



# FCC PART 15.247

## MEASUREMENT AND TEST REPORT

For

# **Electronics Co., Ltd.**

NO.161, Xin Min Road, Tong Luo Wei Industrial Zone, Jin Xia, Chang An Town,

Dong Guan City, Guang Dong Province, China

FCC ID: WED-1637287A

Report Type: Product Type:

Original Report E-BOOK

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**Note**: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP\*, NIST, or any agency of the Federal Government. \* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "\*" (Rev.2)

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### **GENERAL INFORMATION**

## **Product Description for Equipment under Test (EUT)**

The *Electronics Co., Ltd*'s product, model number: *1637287(FCC ID: WED-1637287A)* or the "EUT" as referred to in this report is a *E-BOOK*, which measures approximately: 24.0 cm (L) x 12.7 cm (W) x 1.5 cm (H), rated input voltage: DC 3.7 V battery.

Adapter information: Manufacturer: HUONIU M/N: HNC050150U

Input: AC 100-240 V 50-60 Hz 0.35 A Max.

Output: 5.0 V 1.5A

\* All measurement and test data in this report was gathered from production sample serial number: 1010019 (Assigned by BACL, Shenzhen). The EUT was received on 2010-10-11.

## **Objective**

This Type approval report is prepared on behalf of *Electronics Co., Ltd* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

## Related Submittal(s)/Grant(s)

No related submittal(s).

### **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 emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

#### **Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 21, 2007. 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 has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <a href="http://ts.nist.gov/Standards/scopes/2007070.htm">http://ts.nist.gov/Standards/scopes/2007070.htm</a>

## **SYSTEM TEST CONFIGURATION**

## **Description of Test Configuration**

For 802.11b and 802.11g mode, 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	/

EUT was tested with Channel 1, 6 and 11.

## **EUT Exercise Software**

N/A

## **Equipment Modifications**

No modification was made to the unit tested.

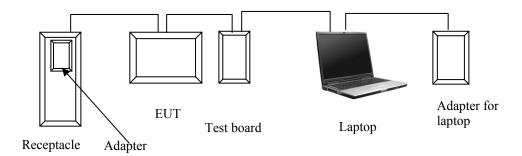
## **Local Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number	FCC ID
Compaq	Laptop	PP2040	N/A	N/A

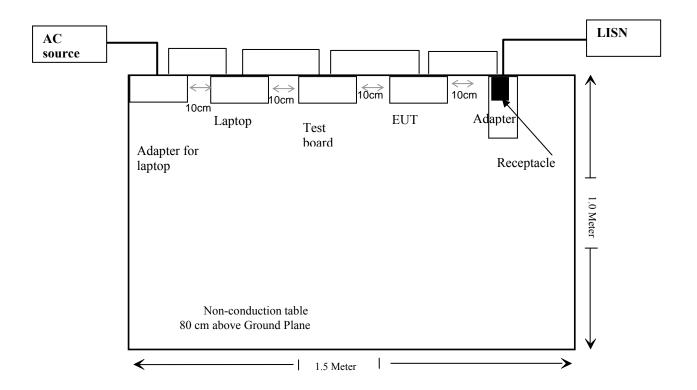
## **External I/O Cable**

Cable Description	Length (m)	From/Port	То
Unshielded Detachable USB Cable	0.5	EUT	Test board
Unshielded Detachable Serial Port Cable	1.0	Test board	Laptop
Unshielded Detachable USB Cable	0.5	Test board	Laptop

# **Configuration of Test Setup**



# **Block Diagram of Test Setup**



# **SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§15.247(i), §2.1093	RF Exposure (SAR)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a),	Conducted Emissions	Compliance
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions & Restricted Bands	Compliance
§15.247 (a)(2)	6 dB Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

## FCC §15.247 (i) & §2.1093 - RF EXPOSURE

## **Applicable Standard**

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 Mobile Portable RF Exposure v03r03, no SAR required if power is lower than the flowing threshold:

When routine evaluation is required for SAR and the output power is  $\leq$  60/f(GHz) mW, the test reduction and test exclusion procedures given herein, or in KDB 616217 or KDB 648474, are applicable.

A device may be used in portable exposure conditions with no restrictions on host platforms when either the source-based time-averaged output power is  $\leq 60/f(GHz)$  mW or all measured 1-g SAR are < 0.4 W/kg.10 When SAR evaluation is required, the most conservative exposure conditions for all expected operating configurations must be tested.

#### **Measurement Result:**

Max conducted peak output power (P): 11.31 dBm Antenna Gain: 0 dBi EIRP = 11.31 dBm

 $P_{Max} = 11.31 \text{ dBm} = 13.52 \text{ mW}$ 

SAR exempted threshold:  $60/f_{GHz} = 60/2.412 = 24.88 \text{ mW}$ 

 $P_{\text{Max}} < 60 / f_{\text{GHz}}$ 

SAR evaluation can be exempted due to the maximum output power is less than the threshold.

## FCC §15.203 - ANTENNA REQUIREMENT

## **Applicable Standard**

According to FCC §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC §15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### **Antenna Connector Construction**

The EUT has a Wi-Fi (integral) antenna on PCB, which complies with the Part 15.203. The maximum antenna gain is 0 dBi. Please see EUT photo for details.

**Result:** Compliant.

# FCC §15.207 (a) - CONDUCTED EMISSIONS

## **Applicable Standard**

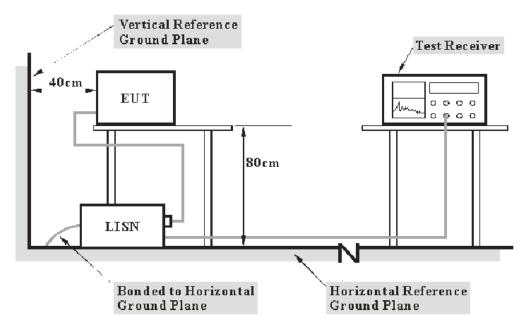
FCC §15.207

### **Measurement Uncertainty**

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is  $\pm 2.4$  dB.

