



FCC - TEST REPORT

Report Number	: 68.920.15.047.01	Date of Issue: <u>10 September, 2015</u>
Model	MGOVS015, SDV5301, SDV2301, SDV6301, SDV8301, MG015	
Product Type	Action Camera	
Applicant	OMG ELECTRONIC LIMITED	
Address	7Floor, Huarong Building, Mintian Road, Futian District, Shenzhen, China	
Production Facility	OMG ELECTRONIC LIMITED	
Address	Lefushan Industrial Park, Youganpu Village Fenggang Town, Dongguan, China	
Test Result	■ Positive <input type="checkbox"/> Negative	
Total pages including Appendices	16	

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 502708

Telephone: 86 755 8828 6998
Fax: 86 755 828 5299

Test Site 2

Company name: Global United Technology Services Co., Ltd.
2nd Floor, Block No.2, Laodong Industrial Zone,
Xixiang Road, Baoan District,
Shenzhen, China 518102

FCC Registration Number: 600491

Telephone: 86 755 2779 8480
Fax: 86 755 2779 8960

Remark: All test items were performed at Site 2.



3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product: Action Camera

Model no.: MGOVS015, SDV5301, SDV2301, SDV6301, SDV8301, MG015

FCC ID: 2AAAO-MG015R

Options and accessories: NIL

Rating: 1.5VDC by 1*AAA Battery

RF Transmission Frequency: 2450MHz

No. of Operated Channel: 1

Modulation: FSK

Duty Cycle: 100%

Antenna Type: PCB Antenna

Antenna Gain: 2.3dBi

Description of the EUT: The Equipment Under Test (EUT) is a Digital Video Camera with remote function operating at 2450MHz.



4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C					
Test Condition	Pages	Test Site	Test Result		
			Pass	Fail	N/A
15.207 Conducted emission AC power port	--	--	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.205(a), §15.209(a), §15.249(a), §15.249(c) Field strength of emissions and Restricted bands	9	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC §15.215(c) 20dB bandwidth	11	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.249(d) Out of band emissions	13	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.203 Antenna requirement	See note 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses an integral antenna, which gain is 2.3dBi. According to §15.203 and RSSGEN 8.3, it is considered sufficiently to comply with the provisions of this section.



6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AAAO-MG015R complies with Section 15.205, 15.209, 15.249 of the FCC Part 15, Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

- Performed

- **Not** Performed

The Equipment under Test

- **Fulfills** the general approval requirements.

- **Does not** fulfill the general approval requirements.

Sample Received Date: August 19, 2015

Testing Start Date: September 6, 2015

Testing End Date: September 9, 2015

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by: Prepared by:

A handwritten signature in black ink, appearing to read "John Zhi".

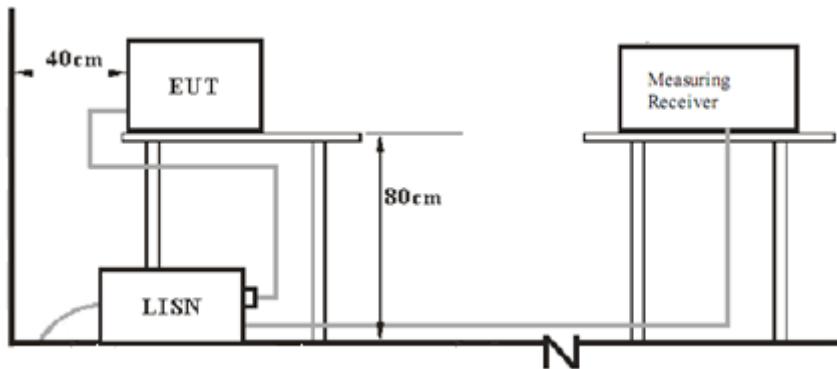
John Zhi
EMC Project Manager

A handwritten signature in black ink, appearing to read "Alan Xiong".

