Test Report

Curtis-Straus LLC, *a wholly owned subsidiary of BV CPS*

Report No	EJ0261-1
Client	Enterasys Networks John Ballew
Address	50 Minuteman Road Andover, MA 01810
Phone	(978) 684-1009
Item tested	WS-AP2620
Standards	FCC Part 15 Section 15.247 and 15.407
FCC ID	REB-APXXX1
FRN	0019588359
Test Dates	February 10-17, 2010
Results	As detailed within this report
Prepared by	Evan Gould – Compliance Engineer
Authorized by	Mairaj Hussain – EMC Supervisor
Issue Date	3/12/2010
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 18 of this report.

Curtis-Straus LLC is accredited by the American Association for Laboratory Accreditation for the specific scope of accreditation under Certificate Number 1627-01. This report may contain data which is not covered by the A2LA accreditation.

Contents

Summary

On February 10-17, 2010 we tested the AP2620 Wireless Access Point for compliance with the following radiated emissions requirements. This report presents data to support a Class II permissive change to FCC ID: REB-APXXX1.

The change applies to both the AP2620 and the AP2640, which are electrically identical.

The Class II permissive change is for the addition of the following antennas to the above mentioned access points.

ANTENNAS BEING ADDED

Manufacturer	Model #	Antenna Type	Frequency Band(s)	Gain(s)
LairdTech	SQ2403PG36RSM	WS-AI-2S03360	2.4GHz	3.5dBi
Joymax	FWX-614RSXXX-514	WS-ANT01	2.4GHz; 5GHz	4dBi
LairdTech	S24493BPX12RNF	WS-AO-DS05360	2.4GHz; 5GHz	5dBi
LairdTech	SR24912OD12RNF	WS-AIO-DS05120	2.4GHz; 5GHz	5dBi
PCTel	PCTCMB7058NF	WS-AI-DS06360	2.4GHz; 5GHz	5dBi; 6dBi
LairdTech	S2307AMP10NF	WS-AIO-2S07060	2.4GHz	7.5dBi
LairdTech	S51512MP10RNF	WS-AIO-5S12060	5GHz	12dBi
PCTel	WISP 2401490/Z2081	WS-AIO-2S14090	2.4GHz	14dBi
PCTel	WISP 4959018/Z2039	WS-AIO-5S15090	5GHz	16dBi
LairdTech	S54717P12RNF	WS-AIO-5S17017	5GHz	17dBi
PCTel	WISP 24018PTNF/Z2082	WS-AIO-2S18018	2.4GHz	18dBi

Test Methodology

Radiated emission testing was performed according to the procedures specified in ANSI C63.4 (2003). Emissions were maximized by rotating the system around its vertical axis as well as varying the test antenna's height and polarity.

The EUT was scanned for spurious emissions within the operational bands of the new antennas.

Frequency range investigated: 1000MHz – 6000MHz.

Measurement distance: 3 meters.

Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	3/10/10

Product Tested - Configuration Documentation

EUT Configuration

Work Order: J0261
Company: Enterasys Networks
Company Address: 50 Minuteman Road
Andover, MA 01810
Contact: John Ballew
Person Present: John Ballew

	MN	SN
EUT:	WS-AP2620	0500009372150060

EUT Description: Wireless Access Point
EUT TX Frequencies: 2412-2462MHz, 5180-5320MHz, 5745-5825MHz

Support Equipment:	MN	SN
Enterasys ethernet switch	D2G124-12P	0813022749041
SINPRO switching power supply	SPU130-111	05036156

EUT Ports:

Port Label	Port Type	No. of ports	No. Populated	Cable Type	Shielded	Ferrites	Length	Max Length	In/Out NEBS Type	Unpopulated Reason
Antenna	SMA	2	2	Coaxial	Yes	No	50 cm	Not Specified	NA	
LAN	RJ45	1	1	cat.5 RJ45	No	No	2.0 m	100 m	NA	.
DC Power	DC Power	1	0	NA	NA	NA	NA	NA	NA	using POE

Software / Operating Mode Description:

EUT is transmitting IEEE802.11b, IEEE802.11g, and IEEE802.11a protocols. Using diagnostic firmware to set the channels and output power settings.

ART SETTINGS TABLES

The following are the ART power settings which will be associated with each of the new antennas according to the modulation employed:

802.11b

	Max ART Setting per channel										
Anntenna Type	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	1	2	3	4	5	6	7	8	9	10	11
WS-AI-2S03360	17.5	20	20	20	20	20	20	20	20	20	19
WS-ANT01	20	20	20	20	20	20	20	20	20	20	20
WS-AI-DS06360	20	20	20	20	20	20	20	20	20	20	20
WS-AIO-DS05120	16	20	20	20	20	20	20	20	20	20	14
WS-AO-DS05360	20	20	20	20	20	20	20	20	20	20	20
WS-AIO-2S07060	19	20	20	20	20	20	20	20	20	20	20
WS-AIO-2S14090	20	20	20	20	20	20	20	20	20	20	20
WS-AIO-2S18018	16	20	20	20	20	20	20	20	20	20	18

802.11g

	Max ART Setting per channel										
Anntenna Type	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	1	2	3	4	5	6	7	8	9	10	11
WS-AI-2S03360	15	20	20	20	20	20	20	20	20	20	15
WS-ANT01	20	20	20	20	20	20	20	20	20	20	20
WS-AO-DS05360	17	20	20	20	20	20	20	20	20	20	17
WS-AI-DS06360	15	20	20	20	20	20	20	20	20	20	15
WS-AIO-DS05120	13	20	20	20	20	20	20	20	20	20	16
WS-AIO-2S07060	16	20	20	20	20	20	20	20	20	20	18
WS-AIO-2S14090	15	18	18	18	18	18	18	18	18.5	18.5	16
WS-AIO-2S18018	17	20	20	20	20	20	20	20	20	20	15

