EMTEK
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ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 74 SUBPART H REQUIREMENT

OF

Wireless Microphone

MODEL No.: W-1506D

Trademark: N/A

FCC ID: 2AHWN-W1506D

REPORT No: ED160601011E

ISSUE DATE: June 20, 2016

Prepared for

JOYAUDIO CO., LIMITED
Unit E15, 3/F, Wing Tat Commericial Building, 97 Bonham Street East, Sheung Wan, Hongkong

Prepared by

EMTEK(DONGGUAN) CO., LTD

No.281, Guantai Road, Nancheng District,
Dongguan, Guangdong, China
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VERIFICATION OF COMPLIANCE

Applicant:	JOYAUDIO CO., LIMITED Unit E15, 3/F, Wing Tat Commericial Building, 97 Bonham Street East, Sheung Wan, Hongkong
Manufacturer:	Foshan Nanhai Roby Electronics Co.,Ltd Shirong industrial Zone, Lishui Town, Nanhai Dist, Foshan City, Guangdong Province
Product Description:	Wireless Microphone
Trademark:	N/A
Model Number:	W-1506D
Serial Number:	N/A
File Number:	ED160601011E
Date of Test:	June 01, 2016 to June 20, 2016

We hereby certify that:

The above equipment was tested by EMTEK(DONGGUAN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 74 Subpart H.

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

Approved By

Sam lv / Manager
EMTEK(DONGGUAN) CO., LTD.

Table of Contents

1. GENERAL INFORMATION

1.1 Product Description

The JOYAUDIO CO., LIMITED Model: W-1506D (referred to as the EUT in this report). The EUT is a Wireless Microphone designed as Low Power Auxiliary Stations for transmitting voice only. It is designed by may of utilizing the FM modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

A). Frequency Tolerance: 0.005%
B). Modulation: FM
C). Max. Deviation Range: ±15KHz(Limit<±75KHz)
E). Spurious Emissions: <-55dBc
F). RF Output Power: 10mW
G). Frequency Adjustment: Fixed
B). Operation Frequency: 203.6MHZ
C). Power Supply: DC8V

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AHWN-W1506D filing to comply with FCC Part 74, Subpart H Rules.

1.3 Test Methodology

The radiated emission testing was performed according to the procedures of ANSI TIA/EIA 603-C:2004 and FCC CFR 47 2.1046, 2.1047,2.1051,2.1053, 2.1055 and 2.1057

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description

EMC Lab. : Registered on FCC, June 18, 2014
The Certificate Number is 247565

Registered on Industry Canada, February 19, 2014
The Certificate Number is 9444A.

Name of Firm : EMTEK(DONGGUAN) CO., LTD

Site Location : No.281, Guantai Road, Nancheng District,
Dongguan, Guangdong, China

2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.3 General Technical Requirements

a). Section 74.861(e)-1: Maximum Transmitter power less than 50mW
b). Section 74.861(e)-3: Peak Frequency Deviation less than 75KHz
c). Section 74.861(e)-4: Frequency Tolerance less than 0.005%
d). Section 74.861(e)-5: Emission Bandwidth shall less than 200KHz
e). Section 74.861(e)-6: Unwanted radiation

According to Section 74.861(1)-6, the mean power of emission shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

1). At least 25dB on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.

2). At least 35dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth.

3). At least $43+10\log_{10}(T)$dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	Wireless Microphone	N/A	W-1506D	2AHWN-W1506D	N/A	***EUT***

Note:

(1) Unless otherwise denoted as EUT in『Remark』column , device(s) used in tested system is a support equipment.

3. Summary Of Test Results

FCC Rules	Description Of Test	Result
§ 74.861(e)-1	Carrier Power	Compliant
§ 74.861(e)-3	Frequency Deviation	Compliant
§ 74.861(e)-4	Frequency Tolerance	Compliant
§ 74.861(e)-5	Operating Bandwidth	Compliant
§ 74.861(e)-6	Unwanted Radiation	Compliant

4. Description of test modes

The EUT (Wireless Microphone) has been tested under normal operating condition.
One channel of EUT have been chosen for testing under Normal Operating condition. In this report, all the measured datum of this channel have been reported. No software used to control the EUT for staying in continuous transmitting mode for testing.

