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CERTIFICATION TEST REPORT

Class II Permissive Change

Report Number: 2011 015175154 FCC

Project Number: 1028751

Nex Number: 175154

Applicant: ON-RAMP WIRELESS
10920 VIA FRONTERA
San Diego, CA 92127

Equipment Under Test (EUT): ACCESS POINT

Model: ULPAP110

FCCID: XTE-ULPAP110
IC: 8655A-ULPAP110

In Accordance With: FCC Part 15 Subpart C, 15.247
IC RSS-210 Issue 8 December 2010
IC RSS-Gen Issue 3 December 2010

Tested By: Nemko USA Inc.
11696 Sorrento Valley Road, Suite F
San Diego, CA 92121

A handwritten signature in blue ink, appearing to read 'Alan Laudani'.

ALAN LAUDANI, EMC/RF Test Engineer

Authorized By:

Date: MAY 19, 2011
Total Number of Pages: 31



Section1: Summary of Test Results

1.1 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 in 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:	Access Point
Model:	ULPAP110
Specification:	FCC Part 15 Subpart C, 15.247 IC RSS-210 Issue 8 December 2010
Dates Tested in Laboratory:	May 16, 2011 to May 18, 2011
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None



1.2 Report Release History

Revision	Date	Comments	
-	May 19, 2011	Prepared By:	Alan Laudani
-	May 19, 2011	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: May 19, 2011
ALAN LAUDANI, EMC Test Engineer

TABLE OF CONTENTS

Section1: Summary of Test Results	2
1.1 General	2
1.2 Report Release History	3
Section 2: Equipment Under Test	5
2.1 Product Identification.....	5
2.2 Theory of Operation	5
2.3 Technical Specifications of the EUT	5
Section 3: Test Conditions	6
3.1 Specifications	6
3.3 Test Environment.....	6
3.4 Test Equipment	7
Section 4: Observations	8
4.1 Modifications Performed During Assessment.....	8
4.2 Record Of Technical Judgements.....	8
4.3 EUT Parameters Affecting Compliance	8
4.4 Deviations From Laboratory Test Procedures	8
4.5 Test Deleted.....	8
4.6 Additional Observations	8
Section 5: Results Summary	9
5.1 Test Results	9
Appendix A: Test Results.....	10
Power Line Conducted Emissions	10
20 dB / 99% Bandwidth.....	12
Minimum 6dB RF Bandwidth.....	12
Peak Output Power	13
Spurious RF Conducted Emissions	15
Spurious Radiated Emissions	16
Band-edge Compliance of RF Conducted /Radiated Emissions	18
Power Spectral Density for Digitally Modulated Devices	22
Receiver Spurious Radiated Emissions.....	24



Section 2: Equipment Under Test

2.1 Product Identification

The Equipment Under Test was identified as follows:

On-Ramp Wireless ULPAP110 Access Point

2.2 Theory of Operation

The ULPAP110 is an Access Point. Its function is to transfer digital data. The EUT was exercised by test software.

The EUT's performance during test was evaluated against the performance criterion specified by applicable test standards. Performance results are detailed in the test results section of this report.

2.3 Technical Specifications of the EUT

Manufacturer:	On-Ramp Wireless
Operating Frequency:	2402.0 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 8 December 2010

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 3 December 2010

General Requirements and Information for the Certification of Radio-communication Equipment

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	16-22°C
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
110	Antenna, LPA	Electrometrics	LPA-25	1217	4/1/2011	4/1/2013
115	Antenna, Bicon	EMCO	3104	3020	9/28/2010	9/28/2011
625	Antenna, Dbl Ridge Horn	EMCO	3116	2325	2/1/2010	2/1/2012
684	Transient Limiter	HP	11974A	3107A02636	9/10/2010	9/10/2011
805	LISN	Solar	9348-50-R-24-BNC	992823	2/7/2011	2/7/2012
813	Multimeter	Fluke	111	78130060	9/16/2009	9/16/2011
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	7/12/2010	7/12/2011
877	Antenna, DRG Horn, .7-18GHz	AH Systems	SAS-571	688	8/16/2010	8/16/2012
898	EMI Receiver & filter set	HP	8546A	3625A00348	6/22/2010	6/22/2011
899	Filter Section	HP	85460A	3448A00288	6/22/2010	6/22/2011
919	Preamplifier	Spacek Labs MM-Wave Technology	100MHz to 40GHz	3M12 (SLK-35-3) and 3M13 (SLKa-35-4)	12/14/2010	12/14/2011
E1018	9kHz to 7GHz Spectrum Analyzer	Rohde & Schwarz	FSP7	835363/0003	2/1/2011	2/1/2012
E1020	Two Line V-Network	Rohde & Schwarz	ENV216	101044	4/4/2011	4/4/2012
NA	Regulating Transformer	TDGC	0-250 Vac	NA	NCR	NCR

Registration of the OATS are on file with the Federal Communications Commission, 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 Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedure

4.5 Test Deleted

As this was a Class II Permissive Change test evaluation, retesting was not advisable as the change to the circuitry does not warrant retest.

4.6 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 8 December 2010
IC RSS-Gen Issue 3 December 2010

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 4.5 Test deleted)
S Sampled for verification of no change from original test results.

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

5.1 Test Results

Part 15C	RSS-210	Test Description	Required	Result
15.207 (a)	RSS-Gen 7.2.4	Conducted Emission Limit	S	Pass
15.215(c)	RSS-Gen 4.6.1	20 dB & 99% Bandwidth	N/T	Pass
15.247(a)(2)	RSS-210 A8.2 (a)	Minimum 6dB RF Bandwidth	N/T	Pass
15.247(b)(3)	RSS-210 A8.4 (4)	Peak Output Power	Y	Pass
15.247(d)	RSS-210 A8.5	Band-edge Compliance of RF Conducted Emissions	Y	Pass
15.247 (d)	RSS-210 A8.5	Spurious RF Conducted Emissions	N/T	Pass
15.247 (d)	RSS-210 A8.5	Spurious Radiated Emissions	Y	Pass
15.247(e)	RSS-210 A8.2 (b)	Power Spectral Density for Digitally Modulated Devices	S	Pass
	RSS-Gen 4.10	Receiver Spurious Emissions	Y	Pass

Appendix A: Test Results

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 μ H/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 (dB μ V)	
	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:	20°C
Date:	May 17, 2011	Humidity:	50 %
Modification State:	Low, Mid and High Channel	Tester:	Alan Laudani

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.
- 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 100 kHz RBW/100kHz VBW for Peak measurements.



Sample: mid channel frequency

Nemko USA, Inc.

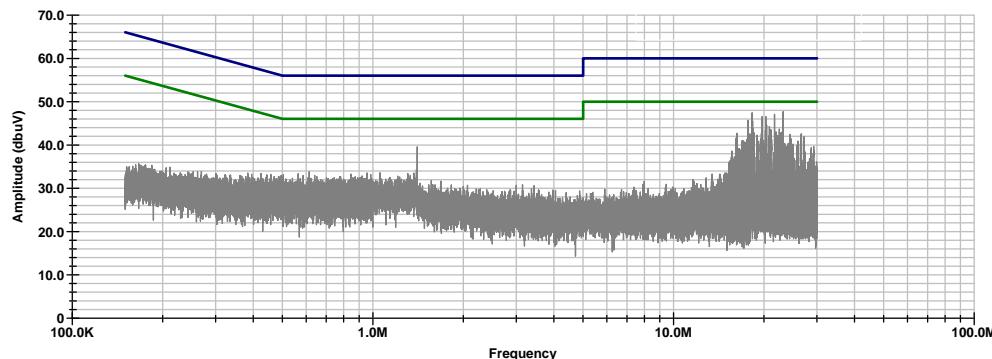
FCC 15C Conducted Emissions

120Vac 60 Hz - Peak L1, QP = 0 (Blue), AV = X (Green)

AP FCC

2440 MHz mid channel

100 MB Ethernet with cross over cable



09:55:34 AM, Tuesday, May 17, 2011

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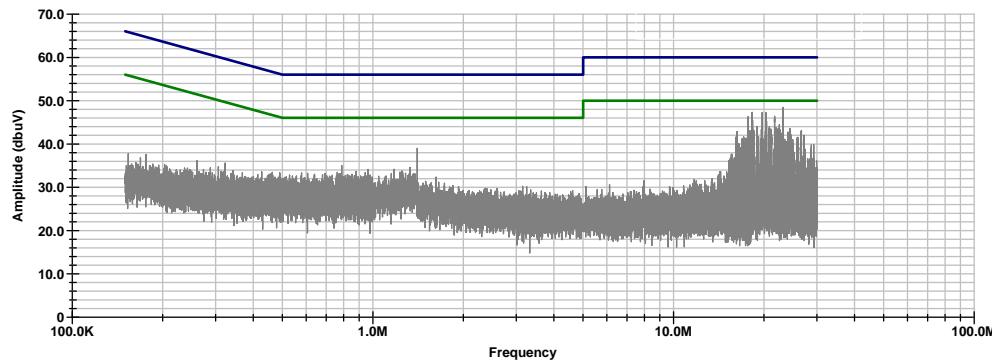
FCC 15C Conducted Emissions

120Vac 60 Hz - Peak L2, QP = 0 (Blue), AV = X (Green)

AP FCC

2440 MHz mid channel

100 MB Ethernet with cross over cable



09:57:53 AM, Tuesday, May 17, 2011

**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:	
Date:		Humidity:	
Modification State:	Low, Mid and High Channel	Tester:	Alan Laudani

Test Results: Not tested as changes made did not warrant retest.

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:	
Date:		Humidity:	
Modification State:	Low, Mid and High Channel	Tester:	Alan Laudani

Test Results: Not tested as changes made did not warrant retest.



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:	21°C
Date:		Humidity:	39%
Modification State:	Low, Mid and High Channel	Tester:	Alan Laudani
		Laboratory:	Nemko

Test Results: Complies, output within 1 dB of previous testing.

Additional Observations:

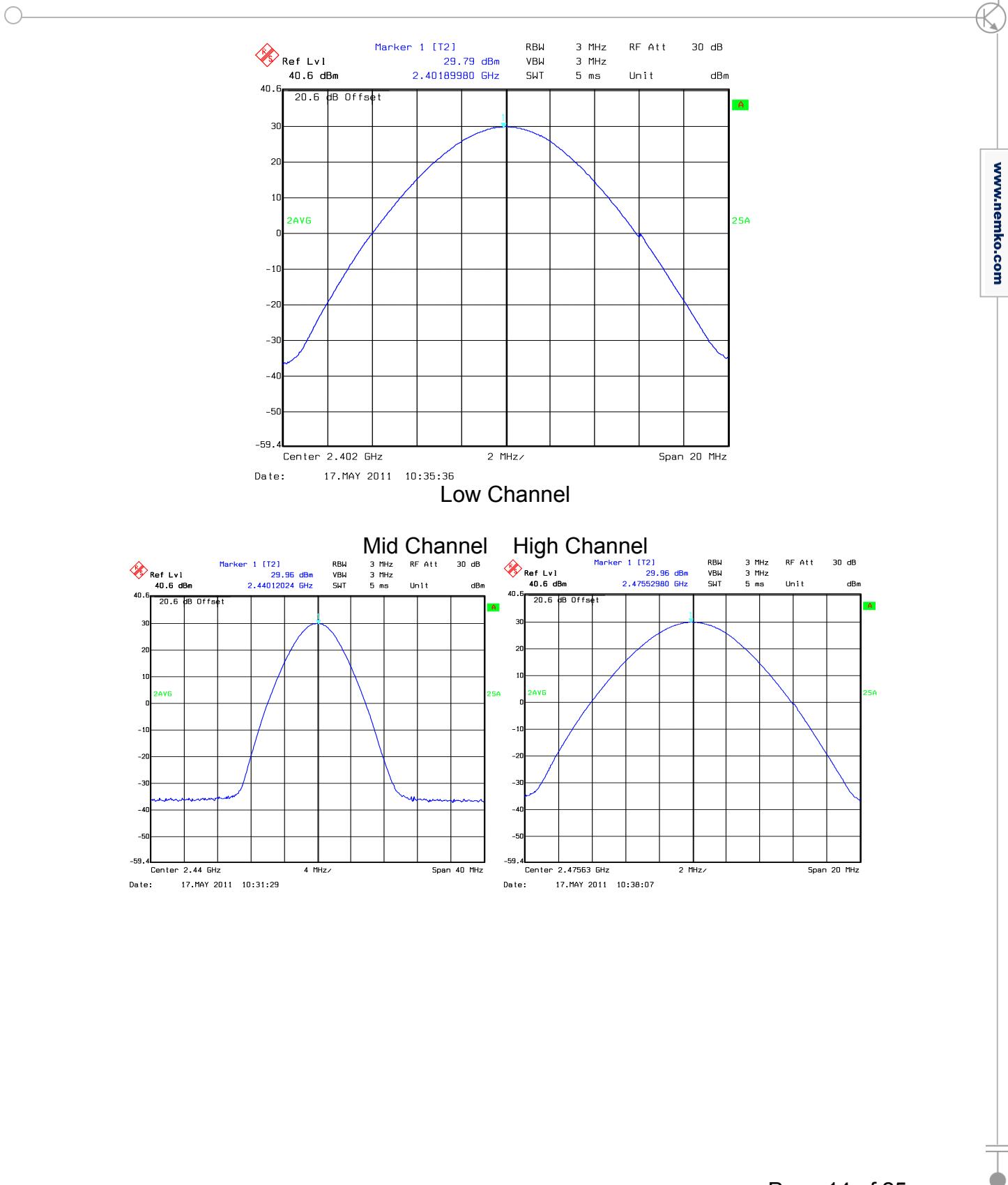
- This is a conducted test. 20.6 dB was offset for the cable and attenuators used.
- Input voltage to the EUT was varied from 48 VDC+/-15%, however no variation in results observed.
- Power was measured using Option 2, method 2: Sample detector mode, sample set to 100, average.

Original test results:

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

Retest:

Channel Range	Peak Power Output (dBm)
Low (2402.00 MHz)	29.79
Mid (2440.00 MHz)	29.96
High (2475.63 MHz)	29.96



**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:	
Date:		Humidity:	
Modification State:		Tester:	Alan Laudani
		Laboratory:	Nemko

Test Results: Not tested as changes made did not warrant retest.



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:	17°C
Date:	May 16, 2011	Humidity:	44%
Modification State:	Receive mode, mid channel	Tester:	Alan Laudani
		Laboratory:	Nemko

Test Results: EUT complies.

Emissions were searched from 30 MHz to 25000 MHz, no other emissions within 20 dB of the limits were detected.

Digital emissions presented. No emissions due to the harmonics of the transmit frequencies were within 20 dB of the limits.

Band edge emissions presented.

Digital emissions.

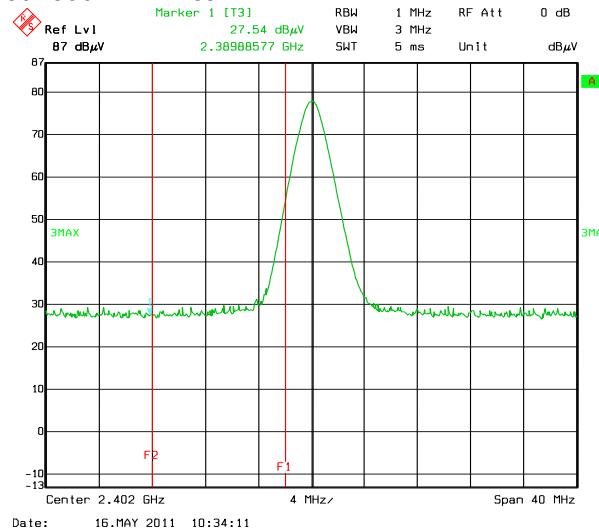
Radiated Emissions Data											
Job #:	1028751		Date :	5-16-2011		Page	1	of	1		
NEX #:	175154		Time :	1100							
Staff :	aal										
Client Name :	On-Ramp Wireless		EUT Voltage :	120							
EUT Name :	Access Point		EUT Frequency :	60							
EUT Model #:	ULPAP110		Phase:	1							
EUT Serial #:	NA		NOATS								
EUT Config.:	TEST transit mode		SOATS	X							
Specification :	CFR47 Part 15, Subpart B, Class B		Distance < 1000 MHz:	3 m							
Loop Ant. #:	NA		Distance > 1000 MHz:	3 m							
Bicon Ant.#:	115_3m		Quasi-Peak	RBW: 120 kHz							
Log Ant.#:	110_3m		Peak	RBW: 1 MHz							
DRG Ant. #	877		Spec An. Display #:	300 kHz							
Cable LF#:	SOATS		Spec An. #:	3 MHz							
Cable HF#:	40ft		QP #:	Average							
Preamp LF#:	NA		PreSelect#:	RBW: 10 Hz							
Preamp HF#	NA										
Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dB μ V)	Corrected Reading (dB μ V/m)	Spec. limit (dB μ V/m)	CR/SL Diff. (dB)	Pass	Fail
											Comment
43.8	19.1	14.6	Q	-	1.0	19.1	30.0	40.0	-10.0	Pass	ambient
47.0	19.1	15.1	Q	-	1.0	19.1	29.8	40.0	-10.2	Pass	ambient
57.8	14.1	7.8	Q	-	1.0	14.1	26.0	40.0	-14.0	Pass	ambient
74.0	14.3	11.3	Q	-	1.0	14.3	23.3	40.0	-16.7	Pass	ambient
221.0	1.2	0.4	Q	-	1.0	1.2	14.6	46.0	-31.4	Pass	
284.0	-0.6	-1.0	Q	-	1.0	-0.6	15.9	46.0	-30.1	Pass	
332.0	0.7	2.4	Q	-	1.0	2.4	20.1	46.0	-26.0	Pass	
375.0	2.0	2.5	Q	-	1.0	2.5	20.5	46.0	-25.5	Pass	

Band-edge Compliance of RF Conducted /Radiated Emissions

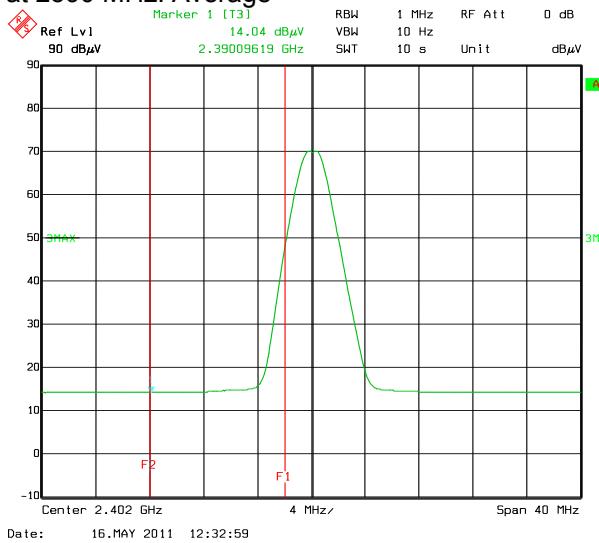
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains 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 3 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)).

Compare plots and table below.

restricted band ending at 2390 MHz: Peak

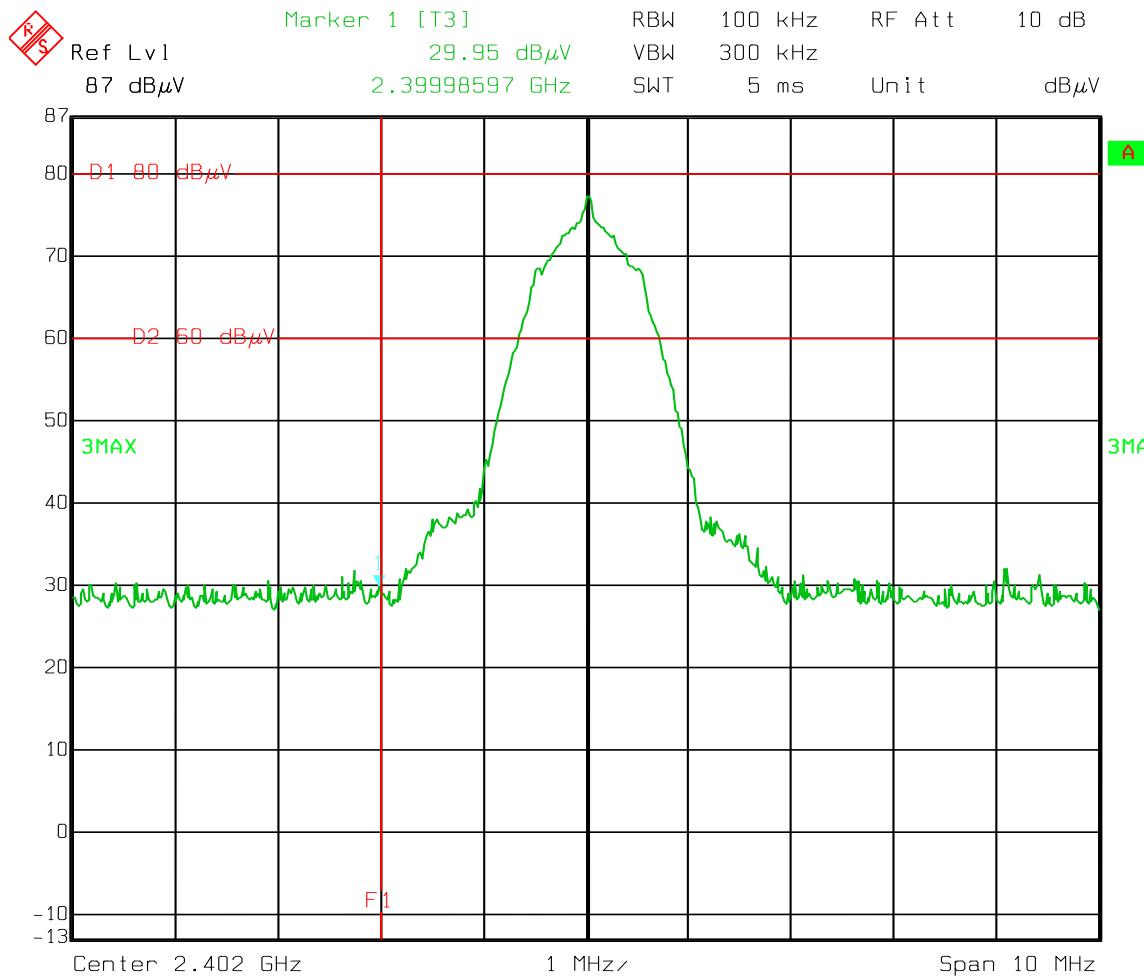


restricted band ending at 2390 MHz: Average

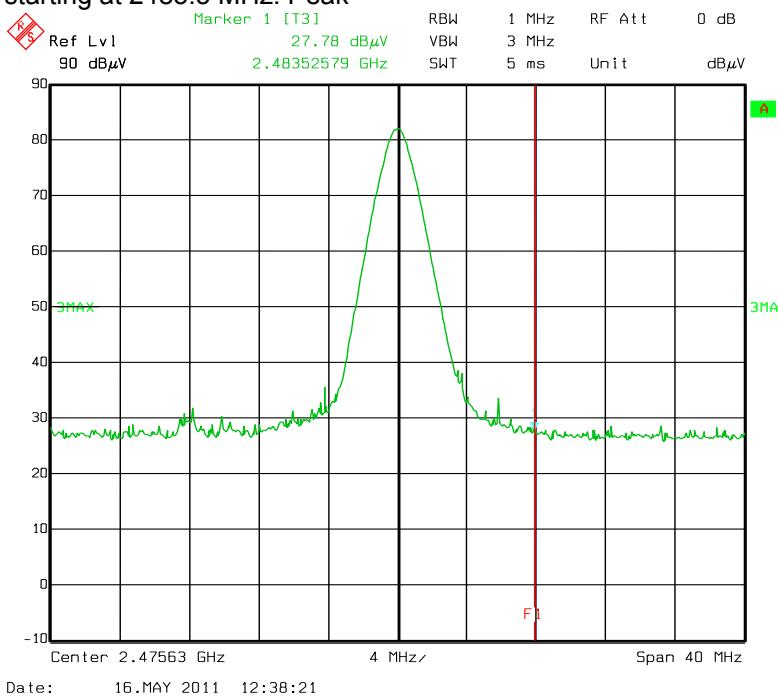




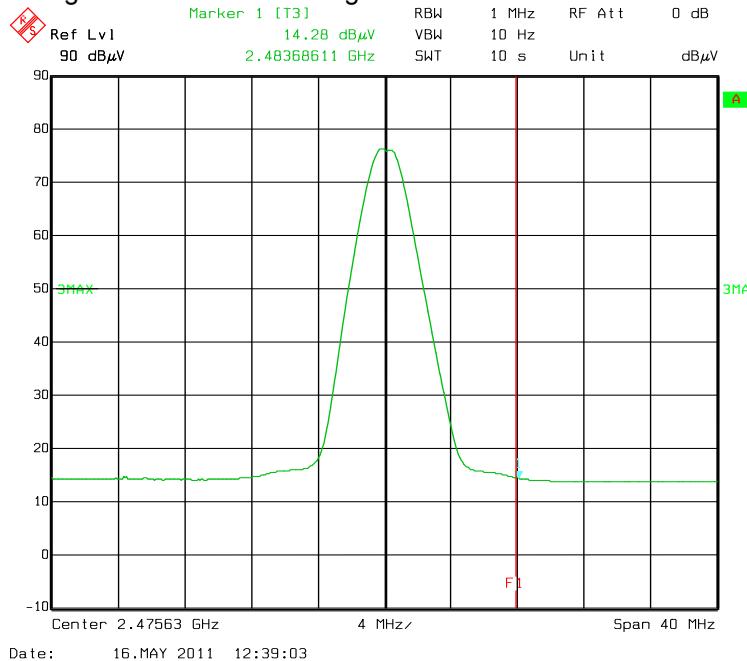
lower band egde.
Limit is 20 dBc peak, based on Channel Peak Field Strength.



restricted band starting at 2483.5 MHz: Peak



restricted band starting at 2483.5 MHz: Average



**Example:**

Corrected reading = max Reading + antenna correction factor and cable loss at frequency
2400 MHz: 64.9 dB μ V/m = 29.9 dB μ V + 29.1 dB/m + 5.9 + dB

Radiated Emissions Data											
Job # :	1028751		Date :	5-16-2011		Page	1	of	1		
NEX #:	175154		Time :	1130							
Staff :	aal										
Client Name :	On-Ramp Wireless										
EUT Name :	Access Point										
EUT Model #:	ULPAP110										
EUT Serial #:	NA										
EUT Config. :	TEST transit mode										
Specification :	CFR47 Part 15, Subpart B, Class B										
Loop Ant. #:	NA		Temp. (°C) :	17		Quasi-Peak	RBW: 120 kHz				
Bicon Ant.#:	NA		Humidity (%) :	44		Peak	Video Bandwidth 300 kHz				
Log Ant. #:	NA		Spec An.#:	898		Average	RBW: 1 MHz				
DRG Ant. #	877		Spec An. Display #:	898			Video Bandwidth 3 MHz				
Cable LF#:	NA		QP #:	898			RBW: 1 MHz				
Cable HF#:	40ft		PreSelect#:	899			Video Bandwidth 10 Hz				
Preamp LF#:	NA					Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.					
Preamp HF#:	NA					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 (dB μ V)	Corrected Reading (dB μ V/m)	Spec. limit (dB μ V/m)	CR/SL Diff. (dB)	Pass Fail	Comment
2400.0	29.9	28.5	P	-	1.0	29.9	64.9	95.0	-30.1	Pass	AP FCC
2402.0	80.0	77.0	P	-	1.0	80.0	115.0				3 MHz RBW
2390.0	27.5	27.4	P	-	1.0	27.5	61.7	74.0	-12.2	Pass	
2390.0	14.0	13.9	A	-	1.0	14.0	48.2	54.0	-5.8	Pass	
2483.5	27.8	26.5	P	-	1.0	27.8	62.8	74.0	-11.1	Pass	
2483.5	14.3	14.0	A	-	1.0	14.3	49.3	54.0	-4.6	Pass	



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:

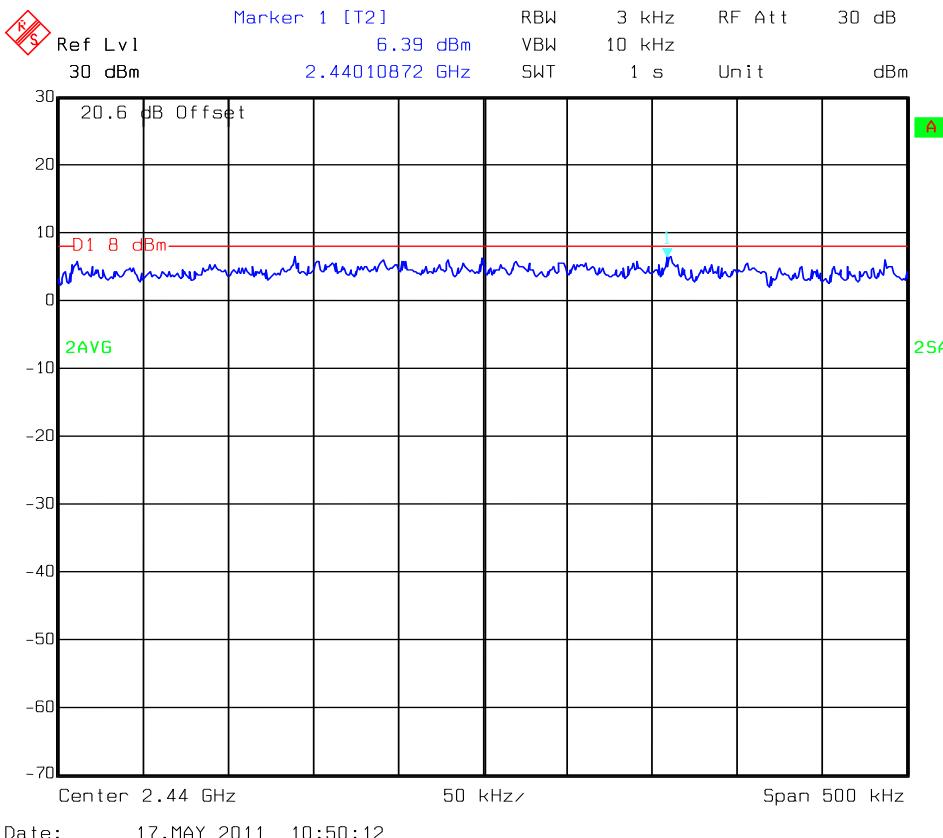
Sample Number:	ULPAP110	Temperature:	21°C
Date:	May 17, 2011	Humidity:	57%
Modification State:	Mid Channel	Tester:	Alan Laudani
Laboratory:			Nemko

Test Results: Complies.

Additional Observations:

- This is a conducted test. 20.6 dB was offset for the cable and attenuators used.
- RBW is 3kHz
- VBW is 10kHz
- Span is set to 0.5 MHz
- Power was measured using *Option 2, method 2: Sample detector mode, sample set to 100, average, sweep: free run.
- Limit is 8 dBm
- EUT complies

* FCC guidelines for Measurement of DTS March 23, 2005

**Mid Channel 6.39 dBm**



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:	17°C
Date:	May 16, 2011	Humidity:	44%
Modification State:	Receive mode, mid channel	Tester:	Alan Laudani
Laboratory:			Nemko

Test Results:

See attached test result.

Additional Observations:

- The Spectrum was searched from 30 MHz to 12500 MHz.
- EUT operated on “test receive mode”.
- Below 1GHz measurements are measured using CISPR quasi-peak detector.
- No other emissions within 20 dB of the limit were detected.

Radiated Emissions Data

Job # : 1028751
NEX #: 175154

Date : 5-16-2011
Time : 0900
Staff : aal

Page 1 of 1

Client Name :	On-Ramp Wireless
EUT Name :	Access Point
EUT Model # :	ULPAP110
EUT Serial # :	NA
EUT Config. :	TEST receive mode

EUT Voltage :	120
EUT Frequency :	60
Phase:	1
NOATS	
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.#:	115_3m	Temp. (°C) : 17
Log Ant. #:	110_3m	Humidity (%) : 44
DRG Ant. #	877	Spec An.#: 898
Cable LF#:	SOATS	Spec An. Display #: 898
Cable HF#:	40ft	QP #: 898
Preamp LF#:	NA	PreSelect#: 899
Preamp HF#	NA	

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