TEST REPORT

Reference No.	:	WTS14S0917954E
FCC ID	:	CCRAF1N
Applicant	:	Sam Ash Music Corporation
Address	:	262 Duffy Avenue Hicksville, NY 11801 United States
Manufacturer	:	The same as above
Address	:	The same as above
Product Name	:	Airline 77 Wireless Microphone Transmitter
Model No.	:	AF1&AG1
Standards	:	FCC CFR47 Part 74
Date of Receipt sample	:	Aug. 30, 2014
Date of Test	:	Sep.01~10, 2014
Date of Issue	:	Sep. 10, 2014
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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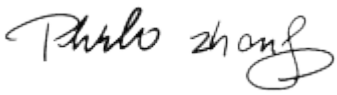
Compiled by:

Zero Zhou / Project Engineer

Approved by:



Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Test Method	Result
RF Output Power	74.861(e)(1)(ii)	TIA/EIA-603-C-2004	PASS
Modulation Characteristics	2.1047(a)	TIA/EIA-603-C-2004	PASS
Occupied Bandwidth	2.1049(c)(1)	TIA/EIA-603-C-2004	PASS
Radiated Emissions	2.1053 & 74.861(e)(6)	TIA/EIA-603-C-2004	PASS
Spurious emissions at antenna terminals	2.1051	TIA/EIA-603-C-2004	PASS
Frequencies Stability	2.1055(a)(1)	TIA/EIA-603-C-2004	PASS
Remark: PASS means that the test results complies with related requirements. N/A means that the test is not applicable for the EUT.			

3 Contents

4 General Information

4.1 General Description of E.U.T.

Product Name : Airline 77 Wireless Microphone Transmitter

Model No. : AF1&AG1

Differences describe : AF1 circuit is same as AG1, the only different is the Audio input plug direction.

Operation Frequency : 642.375 MHz ~ 645.750 MHz ,6 channels in total.

Antenna installation : Integrated Antenna

4.2 Details of E.U.T.

Technical Data : Battery: DC 1.5V

4.3 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	642.375	2	642.875	3	644.125
4	644.750	5	645.500	6	645.750

4.4 Test Mode

Test mode	Low channel	Middle channel	High channel
Transmitting	642.375MHz	-	645.750 MHz

4.5 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

  Waltek Services (Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration No.:7760A-1, July 12, 2012.

- **FCC – Registration No.: 880581**

  Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, April 29, 2014.

4.6 Test Location

All the tests were performed at:
Waltek Services (Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen, China

5 Equipment Used during Test

5.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.18,2013	Sep.17,2014
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.18,2013	Sep.17,2014
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.19,2014	Apr.18,2015
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.18,2013	Sep.17,2014
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.19,2014	Apr.18,2015
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.19,2014	Apr.18,2015
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.17,2014	Mar.16,2015
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.10,2014	Apr.09,2015
RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMC Analyzer	R&S	ESCI	101155	Sep.18,2013	Sep.17,2014
2.	Humidity Chamber	GF	GTH-225-40-1P	IAA061213	May 16,2014	May 15,2015
3.	DC Power Supply	EVERFINE	WY305	1004002	Apr.11,2014	Apr.10,2015

5.2 Measurement Uncertainty

Parameter	**Uncertainty**
Radio Frequency	± 1 x 10^{-6}
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)

5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 RF Output Power

Test requirement: FCC CFR47 Part 74 Section 74.861(e)(1)(ii)

Test method: Based on TIA/EIA-603-C-2004

Limit: According to Part 74.861(e)(1)(ii), the output power shall not xceed 250mW (23.98 dBm).

6.1 Test Procedure

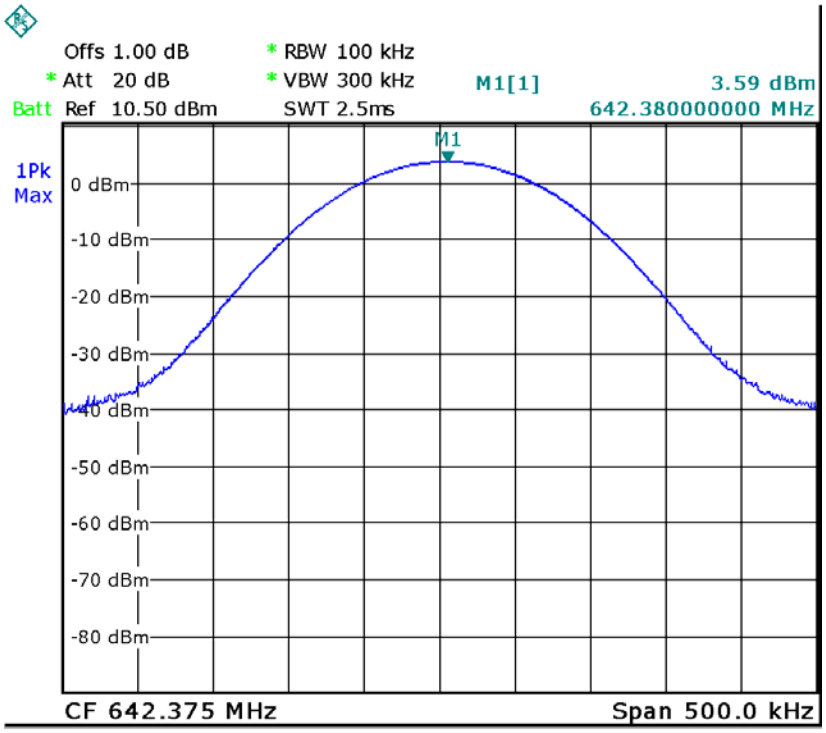
The maximum peak output power was measured with a spectrum analyzer connected to the antenna terminal (conducted measurement) while EUT was operating in normal situation.

6.2 Test result

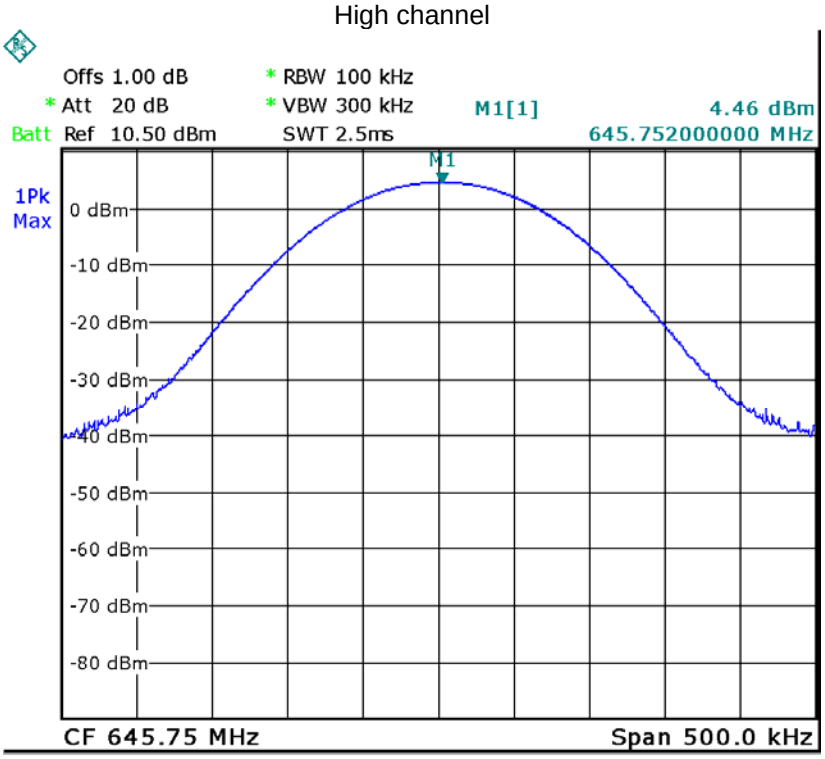
Frequency (MHz)	RF Output Power (dBm)	Limit (dBm)	Result
Low	3.59	23.98	PASS
Middle	/	/	/
High	4.46	23.98	PASS

