Excellence in Compliance Testing

Certification Test Report

FCC ID: ZNR-CU3000
IC: 9675A-CU3000

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

ACS Report Number: 10-0364.W06.23.A

Manufacturer: Preventix Systems, Inc.
Model: CU3000

Test Begin Date: October 18, 2010
Test End Date: February 3, 2010

Report Issue Date: June 22, 2011

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 23 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.

1.2 Product description

The CU3000 device is intended to be used by Health Care, Restaurants, Schools, and other bodies desiring to monitor Hand Hygiene Compliance in their facilities. The CU3000 is installed adjacent to Hand Soap or Hand Sanitizer Dispensers where device utilization is to be monitored. The CU3000 is powered from a Class 2 low voltage power supply.

The CU3000 contains two RF transceivers. The main radio communicates to the Ethernet bridge unit and the tag radio communicates with an asset tag (FCC ID: ZNR-TG3000). This report addresses the CU3000 main radio. Report number 10-0364.W06.13.A addresses the CU3000 tag radio.

Technical Information:

Band of operation:	2405 – 2480 MHz
Number of channels:	16
Modulation format:	O-QPSK
Antenna Type/Gain:	PIFA / 0dBi
Operating Voltage:	120 VAC (9V Adaptor)

Manufacturer Information:
Proventix Systems, Inc.
4518 Valleydale Rd, Suite 201
Birmingham, AL 35242
USA

Test Sample Serial Number(s): FFA129

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

1.3 Test Methodology and Considerations

The CU3000 was tested in an orientation representative of final installation for radiated and conducted emissions. Two (2) distinct power supplies where provided with both potentially to be marketed with the CU3000 device. Both supplies were evaluated for radiated and conducted emissions where applicable. See sections 5.0 – 6.0 for additional details.

A reduction in power was required at channel 26 (2480MHz) for compliance with band-edge limits, therefore measurements were made at both channels 25 and 26 and data for both included in the following report.

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
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:

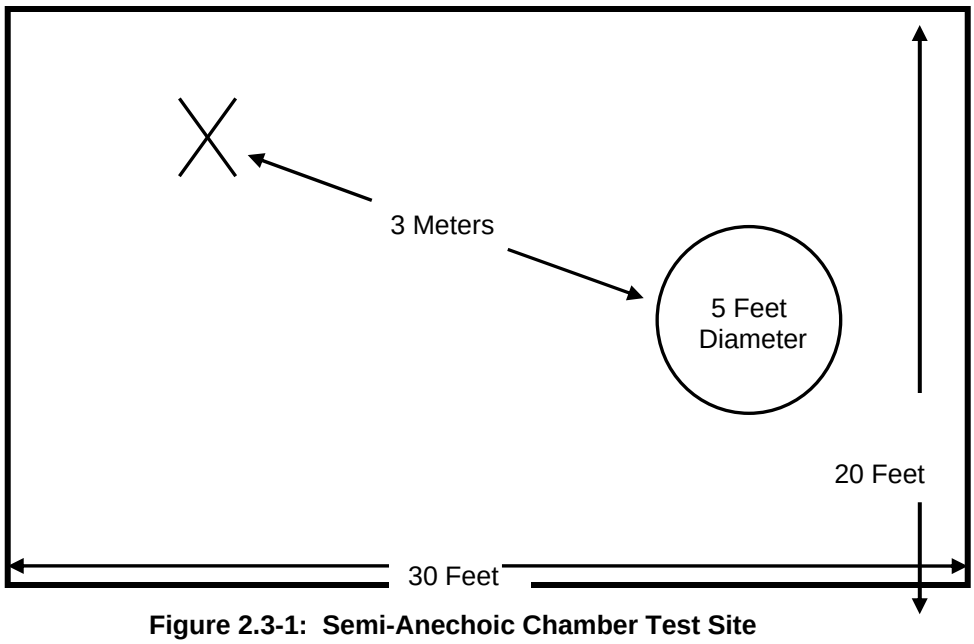


Figure 2.3-1: Semi-Anechoic Chamber Test Site

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:

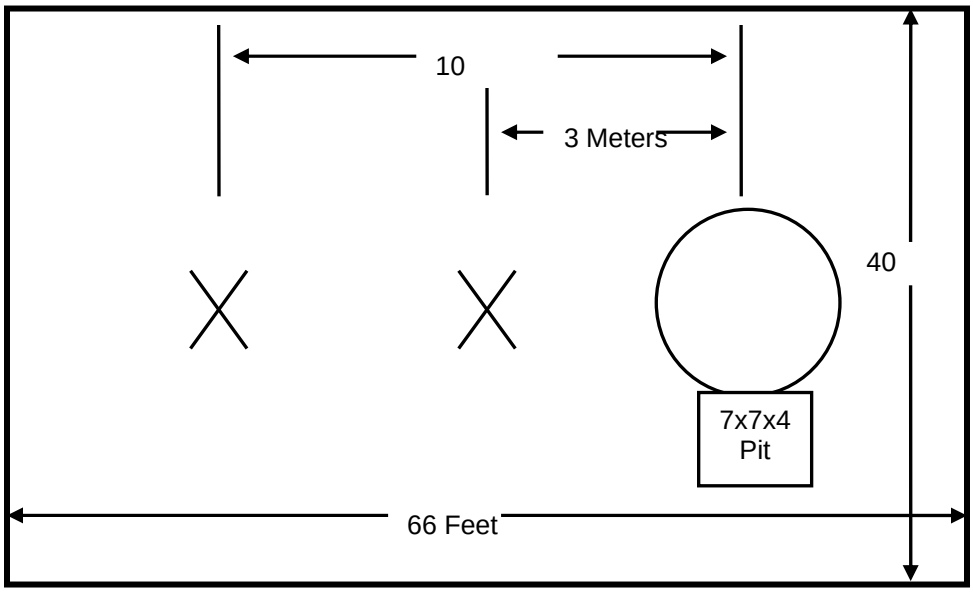


Figure 2.3-2: Open Area Test Site

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 group 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:

