MEASUREMENT REPORT

FCC PART 15.247 Bluetooth BLE

FCC ID	:	2AI3GA7110
APPLICANT	:	Pico Technology Co., Ltd.
Application Type	:	Certification
Product	:	VR All-In-One Headset
Model No.	:	A7110
Brand Name	:	Pico
FCC Classification	:	Digital Transmission System (DTS)
FCC Rule Part(s)	:	Part 15 Subpart C (Section 15.247)
Test Procedure(s)	:	ANSI C63.10-2013, KDB 558074 D01v04
Test Date	:	December 09 ~ 16, 2017

Reviewed By : Jame Yuan
(Jame Yuan)

Approved By : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074 D01v04. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
1711RSU00806	Rev. 01	Initial report	01-17-2018	Valid

CONTENTS

Description Page

§2.1033 General Information

Applicant:	Pico Technology Co., Ltd.
Applicant Address:	Room 2101, Shining Tower, No.35 Xueyuan Road, HaiDian District, Beijing, The People's Republic of China
Manufacturer:	Pico Technology Co., Ltd.
Manufacturer Address:	Room 2101, Shining Tower, No.35 Xueyuan Road, HaiDian District, Beijing, The People's Republic of China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
FCC Registration No.:	893164
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**


Accredited Laboratory

A2LA has accredited

MRT TECHNOLOGY (SUZHOU) CO., LTD.

Suzhou, Jiangsu, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Presented this 6th day of September 2016.

Senior Director of Quality and Communications
For the Accreditation Council
Certificate Number 3628.01
Valid to August 31, 2018

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

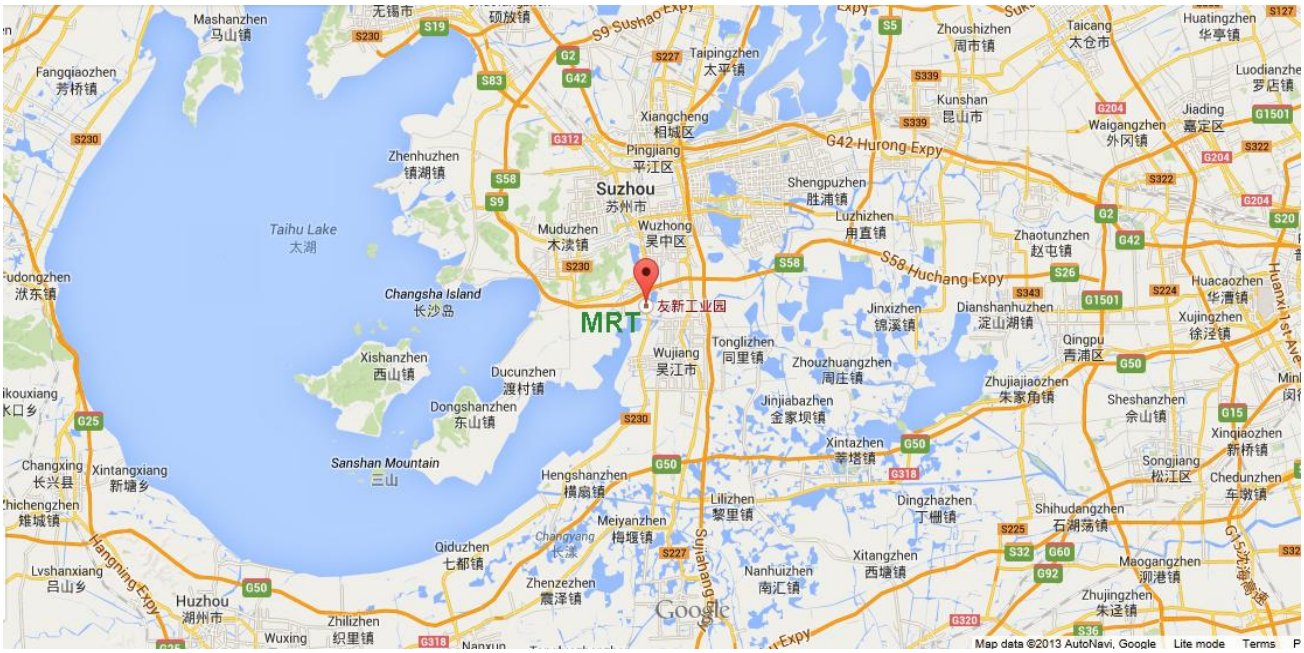
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



2. PRODUCT INFORMATION

2.1. Feature of Equipment under Test

Product Name	VR All-In-One Headset
Model No.	A7110
Wi-Fi Specification	802.11a/b/g/n/ac
Bluetooth Version	v4.2 dual mode
Antenna Delivery	2*TX + 2*RX
Components	
Adapter	M/N: HUUS090200-K00 INPUT: 100-240V ~ 50/60Hz, 0.5A OUTPUT: 5Vdc, 2.0A OR 9Vdc, 2.0A

2.2. Product Specification Subjective to this Report

Bluetooth Frequency	2402 ~ 2480MHz
Type of modulation	GFSK
Data Rate	1Mbps
Antenna Type	FPC Antenna
Antenna Gain	3.74dBi

Note: For other features of this EUT, test report will be issued separately.

2.3. Working Frequencies for this report

Channel List for BLE

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz
03	2408 MHz	04	2410 MHz	05	2412 MHz
06	2414 MHz	07	2416 MHz	08	2418 MHz
09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz
15	2432 MHz	16	2434 MHz	17	2436 MHz
18	2438 MHz	19	2440 MHz	20	2442 MHz
21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz
27	2456 MHz	28	2458 MHz	29	2460 MHz
30	2462 MHz	31	2464 MHz	32	2466 MHz
33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz
39	2480 MHz	--	--	--	--

2.4. Description of Available Antennas

Antenna Type	Frequency Band (GHz)	TX Paths	Max Peak Gain (dBi)		CDD Directional Gain (dBi)	
			Ant 1	Ant 2	For Power	For PSD
Wi-Fi Internal Antenna						
FPC	2.4	2	3.74	2.43	3.74	6.75
	5	2	4.87	4.15	4.87	7.88
Bluetooth Internal Antenna						
FPC	2.4	1	3.74	--	--	

Note: The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

For CDD transmissions, directional gain is calculated as follows, N_{ANT} = 2, N_{SS} = 1.

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,

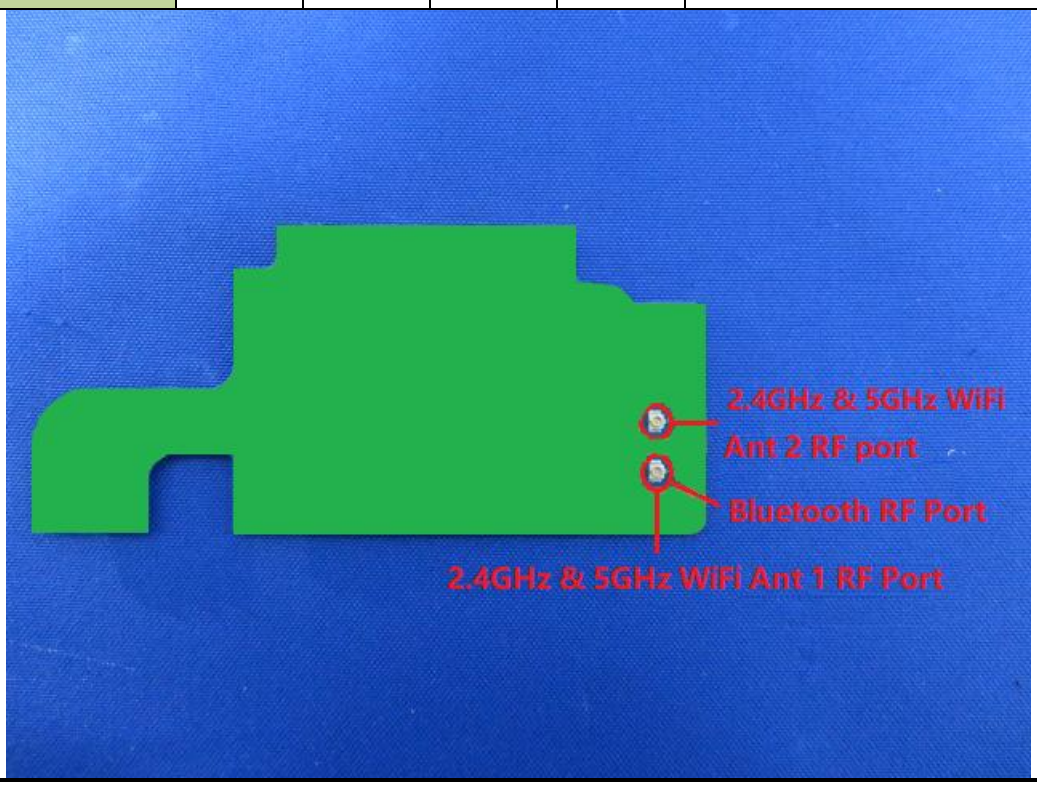
  Array Gain = 10 log (N_{ANT}/ N_{SS}) dB = 3.01;

- For power measurements on IEEE 802.11 devices,

  Array Gain = 0 dB for $N_{ANT} \leq 4$;

2.5. Description of Antenna RF Port

Antenna RF Port					
--	2.4GHz RF Port		5GHz RF Port		Bluetooth(v4.2 dual mode) RF Port
Software Control Port	Ant 1	Ant 2	Ant 1	Ant 2	Bluetooth



2.6. Test Mode

Test Mode	Mode 1: Transmit by BLE

2.7. Test Software

The test utility software used during testing was “QRCT”, and the version was “3.0.268.0”.

2.8. Device Capabilities

This device contains the following capabilities:
802.11a/b/g/n/ac Wi-Fi and Bluetooth (v4.2 dual mode) Device.

