Project:	**04CA45928**
File:	**MC1414**
Report:	**040200D**
Date:	**October 29, 2004** (Revised January 27, 2005)
Models:	**Telecommunications Access Point** LPS-200R-L1A, LPS-210R-L1A, LPS-200R-L1B, LPS-210R-L1B, LPS-202R-L1A, LPS-212R-L1A, LPS-202R-L1B, LPS-212R-L1B
FCC ID:	**F8I-LAB2442A**

Test Report

On

Electromagnetic Compatibility Testing

ADC

Raleigh, NC USA

Test Report Details:

Tests Performed By:	**Underwriters Laboratories Inc.** **12 Laboratory Drive** **Research Triangle Park, NC 27709**
Tests Performed For:	**ADC** **6531 Meridian Drive** **Raleigh, NC 27616 USA**
Applicant Contact:	**Mr. Matt Richardson** **Regulatory Contact** **(919) 875-3420** **Matt.Richardson@adc.com**
Test Report Number:	**040200B**
Test Report Date:	**October 29, 2004** (Revised December 9, 2004 to include 20 dB bandwidth measurement) (Revised January 20, 2005 to include conducted spurious measurement, measurement comment, and Canadian Rule Parts) (Revised January 27, 2005 to include antenna part and model number)
Product Type:	**Telecommunications Access Point**
Model Number:	**LPS-200R-L1A, LPS-210R-L1A, LPS-200R-L1B, LPS-210R-L1B, LPS-202R-L1A, LPS-212R-L1A, LPS-202R-L1B, LPS-212R-L1B**
Sample Serial Number:	**Unserialized, production sample**
Sample Tag Number:	**S04LB246**
EUT Category:	**Transmitter - Low Powered**
EUT Type:	**Wall Mounted**
Sample Receive Date:	**October 21, 2004**
Testing Start Date:	**October 21, 2004**
Date Testing Complete:	**October 25, 2004**

Summary of Testing:

Test #	Test Name Test Requirement/Specification	Comply	Does Not Comply	See Remark
1	Radiated Spurious Emissions 47 CFR Part 15.247 / ANSI C63.4:2001 RSS-210 Issue 5, Amendment, Section 6.2.2(o)	X	-	
2	Occupied Bandwidth - 20 dB Bandwidth RSS-210 Issue 5, Amendment, Section 6.2.2(o)	X	-	
3	Conducted Spurious Emissions 47 CFR Part 15.247 / ANSI C63.4:2001 RSS-210 Issue 5, Amendment, Section 6.2.2(o)	X	-	

Remarks:

1) This product has previously been certified as a modular transmitter. This application requires a higher gain antenna than the 0 dBi gain antenna in the original grant. The new antenna, ADC Part Number 1293498 / Model Number M902, has 5.1 dBi gain. Only radiated spurious emissions and RF exposure exhibits have been performed with the new higher gain antenna. The original measurements performed for conducted power, occupied bandwidth, bandedge, and spectral density are considered to be still valid by the manufacturer.

2) This antenna, ADC Part Number 1293498 / Model Number M902, represents the highest gain antenna of this antenna family. Alternate, lower-gain antennas of the same family are intended.

3) Modifications required to comply:
   a. A foil shield was required surrounding the body of the transceiver card

4) The highest spurious emission was found to be at 2087.8 MHz. The field strength measured was 52.0 dBuV/m, or 398.1 uV/m (linear units), at a 3 meter distance.

5) Maximum EIRP with new antenna is 577 mW.

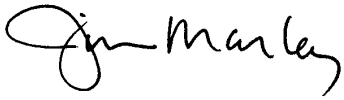
6) The antenna connector is type MMCX. This antenna will be professionally installed.

7) The Canadian Emissions designator is 16M9G1D.

Conclusion:

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

Prepared By:



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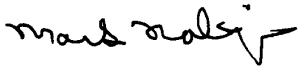
Reviewed By:



Mark Nolting
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Test Facilities:

Test Location A) 10-Meter Anechoic Chamber (Industry Canada - IC 2953, NVLAP - 200246-0, VCCI - R-722)

Constructed by Lindgren RF Enclosures, this room consists of a 17.9 by 12 by 8.3 m (inside clearance) shielded room lined with TDK absorber material. The walls, floor (conducting ground plane) and ceiling are constructed of double sided galvanized sheet steel supported by 19 mm thick particle board. The interior walls and ceiling are covered with 10 by 10 cm, 4.6 mm thick ferrite tiles and partially covered with polystyrene absorber cones. Removable floor tiles and cones covering the floor between the EUT and antenna are provided when RF immunity testing is performed.

Room is provided with a 4.0 m diameter embedded turntable and a 1.2 by 2.1 m and 2.4 by 2.4 m double knife edge doors for access. Also, the room is fed electrical EUT power via permanently installed filters and is provided with a permanently mounted video surveillance camera. A remotely controllable antenna mast is located in the room for positioning the measuring antenna from 1 to 4 m above the ground plane.

Test Location B) Compact Anechoic Chamber

Constructed by Lindgren RF Enclosures, this room consists of a 6 by 3 by 2.9 m (inside clearance) shielded room lined with TDK absorber material. The walls, floor, and ceiling are constructed of double sided galvanized sheet steel supported by 19 mm thick particle board. The interior walls and ceiling are covered with 10 by 10 cm, 4.6 mm thick ferrite tiles and partially covered with polystyrene absorber cones. Removable floor tiles and cones cover the floor between the EUT and antenna.

Room is provided with a 1.2 by 2.1 m double knife edge door for access. Also, the room is fed electrical EUT power via permanently installed filters and is provided with a video camera.

Test Location C) RF Shielded Room (VCCI - C-744, NVLAP - 200246-0)

Constructed by Lindgren RF Enclosures, this room consists of a 7.3 by 4.3 by 2.7 m (inside clearance) shielded room. The walls, floor (conducting ground plane) and ceiling are constructed of double sided galvanized sheet steel supported by 19 mm thick particle board. Room is provided with a 1.2 by 2.1m double knife edge door for access. Also, the room is fed electrical EUT power via permanently installed filters and is provided with a portable video surveillance camera.

Test Location D) Ground Reference Plane # 1 (VCCI - C-742, NVLAP - 200246-0)

Horizontal floor ground reference plane constructed of double sided galvanized sheet steel supported by 19 mm particle board and measures 3.6 by 3.0 m. It is located and bonded next to one vertical wall of the Control Room and is, therefore, provided with a 3.0 by 3.6 m vertical ground reference plane constructed of the same material. Power filters and LISNs, when required, are placed on top of and bonded to the horizontal floor ground reference plane.

Test Location E) Ground Reference Plane # 2 (VCCI - C-743, NVLAP - 200246-0)

Horizontal floor ground reference plane constructed of double sided galvanized sheet steel supported by 19 mm particle board and measures 4.3 by 5.2 m. It is located and bonded next to one vertical wall of the RFD Shielded Room and is, therefore, provided with a 4.3 by 2.8 m vertical ground reference plane constructed of the same material. Power filters and LISNs, when required, are placed on top of and bonded to the horizontal floor ground reference plane.

Test Location F) Ground Reference Plane # 3

Horizontal floor ground reference plane constructed of galvanized sheet steel measuring 3.0 by 3.6 m x 2.5mm thick.

Test Location G) Ground Reference Plane # 4 (Automotive)

Horizontal floor ground reference plane constructed of double-sided galvanized sheet steel supported by 19 mm particle board and measures 3.6 by 3.0 m.

Test Location I) Harmonic Current Test Area - Located in front of Standard Source Impedance Power Supply.

Test Location J) Magnetic Field Ground Reference Plane

Horizontal floor ground reference plane constructed of 1.5 mm thick aluminum measuring 3.6 by 2.4 m.

Test Location P) Ground Reference Plane # 5

Horizontal floor ground reference plane constructed of double-sided galvanized sheet steel supported by 19 mm particle board and measures 3.6 by 3.0 m.

Test Location R) Ground Reference Plane # 6

Ground reference plane constructed of galvanized sheet steel measuring 3.0 m x 3.6 m x 2.5 mm thick. CDNs, when required, are placed on top of and bonded to the horizontal floor ground reference plane.

Test Location Q) CISPR 12 Outdoor Site

30 meter diameter non-reflective area located behind the UL-RTP EMC Lab. Test area is used for CISPR 12 testing.

Test Location X) Other - As described in the Comments Section of Test Results.

EUT Information:

Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Telecommunications Access Point	ADC	LPS-200R-L1A	G-SHDSL host Access Point Low-profile cover**
ACC	Laptop Computer	Dell		Located outside test area
ACC	Telecom Equipment	ADC		Provide G-SHDSL to EUT

* Use = EUT - Equipment Under Test, ACC - Accessory (Not Subjected to Test), or SIM - Simulator (Not Subjected to Test)
** Similar models not tested see Product Description.

Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
0	Enclosure	N/E	No	No	
1	G-SHDSL	I/O	No	No	Supplies DC power to NID as well as data I/O
2	Antenna	I/O	No	No	Two antenna ports support twin antennas.

* AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
PMC = Process Measurement and Control Port

Product Description:

The ADC Telecommunications Access Point Model LPS-2XYR-L1Z is an 802.11(b) wireless communications device. The device is intended to be mounted on a pole or building wall to deliver Wi-Fi communications. Characters X, Y, and Z represent order options available to the customer. The LPS-2XYR-L1X is available with the following:

1. X=0: Access Point X=1: Access Controller Note: Software Change Only
2. Y=0: G.SHDSL Modem Y=2: ADSL Modem Note: SHDSL found to be worst-case
3. Z=A: Low Profile Cover Z=B: Outdoor Cover Note: Plastic cover Shape only. Hardware identical.