Channel	Frequency(MHz)
1	203.60MHz

5. Maximum Transmitter Power

5.1 Provisions Applicable

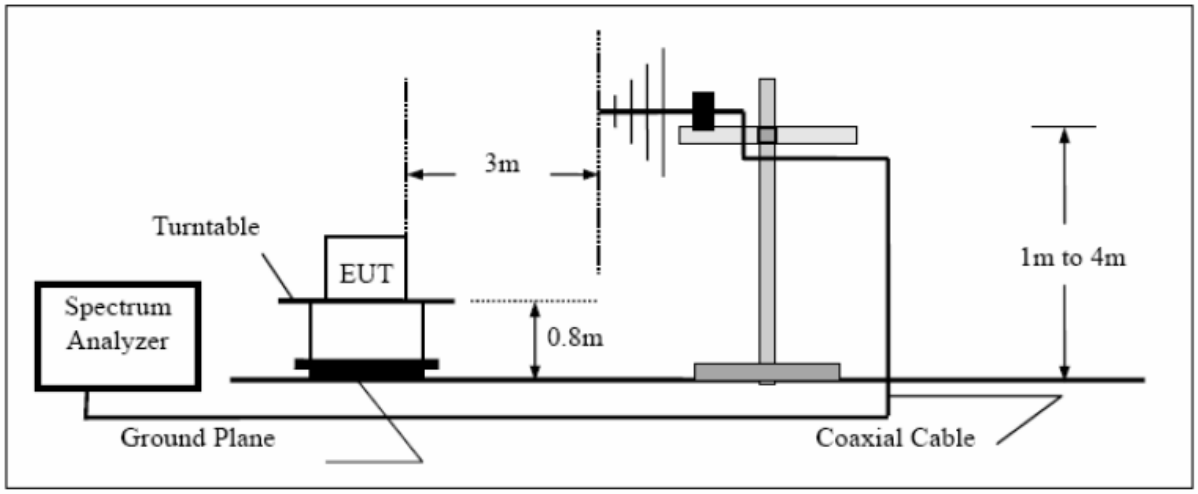
According to FCC Part 74 Section 74.861(e)-1: The power of the measured unmodulated carrier power at the output of the transmitter power amplifier may not exceed 50mW.

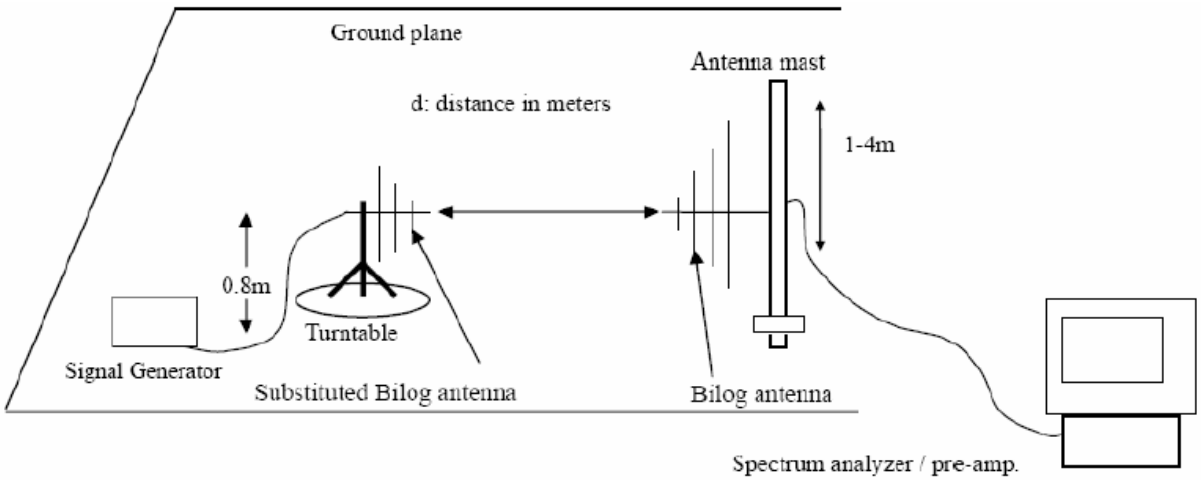
5.2 Measurement Procedure

1). On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
3). The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
4). The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
5). The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
6). The transmitter shall than be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7). The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
8). The maximum signal level detected by the measuring receiver shall be noted.
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 measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

5.3 Test SET-UP (Block Diagram of Configuration)

TEST SETUP OF SUBSTITUTION METHOD:





5.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ANRITSU	MS2661C	6200140915	05/29/2016	05/29/2017
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2016	05/29/2017
Pre-Amplifier	HP	8447D	2944A07999	05/29/2016	05/29/2017
Bilog Antenna	Schwarzbeck	VULB9163	142	05/29/2016	05/29/2017
Loop Antenna	ARA	PLA-1030/B	1029	05/29/2016	05/29/2017
Substitution Bilog Antenna	SCHAFFNER	CBL6143	5082	05/29/2016	05/29/2017
Substitution Loop Antenna	ARA	PLA-1030/B	1030	05/29/2016	05/29/2017
Signal Generator	Agilent	N5182B	My53050553	05/29/2016	05/29/2017

5.4 Measurement Result

The Output Power of Wireless Microphone

Operation Mode:	TX Mode	Test Date :	June 10, 2016
Test Item:	Output power	Temperature :	28 ℃
Test Result:	PASS	Humidity :	65 %
Fundamental:	203.60 MHz	Test By:	Sam

Freq. (MHz)	Ant.Pol. H/V	Reading (dBuV)	SGO/P (dBm)	Ant. Gain (dBi)	Dipole Gain (dB)	Cable (dB)	Corrected power (dBm)	Corrected power (mW)	Limit (mW)
203.60	V	26.38	-3.89	11.52	0	1.28	6.35	4.31	50
203.60	H	25.82	-4.68	11.52	0	1.28	5.56	3.59	50

Remark:

(1) Corrected Power (dBm) = SG O/P-Cable + Ant Gain

6. Modulation Characteristics

6.1 PROVISIONS APPLICABLE

a).According to CFR 47 section 2.1047(a), for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

b). According to CFR 47 section 74.861(e)-3, any form of modulation may be used. A maximum deviation of ±75 KHz is permitted when frequency modulation is employed.

6.2 MEASUREMENT METHOD

6.2.1 Modulation Limit

1). Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system deviation at 1KHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.
2). Repeat step 1 with input frequency changing to 300,1000,3000, and 11000Hz in sequence.

