

# TEST REPORT

Reference No. .... : WTS17S0683356E  
FCC ID ..... : CCRVH212  
Applicant ..... : Sam Ash Music Corporation  
Address ..... : 262 Duffy Avenue Hicksville, NY 11801 USA  
Manufacturer ..... : The same as above  
Address ..... : The same as above  
Product Name ..... : Wireless Microphone  
Model No. .... : VH212  
Standards ..... : FCC CFR47 Part 74  
Date of Receipt sample... : 2017-06-28  
Date of Test ..... : 2017-06-29 to 2017-11-06  
Date of Issue ..... : 2017-11-06  
Test Result ..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

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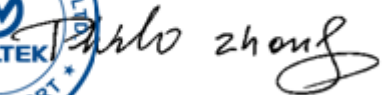
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Compiled by:



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Approved by:



Philo Zhong / Manager

## 2 Laboratories Introduction

**Waltek Services Test Group Ltd.** is one of the largest and the most comprehensive third party testing organizations in China, our headquarter located in Shenzhen (CNAS Registration No. L3110, A2LA Certificate Number: 4243.01) and have branches in Foshan (CNAS Registration No. L6478), Dongguan (CNAS Registration No. L9950), Zhongshan, Suzhou (CNAS Registration No. L7754), Ningbo and Hong Kong, Our test capability covered four large fields: safety test. Electronic Magnetic Compatibility(EMC), reliability and energy performance, Chemical test. Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CPSC(Consumer Product Safety Commission), CEC(California energy efficiency), IC(Industry Canada) and ELI(Efficient Lighting Initiative). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as UL, Intertek(ETL-SEMKO), CSA, TÜV Rheinland, TÜV SÜD, etc. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

### Waltek Services (Shenzhen) Co., Ltd.

#### A. Accreditations for Conformity Assessment (International)

Country/Region	Accreditation Body	Scope	Note
USA	<b>CNAS (Registration No.: L3110) A2LA (Certificate No.: 4243.01)</b>	FCC ID \ DOC \ VOC	1
Canada		IC ID \ VOC	2
Japan		MIC-T \ MIC-R	-
Europe		EMCD \ RED	-
Taiwan		NCC	-
Hong Kong		OFCA	-
Australia		RCM	-
India		WPC	-
Thailand	<b>International Services</b>	NTC	-
Singapore		IDA	-
Note:			
1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.			
2. IC Canada Registration No.: 7760A			

#### B. TCBs and Notify Bodies Recognized Testing Laboratory.

Recognized Testing Laboratory of ...	Notify body number
TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681

## 2 Test Summary

Test Items	Test Requirement	Test Method	Result
EIRP	74.861(e)(1)(i)	ANSI/TIA-603-E:2016	PASS
Modulation Characteristics	2.1047(a)	ANSI/TIA-603-E:2016	PASS
Occupied Bandwidth	2.1049(c)(1)	ANSI/TIA-603-E:2016	PASS
Radiated Emissions	2.1053 & 74.861(e)(6)	ANSI/TIA-603-E:2016	PASS
Spurious emissions at antenna terminals	2.1051	ANSI/TIA-603-E:2016	PASS
Frequencies Stability	2.1055(a)(1)	ANSI/TIA-603-E:2016	PASS
RF Exposure	1.1307(b)(1)	KDB 447498 D01	PASS

Remark:  
PASS means that the test results complies with related requirements.  
N/A means that the test is not applicable for the EUT.

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#### 4 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS17S06833 56E	2017-06-28	2017-06-29 to 2017-11- 06	2017-11-06	original	-	Valid

## 5 General Information

### 5.1 General Description of E.U.T

<b>Product Name</b>	: Wireless Microphone
<b>Model No.</b>	: VH212
<b>Differences describe</b>	: N/A
<b>Operation Frequency</b>	: 174MHz~199MHz
<b>The Lowest Oscillator</b>	: 16MHz
<b>Antenna installation</b>	: Integrated Antenna
<b>Gain</b>	: -0.45dBi

### 5.2 Details of E.U.T

<b>Technical Data</b>	: Input: DC 3V power by batteries
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## 6 Equipment Used during Test

### 6.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions Test site						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP	100091	2017-04-28	2018-04-27
2	EMI Test Receiver	R&S	ESCI	100947	2017-09-11	2018-09-10
3	Pre-amplifier	Agilent	8447F	3113A06717	2017-04-18	2018-04-17
4	Pre-amplifier	Compliance Direction	PAP-0118	24002	2017-09-14	2018-09-13
5	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2017-04-08	2018-04-07
6	Horn Antenna	ETS	3117	00086197	2017-04-18	2018-04-17
7	Horn Antenna	ETS	3116B	00088203	2017-03-16	2018-03-15
8	Loop Antenna	SCHWARZECK	HFRA 5165	9365	2017-04-09	2018-04-08
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer	R&S	ESCI	101155	2017-09-16	2018-09-15
2.	Humidity Chamber	GF	GTH-225-40-1P	IAA061213	2017-05-14	2018-05-13
3.	DC Power Supply	EVERFINE	WY305	1004002	2017-04-09	2018-04-08
4.	Modulation Analyzer	HP	8920B	-	2017-04-09	2018-04-08

### 6.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	$\pm 1.0$ dB
RF Power Density	$\pm 2.2$ dB
Radiated Spurious Emissions test	$\pm 5.03$ dB (Bilog antenna 30M~1000MHz)
	$\pm 4.74$ dB (Horn antenna 1000M~25000MHz)



## 7 EIRP

Test requirement: FCC CFR47 Part 74 Section 74.861(e)(1)(ii)  
 Test method: Based on ANSI/TIA-603-E:2016  
 Limit: According to Part 74.861(e)(1)(ii), the EIRP shall not exceed 250mW (23.98 dBm).

### 7.1 Test Procedure

The maximum peak output power was measured with a spectrum analyzer connected to the antenna terminal (conducted measurement) while EUT was operating in normal situation.

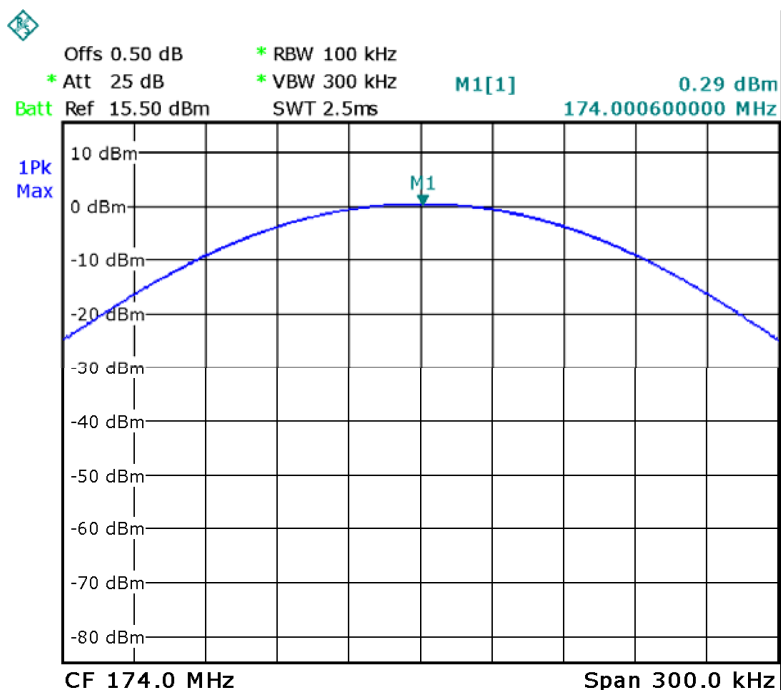
### 7.2 Test result

Frequency (MHz)	RF Output Power (dBm)	Ant Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result
174	0.29	-0.45	-0.16	23.98	PASS
199	0.96	-0.45	0.51	23.98	PASS

