FCC CFR47 PART 15 SUBPART C

INDUSTRY CANADA RSS-210 ISSUE 7, ANNEX 2

INDUSTRY CANADA RSS-GEN ISSUE 2

CERTIFICATION TEST REPORT

FOR

ViVOpay Kiosk

MODEL NUMBER: ViVOpay Kiosk

FCC ID: Q55VIVOPAYKIOSK

IC: 5141A-VPKIOSK

REPORT NUMBER: 07U11445-2, REVISION B

ISSUE DATE: JANUARY 03, 2007

Prepared for

VIVOTECH
451 EL CAMINO REAL
SANTA CLARA, CA 95050, USA

Prepared by

COMPLIANCE CERTIFICATION SERVICES
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/27/07	Initial Issue	F. Ibrahim
A	12/28/07	Corrected 99% BW results section on page 23	T. Hong
B	01/03/08	Added RSS 210 Annex number. Added the formula of converting field strength to dBuV/m unit to Section 7.1	F. Ibrahim

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	VIVOTECH
	451 EL CAMINO REAL
	SANTA CLARA, CA 95050, USA
EUT DESCRIPTION:	ISO/IEC14443 Contactless Proximity Coupling Device with Application (PCDA), embedded in a stand-alone intelligent contactless card reader
MODEL:	ViVOpay Kiosk
SERIAL NUMBER:	MAIN BOARD: 300-2130-00 Rev A
	ANTENNA BOARD: 310-2131-00 Rev B
DATE TESTED:	NOVEMBER 15 – 20, 2007

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	No Non-Compliance Noted
RSS-210 Issue 7 Annex 2 and RSS-GEN Issue 2	No Non-Compliance Noted

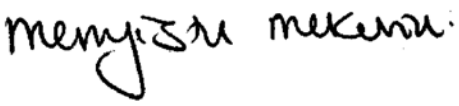
Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: 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 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. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



MENGISTU MEKURIA
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7 Annex 2.

3. FACILITIES AND ACCREDITATION

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

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. 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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an ISO/IEC14443 Contactless Proximity Coupling Device with Application (PCDA), embedded in a stand-alone intelligent contactless card reader, and manufactured by Vivotech.

5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integral ungrounded loop antenna, manufactured by Vivotech.

5.3. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was called production firmware version EC5U3AZZ02100-C01.

5.4. WORST-CASE CONFIGURATION

The natural position of the EUT is considered the worst-case configuration.

5.5. MODIFICATIONS

A clip-on ferrite was used around the power cable in order to pass radiated emission; the ferrite is manufactured by Fair-Rite Products, model 0431167281.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC/DC ADAPTER	GLOBAL POWER	3A-161WP09	GPWAC-15-09-2-VT	N/A

