

TEST REPORT

FCC ID: 2ANJH-WHMS1

Product: WYZE Motion Sensor

Model No.: WHMS1

Additional Model: N/A

Trade Mark: WYZE

Report No.: TCT190411E008

Issued Date: Apr. 22, 2019

Issued for:

TianJin HuaLai Technology Co., Ltd.

No.10 JinPing Road, Ya An Street, Nankai District Tianjin, China

Issued By:

Shenzhen Tongce Testing Lab.

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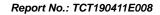




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1. Test Certification

Product:	WYZE Motion Sensor	
Model No.:	WHMS1	(,C
Additional Model:	N/A	
Trade Mark:	WYZE (S)	
Applicant:	TianJin HuaLai Technology Co., Ltd.	
Address:	No.10 JinPing Road, Ya An Street, Nankai District Tianjin, China	(G
Manufacturer:	TianJin HuaLai Technology Co., Ltd.	
Address:	No.10 JinPing Road, Ya An Street, Nankai District Tianjin, China	
Date of Test:	Apr. 12, 2019 – Apr. 19, 2019	
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.249 ANSI C63.10:2013	Č.

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:

Jin Wang

Reviewed By:

Beryl Zhao

Approved By:

Date: Apr. 19, 2019

Date: Apr. 22, 2019

Date: Apr. 22, 2019



2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	N/A
Field Strength of Fundamental	§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

Note:

- 1. Pass: Test item meets the requirement.
- 2. Fail: Test item does not meet the requirement.
- 3. N/A: Test case does not apply to the test object.
- 4. The test result judgment is decided by the limit of test standard.





3. EUT Description

Product:	WYZE Motion Sensor
Model No.:	WHMS1
Additional Model:	N/A
Trade Mark:	WYZE
Hardware Version:	PIR3U-P01
Software Version:	V0.0.0.26
Operation Frequency:	906MHz-918MHz
Number of Channel:	9
Modulation Technology:	FSK
Antenna Type:	Internal Antenna
Antenna Gain:	0.21dBi
Power Supply:	DC 3V

Operation Frequency Each of Channel

Channel	Frequency	Channel	Frequency	Channel	Frequency
0	906MHz	3	907MHz	6	909.8MHz
9)1	906.6MHz) 4	907.4MHz	7	915MHz
2	906.8MHz	5	909.6MHz	8	918MHz

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	906MHz
The middle channel	907.4MHz
The Highest channel	918MHz





4. General Information

4.1. Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel

The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case (Z axis) are shown in Test Results of the following pages.

4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
1 (6)	1 6) /	(6) 1	(0)

Note:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.





5. Facilities and Accreditations

5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

• FCC - Registration No.: 645098

Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC - Registration No.: 10668A-1

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

5.2.Location

Shenzhen Tongce Testing Lab

Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District,

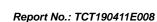
Shenzhen, Guangdong, China

TEL: 86-755-27673339

5.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
(1)	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1GHz)	±3.92dB
5	All emissions, radiated(>1GHz)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%





6. Test Results and Measurement Data

6.1. Antenna Requirement

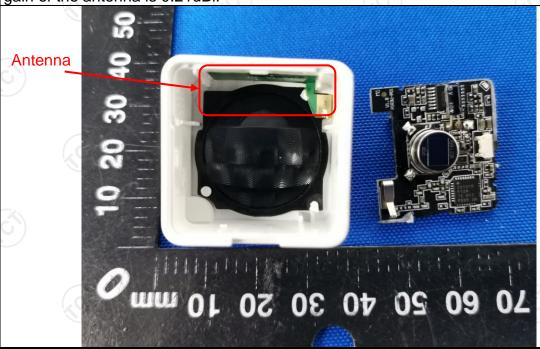
Standard requirement: FCC Part15 C Section 15.203

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 EUT antenna is internal antenna which permanently attached, and the best case gain of the antenna is 0.21dBi.





