



CE-EMC Test Report

Applicant:

Product Description: Sport DV or Action camera

Tested Model: SDV-105

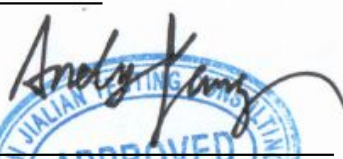
Test Standards: EN 55022 :2010
EN 61000-3-2 :2014
EN 61000-3-3 :2013
EN 55024 :2010

Report No.: JQL151012632-1E

Date of Test: 2015-10-12

Date of Issue: 2015-10-13

Tested By:


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The test results in this report apply exclusively to the tested model / sample. Without written approval of Shenzhen Jialian Testing Consulting Co., Ltd., the test report shall not be reproduced except in full.

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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:	Sport DV or Action camera
Trade Name:	--
Model No.:	SDV-105
<i>Note: The device described in page 1 is tested by us with the listed standards and found that SDV-105 have the same electronic circuit and PCB layout with "SDV-105" except the model name. "SDV-105" has passed EMC tests(Report NO.JQL150923624-1E has the detailed content). So,no tests are necessary. The test results are contained in this test report.</i>	

Technical Characteristics of EUT	
Rated Voltage:	AC 100~240V/50~60Hz
Power Adapter Model:	/
Classification of ITE:	Class B



1.2 Test Standards

The following report is prepared on behalf of the Shenzhen Micro Star Electronic Technology Co., Ltd. in accordance with EN55022, Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement, and EN61000-3-2, Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase), and EN61000-3-3, Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection, and EN55024, Immunity characteristics Limits and methods of measurement.

The objective of the manufacturer is to demonstrate compliance with the standards EN55022, EN61000-3-2, EN61000-3-3, and EN55024 for Information Technology Equipment.

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 standards EN55022, EN61000-3-2, EN61000-3-3, and EN55024 for Information Technology Equipment, and all related testing and measurement techniques intentional standards.

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	Operating	/
TM2	Charging	/
TM3	/	/

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
DC Power Cable	1.2	Unshielded	With Core
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
PC	Dell	380	/

Special Cable List and Details

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

1.6 Performance Criteria for EMS

All the test data has been collected, reduced, and analyzed within this report in accordance with Immunity requires the following as specific performance criteria:

- A. The apparatus shall continue to operate as intended during and after the test. The manufacturer specifies some minimum performance level. The performance level may be specified by the manufacturer as a permissible loss of performance.
- B. The apparatus shall continue to operate as intended after the test. This indicates that the EUT does not need to function at normal performance levels during the test, but must recover. Again some minimal performance is defined by the manufacture. No change in operating state or loss or data is permitted.
- C. Temporary loss of function is allowed. Operation of the EUT may stop as long as it is either automatically reset or can be manually restored by operation of the controls.



2. SUMMARY OF TEST RESULTS

Standards	Description of Test Item	Result
EN55022	Conducted Disturbance	Passed
	Radiated Disturbance	Passed
EN61000-3-2	Harmonic Current Emission	Passed
EN61000-3-3	Voltage Fluctuation and Flicker	Passed
EN55024	Electrostatic Discharge Immunity in accordance with IEC 61000-4-2	Passed
	Continuous Radiated Disturbances Immunity in accordance with IEC 61000-4-3	Passed
	Electrical Fast Transient/Burst Immunity in accordance with IEC 61000-4-4	Passed
	Surges Immunity in accordance with IEC 61000-4-5	Passed
	Continuous Conducted Disturbances Immunity in accordance with IEC 61000-4-6	Passed
	Voltage Dips/Interruptions Immunity in accordance with IEC 61000-4-11	Passed
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.

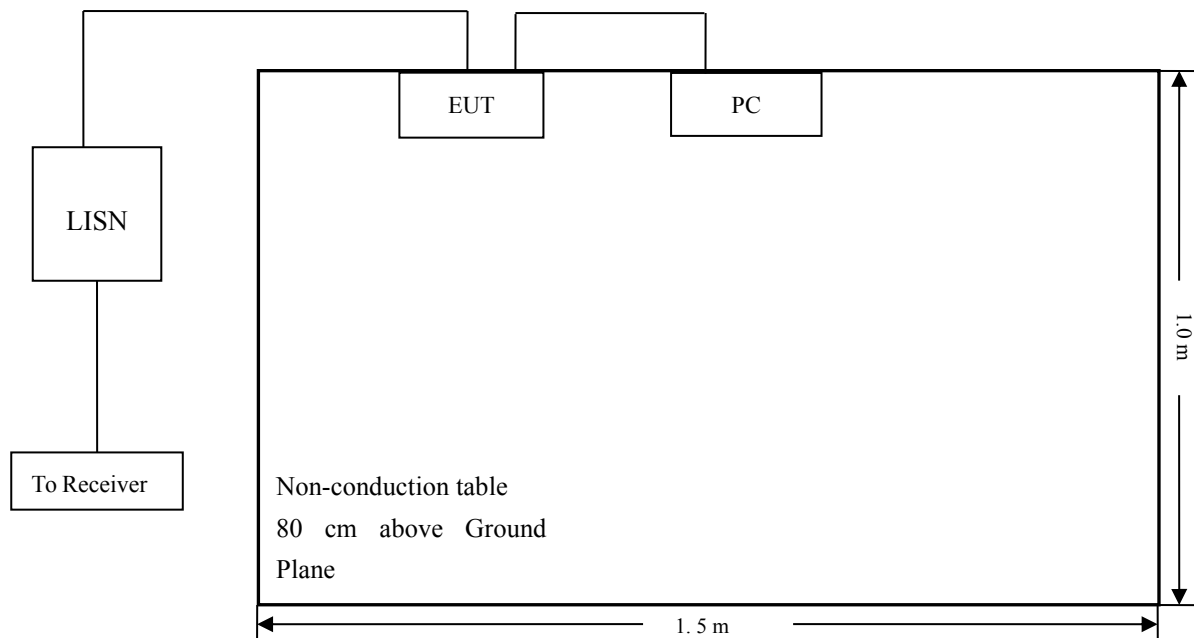
3.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2015-07-01	2016-06-30
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2015-07-01	2016-06-30
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2015-07-01	2016-06-30

3.3 Test Procedure

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

3.4 Basic Test Setup Block Diagram





3.5 Environmental Conditions

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

3.6 Summary of Test Results/Plots

According to the data in section 3.7, the EUT complied with the EN55022 Conducted margin for a Class A device.

**Plot of Conducted Emissions Test Data**

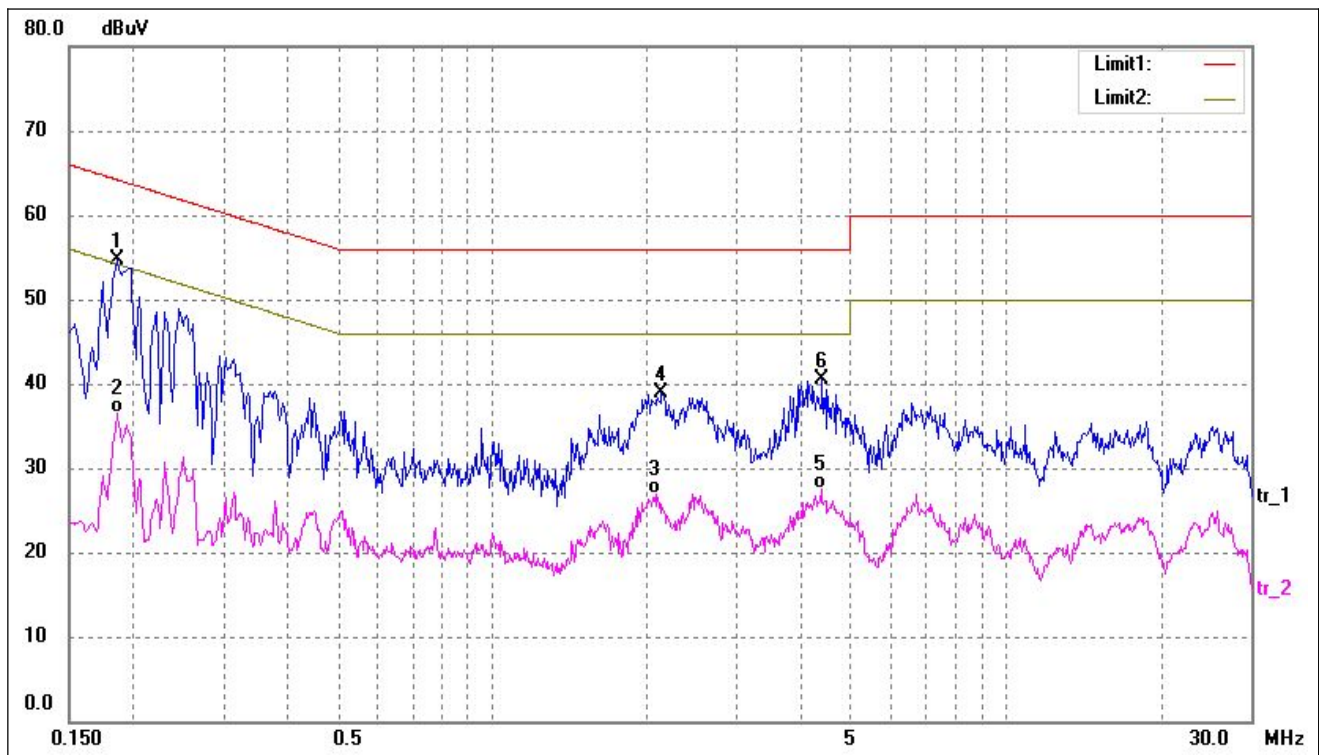
EUT: Sport DV or Action camera

Tested Model: SDV-105

Operating Condition: TMI

Comment: AC 230V/50Hz

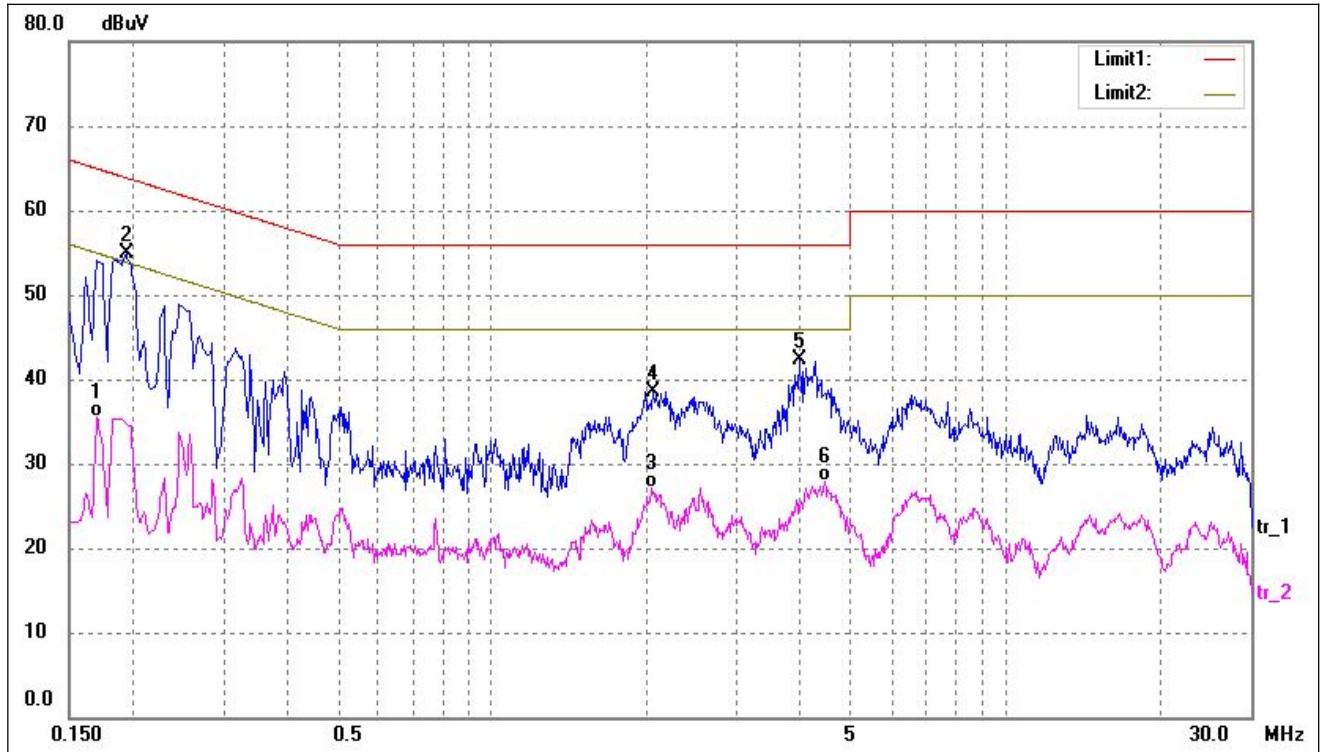
Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1860	45.15	9.50	54.65	64.21	-9.56	peak
2	0.1860	26.91	9.50	36.41	54.21	-17.80	AVG
3	2.0820	16.96	10.00	26.96	46.00	-19.04	AVG
4	2.1340	28.87	10.00	38.87	56.00	-17.13	peak
5	4.3700	17.43	10.00	27.43	46.00	-18.57	AVG
6	4.4020	30.48	10.00	40.48	56.00	-15.52	peak



Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1700	25.98	9.50	35.48	54.96	-19.48	AVG
2*	0.1940	45.34	9.50	54.84	63.86	-9.02	peak
3	2.0540	17.03	10.00	27.03	46.00	-18.97	AVG
4	2.0580	28.59	10.00	38.59	56.00	-17.41	peak
5	3.9820	32.39	10.00	42.39	56.00	-13.61	peak
6	4.4420	17.84	10.00	27.84	46.00	-18.16	AVG

4. RADIATED EMISSION

4.1 Measurement Uncertainty

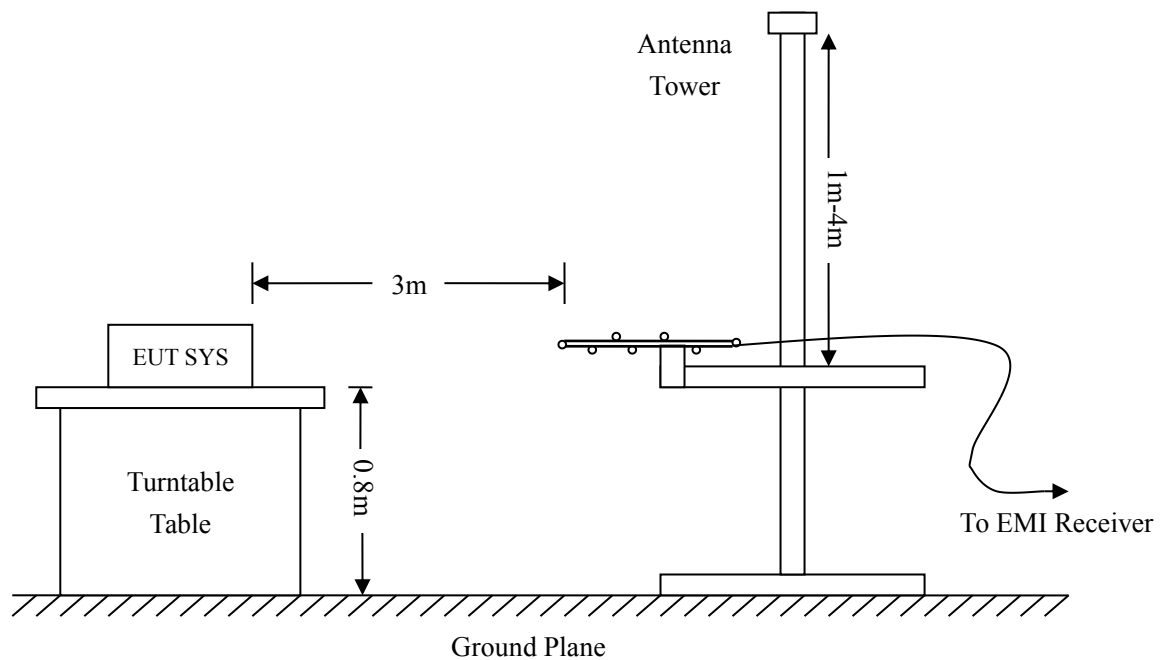
Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 5.10 dB.

4.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2015-07-01	2016-06-30
EMI Test Receiver	R&S	ESVB	825471/005	2015-07-01	2016-06-30
Pre-amplifier	Agilent	8447F	3113A06717	2015-07-01	2016-06-30
Pre-amplifier	Compliance Direction	PAP-0118	24002	2015-07-01	2016-06-30
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2015-07-01	2016-06-30

4.3 Test Procedure

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





4.5 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:

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

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

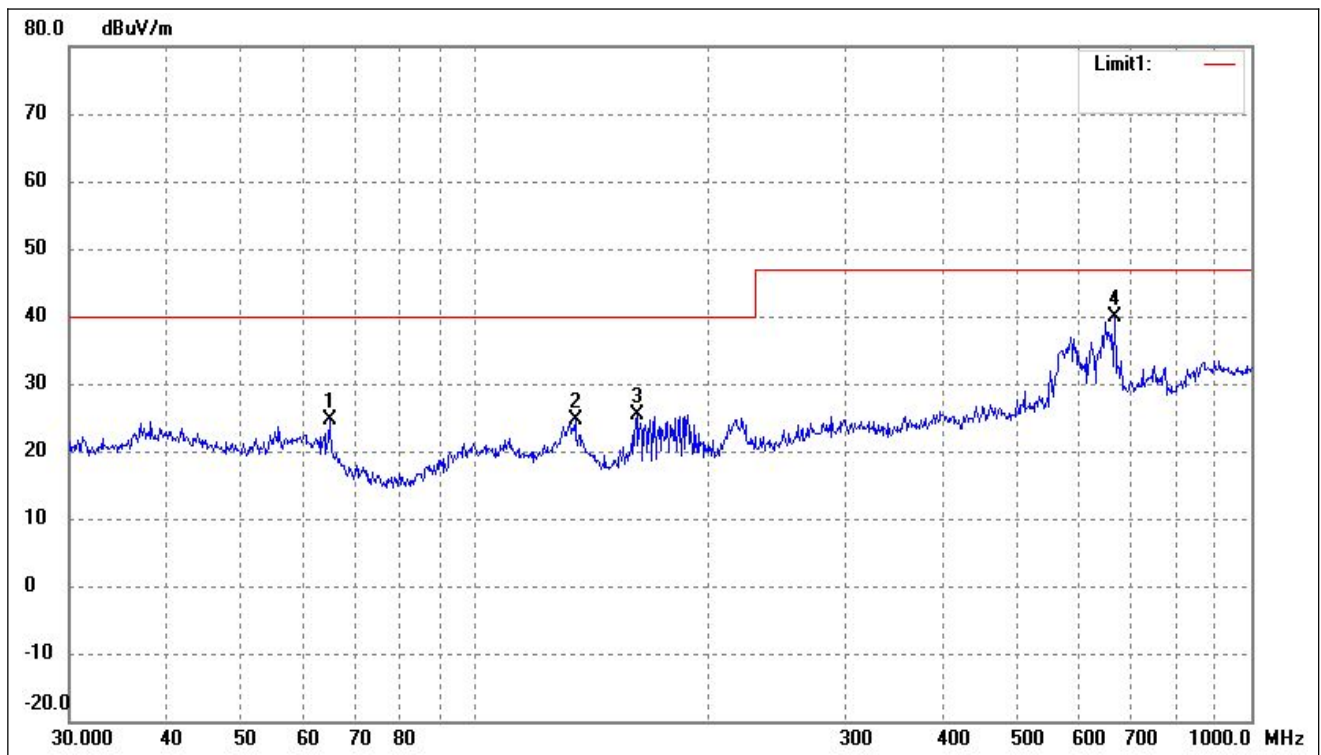
$$\text{Margin} = \text{Corr. Ampl.} - \text{EN55022 Class B Limit}$$

4.6 Environmental Conditions

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

4.7 Summary of Test Results/Plots

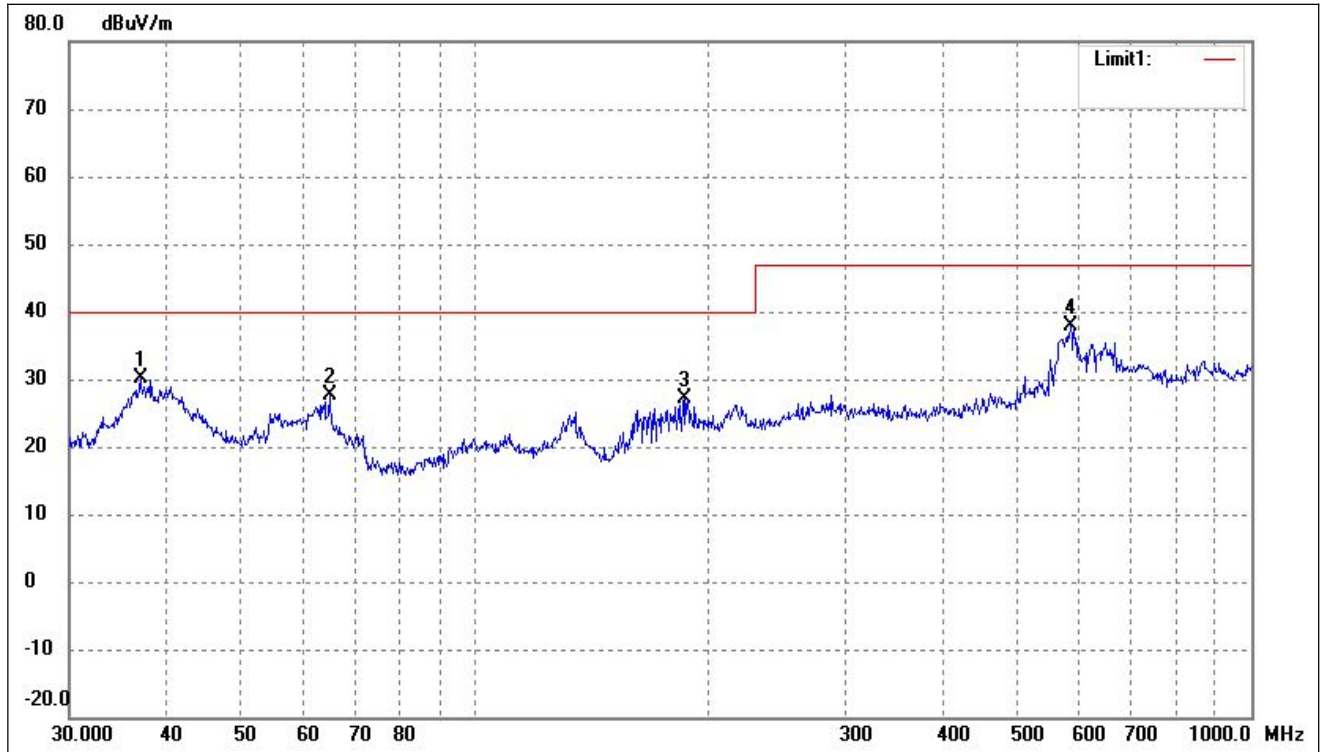
According to the data in section 4.7, the EUT complied with the EN55022 Class B standards.

**Plot of Radiated Emissions Test Data (30MHz to 1GHz)***EUT: Sport DV or Action camera**Tested Model: SDV-105**Operating Condition: TM2**Comment:**Test Specification: Horizontal*

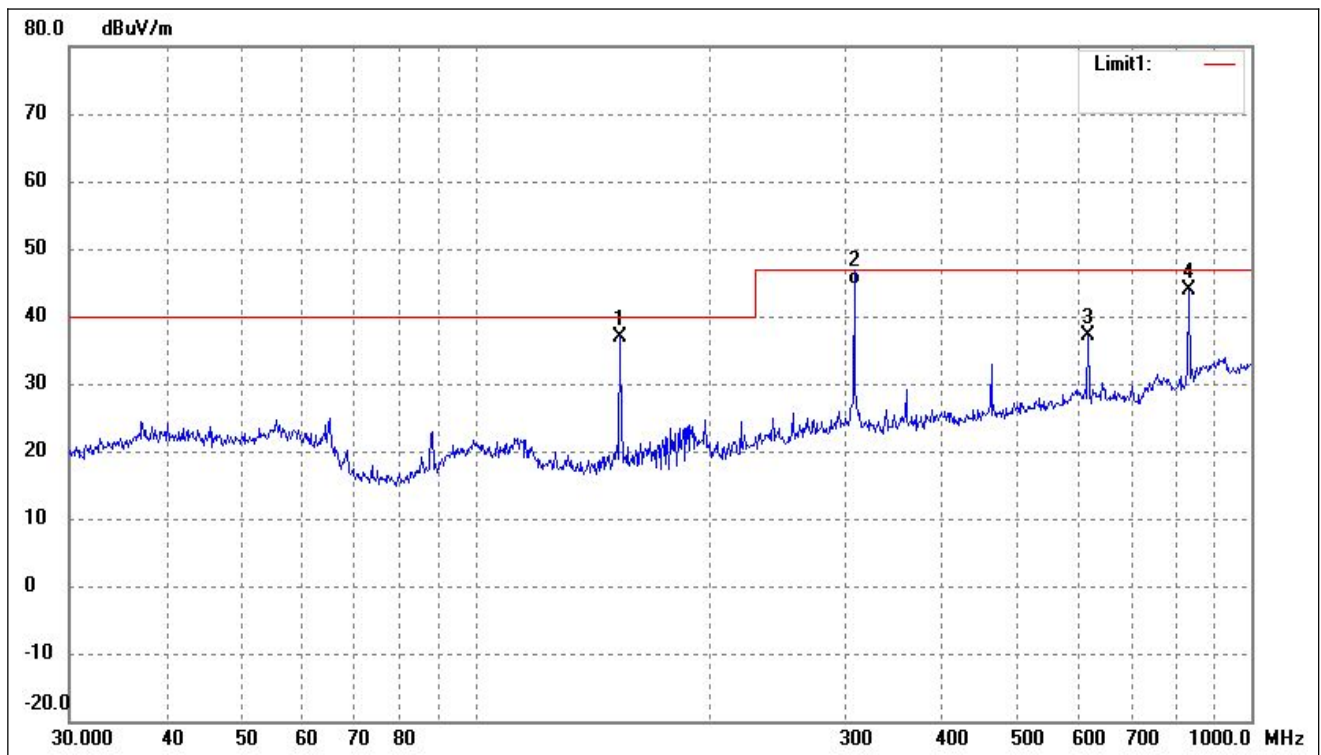
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	64.8865	19.76	4.84	24.60	40.00	-15.40	124	100	peak
2	134.5592	21.73	2.84	24.57	40.00	-15.43	189	100	peak
3	161.4742	22.85	2.63	25.48	40.00	-14.52	224	100	peak
4	668.1423	27.66	12.19	39.85	47.00	-7.15	168	100	peak



Test Specification: Vertical



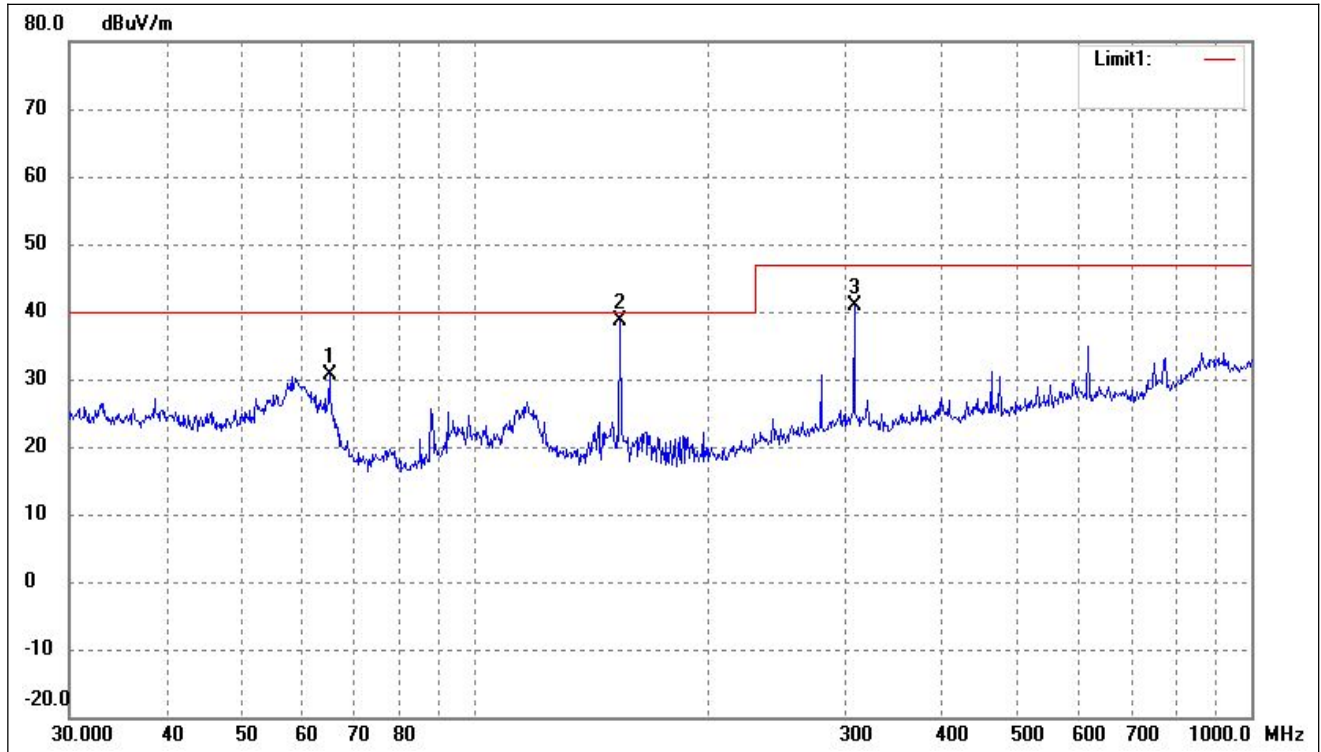
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	37.0249	22.76	7.45	30.21	40.00	-9.79	312	100	peak
2	64.8863	22.76	4.84	27.60	40.00	-12.40	169	100	peak
3	185.7880	24.03	3.01	27.04	40.00	-12.96	258	100	peak
4	584.7894	25.05	12.75	37.80	47.00	-9.20	136	100	peak

**Plot of Radiated Emissions Test Data (30MHz to 1GHz)***EUT:* Sport DV or Action camera*Tested Model:* SDV-105*Operating Condition:* TM1*Comment:**Test Specification:* Horizontal

No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	153.7385	34.46	2.54	37.00	40.00	-3.00	245	100	peak
2	307.8313	35.50	9.22	44.72	47.00	-2.28	135	100	QP
3	616.3718	25.00	12.17	37.17	47.00	-9.83	168	100	peak
4	830.4002	28.51	15.26	43.77	47.00	-3.23	191	100	peak



Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	64.8865	25.71	4.84	30.55	40.00	-9.45	124	100	peak
2	153.7385	36.09	2.54	38.63	40.00	-1.37	227	100	peak
3	307.8313	31.65	9.22	40.87	47.00	-6.13	138	100	peak



5. Harmonic Current Emissions

5.1 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Digital Power Analyzer	California Instrument	CTS	72831	2015-07-01	2016-06-30
Power Source	California Instrument	5001IX-CTS-400	60077	2015-07-01	2016-06-30

5.2 Test Procedure

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

5.3 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

5.4 Harmonic Current Emissions Test Data

According to Clause 7 of EN 61000-3-2, the rated power of the EUT is less than 75W, 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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Digital Power Analyzer	California Instrument	CTS	72831	2015-07-01	2016-06-30
Power Source	California Instrument	5001IX-CTS-400	60077	2015-07-01	2016-06-30

6.2 Test Procedure

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

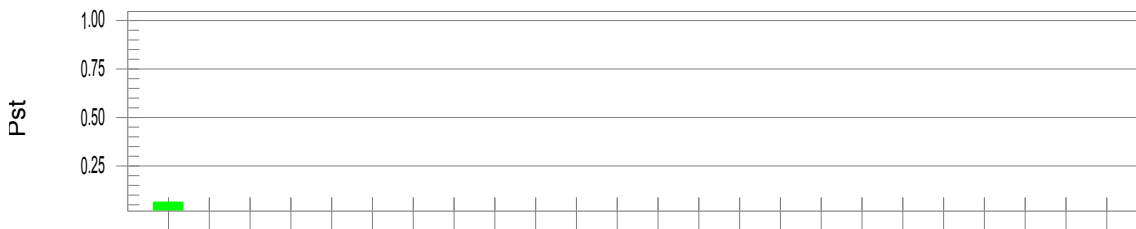
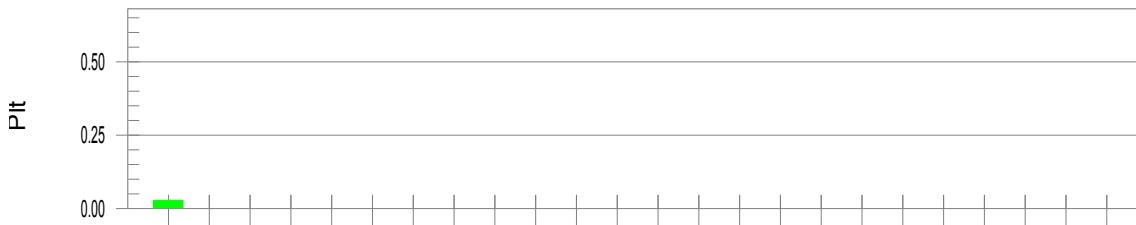
6.3 Test Standards

EN61000-3-3, Limit: Clause 5.

Environmental Conditions

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

6.4 Voltage Fluctuation and Flicker Test Data

**Flicker Test Summary per EN/IEC61000-3-3 (Run time)****EUT: Sport DV****Tested by: Andy Yang****Test category: All parameters (European limits)****Test Margin: 100****Test date: 2015-09-24****Start time: 11:22:21 PM****End time: 11:32:36 PM****Test duration (min): 10****Data file name: F-001644.cts_data****Comment: Running****Customer:****Test Result: Pass****Status: Test Completed****Pst_i and limit line****European Limits****Plt and limit line****Parameter values recorded during the test:****Vrms at the end of test (Volt): 230.32**

Highest dt (%):	0.00	Test limit (%):	3.30	Pass
Time(mS) > dt:	0.0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.00	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.061	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.027	Test limit:	0.650	Pass



7. Electrostatic Discharges (ESD)

7.1 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
ESD Generator	TESQ AG	NSG 437	161	2015-07-01	2016-06-30

7.2 Test Procedure

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

Test Performance

Performance Criterion: B

Environmental Conditions

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

7.3 Electrostatic Discharge Immunity Test Data

Table 1: Electrostatic Discharge Immunity (Air Discharge)

EN 61000-4-2 Test Points	Test Levels (kV)									
	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15
Slots	A	A	A	A	A	A	A	A		
/	/	/	/	/	/	/	/	/		

Table 2: Electrostatic Discharge Immunity (Direct Contact)

EN 61000-4-2 Test Points	Test Levels (kV)									
	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15
Metal Part	A	A	B	B						
/	/	/	/	/						
/	/	/	/	/						



Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

EN 61000-4-2 Test Points	Test Levels (kV)									
	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15
Front Side	A	A	A	A						
Top Side	A	A	A	A						
Back Side	A	A	A	A						
Left Side	A	A	A	A						
Right Side	A	A	A	A						

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

EN 61000-4-2 Test Points	Test Levels (kV)									
	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15
Front Side	A	A	A	A						
Top Side	A	A	A	A						
Back Side	A	A	A	A						
Left Side	A	A	A	A						
Right Side	A	A	A	A						

Test Result: Pass



8. Continuous Radiated Disturbances (R/S)

8.1 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Signal Generator	Rohde & Schwarz	SMT03	100059	2015-07-01	2016-06-30
Voltage Probe	Rohde & Schwarz	URV5-Z2	100013	2015-07-01	2016-06-30
Power Amplifier	AR	150W1000	300999	2015-07-01	2016-06-30
Power Amplifier	AR	25S1G4AM1	305993	2015-07-01	2016-06-30
Trilog Antenna	SCHWARZBECK	VULB9163	9163-333	2015-07-01	2016-06-30
Anechoic chamber	Albatross Projects	MCDC	----	2015-07-01	2016-06-30

8.2 Test Procedure

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

Test Performance

Performance Criterion: A

Environmental Conditions

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

8.3 Continuous Radiated Disturbances Test Data

Frequency step: 1% of fundamental

Dwell time: 1 second

Modulation: AM by 1kHz sine wave with 80% modulation depth

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

Test Result: Pass



9. Electrical Fast Transients (EFT)

9.1 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Transient 2000	EMC PARTNER	TRA2000	863	2015-07-01	2016-06-30
Couple Clamp	EMC PARTNER	CN-EFT1000	513	2015-07-01	2016-06-30

9.2 Test Procedure

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

Test Performance

Performance Criterion: B

Environmental Conditions

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

9.3 Electrical Fast Transients Test Data

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	/	/	/	/
	N1	A	A	B	B	/	/	/	/
	PE	A	A	B	B	/	/	/	/
	L1+N1	A	A	B	B	/	/	/	/
	L1 + PE	A	A	B	B	/	/	/	/
	NI + PE	A	A	B	B	/	/	/	/
	L1+N1+PE	A	A	B	B	/	/	/	/
Signal ports		/	/	/	/	/	/	/	/

Test Result: Pass



10. Surges

10.1 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Transient 2000	EMC PARTNER	TRA2000	863	2015-07-01	2016-06-30

10.2 Test Procedure

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

Test Performance

Performance Criterion: B

Environmental Conditions

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

10.3 Surge Test Data

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. Continuous Conducted Disturbances (C/S)

11.1 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
CS Immunity Tester	EMTEST	CWS500	0900-03	2015-07-01	2016-06-30
Attenuator	EMTEST	MA-500	1009	2015-07-01	2016-06-30
CDN	Luthi	L-801M2/M3	2665	2015-07-01	2016-06-30

11.2 Test Procedure

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

Test Performance

Performance Criterion: A

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

11.3 Continuous Conducted Disturbances Test Data

Sweep frequency range: 150kHz~80MHz

Frequency step: 1% of fundamental

Dwell time: 1 second

Level	Voltage Level (e.m.f.) U_0	Modulation:	Pass	Fail
1	1	AM 80%, 1kHz sinewave	/	/
2	3	AM 80%, 1kHz sinewave	A	/
3	10	AM 80%, 1kHz sinewave	/	/

Test Result: Pass



12. Voltage Dips and Interruptions

12.1 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Transient 2000	EMC PARTNER	TRA2000	863	2015-07-01	2016-06-30

12.2 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:	55%
ATM Pressure:	1011 mbar

12.3 Voltage Dips And Interruptions Test Data

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

T: Test duration

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

Test Result: Pass



EXHIBIT A - LABEL

Label Information

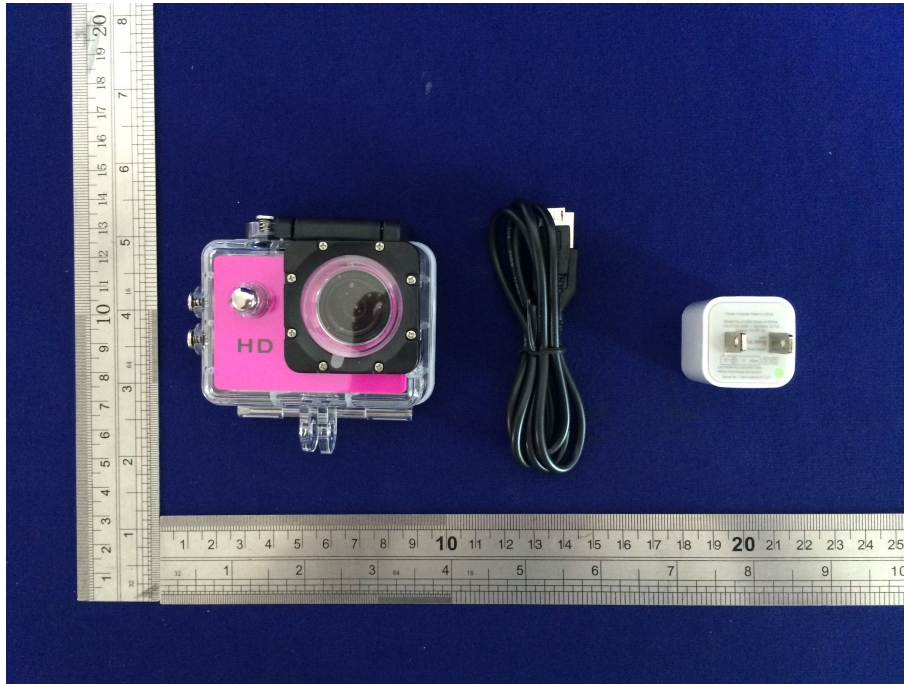


Remark: Text is Black in color and is justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT. The 'CE' marking must be affixed to the EUT or to its data plate. Where this is not possible or not 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.

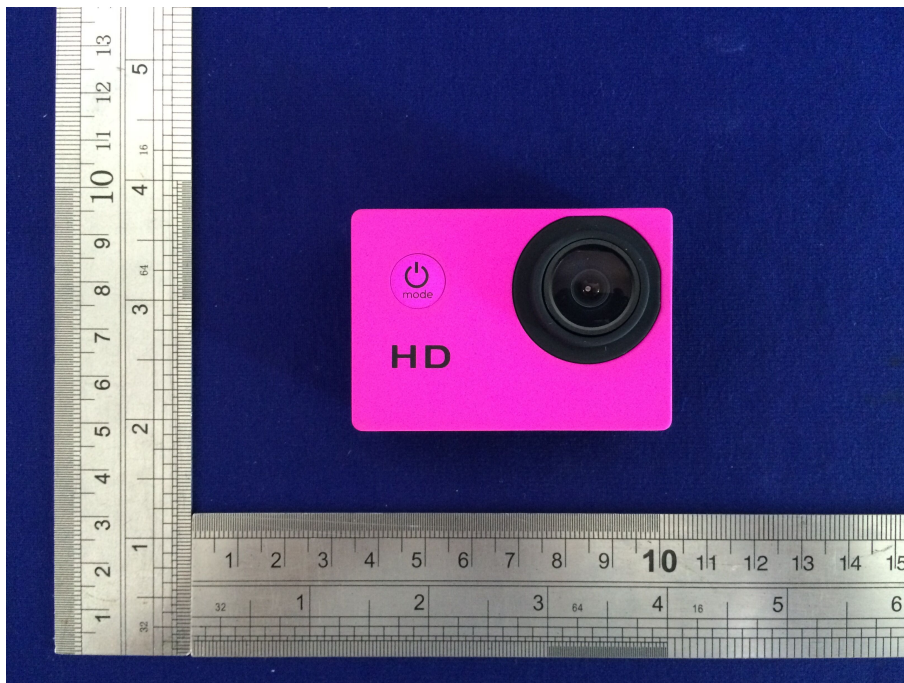


EXHIBIT B - EUT PHOTOS

EUT View 1

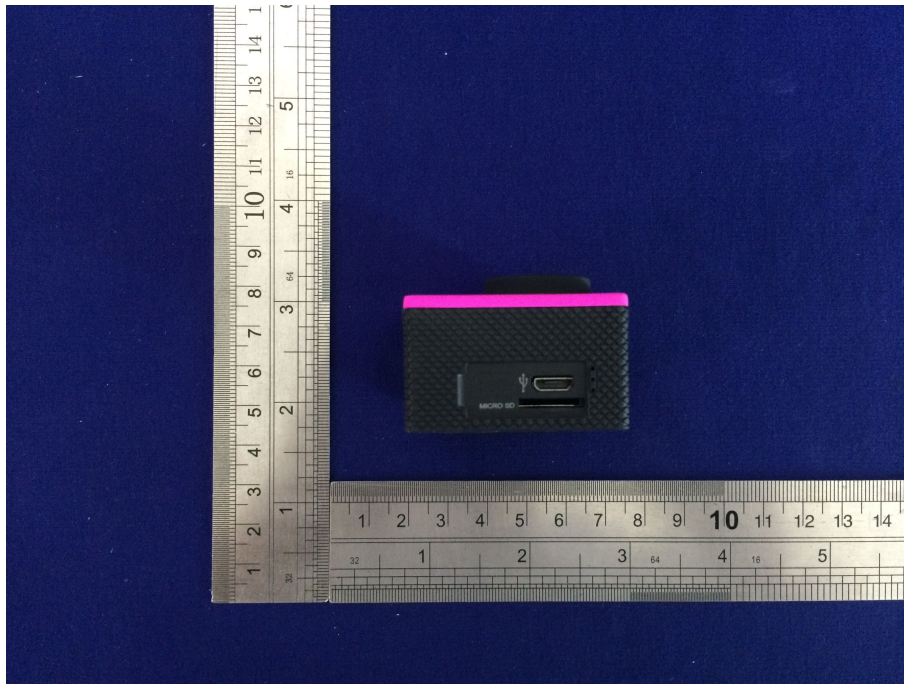


EUT View 2





EUT View 3



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