2.9. Test Configuration

The **VR All-In-One Headset** was tested per the guidance of KDB 558074 D01v04. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.10. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.11. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 558074 D01v04 were used in the measurement of the **VR All-In-One Headset.**

Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions were used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the Antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable. For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive Antenna height using a broadband Antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn Antennas were used. For frequencies below 30MHz, a calibrated loop Antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband Antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive Antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn Antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive Antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive Antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn Antenna, the horn Antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of the **VR All-In-One Headset** is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The **VR All-In-One Headset** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2018/08/18
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2018/06/21
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2018/06/21
Thermohygrometer	Testo	608-H1	MRTSUE06404	1 year	2018/08/14
Shielding Anechoic Chamber	Mikebang	Chamber-SR2	MRTSUE06214	1 year	2018/05/10

Radiated Emissions - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Agilent	N9038A	MRTSUE06125	1 year	2018/08/18
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2018/11/20
Bilog Period Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2018/10/21
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2018/11/18
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06106	1 year	2018/11/17
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2018/04/25
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2018/04/16
Digitial Thermometer & Hygrometer	Minggao	ETH529	MRTSUE06170	1 year	2017/12/12
				1 year	2018/12/12
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2018/05/09

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2018/12/06
Thermohygrometer	Testo	608-H1	MRTSUE06401	1 year	2018/08/14

Software	Version	Function
e3	V8.3.5	EMI Test Software

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement - SR2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 25GHz: 4.76dB
Spurious Emissions, Conducted - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Power Spectrum Density - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.15dB
Occupied Bandwidth - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

7. TEST RESULT

7.1. Summary

Company Name: **Pico Technology Co., Ltd.**

FCC ID: **2AI3GA7110**

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	6dB Bandwidth	≥ 500kHz	Conducted	Pass	Section 7.2
15.247(b)(3)	Output Power	≤ 1Watt		Pass	Section 7.3
15.247(e)	Power Spectral Density	Refer to Section 7.4		Pass	Section 7.4
15.247(d)	Band Edge / Out-of-Band Emissions	≥ 20dBc(Peak)		Pass	Section 7.5
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 7.6 & 7.7
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.8

Notes:

1) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

7.2. 6dB Bandwidth Measurement

7.2.1.Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

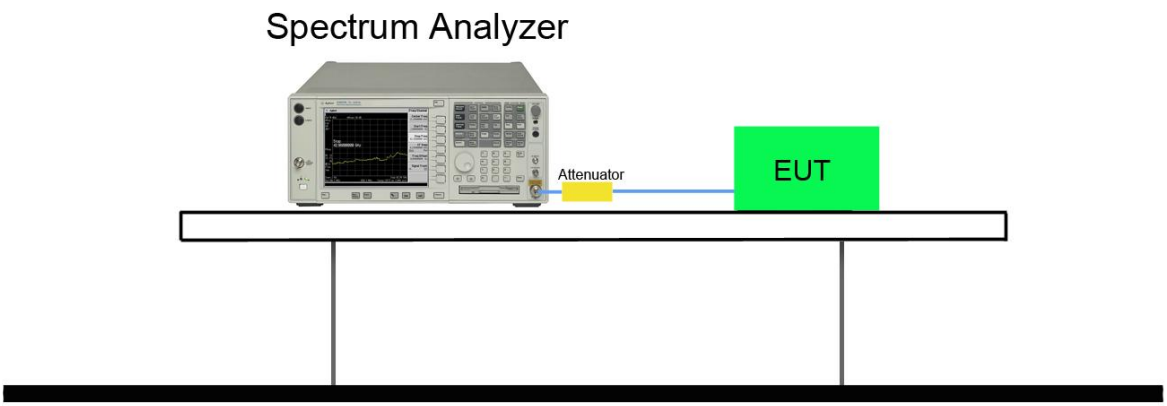
7.2.2.Test Procedure used

KDB 558074 D01v04 - Section 8.2 Option 2

7.2.3.Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize

7.2.4.Test Setup



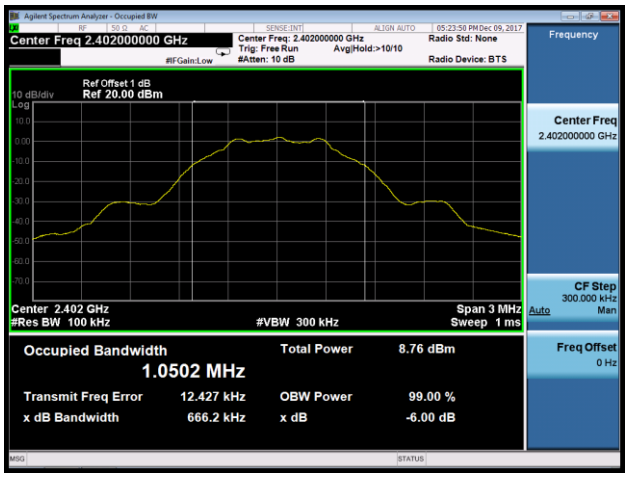
7.2.5.Test Result

Product	VR All-In-One Headset	Temperature	25°C
Test Engineer	Hunk Li	Relative Humidity	52%
Test Site	TR3	Test Date	2017/12/09

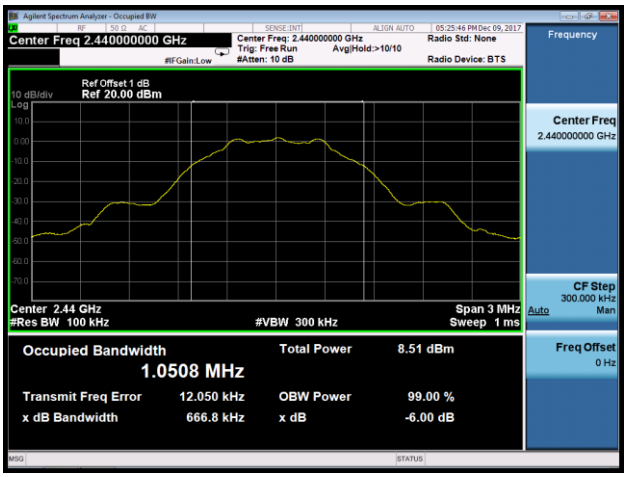
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
BLE	1	00	2402	0.67	≥ 0.5	Pass
BLE	1	19	2440	0.67	≥ 0.5	Pass
BLE	1	39	2480	0.66	≥ 0.5	Pass

BLE 6dB Bandwidth

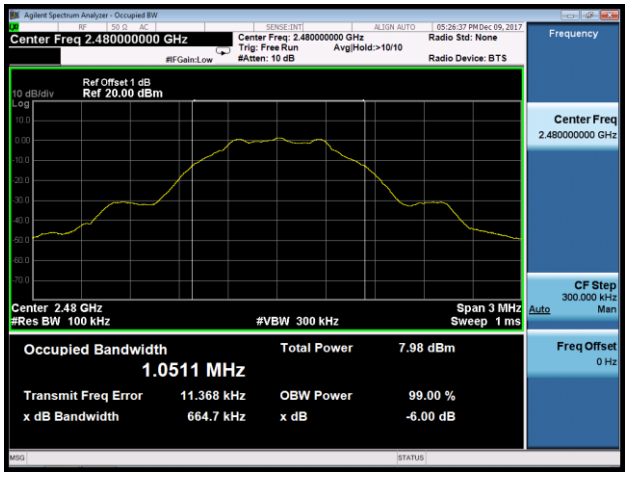
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



7.3. Output Power Measurement

7.3.1.Test Limit

The maximum out power shall be less 1 Watt (30dBm).

7.3.2.Test Procedure Used

KDB 558074 D01v04 - Section 9.1.3 PKPM1 Peak-reading power meter method

KDB 558074 D01v04 - Section 9.2.3.2 AVGPM-G

7.3.3.Test Setting

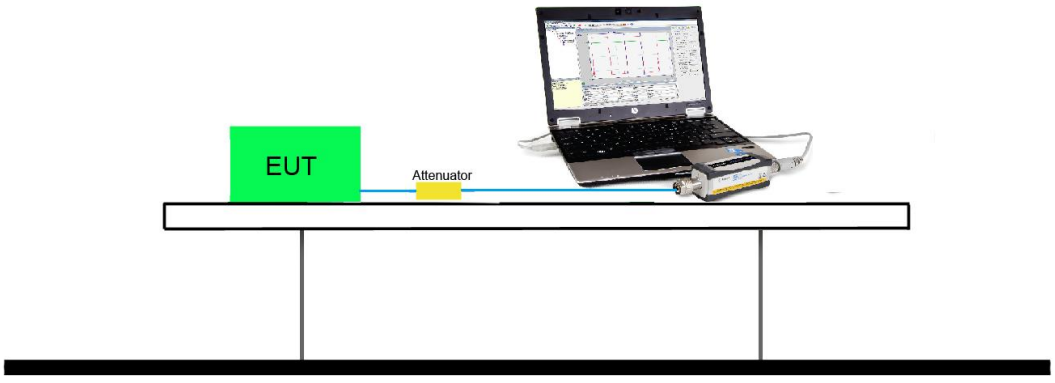
PKPM1 Peak-reading power meter method

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

Method AVGPM-G (Measurement using a gated RF average-reading power meter)

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

7.3.4.Test Setup



7.3.5.Test Result of Output Power

Product	VR All-In-One Headset	Temperature	23°C
Test Engineer	Hunk Li	Relative Humidity	51%
Test Site	TR3	Test Date	2017/12/09

Test Result of Peak Output Power

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1	00	2402	2.35	≤ 30	Pass
BLE	1	19	2440	2.15	≤ 30	Pass
BLE	1	39	2480	1.94	≤ 30	Pass

Test Result of Average Output Power (Reporting Only)

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
BLE	1	00	2402	2.26	≤ 30	Pass
BLE	1	19	2440	1.97	≤ 30	Pass
BLE	1	39	2480	1.82	≤ 30	Pass

7.4. Power Spectral Density Measurement

7.4.1.Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

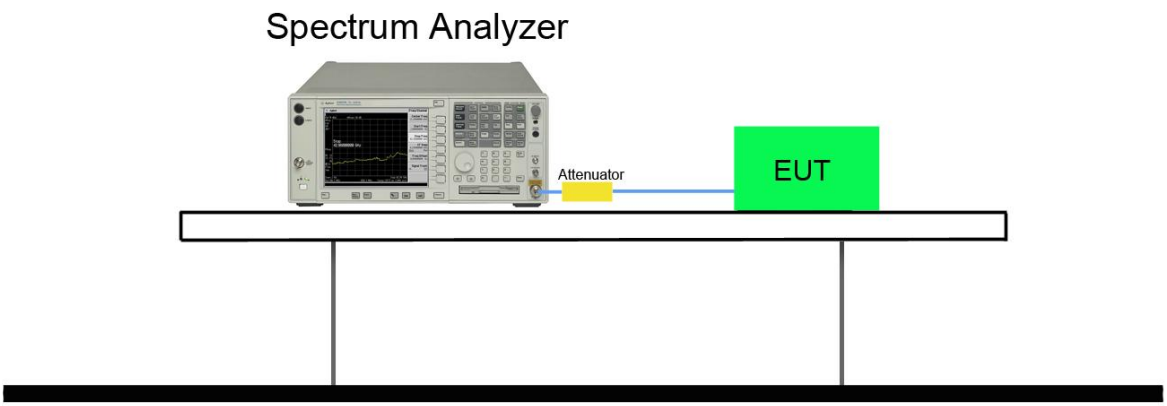
7.4.2.Test Procedure Used

KDB 558074 D01v04 - Section 10.2 Method (peak PSD)

7.4.3.Test Setting

1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the DTS channel bandwidth
3. RBW = 3kHz
4. VBW = 10kHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Trace was allowed to stabilize

7.4.4.Test Setup



7.4.5.Test Result

Product	VR All-In-One Headset	Temperature	23°C
Test Engineer	Hunk Li	Relative Humidity	52%
Test Site	TR3	Test Date	2017/12/09

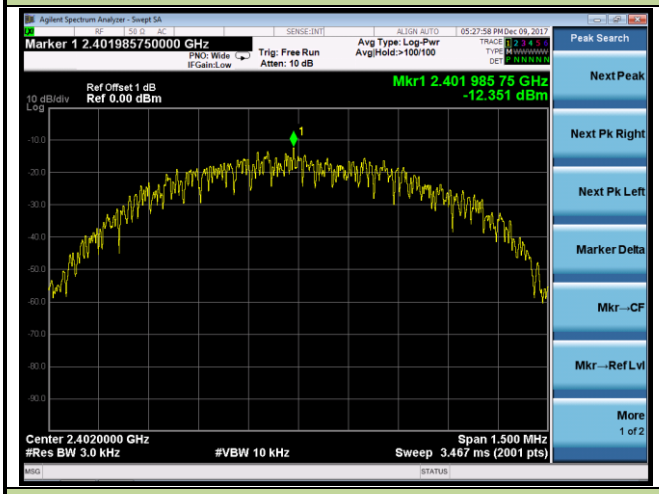
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1	00	2402	-12.35	≤ 7.25	Pass
BLE	1	19	2440	-12.56	≤ 7.25	Pass
BLE	1	39	2480	-13.11	≤ 7.25	Pass

Note: For 2.4GHz PSD: the directional gain = 6.75 (dBi)

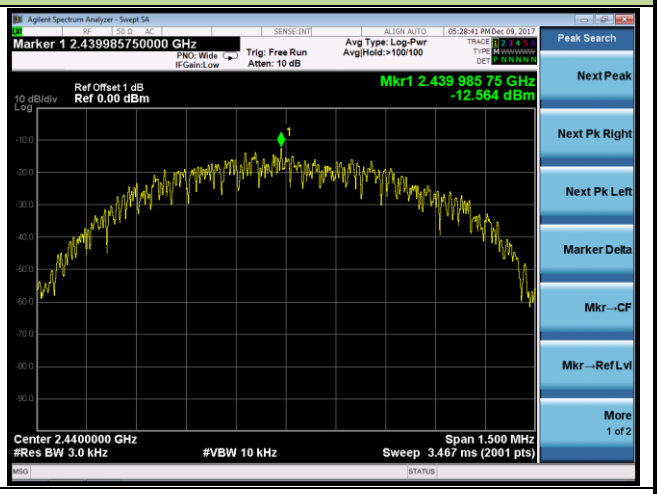
The PSD limit (dBm / 3kHz) = [8 – (6.75 – 6)] (dBm / 3kHz) = 7.25 (dBm / 3kHz).

BLE PSD

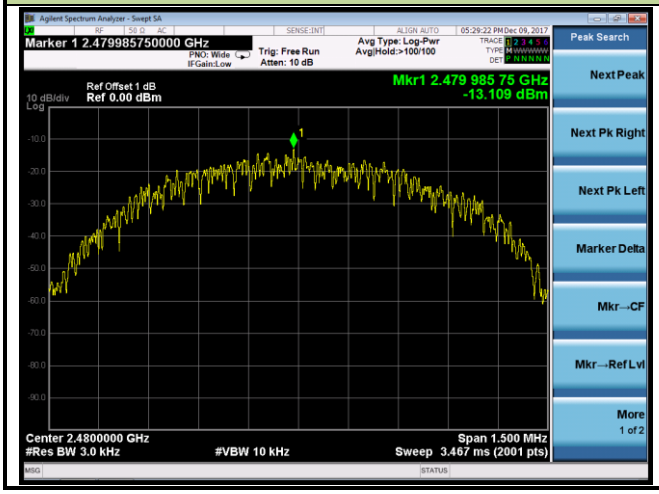
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



7.5. Conducted Band Edge and Out-of-Band Emissions

7.5.1.Test Limit

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the PSD procedure.

7.5.2.Test Procedure Used

KDB 558074 D01v04 - Section 11.2 & Section 11.3

7.5.3.Test Settitng

1. Reference level measurement

a) Set instrument center frequency to DTS channel center frequency

b) Set the span to ≥ 1.5 times the DTS bandwidth

c) Set the RBW = 100 kHz

d) Set the VBW ≥ 3 x RBW

e) Detector = peak

f) Sweep time = auto couple

g) Trace mode = max hold

h) Allow trace to fully stabilize

2. Emission level measurement

a) Set the center frequency and span to encompass frequency range to be measured

b) RBW = 100kHz

c) VBW = 300kHz

d) Detector = Peak

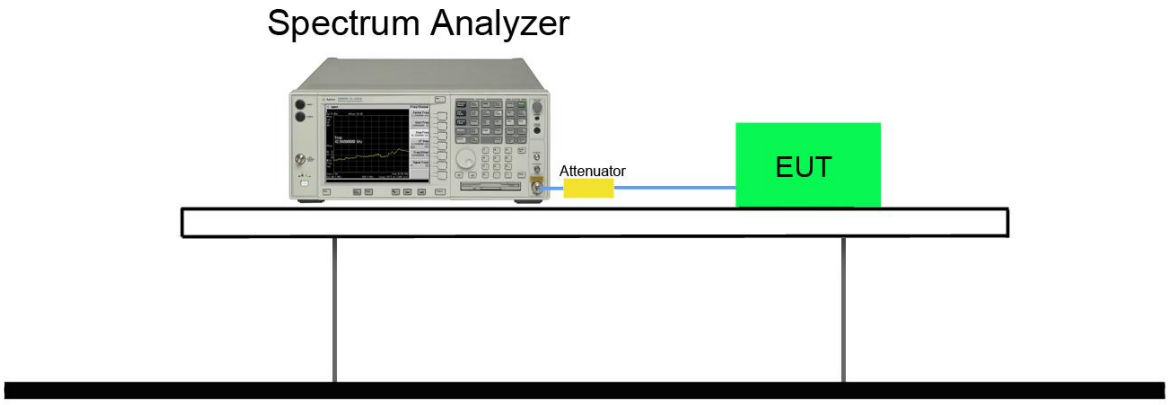
e) Number of sweep points ≥ 2 x Span/RBW

f) Trace mode = max hold

g) Sweep time = auto couple

h) The trace was allowed to stabilize

7.5.4.Test Setup



7.5.5.Test Result

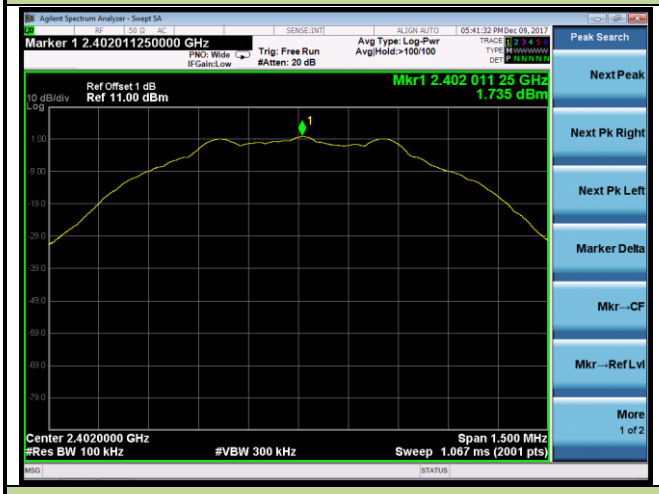
Product	VR All-In-One Headset	Temperature	23°C
Test Engineer	Hunk Li	Relative Humidity	52%
Test Site	TR3	Test Date	2017/12/09

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Limit	Result
BLE	1	00	2402	20dBc	Pass
BLE	1	19	2440	20dBc	Pass
BLE	1	39	2480	20dBc	Pass

BLE Out-of-Band Emissions

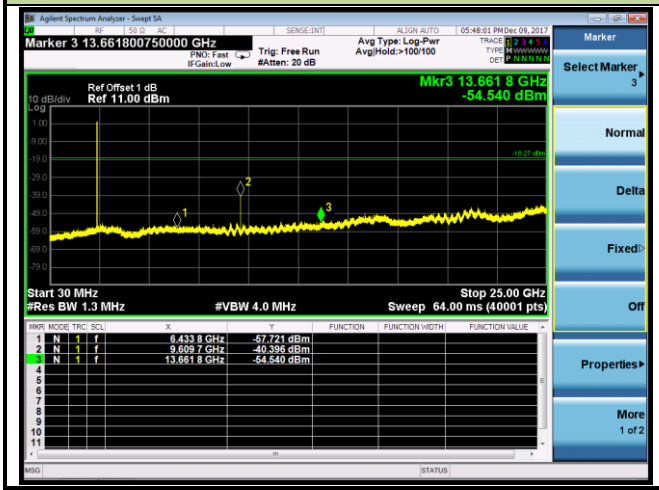
Channel 00 (2402MHz)