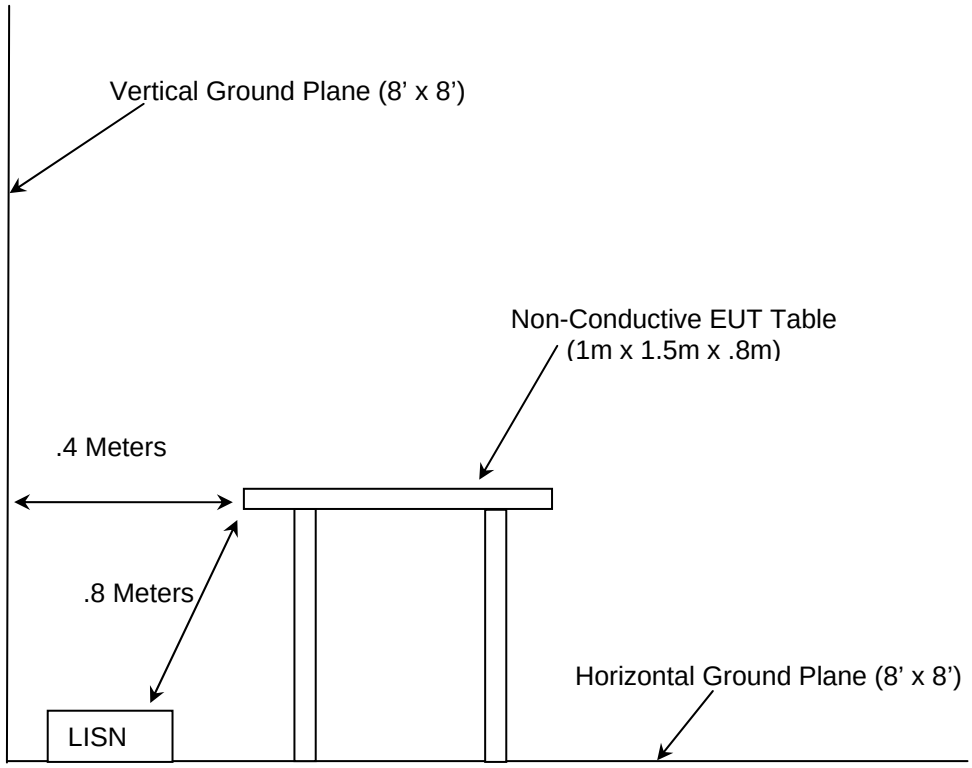


Figure 2.4-1: AC Mains Conducted EMI Site

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
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2010
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2010
- FCC KDB Publication No. 558074 - Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247), March 2005
- 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

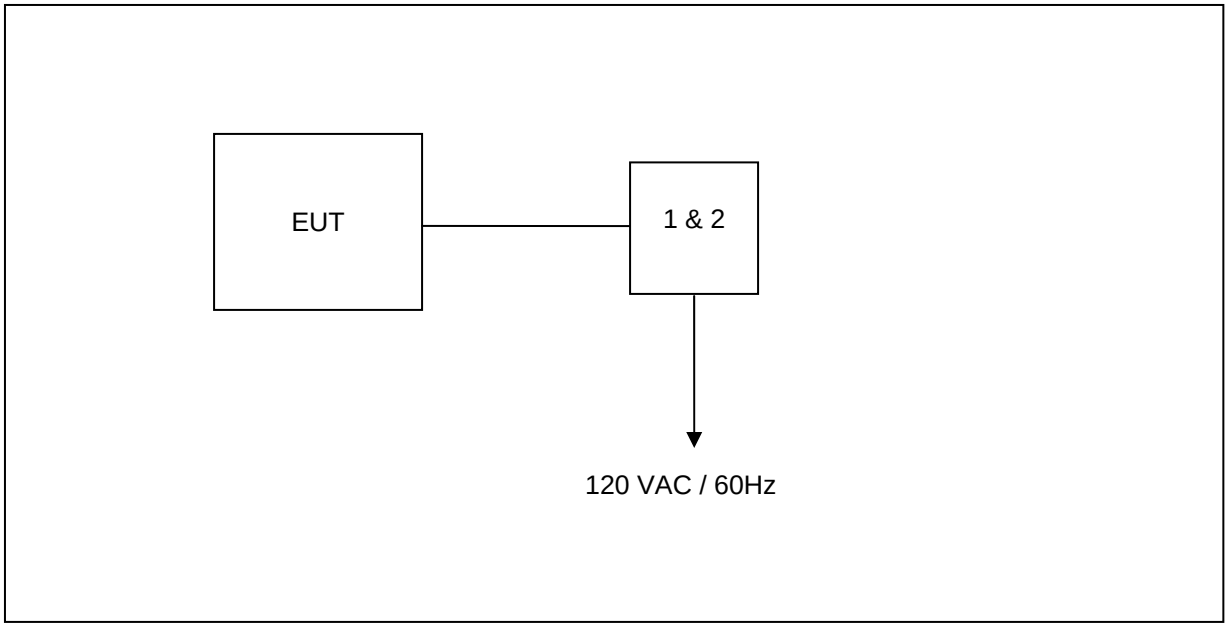
AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
1	Rohde & Schwarz	ESMI - Display	Spectrum Analyzers	833771/007	9/23/2010	9/23/2012
2	Rohde & Schwarz	ESMI-Receiver	Spectrum Analyzers	839587/003	9/23/2010	9/23/2012
3	Rohde & Schwarz	ESMI - Display	Spectrum Analyzers	839379/011	5/26/2011	5/26/2013
4	Rohde & Schwarz	ESMI - Receiver	Spectrum Analyzers	833827/003	5/26/2011	5/26/2013
22	Agilent	8449B	Amplifiers	3008A00526	9/2/2010	8/30/2011
25	Chase	CBL6111	Antennas	1043	9/13/2010	9/13/2012
30	Spectrum Technologies	DRH-0118	Antennas	970102	4/27/2011	4/27/2013
73	Agilent	8447D	Amplifiers	2727A05624	3/21/2011	3/21/2012
153	EMCO	3825/2	LISN	9411-2268	1/13/2011	1/13/2012
167	ACS	Chamber EMI Cable Set	Cable Set	167	1/26/2011	1/26/2012
168	Hewlett Packard	11947A	Attenuators	44829	2/4/2011	2/4/2012
283	Rohde & Schwarz	FSP40	Spectrum Analyzers	1000033	8/31/2010	8/31/2011
291	Florida RF Cables	SMRE-200W-12.0-SMRE	Cables	None	12/7/2010	12/7/2011
292	Florida RF Cables	SMR-290AW-480.0-SMR	Cables	None	4/11/2011	4/11/2012
324	ACS	Belden	Cables	8214	7/9/2010	7/9/2011
329	AH Systems	SAS-571	Antennas	721	8/4/2009	8/4/2011
334	Rohde&Schwarz	3160-10	Antennas	45576	11/4/2010	NCR
335	Suhner	SF-102A	Cables	882/2A	10/29/2010	10/29/2011
338	Hewlett Packard	8449B	Amplifiers	3008A01111	3/24/2011	3/24/2012
340	Aeroflex/Weinschel	AS-20	Attenuators	7136	10/5/2010	10/5/2011
345	Suhner Sucoflex	102A	Cables	1077/2A	10/29/2010	10/29/2011
422	Florida RF	SMS-200AW-72.0-SMR	Cables	805	12/29/2010	12/29/2011
432	Microwave Circuits	H3G020G4	Filters	264066	7/16/2010	7/16/2011

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
1	9V DC Power Supply	GTE	ADP2108GT(64-23170)	NA
2	9V DC Power Supply	V-INFINITY	EPS090066-P5RP	NA

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM



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 – FCC: Section 15.203

The antenna used for the CU3000 main radio is a PIFA PCB antenna with 0dBi gain, and therefore meets the requirements of Section 15.203.

7.2 Power Line Conducted Emissions – FCC: Section 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 and Tables 7.2.2-1 to 7.2.2.4.

