Test of Strix MWS 100 802.11 Wireless AP

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

Test Report Serial No.: STRX16-A8 Rev A

TEST REPORT

FROM

Test of Strix MWS 100 802.11 Wireless AP
to
To: FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: STRX16-A8 Rev A

Note: this report only contains data with regard to the 5,150 to 5,250 MHz operational mode of the Strix Wireless Access Point. 2.4 and 5.8 GHz test data are reported in MiCOM Labs test report STRX16-A4.

This report supersedes None

Applicant: Strix Systems Inc
26610 Agoura Road
Calabasas
California 91302 USA

Product Function: 802.11a/b/g Wireless Access Point

Copy No: pdf **Issue Date:** 25th March 2008

This Test Report is Issued Under the Authority of;

MiCOM Labs, Inc.
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Pleasanton, CA 94566 USA
Phone: +1 (925) 462-0304
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ACCREDITED
CERTIFICATE #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

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ACCREDITATION & LISTINGS

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 test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

MICOM LABS
Pleasanton, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 18 June 2005*).

Presented this 26th day of February 2008.

President
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2009

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

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 I	

DOCUMENT HISTORY

Document History		
Revision	**Date**	**Comments**
Draft		
Rev A	25th March 2008	First issue.

1. TEST RESULT CERTIFICATE

Applicant:	Strix Systems Inc 26610 Agoura Road Calabasas California 91302 USA	Tested By:	MiCOM Labs, Inc. 440 Boulder Court Suite 200 Pleasanton California, 94566, USA
EUT:	Wireless Access Point	Telephone:	+1 925 462 0304
Model:	MWS 100	Fax:	+1 925 462 0306
S/N:	001		
Test Date(s):	28th January to 28th Feb 2008	Website:	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.

ACCREDITED
CERTIFICATE #2381.01

Approved & Released for MiCOM Labs, Inc. by:

Graeme Grieve
Quality Manager MiCOM Labs,

Gordon Hurst
President & CEO MiCOM Labs, Inc.

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	14th 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

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.

3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Details	Description
Purpose:	Test of the Strix MWS 100 802.11 Wireless AP in the frequency ranges 5150 to 5350 MHz, and 5470 to 5,725 MHz to FCC Part 15.407 and Industry Canada RSS-210 regulations.
Applicant:	Strix Systems Inc 26610 Agoura Road Calabasas California 91302 USA
Manufacturer:	As applicant.
Laboratory performing the tests:	MiCOM Labs, Inc. 440 Boulder Court, Suite 200 Pleasanton, California 94566 USA
Test report reference number:	STRX16-A8 Rev A
Date EUT received:	17TH January 2008
Standard(s) applied:	FCC 47 CFR Part 15.407 & IC RSS-210
Dates of test (from - to):	28th January to 28th Feb 2008
No of Units Tested:	1
Type of Equipment:	802.11a/b/g Wireless Access Point
Manufacturers Trade Name:	Wireless Access Point
Model:	MWS 100
Location for use:	Outdoor
Declared Frequency Range(s):	5,150 to 5,250 MHz
Type of Modulation:	Per 802.11a – OFDM
Declared Nominal Output Power: (Average Power)	5,150-5,250 MHz: +16 dBm
EUT Modes of Operation:	802.11a/b/g
Transmit/Receive Operation:	Time Division Duplex
Rated Input Voltage and Current:	10.8 - 48 Vdc,
Operating Temperature Range:	Client Declared range -40 to +80ºC
ITU Emission Designator:	802.11a – 15M4W7D
Microprocessor(s) Model:	Atheros AR5312
Clock/Oscillator(s):	25 MHz, 40 MHz
Frequency Stability:	±20 ppm max
Equipment Dimensions:	9.5” X 6” X 2”
Weight:	1.5 lbs
Primary function of equipment:	802.11 Device

3.2. Scope of Test Program

The scope of the compliance program was to test the Strix Systems MWS 100 wireless AP in the frequency range 5150 - 5350 MHz for compliance against FCC 47 CFR Part 15.407, Industry Canada RSS-210 specifications.

Strix MWS 100
Wireless Access Point

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

Type (EUT/ Support)	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	Wireless AP	Strix	MWS 100	001
Support	Power Supply	Strix	SA07H1724	None
Support	POE	Strix	POE 48i	010615
Support	Laptop PC	IBM	ThinkPad	None

3.4. Antenna Details

Dome antenna manufactured by Huber & Suhner Model SWA2459

Gain 2400 - 5875 MHz; 4dBi

Rubber Ducky antenna manufactured by Connex Wireless Model RD2458-5

Gain @ 5150 MHz; 5 dBi

3.5. Cabling and I/O Ports

Number and type of I/O ports

1. 10/100 Ethernet with POE
2. RF Main (SMA)
3. RF Aux (SMA)
4. Vdc, 4mm supply connector

3.6. Test Configurations

Matrix of test configurations

Operational Mode (802.11)	Frequencies (MHz)	Maximum Data Rates (MBit/s)	Data Rate(s) Selected for Test Purposes (Mbit/s)	
			Conducted	Radiated
a	5,180 5,200 5,240	6	6	6

3.7. Equipment Modifications

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

1. Radiated Band-Edge Issue

   Irrespective of antenna type the EUT had problems meeting the average power limit for radiated band-edge emissions. The output power of the EUT was reduced however this did not have an effect on the transmitted energy in the restricted-band.

   To fix the problem the transmitter gain constants in the radio calibration data were adjusted to optimize the transmitter signal to noise ratio thereby lowering the transmitted noise floor in restricted bands.

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

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	Complies	5.1.1
15.407(a) **A9.2(2)** **4.6**	Transmit Output Power	Power Measurement	Conducted	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)	SAR testing performed	Complies	5.1.6

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	*5.1.7.2*
RSS-GEN **6**	Receiver Radiated Spurious Emissions	Emissions above 1 GHz		Complies	*5.1.7.3*
15.407(b)(6) **15.205(a)** **15.209(a)** **2.2**	Radiated Emissions	Emissions <1 GHz (30M-1 GHz)		Complies	*5.1.7.4*
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

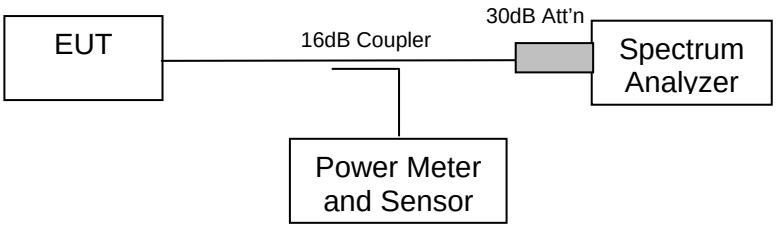
5.1. Device Characteristics

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 analyser connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. The spectrum analyzer utilized the 6 dB resolution bandwidth filter for all measurements.

Test Measurement Set up



Measurement set up for 6 dB and 99 % bandwidth test

EUT parameters.
Data Rate(s): 802.11a 6 MBit/s,
Power Level: Maximum

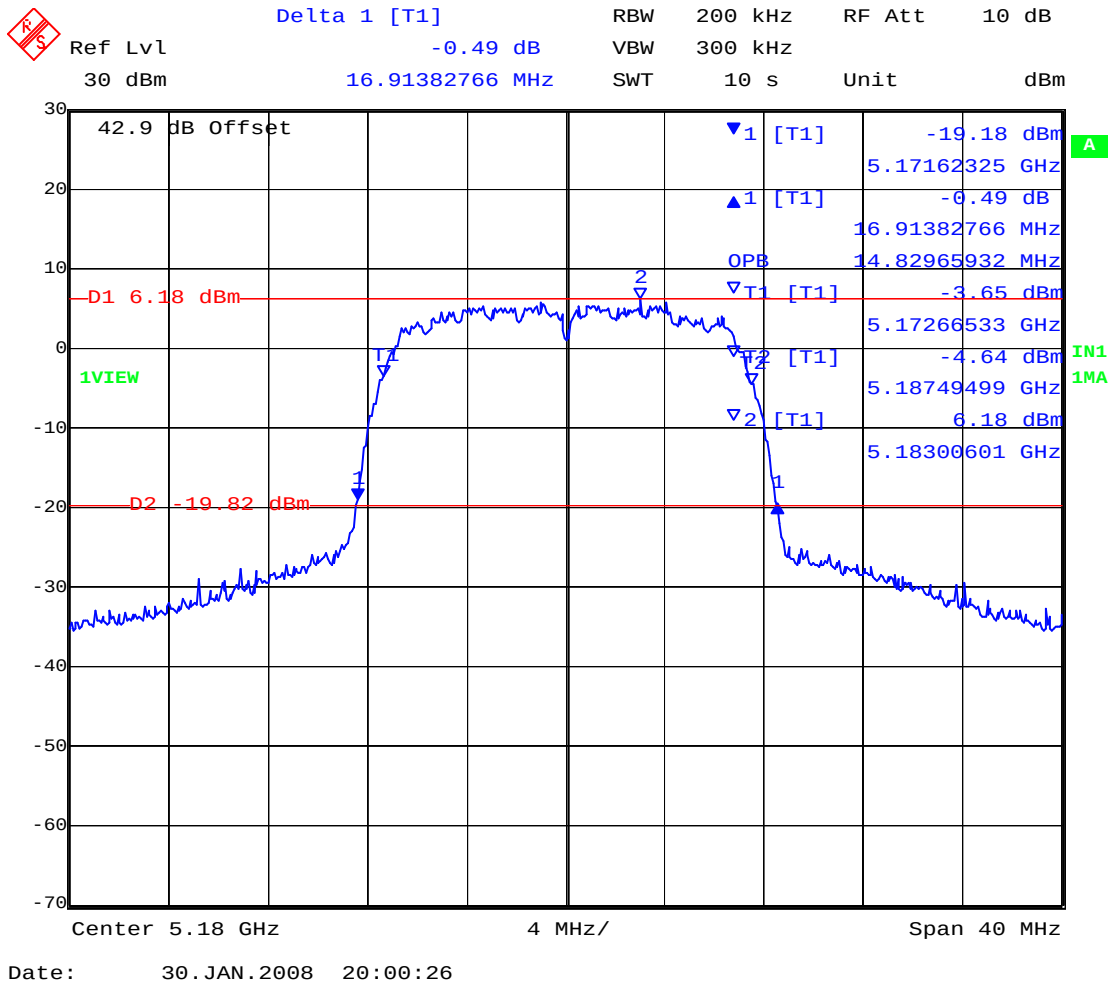
Measurement Results for 26 dB and 99 % Operational Bandwidth(s)

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

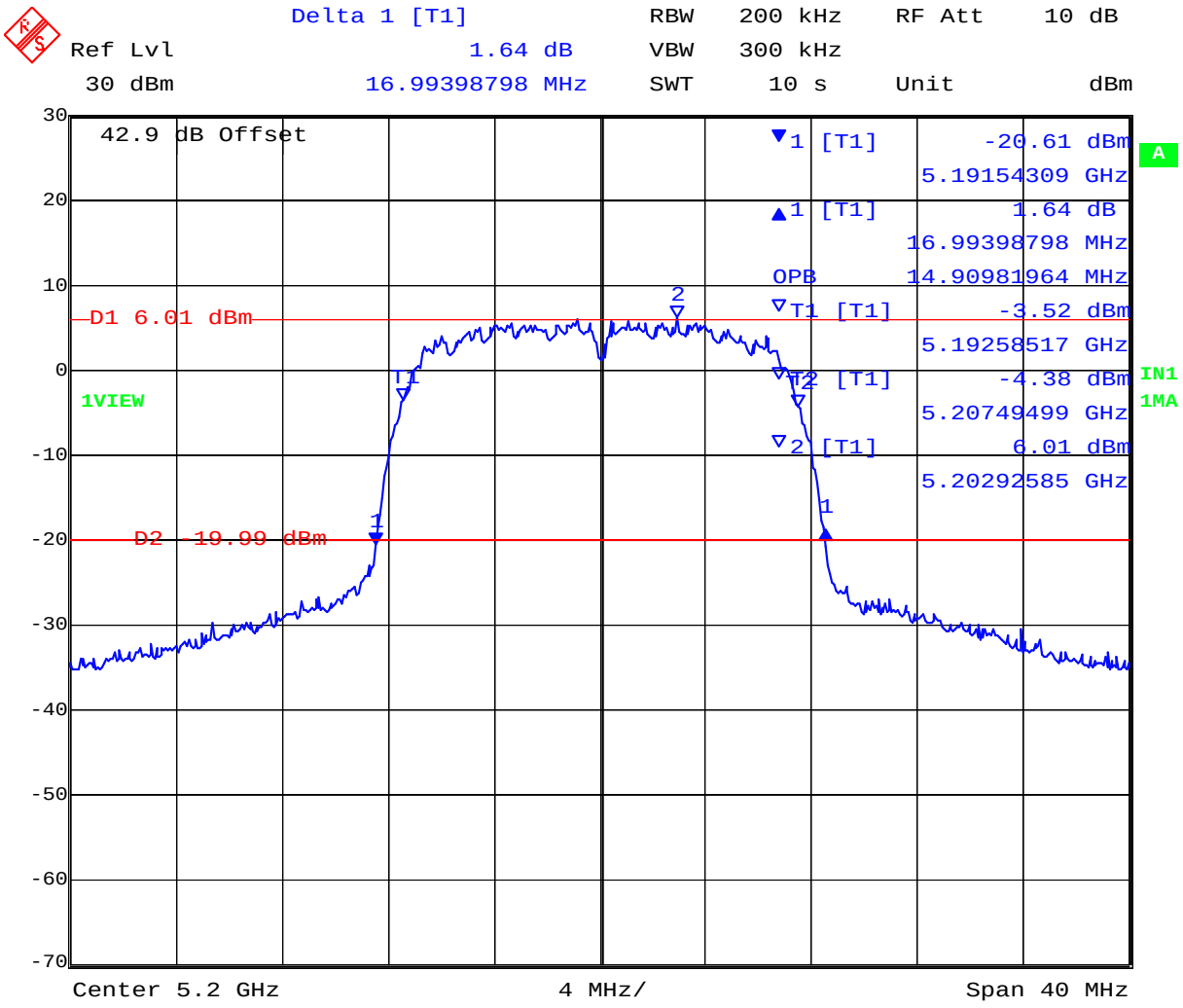
TABLE OF RESULTS – **802.11a**

Center Frequency (MHz)	26 dB Bandwidth (MHz)	99 % BW (MHz)
5,180	16.914	14.830
5,200	16.994	14.910
5,240	16.994	14.830

