Excellence in Compliance Testing

Certification Test Report

FCC ID: 2AB8BARX200
IC: 11944A-ARX200

FCC Rule Part: 15.247
IC Radio Standards Specification: RSS-210

ACS Report Number: 14-0131.W06.1B

Manufacturer: AirNetix, LLC
Model: ARX-200

Test Begin Date: April 4, 2014
Test End Date: April 14, 2014

Report Issue Date: May 14, 2014

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Reviewed by:
Kirby Munroe
Director, Wireless Certifications
ACS, Inc.

This report contains 29 pages

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1 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and Industry Canada's Radio Standards Specification RSS-210 for Certification.

1.2 Product Description

The ARX-200 is an AiRocks Wireless Audio Repeater and is a component of the AiRocks Pro digital wireless audio system designed to provide significantly extended coverage area, ultra-reliable audio distribution for pro-audio sound reinforcement applications. The ARX-200 is used to transport audio from a single source to multiple powered speakers within its range. The ARX-200 is enclosed in a weather resistant outdoor enclosure and includes a sealed pushbutton front panel interface with an LCD display. The ARX-200 will typically be deployed in indoor and outdoor music venues, sports arenas, or other areas where the wide area of audio distribution is required.

Technical Information:

Detail	Description
Frequency Range	2402.5 – 2477.5 MHz
Number of Channels	16
Modulation Format	GFSK
Data Rate(s)	2MB/s
Operating Voltage	120 VAC / 60Hz
Number of Inputs/Outputs	2 (TX/RX Diversity)
Antenna Type / Gain	Dipole / 5 dBi

Manufacturer Information:
AirNetix, LLC
2218 Edgartown Lane
Smyrna, GA 30080

Test Sample Serial Number: #2

Test Sample Condition: The test samples were provided in good working order with no visible defects.

1.3 Test Methodology and Considerations

For radiated emissions the EUT was tested in an orientation and configuration typical of final installation. Both antenna ports were evaluated and worst case data provided where applicable. For RF conducted measurements, both antenna ports were evaluated in full.

For power-line conducted emissions the EUT was tested in three different configurations for all different modes of operation: The AiRocks configuration with only the microphone and load were tested in Relay Mode as if the unit was used to relay information from the master unit to an end point. The AiRocks with Breakout Box configuration was tested on the breakout box with the AiRocks getting power over the Ethernet cable. The AiRocks with Breakout Box configuration was tested on the PC because the breakout box can be used as a computer peripheral when connected to a computer over USB.

EUT power settings during testing:
2402.5MHz: 20
2437.5MHz: 20
2477.5MHz: 20

2 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

ACS is accredited to ISO/IEC 17025 by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program (NVLAP), Lab Code 200612-0. Unless otherwise specified, all tests methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment.

FCC Registration Number: 511277
Industry Canada Lab Code: IC 4175A-1
VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

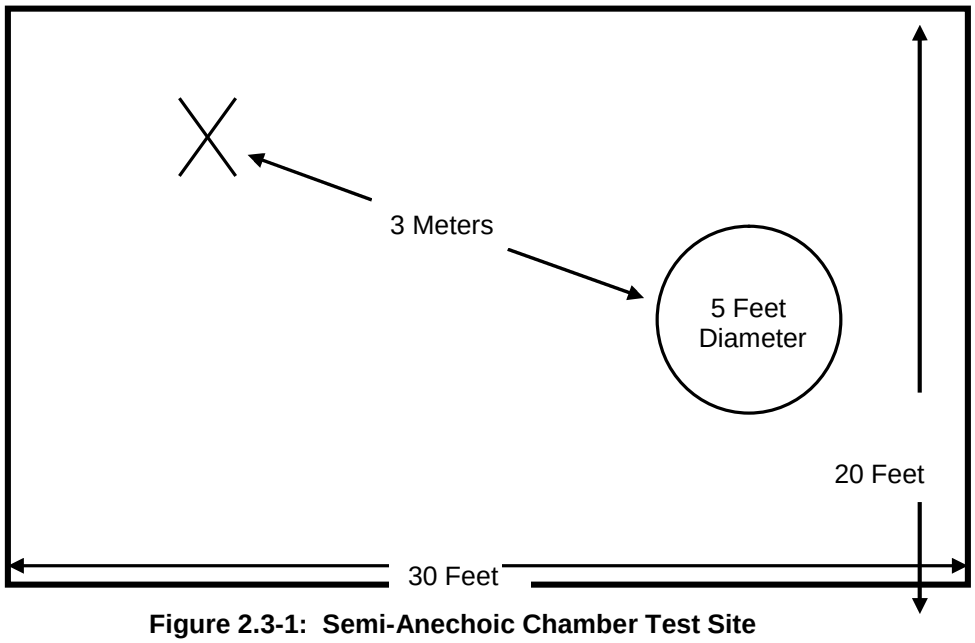


Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

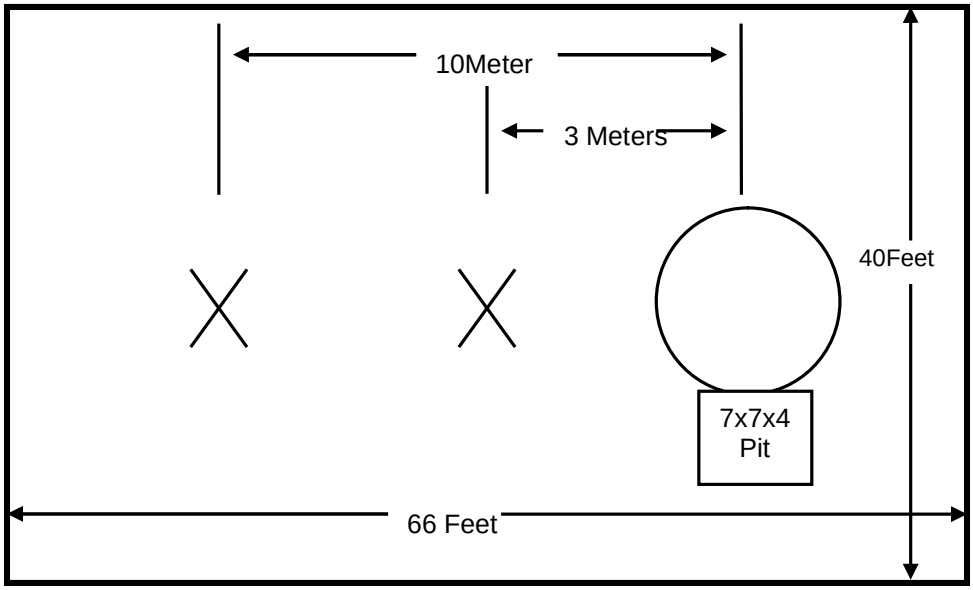


Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal ground reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 4.1.3-1:

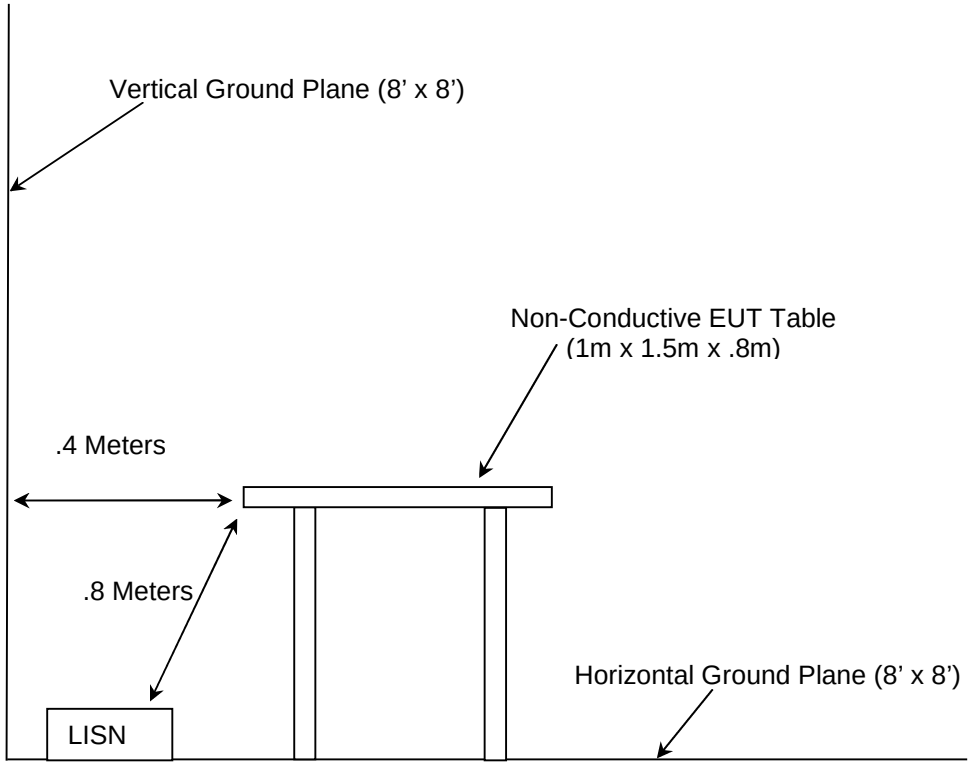


Figure 2.4-1: AC Mains Conducted EMI Site

3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2014
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2014
- FCC KDB 558074 D01 DTS Meas Guidance v03r01 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247, April 9, 2013
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8, Dec 2010
- Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue 3, Dec 2010.

