

# Test Report

Verified code: 879851

Report No.: E20211222698901-1

Customer: Lumi United Technology Co., Ltd.

Address: Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No.3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

Sample Name: Motion Sensor P1

Sample Model: MS-S02

Receive Sample Date: Dec.24,2021

Test Date: Dec.27,2021 ~ Dec.31,2021

Reference Document: ETSI EN 301 489-17 V3.2.4 (2020-09) ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU  
ETSI EN 301 489-1 V2.2.3 (2019-11) ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility  
EN55032:2015/A11:2020 Electromagnetic compatibility of multimedia equipment – Emission Requirements  
EN 55035:2017 Electromagnetic compatibility of multimedia equipment - Immunity requirements  
EN 61000-4-2: 2009 "Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test  
EN 61000-4-3 (2006), A1 (2008) and A2 (2010): Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test  
IEC 61000-4-8:2009: Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test

Test Result: Pass

Prepared By: Yang Zhaoyun Reviewed By: Jiang Tao Approved By: Xiao Liang

GUANGZHOU GRG METROLOGY & TEST CO., LTD

Issued Date: 2022-01-18

Guangzhou GRG Metrology & Test Co., Ltd.

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## 1. TEST RESULT SUMMARY

### Emissions

Test Item	Test mode	Equipment test requirement	Test Method	Class / Severity	Test Result
<b>Performance Standard:</b> <b>ETSI EN 301 489-17 V3.2.4 (2020-09)&amp;ETSI EN 301 489-1 V2.2.3 (2019-11)&amp;EN 55032:2015/A11:2020</b>					
Conducted Emission	Mode 1	ETSI EN 301 489-17/7.1.1 ETSI EN 301 489-1/8.4	EN 55032:2015/A11:2020annex A.3	Table A.10 Class B	Note <sup>2)</sup>
Asymmetric mode conducted emissions	/	ETSI EN 301 489-17/7.1.1 ETSI EN 301 489-1/8.7	EN 55032:2015/A11:2020annex A.3	/	Note <sup>2)</sup>
Radiated Emission	Mode 1	ETSI EN 301 489-17/7.1.1 ETSI EN 301 489-1/8.2	EN 55032:2015/A11:2020Table A.4 and A.5	Table A.4 Class B Table A.5 Class B	PASS
Harmonic current	Mode 1	ETSI EN 301 489-17/7.1.1 ETSI EN 301 489-1/8.5	EN 61000-3-2:2019	Class A	Note <sup>1)</sup>
Voltage fluctuations and flicker	Mode 1	ETSI EN 301 489-17/7.1.1 ETSI EN 301 489-1/8.6	EN 61000-3-3:2013/A1:2019	/	Note <sup>2)</sup>

### Immunity

Test Item	Test mode	Equipment test requirement	Test Method	Class / Severity	Test Result
<b>Performance Standard:</b> <b>ETSI EN 301 489-17 V3.2.4 (2020-09)&amp;ETSI EN 301 489-1 V2.2.3 (2019-11)&amp;EN 55035:2017/A11:2020</b>					
Electrostatic discharge (ESD)	Mode 1	ETSI EN 301 489-17/7.2.1 ETSI EN 301 489-1/9.3 EN 55035:2017 Table 1	EN 61000-4-2:2009	Test specification: ±8kV air discharge ±4kV Contact discharge Performance : Criteria B	PASS
RF electromagnetic field (RS)	Mode 1	ETSI EN 301 489-17/7.2.1 ETSI EN 301 489-1/9.2	EN61000-4-3:2006+A1: 2008+A2:2010	Test specification: Test level: For the frequency range 80MHz to 6000MHz, test level shall be 3 V/m, 80% AM(1kHz) Performance: Criteria A	PASS
RF electromagnetic field (RS)	Mode 1	EN 55035:2017 Table 1	IEC 61000-4-3:2006+A1: 2008+A2:2010	Test specification: For the frequency range 80MHz to 1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz test level shall be 3 V/m, 80% AM(1kHz) Performance: Criteria A	PASS
Power frequency magnetic field	Mode 1	EN 55035:2017	IEC 61000-4-8:2009	1A/m 50Hz&60Hz Performance Criterion A	PASS

Note <sup>1)</sup>: The EUT with a rated power of less 75 W, the result no judgment.

<sup>2)</sup>: Without AC power port and telecom port of the EUT.

## 2. GENERAL DESCRIPTION OF EUT

### 2.1 APPLICANT

Name: Lumi United Technology Co., Ltd.  
Room 801-804,Building 1,Chongwen Park,Nanshan iPark,No.3370,  
Address: Liuxian Avenue, Fuguang Community,Taoyuan Residential District, Nanshan District, Shenzhen, China

### 2.2 MANUFACTURER

Name: Lumi United Technology Co., Ltd.  
Room 801-804,Building 1,Chongwen Park,Nanshan iPark,No.3370,  
Address: Liuxian Avenue, Fuguang Community,Taoyuan Residential District, Nanshan District, Shenzhen, China

### 2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Product Name: Motion Sensor P1  
Product Model: MS-S02  
Adding Model: /  
Trade Name: Aqara  
Power Supply: Button batteries: CR2450 DC 3V, 3mA  
Frequency Band: 2405MHz-2480MHz  
Modulation Type: OQPSK  
Antenna Type: Internal antenna  
Hardware Version: X3  
Software Version: 0.0.0\_0005  
Sample submitting way:  Provided by customer  Sampling  
Sample No: E20211222698901-0004  
Note: /

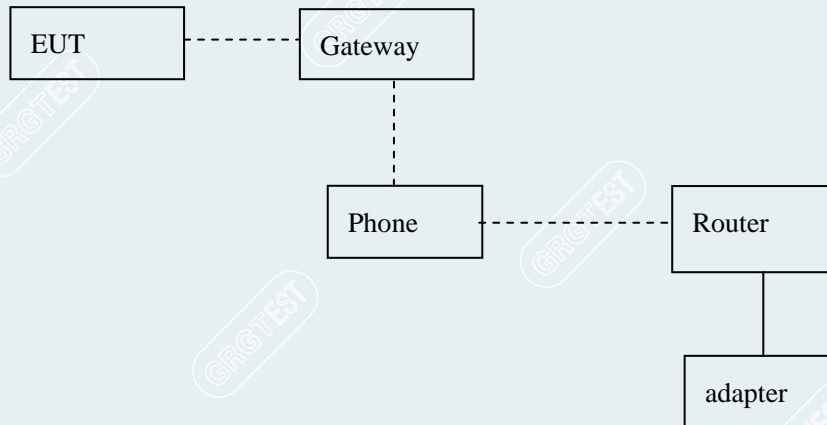
**2.4 TEST MODE**

Mode No.	Description of the modes
1	After connecting with APP, gateway M2 associates EUT in sub-device options, and then monitors human body movement and illuminance feedback information in EUT device log.

**2.5 LOCAL SUPPORTIVE INSTRUMENTS**

Name of Equipment	Manufacturer	Model	Serial Number	Note
Router	Mercury	D128G	1193219002978	/
Phone	OPPO	OPPO R11s Plus	SZDC-2020-052	/
Gateway	Aqara	ZHWG19LM	A00033/5H1AUW10003	/
adapter	Aohai	A70-050200U-EU1	/	Unshielded 1.2m

**2.6 CONFIGURATION OF SYSTEM UNDER TEST**



### 3. LABORATORY AND ACCREDITATIONS

#### 3.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add.: No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District  
Shenzhen, 518110, People's Republic of China.

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Tel : 0755-61180008

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#### 3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

**USA** A2LA(Certificate#:2861.01)

**China** CNAS(L0446)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

**Canada** ISED (Company Number: 24897, CAB identifier:CN0069)

**USA** FCC (Registration Number: 759402, Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site,

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### 3.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty
Conduction Emission	9 KHz~150 KHz	2.2 dB
	150 KHz~30 MHz	2.8 dB
Radiated Emission (3m)	30MHz~200MHz(H)	4.3 dB
	200MHz~1000MHz(H)	4.5 dB
	30MHz~200MHz(V)	4.4 dB
	200MHz~1000MHz(V)	4.5 dB
	1GHz~6GHz(H)	4.5 dB
	1GHz~6GHz(V)	4.5 dB
Harmonic Current	/	1)
Voltage Fluctuation and Flicks	/	1)
Electrostatic discharge	/	1)
Radio-Frequency Electromagnetic Field	/	1)
Electrical fast transient/burst	/	1)
Surge	/	1)
Conducted radio frequency disturbances	/	1)
Power frequency magnetic field	/	1)
Voltage Dip & Voltage Interruptions	/	1)

1) This uncertainty represents an expanded uncertainty factor of  $k=2$ .

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#### 4. LIST OF USED TEST EQUIPMENT AT GRGT

##### 4.1 LIST OF USED TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
<b>Radiated Emission (Below 1GHz)</b>				
Test S/W	EZ	CCS-2ANT	/	/
Test Receiver	R&S	ESR7	102444	2022-09-22
Preamplifier	EMEC	EM330	/	2022-03-21
Bi-log Antenna	Schwarzbeck	VULB9160	VULB9160-3401	2022-10-27
<b>Radiated Emission (Above 1GHz)</b>				
Test software	Tonscend	JS32-RE	/	/
Spectrum Analyzer	Agilent	N9020B	MY57120179	2022-08-08
Preamplifiers	Tonscend	TAP01018048	AP20E8060075	2022-06-07
Horn antenna	Schwarzbeck	BBHA 9120D	02143	2022-10-22
<b>Electrostatic discharge</b>				
Dito ESD Simulator	EM Test	dito	V0809103493	2022-10-30
<b>Radio-Frequency Electromagnetic Field</b>				
Test S/W	Tonscend	JS35-RS	/	/
Signal generator	R&S	SMA100A	100434	2022-09-04
Switch	TOYO	BS5000	/	/
Power Amplifier	SCHAFFNER	CBA9433	3007	2022-03-21
Power Amplifier	TESEQ	CBA 3G-050	T44161	2022-04-16
Power Amplifier	Milmega	AS1860-50	1079232	2022-10-29
Dual directional Coupler	AR	DC 6180A	0328212	2022-09-22
Dual directional Coupler	AR	DC 7144A	327057	2022-09-22
Log-periodic broadband antenna	Schaffner	CBL6143	5082	2022-02-04
Microwave Log.-Per. Antenna	Schwarzbeck	STLP9149	9149-163	2022-09-18
Power Meter	Keysight	N1914A	MY57090009	2022-10-11
Power Probe	Keysight	E9301A	MY57060008	2022-09-04

<b>Power frequency magnetic field</b>				
Test S/W	TESEQ	Win2120 Ver6.00	/	/
Power Source	SCHAFFNER	NSG1007	54789	2022-03-21
Harmonic & Flicker Tester	SCHAFFNER	CCN1000	72045	2022-09-24
Induction coil Interface	SCHAFFNER	INA2141	6003	2022-09-08
Induction coil Interface	SCHAFFNER	INA-702	711-1115	2022-09-08

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## 5. EMISSION TEST

### 5.1 RADIATED EMISSION MEASUREMENT (RE)

Test Requirement: ETSI EN 301 489-17 V3.2.4/7.1.1  
 ETSI EN 301 489-1 V2.2.3/8.2  
 EN55032:2015/A11:2020

Test Method: EN 55032 /annex A.2

#### 5.1.1 LIMITS

The ancillary equipment shall meet the class B limits given in CENELEC EN 55032 [1], annex A tables A.4 and A.5.

**Table A.4 – Requirements for radiated emissions at frequencies up to 1 GHz  
 for class B equipment**

Frequency range(MHz)	Distance (m)	bandwidth	Limits dB(uV/m)		
			Peak (PK)	Quasi-peak (QP)	Average (Avg)
30 to 230	3	120 KHz	/	40	/
230 to 1000	3	120 KHz	/	47	/

**Table A.5 – Requirements for radiated emissions at frequencies above 1 GHz  
 for class B equipment**

Frequency range(MHz)	Distance (m)	bandwidth	Limits dB(uV/m)		
			Peak (PK)	Quasi-peak (QP)	Average (Avg)
1000~3000	3	1MHz	70	/	50
3000~6000	3	1MHz	74	/	54

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## 5.1.2 TEST PROCEDURE

### (1) Procedure of Preliminary Test

Radiated emission tests shall be made with the receive or transmit antenna located at a horizontal distance of 3m plus half of the maximum width of the EUT being tested, measured from the centre of the EUT. The tests shall be performed with the equipment configured as closely as possible to its typical, practical operation. Unless stated otherwise, cables and wiring shall be as specified by the manufacturer and the equipment shall be in its housing (or cabinet) with all covers and access panels in place. Any deviation from normal EUT operating conditions shall be included in the test report.

The EUT (on a non-conductive support structure, where applicable) shall be placed on a remotely operated turntable, to allow the EUT to be rotated. The height of the EUT above the ground plane shall be according to the following requirements.

-- Table-top equipment is placed on a non-conductive set-up table with height  $0.8\text{ m} \pm 0.01\text{ m}$ , CISPR 16-1-4 specifies the method to determine the impact of the non-conductive set-up table on test results.

-- Floor-standing equipment is placed on a non-conductive support, as specified in the applicable product standard. If there are no EUT height placement requirements in the product standard, the EUT shall be placed on a non-conductive support at a height of 5 cm to 15 cm above the ground plane.

Note: This is table-top equipment.

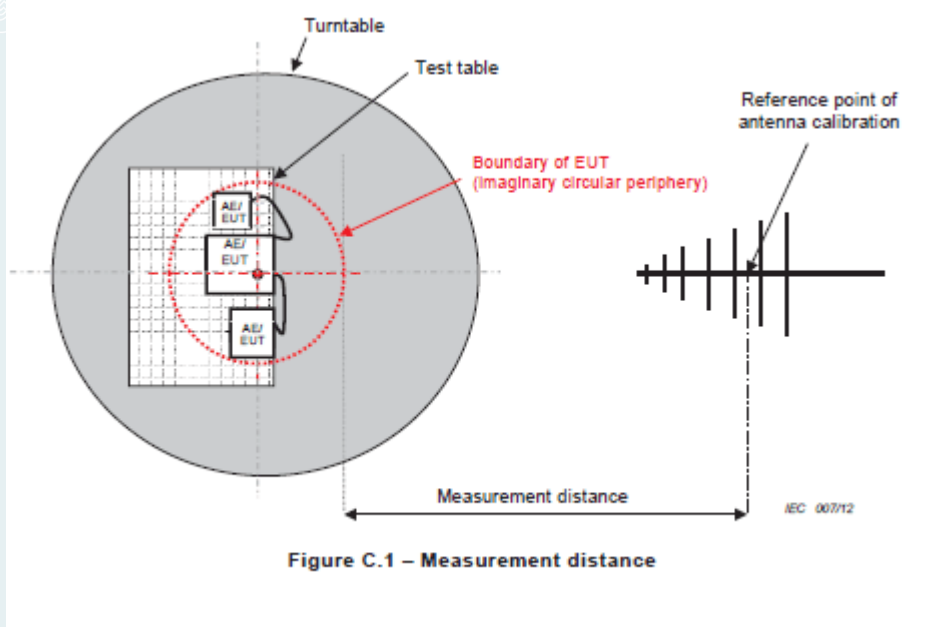
Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. Where there are multiple interface ports of the same type, a typical number of these devices shall be connected to devices or loads. It is sufficient to connect only one of the loads, provided that it can be shown, for example by preliminary testing, that the connection of further ports would not significantly increase the level of disturbance (that is, more than 2 dB) or significantly degrade the immunity level.

The test mode(s) were scanned during the preliminary test. After the preliminary scan, we found the test mode producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

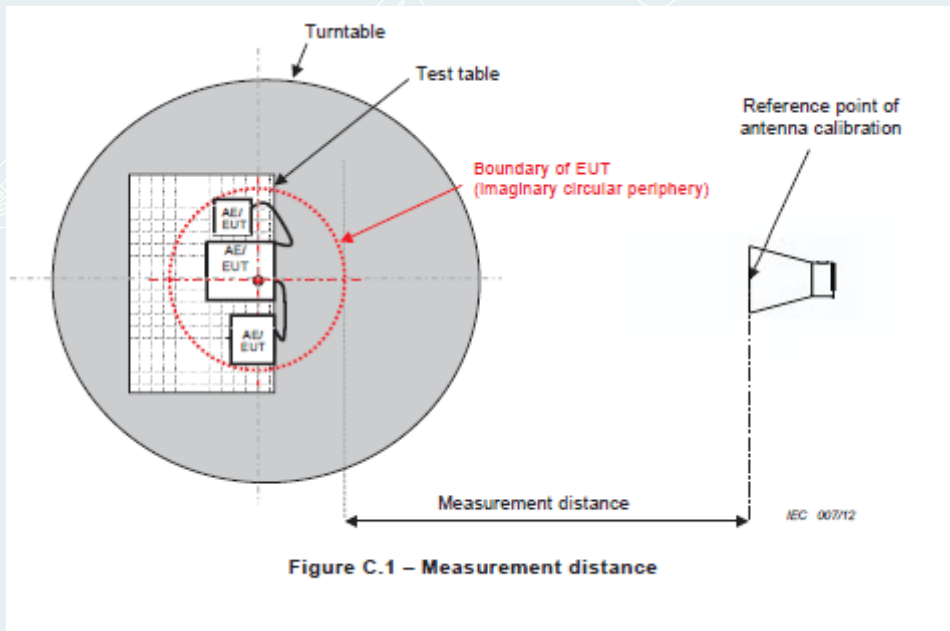
### (2) Procedure of Final Test

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test. The Analyzer/ Receiver scanned from 30MHz to 1000MHz and 1000MHz to 6000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level. Record at least six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and for 30MHz~1000MHz only QP reading is presented, for 1000MHz~6000 MHz Peak and AVG reading is presented.

### 5.1.3 TEST SETUP



Below the frequency of 1GHz



Above the frequency of 1GHz(1GHz-6GHz)

**5.1.4 DATA SAMPLE**

**Below 1GHz**

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over (dB)	Remark
XXX.XXXX	48.49	-9.91	38.58	47.00	-8.42	QP

- Frequency (MHz) = Emission frequency in MHz
- Reading (dBuV) = Uncorrected Analyzer / Receiver reading
- Correct Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
- Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)
- Limit (dBuV/m) = Limit stated in standard
- Over (dB) = Result (dBuV/m) – Limit(dBuV/m)
- QP = Quasi-peak Reading

**Above 1GHz**

Frequency (MHz)	Reading (dBuV)	Level (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Remark
XXXX	56.70	34.18	-22.52	74	39.82	Peak
XXXX	46.34	23.80	-22.54	54	30.20	AVG

- Frequency (MHz) = Emission frequency in MHz
- Reading (dBuV) = Uncorrected Analyzer / Receiver reading
- Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
- Result (dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)
- Limit (dBuV/m) = Limit stated in standard
- Margin (dB) =Limit(dBuV/m)- Level(dBuV/m)
- Peak = Peak Reading
- AVG = Average Reading

### 5.1.5 PHOTOGRAPH OF THE TEST ARRANGEMENT



Below 1GHz



Above 1GHz

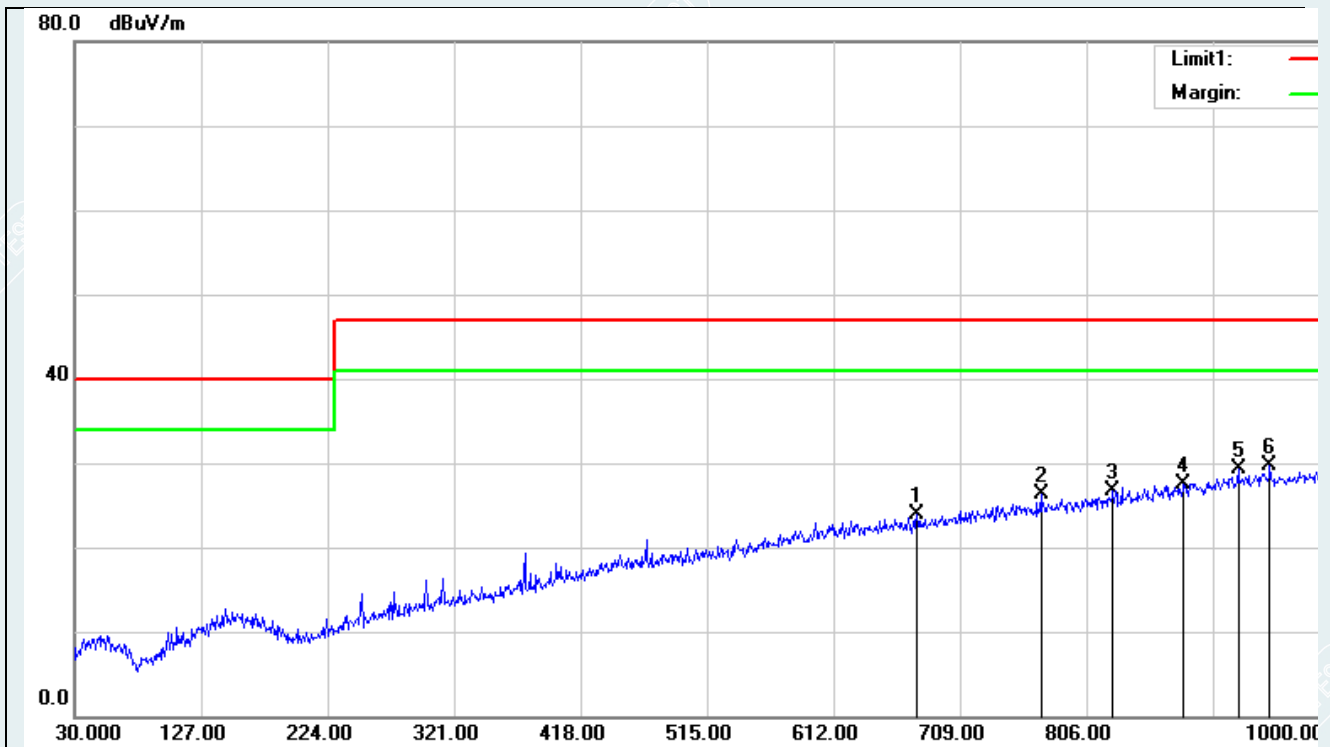


**5.1.6 TEST RESULTS**

Below 1GHz

EUT Name	Motion Sensor P1	Model	MS-S02
Environmental Conditions	25.3°C/51%RH/101.0kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Zhong Fuping
Test Date	2021-12-30	Sample No.	E20211222698901-0004

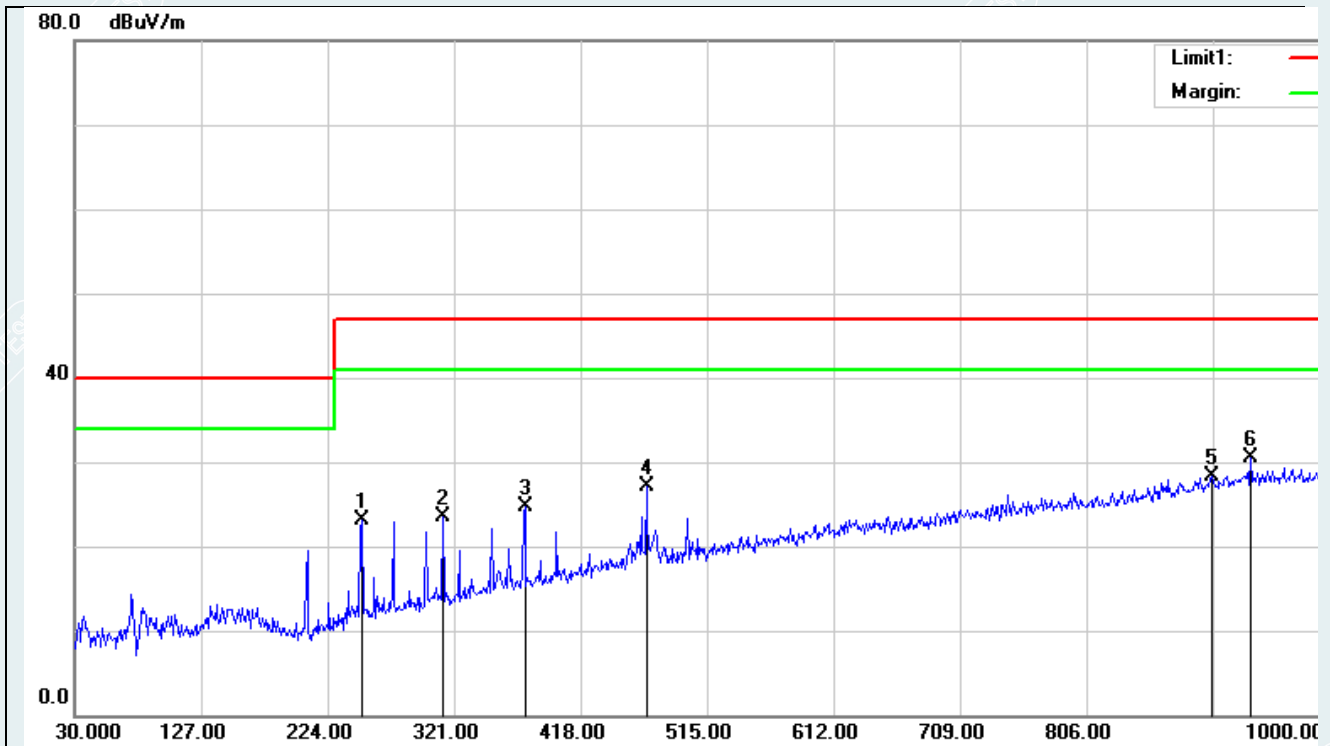
Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg)	Remark
1	676.0200	37.12	-13.18	23.94	47.00	-23.06	100	216	QP
2	771.0800	37.59	-11.35	26.24	47.00	-20.76	100	232	QP
3	826.3700	37.37	-10.59	26.78	47.00	-20.22	300	177	QP
4	880.6900	37.23	-9.77	27.46	47.00	-19.54	400	304	QP
5	922.4000	38.35	-9.13	29.22	47.00	-17.78	106	0	QP
6*	946.6500	38.54	-8.77	29.77	47.00	-17.23	200	188	QP

EUT Name	Motion Sensor P1	Model	MS-S02
Environmental Conditions	25.3°C/51%RH/101.0kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Zhong Fuping
Test Date	2021-12-30	Sample No.	E20211222698901-0004

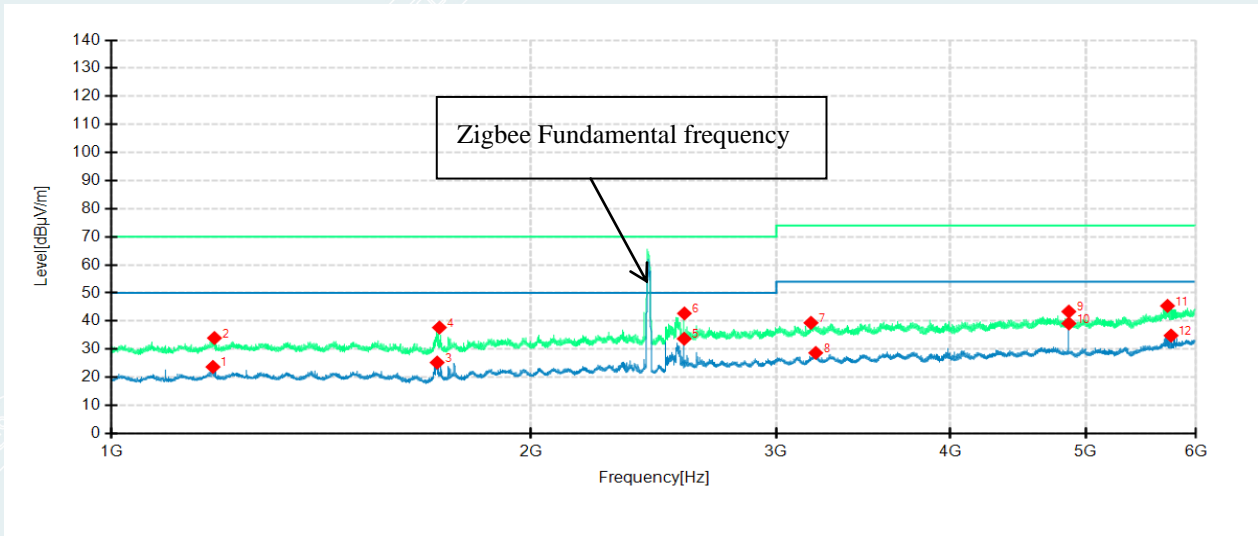
Polarity: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg)	Remark
1	250.1900	47.97	-24.92	23.05	47.00	-23.95	100	341	QP
2	312.2700	46.20	-22.78	23.42	47.00	-23.58	100	282	QP
3	375.3200	45.52	-20.90	24.62	47.00	-22.38	100	157	QP
4	468.4400	44.97	-17.86	27.11	47.00	-19.89	100	237	QP
5	902.0300	37.72	-9.42	28.30	47.00	-18.70	121	0	QP
6*	932.1000	39.56	-8.99	30.57	47.00	-16.43	100	35	QP

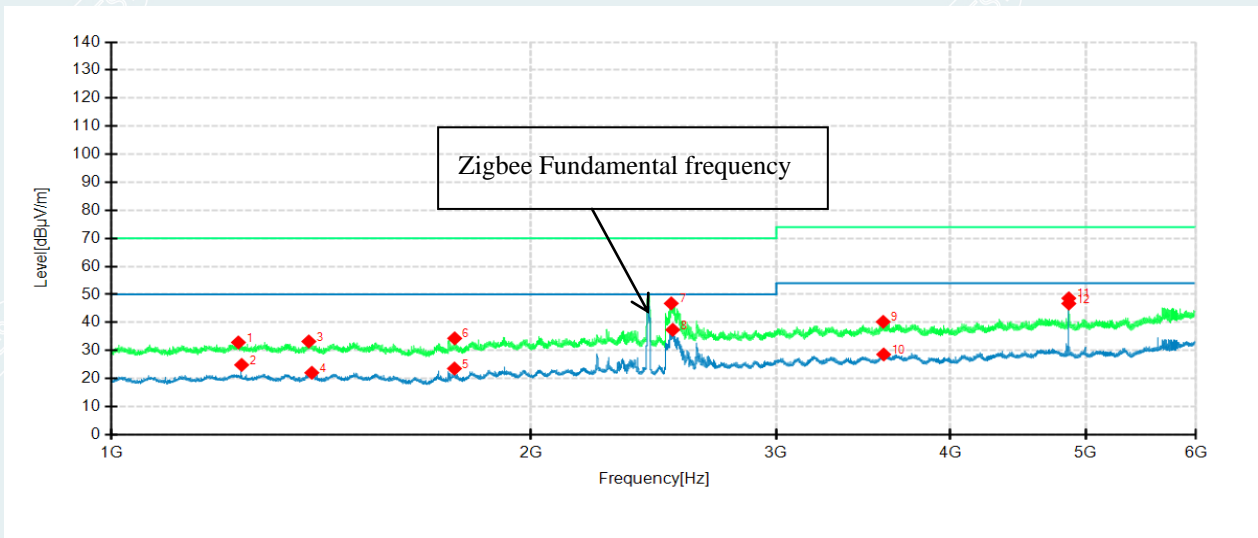
Above 1GHz

EUT Name	Motion Sensor P1	Model	MS-S02
Environmental Conditions	25.0°C/60%RH/101.0kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	LuQiang
Test Date	2021-12-30	Sample No.	E20211222698901-0004



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1182.8000	48.23	23.68	-24.55	50.00	26.32	200	351	Horizontal
2	1185.8000	58.51	33.96	-24.55	70.00	36.04	200	351	Horizontal
3	1713.0000	47.63	25.25	-22.38	50.00	24.75	100	195	Horizontal
4	1719.4000	60.08	37.69	-22.39	70.00	32.31	100	220	Horizontal
5	2576.4000	52.76	33.71	-19.05	50.00	16.29	100	10	Horizontal
6	2577.4000	61.79	42.73	-19.06	70.00	27.27	100	10	Horizontal
7	3176.7000	55.71	39.36	-16.35	74.00	34.64	200	105	Horizontal
8	3201.9000	44.53	28.67	-15.86	54.00	25.33	100	355	Horizontal
9	4863.9000	53.12	43.38	-9.74	74.00	30.62	100	112	Horizontal
10	4864.5000	48.89	39.15	-9.74	54.00	14.85	100	112	Horizontal
11	5725.2000	53.67	45.41	-8.26	74.00	28.59	200	302	Horizontal
12	5758.8000	43.31	34.85	-8.46	54.00	19.15	200	217	Horizontal

EUT Name	Motion Sensor P1	Model	MS-S02
Environmental Conditions	25.0°C/60%RH/101.0kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	LuQiang
Test Date	2021-12-30	Sample No.	E20211222698901-0004



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1233.6000	57.17	32.89	-24.28	70.00	37.11	200	326	Vertical
2	1240.2000	49.10	24.87	-24.23	50.00	25.13	100	136	Vertical
3	1385.8000	56.78	33.22	-23.56	70.00	36.78	200	346	Vertical
4	1392.6000	45.60	22.07	-23.53	50.00	27.93	100	242	Vertical
5	1762.8000	45.92	23.58	-22.34	50.00	26.42	100	93	Vertical
6	1763.4000	56.68	34.34	-22.34	70.00	35.66	100	93	Vertical
7	2522.0000	66.02	46.81	-19.21	70.00	23.19	100	232	Vertical
8	2528.2000	56.50	37.39	-19.11	50.00	12.61	100	232	Vertical
9	3579.3000	55.24	40.24	-15.00	74.00	33.76	100	29	Vertical
10	3582.3000	43.50	28.60	-14.90	54.00	25.40	200	336	Vertical
11	4863.9000	58.37	48.63	-9.74	74.00	25.37	100	293	Vertical
12	4864.2000	56.49	46.75	-9.74	54.00	7.25	100	293	Vertical

Remark: The fundamental frequency or multiple of fundamental frequency's limit is controlled to the standard of Radio frequency.

## 6. IMMUNITY TEST

### 6.1 GENERAL DESCRIPTION

EMC Immunity					
ETSI EN 301 489-17 V3.2.4&ETSI EN 301 489-1 V2.2.3&EN 55035:2017/A11:2020					
Item	Application port	Basic Standard	Test method	Performance Criterion	Result
Electrostatic discharge (ESD)	Enclosure port	ETSI EN 301 489-17 V3.2.4 /7.2.1 ETSI EN 301 489-1 V2.2.3/9.3 EN 55035:2017 Table 1	EN 61000-4-2	Test specification: ±8kV air discharge ±4kV Contact discharge Performance : Criteria B	PASS
Radiated radio-frequency electromagnetic (RS)	Enclosure port	ETSI EN 301 489-1 V2.2.3/9.2 ETSI EN 301 489-17 V3.2.4 /7.2.1	EN 61000-4-3	Test specification: Test level: For the frequency range 80MHz to 6000MHz, test level shall be 3 V/m, 80% AM(1kHz) Performance: Criteria A	PASS
Radiated radio-frequency electromagnetic (RS)	Enclosure port	EN 55035:2017 Table 1	IEC 61000-4-3	Test specification: Test level: For the frequency range 80MHz to 1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz test level shall be 3 V/m, 80% AM(1kHz) Performance: Criteria A	PASS
Power frequency magnetic field(PFMF)	Enclosure ports	EN 55035:2017 Table 1	IEC 61000-4-8	1A/m 50Hz&60Hz Performance Criterion A	PASS

**6.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION (ETSI EN 301 489-1/17)**

**6.2.1 GENERAL PERFORMANCE CRITERIA**

The performance criteria are:

- Performance criteria A for immunity tests with phenomena of a continuous nature;
- Performance criteria B for immunity tests with phenomena of a transient nature;
- Performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

**Performance table**

Criteria	During Test	After test (i.e. as a result of the application of the test)
A	Shall operate as intended. (See note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.

NOTE: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.

Performance Criteria	Description
Performance criteria for continuous phenomena applied to transmitters and receivers	If no further details are given in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for continuous phenomena shall apply. During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance. During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
Performance criteria for transient phenomena applied to transmitters and receivers	If no further details are given in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for transient phenomena shall apply. For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies: <ul style="list-style-type: none"> <li>• For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A SW reboot is not allowed.</li> </ul>

	<p>Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p> <ul style="list-style-type: none"> <li>• For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. A SW reboot is not allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</li> </ul> <p>For all other ports the following applies:</p> <ul style="list-style-type: none"> <li>• After the test, the equipment shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the equipment is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.</li> <li>• During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.</li> <li>• If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.</li> </ul>
<p>Performance criteria for equipment which does not provide a continuous communication link</p>	<p>For radio equipment which does not provide a continuous communication link, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, in these cases the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account. The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.</p>
<p>Performance criteria for ancillary equipment tested on a stand alone basis</p>	<p>If ancillary equipment is intended to be tested on a stand alone basis, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, in these cases the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account. The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.</p>

Performance Criteria	Description
CT	The performance criteria A shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.
TT	The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.
CR	The performance criteria A shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.
TR	The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Note:

Criterion A applies for immunity tests with phenomena of a continuous nature. (CT, CR)

Criterion B applies for immunity tests with phenomena of a transient nature. (TT, TR)

Criterion C for immunity tests with power interruptions exceeding a certain time.

### 6.2.2 MINIMUM PERFORMANCE LEVEL

For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.



### **6.2.3 PERFORMANCE CRITERIA FOR CONTINUOUS PHENOMENA**

The performance criteria A shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.

### **6.2.4 PERFORMANCE CRITERIA FOR TRANSIENT PHENOMENA**

The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.

----- **The following blanks** -----

### 6.3 GENERAL PERFORMANCE CRITERIA DESCRIPTION (EN 55035)

#### 6.3.1 GENERAL PERFORMANCE CRITERIA

##### **Performance criterion A**

The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

##### **Performance criterion B**

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

##### **Performance criterion C**

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

----- The following blanks -----

## 6.4 ELECTROSTATIC DISCHARGE(ESD)

### 6.4.1 TEST SPECIFICATION

Test Requirement:	ETSI EN 301 489-17 V3.2.4 /7.2.1 ETSI EN 301 489-1 V2.2.3/9.3 EN 55035:2017/A11:2020 Table 1
Test Method:	EN 61000-4-2:2009
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge : $\pm 8$ kV; Contact Discharge: $\pm 4$ kV
Polarity:	Positive & Negative
Number of Discharge:	10 times at each test point
Discharge Mode:	Single Discharge 1 second

### 6.4.2 TEST PROCEDURE

#### The basic test procedure was in accordance with EN 61000-4-2:

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

- (1) The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied.

NOTE 1 The minimum number of discharges applied is depending on the EUT; for products with synchronized circuits the number of discharges should be larger.

For the time interval between successive single discharges an initial value of 1 s is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.

NOTE 2 The points to which the discharges should be applied may be selected by means of an exploration carried out at a repetition rate of 20 discharges per second, or more.

#### Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

#### Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

- (2) Air discharges at insulation surfaces of the EUT.

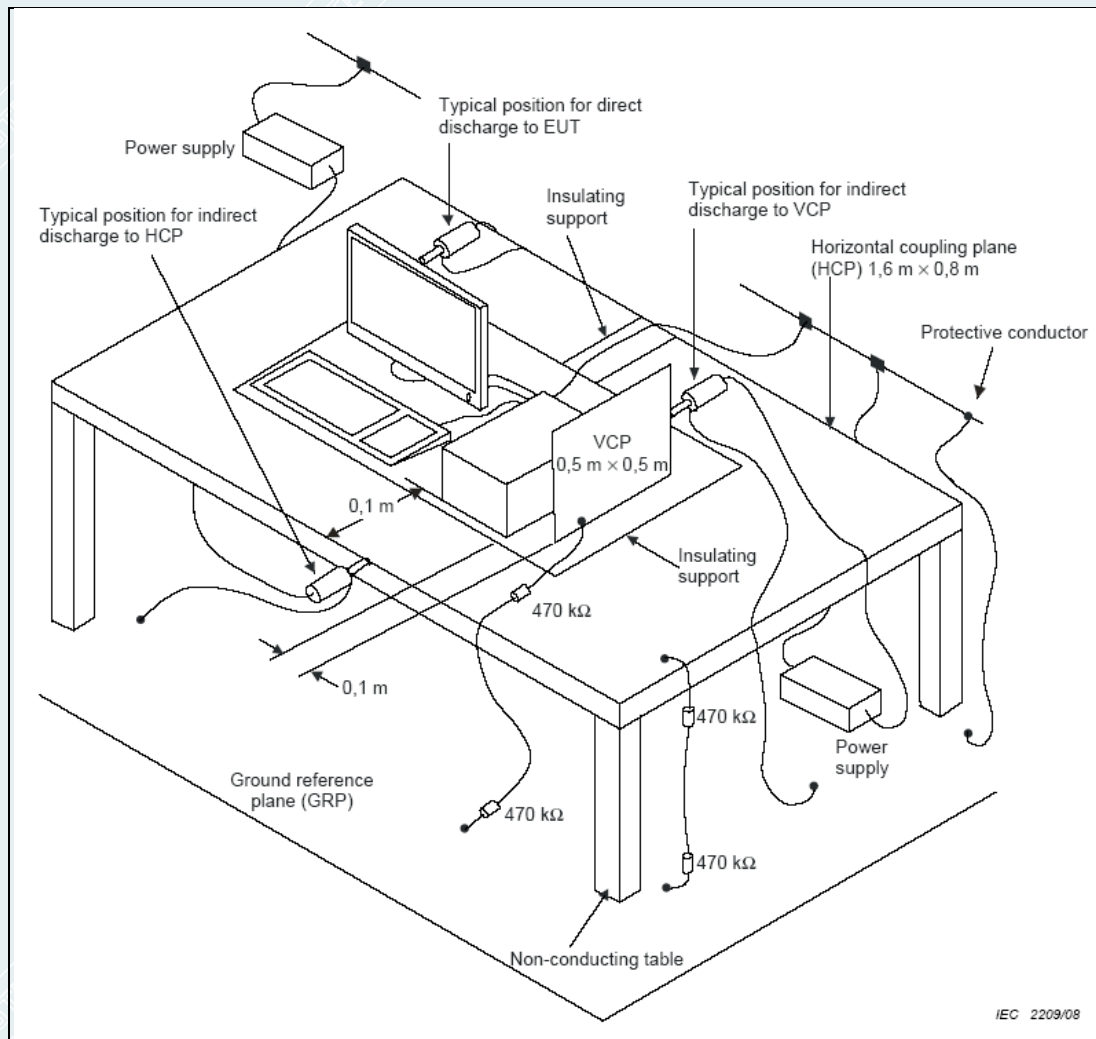
It was at least ten single discharges with positive and negative at the same selected point.

- (3) For TABLE-TOP equipment:

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective

grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940k total impedance. The equipment under test was installed in a representative system as described in EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

### 6.4.3 TEST SETUP



#### 6.4.4 PHOTOGRAPH OF THE TEST ARRANGEMENT



----- The following blanks -----

**6.4.5 TEST RESULTS**

EUT Name	Motion Sensor P1	Model	MS-S02
Environmental Conditions	23.1 °C/41%RH/101kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Tang Shenghui
Test Date	2021-12-31	Sample No.	E20211222698901-0004

For EN55035:

Discharge point	Discharge voltage	C-Conduct A-Air	Required Performance	Actual performance	Result
Vertical coupling plane	±2kV, ±4kV	C	Criterion B	Criterion A <sup>1)</sup>	PASS
Horizontal coupling plane	±2kV, ±4kV	C	Criterion B	Criterion A <sup>1)</sup>	PASS
EUT Shell gaps	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
EUT indicator light	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
EUT switch button	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
NOTE: <sup>1)</sup> Before test, during the test, and after test, the EUT functions and works are normally. The feedback information in EUT device logs is not interrupted.					

For EN 301489-1/ EN301489-17:

Discharge point	Discharge voltage	C-Conduct A-Air	Required Performance	Actual performance	Result
Vertical coupling plane	±2kV, ±4kV	C	Criterion B	Criterion A <sup>1)</sup>	PASS
Horizontal coupling plane	±2kV, ±4kV	C	Criterion B	Criterion A <sup>1)</sup>	PASS
EUT Shell gaps	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
EUT indicator light	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
EUT switch button	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
NOTE: <sup>1)</sup> Before test, during the test, and after test, the EUT functions and works are normally. The feedback information in EUT device logs is not interrupted.					

## 6.5 RADIATED RADIO-FREQUENCY ELECTROMAGNETIC FIELD (RS)

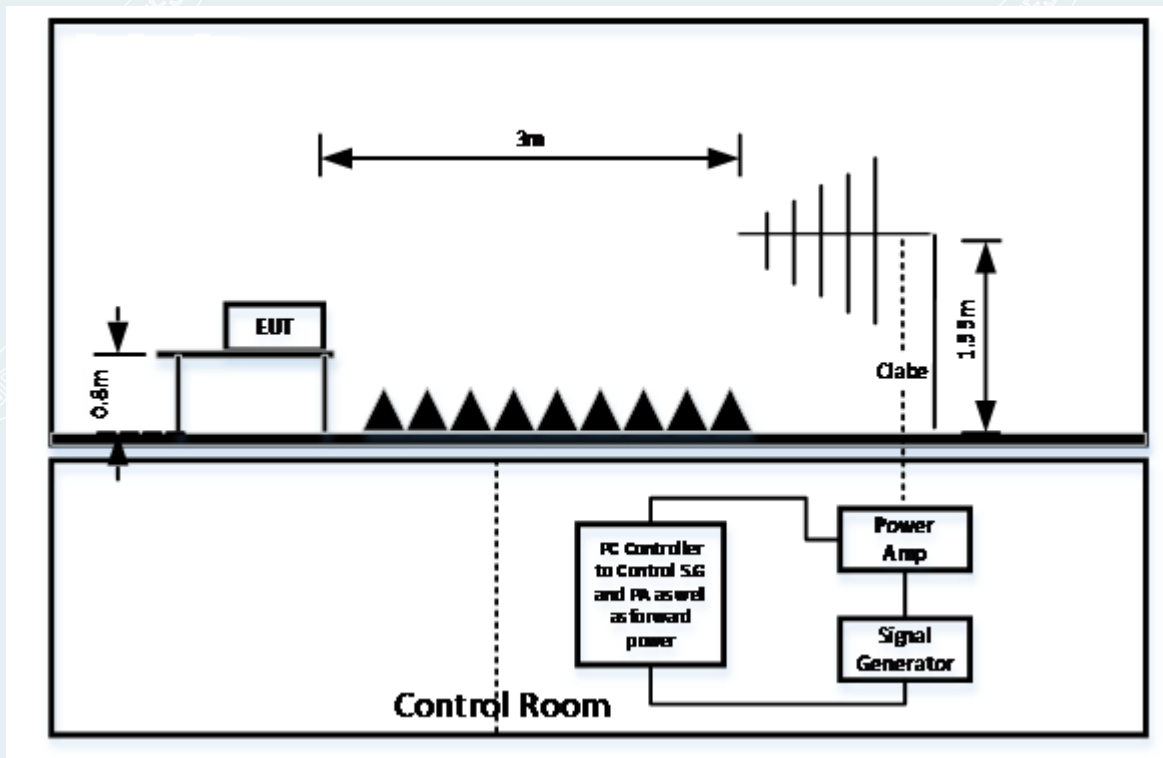
### 6.5.1 TEST SPECIFICATION

Test Requirement:	ETSI EN 301 489-17 V3.2.4 /7.2.1 ETSI EN 301 489-1 V2.2.3/9.2 EN 55035:2017/A11:2020 Table 1
Test Method:	EN 61000-4-3:2006+A2:2010
Frequency Range:	EN 55035: 80MHz~1000MHz,1800MHz, 2600MHz, 3500MHz, 5000MHz ETSI EN 301 489-17& ETSI EN 301 489-1: 80MHz~6000MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.55m

### 6.5.2 TEST PROCEDURE

- (1) The testing is performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- (2) The frequency range is swept from 80 MHz~6000 MHz, with the signal 80% amplitude modulated with a 1 KHz sine-wave. The rate of sweep did not exceed  $1.5 \times 10^{-3}$  decade/s, where the frequency range is swept incrementally; the step size is 1% of preceding frequency value.
- (3) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- (4) The test is performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

### 6.5.3 TEST SETUP



#### NOTE:

##### (1) Table-top equipment

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

##### (2) Floor-standing equipment

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

Note: the EUT is a Table-top equipment.



#### 6.5.4 PHOTOGRAPH OF THE TEST ARRANGEMENT



80MHz~1000MHz



1000MHz~6000MHz

**6.5.5 TEST RESULTS**

EUT Name	Motion Sensor P1	Model	MS-S02
Environmental Conditions	24.7°C/57%RH/101kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Tang Shenghui
Test Date	2021-12-31	Sample No.	E20211222698901-0004

For EN 55035:

Frequency (MHz)	Field strength (V/m)	EUT orientation	Antenna polarization	Required criterion	Actual performance	Result
80MHz~1000MHz	3	Front	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Left	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Right	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
Rear	H	Criterion A	Criterion A <sup>1)</sup>	pass		
	V	Criterion A	Criterion A <sup>1)</sup>	pass		
1800MHz,2600MHz,3500MHz,5000MHz	3	Front	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Left	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Right	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
Rear	H	Criterion A	Criterion A <sup>1)</sup>	pass		
	V	Criterion A	Criterion A <sup>1)</sup>	pass		

NOTE: <sup>1)</sup>Before test, during the test, and after test, the EUT functions and works are normally.  
The feedback information in EUT device logs is not interrupted.

For EN 301489-1/ EN301489-17:

Frequency (MHz)	Field strength (V/m)	EUT orientation	Antenna polarization	Required criterion	Actual performance	Result
80MHz~6000MHz	3	Front	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Left	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Right	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
Rear	H	Criterion A	Criterion A <sup>1)</sup>	pass		
	V	Criterion A	Criterion A <sup>1)</sup>	pass		

NOTE: <sup>1)</sup>Before test, during the test, and after test, the EUT functions and works are normally.  
The feedback information in EUT device logs is not interrupted.

## 6.6 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

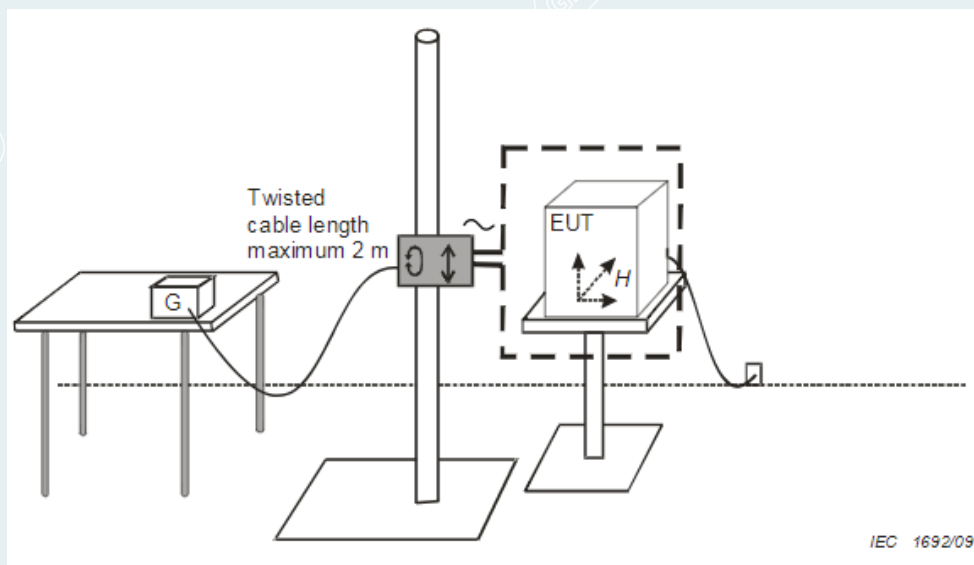
### 6.6.1 TEST SPECIFICATION

Test Requirement	EN 55035:2017/A11:2020
Test Method	IEC 61000-4-8:2009
Frequency	50Hz&60Hz
Field Strength	1 A/m
Observation Time	5 min
Inductance Coil	Rectangular type, 1mx1m
Direction	X-axis, Y-axis, Z-axis

### 6.6.2 TEST PROCEDURE

- The equipment is configured and connected to satisfy its functional requirements. It shall be placed on the GRP with the interposition of a 0.1m-thick insulating support.
- The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

### 6.6.3 TEST SETUP



#### 6.6.4 PHOTOGRAPH OF THE TEST ARRANGEMENT



----- The following blanks -----

**6.6.5 TEST RESULTS**

EUT Name	Motion Sensor P1	Model	MS-S02
Environmental Conditions	23.9°C/49%RH/101kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Tang Shenghui
Test Date	2021-12-31	Sample No.	E20211222698901-0004

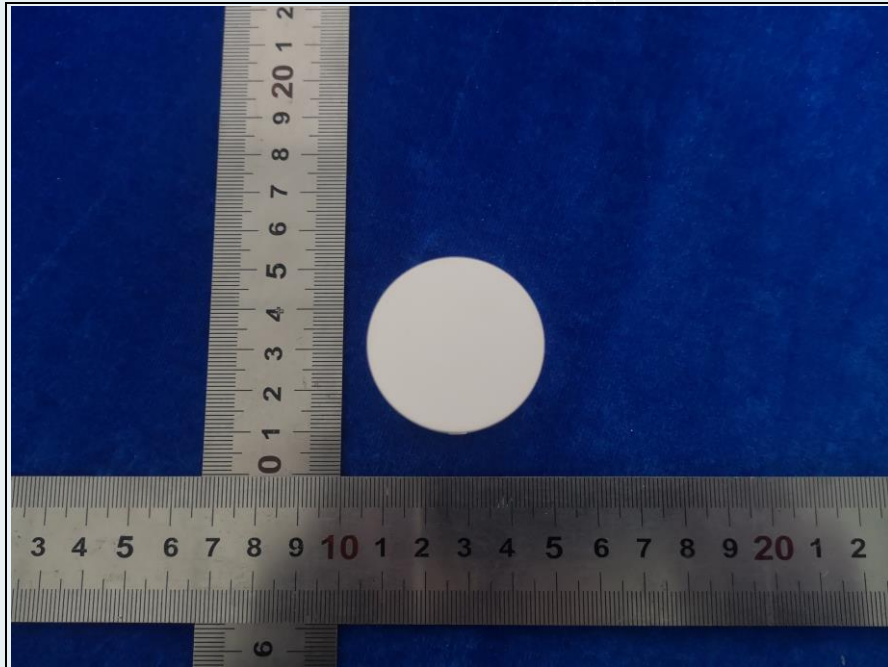
Field Strength (A/m)	Frequency (Hz)	Observation Time (min)	Direction	Required Performance	Actual performance	Result
1	50	5	X	A	A <sup>1)</sup>	PASS
1	50	5	Y	A	A <sup>1)</sup>	PASS
1	50	5	Z	A	A <sup>1)</sup>	PASS
1	60	5	X	A	A <sup>1)</sup>	PASS
1	60	5	Y	A	A <sup>1)</sup>	PASS
1	60	5	Z	A	A <sup>1)</sup>	PASS

**Note:** <sup>1)</sup>Before test, during the test, and after test, the EUT functions and works are normally.  
The feedback information in EUT device logs is not interrupted.

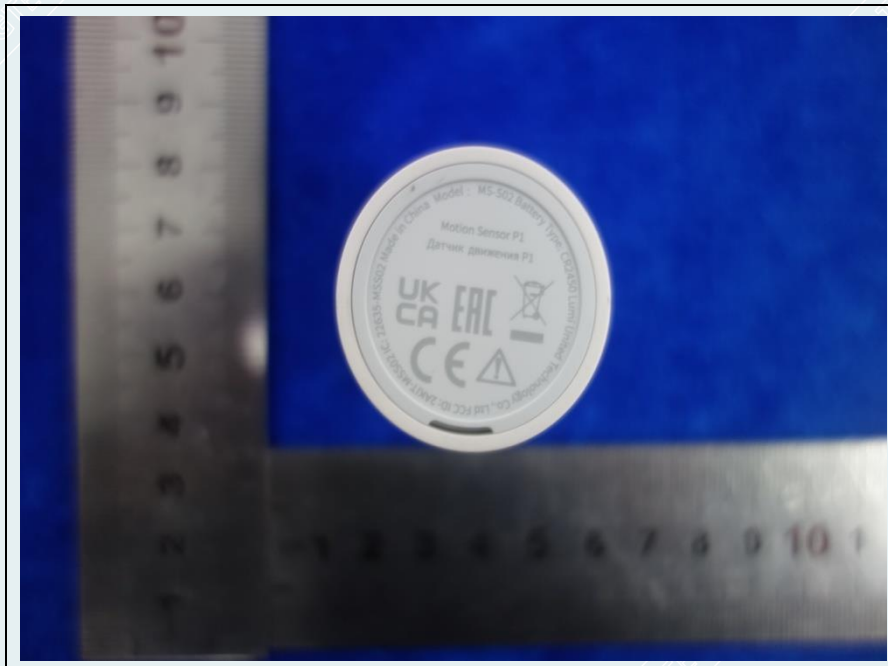
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## APPENDIX A. PHOTOGRAPHS OF EUT

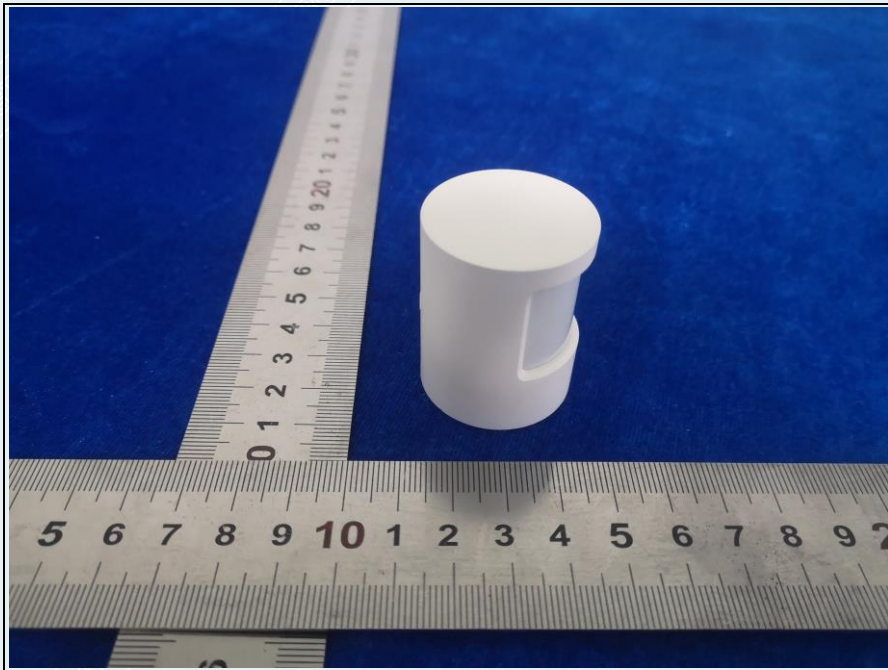
### External Photos of EUT



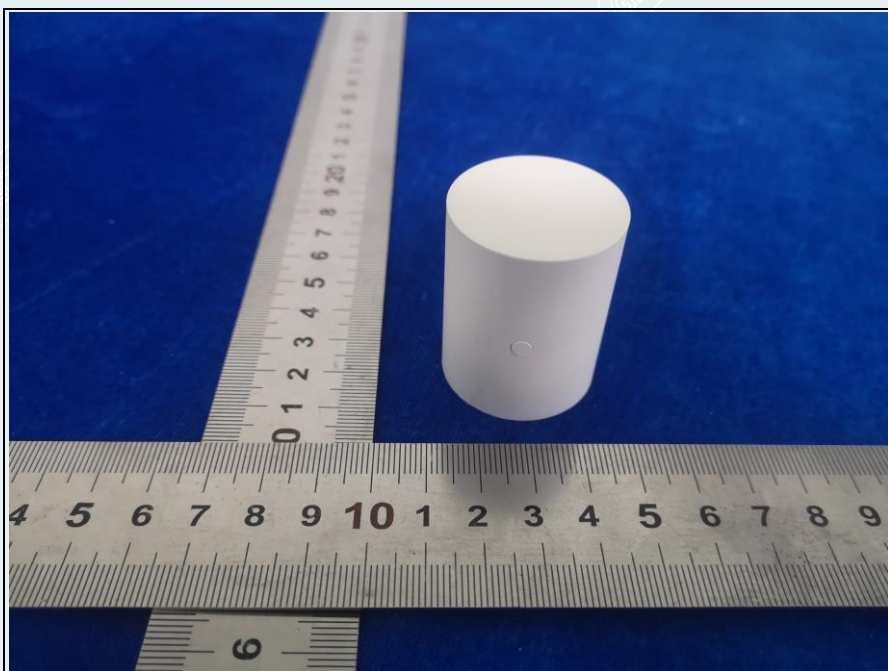
EUT-1



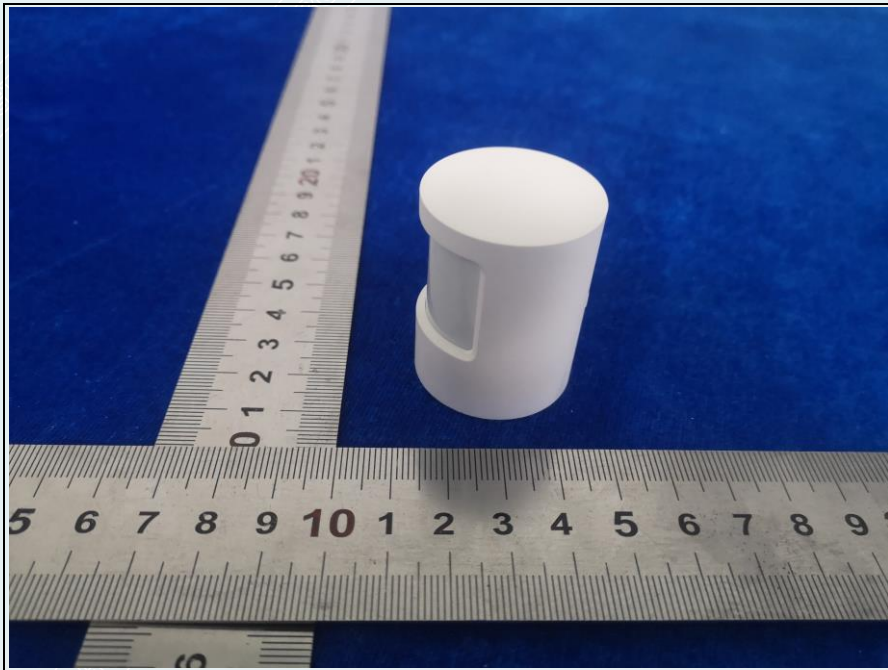
EUT-2



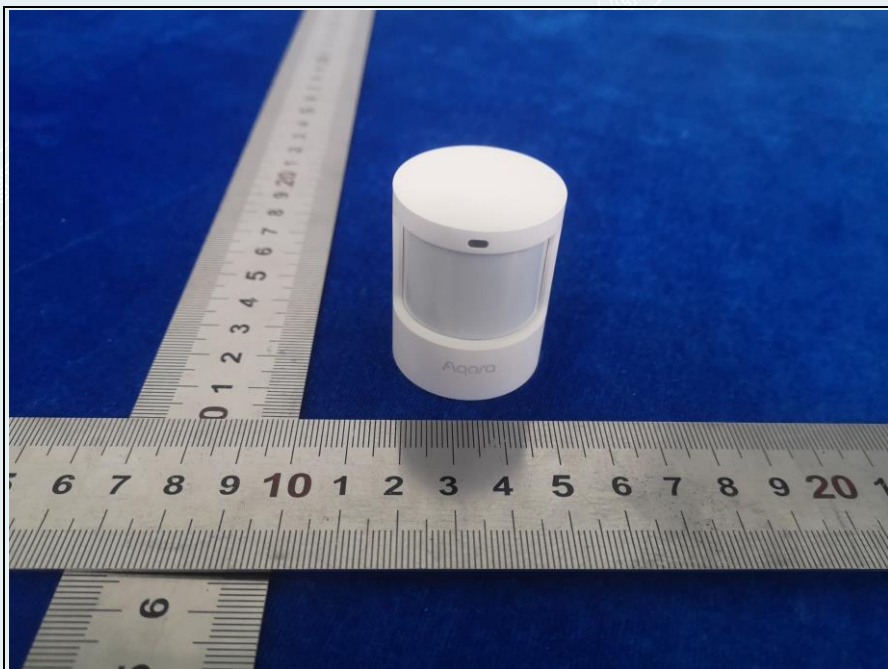
**EUT-3**



**EUT-4**



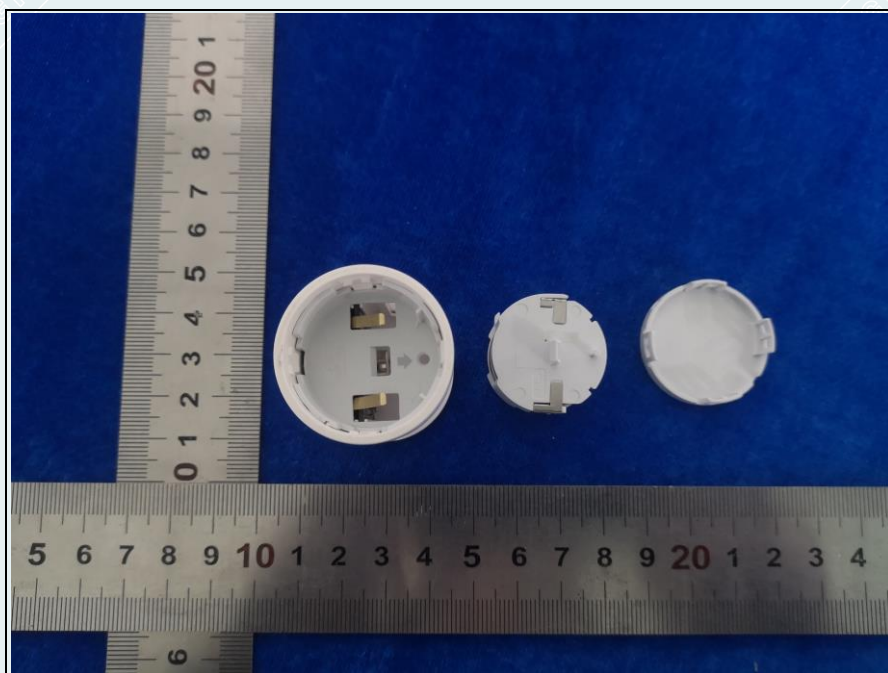
**EUT-5**



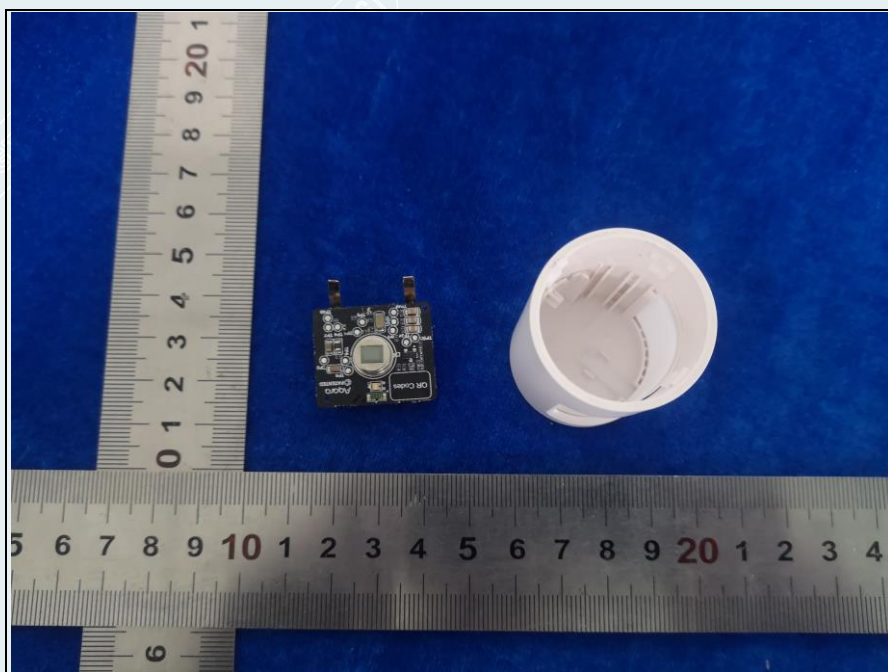
**EUT-6**



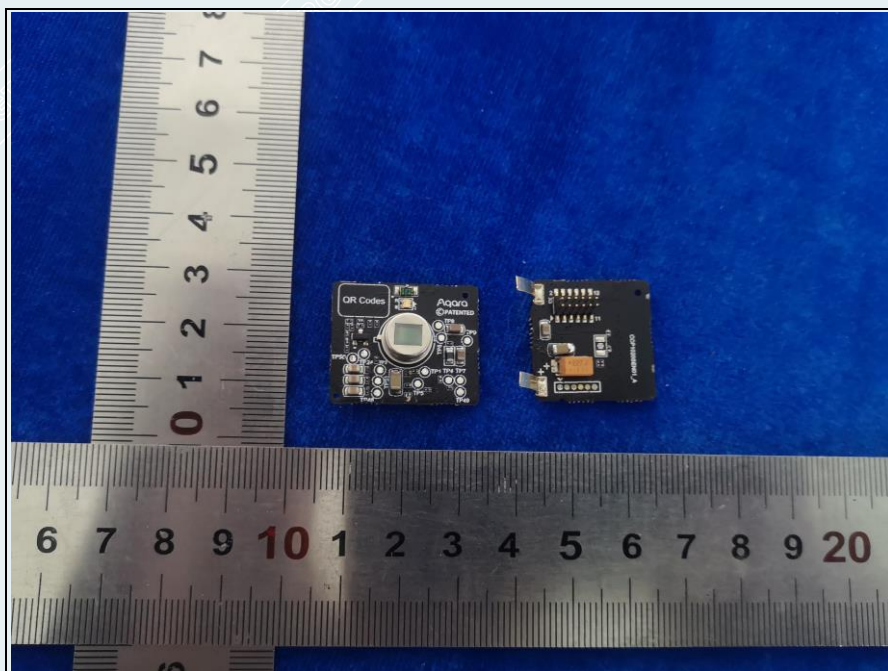
**Internal Photos of EUT**



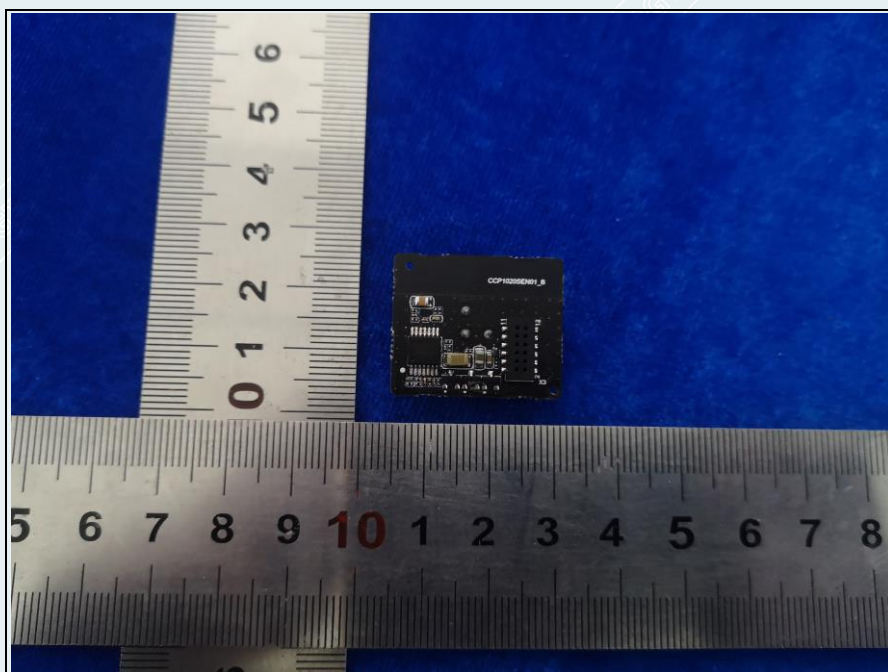
**EUT-1**



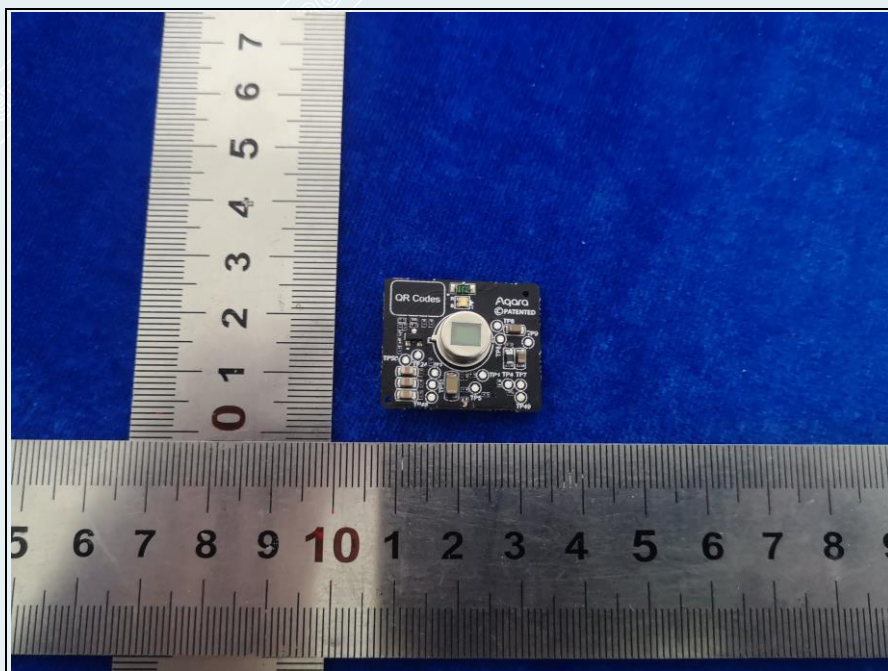
**EUT-2**



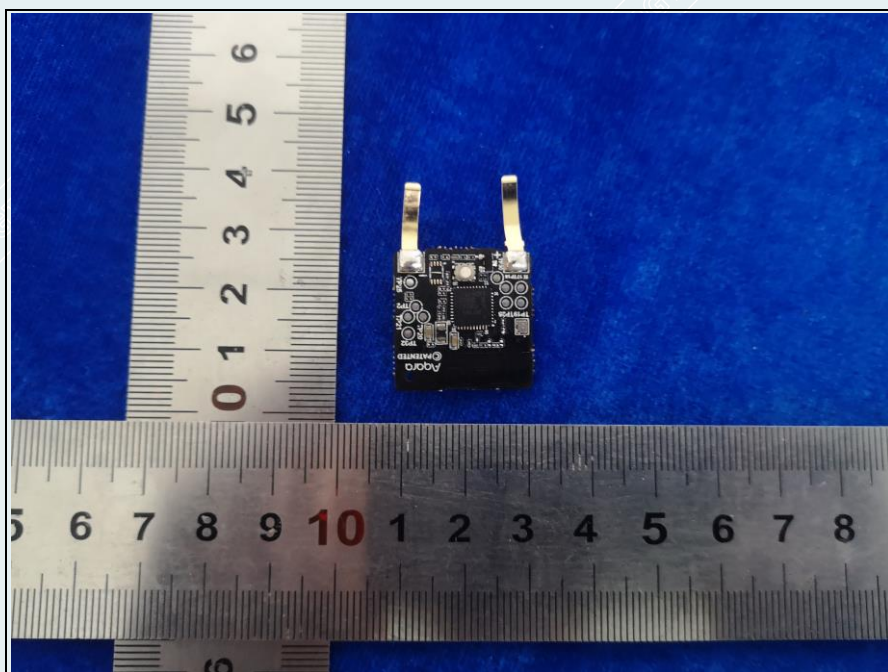
EUT-3



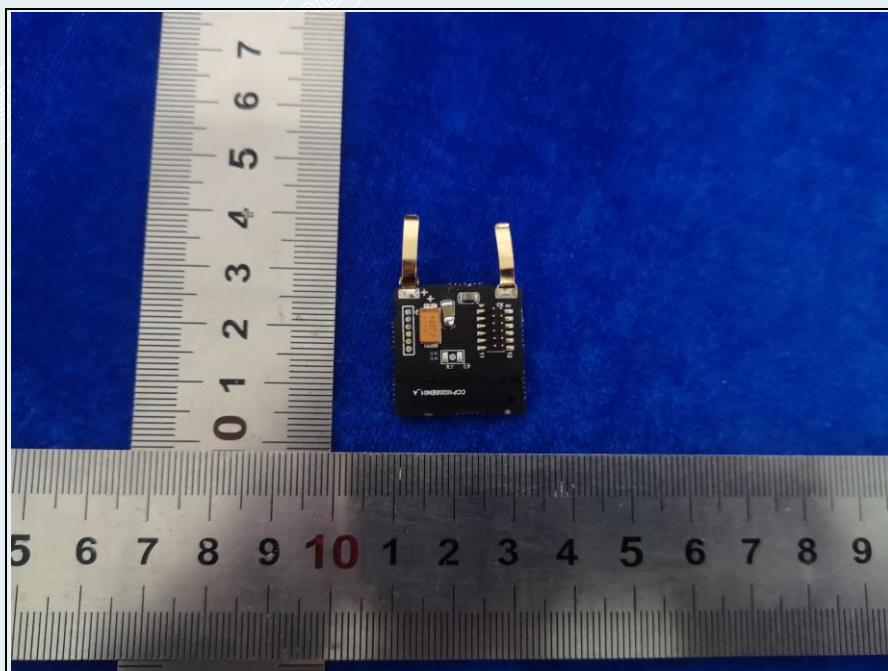
EUT-4



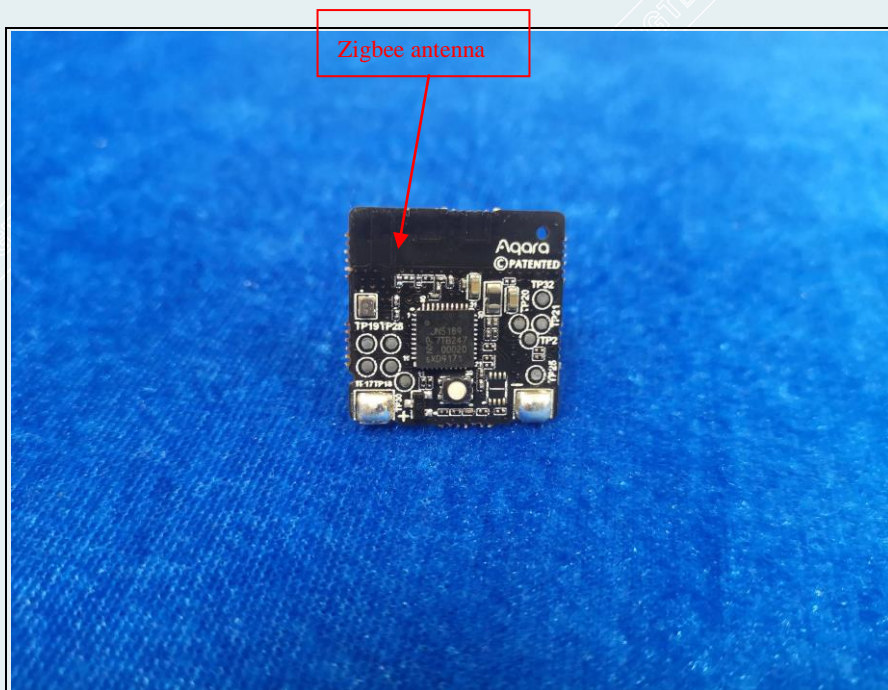
EUT-5



EUT-6



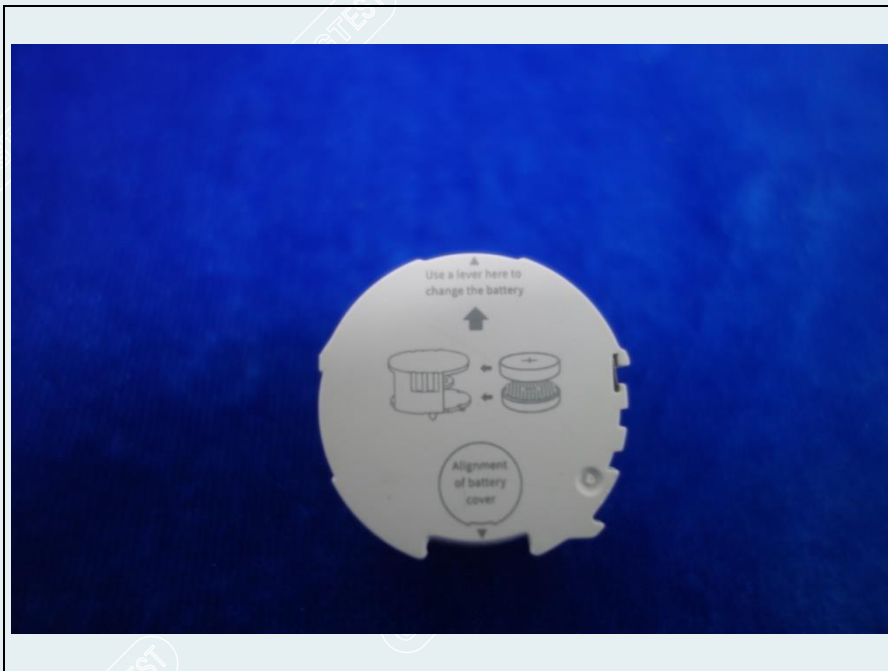
EUT-7



EUT-8



**EUT-9**



**EUT-10**



**EUT-11**



**EUT-12**



**EUT-13**

----- **End of Report** -----