TEST REPORT

Reference No.	:	WTX20X11088153W-3
Manufacturer	:	Lumi United Technology Co., Ltd
Address	:	8th Floor, JinQi Wisdom Valley, No.1 Tangling Road, Liuxian Ave, Taoyuan Residential District, Nanshan District, Shenzhen.China
Product	:	Wireless Remote Switch H1 (Double Rocker)
Test Model	:	WRS-R02
Standards	:	**ETSI EN 301 489-1 V2.2.3 (2019-11)** **ETSI EN 301 489-17 V3.2.4 (2020-09)**
Date of Receipt sample	:	Nov.20, 2020
Date of Test	:	Nov.20, 2020 to Dec.14, 2020
Date of Issue	:	Dec.14, 2020
Test Result	:	**Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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Report version

Version No.	Date of issue	Description
Rev.00	Jan.29, 2021	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Manufacturer: Lumi United Technology Co., Ltd

Address of manufacturer: 8th Floor, JinQi Wisdom Valley, No.1 Tangling Road, Liuxian Ave, Taoyuan Residential District, Nanshan District, Shenzhen.China

General Description of EUT	
Product Name:	Wireless Remote Switch H1 (Double Rocker)
Trade Name:	Aqara
Model No.:	WRS-R02
Adding Model(s):	/
Rated Voltage:	Battery DC 3V
Battery Capacity:	/
Power Adapter:	/
Software Version:	0.0.0_0021
Hardware Version:	T0
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Support Standards:	Zigbee
Frequency Range:	2405MHz-2480MHz
Max.RF Output Power:	10.69dBm (EIRP)
Modulation:	OQPSK
Type of Antenna:	PCB Antenna
Antenna Gain:	2dBi

1.2 Test Standards

The tests were performed according to following standards:

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.
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 for ElectroMagnetic Compatibility

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with the standard ETSI EN 301489-1, Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements.

1.4 Test Facility

FCC – Registration No.: 125990
Waltek Testing Group (Shenzhen) Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A
The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.5 EUT Setup and Operation Mode

Use “QCOM_V1.0.exe” and follow the instructions given by the manufacturer, you can start to test. During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

RF Output Power Setup			
Mode	Test Frequency (MHz)		
	2405	2440	2480
Zigbee	10dBm	10dBm	10dBm

Test Mode List		
Test Mode	Description	Remark
TM1	Normal Working	Connect to the Gateway(M1S); DC 3V
TM2	Zigbee	Connect to the Gateway(M1S); DC 3V
TM3	Zigbee (2.4G)	TR, CR, TT, CT for EMS testing

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Hub M1S	Lumi	HM1S-G01	/
Mobile phone	HUAWEI	VOG-AL00	/
Notebook	Lenovo	E445	EB12648265

1.6 Performance Criteria for EMS

➢ **EN 301 489-17, 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.

Table 1: Performance criteria

Criteria	During test	After test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).

NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

1.7 Measurement Uncertainty

Measurement uncertainty	
Parameter	**Uncertainty**
Uncertainty for Radiated Emission in 3m chamber	@30-200MHz ±4.52dB @0.2-1GHz ±5.56dB @1-6GHz ±3.84dB @6-18GHz ±3.92dB
Uncertainty for Conducted Emission	@9-150kHz ±3.74dB @0.15-30MHz ±3.34dB
Uncertainty for Harmonic test	3.26%
Uncertainty for Flicker test	4.76%
Uncertainty for RS test	21%, k=2
Uncertainty for CS test	29%, k=2
Uncertainty for ESD test	The immunity measurement system uncertainty is within standard requirement and is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
Uncertainty for EFT test	
Uncertainty for Surges test	
Uncertainty for Voltage Dips, Voltage Variations and Short Interruptions Test	
Uncertainty for PFMF test	

1.8 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2020-04-28	2021-04-27
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2020-04-28	2021-04-27
Amplifier	Agilent	8447F	3113A06717	2020-04-28	2021-04-27
Amplifier	C&D	PAP-1G18	2002	2020-04-28	2021-04-27
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-05-05	2021-05-04
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2020-04-28	2021-04-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2020-04-28	2021-04-27
AC LISN	Schwarz beck	NSLK8126	8126-224	2020-04-28	2021-04-27
DC LISN	Schwarz beck	NNBM8126D	279	2020-04-28	2021-04-27
8-WIRE LISN	Schwarz beck	8158	CAT3-8158-0059	2020-04-28	2021-04-27
8-WIRE LISN	Schwarz beck	8158	CAT5-8158-0117	2020-04-28	2021-04-27
Digital Power Analyzer	California Instrument	PACS-1	72831	2020-04-28	2021-04-27
Power Source	California Instrument	5001iX	25965	2020-04-28	2021-04-27
ESD Generator	LIOGCEL	ESD-203B	0170901	2020-04-28	2021-04-27
Signal Generator	Rohde & Schwarz	SMT03	100059	2020-04-28	2021-04-27
Voltage Probe	Rohde & Schwarz	URV5-Z2	100013	2020-04-28	2021-04-27
Power Amplifier	AR	150W1000	300999	2020-04-28	2021-04-27
Power Amplifier	AR	25S1G4AM1	305993	2020-04-28	2021-04-27
Transient 2000	EMC PARTNER	TRA2000	863	2020-04-28	2021-04-27
CS Immunity Tester	SCHAFFNER	NSG2070	1123	2020-04-28	2021-04-27
CDN	Luthi	CDNL-801	2655	2020-04-28	2021-04-27
Attenuator	EMCI	MA-5100/6BF2	1009	2020-04-28	2021-04-27
EMCPRO	KEYTEK	EMCPro	0509124	2020-04-28	2021-04-27
Coil	KEYTEK	F-1000-4-8	0533	2020-04-28	2021-04-27
Anechoic chamber	Albatross Projects	MCDC	----	2020-04-28	2021-04-27
CS Generator	MARCONI	2024	112260/042	2020-04-28	2021-04-27
Attenuator	FRANKONIA	75-A-FFN-06	1001698	2020-04-28	2021-04-27
CDN	FRANKONIA	CDN M2+M3	A3027019	2020-04-28	2021-04-27
Signal Generator	HP	8688B	3438A00604	2020-04-28	2021-04-27
Power Meter	KEITHLEY	3500	1162591	2020-04-28	2021-04-27
Power Meter	KEITHLEY	3500	1121428	2020-04-28	2021-04-27
RF Power Amplifier	MicoTop	MPA-80-1000-250	MPA1906239	2020-04-28	2021-04-27
RF Power Amplifier	MicoTop	MPA-80-1000-100	MPA1906238	2020-04-28	2021-04-27
Antenna	SCHWARZBECK	STLP 9129	9129 114	N/A	N/A

Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission)*	Farad	EZ-EMC	RA-03A1

*Remark: indicates software version used in the compliance certification testing

2. SUMMARY OF TEST RESULTS

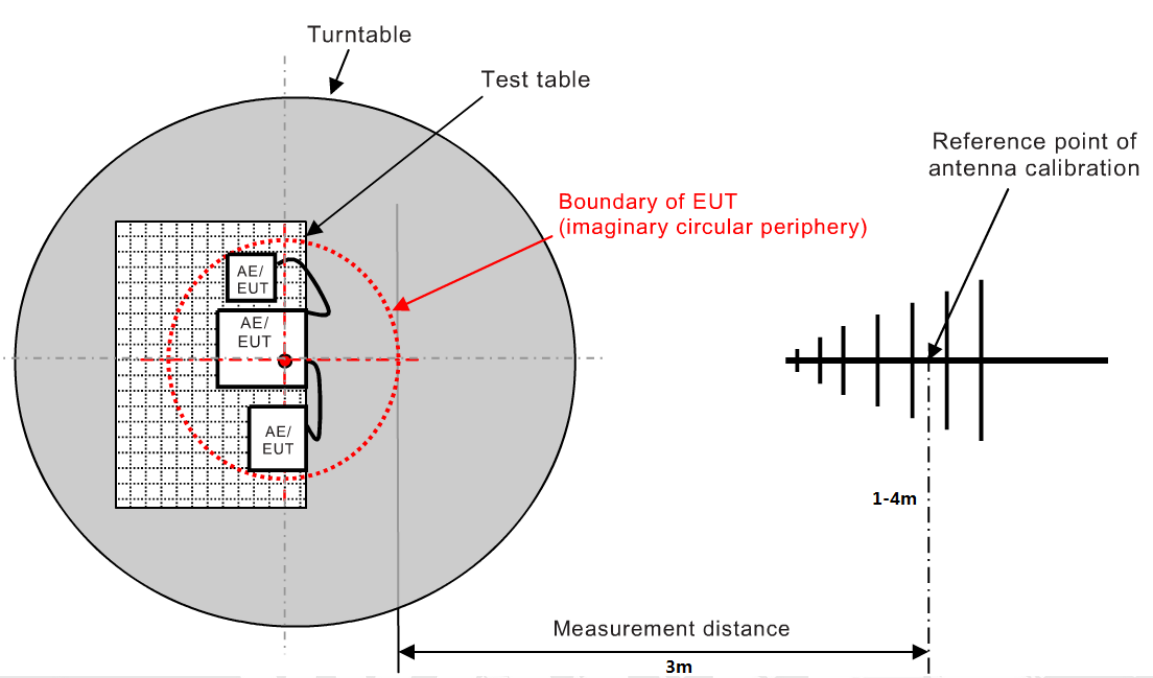
Standards	Reference	Description of Test Item	Result
ETSI EN 301 489-1	8.2	Radiated Emissions	Pass
	8.3	Conducted Emissions for DC Power Port	N/A
	8.4	Conducted Emissions for AC Power Port	N/A
	8.5	Harmonic Current Emissions	N/A
	8.6	Voltage Fluctuations and Flicker	N/A
	8.7	Telecommunication Ports	N/A
	9.2	Radio Frequency Electromagnetic Field	Pass
	9.3	Electrostatic Discharge	Pass
	9.4	Fast Transients, Common Mode	N/A
	9.5	Radio Frequency, Common Mode	N/A
	9.6	Transient and Surges in the Vehicular Environment	N/A
	9.7	Voltage Dips and Interruptions	N/A
	9.8	Surges	N/A

Pass: The EUT complies with the essential requirements in the standard.
Fail: The EUT does not comply with the essential requirements in the standard.
N/A: Not applicable.

3. Radiated Emissions

3.1 Test Procedure

Test is conducting under the description of EN55032 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.



3.2 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBµV means the emission is 6dBµV below the maximum limit for Class B device. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – EN 301489 Class B Limit

3.3 Environmental Conditions

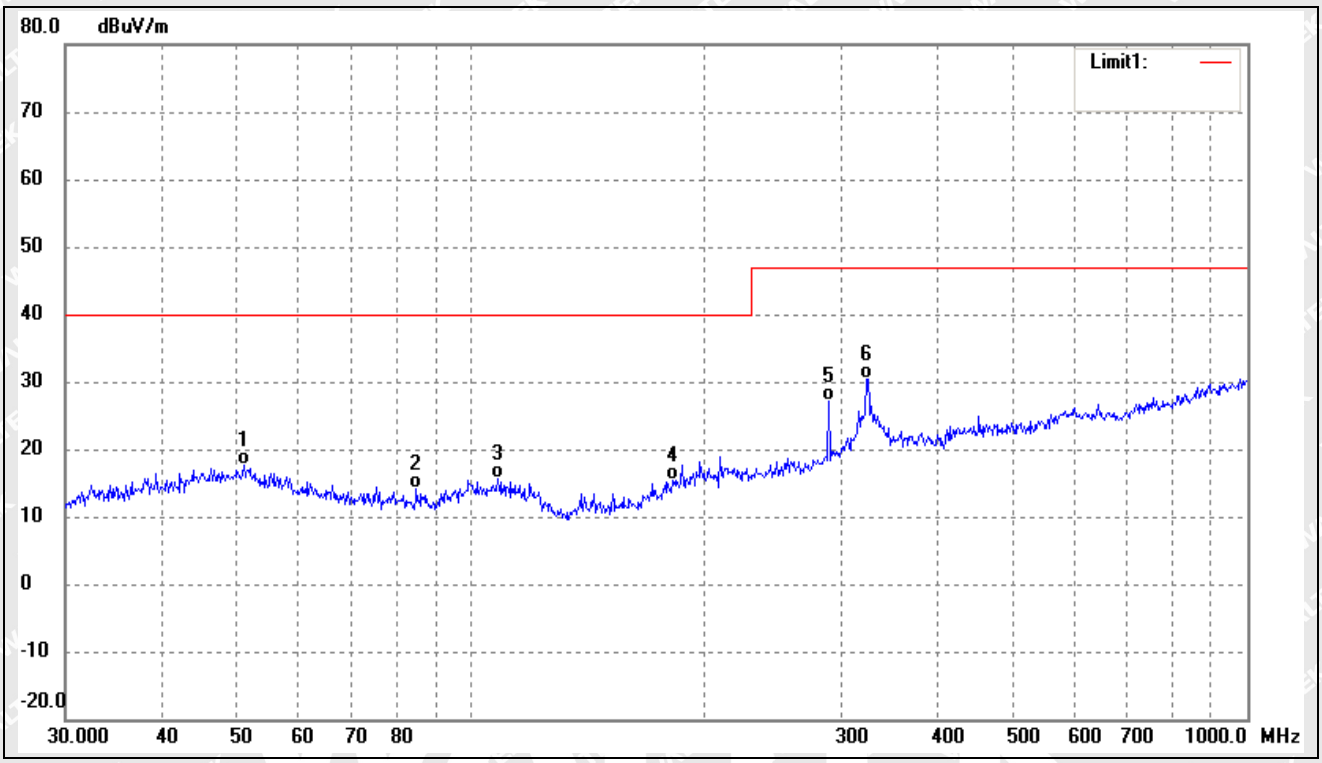
Temperature:	22.5° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

3.4 Summary of Test Results/Plots

Note: Only show the worst case in the test report

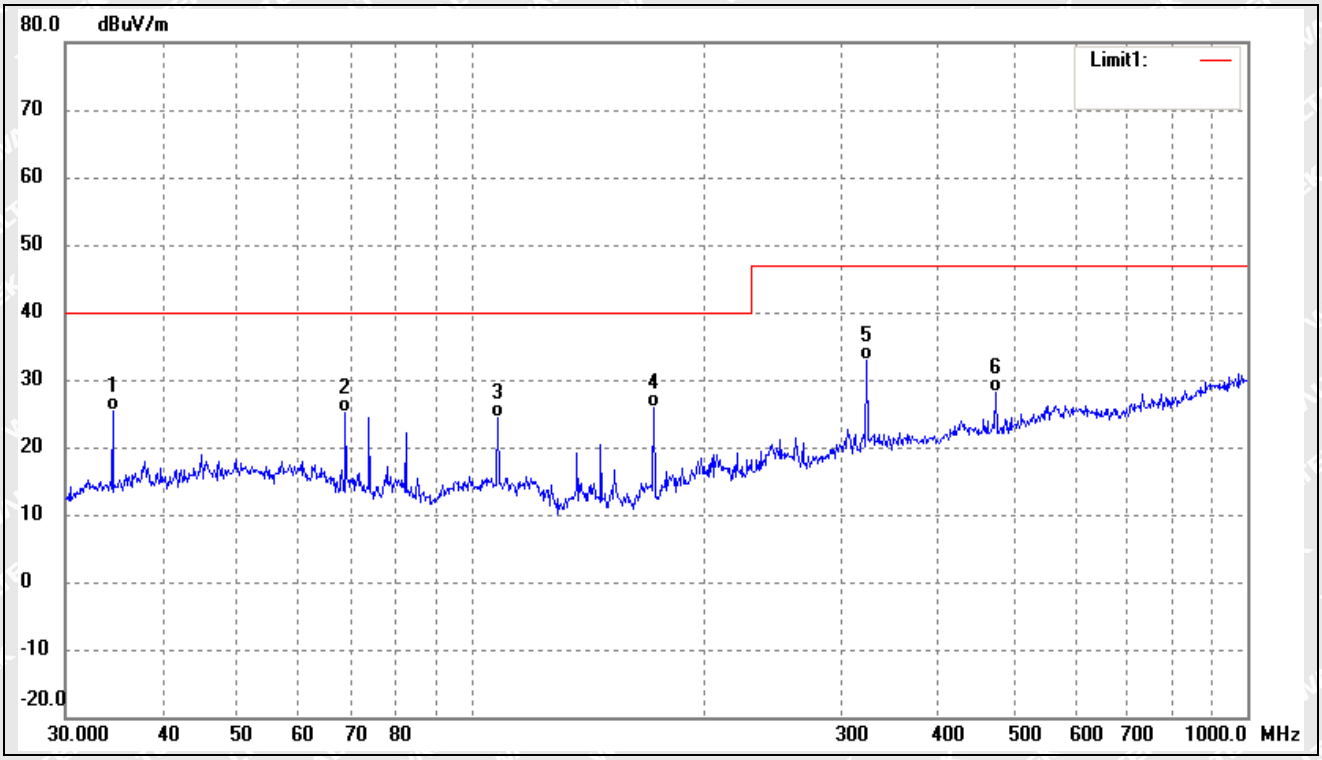
➢ 30MHz to 1GHz

Test mode:	TM1	Polarity:	Horizontal



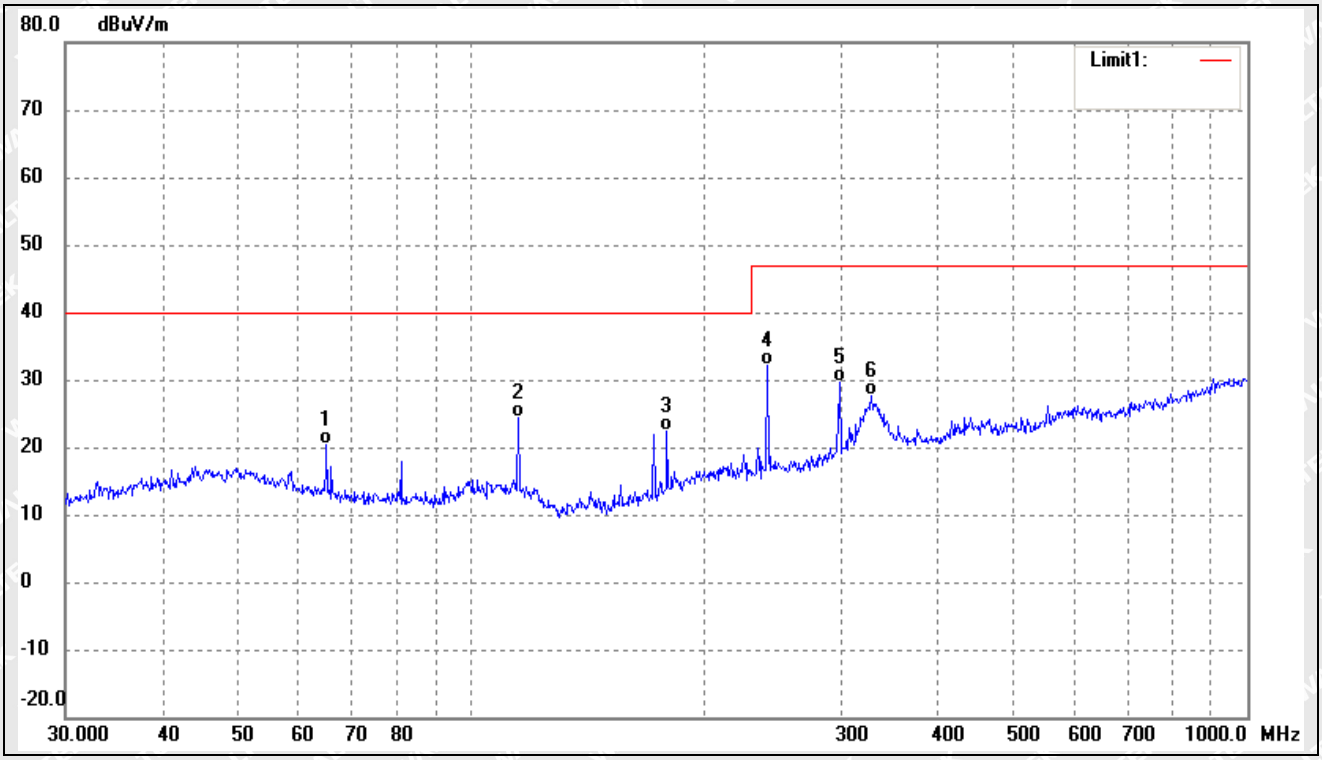
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	50.9420	28.01	-10.39	17.62	40.00	-22.38	-	-	QP
2	84.9995	28.44	-14.41	14.03	40.00	-25.97	-	-	QP
3	108.2667	27.85	-12.20	15.65	40.00	-24.35	-	-	QP
4	181.9202	28.56	-13.08	15.48	40.00	-24.52	-	-	QP
5	289.0021	34.90	-7.88	27.02	47.00	-19.98	-	-	QP
6	323.3204	37.86	-7.39	30.47	47.00	-16.53	-	-	QP

Test mode:	TM1	Polarity:	Vertical



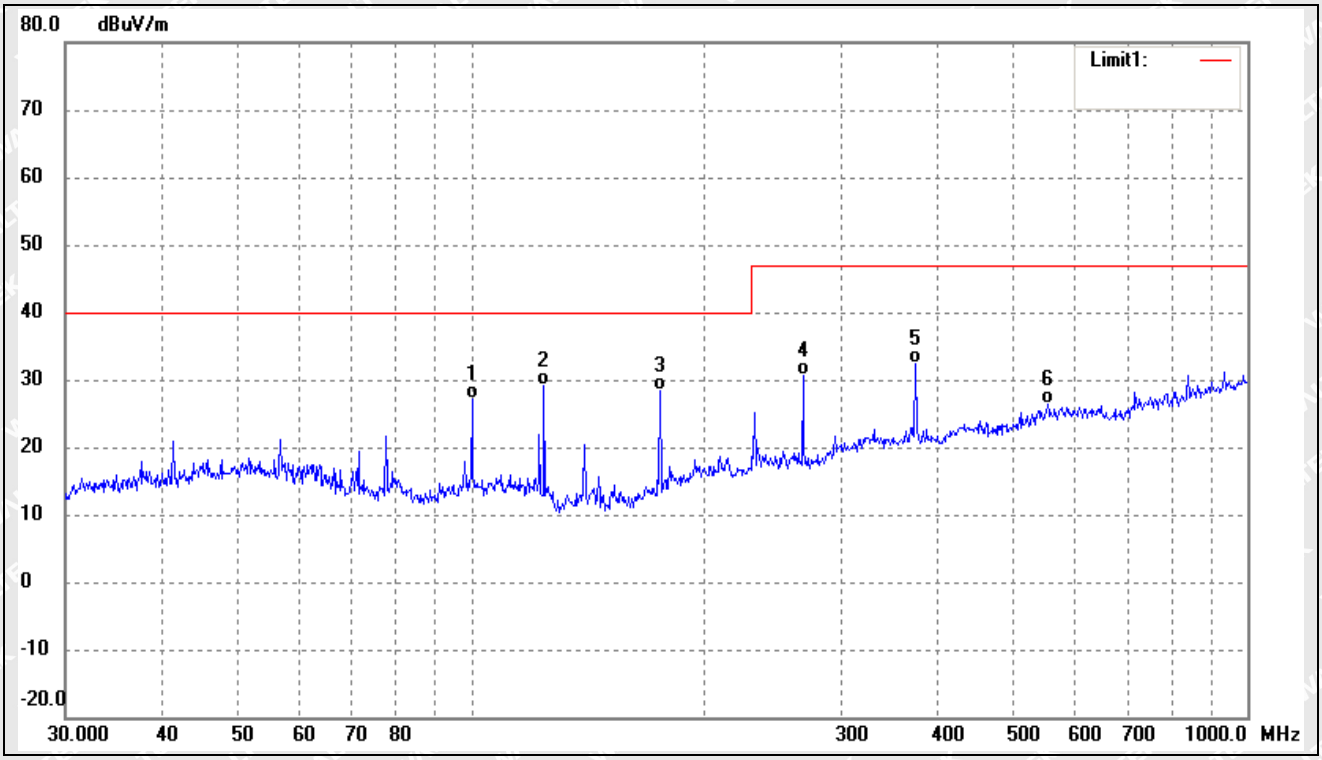
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	34.5172	38.05	-12.74	25.31	40.00	-14.69	-	-	QP
2	68.8721	39.07	-13.83	25.24	40.00	-14.76	-	-	QP
3	108.2667	36.56	-12.20	24.36	40.00	-15.64	-	-	QP
4	171.9946	39.51	-13.59	25.92	40.00	-14.08	-	-	QP
5	323.3204	40.28	-7.39	32.89	47.00	-14.11	-	-	QP
6	473.8346	32.87	-4.86	28.01	47.00	-18.99	-	-	QP

Test mode:	TM2	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	65.1145	33.34	-13.04	20.30	40.00	-19.70	-	-	QP
2	114.9169	37.17	-12.69	24.48	40.00	-15.52	-	-	QP
3	178.7584	35.80	-13.36	22.44	40.00	-17.56	-	-	QP
4	240.8304	41.92	-9.83	32.09	47.00	-14.91	-	-	QP
5	298.2681	37.07	-7.34	29.73	47.00	-17.27	-	-	QP
6	327.8873	34.88	-7.27	27.61	47.00	-19.39	-	-	QP

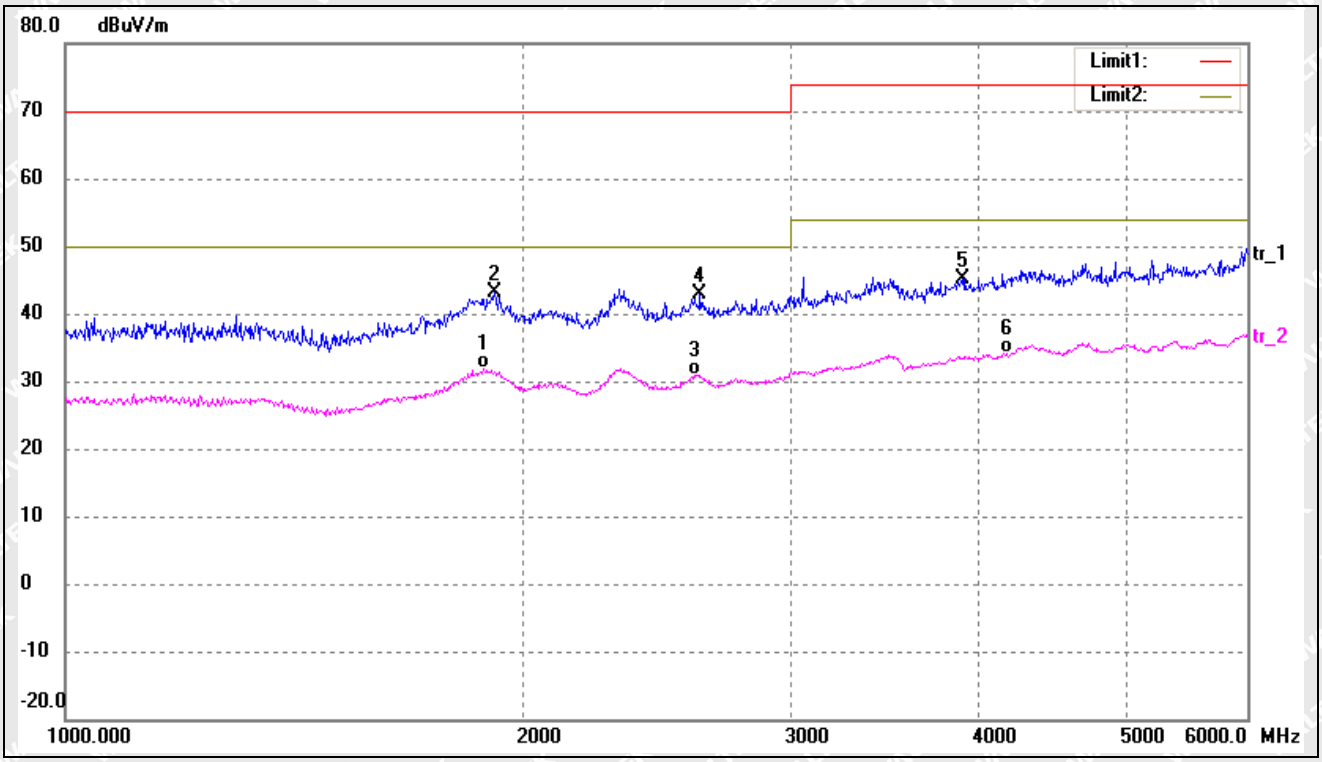
Test mode:	TM2	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	100.2286	39.58	-12.38	27.20	40.00	-12.80	-	-	QP
2	124.1329	43.33	-14.31	29.02	40.00	-10.98	-	-	QP
3	175.0367	41.88	-13.49	28.39	40.00	-11.61	-	-	QP
4	267.5455	39.47	-8.88	30.59	47.00	-16.41	-	-	QP
5	373.3110	38.19	-5.72	32.47	47.00	-14.53	-	-	QP
6	552.8832	30.13	-3.65	26.48	47.00	-20.52	-	-	QP

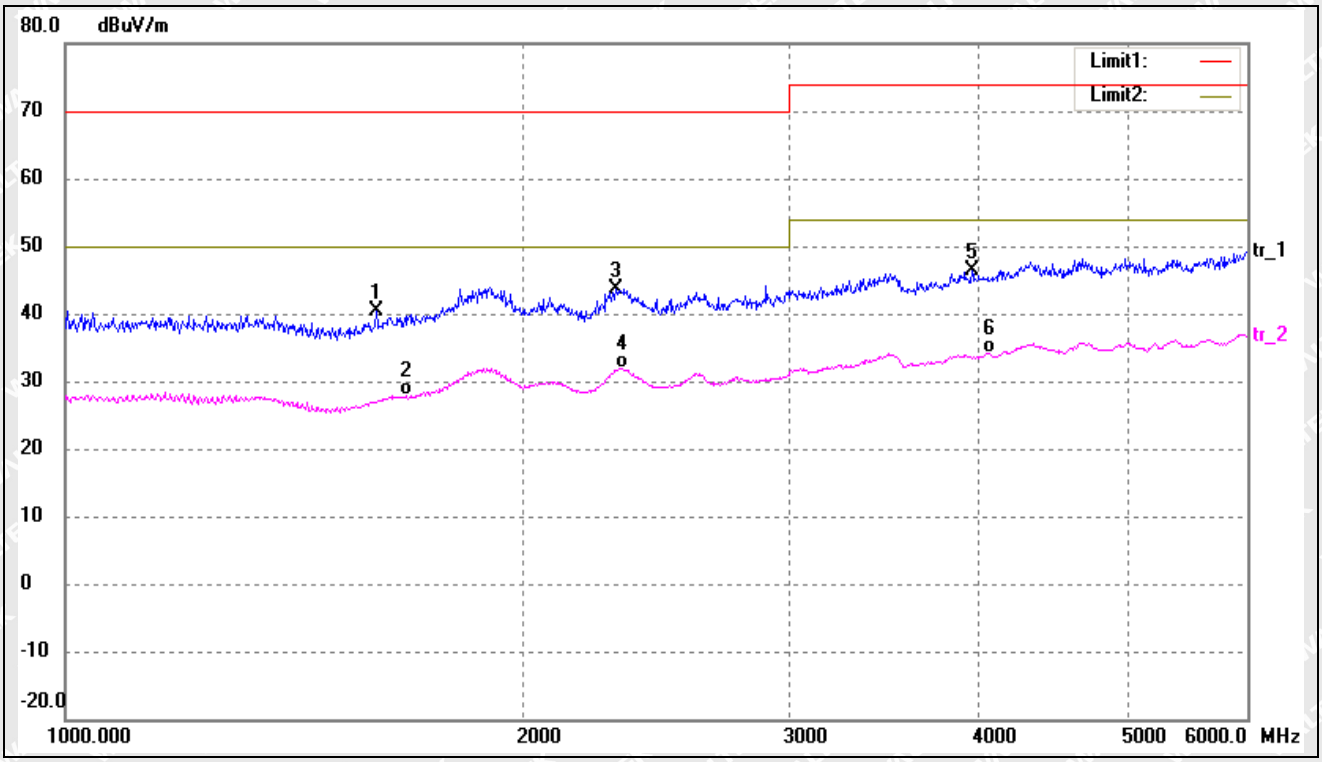
➢ Above 1GHz

Test mode:	TM1(worst case)	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	1885.669	40.48	-8.68	31.80	50.00	-18.20	-	-	AVG
2	1916.324	51.84	-8.83	43.01	70.00	-26.99	-	-	peak
3	2594.039	40.09	-9.16	30.93	50.00	-19.07	-	-	AVG
4	2617.383	51.92	-9.13	42.79	70.00	-27.21	-	-	peak
5	3895.981	51.90	-6.83	45.07	74.00	-28.93	-	-	peak
6	4163.019	40.18	-6.08	34.10	54.00	-19.90	-	-	AVG

Test mode:	TM1(worst case)	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	1601.968	53.55	-13.27	40.28	70.00	-29.72	-	-	peak
2	1675.358	40.09	-12.25	27.84	50.00	-22.16	-	-	AVG
3	2304.722	53.32	-9.68	43.64	70.00	-26.36	-	-	peak
4	2325.462	41.54	-9.63	31.91	50.00	-18.09	-	-	AVG
5	3952.228	53.28	-6.79	46.49	74.00	-27.51	-	-	peak
6	4059.890	40.58	-6.50	34.08	54.00	-19.92	-	-	AVG

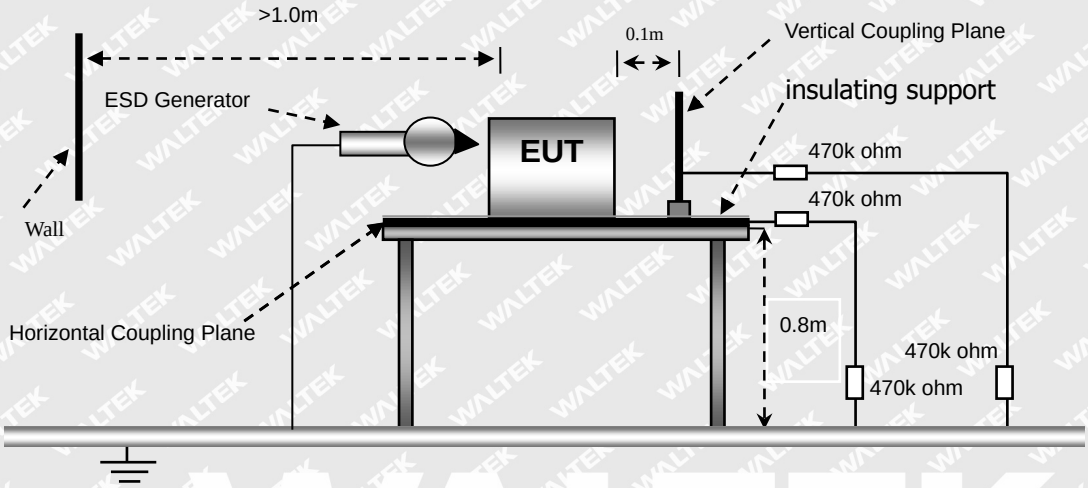
Remark:'-'Means' the test Degree and Height are not recorded by the test software and only show the worst case i n the test report.

4. Electrostatic Discharge (ESD)

4.1 Test Procedure

Test is conducting under the description of EN 61000-4-2.

4.2 Test Setup Block Diagram



4.3 Test Performance

Performance Criterion:	Mode	Verdict
	TM1-TM3	B
Note:TM3 for TT,TR		

4.4 Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

4.5 Electrostatic Discharge Immunity Test Data

Test mode	TM1-TM3							
EN 61000-4-2	Test Levels (kV)							
Test Points	-2	+2	-4	+4	-6	+6	-8	+8
Air Discharge								
Indicator Light	A	A	A	A	A	A	A	A
Shell Gap	A	A	A	A	A	A	A	A
Direct Contact Discharge								
/	/	/	/	/	/	/	/	/
Indirect Contact Discharge								
HCP (6 Sides)	A	A	A	A	/	/	/	/
VCP (4 Sides)	A	A	A	A	/	/	/	/

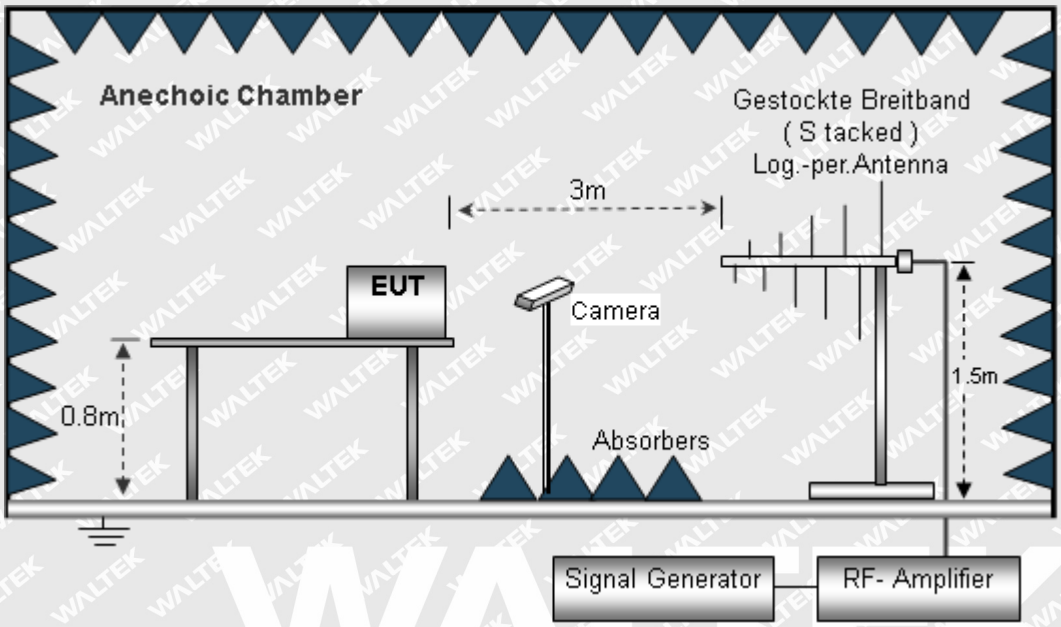
Test Result: Pass

5. Radio Frequency Electromagnetic Field (R/S)

5.1 Test Procedure

Test is conducting under the description of EN 61000-4-3.

5.2 Test Setup Block Diagram



5.3 Test Performance

Performance Criterion:	Mode	Verdict
	TM1-TM3	A
Note:TM3 for CT,CR		

5.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1010 mbar

5.5 Continuous Radiated Disturbances Test Data

Frequency step: 1% of fundamental
Dwell time: 1 second
Modulation: AM by 1kHz sine wave with 80% modulation depth

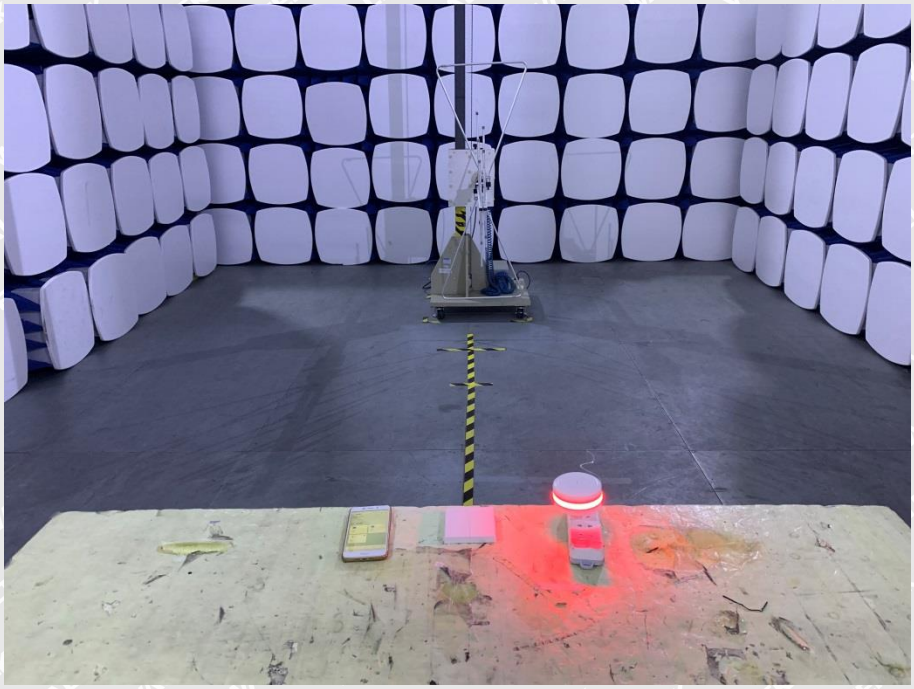
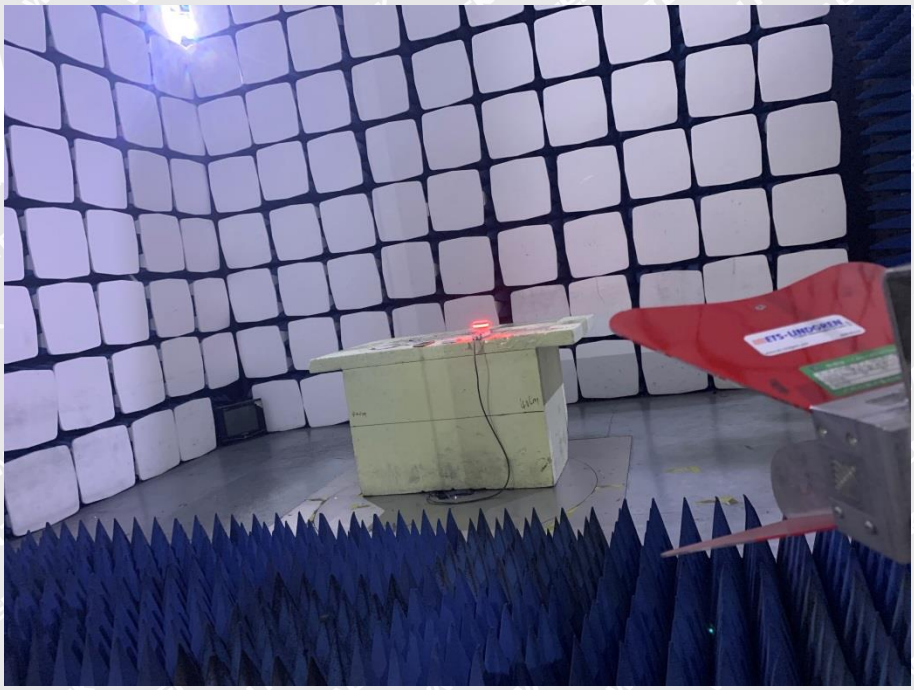
Test mode		TM1-TM3							
Frequency Range(MHz)	Field (V/m)	Front		Rear		Left Side		Right Side	
		VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	3	A	A	A	A	A	A	A	A
1000-3000	3	A	A	A	A	A	A	A	A
3000-6000	3	A	A	A	A	A	A	A	A

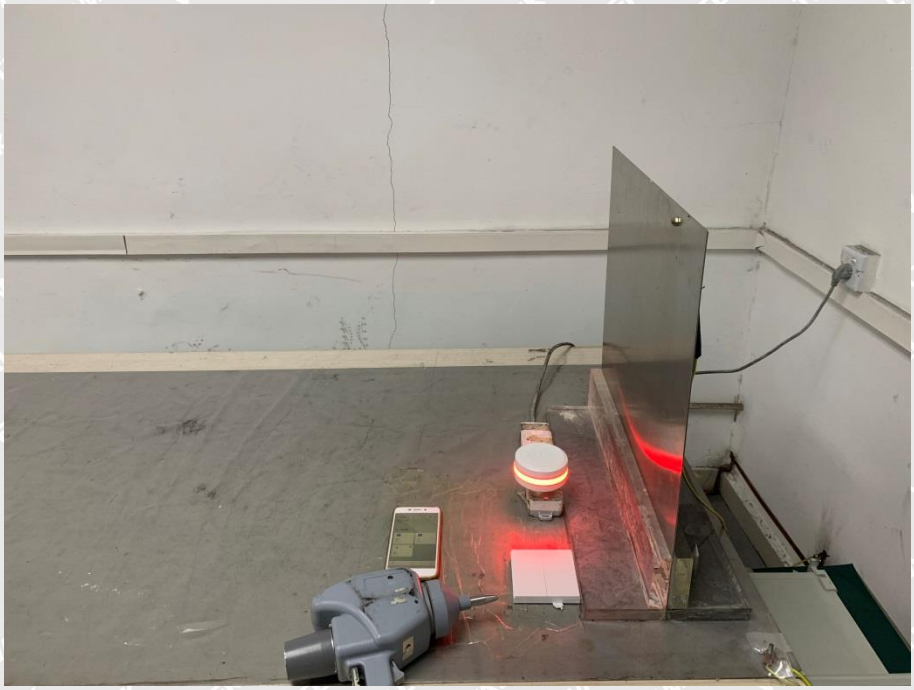
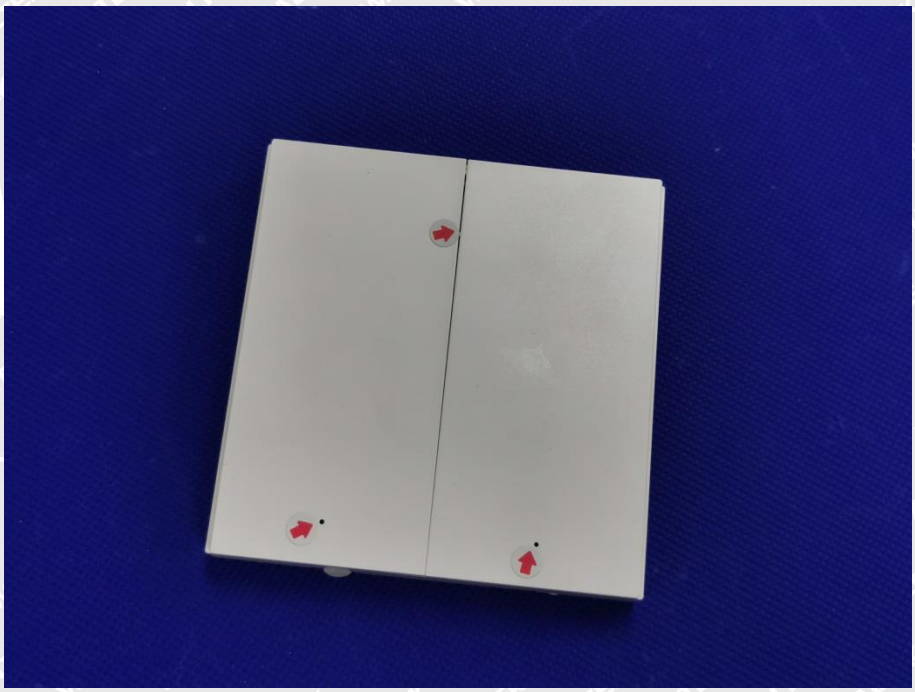
Test Result: Pass

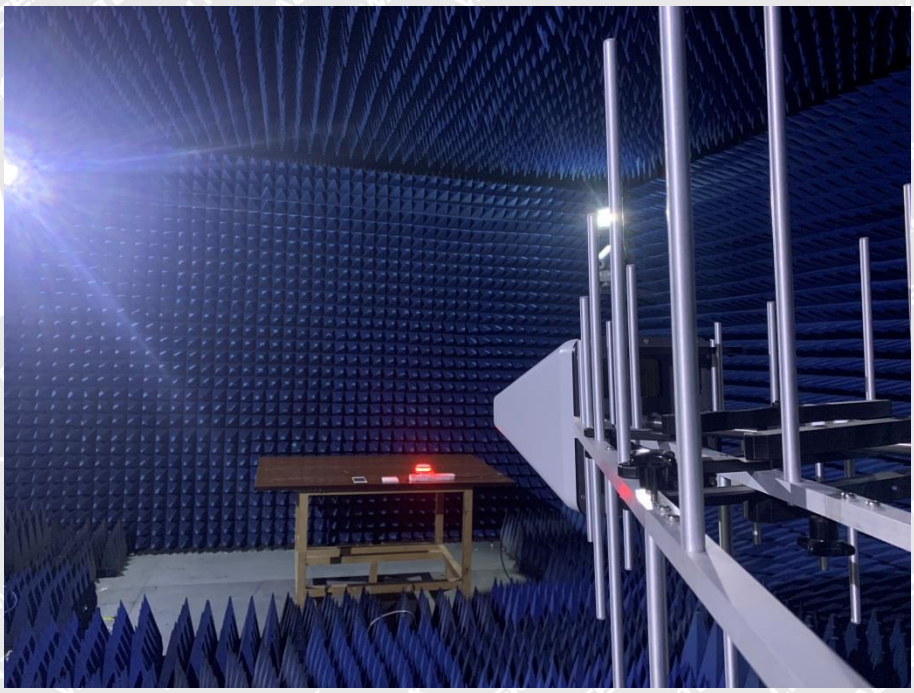
EXHIBIT 1 - EUT PHOTOGRAPHS

Please refer to "ANNEX".

EXHIBIT 2 - TEST SETUP PHOTOGRAPHS

Radiation Emission Test View(30MHz to 1GHz)	
Radiation Emission Test Setup ((Above 1GHz)	

EN 61000-4-2 Test View	
EN 61000-4-2 Test View	

EN 61000-4-2 Test View	
EN 61000-4-3 Test View	

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