

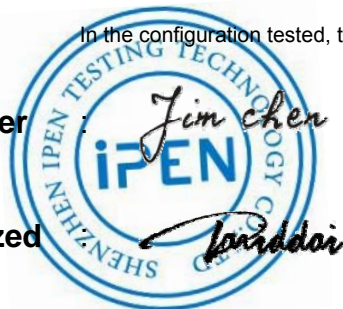
RADIO TEST REPORT

Application No. : IP19082740
Applicant : ASBISC Enterprises PLC
Equipment Under Test (EUT)
EUT Name : Wireless mouse
Model No. : CNS-CMSW13XX
Serial No. : CNS-CMSW13BO
Brand Name : CANYON
Receipt Date : 2019-08-07
Test Date : 2019-08-08 to 2019-08-16
Issue Date : 2019-08-17
Standards : ETSI EN 300 440 V2.2.1: 2018
Conclusions : **PASS**

In the configuration tested, the EUT complied with the standards specified above

Test/Witness Engineer

Approved & Authorized



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

TABLE OF CONTENTS

1	GENERAL INFORMATION	4
1.1	Client Information	4
1.2	General Description of EUT (Equipment Under Test)	4
1.3	Block Diagram Showing the Configuration of System Tested	4
1.4	Description of Support Units	5
1.5	Description of Operating Mode	5
1.6	Description of Test Software Setting	6
1.7	Test Facility	6
2	TEST RESULTS SUMMARY	7
3	MAXIMUM TRANSMIT POWER	9
3.1	Test Standard and Limit	9
3.2	Test Setup	9
3.3	Test Procedure	10
3.4	Test Equipment Used	10
3.5	Test Data	11
4	DUTY CYCLE	13
4.1	Test Standard and Limit	13
4.2	Test Setup	13
5	EQUIVALENT ISOTROPIC RADIATED POWER.....	14
5.1	Test Standard and Limit	14
5.2	Test Setup	14
5.3	Test Procedure	14
5.4	Test Equipment Used	15
5.5	Test Data	15
6	EQUIVALENT ISOTROPIC RADIATED POWER(DUTY CYCLE)	17
6.1	Test Standard and Limit	17
6.2	Test Setup	17
6.3	Test Procedure	17
6.4	Test Equipment Used	17
6.5	Test Data	18
7	OCCUPIED CHANNEL BANDWIDTH	19
7.1	Test Standard and Limit	19
7.2	Test Setup	19
7.3	Test Procedure	19
7.4	Test Equipment Used	20
7.5	Test Data	20
8	MEDIUM UTILISATION (MU) FACTOR.....	22
8.1	Test Standard and Limit	22
8.2	Test Setup	22
9	ADAPTIVITY (ADAPTIVE FREQUENCY HOPPING)	23
9.1	Test Standard and Limit	23
9.2	Test Setup	23
10	TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN	24
10.1	Test Standard and Limit	24
10.2	Test Setup	24
10.3	Test Procedure	24
10.4	Test Equipment Used	26

10.5	Test Date	26
11	TRANSMITTER UNWANTED SPURIOUS EMISSIONS IN THE SPURIOUS DOMAIN	27
11.1	Test Standard and Limit	27
11.2	Test Setup	28
11.3	Test Procedure	29
11.4	Test Equipment Used	30
11.5	Test Date	30
12	RECEIVER SPURIOUS EMISSIONS	34
12.1	Test Standard and Limit	34
12.2	Test Setup	34
12.3	Test Procedure	35
12.4	Test Equipment Used	36
12.5	Test Date	37
13	RECEIVER BLOCKING	40
13.1	Test Standard and Limit	40
13.2	Test Setup	40
14	PHOTOGRAPHS - CONSTRUCTIONAL DETAILS	41

1 General Information

1.1 Client Information

Applicant : ASBISC Enterprises PLC
Address : 43 Kolonakiou street, Diamond Court, 4103, Ayios Athanasios, Limassol, Cyprus
Manufacturer : DONGGUAN INDENA ELECTRONIC TECHNOLOGY CO.,LTD.
Address : City NO.6 GAOLI 7TH ROAD QINGHUTOU COMMUNITY TANGXIA TOWN DONGGUAN,CHINA

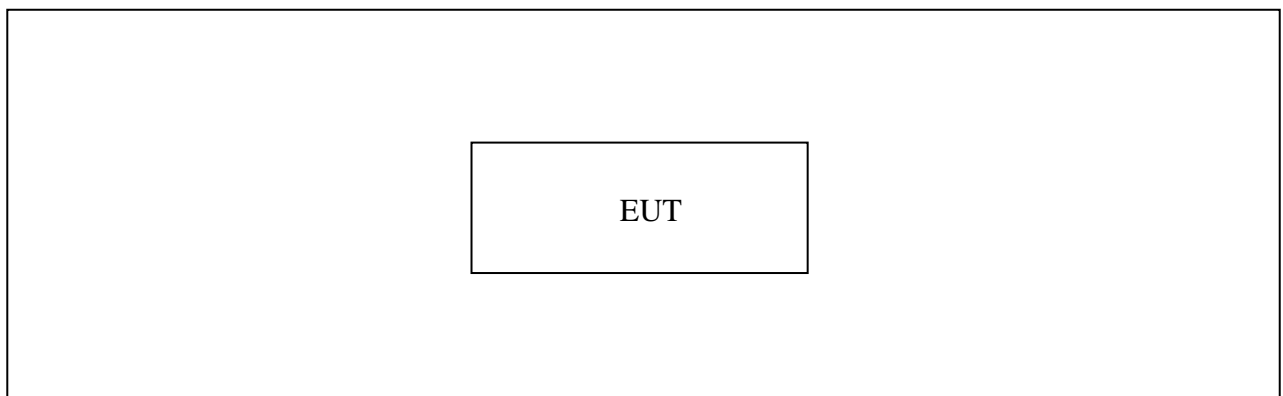
1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Wireless mouse	
Model No.	:	CNS-CMSW13XX	
Serial No.	:	CNS-CMSW13BO	
Product Description		Operation Frequency:	2405MHz~2472MHz
Power Rating		DC 3V from battery	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

Note:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

1.3 Block Diagram Showing the Configuration of System Tested



1.4 Description of Support Units

The EUT has been tested as an independent unit.

Name	Model	S/N	Manufacturer	Used “√”

1.5 Description of Operating Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Modulation	Test conditions	Frequency Range(MHz)		
		f _L		f _H
MSK	Normal		2404.8875	2471.9375
	Extreme	LTLV	2404.8860	2471.9372
		LTHV	2404.8865	2471.9369
		HTLV	2404.8868	2471.9364
		HTHV	2404.8850	2471.9358
Wireless Transmission Function with 2.4G				

Test Items	Mode	Data Rate	Channel
Transmitter Spurious Emissions (1GHz~12.75GHz)	MSK	--	2405/2438/2472MHz
Receiver Spurious Emissions (1GHz~12.75GHz)	MSK	--	2405/2438/2472MHz

1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control operating channel as well as the output power level. The RF output power selection is for setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of Bluetooth mode.

1.7 Test Facility

The testing report were performed by the Shenzhen iPEN Testing Technology Co., Ltd., in their facilities located at 4/F Building E,Fenghuanggang Second Industrial Zone,Xixiang Street, Baoan District,Shenzhen,China.

.

2 TEST RESULTS SUMMARY

ETSI EN 300 440 V2.2.1: 2018							
Essential Requirement			Requirement Conditionality		Test Specification		
No	Description	Reference : Clause No	U/C	Condition	E/O	Reference: Clause No	Observations
1	RF Output Power	4.3.1.1 or 4.3.2.1	U		E	5.3.2	PASS Note (2)
2	Power Spectral Density	4.3.2.2	C	Only for modulations other than FHSS	E	5.3.3	N/A
3	Duty cycle, TX-Sequence, TX-gap	4.3.1.2 or 4.3.2.3	C	Only for non-adaptive equipment	E	5.3.2	N/A Note (3)
4	Dwell time, Minimum Frequency Occupation & Hopping Sequence	4.3.1.3	C	Only for FHSS	E	5.3.4	PASS
5	Hopping Frequency Separation	4.3.1.4	C	Only for FHSS	E	5.3.5	PASS
6	Medium Utilisation	4.3.1.5 or 4.3.2.4	C	Only for non-adaptive equipment	E	5.3.2	N/A Note (3)
7	Adaptivity	4.3.1.6 or 4.3.2.5	C	Only for non-adaptive equipment	E	5.3.3	N/A Note (3)
8	Occupied Channel Bandwidth	4.3.1.7 or 4.3.2.6	U		E	5.3.8	PASS
9	Transmitter unwanted emissions in the OOB domain	4.3.1.8 or 4.3.2.7	U		E	5.3.9	PASS
10	Transmitter unwanted emissions in the spurious domain	4.3.1.9 or 4.3.2.8	U		E	5.3.10	PASS
11	Receiver spurious emissions	4.3.1.10 or 4.3.2.9	U		E	5.3.11	PASS
12	Receiver Blocking	4.3.1.11 or 4.3.2.10	C	Only for adaptive equipment	E	5.3.7	N/A Note (3)

Note:

- (1) "U/C": indicates whether the requirement is to be unconditionally applicable (U) or is conditional upon the manufacturers claimed functionality of the equipment (C).
"E/O": indicates whether the test specification forms part of the Essential Radio Test Suite (E) or whether it is one of the Other Test Suite (O).
"X": indicates there is no test specified corresponding to the requirement.
"N/A": indicates test is not applicable in this Test Report.
- (2) The equipment must be complied with as a necessary condition for presumption of conformity, although conformance with the requirement may be claimed by an equivalent test or by manufacturer's assertion supported by appropriate entries in the technical construction file.
- (3) This requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.
- (4) The equipment was supplied by Host system, so the upper extreme test voltage shall be 1.1 times the nominal voltage of the battery, and the lower extreme test voltage shall be 0.9 times the nominal voltage of the Host system.

3 Maximum Transmit Power

3.1 Test Standard and Limit

3.1.1 Test Standard

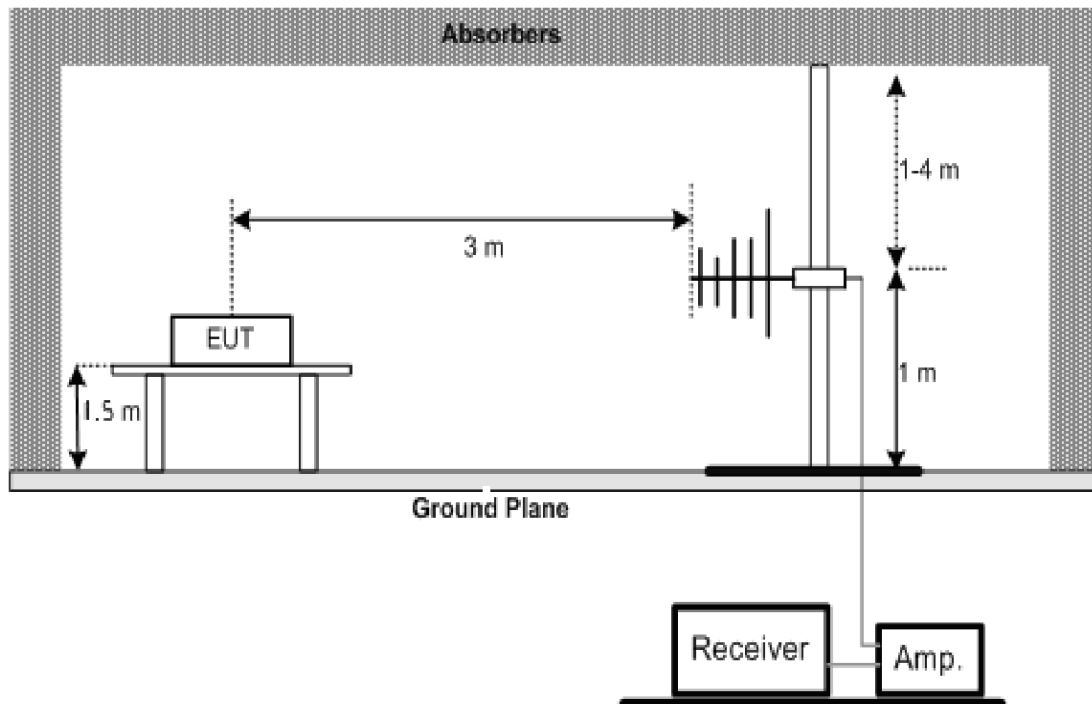
ETSI EN 300 440 V2.2.1: 2018

3.1.2 Test Limit

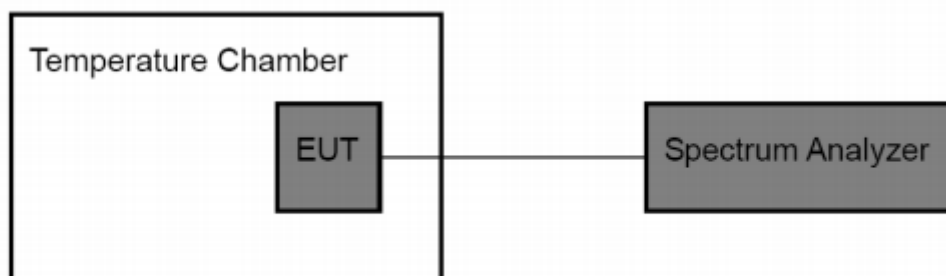
Test Item	Limit
Equivalent isotropic radiated power	20 dBm

3.2 Test Setup

Normal Condition



Extreme Condition



3.3 Test Procedure

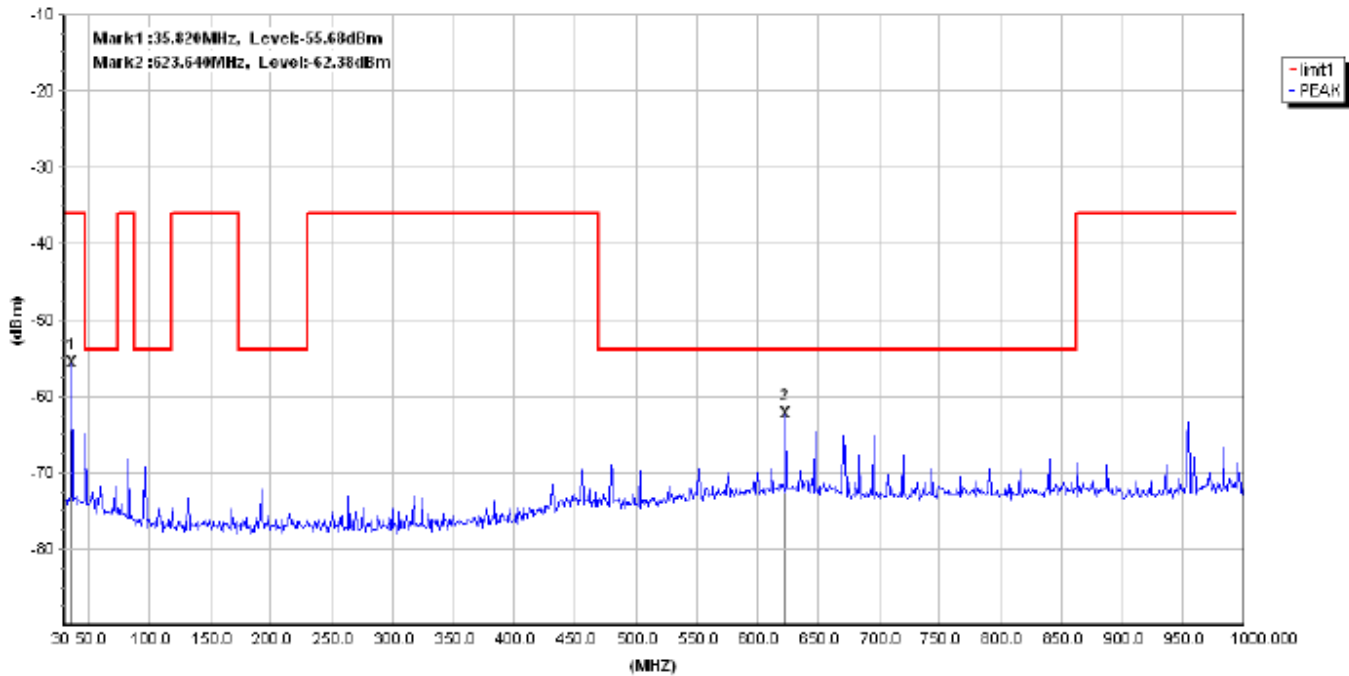
1. The EUT was placed on the top of the turntable in chamber.
2. The test shall be made in the transmitting mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. This measurement shall be repeated with the transmitter in standby mode where applicable.
4. The receiver shall be set the center frequency equal to the EUT transmit, and the Resolution Bandwidth equal to the Video Bandwidth is set to 1 MHz for the frequency bellow 1 GHz, and the frequency is above 1 GHz the Resolution Bandwidth equal to the Video Bandwidth is set to 3MHz.
5. The broadband receiving antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization. Each recorded suspected value is indicated as Read Level (Raw).
6. Replace the EUT by standard antenna and feed the RF port by signal generator.
7. The $EIRP = A + G + 10 \cdot \log(1/x)$, the A is the power measured in the above, and G is the gain of the antenna of the EUT in dBi and x is the duty cycle of the EUT in continuously transmitting mode.
8. The measurement shall be repeated at the lowest, the middle, and the highest channel of the stated frequency range. These measurements shall also be performed at the normal and the extreme test conditions.

3.4 Test Equipment Used

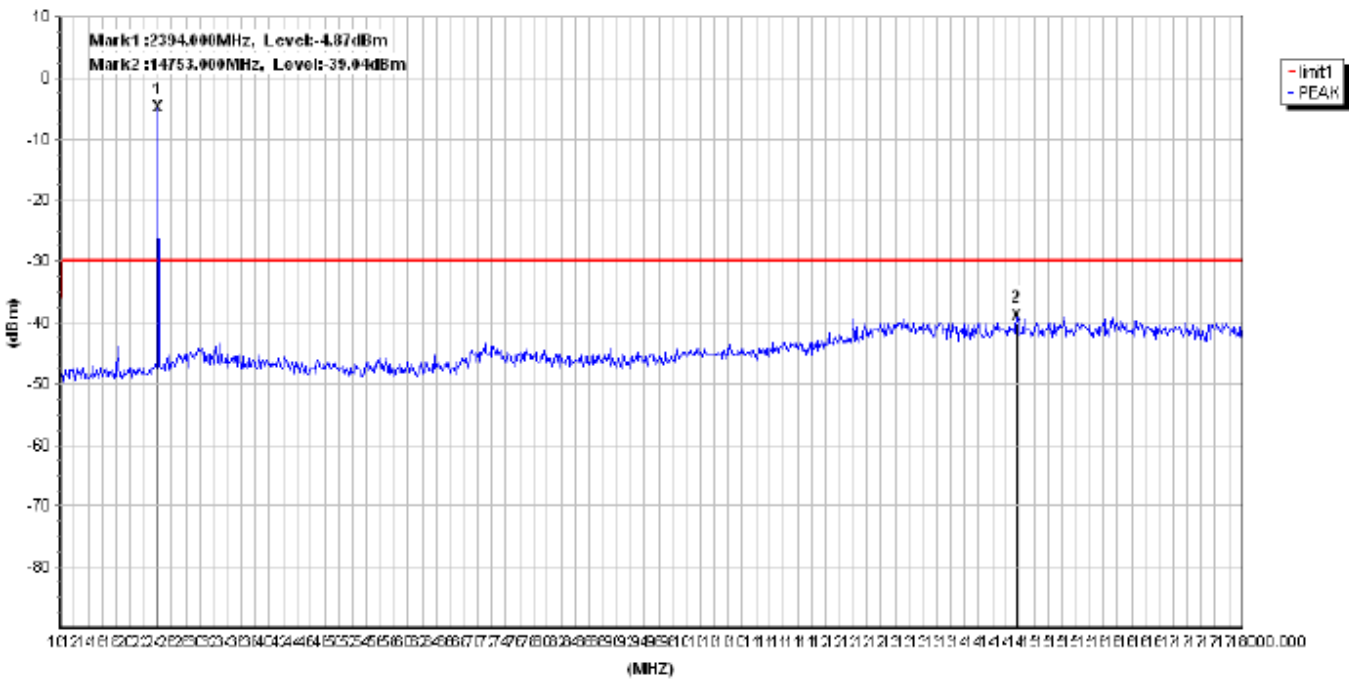
Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2019-01-05	2020-01-04
Positioning Controller	C&C	CC-C-1F	N/A	2019-01-05	2020-01-04
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2019-01-05	2020-01-04
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2019-01-05	2020-01-04
RF Switch	EM	EMSW18	SW060023	2019-01-05	2020-01-04
Amplifier	Agilent	8447F	3113A06717	2019-01-05	2020-01-04
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2019-01-05	2020-01-04
EMI Test Receiver	ROHDE& SCHWARZ	ESPI	25498514	2019-01-05	2020-01-04
EMI Test Receiver	ROHDE& SCHWARZ	ESI26	838786/103	2019-01-05	2020-01-04

3.5 Test Data

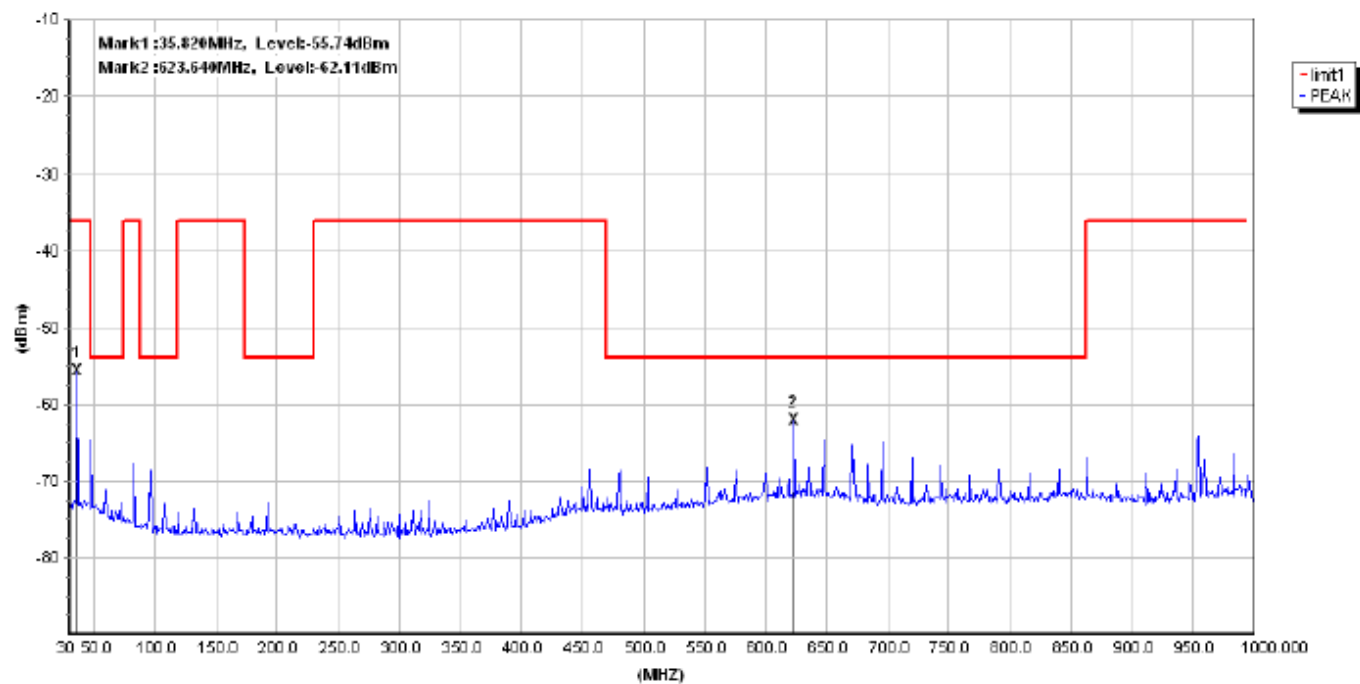
RADIATED EMISSION MEASUREMENT V
TX
(30M-1G)



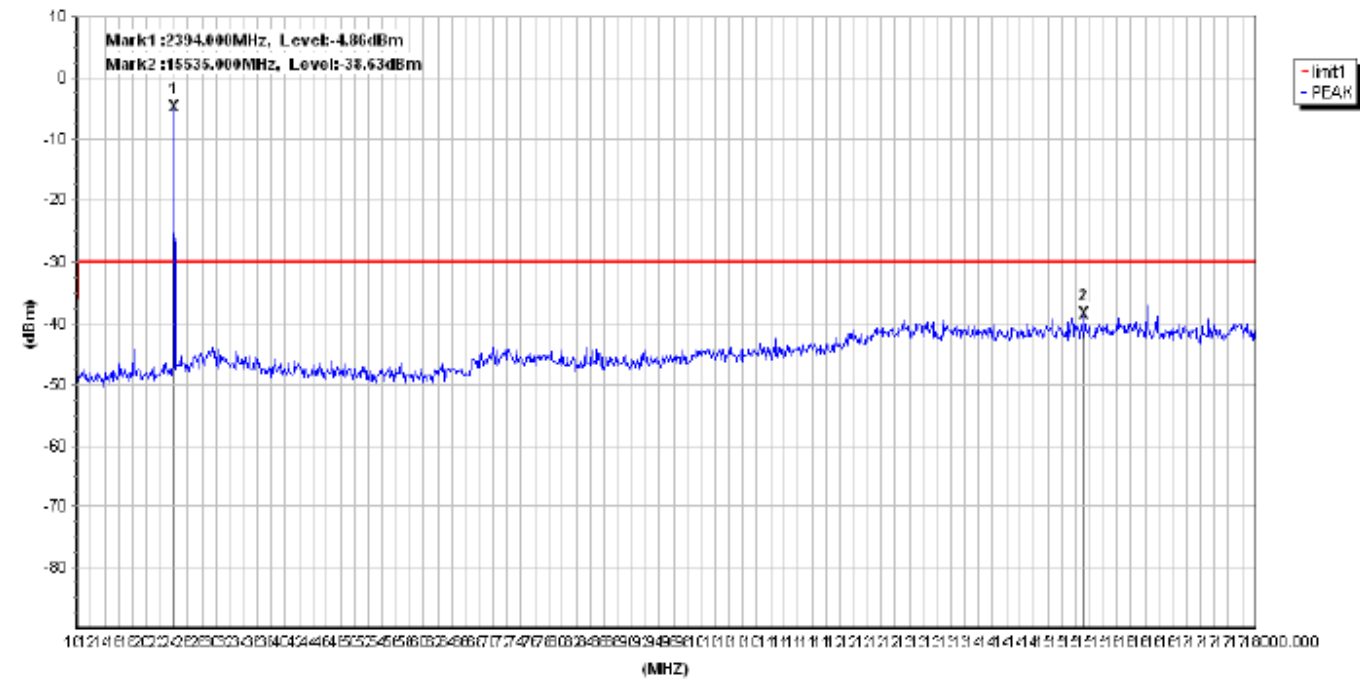
RADIATED EMISSION MEASUREMENT V
(1G-18G)



RADIATED EMISSION MEASUREMENT H
(30M-1G)



RADIATED EMISSION MEASUREMENT H
(1G-18G)



4 Duty Cycle

4.1 Test Standard and Limit

4.1.1 Test Standard

ETSI EN 300 440 V2.2.1: 2018

4.1.2 Test Limit

Test Item	Limit
Duty Cycle	2400 MHz to 2483.5 MHz No restriction in generic use

The frequency range of the equipment is determined by the lowest and highest frequencies occupied by the spectrum envelope.

fH is the highest frequency of the spectrum envelope: it is the frequency furthest above the frequency of maximum power where the e.i.r.p. spectral density drops below the level of -80 dBm/Hz (-30 dBm if measured in a 100 kHz bandwidth).

fL is the lowest frequency of the spectrum envelope; it is the frequency furthest below the frequency of maximum power where the e.i.r.p. spectral density drops below the level of -80 dBm/Hz (or -30 dBm if measured in a 100 kHz bandwidth).

For a given operating frequency, the width of the spectrum envelope is (fH - fL). In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allocated band. The frequency range is determined by the lowest value of fL and the highest value of fH resulting from the adjustment of the equipment to the lowest and highest operating frequencies.

4.2 Test Setup

These requirements do not apply for equipment with a maximum declared RF Output power of less than 10 dBm e.i.r.p or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

Note:

The Equipment e.i.r.p. power is less than 10 dBm, so no requirement for this test item.

5 Equivalent Isotropic Radiated Power

5.1 Test Standard and Limit

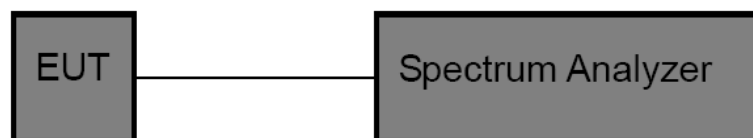
5.1.1 Test Standard

ETSI EN 300 440 V2.2.1: 2018

5.1.2 Limits

Test Item	Frequency Range (MHz)	Limit	Result
Dwell Time	2400-2483.5	0.4s	PASS
Minimum Frequency Occupation Time		Not exceeding four times of the dwell time per hop and the number of hopping frequencies in use	PASS
Hopping Sequence		At least 15 hopping frequencies at all times	PASS

5.2 Test Setup



5.3 Test Procedure

1. The transmitter output was connected to the spectrum analyzer.
2. Set Resolution Bandwidth of the spectrum analyzer to 1MHz and Video Bandwidth to 1MHz.
3. Use a video trigger with the trigger level set to enable triggering only on full pulses.
4. Sweep Time is more than once pulse time.
5. Set the center frequency on any frequency would be measured and set the frequency span to zero span.
6. Measure the maximum time duration of one single pulse.
7. Set the EUT for DH5, DH3 and DH1 packet transmitting.
8. Measure the maximum time duration of one single pulse.
9. DH5 Packet permit maximum $1600/79/6=3.37$ hops per second in each channel (5 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times $3.37 *$

31.6=106.6 with 31.6 seconds.

DH3 Packet permit maximum $1600/79/4=5.06$ hops per second in each channel (3 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times $5.06 *$

31.6=160 with 31.6 seconds.

DH1= Packet permit maximum $1600/79/2=10.12$ hops per second in each channel (1 time slot RX, 1time slot TX).So, the dwell time is

the time duration of the pulse times $10.12 * 31.6=320$ within 31.6 seconds.

10. The lowest, middle and highest frequency of the EUT should be tested.

5.4 Test Equipment Used

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2019-01-05	2020-01-04
DC power supply	GVE	PL0825	N/A	N/A	N/A
Temp.&Humid. Chamber	GIANT	IHT-550	IKW682-054	2019-01-05	2020-01-04

5.5 Test Data

(1) Dwell Time

EUT:	Wireless mouse	Model Name :	CNS-CMSW13XX	
Temperature:	23°C	Relative Humidity :	60%	
Pressure:	1010 hPa	Test Voltage :	DC 3V	
Test Mode:	Continous transmitting			
Test Results				
Data Packet	Frequency (MHz)	-6 dB Bandwidth (MHz)	Requirement (MHz)	Result
Low CH	2405	0.600	1MHz or less	Pass
Mid CH	2438	0.590	1MHz or less	Pass
Hig CH	2472	0.600	1MHz or less	Pass

6 Equivalent Isotropic Radiated Power(Duty Cycle)

6.1 Test Standard and Limit

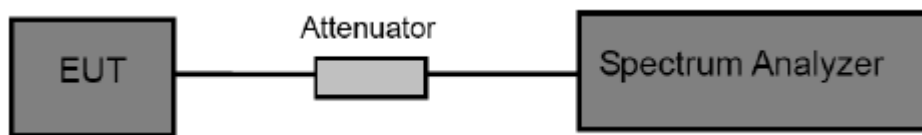
6.1.1 Test Standard

ETSI EN 300 440 V2.2.1: 2018

6.1.2 Limits

Test Item	Requirement
Duty Cycle	No Requirement

6.2 Test Setup



6.3 Test Procedure

1. The transmitter output was connected to the spectrum analyzer.
2. Set the spectrum analyzer as follows to measure the 20 dB bandwidth.
 Resolution BW : 1 MHz
 Resolution BW : 1 MHz
 Detector : Peak
 Trace Mode : Single
 Sweep time : Larger than one cycle.
 Span : >Frequency Operating Bandwidth

6.4 Test Equipment Used

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	ROHDE & SCHWARZ	FSEA20	DE25181	2019-01-05	2020-01-04
DC power supply	GVE	PL0825	N/A	N/A	N/A

6.5 Test Data

EUT:	Wireless mouse	Model Name :	CNS-CMSW13XX
Temperature:	23°C	Relative Humidity :	60%
Pressure:	1010 hPa	Test Voltage :	DC 3V
Test Mode:	Continous transmitting		
Test Results			
Data Packet	Frequency (MHz)	Duty Cycle	Result
Low CH	2405	19.40%	Pass
Mid CH	2438	19.40%	Pass
Hig CH	2472	19.40%	Pass

7 Occupied Channel Bandwidth

7.1 Test Standard and Limit

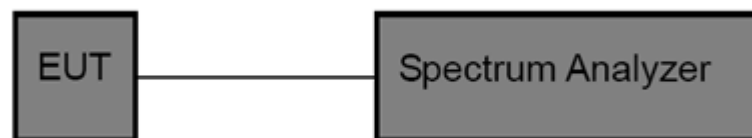
7.1.1 Test Standard

ETSI EN 300 440 V2.2.1: 2018

7.1.2 Limits

Test Item	Frequency Range (MHz)	Limit	Result
Occupied Bandwidth	2400-2483.5	Fall completely within the Operation Band	PASS
		For non-adaptive Frequency Hopping equipment with e.i.r.p greater than 10 dBm, the occupied Bandwidth shall equal to or less than the value declared by the supplier, and shall not greater than 5 MHz.	

7.2 Test Setup



7.3 Test Procedure

1. The transmitter output was connected to the spectrum analyzer.
2. Set the spectrum analyzer as follows to measure the 20 dB bandwidth.
 - Resolution BW : 30kHz.
 - Resolution BW : 100kHz.
 - Detector : Peak.
 - Trace Mode : Max Hold.
 - Sweep time : Auto.
 - Span : Wide enough to capture the channel separation.
3. Set the spectrum analyzer as follows to measure the 20 dB bandwidth.
 - Resolution BW : 30kHz.
 - Resolution BW : 100kHz.
 - Detector : Peak.
 - Trace Mode : Max Hold.
 - Sweep time : Auto.
 - Span : 3MHz

7.4 Test Equipment Used

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2019-01-05	2020-01-04
DC power supply	GVE	PL0825	N/A	N/A	N/A

7.5 Test Data

EUT:	WIRELESS MOUSE	Model Name :	CNS-CMSW13XX
Temperature:	23°C	Relative Humidity :	60%
Pressure:	1010 hPa	Test Voltage :	DC 3V
Test Mode:	2405/2438/2472MHz		
Fall completely within the Operation Band			
Frequency (MHz)	20dB Bandwidth (kHz)	99%Occupied Bandwidth (kHz)	Result
2405	858.00	847.00	Pass
2438	892.00	842.00	Pass
2472	979.00	845.00	Pass

8 Medium Utilisation (MU) factor

8.1 Test Standard and Limit

8.1.1 Test Standard

ETSI EN 300 440 V2.2.1: 2018

8.1.2 Limits

Transmitter limits for narrowband spurious emissions

Test Item Limit	Limit
Medium Utilisation Factor	Less than 10%

8.2 Test Setup

This requirement does not apply to adaptive equipment unless operating in non-adaptive mode.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

The Equipment e.i.r.p. power is less than 10 dBm, So no requirement for this test item.

9 Adaptivity (Adaptive Frequency Hopping)

9.1 Test Standard and Limit

9.1.1 Test Standard

ETSI EN 300 440 V2.2.1: 2018

9.1.2 Test Description

Adaptive Frequency Hopping equipment is allowed to operate in a non-adaptive mode providing it complies with the requirements applicable to non-adaptive frequency hopping equipment.

Adaptive Frequency Hopping equipment is allowed to have Short Control Signaling Transmissions (e.g. ACK/NACK signals, etc.) without sensing the frequency for the presence of other signals. Please see clause 4.3.1.6.3 Short Control Signaling Transmissions

Adaptive Frequency Hopping (AFH) equipment uses a Detect And Avoid (DAA) mechanism which allows an equipment to adapt to its environment by identifying frequencies, that are being used by other equipment.

Adaptive frequency Hopping systems shall implement either of the DAA mechanisms provided in clauses 4.3.1.6.1 Adaptive Frequency Hopping Using LBT based DAA or 4.3.1.6.2 Adaptive Frequency Hopping Using other forms of DAA (non-LBT based)

9.2 Test Setup

This requirement does not apply to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode providing the equipment complies with the requirements and /or restrictions applicable to non-adaptive equipment.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

Note:

The Equipment e.i.r.p. power is less than 10 dBm, so no requirement for this test item.

10 Transmitter Unwanted Emissions in the out-of-band domain

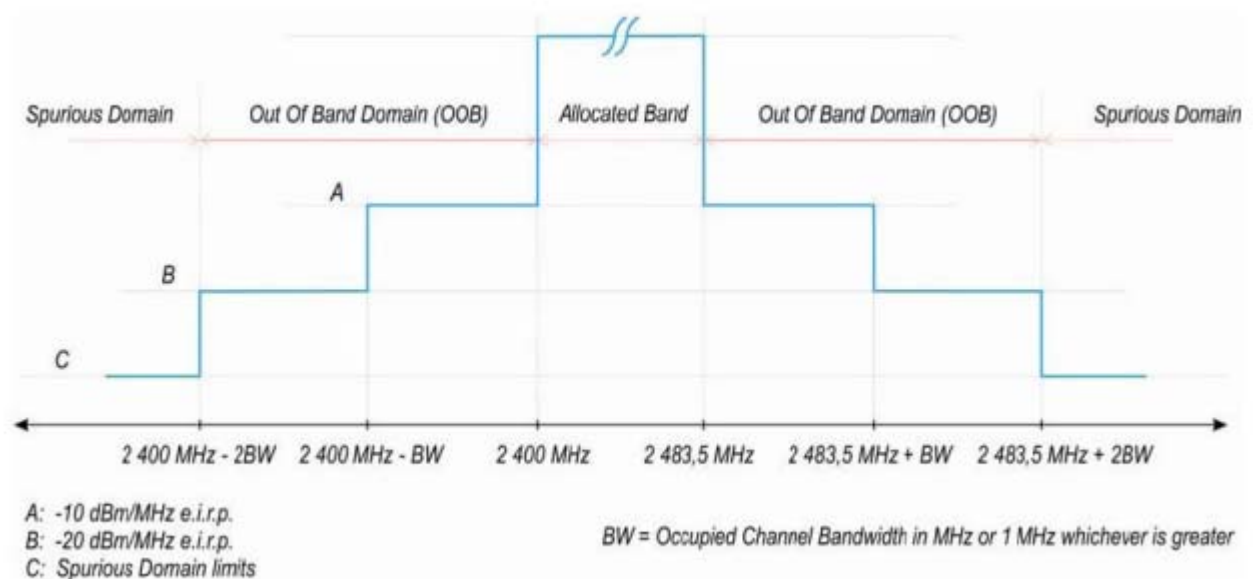
10.1 Test Standard and Limit

10.1.1 Test Standard

ETSI EN 300 440 V2.2.1: 2018

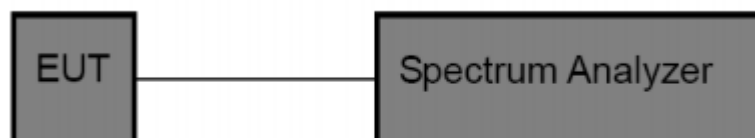
10.1.2 Limits

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 1 of clause 4.3.1.8.2



Adaptive Frequency Hopping equipment is allowed to operate in a non-adaptive mode

10.2 Test Setup



10.3 Test Procedure

(1) The transmitter output was connected to the spectrum analyzer.

Set the spectrum analyzer as following:

Centre Frequency: 2472 MHz.

Span: 0 Hz

Resolution BW : 1 MHz

Filter mode: Channel filter

Video BW : 3 MHz

Detector Mode: RMS

Trace Mode : Clear / Write

Sweep Mode: Continuous

Sweep Points : 5000

Trigger Mode: Video trigger

Sweep Time: Suitable to capture one transmission burst

Step 2 (2483.5 MHz to 2483.5 MHz +BW):

(1) Adjust trigger level to select the transmissions with the highest power level.

(2) The highest power level shall be selected.

(3) Set a window to match with the start and end of the burst and in which the RMS Power shall be measured using the Time Domain Power Function.

(4) RMS Power within this 1 MHz segment (2483.5 MHz to 2484.5 MHz). Compare this value

the applicable limit provided by the mask.

(5) Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1

MHz segment within the range 2483.5 MHz to 2483.5 MHz+BW. The centre frequency of the last 1 MHz segment within the range 2483.5 MHz to 2483.5 MHz +BW. The centre frequency of the last 1 MHz segment shall be set to 2483.5 MHz+BW-0.5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3 (2483.5 MHz +BW to 2483.5 MHz +2BW):

(1) Change the centre frequency of the analyzer to 2484MHz + BW and perform the measurement for the first 1MHz segment within range 2483.5MHz +BW to 2483.5 MHz +2BW. Increase the centre frequency in 1MHz

steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2483.5 MHz+ 2BW-0.5 MHz.

Step 4 (2400 MHz-BW to 2400 MHz):

(1) Change the centre frequency of the analyzer to 2399.5MHz and perform the measurement

for the first 1MHz segment within range 2400 MHz -BW to 2400 MHz Reduce the centre frequency in 1MHz steps and repeat the measurement to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2400 MHz -BW+ 0.5 MHz.

Step 5 (2400 MHz-BW to 2400 MHz):

(1) Change the centre frequency of the analyzer to 2399.5MHz-BW and perform the measurement for the first 1MHz segment within range 2400 MHz -2BW to 2400 MHz

CBW.

Reduce the centre frequency in 1MHz steps and repeat the measurement to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2400 MHz -2BW+ 0.5 MHz.

10.4 Test Equipment Used

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE & SCHWARZ	FSP30	DE25181	2019-01-05	2020-01-04
DC Power	GVE	PL0825	N/A	N/A	N/A

10.5 Test Date

EUT:	Wireless mouse	Model Name :	CNS-CMSW13X X	
Temperature:	23°C	Relative Humidity :	60%	
Pressure:	1010 hPa	Test Voltage :	DC 3V	
Test Mode: Normal Hopping Mode (MSK)				
Frequency Band		Maximum Level	Limit	Result
(2483.5MHz,2483.5MHz+BW)		-46.58	-10dBm/MHz	Pass
(2483.5MHz+BW,2483.5MHz+BW)		-49.26	-20dBm/MHz	Pass
(2400MHz-BW,2400MHz)		-45.89	-10dBm/MHz	Pass
(2400MHz-2BW,2400MHz-BW)		-48.53	-20dBm/MHz	Pass

11 TRANSMITTER UNWANTED SPURIOUS EMISSIONS IN THE SPURIOUS DOMAIN

11.1 Test Standard and Limit

11.1.1 Test Standard

ETSI EN 300 440 V2.2.1: 2018

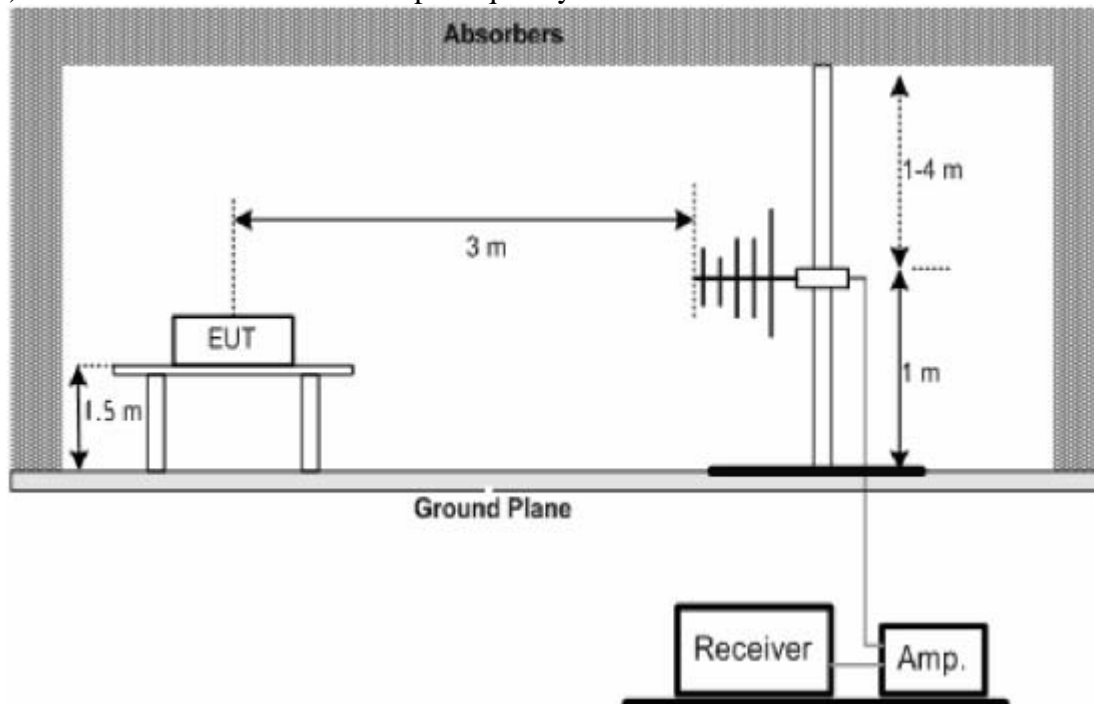
11.1.2 Limits

Transmitter limits for spurious emissions

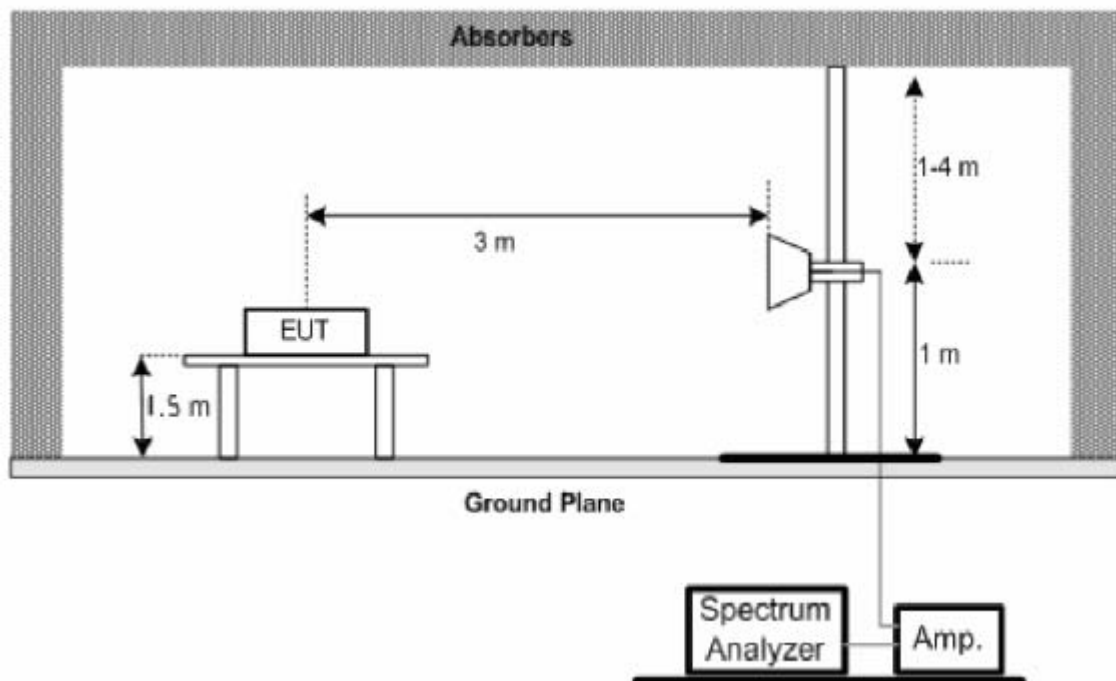
Frequency Range	Maximum Power, e.r.p.(≤ 1 GHz) e.i.r.p.(> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87.5 MHz	-36 dBm	100 kHz
87.5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
Above 1 GHz to 12.75 GHz	-30 dBm	1 MHz

11.2 Test Setup

(A) Radiated Emission Test Set-Up Frequency Bellow 1 GHz.



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz.



11.3 Test Procedure

1. The EUT was placed on the top of the turntable in chamber.
2. The test shall be made in the transmitting mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. Set the spectrum analyzer as follows to measure the emissions (Below 1 GHz):
 - Resolution BW : 100 kHz.
 - Resolution BW : 300 kHz.
 - Detector : RMS.
 - Trace Mode : Max Hold.
 - Sweep time : 1s.
 - Span : 100M.
 - Amplitude : Adjust for middle of the instrument's range.
4. Set the spectrum analyzer as follows to measure the emissions (Above 1 GHz):
 - Resolution BW : 1 MHz.
 - Resolution BW : 3 MHz.
 - Detector : RMS.
 - Trace Mode : Max Hold.
 - Sweep time : 1s.
 - Span : 100M.
 - Amplitude : Adjust for middle of the instrument's range.
5. For 30~1000MHz spurious emissions antenna was placed 3 meters far away from the turntable. .
6. The broadband receiving antenna was fixed on each suspected emissions of both horizontal suspected value is indicated as Read Level (Raw).
7. Replace the EUT by standard antenna and feed the RF port by signal generator.
8. Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
9. Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
10. The level of the spurious emission is the power level of (g) plus the gain of the standard antenna in dBi and minus the loss of the cable used between the signal generator and the standard antenna.
11. If the measuring emissions that exceed the level of 6 dB below the applicable limit, the resolution bandwidth shall be switched to 30 kHz and the span shall be adjusted accordingly. If the level does not change by more than 2 dB, it is a narrowband emission; the observed value shall be recorded. If the level changes by more than 2 dB, the emission is a wideband emission and its level shall be measured and recorded.
12. The measurement shall be repeated at the lowest and the highest channel of the stated frequency range.

11.4 Test Equipment Used

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2019-01-05	2020-01-04
Spectrum Analyzer	Agilent	E4407B	MY49510055	2019-01-05	2020-01-04
EMI Receiver	ROHDE& SCHWARZ	ESCI	101165	2019-01-05	2020-01-04
Bilog Antenna	SCHWARZBECK	VULB9168	9120-426	2019-01-05	2020-01-04
Horn Antenna	SCHWARZBECK	BBHA9120D	SW060023	2019-01-05	2020-01-04
Horn Antenna	SCHWARZBECK	BBHA9120	BBHA9170D	2019-01-05	2020-01-04
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2019-01-05	2020-01-04
Pre-amplifier	SCHWARZBECK	BBV9743	9743-019	2019-01-05	2020-01-04
Pre-amplifier	Quietek	AP-180C	CHM-060212	2019-01-05	2020-01-04
Signal Generator	ROHDE& SCHWARZ	SML03	T0054	2019-01-05	2020-01-04
Temp. & Humid. Chamber	GIANT	IHT-550	IKW682-054	2019-01-05	2020-01-04

11.5 Test Date

(1) Bellow 1 G

EUT:	Wireless mouse	Model Name :	CNS-CMSW13XX
Temperature:	23 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Voltage :	DC 3V
Test Mode :	TX 2405MHz		

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	Note
52.8000	V	TX	-61.52	-36.00	27.12	
135.5000	V	TX	-59.75	-36.00	25.33	
389.6000	V	TX	-62.23	-36.00	18.42	
465.7000	V	TX	-61.27	-36.00	27.08	
652.5000	V	TX	-61.35	-36.00	26.76	
828.1000	V	TX	-58.55	-36.00	24.12	

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	Note
52.6000	H	TX	-61.32	-36.00	26.42	
129.2000	H	TX	-60.47	-36.00	25.45	
382.6000	H	TX	-62.32	-36.00	26.23	
639.3000	H	TX	-62.36	-36.00	26.31	
812.5000	H	TX	-61.25	-36.00	25.52	
875.1000	H	TX	-59.35	-36.00	23.26	

(2) Above 1 G

EUT:	Wireless mouse	Model Name :	CNS-CMSW13XX
Temperature:	23 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Voltage :	DC 3V
Test Mode :	TX 2405MHz		

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	Note
4804.8000	V	TX	-42.25	-30.00	12.26	
---	V	TX	---	---	---	
---	V	TX	---	---	---	
---	V	TX	---	---	---	
---	V	TX	---	---	---	
---	V	TX	---	---	---	

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	Note
4804.8000	H	TX	-48.63	-30.00	18.35	
---	H	TX	---	---	---	
---	H	TX	---	---	---	
---	H	TX	---	---	---	
---	H	TX	---	---	---	
---	H	TX	---	---	---	

EUT:	Wireless mouse	Model Name :	CNS-CMSW13XX
Temperature:	23 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Voltage :	DC 3V
Test Mode :	TX 2472MHz		

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	Note
4944.8000	V	TX	-43.23	-30.00	13.19	
---	V	TX	---	---	---	
---	V	TX	---	---	---	
---	V	TX	---	---	---	
---	V	TX	---	---	---	
---	V	TX	---	---	---	

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	
4944.8000	H	TX	-47.35	-30.00	15.63	
---	H	TX	---	---	---	
---	H	TX	---	---	---	
---	H	TX	---	---	---	
---	H	TX	---	---	---	
---	H	TX	---	---	---	

12 Receiver Spurious Emissions

12.1 Test Standard and Limit

12.1.1 Test Standard

ETSI EN 300 440 V2.2.1: 2018

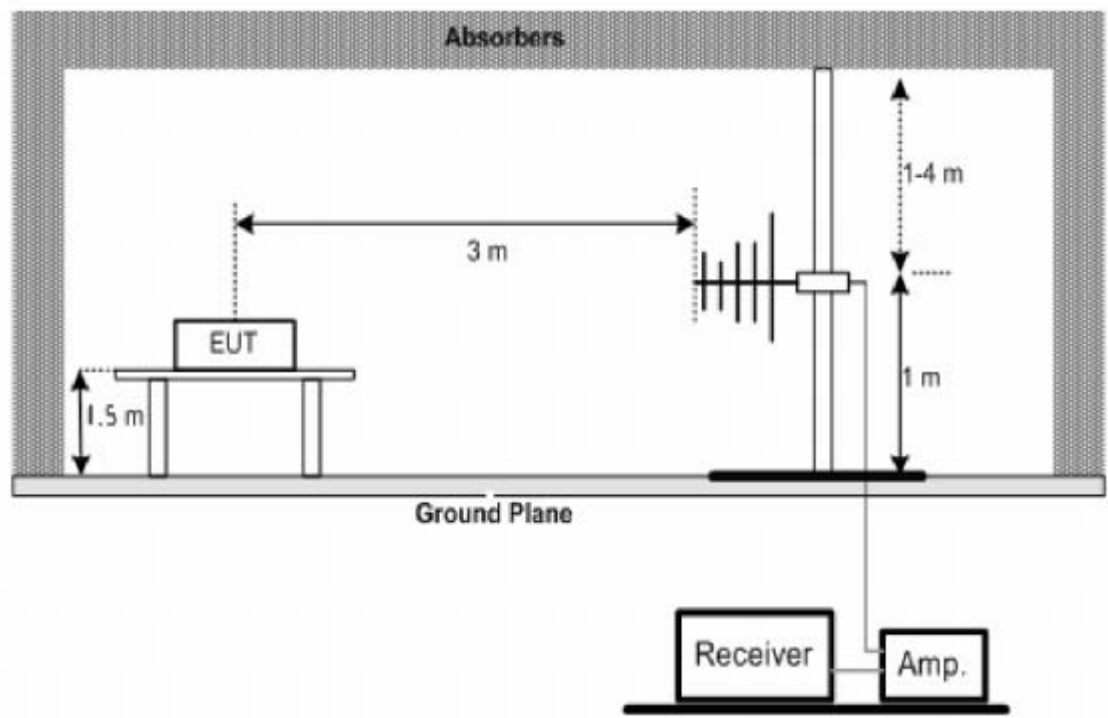
12.1.2 Limits

Spurious emission limits for receivers

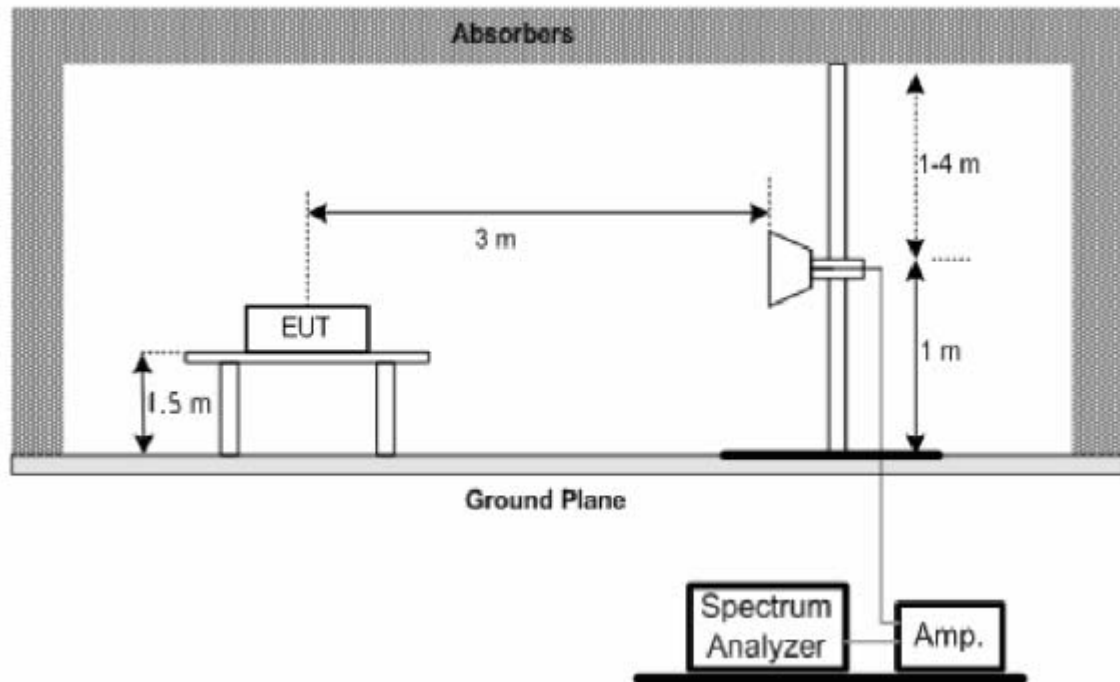
Frequency Range	Maximum Power, e.r.p.(≤ 1 GHz) e.i.r.p.(> 1 GHz)	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

12.2 Test Setup

(A) Radiated Emission Test Set-Up Frequency Bellow 1 GHz.



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz.



12.3 Test Procedure

1. The EUT was placed on the top of the turntable in chamber.
2. The test shall be made in the transmitting mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. Set the spectrum analyzer as follows to measure the emissions:
 - Resolution BW : 100 kHz.
 - Resolution BW :300 kHz.
 - Detector : RMS.
 - Trace Mode : Max Hold.
 - Sweep time : 1s.
 - Span :100M.
 - Amplitude :Adjust for middle of the instrument's range.
4. Set the spectrum analyzer as follows to measure the emissions:
 - Resolution BW : 1 MHz.
 - Resolution BW :3 MHz.
 - Detector : RMS.
 - Trace Mode : Max Hold.
 - Sweep time : 1s.
 - Span :100M.
 - Amplitude :Adjust for middle of the instrument's range.
5. For 30~1000MHz spurious emissions measurement, the broad band bi-log receiving antenna was placed 3 meters far away from the turntable. .
6. The broadband receiving antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization. Each recorded

suspected value is indicated as Read Level (Raw).

7. Replace the EUT by standard antenna and feed the RF port by signal generator.
8. Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
9. Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
10. The level of the spurious emission is the power level of (g) plus the gain of the standard antenna in dBi and minus the loss of the cable used between the signal generator and the standard antenna.
11. If the measuring emissions that exceed the level of 6 dB below the applicable limit, the resolution bandwidth shall be switched to 30 kHz and the span shall be adjusted accordingly. If the level does not change by more than 2 dB, it is a narrowband emission; the observed value shall be recorded. If the level changes by more than 2 dB, the emission is a wideband emission and its level shall be measured and recorded.
12. The measurement shall be repeated at the lowest and the highest channel of the stated frequency range.

12.4 Test Equipment Used

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Date
Spectrum Analyzer	ROHDE& SCHWARZ	FSEA20	DE25181	2019-01-05	2020-01-04
Spectrum Analyzer	Agilent	E4407B	MY49510055	2019-01-05	2020-01-04
EMI Test Receiver	ROHDE& SCHWARZ	ESCI	101165	2019-01-05	2020-01-04
Bilog Antenna	SCHWARZBECK	VULB9168	9168-438	2019-01-05	2020-01-04
Horn Antenna	SCHWARZBECK	BBHA9120 D	BBHA9120D	2019-01-05	2020-01-04
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170D	2019-01-05	2020-01-04
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2019-01-05	2020-01-04
Pre-amplifier	SCHWARZBECK	BBV9743	9743-019	2019-01-05	2020-01-04
Pre-amplifier	Quietek	AP-180C	CHM-060201 2	2019-01-05	2020-01-04
Signal Generator	ROHDE&SCHWARZ	SML03	T0054	2019-01-05	2020-01-04
Temp&Humid Chamber	GIANT	IHT-550	IKW682-054	2019-01-05	2020-01-04

12.5 Test Date

(2) Bellow 1 G

EUT:	Wireless mouse	Model Name :	CNS-CMSW13XX
Temperature:	23 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Voltage :	DC 3V
Test Mode :	RX 2405MHz		

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	
52.7000	V	RX	-61.42	-57.00	6.58	
136.5000	V	RX	-62.23	-57.00	5.77	
351.6000	V	RX	-60.24	-57.00	7.75	
436.7000	V	RX	-64.62	-57.00	8.73	
645.8000	V	RX	-65.76	-57.00	8.89	
729.3000	V	RX	-63.45	-57.00	7.45	

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	
55.8000	H	RX	-62.12	-57.00	7.12	
152.2000	H	RX	-61.45	-57.00	7.25	
372.6000	H	RX	-63.32	-57.00	8.65	
452.5000	H	RX	-64.65	-57.00	9.78	
642.3000	H	RX	-63.59	-57.00	8.62	
763.8000	H	RX	-63.78	-57.00	5.97	

(2) Above 1 G

EUT:	Wireless mouse	Model Name :	CNS-CMSW13XX
Temperature:	23 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Voltage :	DC 3V
Test Mode :	RX 2405MHz		

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	Note
1608.2000	V	RX	-55.75	-47.00	15.63	
5580.6000	V	RX	-56.72	-47.00	18.25	
---	V	RX	---		---	
---	V	RX	---		---	
---	V	RX	---		---	
---	V	RX	---		---	

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	Note
1608.2000	H	RX	-58.95	-47.00	18.83	
5580.6000	H	RX	-62.33	-47.00	23.12	
---	H	RX	---		---	
---	H	RX	---		---	
---	H	RX	---		---	
---	H	RX	---		---	

EUT:	Wireless mouse	Model Name :	CNS-CMSW13XX
Temperature:	23 °C	Relative Humidity:	60%
Pressure:	1010 hPa	Test Voltage :	DC 3V
Test Mode :	RX 2472 MHz		

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	Note
1760.2000	V	RX	-53.25	-47.00	17.08	
---	V	RX	---	-36.00	---	
---	V	RX	---	-36.00	---	
---	V	RX	---	-36.00	---	
---	V	RX	---	-36.00	---	

Frequency (MHz)	Ant H / V	TX/RX	Measured (dBm)	Limits (dBm)	Margins	Note
1608.2000	H	RX	-55.63	-47.00	17.23	
---	H	RX	---	-36.00	---	
---	H	RX	---	-36.00	---	
---	H	RX	---	-36.00	---	
---	H	RX	---	-36.00	---	

13 Receiver Blocking

13.1 Test Standard and Limit

13.1.1 Test Standard

ETSI EN 300 440 V2.2.1: 2018

13.1.2 Test Description

Receiver blocking is a measure of the capability of the adaptivity mechanism to operate as intended (see clause 4.3.1.6) in the presence of an unwanted signal (blocking signal) on frequencies other than those of the operating channel and the adjacent channels.

Adaptive Frequency Hopping equipment is allowed to have Short Control Signaling Transmissions (e.g. ACK/NACK signals, etc.) without sensing the frequency for the presence of other signals. Please see clause 4.3.1.6.3 Short Control Signaling Transmissions

13.1.3 Test Limits

Adaptive Frequency Hopping equipment shall comply with the requirements defined in clauses 4.3.1.6.1 (LBT based DAA) or 4.3.1.6.2 (non-LBT based AA) in the presence of a blocking signal with characteristics as provided in bellow:

d)

13.2 Test Setup

This requirement does not apply to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode providing the equipment complies with the requirements and /or restrictions applicable to non-adaptive equipment.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

Note:

The Equipment e.i.r.p. power is less than 10 dBm, so no requirement for this test item.

14 Photographs - Constructional Details

Photo1 Appearance of EUT



Photo2 Appearance of EUT



Photo 3 PCB of EUT

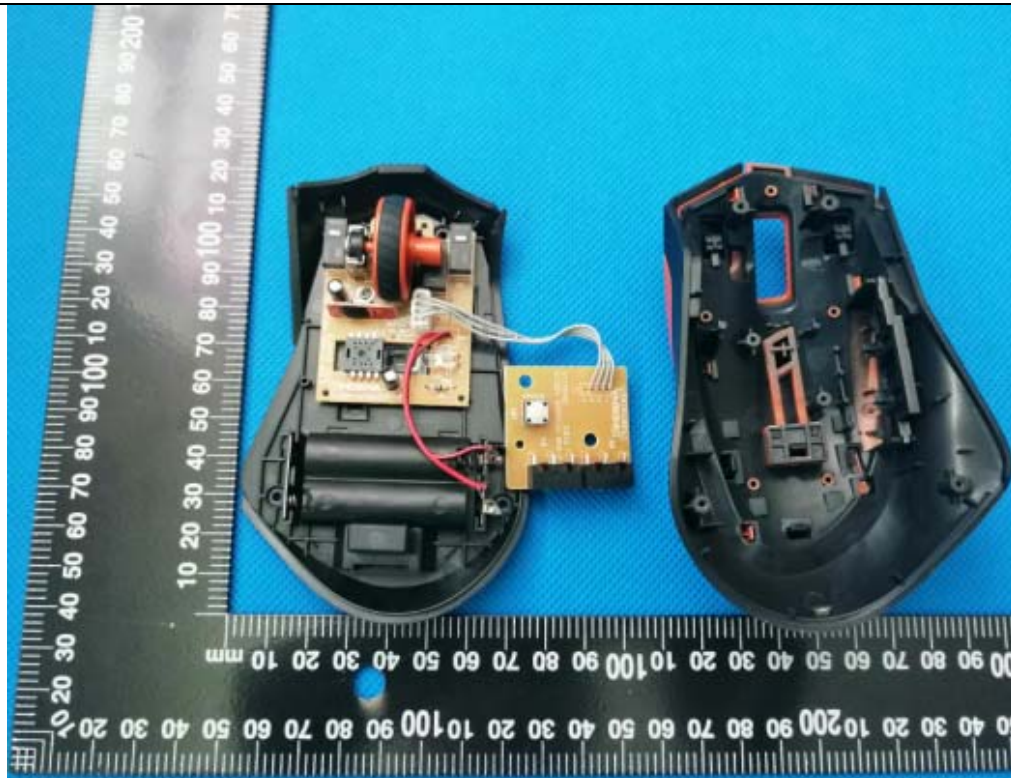


Photo 4 PCB of EUT



END OF REPORT