FCC PART 15.249

EMI MEASUREMENT AND TEST REPORT

For

Shanghai Fullband Technologies Co., Ltd.

Suite 213-215, Building 22, 498 Guo Shoujing Rd.
Shanghai 201203, P.R. China

FCC ID: SDECN20050608

This Report Concerns:	Equipment Type:
☒ Original Report	2.4GHz Wireless A/V (Pro A/V Media Extender) Transmitter

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Report No.:	R0506157
Report Date:	2005-07-06
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Shanghai Fullband Technologies Co., Ltd.* product, FCC ID: *SDECN20050608*, 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: FT20050608002, 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 and 15.205, 15.207,15.249, 15.203 and 15.209 rules.

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

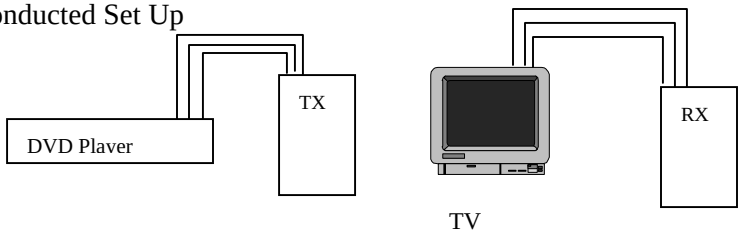
Manufacturer	Description	Model	Serial Number	FCC ID
Extreme	DVD Player	DVD-8812	None	DOC
Toshiba	TV	14AF41	22612119A	DOC

Interface Ports and Cabling

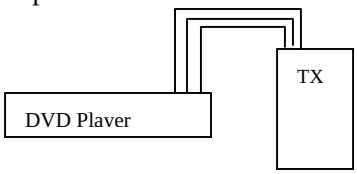
Cable Description	Length (M)	From	To
AV Cable x3	1.5	DVD	EUT (TX)
A/V Cable x3	1.5	TV	EUT (RX)

Test Setup Configuration

Conducted Set Up

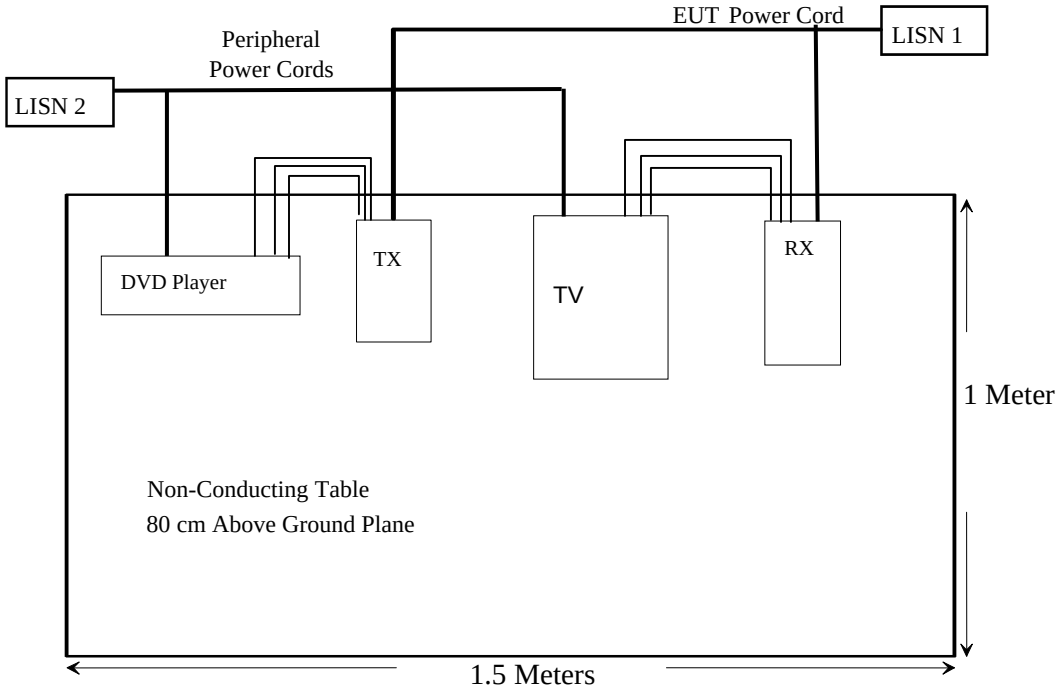


Radiated Set Up

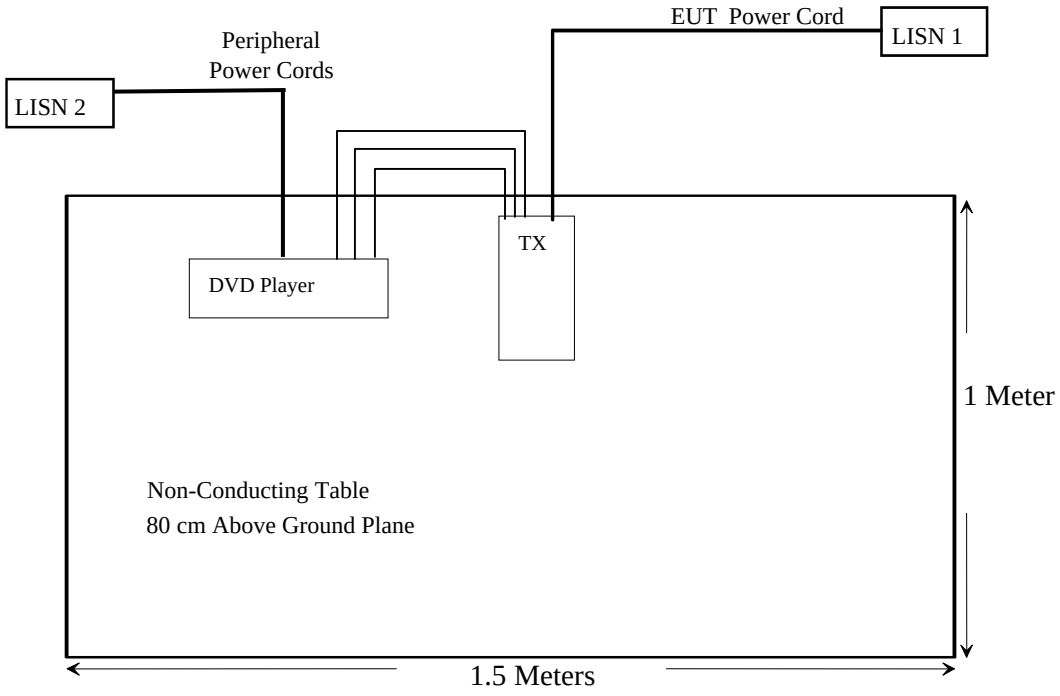


Test Setup Block Diagram

Conducted Set Up



Radiated Set Up



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

*The EUT was within the measurement of uncertainty at High Channel with the worst result of –2.36 dB

§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 $\pm$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	2004-07-18
Rohde & Schwarz	LISN, Artificial Mains	ESH2-Z5	871884/039	2004-08-16

* **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:	51%
ATM Pressure:	1018mbar

**Testing was performed by Jerry Wang on 2005-07-05.*

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:

-13.1 dB at **0.185 MHz** in the **Line** mode

Conducted Emissions Test Data

For 120V

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.185	41.2	Ave	Line	54.3	-13.1
19.300	36.8	Ave	Line	50.0	-13.2
0.185	40.2	Ave	Neutral	54.3	-14.1
0.370	34.0	Ave	Line	48.5	-14.5
0.370	33.2	Ave	Neutral	48.5	-15.3
16.900	34.6	Ave	Neutral	50.0	-15.4
0.185	47.2	QP	Neutral	64.3	-17.1
16.900	42.0	QP	Neutral	60.0	-18.0
0.185	45.4	QP	Line	64.3	-18.9
0.370	38.2	QP	Line	58.5	-20.3
19.300	39.7	QP	Line	60.0	-20.3
0.370	37.7	QP	Neutral	58.5	-20.8

Plot of Conducted Emissions Test Data

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

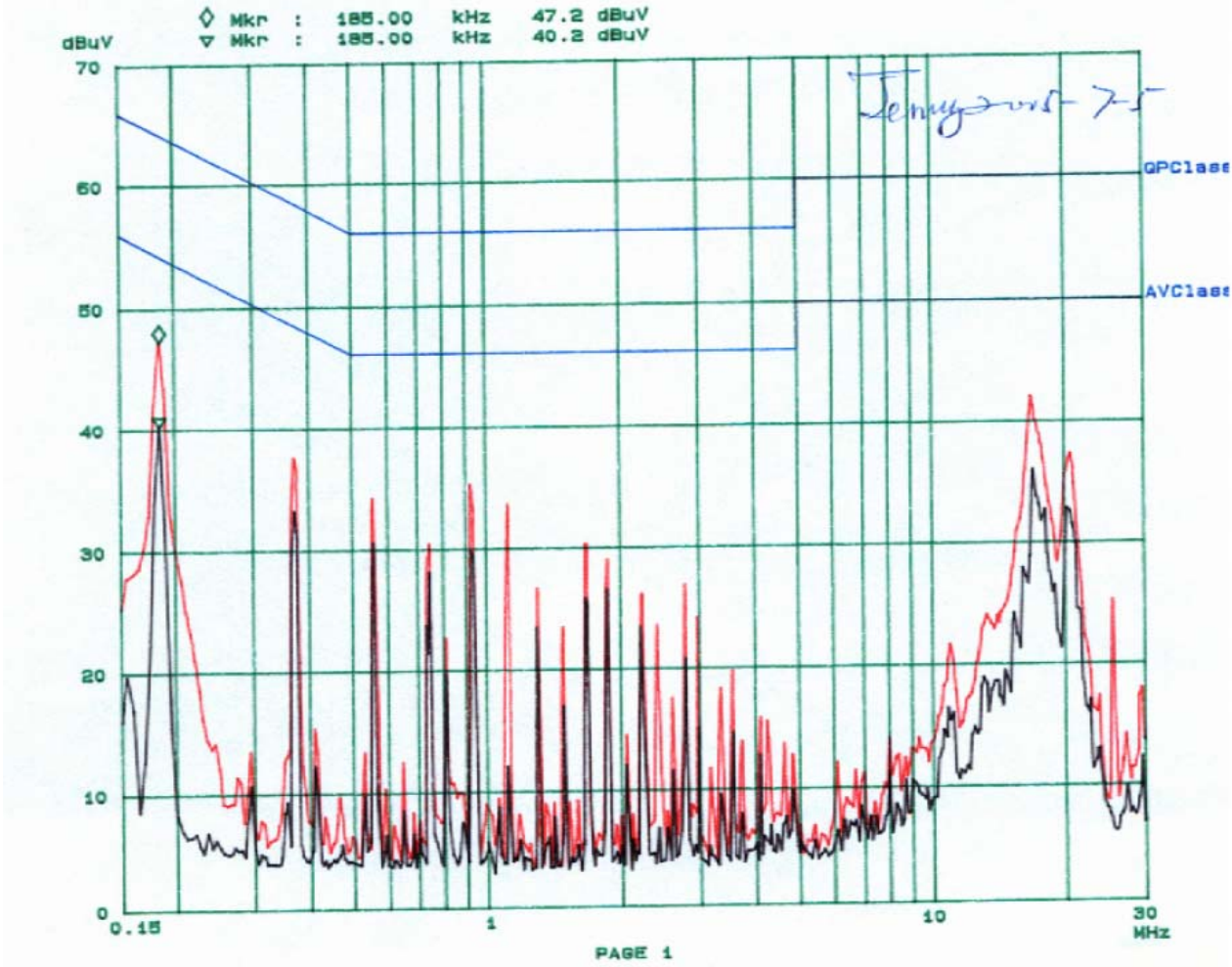
Bay Area Compliance Laboratory Corp 05. Jul 05 16:09

Class B

EUT: FlyImage2000 (Transmitter)
Manuf: Shanghai Fullband Technologies
Op Cond: Normal
Operator: Jerry
Comment: N
120 VAC

Scan Settings (3 Ranges)

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



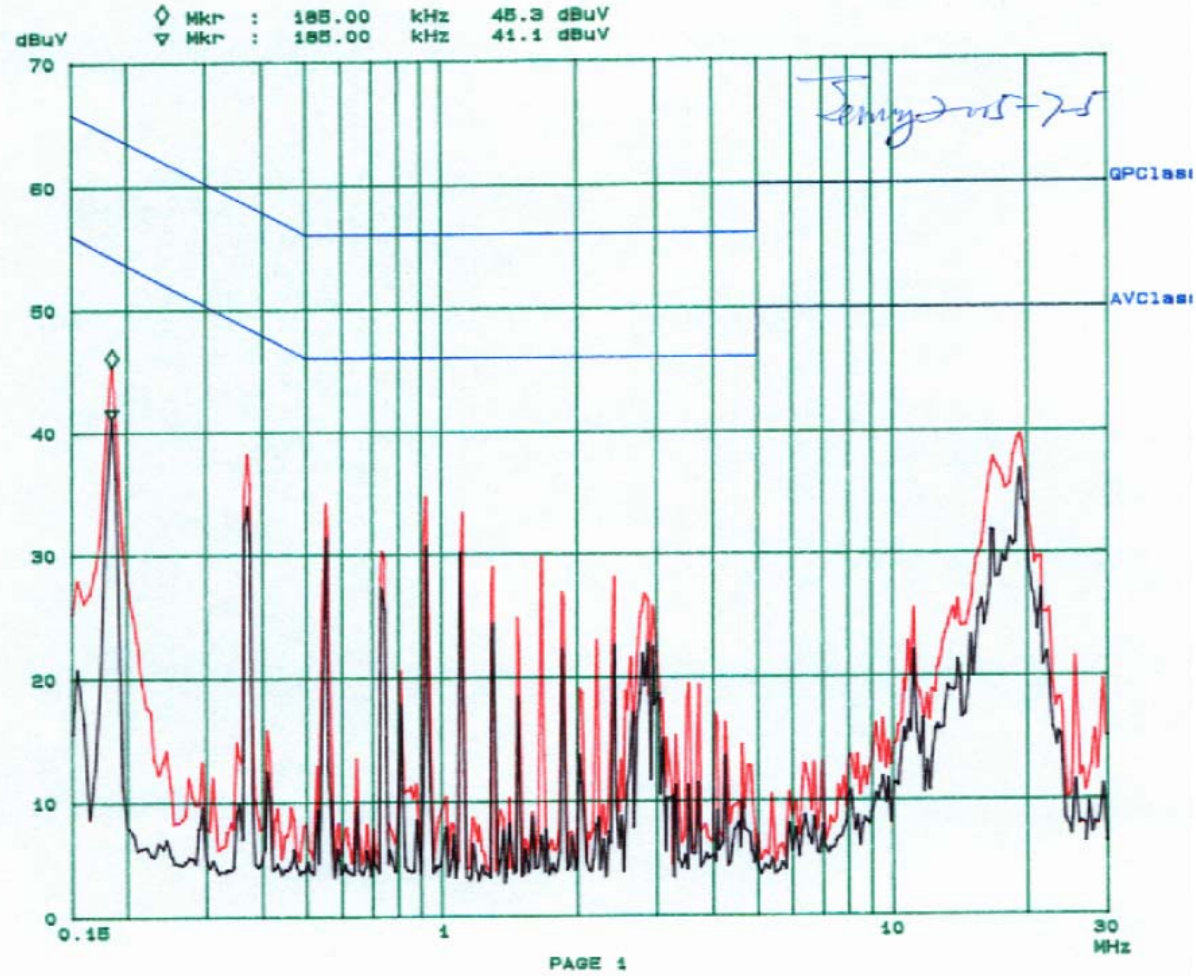
Bay Area Compliance Laboratory Corp 05. Jul 05 15: 50

Class B

EUT: FlyImage2000 (Transmitter)
Manuf: Shanghai Fullband Technologies
Op Cond: Normal
Operator: Jerry
Comment: L
120 VAC

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	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 fundamental (millivolts/meter)	Field strength of 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 $\pm$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.

The spacing between the peripherals was 10 centimeters.

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

The EUT was connected to the power adapter, which is connected with 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:

Frequency Range	***RBW***	***Video B/W***
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	2004-08-20
Agilent	Spectrum Analyzer	E4446A	US44300386	2004-11-10
A.H. System, Inc.	Antenna, HORN	SAS-200/571	261	2005-04-20
HP	Pre, Amplifier, Microwave	8449B	3147A00400	2005-03-14

* **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:	51%
ATM Pressure:	1018mbar

**Testing was performed by Jerry Wang on 2005-07-05.*

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:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - 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:

Margin = Corr. Ampl. - 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:

-7.9 dB at **4828.00 MHz** in the **Vertical** polarization at **Low** Channel
-4.01 dB at **2450.00 MHz** in the **Horizontal** polarization at **Mid** Channel
-2.36 dB at **7404.00 MHz** in the **Horizontal** polarization at **High** Channel
-12.262 dB at **150.00 MHz** in the **Horizontal** polarization at **Unintentional** Emission*

*The EUT was within the measurement of uncertainty at High Channel with the worst result of –2.36 dB

Radiated Emissions Test Result Data - 3Meter

Low Channel

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction Factor	FCC	FCC	Comments
MHz	dBuV	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	
4828	45.30	250	1.2	V3	32.53	3.1	34.83	46.10	54	-7.90	Ave
4828	45.20	200	1.2	H3	32.53	3.1	34.83	46.00	54	-8.00	Ave
7242	34.90	180	1.5	H3	36.71	4.3	34.67	41.24	54	-12.76	Ave
2414	106.30	270	1.2	V3	28.65	2.0	35.83	101.12	114	-12.88	Fund/Peak
7242	32.70	180	1.2	V3	36.71	4.3	34.67	39.04	54	-14.96	Ave
2414	81.75	180	1.2	V3	28.65	2.0	35.83	76.57	94	-17.43	Ave
4828	55.20	180	1.3	V3	32.53	3.1	34.83	56.00	74	-18.00	Peak
4828	54.30	200	1.5	H3	32.53	3.1	34.83	55.10	74	-18.90	Peak
2414	100.04	180	1.5	H3	28.65	2.0	35.83	94.86	114	-19.14	Fund/Peak
2414	78.60	200	1.5	H3	28.65	2.0	35.83	73.42	94	-20.58	Ave
7242	43.10	200	1.2	H3	36.71	4.3	34.67	49.44	74	-24.56	Peak
7242	42.80	200	1.2	V3	36.71	4.3	34.67	49.14	74	-24.86	Peak

Radiated Emissions Test Result Data - 3Meter (Continued)

Mid Channel

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction Factor	FCC	FCC	Comments
MHz	dBuV	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	
2450	95.17	200	1.2	H3	28.65	2.0	35.83	89.99	94	-4.01	Ave
4900	46.30	100	1.2	V3	32.53	3.1	34.83	47.10	54	-6.90	Ave
7350	39.50	180	1.2	V3	36.71	4.3	34.67	45.84	54	-8.16	Ave
7350	38.70	180	1.2	H3	36.71	4.3	34.67	45.04	54	-8.96	Ave
2450	88.60	180	1.2	V3	28.65	2.0	35.83	83.42	94	-10.58	Ave
4900	42.30	180	1.5	H3	32.53	3.1	34.83	43.10	54	-10.90	Ave
2450	107.26	200	1.2	V3	28.65	2.0	35.83	102.08	114	-11.92	Fund/Peak
4900	60.10	20	1.2	V3	32.53	3.1	34.83	60.90	74	-13.10	Peak
2450	105.20	200	1.2	H3	28.65	2.0	35.83	100.02	114	-13.98	Fund/Peak
7350	48.30	270	1.5	H3	36.71	4.3	34.67	54.64	74	-19.36	Peak
7350	47.70	200	1.2	V3	36.71	4.3	34.67	54.04	74	-19.96	Peak
4900	52.40	200	1.2	H3	32.53	3.1	34.83	53.20	74	-20.80	Peak

High Channel

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction Factor	FCC	FCC	Comments
MHz	dBuV	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	
7404	45.3	200	1.2	H3	36.71	4.3	34.67	51.64	54	-2.36	Ave
7404	44.9	180	1.2	V3	36.71	4.3	34.67	51.24	54	-2.76	Ave
4936	44.8	120	1.5	H3	32.53	3.1	34.83	45.60	54	-8.40	Ave
4936	43.7	200	1.2	V3	32.53	3.1	34.83	44.50	54	-9.50	Ave
7404	51.7	120	1.2	V3	36.71	4.3	34.67	58.04	74	-15.96	Peak
2468	103.0	200	1.2	V3	28.65	2.0	35.83	97.82	114	-16.18	Fund/Peak
2468	102.1	200	1.2	H3	28.65	2.0	35.83	96.92	114	-17.08	Fund/Peak
7404	50.5	200	1.2	H3	36.71	4.3	34.67	56.84	74	-17.16	Peak
2468	80.6	180	1.2	V3	28.65	2.0	35.83	75.42	94	-18.58	Ave
2468	80.3	180	1.5	H3	28.65	2.0	35.83	75.08	94	-18.92	Ave
4936	53.2	180	1.2	V3	32.53	3.1	34.83	54.00	74	-20.00	Peak
4936	52.9	200	1.2	H3	32.53	3.1	34.83	53.70	74	-20.30	Peak

Radiated Emissions Test Result Data - 3Meter (Continued)

Unintentional Emission

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Correction Factor	FCC	FCC
MHz	dBuV	Degree	Meter	H/V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB
150.00	45.3	180	1.5	H	12.70	1.6600	28.422	31.238	43.5	-12.262
399.98	42.3	200	1.2	V	16.40	2.5000	28.250	32.950	46.0	-13.050
125.00	45.1	200	1.5	H	11.85	1.5800	28.533	29.997	43.5	-13.503
240.00	44.5	200	1.2	V	13.80	2.1700	28.040	32.430	46.0	-13.570
433.02	40.7	200	1.2	V	16.90	2.7900	28.480	31.910	46.0	-14.090
150.00	42.7	100	1.2	V	12.70	1.6600	28.422	28.638	43.5	-14.862
144.00	42.3	270	1.5	H	12.40	1.6300	28.467	27.863	43.5	-15.637
400.00	39.2	180	1.5	H	16.40	2.5000	28.300	29.800	46.0	-16.200
144.00	40.1	200	1.2	V	12.40	1.6300	28.467	25.663	43.5	-17.837

§15.249 (d) – BAND-EDGE TESTING

Standard Applicable

Requirements: FCC 15.249 (c), 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

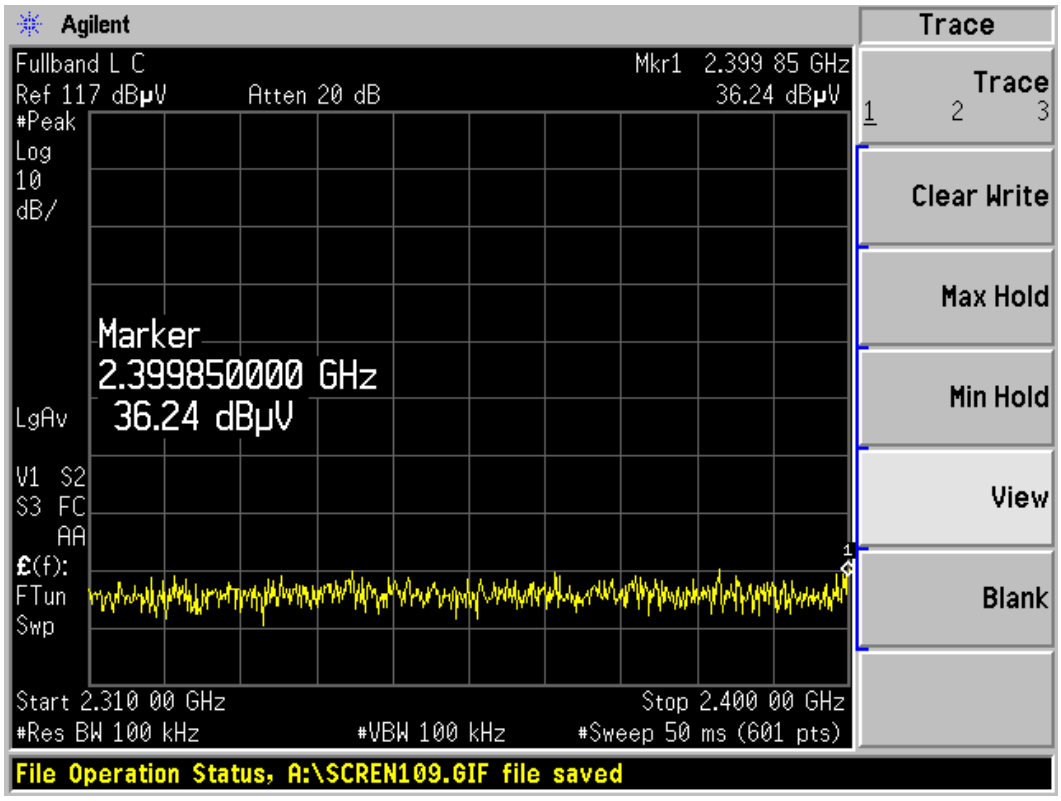
Temperature:	25 °C
Relative Humidity:	51%
ATM Pressure:	1018mbar