4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

Table 4-1: Test Equipment

AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
1	Rohde & Schwarz	ESMI - Display	Spectrum Analyzers	833771/007	8/2/2012	8/2/2014
2	Rohde & Schwarz	ESMI-Receiver	Spectrum Analyzers	839587/003	8/2/2012	8/2/2014
30	Spectrum Technologies	DRH-0118	Antennas	970102	4/23/2013	4/23/2015
40	EMCO	3104	Antennas	3211	2/14/2013	2/14/2015
73	Agilent	8447D	Amplifiers	2727A05624	7/16/2013	7/16/2014
167	ACS	Chamber EMI Cable Set	Cable Set	167	11/7/2013	11/7/2014
267	Agilent	N1911A	Meters	MY45100129	7/30/2013	7/30/2015
268	Agilent	N1921A	Sensors	MY45240184	7/30/2013	7/30/2015
292	Florida RF Cables	SMR-290AW-480.0-SMR	Cables	None	3/17/2014	3/17/2015
334	Rohde&Schwarz	3160-09	Antennas	49404	11/4/2010	NCR
335	Suhner	SF-102A	Cables	882/2A	7/29/2013	7/29/2014
338	Hewlett Packard	8449B	Amplifiers	3008A01111	7/30/2013	7/30/2015
340	Aeroflex/Weinschel	AS-20	Attenuators	7136	7/30/2013	7/30/2014
345	Suhner Sucoflex	102A	Cables	1077/2A	7/29/2013	7/29/2014
412	Electro Metrics	LPA-25	Antennas	1241	7/27/2012	7/27/2014
422	Florida RF	SMS-200AW-72.0-SMR	Cables	805	11/7/2013	11/7/2014
432	Microwave Circuits	H3G020G4	Filters	264066	6/19/2013	6/19/2014
616	Florida RF Cables	SMRE-200W-12.0-SMRE	Cables	N/A	9/26/2013	9/26/2014
622	Rohde & Schwarz	FSV40	Analyzers	101338	11/19/2013	11/19/2014

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type (Host)	Manufacturer	Model Number	Serial Number
1	Microphone	Shure	BG1.0	N/A
2	XLR Load	N/A	N/A	ACS #11 ACS #9
3	Breakout Box	AirNetix	ARX-200-BOB	1
4	Microphone	Sennheiser	e835 S	ACS #7
5	Laptop Computer	Lenovo Dell	ThinkPad X1 Carbon PP18L	R9-TT2WV 12/10 CN-0TD761-12961-68G-3200
6	Laptop Power Supply	Lenovo Dell	45N0239 PA-1650-05D2	11S45N0239Z1ZKTW281AJX CN-0F7970-71615-55M-6BF4
7	Battery Pack	N/A	N/A	N/A

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

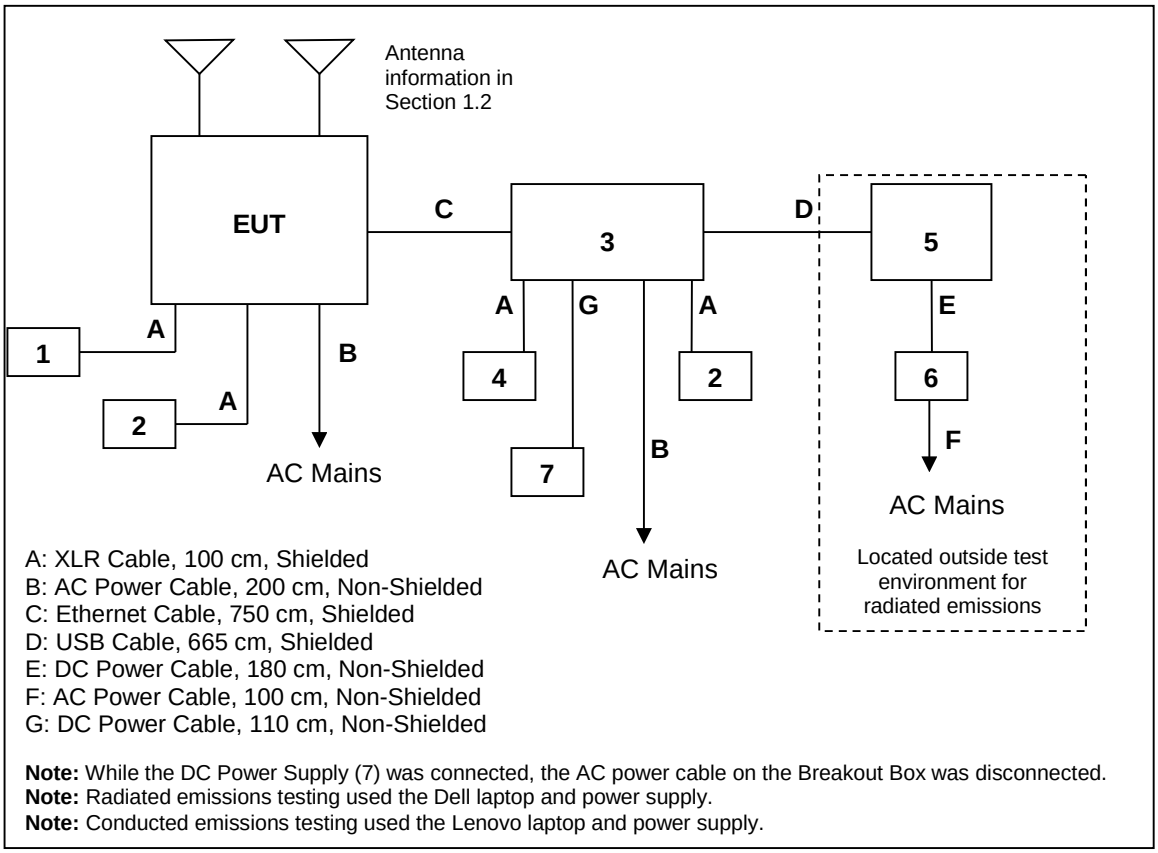
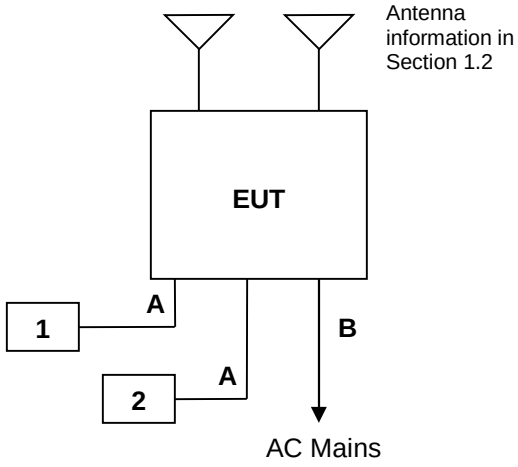


Figure 6-1: EUT Test Setup – Radiated and Conducted Emissions



A: XLR Cable, 100 cm, Shielded
B: AC Power Cable, 200 cm, Non-Shielded

Figure 6-2: EUT Test Setup – Conducted Emissions

7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement – Section 15.203

The EUT utilizes a detachable antenna with N-Type coupling therefore professional installation is required.

7.2 Power Line Conducted Emissions – FCC 15.207; IC RSS-Gen 7.2.4

7.2.1 Measurement Procedure

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

7.2.2 Measurement Results

Results of the test are shown below in Tables 7.2.2-1 through 7.2.2-6.

