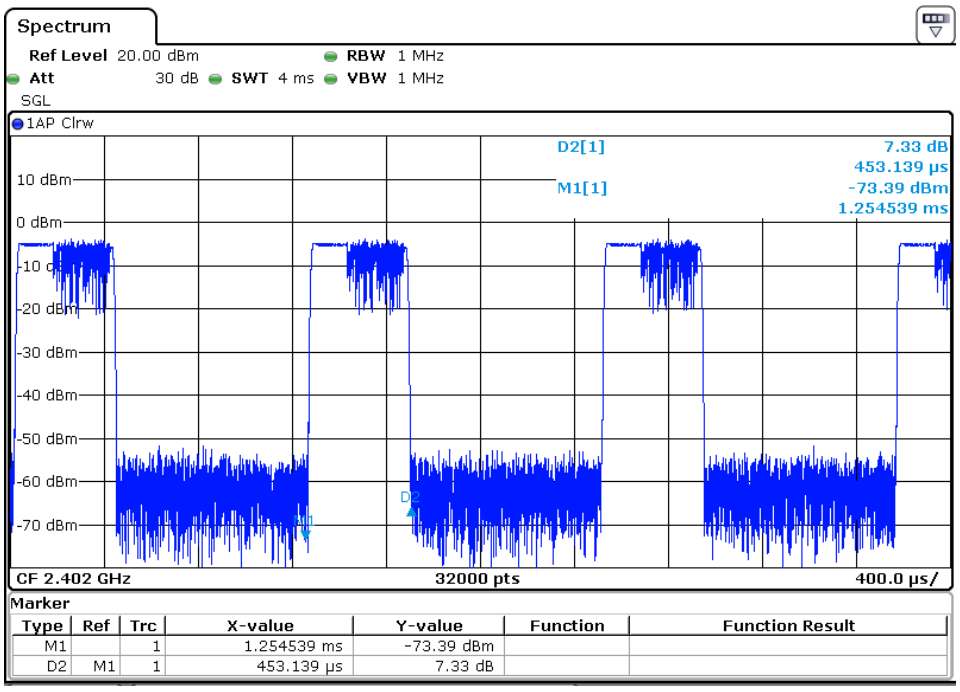

**CH 00- DH5**



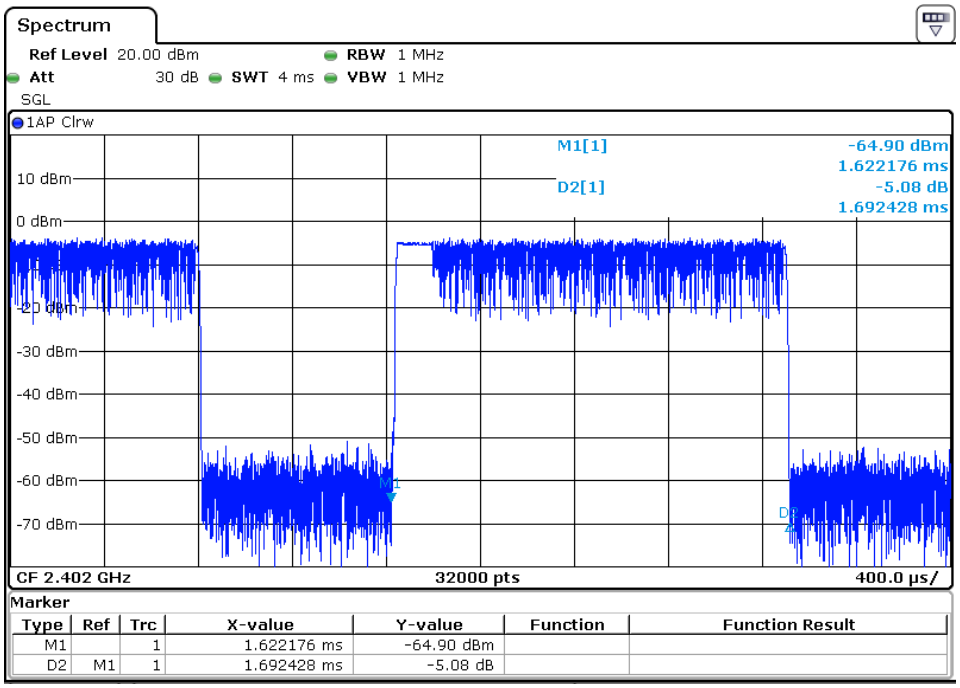
| EUT： | Bone Conduction Sports Headphone | Model Name ： | YKL-701 |
|---|---|---|---|
| Temperature： | 26 ℃ | Relative Humidity： | 53% |
| Pressure： | 1010 hPa | Test Power ： | DC 3.7V from battery |
| Test Mode ： | CH00-3DH1/3DH3/3DH5 (3Mbps Mode) | | |

| Data Packet | Frequency | Pulse Duration (ms) | Dwell Time (ms) | Limits (s) |
|---|---|---|---|---|
| 3DH1 | 2402 MHz | 0.453 | 144.96 | 0.4000 |
| 3DH3 | 2402 MHz | 1.692 | 270.72 | 0.4000 |
| 3DH5 | 2402 MHz | 2.948 | 314.4533 | 0.4000 |

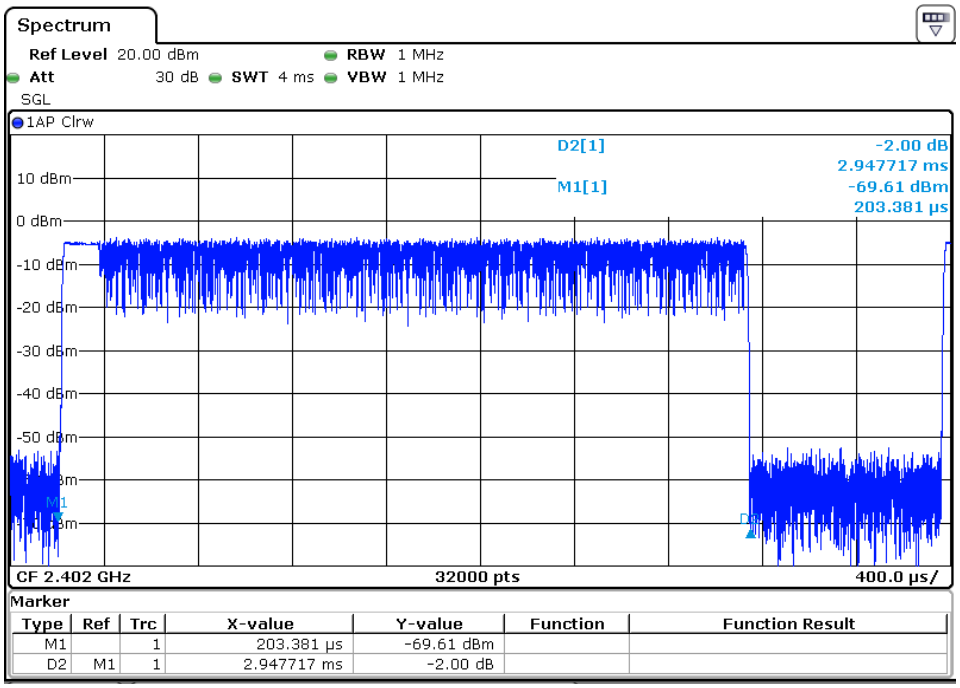
**CH 00- DH1**



**CH 00- DH3**




**CH 00- DH5**



## 6.8 Maximum Peak Output Power

### 6.8.1 Applied procedures / Limit

15.247(a) (1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
15.247(b) (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

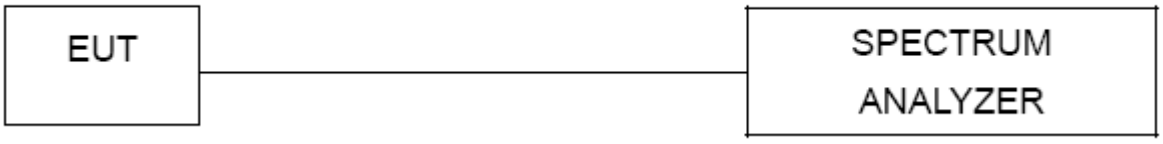
### 6.8.2 Test procedure

(1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as
(2) Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
(3) RBW > the 20 dB bandwidth of the emission being measured, VBW ≥ RBW, Sweep = auto
(4) Detector function = peak, Trace = max hold
(5) 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.
(6) 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.

### 6.8.3 Deviation from standard

No deviation.

### 6.8.4 Test setup

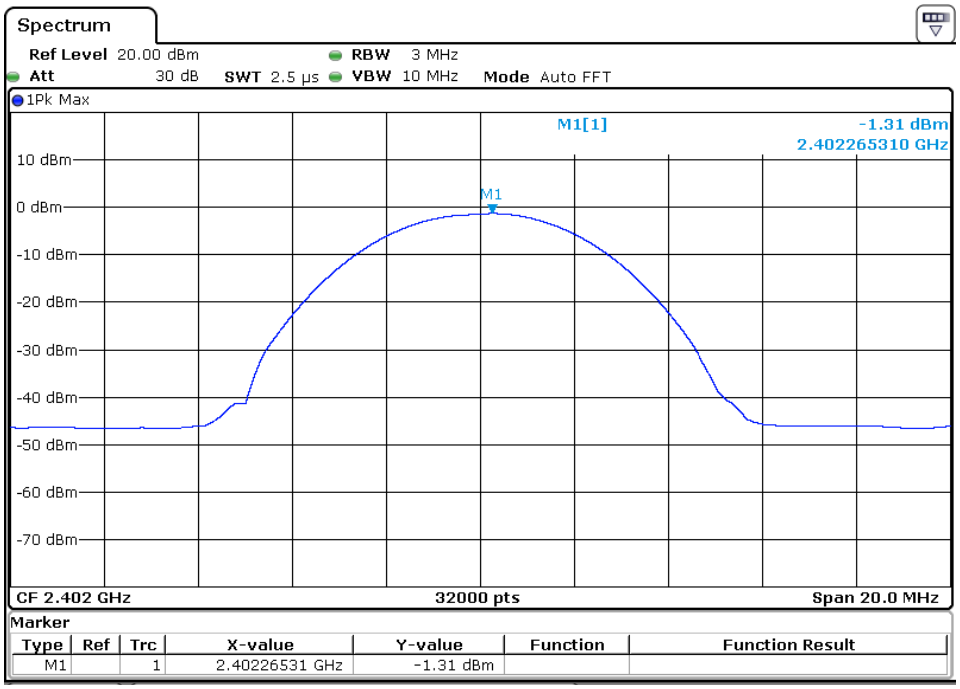


### 6.8.5 Test results

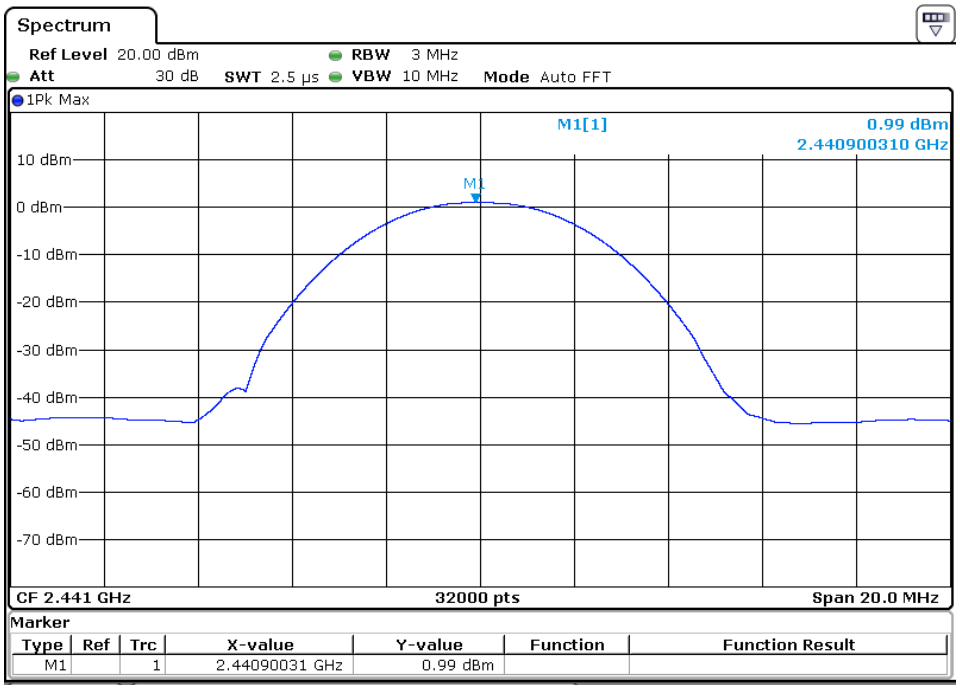
| | | | |
|---|---|---|---|
| EUT： | Bone Conduction Sports Headphone | Model Name ： | YKL-701 |
| Temperature： | 26 ℃ | Relative Humidity： | 60% |
| Pressure： | 1010 hPa | Test Voltage ： | DC 3.7V from battery |
| Test Mode ： | TX | | |
| Note: All the data rates have be tested and the worst-case as the table below. | | | |

| Test Mode | Frequency | Peak Output Power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| Data rate 1Mbps | 2402 MHz | -1.31 | 21 | Pass |
| | 2441 MHz | 0.99 | 21 | Pass |
| | 2480 MHz | 1.68 | 21 | Pass |
| Data rate 2Mbps | 2402 MHz | -4.04 | 21 | Pass |
| | 2441 MHz | -0.97 | 21 | Pass |
| | 2480 MHz | -0.25 | 21 | Pass |
| Data rate 3Mbps | 2402 MHz | -3.48 | 21 | Pass |
| | 2441 MHz | -0.70 | 21 | Pass |
| | 2480 MHz | 0.18 | 21 | Pass |
| Cable loss = 0.5 dBm | | | | |

