



## CE-EMC Test Report

**Applicant:**

**Product Description:** Sports DV or Action camera

**Tested Model:**

EN 55032:2015  
EN 55024 :2010+A1 :2015  
EN 61000-3-2:2014

**Test Standards:** EN 61000-3-3:2013

**Report No.:** JQL170803006-1E


**Date of Test:** 2017-08-03 to 2017-08-11

**Date of Issue:** 2017-08-11

**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:	Sports DV or Action camera
Trade Name:	--
Model No.:	
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:	5V
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. (Micro star International Co.,Ltd.)in accordance with EN55032, Electromagnetic compatibility of multimedia equipment - Emission requirements, 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  $\leq 16$  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 EN55032, 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 EN55032, 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	Running	--
TM2	--	--
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
--	--	--	--

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
EN55032	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  $\pm 2.88$  dB.

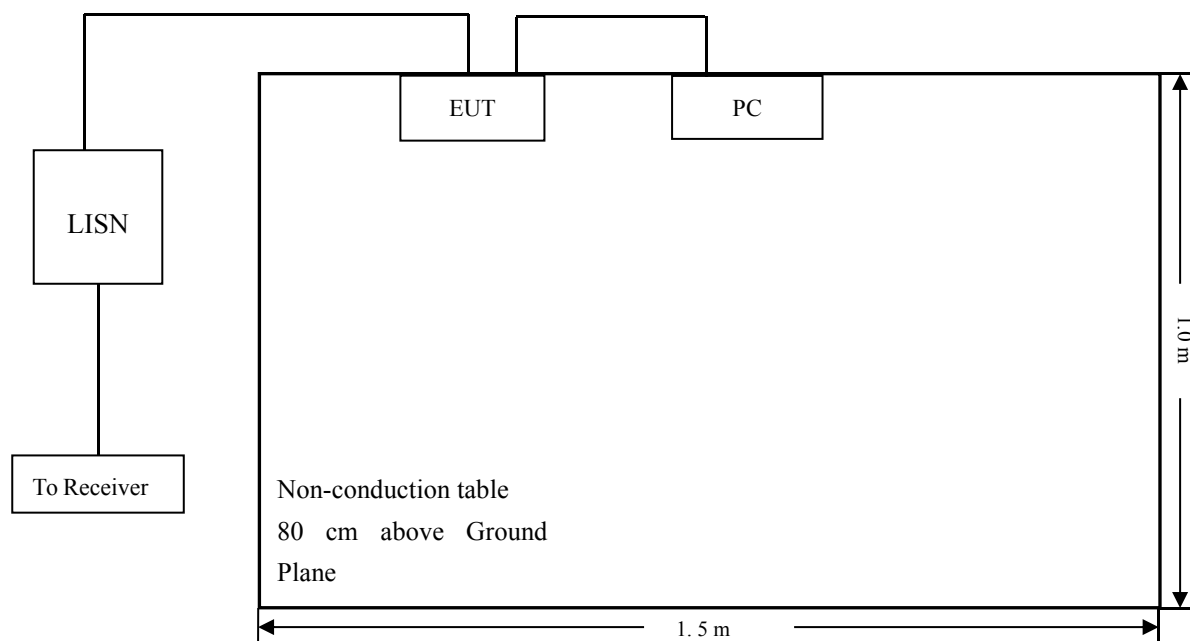
#### 3.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2017-07-01	2018-06-30
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2017-07-01	2018-06-30
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2017-07-01	2018-06-30

#### 3.3 Test Procedure

Test is conducting under the description of EN55032 Electromagnetic compatibility of multimedia equipment - Emission requirements.

#### 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 3.6, the EUT complied with the EN55032 Conducted margin for a Class B device.

**Plot of Conducted Emissions Test Data**

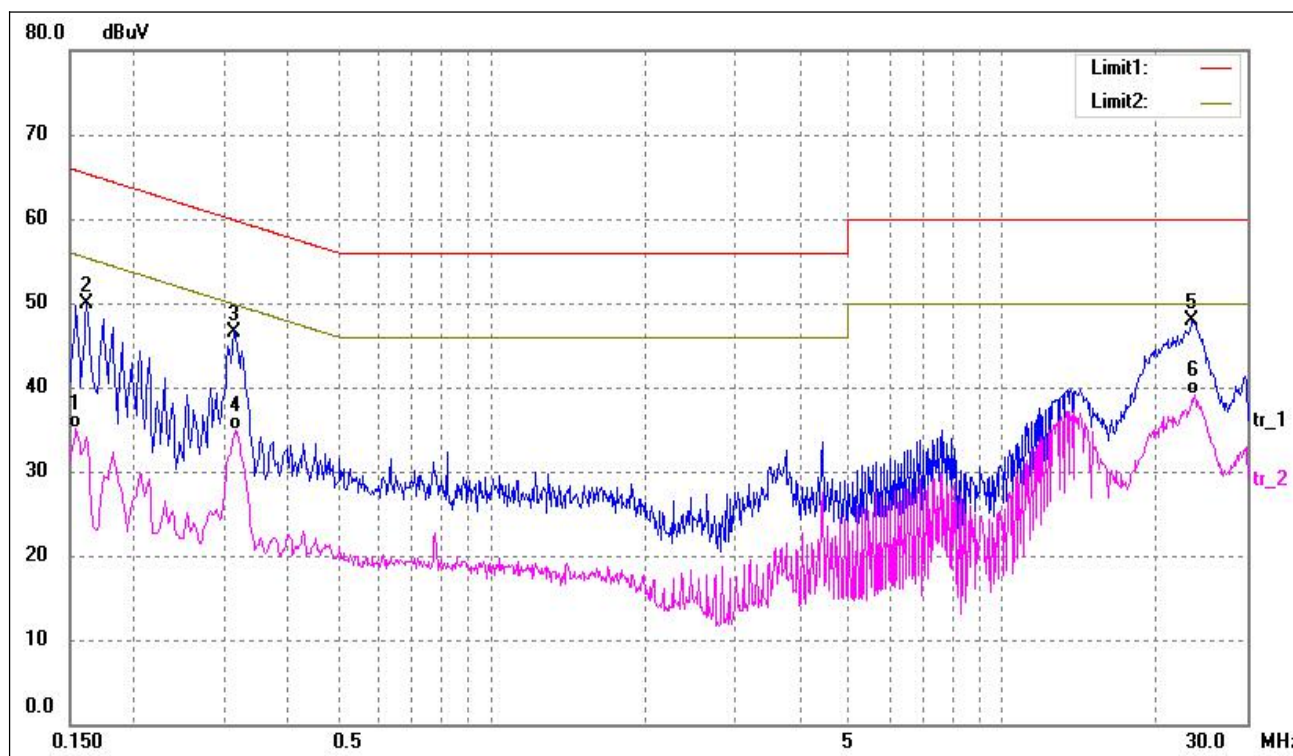
EUT: Sports DV or Action camera

Tested Model: SDV-105

Operating Condition: TM1

Comment:

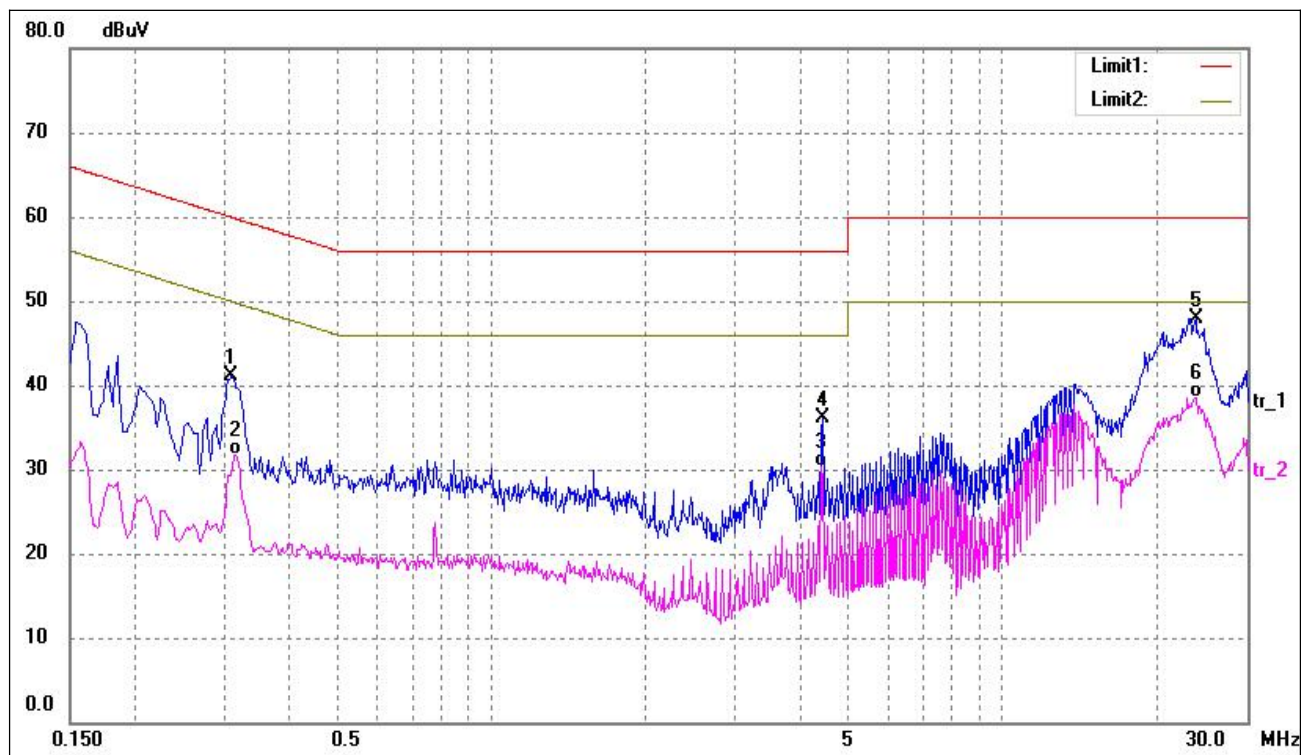
Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1540	25.66	9.50	35.16	55.78	-20.62	AVG
2	0.1620	40.44	9.50	49.94	65.36	-15.42	peak
3	0.3140	37.10	9.50	46.60	59.86	-13.26	peak
4	0.3180	25.45	9.50	34.95	49.76	-14.81	AVG
5	23.5100	35.39	12.50	47.89	60.00	-12.11	peak
6*	23.6980	26.46	12.57	39.03	50.00	-10.97	AVG



Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3100	31.52	9.50	41.02	59.97	-18.95	peak
2	0.3180	22.19	9.50	31.69	49.76	-18.07	AVG
3	4.4260	20.27	10.00	30.27	46.00	-15.73	AVG
4	4.4420	26.06	10.00	36.06	56.00	-19.94	peak
5	23.8300	35.38	12.61	47.99	60.00	-12.01	peak
6*	23.9220	25.94	12.64	38.58	50.00	-11.42	AVG

## 4. RADIATED EMISSION

### 4.1 Measurement Uncertainty

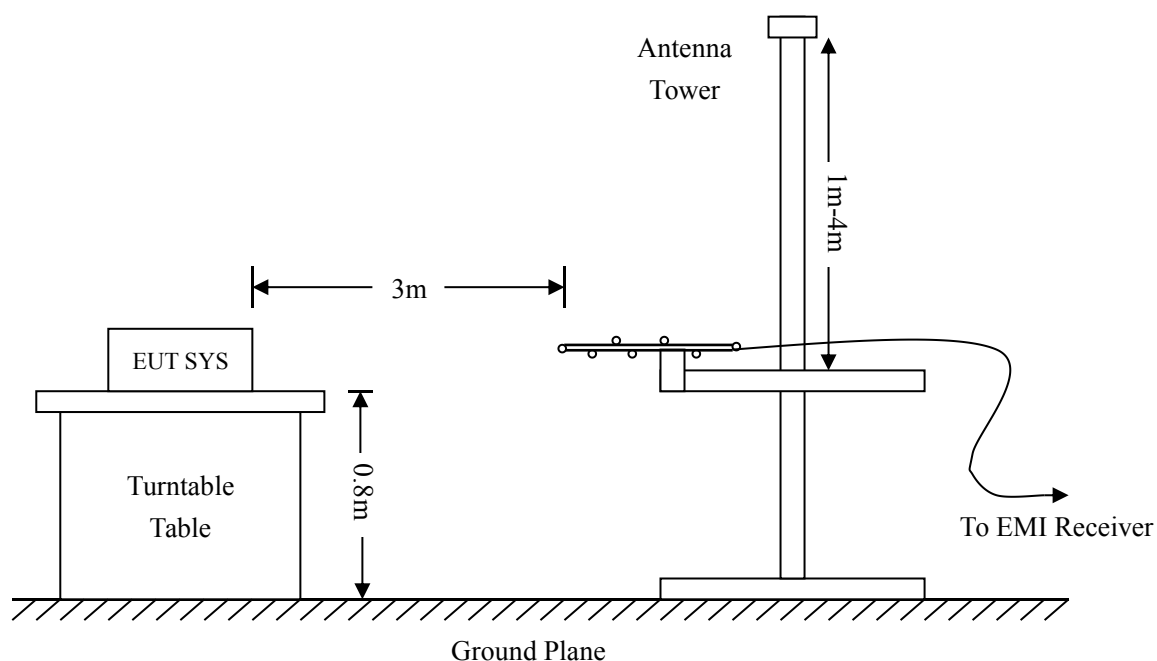
Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is  $\pm 5.10$  dB.

### 4.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2017-07-01	2018-06-30
EMI Test Receiver	R&S	ESVB	825471/005	2017-07-01	2018-06-30
Pre-amplifier	Agilent	8447F	3113A06717	2017-07-01	2018-06-30
Pre-amplifier	Compliance Direction	PAP-0118	24002	2017-07-01	2018-06-30
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2017-07-01	2018-06-30

### 4.3 Test Procedure

Test is conducting under the description of EN55032 Electromagnetic compatibility of multimedia equipment - Emission requirements.





#### 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 $\mu$ V means the emission is 6dB $\mu$ V below the maximum limit for Class B device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{EN55032 Class B Limit}$$

#### 4.6 Environmental Conditions

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

#### 4.7 Summary of Test Results/Plots

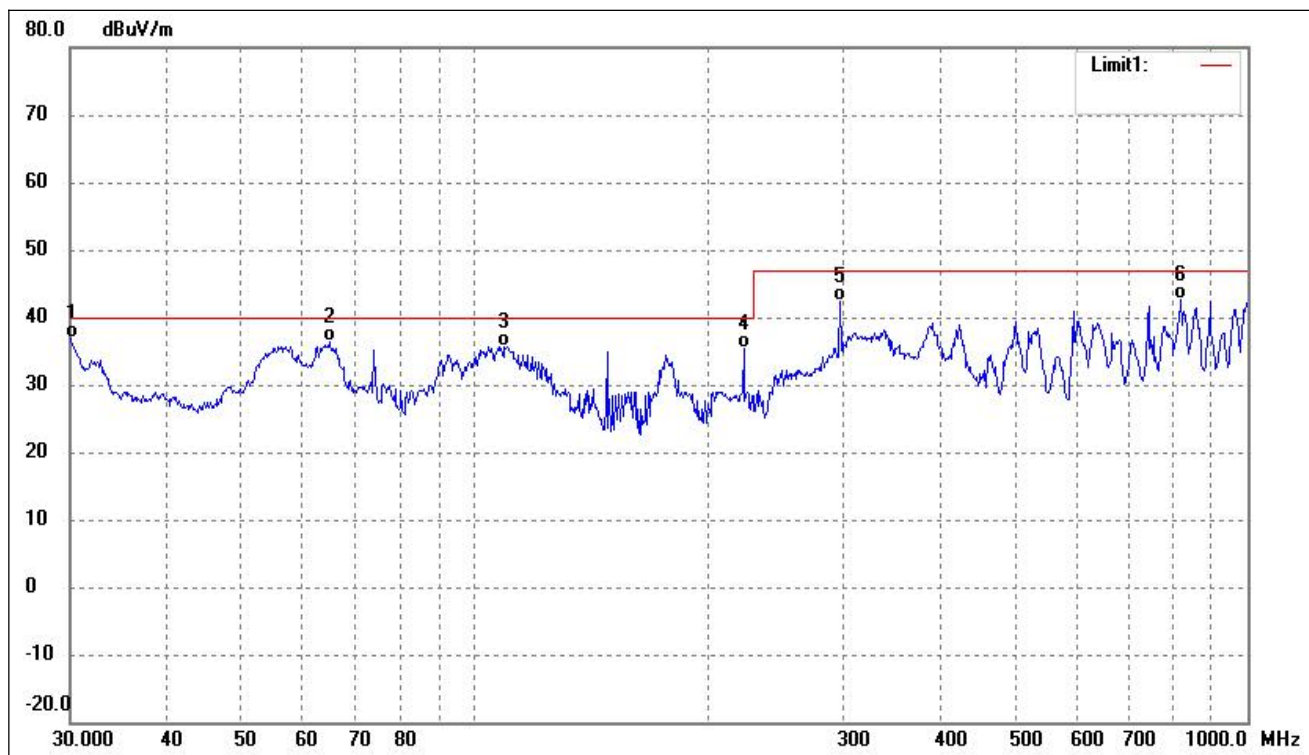
According to the data in section 4.7, the EUT complied with the EN55032 Class B standards.

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

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Detector
1	56.3948	44.20	-8.16	36.04	40.00	-3.96	0	100	QP
2	118.6014	47.61	-11.04	36.57	40.00	-3.43	0	100	QP
3*	222.9502	45.65	-8.74	36.91	40.00	-3.09	0	100	QP
4	302.4812	49.19	-6.09	43.10	47.00	-3.90	0	100	QP
5	670.4893	43.79	-1.01	42.78	47.00	-4.22	0	100	QP
6	948.7610	36.92	5.92	42.84	47.00	-4.16	0	100	QP



Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Detector
1*	30.0000	47.06	-10.24	36.82	40.00	-3.18	0	100	QP
2	64.8864	46.20	-9.83	36.37	40.00	-3.63	0	100	QP
3	109.4116	45.33	-9.59	35.74	40.00	-4.26	0	100	QP
4	222.9501	44.12	-8.74	35.38	40.00	-4.62	0	100	QP
5	297.2241	48.60	-6.24	42.36	47.00	-4.64	0	100	QP
6	818.8341	38.70	3.97	42.67	47.00	-4.33	0	100	QP



## 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	2017-07-01	2018-06-30
Power Source	California Instrument	5001IX-CTS-400	60077	2017-07-01	2018-06-30

### 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	2017-07-01	2018-06-30
Power Source	California Instrument	5001IX-CTS-400	60077	2017-07-01	2018-06-30

### 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

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 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	2017-07-01	2018-06-30

### 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	B	B		
LED	A	A	A	A	A	A	B	B		

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
USB Port	A	A	A	A						
Metal Slots	A	A	A	A						
/	/	/	/	/						



Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

EN 61000-4-2	Test Levels (kV)									
Test Points	-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 Levels (kV)									
Test Points	-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	2017-07-01	2018-06-30
Voltage Probe	Rohde & Schwarz	URV5-Z2	100013	2017-07-01	2018-06-30
Power Amplifier	AR	150W1000	300999	2017-07-01	2018-06-30
Power Amplifier	AR	25S1G4AM1	305993	2017-07-01	2018-06-30
Trilog Antenna	SCHWARZBECK	VULB9163	9163-333	2017-07-01	2018-06-30
Anechoic chamber	Albatross Projects	MCDC	----	2017-07-01	2018-06-30

### 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	2017-07-01	2018-06-30
Couple Clamp	EMC PARTNER	CN-EFT1000	513	2017-07-01	2018-06-30

### 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	/	/	/	/	/	/	/	/
	L1+N1	A	A	B	B	/	/	/	/
	L1 + PE	/	/	/	/	/	/	/	/
	NI + PE	/	/	/	/	/	/	/	/
	L1+N1+PE	/	/	/	/	/	/	/	/
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	2017-07-01	2018-06-30

### 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	/	/
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	2017-07-01	2018-06-30
Attenuator	EMTEST	MA-500	1009	2017-07-01	2018-06-30
CDN	Luthi	L-801M2/M3	2665	2017-07-01	2018-06-30

### 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	2017-07-01	2018-06-30

### 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	B	/

Test Result: Pass





## EXHIBIT A - LABEL

### Label Information

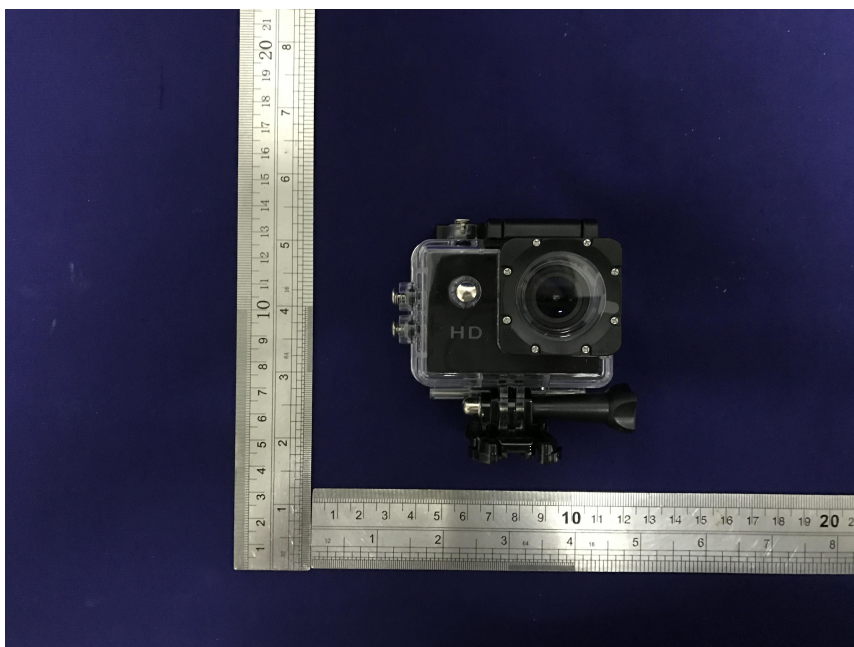


Remark: Text is Black in color and is justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT. The 'CE' marking must be affixed to the EUT or to its data plate. Where this is not possible or not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

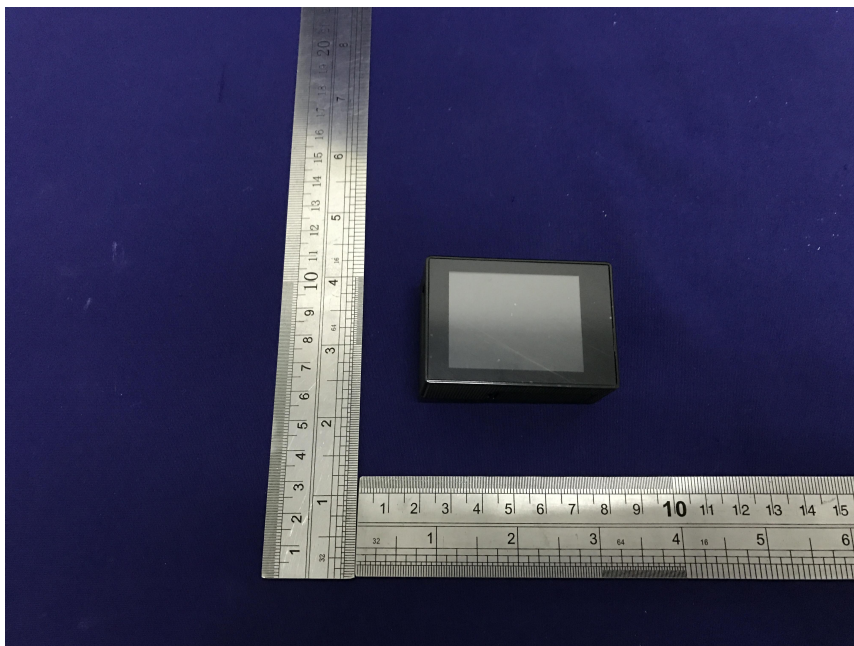




**EUT View 3**



**EUT View 4**







**EUT View 5**



**EUT View 6**



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