Nemko USA, Inc.
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CERTIFICATION TEST REPORT

Report Number:	2010 10157899 FCC
Project Number:	61586-1
Nex Number:	157899
Applicant:	ON-RAMP WIRELESS 10920 VIA FRONTERA SUITE 200 San Diego, CA 92127
Equipment Under Test (EUT):	ON-RAMP WIRELESS ACCESS POINT
Model:	ULPAP110
FCC ID:	XTE-ULPAP110
IC:	8655A-ULPAP100
In Accordance With:	FCC Part 15 Subpart C, 15.247 IC RSS-210 Issue 7 June 2007 IC RSS-Gen Issue 2 June 2007
Tested By:	Nemko USA Inc. 11696 Sorrento Valley Road, Suite F San Diego, CA 92121
Authorized By:	 Alan Laudani, EMC/RF Test Engineer
Date:	October 18, 2010
Total Number of Pages:	41

Section1: Summary of Test Results

General

All measurements are traceable to national standards

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15; Subpart C and IC RSS-210. Radiated tests were conducted is accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC and IC.

The assessment summary is as follows:

Apparatus Assessed:	On-Ramp Wireless Access Point
Model:	ULPAP110
Specification:	FCC Part 15 Subpart C, 15.247 IC RSS-210 Issue 7 June 2007
Date Received in Laboratory:	October 4, 2010
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None

1.1 Report Release History

REVISION	DATE	COMMENTS
-	October 18, 2010	Prepared By: Alan Laudani
-	October 18, 2010	Initial Release: Alan Laudani

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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TESTED BY: _____ Date: October 18, 2010
Alan Laudani, EMC Test Engineer

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Section 2: Equipment Under Test

2.1 Product Identification

The Equipment Under Test was indentified as follows:

On-Ramp Wireless ULPAP110 On-Ramp Wireless Access Point

2.2 Samples Submitted for Assessment

The following sample of the apparatus and antenna have been submitted for type assessment:

Description	Serial No.
ULPAP110 ON-RAMP WIRELESS ACCESS POINT	**A9240001**

2.3 Theory of Operation

The ULPAP110 is an Ultra Link Outdoor Access Point. The EUT is an Access Point for communication with a large number of remote field units. The method of operation is similar to a Wi-Fi Access Point or cellular base station. The unit is mounted on a pole or other high location with a GPS antenna, 2.4GHz antenna, power, and Ethernet.
For Immunity testing, a simultaneous uplink and downlink was established between the EUT and the On-ramp Wireless eNode. This allows for concurrent testing of radiated immunity for the AP's transmitter and receiver. An On-ramp eNode was provided as peripheral test equipment. It was housed in a shielded RF enclosure and coupled to the AP via a coaxial cable path with suitable inline attenuators in order to achieve system link operating point 10 dB higher than the sensitivity level. A test script was used to setup the AP to eNode link and also monitored any degradation in link performance. A loss of a downlink packet is indicated by verbose display message. A loss of an uplink packet is indicated by verbose display message. This indication approximates a 10% FER for either the uplink or the downlink.

Model number ULPAP110 replaced "550-0003-01" after radiated test data was secured due to marketing decision by ON-Ramp Wireless.

2.4 Technical Specifications of the EUT

Manufacturer:	On-Ramp Wireless
Operating Frequency:	2402.00 MHz to 2475.63 MHz in the 2400-2483.5 MHz Band
Number of Operating Frequencies:	40
Rated Power:	957 mW
Modulation:	DSSS-DBPSK
Reference Designator:	2M48G1D
Antenna Connector:	Type "N" (professionally installed)
Power Source:	48VDC POE

Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.247
Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz and 24.0-24.25 GHz bands.

IC RSS-210 Issue 7 June 2007
Low-power Licence-exempt Radio-communication Devices (All Frequency Bands): Category I Equipment. Annex 8 - Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

IC RSS-Gen Issue 2 June 2007
General Requirements and Information for the Certification of Radio-communication Equipment

3.2 Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedure

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	16-22ºC
Humidity range	39-45%
Pressure range	102.0 – 102.3 kPa
Power supply range	48VDC nominal

3.4 Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
N97	DC power supply	Kukusui	--	--	NCR	NCR
111	Antenna, LPA	EMCO	3146	1382	10/20/2008	10/20/2010
128	Antenna, Bicon	EMCO	3104	2882	2/9/2009	2/9/2011
317	Preamplifier	HP	8449A	2749A00167	5/7/2010	5/7/2011
384	LISN	Solar	9348-50-R-24-BNC	941716	9/16/2010	9/16/2011
395	LISN	Solar	9348-50-R-24-BNC	941718	4/9/2010	4/9/2011
625	Antenna, Dbl Ridge Horn	EMCO	3116	2325	2/1/2010	2/1/2012
674	Attenuator, High Voltage	Solar	9410-1	962023	9/10/2010	9/10/2011
675	Spectrum Analyzer	HP	8568B	2007A00910	5/14/2010	5/14/2011
676	Spectrum Analyzer Display	HP	85662A	2005A01282	5/14/2010	5/14/2011
682	Transient Limiter	HP	11974A	3107A02633	1/26/2010	1/26/2011
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	7/12/2010	7/12/2011
919	Preamplifier	Spacek Labs MM-Wave Technology	100MHz to 40GHz	3M12 (SLK-35-3) and 3M13 (SLKa-35-4)	11/30/2009	11/30/2010

Registration of the OATS are on file with the Federal Communications Commission, under Registration Number 90579, the VCCI under registration number R-3027, and are also registered with Industry Canada under Site Numbers 2040B-1 and 2040B-2.

Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications were performed during assessment.

4.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

4.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.4 Test Deleted

No Tests were deleted from this assessment.

4.5 Additional Observations

There were no additional observations made during this assessment.

Section 5: Results Summary

This section contains the following:

FCC Part 15 Subpart C:
IC RSS-210 Issue 7 June 2007 Annex 8
IC RSS-Gen Issue 2 June 2007

The column headed "Required" indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No: not applicable / not relevant
Y Yes: Mandatory i.e. the apparatus shall conform to these tests.
N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

5.1 Test Results

Part 15C		Test Description	Required	Result
15.207 (a)	RSS-Gen 7.2.2	Conducted Emission Limit	Y	Pass
15.215(c)	RSS-Gen 4.6.1	20 dB Bandwidth	Y	Pass
15.247(a)(2)	RSS-210 A8.2 (a)	Minimum 6dB RF Bandwidth	Y	Pass
15.247(b)(3)	RSS-Gen 4.8	Peak Output Power	Y	Pass
15.247(d)		Band-edge Compliance of RF Conducted Emissions	Y	Pass
15.247 (d)	RSS-210 A8.5	Spurious RF Conducted Emissions	Y	Pass
15.247 (d)	RSS-Gen 4.9	Spurious Radiated Emissions	Y	Pass
15.247(e)	RSS-210 A8.2 (b)	Power Spectral Density for Digitally Modulated Devices	Y	Pass
	RSS-Gen 4.10	Receiver Spurious Emissions	Y	Pass

Appendix A: Test Results

Section 15.207(a) – Power Line Conducted Emissions

15.207(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

Test Conditions:

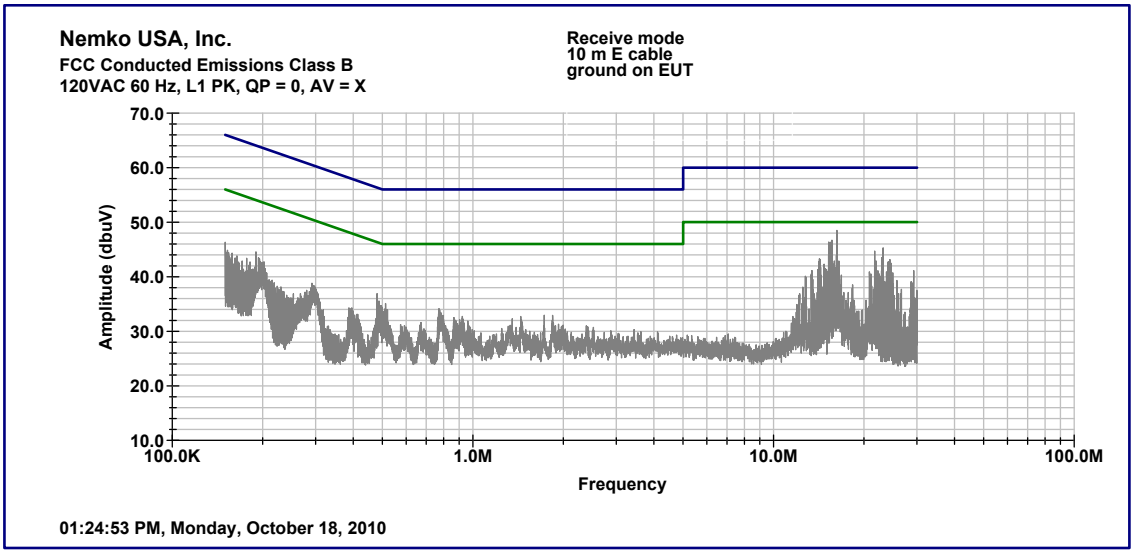
Sample Number:	**ULPAP110**	**Temperature:**	24°C
Date:	October 18, 2010	**Humidity:**	54 %
Modification State:	Low ,Mid and High Channel	**Tester:**	Alan Laudani
		Laboratory:	Nemko SR2

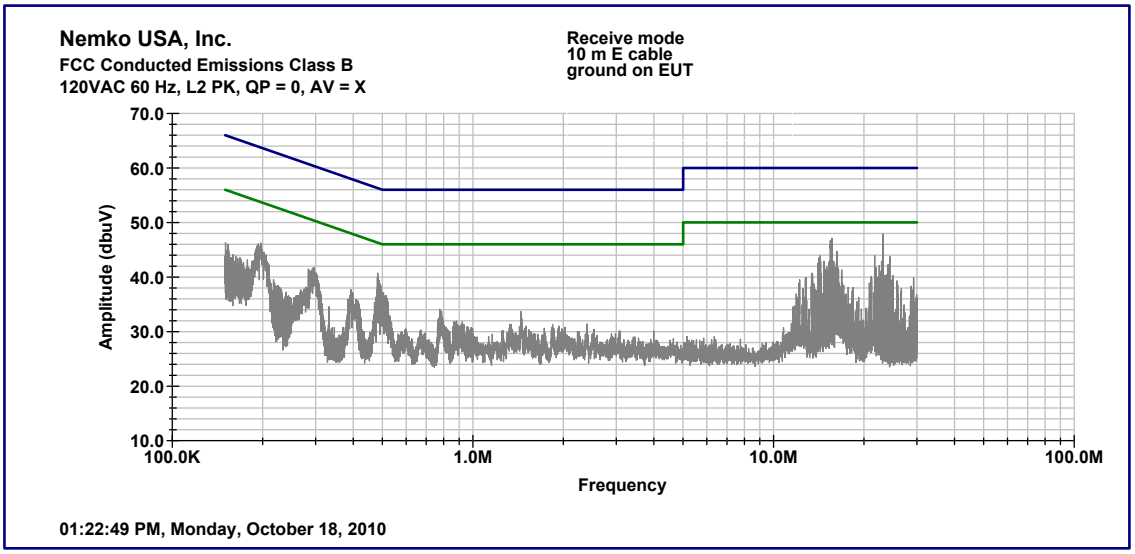
Test Results: EUT complies

See attached plots

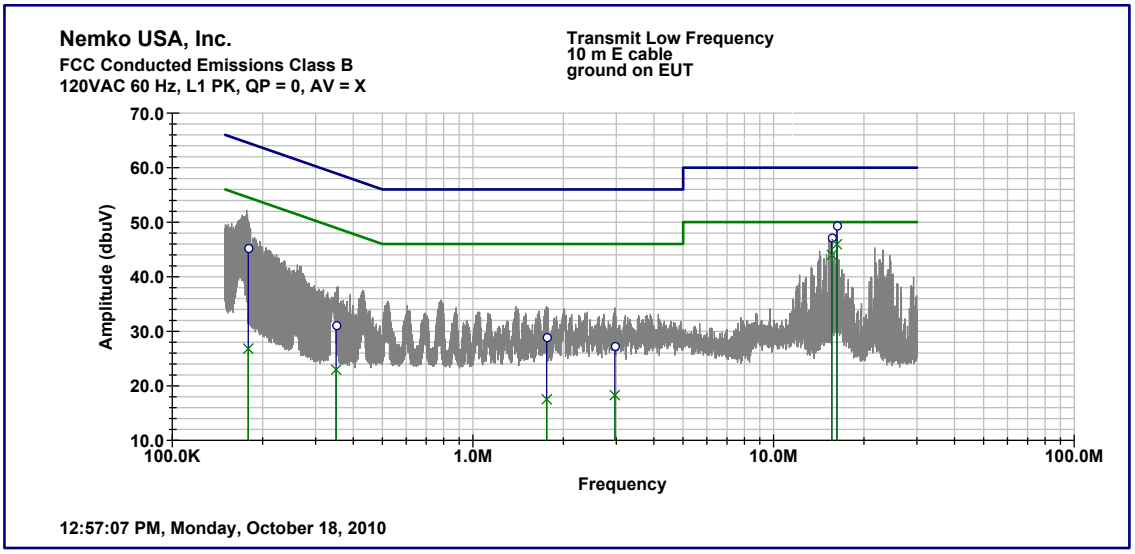
Additional Observations:

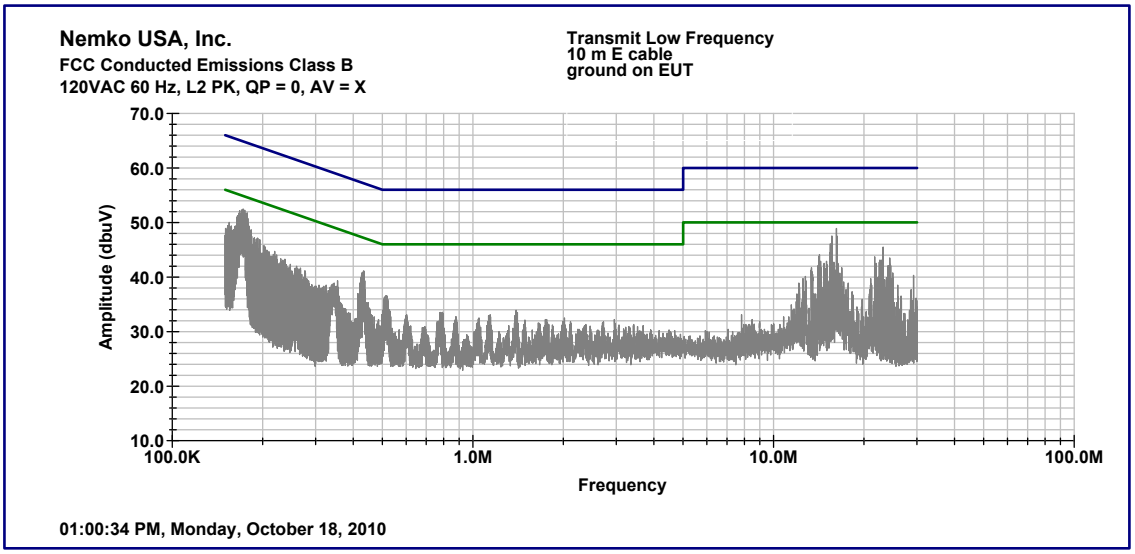
- EUT was tested using the following modes: Low channel, Mid channel, High channel and Receive Test Mode.
- EUT was tested using a V-Infinity medical grade power supply model VGS-25-48 for representative POE power supply.
- No differences in receive mode emissions due to receive channel selected. Plot shown is worst case.
- Green limit line is Average limit and blue limit line is Quasi-peak limit.
- o represents final quasi peak measurements while x represent final average measurements.
- Instrumentation settings are 9kHz RBW/30kHz VBW for Average measurements and 100kHz RBW/100kHz VBW for Peak measurements.



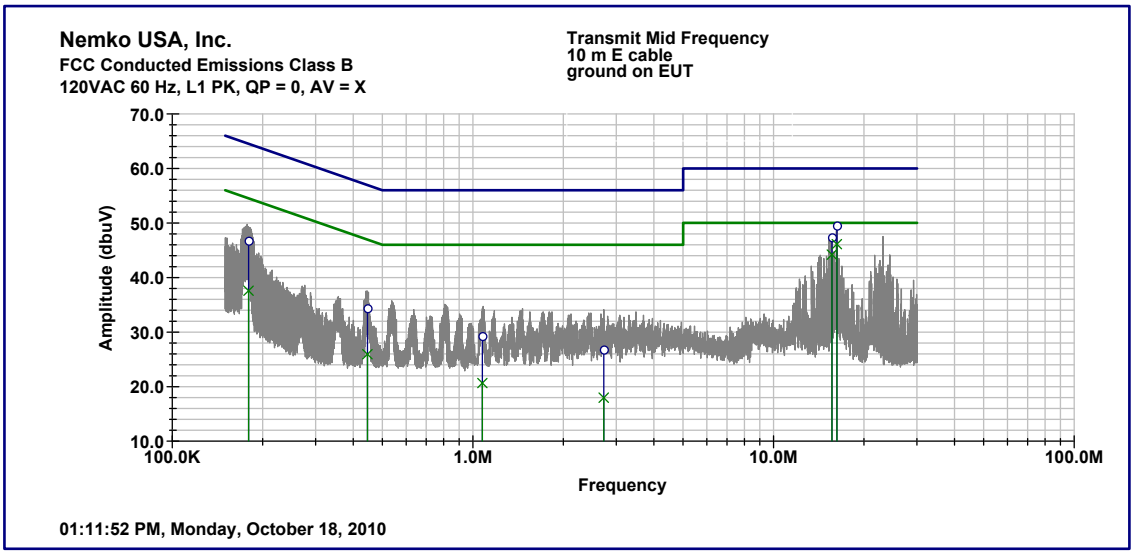


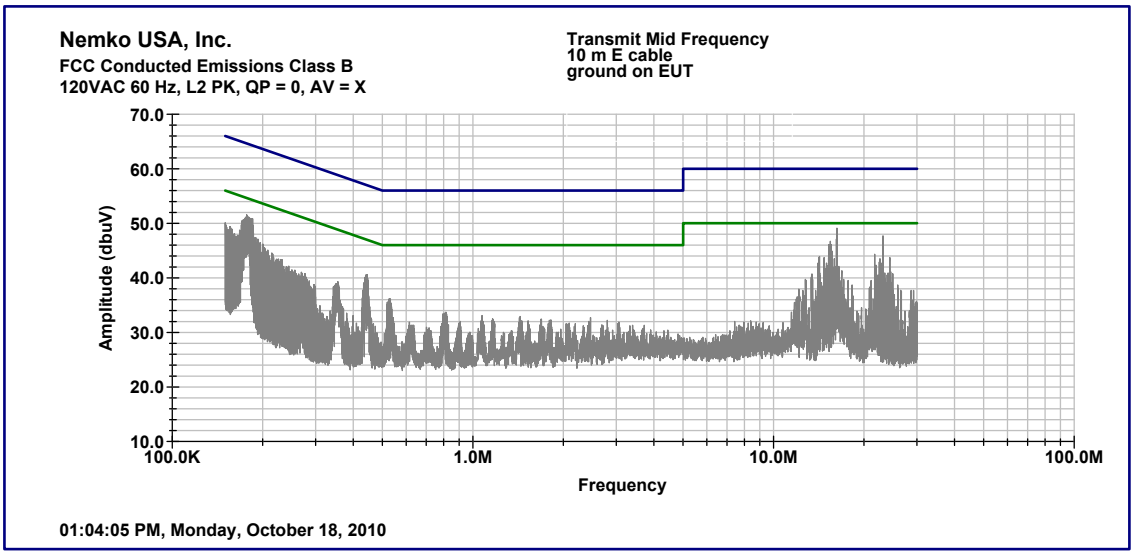
Low transmit frequency



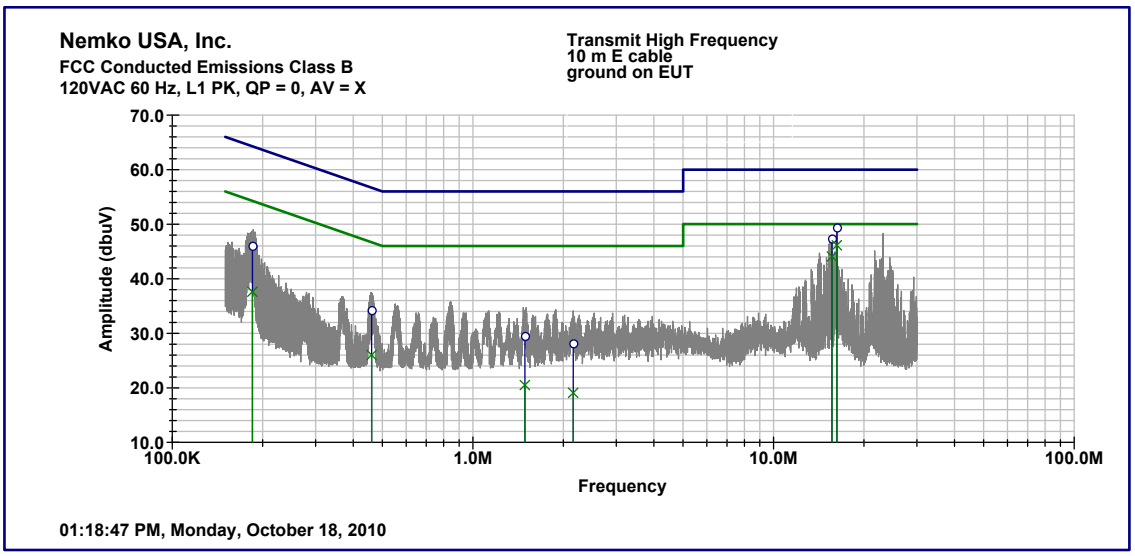


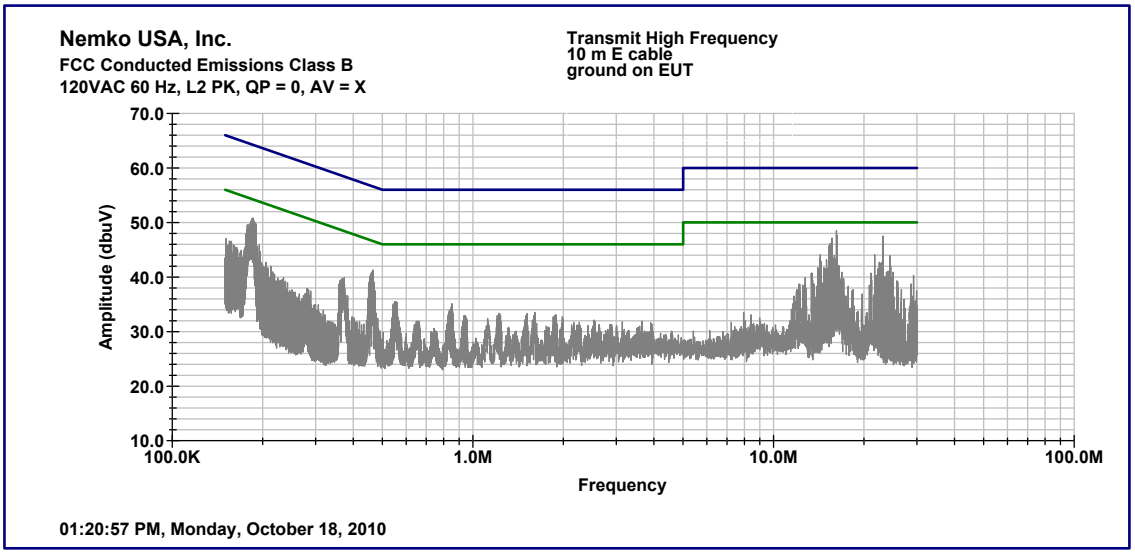
Mid transmit frequency





High transmit frequency





Section 15.215(c) – 20 dB / 99% Bandwidth

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Conditions:

Sample Number:	**ULPAP110**	**Temperature:**	24°C
Date:	October 7, 2010	**Humidity:**	35%
Modification State:	Low , Mid and High Channel	**Tester:**	Alan Laudani
		Laboratory:	Nemko

Test Results: See attached plots.