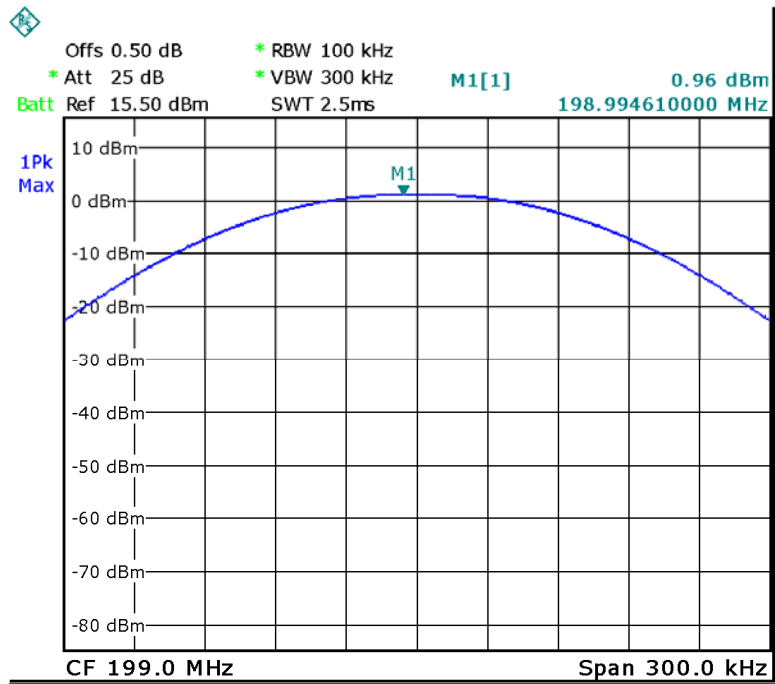
Remark: EIRP = RF Output Power + Ant Gain-L<sub>C</sub>,G= -0.45dBi, L<sub>C</sub>=0

Please refer to following plot:

Low channel



### High channel

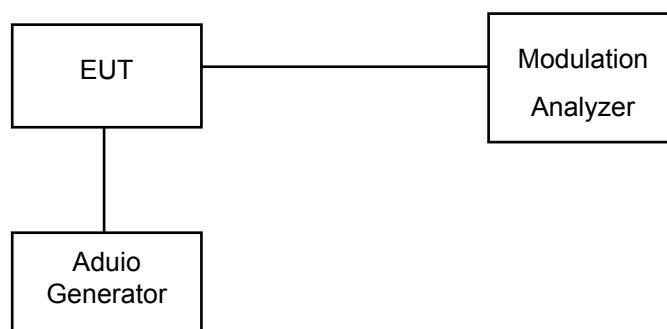


## 8 Modulation Characteristics

Test requirement:	FCC CFR47 Part 2 Section 2.1047(a)
Test method:	Based on ANSI/TIA-603-E:2016
Requirement:	According to Part 2.1047(a), for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100Hz to 5000Hz shall be measured.

### 8.1 Test Procedure

#### (a) Test Configuration



#### (b) Audio Frequency Response:

- 1) Apply a 1000 Hz tone and adjust the audio frequency generator to produce 20% of the rated system deviation.
- 2) Set the test receiver to measure rms deviation and record the deviation reading as  $DEV_{REF}$ .
- 3) Set the audio frequency generator to the desired test frequency between 100 Hz and 5000 Hz.
- 4) Record the test receiver deviation reading as  $DEV_{FREQ}$ .
- 5) Calculate the audio frequency response at the present frequency as:  

$$\text{audio frequency response} = 20\lg(DEV_{FREQ} / DEV_{REF})$$
- 6) Repeat steps 4) through 5) for all the desired test frequencies.

#### (c) Modulation Limiting:

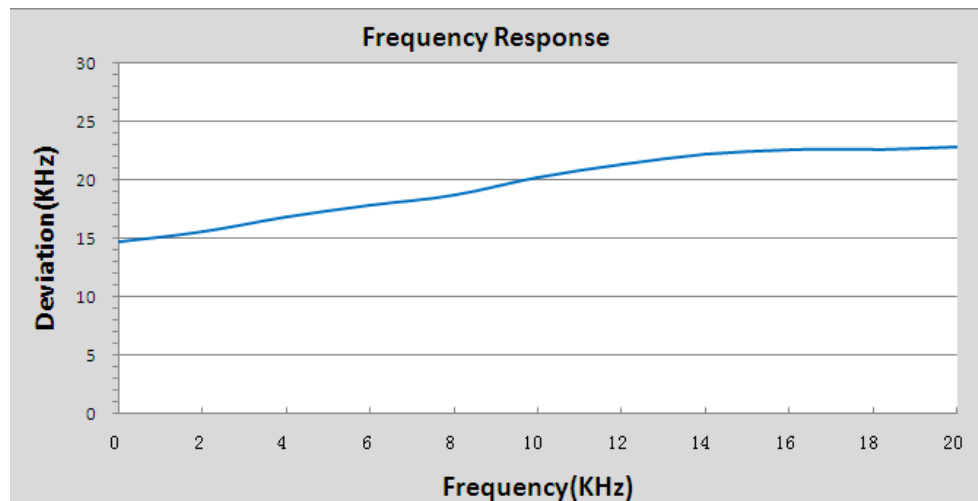
- 1) Apply a 1000 Hz modulating signal to the transmitter from the audio frequency generator, and adjust the level to obtain 60% of full rated system deviation.
- 2) Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level.
- 3) With the level from the audio frequency generator held constant at the level obtained in step e), slowly vary the audio frequency from 300 Hz to 3000 Hz and observe the steady-state deviation. Record the maximum deviation.
- 4) Set the test receiver to measure peak negative deviation and repeat steps 1) through 3).
- 5) The values recorded in steps 3) and 4) are the modulation limiting.

## 8.2 Test Result

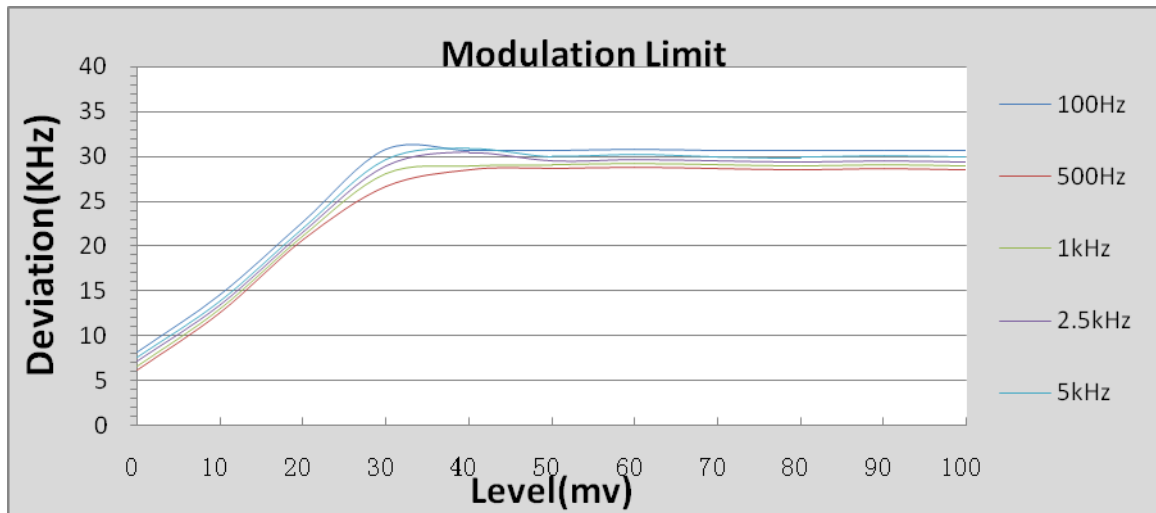
The test data of modulation characteristic is showing as below:

Audio Frequency Response

Low Channel



Level(mv )	100Hz	500Hz	1kHz	2.5kHz	5kHz	Limit(kHz )
0	8.23	6.17	6.61	7.06	7.47	±75.00
10	14.61	12.56	13.02	13.45	13.90	±75.00
20	23.06	20.96	21.43	21.88	22.28	±75.00
30	31.14	27.00	28.42	29.18	29.89	±75.00
40	30.87	28.82	29.22	30.63	31.05	±75.00
50	30.94	28.85	29.33	29.73	30.21	±75.00
60	30.93	28.73	29.22	29.62	30.09	±75.00
70	31.00	28.95	29.44	29.91	30.32	±75.00
80	30.96	28.94	29.40	29.84	30.32	±75.00
90	31.02	28.93	29.43	29.92	30.42	±75.00
100	30.98	28.95	29.40	29.88	30.33	±75.00



## 9 Occupied Bandwidth of Emission

Test requirement: FCC CFR47 Part 2 Section 2.1049©(1)  
 Test method: Based on ANSI/TIA-603-E:2016  
 Limit: According to FCC 74.861 (e)(5), the frequency emission bandwidth shall not exceed 200 kHz.