Table 7.2.2-1: Conducted EMI Results Line 1 – AiRocks Configuration

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
12.0976	34.233	29.895	10.559	44.792	40.455	60	50	15.208	9.545
11.6963	34.477	30.119	10.543	45.019	40.662	60	50	14.981	9.338
10.2351	33.862	29.471	10.483	44.344	39.954	60	50	15.656	10.046
0.488	42.52	35.08	10.21	52.73	45.29	56.20	46.20	3.5	0.9
0.49	43.02	35.02	10.21	53.23	45.23	56.17	46.17	2.9	0.9
0.936	37.3	26.36	10.28	47.58	36.64	56.00	46.00	8.4	9.4

Table 7.2.2-2: Conducted EMI Results Line 2 – AiRocks Configuration

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
12.5619	35.128	29.504	10.578	45.706	40.082	60	50	14.294	9.918
11.5314	35.911	30.359	10.536	46.447	40.895	60	50	13.553	9.105
11.0116	36.29	30.429	10.515	46.804	40.944	60	50	13.196	9.056
10.9391	36.207	30.399	10.512	46.718	40.91	60	50	13.282	9.09
10.4805	36.2	30.312	10.493	46.693	40.805	60	50	13.307	9.195
0.407	39.33	30.6	10.19	49.52	40.79	57.71	47.71	8.2	6.9

Table 7.2.2-3: Conducted EMI Results Line 1 – Breakout Box Configuration

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
19.2695	31.766	26.22	10.765	42.531	36.985	60	50	17.469	13.015
18.7453	32.02	26.684	10.767	42.786	37.451	60	50	17.214	12.549
15.2477	31.381	26.877	10.778	42.158	37.655	60	50	17.842	12.345
0.9864	34.341	26.064	10.201	44.542	36.265	56	46	11.458	9.735
0.506	40.07	31.6	10.19	50.26	41.79	55.90	45.90	5.6	4.1
0.499	40.23	32.43	10.21	50.44	42.64	56.02	46.02	5.6	3.4

Table 7.2.2-4: Conducted EMI Results Line 2 – Breakout Box Configuration

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
15.6431	32.106	26.267	10.776	42.882	37.043	60	50	17.118	12.957
14.1824	32.391	26.577	10.663	43.054	37.24	60	50	16.946	12.76
13.1705	33.031	27.083	10.603	43.634	37.687	60	50	16.366	12.313
11.8536	33.019	27.148	10.549	43.568	37.697	60	50	16.432	12.303
0.5	39.44	29.52	10.19	49.63	39.71	56.00	46.00	6.4	6.3
0.504	39.42	29.41	10.19	49.61	39.60	55.93	45.93	6.3	6.3

Table 7.2.2-5: Conducted EMI Results Line 1 – Breakout Box Computer Configuration

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
1.40229	19.76	16.962	10.191	29.951	27.153	56	46	26.049	18.847
1.19051	16.137	14.091	10.189	26.326	24.28	56	46	29.674	21.72
1.06627	15.77	13.161	10.188	25.958	23.349	56	46	30.042	22.651
0.8254	17.543	13.652	10.212	27.755	23.864	56	46	28.245	22.136
0.635324	14.839	14.509	10.224	25.063	24.734	56	46	30.937	21.266
0.615256	16.114	15.92	10.205	26.319	26.126	56	46	29.681	19.874

Table 7.2.2-6: Conducted EMI Results Line 2 – Breakout Box Computer Configuration

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
23.2514	20.06	14.469	10.928	30.988	25.397	60	50	29.012	24.603
22.6438	20.035	14.598	10.897	30.932	25.495	60	50	29.068	24.505
22.511	19.926	14.803	10.89	30.816	25.694	60	50	29.184	24.306
19.5212	21.393	16.015	10.764	32.157	26.779	60	50	27.843	23.221
19.2263	20.898	15.9	10.765	31.663	26.665	60	50	28.337	23.335
18.3485	19.8	14.372	10.768	30.568	25.14	60	50	29.432	24.86

7.3 6dB / 99% Bandwidth – FCC 15.247(a)(2); IC RSS-210 A8.2(a)

7.3.1 Measurement Procedure

The 6dB bandwidth was measured in accordance with the FCC KDB 558074 D01 DTS Meas Guidance v03r01. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 3 times the RBW. The trace was set to max hold with a peak detector active. The marker-delta function of the spectrum analyzer was utilized to determine the 6 dB bandwidth of the emission.

The occupied bandwidth measurement function of the spectrum analyzer was used to measure the 99% bandwidth. The span of the analyzer was set to capture all products of the modulation process, including the emission sidebands. The resolution bandwidth was set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth was set to 3 times the resolution bandwidth. A sampling detector was used.

7.3.2 Measurement Results

Results are shown below in tables 7.3.2-1 to 7.3.2-6 and figures 7.3.2-7 to 7.3.2-12:

Table 7.3.2-1: 6dB / 99% Bandwidth – ANT1

Frequency [MHz]	6dB Bandwidth [MHz]	99% Bandwidth [MHz]
2402.5	1.365	2.039
2437.5	1.446	2.051
2477.5	1.447	2.078

