FCC CFR47 PART 15 SUBPART C
FCC CFR47 PART 15 SUBPART B
ICES-003 ISSUE 4
INDUSTRY CANADA RSS-210 ISSUE 8
INDUSTRY CANADA RSS-GEN ISSUE 3

CERTIFICATION TEST REPORT

FOR

WIRELESS CARD READER

MODEL NUMBER: ViVOpay MSR Accessory

FCC ID: Q55VP4800M
IC: 5141A-VP4800M

REPORT NUMBER: 11U14088-1, Revision B

ISSUE DATE: APRIL 11, 2012

Prepared for
ViVOTECH, INC.
451 EL CAMINO REAL
SANTA CLARA, CA 95050, U.S.A.

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	03/21/12	Initial Issue	S. Leitner
A	03/28/12	Revised Model Name	A. Zaffar
B	04/11/12	Updated worst case configuration information	S. Leitner

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: ViVOTECH, INC.
451 EL CAMINO REAL
SANTA CLARA, CA 95050, U.S.A.

EUT DESCRIPTION: WIRELESS CARD READER

MODEL: ViVOpay MSR Accessory

SERIAL NUMBER: CA1017D294 and CA1017E740

DATE TESTED: March 2 to 21, 2012

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Pass
FCC PART 15 SUBPART B	Pass
ICES-003 Issue 4	Pass
INDUSTRY CANADA RSS-210 Issue 8, Annex 2	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

STEVE LEITNER
EMC SUPERVISOR
UL CCS

Tested By:

DOUG ANDERSON
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8 and CAN/CSA-CEI/IEC CISPR 22:02 as referenced by ICES-003 Issue 4.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

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

4. CALIBRATION AND UNCERTAINTY

4.1. 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.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The VP4800M is a wireless card reader with or without an optional MSR (magnetic strip reader) accessory. The wireless fundamental frequency is 13.56 MHz. The EUT has a serial port with an RJ-45 connector, and is provided with a cable terminated in a DB9 connector for connection to an RS-232 interface.

Internally generated frequencies include 12 MHz, 24 MHz and 27.12 MHz.

The product includes Condor AC adapter Model 3A-066WP09.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum E field as follows:

Frequency MHz	Mode	Fundamental E field at 10m distance dB(µV/m)
13.56	Normal TX mode	63.67

The transmitter has a maximum E-field at 10 m distance as follows:
EIRP = E field at 3m distance – 95.2
E field at 3 m distance = E field at 10 m distance + 20 = 63.67 + 20 = 83.67 dB(µV/m)
EIRP = 83.67 -95.2 = **–11.53 dBm**

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The 13.56 MHz antenna is a trace on the printed circuit board.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was HG1, rev. AR 2.1.1.

5.5. WORST-CASE CONFIGURATION AND MODE

The configuration incorporating a magnetic strip reader was considered worst case. From preliminary evaluation it was determined that horizontal mounting was worst case.

5.6. MODIFICATIONS

No modifications were made during testing.

5.7. DESCRIPTION OF TEST SETUP

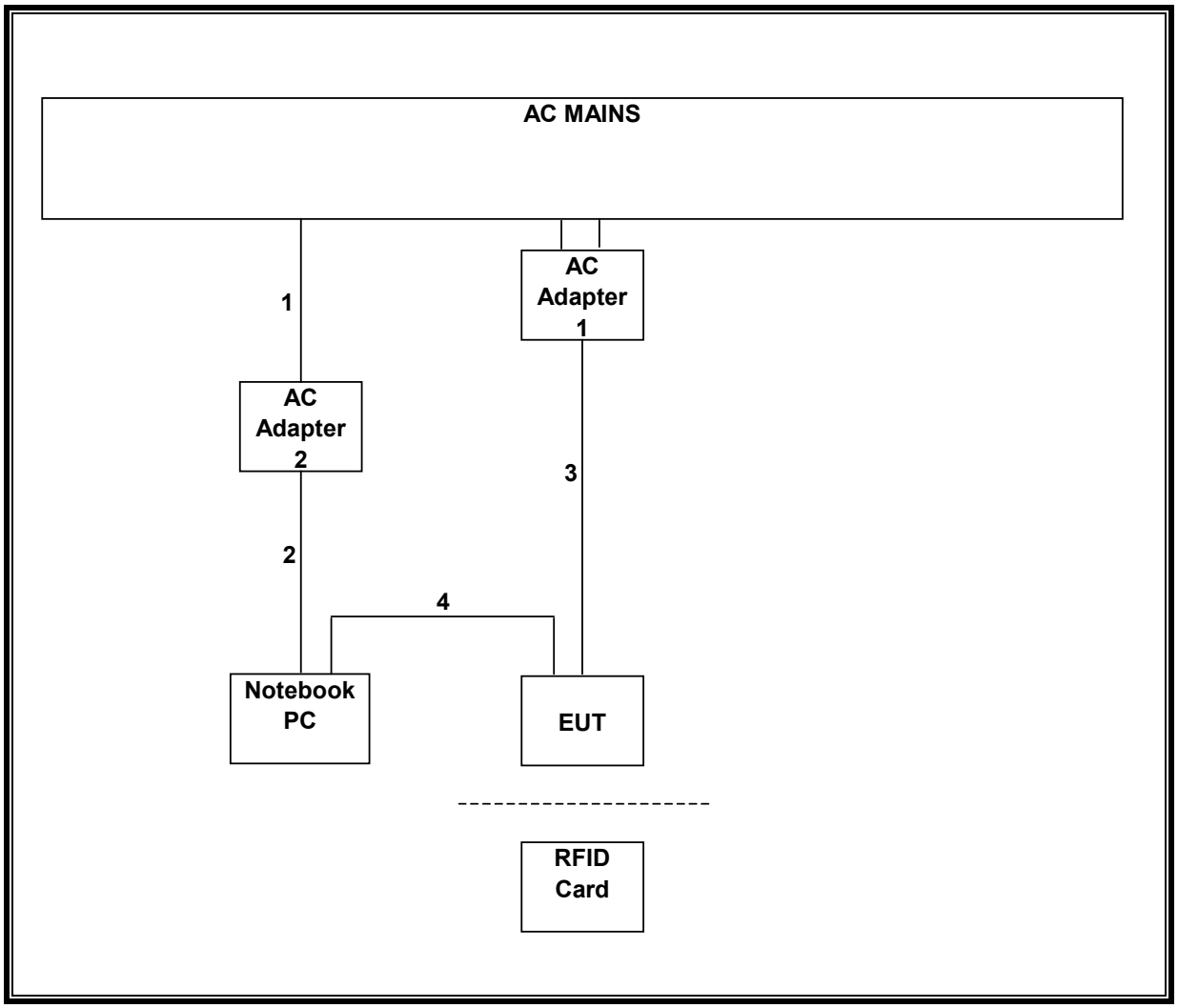
SUPPORT EQUIPMENT

SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Notebook PC	Dell	PP18L	38707924033	DoC
AC Adapter 2	Lite On Technology	PA-1900-01 D3	CN-0DF266-71615-78U-24C	DoC

