



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8**

CERTIFICATION TEST REPORT

FOR

Low Power Transmitter Wireless Card Reader

MODEL NUMBER: ViVOPay 5000

**FCC ID: Q55VP5KA
IC: 5141A-030VP5K**

REPORT NUMBER: 11U13717-3

ISSUE DATE:

Prepared for
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NVLAP[®]
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Revision History

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--	2011-06-03	Initial Issue	B. DeLisi

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Vivotech
451 El Camino Real
Santa Clara, CA, 95050, USA

EUT DESCRIPTION: Low Power Transmitter Wireless Card Reader

MODEL: ViVOPay 5000

SERIAL NUMBER: CA10328700

DATE TESTED:

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

Underwriters Laboratories Inc. tested the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Inc. based on interpretations of these calculations. The results show that the equipment 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 by the referenced documents. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Inc. 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 By:



Joseph Danisi
Lead Engineering Associate
UL

Tested By:



Bob DeLisi
Sr. Staff Engineer
UL

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.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 1285 Walt Whitman Rd. Melville, NY 11747, USA.

UL Melville is accredited by NVLAP, Laboratory Code 100255-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/1002550.htm>.

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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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	$\pm 3.3 \text{ dB}$
Radiated Disturbance, 30 to 1000 MHz	$\pm 4.00 \text{ dB}$

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Low Power Transmitter Wireless Card Reader intended for commercial applications.

5.2. MAXIMUM OUTPUT FIELD STRENGTH

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Field Strength (dBuV/m) @ 3-m
13.56	Transmitting	73.71

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a loop coil antenna. The loop coil antenna area is 4.2 m².

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was GR, rev. 1.2.2.

The test utility software used during testing was EMVPosSim Rev.1.06E.

5.5. WORST-CASE CONFIGURATION AND MODE

The device only has one mode of operation. Testing was conducted with the card reader active and sending data via the RS-232 link to the support computer.

5.6. MODIFICATIONS

No modifications were made during testing.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	PP18L	38707924033	
Power Supply	Dell	LA90PS0-00	DP/N DF266 PA-190	-
RS-233 to Ethernet Adapter	-	-	-	-

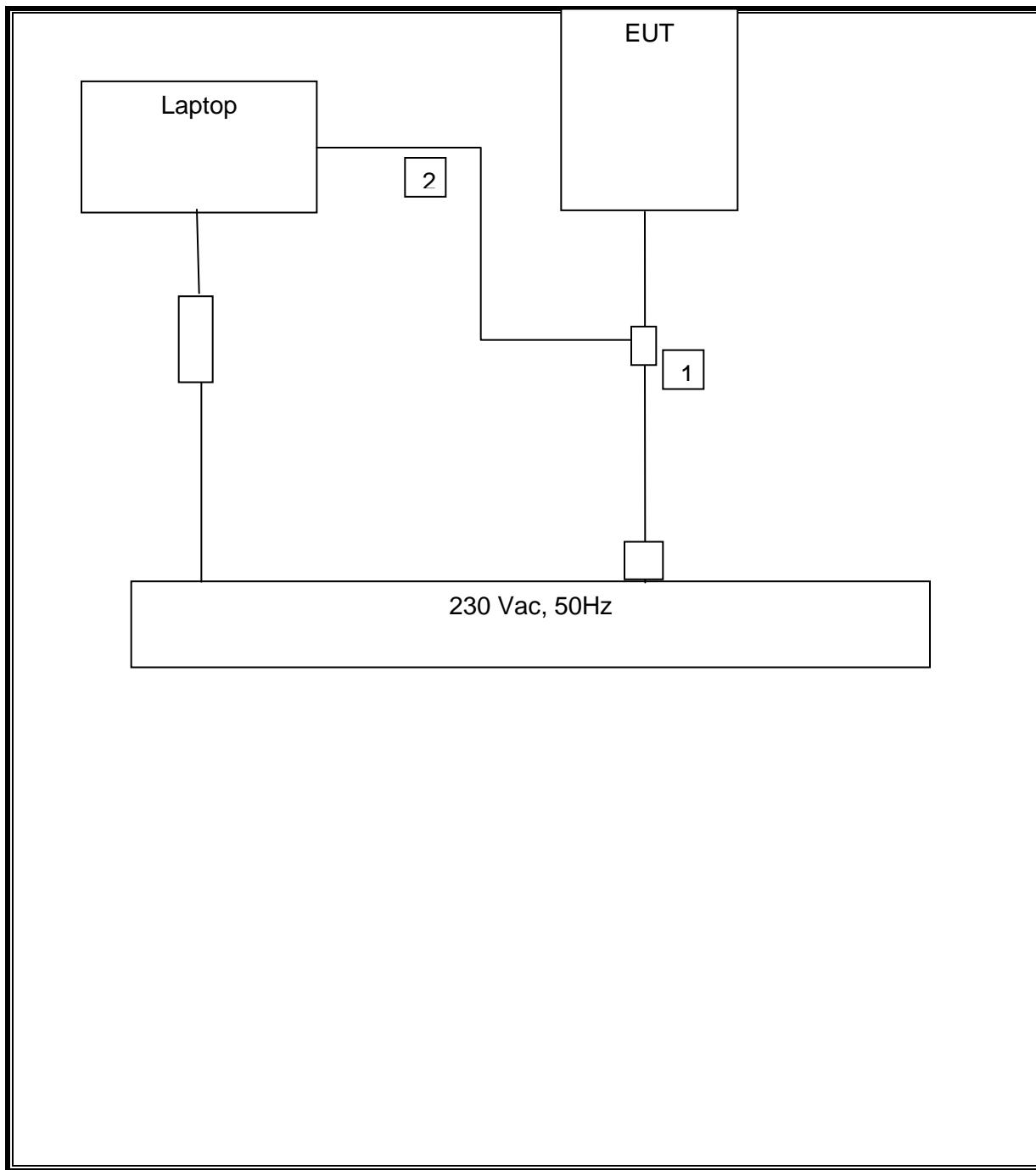
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC Plug	Unshielded	1.8m	AC/DC Adapter for EUT
2	Ethernet	1	RJ45	Unshielded	>3m	None

TEST SETUP

The EUT is connected to a laptop computer via a RS-232 connection.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
60Hz-30MHz					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2011-03-01	2012-03-01
Active Loop Antenna	EMCO	6507	ME5A-288	2011-10-19	2012-10-19
Switch Driver	HP	11713A	ME7A-627	N/A	N/A
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A
RF Switch Box	UL	1	44398	N/A	N/A
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2010-12-07	2012-12-07
Multimeter	Fluke	87V	44547	2011-02-01	2012-02-29
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2011-03-01	2012-03-01
Log-P Antenna	Schaffner	UPA6109	44068	2011-04-05	2012-04-05
Bicon Antenna	Schaffner	VBA6106A	54	2011-04-05	2012-04-05
Switch Driver	HP	11713A	ME7A-627	N/A	N/A
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A
RF Switch Box	UL	1	44398	N/A	N/A
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2010-12-07	2012-12-07
Multimeter	Fluke	87V	44547	2011-02-01	2012-02-29

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Conducted Emissions – GP 1					
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2011-01-27	2011-01-12
LISN support	EMCO	3825/2R	ME5-790	2011-02-04	2012-02-28
LISN eut	Solar	9252-50-R-24-BNC	ME5A-636	2011-02-04	2012-02-28
Switch Driver	HP	11713A	44397	N/A	N/A
RF Switch Box	UL	4	44404	N/A	N/A

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Measurement Software	UL	Version 9.3	44736	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-08-10	2012-08-12
Multimeter	Fluke	83III	ME5B-305	2011-02-01	2011-02-29

Occupied Bandwidth

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2011-01-27	2011-01-12
Active Loop Antenna	EMCO	6507	ME5A-288	2011-10-19	2012-10-19
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-08-10	2012-08-12
Multimeter	Fluke	83III	ME5B-305	2011-02-01	2011-02-29

Frequency Stability

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2011-01-27	2011-01-12
Active Loop Antenna	EMCO	6507	ME5A-288	2011-10-19	2012-10-19
Environmental Controller	Thermotron	FA-35-CH-5-5	6-301	2010-07-13	2011-07-13
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-08-10	2012-08-12
Multimeter	Fluke	83III	ME5B-305	2011-02-01	2011-02-29

7. RADIATED EMISSION TEST RESULTS

7.1. LIMITS AND PROCEDURE

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. (124dBuV/m) 40dB/decade extrapolation factor used.

(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 and 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 (μ V/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 field strength from μ V/m to dBuV/m is:

Limit (dBuV/m) = 20 log limit (μ V/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

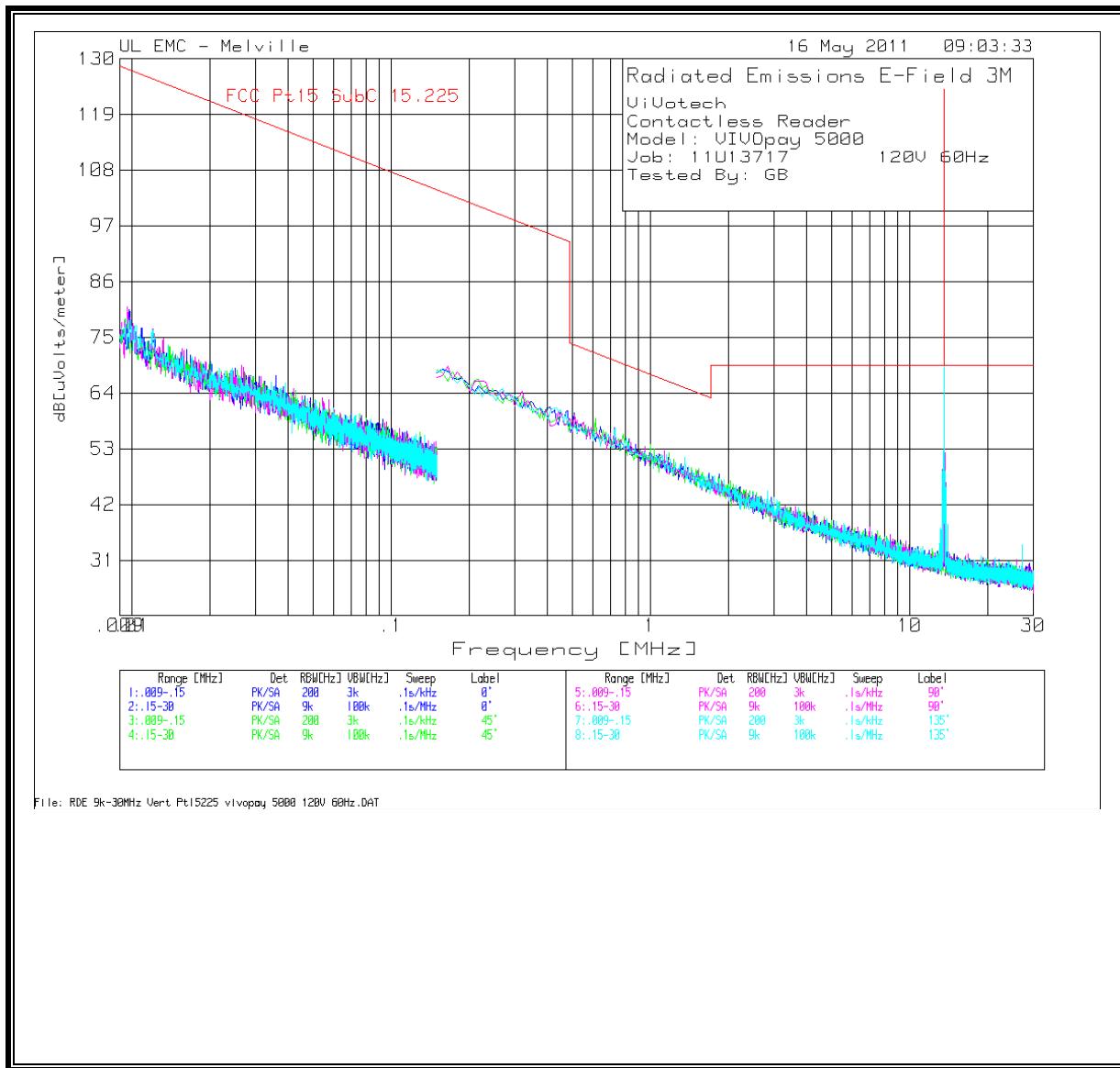
ANSI C63.4

The EUT is an intentional radiator that incorporates a digital device, the highest fundamental frequency generated or used in the device is 13.56 MHz; therefore, the frequency range was investigated from 30 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000 MHz).

RESULTS

No non-compliance noted:

7.1.1. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)



ViVotech
Contactless Reader
Model: VIVOpay 5000
Job: 11U13717 120V 60Hz
Tested By: GB

Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level dB[uVolts/meter]	Margin 1[dB]	Azimuth [degs]	Height [cm]	Polarity
Number	Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]					
0° .009 - .15MHz										
1	0.00979	49.23 PK		0.3	31	80.53	127.8	-47.27	138	101 Vert
2	0.01086	46.24 PK		0.3	30.3	76.84	126.9	-50.06	275	101 Vert
3	0.03597	45.35 PK		0.2	21.9	67.45	116.5	-49.05	70	101 Vert
0° .15 - 30MHz										
4	13.48882	28.82 PK		0.4	17.5	46.72	69.5	-22.78	265	101 Vert
135° .15 - 30MHz										
5	13.56347	56.19 PK		0.4	17.5	74.09	124	-49.91	279	160 Vert
6	13.63065	33.93 PK		0.4	17.5	51.83	69.5	-17.67	252	160 Vert

LIMIT 1: FCC Pt15 SubC 15.225

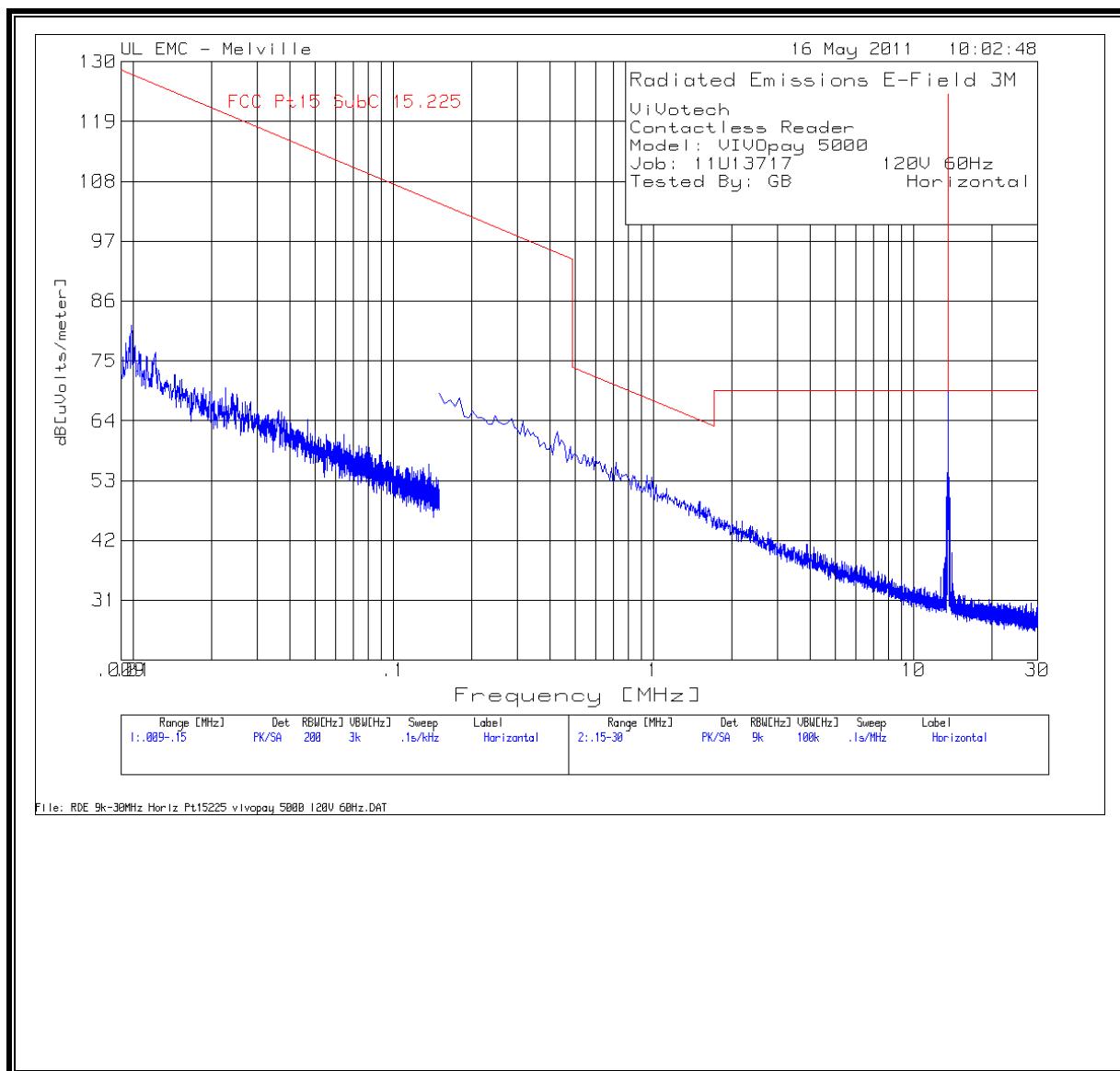
PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear Average detector
LgAv - Log Average detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