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

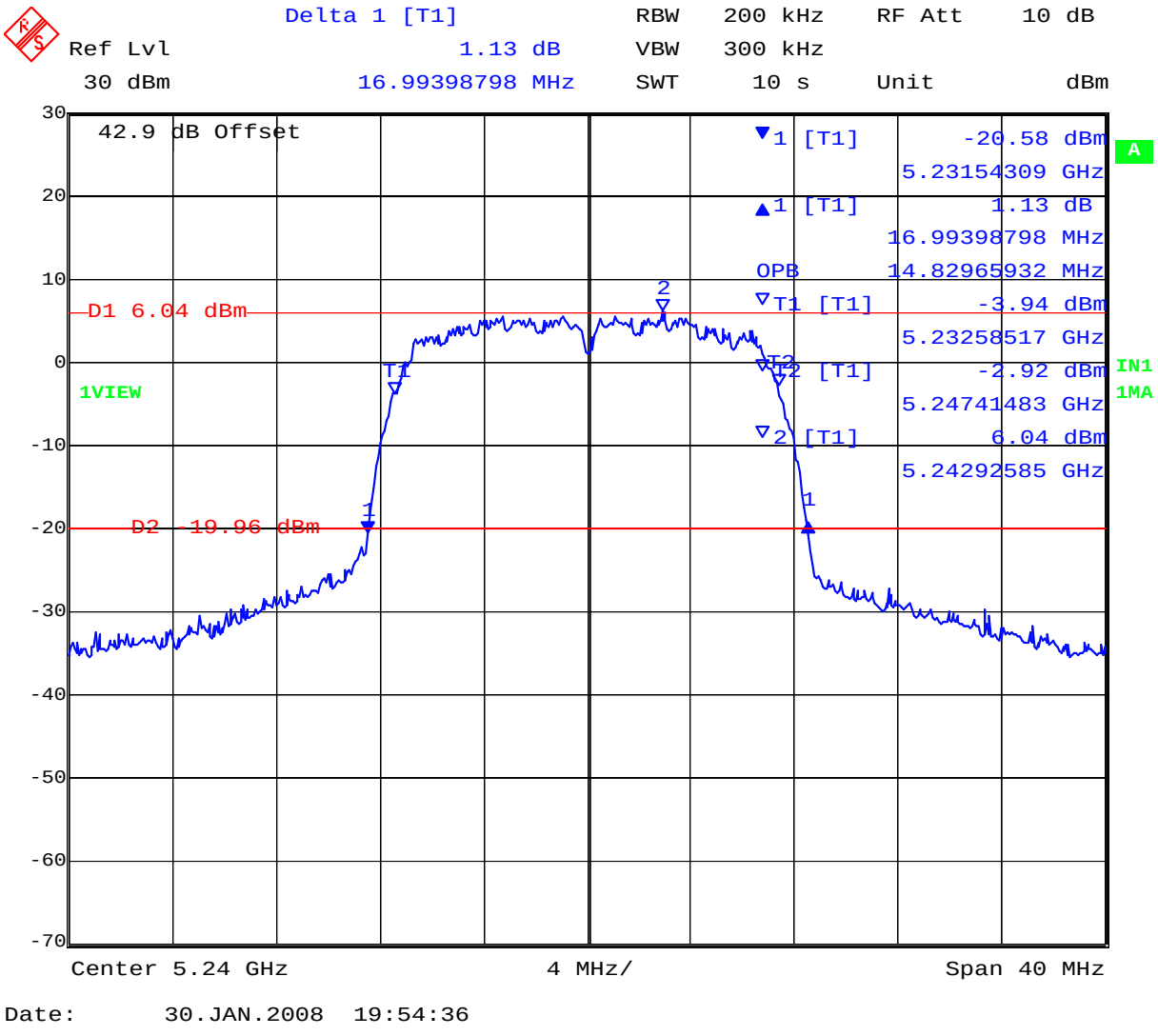


5,200 MHz 802.11a 26 dB and 99 % Bandwidth



Date: 30.JAN.2008 19:58:03

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



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

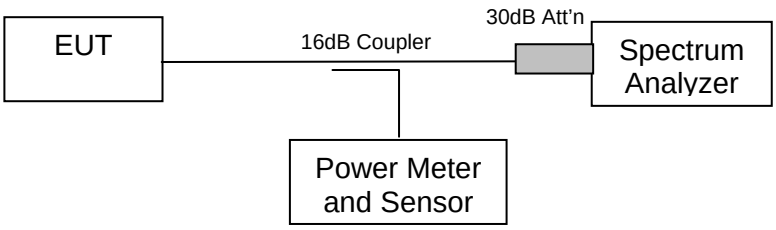
Method	Test Equipment Used
Measurements were made per work instruction WI-03 'Measurement of RF Spectrum Mask'	0158, 0193, 0252, 0313, 0314, 0070, 0116, 0117

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 the average power meter and the spectrum analyzer. Method #2 as outlined in the FCC's Public Notice (DA 02-2138, August 30, 2002 was used to make all measurements. The results reported include all offsets due to attenuators, cable losses etc.

Test Measurement Set up



Measurement set up for Transmitter Output Power

Maximum Transmit Power, FCC Limits

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

Frequency Range (MHz)	Maximum 26 dB Bandwidth (MHz)	4 + 10 Log (B) (dBm)	Limit (dBm)
5150 – 5250	16.994	+16.30	+16.30

Maximum Transmit Power, Industry Canada Limits

Limit 5150 – 5250: Lesser of 200 mW (+23 dBm) or 10 + 10 Log (B) dBm

Frequency Range (MHz)	Maximum 99% Bandwidth (MHz)	10 + 10 Log (B) (dBm)	Limit (dBm)
5150 – 5250	14.910	+21.74	+21.74

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.
Data Rate(s): 802.11a 6 MBit/s,
Power Level: Maximum

Take from

TABLE OF RESULTS – **802.11a**

Center Frequency (MHz)	Maximum Conducted Power (dBm)
5,180	+15.18
5,200	+14.95
5,240	+14.72

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-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 log10 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 log10 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 log10 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	±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

5.1.3. Peak Power Spectral Density

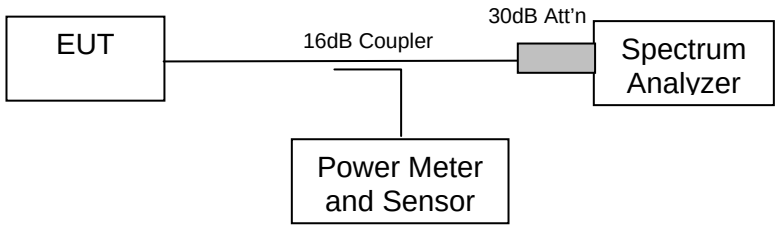
FCC, Part 15 Subpart C §15.407(a)
Industry Canada RSS-210 § A9.2(2)

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 (x) in Section 2.1 'References and Measurement Uncertainty';

"Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands."

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

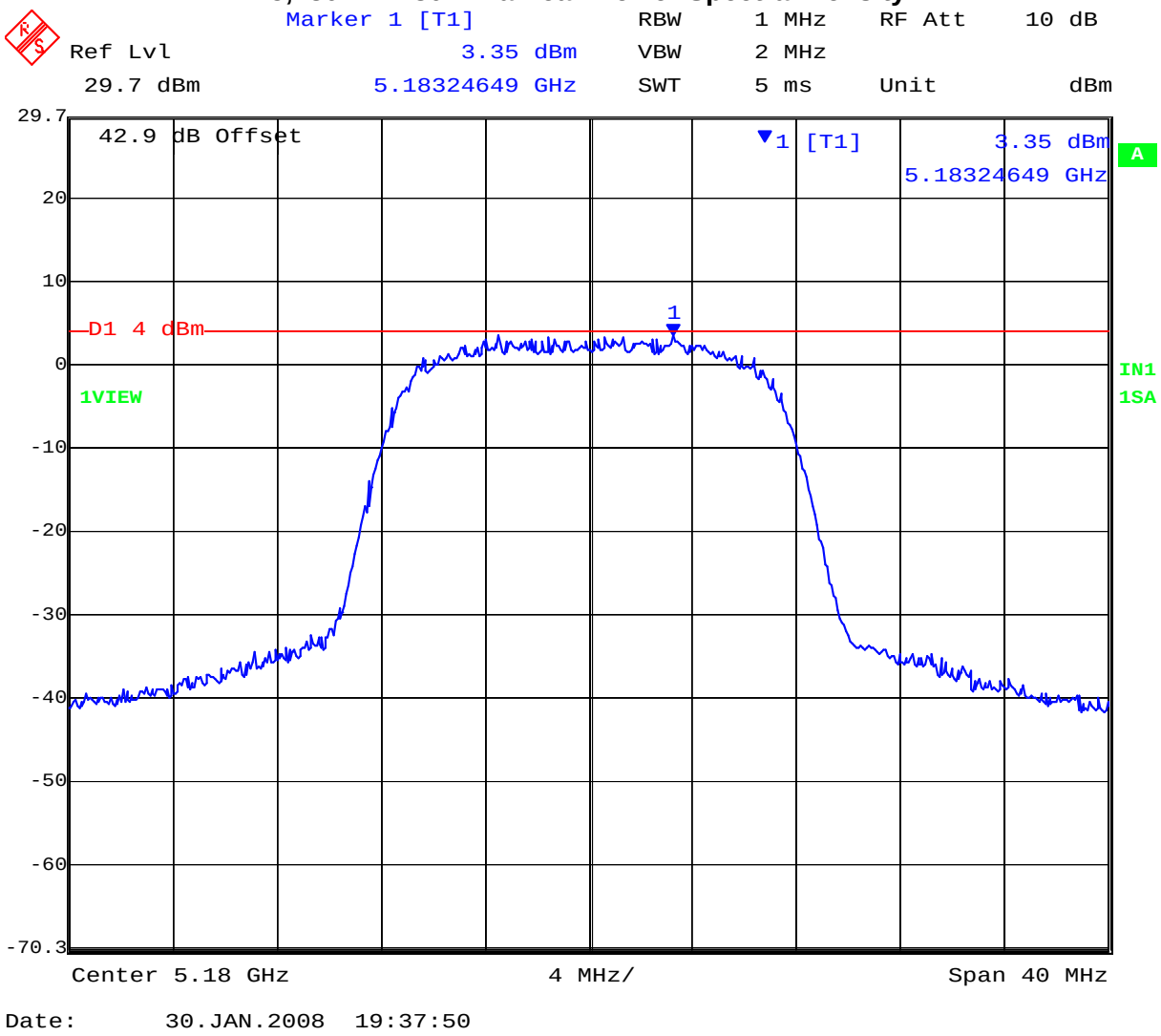
Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

