MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
33439 WESTERN AVENUE ! UNION CITY, CALIFORNIA 94587 ! PHONE (510) 489-6300 ! FAX (510) 489-6372

March 22, 2007

Ubiquiti Networks
495-499 Montague Expressway
Milpitas, CA 95035

Dear Robert Pera,

Enclosed is the EMC test report for compliance testing of the Ubiquiti Networks, XR5 tested to the requirements of ETSI EN 301 893 V1.3.1 (2005-08) (Article 3.2 of R&TTE Directive).

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Krystal Mignone
Documentation Department

Reference: (\Ubiquiti Networks\EMCS21312-EN893)

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Electromagnetic Compatibility Criteria Test Report

For the

Ubiquiti Networks
Model XR5

Tested under

ETSI EN 301 893 V1.3.1 (2005-08)

(Article 3.2 of R&TTE Directive)

MET Report: EMCS21312-EN893

March 22, 2007

Prepared For:

Ubiquiti Networks
495-499 Montague Expressway
Milpitas, CA 95035

Prepared By:
MET Laboratories, Inc.
4855 Patrick Henry Dr., Building 6
Santa Clara, CA 95054

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MET Report: EMCSS21312-EN893

Shawn McMillen, Project Engineer
Electromagnetic Compatibility Lab

Krystal Mignone
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of ETSI EN 301 893 V1.3.1 (2005-08) of the EU Rules under normal use and maintenance.

Tony Permsombut, Manager
Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	March 22, 2007	Initial Issue.

Table of Contents

List of Tables

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List of Terms and Abbreviations

AC	**Al**ternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBμA	**D**eci**b**els above one **micro**amp
dBμV	**D**eci**b**els above one **micro**volt
dBμA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBμV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
fc	**C**arrier **F**requency
CISPR	**C**omite **I**nternational **S**pecial des **P**erturbations **R**adioelectriques (International Special Committee on Radio Interference)
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**H**ert**z**
kPa	**k**ilo**Pa**scal
kV	**k**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**H**ertz
μH	**micro**Henry
μF	**micro**Farad
μs	**micro**seconds
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

I. Requirements Summary

A. Requirements Summary

ETSI EN 301 893 Section Number	Descriptive Name	Compliance			Comments
		Yes	No	N/A	
Sections 4.2	Carrier Frequencies	X			Compliant
Sections 4.3	RF Output Power, Transmit Power Control (TPC) and Power Density	X			Compliant
Sections 4.4	Transmitter Unwanted Emissions	X			Compliant
Sections 4.5	Receive Spurious Emissions	X			Compliant
Sections 4.6	Dynamic Frequency Selection (DFS)		X		Not Performed

Table 1. Summary of EMC ETSI EN 301 893 V1.3.1 (2005-08) Compliance Testing

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Ubiquiti Networks to perform testing on a XR5.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Ubiquiti Networks model XR5.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	XR5
Model(s) Number:	XR5
EUT Specifications:	Primary Power from Laptop: 5V DC
	Secondary Power from HP DC PWR Supply: 3.3V DC
Lab Ambient (Normal) Test Conditions:	Temperature: 15-35º C
	Relative Humidity: 30-60%
	Atmospheric Pressure: 860-1060 mbar
Extreme Test Conditions:	Voltage:
	Temperature: -20 to +55º C
	Relative Humidity: 30-60%
Evaluated by:	Shawn McMillen
Date(s):	March 22, 2007

B. References

ETSI EN 301.893 V1.3.1 (2005-08)	Broadband Radio Access Networks (BRAN); 5GHz high performance RLAN; Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive.

Table 2. Test References

C. Test Site

All testing was performed at MET Laboratories, Inc., 4855 Patrick Henry Dr., Building 6, Santa Clara, CA 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

D. Description of Test Sample

The Ubiquiti Networks XR5, is a 5.8GHz modular wireless device (PCMCIA).

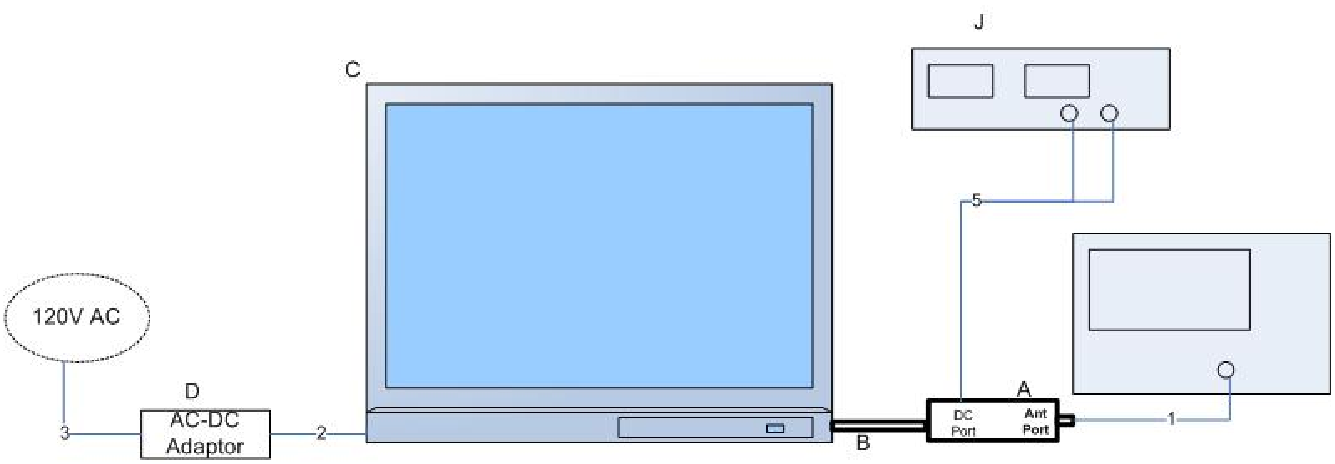


Figure 1. Block Diagram of Test Configuration

E. Equipment Configuration

The EUT was set up as outlined in Figure 1, Block Diagram of Test Setup. All cards, racks, etc., incorporated as part of the EUT is included in the following list.

Ref. ID	Name / Description	Model Number	Serial Number
A	5.8GHz mini-PCI 802.11a w/24dBi antenna	XR5C	Proto 1

Table 3. Equipment Configuration

F. Support Equipment

Ubiquiti Networks supplied support equipment necessary for the operation and testing of the XR5. All support equipment supplied is listed in the following Support Equipment List.

Ref. ID	Name / Description	Manufacturer	Model Number
B	PCMCIA Extension Card	Accurite Technologies	307507
C	Laptop	Dell	Latitude
D	AC-DC PWR Adaptor	Dell	PA-2
F	Spectrum Analyzer	HP	E4407B
G	50ohms terminator	N/A	N/A
H	Printer	HP	DeskJet 932C
I	USB Mouse	Microsoft	IntelliMouse 3.0A
J	DC Power Supply	HP	6236B

Table 4. Support Equipment

G. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty.	Length (m)	Shielded Y/N	Termination Box ID & Port ID
Conducted Measurement						
1	A, Antenna	Coax	1	1.5	Yes	F, Input
2	C, PWR	DC Power Cord	1	1.5	No	D, DC Output
3	D, AC Input	AC Cable	1	1.5	No	AC PWR Outlet
5	A, D Cinput	DC Power	2	.2	No	J,, Output
Spurious Emission, REE and CEV						
1	C, PWR	DC Power Cord	1	1.5	No	D, DC Output
2	D, AC Input	AC Cable	1	1.5	No	AC PWR Outlet
3	C, Printer	DB25	1	2	Yes	H
4	C,USB	USB	1	2	Yes	I
5	A, D Cinput	DC Power	2	.2	No	J,, Output

Table 5. Ports and Cabling Information

H. Mode of Operation

Telnet was use to access the radio in order to change the channel frequency, bit rate and to turn on/off the transmitter.

I. Method of Monitoring EUT Operation

A Spectrum Analyzer and a Power Meter was use to monitor the EUT's transmitter channel and power output.

J. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the EUT.

K. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Ubiquiti Networks upon completion of testing.

III. Conformance Requirements

Conformance Requirements

4.2. Carrier Frequencies

Test Requirement(s): **ETSI EN 301 893, Clause 5.3.2:**

4.2.1 Definition
The equipment is required to operate on the applicable specific carrier centre frequencies that correspond to the nominal carrier frequencies f_c of 5180MHz and 5350MHz for the lower Sub-Bands and 5500MHz and 5700MHz for the Higher Sub-band.

4.2.2 Limits
The actual carrier centre frequency for any given channel given in table 1 shall be maintained within the range $f_c \pm 20$ ppm.

Test Procedure: The EUT was placed in an environmental chamber and the RF port was connected directly to a spectrum analyzer through an attenuator. Depending on which band was being investigated, the EUT was set to transmit at the f_c indicated above at a normal power level. If the EUT was capable of transmitting a CW carrier then the spectrum analyzer's frequency counting function was used to measure the actual frequency. If only a modulated carrier was available then the frequency relative to -10dBc above and below the carrier was measured and the carrier frequency was determined using (f1+f2)/2. The frequency of the carrier was measured at normal and extreme conditions. The resulting carrier frequencies were tabulated below and the frequency error determined.

Test Results: The EUT was found to be compliant with the limits set forth in Clause 4.2

Target Frequency (MHz)	Normal Conditions 20 °C @230V (MHz)	Extreme Conditions (MHz)				Maximum Frequency Error (ppm)
		-20 °C		+55 °C		
		207V	253V	207V	253V	
5600.0	5600.000145	5600.000147	5600.000144	5600.000142	5600.000149	4

Test Engineer:

Test Date:

Conformance Requirements

4.3 RF Output Power

Test Requirement(s): **ETSI EN 301 893, Clause 5.3.3.2:**

4.3.1.1 Definition

The RF output power is the mean equivalent isotropically radiated power (EIRP) during a transmission burst.

4.3.2.1 Limit

Frequency range	Mean EIRP limit
5 150 MHz to 5 350 MHz	23 dBm
5 470 MHz to 5 725 MHz	30 dBm

This limit shall apply for any combination of power level and intended antenna assembly.

Test Procedure: The EUT was connected directly to a power meter capable of measuring the average RF power of a modulated carrier. Measurements were carried out in all modulations available and at f_c of 5150MHz and 5350MHz for the lower Sub-Bands and 5500MHz and 5700MHz for the Higher Sub-band. Both normal and extreme test conditions were observed.

The EIRP was determined from the equation P = A + G + 10 log (1/x); where A is the measured power, x is the duty cycle and G is the antenna assembly gain.

Test Results: The EUT as tested was found compliant with the specified limits in clause 4.3.

Test Engineer: Shawn McMillen

Test Date: February 12, 2007

Conformance Requirements

Effective Isotropic Radiated Power Results

Maximum Average Power Under Normal and Extreme Conditions						
Frequency (MHz)	Temperature (C)	Voltage (V)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP	Limit
5500	+22	230	27.5	2.5	30.0	30
5500	-20	207	27.4	2.5	29.9	30
5500	-20	253	27.4	2.5	29.9	30
5500	+55	207	27.5	2.5	30.0	30
5500	+55	253	27.5	2.5	30.0	30
5700	+22	230	27.5	2.5	30.0	30
5700	-20	207	27.4	2.5	29.9	30
5700	-20	253	27.4	2.5	29.9	30
5700	+55	207	27.5	2.5	30.0	30
5700	+55	253	27.5	2.5	30.0	30

Conformance Requirements

4.3 Transmit Power Control

Test Requirement(s): **ETSI EN 301 893 Section 5.3.3.2.1.2:**

4.3.1.2 Definition
The Transmit Power Control (TPC) is a mechanism to be used by the EUT to ensure a mitigation factor of at least 3dB on the aggregate power from a large number of devices. This requires the EUT to have a TPC range from which the lowest value is at least 6 dB below the values for the mean EIRP given in the table below. TPC is not required in the band 5150MHz- 5250MHz.