Additional Observations:

- Span is wide enough to capture the channel transmission
- RBW is 1% of the span
- VBW is 3X RBW
- Sweep is auto
- Detector is Peak
- Trace is Max Hold
- Used 99% bandwidth of Spectrum Analyzer's programmed functions.
- A peak output max hold reading was taken, a display line was drawn 20 dB lower than peak level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.
- Observed maximum 20 dB BW is 2.32 MHz (high channel).
- 2402.00 MHz – 1.08 MHz = 2400.92 MHz (within the frequency band)
- 2475.63 MHz + 1.16 MHz = 2476.79 MHz (within the frequency band)

Frequency	20 dB bandwidth	99% bandwidth
2402.00 MHz	2.16 MHz	2.40 MHz
2439.81 MHz	2.28 MHz	2.43 MHz
2475.63 MHz	2.32 MHz	2.48 MHz

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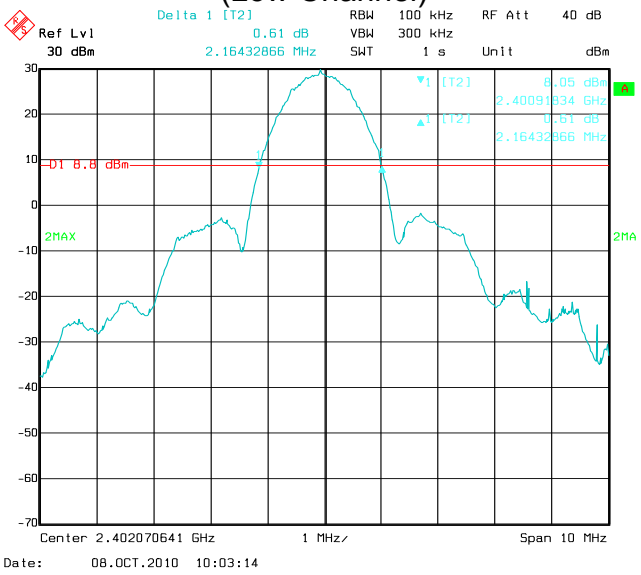
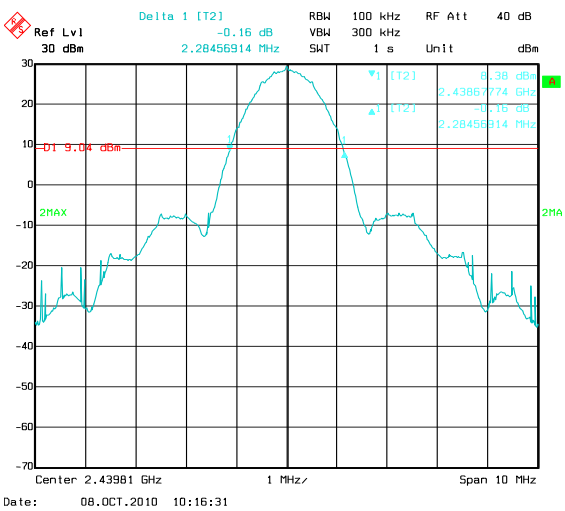
20 dB Band Width

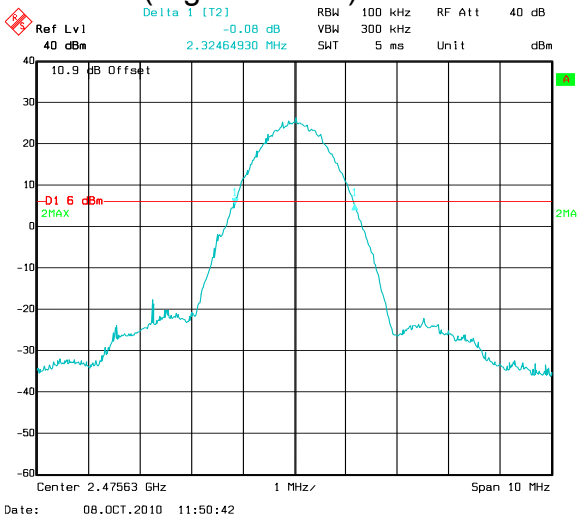
(Low Channel)



(Mid Channel)



(High Channel)



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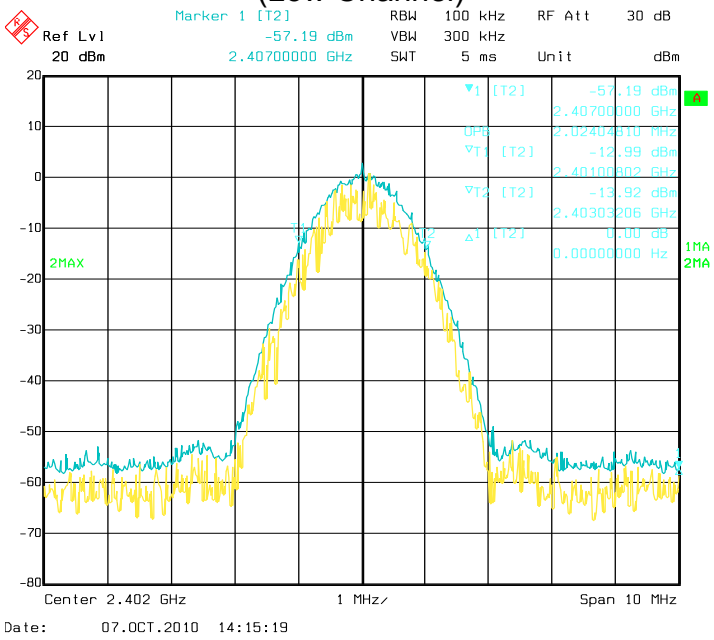
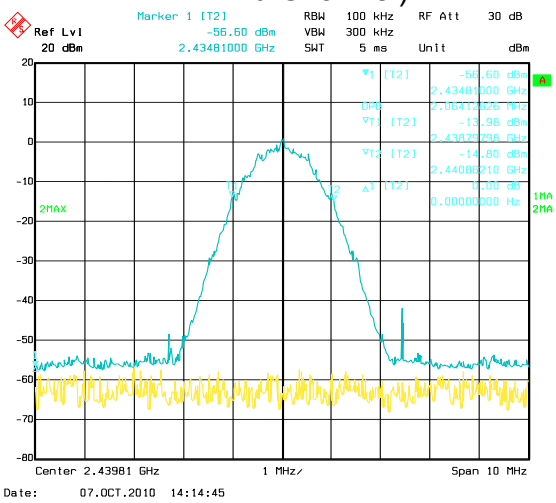
99% band width

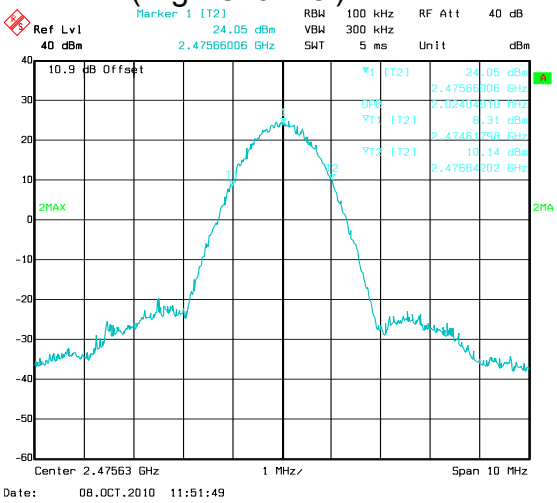
(Low Channel)



Mid Channel)



(High Channel)



Section 15.247(a)(2) – Minimum 6dB RF Bandwidth

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Conditions:

Sample Number:	**ULPAP110**	**Temperature:**	24°C
Date:	October 8, 2010	**Humidity:**	35 %
Modification State:	Low ,Mid and High Channel	**Tester:**	Alan Laudani
		Laboratory:	Nemko

Test Results: EUT complies, See attached plots.

Additional Observations:

- This is a conducted test
- RBW is set to 100kHz
- VBW is 3X RBW
- Sweep is auto
- Detector is Peak
- Trace is Max Hold
- For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was plotted; a DISPLAY line was drawn 6 dB lower than PEAK level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

Channel Range	Observed 6 dB bandwidth
Low (2402.00 MHz)	1.12 MHz
Mid (2439.81 MHz)	1.22 MHz
High (2475.63 MHz)	1.18 MHz

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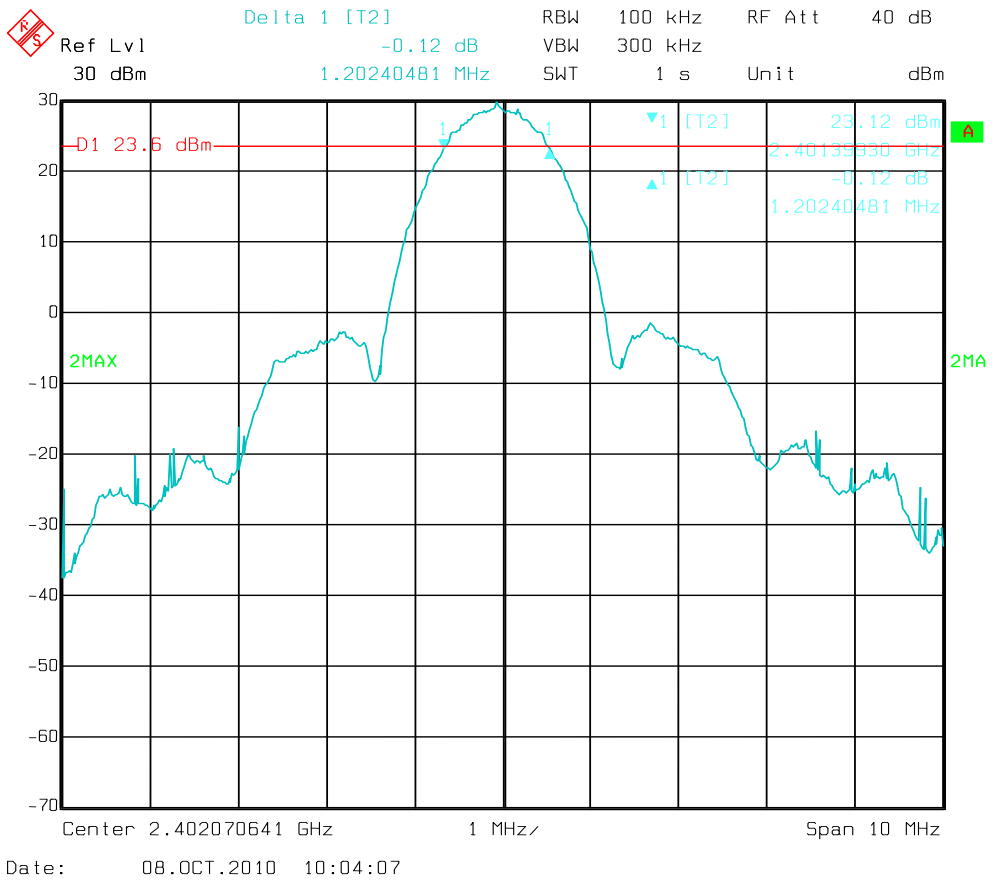

(Low Channel) Observed 6 dB Bandwidth is **1.12 MHz**

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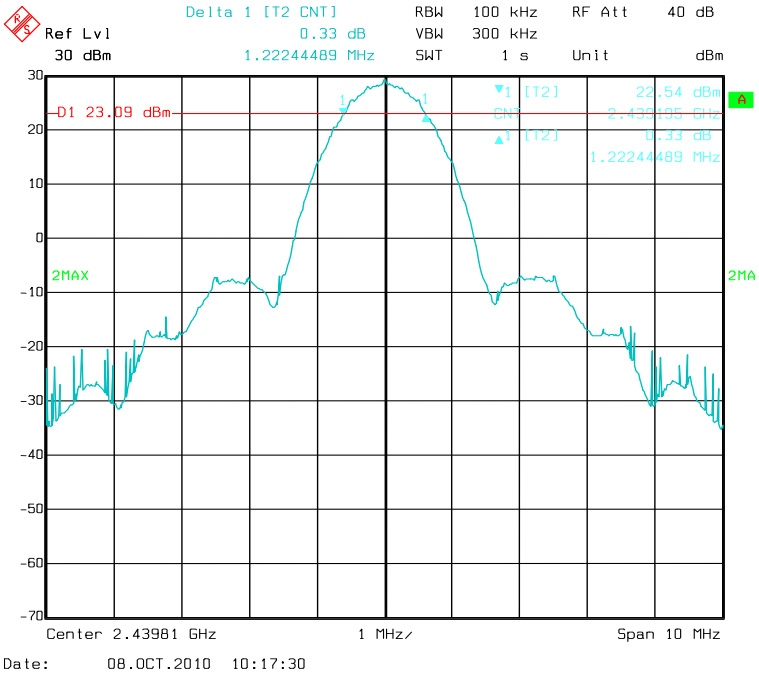
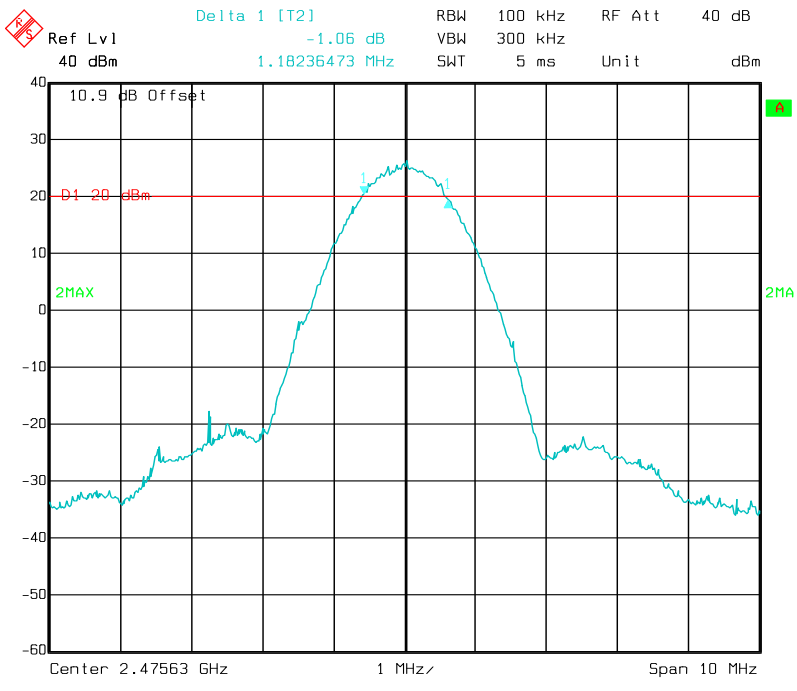


(Mid Channel) Observed 6 dB Bandwidth is **1.22 MHz**



(High Channel) Observed 6 dB Bandwidth is **1.18 MHz**

Section 15.247(b)(1) – Peak Output Power

(3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

Test Conditions:

Sample Number:	**ULPAP110**	**Temperature:**	24°C
Date:		**Humidity:**	35 %
Modification State:	Low ,Mid and High Channel	**Tester:**	Alan Laudani
		Laboratory:	Nemko

Test Results:

See attached plots.
power output option 2,
specify which method was used, 1, 2, or 3, and provide all details.

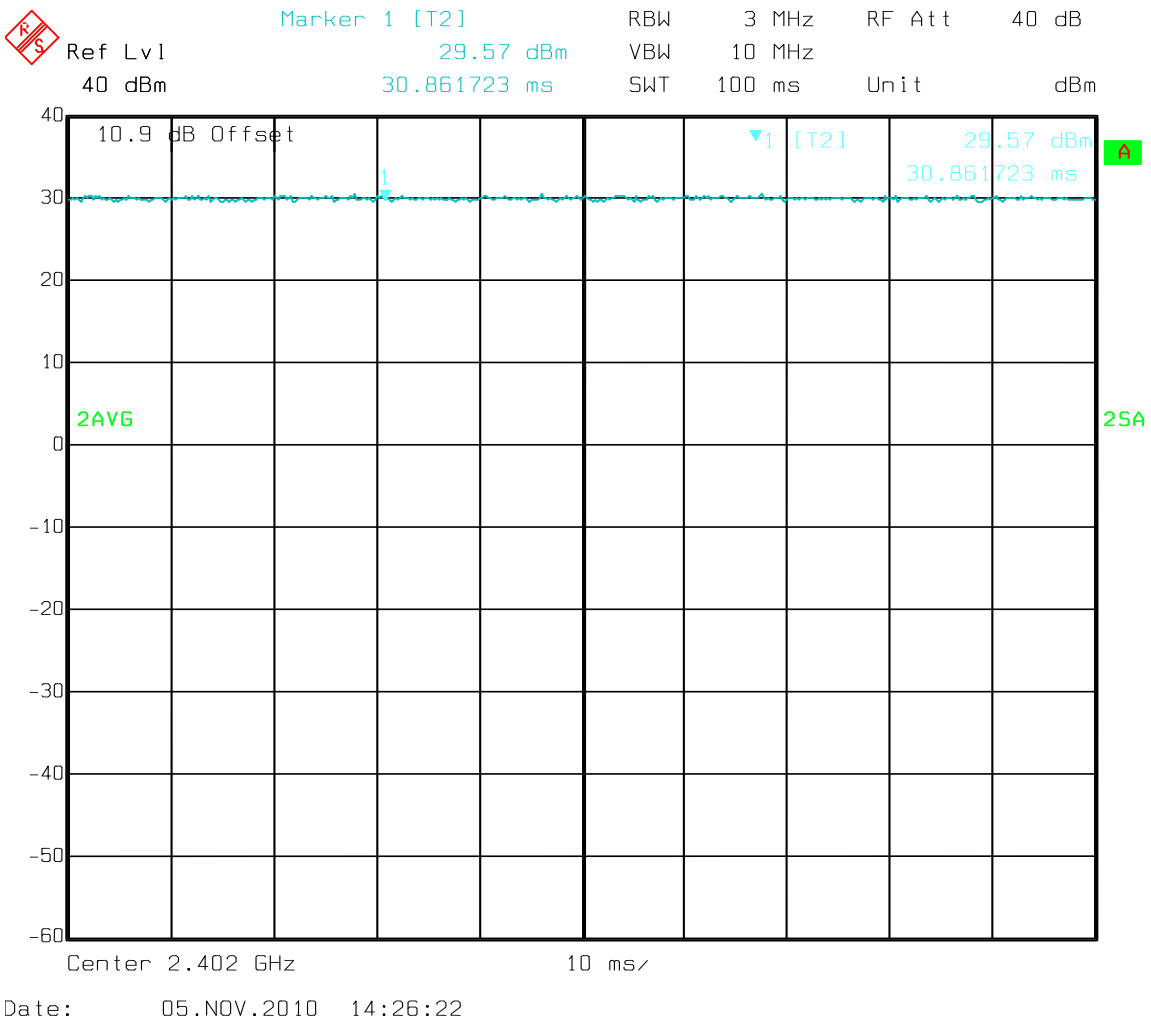
Additional Observations:

- This is a conducted test. A 10 dB attenuator was placed between the sensor and the antenna port. Additional 0.9 dB was added for the cable assembly used. Total offset used is 10.9dB.
- Input voltage to the EUT is varied from 48+/-15%, 40.8VDC, 48VDC, 55.2 VDC (limited by programmable power supply), however no variation in results observed.
- Power Option 2, method 2
- Span set Zero
- RBW = 3 MHz; VBW = 10 MHz.
- Sweep time = T = 100ms as it was 100% duty cycle.
- Sample detector Mode
- Sample = 100, power averaging on
- When an antenna is installed with more than 6 dBi of gain, the output power is reduced accordingly. EUT was tested with a 9 dBi antenna, therefore, the output power is reduced to 27 dBm

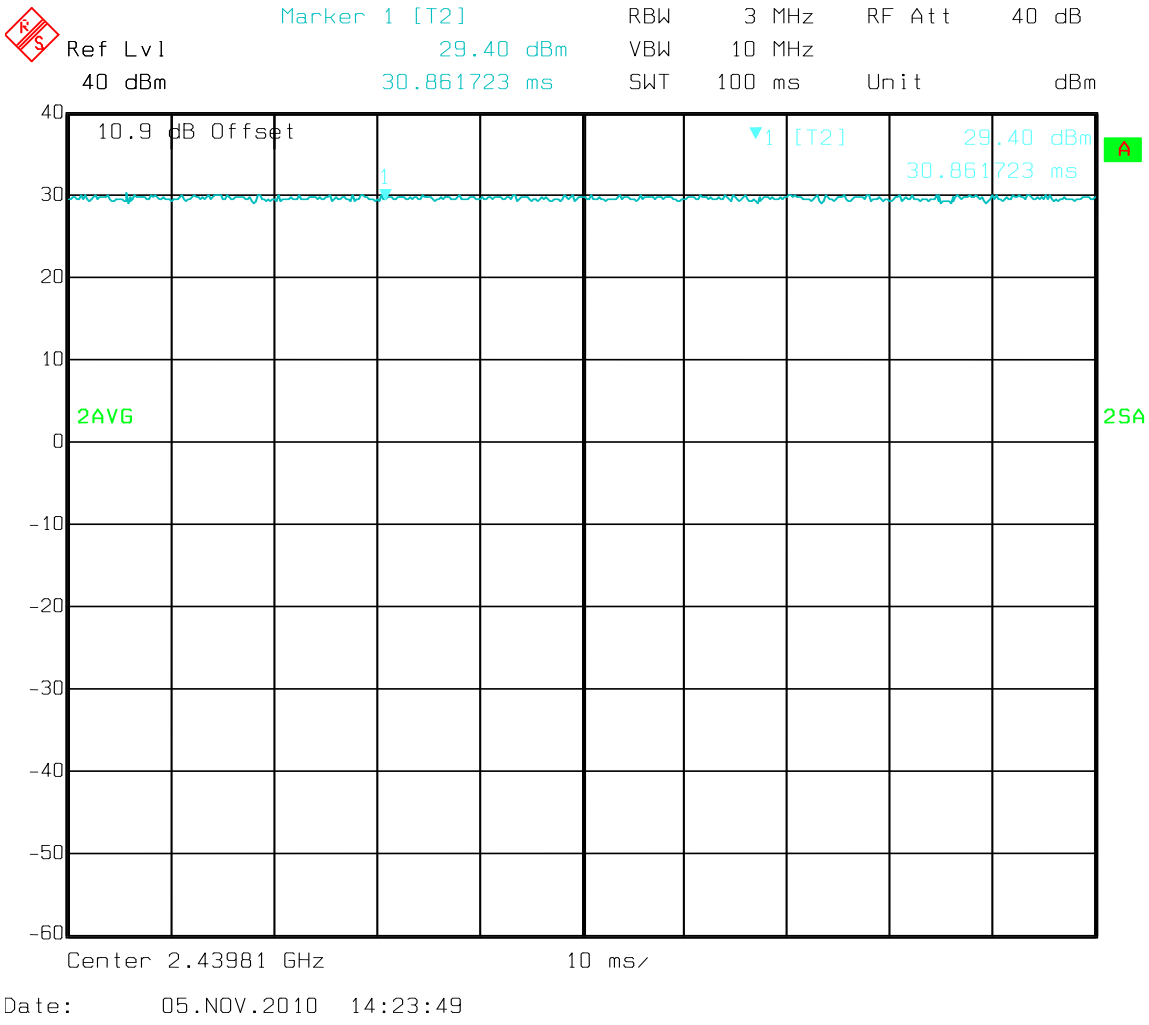
Channel Range	Peak Power Output (dBm)
Low (2402.00 MHz)	29.67
Mid (2439.81 MHz)	29.40
High (2475.63MHz)	29.81