EUT parameters.
Data Rate(s): 802.11a 6 MBit/s,
Power Level: Maximum

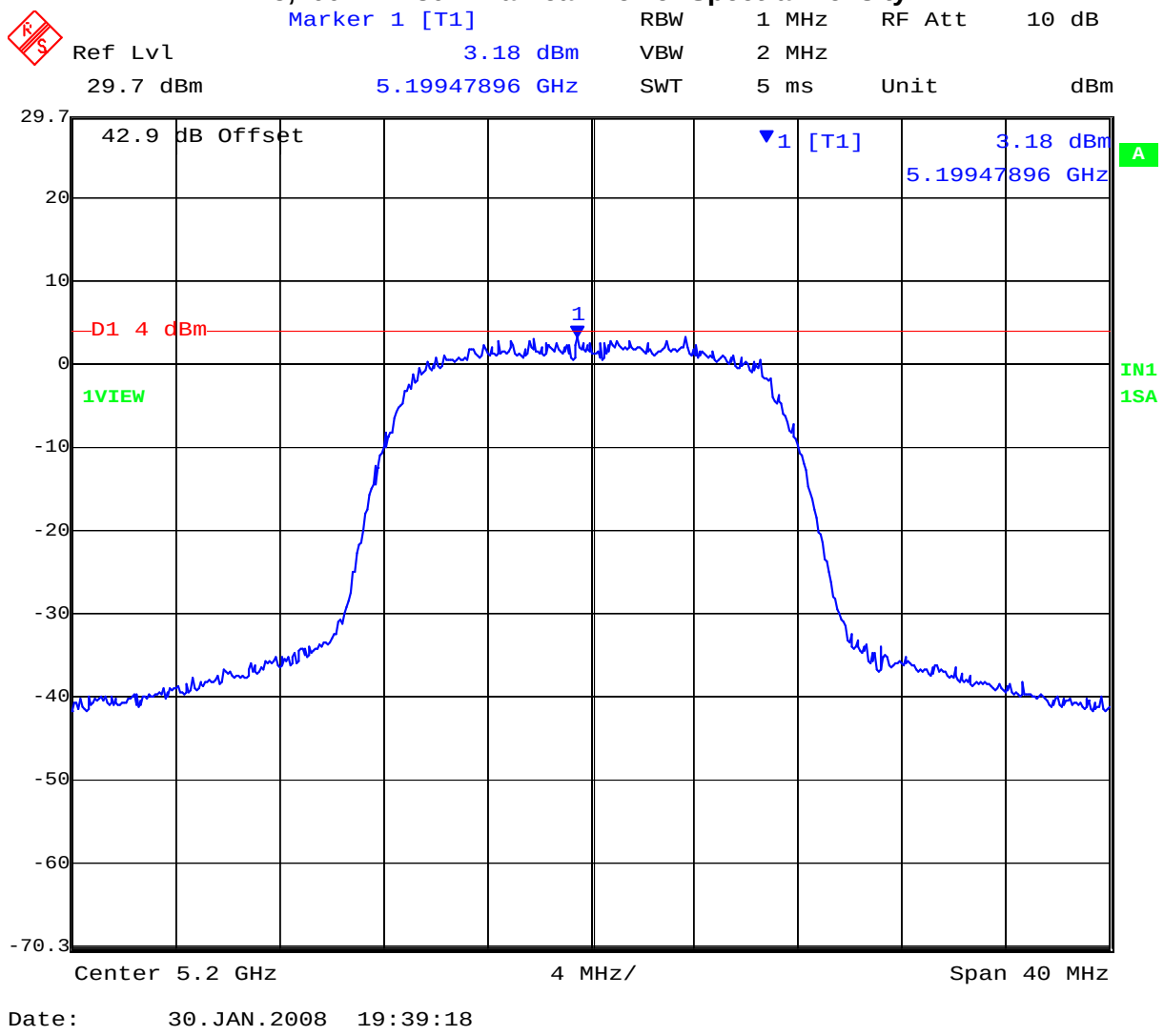
TABLE OF RESULTS – **802.11a**

Center Frequency (MHz)	Peak Frequency (MHz)	PPSD (dBm)
5,180	5183.24649	+3.35
5,200	5199.47896	+3.16
5,240	5240.68136	+3.35

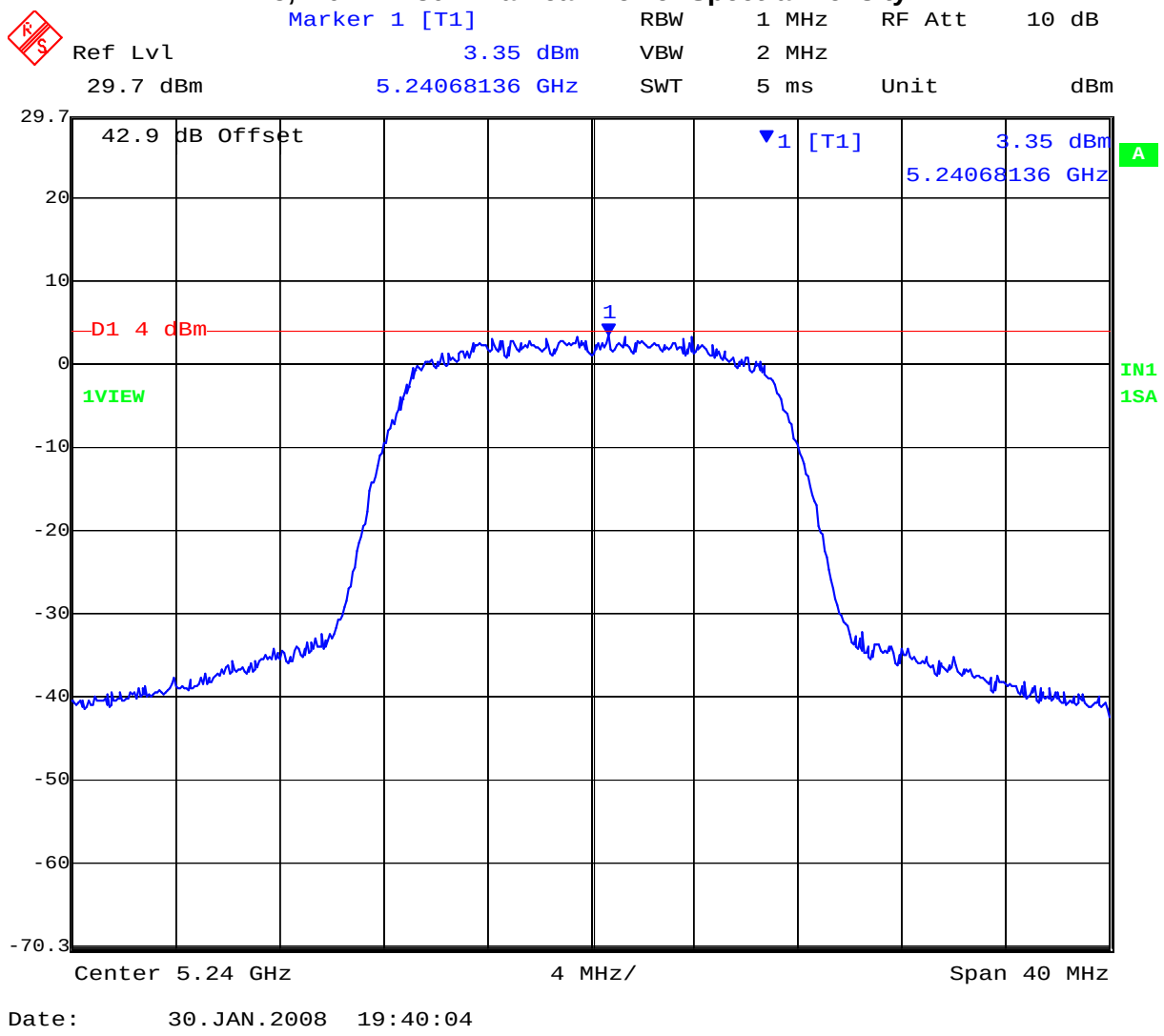
5,180 MHz 802.11a Peak Power Spectral Density



5,200 MHz 802.11a Peak Power Spectral Density



5,240 MHz 802.11a Peak Power Spectral Density



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

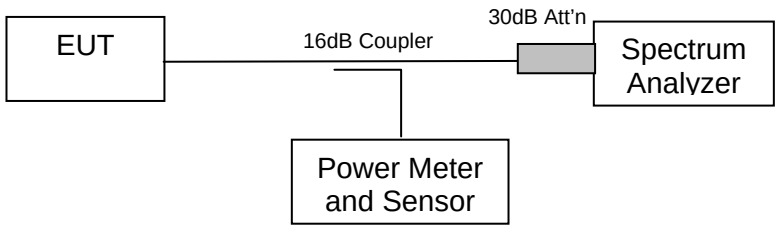
5.1.4. Peak Excursion Ratio

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

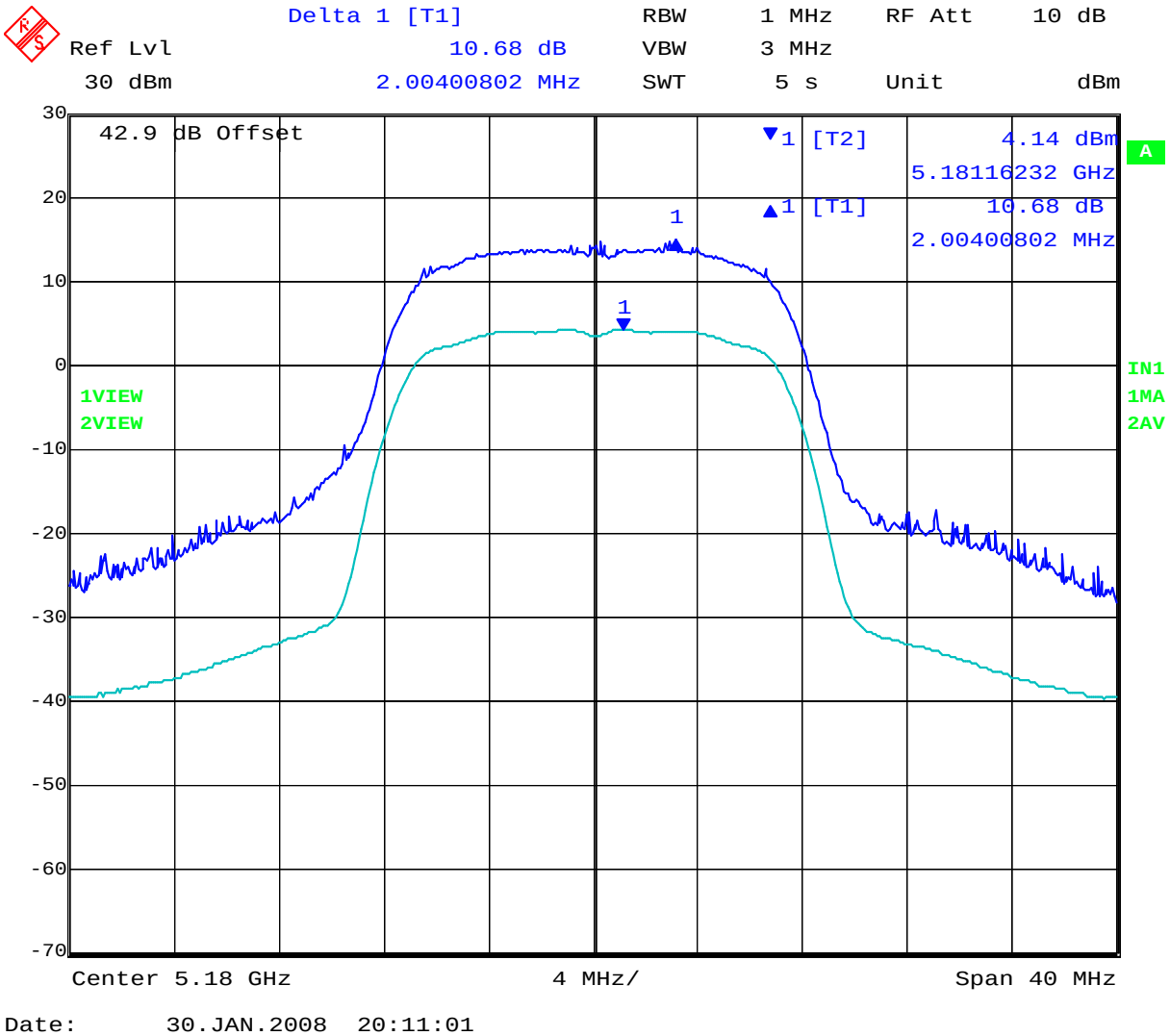
Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57% Pressure: 999 to 1012 mbar