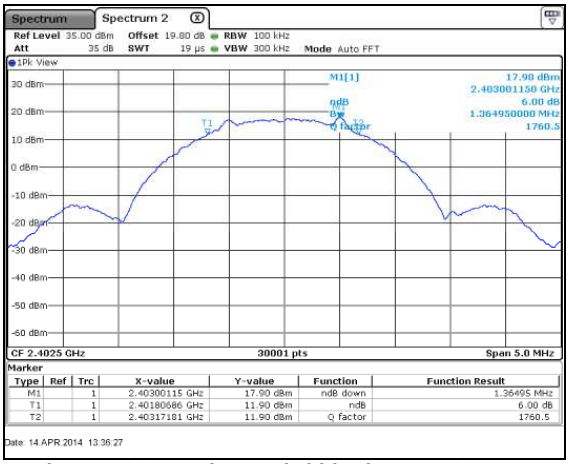


Figure 7.3.2-1: 6dB Bandwidth Plot – 2402.5 MHz

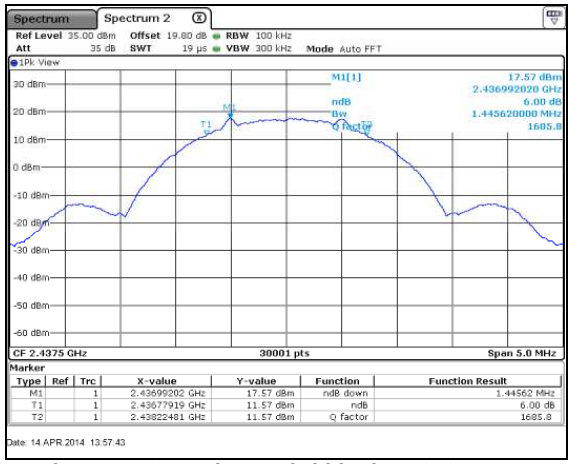


Figure 7.3.2-2: 6dB Bandwidth Plot – 2437.5 MHz

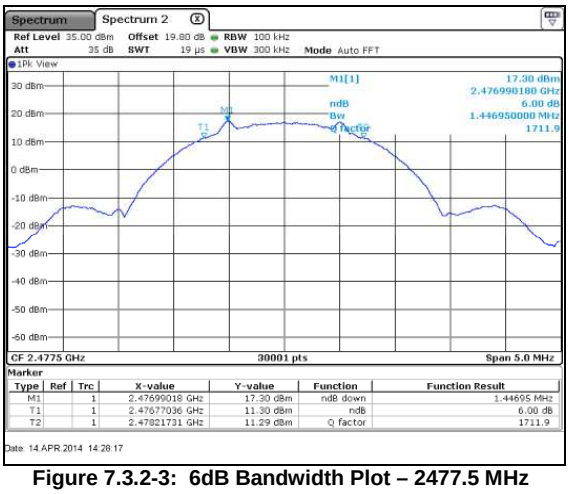


Figure 7.3.2-3: 6dB Bandwidth Plot – 2477.5 MHz

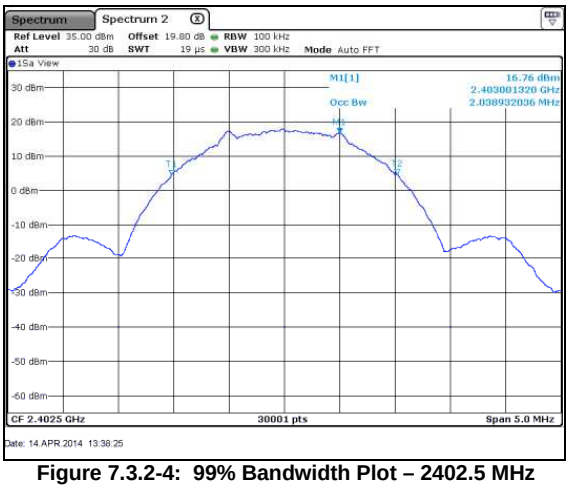


Figure 7.3.2-4: 99% Bandwidth Plot – 2402.5 MHz

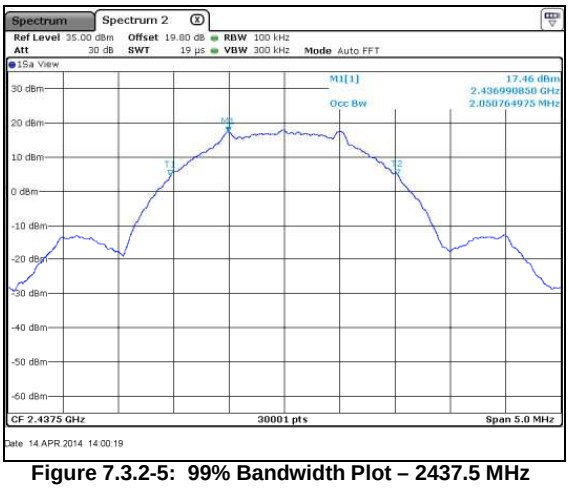


Figure 7.3.2-5: 99% Bandwidth Plot – 2437.5 MHz

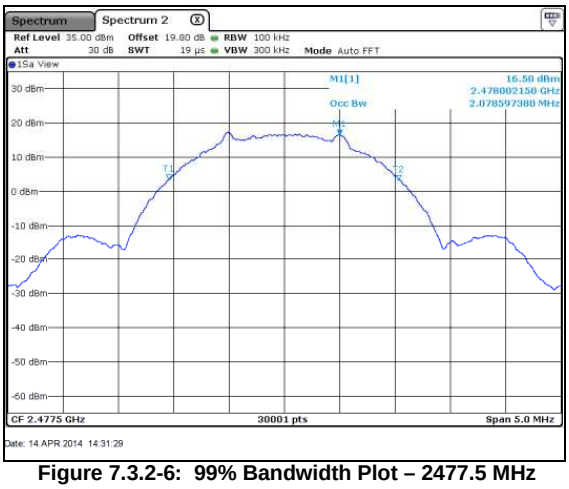


Figure 7.3.2-6: 99% Bandwidth Plot – 2477.5 MHz

Table 7.3.2-2: 6dB / 99% Bandwidth – ANT2

Frequency [MHz]	6dB Bandwidth [MHz]	99% Bandwidth [MHz]
2402.5	1.332	2.042
2437.5	1.404	2.054
2477.5	1.401	2.079

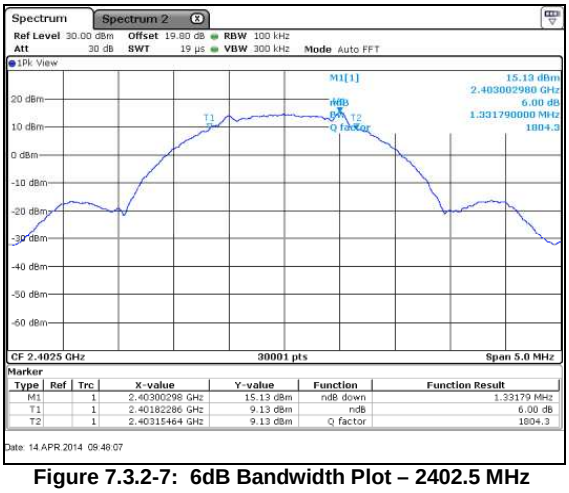


Figure 7.3.2-7: 6dB Bandwidth Plot – 2402.5 MHz

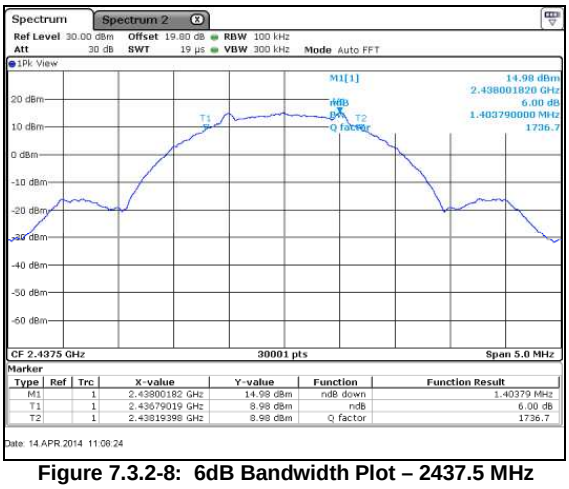


Figure 7.3.2-8: 6dB Bandwidth Plot – 2437.5 MHz

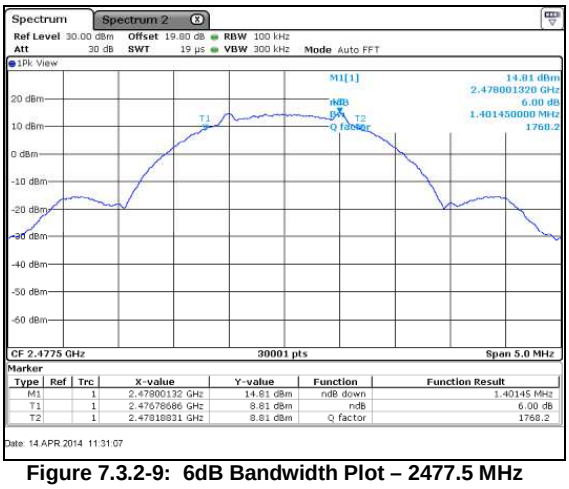


Figure 7.3.2-9: 6dB Bandwidth Plot – 2477.5 MHz

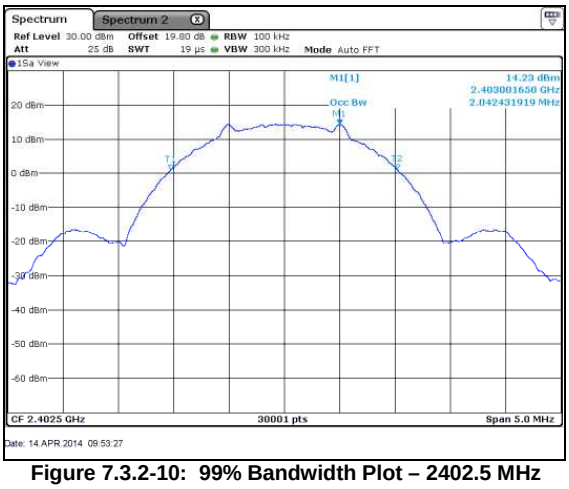


Figure 7.3.2-10: 99% Bandwidth Plot – 2402.5 MHz

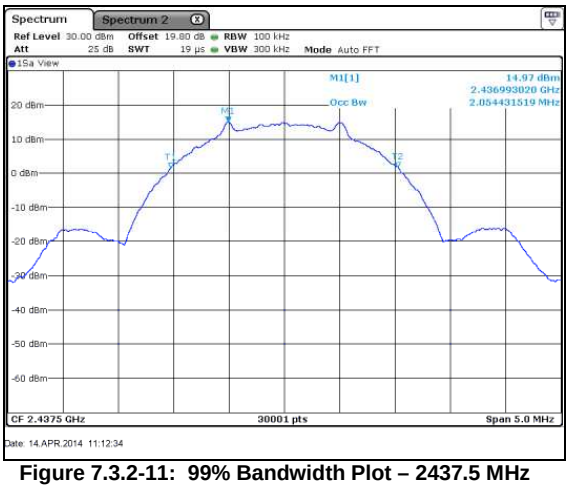


Figure 7.3.2-11: 99% Bandwidth Plot – 2437.5 MHz

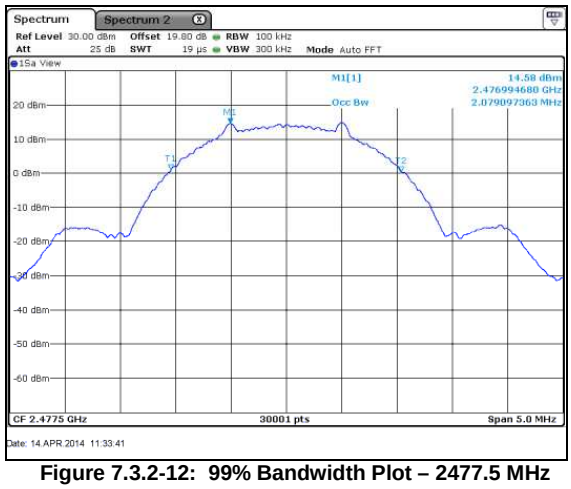


Figure 7.3.2-12: 99% Bandwidth Plot – 2477.5 MHz

7.4 Fundamental Emission Output Power – FCC 15.247(b)(3), IC: RSS-210 A8.4(4)

7.4.1 Measurement Procedure

The maximum peak conducted output power was measured in accordance with FCC KDB 558074 D01 DTS Meas Guidance v03r01 utilizing the PKPM1 Peak power meter method. The RF output of the equipment under test was directly connected to the input of the peak power meter applying suitable attenuation.

