CE-EMC Test Report

Applicant:	_____
Product Description:	small action camera
Tested Model:	SDV121
Test Standards:	Draft ETSI EN 301 489-1 V2.2.0 (2017-03) Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
Report No.:	JQL170512936-1E
Date of Test:	2017-05-03 to 2017-05-12
Date of Issue:	2017-05-12
Tested By:	_____ (Andy Yang / Test Engineer)
Reviewed By:	_____ (RC Peng / Manager)

Prepared By:

Shenzhen Jialian Testing Consulting Co., Ltd.

5/F, 7 Building, XinYuan Industrial Park, Xili Town, NanShan District, ShenZhen City, China

Tel.: +86-755-26994385 Fax.: +86-755-86108753 Website: www.test-jql.com

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:

Address of applicant:

Manufacturer:

Address of manufacturer:

General Description of EUT	
Product Name:	small action camera
Trade Name:	--
Model No.:	SDV121
Adding Model(s):	SDV100, SDV101, SVD102, SDVX(X=103-120), SDVY(Y=122-200)
Rated Voltage:	Battery 3.7V, Charging: USB 5V
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Frequency Range:	2412-2472MHz for 802.11b,g,n-HT20 2422-2462MHz for 802.11n-HT40
RF Output Power:	12.78 dBm (EIRP)
Type of Modulation:	CCK, PBCC, QPSK, BPSK, 16QAM, 64QAM
Data Rate:	1-11Mbps, 6-54Mbps, up to 150Mbps
Quantity of Channels	13 for 802.11b,g,n-HT20 9 for 802.11n-HT40
Channel Separation:	5MHz
Type of Antenna:	Integral Antenna
Antenna Gain:	0 dBi

1.2 Test Standards

The following report is prepared on behalf of the Deeray Global Co., Ltd in accordance Draft ETSI EN 301 489-1 V2.2.0 (2017-03) ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU. Draft ETSI EN 301 489-17 V3.2.0 (2017-03) ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

The objective of the manufacturer is to demonstrate compliance with the standards ETSI EN 301 489-1 V2.2.0 (2017-03) and Draft ETSI EN 301 489-17 V3.2.0 (2017-03).

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

1.3 Test Methodology

All measurements contained in this report were conducted with the standard ETSI EN 301 489-1 V2.2.0 (2017-03)

1.4 Test Facility

CNAS Registration No.: L0579

Shenzhen Academy of Metrology and Quality Inspection is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L0579. All measurement facilities used to collect the measurement data are located at Metrology and Quality Inspection Building,Central Section of LongZhu Road, Nanshan District, Shenzhen (518055)

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	Connect to PC
TM2	Operating	Wi-Fi TT & TR

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
/	/	/	/

Special Cable List and Details

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

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Conducted Emissions	150kHz-30MHz	±2.88dB
Radiated Emissions	30MHz-6GHz	±5.10dB

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2016-07-01	2017-06-30
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2016-07-01	2017-06-30
Amplifier	Agilent	8447F	3113A06717	2016-07-01	2017-06-30
Amplifier	C&D	PAP-1G18	2002	2016-07-01	2017-06-30
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2016-07-01	2017-06-30
Horn Antenna	ETS	3117	00086197	2016-07-01	2017-06-30
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2016-07-01	2017-06-30
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2016-07-01	2017-06-30
AC LISN	Schwarz beck	NSLK8126	8126-224	2016-07-01	2017-06-30
Digital Power Analyzer	California Instrument	PACS-1	72831	2016-07-01	2017-06-30
Power Source	California Instrument	5001iX	25965	2016-07-01	2017-06-30
ESD Generator	TESQ AG	NSG 437	161	2016-07-01	2017-06-30
Signal Generator	Rohde & Schwarz	SMT03	100059	2016-07-01	2017-06-30
Voltage Probe	Rohde & Schwarz	URV5-Z2	100013	2016-07-01	2017-06-30
Power Amplifier	AR	150W1000	300999	2016-07-01	2017-06-30
Power Amplifier	AR	25S1G4AM1	305993	2016-07-01	2017-06-30
Transient 2000	EMC PARTNER	TRA2000	863	2016-07-01	2017-06-30
CW Simulator	EM Test	CWS 500C	0900-03	2016-07-01	2017-06-30
Anechoic chamber	Albatross Projects	MCDC	----	2016-07-01	2017-06-30

1.8 Performance Criteria for EMS

According Clause 6.1 of EN 301 489-17, the performance criteria are:

-performance criteria A for immunity tests with phenomena of a continuous nature;

-performance criteria B for immunity tests with phenomena of a transient nature;

-performance criteria C for immunity tests with power interruptions exceeding a certain time.

Criteria	During test	After test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).

NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

2. SUMMARY OF TEST RESULTS

Standards	Reference	Description of Test Item	Result
Draft ETSI EN 301 489-1 V2.2.0 (2017-03)	8.2	Radiated Emissions	Pass
	8.3	Conducted Emissions for DC Power Port	N/A
	8.4	Conducted Emissions for AC Power Port	Pass
	8.5	Harmonic Current Emissions	N/A
	8.6	Voltage Fluctuations and Flicker	N/A
	8.7	Telecommunication Ports	N/A
	9.2	Radio Frequency Electromagnetic Field	Pass
	9.3	Electrostatic Discharge	Pass
	9.4	Fast Transients, Common Mode	Pass
	9.5	Radio Frequency, Common Mode	Pass
	9.6	Transient and Surges in the Vehicular Environment	N/A
	9.7	Voltage Dips and Interruptions	N/A
	9.8	Surges	Pass

Pass: The EUT complies with the essential requirements in the standard
Fail: The EUT does not comply with the essential requirements in the standard
N/A: not applicable

3. Conducted Emissions

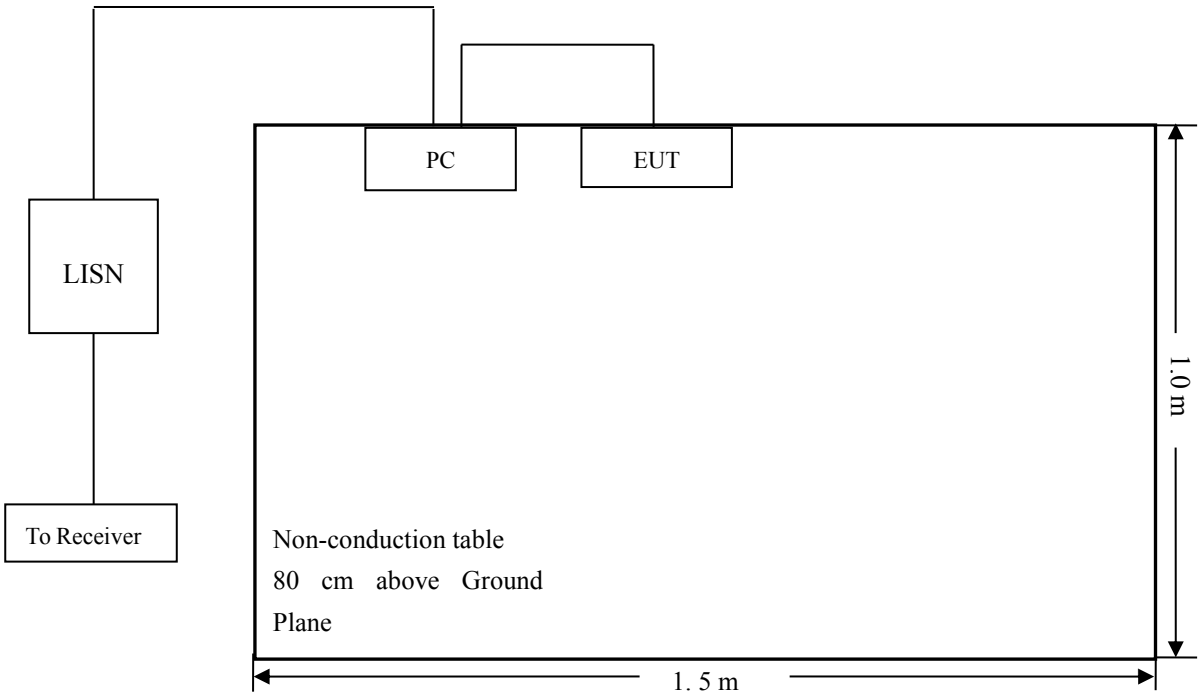
3.1 Measurement Uncertainty

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

3.2 Test Procedure

Test is conducting under the description of EN55032 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.

3.3 Basic Test Setup Block Diagram



3.5 Environmental Conditions

Temperature:	22 ° C
Relative Humidity:	55 %
ATM Pressure:	1011 mbar

3.6 Summary of Test Results/Plots

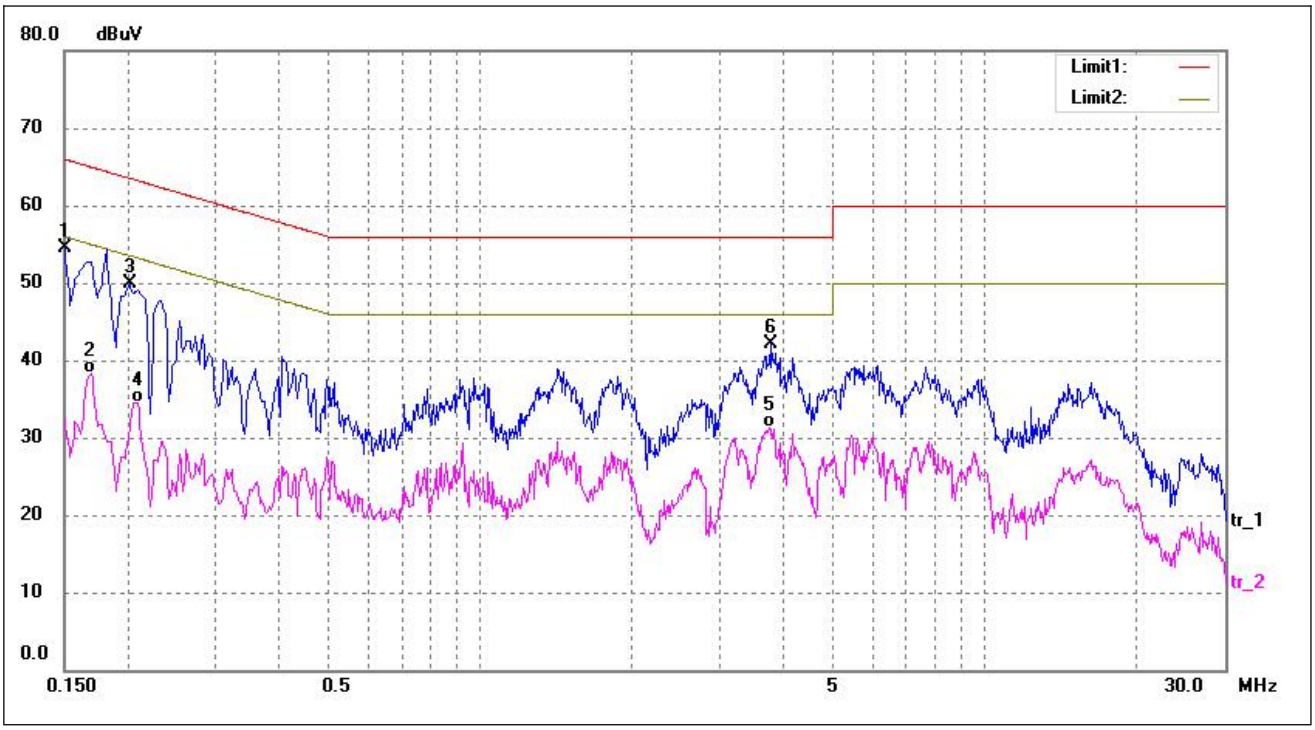
According to the data in section 3.7, the EUT complied with the EN 301489

3.5 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

EUT: *small action camera*
Tested Model: *SDV121*
Operating Condition: *TM1*
Comment: *Charging*

Test Specification: *Line*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.1500	45.07	9.50	54.57	66.00	-11.43	peak
2	0.1700	28.80	9.50	38.30	54.96	-16.66	AVG
3	0.2020	40.43	9.50	49.93	63.53	-13.60	peak
4	0.2100	25.09	9.50	34.59	53.21	-18.62	AVG
5	3.7540	21.15	10.07	31.22	46.00	-14.78	AVG
6	3.7700	31.98	10.07	42.05	56.00	-13.95	peak

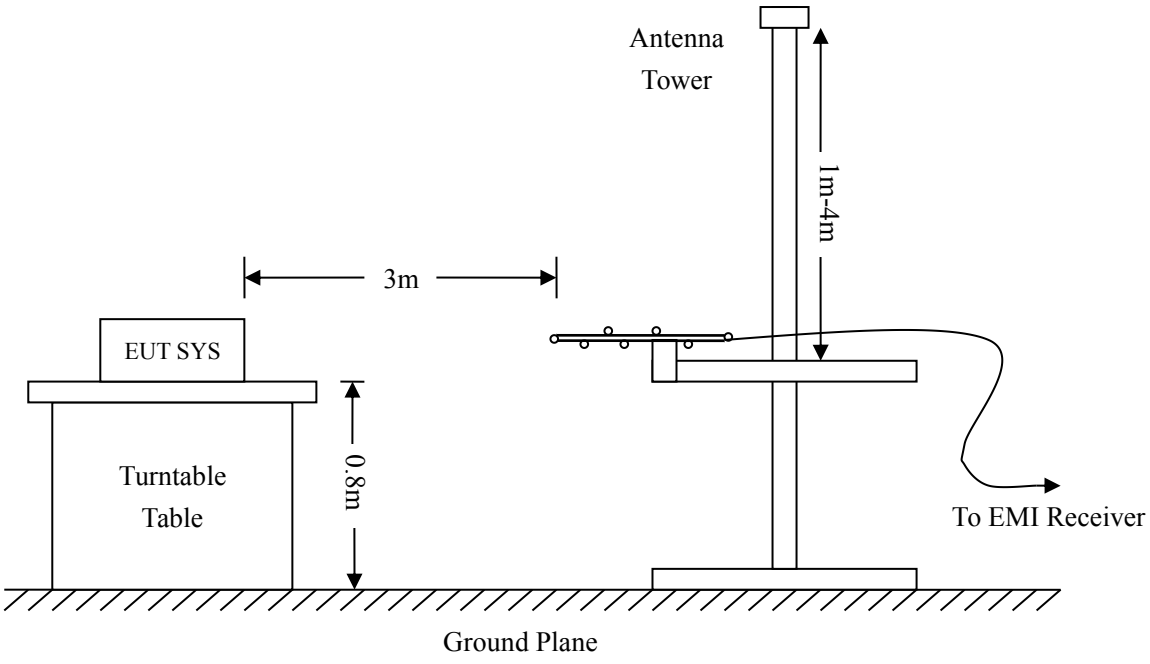
4. Radiated Emissions

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 ± 5.10 dB.

4.2 Test Procedure

Test is conducting under the description of EN55022 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.



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 + Antenna Factor + Cable Factor - Amplifier Gain

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 Class B device. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – EN 301489 Class B Limit

4.4 Environmental Conditions

Temperature:	23° C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

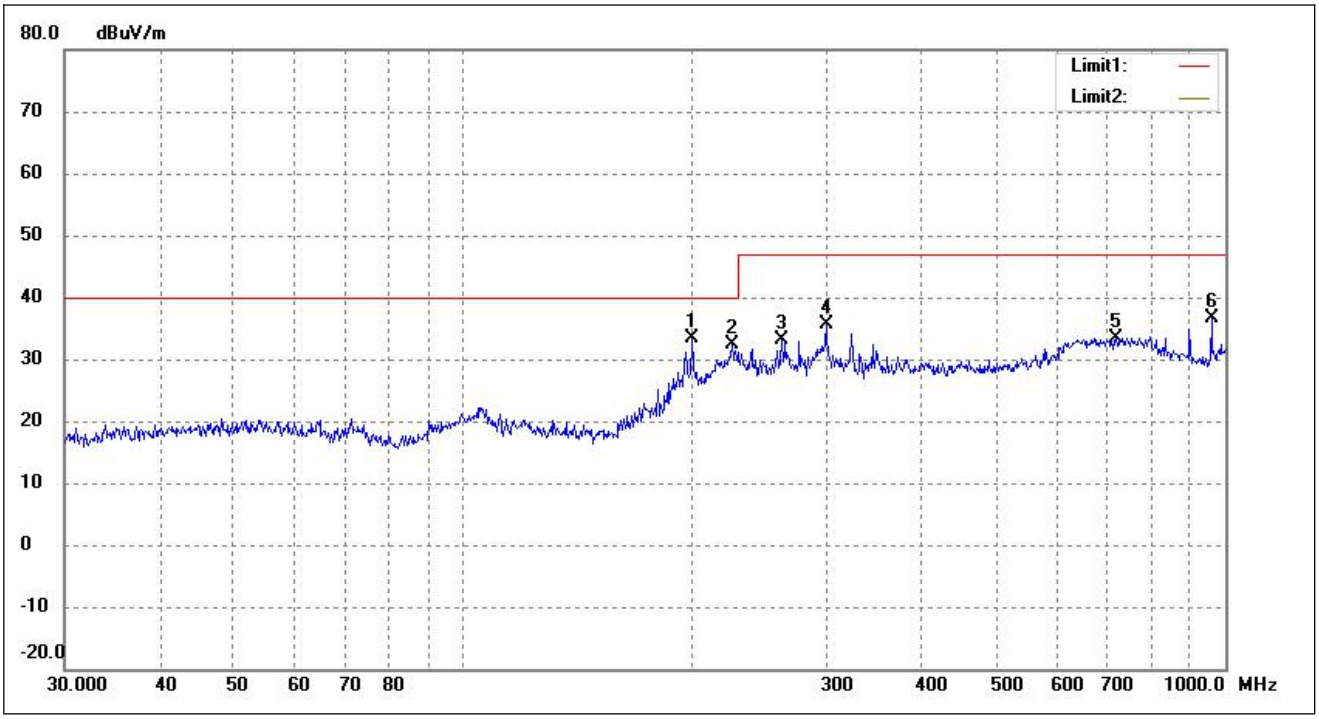
4.5 Summary of Test Results/Plots

According to the data in section 4.6, the EUT complied with the EN 301489 Class B standards

Plot of Radiated Emissions Test Data

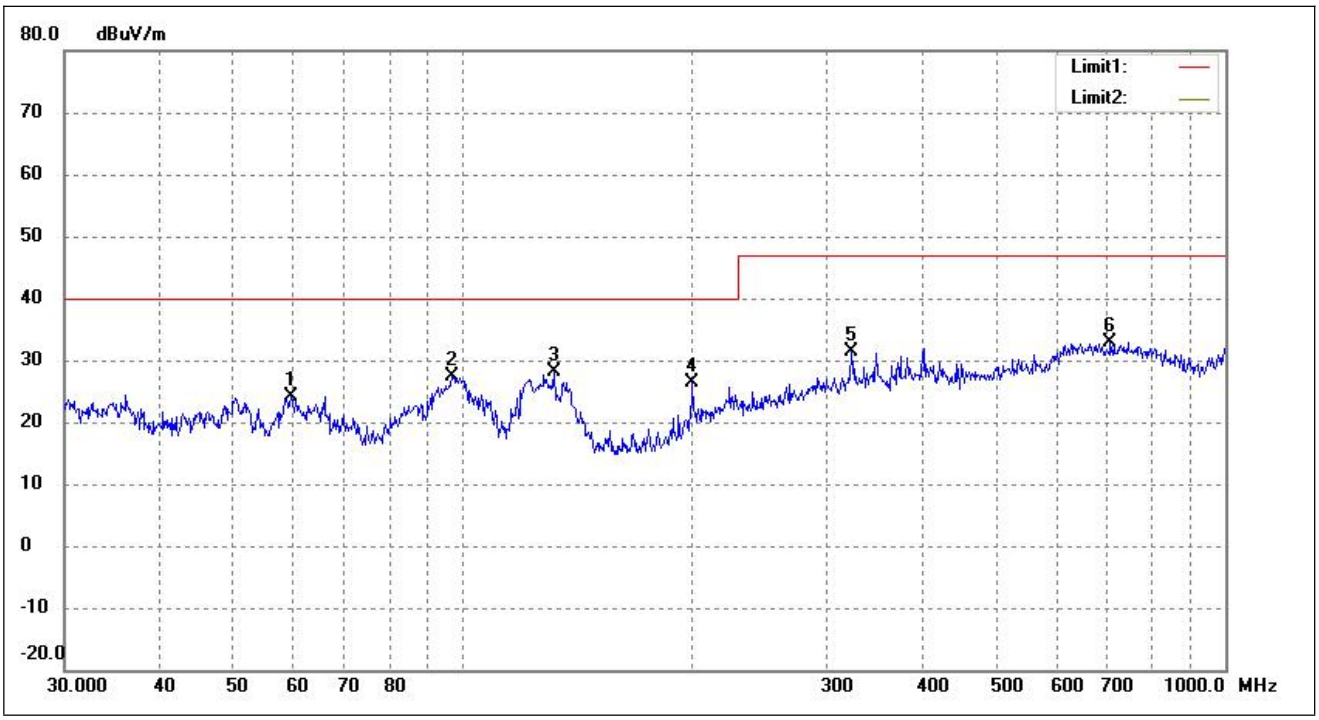
EUT: *small action camera*
Tested Model: *SDV121*
Operating Condition: *TM1*
Comment: *Charging*

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	199.9856	30.06	3.35	33.41	40.00	-6.59	360	200	peak
2	225.3080	24.44	8.00	32.44	40.00	-7.56	0	100	peak
3	261.9753	23.32	9.83	33.15	47.00	-13.85	0	100	peak
4	299.3158	23.75	11.92	35.67	47.00	-11.33	186	100	peak
5	719.1995	15.68	17.79	33.47	47.00	-13.53	46	100	peak
6	958.7943	22.02	14.63	36.65	47.00	-10.35	360	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	59.4405	19.01	5.02	24.03	40.00	-15.97	205	112	peak
2	96.7749	22.86	4.46	27.32	40.00	-12.68	221	105	peak
3	131.7577	24.17	3.84	28.01	40.00	-11.99	360	200	peak
4	199.9856	22.98	3.35	26.33	40.00	-13.67	360	200	peak
5	323.3204	19.47	11.84	31.31	47.00	-15.69	0	200	peak
6	706.6999	15.48	17.40	32.88	47.00	-14.12	146	100	peak

5. Harmonic Current Emissions

5.1 Test Procedure

Test is conducting under the description of EN61000-3-2.

5.2 Test Standards

EN61000-3-2, Clause 7.1 Limits for Class A equipment.

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	48%
ATM Pressure:	1022 mbar

5.3 Harmonic Current Emissions Test Data

According to Clause 7 of EN61000-3-2, the EUT is less than 75W, belong to ‘equipment with a rated power of 75W or less’, therefore ‘limits are not specified in this edition of the standards’. It is deem to full fit the requirements of the standards.

Result: The EUT is compliance with the requirements of this section.

6. Voltage Fluctuation and Flicker

6.1 Test Procedure

Test is conducting under the description of EN61000-3-3.

6.2 Test Standards

EN61000-3-3, Limit: Clause 5.

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	48%
ATM Pressure:	1022 mbar

6.3 Voltage Fluctuation and Flicker Test Data

According to clause 6.1 of EN 61000-3-3, “Tests need not be made on equipment which is unlikely to produce significant voltage fluctuations or flicker.”

Result: The EUT is compliance with the requirements of this section.

7. Electrostatic Discharge (ESD)

7.1 Test Procedure

Test is conducting under the description of IEC61000-4-2.

Test Performance

Performance Criterion: B for TT, TR

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

7.2 Electrostatic Discharge Immunity Test Data

Operating Condition: TM1/TM2

EN 61000-4-2	Test Levels (kV)							
Test Points	-2	+2	-4	+4	-6	+6	-8	+8
Air Discharge								
Slots	A	A	A	A	A	A	B	B
LED	A	A	A	A	A	A	B	B
Buttons	A	A	A	A	A	A	B	B
Direct Contact Discharge								
USB Port	A	A	A	A	--	--	--	--

Test Result: Pass

8. Radio Frequency Electromagnetic Field (R/S)

8.1 Test Procedure

Test is conducting under the description of IEC61000-4-3.

Test Performance

Performance Criterion: A for CT, CR

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1010 mbar

8.2 Continuous Radiated Disturbances Test Data

Frequency step: 1% of fundamental
Dwell time: 1 second
Modulation: AM by 1kHz sine wave with 80% modulation depth

Operating Condition: TM1/TM2

Frequency Range(MHz)	Field (V/m)	Front		Rear		Left Side		Right Side	
		VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	3	A	A	A	A	A	A	A	A
1000-3000	3	A	A	A	A	A	A	A	A
3000-6000	3	A	A	A	A	A	A	A	A

Test Result: Pass

9. Fast Transients, Common Mode (EFT)

9.1 Test Procedure

Test is conducting under the description of IEC61000-4-4.

Test Performance

Performance Criterion: B for TT, TR

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

9.2 Electrical Fast Transients Test Data

Operating Condition: TM1/TM2

EN 61000-4-4 Test Points		Test Levels (kV)							
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0	+4.0	-4.0
Power Supply Power Port of EUT	L1	A	A	B	B	/	/	/	/
	L2	A	A	B	B	/	/	/	/
	PE	A	A	B	B	/	/	/	/
	L1+L2	A	A	B	B	/	/	/	/
	L1 + PE	A	A	B	B	/	/	/	/
	L2 + PE	A	A	B	B	/	/	/	/
	L1+L2+PE	A	A	B	B	/	/	/	/
Signal ports		/	/	/	/	/	/	/	/

Test Result: Pass

10. Surges

10.1 Test Procedure

Test is conducting under the description of IEC 61000-4-5.

Test Performance

Performance Criterion: B for TT, TR

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

10.2 Surge Test Data

Operating Condition: TM1/TM2

Level	Voltage	Poll	Path	Pass	Fail
1	0.5kV	±	L-N	A	/
2	1kV	±	L-N	A	/
3	2kV	±	L-PE, N-PE	A	/
4	4kV	±	L-N, L-PE, N-PE	/	/

Test Result: Pass

11. Radio Frequency, Common Mode (C/S)

11.1 Test Procedure

Test is conducting under the description of IEC 61000-4-6.

Test Performance

Performance Criterion: A for CT, CR

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

11.2Continuous Conducted Disturbances Test Data

Sweep frequency range: 150kHz~80MHz
Frequency step: 1% of fundamental
Dwell time: 1 second

Operating Condition: TM1/TM2

Level	Voltage (V) (rms, unmodulated)	Modulation:	Pass	Fail
1	1	AM 80%, 1kHz sinewave	/	/
2	3	AM 80%, 1kHz sinewave	A	/
3	10	AM 80%, 1kHz sinewave	/	/
X	Special	/	/	/

Test Result: Pass

12. Voltage Dips and Interruptions

12.1 Test Procedure

Test is conducting under the description of IEC 61000-4-11.

Test Performance

Performance Criterion: B/C

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	1011 mbar

12.2 Voltage Dips And Interruptions Test Data

U: Vlotage dips in % U_T (U_T is rated voltage for the EUT)
T: Test duration

Operating Condition: TM1/TM2

Level	U	T	Phase Angle	N	Pass	Fail
1	100%	10ms	0/90/180/270	3	A	/
2	100%	20ms	0/90/180/270	3	A	/
3	30%	500ms	0/90/180/270	3	B	/
4	100%	5000ms	0/90/180/270	3	C	/

Test Result: Pass

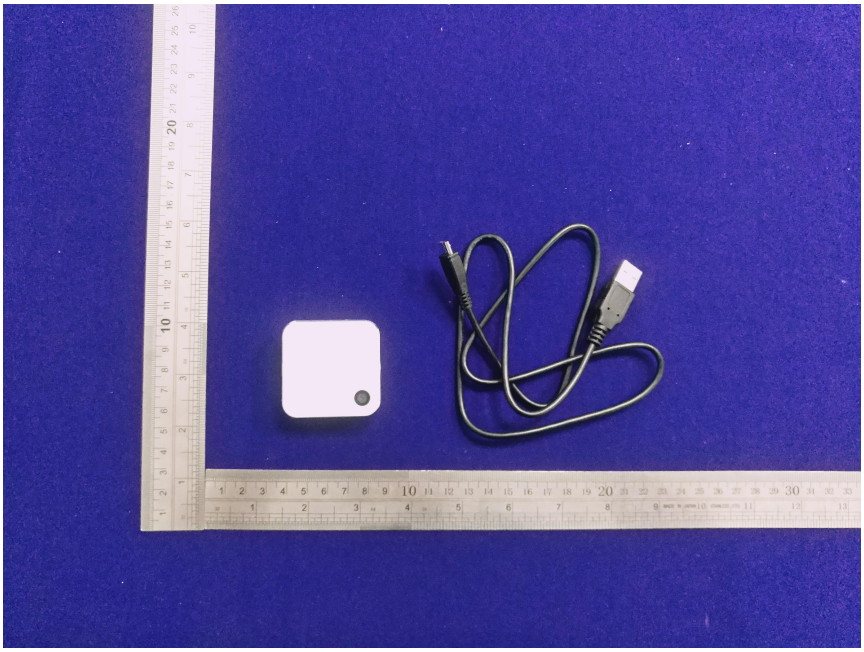
EXHIBIT A - LABEL

Label Information

Remark: Text is Black in color and is justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT. The 'CE' marking must be affixed to the EUT or to its data plate. Where this is not possible or not warranted on account of the nature of the apparatus, it must be affixed to the packaging, if any, and to the accompanying documents. The 'CE' marking must have a height of at least 5 mm. If the 'CE' marking is reduced or enlarged the proportions given in the above graduated drawing must be respected.

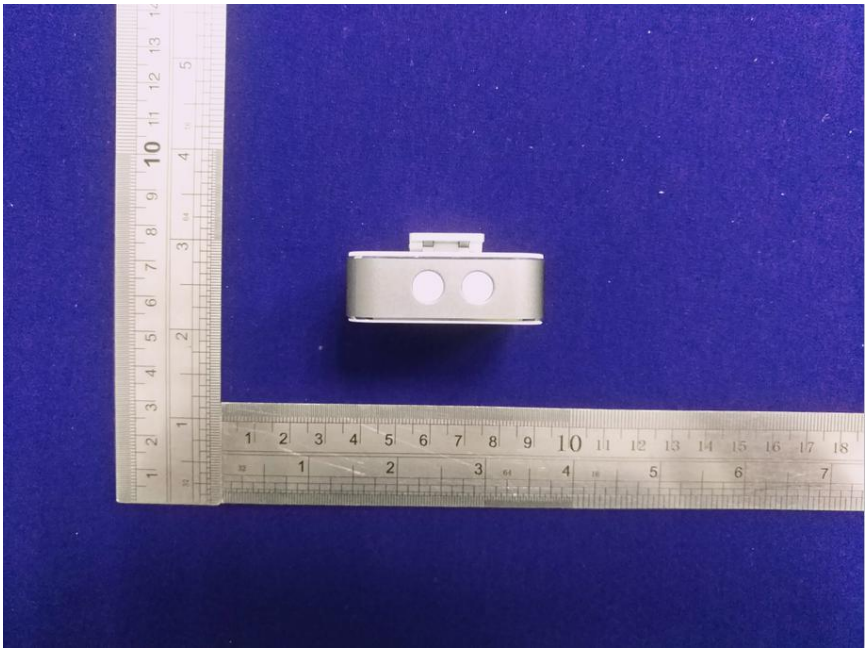
EXHIBIT B - EUT PHOTOS

EUT View 1



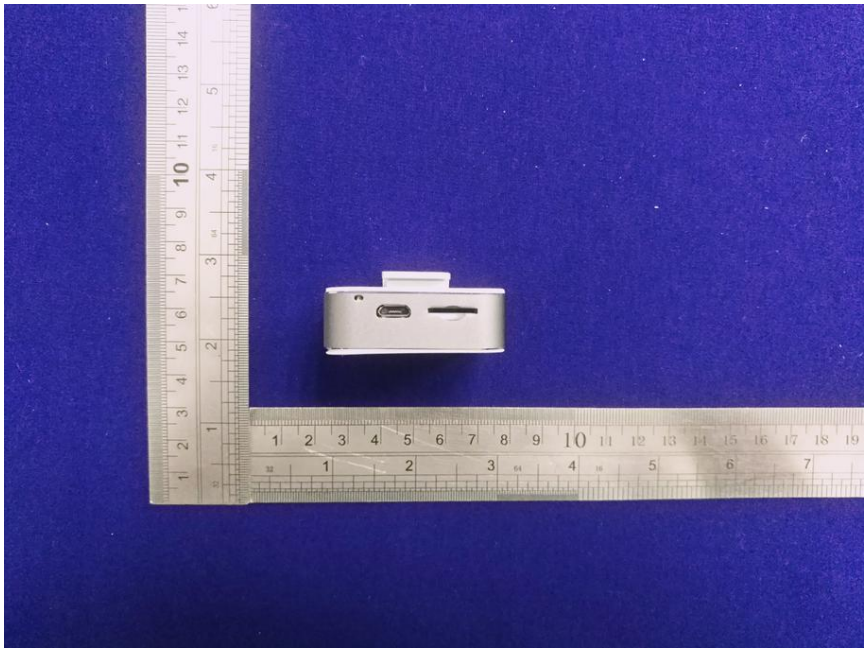
EUT View 2

EUT View 3



EUT View 4

EUT View 5



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