Example: LPS-200R-L1A = G.SHDSL Access Point with Low Profile Cover.

The wireless transceiver, antennas, interface, shielding, and enclosure are identical with all models. From previous testing for unintentional emissions it was determined that the G-SHDSL interface is worst-case emissions and was selected as the host interface to be used for this testing. The data presented from the G-SHDSL host version is intended to represent application of the Wi-Fi transceiver for the LPS model family. The software differences between Access Point and Access Control operation and the plastic cover style are considered insignificant.

EUT Internal Operating Frequencies:

Frequency (MHz)*	Description
2.08	Highest local oscillator frequency
2.4	Highest operating frequency (2.4 to 2.4835 MHz band)

Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	-	-	-	DC	1	
1	-	-	-	DC	1	Span powered.

EUT Operation Modes:

Mode #	Description
1	Data is being sent from PC outside test area to NID and Wi-Fi card for transmission.

EUT Configuration Modes:

Mode #	Description
1	NID host with 802.11(b) transceiver card built in. Twin antennas with total 5.1dBi gain are attached.

Test 1: Radiated Spurious Emissions

Test Requirement: 47 CFR Part 15.247
RSS-210 Issue 5, Amendment, Section 6.2.2(o)

Test Specification: ANSI C63.4:2001

Test Procedure:

The test was performed in accordance with the Test Requirement and Specification and configured as noted in the Test Setup. The EUT was placed inside the anechoic chamber with a fresh battery installed. A peak measurement was first made by scanning the entire test frequency range and maximizing the EUT emissions by rotating the EUT and raising the antenna height from 1 to 4 meters above the ground reference plane. Then, a measurement was taken for all peak emissions to verify each were below the Test Limits.

Radiated Disturbance Limits for Manually Operated Transmitters - Section 15.247/RSS-210 Section 6.2.2(o)
at a measurement distance of 3 meters

Power of Fundamental		Field Strength of Spurious*	
(mW)	(dBm)	(mW)	(dBm)
1000	30	100	10

Spurious inside restricted band must comply with general limits of 54 dBuV/m (average) at 3 meters. Harmonics at 2, 3, 5, 6, 8, and 9 times the fundamental are wholly or partially within restricted bands. Harmonics at 4, 7, and 10 times the fundamental frequency do not lie within restricted bands.

Radiated Disturbance Limits - General Requirements Section 15.209/RSS-210 Section 6.2.2(t1)

Frequency Range MHz	Field Strength Limit µV/m	Field Strength Limit dBµV/m	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	20*log(2400/F(kHz))	300
0.490 to 1.705	24,000/F (kHz)	20*log(24,000/F(kHz))	30
1.705 to 30	30	29.5	30
30 to 88	100	40	3
88 to 216	150	43.5	3
216 to 960	200	46	3
Above 960	500	54	3

Harmonics at 2, 3, 5, 6, 8, and 9 times the fundamental are wholly or partially within restricted bands.
Harmonics at 4, 7, and 10 times the fundamental frequency do not lie within restricted bands.

Test Deviations:

None

Test Setup: Only the following ports were tested. See EUT Information for details.

Test Item	Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
A	0	Enclosure	1	1	1

Test 1 - Results: Radiated Spurious Emissions

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	A	32	22	101	P	10/25/04	1, 2

The EUT was considered to **Pass** the Requirements.

Comments:

Comment #	Description
1	Measurements were performed without power set to maximum. All units destined for deployment within US and Canada are preset to full power at time of manufacture.
2	Product is tested with the highest gain antenna. This is the only antenna planned at this time.

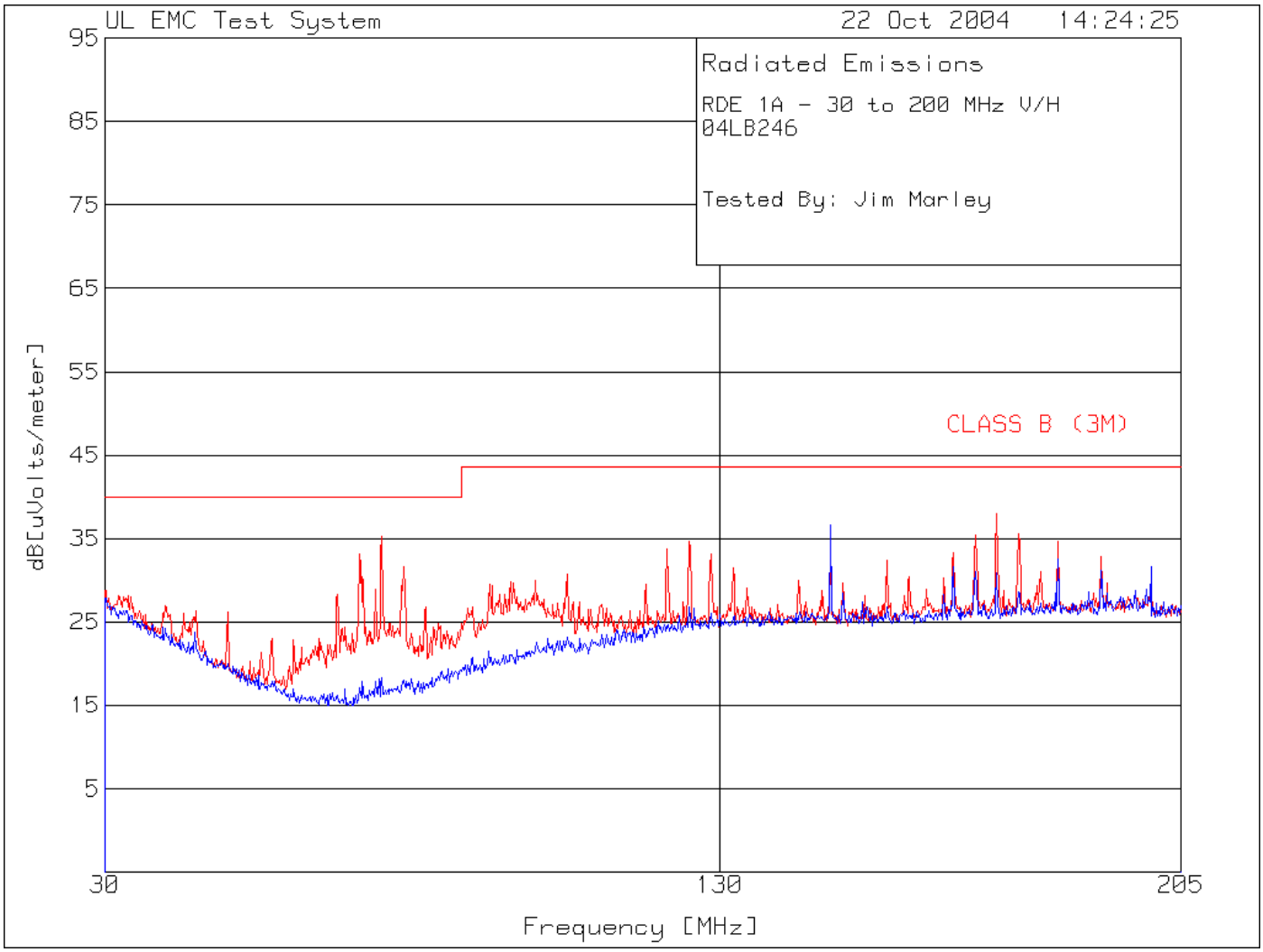
Test Equipment Used:

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0025	Biconical Antenna, 30 to 300 MHz	Schaffner, EMC	VBA6106A	3/22/04	3/31/05
AT0026	Horn Antenna, 1 to 18 GHz	EMC Test Systems	3115	6/8/04	6/31/05
AT0030	Log periodic Antenna, 200 MHz to 1000 MHz	Schaffner, EMC	3160-07	2/9/04	2/28/05
ATA084	Attenuator 6 dB, 2 GHz	Pasternack	PE7002-6	3/11/04	3/31/05
ATA085	Attenuator 6 dB, 2 GHz	Pasternack	PE7002-6	3/11/04	3/31/05
ATA096	50 ft, N male - N male	Micro-Coax	Coaxial Cable	6/25/04	2/28/05
ATA124	RF Amplifier, 1 to 1000 MHz	Miteq	AM-3A-000110-N	3/11/04	3/31/05
ATA125	RF Amplifier, 1 to 1000 MHz	Miteq	AM-3A-000110-N	3/11/04	3/31/05
ATA132	45ft. N-Male to N-Male	UL	Coaxial Cable	3/11/04	3/31/05
ATA140	RG214 Ferrite Cable	EMC Eupen	N/A	3/11/04	3/31/05
ATA143	Cable, 6ft., N-male to N-male	Micro-Coax	N/A	3/11/04	3/31/05
ATA167	RG214 Ferrite Cable	EMC Eupen	N/A	3/11/04	3/31/05
RTP077	2.45 GHz Band Reject Filter	UL	Custom	10/19/04	10/31/05
SAR003	EMC Receiver	Rohde & Schwarz	1088.7490K40	11/10/03	11/30/04
AT0029	Octave Horn Antenna, 8 to 12.4 GHz	EMC Test Systems	3160-07	10/29/04	10/31/05
AT0031	Octave Horn Antenna, 12 to 18 GHz	EMC Test Systems	3160-08	10/29/04	10/31/05

The above equipment has been calibrated and is within the manufacturer's published limit of error. Calibration is traceable to the National Institute of Standards & Technology(NIST) and conforms to ANSI/NCSL Z540-1-1994.