802.11a

	Max ART Setting per channel												
Anntenna Type	5180	5200	5220	5240	5260	5280	5300	5320	5745	5765	5785	5805	5825
	36	40	44	48	52	56	60	64	149	153	157	161	165
WS-ANT01	4	15.5	16	16	4	20	20	19	20	20	20	20	20
WS-AO-DS05360	16	15.5	16	16	4	20	20	19	20	20	20	20	20
WS-AIO-DS05120	16	15.5	16	16	4	20	20	19	20	20	20	20	20
WS-AI-DS06360	16	15.5	16	16	4	20	20	19	20	20	20	20	20
WS-AIO-5S12060	9.5	10	10	10	X	18	18	14	20	20	20	20	20
WS-AIO-5S15090	5.5	5	5	5.5	X	14.5	14.5	10	19	19	19	19	19
WS-AIO-5S17017	4	4	4	4	X	13	13	10	20	20	20	20	20

Note: The ART Settings in the above tables have been determined in the following manner: 1) Conducted Output Power measurements were taken in order to find the highest settings allowed per channel without regard for spurious emissions, 2) Spurious emissions at the band edges further restricted the allowed ART Settings at the adjacent channels.

Statement of Conformity

The AP2620 has been found to conform to the following parts of 47 CFR as detailed below:

Part 15	Comments
15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209.
15.247(b)(c)(d)	Conducted output power meets the requirement of the section. Spurious emissions that fall within the restricted bands in the antenna pass bands meet the limits of 15.209.
15.407(a)& (b)(7)	Conducted output power meets the requirement of the section. Spurious emissions that fall within the restricted bands in the antenna pass bands meet the limits of 15.209.

Test Results

Radiated Spurious Emissions

LIMITS

"…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)" [15.247(d)]

"The provisions of §15.205 apply to intentional radiators operating under this section." [15.407(b)(7)]

MEASUREMENTS

Radiated Spurious Emissions Table

Date: 16-Feb-10 **Company:** Enterasys **Work Order:** J0261
Engineer: Evan Gould **EUT Desc:** AP2620 **EUT Operating Voltage/Frequency:** 48VDC
Temp: 17.6°C **Humidity:** 25% **Pressure:** 988.6mBar
Frequency Range: 1 - 6GHz **Measurement Distance:** 3 m
Notes: 3.5dBi Laird "Squint" Omni Directional WS-AI-2S03360 **RBW:** 1MHz (pk) 1MHz (av) **VBW:** 3MHz (pk) 10Hz (av)

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	47 CFR 15.209(a) - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	47 CFR 15.209(a) - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
802.11b; 2412MHz; power = 17.5 H	2390.0	60.7	46.3	22.7	28.2	1.6	67.8	53.4	74.0	-6.2	Pass	54.0	-0.6	Pass
802.11g; 2412MHz; power = 15 H	2390.0	63.7	46.1	22.7	28.2	1.6	70.8	53.2	74.0	-3.2	Pass	54.0	-0.8	Pass
802.11g; 2462MHz; power = 15 H	2483.5	62.1	44.0	22.7	28.3	1.6	69.3	51.2	74.0	-4.7	Pass	54.0	-2.8	Pass
802.11b; 2462MHz; power = 19 H	2483.5	56.9	44.9	22.7	28.3	1.6	64.1	52.1	74.0	-9.9	Pass	54.0	-1.9	Pass

Table Result: Pass by -0.6 dB ***Worst Freq:*** 2390.0 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-21 **Cable 2:** --- **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Preselctor:** ---

Radiated Spurious Emissions Table

Date: 16-Feb-10 **Company:** Enterasys **Work Order:** J0261
Engineer: Evan Gould **EUT Desc:** AP2620 **EUT Operating Voltage/Frequency:** 48VDC
Temp: 18°C **Humidity:** 25% **Pressure:** 989.3mBar
Frequency Range: 1 - 6GHz **Measurement Distance:** 3 m
Notes: 4dBi Antenna WS-ANT01 **RBW:** 1MHz (pk) 1MHz (av) **VBW:** 3MHz (pk) 10Hz (av)

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	47 CFR 15.209(a) - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	47 CFR 15.209(a) - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
802.11b; 2412MHz; power = 20 V	2390.0	44.8	34.6	22.7	28.2	1.6	51.9	41.7	74.0	-22.1	Pass	54.0	-12.3	Pass
80211b; 2462MHz; power = 20 V	2483.5	41.7	31.0	22.7	28.3	1.6	48.9	38.2	74.0	-25.1	Pass	54.0	-15.8	Pass
802.11g; 2462MHz; power = 20 V	2483.5	64.1	43.2	22.7	28.3	1.6	71.3	50.4	74.0	-2.7	Pass	54.0	-3.6	Pass
802.11g; 2412MHz; power = 20 V	2390.0	61.8	42.0	22.7	28.2	1.6	68.9	49.1	74.0	-5.1	Pass	54.0	-4.9	Pass
802.11a; 5320MHz; power = 19 V	5350.0	45.0	31.5	20.8	34.0	2.3	60.5	47.0	74.0	-13.5	Pass	54.0	-7.0	Pass
802.11a; 5180MHz; power = 4 V	5150.0	37.2	26.7	20.8	33.6	2.3	52.3	41.8	74.0	-21.7	Pass	54.0	-12.2	Pass

Table Result: Pass by -2.7 dB ***Worst Freq:*** 2483.5 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-21 **Cable 2:** --- **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Preselctor:** ---

Radiated Spurious Emissions Table

Date: 16-Feb-10 **Company:** Enterasys **Work Order:** J0261
Engineer: Evan Gould **EUT Desc:** AP2620 **EUT Operating Voltage/Frequency:** 48VDC
Temp: 18°C **Humidity:** 25% **Pressure:** 989.3mBar
Frequency Range: 1 - 6GHz **Measurement Distance:** 3 m
Notes: 5dBi Laird Omni Antenna WS-AO-DS05360 **RBW:** 1MHz (pk) 1MHz (av) **VBW:** 3MHz (pk) 10Hz (av)

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	47 CFR 15.209(a) - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	47 CFR 15.209(a) - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
802.11b; 2412MHz; power = 20 V	2390.0	63.2	43.6	22.7	28.2	1.6	70.3	50.7	74.0	-3.7	Pass	54.0	-3.3	Pass
802.11b; 2462MHz; power = 20 V	2483.5	46.9	36.2	22.7	28.3	1.6	54.1	43.4	74.0	-19.9	Pass	54.0	-10.6	Pass
802.11g; 2462MHz; power = 17 V	2483.5	61.9	41.1	22.7	28.3	1.6	69.1	48.3	74.0	-4.9	Pass	54.0	-5.7	Pass
802.11g; 2412MHz; power = 17 V	2390.0	65.1	44.8	22.7	28.2	1.6	72.2	51.9	74.0	-1.8	Pass	54.0	-2.1	Pass
802.11a; 5180MHz; power = 16 V	5150.0	32.3	21.8	20.8	33.6	2.3	47.4	36.9	74.0	-26.6	Pass	54.0	-17.1	Pass
802.11a; 5350MHz; power = 19 V	5350.0	32.0	22.3	20.8	34.0	2.3	47.5	37.8	74.0	-26.5	Pass	54.0	-16.2	Pass

Table Result: Pass by -1.8 dB ***Worst Freq:*** 2390.0 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-21 **Cable 2:** --- **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Preselctor:** ---

Radiated Spurious Emissions Table

Date: 17-Feb-10 **Company:** Enterasys **Work Order:** J0261
Engineer: Evan Gould **EUT Desc:** AP2620 **EUT Operating Voltage/Frequency:** 48VDC
Temp: 17.6°C **Humidity:** 25% **Pressure:** 988.6mBar
Frequency Range: 1 - 6GHz **Measurement Distance:** 3 m
Notes: 5dBi Laird 120 Degree Sector WS-AIO-DS05120 **RBW:** 1MHz (pk) 1MHz (av) **VBW:** 3MHz (pk) 10Hz (av)

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	47 CFR 15.209(a) - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	47 CFR 15.209(a) - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
802.11b; 2462MHz; power = 14														
H	2483.5	65.8	46.3	22.7	28.3	1.6	73.0	53.5	74.0	-1.0	Pass	54.0	-0.5	Pass
802.11g; 2462MHz; power = 16														
H	2483.5	55.9	46.0	22.7	28.3	1.6	63.1	53.2	74.0	-10.9	Pass	54.0	-0.8	Pass
802.11g; 2412MHz; power = 13														
H	2390.0	64.9	46.4	22.7	28.2	1.6	72.0	53.5	74.0	-2.0	Pass	54.0	-0.5	Pass
802.11b; 2412MHz; power = 16														
H	2390.0	64.6	45.5	22.7	28.2	1.6	71.7	52.6	74.0	-2.3	Pass	54.0	-1.4	Pass
802.11a; 5180MHz; power = 16														
H	5150.0	54.4	37.4	20.8	33.6	2.3	69.5	52.5	74.0	-4.5	Pass	54.0	-1.5	Pass
802.11a; 5320MHz; power = 19														
H	5350.0	48.4	34.6	20.8	34.0	2.3	63.9	50.1	74.0	-10.1	Pass	54.0	-3.9	Pass

Table Result: Pass by -0.5 dB ***Worst Freq:*** 2390.0 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-21 **Cable 2:** --- **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Preselctor:** ---

Radiated Spurious Emissions Table

Date: 16-Feb-10 **Company:** Enterasys **Work Order:** J0261
Engineer: Evan Gould **EUT Desc:** AP2620 **EUT Operating Voltage/Frequency:** 48VDC
Temp: 18°C **Humidity:** 25% **Pressure:** 989.3mBar
Frequency Range: 1 - 6GHz **Measurement Distance:** 3 m
Notes: 5/6dBi PCTEL Multi-Band Antenna WS-AI-DS06360 **RBW:** 1MHz (pk) 1MHz (av) **VBW:** 3MHz (pk) 10Hz (av)

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	47 CFR 15.209(a) - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	47 CFR 15.209(a) - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
802.11g; 2412MHz; power = 15														
H	2390.0	64.3	44.3	22.7	28.2	1.6	71.4	51.4	74.0	-2.6	Pass	54.0	-2.6	Pass
802.11g; 2462MHz; power = 15														
H	2483.5	62.6	44.0	22.7	28.3	1.6	69.8	51.2	74.0	-4.2	Pass	54.0	-2.8	Pass
802.11b; 2462MHz; power = 20														
H	2483.5	64.4	43.2	22.7	28.3	1.6	71.6	50.4	74.0	-2.4	Pass	54.0	-3.6	Pass
802.11b; 2412MHz; power = 20														
H	2390.0	55.9	46.3	22.7	28.2	1.6	63.0	53.4	74.0	-11.0	Pass	54.0	-0.6	Pass
802.11a; 5180MHz; power = 16														
H	5150.0	52.1	38.4	20.8	33.6	2.3	67.2	53.5	74.0	-6.8	Pass	54.0	-0.5	Pass
802.11a; 5350MHz; power = 19														
H	5350.0	47.2	35.7	20.8	34.0	2.3	62.7	51.2	74.0	-11.3	Pass	54.0	-2.8	Pass

Table Result: Pass by -0.5 dB ***Worst Freq:*** 5150.0 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-21 **Cable 2:** --- **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Preselctor:** ---

Radiated Spurious Emissions Table

Date: 16-Feb-10 **Company:** Enterasys **Work Order:** J0261
Engineer: Evan Gould **EUT Desc:** AP2620 **EUT Operating Voltage/Frequency:** 48VDC
Temp: 18°C **Humidity:** 25% **Pressure:** 989.3mBar
Frequency Range: 1 - 6GHz **Measurement Distance:** 3 m
Notes: 7.5dBi Laird DirectLink S2307 Patch Antenna WS-AIO-2S07060 **RBW:** 1MHz (pk) 1MHz (av) **VBW:** 3MHz (pk) 10Hz (av)

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	47 CFR 15.209(a) - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	47 CFR 15.209(a) - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
802.11b; 2412MHz; power = 19														
V	2390.0	52.1	45.3	22.7	28.2	1.6	59.2	52.4	74.0	-14.8	Pass	54.0	-1.6	Pass
802.11g; 2412MHz; power = 16														
V	2390.0	61.6	44.6	22.7	28.2	1.6	68.7	51.7	74.0	-5.3	Pass	54.0	-2.3	Pass
802.11g; 2462MHz; power = 18														
V	2483.5	66.1	45.2	22.7	28.3	1.6	73.3	52.4	74.0	-0.7	Pass	54.0	-1.6	Pass
802.11b; 2462MHz; power = 20														
V	2483.5	48.5	37.4	22.7	28.3	1.6	55.7	44.6	74.0	-18.3	Pass	54.0	-9.4	Pass

Table Result: Pass by -0.7 dB ***Worst Freq:*** 2483.5 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-21 **Cable 2:** --- **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Preselctor:** ---

Radiated Emissions Table

Date: 16-Feb-10 **Company:** Enterasys **Work Order:** J0261
Engineer: Evan Gould **EUT Desc:** AP2620 **EUT Operating Voltage/Frequency:** 48VDC
Temp: 18°C **Humidity:** 25% **Pressure:** 989.3mBar
Frequency Range: 1 - 6GHz **Measurement Distance:** 3 m
Notes: 12dBi Laird DirectLink Patch Antenna WS-AIO-5S12060 **RBW:** 1MHz (pk) 1MHz (av) **VBW:** 3MHz (pk) 10Hz (av)

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	47 CFR 15.209(a) - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	47 CFR 15.209(a) - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
802.11a; 5180MHz; power = 9.5														
V	5150.0	45.8	35.1	20.8	33.6	2.3	60.9	50.2	74.0	-13.1	Pass	54.0	-3.8	Pass
802.11a; 5320MHz; power = 14														
V	5350.0	45.0	34.5	20.8	34.0	2.3	60.5	50.0	74.0	-13.5	Pass	54.0	-4.0	Pass

Table Result: Pass by -3.8 dB ***Worst Freq:*** 5150.0 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-21 **Cable 2:** --- **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Preselctor:** ---

Radiated Spurious Emissions Table

Date: 16-Feb-10 **Company:** Enterasys **Work Order:** J0261
Engineer: Evan Gould **EUT Desc:** AP2620 **EUT Operating Voltage/Frequency:** 48VDC
Temp: 18°C **Humidity:** 25% **Pressure:** 989.3mBar
Frequency Range: 1 - 6GHz **Measurement Distance:** 3 m
Notes: 14dBi Enterasys Sector Panel WS-AIO-2S14090 **RBW:** 1MHz (pk) 1MHz (av) **VBW:** 3MHz (pk) 10Hz (av)

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	47 CFR 15.209(a) - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	47 CFR 15.209(a) - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
802.11g; 2412MHz; power = 15 V	2390.0	62.0	44.7	22.7	28.2	1.6	69.1	51.8	74.0	-4.9	Pass	54.0	-2.2	Pass
802.11g; 2462MHz; power = 16 V	2483.5	62.5	42.0	22.7	28.3	1.6	69.7	49.2	74.0	-4.3	Pass	54.0	-4.8	Pass
802.11b; 2412MHz; power = 20 V	2390.0	54.9	44.5	22.7	28.2	1.6	62.0	51.6	74.0	-12.0	Pass	54.0	-2.4	Pass
802.11b; 2462MHz; power = 20 V	2483.5	53.0	39.0	22.7	28.3	1.6	60.2	46.2	74.0	-13.8	Pass	54.0	-7.8	Pass

Table Result: Pass by -2.2 dB ***Worst Freq:*** 2390.0 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-21 **Cable 2:** --- **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Preselctor:** ---

Radiated Spurious Emissions Table

Date: 16-Feb-10 **Company:** Enterasys **Work Order:** J0261
Engineer: Evan Gould **EUT Desc:** AP2620 **EUT Operating Voltage/Frequency:** 48VDC
Temp: 18°C **Humidity:** 25% **Pressure:** 989.3mBar
Frequency Range: 1 - 6GHz **Measurement Distance:** 3 m
Notes: 16dBi PCTEL Panel Antenna WS-AIO-5S15090 **RBW:** 1MHz (pk) 1MHz (av) **VBW:** 3MHz (pk) 10Hz (av)

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	47 CFR 15.209(a) - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	47 CFR 15.209(a) - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
802.11a; 5180MHz; power = 5.5 V	5150.0	42.4	32.4	20.8	33.6	2.3	57.5	47.5	74.0	-16.5	Pass	54.0	-6.5	Pass
802.11a; 5320MHz; power = 10 V	5350.0	44.5	31.8	20.8	34.0	2.3	60.0	47.3	74.0	-14.0	Pass	54.0	-6.7	Pass

Table Result: Pass by -6.5 dB ***Worst Freq:*** 5150.0 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-21 **Cable 2:** --- **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Preselctor:** ---

Radiated Spurious Emissions Table

Date: 16-Feb-10 **Company:** Enterasys **Work Order:** J0261
Engineer: Evan Gould **EUT Desc:** AP2620 **EUT Operating Voltage/Frequency:** 48VDC
Temp: 18°C **Humidity:** 25% **Pressure:** 989.3mBar
Frequency Range: 1 - 6GHz **Measurement Distance:** 3 m
Notes: 17dBi Antenna WS-AIO-5S17017 **RBW:** 1MHz (pk) 1MHz (av) **VBW:** 3MHz (pk) 10Hz (av)

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	47 CFR 15.209(a) - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	47 CFR 15.209(a) - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
802.11a; 5180MHz; power = 4 V	5150.0	41.3	31.2	20.8	33.6	2.3	56.4	46.3	74.0	-17.6	Pass	54.0	-7.7	Pass
802.11a; 5320MHz; power = 10 V	5350.0	42.6	30.7	20.8	34.0	2.3	58.1	46.2	74.0	-15.9	Pass	54.0	-7.8	Pass

Table Result: Pass by -7.7 dB ***Worst Freq:*** 5150.0 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-21 **Cable 2:** --- **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Preselctor:** ---

Radiated Spurious Emissions Table

Date: 16-Feb-10 **Company:** Enterasys **Work Order:** J0261
Engineer: Evan Gould **EUT Desc:** AP2620 **EUT Operating Voltage/Frequency:** 48VDC
Temp: 18°C **Humidity:** 25% **Pressure:** 989.3mBar
Frequency Range: 1 - 6GHz **Measurement Distance:** 3 m
Notes: 18dBi Enterasys Directional Panel WS-AIO-2S18018 **RBW:** 1MHz (pk) 1MHz (av) **VBW:** 3MHz (pk) 10Hz (av)

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	47 CFR 15.209(a) - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	47 CFR 15.209(a) - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
802.11b; 2412MHz; power = 16 V	2390.0	59.8	44.5	22.7	28.2	1.6	66.9	51.6	74.0	-7.1	Pass	54.0	-2.4	Pass
802.11b; 2462MHz; power = 18 V	2483.5	56.4	44.0	22.7	28.3	1.6	63.6	51.2	74.0	-10.4	Pass	54.0	-2.8	Pass
802.11g; 2462MHz; power = 15 V	2483.5	64.6	45.2	22.7	28.3	1.6	71.8	52.4	74.0	-2.2	Pass	54.0	-1.6	Pass
802.11g; 2412MHz; power = 17 V	2390.0	64.4	45.6	22.7	28.2	1.6	71.5	52.7	74.0	-2.5	Pass	54.0	-1.3	Pass

Table Result: Pass by -1.3 dB ***Worst Freq:*** 2390.0 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-21 **Cable 2:** --- **Cable 3:** ---
Analyzer: Asset #1328 **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Preselctor:** ---

Rev: 18-Feb-2010

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
SA EMI Chamber (1328)	9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	16-Dec-2010
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**			**Cat**	**Calibration Due**
1DCC-OATS-3M-I	719150	2762A-8	R-3109			II	7-Jul-2011
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
1517 HF Preamp	1-18GHz	CS	CS	N/A	1517	II	29-May-2010
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Yellow Horn	1-18GHz	3115	EMCO	9608-4898	37	I	27-May-2011
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
1DCC-OATS-3M-I Thermohygrometer		35519-044	Control Company	72457635	1334	II	18-Aug-2011
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	17-Mar-2011

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Conducted Output Power

"The maximum peak conducted output power of the intentional radiator shall not exceed…1 Watt." [15.247(b)(3)]

"…if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below (1 Watt) by the amount in dB that the directional gain of the antenna exceeds 6 dBi." [15.247(b)(4)]

"Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi." [15.247(b)(4)(i)]

"Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power." [15.247(b)(4)(ii)]

"For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed…50mW. If transmitting antennas of directional gain greater than 6 dBi are used…the maximum conducted output power…shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi." [15.407(a)(1)]

"For the band 5.25-5.35 GHz and 5.47-5.725GHz, the maximum conducted output power over the frequency band of operation shall not exceed…250mW. If transmitting antennas of directional gain greater than 6 dBi are used…the maximum conducted output power…shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi." [15.407(a)(2)]

Note: The ART Settings shown in the tables below are worst case settings. These settings apply only to the output power limits. Further restrictions on the ART settings are dictated by spurious emissions requirements (e.g., band edges). Therefore, the ART settings tables in this report do not match the settings shown below because the other restrictions hadn't been accounted for at the time these measurements were taken.

MEASUREMENTS

802.11b

Antennas (dBi)	Frequency (MHz)	ART Setting	Analyzer Reading (dBm)	Attenuation (dB)	Adjusted Output Power (dBm)	FCC Limit (dBm)	Result (Pass/Fail)
3.5, 4, 5, 14	2412	20	0.9	20.2	21.1	22	Pass
3.5, 4, 5, 14	2417	20	0.6	20.2	20.8	22	Pass
3.5, 4, 5, 14	2422	20	0.9	20.2	21.1	22	Pass
3.5, 4, 5, 14	2427	20	0.8	20.2	21	22	Pass
3.5, 4, 5, 14	2432	20	0.7	20.2	20.9	22	Pass
3.5, 4, 5, 14	2437	20	0.7	20.2	20.9	22	Pass
3.5, 4, 5, 14	2442	20	0.7	20.2	20.9	22	Pass
3.5, 4, 5, 14	2447	20	0.7	20.2	20.9	22	Pass
3.5, 4, 5, 14	2452	20	0.8	20.2	21	22	Pass
3.5, 4, 5, 14	2457	20	0.9	20.2	21.1	22	Pass
3.5, 4, 5, 14	2462	20	0.9	20.2	21.1	22	Pass
point-to-point: 7.5, 18	2412	20	0.9	20.2	21.1	26	Pass
point-to-point: 7.5, 18	2417	20	0.6	20.2	20.8	26	Pass
point-to-point: 7.5, 18	2422	20	0.9	20.2	21.1	26	Pass
point-to-point: 7.5, 18	2427	20	0.8	20.2	21	26	Pass
point-to-point: 7.5, 18	2432	20	0.7	20.2	20.9	26	Pass
point-to-point: 7.5, 18	2437	20	0.7	20.2	20.9	26	Pass
point-to-point: 7.5, 18	2442	20	0.7	20.2	20.9	26	Pass
point-to-point: 7.5, 18	2447	20	0.7	20.2	20.9	26	Pass
point-to-point: 7.5, 18	2452	20	0.8	20.2	21	26	Pass
point-to-point: 7.5, 18	2457	20	0.9	20.2	21.1	26	Pass
point-to-point: 7.5, 18	2462	20	0.9	20.2	21.1	26	Pass

802.11g

Antennas (dBi)	Frequency (MHz)	ART Setting	Analyzer Reading (dBm)	Attenuation (dB)	Adjusted Output Power (dBm)	FCC Limit (dBm)	Result (Pass/Fail)
3.5, 4, 5	2412	20	2.6	20.2	22.8	30	Pass
3.5, 4, 5	2417	20	3.2	20.2	23.4	30	Pass
3.5, 4, 5	2422	20	3	20.2	23.2	30	Pass
3.5, 4, 5	2427	20	3	20.2	23.2	30	Pass
3.5, 4, 5	2432	20	2.7	20.2	22.9	30	Pass
3.5, 4, 5	2437	20	2.7	20.2	22.9	30	Pass
3.5, 4, 5	2442	20	2.7	20.2	22.9	30	Pass
3.5, 4, 5	2447	20	2.7	20.2	22.9	30	Pass
3.5, 4, 5	2452	20	2.7	20.2	22.9	30	Pass
3.5, 4, 5	2457	20	2.8	20.2	23	30	Pass
3.5, 4, 5	2462	20	2.8	20.2	23	30	Pass
14	2412	18	1.6	20.2	21.8	22	Pass
14	2417	18	1.3	20.2	21.5	22	Pass
14	2422	18	1.4	20.2	21.6	22	Pass
14	2427	18	1.3	20.2	21.5	22	Pass
14	2432	18	1.2	20.2	21.4	22	Pass
14	2437	18	1.2	20.2	21.4	22	Pass
14	2442	18	1	20.2	21.2	22	Pass
14	2447	18	1.1	20.2	21.3	22	Pass
14	2452	18.5	1.5	20.2	21.7	22	Pass
14	2457	18.5	1.5	20.2	21.7	22	Pass
14	2462	18.5	1.5	20.2	21.7	22	Pass
point-to-point: 7.5, 18	2412	20	2.6	20.2	22.8	26	Pass
point-to-point: 7.5, 18	2417	20	3.2	20.2	23.4	26	Pass
point-to-point: 7.5, 18	2422	20	3	20.2	23.2	26	Pass
point-to-point: 7.5, 18	2427	20	3	20.2	23.2	26	Pass
point-to-point: 7.5, 18	2432	20	2.7	20.2	22.9	26	Pass
point-to-point: 7.5, 18	2437	20	2.7	20.2	22.9	26	Pass
point-to-point: 7.5, 18	2442	20	2.7	20.2	22.9	26	Pass
point-to-point: 7.5, 18	2447	20	2.7	20.2	22.9	26	Pass
point-to-point: 7.5, 18	2452	20	2.7	20.2	22.9	26	Pass
point-to-point: 7.5, 18	2457	20	2.8	20.2	23	26	Pass
point-to-point: 7.5, 18	2462	20	2.8	20.2	23	26	Pass

802.11a (15.247)

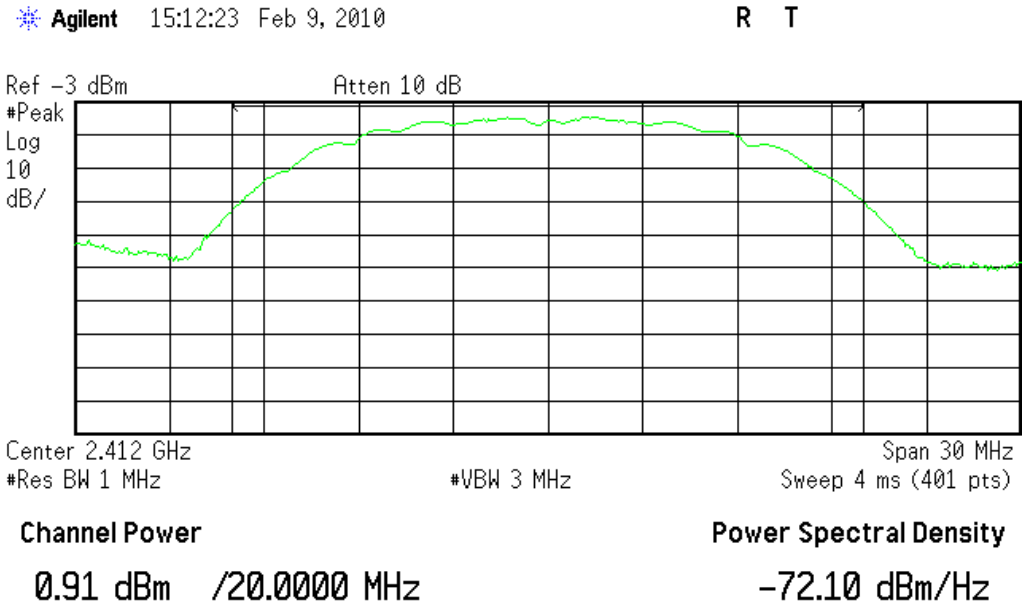
Antennas (dBi)	Frequency (MHz)	ART Setting	Analyzer Reading (dBm)	Attenuation (dB)	Adjusted Output Power (dBm)	FCC Limit (dBm)	Result (Pass/Fail)
4, 5, 6	5745	20	0.4	20.2	20.6	30	Pass
4, 5, 6	5765	20	0.2	20.2	20.4	30	Pass
4, 5, 6	5785	20	-0.1	20.2	20.1	30	Pass
4, 5, 6	5805	20	-0.4	20.2	19.8	30	Pass
4, 5, 6	5825	20	-0.7	20.2	19.5	30	Pass
16	5745	19	-1.6	20.2	18.6	20	Pass
16	5765	19	-1	20.2	19.2	20	Pass
16	5785	19	-1.4	20.2	18.8	20	Pass
16	5805	19	-1.3	20.2	18.9	20	Pass
16	5825	19	-1.7	20.2	18.5	20	Pass
point-to-point: 12, 17	5745	20	0.4	20.2	20.6	30	Pass
point-to-point: 12, 17	5765	20	0.2	20.2	20.4	30	Pass
point-to-point: 12, 17	5785	20	-0.1	20.2	20.1	30	Pass
point-to-point: 12, 17	5805	20	-0.4	20.2	19.8	30	Pass
point-to-point: 12, 17	5825	20	-0.7	20.2	19.5	30	Pass

802.11a (U-NII)

Antennas (dBi)	Frequency (MHz)	ART Setting	Analyzer Reading (dBm)	Attenuation (dB)	Adjusted Output Power (dBm)	FCC Limit (dBm)	Result (Pass/Fail)
4, 5, 6	5180	16	-3.4	20.2	16.8	16.99	Pass
4, 5, 6	5200	15.5	-4	20.2	16.2	16.99	Pass
4, 5, 6	5220	16	-4.3	20.2	15.9	16.99	Pass
4, 5, 6	5240	16	-4.6	20.2	15.6	16.99	Pass
4, 5, 6	5260	4	-17.3	20.2	2.9	23.98	Pass
4, 5, 6	5280	20	-0.9	20.2	19.3	23.98	Pass
4, 5, 6	5300	20	-0.6	20.2	19.6	23.98	Pass
4, 5, 6	5320	19	-1.4	20.2	18.8	23.98	Pass
12	5180	9.5	-9.7	20.2	10.5	10.99	Pass
12	5200	10	-9.7	20.2	10.5	10.99	Pass
12	5220	10	-9.6	20.2	10.6	10.99	Pass
12	5240	10	-9.7	20.2	10.5	10.99	Pass
12	5280	18	-2.6	20.2	17.6	17.98	Pass
12	5300	18	-2.7	20.2	17.5	17.98	Pass
12	5320	14	-6.7	20.2	13.5	17.98	Pass
16	5180	5.5	-13.3	20.2	6.9	6.99	Pass
16	5200	5	-13.9	20.2	6.3	6.99	Pass
16	5220	5	-13.9	20.2	6.3	6.99	Pass
16	5240	5.5	-14.1	20.2	6.1	6.99	Pass
16	5280	14.5	-6.4	20.2	13.8	13.98	Pass
16	5300	14.5	-6.7	20.2	13.5	13.98	Pass
16	5320	10	-9.9	20.2	10.3	13.98	Pass
17	5180	4	-14.6	20.2	5.6	5.99	Pass
17	5200	4	-14.8	20.2	5.4	5.99	Pass
17	5220	4	-15.2	20.2	5	5.99	Pass
17	5240	4	-15.5	20.2	4.7	5.99	Pass
17	5280	13	-7.9	20.2	12.3	12.98	Pass
17	5300	13	-8.2	20.2	12	12.98	Pass
17	5320	10	-7.6	20.2	12.6	12.98	Pass

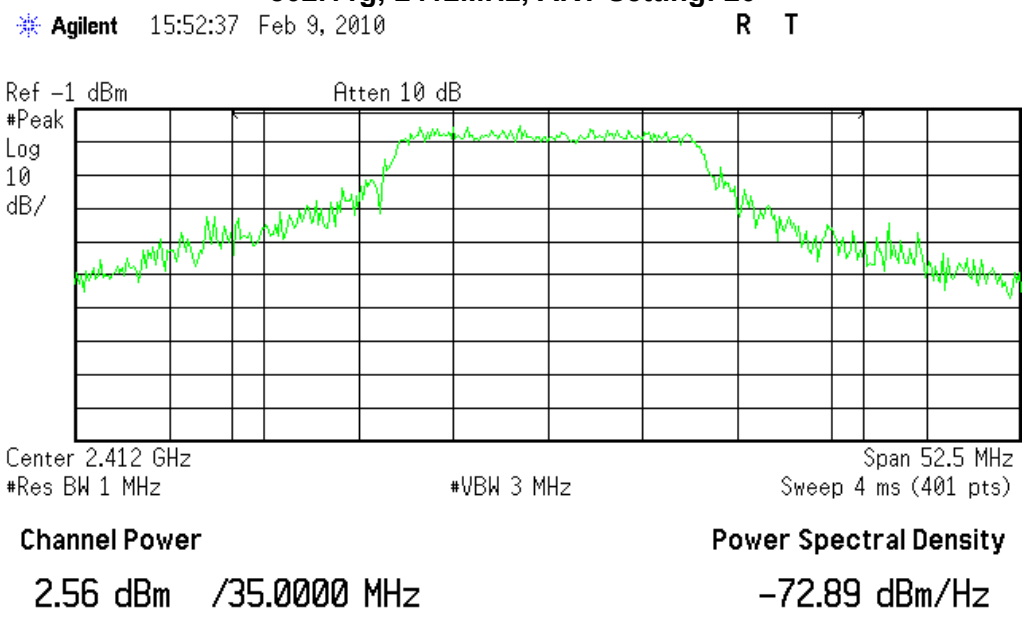
SAMPLE ANALYZER PLOTS

802.11b; 2412MHz; ART Setting: 20



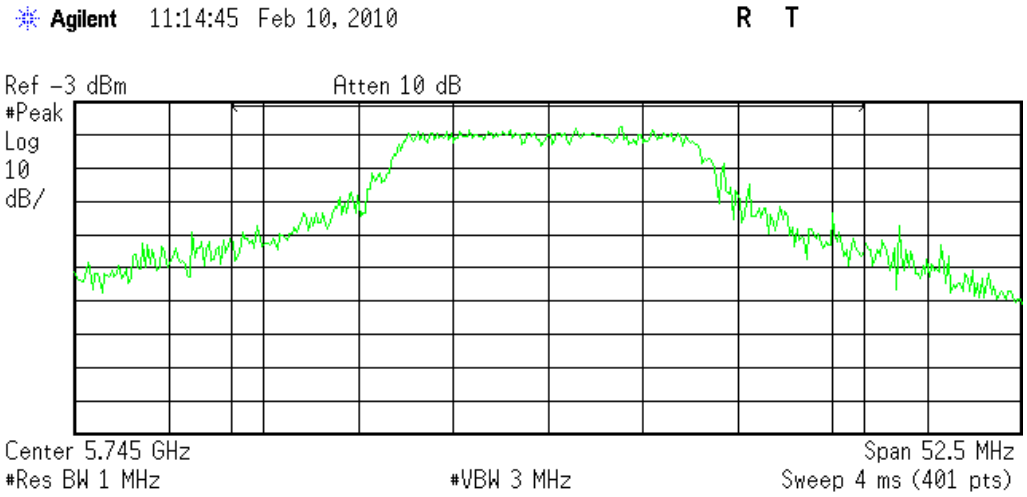
C:\SETUP672.SET file loaded

802.11g; 2412MHz; ART Setting: 20



C:temp.gif file saved

802.11a; 5745MHz; ART Setting: 19



Channel Power

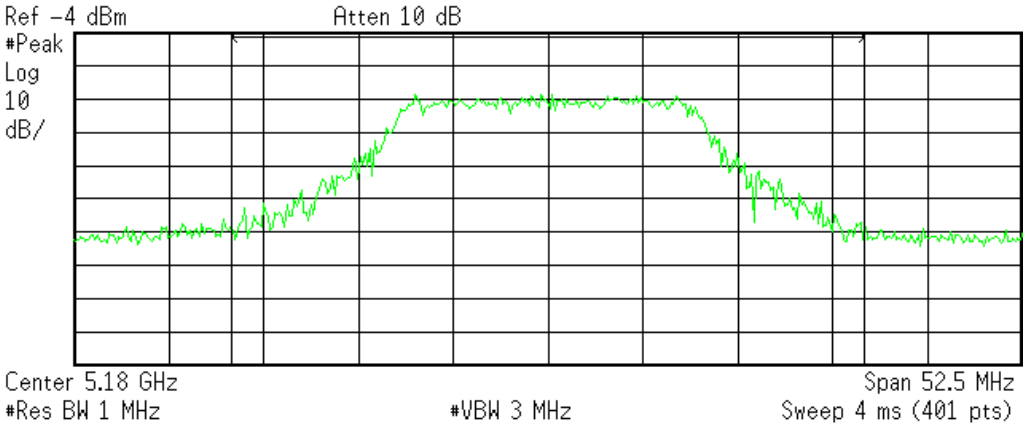
-1.68 dBm /35.0000 MHz

Power Spectral Density

-77.12 dBm/Hz

C:\SETUP672.SET file loaded

802.11a; 5180MHz; ART Setting: 5.5



Channel Power

-13.34 dBm /35.0000 MHz

Power Spectral Density

-88.78 dBm/Hz

C:temp.gif file saved

Rev: 9-Feb-2010

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Rental SA #1 (Brown)	9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	10-Mar-2010

Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	8-May-2011

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Measurement Uncertainty

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty (ETSI)
Radiated Emissions (30-1000MHz)	5.6dB	N/A
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions	3.9dB	N/A
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency	8.2×10^{-8}	1×10^{-7}
RF power, conducted	0.7dB	0.75dB
Maximum frequency deviation: • Within 300Hz and 6kHz of audio frequency • Within 6kHz and 25kHz of audio frequency	• 1.2% • 0.1dB	• 5% • 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	0.7dB	3dB
Conducted emission of receivers	0.7dB	1dB
Radiated emission of transmitter, valid up to 26.5GHz	5.6dB	6dB
Radiated emission of transmitter, valid up to 80GHz	5.6dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	5.6dB	6dB
Radiated emission of receiver, valid up to 80GHz	5.6dB	6dB
RF level uncertainty for a given BER	0.7dB	1dB
Humidity	2.31%	5%
Temperature	0.6°C	1.0°C
Time	0.8%	10%
RF Power Density, Conducted	2.2dB	3dB
DC and low frequency voltages	1.29%	3%
Voltage (AC, <10kHz)	1.29%	2%
Voltage (DC)	0.23%	1%
The above reflects a 95% confidence level		

Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("**Client**"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "**Conditions**"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("**Test Report**") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "**BUREAU VERITAS**," "**BUREAU VERITAS CONSUMER PRODUCTS SERVICES**," "**BVCPS**", "**MTL**", "**ACTS**", "**MTL-ACTS**" and **CURTIS-STRAUS** (collectively, the "**Marks**") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only were such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.

13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.

14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.

15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B)NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

Rev.160009121(2)_#684340 v13CS