Test Report

Spurious and EMC Emissions

AIR-AP1572xxx-x-K9

FCC ID: LDK102093P
IC: 2461B-102093P

Receiver Spurious up to 40 GHz
&
2412 - 2462 MHz Tx

Cisco Systems
170 West Tasman Drive
San Jose, CA 95134

Engineer:
Date: **11-3-2014**

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Section 1: Overview

1.1 Test Summary

The samples were assessed against the tests detailed in section 3 under the requirements of the following specifications:

Emission	Immunity
CFR47 Part 15	N/A

The specifications listed above represent actual tests performed to demonstrate compliance against the specifications and basic standards listed on the front cover of this report. This list is not a one to one match to the front cover for one or more of the following reasons.

1. Basic standards call up many different test phenomena specifications such as the 61000-4-X series. The basic standards define which elements and levels shall be applied from these specifications and as such it is not appropriate to list the individual specifications on the front cover.
2. A Standard listed on the front cover may be required in a particular country but is not appropriate for the particular technologies included in the equipment under test. E.g. You cannot test a DC product to the mains Harmonics requirements in EN61000-3-2. See section 3.2.
3. Test results against a particular standard or specification may be included in a different test report. See section 3.2 for an EDCS reference of this data.
4. Where appropriate, Cisco may have substituted a later revision of a basic standard to those referenced in the specification on the front sheet of this test report. This decision was based upon improved test methodology and repeatability and/or where the newer revision represented a more stringent test.
5. Where relevant, testing has been carried out to the requirements of both EN and IEC Specifications. This was possible because of the similarities of the test methods involved and the Cisco EMC test procedures.
6. Testing may have been performed to an equivalent test that satisfies the requirements of the standards and specifications listed on the front cover of the report. See section 3.2.
7. Where radiated emissions testing has been performed to EN55022/CISPR22 the additional requirements of VCCI: V- 3/2006.04, EN55022: 1994 +A1/2 and CAN/CSA- CISPR 22-02 have also been evaluated unless otherwise stated.
8. Testing to the requirements of CFR47 Part 15 was performed against the CISPR22 limits. The results are therefore deemed satisfactory evidence of compliance with Industry Canada Interference Causing Equipment Standard ICES-003.
9. Where assessment has been performed to CISPR24, all the applicable test requirements may have not been covered. Refer to the results section for the tests performed.

Notes:

1) Where a specification listed on the front cover of this report has deviations from the basic standards listed above, the additional technical requirements of the specification were also assessed.
2) Where appropriate, Cisco may have substituted a later revision of a basic standard to those referenced in the specification on the front sheet of this test report. This decision was based upon improved test methodology and repeatability and/or where the newer revision represented a more stringent test.
3) Where relevant, testing has been carried out to the requirements of both EN and IEC Specifications. This was possible because of the similarities of the test methods involved and the Cisco EMC test procedures.

Section 2: Assessment Information

2.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on the samples submitted. The testing was performed by and for the use of Cisco systems Inc.

With regard to this assessment, the following points should be noted:

a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results due to production and measurement tolerances.

b) The apparatus was set up and exercised using the configuration and modes of operation defined in the operations manual.

c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).

d) All testing was performed under the following environmental conditions:

Temperature	15°C to 35°C (54°F to 95°F)
Atmospheric Pressure	860mbar to 1060mbar (25.4" to 31.3")
Humidity	10% to 75*%

*[Where applicable] For ESD testing the humidity limits used were 30% to 60% and for EFT/B tests the humidity limits used were 25% to 75%.

e) All AC testing was performed at one or more of the following supply voltages:

110V 60 Hz (+/-20%)

220V 50 Hz (+/-20%)

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2.2 Date of testing

February 2014

2.3 Report Issue Date

Cisco uses an electronic system to issue, store and control the revision of test reports. This system is called the Engineering Document Control System (EDCS). The actual report issue date is embedded into the original file on EDCS. Any copies of this report, either electronic or paper, that are not on EDCS must be considered uncontrolled.

2.4 Testing facilities

This assessment was performed by:

Testing Laboratory	
Cisco Systems, Inc.,	Cisco Systems, Inc.
4125 Highlander Parkway	170 West Tasman Drive
Richfield, OH 44286	San Jose, CA 95134
USA	USA

Test Engineers

Bud Chiller

2.5 Equipment Assessed (EUT)

AIR-AP1572EAC-B-K9

This report provides data supporting compliance with undesired emissions regulations stated in CFR47 Part 15 of the FCC Rules and Regulations.

2.6 EUT Description

The AIR-AP1572 Series AP is an 802.11n dual band mesh access point employing externally mounted antennas either directly on the RF port connectors or mounted separately to provide desired coverage.

Appendix A: Emission Test Results

Testing Laboratory: Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134, USA

Radiated Spurious Emissions

15.205: Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

Span:	1GHz – 18 GHz
Reference Level:	80 dBuV
Attenuation:	10 dB
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	1 MHz for peak, 10 Hz for average
Detector:	Peak

Terminate the access Point RF ports with 50 ohm loads.

Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

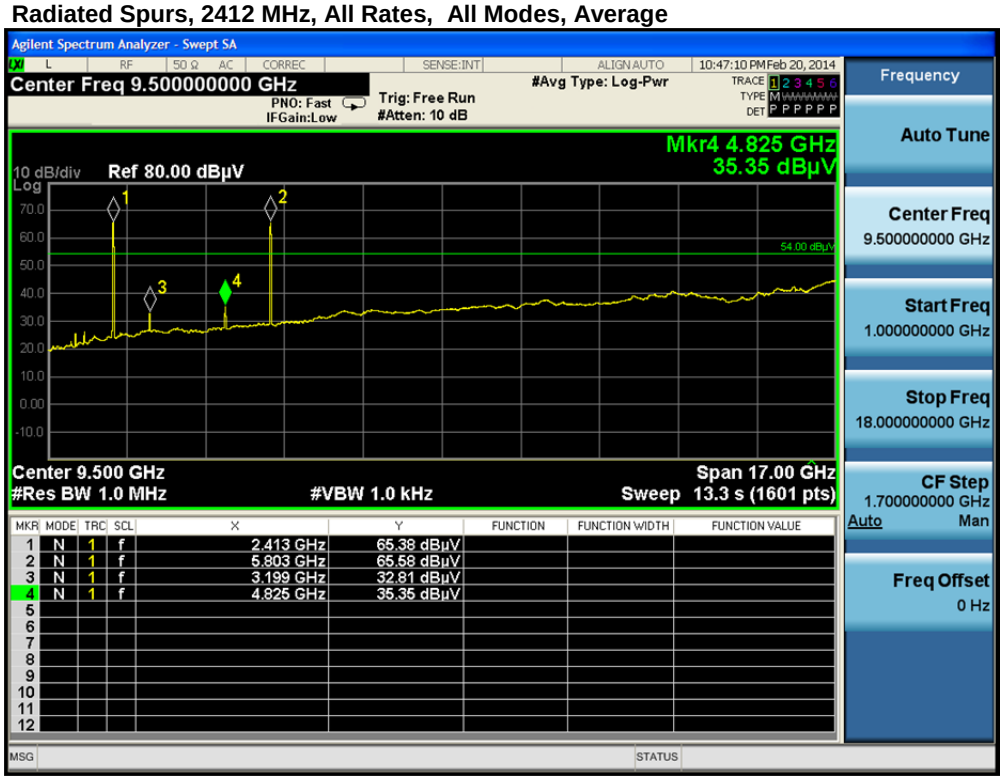
Save 2 plots: 1) Average Plot (Vertical and Horizontal), Limit= 54dBuV/m @3m
2) Peak plot (Vertical and Horizontal), Limit = 74dBuV/m @3m

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands.

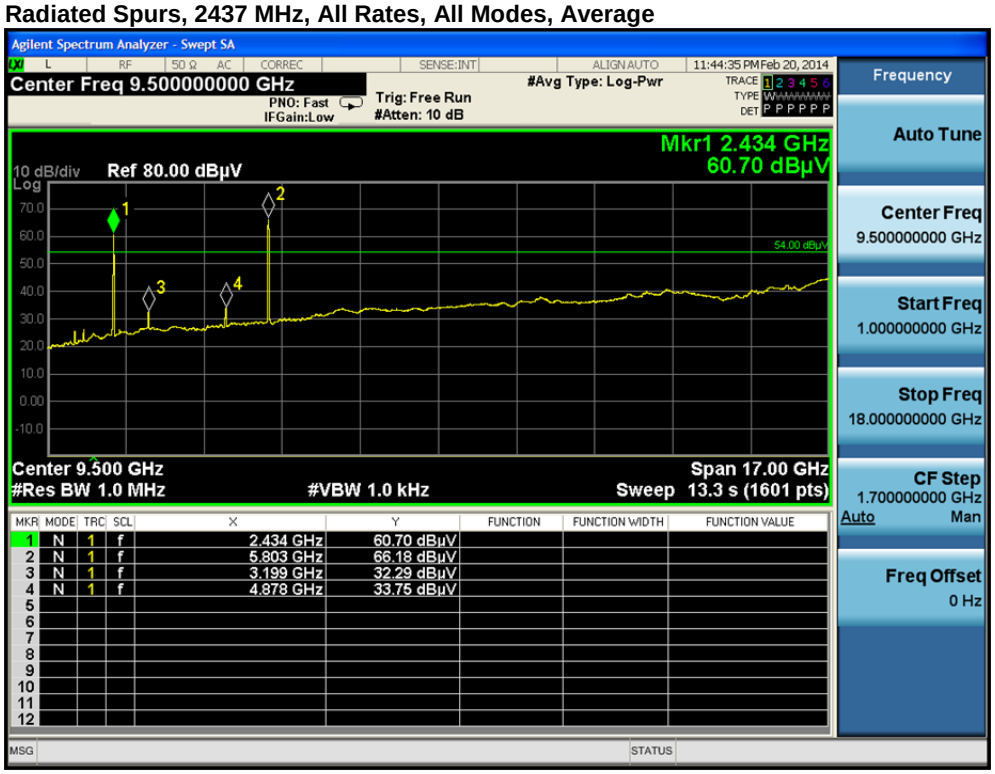
This report represents the worst case data for all supported operating modes and antennas. There are no measurable emissions above 18 GHz.

Frequency (MHz)	Mode	Data Rate (Mbps)	Spurious Emission Level (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)
2412	Legacy CCK, 1 to 11 Mbps	1	35.4	**<54**	18.6
	Non HT-20, 6 to 54 Mbps	6	35.4	**<54**	18.6
	Non HT-20 Beam Forming, 6 to 54 Mbps	6	35.4	**<54**	18.6
	HT-20, M0 to M23	m0	35.4	**<54**	18.6
	HT-20 STBC, M0 to M7	m0	35.4	**<54**	18.6
	HT-20 Beam Forming, M0 to M23	m0	35.4	**<54**	18.6
2437	Legacy CCK, 1 to 11 Mbps	1	33.8	**<54**	20.2
	Non HT-20, 6 to 54 Mbps	6	33.8	**<54**	20.2
	Non HT-20 Beam Forming, 6 to 54 Mbps	6	33.8	**<54**	20.2
	HT-20, M0 to M23	m0	33.8	**<54**	20.2
	HT-20 STBC, M0 to M7	m0	33.8	**<54**	20.2
	HT-20 Beam Forming, M0 to M23	m0	33.8	**<54**	20.2
2462	Legacy CCK, 1 to 11 Mbps	1	35.5	**<54**	18.5
	Non HT-20, 6 to 54 Mbps	6	35.5	**<54**	18.5
	Non HT-20 Beam Forming, 6 to 54 Mbps	6	35.5	**<54**	18.5
	HT-20, M0 to M23	m0	35.5	**<54**	18.5
	HT-20 STBC, M0 to M7	m0	35.5	**<54**	18.5
	HT-20 Beam Forming, M0 to M23	m0	35.5	**<54**	18.5

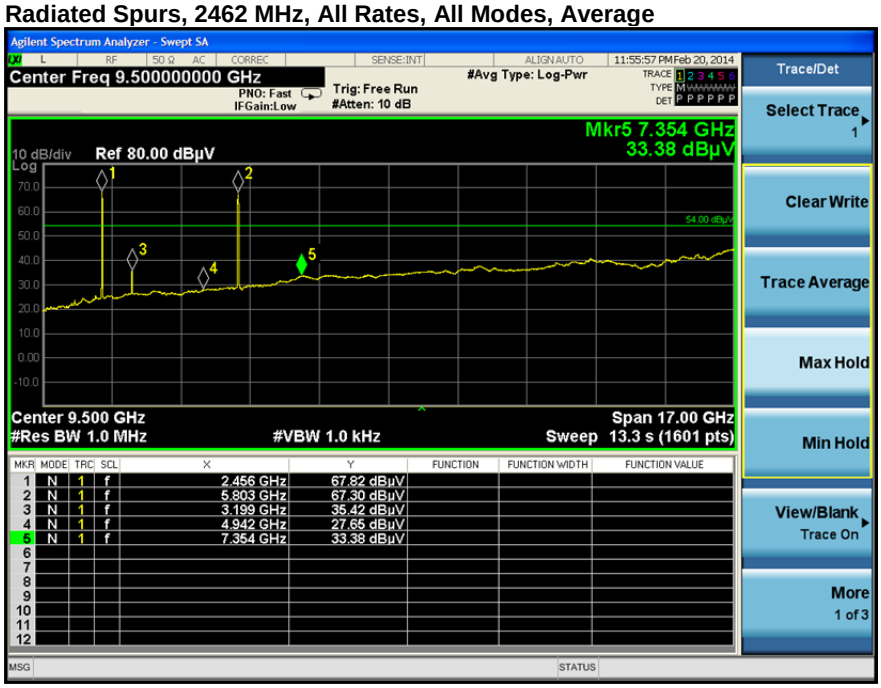
Radiated Spurs, 2412 MHz, All Rates, All Modes, Average



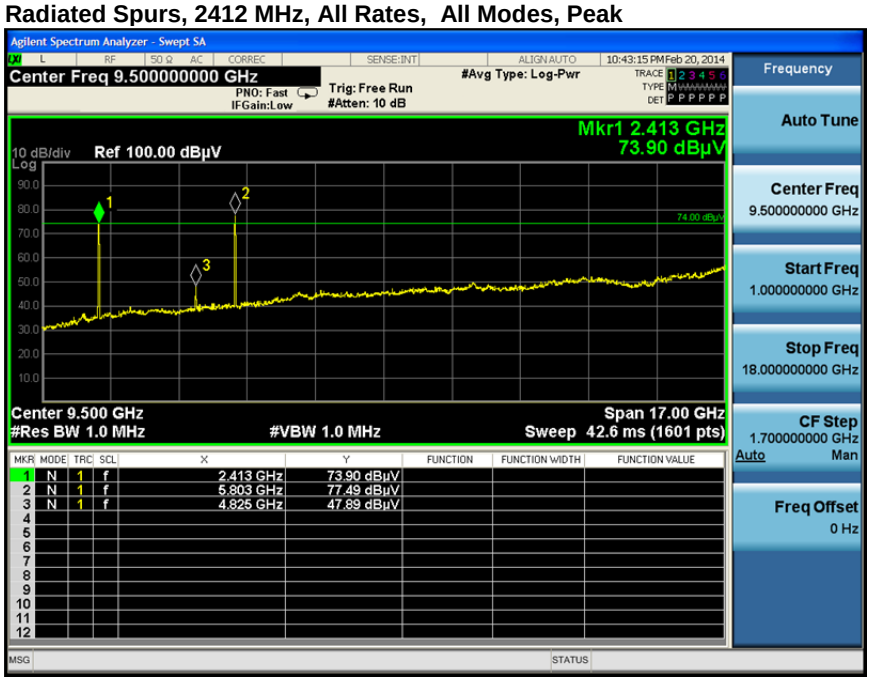
Radiated Spurs, 2437 MHz, All Rates, All Modes, Average



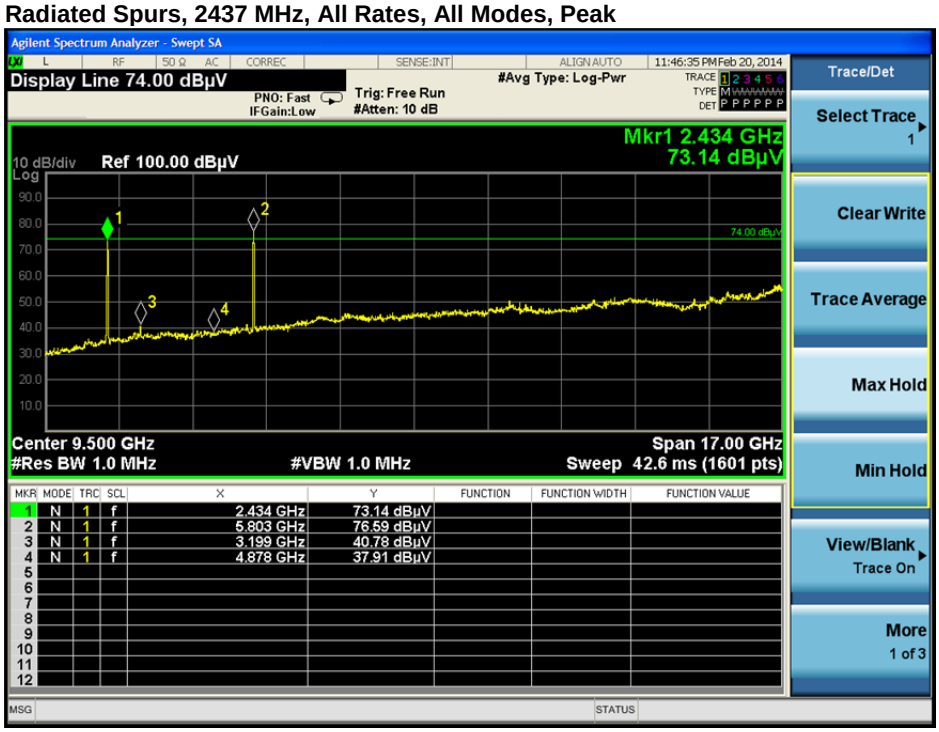
Radiated Spurs, 2462 MHz, All Rates, All Modes, Average



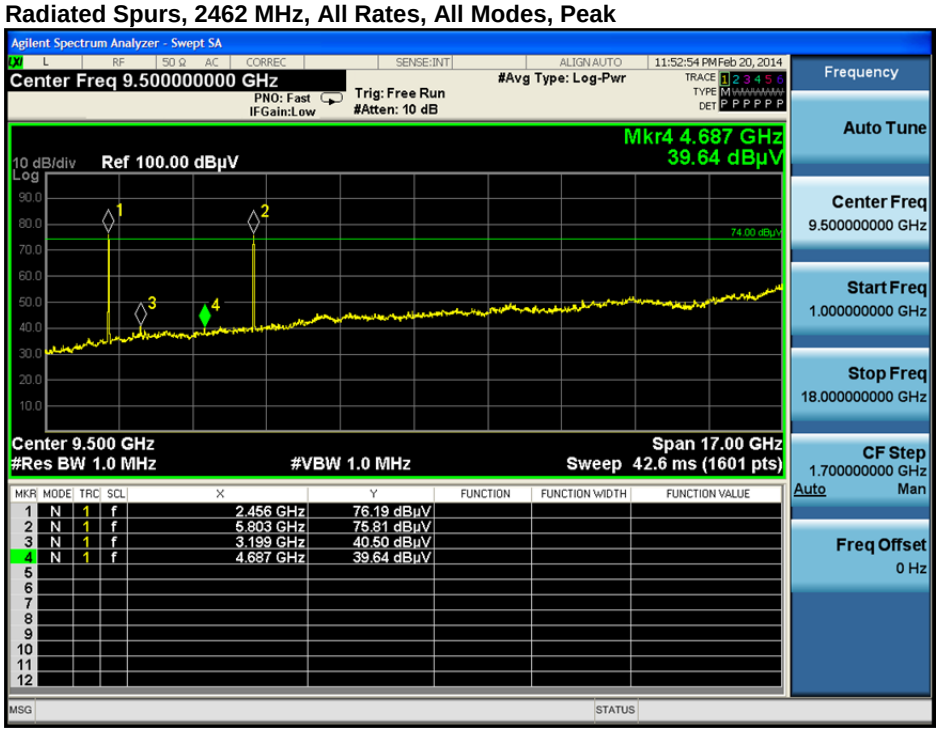
Radiated Spurs, 2412 MHz, All Rates, All Modes, Peak



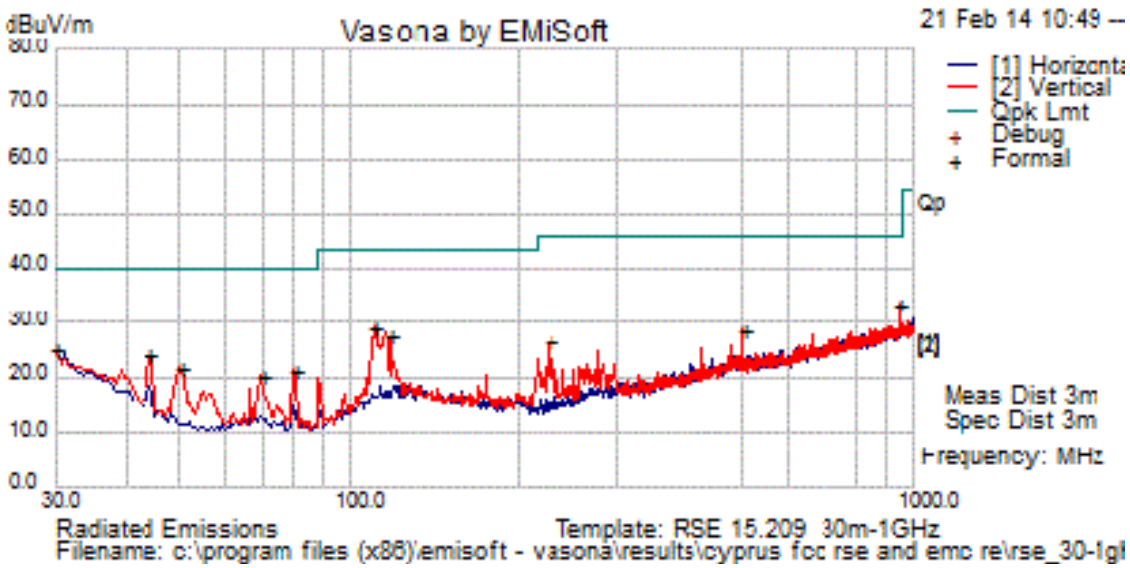
Radiated Spurs, 2437 MHz, All Rates, All Modes, Peak

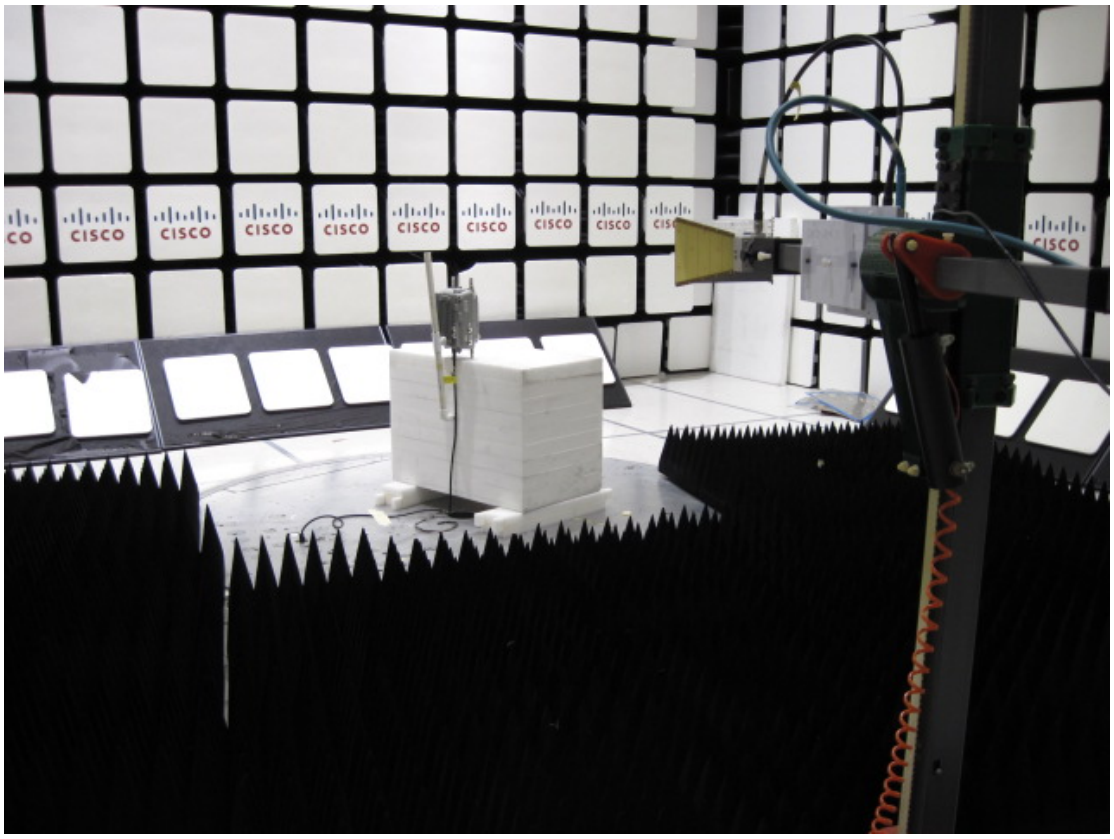


Radiated Spurs, 2462 MHz, All Rates, All Modes, Peak



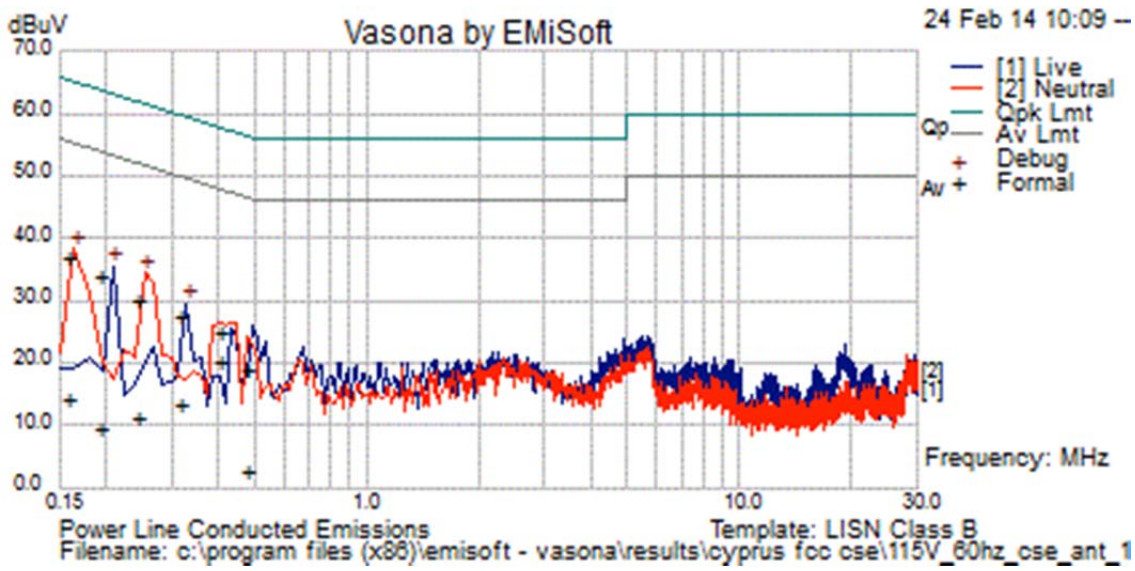
Radiated Emissions 30 – 1000 MHz





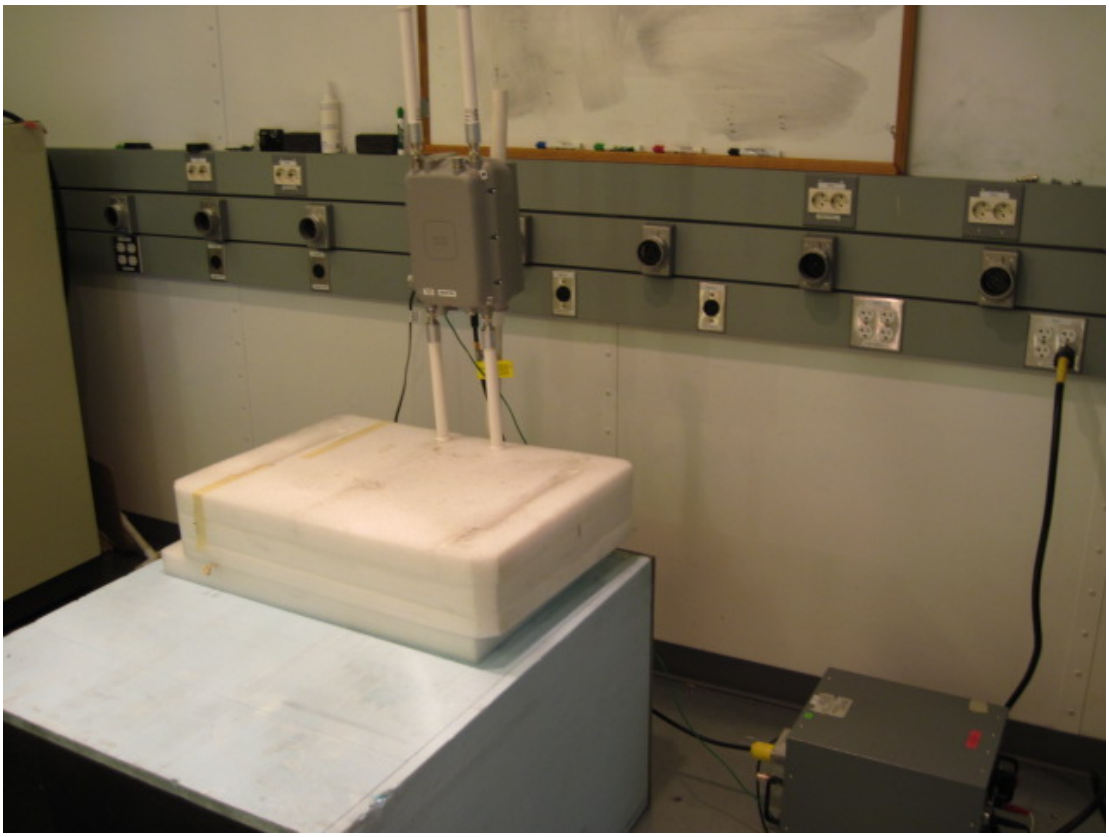
Test Setup for Radiated Measurements

Conducted Emissions



Test Results Table

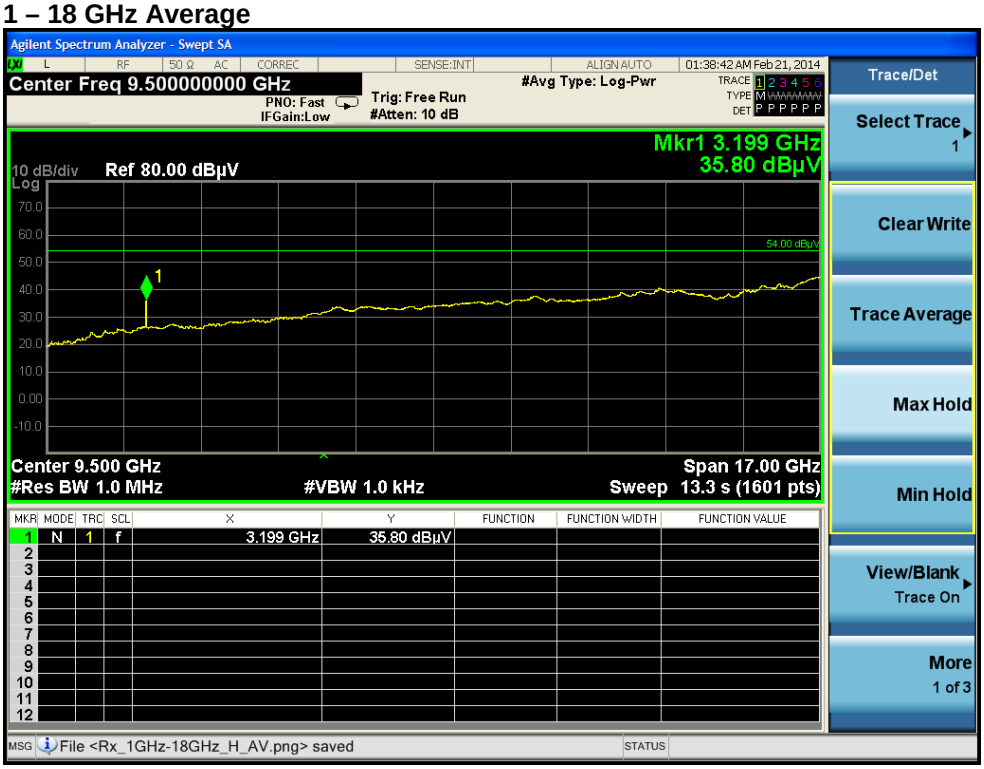
Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.405086	0.1	20.2	0	20.4	Av	N	47.8	-27.4	Pass	
0.158502	15.3	21.4	0	36.7	Qp	N	65.5	-28.8	Pass	
0.19233	12.7	21.1	0	33.8	Qp	L	63.9	-30.1	Pass	
0.241893	9.3	20.8	0	30.2	Qp	N	62	-31.9	Pass	
0.312306	7	20.5	0	27.5	Qp	L	59.9	-32.4	Pass	
0.405086	4.6	20.2	0	24.8	Qp	N	57.8	-32.9	Pass	
0.312306	-7.3	20.5	0	13.2	Av	L	49.9	-36.7	Pass	
0.47754	-1.3	20.1	0	18.8	Qp	N	56.4	-37.6	Pass	
0.241893	-9.8	20.8	0	11	Av	N	52	-41	Pass	
0.158502	-7.4	21.4	0	14	Av	N	55.5	-41.5	Pass	
0.47754	-17.7	20.1	0	2.4	Av	N	46.4	-44	Pass	
0.19233	-11.9	21.1	0	9.3	Av	L	53.9	-44.6	Pass	



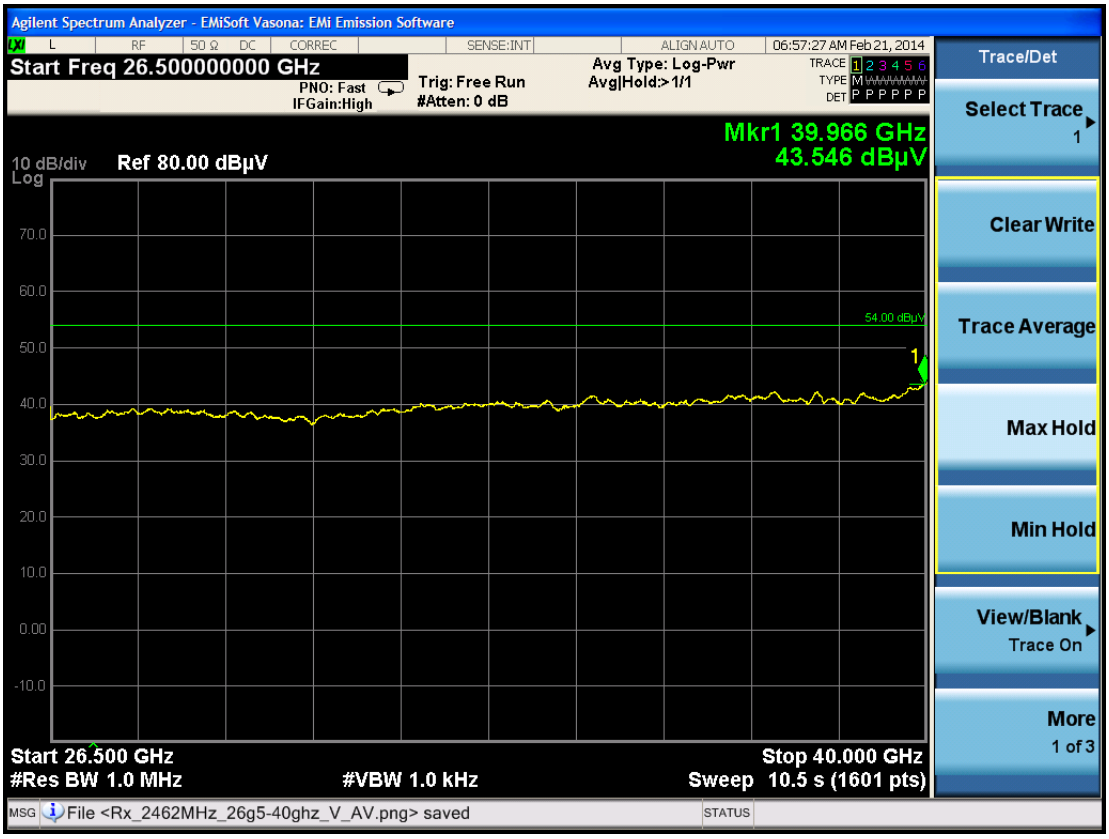
Test Setup for Conducted Emissions

Receiver Radiated Emissions:

1 – 18 GHz Average



1 – 18 GHz Peak


Agilent Spectrum Analyzer - EMiSoft Vasona: EMi Emission Software
Start Freq 26.500000000 GHz
PNO: Fast
IFGain:High
Trig: Free Run
#Atten: 0 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
06:57:27 AM Feb 21, 2014
Mkr1 39.966 GHz
43.546 dBµV
10 dB/div
Log
Ref 80.00 dBµV
54.00 dBµV
Start 26.500 GHz
#Res BW 1.0 MHz
#VBW 1.0 kHz
Stop 40.000 GHz
Sweep 10.5 s (1601 pts)
Trace/Det
Select Trace
1
Clear Write
Trace Average
Max Hold
Min Hold
View/Blank
Trace On
More
1 of 3
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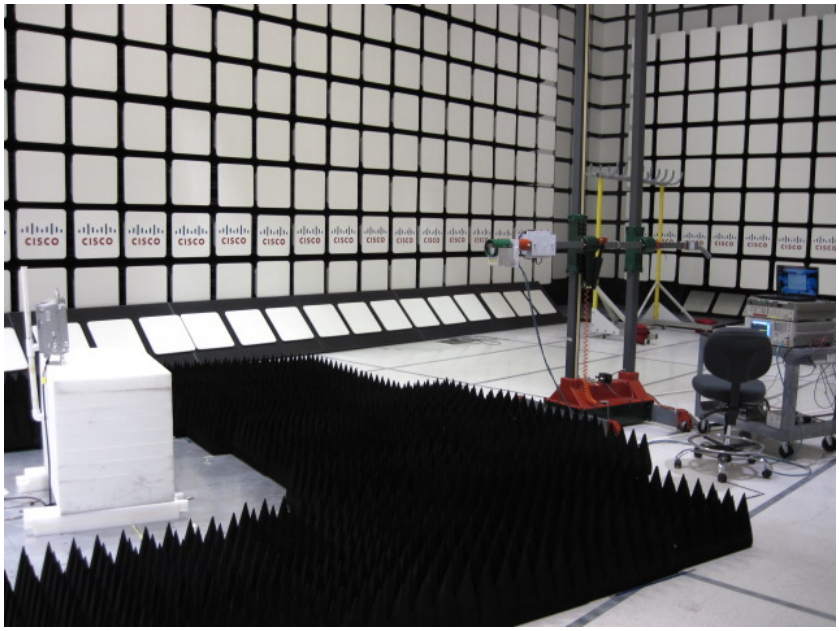

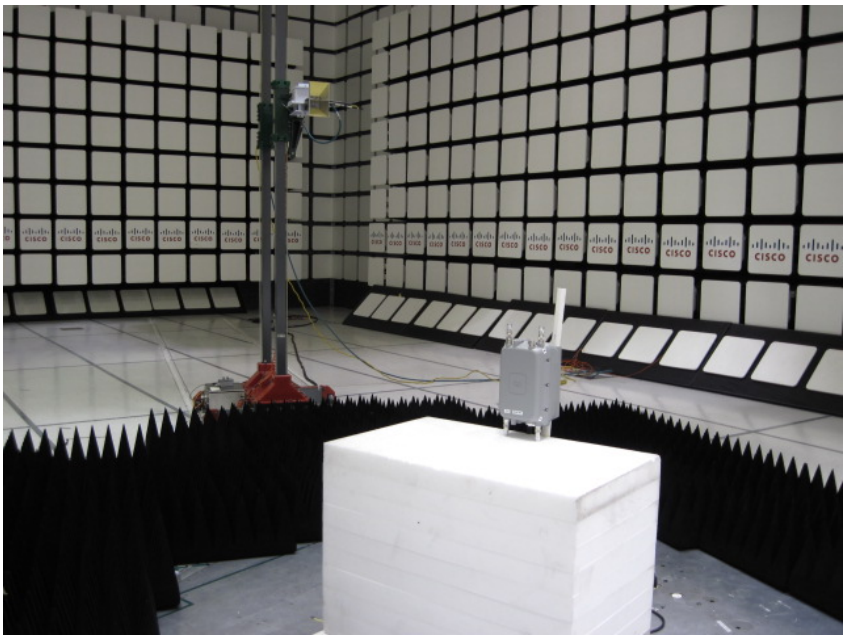

Appendix B: Test Equipment

Equipment No	Manufacturer	Model	Description	Last Cal	Next Cal Due Date
CIS008469	Bird	5-T-MN	50 Ohm, 5W Terminator,Type N	03-JUL-13	03-JUL-14
CIS008496	Fischer Custom Communications	FCC-450B-2.4-N	Instrumentation Limiter	20-MAY-13	20-MAY-14
CIS019206	TTE	H785-150K-50-21378	High Pas Filter,Fo=150kHz	12-SEP-13	12-SEP-14
CIS029960	Fischer Custom Communications	FCC-LISN-50/250-50-2-01	LISN	05-MAR-13	05-MAR-14
CIS029962	Fischer Custom Communications	FCC-LISN-PA-NEMA-5-15	Power Adaptor, Polarized 120VAC	05-MAR-13	05-MAR-14
CIS033456	Suhner	RG-223/U	10ft RG223 cable	22-JAN-14	22-JAN-15
CIS045050	Rohde & Schwarz	ESCI	EMI Test Receiver	28-OCT-13	28-OCT-14
CIS041933	Newport	iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	16-DEC-13	16-DEC-14
CIS-50378	Agilent	N9030A	PXA Spectrum Analyzer	27-FEB-14	17-JAN15