7.4.2 Measurement Results

Results are shown below in Tables 7.4.2-1 to 7.4.2-2.

Table 7.4.2-1: Maximum Peak Conducted Output Power – ANT1

Frequency (MHz)	Output Power (dBm)
2402.5	19.65
2437.5	19.67
2477.5	18.91

Table 7.4.2-2: Maximum Peak Conducted Output Power – ANT2

Frequency (MHz)	Output Power (dBm)
2402.5	19.47
2437.5	19.45
2477.5	18.69

7.5 Emission Levels – FCC 15.247(d), 15.205, 15.209; IC RSS-210 2.2/A8.5, RSS-Gen 7.2.2

7.5.1 Emissions into Non-restricted Frequency Bands

7.5.1.1 Measurement Procedure

The unwanted emissions into non-restricted bands were measured conducted in accordance with FCC KDB 558074 D01 DTS Meas Guidance v03r01. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 300 kHz. Span was set to 1.5 times the DTS bandwidth. The trace was set to max hold with a peak detector active. The resulting spectrum analyzer peak level was used to determine the reference level with respect to the 20 dBc limit. The spectrum span was then adjusted for the measurement of spurious emissions from 30MHz to 25GHz, 10 times the highest fundamental frequency.

Band-edge compliance was determined using the conducted marker-delta method in which the radio frequency power that is produced by the EUT is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power.

7.5.1.2 Measurement Results

RF Conducted Emissions are displayed in Figures 7.5.1.2-1 through 7.5.1.2-22.

ANT1

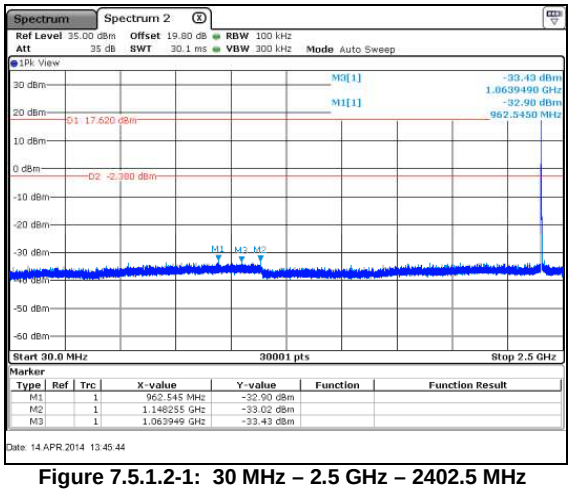


Figure 7.5.1.2-1: 30 MHz – 2.5 GHz – 2402.5 MHz

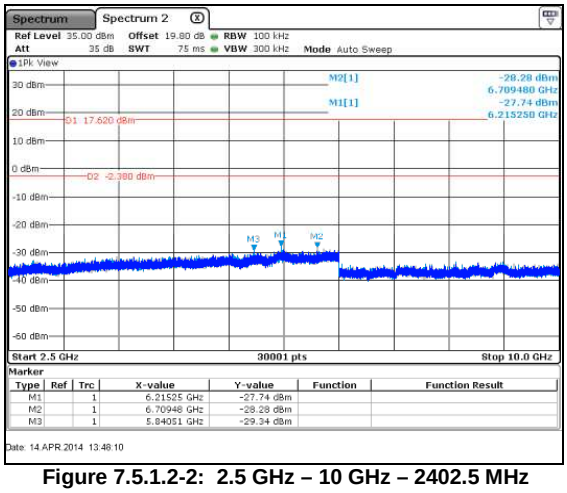


Figure 7.5.1.2-2: 2.5 GHz – 10 GHz – 2402.5 MHz

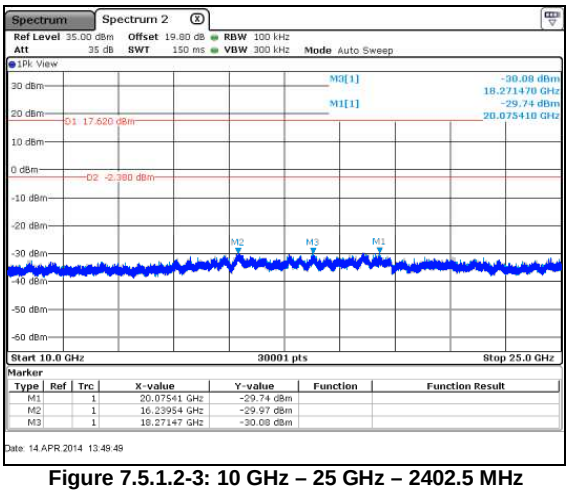


Figure 7.5.1.2-3: 10 GHz – 25 GHz – 2402.5 MHz

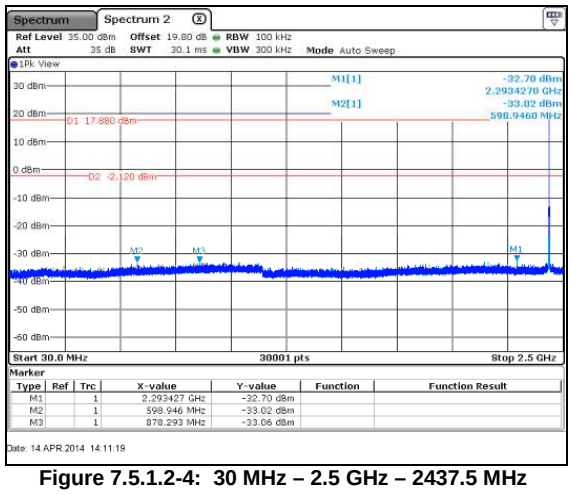


Figure 7.5.1.2-4: 30 MHz – 2.5 GHz – 2437.5 MHz

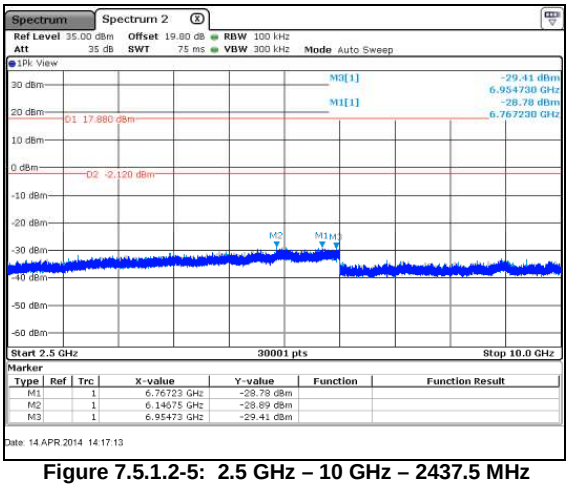


Figure 7.5.1.2-5: 2.5 GHz – 10 GHz – 2437.5 MHz

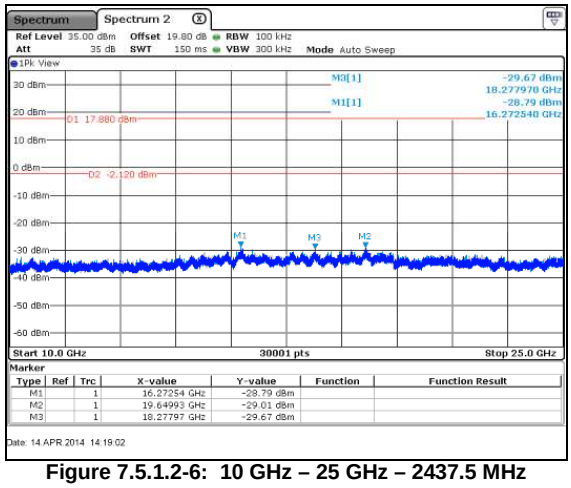


Figure 7.5.1.2-6: 10 GHz – 25 GHz – 2437.5 MHz

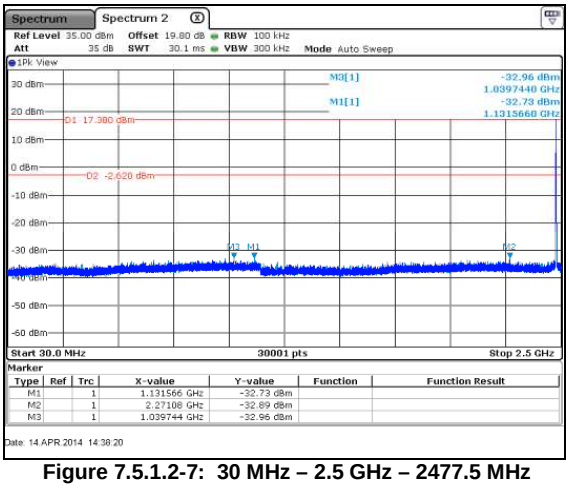


Figure 7.5.1.2-7: 30 MHz – 2.5 GHz – 2477.5 MHz

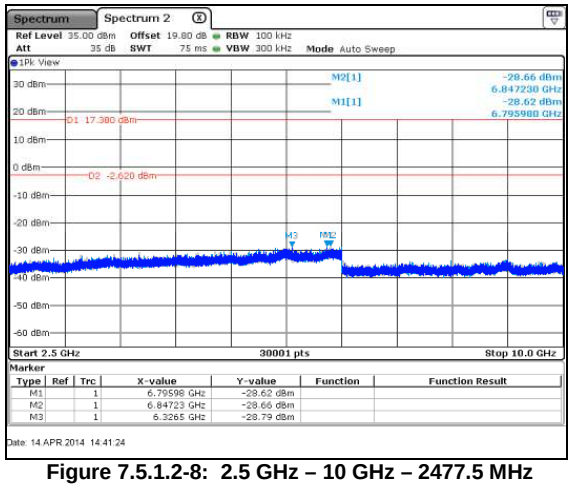


Figure 7.5.1.2-8: 2.5 GHz – 10 GHz – 2477.5 MHz

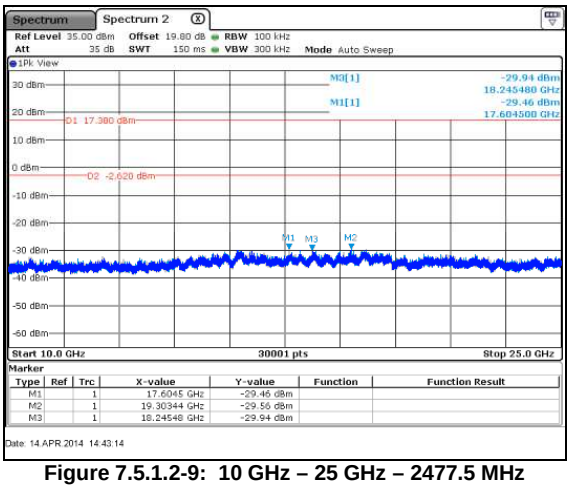


Figure 7.5.1.2-9: 10 GHz – 25 GHz – 2477.5 MHz

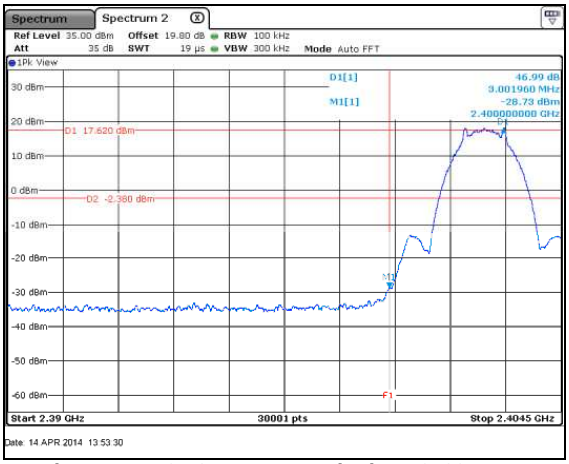


Figure 7.5.1.2-10: Lower Band-edge - 2402.5 MHz

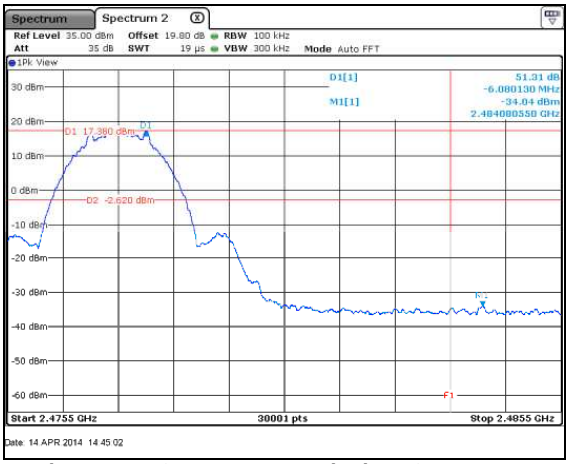


Figure 7.5.1.2-11: Upper Band-edge - 2477.5 MHz

ANT2

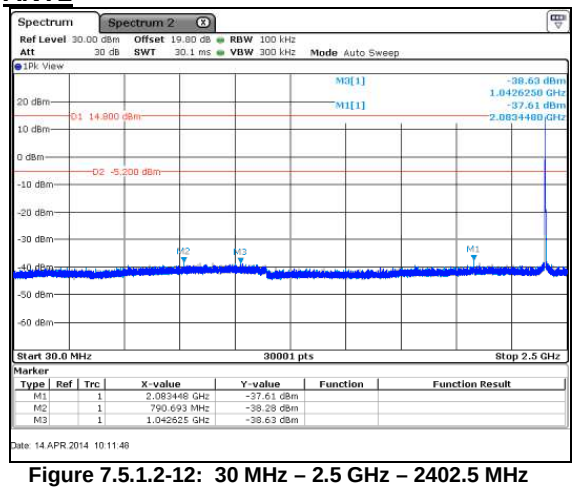


Figure 7.5.1.2-12: 30 MHz – 2.5 GHz – 2402.5 MHz

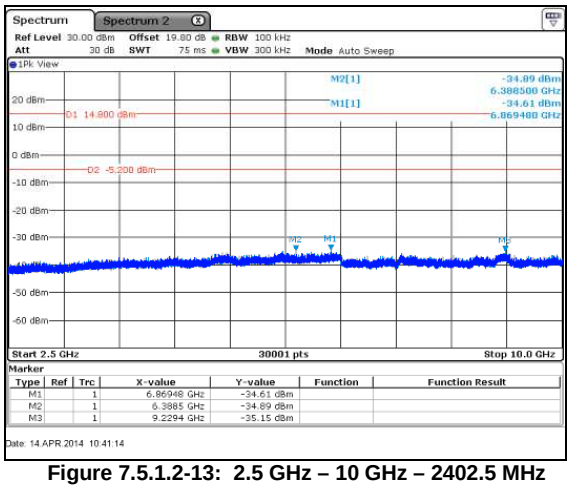


Figure 7.5.1.2-13: 2.5 GHz – 10 GHz – 2402.5 MHz

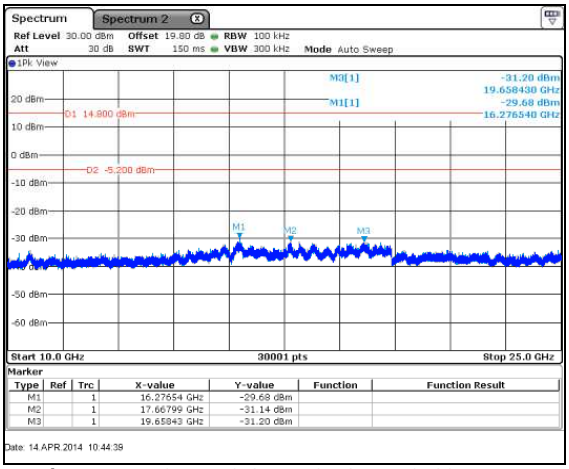


Figure 7.5.1.2-14: 10 GHz – 25 GHz – 2402.5 MHz

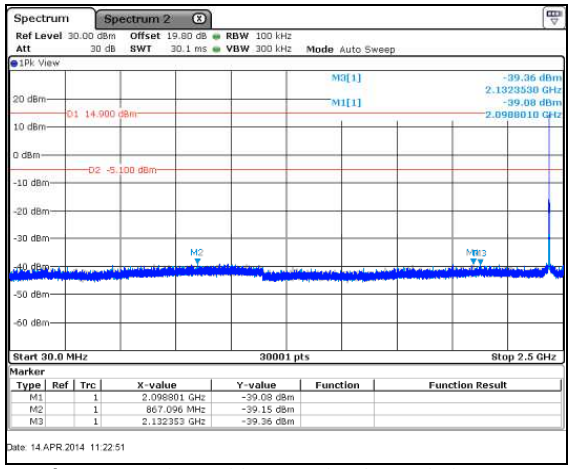


Figure 7.5.1.2-15: 30 MHz – 2.5 GHz – 2437.5 MHz

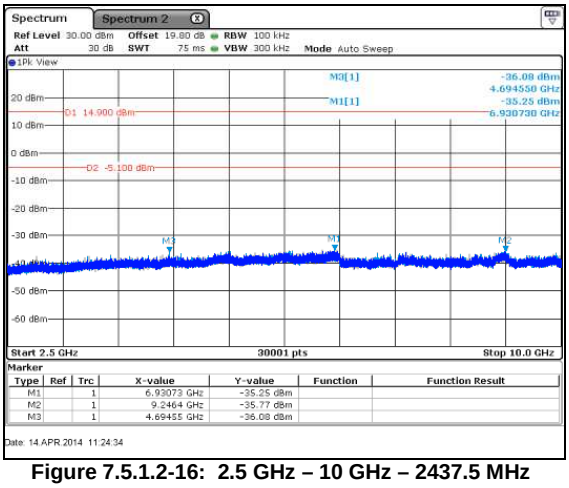


Figure 7.5.1.2-16: 2.5 GHz – 10 GHz – 2437.5 MHz

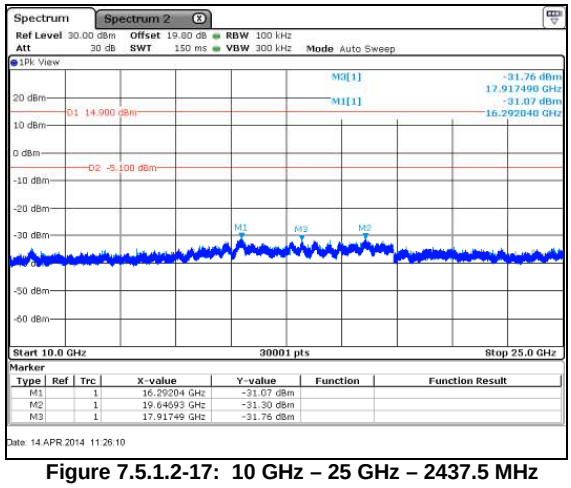


Figure 7.5.1.2-17: 10 GHz – 25 GHz – 2437.5 MHz

