FCC Part 15B
Measurement and Test Report

For

Air Visual Limited

Flat B, 18F, Two Chinachem Plaza, 68 Connaught road, Hong Kong

FCC ID: 2AHVMAV-5PCA-4A

Test Rule(s):	FCC Part 15 Subpart B
Product Description:	AirVisual Node
Tested Model:	AV-5PCA-4A
Report No.:	STR16038224I-2
Tested Date:	2016-03-28 to 2016-04-20
Issued Date:	2016-04-20
Tested By:	Jong Wang / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy so / PSQ Manager

Prepared By:

Shenzhen SEM.Test Technology Co., Ltd.
1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,
Bao'an District, Shenzhen, P.R.C.（518101）
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Air Visual Limited
Address of applicant:	Flat B, 18F, Two Chinachem Plaza, 68 Connaught road, Hong Kong
Manufacturer:	Air Visual Limited
Address of manufacturer:	Flat B, 18F, Two Chinachem Plaza, 68 Connaught road, Hong Kong

General Description of EUT	
Product Name:	AirVisual Node
Trade Name:	AirVisual
Model No.:	AV-5PCA-4A
Adding Model(s):	AV-0PCA-4A; AV-5PCV-4A; AV-5PAA-4A; AV-0PAA-4A; AV-5PCA-8A; AV-0PCA-8A; AV-5PCV-8A; AV-5PAA-8A; AV-0PAA-8A
Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model AV-5PCA-4A, but the circuit and the electronic construction do not change, declared by the manufacturer.	

Technical Characteristics of EUT	
Rated Voltage:	DC 3.7V
Rated Current:	1A
Rated Power:	5W
Power Adapter Model:	GQ05-050100-ZU I/P: AC 100-240V, 50/60Hz; O/P: DC 5V/1A
Lowest Internal Frequency:	32.768kHz
Highest Internal Frequency:	1.5GHz
Classification of ITE:	Class B

1.2 Test Standards

The following report is prepared on behalf of the Air Visual Limited in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart B, and section 15.205, 15.107, and 15.109 rules.

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

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, 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.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark
TM1	Charging	/
TM4	Downloading	/

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	1.5	Shielded	With Ferrite

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Notebook	Lenovo	E10	LR-63C8R

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Conducted Emissions	Conducted	±2.88dB
Transmitter Spurious Emissions	Radiated	±5.1dB

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Loop Antenna	Schwarz beck	FMZB 1516	9773	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2015-06-17	2016-06-16
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2015-06-17	2016-06-16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2015-06-17	2016-06-16

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.107 (a)	Conducted Emissions	Compliant
§ 15.109 (a)	Radiated Emissions	Compliant

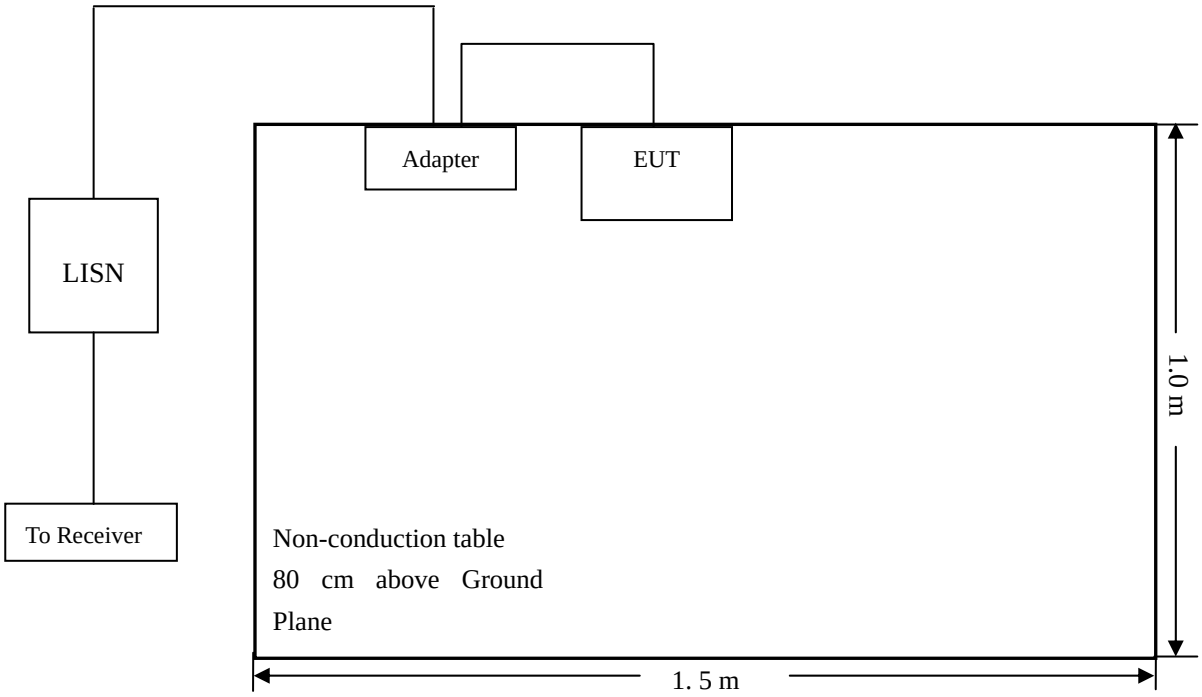
N/A: not applicable

3. Conducted Emissions

3.1 Test Procedure

Test is conducting under the description of ANSI C63.4-2014, 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.

3.2 Basic Test Setup Block Diagram



3.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

3.4 Summary of Test Results/Plots

According to the data in section 3.6, the EUT complied with the FCC Part 15.107(a) Conducted margin for a Class B device, with the *worst* margin reading of:

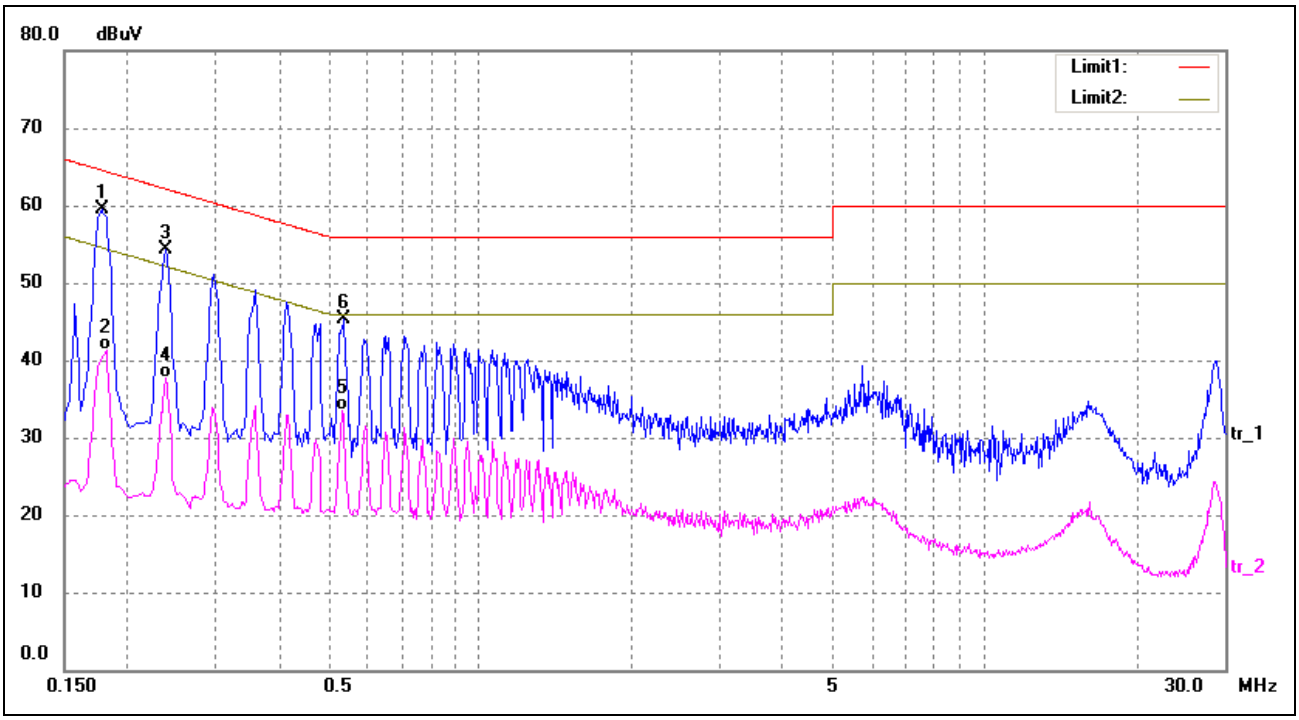
-5.13 dB at **0.1780 MHz** in the **Neutral**, **TM1** Mode **Peak** detector, 0.15-30MHz

3.5 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

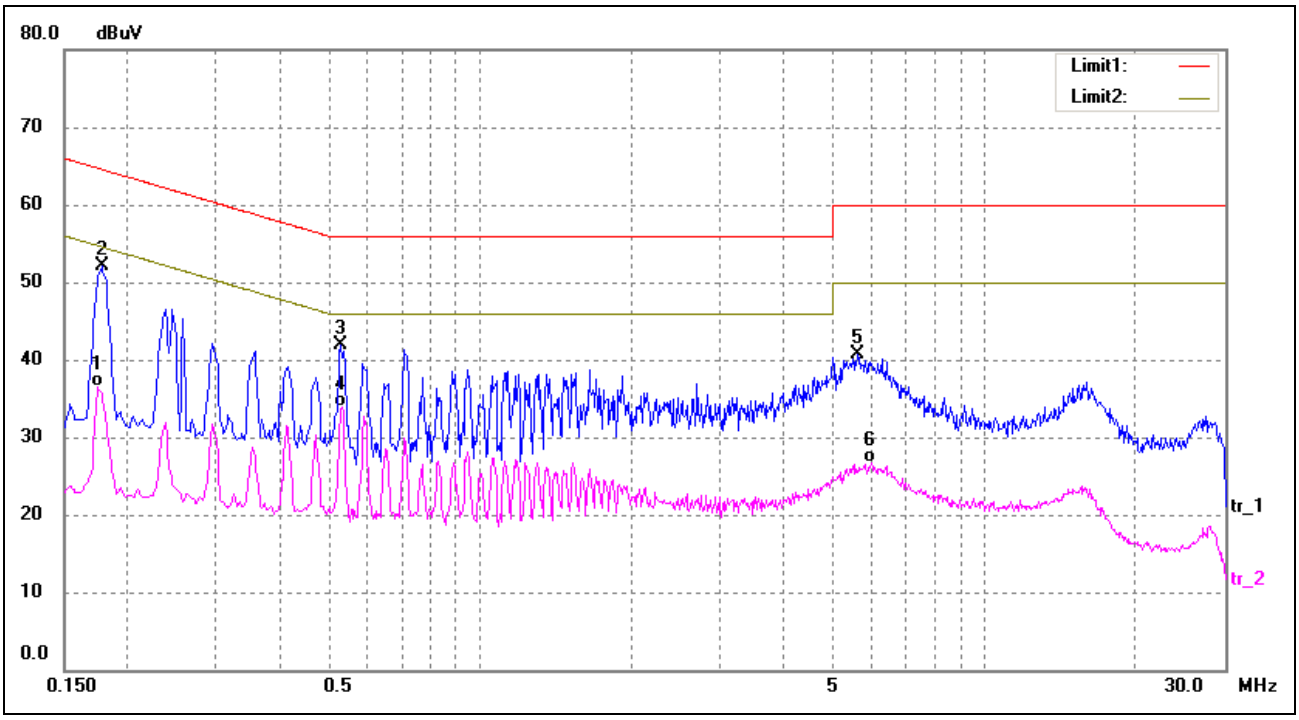
EUT: *AirVisual Node*
Tested Model: *AV-5PCA-4A*
Operating Condition: *TM1*
Comment: *AC 120V/60Hz; Adapter DC 5V*

Test Specification: *Neutral*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.1780	49.95	9.50	59.45	64.58	-5.13	peak
2	0.1820	31.72	9.50	41.22	54.39	-13.17	AVG
3	0.2380	44.72	9.50	54.22	62.17	-7.95	peak
4	0.2380	28.27	9.50	37.77	52.17	-14.40	AVG
5	0.5340	23.91	9.57	33.48	46.00	-12.52	AVG
6	0.5380	35.71	9.57	45.28	56.00	-10.72	peak

Test Specification: *Line*

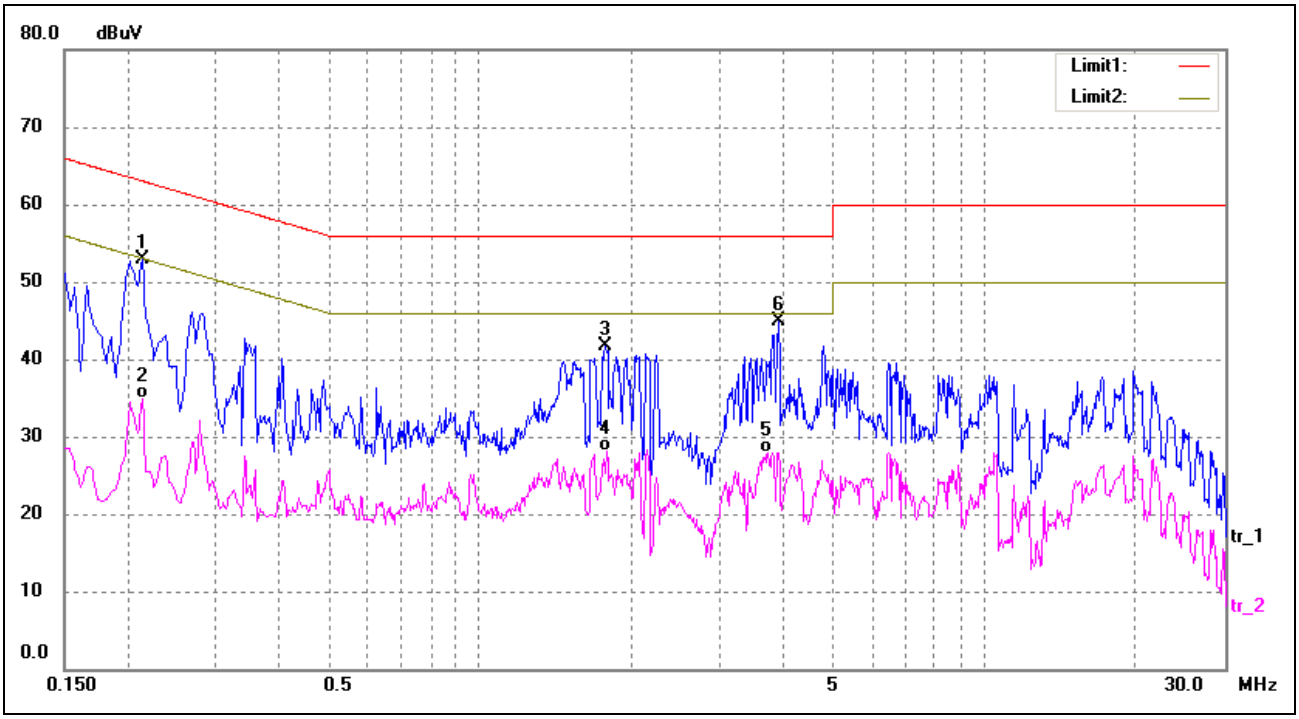


No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.1740	27.02	9.50	36.52	54.77	-18.25	AVG
2	0.1780	42.51	9.50	52.01	64.58	-12.57	peak
3	0.5300	32.40	9.57	41.97	56.00	-14.03	peak
4*	0.5340	24.24	9.57	33.81	46.00	-12.19	AVG
5	5.6020	30.36	10.25	40.61	60.00	-19.39	peak
6	5.9900	16.49	10.26	26.75	50.00	-23.25	AVG

Plot of Conducted Emissions Test Data

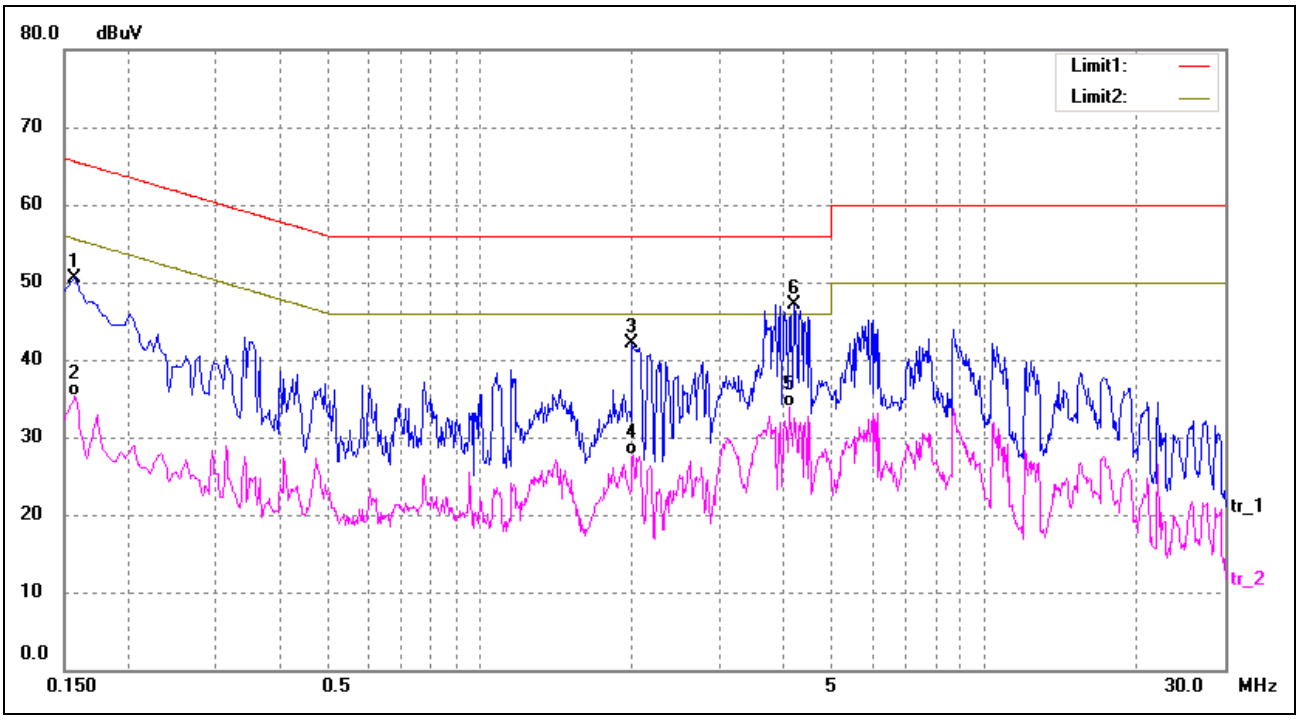
EUT: *AirVisual Node*
Tested Model: *AV-5PCA-4A*
Operating Condition: *TM2*
Comment: *AC 120V/60Hz; USB 5V*

Test Specification: *Neutral*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.2140	43.33	9.50	52.83	63.05	-10.22	peak
2	0.2140	25.47	9.50	34.97	53.05	-18.08	AVG
3	1.7780	31.94	9.79	41.73	56.00	-14.27	peak
4	1.7860	18.30	9.79	28.09	46.00	-17.91	AVG
5	3.7340	17.94	10.06	28.00	46.00	-18.00	AVG
6	3.9020	34.76	10.09	44.85	56.00	-11.15	peak

Test Specification: *Line*

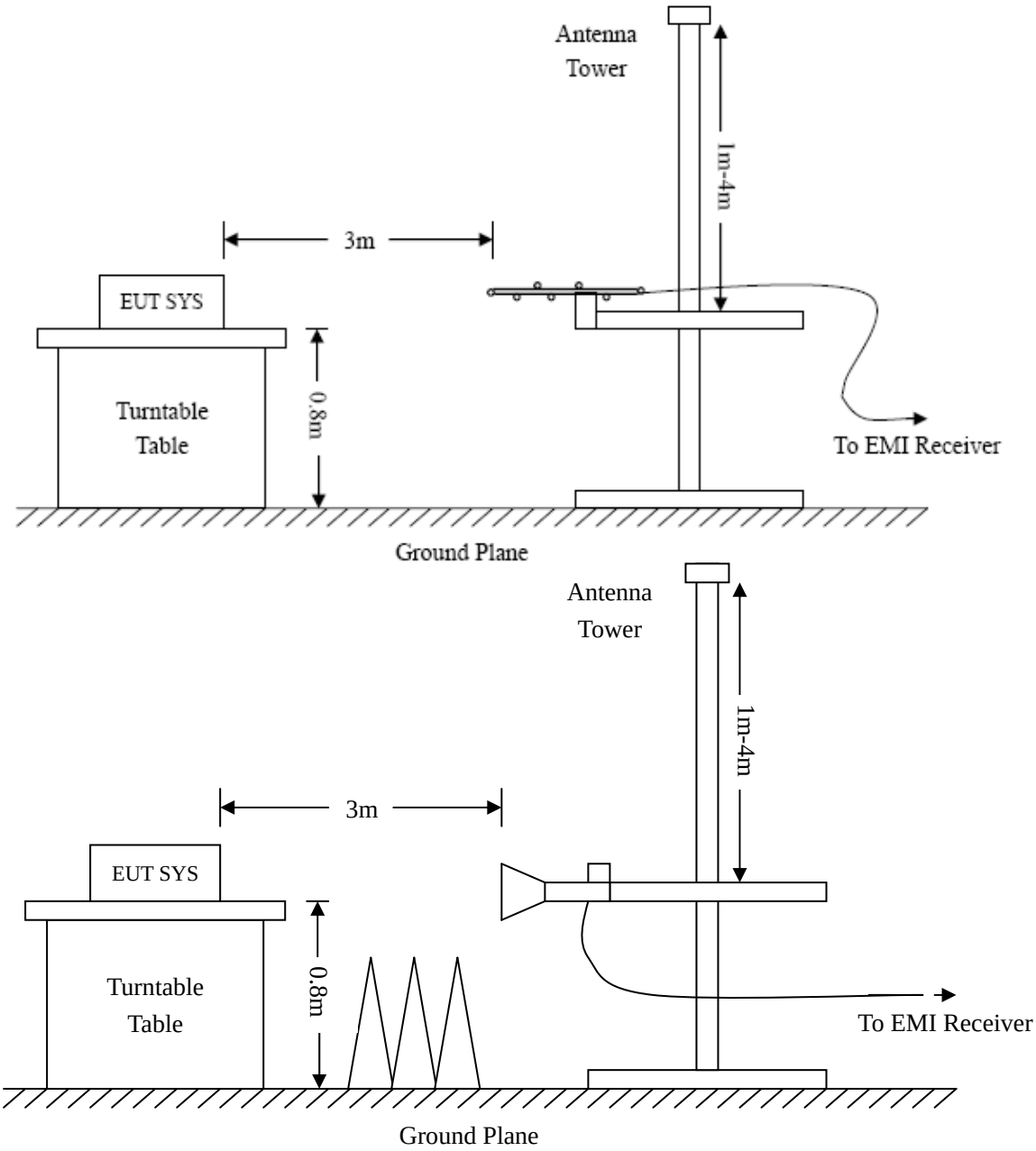


No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.1580	43.37	10.02	53.39	65.57	-12.18	peak
2	0.1740	28.98	9.06	38.04	54.77	-16.73	AVG
3	2.0100	31.53	11.01	42.54	56.00	-13.46	peak
4	2.0980	19.66	11.07	30.73	46.00	-15.27	AVG
5	4.1540	31.38	12.44	43.82	56.00	-12.18	peak
6	4.4740	21.09	12.65	33.74	46.00	-12.26	AVG

4. Radiated Emissions

4.1 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.109 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.



4.2 Test Receiver Setup

Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10KHz,	RBW=120KHz,	RBW=1MHz,
VBW =30KHz	VBW=300KHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak, QP	Detector function = peak, AV

4.3 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:

Corr. Ampl. = Indicated Reading – Corr. Factor

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

Margin = Corr. Ampl. – FCC Part 15.109(a) Limit

4.4 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	55 %
ATM Pressure:	1011 mbar

4.5 Summary of Test Results/Plots

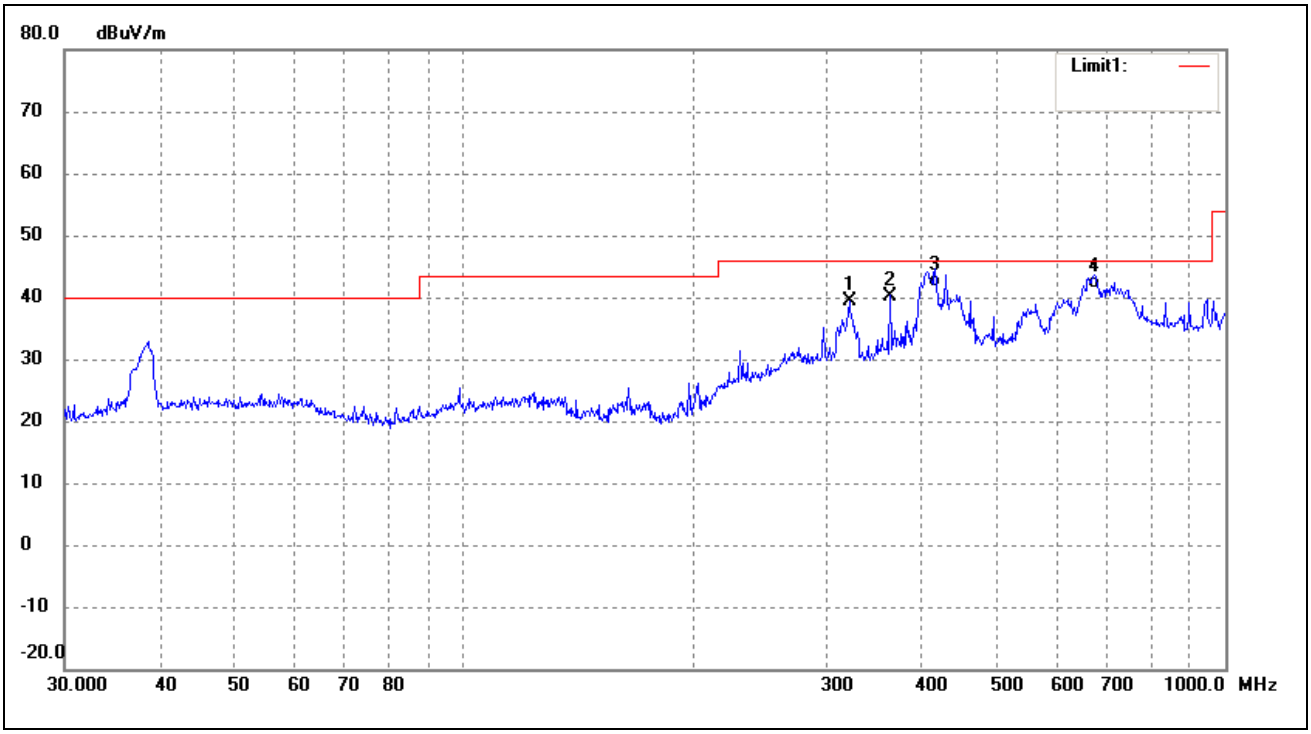
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

-3.24 dB at **672.8445 MHz** in the **Vertical** polarization, **TM2** Mode, **30MHz** to **7.5 GHz**, **3Meters**

Plot of Radiated Emissions Test Data

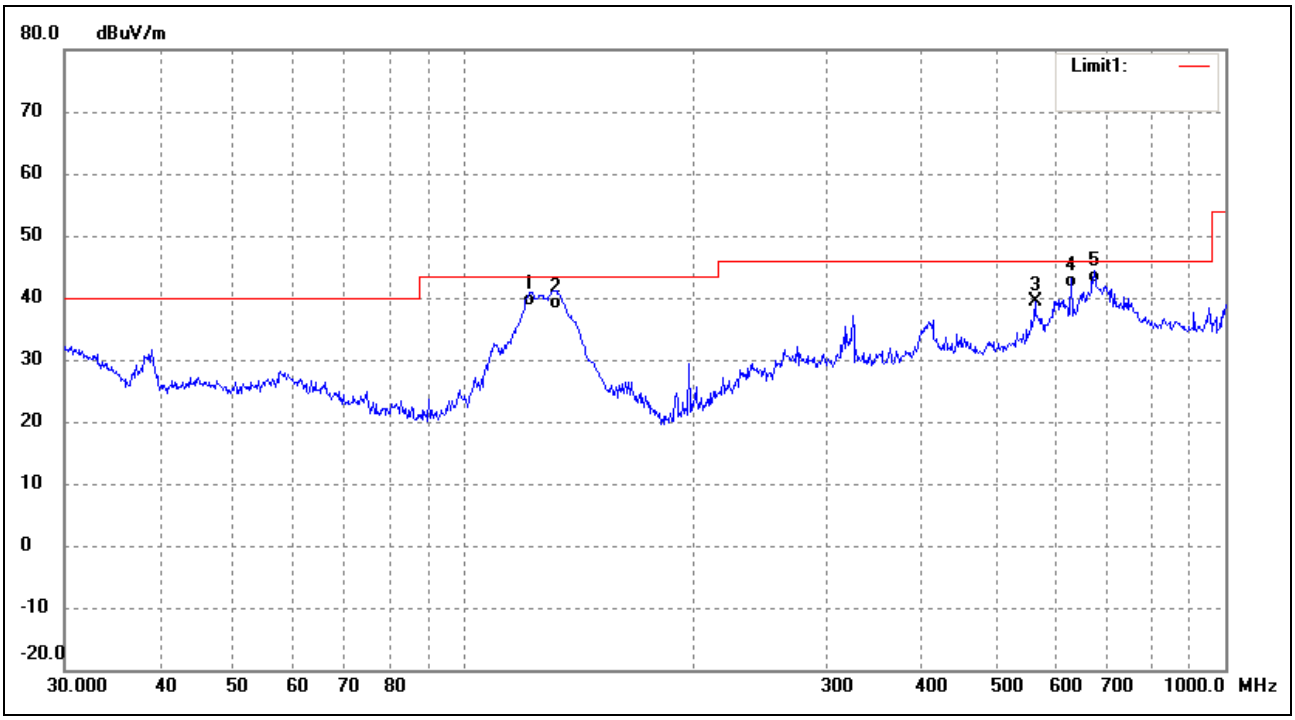
EUT: *AirVisual Node*
Tested Model: *AV-5PCA-4A*
Operating Condition: *TM1*
Comment: *AC 120V/60Hz; Adapter DC 5V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	321.0608	27.18	12.26	39.44	46.00	-6.56	58	100	peak
2	362.9845	28.01	12.24	40.25	46.00	-5.75	157	100	peak
3	416.1791	29.00	12.52	41.52	46.00	-4.48	193	200	QP
4	672.8445	22.60	18.87	41.47	46.00	-4.53	248	100	QP

Test Specification: *Vertical*

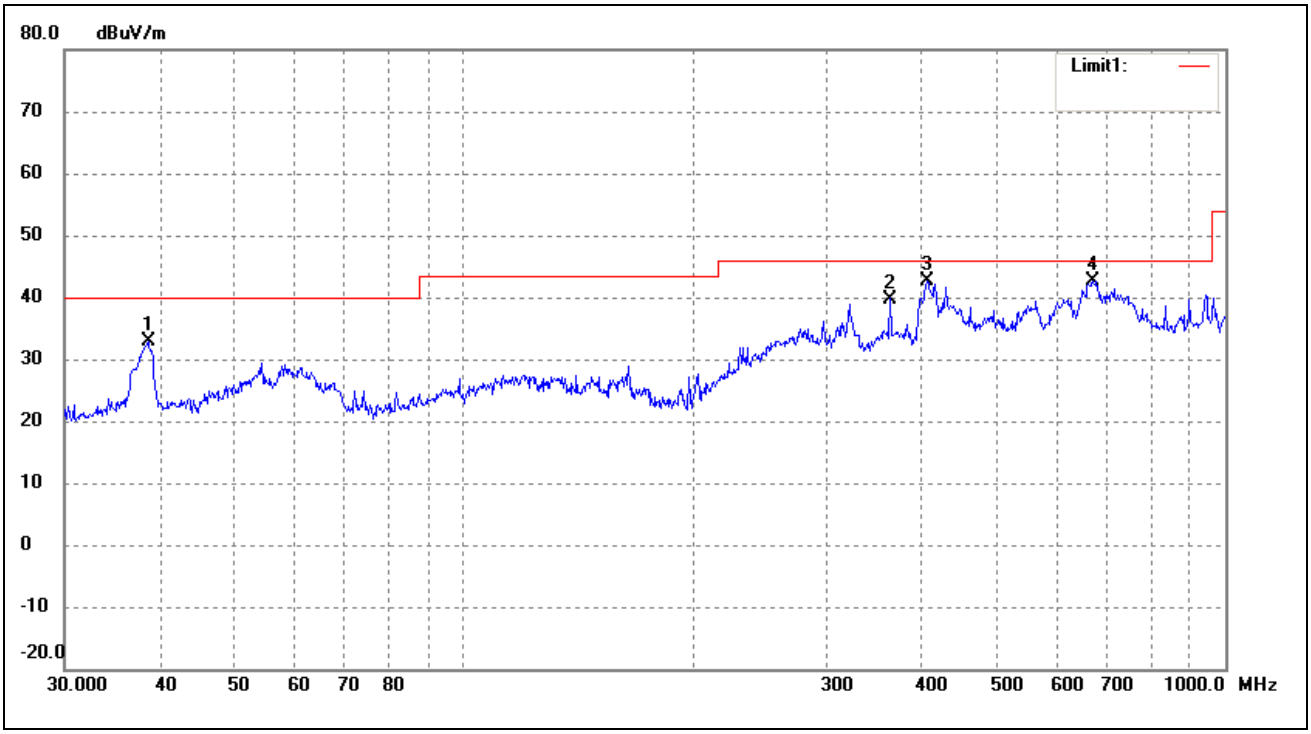


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	122.4040	33.90	4.82	38.72	43.50	-4.78	51	100	QP
2	132.2206	34.00	4.03	38.03	43.50	-5.47	157	100	QP
3	562.6624	24.78	14.67	39.45	46.00	-6.55	120	100	peak
4	627.2738	23.50	18.17	41.67	46.00	-4.33	276	100	QP
5	672.8444	23.60	18.87	42.47	46.00	-3.53	201	100	QP

Plot of Radiated Emissions Test Data

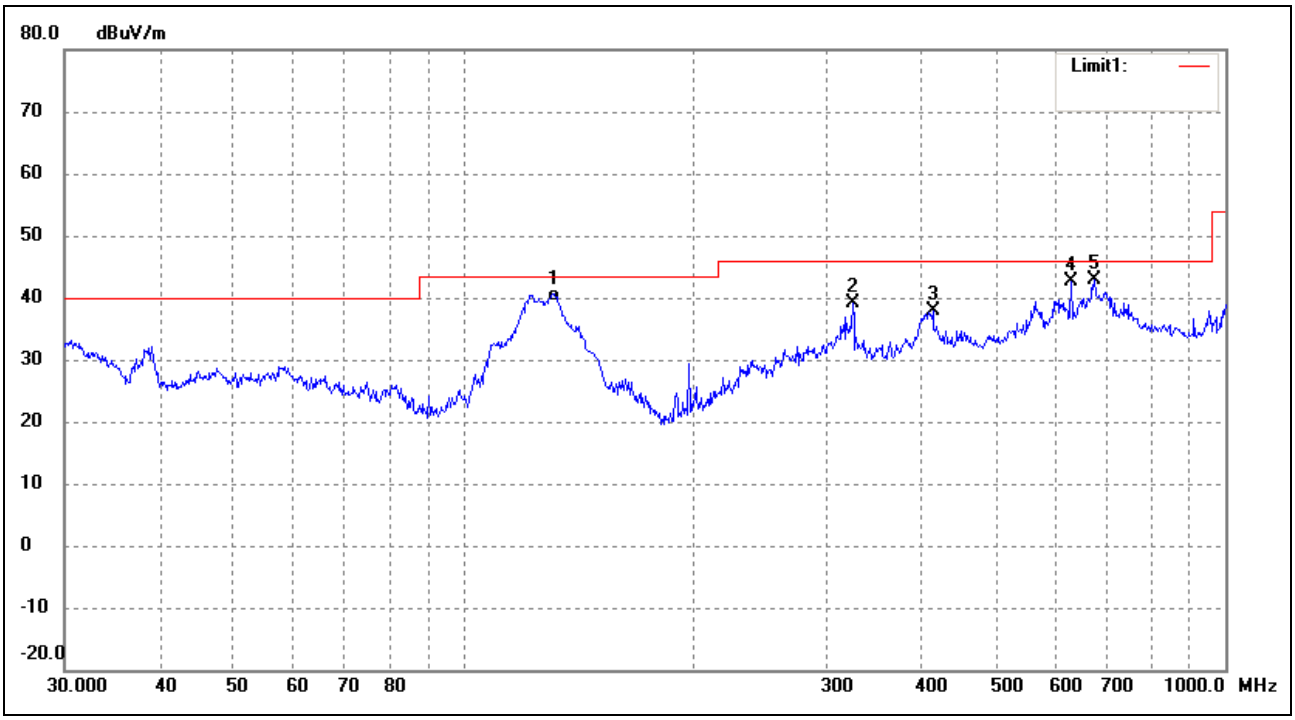
EUT: *AirVisual Node*
Tested Model: *AV-5PCA-4A*
Operating Condition: *TM2*
Comment: *AC 120V/60Hz; USB 5V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	38.6161	27.86	5.01	32.87	40.00	-7.13	38	100	peak
2	362.9845	27.51	12.24	39.75	46.00	-6.25	134	100	peak
3	406.0880	29.78	12.91	42.69	46.00	-3.31	183	200	peak
4	670.4892	23.90	18.73	42.63	46.00	-3.37	159	100	peak

Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	131.7575	35.26	4.07	39.33	43.50	-4.17	82	100	QP
2	324.4560	27.05	12.16	39.21	46.00	-6.79	139	100	peak
3	413.2706	25.36	12.63	37.99	46.00	-8.01	157	100	peak
4	627.2738	24.44	18.17	42.61	46.00	-3.39	210	100	peak
5	672.8445	23.89	18.87	42.76	46.00	-3.24	253	100	peak

Note: Testing is carried out with frequency rang 9kHz to the 5GHz, which above 1GHz is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

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