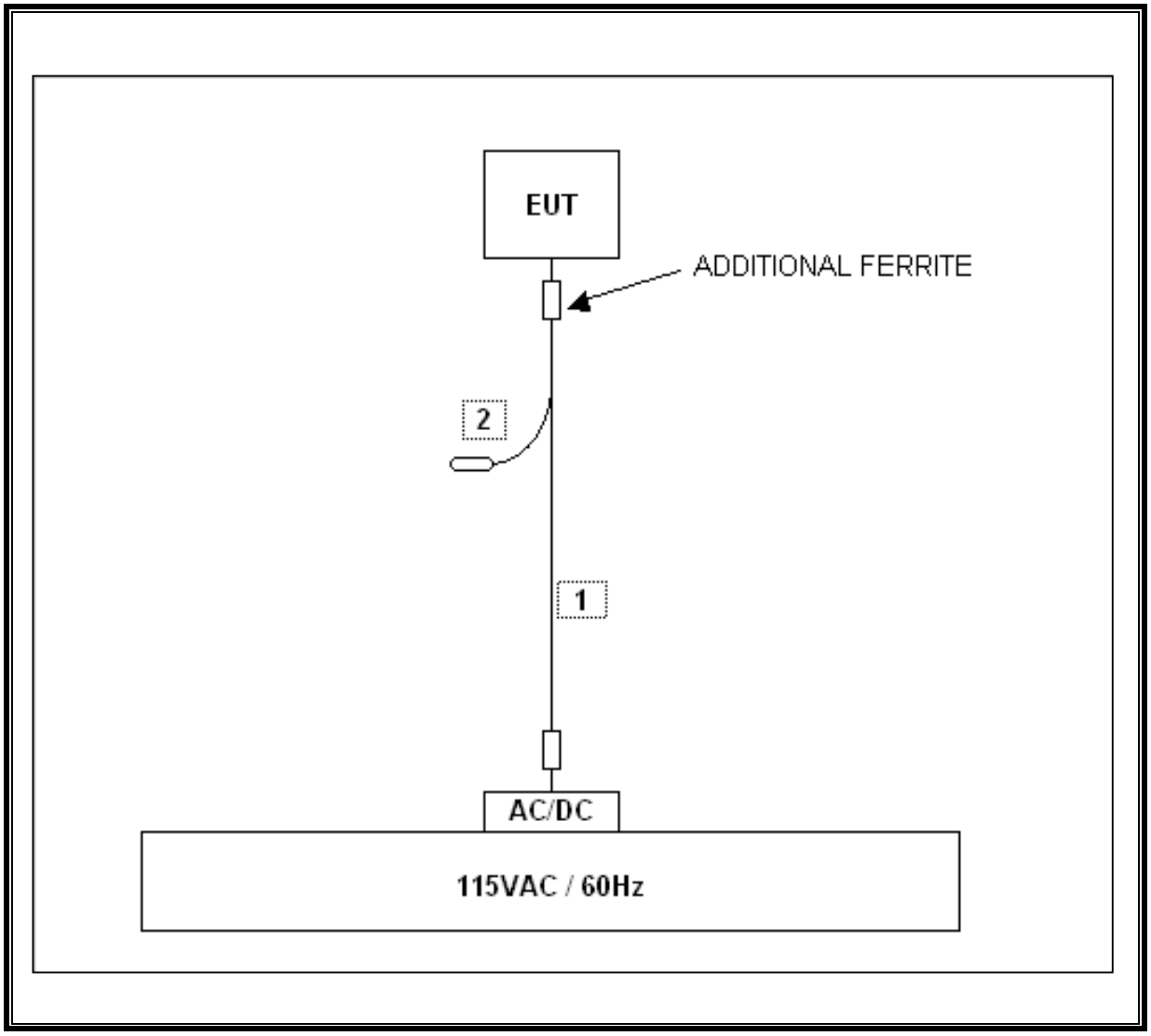
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	10 Pin Connector	1	Female Socket	Unshielded	2.0 m	Ferrite at one end
2	RS232	1	RJ45	Unshielded	0.8m	Terminated

TEST SETUP

The EUT is a stand-alone device; the firmware in the EUT makes the radio unit work.

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 LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
RF Filter Section	HP	85420E	3705A00256	06/12/08
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	10/25/08
EMI Test Receiver	R & S	ESHS 20	827129/006	01/27/08
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	06/12/08
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	US42070220	11/26/07
Preamplifier	HP	8447D	1937A02062	05/09/08
Antenna, Bilog 30MHz ~ 2Ghz	Sunol Sciences	JB1	A0022704	09/28/08
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	N02481	10/25/08
Antenna, Loop, 30 MHz	EMCO	6502	C00593	10/24/08
Environmental Chamber	Thermotron	SE 600-10-10	C00930	04/16/08

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSION

TEST PROCEDURE

ANSI C63.4

The highest clock frequency generated or used in the EUT is 13.56 MHz; therefore the frequency range was investigated from 9 kHz to 1000 MHz.

LIMIT

§15.225:

(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 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 (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.

RESULTS

No non-compliance noted:

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

TRANSCEIVER SPURIOUS EMISSIONS BELOW 30 MHz

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

Company: VIVOTECH
Project #: 07U11445
Model #: VIVOPAY KIOSK
Tester: MENGISTU MEKURIA
Date: 11/16/2007