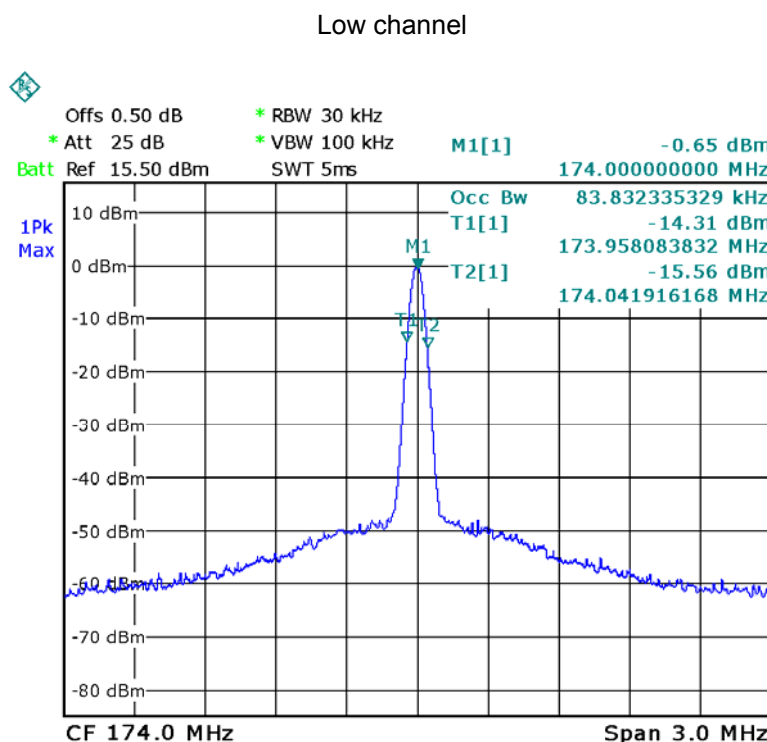
### 9.1 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and set it to any one convenient frequency within its operating range.

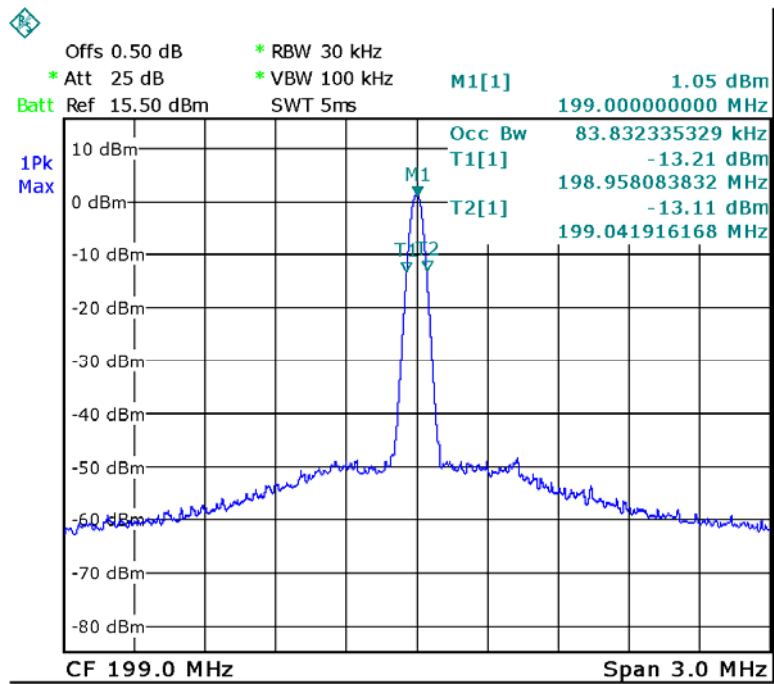
### 9.2 Test Result

Frequency (MHz)	99% Bandwidth (kHz)	Limit (kHz)	Result
174	83.832	200	PASS
199	83.832	200	PASS

Test Plot:



High channel



## 10 Spurious Emissions at Antenna Terminals

Test requirement:	FCC CFR47 Part 2 Section 2.1053
Test method:	Based on ANSI/TIA-603-E:2016
Limit:	According to Part 74.861 (e)(6), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule: (i) on any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB. (ii) on any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB. (iii) on any frequency removed from the operating frequency by more than 250 percent up to and the authorized bandwidth shall be attenuated below the un-modulated carrier by at least $43 + 10 \text{ Log}(\text{output power in watts})$ dB.

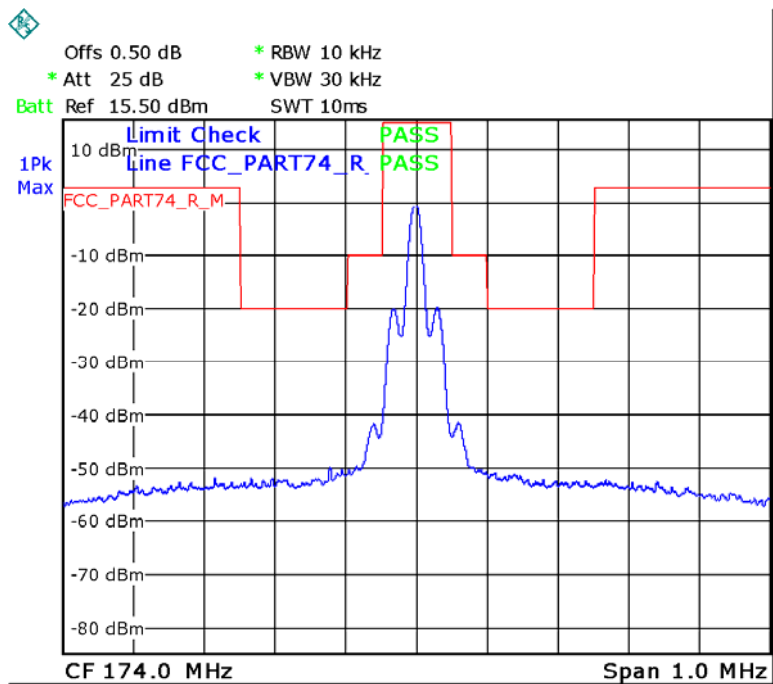
### 10.1 Test Procedure

1. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
2. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.
3. Set the SA on View mode and then plot the result on SA screen.
4. Repeat above procedures until all frequencies measured were complete.