Table 7.2.2-1: Line 1 Conducted EMI Results – GTE ADP2108GT(64-23170)

Frequency (MHz)	Level (dBuV)	Transducer (dB)	Limit (dBuV)	Margin (dB)	Line	PE	Detector
0.222	32.1	9.9	63	30.7	L1	FLO	QP
0.324	28.6	10	60	31	L1	FLO	QP
0.426	25.3	10	57	32.1	L1	FLO	QP
0.486	23.1	10	56	33.1	L1	FLO	QP
0.678	21.5	10	56	34.5	L1	FLO	QP
0.768	21.8	10.1	56	34.2	L1	FLO	QP
0.84	21.4	10	56	34.6	L1	FLO	QP
0.924	21	10	56	35	L1	FLO	QP
1.056	20	10	56	36	L1	FLO	QP
1.152	19	10	56	37	L1	FLO	QP
0.228	10.3	9.9	53	42.2	L1	FLO	AVG
0.33	9.3	10	50	40.1	L1	FLO	AVG
0.426	8.6	10	47	38.8	L1	FLO	AVG
0.48	8.3	10	46	38.1	L1	FLO	AVG
0.666	8	10	46	38	L1	FLO	AVG
0.822	8	10	46	38	L1	FLO	AVG
0.924	7.7	10	46	38.3	L1	FLO	AVG
0.99	7.8	10	46	38.2	L1	FLO	AVG
1.02	7.7	10	46	38.3	L1	FLO	AVG
1.176	7.7	10	46	38.3	L1	FLO	AVG

Table 7.2.2-2: Line 2 Conducted EMI Results – GTE ADP2108GT(64-23170)

Frequency (MHz)	Level (dBuV)	Transducer (dB)	Limit (dBuV)	Margin (dB)	Line	PE	Detector
0.216	32.5	9.9	63	30.4	L2	FLO	QP
0.324	29	10	60	30.6	L2	FLO	QP
0.42	25.6	10	57	31.8	L2	FLO	QP
0.51	22.1	10	56	33.9	L2	FLO	QP
0.582	20.8	10	56	35.2	L2	FLO	QP
0.696	21.1	10.1	56	34.9	L2	FLO	QP
0.774	21.1	10.1	56	34.9	L2	FLO	QP
0.954	18.7	10	56	37.3	L2	FLO	QP
1.074	17.8	10	56	38.2	L2	FLO	QP
1.146	17.3	10	56	38.7	L2	FLO	QP
0.228	10.4	9.9	53	42.1	L2	FLO	AVG
0.33	9.4	10	50	40.1	L2	FLO	AVG
0.408	8.8	10.1	48	38.8	L2	FLO	AVG
0.492	8.3	10	46	37.9	L2	FLO	AVG
0.576	7.9	10	46	38.1	L2	FLO	AVG
0.738	8.1	10.1	46	37.9	L2	FLO	AVG
0.81	8	10.1	46	38	L2	FLO	AVG
0.954	7.7	10	46	38.3	L2	FLO	AVG
1.05	7.6	10	46	38.4	L2	FLO	AVG
1.086	7.5	10	46	38.5	L2	FLO	AVG

Table 7.2.2-3: Line 1 Conducted EMI Results – V-INFINITY EPS090066-P5RP

Frequency (MHz)	Level (dBuV)	Transducer (dB)	Limit (dBuV)	Margin (dB)	Line	PE	Detector
0.478	45.19	10	56.37	11.2	L1	FLO	QP
0.952	43.52	10	56	12.5	L1	FLO	QP
1.07	46.11	10	56	9.9	L1	FLO	QP
1.18	46.29	10	56	9.7	L1	FLO	QP
25.89	19.16	10.97	60	40.8	L1	FLO	QP
21.19	20.17	11.08	60	39.8	L1	FLO	QP
0.478	32.9	10	46.37	13.5	L1	FLO	AVG
0.952	24.24	10	46	21.8	L1	FLO	AVG
1.07	27.25	10	46	18.8	L1	FLO	AVG
1.18	26.98	10	46	19	L1	FLO	AVG
25.89	11.34	10.97	50	38.7	L1	FLO	AVG
21.19	11.27	11.08	50	38.7	L1	FLO	AVG

Table 7.2.2-4: Line 2 Conducted EMI Results - V-INFINITY EPS090066-P5RP

Frequency (MHz)	Level (dBuV)	Transducer (dB)	Limit (dBuV)	Margin (dB)	Line	PE	Detector
0.477	37.89	10	56.39	18.5	L2	FLO	QP
0.95	37.64	10	56	18.4	L2	FLO	QP
1.07	40.3	10	56	15.7	L2	FLO	QP
1.19	33.54	10	56	22.5	L2	FLO	QP
21	20.06	11.08	60	39.9	L2	FLO	QP
26.4	19.6	10.98	60	40.4	L2	FLO	QP
0.477	26.93	10	46.39	19.5	L2	FLO	AVG
0.95	15.7	10	46	30.3	L2	FLO	AVG
1.07	21.13	10	46	24.9	L2	FLO	AVG
1.19	16.49	10	46	29.5	L2	FLO	AVG
21	11.21	11.08	50	38.8	L2	FLO	AVG
26.4	11.74	10.98	50	38.3	L2	FLO	AVG

7.3 6dB / 99% Bandwidth – FCC: Section 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 Publication No. 558074 "Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)". The RBW of the spectrum analyzer was set to 100 kHz and VBW 300 kHz. Span was set large enough to capture the entire emissions and >> RBW.

The occupied bandwidth measurement function of the analyzer was used for the 99% bandwidth.

7.3.2 Measurement Results

Results are shown below in table 7.3.2-1 and figure 7.3.2-1 to 7.3.2-8:

Table 7.3.2-1: 6dB / 99% Bandwidth

Frequency [MHz]	6dB Bandwidth [MHz]	99% Bandwidth [MHz]
2405	1.34	2.29
2440	1.36	2.35
2475	1.42	2.36
2480	1.47	2.34

