

Test of Aruba AP120,121 802.11a/b/g/n AP

To: FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: ARUB23-A4 Rev A



# TEST REPORT

FROM



Test of Aruba AP120,121 802.11a/b/g/n AP  
to  
To: FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: ARUB23-A4 Rev A

Note: this report only contains data with regard to the 5,150 to 5,250 MHz operational modes of the Aruba Wireless Access Point. 2.4 and 5.8 GHz test data are reported in MiCOM Labs test report ARUB23-A2.

This report supersedes NONE

**Manufacturer:** Aruba Networks  
1322 Crossman Avenue  
Sunnyvale  
California 94089, USA

**Product Function:** Wireless Access Point

**Copy No:** pdf **Issue Date:** 23rd May 2008

**This Test Report is Issued Under the Authority of:**

**MiCOM Labs, Inc.**  
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CERTIFICATE #2381.01

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**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
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## **ACCREDITATION, LISTINGS & RECOGNITION**

MiCOM Labs, Inc. an accredited laboratory complies with the international standard BS EN ISO/IEC 17025. The company is accredited by the American Association for Laboratory Accreditation (A2LA) [www.a2la.org](http://www.a2la.org) test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; <http://www.a2la.org/scopepdf/2381-01.pdf>



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A2LA has accredited

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Pleasanton, CA

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DISTRICT OF COLUMBIA  
A2LA

Presented this 13<sup>th</sup> day of August 2007.



\_\_\_\_\_  
President  
For the Accreditation Council  
Certificate Number 2381.01  
Valid to February 29, 2008

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## LISTINGS

MiCOM Labs test facilities are listed by the following organizations;

### North America

#### **United States of America**

Federal Communications Commission (FCC) Listing #: 102167

#### **Canada**

Industry Canada (IC) Listing #:4143A-2

## RECOGNITION

### **APEC MRA (Asia-Pacific Economic Community Mutual Recognition Agreement)**

#### **Conformity Assessment Body (CAB) – MiCOM Labs**

Test data generated by MiCOM Labs is accepted in the following countries under the APEC MRA.

Country	Recognition Body	Phase	CAB Identification No.
Australia	Australian Communications and Media Authority (ACMA)	I	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)	I	
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)	I	
Singapore	Infocomm Development Authority (IDA)	I	
Taiwan	Directorate General of Telecommunications (DGT) Bureau of Standards, Metrology and Inspection (BSMI)	I	

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## DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft		
Rev A	23 <sup>rd</sup> May 2008	Initial Release

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## 1. TEST RESULT CERTIFICATE

<b>Manufacturer:</b>	Aruba Networks 1322 Crossman Avenue Sunnyvale California 94089, USA	<b>Tested By:</b>	MiCOM Labs, Inc. 440 Boulder Court Suite 200 Pleasanton California, 94566, USA
<b>EUT:</b>	Wireless Access Point	<b>Telephone:</b>	+1 925 462 0304
<b>Model:</b>	AP120, AP121	<b>Fax:</b>	+1 925 462 0306
<b>S/N:</b>	AP120 AD0001035, AP121 AD0010243		
<b>Test Date(s):</b>	7th Nov '07 to 20th May 2008	<b>Website:</b>	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC 47 CFR Part 15.407 & IC RSS-210	EQUIPMENT COMPLIES

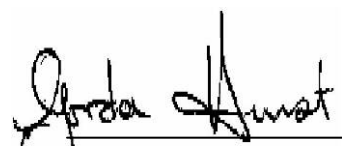
MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

### Notes:

1. This document reports conditions under which testing was conducted and the results of testing performed.
2. Details of test methods used have been recorded and kept on file by the laboratory.
3. Test results apply only to the item(s) tested.

Approved & Released for MiCOM Labs, Inc. by:

  
\_\_\_\_\_  
Graeme Grieve  
Quality Manager MiCOM Labs,

  
\_\_\_\_\_  
Gordon Hurst  
President & CEO MiCOM Labs, Inc.



CERTIFICATE #2381.01

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## 2. REFERENCES AND MEASUREMENT UNCERTAINTY

### 2.1. Normative References

Ref.	Publication	Year	Title
(i)	FCC 47 CFR Part 15.407	2007	Code of Federal Regulations
(ii)	FCC 06-96	June 2006	Memorandum Opinion and Order
(iii)	Industry Canada RSS-210	Issue 7 June 2007	Low Power License-Exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment
(iv)	Industry Canada RSS-Gen	Issue 2 June 2007	General Requirements and Information for the Certification of Radiocommunication Equipment
(v)	ANSI C63.4	2003	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
(vi)	CISPR 22/ EN 55022	1997 1998	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
(vii)	M 3003	Edition 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
(viii)	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
(ix)	ETSI TR 100 028	2001	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
(x)	A2LA	14 <sup>th</sup> September 2005	Reference to A2LA Accreditation Status – A2LA Advertising Policy
(xi)	FCC Public Notice – DA 02-2138	2002	Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices

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## **2.2. Test and Uncertainty Procedures**

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

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### 3. PRODUCT DETAILS AND TEST CONFIGURATIONS

#### 3.1. Technical Details

Details	Description
Purpose:	Test of the Aruba AP120,121 802.11a/b/g/n AP in the frequency range 5150 to 5250 MHz to FCC Part 15.407 and Industry Canada RSS-210 regulations.
Applicant:	As Manufacturer
Manufacturer:	Aruba Networks 1322 Crossman Avenue Sunnyvale California 94089, USA
Laboratory performing the tests:	MiCOM Labs, Inc. 440 Boulder Court, Suite 200 Pleasanton, California 94566 USA
Test report reference number:	ARUB23-A4 Rev A
Date EUT received:	2 <sup>nd</sup> November 2007 & 2 <sup>nd</sup> May 2008 (AP120/121)
Standard(s) applied:	FCC 47 CFR Part 15.407 & IC RSS-210
Dates of test (from - to):	7th Nov '07 to 20th May 2008
No of Units Tested:	1
Type of Equipment:	802.11a/b/g/n Wireless Access Point, 3x3 Spatial Multiplexing MIMO configuration
Manufacturers Trade Name:	Wireless Access Point
Model(s):	AP120 (external) and AP121 (integral) antenna
Location for use:	Indoor
Declared Frequency Range:	5,150 to 5,250 MHz
Software Release	3.3.2.0
Hardware Release:	8.0
Type of Modulation:	Per 802.11 –CCK, BPSK, QPSK, DSSS, OFDM
Declared Nominal Output Power: (Average Power)	802.11a: Legacy +17 dBm 802.11n: HT-20 +19 dBm 802.11n: HT-40 +19 dBm
EUT Modes of Operation:	Legacy 802.11a/b/g; 802.11n HT-20, HT-40
Transmit/Receive Operation:	Time Division Duplex
Rated Input Voltage and Current:	5 Vdc, 2.5 A POE 48 Vdc 350 mA
Operating Temperature Range:	Declared range 0 to +40°C
ITU Emission Designator:	802.11a Legacy 16M7W7D 802.11n HT-20 17M8W7D 802.11n HT-40 37M2W7D
Frequency Stability:	±20 ppm max
Equipment Dimensions:	Antenna Retracted 4.9 " x 5.13" x 2.0"
Weight:	15oz (420 grams)
Primary function of equipment:	Wireless Access Point for transmitting data and voice

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### **3.2. Scope of Test Program**

The scope of the compliance program was to test the Aruba AP120 and 121 wireless Access Points, 3x3 Spatial Multiplexing MIMO configurations in the frequency range 5150 - 5250 MHz for compliance against FCC 47 CFR Part 15.407 and Industry Canada RSS-210 specifications.

The AP120/121 is identical to Aruba Networks AP124/125 however unlike the AP124/125 this device has a single wireless chipset. The AP124/125 utilizes two identical wireless chipsets. Only 50% of the wireless printed circuit board on the AP120/121 has been populated.

The Aruba Networks AP120 has external antennas with reverse SMA connectors while the AP121 has integral antenna(s). The antennas used with the AP120 and AP121 are detailed in section 3.4 "Antenna Details".

Measurements were made to compare the spectral output of AP120 and AP124 access points. As a result of this comparison measurements from the AP124/125 and AP120/121 have been used to generate this test report. Section 4 'Test Summary' identifies the tests completed on the AP120/121.

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**Aruba Networks  
AP120 Wireless Access Point (Front)**



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**Aruba Networks AP120  
Wireless Access Point (Underside)**



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**Aruba Networks  
AP121 Wireless Access Point (Integral Antenna)**



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### 3.3. Equipment Model(s) and Serial Number(s)

Type (EUT/Support)	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	Access Point	Aruba Networks	AP120, AP121	AP120 AD0001035, AP121 AD0010243
Support	Power Over LAN Hub	PowerDsine	PD-6001/AC	A03176040000172
Support	Power Supply	CUI Inc	A1-15S05	
Support	Laptop PC	IBM	Thinkpad	None

### 3.4. Antenna Details

- Integral 7.21 dBi
- AP-ANT-10, 6 dBi Omni-Directional
- AP-ANT-12, 14 dBi Directional

### 3.5. Cabling and I/O Ports

Number and type of I/O ports

1. Gigabit Ethernet (non-screened) x 2
2. 5 Vdc, 4mm supply connector

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### 3.6. Test Configurations

Testing was performed to determine the highest power level versus bit rate. The variant with the highest power was used to exercise the product.

Matrix of test configurations

Operational Mode(s) (802.11)	Variant	Data Rates with Highest Power	Frequencies (MHz)
a	Legacy	6 MBit/s	5,180
n	HT-20	6.5 MCS	5,200
n	HT-40	13.5 MCS	5,240
			5,190
			5,230

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**Conducted Testing**

Conducted test parameters were performed on a single antenna connector. The performance testing was carried out on the transmitter port exhibiting the highest output power. A table of output power V's antenna port for each operational mode is provided below. The power from each transmitter is provided together with the aggregate power for all three transmitters. Complete characterization for each chain has been provided only for the power settings utilized in the generation of this report. Aggregate power measurements are provided for all power settings.

**Channel 5,180 MHz**

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
Legacy a	5				8.4
	6				9.29
	7				10.33
	8				11.36
	9				12.33
	10				13.49
	11				14.45
	12				15.51
	13	10.93	10.82	11.52	16.4
	14	11.83	11.74	12.61	17.3
	15				18.21
	16	13.70	13.65	14.56	19.27
	17				20.2
	18				21.2
19				22.4	
HT-20	5				
	6				8.32
	7				9.24
	8				10.35
	9				11.39
	10				12.48
	11				13.43
	12				14.4
	13	10.92	10.71	11.44	15.51
	14				16.41
	15				17.28
	16				18.26
	16.5	14.02	13.82	14.80	18.75
	17				19.31
18				20	
19				21.4	

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**Channel 5,190 MHz**

<b>Configuration</b>	<b>ART Power Setting</b>	<b>Tx 1 Measured Pwr (dBm)</b>	<b>Tx 2 Measured Pwr (dBm)</b>	<b>Tx 3 Measured Pwr (dBm)</b>	<b>Aggregate Measured Pwr (dBm)</b>
<b>HT-40 ( 5.190 GHz )</b>	5				8.17
	6				9.04
	7	4.55	4.66	5.96	10.2
	8				11.22
	9				12.26
	10	7.38	7.38	8.35	12.91
	11				14
	12				15.05
	13	10.27	10.53	10.90	16.04
	14				16.95
	15				17.92
	16				18.97
	17				19.98
	18				20.96
	19				22.09

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**Channel 5,200 MHz**

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
<b>Legacy a</b>	5				8.25
	6				9.17
	7				10.27
	8				11.24
	9				12.35
	10				13.07
	11				14.00
	12				15.07
	13				16.1
	14				17.3
	15				18.11
	16				19.16
	17				19.96
	18				21.09
19				22.08	
<b>HT-20</b>	5				
	6				8.2
	7				9.14
	8				10.22
	9				11.32
	10				12.35
	11				13.03
	12				13.99
	13				15.02
	14				16.08
	15				16.98
	16				17.98
	17				19.00
	18				20.2
19				21.02	

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**Channel 5,240 MHz**

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
<b>Legacy a</b>	5				8.3
	6				9.22
	7				10.26
	8				11.41
	9				12.42
	10				12.75
	11				13.75
	12				14.84
	13				15.96
	14				16.83
	15				17.87
	16				18.92
	17				19.76
	18				20.85
19				21.66	
<b>HT-20</b>	5				
	6				8.15
	7				8.96
	8				10.2
	9				11.3
	10				12.3
	11				12.65
	12				13.65
	13				14.57
	14				15.83
	15				16.77
	16				17.72
	17				18.87
	18				19.67
19				20.65	

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**Channel 5,230 MHz**

<b>Configuration</b>	<b>ART Power Setting</b>	<b>Tx 1 Measured Pwr (dBm)</b>	<b>Tx 2 Measured Pwr (dBm)</b>	<b>Tx 3 Measured Pwr (dBm)</b>	<b>Aggregate Measured Pwr (dBm)</b>
<b>HT-40 ( 5.230 GHz )</b>	5				8.25
	6				9.17
	7				8.34
	8				9.24
	9				10.36
	10				11.23
	11				12.2
	12				12.96
	13				13.86
	14				14.82
	15				15.7
	16				16.67
	17				17.62
	18				18.56
19				19.48	

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## Antenna Test Configurations for Radiated Emissions

### Spurious Emission and Band-Edge Test Strategy

When testing radiated spurious emissions and band-edge three identical antennae were connected to the EUT at all times. Transmission during this test process simulated a typical installation. Results for the following configurations are provided in this report.

#### Legacy

AP-ANT-Int	AP-ANT-12(Direct)	AP-ANT-10
a 5180	a 5180	a 5180
a 5200	a 5200	a 5200
a 5240	a 5240	a 5240
BE a 5150	BE a 5150	BE a 5150
Pk a 5180	Pk a 5180	Pk a 5180
Pk a 5200	Pk a 5200	Pk a 5200
Pk a 5240	Pk a 5240	Pk a 5240

KEY;-

BE – Band-Edge

PK - Peak Emission

#### HT-20

AP-ANT-Int	AP-ANT-12(Direct)	AP-ANT-10
a 5180	a 5180	a 5180
a 5200	a 5200	a 5200
a 5240	a 5240	a 5240
BE a 5150	BE a 5150	BE a 5150
Pk a 5180	Pk a 5180	Pk a 5180
Pk a 5200	Pk a 5200	Pk a 5200
Pk a 5240	Pk a 5240	Pk a 5240

#### HT-40

AP-ANT-Int	AP-ANT-12(Direct)	AP-ANT-10
a 5190	a 5190	a 5190
a 5230	a 5230	a 5230
BE a 5150	BE a 5150	BE a 5150
Pk a 5190	Pk a 5190	Pk a 5190
Pk a 5230	Pk a 5230	Pk a 5230



**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
**Issue Date:** 23rd May 2008  
**Page:** 24 of 126

---

### **3.7. Equipment Modifications**

The following modifications were required to bring the equipment into compliance:

#### **EUT Software Power Settings - Radiated Testing**

1. Reduction in output power to meet band-edge requirements was required in certain circumstances. When testing radiated spurious emissions a matrix has been included identifying the power settings for this scenario. The matrix identifies whether the reduction in power was as a result of band-edge issues or spurious emissions.

### **3.8. Deviations from the Test Standard**

The following deviations from the test standard were required in order to complete the test program:

1. None

### **3.9. Subcontracted Testing or Third Party Data**

1. NONE

---

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#### 4. TEST SUMMARY

##### List of Measurements

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407** and **Industry Canada RSS-210** and **Industry Canada RSS-Gen**.

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.407(a) A9.2(2) 4.4	26dB and 99% Emission BW	Emission bandwidth measurement	Conducted (AP120 results)	Complies	5.1.1
15.407(a) A9.2(2) 4.6	Transmit Output Power	Power Measurement	Conducted (AP120 results)	Complies	5.1.2
15.407(a) A9.2(2)	Peak Power Spectral Density	PPSD	Conducted	Complies	5.1.3
15.407(a)(6)	Peak Excursion Ratio	<13dB in any 1MHz bandwidth	Conducted	Complies	5.1.4
15.407(g) 15.31 2.1 4.5	Frequency Stability	Limits: contained within band of operation at all times.	Manufacturer declaration	Complies	5.1.5
15.407(f) 5.5	Radio Frequency Radiation Exposure	Exposure to radio frequency energy levels, Maximum Permissible Exposure (MPE)	Conducted	Complies	5.1.6

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**List of Measurements (continued)**

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407** and **Industry Canada RSS-210** and **Industry Canada RSS-Gen**.

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.407(b)(2) 15.205(a) 15.209(a) 2.2 2.6 A9.3(2) 4.7	Radiated Emissions		Radiated		5.1.7
	Transmitter Radiated Spurious Emissions	Emissions above 1 GHz		Complies	5.1.7.1
	Radiated Band Edge	Band edge results		Complies	5.1.7.1
RSS-GEN 6	Receiver Radiated Spurious Emissions	Emissions above 1 GHz		Complies	5.1.7.2
15.407(b)(6) 15.205(a) 15.209(a) 2.2	Radiated Emissions	Emissions <1 GHz (30M-1 GHz)	(AP120 results)	Complies	5.1.7.3
15.407(b)(6) 15.207 7.2.2	AC Wireline Conducted Emissions 150 kHz–30 MHz	Conducted Emissions	Conducted	Complies	5.1.8

**Note 1:** Test results reported in this document relate only to the items tested

**Note 2:** The required tests demonstrated compliance as per client declaration of test configuration, monitoring methodology and associated pass/fail criteria

## 5. TEST RESULTS

### 5.1. Device Characteristics

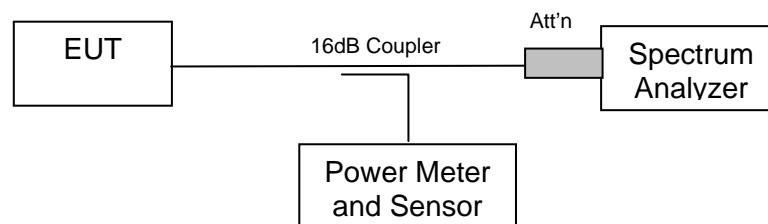
#### 5.1.1. 26 dB and 99 % Bandwidth

**FCC, Part 15 Subpart C §15.407(a)**  
**Industry Canada RSS-210 § A9.2(2)**  
**Industry Canada RSS-Gen 4.4**

#### Test Procedure

The bandwidth at 26 dB and 99 % is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

#### Test Measurement Set up



Measurement set up for 26 dB and 99 % bandwidth test

#### Radio Parameters

Duty Cycle: 100%

Output: Modulated Carrier

Power: Maximum Default Power



**Measurement Results for 26 dB and 99 % Operational Bandwidth(s)**

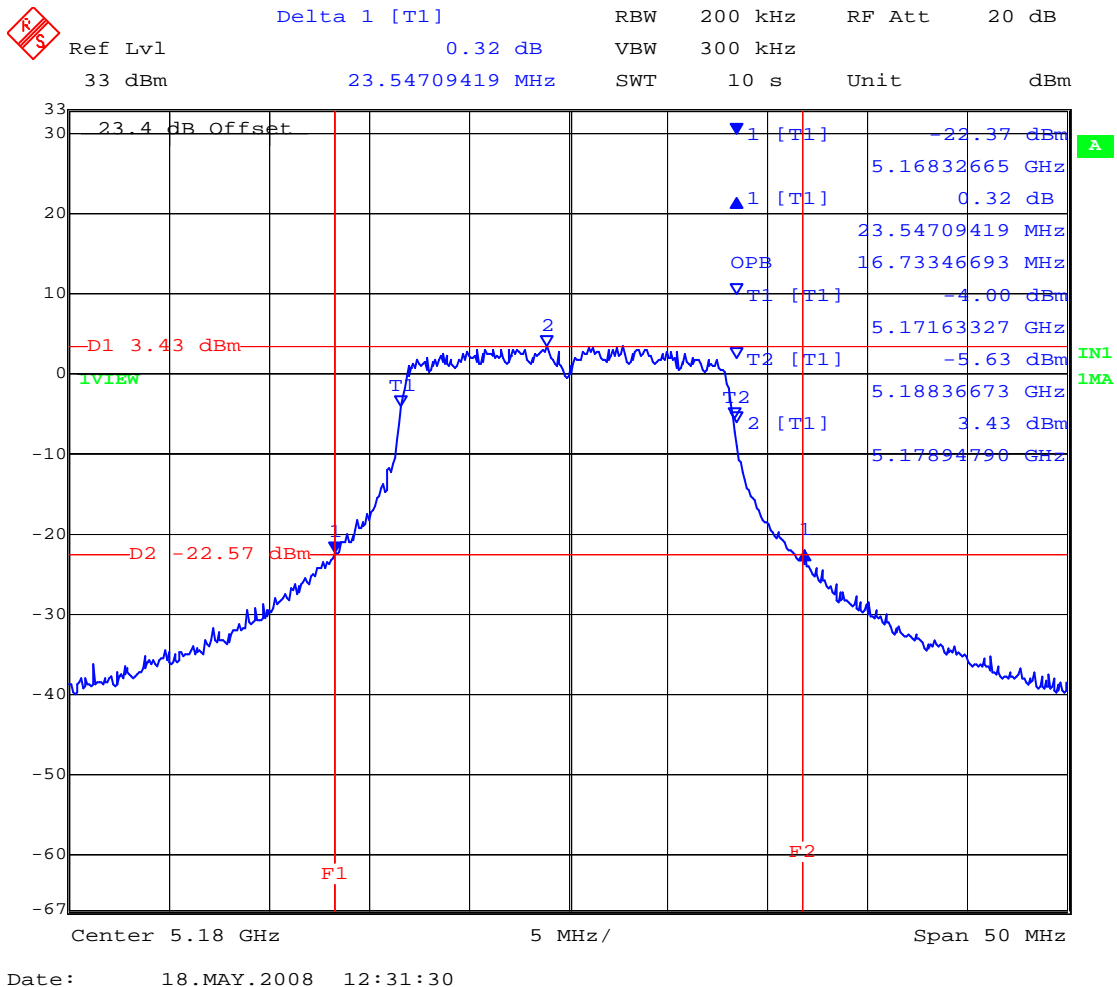
Ambient conditions.

Temperature: 17 to 23 °C    Relative humidity: 31 to 57 %    Pressure: 999 to 1012 mbar

**TABLE OF RESULTS – 802.11a Legacy**

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,180	23.547	16.733
5,200	22.545	16.633
5,240	23.246	16.733

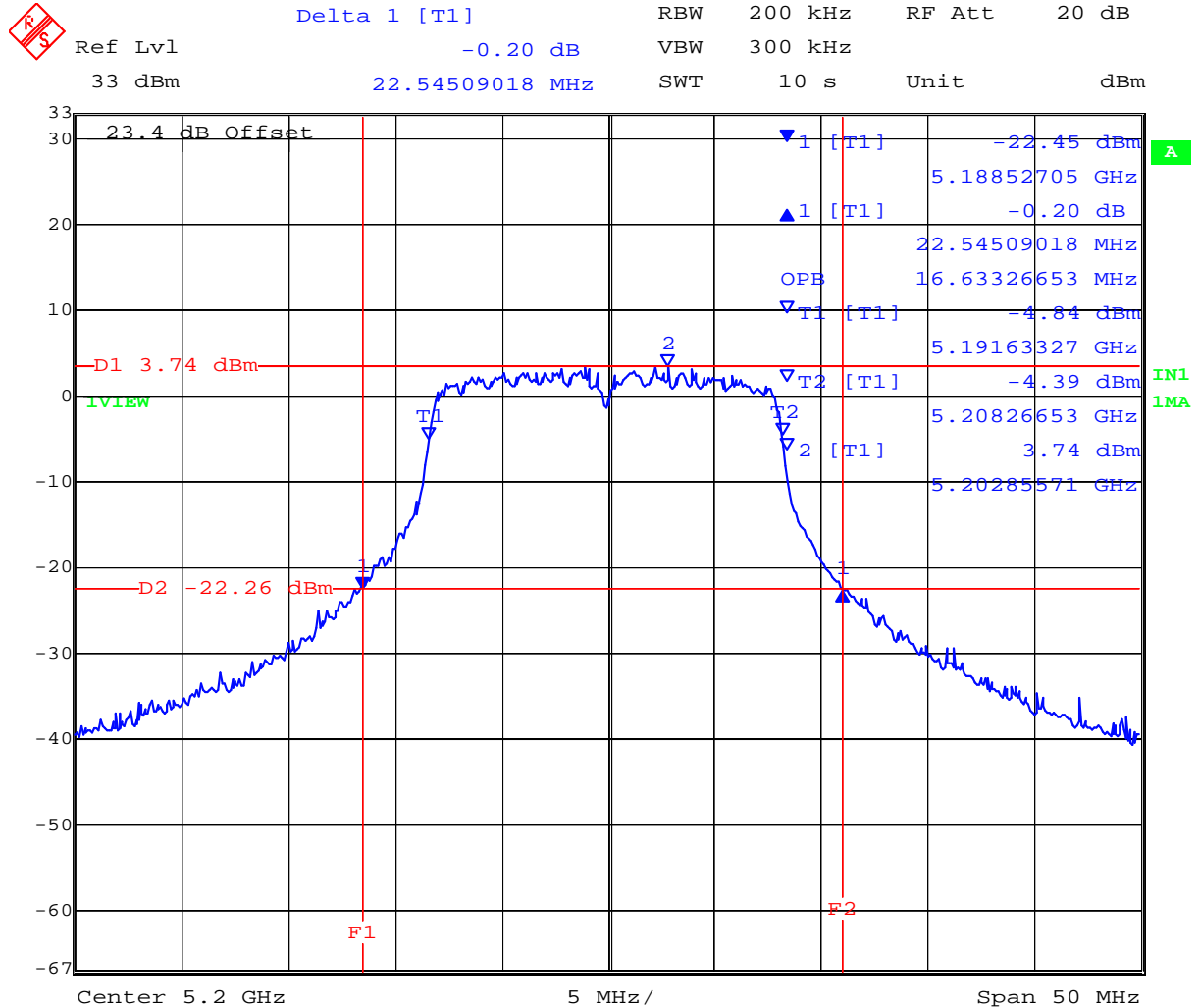
**5,180 MHz 802.11a Legacy 26 dB and 99 % Bandwidth**



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**5,200 MHz 802.11a Legacy 26 dB and 99 % Bandwidth**



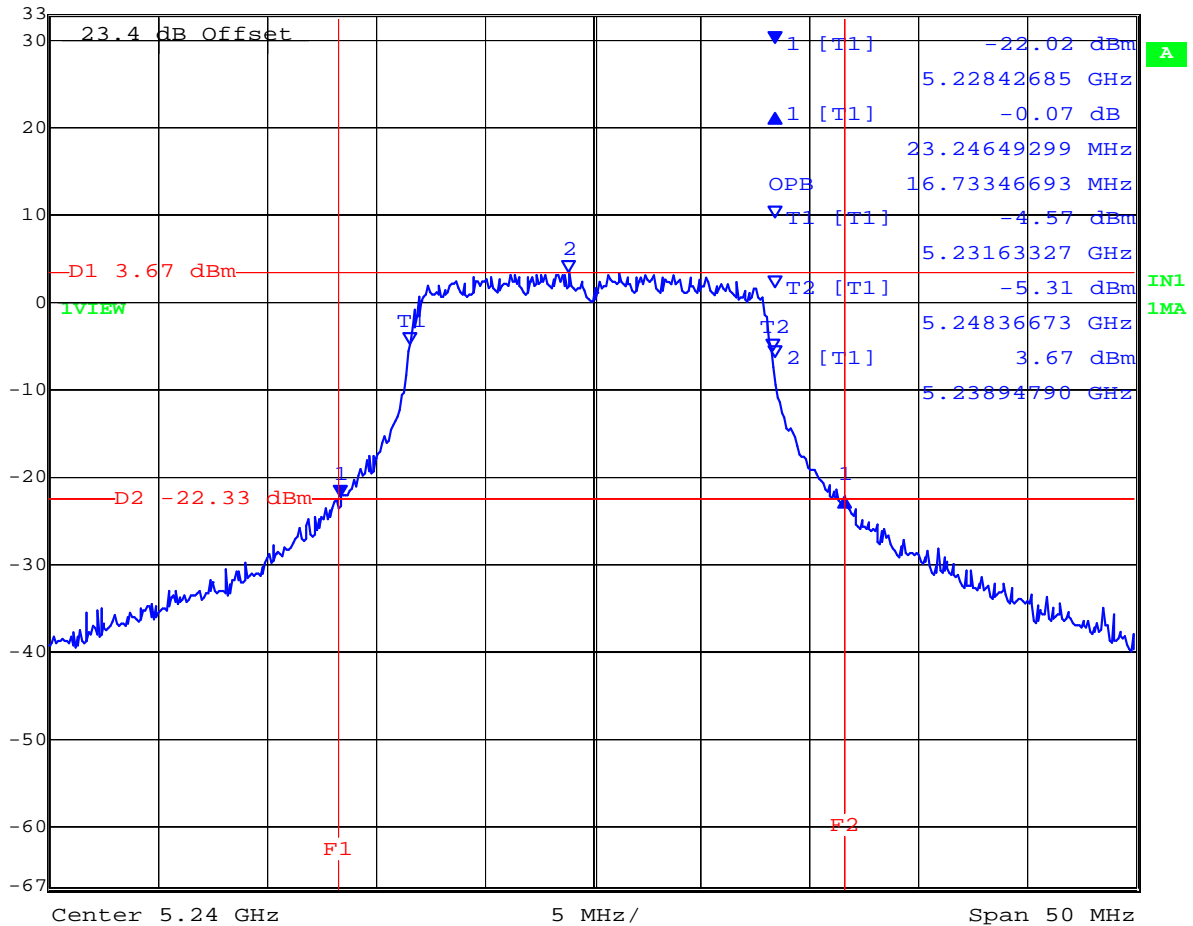
Date: 18.MAY.2008 12:35:08

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**5,240 MHz 802.11a Legacy 26 dB and 99 % Bandwidth**

Delta 1 [T1]      RBW 200 kHz    RF Att 20 dB  
 Ref Lvl -0.07 dB    VBW 300 kHz  
 33 dBm      23.24649299 MHz    SWT 10 s    Unit dBm



Date: 18.MAY.2008 12:37:59

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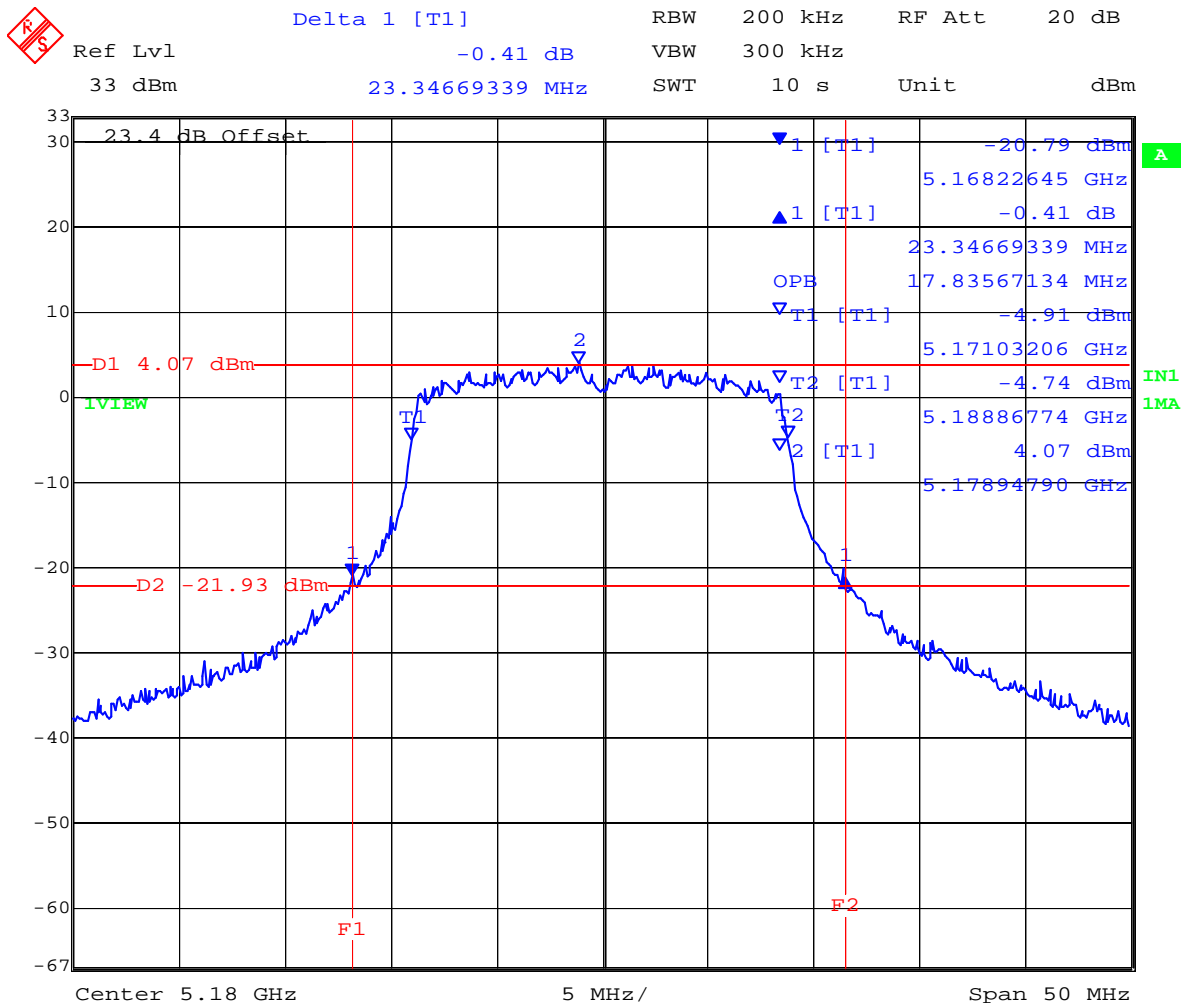


**Measurement Results for 26 dB and 99 % Operational Bandwidth(s) -Continued**

TABLE OF RESULTS – 802.11n HT20

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,180	23.347	17.836
5,200	23.547	17.836
5,240	23.948	17.836

**5,180 MHz 802.11n HT20 26 dB and 99 % Bandwidth**

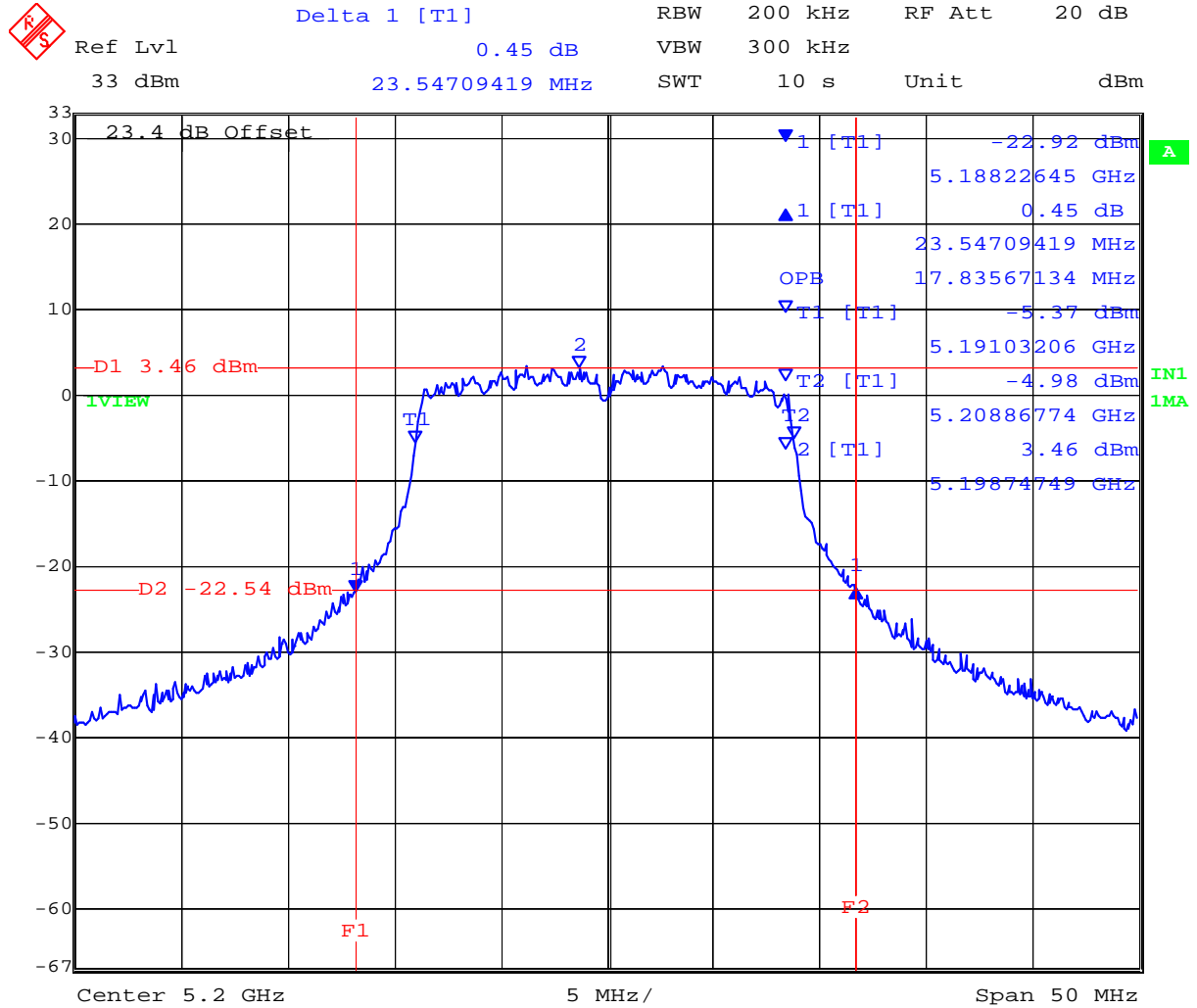


Date: 18.MAY.2008 12:56:40

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**5,200 MHz 802.11n HT20 26 dB and 99 % Bandwidth**



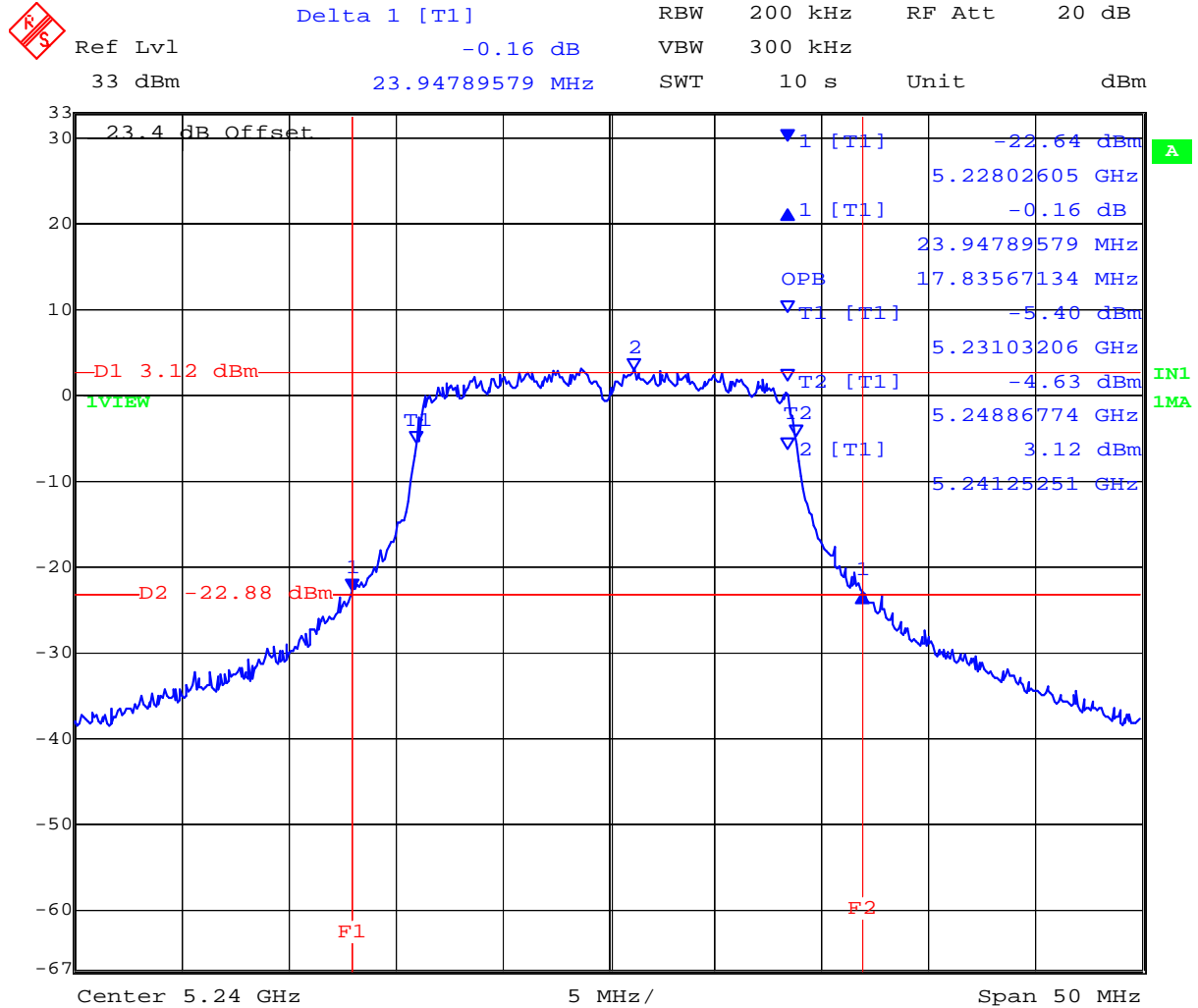
Date: 18.MAY.2008 12:59:04

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**5,240 MHz 802.11n HT20 26 dB and 99 % Bandwidth**



Date: 18.MAY.2008 13:03:35

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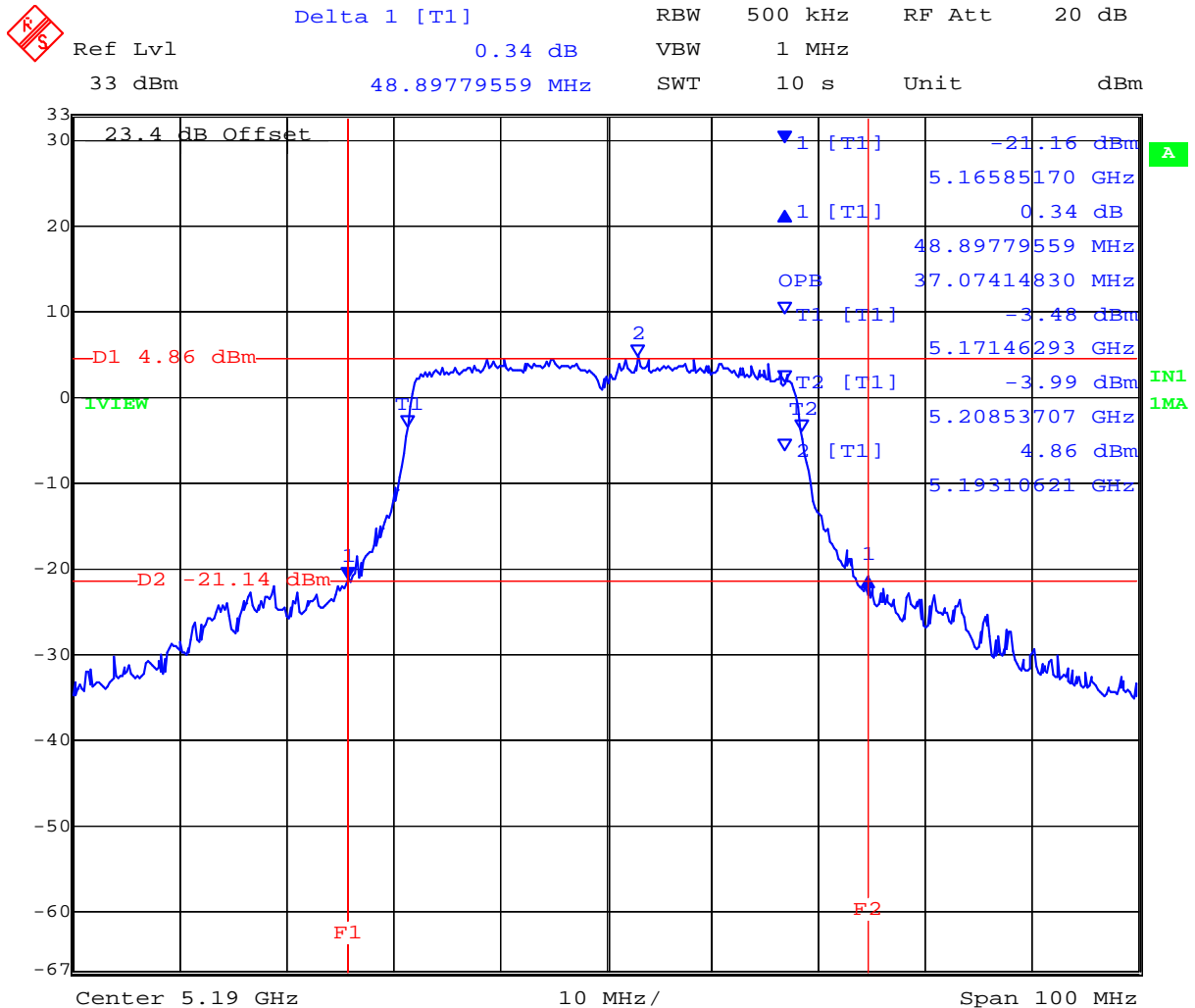


**Measurement Results for 26 dB and 99 % Operational Bandwidth(s) -Continued**

TABLE OF RESULTS – 802.11n HT40

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,190	48.898	37.074
5,230	48.898	37.074

**5,190 MHz 802.11n HT40 26 dB and 99 % Bandwidth**

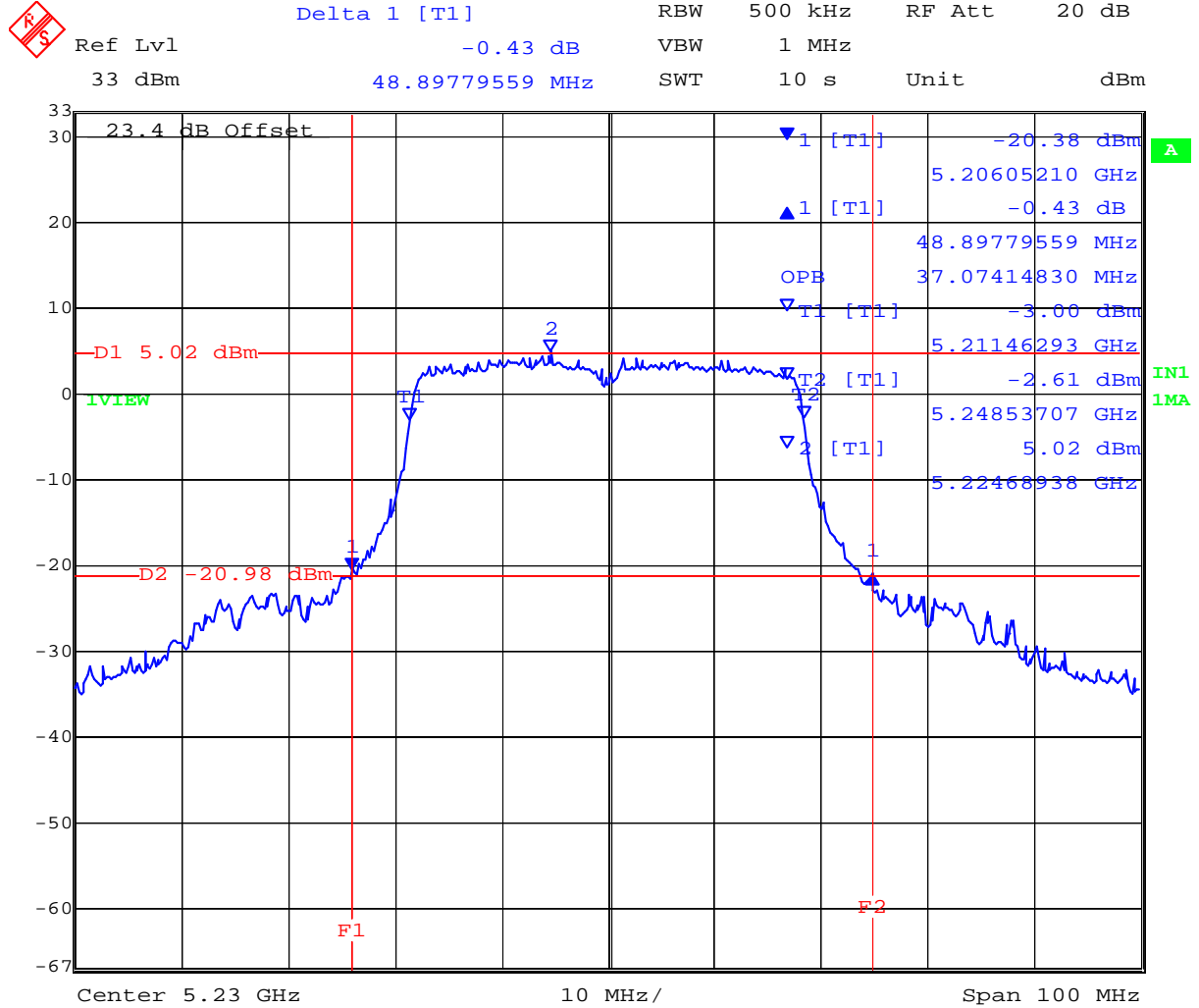


Date: 18.MAY.2008 13:24:38

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**5,230 MHz 802.11n HT40 26 dB and 99 % Bandwidth**



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## Specification

### Limits

#### FCC, Part 15 §15.407 (a)(1), (a)(2) and Industry Canada RSS-210 § A9.2(2)

**(a)(1)** For the band 5.15-5.25 GHz the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or +4 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

**(a)(2)** For the 5.25-5.35 GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or +11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

#### Industry Canada RSS-Gen 4.4

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

## Laboratory Measurement Uncertainty for Spectrum Measurement

Measurement uncertainty	±2.81 dB
-------------------------	----------

## Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

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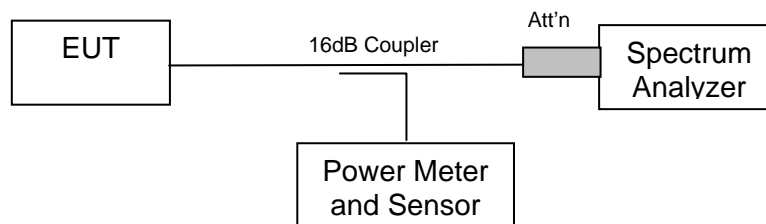
### 5.1.2. Transmit Output Power

**FCC, Part 15 Subpart C §15.407(a)**  
**Industry Canada RSS-210 §9.9(2)**  
**Industry Canada RSS-Gen 4.6**

#### Test Procedure

The transmitter terminal of EUT was connected to the input of an average power meter. Measurements were made while EUT was operating in a continuous transmission mode i.e. 100 % duty cycle at the appropriate center frequency. All cable losses and offsets were taken into consideration in the measured result.

#### Test Measurement Set up



Measurement set up for Transmitter Output Power



### Antenna Gain - Maximum Permissible Peak Transmit Power

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Type	Freq Band (MHz)	Gain (dBi)	Antenna Gain >6dBi (dB)	Max. Allowable Peak Power (dBm)	Max. EIRP (dBm)
ANT-12 Panel	5150-5250	14	8	$17 - 8 = 9$	23.0

### Maximum Transmit Power, FCC Limits

Limit 5150 – 5250 MHz: Lesser of 50 mW (+17dBm) or  $4 + 10 \text{ Log (B)}$  dBm

Frequency Range (MHz)	Maximum 26 dB Bandwidth (MHz)	$4 + 10 \text{ Log (B)}$ (dBm)	Limit (dBm)
5150 – 5250	69.539	22.42	17.00

### Maximum Transmit Power Industry Canada Limits

Limit 5150 – 5250 MHz: Lesser of 200 mW (+23 dBm) or  $10 + 10 \text{ Log (B)}$  dBm

Frequency Range (MHz)	Maximum 99% Bandwidth (MHz)	$10 + 10 \text{ Log (B)}$ (dBm)	Limit (dBm)
5150 – 5250	38.877	25.90	23.00



**Measurement Results for Transmit Output Power**

Ambient conditions.

Temperature: 17 to 23 °C      Relative humidity: 31 to 57 %      Pressure: 999 to 1012 mbar

EUT parameters.

Power Level: Maximum

Duty Cycle: 100%

**TABLE OF RESULTS – 802.11a Legacy**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,180	+14.58
5,200	+14.30
5,240	+14.32

**TABLE OF RESULTS – 802.11n HT20**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,180	+14.67
5,200	+14.30
5,240	+14.41

**TABLE OF RESULTS – 802.11n HT40**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,190	+14.69
5,230	+14.58

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**Specification**

**Limits**

**FCC, Part 15 §15.407 (a)(1), (a)(2) and Industry Canada RSS-210 § A9.2(2)**

**(a)(1)** For the band 5.15-5.25 GHz the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or  $+4 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

**(a)(2)** For the 5.25-5.35 GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $+11 \text{ dBm} + 10 \log B$ , where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

**Industry Canada RSS-210 §A9.2(2)**

For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200 mW or  $10 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

For the band 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250 mW or  $11 + 10 \log_{10} B$ , dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or  $17 + 10 \log_{10} B$ , dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

**Industry Canada RSS-Gen 4.4**

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

**Laboratory Measurement Uncertainty for Power Measurements**

Measurement uncertainty	$\pm 1.33 \text{ dB}$
-------------------------	-----------------------

**Traceability**

Method	Test Equipment Used
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

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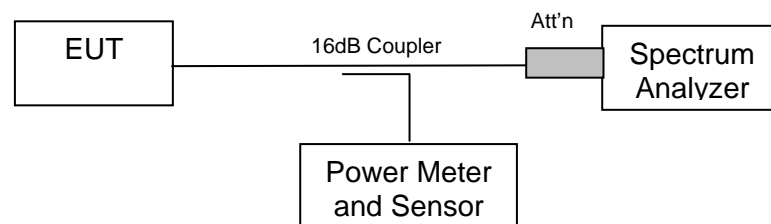
### 5.1.3. Peak Power Spectral Density

**FCC, Part 15 Subpart C §15.407(a)**  
**Industry Canada RSS-210 § A9.2(2)**

#### **Test Procedure**

The transmitter output was connected to a spectrum analyzer and the peak power spectral density measured. Method 2 Sample Detection and power averaging, specified in FCC document DA 02-2138 (Normative Reference (ix) Section 2.1 “Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices”) was used to determine the peak power spectral density of the emission. The Peak Power Spectral Density is the highest level found across the emission in a 1 MHz resolution bandwidth.

#### **Test Measurement Set up**



Measurement set up for Peak Power Spectral Density

#### **Measurement Results for Peak Power Spectral Density**

Ambient conditions.

Temperature: 17 to 23 °C      Relative humidity: 31 to 57 %      Pressure: 999 to 1012 mbar

Radio Parameters

Duty Cycle: 100%

Output: Modulated Carrier

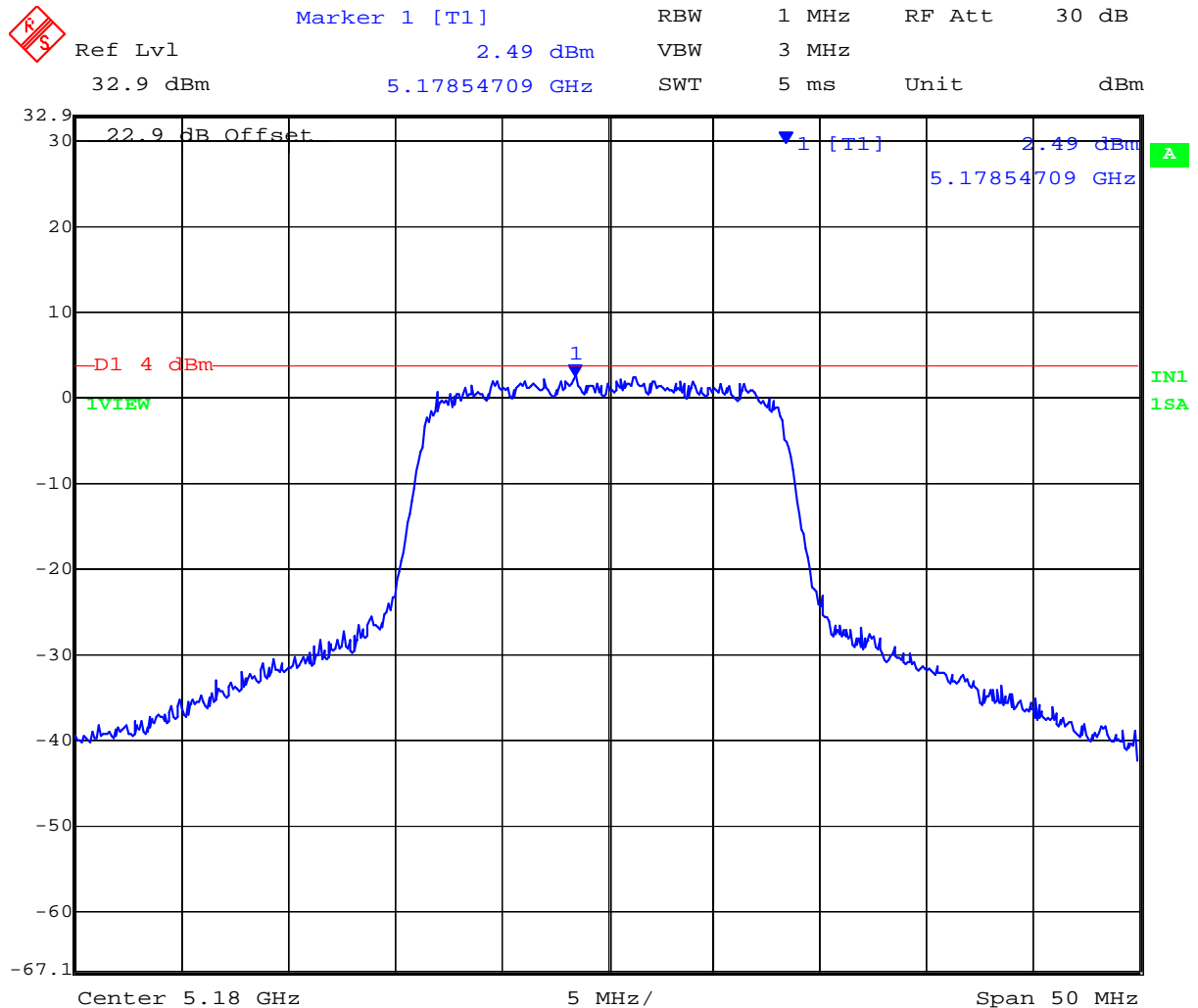
Power: Maximum Default Power



**TABLE OF RESULTS – 802.11a Legacy**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,180	5178.54709	+2.49
5,200	5198.64729	+2.11
5,240	5237.34469	+2.21

**5,180 MHz 802.11a Legacy Peak Power Spectral Density**

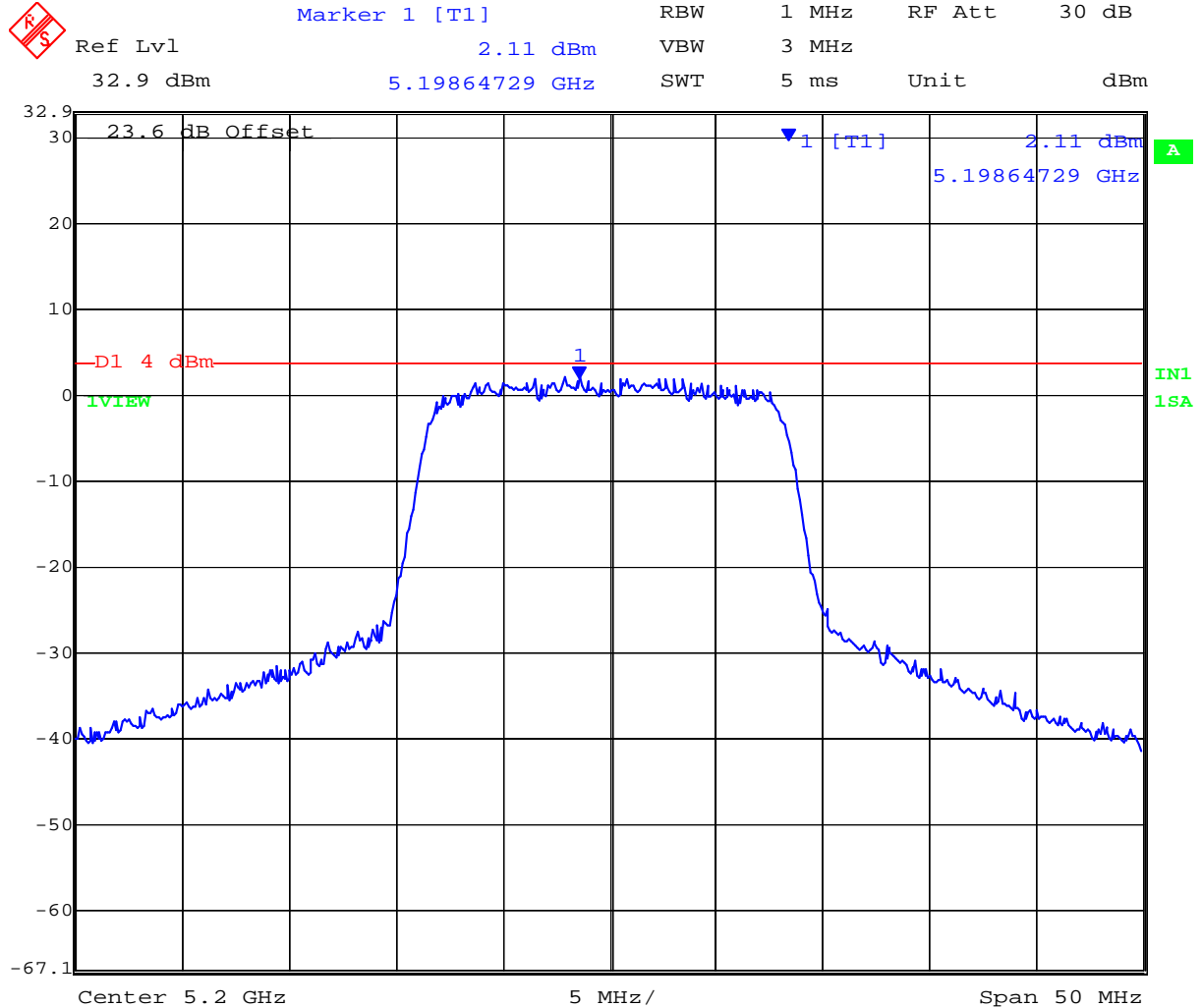


Date: 10.NOV.2007 13:10:14

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### 5,200 MHz 802.11a Legacy Peak Power Spectral Density

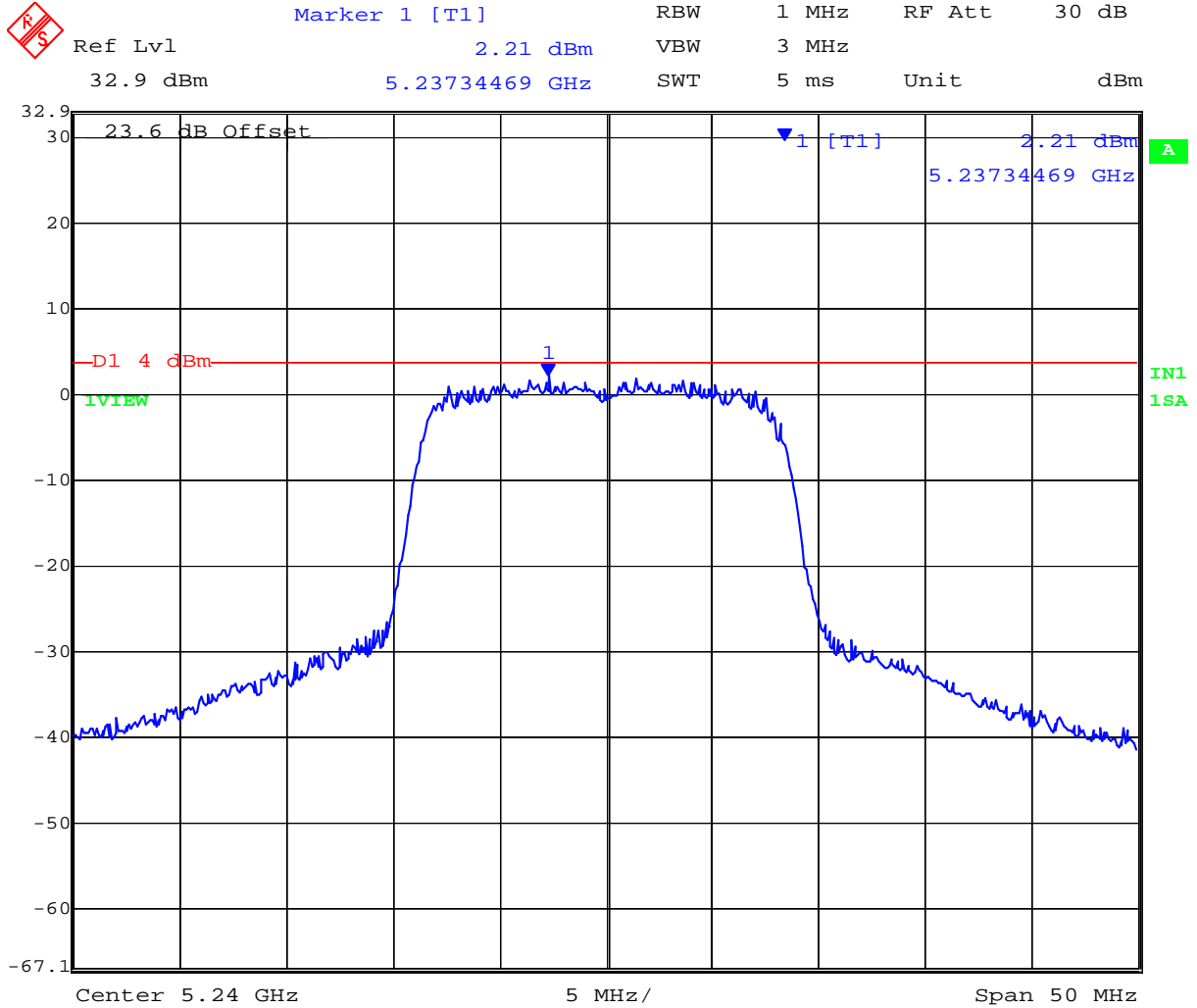


Date: 5.DEC.2007 19:36:38

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### 5,240 MHz 802.11a Legacy Peak Power Spectral Density



Date: 5.DEC.2007 19:35:31

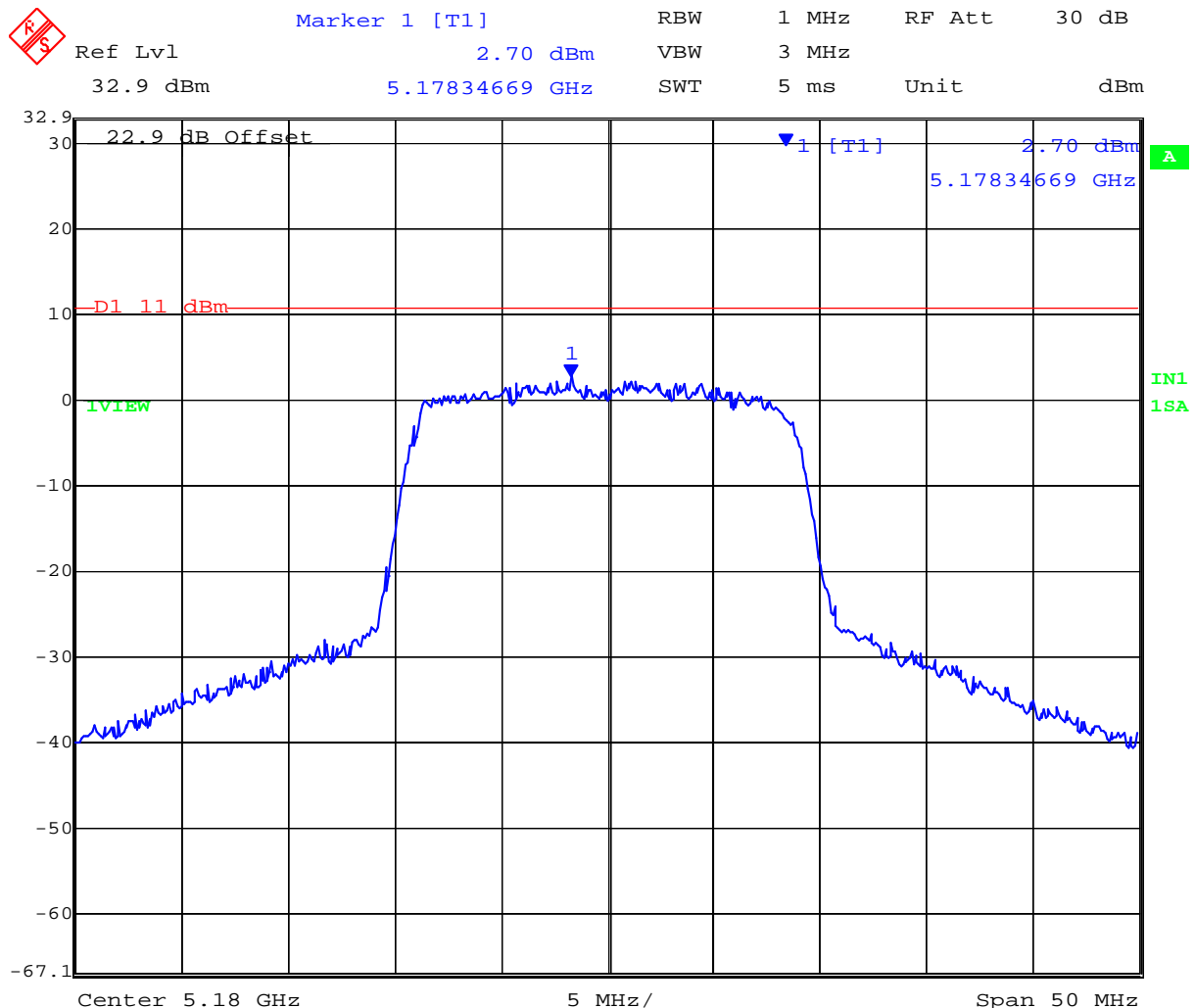
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**TABLE OF RESULTS – 802.11n HT20**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,180	5178.34669	+2.70
5,200	5197.34469	+2.11
5,240	5241.45291	+1.59

**5,180 MHz 802.11n HT20 Peak Power Spectral Density**



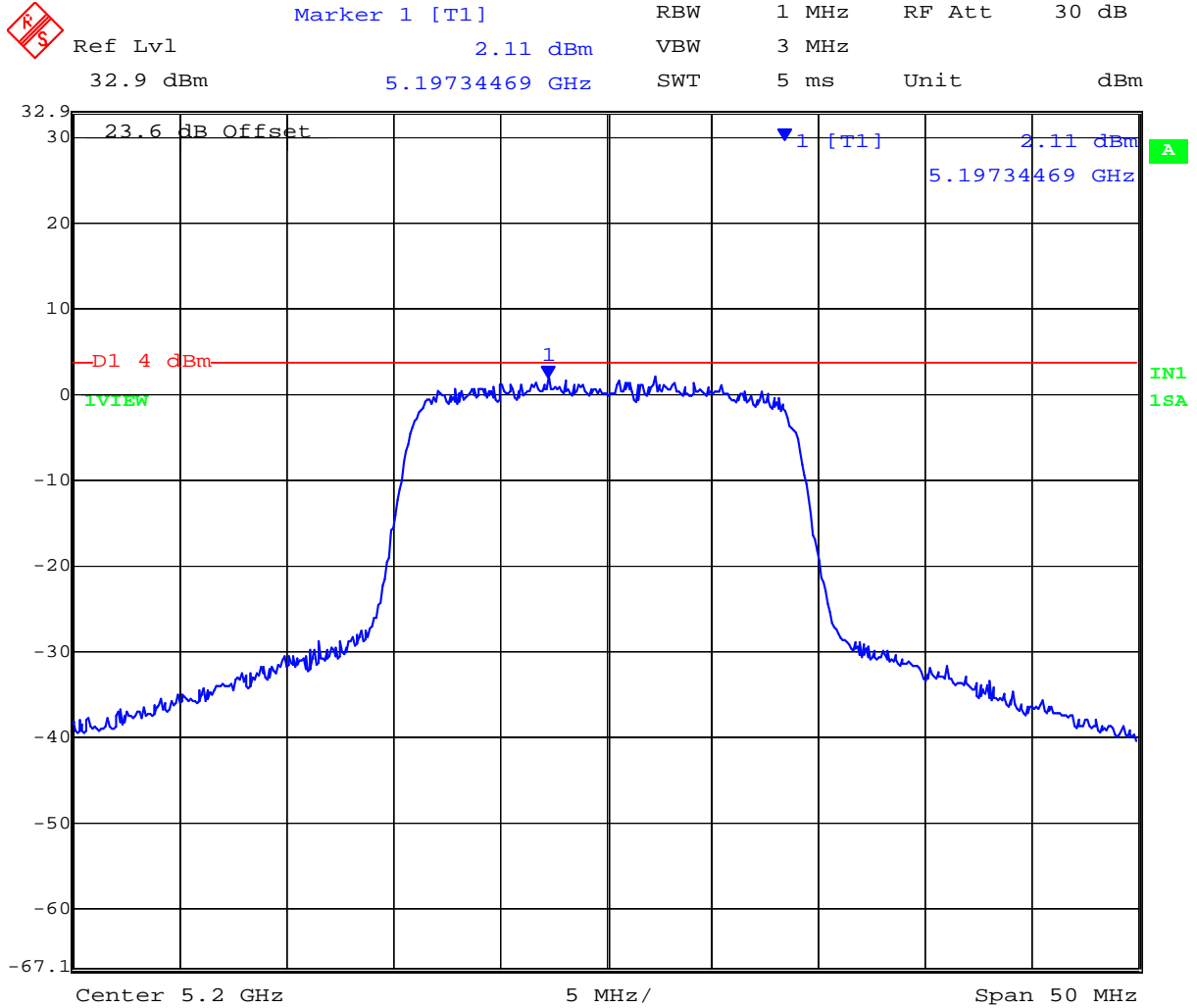
Date: 10.NOV.2007 13:41:27

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Title: Aruba AP120,121 802.11a/b/g/n AP  
To: FCC 47 CFR Part 15.407 & IC RSS-210  
Serial #: ARUB23-A4 Rev A  
Issue Date: 23rd May 2008  
Page: 46 of 126

### 5,200 MHz 802.11n HT20 Peak Power Spectral Density

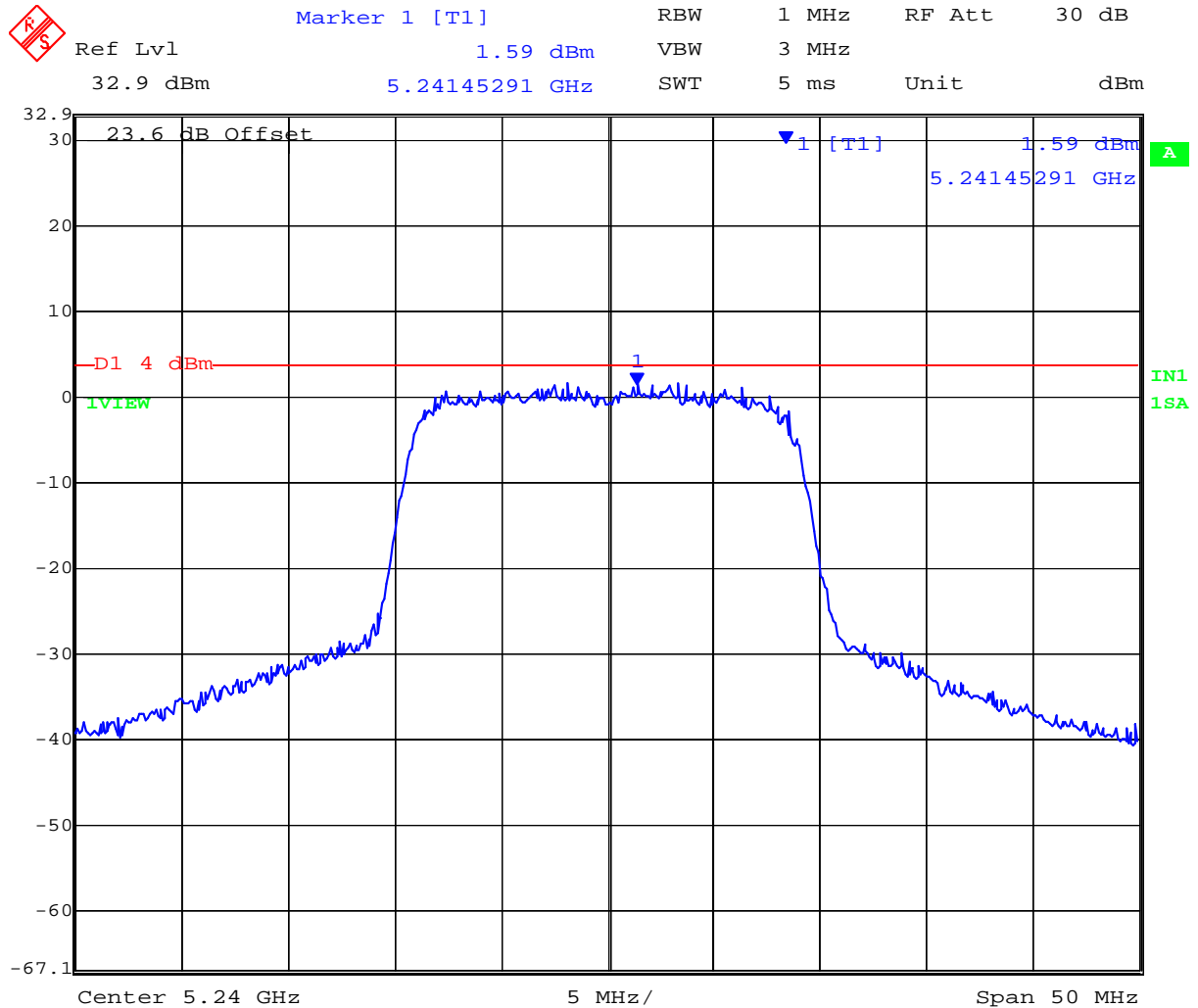


Date: 5.DEC.2007 19:33:50

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### 5,240 MHz 802.11n HT20 Peak Power Spectral Density



Date: 5.DEC.2007 19:34:46

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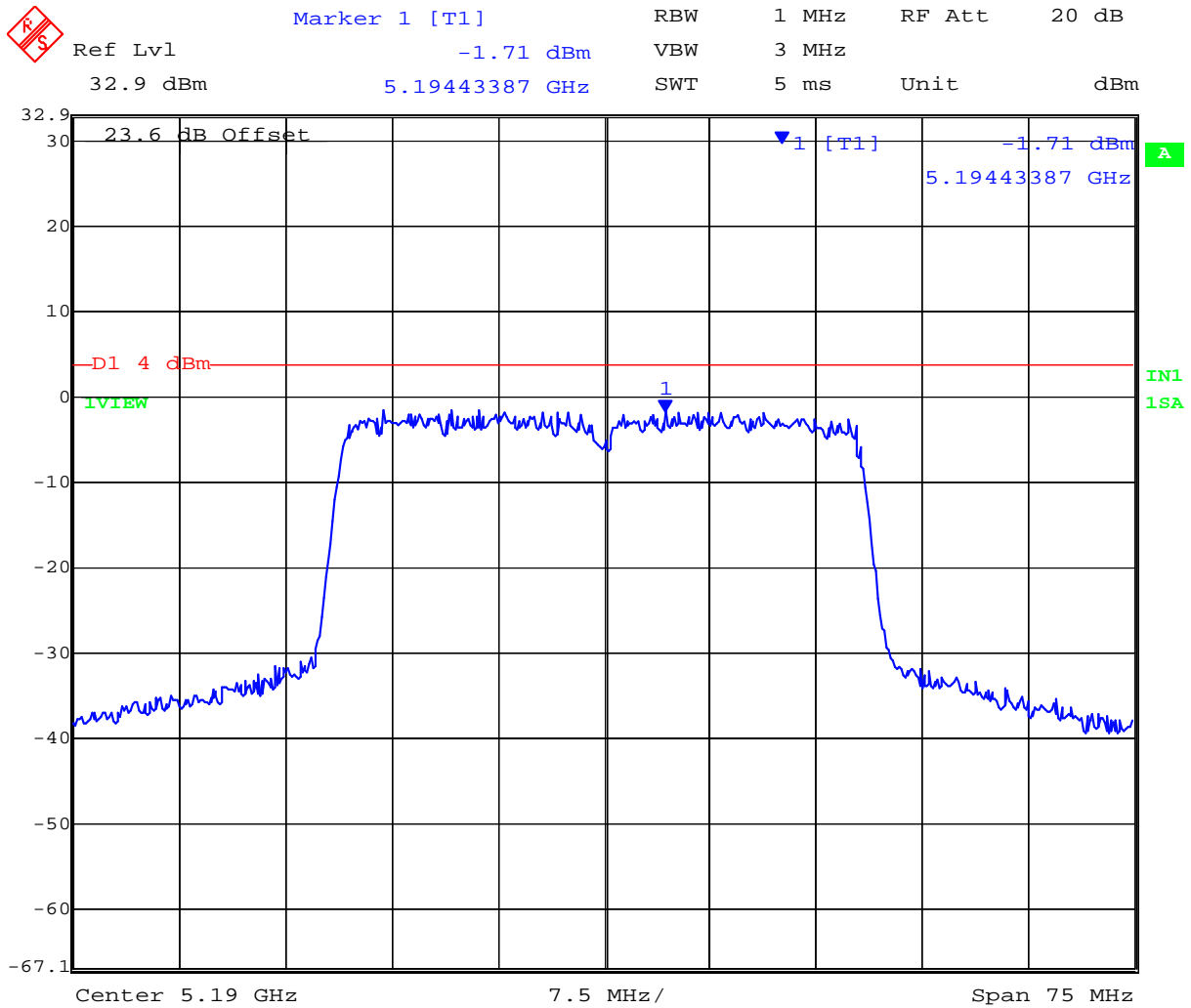


**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
**Issue Date:** 23rd May 2008  
**Page:** 48 of 126

TABLE OF RESULTS – 802.11n HT40

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,190	5194.43387	-1.71
5,230	5223.61222	-1.59

5,190 MHz 802.11n HT40 Peak Power Spectral Density



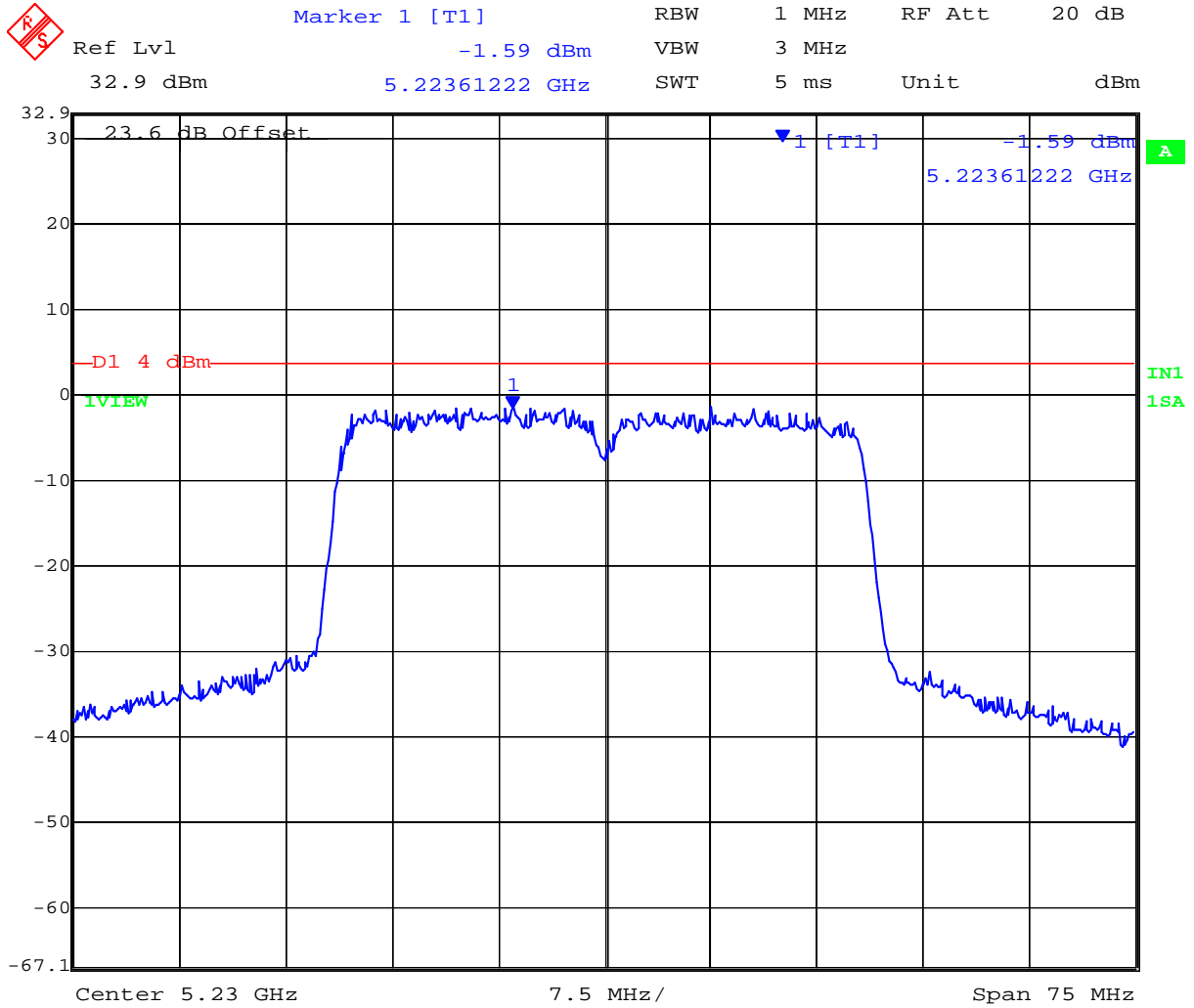
Date: 5.DEC.2007 20:35:12

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### 5,230 MHz 802.11n HT40 Peak Power Spectral Density



Date: 5.DEC.2007 20:34:24

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## Specification

### **FCC, Part 15 §15.407 (a)(1), (a)(2)**

**(a)(1)** The peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

**(a)(2)** The peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

### **Industry Canada RSS-210 § A9.2(1), A9.2(2)**

§ **A9.2(1)** The eirp spectral density shall not exceed +10 dBm in any 1 MHz band

§ **A9.2(2)** The power spectral density shall not exceed +11 dBm in any 1 MHz band

## Laboratory Measurement Uncertainty for Spectral Density

Measurement uncertainty	±1.33 dB
-------------------------	----------

## Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

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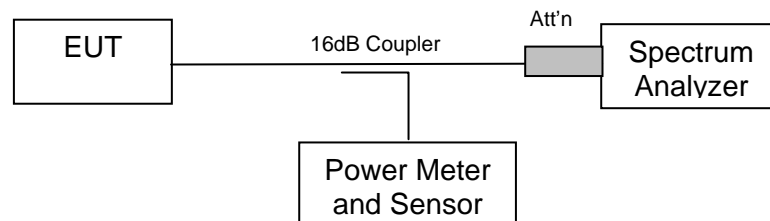
#### 5.1.4. Peak Excursion Ratio

#### FCC, Part 15 Subpart C §15.407(a)(6)

##### Test Procedure

Normative Reference (xi) Section 2.1 Measurement Procedure DA 02-2138 “Measurement Procedure Updated for Peak Transmit Power in the UNII Bands” was implemented to determine the Peak Excursion Ratio. This is a conducted measurement using a spectrum analyzer. The Peak Excursion Ratio is the difference in amplitude (dB) between the two traces.

##### Test Measurement Set up



Measurement set up for Peak Excursion Ratio

##### Measurement Results for Peak Excursion Ratio

Ambient conditions.

Temperature: 17 to 23 °C Relative humidity: 31 to 57% Pressure: 999 to 1012 mbar

Radio Parameters

Duty Cycle: 100%

Output: Modulated Carrier

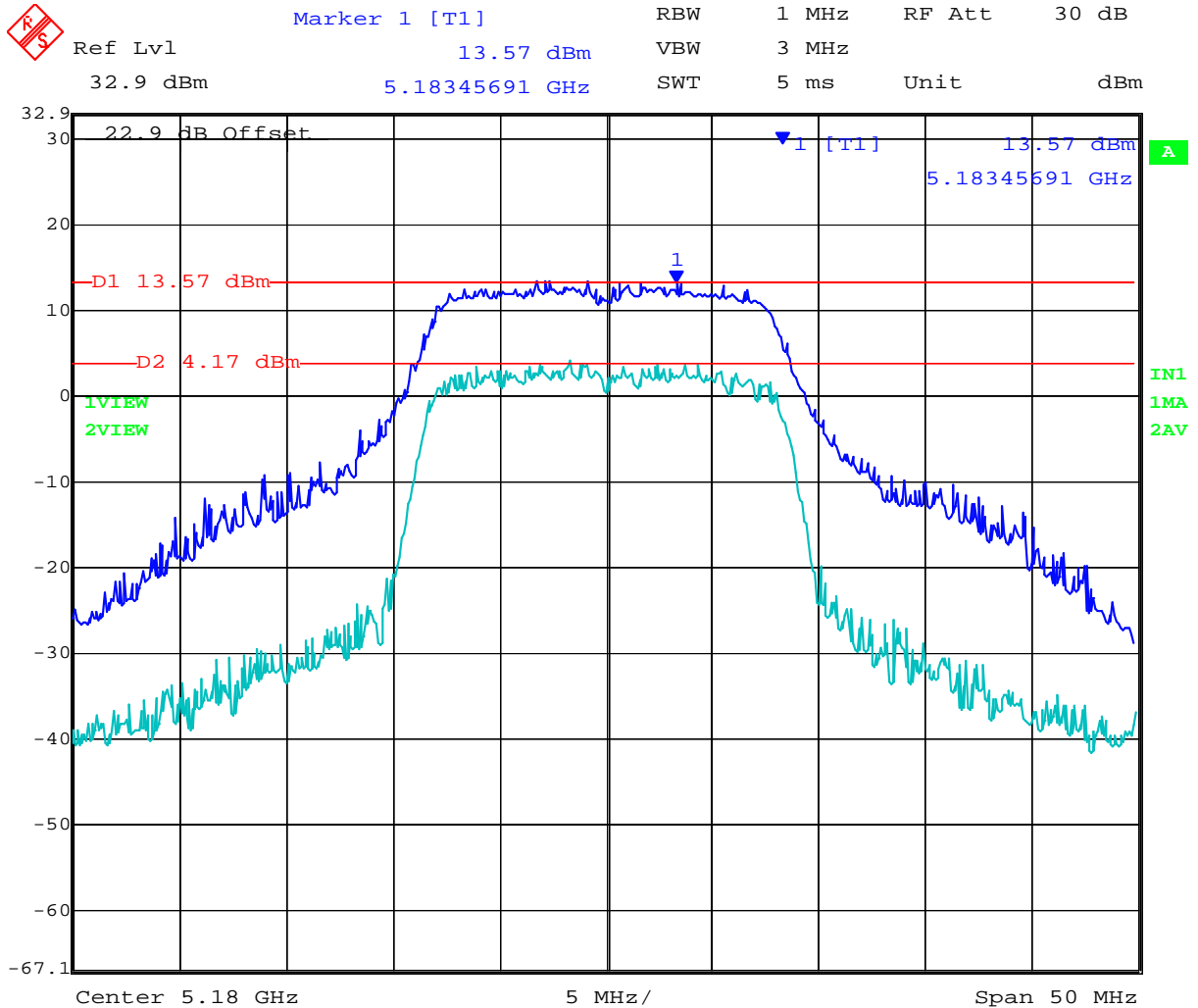
Power: Maximum Default Power



**TABLE OF RESULTS – 802.11a Legacy**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,180	9.40
5,200	10.97
5,240	10.80

**5,180 MHz 802.11a Legacy - Peak Excursion Ratio**



Date: 10.NOV.2007 13:27:41

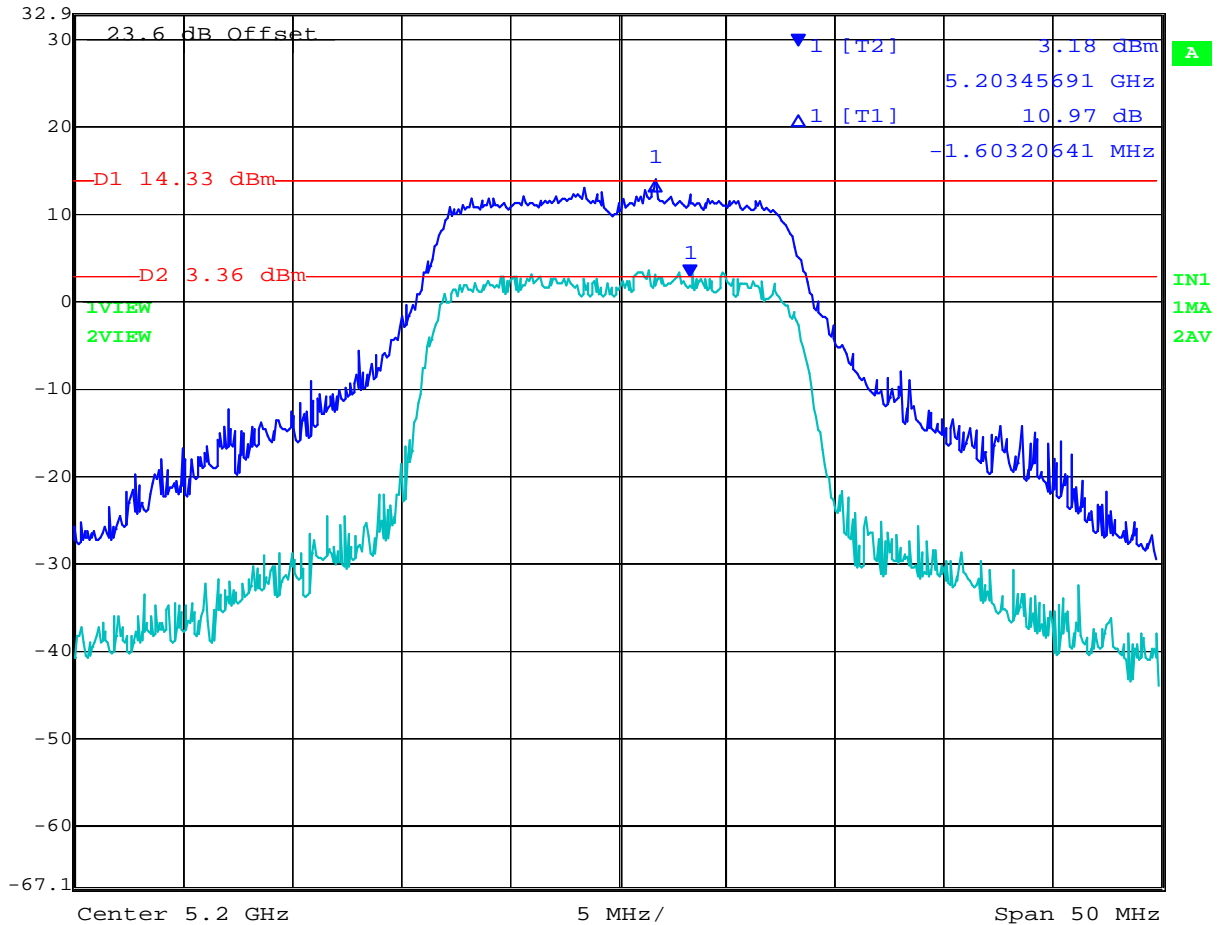
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### 5,200 MHz 802.11a Legacy - Peak Excursion Ratio



Ref Lvl	32.9 dBm	Marker 1 [T2]	3.18 dBm	RBW	1 MHz	RF Att	30 dB
			5.20345691 GHz	VBW	3 MHz	Unit	dBm
				SWT	5 ms		



Date: 5.DEC.2007 19:46:22

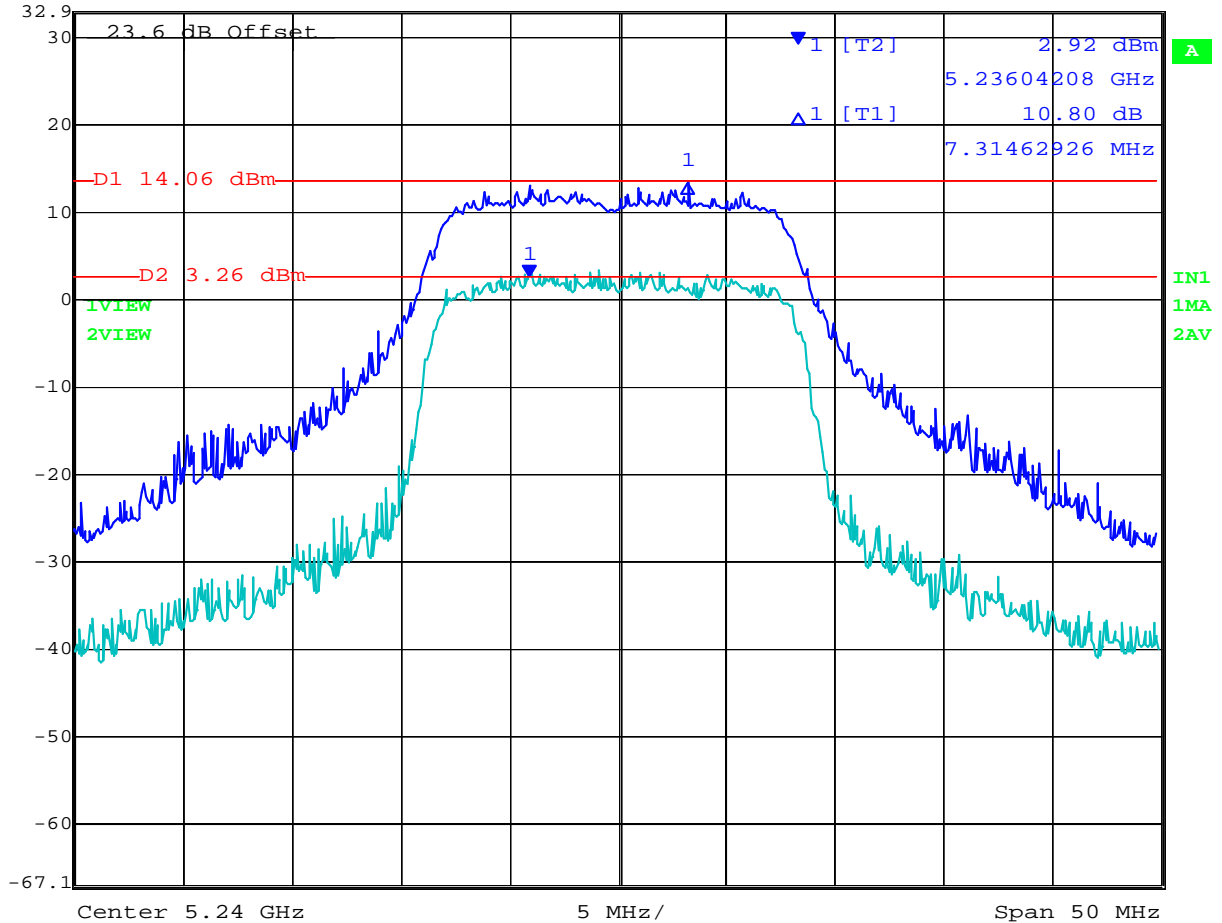
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### 5,240 MHz 802.11a Legacy - Peak Excursion Ratio



Ref Lvl	Marker 1 [T2]	RBW	1 MHz	RF Att	30 dB
32.9 dBm	2.92 dBm	VBW	3 MHz		
	5.23604208 GHz	SWT	5 ms	Unit	dBm



Date: 5.DEC.2007 19:49:09

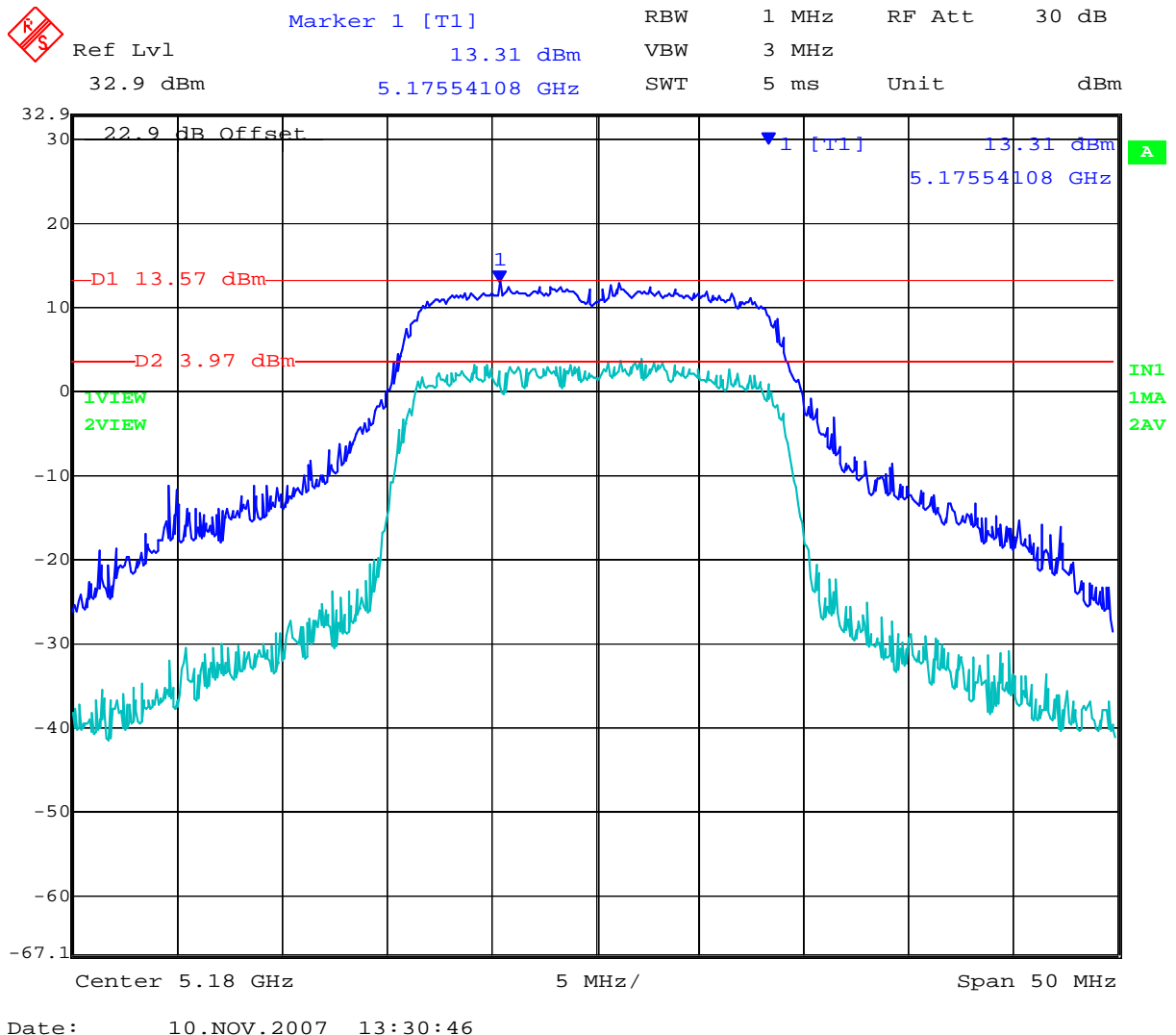
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**TABLE OF RESULTS – 802.11n HT20**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,180	9.60
5,200	9.36
5,240	8.29

**5,180 MHz 802.11n HT20 - Peak Excursion Ratio**



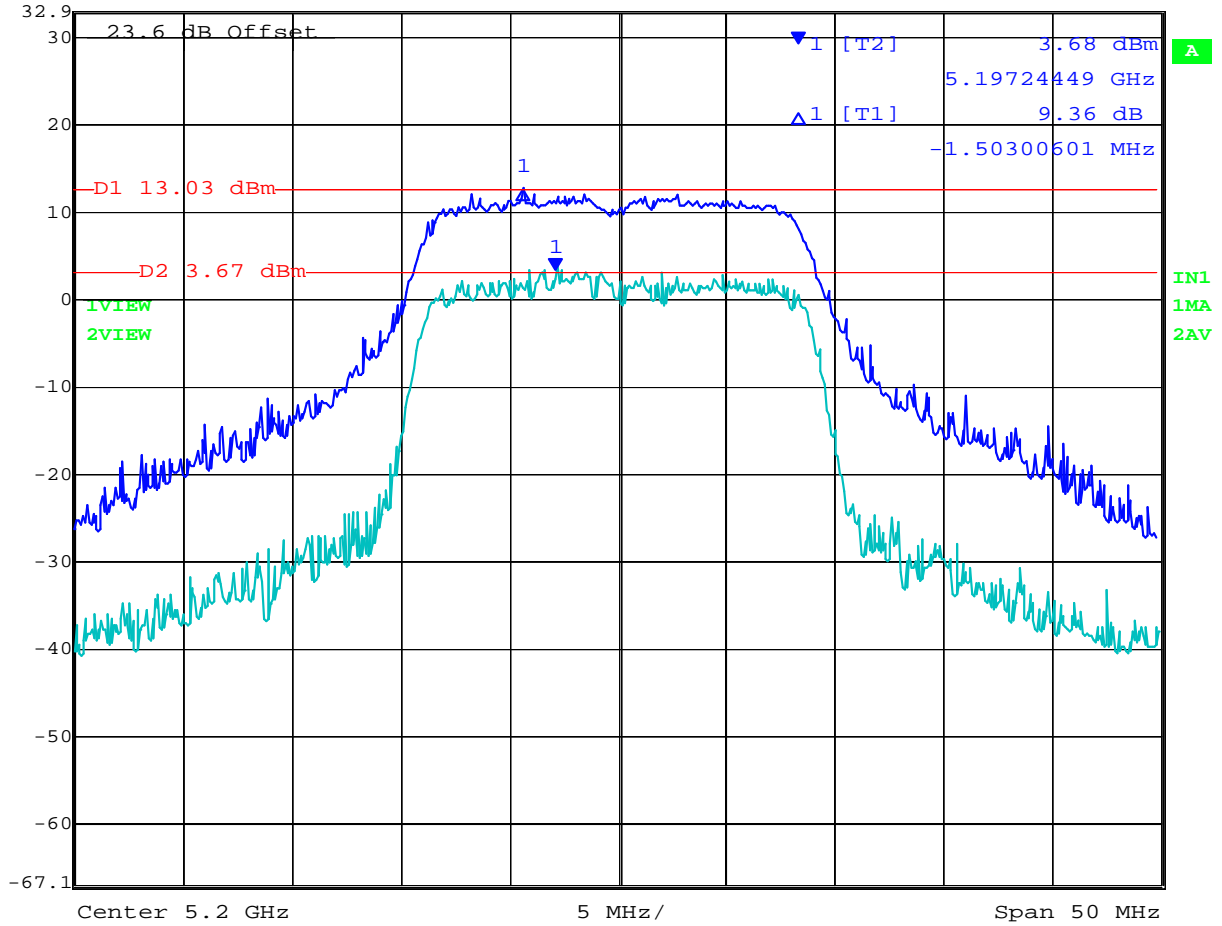
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**5,200 MHz 802.11n HT20 - Peak Excursion Ratio**



Ref Lvl	32.9 dBm	Marker 1 [T2]	3.68 dBm	RBW	1 MHz	RF Att	30 dB
			5.19724449 GHz	VBW	3 MHz	Unit	dBm
				SWT	5 ms		



Date: 5.DEC.2007 19:43:40

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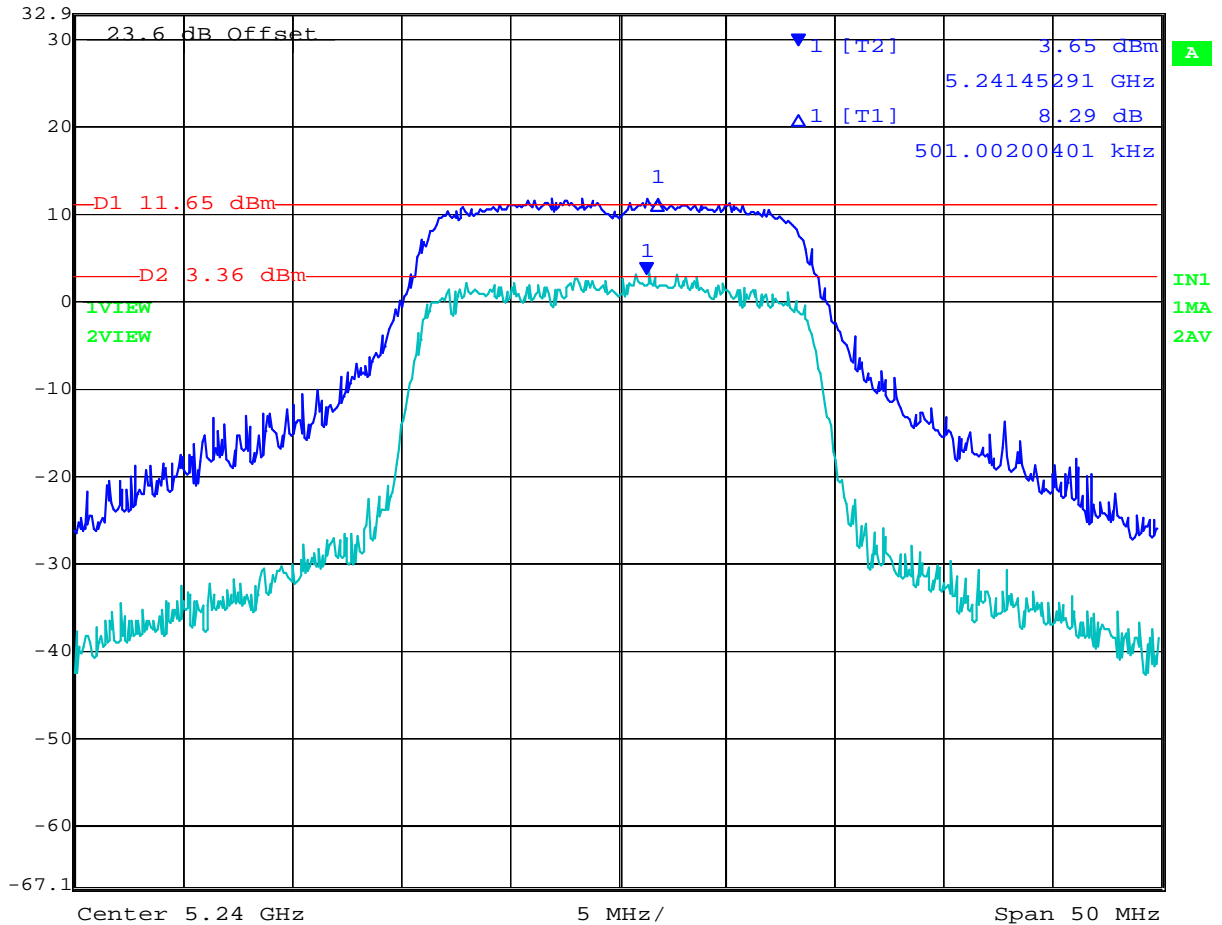




### 5,240 MHz 802.11n HT20 - Peak Excursion Ratio



Ref Lvl 32.9 dBm  
Marker 1 [T2] 3.65 dBm  
5.24145291 GHz  
RBW 1 MHz RF Att 30 dB  
VBW 3 MHz  
SWT 5 ms Unit dBm



Date: 5.DEC.2007 19:51:38

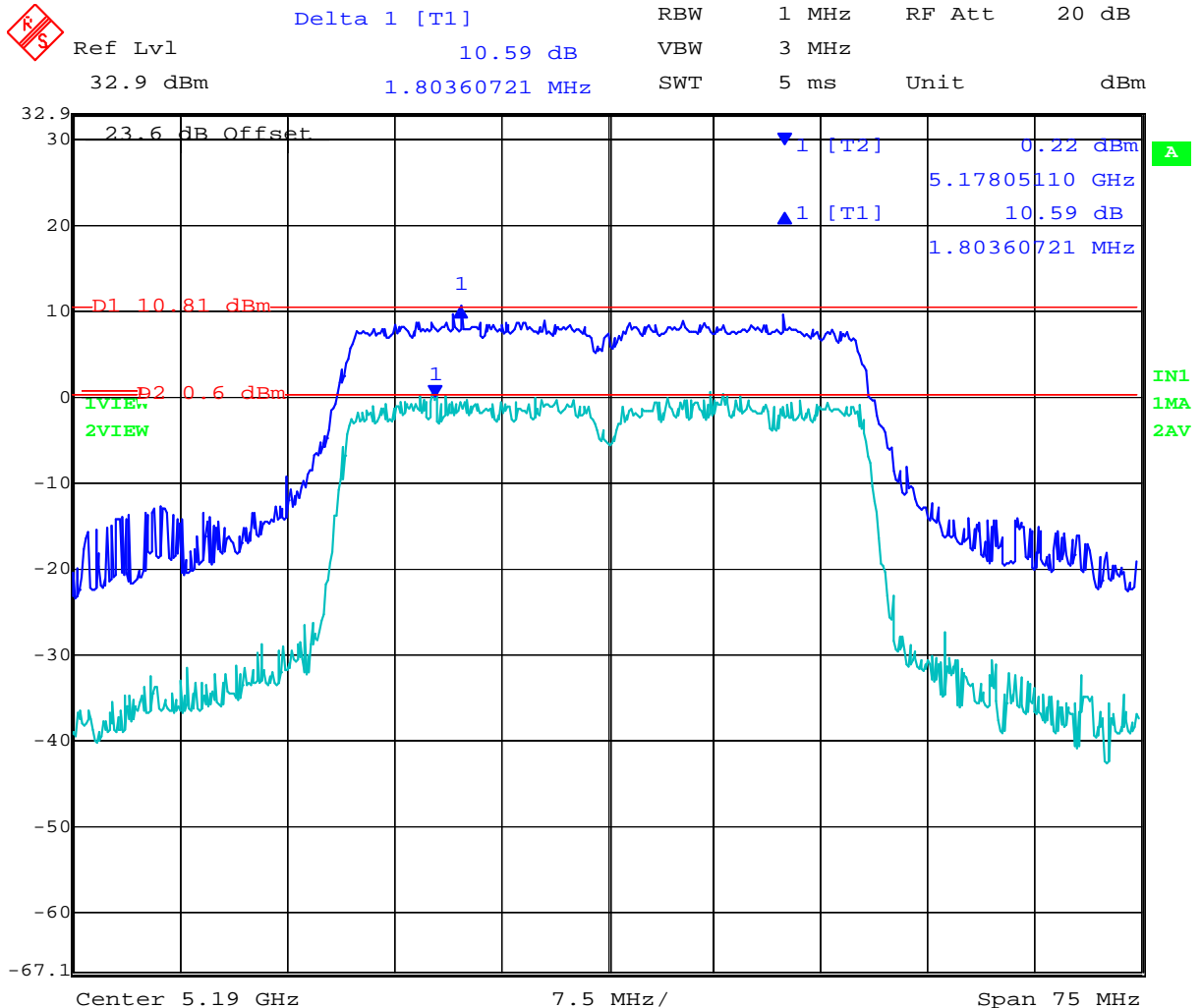
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**TABLE OF RESULTS – 802.11n HT40**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,190	10.59
5,230	9.28

**5,190 MHz 802.11n HT40 - Peak Excursion Ratio**

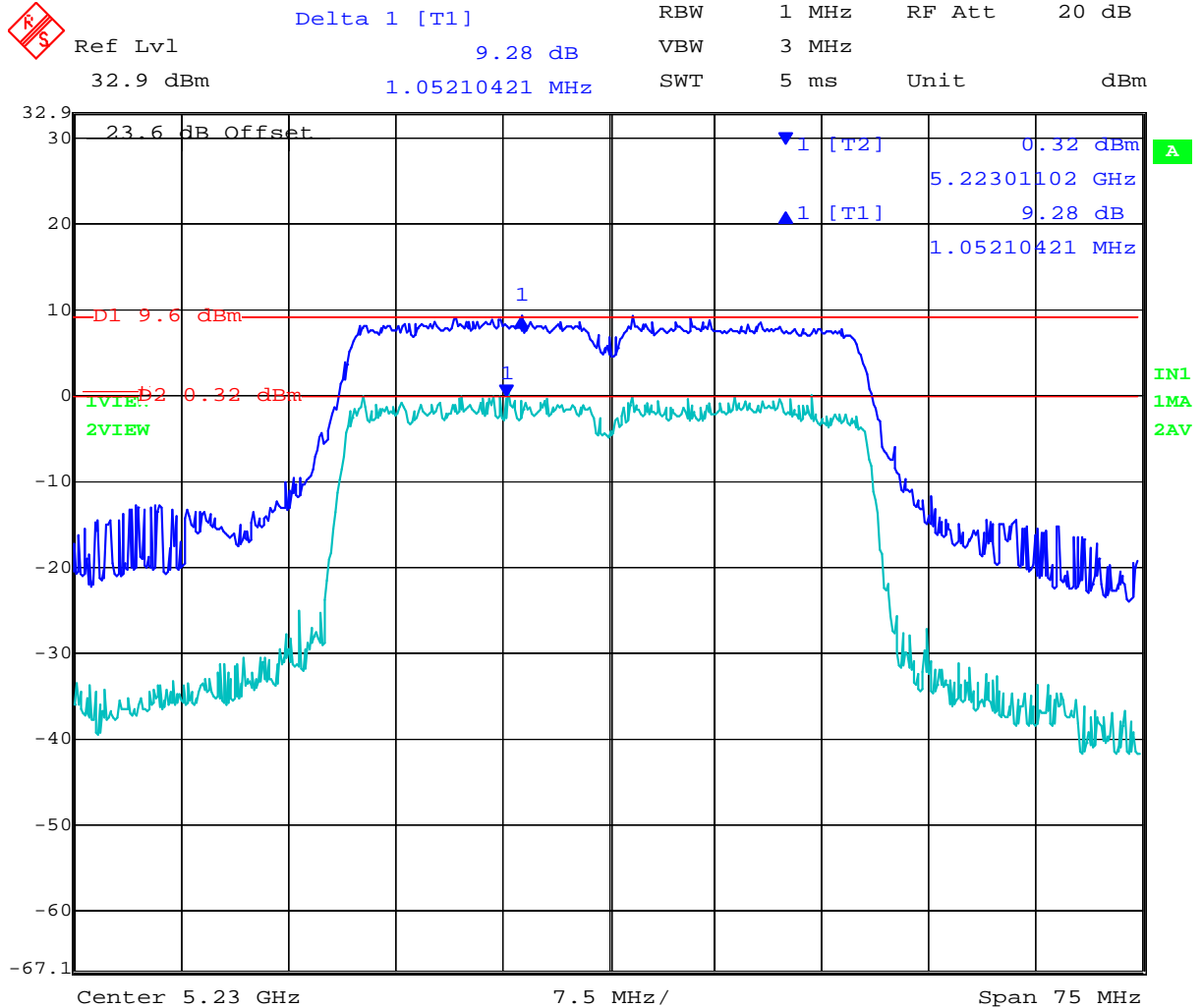


Date: 5.DEC.2007 20:43:52

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**5,230 MHz 802.11n HT40 - Peak Excursion Ratio**



Date: 5.DEC.2007 20:45:43

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**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
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---

## Specification

### Limits

**§15.407 (a)(6)** The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified in this paragraph) shall not exceed 13dB across any 1MHz bandwidth or the emission bandwidth whichever is less

## Laboratory Measurement Uncertainty for Spectrum Measurement

Measurement uncertainty	$\pm 2.81\text{dB}$
-------------------------	---------------------

## Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

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**Title:** Aruba AP120,121 802.11a/b/g/n AP  
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### 5.1.5. Frequency Stability

**FCC, Part 15 Subpart C §15.407(g)**  
**Industry Canada RSS-210 §2.1**

#### **Test Procedure**

The manufacturer of the equipment is responsible for ensuring that the frequency stability is such that emissions are always maintained within the band of operation under all conditions.

#### **Manufacturer Declaration**

The frequency stability of the reference oscillator sets the frequency stability of the RF transceiver signals. Therefore all of the RF signals should have  $\pm 20$ ppm stability.

This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

$\pm 20$ ppm at 5.250 GHz translates to a maximum frequency shift of  $\pm 105$  KHz. As the edge of the channels is at least one MHz from either of the band edges,  $\pm 105$  KHz is more than sufficient to guarantee that the intentional emission will remain in the band over the entire operating range of the EUT.

#### **Specification**

#### **Limits**

**§15.407 (g)** Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

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**5.1.6. Maximum Permissible Exposure**

**FCC, Part 15 Subpart C §15.407(f)**  
**Industry Canada RSS-Gen §5.5**

**Calculations for Maximum Permissible Exposure Levels**

Power Density = Pd (mW/cm<sup>2</sup>) = EIRP/(4πd<sup>2</sup>)

EIRP = P \* G \* 3

P = Peak output power (mW)

G = Antenna numeric gain (numeric)

d = Separation distance (cm)

Numeric Gain = 10 ^ (G (dBi)/10)

The Aruba AP120, AP121 has three transmitters. The peak power in the table below is calculated by assuming a worst case scenario where the three transmitters are operating simultaneously in the same band. The Peak Power in mW is calculated by taking the maximum conducted power measured in each band and multiplying by 3.

Because the EUT belongs to the General Population/Uncontrolled Exposure the limit of power density is 1.0 mW/cm<sup>2</sup>

Freq. Band (MHz)	Antenna Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Calculated Safe Distance @ 1mW/cm <sup>2</sup> Limit(cm)	Minimum Separation Distance (cm)
5150 - 5250	14.0	25.12	+14.69	88.33	13.29	20

**Note:** for mobile or fixed location transmitters the minimum separation distance is 20cm, even if calculations indicate the MPE distance to be less.

**Specification**  
**Maximum Permissible Exposure Limits**

**FCC §1.1310** Limit = 1mW / cm<sup>2</sup> from 1.310 Table 1

**RSS-Gen §5.5** Before equipment certification is granted, the application requirements of RSS-102 shall be met.

**Laboratory Measurement Uncertainty for Power Measurements**

Measurement uncertainty	±1.33 dB
-------------------------	----------

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### 5.1.7. Radiated Emissions

#### 5.1.7.1. Transmitter Radiated Spurious Emissions (above 1 GHz); Peak Field Strength Measurements; and Radiated Band Edge Measurements – Restricted Bands

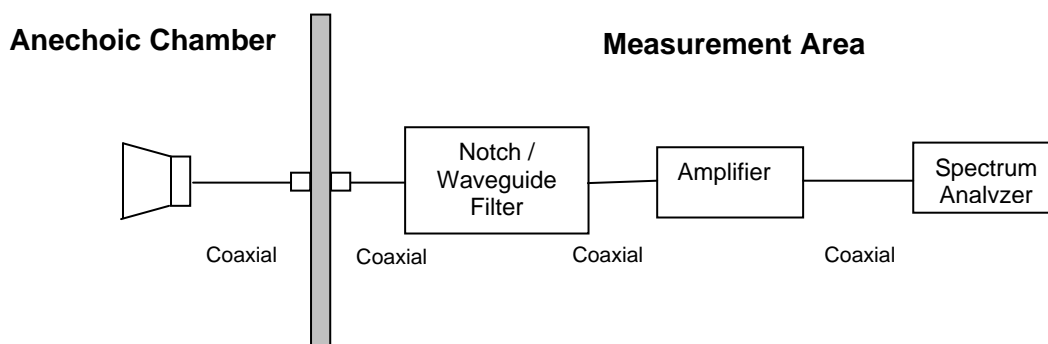
**FCC, Part 15 Subpart C §15.407(b)(2), §15.205(a)/15.209(a)**  
**Industry Canada RSS-210 §A9.3(2); §2.2; §2.6; RSS-Gen §4.7**

#### Test Procedure

Radiated emissions above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.

All measurements on any frequency or frequencies over 1 MHz are based on the use of measurement instrumentation employing an average detector function. All measurements above 1 GHz were performed using a minimum resolution bandwidth of 1 MHz.

#### Test Measurement Set up



Measurement set up for Radiated Emission Test

#### Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

$$FS = R + AF + CORR - FO$$

where: FS = Field Strength

R = Measured Spectrum analyzer Input Amplitude

AF = Antenna Factor

CORR = Correction Factor = CL – AG + NFL

CL = Cable Loss

AG = Amplifier Gain

FO = Distance Falloff Factor

NFL = Notch Filter Loss or Waveguide Loss



For example:

Given receiver input reading of 51.5 dB $\mu$ V; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

$$FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3 \text{ dB}\mu\text{V/m}$$

Conversion between dB $\mu$ V/m (or dB $\mu$ V) and  $\mu$ V/m (or  $\mu$ V) are done as:

$$\text{Level (dB}\mu\text{V/m)} = 20 * \text{Log (level (\mu\text{V/m}))}$$

$$40 \text{ dB}\mu\text{V/m} = 100 \mu\text{V/m}$$

$$48 \text{ dB}\mu\text{V/m} = 250 \mu\text{V/m}$$

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength (dB $\mu$ V/m);

$$E = 1000000 \times \sqrt{30P} / 3 \mu\text{V/m}$$

where P is the EIRP in Watts

$$\text{Therefore: } -27 \text{ dBm/MHz} = 68.23 \text{ dB}\mu\text{V/m}$$

**Note:** The data in this Section identifies that the EUT is in compliance with the -27dBm/MHz EIRP limit (68.23 dB $\mu$ V/m) for out of band emissions. All peak emissions are less than 68.23 dB  $\mu$ V/m.

### Measurement Results Transmitter Radiated Spurious Emissions above 1 GHz

Ambient conditions.

Temperature: 17 to 23°C      Relative humidity: 31 to 57 %      Pressure: 999 to 1012 mbar

#### Emission Characterization

During testing it was verified that there were several emissions emanating from the body of the EUT which was unrelated to antenna type and gain. The emissions which were observed over the range 1 - 3.5 GHz were individually characterized. The peak amplitude of emissions were found to be above 54dB $\mu$ V/m however they averaged down below the average limit in all cases.

Emissions 1-3.5 GHz and corresponding measurement values are identified on the following page.

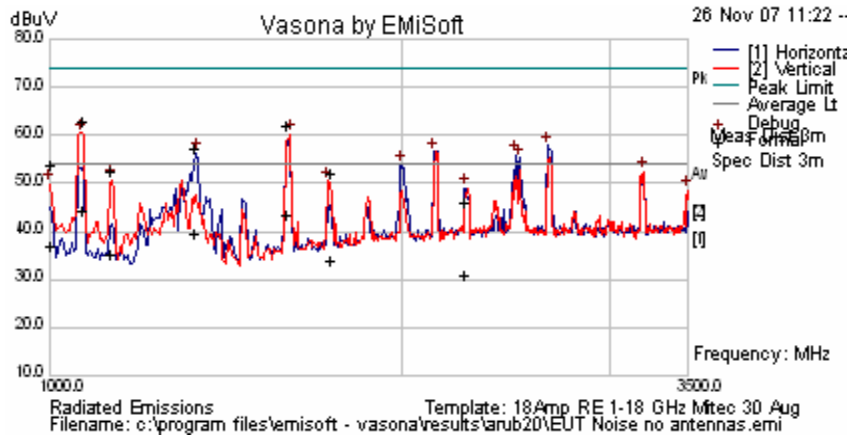




### Emission Characterization

Emissions emanating from body of EUT, 50 Ohm termination on all antenna ports  
 NRB = None Restrictive Band

### Spurious Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1070.391	74.79	2.02	-16.09	60.72	Peak Max	V	98	45	74	-13.28	Pass	
1594.398	71.79	2.45	-14.37	59.88	Peak Max	V	104	187	74	-14.12	Pass	
2490.768	65.69	3	-11.24	57.45	Peak Max	V	128	30	74	-16.55	Pass	
1331.012	68.73	2.25	-15.58	55.4	Peak Max	V	119	66	74	-18.60	Pass	
1129.389	64.41	2.08	-15.96	50.52	Peak Max	V	98	27	74	-23.48	Pass	
1739.83	60.74	2.57	-13.26	50.04	Peak Max	V	98	218	74	-23.96	Pass	
1002.856	66.21	1.95	-16.15	52.01	Peak Max	V	99	12	74	-21.99	Pass	
2257.515	52.19	2.89	-11.02	44.05	Peak Max	V	142	185	74	-29.95	Pass	
1070.391	56.14	2.02	-16.09	42.07	Average Max	V	98	45	54	-11.93	Pass	
1594.398	53.15	2.45	-14.37	41.24	Average Max	V	104	187	54	-12.76	Pass	
2490.768	52.71	3	-11.24	44.47	Average Max	V	128	30	54	-9.53	Pass	
1331.012	51.05	2.25	-15.58	37.72	Average Max	H	106	18	54	-16.28	Pass	
1129.389	47.2	2.08	-15.96	33.31	Average Max	V	98	27	54	-20.69	Pass	
1739.83	42.47	2.57	-13.26	31.78	Average Max	V	98	218	54	-22.22	Pass	
1002.856	49.16	1.95	-16.15	34.96	Average Max	V	99	12	54	-19.04	Pass	
2257.515	37.03	2.89	-11.02	28.89	Average Max	H	125	134	54	-25.11	Pass	
2658.317	66.27	3.13	-11.37	58.02	Peak [Scan]	H	100	0				NRB
2127.255	64.97	2.82	-11.04	56.75	Peak [Scan]	H	100	0				NRB
2513.026	63.53	3.01	-11.31	55.23	Peak [Scan]	H	100	0				NRB
1996.994	62.23	2.75	-11.18	53.79	Peak [Scan]	H	100	0				NRB
3209.419	60.7	3.48	-11.65	52.53	Peak [Scan]	V	100	0				NRB
3494.99	56.73	3.6	-11.68	48.65	Peak [Scan]	V	100	0				NRB

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**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
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**ARUB20 AP125 (ANT-INTEGRAL)  
ART Settings V Aggregate Measured Power**

The following matrix identifies the ART power setting V's each output chain. The aggregate power was also measured for all three chains.

As a result of either spurious emissions (harmonic) or band-edge issues the power was reduced to bring the unit into compliance.

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
Legacy a (5150   5180 MHz)BE	16	13.70	13.65	14.56	19.27
HT-20 (5150   5180 MHz)BE	16.5	14.02	13.82	14.80	18.75
HT-40 (5150   5190 MHz)BE	13	10.27	10.53	10.90	16.04

Note BE = Band-edge, SE – Spurious emissions

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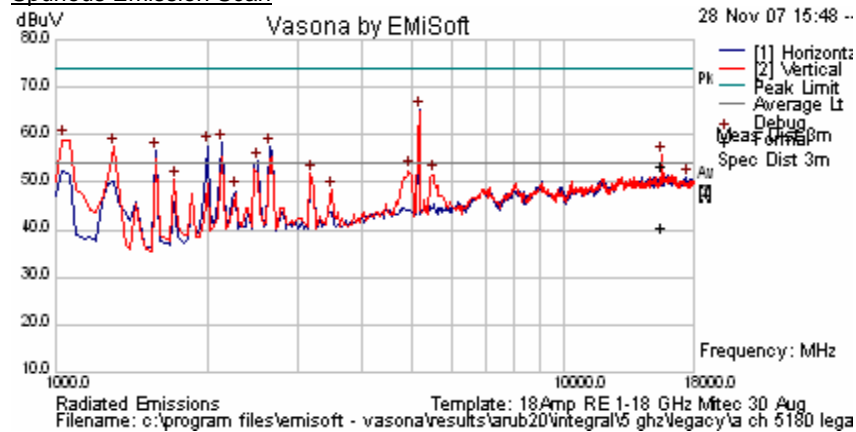
**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
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**AP125: 5150-5250GHz INTEGRAL Legacy Data Rates**

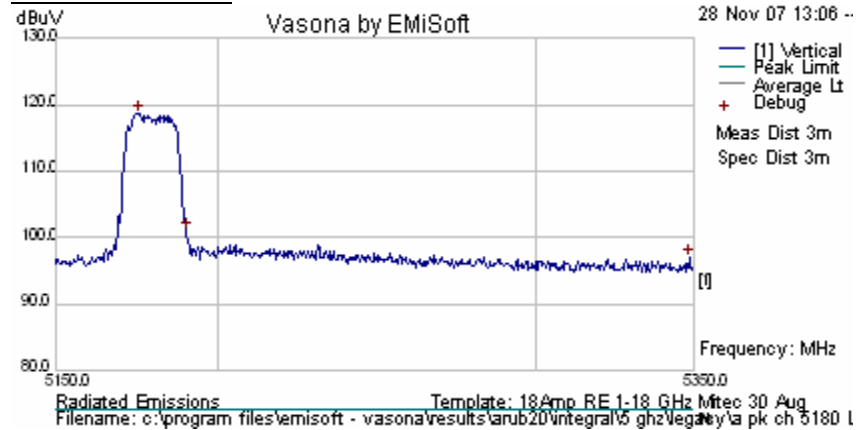
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MBit/s)	Compliant
36	5180	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**

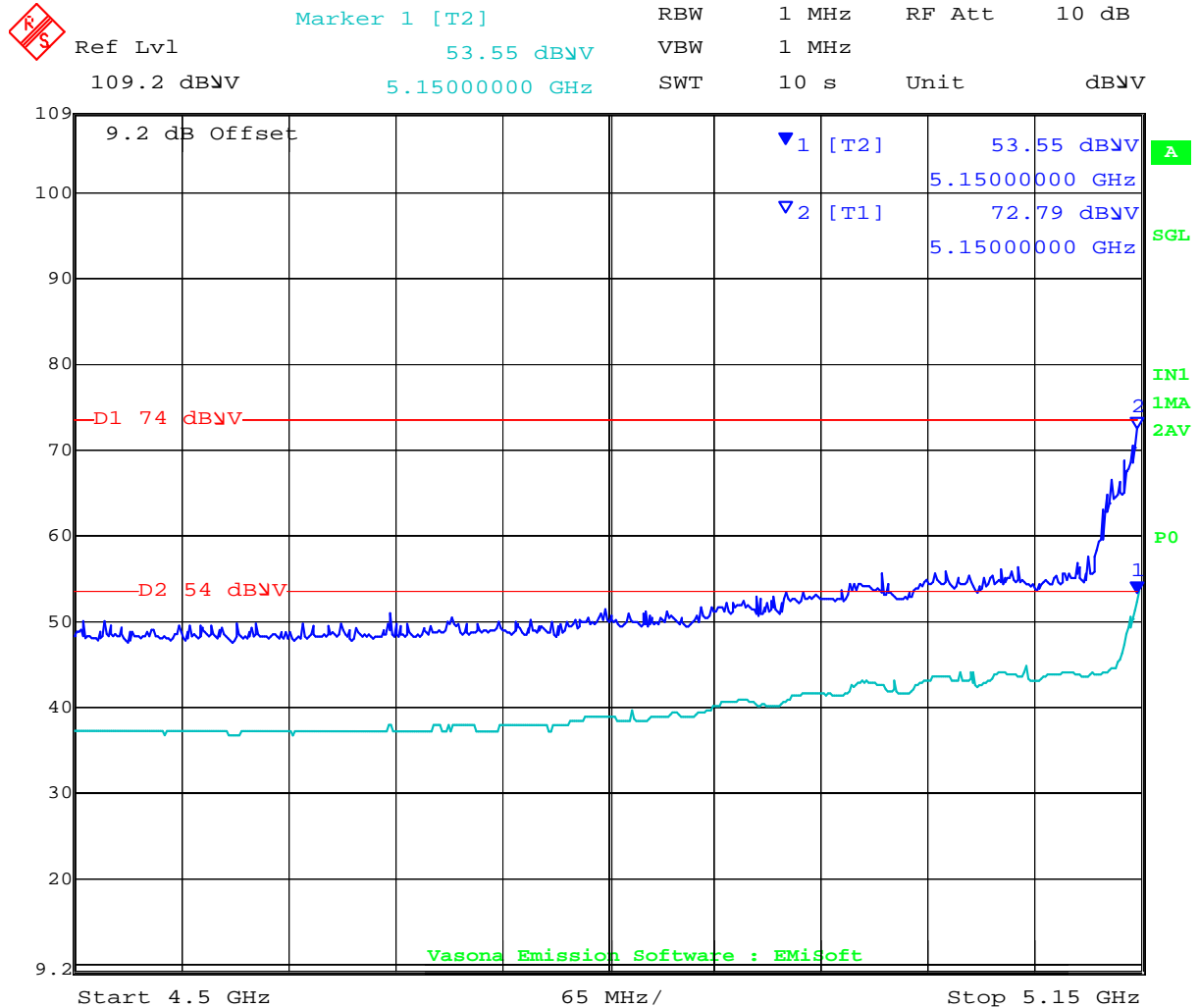


**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5176.052	73.39	10.62	34.65	118.66	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 16.0				Peak Max				74	-1.21	Pass	Band-edge
5150.000	ART Power Setting = 16.0				Average Max				54	-0.45	Pass	Band-edge
15541.16	44.18	8.28	-1.03	51.42	Peak Max	V	111	344	74	-22.58	Pass	
15541.16	31.06	8.28	-1.03	38.3	Average Max	H	112	154	54	-15.7	Pass	

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Date: 1.DEC.2007 16:27:26

### 802.11a Legacy Band-edge @ 5150 MHz with Integral antenna

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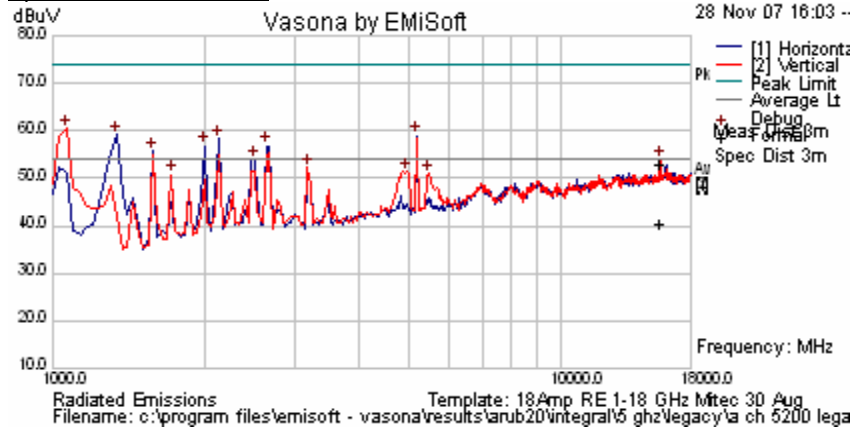


**Title:** Aruba AP120,121 802.11a/b/g/n AP  
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ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MBit/s)	Compliant
40	5200	ART 17	99%	a 6 Legacy	Yes

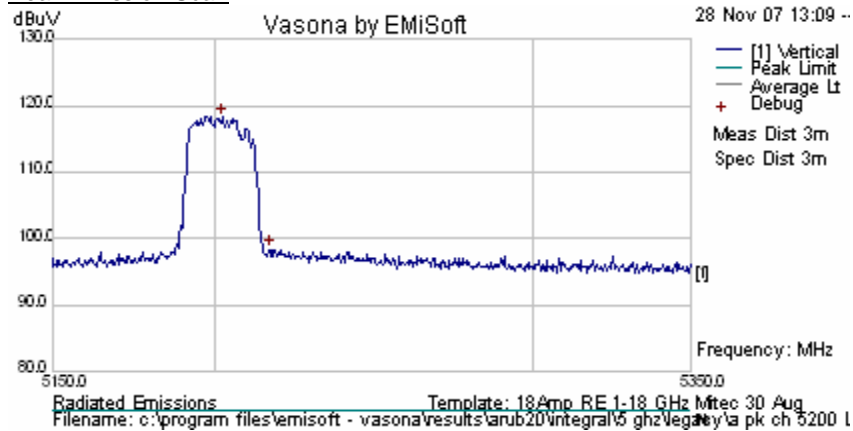
Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**



**Spurious Emission Scan**

**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	PoI	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5202.505	73.03	10.62	34.67	118.32	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15602.3	43.62	8.38	-1.16	50.84	Peak Max	V	127	316	74	-23.16	15602.3	
15602.3	30.96	8.38	-1.16	38.18	Average Max	V	127	316	54	-15.82	15602.3	

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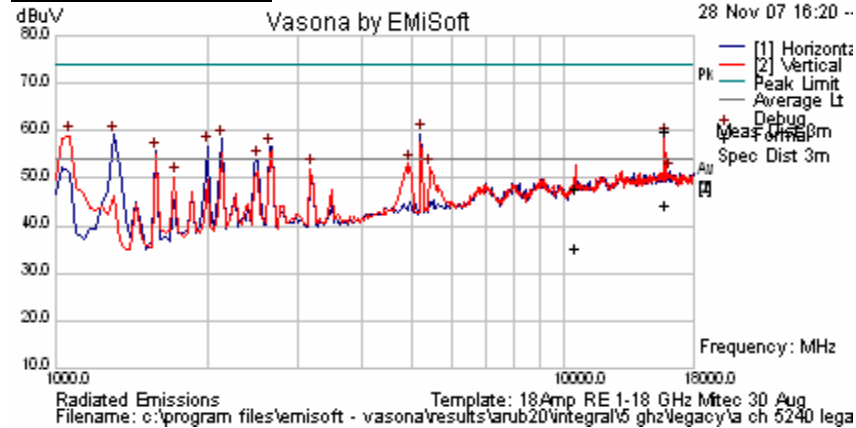


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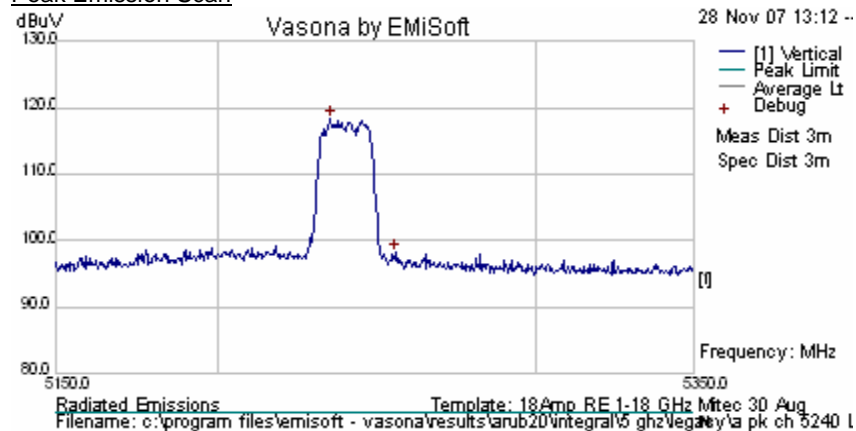
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MBit/s)	Compliant
48	5240	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**



**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5235.371	72.9	10.62	34.69	118.21	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15751.5	50.36	8.62	-1.16	57.82	Peak Max	V	98	283	74	-16.18	Pass	
10481.65	39.9	6.77	-1.04	45.63	Peak Max	V	151	47	74	-28.37	Pass	
15751.5	34.65	8.62	-1.16	42.11	Average Max	V	98	283	54	-11.89	Pass	
10481.65	27.25	6.77	-1.04	32.98	Average Max	V	151	47	54	-21.02	Pass	

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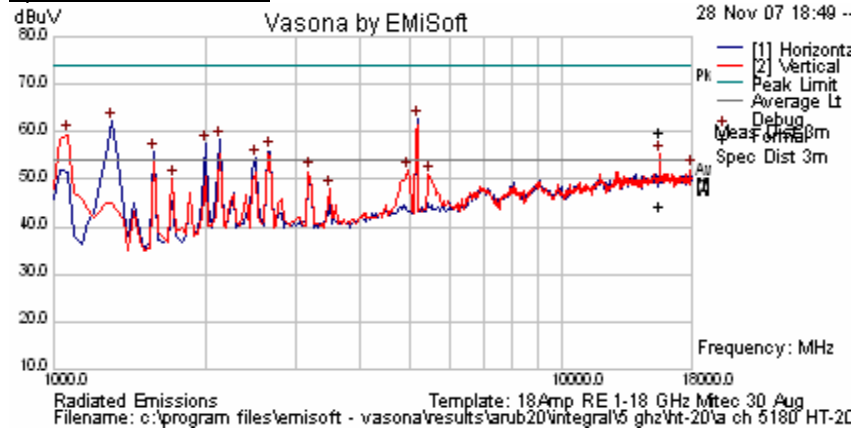


**AP125: 5150-5250GHz INTEGRAL HT-20 Data Rates**

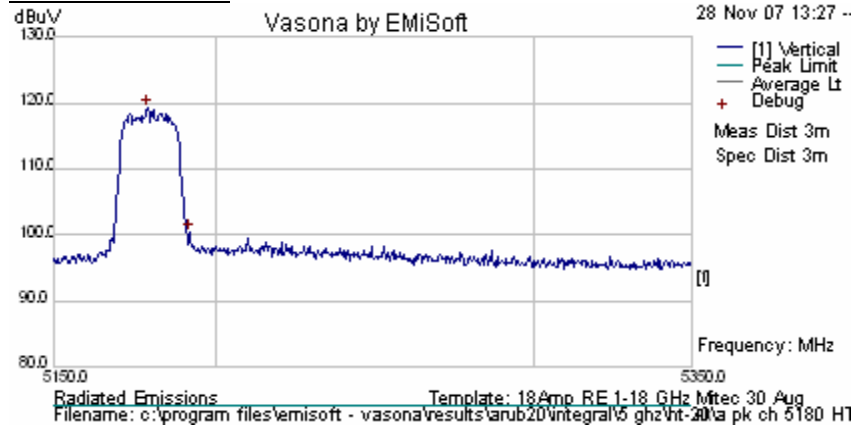
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
36	5180	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**

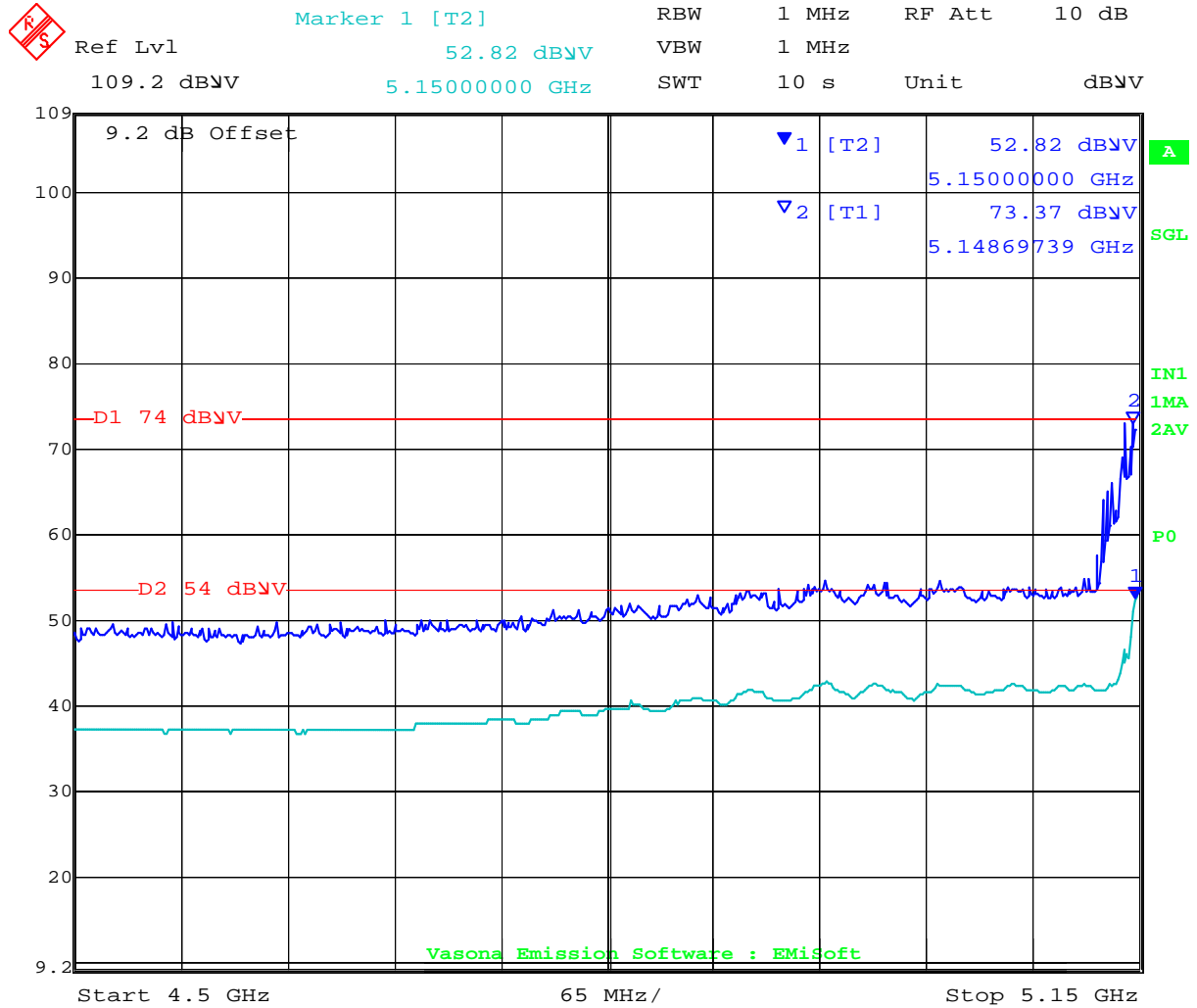


**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5179.259	73.87	10.62	34.65	119.14	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 16.5				Peak Max				74	-0.63	Pass	Band-edge
5150.000	ART Power Setting = 16.5				Average Max				54	-1.18	Pass	Band-edge
15541.09	50.74	8.28	-1.03	57.98	Peak Max	V	98	283	74	-16.02	Pass	
15541.09	35.03	8.28	-1.03	42.28	Average Max	V	98	283	54	-11.72	Pass	

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Date: 1.DEC.2007 14:22:00

### HT-20 Band-edge @ 5150 MHz - Integral antenna

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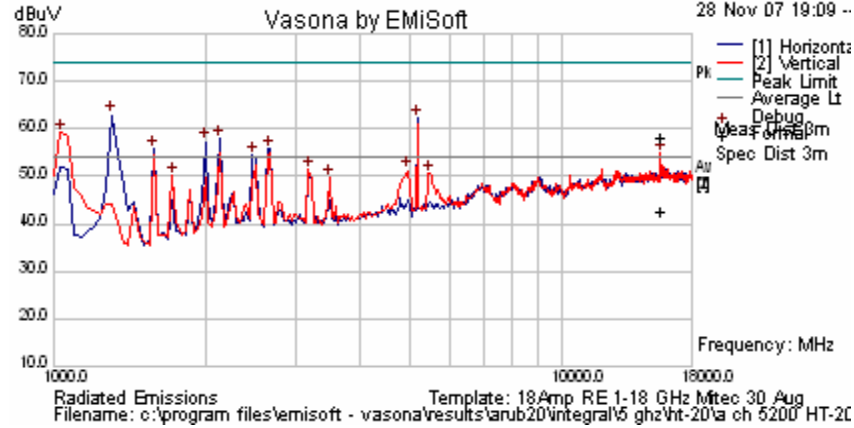


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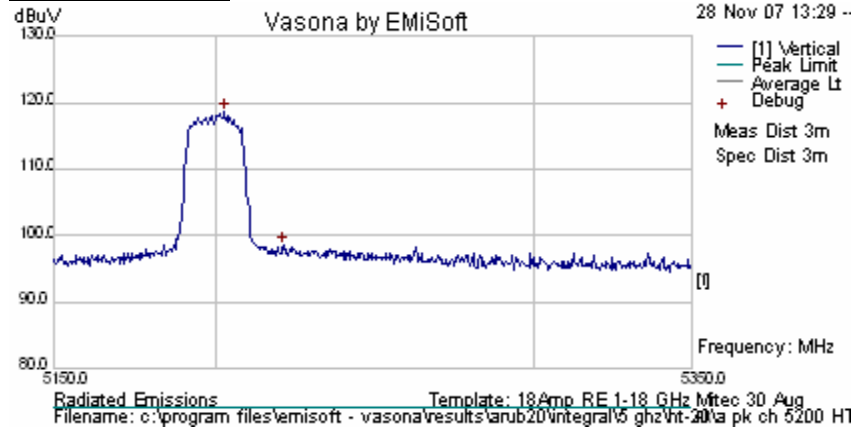
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
40	5200	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**



**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5202.906	73.18	10.62	34.67	118.46	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15601.23	48.85	8.38	-1.17	56.06	Peak Max	V	106	288	74	-17.94	Pass	
15601.23	33.23	8.38	-1.17	40.43	Average Max	V	106	288	54	-13.57	Pass	

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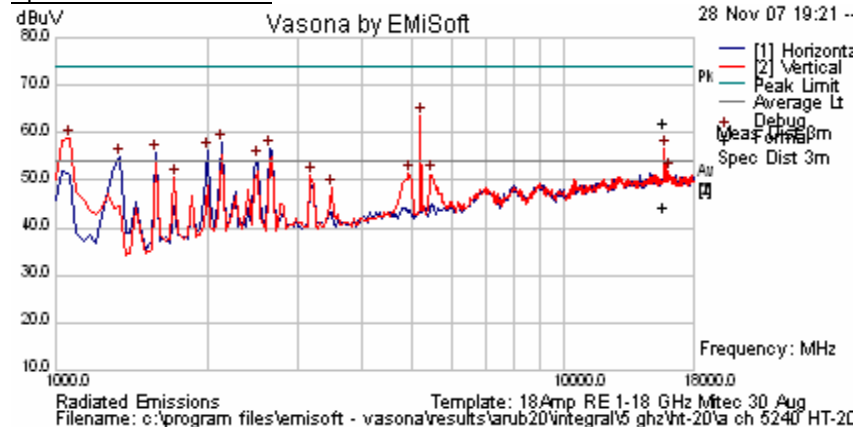


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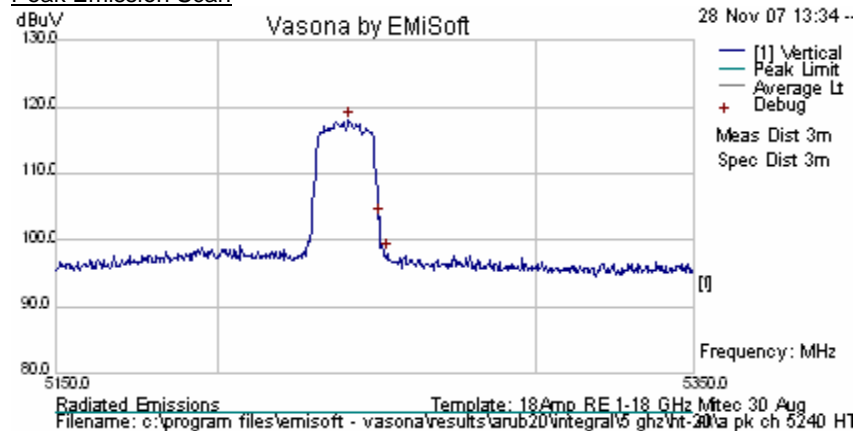
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
48	5240	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**



**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5240.982	72.65	10.62	34.7	117.97	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15721.5	52.62	8.57	-1.09	60.09	Peak Max	V	141	285	74	-13.91	Pass	
15721.5	34.99	8.57	-1.09	42.47	Average Max	V	141	285	54	-11.53	Pass	

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**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
**Issue Date:** 23rd May 2008  
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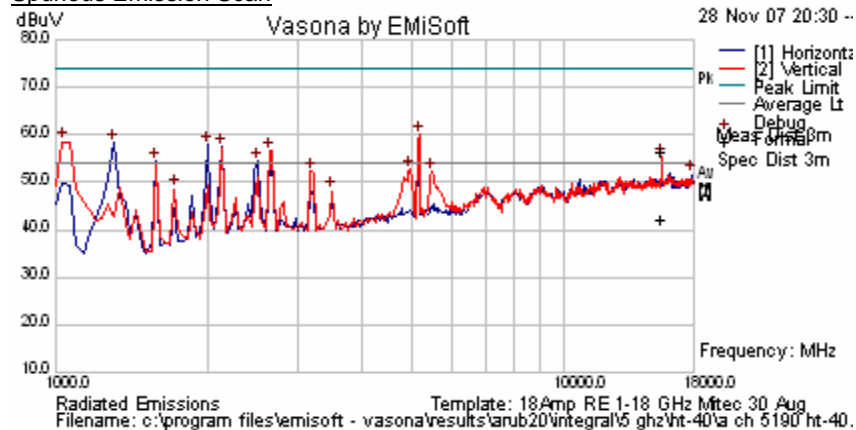
**AP125: 5150-5250GHz INTEGRAL HT-40 Data Rates**

ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
	5190	ART 17	99%	13.5 HT-40	Yes

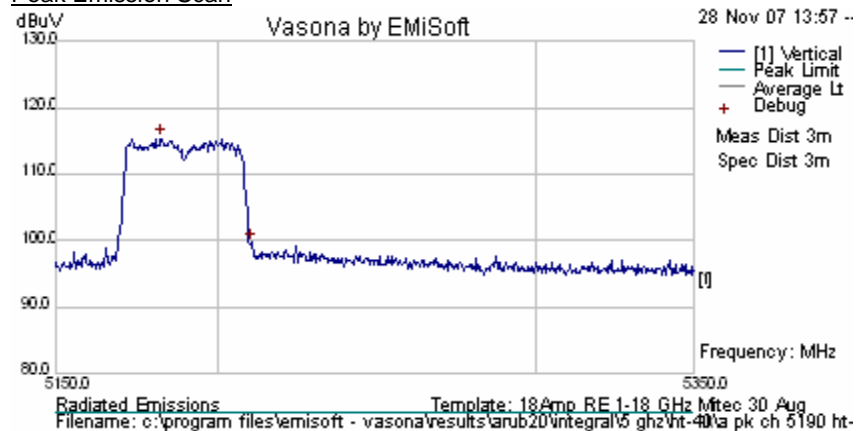
Three antennas operating simultaneously

NRB = None Restrictive Band

**Spurious Emission Scan**



**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5182.866	70.02	10.62	34.65	115.29	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 13.0				Peak Max	V			74	-1.40	Pass	Band-edge
5150.000	ART Power Setting = 13.0				Average Max	V			54	-0.90	Pass	Band-edge
15573.16	47.32	8.33	-1.2	54.46	Peak Max	V	137	288	74	-19.54	Pass	
15573.16	33.12	8.33	-1.2	40.25	Average Max	V	137	288	54	-13.75	Pass	

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Date: 1.DEC.2007 14:18:30

HT-40 Band-edge @ 5150 MHz - Integral antenna

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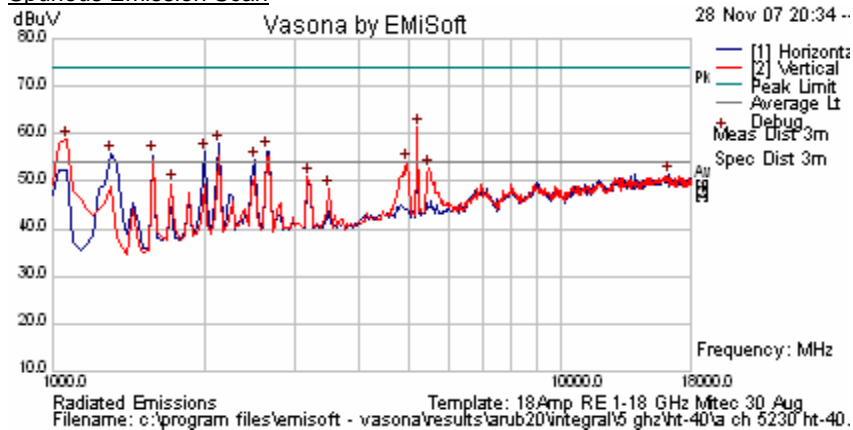


**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
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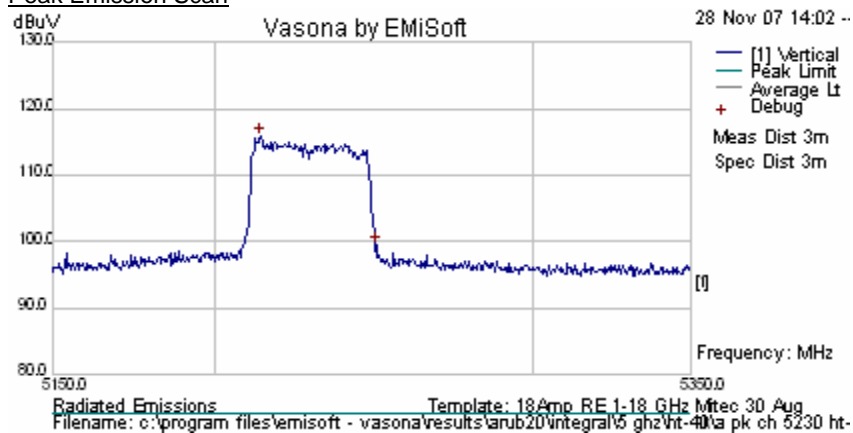
ARUB20 AP125 - INTEGRAL Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
	5230	ART 17	99%	13.5 HT-40	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

#### Spurious Emission Scan



#### Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5214.529	70.49	10.62	34.68	115.79	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental

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**ARUB20 AP125 (ANT-10)  
ART Settings V Aggregate Measured Power**

The following matrix identifies the ART power setting V's each output chain. The aggregate power was also measured for all three chains.

As a result of either spurious emissions (harmonic) or band-edge issues the power was reduced to bring the unit into compliance.

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
Legacy a (5150   5180 MHz)BE	14	11.83	11.74	12.61	17.3
HT-20 (5150   5180 MHz)BE	13	10.92	10.71	11.44	15.51
HT-40 (5150   5190 MHz)BE	10	7.38	7.38	8.35	12.91

Note BE = Band-edge, SE – Spurious emissions

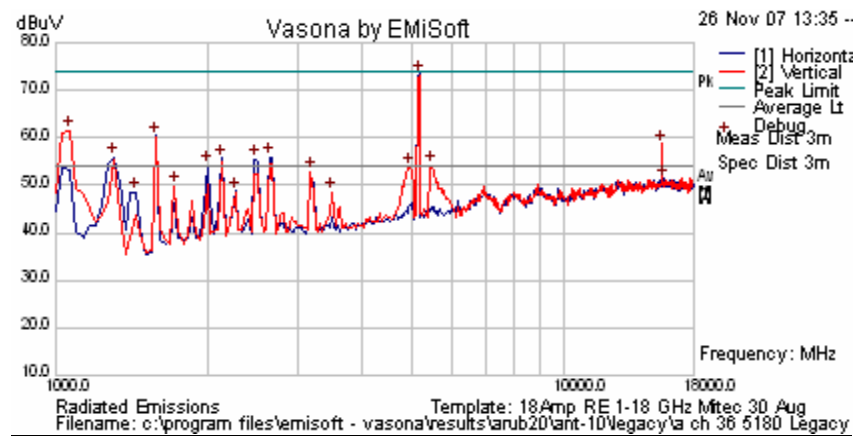


**AP124: 5150-5250GHz ANT-10 (6dBi) Legacy Data Rates**

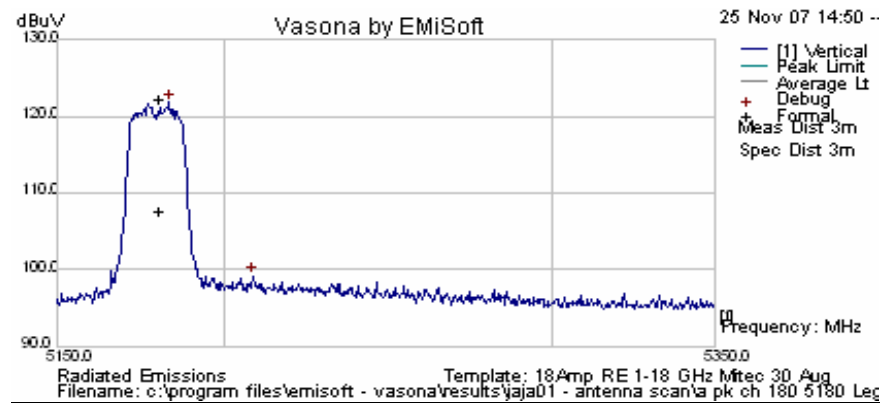
ARUB20 AP124 - ANT-10 (6dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MBit/s)	Compliant
36	5180	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

Spurious Emission Scan

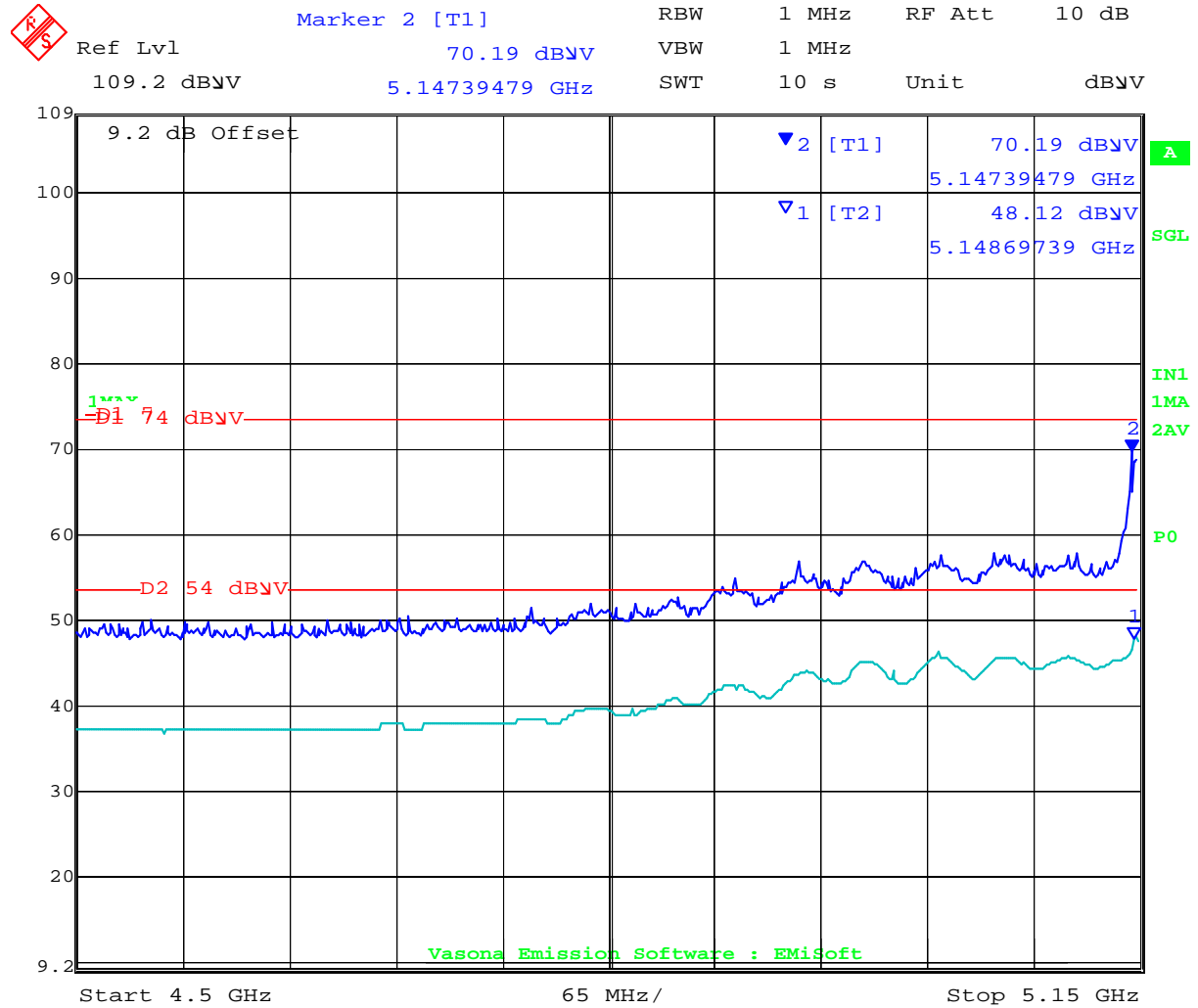


Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5183.667	76.51	10.62	34.65	121.78	Peak [Scan]	H	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 14				Peak Max	V			74	-3.81	Pass	Band-edge
5150.000	ART Power Setting = 14				Average Max	V			54	-5.88	Pass	Band-edge
15547.09	51.68	8.29	-1.06	58.91	Peak [Scan]	V	100	0	74	-15.09	Pass	

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Date: 1.DEC.2007 16:19:36

### 802.11a Legacy Band-edge @ 5150 MHz with ANT-10

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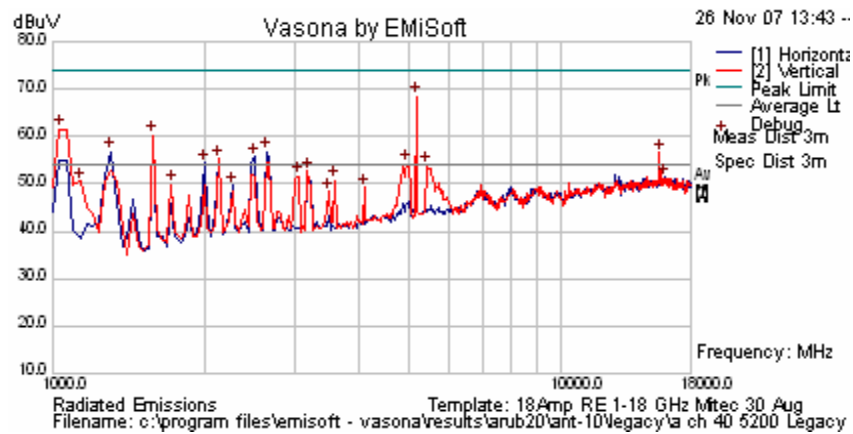
**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
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**ARUB20 AP124 - ANT-10 (6dBi) Test Configuration**

Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MBit/s)	Compliant
40	5200	ART 17	99%	a 6 Legacy	Yes

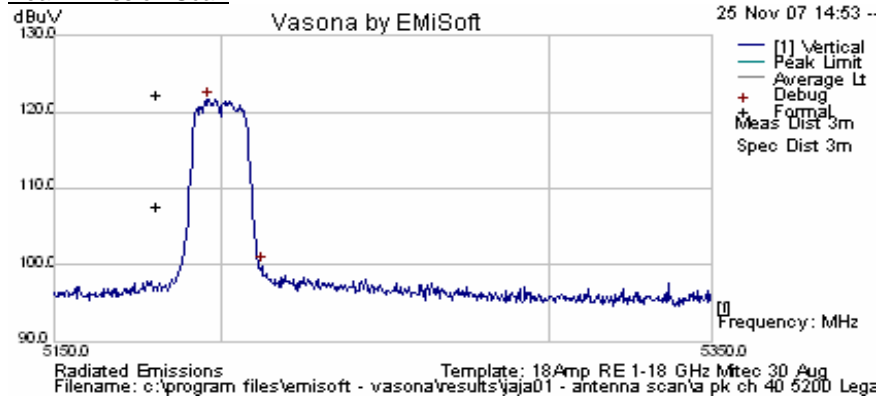
Three antennas operating simultaneously  
 NRB = None Restrictive Band

Spurious Emission Scan



Spurious Emission Scan

Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5196.493	76.38	10.62	34.66	121.66	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15615.23	49.26	8.4	-1.14	56.52	Peak [Scan]	V	100	0	74	-17.48	Pass	

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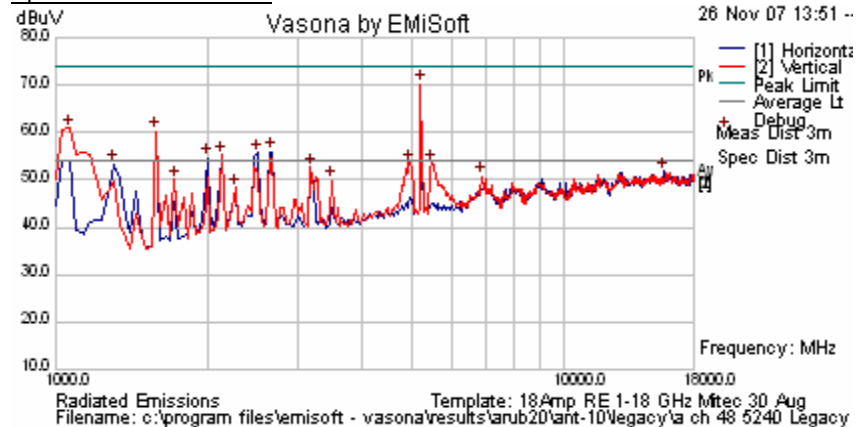


**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
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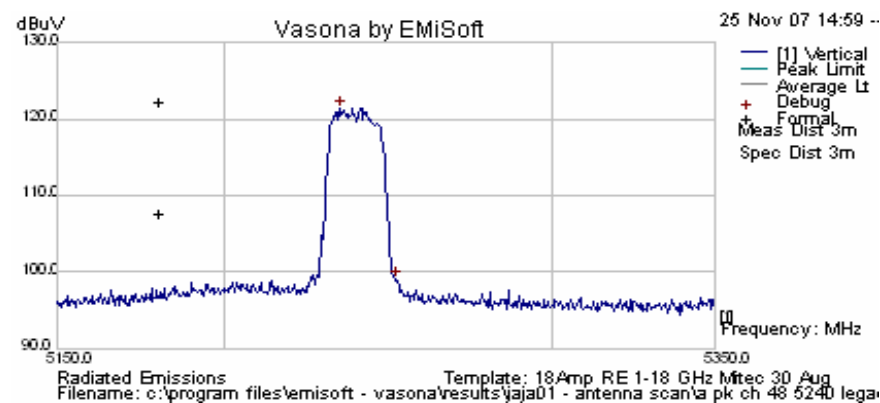
ARUB20 AP124 - ANT-10 (6dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MBit/s)	Compliant
48	5240	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**



**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5235.371	76.1	10.62	34.69	121.42	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental

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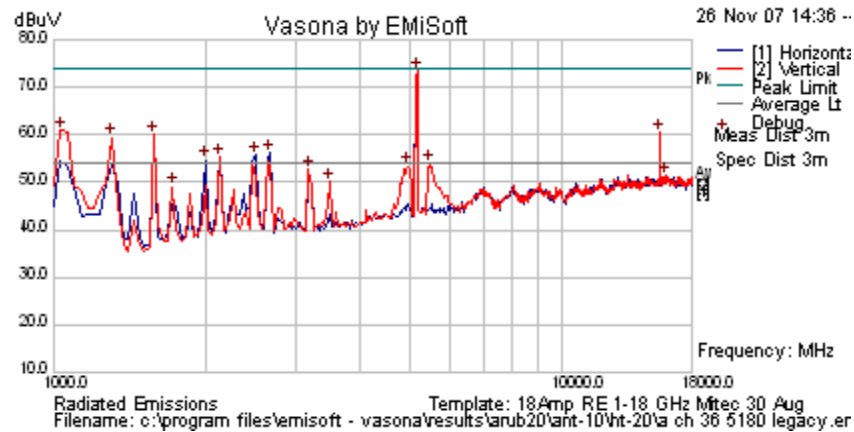
**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
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**Issue Date:** 23rd May 2008  
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**AP124: 5150-5250GHz ANT-10 (6dBi) HT-20 Data Rates**

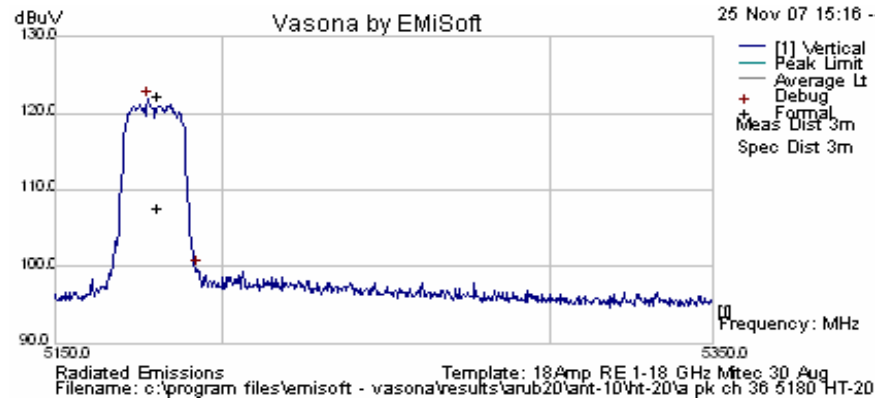
ARUB20 AP124 - ANT-10 (6dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
36	5180	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

Spurious Emission Scan

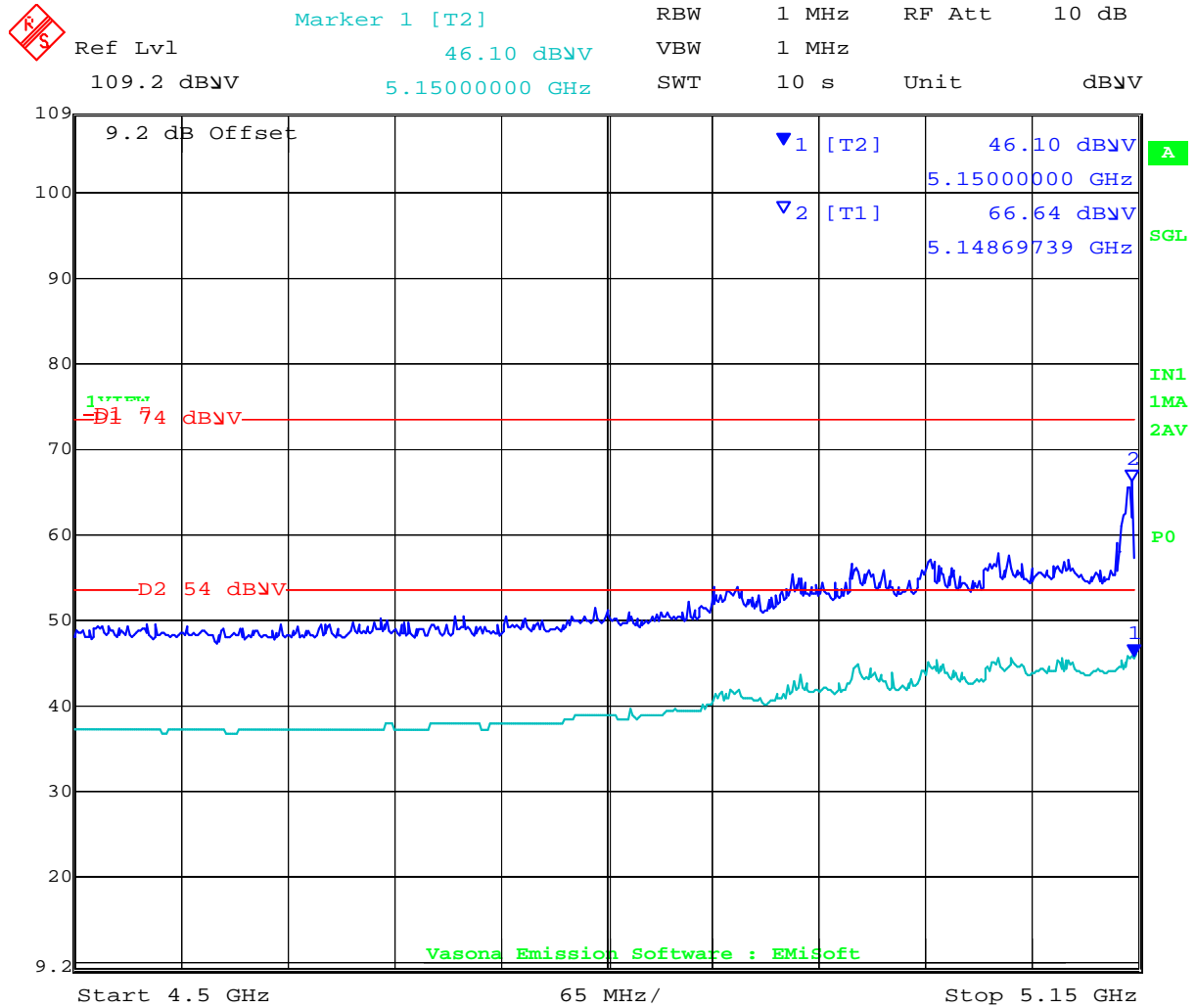


Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5178.056	76.55	10.62	34.65	121.82	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 13.0				Peak Max				74	-7.90	Pass	Band-edge
5150.000	ART Power Setting = 13.0				Average Max				54	-7.36	Pass	Band-edge
15595.94	34.51	8.37	-1.18	41.7	Average	V	98	283	54	-12.3	Pass	
15595.94	52.62	8.37	-1.18	59.81	Peak	V	98	283	74	-14.19	Pass	

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Date: 1.DEC.2007 16:24:54

### 802.11a Legacy Band-edge @ 5150 MHz with ANT-10

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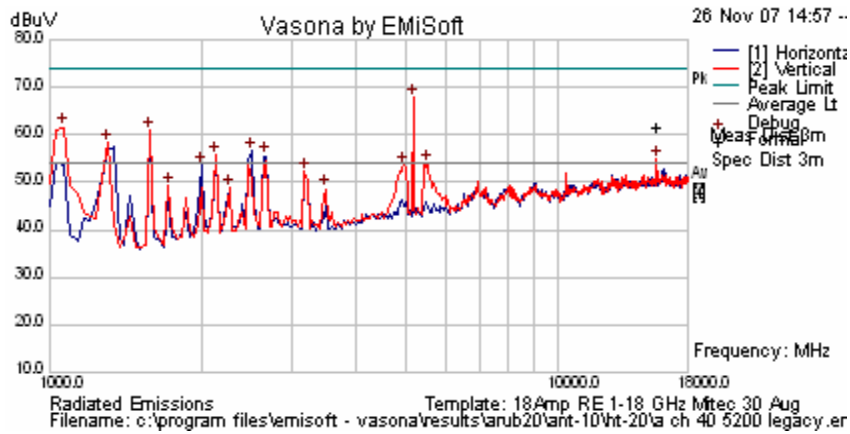


**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
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ARUB20 AP124 - ANT-10 (6dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
40	5200	ART 17	99%	6.5 HT-20	Yes

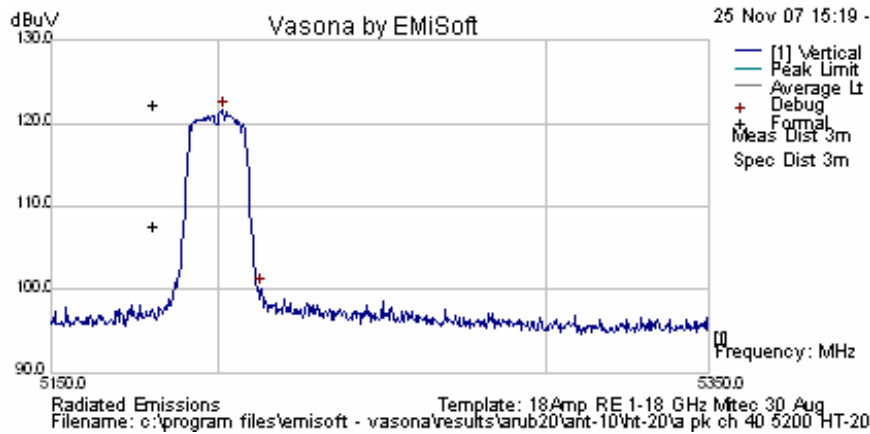
Three antennas operating simultaneously  
 NRB = None Restrictive Band

Spurious Emission Scan



Spurious Emission Scan

Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5201.703	76.35	10.62	34.67	121.63	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15595.94	34.51	8.37	-1.18	41.7	Average	V	98	283	54	-12.3	Pass	
15595.94	52.62	8.37	-1.18	59.81	Peak	V	98	283	74	-14.19	Pass	

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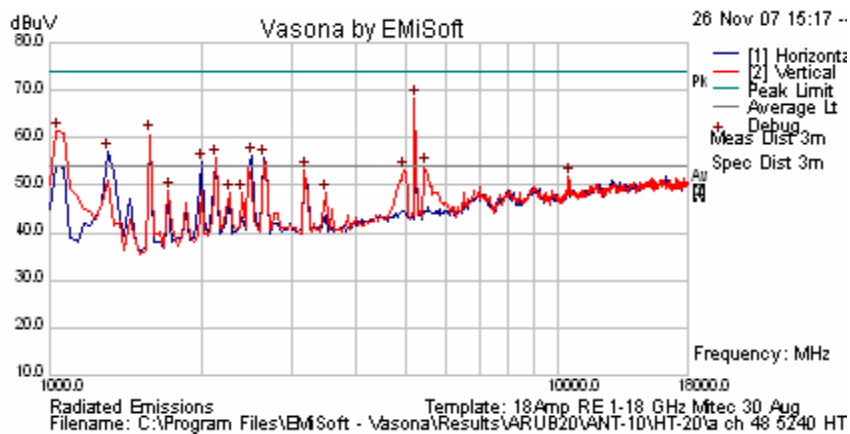


**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
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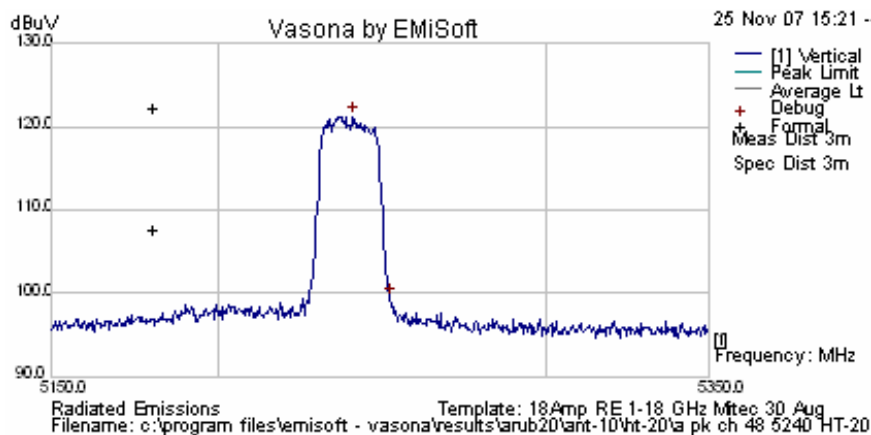
ARUB20 AP124 - ANT-10 (6dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
48	5240	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5240.982	75.89	10.62	34.7	121.21	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental

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**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
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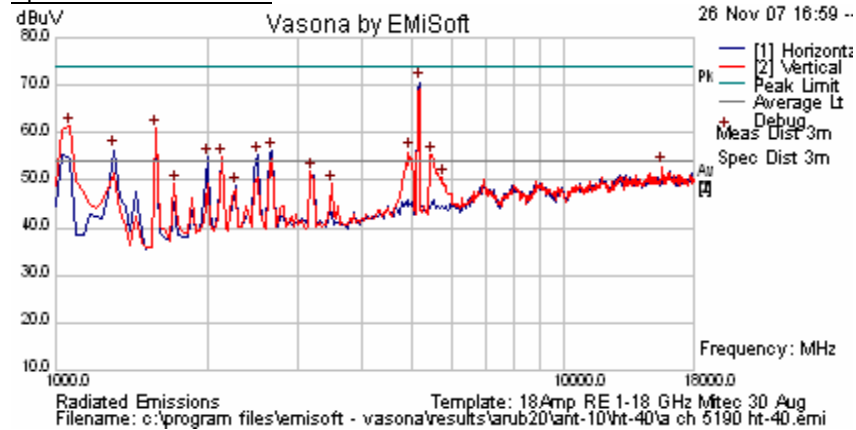
**AP124: 5150-5250GHz ANT-10 (6dBi) HT-40 Data Rates**

ARUB20 AP124 - ANT-10 (6dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
	5190	ART 17	99%	13.5 HT-40	Yes

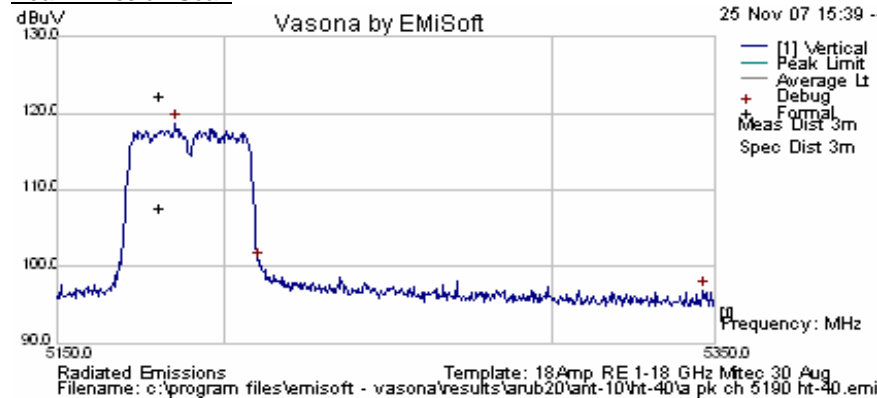
Three antennas operating simultaneously

NRB = None Restrictive Band

**Spurious Emission Scan**

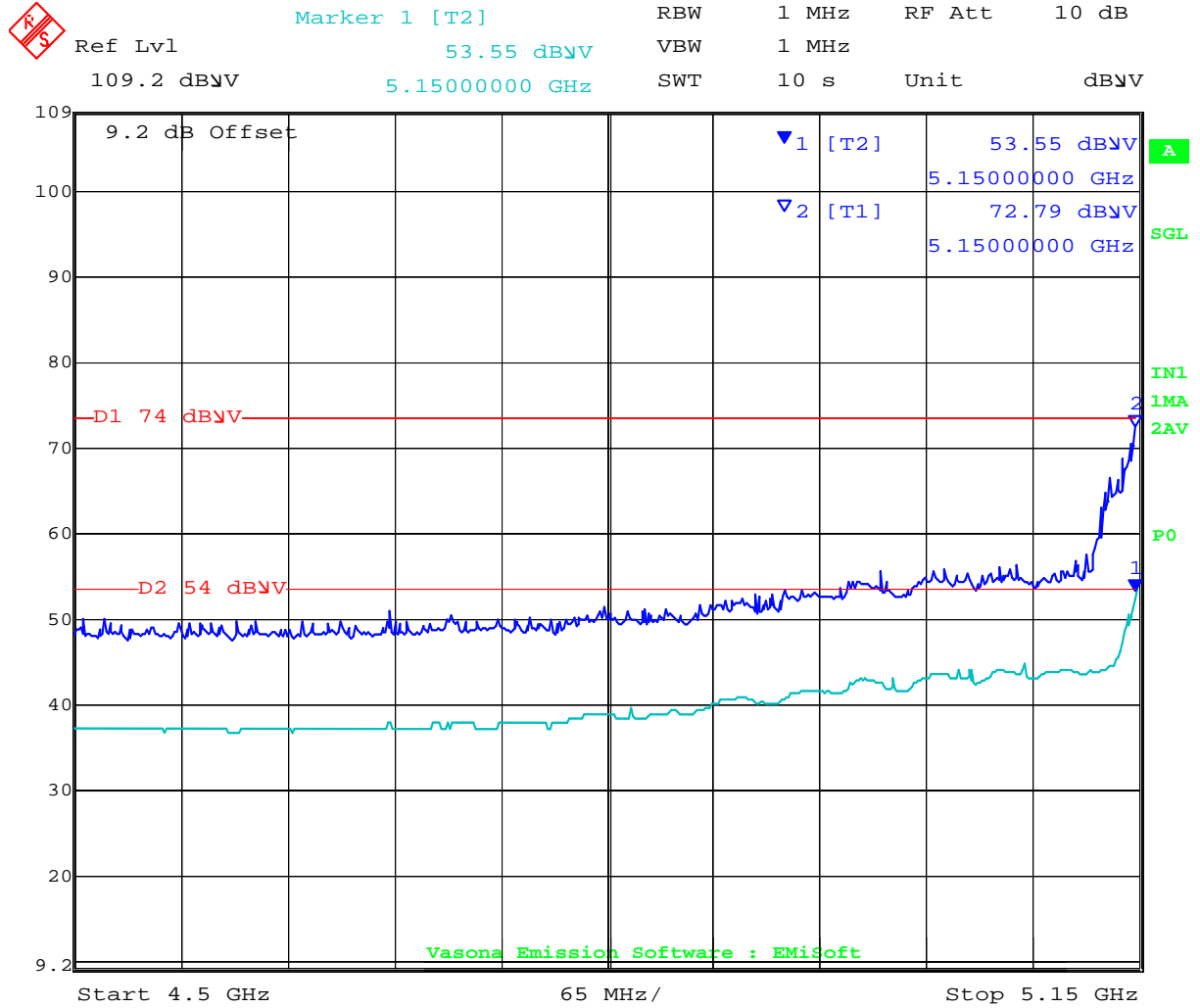


**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5185.671	73.51	10.62	34.65	118.78	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 10.0				Peak Max	V			74	-1.21	Pass	Band-edge
5150.000					Average Max	V			54	-0.45	Pass	Band-edge

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Date: 1.DEC.2007 16:27:26

HT- 40 Band-edge @ 5150 MHz with ANT-10

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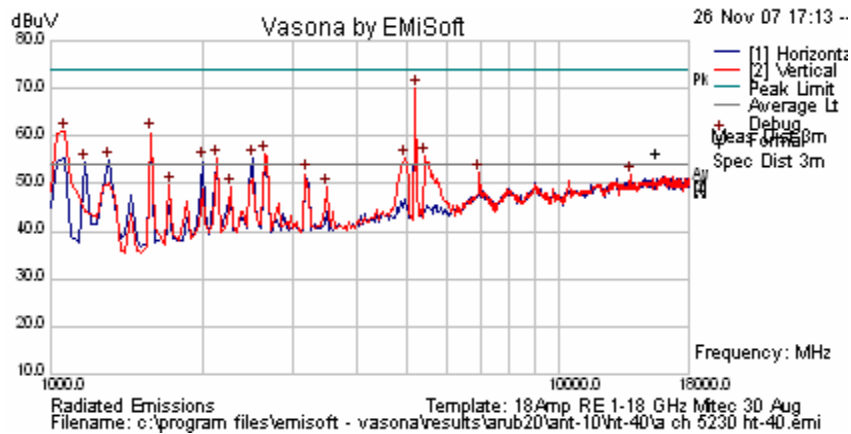




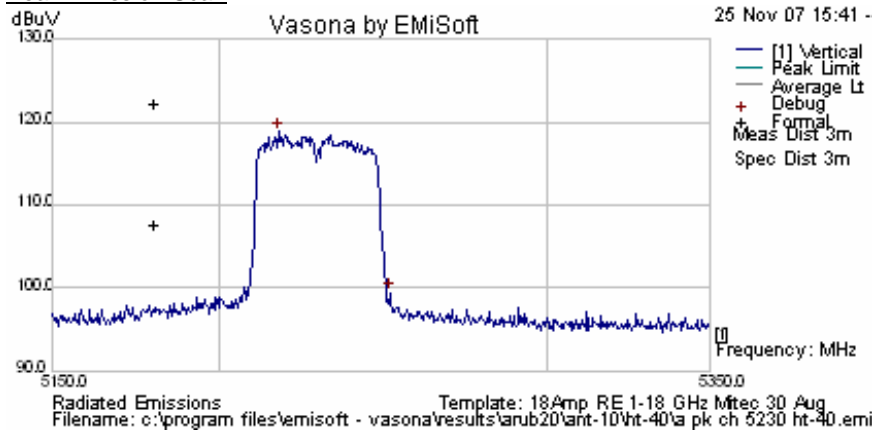
ARUB20 AP124 - ANT-10 (6dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
	5230	ART 17	99%	13.5 HT-40	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5218.136	73.52	10.62	34.68	118.82	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental

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**ARUB20 AP125 (ANT-12)  
ART Settings V Aggregate Measured Power**

The following matrix identifies the ART power setting V's each output chain. The aggregate power was also measured for all three chains.

As a result of either spurious emissions (harmonic) or band-edge issues the power was reduced to bring the unit into compliance.

Configuration	ART Power Setting	Tx 1 Measured Pwr (dBm)	Tx 2 Measured Pwr (dBm)	Tx 3 Measured Pwr (dBm)	Aggregate Measured Pwr (dBm)
Legacy a (5150   5180 MHz)BE	13	10.93	10.82	11.52	16.40
HT-20 (5150   5180 MHz)BE	13	10.83	11.72	11.47	15.51
HT-40 (5150   5190 MHz)BE	7	4.55	4.66	5.96	10.2

Note BE = Band-edge, SE – Spurious emissions

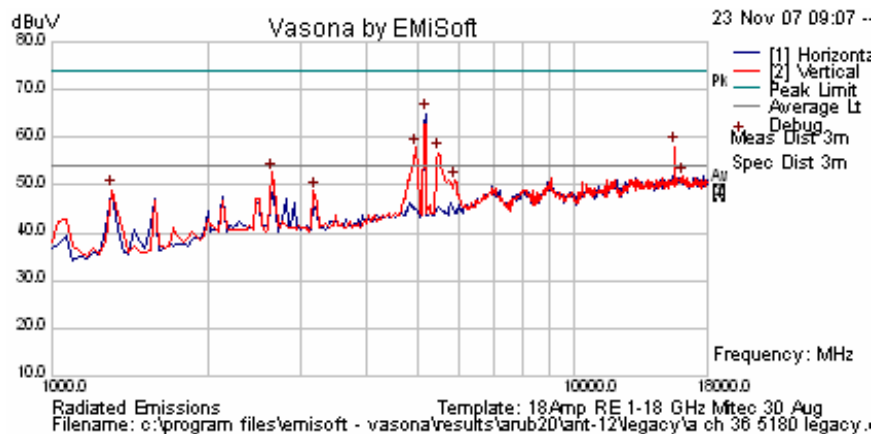


**AP124: 5150-5250GHz ANT-12 (14dBi) Legacy Data Rates**

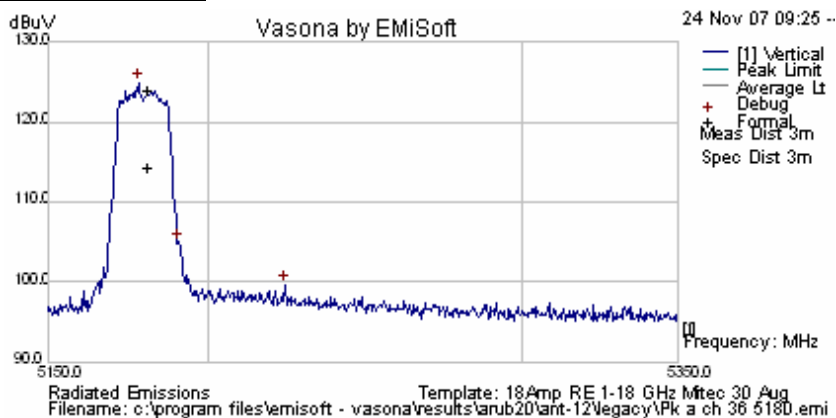
ARUB20 AP124 - ANT-12 (14dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MBit/s)	Compliant
36	5180	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

Spurious Emission Scan

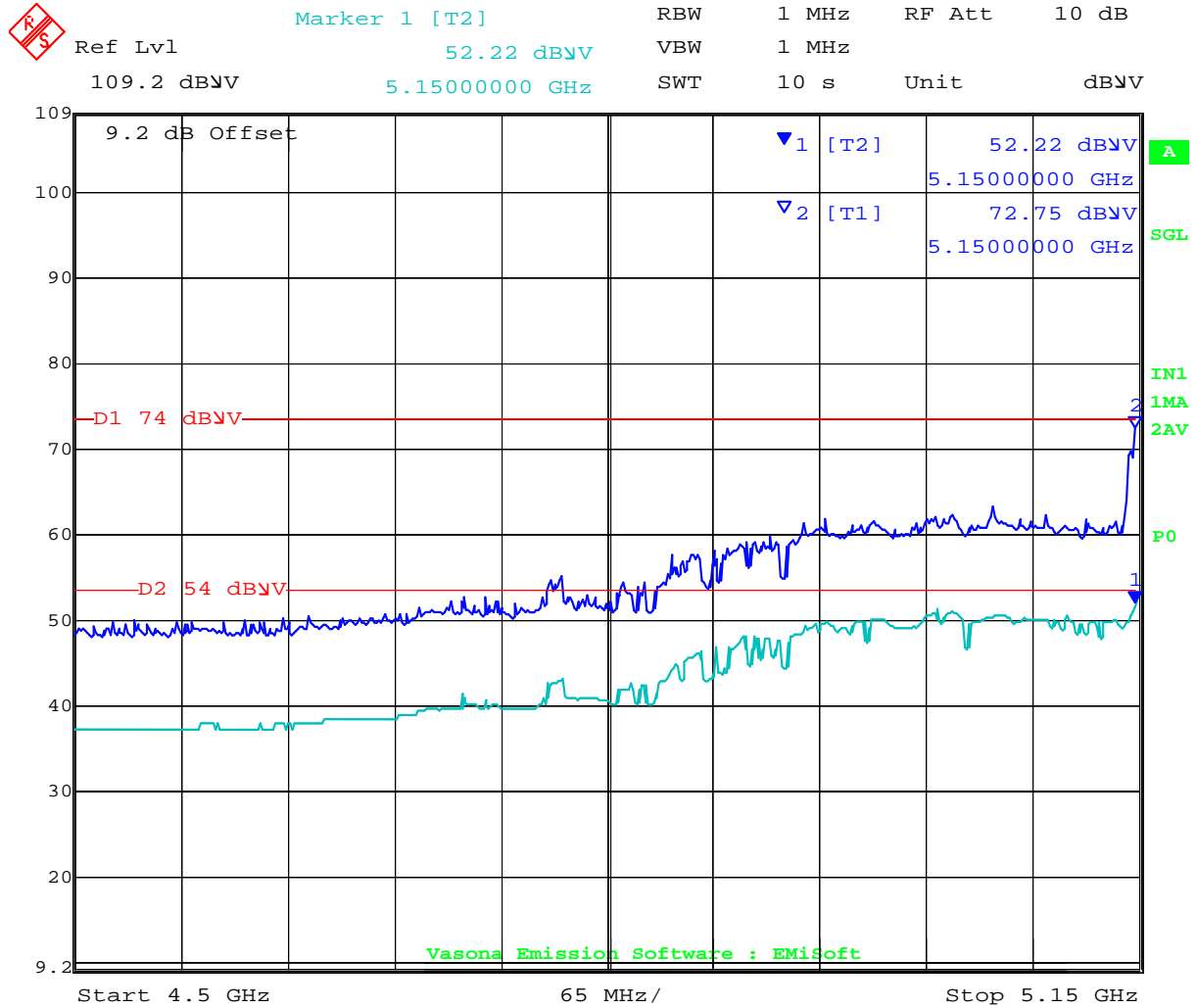


Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5178.457	79.66	10.62	34.65	124.93	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 13.0				Peak Max	V			74	-1.25	Pass	Band-edge
5150.000	ART Power Setting = 13.0				Average Max	V			54	-1.78	Pass	Band-edge
15542.021	57.7	6.97	-1.55	63.11	Peak Max	V	125	59	74	-10.89	Pass	
15542.021	66.19	2.24	-15.63	52.79	Average Max	V	102	340	54	-21.21	Pass	
1317.765	66.19	2.24	-15.63	52.79	Peak Max	V	102	340	74	-21.21	Pass	
1317.765	35.92	2.24	-15.63	22.52	Average Max	H	100	27	54	-31.48	Pass	
2635.271	60.91	3.11	-11.37	52.65	Peak [Scan]	V	100	0	104.93	-52.28	Pass	NRB
16092.184	43.77	8.98	-0.93	51.83	Peak [Scan]	V	100	0	104.93	-53.10	Pass	NRB

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Date: 1.DEC.2007 17:19:11

### 802.11a Legacy Band-edge @ 5150 MHz with ANT-12

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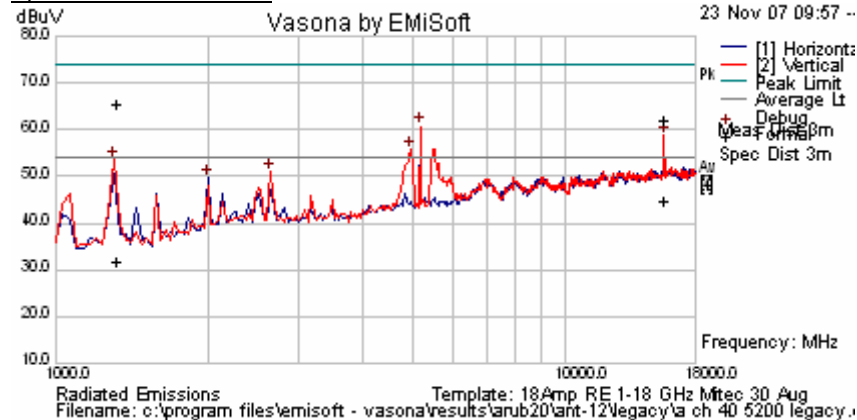


**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
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ARUB20 AP124 - ANT-12 (14dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MBit/s)	Compliant
40	5200	ART 17	99%	a 6 Legacy	Yes

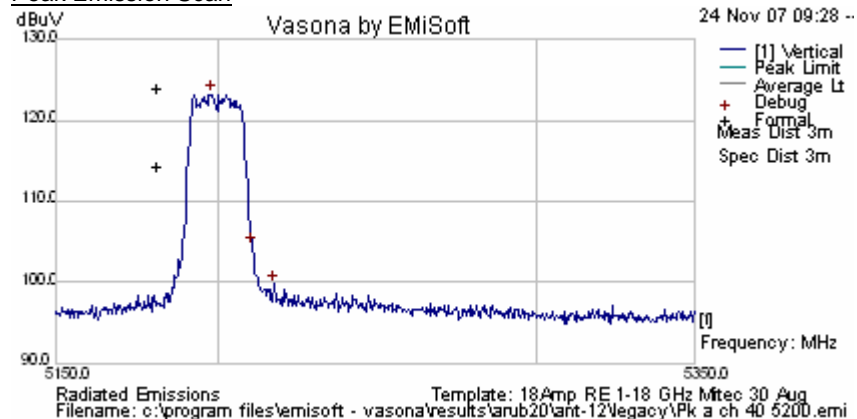
Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**



**Spurious Emission Scan**

**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5198.096	77.94	10.62	34.66	123.22	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
15598.476	52.95	8.37	-1.17	60.14	Peak Max	V	110	298	74	-13.86	Pass	
15598.476	35.43	8.37	-1.17	42.63	Average Max	V	110	298	54	-11.37	Pass	
1329.859	76.95	2.25	-15.58	63.61	Peak Max	V	101	284	74	-10.39	Pass	
1329.859	42.96	2.25	-15.58	29.62	Average Max	V	101	284	54	-24.38	Pass	
2635.271	59.25	3.11	-11.37	50.99	Peak [Scan]	V	100	0	103.22	-52.23	Pass	NRB
1987.976	58.24	2.74	-11.26	49.72	Peak [Scan]	H	100	0	103.22	-53.50	Pass	NRB

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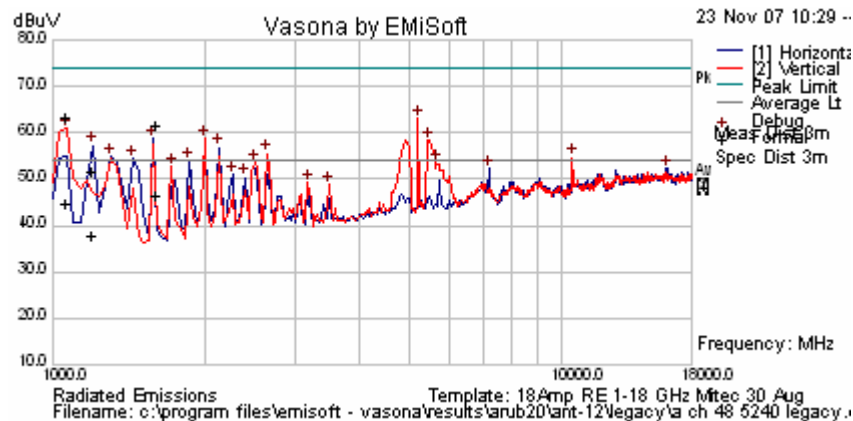


**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
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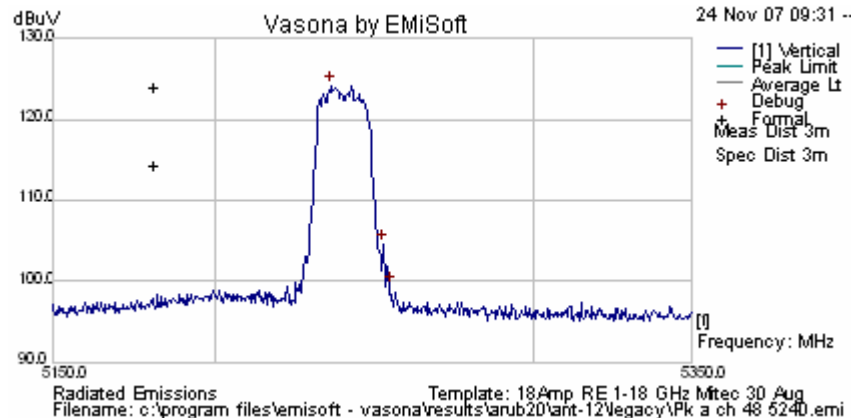
ARUB20 AP124 - ANT-12 (14dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MBit/s)	Compliant
48	5240	ART 17	99%	a 6 Legacy	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**



**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5236.172	78.85	10.62	34.69	124.16	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
1070.561	75.6	2.02	-16.09	61.53	Peak Max	V	100	18	74	-12.47	Pass	
1070.561	56.62	2.02	-16.09	42.55	Average Max	V	100	18	54	-11.45	Pass	
1603.206	71.38	2.46	-14.28	59.55	Peak Max	V	108	180	74	-14.45	Pass	
1603.206	56.36	2.46	-14.28	44.54	Average Max	H	129	42	54	-9.46	Pass	
1203.046	63.48	2.14	-15.85	49.77	Peak Max	V	100	40	74	-24.23	Pass	
1203.046	49.52	2.14	-15.85	35.81	Average Max	H	100	316	54	-18.19	Pass	
1987.976	67.35	2.74	-11.26	58.84	Peak [Scan]	H	100	0	104.16	-45.32	Pass	NRB
5462.926	62.22	4.62	-8.4	58.44	Peak [Scan]	V	100	0	104.16	-45.72	Pass	NRB
2124.248	65.01	2.82	-11.03	56.79	Peak [Scan]	H	100	0	104.16	-47.37	Pass	NRB

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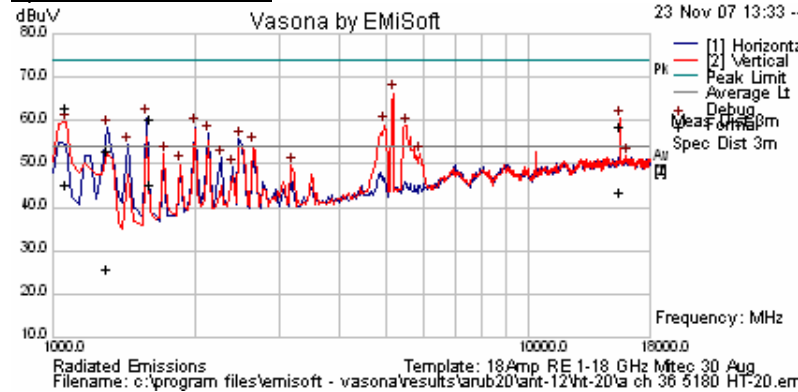


**AP124: 5150-5250GHz ANT-12 (14dBi) HT-20 Data Rates**

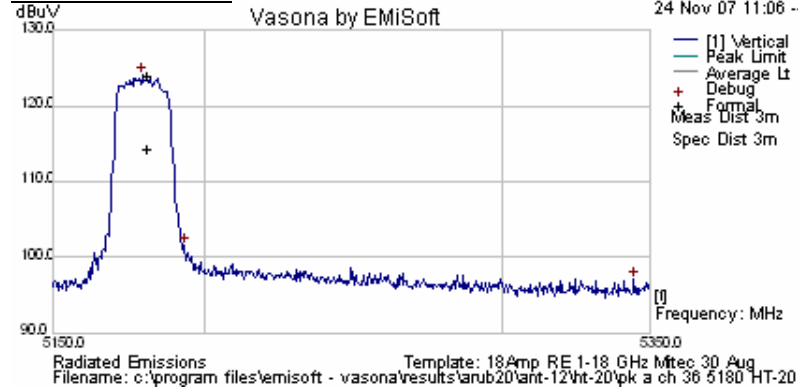
ARUB20 AP124 - ANT-12 (14dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
36	5180	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**

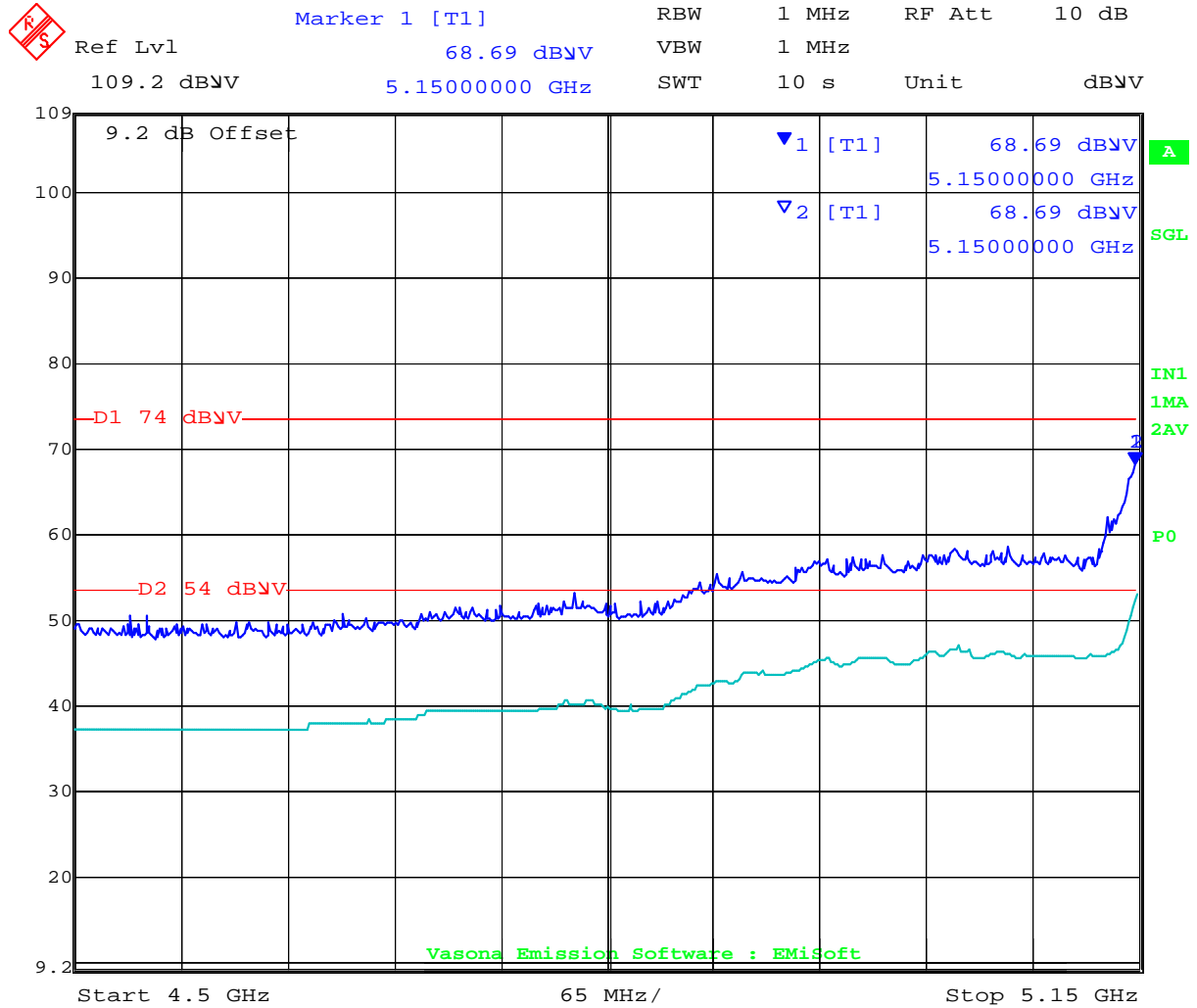


**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5179.659	78.75	10.62	34.65	124.01	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 13.0				Peak Max	V			74	-5.31	Pass	Band-edge
5150.000	ART Power Setting = 13.0				Average Max	V			54	-1.00	Pass	Band-edge
1604.569	70.29	2.46	-14.27	58.48	Peak Max	V	111	182	74	-15.52	Pass	
15543.41	49.31	8.28	-1.04	56.55	Peak Max	V	120	347	74	-17.45	Pass	
1069.92	75	2.02	-16.09	60.93	Peak Max	V	104	25	74	-13.07	Pass	
1304.128	64.26	2.23	-15.68	50.8	Peak Max	V	122	289	74	-23.2	Pass	
1604.569	54.98	2.46	-14.27	43.17	Average Max	H	98	40	54	-10.83	Pass	
15543.41	34.33	8.28	-1.04	41.57	Average Max	V	120	347	54	-12.43	Pass	
1069.92	57.3	2.02	-16.09	43.23	Average Max	V	104	25	54	-10.77	Pass	
1304.128	37.04	2.23	-15.68	23.59	Average Max	H	113	107	54	-30.41	Pass	
5531.062	62.42	4.64	-8.32	58.74	Peak [Scan]	V	100	0	104.01	-45.27	Pass	NRB
1987.976	67.1	2.74	-11.26	58.58	Peak [Scan]	H	100	0	104.01	-45.43	Pass	NRB

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HT-20 Band-edge @ 5150 MHz with ANT-12

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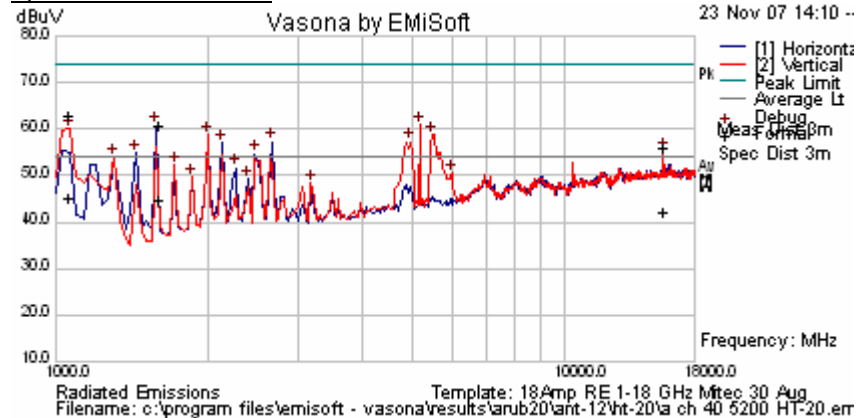


**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
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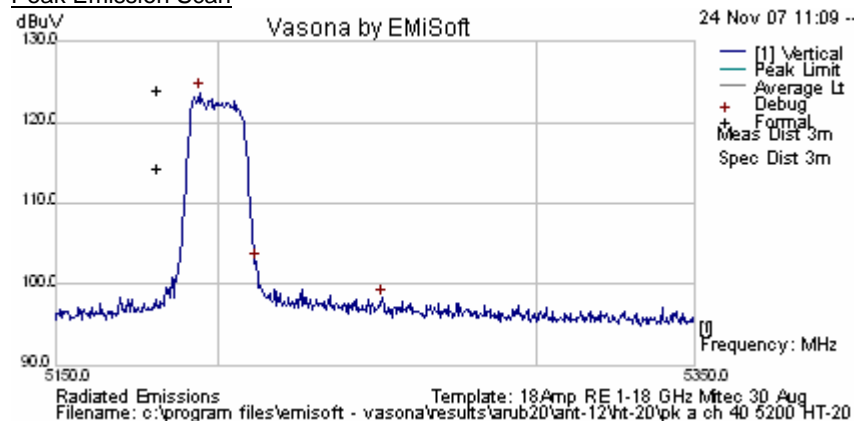
ARUB20 AP124 - ANT-12 (14dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
40	5200	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**



**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5194.489	78.42	10.62	34.66	123.70	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
1604.248	70.71	2.46	-14.27	58.89	Peak Max	V	150	183	74	-15.11	Pass	
1070.04	75	2.02	-16.09	60.93	Peak Max	V	104	39	74	-13.07	Pass	
15604.23	46.72	8.38	-1.16	53.94	Peak Max	V	140	294	74	-20.06	Pass	
1604.248	54.67	2.46	-14.27	42.86	Average Max	H	98	42	54	-11.14	Pass	
1070.04	57.26	2.02	-16.09	43.19	Average Max	V	104	39	54	-10.81	Pass	
15604.23	32.88	8.38	-1.16	40.1	Average Max	V	140	294	54	-13.9	Pass	
1987.976	67.31	2.74	-11.26	58.79	Peak [Scan]	V	100	0	103.70	-44.91	Pass	NRB
2669.339	65.53	3.14	-11.36	57.31	Peak [Scan]	H	100	0	103.70	-46.39	Pass	NRB
2124.248	65.33	2.82	-11.03	57.12	Peak [Scan]	H	100	0	103.70	-46.58	Pass	NRB

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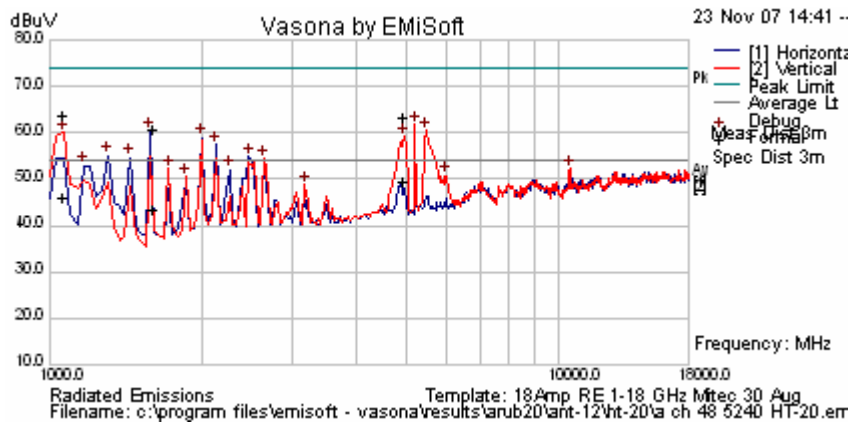


**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
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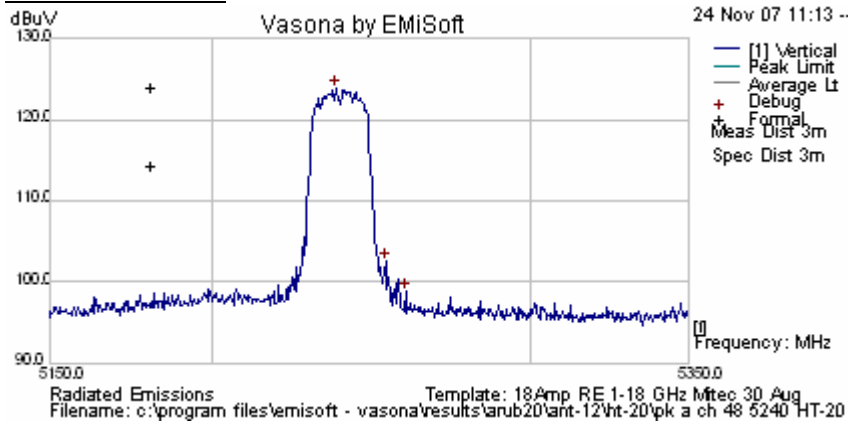
ARUB20 AP124 - ANT-12 (14dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
48	5240	ART 17	99%	6.5 HT-20	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

Spurious Emission Scan



Peak Emission Scan



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5238.577	78.54	10.62	34.7	123.85	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
1605.851	70.71	2.46	-14.26	58.91	Peak Max	V	106	182	74	-15.09	Pass	
1070.401	76.04	2.02	-16.09	61.97	Peak Max	V	105	46	74	-12.03	Pass	
4948.938	65.93	4.58	-9.29	61.21	Peak Max	V	103	130	74	-12.79	Pass	
1605.851	53.26	2.46	-14.26	41.46	Average Max	H	98	40	54	-12.54	Pass	
1070.401	57.9	2.02	-16.09	43.83	Average Max	V	105	46	54	-10.17	Pass	
4948.938	51.98	4.58	-9.29	47.26	Average Max	V	103	130	54	-6.74	Pass	
1987.976	67.56	2.74	-11.26	59.04	Peak [Scan]	H	100	0	103.85	-44.81	Pass	NRB
2124.248	65.78	2.82	-11.03	57.56	Peak [Scan]	H	100	0	103.85	-46.29	Pass	NRB
2464.93	62.99	2.98	-11.17	54.80	Peak [Scan]	H	100	0	103.85	-49.05	Pass	NRB

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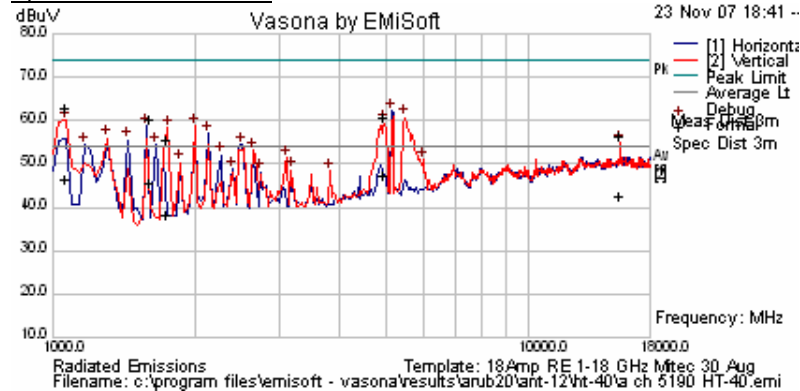
**AP124: 5150-5250GHz ANT-12 (14dBi) HT-40 Data Rates**

ARUB20 AP124 - ANT-12 (14dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
	5190	ART 17	99%	13.5 HT-40	Yes

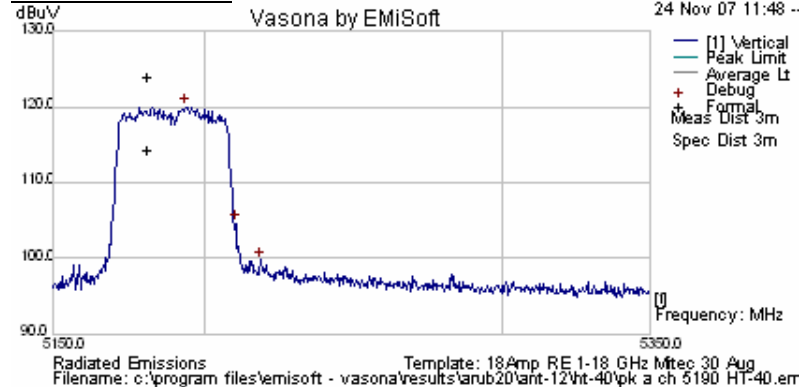
Three antennas operating simultaneously

NRB = None Restrictive Band

**Spurious Emission Scan**

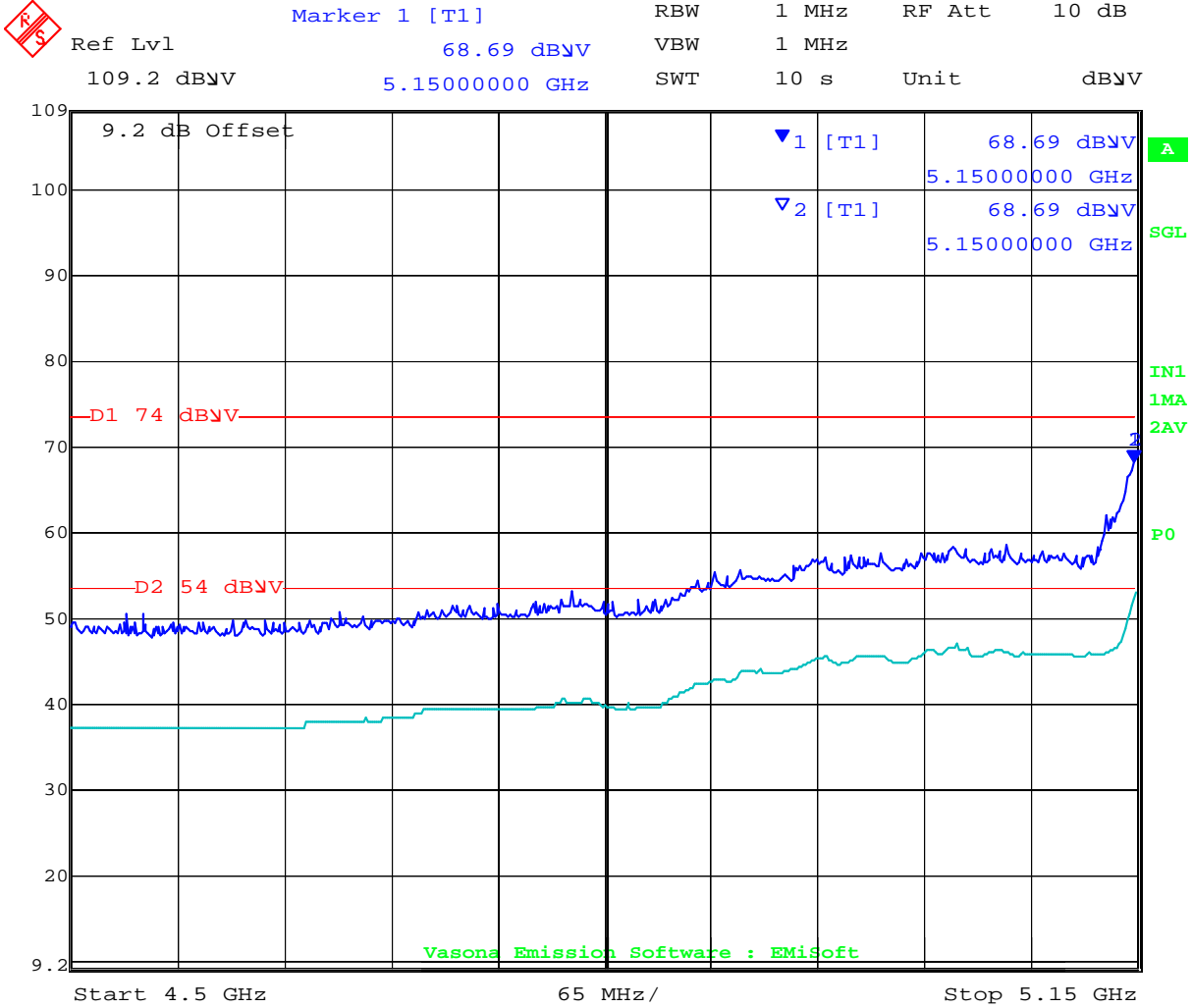


**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5194.088	74.74	10.62	34.66	120.02	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
5150.000	ART Power Setting = 7.0				Peak Max	V			74	-5.31	Pass	Band-edge
5150.000					Average Max	V			54	-0.95	Pass	Band-edge
1068.136	75	2.02	-16.09	60.93	Peak Max	V	105	27	74	-13.07	Pass	
4954.534	63.48	4.58	-9.31	58.76	Peak Max	V	100	137	74	-15.24	Pass	
1603.619	70.16	2.46	-14.28	58.34	Peak Max	V	105	181	74	-15.66	Pass	
1736.201	64.13	2.56	-13.29	53.41	Peak Max	V	104	201	74	-20.59	Pass	
15574.43	47.22	8.33	-1.2	54.35	Peak Max	V	102	312	74	-19.65	Pass	
1068.136	58.37	2.02	-16.09	44.3	Average Max	V	105	27	54	-9.7	Pass	
4954.534	50.07	4.58	-9.31	45.34	Average Max	V	100	137	54	-8.66	Pass	
1603.619	55.61	2.46	-14.28	43.79	Average Max	H	100	42	54	-10.21	Pass	
1736.201	47.06	2.56	-13.29	36.34	Average Max	V	104	201	54	-17.66	Pass	
15574.43	33.23	8.33	-1.2	40.36	Average Max	V	102	312	54	-13.64	Pass	
5496.994	64.48	4.62	-8.38	60.72	Peak [Scan]	V	100	0	100.02	-39.30	Pass	NRB
1987.976	67.21	2.74	-11.26	58.69	Peak [Scan]	V	100	0	100.02	-41.33	Pass	NRB

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HT-40 Band-edge @ 5150 MHz with ANT-12

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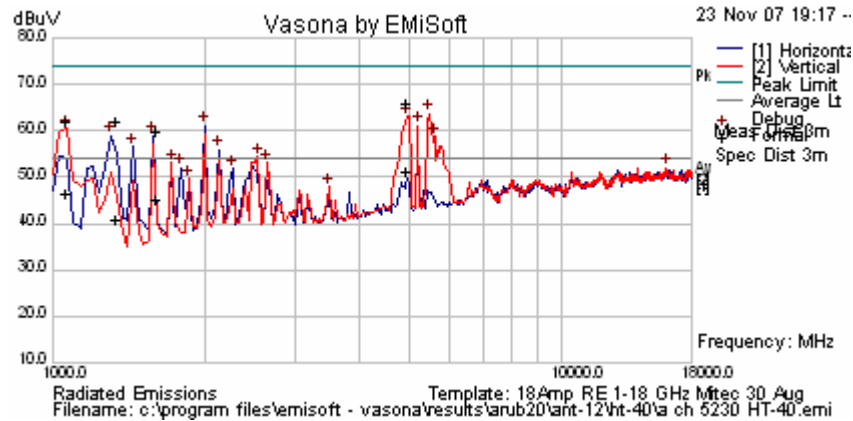


**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
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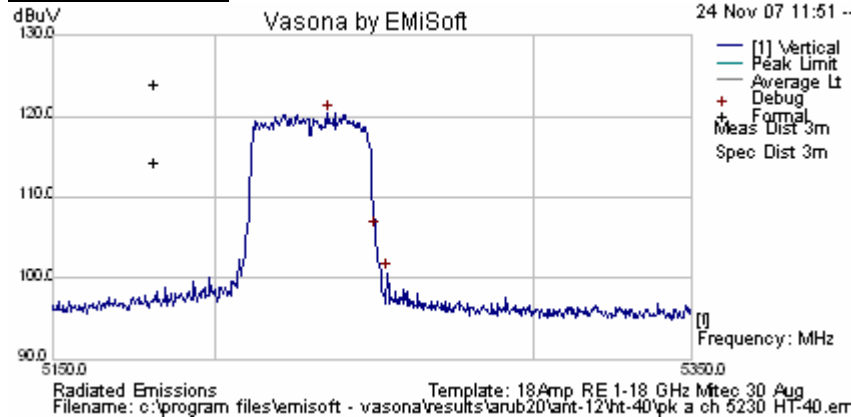
ARUB20 AP124 - ANT-12 (14dBi) Test Configuration					
Channel	Freq (MHz)	Software Pwr Setting	Duty Cycle	Data Rate (MCS)	Compliant
	5230	ART 17	99%	13.5 HT-40	Yes

Three antennas operating simultaneously  
 NRB = None Restrictive Band

**Spurious Emission Scan**



**Peak Emission Scan**



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
5235.371	75.07	10.62	34.69	120.38	Peak [Scan]	V	100	0	N/A	N/A	N/A	Fundamental
4946.894	68.7	4.57	-9.29	63.98	Peak Max	V	103	128	74	-10.02	Pass	
1066.483	74.16	2.02	-16.09	60.09	Peak Max	V	100	15	74	-13.91	Pass	
1603.747	69.89	2.46	-14.28	58.07	Peak Max	V	110	177	74	-15.93	Pass	
1332.224	73.34	2.25	-15.57	60.02	Peak Max	V	100	305	74	-13.98	Pass	
4946.894	53.73	4.57	-9.29	49.02	Average Max	V	103	128	54	-4.98	Pass	
1066.483	58.71	2.02	-16.09	44.64	Average Max	V	100	15	54	-9.36	Pass	
1603.747	55.09	2.46	-14.28	43.27	Average Max	H	139	43	54	-10.73	Pass	
1332.224	52.36	2.25	-15.57	39.03	Average Max	H	108	79	54	-14.97	Pass	
5496.994	67.58	4.62	-8.38	63.83	Peak [Scan]	V	100	0	100.38	-36.55	Pass	NRB
5224.449	65.69	4.62	-9.09	61.22	Peak [Scan]	V	100	0	100.38	-39.16	Pass	NRB
1987.976	69.71	2.74	-11.26	61.19	Peak [Scan]	H	100	0	100.38	-39.19	Pass	NRB

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## Specification

### Limits

**15.407 (b)(2).** All emissions outside of the 5,150-5,350MHz band shall not exceed an EIRP of -27dBm/MHz.

**§15.205 (a)** Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

**§15.205 (a)** Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

**§15.209 (a)** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

**RSS-210 §A9.3(2)** For transmitters operating in the 5250-5350 MHz band, all emissions outside the 5150-5350 MHz band shall not exceed -27 dBm/MHz e.i.r.p. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band shall not exceed out of band emission limit of 27 dBm/MHz e.i.r.p. in the 5150-5250 MHz band in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the 5150-5250 MHz band and shall be labeled "for indoor use only".

**RSS-Gen §4.7** The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate of carrier frequency), or from 30 MHz, whichever is the lowest frequency, to the 5<sup>th</sup> harmonic of the highest frequency generated without exceeding 40 GHz.

#### **RSS-Gen §6** Receiver Spurious Emission Standard

If a radiated measurement is made, all spurious emissions shall comply with the limits of the following Table. The resolution bandwidth of the spectrum analyzer shall be 100 kHz for spurious emission measurements below 1.0 GHz and 1.0 MHz for measurements above 1.0 GHz

#### **§15.209 (a)** Limit Matrix

Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

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### Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB
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### Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions'	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

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### 5.1.7.2. Receiver Radiated Spurious Emissions (above 1 GHz)

#### Industry Canada RSS-Gen §4.8, §6

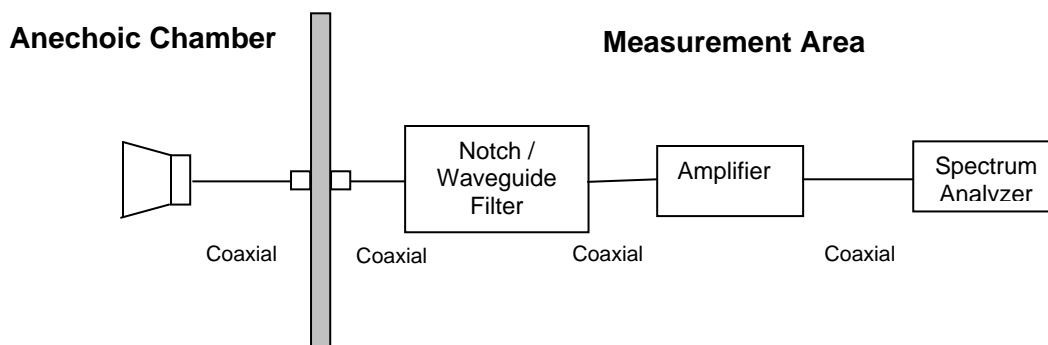
#### Test Procedure

Radiated emissions above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.

All measurements on any frequency or frequencies over 1 MHz are based on the use of measurement instrumentation employing an average detector function. All measurements above 1 GHz were performed using a minimum resolution bandwidth of 1 MHz.

All Sectors of the EUT were tested simultaneously

#### Test Measurement Set up



Measurement set up for Radiated Emission Test

#### Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

$$FS = R + AF + CORR - FO$$

where: FS = Field Strength

R = Measured Spectrum analyzer Input Amplitude

AF = Antenna Factor

CORR = Correction Factor = CL – AG + NFL

CL = Cable Loss

AG = Amplifier Gain

FO = Distance Falloff Factor

NFL = Notch Filter Loss or Waveguide Loss





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For example:

Given receiver input reading of 51.5 dB $\mu$ V; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

$$FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3 \text{ dB}\mu\text{V/m}$$

Conversion between dB $\mu$ V/m (or dB $\mu$ V) and  $\mu$ V/m (or  $\mu$ V) are done as:

$$\text{Level (dB}\mu\text{V/m)} = 20 * \text{Log (level (\mu\text{V/m}))}$$

$$40 \text{ dB}\mu\text{V/m} = 100 \mu\text{V/m}$$

$$48 \text{ dB}\mu\text{V/m} = 250 \mu\text{V/m}$$

Section 5.1.6.1 Transmitter Spurious above 1 GHz identifies that emissions peaking above 54 dB $\mu$ V/m emanate from the EUT and not transmitted through the antenna port. These (1 – 3.5 GHz) emissions were formally measured and characterized and are not considered when examining Receiver Radiated Spurious above 1 GHz.

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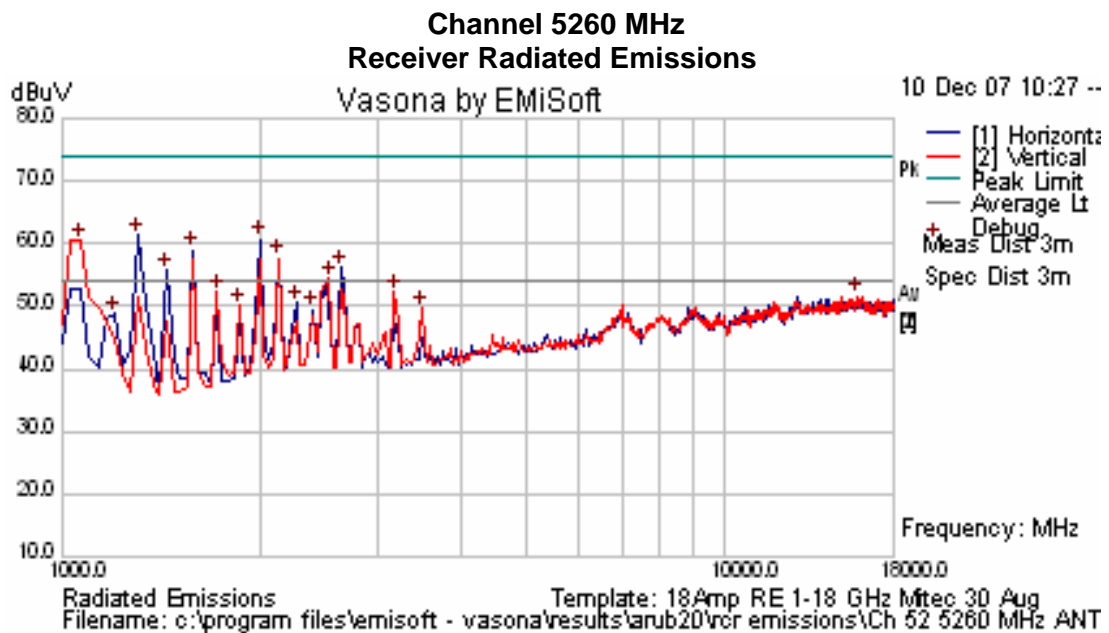


**Receiver Radiated Spurious Emissions above 1 GHz**

Test Setup – Channel 5200 MHz, all modes Legacy, HT-20, HT-40, Integral Antenna.

TABLE OF RESULTS –

Freq. (MHz)	Pol. (H/V)	Raw Reading (dB $\mu$ V/m)	Correction Factor (dB)	Corrected Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)



See Section 5.1.6.1 for characterization of emissions (1 – 3.5 GHz) breaking the 54 dB $\mu$ V/m limit line.

No receiver emissions were observed.

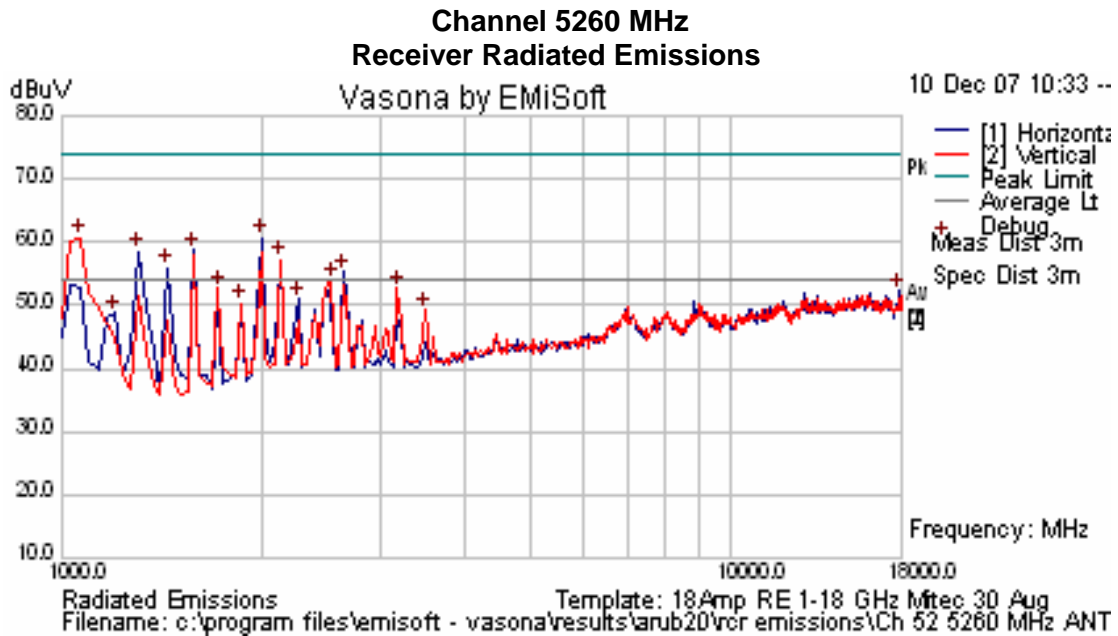


**Receiver Radiated Spurious Emissions above 1 GHz**

Test Setup – Channel 5200 MHz, all modes Legacy, HT-20, HT-40, Antenna ANT-10.

TABLE OF RESULTS –

Freq. (MHz)	Pol. (H/V)	Raw Reading (dB $\mu$ V/m)	Correction Factor (dB)	Corrected Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)



See Section 5.1.6.1 for characterization of emissions (1 – 3.5 GHz) breaking the 54 dB $\mu$ V/m limit line.

No receiver emissions were observed.



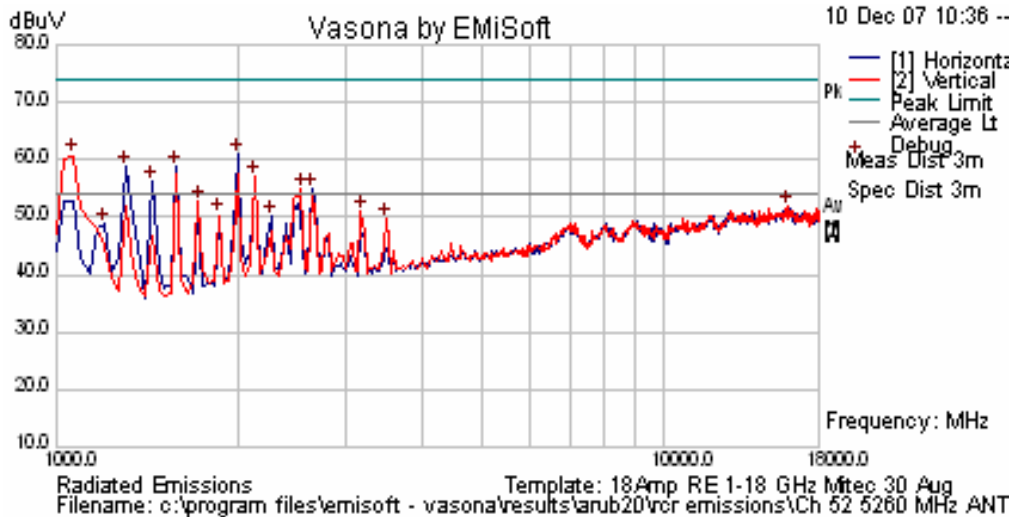
**Receiver Radiated Spurious Emissions above 1 GHz**

Test Setup – Channel 5200 MHz, all modes Legacy, HT-20, HT-40, Antenna ANT-12

TABLE OF RESULTS –

Freq. (MHz)	Pol. (H/V)	Raw Reading (dB $\mu$ V/m)	Correction Factor (dB)	Corrected Field Strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)

**Channel 5260 MHz  
Receiver Radiated Emissions**



See Section 5.1.6.1 for characterization of emissions (1 – 3.5 GHz) breaking the 54 dB $\mu$ V/m limit line.

No receiver emissions were observed.



## Specification

### Receiver Radiated Spurious Emissions

#### Industry Canada RSS-Gen §4.8,

The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tunable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

#### RSS-Gen §6

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.

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ )	Field Strength ( $\text{dB}\mu\text{V/m}$ )	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

### Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB
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### Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions'	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

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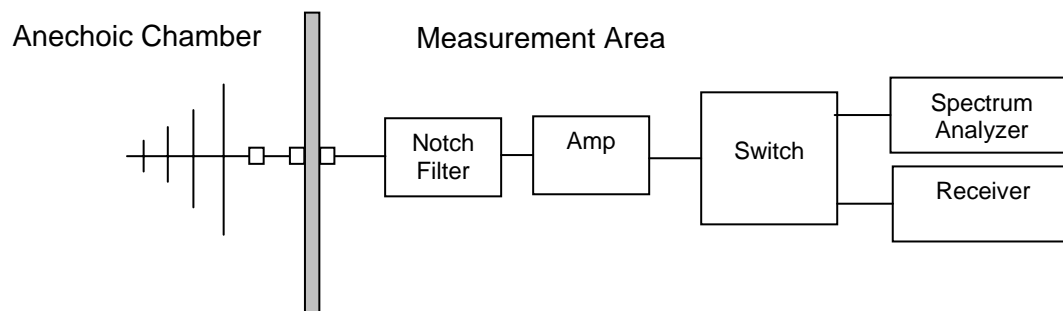
### 5.1.7.3. Radiated Spurious Emissions (30M-1 GHz)

**FCC, Part 15 Subpart C §15.407(b)(6); §15.205(a); §15.209(a)**  
**Industry Canada RSS-210 §2.2**

#### Test Procedure

Preliminary radiated emissions are measured in the anechoic chamber at a 10-meter distance on every azimuth in both horizontal and vertical polarity. The emissions are recorded with a spectrum analyzer in peak hold mode. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed. The anechoic chamber test set-up is identified in Section 6 Test Set-Up Photographs.

The EUT had two methods of powering on ac/dc converter and Power over Ethernet, Both modes were tested.



#### Test Measurement Set up

#### Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver.

$$FS = R + AF + CORR$$

where:

FS = Field Strength

R = Measured Receiver Input Amplitude

AF = Antenna Factor

CORR = Correction Factor = CL – AG + NFL

CL = Cable Loss

AG = Amplifier Gain



**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
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For example:

Given a Receiver input reading of 51.5dB $\mu$ V; Antenna Factor of 8.5dB; Cable Loss of 1.3dB; Falloff Factor of 0dB, an Amplifier Gain of 26dB and Notch Filter Loss of 1dB. The Field Strength of the measured emission is:

$$FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3\text{dB}\mu\text{V/m}$$

Conversion between dB $\mu$ V/m (or dB $\mu$ V) and  $\mu$ V/m (or  $\mu$ V) are done as:

$$\text{Level (dB}\mu\text{V/m)} = 20 * \text{Log (level (\mu\text{V/m}))}$$

$$40 \text{ dB}\mu\text{V/m} = 100\mu\text{V/m}$$

$$48 \text{ dB}\mu\text{V/m} = 250\mu\text{V/m}$$

### **Measurement Results for Spurious Emissions (30 MHz – 1 GHz)**

Ambient conditions.

Temperature: 17 to 23 °C      Relative humidity: 31 to 57 %      Pressure: 999 to 1012 mbar

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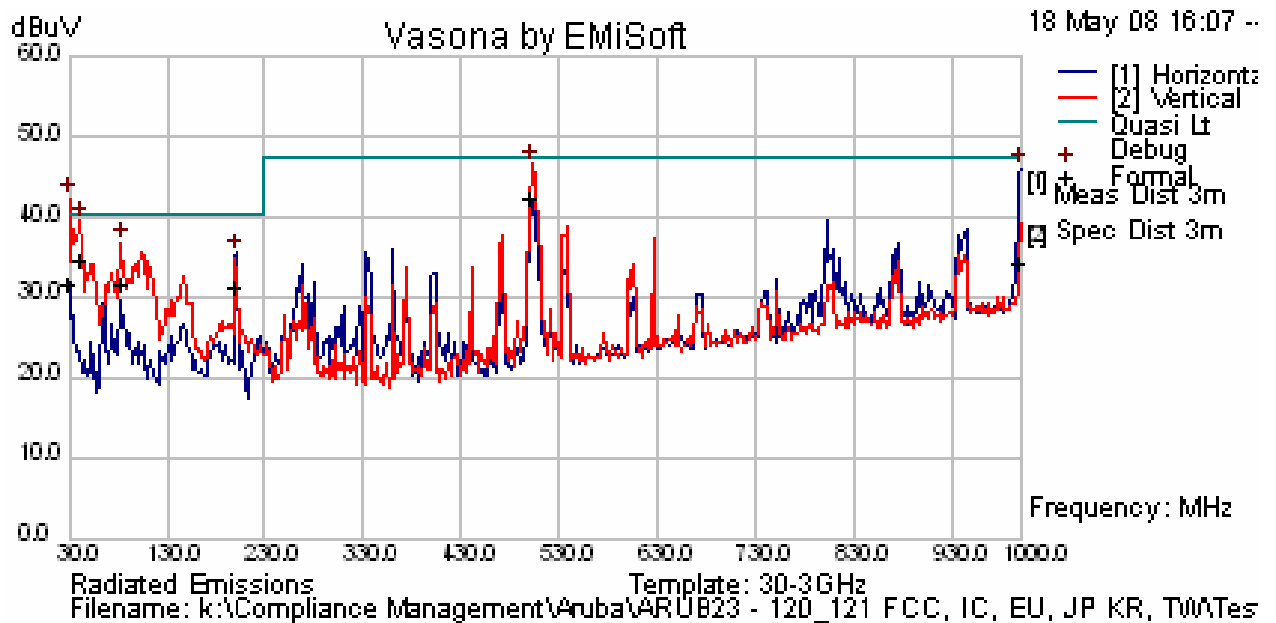


**TABLE OF RESULTS**

EUT powered via ac/dc Convertor – AP120

Freq. (MHz)	Peak (dBuV/m)	QP (dBuV/m)	QP Lmt (dBuV/m)	QP Margin (dB)	Angle (deg)	Height (cm)	Polarity
30.00	42.42	31.72	40.5	-8.78	91	400	V
42.108	39.65	34.79	40.5	-5.71	133	100	V
501.258	46.55	42.56	47.5	-4.94	142	100	V
998.937	46.19	34.33	47.5	-13.17	128	160	H
85.551	36.86	31.72	40.5	-8.78	238	108	V
200.469	35.59	31.35	40.5	-9.15	232	100	H

**Radiated Spurious Emissions 30 MHz to 1 GHz – ac/dc Convertor**



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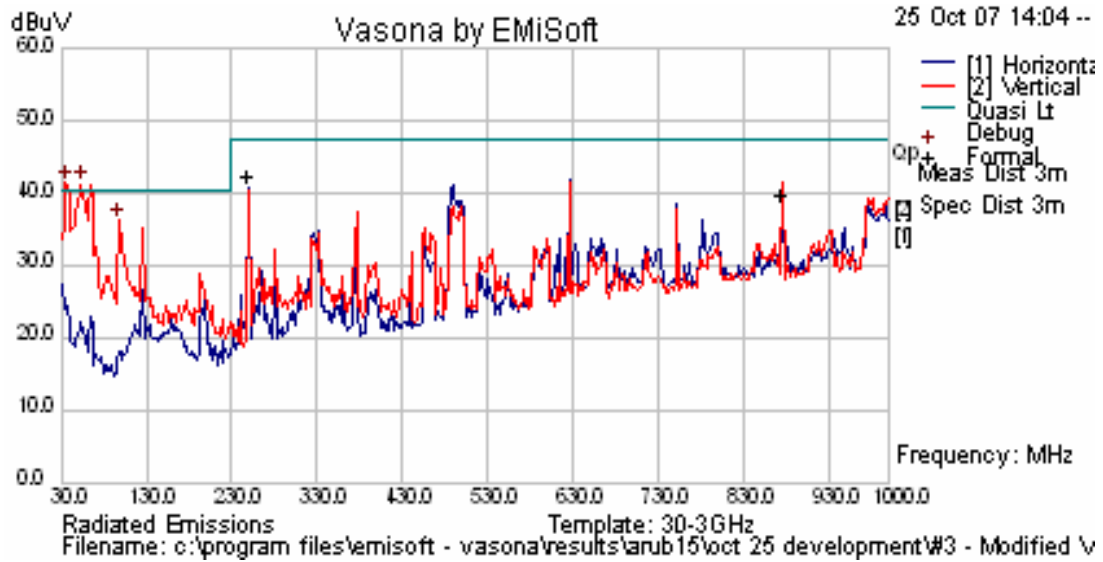


**TABLE OF RESULTS**

EUT powered via POE

Freq. (MHz)	Peak (dBuV/m)	QP (dBuV/m)	QP Lmt (dBuV/m)	QP Margin (dB)	Angle (deg)	Height (cm)	Polarity
38.846	41.38	34.54	40.5	-5.96	243	98	V
55.443	41.3	38.15	40.5	-2.35	44	101	V
98.097	36.18	34.47	40.5	-6.03	80	118	V

**Radiated Spurious Emissions 30 MHz to 1 GHz - POE**



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## Specification

### Limits

**§15.407(b)(6)** Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209.

**§15.205 (a)** Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

**§15.205 (a)** Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

**§15.209 (a)** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

**RSS-210 §2.2** refers to Section 2.7 Table 2 below;-

Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

### Laboratory Measurement Uncertainty for Radiated Emissions

Measurement uncertainty	+5.6/ -4.5 dB
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### Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions'	0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312

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### 5.1.8. AC Wireline Conducted Emissions (150 kHz – 30 MHz)

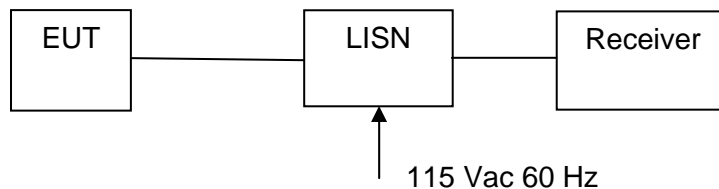
**FCC, Part 15 Subpart C §15.407(b)(6)/15.207**

**Industry Canada RSS-Gen §7.2.2**

#### **Test Procedure**

The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

#### **Test Measurement Set up**



Measurement set up for AC Wireline Conducted Emissions Test

#### **Measurement Results for AC Wireline Conducted Emissions (150 kHz – 30 MHz)**

Ambient conditions.

Temperature: 17 to 23 °C    Relative humidity: 31 to 57 %    Pressure: 999 to 1012 mbar

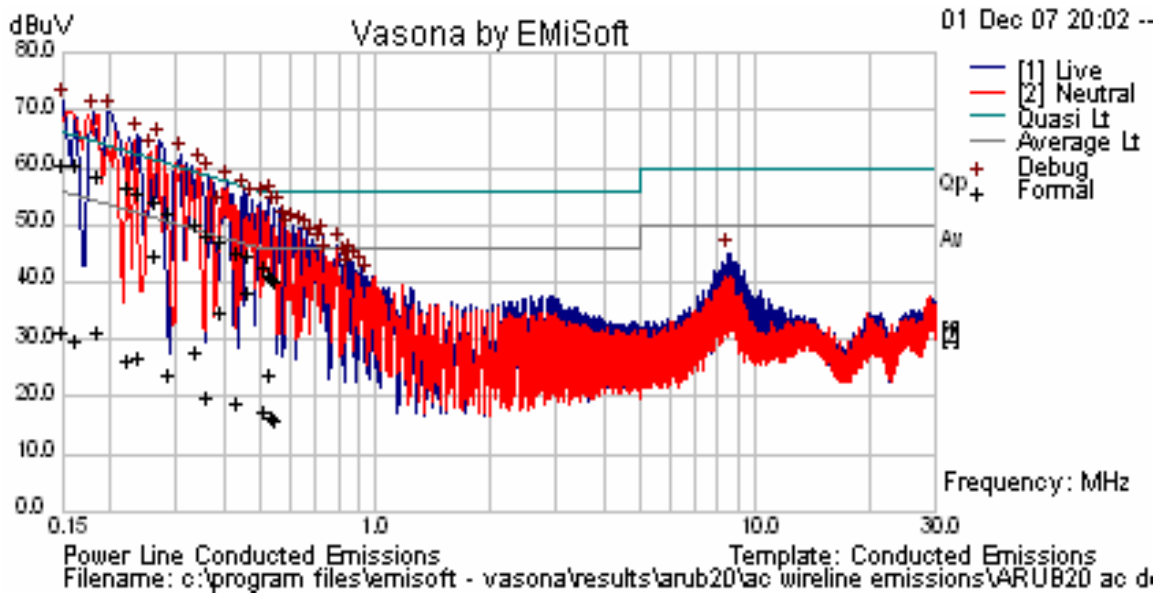
AC Wireline Emissions 115Vac 60Hz  
Transmitter Power Level: Maximum



**TABLE OF RESULTS – ac/dc Converter**

Freq (MHz)	Line	Peak (dB $\mu$ V)	QP (dB $\mu$ V)	QP Limit (dB $\mu$ V)	QP Margin (dB)	Ave. (dB $\mu$ V)	Ave. Limit (dB $\mu$ V)	Ave. Margin (dB)
0.150	Live	71.57	58.36	65.99	-7.64	29.19	55.99	-26.80
0.187	Live	69.74	55.98	64.18	-8.21	29.05	54.18	-25.13
0.265	Live	64.52	51.52	61.27	-9.75	42.39	51.27	-8.89
0.392	Live	52.92	45.03	58.02	-12.99	32.22	48.02	-15.8
0.463	Live	55.83	42.49	56.65	-14.16	35.68	46.65	-10.97
0.534	Live	54.53	38.97	56.00	-17.03	21.39	46.00	-24.61

**AC Wireline Conducted Emissions –150 kHz – 30 MHz) ac/dc Converter**



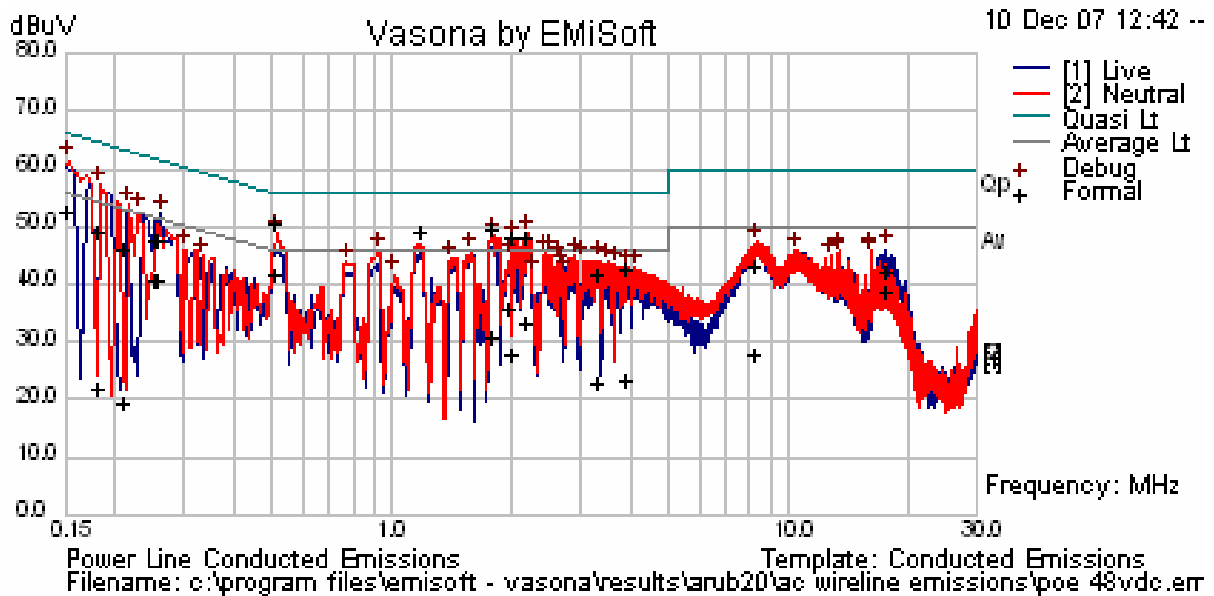
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**TABLE OF RESULTS – POE**

Freq (MHz)	Line	Peak (dBμV)	QP (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Ave. (dBμV)	Ave. Limit (dBμV)	Ave. Margin (dB)
0.154	Neutral		50.3	65.78	-15.48	50.3	55.78	-5.48
0.515	Neutral		48.08	56.00	-7.92	39.28	46.00	-6.72
2.204	Neutral		45.93	56.00	-10.07	30.93	46.00	-15.17
1.803	Neutral		47.31	56.00	-8.69	28.60	46.00	-17.40
2.039	Neutral		45.94	56.00	-10.06	25.65	46.00	-20.35
1.195	Neutral		44.77	56.00	-11.23	23.71	46.00	-22.29

**AC Wireline Conducted Emissions –150 kHz – 30 MHz) POE**



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## Specification

### Limit

**§15.407 (b)(6);** Any U-NII devices using an AC power line are required to comply also with the limits set forth in Section 15.207.

**§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  $\mu\Omega$  line impedance stabilization network (LISN), see §15.207 (a) matrix below. 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.

#### RSS-Gen §7.2.2

The radio frequency voltage that is conducted back into the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table below. The tighter limit applies at the frequency range boundaries.

### §15.207 (a) and RSS-Gen §7.2.2 Limit Matrix

The lower limit applies at the boundary between frequency ranges

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ 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

### Laboratory Measurement Uncertainty for Conducted Emissions

Measurement uncertainty	$\pm 2.64$ dB
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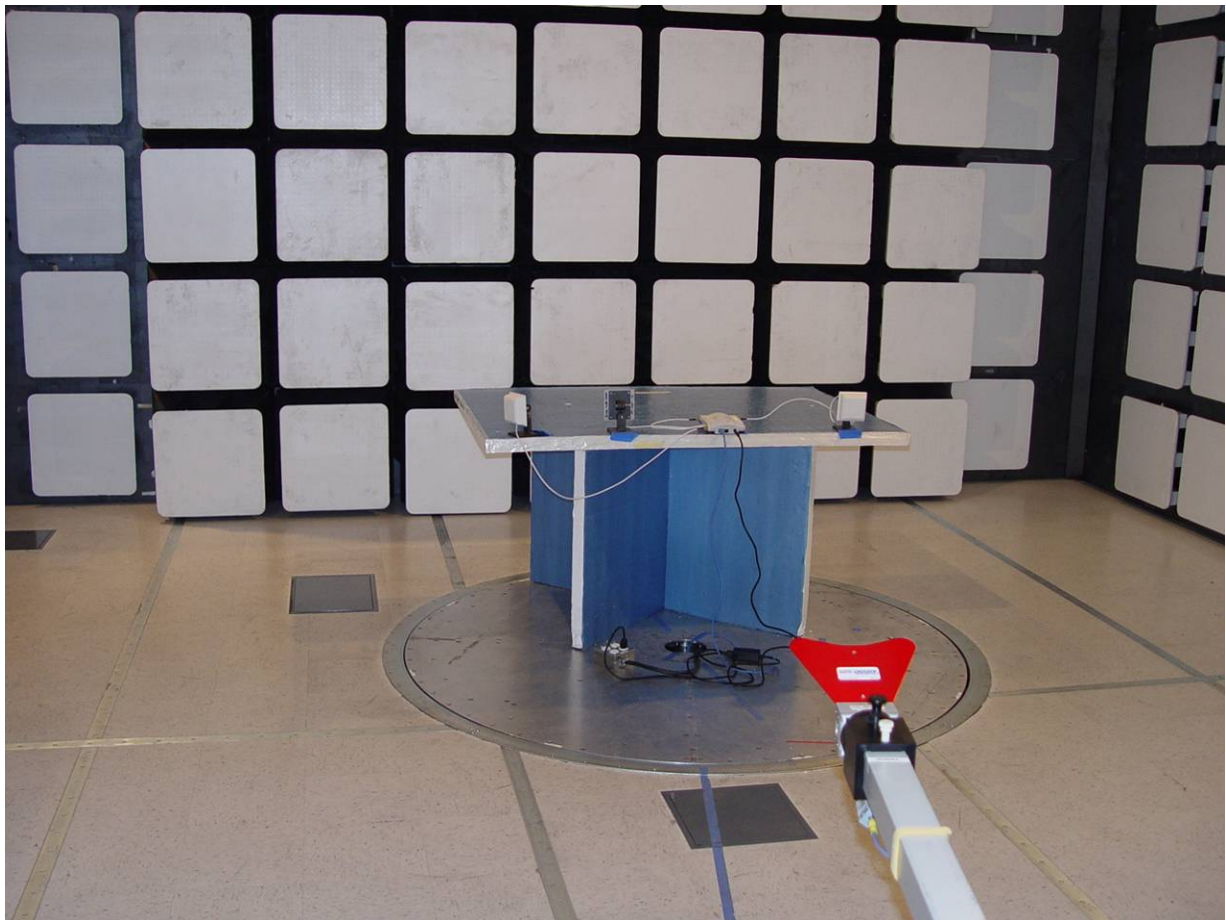
### Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-EMC-01 'Measurement of Conducted Emissions'	0158, 0184, 0193, 0190, 0293, 0307

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## 6. PHOTOGRAPHS

### 6.1. Radiated Emissions > 1GHz



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## 6.2. Radiated Emissions < 1GHz with Power Convertor



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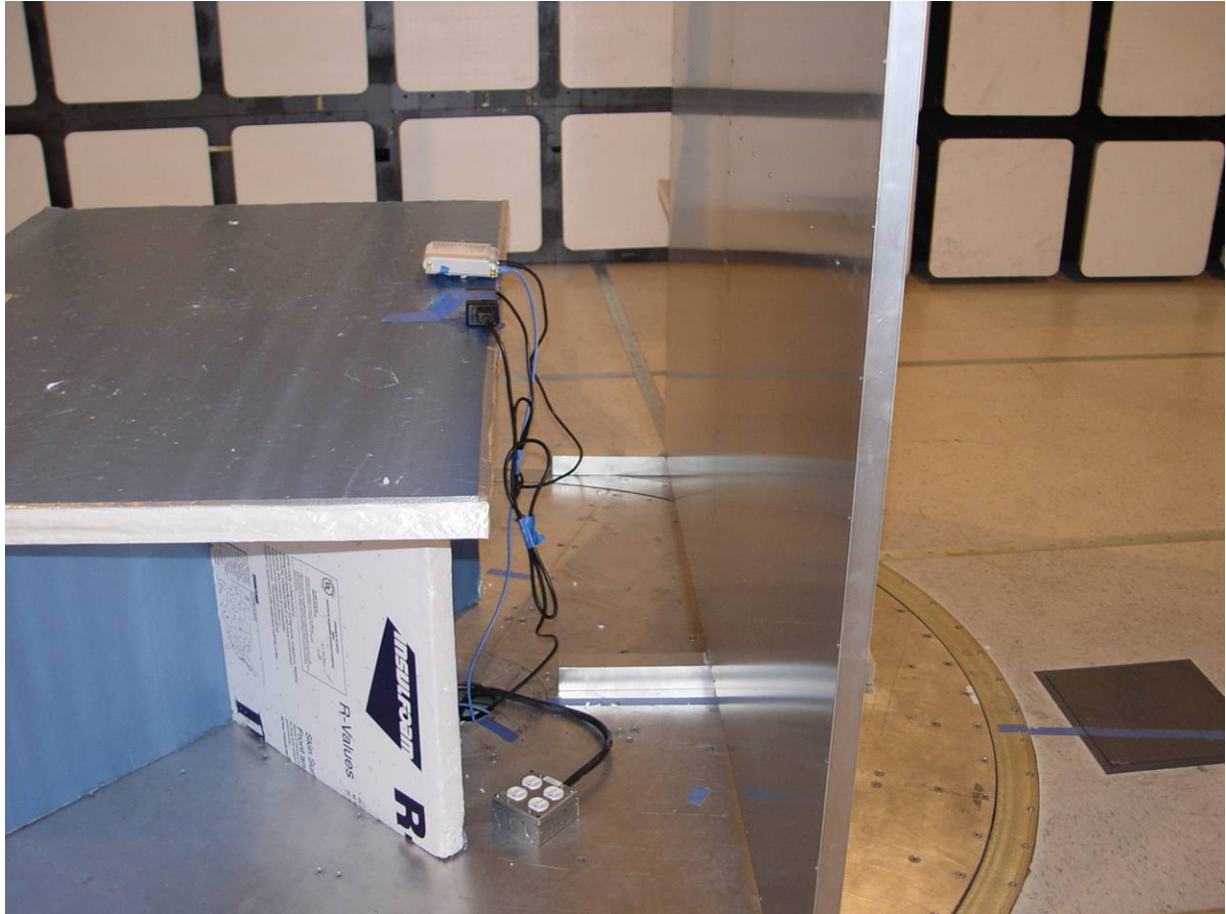
### 6.3. Radiated Emissions < 1GHz with POE (Power Over EtherNet)



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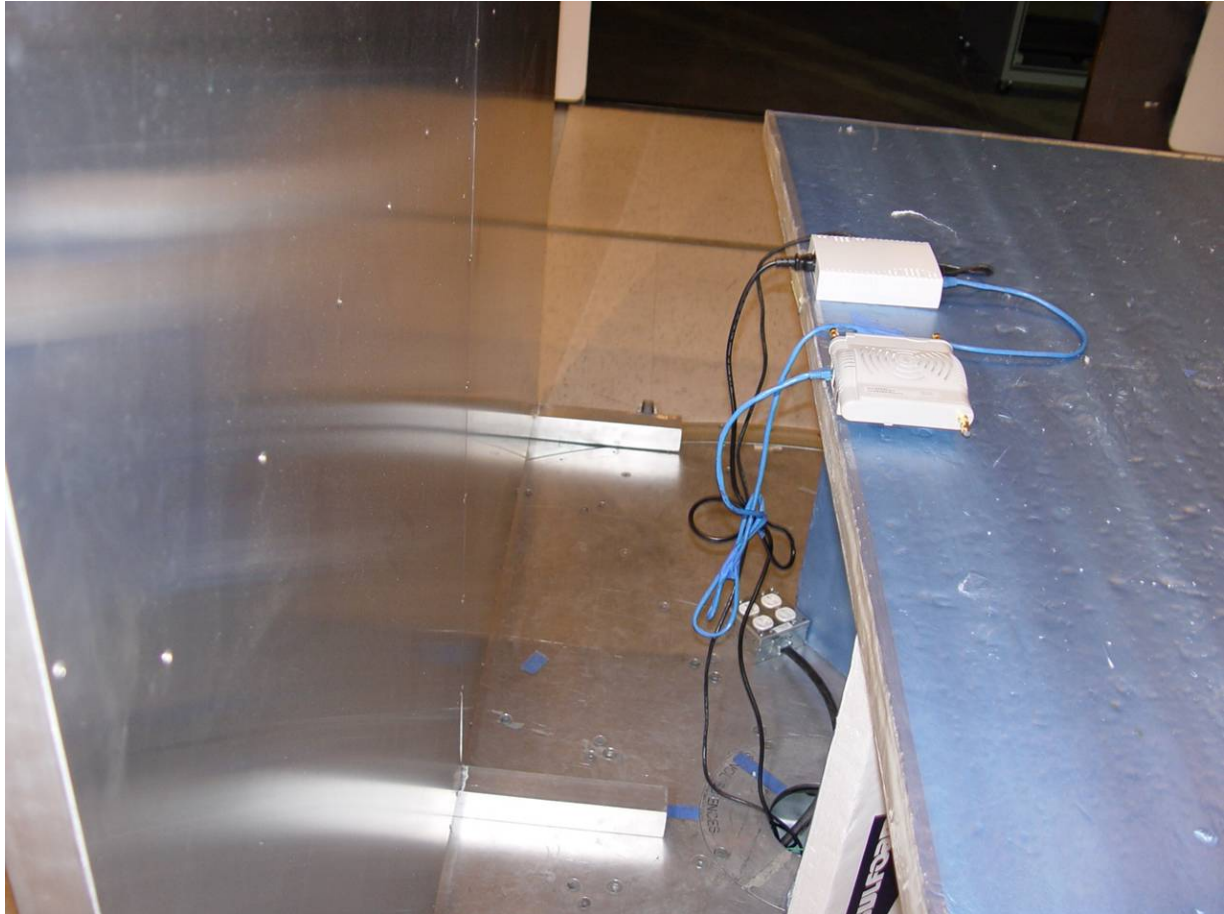
#### 6.4. AC Wireline Conducted Emissions ac/dc Convertor



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## 6.5. AC Wireline Conducted Emissions POE



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## 6.6. General Measurement Test Set-Up



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**Title:** Aruba AP120,121 802.11a/b/g/n AP  
**To:** FCC 47 CFR Part 15.407 & IC RSS-210  
**Serial #:** ARUB23-A4 Rev A  
**Issue Date:** 23rd May 2008  
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## 7. TEST EQUIPMENT DETAILS

Asset #	Instrument	Manufacturer	Part #	Serial #
0088	Spectrum Analyzer	Hewlett Packard	8564E	3410A00141
0134	Amplifier	Com Power	PA 122	181910
0158	Barometer /Thermometer	Control Co.	4196	E2846
0193	EMI Receiver	Rhode & Schwartz	ESI 7	838496/007
0252	SMA Cable	Megaphase	Sucoflex 104	None
0310	2m SMA Cable	Micro-Coax	UFA210A-0-0787-3G03G0	209089-001
0312	3m SMA Cable	Micro-Coax	UFA210A-1-1181-3G0300	209092-001
0313	Coupler	Hewlett Packard	86205A	3140A01285
0314	30dB N-Type Attenuator	ARRA	N9444-30	1623
0070	Power Meter	Hewlett Packard	437B	3125U11552
0116	Power Sensor	Hewlett Packard	8485A	3318A19694
0117	Power Sensor	Hewlett Packard	8487D	3318A00371
0184	Pulse Limiter	Rhode & Schwartz	ESH3Z2	357.8810.52
0190	LISN	Rhode & Schwartz	ESH3Z5	836679/006
0293	BNC Cable	Megaphase	1689 1GVT4	15F50B001
0301	5.6 GHz Notch Filter	Micro-Tronics	RBC50704	001
0302	5.25 GHz Notch Filter	Micro-Tronics	BRC50703	002
0303	5.8 GHz Notch Filter	Micro-Tronics	BRC50705	003
0304	2.4GHzHz Notch Filter	Micro-Tronics	--	001
0307	BNC Cable	Megaphase	1689 1GVT4	15F50B002
0335	1-18GHz Horn Antenna	ETS- Lindgren	3117	00066580
0337	Amplifier	MiCOM Labs	--	--
0338	Antenna	Sunol Sciences	JB-3	A052907

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