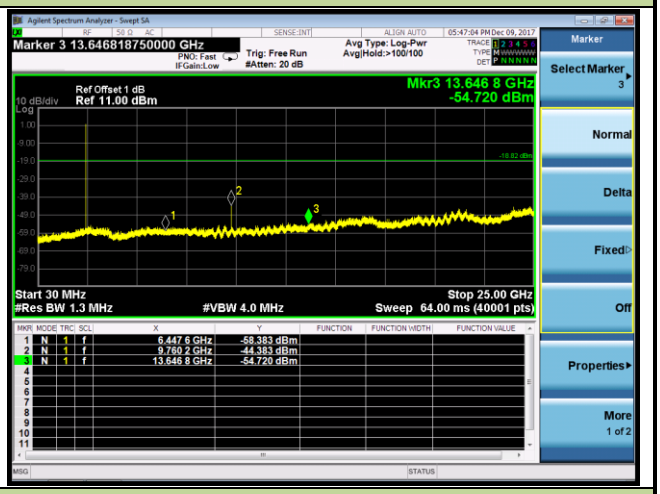
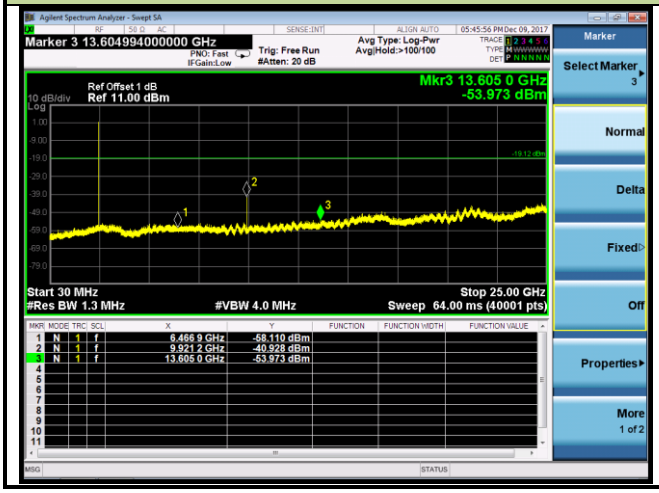
100kHz PSD reference Level



Low Band Edge

Spurious Emission



Channel 19 (2440MHz)	
100kHz PSD reference Level	Spurious Emission
	
Channel 39 (2480MHz)	
100kHz PSD reference Level	High Band Edge
	
Spurious Emission	
	

7.6. Radiated Spurious Emission Measurement

7.6.1.Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.6.2.Test Procedure Used

KDB 558074 D01v04 - Section 12.2.3 (quasi-peak measurements)

KDB 558074 D01v04 - Section 12.2.4 (peak power measurements)

KDB 558074 D01v04 - Section 12.2.5 (average power measurements)

7.6.3.Test Setting

Peak Field Strength Measurements

Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

1. RBW = as specified in Table 1
2. VBW = 3MHz
3. Detector = peak
4. Sweep time = auto couple

5. Trace mode = max hold
6. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

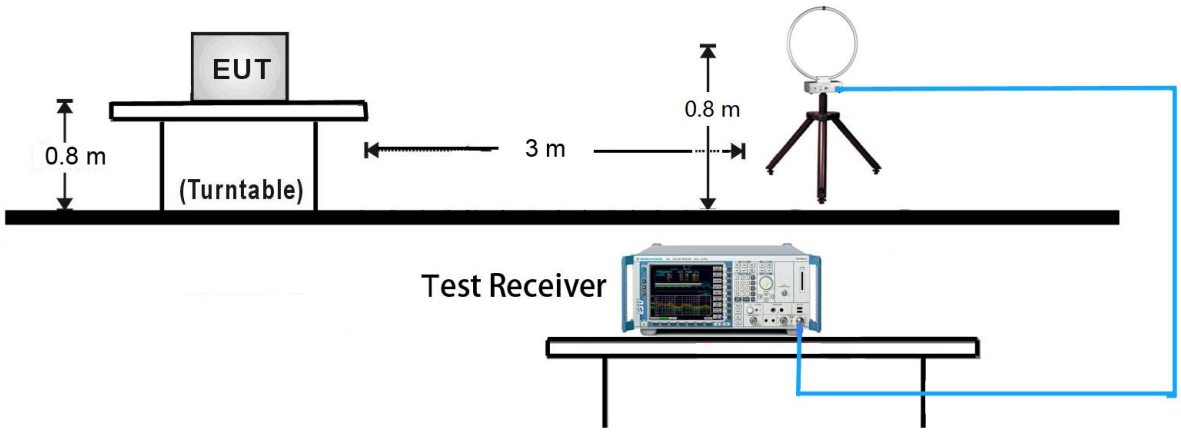
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

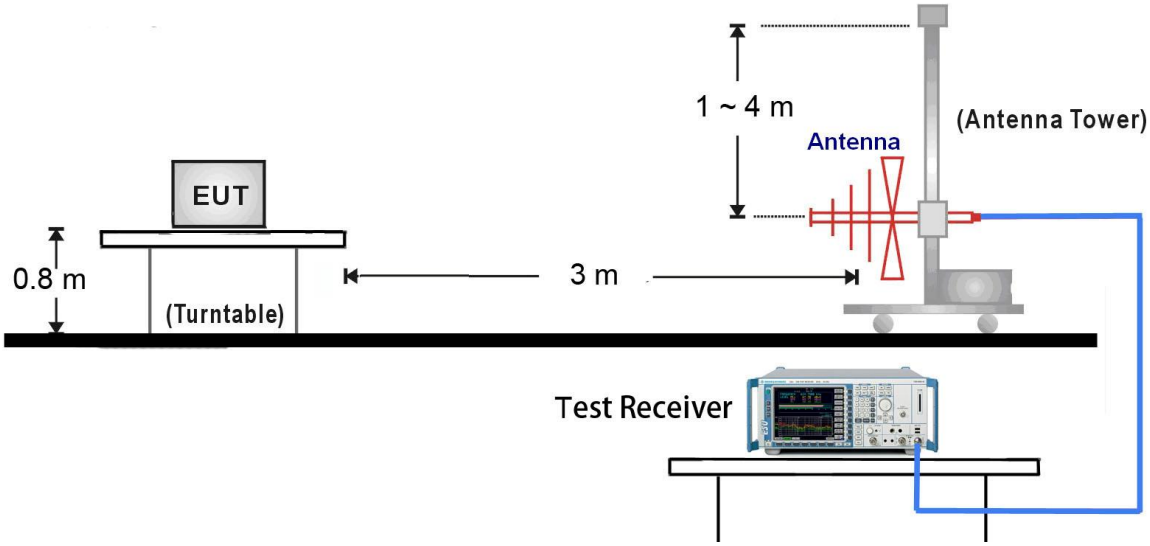
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

7.6.4.Test Setup

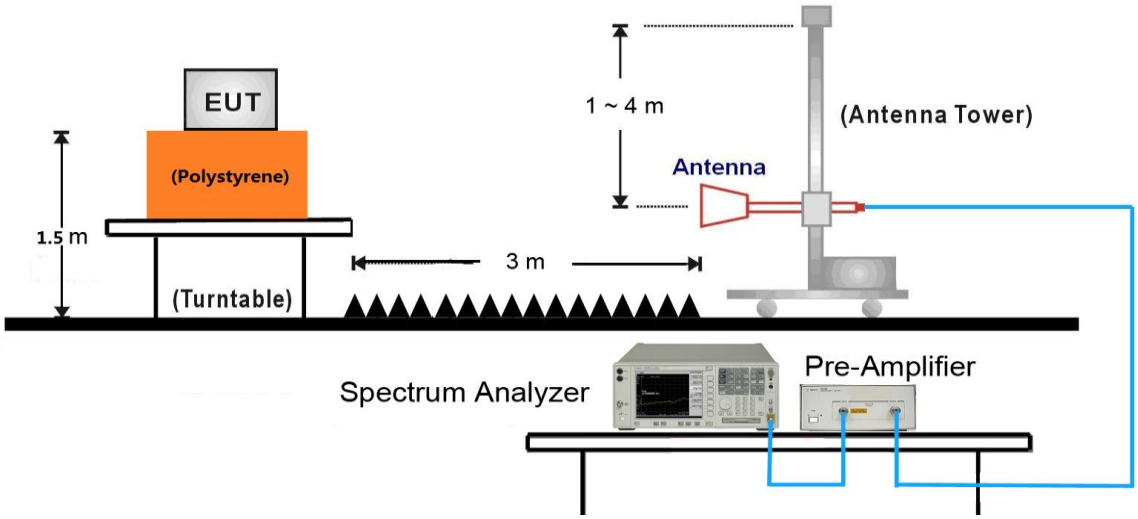
9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



1GHz ~ 25GHz Test Setup:



7.6.5.Test Result

Test Mode:	BLE	Test Site:	AC2
Test Channel:	00	Test Engineer:	Bruce Wang
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7383.5	33.7	13.9	47.6	74.0	-26.4	Peak	Horizontal
	8488.5	33.3	14.1	47.4	74.0	-26.6	Peak	Horizontal
*	9608.0	41.2	16.2	57.4	75.4	-18.0	Peak	Horizontal
*	12781.0	29.8	20.5	50.3	75.4	-25.1	Peak	Horizontal
	7477.0	31.9	14.0	45.9	74.0	-28.1	Peak	Vertical
	8242.0	31.8	14.2	46.0	74.0	-28.0	Peak	Vertical
*	9608.0	38.4	16.2	54.6	75.4	-20.8	Peak	Vertical
*	12781.0	29.8	20.5	50.3	75.4	-25.1	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is 20dBc of the fundamental emission level (95.4dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	BLE	Test Site:	AC2
Test Channel:	19	Test Engineer:	Bruce Wang
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7477.0	31.9	14.0	45.9	74.0	-28.1	Peak	Horizontal
	8361.0	32.6	13.8	46.4	74.0	-27.6	Peak	Horizontal
*	9760.0	38.4	16.9	55.3	75.2	-19.9	Peak	Horizontal
*	12781.0	30.7	20.5	51.2	75.2	-24.0	Peak	Horizontal
	7434.5	33.3	14.3	47.6	74.0	-26.4	Peak	Vertical
	8361.0	32.6	13.8	46.4	74.0	-27.6	Peak	Vertical
*	9916.5	30.9	17.4	48.3	75.2	-26.9	Peak	Vertical
*	13189.0	30.3	21.4	51.7	75.2	-23.5	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (95.2dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	BLE	Test Site:	AC2
Test Channel:	39	Test Engineer:	Bruce Wang
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7366.5	32.1	13.9	46.0	74.0	-28.0	Peak	Horizontal
	8335.5	31.5	13.9	45.4	74.0	-28.6	Peak	Horizontal
*	9920.0	41.0	17.4	58.4	74.8	-16.4	Peak	Horizontal
*	12781.0	31.1	20.5	51.6	74.8	-23.2	Peak	Horizontal
	7536.5	33.0	14.4	47.4	74.0	-26.6	Peak	Vertical
	8310.0	32.9	13.8	46.7	74.0	-27.3	Peak	Vertical
*	9916.5	36.2	17.4	53.6	74.8	-21.2	Peak	Vertical
*	12721.5	30.8	20.4	51.2	74.8	-23.6	Peak	Vertical

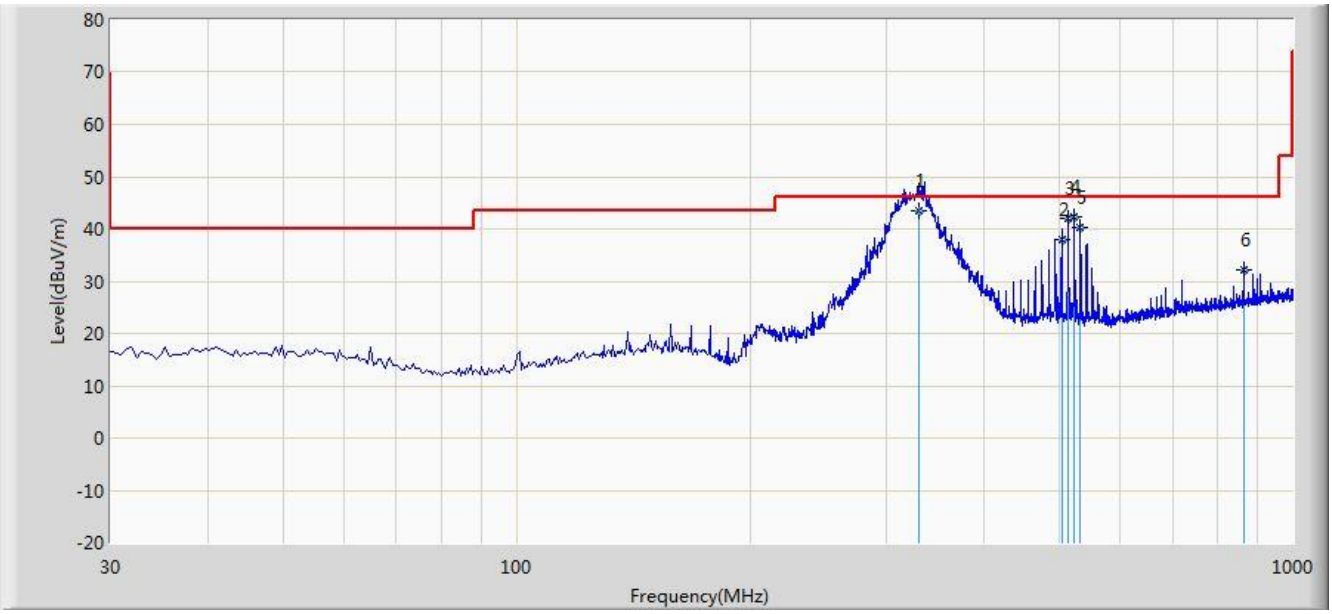
Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (94.8dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

The worst case of Radiated Emission below 1GHz:

Site: AC2	Time: 2017/12/16 - 13:43
Limit: FCC_Part15.209_RE(3m)	Engineer: Alex Ma
Probe: VULB9168_20-2000MHz	Polarity: Horizontal
EUT: VR All-In-One Headset	Power: By Battery
Worse Case Mode: Transmit by BLE at channel 2402MHz	



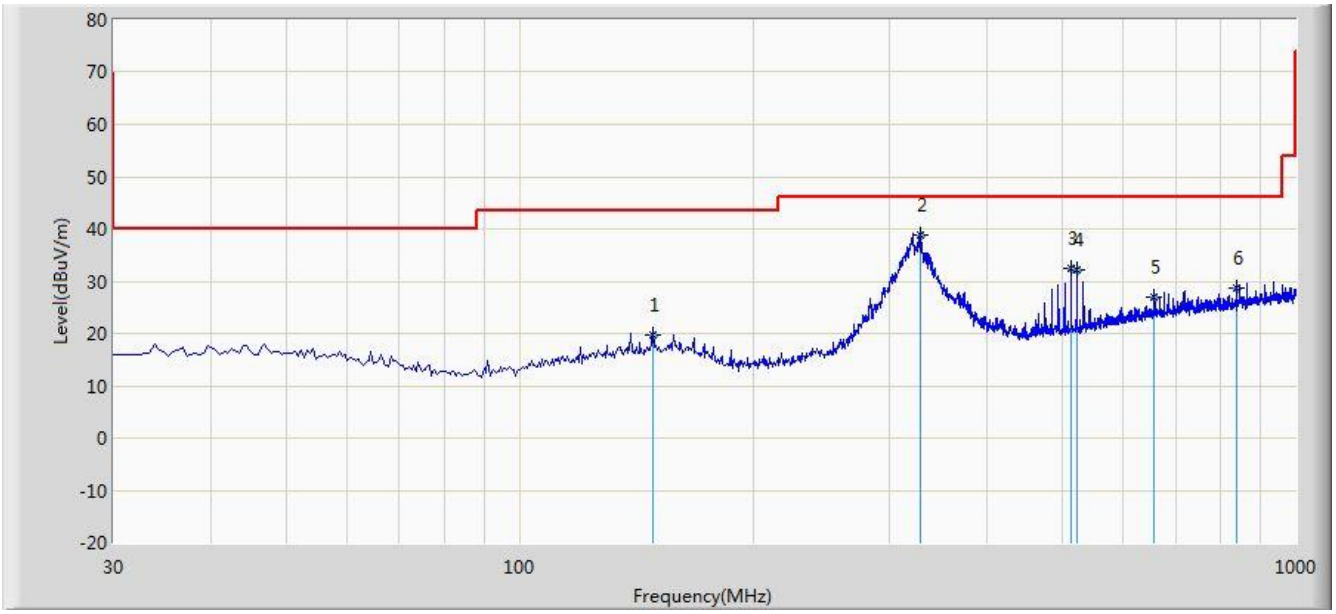
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	329.245	43.606	28.440	-2.394	46.000	15.166	QP
2			503.845	38.111	19.467	-7.889	46.000	18.644	QP
3			513.545	42.023	23.180	-3.977	46.000	18.843	QP
4			523.245	42.379	23.341	-3.621	46.000	19.038	QP
5			532.945	40.237	21.005	-5.763	46.000	19.232	QP
6			864.200	32.048	8.128	-13.952	46.000	23.920	QP

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

Site: AC2	Time: 2017/12/16 - 13:49
Limit: FCC_Part15.209_RE(3m)	Engineer: Snake Ni
Probe: VULB9168_20-2000MHz	Polarity: Vertical
EUT: VR All-In-One Headset	Power: By Battery
Worse Case Mode: Transmit by BLE at channel 2402MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			148.825	19.592	4.392	-23.908	43.500	15.200	QP
2		*	327.790	38.738	23.603	-7.262	46.000	15.135	QP
3			513.545	32.374	13.531	-13.626	46.000	18.843	QP
4			523.245	32.263	13.225	-13.737	46.000	19.038	QP
5			657.590	27.072	5.510	-18.928	46.000	21.562	QP
6			839.950	28.668	4.994	-17.332	46.000	23.674	QP

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

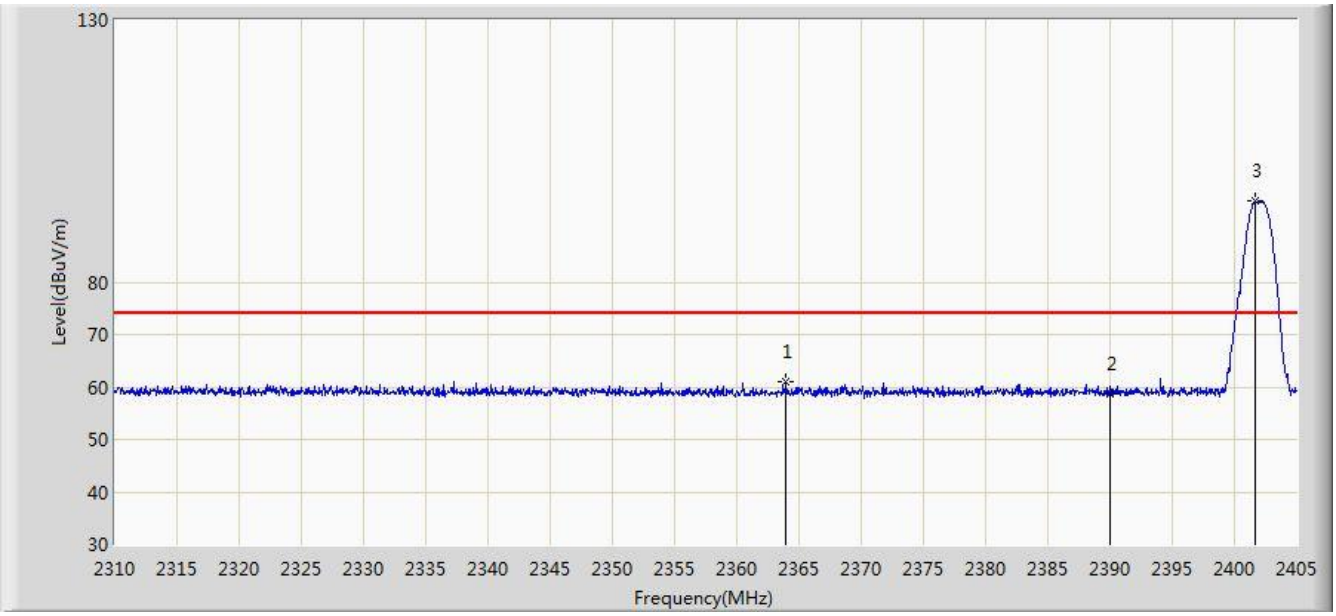
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

7.7. Radiated Restricted Band Edge Measurement

7.7.1.Test Result

Site: AC2	Time: 2017/12/15 - 19:02
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: VR All-In-One Headset	Power: By Battery
Test Mode: Transmit by BLE at channel 2402MHz	

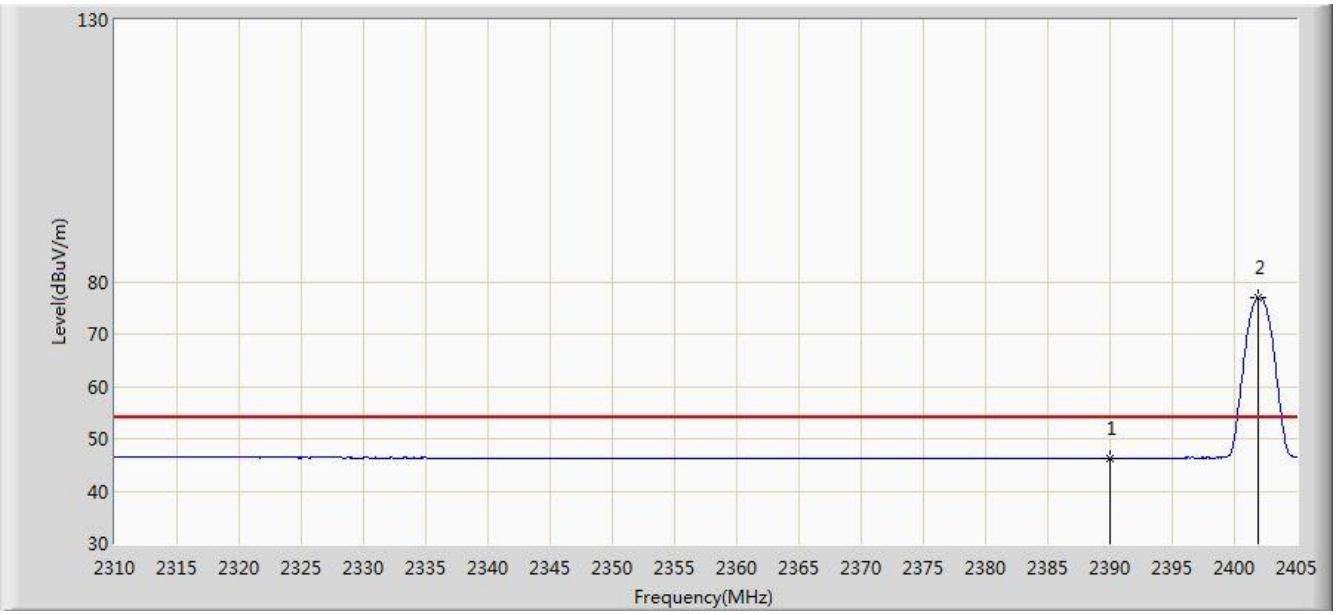


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2363.960	60.975	28.358	-13.025	74.000	32.616	PK
2			2390.000	58.744	26.169	-15.256	74.000	32.575	PK
3		*	2401.722	95.426	62.867	N/A	N/A	32.559	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC2	Time: 2017/12/15 - 19:03
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: VR All-In-One Headset	Power: By Battery
Test Mode: Transmit by BLE at channel 2402MHz	

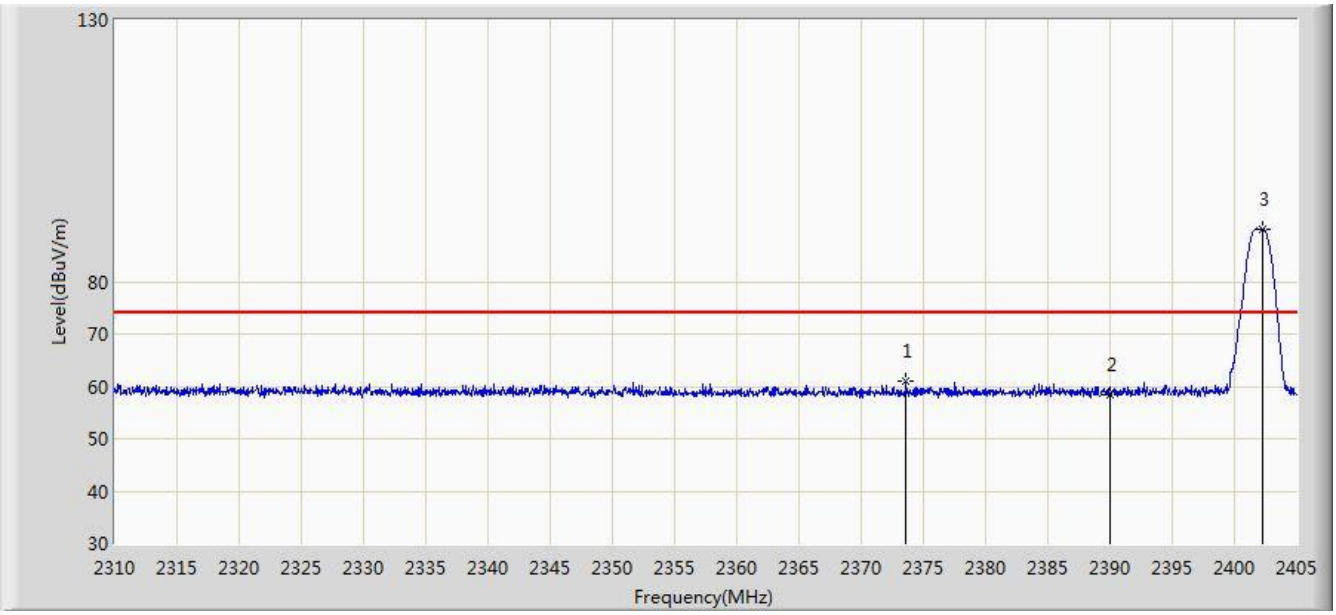


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	46.308	13.733	-7.692	54.000	32.575	AV
2		*	2401.913	77.077	44.518	N/A	N/A	32.559	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC2	Time: 2017/12/15 - 19:04
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: VR All-In-One Headset	Power: By Battery
Test Mode: Transmit by BLE at channel 2402MHz	

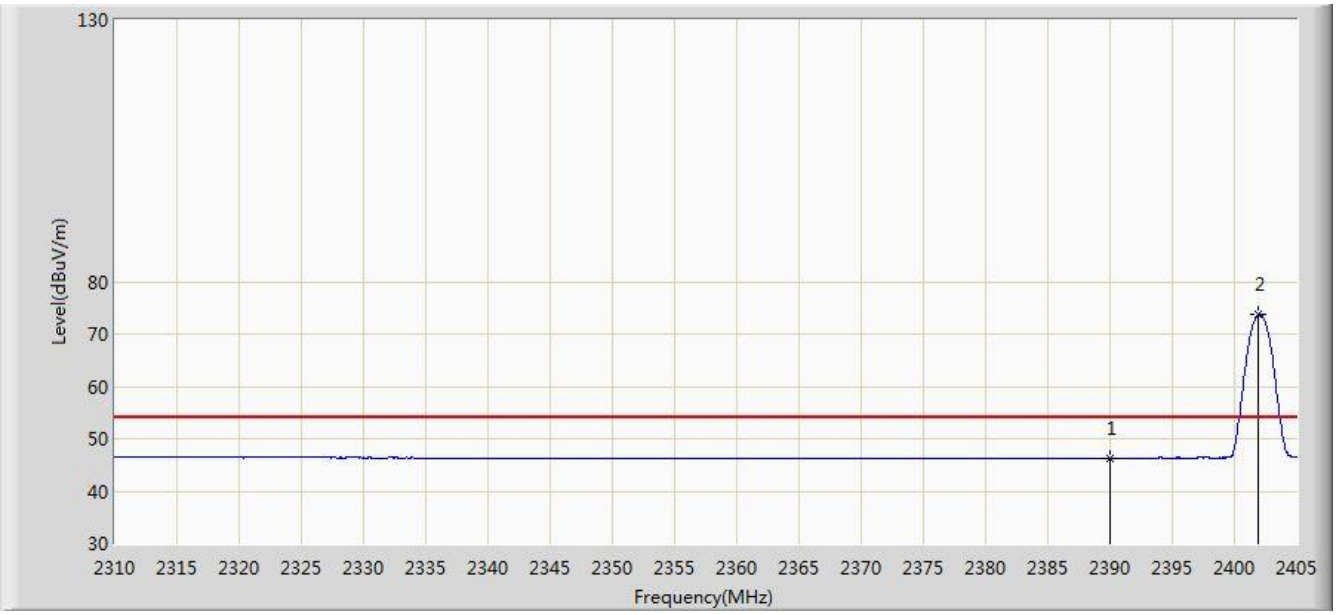


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2373.603	60.975	28.372	-13.025	74.000	32.602	PK
2			2390.000	58.513	25.938	-15.487	74.000	32.575	PK
3		*	2402.292	90.136	57.577	N/A	N/A	32.559	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC2	Time: 2017/12/15 - 19:05
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: VR All-In-One Headset	Power: By Battery
Test Mode: Transmit by BLE at channel 2402MHz	

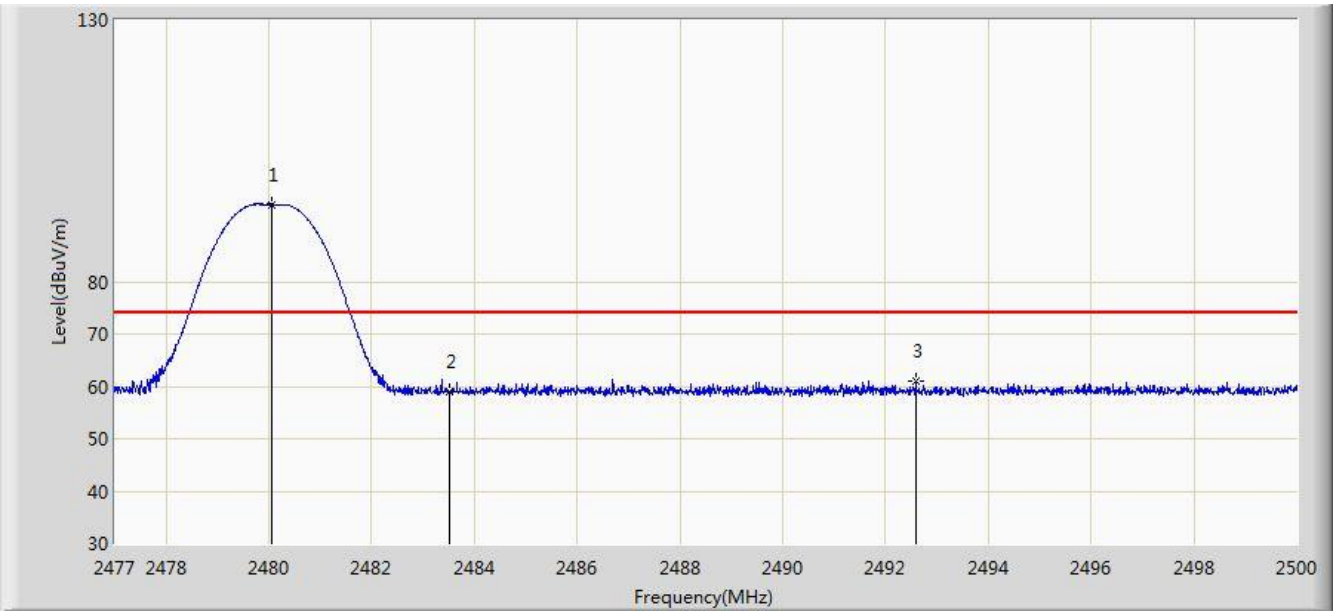


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	46.301	13.726	-7.699	54.000	32.575	AV
2		*	2401.960	73.659	41.100	N/A	N/A	32.559	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC2	Time: 2017/12/15 - 19:05
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: VR All-In-One Headset	Power: By Battery
Test Mode: Transmit by BLE at channel 2480MHz	

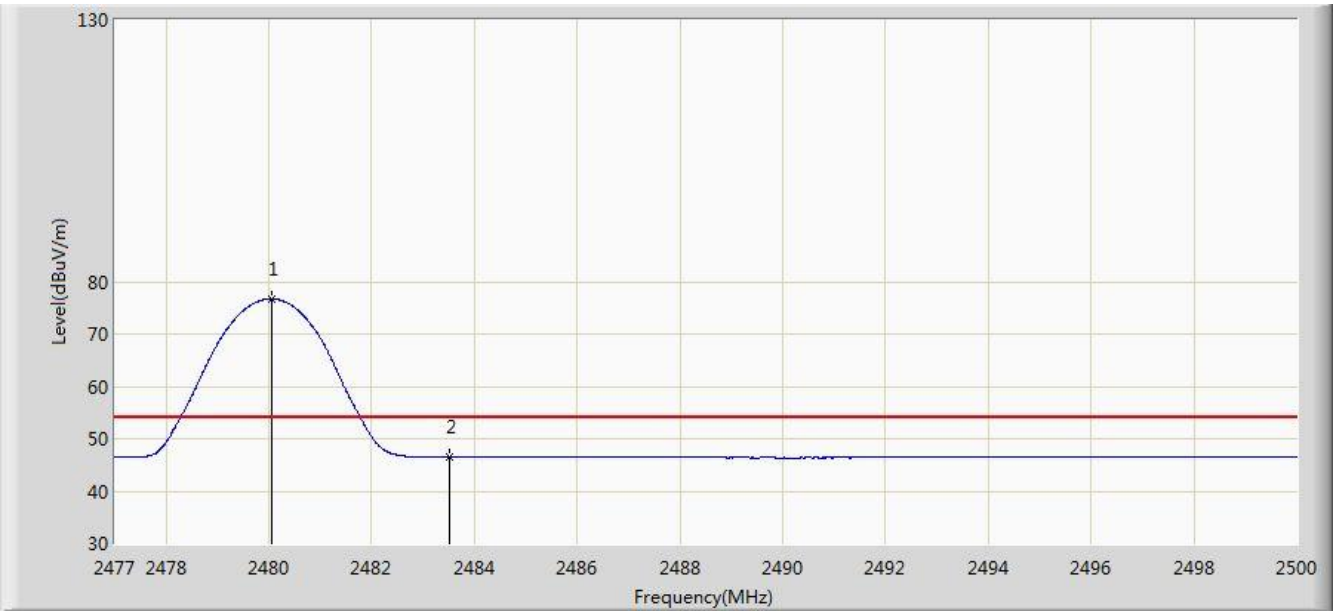


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.059	94.776	62.189	N/A	N/A	32.587	PK
2			2483.500	59.009	26.413	-14.991	74.000	32.596	PK
3			2492.594	60.972	28.353	-13.028	74.000	32.619	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC2	Time: 2017/12/15 - 19:06
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: VR All-In-One Headset	Power: By Battery
Test Mode: Transmit by BLE at channel 2480MHz	

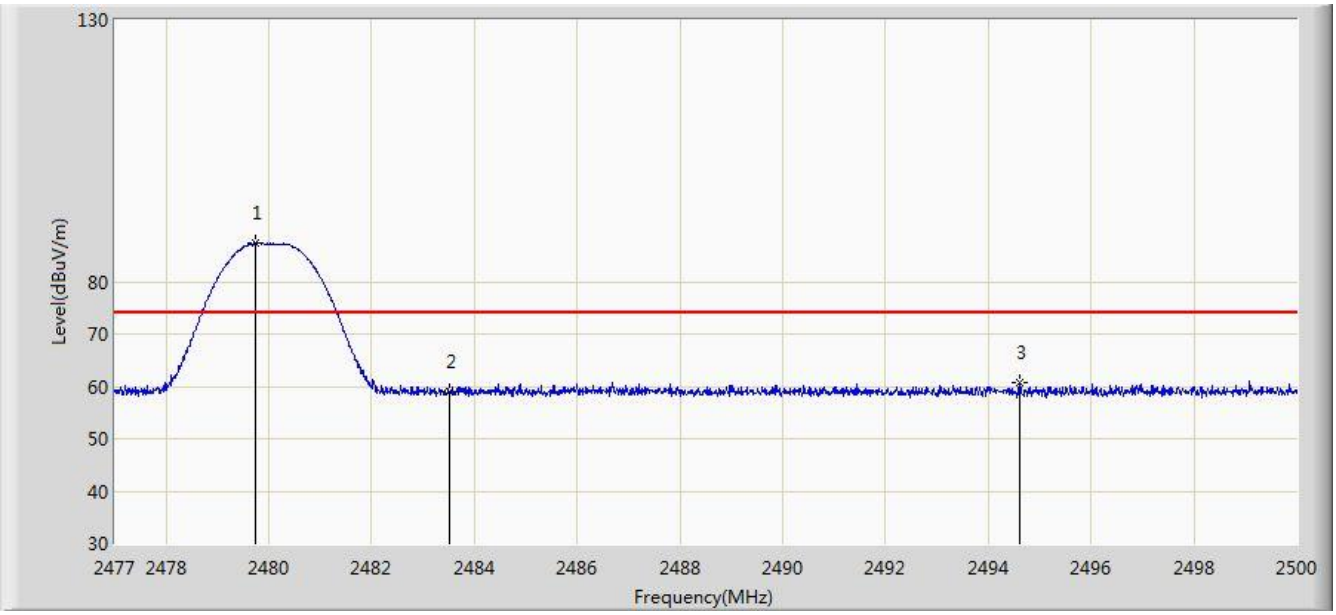


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.059	76.688	44.101	N/A	N/A	32.587	AV
2			2483.500	46.434	13.838	-7.566	54.000	32.596	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC2	Time: 2017/12/15 - 19:07
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: VR All-In-One Headset	Power: By Battery
Test Mode: Transmit by BLE at channel 2480MHz	

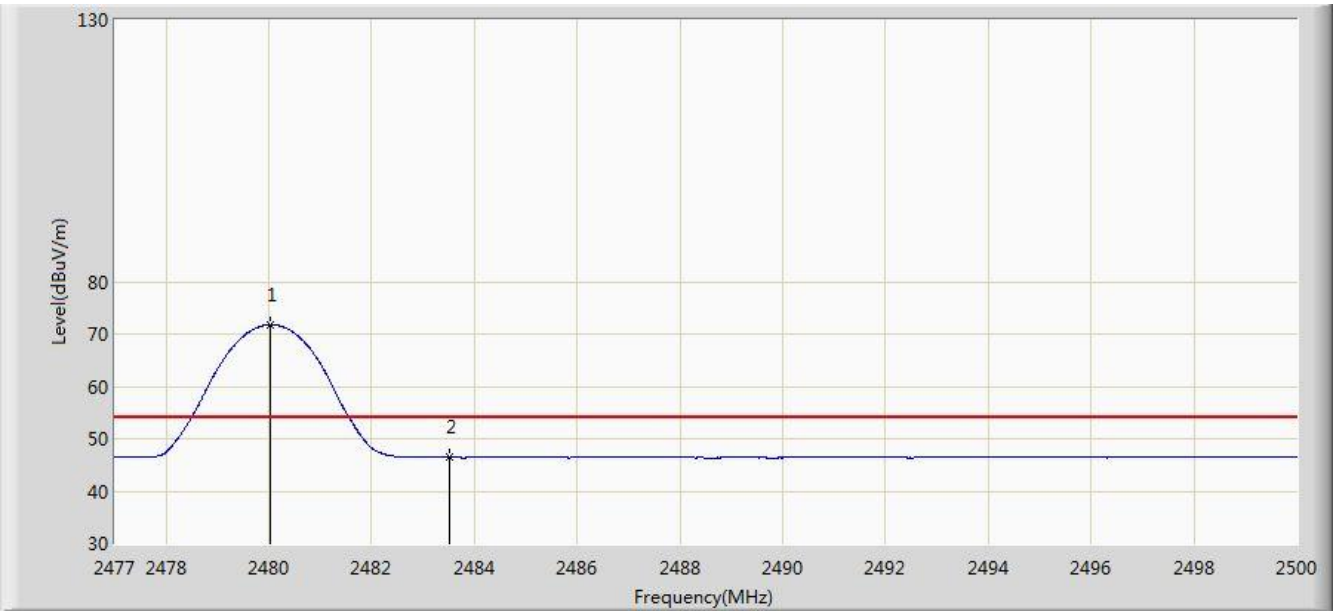


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2479.737	87.411	54.825	N/A	N/A	32.587	PK
2			2483.500	59.067	26.471	-14.933	74.000	32.596	PK
3			2494.606	60.810	28.186	-13.190	74.000	32.624	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC2	Time: 2017/12/15 - 19:08
Limit: FCC_Part15.209_RE(3m)	Engineer: Dandy Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: VR All-In-One Headset	Power: By Battery
Test Mode: Transmit by BLE at channel 2480MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2480.024	71.774	39.187	N/A	N/A	32.587	AV
2			2483.500	46.407	13.811	-7.593	54.000	32.596	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

7.8. AC Conducted Emissions Measurement

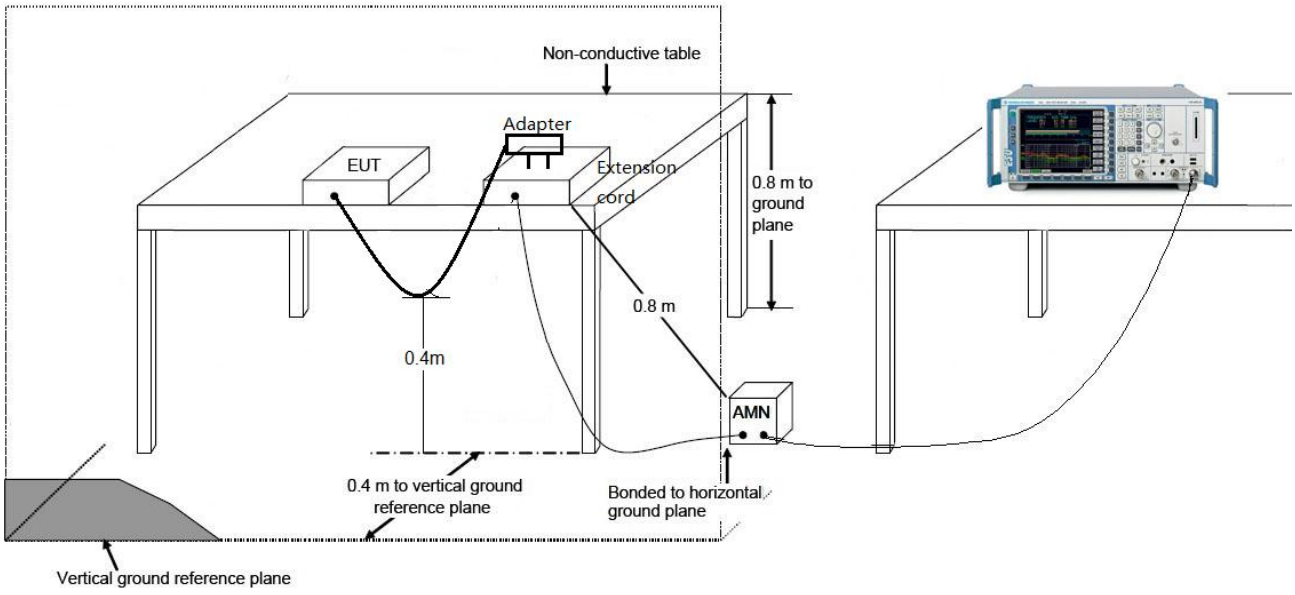
7.8.1.Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

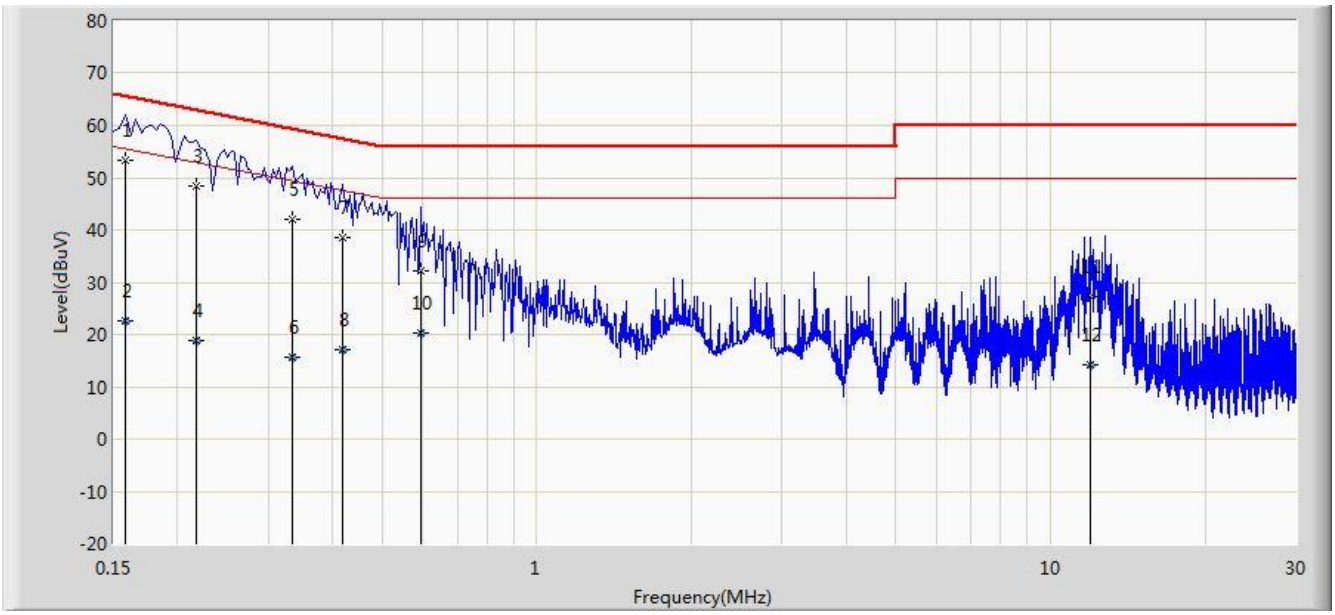
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

7.8.2.Test Setup



7.8.3.Test Result

Site: SR2	Time: 2017/12/11 - 10:02
Limit: FCC_Part15.207_CE_AC Power	Engineer: Polly Zong
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: VR All-In-One Headset	Power: AC 120V/60Hz
Test Mode 1	

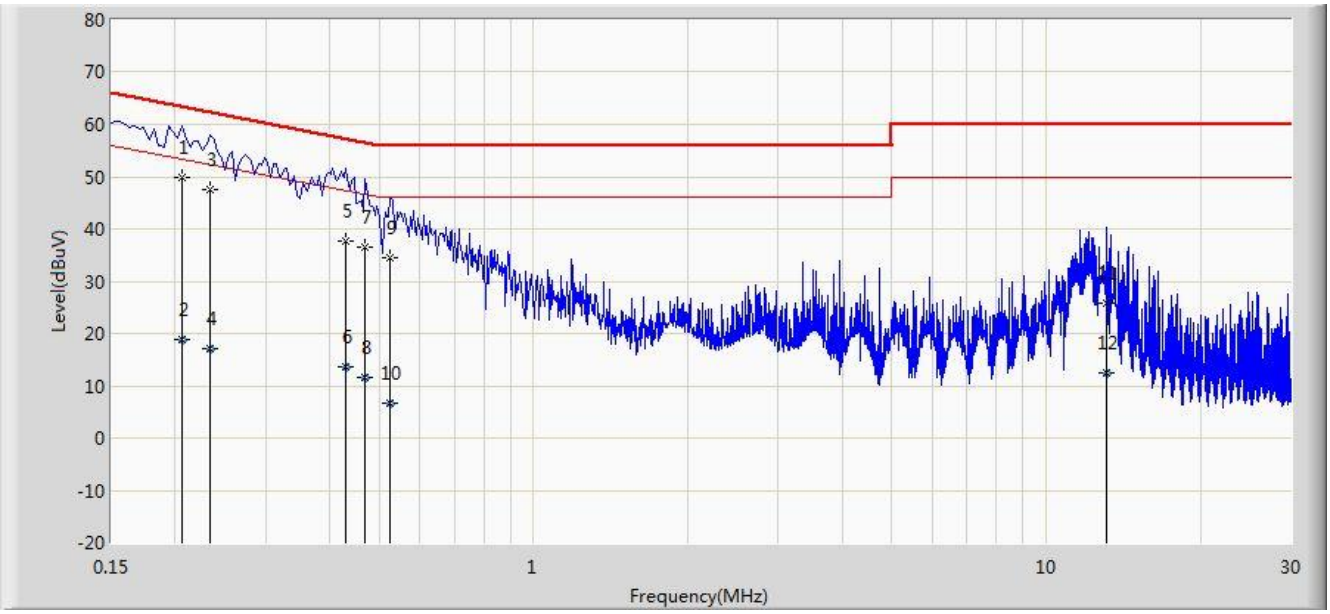


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		*	0.158	53.229	42.918	-12.340	65.568	10.311	QP
2			0.158	22.610	12.299	-32.958	55.568	10.311	AV
3			0.218	48.494	38.549	-14.401	62.895	9.945	QP
4			0.218	18.887	8.942	-34.008	52.895	9.945	AV
5			0.334	41.931	31.900	-17.420	59.351	10.031	QP
6			0.334	15.791	5.760	-33.560	49.351	10.031	AV
7			0.418	38.583	28.483	-18.904	57.488	10.101	QP
8			0.418	16.993	6.893	-30.495	47.488	10.101	AV
9			0.594	32.063	21.945	-23.937	56.000	10.118	QP
10			0.594	20.349	10.231	-25.651	46.000	10.118	AV
11			11.982	27.382	17.301	-32.618	60.000	10.081	QP
12			11.982	14.328	4.246	-35.672	50.000	10.081	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

Site: SR2	Time: 2017/12/11 - 10:07
Limit: FCC_Part15.207_CE_AC Power	Engineer: Polly Zong
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: VR All-In-One Headset	Power: AC 120V/60Hz
Test Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		*	0.206	49.901	39.900	-13.464	63.365	10.001	QP
2			0.206	18.787	8.786	-34.578	53.365	10.001	AV
3			0.234	47.474	37.485	-14.833	62.307	9.989	QP
4			0.234	17.017	7.028	-35.290	52.307	9.989	AV
5			0.430	37.697	27.562	-19.556	57.253	10.135	QP
6			0.430	13.487	3.352	-33.766	47.253	10.135	AV
7			0.470	36.502	26.338	-20.012	56.514	10.164	QP
8			0.470	11.503	1.339	-35.011	46.514	10.164	AV
9			0.526	34.359	24.187	-21.641	56.000	10.172	QP
10			0.526	6.795	-3.377	-39.205	46.000	10.172	AV
11			13.078	25.721	15.608	-34.279	60.000	10.113	QP
12			13.078	12.589	2.476	-37.411	50.000	10.113	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

8. CONCLUSION

The data collected relate only the item(s) tested and show that the **VR All-In-One Headset** is in compliance with Part 15C of the FCC Rules.

The End