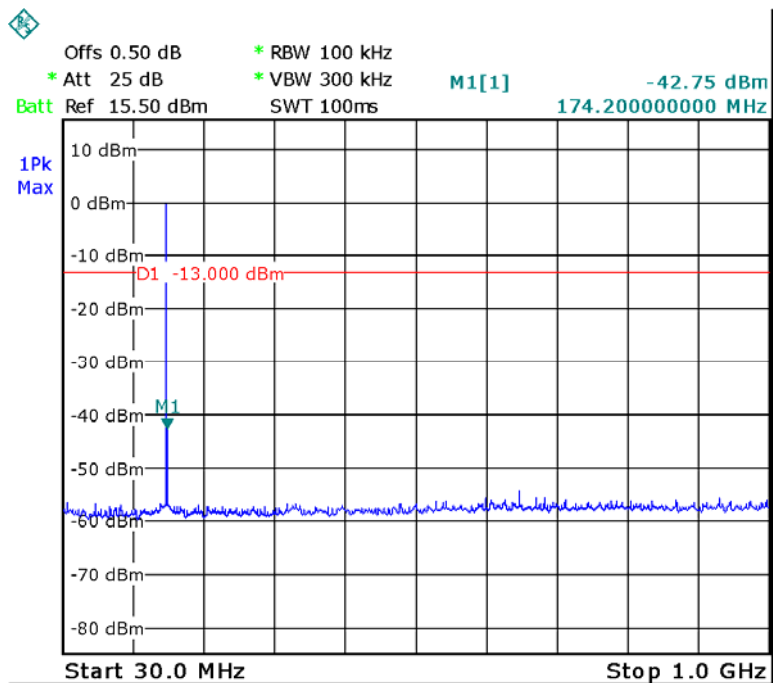


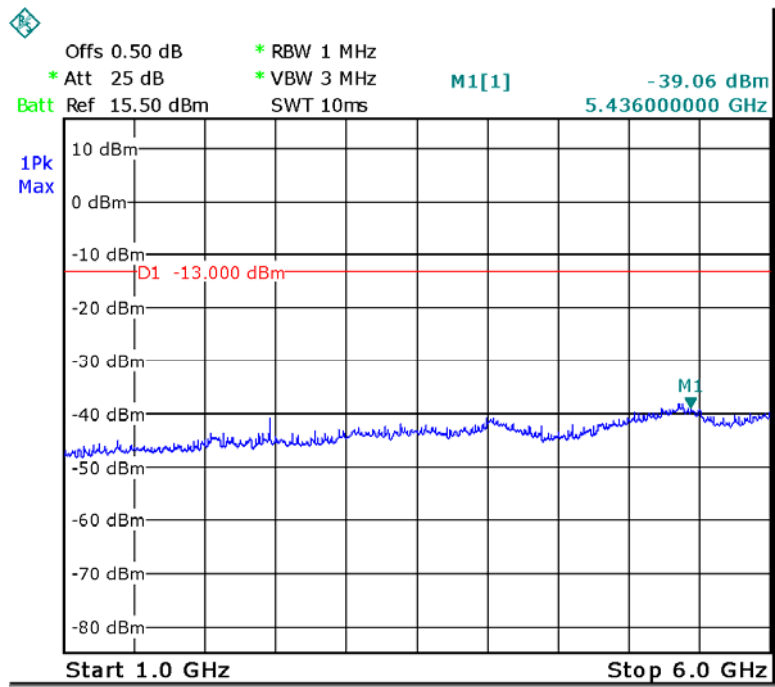
### 10.2 Test Data

#### Emission Mask Low Channel

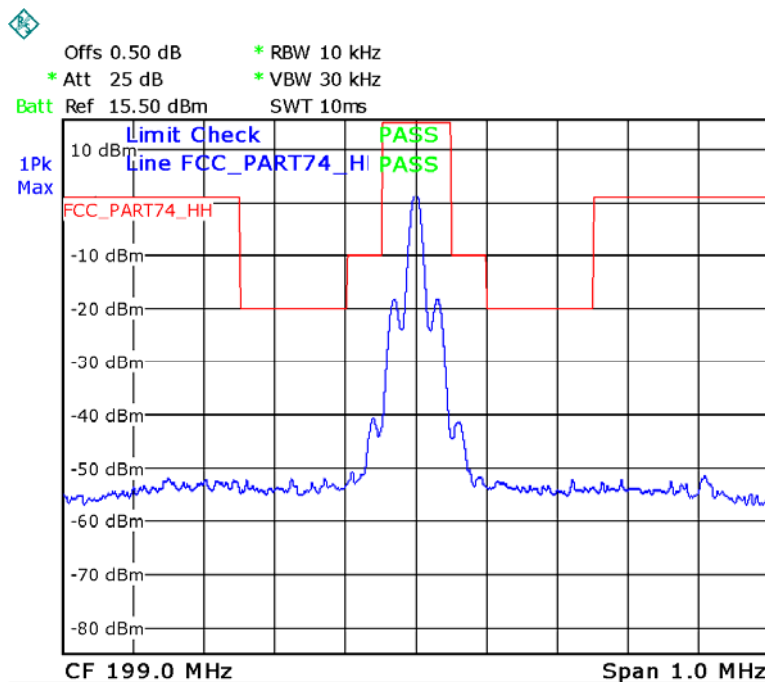


#### Low channel 30M-6G

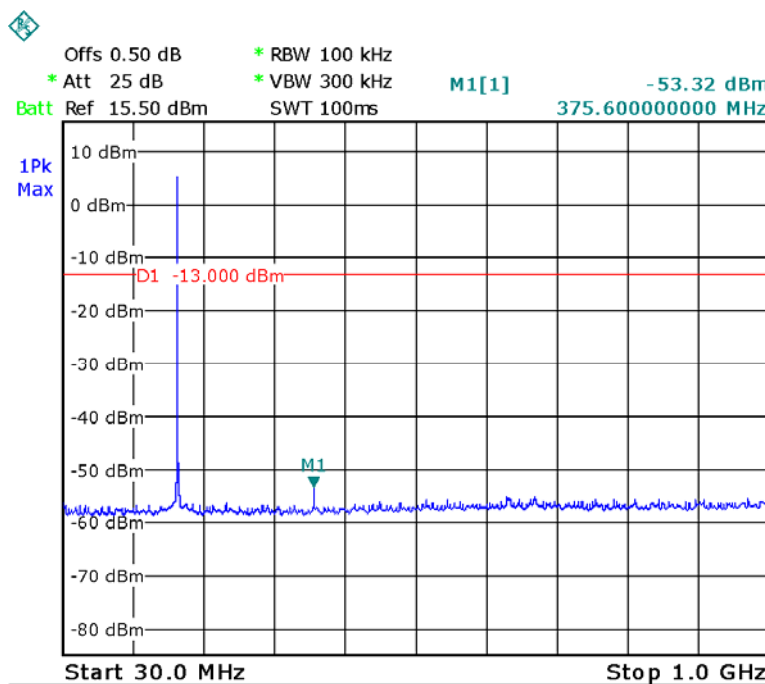


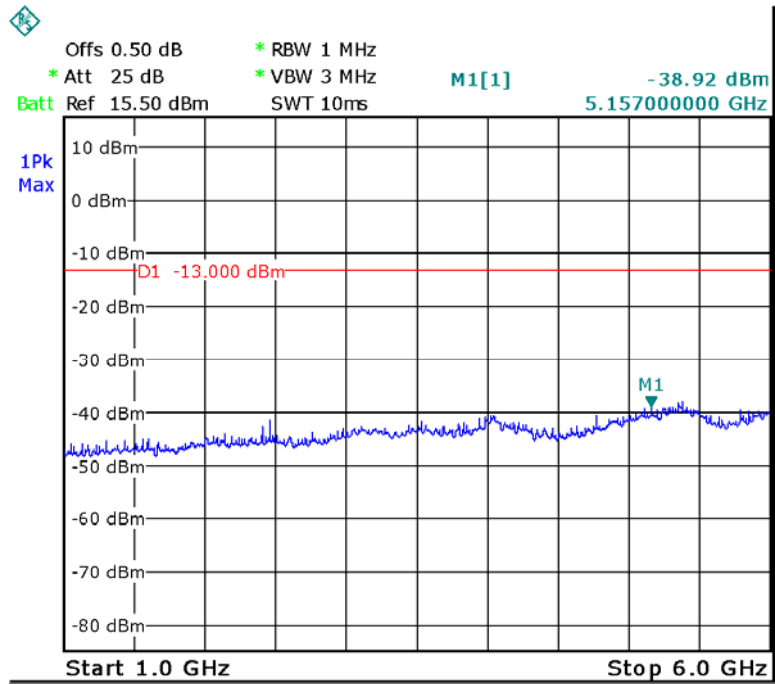


### Emission Mask High Channel



### High channel 30M-6G





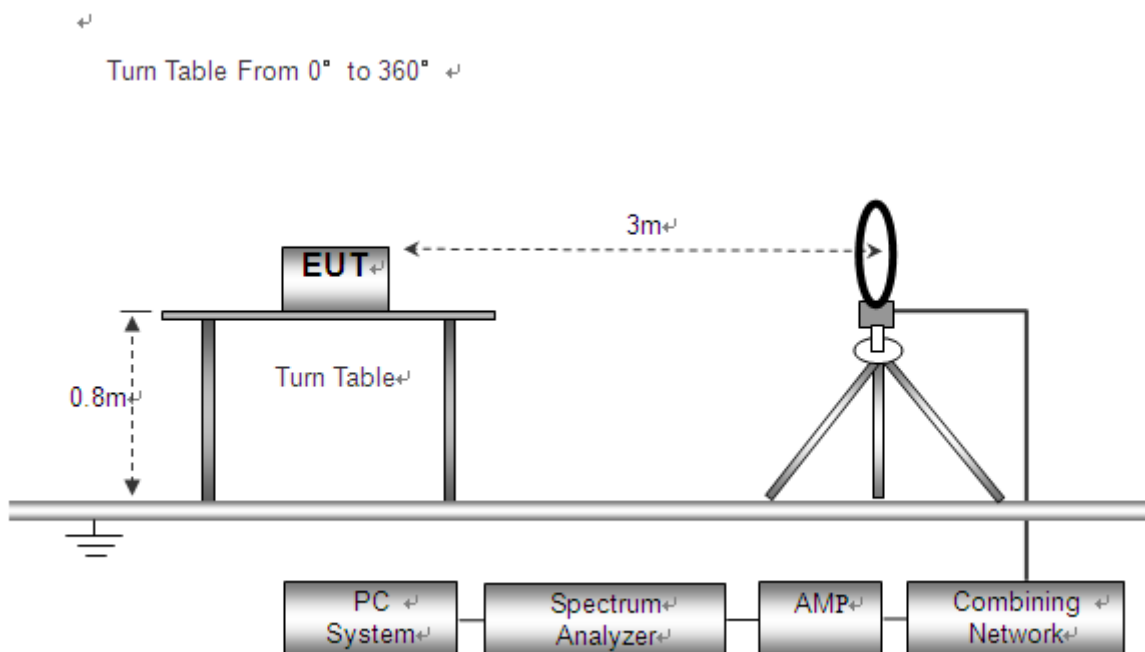
## 11 Radiated Emission Test

Test requirement:	FCC CFR47 Part 2 Section 2.1053
Test method:	Based on ANSI/TIA-603-E:2016
Limit:	According to Part 74.861 (e)(6), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule: <ul style="list-style-type: none"> <li>(i) on any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.