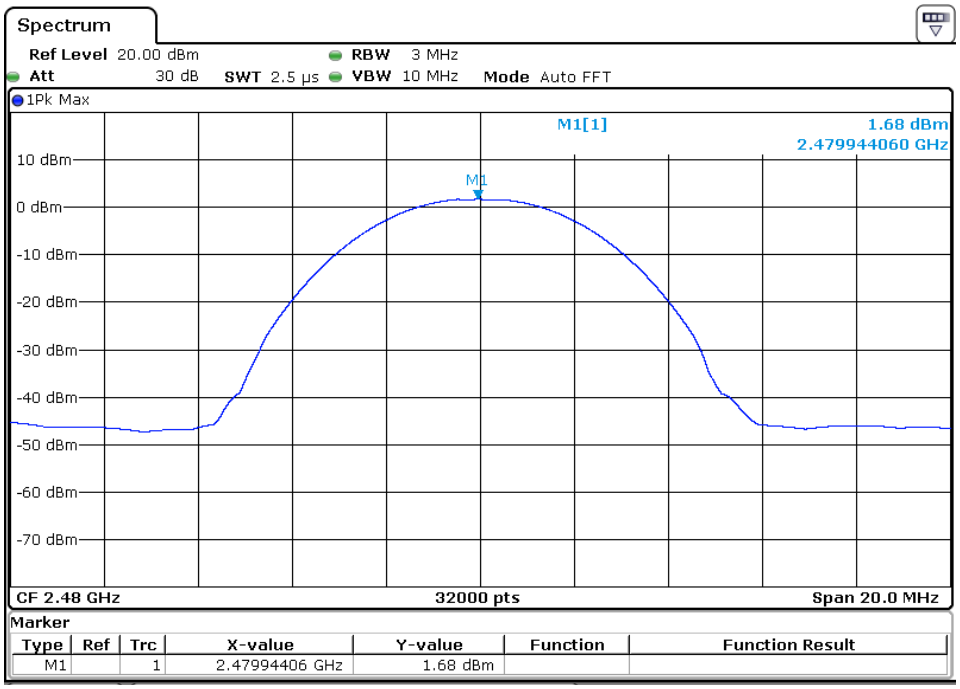
**CH 00-1Mbps**



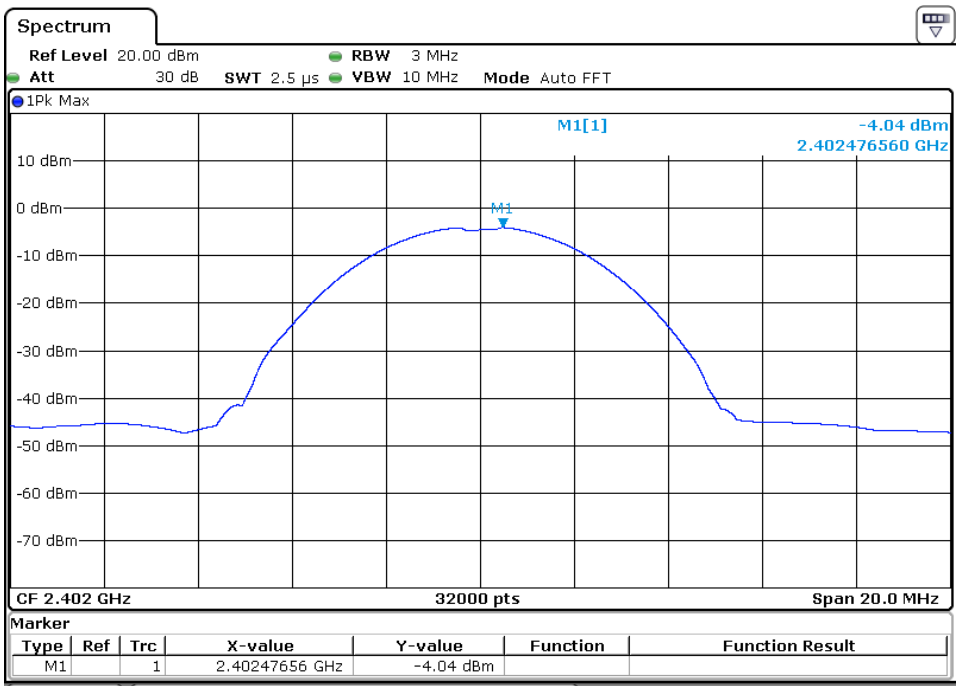

**CH 39-1Mbps**



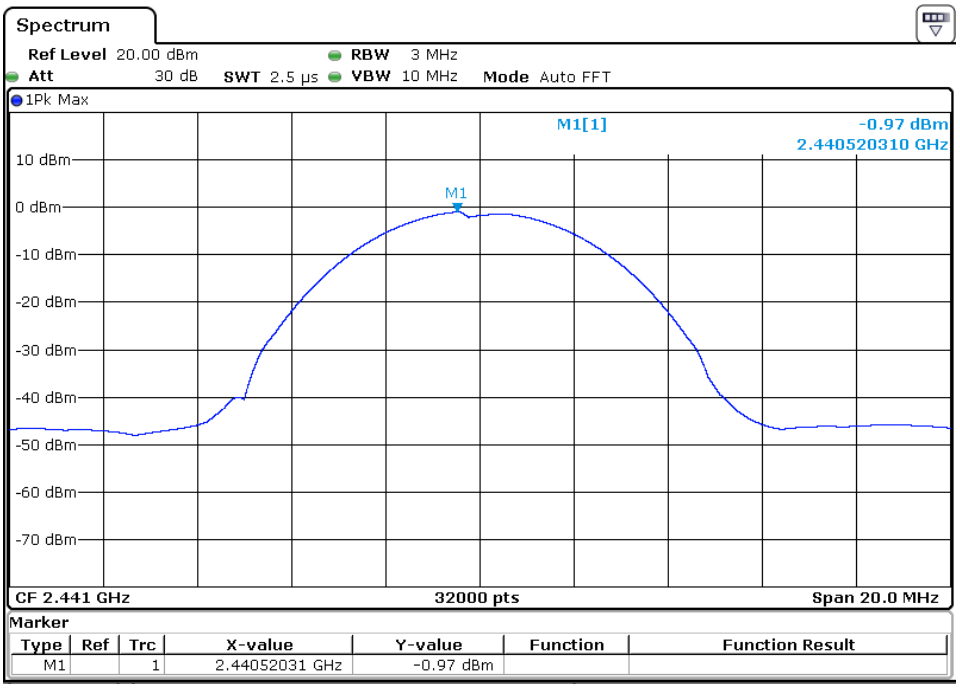
**CH 78-1Mbps**



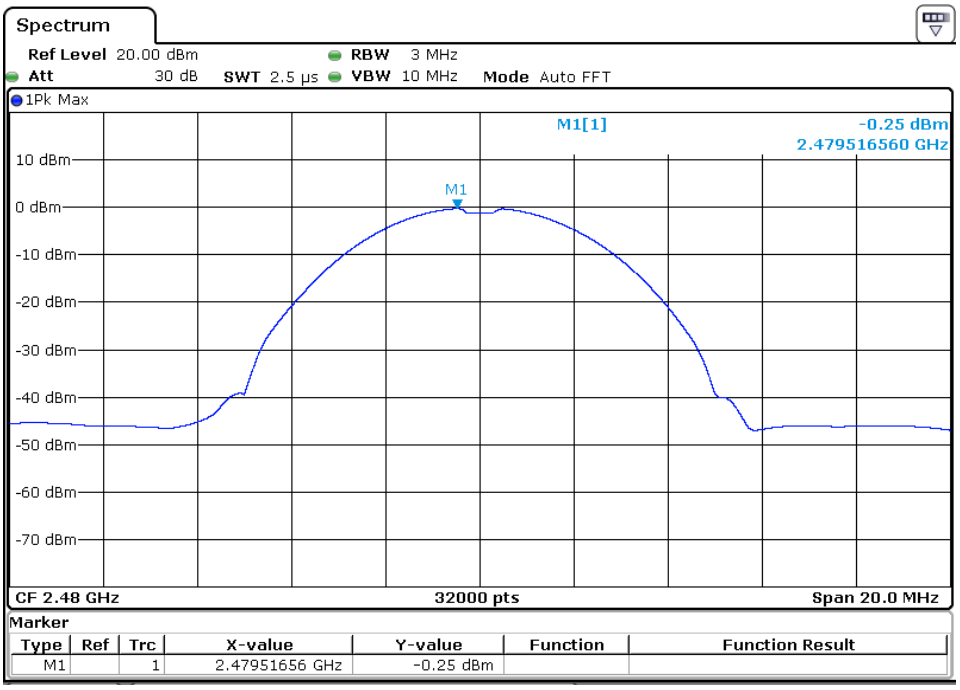

**CH 00-2Mbps**



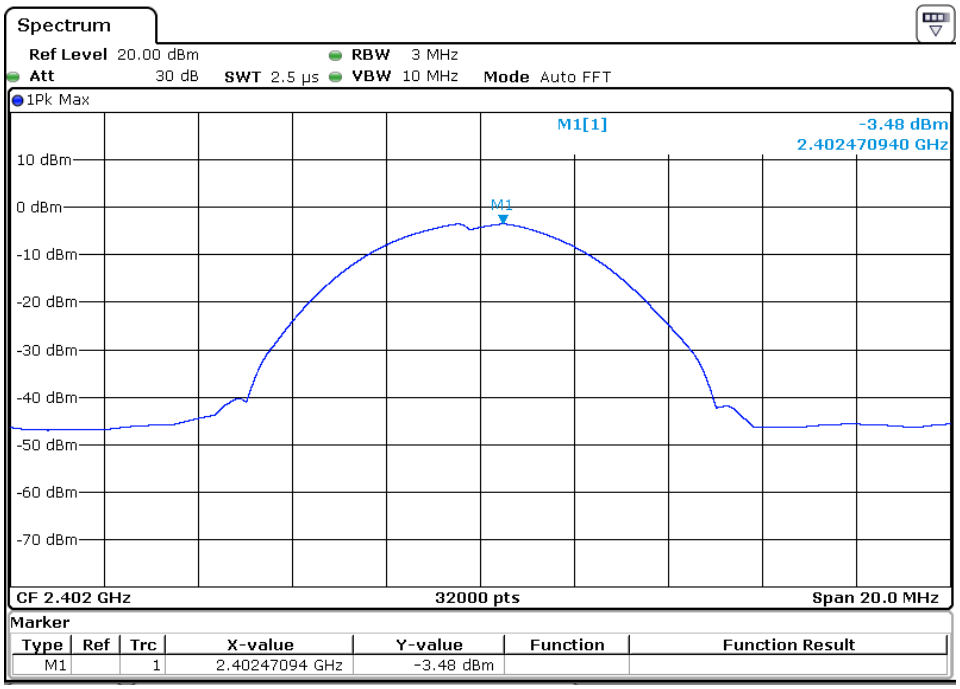
**CH 39-2Mbps**



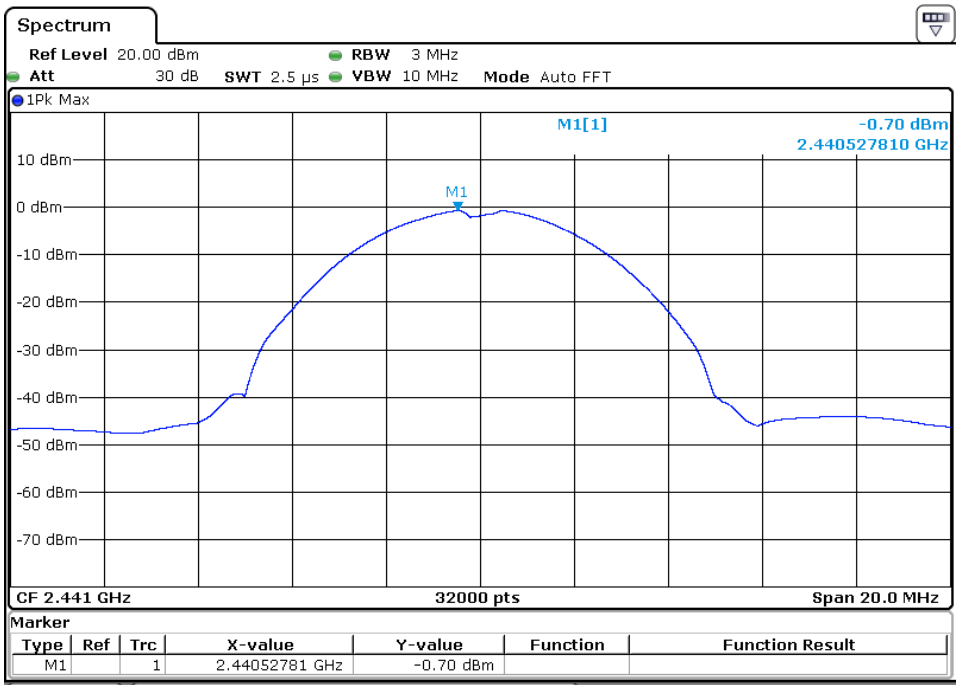

**CH 78-2Mbps**



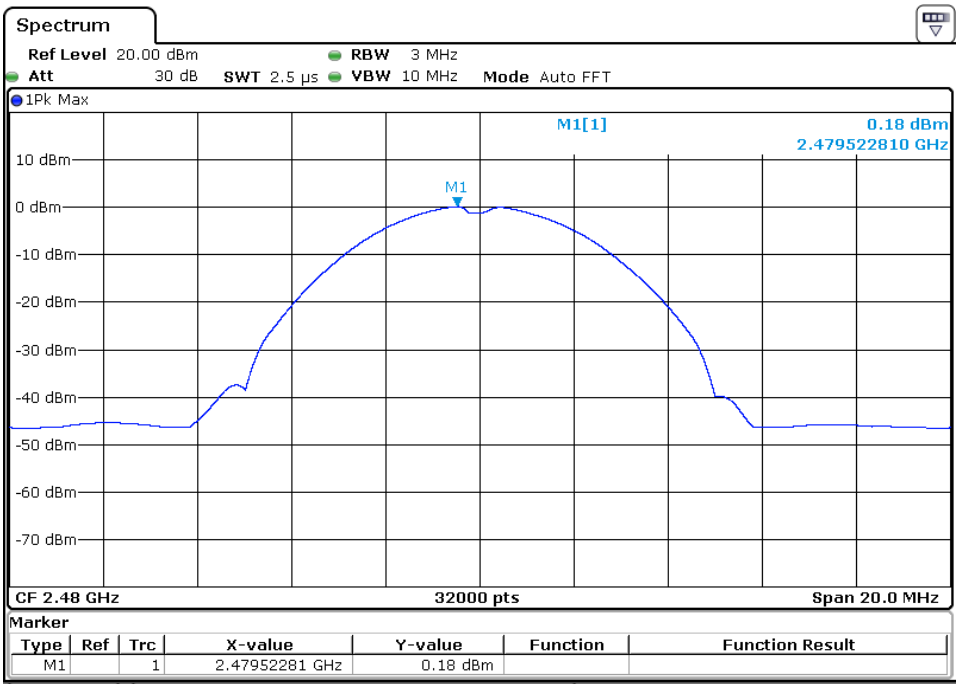
**CH 00-3Mbps**




**CH 39-3Mbps**



**CH 78-3Mbps**


Spectrum
Ref Level 20.00 dBm
RBW 3 MHz
Att 30 dB
SWT 2.5 µs
VBW 10 MHz
Mode Auto FFT
1Pk Max
M1[1]
0.18 dBm
2.479522810 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.48 GHz
32000 pts
Span 20.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.47952281 GHz 0.18 dBm

# 6.9 Band edge

## 6.9.1 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)).

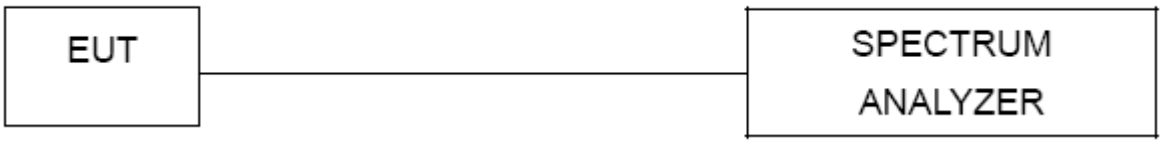
## 6.9.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation, RBW ≥ 1% of the span, VBW ≥ RBW, Sweep = auto,
Detector function = peak, Trace = max hold

## 6.9.3 Deviation from standard

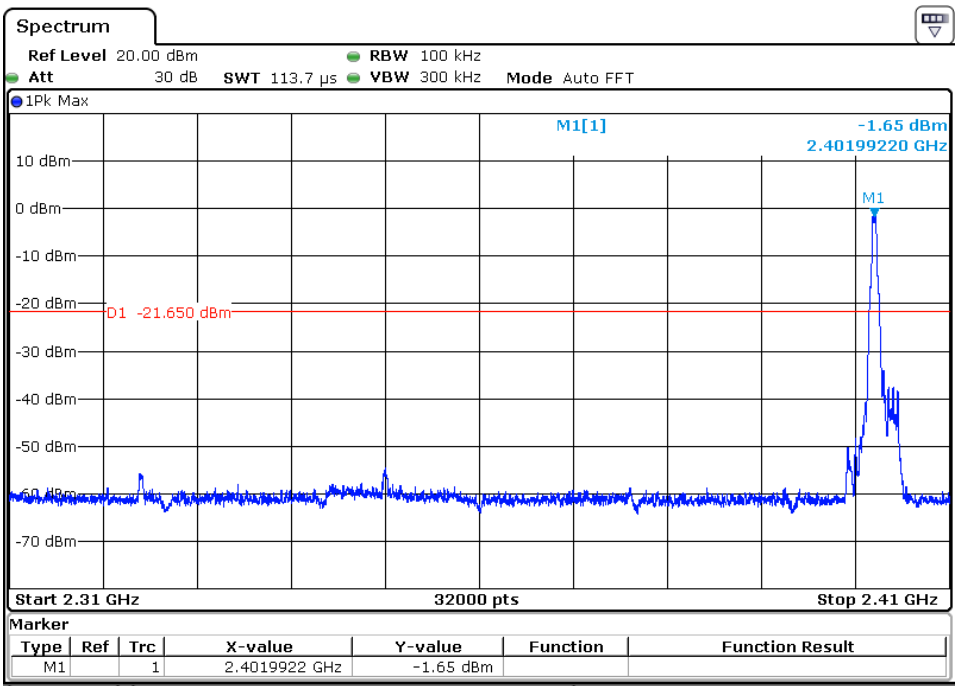
No deviation.