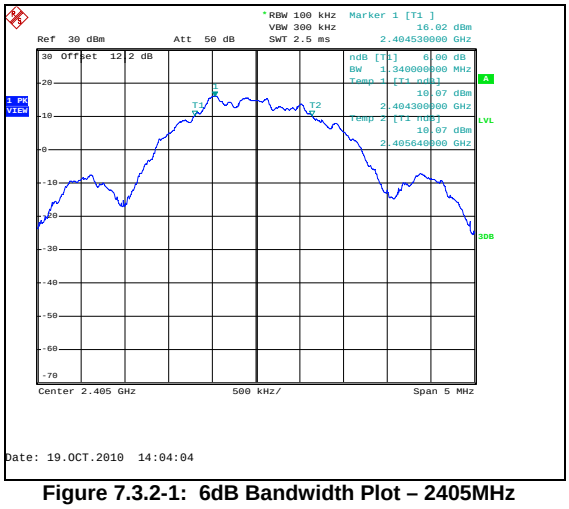


Figure 7.3.2-1: 6dB Bandwidth Plot – 2405MHz

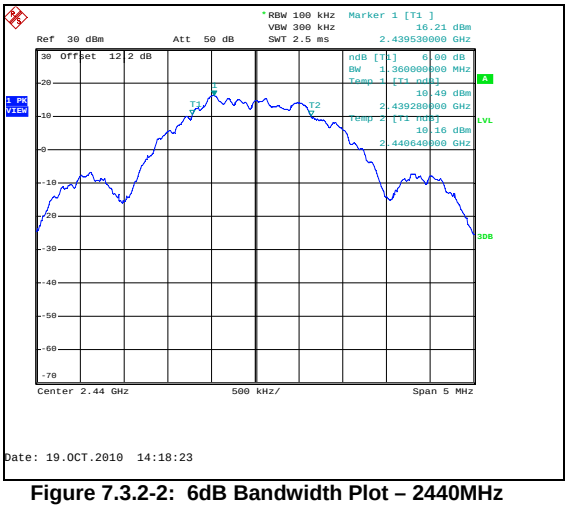


Figure 7.3.2-2: 6dB Bandwidth Plot – 2440MHz

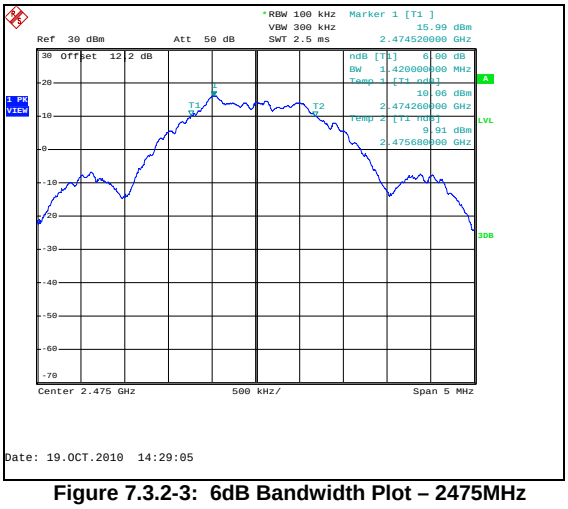


Figure 7.3.2-3: 6dB Bandwidth Plot – 2475MHz

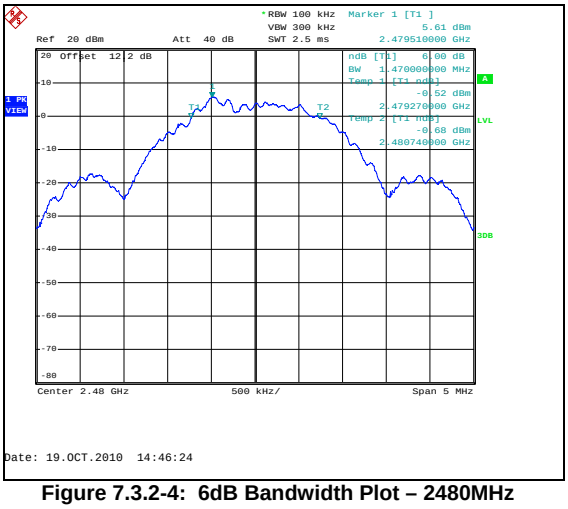


Figure 7.3.2-4: 6dB Bandwidth Plot – 2480MHz

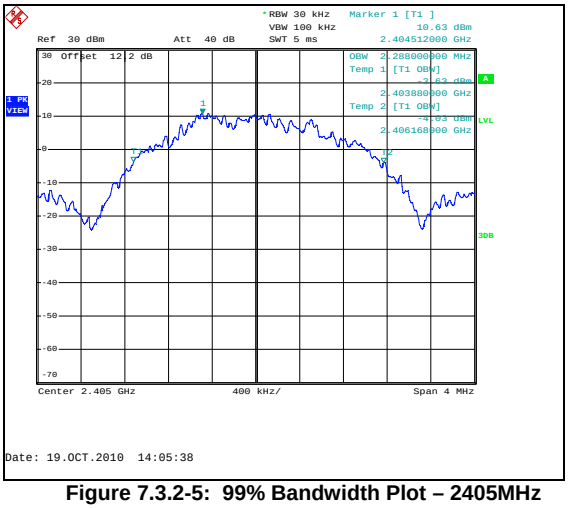


Figure 7.3.2-5: 99% Bandwidth Plot – 2405MHz

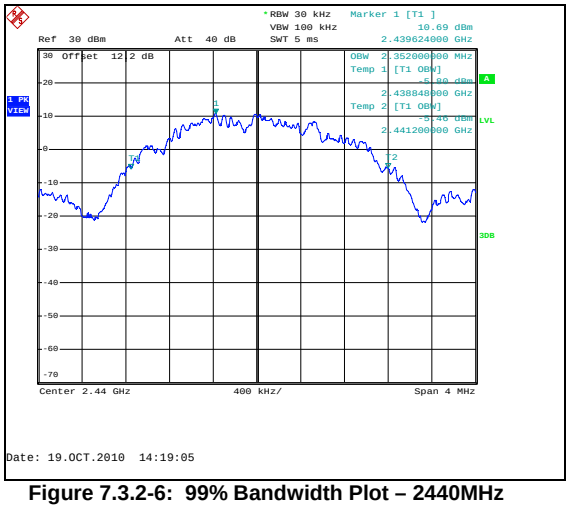


Figure 7.3.2-6: 99% Bandwidth Plot – 2440MHz

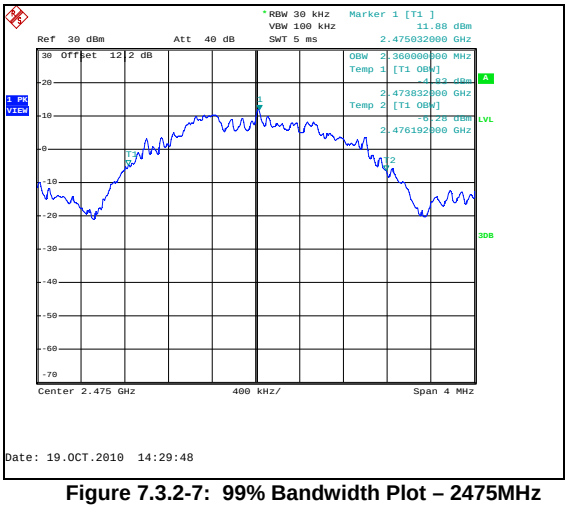


Figure 7.3.2-7: 99% Bandwidth Plot – 2475MHz

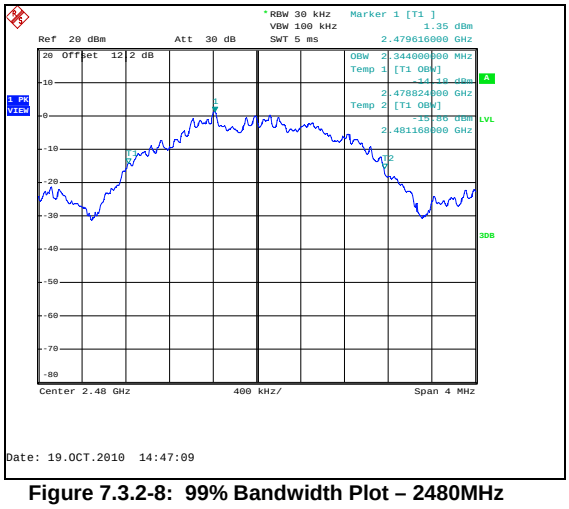


Figure 7.3.2-8: 99% Bandwidth Plot – 2480MHz

7.4 Peak Output Power Requirement - FCC Section 15.247(b)(3) IC: RSS-210 A8.4(4)

7.4.1 Measurement Procedure

The Peak Output Power was measured in accordance with the FCC KDB Publication No. 558074 "Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)" Power Option 1. The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. Data was collected with the EUT operating at maximum power per channelization. Measurements were made at both 2475MHz and 2480MHz based on the difference in power levels.

7.4.2 Measurement Results

Results are shown below in Table 7.4.2-1 and Figures 7.4.2-1 to 7.4.2-4.

Table 7.4.2-1: Peak Output Power

Frequency (MHz)	Output Power (dBm)
2405	19.05
2440	18.96
2475	18.80
2480	8.29

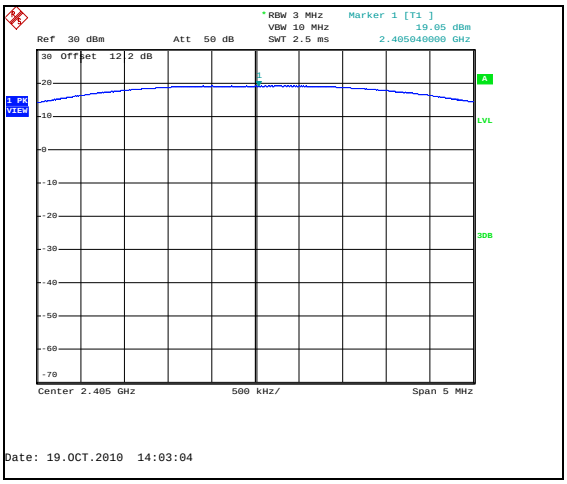


Figure 7.4.2-1: Output power – 2405MHz

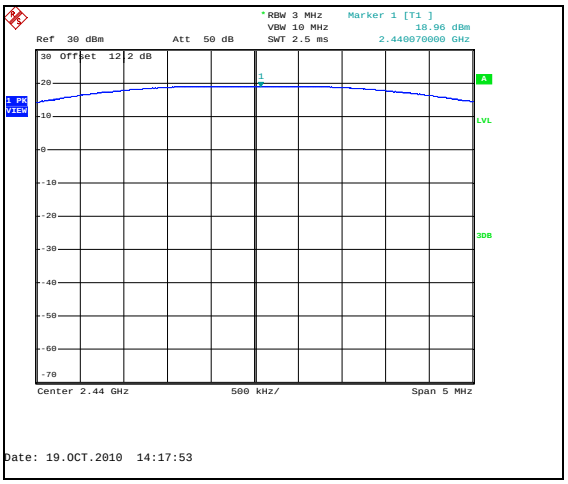


Figure 7.4.2-2: Output power – 2440MHz

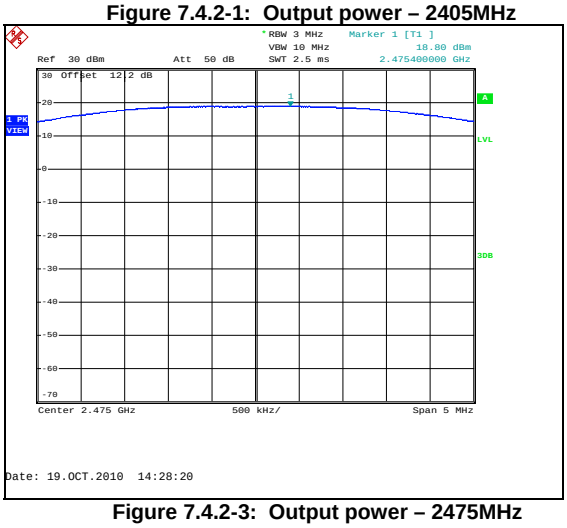


Figure 7.4.2-3: Output power – 2475MHz

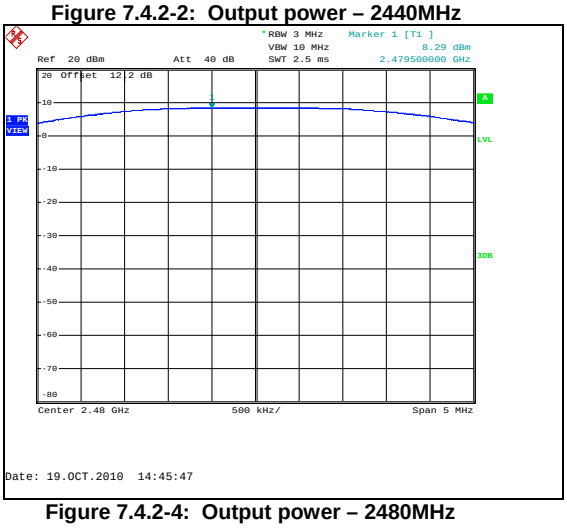


Figure 7.4.2-4: Output power – 2480MHz

7.5 Band-Edge Compliance and Spurious Emissions-FCC 15.247(d) IC:RSS-210 2.2, A8.5

7.5.1 Band-Edge Compliance

7.5.1.1 Measurement Procedure

The EUT was investigated at the low and high channels of operation to determine band-edge compliance. Because the upper band-edge coincides with a restricted band, band-edge compliance for the upper band-edge was determined based on absolute radiated field strength measurements.

The lower 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.

Band-edge measurements were made at both 2475MHz and 2480MHz based on the difference in power levels.

7.5.1.2 Measurement Results

Band-edge compliance is displayed in Tables 7.5.1.2-1 – 7.5.1.2-2 and Figure 7.5.1.2-1.

Table 7.5.1.2-1: Upper Band-edge Radiated Emissions - 2475MHz

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
2483.5	65.98	55.72	H	1.00	66.98	39.71	74.0	54.0	7.0	14.3
2483.5	67.76	57.73	V	1.00	68.76	41.72	74.0	54.0	5.2	12.3

Table 7.5.1.2-2: Upper Band-edge Radiated Emissions - 2480MHz

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
2483.5	70.37	60.49	H	1.00	71.37	44.48	74.0	54.0	2.6	9.5
2483.5	72.05	61.82	V	1.00	73.05	45.81	74.0	54.0	0.9	8.2

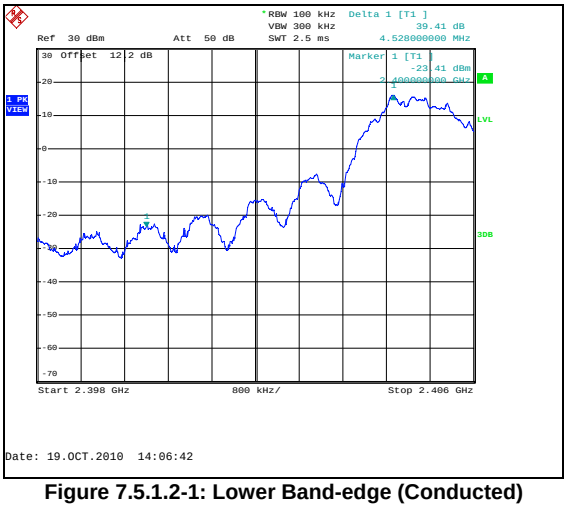


Figure 7.5.1.2-1: Lower Band-edge (Conducted)

7.5.2 RF Conducted Spurious Emissions

7.5.2.1 Measurement Procedure

The RF Conducted Spurious Emissions were measured in accordance with the FCC KDB Publication No. 558074 "Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)". The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. The EUT was investigated for conducted spurious emissions from 30MHz to 25GHz, 10 times the highest fundamental frequency. For each measurement, the spectrum analyzer's RBW was set to 100 kHz and the VBW was set to 300 kHz. The peak detector and Max Hold function of the analyzer were utilized.

7.5.2.2 Measurement Results

RF Conducted Emissions are displayed in Figures 7.5.2.2-1 through 7.5.2.2-9.

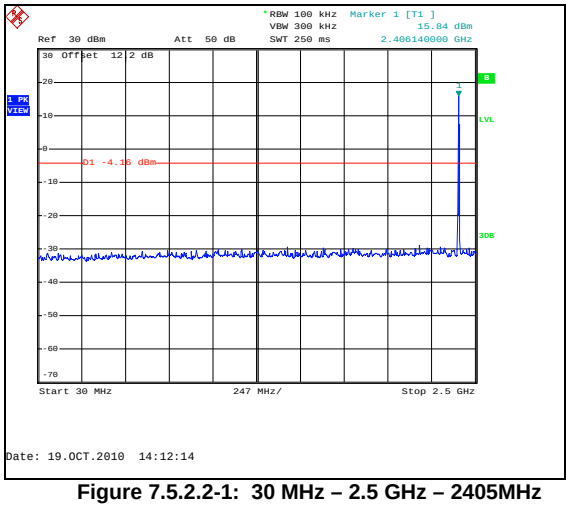


Figure 7.5.2.2-1: 30 MHz – 2.5 GHz – 2405MHz

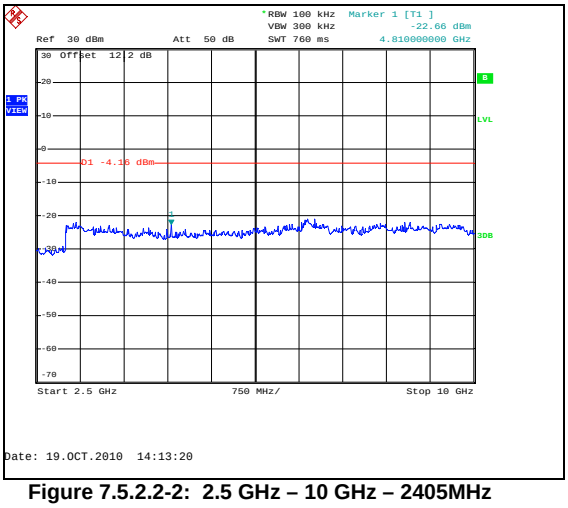


Figure 7.5.2.2-2: 2.5 GHz – 10 GHz – 2405MHz

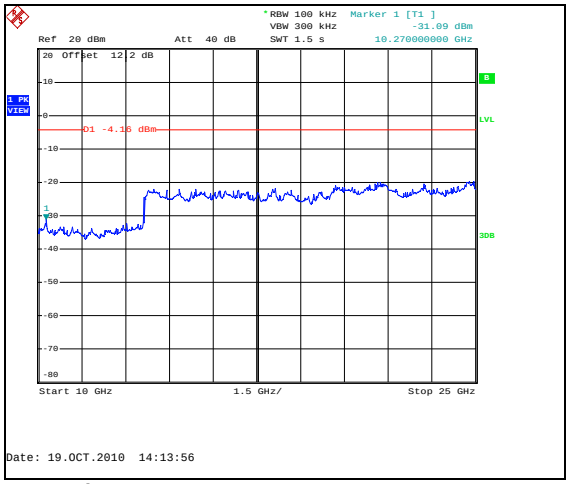


Figure 7.5.2.2-3: 10 GHz – 25 GHz – 2405MHz

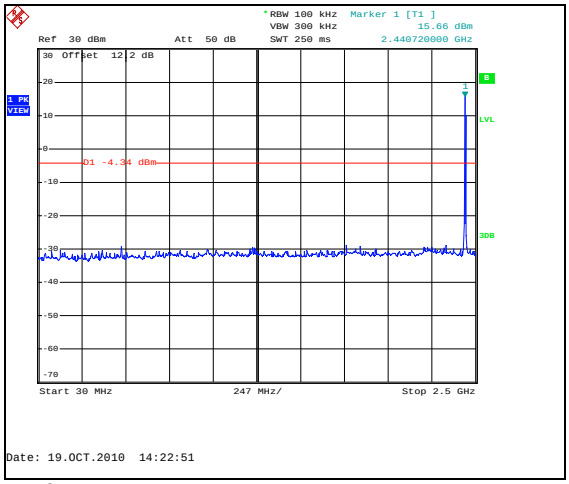


Figure 7.5.2.2-4: 30 MHz – 2.5 GHz – 2440MHz

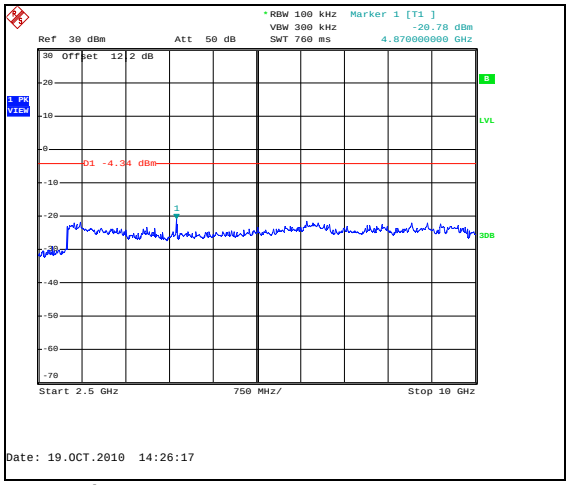


Figure 7.5.2.2-5: 2.5 GHz – 10 GHz – 2440MHz

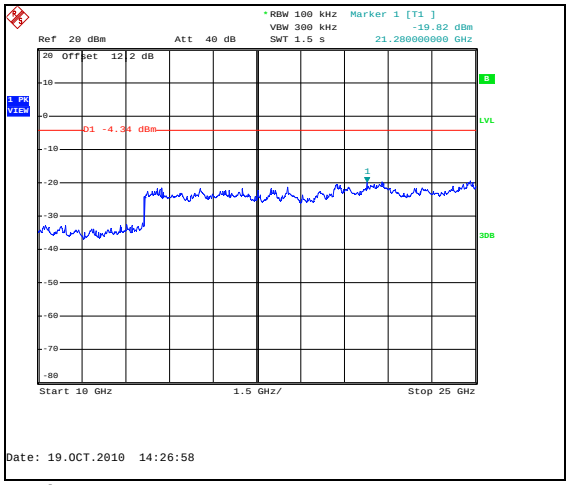


Figure 7.5.2.2-6: 10 GHz – 25 GHz – 2440MHz

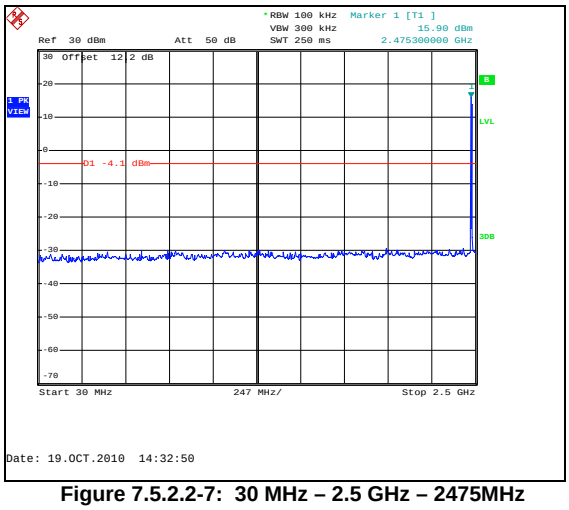


Figure 7.5.2.2-7: 30 MHz – 2.5 GHz – 2475MHz

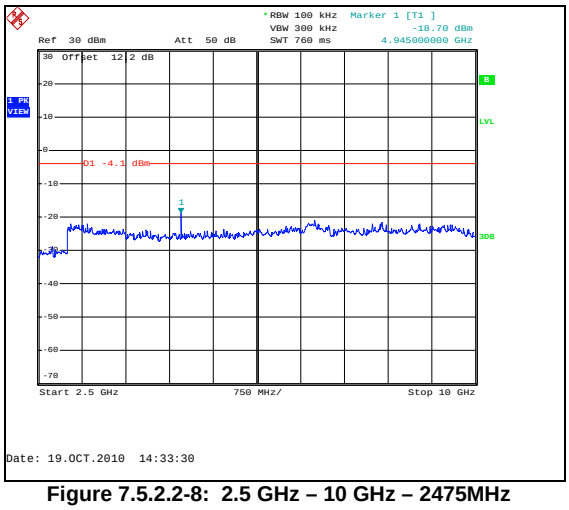


Figure 7.5.2.2-8: 2.5 GHz – 10 GHz – 2475MHz

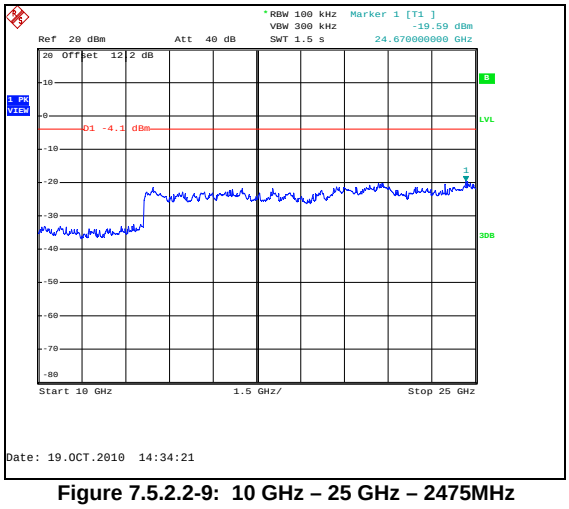


Figure 7.5.2.2-9: 10 GHz – 25 GHz – 2475MHz

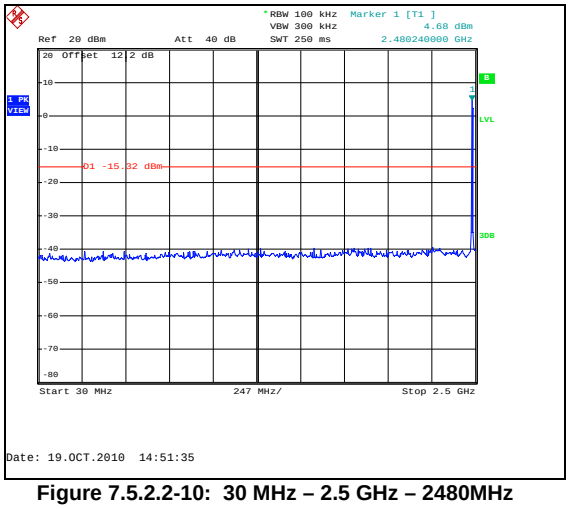


Figure 7.5.2.2-10: 30 MHz – 2.5 GHz – 2480MHz

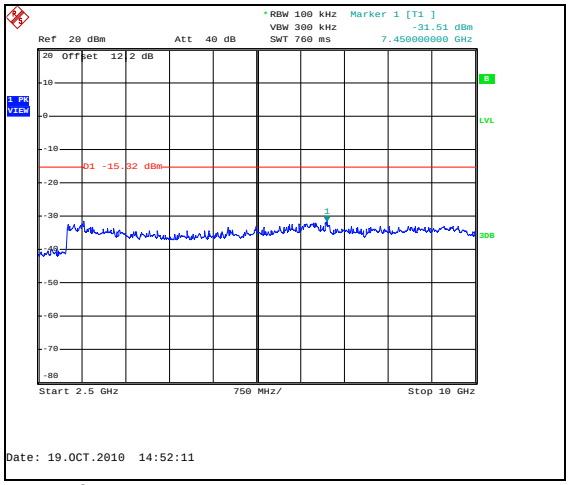


Figure 7.5.2.2-11: 2.5 GHz – 10 GHz – 2480MHz

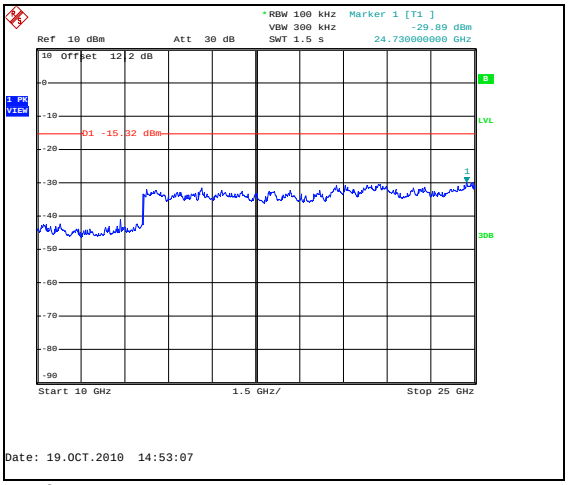


Figure 7.5.2.2-12: 10 GHz – 25 GHz – 2480MHz

7.5.3 Radiated Spurious Emissions (Restricted Bands)

7.5.3.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 30MHz to 25 GHz, 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 was compared to the applicable radiated emission limits.

7.5.3.2 Duty Cycle Correction

For average radiated measurements, using a 14.1% duty cycle, the measured level was reduced by a factor 17.02dB. The duty cycle correction factor is determined using the formula: 20log (14.1/100) = -17.02dB.

A detailed analysis of the duty cycle timing is provided in the Theory of Operation accompanying this report.

7.5.3.3 Measurement Results

Radiated spurious emissions found in the band of 30MHz to 25GHz are reported in the tables below.

Table 7.5.3.3-1: Radiated Spurious Emissions Tabulated Data – 2405MHz

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
4810	51.64	44.70	H	8.33	59.97	36.01	74.0	54.0	14.0	18.0
4810	55.32	48.84	V	8.33	63.65	40.15	74.0	54.0	10.4	13.8
12025	53.19	45.72	H	22.48	75.67	51.18	83.5	63.5	7.8	12.3
12025	49.73	41.48	V	22.48	72.21	46.94	83.5	63.5	11.3	16.6

* Note: All emissions above 12025 MHz were attenuated below the permissible limit.

Table 7.5.3.3-2: Radiated Spurious Emissions Tabulated Data – 2440MHz

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
4880	53.01	45.92	H	8.53	61.54	37.44	74.0	54.0	12.5	16.6
4880	56.79	50.39	V	8.53	65.32	41.91	74.0	54.0	8.7	12.1
7320	56.79	48.13	H	13.27	70.06	44.39	74.0	54.0	3.9	9.6
7320	56.72	49.86	V	13.27	69.99	46.12	74.0	54.0	4.0	7.9
12200	49.20	40.62	H	23.69	72.89	47.30	83.5	63.5	10.6	16.2
12200	46.48	37.44	V	23.69	70.17	44.12	83.5	63.5	13.3	19.4

* Note: All emissions above 12200 MHz were attenuated below the permissible limit.

Table 7.5.3.3-3: Radiated Spurious Emissions Tabulated Data – 2475MHz

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
4950	52.88	46.05	H	8.74	61.62	37.77	74.0	54.0	12.4	16.2
4950	56.51	50.24	V	8.74	65.25	41.96	74.0	54.0	8.8	12.0
7425	54.15	45.39	H	13.40	67.55	41.77	74.0	54.0	6.4	12.2
7425	54.73	46.02	V	13.40	68.13	42.40	74.0	54.0	5.9	11.6
12375	45.07	35.03	H	24.90	69.97	42.92	83.5	63.5	13.5	20.6
12375	44.15	34.01	V	24.90	69.05	41.90	83.5	63.5	14.4	21.6

* Note: All emissions above 12375 MHz were attenuated below the permissible limit.

Table 7.5.3.3-4: Radiated Spurious Emissions Tabulated Data – 2480MHz

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
All measurements were attenuated below the noise floor.										

7.5.3.4 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: 51.64+ 8.33 = 59.97dBuV/m
Margin: 74dBuV/m – 59.97dBuV/m = 14.0dB

Example Calculation: Average

Corrected Level: 44.70 + 8.33 - 17.02 = 36.01dBuV
Margin: 54dBuV – 36.01dBuV = 18.0dB

7.6 Peak Power Spectral Density- FCC Section 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 Publication No. 558074 "Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)". The emission peaks within the pass band were located and zoomed in on. The spectrum analyzer RBW was set to 3 kHz and VBW 10 kHz. Span was adjusted to 200 kHz and the sweep time was calculated to be 68s ~ (Span/3 kHz).

7.6.2 Measurement Results

Results are shown below in table 7.6.2-1 and figures 7.6.2-1 – 7.6.2-4:

Table 7.6.2-1: Peak Power Spectral Density

Frequency (MHz)	PSD Level (dBm)
2405	1.69
2440	1.61
2475	1.40
2480	-10.69

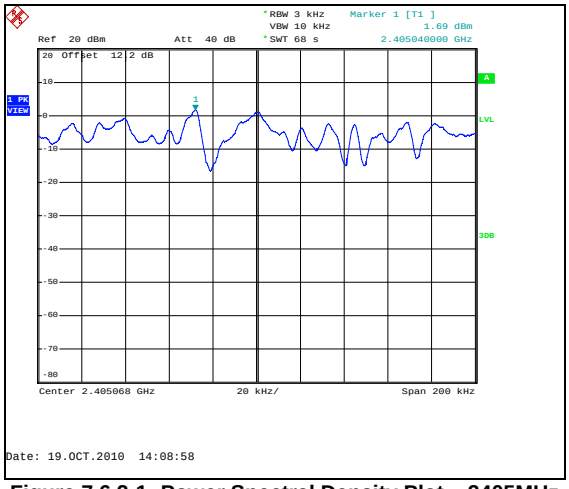


Figure 7.6.2-1: Power Spectral Density Plot – 2405MHz

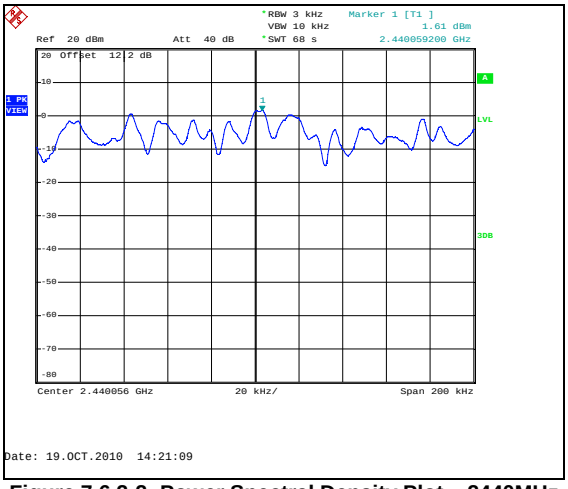


Figure 7.6.2-2: Power Spectral Density Plot – 2440MHz

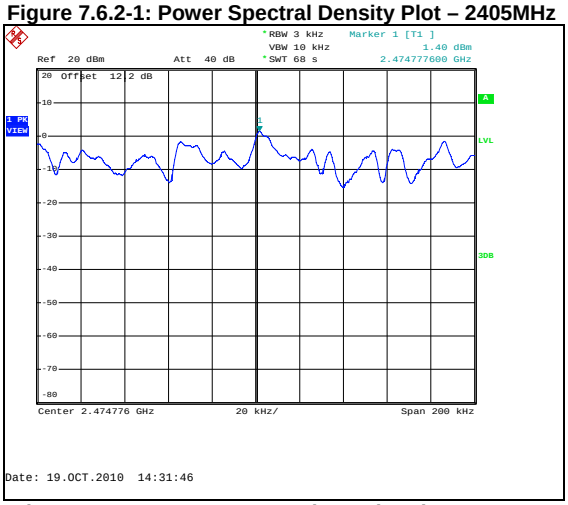


Figure 7.6.2-3: Power Spectral Density Plot – 2475MHz

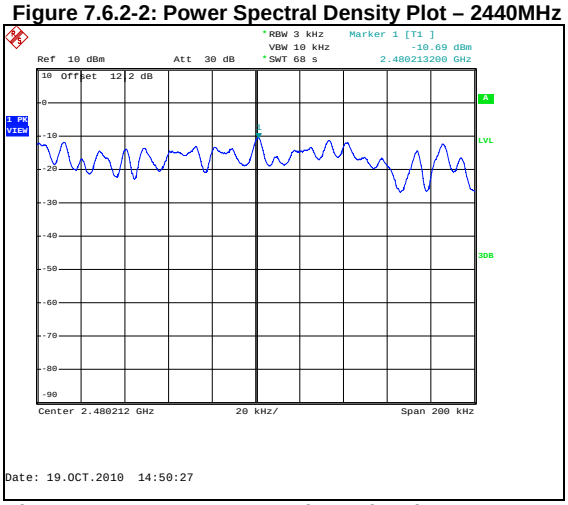


Figure 7.6.2-4: Power Spectral Density Plot – 2480MHz

8 CONCLUSION

In the opinion of ACS, Inc. the CU3000, manufactured by Proventix Systems, Inc. meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT