

## FCC PART 15.247

## TEST REPORT

For

**ShenZhen Foscam Intelligent Technology Co., Ltd.**

5/F, Block 1, Vision Business Park, Nanshan District, Shenzhen, China

**FCC ID: ZDEFI9818W**

<b>Report Type:</b> Original Report	<b>Product Type:</b> HD Wireless IP Camera
<b>Test Engineer:</b> <u>Gardon Zhang</u>	<i>Gardon Zhang</i>
<b>Report Number:</b> <u>RSZ130801001-00B</u>	
<b>Report Date:</b> <u>2013-11-14</u>	
<b>Reviewed By:</b> <u>Alvin Huang</u>	<i>Alvin Huang</i>
<b>Prepared By:</b>	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 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>

**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.

## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>4</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	4
OBJECTIVE .....	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY .....	4
TEST FACILITY .....	5
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>6</b>
DESCRIPTION OF TEST CONFIGURATION .....	6
EUT EXERCISE SOFTWARE .....	6
EQUIPMENT MODIFICATIONS .....	6
SUPPORT EQUIPMENT LIST AND DETAILS .....	7
EXTERNAL I/O CABLE.....	7
BLOCK DIAGRAM OF TEST SETUP .....	8
<b>SUMMARY OF TEST RESULTS .....</b>	<b>9</b>
<b>FCC §15.247 (i) &amp; §1.1307 (b) (1) &amp; §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE).....</b>	<b>10</b>
APPLICABLE STANDARD .....	10
RESULT .....	10
<b>FCC §15.203 - ANTENNA REQUIREMENT.....</b>	<b>11</b>
APPLICABLE STANDARD .....	11
ANTENNA CONNECTOR CONSTRUCTION .....	11
<b>FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS .....</b>	<b>12</b>
APPLICABLE STANDARD .....	12
MEASUREMENT UNCERTAINTY.....	12
EUT SETUP .....	12
EMI TEST RECEIVER SETUP.....	13
TEST PROCEDURE .....	13
TEST EQUIPMENT LIST AND DETAILS.....	13
TEST RESULTS SUMMARY .....	13
TEST DATA .....	14
<b>FCC §15.209, §15.205 &amp; §15.247(d) - SPURIOUS EMISSIONS.....</b>	<b>16</b>
APPLICABLE STANDARD .....	16
MEASUREMENT UNCERTAINTY .....	16
EUT SETUP .....	16
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP .....	17
TEST PROCEDURE .....	17
TEST EQUIPMENT LIST AND DETAILS.....	17
CORRECTED AMPLITUDE & MARGIN CALCULATION .....	18
TEST RESULTS SUMMARY .....	18
TEST DATA .....	18
<b>FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH.....</b>	<b>27</b>
APPLICABLE STANDARD .....	27
TEST DATA .....	27
<b>FCC §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER .....</b>	<b>28</b>
APPLICABLE STANDARD .....	28

TEST DATA .....28

**FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE.....29**

APPLICABLE STANDARD .....29

TEST DATA .....29

**FCC §15.247(e) - POWER SPECTRAL DENSITY .....30**

APPLICABLE STANDARD .....30

TEST DATA .....30

**DECLARATION LETTER .....31**

## GENERAL INFORMATION

---

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

The *ShenZhen Foscam Intelligent Technology Co., Ltd.*'s product, model number: *FI9818W V2* (FCC ID: *ZDEFI9818W*) or the "EUT" in this report was a *HD Wireless IP Camera*, which was measured approximately: 11.0cm (L) x 10.3 cm (W) x 12.6 cm (H), rated with input voltage: DC 5V from adapter.

Adapter Information:

Model: SAW-0502000

Input: 100-240V~50/60Hz, 0.5A

Output: 5V, 2000mA

*Note: Product HD Wireless IP Camera, model FI9818W V2, FI9818P, HD811W, HD811P, FC2401W, FC2401P they are just different from the model number and has P2P function or not. Model FI9818W V2 was selected for fully testing, which was explained in the attached declaration letter that stated and guaranteed by the applicant.*

*\*All measurement and test data in this report was gathered from production sample serial number: 1308001 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2013-08-01.*

### Objective

This report is prepared on behalf of *ShenZhen Foscam Intelligent Technology 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)

FCC Part 15B JBP submissions with FCC ID: ZDEFI9818W

### 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 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.

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

## **Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3<sup>rd</sup> 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 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.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

For 802.11b 802.11g and 802.11n-HT20 mode, 11 channels are provided to testing, for 802.11n-HT40 mode, 7 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 for 802.11b 802.11g & 802.11n-HT20 mode were tested with Channel 1, 6 and 11. 802.11n-HT40 mode was tested with channel 3, 6 and 9.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations.

### EUT Exercise Software

QA RT3x7x\_V1.5.6.7

802.11b: Data rate: 1 Mbps.

802.11g: Data rate: 6 Mbps.

802.11n-HT20: Data rate: 6.5 Mbps.

802.11n-HT40: Data rate: 13.5Mbps.

### Equipment Modifications

No modification was made to the EUT tested.

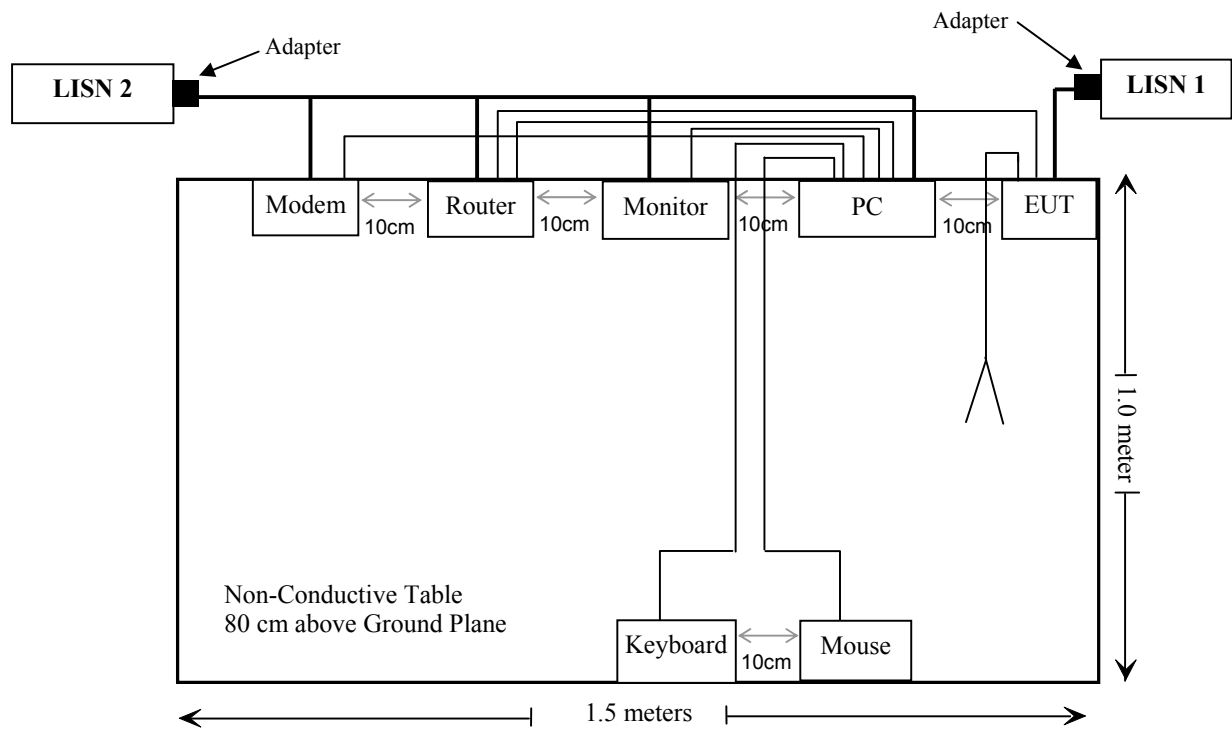
**Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Remark
DELL	PC	127BPX2	N/A	EMI
DELL	Monitor	E178WFPC	CN-OWY564-64180-7C4-2SQH	/
N/A	Mouse	M-2	N/A	/
DELL	Keyboard	L100	CNORH656658907 BL04TY	/
ECOM	Modem	5600pbs	N/A	/
PHILIPS	Headset	SHM1500	N/A	/
SAGEM	Wireless ADSL Router	SAGEM F@ST™ 2604 White	N/A	

**External I/O Cable**

Cable Description	Length (m)	From/Port	To
Unshielded Detachable AC Cable	1.0	Main	PC
Shielded Undetachable USB cable	1.5	EUT	PC
Shielded Undetachable Mouse Cable	1.5	Mouse	PC
Shielded Undetachable K/B Cable	1.5	K/B	PC
Shielded Detachable VGA Cable	1.5	Monitor	PC
Unshielded Detachable RS232 Cable	1.5	Modem	PC
Unshielded Detachable AC Cable	1.5	Mains	Monitor
Unshielded Undetachable DC Cable	1.7	Adapter	Modem
Unshielded Detachable RJ45 Cable	1.5	Router	PC
Unshielded Undetachable adapter cable	1.5	EUT	Adapter

# Block Diagram of Test Setup





**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b)(1), §2.1091	Maximum Permissible Exposure (MPE)	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	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*

Note: Compliance\*: The RF module was test in Shenzhen BST Technology Co., Ltd. with FCC ID: Q8Y-FR4020A2, which was granted on 2012-10-16.

## FCC §15.247 (i) & §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

#### Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

### Result

#### Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Frequency (MHz)	Antenna Gain		Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
	(dBi)	(numeric)	(dBm)	(mW)			
2412	2	1.58	18.84	76.56	20	0.024	1

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

### Result: Compliance

**FCC §15.203 - ANTENNA REQUIREMENT**

---

**Applicable Standard**

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. 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.

**Antenna Connector Construction**

The EUT has an integrated antenna arrangement for Wi-Fi, which was permanently attached and the gain was 2dBi, fulfill the requirement of this section. Please refer to the internal photos.

**Result:** Compliance.

## FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

### Applicable Standard

FCC§15.207

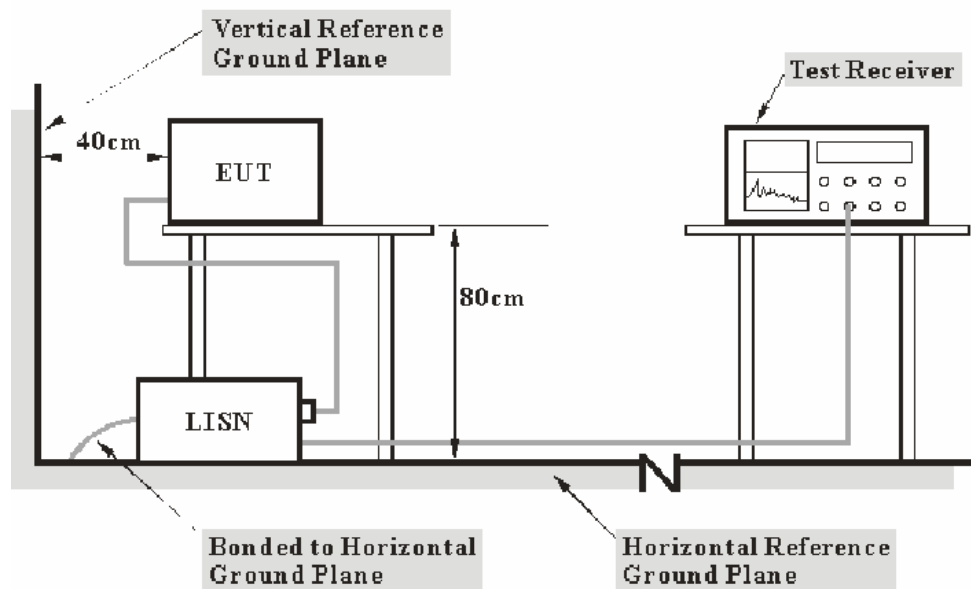
### Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements may be receiver reading, attenuation of the connection between AMN/ISN and receiver, AMN/ISN voltage division factor, AMN/ISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report

Port	Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

### 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 ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The adapter was connected to a 120 V<sub>AC</sub>/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 Procedure

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	100176	2013-06-17	2014-06-17
Rohde & Schwarz	LISN	ESH2-Z5	892107/021	2013-08-22	2014-08-22
Rohde & Schwarz	Transient Limitor	ESH3Z2	DE25985	2013-10-15	2014-10-15
Rohde & Schwarz	CE Test software	EMC 32	8.95	--	--

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

### Test Results Summary

According to the recorded data in following table, with the worst margin reading of:

**18.8 dB at 0.346000 MHz in the Line conducted mode**

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cisp\text{r}}$$

In BACL,  $U_{(Lm)}$  is less than  $U_{cisp\text{r}}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

**Test Data****Environmental Conditions**

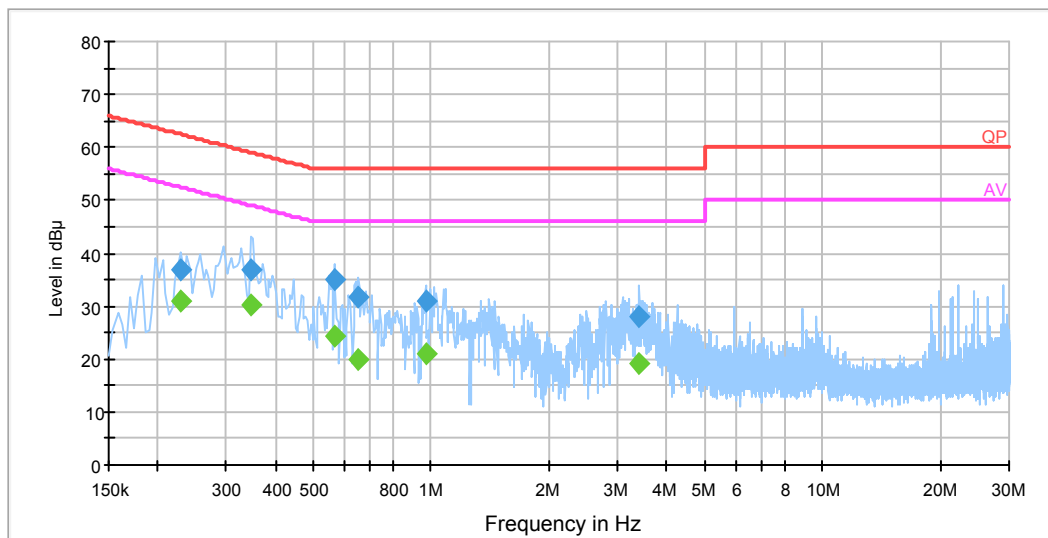
<b>Temperature:</b>	26 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101.0 kPa

The testing was performed by Gardon Zhang on 2013-11-13.

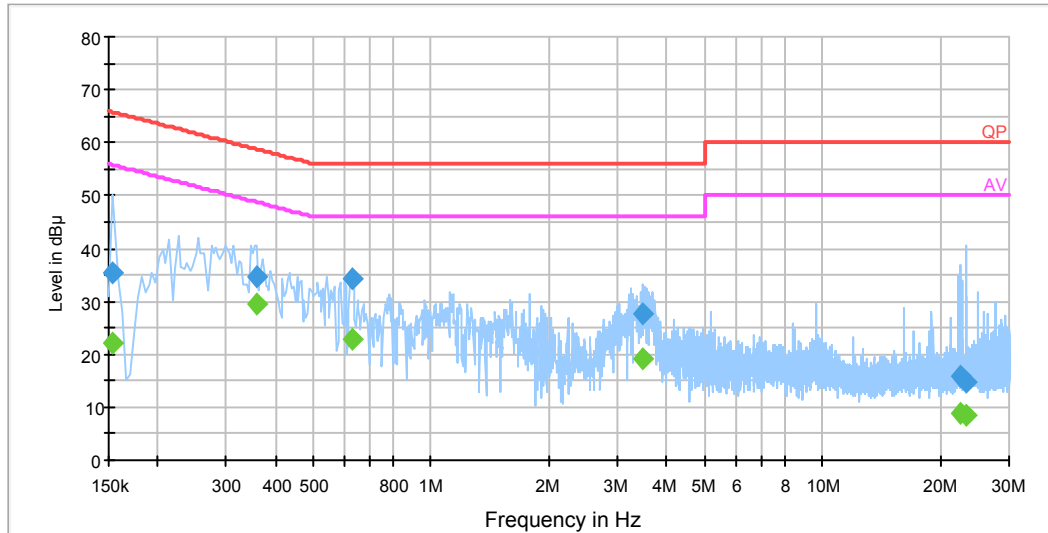
EUT operation mode: Transmitting

**AC 120V/60 Hz, Line**

EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave.)
0.346000	30.3	19.5	49.1	18.8	Ave.
0.566000	35.1	19.5	56.0	20.9	QP
0.230000	31.1	19.5	52.4	21.3	Ave.
0.566000	24.5	19.5	46.0	21.5	Ave.
0.346000	36.7	19.5	59.1	22.4	QP
0.654000	31.6	19.5	56.0	24.4	QP
0.970000	21.1	19.5	46.0	24.9	Ave.
0.970000	30.8	19.5	56.0	25.2	QP
0.230000	36.8	19.5	62.4	25.6	QP
0.654000	20.1	19.5	46.0	25.9	Ave.
3.414000	19.0	19.6	46.0	27.0	Ave.
3.414000	27.9	19.6	56.0	28.1	QP

**AC 120V/60 Hz, Neutral****EMI Auto Test N**

Frequency (MHz)	Corrected Amplitude (dBμV)	Corrected Factor (dB)	Limit (dBμV)	Margin (dB)	Remark (PK/QP/Ave.)
0.358000	29.5	19.5	48.8	19.3	Ave.
0.630000	34.4	19.5	56.0	21.6	QP
0.630000	22.8	19.5	46.0	23.2	Ave.
0.358000	34.6	19.5	58.8	24.2	QP
3.486000	19.2	19.6	46.0	26.8	Ave.
3.486000	27.5	19.6	56.0	28.5	QP
0.154000	35.5	19.5	65.8	30.3	QP
0.154000	22.2	19.5	55.8	33.6	Ave.
22.490000	8.9	20.2	50.0	41.1	Ave.
23.214000	8.5	20.3	50.0	41.5	Ave.
22.490000	15.7	20.2	60.0	44.3	QP
23.214000	14.7	20.3	60.0	45.3	QP

**Note:**

- 1) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation  
The corrected factor has been input into the transducer of the test software.
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

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

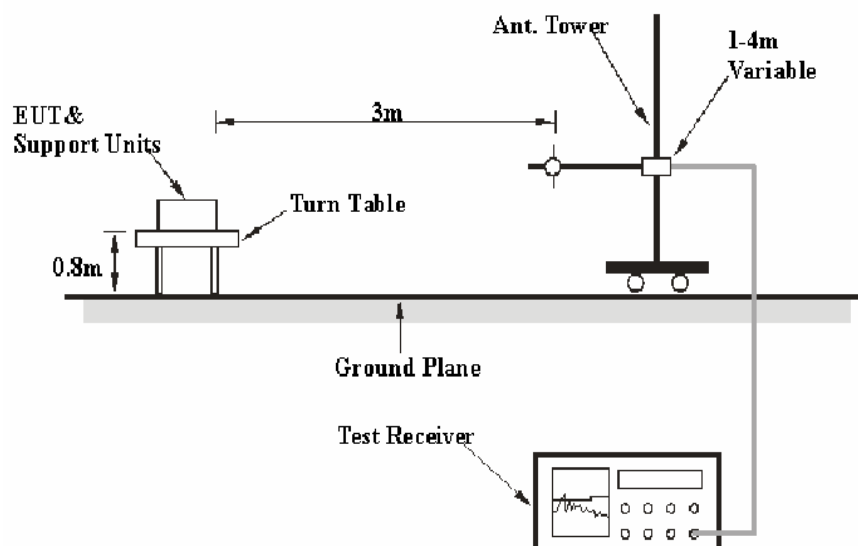
### Applicable Standard

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.

### EUT Setup



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. 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 adapter was connected to an AC 120V/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	IF B/W	Detector
30MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

## Test Procedure

For the radiated emissions test, the adapter was connected to the AC floor outlet.

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-1 GHz and peak and Average detection modes for frequencies above 1 GHz.

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2013-09-30	2014-09-30
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-05-09	2014-05-09
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
SUPER ULTRA	Amplifier	ZVA-213+	--	2012-11-24	2013-11-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2014-11-30
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2012-11-24	2013-11-23
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2013-10-14	2016-10-13

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## 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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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 limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Results Summary

According to the recorded data in following table, with the worst margin reading of:

**7.19 dB at 4874 MHz** in the **Vertical** polarization for 802.11n-HT20 Mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL,  $U_{(Lm)}$  is less than  $U_{cispr}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

## Test Data

### Environmental Conditions

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Gardon Zhang on 2013-11-13.*

*EUT operation mode: Transmitting*

**30 MHz-25 GHz:****802.11b Mode:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
219.5	47.41	QP	128	1.3	H	-15.4	32.01	46	13.99
2412	92.38	PK	244	1.4	H	6.13	98.51	/	/
2412	87.82	Ave.	244	1.4	H	6.13	93.95	/	/
2412	100.93	PK	235	1.3	V	6.13	107.06	/	/
2412	95.69	Ave.	235	1.3	V	6.13	101.82	/	/
4824	41.67	PK	125	1.3	V	12.40	54.07	74	19.93
4824	32.64	Ave.	125	1.3	V	12.40	45.04	54	8.96
7236	36.24	PK	227	1.2	V	16.62	52.86	74	21.14
7236	23.07	Ave.	227	1.2	V	16.62	39.69	54	14.31
2265.8	47.35	PK	44	1.4	H	4.99	52.34	74	21.66
2265.8	31.29	Ave.	44	1.4	H	4.99	36.28	54	17.72
2354.6	43.57	PK	278	1.3	V	5.48	49.05	74	24.95
2354.6	31.10	Ave.	278	1.3	V	5.48	36.58	54	17.42
2485.6	44.62	PK	296	1.3	V	7.21	51.83	74	22.17
2485.6	32.39	Ave.	296	1.3	V	7.21	39.60	54	14.40
Middle Channel (2437 MHz)									
219.5	45.64	QP	63	1.0	H	-15.4	30.24	46	15.76
2437	90.24	PK	151	1.2	H	7.21	97.45	/	/
2437	85.18	Ave.	151	1.2	H	7.21	92.39	/	/
2437	98.38	PK	167	1.3	V	7.21	105.59	/	/
2437	95.67	Ave.	167	1.3	V	7.21	102.88	/	/
4874	42.75	PK	289	1.5	V	12.46	55.21	74	18.79
4874	33.68	Ave.	289	1.5	V	12.46	46.14	54	7.86
7311	32.38	PK	37	1.4	V	16.49	48.87	74	25.13
7311	19.64	Ave.	37	1.4	V	16.49	36.13	54	17.87
2236.8	45.47	PK	134	1.4	V	4.40	49.87	74	24.13
2236.8	31.23	Ave.	134	1.4	V	4.40	35.63	54	18.37
2388.5	46.54	PK	99	1.3	V	6.13	52.67	74	21.33
2388.5	31.48	Ave.	99	1.3	V	6.13	37.61	54	16.39
2485.0	45.27	PK	299	1.3	H	7.21	52.48	74	21.52
2485.0	30.50	Ave.	299	1.3	H	7.21	37.71	54	16.29

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
219.5	46.68	QP	320	1.2	H	-15.4	31.28	46	14.72
2462	88.59	PK	69	1.2	H	7.21	95.80	/	/
2462	83.04	Ave.	69	1.2	H	7.21	90.25	/	/
2462	100.54	PK	347	1.5	V	7.21	107.75	/	/
2462	95.89	Ave.	347	1.5	V	7.21	103.10	/	/
4924	43.28	PK	208	1.3	H	12.50	55.78	74	18.22
4924	32.35	Ave.	208	1.3	H	12.50	44.85	54	9.15
7386	34.25	PK	276	1.3	H	15.91	50.16	74	23.84
7386	22.39	Ave.	276	1.3	H	15.91	38.30	54	15.70
2263.5	46.12	PK	316	1.5	V	4.99	51.11	74	22.89
2263.5	29.14	Ave.	316	1.5	V	4.99	34.13	54	19.87
2383.5	45.26	PK	197	1.4	H	6.13	51.39	74	22.61
2383.5	32.68	Ave.	197	1.4	H	6.13	38.81	54	15.19
2490.2	45.48	PK	203	1.3	V	7.21	52.69	74	21.31
2490.2	30.22	Ave.	203	1.3	V	7.21	37.43	54	16.57

**802.11g Mode:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
219.5	48.67	QP	163	1.3	H	-15.4	33.27	46	12.73
2412	85.45	PK	178	1.4	H	6.13	91.58	/	/
2412	77.62	Ave.	178	1.4	H	6.13	83.75	/	/
2412	96.57	PK	40	1.2	V	6.13	102.70	/	/
2412	88.76	Ave.	40	1.2	V	6.13	94.89	/	/
4824	42.27	PK	189	1.4	V	12.40	54.67	74	19.33
4824	32.57	Ave.	189	1.4	V	12.40	44.97	54	9.03
7236	33.57	PK	58	1.5	H	16.62	50.19	74	23.81
7236	22.24	Ave.	58	1.5	H	16.62	38.86	54	15.14
2275.8	45.70	PK	23	1.2	V	4.99	50.69	74	23.31
2275.8	32.41	Ave.	23	1.2	V	4.99	37.40	54	16.60
2363.1	44.48	PK	200	1.3	H	5.48	49.96	74	24.04
2363.1	30.27	Ave.	200	1.3	H	5.48	35.75	54	18.25
2485.2	47.26	PK	191	1.4	H	7.21	54.47	74	19.53
2485.2	32.49	Ave.	191	1.4	H	7.21	39.70	54	14.30
Middle Channel (2437 MHz)									
219.5	47.02	QP	92	1.5	H	-15.4	31.62	46	14.38
2437	86.77	PK	58	1.4	H	7.21	93.98	/	/
2437	79.28	Ave.	58	1.4	H	7.21	86.49	/	/
2437	97.37	PK	26	1.3	V	7.21	104.58	/	/
2437	90.01	Ave.	26	1.3	V	7.21	97.22	/	/
4874	43.54	PK	226	1.3	V	12.46	56.00	74	18.00
4874	33.26	Ave.	226	1.3	V	12.46	45.72	54	8.28
7311	32.21	PK	83	1.4	H	16.49	48.70	74	25.30
7311	22.03	Ave.	83	1.4	H	16.49	38.52	54	15.48
2260.5	45.34	PK	110	1.2	H	4.99	50.33	74	23.67
2260.5	30.52	Ave.	110	1.2	H	4.99	35.51	54	18.49
2348.6	45.69	PK	45	1.5	V	5.48	51.17	74	22.83
2348.6	32.34	Ave.	45	1.5	V	5.48	37.82	54	16.18
2492.0	43.51	PK	191	1.5	V	7.21	50.72	74	23.28
2492.0	32.44	Ave.	191	1.5	V	7.21	39.65	54	14.35

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
219.5	47.93	QP	352	1.4	H	-15.4	32.53	46	13.47
2462	90.24	PK	265	1.2	H	7.21	97.45	/	/
2462	80.19	Ave.	265	1.2	H	7.21	87.40	/	/
2462	99.98	PK	22	1.3	V	7.21	107.19	/	/
2462	91.36	Ave.	22	1.3	V	7.21	98.57	/	/
4924	44.36	PK	293	1.4	V	12.50	56.86	74	17.14
4924	33.58	Ave.	293	1.4	V	12.50	46.08	54	7.92
7386	34.28	PK	156	1.5	H	15.91	50.19	74	23.81
7386	22.60	Ave.	156	1.5	H	15.91	38.51	54	15.49
2256.4	45.28	PK	21	1.4	V	4.99	50.27	74	23.73
2256.4	33.24	Ave.	21	1.4	V	4.99	38.23	54	15.77
2376.2	46.27	PK	94	1.2	V	6.13	52.40	74	21.60
2376.2	32.51	Ave.	94	1.2	V	6.13	38.64	54	15.36
2486.5	47.58	PK	32	1.5	H	7.21	54.79	74	19.21
2486.5	33.52	Ave.	32	1.5	H	7.21	40.73	54	13.27

**802.11n-HT20 Mode:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
219.5	46.48	QP	178	1.3	H	-15.4	31.08	46	14.92
2412	86.27	PK	66	1.4	H	6.13	92.40	/	/
2412	80.23	Ave.	66	1.4	H	6.13	86.36	/	/
2412	98.79	PK	221	1.5	V	6.13	104.92	/	/
2412	91.62	Ave.	221	1.5	V	6.13	97.75	/	/
4824	43.24	PK	359	1.4	H	12.40	55.64	74	18.36
4824	33.26	Ave.	359	1.4	H	12.40	45.66	54	8.34
7236	36.20	PK	116	1.3	V	16.62	52.82	74	21.18
7236	22.38	Ave.	116	1.3	V	16.62	39.00	54	15.00
2266.6	44.29	PK	84	1.3	H	4.99	49.28	74	24.72
2266.6	30.52	Ave.	84	1.3	H	4.99	35.51	54	18.49
2388.9	46.77	PK	322	1.2	V	6.13	52.90	74	21.10
2388.9	32.86	Ave.	322	1.2	V	6.13	38.99	54	15.01
2372.7	45.22	PK	264	1.4	H	6.13	51.35	74	22.65
2372.7	31.66	Ave.	264	1.4	H	6.13	37.79	54	16.21
Middle Channel (2437 MHz)									
219.5	46.02	QP	124	1.2	H	-15.4	30.62	46	15.38
2437	85.87	PK	287	1.3	H	7.21	93.08	/	/
2437	78.63	Ave.	287	1.3	H	7.21	85.84	/	/
2437	97.62	PK	261	1.3	V	7.21	104.83	/	/
2437	91.54	Ave.	261	1.3	V	7.21	98.75	/	/
4874	41.27	PK	227	1.4	V	12.46	53.73	74	20.27
4874	34.35	Ave.	227	1.4	V	12.46	46.81	54	7.19
7311	35.82	PK	258	1.5	H	16.49	52.31	74	21.69
7311	23.26	Ave.	258	1.5	H	16.49	39.75	54	14.25
2242.6	45.27	PK	185	1.4	V	4.40	49.67	74	24.33
2242.6	32.50	Ave.	185	1.4	V	4.40	36.90	54	17.10
2375.6	46.93	PK	298	1.3	H	6.13	53.06	74	20.94
2375.6	34.22	Ave.	298	1.3	H	6.13	40.35	54	13.65
2491.1	35.64	PK	131	1.4	H	7.21	42.85	74	31.15
2491.1	23.50	Ave.	131	1.4	H	7.21	30.71	54	23.29

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
219.5	47.22	QP	124	1.0	H	-15.4	31.82	46	14.18
2462	84.27	PK	189	1.4	H	7.21	91.48	/	/
2462	79.30	Ave.	189	1.4	H	7.21	86.51	/	/
2462	98.57	PK	288	1.2	V	7.21	105.78	/	/
2462	90.23	Ave.	288	1.2	V	7.21	97.44	/	/
4924	43.26	PK	178	1.2	H	12.50	55.76	74	18.24
4924	32.14	Ave.	178	1.2	H	12.50	44.64	54	9.36
7386	36.27	PK	151	1.2	H	15.91	52.18	74	21.82
7386	24.38	Ave.	151	1.2	H	15.91	40.29	54	13.71
2352.6	46.17	PK	100	1.5	V	5.48	51.65	74	22.35
2352.6	29.87	Ave.	100	1.5	V	5.48	35.35	54	18.65
2486.1	48.71	PK	92	1.3	V	7.21	55.92	74	18.08
2486.1	30.65	Ave.	92	1.3	V	7.21	37.86	54	16.14
2489.5	49.10	PK	167	1.4	V	7.21	56.31	74	17.69
2489.5	31.08	Ave.	167	1.4	V	7.21	38.29	54	15.71



**802.11n-HT40 Mode:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2422 MHz)									
219.5	44.93	QP	42	1.5	H	-15.4	29.53	46	16.47
2422	83.72	PK	211	1.4	H	6.13	89.85	/	/
2422	76.10	Ave.	211	1.4	H	6.13	82.23	/	/
2422	96.20	PK	300	1.4	V	6.13	102.33	/	/
2422	87.58	Ave.	300	1.4	V	6.13	93.71	/	/
4844	41.28	PK	18	1.3	H	12.40	53.68	74	20.32
4844	33.36	Ave.	18	1.3	H	12.40	45.76	54	8.24
7266	36.37	PK	263	1.4	H	16.62	52.99	74	21.01
7266	23.42	Ave.	263	1.4	H	16.62	40.04	54	13.96
2362.0	45.27	PK	66	1.2	H	5.48	50.75	74	23.25
2362.0	30.98	Ave.	66	1.2	H	5.48	36.46	54	17.54
2387.5	47.28	PK	29	1.4	V	6.13	53.41	74	20.59
2387.5	34.57	Ave.	29	1.4	V	6.13	40.70	54	13.30
2490.2	36.54	PK	119	1.5	H	7.21	43.75	74	30.25
2490.2	22.40	Ave.	119	1.5	H	7.21	29.61	54	24.39
Middle Channel (2437 MHz)									
219.5	46.60	QP	30	1.2	H	-15.4	31.20	46	14.80
2437	84.20	PK	21	1.5	H	7.21	91.41	/	/
2437	77.32	Ave.	21	1.5	H	7.21	84.53	/	/
2437	95.11	PK	153	1.5	V	7.21	102.32	/	/
2437	88.03	Ave.	153	1.5	V	7.21	95.24	/	/
4874	42.30	PK	289	1.3	V	12.46	54.76	74	19.24
4874	33.76	Ave.	289	1.3	V	12.46	46.22	54	7.78
7311	35.21	PK	19	1.3	H	16.49	51.70	74	22.30
7311	22.31	Ave.	19	1.3	H	16.49	38.80	54	15.20
2371.2	38.24	PK	102	1.3	H	6.13	44.37	74	29.63
2371.2	25.38	Ave.	102	1.3	H	6.13	31.51	54	22.49
2383.6	39.57	PK	105	1.3	H	6.13	45.70	74	28.30
2383.6	26.23	Ave.	105	1.3	H	6.13	32.36	54	21.64
2493.8	36.52	PK	69	1.3	H	7.21	43.73	74	30.27
2493.8	23.21	Ave.	69	1.3	H	7.21	30.42	54	23.58

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2452 MHz)									
219.5	47.28	QP	162	1.2	H	-15.4	31.88	46	14.12
2452	84.92	PK	143	1.2	H	7.21	92.13	/	/
2452	77.27	Ave.	143	1.2	H	7.21	84.48	/	/
2452	96.66	PK	287	1.3	V	7.21	103.87	/	/
2452	89.51	Ave.	287	1.3	V	7.21	96.72	/	/
4904	39.83	PK	324	1.2	V	12.46	52.29	74	21.71
4904	32.31	Ave.	324	1.2	V	12.46	44.77	54	9.23
7356	35.27	PK	222	1.3	H	15.91	51.18	74	22.82
7356	23.67	Ave.	222	1.3	H	15.91	39.58	54	14.42
2382.2	35.73	PK	50	1.2	V	6.13	41.86	74	32.14
2382.2	24.24	Ave.	50	1.2	V	6.13	30.37	54	23.63
2348.6	37.62	PK	101	1.2	H	5.48	43.10	74	30.90
2348.6	30.27	Ave.	101	1.2	H	5.48	35.75	54	18.25
2486.7	45.93	PK	177	1.2	H	7.21	53.14	74	20.86
2486.7	32.83	Ave.	177	1.2	H	7.21	40.04	54	13.96

Note:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor

Margin = Limit- Corr. Amplitude

### Conducted Spurious Emissions at Antenna Port:

Test data is referred to FCC ID: Q8Y-FR4020A2 granted on 2012-10-16, report number: BST12081027Y-1E-3, which was tested by Shenzhen BST Technology Co., Ltd.

---

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

---

### **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 Data**

Test data is referred to FCC ID: Q8Y-FR4020A2 granted on 2012-10-16, report number: BST12081027Y-1E-3, which was tested by Shenzhen BST Technology Co., Ltd.

**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 Data**

Test data is referred to FCC ID: Q8Y-FR4020A2 granted on 2012-10-16, report number: BST12081027Y-1E-3, which was tested by Shenzhen BST Technology Co., Ltd.

---

**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 Data**

Test data is referred to FCC ID: Q8Y-FR4020A2 granted on 2012-10-16, report number: BST12081027Y-1E-3, which was tested by Shenzhen BST Technology Co., Ltd.

---

## **FCC §15.247(e) - POWER SPECTRAL DENSITY**

---

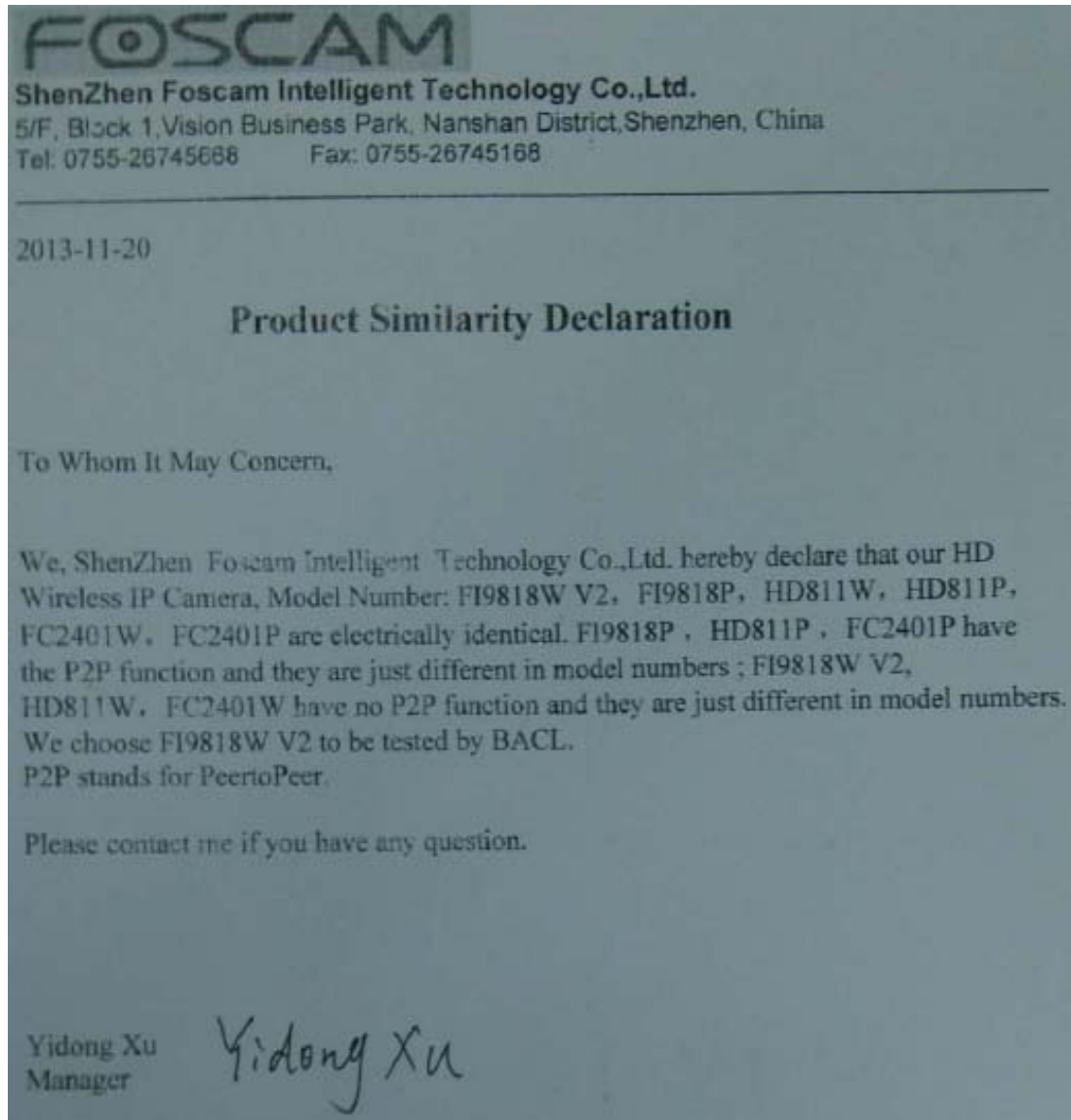
### **Applicable Standard**

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 Data**

Test data is referred to FCC ID: Q8Y-FR4020A2 granted on 2012-10-16, report number: BST12081027Y-1E-3, which was tested by Shenzhen BST Technology Co., Ltd.

## **DECLARATION LETTER**



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