Peak Output Power = 29.81 dBm or **957 mW**

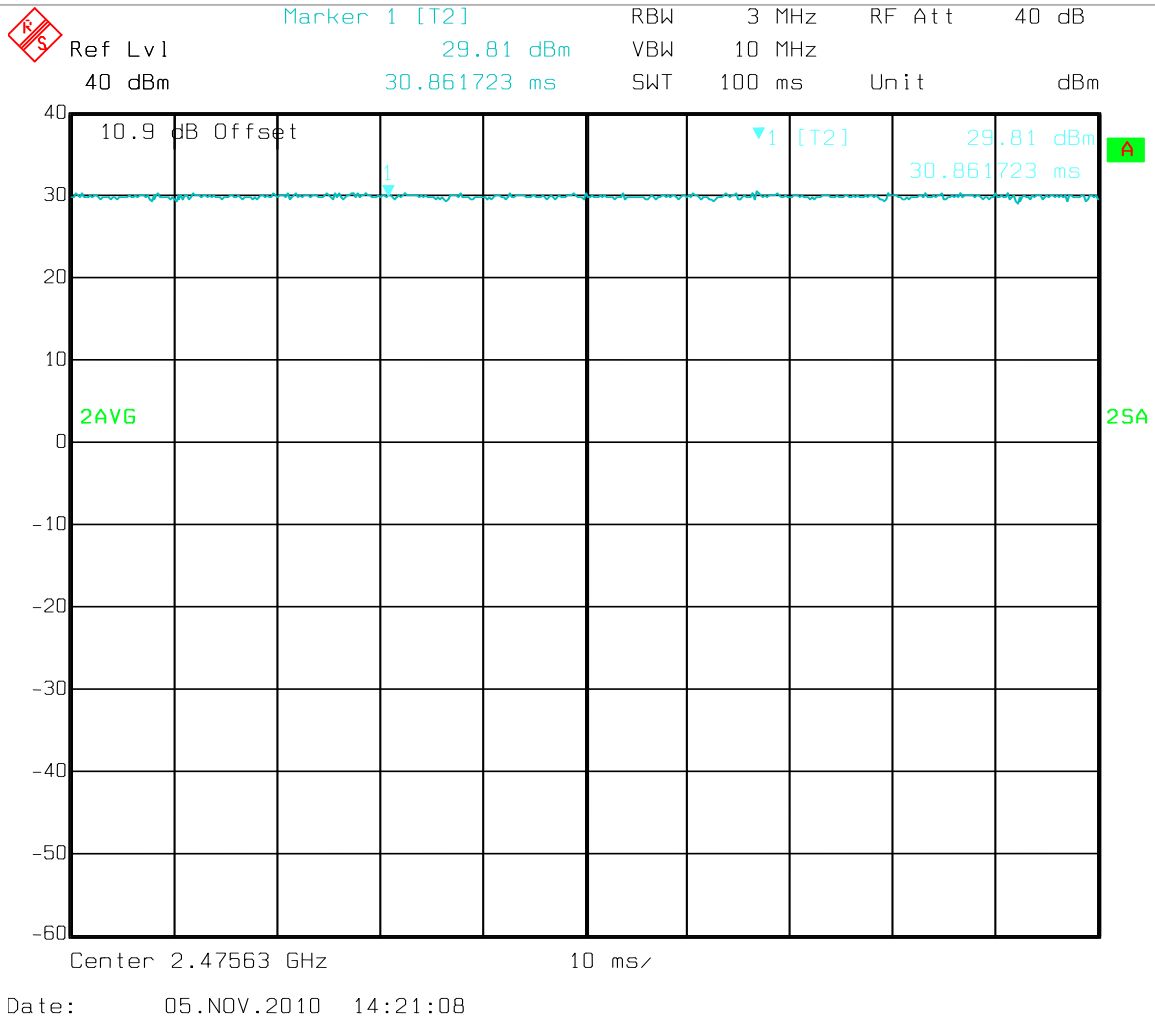
Test Plots:



Low Channel



Mid Channel



High Channel

Section 15.247(d) – Band-edge Compliance of RF Conducted Emissions

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Conditions:

Sample Number:	**ULPAP110**	**Temperature:**	23°C
Date:	Oct. 7, 2010	**Humidity:**	43 %
Modification State:	Low and High Channel	**Tester:**	Alan Laudani
		Laboratory:	Nemko

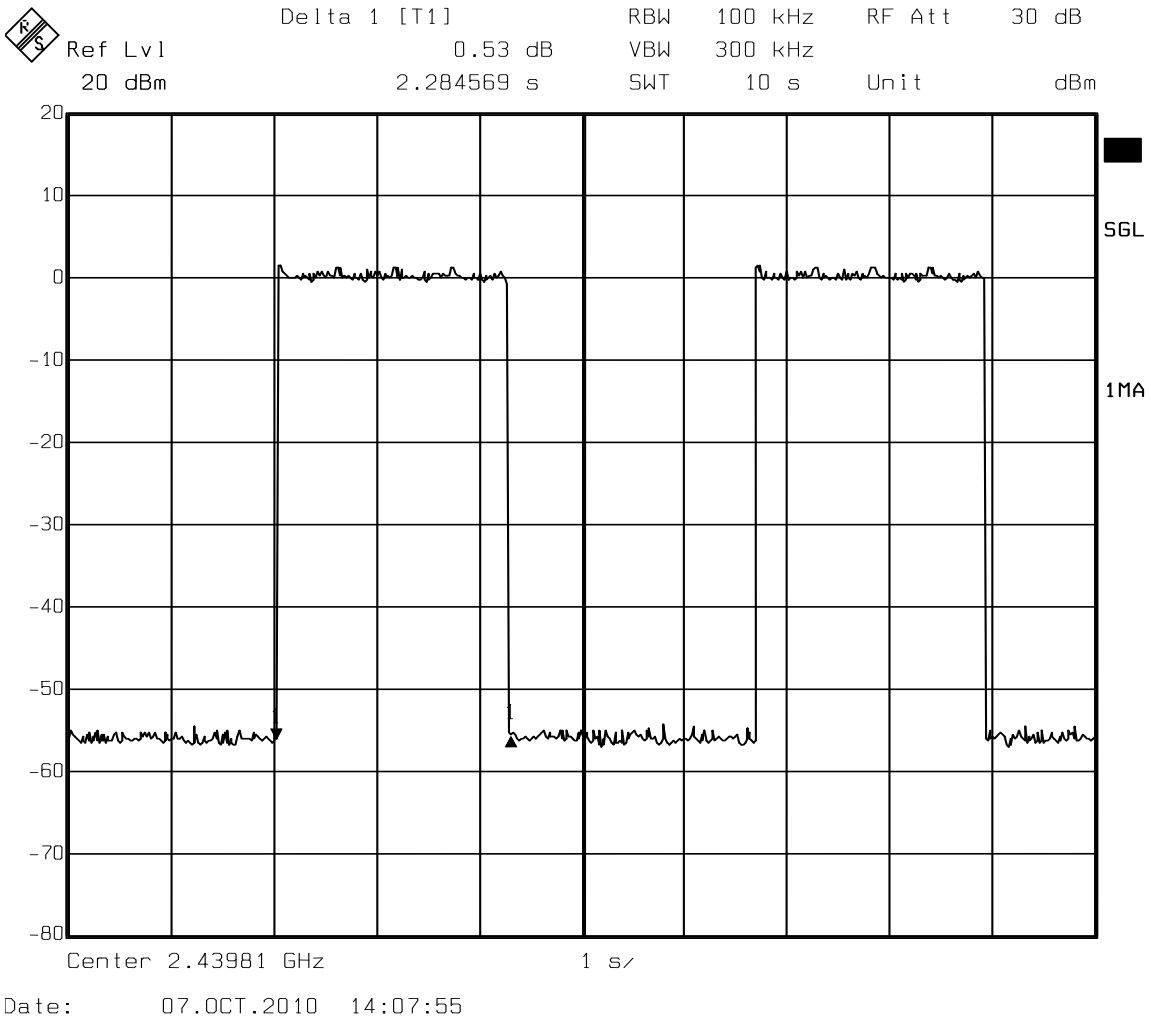
Test Results:

See attached plots.

Additional Observations:

- This is a conducted test.
- Span is wide enough to capture the peak level of the emission operating on the channel closest to the band edges (Lower and Upper).
- RBW is 100kHz
- VBW is 3X RBW
- Sweep is auto.
- Detector is Peak
- Trace is Max Hold
- For each investigation, the peak level reading was taken and a display line was drawn 30 dBc below this level which will be the limit for this test.