EUT parameters
Data Rate(s): 802.11a 6 MBit/s,
Power Level: Maximum

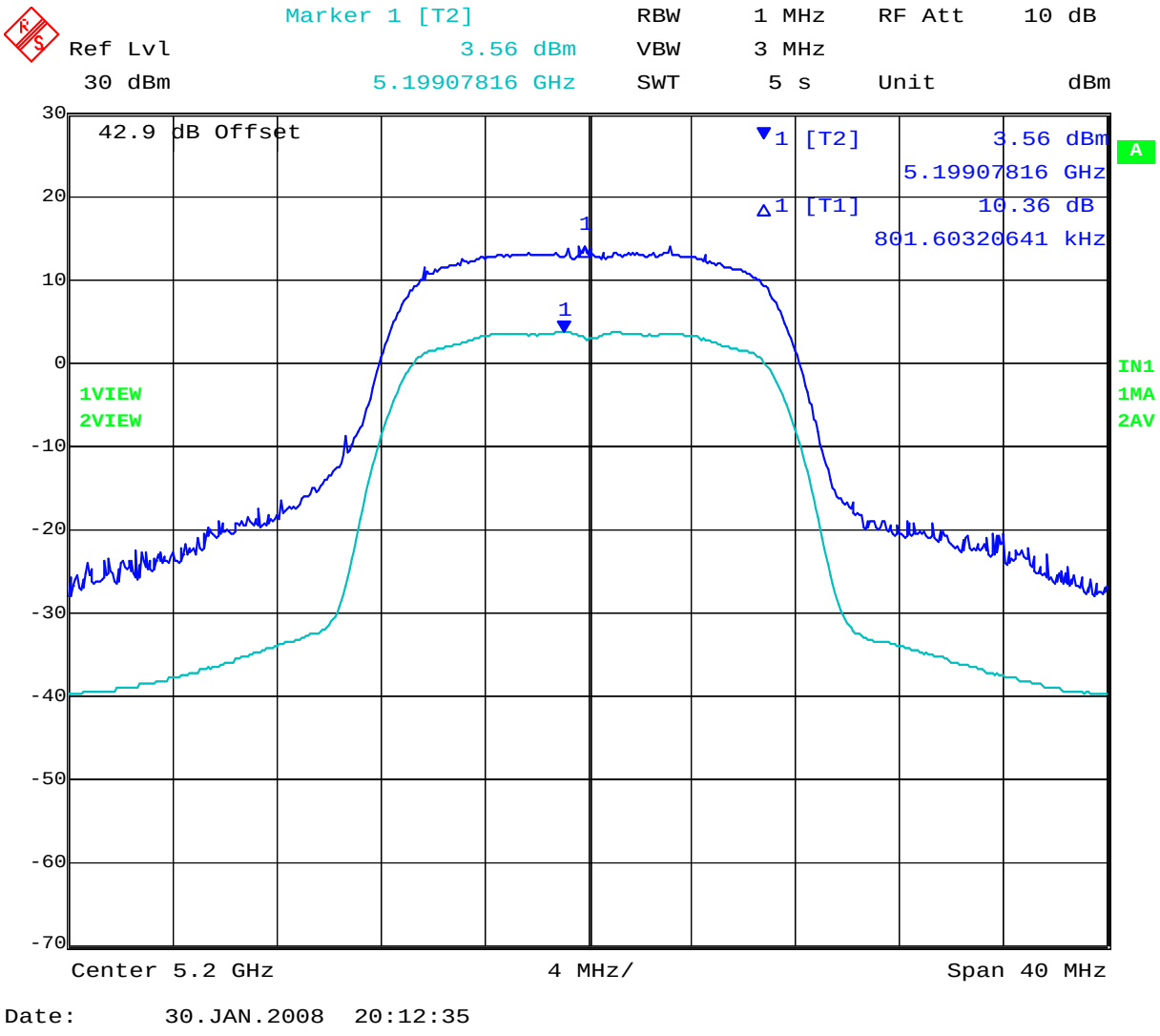
TABLE OF RESULTS – **802.11a**

Centre Frequency (MHz)	Peak Excursion Ratio (dB)
5,180	10.68
5,200	10.36
5,240	10.54

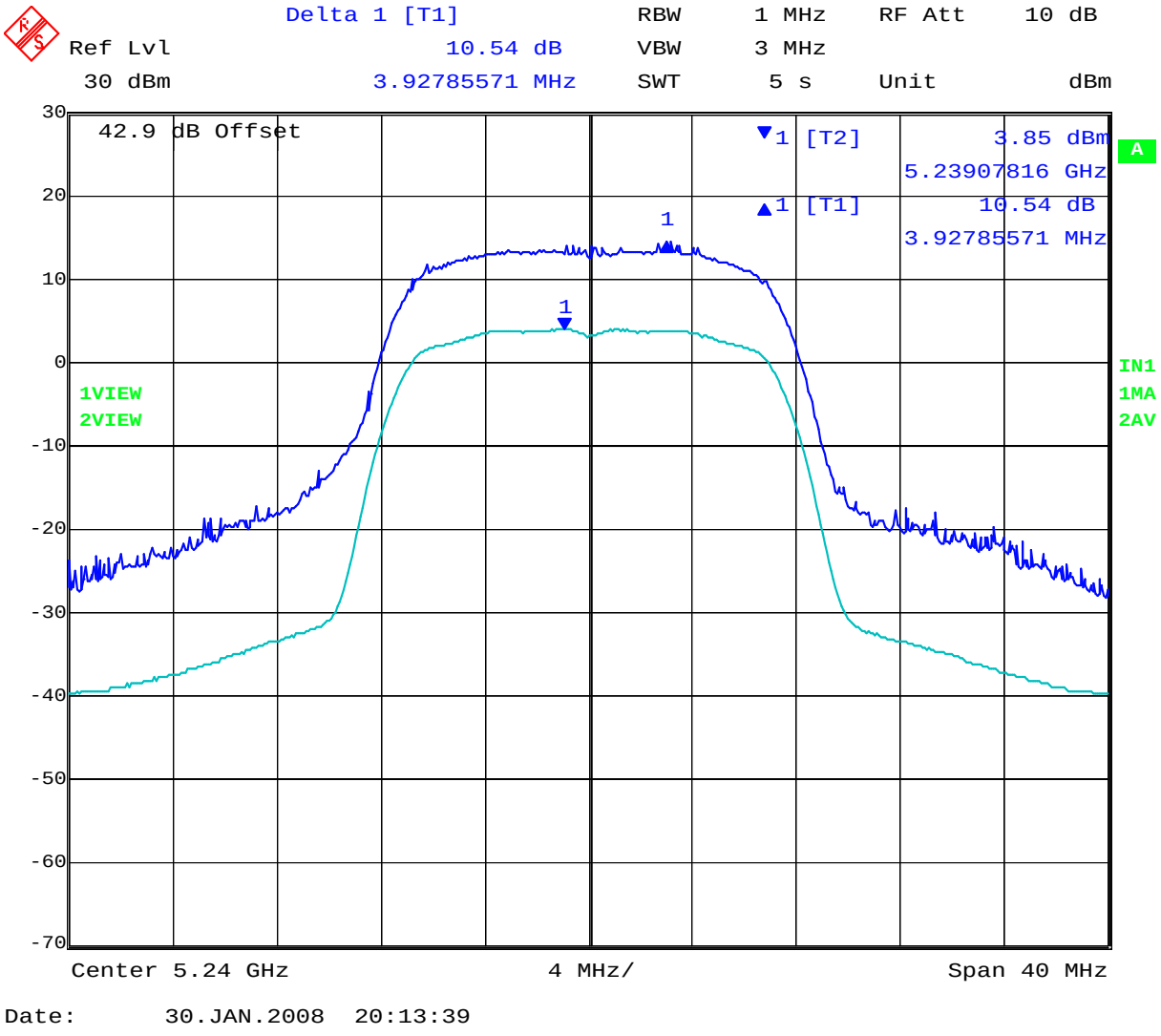
5,180 MHz 802.11a - Peak Excursion Ratio



5,200 MHz 802.11a - Peak Excursion Ratio



5,240 MHz 802.11a - Peak Excursion Ratio



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	± 2.81dB

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

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 ±20ppm stability.
This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

±20ppm at 5.250 GHz translates to a maximum frequency shift of ±105 KHz. As the edge of the channels is at least one MHz from either of the band edges, ±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.

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^2) = EIRP/(4πd^2)

EIRP = P * G

P = Peak output power (mW)

G = Antenna numeric gain (numeric)

d = Separation distance (cm)

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

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

Freq. Band (GHz)	Antenna Gain (dBi)	Numeric Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Calculated Safe Distance @ 1mW/cm^2 Limit(cm)	Minimum Separation Distance (cm)
5.2	5.0	3.16	+15.18	32.96	2.9	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

§15.247 (f) U-NII devices are subject to the radio frequency radiation exposure requirements specified in §1.1307 (b), 2.1091 and 2.1093 as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment.

FCC §1.1310 Limit = 1mW / cm^2 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

5.1.7. Radiated Emissions

5.1.7.1. Transmitter Radiated Spurious Emissions (above 1 GHz)

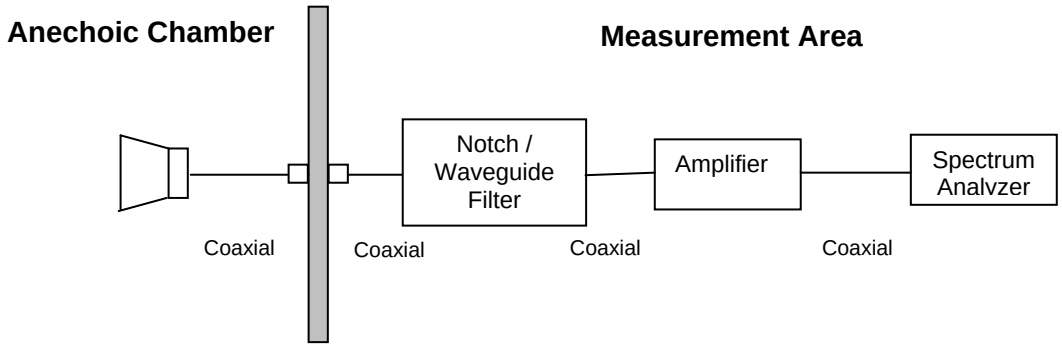
FCC, Part 15 Subpart C §15.407(b)(2), §15.205(a)/15.209(a)
Industry Canada RSS-210 §A9.3(2); §2.2; §2.6; RSS-Gen §4.7

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 dBμV; 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 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength;

$$E = 1000000 \times \sqrt{30P}/3 \ \mu V/m$$, where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

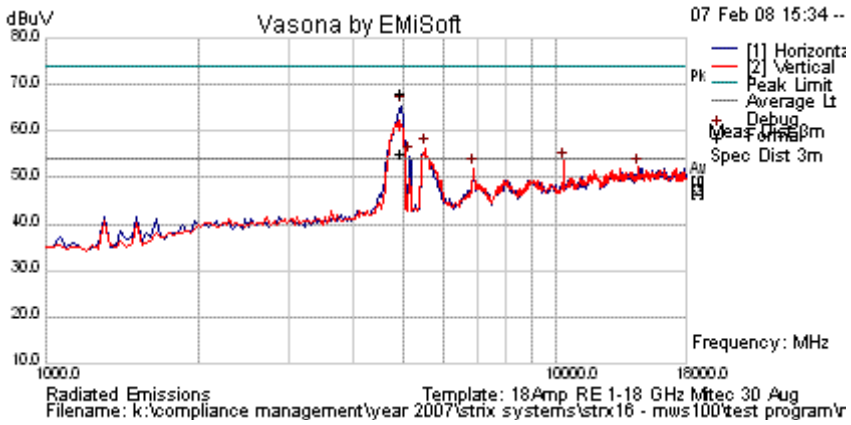
Note: The data in this Section along with the data in sections 5.1.7 (Conducted Spurious Emissions) and Section 5.1.8.2 (Radiated Band Edge - Restricted Bands) identifies that the EUT is in compliance with the -27dBm/MHz EIRP limit for out of band emissions.

