

FCC PART 15.249
EMI MEASUREMENT AND TEST REPORT

For

Shanghai Fullband Technologies Co., Ltd.

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Shanghai 201203, P.R. China

FCC ID: SDECN20050808

This Report Concerns: ☒ Original Report	Equipment Type: Wireless PC-to-TV (Pro PC/TV Wireless)
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Report No.: R0508165	
Report Date: 2005-08-25	
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Shanghai Fullband Technologies Co., Ltd.* product, FCC ID: *SDECN20050808*, or the "EUT" as referred to in this report is the transmitter part of a 2.4GHz Wireless A/V (Pro A/V Media Extender) Transmitter, operating frequency 2414 – 2468 MHz. The EUT is measured approximately 160mmL x 120mmW x 65mmH.

** The test data gathered are from production sample, serial number: FI690342001446, provided by the manufacturer.*

Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2003.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209, and 15.249.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp.

Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2003.

Schematics and Block Diagram

Please refer to Appendix A.

Equipment Modifications

No modifications were made to the EUT.

Power Supply

Manufacturer	Description	Model	Serial Number	FCC ID
DVE	Switching adaptor	DSA-009F-07 A	None	None

Local Support Equipment

Manufacturer	Description	Model	Serial Number	FCC ID
Extreme	DVD Player	DVD-8812	None	DOC

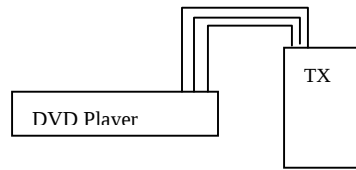
Remote Support Equipment

Manufacturer	Description	Model	Serial Number	FCC ID
Toshiba	TV	14AF41	22612119A	DOC

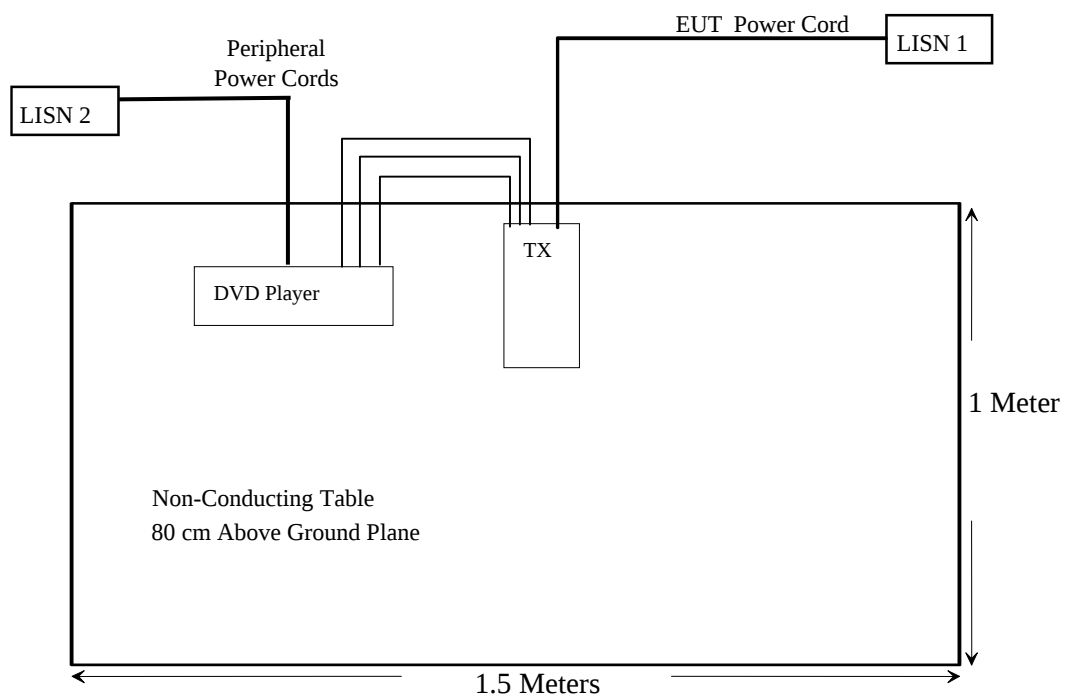
Interface Ports and Cabling

Cable Description	Length (M)	From	To
AV Cable	1.5	DVD	EUT (TX)
AV Cable	1.5	TV	EUT (RX)