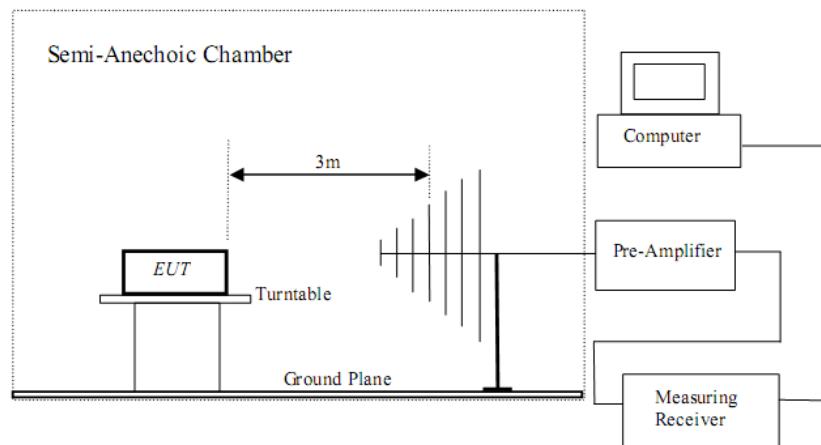
Alan Xiong
EMC Project Engineer

7 Test setups

7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups



8 Technical Requirement

8.1 Field strength of emissions and restricted bands

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured ,RBW = 1 MHz for $\geq 1\text{GHz}$, 100 kHz for $f < 1\text{ GHz}$, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from $20\log(\text{duty cycle}/100\text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limits

According to §15.249 (a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

According to §15.249 (c), Field strength limits are specified at a distance of 3 meters.

According to §15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

According to §15.205 and Unwanted emissions falling into restricted bands in §15.205 (a) Table 3 shall comply with the limits specified in §15.209.

Field strength of emissions and Restricted bands

EUT: Action Camera

M/N: MGOVS015

Operating Condition: Tx; 2450MHz

Frequency MHz	Emission Level dB μ V/m	Polarizatio n	Limit dB μ V/m	Detector	Margin dB μ V/m	Result
44.12	9.81	Horizontal	40.00	QP	-30.19	Pass
99.53	10.04	Horizontal	43.50	QP	-33.46	Pass
245.95	9.01	Horizontal	46.00	QP	-36.99	Pass
437.12	13.08	Horizontal	46.00	QP	-32.92	Pass
679.96	18.35	Horizontal	46.00	QP	-27.65	Pass
881.41	21.52	Horizontal	46.00	QP	-24.48	Pass
37.68	12.79	Vertical	40.00	QP	-27.21	Pass
53.88	9.36	Vertical	40.00	QP	-30.64	Pass
99.88	9.66	Vertical	43.50	QP	-33.84	Pass
223.73	9.92	Vertical	46.00	QP	-36.08	Pass
400.43	13.37	Vertical	46.00	QP	-32.63	Pass
689.57	19.73	Vertical	46.00	QP	-26.27	Pass
2450.00	72.27	Horizontal	94.00	AV	-21.73	Pass
2450.00	87.70	Horizontal	114.00	PK	-26.30	Pass
*4900.00	49.06	Horizontal	54.00	AV	-4.94	Pass
*4900.00	59.13	Horizontal	74.00	PK	-14.87	Pass
*7350.00	41.97	Horizontal	54.00	AV	-12.03	Pass
*7350.00	52.10	Horizontal	74.00	PK	-21.90	Pass
9800.00	41.32	Horizontal	54.00	AV	-12.68	Pass
9800.00	51.31	Horizontal	74.00	PK	-22.69	Pass
*12250.00	38.85	Horizontal	54.00	AV	-15.15	Pass
*12250.00	48.63	Horizontal	74.00	PK	-25.37	Pass
2450.00	82.55	Vertical	94.00	AV	-11.45	Pass
2450.00	95.68	Vertical	114.00	PK	-18.32	Pass
*4900.00	49.60	Vertical	54.00	AV	-4.40	Pass
*4900.00	61.35	Vertical	74.00	PK	-12.65	Pass
*7350.00	47.87	Vertical	54.00	AV	-6.13	Pass
*7350.00	57.68	Vertical	74.00	PK	-16.32	Pass
9800.00	41.68	Vertical	54.00	AV	-12.32	Pass
9800.00	51.22	Vertical	74.00	PK	-22.78	Pass
*12250.00	37.98	Vertical	54.00	AV	-16.02	Pass
*12250.00	47.55	Vertical	74.00	PK	-26.45	Pass

“*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

8.2 20dB Bandwidth

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

Limits:

According to 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.



20dB Bandwidth

Frequency MHz	20dB Bandwidth MHz	Limit kHz	Result
2450	1.946	--	Pass



8.3 Band edge testing

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured, RBW = 1 MHz,
VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from $20\log(\text{duty cycle}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit:

According to §15.249(d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.



Band edge testing

EUT: Action Camera

M/N: MGOVS015

Operating Condition: Tx; 2450MHz

Frequency MHz	Emission Level dB μ V/m	Polarizatio n	Limit dB μ V/m	Detector	Margin dB μ V/m	Result
2310.00	35.55	Vertical	74.00	PK	-38.45	Pass
2390.00	38.60	Vertical	74.00	PK	-35.40	Pass
2400.00	37.00	Vertical	74.00	PK	-37.00	Pass
2483.50	38.61	Vertical	74.00	PK	-35.39	Pass
2500.00	35.71	Vertical	74.00	PK	-38.29	Pass
2310.00	24.66	Vertical	54.00	AV	-29.34	Pass
2390.00	25.13	Vertical	54.00	AV	-28.87	Pass
2400.00	24.59	Vertical	54.00	AV	-29.41	Pass
2483.50	24.73	Vertical	54.00	AV	-29.27	Pass
2500.00	24.95	Vertical	54.00	AV	-29.05	Pass
2310.00	36.15	Horizontal	74.00	PK	-37.85	Pass
2390.00	35.56	Horizontal	74.00	PK	-38.44	Pass
2400.00	34.79	Horizontal	74.00	PK	-39.21	Pass
2483.50	35.12	Horizontal	74.00	PK	-38.88	Pass
2500.00	35.87	Horizontal	74.00	PK	-38.13	Pass
2310.00	24.65	Horizontal	54.00	AV	-29.35	Pass
2390.00	24.74	Horizontal	54.00	AV	-29.26	Pass
2400.00	24.50	Horizontal	54.00	AV	-29.50	Pass
2483.50	24.68	Horizontal	54.00	AV	-29.32	Pass
2500.00	25.02	Horizontal	54.00	AV	-28.98	Pass



9 Test equipment list

List of Test Instruments

	DESCRIPTION	MANUFACTURE R	MODEL NO.	SERIAL NO.	CAL. DUE DATE
C	Spectrum Analyzer	Agilent	E4440A	GTS533	Dec. 3 2015
RE	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Mar. 26 2016
	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A
	Spectrum Analyzer	Agilent	E4440A	GTS533	Dec. 3 2015
	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June 29 2016
	BiConiLog Antenna	SCHWARZBECK MESS- ELEKTRONIK	VULB9163	GTS214	June 29 2016
	Double -ridged waveguide horn	SCHWARZBECK MESS- ELEKTRONIK	9120D-829	GTS208	June 25 2016
	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 26 2016
	EMI Test Software	AUDIX	E3	N/A	N/A
	Coaxial Cable	GTS	N/A	GTS213	Mar. 27 2016
	Coaxial Cable	GTS	N/A	GTS211	Mar. 27 2016
	Coaxial cable	GTS	N/A	GTS210	Mar. 27 2016
	Coaxial Cable	GTS	N/A	GTS212	Mar. 27 2016
	Amplifier(100kHz- 3GHz)	HP	8347A	GTS204	June 29 2016
	Amplifier(2GHz- 20GHz)	HP	8349B	GTS206	June 29 2016
	Amplifier (18- 26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 25 2016

C - Conducted RF tests

- 20dB bandwidth
- Band edge

10 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.68dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.