</li> <li>(ii) on any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.</li> <li>(iii) on any frequency removed from the operating frequency by more than 250 percent up to and the authorized bandwidth shall be attenuated below the un-modulated carrier by at least <math>43 + 10 \text{ Log (output power in watts)dB}</math>.</li> </ul>

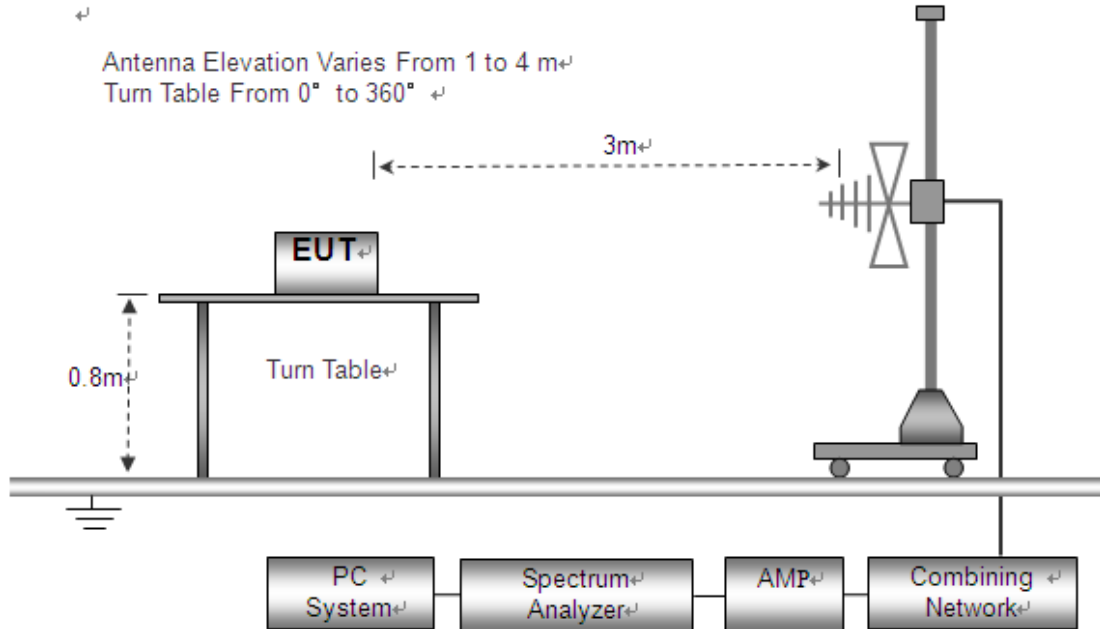
### 11.1 EUT Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4

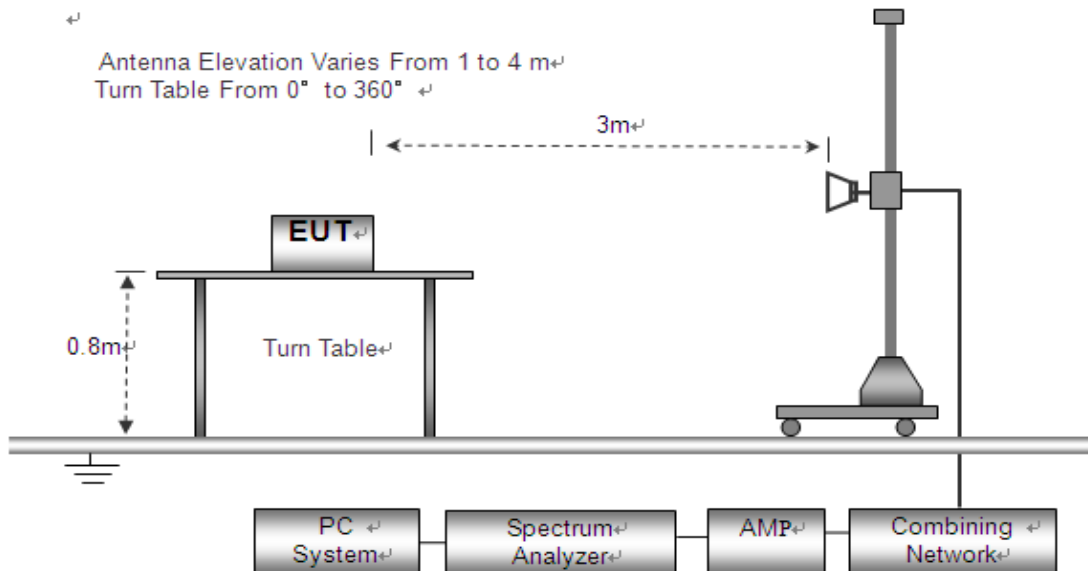
The test setup for emission measurement below 30MHz.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz Emissions.



### 11.2 Spectrum Analyzer Setup

According to FCC Part 2 Section 2.1053 Rules, the system was tested 9KHz to 6000MHz.