4.3.2.2 Limit

Frequency range	Mean EIRP limit
5 250 MHz to 5 350 MHz	17 dBm
5 470 MHz to 5 725 MHz	24 dBm

Mean EIRP for RF Output Power at the Lowest TPC level

Test Procedure: The EUT was connected directly to a power meter capable of measuring the average RF power of a modulated carrier. Measurements were carried out in all modulations available and at f_c of 5250MHz and 5350MHz for the lower Sub-Bands and 5500MHz and 5700MHz for the Higher Sub-band. Both normal and extreme test conditions were observed.

Test Results: The EUT was found to be compliant with the limits set forth in Clause 4.3

Test Engineer: Shawn McMillen

Test Date: February 12, 2007

Conformance Requirements

Effective Isotropic Radiated Power Results

Minimum Average Power Under Normal and Extreme Conditions						
Frequency (MHz)	Temperature (C)	Voltage (V)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP	Limit
5500	+22	230	6.0	2.5	8.5	24
5500	-20	207	5.9	2.5	8.4	24
5500	-20	253	5.9	2.5	8.4	24
5500	+55	207	6.0	2.5	8.5	24
5500	+55	253	6.0	2.5	8.5	24
5700	+22	230	10.0	2.5	12.5	24
5700	-20	207	9.9	2.5	12.4	24
5700	-20	253	9.9	2.5	12.4	24
5700	+55	207	10.0	2.5	12.5	24
5700	+55	253	10.0	2.5	12.5	24

Conformance Requirements

4.3 Power Density

Test Requirement(s): **ETSI EN 301 893 Section 5.3.3.2.1.3:**

4.3.1.3 Definition
The Power Density is the mean equivalent isotropically radiated power (EIRP) during a transmission burst

4.3.2.1 Limit
For Devices with TPC, the Power Density when configured to operate at the highest stated power level shall not exceed the levels below.

Frequency range	Mean EIRP Density limit
5 250 MHz to 5 350 MHz	10 dBm/MHz
5 470 MHz to 5 725 MHz	17 dBm/MHz

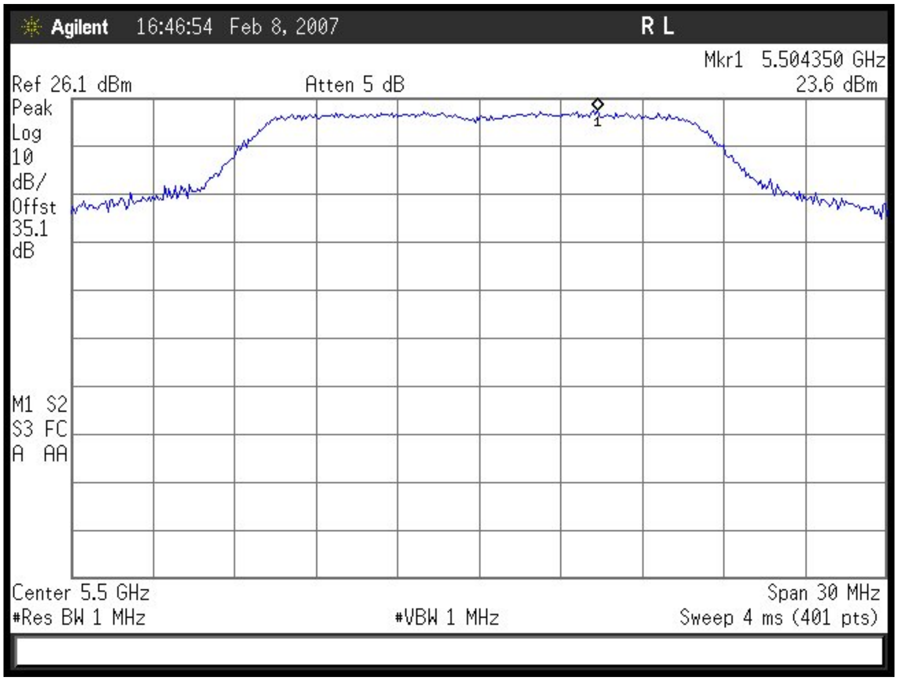
Test Procedure: The EUT was connected directly to a Spectrum Analyzer through an attenuator. Measurements were carried out in all modulations available and at f_c of 5150MHz and 5350MHz for the lower Sub-Bands and 5500MHz and 5700MHz for the Higher Sub-band. The spectrum analyzer was initially set with a RBW and VBW of 1MHz and a span 3 times that of the carrier width. The max hold function was used to determine the frequency which gave the maximum value across the occupied band of the carrier. The spectrum analyzer was reset to use the power density function at the frequency found previously. The power density was then measured over 1MHz resolution.

Test Results: The EUT as tested was found compliant with the specified limits of Clause 4.3.

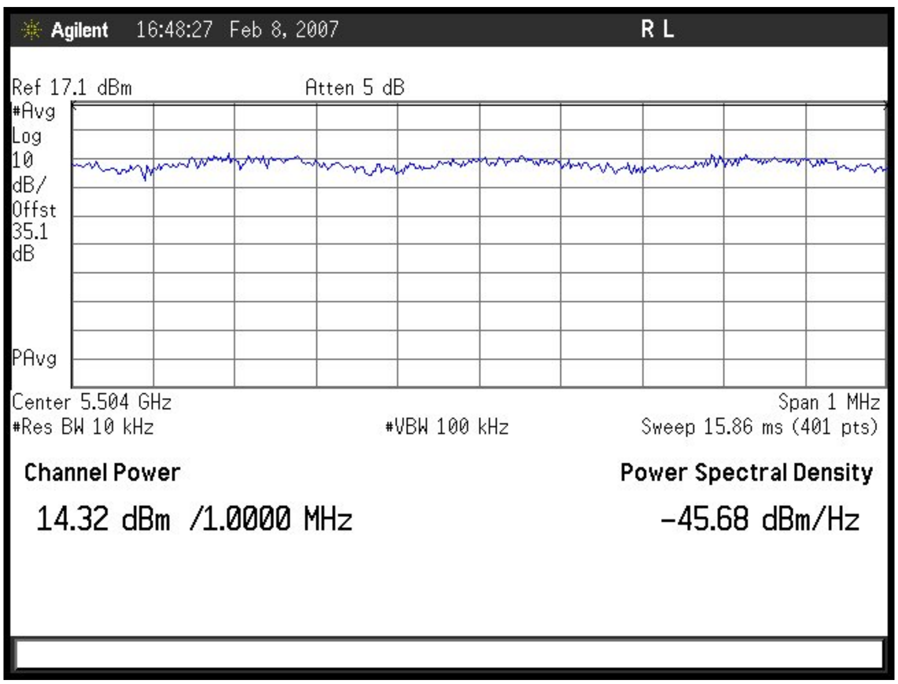
Frequency (MHz)	Mode	Measured Maximum Spectral Power Density (dBm)	Antenna Gain	Maximum EIRP SPD	Limit (dBm)	Margin dB
5500	OFDM	14.32	0	14.32	17	2.68
5700	OFDM	15.26	0	15.26	17	1.74

Test Engineer: Shawn McMillen

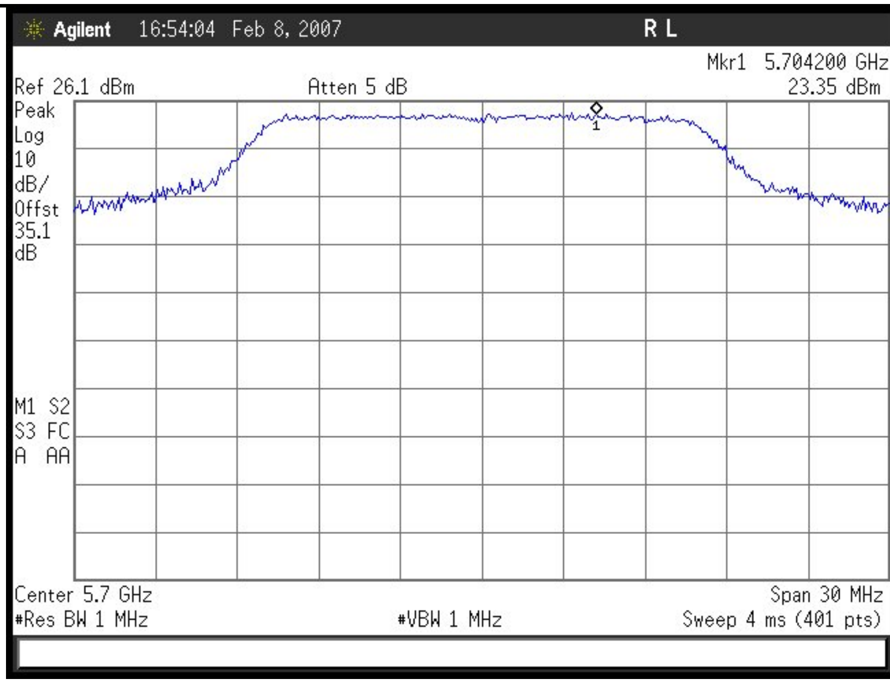
Test Date: February 8, 2007



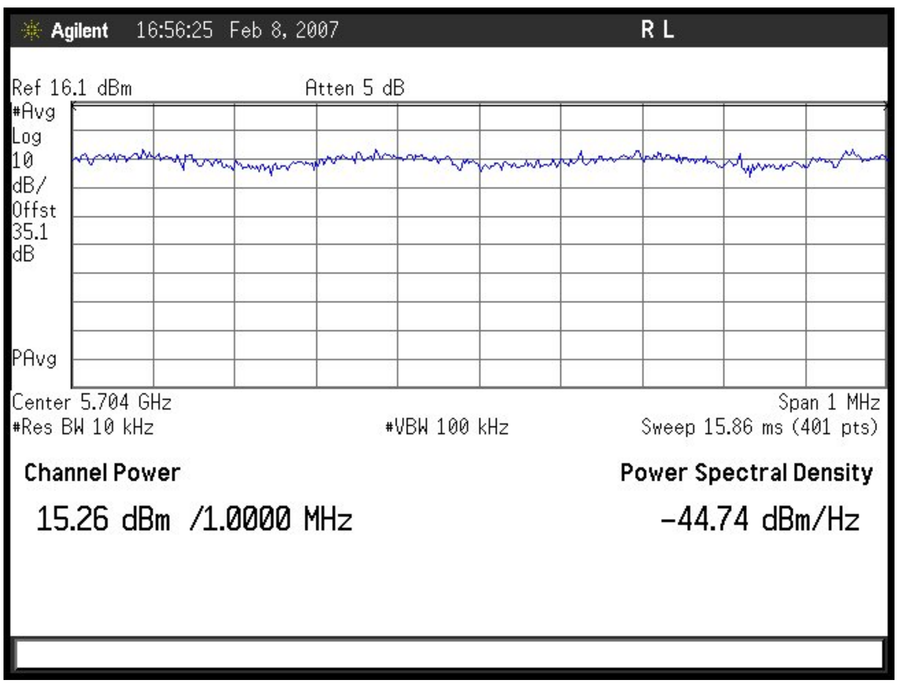
Low channel Peak



Low channel PSD



High channel Peak



High channel PSD

4.4 Transmitter Unwanted Emissions Outside the 5GHz RLAN Bands (conducted)

Test Requirement(s): **EN 301 893, Clause 5.3.4.2:**

4.4.1.1 Definition
These are conducted radio frequency emissions outside the 5GHz RLAN bands when the RF output port is connected to a spectrum analyzer.

4.3.4.2 Limit
The level of unwanted emissions shall not exceed the limits given below.

Frequency range	Maximum power ERP	Resolution Bandwidth
30 MHz to 47 MHz	-36dBm	100KHz
47 MHz to 74 MHz	-54dBm	100KHz
74 MHz to 87,5 MHz	-36dBm	100KHz
87,5 MHz to 118 MHz	-54dBm	100KHz
118 MHz to 174 MHz	-36dBm	100KHz
174 MHz to 230 MHz	-54dBm	100KHz
230 MHz to 470 MHz	-36dBm	100KHz
470 MHz to 862 MHz	-54dBm	100KHz
862 MHz to 1 GHz	-36dBm	100KHz
1 GHz to 5,15 GHz	-30dBm	1MHz
5,35 GHz to 5,47 GHz	-30dBm	1MHz
5,725 GHz to 26,5 GHz	-30dBm	1MHz

Test Procedure: The EUT was connected directly to a spectrum analyzer through an attenuator. The RBW and VBW of the spectrum analyzer was initially set to 1MHz using the peak hold function or video averaging. Emissions were investigated from 25MHz up to 1GHz. If any emission exceeded the limits in the table above then the spectrum analyzer was reset with a resolution of 100KHz, zero span, and the spectrum investigate at 11 frequencies spaced 100KHz in a band ± 0.5MHz centered on the failing frequency. The spectrum also was investigated from 1GHz to 5.15GHz, 5.35GHz to 5.47GHz and 5.725GHz to 26.5GHz using a resolution of 1MHz and a peak hold function or video averaging. Measurements were carried out in all modulations available and at f_c of 5150MHz and 5350MHz for the lower Sub-Bands and 5500MHz and 5700MHz for the Higher Sub-band.

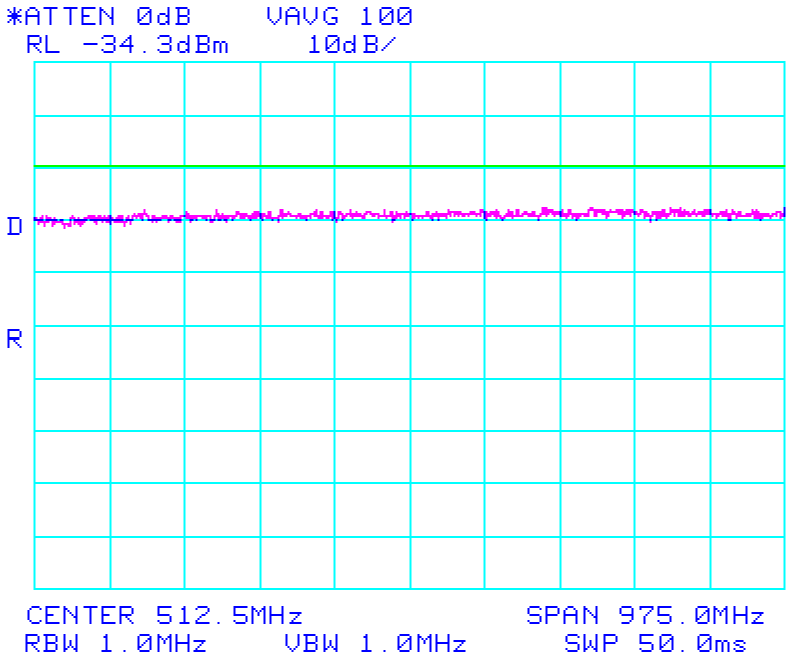
Test Results: The EUT as tested was found compliant with the specified requirements of Clause 4.4.

Test Engineer: Shawn McMillen

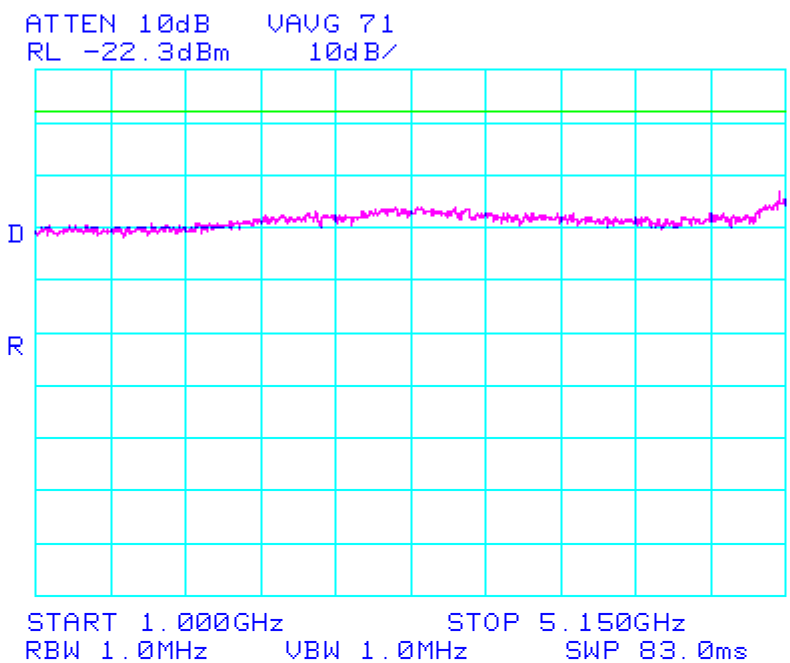
Test Date: February 16, 2007

Conformance Requirements

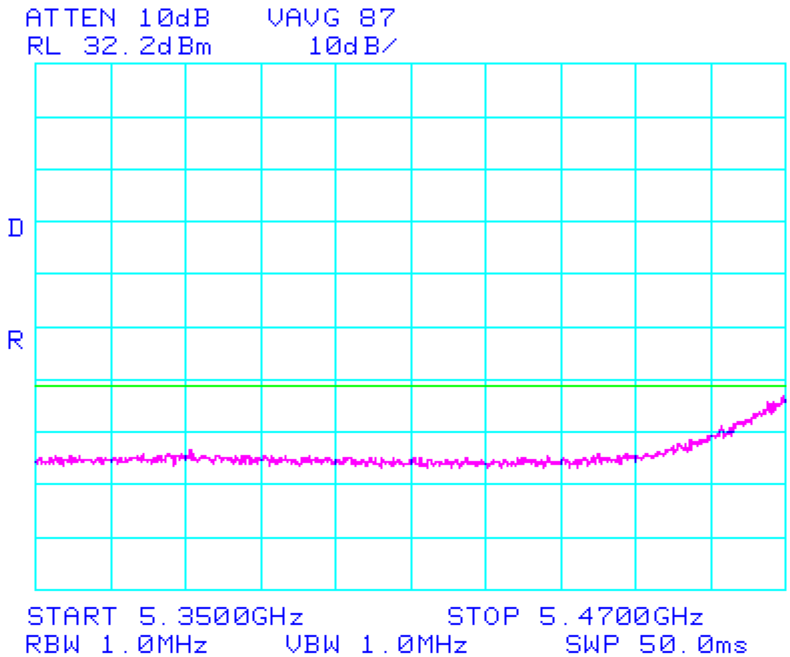
4.4.1 Transmitter Unwanted Emissions Outside the 5GHz RLAN Bands (conducted)



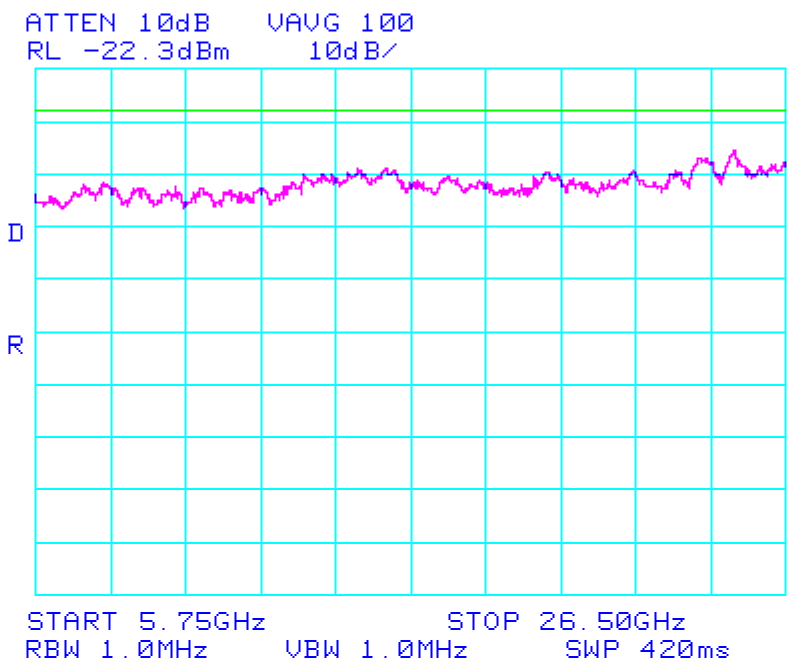
Low channel Spurious Emission 25 MHz - 1GHz



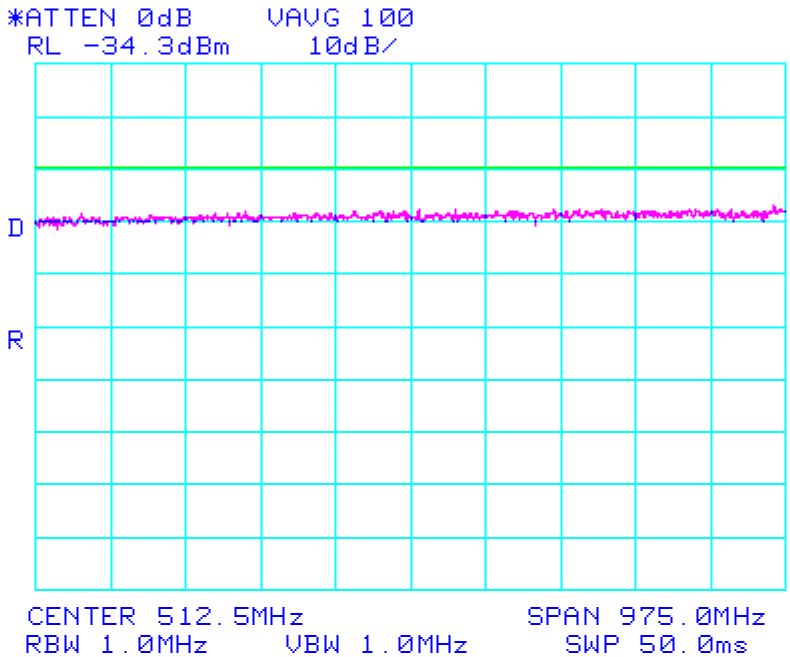
Low channel Spurious Emission 1 GHz – 5.15 GHz



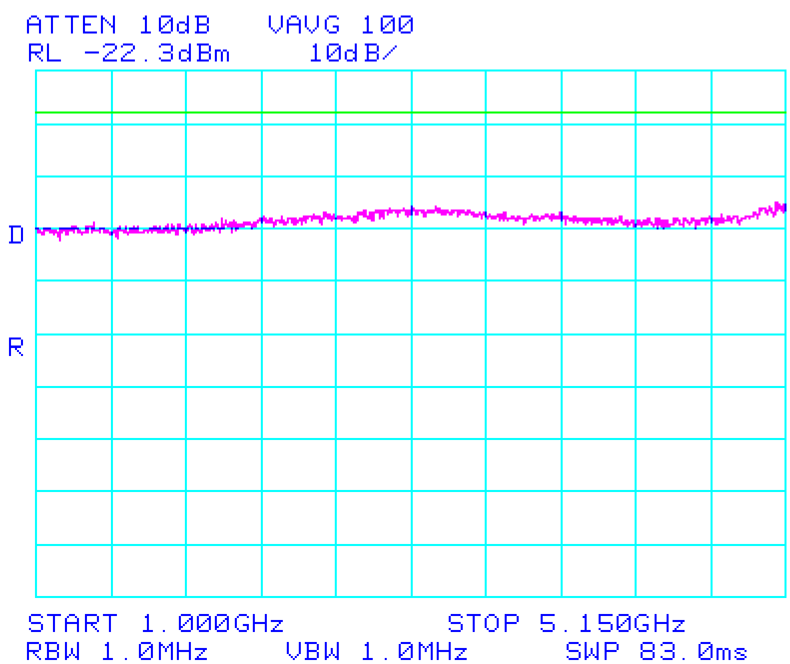
Low channel Spurious Emission 5.35GHz - 5.47 GHz



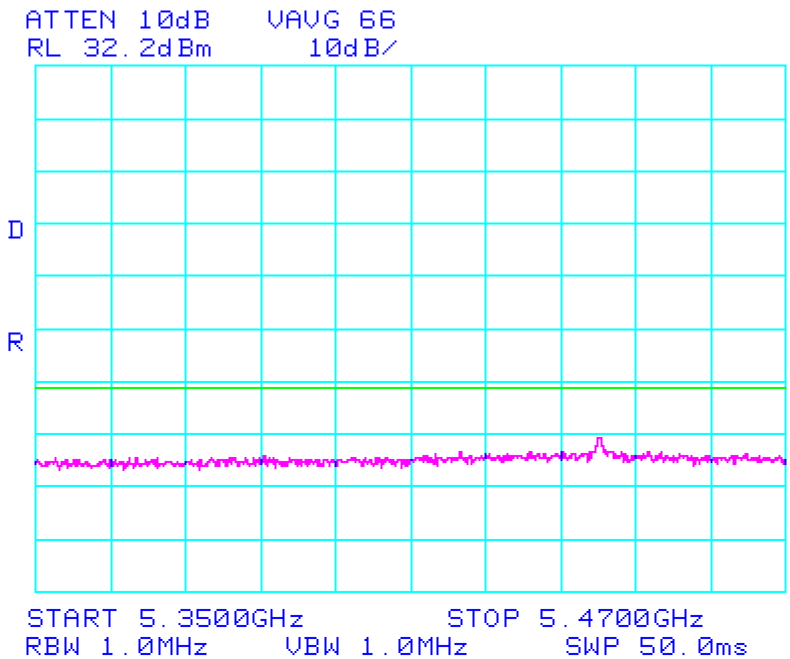
Low channel Spurious Emission 5.725 GHz – 26.5 GHz



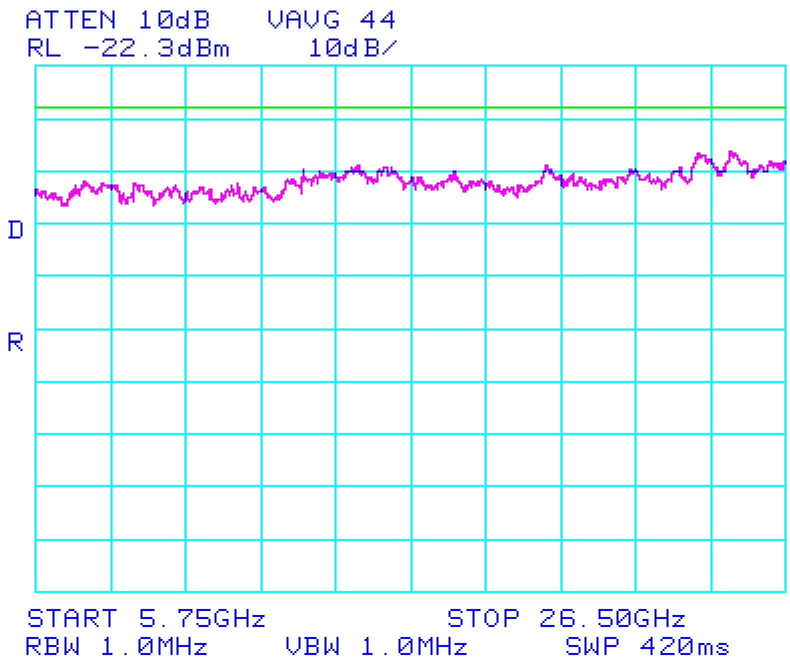
High channel Spurious Emission 25 MHz - 1GHz



High channel Spurious Emission 1 GHz – 5.15 GHz



High channel Spurious Emission 5.35GHz - 5.47 GHz



High channel Spurious Emission 5.725 GHz – 26.5 GHz

4.4 Transmitter Unwanted Emissions Outside the 5GHz RLAN Bands (Radiated)

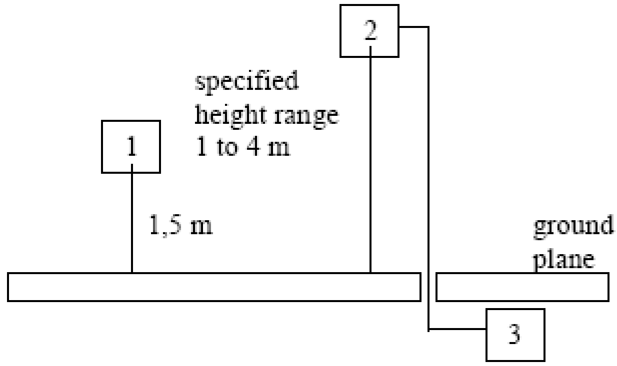
Test Requirement(s): **EN 301 893, Clause 5.3.4.2.2:**

4.4.1.1 Definition
These are radiated radio frequency emissions outside the 5GHz RLAN bands when the RF output port is connected to a spectrum analyzer.

4.3.4.2 Limit
The level of unwanted emissions shall not exceed the limits given

Frequency range	Maximum power ERP	Bandwidth
30 MHz to 47 MHz	-36dBm	100KHz
47 MHz to 74 MHz	-54dBm	100KHz
74 MHz to 87,5 MHz	-36dBm	100KHz
87,5 MHz to 118 MHz	-54dBm	100KHz
118 MHz to 174 MHz	-36dBm	100KHz
174 MHz to 230 MHz	-54dBm	100KHz
230 MHz to 470 MHz	-36dBm	100KHz
470 MHz to 862 MHz	-54dBm	100KHz
862 MHz to 1 GHz	-36dBm	100KHz
1 GHz to 5,15 GHz	-30dBm	1MHz
5,35 GHz to 5,47 GHz	-30dBm	1MHz
5,725 GHz to 26,5 GHz	-30dBm	1MHz

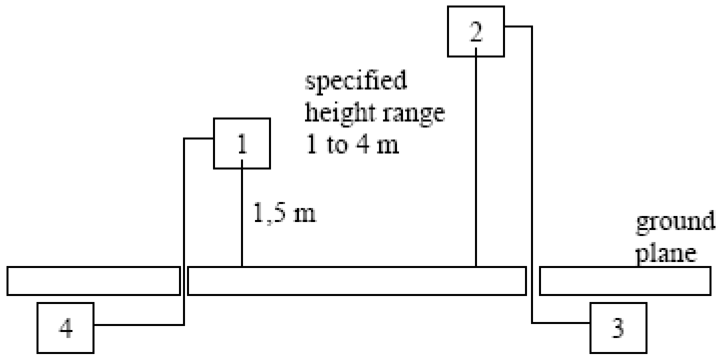
Test Procedure: The EUT was setup as per the specifications set out in Annex B of 301 893 and is shown below.



1. Equipment Under Test
2. Test Antenna
3. Spectrum Analyzer

The antenna ports were terminated into a 50Ω load. The receiving antenna was connected directly to a spectrum analyzer through an RF pre-amplifier. The RBW and VBW of the spectrum analyzer were initially set to 1MHz using the peak hold function or video averaging. Emissions were investigated from 25MHz up to 1GHz. If any emission exceeded the limits in the table above then the spectrum analyzer was reset with a resolution of 100KHz, zero span, and the spectrum investigate at 11 frequencies spaced 100KHz in a band ± 0.5MHz centered on the failing frequency. The spectrum also was investigated from 1GHz to 5.15GHz, 5.35GHz to 5.47GHz and 5.725GHz to 26.5GHz using a resolution of 1MHz and a peak hold function or video averaging. The turntable was rotated about 360^0 and the receiving antenna raised and lowered 1-4m in order to determine the maximum emissions. Measurements were carried out in all modulations available and at f_c of 5150MHz and 5350MHz for the lower Sub-Bands and 5500MHz and 5700MHz for the Higher Sub-band.

The levels of emissions were then determined using a signal substitution method and the setup is shown below.



1. Substitution Antenna
2. Test Antenna
3. Spectrum Analyzer
4. Signal Generator

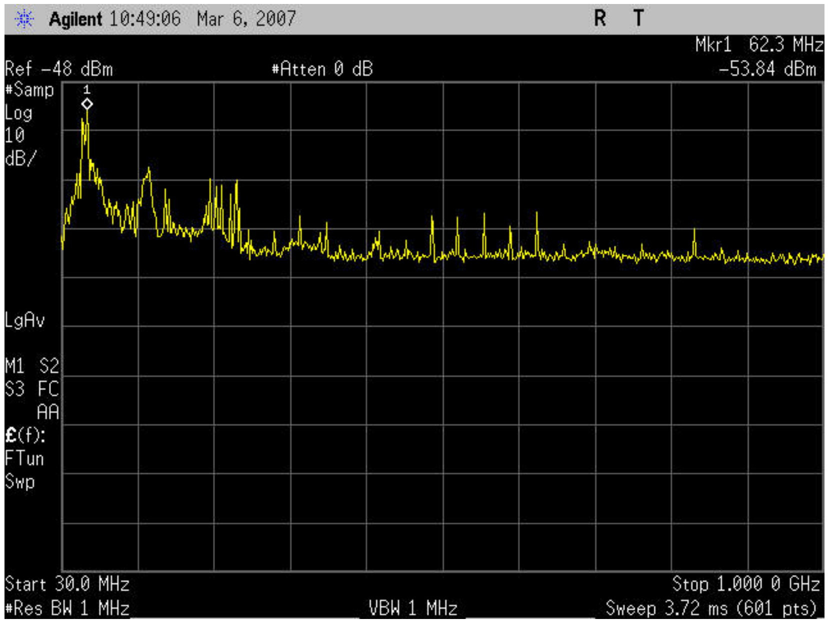
Test Results: The EUT as tested was found compliant with the specified requirements of Clause 4.4

Test Engineer: Shawn McMillen

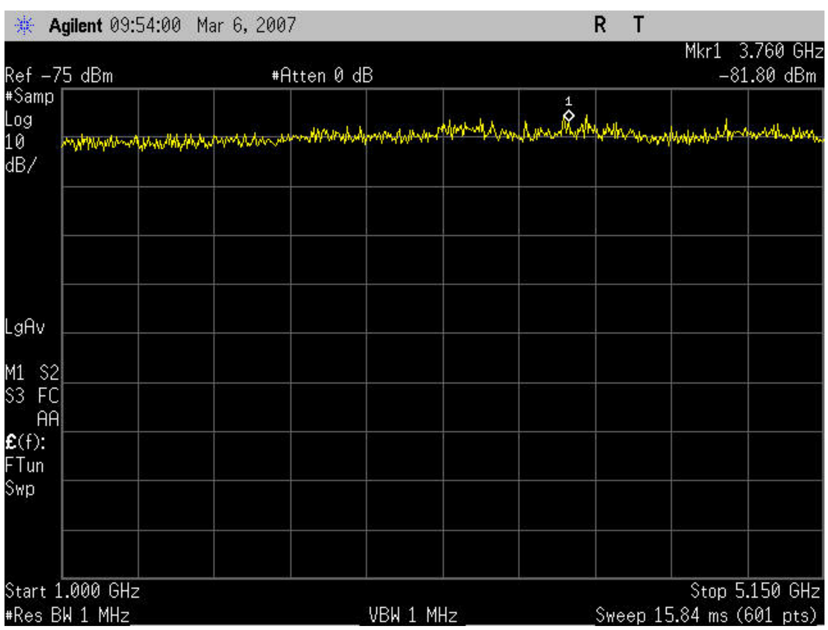
Test Date: March 5, 2007

Conformance Requirements

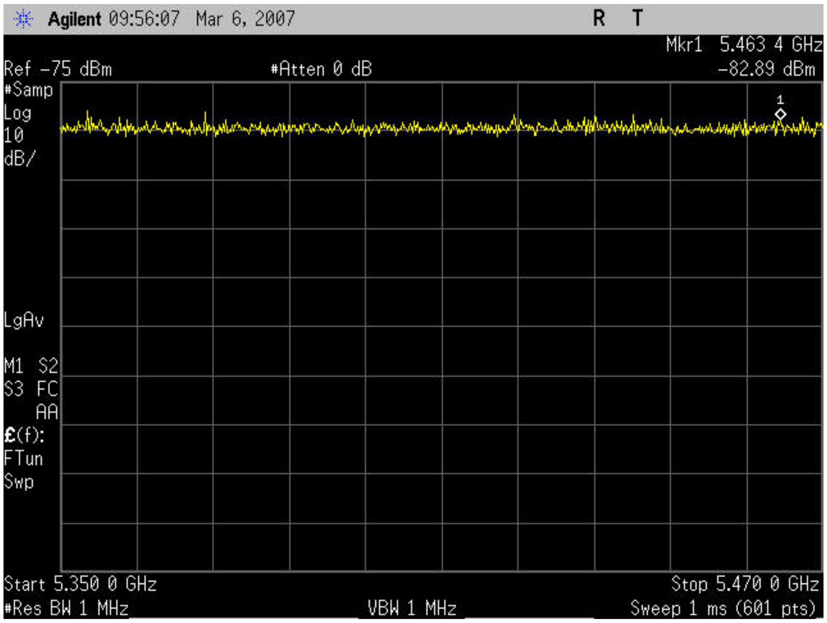
4.4 Transmitter Unwanted Emissions Outside the 5GHz RLAN Bands (Radiated)



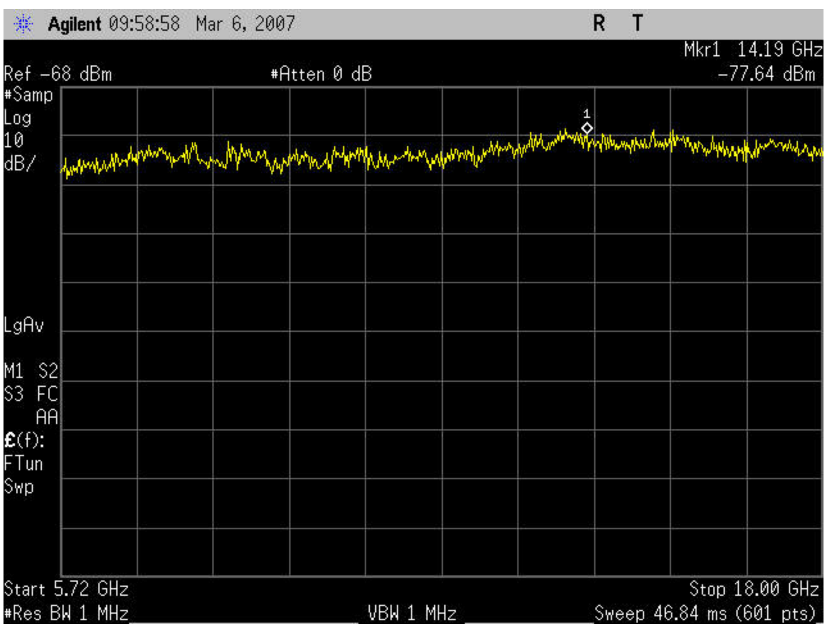
Low channel (5500 MHz) Spurious Emission 30 MHz - 1GHz



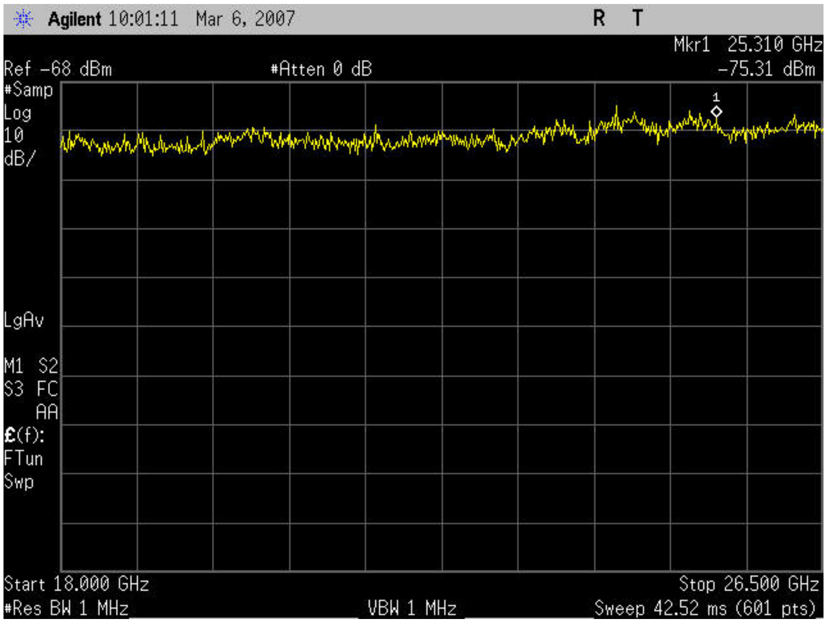
Low channel (5500 MHz) Spurious Emission 1 GHz – 5.15 GHz



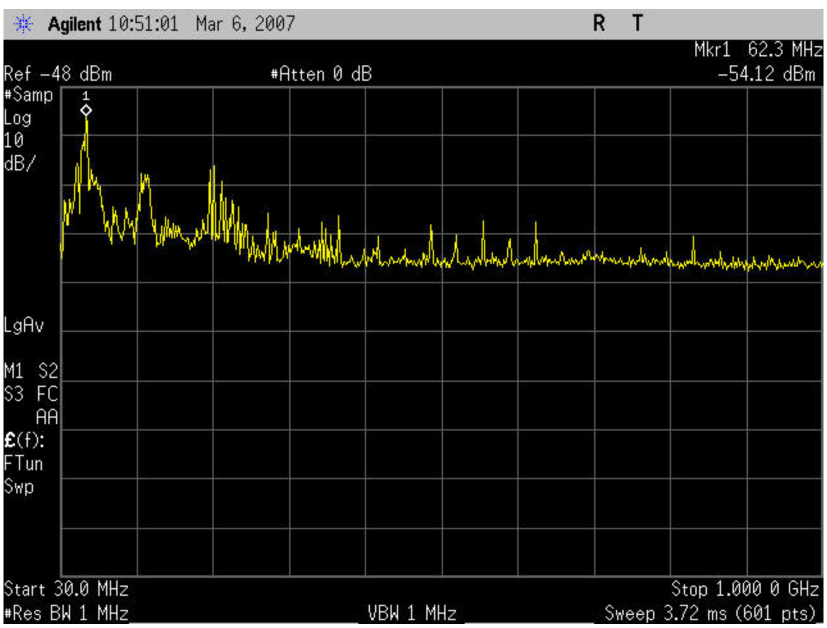
Low channel (5500 MHz) Spurious Emission 5.35 GHz – 5.47 GHz



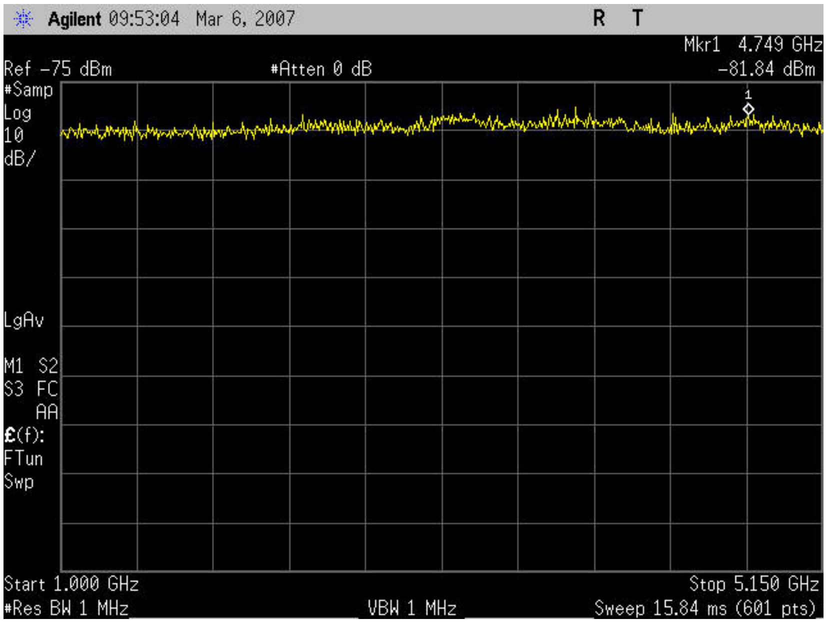
Low channel (5500 MHz) Spurious Emission 5.725 GHz - 18GHz



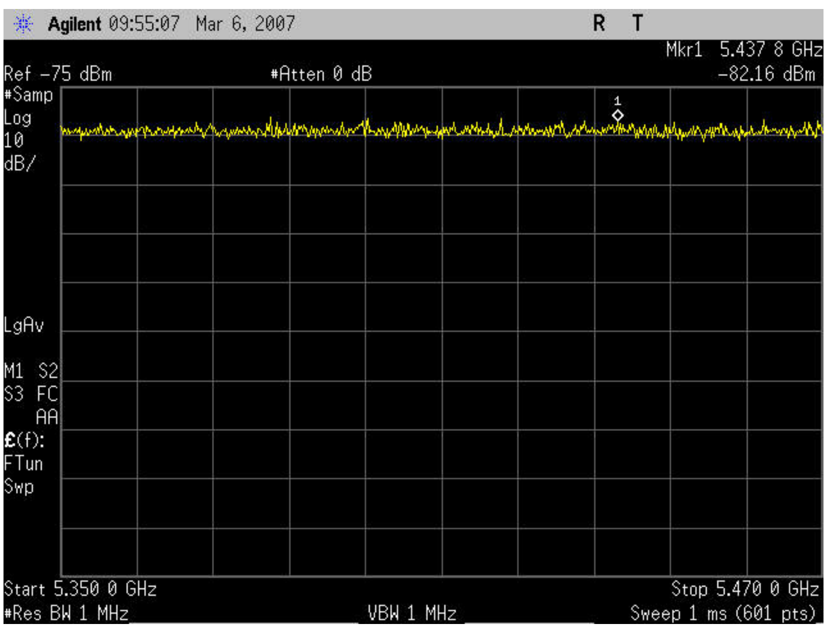
Low channel (5500 MHz) Spurious Emission 18 GHz – 26.5GHz



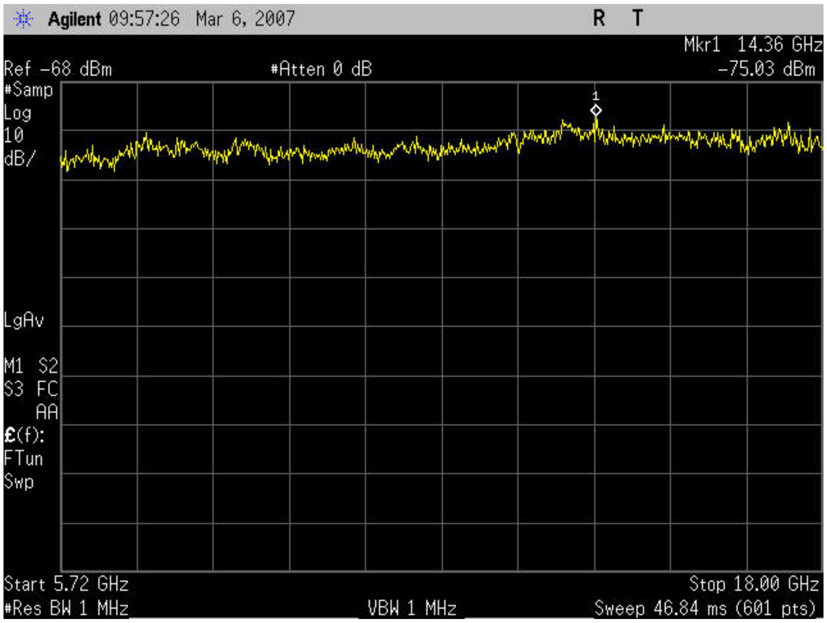
High channel (5700 MHz) Spurious Emission 30 MHz - 1GHz



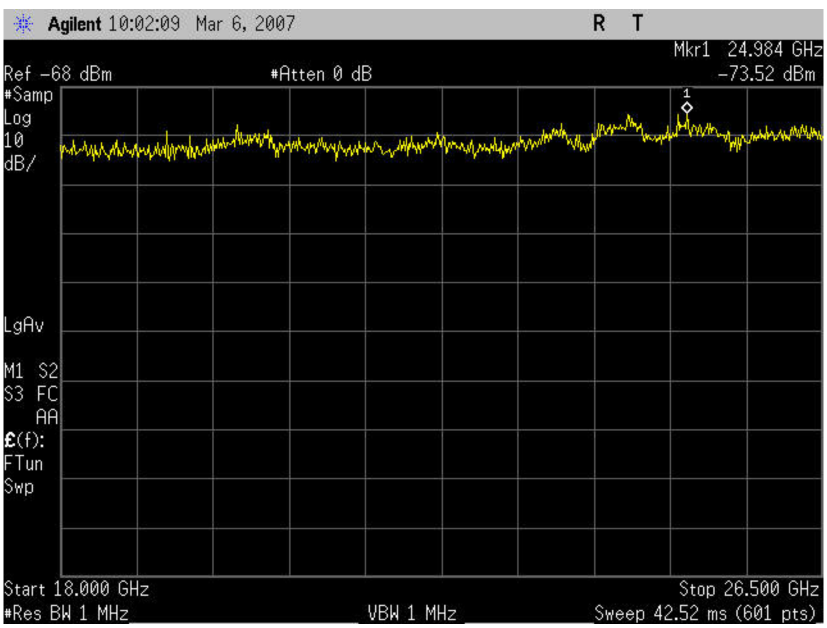
High channel (5700 MHz) Spurious Emission 1 GHz – 5.15 GHz



High channel (5700 MHz) Spurious Emission 5.35 GHz – 5.47 GHz



High channel (5700 MHz) Spurious Emission 5.725 GHz - 18GHz



High channel (5700 MHz) Spurious Emission 18 GHz – 26.5GHz

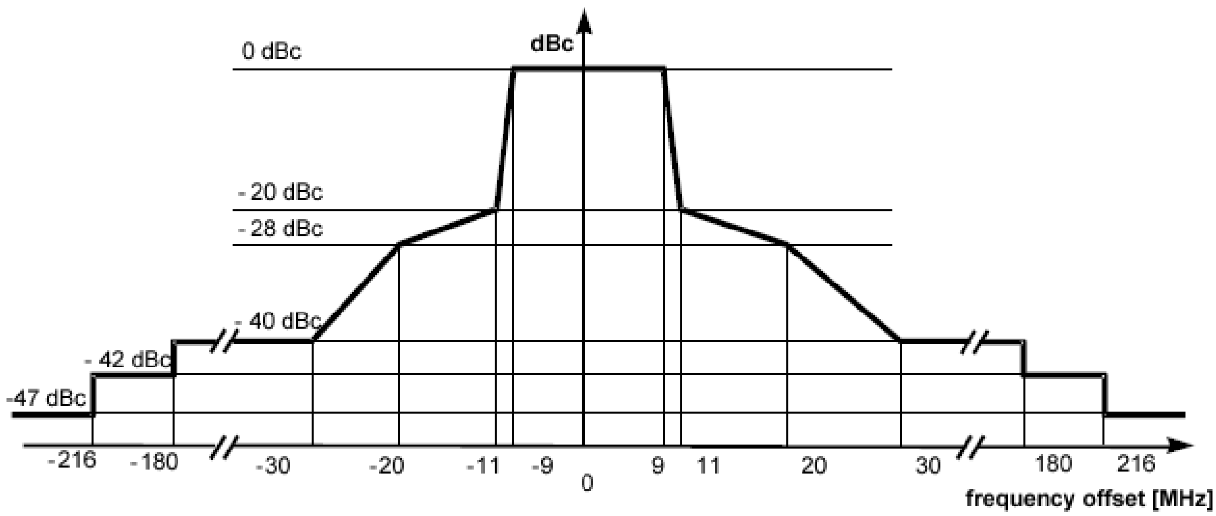
Photograph 1. Radiated Emissions Setup

4.4 Transmitter Unwanted Emissions Within the 5GHz RLAN Bands (Conducted)

Test Requirement(s): **EN 301 893, Clause 5.3.5.2.1:**

4.4.1.2 Definition
These are conducted radio frequency emissions within the 5GHz RLAN bands when the RF output port is connected to a spectrum analyzer.

Limit
The average level of the transmitted spectrum within the 5GHz RLAN bands shall not exceed the limits given below.



Note: dBc is the spectral density relative to the maximum spectral power density of the transmitted signal**.**

Test Procedure: The maximum spectral power density of the EUT's transmitted signal was determined using a broadband power meter capable of measuring the average power of a modulated carrier. The EUT was then connected to a spectrum analyzer with a RBW of 1MHz, a VBW of 30 KHz and with video averaging on. The level of the power density measured previously was then used to set the emission mask relative to the 0 dB reference level of the modulated carrier. Measurements were carried out in all modulations available and at f_c of 5250MHz and 5350MHz for the lower Sub-Bands and 5500MHz and 5700MHz for the Higher Sub-band. The spectrum under the mask was examined both in a relatively narrow span and a broader span in order to determine compliance.

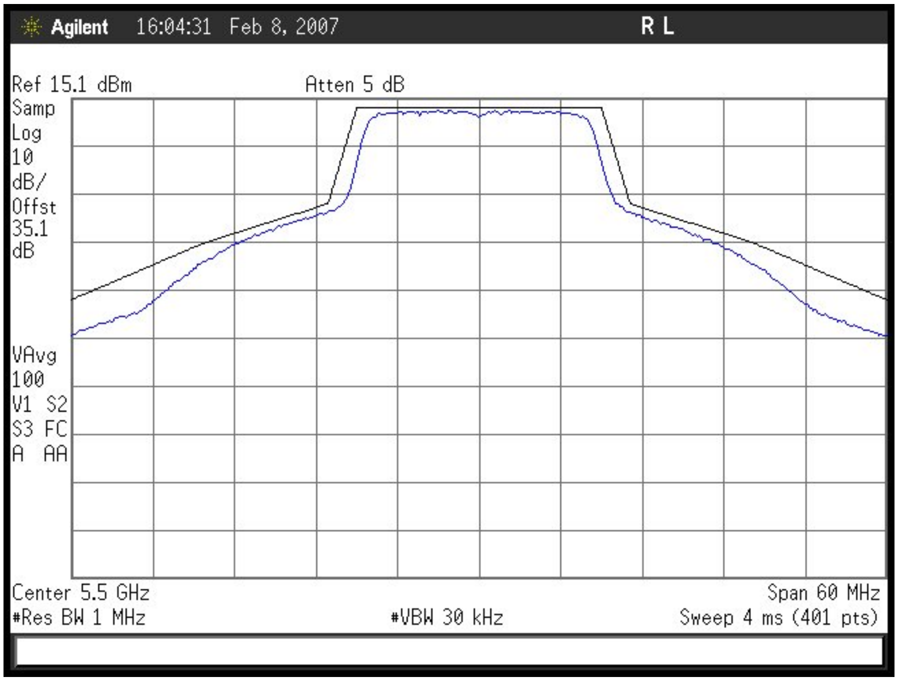
Test Results: The EUT as tested was found compliant with the specified requirements of Clause 4.4.

Test Engineer: Shawn McMillen

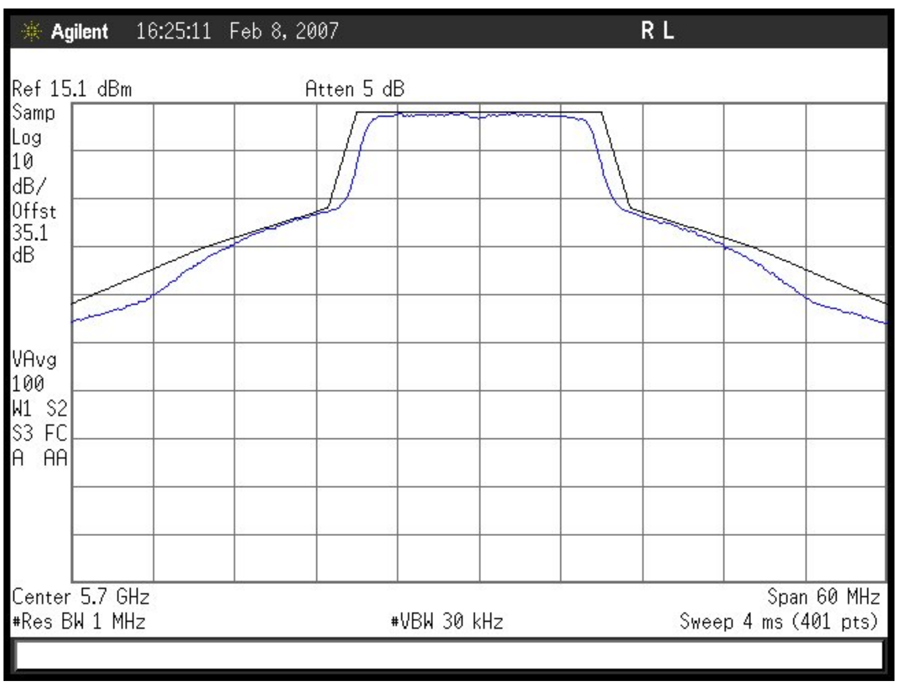
Test Date: February 8, 2007

Conformance Requirements

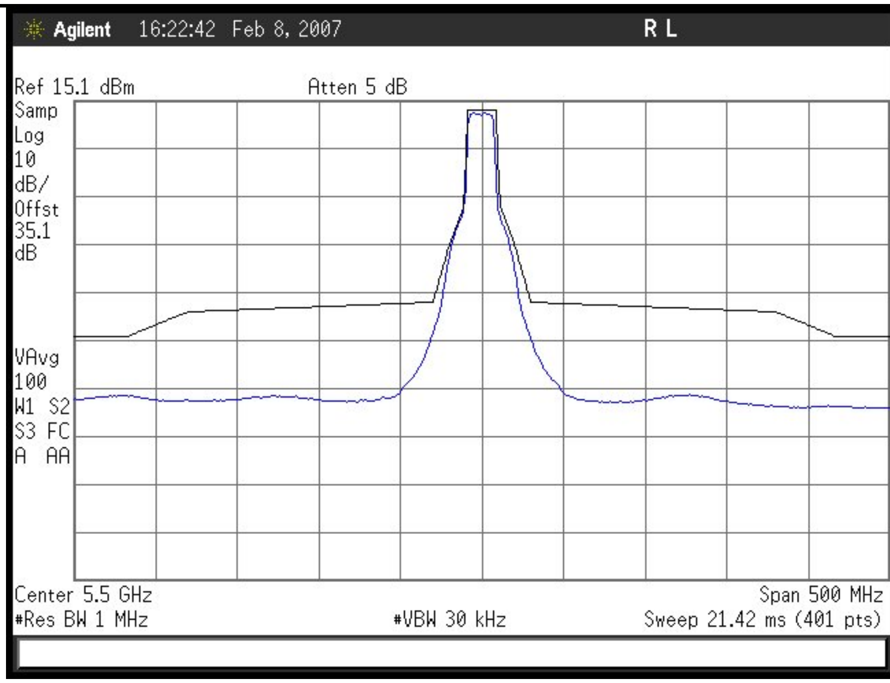
4.3.4 Transmitter Unwanted Emissions Within the 5GHz RLAN Bands (Conducted)



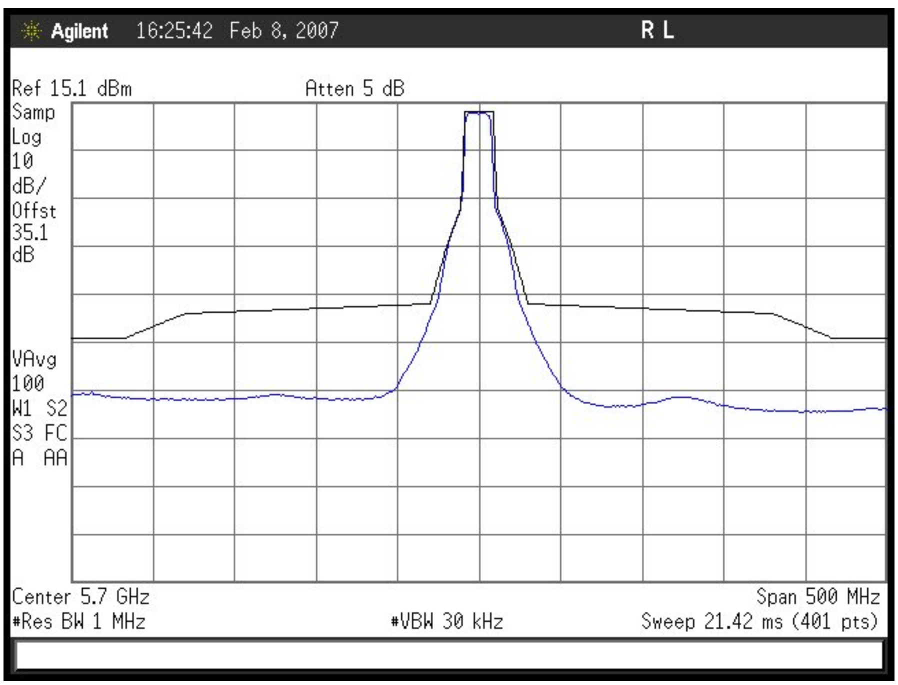
Low channel (60 MHz) Spurious Emission



High channel (60 MHz) Spurious Emission



Low channel (500 MHz) Spurious Emission



High channel (500 MHz) Spurious Emission

4.4 Transmitter Unwanted Emissions Within the 5GHz RLAN Bands (Radiated)

Test Requirement(s): **EN 301 893, Clause 5.3.6.2.2:**

4.5.1 Definition
These are radiated radio frequency emissions within the 5GHz RLAN bands from the cabinet or structure when the EUT is in receive mode.

Limit

Frequency Range	Maximum Power, ERP	Measurement Bandwidth
5.470GHz to 5.725GHz	-47 dBm	1MHz

Test Procedure: The EUT was setup as per section 4.4 above for measuring out of band radiated emissions. The spectrum within the 5GHz RLAN band was investigated for spurious emissions. Measurements were carried out in all modulations available and at f_c of 5150MHz and 5350MHz for the lower Sub-Bands and 5500MHz and 5700MHz for the Higher Sub-band.

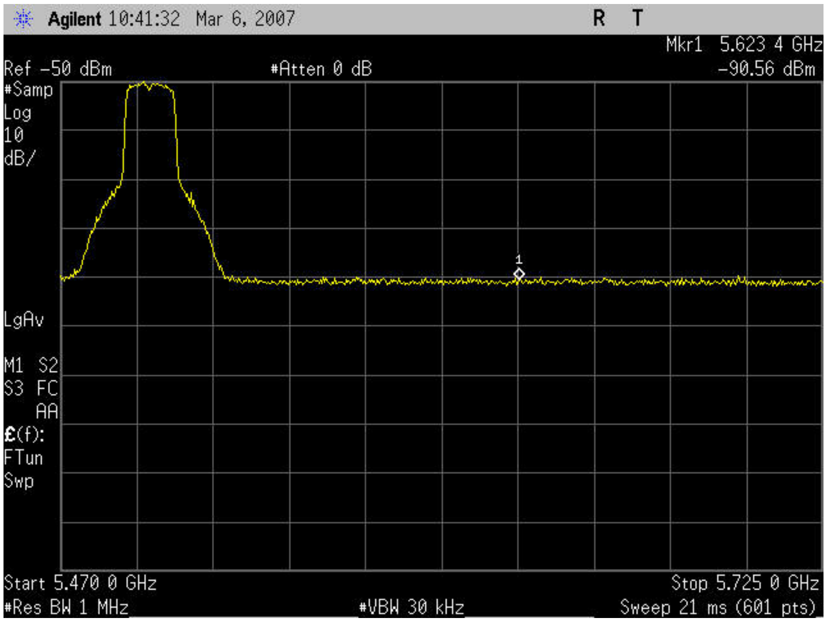
Test Results: The EUT as tested was found compliant with the specified requirements of Clause 5.3.6.2.2.

Test Engineer: Shawn McMillen

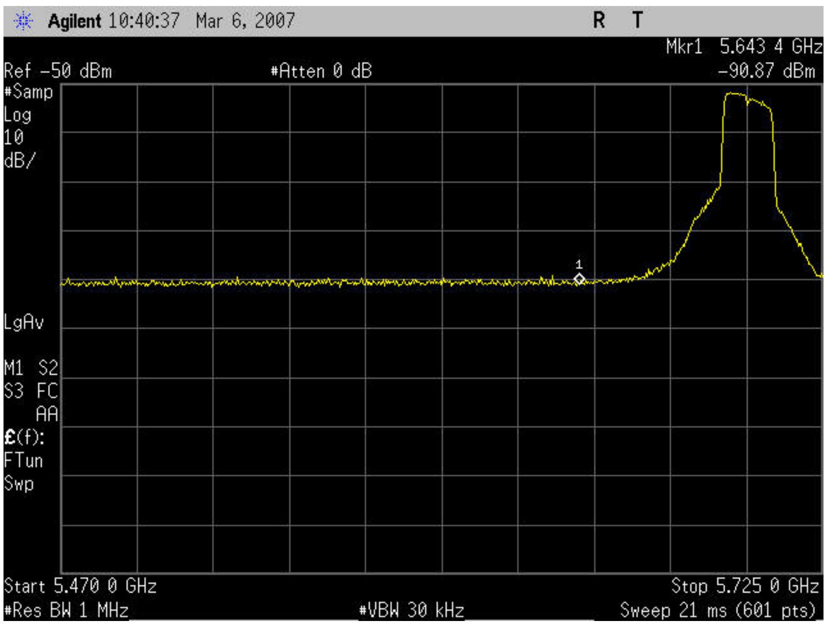
Test Date: March 5, 2007

Conformance Requirements

4.3.4 Transmitter Unwanted Emissions Within the 5GHz RLAN Bands (Radiated)



Low channel (5500 MHz) Spurious Emission



High channel (5700 MHz) Spurious Emission

Conformance Requirements

4.5 Receiver Spurious Emissions (Conducted)

Test Requirement(s): 4.5.1 Definition

Receiver spurious emissions are emissions at any frequency when the equipment is in received mode.

4.5.2 Limit

The spurious emissions of the receiver shall not exceed the values in table below.

Frequency Range	Maximum Power, ERP	Measurement Bandwidth
30 MHz to 1 GHz	-57 dBm	100KHz
above 1 GHz to 26.5 GHz	-47 dBm	1MHz

Test Procedure: Two EUTs were setup to communicate with each other. A test transmission sequence as shown below was used to send data between the two units. A directional coupler was used to isolate the emission measurements from the test data signal while the EUT received test data. The spectrum analyzer was initially set with a RBW of 1MHz or 100KHz and a VBW of 1MHZ using video averaging or peak hold. The Frequency was scanned from 30MHz to 26.5GHz. Measurements were carried out in all modulations available and at f_c of 5250MHz and 5350MHz for the lower Sub-Bands and 5500MHz and 5700MHz for the Higher Sub-band.

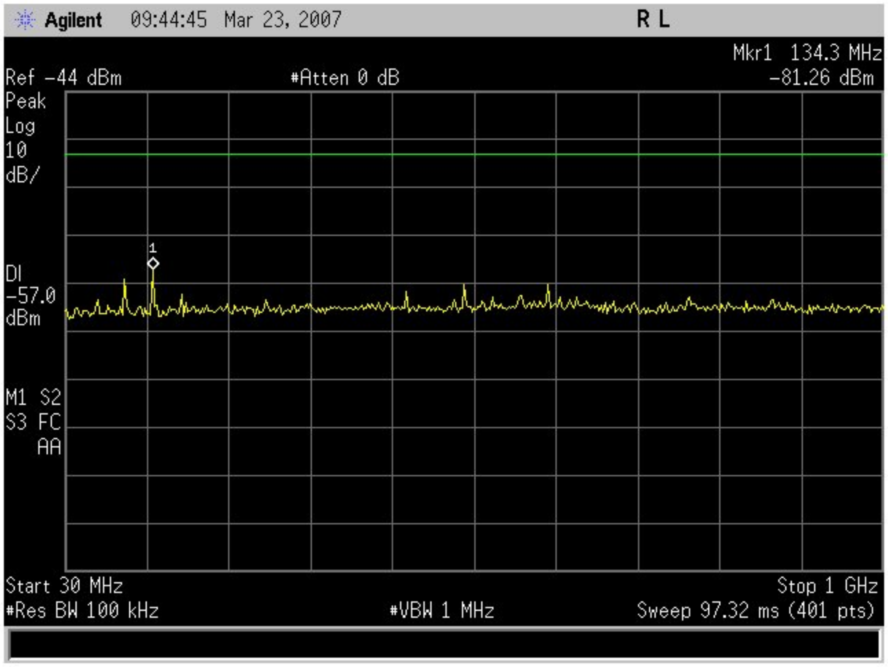
Test Results: The EUT as tested was found compliant with the specified limits of Clause 4.5.

Test Engineer: Shawn McMillen

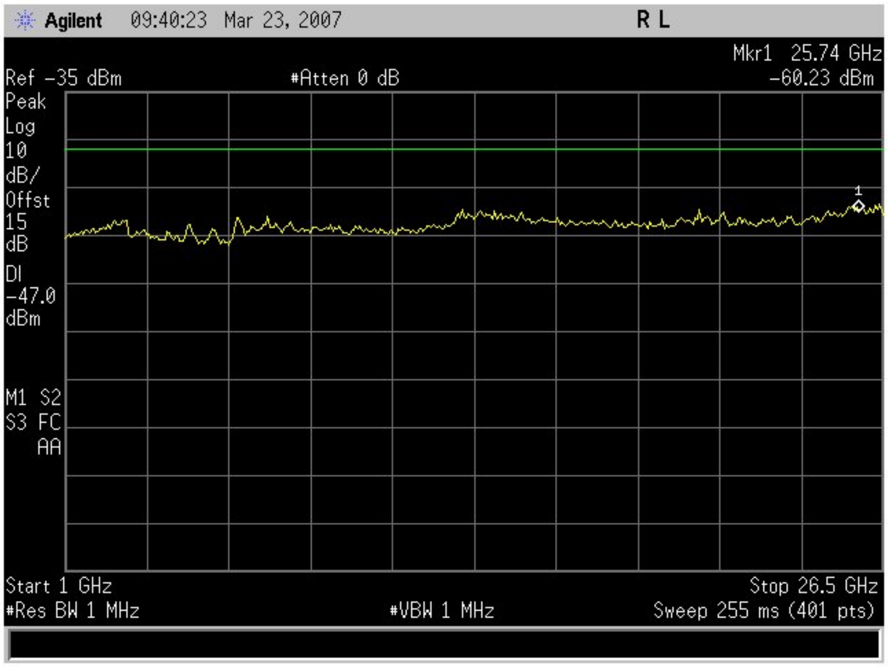
Test Date: March 23, 2007

Conformance Requirements

4.3.5 Receiver Spurious Emissions (Conducted)



Receiver Spurious Emission 30 MHz - 1GHz



Receiver Mode Spurious Emission 1 GHz - 26.5 GHz

Conformance Requirements

4.5 Receiver Spurious Emissions (Radiated)

Test Requirement(s): 4.5.1 Definition

Receiver spurious emissions are emissions at any frequency when the equipment is in received mode.

4.5.2 Limit

The spurious emissions of the receiver shall not exceed the values in table below.

Frequency Range	Maximum Power, ERP	Measurement Bandwidth
30 MHz to 1 GHz	-57 dBm	100KHz
above 1 GHz to 26.5 GHz	-47 dBm	1MHz

Test Procedure: The EUT was setup as per section 4.4 above for measuring out of band radiated emissions. The EUT was set up to receive data. The spectrum within the 5GHz RLAN band was investigated for spurious emissions.

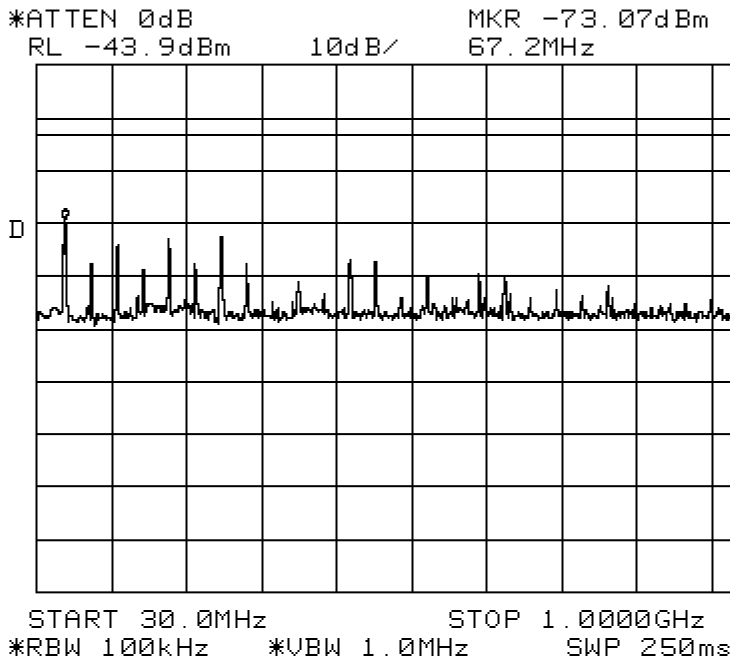
Test Results: The EUT as tested was found compliant with the specified limits of Clause 5.3.6.

Test Engineer: Shawn McMillen

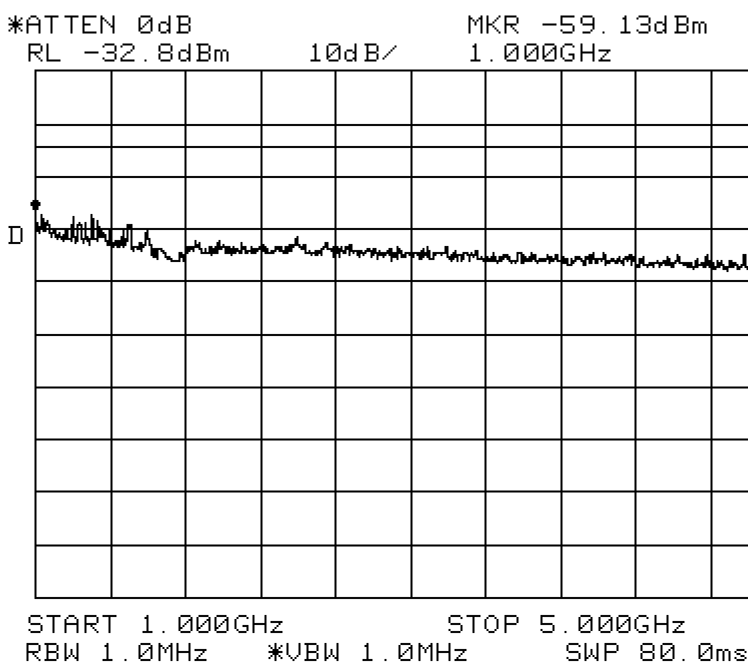
Test Date: March 13, 2007

Conformance Requirements

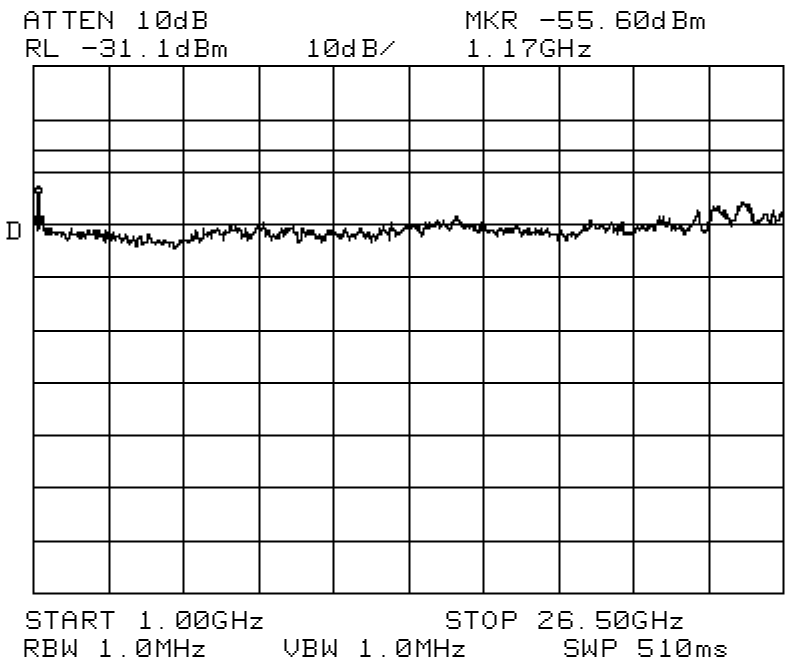
4.3.5 Receiver Spurious Emissions (Radiated)



Receiver Spurious Emission 30 MHz - 1GHz



Receiver Spurious Emission 1 GHz - 5 GHz



Receiver Spurious Emission 1GHz – 26.5GHz

IV. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2421	EMI RECEIVER	ROHDE&SCHWARZ	ESIB 7	3/22/2006	4/22/2007
1S2184	BILOG ANTENNA	CHASE	CBL6112A	1/3/2007	1/3/2008
1S2121	PRE-AMPLIFIER	HEWLETT PACKARD	8449B	11/28/2006	11/28/2007
1S2198	ANTENNA, HORN	EMCO	3115	8/17/2006	8/17/2007
1S2202	ANTENNA, HORN, 1 METER	EMCO	3116	3/23/2004	3/23/2007
N/A	HIGH PASS FILTER	MICRO-TRONICS	HPM13146	SEE NOTE	
1S2263	CHAMBER, 10 METER	RANTEC	N2-14	8/15/2006	8/15/2007
1S2430	WIDEBAND POWER METER	ANRITSU COMPANY	ML2488A	1/12/2007	2/12/2008
1S2432	WIDEBAND POWER SENSOR	ANRITSU COMPANY	MA2491A	1/12/2007	2/12/2008
1S2034	COUPLER, DIRECTIONAL 1-20 GHz	KRYTAR	101020020	SEE NOTE	
1S2041	COUPLER, BI DIRECTIONALCOAXIAL	NARDA	N/A	SEE NOTE	
1S2460	Analyzer, Spectrum 9 kHz-40GHz	Agilent	E4407B	07/06/2005	07/06/2008
1S2034	COUPLER, DIRECTIONAL 1-20 GHz	KRYTAR	101020020	SEE NOTE	
1S2041	COUPLER, BI DIRECTIONALCOAXIAL	NARDA	N/A	SEE NOTE	
1S2128	Harmonic Mixer	Hewlett Packard	11970A	N/A	3/10/2007
1S2129	Harmonic Mixer	Hewlett Packard	11970K	N/A	3/10/2007

Note: Functionally verified test equipment is verified using calibrated instrumentation at the time of testing.

End of Report