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FCC Part 15, Subpart E, UNII (Part 15.401) Certification Application

Industrie Canada RSS-210 Certification Application

Supplemental “Dual Xmit” Test Report on the Dual Band 802.11 Access Point

FCC ID: RUT1200W
IC: 1737G-1200W

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General Information

Per a request of the FCC, the access point radio was tested for radiated emissions in restricted bands while transmitting on both 2.4 GHz and 5 GHz at simultaneously.

The test was conducted at Elliott Labs in Sunnyvale California, Chamber #5 on 17 May 2004

Test Methods

The access point was tested for out of band radiated emissions with the unit transmitting on 802.11 B, 2437 MHz and 802.11 A on 5290 MHz. These frequencies and power levels were chosen because these frequencies produced the worst case radiated emissions during the radiated emissions in restricted bands test performed previously.

The unit was set to transmit at the same power level as was used in the initial radiated emissions tests and was transmitting at the maximum data rate.

Test Facilities

The certification tests were performed at:

Elliott Labs
684 West Maude Ave
Sunnyvale, CA 94086

General:

Final radiated test measurements were taken in May 2004 at the Elliott Laboratories Chamber #5 in Fremont CA..

The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Commission.

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

Antenna, Antenna Mast and Turntable

The Horn antennas that are use to measure radiated emissions above 1000MHz are amounted on a non-conductive antenna mast equipped with a motor drive to vary the antenna height.

ANSI C63.4 specifies that the test height above the ground plane shall be 80cm unless the equipment is intended to be floor mounted. During the radiated emissions tests the equipment is positioned on a motorized turntable in conformance with the ANSI requirement.

Equipment Lists

Instrument Calibration

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

Elliott Test Equipment

The following test equipment was used to perform the testing

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	09-Jan-05
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	868	20-Apr-06
Hewlett Packard	Microwave EMI test system (SA40, 9kHz - 40GHz) Fremont	84125C	1410	26-Mar-05
Hewlett Packard	EMC Spectrum Analyzer 9KHz-26.5GHz, non programmable	8563E	284	15-Mar-05
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1290	22-Apr-05
Rohde & Schwarz	Peak Power Sensor 100uW - 2 Watts	NRV-Z32	1536	22-Apr-05

Dual Xmit, Radiated Emissions in Restricted bands

Specifications:

FCC Part 15 Paragraph 15.247(c)
 IC Specification: RSS-210

Procedure:

This test was conducted in a 5 meter anechoic chamber at Elliott Laboratories Fremont, California facility. The unit was placed on a rotating wooden table 80cm above the ground plane. A Horn antenna was secured to a mast 3 meters away.

The emissions up to 40 GHz were examined. Those emission falling within a restricted band were evaluated against the “restricted band emission limit” (54 dB μ V / 74 dB μ V).

The UUT was rotated 360 degrees and the height of the antenna adjusted from 1 to 4 meters above the ground plane to determine the maximum level of the emission. The level of the emission was measured in two modes, “Peak” and “Average” using the following measurement bandwidths

Restricted Band Peak Measurements: RBW & VBW: 1 MHz

Restricted Band Average Measurements: RBW:1MHz & VBW:10 Hz.

The spectrum analyzer reading was corrected by the measurement software to take into account the various equipment characteristics (antenna factor, cable loss, pre-amplifier gain, HPF loss...) to obtain a final corrected measurement.

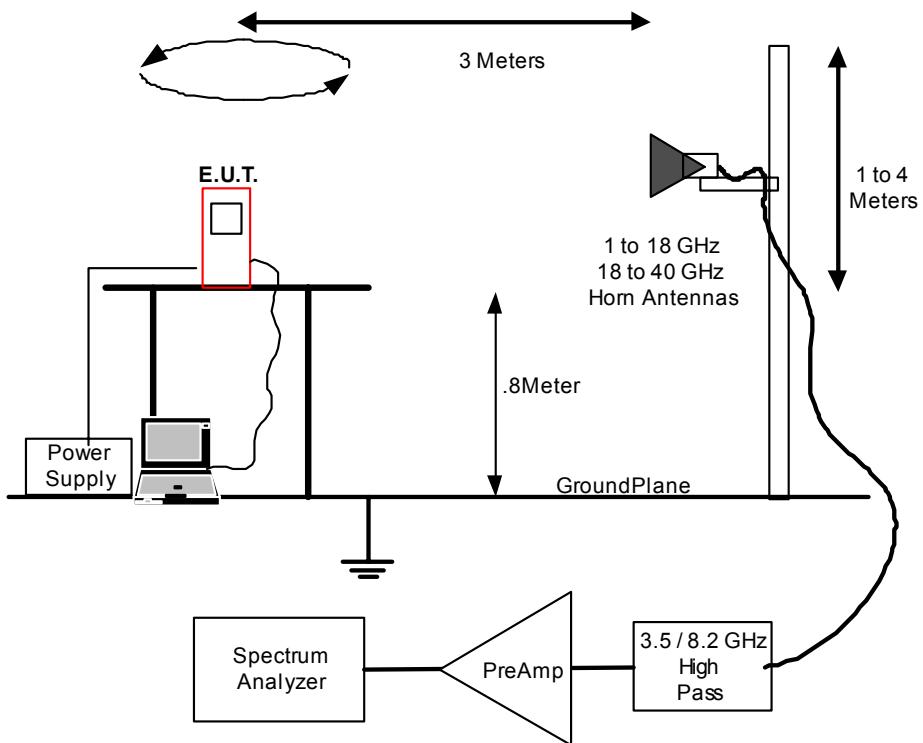
The UUT was configured set to transmit continuous data packets. The UUT was configured to transmit on the channels that produced the worst case radiated emissions for each of the 2.4GHz and 5 GHz 801.11 bands. A high pass filter is required in the test setup to reduce the level of the fundamental signal into the pre-amp. For this test, two filters were used: 3.5 GHz HPF and an 8.2GHz HPF.

While it would be preferable to use the 8.2 GHz HPF to reduce the level of both the 2.4 and 5 GHz fundamental signal levels, this was not possible because the 8.2 GHz filter would reduce the level of the 2^d and 3rd harmonic from the 2.4 GHz signal. Therefore the 3.5 GHz HPF was used to examine the band up to the third harmonic of the 2.4 GHz signal then the filter was replaced with the 8.2GHz HPF and the test continued. While using the 3.5 GHz HPF, measurements were made to ensure that the 5 GHz fundamental was not forcing the pre-amp to operate at or near its compression point.

Dual Xmit Radiated Emissions Test Setup

Support Equipment				
Description	Model number	FCC ID or SN	Mfg	Power Cable
Laptop	Armada E 500	P31000T4X20DC12N2	Compaq	Laptop PS
Test Software	Atheros Radio Test		Atheros	
48VDC AC adapter	Generic		Generic	Std lead DC wire

Test Conditions			
Temperature	Approx 20C	Humidity:	Approx 41%
ATM pressure	Approx 1011 mBar	Grounding:	None
Tested By	Chris Byleckie, David Waitt, Trinh Waitt	Date of Test:	17 May 2004
Test Reference	FCC Part 15.205		
Setup Method	ANSI C63.4		
Tested Range	1 GHz to 40 GHz		
Test Voltage	48 VDC		
Modifications	No modifications were made to the unit		



Dual Xmit Radiated Emissions Test Results

The levels of the detected emissions are below. No emissions other than harmonics of the fundamental signals were detected.

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector	Azimuth degrees	Height meters
			Limit	Margin	Pk/QP/Avg		
7390.29	38.7	H	54.0	-15.3	AVG	304	1.1
7390.29	66.1	H	74.0	-7.9	PK	304	1.1
9848.04	47.0	H	54.0	-7.0	AVG	308	1.0
9848.04	59.8	H	74.0	-14.2	PK	308	1.0
11539.23	49.6	H	54.0	-4.4	AVG	262	1.0
11539.23	61.2	H	74.0	-12.8	PK	262	1.0
12308.86	51.0	H	54.0	-3.0	AVG	269	1.0
12308.86	64.0	H	74.0	-10.0	PK	269	1.0
17299.95	50.0	V	54.0	-4.0	AVG	38	1.0
17299.95	62.4	V	74.0	-11.7	PK	38	1.0