Frequency (MHz)	PK (dBuV)	QP (dBuV)	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:												
13.5600	50.43		N/A	10.56	-19.08	41.90	N/A	84.00	N/A	-42.1	N/A	Fundamental @ 10m Dist
13.4530	22.79		N/A	10.55	-19.08	14.25	N/A	50.48	N/A	-36.2	N/A	13.41-13.553MHz Sprious @ 10m
13.6634	26.80		N/A	10.57	-19.08	18.28	N/A	50.48	N/A	-32.2	N/A	13.567-13.710MHz Spurious @ 10m
13.3470	18.23		N/A	10.53	-19.08	9.68	N/A	40.51	N/A	-30.8	N/A	13.110-13.410MHz Spurious @ 10m
13.7190	21.59		N/A	10.57	-19.08	13.08	N/A	40.51	N/A	-27.4	N/A	13.710-14.010MHz Spurious @ 10m
27.1200	15.47		N/A	9.046	-19.08	5.43	N/A	29.54	N/A	-24.1	N/A	0.15-13.110 and 14.010-30 MHz Spurious @ 10m
Loop Antenna Face Off:												
13.5600	53.86		N/A	10.56	-19.08	45.33	N/A	84.00	N/A	-38.7	N/A	Fundamental @ 10m Dist
13.4530	34.17		N/A	10.55	-19.08	25.63	N/A	50.48	N/A	-24.8	N/A	13.41-13.553MHz Sprious @ 10m
13.6634	34.21		N/A	10.57	-19.08	25.69	N/A	50.48	N/A	-24.8	N/A	13.567-13.710MHz Spurious @ 10m
13.3470	28.30		N/A	10.53	-19.08	19.75	N/A	40.51	N/A	-20.8	N/A	13.110-13.410MHz Spurious @ 10m
13.7190	28.95		N/A	10.57	-19.08	20.44	N/A	40.51	N/A	-20.1	N/A	13.710-14.010MHz Spurious @ 10m
13.9845	21.72		N/A	10.6	-19.08	13.23	N/A	40.51	N/A	-27.3	N/A	13.710-14.010MHz Spurious @ 10m
27.1200	19.67		N/A	9.046	-19.08	9.63	N/A	29.54	N/A	-19.9	N/A	0.15-13.110 and 14.010-30 MHz 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.

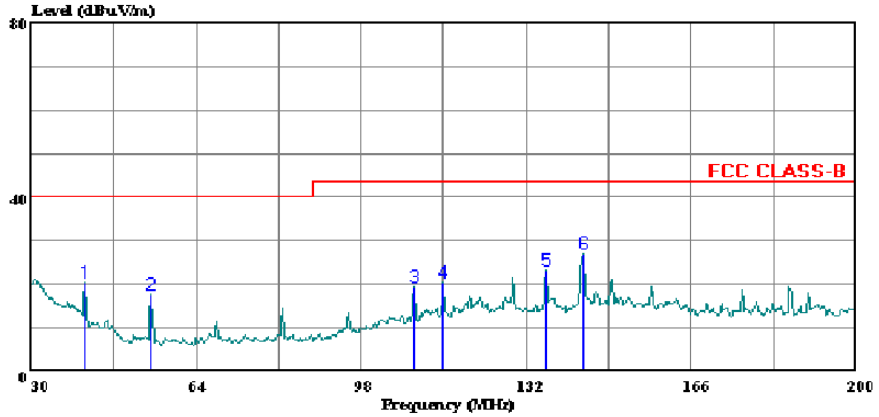
P.K. = Peak
Q.P. = Quasi Peak Readings
A.F. = Antenna factor

7.1.2. SPURIOUS EMISSIONS (30 - 1000 MHz)

SPURIOUS EMISSIONS 30 TO 230 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 25 File#: 07U11445 EMI.EMI Date: 11-15-2007 Time: 22:23:39



Trace: 24 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Engineer: : Mengistu Mekuria
Company: : VIVOtech
Project #: : 07U11445
Test Configuration:: EUT With Access Card (VIVOpay kiosk)
: Production Firmware and Ferrite
Mode of operation: : Card Read 1s Dwell Mode
Test Target: : FCC Class B

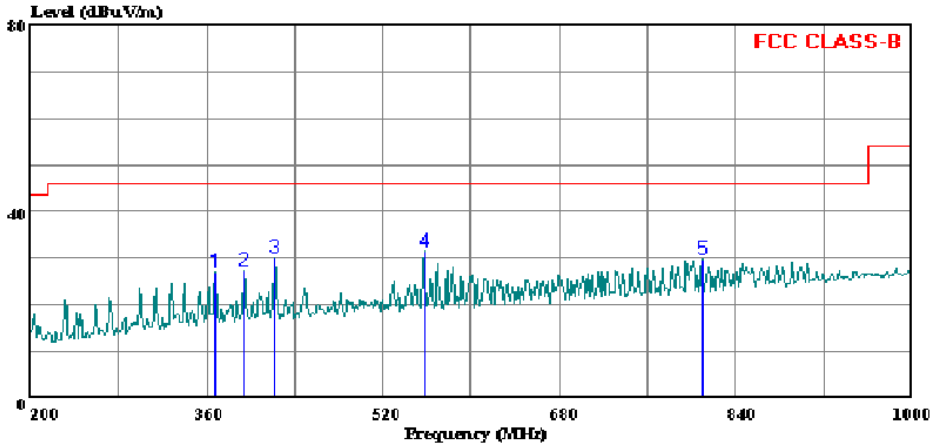
Page: 1

	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV/m	dB	dBuV/m	dB	
1	40.880	37.17	20.28	-16.89	40.00	-19.72	Peak
2	54.480	40.35	17.53	-22.82	40.00	-22.47	Peak
3	108.880	38.46	19.51	-18.95	43.50	-23.99	Peak
4	114.830	38.15	20.44	-17.71	43.50	-23.06	Peak
5	136.080	40.06	23.28	-16.78	43.50	-20.22	Peak
6	143.730	43.93	26.91	-17.02	43.50	-16.59	Peak

SPURIOUS EMISSIONS 230 TO 100 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 23 File#: 07U11445 EMI.EMI Date: 11-15-2007 Time: 22:18:17



Trace: 22 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Engineer: : Mengistu Mekuria
Company: : VIVOtech
Project #: : 07U11445
Test Configuration:: EUT With Access Card (VIVOpay kiosk)
: Production Firmware and Ferrite
Mode of operation: : Card Read 1s Dwell Mode
Test Target: : FCC Class B

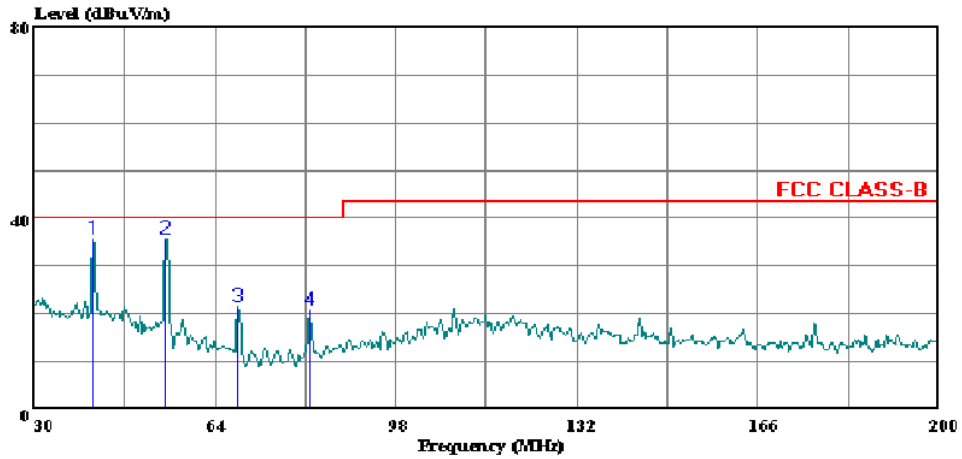
Page: 1

	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV/m	dB	dBuV/m	dB	
1	367.200	41.20	27.07	-14.13	46.00	-18.93	Peak
2	393.600	40.99	27.45	-13.54	46.00	-18.55	Peak
3	421.600	43.02	30.15	-12.87	46.00	-15.85	Peak
4	557.600	42.03	31.53	-10.50	46.00	-14.47	Peak
5	809.600	36.53	29.86	-6.67	46.00	-16.14	Peak

SPURIOUS EMISSIONS 30 TO 230 MHz (WORST-CASE CONFIGURATION, VERTICAL)

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 19 File#: 07U11445 EMI.EMI Date: 11-15-2007 Time: 22:07:32



Trace: 18 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Engineer: : Mengistu Mekuria
Company: : VIVOtech
Project #: : 07U11445
Test Configuration:: EUT With Access Card (VIVOpay kiosk)
: Production Firmware and Ferrite
Mode of operation: : Card Read 1s Dwell Mode
Test Target: : FCC Class B

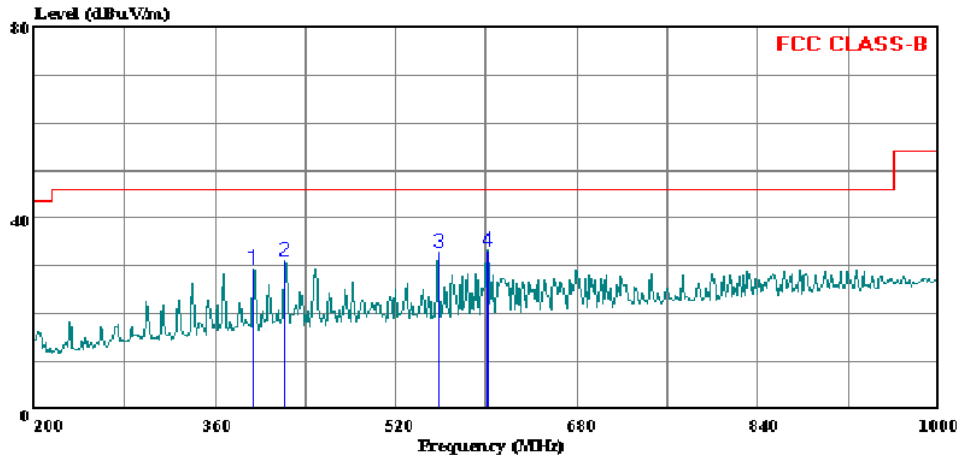
Page: 1

	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV/m	dB	dBuV/m	dB	
1	40.880	52.64	35.75	-16.89	40.00	-4.25	Peak
2	54.480	58.57	35.75	-22.82	40.00	-4.25	Peak
3	68.080	44.01	21.34	-22.67	40.00	-18.66	Peak
4	81.680	43.74	20.90	-22.84	40.00	-19.10	Peak

SPURIOUS EMISSIONS 230 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 21 File#: 07U11445 EMI.EMI Date: 11-15-2007 Time: 22:13:37



Trace: 20 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Engineer: : Mengistu Mekuria
Company: : VIVOtech
Project #: : 07U11445
Test Configuration:: EUT With Access Card (VIVOpay kiosk)
: Production Firmware and Ferrite
Mode of operation: : Card Read 1s Dwell Mode
Test Target: : FCC Class B

Page: 1

	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV/m	dB	dBuV/m	dB	
1	393.600	42.88	29.34	-13.54	46.00	-16.66	Peak
2	421.600	44.20	31.33	-12.87	46.00	-14.67	Peak
3	557.600	43.39	32.89	-10.50	46.00	-13.11	Peak
4	601.600	43.19	33.40	-9.80	46.00	-12.60	Peak

7.2. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4

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 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.		

RESULTS:

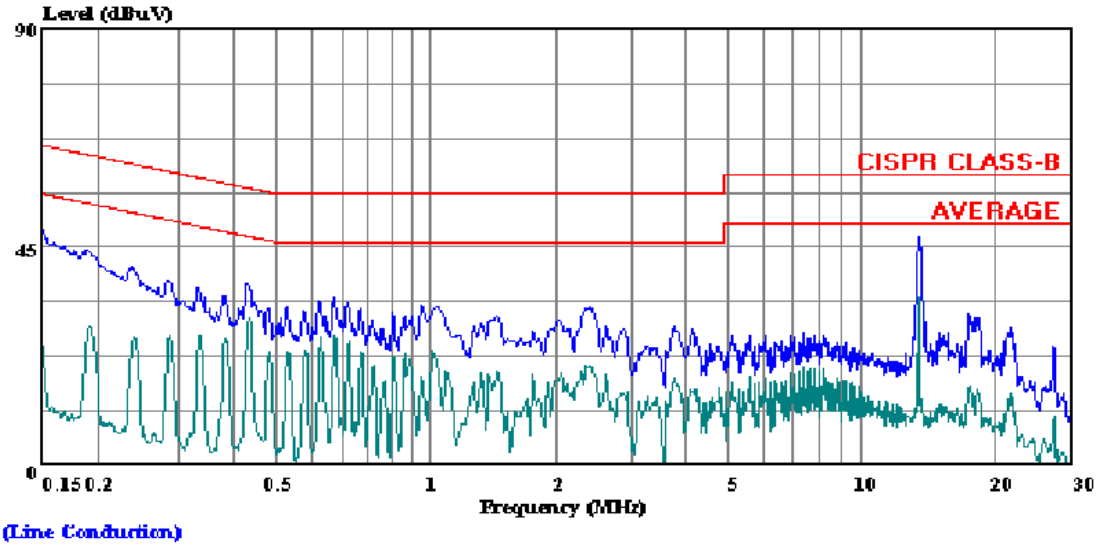
6 WORST EMISSIONS

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
0.43	37.34	--	--	0.00	57.33	47.33	-19.99	-9.99	L1
0.67	34.74	--	--	0.00	56.00	46.00	-21.26	-11.26	L1
13.56	47.16	--	--	0.00	60.00	50.00	-12.84	-2.84	L1
0.43	38.88	--	--	0.00	57.23	47.23	-18.35	-8.35	L2
1.14	33.26	--	--	0.00	56.00	46.00	-22.74	-12.74	L2
13.56	47.36	--	--	0.00	60.00	50.00	-12.64	-2.64	L2
6 Worst Data									

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 7 File#: 07U11445 LC.EMI Date: 11-15-2007 Time: 22:40:09



(Line Conduction)

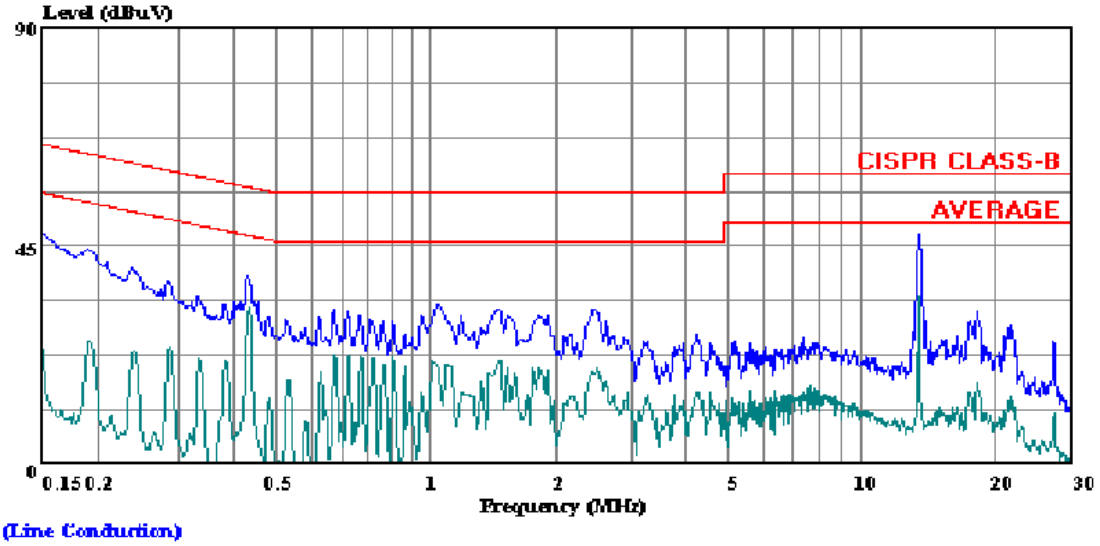
Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Mengistu Mekuuria
Project #: : 07U11445
Company: : VIVOtech
Configuration:: EUT Alone (Kiosk)
Mode: : Production Firmware
Target: : FCC Class B
Voltage: : 115VAC/60Hz
: L1: Peak (Blue); Green (Average)

LINE 2 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 14 File#: 07U11445 LC.EMI Date: 11-15-2007 Time: 22:49:01



(Line Conduction)

Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Mengistu Mekuuria
Project #: : 07U11445
Company: : VIVOtech
Configuration:: EUT Alone (Kiosk)
Mode: : Production Firmware
Target: : FCC Class B
Voltage: : 115VAC/60Hz
: L2: Peak (Blue); Green (Average)

7.3. 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 13.56 MHz @ 20°C Limit: ± 100 ppm = 135.604 kHz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measureed with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
9.30	50	13.5602500	0.111	± 100
9.30	40	13.5602830	0.086	± 100
9.30	30	13.5603660	0.025	± 100
9.30	***20***	***13.5604000***	***0.000***	***± 100***
9.30	10	13.5604500	-0.037	± 100
9.30	0	13.5604670	-0.049	± 100
9.30	-10	13.5604790	-0.058	± 100
9.30	-20	13.5604910	-0.067	± 100
7.90	20	13.5603970	0.002	± 100
10.7	20	13.5603980	0.001	± 100

7.4. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

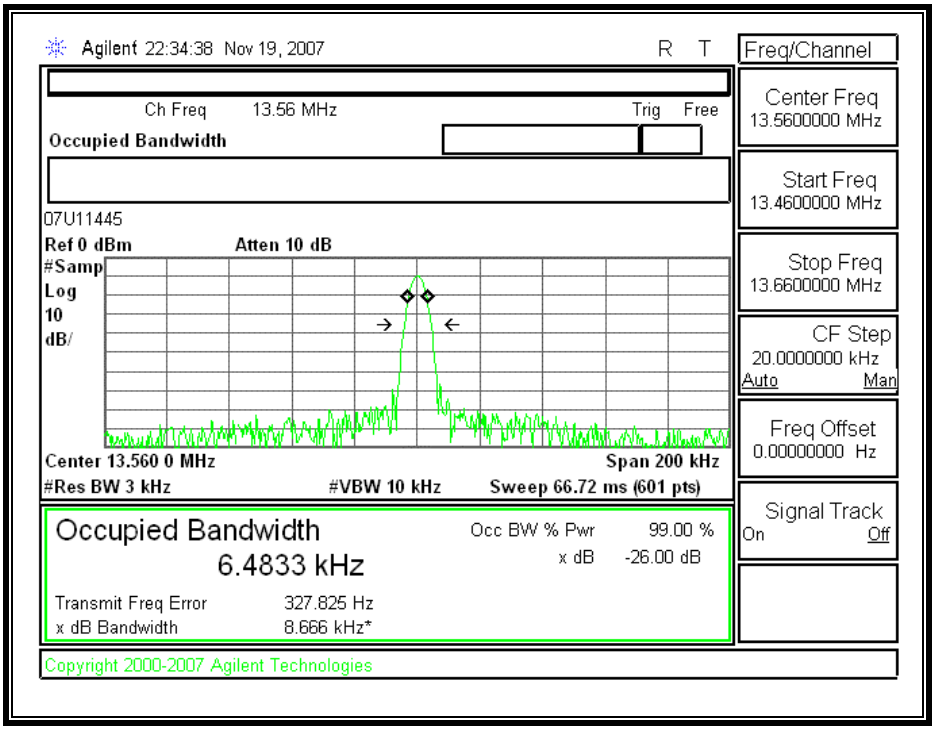
TEST PROCEDURE

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

Frequency (MHz)	99% Bandwidth (KHz)
13.56	6.4833

99% BANDWIDTH



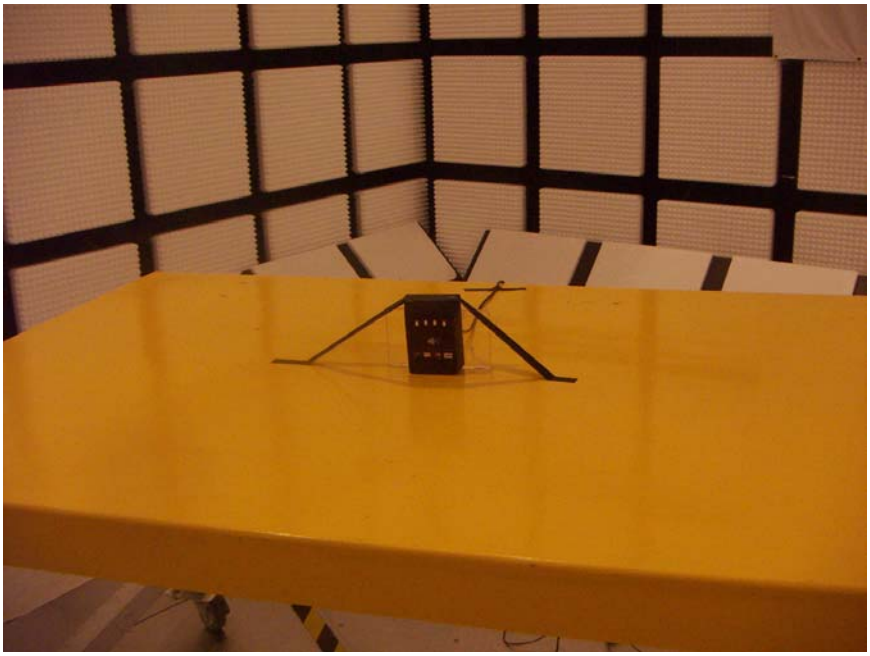
8. SETUP PHOTOS

RADIATED EMISSION (0.15-30 MHz)

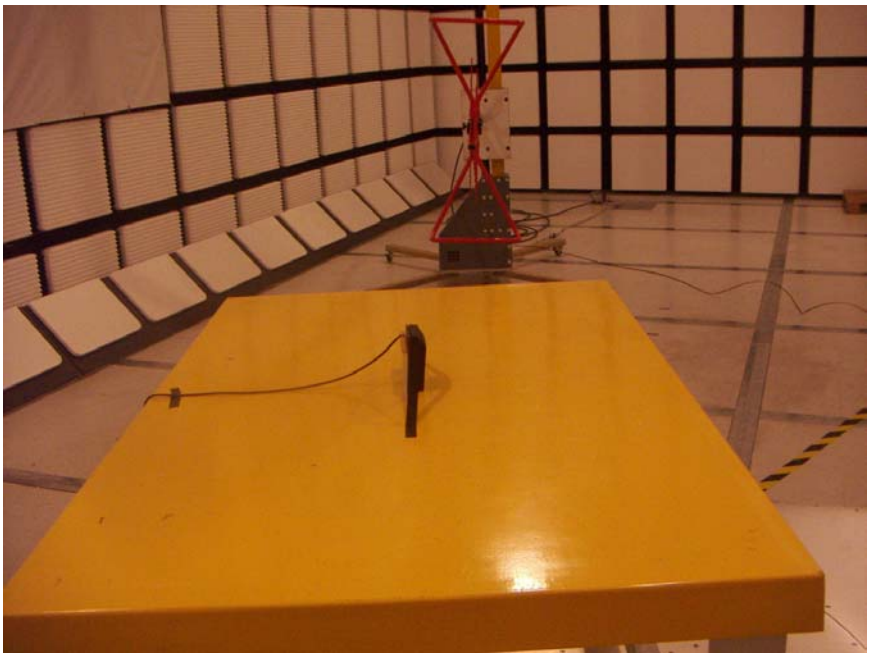
RADIATED EMISSION (0.15-30 MHz) – FACE ON

RADIATED EMISSION (30-1000 MHz)

RADIATED EMISSION (30-1000 MHz) - FRONT

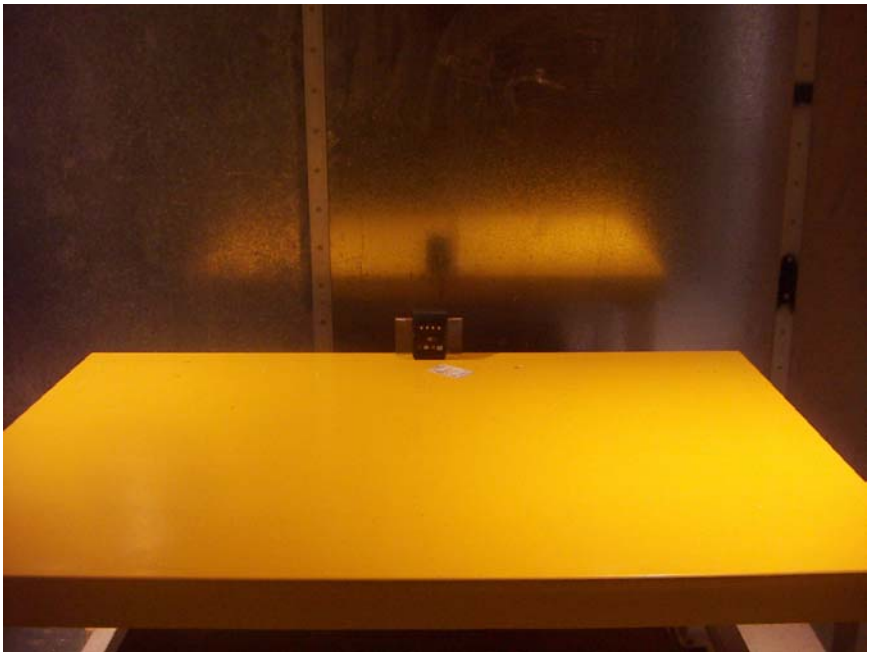


RADIATED EMISSION (30-1000 MHz) - BACK



AC MAINS LINE CONDUCTED EMISSION

LINE CONDUCTED EMISSION (FRONT)



LINE CONDUCTED EMISSION (BACK)

FREQUENCY TOLERANCE OVER EXTREME CONDITIONS

FREQUENCY TOLERANCE OVER EXTREME CONDITIONS

END OF REPORT