

FCC PART 15, CLASS B TEST REPORT

For

ShenZhen Foscam Intelligent Technology Co., Ltd

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

FCC ID: ZDER2

Report Type: Original Report	Product Type: FHD Wireless IP Camera
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Report Number: RSZ150601007-00	
Report Date: 2015-06-11	
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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.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *ShenZhen Foscam Intelligent Technology Co., Ltd*'s product, model number: R2 or the "EUT" in this report was a *FHD Wireless IP Camera*, which was measured approximately: 7.2 cm (L) x 7.2 cm (W) x 11.8 cm (H), rated with input voltage: DC 5V from adapter. The highest operating frequency is 600 MHz.

Adapter Information:

Model: SAW-0502000

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

Output: 5V, 2000mA

Note: This series products model: EF8166, R4, R2S, R4S, FHD816W, R2 Plus, R4 Plus, FC2607P and R2 are identical schematics, the difference among them is just the model number due to marketing purpose, and model R2 was selected for fully testing, the detailed information can be referred to 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: 1505242 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2015-06-01.*

Objective

This test report is prepared on behalf of *ShenZhen Foscam Intelligent Technology Co., Ltd* in accordance with Part 2-Subpart J, Part 15-Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine the compliance of the EUT with FCC Part 15 B.

Related Submittal(s)/Grant(s)

FCC PART 15.247 DTS submissions with transmitter FCC ID: ZDER2.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on 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 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

The system was configured for testing in normal mode.

EUT operation mode: Recording & monitoring

EUT Exercise Software

“BurnIn test v5.3” and “IP camera” exercise software were used.

Special Accessories

The accessories were provided by manufactures.

Equipment Modifications

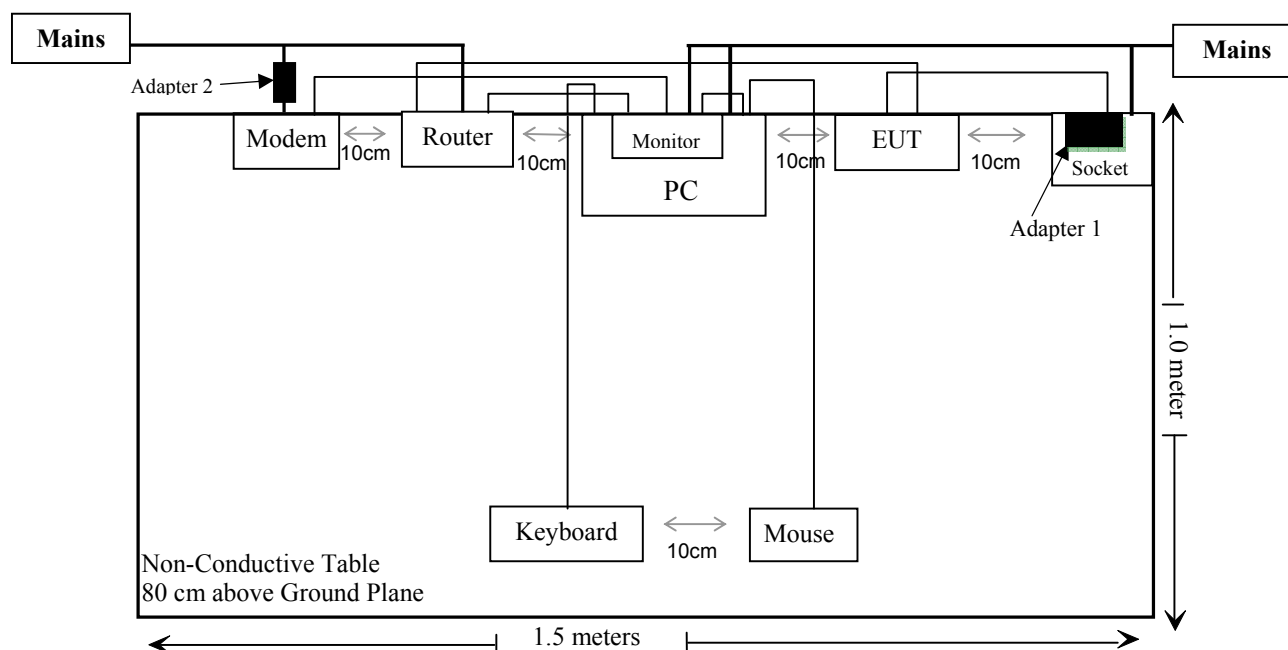
No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Sandisk	T-F card	N/A	3491
BULL	Socket	GN-415K	5503290068073
DELL	Monitor	E178FPc	070072
DELL	PC	Inspiron 660	6104472
DELL	PC	DCSCSF	127BP2X
ECOM	Modem	56000bps	21654684
LISTED	Adapter	TYP60-1207000Z	326703
Microsoft	Keyboard	1406	N/A
Microsoft	Mouse	1405	N/A
Sagem	Router	N/A	N/A
N/A	Router adapter	N/A	N/A

External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-shielded Detachable AC cable	1.5	Monitor	Mains
Shielded Detachable VGA cable	1.5	PC	Monitor
Un-shielded Detachable AC cable	1.2	PC	Mains
Un-shielded Detachable RJ45 cable	0.8	Router	EUT
Un-shielded Detachable RS232 cable	1.8	PC	Modem
Un-shielded Un-detachable DC cable	1.7	Modem	Adapter
Un-shielded Detachable AC cable	1.6	Adapter	Mains
Shielded Un-detachable USB cable	1.5	Keyboard	PC
Shielded Un-detachable USB cable	1.5	Mouse	PC
Un-shielded Un-detachable AC cable	1.2	Socket	Mains
Un-shielded Detachable RJ45 cable	1.5	Router	PC
Un-shielded Un-detachable DC cable	1.5	EUT	EUT Adapter
Un-shielded Un-detachable DC cable	1.6	Router	Router Adapter

Block Diagram of Test Setup

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Spurious Emissions	Compliance

FCC §15.107 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

According to FCC §15.107

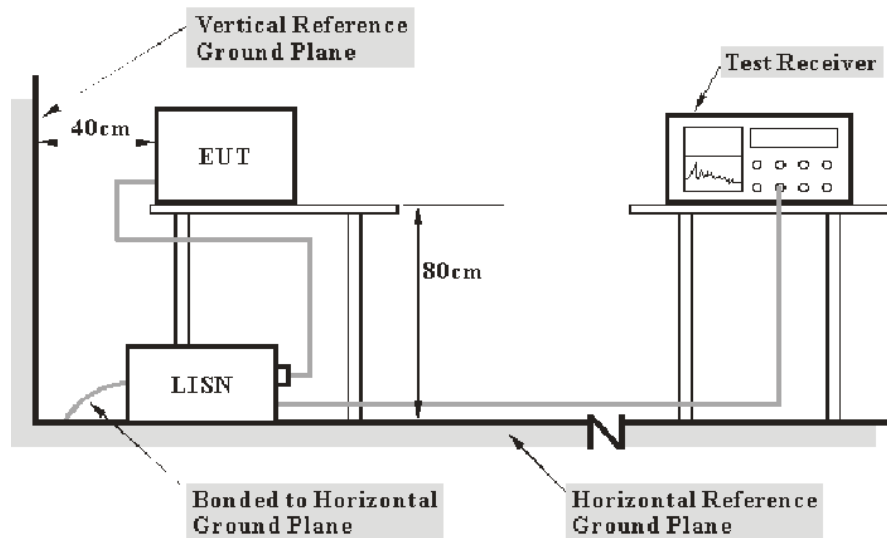
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between LISN/ISN and receiver, LISN/ISN voltage division factor, LISN/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	Expanded 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 measurement procedure of EUT setup is according with per ANSI C63.4-2009. The related limit was specified in FCC Part 15.107 Class B.

The spacing between the peripherals was 10 cm.

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

The socket 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 Procedure

During the conducted emission test, the socket 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2014-06-03	2015-06-03
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2014-12-01	2015-12-01
Rohde & Schwarz	LISN	ESH3-Z5	100113	NCR	NCR
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2015-05-14	2016-05-14
Rohde & Schwarz	CE Test software	EMC 32	V8.53	NCR	NCR

* **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 Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

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:

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

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.107, the worst margin reading as below:

10.2 dB at 0.604970 MHz in the **Line** conducted mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in complies 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

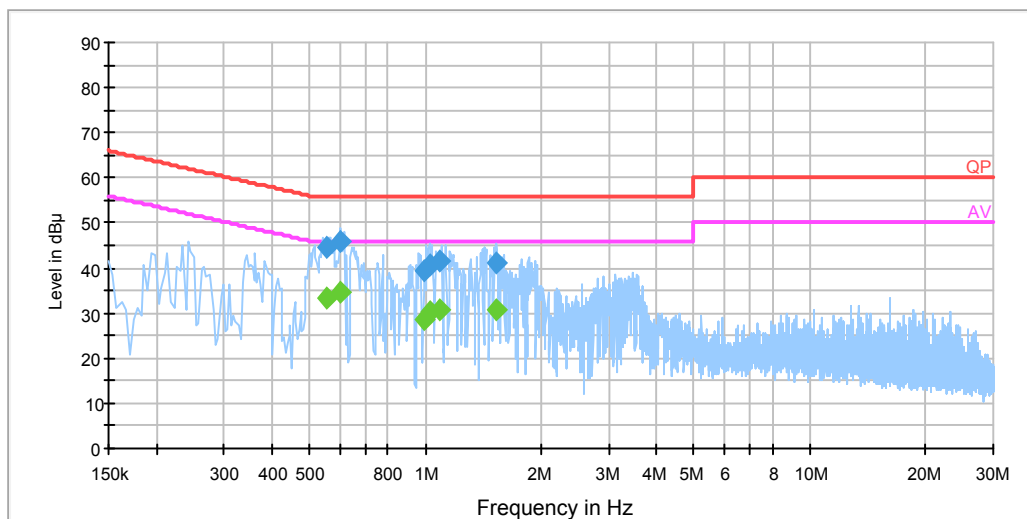
Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Joson Xiao on 2015-06-03.

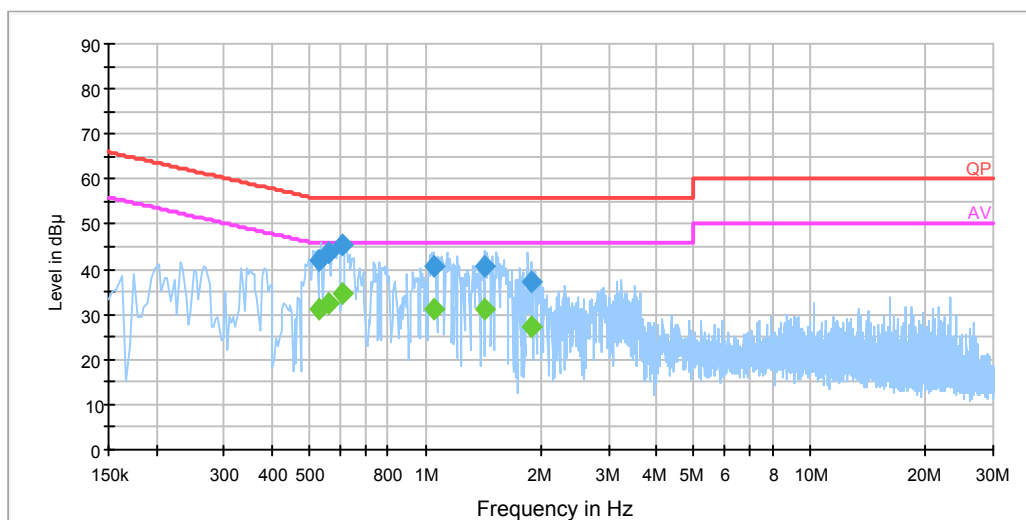
EUT Operation Mode: Recording & monitoring

AC 120V/60 Hz, Line

EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.553570	44.6	19.9	56.0	11.4	QP
0.553570	33.2	19.9	46.0	12.8	Ave.
0.604970	45.8	19.9	56.0	10.2	QP
0.604970	34.5	19.9	46.0	11.5	Ave.
0.994850	39.3	20.0	56.0	16.7	QP
0.994850	28.7	20.0	46.0	17.3	Ave.
1.030610	40.7	20.0	56.0	15.3	QP
1.030610	30.3	20.0	46.0	15.7	Ave.
1.089530	41.3	20.0	56.0	14.7	QP
1.089530	30.8	20.0	46.0	15.2	Ave.
1.526930	41.1	20.0	56.0	14.9	QP
1.526930	30.7	20.0	46.0	15.3	Ave.

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

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.526170	41.9	19.9	56.0	14.1	QP
0.526170	31.1	19.9	46.0	14.9	Ave.
0.557570	43.9	19.9	56.0	12.1	QP
0.557570	32.6	19.9	46.0	13.4	Ave.
0.606970	45.3	19.9	56.0	10.7	QP
0.606970	34.5	19.9	46.0	11.5	Ave.
1.053570	40.8	20.0	56.0	15.2	QP
1.053570	31.0	20.0	46.0	15.0	Ave.
1.432490	40.8	20.0	56.0	15.2	QP
1.432490	31.0	20.0	46.0	15.0	Ave.
1.881810	37.3	20.0	56.0	18.7	QP
1.881810	27.2	20.0	46.0	18.8	Ave.

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 §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

FCC §15.109

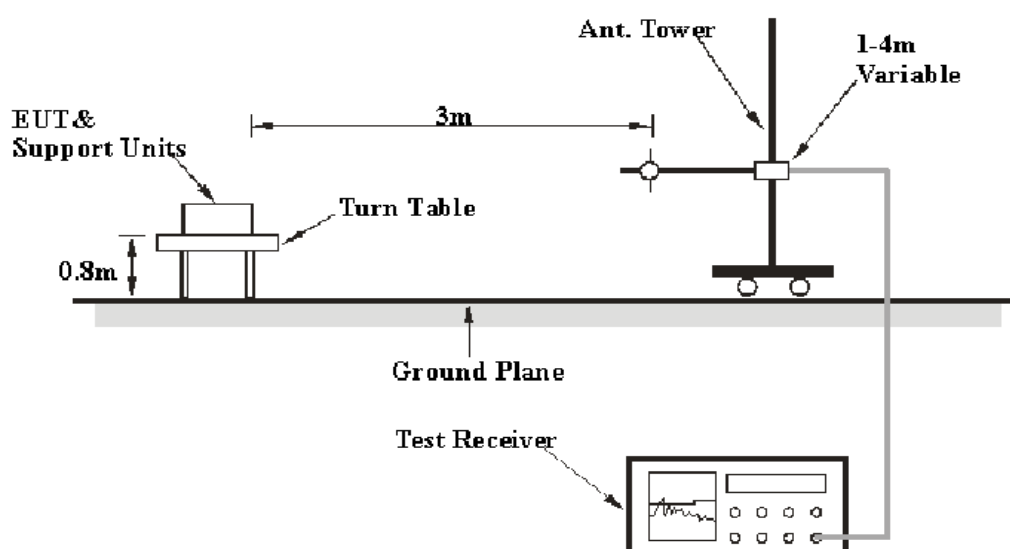
Measurement Uncertainty

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

Frequency	Polarity	Measurement uncertainty
30 MHz~200 MHz	Horizontal	4.62 dB (k=2, 95% level of confidence)
	Vertical	4.54 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	Horizontal	4.84 dB (k=2, 95% level of confidence)
	Vertical	5.91 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	Horizontal/Vertical	4.68 dB (k=2, 95% level of confidence)
Above 6 GHz	Horizontal/Vertical	4.92 dB (k=2, 95% level of confidence)

EUT Setup



The radiated 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 Part 15.109 Class B 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 socket was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 5 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
TDK	Chamber	Chamber A	2#	2012-10-15	2015-10-15
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2014-12-07	2017-12-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2014-11-03	2015-11-03
HP	Amplifier	HP8447E	1937A01046	2015-05-06	2016-05-06
TDK	Chamber	Chamber B	1#	2012-07-22	2015-07-22
BIZI	Signal Analyier	FSIQ26	8386001028	2014-11-12	2015-11-12
A.H.System	Horn Antenna	SAS-200/571	135	2013-02-11	2016-02-10
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2015-04-23	2016-04-23
Rohde & Schwarz	RE Test software	EMC 32	V9.10.00	NCR	NCR

* **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 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

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

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109 Class B, the worst margin reading as below:

0.93 dB at 410.856375 MHz in the Vertical polarization

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies 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

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Joson Xiao on 2015-06-03.

EUT operation mode: Recording & monitoring

30 MHz to 6 GHz

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part15B	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
72.504375	37.61	QP	0.0	1.0	V	-19.5	18.11	40.00	2.39
120.843000	41.60	QP	125.0	1.1	V	-13.0	28.6	43.50	1.90
169.177750	40.82	QP	16.0	1.1	V	-14.5	26.32	43.50	2.68
410.856375	45.07	QP	357.0	1.3	V	-9.9	35.17	46.00	0.93
480.070250	40.29	QP	16.0	1.2	V	-8.6	31.69	46.00	5.71
507.526875	39.19	QP	276.0	1.1	H	-8.7	30.49	46.00	6.81
1994	45.94	PK	345.0	1.2	H	3.07	49.01	74	24.99
1994	28.28	Ave.	345.0	1.2	H	3.07	31.35	54	22.65
2114.3	50.5	PK	274.0	1.9	H	3.59	54.09	74	19.91
2114.3	31.26	Ave.	274.0	1.9	H	3.59	34.85	54	19.15
2114.3	52.09	PK	278.0	1.9	V	3.59	55.68	74	18.32
2114.3	30.98	Ave.	278.0	1.9	V	3.59	34.57	54	19.43

Note:

- 1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Corrected Amplitude = Correction Factor + Reading
- 3) Margin = Limit - Corrected Amplitude

PRODUCT SIMILARITY DECLARATION LETTER

FOSCAM
ShenZhen Foscam Intelligent Technology Co.,Ltd.
5/F, Block 1,Vision Business Park, Nanshan District,Shenzhen,PRC
Tel:86-0755-26720367-8306

2015-06-12

Product Similarity Declaration

To Whom It May Concern,

We, ShenZhen Foscam Intelligent Technology Co.,Ltd., hereby declare that we have a product named as FHD Wireless IP Camera (Model number: R2 was tested by BACL, meanwhile, for our marketing purpose, we would like to list a series models (EF8166, R4, R2S, R4S, FHD816W, R2 Plus, R4 Plus, FC2607P) on reports and certificate, all the models are identical schematics, only named differently. No other changes are made to them

We confirm that all information above is true, and we'll be responsible for all the consequences. Please contact me if you have any question.

Sincerely,

Signature

YIDONG XU *Yi Dong XU*
6/12, 2015

Manager

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