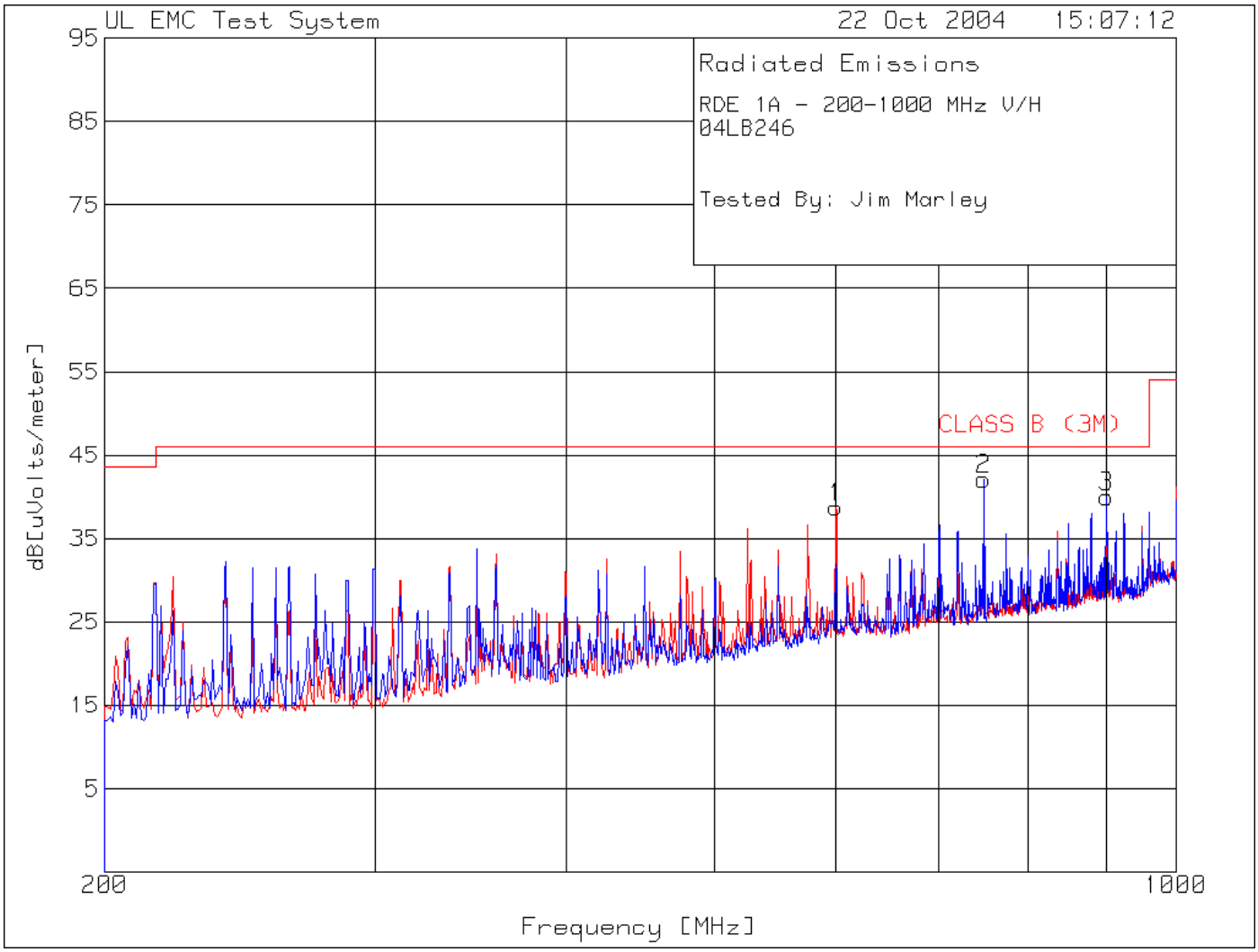
Test 1, Item A (30 to 200 MHz) - Peak Plot (Amplitude in dBuV/m):

Radiated Spurious Emissions



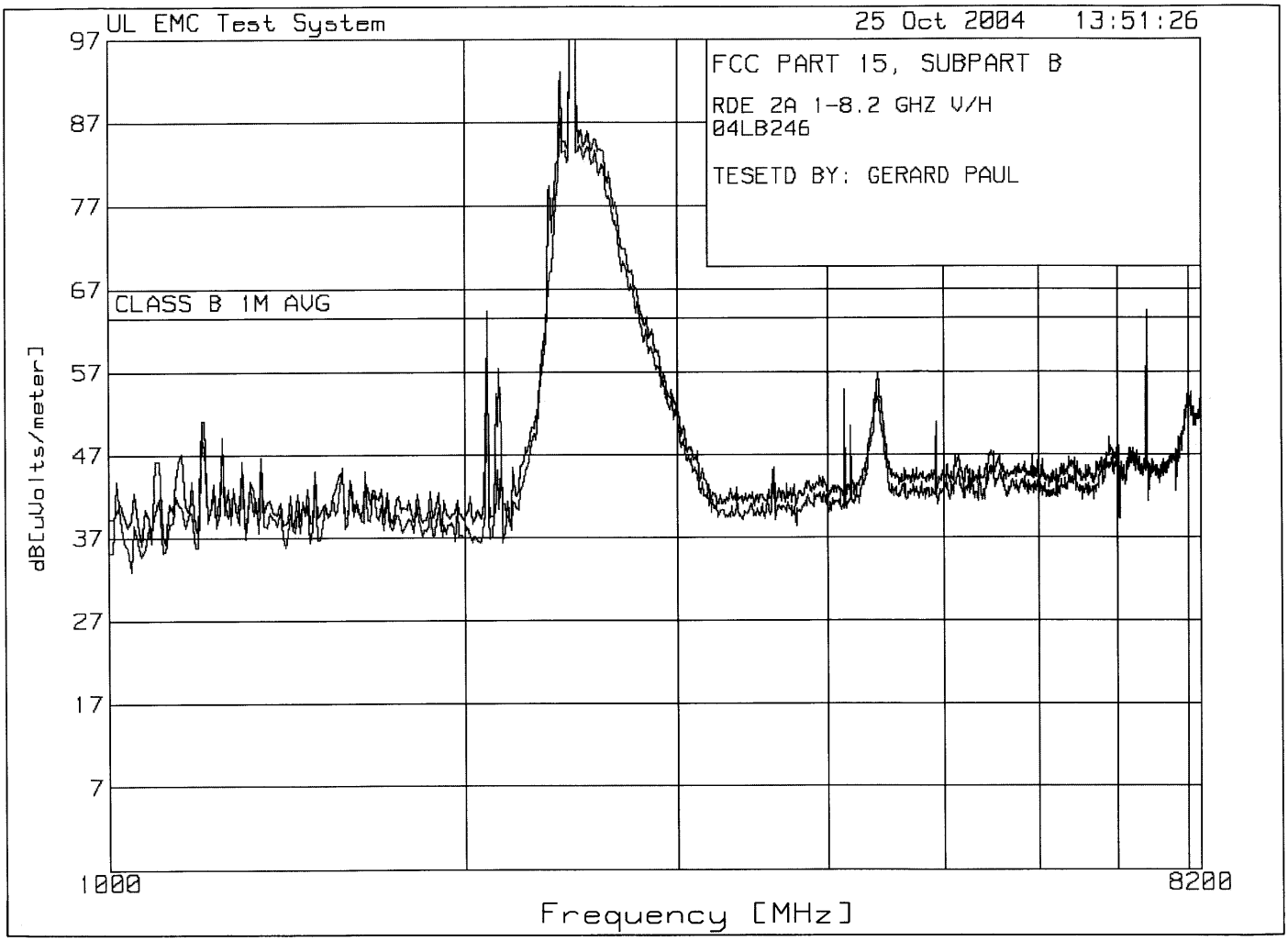
Test 1, Item A (200 to 1000 MHz) - Peak Plot (Amplitude in dBuV/m):

Radiated Spurious Emissions



Test 1, Item A (1 to 8 GHz) - Peak Plot (Amplitude in dBuV/m):