Duty Cycle > 100 ms



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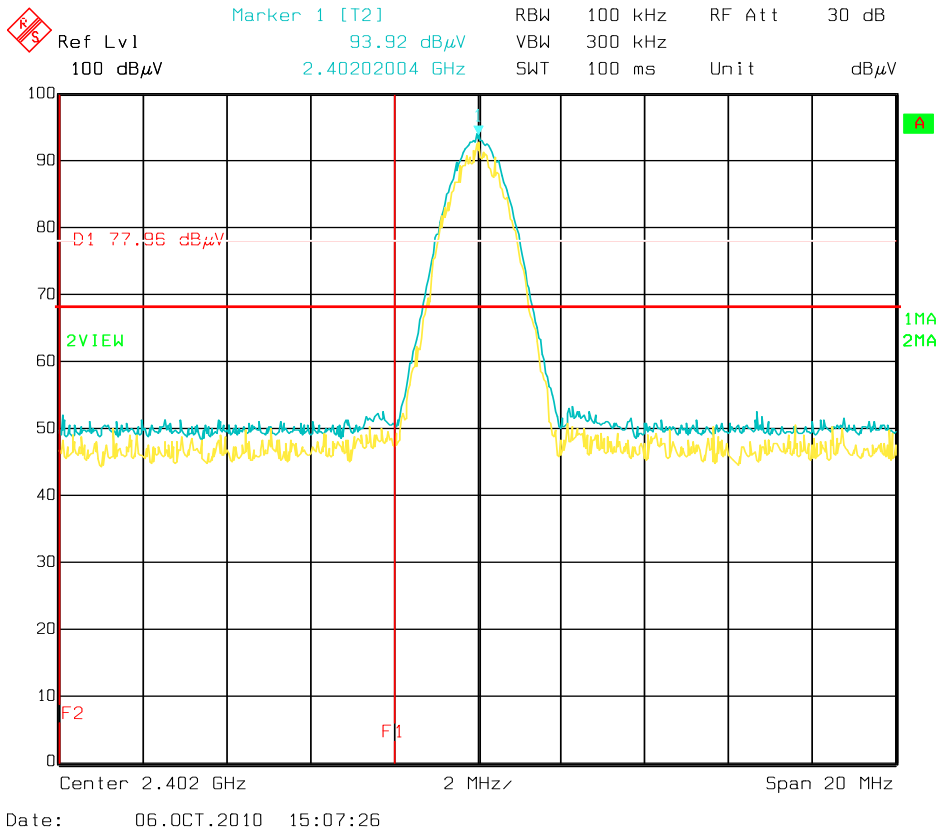
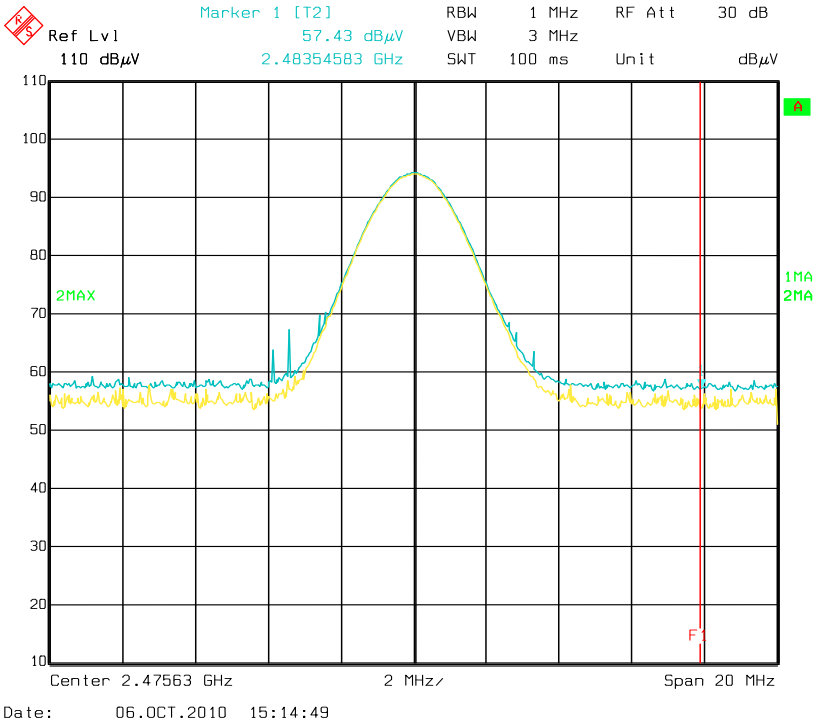
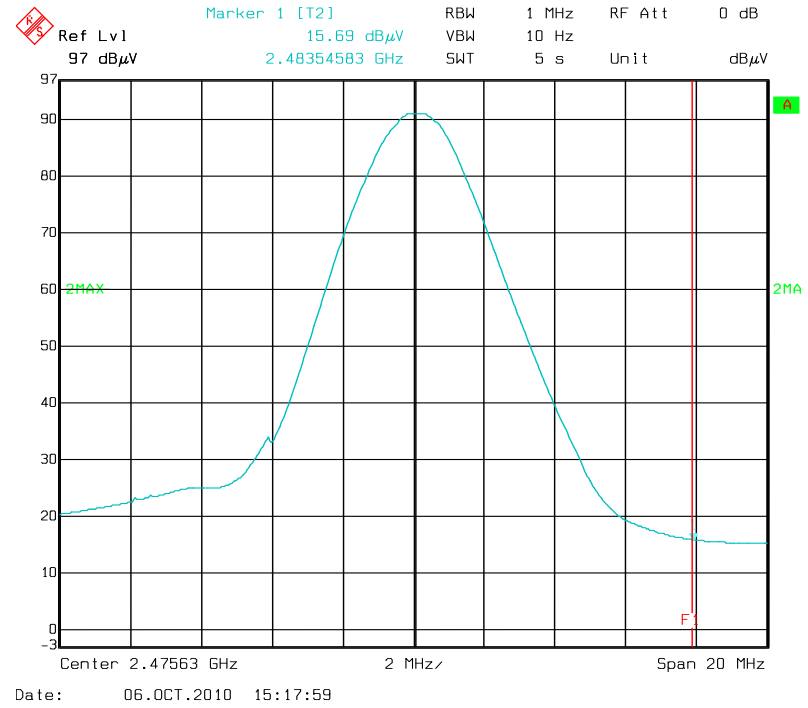
Low Channel centered at 2400 MHz



11696 Sorrento Valley Road, Suite F, San Diego, CA 92121
Phone (858) 755-5525 Fax (858) 452-1810



High Channel Peak



High Channel Average

Section 15.247(d) – Spurious RF Conducted Emissions

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Conditions:

Sample Number:	**ULPAP110**	**Temperature:**	23°C
Date:	October 8, 2010	**Humidity:**	43 %
Modification State:	Low, Mid and High Channel	**Tester:**	A. Laudani
		Laboratory:	Nemko

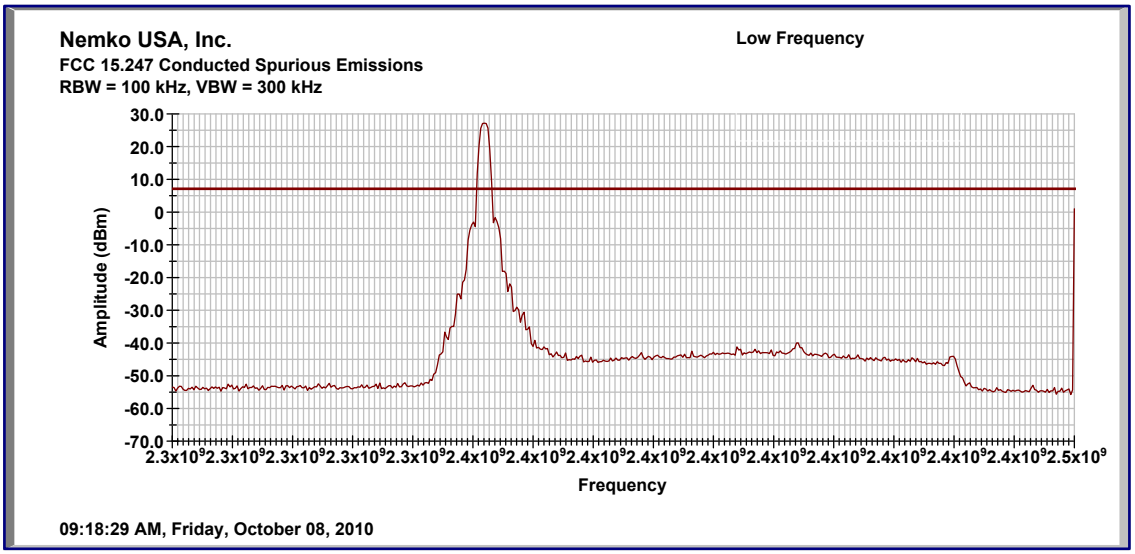
Test Results:

See attached plots.

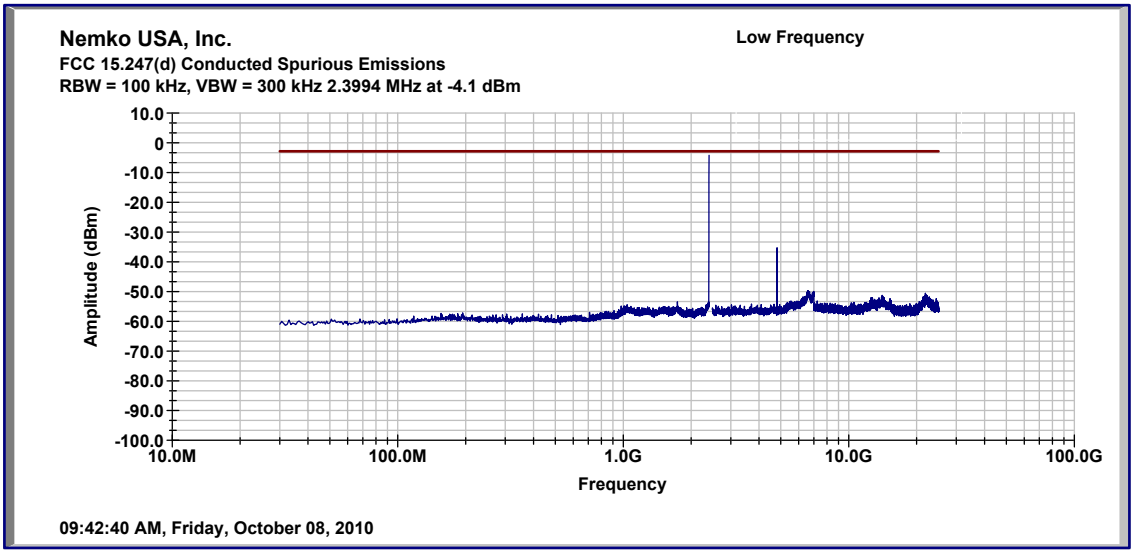
Additional Observations:

- This is a conducted test. The 10.9 dB offset is from the attenuator and cable assembly used.
- The peak level reading was taken at the carrier frequency then a display line was drawn 30 dBc below this level which will be the limit for this test.
- VBW is 3X RBW
- Sweep is auto.
- Detector is Peak
- Trace is Max Hold
- EUT complies.

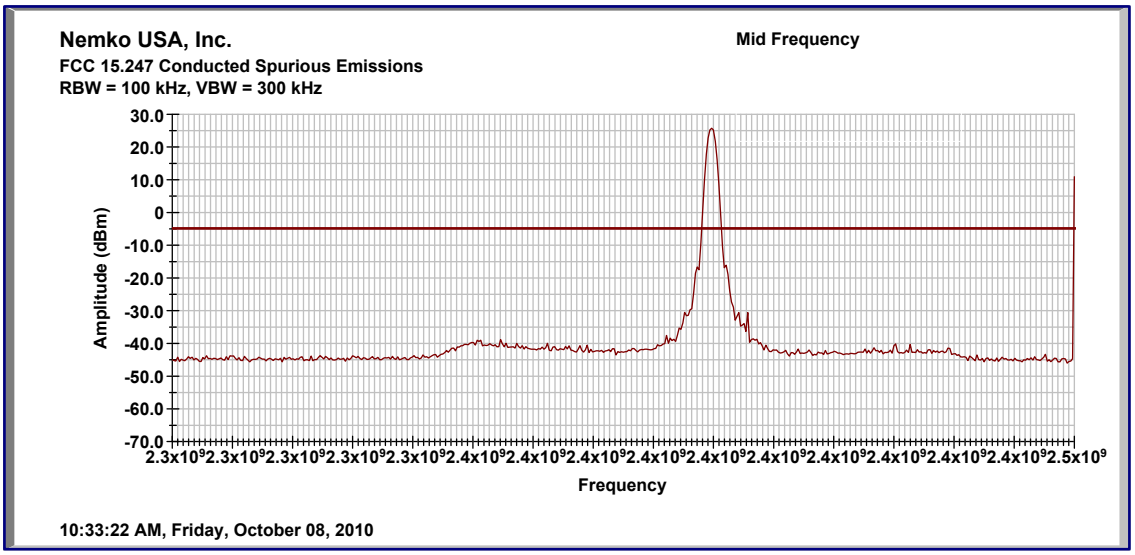
In Band



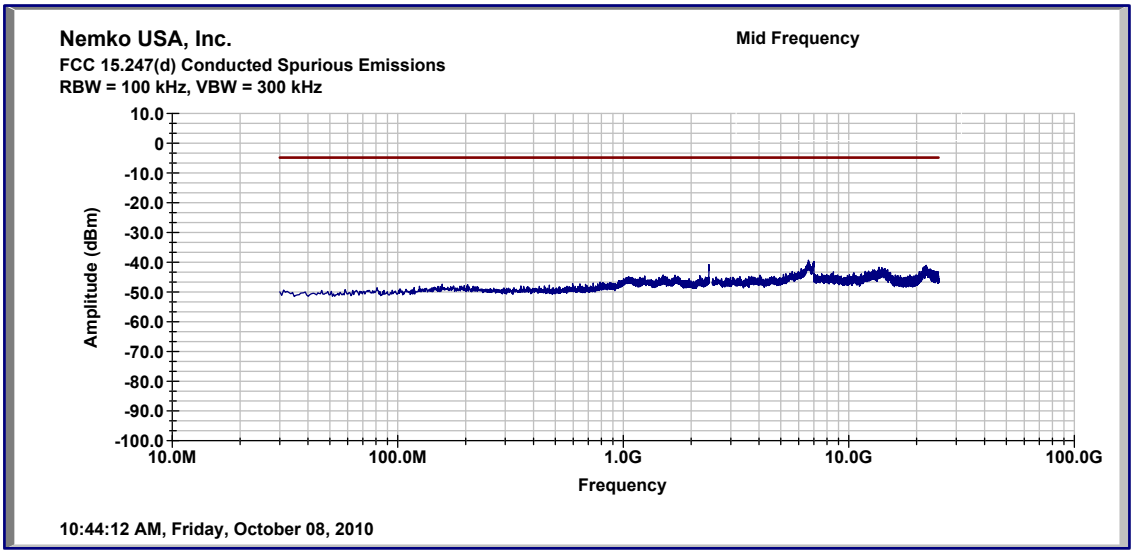
Out of Band



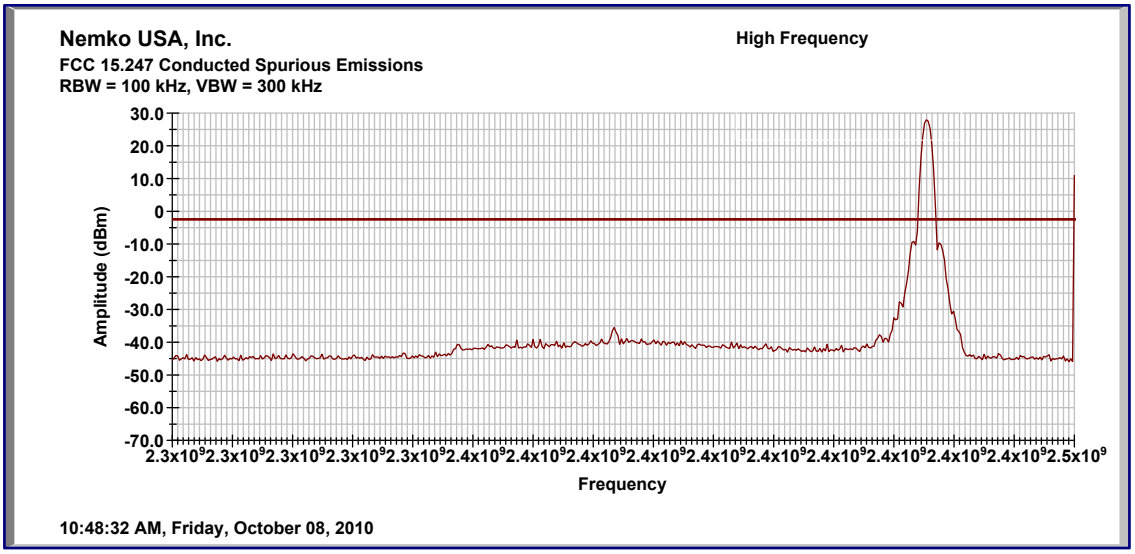
In Band



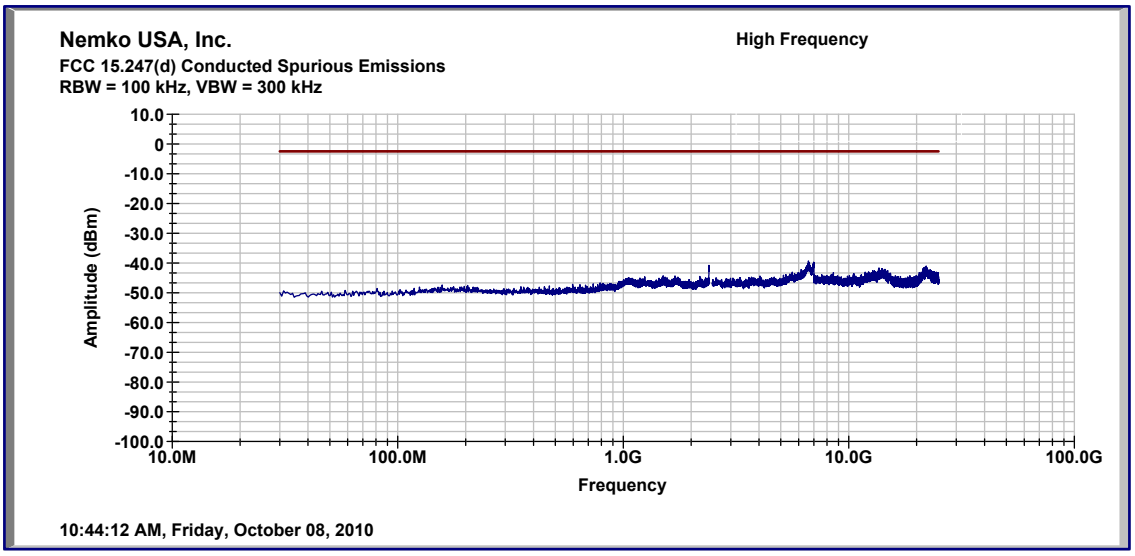
Out of Band



In Band



Out of Band



Section 15.247(d) – Spurious Radiated Emissions

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Conditions:

Sample Number:	**ULPAP110**	**Temperature:**	18°c
Date:	October 6, 2010	**Humidity:**	36%
Modification State:	Transmit with modulation	**Tester:**	A. Laudani
		Laboratory:	Nemko SOATS

Test Results: EUT complies.
Emissions were searched from 30MHz to 25000 MHz, no other emissions within 20 dB of the limit were detected.

Model number **ULPAP110** replaced "550-0003-01" after test data was secured.

Radiated Emissions Data

Job # :	61586-1	Date :	10-6-2010	Page	1 of 1
NEX #:	157899	Time :	1500		
		Staff :	AAL		

Client Name :	On-Ramp Wireless	EUT Voltage :	120
EUT Name :	Access Point	EUT Frequency :	60
EUT Model # :	550-0003-01	Phase:	1
EUT Serial # :	A9240001	NOATS	
EUT Config. :	SEE COMMENTS	SOATS	X
		Distance < 1000 MHz:	3 m
		Distance > 1000 MHz:	3 m

Specification :	CFR47 Part 15, Subpart B, Class B		
Loop Ant. #:	NA		
Bicon Ant.#:	128_3M	Temp. (°C) :	18
Log Ant.#:	111_3M	Humidity (%) :	36
DRG Ant. #	877	Spec Analyzer #:	E1018
Cable LF#:	SOATS	Analyzer Display #:	E1018
Cable HF#:	40FT_BLUE	Quasi-Peak Detector #:	E1018
Preamp LF#:	902	Preselector #:	NA
Preamp HF#	317		

Quasi-Peak	RBW:	120 kHz
	Video Bandwidth	300 kHz
Peak	RBW:	1 MHz
	Video Bandwidth	3 MHz
Average	RBW:	1 MHz
	Video Bandwidth	10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
											TRANSMIT LOW
43.8	47.9	38.9	Q	-	1.5	47.9	27.7	40.0	-12.3	Pass	AMBIENT
47.0	51.5	37.8	Q	-	1.5	51.5	31.4	40.0	-8.6	Pass	AMBIENT
57.8	47.5	42.0	Q	-	1.5	47.5	28.0	40.0	-12.0	Pass	AMBIENT
74.0	50.3	40.8	Q	-	1.5	50.3	27.1	40.0	-12.9	Pass	AMBIENT
221.0	30.0	28.9	Q	-	1.5	30.0	10.9	46.0	-35.2	Pass	
284.2	33.6	33.6	Q	-	1.5	33.6	19.5	46.0	-26.5	Pass	
332.0	27.8	28.4	Q	-	1.5	28.4	15.3	46.0	-30.7	Pass	
375.0	29.9	32.8	Q	-	1.5	32.8	18.7	46.0	-27.3	Pass	
2400.0	52.5	51.2	P	-	1.5	52.5	89.4	100.8	-11.4	Pass	100 kHz RBW
											Limit = Peak - 30 dBm
2402.00	93.9	66.2	P	-	1.5	93.9	130.8	131.3	-0.5	Pass	100 kHz RBW
											TRANSMIT MID
43.8	47.9	38.9	P	-	1.5	47.9	27.7	40.0	-12.3	Pass	AMBIENT
47.0	51.5	37.8	P	-	1.5	51.5	31.4	40.0	-8.6	Pass	AMBIENT
57.8	47.5	42.0	P	-	1.5	47.5	28.0	40.0	-12.0	Pass	AMBIENT
74.0	50.3	40.8	P	-	1.5	50.3	27.1	40.0	-12.9	Pass	AMBIENT
221.0	32.9	35.2	P	-	1.5	35.2	16.1	46.0	-30.0	Pass	
284.2	36.2	37.2	P	-	1.5	37.2	23.1	46.0	-22.9	Pass	
332.0	26.6	29.9	P	-	1.5	29.9	16.8	46.0	-29.2	Pass	
375.0	29.8	29.3	P	-	1.5	29.8	15.7	46.0	-30.3	Pass	
2439.81	93.3	66.5	P	-	1.5	93.3	130.2	131.3	-1.1	Pass	
											TRANSMIT HIGH
43.8	47.9	38.9	P	-	1.5	47.9	27.7	40.0	-12.3	Pass	AMBIENT
47.0	51.5	37.8	P	-	1.5	51.5	31.4	40.0	-8.6	Pass	AMBIENT
57.8	47.5	42.0	P	-	1.5	47.5	28.0	40.0	-12.0	Pass	AMBIENT
74.0	50.3	40.8	P	-	1.5	50.3	27.1	40.0	-12.9	Pass	AMBIENT
221.0	32.2	36.6	P	-	1.5	36.6	17.5	46.0	-28.6	Pass	
284.2	39.8	39.7	P	-	1.5	39.8	25.7	46.0	-20.3	Pass	
332.0	30.2	29.7	P	-	1.5	30.2	17.1	46.0	-28.9	Pass	
375.0	28.3	31.8	P	-	1.5	31.8	17.7	46.0	-28.3	Pass	

Section 15.247(e) – Power Spectral Density for Digitally Modulated Devices

(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Conditions:

Sample Number:	**ULPAP110**	**Temperature:**	24°C
Date:	October 8, 2010	**Humidity:**	35 %
Modification State:	Low ,Mid and High Channel	**Tester:**	A. Laudani
		Laboratory:	Nemko

Test Results:

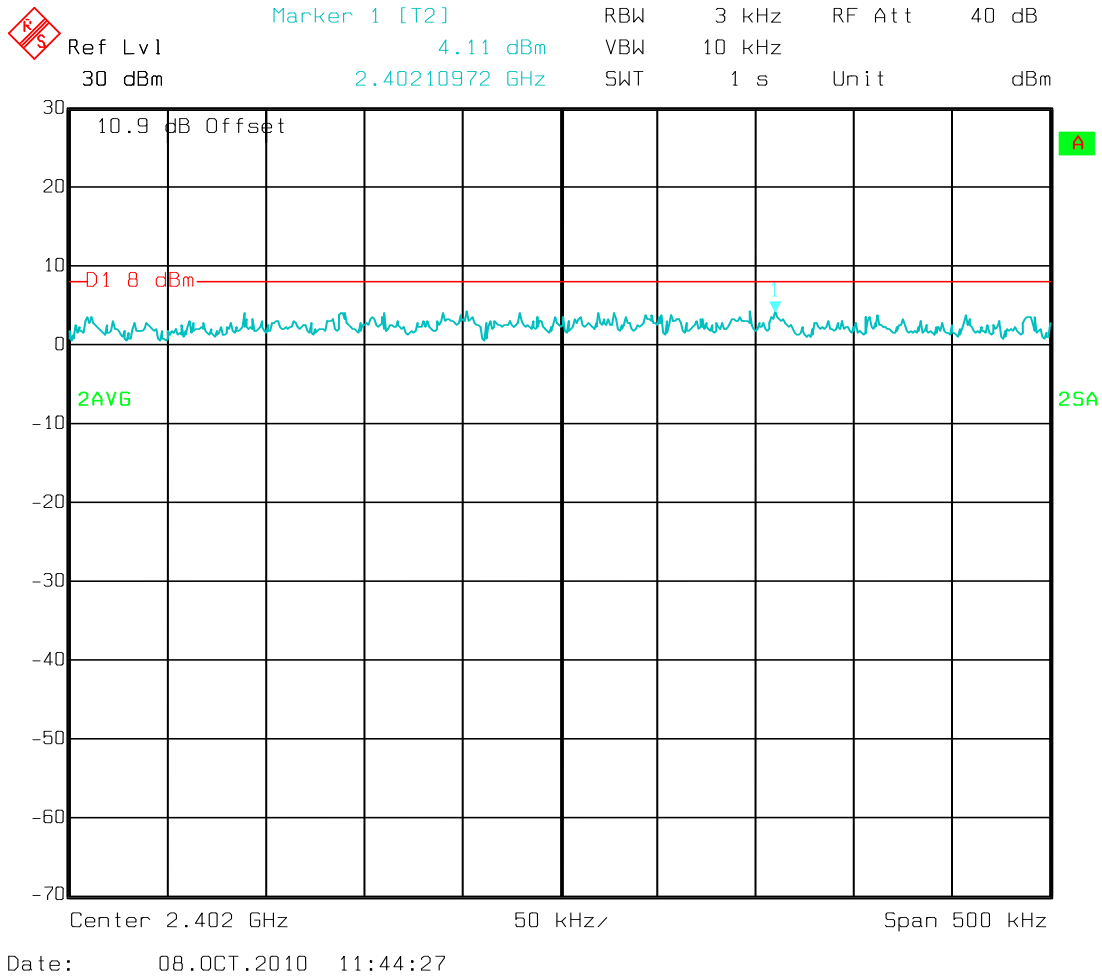
See attached plots.

Additional Observations:

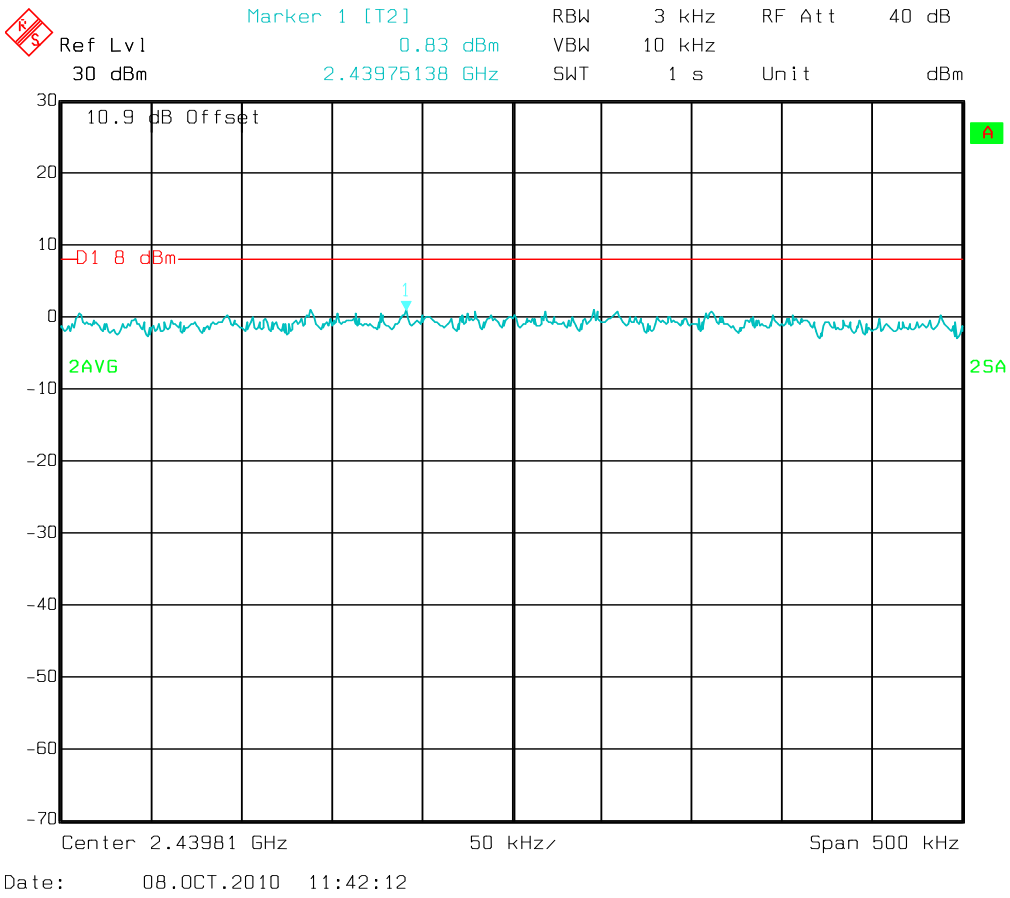
- This is a conducted test. The 10.9 dB offset is from the attenuator and cable assembly used.
- RBW is 3kHz
- VBW is ≥ 9kHz
- Sweep is set to auto.
- Trigger is set to “free run” (EUT set to transmit continuously).
- Trace average 100 traces in power averaging mode.
- Detector is Sampling Detector--based on Span = 500 kHz (highest level of emission) divided by 500 pixel screen which is less than 0.5 x 3 kHz RBW

PSD Option 2 used as per FCC guidelines for **Measurement of Digital Transmission Systems Operating under Section 15.247** March 23, 2005: A sample detector mode can be used only if the following can be achieved with automatic sweep time and adjusting the bin width.

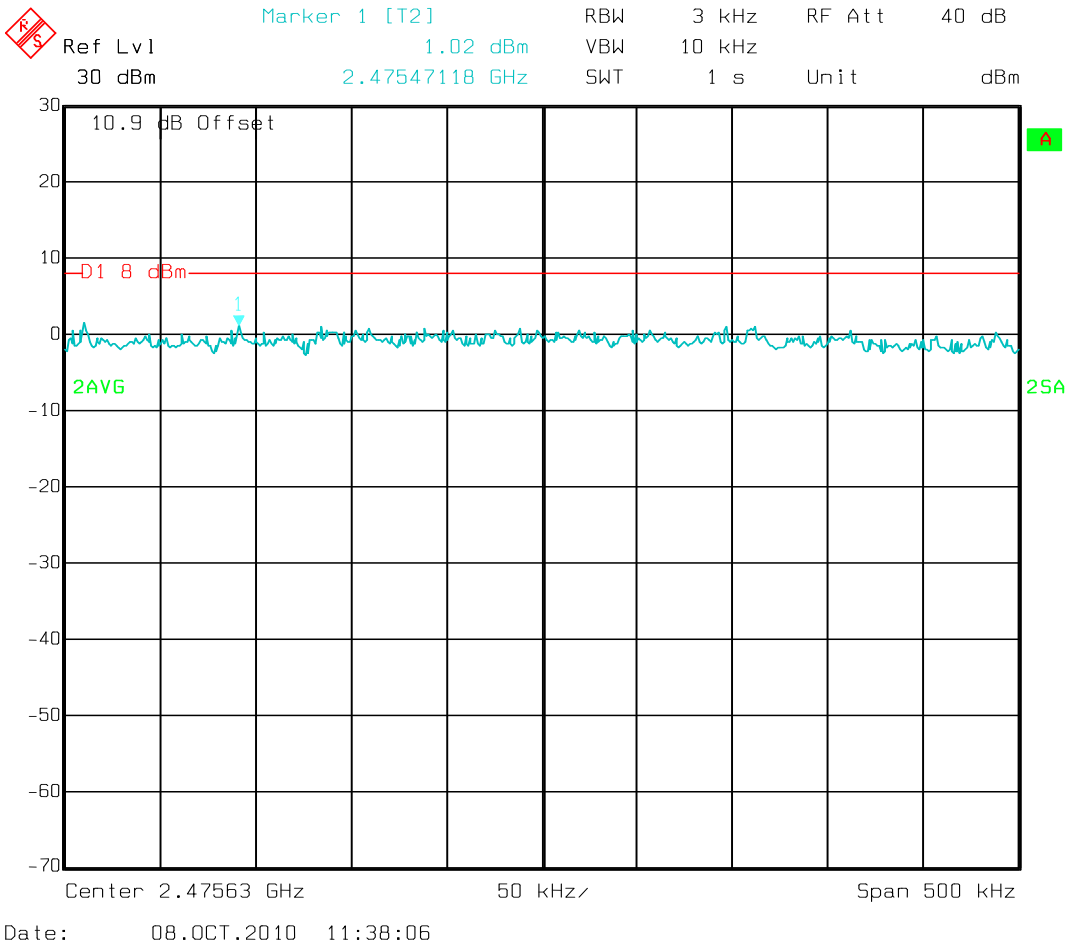
1. Bin width (i.e., span/number of points in spectrum display) < 0.5 RBW.
2. The transmission pulse or sequence of pulses remains at maximum transmit power throughout each of the 100 sweeps of averaging and that the interval between pulses is not included in any of the sweeps (e.g., 100 sweeps should occur during one transmission, or each sweep gated to occur during a transmission)



Low Channel – Max level is 4.1 dBm



Mid Channel – Max level is 0.8 dBm



High Channel – Max level is 1.0 dBm

Section 4.10 – Receiver Spurious Radiated Emissions

The following receiver spurious emission limits shall be complied with:
(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.
Table 1 - Spurious Emission Limits for Receivers

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

Test Conditions:

Sample Number:	**ULPAP110**	**Temperature:**	18°C
Date:	October 6, 2010	**Humidity:**	36 %
Modification State:	Worst channel configuration (Mid)	**Tester:**	A. Laudani
		Laboratory:	SOATS

Test Results:

See attached test result.

Additional Observations:

- The Spectrum was searched from 30MHz to 7500 MHz.
- EUT operated on “test receive mode”.
- Below 1GHz measurements are measured using CISPR quasi-peak detector while above 1GHz are measured using average detector with 1MHz RBW.
- No other emissions within 20 dB of the limit was detected.
- Receive mode was radiated. GPS receive function was on

Model number **ULPAP110** replaced "550-0003-01" after test data was secured.

Radiated Emissions Data

Job # :	61586-1	Date :	10-6-2010	Page	1 of 1
NEX #:	157899	Time :	1500		
		Staff :	AAL		

Client Name :	On-Ramp Wireless	EUT Voltage :	120
EUT Name :	Access Point	EUT Frequency :	60
EUT Model # :	550-0003-01	Phase:	1
EUT Serial # :	A9240001	NOATS	
EUT Config. :	SEE COMMENTS	SOATS	X
		Distance < 1000 MHz:	3 m
		Distance > 1000 MHz:	3 m

Specification :	CFR47 Part 15, Subpart B, Class B		
Loop Ant. #:	NA		
Bicon Ant.#:	128_3M	Temp. (°C) :	18
Log Ant.#:	111_3M	Humidity (%) :	36
DRG Ant. #	877	Spec Analyzer #:	E1018
Cable LF#:	SOATS	Analyzer Display #:	E1018
Cable HF#:	40FT_BLUE	Quasi-Peak Detector #:	E1018
Preamp LF#:	902	Preselector #:	NA
Preamp HF#	317		

Quasi-Peak	RBW:	120 kHz
	Video Bandwidth	300 kHz
Peak	RBW:	1 MHz
	Video Bandwidth	3 MHz
Average	RBW:	1 MHz
	Video Bandwidth	10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
											RECEIVE
43.8	47.9	38.9	Q	-	1.5	47.9	27.7	40.0	-12.3	Pass	AMBIENT
47.0	51.5	37.8	Q	-	1.5	51.5	31.4	40.0	-8.6	Pass	AMBIENT
57.8	47.5	42.0	Q	-	1.5	47.5	28.0	40.0	-12.0	Pass	AMBIENT
74.0	50.3	40.8	Q	-	1.5	50.3	27.1	40.0	-12.9	Pass	AMBIENT
221.0	32.0	35.3	Q	-	1.5	35.3	16.2	46.0	-29.9	Pass	
284.2	34.8	40.1	Q	-	1.5	40.1	26.0	46.0	-20.0	Pass	
332.0	28.8	29.4	Q	-	1.5	29.4	16.3	46.0	-29.7	Pass	
375.0	28.6	28.9	Q	-	1.5	28.9	14.8	46.0	-31.2	Pass	