

# FCC Part 15B

## Measurement and Test Report

For

**Shenzhen Arashi Vision Company Limited**

**Room B031 Logan Century Building, Hai Xiu Road, Bao An**

**District, Shenzhen, Guangdong.**

**FCC ID: 2AFSHINSTA4KB**

<b>FCC Rule(s):</b>	<u>FCC Part 15 Subpart B</u>
<b>Product Description:</b>	<u>360 video camera</u>
<b>Tested Model:</b>	<u>Insta360 4K beta</u>
<b>Report No.:</b>	<u>STR15118144I-2</u>
<b>Tested Date:</b>	<u>2015-11-21 to 2015-12-29</u>
<b>Issued Date:</b>	<u>2015-12-30</u>
<b>Tested By:</b>	<u>Rode Liu / Engineer</u> <i>Rode Liu</i>
<b>Reviewed By:</b>	<u>Silin Chen / EMC Manager</u> <i>Silin Chen</i>
<b>Approved &amp; Authorized By:</b>	<u>Jandy so / PSQ Manager</u> <i>Jandyso</i>
<b>Prepared By:</b>	

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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 Shenzhen SEM.Test Technology Co., Ltd.

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: Shenzhen Arashi Vision Company Limited  
Address of applicant: Room B031 Logan Century Building, Hai Xiu Road,  
Bao An District, Shenzhen, Guangdong.  
Manufacturer: Shenzhen Arashi Vision Company Limited  
Address of manufacturer: Room B031 Logan Century Building, Hai Xiu Road,  
Bao An District, Shenzhen, Guangdong.

General Description of EUT	
Product Name:	360 video camera
Trade Name:	Insta360
Model No.:	Insta360 4K beta
Adding Model(s):	/
<i>Note: The test data is gathered from a production sample, provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Rated Voltage:	Battery DC 3.7V/5000mAh
Rated Current:	/
Rated Power:	15W
Power Adapter Model:	TEKA018-0503000BS I/P: AC100-240V/50Hz; O/P: DC 5V/3A
Lowest Internal Frequency:	12MHz
Highest Internal Frequency:	40MHz
Classification of ITE:	CLASS B

## 1.2 Test Standards

The following report is prepared on behalf of the Shenzhen Arashi Vision Company 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 2<sup>nd</sup> 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 & Camera	for EMI testing
TM2	downloading	for EMI testing
TM3	/	/

EUT Cable List and Details

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

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E23	EB12648265

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB cable	0.5	Unshielded	Without Core
Power cable	1.0	Unshielded	With Core

## 1.6 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

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## 2. SUMMARY OF TEST RESULTS

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Description of Test	Result
§15.107 (a) Conducted Emission	Compliant
§15.109(a) Radiated Emission	Compliant

N/A: not applicable

### 3. Conducted Emissions

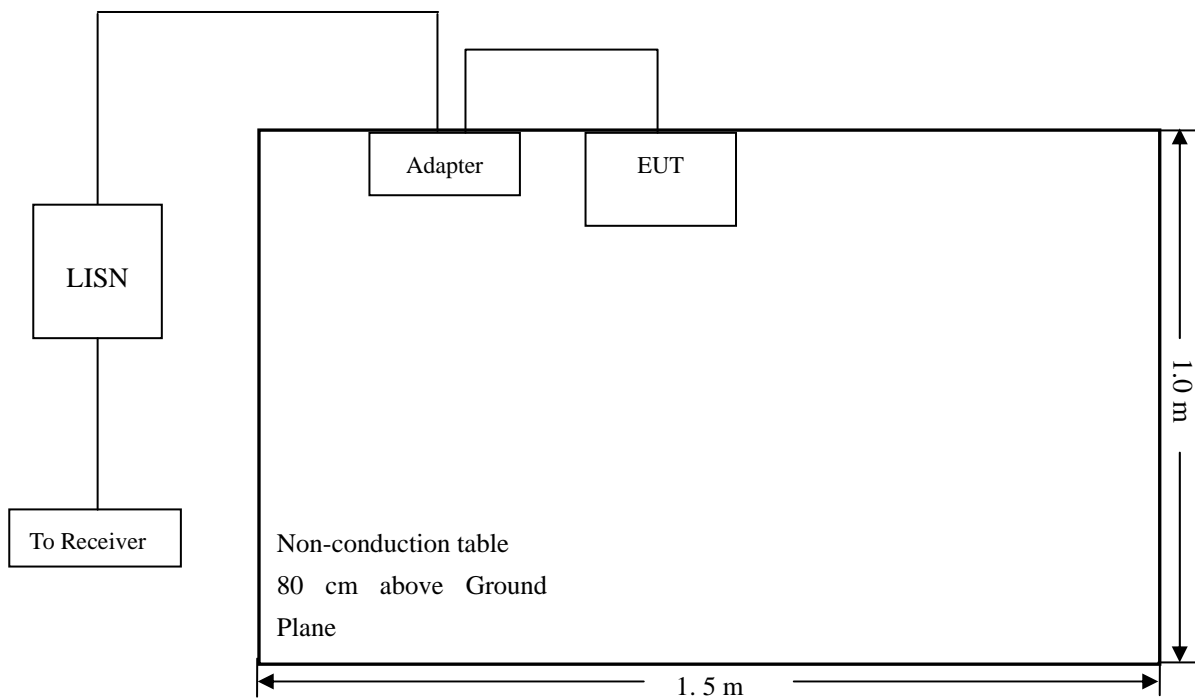
#### 3.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is  $\pm 2.88$  dB.

#### 3.2 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.

#### 3.3 Basic Test Setup Block Diagram



### 3.4 Environmental Conditions

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

### 3.5 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:

**-4.17 dB** at **0.2060 MHz** in the **Neutral, TM2 Mode, Peak** detector, 0.15-30MHz

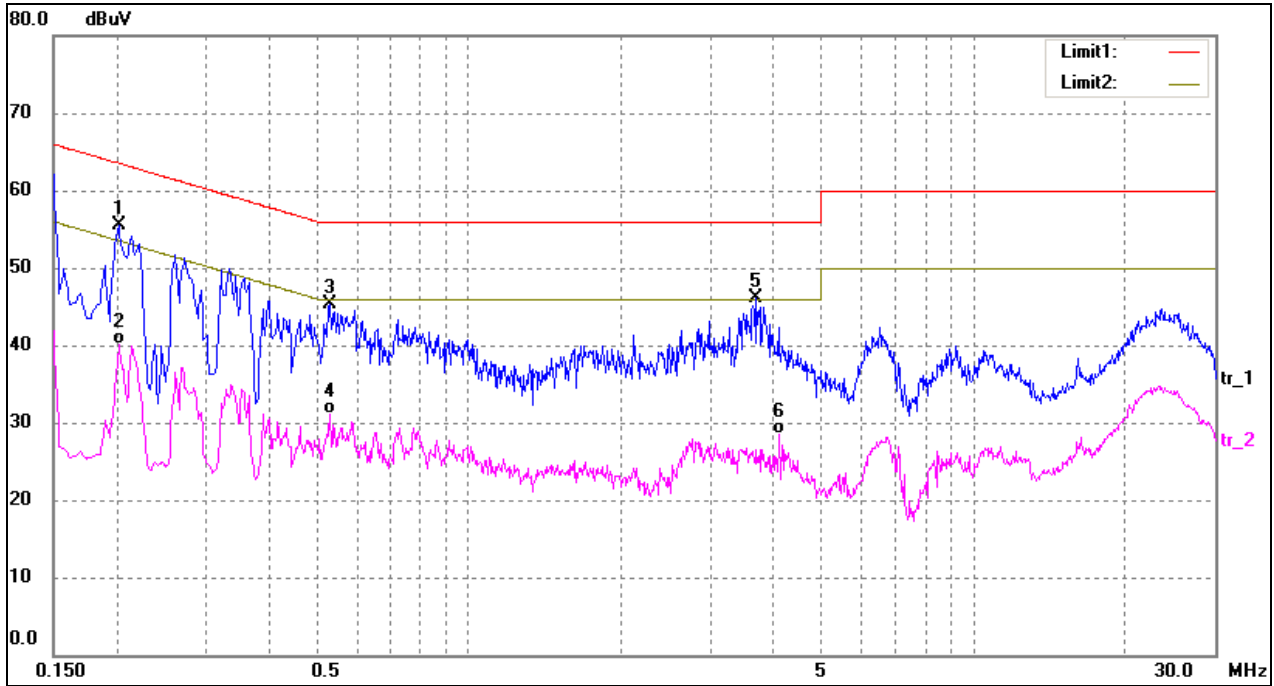
### 3.6 Conducted Emissions Test Data



**Plot of Conducted Emissions Test Data**

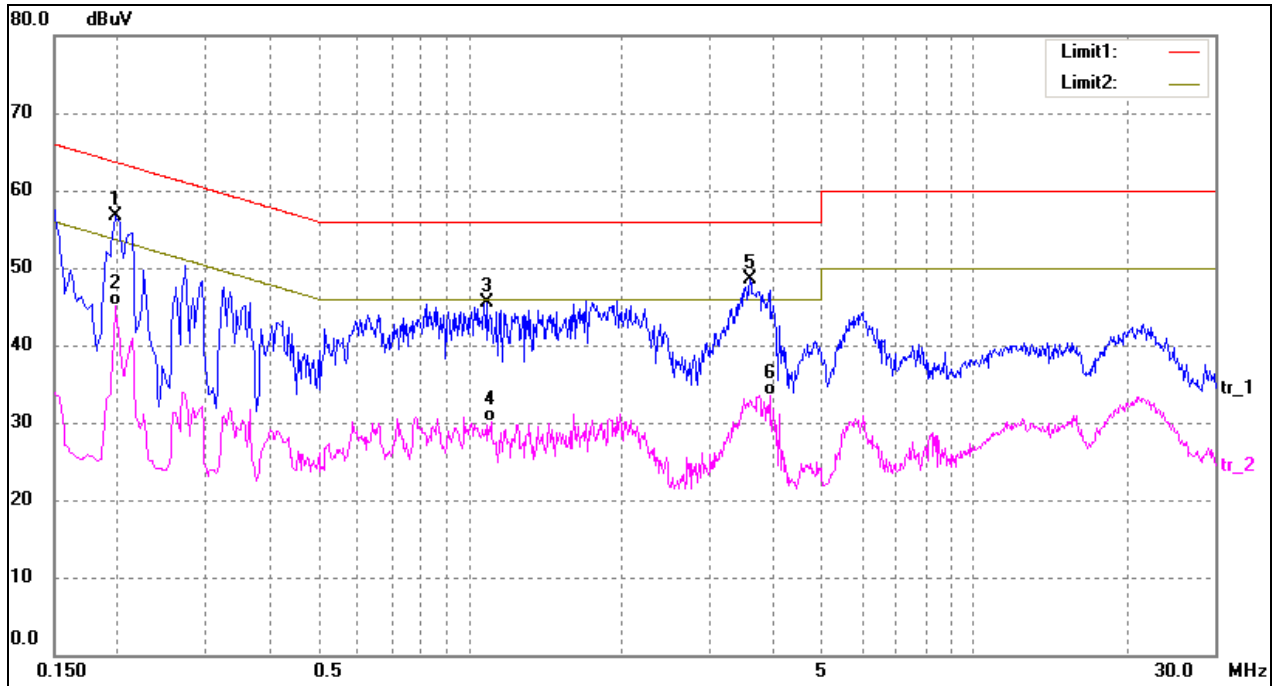
EUT: 360 video camera  
 Tested Model: Insta360 4K beta  
 Operating Condition: TM1  
 Comment: AC 120V/60Hz; Adapter DC 5V/3A

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.2020	43.03	12.50	55.53	63.52	-7.99	peak
2	0.2020	27.58	12.50	40.08	53.52	-13.44	AVG
3	0.5300	32.71	12.53	45.24	56.00	-10.76	peak
4	0.5300	18.63	12.53	31.16	46.00	-14.84	AVG
5	3.7060	33.10	13.00	46.10	56.00	-9.90	peak
6	4.1299	15.46	13.00	28.46	46.00	-17.54	AVG

Test Specification: Line

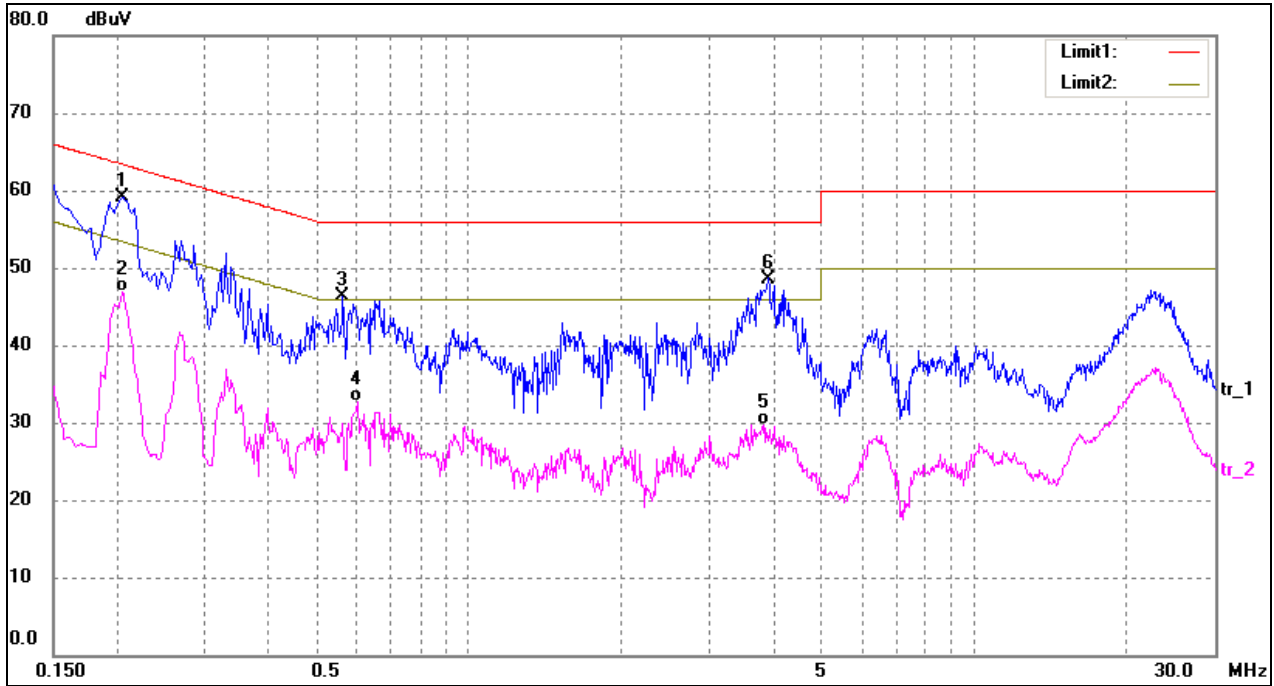


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.2020	39.09	12.50	51.59	63.53	-11.94	QP
2	0.2020	22.32	12.50	34.82	53.53	-18.71	AVG
3	1.9500	23.49	13.00	36.49	56.00	-19.51	QP
4	1.9500	13.10	13.00	26.10	46.00	-19.90	AVG
5	3.8740	26.63	13.00	39.63	56.00	-16.37	QP
6	3.8740	16.71	13.00	29.71	46.00	-16.29	AVG

**Plot of Conducted Emissions Test Data**

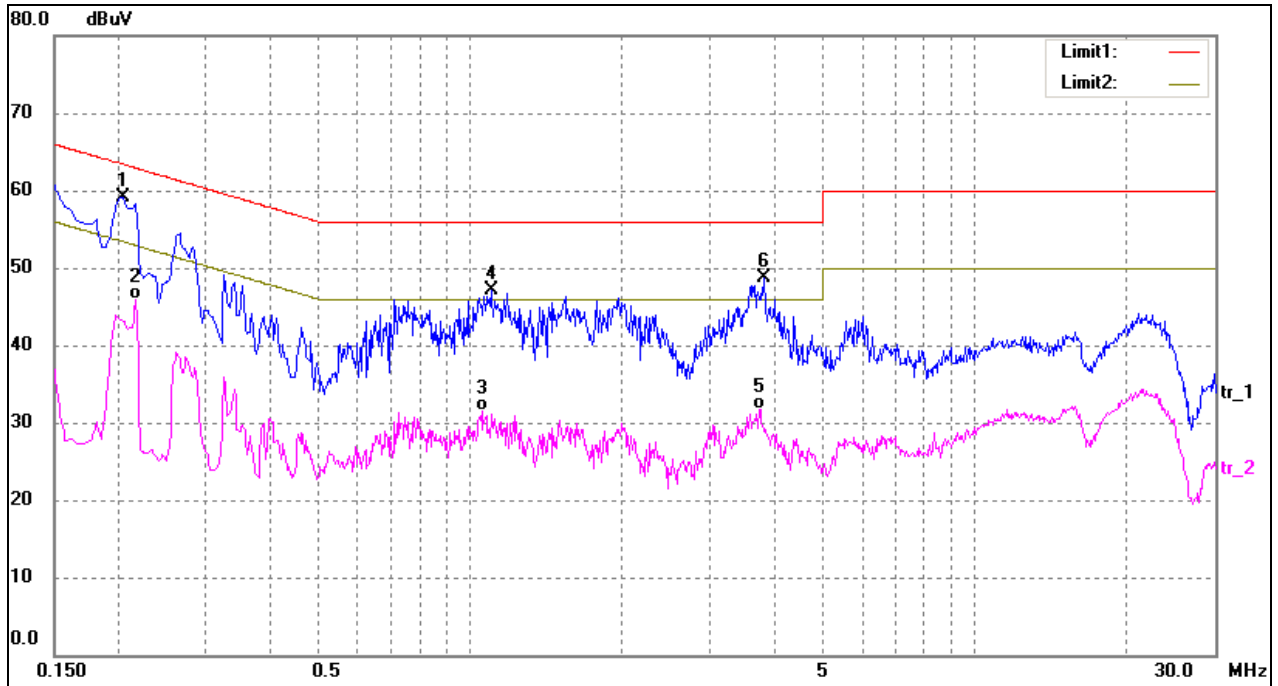
EUT: 360 video camera  
 Tested Model: Insta360 4K beta  
 Operating Condition: TM2  
 Comment: AC 120V/60Hz; USB DC 5V

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.2060	46.69	12.50	59.19	63.36	-4.17	peak
2	0.2060	34.35	12.50	46.85	53.36	-6.51	AVG
3	0.5620	33.67	12.56	46.23	56.00	-9.77	peak
4	0.6020	20.08	12.60	32.68	46.00	-13.32	AVG
5	3.8260	16.71	13.00	29.71	46.00	-16.29	AVG
6	3.9180	35.60	13.00	48.60	56.00	-7.40	peak

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.2060	46.67	12.50	59.17	63.36	-4.19	peak
2	0.2180	33.33	12.50	45.83	52.89	-7.06	AVG
3	1.0580	18.43	13.00	31.43	46.00	-14.57	AVG
4	1.1019	34.19	13.00	47.19	56.00	-8.81	peak
5	3.7620	18.77	13.00	31.77	46.00	-14.23	AVG
6	3.8380	35.69	13.00	48.69	56.00	-7.31	peak

## 4. RADIATED EMISSION

### 4.1 Measurement Uncertainty

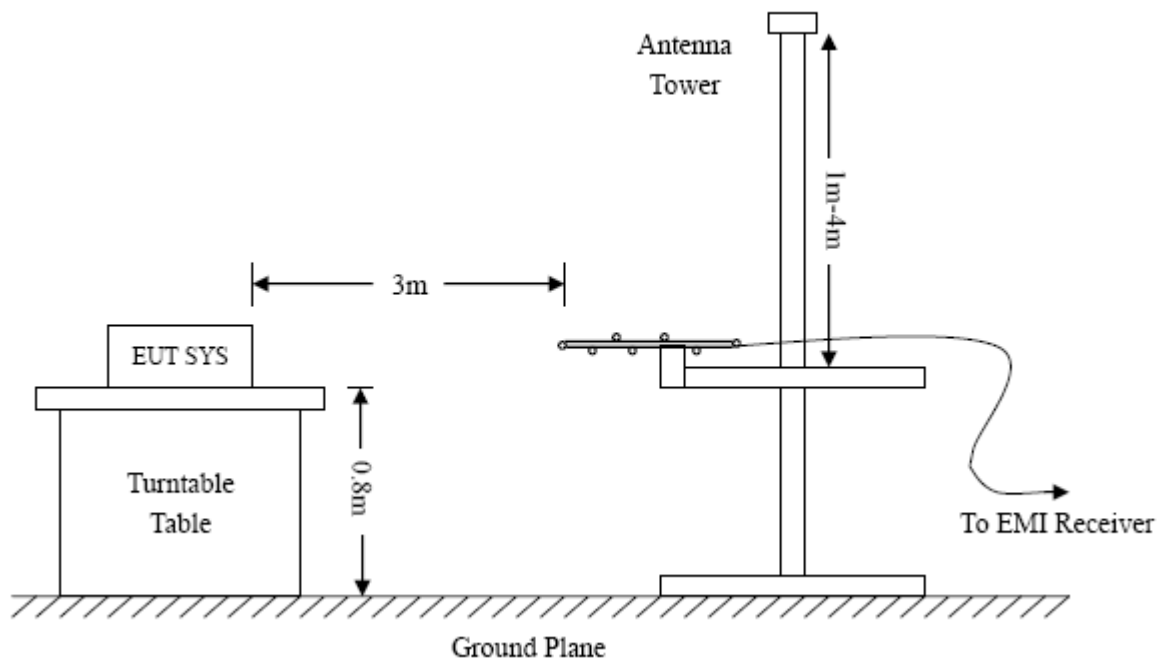
Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is  $\pm 5.10$  dB.

### 4.2 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.



### 4.3 Test Receiver Setup

Frequency :9kHz-30MHz

RBW=10KHz,

VBW =30KHz

Sweep time= Auto

Trace = max hold

Detector function = peak

Frequency :30MHz-1GHz

RBW=120KHz,

VBW=300KHz

Sweep time= Auto

Trace = max hold

Detector function = peak, QP

Frequency :Above 1GHz

RBW=1MHz,

VBW=3MHz(Peak), 10Hz(AV)

Sweep time= Auto

Trace = max hold

Detector function = peak, AV

#### 4.4 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} - \text{Corr. Factor}$$

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

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15.109(a) Limit}$$

#### 4.5 Environmental Conditions

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

#### 4.6 Summary of Test Results/Plots

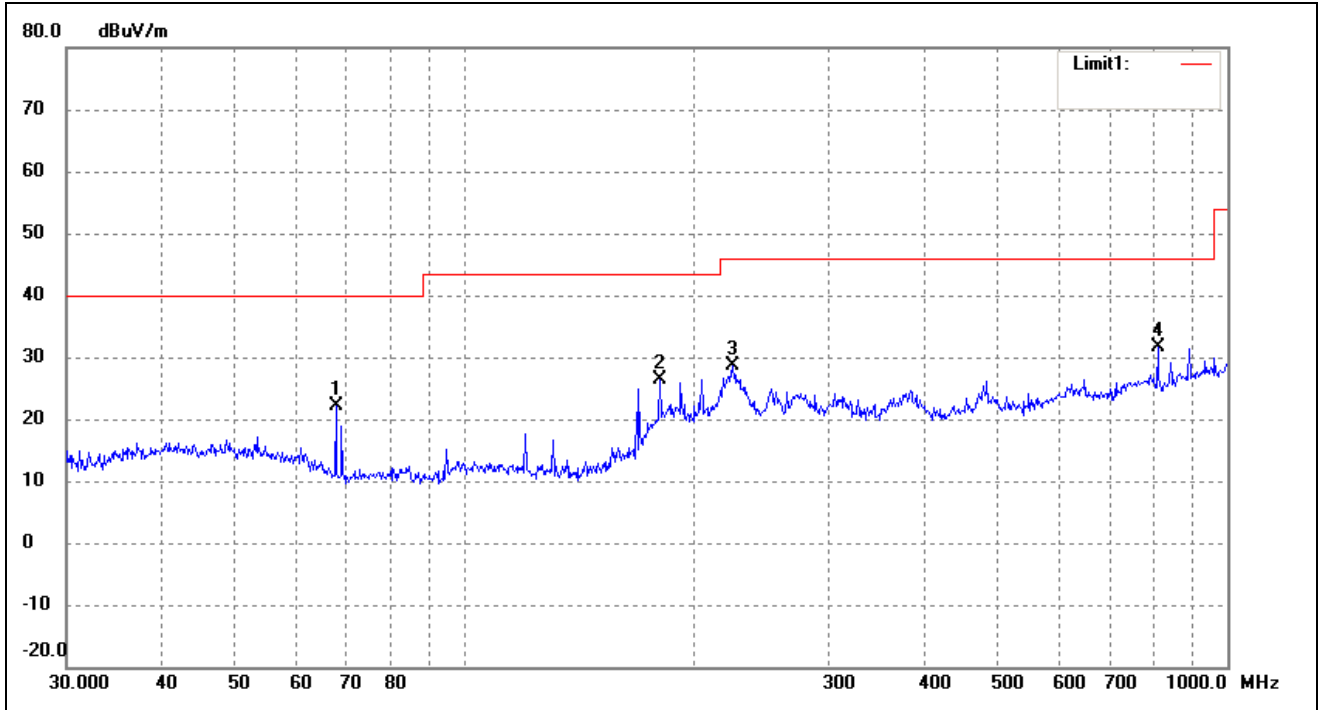
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

**-0.66 dB at 566.6223 MHz in the Horizontal polarization, TM2 Mode, 30 MHz to 1 GHz, 3Meters**

**Plot of Radiated Emissions Test Data**

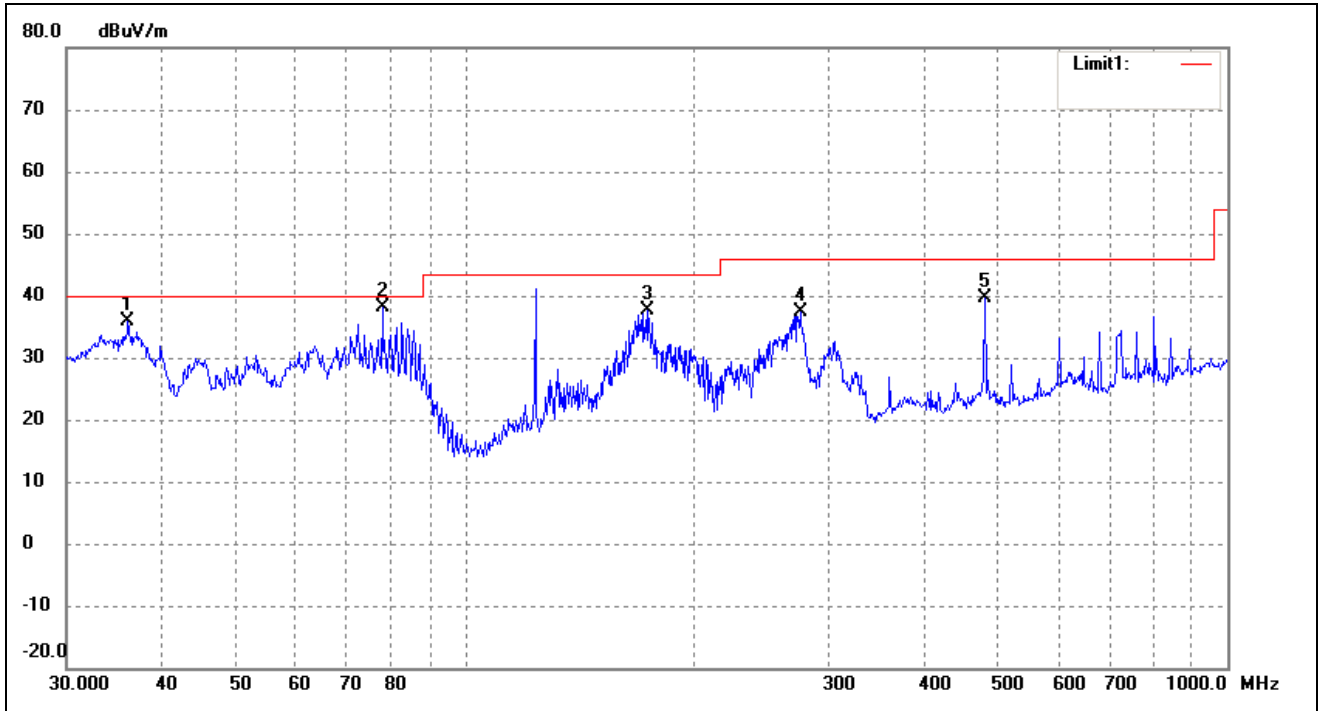
EUT: 360 video camera  
 Tested Model: Insta360 4K beta  
 Operating Condition: TM1  
 Comment: AC 120V/60Hz; Adapter DC 5V/3A

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	67.6751	34.19	-12.08	22.11	40.00	-17.89	100	200	peak
2	180.0165	37.78	-11.36	26.42	43.50	-17.08	100	200	peak
3	224.5193	37.23	-8.72	28.51	46.00	-17.49	100	200	peak
4	810.2654	30.05	1.70	31.75	46.00	-14.25	100	200	peak

Test Specification: Vertical



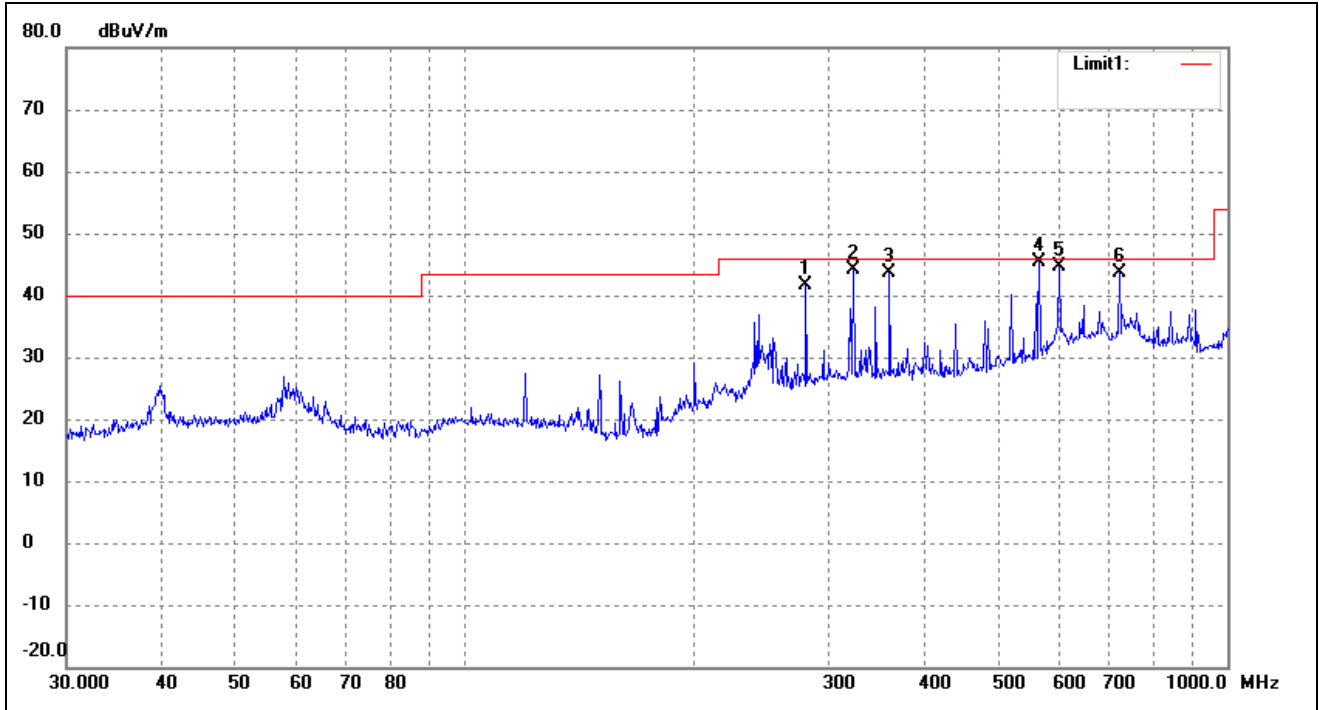
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	36.1272	44.68	-8.74	35.94	40.00	-4.06	100	100	peak
2	77.8654	50.21	-12.17	38.04	40.00	-1.96	100	100	peak
3	173.2051	49.34	-11.68	37.66	43.50	-5.84	100	100	peak
4	275.1570	43.62	-6.30	37.32	46.00	-8.68	100	100	peak
5	480.5276	40.65	-1.08	39.57	46.00	-6.43	100	100	peak



**Plot of Radiated Emissions Test Data**

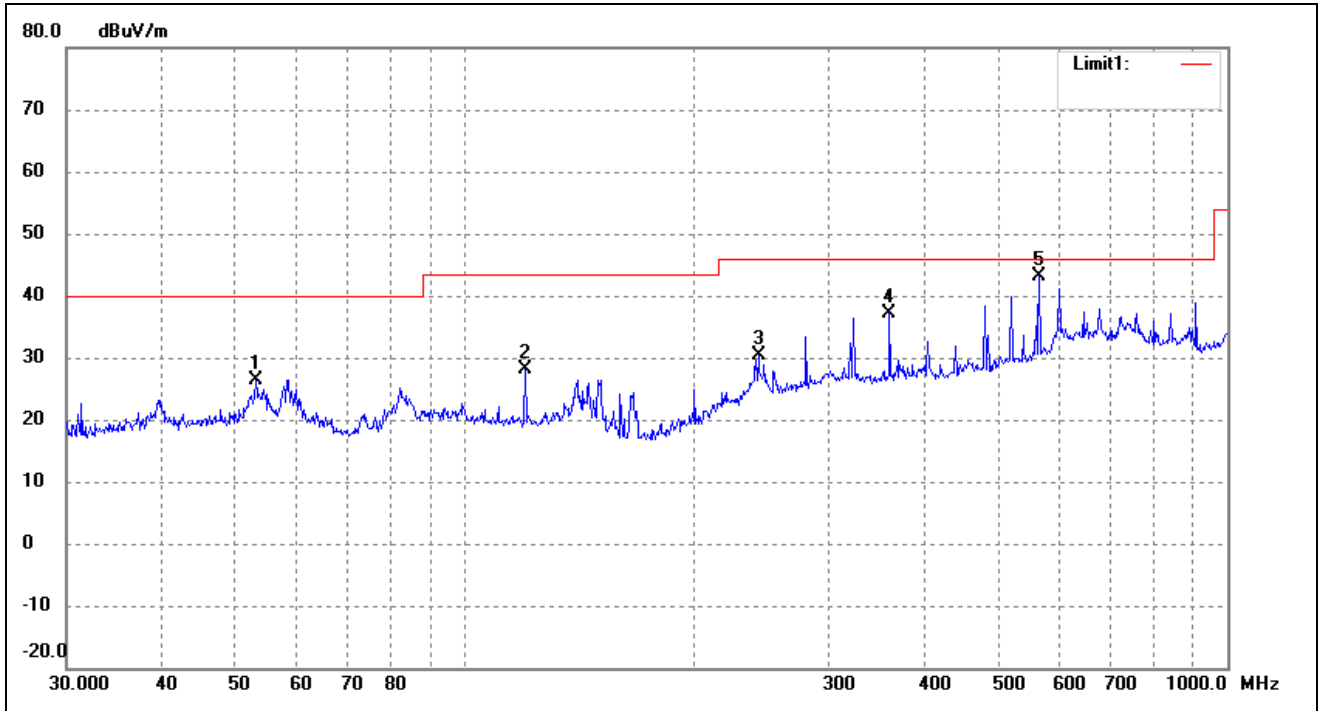
EUT: 360 video camera  
 Tested Model: Insta360 4K beta  
 Operating Condition: TM2  
 Comment: AC 120V/60Hz; USB DC 5V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	280.0237	30.22	11.40	41.62	46.00	-4.38	58	200	peak
2	323.3204	31.88	12.19	44.07	46.00	-1.93	326	200	peak
3	360.4476	31.34	12.24	43.58	46.00	-2.42	29	200	peak
4	566.6223	30.47	14.87	45.34	46.00	-0.66	209	200	peak
5	601.4265	25.40	19.22	44.62	46.00	-1.38	100	100	peak
6	721.7259	25.13	18.47	43.60	46.00	-2.40	100	100	peak

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	53.1313	21.12	5.30	26.42	40.00	-13.58	100	100	peak
2	119.8555	23.07	5.02	28.09	43.50	-15.41	100	100	peak
3	242.5253	20.83	9.43	30.26	46.00	-15.74	100	100	peak
4	360.4476	24.78	12.24	37.02	46.00	-8.98	100	100	peak
5	566.6223	28.27	14.87	43.14	46.00	-2.86	100	100	peak

The measurements greater than 20dB below the limit from 9kHz to 30MHz and test data are not provided.

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