Test Setup Configuration



Test Setup Block Diagram



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band	Compliant*
§15.207(a)	Conducted Emission	Compliant
§15.209 (a), §15.249 (a)	Radiated Emission	Compliant
15.249 (d)	Band Edge Testing	Compliant

*Within the Measurement of Uncertainty

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Connected Construction

The antenna connector is designed with permanent attachment and no consideration of replacement.

§ 15.207 (a) - CONDUCTED EMISSIONS TEST DATA

Measurement Uncertainty

All measurements involve certain levels of uncertainties. These uncertainties are attributed to: Receiver, Cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the estimated uncertainty of any conducted emission measurement at BACL is ± 2.4 dB.

EUT Setup

The measurement was performed in the shielded room, using the same setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC 15 Subpart C limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected to an adapter, which connected to 120Vac/60Hz power source.

Receiver Setup

The receiver was set to investigate the frequency 150 kHz to 30MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Receiver, EMI Test	ESCS30	100176	2004-09-15
Fluke	Calibrated Voltmeter	189	18485-38	2005-07-18
Rohde & Schwarz	LISN, Artificial Mains	ESH2-Z5	871884/039	2005-08-16

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Test Procedure

During the conducted emission test, the adapter of EUT was connected to the main outlet of the LISN-1.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with an "QP". Average readings are distinguished with an "Ave".

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	45%
ATM Pressure:	1019mbar

*Testing was performed by Kevin Lee on 2005-08-23.

Summary of Test Results

According to the recorded data in following table, the EUT complies with the FCC Conducted limit for a Class B device, with the *worst* margin reading of:

-7.7 dB at 17.900 MHz in the Neutral mode

Conducted Emissions Test Data

Frequency MHz	LINE CONDUCTED EMISSIONS			FCC CLASS B	
	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
17.900	52.3	QP	Neutral	60.00	-7.7
17.900	52.2	QP	Line	60.00	-7.8
0.230	43.8	Ave	Neutral	52.45	-8.6
20.200	34.6	Ave	Neutral	50.00	-15.4
0.230	45.5	QP	Neutral	62.45	-16.9
0.230	45.5	QP	Line	62.45	-16.9
0.230	35.5	Ave	Line	52.45	-16.9
20.200	40.0	QP	Neutral	60.00	-20.0
16.500	29.7	Ave	Line	50.00	-20.3
16.500	34.8	QP	Line	60.00	-25.2

Plot of Conducted Emissions Test Data

Plot of Conducted Emissions test data was presented hereinafter as reference.

Bay Area Compliance Laboratory Corp
Class B

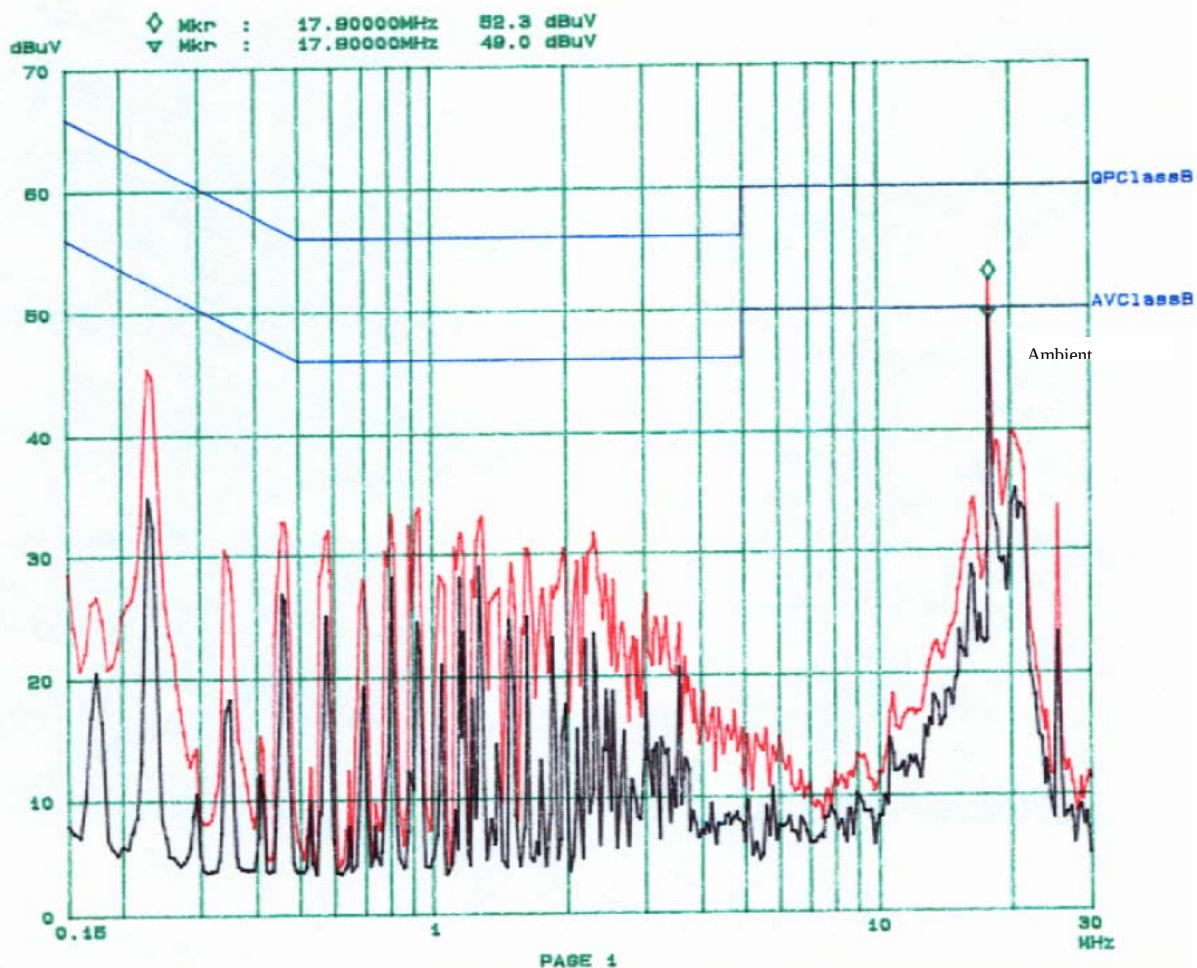
23. Aug 05 13:25

Kevin Lu
8/23/05

EUT: flyimage 3000
Manuf: Shanghai Fullband
Op Cond: Normal
Operator: Kevin Lee
Comment: N
120VAC

Scan Settings (3 Ranges)

Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	18dB LN	OFF
1M	5M	10k	9k	QP+AV	1ms	18dB LN	OFF
5M	30M	100k	9k	QP+AV	1ms	18dB LN	OFF



Bay Area Compliance Laboratory Corp
Class B

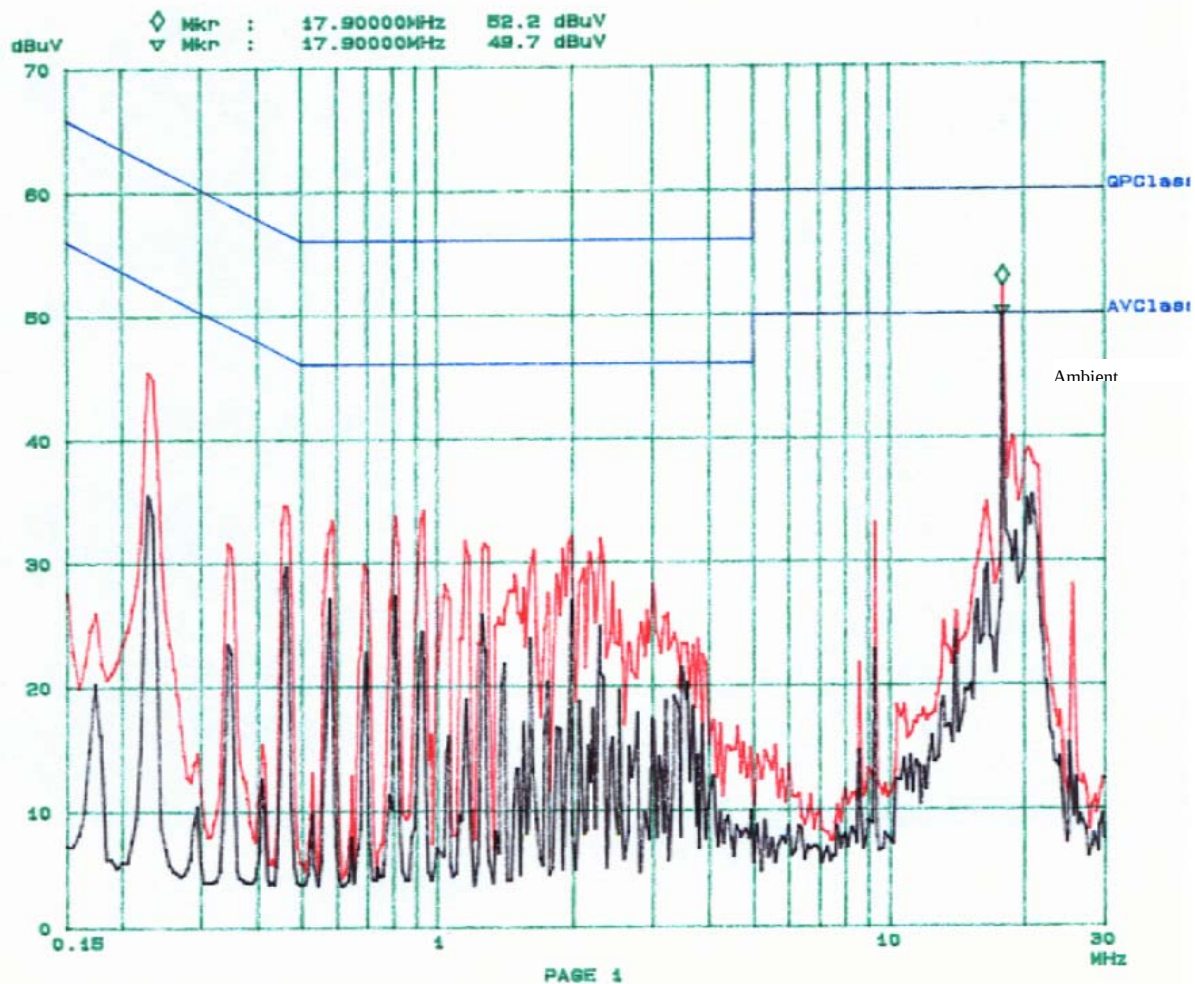
23. Aug 05 13:56

EUT: flyimage 3000
Manuf: Shanghai Fullband
Op Cond: Normal
Operator: Kevin Lee
Comment: L
120VAC

Kevin Lee
8/23/05

Scan Settings (3 Ranges)

Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten Presamp
150k	1M	5k	9k	QP+AV	20ms	15dB LN OFF
1M	5M	10k	9k	QP+AV	1ms	15dB LN OFF
5M	30M	100k	9k	QP+AV	1ms	15dB LN OFF



§15.205, §15.209 (a), §15.249 (a) - RADIATED EMISSION DATA

Applicable Standard

According to §15.249 (a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of (millivolts/ meter)	Field strength of fundamental harmonics (microvolts/ meter)
902-928 MHz.....	50	500
2400-2483.5 MHz.....	50	500
5725-5875 MHz.....	50	500
24.0-24.25 GHz.....	250	2500

According to §15.249 (d), emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ± 4.0 dB.

EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected to an adapter, which connected to 120Vac/60Hz power source.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33 (a) (1), the system was tested to 25GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

<u>Frequency Range</u>	<u>RBW</u>	<u>Video B/W</u>
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Sunol Sciences	Antenna	JB1	A013105-3	2005-02-11
HP	Amplifier	8447D	2944A10198	2005-08-20
Rohde & Schewarz	EMI Test Receiver	ESCI 1166.595 0K03	100044	2004-09-29

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	45%
ATM Pressure:	1019mbar

*Testing was performed by Kevin Lee on 2005-08-23.

Test Procedure

For the radiated emissions test, the power cord of the EUT was connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limits), and are distinguished with a "Qp" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for applicable limits. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Applicable Limit}$$

Summary of Test Results

According to the recorded data in following table, the EUT measured test data within the measurement uncertainty of ± 4.0 , and had the worst margin of:

- 0.7 dB at 2414.00 MHz in the **Vertical** polarization at **Low** Channel*
- 2.4 dB at 2432.00 MHz in the **Vertical** polarization at **Mid** Channel*
- 4.1 dB at 2468.00 MHz in the **Horizontal** polarization at **High** Channel
- 4.5 dB at 405.00 MHz in the **Horizontal** polarization at **Unintentional** Emission

* The test data was Within the Measurement of Uncertainty

Radiated Emissions Test Result Data - 3Meter

Low Channel

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction Factor	15.249		Comments
MHz	dBuV/m	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit (dBuV/m)	Margin dB	
2414.00	98.5	55	1.8	H	28.7	2.0	35.8	93.3	94	-0.7	Ave
2414.00	97.6	180	1.2	V	28.7	2.0	35.8	92.4	94	-1.5	Ave
4828.00	43.7	180	1.5	V	32.5	3.1	34.8	44.5	54	-9.5	Ave
4828.00	43.3	180	2.3	H	32.5	3.1	34.8	44.1	54	-10.0	Ave
7242.00	36.3	180	1.8	H	36.7	4.3	34.7	42.6	54	-11.4	Ave
7242.00	36.1	90	1.5	V	36.7	4.3	34.7	42.4	54	-11.6	Ave
2414.00	106.4	315	1.8	H	28.7	2.0	35.8	101.2	114	-12.7	Peak
4828.00	59.6	55	2.3	H	32.5	3.1	34.8	60.4	74	-13.6	Peak
2414.00	105.4	90	1.0	V	28.7	2.0	35.8	100.2	114	-13.7	Fund/Peak
4828.00	57.3	180	1.5	V	32.5	3.1	34.8	58.1	74	-16.7	Peak
7242.00	50.1	180	1.8	H	36.7	4.3	34.7	56.4	74	-17.6	Peak
7242.00	49.1	90	1.5	V	36.7	4.3	34.7	55.4	74	-18.6	Peak

Radiated Emissions Test Result Data - 3Meter

Mid Channel

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.249 Limit (dBuV/m) Margin dB		Comments
2432.00	96.7	95	2.0	V	28.7	2.0	35.8	91.6	94	-2.4	Ave
2432.00	95.6	0	1.2	H	28.7	2.0	35.8	90.5	94	-3.5	Ave
7296.00	41.9	270	2.4	V	36.7	4.3	34.7	48.3	54	-5.7	Ave
7296.00	41.6	180	2.1	H	36.7	4.3	34.7	47.9	54	-6.1	Ave
3034.75	45.1	180	1.6	H	29.8	2.5	35.2	42.3	54	-8.9	Ave
4864.00	43.4	270	2.4	V	32.5	3.1	34.8	44.2	54	-9.8	Ave
3034.75	57.2	180	1.6	V	29.8	2.5	35.2	54.3	74	-16.8	Peak
2432.00	101.8	85	1.8	V	28.7	2.0	35.8	96.7	114	-17.3	Fund/Peak
2432.00	98.3	180	1.2	H	28.7	2.0	35.8	93.2	114	-20.8	Fund/Peak
4864.00	52.4	180	2.2	H	32.5	3.1	34.8	53.2	74	-20.8	Peak
4864.00	51.0	90	2.2	H	32.5	3.1	34.8	51.8	74	-22.2	Peak
7296.00	42.0	270	2.4	V	36.7	4.3	34.7	48.3	74	-25.7	Peak
7296.00	41.5	180	2.3	H	36.7	4.3	34.7	47.8	74	-26.2	Peak

High Channel

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.249 Limit (dBuV/m) Margin dB		Comments
2468.00	95.1	90	1.2	H	28.7	2.0	35.8	89.9	94	-4.1	Ave
2468.00	94.5	65	2.8	V	28.7	2.0	35.8	89.3	94	-4.7	Ave
7404.00	34.1	0	2.4	H	36.7	4.3	34.7	40.5	54	-13.5	Ave
7404.00	33.3	90	2.1	H	36.7	4.3	34.7	39.7	54	-14.3	Ave
2468.00	104.0	90	1.0	V	28.7	2.0	35.8	98.8	114	-15.2	Fund/Peak
3071.00	38.8	180	1.5	H	29.8	2.5	35.2	36.0	54	-15.2	Ave
2468.00	103.1	65	1.2	H	28.7	2.0	35.8	97.9	114	-16.1	Fund/Peak
7404.00	47.9	0	2.1	H	36.7	4.3	34.7	54.3	74	-19.7	Peak
4936.00	53.3	90	2.1	H	32.5	3.1	34.8	54.1	74	-19.9	Peak
7404.00	46.8	90	2.1	V	36.7	4.3	34.7	53.2	74	-20.8	Peak
4936.00	51.5	270	2.4	V	32.5	3.1	34.8	52.3	74	-21.7	Peak
3071.00	52.1	180	1.5	V	29.8	2.5	35.2	49.3	74	-21.9	Peak

Radiated Emissions Test Result Data - 3Meter

Unintentional Emission

Frequency MHz	Reading dBuV	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.249		Comments
									Limit (dBuV/m)	Margin dB	
405.00	49.6	95	1.9	H	15.4	4.6	28.1	41.5	46	-4.5	Peak
270.00	51.6	175	2.4	V	13.2	3.4	27.4	40.8	46	-5.2	Peak
405.00	48.1	150	2.1	V	15.4	4.6	28.1	40.0	46	-6.0	Peak
350.24	48.0	270	2.1	H	14.5	4.2	27.7	39.0	46	-7.0	Peak
270.00	47.2	195	1.3	H	13.2	3.4	27.4	36.4	46	-9.6	Peak
393.72	44.2	15	1.7	H	15.2	4.3	28.1	35.6	46	-10.4	Peak
393.72	43.6	305	1.5	V	15.2	4.3	28.1	35.0	46	-11.0	Peak
305.08	45.1	250	1.0	V	13.6	3.6	27.4	34.9	46	-11.1	Peak
310.80	43.6	0	3.2	H	13.8	3.8	27.5	33.7	46	-12.3	Peak
310.80	43.6	0	3.2	H	13.8	3.8	27.5	33.7	46	-12.3	Peak
310.80	42.7	265	1.2	V	13.8	3.8	27.5	32.8	46	-13.2	Peak
305.08	42.2	214	2.0	H	13.6	3.6	27.4	32.0	46	-14.0	Peak
350.24	40.6	180	2.0	V	14.5	4.2	27.7	31.6	46	-14.4	Peak

§15.249 (d) – BAND-EDGE TESTING

Standard Applicable

Requirements: FCC 15.249 (d), the emission power at the START and STOP frequencies shall be at least 50 dB below the level of the fundamental or to the general radiated emission limits in FCC 15.209, whichever is the lesser attenuation.

Test Procedure

With the EUT's antenna attached, the EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8565EC	3946A00131	2005-05-03

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	45%
ATM Pressure:	1019mbar

*Testing was performed by Kevin Lee on 2005-08-23.

Test Results

Refer to the attached plots.