Please refer to following plot:

Low channel



High channel



7 Modulation Characteristics

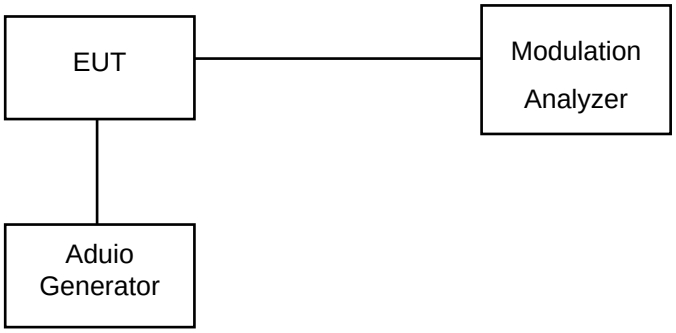
Test requirement: FCC CFR47 Part 2 Section 2.1047(a)

Test method: Based on TIA/EIA-603-C-2004

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.

7.1 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:

audio frequency response =$20lg(DEV_{FREQ}/ DEV_{REF})$

6) Repeat steps 4) through5) 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).

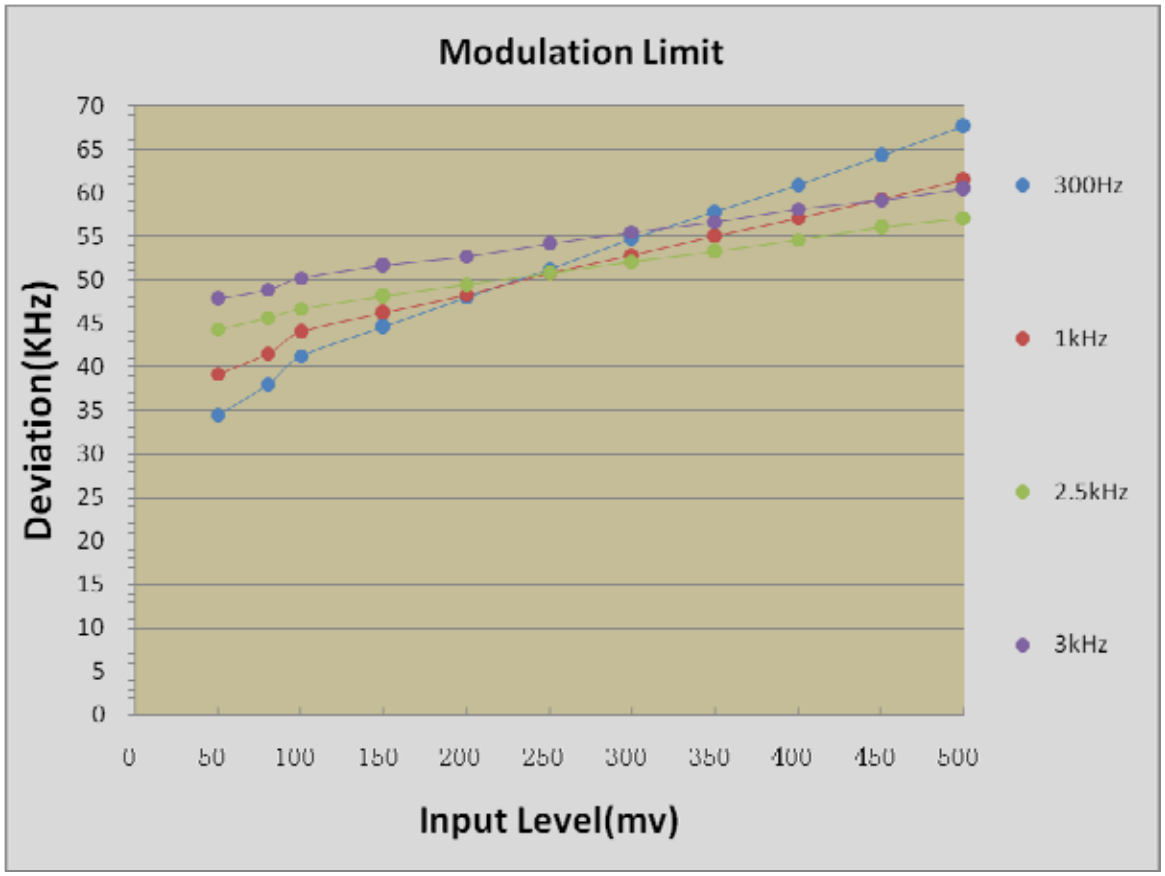
5) The values recorded in steps 3) and 4) are the modulation limiting.

7.2 Test Result

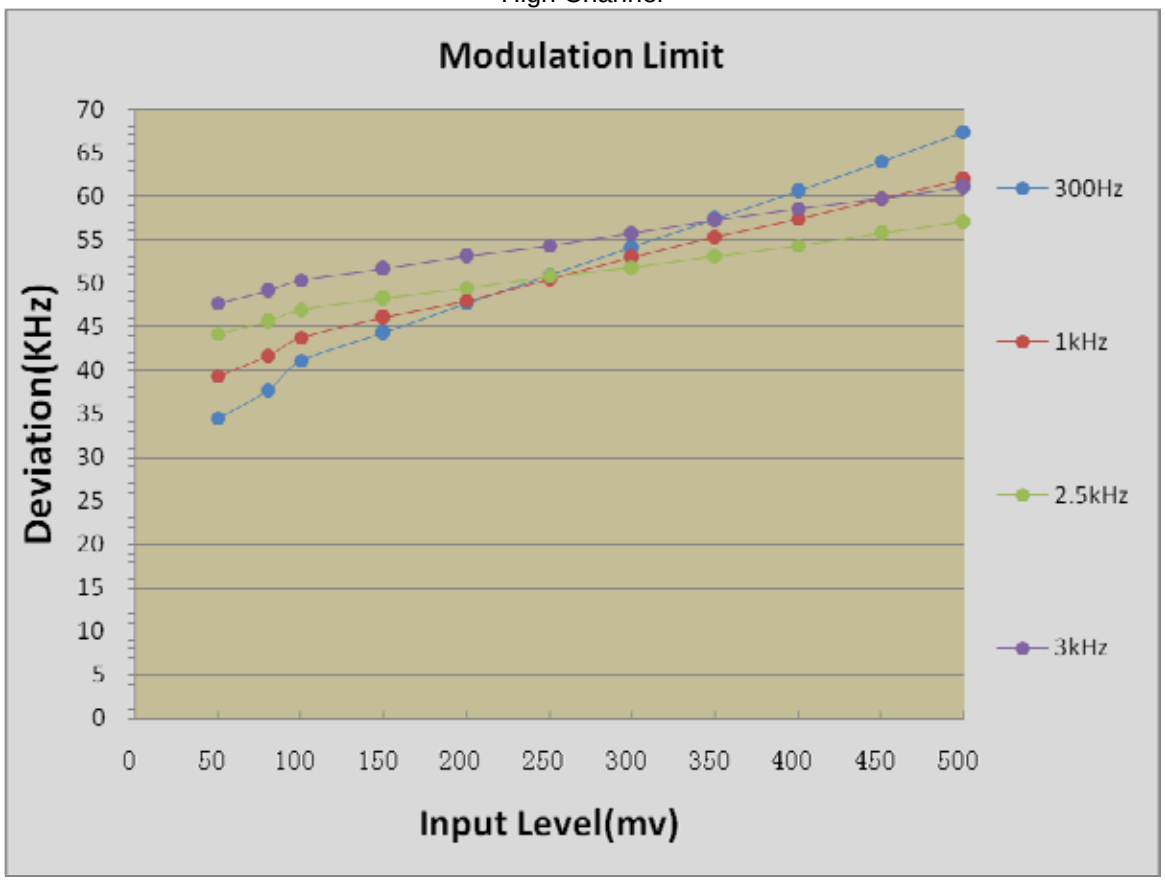
The test data of modulation characteristic is showing as below:

Audio Frequency Response

Low Channel



High Channel



8 Occupied Bandwidth of Emission

Test requirement: FCC CFR47 Part 2 Section 2.1049©(1)

Test method: Based on TIA/EIA-603-C-2004

Limit: According to FCC 74.861 (e)(5), the frequency emission bandwidth shall not exceed 200 kHz.

8.1 Test Procedure

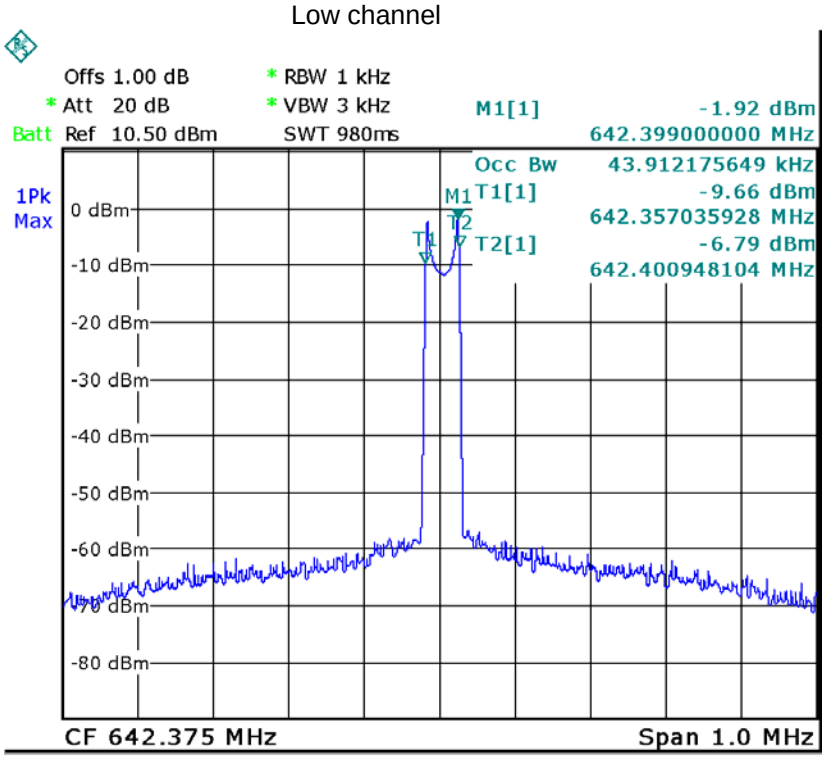
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and set it to any one convenient frequency within its operating range.

8.2 Test Result

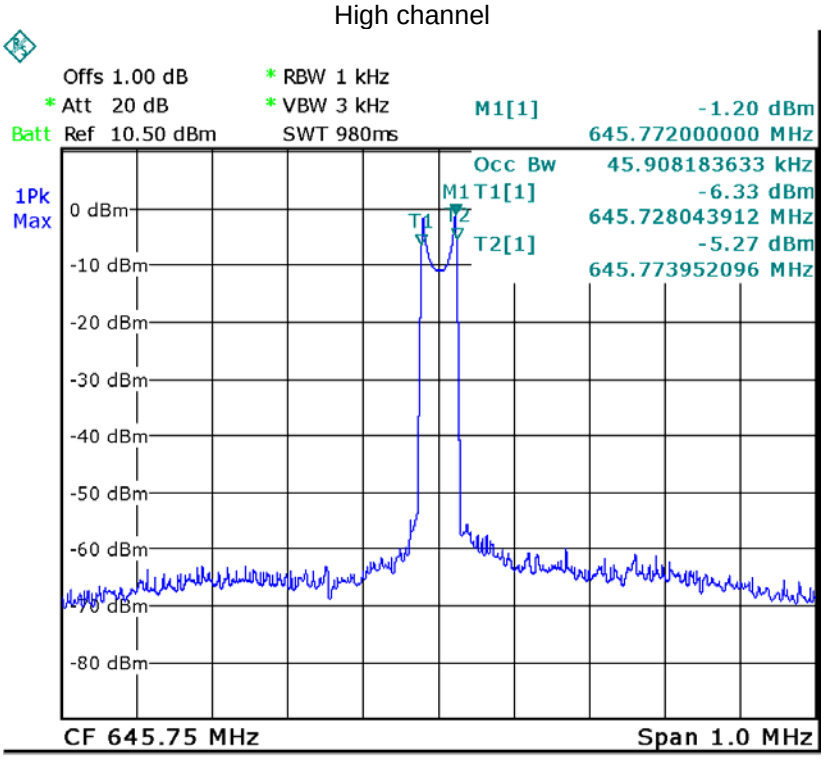
Frequency (MHz)	99% Bandwidth (kHz)	Limit (kHz)	Result
Low	43.91	200	PASS
-	-	-	-
High	45.91	200	PASS

Test Plot:

Low channel



High channel



9 Spurious Emissions at Antenna Terminals

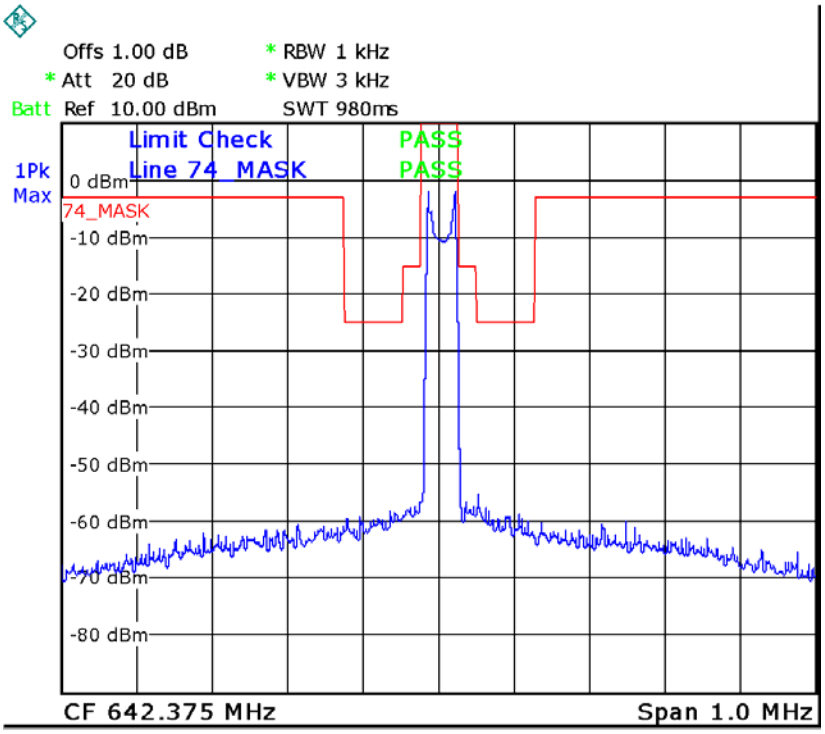
Test requirement:	FCC CFR47 Part 2 Section 2.1053
Test method:	Based on TIA/EIA-603-C-2004
Limit:	According to Part 74.861 (e)(6), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule: (i) on any frequency removed from 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 Log (output power in watts)dB.

9.1 Test Procedure

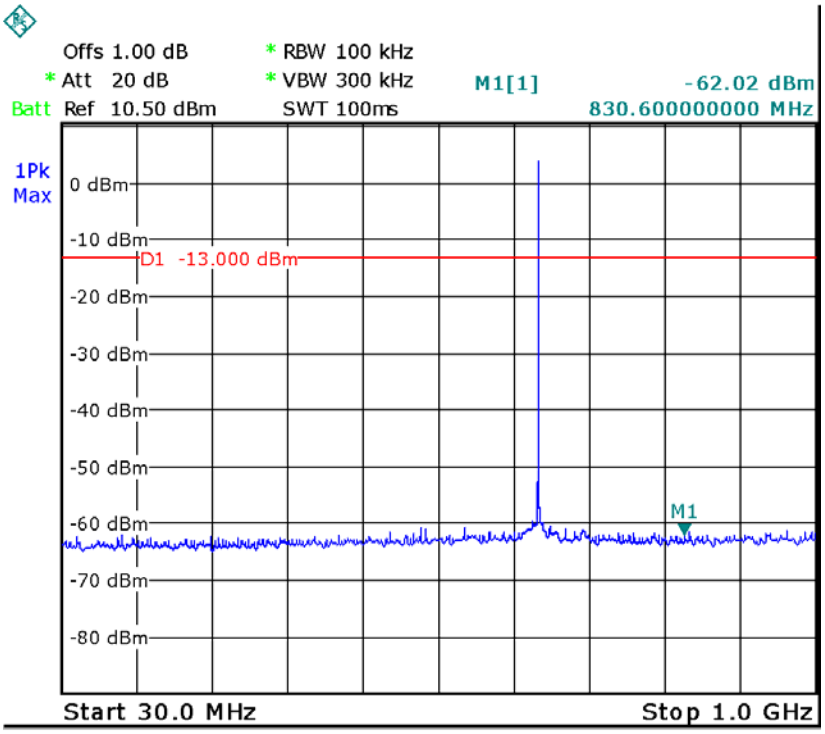
1. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
2. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting 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.