6.2.2 Audio Frequency Response

1). Configure the EUT as shown in figure 1.
2). Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0 dB).
3). Vary the Audio frequency from 100 Hz to 30 KHz and record the frequency deviation.

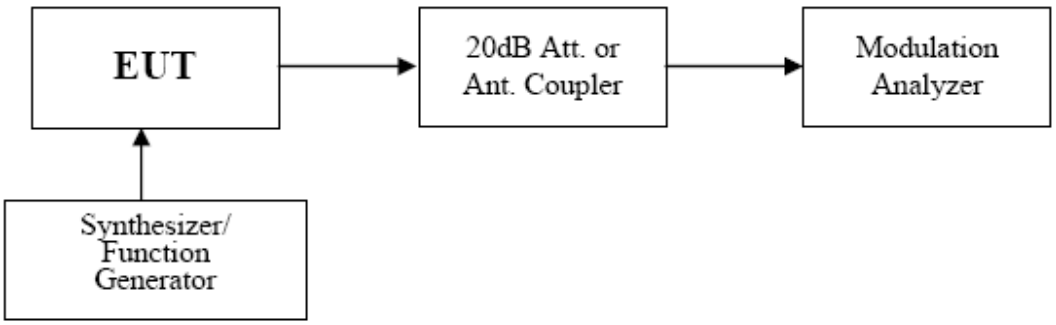


Figure 1: Modulation characteristic measurement configuration

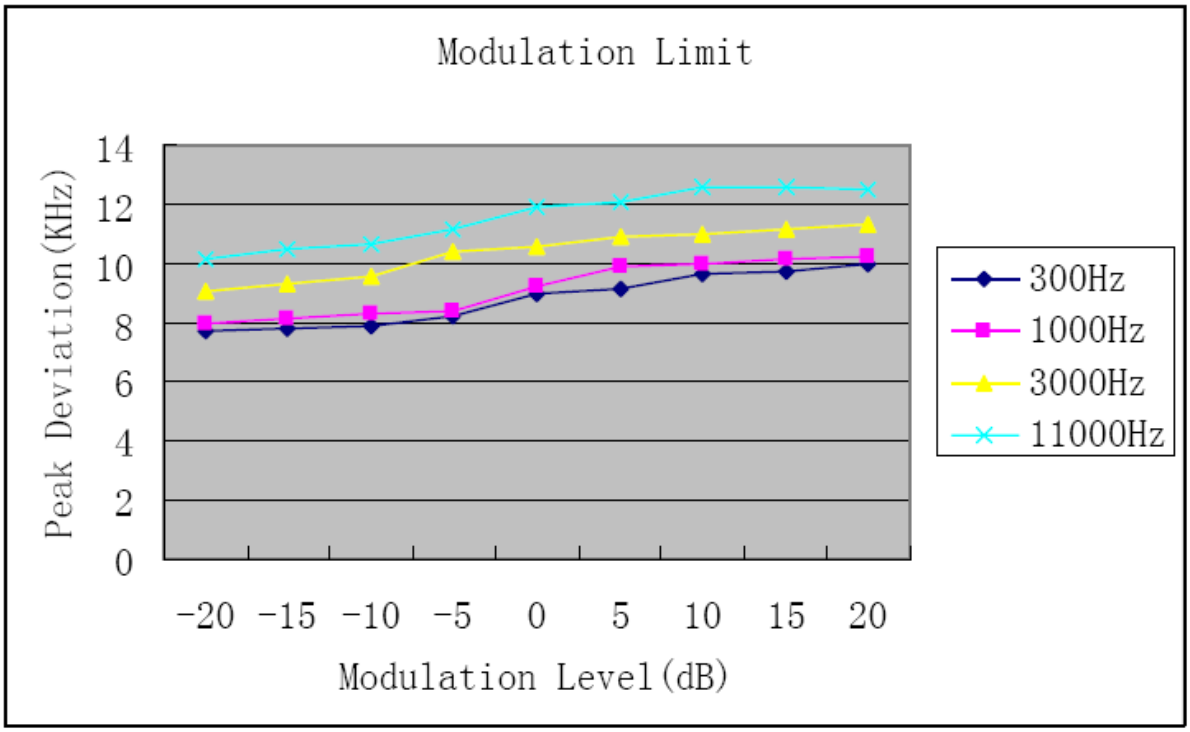
6.3 Measurement instruments

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ANRITSU	MS2661C	6200140915	05/29/2016	05/29/2017
Audio Signal Generator	HP	3325A	2561540502	05/29/2016	05/29/2017
Attenuator	MINI CIRCUITS	8920B	2484357000	05/29/2016	05/29/2017

6.4 Measurement Result

a). Modulation Limit:

Modulation Level (dB)	Peak Freq. Deviation At 300Hz(KHz)	Peak Freq. Deviation At 1000Hz(KHz)	Peak Freq. Deviation At 3000Hz(KHz)	Peak Freq. Deviation At 11000Hz(KHz)
-20	7.74	7.96	9.06	10.14
-15	7.77	8.12	9.28	10.52
-10	7.89	8.28	9.55	10.67
-5	8.25	8.35	10.38	11.15
0	8.97	9.25	10.56	11.88
+5	9.12	9.87	10.88	12.08
+10	9.65	9.98	11.01	12.60
+15	9.72	10.11	11.17	12.59
+20	9.94	1.22	11.34	12.48


Modulation Limit
Peak Deviation(KHz)
14
12
10
8
6
4
2
0
-20 -15 -10 -5 0 5 10 15 20
Modulation Level(dB)
300Hz
1000Hz
3000Hz
11000Hz

b). Audio Frequency Response:

Frequency(Hz)	Deviation(KHz)
100	1.47
200	1.56
300	1.72
400	1.50
500	0.81
600	0.90
700	0.70
800	0.82
900	0.67
1000	1.10
1200	1.68
1400	1.76
1600	1.91
1800	1.87
2000	1.92
2400	1.68
2800	1.70
3200	1.76
3600	1.85
4000	1.91
4500	1.98
5000	2.11
5500	2.35
6000	2.46
6500	2.83
7000	3.23
8000	3.32
9000	3.56
10000	3.53
12000	3.82
14000	3.91
16000	4.24
18000	4.13
20000	3.96
25000	3.60
30000	3.51

7. Frequency Tolerance

7.1 Provisions Applicable

a). According to FCC Part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from －30℃ to +50℃ centigrade.

b). According to FCC Part 2 Section 2.1055(d)(2), for hand carried battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.

c). According to FCC Part 74 Section 74.861(e)-4, the frequency tolerance must be maintained within 0.005%.

7.2 Measurement Procedure

7.2.1 Frequency stability versus environmental temperature

1. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.

2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz.Record this frequency as reference frequency.

3. Set the temperature of chamber to 50℃. 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.

1. Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured; Record all measured frequencies on each temperature step.

7.2.2 Frequency stability versus input voltage

1. Setup the configuration per figure 1 for frequencies measured at temperature if it is within 15℃ to 25℃. Otherwise, an environment chamber set for a temperature of 20℃ shall be used. Install new battery in the EUT.

2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz. Record this frequency as reference frequency.

3. For battery operated only device, supply the EUT primary voltage at the operating end point, which is specified by manufacturer, and record the frequency.

7.3 Test Setup Block diagram(Block diagram of configuration)

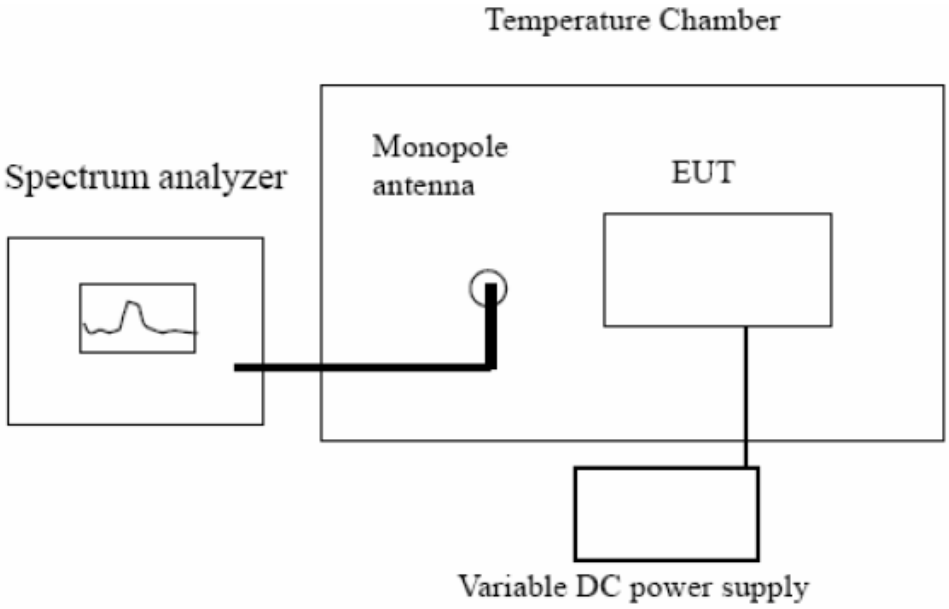


Figure 1

7.4 Test Equipment used:

EQUIPMENT TYPE	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Advantest Spectrum Analyzer	R3132	120901472	05/29/2016	05/29/2017
Shihin Temperature Chamber	BM50-CB	908	05/29/2016	05/29/2017
Huber+Suhner low loss cable	WYK-605	N/A	05/29/2016	05/29/2017
Monople Antenna	N/A	N/A	05/29/2016	05/29/2017

7.5 Test Result

a. Frequency Stability versus input voltage(battery operation end point voltage is 7.2V)

Wireless Microphone	Reference Frequency (MHz)	Frequency Measured at end point voltage	Frequency Error (%)	Limit (%)
Channel	203.60	203.6082	-0.00402	0.005

b. Frequency stability versus ambient temperature

Reference Frequency: 203.600MHz			Limit (%)±0.005%
Environment Temperature(℃)	Power Supply	Frequency deviation measured with time Elapse(30 minutes)	
		(MHz)	%
50	New Battery	203.6030	0.00147
40	New Battery	203.5992	-0.00039
30	New Battery	203.5965	-0.00172
20	New Battery	203.6063	0.00309
10	New Battery	203.5955	-0.00221
0	New Battery	203.5990	-0.00049
-10	New Battery	203.6035	0.00172
-20	New Battery	203.6024	0.00118
-30	New Battery	203.6005	0.00025

8. Emission Bandwidth

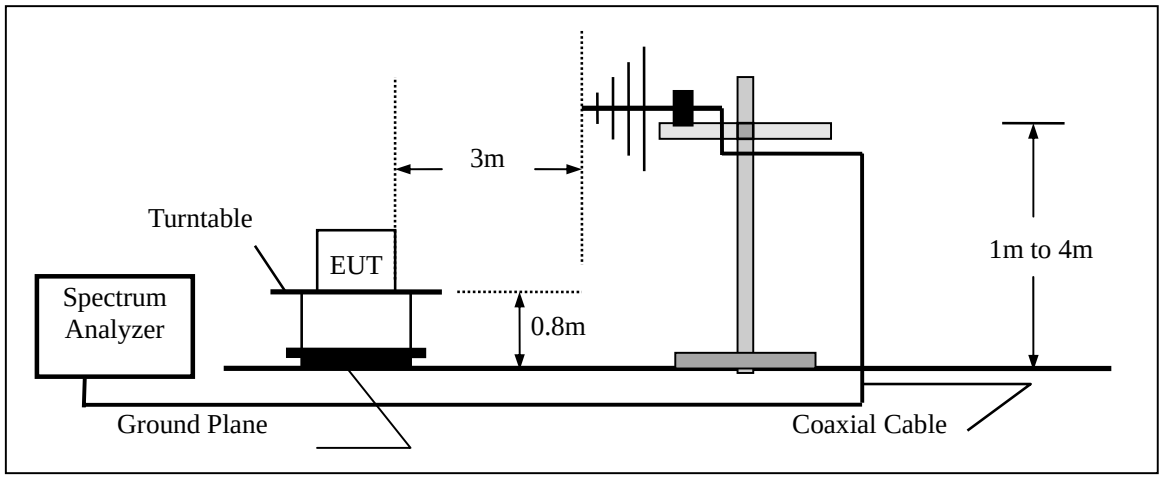
8.1 Provisions Applicable

According to FCC Part 74 Section 74.861(e)-5: The operation bandwidth shall not exceed 200 KHz

8.2 MEASUREMENT PROCEDURE

1). The EUT was placed on a turn table which is 0.8m above ground plane.
2). Set EUT as normal operation
3). Set SPA Center Frequency = fundamental frequency , RBW,VBW= 1 KHz, Span =200 KHz.
4). Set SPA Max hold. Mark peak, -26dB.

8.3 TEST SETUP BLOCK DIAGRAM (Block Diagram of Configuration)



8.4 Measurement Equipment used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ANRITSU	MS2661C	6200140915	05/29/2016	05/29/2017
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2016	05/29/2017
Pre-Amplifier	HP	8447D	2944A07999	05/29/2016	05/29/2017
Bilog Antenna	Schwarzbeck	VULB9163	142	05/29/2016	05/29/2017

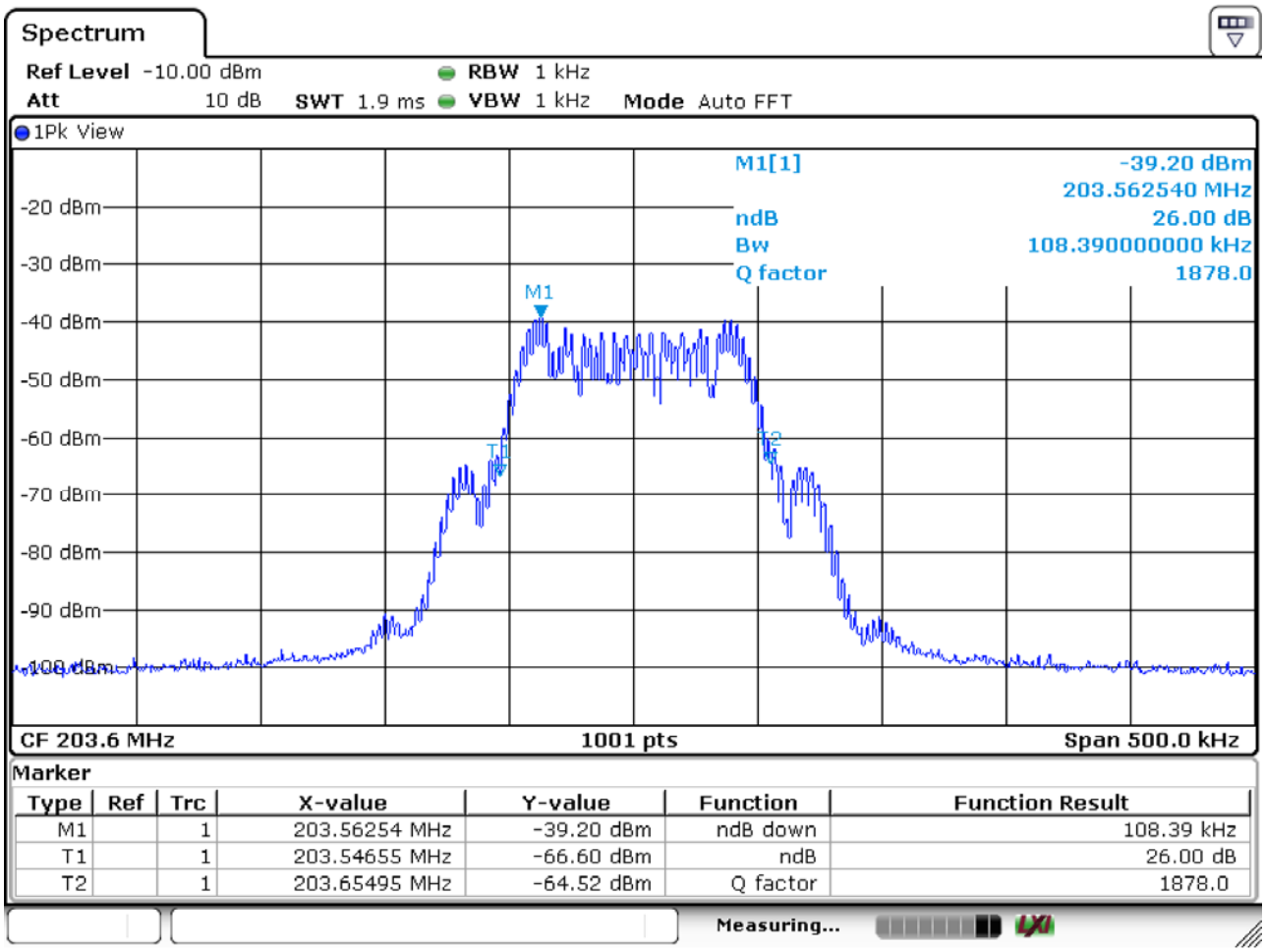
8.5 Measurement Result:

The Occupied bandwidth's plot is presented on the following pager, which illustrates compliance with the rules.

Calculation of Necessary Bandwidth (Bn)
Bn=2M+2KD
M=Max.Modulation Frequency =11KHz
D=Peak Frequency Deviation=12.60KHz
K=1
Bn=47.2KHz

Emission Type: F3E
Emission designator: 47K2F3E.

Refer to attached data chart



9. Unwanted Radiation

9.1 Provisions applicable

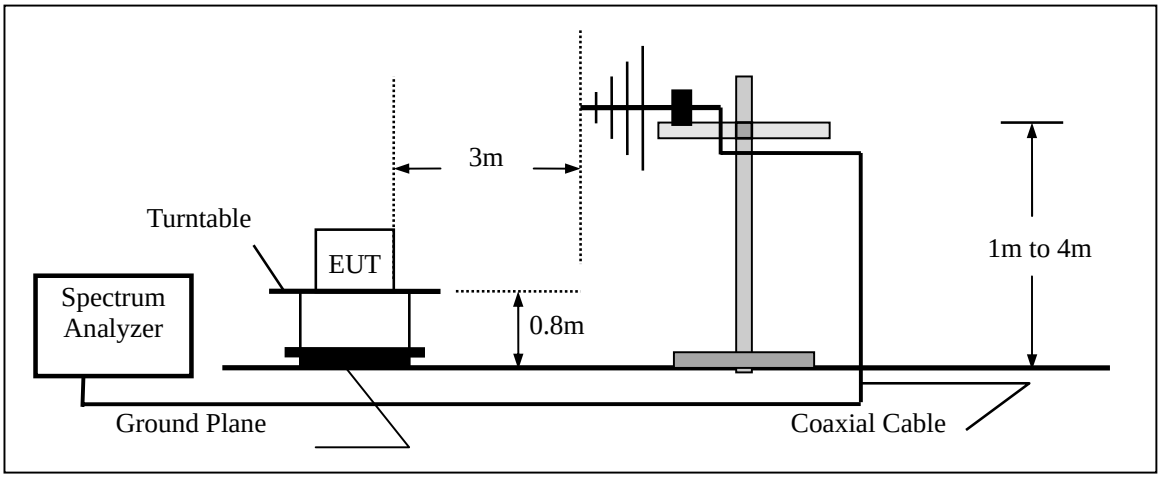
According to Section 74.861(e)-6, The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

1). 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;
2). 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;
3). On any frequency removed form the operating frequency.

9.2 MEASUREMENT PROCEDURE

1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
3). The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
4). The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
5). The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
6). The transmitter shall than be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7). The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
8). The maximum signal level detected by the measuring receiver shall be noted.
9). The measurement shall be repeated with the test antenna set to horizontal polarization.
10). Replace the antenna with a proper Antenna (substitution antenna).
11). 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.
12). The substitution antenna shall be connected to a calibrated signal generator.
13). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
14). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
15). 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.
16). 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.
17). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

9.3 Test Setup Block Diagram(block diagram of configuration)



9.4 Measurement Equipment used:

EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	ANRITSU	MS2661C	6200140915	05/29/2016	05/29/2017
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2016	05/29/2017
Pre-Amplifier	HP	8447D	2944A07999	05/29/2016	05/29/2017
Bilog Antenna	Schwarzbeck	VULB9163	142	05/29/2016	05/29/2017
Horn Antenna	ARA	DRG-118/A	105	05/29/2016	05/29/2017

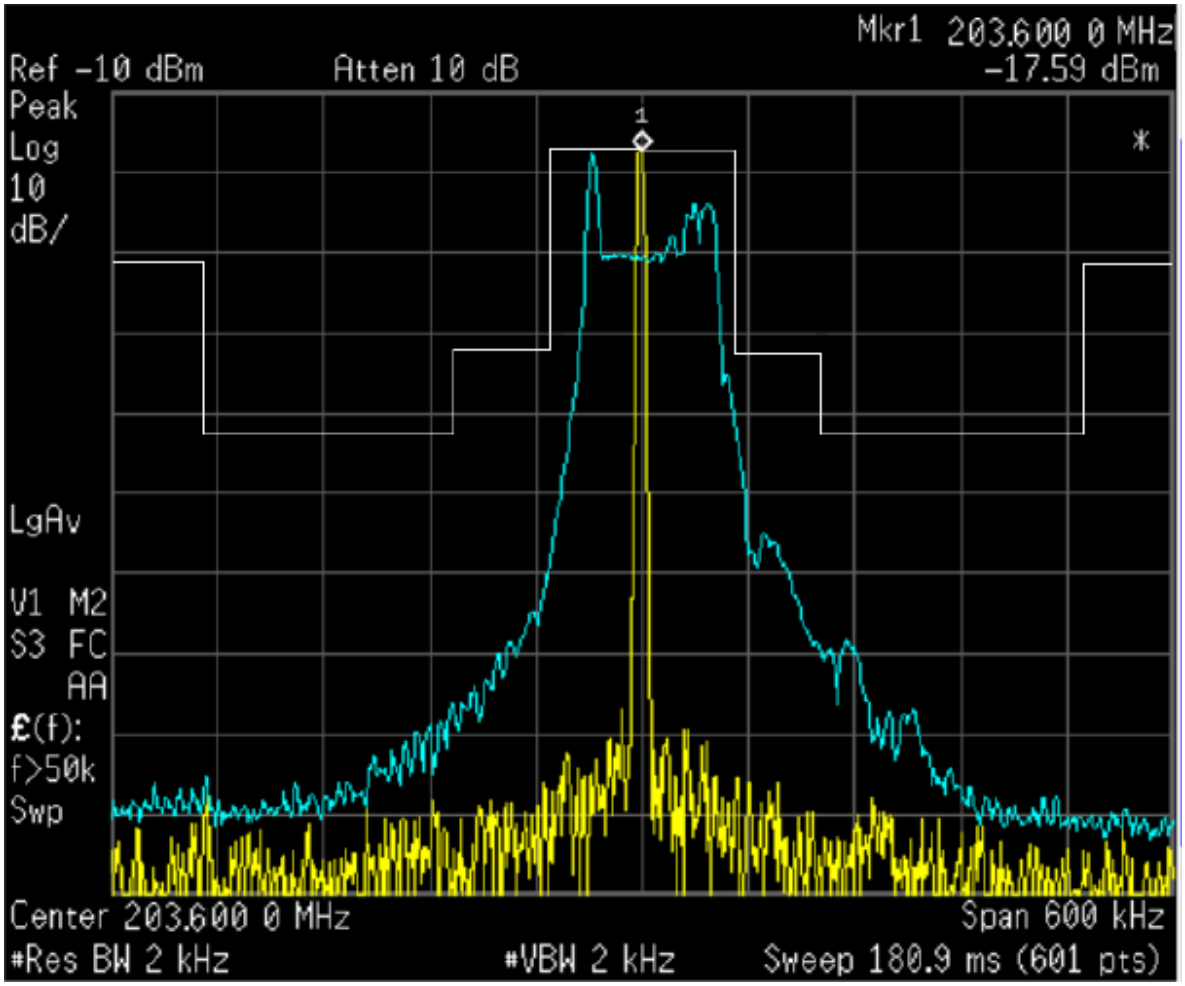
9.5 Measurement Results:

Frequency (MHz)	Reading level (dBm)	Antena Polarization	Cable loss (Db)	Ant.Gain (dB)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
407.20*	-46.29	V	1.52	13.42	-34.39	-13	-21.39
407.20*	-48.09	H	1.52	13.42	-36.19	-13	-23.19
610.80*	-64.74	V	1.64	13.87	-52.51	-13	-39.51
610.80*	-62.05	H	1.64	13.87	-49.82	-13	-36.82
814.40*	-65.65	V	1.67	13.96	-53.36	-13	-40.36
814.40*	-62.38	H	1.67	13.96	-50.09	-13	-37.09
1018*	-66.43	V	1.69	14.07	-54.05	-13	-41.05
1018*	-62.76	H	1.69	14.07	-50.38	-13	-37.38
1221.60*	-67.37	V	1.72	14.22	-54.87	-13	-41.87
1221.60*	-63.32	H	1.72	14.22	-50.82	-13	-37.82
1425.20*	-68.02	V	1.76	14.36	-55.42	-13	-42.42
1425.20*	-63.87	H	1.76	14.36	-51.27	-13	-38.27
1628.80*	-68.76	V	1.81	14.51	-56.06	-13	-43.06
1628.80*	-64.31	H	1.81	14.51	-51.61	-13	-38.61
1832.40*	-69.28	V	1.83	15.15	-55.96	-13	-42.96
1832.40*	-64.42	H	1.83	15.15	-51.10	-13	-38.10
2036*	-70.05	V	1.88	15.33	-56.60	-13	-43.60
2036*	-65.08	H	1.88	15.33	-51.63	-13	-38.63

Note: * means the output power of all the spurious frequency is at least 20dB down to the limit.

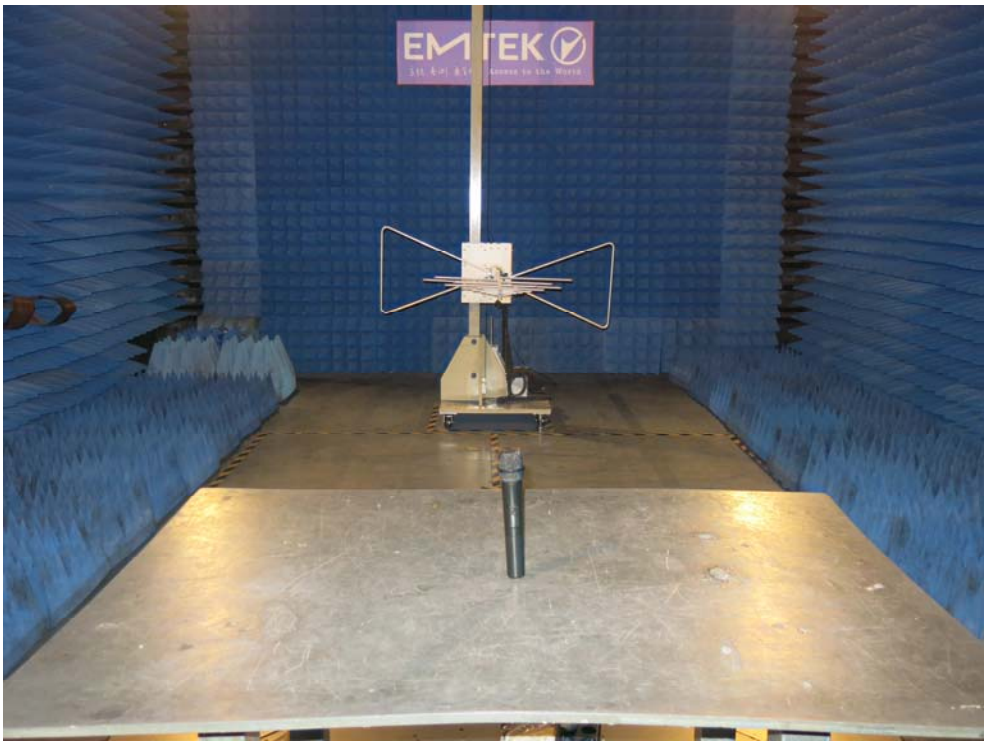
9.6 Radiation Emission Mask:

Bottom channel



APPENDIX 1

PHOTOGRAPHS OF SET UP


EMTEK

APPENDIX 2

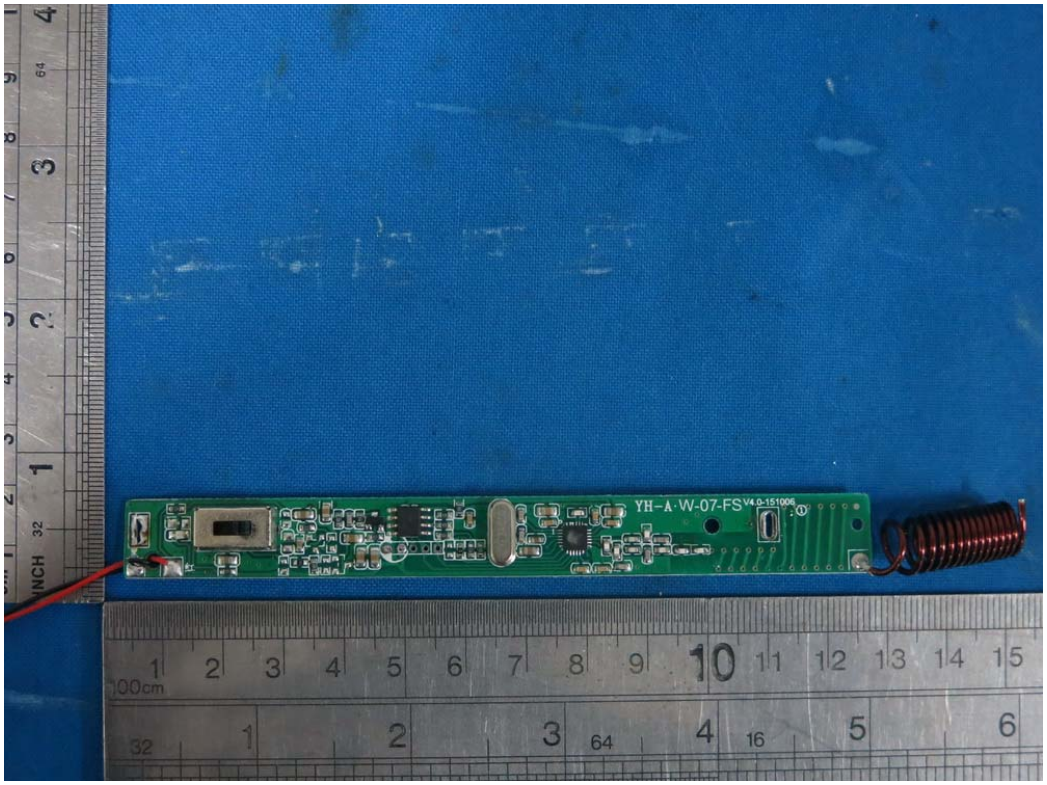
PHOTOGRAPHS OF EUT

UP View of EUT

Bottom View of EUT

Side of EUT

Internal of EUT



Internal of EUT