## 6.9.4 Test setup

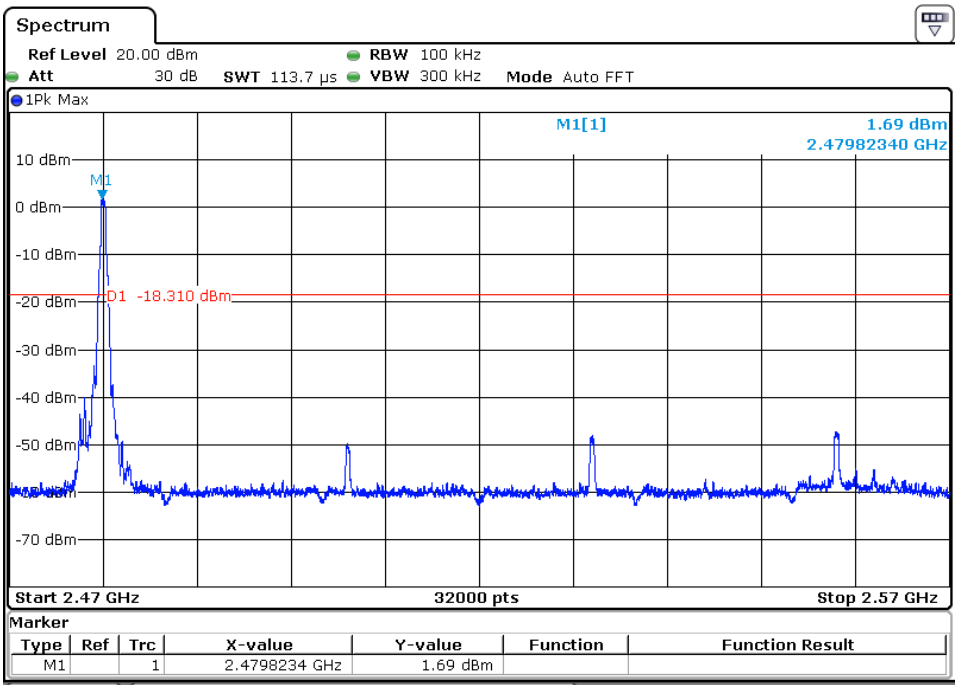


## 6.9.5 Test results

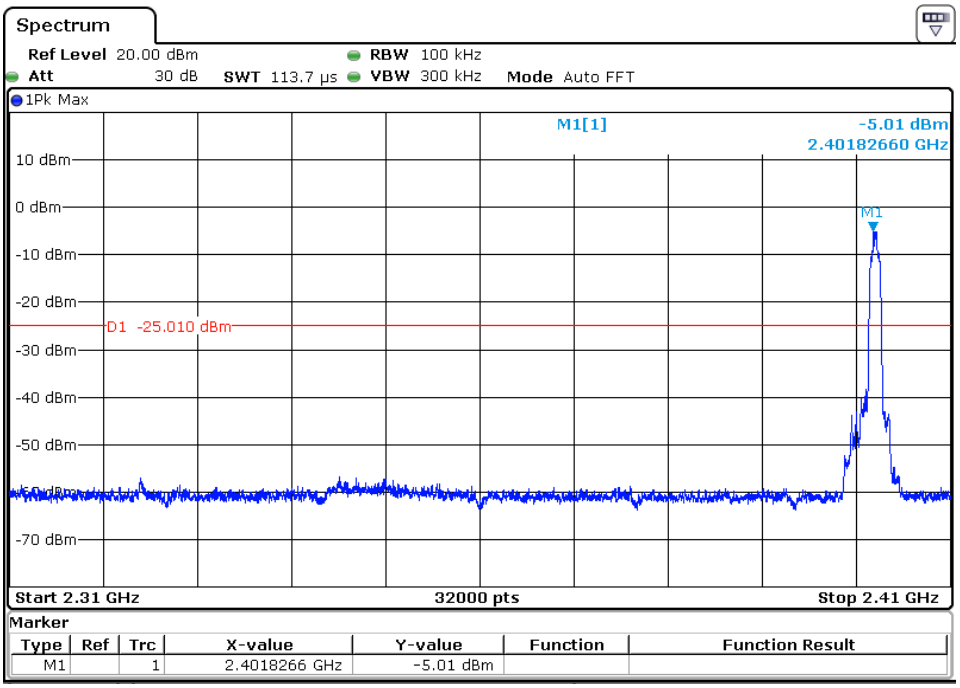
**CH00 (Lower) Data rate 1Mbps**



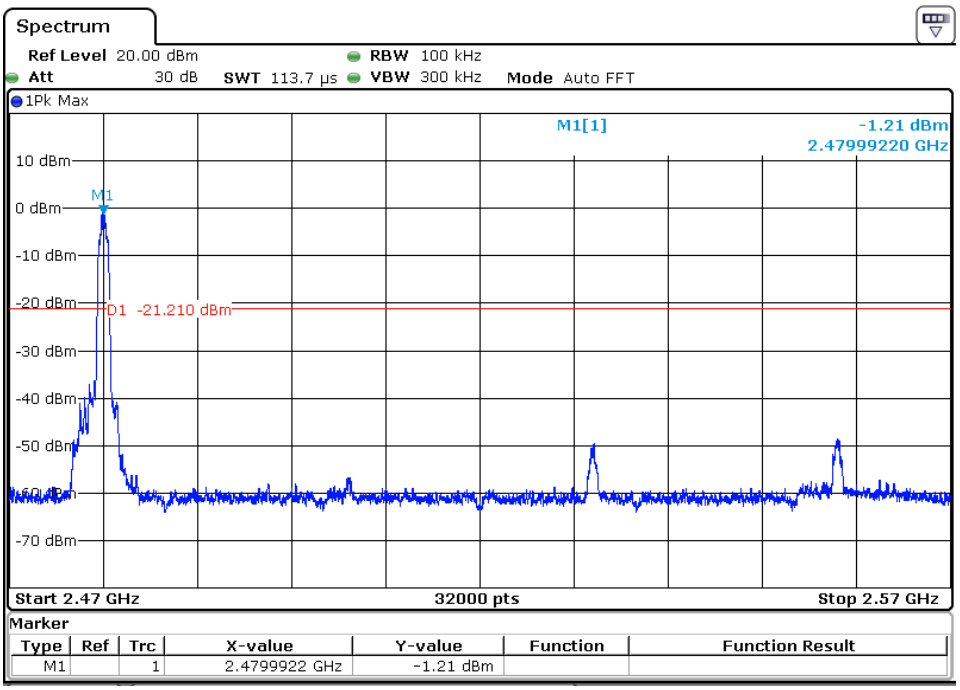

**CH 78 (Upper) Data rate 1Mbps**



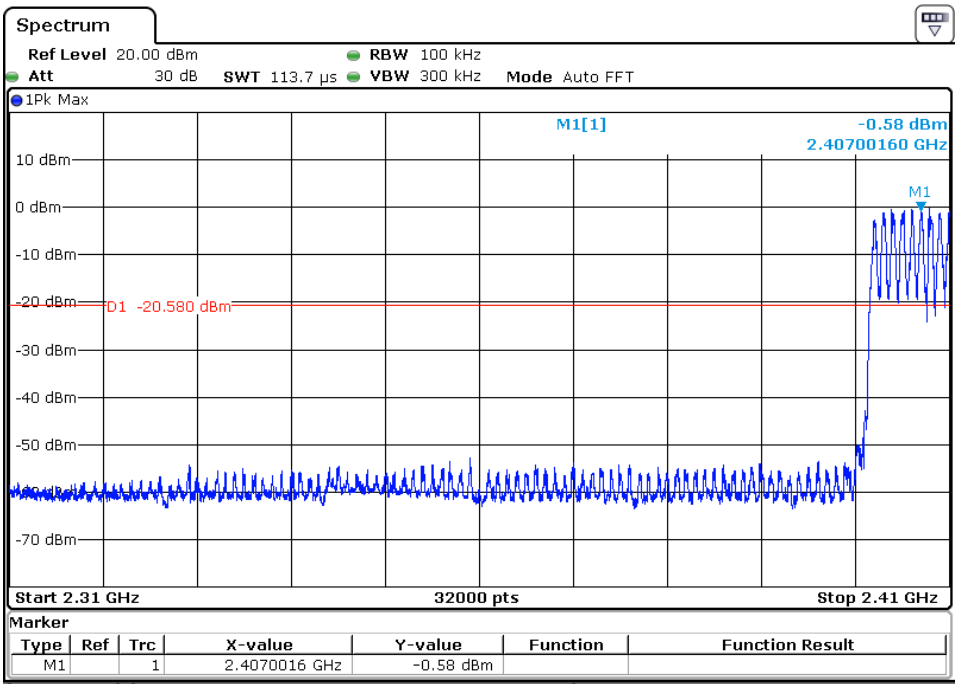
**CH00 (Lower) Data rate 3Mbps**



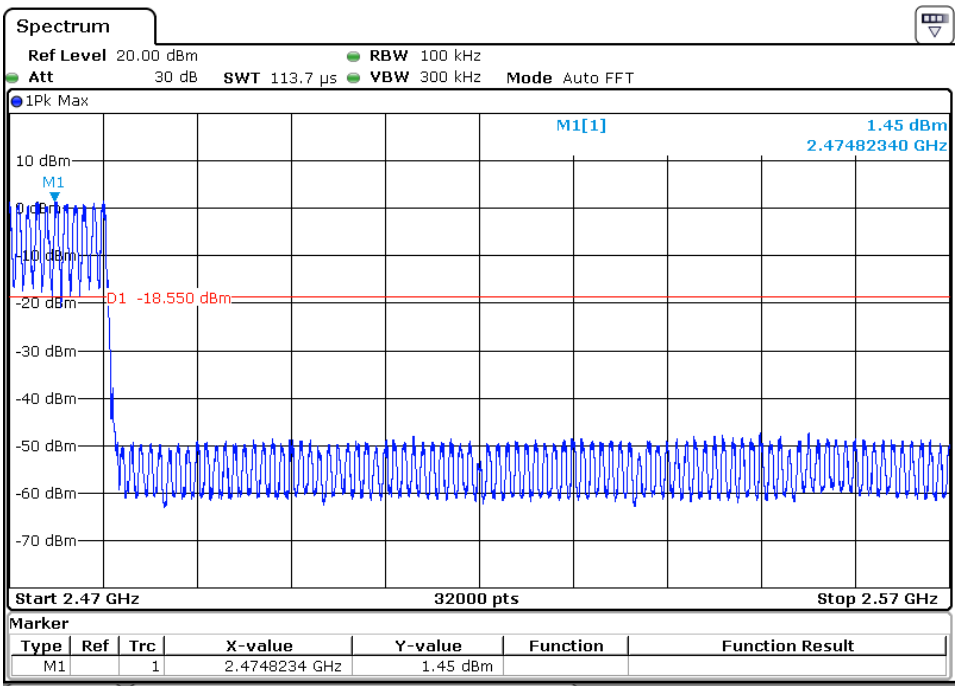

**CH 78 (Upper) Data rate 3Mbps**



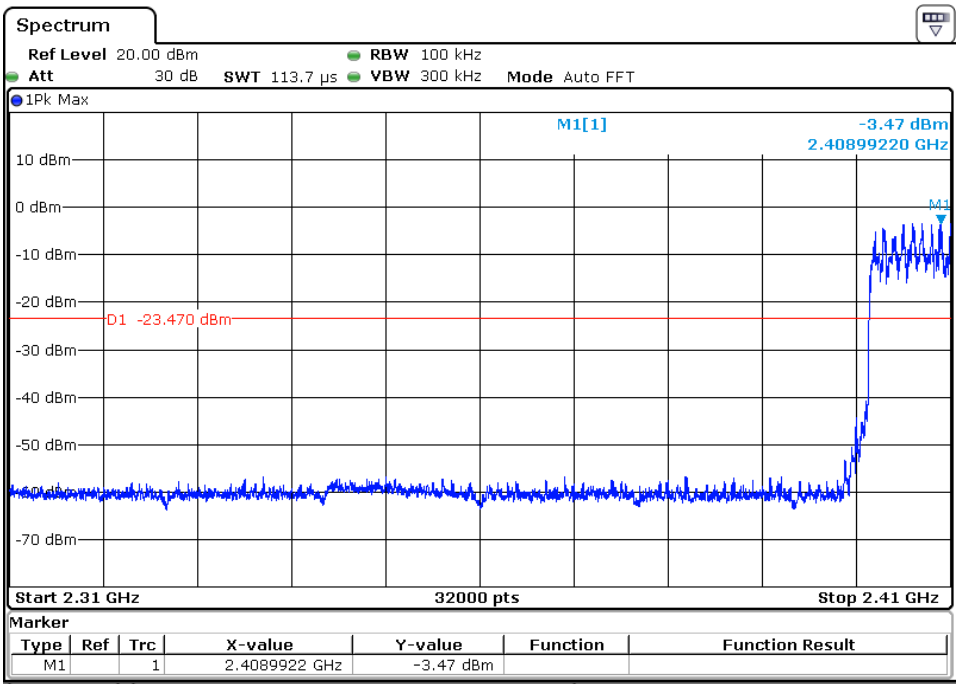
**CH00 (Lower) Data rate 1Mbps**



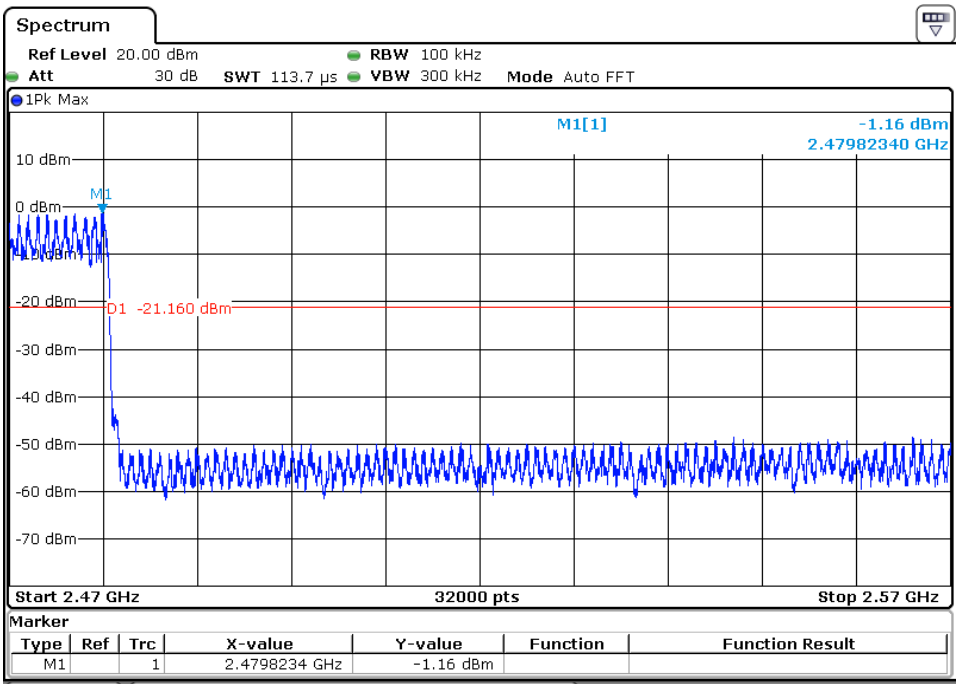

**CH 78 (Upper) Data rate 1Mbps**



## CH00 (Lower) Data rate 3Mbps




## CH 78 (Upper) Data rate 3Mbps



# 6.10 Conducted Spurious Emissions

## 6.10.1 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)).

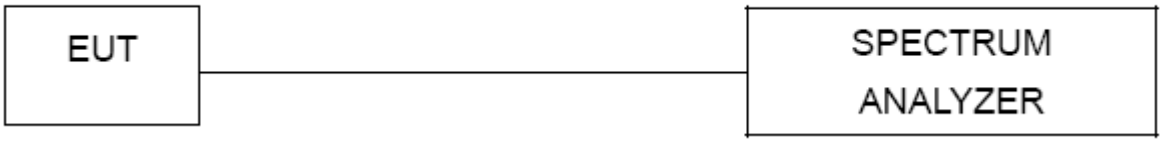
## 6.10.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10$^{th}$ harmonic. Typically, several plots are required to cover this entire span. RBW = 100 kHz
VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
sweep points ≥ investigated frequency range/RBW.

