

FCC PART 15, CLASS B  
MEASUREMENT AND TEST REPORT

For

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

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

**FCC ID: ZDEFI9831EP**

<b>Report Type:</b> Original Report	<b>Product Name:</b> HD PoE IP Camera
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<b>Report Number:</b> RSZ140326002-00	
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## GENERAL INFORMATION

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

The *Shenzhen Foscam Intelligent Technology Co., Ltd.*'s product, model number: *FI9831EP* (FCC ID: *ZDEFI9831EP*) or the "EUT" in this report is a *HD PoE IP Camera*, which was measured approximately: 11.2 cm (L) x 11.2 cm (W) x 11.2 cm (H), the input power is DC 5.0 V from adapter. The highest operating frequency is 400 MHz.

Adapter Information: AC Adapter  
Model: SAW-0502000  
Input: AC 100-240V, 50/60 Hz, 0.5A  
Output: DC 5V, 2.0A

Note: *The product, model FI9831EP, HD816E, FI9821EP, HD817E, they are electrically identical; the only differences are the model numbers. Model FI9831EP was selected for full test, which is explained in the declaration letter that provided and guaranteed by applicant.*

*All measurement and test data in this report was gathered from production sample serial number: 1403175 (Assigned by BAACL, Shenzhen). The EUT supplied by the applicant was received on 2014-03-26.*

### Objective

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

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

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

No related submittal(s).

### 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.

## 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.

F I N A L

## SYSTEM TEST CONFIGURATION (FCC §15.27)

### Justification

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

### EUT Exercise Software

No exercise software was used.

### Special Accessories

No special accessory was used.

### Equipment Modifications

No modification was made to the EUT tested.

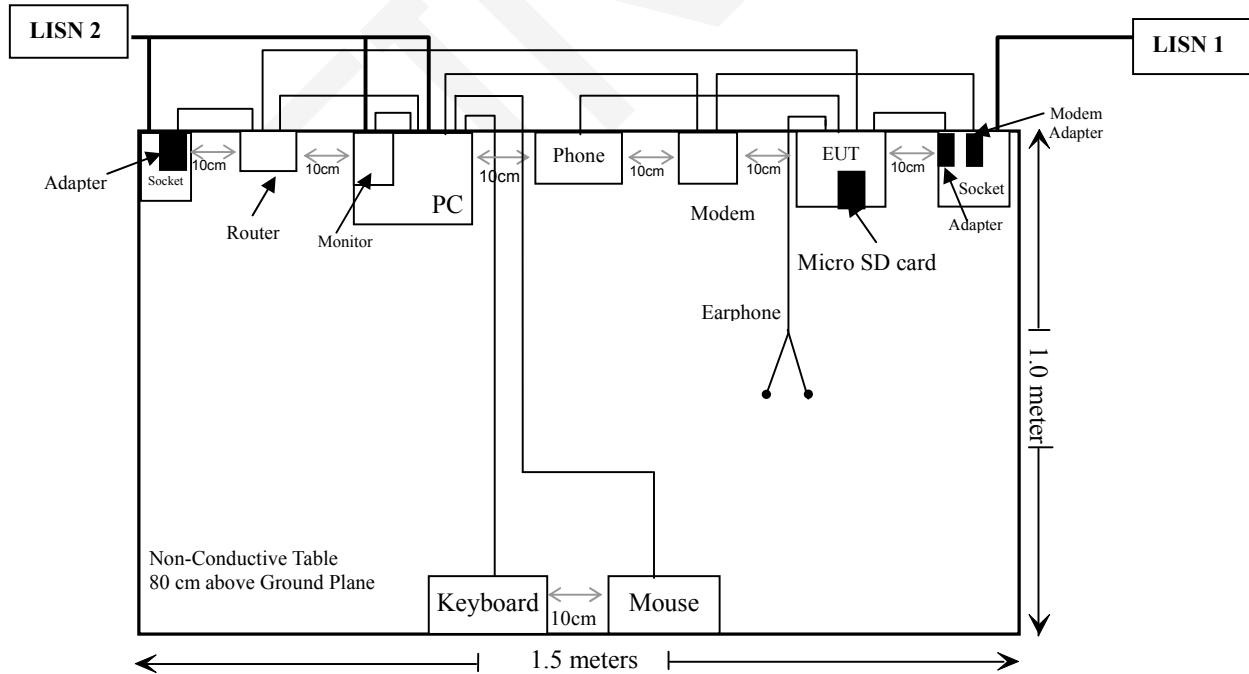
### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	Remark
Sandisk	T-F card	N/A	3491	-
N/A	Earphone	N/A	254563	-
Nokia	Phone	5250	C8DF7C720373	-
TP-Link	Router	TL-WR847N	13203838617	-
DELL	PC	DCSCSF	127BP2X	-
DELL	Monitor	E178FPc	070072	-
DELL	keyboard	SK-8115	CN-0DJ313-71616-0C E-0ATX	-
DELL	Mouse	M-UAR	2014789	-
TP-LINK	Adapter	T090060-2A1	1303	-
LISTED	Modem adapter	TYP60-1207000Z	E326703	-
ECOM	modem	56000BPS	215465454	-
JISHENG	Socket	506	CH0076104	-

**External I/O Cable**

Cable Description	Length (m)	From / Port	To
Un-shielding detachable RJ45 Cable	1.5	PC	Router
Un-shielding detachable RJ45 Cable	1.0	EUT	Router
Un-shielding Un-detachable DC Cable	1.2	Adapter	Router
Un-shielding Un-detachable DC Cable	1.2	Modem adapter	Modem
Un-shielding detachable AC Cable	1.7	Mains	Modem adapter
Un-shielding detachable audio Cable	0.5	Phone	EUT
Un-shielding Un-detachable DC Cable	1.5	EUT	EUT adapter
Un-shielded un-detachable AC Cable	1.0	Mains	Socket
Un-shielding un-detachable earphone Cable	1.2	EUT	Earphone
Shielded un-detachable USB Cable	1.5	Mouse	PC
Shielded un-detachable USB Cable	1.5	Keyboard	PC
Un-shielding detachable VGA Cable	1.2	PC	monitor
Un-shielding detachable AC Cable	1.2	mains	PC
Un-shielding detachable AC Cable	1.5	mains	monitor
Un-shielding detachable RS232 Cable	1.8	Modem	PC

**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 Emissions	Compliance

FINAL

## FCC §15.107 – AC LINE CONDUCTED EMISSIONS

### Applicable Standard

According to FCC§15.107

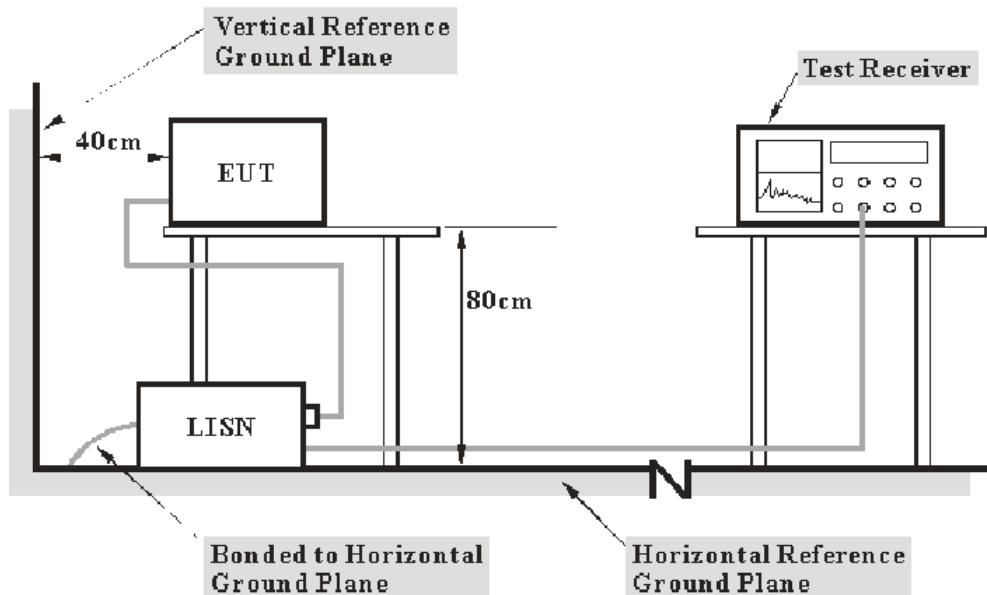
### Measurement Uncertainty

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

The socket was connected to an AC 120V/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 outlet of the LISN.

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

All final 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	ENV216	3560.6650.12-101613-Yb	2014-05-07	2015-05-07
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2013-10-15	2014-10-15
Rohde & Schwarz	CE Test software	EMC 32	V8.53	--	--

\* **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 7dB 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 worst margin reading as below:

**8.7 dB at 0.553570 MHz** in the **Neutral** conducted mode

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

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

In BACL.,  $U_{(L_m)}$  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

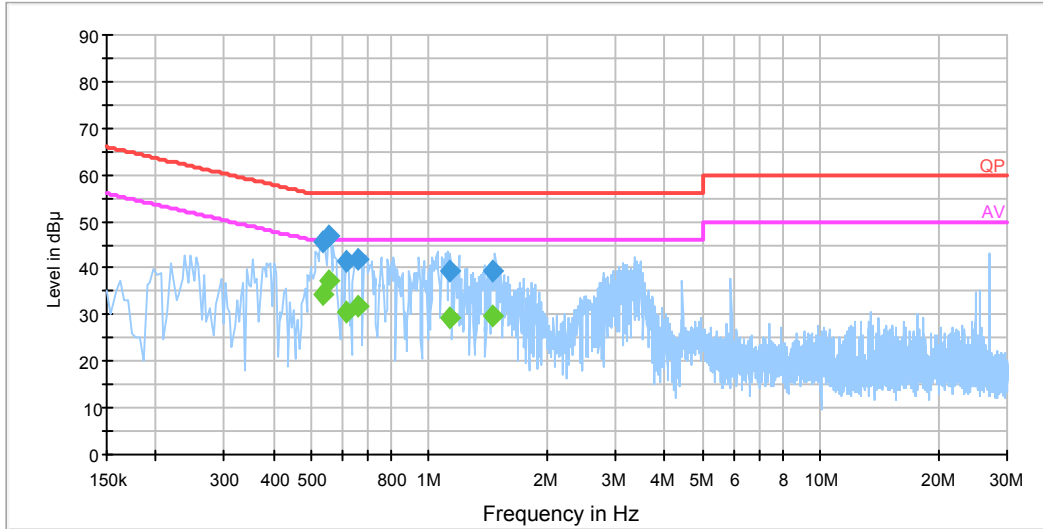
<b>Temperature:</b>	25°C
<b>Relative Humidity:</b>	55 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Joson Xiao on 2014-07-01.*

*Test Mode: Recording & monitoring*

AC 120V/60 Hz, Line

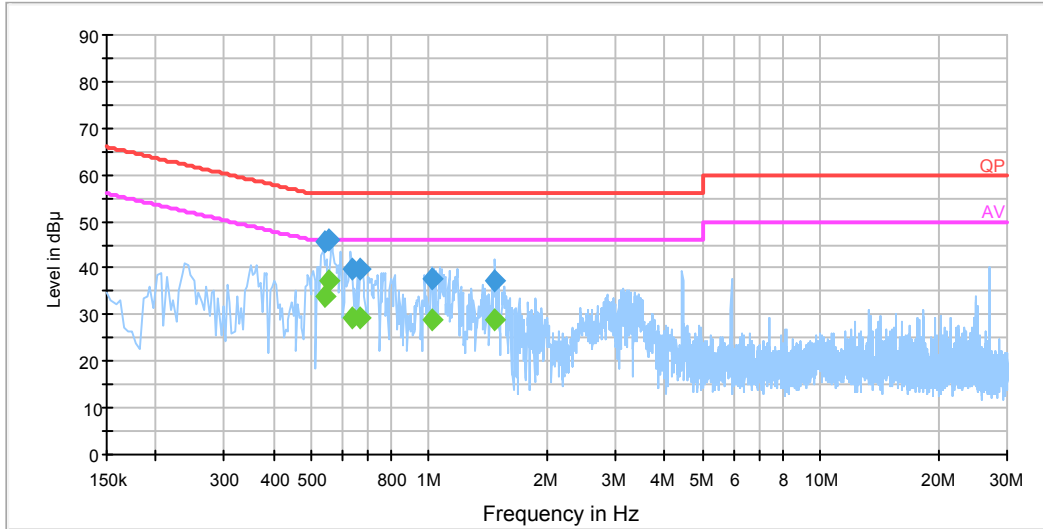
EMI Auto Test L



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.533990	45.4	19.6	56.0	10.6	QP
0.533990	34.3	19.6	46.0	11.7	Ave.
0.553690	46.7	19.6	56.0	9.3	QP
0.553690	37.1	19.6	46.0	8.9	Ave.
0.612790	41.4	19.6	56.0	14.6	QP
0.612790	30.7	19.6	46.0	15.3	Ave.
0.660010	41.8	19.6	56.0	14.2	QP
0.660010	32.0	19.6	46.0	14.0	Ave.
1.129290	39.3	19.5	56.0	16.7	QP
1.129290	29.2	19.5	46.0	16.8	Ave.
1.459830	39.2	19.5	56.0	16.8	QP
1.459830	29.9	19.5	46.0	16.1	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)
0.542010	45.5	19.6	56.0	10.5	QP
0.542010	34.0	19.6	46.0	12.0	Ave.
0.553570	46.1	19.6	56.0	9.9	QP
0.553570	37.3	19.6	46.0	8.7	Ave.
0.639450	39.8	19.6	56.0	16.2	QP
0.639450	29.5	19.6	46.0	16.5	Ave.
0.667890	39.7	19.6	56.0	16.3	QP
0.667890	29.3	19.6	46.0	16.7	Ave.
1.018790	37.6	19.5	56.0	18.4	QP
1.018790	28.9	19.5	46.0	17.1	Ave.
1.475830	37.1	19.5	56.0	18.9	QP
1.475830	28.9	19.5	46.0	17.1	Ave.

Note:

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
- 3) Margin = Limit – Corrected Amplitude

## FCC §15.109 - RADIATED SPURIOUS EMISSIONS

### Applicable Standard

FCC §15.109

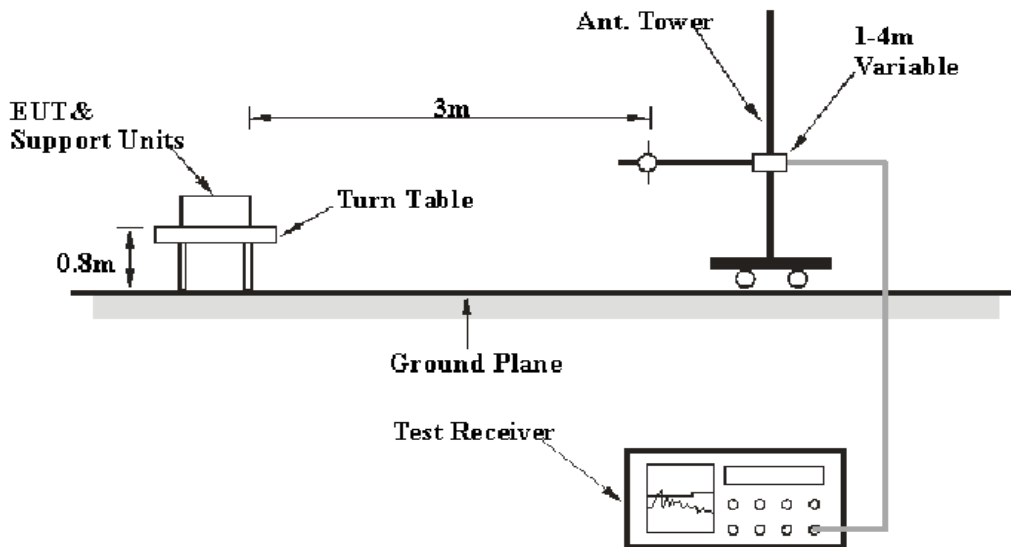
### Measurement Uncertainty

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
30MHz~200MHz	Horizontal	4.62 dB (k=2, 95% level of confidence)
	Vertical	4.54 dB (k=2, 95% level of confidence)
200MHz~1GHz	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.

### EMI Test Receiver Setup

The system was investigated from 30 MHz to 2 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
30MHz – 1000 MHz	100 kHz	300 kHz	120kHz	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 final data was recorded in the Quasi-peak detector mode.

### 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
HP	Amplifier	8447E	1937A01046	2013-09-30	2014-09-30
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2013-11-12	2014-11-12
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
R&S	Auto test Software	EMC32	V9.10	-	-
TDK	Chamber	Chamber B	1#	2011-07-23	2015-07-22
BIZI	Signal Analyzer	FSIQ26	8386001028	2013-11-12	2014-11-12
A. H. System	Horn Antenna	SAS-200/571	135	2012-02-11	2015-02-10
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2014-04-03	2015-04-03

\* **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 recorded data in following table, the worst margin reading as below:

**0.66 dB at 271.651250 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**

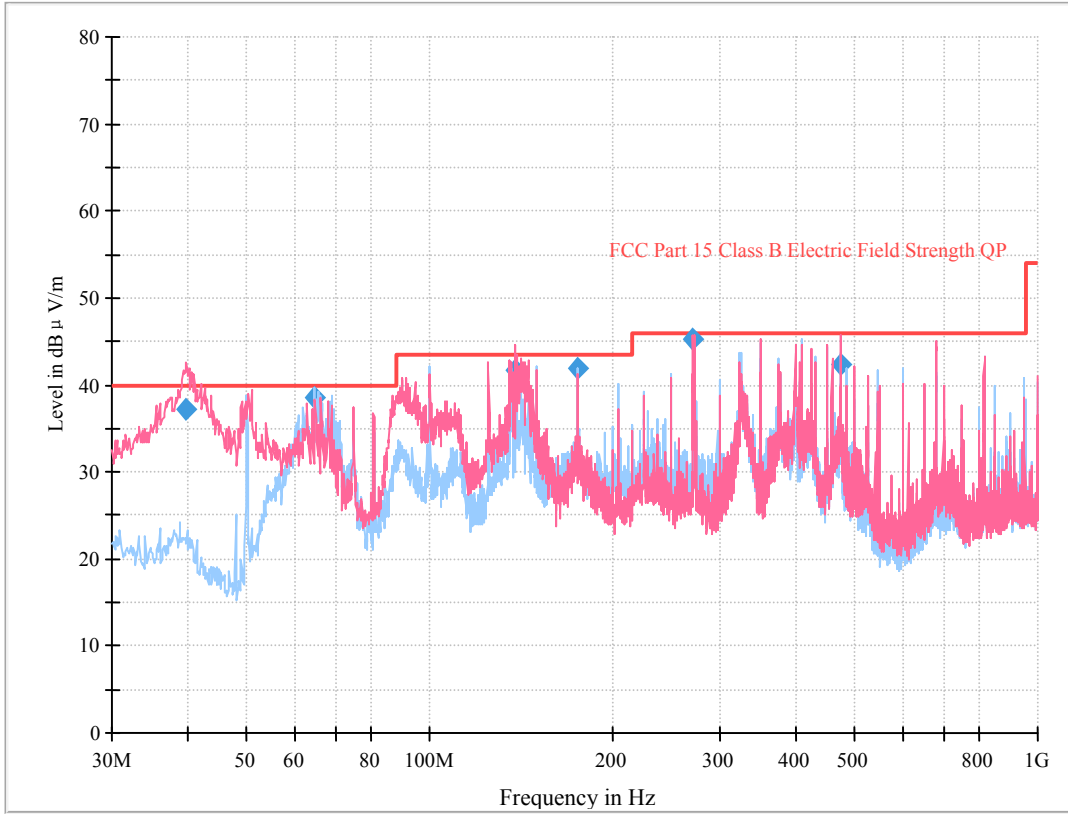
**Environmental Conditions**

<b>Temperature:</b>	23~27 °C
<b>Relative Humidity:</b>	53~55 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Webb Liu on 2014-04-03 and 2014-07-02.*

*Test mode: Recording & monitoring*

Full Spectrum



Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity	Turntable Position (Degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
39.821250	37.28	197.0	V	121.0	-13.2	40.00	2.72
64.677500	38.46	103.0	H	55.0	-19.8	40.00	1.54
138.397500	41.69	213.0	V	237.0	-13.2	43.50	1.81
174.893750	41.86	100.0	H	156.0	-14.9	43.50	1.64
271.651250	45.34	186.0	V	189.0	-13.0	46.00	0.66
475.108750	42.38	100.0	V	86.0	-8.7	46.00	3.62

Note:

- 1) Corrected Amplitude = Meter Reading + Correction Factor
- 2) Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain
- 3) Margin = Limit – Corrected Amplitude



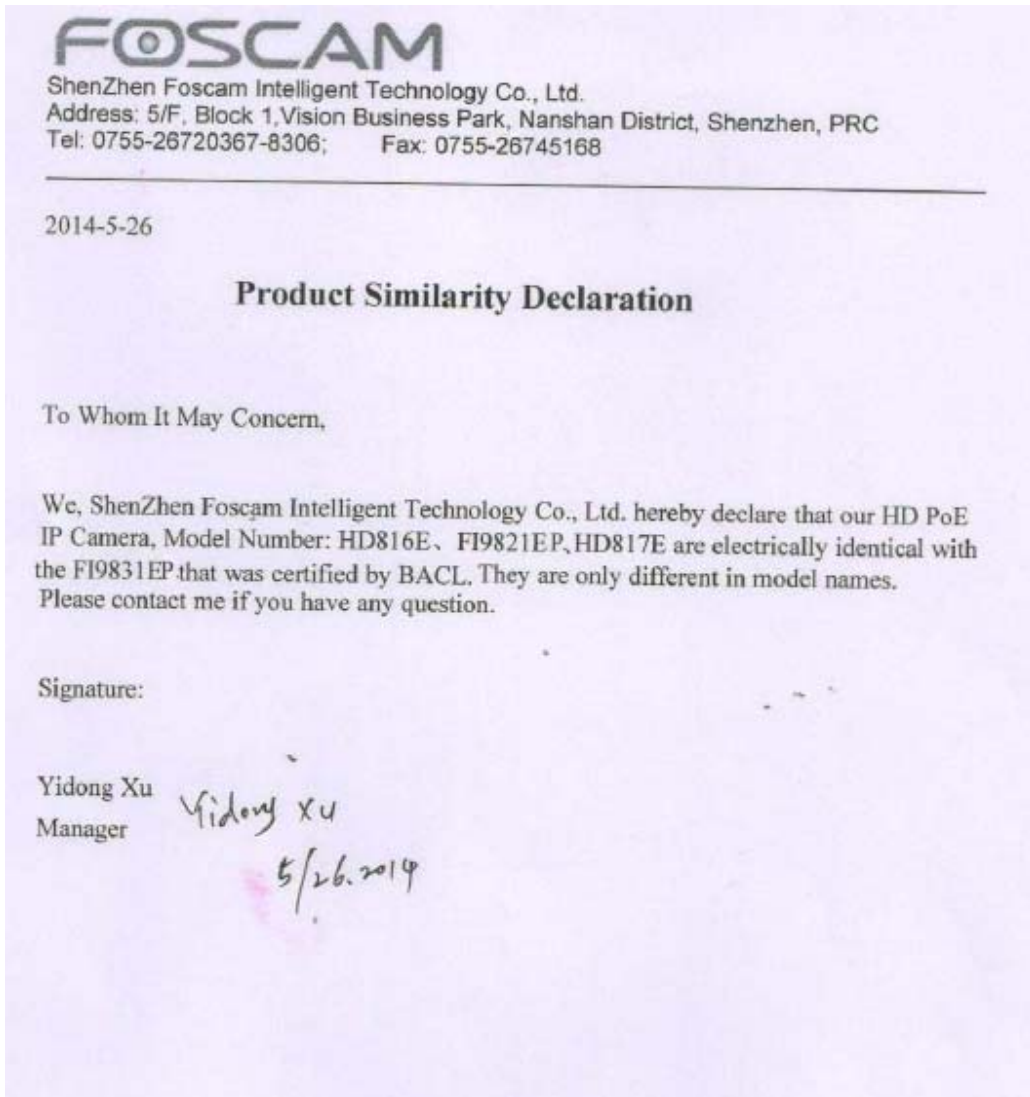
**1~2 GHz:**

Frequency (MHz)	Reading (dB $\mu$ V)	Detector (PK/QP/Ave.)	Turntable Degree	Height (m)	Polar (H/V)	Corrected Factor (dB/m)	Corrected Amplitude (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
1822.6	43.62	PK	207	1.7	H	2.32	45.94	74	28.06
1822.6	30.56	Ave.	207	1.7	H	2.32	32.88	54	21.12
1822.6	40.59	PK	192	1.5	V	2.32	42.91	74	31.09
1822.6	28.73	Ave.	192	1.5	V	2.32	31.05	54	22.95

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



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