



**FCC CFR47 PART 15 SUBPART C  
CLASS II PERMISSIVE CHANGE  
TEST REPORT**

**Per**

**FCC PART 15 SUBPART C TECHNICAL REQUIREMENT  
WI-FI BASE STATION**

**MODEL NAME: VP2200 (IDU); VP2210 (ODU)**

**FCC ID: QLVNESH24SWP**

**REPORT NUMBER: 04U2788-1**

**ISSUE DATE: JULY 7, 2004**

*Prepared for*  
**VIVATO, INC.**  
**12610 E. MIRABEAU PARKWAY, #900**  
**SPOKANE, WA 99216, USA**

*Prepared by*  
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## 1. TEST RESULT CERTIFICATION

**COMPANY NAME:** VIVATO, INC.  
12610 E. MIRABEAU PARKWAY, #900  
SPOKANE, WA 99216

**EUT DESCRIPTION:** 802.11b/g Wi-Fi Base Station

**MODEL:** VP2200 (IDU); VP2210 (ODU)

**MODEL DIFFERENCE:** VP2200 is designed for indoor uses while VP2210 is for outdoor uses. VP2210 uses the same electronics and antenna as VP2200 does.

**DATE TESTED:** June 28, 2004

| APPLICABLE STANDARDS  |                         |
|-----------------------|-------------------------|
| STANDARD              | TEST RESULTS            |
| FCC PART 15 SUBPART C | NO NON-COMPLIANCE NOTED |

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Approved & Released For CCS By:



THU CHAN  
EMC SUPERVISOR  
COMPLIANCE CERTIFICATION SERVICES

Tested By:



DAVID GARCIA  
EMC ENGINEER  
COMPLIANCE CERTIFICATION SERVICES

## 2. EUT DESCRIPTION

The EUT is a wireless device operating in the 2.4GHz band, providing network connections to Wi-Fi (802.11b/g) client devices.

## 3. CLASS II PERMISSIVE CHANGE DESCRIPTION

This is a Class II permissive change for FCC ID: QLNVSH24SWP, originally granted on April 16, 2004.

The major change filed under this application includes:

1. VP2200 (Indoor unit) - Replaced the original power supply PCA with a new power supply PCA;
2. VP2210 (Outdoor unit) – Placed existing antenna and electronics that are used in VP2200 into a weather-tight enclosure;
3. Added a transient surge protection PCA for the I/O ports to the outdoor VP2210;
4. Added a transient surge protection/environmental control PCA for the incoming input voltage to the outdoor VP2210. This PCA will also control a fan and a heater plate;
5. Request that the same FCC IC#: QLNVSH24SWP be used for both the VP2200 and VP2210.

## 4. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4/2001, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

## 5. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.



No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

## 6. CALIBRATION AND UNCERTAINTY

### 6.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 6.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER                           | UNCERTAINTY    |
|-------------------------------------|----------------|
| Radiated Emission, 30 to 200 MHz    | +/- 3.3 dB     |
| Radiated Emission, 200 to 1000 MHz  | +4.5 / -2.9 dB |
| Radiated Emission, 1000 to 2000 MHz | +4.5 / -2.9 dB |
| Power Line Conducted Emission       | +/- 2.9 dB     |

Uncertainty figures are valid to a confidence level of 95%.

### 6.3. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

FOR VP2200

| TEST EQUIPMENT LIST                  |              |                  |            |            |
|--------------------------------------|--------------|------------------|------------|------------|
| Name of Equipment                    | Manufacturer | Model No.        | Serial No. | Due Date   |
| EMI Test Receiver                    | R & S        | ESHS 20          | 827129/006 | 7/17/2004  |
| LISN, 10 kHz ~ 30 MHz                | FCC          | 50/250-25-2      | 114        | 10/13/2004 |
| LISN, 10 kHz ~ 30 MHz                | Solar        | 8012-50-R-24-BNC | 8379443    | 10/13/2004 |
| Site A Line Stabilizer / Conditioner | Tripplite    | LC-1800a         | A0051681   | CNR        |
| Site B Antenna, Bilog                | Chase        | CBL6112B         | 2586       | 3/8/2005   |
| RF Preselector, 20 Hz ~ 2 GHz        | HP           | 85685A           | 2817A00756 | 8/22/2004  |
| SA RF Section, 1.5 GHz               | HP           | 85680B           | 2814A04227 | 2/22/2005  |
| SA Display Section 2                 | HP           | 85662A           | 2816A16696 | 5/24/2005  |
| Quasi-Peak Adaptor                   | HP           | 85650A           | 2811A01155 | 5/24/2005  |

FOR VP2210

| TEST EQUIPMENT LIST                  |                |                  |            |            |
|--------------------------------------|----------------|------------------|------------|------------|
| Name of Equipment                    | Manufacturer   | Model No.        | Serial No. | Due Date   |
| EMI Test Receiver                    | R & S          | ESHS 20          | 827129/006 | 7/17/2004  |
| LISN, 10 kHz ~ 30 MHz                | FCC            | 50/250-25-2      | 114        | 10/13/2004 |
| LISN, 10 kHz ~ 30 MHz                | Solar          | 8012-50-R-24-BNC | 8379443    | 10/13/2004 |
| Site A Line Stabilizer / Conditioner | Tripplite      | LC-1800a         | A0051681   | CNR        |
| 30MHz---- 2Ghz                       | Sunol Sciences | JB1 Antenna      | A121003    | 12/22/2004 |
| EMI Receiver, 9 kHz ~ 2.9 GHz        | HP             | 8542E            | 3942A00286 | 11/21/2004 |
| RF Filter Section                    | HP             | 85420E           | 3705A00256 | 11/21/2004 |

## 7. EQUIPMENT MODIFICATIONS

To achieve compliance to FCC Section 15.247 technical limits, the following change(s) were made during compliance testing:

**Ferrite cores were added to the internal LAN cables of the outdoor unit VP2210 as shown in the photo in the Setup Photos Section.**

## 8. SETUP OF EQUIPMENT UNDER TEST

### SUPPORT EQUIPMENT

| TEST PERIPHERALS   |              |              |               |                |
|--------------------|--------------|--------------|---------------|----------------|
| Device Type        | Manufacturer | Model Number | Serial Number | FCC ID         |
| Laptop             | IBM          | X24          | FX-GU403      | AN0SY4W2662DFJ |
| USB/Serial Adapter | Belkin       | FSU109       | N/A           | N/A            |

### I/O CABLES

FOR VP2200

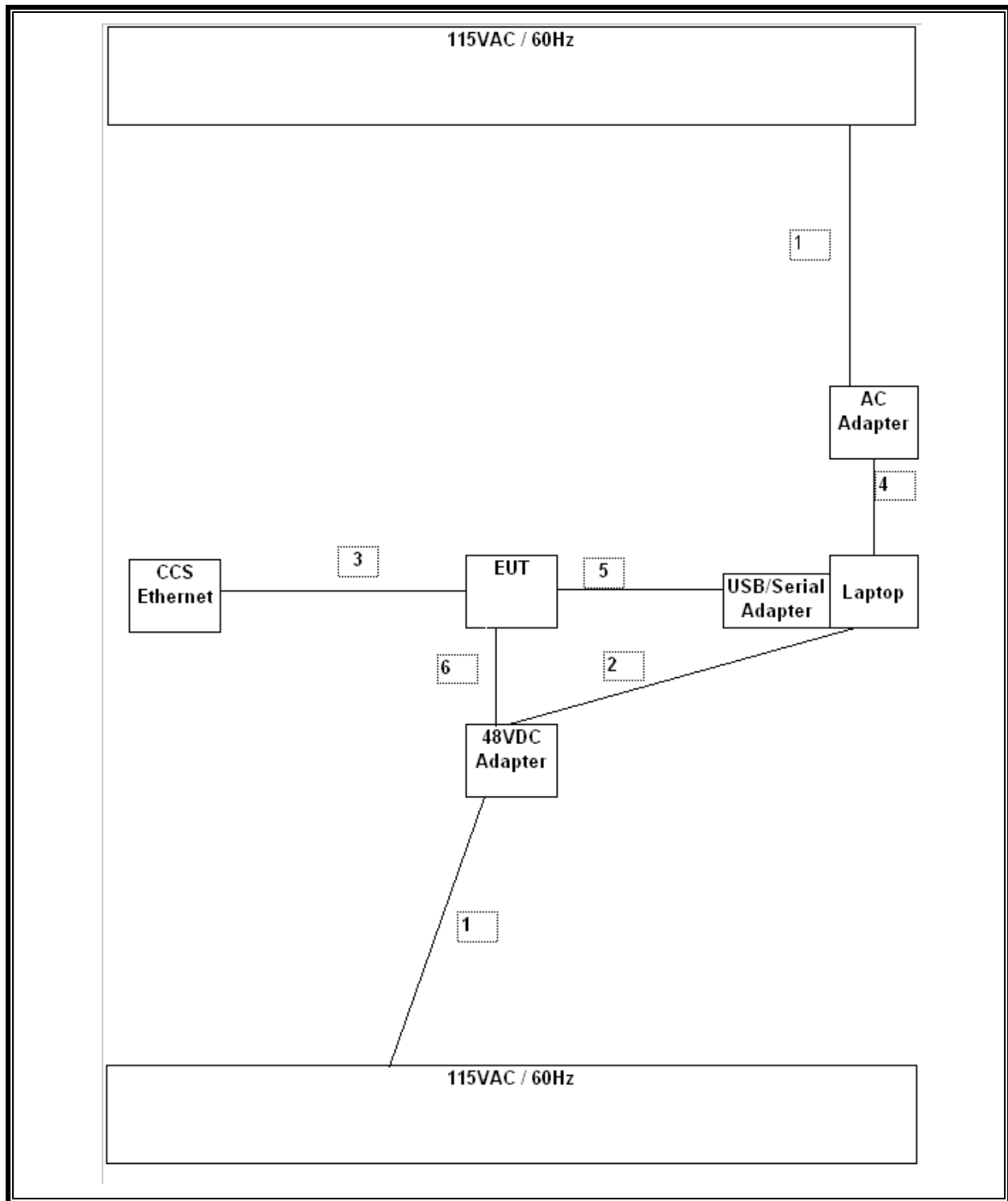
| TEST I / O CABLES |          |               |                |               |              |              |         |                  |
|-------------------|----------|---------------|----------------|---------------|--------------|--------------|---------|------------------|
| Cable No          | I/O Port | # of I/O Port | Connector Type | Type of Cable | Cable Length | Data Traffic | Bundled | Remark           |
| 1                 | AC       | 2             | IEC            | unshielded    | 1.5 meters   | no           | yes     | N/A              |
| 2                 | LAN      | 1             | RJ45           | unshielded    | 3+30 meters  | yes          | no      | Crossover Cable  |
| 3                 | LAN      | 1             | RJ45           | unshielded    | 3+30 meters  | no           | no      | LAN/DC over LAN  |
| 4                 | DC       | 1             | DC             | unshielded    | 1 meter      | no           | no      | DC from Adapter  |
| 5                 | Serial   | 1             | RJ45           | unshielded    | 3 meters     | yes          | yes     | Serial interface |
| 6                 | DC/LAN   | 1             | RJ45           | unshielded    | 3 meters     | yes          | no      | DC over LAN      |

FOR VP2210

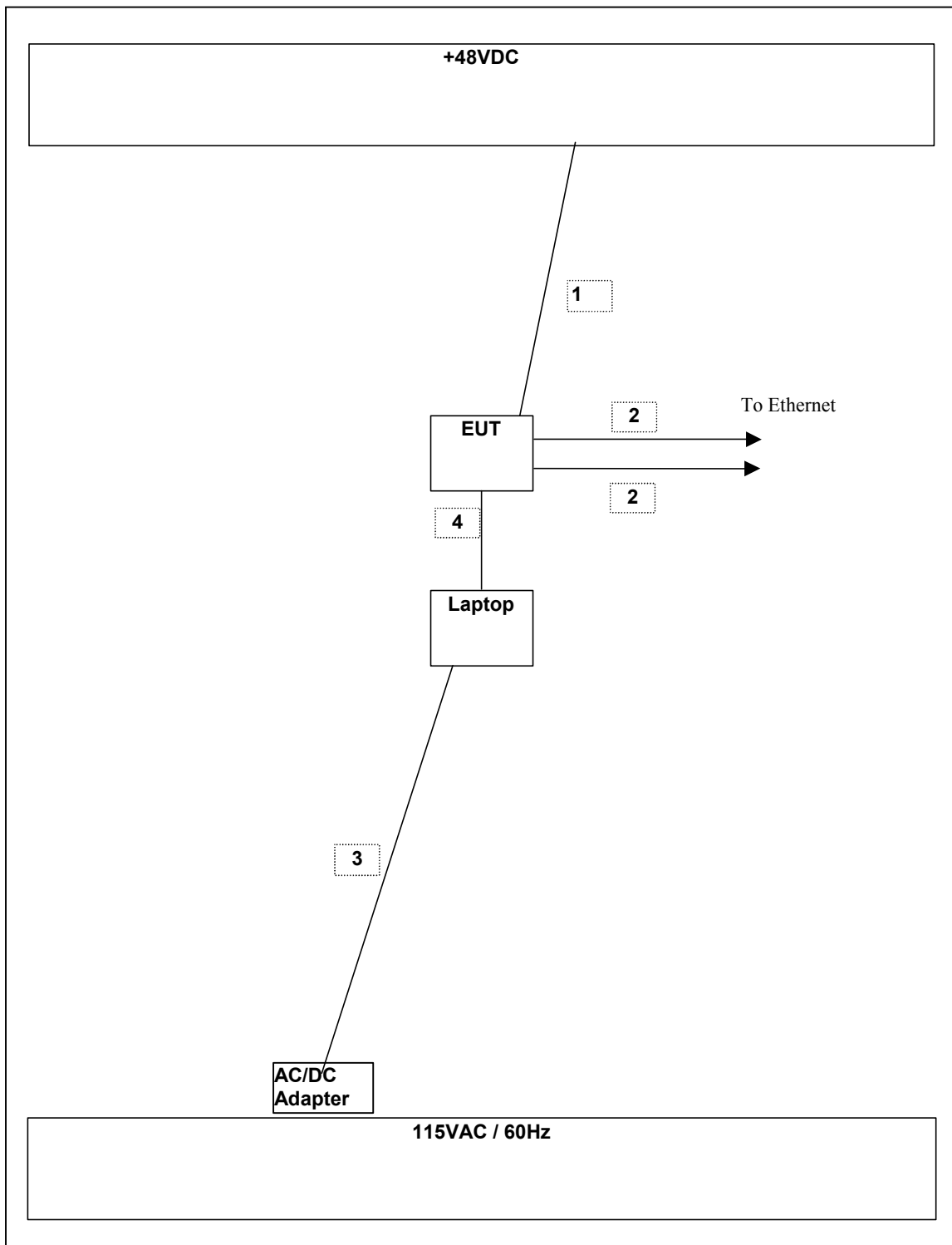
| TEST I / O CABLES |          |               |                |               |              |              |         |                     |
|-------------------|----------|---------------|----------------|---------------|--------------|--------------|---------|---------------------|
| Cable No          | I/O Port | # of I/O Port | Connector Type | Type of Cable | Cable Length | Data Traffic | Bundled | Remark              |
| 1                 | DC       | 1             | screw clamp    | unshielded    | 6 meters     | no           | yes     | DC supply cable     |
| 2                 | LAN      | 2             | RJ45           | unshielded    | 3+30 meters  | yes          | no      | Ethernet            |
| 3                 | AC/DC    | 1             | DC             | unshielded    | 2 meters     | no           | no      | Laptop AC/DC supply |
| 4                 | Serial   | 1             | RJ45           | unshielded    | 3 meters     | yes          | no      | Serial interface    |

**SETUP DIAGRAM FOR TESTS**

FOR VP2200



FOR VP2210



## 9. APPLICABLE LIMITS AND TEST RESULTS

### 9.1. RADIATED EMISSIONS

#### 9.1.1. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

##### LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz                        | MHz                   | MHz             | GHz              |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423        | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525   | 608 - 614       | 5.35 - 5.46      |
| 2.1735 - 2.1905            | 16.80425 - 16.80475   | 960 - 1240      | 7.25 - 7.75      |
| 4.125 - 4.128              | 25.5 - 25.67          | 1300 - 1427     | 8.025 - 8.5      |
| 4.17725 - 4.17775          | 37.5 - 38.25          | 1435 - 1626.5   | 9.0 - 9.2        |
| 4.20725 - 4.20775          | 73 - 74.6             | 1645.5 - 1646.5 | 9.3 - 9.5        |
| 6.215 - 6.218              | 74.8 - 75.2           | 1660 - 1710     | 10.6 - 12.7      |
| 6.26775 - 6.26825          | 108 - 121.94          | 1718.8 - 1722.2 | 13.25 - 13.4     |
| 6.31175 - 6.31225          | 123 - 138             | 2200 - 2300     | 14.47 - 14.5     |
| 8.291 - 8.294              | 149.9 - 150.05        | 2310 - 2390     | 15.35 - 16.2     |
| 8.362 - 8.366              | 156.52475 - 156.52525 | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.7 - 156.9         | 2655 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 162.0125 - 167.17     | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 167.72 - 173.2        | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 240 - 285             | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 322 - 335.4           | 3600 - 4400     | ( <sup>2</sup> ) |
| 13.36 - 13.41              |                       |                 |                  |

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|--------------------|--------------------------------------|----------------------------------|
| 30 - 88            | 100 **                               | 3                                |
| 88 - 216           | 150 **                               | 3                                |
| 216 - 960          | 200 **                               | 3                                |
| Above 960          | 500                                  | 3                                |

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

## **TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels of the 2.4 GHz band.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels of the 5.8 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

## **RESULTS**

No non-compliance noted:

**WORST-CASE RADIATED EMISSIONS BELOW 1 GHz**

**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)**

FOR VP2200

|                                                                                                                                                                                                               |  |                              |  |                              |  |                                                                                                                                      |  |                                             |  |                                           |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------|--|------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------|--|-------------------------------------------|--|
|                                                                                                                              |  |                              |  |                              |  | <b>Project #:</b> 04U2788<br><b>Report #:</b> 04U2788-xx<br><b>Date &amp; Time:</b> 06/28/04 11:17 AM<br><b>Test Engr:</b> D. Garcia |  |                                             |  |                                           |  |
| FCC, VCCI, CISPR, CE, AUSTEL, NZ<br>UL, CSA, TUV, BSMI, DHHS, NVLAP<br>561F MONTEREY ROAD, SAN JOSE, CA 95037-9001<br>PHONE: (408) 463-0885 FAX: (408) 463-0888                                               |  |                              |  |                              |  |                                                                                                                                      |  |                                             |  |                                           |  |
| <b>Company:</b> VIVATO, Inc.<br><b>EUT Description:</b> WiFi Base Station<br><b>Test Configuration :</b> EUT/Laptop<br><b>Type of Test:</b> FCC Class B (3 Meters)<br><b>Mode of Operation:</b> TX Worst Case |  |                              |  |                              |  |                                                                                                                                      |  |                                             |  |                                           |  |
| <input type="radio"/> A-Site                                                                                                                                                                                  |  | <input type="radio"/> B-Site |  | <input type="radio"/> C-Site |  | <input type="radio"/> F-Site                                                                                                         |  | <input type="button" value="6 Worst Data"/> |  | <input type="button" value="Descending"/> |  |

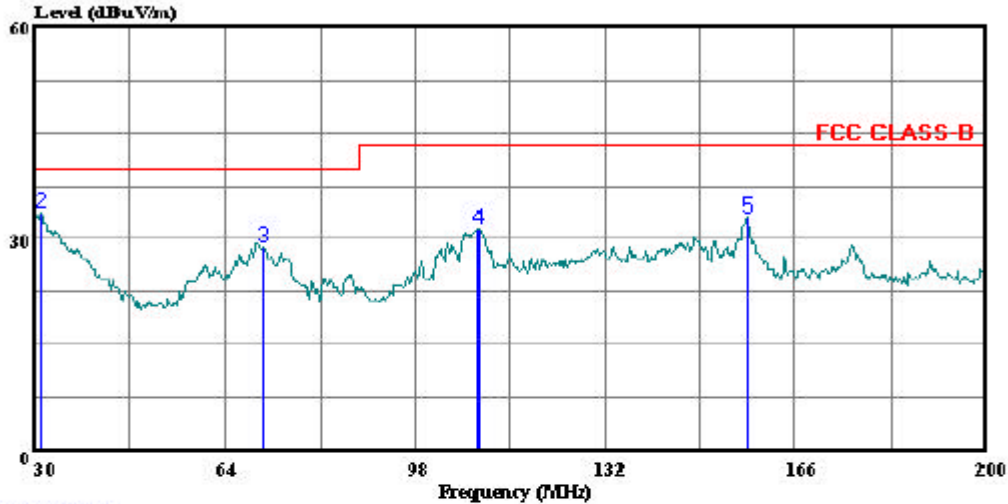
| Freq.<br>(MHz) | Reading<br>(dBuV) | AF<br>(dB) | Closs<br>(dB) | Pre-amp<br>(dB) | Level<br>(dBuV/m) | Limit<br>FCC B | Margin<br>(dB) | Pol<br>(H/V) | Az<br>(Deg) | Height<br>(Meter) | Mark<br>(P/Q/A) |
|----------------|-------------------|------------|---------------|-----------------|-------------------|----------------|----------------|--------------|-------------|-------------------|-----------------|
| 119.99         | 41.10             | 12.60      | 2.39          | 29.07           | 27.02             | 43.50          | -16.48         | 3mV          | 180.00      | 1.00              | P               |
| 160.04         | 45.30             | 10.08      | 2.83          | 28.80           | 29.41             | 43.50          | -14.09         | 3mV          | 90.00       | 1.00              | P               |
| 672.34         | 41.60             | 18.74      | 6.40          | 28.82           | 37.92             | 46.00          | -8.08          | 3mV          | 180.00      | 1.00              | P               |
| 119.99         | 38.60             | 12.60      | 2.39          | 29.07           | 24.52             | 43.50          | -18.98         | 3mH          | 0.00        | 1.20              | P               |
| 432.04         | 37.50             | 16.38      | 5.12          | 28.99           | 30.02             | 46.00          | -15.98         | 3mH          | 180.00      | 1.00              | P               |
| 800.03         | 30.00             | 19.79      | 7.01          | 28.60           | 28.20             | 46.00          | -17.80         | 3mH          | 270.00      | 1.00              | P               |
| 6 worst data   |                   |            |               |                 |                   |                |                |              |             |                   |                 |

FOR VP2210 – HORIZONTAL (30-200MHz)



561F Monterey Road  
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Tel: (408) 463-0888  
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Data#: 23 File#: 04u2788.emi Date: 06-29-2004 Time: 12:21:49



(Auxiliary ATC)  
Trace: 22

Ref Trace:

Condition: FCC CLASS-B SUNOL BILOG 12/22/04 HORIZONTAL  
Test Operator: : David Garcia  
Project #: : 04U2788-2  
Company: : Vivato, Inc.  
EUT: : WiFi Outdoor Base Station  
Model No: : VP2210  
Configuration: : EUT/Laptop  
Target of Test: : FCC Class B  
Mode of Operation: TX Worst Case

Page: 1

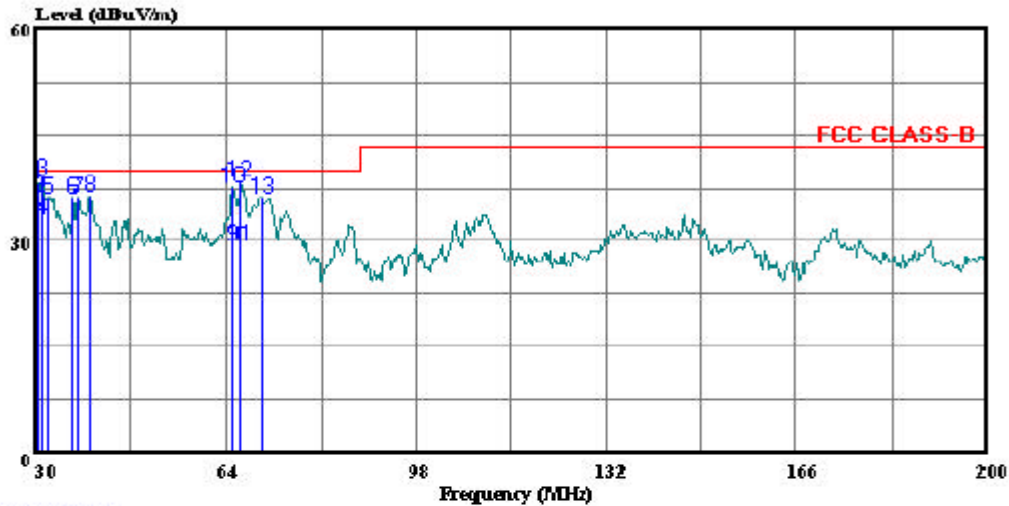
|   | Freq    | Remark | Read Level | Factor | Limit Level | Over Limit   |
|---|---------|--------|------------|--------|-------------|--------------|
|   | MHz     |        | dBuV       | dB     | dBuV/m      | dB           |
| 1 | 30.000  | Peak   | 11.19      | 22.95  | 34.14       | 40.00 -5.86  |
| 2 | 31.190  | Peak   | 11.60      | 22.06  | 33.66       | 40.00 -6.34  |
| 3 | 70.630  | Peak   | 19.42      | 9.39   | 28.81       | 40.00 -11.19 |
| 4 | 109.390 | Peak   | 18.04      | 13.33  | 31.37       | 43.50 -12.13 |
| 5 | 157.330 | Peak   | 19.17      | 13.90  | 33.07       | 43.50 -10.43 |

FOR VP2210 – VERTICAL (30-200MHz)



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Data#: 19 File#: 04u2788.emi Date: 06-29-2004 Time: 11:56:23



(Audix ATC)

Trace: 16

Ref Trace:

Condition: FCC CLASS-B SUNOL BILOG 12/22/04 VERTICAL  
Test Operator: : David Garcia  
Project #: : 04U2788-2  
Company: : Vivato, Inc.  
EUT: : WiFi Outdoor Base Station  
Model No: : VP2210  
Configuration: : EUT/Laptop  
Target of Test: : FCC Class B  
Mode of Operation: TX Worst Case

Page: 1

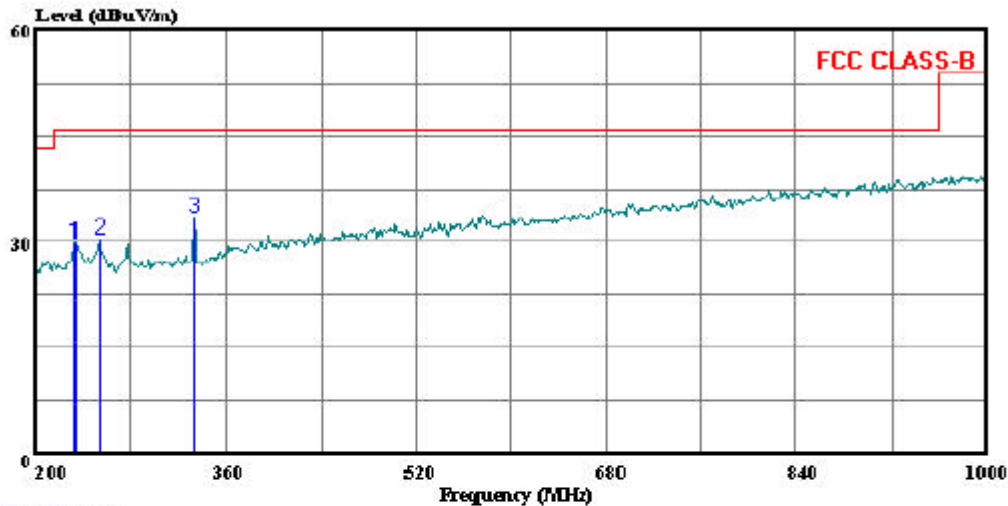
|    | Freq   | Remark | Read<br>Level | Factor | Level  | Limit  | Over   |
|----|--------|--------|---------------|--------|--------|--------|--------|
|    | MHz    |        | dBuV          | dB     | dBuV/m | dBuV/m | dB     |
| 1  | 30.340 | Peak   | 15.51         | 22.75  | 38.26  | 40.00  | -1.74  |
| 2  | 30.340 | QP     | 13.62         | 22.70  | 36.32  | 40.00  | -3.68  |
| 3  | 31.190 | Peak   | 16.76         | 22.06  | 38.82  | 40.00  | -1.18  |
| 4  | 31.190 | QP     | 11.13         | 22.03  | 33.16  | 40.00  | -6.84  |
| 5  | 32.380 | Peak   | 14.95         | 21.18  | 36.13  | 40.00  | -3.87  |
| 6  | 36.630 | Peak   | 18.07         | 18.12  | 36.19  | 40.00  | -3.81  |
| 7  | 37.480 | Peak   | 18.46         | 17.55  | 36.00  | 40.00  | -4.00  |
| 8  | 39.690 | Peak   | 20.50         | 15.84  | 36.34  | 40.00  | -3.66  |
| 9  | 65.190 | QP     | 20.00         | 9.27   | 29.27  | 40.00  | -10.73 |
| 10 | 65.190 | Peak   | 28.51         | 9.27   | 37.78  | 40.00  | -2.22  |
| 11 | 66.380 | QP     | 20.00         | 9.31   | 29.31  | 40.00  | -10.69 |
| 12 | 66.380 | Peak   | 29.16         | 9.31   | 38.47  | 40.00  | -1.53  |
| 13 | 70.290 | Peak   | 26.68         | 9.40   | 36.08  | 40.00  | -3.92  |

FOR VP2210 – HORIZONTAL (200-1000MHz)



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Tel: (408) 463-0888  
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Data#: 25 File#: 04u2788.emi Date: 06-29-2004 Time: 12:26:23



(Auxiliary ATC)

Trace: 24

Ref Trace:

Condition: FCC CLASS-B SUNOL BILOG 12/22/04 HORIZONTAL  
Test Operator: : David Garcia  
Project #: : 04U2788-2  
Company: : Vivato, Inc.  
EUT: : WiFi Outdoor Base Station  
Model No: : VP2210  
Configuration: : EUT/Laptop  
Target of Test: : FCC Class B  
Mode of Operation: TX Worst Case

Page: 1

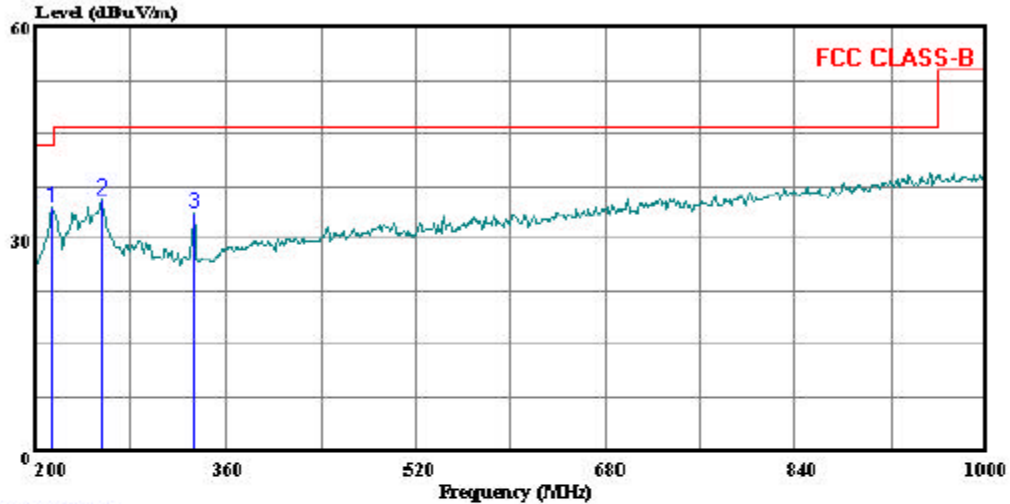
|   | Freq    | Remark | Read  |        | Limit  | Over         |
|---|---------|--------|-------|--------|--------|--------------|
|   |         |        | Level | Factor | Line   | Limit        |
|   | MHz     |        | dBuV  | dB     | dBuV/m | dB           |
| 1 | 233.600 | Peak   | 16.54 | 13.41  | 29.95  | 46.00 -16.05 |
| 2 | 253.600 | Peak   | 16.05 | 14.26  | 30.31  | 46.00 -15.69 |
| 3 | 333.600 | Peak   | 17.08 | 16.55  | 33.63  | 46.00 -12.37 |

FOR VP2210 – VERTICAL (200-1000MHz)



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Tel: (408) 463-0888  
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Data#: 21 File#: 04u2788.emi Date: 06-29-2004 Time: 12:15:14



(Audix ATC)  
Trace: 20

Ref Trace:

Condition: FCC CLASS-B SUNOL BILOG 12/22/04 VERTICAL  
Test Operator: : David Garcia  
Project #: : 04U2788-2  
Company: : Vivato, Inc.  
EUT: : WiFi Outdoor Base Station  
Model No: : VP2210  
Configuration: : EUT/Laptop  
Target of Test: : FCC Class B  
Mode of Operation: TX Worst Case

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|   |         |        | Read  |        | Limit  | Over  |
|---|---------|--------|-------|--------|--------|-------|
|   | Freq    | Remark | Level | Factor | Level  | Line  |
|   | MHz     |        | dBuV  |        | dBuV/m | Limit |
| 1 | 213.600 | Peak   | 21.59 | 12.85  | 34.44  | 43.50 |
| 2 | 255.200 | Peak   | 21.20 | 14.35  | 35.55  | 46.00 |
| 3 | 333.600 | Peak   | 17.13 | 16.55  | 33.68  | 46.00 |

## 9.2. POWERLINE CONDUCTED EMISSIONS

### LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

| Frequency of Emission (MHz) | Conducted Limit (dBuV) |           |
|-----------------------------|------------------------|-----------|
|                             | Quasi-peak             | Average   |
| 0.15-0.5                    | 66 to 56*              | 56 to 46* |
| 0.5-5                       | 56                     | 46        |
| 5-30                        | 60                     | 50        |

\* Decreases with the logarithm of the frequency.

### TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

### RESULTS

No non-compliance noted:

## 6 WORST EMISSIONS

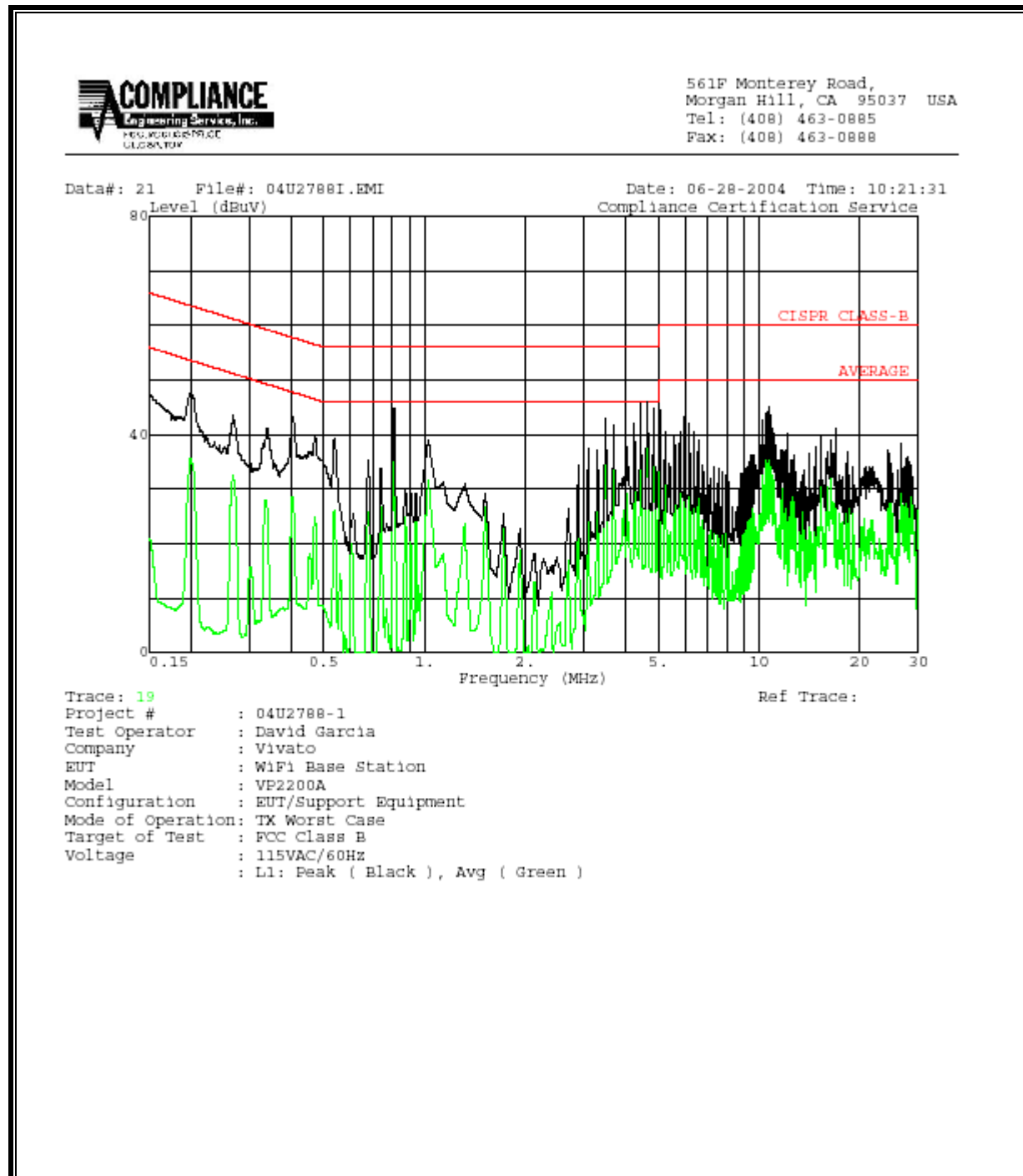
FOR VP2200

| CONDUCTED EMISSIONS DATA (115VAC 60Hz) |           |           |           |       |       |       |         |         |         |
|----------------------------------------|-----------|-----------|-----------|-------|-------|-------|---------|---------|---------|
| Freq.                                  | Reading   |           |           | Closs | Limit | EN B  | Margin  |         | Remark  |
| (MHz)                                  | PK (dBuV) | QP (dBuV) | AV (dBuV) | (dB)  | QP    | AV    | QP (dB) | AV (dB) | L1 / L2 |
| 4.43                                   | 45.62     | --        | --        | 0.00  | 56.00 | 46.00 | -10.38  | -0.38   | L1      |
| 4.65                                   | 45.90     | --        | --        | 0.00  | 56.00 | 46.00 | -10.10  | -0.10   | L1      |
| 10.68                                  | 44.96     | --        | --        | 0.00  | 60.00 | 50.00 | -15.04  | -5.04   | L1      |
| 0.81                                   | 44.24     | --        | --        | 0.00  | 56.00 | 46.00 | -11.76  | -1.76   | L2      |
| 4.38                                   | 44.86     | --        | --        | 0.00  | 56.00 | 46.00 | -11.14  | -1.14   | L2      |
| 10.68                                  | 43.72     | --        | --        | 0.00  | 60.00 | 50.00 | -16.28  | -6.28   | L2      |
| 6 Worst Data                           |           |           |           |       |       |       |         |         |         |

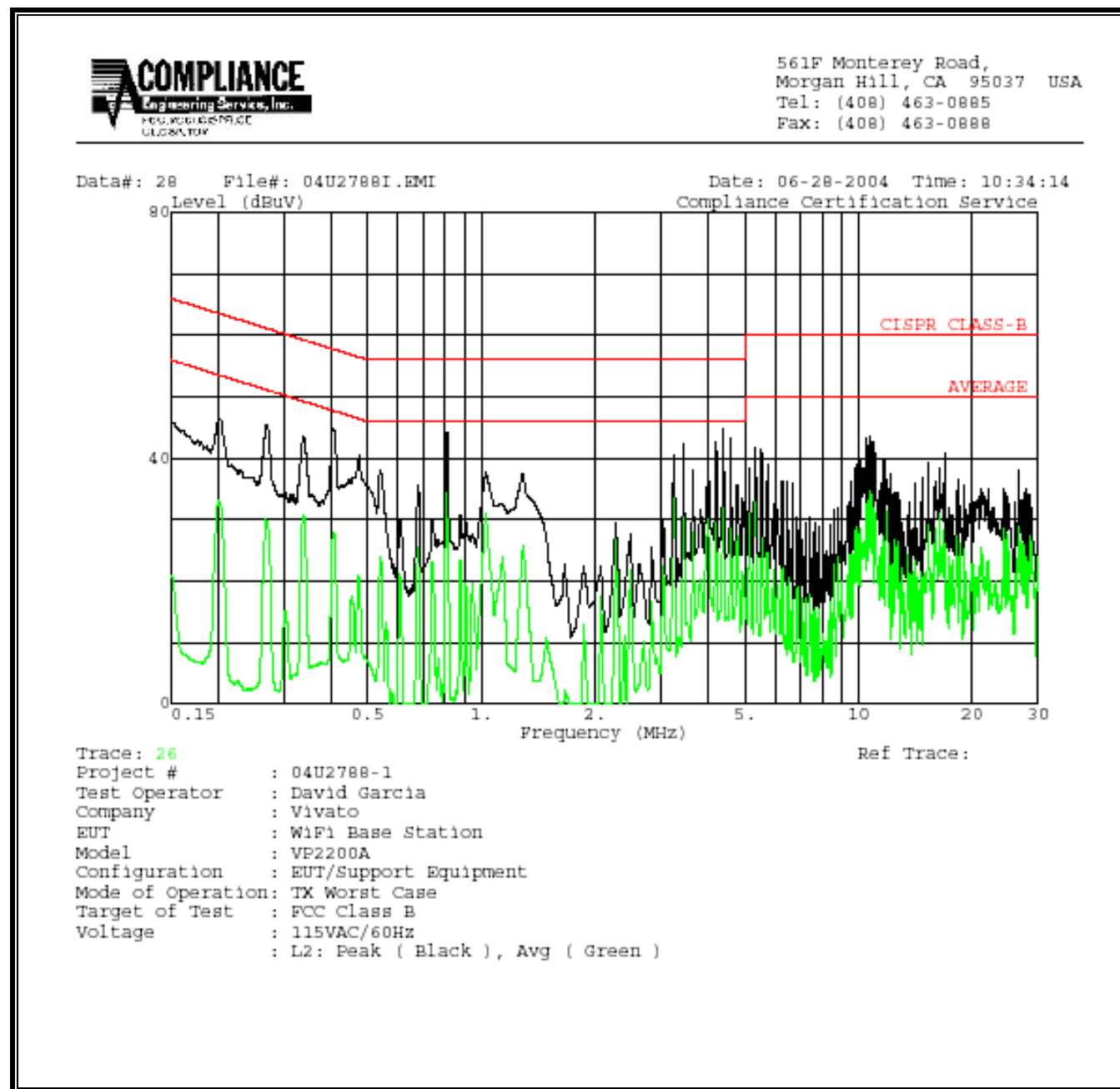
FOR VP2210

| CONDUCTED EMISSIONS DATA (48VDC) |           |           |           |       |       |       |         |         |         |
|----------------------------------|-----------|-----------|-----------|-------|-------|-------|---------|---------|---------|
| Freq.                            | Reading   |           |           | Closs | Limit | EN B  | Margin  |         | Remark  |
| (MHz)                            | PK (dBuV) | QP (dBuV) | AV (dBuV) | (dB)  | QP    | AV    | QP (dB) | AV (dB) | L1 / L2 |
| 0.15                             | 55.48     | --        | 54.92     | 0.00  | 65.94 | 55.94 | -10.46  | -1.02   | L1      |
| 0.31                             | 49.42     | --        | 48.00     | 0.00  | 61.51 | 51.51 | -12.09  | -3.51   | L1      |
| 0.46                             | 44.86     | --        | 43.39     | 0.00  | 57.11 | 47.11 | -12.25  | -3.72   | L1      |
| 0.15                             | 55.32     | --        | 54.94     | 0.00  | 65.91 | 55.91 | -10.59  | -0.97   | L2      |
| 0.31                             | 48.98     | --        | 47.68     | 0.00  | 61.51 | 51.51 | -12.53  | -3.83   | L2      |
| 0.46                             | 48.58     | --        | 43.16     | 0.00  | 57.17 | 47.17 | -8.59   | -4.01   | L2      |
| 6 Worst Data                     |           |           |           |       |       |       |         |         |         |

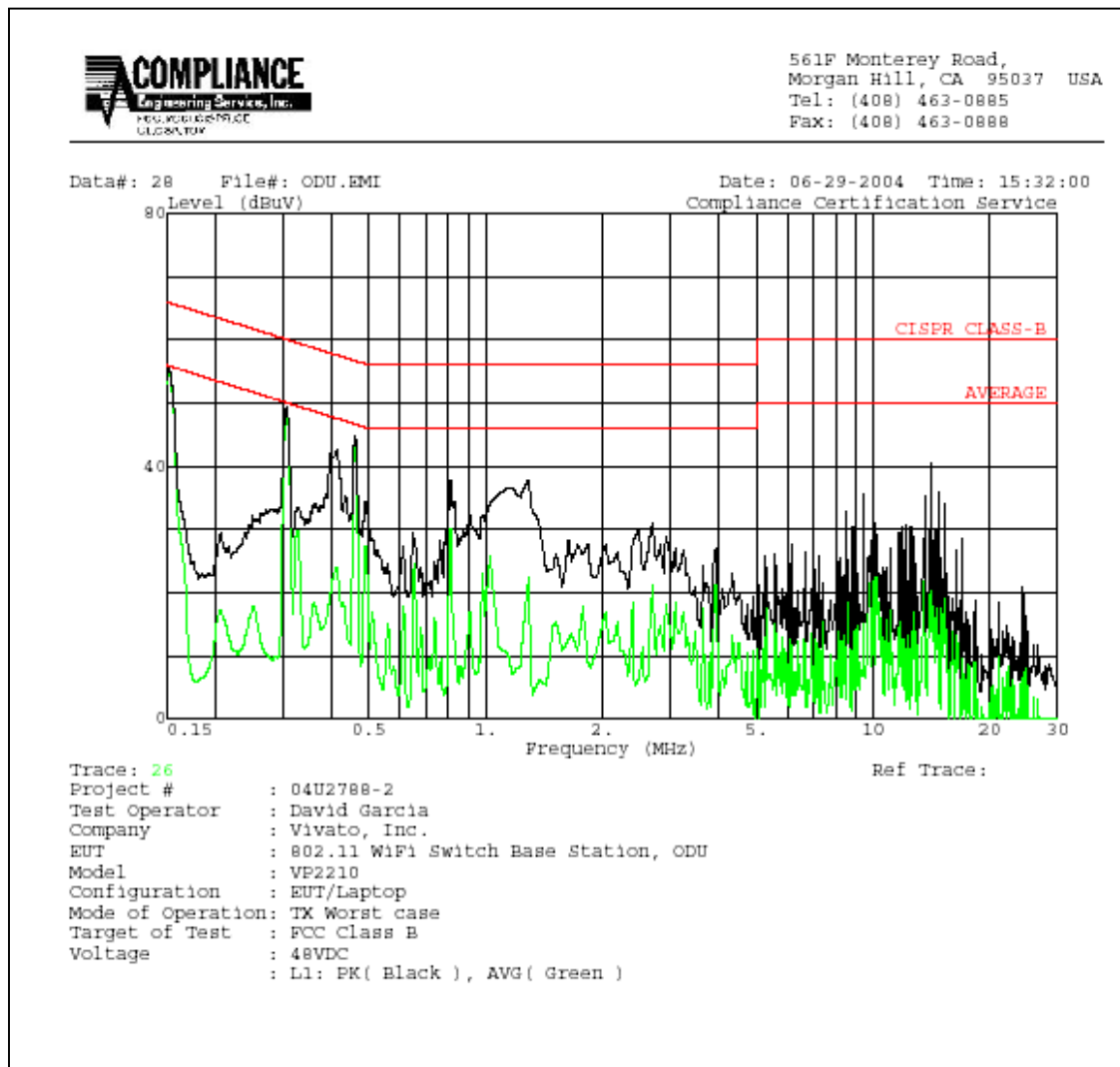
**VP2200 - LINE 1 RESULT**



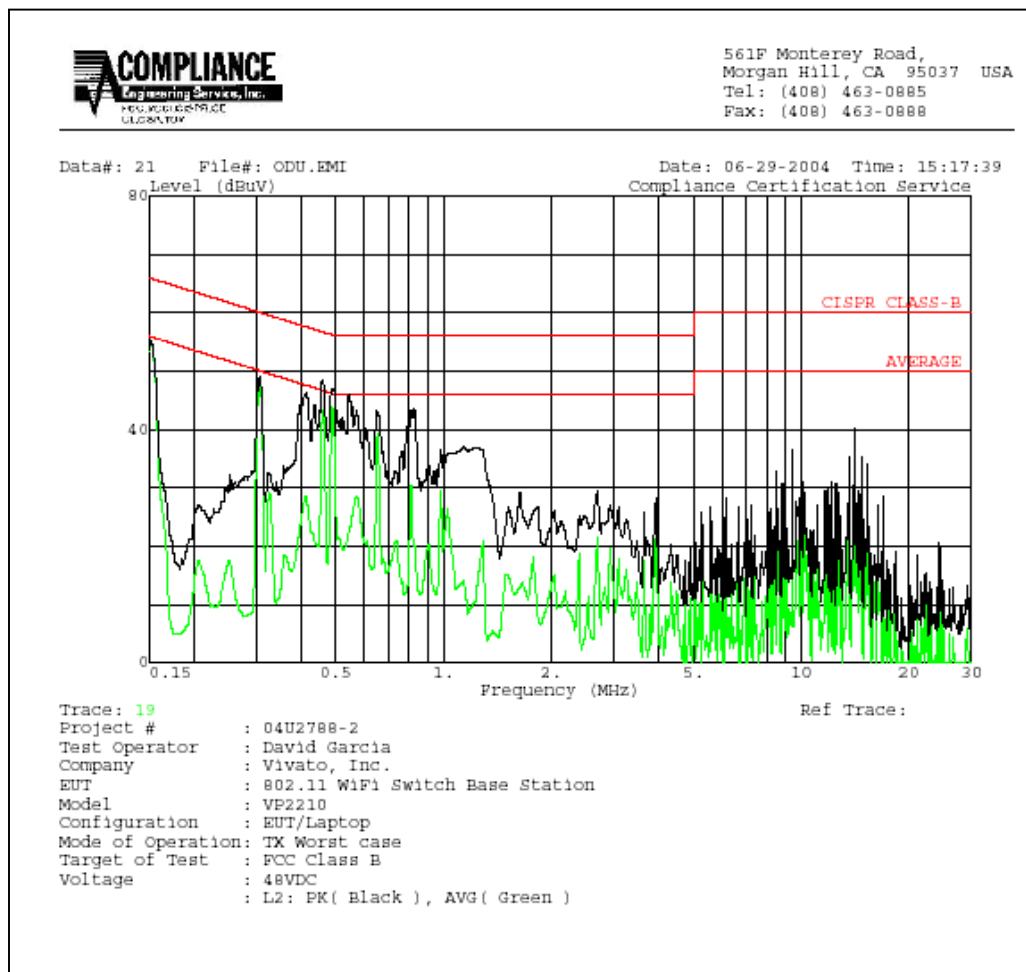
**VP2200 - LINE 2 RESULTS**



VP2210 - LINE 1 RESULT



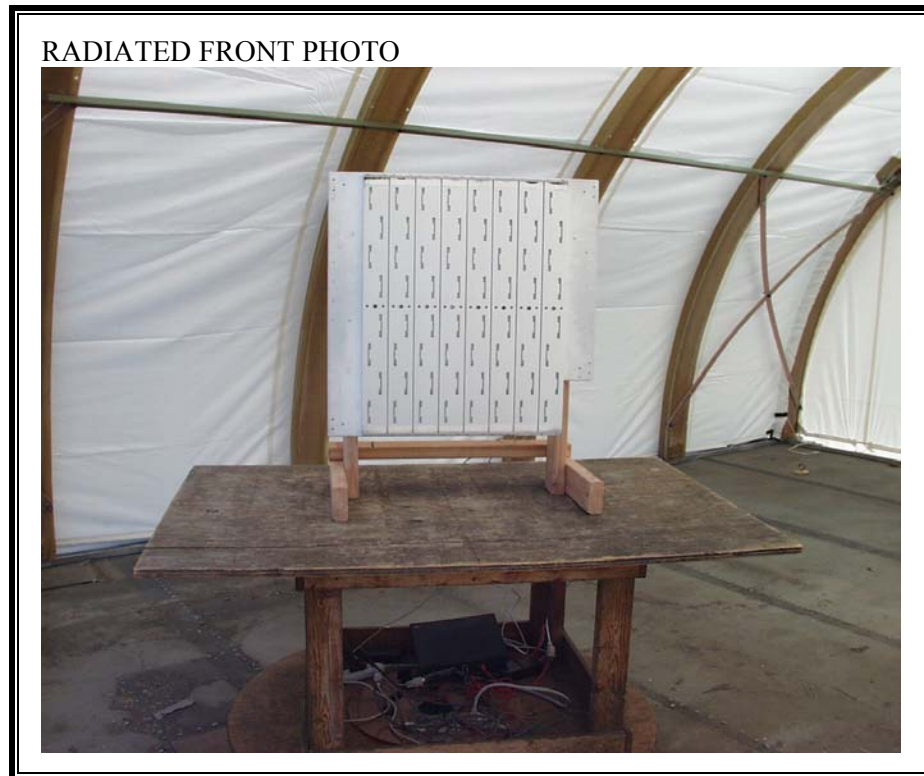
VP2210 - LINE 2 RESULT



## 10. SETUP PHOTOS

### RADIATED RF MEASUREMENT SETUP

#### VP2200



RADIATED BACK PHOTO

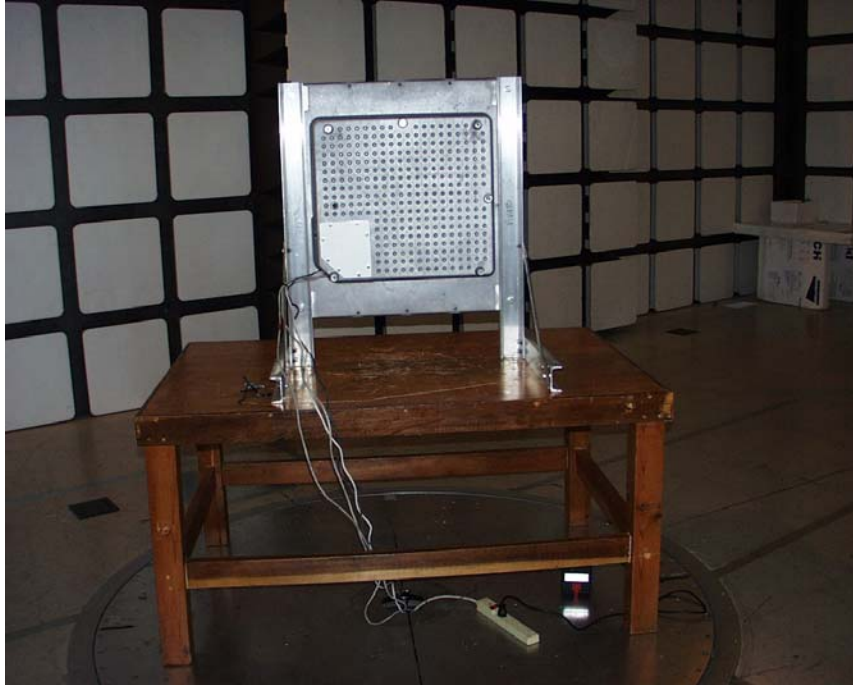


**VP2210**

RADIATED FRONT PHOTO

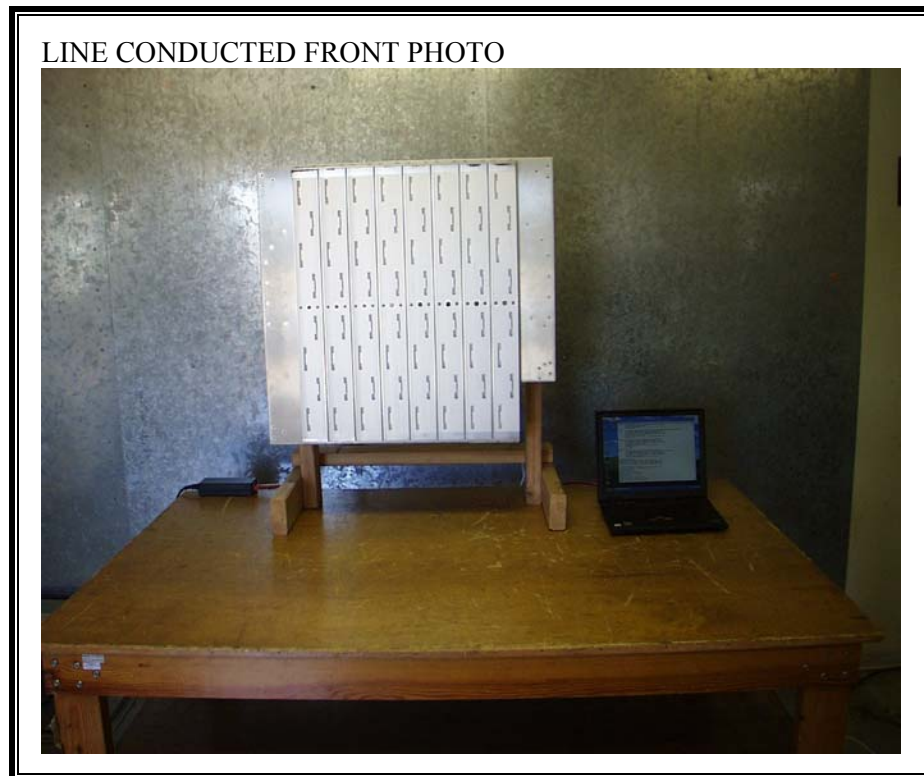


RADIATED BACK PHOTO



**POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP**

VP2200



LINE CONDUCTED BACK PHOTO



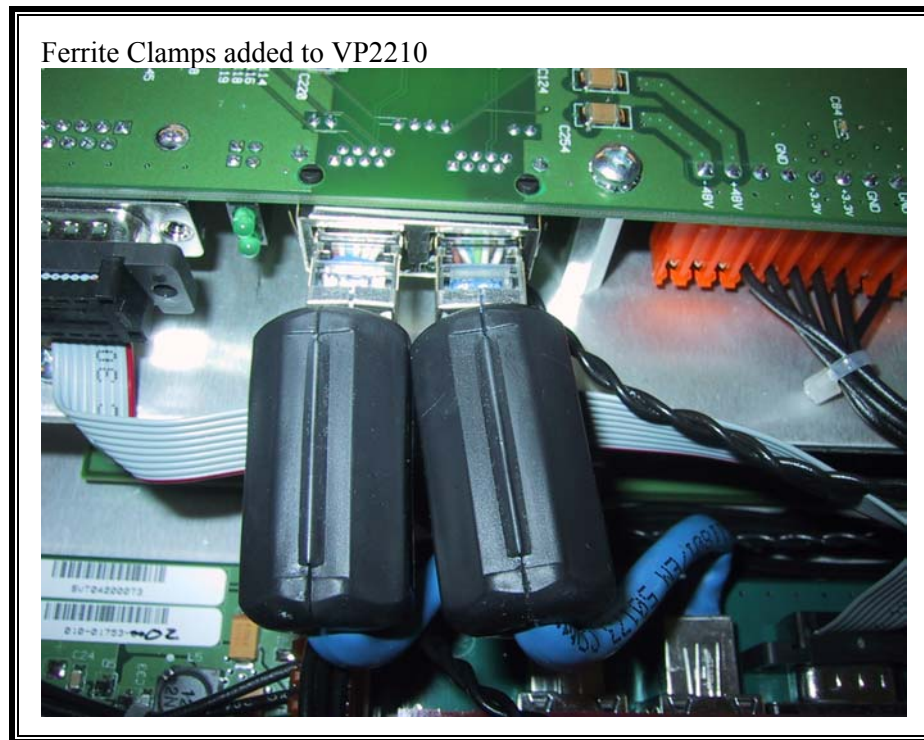
VP2210



LINE CONDUCTED BACK PHOTO



Equipment modification on VP2210



**END OF REPORT**