I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC Power	1	2-Prong	Unshielded	1 m	
2	DC Power	1	Barrel	Unshielded	2 m	Ferrite at support PC end
3	DC Power	1	Barrel	Unshielded	1.75 m	
4	Serial	1	RJ-45	Shielded	4 m	Ferrite at EUT end, DB-9 connector at opposite end, RJ-45 connector is not shielding type

SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**Asset**	**Cal Date**	**Cal Due**
EMI Receiver, 6.5GHz	Agilent / HP	85462A	N/A	08/23/11	02/23/13
Antenna, Loop, 30 MHz	EMCO	6502	C00593	02/10/11	02/10/13
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01179	02/16/12	02/16/13
Antenna, Bilog, 2MHz	Sunol Sciences	JB1	N/A	02/07/12	02/07/13
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	11/11/11	11/11/12
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	N/A	07/06/11	07/06/12
LISN, 30 MHz	FCC	50/250-25-2	C00626	12/13/11	12/13/12
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	03/07/12	03/07/13

7. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

Table 5
Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616\,000/f^{1.2}$

* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.
2. A power density of 10 W/m^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

$$S = EIRP / (4 * Pi * D^2)$$

where

S = Power density in W/m^2
EIRP = Equivalent Isotropic Radiated Power in W
D = Separation distance in m

Power density in units of W/m^2 is converted to units of mWc/m^2 by dividing by 10.

Distance is given by:

$$D = SQRT (EIRP / (4 * Pi * S))$$

where

D = Separation distance in m
EIRP = Equivalent Isotropic Radiated Power in W
S = Power density in W/m^2

For multiple colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power * Gain product (in linear units) of each transmitter.

$$Total EIRP = (P1 * G1) + (P2 * G2) + ... + (Pn * Pn)$$

where

Px = Power of transmitter x
Gx = Numeric gain of antenna x

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

RESULTS

The transmitter has a maximum E-field at 10 m distance as follows:
EIRP = E field at 3m distance – 95.2
E field at 3 m distance = E field at 10 m distance + 20 = 63.67 + 20 = 83.67 dBuV/m
EIRP = 83.67 - 95.2 = **–11.53 dBm = 0.0000703 W,** which is less than 2.5 W based on section 2.2 of RSS210; therefore this test is not applicable.

8. RADIATED EMISSIONS LIMITS AND TEST RESULTS

LIMIT

§15.225
IC RSS-210, Section 2.6 (Transmitter)
IC RSS-GEN, Section 6 (Receiver)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz shall not exceed the general radiated emission limits in § 15.209 as follows:
§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:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
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. §§ 15.231 and 15.241.
§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

ANSI C63.4

§15.209 specifies that spurious emissions are to be measured up to the tenth harmonic of the transmitter fundamental frequency. Thus, for this EUT, spurious emissions were measured to 136 MHz (10 × 13.56 MHz).

§15.209 also specifies that emissions that must be measured above the tenth harmonic applicable to an incorporated digital device are to comply with the general radiated emission limits in §15.109. As a Class A digital device, the EUT was therefore investigated to Class A limits in the frequency range of 30 MHz to 1000 MHz.

RESULTS

FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)

FCC Part 15, Subpart B & C **10 Meter Distance Measurement At Open Field**

Company: Vivotech
Project #: 11U14088
Model #: VP4800M
Tester: Doug Anderson
Date: 03/08/12

Frequency (MHz)	PK (dBu/V)	QP (dBu/V)	AV (dBuV)	AF dB/m	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	AV Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	PK Margin (dB)	AV Margin (dB)	Notes
Loop Antenna Face On:												
13.56	68.2	67.2	N/A	10.56	-19.08	58.67	N/A	84.00	N/A	-25.3	N/A	Fundamental @ 10m Dist
13.41	40.3	29	N/A	10.54	-19.08	20.46	N/A	40.51	N/A	-20.1	N/A	13.41-13.553MHz Spurious @ 10m
13.553	57.2	54.7	N/A	10.56	-19.08	46.17	N/A	50.48	N/A	-4.3	N/A	13.41-13.553MHz Spurious @ 10m
13.567	60.3	58.4	N/A	10.56	-19.08	49.87	N/A	50.48	N/A	-0.6	N/A	13.567-13.710MHz Spurious @ 10m
13.71	21.3	14.6	N/A	10.57	-19.08	6.09	N/A	40.51	N/A	-34.4	N/A	13.567-13.710MHz Spurious @ 10m
13.11	45.7	35.2	N/A	10.51	-19.08	26.63	N/A	40.51	N/A	-13.9	N/A	13.110-13.410MHz Spurious @ 10m
13.41	40.3	29	N/A	10.54	-19.08	20.46	N/A	40.51	N/A	-20.1	N/A	13.110-13.410MHz Spurious @ 10m
13.71	21.3	14.6	N/A	10.57	-19.08	6.09	N/A	40.51	N/A	-34.4	N/A	13.710-14.010MHz Spurious @ 10m
14.01	41	30.2	N/A	10.6	-19.08	21.72	N/A	40.51	N/A	-18.8	N/A	13.710-14.010MHz Spurious @ 10m
27.12	40.7	38.5	N/A	9.046	-19.08	28.46	N/A	29.54	N/A	-1.1	N/A	14.010-30MHz Spurious @ 10m
Loop Antenna Face Off:												
13.56	73.5	72.2	N/A	10.56	-19.08	63.67	N/A	84.00	N/A	-20.3	N/A	Fundamental @ 10m Dist
13.41	46.5	37.3	N/A	10.54	-19.08	28.76	N/A	40.51	N/A	-11.8	N/A	13.41-13.553MHz Spurious @ 10m
13.553	62.2	58.9	N/A	10.56	-19.08	50.37	N/A	50.48	N/A	-0.1	N/A	13.41-13.553MHz Spurious @ 10m
13.567	60.9	58.8	N/A	10.56	-19.08	50.27	N/A	50.48	N/A	-0.2	N/A	13.567-13.710MHz Spurious @ 10m
13.71	45.3	36.3	N/A	10.57	-19.08	27.79	N/A	40.51	N/A	-12.7	N/A	13.567-13.710MHz Spurious @ 10m
13.11	24.5	18.6	N/A	10.51	-19.08	10.03	N/A	40.51	N/A	-30.5	N/A	13.110-13.410MHz Spurious @ 10m
13.41	46.5	37.3	N/A	10.54	-19.08	28.76	N/A	40.51	N/A	-11.8	N/A	13.110-13.410MHz Spurious @ 10m
13.71	45.3	36.3	N/A	10.57	-19.08	27.79	N/A	40.51	N/A	-12.7	N/A	13.710-14.010MHz Spurious @ 10m
14.01	27.8	20.3	N/A	10.6	-19.08	11.82	N/A	40.51	N/A	-28.7	N/A	13.710-14.010MHz Spurious @ 10m
27.12	40.1	38.8	N/A	9.046	-19.08	28.76	N/A	29.54	N/A	-0.8	N/A	14.010-30MHz Spurious @ 10m

