



**FCC CFR47 PART 15 SUBPART C
ATTESTATION TEST REPORT**

FOR

LOW POWER TRANSMITTER WIRELESS CARD READER

FCC ID: Q55VPS500A

MODEL NUMBER: S500

REPORT NUMBER: 05U3737-1, Revision B

ISSUE DATE: OCTOBER 17, 2005

Prepared for
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NVLAP[®]
LAB CODE:200065-0

Revision History

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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: S500

SERIAL NUMBER: 01614

DATE TESTED: SEPTEMBER 30, 2005

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

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

Note: 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:

Tested By:



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EMC SUPERVISOR
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CHIN PANG
EMC ENGINEER
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003.

3. FACILITIES AND ACCREDITATION

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

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

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

EUT is a low power transmitter wireless card reader, and its fundamental frequency is 13.56MHz.

GENERAL INFORMATION

CHASSIS/ ENCLOSURE MATERIAL	PLASTIC
POWER REQUIREMENTS	100-120VAC, 60 Hz
POWERLINE FILTER MANUFACTURER AND MODEL	GATRON CORP
LIST OF ALL OSCILLATOR FREQUENCIES GREATER THAN OR EQUAL TO 9 kHz	13.56MHz, 10MHz

5.2. TEST CONFIGURATION

The following configuration was investigated during testing:

EUT Configuration	Description
Typical Configuration	EUT stand alone

5.3. MODE(S) OF OPERATION

Mode	Description
Normal Mode	Transmit Continuously

5.4. SOFTWARE AND FIRMWARE

Not Applicable.

5.5. MODIFICATIONS

No modifications were made during testing.

5.6. DETAILS OF TESTED SYSTEM

SUPPORT EQUIPMENT

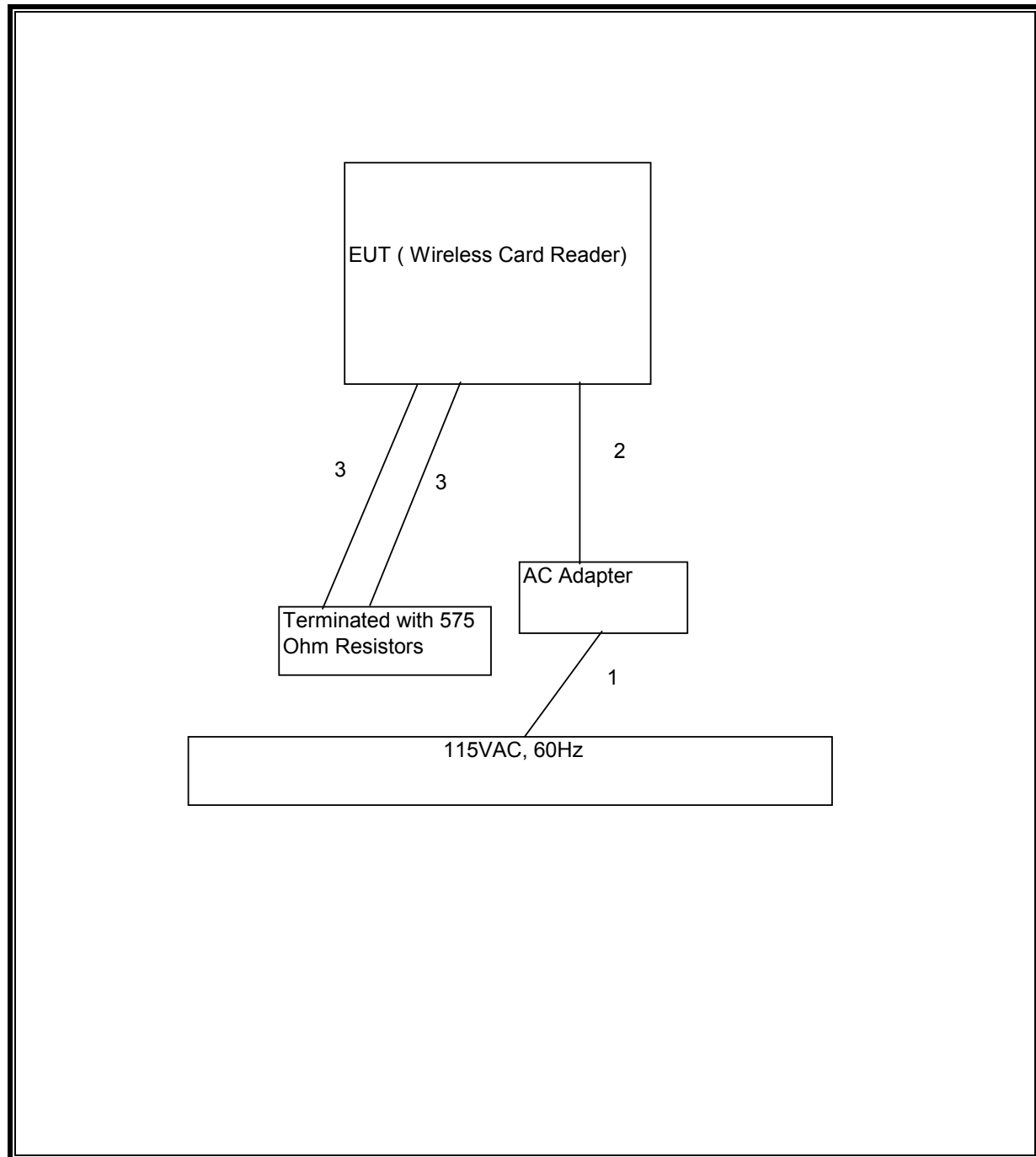
N/A; no support equipment were used for the operation of the EUT.

I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115	Un-Shielded	2m	N/A
2	DC	1	DC	Un-Shielded	1m	N/A
3	Phone Jack	2	RJ11	Un-Shielded	2m	Terminated with 575 Ohm resistor

TEST SETUP

EUT is stand alone unit and continues transmit when is turned on.

TEST 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				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Antenna, Biconical	Eaton	94455-1	1214	3/3/2006
Antenna, Log Periodic 200 ~ 1000 MHz	EMCO	3146	9107-3163	3/3/2006
Site C Preamplifier, 1300MHz	HP	8447D	2944A06550	8/26/2006
Quasi-Peak Adaptor	HP	85650A	2521A01038	1/15/2006
SA Display Section 3	HP	85662A	2314A04793	1/15/2006
SA RF Section, 1.5 GHz	HP	85680A	2314A02604	1/15/2006
Antenna, Loop 9 kHz ~ 30 MHz	EMCO	6502	9202-2722	9/7/2006
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2006
EMI Test Receiver	R & S	ESHS 20	827129/006	6/3/2006
Line Filter	Lindgren	LMF-3489	497	CNR
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	US42070220	4/1/2006
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	29800	6/10/2006

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. 99% BANDWIDTH

LIMIT

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.

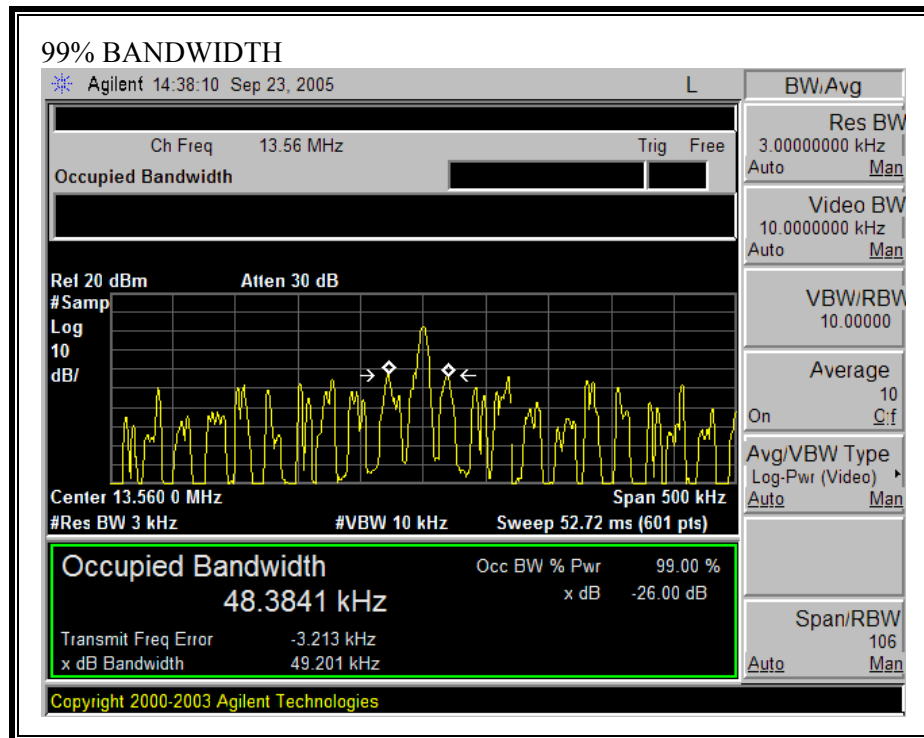
RESULTS

No non-compliance noted:

99% Bandwidth

Frequency (MHz)	99% Bandwidth (KHz)
433.92	48.384

99% BANDWIDTH



7.2. 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 9 kHz to 1000 MHz.

LIMIT

§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 ($\mu\text{V/m}$)	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:

SPURIOUS EMISSIONS 30 TO 1000 MHz

FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

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Project #: 05U3737-1
Report #: 050929C1
Date & Time: 09/29/05 11:32 AM
Test Engr: Chin Pang

Company: Vivotech
EUT Description: Low Power Transmitter Wireless Card Reader-13.56MHz, AC Power
Test Configuration: EUT only
Type of Test: FCC Class B
Mode of Operation: Transmit

[<< Main Sheet](#)

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
176.30	52.19	15.37	1.78	26.43	42.91	43.50	-0.59	3mH	0.00	1.50	QP
583.08	50.60	18.09	3.37	27.18	44.88	46.00	-1.12	3mH	0.00	1.50	P
555.96	50.60	17.85	3.41	27.08	44.78	46.00	-1.22	3mV	0.00	1.00	P
339.00	53.90	14.01	2.59	26.30	44.20	46.00	-1.80	3mH	0.00	1.50	P
325.44	53.80	13.78	2.55	26.21	43.93	46.00	-2.07	3mH	0.00	2.00	P
366.12	53.20	14.47	2.66	26.49	43.84	46.00	-2.16	3mH	0.00	1.50	P
6 Worst Data											

SPURIOUS EMISSIONS 0.15 TO 30 MHz (WORST-CASE CONFIGURATION)

FCC Part 15, Subpart B & C				10 Meter Distance Measurement At Open Field				
Company: Cvivotech								
Project #:05u3737-1								
Model #:S500								
Tester: Chin Pang								
Date: 9/29/2005								
MODE OF OPERATION: Transmit								
Frequency (MHz)	PK (dBuV)	QP (dBuV)	AF dB/m	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Notes
Loop Antenna Face On:								
13.56	61.8		10.56	-19.08	53.27	84.00	-30.7	Fundamental @ 10m Dist
13.41	26.7		10.54	-19.08	18.16	50.48	-32.3	13.41-13.553MHz Sprious @ 10m
13.553	48.8		10.56	-19.08	40.27	50.48	-10.2	13.41-13.553MHz Sprious @ 10m
13.567	40.0		10.56	-19.08	31.47	50.48	-19.0	13.567-13.710MHz Spurious @ 10m
13.71	31.8		10.57	-19.08	23.29	50.48	-27.2	13.567-13.710MHz Spurious @ 10m
13.11	20.0		10.51	-19.08	11.43	40.51	-29.1	13.110-13.410MHz Spurious @ 10m
13.41	24.0		10.54	-19.08	15.46	40.51	-25.1	13.110-13.410MHz Spurious @ 10m
13.71	22.2		10.57	-19.08	13.69	40.51	-26.8	13.710-14.010MHz Spurious @ 10m
14.01	19.7		10.60	-19.08	11.22	40.51	-29.3	13.710-14.010MHz Spurious @ 10m
14.03		26.2	10.60	-19.08	17.72	29.54	-11.8	14.010-30MHz Spurious @ 10m
15.56		24.5	10.66	-19.08	16.07	29.54	-13.5	14.010-30MHz Spurious @ 10m
17.56		26.7	10.50	-19.08	18.11	29.54	-11.4	14.010-30MHz Spurious @ 10m
18.07		25.4	10.45	-19.08	16.77	29.54	-12.8	14.010-30MHz Spurious @ 10m
19.1		21.0	10.37	-19.08	12.29	29.54	-17.3	14.010-30MHz Spurious @ 10m
20.06		23.2	10.29	-19.08	14.40	29.54	-15.1	14.010-30MHz Spurious @ 10m
21.5		23.1	10.00	-19.08	14.02	29.54	-15.5	14.010-30MHz Spurious @ 10m
22		22.9	9.90	-19.08	13.72	29.54	-15.8	14.010-30MHz Spurious @ 10m
27.16		23.0	9.04	-19.08	12.96	29.54	-16.6	14.010-30MHz Spurious @ 10m
29.1		22.8	8.81	-19.08	12.52	29.54	-17.0	14.010-30MHz Spurious @ 10m
Loop Antenna Face Off:								
13.56	69.2		10.56	-19.08	60.67	84.00	-23.3	Fundamental @ 10m Dist
13.41	21.7		10.54	-19.08	13.16	50.48	-37.3	13.41-13.553MHz Sprious @ 10m
13.553	26.0		10.56	-19.08	17.47	50.48	-33.0	13.41-13.553MHz Sprious @ 10m
13.567	24.0		10.56	-19.08	15.47	50.48	-35.0	13.567-13.710MHz Spurious @ 10m
13.71	28.8		10.57	-19.08	20.29	50.48	-30.2	13.567-13.710MHz Spurious @ 10m
13.11	17.1		10.51	-19.08	8.53	40.51	-32.0	13.110-13.410MHz Spurious @ 10m
13.41	17.0		10.54	-19.08	8.46	40.51	-32.1	13.110-13.410MHz Spurious @ 10m
13.71	19.6		10.57	-19.08	11.09	40.51	-29.4	13.710-14.010MHz Spurious @ 10m
14.01	17.0		10.60	-19.08	8.52	40.51	-32.0	13.710-14.010MHz Spurious @ 10m
15.56		32.8	10.66	-19.08	24.32	29.54	-5.2	14.010-30MHz Spurious @ 10m
17.56		27.0	10.50	-19.08	18.41	29.54	-11.1	14.010-30MHz Spurious @ 10m
18.9		21.8	10.39	-19.08	13.10	29.54	-16.4	14.010-30MHz Spurious @ 10m
22		22.2	9.90	-19.08	13.02	29.54	-16.5	14.010-30MHz Spurious @ 10m
23.1		20.6	9.68	-19.08	11.20	29.54	-18.3	14.010-30MHz Spurious @ 10m
24		30.0	9.50	-19.08	20.42	29.54	-9.1	14.010-30MHz Spurious @ 10m
26		23.8	9.18	-19.08	13.90	29.54	-15.6	14.010-30MHz Spurious @ 10m
27.12		21.0	9.05	-19.08	10.96	29.54	-18.6	14.010-30MHz Spurious @ 10m
29.68		26.4	8.74	-19.08	16.05	29.54	-13.5	14.010-30MHz Spurious @ 10m
* No more emissions were found up to 30MHz								
<u>Note:</u> The emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 8–90 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								

7.3. FREQUENCY STABILITY

LIMIT

15.225 (e) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% 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.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 2.3.1 and 2.3.2

RESULTS

No non-compliance noted.

Reference Frequency: EUT Channel 13.56MHz @ 20°C				
Limit: ± 100 ppm = 135.605 KHz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
5.00	50	13.56041	0.031	± 100
5.00	40	13.56044	0.010	± 100
5.00	30	13.56048	-0.017	± 100
5.00	20	13.56046	0.000	± 100
5.00	10	13.56040	0.039	± 100
5.00	0	13.56041	0.037	± 100
5.00	-10	13.56043	0.022	± 100
5.00	-20	13.56042	0.026	± 100
4.25	25	13.56045	0.004	± 100
5.75	25	13.56050	-0.033	± 100

7.4. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4

According to Section 13.1.3.1 of ANSI C63.4-2003, AC Line Conducted measurements on a 13.56 MHz transmitter were acceptable to be performed with a dummy load under the following conditions:

- 1) First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the 15.207 limits outside the transmitter's fundamental emission band;
- 2) Second, retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. Only the fundamental TX emission band needs to be retested.

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 boundary between the frequency ranges.

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
* Decreases with the logarithm of the frequency.		

RESULTS

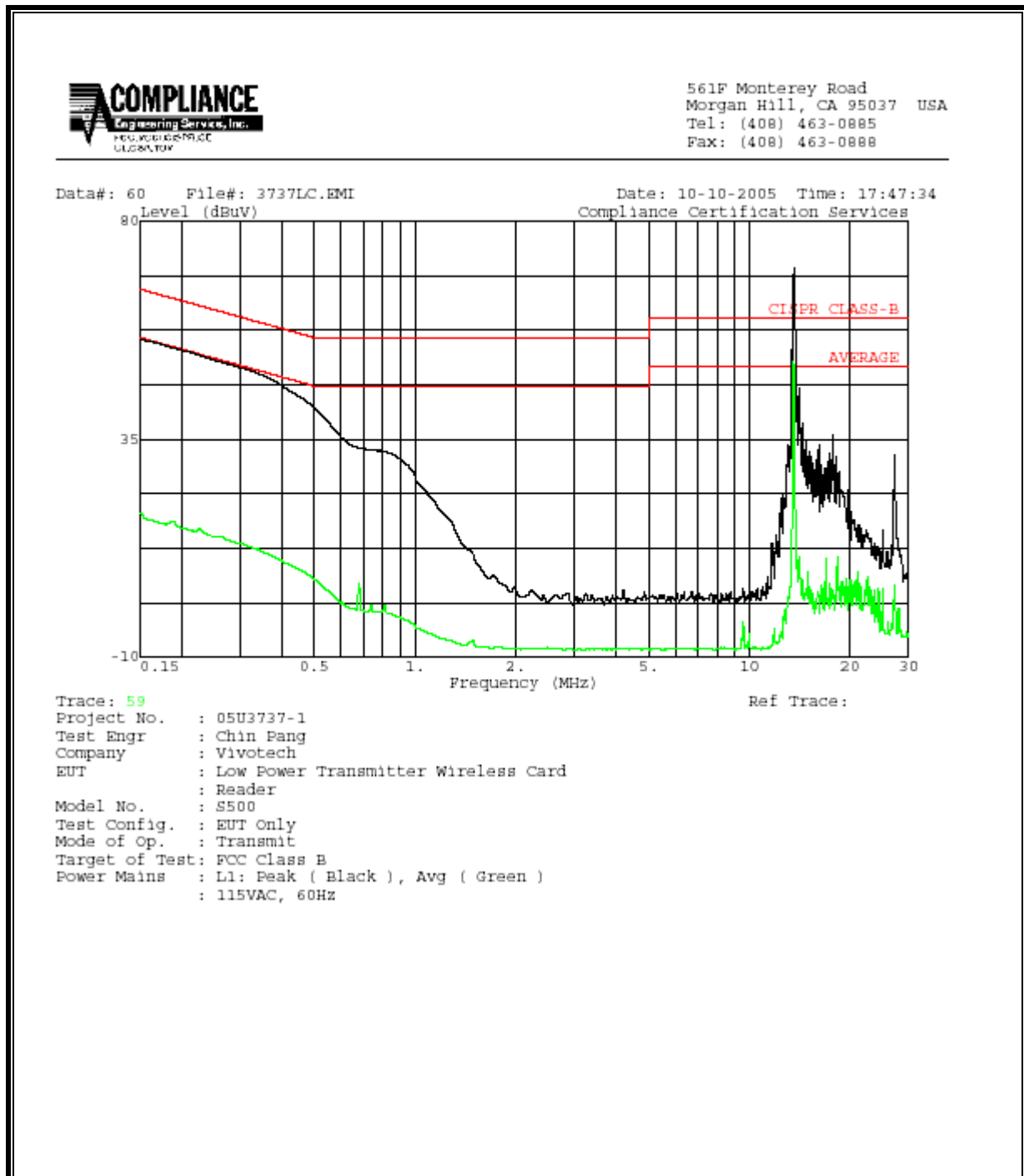
No non-compliance noted:

6 WORST EMISSIONS

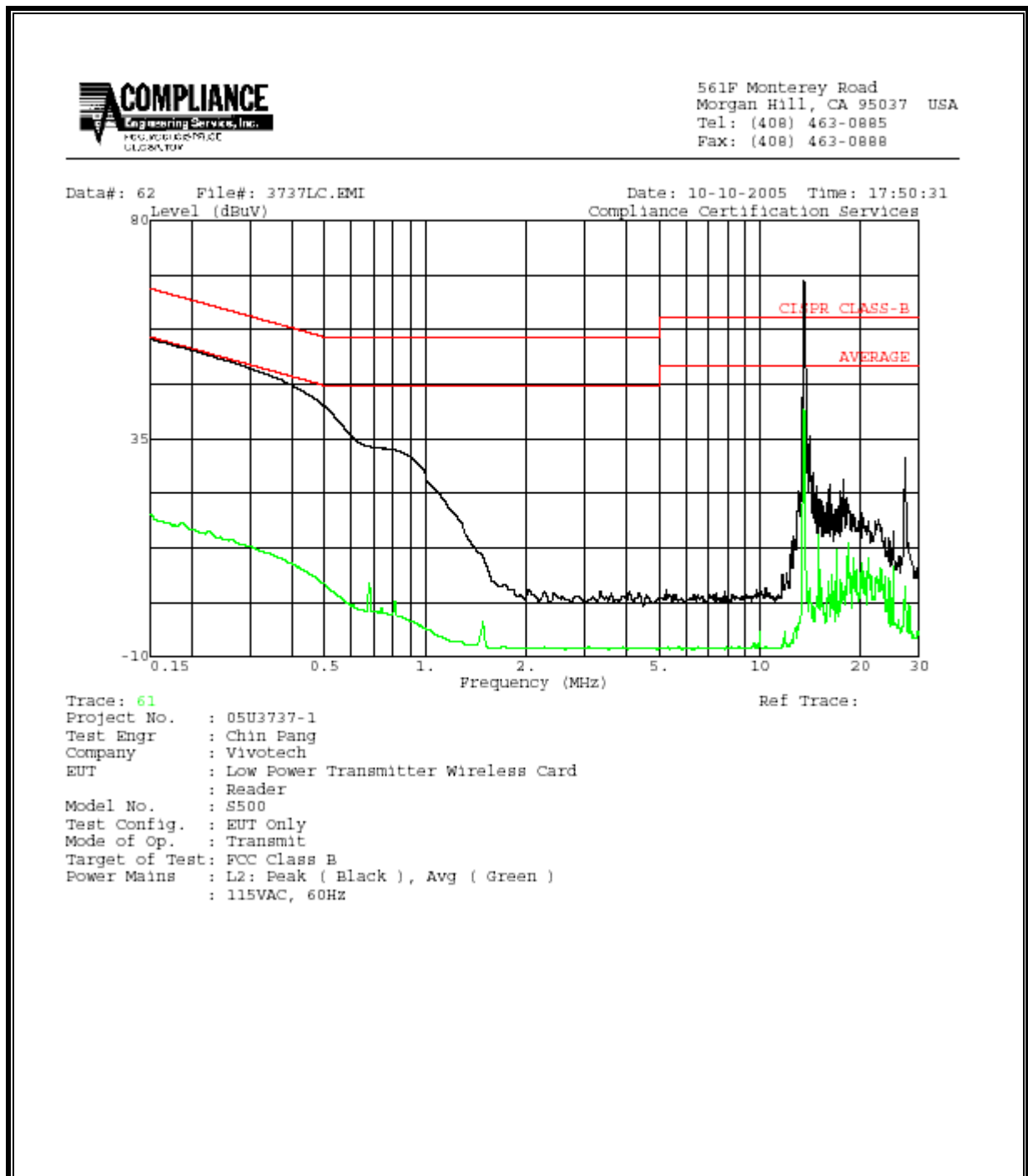
EUT with a dummy load (75 Ω termination at antenna port)

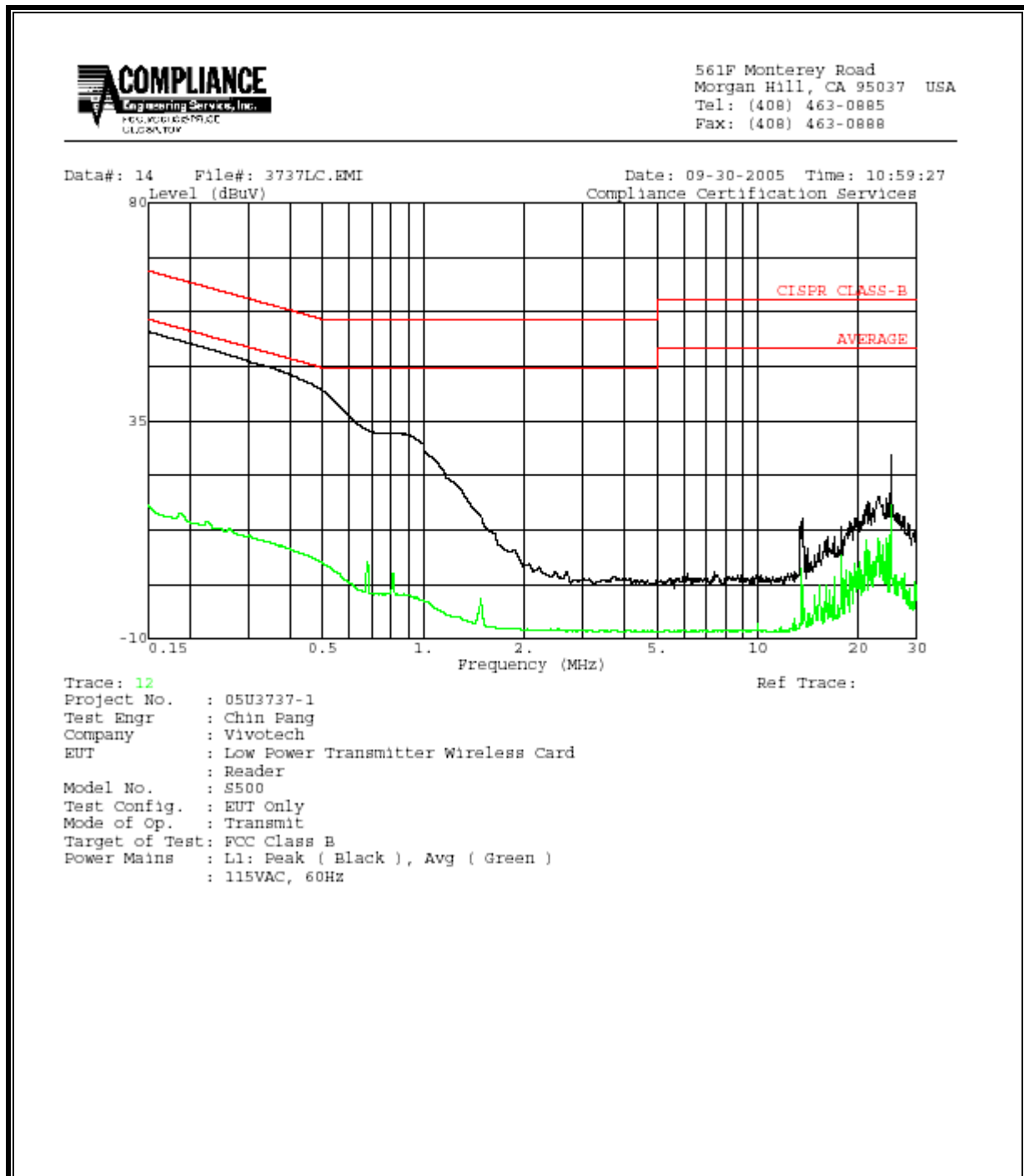
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.18	51.90	--	16.96	0.00	64.44	54.44	-12.54	-37.48	L1
0.48	42.08	--	14.29	0.00	56.36	46.36	-14.28	-32.07	L1
25.05	27.84	--	24.06	0.00	60.00	50.00	-32.16	-25.94	L1
0.16	52.80	--	17.30	0.00	65.52	55.52	-12.72	-38.22	L2
0.46	42.94	--	12.30	0.00	56.77	46.77	-13.83	-34.47	L2
25.05	27.56	--	23.30	0.00	60.00	50.00	-32.44	-26.70	L2
6 Worst Data									

LINE 1 RESULTS - EUT at normal transmitter mode with antenna

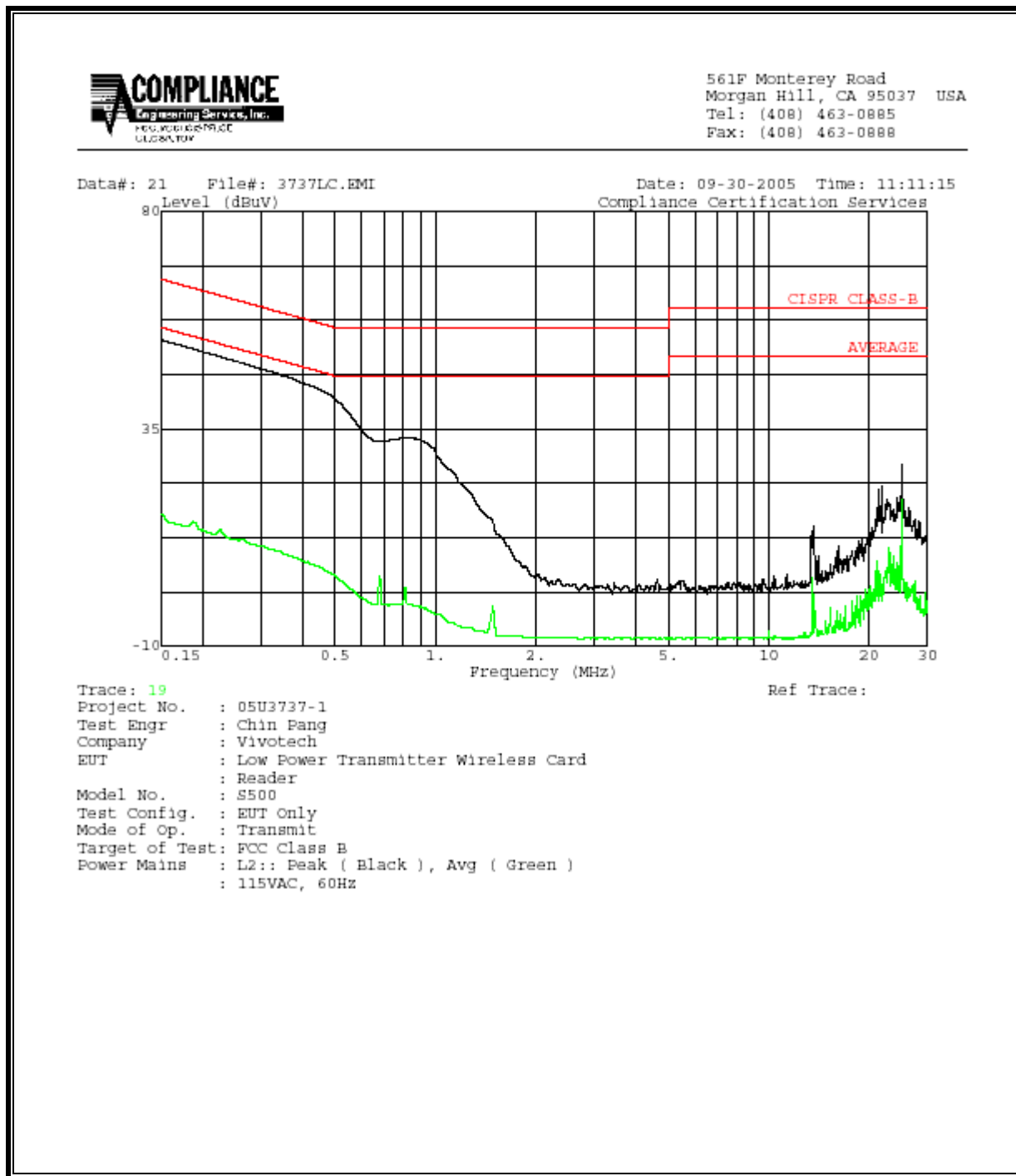


LINE 2 RESULTS - EUT at normal transmitter mode with antenna



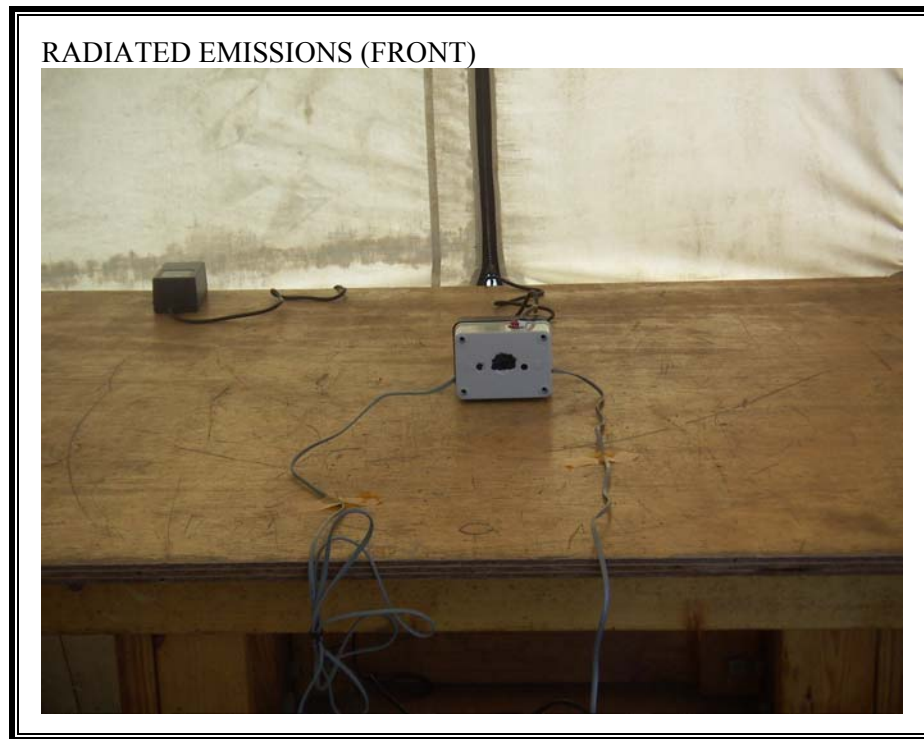
LINE 1 RESULTS - EUT with termination at antenna port

LINE 2 RESULTS - EUT with termination at antenna port



8. SETUP PHOTOS

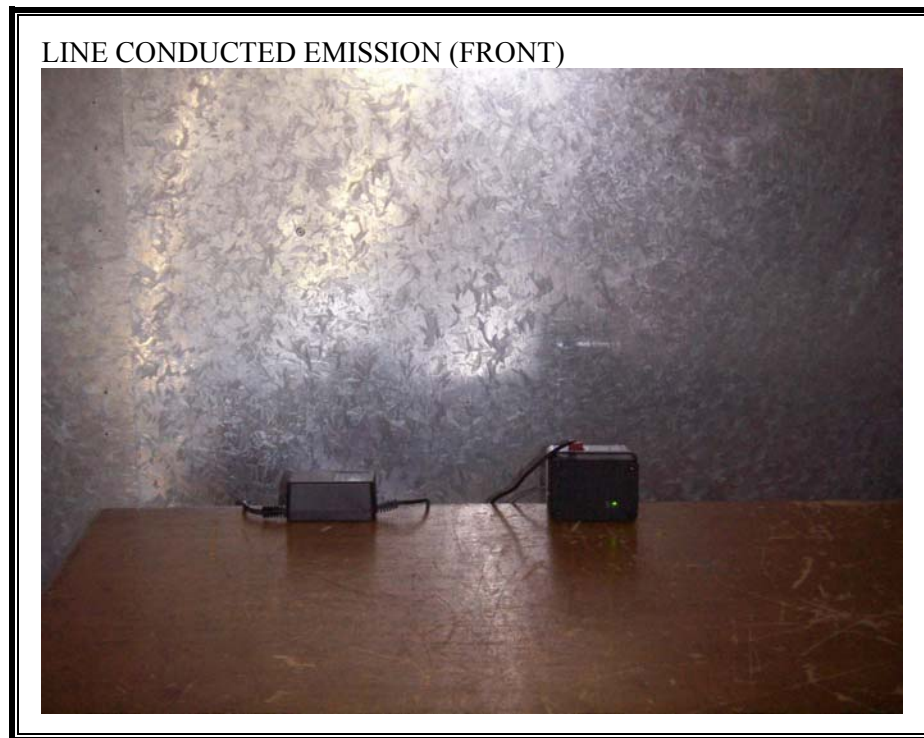
RADIATED EMISSION (30-1000 MHz)



RADIATED EMISSIONS (BACK)



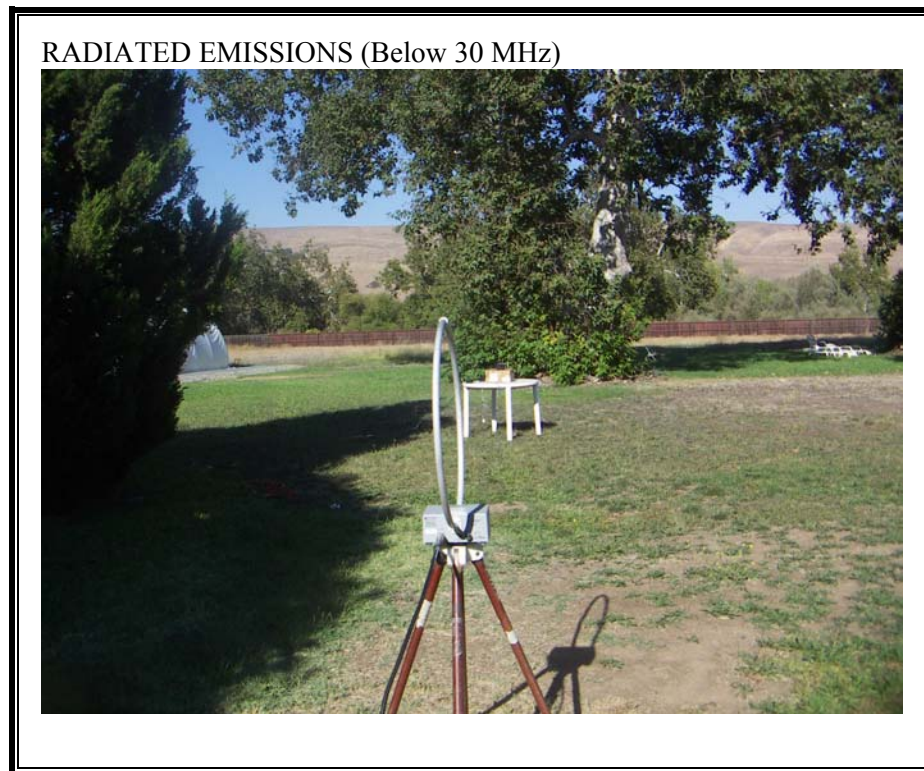
AC MAINS LINE CONDUCTED EMISSION (0.15-30 MHz)



LINE CONDUCTED EMISSION (BACK)



RADIATED EMISSIONS (Below 30 MHz)



END OF REPORT