9.2 Test Data

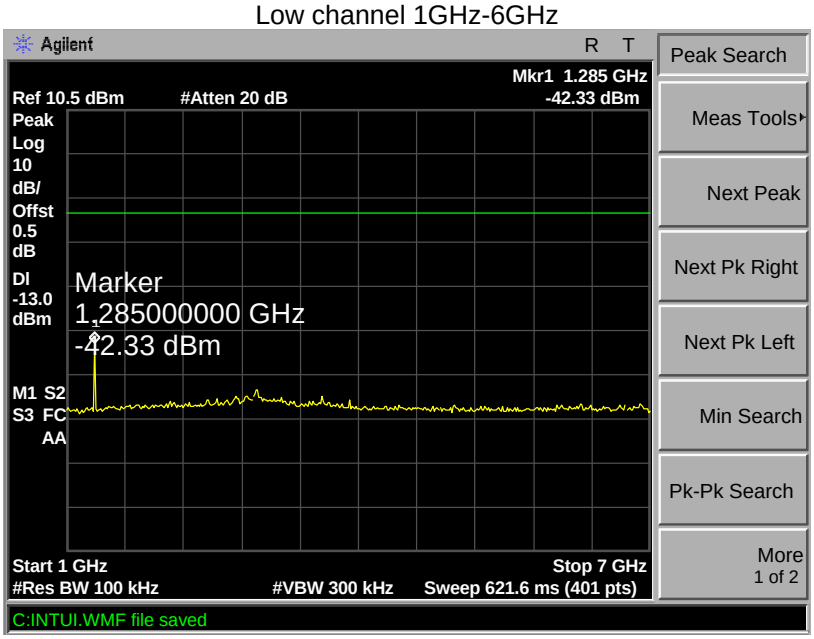
Emission Mask Low Channel



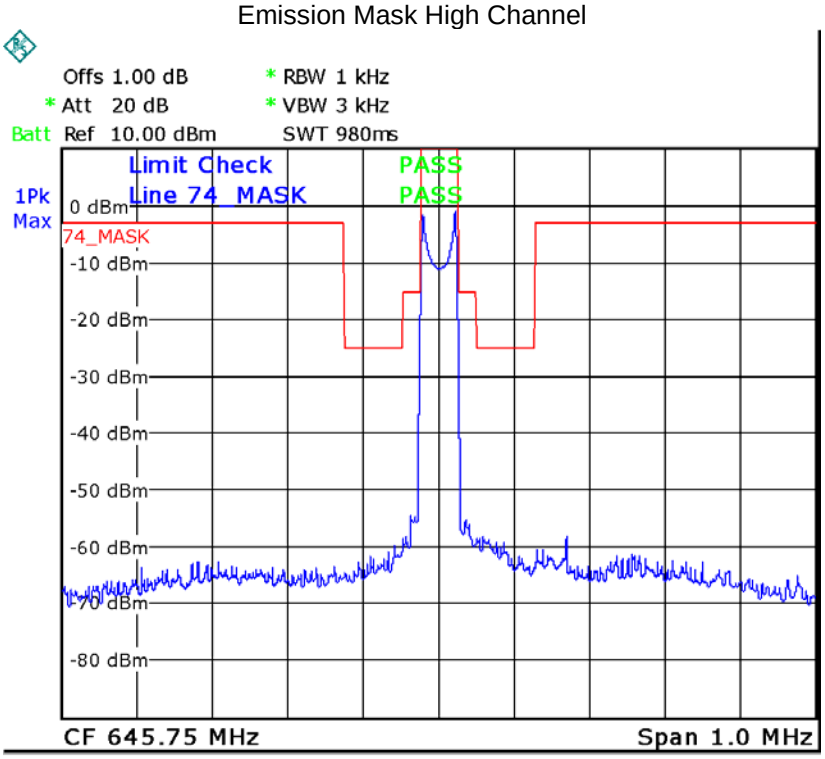
Low channel 30MHz-1GHz



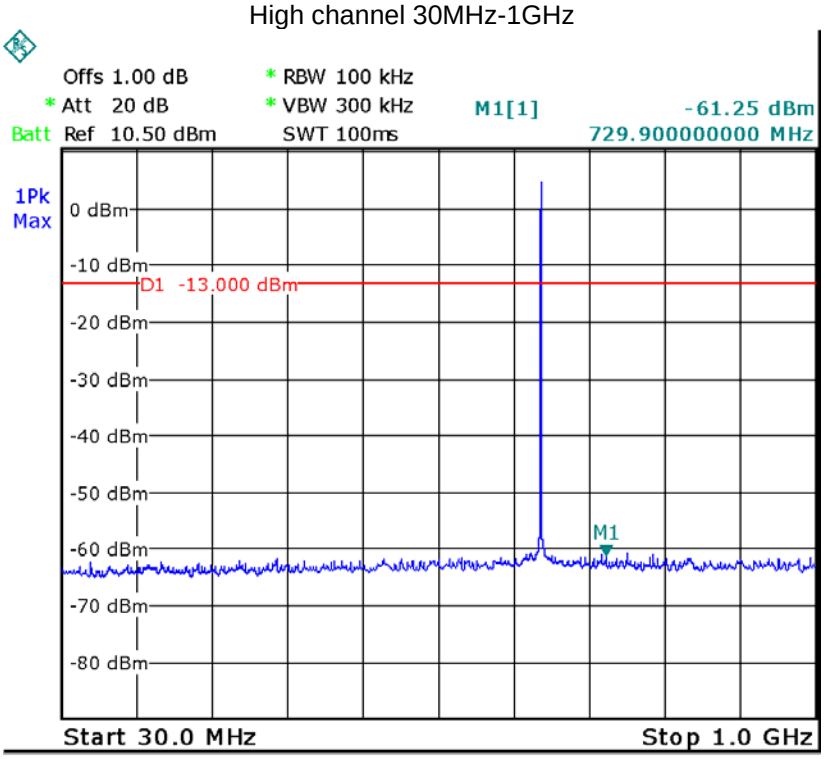
Low channel 1GHz-6GHz



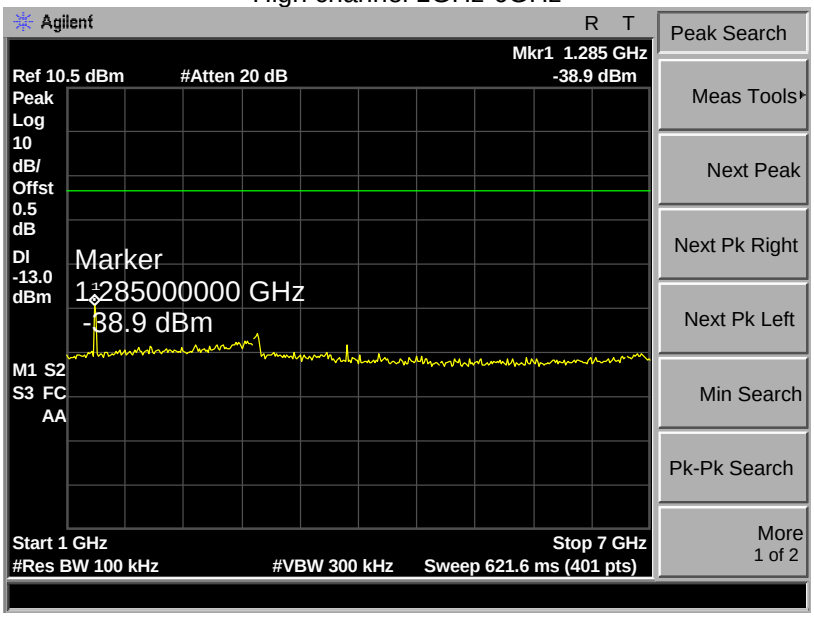
Emission Mask High Channel



High channel 30MHz-1GHz



High channel 1GHz-6GHz



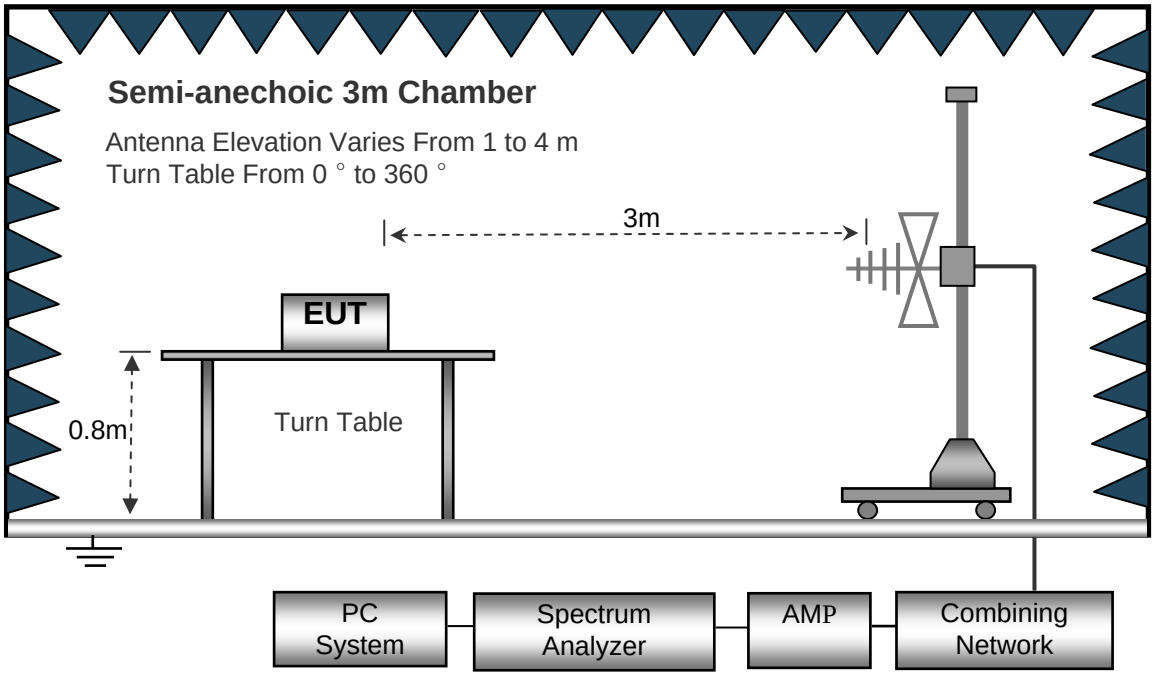
10 Radiated Emission Test

Test requirement:	FCC CFR47 Part 2 Section 2.1053
Test method:	Based on TIA/EIA-603-C-2004
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 Log (output power in watts)dB.

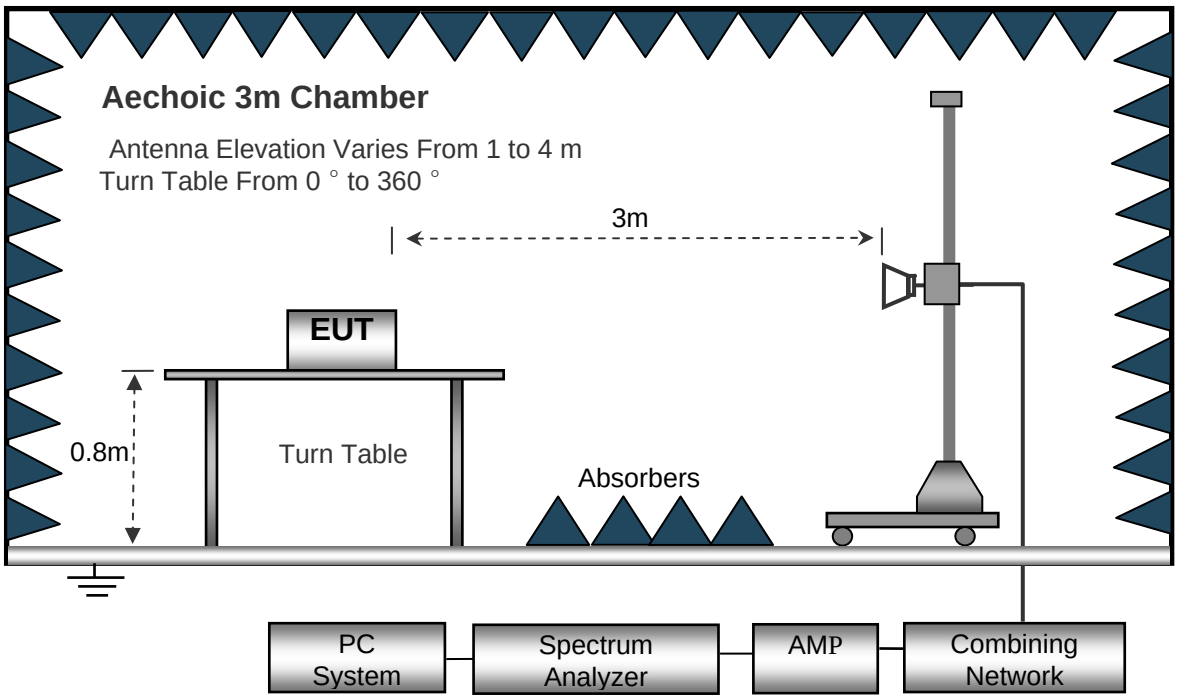
10.1 EUT Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4:2003.

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.



10.2 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested 30MHz to 7000MHz.

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

10.3 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^{o} 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 Lowed 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.

10.4 Test Result

Test Frequency: 30MHz ~ 7GHz

Frequency (MHz)	Detector	Ant. Pol	Antenna Height (m)	Turntable Angle (°)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
Low Channel							
423.18	Peak	H	1.02	131.93	-48.36	-13.00	-35.36
423.18	Peak	V	1.97	169.55	-45.67	-13.00	-32.67
1284.75	Peak	H	1.56	272.05	-41.25	-13.00	-28.25
1284.75	Peak	V	1.76	137.31	-38.76	-13.00	-25.76
1927.13	Peak	H	1.08	190.48	-49.32	-13.00	-36.32
1927.13	Peak	V	1.01	285.05	-45.28	-13.00	-32.28
High Channel							
423.18	Peak	H	1.64	78.59	-49.33	-13.00	-36.33
423.18	Peak	V	1.03	126.81	-46.29	-13.00	-33.29
1291.50	Peak	H	1.19	183.47	-40.24	-13.00	-27.24
1291.50	Peak	V	1.35	58.48	-36.67	-13.00	-23.67
1937.25	Peak	H	1.11	261.87	-48.29	-13.00	-35.29
1937.25	Peak	V	1.00	26.93	-46.74	-13.00	-33.74

11 Frequency Stability

Test requirement:	FCC CFR47 Part 2 Section 2.1055(a)(a)
Test method:	Based on TIA/EIA-603-C-2004
Limit:	According to FCC 74.86(e)(4), the frequency tolerance of the transmitter shall be 0.005 percent.

11.1 Test Configuration

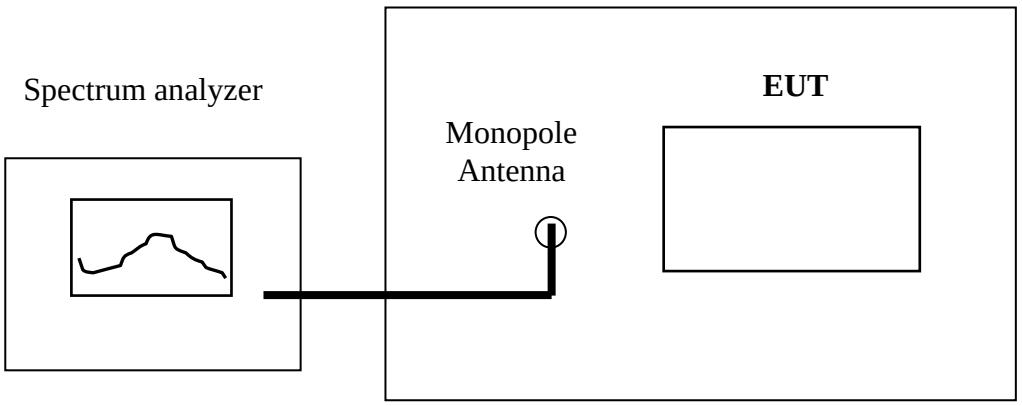


Figure 1

11.2 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 ºC. 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 50ºC. 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 10ºC decreased per stage until the lowest temperature -30ºC is measured, record all measurement frequencies.

11.3 Test Result

a) Frequency stability versus input voltage

Low channel

Power Supply (VDC)	Environment Temperature (ºC)	Reference Frequency (MHz)	Frequency Measured (MHz)	Frequency Tolerance (%)	Limit (%)
1.50	20	642.375	642.38039	0.000839	0.005
1.73	20	642.375	642.38038	0.000838	0.005

High channel

Power Supply (VDC)	Environment Temperature (ºC)	Reference Frequency (MHz)	Frequency Measured (MHz)	Frequency Tolerance (%)	Limit (%)
1.50	20	645.750	645.75180	0.000279	0.005
1.73	20	645.750	645.75172	0.000266	0.005

b) Frequency stability versus environmental temperature:

Low channel

Power Supply (VDC)	Environment Temperature (ºC)	Reference Frequency (MHz)	Frequency Measured (MHz)	Frequency Tolerance (%)	Limit (%)
1.5	50	642.375	642.375180	0.000028	0.005
1.5	40	642.375	642.375432	0.000067	0.005
1.5	30	642.375	642.375789	0.000123	0.005
1.5	20	642.375	642.376544	0.000240	0.005
1.5	10	642.375	642.377358	0.000367	0.005
1.5	0	642.375	642.377825	0.000440	0.005
1.5	-10	642.375	642.378785	0.000589	0.005
1.5	-20	642.375	642.379631	0.000721	0.005
1.5	-30	642.375	642.380334	0.000830	0.005