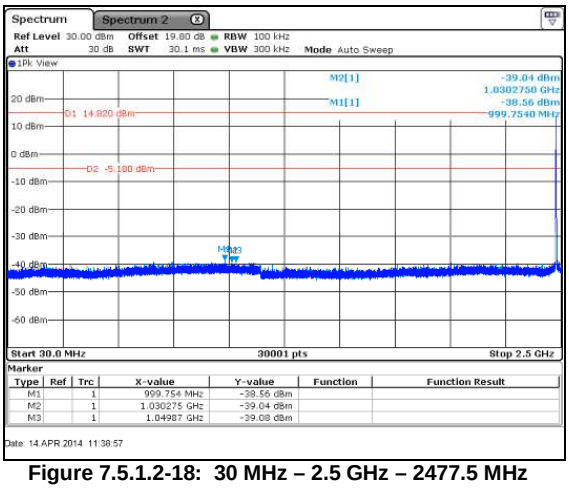


Figure 7.5.1.2-18: 30 MHz – 2.5 GHz – 2477.5 MHz

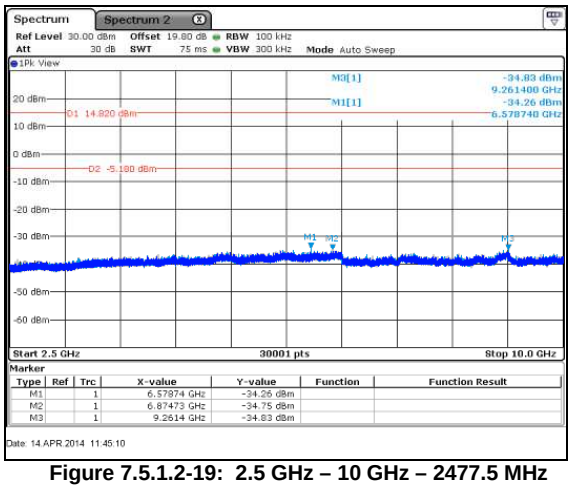


Figure 7.5.1.2-19: 2.5 GHz – 10 GHz – 2477.5 MHz

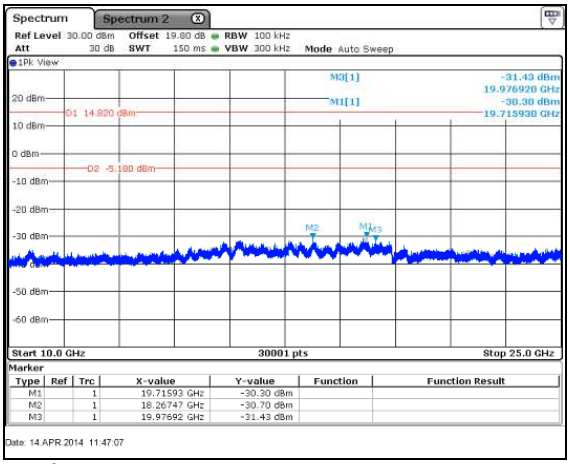


Figure 7.5.1.2-20: 10 GHz – 25 GHz – 2477.5 MHz

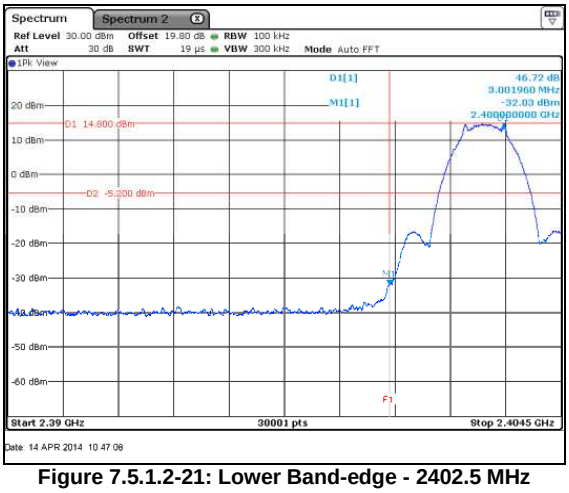


Figure 7.5.1.2-21: Lower Band-edge - 2402.5 MHz

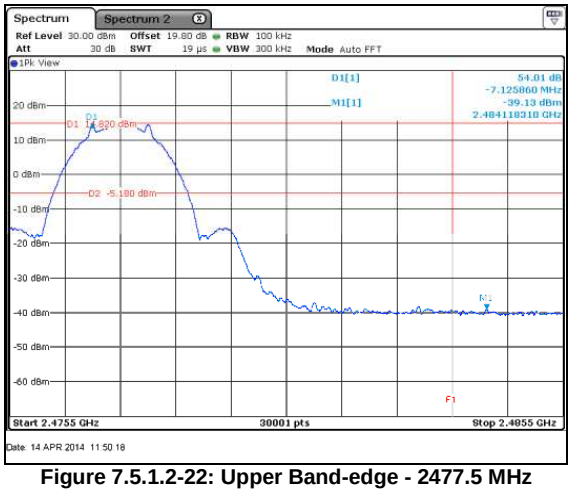


Figure 7.5.1.2-22: Upper Band-edge - 2477.5 MHz

7.5.2 Emissions into Restricted Frequency Bands

7.5.2.1 Measurement Procedure

The unwanted emissions into restricted bands were measured radiated over the frequency range of 30MHz to 25GHz, 10 times the highest fundamental frequency.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000MHz, peak and average measurements were made with RBW and VBW of 1 MHz and 3 MHz respectively. The average emissions were further corrected by applying the duty cycle correction of the EUT for comparison to the average limit.

Each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in section 15.209.

7.5.2.2 Duty Cycle Correction

For average radiated measurements, using a 35.84% duty cycle, the measured level was reduced by a factor -8.91dB. The duty cycle correction factor is determined using the formula: 20log (35.84/100) = -8.91dB.

A detailed analysis of the duty cycle timing is provided in the Theory of Operation accompanying the original application for certification.

7.5.2.3 Measurement Results

Radiated spurious emissions found in the band of 30MHz to 25GHz are reported in the table 7.5.2.3-1 below.