## 6.10.3 Deviation from standard

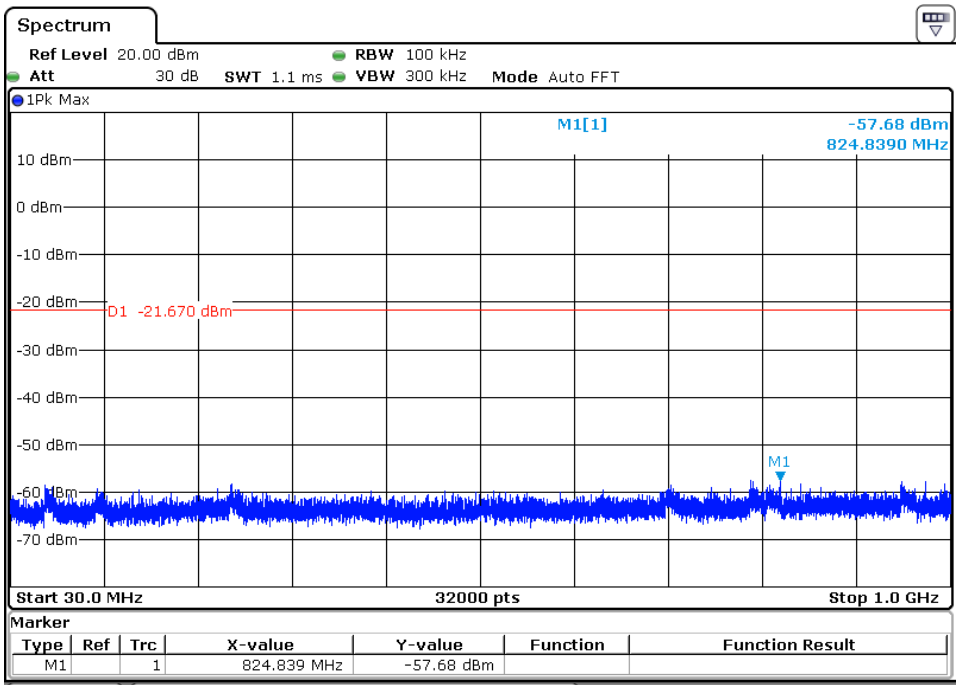
No deviation.

## 6.10.4 Test setup



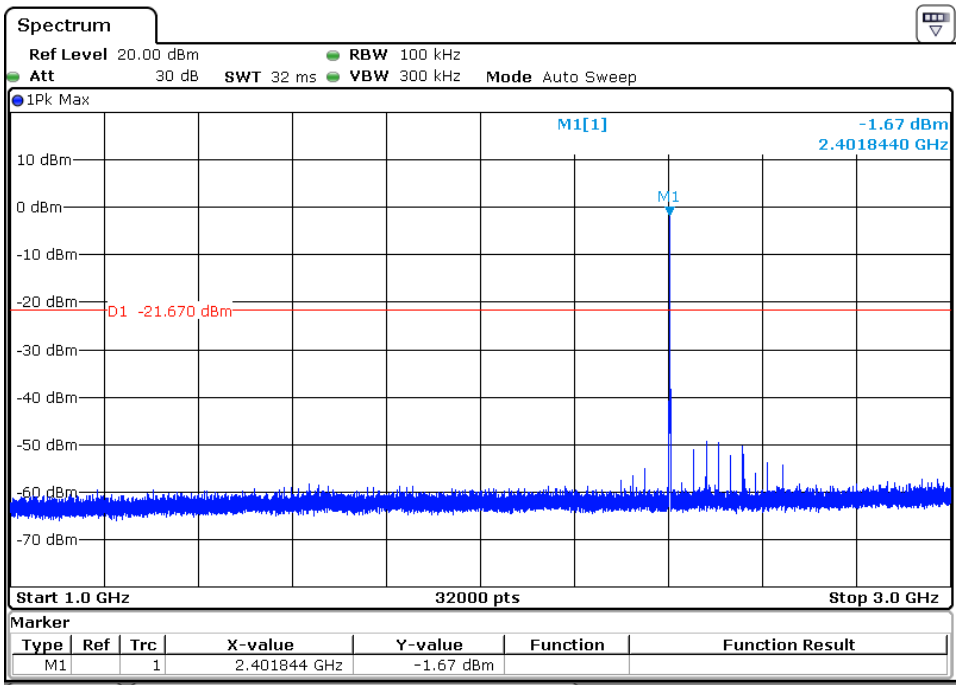
## 6.10.5Test results

**CH00 Data rate 1Mbps**



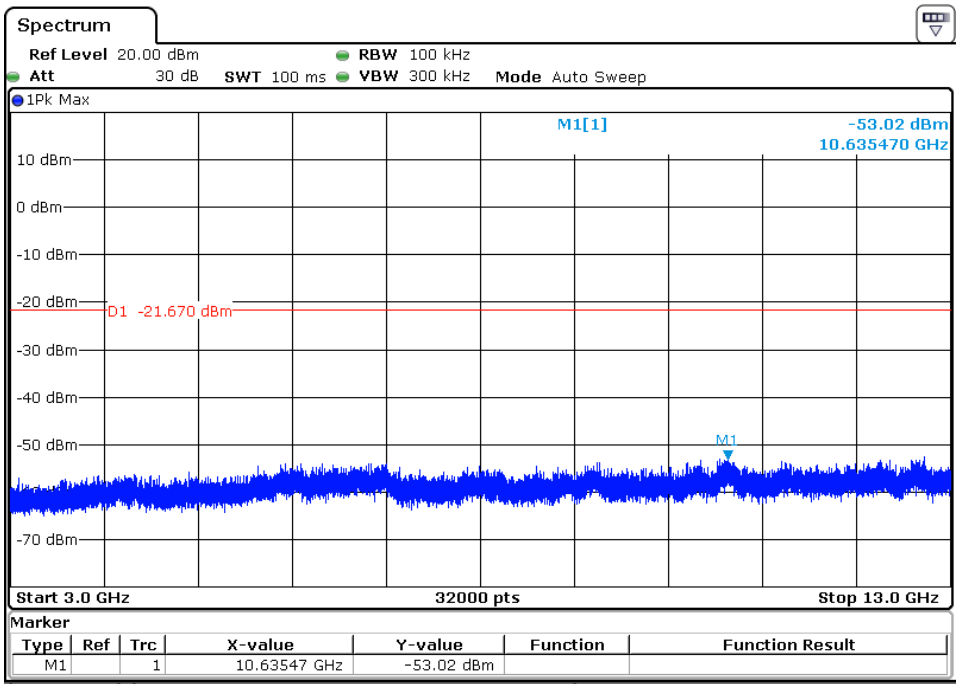

**Note: Sweep Points=9700**

**CH00 Data rate 1Mbps**



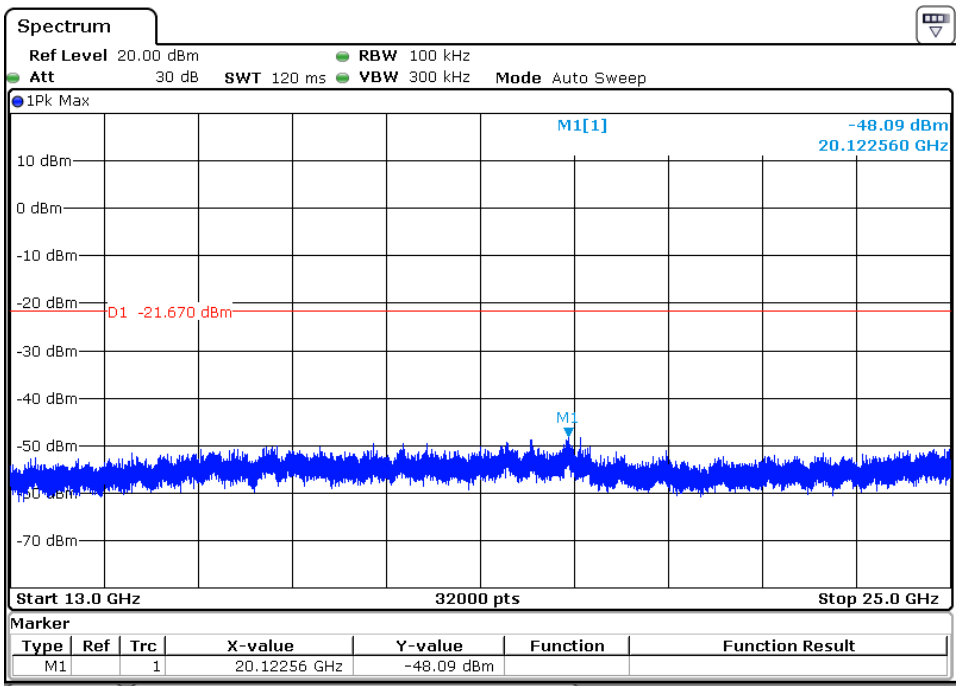

**Note: Sweep Points=20000**

**CH00 Data rate 1Mbps**



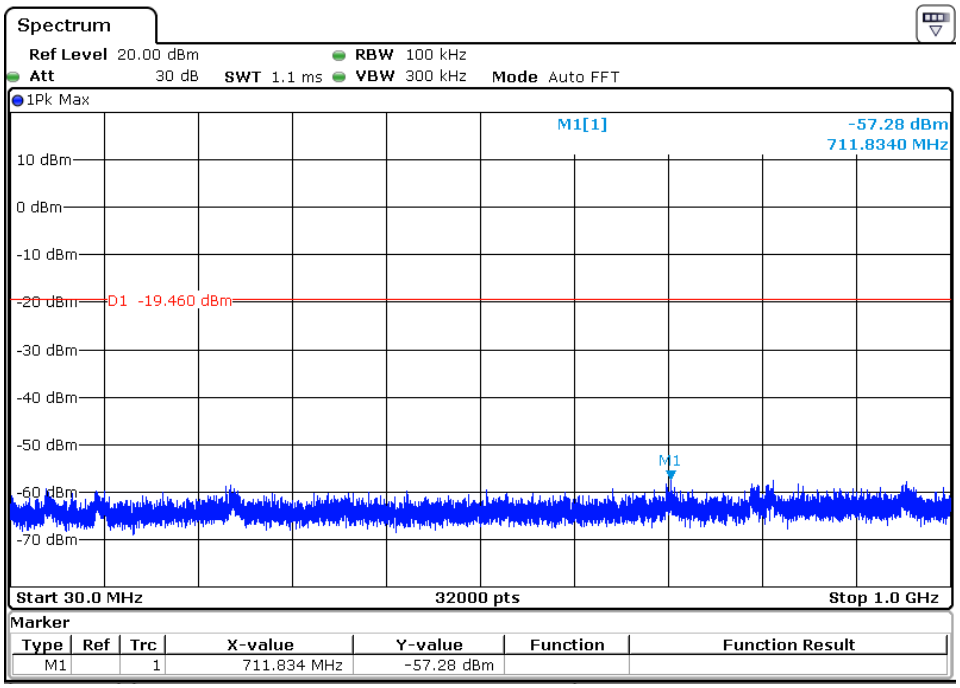

**Note: Sweep Points=100000**

**CH00 Data rate 1Mbps**



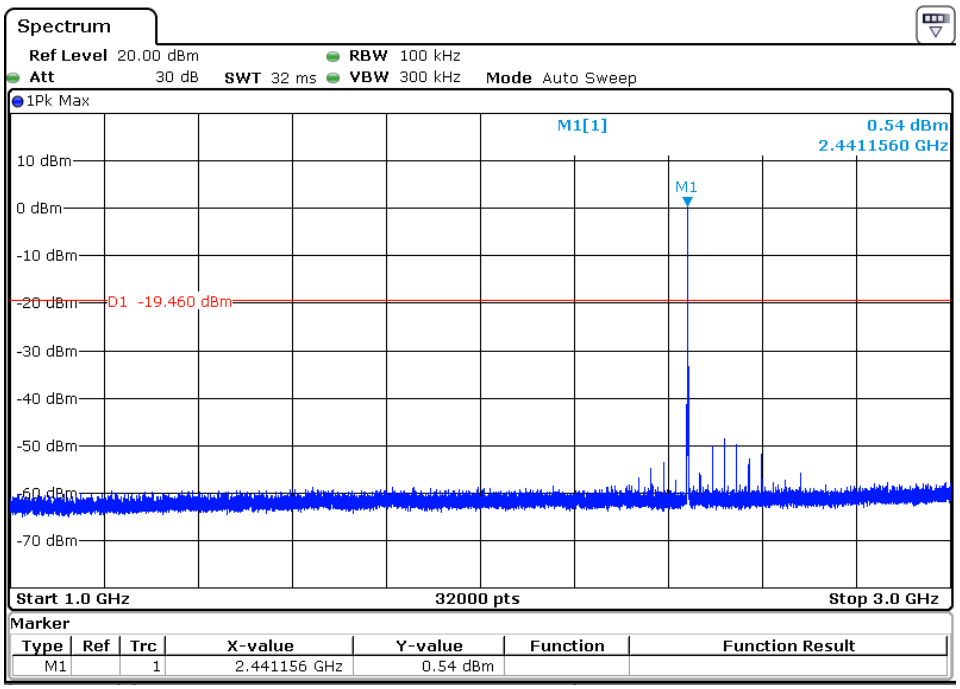

**Note: Sweep Points=120000**

**CH39 Data rate 1Mbps**



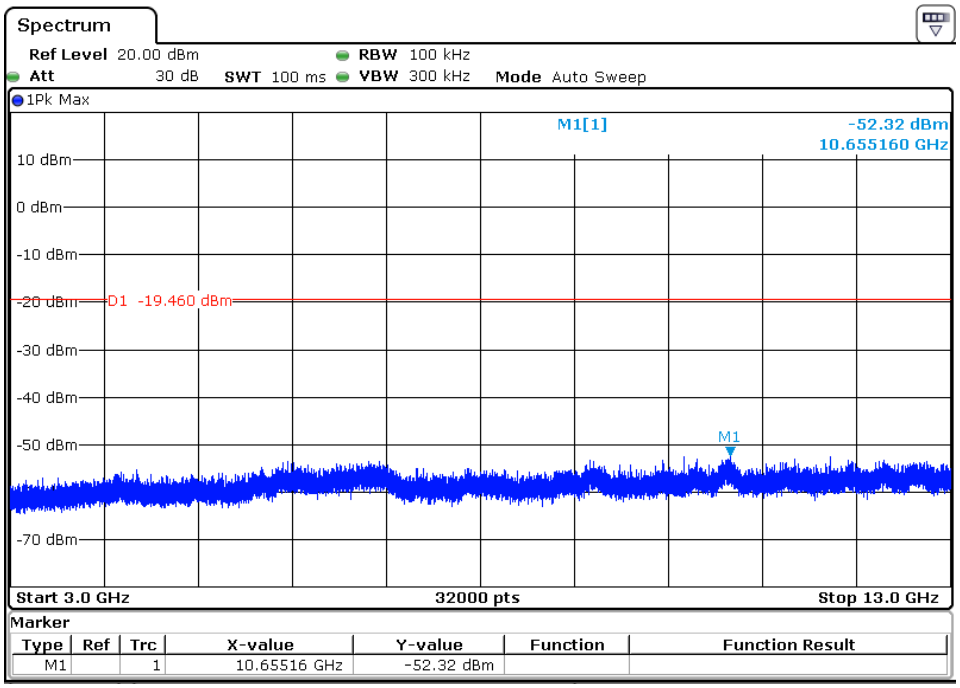

**Note: Sweep Points=9700**

**CH39 Data rate 1Mbps**



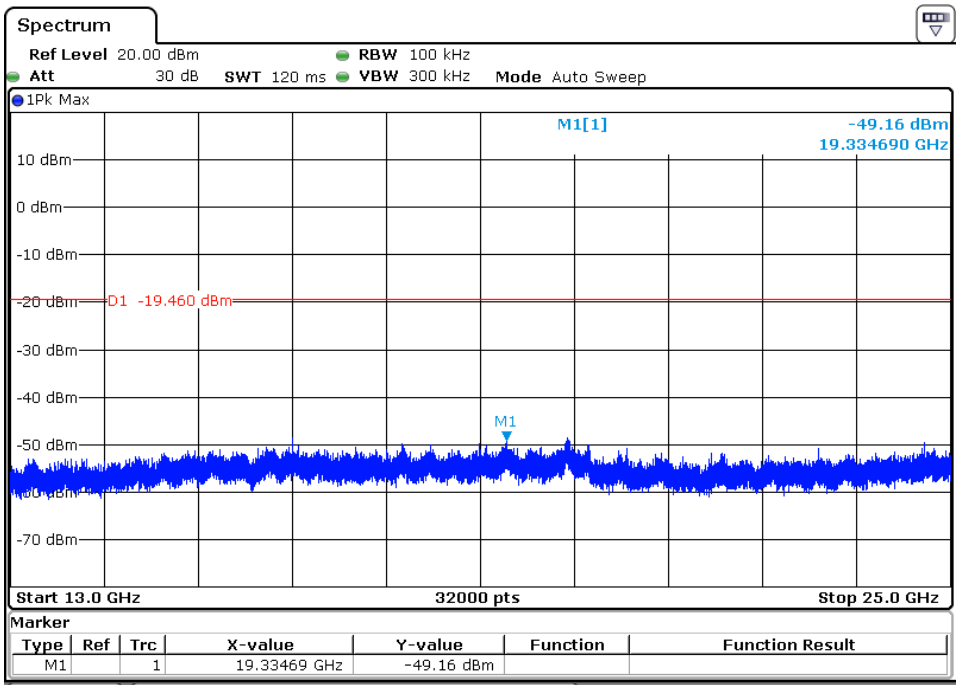

**Note: Sweep Points=20000**

**CH39 Data rate 1Mbps**



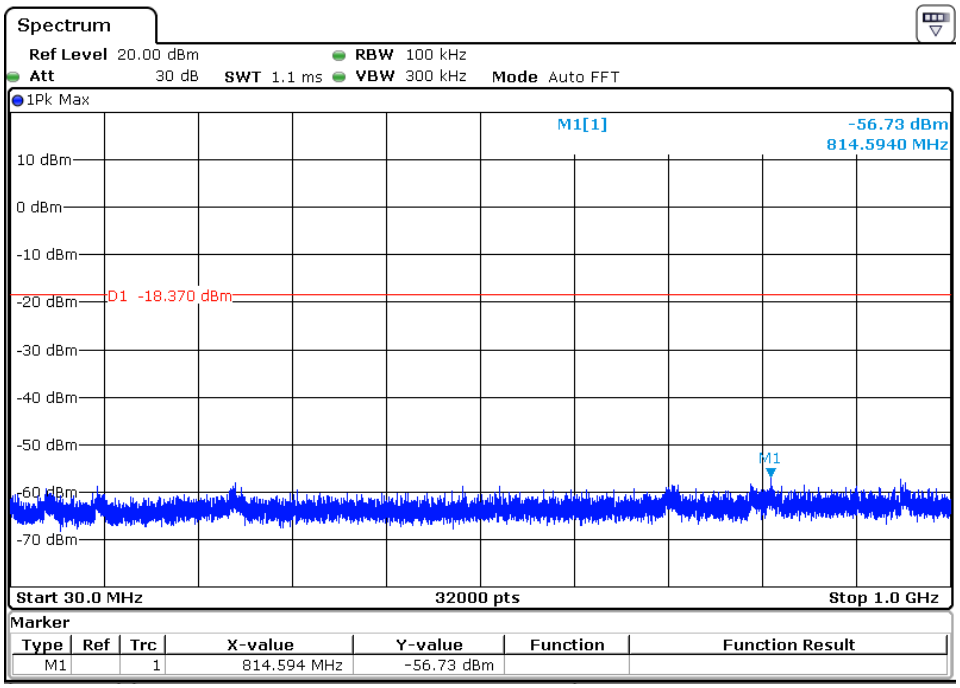

**Note: Sweep Points=100000**

**CH39 Data rate 1Mbps**



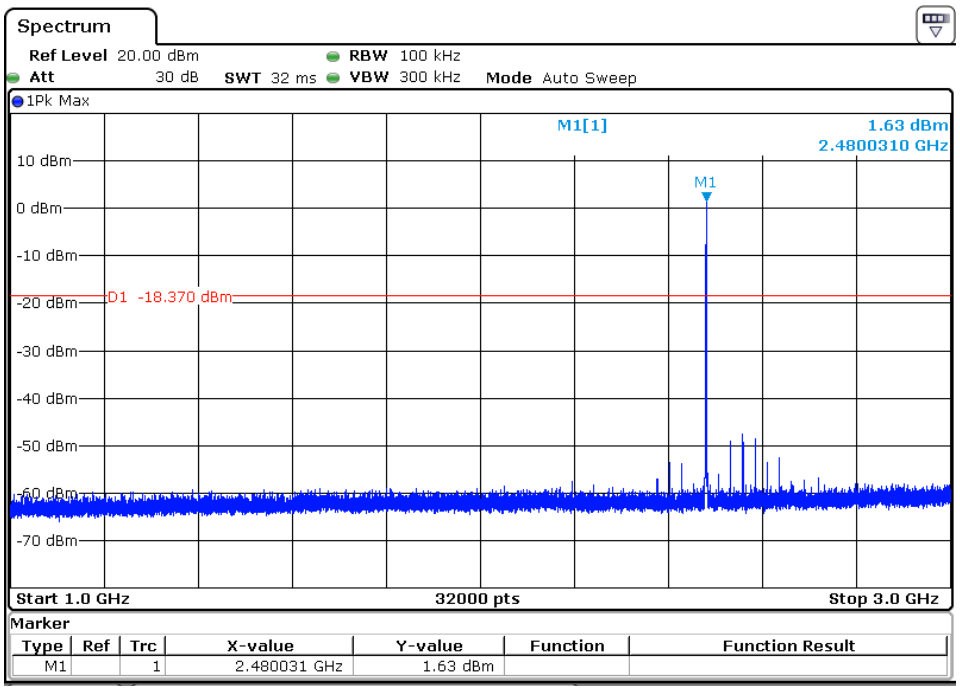

**Note: Sweep Points=120000**

**CH78 Data rate 1Mbps**



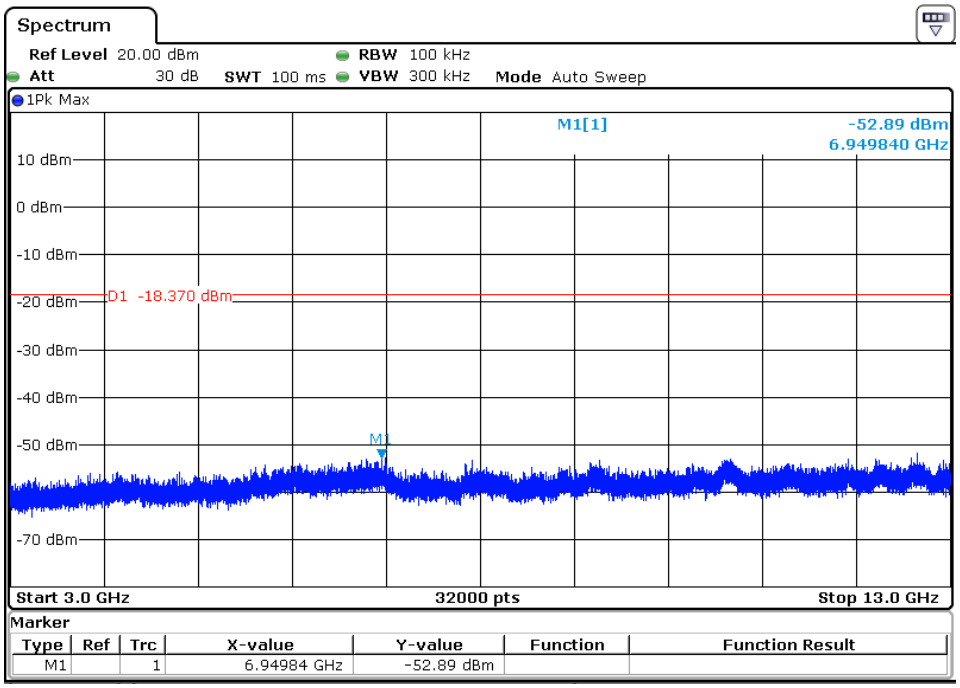

**Note: Sweep Points=9700**

**CH78 Data rate 1Mbps**



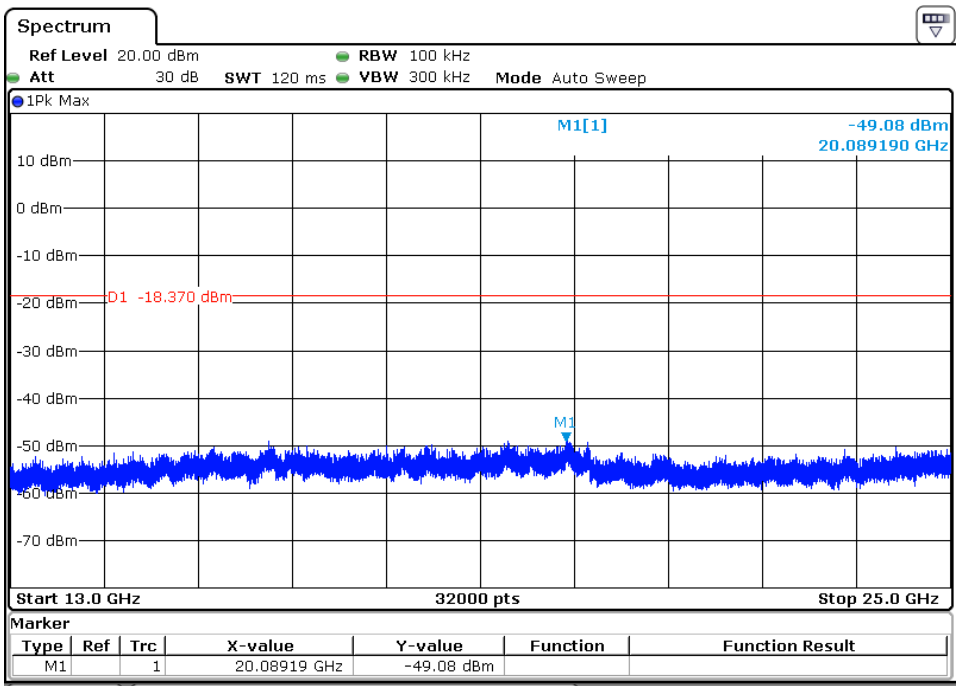

**Note: Sweep Points=20000**

**CH78 Data rate 1Mbps**



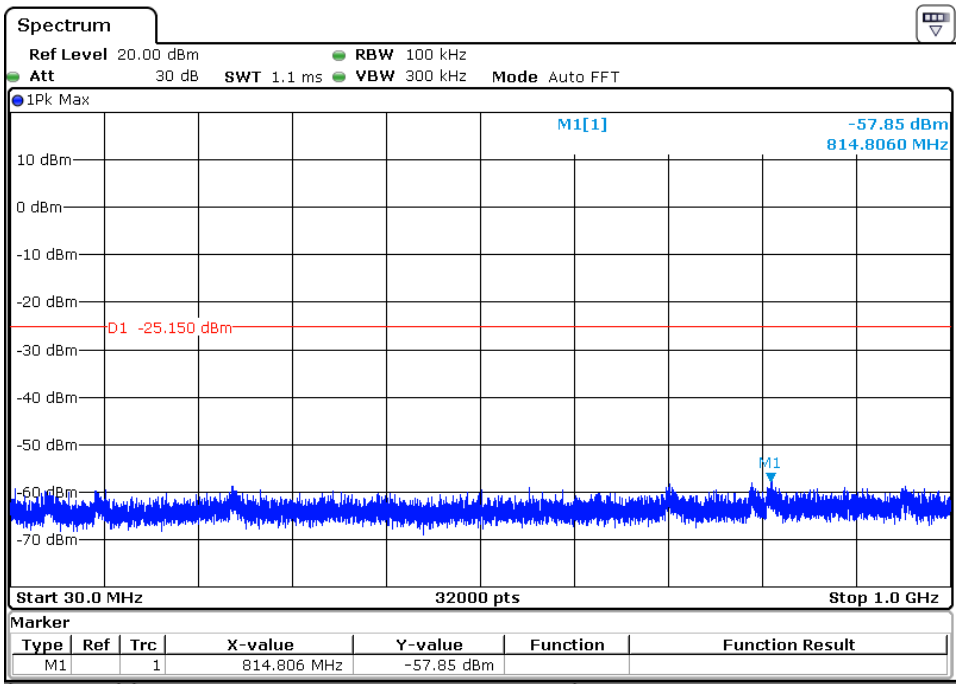

**Note: Sweep Points=100000**

**CH78 Data rate 1Mbps**



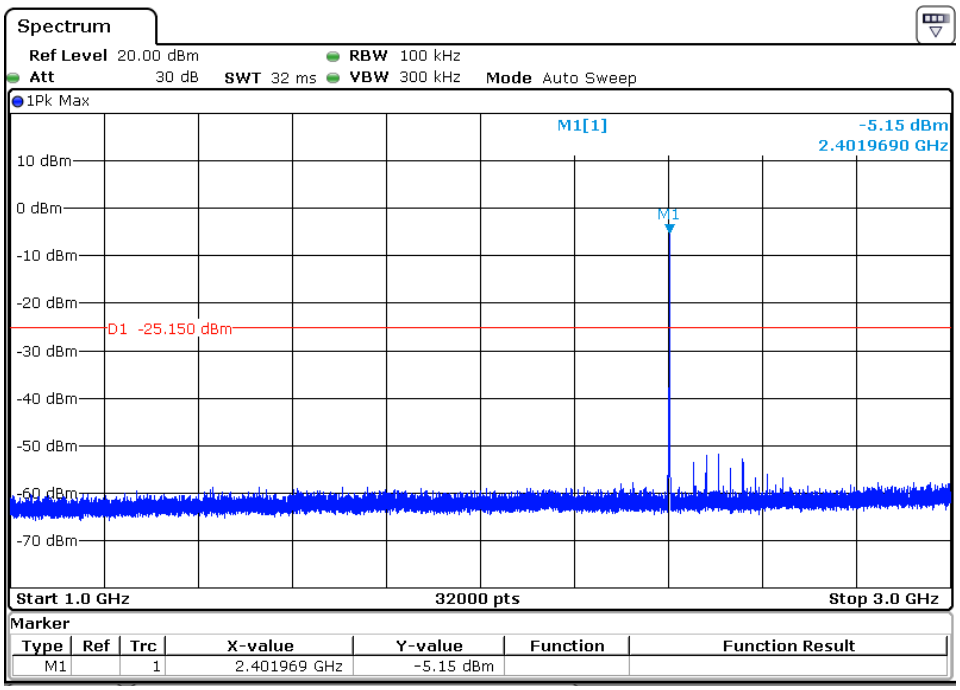

**Note: Sweep Points=120000**

**CH00 Data rate 3Mbps**



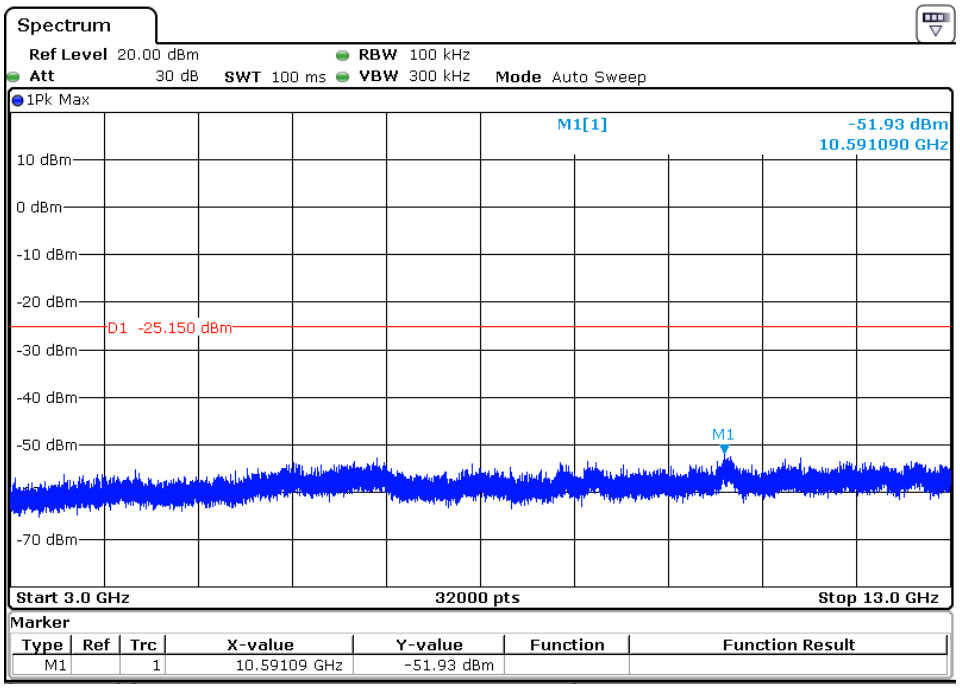

**Note: Sweep Points=9700**

**CH00 Data rate 3Mbps**



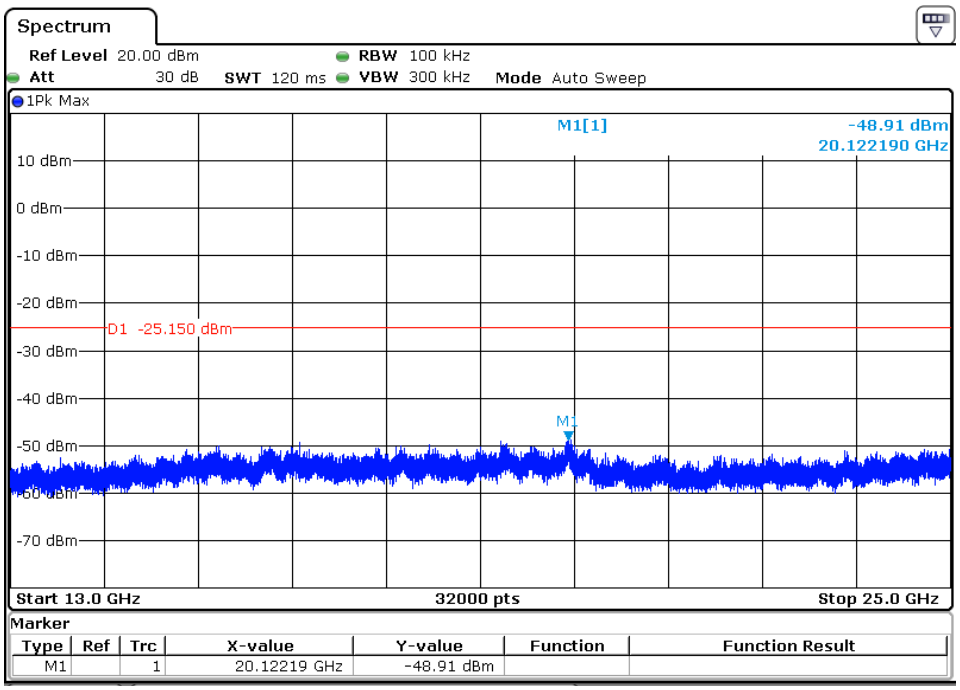

**Note: Sweep Points=20000**

**CH00 Data rate 3Mbps**



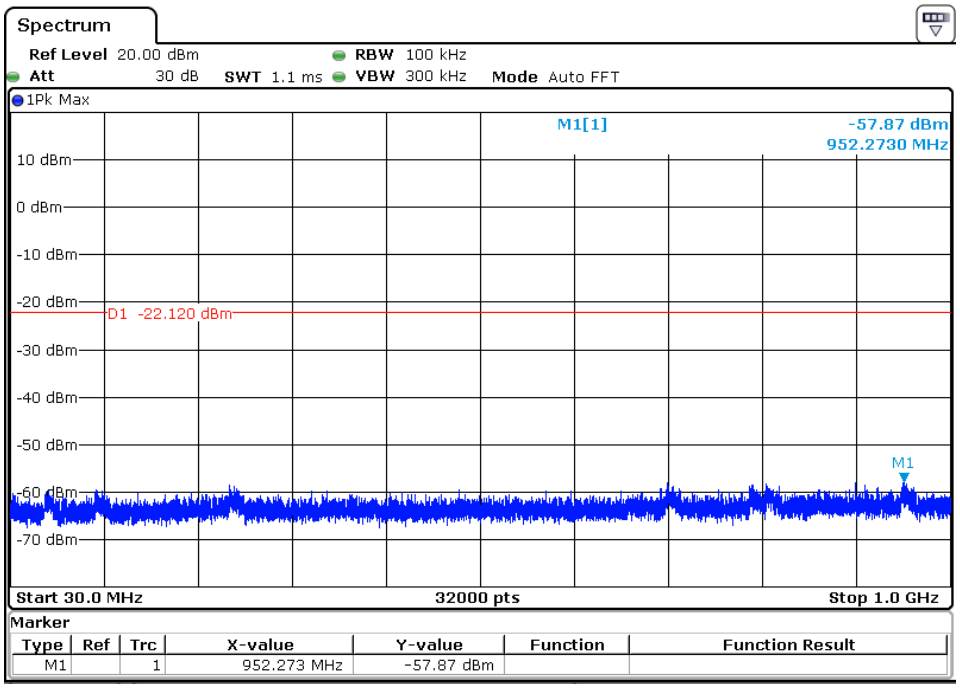

**Note: Sweep Points=100000**

**CH00 Data rate 3Mbps**



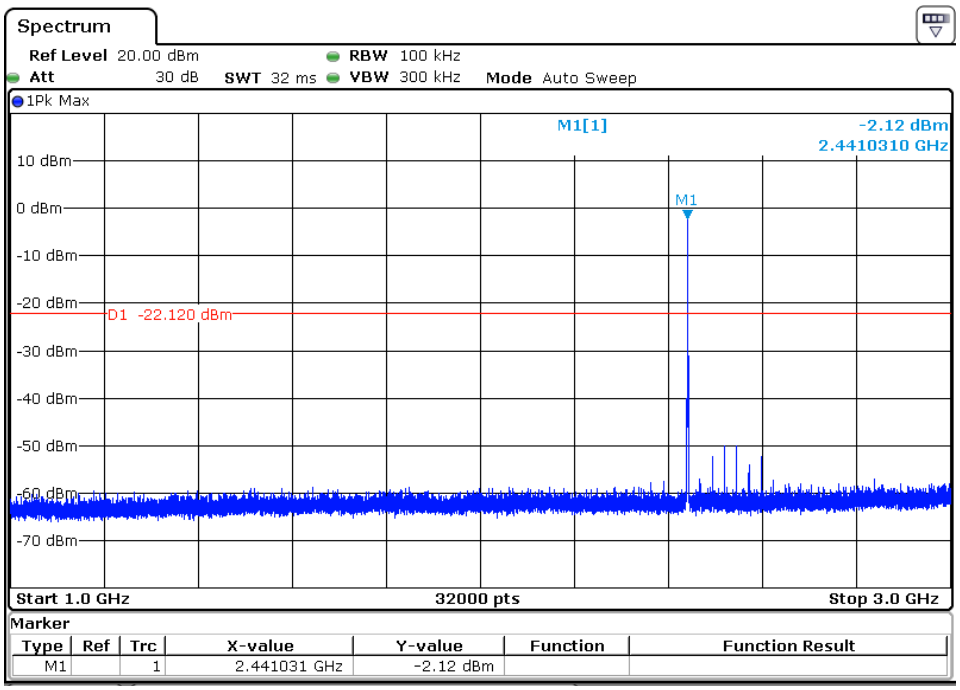

**Note: Sweep Points=120000**

**CH39 Data rate 3Mbps**



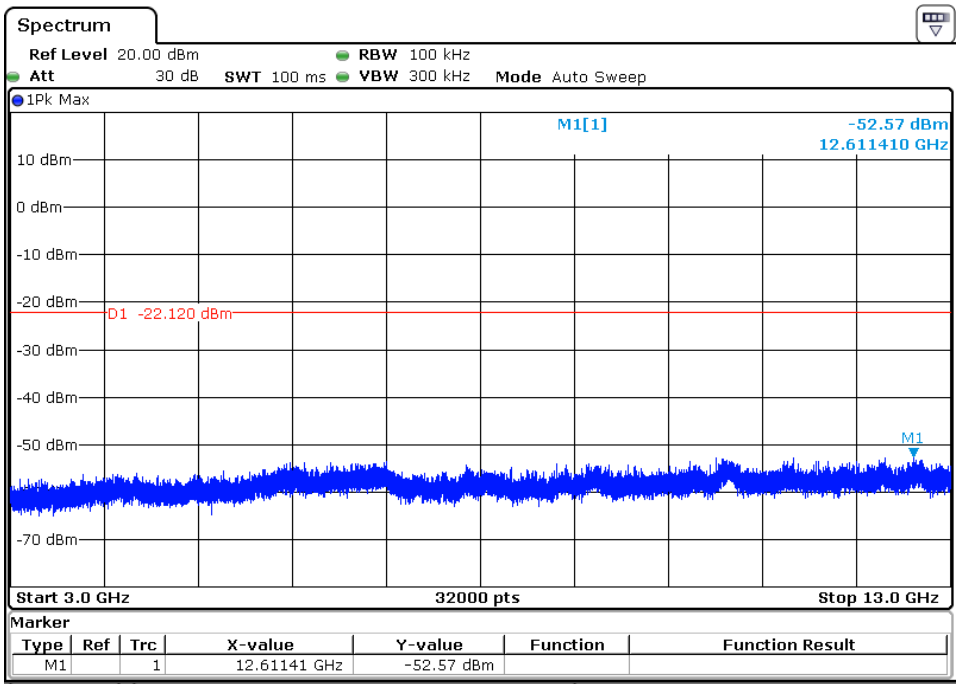

**Note: Sweep Points=9700**

**CH39 Data rate 3Mbps**



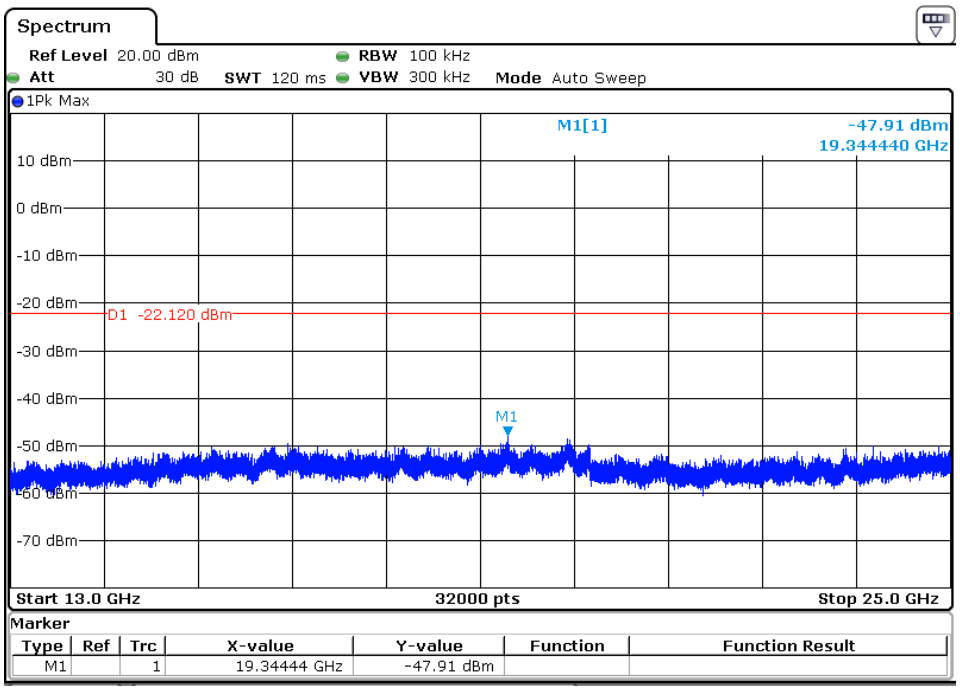

**Note: Sweep Points=20000**

**CH39 Data rate 3Mbps**



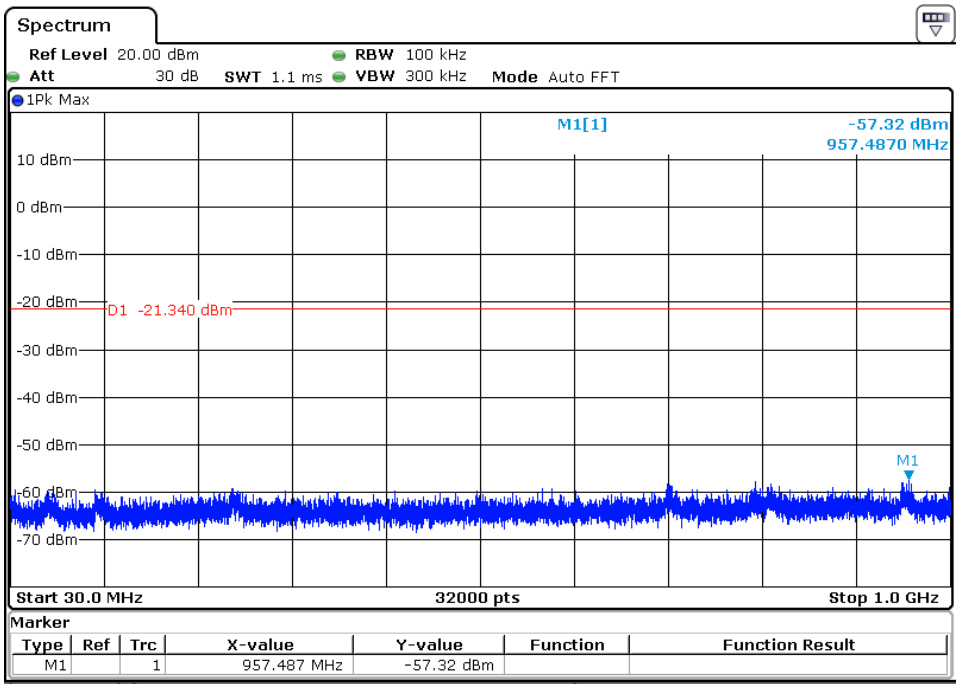

**Note: Sweep Points=100000**

**CH39 Data rate 3Mbps**



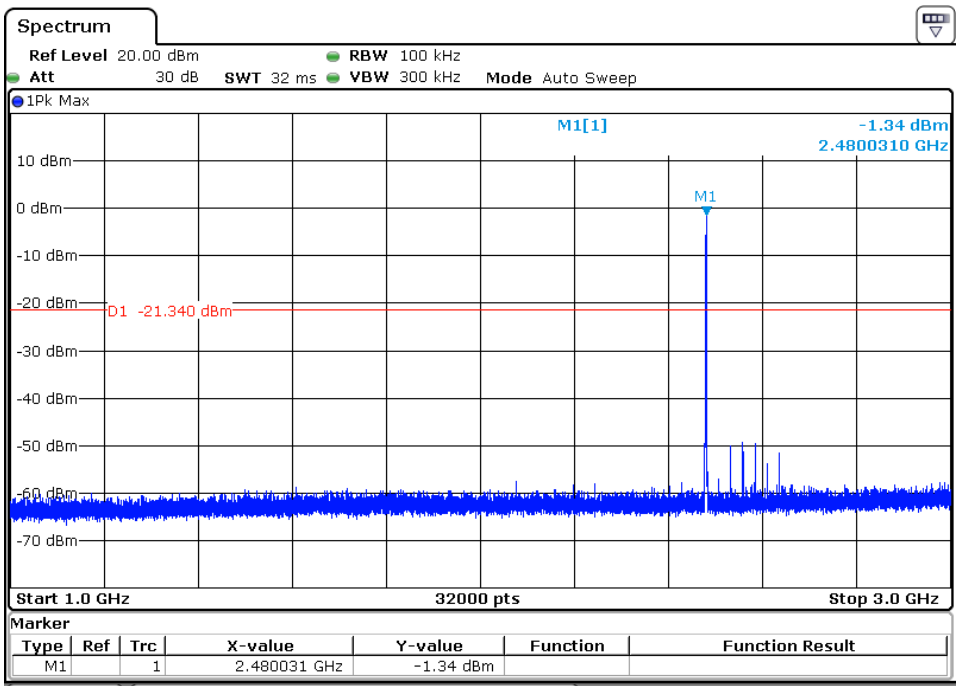

**Note: Sweep Points=120000**

**CH78 Data rate 3Mbps**



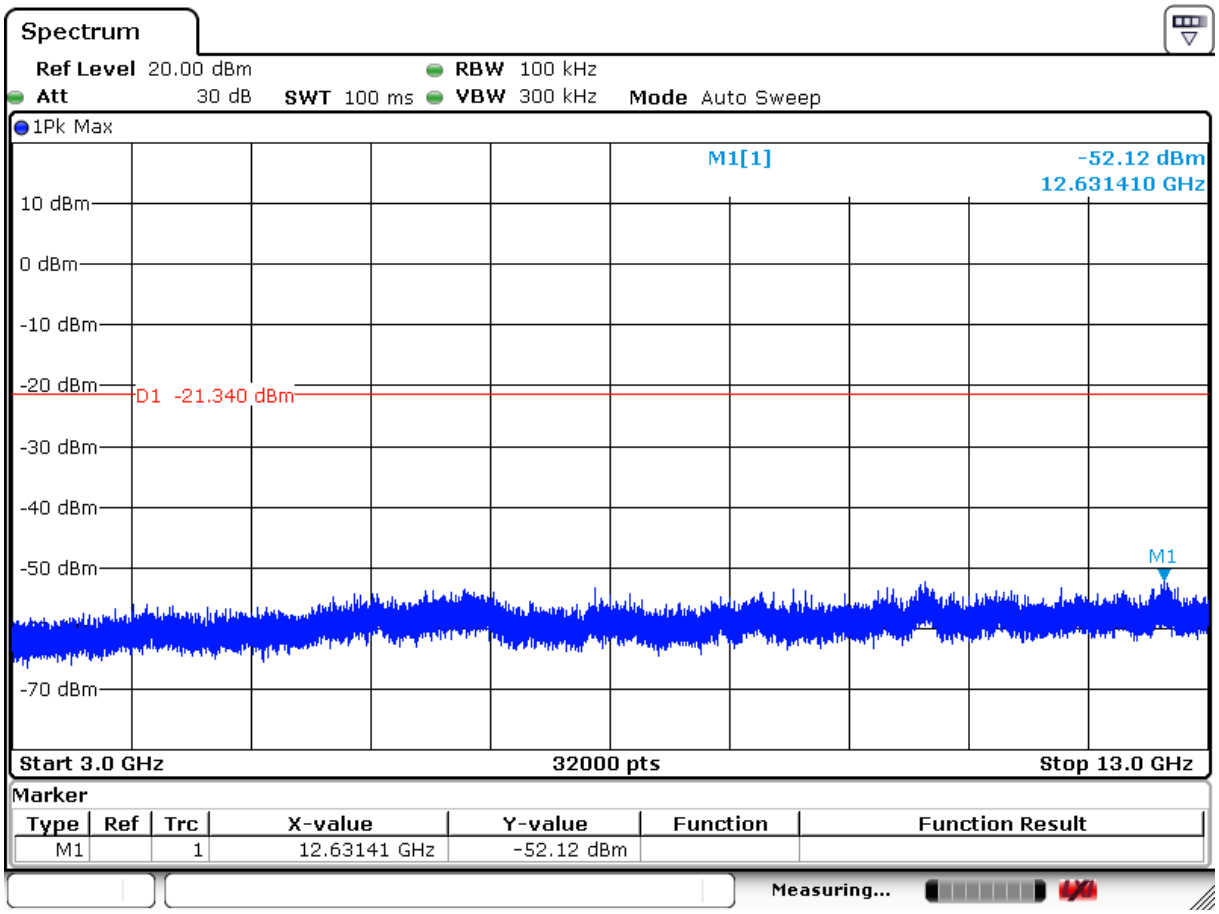

**Note: Sweep Points=9700**

**CH78 Data rate 3Mbps**



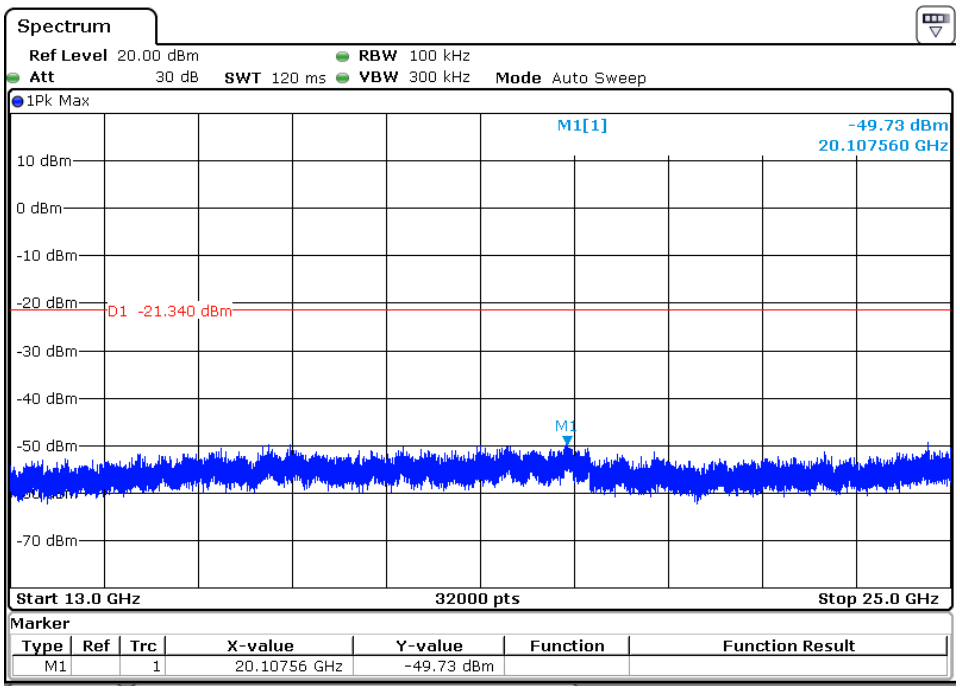

**Note: Sweep Points=20000**

**CH78 Data rate 3Mbps**




**Note: Sweep Points=100000**

**CH78 Data rate 3Mbps**

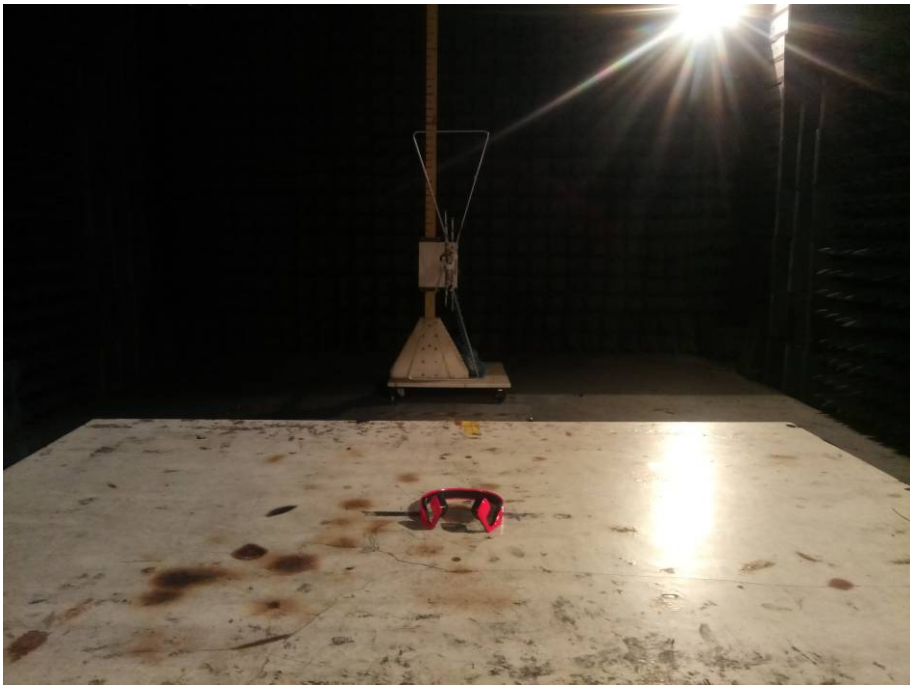



**Note: Sweep Points=120000**

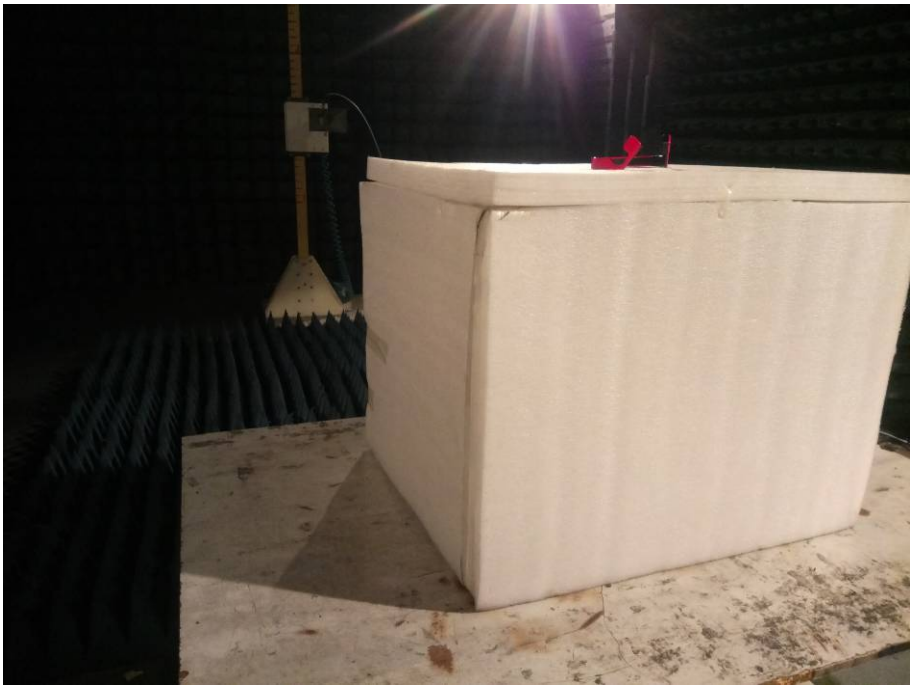
# 7 Photographs

## 7.1 Radiated Emission Test Setup

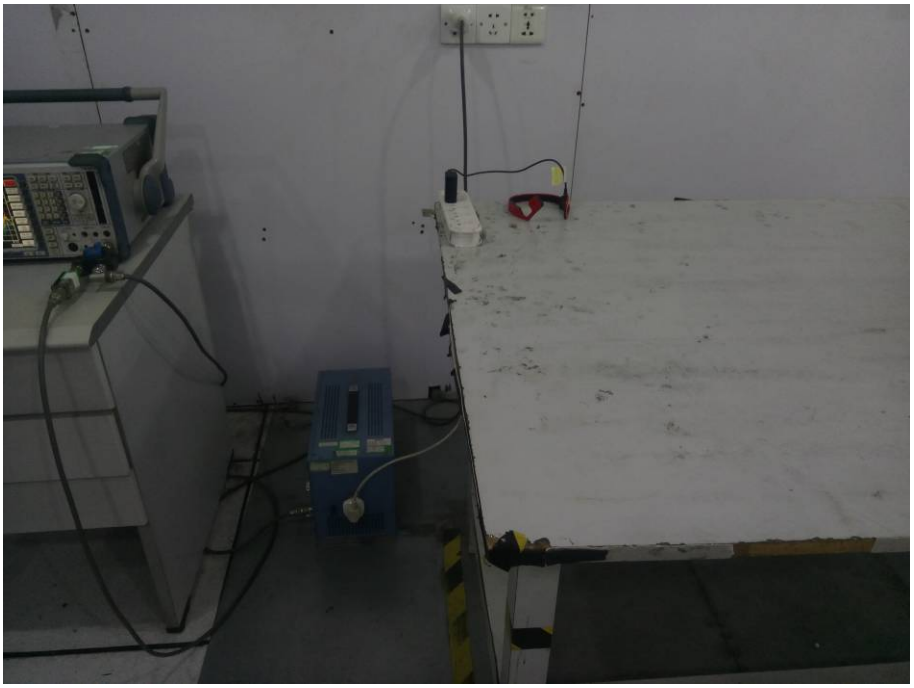
**Below 1G**



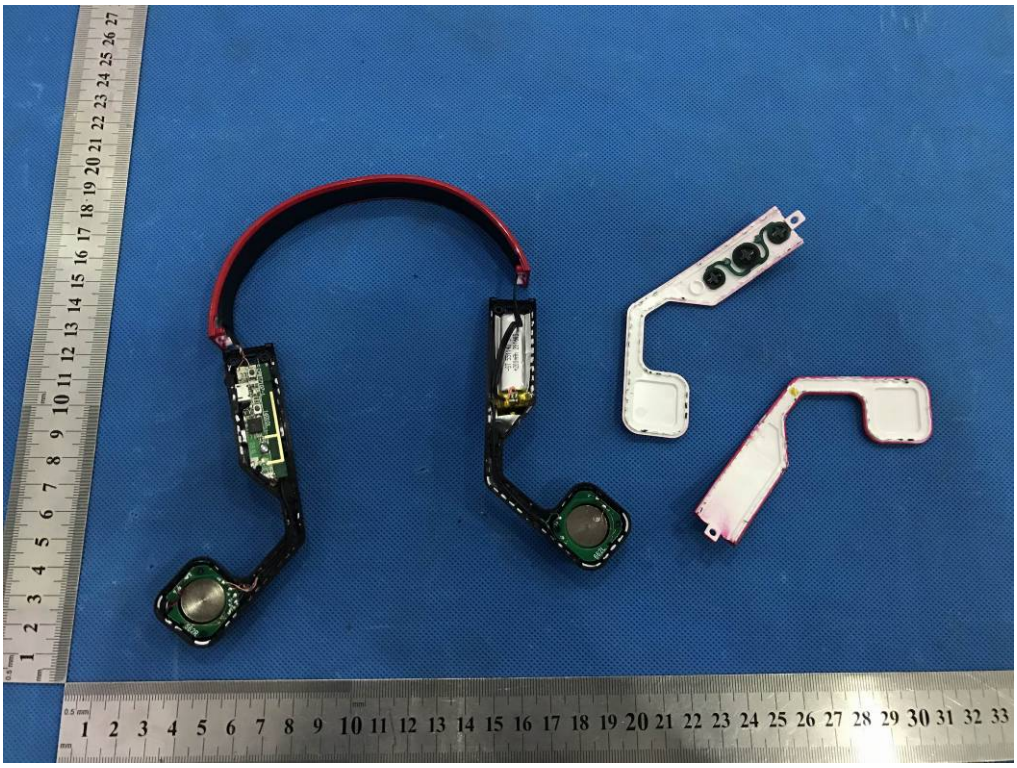
**Above 1G**

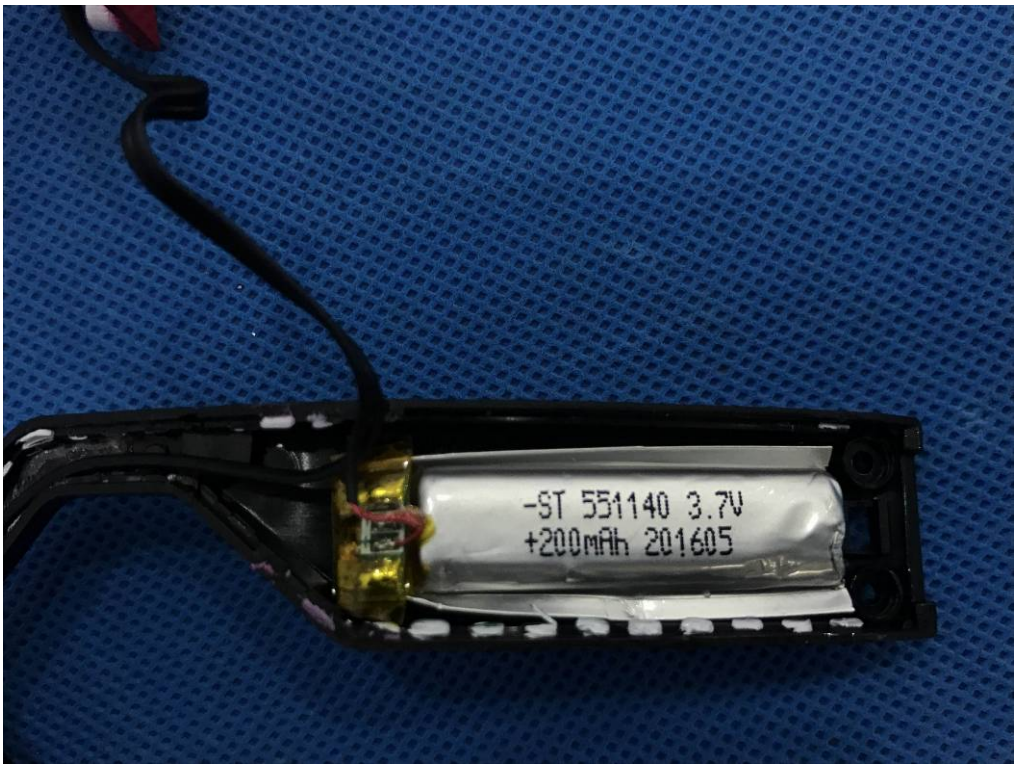


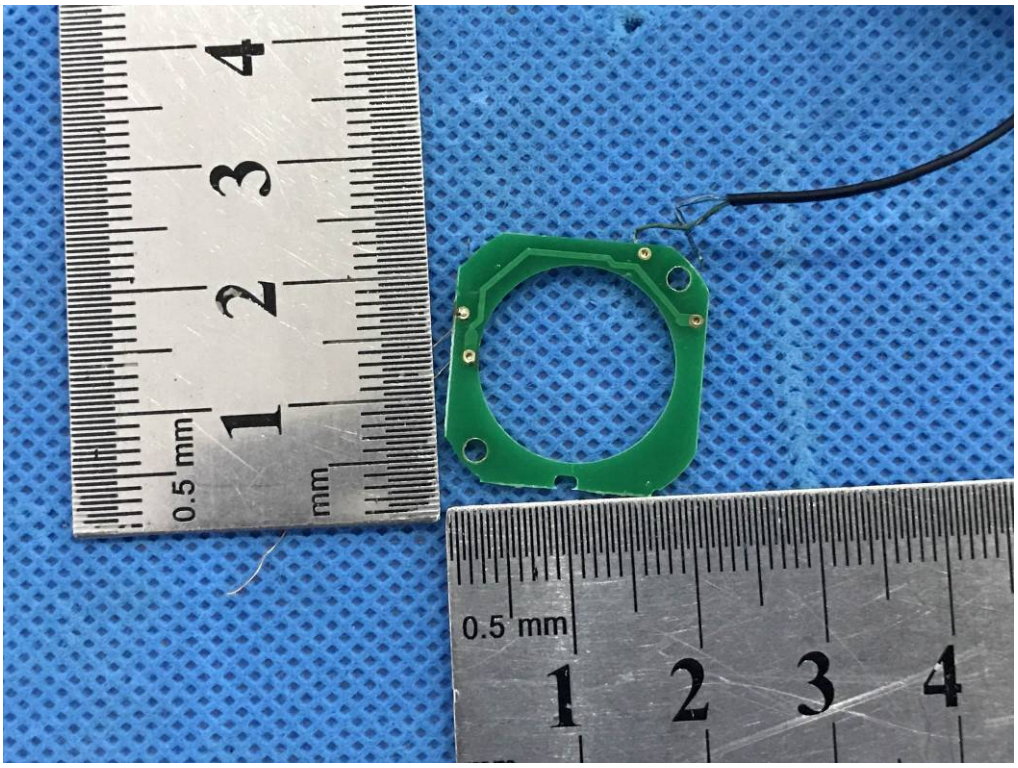
## 7.2 Conducted Emissions Test Setup

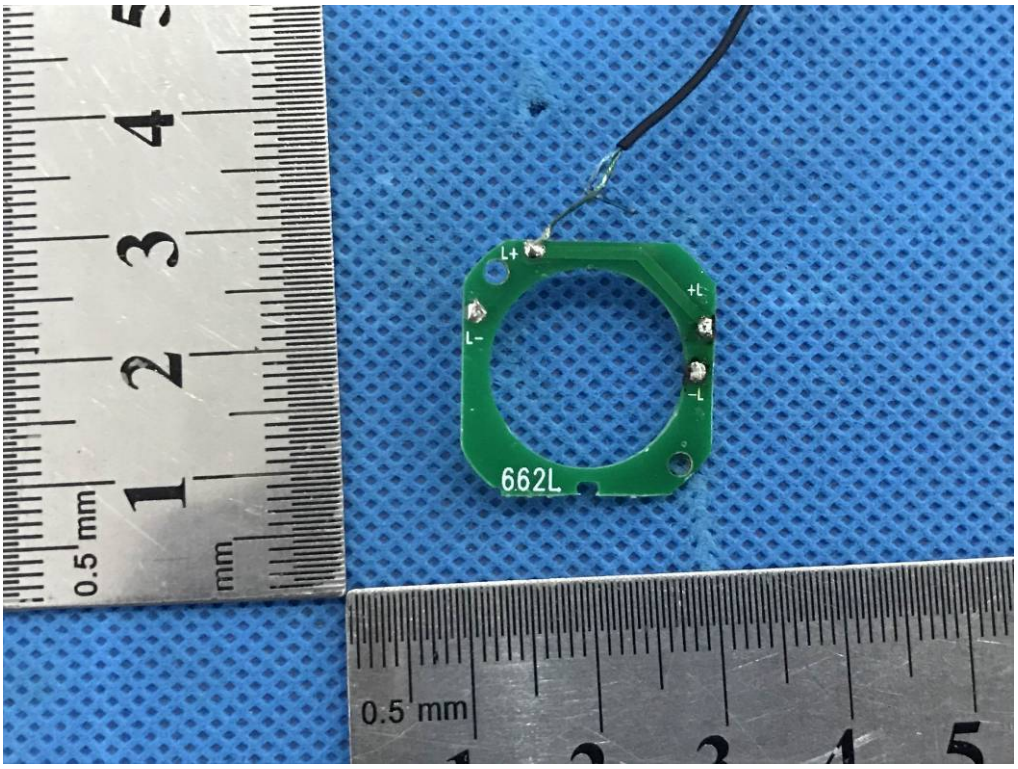


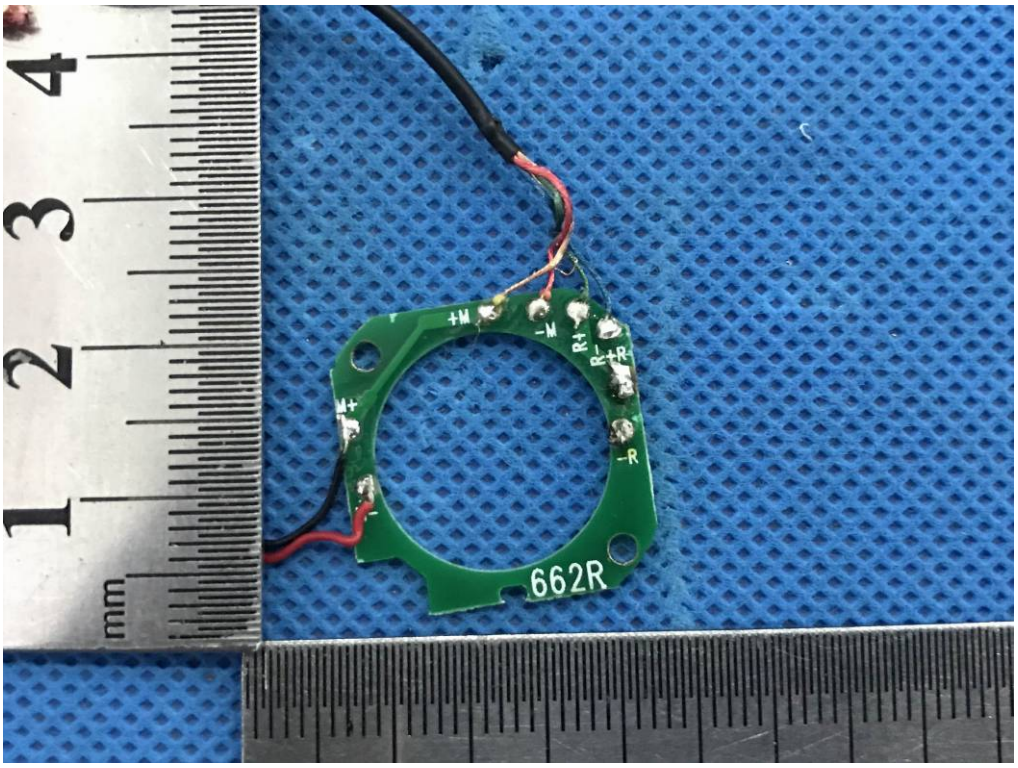
## 7.3 EUT Constructional Details

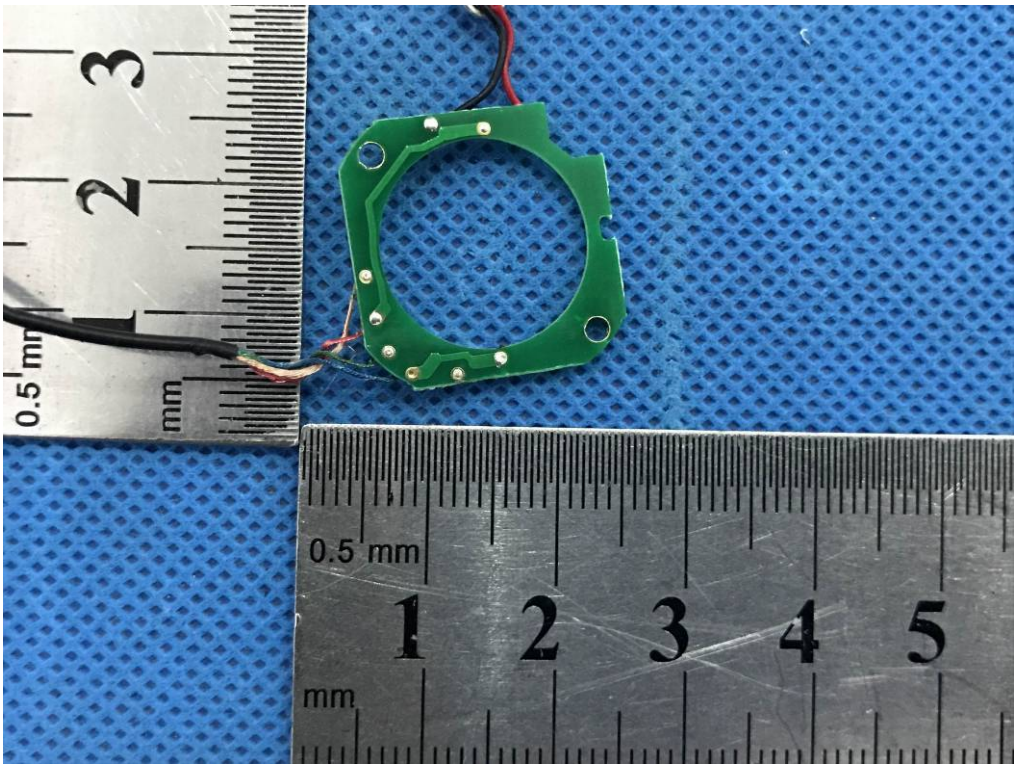


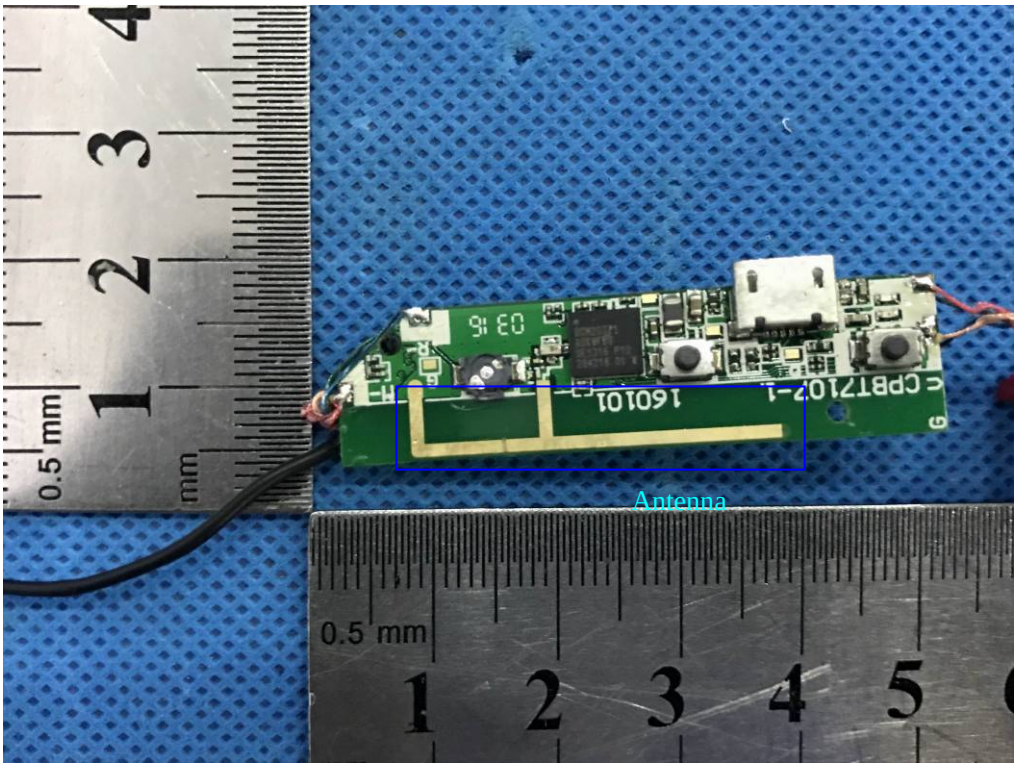

-ST 551140 3.7V
+200mAh 201605

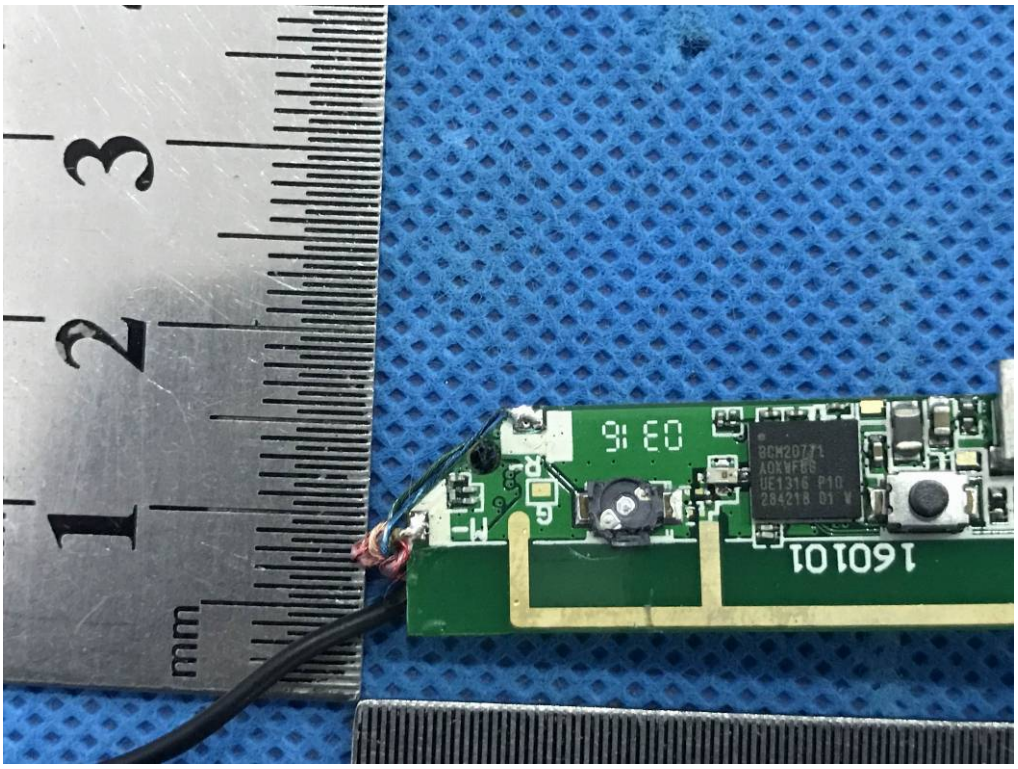

0.5 mm
1
2
3
4
0.5 mm
1
2
3
4

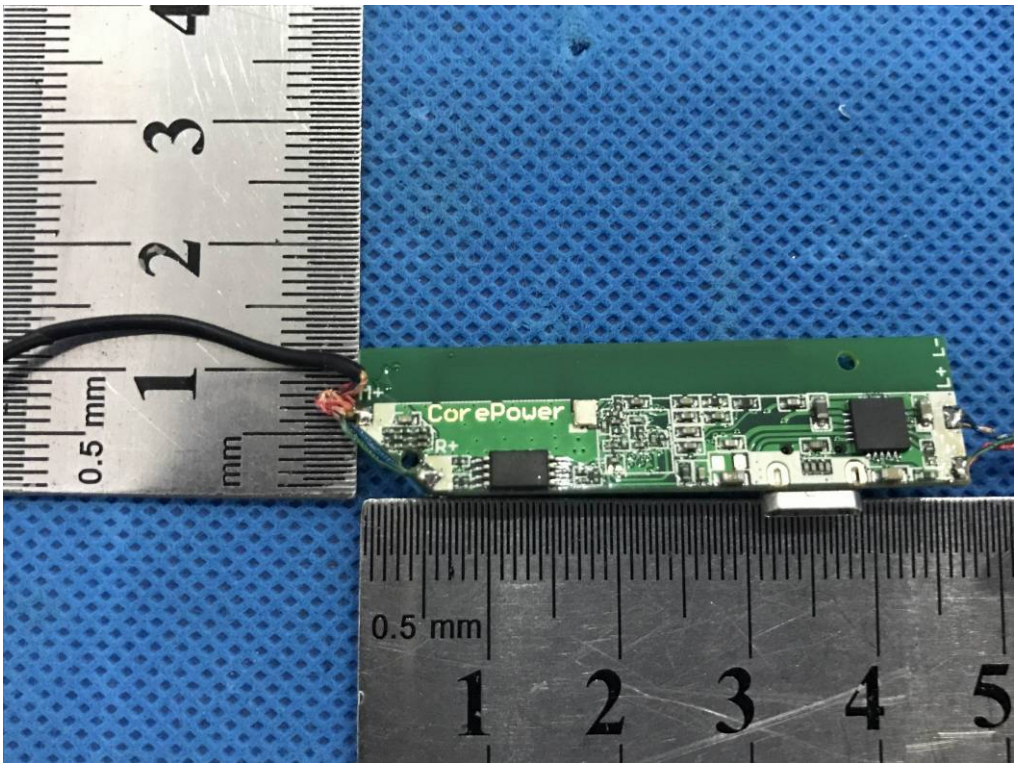

L+
+L-
L-
-L
662L
0.5 mm
0.5 mm


+M
-M
+R
-R
662R
mm


0.5 mm
1 2 3 4 5
mm


Antenna
0.5 mm
1 2 3 4 5
mm




**** End of report ****