High channel

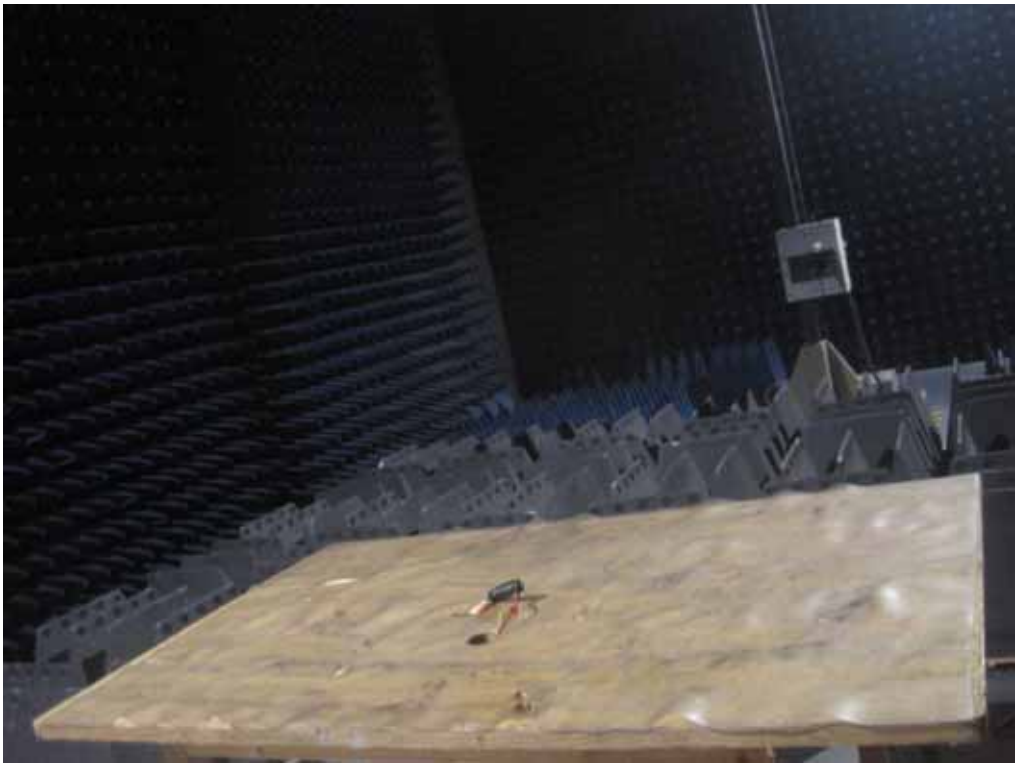
Power Supply (VDC)	Environment Temperature (ºC)	Reference Frequency (MHz)	Frequency Measured (MHz)	Frequency Tolerance (%)	Limit (%)
1.5	50	645.750	645.755180	0.000802	0.005
1.5	40	645.750	645.756016	0.000932	0.005
1.5	30	645.750	645.756666	0.001032	0.005
1.5	20	645.750	645.757088	0.001098	0.005
1.5	10	645.750	645.757751	0.001200	0.005
1.5	0	645.750	645.757753	0.001201	0.005
1.5	-10	645.750	645.758549	0.001324	0.005
1.5	-20	645.750	645.758680	0.001344	0.005
1.5	-30	645.750	645.758766	0.001357	0.005

12 Photographs –Model AG1 Test Setup

12.1 Photograph – Radiation Spurious Emission Test Setup

30MHz-1GHz

Above 1GHz



13 Photographs – Constructional Details

13.1 Model AF1 – Appearance View


SAMSON


AF1


AF1
15dB PAD
POWER

13.2 Model AG1 – Appearance View

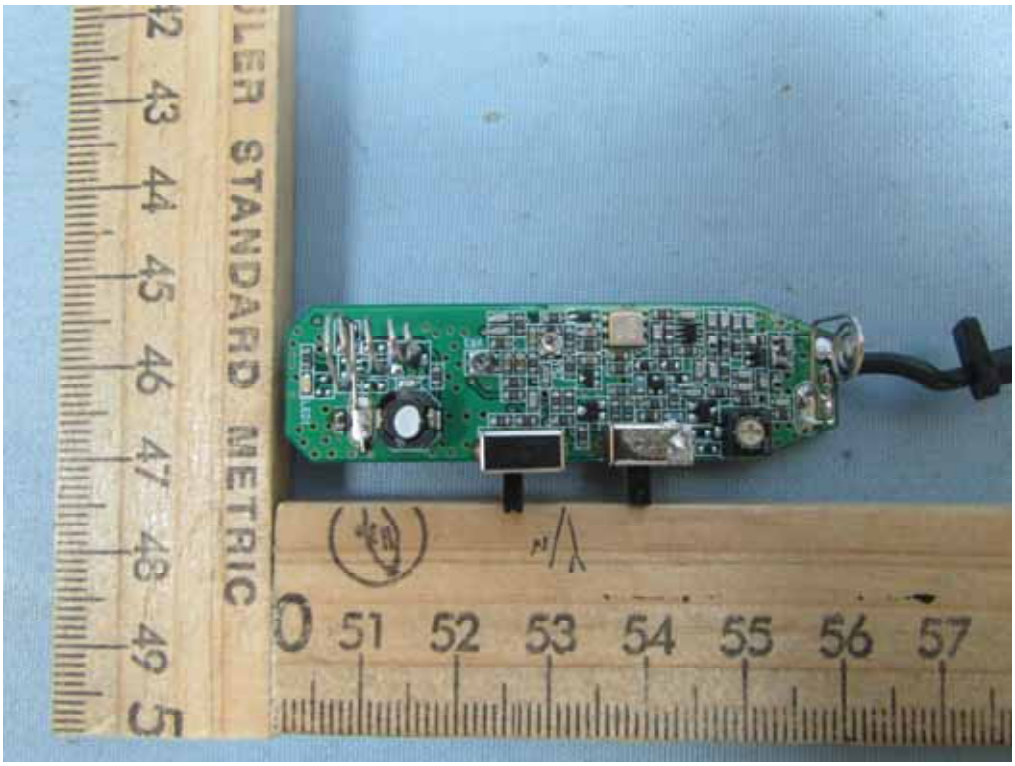

Ch N1

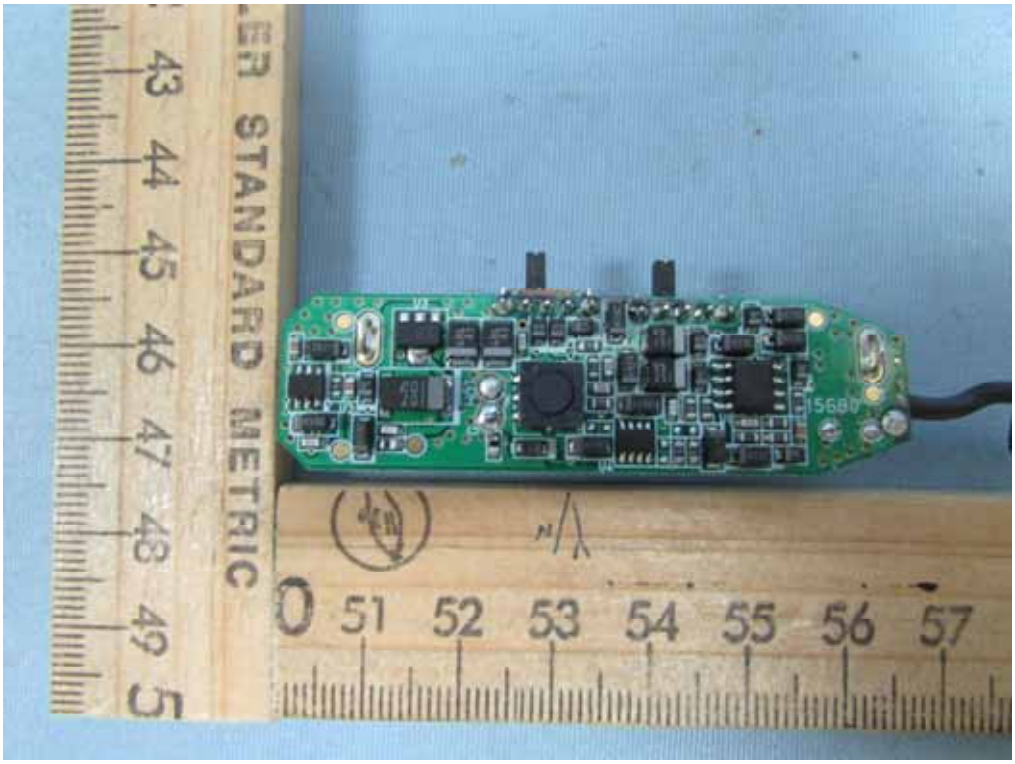

Ch N1


AG1
POWER
cm2
0 51 52 53 54 55 56 57 58 59 60 61 62 63 64

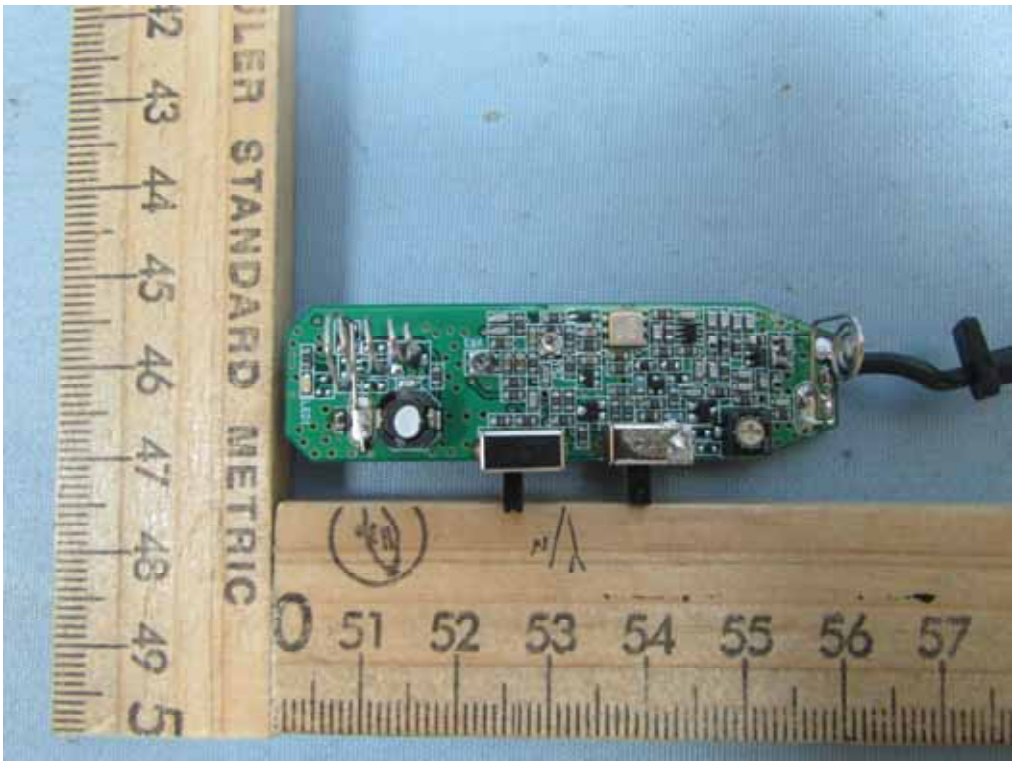

cm2
0 51 52 53 54 55 56 57 58

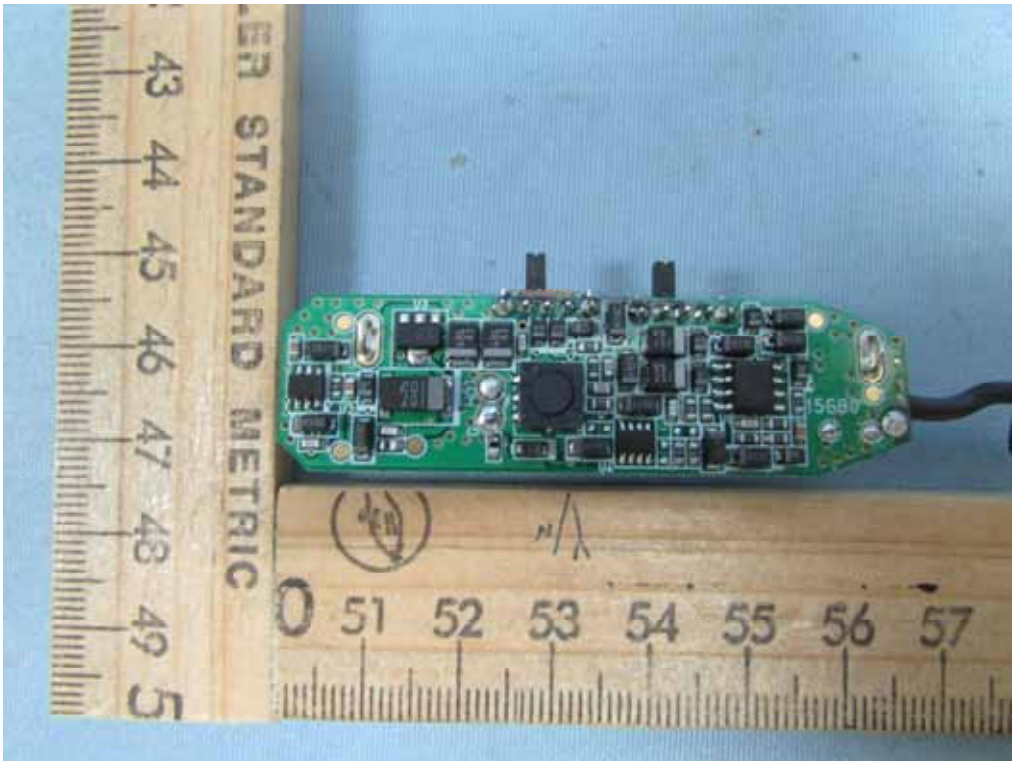
13.3 Model AF1 – Internal View





13.4 Model AG1 – Internal View





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