

***Electromagnetic Emissions Test Report  
and  
Application for Grant of Equipment Authorization  
pursuant to  
FCC Part 15, Subpart C (15.247) DTS Specifications  
for an  
Intentional Radiator on the  
Aruba Networks  
Model: Aruba 52***

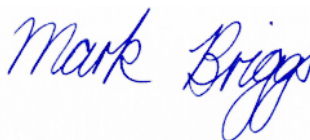
FCC ID: Q9DARUBA52

GRANTEE: Aruba Networks  
180 Great Oaks  
San Jose, CA 95119

TEST SITE: Elliott Laboratories, Inc.  
684 W. Maude Avenue  
Sunnyvale, CA 94086

REPORT DATE: June 20, 2003

FINAL TEST DATE: June 10 and June 11, 2003



AUTHORIZED SIGNATORY:

\_\_\_\_\_  
Mark Briggs  
Director of Engineering



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**DECLARATIONS OF COMPLIANCE**

Equipment Name and Model:  
Aruba 52

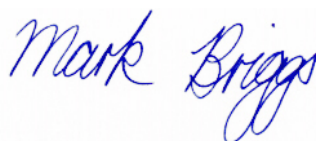
Manufacturer:  
Aruba Networks  
180 Great Oaks  
San Jose, CA 95119

Tested to applicable standards:  
RSS-210, Issue 5, November 2001 (Low Power License-Exempt Radiocommunication Devices)  
FCC Part 15.247 (DTS)

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 SV2 Dated August 12, 2001  
Departmental Acknowledgement Number: IC2845 SV4 Dated July 19, 2001

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above mentioned departmental standards (through the use of ANSI C63.4 as detailed in section 5.3 of RSS-210, Issue 5); and that the equipment performed in accordance with the data submitted in this report.



Signature	_____
Name	Mark Briggs
Title	Director of Engineering
Company	Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA

Date: June 20, 2003

Maintenance of compliance with the above standards is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

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**SCOPE**

An electromagnetic emissions test has been performed on the Aruba Networks model Aruba 52 pursuant to Subpart C of Part 15 of FCC Rules for intentional radiators and RSS-210 Issue 5 for licence-exempt low power devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 as outlined in Elliott Laboratories test procedures.

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Aruba Networks model Aruba 52 and therefore apply only to the tested sample. The sample was selected and prepared by Loren Vorreiter of Aruba Networks

**OBJECTIVE**

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules and RSS-210 Issue 5 for license-exempt low power devices for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units which are subsequently manufactured.

**SUMMARY OF RESULTS**

FCC Part 15 Section	RSS 210 Section	Description	Measured Value	Comments	Result
15.247(a)	6.2.2(o)(b)	Digital Modulation	Systems uses OFDM / DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	6.2.2(o)(b)	6dB Bandwidth (802.11B)	13.00 MHz	Minimum allowed is 500kHz	Complies
15.247 (a) (2)	6.2.2(o)(b)	6dB Bandwidth (802.11G)	12.97 MHz	Minimum allowed is 500kHz	Complies
	RSP 100	99% Bandwidth	16.17 MHz	For information only	Complies
15.247 (b) (3) 15.247 (b) (4) (i)	6.2.2(o)(b)	Output Power, 2400 - 2483.5 MHz	19.5 dBm (0.089 Watts) EIRP = 0.126 W	Point-to-point applications: Maximum permitted is 1Watt, reduced by 1dB for every .3dB that the antenna gain exceeds 6dBi	Complies
15.247(d)	6.2.2(o)(b)	Power Spectral Density (802.11b mode)	6.83 dBm / MHz	Maximum permitted is 8dBm/3kHz	Complies
15.247(d)	6.2.2(o)(b)	Power Spectral Density (802.11g mode)	2.88 dBm / MHz	Maximum permitted is 8dBm/3kHz	Complies
15.247(c)	6.2.2(o)(e1)	Antenna Port Spurious Emissions – 30MHz – 25 GHz	All spurious emissions < -20dBc	All spurious emissions < -20dBc.	Complies
15.247(c) / 15.209		Radiated Spurious Emissions – 30MHz – 25 GHz	53.5 dBuV/m @ 2483.5 MHz (-0.5 dB)	Emissions in restricted bands must meet the radiated emissions limits detailed in 15.207. All others must be < -20dBc	Complies
15.207		AC Conducted Emissions	41.5 dBuV @ 0.265 MHz (-9.8 dB)	-	Complies
	6.6	AC Conducted Emissions	41.5 dBuV @ 0.265 MHz (-6.5 dB)	-	Complies
15.247 (b) (5)		RF Exposure Requirements	MPE Calculation	-	
15.203		RF Connector	Connector is inside device. User will not have access to connectors	Unique antenna connection required for user-installed applications.	Complies

EIRP calculated using antenna gain of dBi (1.5) for the highest EIRP point-to-point system.

**MEASUREMENT UNCERTAINTIES**

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	$\pm 2.4$
Radiated Emissions	30 to 1000	$\pm 3.6$

**EQUIPMENT UNDER TEST (EUT) DETAILS****GENERAL**

The Aruba Networks model Aruba 52 is an Accesspoint Radio, which is designed to operate in home or office network environments. Normally, the EUT would be tabletop during operation. The EUT was treated as tabletop equipment during testing to simulate the end user environment.

The sample was received on June 10, 2003 and tested on June 10 and June 11, 2003. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Aruba 52	Aruba 52	Accesspoint Radio	-	TBD

**OTHER EUT DETAILS**

List any items from the test log.

**ENCLOSURE**

The EUT enclosure is primarily constructed of fabricated sheet steel. It measures approximately 25 cm wide by 15.5 cm deep by 5 cm high.

**MODIFICATIONS**

The EUT did not require modifications during testing in order to comply with the emission specifications.

**SUPPORT EQUIPMENT**

The following equipment was used as local support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Compal	ACY131	Laptop	NZB02084015T14043	DoC
Hawking	PNY09TP	Hub	15B4000276	N/A
Keytronics	H2002	Mouse	24284	DoC

No equipment was used as remote support equipment for emissions testing:

**EUT INTERFACE PORTS**

The I/O cabling configuration during emissions testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
RS-232	Laptop	Multiwire	Shielded	2
Ethernet	Hub	Cat 5	Unshielded	1

**EUT OPERATION DURING TESTING****ANTENNA REQUIREMENTS**

The antenna for the device is an integral antenna as the connectors are located inside the device and there is no users need to open device, which meets the requirements of 15.203.



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**TEST SITE****GENERAL INFORMATION**

Final test measurements were taken on June 10 and June 11, 2003 at the Elliott Laboratories Open Area Test Site #4 located at 684 West Maude Avenue, Sunnyvale, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Federal Communications Commission. In accordance with Industry Canada rules detailed in RSS 210 Issue 5 and RSS-212, construction, calibration, and equipment data for the test sites have been filed with the Federal Communications Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent FCC requirements.

**CONDUCTED EMISSIONS CONSIDERATIONS**

Conducted emissions testing is performed in conformance with ANSI C63.4-1992. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

**RADIATED EMISSIONS CONSIDERATIONS**

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines.

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**MEASUREMENT INSTRUMENTATION****RECEIVER SYSTEM**

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

**INSTRUMENT CONTROL COMPUTER**

The receivers utilize either a Rohde and Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

**LINE IMPEDANCE STABILIZATION NETWORK (LISN)**

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

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**POWER METER**

A power meter and peak power sensor are used for all direct output power measurements from transmitters as they provide a broadband indication of the power output.

**FILTERS/ATTENUATORS**

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

**ANTENNAS**

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers.

**ANTENNA MAST AND EQUIPMENT TURNTABLE**

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

ANSI C63.4 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

**INSTRUMENT CALIBRATION**

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

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**TEST PROCEDURES****EUT AND CABLE PLACEMENT**

The FCC requires that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, and the worst case orientation is used for final measurements.

**CONDUCTED EMISSIONS**

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

**RADIATED EMISSIONS**

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth which results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

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**CONDUCTED EMISSIONS FROM ANTENNA PORT**

Direct measurements are performed with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.

Measurement bandwidths (video and resolution) are set in accordance with FCC procedures for the type of radio being tested.

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**SPECIFICATION LIMITS AND SAMPLE CALCULATIONS**

The limits for conducted emissions from the AC power port are given in units of microvolts, the limits for radiated electric field emissions are given in units of microvolts per meter at a specified test distance and the output power limits are given in terms of Watts, milliwatts or dBm. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp) the following formula is used to determine the field strength limit in terms of microvolts per meter at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \sqrt{30 P}}{3} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

For reference, converting the voltage and electric field strength specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. Conversion of power specification limits from linear units (in milliwatts) to decibel form (in dBm) is accomplished by taking the base ten logarithm, then multiplying by 10.

**FCC 15.407 (a) and RSS 210 (o) OUTPUT POWER LIMITS**

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
902 – 928	1 Watts (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watts (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watts (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

**RSS 210 (o) AND FCC 15.247 SPURIOUS RADIATED EMISSIONS LIMITS**

T limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands detailed in Part 15.205 and for all spurious emissions from the receiver are:

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level.

**FCC 15.205 AC POWER PORT CONDUCTED EMISSIONS LIMITS**

The table below shows the limits for emissions on the AC power line as detailed in FCC Part 15.205.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

**RSS-210 SECTION 6.6 AC POWER PORT CONDUCTED EMISSIONS LIMITS**

The table below shows the limits for emissions on the AC power line as detailed in Industry Canada RSS-210 section 6.6.

Frequency Range (MHz)	Limit (uV)	Limit (dBuV)
0.450 to 30.000	250	48



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**SAMPLE CALCULATIONS - CONDUCTED EMISSIONS**

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - B = C$$

and

$$C - S = M$$

where:

$R_r$  = Receiver Reading in dBuV

B = Broadband Correction Factor\*

C = Corrected Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

\* Broadband Level - Per ANSI C63.4, 13 dB may be subtracted from the quasi-peak level if it is determined that the emission is broadband in nature. If the signal level in the average mode is six dB or more below the signal level in the peak mode, the emission is classified as broadband.

**SAMPLE CALCULATIONS - RADIATED EMISSIONS**

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20 * \text{LOG}_{10} (D_m/D_s)$$

where:

$$F_d = \text{Distance Factor in dB}$$

$$D_m = \text{Measurement Distance in meters}$$

$$D_s = \text{Specification Distance in meters}$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

$$R_r = \text{Receiver Reading in dBuV/m}$$

$$F_d = \text{Distance Factor in dB}$$

$$R_c = \text{Corrected Reading in dBuV/m}$$

$$L_s = \text{Specification Limit in dBuV/m}$$

$$M = \text{Margin in dB Relative to Spec}$$

***EXHIBIT 1: Test Equipment Calibration Data***

1 Page

**Conducted and Radiated Emissions, 30-Jun-03****Engineer: jmartinez**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Assett #</u>	<u>Cal interval</u>	<u>Last Calibrated</u>	<u>Cal Due</u>
Elliott Laboratories	FCC / CISPR LISN	LISN-3, OATS	304	12	6/5/2003	6/5/2004
Elliott Laboratories	LISN 2 x (Solar 8028 LISN + 6512 Caps)	LISN-5,Support	379	12	8/20/2002	8/20/2003
EMCO	Biconical Antenna, 30-300 MHz	773	801	12	5/13/2003	3/18/2004
EMCO	Log Periodic Antenna, 0.2-1 GHz	1321	1294	12	4/12/2003	3/31/2004
Rohde& Schwarz	Pulse Limiter	ESH3 Z2	812	12	1/10/2003	1/10/2004
Rohde & Schwarz	Test Receiver, 0.009-2000 MHz	ESN	1316	12	11/5/2002	11/5/2003
Rohde & Schwarz	Test Receiver, 20-1300 MHz	ESVP	1222	12	7/11/2002	7/12/2003

**Radiated Emissions, 1 - 25,000 GHz, 08-Jul-03****Engineer: jmartinez**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Assett #</u>	<u>Cal interval</u>	<u>Last Calibrated</u>	<u>Cal Due</u>
Hewlett Packard	Microwave EMI test system (SA40, 9kHz - 40GHz)	84125C	1149	12	3/12/2003	3/12/2004

**Power Output Measurement, 08-Jul-03****Engineer: jmartinez**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Assett #</u>	<u>Cal interval</u>	<u>Last Calibrated</u>	<u>Cal Due</u>
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1534	12	3/20/2003	3/20/2004
Rohde & Schwarz	Power Sensor 100uW - 10 Watts	NRV-Z53	1236	12	8/15/2002	8/15/2003

## **EXHIBIT 2: Test Data Log Sheets**

### **ELECTROMAGNETIC EMISSIONS**

#### **TEST LOG SHEETS**

#### **AND**

#### **MEASUREMENT DATA**

T51481\_DTS 28 Pages  
T51481\_Digital 12 Pages



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
		Proj Eng:	Christine Vu
Contact:	Loren Vorreiter		
Emissions Spec:	FCC Part 15 B and E, RSS-210	Class:	B
Immunity Spec:	EN301 489-1	Environment:	-

## EMC Test Data

For The

**Aruba Networks**

Model

**Aruba 52**



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
		Proj Eng:	Christine Vu
Contact:	Loren Vorreiter		
Emissions Spec:	FCC Part 15 B and E, RSS-210	Class:	B
Immunity Spec:	EN301 489-1	Environment:	-

### EUT INFORMATION

#### General Description

The EUT is an Accesspoint Radio which is designed to operate in home or office network environments. The Accesspoint contains 802.11a and 802.11b transceivers. Normally, the EUT would be table-top during operation. The EUT was treated as table-top equipment during testing to simulate the end user environment.

#### Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Aruba Networks	Aruba 52	Accesspoint Radio	-	TBD
Phihong	PSA 18U-033A-1	switching AC adaptor	131300158A1	N/A

#### Antenna

The EUT uses an integral antenna with a gain of 4.5 dBi for the 5GHz and 1.5 dBi for the 2.4 GHz.  
The antenna connector used is non-standard antenna Hirose and MMDX connections to meet the requirements of FCC Part 15.203 and RSS-210

#### EUT Enclosure

The EUT enclosure is primarily constructed of fabricated sheet steel. It measures approximately 25 cm wide by 15.5 cm deep by 5 cm high.

#### Modification History

Mod. #	Test	Date	Modification
1	-	-	None



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
		Proj Eng:	Christine Vu
Contact:	Loren Vorreiter		
Emissions Spec:	FCC Part 15 B and E, RSS-210	Class:	B
Immunity Spec:	EN301 489-1	Environment:	-

### Test Configuration #1

#### Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Compal	ACY131	Laptop	NZB02084015T14043	DoC
Hawking	PNY09TP	Hub	15B4000276	N/A
Keytronics	H2002	Mouse	24284	DoC

#### Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

#### EUT Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
RS-232	Laptop	Multiwire	Shielded	2
Ethernet	Hub	Cat 5	Unshielded	1

#### EUT Operation During Emissions Testing (Radio)

EUT was set to low, middle, and high channel at full power

#### EUT Operation During Immunity

EUT was set to transmit mode. Transmissions were received by a local support EUT in the Receive mode. A laptop computer connected to the serial port of the support EUT reported the number of transmitted packets, Receive packets, number of errors, number of packets dropped, number of collisions, and number of Receive bytes.

#### Criteria A

The EUT shall continue to operate as intended without user intervention.

#### Criteria B

The EUT shall continue to operate as intended after the application of the event.

#### Criteria C

User intervention is permitted to restore the EUT to normal operation conditions.





## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Radiated Emissions (802.11g mode)

#### Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 6/10/03  
Test Engineer: jmartinez/Chris  
Test Location: SVOATS #4

Config. Used: 1  
Config Change: None  
Host Unit Voltage 120Vac, 60Hz

#### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators used.

**Ambient Conditions:** Temperature: 17 °C  
Rel. Humidity: 56 %

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1a	RE, 30 - 25,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	-4.4dB @ 2390 MHz
1b	RE, 30 - 25,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	-14.9dB @ 4874.04 MHz
1c	RE, 30 - 25,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	-0.5dB @ 2483.5 MHz
2	6dB Bandwidth	15.247(a)	Pass	12.97 MHz
3	Output Power	15.247(b)	Pass	19.5 dBm
4	Power Spectral Density (PSD)	15.247(d)	Pass	2.88 dBm
5	Out of Band	15.247(c)	Pass	Refer to plots



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

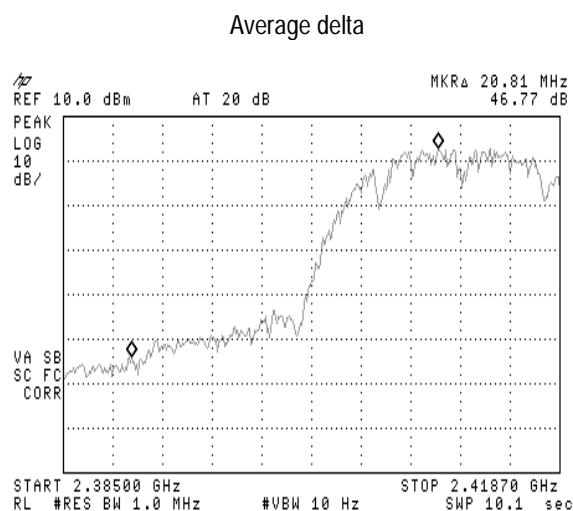
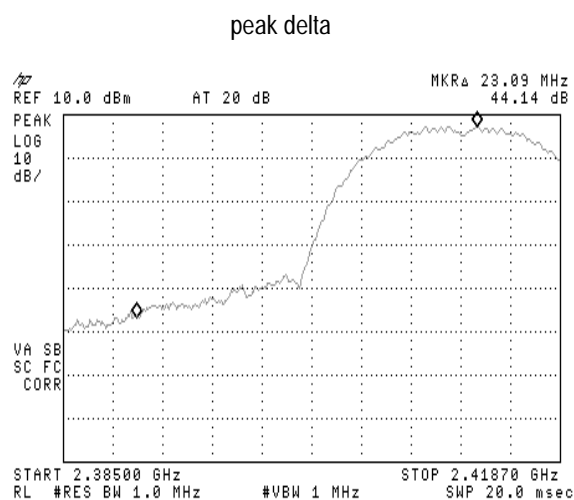
### Modifications Made During Testing:

No modifications were made to the EUT during testing

### Deviations From The Standard

No deviations were made from the requirements of the standard.

### Run #1a: Radiated Spurious Emissions, 30 - 25,000 MHz. Low Channel @ 2412 MHz





## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2413.802	99.9	H	-	-	Pk	-	-	RBW=VBW=1MHz (Fundamental)
2413.609	87.2	H	-	-	Avg	-	-	RBW:1MHz, VBW:10Hz (Fund.)
2413.717	109.1	V	-	-	Pk	-	-	RBW=VBW=1MHz (Fundamental)
2413.860	96.3	V	-	-	Avg	-	-	RBW:1MHz, VBW:10Hz (Fund.)
2390.000	65.0	V	74.0	-9.0	Pk	-	-	Bandedge (-44.14 dB)
2390.000	49.6	V	54.0	-4.4	Avg	-	-	Bandedge (-46.77 dB)
2390.000	55.8	H	74.0	-18.2	Pk	-	-	Bandedge (-44.14 dB)
2390.000	40.5	H	54.0	-13.5	Avg	-	-	Bandedge (-46.77 dB)
2634.000	70.1	V	89.1	-19.0	Pk	0	1.0	
4824.000	48.0	H	74.0	-26.0	Pk	179	1.0	
4824.000	33.8	H	54.0	-20.2	Avg	179	1.0	
7236.000	48.2	H	74.0	-25.8	Pk	0	1.0	
7236.000	36.6	H	54.0	-17.5	Avg	0	1.0	
4824.000	54.0	V	74.0	-20.0	Pk	69	1.6	
4824.000	40.8	V	54.0	-13.3	Avg	59	1.6	
7236.000	48.3	V	74.0	-25.7	Pk	0	1.0	
7236.000	36.3	V	54.0	-17.7	Avg	0	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental.

Note 2: No other emission detected above the 3rd harmonic that were close to 20-dB of the limit.



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #1b: Radiated Spurious Emissions, 30 - 25,000 MHz. Center Channel @ 2437 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.000	52.0	H	74.0	-22.0	Pk	218	1.4	
4874.000	37.2	H	54.0	-16.8	Avg	218	1.4	
7311.000	48.0	H	74.0	-26.0	Pk	0	1.0	
7311.000	36.3	H	54.0	-17.7	Avg	0	1.0	
4874.000	53.3	V	74.0	-20.7	Pk	23	1.7	
4874.000	39.1	V	54.0	-14.9	Avg	23	1.7	
7311.000	48.2	V	74.0	-25.8	Pk	0	1.0	
7311.000	36.3	V	54.0	-17.7	Avg	0	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

Note 2: No other emission detected above the 3rd harmonic that were close to 20-dB of the limit.



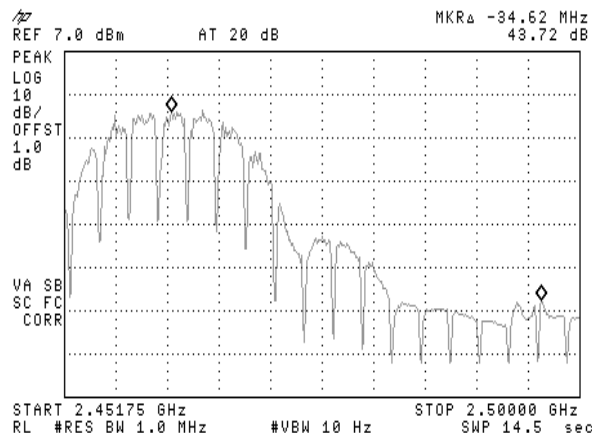
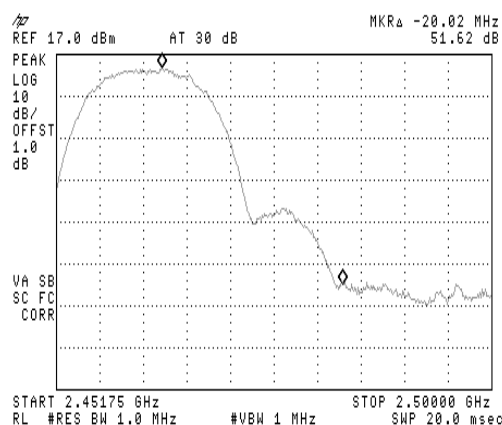
## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #1c: Radiated Spurious Emissions, 30 - 25,000 MHz. High Channel @ 2462 MHz

peak delta

Average delta



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2463.717	109.5	V	-	-	Pk	-	-	RBW=VBW=1MHz (Fundamental)
2463.666	97.2	V	-	-	Avg	-	-	RBW:1MHz, VBW:10Hz (Fund.)
2463.631	98.5	H	-	-	Pk	-	-	RBW=VBW=1MHz (Fundamental)
2463.493	85.8	H	-	-	Avg	-	-	RBW:1MHz, VBW:10Hz (Fund.)
2483.500	57.9	V	74.0	-16.1	Pk	-	-	Bandedge (-51.62 dB)
2483.500	53.5	V	54.0	-0.5	Avg	-	-	Bandedge (-43.72 dB)
2483.500	46.9	H	74.0	-27.1	Pk	-	-	Bandedge (-51.62 dB)
2483.500	42.1	H	54.0	-11.9	Avg	-	-	Bandedge (-43.72 dB)
4924.000	57.1	H	74.0	-16.9	Pk	156	1.7	
4924.000	38.2	H	54.0	-15.8	Avg	156	1.7	
7386.000	48.8	H	74.0	-25.2	Pk	0	1.0	
7386.000	34.6	H	54.0	-19.4	Avg	0	1.0	
4924.000	64.5	V	74.0	-9.5	Pk	306	1.5	
4924.000	42.1	V	54.0	-11.9	Avg	306	1.5	
7386.000	48.0	V	74.0	-26.0	Pk	0	1.0	
7386.000	35.3	V	54.0	-18.7	Avg	0	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.
Note 2:	No other emission detected above the 3rd harmonic that were close to 20-dB of the limit.



## EMC Test Data

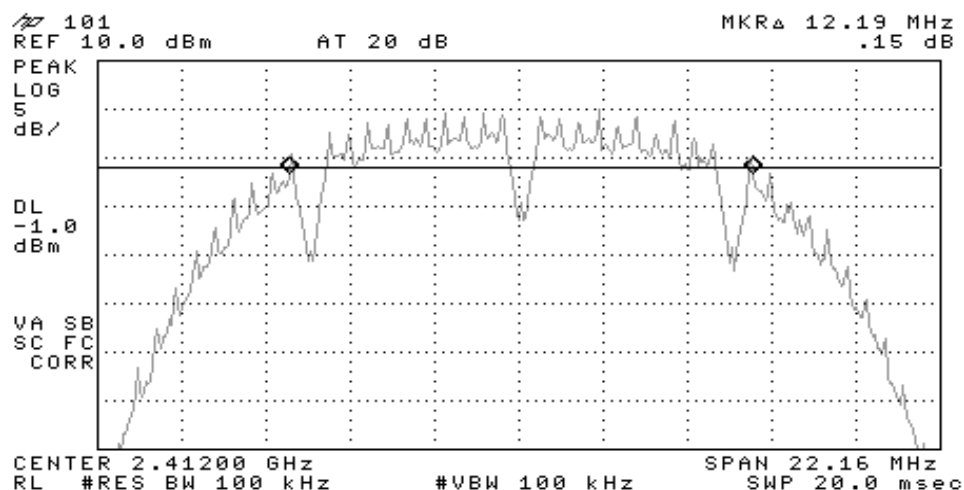
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Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #2: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	Graph reference #
Low	2412	100kHz	12.19	101
Mid	2437	100kHz	12.19	102
High	2462	100kHz	12.97	103

Note 1: Add note here

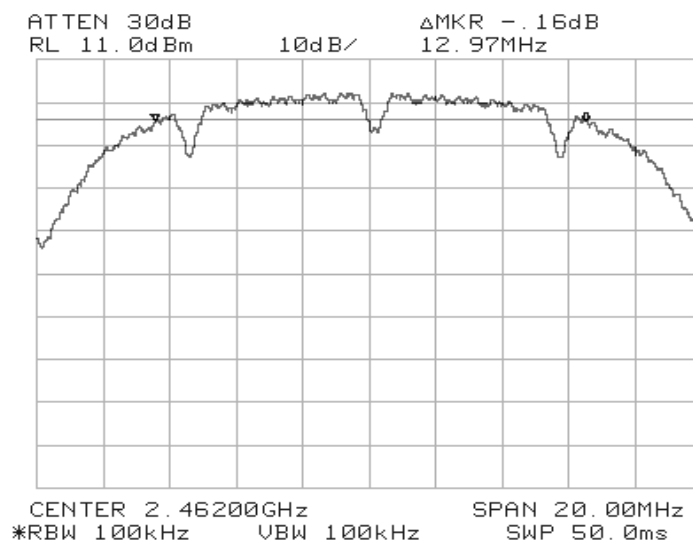
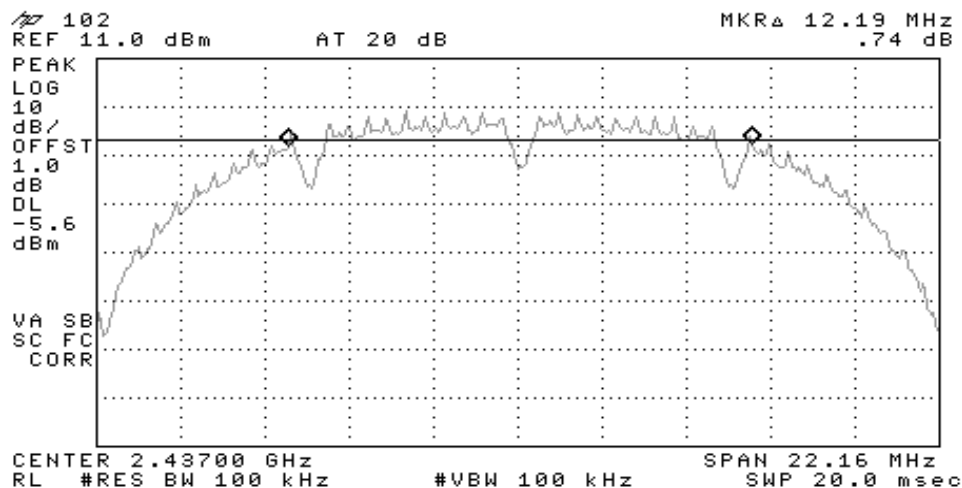
Note 2:





## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A





## EMC Test Data

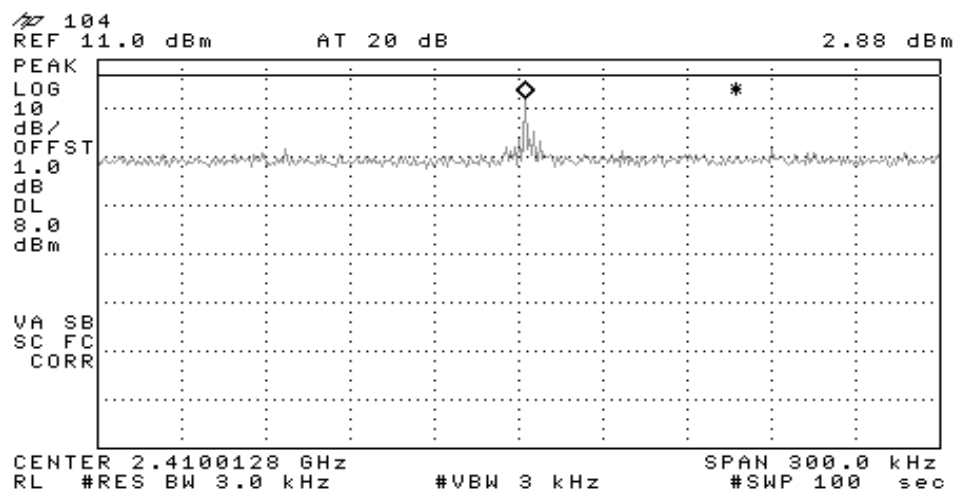
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Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #3: Peak Output Power Meter

Channel	Frequency (MHz)	Peak Output Power	Comments
Low	2412	14.34	-
Mid	2437	13.61	-
High	2462	19.5	-

### Run #4: Power Spectral Density

Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over 1 second in a 3kHz bandwidth)	Graph reference #
Low	2412	3kHz	2.88dBm	104
Mid	2437	3kHz	-3.88dBm	105
High	2462	3kHz	-5.99dBm	106

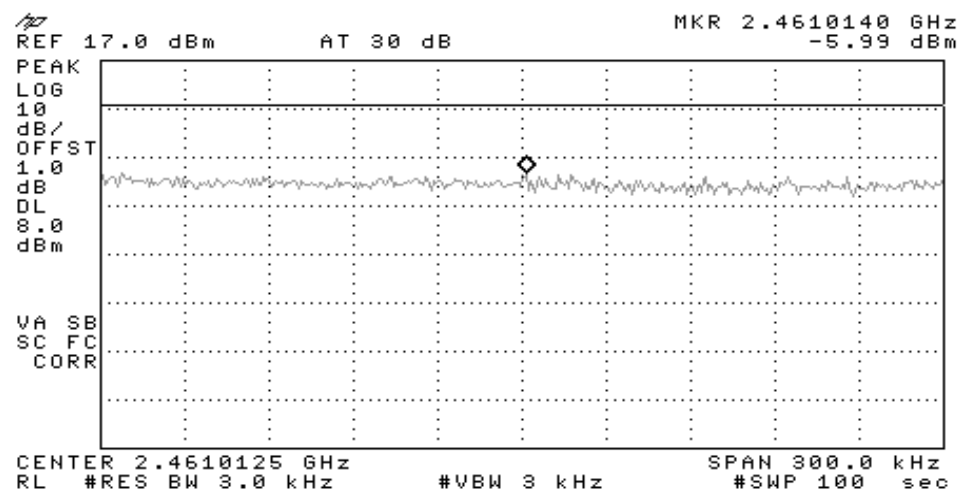
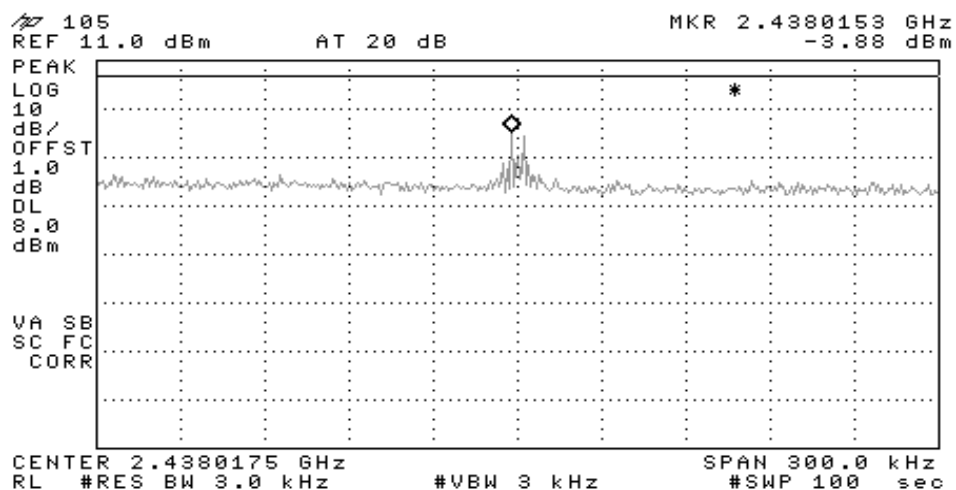






## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A



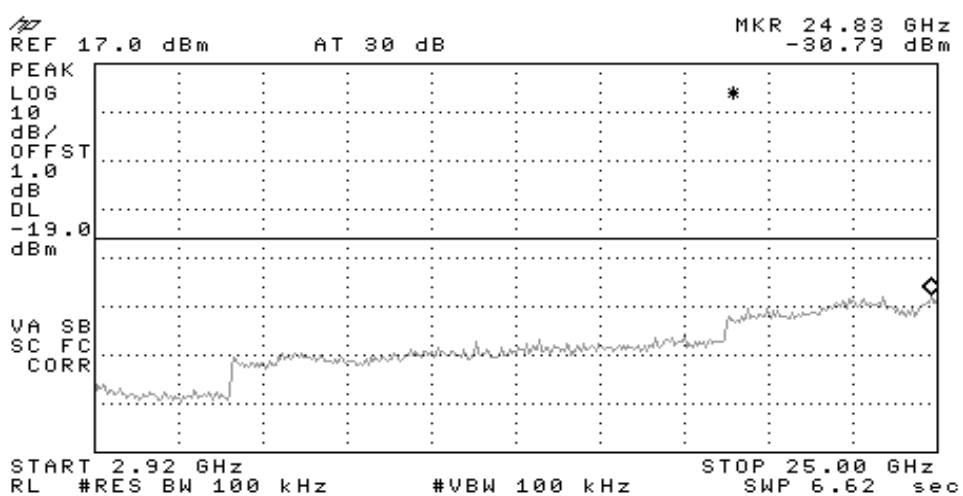
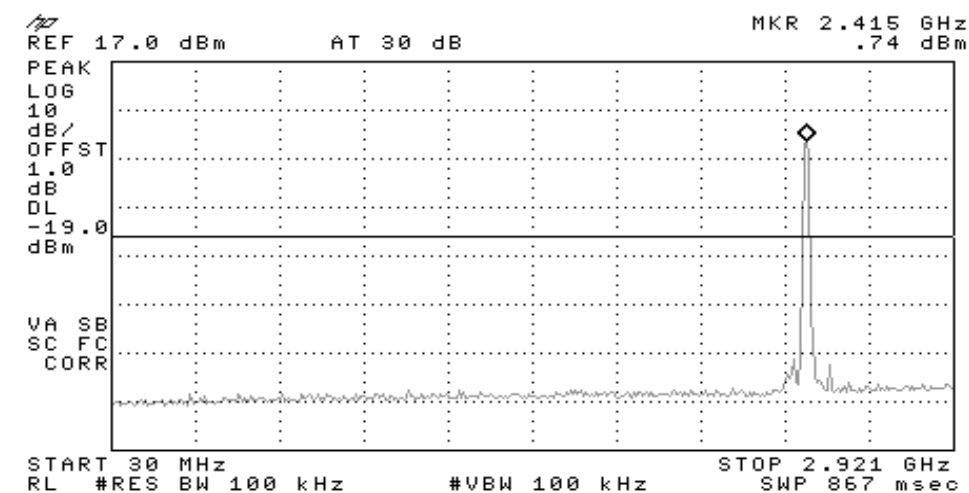


## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #5: Out of Band

#### Low Channel Out of band

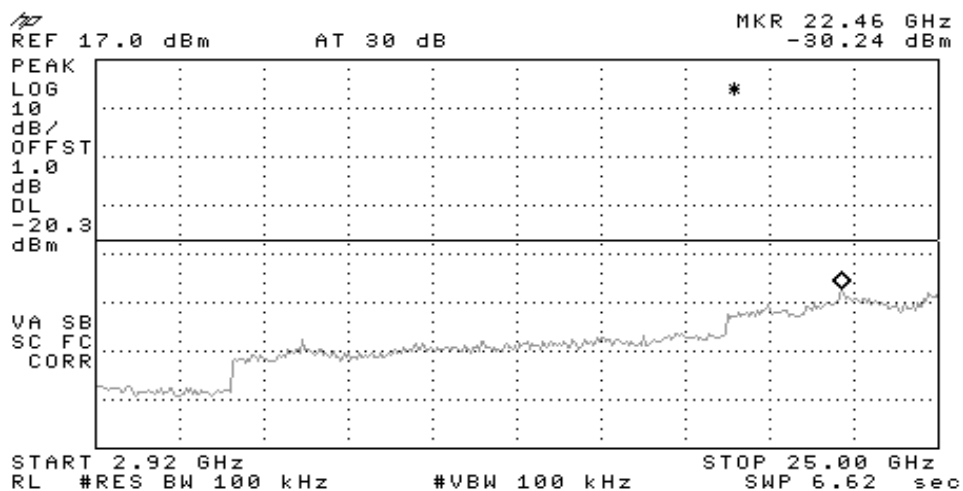
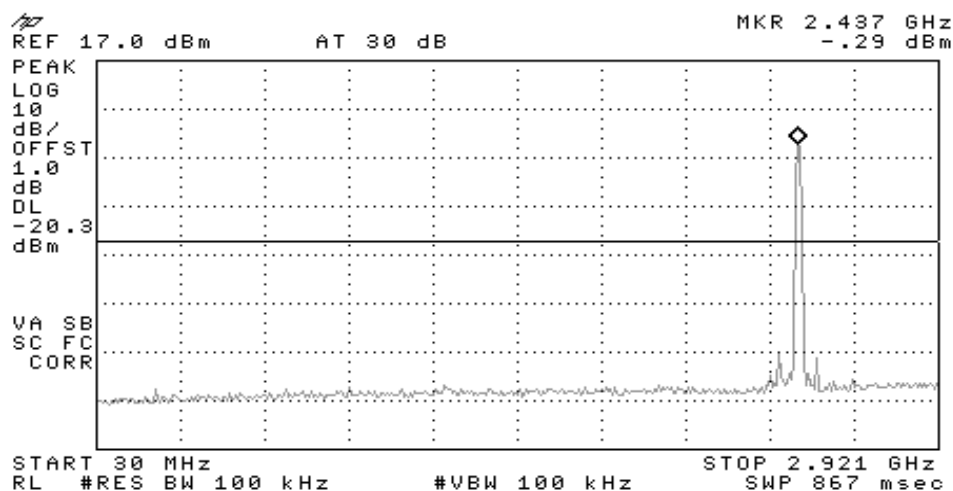




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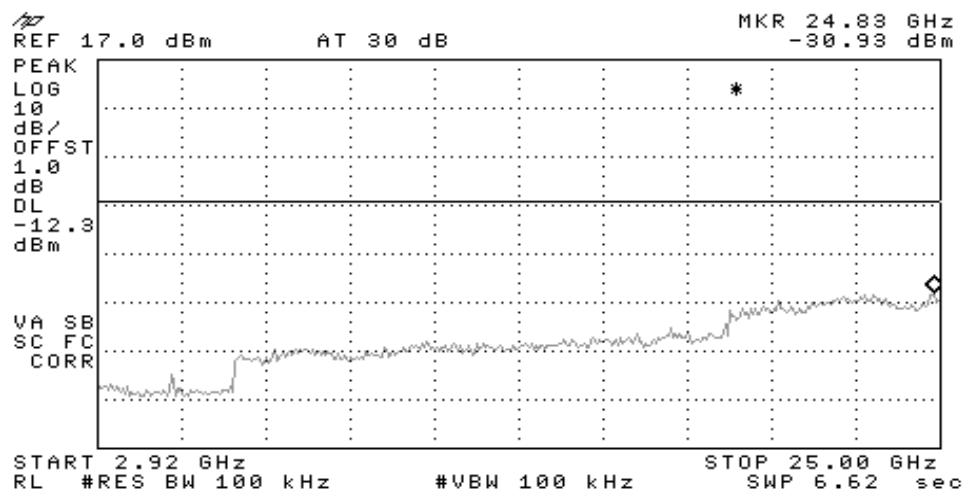
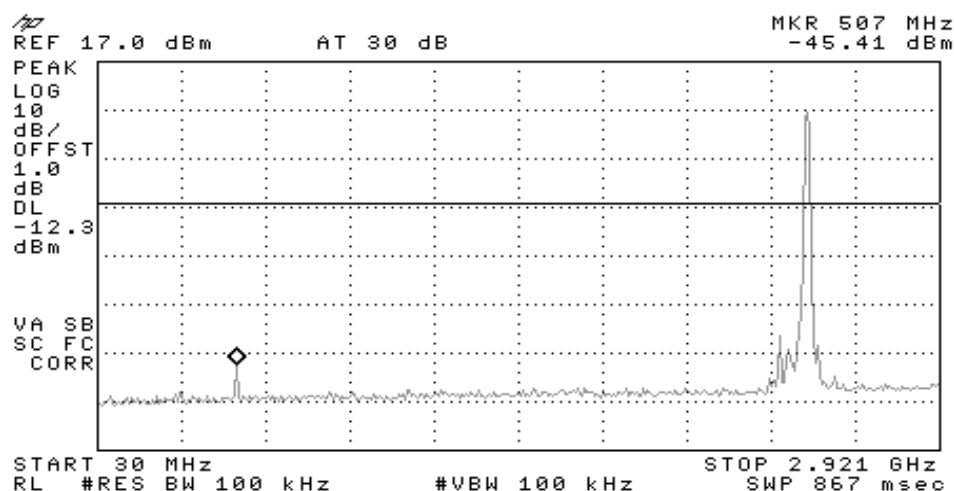
Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Middle Channel Out of band



Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

## High Channel Out of band





## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Radiated Emissions (802.11B mode)

#### Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 6/10/03

Test Engineer: jmartinez/Chris

Test Location: SVOATS #4

Config. Used: 1

Config Change: None

Host Unit Voltage 120Vac, 60Hz

#### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators used.

**Ambient Conditions:**

Temperature:	17 °C
Rel. Humidity:	56 %

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1a	RE, 30 - 25,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	-2.5dB @ 2390 MHz
1b	RE, 30 - 25,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	-4.5dB @ 4874 MHz
1c	RE, 30 - 25,000 MHz - Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	-2.4dB @ 2483.5 MHz
2	6dB Bandwidth	15.247(a)	Pass	13 MHz
3	Output Power	15.247(b)	Pass	16 dBm
4	Power Spectral Density (PSD)	15.247(d)	Pass	6.83 dBm
5	Out of Band	15.247(c)	Pass	Refer to plots



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Modifications Made During Testing:

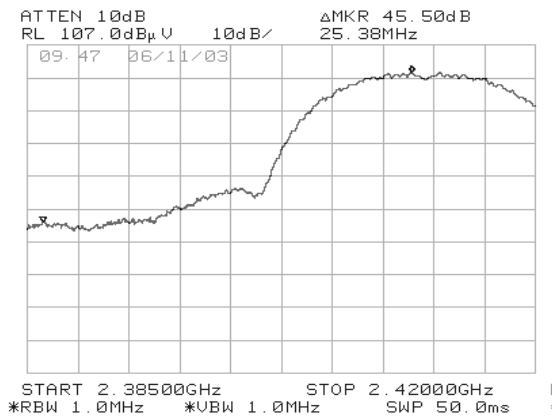
No modifications were made to the EUT during testing

### Deviations From The Standard

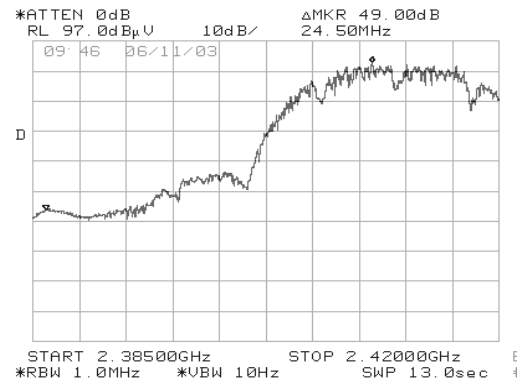
No deviations were made from the requirements of the standard.

### Run #1a: Radiated Spurious Emissions, 30 - 25,000 MHz. Low Channel @ 2412 MHz

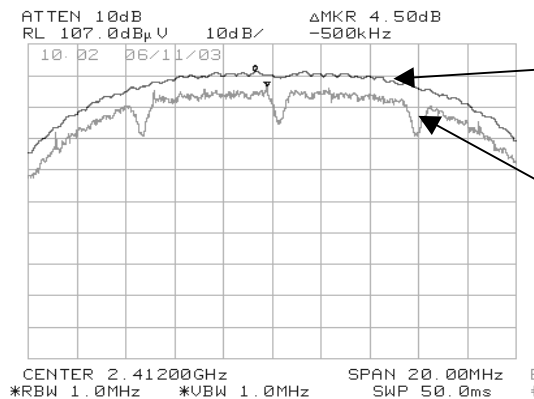
peak delta



Average delta



BW correction



RBW=1MHz,  
VBW=1MHz

RBW= 100kHz,  
VBW= 1MHz



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2411.333	109.0	V	-	-	Pk	-	-	RBW=VBW=1MHz (Fundamental)
2411.237	105.0	V	-	-	Avg	-	-	RBW:1MHz, VBW:10Hz (Fund.)
2411.031	100.2	H	-	-	Pk	-	-	RBW=VBW=1MHz (Fundamental)
2410.799	96.4	H	-	-	Avg	-	-	RBW:1MHz, VBW:10Hz (Fund.)
2390.000	59.0	V	74.0	-15.0	Pk	-	-	Bandedge (-45.5 dB), Bw Cor.(-4.5dB)
2390.000	51.5	V	54.0	-2.5	Avg	-	-	Bandedge (-49.0 dB), Bw Cor.(-4.5dB)
2390.000	50.2	H	74.0	-23.8	Pk	-	-	Bandedge (-45.5 dB), Bw Cor.(-4.5dB)
2390.000	42.9	H	54.0	-11.1	Avg	-	-	Bandedge (-49.0 dB), Bw Cor.(-4.5dB)
2634.000	68.3	V	89.0	-20.7	Pk	180	1.0	
4824.000	47.4	h	74.0	-26.6	Pk	157	1.0	
4824.000	33.4	h	54.0	-20.6	Avg	157	1.0	
7236.000	49.9	h	74.0	-24.1	Pk	208	1.1	
7236.000	36.3	h	54.0	-17.7	Avg	208	1.1	
4824.000	50.1	v	74.0	-23.9	Pk	250	1.0	
4824.000	36.0	v	54.0	-18.0	Avg	250	1.0	
7236.000	48.5	v	74.0	-25.5	Pk	45	1.0	
7236.000	34.3	v	54.0	-19.7	Avg	45	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20 dB below the level of the fundamental.

Note 2: No other emission detected above the 3rd harmonic that were close to 20-dB of the limit.



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #1b: Radiated Spurious Emissions, 30 - 25,000 MHz. Center Channel @ 2437 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4874.000	55.2	v	74.0	-18.8	Pk	180	1.0	
4874.000	48.7	v	54.0	-5.3	Avg	180	1.0	
7311.000	54.9	v	74.0	-19.1	Pk	240	1.0	
7311.000	47.0	v	54.0	-7.0	Avg	240	1.0	
4874.000	56.2	h	74.0	-17.8	Pk	156	1.2	
4874.000	49.5	h	54.0	-4.5	Avg	156	1.2	
7311.000	52.6	h	74.0	-21.4	Pk	245	1.0	
7311.000	43.5	h	54.0	-10.5	Avg	245	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

Note 2: No other emission detected above the 3rd harmonic that were close to 20-dB of the limit.

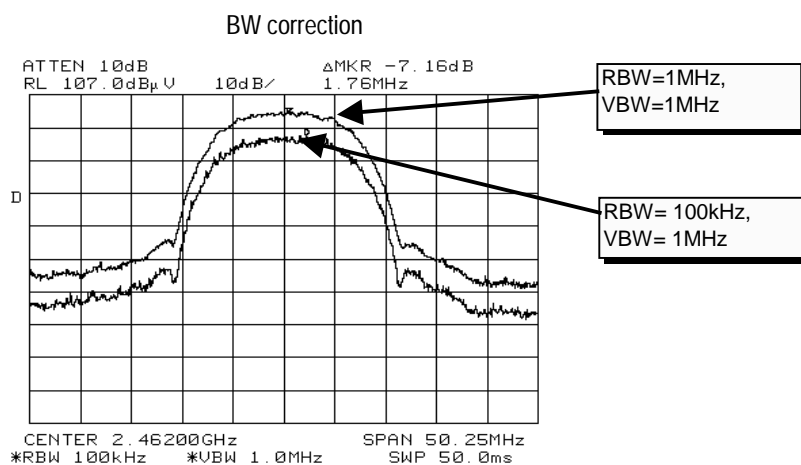
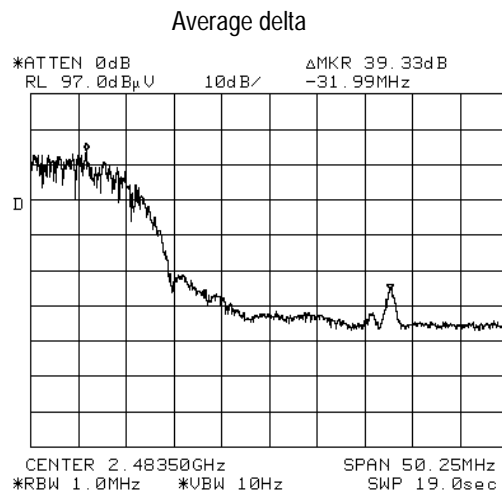
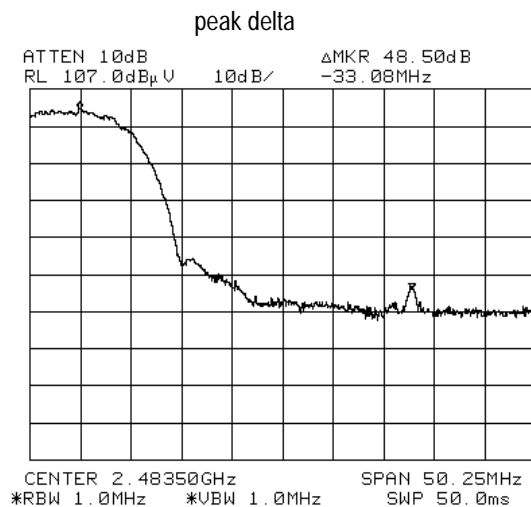




## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #1c: Radiated Spurious Emissions, 30 - 25,000 MHz. High Channel @ 2462 MHz





## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2463.324	99.4	H	-	-	Pk	-	-	RBW=VBW=1MHz (Fundamental)
2463.164	86.9	H	-	-	Avg	-	-	RBW:1MHz, VBW:10Hz (Fund.)
2463.419	110.6	V	-	-	Pk	-	-	RBW=VBW=1MHz (Fundamental)
2463.546	97.9	V	-	-	Avg	-	-	RBW:1MHz, VBW:10Hz (Fund.)
2483.500	43.7	H	74.0	-30.3	Pk	-	-	Bandedge (-48.5 dB), BW Cor. (-7.15dB)
2483.500	40.6	H	54.0	-13.4	Avg	-	-	Bandedge (-39.33 dB), BW Cor. (-7.15dB)
2483.500	54.9	V	74.0	-19.1	Pk	-	-	Bandedge (-48.5 dB), BW Cor. (-7.15dB)
2483.500	51.6	V	54.0	-2.4	Avg	-	-	Bandedge (-39.33 dB), BW Cor. (-7.15dB)
4924.000	55.8	H	74.0	-18.2	Pk	168	1.7	
4924.000	37.3	H	54.0	-16.7	Avg	168	1.7	
7386.000	47.9	H	74.0	-26.1	Pk	0	1.0	
7386.000	34.2	H	54.0	-19.8	Avg	0	1.0	
4924.000	63.6	V	74.0	-10.4	Pk	349	1.7	
4924.000	41.8	V	54.0	-12.2	Avg	349	1.7	
7386.000	48.4	V	74.0	-25.6	Pk	0	1.0	
7386.000	34.7	V	54.0	-19.3	Avg	0	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 20dB below the level of the fundamental.

Note 2: No other emission detected above the 3rd harmonic that were close to 20-dB of the limit.



## EMC Test Data

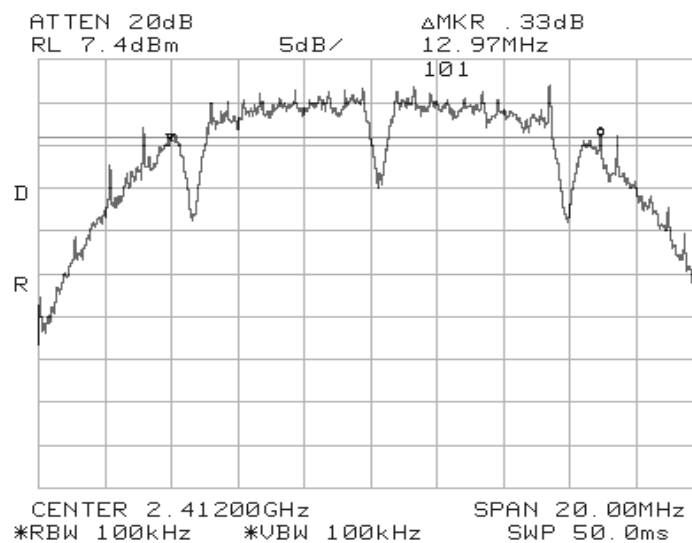
Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #2: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	Graph reference #
Low	2412	100kHz	12.97	101
Mid	2437	100kHz	10.13	102
High	2462	100kHz	13.00	103

Note 1: Add note here

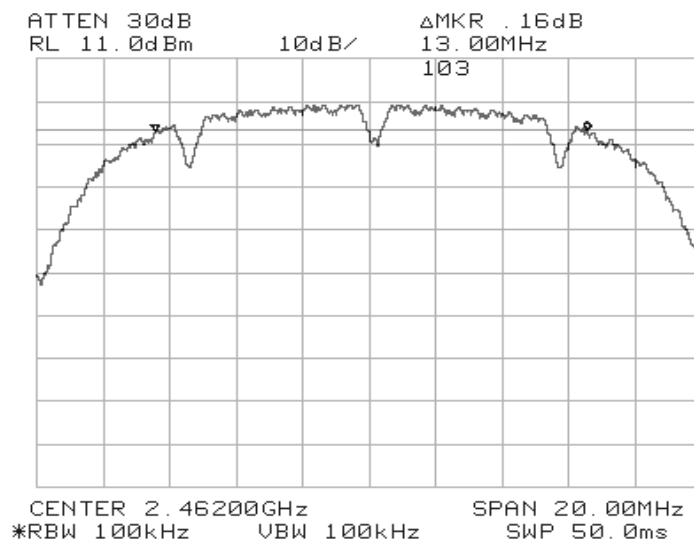
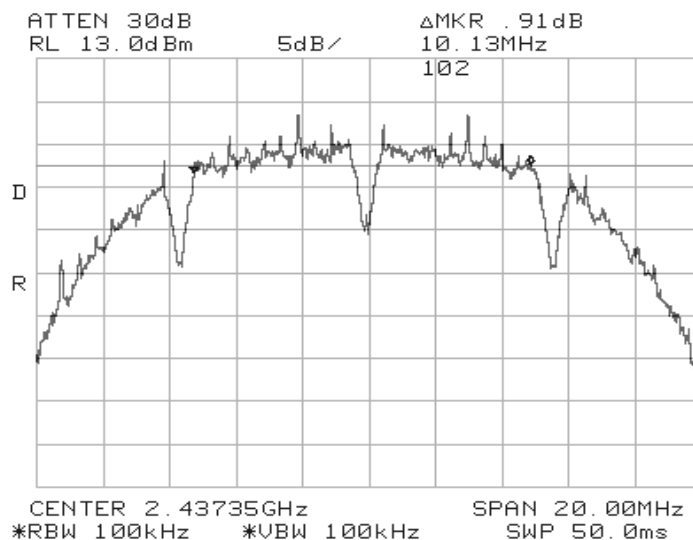
Note 2:





## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A





## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

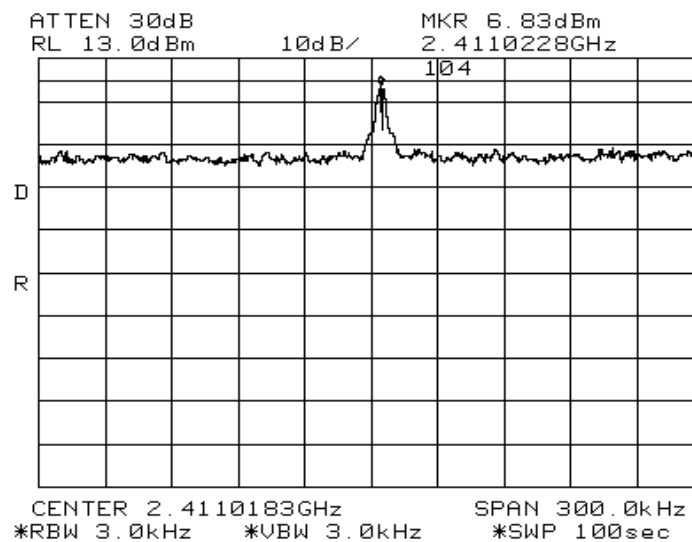
### Run #3: Peak Output Power Meter

Channel	Frequency (MHz)	Peak Output Power	Comments
Low	2412	15.6	
Mid	2437	16.0	
High	2462	15.9	

### Run #4: Power Spectral Density

Channel	Frequency (MHz)	Res BW	P.S.D. (averaged over 1 second in a 3kHz bandwidth)	Graph reference #
Low	2412	3kHz	6.83dBm	104
Mid	2437	3kHz	6.83dBm	105
High	2462	3kHz	-11.17dBm	106

104

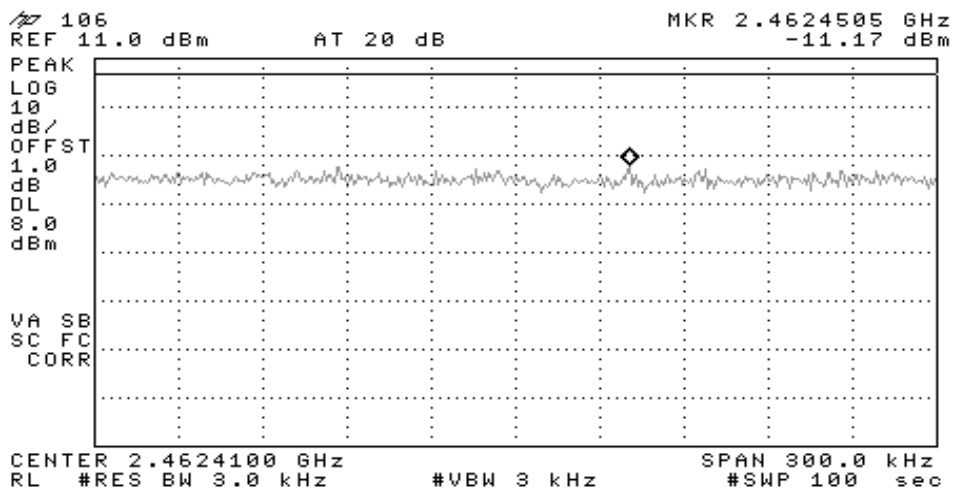
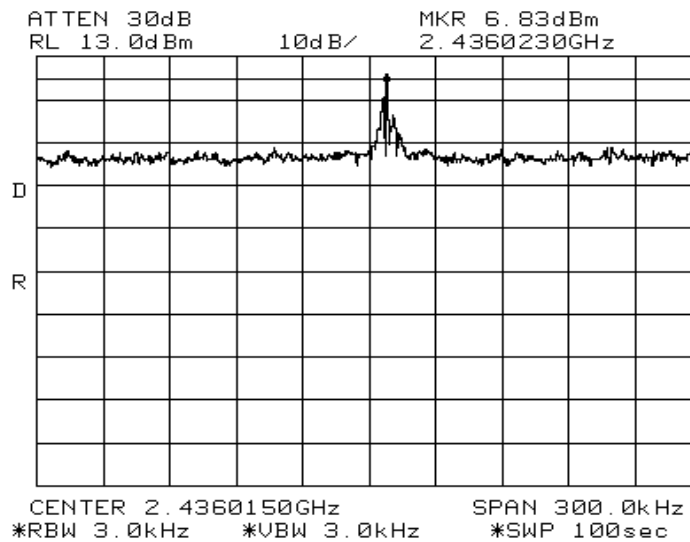




## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

105



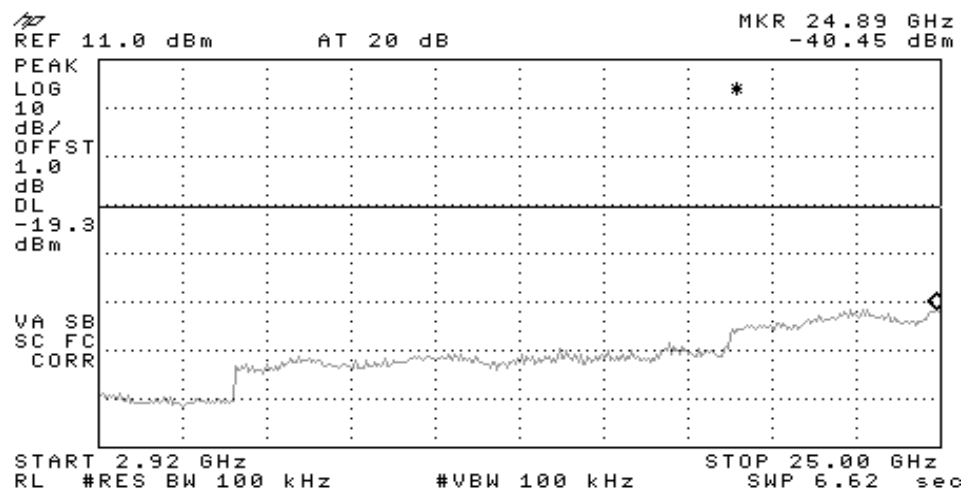
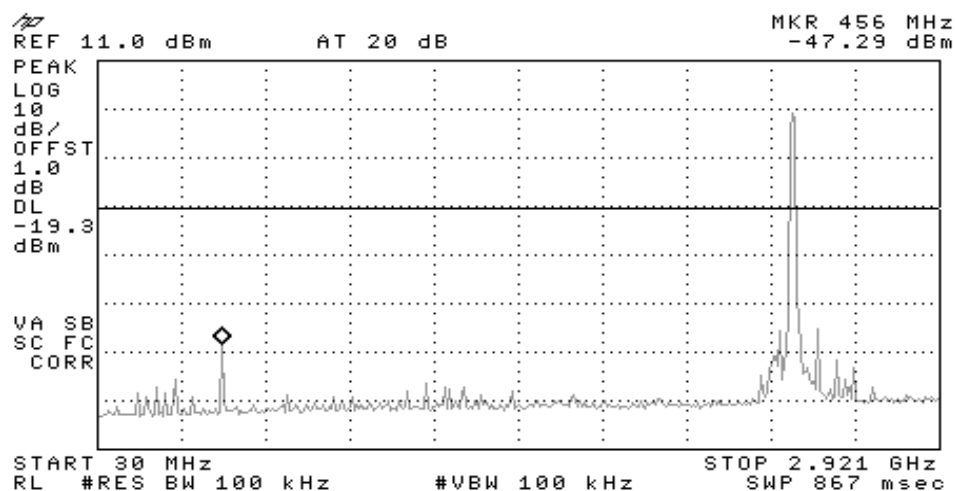


## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #5: Out of Band

#### Low Channel

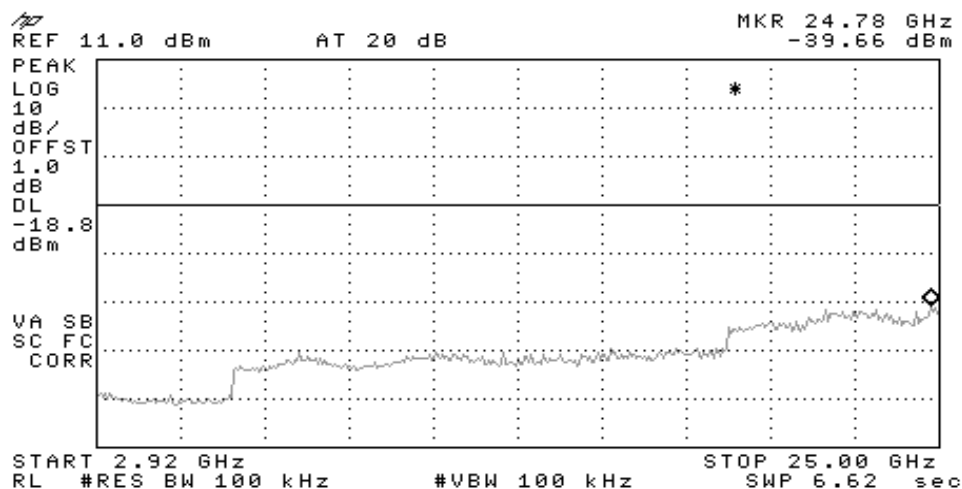
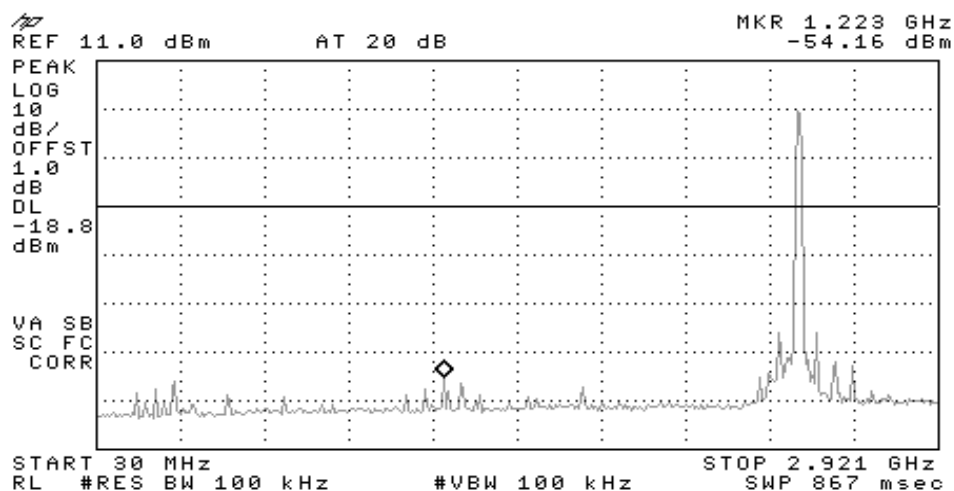




## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Middle Channel



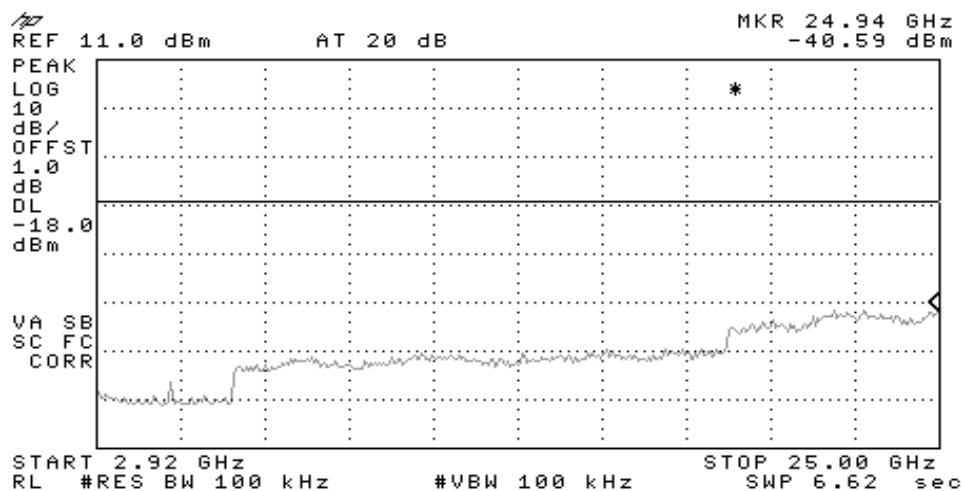
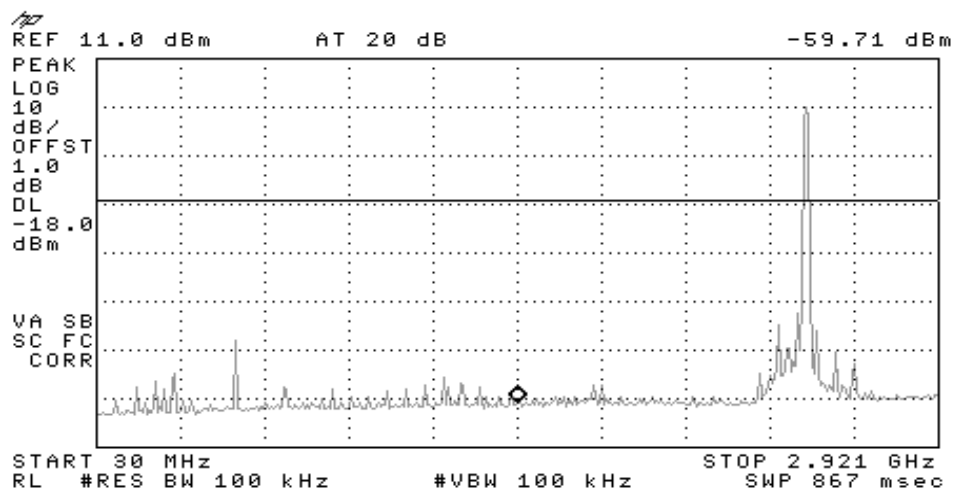




## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### High Channel





## ***EMC Test Data***

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
		Proj Eng:	Christine Vu
Contact:	Loren Vorreiter		
Emissions Spec:	FCC Part 15 B and E, RSS-210	Class:	B
Immunity Spec:	N/A	Environment:	-

# **EMC Test Data**

For The

**Aruba Networks**

Model

**Aruba 52**



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
		Proj Eng:	Christine Vu
Contact:	Loren Vorreiter		
Emissions Spec:	FCC Part 15 B and E, RSS-210	Class:	B
Immunity Spec:	N/A	Environment:	-

### EUT INFORMATION

#### General Description

The EUT is an Accesspoint Radio which is designed to operate in home or office network environments. Normally, the EUT would be table-top during operation. The EUT was treated as table-top equipment during testing to simulate the end user environment.

#### Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Aruba Networks	Aruba 52	Accesspoint Radio	-	TBD
Solar	PS-120	Power Supply	N/A	N/A

#### Antenna

The EUT uses an integral antenna with a gain of 4.5 dBi for the 5GHz and 1.5 dBi for the 2.4 GHz.  
The antenna connector used is non-standard antenna Hirose and MMDX connections to meet the requirements of FCC Part 15.203 and RSS-210

#### EUT Enclosure

The EUT enclosure is primarily constructed of fabricated sheet steel. It measures approximately 25 cm wide by 15.5 cm deep by 5 cm high.

#### Modification History

Mod. #	Test	Date	Modification
1	-	-	None



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
		Proj Eng:	Christine Vu
Contact:	Loren Vorreiter		
Emissions Spec:	FCC Part 15 B and E, RSS-210	Class:	B
Immunity Spec:	N/A	Environment:	-

### Test Configuration #2

#### Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Hawking	PNY09TP	Hub	15B4000276	N/A

#### Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Compal	ACY131	Laptop	NZB02084015T14043	DoC
Keytronics	H2002	Mouse	24284	DoC

#### EUT Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
RS-232	Unterminated	Multiwire	Shielded	2
Ethernet	Hub	Cat 5	Unshielded	1
DC input	AC source	2-wire	Unshielded	1.3

#### Support Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Laptop Ethernet	Hub	Cat 5	Unshielded	30
Hub Ethernet	EUT	Cat 5	Unshielded	1

#### EUT Operation During Digital Emissions

EUT was set to the channel that produced full power.



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
		Account Manager:	Christine Vu
Contact:	Loren Vorreiter		
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Conducted Emissions - Power Ports

#### Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 6/13/2003

Config. Used: 2

Test Engineer: jmartinez

Config Change: None

Test Location: SVOATS #2

EUT Voltage: Refer to individual run

#### General Test Configuration

For tabletop equipment, the EUT was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located approximately 30 meters from the test area. All I/O connections were routed overhead.

**Ambient Conditions:**

Temperature:	18 °C
Rel. Humidity:	45 %

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 230V/50Hz	EN55022 B	Pass	-6.7dB @ 0.268MHz
2	CE, AC Power, 120V/60Hz	EN55022 B	Pass	-9.8dB @ 0.265MHz

#### Modifications Made During Testing:

No modifications were made to the EUT during testing

#### Deviations From The Standard

No deviations were made from the requirements of the standard.



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz

Frequency	Level	AC	EN55022 B		Detector	Comments
MHz	dBμV	Line	Limit	Margin	QP/Ave	
0.268	44.4	Line 1	51.1	-6.7	AV	
0.401	38.3	Line 1	47.8	-9.5	AV	
0.401	37.0	Neutral	47.8	-10.8	AV	
1.472	42.6	Neutral	56.0	-13.4	QP	
0.401	44.3	Line 1	57.8	-13.5	QP	
1.472	42.5	Line 1	56.0	-13.5	QP	
1.590	42.3	Neutral	56.0	-13.7	QP	
0.268	47.1	Line 1	61.1	-14.0	QP	
0.401	43.1	Neutral	57.8	-14.7	QP	
1.334	41.1	Line 1	56.0	-14.9	QP	
2.339	38.5	Line 1	56.0	-17.5	QP	
1.590	25.9	Neutral	46.0	-20.1	AV	
1.472	25.7	Neutral	46.0	-20.3	AV	
1.334	25.2	Line 1	46.0	-20.8	AV	
1.472	24.5	Line 1	46.0	-21.5	AV	
2.339	13.7	Line 1	46.0	-32.3	AV	

Note 1:	
Note 2:	



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

Frequency	Level	AC	EN55022 B		Detector	Comments
MHz	dBμV	Line	Limit	Margin	QP/Ave	
0.265	41.5	Line 1	51.3	-9.8	AV	
0.401	35.6	Neutral	47.8	-12.2	AV	
0.663	32.4	Line 1	46.0	-13.6	AV	
0.663	42.3	Line 1	56.0	-13.7	QP	
2.480	41.2	Line 1	56.0	-14.8	QP	
1.592	40.5	Neutral	56.0	-15.5	QP	
0.265	45.3	Line 1	61.3	-16.0	QP	
0.401	41.6	Neutral	57.8	-16.2	QP	
2.556	38.4	Neutral	56.0	-17.6	QP	
1.074	27.1	Line 1	46.0	-18.9	AV	
1.592	25.4	Neutral	46.0	-20.6	AV	
2.480	23.6	Line 1	46.0	-22.4	AV	
2.556	21.4	Neutral	46.0	-24.6	AV	
1.074	9.0	Line 1	56.0	-47.0	QP	

Note 1:

Note 2:



## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Radiated Emissions

#### Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 6/13/2003

Config. Used: 2

Test Engineer: jmartinez

Config Change: None

Test Location: SVOATS #2

EUT Voltage: 120V/60Hz

#### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated emissions testing. Remote support equipment was located approximately 30 meters from the test area with all I/O connections routed overhead.

On the OATS, the measurement antenna was located 10 meters from the EUT for the measurement range 30 - 1000 MHz.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

**Ambient Conditions:**

Temperature:	18 °C
Rel. Humidity:	45 %

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	RE, 30 - 1000MHz, Maximized Emissions	EN55022 B	Pass	-5dB @ 165.337MHz

#### Modifications Made During Testing:

No modifications were made to the EUT during testing

#### Deviations From The Standard

No deviations were made from the requirements of the standard.





## EMC Test Data

Client:	Aruba Networks	Job Number:	J51385
Model:	Aruba 52	T-Log Number:	T51481
Contact:	Loren Vorreiter	Account Manager:	Christine Vu
Spec:	FCC Part 15 B and E, RSS-210	Class:	N/A

### Run #1: Preliminary Radiated Emissions, 30-1000 MHz

Frequency	Level	Pol	EN55022 B		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
165.337	25.0	v	30.0	-5.0	QP	242	1.0	
165.337	22.5	h	30.0	-7.5	QP	278	3.3	
75.112	22.1	v	30.0	-7.9	QP	30	1.0	
65.102	20.2	v	30.0	-9.8	QP	0	1.0	
192.227	20.1	v	30.0	-9.9	QP	168	1.0	
67.030	20.0	v	30.0	-10.0	QP	360	1.0	
192.269	20.0	v	30.0	-10.0	QP	6	1.0	
85.885	18.0	v	30.0	-12.0	QP	360	1.0	
513.240	25.0	h	37.0	-12.0	QP	0	2.0	
160.623	17.1	h	30.0	-12.9	QP	171	3.2	
448.000	23.8	h	37.0	-13.2	QP	212	1.9	
71.072	16.4	v	30.0	-13.6	QP	360	1.0	
68.379	16.0	v	30.0	-14.0	QP	0	1.0	
287.880	21.5	v	37.0	-15.5	QP	360	1.0	
35.990	14.0	v	30.0	-16.0	QP	361	1.0	
767.830	20.2	v	37.0	-16.8	QP	6	1.0	
352.369	19.5	v	37.0	-17.5	QP	255	1.0	
416.958	16.0	h	37.0	-21.0	QP	19	2.0	
446.679	15.9	v	37.0	-21.1	QP	361	1.0	
385.536	15.0	h	37.0	-22.0	QP	0	2.0	
385.536	14.1	v	37.0	-22.9	QP	120	1.0	
352.369	13.1	h	37.0	-23.9	QP	360	2.0	

### Run #2: Maximized Readings From Run #1

Frequency	Level	Pol	EN55022 B		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
165.337	25.0	v	30.0	-5.0	QP	242	1.0	
165.337	22.5	h	30.0	-7.5	QP	278	3.3	
75.112	22.1	v	30.0	-7.9	QP	30	1.0	
65.102	20.2	v	30.0	-9.8	QP	0	1.0	
192.227	20.1	v	30.0	-9.9	QP	168	1.0	
67.030	20.0	v	30.0	-10.0	QP	360	1.0	

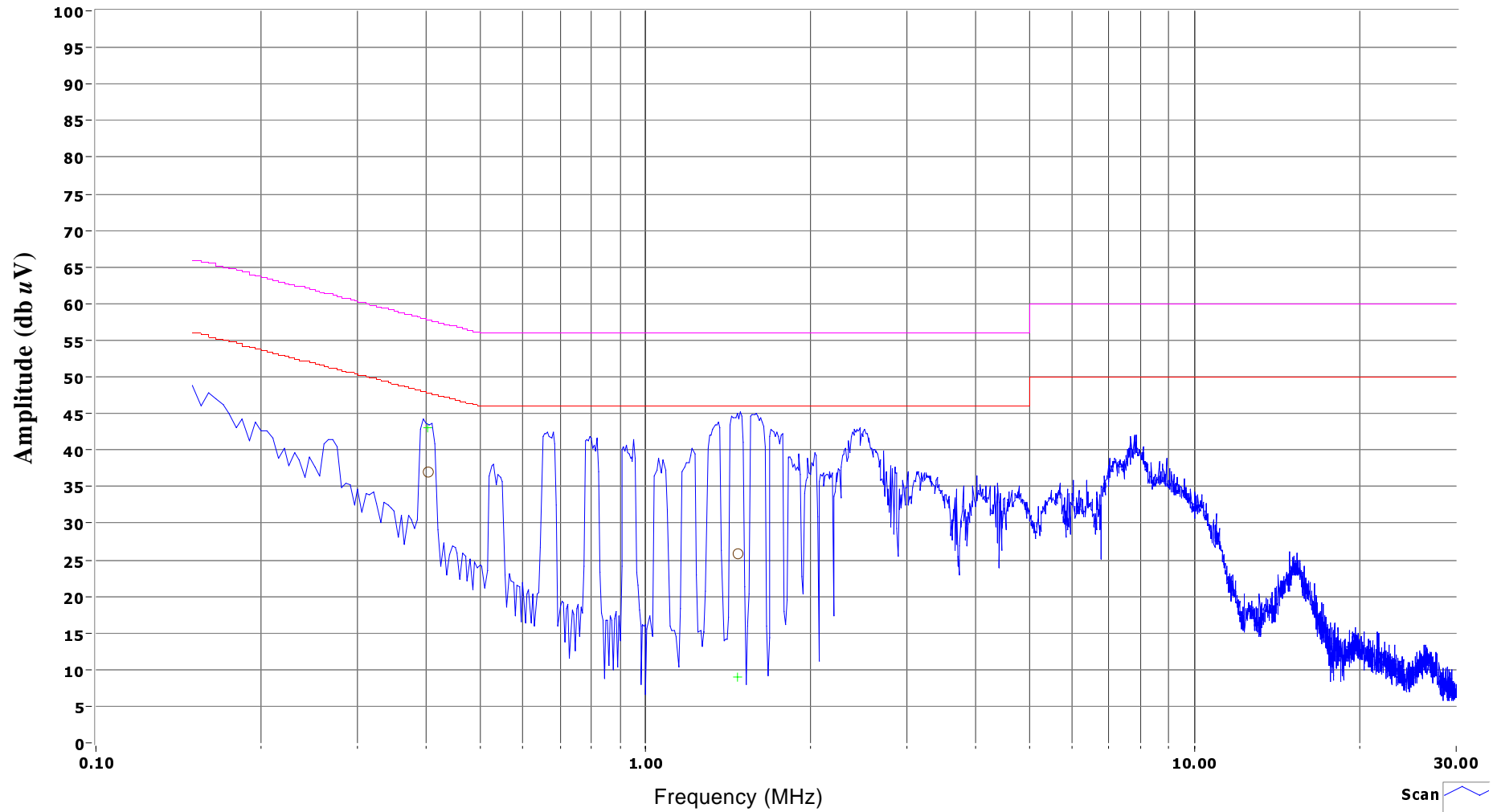


# SVOATS# 2: Aruba Networks Accesspoint Run 3

Spec:

802.11 a/b/g Radio

Mains Lead  
Neutral



230Vac, 50Hz

- Scan
- Peak
- Quasi-peak
- Average
- Average Limit
- QuasiPeak Limit

6/30/2003

Juan Martinez

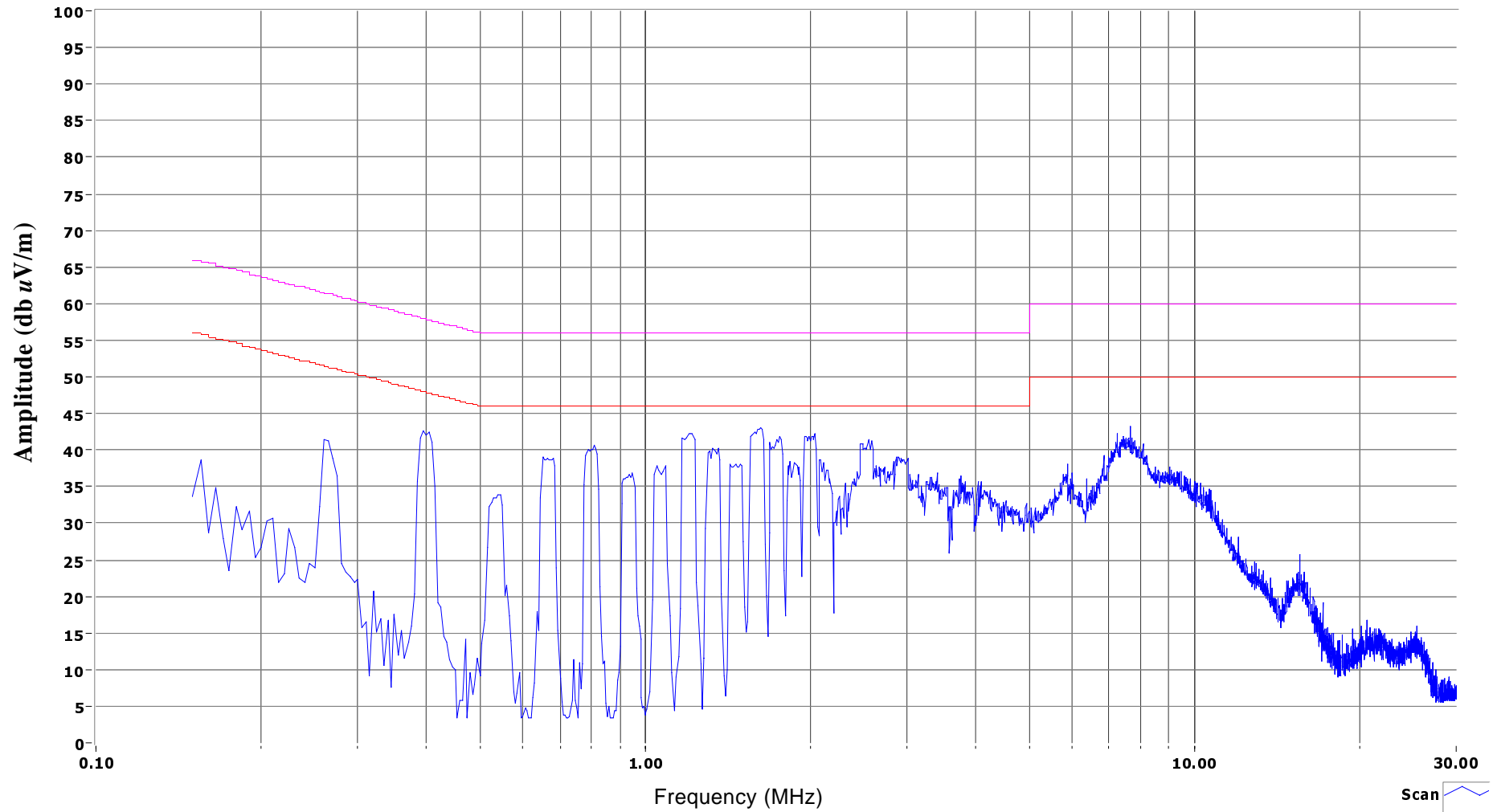


# SVOATS# 2: Aruba Networks Accesspoint Run 2

Spec:

802.11 a/b/g Radio

Mains Lead  
Line 1



120Vac, 60Hz

6/30/2003

Juan Martinez

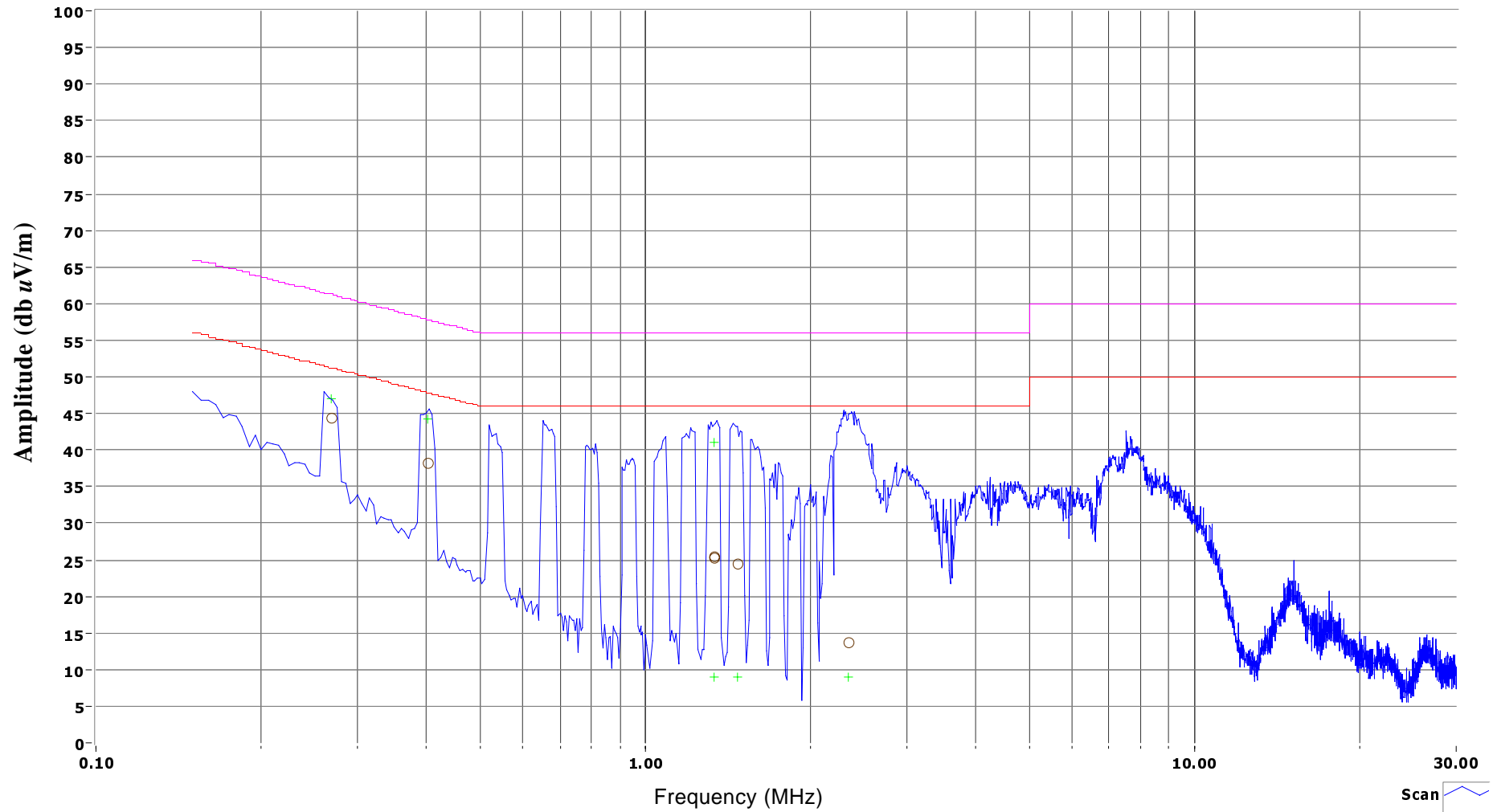


# SVOATS# 2: Aruba Networks Accesspoint Run 4

Spec:

802.11 a/b/g Radio

Mains Lead  
Line 1



230Vac, 50Hz

Scan  
Peak  
Quasi-peak  
Average  
Average Limit  
QuasiPeak Limit

6/30/2003

Juan Martinez

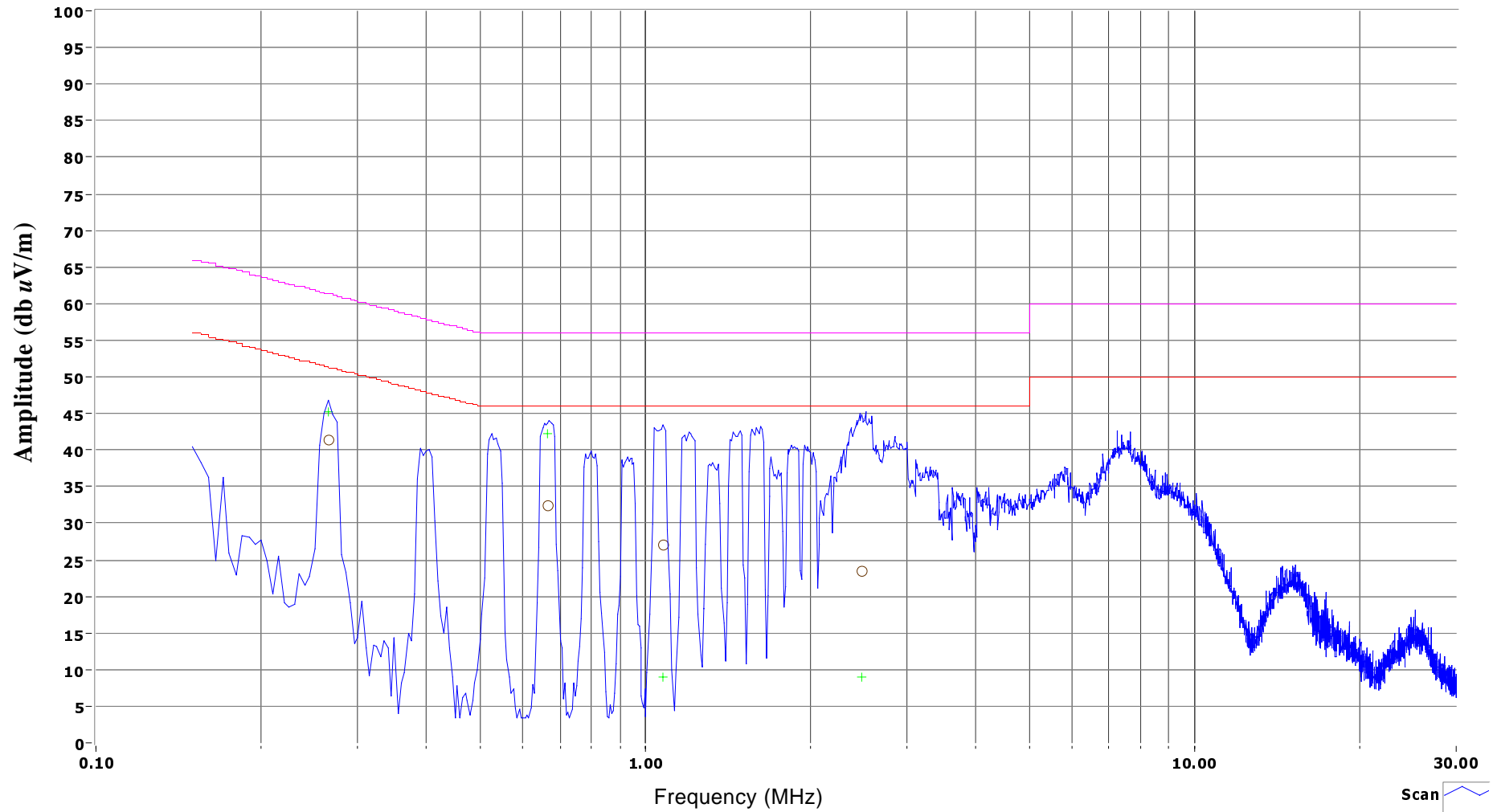


# SVOATS# 2: Aruba Networks Accesspoint Run 1

Spec:

802.11 a/b/g Radio

Mains Lead  
Line 1



120Vac, 60Hz

Scan  
Peak  
Quasi-peak  
Average  
Average Limit  
QuasiPeak Limit

6/30/2003

Juan Martinez