Radiated Emissions > 1GHz 4dBi Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	1000 - 18000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/15:34, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Freq.: Ch36, 5180 MHz Power: Maximum ART=15.5 Data Rate: 6 Mbps ANT: H/S Dome

Graphical Data



Formal Data

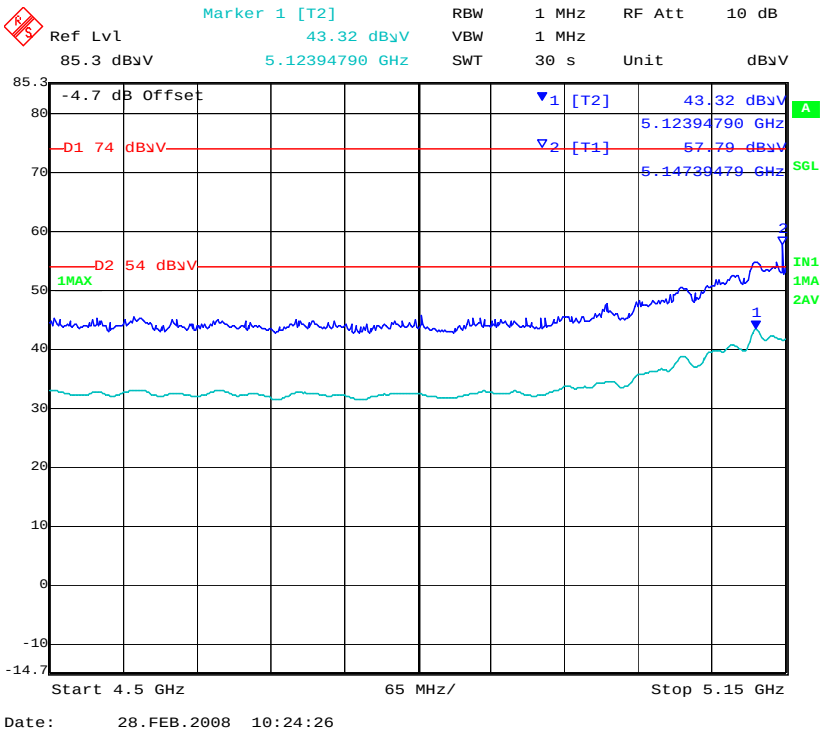
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1	4985.858	70.8	4.6	-9.4	66.1	Peak Max	H	127	26	74.0	-7.9	Pass	
2	4985.858	57.9	4.6	-9.4	53.1	Average Max	H	127	26	54.0	-.9	Pass	
3	5531.062	60.1	4.6	-8.3	56.4	Peak [Scan]	V	100	0	92.8	-36.4	Pass	NRB
4	10368.737	48.1	6.7	-1.2	53.6	Peak [Scan]	V	100	0	92.8	-39.2	Pass	NRB
5	14490.982	46.4	8.3	-2.4	52.3	Peak [Scan]	V	100	0	92.8	-40.5	Pass	NRB
6	6893.788	50.0	5.3	-3.2	52.1	Peak [Scan]	V	100	0	92.8	-40.7	Pass	NRB

Radiated Band Edge - 4dBi Dome Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	1000 - 18000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/15:34, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Freq.: Ch36, 5180 MHz Power: Maximum ART=15.5 Data Rate: 6 Mbps ANT: H/S Dome

Graphical Data



Formal Data

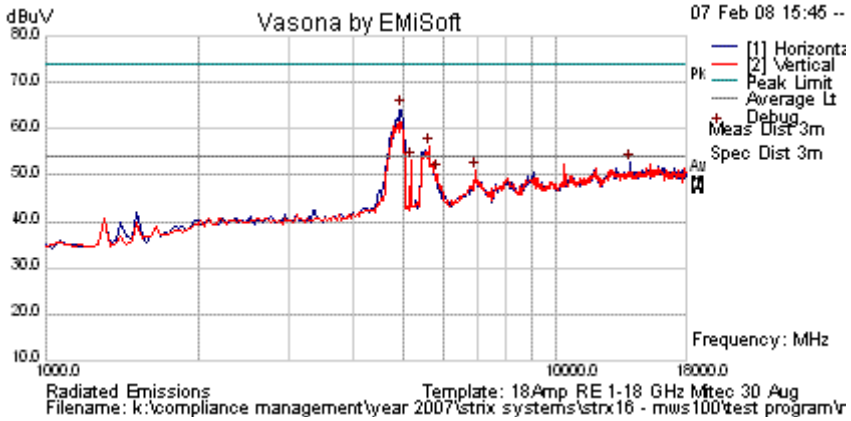
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
	5150.00				57.79	Peak	H			74	-16.21	Pass	Band edge
	5150.00				43.32	Average	H			54	-10.68	Pass	Band edge

Radiated Emissions > 1GHz 4dBi Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	1000 - 18000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/15:45, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Freq.: Ch40, 5200 MHz Power: Maximum ART=15.5 Data Rate: 6 Mbps ANT: H/S Dome

Graphical Data



Formal Data

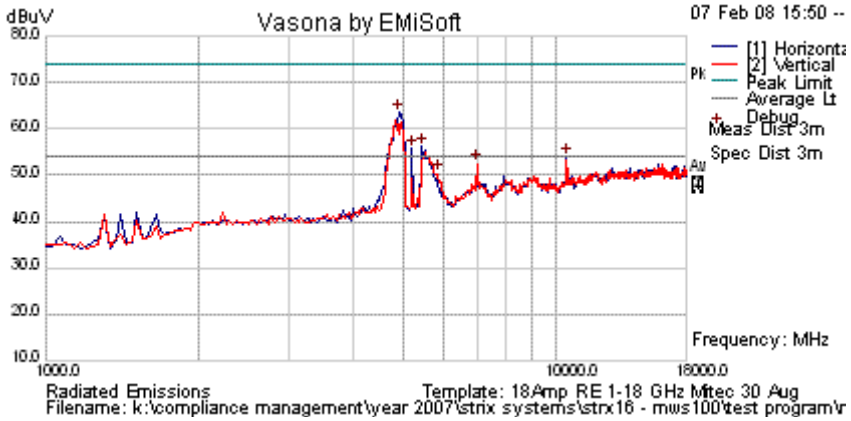
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1	4985.972	69.5	4.6	-9.4	64.8	Peak Max	H	127	26	74.0	-9.2	Pass	
2	4985.972	56.5	4.6	-9.4	51.6	Average Max	H	127	26	54.0	-2.4	Pass	
2	5633.267	60.0	4.7	-8.5	56.2	Peak [Scan]	V	100	0	93.1	-36.9	Pass	NRB
4	13979.960	46.8	7.8	-2.0	52.6	Peak [Scan]	H	100	0	93.1	-40.5	Pass	NRB
5	6927.856	48.6	5.3	-2.9	51.0	Peak [Scan]	V	100	0	93.1	-42.1	Pass	NRB
6	5837.675	53.9	4.8	-8.3	50.4	Peak [Scan]	V	100	0	93.1	-42.7	Pass	NRB

Radiated Emissions > 1GHz 4dBi Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	1000 - 18000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/15:50, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Freq.: Ch48, 5240 MHz Power: Maximum ART=15.5 Data Rate: 6 Mbps ANT: H/S Dome

Graphical Data



Formal Data

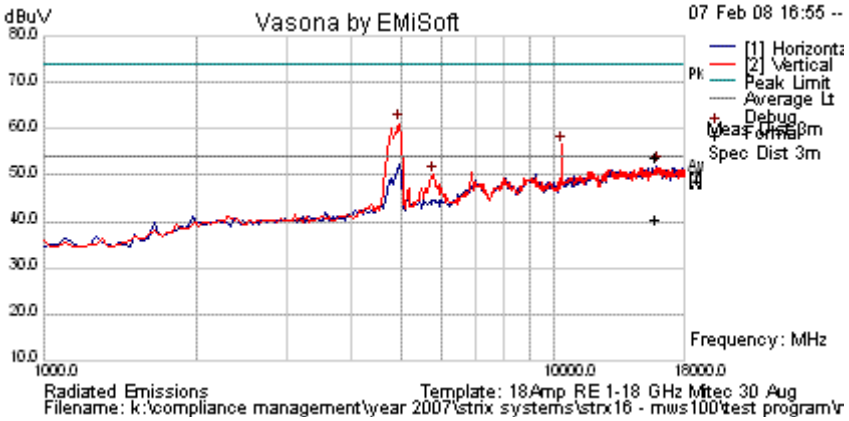
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1	4917.836	68.8	4.6	-9.4	64.1	Peak Max	H	127	26	74.0	-9.9	Pass	
2	4917.836	55.9	4.6	-9.4	51.1	Average Max	H	127	26	54.0	-2.9	Pass	
3	5462.926	59.9	4.6	-8.4	56.2	Peak [Scan]	H	100	0	92.7	-36.5	Pass	NRB
4	10470.942	48.2	6.8	-1.1	53.8	Peak [Scan]	H	100	0	92.7	-38.9	Pass	NRB
5	6995.992	49.4	5.4	-2.2	52.5	Peak [Scan]	V	100	0	92.7	-40.2	Pass	NRB
6	5871.743	53.7	4.8	-8.2	50.4	Peak [Scan]	V	100	0	92.7	-42.3	Pass	NRB

Radiated Emissions > 1GHz 5dBi Rubber Ducky Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	1000 - 18000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/16:55, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Freq.: Ch36, 5180 MHz Power: Maximum ART=15.5 Data Rate: 6 Mbps ANT: Rubber Ducky

Graphical Data



Formal Data

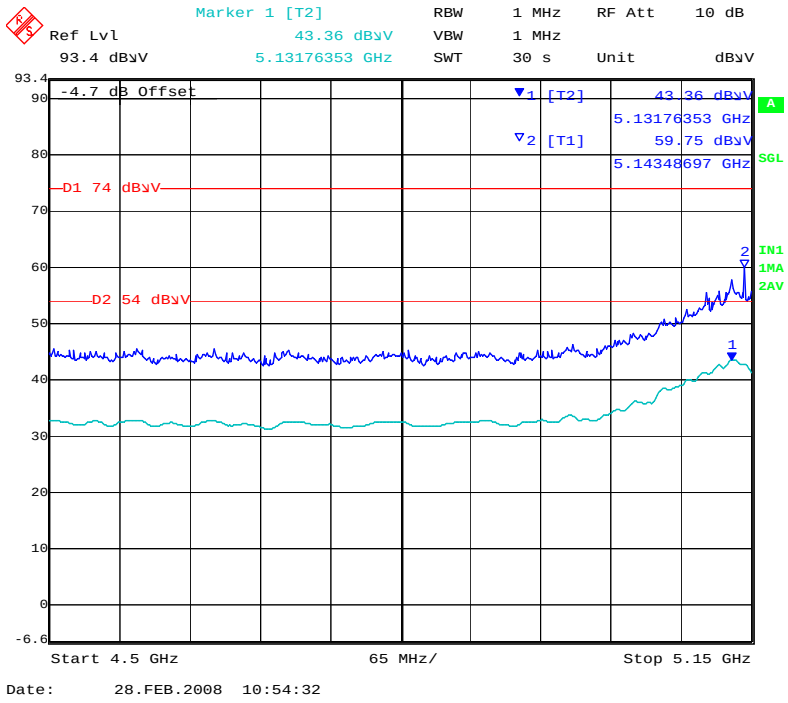
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1	15863.834	44.1	8.8	-1.0	51.9	Peak Max	V	118	168	74.0	-22.1	Pass	
2	15863.834	30.8	8.8	-1.0	38.6	Average Max	H	132	160	54.0	-15.4	Pass	
3	4985.972	64.4	4.6	-9.4	59.7	Peak Max	H	127	26	74.0	-14.3	Pass	
4	4985.972	51.5	4.6	-9.4	46.7	Average Max	H	127	26	54.0	-7.3	Pass	
2	10368.737	51.2	6.7	-1.2	56.8	Peak [Scan]	V	100	0	89.8	-33.0	Pass	NRB
4	5803.607	53.6	4.8	-8.3	50.1	Peak [Scan]	V	100	0	89.8	-39.7	Pass	NRB

Radiated Band Edge - 5dBi Rubber Ducky Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	1000 - 18000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/16:55, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Freq.: Ch36, 5180 MHz Power: Maximum ART=15.5 Data Rate: 6 Mbps ANT: Rubber Ducky

Graphical Data



Formal Data

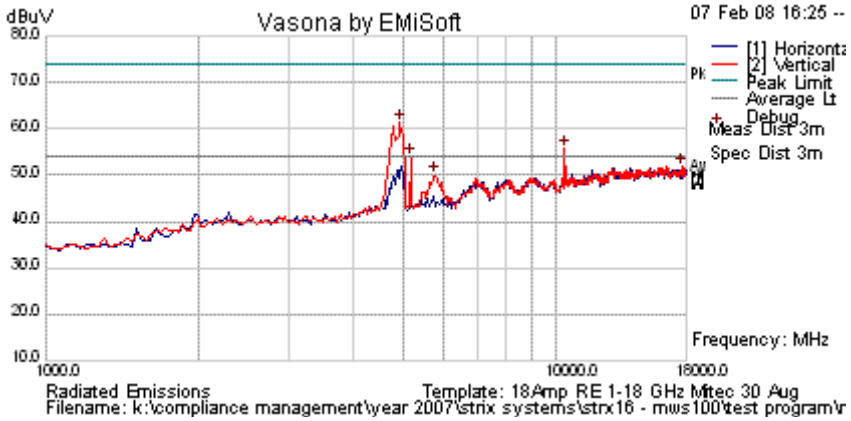
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
	5150.00				59.75	Peak	H			74	-14.25	Pass	Band edge
	5150.00				43.36	Average	H			54	-10.64	Pass	Band edge

Radiated Emissions > 1GHz 5dBi Rubber Ducky Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	1000 - 18000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/16:25, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Freq.: Ch40, 5200 MHz Power: Maximum ART=15.5 Data Rate: 6 Mbps ANT: Rubber Ducky

Graphical Data



Formal Data

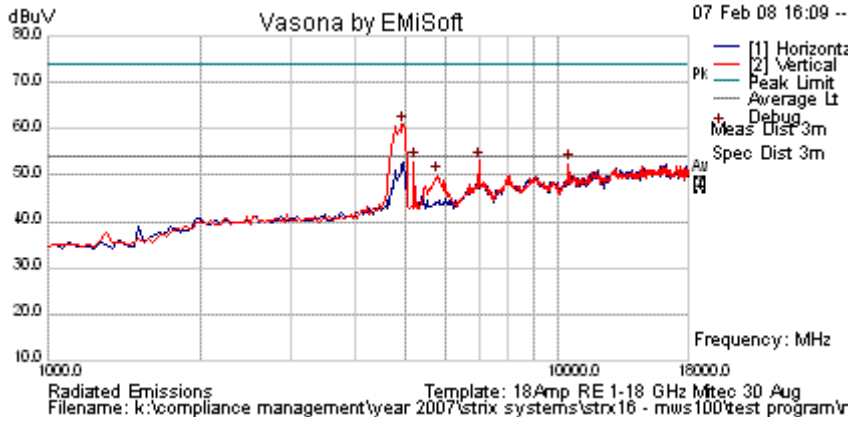
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1	4951.904	66.2	4.6	-9.3	61.5	Peak [Scan]	V	100	0	74.0	-12.50	Pass	
2	4951.904	53.3	4.6	-9.4	48.5	Average Max	v	100	0	54.0	-5.50	Pass	
3	10402.806	50.3	6.7	-1.1	55.9	Peak [Scan]	V	100	0	89.9	-34.00	Pass	NRB
4	17591.182	43.5	8.8	-.5	51.8	Peak [Scan]	V	100	0	89.9	-38.10	Pass	NRB
5	5769.539	53.6	4.8	-8.4	49.9	Peak [Scan]	V	100	0	89.9	-40.00	Pass	NRB

Radiated Emissions > 1GHz 5dBi Rubber Ducky Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	1000 - 18000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/16:09, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Freq.: Ch48, 5240 MHz Power: Maximum ART=15.5 Data Rate: 6 Mbps ANT: Rubber Ducky

Graphical Data



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1	4951.904	66.7	4.6	-9.3	61.0	Peak [Scan]	V	100	0	74.0	-13.00	Pass	
2	4951.904	52.8	4.6	-9.4	48.0	Average Max	v	100	0	54.0	-6.00	Pass	
2	6995.992	50.0	5.4	-2.2	53.1	Peak [Scan]	V	100	0	89.0	-35.9	Pass	NRB
4	10470.942	46.9	6.8	-1.1	52.5	Peak [Scan]	V	100	0	89.0	-36.5	Pass	NRB
5	5803.607	53.4	4.8	-8.3	49.9	Peak [Scan]	V	100	0	89.0	-39.1	Pass	NRB

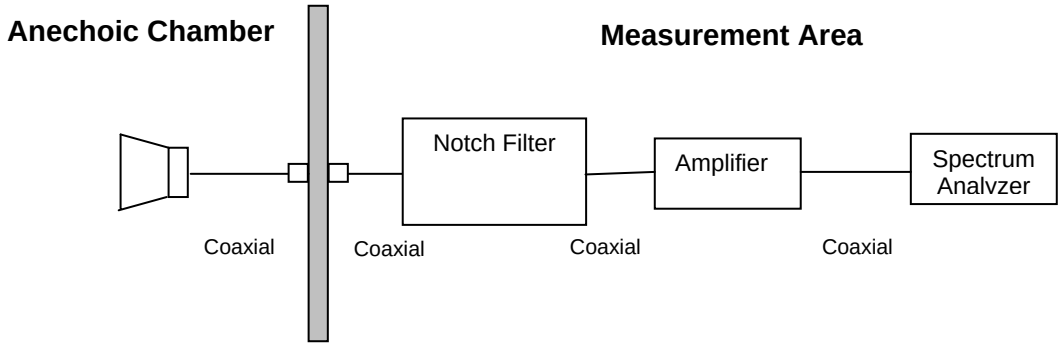
5.1.7.1.1. Peak Field Strength Measurements

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. The highest emissions relative to the limit are listed for each frequency scanned.

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 = Band-stop Filter Loss or Waveguide Loss

For example:
Given receiver input reading of 51.5 dBμV; 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 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

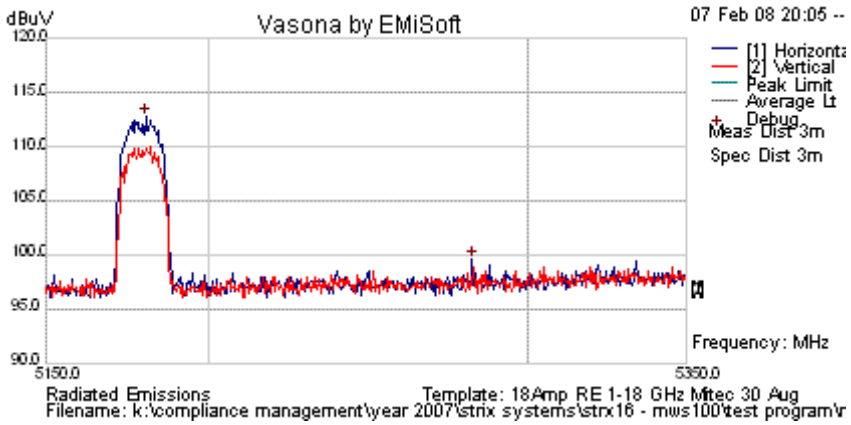
40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

Peak Field Strength - 4dBi Dome Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	5150 - 5350MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/20:05, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Peak Emission Freq.: Ch 36 5180 MHz ANT: 4 dBi Dome

Graphical Data



Formal Data

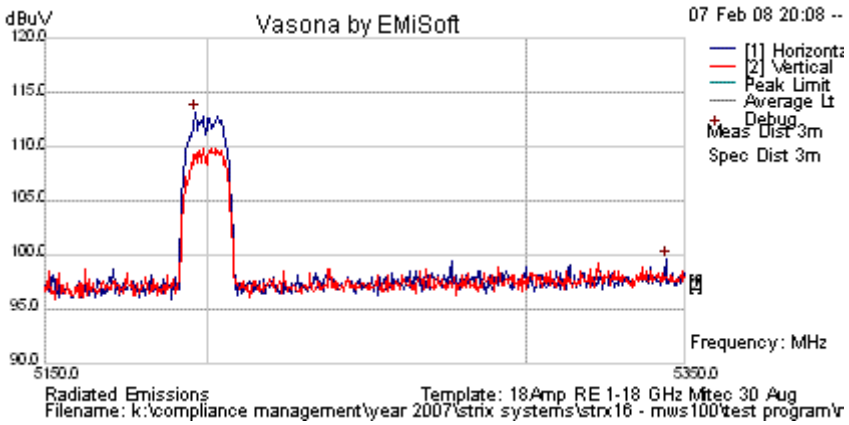
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1	5180.862	43.5	34.6	34.6	112.8	Peak [Scan]	H	100	0				

Peak Field Strength - 4dBi Dome Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	5150 - 5350MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/20:08, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Peak Emission Freq.: Ch 40 5200 MHz ANT: 4 dBi Dome

Graphical Data



Formal Data

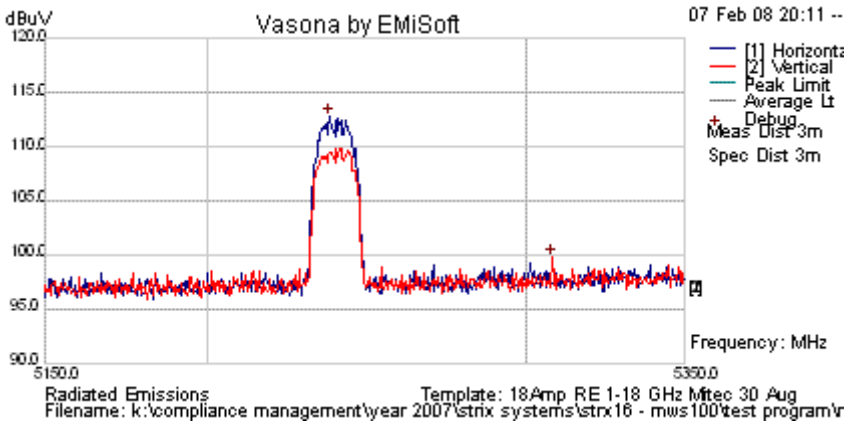
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass / Fail	Comments
1	5196.493	43.8	34.6	34.7	113.1	Peak [Scan]	H	100	0				

Peak Field Strength - 4dBi Dome Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	5150 - 5350MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/20:11, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Peak Emission Freq.: Ch 48 5240 MHz ANT: 4 dBi Dome

Graphical Data



Formal Data

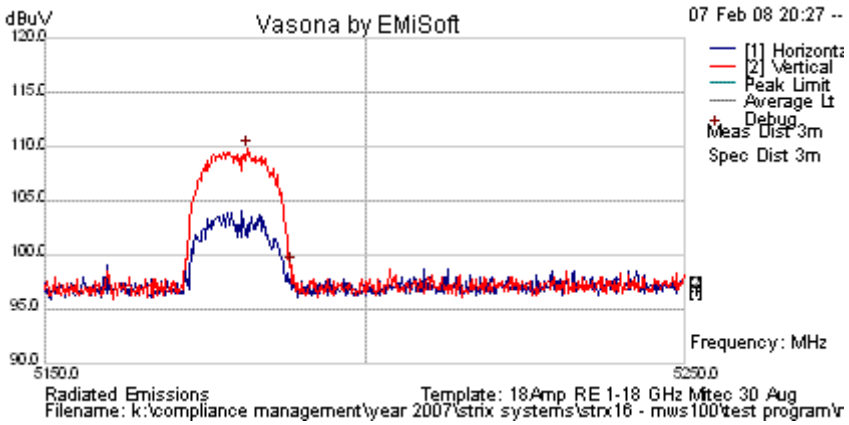
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass / Fail	Comments
1	5238.176	43.4	34.6	34.7	112.7	Peak [Scan]	H	100	0				

Peak Field Strength - 5dBi Rubber Ducky Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	5150 - 5250MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/20:27, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Peak Emission Freq.: Ch 36 5180 MHz ANT: 5 dBi Rubber Ducky

Graphical Data



Formal Data

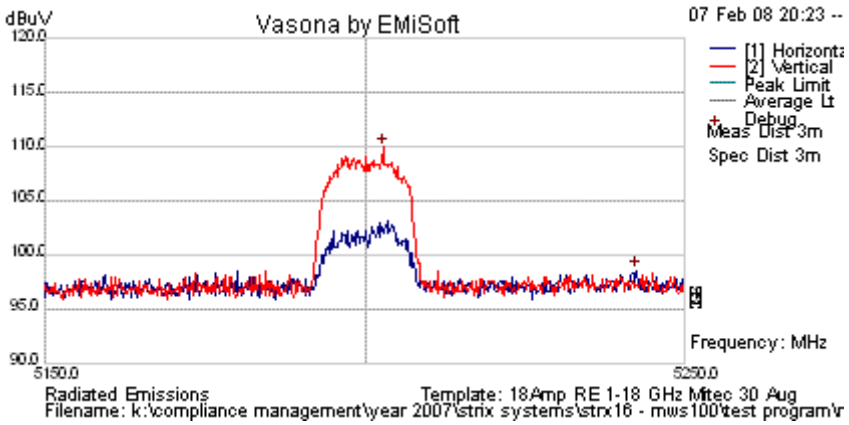
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1	5181.463	40.6	34.6	34.6	109.8	Peak [Scan]	V	100	0				

Peak Field Strength - 5dBi Rubber Ducky Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	5150 - 5250MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/20:23, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Peak Emission Freq.: Ch 40 5200 MHz ANT: 5 dBi Rubber Ducky

Graphical Data



Formal Data

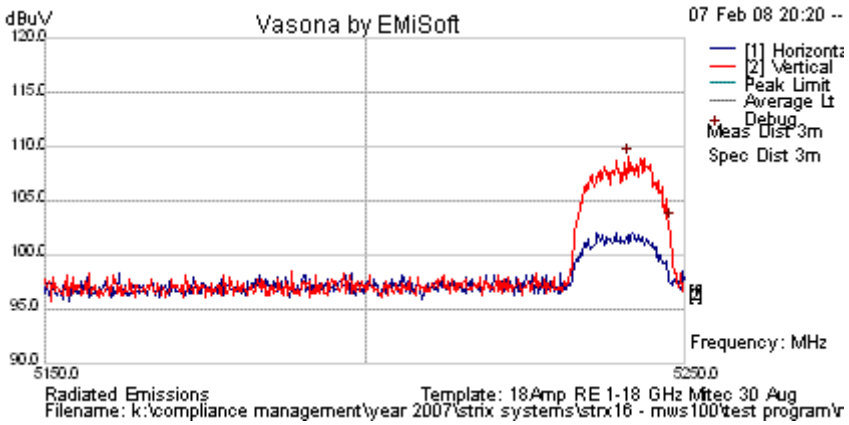
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1	5202.705	40.6	34.6	34.7	109.9	Peak [Scan]	V	100	0				

Peak Field Strength - 5dBi Rubber Ducky Antenna 802.11a

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	5150 - 5250MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/20:20, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Peak Emission Freq.: Ch 48 5240 MHz ANT: 5 dBi Rubber Ducky

Graphical Data



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass / Fail	Comments
1	5240.982	39.7	34.6	34.7	109.0	Peak [Scan]	V	100	0				

5.1.7.2. Receiver Spurious Emissions above 1 GHz

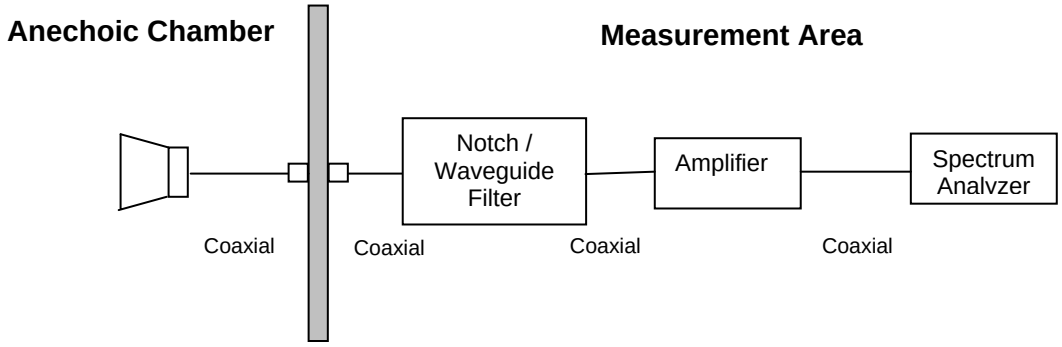
Industry Canada RSS-Gen §4.8, §6

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.

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 dBμV; 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 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

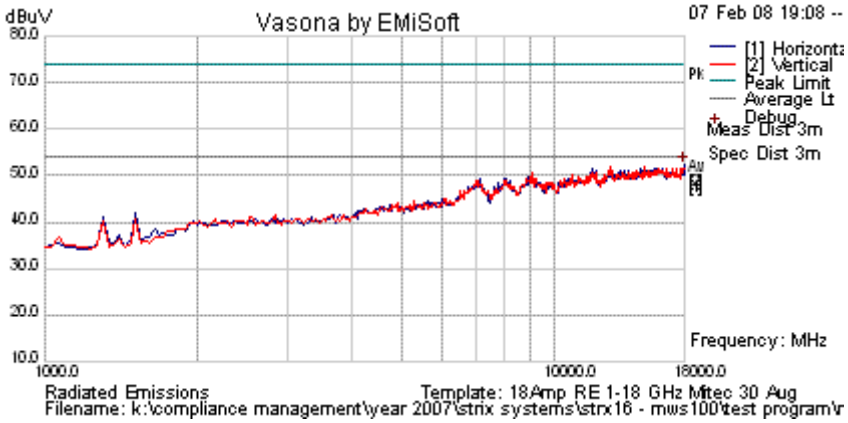
40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

Receiver Radiated Spurious Emissions above 1 GHz – 4dBi Dome antenna

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	1000 - 18000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/19:08, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Receiver Freq.: Ch 40, 5200 MHz ANT: 4 dBi Dome

Graphical Data



Formal Data

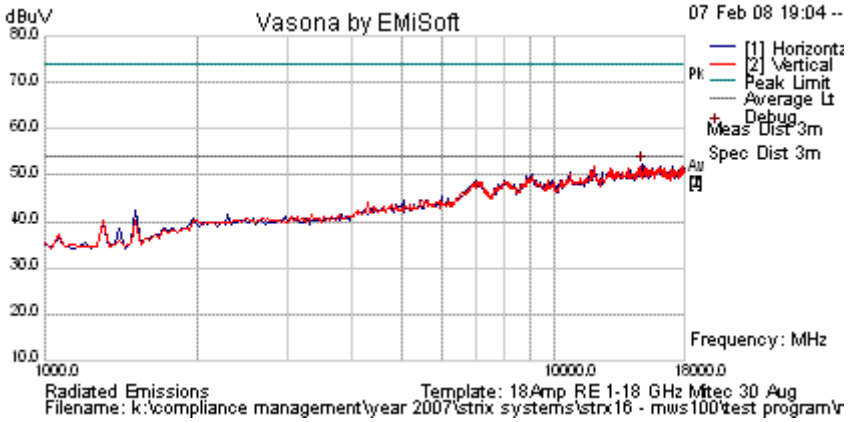
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass / Fail	Comments
1	17965.932	44.1	8.8	-.5	52.4	Peak [Scan]	H	100	0	54.0	-1.6	Pass	

Receiver Radiated Spurious Emissions above 1 GHz – 5dBi Rubber Ducky antenna

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / fcc part 15 peak limits
Range	1000 - 18000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	18Amp RE 1-18 GHz Mitec 30 Aug
Date/Time	07 Feb 08/19:04, Status: Filed on
Manufacturer	Strix Systems, Inc.
EUT	MWS100
Config	Receiver Freq.: Ch 40, 5200 MHz ANT: 5 dBi Rubber Ducky

Graphical Data



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass / Fail	Comments
1	14865.731	45.8	8.1	-1.8	52.2	Peak [Scan]	H	100	0	54.0	-1.8	Pass	

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 5th 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

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

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

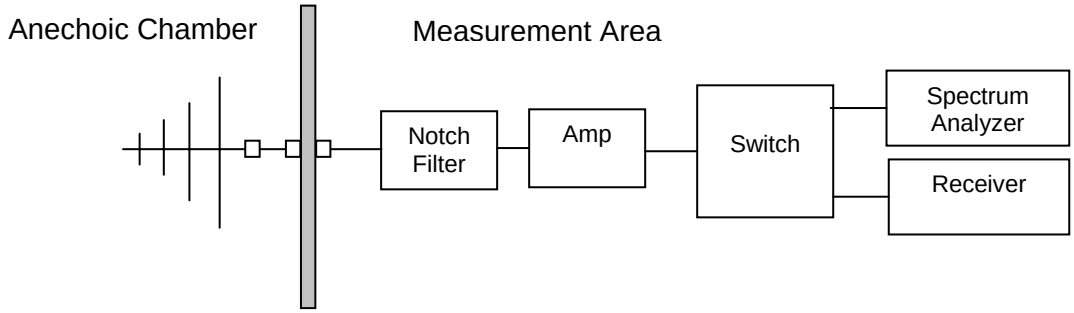
5.1.7.3. Radiated Spurious Emissions (30M-1 GHz)

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 maximum three transmitters were operated during testing of emissions 30M – 1GHz

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

For example:
Given a Receiver input reading of 51.5dBμV; 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 = 36.3dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100μV/m
48 dBμV/m = 250μV/m

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

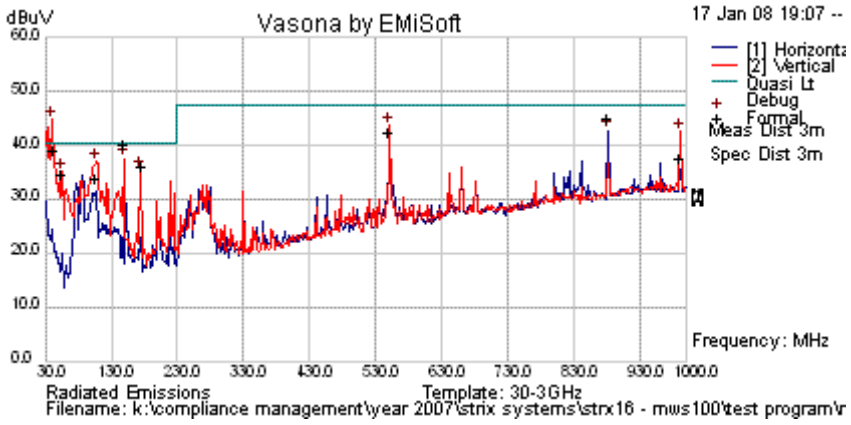
Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

Radiated Emissions below 1GHz – 12Vdc Power Supply

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / CISPR22 RE B at 3m
Range	30 - 1000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	30-3GHz
Date/Time	17 Jan 08/19:07, Status: Filed on
Manufacturer	Strix Systems
EUT	MWS100
Config	802.11abg 12Vdc, 2A variant. Device operating full power on 2,437 MHz and 5,805 MHz. Huber & Suhner dome antenna 5 dBi connected to EUT via 1m SMA cable. HP linear PSU 12Vdc, 2A with 3m cable between PSU & EUT.

Graphical Data



Formal Data

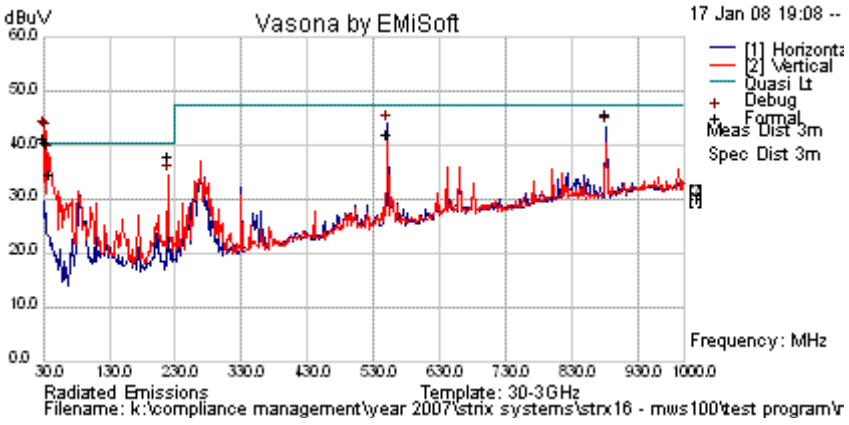
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass / Fail	Comments
1	149.998	51.3	4.5	-17.5	38.3	Quasi Max	V	98	171	40.5	-2.2	Pass	
2	41.562	49.3	3.6	-15.7	37.2	Quasi Max	V	119	141	40.5	-3.3	Pass	
3	105.233	46.2	4.2	-18.1	32.3	Quasi Max	V	98	201	40.5	-8.2	Pass	
4	549.991	45.6	6.2	-11.3	40.6	Quasi Max	H	103	15	47.5	-6.9	Pass	
5	880.010	43.2	7.3	-7.1	43.3	Quasi Max	H	102	314	47.5	-4.2	Pass	
6	174.988	48.4	4.6	-18.6	34.4	Quasi Max	V	98	202	40.5	-6.1	Pass	
7	989.985	34.6	7.7	-6.5	35.7	Quasi Max	V	98	54	47.5	-11.8	Pass	
8	55.996	50.5	3.8	-21.6	32.7	Quasi Max	V	140	78	40.5	-7.8	Pass	

Radiated Emissions below 1GHz – POE Supply

EMiSoft - Vasona Results

Test	Radiated Emissions [Electric Field]
Class/Spec	B / CISPR22 RE B at 3m
Range	30 - 1000MHz
For	Gordon Hurst
Lab Used	MiCOM Labs
Template	30-3GHz
Date/Time	17 Jan 08/19:08, Status: Filed on
Manufacturer	Strix Systems
EUT	MWS100
Config	802.11abg. Device operating full power on 2,437 MHz and 5,805 MHz. Huber & Suhner dome antenna 5 dBi connected to EUT via 1m SMA cable. w/ POE Injecter. Included Fair-Rite clamp-on ferrite # 0461167281 on ethernet cable at EUT.

Graphical Data



Formal Data

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail	Comments
1	30.631	43.0	3.4	-6.8	39.6	Quasi Max	V	98	153	40.5	-.9	Pass	
2	34.641	45.6	3.5	-10.2	38.9	Quasi Max	V	130	170	40.5	-1.6	Pass	
3	39.436	43.6	3.6	-14.1	33.0	Quasi Max	V	98	209	40.5	-7.5	Pass	
4	549.993	45.2	6.2	-11.3	40.2	Quasi Max	V	202	183	47.5	-7.3	Pass	
5	879.997	44.0	7.3	-7.1	44.1	Quasi Max	H	188	329	47.5	-3.4	Pass	
6	220.000	50.6	4.9	-19.1	36.3	Quasi Max	V	98	348	40.5	-4.2	Pass	

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

Traceability

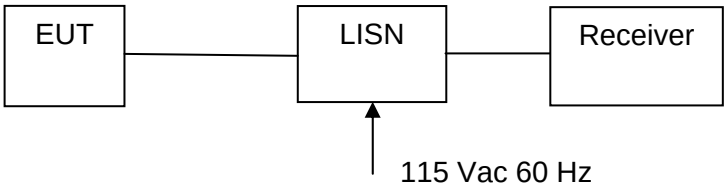
Method	Test Equipment Used
Measurements were made per Sanmina work instruction	8546A HP Receiver and RF Filter, HP Pre-amp, Antenna EMCO Biconilog

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)

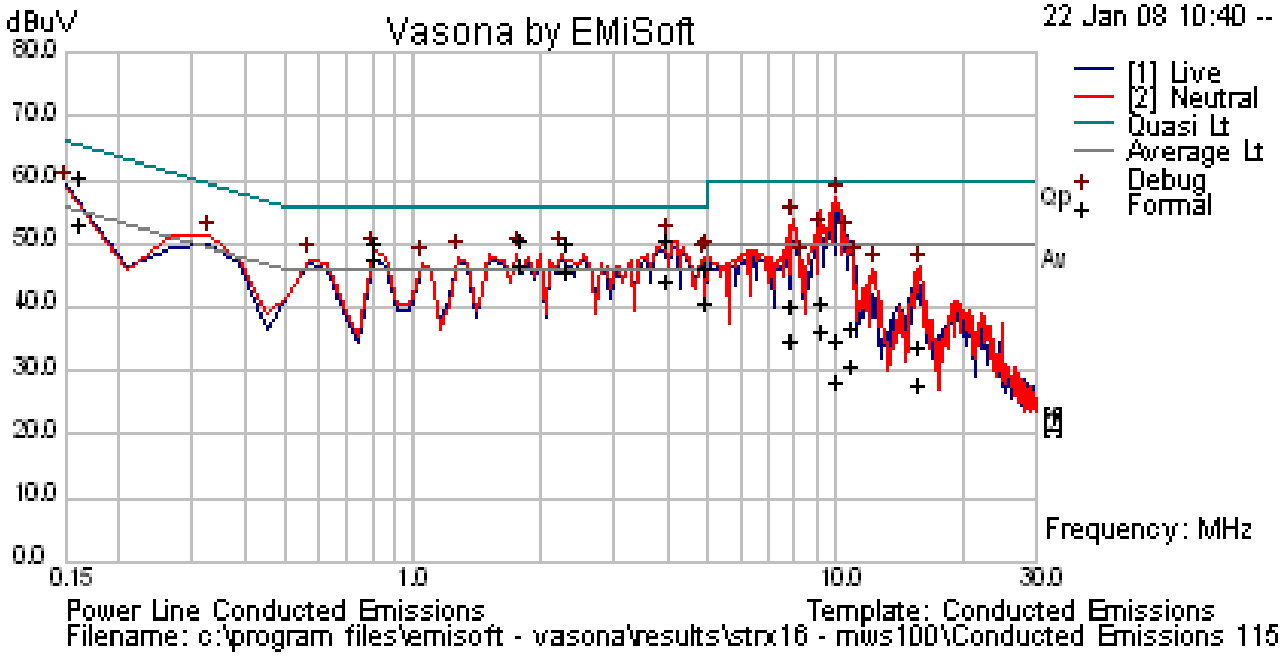
Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

EUT parameters.
Data Rate(s): 6 Mbits/s
Three channel operating simultaneously – 802.11g Channel 6
Power Level: Maximum

TABLE OF RESULTS –

Freq (MHz)	LIne	Peak (dBµV)	QP (dBµV)	QP Limit (dBµV)	QP Margin (dB)	Ave. (dBµV)	Ave. Limit (dBµV)	Ave. Margin (dB)
0.164	L	59.09	58.20	65.26	-7.06	50.72	55.26	-4.54
0.820	N	48.83	47.65	56	-8.35	45.24	46	-0.76
1.807	N	48.64	48.06	56	-7.94	44.21	46	-1.79
2.300	N	48.62	47.65	56	-8.35	43.20	46	-2.80
4.024	N	50.84	48.09	56	-7.91	42.05	46	-3.95
5.011	N	48.04	43.83	60	-16.17	38.32	50	-11.68
7.963	N	53.65	37.76	60	-22.24	32.53	50	-17.47
9.280	N	51.80	38.20	60	-21.80	33.85	50	-16.15
10.079	N	57.14	32.41	60	-27.59	26.04	50	-23.96
11.084	N	47.24	34.45	60	-25.55	28.49	50	-21.51
15.883	N	46.42	31.64	60	-28.36	25.66	50	-24.34

AC Wireline Conducted Emissions – 150 kHz – 30 MHz



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 μΩ 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 (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

Laboratory Measurement Uncertainty for Conducted Emissions

Measurement uncertainty	±2.64 dB

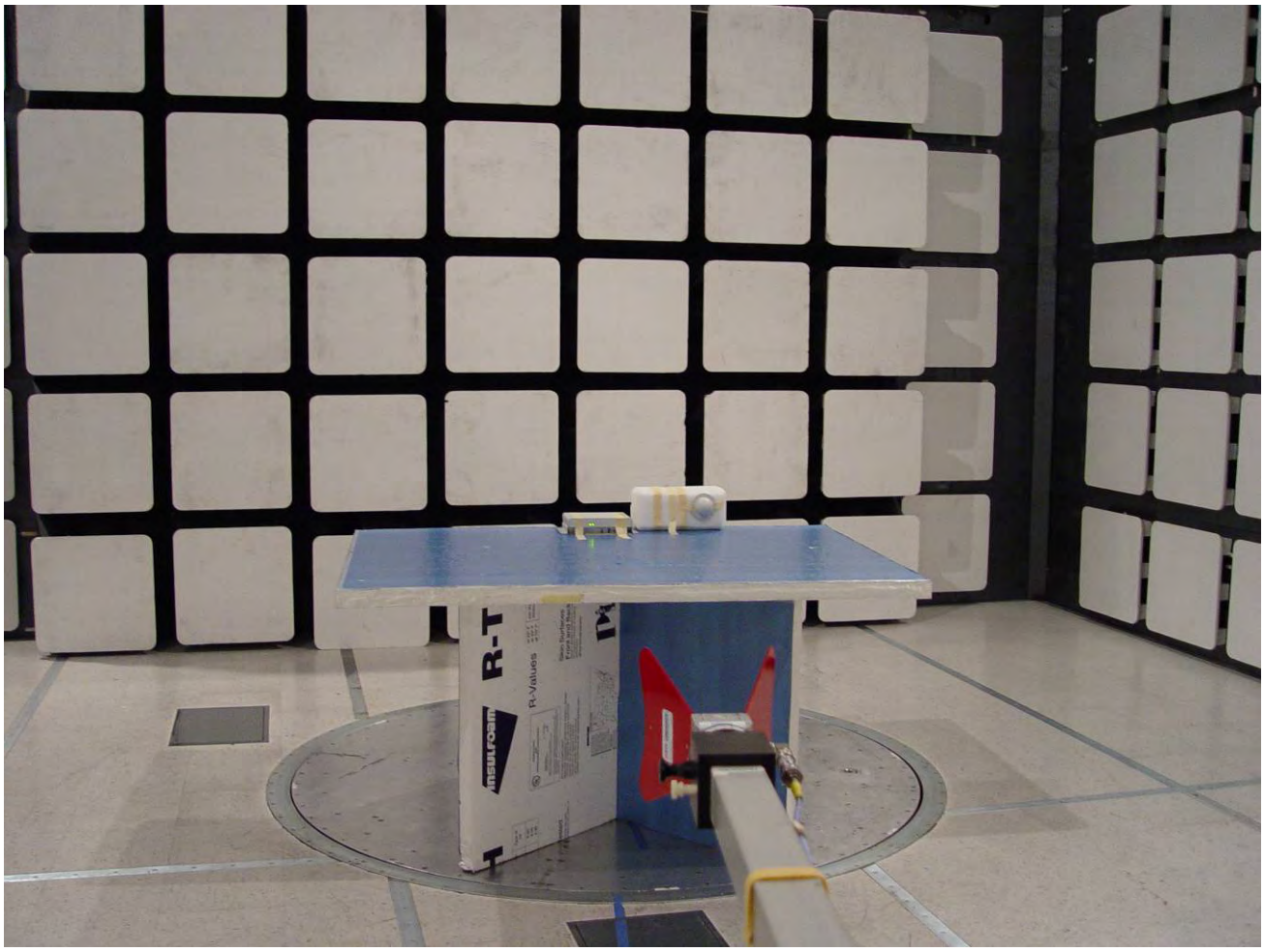
Traceability

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

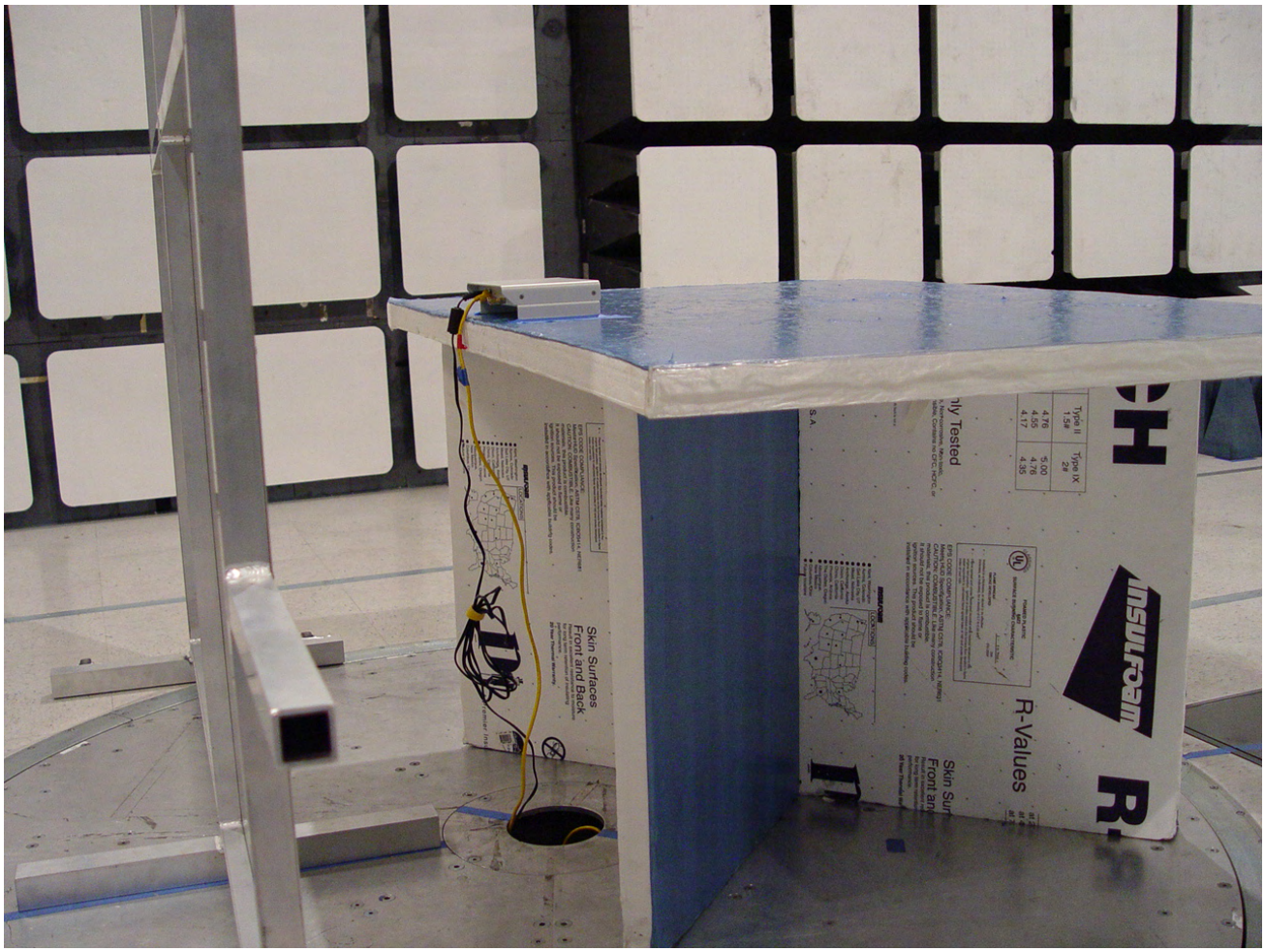
6. PHOTOGRAPHS

6.1. Radiated Emissions (30 MHz-1 GHz)

6.2. Spurious Emissions >1 GHz



6.3. AC Wireline Emissions (150 kHz - 30 MHz)



6.4. General Measurement Test Set-Up

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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