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Report No.: FCC14-RTE062501

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# **FCC REPORT**

Applicant: SHENZHEN FATSHARK ELECTRONIC CO., LTD

Address of Applicant: 8FL, Mansion D, Longjing Industry Zone, Bantian, Longgang

District, Shenzhen

**Equipment Under Test (EUT)** 

Product Name: ULTRAMICRO FPV CAMERA

Model No.: 1251

FCC ID: 2ABYQFSV1251

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.249:2013

Date of sample receipt: June 18, 2014

**Date of Test:** June 18, 2014 To June 25 2014

Date of report issued: June 25, 2014

Test Result: PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Kevin Yu Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the EBO product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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### 2 Version

Version No.	Date	Description
00	June 25, 2014	Original

Prepared By:	Jason	Date:	June 25, 2014	
	Project Engineer	_		_
Check By:	Canyo	Date:	June 25, 2014	_
	Reviewer			

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# 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	N/A
Field strength of the fundamental signal	15.249 (a)	Pass
Spurious emissions	15.249 (a) (d)/15.209	Pass
Band edge	15.249 (d)/15.205	Pass
20dB Occupied Bandwidth	15.215 (c)	Pass

Pass: The EUT complies with the essential requirements in the standard.

N/A: not applicable.

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### 5 General Information

### 5.1 Client Information

Applicant:	SHENZHEN FATSHARK ELECTRONIC CO., LTD
Address of Applicant:	8FL, Mansion D, Longjing Industry Zone, Bantian, Longgang District, Shenzhen
Manufacturer/Factory:	SHENZHEN FATSHARK ELECTRONIC CO., LTD
Address of Manufacturer/Factory:	8FL, Mansion D, Longjing Industry Zone, Bantian, Longgang District, Shenzhen

### 5.2 General Description of EUT

Product Name:	ULTRAMICRO FPV CAMERA
Model No.:	1251
Operation Frequency:	5740MHz ~ 5860MHz
Channel numbers:	7
Channel separation:	20MHz
Modulation type:	FM
Antenna Type:	Integral
Antenna gain:	0dBi (declare by Applicant)
Power supply:	3.3-5.5V d.c.

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Operation Frequency each of channel								
Channel Frequency Channel Frequency Channel Frequency Channel Frequency							Frequency	
1	5740MHz	3	5780MHz	5	5820MHz	7	5860MHz	
2	5760MHz	4	5800MHz	6	5840MHz			

#### Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	5740MHz
The middle channel	5800MHz
The Highest channel	5860MHz

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#### 5.3 Test mode

Transmitting mode Keep the EUT in continuously transmitting mode.

Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

#### Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Axis	Х	Y	Z
Field Strength(dBuV/m)	98.85	103.11	100.79

#### **Final Test Mode:**

According to ANSI C63.4 standards, the test results is "worst setup":

Y axis (see the test setup photo)

### 5.4 Description of Support Units

None.

### 5.5 Test Facility

MRT Technology (Suzhou) Co., Ltd

FCC Registered Test Site Number: 809388

#### 5.6 Test Location

All tests were performed at:

D8 Building, Youxin Industrial Park, No.2 Tian'e,dang Rd., Wuzhong Economic Development Zone, Suzhou, 215104,China

### 5.7 Other Information Requested by the Customer

None.

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### 6 Test Instruments list

#### Radiated Emission

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/01/04
Spectrum Analyzer	Agilent	E4447A	MY45300136	1 year	2014/11/08
Preamplifier	MRT	AP01G18	1310002	1 year	2014/12/14
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	1 year	2014/11/24
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2014/11/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	1 year	2014/11/24
Broadband Horn Antenna	Schwarzbeck	BBHA9170	9170-549	1 year	2014/12/11
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2014/11/15

#### Conducted Test Equipment

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/01/04
Power Sensor	Agilent	U2021XA	MY52450003	1 year	2014/12/14
Temperature/Humidity Meter	Anymetre	TH101B	TR3-01	1 year	2014/11/15

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# 7 Test results and Measurement Data

### 7.1 Antenna requirement:

Standard requirement: FCC Part15 C Section 15.203

#### 15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### **E.U.T Antenna:**

The antenna is Integral Antenna, the best case gain of the antenna is 0dBi.

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#### 7.2 Radiated Emission Method

 Madiated Elliission Wit						
Test Requirement:	FCC Part15 C Section 15.209					
Test Method:	ANSI C63.4:2003					
Test Frequency Range:	30MHz to 40GHz					
Test site:	Measurement Distance: 3m					
Receiver setup:	Frequency	Detector	RBW	VBW	Remark	
	30MHz- 1GHz	Quasi-peal	120KHz	300KHz	Quasi-peak Value	
	Above 1GHz	Peak	1MHz	3MHz	Peak Value	
	Above IGHZ	Peak	1MHz	10Hz	Average Value	
	For field strength PK detector is us	·			0 10MHz and 10MHz. AV value	
Limit:	Freque	ency	Limit (dBuV		Remark	
(Field strength of the fundamental signal)	5725 ~ 58	75MHz	94.0 114.0		Average Value Peak Value	
Limit:	Freque	ency	Limit (dBuV	/m @3m)	Remark	
(Spurious Emissions)	30MHz-8		40.0		Quasi-peak Value	
, ,	88MHz-2		43.5		Quasi-peak Value	
	216MHz-9 960MHz-		46.00 54.00		Quasi-peak Value  Quasi-peak Value	
			54.0		Average Value	
	Above 1	GHz	74.0		Peak Value	
Limit: (band edge)	harmonics, sha	ll be attenuate to the genera	ed by at least Il radiated emi	50 dB belov	bands, except for w the level of the in Section 15.209,	
Test setup:	Below 1GHz  Antenna Tower  Search Antenna  RF Test Receiver  Ground Plane				rch	

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	Above 1GHz
	Antenna Tower  Horn Antenna  Spectrum Analyzer  Turn Table  A A A A A A A A A A A A A A A A A A
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
	The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
	<ol> <li>The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> </ol>
	4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
	<ol><li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li></ol>
	6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

#### Measurement data:

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### 7.2.1 Field Strength of The Fundamental Signal

#### Peak value:

Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
5737.00	63.32	37.35	100.67	114.00	-13.33	Horizontal
5740.85	62.95	37.37	100.32	114.00	-13.68	Vertical
5800.43	65.52	37.59	103.11	114.00	-10.89	Horizontal
5800.41	62.08	37.59	99.67	114.00	-14.33	Vertical
5856.85	64.81	37.76	102.57	114.00	-11.43	Horizontal
5860.39	61.42	37.78	99.20	114.00	-14.80	Vertical

#### Average value:

Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
5740.81	52.49	37.37	89.86	94.00	-4.14	Horizontal
5740.78	52.33	37.37	89.70	94.00	-4.30	Vertical
5800.85	54.80	37.59	92.39	94.00	-1.61	Horizontal
5800.85	51.54	37.59	89.13	94.00	-4.87	Vertical
5860.78	53.97	37.78	91.75	94.00	-2.25	Horizontal
5860.85	50.41	37.78	88.19	94.00	-5.81	Vertical

#### Remark:

- 1. Factor = Antenna Factor + Cable Loss Preamp Factor
- 2. Measured Level = Reading Level + Factor

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### 7.2.2 Spurious emissions

#### **Measurement Data:**

#### **Below 1GHz**

The lowest/middle/highest channels were tested. The worst case is middle channel mode. Only the worst case's data was showing in the report.

Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
378.01	45.35	-15.44	29.91	46.00	-16.09	Horizontal
619.74	46.25	-11.45	34.80	46.00	-11.20	Horizontal
378.01	46.75	-17.50	29.25	46.00	-16.75	Vertical
619.76	42.40	-11.74	30.66	46.00	-15.34	Vertical

#### Remark:

- 1. Factor = Antenna Factor + Cable Loss Preamp Factor
- 2. Measured Level = Reading Level + Factor

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#### **Above 1GHz:**

	Test Frequency: 5740MHz					
Peak value						
Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
11480.50	41.50	19.39	60.89	74.00	-13.11	Horizontal
17220.00	35.15	23.97	59.12	74.00	-14.88	Horizontal
11472.00	39.13	19.37	58.50	74.00	-15.50	Vertical
17220.00	35.34	23.97	59.31	74.00	-14.69	Vertical
Average value	e:					
Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
11481.55	31.41	19.39	50.80	54.00	-3.20	Horizontal
17222.60	23.87	24.03	47.90	54.00	-6.10	Horizontal
11481.73	27.78	19.39	47.17	54.00	-6.83	Vertical
17215.25	22.98	23.90	46.88	54.00	-7.12	Vertical

	Test Frequency: 5800MHz					
Peak value						
Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
11599.50	39.71	19.48	59.19	74.00	-14.81	Horizontal
17400.00	34.13	25.52	59.65	74.00	-14.35	Horizontal
11599.50	38.99	19.48	58.47	74.00	-15.53	Vertical
17400.00	33.92	25.52	59.44	74.00	-14.56	Vertical
Average value	e:				•	
Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
11601.68	30.49	19.48	49.97	54.00	-4.03	Horizontal
17402.83	22.27	25.58	47.85	54.00	-6.15	Horizontal
11601.58	27.73	19.48	47.21	54.00	-6.79	Vertical
17402.83	22.03	25.58	47.61	54.00	-6.39	Vertical

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Test Frequency: 5860MHz						
Peak value						
Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
11718.50	40.08	19.30	59.38	74.00	-14.62	Horizontal
17580.00	33.88	26.46	60.34	74.00	-13.66	Horizontal
11718.50	37.56	19.30	56.86	74.00	-17.14	Vertical
17580.00	34.28	26.46	60.74	74.00	-13.26	Vertical
Average value	e:					
Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
11721.73	29.42	19.26	48.68	54.00	-5.32	Horizontal
17582.75	22.30	26.50	48.80	54.00	-5.20	Horizontal
11721.78	27.22	19.26	46.48	54.00	-7.52	Vertical
17582.30	21.77	26.50	48.27	54.00	-5.73	Vertical

Note 1: The test trace is same as the ambient noise (the test frequency range:18GHz~40GHz), therefore no data appear in the report.

- 2: Factor = Antenna Factor + Cable Loss Preamp Factor
- 3: Measure Level = Reading Level + Factor.

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### 7.2.3 Bandedge emissions

All of the restriction bands were tested, and only the data of worst case was exhibited.

Test Frequency: 5740MHz						
Peak value						
Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
5725.00	47.63	19.63	67.26	74.00	-6.74	Horizontal
5725.00	46.46	19.51	65.97	74.00	-8.03	Vertical
Average value	<del>)</del> :					
Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
5725.00	28.24	19.63	47.87	54.00	-6.13	Horizontal
5725.00	29.08	19.51	48.59	54.00	-5.41	Vertical

Test Frequency: 5860MHz						
Peak value						
Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
5875.00	43.52	20.29	63.81	74.00	-10.19	Horizontal
5875.00	43.42	20.15	63.57	74.00	-10.43	Vertical
Average value	e:					
Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Polarization
5875.00	27.63	20.29	47.92	54.00	-6.08	Horizontal
5875.00	28.46	20.15	48.61	54.00	-5.39	Vertical

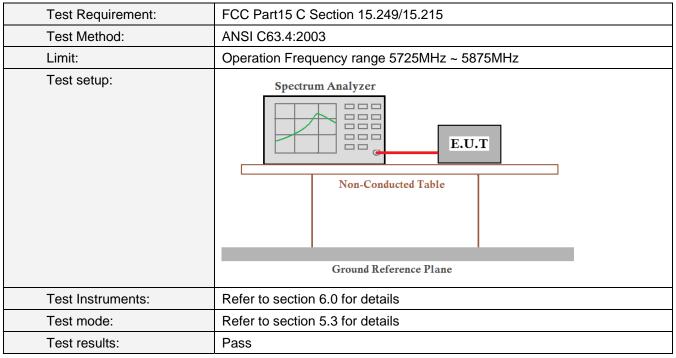
#### Remark:

- 1. Factor = Antenna Factor + Cable Loss Preamp Factor
- 2. Measured Level = Reading Level + Factor

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### 7.3 20dB Occupy Bandwidth



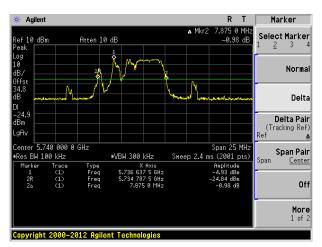
### **Measurement Data**

Test channel	20dB bandwidth(MHz)	Result
Lowest	7.875	Pass
Middle	7.837	Pass
Highest	7.687	Pass

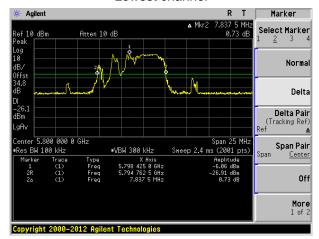
Test plot as follows:

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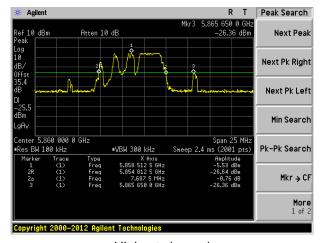
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#### Lowest channel



#### Middle channel



Highest channel

--End--