



FCC PART 15.249 TEST REPORT

For

Johnson Health Tech. (Shanghai) Co., Ltd.

NO.535 Xiwang Road, Malu, Jiading, Shanghai, China

FCC ID: ZV7T0107109

Report Type: **Product Name:** Original Report 2.4GHz Low Power Transceiver Jimmy xiao **Test Engineer:** Jimmy Xiao **Report Number:** RSH110818002-00A **Report Date:** 2012-02-07 Merry Zhao merry. Than **Reviewed By:** EMC Engineer **Test Laboratory:** Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Shenzhen). This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP*, or any agency of the Federal Government.

* This report contains 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 *Johnson Health Tech.*(*Shanghai*)*Co., Ltd* 's product, model *JIS STB T0107109* (*FCC ID*: *ZV7T0107109*) (the "EUT") in this report is a 2.4 GHz low power transceiver, which was measured approximately: 145 mm (L) x 107 mm (W) x 35 mm (H), rated input voltage: DC 12V from adapter.

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Adapter information

Model: RD1201000-C55-2MG

Input: 100-240V~ 50/60 Hz 0.6A MAX.

Output: 12V DC 1.0A P/N: PU120110-5RD

All measurement and test data in this report was gathered from production sample serial number: 1108008 (Assigned by BACL, Shenzhen). The EUT was received on 2011-08-18.

Objective

This report is prepared on behalf of *Johnson Health Tech.* (*Shanghai*) Co., Ltd in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

No related submittal.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, 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 Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

The uncertainty of any RF tests which use conducted method measurement is ± 0.96 dB, the uncertainty of any radiation on emissions measurement is ± 4.0 dB

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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.

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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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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 an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at http://ts.nist.gov/Standards/scopes/2007070.htm

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SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

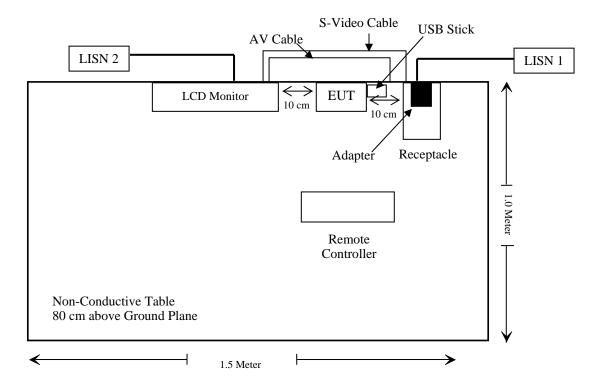
Manufacturer	Description	Model	Serial Number
SAMSUNG	LCD MONITOR	225MS	CR22HVIP401073M
SanDisk	USB Stick	2GB	N/A

External I/O Cable

Cable Description	Length (m)	From/Port	То
AV Cable	1.5	EUT	TV
S-Video Cable	1.5	EUT	TV
Unshielded DC Power Cord	1.5	EUT	Adapter

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Block Diagram of Test Setup



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FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
15.205, §15.209, §15.249	Radiated Emissions	Compliance
§15.249(d)	Outside of Band Emission	Compliance

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FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, 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.

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Antenna Connector Construction

The EUT has a PCB print antenna, the gain is -1.0 dBi, which in accordance to section 15.203, please refer to the EUT photos.

Result: Compliant

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FCC §15.207(a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207

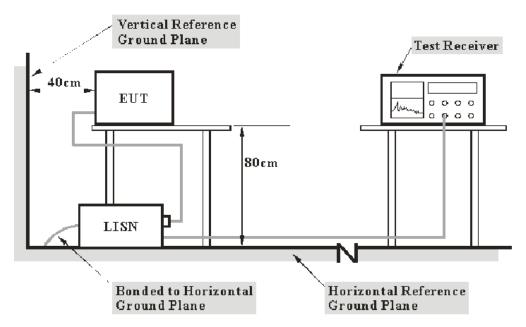
Measurement Uncertainty

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 CISPR 16-4-4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is ± 2.4 dB.(k=2, 95% level of confidence)

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EUT Setup



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

2. Both of LISNs (AMN) 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 C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limit.

The spacing between the peripherals was 10 cm.

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

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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:

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

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the first LISN; the LCD Monitor was connected to the outlet of the second 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2011-03-03	2012-03-02
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2011-03-09	2012-03-08

^{*} **Statement of Traceability:** Bay Area Compliance Laboratory Corp. attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

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:

3.69 dB at 1.075 MHz in the Line conducted mode for S-video out.

Test Data

Environmental Conditions

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

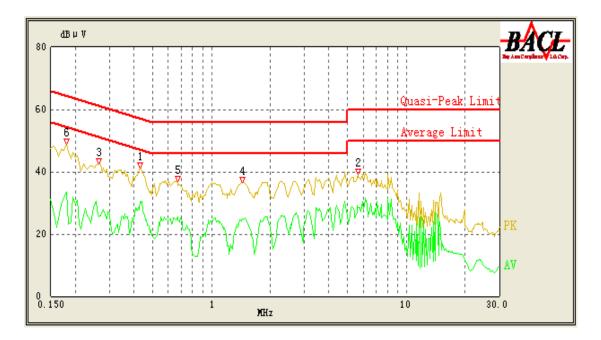
The testing was performed by Jimmy Xiao on 2012-02-03.

Test Result: Compliance

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Test Mode: Operating-AV out

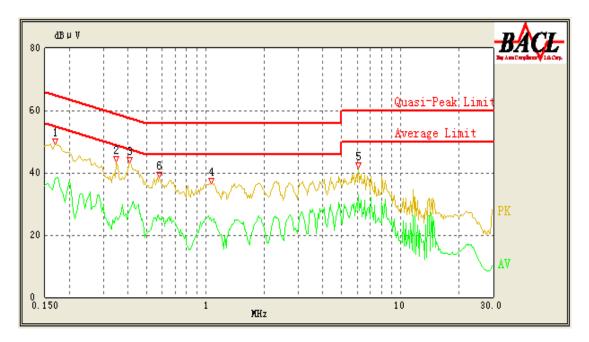
AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.430	30.49	10.10	48.00	17.51	Ave.
0.430	38.18	10.10	58.00	19.82	QP
0.670	25.40	10.10	46.00	20.60	Ave.
5.610	29.05	10.10	50.00	20.95	Ave.
1.460	24.84	10.10	46.00	21.16	Ave.
0.180	33.51	10.10	55.14	21.63	Ave.
0.670	33.97	10.10	56.00	22.03	QP
1.445	32.87	10.10	56.00	23.13	QP
0.180	41.20	10.10	65.14	23.94	QP
0.265	37.85	10.10	62.71	24.86	QP
5.650	33.51	10.10	60.00	26.49	QP
0.265	25.57	10.10	52.71	27.14	Ave.

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AC 120V/60 Hz, Neutral

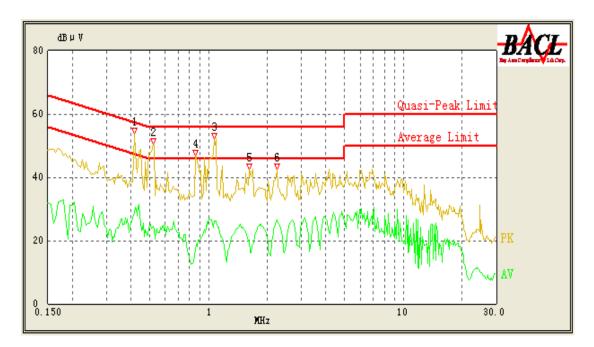


Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
6.115	32.69	10.10	50.00	17.31	Ave.
0.170	38.08	10.10	55.43	17.35	Ave.
0.410	39.03	10.10	58.57	19.54	QP
0.170	45.47	10.10	65.43	19.96	QP
0.410	27.90	10.10	48.57	20.67	Ave.
0.580	25.03	10.10	46.00	20.97	Ave.
0.580	34.96	10.10	56.00	21.04	QP
1.075	24.50	10.10	46.00	21.50	Ave.
6.115	37.84	10.10	60.00	22.16	QP
1.075	33.69	10.10	56.00	22.31	QP
0.350	25.85	10.10	50.29	24.44	Ave.
0.350	34.35	10.10	60.29	25.94	QP

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Test Mode: Operating-S-Video out

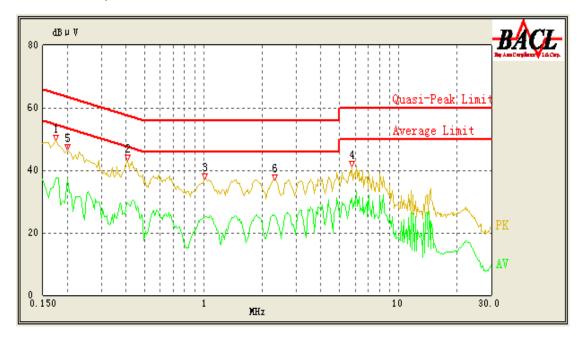
AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
1.075	52.31	10.10	56.00	3.69	PK
0.415	53.68	10.10	58.43	4.75	PK
0.520	50.58	10.10	56.00	5.42	PK
0.860	46.74	10.10	56.00	9.26	PK
2.255	42.50	10.10	56.00	13.50	PK
1.620	42.40	10.10	56.00	13.60	PK
2.255	26.65	10.10	46.00	19.35	Ave.
0.415	28.85	10.10	48.43	19.58	Ave.
1.070	26.03	10.10	46.00	19.97	Ave.
0.520	24.66	10.10	46.00	21.34	Ave.
1.620	20.30	10.10	46.00	25.70	Ave.
0.860	17.08	10.10	46.00	28.92	Ave.

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AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.200	37.11	10.10	54.57	17.46	Ave.
0.175	37.64	10.10	55.29	17.65	Ave.
5.795	31.28	10.10	50.00	18.72	Ave.
0.410	29.50	10.10	48.57	19.07	Ave.
0.175	45.21	10.10	65.29	20.08	QP
0.410	38.49	10.10	58.57	20.08	QP
2.300	25.51	10.10	46.00	20.49	Ave.
1.010	24.94	10.10	46.00	21.06	Ave.
0.200	43.44	10.10	64.57	21.13	QP
1.020	33.47	10.10	56.00	22.53	QP
2.320	32.87	10.10	56.00	23.13	QP
5.795	32.83	10.10	60.00	27.17	QP

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FCC §15.205, §15.209 & §15.249 - RADIATED EMISSIONS

Applicable Standard

As per FCC §15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

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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

As per FCC §15.249 (c), Field strength limits are specified at a distance of 3 meters.

(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 CISPR 16-4-4, 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 $\pm 4.0 \text{ dB}$.

Test Equipment Setup

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

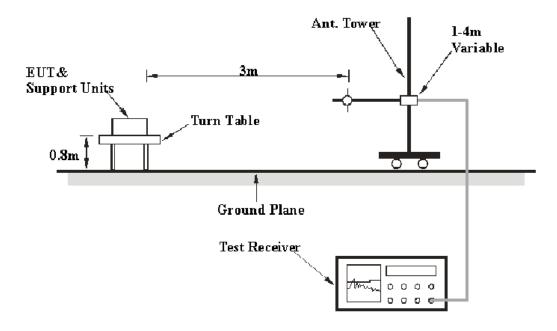
Above 1000 MHz:

Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

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EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209, 15.205 and FCC 15.249 limits.

Test Procedure

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

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

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Test Equipment List and Details

Manufacturer	Description	Model Serial Number		Calibration Date	Calibration Due Date
НР	Amplifier	8447E	1937A01046	2011-08-02	2012-08-01
Rohde & Schwarz	EMI Test Receiver	ESCI	ESCI 100224		2012-11-10
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2011-07-05	2012-07-04
Mini-Circuits	Amplifier	ZVA-213+	T-E27H	2011-03-08	2012-03-07
Sunol Sciences	Horn Antenna	DRH-118	A052604	2011-05-05	2012-05-04
Electro-Mechanics	Horn Antenna	3116	9510-2270	2011-10-11	2012-10-10
Rohde & Schwarz	Signal Analyzer	FSIQ 26	609358	2011-07-08	2012-07-07

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Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 & 15.249, with the worst margin reading of:

1.86 dB at 3685.5 MHz in the Vertical polarization

Test Data

Environmental Conditions

Temperature:	25 °C			
Relative Humidity:	56 %			
ATM Pressure:	100.2 kPa			

The testing was performed by Jimmy Xiao on 2012-02-03

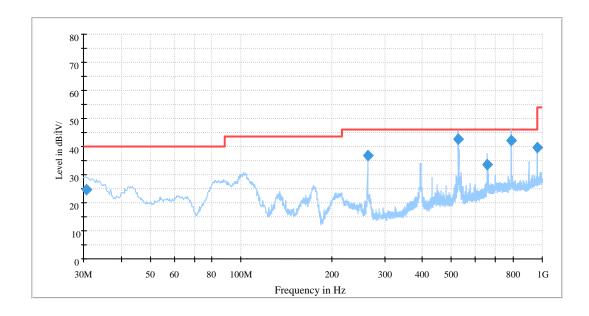
Test Result: Compliance

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^{*} 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 Mode: Transmitting

1) 30-1000 MHz



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity	Turntable Position (Degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
526.471250	43.6	103.0	V	75.0	-7.9	46.0	2.4*
789.742000	42.0	206.0	Н	0.0	-2.0	46.0	4.0
263.281250	36.7	103.0	Н	244.0	-13.2	46.0	9.3
658.624000	33.5	139.0	Н	209.0	-4.5	46.0	12.5
960.000000	39.6	103.0	V	75.0	0.8	46.0	6.4
30.664875	24.6	103.0	V	189.0	-5.9	40.0	15.4

^{*}Within measurement uncertainty!

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Freq.	S.A.	Detector	Detector Direction Test Antenna Cable Amp.		Amp.	p. Cord.	FCC 15.209/ FCC 15.249/15.205					
(MHz)	Reading (dBµV)	QP/PK/Ave	Degree	Height (m)	Polar (H/V)	Factor (dB)	Loss (dB)	Gain (dB)	Amp. (dBμV/m)	Limit (dBµV/m)	Margin (dB)	Comment
·	Channel Frequency = 2405 MHz											
2632.4	42.98	Ave.	120	2.1	V	30.8	3.18	26.84	50.12	54	3.88*	harmonic
2632.4	42.35	Ave.	250	1.6	Н	30.8	3.18	26.84	49.49	54	4.51	harmonic
3685.5	38.12	Ave.	230	1.4	V	32.1	3.79	26.87	47.14	54	6.86	harmonic
3685.5	36.89	Ave.	150	1.3	Н	32.8	3.79	26.87	46.61	54	7.39	harmonic
2632.4	56.24	PK	120	2.1	V	30.8	3.18	26.84	63.38	74	10.62	harmonic
2632.4	53.62	PK	250	1.6	Н	30.8	3.18	26.84	60.76	74	13.24	harmonic
3685.5	48.25	PK	150	1.3	Н	32.8	3.79	26.87	57.97	74	16.03	harmonic
3685.5	47.26	PK	230	1.4	V	32.1	3.79	26.87	56.28	74	17.72	harmonic
2405	66.38	Ave.	100	1.8	Н	30.4	3.03	26.83	72.98	94	21.02	Fundament
2405	63.57	Ave.	330	1.1	V	30.4	3.03	26.83	70.17	94	23.83	Fundament
2405	81.36	PK	100	1.8	Н	30.4	3.03	26.83	87.96	114	26.04	Fundament
2405	79.82	PK	330	1.1	V	30.4	3.03	26.83	86.42	114	27.58	Fundament
	Channel Frequency = 2440 MHz											
3685.5	43.12	Ave.	250	1.2	V	32.1	3.79	26.87	52.14	54	1.86*	harmonic
2632.7	42.03	Ave.	270	1.1	V	30.8	3.18	26.84	49.17	54	4.83	harmonic
3685.5	39.15	Ave.	190	1.6	Н	32.8	3.79	26.87	48.87	54	5.13	harmonic
2632.7	40.12	Ave.	320	1.3	Н	30.8	3.18	26.84	47.26	54	6.74	harmonic
2632.7	53.89	PK	270	1.1	V	30.8	3.18	26.84	61.03	74	12.97	harmonic
2632.7	52.31	PK	320	1.3	Н	30.8	3.18	26.84	59.45	74	14.55	harmonic
3685.5	48.97	PK	250	1.2	V	32.1	3.79	26.87	57.99	74	16.01	harmonic
3685.5	46.21	PK	190	1.6	Н	32.8	3.79	26.87	55.93	74	18.07	harmonic
2440	68.54	Ave.	150	1.9	Н	30.5	3.11	26.84	75.31	94	18.69	Fundament
2440	63.45	Ave.	300	2.1	V	30.5	3.11	26.84	70.22	94	23.78	Fundament
2440	83.24	PK	150	1.9	Н	30.5	3.11	26.84	90.01	114	23.99	Fundament
2440	79.68	PK	300	2.1	V	30.5	3.11	26.84	86.45	114	27.55	Fundament
				Chan	nel Fre	quency	= 2475]	MHz				
3683.4	40.21	Ave.	240	1.4	V	32.1	3.79	26.87	49.23	54	4.77	harmonic
3683.4	39.24	Ave.	130	1.9	Н	32.8	3.79	26.87	48.96	54	5.04	harmonic
2632.4	41.47	Ave.	170	1.2	V	30.8	3.18	26.84	48.61	54	5.39	harmonic
2632.4	38.75	Ave.	170	1.1	Н	30.8	3.18	26.84	45.89	54	8.11	harmonic
2632.4	53.89	PK	170	1.2	V	30.8	3.18	26.84	61.03	74	12.97	harmonic
2632.4	52.13	PK	170	1.1	Н	30.8	3.18	26.84	59.27	74	14.73	harmonic
3683.4	48.15	PK	130	1.9	Н	32.8	3.79	26.87	57.87	74	16.13	harmonic
3683.4	48.25	PK	240	1.4	V	32.1	3.79	26.87	57.27	74	16.73	harmonic
2475	65.24	Ave.	120	1.3	Н	30.6	3.12	26.85	72.11	94	21.89	Fundament
2475	63.47	Ave.	95	1.6	V	30.6	3.12	26.85	70.34	94	23.66	Fundament
2475	80.24	PK	120	1.3	Н	30.6	3.12	26.85	87.11	114	26.89	Fundament
2475	79.45	PK	95	1.6	V	30.6	3.12	26.85	86.32	114	27.68	Fundament

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^{*}Within measurement uncertainty!

FCC §15.249(d) - OUT OF BAND EMISSION

Applicable Standard

As per FCC §152.249, 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

Report No.: RSH110818002-00A

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 100 kHz and VBW of spectrum analyzer to 300 kHz 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100024	2011-11-11	2012-11-10

^{*} 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 Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.2 kPa

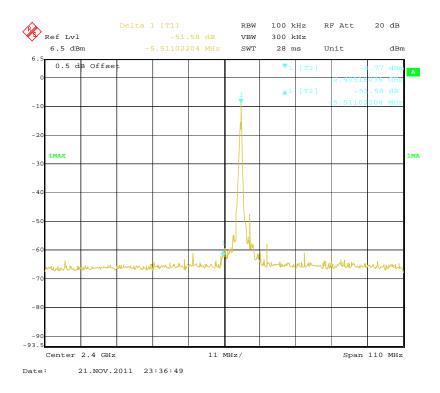
The testing was performed by Jimmy Xiao on 2011-11-21.

Test Result: Compliance. Please refer to the following plots:

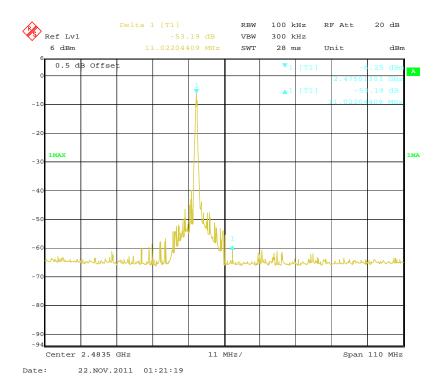
Frequency (MHz)	Delta Peak to Band Emission (dBc)	Delta Limit (dBc)	Result
2399.669	51.58	50	Pass
2486.035	53.19	50	Pass

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Band Edge, Left Side



Band Edge, Right Side



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

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