

FCC PART 15.249
MEASUREMENT AND TEST REPORT
FOR

Swann Communications Pty Ltd
(Swann Global Limited - HK office)

Room 1601, Tung Ning Building 249-255 Des Voeux Road Central,
Hong Kong

FCC ID: VMIWDW001

Report Concerns: Original Report	Equipment Type: Wireless Camera
Model:	<u>ZC812</u>
Report No.:	<u>STR07128012I</u>
Test/Witness Engineer:	<u>Lahm Peng</u>
Test Date:	<u>2007-12-04 to 2007-12-07</u>
Prepared By:	Shenzhen SEM.Test Compliance Service Co., Ltd. Room 609-610, Baotong Building, Baomin 1 st Road, Baoan District, Shenzhen, Guangdong, P.R.C. (518133)
Approved & Authorized By:	 _____ Jandy So / PSQ Manager

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Swann Communications Pty Ltd
(Swann Global Limited – HK office)

Address of applicant: Room 1601, Tung Ning Building 249-255 Des Voeux Road
Central, Hong Kong

Manufacturer: Jove Video Communication Limited

Address of applicant: 3/F, 25#, West of Hengkeng Industrial Zone, Guanlan Town,
Shenzhen, China

General Description of E.U.T

Items	Description
EUT Description:	Wireless Camera
Trade Name:	/
Model No.:	ZC812, ZC818, ZC826, ZC315, ZC806, ZC325, ZC103
Rated Voltage:	DC 12 V
Output Power:	<0dBm
Frequency Range:	2414~2468MHz
No. of Channel:	4
Antenna Type:	Fixed antenna
Size:	6.0x4.2x8.2 cm
For more information refer to the circuit diagram form and the user's manual.	

The test data is gathered from a production sample, model ZC812, provided by the manufacturer. The other listed in the report have different appearance of ZC812 without circuit and electronic construction changed, declared by the manufacturer.

1.2 Test Standards

The following report is prepared on behalf of Swann Communications Pty Ltd (Swann Global Limited - HK office) in accordance with FCC Part 15, Subpart B, Subpart C, and section 15.107, 15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.107,15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Related Submittal(s)/Grant(s)

No Related Submittal(s).

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the Operating Instructions and let the EUT keep transmitting.

1.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

United States of American Federal Communications Commission (FCC), and the registration number is **556682**
Certification and Engineering Bureau of Industry Canada for radio equipment testing with the registration number is **6002**.

All measurement required was performed at laboratory of SGS-CSTC Standards Technical Services Co., Ltd., No.1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China.

1.6 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software is started while the whole system is on.

1.7 Accessories Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

1.8 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Power Cable	1.80	Unshielded	Without Core

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.107 (a)	Conducted Emission	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.209	Radiated Emission	Compliant
§15.249(a)	Field Strength	Compliant
§15.249(d)	Out of Band Emission	Compliant

3. §15.203 - ANTENNA REQUIREMENT

3.1 Standard Applicable

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has a fix antenna, fulfill the requirement of this section.

4. §15.107 (a)- CONDUCTED EMISSION

4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is $\pm 1.5\text{dB}$.

4.2 Test Equipment List and Details

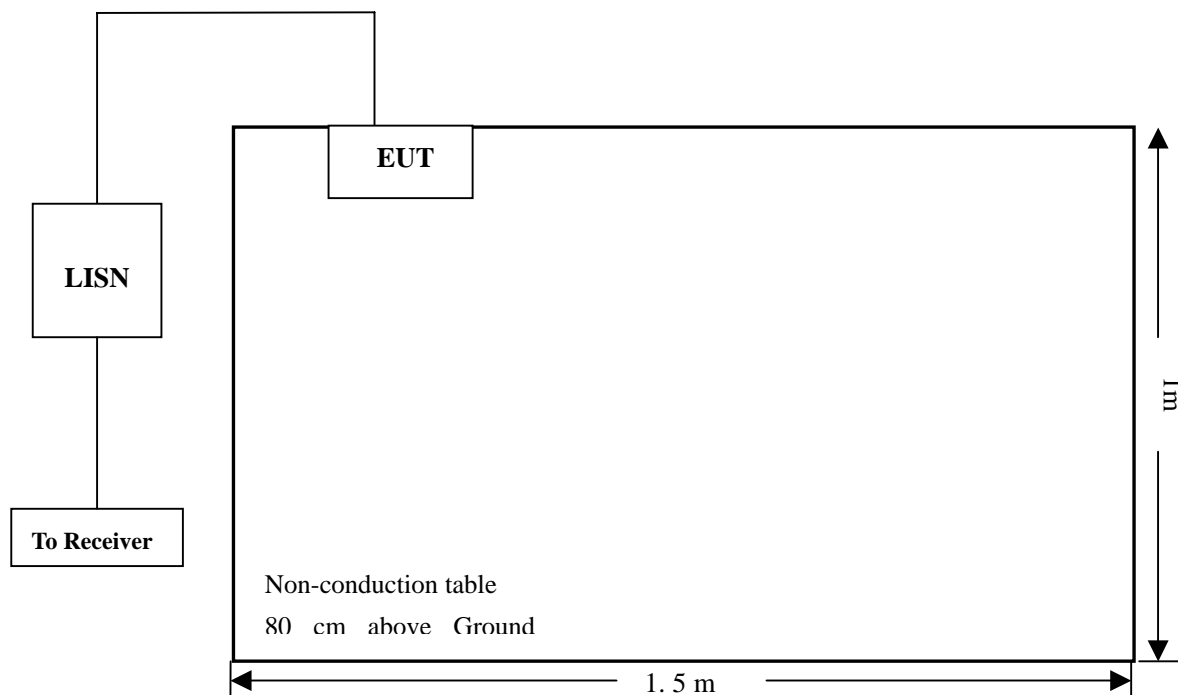
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESCS30	830245/009	2007-1-26	2008-1-25
Artificial Mains	Schwarz beck	NSLK8126	8126-224	2007-1-26	2008-1-25
Limiter	Rohde & Schwarz	ESH3-Z2	357.8810.52	2007-1-26	2008-1-25
AMN	Rohde & Schwarz	ESH3-Z5	828304/014	2007-1-26	2008-1-25
Spectrum Analyzer	Aglient	E4402B-ESA	US41192821	2007-1-26	2008-1-25

4.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.107 Limit.

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.

4.4 Basic Test Setup Block Diagram



4.5 Environmental Conditions

Temperature:	23° C
Relative Humidity:	54%
ATM Pressure:	1012 mbar

4.6 Test Receiver Setup

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

Start Frequency 150 kHz
 Stop Frequency..... 30 MHz
 Sweep Speed Auto
 IF Bandwidth..... 10 kHz
 Quasi-Peak Adapter Bandwidth 9 kHz
 Quasi-Peak Adapter Mode Normal

4.7 Summary of Test Results/Plots

According to the data in section 4.8, the EUT complied with the FCC 15B Conducted margin for a Class B device, with the *worst* margin reading of:

-35.1 dB μ V at 0.55 MHz in the Line mode, 0.15-30MHz

4.8 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC 15 CLASS B	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dB μ V	QP/Ave/Pk	Line/Neutral	dB μ V	dB
0.55	20.93	Pk	Line	56.00	-35.1
0.15	28.80	Pk	Line	66.00	-37.2
0.18	26.45	Pk	Line	64.49	-38.0
0.30	21.61	Pk	Neutral	60.24	-38.6
0.23	22.40	Pk	Neutral	62.45	-40.0
0.17	24.67	Pk	Neutral	64.96	-40.3

Since the peak reading is below the AV limit, the AV reading can be omitted.

Plot of Conducted Emissions Test Data

Conducted Disturbance

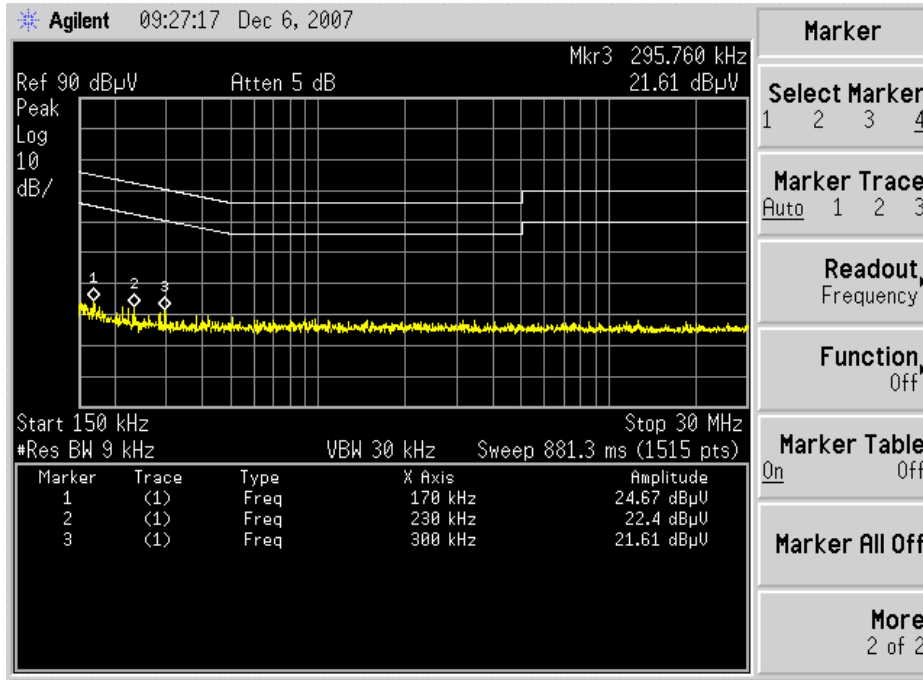
EUT: Wireless Camera

M/N: ZC812

Operating Condition: Running

Test Specification: N

Comment: 120V/60Hz; DC 12V adapter



Plot of Conducted Emissions Test Data

Conducted Disturbance

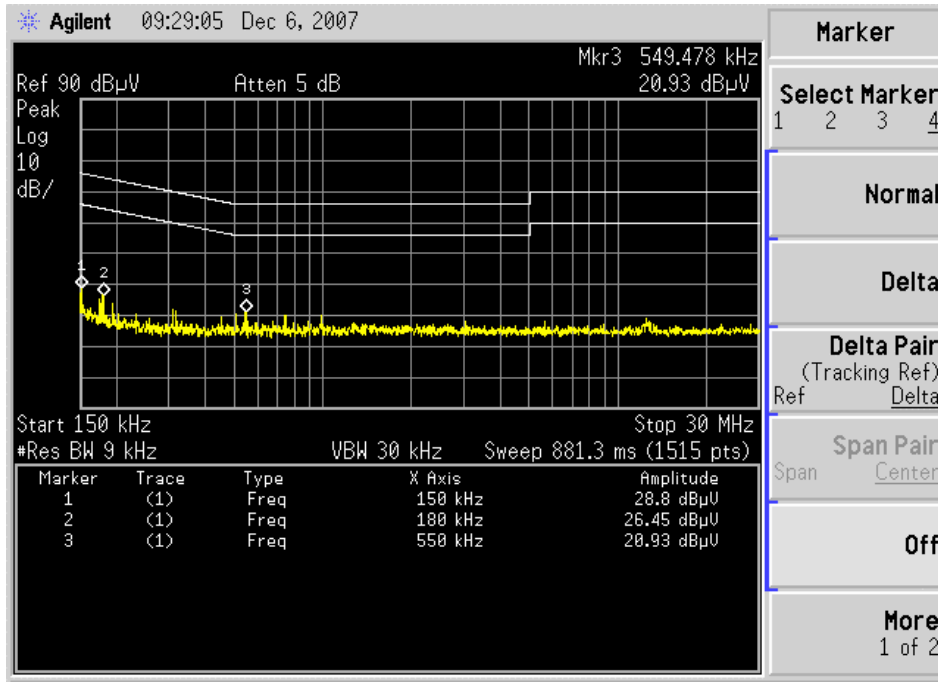
EUT: Wireless Camera

M/N: ZC812

Operating Condition: Running

Test Specification: L

Comment: 120V/60Hz; DC 12V adapter



5. §15.205, §15.209, §15.249 (a)- RADIATED EMISSION

5.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ± 3.0 dB.

5.2 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of fundamental (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 20 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209,WHICHEVER IS THE LESSER ATTENUATION.

Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Rohde & Schwarz	EMI Test Receiver	ESIB26	830245/009	2007-01-26	2008-01-25
ETS	Multi Controller	2090	57230	2007-01-26	2008-01-25
ETS	Receiver Antenna	2175	57337	2007-01-26	2008-01-25
ETS	50 ohm Coaxial Cable	SUCOFLEX 104	25498514	2007-01-26	2008-01-25
Schwarz beck	Horn Antenna	BBHX	BBHX9120-00 2	2007-01-26	2008-01-25

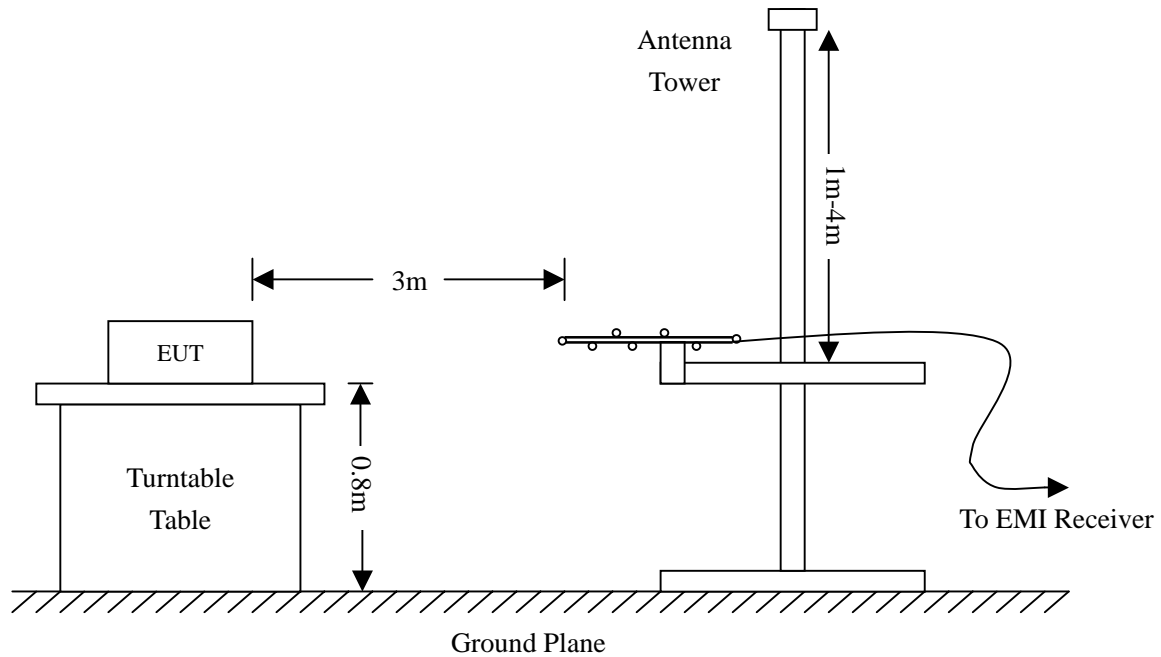
Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.

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.



5.5 Corrected Amplitude & Margin Calculation

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

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

5.6 Environmental Conditions

Temperature:	26° C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

5.7 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.249 standards, and had the worst margin of:

-0.40 dB μ V at 4936.00 MHz in the Horizontal polarization, 30 MHz to 25 GHz, 3Meters

Frequency MHz	Meter Reading dBuV	Detector PK/ QP/AV	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier Gain dB	Corr. Ampl. dBuV/m	FCC Part 15.249 & 15.209	
	Limit dBuV/m									Margin dB	
Transmitting Low CH (Above 1GHz) Low CH											
4828	47.3	AV	66	1	H	23.8	2.72	10.8	50.6	54.0	-3.4
4828	45.4	AV	135	1.2	V	23.8	2.72	10.8	48.7	54.0	-5.3
7242	48.1	AV	45	1	H	23.8	3.19	11.1	51.4	54.0	-2.6
7242	46.8	AV	60	1.3	V	23.8	3.19	11.1	50.1	54.0	-3.9
2414	58.1	AV	98	1.4	H	23.8	1.99	9.7	74.2	/	(Fund.)
2414	57.0	AV	56	2	V	23.8	1.99	9.7	73.1	/	(Fund.)
4828	42.0	PK	45	1.2	H	23.8	2.72	10.7	57.8	74.0	-16.2
4828	41.4	PK	98	1.2	V	23.8	2.72	10.7	57.2	74.0	-16.8
7242	40.5	PK	56	1.4	H	23.8	3.19	11.1	56.4	74.0	-17.6
7242	40.8	PK	60	2	V	23.8	3.19	11.1	56.7	74.0	-17.3
2414	68.4	PK	266	1	H	23.8	1.99	9.7	84.5	/	(Fund.)
2414	66.7	PK	185	1.2	V	23.8	1.99	9.7	82.8	/	(Fund.)
Transmitting Low CH (Above 1GHz) Mid CH											
4864	37.0	AV	66	1	H	23.8	2.72	10.7	52.8	54.0	-1.2
4864	36.3	AV	135	1.2	V	23.8	2.72	10.7	52.1	54.0	-1.9
7296	37.3	AV	45	1	H	23.8	3.19	11.2	53.1	54.0	-0.9
7296	37.2	AV	60	1.3	V	23.8	3.19	11.2	53.0	54.0	-1.0
2432	59.6	AV	60	1	H	23.8	1.99	9.8	75.6	/	(Fund.)
2432	58.3	AV	266	1.3	V	23.8	1.99	9.8	74.3	/	(Fund.)
4864	43.2	PK	45	1.2	H	23.8	2.72	10.7	59.0	74.0	-15.0
4864	42.7	PK	98	1.2	V	23.8	2.72	10.7	58.5	74.0	-15.5
7296	45.4	PK	56	1.4	H	23.8	3.19	11.2	61.2	74.0	-12.8
7296	44.4	PK	60	2	V	23.8	3.19	11.2	60.2	74.0	-13.8
2432	70.1	AV	266	1	H	23.8	1.99	9.8	86.1	/	(Fund.)
2432	69.4	AV	185	1.2	V	23.8	1.99	9.8	85.4	/	(Fund.)
Transmitting Low CH (Above 1GHz) High CH											
4936	37.7	AV	45	1	H	23.8	2.74	10.6	53.6	54.0	-0.4
4936	37.0	AV	60	1.3	V	23.8	2.74	10.6	52.9	54.0	-1.1
7404	35.6	AV	45	1.2	H	23.8	3.18	11.2	51.4	54.0	-2.6
7404	34.9	AV	98	1.2	V	23.8	3.18	11.2	50.7	54.0	-3.3
2468	62.7	AV	45	1.2	H	23.8	1.99	9.9	78.6	/	(Fund.)
2468	62.2	AV	98	1.2	V	23.8	1.99	9.9	78.1	/	(Fund.)
4936	40.3	PK	56	1.4	H	23.8	2.74	10.6	56.2	74.0	-17.8
4936	39.9	PK	60	2	V	23.8	2.74	10.6	55.8	74.0	-18.2
7404	39.4	PK	266	1	H	23.8	3.18	11.2	55.2	74.0	-18.8

7404	38.7	PK	185	1.2	V	23.8	3.18	11.2	54.5	74.0	-19.5
2468	73.6	PK	90	1.5	H	23.8	1.99	9.9	89.5	/	(Fund.)
2468	72.5	PK	43	1	V	23.8	1.99	9.9	88.6	/	(Fund.)

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4. Emissions 20dB lower than the limit are not reported.

Frequency MHz	Meter Reading dBuV	Detector PK/ QP/AV	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifer Gain dB	Corr. Ampl. dBuV/m	FCC Part 15.249 & 15.209	
										Limit dBuV/m	Margin dB
Transmitting from 30MHz to 1GHz											
312.05	43.2	QP	56	1.4	V	14.4	1.7	25.05	34.2	46	-11.8
312.05	41.6	QP	45	1.0	H	14.4	1.7	25.05	32.6	46	-13.4
384.42	39.4	QP	60	2.0	V	15.6	1.9	25.31	31.6	46	-14.4
336.48	38.8	QP	60	1.3	H	14.6	1.7	25.17	29.9	46	-16.1
47.85	38.6	QP	45	1.2	V	10.8	0.6	26.2	23.8	40	-16.2
231.16	40.2	QP	135	1.2	H	11.7	1.3	25.05	28.1	46	-17.9
127.21	34.4	QP	98	1.2	V	14.4	1.1	25.79	24.1	43.5	-19.4
125.22	33.5	QP	66	1.0	H	14.4	1.1	25.79	23.2	43.5	-20.3

Plot of Radiation Emissions Test

Radiated Disturbance

EUT: Wireless Camera

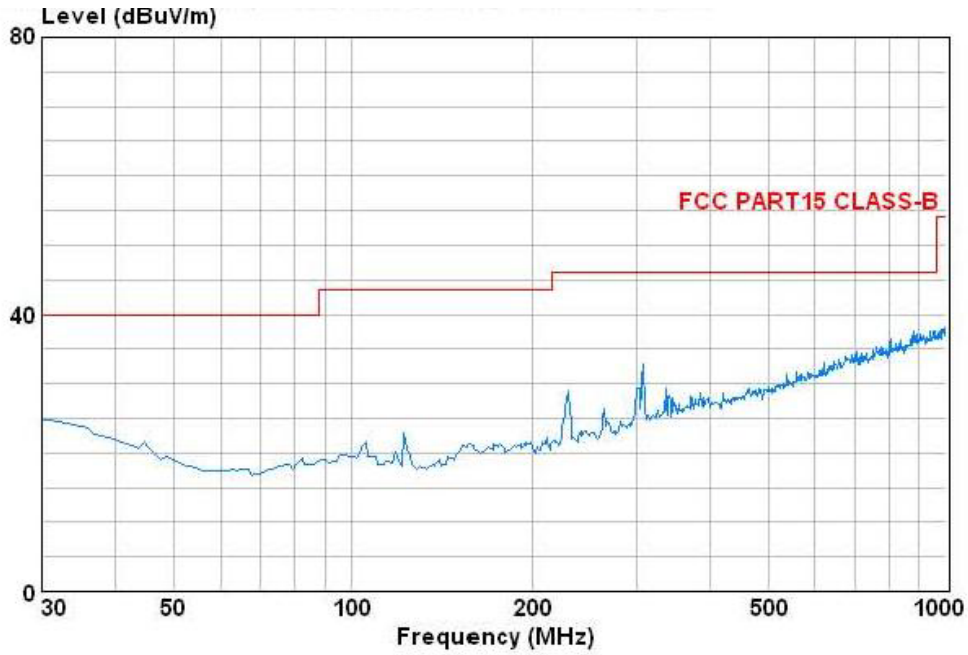
M/N: ZC812

Operating Condition: Transmitting below 1GHz

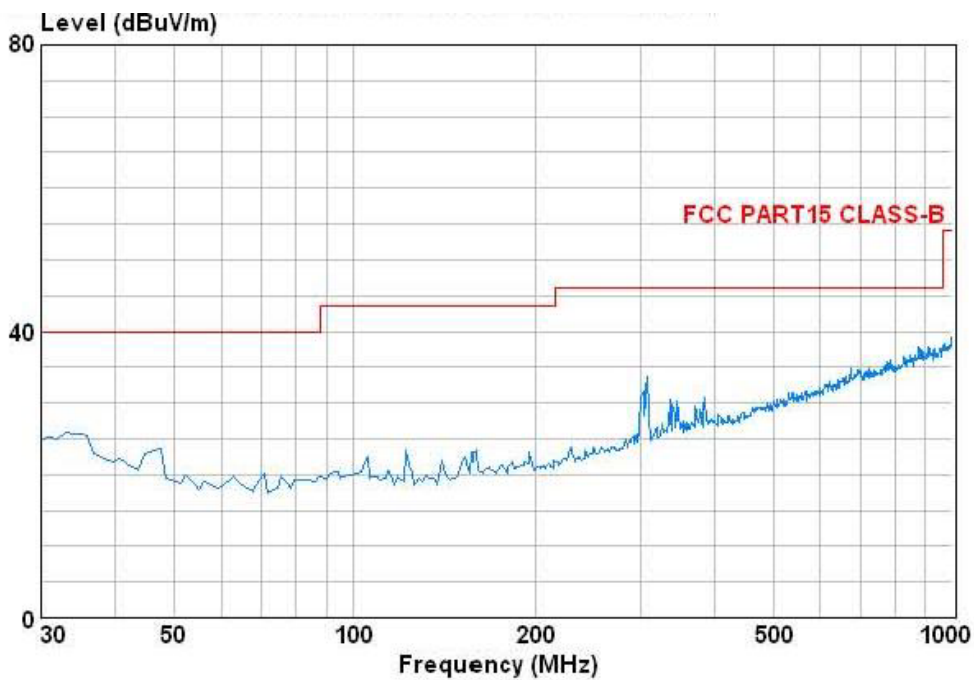
Test Specification: Horizontal & Vertical

Comment: DC 12V adapter

Horizontal



Vertical



6. §15.249(b) OUT OF BAND EMISSIONS

6.1 Standard Applicable

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.

6.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2007-06-30	2008-06-29
ETS.LINDGR EN	Receiver Antenna	2175	57337	2007-01-26	2008-01-25
ETS.LINDGR EN	50 ohm Coaxial Cable	SUCOFLEX 104	25498514	2007-01-26	2008-01-25
Schwarz beck	Horn Antenna	BBHX	BBHX9120-00 2	2007-01-26	2008-01-25

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

6.3 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2438.5MHz, than mark the higher-level emission for comparing with the FCC rules.

6.4 Environmental Conditions

Temperature:	22° C
Relative Humidity:	54%
ATM Pressure:	1012 mbar

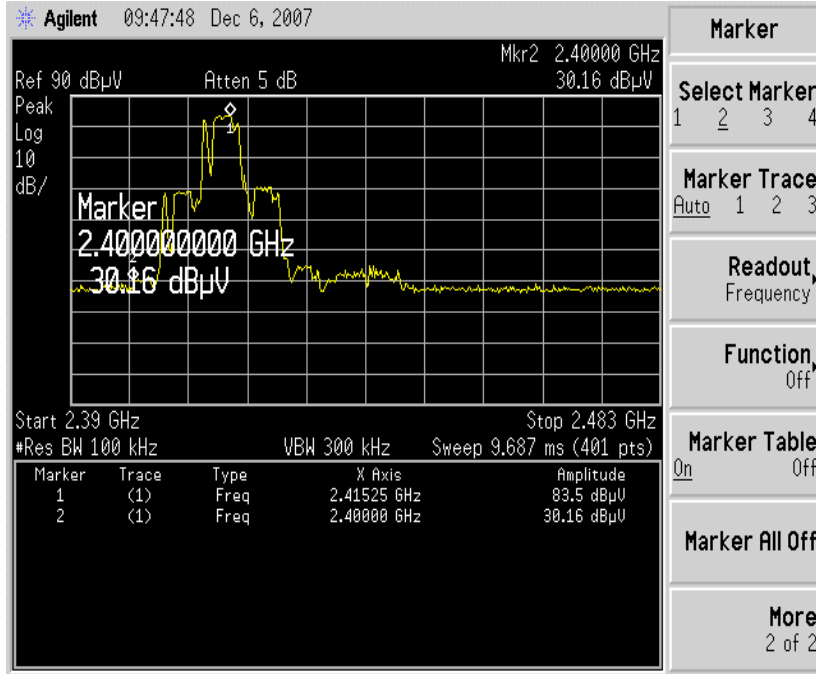
6.5 Summary of Test Results/Plots

Frequency MHz	Emission dB μ V/m	Limit dB μ V/m
2400.0	30.16	54
2438.5	34.58	54

Test Result Pass

Refer to the attached plots.

Lower Bandedge



Upper Bandedge