Below 30MHz	
Sweep Speed .....	Auto
IF Bandwidth.....	10kHz
Video Bandwidth.....	10kHz
Resolution Bandwidth.....	10kHz
30MHz ~ 1GHz	
Start Frequency .....	30 MHz
Stop Frequency.....	1000MHz
Sweep Speed.....	Auto
IF Bandwidth .....	120 KHz
Video Bandwidth .....	300KHz
Quasi-Peak Adapter Bandwidth.....	120 KHz
Quasi-Peak Adapter Mode .....	Normal
Resolution Bandwidth .....	100KHz
Above 1GHz	
Start Frequency .....	1000 MHz
Stop Frequency.....	7000MHz
Sweep Speed.....	Auto
IF Bandwidth .....	120 KHz
Video Bandwidth .....	3MHz
Quasi-Peak Adapter Bandwidth.....	120 KHz
Quasi-Peak Adapter Mode .....	Normal
Resolution Bandwidth .....	1MHz

### 11.3 Test Procedure

1. Place the transmitter to be tested on the turntable in the standard test site. The transmitter is Transmitting into a non-radiating load, which is placed on the turntable.
2. The output of the antenna was connected to the measuring receiver and a peak detector was used for the measurement as indicated on the report.
3. The transmitter was switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
4. The test antenna shall be raised and Lowed through the specified range of height until the measuring receiver detects a maximum signal level.
5. The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
6. The test antenna shall be raised and Lowed again through the specified range of height until the measuring receiver detects a maximum signal level.
7. The maximum signal level detected by the measuring receiver shall be noted.
8. The measurement shall be repeated with the test antenna set to horizontal polarization.

9. Replace the antenna with a proper antenna (substitution antenna).
10. The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
11. The substitution antenna shall be connected to a calibrated signal generator.
12. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
13. The test antenna shall be raised and Lowered through the specified range of the height to ensure that the maximum signal is received.
14. The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
15. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16. The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
17. The radiation emission was tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.
18. The EUT was under working mode during the final qualification test and the configuration was used to represent the worst case results.



## 11.4 Test Result

### Test Frequency : 9kHz ~ 30MHz

The measurements were more than 20 dB below the limit and not reported.

### Test Frequency : 30MHz ~ 1GHz

Frequency	Detector	Ant.	Antenna Height	Turntable Angle	Emission Level	Limit	Margin
(MHz)		Pol	(m)	(°)	(dBm)	(dBm)	(dB)
<b>Low Channel</b>							
346.00	Peak	H	1.4	298	-32.37	-13	-19.37
346.00	Peak	V	1.8	35	-37.25	-13	-24.25
519.00	Peak	H	1.2	0	-50.49	-13	-37.49
519.00	Peak	V	1.6	270	-52.55	-13	-39.55
692.00	Peak	H	1.1	163	-50.07	-13	-37.07
692.00	Peak	V	1.7	5	-52.24	-13	-39.24
<b>High Channel</b>							
398.00	Peak	H	1.3	357	-38.54	-13	-25.54
398.00	Peak	V	1.5	227	-40.02	-13	-27.02
597.00	Peak	H	1.8	221	-51.35	-13	-38.35
597.00	Peak	V	1.0	252	-52.07	-13	-39.07
796.00	Peak	H	1.4	326	-51.39	-13	-38.39
796.00	Peak	V	1.4	159	-51.93	-13	-38.93

The measurements above 1G were more than 20 dB below the limit and not reported.

## 12 Frequency Stability

Test requirement:	FCC CFR47 Part 2 Section 2.1055(a)(a)
Test method:	Based on ANSI/TIA-603-E:2016
Limit:	According to FCC 74.86(e)(4), the frequency tolerance of the transmitter shall be 0.005 percent.

### 12.1 Test Configuration

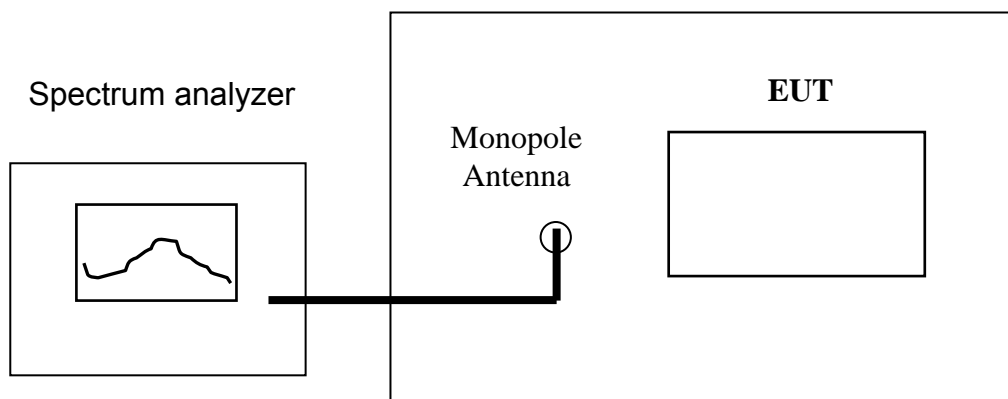


Figure 1

### 12.2 Test Procedure

#### A) Frequency stability versus input voltage

1. Setup the configuration per figure 1 for frequencies measured at an environmental chamber whose temperature is set to 20 °C. Install new batteries in the EUT.
2. Set SA center frequency to the EUT operation frequency. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.
3. Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

#### B) Frequency stability versus environmental temperature

1. Setup the configuration per figure 1 for frequencies measured at an environmental chamber, Install new batteries in the EUT.
2. Turn on EUT and set SA center frequency to the EUT operation frequency, then set SA RBW to 30kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.
3. Set the temperature of chamber to 50°C. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a 10°C decreased per stage until the lowest temperature -30°C is measured, record all measurement frequencies.

### 12.3 Test Result

a) Frequency stability versus input voltage

Low channel

Power Supply	Reference Frequency (MHz)	Environment Temperature (°C)	Frequency Measured	Frequency Tolerance (%)
3V, DC	174	20	173.997	0.00178
2.7V, DC	174	20	174.000	0.00014

High channel

Power Supply	Reference Frequency (MHz)	Environment Temperature (°C)	Frequency Measured	Frequency Tolerance (%)
3V, DC	199	20	199.003	0.00173
2.7V, DC	199	20	198.997	0.00173

Remark: The 2.7V is the end point voltage which is specified by the manufacturer.

## b) Frequency stability versus environmental temperature

<b>Low Channel Limit: 0.005%</b>			
<b>Environment Temperature(°C)</b>	<b>Power Supply</b>	<b>Frequency Deviation measured with time Elapse(30 minutes)</b>	
		<b>MHz</b>	<b>%</b>
50	3V, DC	174.001	0.00063
40	3V, DC	173.997	0.00167
30	3V, DC	174.002	0.00121
20	3V, DC	173.998	0.00122
10	3V, DC	173.998	0.00130
0	3V, DC	174.000	0.00019
-10	3V, DC	173.997	0.00178
-20	3V, DC	173.999	0.00084
-30	3V, DC	174.004	0.00208

<b>High channel Limit: 0.005%</b>			
<b>Environment Temperature(°C)</b>	<b>Power Supply</b>	<b>Frequency Deviation measured with time Elapse(30 minutes)</b>	
		<b>MHz</b>	<b>%</b>
50	3V, DC	199.001	0.00056
40	3V, DC	199.005	0.00254
30	3V, DC	199.004	0.00220
20	3V, DC	199.003	0.00165
10	3V, DC	198.998	0.00107
0	3V, DC	199.006	0.00288
-10	3V, DC	199.005	0.00252
-20	3V, DC	198.995	0.00237
-30	3V, DC	199.005	0.00238

Test Result: The max frequency tolerance rating is 0.00339% < 0.005%. Passed.

## 13 RF Exposure

Test Requirement: FCC Part 1.1307  
 Evaluation Method 447498 D01 General RF Exposure Guidance v05r02

### 13.1 Requirements

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR where

1.  $f(\text{GHz})$  is the RF channel transmit frequency in GHz
2. Power and distance are rounded to the nearest mW and mm before calculation
3. The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm is applied to determine SAR test exclusion.

### 13.2 The procedures / limit

Freq. (GHz)	conducted power (dBm)	conducted power (mW)	Source-based time-averaged maximum conducted output power (mW)	Minimum test separation distance required for the exposure conditions (mm)	Computed value	SAR Test Exclusion Thresholds(mW)
0.199	1.46=(0.96+0.5)	1.400	1.400	5	0.125	3

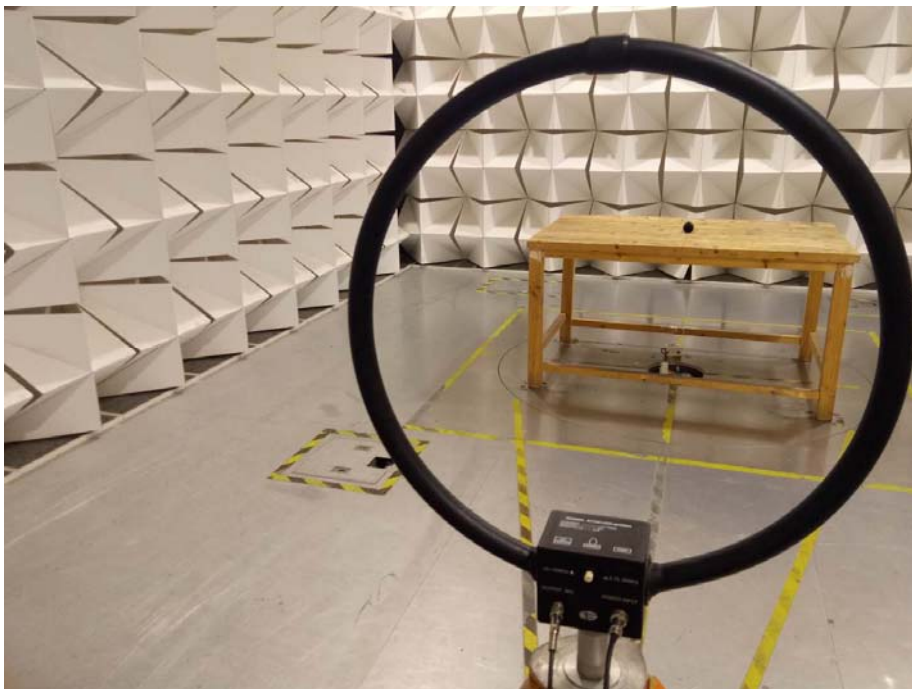
Remark: Max. duty factor is 100%

Calculation formula: Source-based time-averaged maximum conducted output power(mW)  
 =Conducted peak power(mW)\*Duty factor

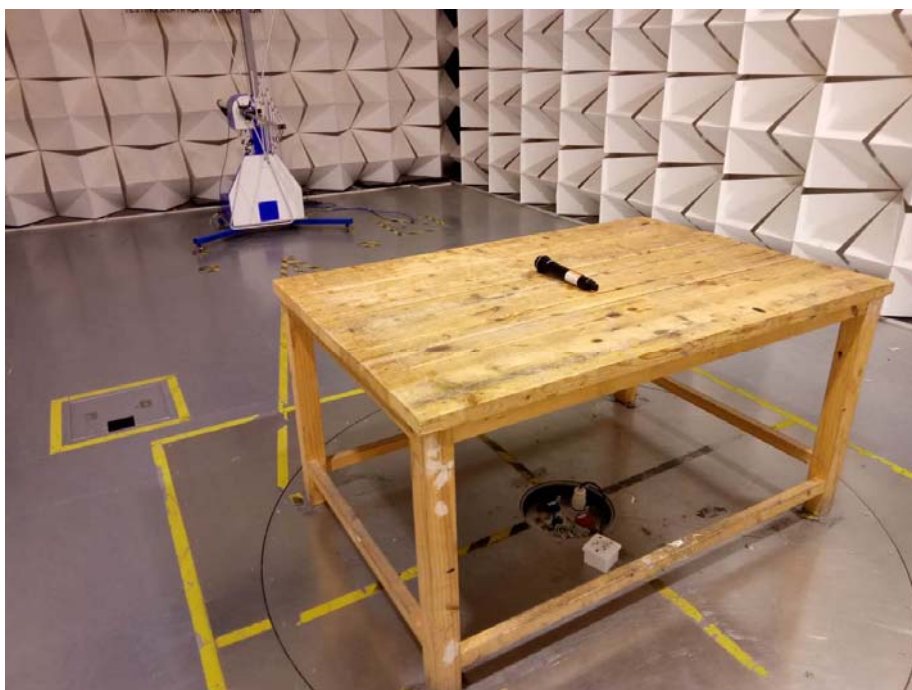
## 14 Photographs –Model TX: VH212 Test Setup

### 14.1 Photograph – Radiation Spurious Emission Test Setup

Below 30MHz

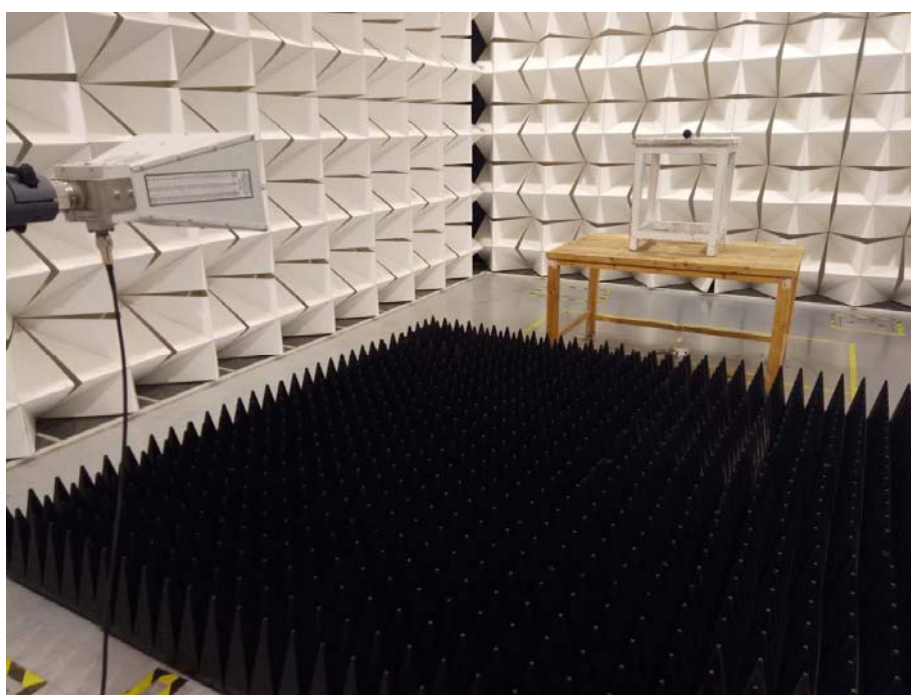
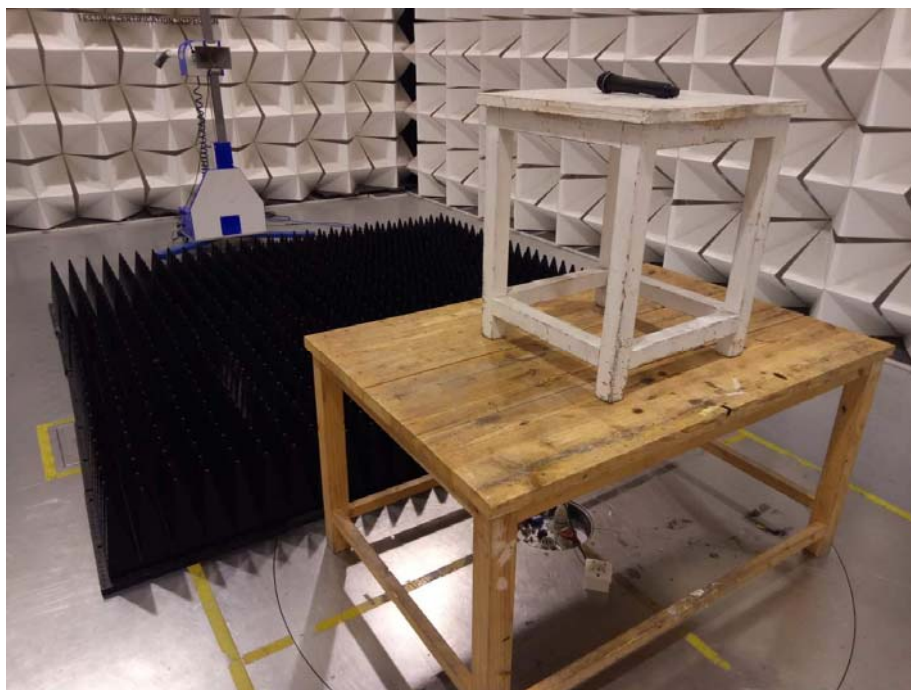


30MHz-1GHz





Above 1GHz





## 15 Photographs – Constructional Details

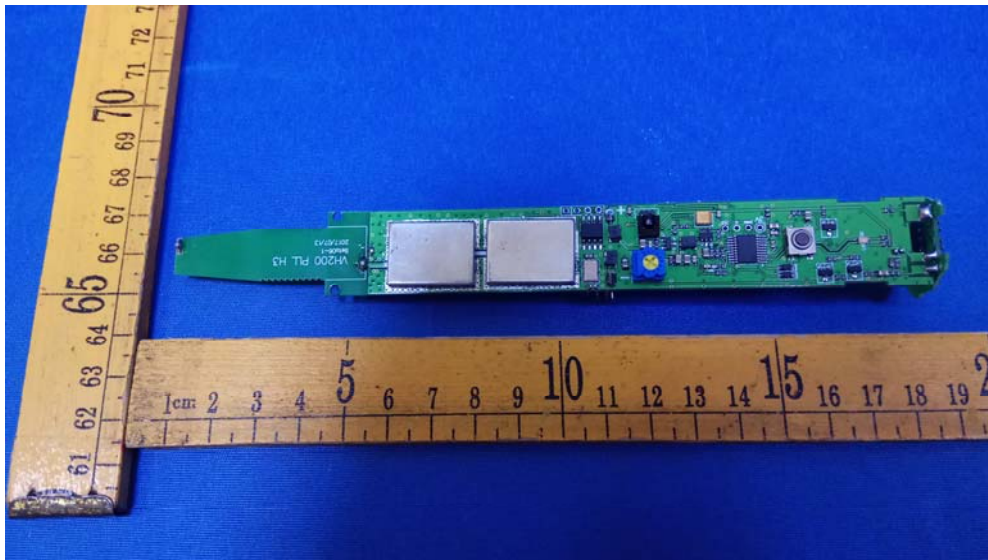
### 15.1 EUT –Model TX: VH212 External Photos



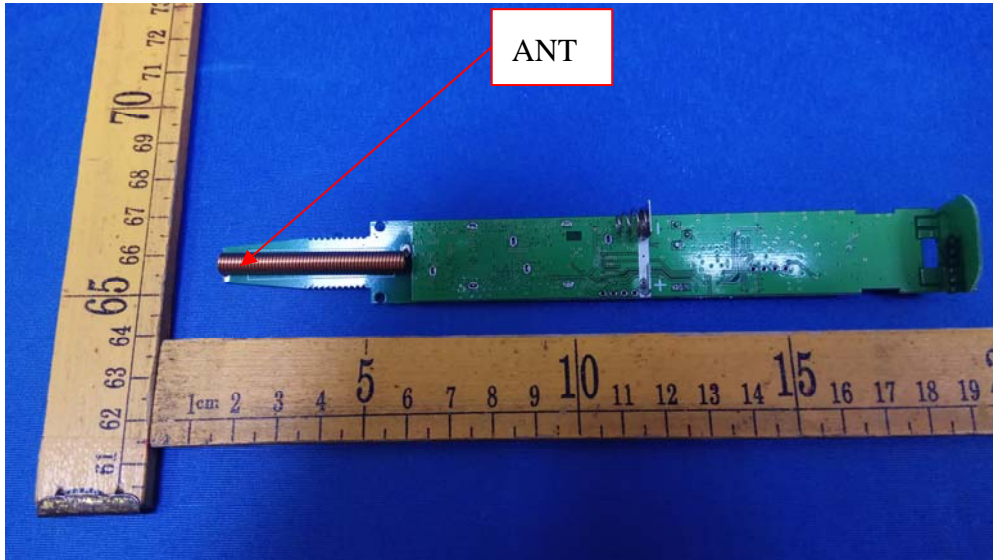


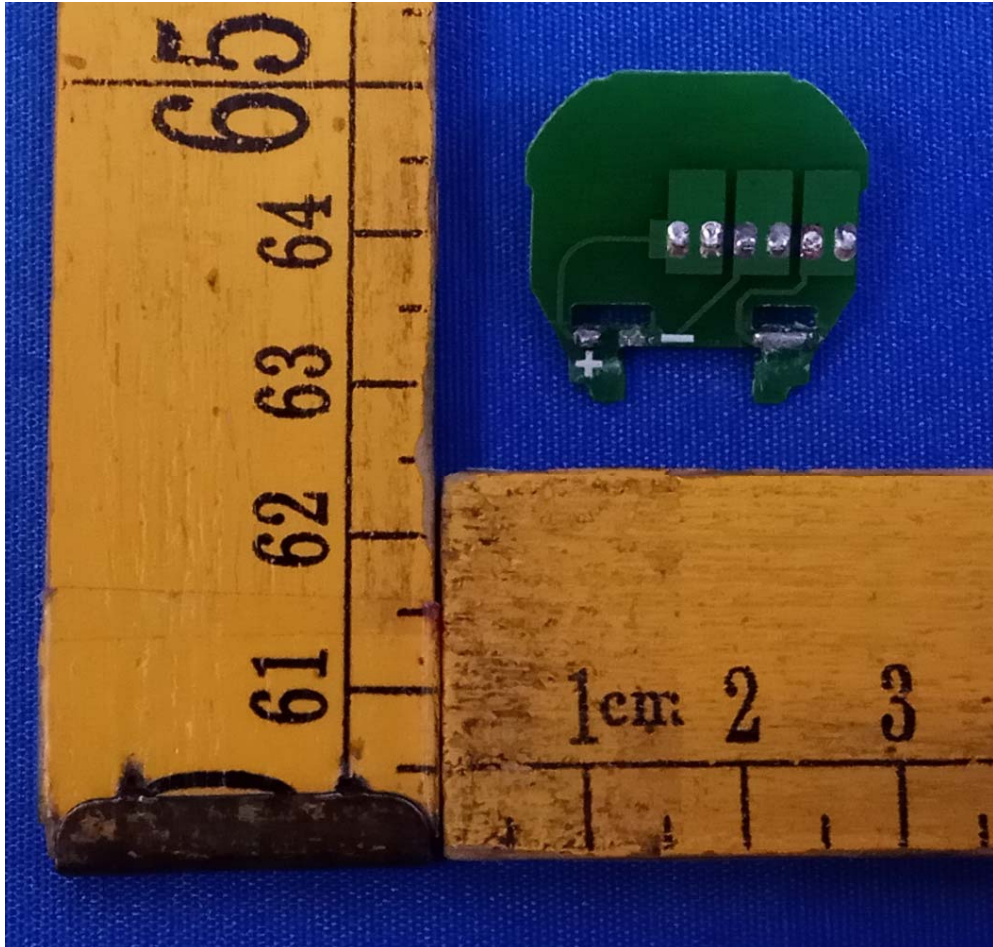


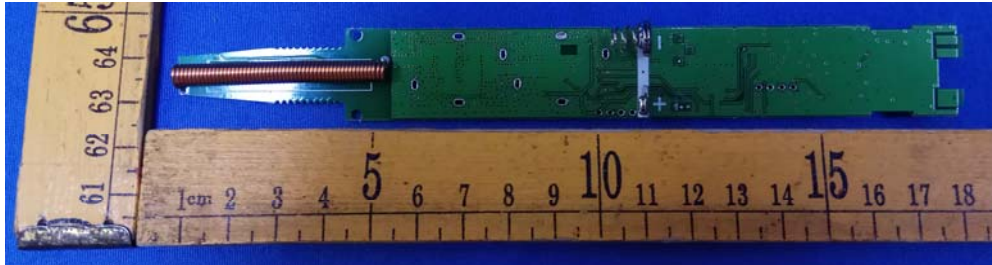
### 15.2 EUT –Model TX: VH212 Internal Photos















=====-End of Report=-====