



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 7
INDUSTRY CANADA RSS-GEN ISSUE 2
CERTIFICATION TEST REPORT**

**FOR
LOW POWER TRANSMITTER WIRELESS CARD READER**

MODEL NUMBER: ViVOpay 5000m

FCC ID: Q55VP5KAM

IC: 5141A-030VP5M

REPORT NUMBER: 07U11478-1, REVISION B1

ISSUE DATE: JANUARY 18, 2008

Prepared for

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

Prepared by

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NVLAP®

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/29/07	Initial Issue	F. Ibrahim
A	01/10/08	Revised model name and EUT description Added EUT photo to section 5.1 Revised the S/N	F. Ibrahim
B	01/15/08	Added reference to IC rules	F. Ibrahim
B1	01/18/08	Revised FCC ID and IC #	T. Hong

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: VIVOTECH
451 EL CAMINO REAL
SANTA CLARA, CA 95050, USA

EUT DESCRIPTION: It is an ISO/IEC14443 Contactless Proximity Coupling Device with Application (PCDA) and also known as Embedded in a stand-alone intelligent Contactless card reader with magnetic stripe module.

MODEL: ViVOpay 5000m

SERIAL NUMBER: CA0752A332

DATE TESTED: 11/15 – 11/20/2007

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	No Non-Compliance Noted
RSS-210 Issue 7 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.

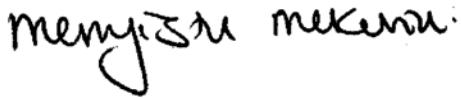
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. 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.

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

It is an ISO/IEC14443 Contactless Proximity Coupling Device with Application (PCDA) and also known as Embedded in a stand-alone intelligent contactless card reader with magnetic stripe module.



5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integral ungrounded loop antenna, the Antenna manufacturer is Vivotech.

5.3. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was called production firmware version
EB7-GR 1.0.0

5.4. WORST-CASE CONFIGURATION

The natural position of the EUT considered as a worst-case configuration

5.5. 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

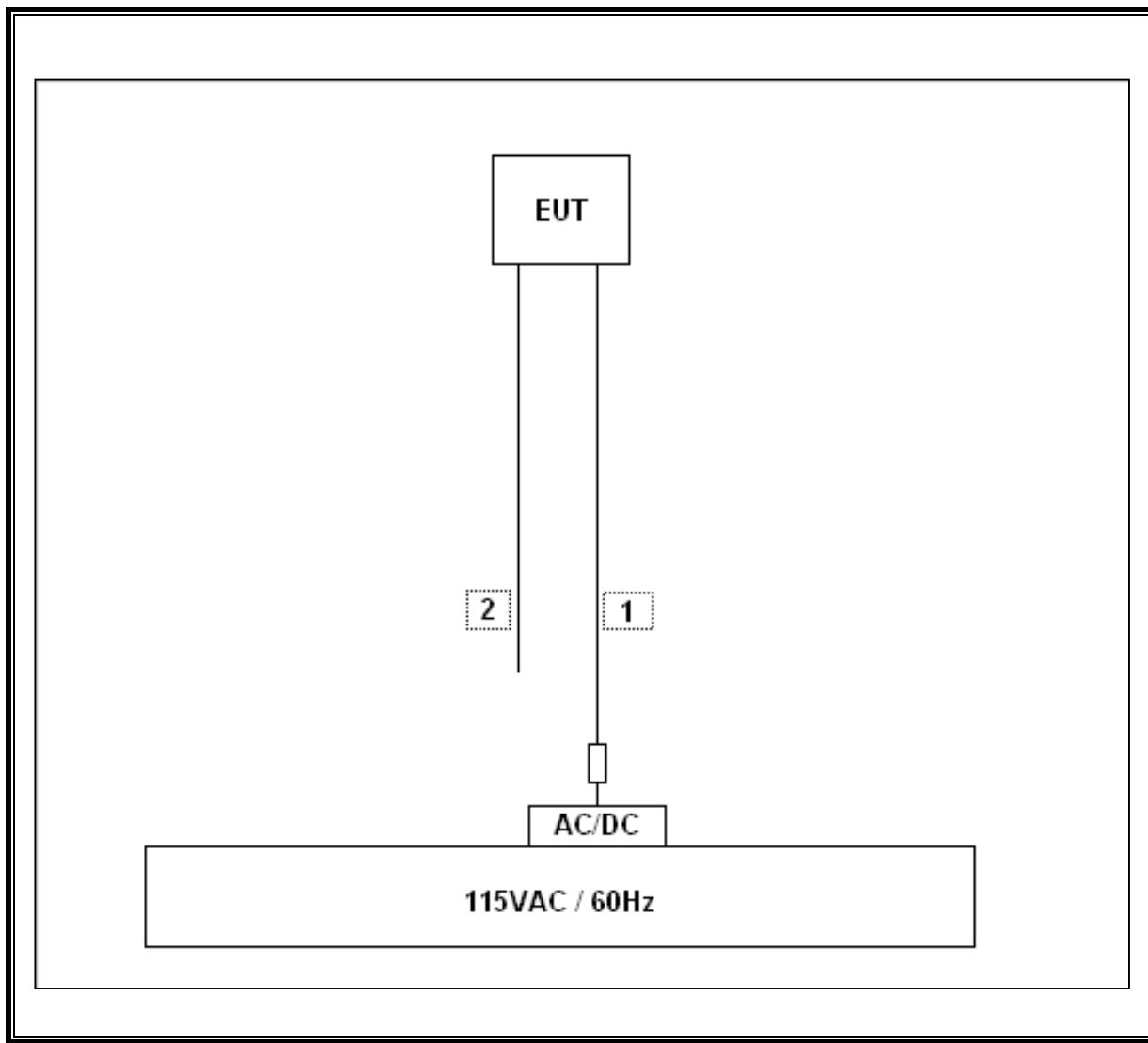
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	DC	1	DC	Unshielded	2.0 m	Ferrite at one end
2	ETHERNET	1	RJ45	Unshielded	3.0m	N/A

TEST SETUP

The EUT is a stand-alone device; the firmware that the EUT has makes the radio unit works.

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 EMISSIONS

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 0.15 MHz to 1000 MHz.

LIMIT

FCC §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:

IC, A2.6 13.110-14.010 MHz:

The field strength of any emission shall not exceed the following limits:

- (a) 15.848 millivolts/m (84 dB μ V/m) at 30 m, within the band 13.553–13.567 MHz.
- (b) 334 microvolts/m (50.5 dB μ V/m) at 30 m, within the bands 13.410–13.553 MHz and 13.567–13.710 MHz.
- (c) 106 microvolts/m (40.5 dB μ V/m) at 30 m, within the bands 13.110–13.410 MHz and 13.710–14.010 MHz.
- (d) 30 microvolts/m (29.5 dB μ V/m) at 30 m, outside the band 13.110–14.010 MHz.

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.

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)

EMISSIONS IN THE FREQUENCY RANGE OF 13.11-14.01 MHz

FCC Part 15, Subpart B & C 10 Meter Distance Measurement At Open Field												
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:												
13.56	40.9	40.2	N/A	10.56	-19.08	31.67	N/A	84.00	N/A	-52.3	N/A	Fundamental @ 10m Dist
13.41	12.44	8.9	N/A	10.54	-19.08	-1.64	N/A	50.48	N/A	-52.1	N/A	13.41-13.553MHz Spurious @ 10m
13.553	29.51	26.4	N/A	10.56	-19.08	17.87	N/A	50.48	N/A	-32.6	N/A	13.41-13.553MHz Spurious @ 10m
13.567	29.00	26.3	N/A	10.56	-19.08	17.77	N/A	50.48	N/A	-32.7	N/A	13.567-13.710MHz Spurious @ 10m
13.71	14.8	6.6	N/A	10.57	-19.08	-1.91	N/A	50.48	N/A	-52.4	N/A	13.567-13.710MHz Spurious @ 10m
13.11	14.8	11.6	N/A	10.51	-19.08	3.03	N/A	40.51	N/A	-37.5	N/A	13.110-13.410MHz Spurious @ 10m
13.41	12.44	6.9	N/A	10.54	-19.08	-1.64	N/A	40.51	N/A	-42.2	N/A	13.110-13.410MHz Spurious @ 10m
13.71	14.9	6.6	N/A	10.57	-19.08	-1.91	N/A	40.51	N/A	-42.4	N/A	13.710-14.010MHz Spurious @ 10m
14.01	11.2	5.8	N/A	10.6	-19.08	-2.68	N/A	40.51	N/A	-43.2	N/A	13.710-14.010MHz Spurious @ 10m
Loop Antenna Face Off:												
13.56	53.3	52.8	N/A	10.56	-19.08	44.27	N/A	84.00	N/A	-39.7	N/A	Fundamental @ 10m Dist
13.41	29.8	21.9	N/A	10.54	-19.08	13.36	N/A	50.48	N/A	-37.1	N/A	13.41-13.553MHz Spurious @ 10m
13.553	47.1	46.3	N/A	10.56	-19.08	37.77	N/A	50.48	N/A	-12.7	N/A	13.41-13.553MHz Spurious @ 10m
13.567	49.00	48.2	N/A	10.56	-19.08	39.67	N/A	50.48	N/A	-10.8	N/A	13.567-13.710MHz Spurious @ 10m
13.71	30.2	20.00	N/A	10.57	-19.08	11.49	N/A	50.48	N/A	-39.0	N/A	13.567-13.710MHz Spurious @ 10m
13.11	15.9	9.7	N/A	10.51	-19.08	1.13	N/A	40.51	N/A	-39.4	N/A	13.110-13.410MHz Spurious @ 10m
13.41	29.8	21.9	N/A	10.54	-19.08	13.36	N/A	40.51	N/A	-27.2	N/A	13.110-13.410MHz Spurious @ 10m
13.71	30.2	20.00	N/A	10.57	-19.08	11.49	N/A	40.51	N/A	-29.0	N/A	13.710-14.010MHz Spurious @ 10m
14.01	15.3	10.9	N/A	10.6	-19.08	2.42	N/A	40.51	N/A	-38.1	N/A	13.710-14.010MHz Spurious @ 10m

* No more emissions were found between 13.110 – 14.010 MHz band.

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

EMISSIONS OUTSIDE THE FREQUENCY RANGE OF 13.11-14.01 MHz (0.15-30 MHz)

FCC Part 15, Subpart B & C												10 Meter Distance Measurement At Open Field			
Company: Vivotech Project #: 07U11478 Model #: Vivopay 5000m Tester: Doug Anderson Date: 11/19/07															
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:															
27.12	29.9	28.6	N/A	9.046	-19.08	18.56	N/A	29.54	N/A	-11.0	N/A	0.15-30MHz Spurious @ 3m			
Loop Antenna Face Off:															
27.12	14.3	11.1	N/A	9.046	-19.08	1.06	N/A	29.54	N/A	-28.5	N/A	0.15-30MHz Spurious @ 3m			
* 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															

7.1.2. SPURIOUS EMISSIONS (30 - 1000 MHz)

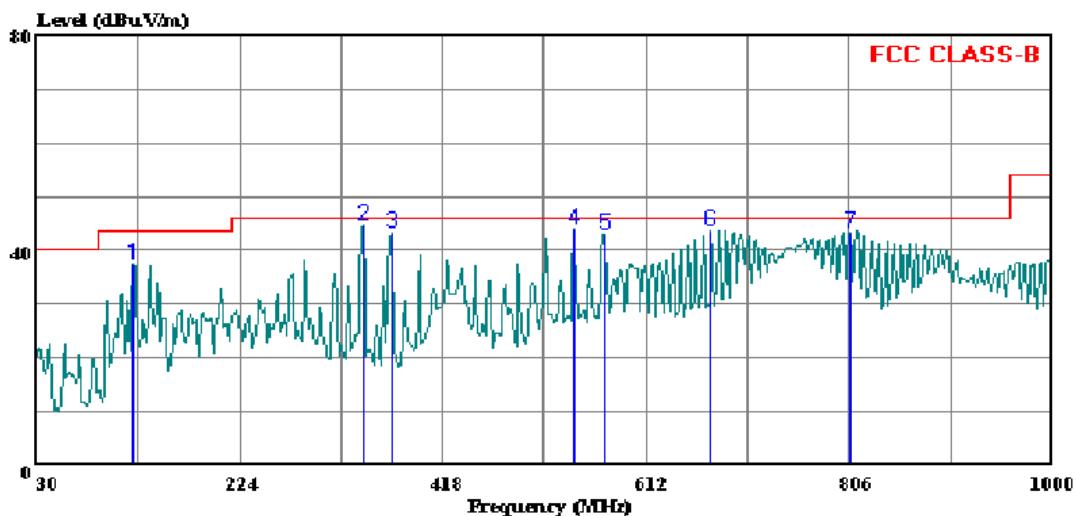
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

Data#: 9 File#: 07U11478 EMI.EMI Date: 11-15-2007 Time: 19:34:52



Trace: 8

Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Engineer: : Mengistu Mekuria
Company: : VIVOTECH
Project #: : 07U11478
Test Configuration: : EUT Alone (VP5000m)
: Standard Firmware
Mode of operation: : Card Read 1s Dwell Mode
Test Target: : FCC Class B

HORIZONTAL DATA

		Read			Limit	Over	
	Freq	Level	Level	Factor	Line	Limit	Remark
	MHz	dBuV	dBuV/m		dB	dBuV/m	dB
1	121.180	53.94	37.29	-16.66	43.50	-6.22	Peak
2	342.340	59.59	44.69	-14.90	46.00	-1.31	Peak
3	368.530	57.36	43.29	-14.07	46.00	-2.71	Peak
4	543.130	54.49	43.94	-10.55	46.00	-2.06	Peak
5	572.230	53.21	43.01	-10.20	46.00	-2.99	Peak
6	674.080	52.39	43.51	-8.88	46.00	-2.49	Peak
7	807.940	50.12	43.30	-6.82	46.00	-2.70	Peak

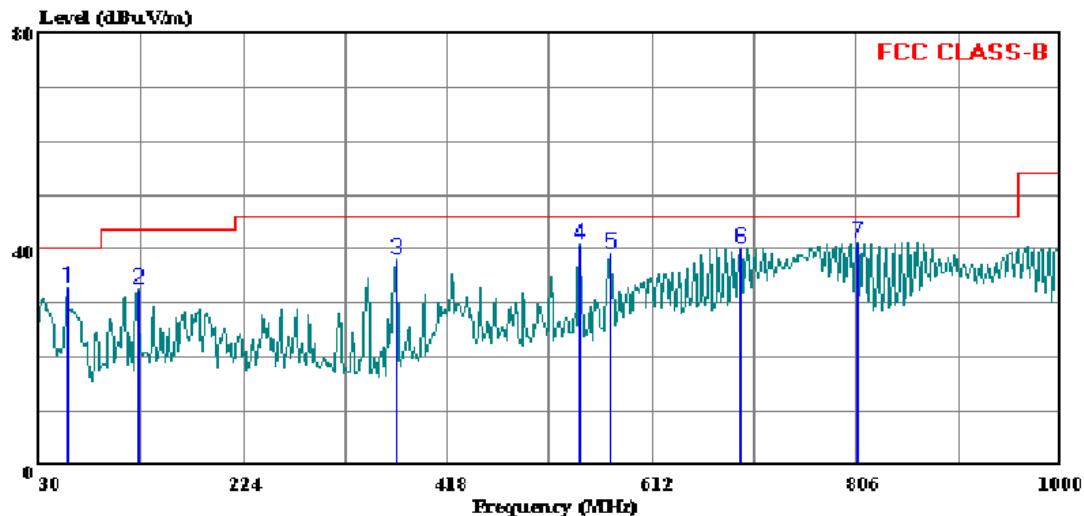
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



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

Data#: 11 File#: 07U11478 EMI.EMI Date: 11-15-2007 Time: 19:45:34



Trace: 10

Ref Trace:

Condition: FCC CLASS-B VERTICAL
Engineer: Mengistu Mekuria
Company: VIVOtech
Project #: 07U11478
Test Configuration: EUT Alone (VP5000m)
: Standard Firmware
Mode of operation: Card Read is Dwell Mode
Test Target: FCC Class B

VERTICAL DATA

		Read			Limit	Over	
	Freq	Level	Level	Factor	Line	Limit	Remark
	MHz	dBuV	dBuV/m		dB	dBuV/m	dB
1	56.190	55.82	32.88	-22.94	40.00	-7.12	Peak
2	124.090	49.20	32.68	-16.52	43.50	-10.82	Peak
3	368.530	52.26	38.19	-14.07	46.00	-7.81	Peak
4	543.130	51.35	40.80	-10.55	46.00	-5.20	Peak
5	572.230	49.41	39.21	-10.20	46.00	-6.79	Peak
6	696.390	48.85	40.31	-8.54	46.00	-5.69	Peak
7	807.940	48.05	41.23	-6.82	46.00	-4.77	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 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:

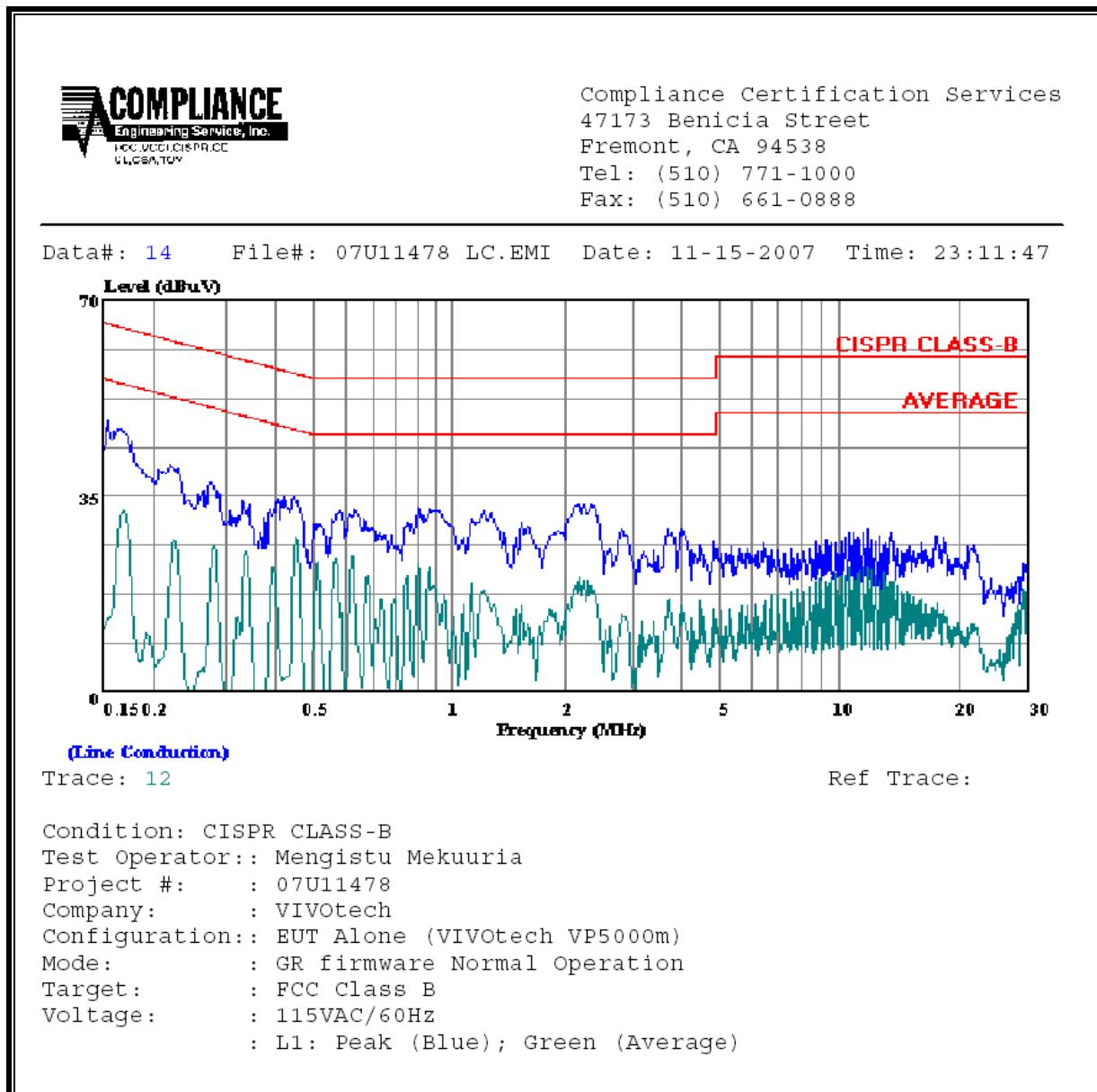
1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

RESULTS:

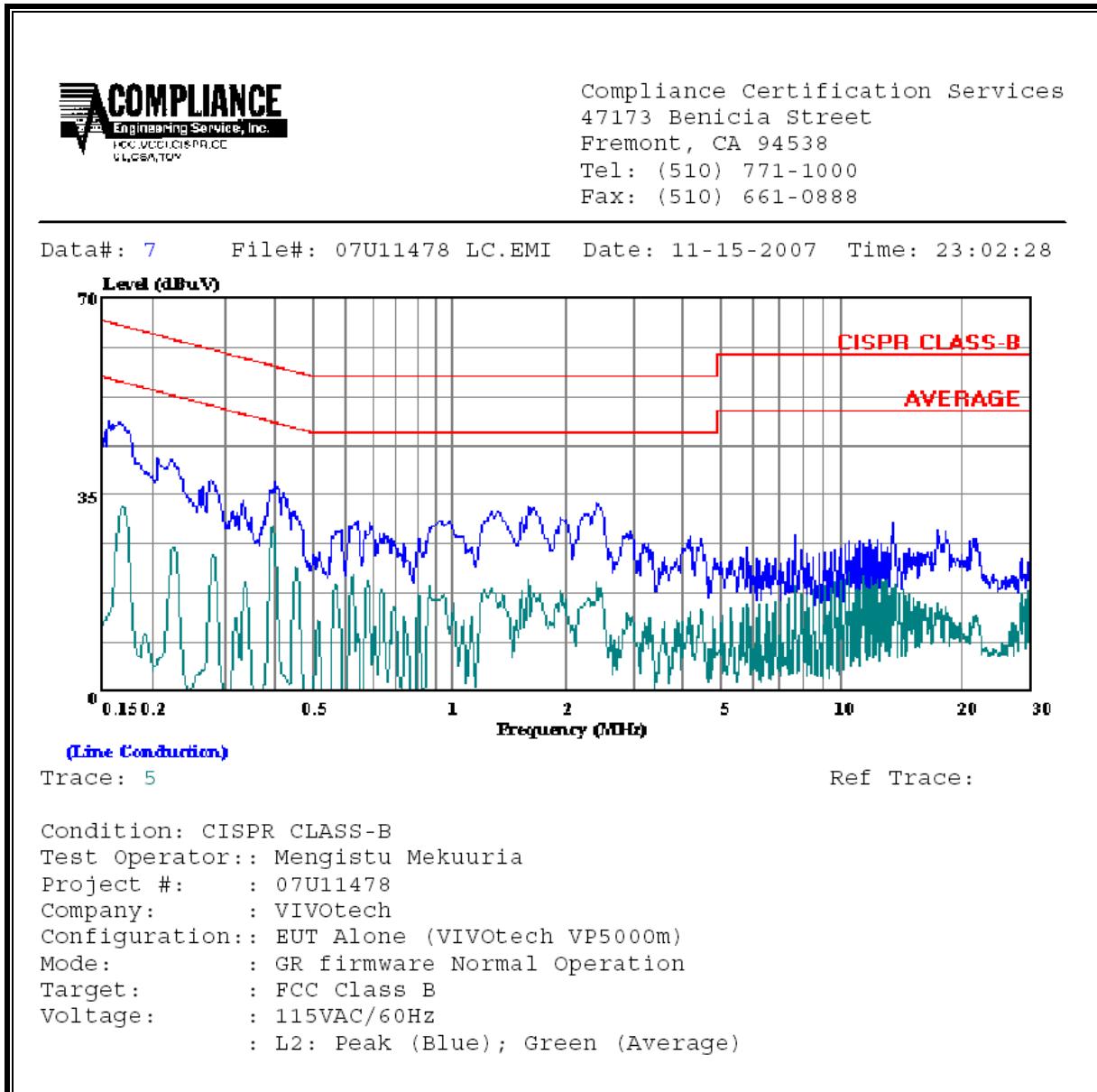
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Closs (dB)	Limit	EN_B	Margin		Remark
	PK (dBuV)	QP (dBuV)	AV (dBuV)				QP (dB)	AV (dB)	
0.16	48.40	--	--	0.00	65.73	55.73	-17.33	-7.33	L1
0.42	34.78	--	--	0.00	57.47	47.47	-22.69	-12.69	L1
2.33	33.56	--	--	0.00	56.00	46.00	-22.44	-12.44	L1
0.16	48.10	--	--	0.00	65.73	55.73	-17.63	-7.63	L2
0.40	37.32	--	--	0.00	57.85	47.85	-20.53	-10.53	L2
2.51	33.56	--	--	0.00	56.00	46.00	-22.44	-12.44	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



7.3. FREQUENCY STABILITY

LIMIT

FCC §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.

IC, A2.6 13.110-14.010 MHz:

Carrier frequency stability shall be maintained to $\pm 0.01\%$ (± 100 ppm).

TEST PROCEDURE

ANSI / TIA / EIA 603 Clauses 2.3.1 and 2.3.2

RESULTS

No non-compliance noted.

Reference Frequency: EUT Channel 13.56MHz @ 20°C Limit: ± 100 ppm = 135.603 KHz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
9.30	50	13.5602920	0.018	± 100
9.30	40	13.5602960	0.015	± 100
9.30	30	13.5603070	0.007	± 100
9.30	20	13.5603170	0.000	± 100
9.30	10	13.5603650	-0.035	± 100
9.30	0	13.5604020	-0.063	± 100
9.30	-10	13.5604120	-0.070	± 100
9.30	-20	13.5604130	-0.071	± 100
7.90	20	13.5603160	0.001	± 100
10.7	20	13.5603140	0.002	± 100

7.4. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

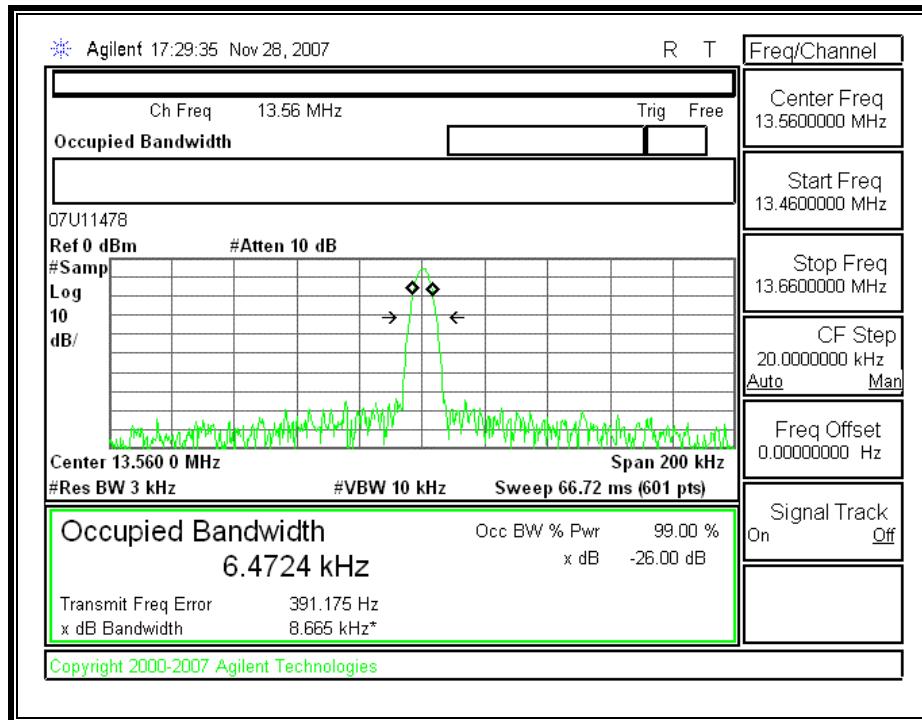
TEST PROCEDURE

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	6.4724

99% BANDWIDTH



8. SETUP PHOTOS

RADIATED EMISSION (0.15-30 MHz)

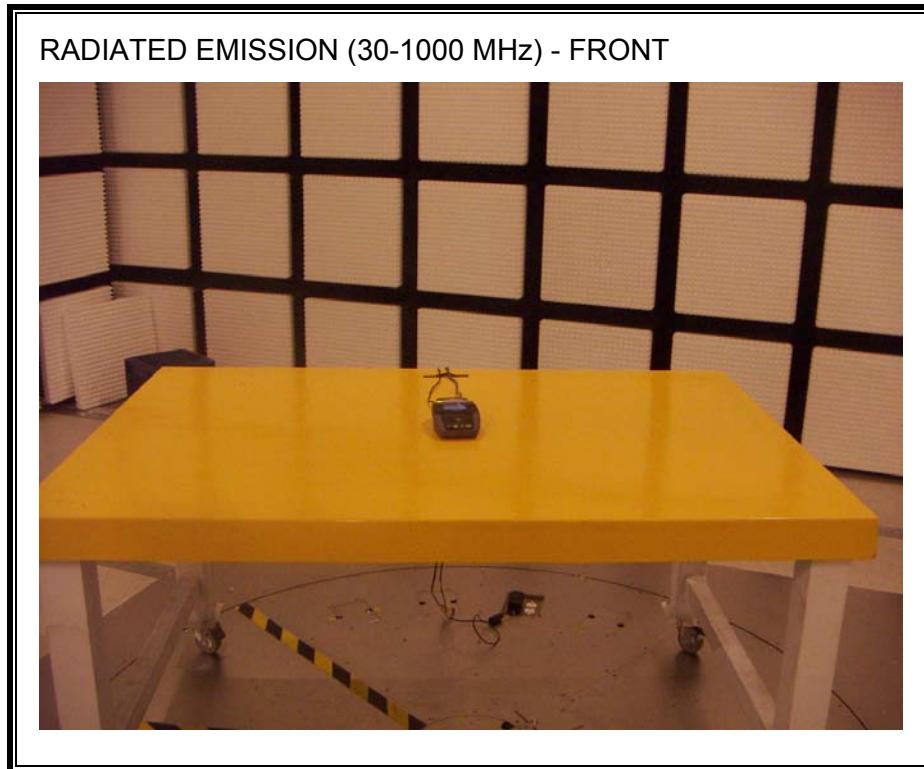
RADIATED EMISSION (0.15-30 MHz) – FACE ON



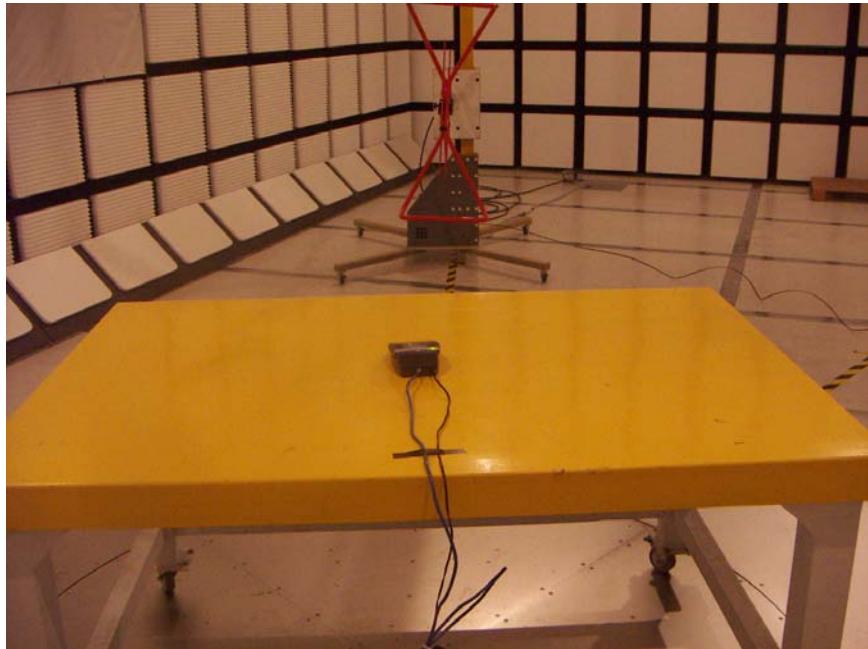
RADIATED EMISSION (0.15-30 MHz) – FACE OFF



RADIATED EMISSION (30-1000 MHz)

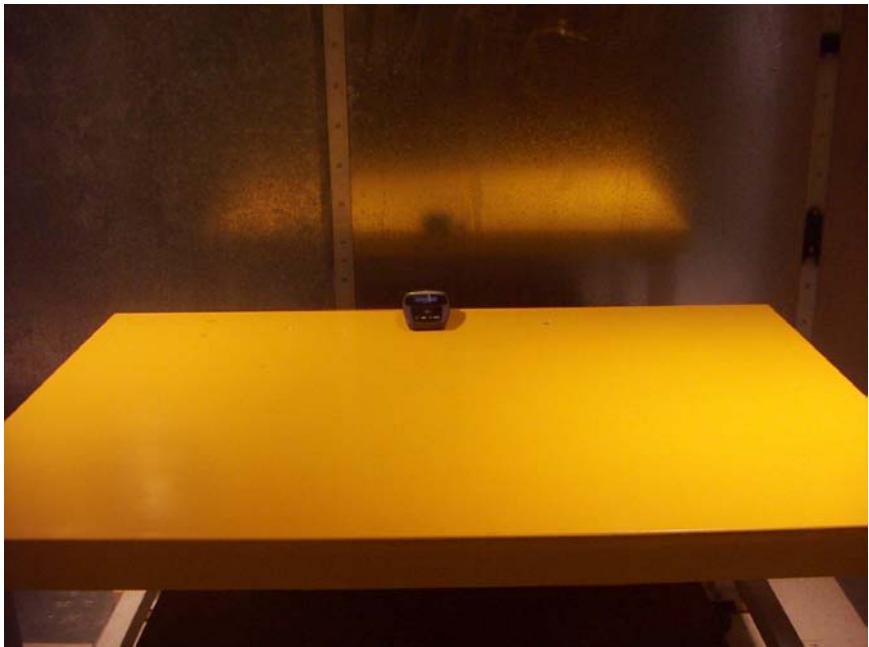


RADIATED EMISSION (30-1000 MHz) - BACK



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