* No more emissions were found up to 30MHz

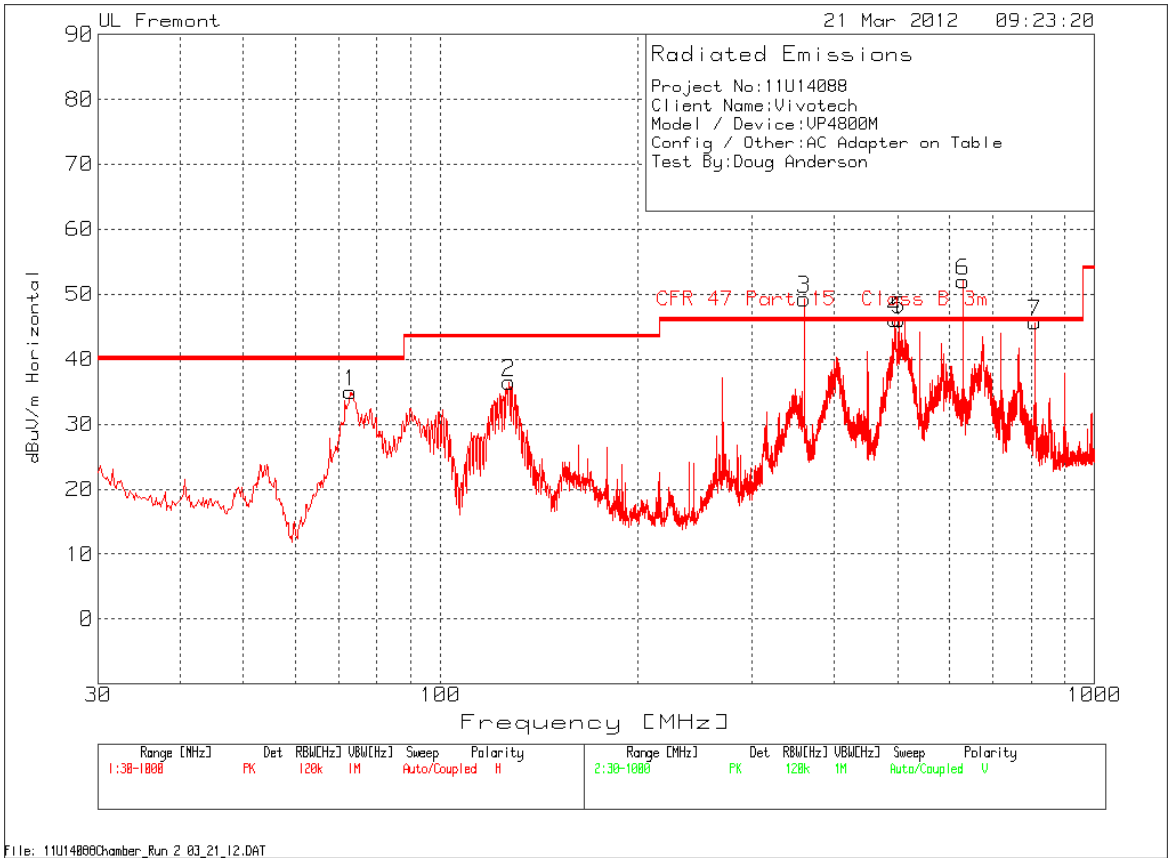
Note: The emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 10000Mhz. Radiated emission limits in these three bands are based on measurements employing an average detector.

P.K. = Peak
Q.P. = Quasi Peak Reading
A.F. = Antenna factor

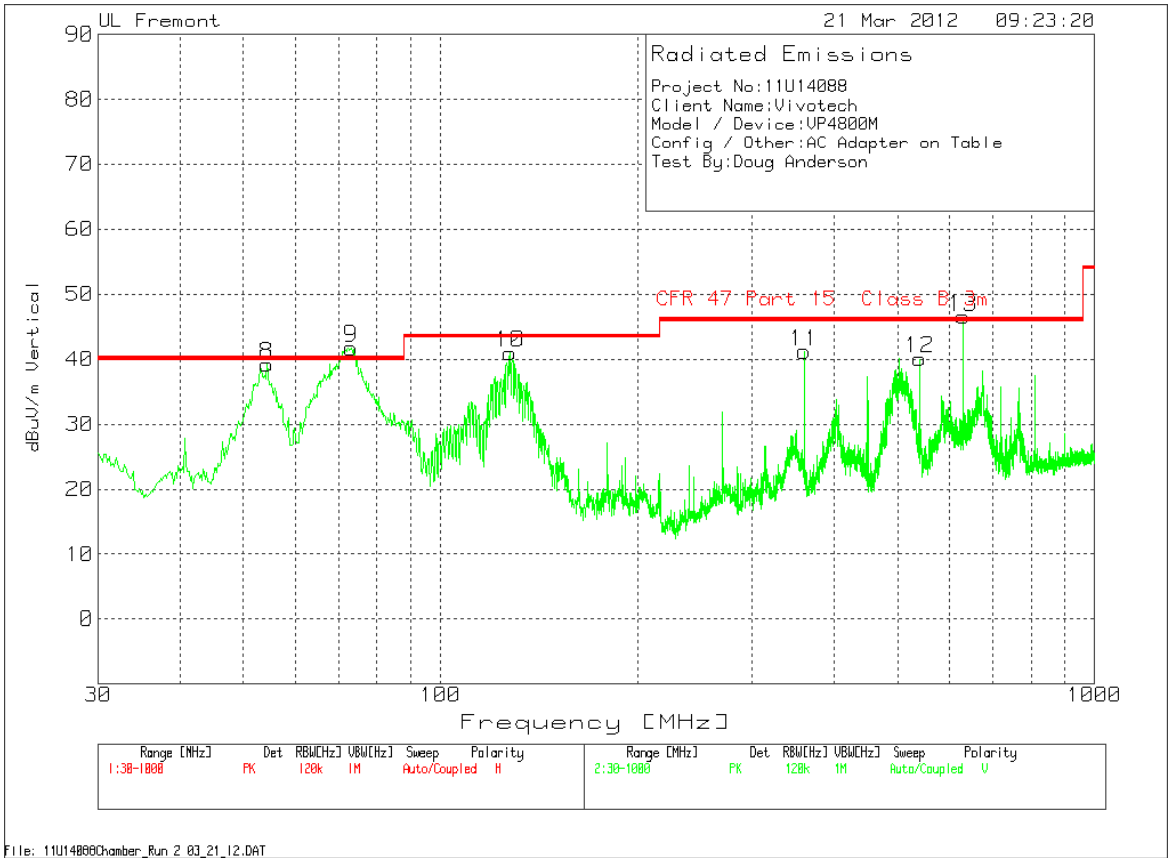
Rev. 10.23.09

TX/RX SPURIOUS EMISSIONS 30 TO 1000 MHz

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

TX/RX Spurious Emissions 30 MHz to 136 MHz (10th harmonic of fundamental)

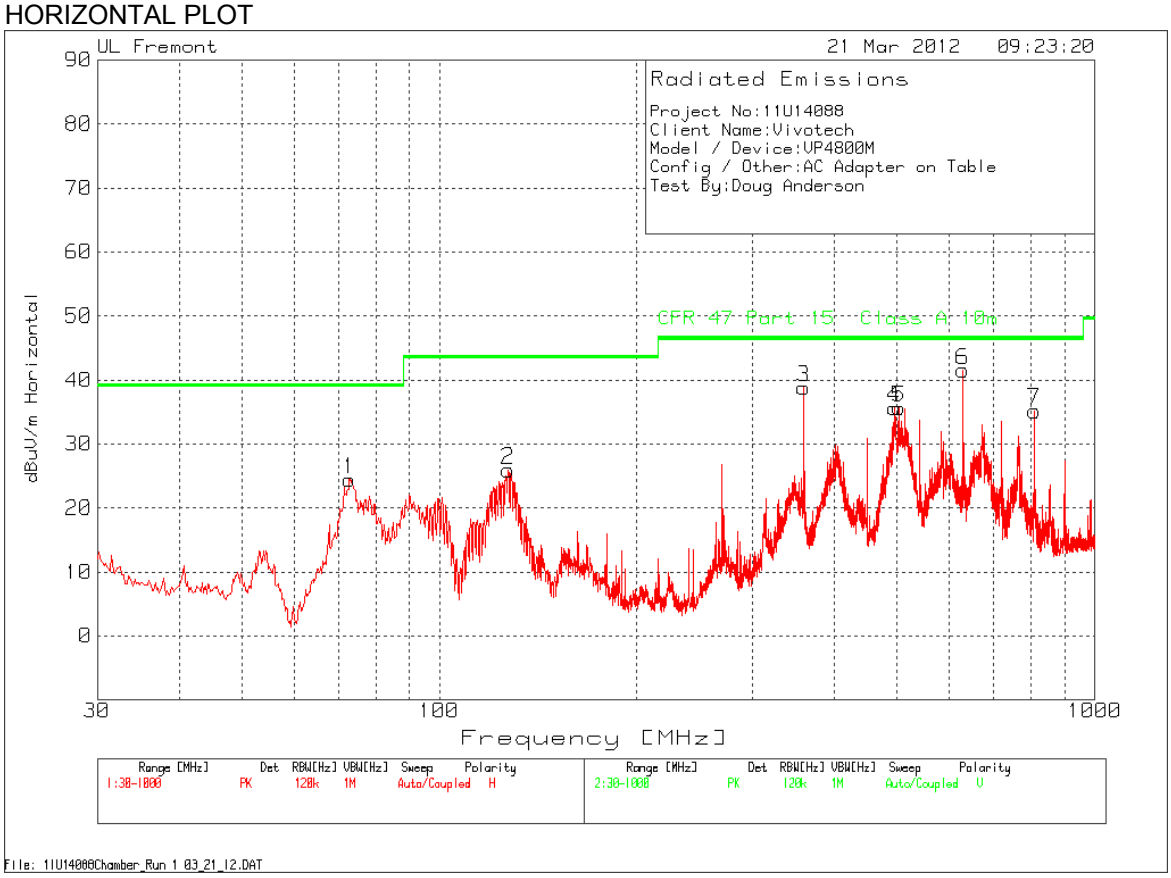
Project No: 11U14088
Client Name: Vivotech
Model / Device: VP4800M
Config / Other: AC Adapter on Table
Test By: Doug Anderson

Test Freq. MHz	Meter Reading dB(μV)	Detector	Pre-Amp Gain + Cable Loss dB	Antenna Factor dB	Corrected Reading dB(μV/m)	FCC Class B 3 m Limit dB(μV/m)	Margin dB	Height cm	Polarity
72.8397	50.54	**QP**	-27.1	8.1	31.54	40	-8.46	200	Horz
127.3102	46.49	**QP**	-26.7	13.8	33.59	43.5	-9.91	200	Horz
54.2306	54.46	**QP**	-27.3	7.3	34.46	40	-5.54	100	Vert
73.0336	56.5	**QP**	-27.1	8.1	37.5	40	-2.5	100	Vert
127.6978	51.42	**QP**	-26.7	13.7	38.42	43.5	-5.08	100	Vert

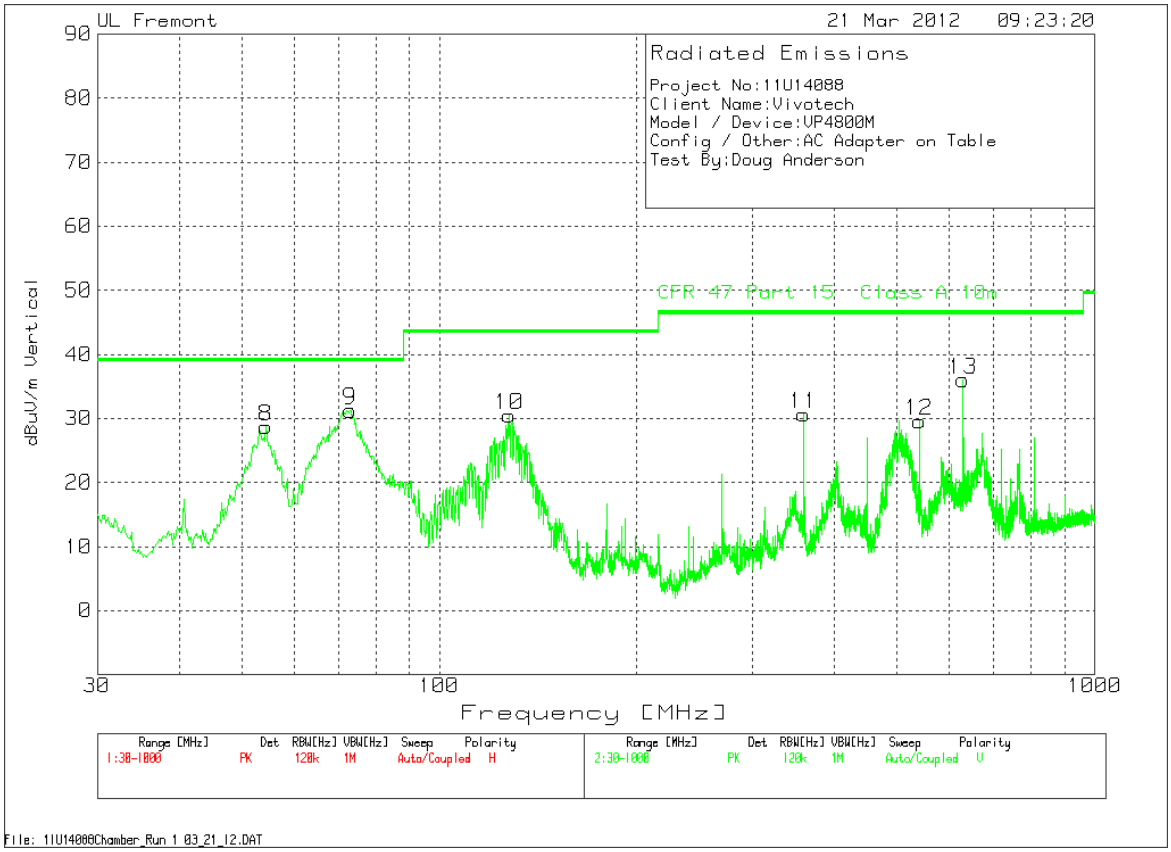
PK - Peak detector
QP - Quasi-Peak detector

CLASS A DIGITAL DEVICE (UNINTENTIONAL RADIATOR) 30 to 1000 MHz:

HORIZONTAL PLOT



VERTICAL PLOT



HORIZONTAL AND VERTICAL DATA

Project No: 11U14088
Client Name: Vivotech
Model / Device: VP4800M
Config / Other: AC Adapter on Table
Test By: Doug Anderson

Test Freq. MHz	Meter Reading dB(μV)	Detector	Pre-Amp Gain + Cable Loss dB	Antenna Factor dB	10m to 3m Conversion [dB]	Corrected Reading dB(μV/m)	FCC Class B 3 m Limit dB(μV/m)	Margin dB	Height cm	Polarity
72.8397	57.72	PK	-27.1	8.1	-10.5	28.22	39	-10.78	200	Horz
359.9241	59.79	PK	-25.4	14.9	-10.5	38.79	46.4	-7.61	100	Horz
630.1439	56.44	PK	-23.8	19.4	-10.5	41.54	46.4	-4.86	100	Horz
54.2306	61.07	PK	-27.3	7.3	-10.5	30.57	39	-8.43	100	Vert
73.0336	56.5	**QP**	-27.1	8.1	-10.5	22.88	39	-7.72	100	Vert
630.1439	50.94	PK	-23.8	19.4	-10.5	36.04	46.4	-10.36	100	Vert

PK - Peak detector
QP - Quasi-Peak detector

9. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207
IC RSS-GEN, Section 7.2.2

(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 50μH/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 band edges.

Frequency range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

TEST PROCEDURE

ANSI C63.4

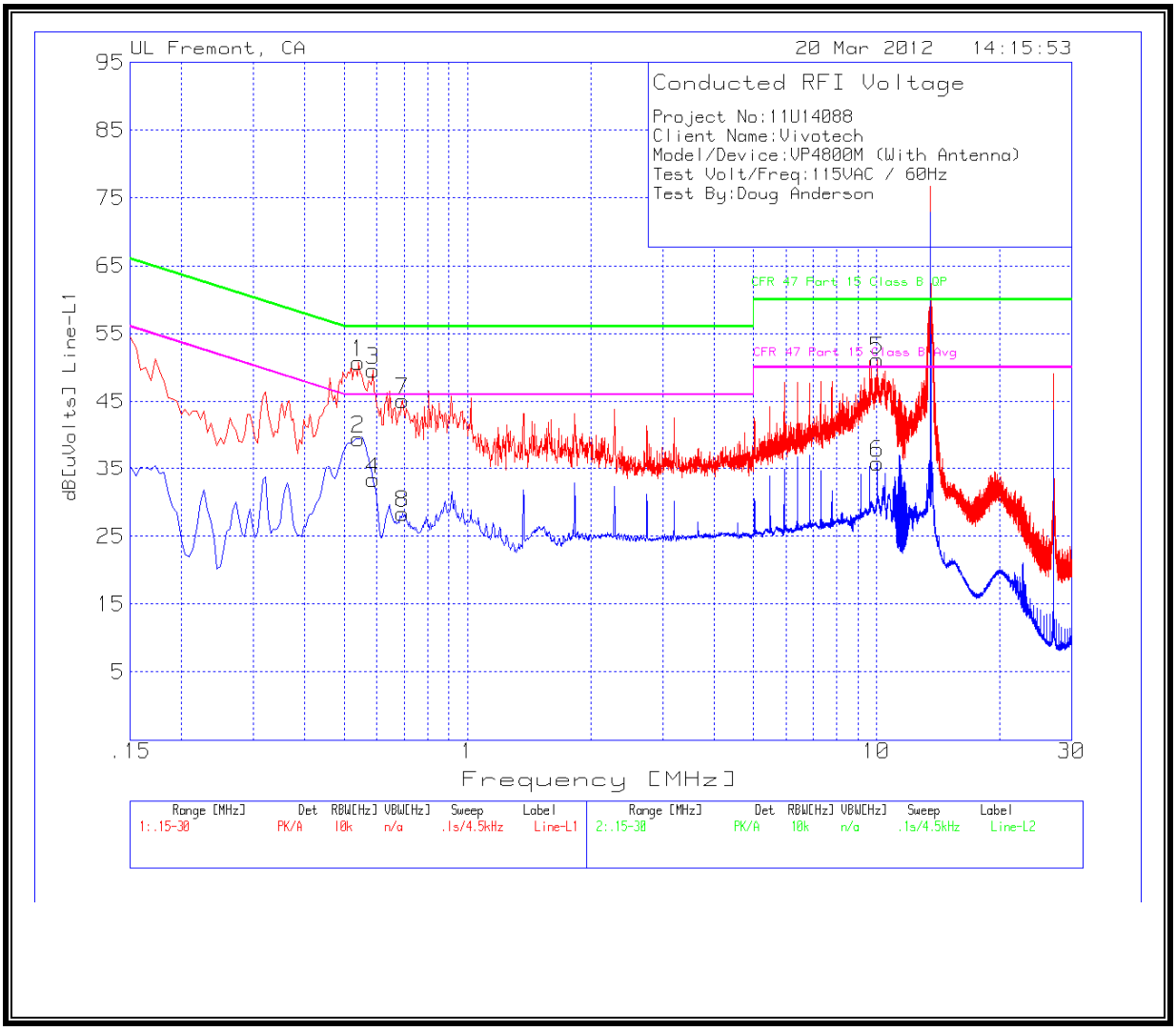
Measurements were taken with the EUT antenna as shipped to ensure that it complies with the limits outside the transmitter's fundamental emission band. Measurements were also taken with a 50-Ω dummy load in place of the antenna to ensure that the EUT complies with the limits inside the transmitter's fundamental emission band.

RESULTS

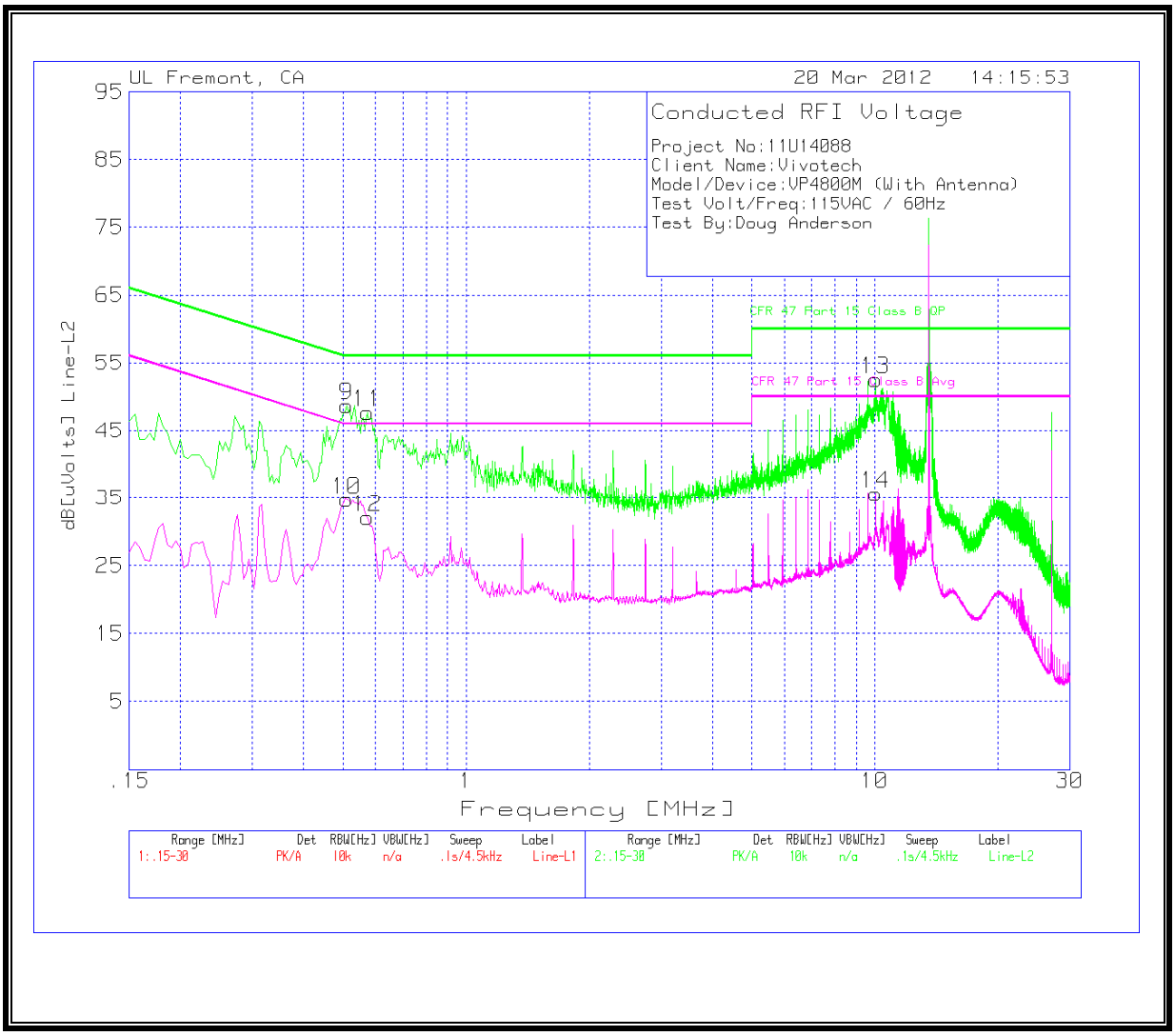
WORST EMISSIONS – With antenna

Project No:11U14088									
Client Name:Vivotech									
Model/Device:VP4800M (With Antenna)									
Test Volt/Freq:115VAC / 60Hz									
Test By:Doug Anderson									
Test Freq. MHz	**Meter Reading dB(μV)**	**Detector Type**	**LISN Factor dB**	**Path Loss dB**	**Corrected Reading dB(μV)**	**Class B QP Limit dB(μV)**	**QP Margin dB**	**Class B Av Limit dB(μV)**	**Av Margin dB**
Line-L1 .15 - 30MHz									
0.5415	50.69	PK	0.1	0	50.79	56	-5.21	-	-
0.5415	39.33	Av	0.1	0	39.43	-	-	46	-6.57
0.5865	49.44	PK	0.1	0	49.54	56	-6.46	-	-
0.5865	33.22	Av	0.1	0	33.32	-	-	46	-12.68
10.059	50.78	PK	0.1	0.2	51.08	60	-8.92	-	-
10.059	35.54	Av	0.1	0.2	35.84	-	-	50	-14.16
0.6945	45.02	PK	0.1	0	45.12	56	-10.88	-	-
0.6945	28.22	Av	0.1	0	28.32	-	-	46	-17.68
Line-L2 .15 - 30MHz									
0.51	48.62	PK	0.1	0	48.72	56	-7.28	-	-
0.51	34.69	Av	0.1	0	34.79	-	-	46	-11.21
0.573	47.55	PK	0.1	0	47.65	56	-8.35	-	-
0.573	31.99	Av	0.1	0	32.09	-	-	46	-13.91
10.0635	52.21	PK	0.1	0.2	52.51	60	-7.49	-	-
10.0635	35.38	Av	0.1	0.2	35.68	-	-	50	-14.32
PK - Peak detector									
QP - Quasi-Peak detector									
Av - Average detector									

LINE 1 RESULTS – With antenna



LINE 2 RESULTS – With antenna



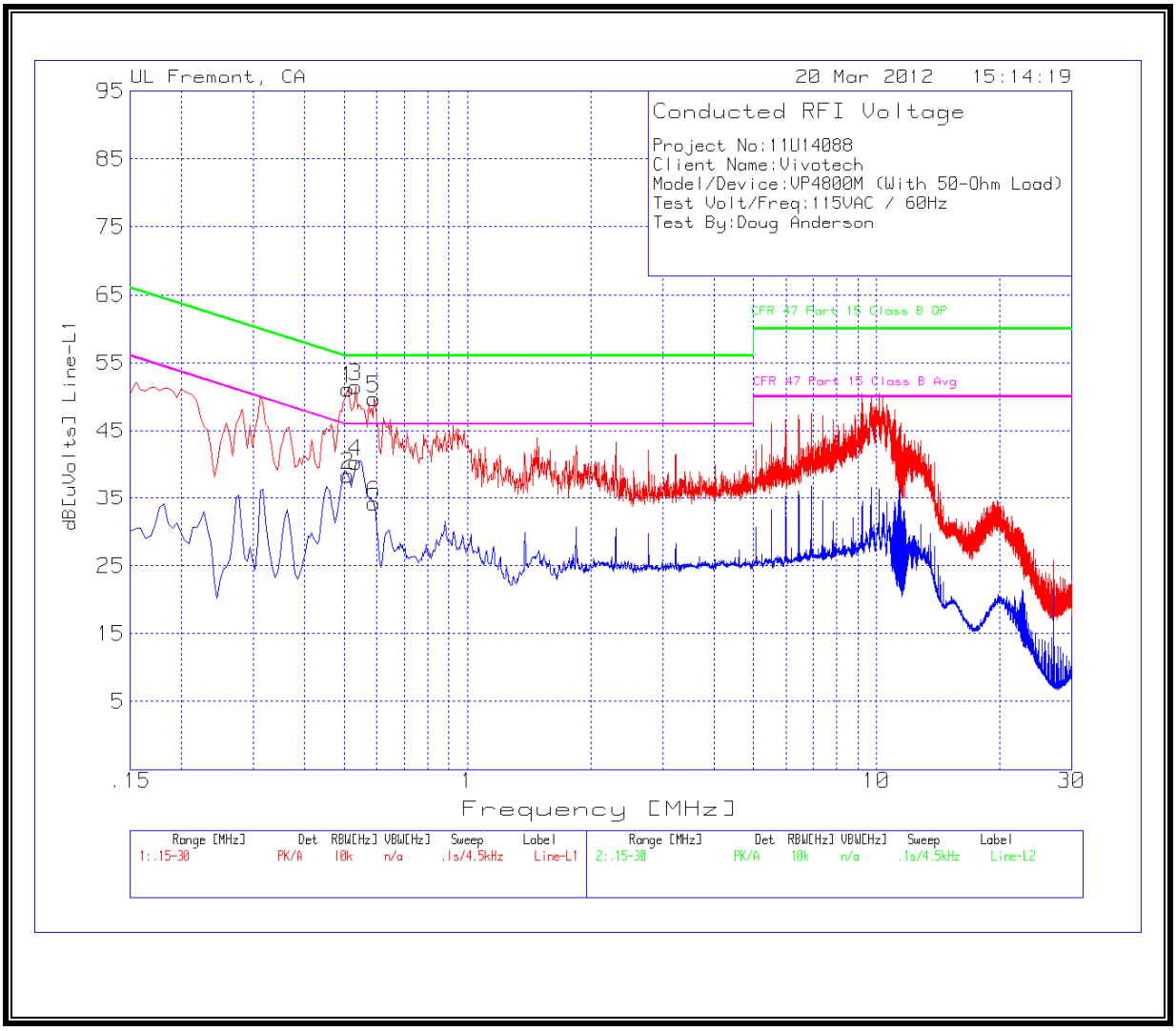
WORST EMISSIONS – With 50-Ω load

Project No:11U14088
Client Name:Vivotech
Model/Device:VP4800M (With 50-Ohm Load)
Test Volt/Freq:115VAC / 60Hz
Test By:Doug Anderson

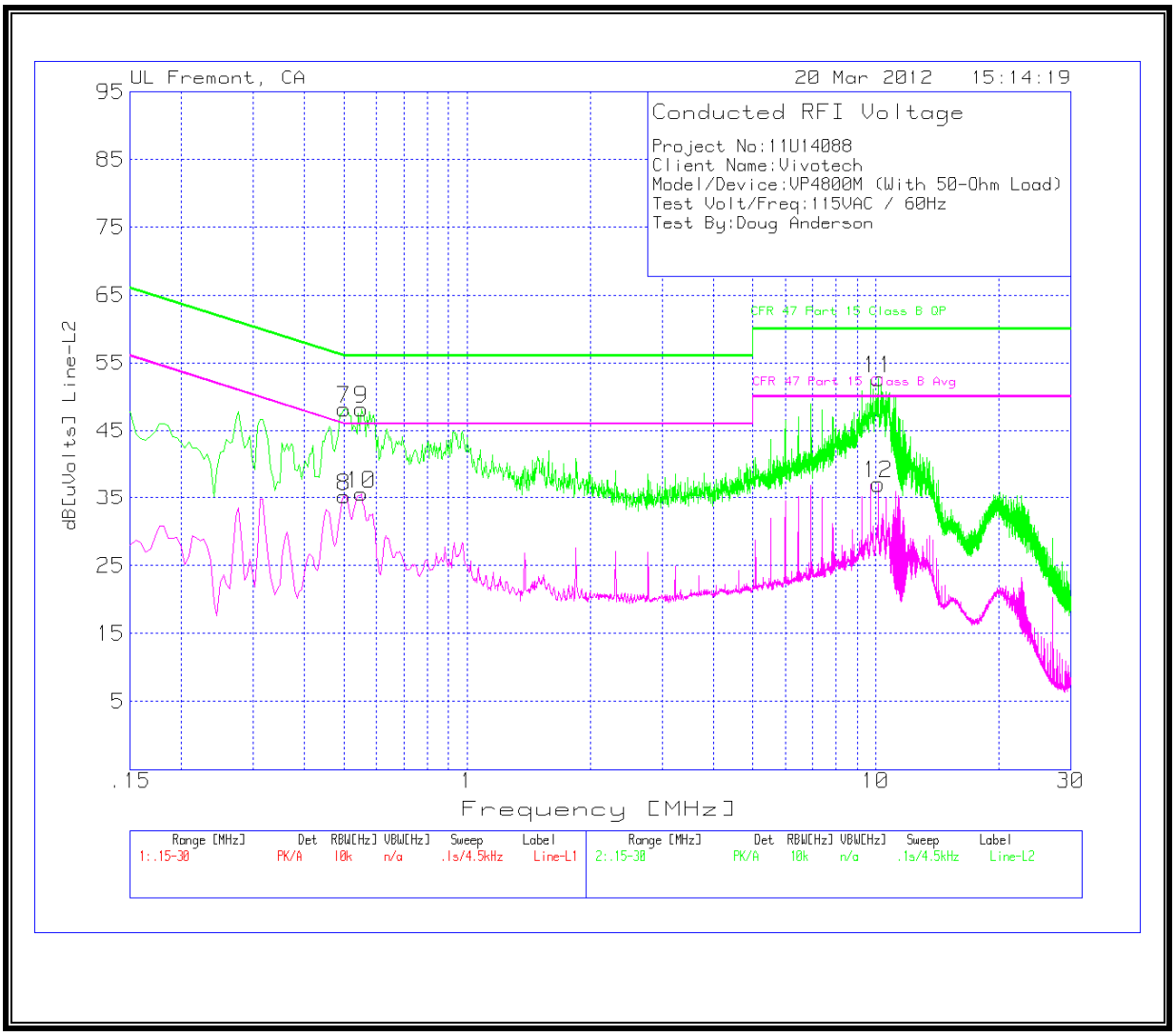
Test Freq. MHz	Meter Reading dB(μV)	Detector Type	LISN Factor dB	Path Loss dB	Corrected Reading dB(μV)	Class B QP Limit dB(μV)	QP Margin dB	Class B Av Limit dB(μV)	Av Margin dB
Line-L1 .15 - 30MHz									
0.51	50.97	PK	0.1	0	51.07	56	-4.93	-	-
0.51	38.35	Av	0.1	0	38.45	-	-	46	-7.55
0.5325	51.43	PK	0.1	0	51.53	56	-4.47	-	-
0.5325	40.22	Av	0.1	0	40.32	-	-	46	-5.68
0.591	49.65	PK	0.1	0	49.75	56	-6.25	-	-
0.591	34.11	Av	0.1	0	34.21	-	-	46	-11.79
Line-L2 .15 - 30MHz									
0.501	48.11	PK	0.1	0	48.21	56	-7.79	-	-
0.501	35.17	Av	0.1	0	35.27	-	-	46	-10.73
0.5505	48.06	PK	0.1	0	48.16	56	-7.84	-	-
0.5505	35.51	Av	0.1	0	35.61	-	-	46	-10.39
10.1535	52.36	PK	0.1	0.2	52.66	60	-7.34	-	-
10.1535	36.82	Av	0.1	0.2	37.12	-	-	50	-12.88

PK - Peak detector
QP - Quasi-Peak detector
Av - Average detector

LINE 1 RESULTS – With 50-Ω load



LINE 2 RESULTS – With 50-Ω load



10. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ± 0.01% of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 2.3.1 and 2.3.2

RESULTS

No non-compliance noted.

Reference Frequency: EUT Channel 13.5600800 MHz @ 20ºC **Limit: ± 100 ppm = 135.601 kHz**				
Power Supply	**Environment**	**Frequency Deviation Measureed with Time Elapse**		
(Vac)	**Temperature (ºC)**	**(MHz)**	**Delta (ppm)**	**Limit (ppm)**
115.00	50	13.5601330	-0.039	± 100
115.00	40	13.5600683	0.009	± 100
115.00	30	13.5600316	0.036	± 100
115.00	***20***	***13.5600800***	***0.000***	***± 100***
115.00	10	13.5600146	0.048	± 100
115.00	0	13.5600185	0.045	± 100
115.00	-10	13.5600218	0.043	± 100
115.00	-20	13.5600176	0.046	± 100
97.15	20	13.5601760	-0.071	± 100
132.25	20	13.5601765	-0.071	± 100

11. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1 % to 3 % of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

99% BANDWIDTH