Radiated Spurious Emissions

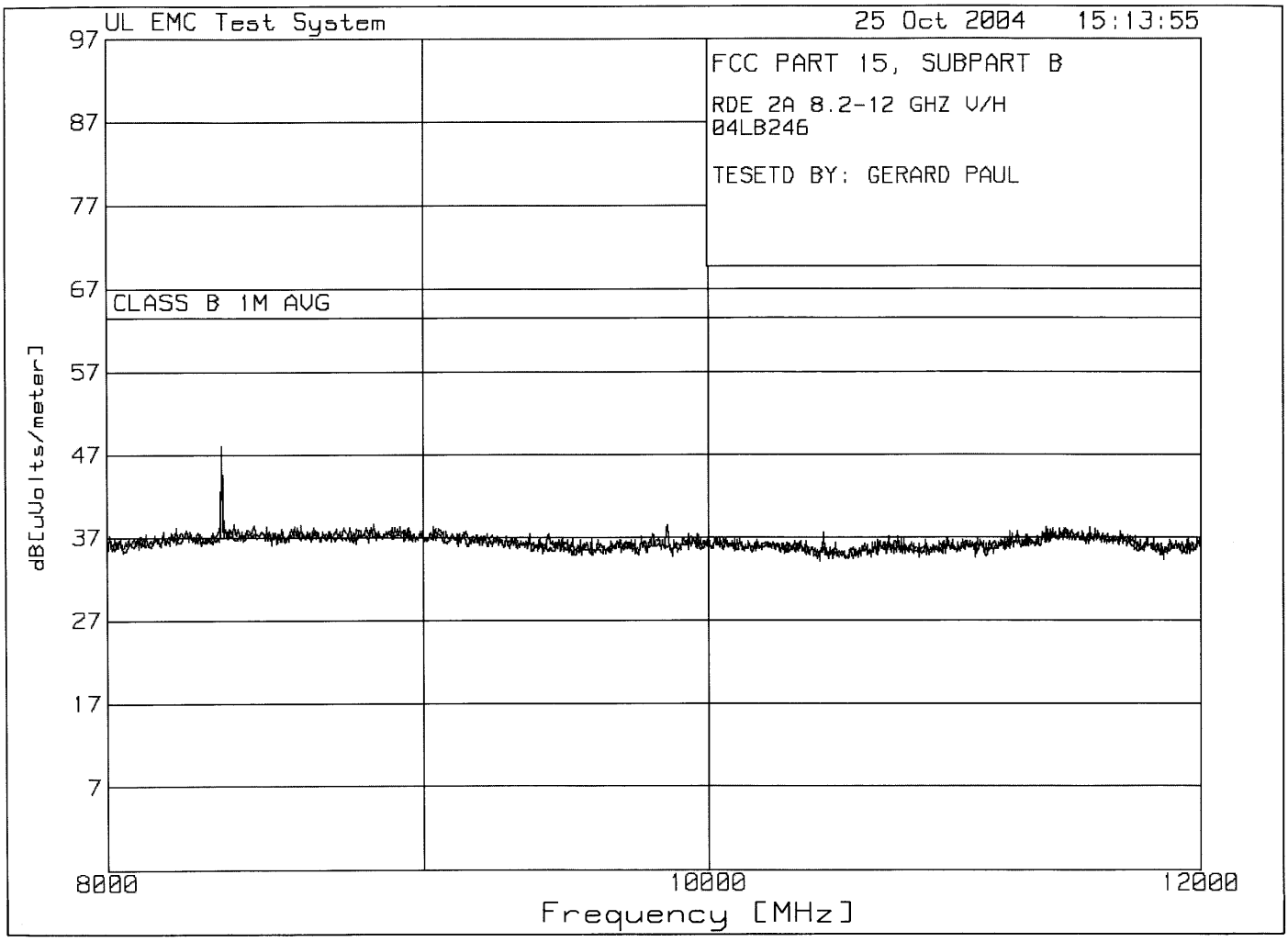


Note: Emission shown on plot from 2.2 GHz to 3.2 GHz represents mathematical correction for band reject filter used for test plus some emissions at transmit frequency. Actual emissions at 2.4 to 2.4835 GHz are determined from conducted power measurements.

Measurement performed at 1 meter distance with General Limit adjusted by 20∗log(3m/1m) dB, or 9.5 dB to improve noise floor. Frequencies close to limit when average was performed at 1 meter, were remeasured at 3 meter distance to ensure compliance (see table).

Test 1, Item A (8 to 12 GHz) - Peak Plot (Amplitude in dBuV/m):

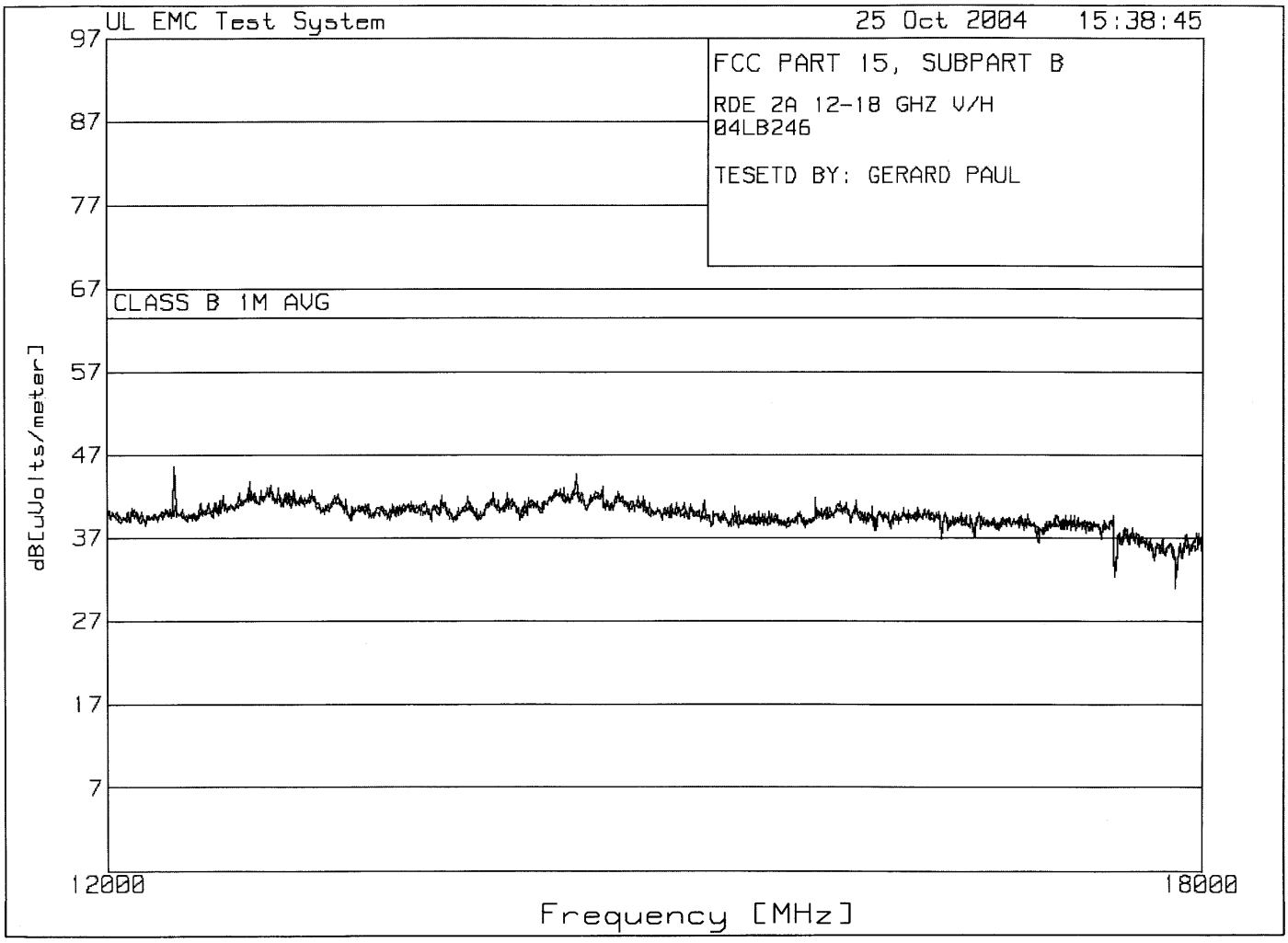
Radiated Spurious Emissions



Note: Measurement performed at 1 meter distance with General Limit adjusted by 20*log(3m/1m) dB, or 9.5 dB.

Test 1, Item A (12 to 18 GHz) - Peak Plot (Amplitude in dBuV/m):

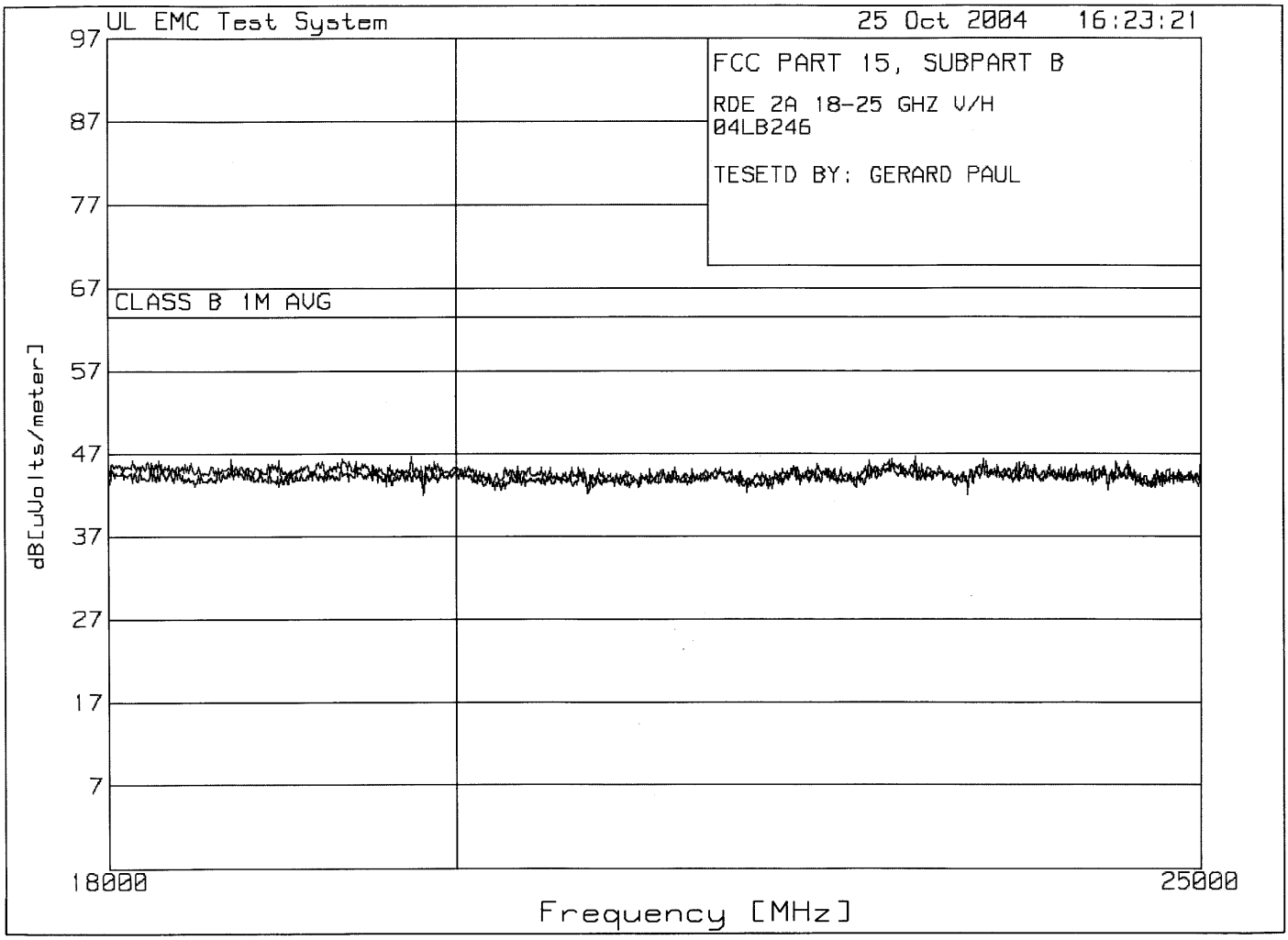
Radiated Spurious Emissions



Note: Measurement performed at 1 meter distance with General Limit adjusted by 20*log(3m/1m) dB, or 9.5 dB.

Test 1, Item A (18 to 25 GHz) - Peak Plot (Amplitude in dBuV/m):

Radiated Spurious Emissions



Note: Measurement performed at 1 meter distance with General Limit adjusted by 20*log(3m/1m) dB, or 9.5 dB.

Test 1, Item A - Discrete Data: Radiated Spurious Emissions

Test Item (A-Z)	Detector Type* (P/Q/A)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Frequency (MHz)	Measured Value (dBµV)	Equipment Correction (dB/m)	Corrected Value @ (dBµV/m)	Specified Limit** (dBµV/m)	Spec Margin (dB)	See Comment (#) ***
A	P	V	3	75.020	21.7	13.5	35.2	40.0	-4.8	
A	P	V	3	71.341	20.2	12.9	33.1	40.0	-6.9	
A	P	V	3	78.533	17.4	14.3	31.7	40.0	-8.3	
A	P	V	3	175.045	15.3	22.6	37.9	43.5	-5.6	
A	Q	V	3	748.507	42.7	-3.9	38.8	46.0	-7.2	
A	A	V	1	2087.798	68.2	-6.1	62.1	63.5	-1.4	1
A	A	V	3	2087.798	56.4	-4.4	52.0	54.0	-2.0	2, 3
A	A	V	1	7389.321	26.5	7.5	34.0	63.5	-29.5	1
A	P	V	1	8348.348	50.5	-2.4	48.1	63.5	-15.4	1
A	P	V	1	12306.306	44.5	1.1	45.6	63.5	-17.9	1
A	P	V	1	14288.288	44.0	0.6	44.6	63.5	-18.9	1
A	P	V	1	18679.680	45.8	0.6	46.4	63.5	-17.1	1
A	P	V	1	19723.724	44.3	2.4	46.7	63.5	-16.8	1

*Equipment Correction = Antenna Factor + Cable Loss - Preamp Gain.
**Limit presented represents FCC Class B (unintentional) and 15.209 (intentional, general limit). As no spurious emission exceeded the general limit in 15.209, then no comparison to 15.247 harmonic limit is necessary.

Comments:

Comment #	Description
1	Product was measured at 1 meter to improve noise floor.
2	Frequency close to the limit at 1 meter, 2087.798 MHz, is a local oscillator present with transmitter RF off. This frequency was remeasured at 3 meter distance with RF output off and band-reject filter removed from measurement setup and found to comply.
3	Highest Spurious Emissions. 2087.798 MHz, 52.0 dBuV/m or 398.1 uV/m, @ 3 meter distance.

Restricted Bands:

The EUT is verified to produce only spurious emissions in the bands listed below. Where spurious emissions exist they must comply with the general limits from 47 CFR Part 15, Section 15.209. Results from measurements are examined to ensure that no spurious emission in a restricted band (below) exceeds the general limits in Section 15.209.

The restricted bands from Section 15.205 are:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	608 - 614	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	960 - 1240	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	1300 - 1427	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1435 - 1626.5	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1645.5 - 1646.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1660 - 1710	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1718.8 - 1722.2	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	2200 - 2300	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2310 - 2390	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2483.5 - 2500	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2655 - 2900	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	3260 - 3267	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3332 -3339	23.6 - 24.0
12.29 - 12.293	127.72 - 167.17	3345.8 - 3358	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3600 - 4400	36.43 - 36.5
12.57675 - 12.57725	332-335.4		Above 38.6
13.36 - 13.41	399.9 - 410		

Radiated Disturbance Limits - General Requirements Section 15.209

Frequency Range MHz	Field Strength Limit µV/m	Field Strength Limit dBµV/m	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	20*log(2400/F(kHz))	300
0.490 to 1.705	24,000/F (kHz)	20*log(24,000/F(kHz))	30
1.705 to 30	30	29.5	30
30 to 88	100	40	3
88 to 216	150	43.5	3
216 to 960	200	46	3
Above 960	500	54	3

Results:

From the data recorded in Test 1, all spurious emissions falling within restricted bands were observed to meet the general limits of 15.209.

Radiated Power - Maximum EIRP:

The maximum radiated power in EIRP is calculated from the conducted power measurements (previously performed) and the new, higher gain antenna.

Radiated Power = Conducted Power $*$ $10^{(\text{Antenna Gain dBi}/10)}$

Where: Conducted Power = 178 mW (from previous measurement)

Antenna Gain = 5.1 dBi

Therefore Radiated Power = 178 mW $*$ 3.24 = 577 mW EIRP

Maximum Permissible Exposure:

This device is shown to meet both Controlled/Occupational exposure and Uncontrolled exposure limits at a distance of 20 cm.

Power Density = EIRP / (4 * Pi * R^2),
where EIRP = Output Power * Antenna Gain

Limit for **Uncontrolled** Exposure at Operating Frequency	**10**	W/m^2	- or -	**1**	mW/cm^2

Uncontrolled/Occupational Exposure

Operating Frequency	2440	MHz			
Output Power (Peak)	0.178	Watts			
Antenna Gain	5.1	dB	or (linear)	3.235937	(unitless)
Separation Distance	0.2	m	-or-	7.874	inches
Peak Power Density	1.146	W/m^2	- or -	0.1146	mW/cm^2
Exposure % (over 6 min timespan for uncontrolled)	100%				
Transmit Duty Cycle (Peak-to-Average Ratio)	100%				
Average Power Density	**1.146**	W/m^2	- or -	**0.1146**	mW/cm^2

Limit for **Uncontrolled** Exposure at Operating Frequency	**10**	W/m^2	- or -	**1**	mW/cm^2

Test 2: Occupied Bandwidth - 20 dB Bandwidth

Test Requirement: RSS-210 Issue 5, Amendment, Section 6.2.2(o)

Test Specification: RSS-210 Issue 5, Amendment, Section 6.2.2(o)

Test Procedure:

The test was performed in accordance with the Test Requirement and Specification and configured as noted in the Test Setup. The EUT output was connected to the input of a calibrated spectrum analyzer. An attenuator was inserted into the setup to reduce the signal level.

As this device is intentionally broadband, no maximum bandwidth limit exists provided the device is demonstrated to comply with the bandedge requirements.

Test Deviations:

None

Test Setup: Only the following ports were tested. See EUT Information for details.

Test Item	Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
A	2	Antenna Port	1	1	1

Test 2 - Results: Occupied Bandwidth

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
D	A	42	23	101	P	12/9/04	

The EUT was considered to **Pass** the Requirements.

Comments:

Comment #	Description

Test Equipment Used:

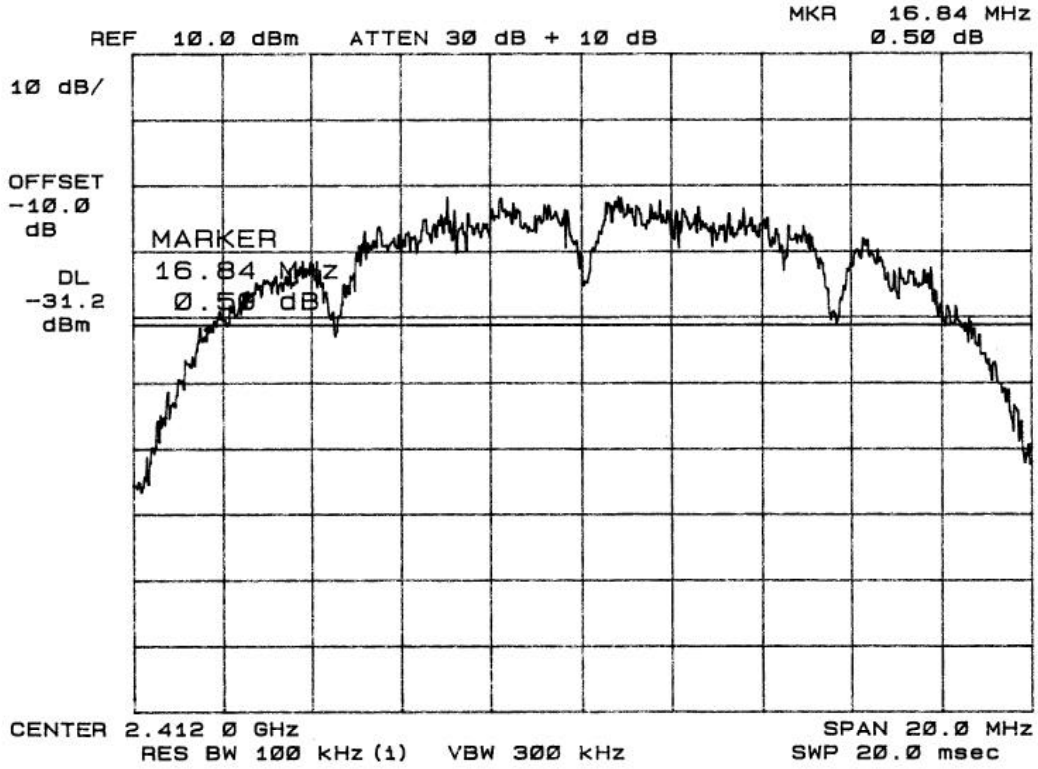
Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SAR001	EMC Spectrum Analyzer/Receiver	Hewlett-Packard	8566B	2/2/04	2/28/05

The above equipment has been calibrated and is within the manufacturer's published limit of error. Calibration is traceable to the National Institute of Standards & Technology(NIST) and conforms to ANSI/NCSL Z540-1-1994.

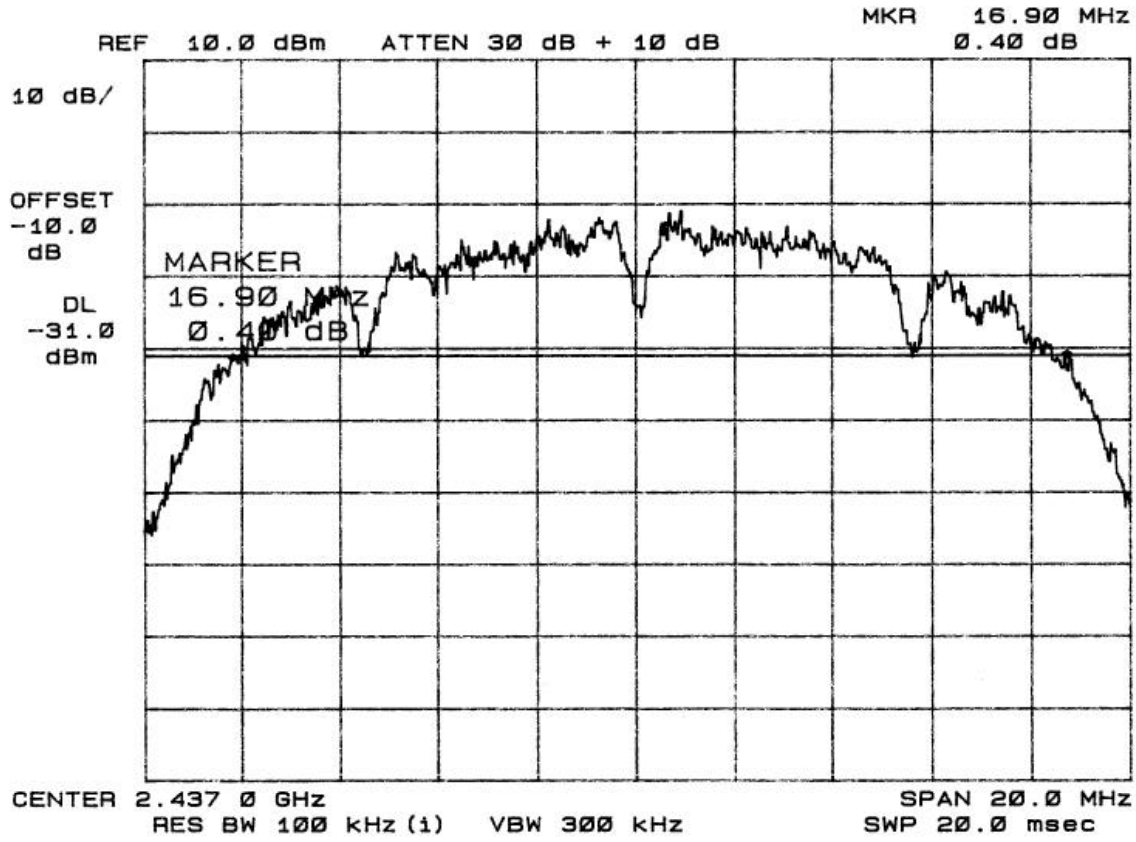
Test 2, Item A - 20 dB Bandwidth:

Test Item (A-Z)	Channel (#)	Center Frequency (MHz)	20 dB Bandwidth (MHz)	Comments (#)
A	1	2412	16.84	
A	6	2437	16.90	
A	11	2462	16.94	

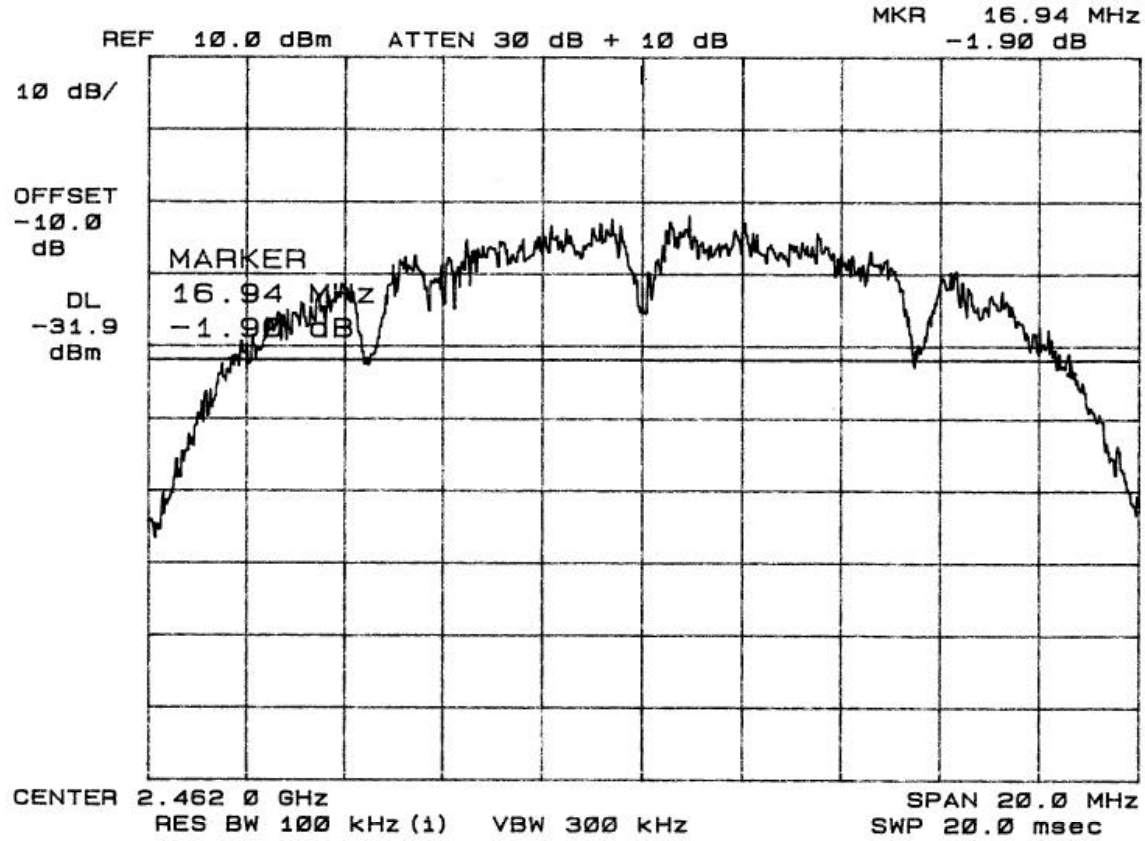
Channel 1:



Channel 6:



Channel 11:



Test 3: Conducted Spurious Emissions

Test Requirement: 47 CFR Part 15.247
RSS-210 Issue 5, Amendment, Section 6.2.2(o)

Test Specification: ANSI C63.4:2001

Test Procedure:

The test was performed in accordance with the Test Requirement and Specification and configured as noted in the Test Setup. The antenna port was connected to the front end of the spectrum analyzer. A calibrated attenuator was used to attenuate the signal for measurement.

Radiated Disturbance Limits for Manually Operated Transmitters - Section 15.247/RSS-210 Issue 5, Amendment, Section 6.2.2(o) at a measurement distance of 3 meters

Power of Fundamental		Field Strength of Spurious*	
(mW)	(dBm)	(mW)	(dBm)
1000	30	100	10

Test Deviations:

None

Test Setup: Only the following ports were tested. See EUT Information for details.

Test Item	Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
A	2	Antenna Port	1	1	1

Test 3 - Results: Radiated Spurious Emissions

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	D	28	23	101	P	1/18/2005	1

The EUT was considered to **Pass** the Requirements.

Comments:

Comment #	Description
1	Due to brief transmission cycle of the transmitter by the support equipment, the resolution bandwidth of the measurement receiver was widened to 1 MHz to facilitate testing. Results at 100 kHz resolution bandwidth would be lower.

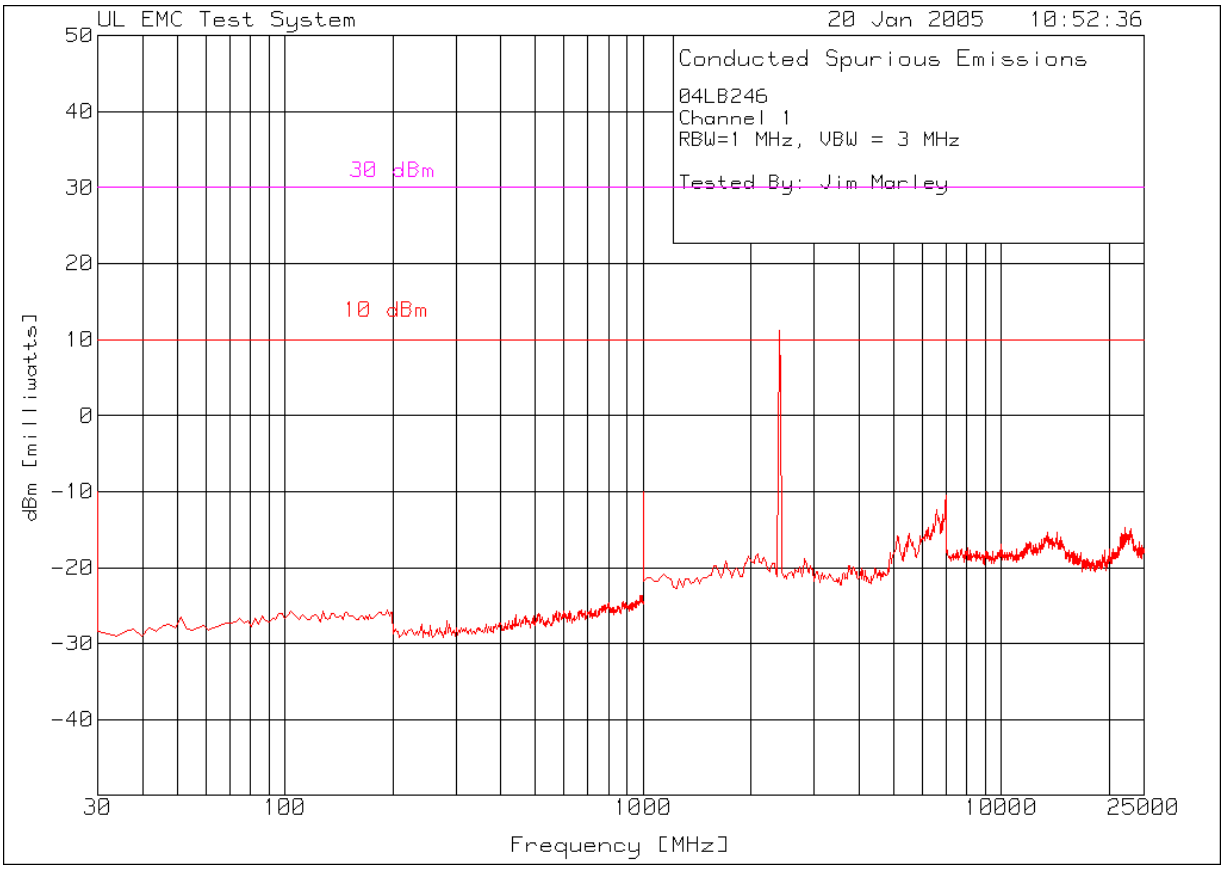
Test Equipment Used:

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SAR001	EMC Spectrum Analyzer/Receiver	Hewlett-Packard	8566B	2/2/04	2/28/05
ATA160	30 dB attenuator, 50 W	-	-	8/31/04	8/31/05

The above equipment has been calibrated and is within the manufacturer's published limit of error. Calibration is traceable to the National Institute of Standards & Technology(NIST) and conforms to ANSI/NCSL Z540-1-1994.

Test 3, Item A – Conducted Spurious Emissions:

Conducted Spurious Emissions – Channel 1



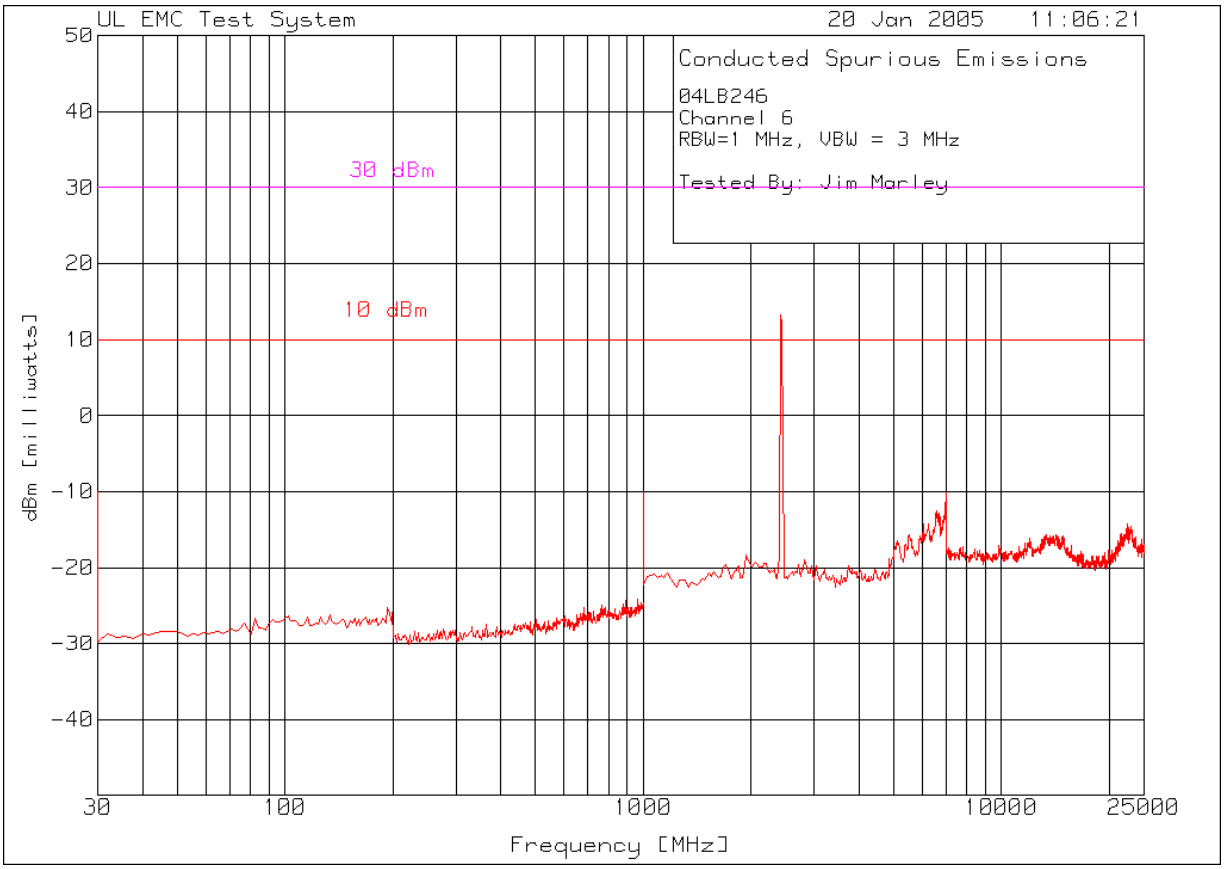
No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Attenuator Factor [dB]	Conversion Factor [dBm/dBuV]	Level Limit [dBm]	Spurious Limit [dBm]	Power Limit [dBm]	Margin [dB]
1	2393.393	87.85 pk	30.4	-107	11.25		30	-18.75
2	4891.892	58.16 pk	30.8	-107	-18.04	10		-28.04
3	7342.342	58.87 pk	29.9	-107	-18.23	10		-28.23
4	9720.721	58.48 pk	30.5	-107	-18.02	10		-28.02
5	11954.955	60.04 pk	30.4	-107	-16.56	10		-26.56
6	14261.261	60.93 pk	30.7	-107	-15.37	10		-25.37
7	22141.141	61.88 pk	30.4	-107	-14.72	10		-24.72

LIMIT 1: 10 dBm (10 mW)
LIMIT 2: 30 dBm (1 Watt)

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

Test 3, Item A – Conducted Spurious Emissions:

Conducted Spurious Emissions – Channel 6



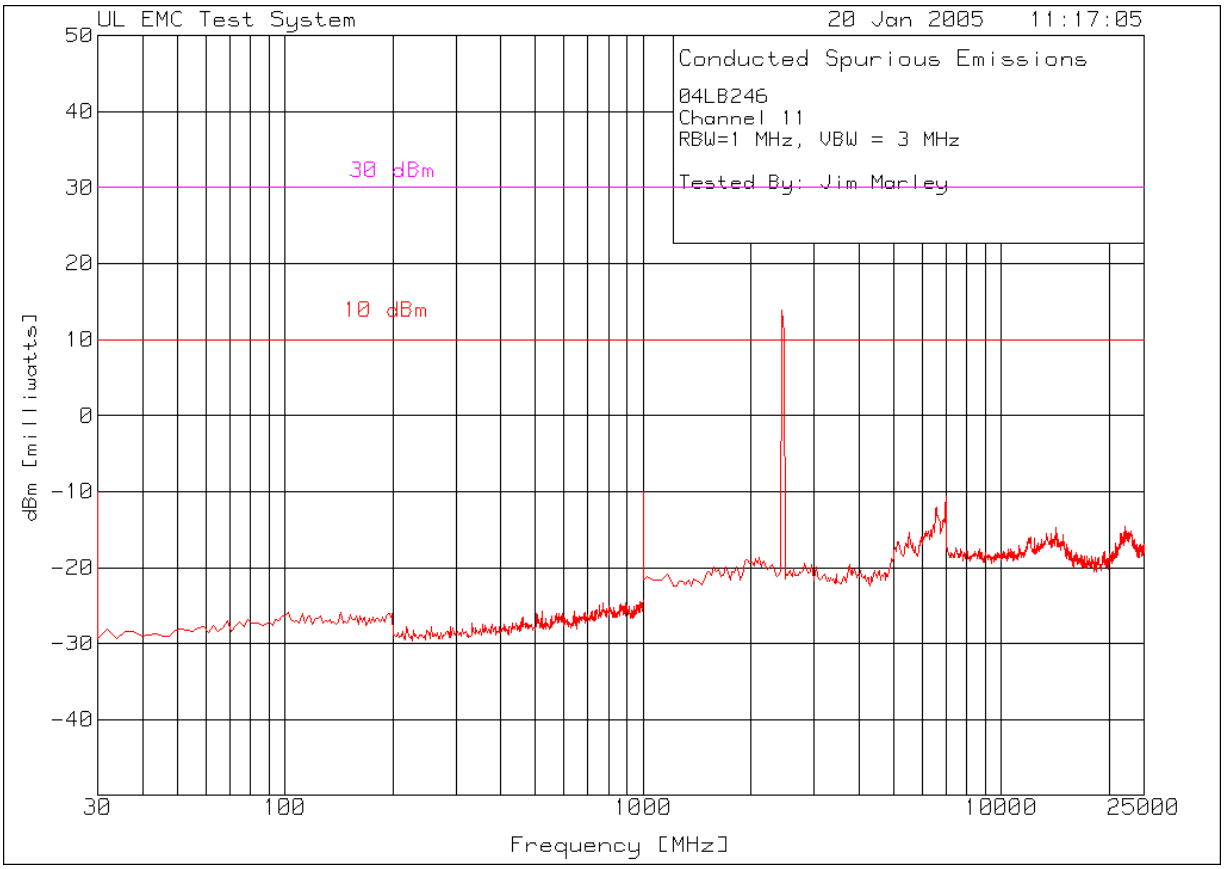
No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Attenuator Factor [dB]	Conversion Factor [dBm/dBuV]	Level Limit [dBm]	Spurious Limit [dBm]	Power Limit [dBm]	Margin [dB]
1	2417.417	89.92 pk	30.4	-107	13.32		30	-16.68
2	4867.868	57.36 pk	30.8	-107	-18.84	10		-28.84
3	7342.342	58.97 pk	29.9	-107	-18.13	10		-28.13
4	9696.697	58.38 pk	30.5	-107	-18.12	10		-28.12
5	12075.075	59.81 pk	30.6	-107	-16.59	10		-26.59
6	14405.405	60.32 pk	30.7	-107	-15.98	10		-25.98
7	22573.574	61.92 pk	30.4	-107	-14.68	10		-24.68

LIMIT 1: 10 dBm (10 mW)
LIMIT 2: 30 dBm (1 Watt)

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

Test 3, Item A – Conducted Spurious Emissions:

Conducted Spurious Emissions – Channel 11



No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Attenuator Factor [dB]	Conversion Factor [dBm/dBuV]	Level Limit [dBm]	Spurious Limit [dBm]	Power Limit [dBm]	Margin [dB]
1	2441.441	90.53 pk	30.4	-107	13.93		30	-16.07
2	4867.868	56.07 pk	30.8	-107	-20.13	10		-30.13
3	7294.294	59.19 pk	29.7	-107	-18.11	10		-28.11
4	9720.721	58.48 pk	30.5	-107	-18.02	10		-28.02
5	12339.339	60.27 pk	30.6	-107	-16.13	10		-26.13
6	14213.213	61.68 pk	30.6	-107	-14.72	10		-24.72
7	22141.141	62.06 pk	30.4	-107	-14.54	10		-24.54

LIMIT 1: 10 dBm (10 mW)
LIMIT 2: 30 dBm (1 Watt)

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

Accreditation Certificates:

National Institute of Standards and Technology NVLAP® National Voluntary Laboratory Accreditation Program

ISO/IEC 17025:1999
ISO 9002:1994

Scope of Accreditation

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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS — **NVLAP LAB CODE 200246-0**

UNDERWRITERS LABORATORIES, INC.

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NVLAP Code	*Designation / Description*
Emissions Test Methods:	
12/CIS14	CISPR 14-1 (March 30, 2000): Limits and Methods of Measurement of Radio interference Characteristics of Household Electrical Appliances, Portable Tools and Similiar Electrical Apparatus - Part 1: Emissions
12/CIS14a	EN 55014-1 (1993) with Amendments A1 (1997) & A2 (1999)
12/CIS14b	AS/NZS 1044 (1995)
12/CIS14c	CNS 13783-1
12/CIS22	IEC/CISPR 22 (1997) and EN 55022 (1998): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
12/CIS22a	IEC/CISPR 22 (1993): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1 (1995) and Amendment 2 (1996)

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NVLAP Code	*Designation / Description*
12/CIS22b	CNS 13438 (1997): Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment
12/EM02a	IEC 61000-3-2, Edition 2.1 (2001-10), EN 61000-3-2 (2000), and AS/NZS 2279.1 (2000): Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A)
12/EM03b	IEC 61000-3-3, Edition 1.1(2002-03) & EN 61000-3-3, A1(2001): EMC - Part 3-3: Limits - Limitations of voltage changes, voltage fluctuations and flicker, in public low-voltage supply-systems, for equipment with rated current <=16 A per phase and not subject to conditional connections
12/FCC15b	ANSI C63.4 (2001) with FCC Method - 47 CFR Part 15, Subpart B: Unintentional Radiators
12/T51	AS/NZS CISPR 22 (2002) and AS/NZS 3548 (1997): Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment
Immunity Test Methods:	
12/I01	IEC 61000-4-2, Edition 2.1 (2001) including Amds. 1 & 2 and EN 61000-4-2: Electrostatic Discharge Immunity Test
12/I02	IEC 61000-4-3, Edition 2.0 (2002-03) and EN 61000-4-3: Radiated Radio-Frequency Electromagnetic Field Immunity Test

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NVLAP Code	*Designation / Description*
12/I03	IEC 61000-4-4 (1995) + Amd. 1 (2000) & Amd. 2 (2001) and EN 61000-4-4: Electrical Fast Transient/Burst Immunity Test
12/I04	IEC 61000-4-5, Edition 1.1 (2001-04) and EN 61000-4-5: Surge Immunity Test
12/I05	IEC 61000-4-6, Edition 2.0 (2003-05) and EN 61000-4-6: Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields
12/I06	IEC 61000-4-8, Edition 1.1 (2001) and EN 61000-4-8: Power Frequency Magnetic Field Immunity Test
12/I07	IEC 61000-4-11, Edition 1.1 (2001-03) and EN 61000-4-11: Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests
Safety Test Methods:	
12/T41	AC/ACIF S001 (2001): Safety Requirements for Customer Equipment
12/T50	AS/NZS 3260 (1993) + Supplement 1 (1996): Safety of Information Technology Equipment Including Electrical Business Equipment
Telecommunications Test Methods:	
12/1089d	GR-1089-CORE, Issue 3 (April 2002): EMC and Electrical Safety - Generic Criteria for Network Telecommunications Equipment (sections: 2.1.2.1, 2.1.2.2, 2.1.4, 2.2, 3.2, 3.3, 4.6.2, 4.6.5, 4.6.7 - 4.6.17, 4.7, 5.2, 5.3.1, 5.4, 6, 7.2 - 7.7, 8, and 9.2 - 9.12)

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UNDERWRITERS LABORATORIES, INC.

NVLAP Code	*Designation / Description*
12/76200a	SBC-TP-76200, Issue 4 (May 2003): Network Equipment Power, Grounding, Environmental, and Physical Design Requirements (sections: 6.1B, 7.1, 7.2, 7.3, 7.4, and 10.1 - 10.4B)
12/GR63a	GR-63-CORE, Issue 2 (April 2002): NEBS (TM) Requirements: Physical Protection (sections: 2, 3, 4.1, 4.2.3, 4.3, 4.4.1, 4.4.3, 4.4.4, 4.5, 4.6, and 4.7)

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Measurement Uncertainty Statement

Test	Expanded Estimate of Uncertainty (k = 2, for 95% of a normal distribution)	Units
Radiated Disturbance Emissions: • 3 and 10 meter measurement distances • 1 meter measurement distance	 +/- 3.8 dB +/- 2.3 dB	 Volts/meter Volts/meter
Conducted Disturbance Emissions (9 kHz – 30 MHz):	+/- 3.4 dB	Volts
Electrostatic Discharge	+/- 2.2 %	Volts
Radiated RF Immunity (Chamber):	+/- 2.7 dB	Volts/meter
Electrical Fast Transients/Bursts Immunity	+/- 4.6 %	Volts
Surge Immunity	+/- 4.6 %	Volts
Conducted RF Immunity	+/- 2.8 dB	Volts
Power Frequency Magnetic Field Immunity	+/-13.6 %	Amps/meter
Voltage Dips and Short Interrupts	+/-4.2 %	Volts
Radiated RF Immunity (Tri-plate)	+/-3.2 %	Volts/meter
Disturbance Power (30 – 300 MHz)	+/-3.5%	Volts

CISPR 16-4:2000 Statement

The UL-RTP estimate of expanded measurement uncertainty listed above for Conducted Disturbance (+/- 3.4 dB), Disturbance Power (+/- 3.5 dB), and Radiated Disturbance (+/-3.8 dB) are less than the Values of U_{cispr} as listed in Table 1 of CISPR 16-4. Therefore:

- Compliance is deemed to occur if no measured disturbance reported exceeds the disturbance limits.
- Non-compliance is deemed to occur if any measured disturbance reported exceeds the disturbance limits.