### **EUT Setup**



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMIN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

### **EMI Test Receiver Setup**

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

## **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2010-03-03	2011-03-02
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2010-03-09	2011-03-08

<sup>\*</sup> **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

#### **Test Procedure**

During the conducted emission test, the adapter was connected to the LISN.

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

All data was recorded in the Quasi-peak and average detection mode.

## **Test Results Summary**

According to the recorded data in following table, the EUT complied with the <u>FCC Part 15.207</u>, with the worst margin reading of:

11.28 dB at 0.690 MHz in the Line conductor mode, for 802.11b mode

3.77 dB at 0.195 MHz in the Line conductor mode, for 802.11g mode

### **Test Data**

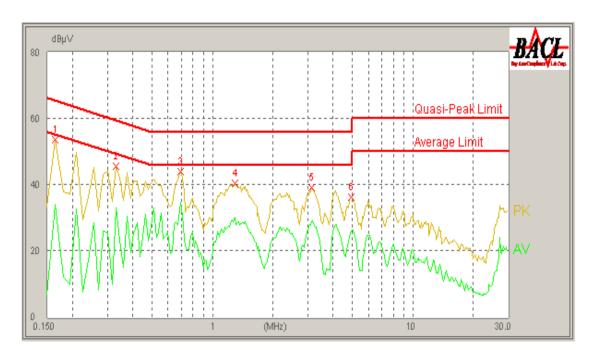
#### **Environmental Conditions**

Temperature:	25 ° C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Kvass Yang on 2010-10-15 to 2010-10-19.

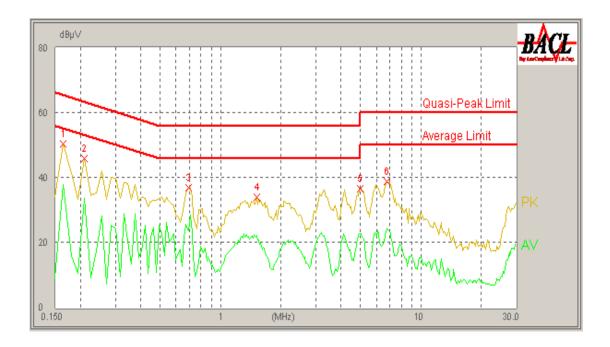
Test Mode: Transmitting (WIFI) & Charging, 802.11b

## 120 V, 60 Hz, Line:



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	Corrected Factor (dB)	Cord. Result (dВµV)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave.)
0.690	10.20	34.72	46.00	11.28	Ave
0.165	10.10	50.35	65.57	15.22	QP
1.290	10.10	30.28	46.00	15.72	Ave
3.150	10.20	29.29	46.00	16.71	Ave
0.690	10.20	38.83	56.00	17.17	QP
0.330	10.00	33.21	50.86	17.65	Ave
0.330	10.00	41.27	60.86	19.59	QP
4.935	10.10	26.12	46.00	19.88	Ave
1.290	10.10	35.21	56.00	20.79	QP
3.120	10.20	34.82	56.00	21.18	QP
0.165	10.10	33.99	55.57	21.58	Ave
4.935	10.10	31.89	56.00	24.11	QP

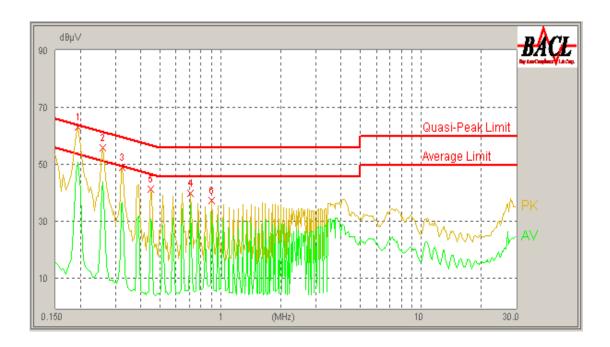
## 120V, 60 Hz, Neutral:



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	Corrected Factor (dB)	Cord. Result (dBµV)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave.)
0.165	10.10	37.80	55.57	17.77	Ave
0.165	10.10	47.49	65.57	18.08	QP
0.165	10.10	47.49	65.57	18.08	QP
0.210	10.10	33.69	54.29	20.60	Ave
0.210	10.10	43.16	64.29	21.13	QP
0.690	10.20	23.70	46.00	22.30	Ave
4.980	10.10	22.93	46.00	23.07	Ave
1.515	10.10	22.32	46.00	23.68	Ave
0.690	10.20	32.10	56.00	23.90	QP
1.515	10.10	29.11	56.00	26.89	QP
4.980	10.10	29.11	56.00	26.89	QP
6.735	10.10	31.64	60.00	28.36	QP

Test Mode: Transmitting (WIFI) & Charging, 802.11g

## 120 V, 60 Hz, Line:



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	Corrected Factor (dB)	Cord. Result (dВµV)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave.)
0.195	10.10	50.94	54.71	3.77	Ave
0.195	10.10	57.95	64.71	6.76	QP
0.260	10.10	44.18	52.86	8.68	Ave
0.710	10.20	36.26	46.00	9.74	Ave
0.260	10.10	51.92	62.86	10.94	QP
0.905	10.20	33.29	46.00	12.71	Ave
0.325	10.00	36.90	51.00	14.10	Ave
0.325	10.00	46.68	61.00	14.32	QP
0.450	10.00	31.08	47.43	16.35	Ave
0.710	10.20	34.06	56.00	21.94	QP
0.450	10.00	35.16	57.43	22.27	QP
0.905	10.20	30.11	56.00	25.89	QP

## 120V, 60 Hz, Neutral:



Co	onducted Emissi	ons		FCC Part 15.20	)7
Frequency (MHz)	Corrected Factor (dB)	Cord. Result (dBµV)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave.)
0.165	10.10	43.12	55.57	12.45	Ave
0.165	10.10	50.75	65.57	14.82	QP
0.205	10.10	37.92	54.43	16.51	Ave
0.205	10.10	45.71	64.43	18.72	QP
0.250	10.10	33.98	53.14	19.16	Ave
0.290	10.10	31.57	52.00	20.43	Ave
0.330	10.00	29.97	50.86	20.89	Ave
0.370	10.00	27.23	49.71	22.48	Ave
0.330	10.00	37.86	60.86	23.00	QP
0.290	10.10	38.00	62.00	24.00	QP
0.250	10.10	35.47	63.14	27.67	QP
0.370	10.00	31.00	59.71	28.71	QP

## FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

## **Applicable Standard**

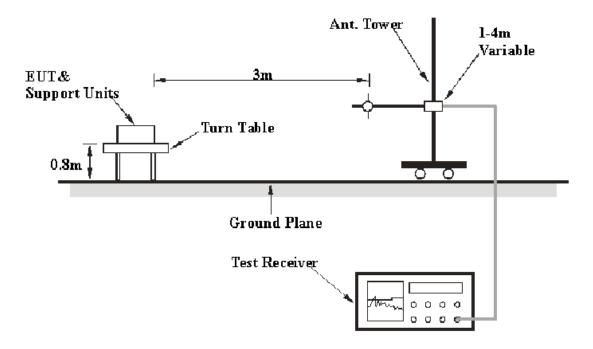
FCC §15.247 (d); §15.209; §15.205;

### **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 Bay Area Compliance Laboratories Corp. (Shenzhen) is +4.0 dB.

### **EUT Setup**



The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

### EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W
30MHz – 1000 MHz	100 kHz	300 kHz
1000 MHz – 25 GHz	1 MHz	3 MHz

## **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
НР	Amplifier	HP8447D	2944A09795	2010-08-02	2011-08-02
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-24	2010-11-23
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2010-03-11	2011-03-11
HP	Amplifier	8449B	3008A00277	2009-09-12	2010-09-11
Sunol Sciences	Horn Antenna	DRH-118	A052604	2010-05-05	2011-05-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-08

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

#### **Test Procedure**

For the radiated emissions test, the adapter was connected to the LISN.

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Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz , peak and Average detection modes for frequencies above 1GHz.

### **Corrected Amplitude & Margin Calculation**

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

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

Margin = Limit – Corrected Amplitude

### **Test Results Summary**

According to the recorded data in following table, the EUT complied with the <u>FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247,</u> with the worst margin reading of:

#### **Below 1 GHz:**

802.11b: **0.7 dB** at **114.559750 MHz** in the Vertical polarization

802.11g: **1.4 dB** at **174.737250 MHz** in the **Vertical** polarization

#### **Above 1 GHz:**

802.11b (Low Channel): 10.42 dB at 4824 MHz in the Horizontal polarization

802.11g (High Channel): 11.46 dB at 4924 MHz in the Horizontal polarization

### **Test Data**

#### **Environmental Conditions**

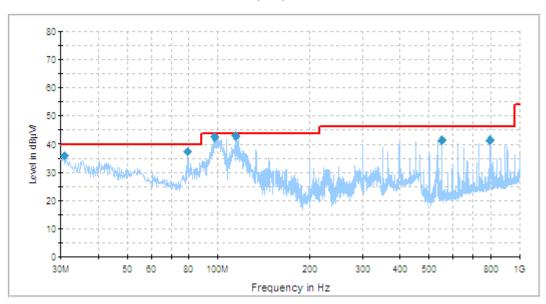
Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

The testing was performed by Kvass Yang on 2010-10-19.

## Below 1 GHz:

Test Mode: Transmitting (802.11b)

Auto Test(FCC )

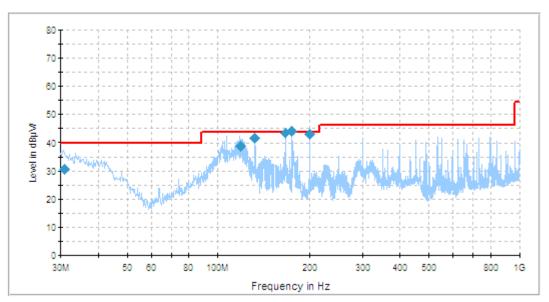


Frequency (MHz)	Corrected Amplitude (dBµV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBμV/m)	Margin (dB)
114.559750	42.8	190.0	V	43.0	-12.9	43.5	0.7*
97.738750	42.4	104.0	V	60.0	-9.2	43.5	1.1*
79.107750	37.5	185.0	V	288.0	-8.1	40.0	2.5*
30.869500	36.2	104.0	V	308.0	-6.0	40.0	3.8*
550.007500	41.6	173.0	Н	191.0	-7.5	46.0	4.4
794.944500	41.6	104.0	Н	348.0	-1.9	46.0	4.4

 $<sup>*\</sup> Within\ measurement\ uncertainty.$ 

Test Mode: Transmitting (802.11g)





Frequency (MHz)	Corrected Amplitude (dBµV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
174.737250	42.1	113.0	V	323.0	-15.1	43.5	1.4*
166.262500	41.9	102.0	V	303.0	-14.7	43.5	1.6*
199.985500	41.7	104.0	V	180.0	-14.4	43.5	1.8*
132.659750	41.5	122.0	V	9.0	-12.7	43.5	2.0*
118.711000	38.8	104.0	V	135.0	-12.5	43.5	4.7
30.903750	30.7	103.0	V	319.0	-6.0	40.0	9.3

 $<sup>* \</sup> Within \ measurement \ uncertainty.$ 

## **Above 1 GHz:**

802.11b Mode:

Indic	cated		Table	Test An	tenna	Corr	ection F	actor	F	CC Part 15.	247/15.2	09
Frequency (MHz)	S.A. Reading (dBµV)	Detector (PK/AV)	Angle Degree	Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
				Lo	w Char	nnel (241	2 MHz	)				
4824	34.78	AV	0	1.1	Н	31.2	4.3	26.7	43.58	54	10.42	harmonic
4824	32.65	AV	15	1.5	V	31.2	4.3	26.7	41.45	54	12.55	harmonic
4824	44.21	PK	0	1.1	Н	31.2	4.3	26.7	53.01	74	20.99	harmonic
4824	43.45	PK	15	1.5	V	31.2	4.3	26.7	52.25	74	21.75	harmonic
				Mid	dle Ch	annel (24	137 MH	z)				
4874	33.98	AV	10	1.2	Н	31.2	4.3	26.7	42.78	54	11.22	harmonic
4874	32.45	AV	310	1.6	V	31.2	4.3	26.7	41.25	54	12.75	harmonic
4874	44.04	PK	10	1.2	Н	31.2	4.3	26.7	52.84	74	21.16	harmonic
4874	43.05	PK	310	1.6	V	31.2	4.3	26.7	51.85	74	22.15	harmonic
				Hiş	gh Chai	nnel (246	62 MHz	<u>:</u> )				
4924	32.12	AV	125	1.5	Н	31.9	4.4	26.6	41.82	54	12.18	harmonic
4924	31.78	AV	25	1.4	V	31.9	4.4	26.6	41.48	54	12.52	harmonic
4924	43.77	PK	125	1.5	Н	31.9	4.4	26.6	53.47	74	20.53	harmonic
4924	42.84	PK	25	1.4	V	31.9	4.4	26.6	52.54	74	21.46	harmonic

## **Suprious emission in restricted band:**

Indic	ated		Table		Test Antenna		Correction Factor		FCC Part 15.247/15.209/15.205			
Frequency (MHz)	S.A. Reading (dBµV)	Detector (PK/AV) Angle	Angle Degree	Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
2378.326	36.54	AV	0	1.3	Н	27.5	3.0	26.8	40.24	54	13.76	spurious
2378.326	34.65	AV	125	2.4	V	27.5	3.0	26.8	38.35	54	15.65	spurious
2495.018	33.74	AV	305	1.7	Н	27.5	3.2	26.8	37.64	54	16.36	spurious
2495.018	32.70	AV	117	1.7	V	27.5	3.2	26.8	36.6	54	17.40	spurious
2378.326	45.24	PK	0	1.3	Н	27.5	3.0	26.8	48.94	74	25.06	spurious
2378.326	44.31	PK	125	2.4	V	27.5	3.0	26.8	48.01	74	25.99	spurious
2495.018	42.65	PK	305	1.7	Н	27.5	3.2	26.8	46.55	74	27.45	spurious
2495.018	41.46	PK	117	1.7	V	27.5	3.2	26.8	45.36	74	28.64	spurious

# 802.11g Mode:

Indic	ated		Table	Test An	tenna	Corr	ection F	actor	F	CC Part 15.	247/15.2	09
Frequency (MHz)	S.A. Reading (dBµV)	Detector (PK/AV)	Angle Degree	Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
				Lov	w Chan	nel (241	2 MHz)	1				
4824	32.90	AV	142	1.5	V	31.2	4.3	26.7	41.7	54	12.30	harmonic
4824	32.65	AV	14	1.3	Н	31.2	4.3	26.7	41.45	54	12.55	harmonic
4824	42.45	PK	14	1.3	Н	31.2	4.3	26.7	51.25	74	22.75	harmonic
4824	42.41	PK	142	1.5	V	31.2	4.3	26.7	51.21	74	22.79	harmonic
				Mide	dle Cha	nnel (24	37 MHz	z)				
4874	32.87	AV	321	1.4	V	31.2	4.3	26.7	41.67	54	12.33	harmonic
4874	32.58	AV	105	1.5	Н	31.2	4.3	26.7	41.38	54	12.62	harmonic
4874	42.36	PK	321	1.4	V	31.2	4.3	26.7	51.16	74	22.84	harmonic
4874	42.32	PK	105	1.5	Н	31.2	4.3	26.7	51.12	74	22.88	harmonic
				Hig	h Char	nel (246	2 MHz)	)				
4924	32.84	AV	0	1.5	Н	31.9	4.4	26.6	42.54	54	11.46	harmonic
4924	32.10	AV	0	1.5	V	31.9	4.4	26.6	41.8	54	12.20	harmonic
4924	42.60	PK	0	1.5	Н	31.9	4.4	26.6	52.3	74	21.70	harmonic
4924	42.34	PK	0	1.5	V	31.9	4.4	26.6	52.04	74	21.96	harmonic

## **Suprious emission in restricted band:**

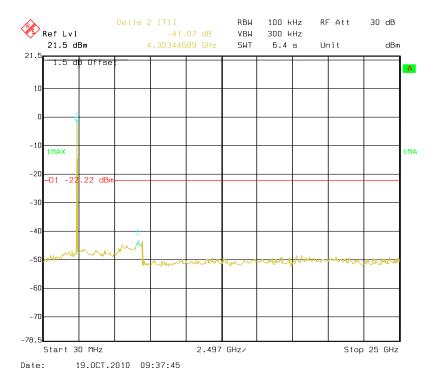
Indic	ated	_ Table		Test An	itenna	Correction Factor		FCC Part 15.247/15.209/15.205				
Frequency (MHz)	S.A. Reading (dBµV)	Detector (PK/AV)	Angle Degree	Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comment
2398.138	44.78	PK	25	1.8	Н	27.5	3	26.8	48.48	74	25.52	spurious
2398.138	34.15	AV	25	1.8	Н	27.5	3	26.8	37.85	54	16.15	spurious
2398.138	43.78	PK	125	2	V	27.5	3	26.8	47.48	74	26.52	spurious
2398.138	33.64	AV	125	2	V	27.5	3	26.8	37.34	54	16.66	spurious
2497.456	42.64	PK	32	1.5	Н	27.5	3.2	26.8	46.54	74	27.46	spurious
2497.456	32.70	AV	32	1.5	Н	27.5	3.2	26.8	36.6	54	17.4	spurious
2497.456	42.35	PK	0	1.7	V	27.5	3.2	26.8	46.25	74	27.75	spurious
2497.456	31.97	AV	0	1.7	V	27.5	3.2	26.8	35.87	54	18.13	spurious

# **Antenna Port Conducted Spurious Emissions**

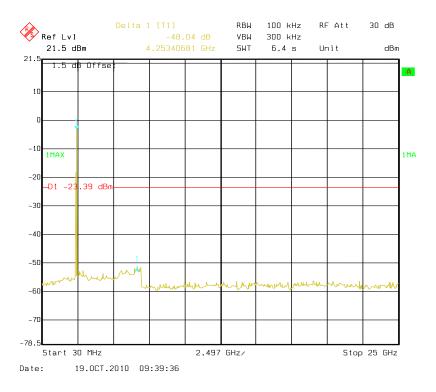
Channel Frequency (MHz)	Limit (dBc)	Ref. Plot	Result
	802.118	mode	
2412	20	PLOT 1	PASS
2437	20	PLOT 2	PASS
2462	20	PLOT 3	PASS
	802.11g	g mode	
2412	20	PLOT 4	PASS
2437	20	PLOT 5	PASS
2462	20	PLOT 6	PASS

Please refer to the following plots. The limit was 20 dBc to the fundamental in 100 kHz RBW.

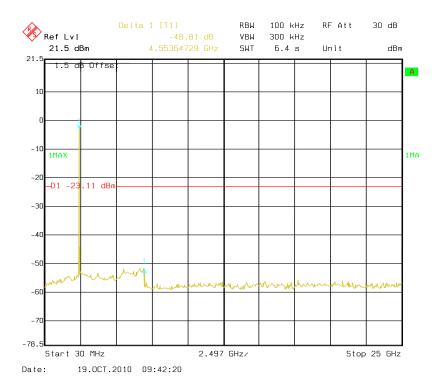
PLOT 1-802.11b Low Channel



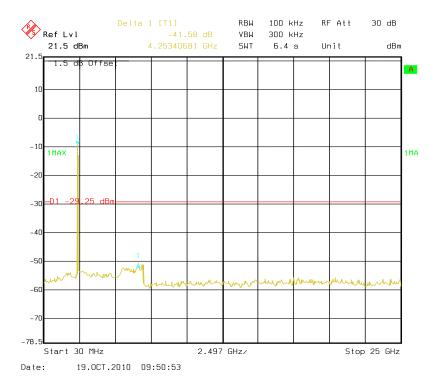
PLOT 2-802.11b Middle Channel



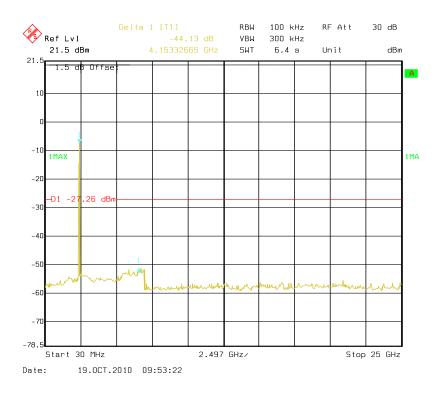
PLOT 3-802.11b High Channel



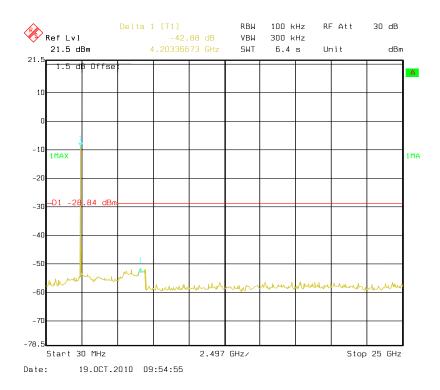
PLOT 4-802.11g Low Channel



PLOT 5-802.11g Middle Channel



PLOT 6-802.11g High Channel



## FCC §15.247(a) (2) – 6 dB BANDWIDTH TESTING

## **Applicable Standard**

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

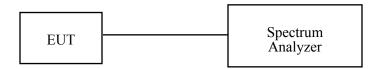
### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date	
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-24	2010-11-23	

<sup>\*</sup> **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

#### **Test Procedure**

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- 3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
- 4. Repeat above procedures until all frequencies measured were complete.



#### **Test Data**

#### **Environmental Conditions**

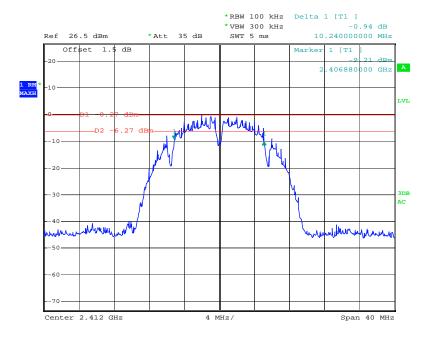
Temperature:	25 °C	
Relative Humidity:	56%	
ATM Pressure:	100.0kPa	

The testing was performed by Kvass Yang on 2010-10-18.

**Test Result:** Pass, please refer to the following tables and plots.

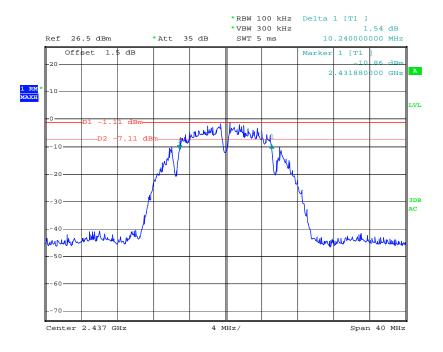
Channel	Frequency (MHz)	Measured 6 dB Bandwidth (MHz)	FCC Part 15.247 Limit (kHz)	
802.11b mode				
Low	2412	10.24	> 500	
Middle	2437	10.24	> 500	
High	2462	10.24	> 500	
802.11g mode				
Low	2412	16.48	> 500	
Middle	2437	16.56	> 500	
High	2462	16.56	> 500	

### 802.11b Low Channel



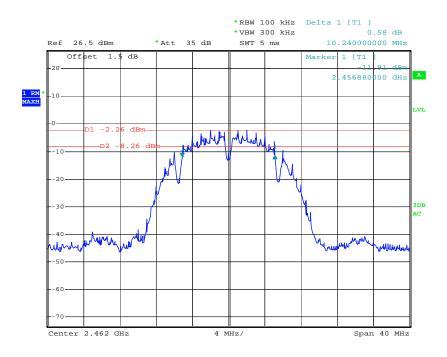
Date: 18.OCT.2010 17:28:06

### 802.11b Middle Channel



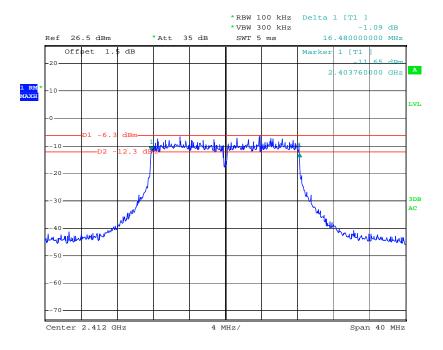
Date: 18.OCT.2010 17:26:11

## 802.11b High Channel



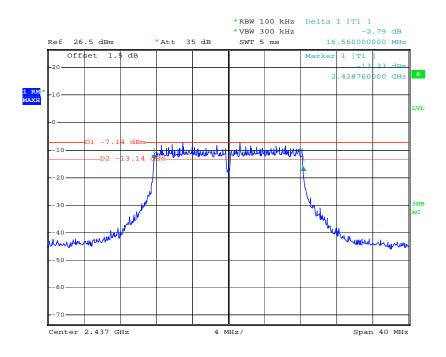
Date: 18.OCT.2010 17:30:04

## 802.11g Low Channel



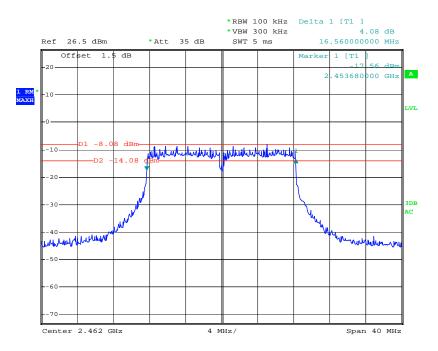
Date: 18.OCT.2010 17:04:32

## 802.11g Middle Channel



Date: 18.OCT.2010 17:06:55

## 802.11g High Channel



Date: 18.OCT.2010 17:12:34

## FCC §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER

## **Applicable Standard**

According to §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

## **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-24	2010-11-23

<sup>\*</sup> **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

#### **Test Procedure**

- 1. Place the EUT on a bench and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI Test Receiver.
- 3. Add a correction factor to the display.



#### **Test Data**

#### **Environmental Conditions**

Temperature:	25 °C	
Relative Humidity:	56 %	
ATM Pressure:	100.0kPa	

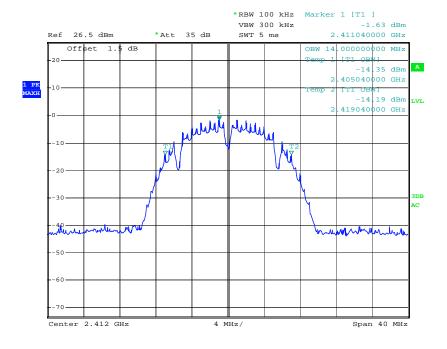
The testing was performed by Kvass Yang on 2010-10-18.

Test Mode: Transmitting

Channel	Frequency (MHz)	Data Rate (Mbps)	Output Power (dBm)	Limit (dBm)		
802.11b mode						
Low	2412	1	11.31	30		
Middle	2437	1	10.33	30		
High	2462	1	9.70	30		
802.11g mode						
Low	2412	6	8.38	30		
Middle	2437	6	7.80	30		
High	2462	6	7.56	30		

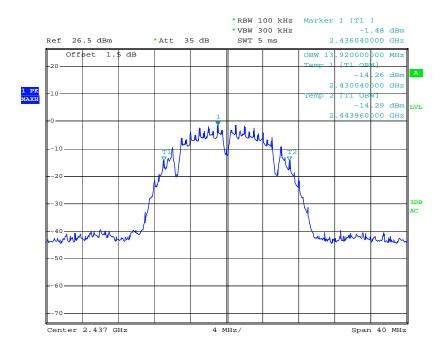
### 802.11b Mode:

## 99% Occupied Bandwith, Low Channel



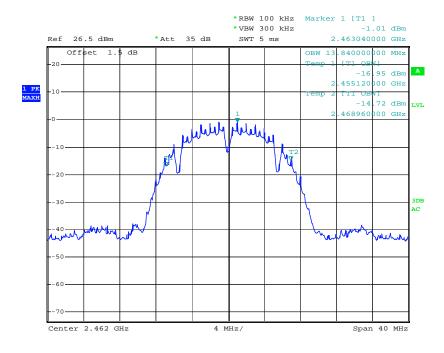
Date: 18.OCT.2010 13:36:02

## 99% Occupied Bandwith, Middle Channel



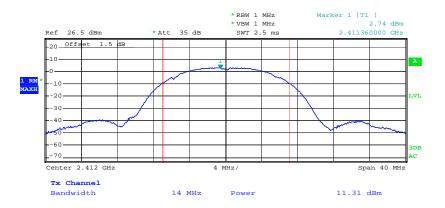
Date: 18.OCT.2010 13:38:48

## 99% Occupied Bandwith, High Channel



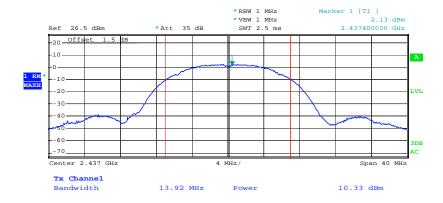
Date: 18.OCT.2010 13:43:11

## 802.11b RF Output Power, Low Channel



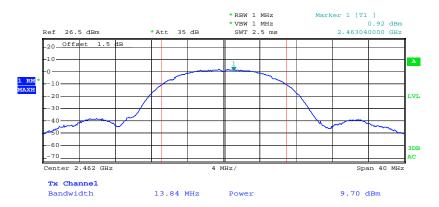
Date: 18.OCT.2010 13:37:07

## 802.11b RF Output Power, Middle Channel



Date: 18.OCT.2010 13:39:19

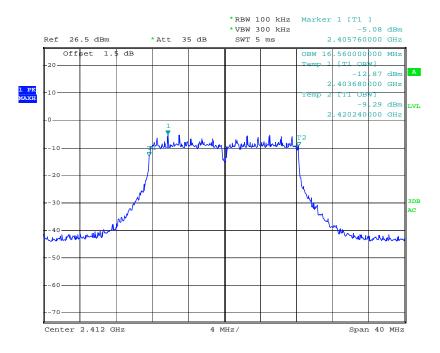
### 802.11b RF Output Power, High Channel



Date: 18.OCT.2010 13:41:54

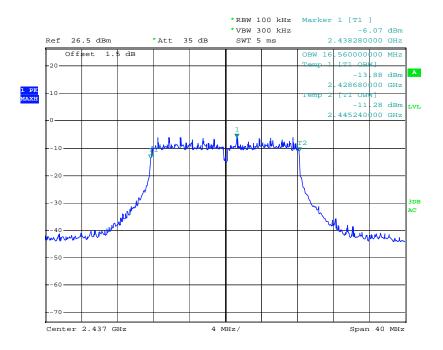
## 802.11g Mode:

## 99% Occupied Bandwith, Low Channel



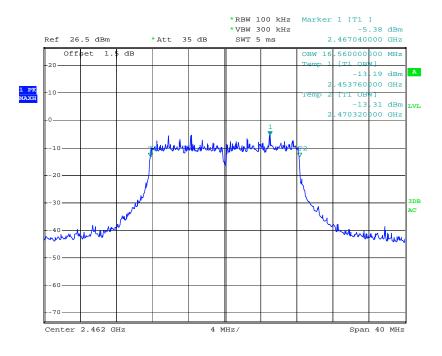
Date: 18.OCT.2010 16:11:56

## 99% Occupied Bandwith, Middle Channel



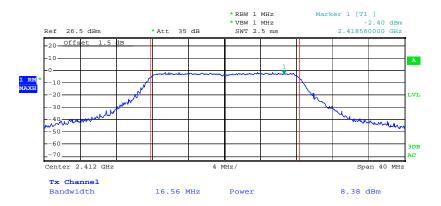
Date: 18.OCT.2010 16:13:34

## 99% Occupied Bandwith, High Channel



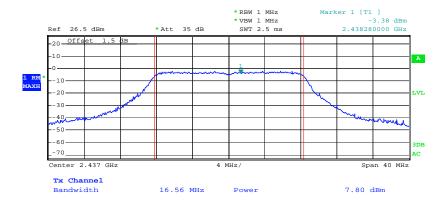
Date: 18.OCT.2010 16:14:58

## 802.11g RF Output Power, Low Channel



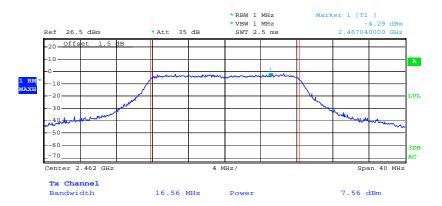
Date: 18.OCT.2010 16:12:33

## 802.11g RF Output Power, Middle Channel



Date: 18.OCT.2010 16:14:07

# 802.11g RF Output Power, High Channel



Date: 18.OCT.2010 16:16:53

# FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

## **Applicable Standard**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-24	2010-11-23

<sup>\*</sup> **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

#### Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- 3. Set RBW to 1 MHz and VBW of spectrum analyzer to 1 MHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5. Repeat above procedures until all measured frequencies were complete.

### **Test Data**

### **Environmental Conditions**

Temperature:	25 °C	
Relative Humidity:	56 %	
ATM Pressure:	100.0kPa	

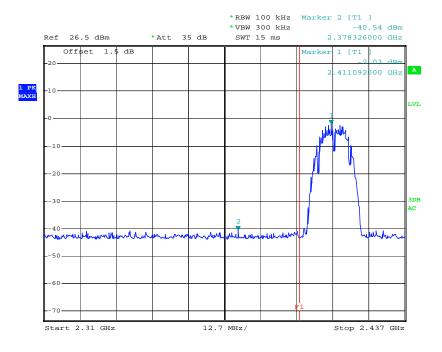
The testing was performed by Kvass Yang on 2010-10-18.

# Test Result: Compliance.

Frequency (MHz)	Delta Peak to band emission (dBc)	Limit (dBc)		
802.11b mode				
2378.326	38.51	20		
2495.018	39.63	20		
802.11g mode				
2398.138	33.82	20		
2497.456	34.64	20		

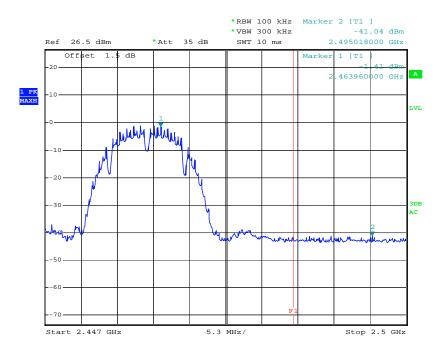
Please refer to following plots.

802.11b: Band Edge, Left Side



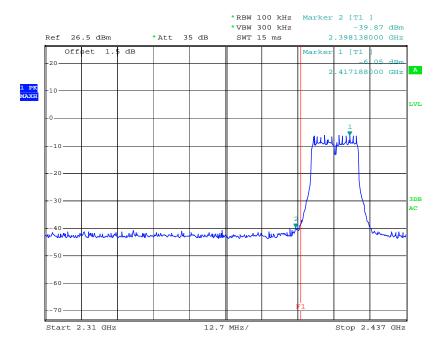
Date: 18.OCT.2010 17:34:19

802.11b: Band Edge, Right Side



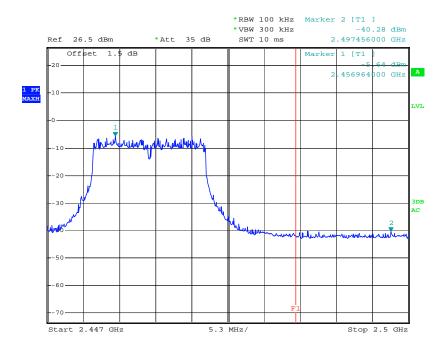
Date: 18.OCT.2010 17:32:20

802.11g: Band Edge, Left Side



Date: 18.OCT.2010 17:36:30

802.11g: Band Edge, Right Side



Date: 18.OCT.2010 17:43:17

# FCC §15.247(e) - POWER SPECTRAL DENSITY

## **Applicable Standard**

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2009-11-24	2010-11-23

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### **Test Procedure**

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- 3. Adjust the center frequency of SA on any frequency be measured and set SA to 1.5MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (DTS)
- 4. Repeat above procedures until all frequencies measured were complete.

### **Test Data**

### **Environmental Conditions**

Temperature:	25 °C		
Relative Humidity:	56 %		
ATM Pressure:	100.0kPa		

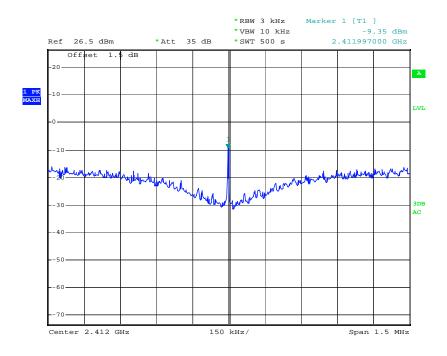
The testing was performed by Kvass Yang on 2010-10-18.

Test Mode: Transmitting

**Test Result:** Pass

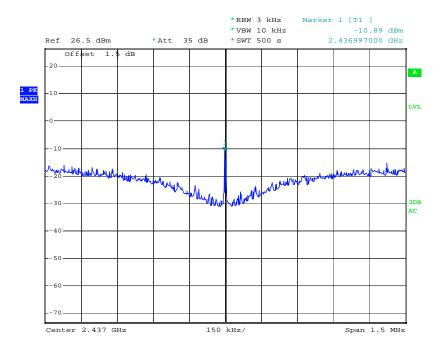
Channel	Frequency (MHz)	Data Rate	PSD (dBm/3KHz)	Limit (dBm/3KHz)	Result	
802.11b mode						
Low	2412	1	-9.35	8	Pass	
Middle	2437	1	-10.89	8	Pass	
High	2462	1	-11.91	8	Pass	
802.11g mode						
Low	2412	6	-20.12	8	Pass	
Middle	2437	6	-20.61	8	Pass	
High	2462	6	-20.89	8	Pass	

# Power Spectral Density, 802.11b Low Channel



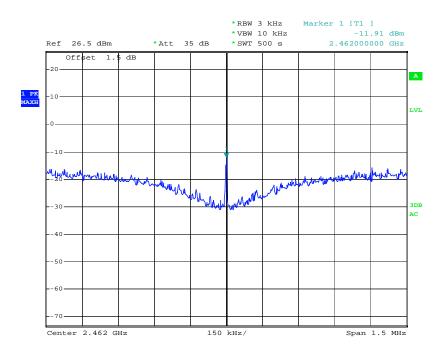
Date: 18.OCT.2010 15:43:18

## Power Spectral Density, 802.11b Middle Channel



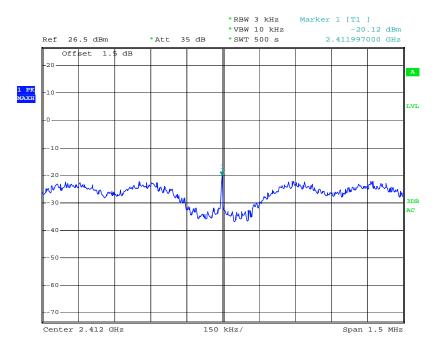
Date: 18.OCT.2010 15:52:55

## Power Spectral Density, 802.11b High Channel



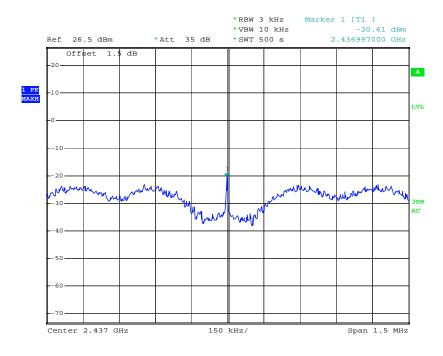
Date: 18.OCT.2010 16:10:36

## Power Spectral Density, 802.11g Low Channel



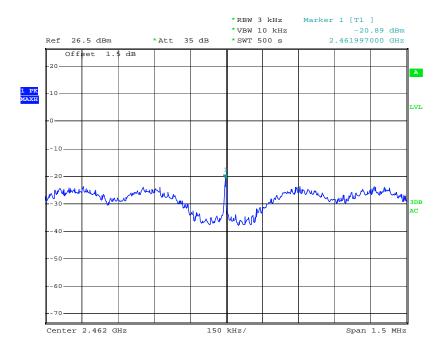
Date: 18.OCT.2010 16:59:17

## Power Spectral Density, 802.11g Middle Channel



Date: 18.OCT.2010 16:49:38

# Power Spectral Density, 802.11g High Channel



Date: 18.OCT.2010 17:22:24

\*\*\*\*\* END OF REPORT \*\*\*\*\*