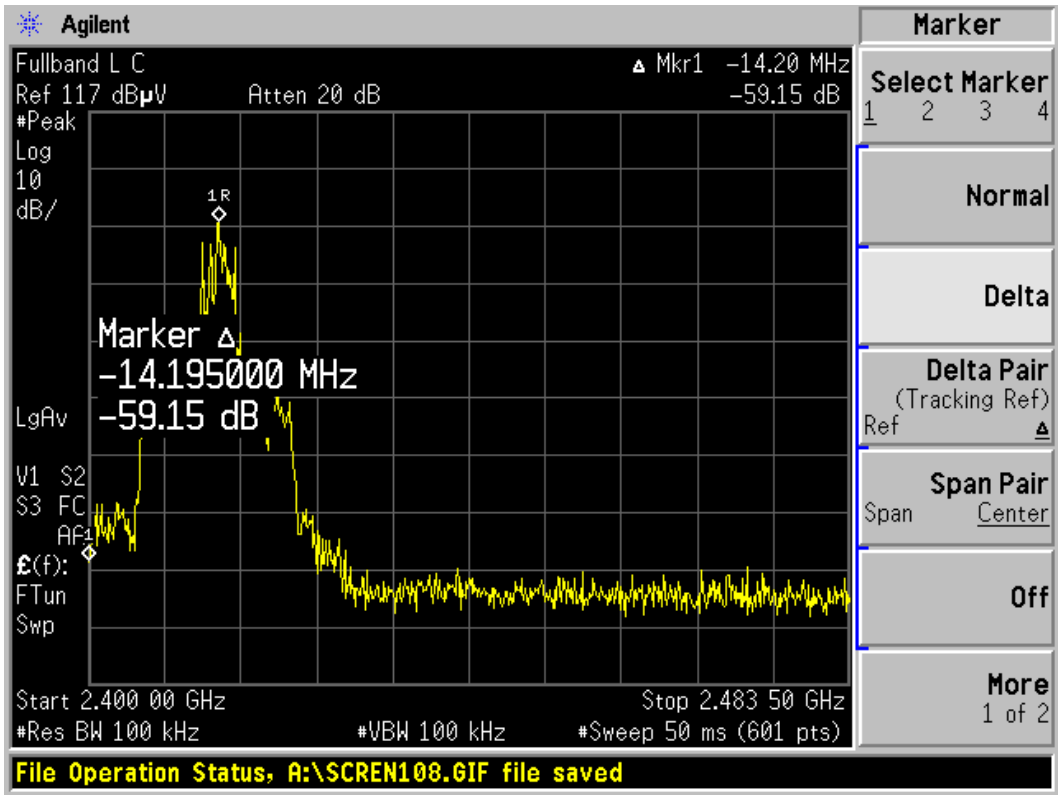
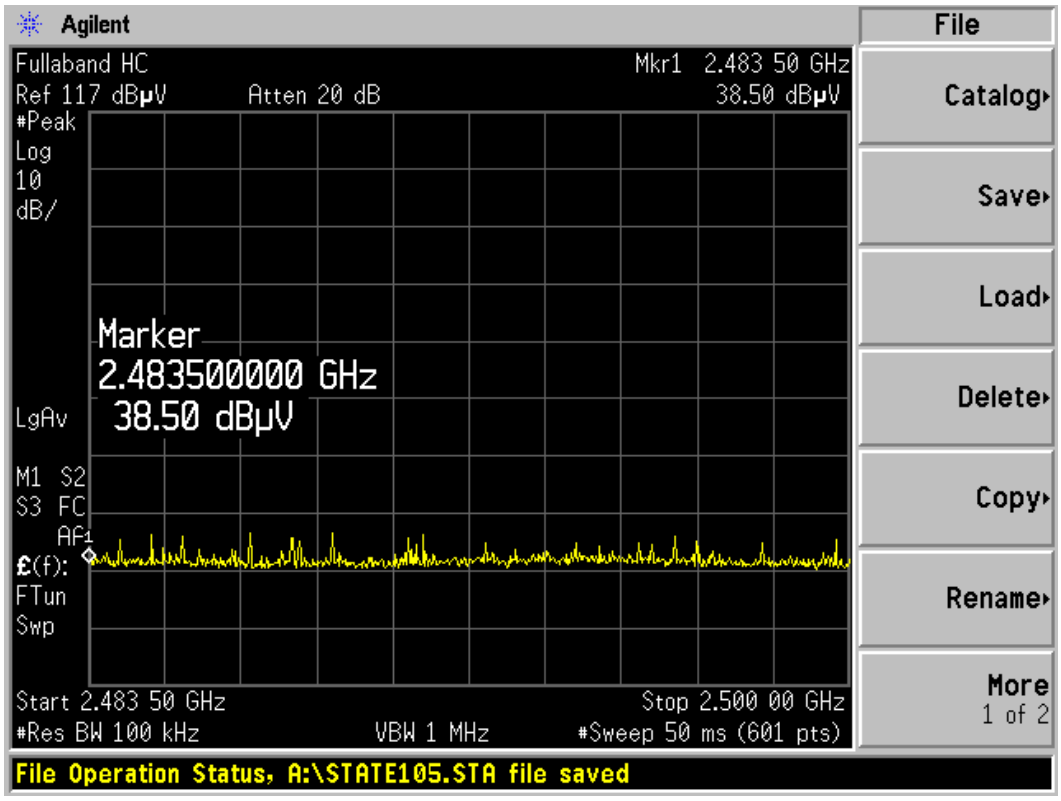
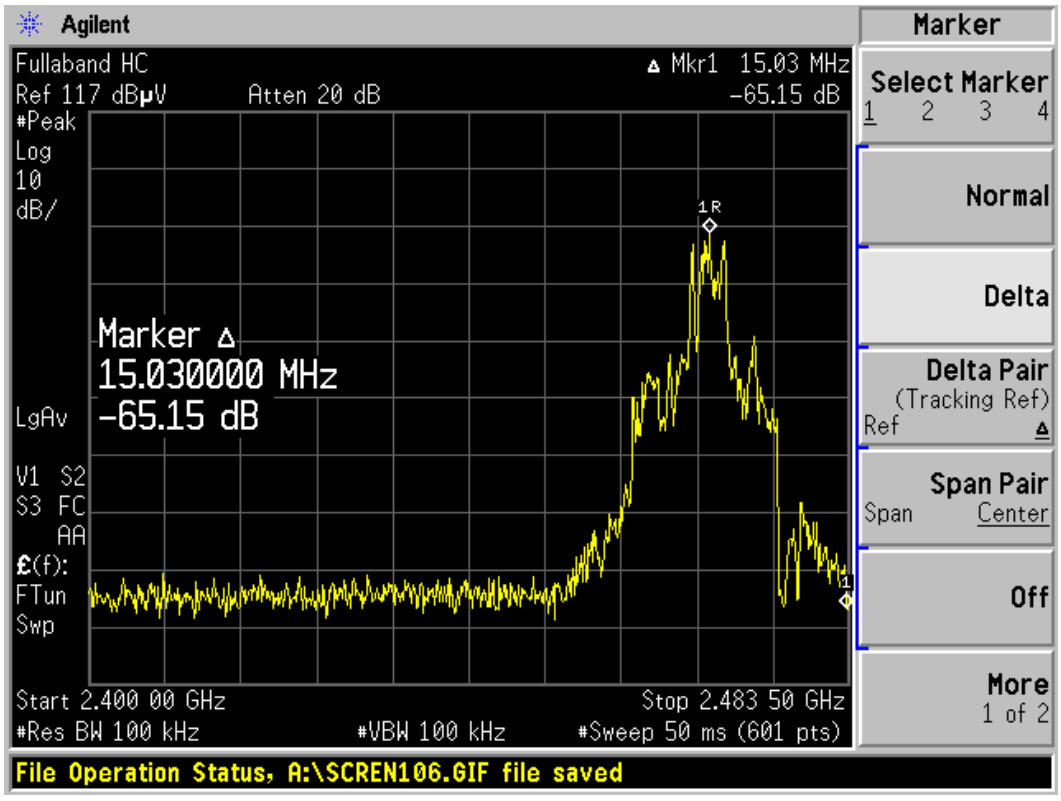
**Testing was performed by Jerry Wang on 2005-07-05.*

Test Results

Refer to the attached plots.

Low Channel:


Agilent
Trace
Fullband L C
Ref 117 dBµV
Atten 20 dB
Mkr1 2.399 85 GHz
36.24 dBµV
#Peak
Log
10
dB/
Marker
2.399850000 GHz
36.24 dBµV
LgAv
V1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.310 00 GHz
Stop 2.400 00 GHz
#Res BW 100 kHz
#VBW 100 kHz
#Sweep 50 ms (601 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File Operation Status, A:\SCREN109.GIF file saved


Agilent
Marker
Fullband L C
Ref 117 dBµV
Atten 20 dB
Δ Mkr1 -14.20 MHz
-59.15 dB
#Peak
Log
10
dB/
1R
Marker Δ
-14.195000 MHz
-59.15 dB
LgAv
V1 S2
S3 FC
AF
£(f):
FTun
Swp
Start 2.400 00 GHz
Stop 2.483 50 GHz
#Res BW 100 kHz
#VBW 100 kHz
#Sweep 50 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN108.GIF file saved

High Channel: