

TEST REPORT

ETSI EN 300 440 V2.2.1 (2018-07)

Report Reference No......: 19ITC1231137E3

Compiled by

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Date of issue.....: Dec.31, 2019

Representative Laboratory Name.: Shenzhen iTC Product Testing Co., Ltd.

Address.....: Room 502, Floor 5, Fuong buliding, No. 3, Dayang road,Qiaotou community, Fuhai street, Baoan district, Shenzhen, China

Applicant's name.....: ONARAN ELEKTRONIK SAAT VE DAYANIKLI TUK.MALL.

ITH.IHR.SAN.TIC.LTD.STI.

Address.....: 1369 Sk.No:29a Cankaya Izmir Turkiye Kemeralti Vd V No:642 003 3200

Test specification.....:

Standard.....: ETSI EN 300 440 V2.2.1 (2018-07)

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Test item description.....: Wireless mouse and keyboard

Trade Mark.....: N/A

Shenzhen Ruiaili Electronics Co.Ltd.

Manufacturer.....: 1A buliding shenyuan industrual garden ,donghuan road,shajing, baoan district,shenzhen ,China

Model/Type reference.....: RAYNOX

List Model.....: RX-K12,RX-W08,RX-W09,RX-W10,RX-W11,RX-W12,RX-W13, RX-W14,RX-W15,RX-W16,RX-W17,RX-W18,RX-W19,RX-W20, RX-W21,RX-W22,RX-W23,RX-W24,RX-W25,RX-W26,RX-W27, RX-W28,RX-W29,RX-W30,RX-XXXX

Modulation Type.....: GFSK

Operation Frequency.....: From 2420MHz to 2461MHz

Ratings.....: For keyboard: DC3.0V \equiv (2 x 1.5V AAA batteries), 0.5A

For mouse: DC1.5V \equiv (AAA batteries), 0.25A

Result.....: **PASS**

TEST REPORT

Test Report No. :	19ITC1231137E3	Dec.31, 2019
		Date of issue

Equipment under Test : Wireless mouse and keyboard

Model /Type : RAYNOX

Listed Models : RX-K12,RX-W08,RX-W09,RX-W10,RX-W11,RX-W12,RX-W13,RX-W14,
RX-W15,RX-W16,RX-W17,RX-W18,RX-W19,RX-W20,RX-W21,RX-W22,
RX-W23,RX-W24,RX-W25,RX-W26,RX-W27,RX-W28,RX-W29,RX-W30,
RX-XXXX

Applicant : **ONARAN ELEKTRONIK SAAT VE DAYANIKLI TUK.MALL.
ITH.IHR.SAN.TIC.LTD.STI.**

Address : 1369 Sk.No:29a Cankaya Izmir Turkiye Kemeralti Vd V No:642 003 3200

Manufacturer : **Shenzhen Ruiaili Electronics Co.Ltd.**

Address : 1A buliding shenyuan indrustrial garden ,donghuan road,shajing,baoan
district,shenzhen ,China

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. TEST STANDARDS

The tests were performed according to following standards:

[ETSI EN 300 440 V2.2.1 \(2018-07\)](#)—Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard for access to radio spectrum

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Dec.23, 2019
Testing commenced on	:	Dec.23, 2019
Testing concluded on	:	Dec.31, 2019

2.2. Product Description

Product Name:	Wireless mouse and keyboard
Trade Mark:	N/A
Model/Type reference:	RAYNOX
List Model:	RX-K12,RX-W08,RX-W09,RX-W10,RX-W11,RX-W12,RX-W13,RX-W14, RX-W15,RX-W16,RX-W17,RX-W18,RX-W19,RX-W20,RX-W21,RX-W22, RX-W23,RX-W24,RX-W25,RX-W26,RX-W27,RX-W28,RX-W29,RX-W30, RX-XXXX
Power supply:	For keyboard: DC3.0V $\overline{\text{---}}$ (2 x 1.5V AAA batteries), 0.5A For mouse: DC1.5V $\overline{\text{---}}$ (AAA batteries), 0.25A
Adapter information(Auxiliary test)	N/A
Antenna Type	Internal
Antenna Gain	2.10 dBi
Operation frequency	2420~2461MHz
Number of Channels	30
Modulation Type	GFSK
Remark: The EUT only has trasmitting without receiving	

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	<input type="radio"/> 230V / 50 Hz	<input type="radio"/> 120V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input checked="" type="radio"/> Other (specified in blank below)	

DC 3V

Description of the test mode

Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2420	11	2435	21	2450
2	2421	12	2436	22	2451
3	2423	13	2438	23	2453
4	2424	14	2439	24	2454
5	2425	15	2440	25	2455
6	2426	16	2441	26	2456
7	2428	17	2443	27	2458
8	2429	18	2444	28	2459

9	2430	19	2445	29	2460
10	2434	20	2446	30	2461

2.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○ /	M/N: /
	Manufacturer: /

2.5. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen iTC Product Testing Co., Ltd.

Room 502, Floor 5, Fuong buliding, No. 3, Dayang road, Qiaotou community, Fuhai street,
Baoan district, Shenzhen, China

3.2. Environmental conditions

Normal Temperature: 25 °C

High Temperature: 55 °C

Low Temperature: -20 °C

Normal Voltage : DC 3.0V

High Voltage:DC 3.0V

Low Voltage:DC 2.7V

Relative Humidity: 55 %

Air Pressure: 989 hPa

3.3. Test Description

ETSI EN 300 440 Requirements		
Equivalent isotropic radiated power(Radiated)	ETSI EN 300 440 Sub-clause 4.2.2	Pass
Permitted range of operating frequencies	ETSI EN 300 440 Sub-clause 4.2.3	Pass
Spurious emissions	ETSI EN 300 440 Sub-clause 4.2.4	Pass
Duty cycle	ETSI EN 300 440 Sub-clause 4.2.5	Pass
Additional requirements for FHSS equipment	ETSI EN 300 440 Sub-clause 4.2.6	N/A ^{Note 1}
Adjacent channel selectivity	ETSI EN 300 440 Sub-clause 4.3.3	N/A ^{Note 3}
Blocking or desensitization	ETSI EN 300 440 Sub-clause 4.3.4	N/A ^{Note 3}
Receiver Spurious emissions	ETSI EN 300 440 Sub-clause 4.3.5	N/A ^{Note 3}
Spectrum access techniques	ETSI EN 300 440 Sub-clause 4.4	N/A ^{Note 4}

Remark: Note 1: Which only applicable to FHSS system device.

Note 2: The manufacturer declares compliance with Section 4.4(Spectrum access techniques)

Note 3:The EUT only has trasmitting without receiving

Note 4: The EUT is not belong to GBSAR systems.

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 2 " and is documented in the Shenzhen iTC Product Testing Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen iTC Product Testing Co., Ltd. is reported:

Test Items	Measurement Uncertainty	Notes
Frequency error	25 Hz	(1)
Frequency range	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Adjacent and alternate channel power Conducted	1.20 dB	(1)
Conducted spurious emission	1.60 dB	(1)
Radiated spurious emission	2.20 dB	(1)
Intermodulation attenuation	1.00 dB	(1)
Maximum useable receiver sensitivity	2.80 dB	(1)
Co-channel rejection	2.80 dB	(1)
Adjacent channel selectivity	2.80 dB	(1)
Spurious response rejection	2.80 dB	(1)
Intermodulation response rejection	2.80 dB	(1)
Blocking or desensitization	2.80 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5. Equipments Used during the Test

RF output power&PSD&OOB&OBW &Hopping &Duty Cycle, Tx-sequence, Tx-gap & Adaptively& Receiver Blocking						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Spectrum Analyzer	Agilent	N9020A	MY48010425	2019/07/14	2020/07/13
2	Vector Signal generator	Agilent	N5181A	MY49060502	2019/07/14	2020/07/13
3	Signal generator	Agilent	E4421B	3610AO1069	2019/07/14	2020/07/13
4	4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063513	2019/07/14	2020/07/13
5	X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080019	2019/07/14	2020/07/13
6	Climate Chamber	ESPEC	EL-10KA	A20120523	2019/07/14	2020/07/13
7	Radio Communication Tester	Rohde&Schwarz	CMW500	115406	2019/07/14	2020/07/13

Transmitter spurious emissions & Receiver spurious emissions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	ULTRA-BROADBAND ANTENNA	Schwarzbeck	VULB9163	000976	2019/07/14	2020/07/13
2	Horn Antenna	Schwarzbeck	BBHA 9120D	01622	2019/07/14	2020/07/13
3	EMI Test Receiver	Rohde&Schwarz	ESCI	101102	2019/07/14	2020/07/13
4	Spectrum Analyzer	Agilent	N9020A	MY48010425	2019/07/14	2020/07/13
5	Pre-Amplifier	Schwarzbeck	BBV 9743	#202	2019/07/14	2020/07/13
6	Pre-Amplifier	Chenyi	EMC05184 5B	980355	2019/07/14	2020/07/13
7	High-Pass Filter	K&L	9SH10-2700/X127 50-O/O	N/A	2019/07/14	2020/07/13
8	High-Pass Filter	K&L	41H10-1375/U127 50-O/O	N/A	2019/07/14	2020/07/13
9	RF Cable	HUBER+SUHNER	C102	N/A	2019/07/14	2020/07/13

The calibration interval is 1 year.

4. TEST CONDITIONS AND RESULTS

4.1. Equivalent Isotropically Radiated Power (e.i.r.p)

LIMIT

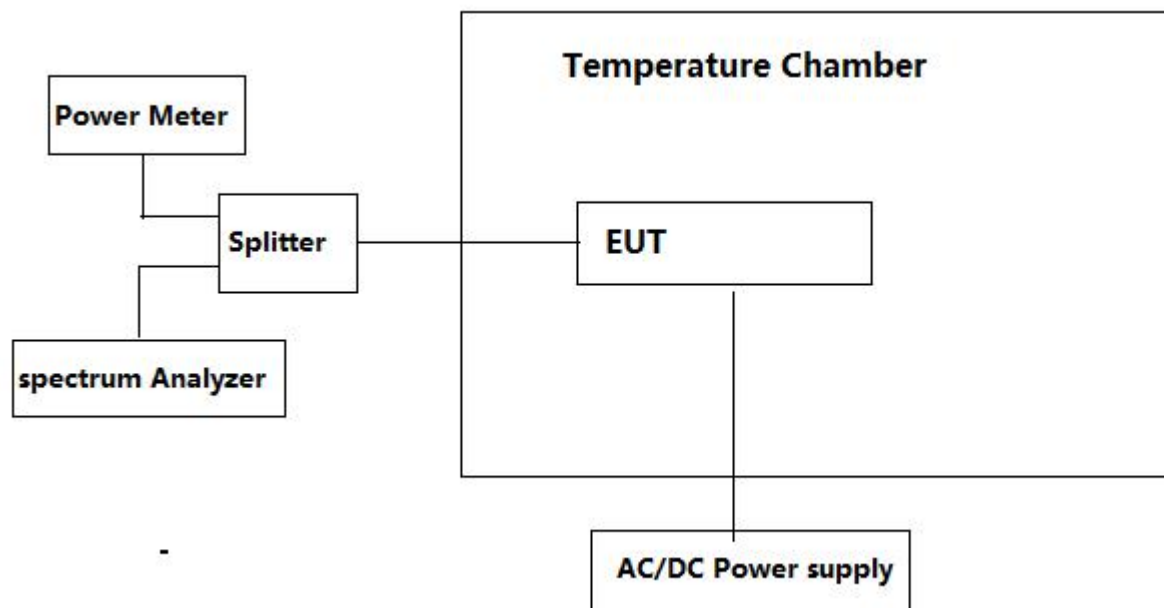
According to ETSI EN 300 440 clause 4.2.2.3.2

The transmitter maximum e.i.r.p. under normal and extreme test conditions shall not exceed the values given in table 2.

Table 2: Maximum radiated peak power (e.i.r.p.)

Frequency Bands	Power	Application	Notes
2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Non-specific short range devices	
2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Radio determination devices	
(a) 2 446 MHz to 2 454 MHz	500 mW e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex D
(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex D
5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Non-specific short range devices	
9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radio determination devices	
9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radio determination devices	
10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radio determination devices	
13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radio determination devices	
17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radio determination devices	See annex F
24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Non-specific short range devices and Radio determination devices	

TEST CONFIGURATION



TEST PROCEDURE

1. Please refer to ETSI EN 300 440 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 clause 4.2.2.3 for the measurement method.
3. According to the -6 dB channel bandwidth measurement result, the test procedure define in Sub-clause clause 4.2.2.3.2 is used for 802.11a HT20/802.11n HT20 test.

TEST RESULTS

GFSK							
Test conditions		Frequency	Measured power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (°C)	Voltage (V)						
+25°C	3V	2420	8.576	0.00	8.576	10.00	PASS
-10°C	3.0V		8.578	0.00	8.578		
	2.7V		8.571	0.00	8.571		
+40°C	3.0V		8.580	0.00	8.580		
	2.7V		8.569	0.00	8.569		
+25°C	3V	2440	8.621	0.00	8.621		
-10°C	3.0V		8.631	0.00	8.631		
	2.7V		8.629	0.00	8.629		
+40°C	3.0V		8.617	0.00	8.617		
	2.7V		8.625	0.00	8.625		
+25°C	3V	2460	8.667	0.00	8.667		
-10°C	3.0V		8.670	0.00	8.670		
	2.7V		6.661	0.00	6.661		
+40°C	3.0V		8.659	0.00	8.659		
	2.7V		8.678	0.00	8.678		

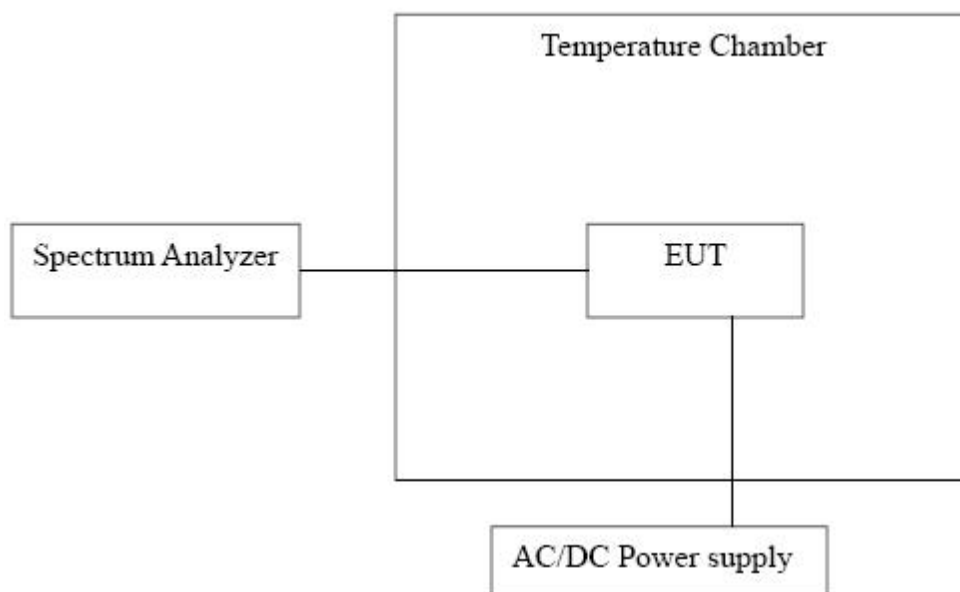
4.2. Permitted Range of Operating Frequencies

LIMIT

According to ETSI EN 300 440 clause 4.2.3.5

Frequency range Limit	
$F_{Low} > 5725G$	$F_{High} < 5875GHz$

TEST CONFIGURATION



TEST PROCEDURE

1. Please refer to ETSI EN 300 440 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 clause 4.2.3.3 for the measurement method.

TEST RESULTS

Antenna 1

GFSK					
Test Condition		f _L (MHz)	f _H (MHz)	Limit	Result
Temperature (°C)	Voltage (V)				
+25°C	3V	2418.762	2461.5512	f _L ≥ 2400MHz and f _H ≤ 2483.5MHzGHz	Pass
-10°C	3.0V	2418.786	2461.5535		
	2.7V	2418.757	2461.5508		
+40°C	3.0V	2418.749	2461.5519		
	2.7V	2418.765	2461.5522		

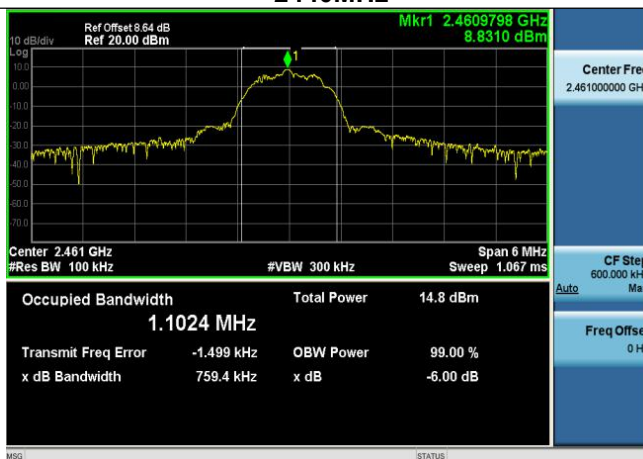
99% Bandwidth(MHz)



2420MHz



2440MHz



2462MHz

4.3. Spurious emissions and cabinet

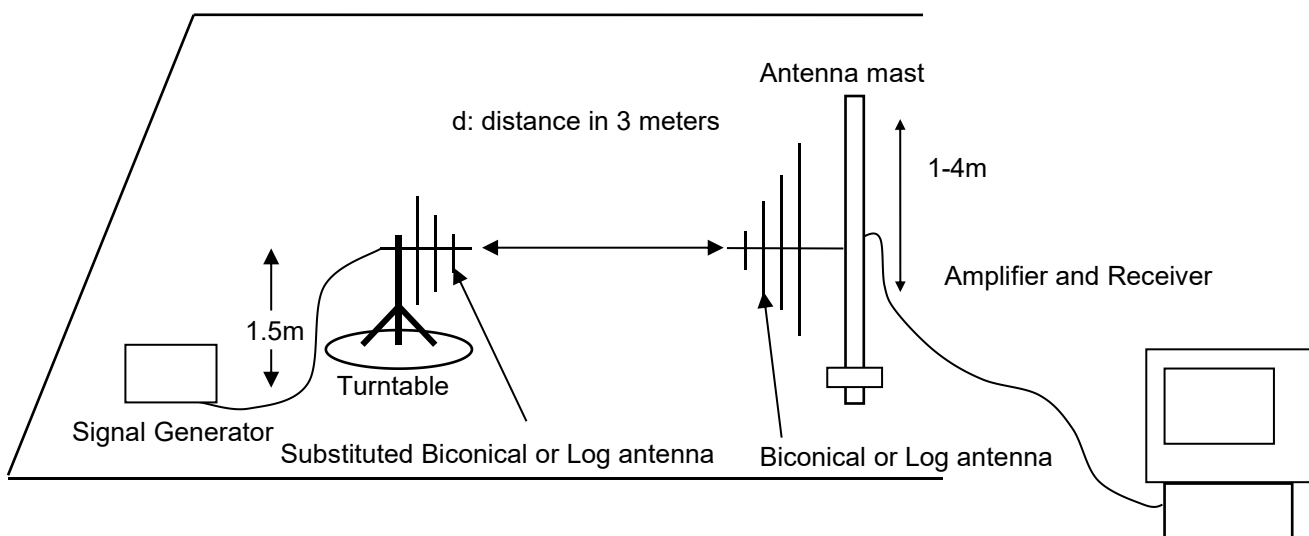
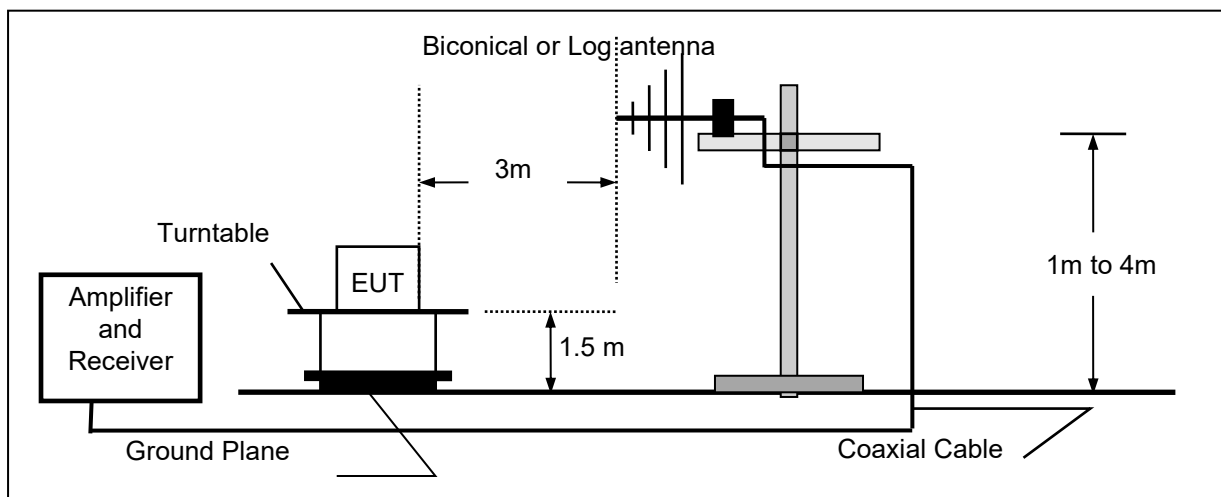
LIMIT

The power of the spurious emissions shall not exceed the limits of table

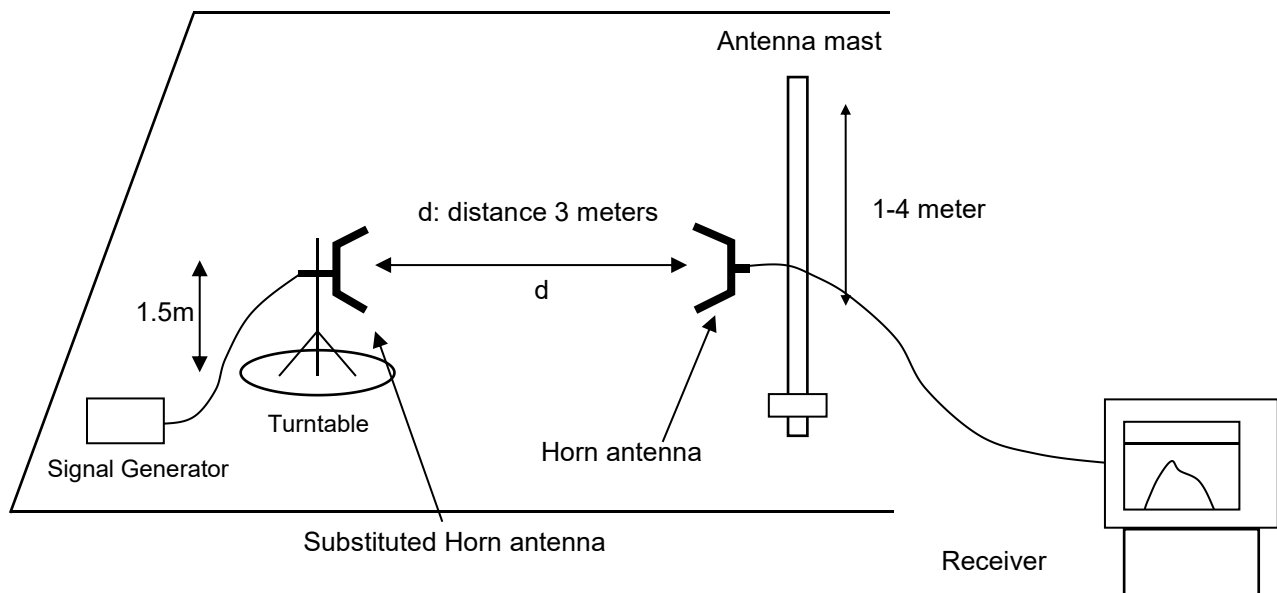
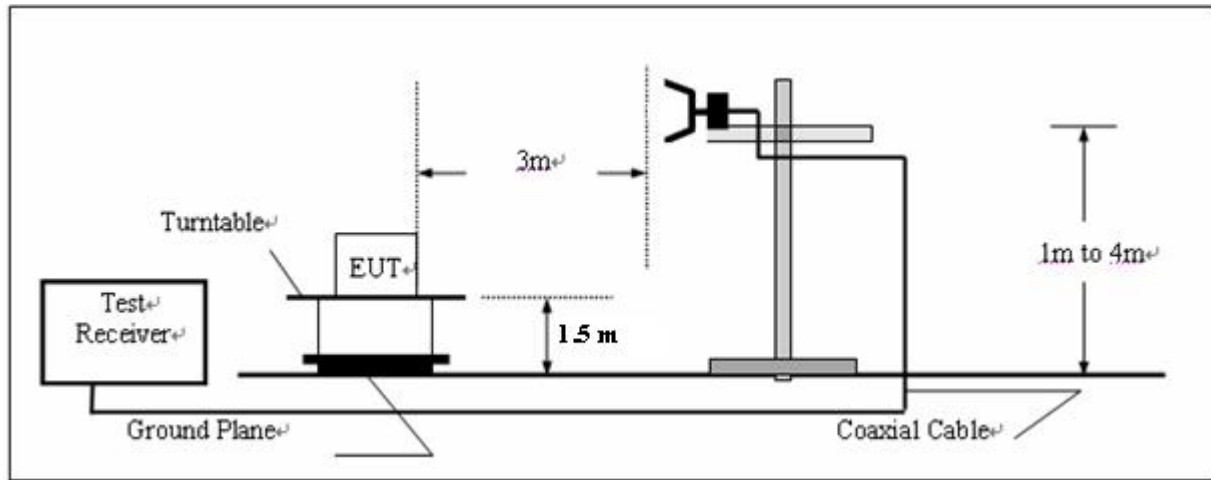
State	47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies $\leq 1\ 000$ MHz	Frequencies $> 1\ 000$ MHz
Operating	4 nW /-54dBm	250 nW/-36dBm	1 μ W /-30dBm
Standby	2 nW /-57dBm	2 nW /-57dBm	20 nW /-47dBm

TEST CONFIGURATION

Below 1GHz



Above 1GHz



TEST PROCEDURE

1. Please refer to ETSI EN 300 440 clause 5 for the test conditions.
2. Please refer to ETSI EN 300 440 clause 4.2.4.3 for the measurement method.

TEST RESULTS

The measurement frequency range is from 25MHz to the 10th harmonic of the fundamental frequency

GFSK						
Low channel				Horizontal/ Vertical		
Suspected List						
NO.	Freq. [MHz]	Result Level [dBm]	Factor [dB]	Limit [dBm]	Margin [dB]	Polarity
1	2420.00	-63.56	14.15	-30.00	33.59	Horizontal
2	2460.00	-62.19	23.49	-30.00	32.19	Vertical
Mid channel				Horizontal/ Vertical		
Suspected List						
NO.	Freq. [MHz]	Result Level [dBm]	Factor [dB]	Limit [dBm]	Margin [dB]	Polarity
1	2420.00	-49.35	14.36	-30.00	19.35	Vertical
2	2460.00	-50.66	24.12	-30.00	20.66	Vertical
High channel				Horizontal/ Vertical		
Suspected List						
NO.	Freq. [MHz]	Result Level [dBm]	Factor [dB]	Limit [dBm]	Margin [dB]	Polarity
1	2420.00	-47.26	15.17	-30.00	17.26	Vertical
2	2460.00	-51.36	24.65	-30.00	21.36	Horizontal

4.4. Duty cycle

According to ETSI EN 300 440 clause 4.2.5.4

Table 4 defines the maximum duty cycle within a 1 hour period.

Table 4: Duty cycle limits

Frequency Band	Duty cycle	Application	Notes
2 400 MHz to 2 483,5 MHz	No Restriction	Generic use	
2 400 MHz to 2 483,5 MHz	No Restriction	Detection, movement and alert applications	
(a) 2 446 MHz to 2 454 MHz	No Restriction	RFID	Limits shown in annex D shall apply
(b) 2 446 MHz to 2 454 MHz	≤ 15 %	RFID	Limits shown in annex D shall apply
5 725 MHz to 5 875 MHz	No Restriction	Generic use	
9 200 MHz to 9 500 MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
9 500 MHz to 9 975 MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
10,5 GHz to 10,6 GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
13,4 GHz to 14,0 GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
17,1 GHz to 17,3 GHz	DAA or equivalent techniques	Radiodetermination: GBSAR detecting and movement and alert applications	Limits shown in annex F shall apply
24,00 GHz to 24,25 GHz	No Restriction	Generic use and for Radiodetermination: radar, detection, movement and alert applications	

TEST RESULTS

For device working in frequency band 2400MHz to 2483.5MHz, no duty cycle restricted.

5. Test Setup Photos of the EUT



6. External and Internal Photos of the EUT



Photo 1

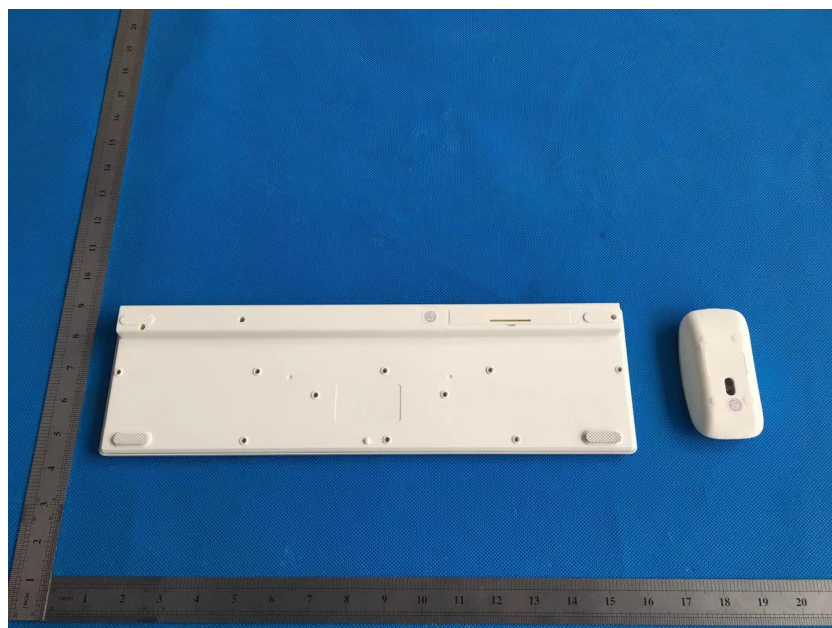


Photo 2



Photo 3

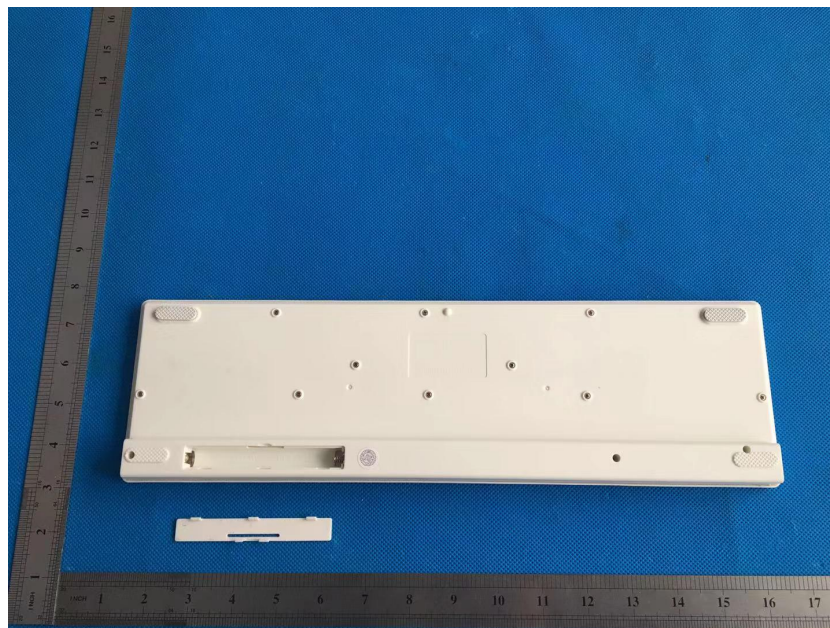


Photo 4



Photo 5



Photo 6

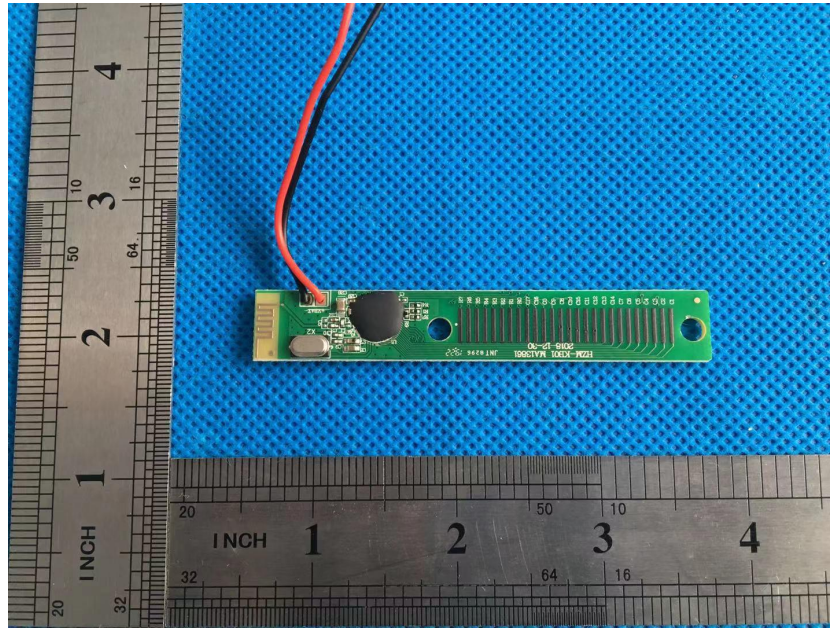


Photo 7

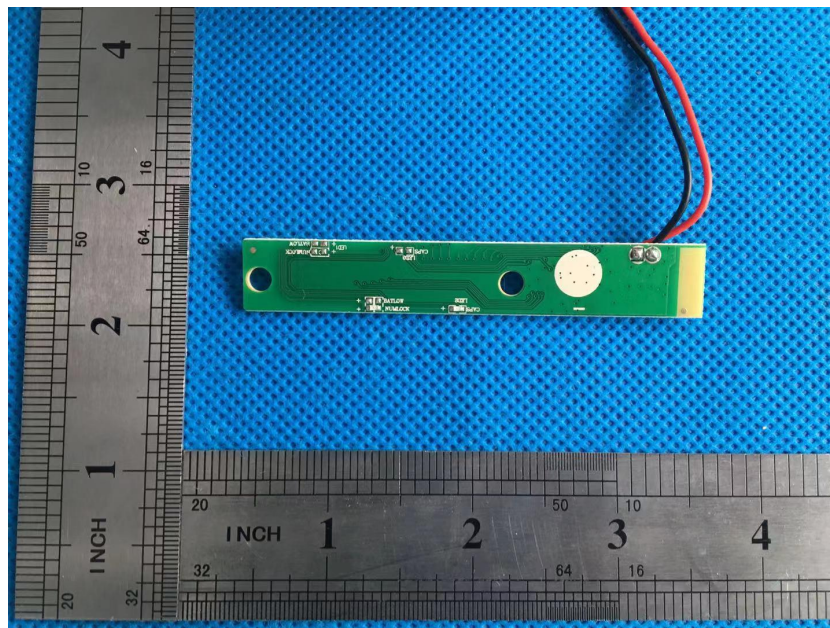


Photo 8



Photo 9

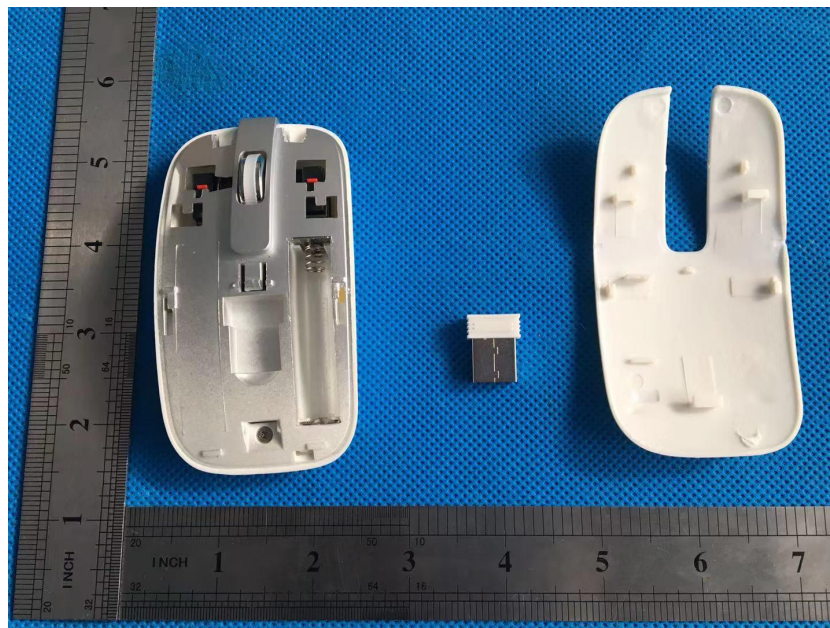


Photo 10

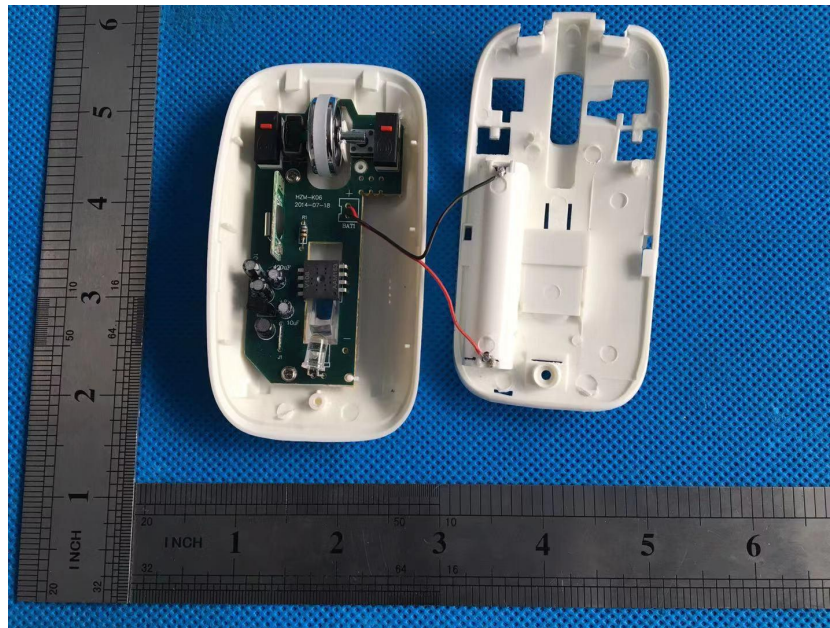


Photo 11

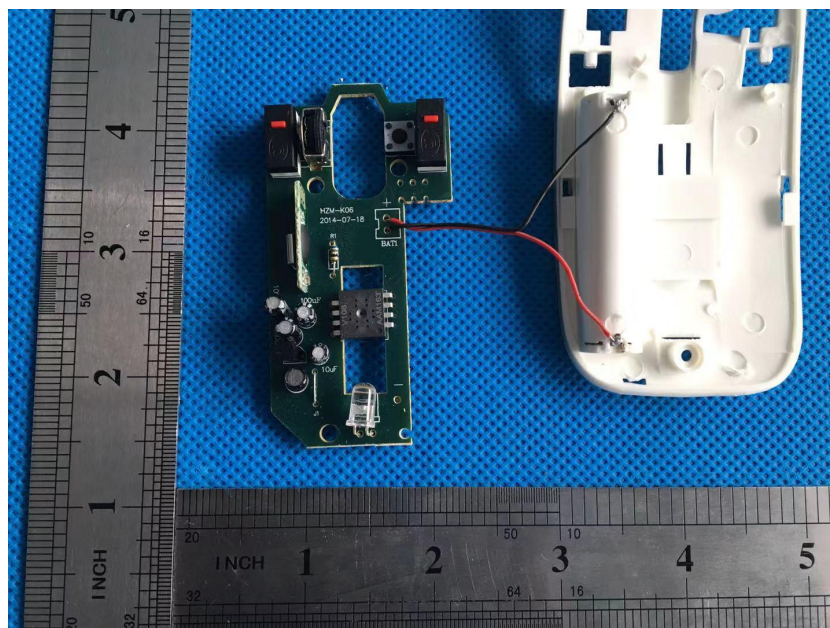


Photo 12

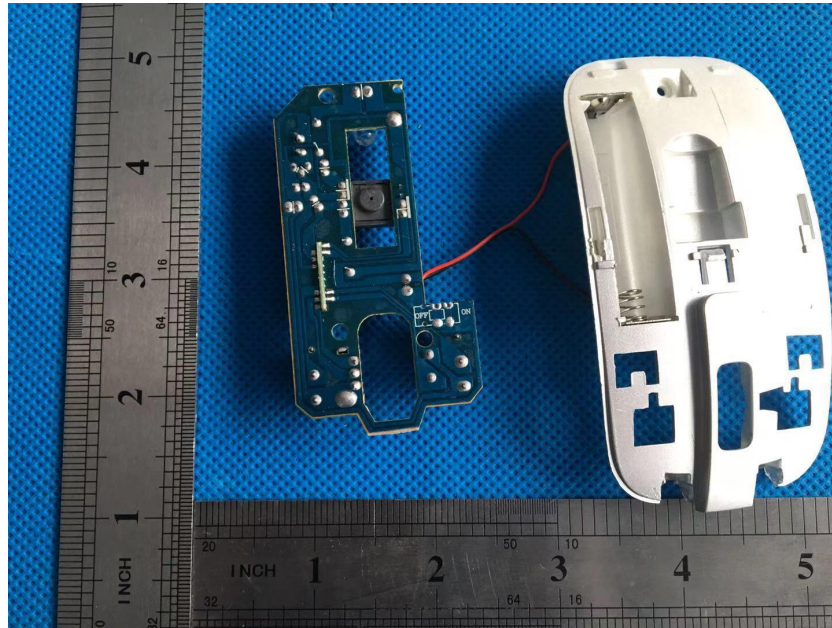


Photo 13

.....End of Report.....