ViVotech
Contactless Reader
Model: VIVOpay 5000
Job: 11U13717 120V 60Hz
Tested By: GB

Test	Meter	Detector	Gain/Loss	Transducer	Level dB[uVolts/me- ter]	Margin 1[dB]	Azimuth [degs]	Height [cm]	Polarity
Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]					
135° .15 - 30MHz									
13.56	55.81 QP		0.4	17.5	73.71	124	-50.29	225	152 Vert

LIMIT 1: FCC Pt15 SubC 15.225

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear Average detector
LgAv - Log Average detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection



ViVotech
Contactless Reader
Model: VIVOpay 5000
Job: 11U13717 120V 60Hz
Tested By: GB Horizontal

Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level dB[uVolts/meter]	Margin 1[dB]	Azimuth [degs]
Number	Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]			
Horizontal .009 - .15MHz								
1	0.00985	50.29	PK	0.3	31	81.59	127.7	-46.11
2	0.01216	46.74	PK	0.3	29.5	76.54	125.9	-49.36
3	0.01444	44.05	PK	0.3	28.2	72.55	124.4	-51.85
Horizontal .15 - 30MHz								
4	0.15	51.57	PK	0.1	17.4	69.07	104.1	-35.03
5	13.56347	59.38	PK	0.4	17.5	77.28	124	-46.72
6	13.62318	36.74	PK	0.4	17.5	54.64	69.5	-14.86

LIMIT 1: FCC Pt15 SubC 15.225

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear Average detector
LgAv - Log Average detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

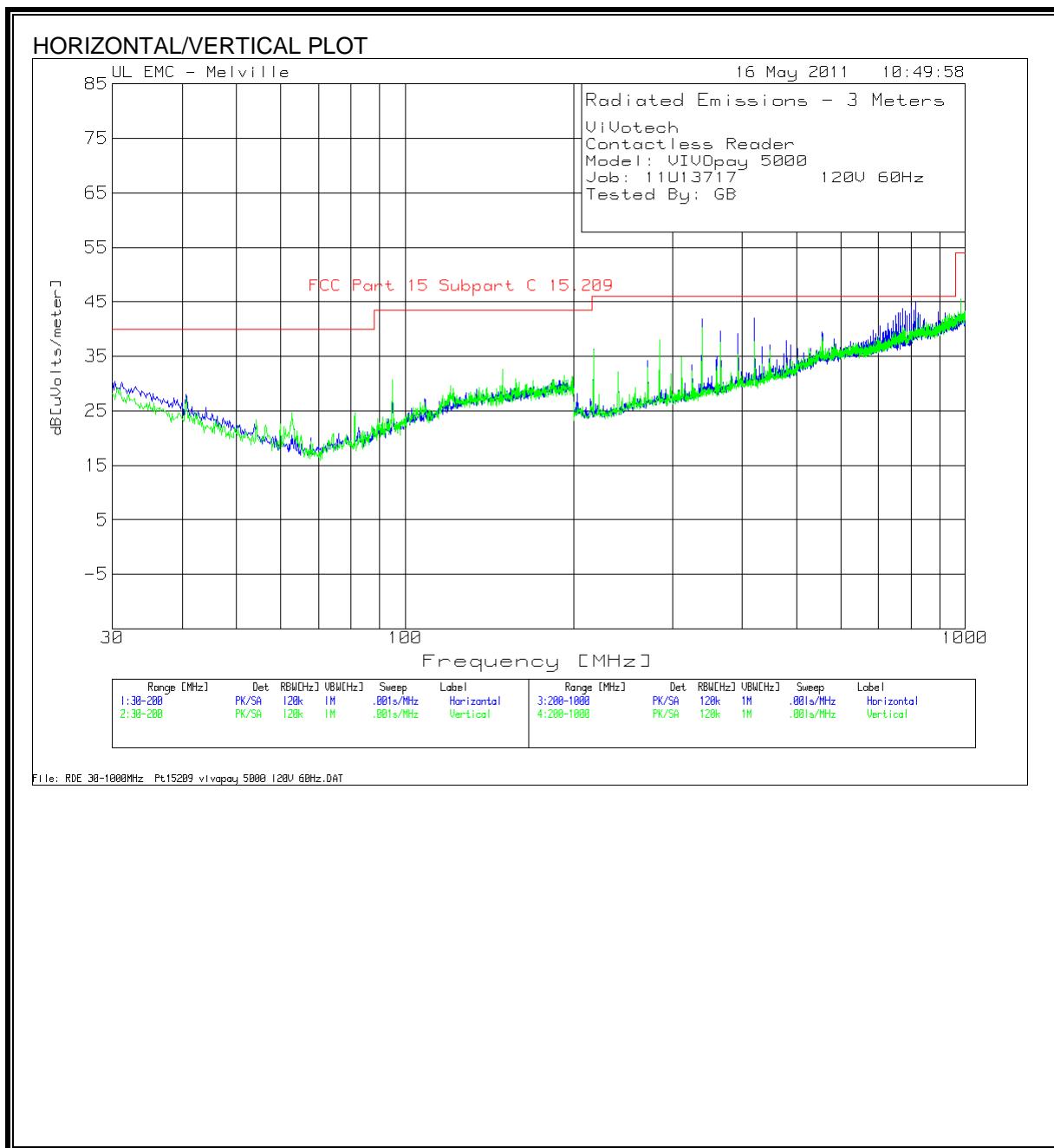
ViVotech
Contactless Reader
Model: VIVOpay 5000
Job: 11U13717 120V 60Hz
Tested By: GB Horizontal

Test	Meter	Detector	Gain/Loss	Transducer	Level dB[uVolts/me	Margin 1[dB]	Azimuth [degs]
Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]	ter]		
Horizontal .15 - 30MHz							
13.5611	59.2	PK	0.4	17.5	77.1	124	-46.9

LIMIT 1: FCC Pt15 SubC 15.225

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear Average detector
LgAv - Log Average detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

7.1.2. TX SPURIOUS EMISSION 30 TO 1000 MHz



HORIZONTAL/VERTICAL DATA

ViVotech

Contactless Reader

Model: VIVOpay 5000

Job: 11U13717 120V 60Hz

Tested By: GB

Test	Meter	Detector	Gain/Loss	Transducer	Level dB[uVolts/meter]	Margin 1[dB]	Azimuth [degs]	Height [cm]	Polarity
Horizontal 200 - 1000MHz									
816.1184	16.67	QP		3.3	22.6	42.57	46	-3.43	4
801.7946	17.42	QP		3.3	22.1	42.82	46	-3.18	352
808.9248	15.51	QP		3.3	22.4	41.21	46	-4.79	351
780.305	16.39	QP		3.2	21.9	41.49	46	-4.51	316
823.2756	16.43	QP		3.3	22.9	42.63	46	-3.37	351
895	9.82	QP		3.5	23.3	36.62	46	-9.38	305
338.9918	21.69	QP		2	15.2	38.89	46	-7.11	164
420.3657	22.01	QP		2.2	16.6	40.81	46	-5.19	124
751.6948	15.94	QP		3.1	21.5	40.54	46	-5.46	136
758.8409	17.97	QP		3.1	21.5	42.57	46	-3.43	125
766	18.69	QP		3.2	21.5	43.39	46	-2.61	139
773.1553	17.73	QP		3.2	21.7	42.63	46	-3.37	130
787.485	17.18	QP		3.2	21.9	42.28	46	-3.72	157
794.6443	16.92	QP		3.2	22	42.12	46	-3.88	142
830.4345	14.75	QP		3.3	23	41.05	46	-4.95	32
921.0696	8.41	QP		3.5	23.7	35.61	46	-10.39	160
Vertical 200 - 1000MHz									
821.1259	7.84	QP		3.3	23.3	34.44	46	-11.56	238
164 Vert									

LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector

QP - Quasi-Peak detector

LnAv - Linear Average detector

LgAv - Log Average detector

Av - Average detector

CAV - CISPR Average detector

RMS - RMS detection

CRMS - CISPR RMS detection

8. 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 50 μ 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 band edges.

Frequency range (MHz)	Limits (dB μ V)	
	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

RESULTS

No non-compliance noted:

EMISSIONS – with internal antenna

ViVotech
Contactless Reader
Model: VIVOpay 5000
Job: 11U13717 120V 60Hz
Tested By: GB

Test	Meter	Detector	Gain/Loss	Transduce r	Level [dB(uVolts)]	Limit 1	Margin 1[dB]	Margin 2[dB]
Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]				
Line - L1 .15 - 1MHz								
0.16958	36.3 QP		11.4	0	47.7	65	-17.3	55 -7.3
0.44596	26.02 QP		10.5	0	36.52	57	-20.48	47 -10.48
0.94109	16.9 QP		10.4	0	27.3	56	-28.7	46 -18.7
Line - L1 1 - 30MHz								
13.56443	64.02 QP		10.6	0	74.62+	60	14.62	50 24.62
13.72155	28.53 QP		10.6	0	39.13	60	-20.87	50 -10.87
Neutral .15 - 1MHz								
0.22236	30.67 QP		11	0	41.67	62.7	-21.03	52.7 -11.03
0.43512	27.78 QP		10.5	0	38.28	57.2	-18.92	47.2 -8.92
Neutral 1 - 30MHz								
13.52433	37.73 QP		10.7	0	48.43	60	-11.57	50 -1.57
13.5702	48.75 QP		10.7	0	59.45	60	-0.55	50 9.45
13.5949	36.94 QP		10.7	0	47.64	60	-12.36	50 -2.36
13.64675	37.33 QP		10.7	0	48.03	60	-11.97	50 -1.97
27.12758	10.56 QP		11.1	0	21.66	60	-38.34	50 -28.34

NOTE: "+" - Fundamental Frequency

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear Average detector
LgAv - Log Average detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

LIMIT 1: FCC Part 15 Subpart C QPk
LIMIT 2: FCC Part 15 Subpart C Avg

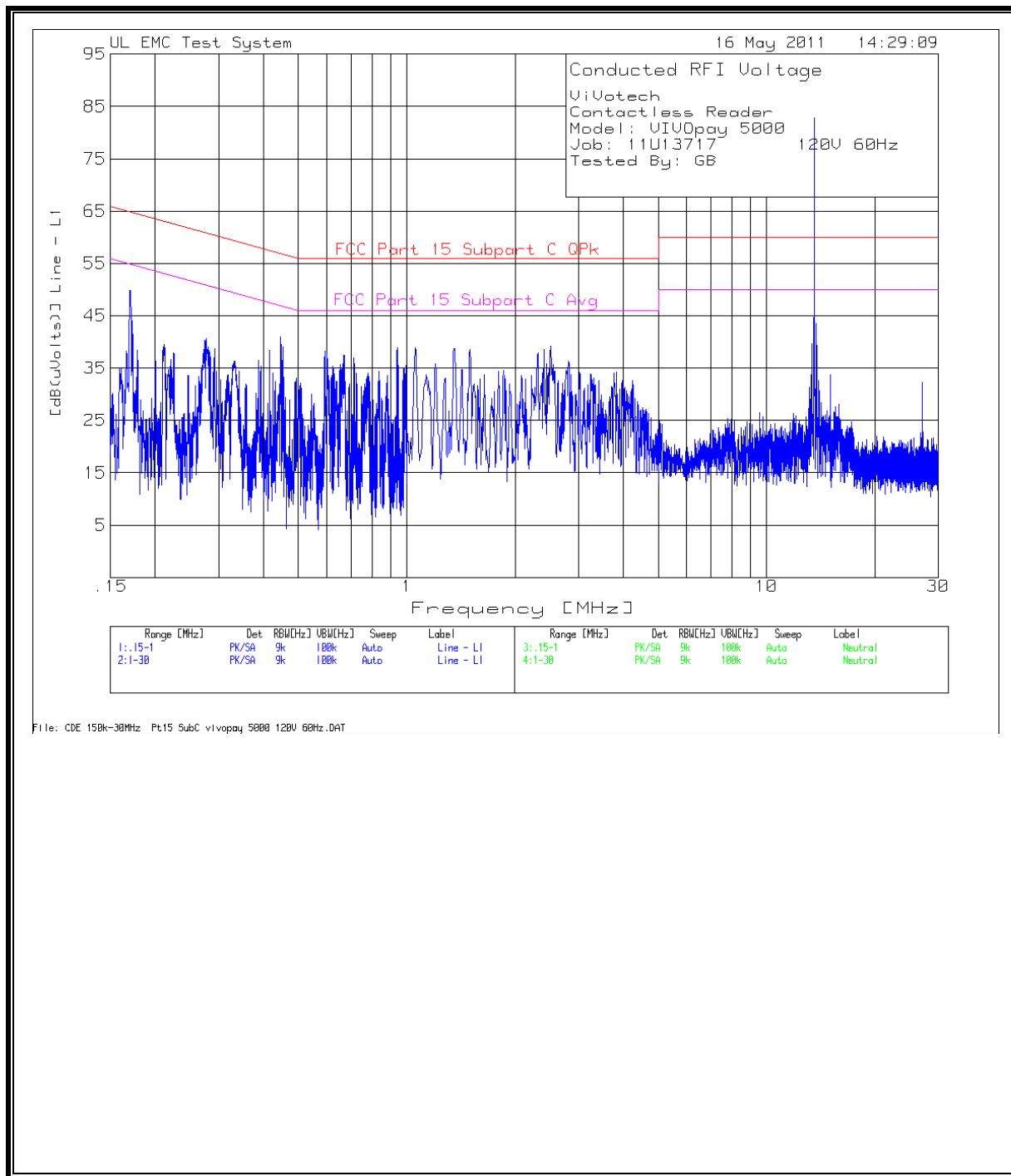
ViVotech
Contactless Reader
Model: VIVOpay 5000
Job: 11U13717 120V 60Hz
Tested By: GB

Test	Meter	Detector	Gain/Loss	Transduce r	Level [dB(uVolts)]	Limit 1	Margin 1[dB]	Margin 2[dB]
Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]				
Line - L1 .15 - 1MHz								
0.16958	19.8 Av		11.4	0	31.2	65	-33.8	55 -23.8
0.44596	19.07 Av		10.5	0	29.57	57	-27.43	47 -17.43
0.94109	8.37 Av		10.4	0	18.77	56	-37.23	46 -27.23
Line - L1 1 - 30MHz								
13.56443	62.66 Av		10.6	0	73.26+	60	13.26	50 23.26
13.72155	14.89 Av		10.6	0	25.49	60	-34.51	50 -24.51
Neutral .15 - 1MHz								
0.22236	19.75 Av		11	0	30.75	62.7	-31.95	52.7 -21.95
0.43512	20.98 Av		10.5	0	31.48	57.2	-25.72	47.2 -15.72
Neutral 1 - 30MHz								
13.52433	24.56 Av		10.7	0	35.26	60	-24.74	50 -14.74
13.5702	47.34 Av		10.7	0	58.04+	60	-1.96	50 8.04
13.5949	23.67 Av		10.7	0	34.37	60	-25.63	50 -15.63
13.64675	21.7 Av		10.7	0	32.4	60	-27.6	50 -17.6
27.12758	8.94 Av		11.1	0	20.04	60	-39.96	50 -29.96

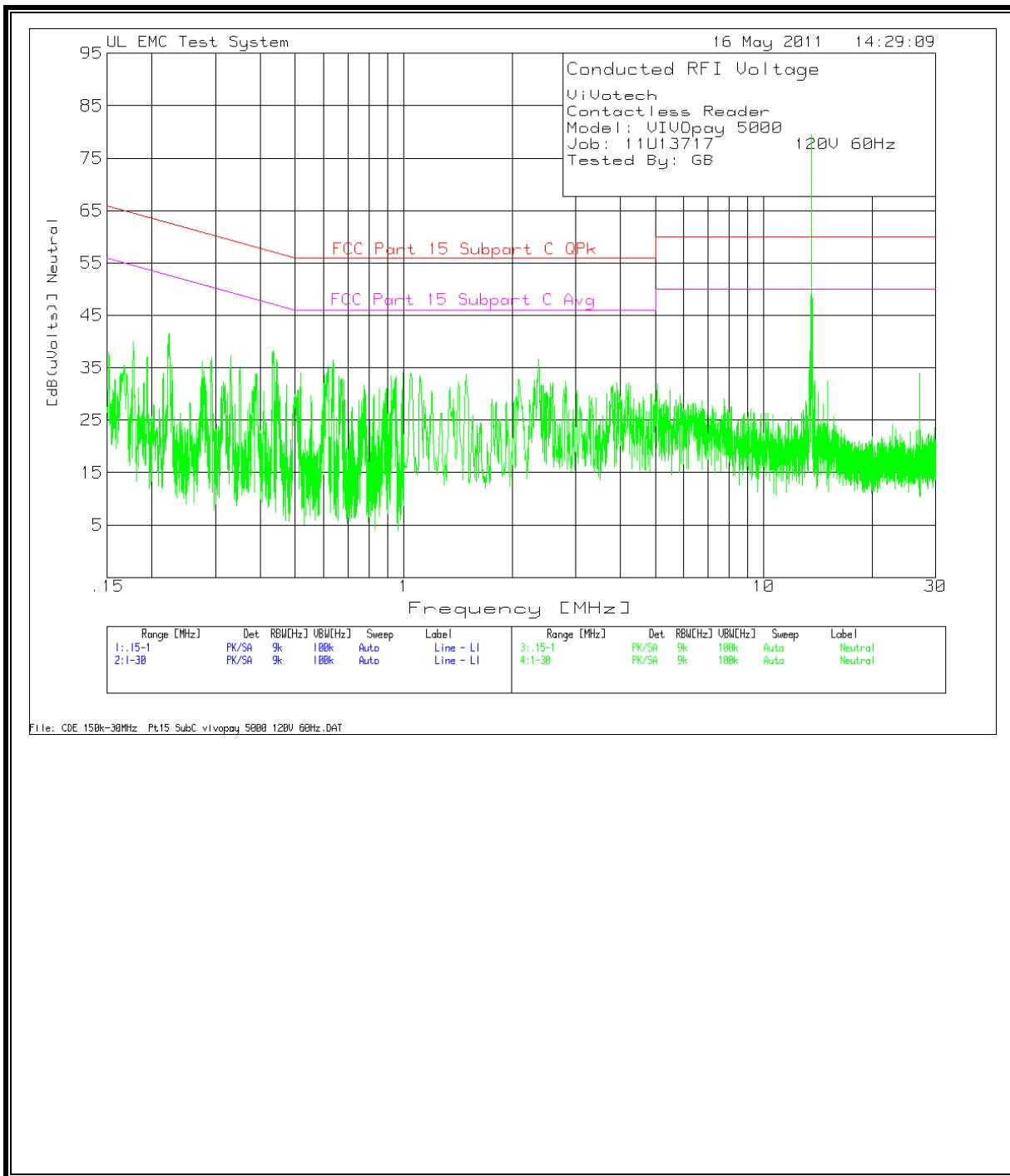
PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear Average detector
LgAv - Log Average detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

LIMIT 1: FCC Part 15 Subpart C QPk
LIMIT 2: FCC Part 15 Subpart C Avg

LINE 1 RESULTS



LINE 2 RESULTS



EMISSIONS – with suitable dummy antenna

ViVotech
Contactless Reader
Model: VIVOpay 5000
Job: 11U13717 120V 60Hz
Tested By: GB Internal load

Marker Number	Test Frequency [MHz]	Meter Reading [dB(uV)]	Detector Type	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit 1	Margin 1[dB]	Margin 2[dB]	
								Limit 2	Margin 2[dB]	
Line - L1 .15 - 1MHz										
1	0.25457	27.55 PK		10.9	0	38.45	61.6	-23.15	51.6	-13.15
2	0.42903	25.95 PK		10.6	0	36.55	57.3	-20.75	47.3	-10.75
3	0.62423	25.13 PK		10.5	0	35.63	56	-20.37	46	-10.37
4	0.64514	25.47 PK		10.4	0	35.87	56	-20.13	46	-10.13
Line - L1 1 - 30MHz										
5	13.56531	21.48 PK		10.6	0	32.08	60	-27.92	50	-17.92
6	27.12843	21.45 PK		11	0	32.45	60	-27.55	50	-17.55
Neutral .15 - 1MHz										
7	0.18486	26.43 PK		11.2	0	37.63	64.3	-26.67	54.3	-16.67
8	0.31442	25.77 PK		10.7	0	36.47	59.9	-23.43	49.9	-13.43
9	0.41185	28.45 PK		10.6	0	39.05	57.6	-18.55	47.6	-8.55
Neutral 1 - 30MHz										
10	2.35167	23.71 PK		10.4	0	34.11	56	-21.89	46	-11.89
11	13.55951	21.09 PK		10.7	0	31.79	60	-28.21	50	-18.21
12	27.12843	19.59 PK		11.1	0	30.69	60	-29.31	50	-19.31

LIMIT 1: FCC Part 15 Class B QPk

LIMIT 2: FCC Part 15 Class B Avg

PK - Peak detector

QP - Quasi-Peak detector

LnAv - Linear Average detector

LgAv - Log Average detector

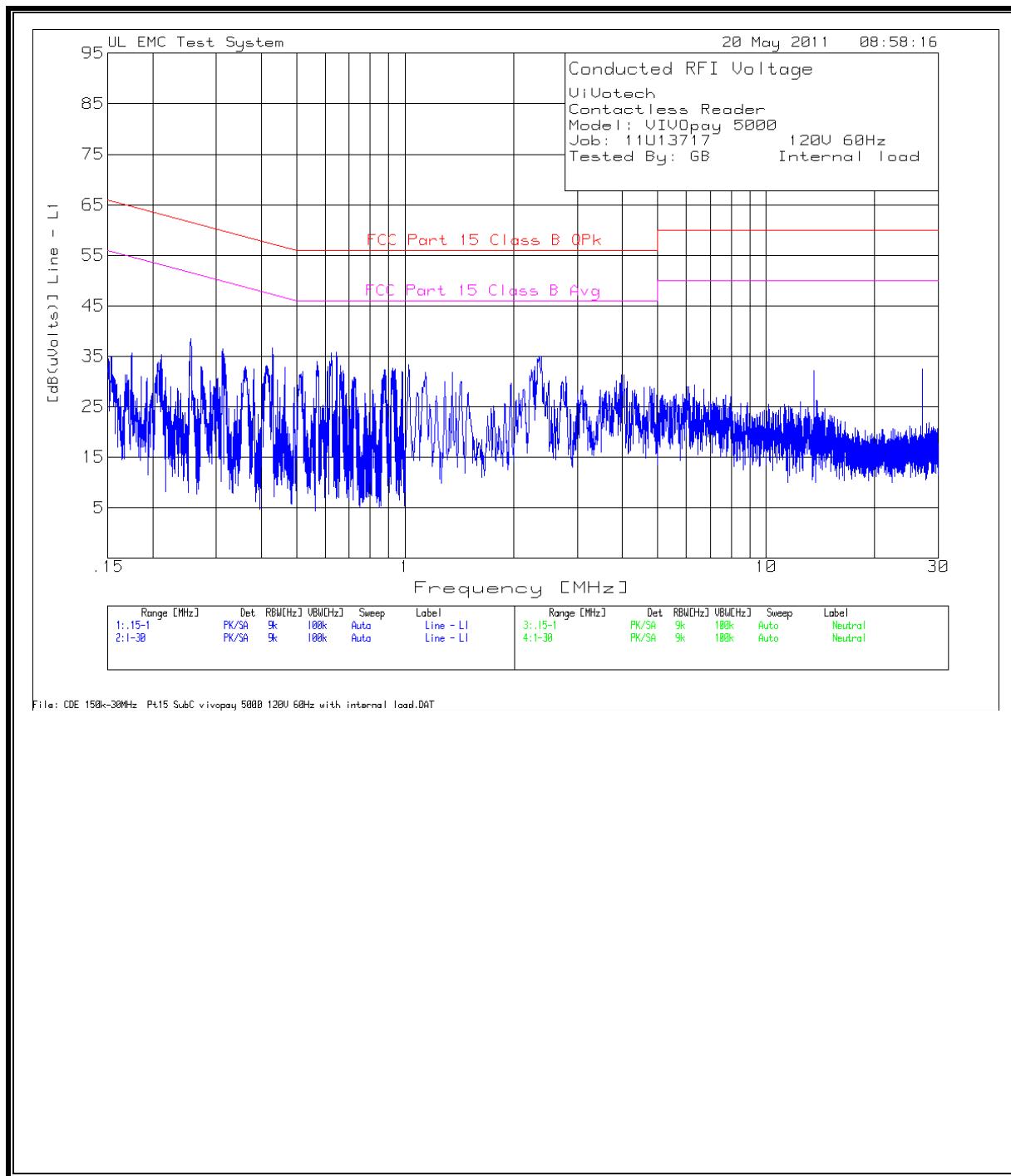
Av - Average detector

CAV - CISPR Average detector

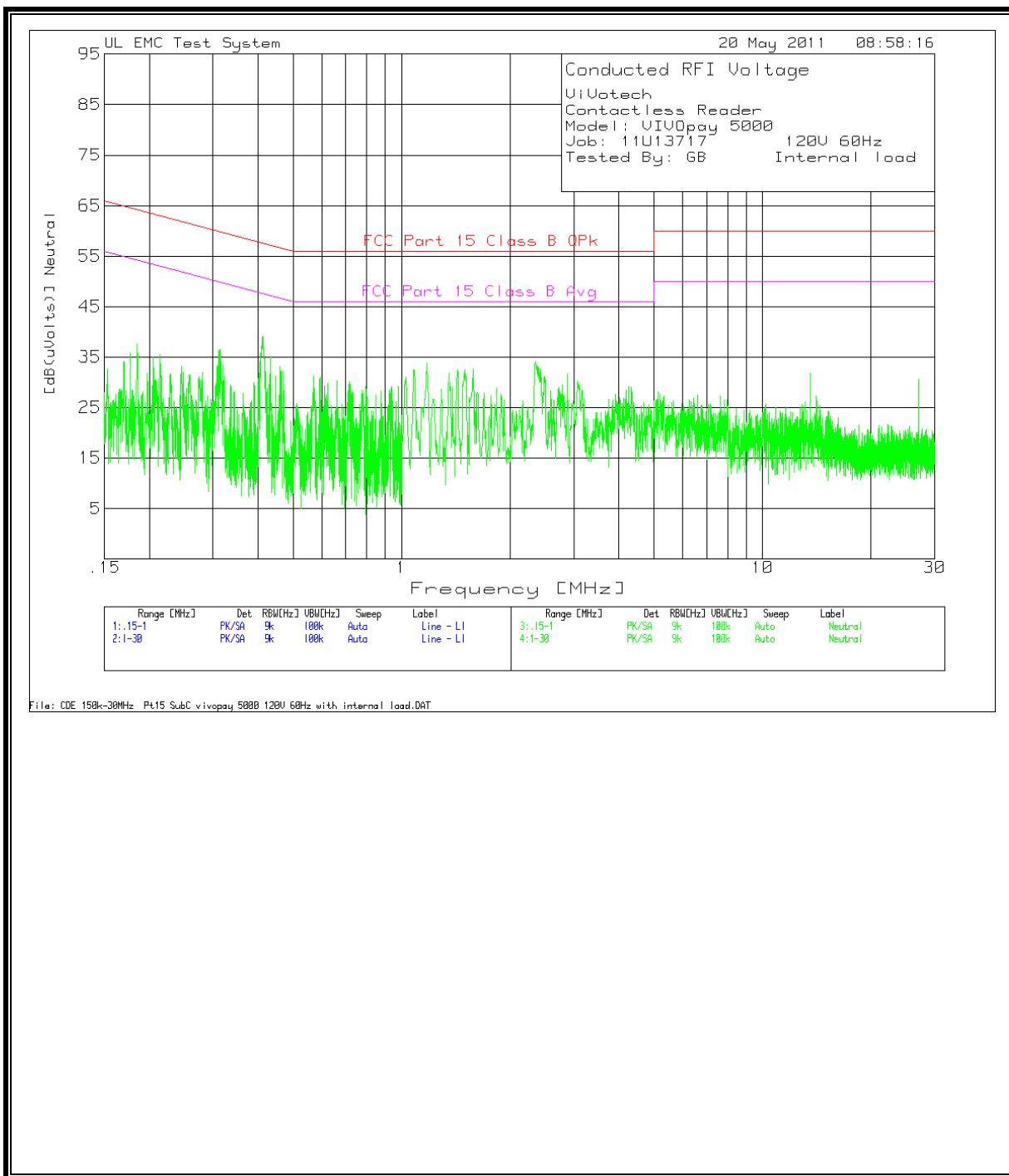
RMS - RMS detection

CRMS - CISPR RMS detection

LINE 1 RESULTS



LINE 2 RESULTS



9. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ 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

C63.10:2009

RESULTS

No non-compliance noted.

Reference Frequency: EUT Channel xxxxxx MHz @ 20°C				
Limit: ± 100 ppm = 135.602 kHz				
Power Supply (Vac)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
120.00	50	13.5601790	0.012	± 100
120.00	40	13.5601977	-0.002	± 100
120.00	30	13.5602178	-0.017	± 100
120.00	20	13.5601954	0.000	± 100
120.00	10	13.5602520	-0.042	± 100
120.00	0	13.5603230	-0.094	± 100
120.00	-10	13.5603543	-0.117	± 100
120.00	-20	13.5603351	-0.103	± 100
102.00	20	13.5602700	-0.055	± 100
138.00	20	13.5602017	-0.005	± 100

10. 99% BANDWIDTH and 20dB Occupied Bandwidth

LIMITS

None; for reporting purposes only.

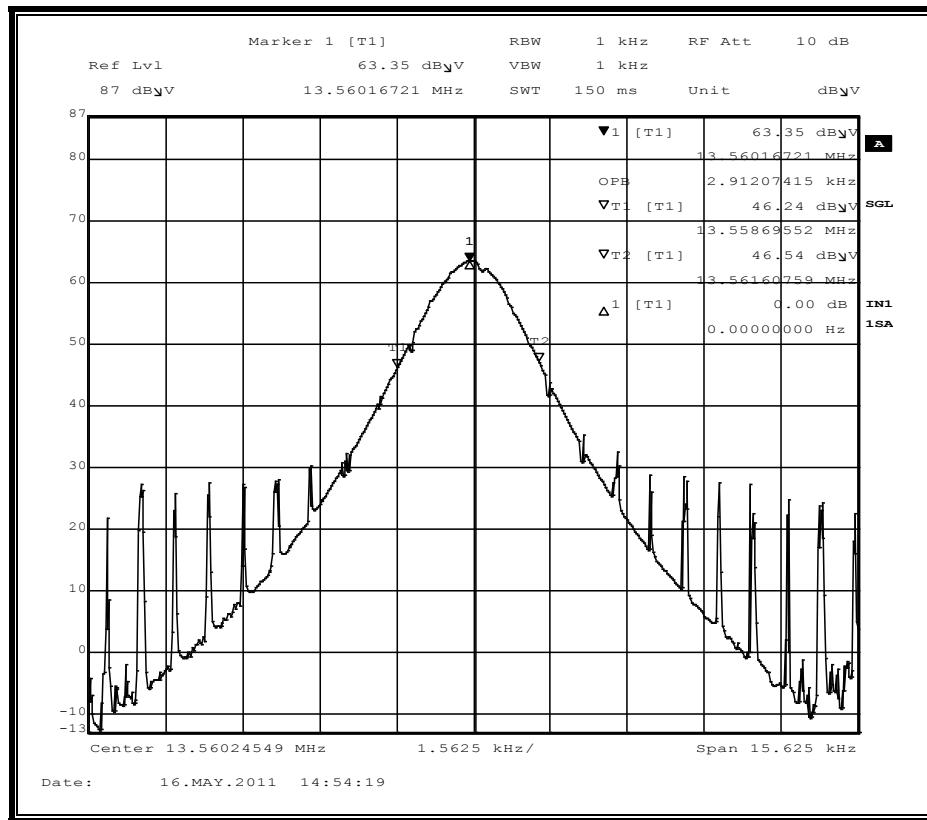
TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth or 20dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. For 99% bandwidth the spectrum analyzer internal 99% bandwidth function is utilized with a sample detector. For 20dB bandwidth, markers were placed 20dB below the peak emission.

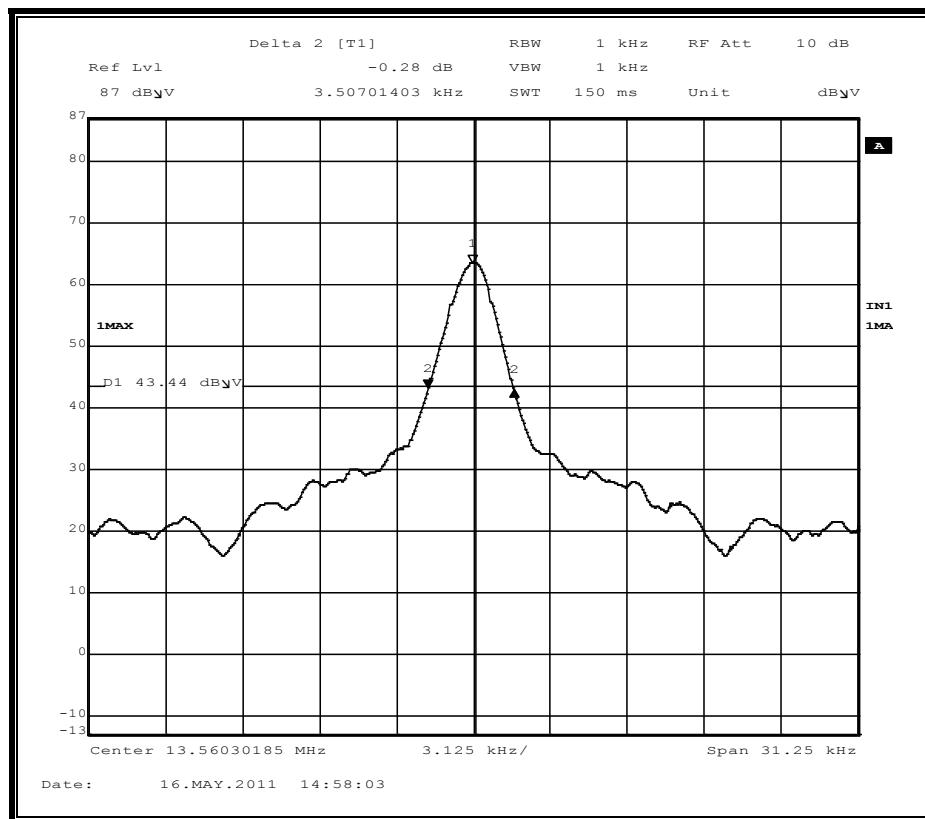
RESULTS

Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
13.56	2.91	3.51

99% BANDWIDTH

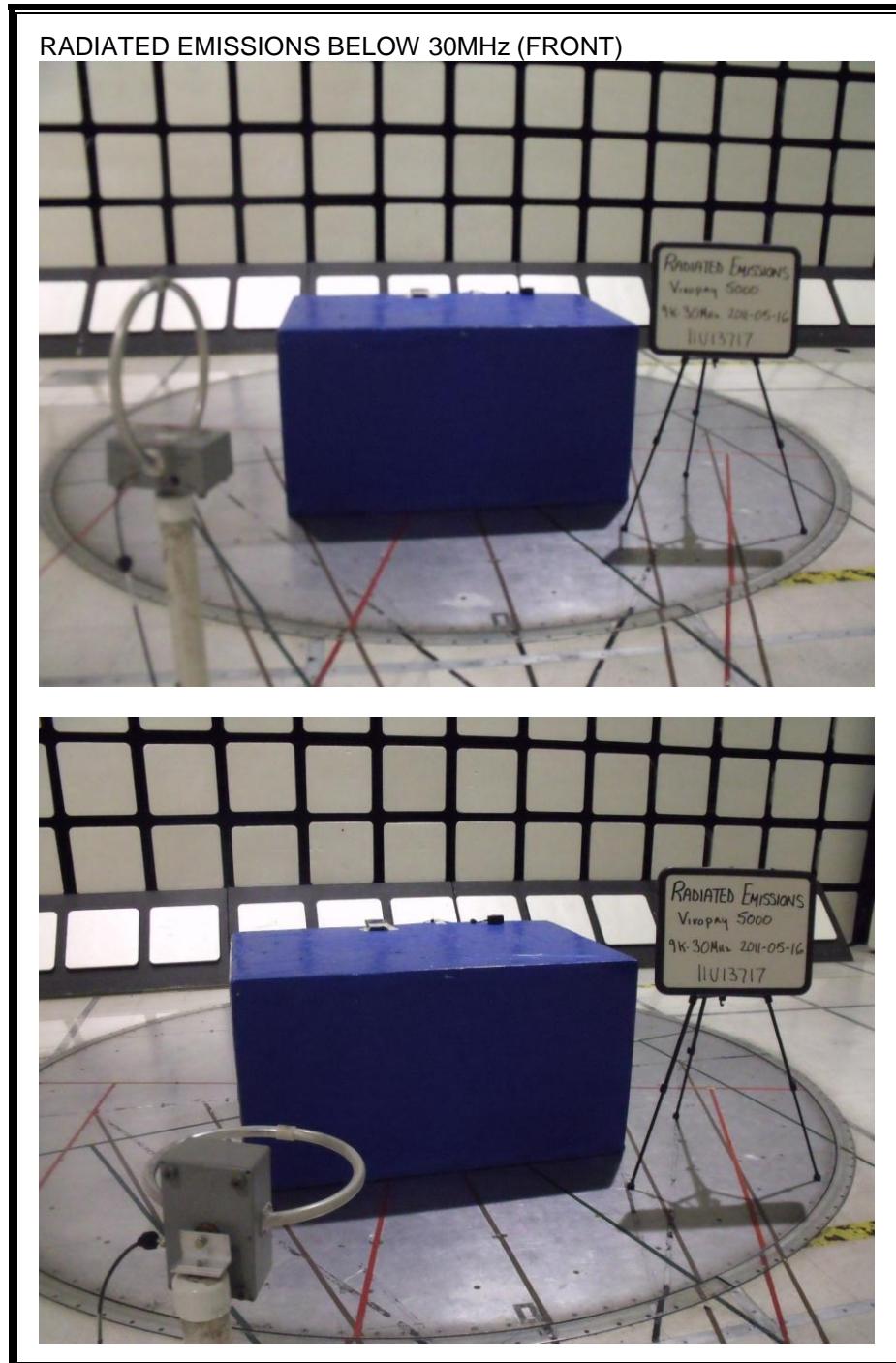


20dB BANDWIDTH



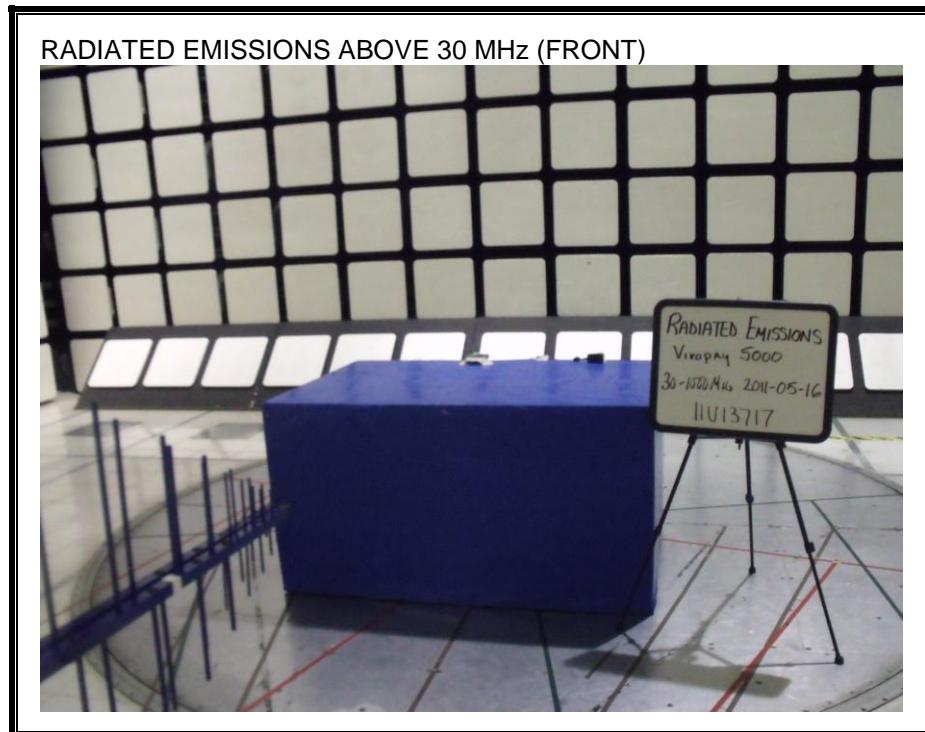
11. SETUP PHOTOS

RADIATED EMISSION BELOW 30 MHz



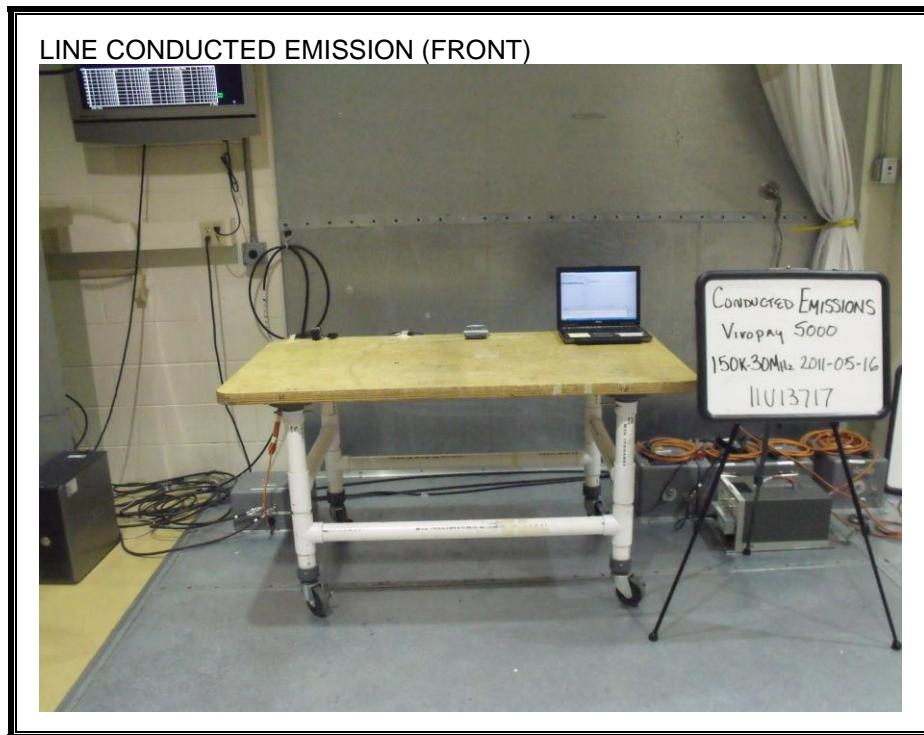


RADIATED EMISSION ABOVE 30 MHz

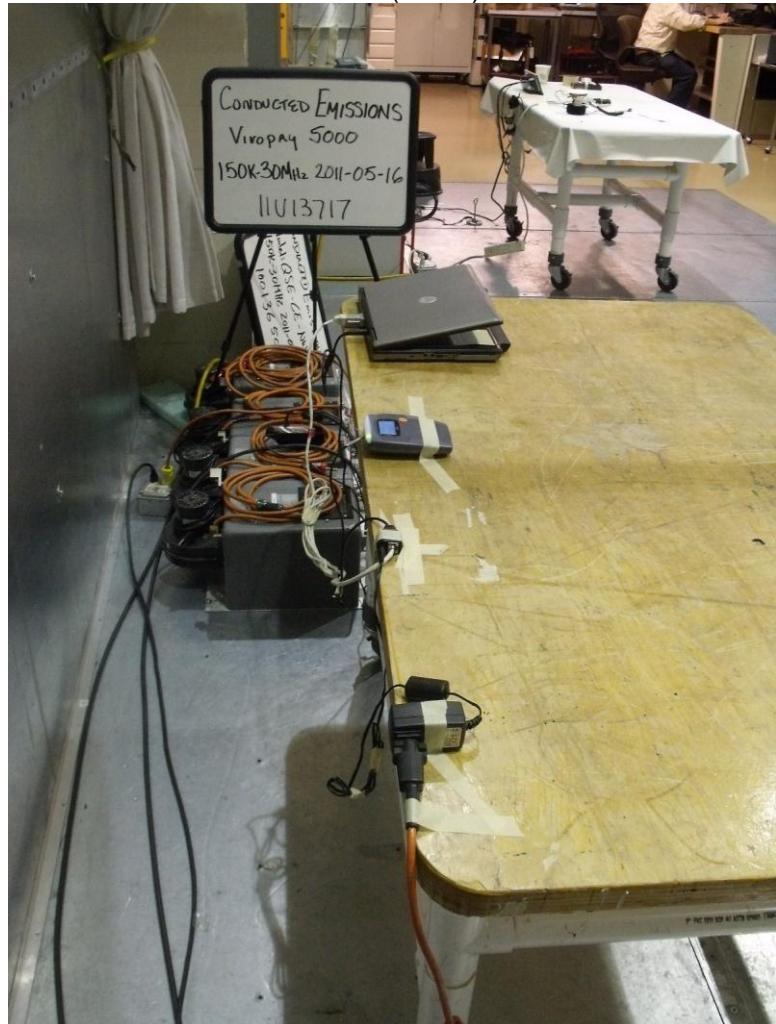




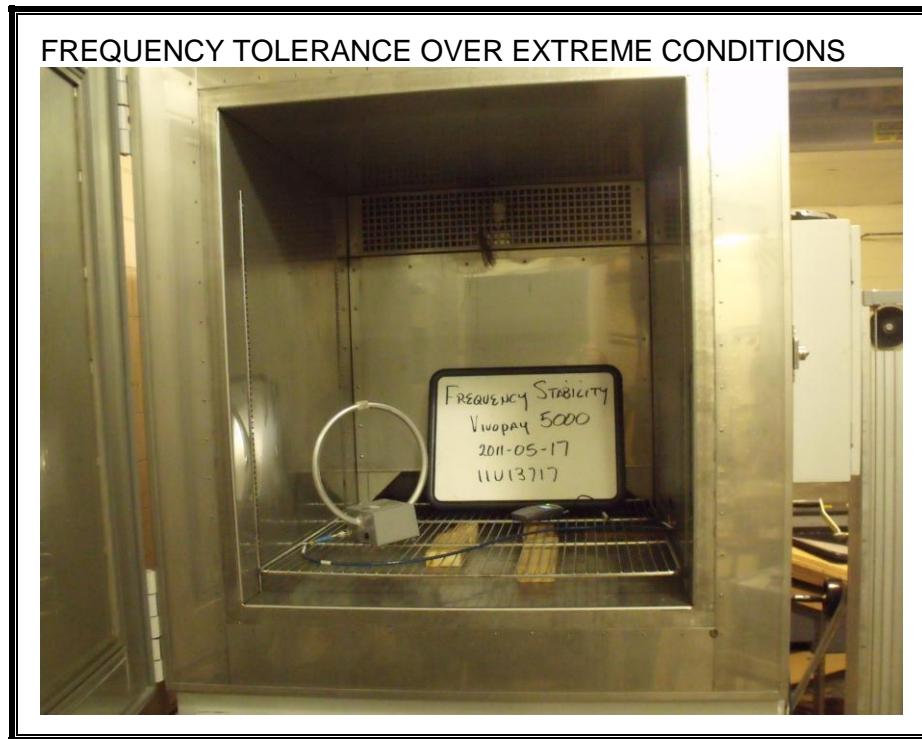
AC MAINS LINE CONDUCTED EMISSION



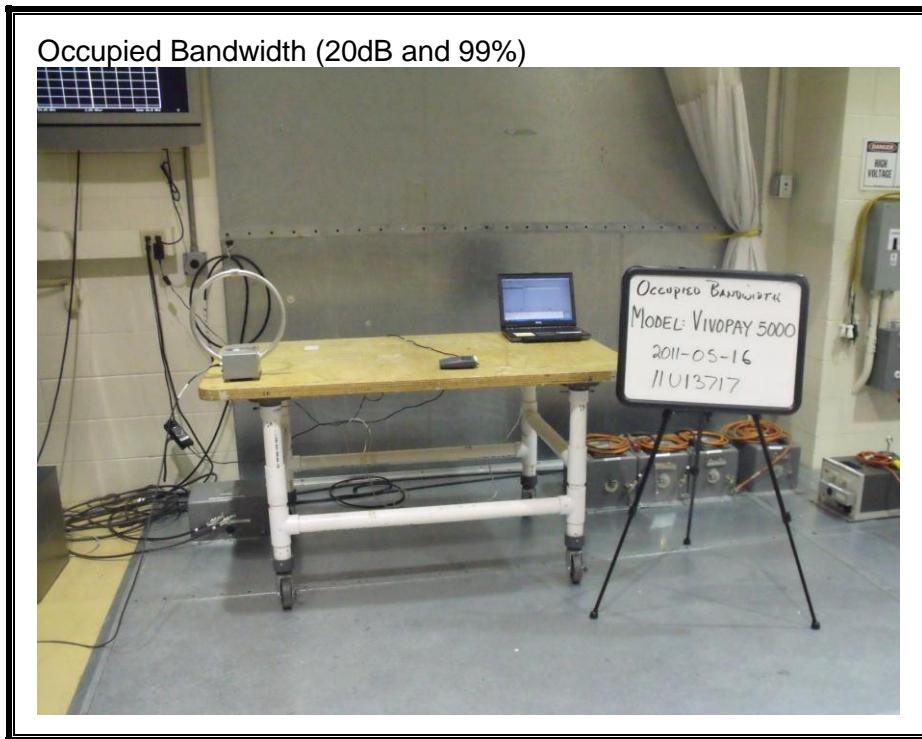
LINE CONDUCTED EMISSION (BACK)



FREQUENCY TOLERANCE OVER EXTREME CONDITIONS



OCCUPIED BANDWIDTH



END OF REPORT