6.2.Conducted Emission

6.2.1. Test Specification

(c.)			(,c			
Test Requirement:	FCC Part15 C Section 15.207					
Test Method:	ANSI C63.10:2013	ANSI C63.10:2013				
Frequency Range:	150 kHz to 30 MHz	150 kHz to 30 MHz				
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto					
	Frequency range	Limit (dBuV)			
	(MHz)	Quasi-peak	Average			
Limits:	0.15-0.5	66 to 56*	56 to 46*			
	0.5-5	56	46			
	5-30	60	50			
	Refere	nce Plane				
Test Setup:	AUX Equipment E.U.T					
Test Mode:	Transmitting mode with modulation					
Test Procedure:	 The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement. 					
Test Result:	N/A; Because the EUT is powered by the button cell, so the item is not applicable.					



6.3. Radiated Emission Measurement

6.3.1. Test Specification

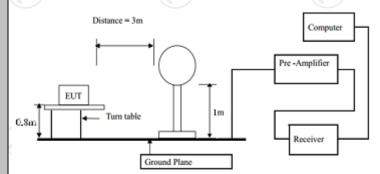
	(G) (G) (G)				
Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Frequency Range:	9 kHz to 25	GHz	<u>(1)</u>		(3)
Measurement Distance:	3 m				
Antenna Polarization:	Horizontal 8	& Vertical			
	Frequency 9kHz- 150kHz	Detector Quasi-peak	RBW 200Hz	VBW 1kHz	Remark Quasi-peak Value
Receiver Setup:	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
Limit(Field strength of the	Freque	ency	Limit (dBu\	//m @3m)	Remark
,	2400MHz-24	102 EMU-	94.	00	Average Value
fundamental signal):	2400101112-22	+03.3IVITZ	114	.00	Peak Value
	Freque	encv	Limit (dRu)	//m @3m)	Remark
	Frequency 0.009-0.490		Limit (dBuV/m @3m) 2400/F(KHz)		Quasi-peak Value
	0.490-1.705		2400/F(KHz)		Quasi-peak Value
	1.705-30		30		Quasi-peak Value
Limit/Caurious Emissions).	30MHz-88MHz		40.0		Quasi-peak Value
Limit(Spurious Emissions):	88MHz-216MHz		43	.5	Quasi-peak Value
	216MHz-9	60MHz	46	.0	Quasi-peak Value
	960MHz-1GHz		54	.0	Quasi-peak Value
	Above 1GHz		54	_	Average Value
			74		Peak Value
Limit (band edge) :	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by a least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209 whichever is the lesser attenuation.				
Test Procedure:	 The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber in below 1GHz, 1.5m above the ground in above 1GHz. 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. 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.

- 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.

For radiated emissions below 30MHz



30MHz to 1GHz

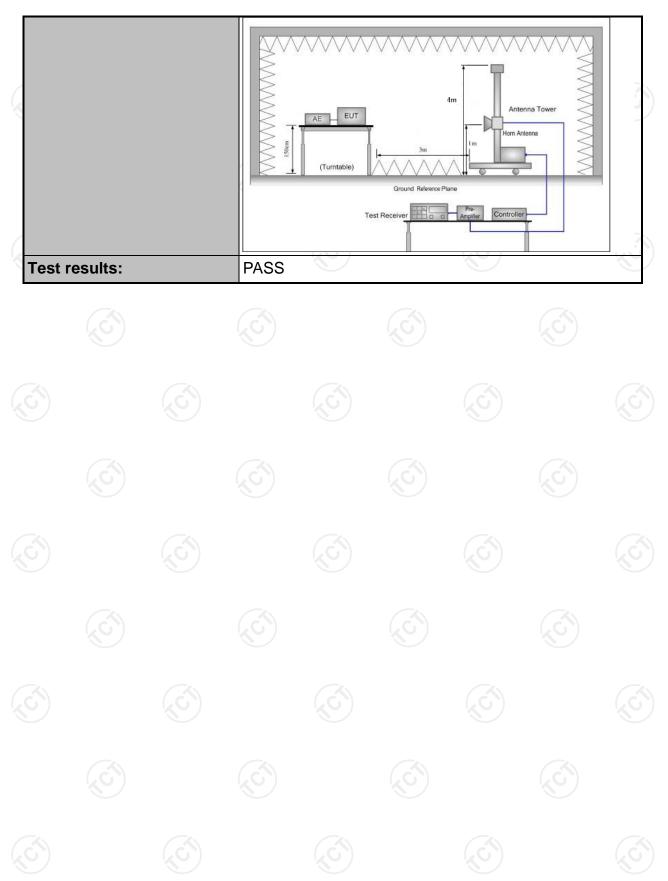
Test setup: Search Antenna EUT RF Test Receiver Turn Table

Above 1GHz

Ground Plane

(The diagram below shows the test setup that is utilized to make the measurements for emission from 1GHz to the tenth harmonic of the highest fundamental frequency or to 40GHz emissions, whichever is lower.)









6.3.2. Test Instruments

	Radiated Emission Test Site (966)						
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due			
Test Receiver	ROHDE&SCHW ARZ	ESIB7	100197	Jul. 17, 2019			
Spectrum Analyzer	ROHDE&SCHW ARZ	FSQ40	200061	Sep. 20, 2019			
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 16, 2019			
Pre-amplifier	HP	8447D	2727A05017	Sep. 16, 2019			
Loop antenna	ZHINAN	ZN30900A	12024	Oct. 20, 2019			
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 02, 2019			
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Oct. 20, 2019			
Horn Antenna	A-INFO	LB-180400-KF	J211020657	Sep. 16, 2019			
Antenna Mast	Keleto	RE-AM	N/A	N/A			
Coax cable (9KHz-1GHz)	тст	RE-low-01	N/A	Sep. 16, 2019			
Coax cable (9KHz-40GHz)	тст	RE-high-02	N/A	Sep. 16, 2019			
Coax cable (9KHz-1GHz)	тст	RE-low-03	N/A	Sep. 16, 2019			
Coax cable (9KHz-40GHz)	тст	RE-high-04	N/A	Sep. 16, 2019			
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A			

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



6.3.3. Test Data

Field Strength of Fundamental

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horizontal /Vertical	Limits PK/AV (dBuV/m)	Margin (dB)
906	78.3(PK)	Н	114	-35.7
906	72.6(AV)	Н	94	-21.4
907.4	78.1(PK)	н	114	-35.9
907.4	72.9(AV)	Н	94	-21.1
918	78.6(PK)	(C)H	114	-35.4
918	72.1(AV)	Н	94	-21.9
906	73.2(PK)	V	114	-40.8
906	67.4(AV)	V	94	-26.6
907.4	73.7(PK)	V	114	-40.3
907.4	68.8(AV)	V	94	-25.2
918	73.5(PK)	V	114	-40.5
918	67.7(AV)	V	94	-26.3
			Ž.	

Spurious Emissions

Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dBµV/m)	Limit@3m (dBµV/m)		
	1			
(c)-	(c) (c)	- (c)		

Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor

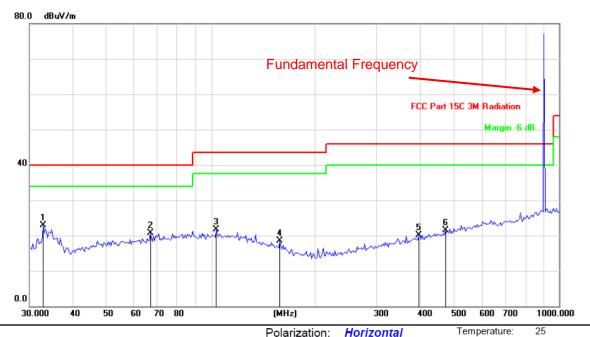
2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

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Frequency Range (30MHz-1GHz)

Horizontal:



Site Polarization: Horizontal Temperature: 25
Limit: FCC Part 15C 3M Radiation Power: Humidity: 55 %

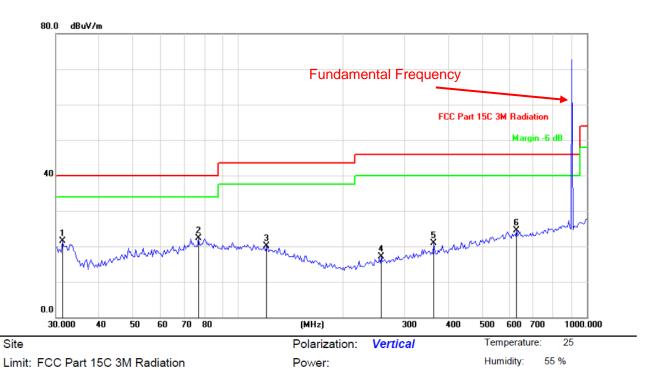
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	32.8697	33.87	-11.02	22.85	40.00	-17.15	peak
2		66.8395	35.30	-14.61	20.69	40.00	-19.31	peak
3		103.3353	29.96	-8.29	21.67	43.50	-21.83	peak
4		157.5290	34.36	-15.91	18.45	43.50	-25.05	peak
5		395.5071	29.11	-9.01	20.10	46.00	-25.90	peak
6		471.4665	29.47	-7.92	21.55	46.00	-24.45	peak







Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		31.2919	32.48	-11.00	21.48	40.00	-18.52	peak
2	*	76.9256	38.75	-16.38	22.37	40.00	-17.63	peak
3		120.6118	31.81	-11.78	20.03	43.50	-23.47	peak
4		257.6266	29.48	-12.32	17.16	46.00	-28.84	peak
5	,	363.5231	30.40	-9.49	20.91	46.00	-25.09	peak
6		628.8936	30.14	-5.67	24.47	46.00	-21.53	peak

Note: Measurements were conducted in all channels (high, middle, low), and the worst case (middle channel) was submitted only.





Above 1GHz

	Low channel: 906MHz								
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Peak	۸۱/	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
1812.00	Н	23.12		-3.94	19.18		74	54	-34.82
2718.00	Н	22.57		0.52	23.09		74	54	-30.91
1812.00	V	23.36		-3.94	19.42		74	54	-34.58
2718.00		20.04	-420	0.52	20.56	(C)+-	74	54	-33.44
			-		-				

		Middle channel: 907.4MHz								
	Frequency	Ant. Pol.	Peak	AV	Correction		n Level	Peak limit	AV limit	Margin
	(MHz)	H/V	reading	reading	Factor	Peak	AV		(dBµV/m)	(dB)
	,		(dBµV)	(dBµV)	(dB/m)	(dBµV/m)	(dBµV/m)	\	\	` ,
	1814.80	Η	22.85		-3.98	18.87		74	54	-35.13
	2722.20	H	21.21		0.57	21.78		74	54	-32.22
				-f.C			<u> </u>			
	1814.80	V	23.79		-3.98	19.81		74	54	-34.19
	2722.20	V	20.42		0.57	20.99		74	54	-33.01
	Z\							-		
<	G_{a}		$(C_{\mathcal{O}})$		(20	(` ر		$(C_{\mathcal{O}})$		(, 0

	High channel: 918MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Peak	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)	
1836.00	(CH)	20.96	-420	-3.98	16.98	(C) }	74	54	-37.02	
2754.00	H	22.14		0.57	22.71	<u></u>	74	54	-31.29	
			,							
1836.00	V	21.56		-3.98	17.58		74	54	-36.42	
2754.00	V	22.03		0.57	22.60		74	54	-31.40	

Note:

- 1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 2. $Margin (dB) = Emission Level (Peak) (dB\mu V/m)-Average limit (dB\mu V/m)$
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.



Band Edge Requirement

Low chann	ow channel: 906MHz								
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	AV	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
902	Н	28.07		-4.20	23.87		74		-50.13
902	Η		22.34	-4.20		18.14		54	-35.86
			(-			
	(C)		X	O^{*}				120	
902	V	27.23		-4.20	23.03		74		-50.97
902	V		21.51	-4.20		17.31		54	-36.69
							-		

High chann	nel: 918MH	Ηz							
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	AV	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
928	H	24.67	<	-4.20	20.47	()/	74		-53.53
928	Н		21.03	-4.20		16.83		54	-37.17
							-		
928	V	27.44)	-4.20	23.24		74		-50.76
928	V		22.59	-4.20		18.39		54	-35.61

Note:

- 1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 2. $Margin (dB) = Emission Level (Peak/Average)(dB\mu V/m)-(Peak/Average) limit (dB\mu V/m)$
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.





6.4. 20dB Occupied Bandwidth

6.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.215(c)
Test Method:	ANSI C63.10: 2013
Limit:	N/A
	 According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. Set to the maximum power setting and enable the EUT transmit continuously. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; RBW≥1% of the 20 dB bandwidth; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold. Measure and record the results in the test report.
Test setup:	Spectrum Analyzer EUT
Test Mode:	Transmitting mode with modulation
Test results:	PASS

6.4.2. Test Instruments

RF Test Room								
Equipment	Manufacturer	Model	Serial Number	Calibration Due				
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 20, 2019				

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

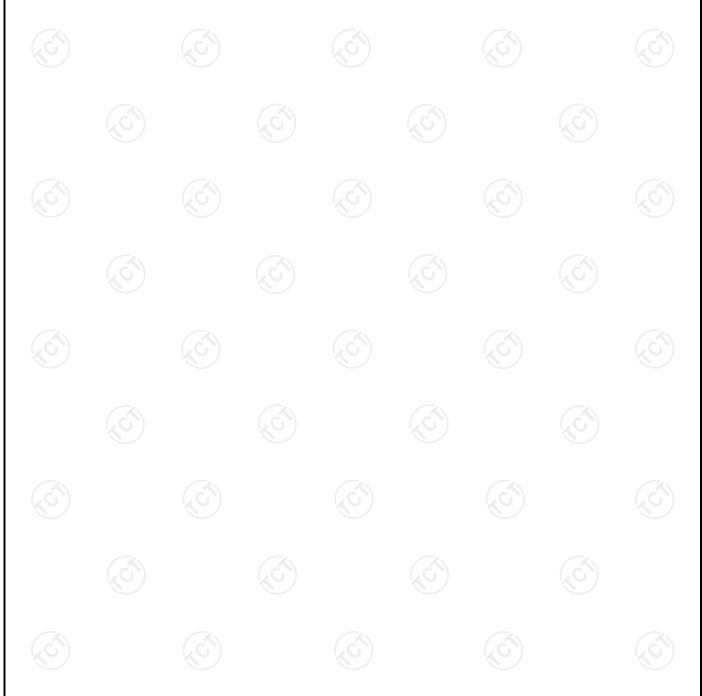
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6.4.3. Test data

Test Channel	20dB Occupy Bandwidth (kHz)	Limit	Conclusion	
Lowest	24.55	(c)	PASS	
Middle	24.46		PASS	
Highest	23.29	<u> </u>	PASS	

Test plots as follows:







Lowest channel



Middle channel



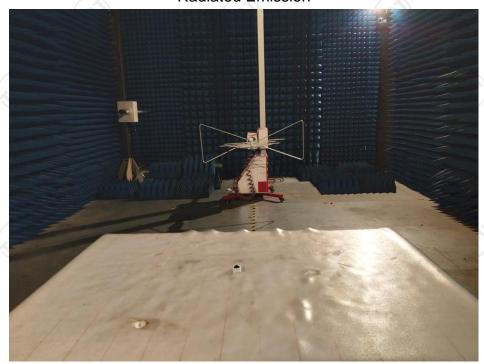
Highest channel

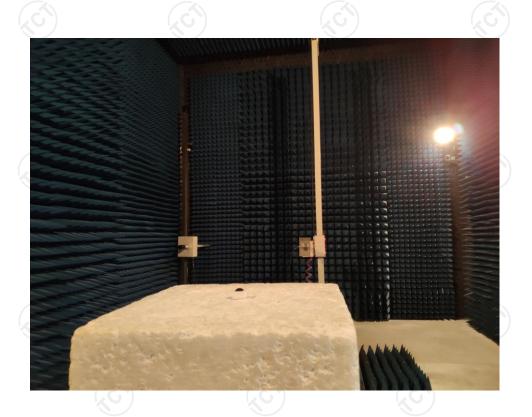




Appendix A: Photographs of Test Setup Product: WYZE Motion Sensor

Product: WYZE Motion Sensor Model: WHMS1 Radiated Emission







Appendix B: Photographs of EUT Product: WYZE Motion Sensor

Model: WHMS1
External Photos





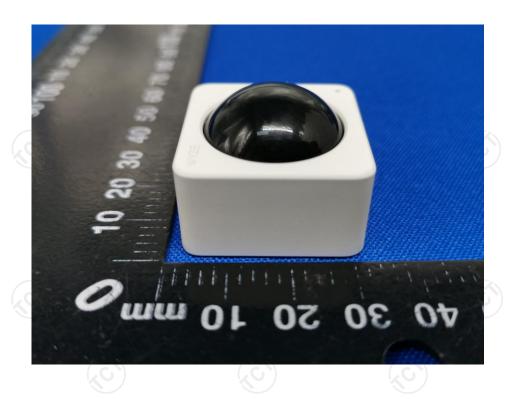
TCT通测检测 TESTING CENTRE TECHNOLOGY

Report No.: TCT190411E008



TCT通测检测 testing centre technology

Report No.: TCT190411E008



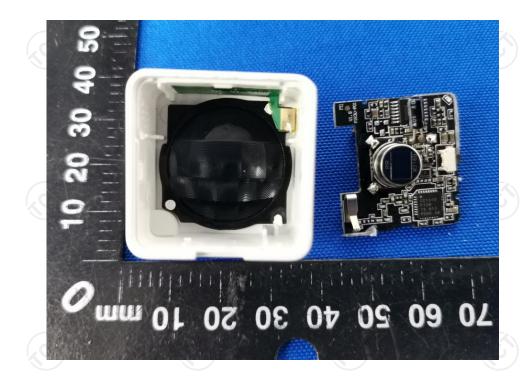






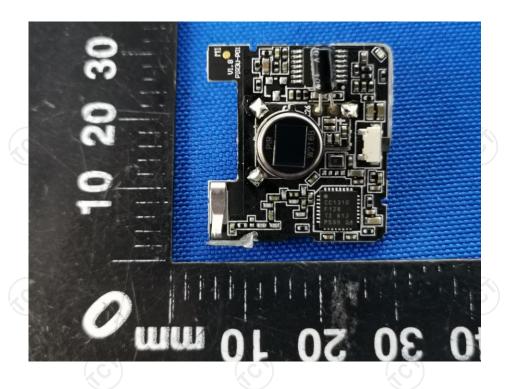
Product: WYZE Motion Sensor Model: WHMS1 Internal Photos

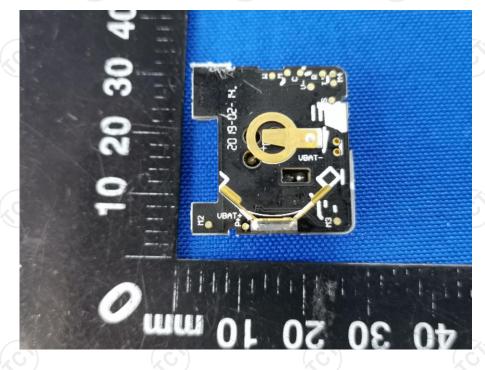




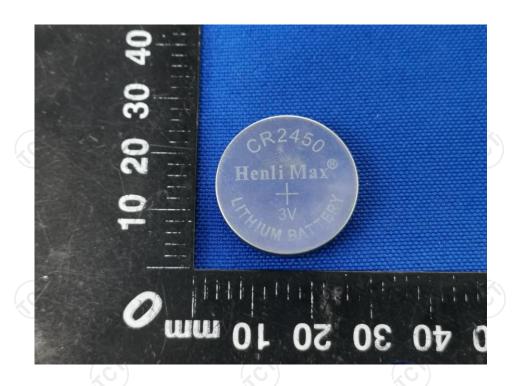


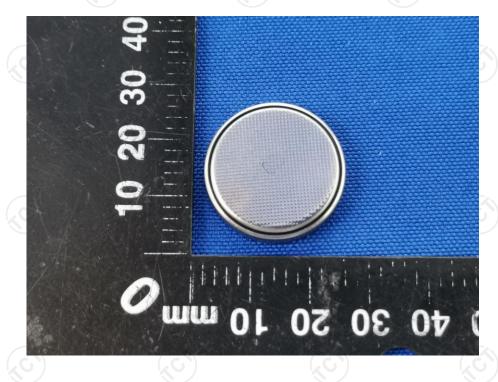












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