Table 7.5.2.3-1: Radiated Spurious Emissions Tabulated Data – ANT1 (Worst case)

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
2402.5 MHz										
4805	50.64	39.98	H	1.48	52.12	32.55	74.0	54.0	21.9	21.5
4805	50.18	38.64	V	1.48	51.66	31.21	74.0	54.0	22.3	22.8
2390	53.40	41.46	H	-6.39	47.01	26.16	74.0	54.0	27.0	27.8
2390	68.27	55.52	V	-6.39	61.88	40.22	74.0	54.0	12.1	13.8
2343.9	48.64	37.77	H	-6.64	42.00	22.22	74.0	54.0	32.0	31.8
2343.9	56.69	48.24	V	-6.64	50.05	32.69	74.0	54.0	23.9	21.3
2437.5 MHz										
4875	48.50	37.06	H	1.60	50.10	29.74	74.0	54.0	23.9	24.3
4875	49.16	37.85	V	1.60	50.76	30.53	74.0	54.0	23.2	23.5
2497.8	48.56	38.38	H	-5.80	42.76	23.67	74.0	54.0	31.2	30.3
2497.8	56.59	51.34	V	-5.80	50.79	36.63	74.0	54.0	23.2	17.4
2376.98	50.63	42.67	H	-6.46	44.17	27.30	74.0	54.0	29.8	26.7
2376.98	58.67	54.18	V	-6.46	52.21	38.81	74.0	54.0	21.8	15.2
2477.5 MHz										
4955	49.51	38.89	H	1.73	51.24	31.71	74.0	54.0	22.8	22.3
4955	49.35	38.61	V	1.73	51.08	31.43	74.0	54.0	22.9	22.6
2483.5	51.32	39.65	H	-5.88	45.44	24.86	74.0	54.0	28.6	29.1
2483.5	68.59	56.67	V	-5.88	62.71	41.88	74.0	54.0	11.3	12.1

7.5.2.4 Sample Calculation:

$R_C = R_U + CF_T$

Where:

CF_T = Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U = Uncorrected Reading
R_C = Corrected Level
AF = Antenna Factor
CA = Cable Attenuation
AG = Amplifier Gain
DC = Duty Cycle Correction Factor

Example Calculation: Peak

Corrected Level: 50.64 + 1.48 = 52.12dBuV/m
Margin: 74dBuV/m – 52.12dBuV/m = 21.9dB

Example Calculation: Average

Corrected Level: 39.98 + 1.48 - 8.91 = 32.55dBuV
Margin: 54dBuV – 32.55dBuV = 21.5dB

7.6 Maximum Power Spectral Density in the Fundamental Emission – FCC 15.247(e) IC: RSS-210 A8.2(b)

7.6.1 Measurement Procedure

The power spectral density was measured in accordance with the FCC KDB 558074 D01 DTS Meas Guidance v03r01 utilizing the PKPSD (peak PSD) method. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 3 kHz. The Video Bandwidth (VBW) was set to 10 kHz. Span was set to 1.5 times the DTS bandwidth. The trace was set to max hold with a peak detector active.

7.6.2 Measurement Results

Results are shown below in tables 7.6.2-1 to 7.6.2-2 and figures 7.6.2-1 to 7.6.2-6.

Table 7.6.2-1: Peak Power Spectral Density – ANT1

Frequency (MHz)	PSD Level (dBm)
2402.5	5.36
2437.5	5.63
2477.5	4.00

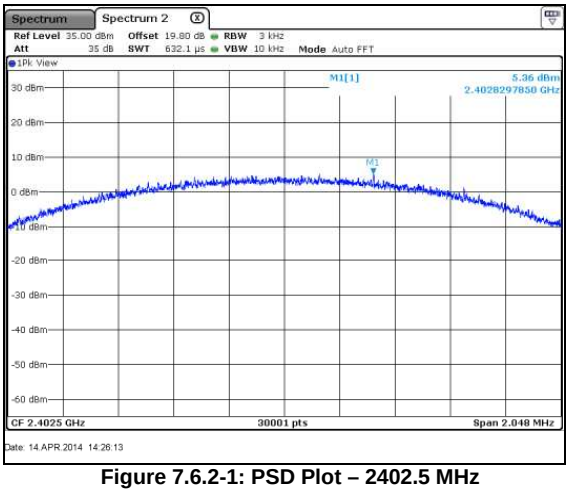


Figure 7.6.2-1: PSD Plot – 2402.5 MHz

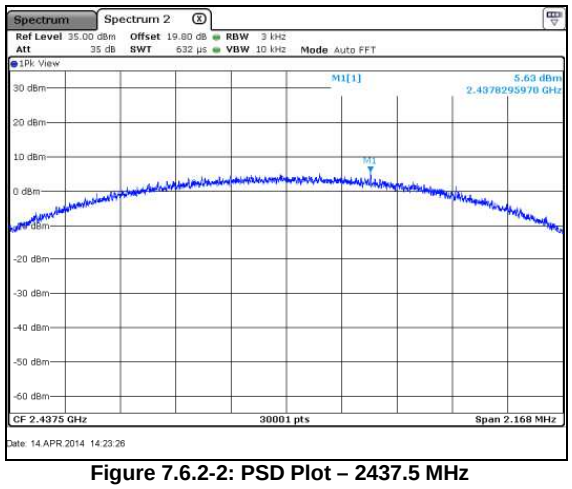


Figure 7.6.2-2: PSD Plot – 2437.5 MHz

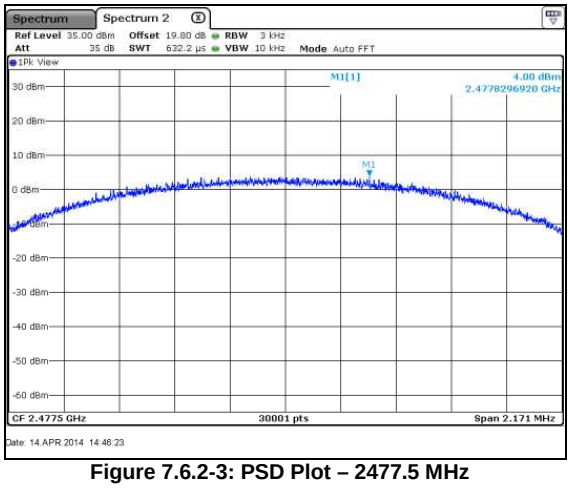


Figure 7.6.2-3: PSD Plot – 2477.5 MHz

Table 7.6.2-2: Peak Power Spectral Density – ANT2

Frequency (MHz)	PSD Level (dBm)
2402.5	2.45
2437.5	2.06
2477.5	2.01

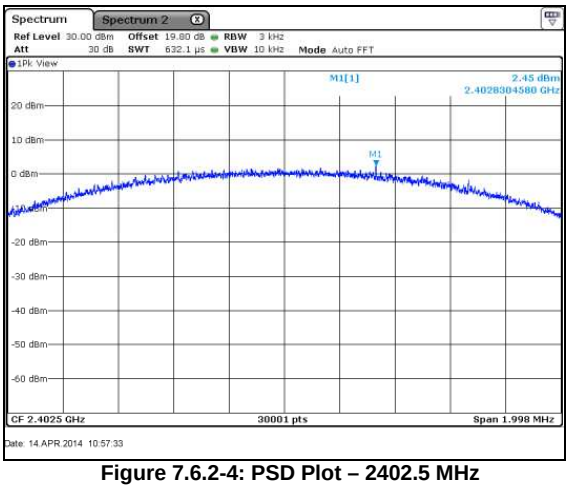


Figure 7.6.2-4: PSD Plot – 2402.5 MHz

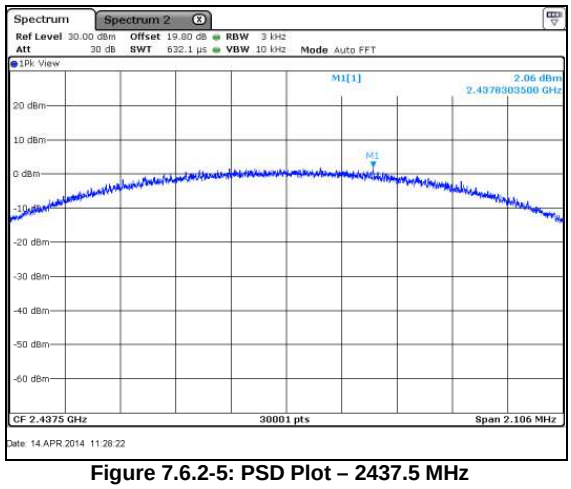


Figure 7.6.2-5: PSD Plot – 2437.5 MHz

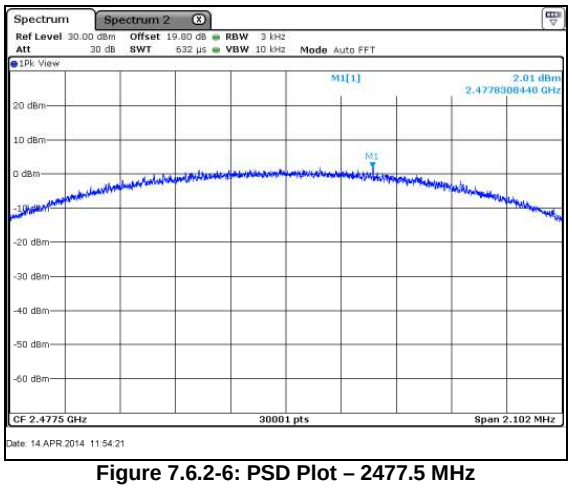


Figure 7.6.2-6: PSD Plot – 2477.5 MHz

8 CONCLUSION

In the opinion of ACS, Inc. the ARX-200, manufactured by AirNetix, LLC meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT