TEST REPORT

FROM

SIEMIC, INC.
Accessing global markets

For

Intelicis

Enterprise Dual Radio Access Point

Model: CEDAR 860AG

To

47 CFR 15.407:2006

Test Report Serial No.:
SLCN07020101-INT-001(FCC 15E)

This report supersedes None

Remarks: Equipment complied with the specification [X]
Equipment did not comply with the specification [ ]

This Test Report is Issued Under the Authority of:

Snell Leong

.....
Tested by: Snell Leong, Test Engineer

Kerwinn Corpuz

.....
Reviewed by: Kerwinn Corpuz, Lab Manager

Issue date: 20 Febuary 2007
Manufacturer: Intelicis Corporation

Industry Canada
Industrie Canada

MIC

OFTA
電訊管理局

Registration No. 783147 Registration No. 4842 Lab Code: KR0032 RTA No. D23/16V

NVLAP

NVLAP Lab Code: 200729-0

BSMI Code: SL2-IN-E-I30R

This page has been left blank intentionally.

CONTENTS

EXECUTIVE SUMMARY **5**

1 TECHNICAL DETAILS **6**

2 TESTS REQUIRED **7**

3 MEASUREMENTS, EXAMINATIONS AND DERIVED RESULTS **8**

4 TEST INSTRUMENTATION **32**

APPENDIX A: EUT TEST CONDITIONS **33**

APPENDIX B: EXTERNAL PHOTOS **34**

APPENDIX C: CIRCUIT/BLOCK DIAGRAMS **38**

APPENDIX D: INTERNAL PHOTOS **39**

APPENDIX E: TEST SETUP PHOTO **41**

APPENDIX F: PRODUCT DESCRIPTION **43**

APPENDIX G: FCC LABEL LOCATION **44**

APPENDIX H: USER MANUAL **45**

This page has been left blank intentionally.

Executive Summary

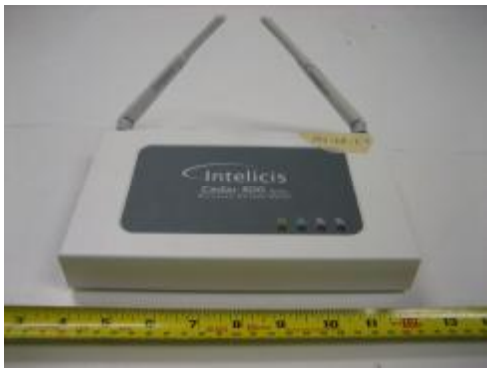
The purpose of this test programme was to demonstrate compliance of the Intelicis Corporation, Enterprise Dual Radio Access Point, model CEDAR 860AG, against the current 47 CFR 15.407:2006. The Enterprise Dual Radio Access Point demonstrated compliance with the 47 CFR 15.407:2006.

The Enterprise Dual Radio Access Point operates in the band of 5.15 – 5.25 GHz with an OFDM modulation technology.

Intelicis Corporation is the applicant and claimed manufacturer of this tested product. For the detailed description of this product, please refer to the Enterprise Dual Radio Access Point User Manual.

The equipment was tested with the following antennas: 2 dBi 2400~2500MHZ
3 dBi 4900~5875MHz
Swivel Omni Directional antenna

The test has demonstrated that this unit complies with stipulated standards.



EUT Sample

1 Technical Details

Purpose	Compliance testing of Enterprise Dual Radio Access Point with 47 CFR 15.407:2006
Applicant / Client	Intelicis Corporation
Manufacturer	Intelicis Corporation
Laboratory performing the tests	SIEMIC Labs 2206 Ringwood Avenue San Jose, CA 95131
Test location(s)	SIEMIC Labs 2206 Ringwood Avenue San Jose, CA 95131
Test report reference number	SLCN07020101-INT-001(FCC 15E)
Date EUT received	09-Feb-2007
Standard applied	47 CFR 15.407:2006
Dates of test (from – to)	15-Feb-2007 to 18-Feb-2007
No of Units:	1
Equipment Category:	DSS
Trade/Product Name:	Intelicis
Type/Model Name/No:	CEDAR 860AG
Technical Variants:	None
FCC ID No.	U3HCEDAR860AG

2 Tests Required

The product was tested in accordance with the following specifications.
The test results recorded in this Test Report are exclusively referred to the tested sample(s).

Test Standard		Description	Pass / Fail
47 CFR Part 15 Subpart E	RSS 210 Issue 6		
15.205	RSS210(A8.5)	Restricted Band of Operation	
15.207	RSSGen(7.2.2)	Conducted Emissions Voltage	
15.209		Radiated Emissions Limits; General Requirements	
15.407(a)(2)	RSS210(A9.2)(2)	Occupied Bandwidth	Pass
15.407(a)(2)	RSS210(A9.2)(2)	Peak Output Power	Pass
15.407(a)(2)	RSS210(A9.2)(2)	Peak Power Spectral Density	Pass
15.407(a)(2)		Power Reduction (antenna gain > 6dBi)	N/A
15.407(a)(6)		Peak Excursion Ratio	Pass
15.407(b)(6)	RSSGen(7.2.2)	AC Conducted Emissions	Pass
15.407(b)(2)	RSS210(A9.3)(2)	Radiated Spurious Emissions > 1GHz	Pass
15.407(b)(6)	RSS210(A9.3)(2)	Radiated Spurious Emissions < 1GHz	Pass
15.407(f)	RSSGen(5.5)	RF Exposure	Pass
15.407(g)	RSS210(A9.5)(e)	Frequency Stability	Pass
	RSS210(A9.5)(g)	User Manual	Pass
ANSI C63.4: 2003			

Notes: Deviations to above standards are outlined in specific test sections if applicable.
Cable loss and external attenuation are compensated for in the measurement system when applicable.

3 Measurements, Examinations and Derived Results

3.1 General observations

Equipment serial number(s)		
Module:	Part number:	Serial number:
Enterprise Dual Radio Access Point	N/A	CD860AG-04-06-01383

3.2 Test Results

3.2.1 AC Conducted Emissions Voltage

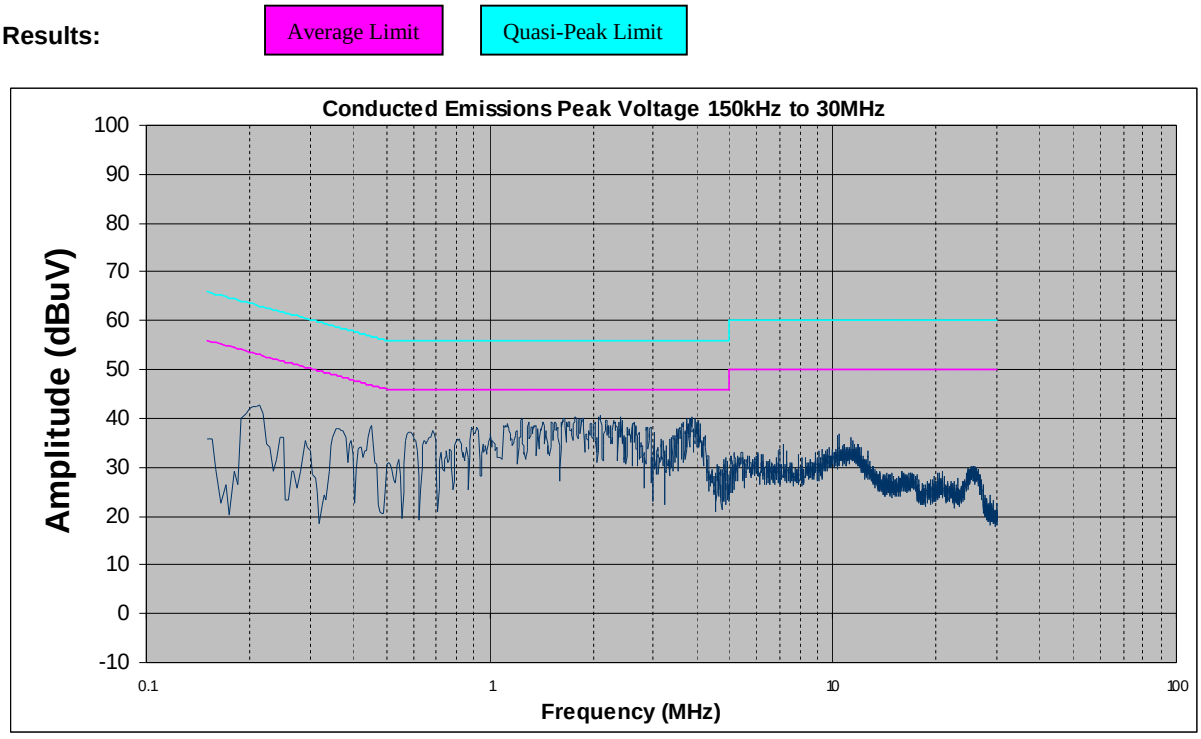
Requirement(s): 47 CFR §15.407(b)(6)/15.207

Procedures: The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. All other supporting equipment were powered separately from another mains.

The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was set to frequency hopping mode. A scan was made on the NEUTRAL line over the required frequency range using an EMI test receiver. High peaks, relative to the limit line, were then selected. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth set to 10 kHz. Quasi-peak and Average measurements were made when necessary with the receiver RES BW set to 100 kHz. The procedure was then repeated for the PHASE line.

Preliminary test were made to transmit and standby mode with the worse case (transmit mode) reported.

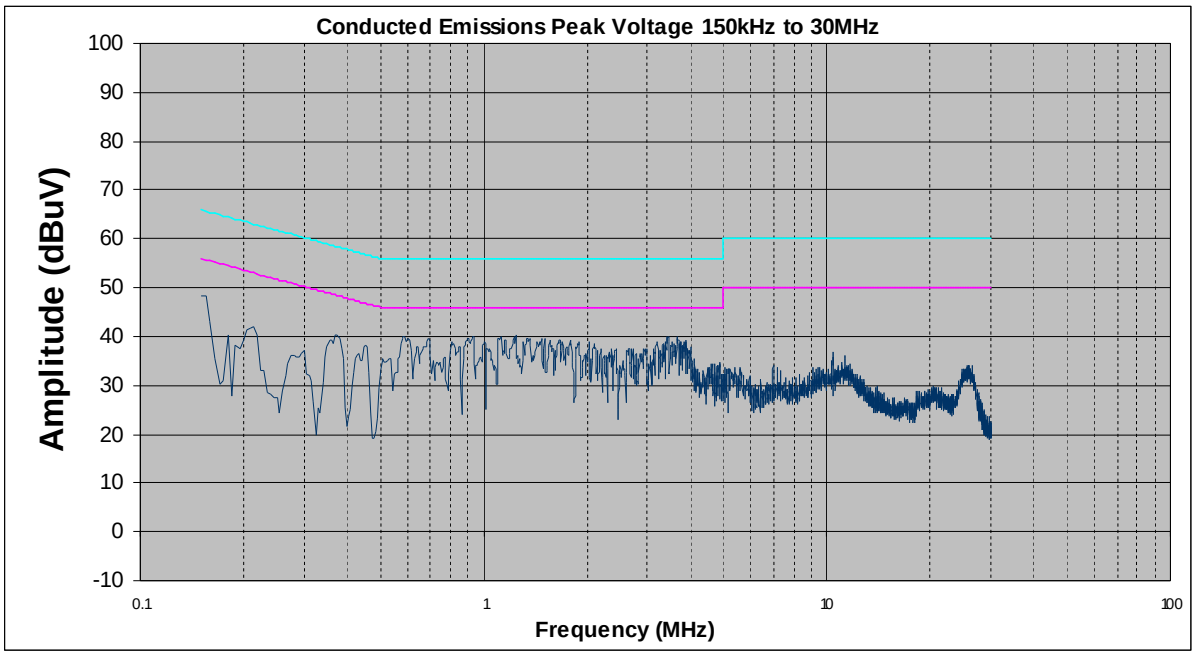
Results:



Phase Line at 120Vac, 60Hz

Line Under Test	Freq. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
Neutral	0.22	42.60	62.82	-20.22	35.50	52.82	-17.32
Neutral	0.46	38.50	56.69	-18.19	33.10	46.69	-13.59
Neutral	1.82	30.30	56.00	-25.70	27.60	46.00	-18.40
Neutral	3.88	39.90	56.00	-16.10	34.40	46.00	-11.60

Neutral	1.25	38.90	56.00	-17.10	33.50	46.00	-12.50



Neutral Line at 120Vac, 60Hz

Line Under Test	Freq. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
Line	0.22	43.1	62.82	-19.72	35.60	52.82	-17.22
Line	0.46	39.9	56.69	-16.79	35.60	46.69	-11.09
Line	1.82	41.2	56.00	-14.80	34.10	46.00	-11.90
Line	3.88	42.1	56.00	-13.90	35.40	46.00	-10.60
Line	1.25	42.6	56.00	-13.40	33.70	46.00	-12.30

Tested By: Snell Leong

Date Tested: 18 February 2007

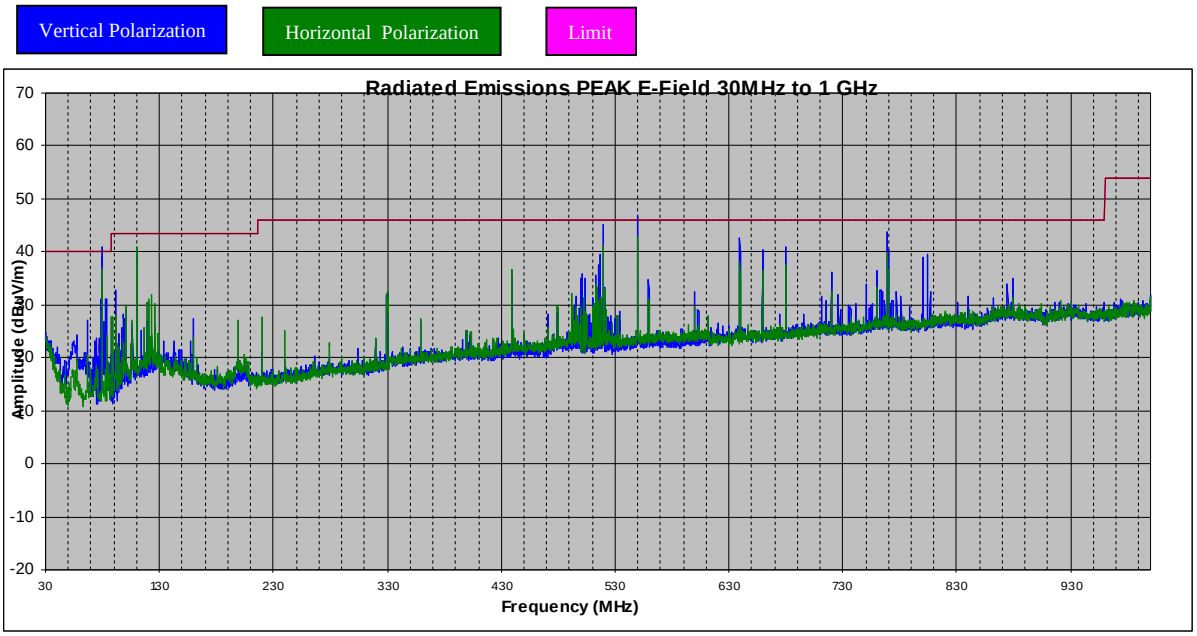
3.2.2 Radiated Spurious Emissions (< 1 GHz)

Requirement(s): 47 CFR §15.407(b)(6)/15.209

Procedures: Radiated emissions were measured according to ANSI C63.4. Equipment was tested at low, mid and hi channel with different channel bandwidth and reported the worse case.

Sample Calculation: Corrected Amplitude = Raw Amplitude + Antenna Factor + Cable Loss

Results:



Radiated Emissions Plot

Frequency	Azimuth	Measure	Antenna Polarity	Antenna Height	Raw Amplitude @ 3m	ACF	CBL loss	Corrected Amplitude @ 3m	Limit @3m	Delta
(MHz)	(degrees)	(Avg/QP)	(H/V)	(m)	(dBuV/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)
520.00	180	QP	H	1	24.00	18.2	1.8	44	46	-2.00
520.00	200	QP	V	1	25.90	17.8	1.8	45.5	46	**-0.50**
550.00	0	QP	H	2	24.80	18.6	1.8	45.2	46	**-0.80**
550.00	0	QP	V	1	25.30	18.2	1.8	45.3	46	**-0.70**
640.00	180	QP	H	2	18.10	19.6	1.9	39.6	46	-6.40
640.00	0	QP	V	1	22.00	19.5	1.9	43.4	46	-2.60
770.00	270	QP	H	1	21.40	20.9	2	44.3	46	**-1.70**
770.00	0	QP	V	1	21.60	20.8	2	44.4	46	**-1.60**
80.00	0	QP	H	1	28.50	8.2	0.7	37.4	40	-2.60
80.00	270	QP	V	1	31.50	7	0.7	39.2	40	**-0.80**

Radiated Emissions Data

3.2.3 Radiated Spurious Emissions (> 1 GHz)

Requirement(s): 47 CFR §15.407(b)(2)

Procedures: Equipment was setup in a semi-anechoic chamber. For measurements above 1 GHz an average measurement was taken with a 1MHz resolution bandwidth and a 10Hz video bandwidth was used. The EUT was tested at low, mid and high with the highest output power. Emissions were investigated up to 40 GHz.

- 27 dBm = 68.2 dBµV/m at 3 meter distance.

Sample Calculation: EUT Field Strength = Raw Amplitude – Amplifier Gain + Antenna Factor + Cable Loss + Filter Attenuation (if used)

Results:

f_o = 5.180 GHz (Low Channel)

Frequency (GHz)	Azimuth (Degrees)	Antenna Polarity (H/V)	Height (m)	Raw Amp. @ 3m (dBuV)	Pre Amp. (dB)	Ant.Corr. Factor (dB)	Cable Loss (dB)	EUT Final Field Strength (dBuV/m)	Limit @ 3m (dBuV/m)	Delta (dBuV/m)	Detector (pk/avg)
10.36	0	H	1.3	43.2	32.84	40.67	5.72	47.20	68.2	-11.45	pk
10.36	90	V	1	45.3	32.84	40.67	5.72	49.30	68.2	-9.35	pk

Note: Emissions after 2nd harmonic measured noise floor.

f_o = 5.200 GHz (Mid Channel)

Frequency (GHz)	Azimuth (Degrees)	Antenna Polarity (H/V)	Height (m)	Raw Amp. @ 3m (dBuV)	Pre Amp. (dB)	Ant.Corr. Factor (dB)	Cable Loss (dB)	EUT Final Field Strength (dBuV/m)	Limit @ 3m (dBuV/m)	Delta (dBuV/m)	Detector (pk/avg)
10.4	0	H	1.3	43.5	32.84	40.67	5.73	47.53	68.2	-11.14	pk
10.4	90	V	1	44.3	32.84	40.67	5.73	48.33	68.2	-10.34	pk

Note: Emissions after 3rd harmonic measured noise floor.

f_o = 5.220 GHz (Mid Channel)

Frequency (GHz)	Azimuth (Degrees)	Antenna Polarity (H/V)	Height (m)	Raw Amp. @ 3m (dBuV)	Pre Amp. (dB)	Ant.Corr. Factor (dB)	Cable Loss (dB)	EUT Final Field Strength (dBuV/m)	Limit @ 3m (dBuV/m)	Delta (dBuV/m)	Detector (pk/avg)
10.44	0	H	1.3	42.3	32.83	40.68	5.75	46.36	68.2	-12.3	pk
10.44	90	V	1	44.1	32.83	40.68	5.75	48.16	68.2	-10.5	pk

Note: Emissions after 3rd harmonic measured noise floor.

Tested By : Snell Leong
Test Date : Feb-18-2007

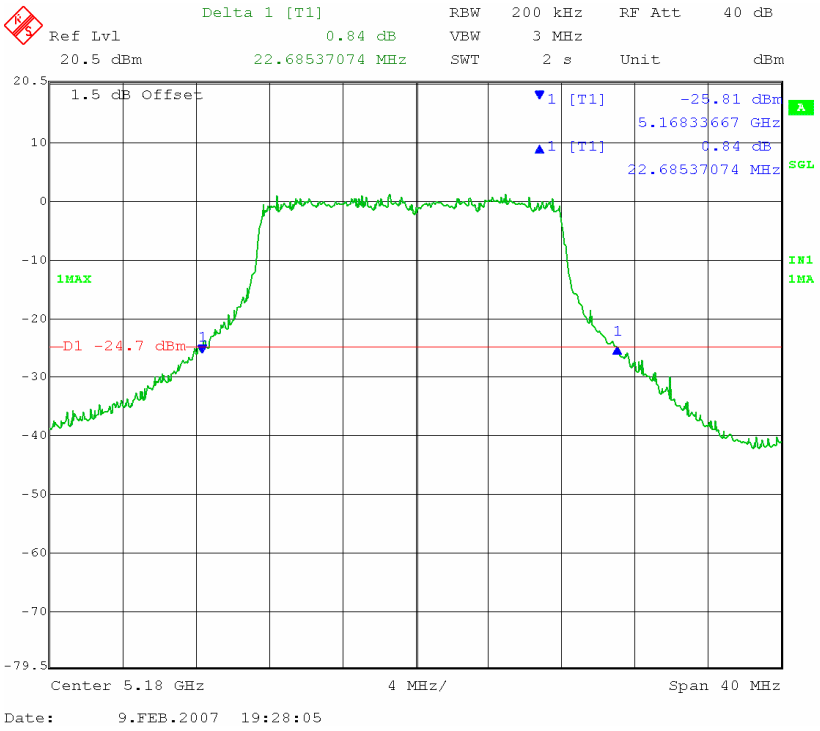
3.2.4 Occupied Bandwidth

Requirement(s): 47 CFR §15.407(a)(2)

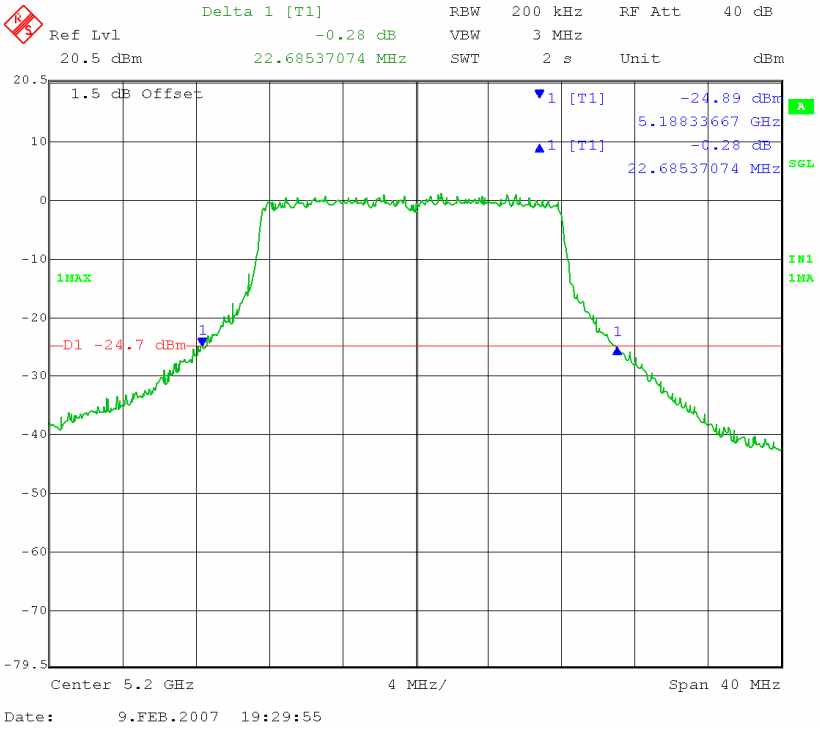
Procedures: The 26dB and 99% bandwidths were measured at the antenna terminal using a spectrum analyzer. 26 dB BW spectrum analyzer setting: RBW = approximately 1% of the emission BW and VBW = approximately 3 times RBW.

Results:

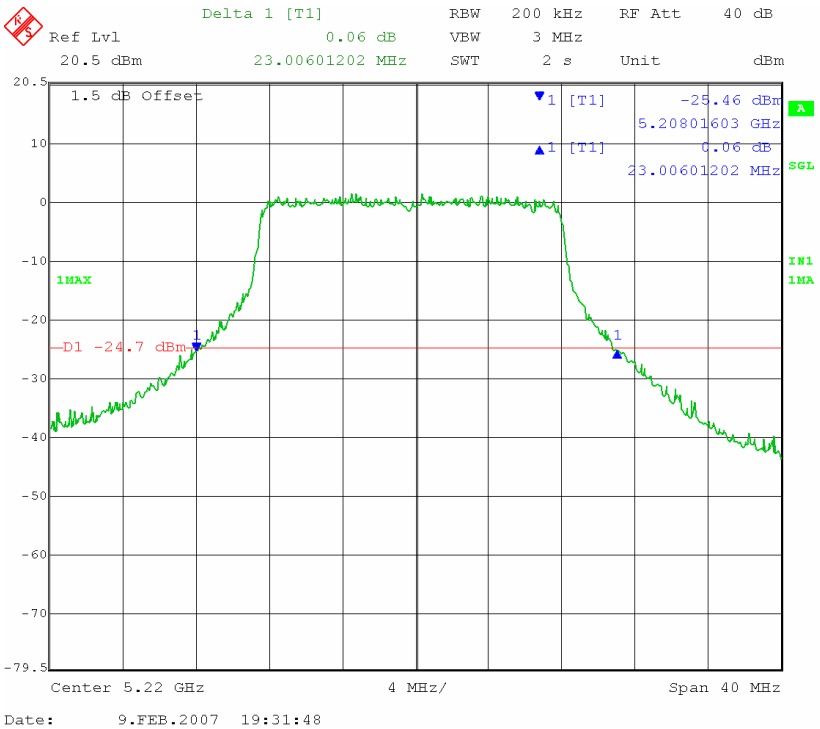
Plot #	Frequency (MHz)	Channel	Measured Bandwidth (MHz)	Emission Bandwidth
1	5180	Low	22.7	26 dB
2	5200	Mid	22.7	26 dB
3	5220	Hi	23.0	26 dB



802.11a Low Channel 26dB Bandwidth



802.11a Middle Channel 26dB Bandwidth



802.11a High Channel 26dB Bandwidth

Tested By : Snell Leong

Test Date: Feb-09-2007

3.2.5 Peak Output Power

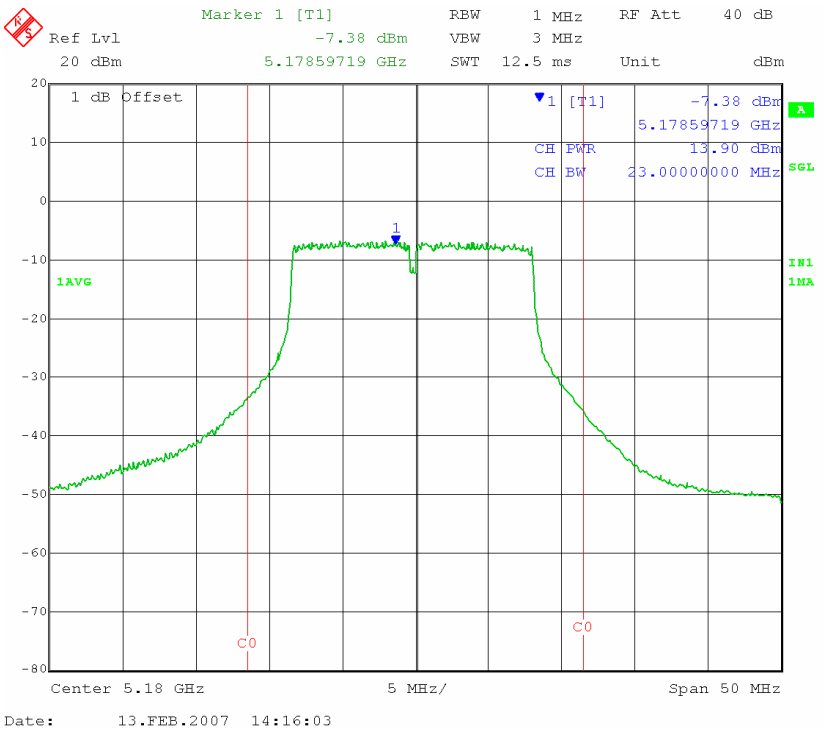
Requirement(s): 47 CFR §15.407(a)(2)

Procedures: The peak output power was measured at the antenna terminal using Acceptable Procedures: Peak conducted transmit output power outlined in FCC DA 02-2138 Appendix A. 100KHz VBW was determined, where T = ∞ µsec.

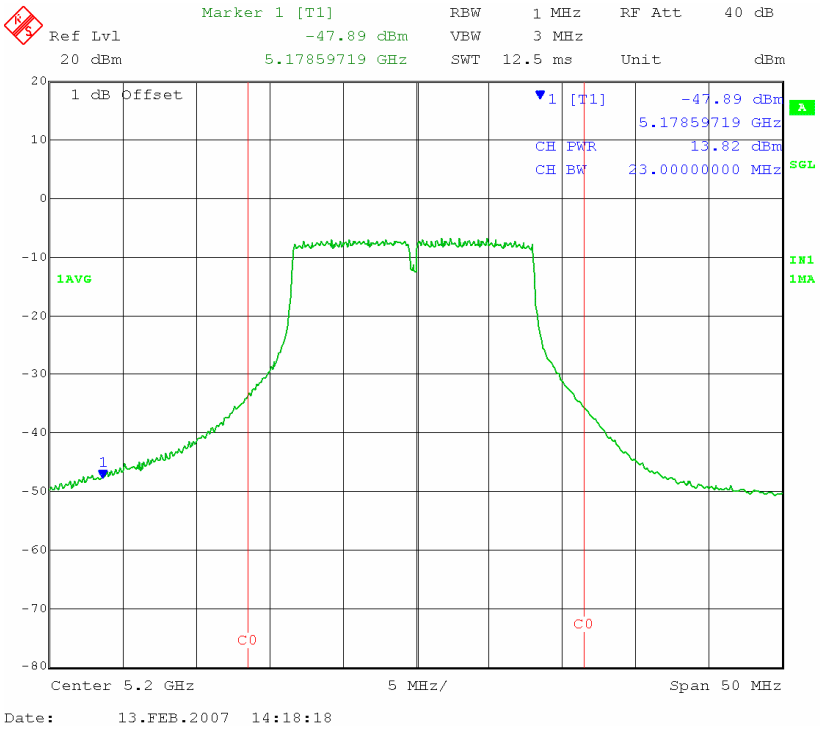
Conducted Peak Power Limit is 50mW (17 dBm).

Results:

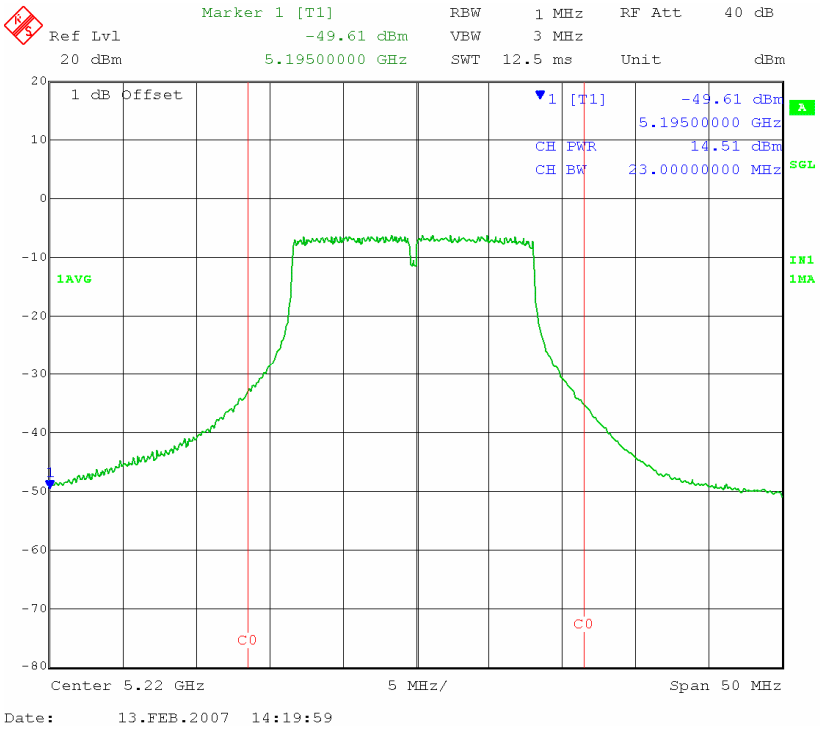
Plot #	Frequency (MHz)	Channel	Measured Peak Power (dBm)	Peak Limit (dBm)
1	5180	Low	13.9	17
2	5200	Mid	13.8	17
3	5220	Hi	14.5	17



802.11a Low Channel Output Power



802.11a Middle Channel Output Power



802.11a High Channel Output Power

Tested By: Snell Leong
Test Date : Feb-13-2007

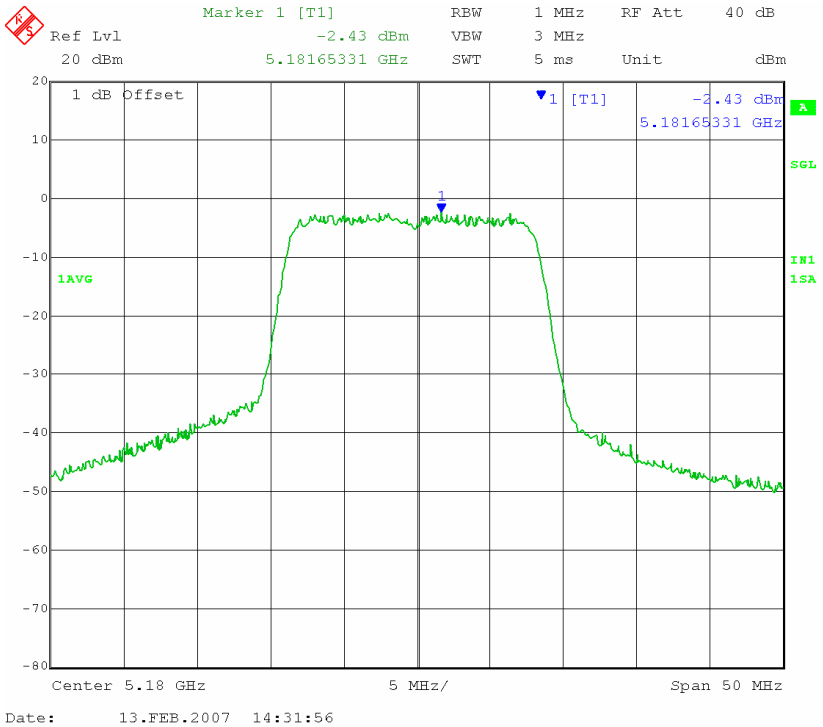
3.2.6 Peak Power Spectral Density

Requirement(s): 47 CFR §15.407(a)(2)

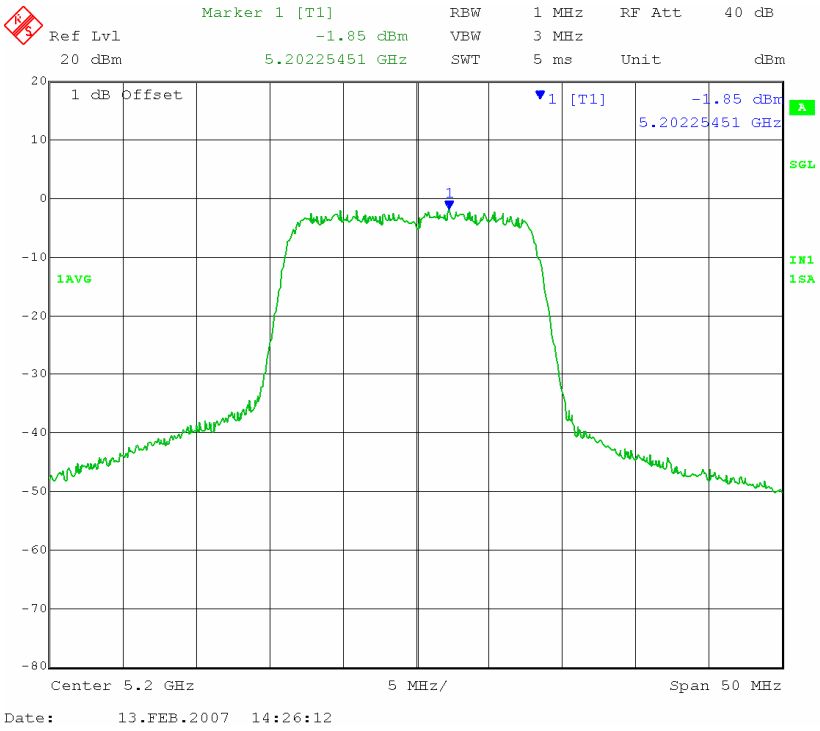
Procedures: The peak power spectral density measured at the antenna terminal using a spectrum analyzer. RBW=1MHz, VBW=3MHz, sample Detector with power averaging. Peak power spectral density limit is 4 dBm in any 1 MHz band.

Results:

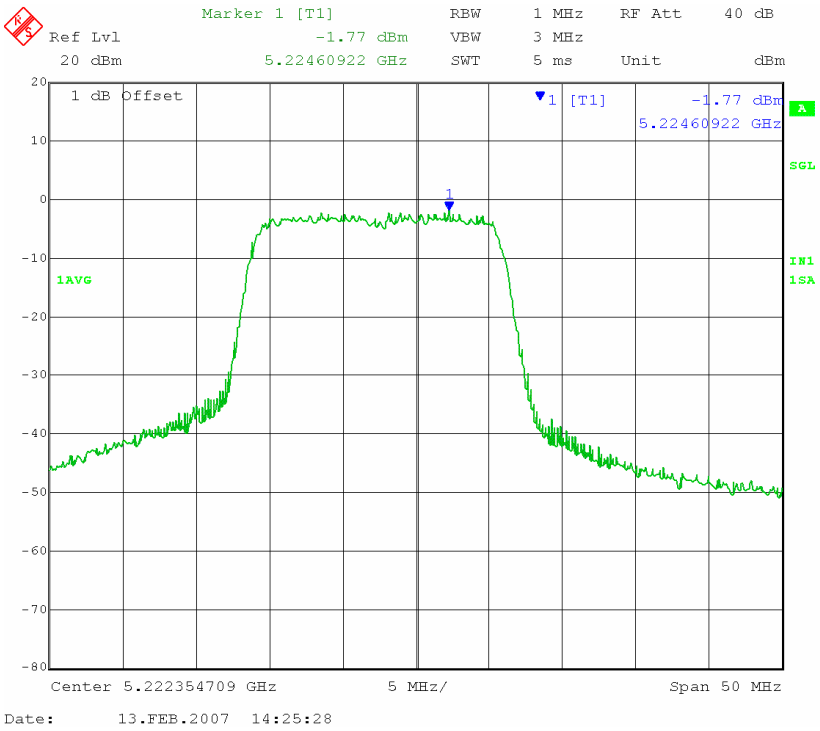
Plot #	Frequency (MHz)	Channel	Measured PPSD (dBm)	PPSD Limit (dBm)
1	5180	Low	-2.43	4
2	5200	Mid	-1.83	4
3	5220	Hi	-1.77	4



802.11a Low Channel Peak Spectral Density



802.11a Middle Channel Peak Spectral Density



802.11a High Channel Peak Spectral Density

Tested By: Snell Leong
Test Date : Feb-13-2007

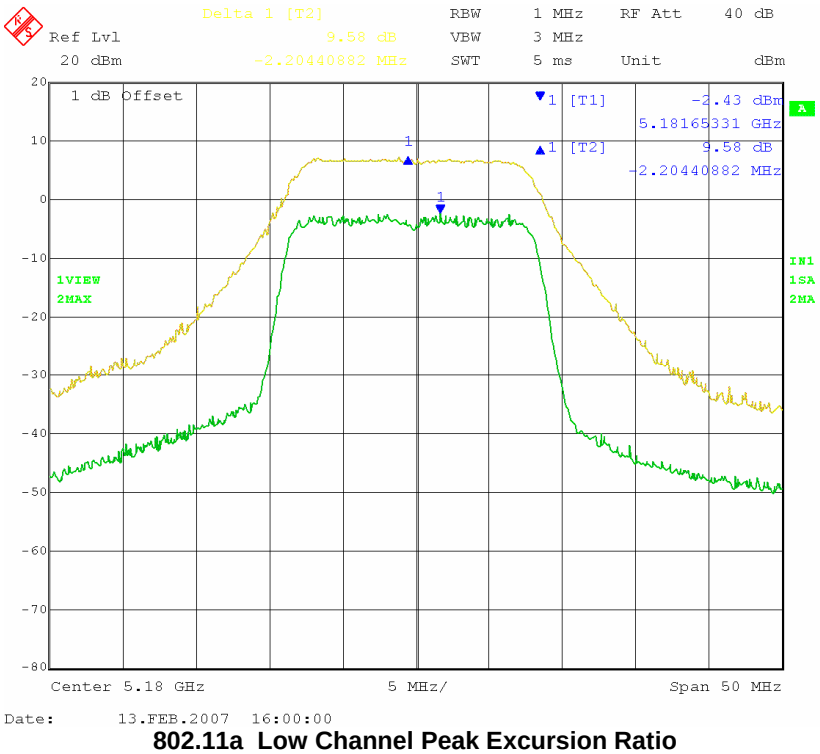
3.2.7 Peak Excursion Ratio

Requirement(s): 47 CFR §15.407(a)(6)

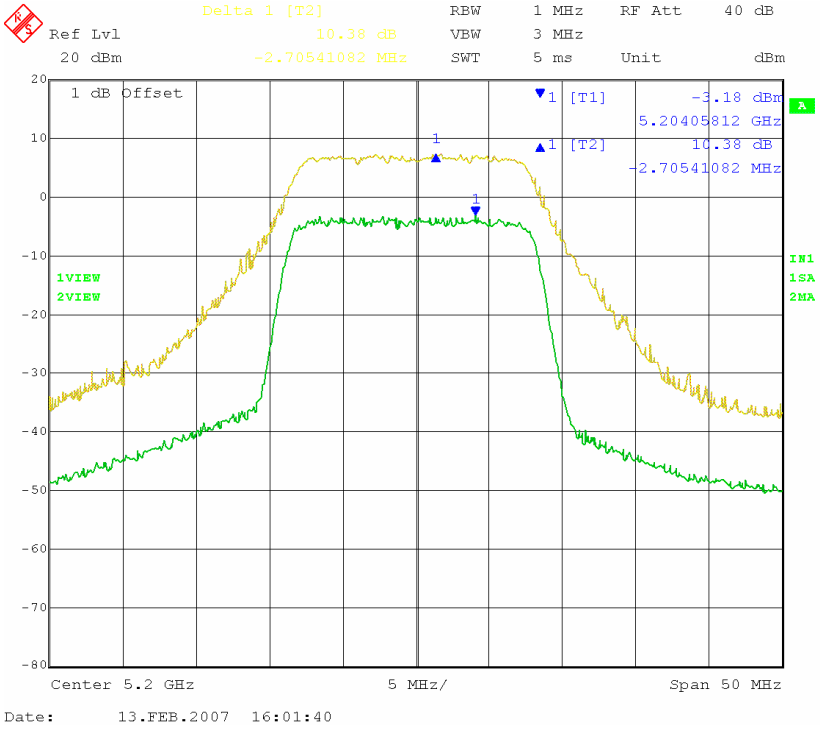
Procedures: The peak excursion ratio was measured at the antenna terminal using a spectrum analyzer. Trace A setting: RBW = VBW = 1 MHz (peak detector). Trace B setting: RBW = 1 MHz and VBW = 1MHz (sample detector).

Results:

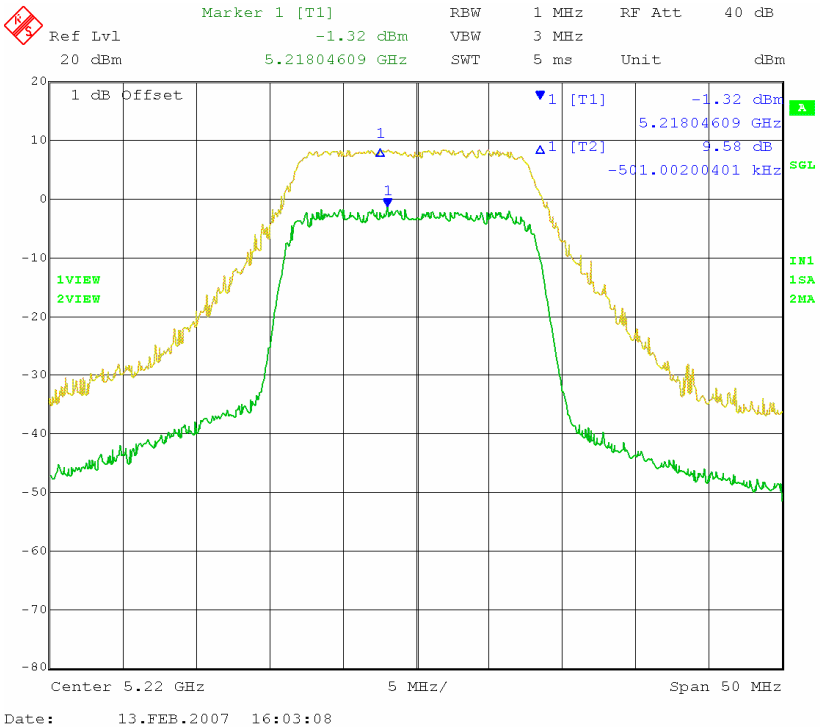
Plot #	Frequency (MHz)	Channel	Measured Peak Excursion (dB)	PE Limit (dB)
1	5180	Low	9.6	13
2	5200	Mid	10.4	13
3	5220	Hi	9.4	13



802.11a Low Channel Peak Excursion Ratio



802.11a Middle Channel Peak Excursion Ratio



802.11a High Channel Peak Excursion Ratio

Tested By : Snell Leong

Test Date : Feb-13-2007

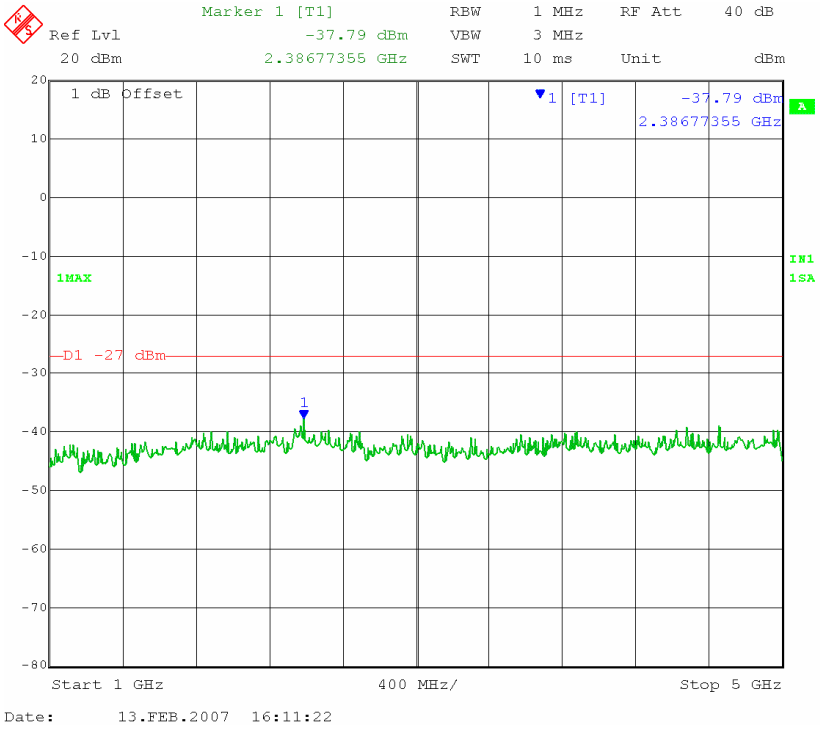
3.2.8 Spurious Emissions at Antenna Terminals

Requirement(s): 47 CFR §15.407(b)(2)

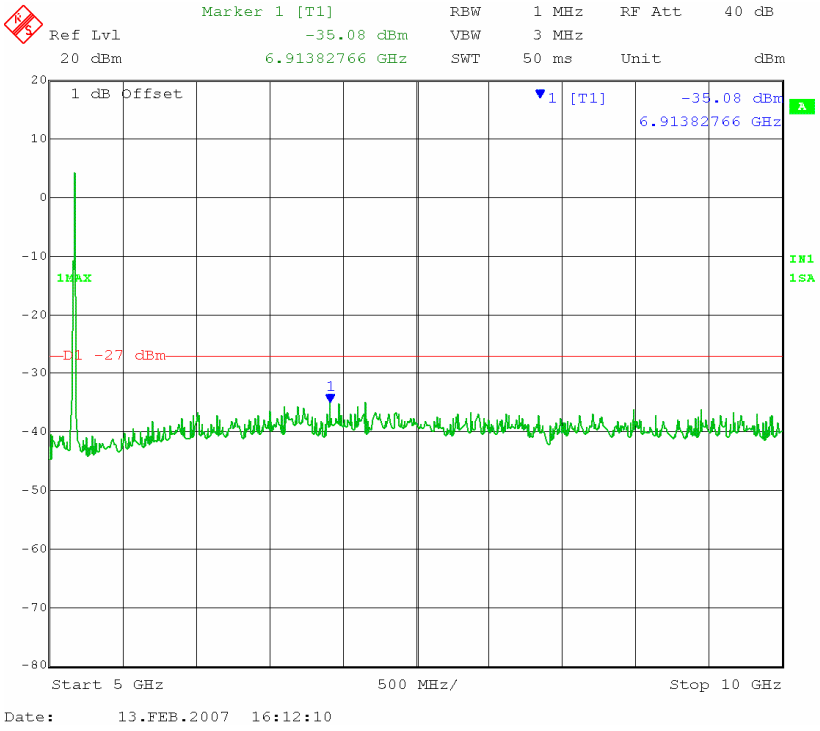
Procedures: The spurious emissions was measured at the antenna terminal using a spectrum analyzer. bandwidths at hi, mid, and low channels with the highest output power.

Out of Band Emission Limit: -27 dBm / MHz (EIRP)

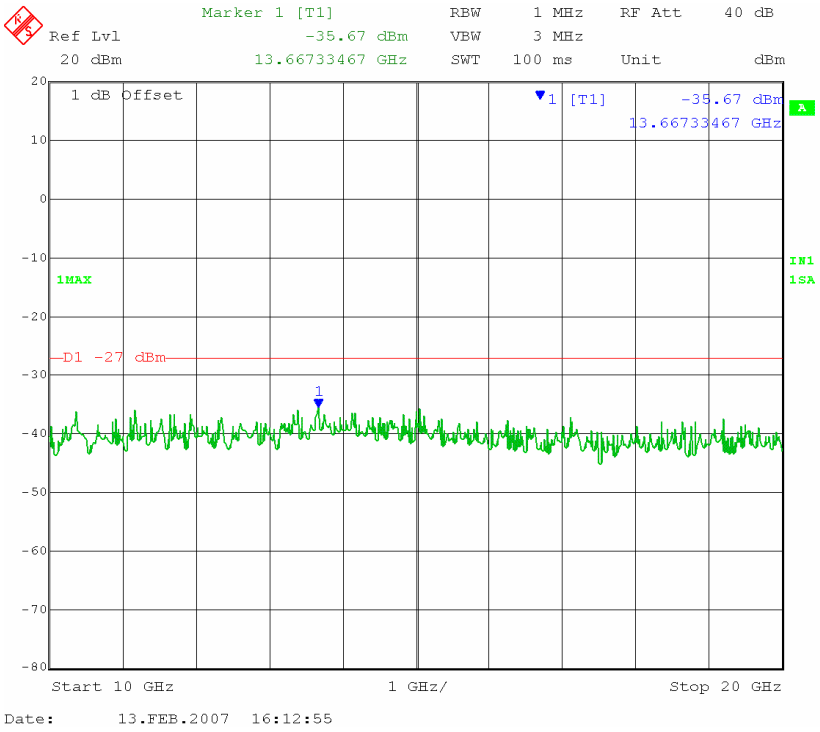
Results:



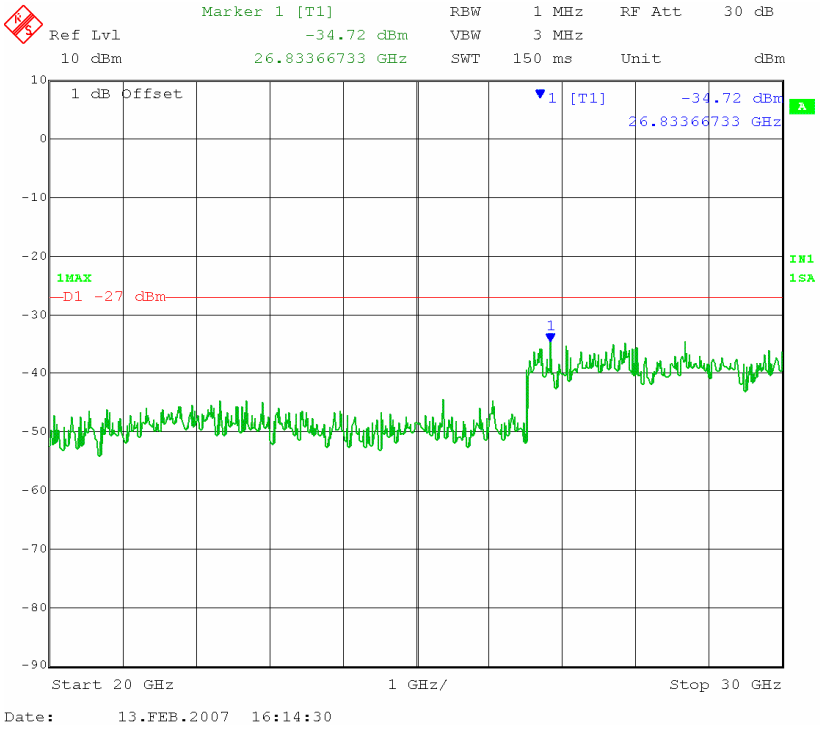
802.11a Low Channel Conducted Spurious Emissions (1 of 5)



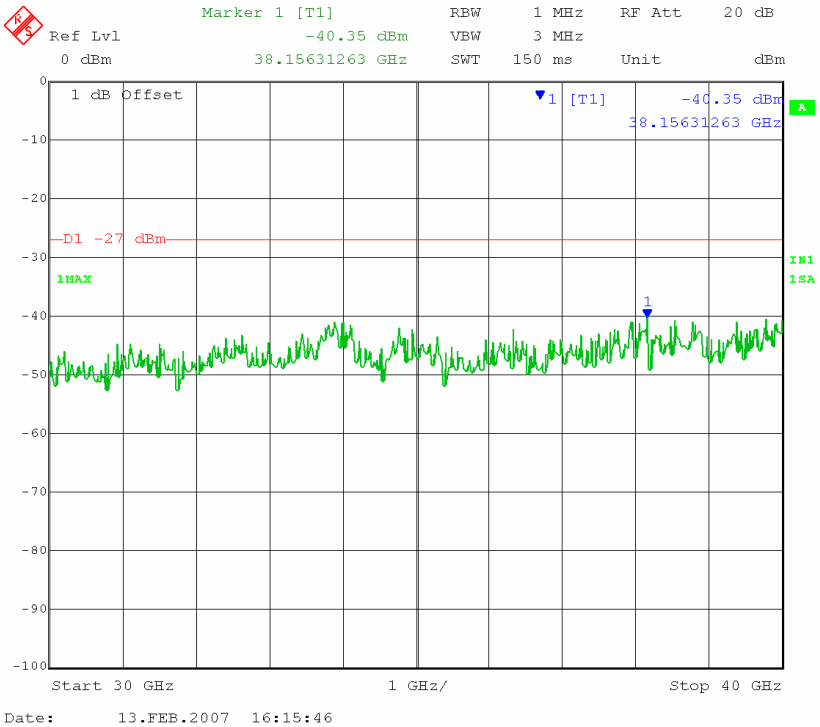
802.11a Low Channel Conducted Spurious Emissions (2 of 5)
Note: Emission above the limit is the fundamental



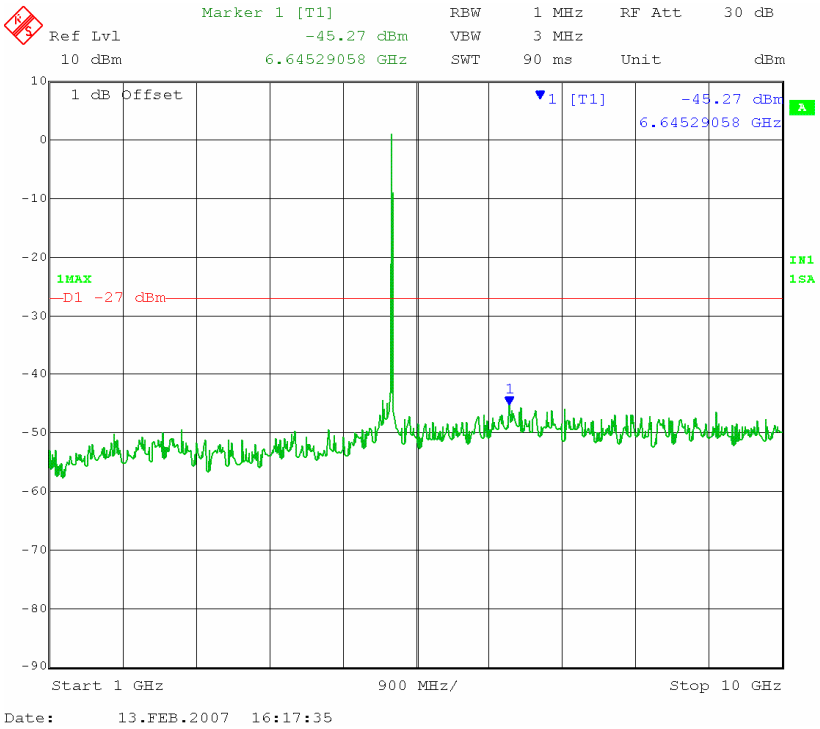
802.11a Low Channel Conducted Spurious Emissions (3 of 5)



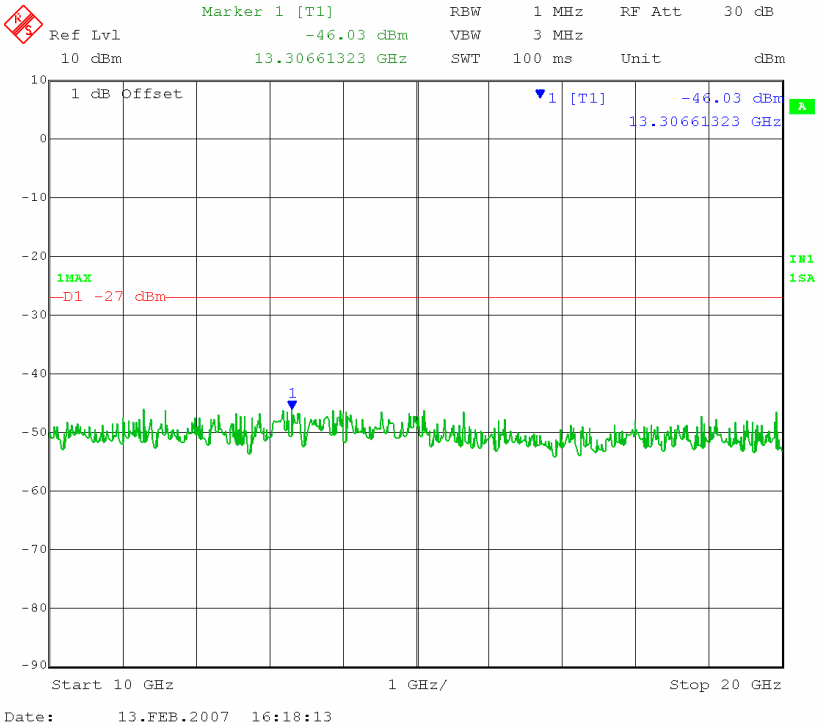
802.11a Low Channel Conducted Spurious Emissions (4 of 5)



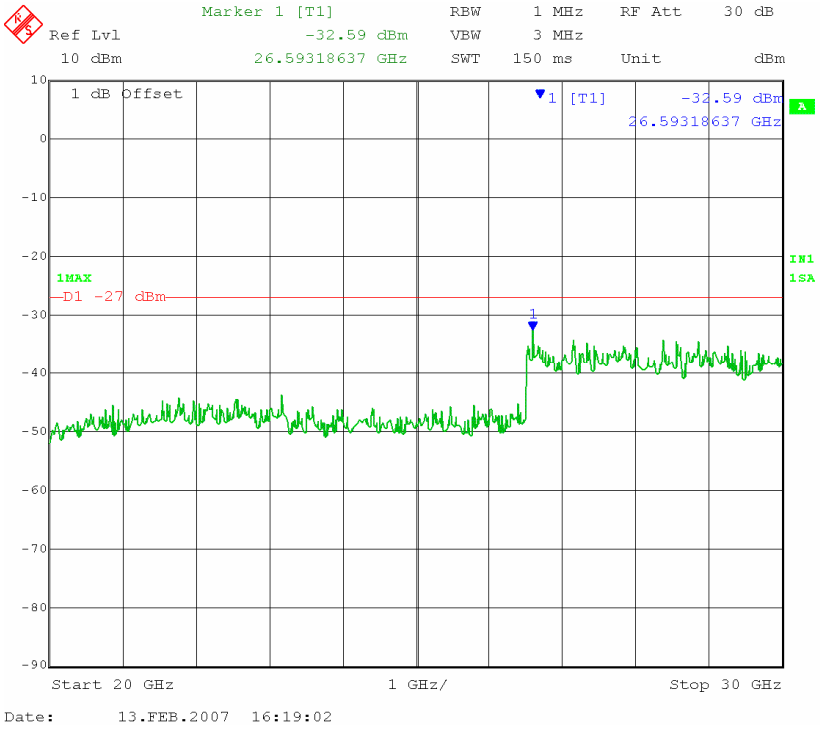
802.11a Low Channel Conducted Spurious Emissions (5 of 5)



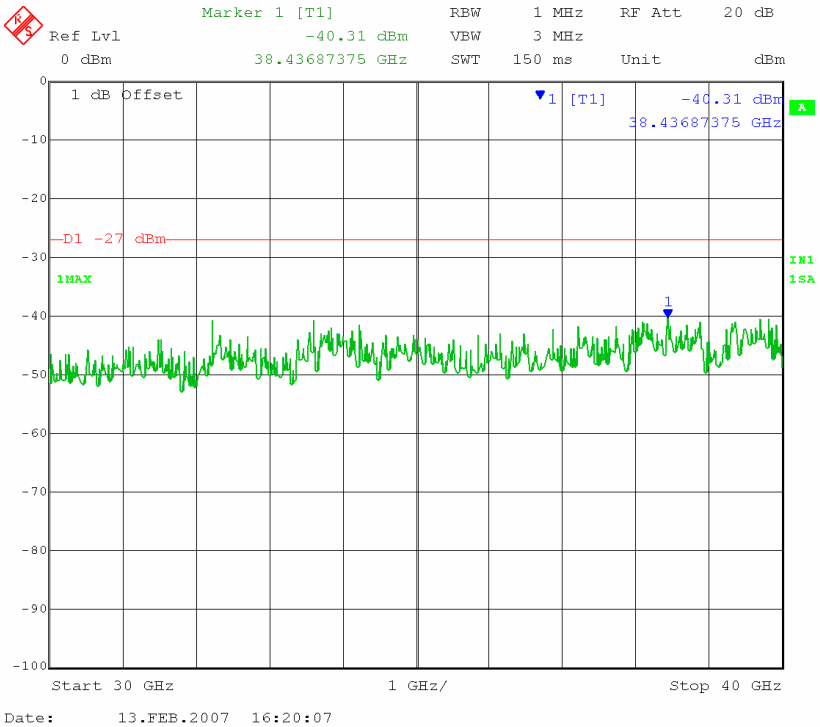
802.11a High Channel Conducted Spurious Emissions (1 of 4)
Note: Emission above the limit is the fundamental



802.11a High Channel Conducted Spurious Emissions (2 of 4)



802.11a High Channel Conducted Spurious Emissions (3 of 4)



802.11a High Channel Conducted Spurious Emissions (4 of 4)

Tested By : Snell Leong
Test Date: Feb-13-2007

3.2.9 Spurious Emission and Bandedges

Requirement(s): 47 CFR §15.205

Procedures: The restricted bandedges were measured radiated emission using a spectrum analyzer. The measurements were made for the

Peak measurement spectrum analyzer setting: RBW = VBW = 1MHz.

Average measurement spectrum analyzer setting: RBW = 1MHz and VBW = 10Hz.

Results:

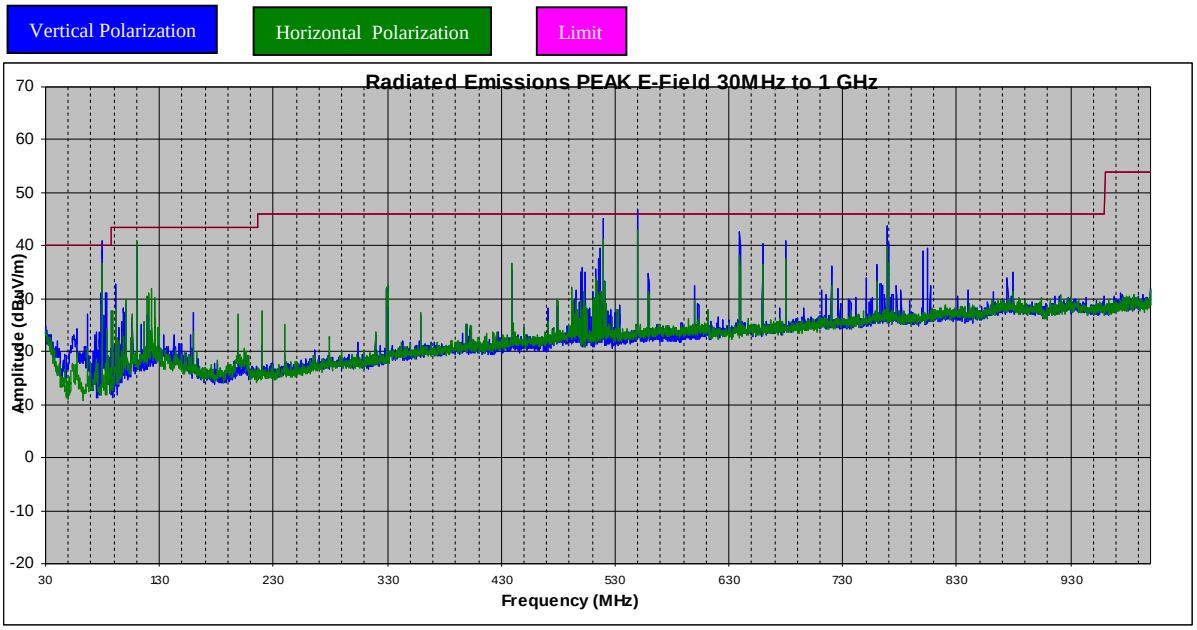
(a) Radiated Spurious Emission < 1 Ghz

Procedures: Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power. The EUT was set to transmit at mid channel. Note that setting the channel other than mid, the spurious emissions are the same.

The limit is converted from microvolts/meter to decibel microvolts/meter.

Sample Calculation: Corrected Amplitude = Raw Amplitude(dBµV/m) + ACF(dB) + Cable Loss(dB)

Results:

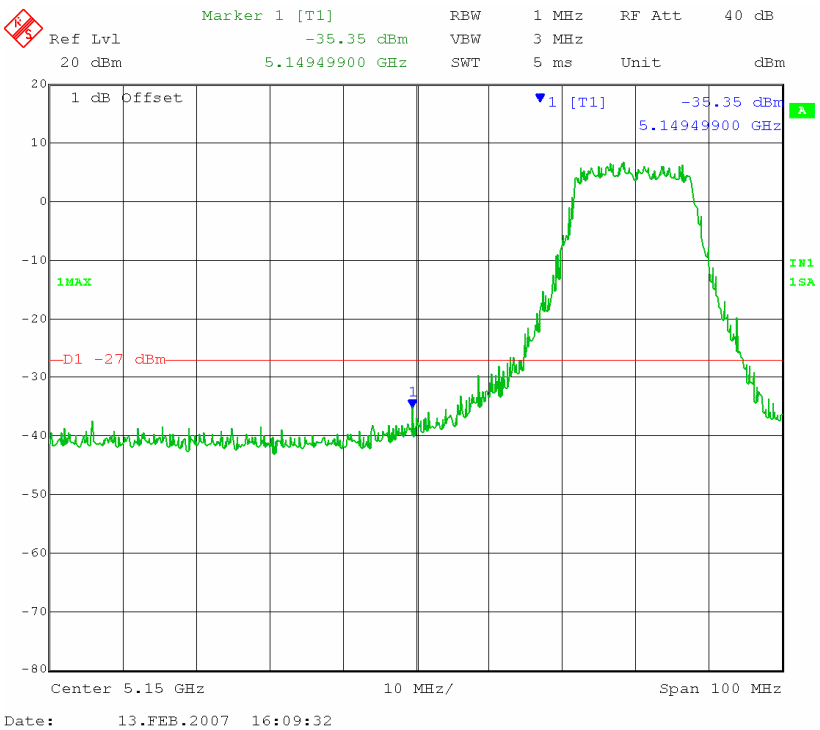


Radiated Emission Plot (Transmit Mode)

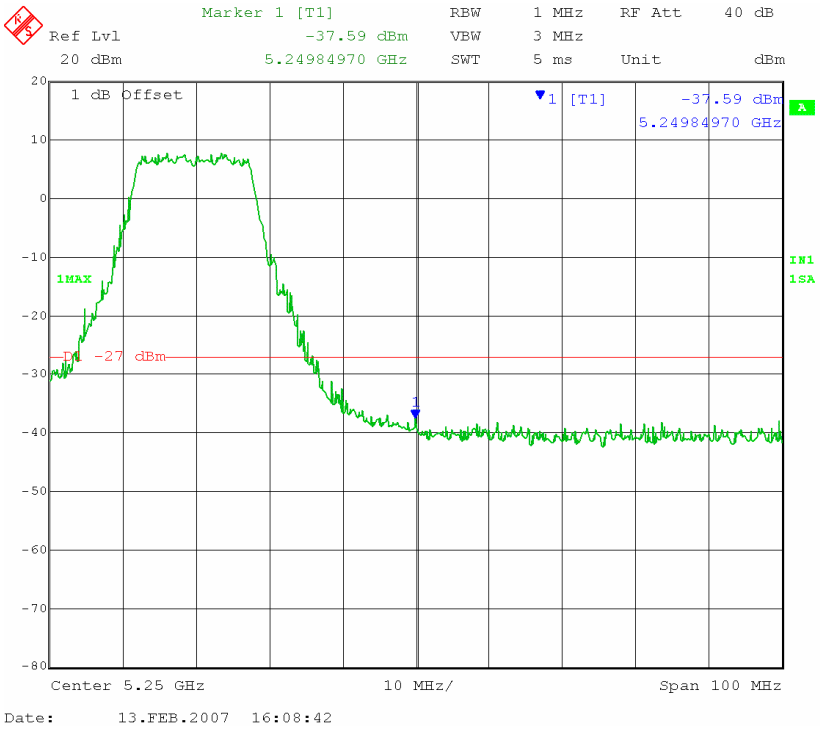
Radiated Emissions Data (Transmit Mode)

Frequency	Azimuth	Measure	Antenna Polarity	Antenna Height	Raw Amplitude @ 3m	ACF	CBL loss	Corrected Amplitude @ 3m	Limit @3m	Delta
(MHz)	(degrees)	(Avg/QP)	(H/V)	(m)	(dBuV/m)	(dBm)	(dBm)	(dBuV/m)	(dBuV/m)	(dBuV/m)
520.00	180	QP	H	1	24.00	18.2	1.8	44	46	-2.00
520.00	200	QP	V	1	25.90	17.8	1.8	45.5	46	-0.50
550.00	0	QP	H	2	24.80	18.6	1.8	45.2	46	-0.80
550.00	0	QP	V	1	25.30	18.2	1.8	45.3	46	-0.70
640.00	180	QP	H	2	18.10	19.6	1.9	39.6	46	-6.40
640.00	0	QP	V	1	22.00	19.5	1.9	43.4	46	-2.60
770.00	270	QP	H	1	21.40	20.9	2	44.3	46	-1.70
770.00	0	QP	V	1	21.60	20.8	2	44.4	46	-1.60
80.00	0	QP	H	1	28.50	8.2	0.7	37.4	40	-2.60
80.00	270	QP	V	1	31.50	7	0.7	39.2	40	-0.80

(b) Bandedge



Bandedge – Lower edge



Bandedge – Upper edge

Tested By: Snell Leong

Date Tested: Feb-18- 2007

4 TEST INSTRUMENTATION

4.1 TEST INSTRUMENTATION

Instrument	Manufacturer	Model	CAL Due Date
Spectrum Analyzer	HP	8568B	04/26/2007
Quasi-Peak Adapter	HP	85650A	04/26/2007
RF Pre-Selector	HP	85685A	04/26/2007
Spectrum Analyzer	HP	8564E	05/01/2007
EMI Receiver	Rohde & Schwarz	ESIB 40	02/07/2008
Power Meter	HP	437B	04/26/2007
Power Sensor	HP	8485A	04/26/2007
Antenna	Emco	3115	08/17/2007
Antenna	Emco	3115	See Note
Signal Generator	Wiltron	68169B	04/26/2007
Chamber	Lingren	3m	09/28/2007
Pre-Amplifier	HP	8449	05/01/2007
DMM	Fluke	73III	05/01/2007
Variac	KRM	AEEC-2090	See Note
DMM	Fluke	51II	See Note
900 MHz Notch Filter	AWID	N/A	See Note
4GHz High Pass Filter	LORCH Microwave	4HPD-X4000-3R	See Note
Harmonic Mixer (18-26.5 GHz)	HP	11970K	10/10/2007
Harmonic Mixer (26.5-40 GHz)	HP	11970A	10/10/2007

Note: Functional Verification

APPENDIX A: EUT TEST CONDITIONS

The following is the description of supporting equipment and details of cables used with the EUT.

Equipment Description (Including Brand Name)	Cable Description
PC Laptop	1. Power cord 2. Ethernet

EUT Description	:	Enterprise Dual Radio Access Point
Model No	:	CEDAR 860AG
Serial No	:	CD860AG-04-06-01383

The following is the description of how the EUT is exercised during testing.

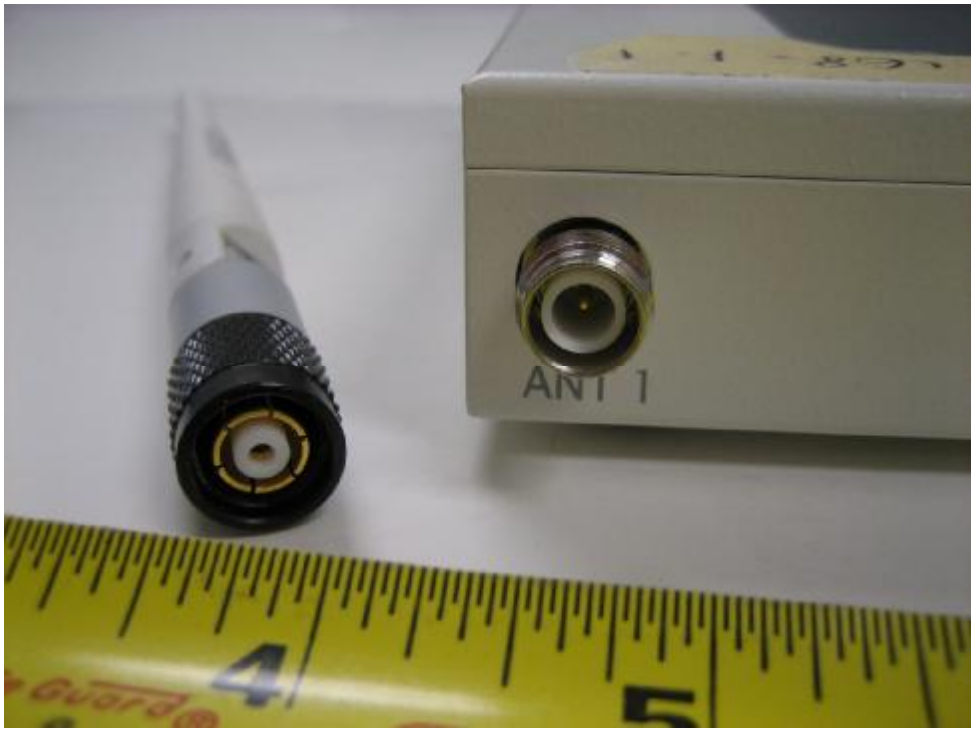
Test	Description Of Operation
	The EUT was controlled and monitored via Ethernet by a PC running a radio test program. The data rate was set at maximum at each bandwidth to simulate worse case conditions during the equipment operation. The power was set to 17dBm during testing.

APPENDIX B: EXTERNAL PHOTOS

EUT Front View

EUT Rear View

EUT Side View



EUT Antenna Connector

Antenna View 1

Antenna View 2

Power Supply Adaptor

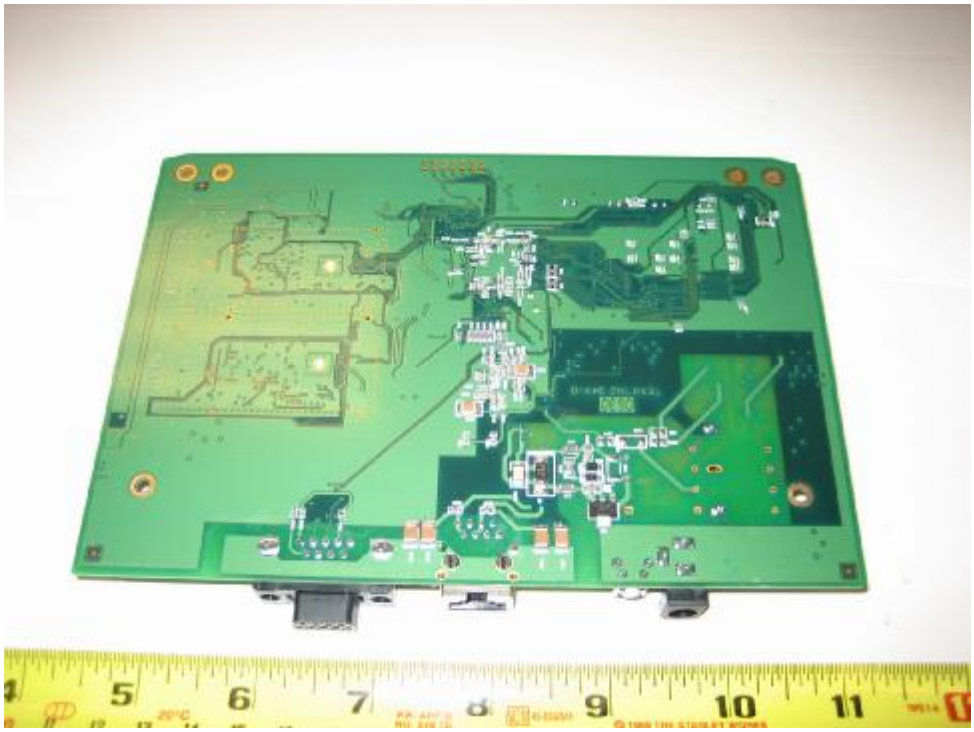
APPENDIX C: CIRCUIT/BLOCK DIAGRAMS

See Attachment

APPENDIX D: INTERNAL PHOTOS

EUT Cover Off View

EUT Main Board Component's View



EUT Main Board Solder's View

APPENDIX E: Test Setup Photo

AC Line Conducted Emission Front View

AC Line Conducted Emission Rear View

Radiated Emission Front View

Radiated Emission Rear View

APPENDIX F: PRODUCT DESCRIPTION

Detail description of this product is shown in the User's Guide.

APPENDIX G: FCC LABEL LOCATION

See Attachment

APPENDIX H: USER MANUAL

See Attachment

END OF REPORT