



CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

CERTIFICATE

CERTIFICATE NO.: 14-17101

Product: Wireless Mouse
Model: MS-295OR
Applicant: SHENZHEN TIANJIE ELECTRONIC CO. , LTD
Address: Address: Bld 18,3rd industry area,Xitian town, Gongming street,
Guangming new district, Shenzhen, Guangdong,China.

This is to certify that, on the basis of the tests undertaken as per Report No.:
SET2014-14148 , SET2014-14172 , SET2014-14204

the submitted sample of the above item complies with:

ETSI EN 300 440-1 V1.6.1 (2010-08) ETSI EN 300 440-2 V1.4.1 (2010-08)
ETSI EN 301 489-1 V1.9.2(2011-09) ETSI EN 301 489-3 V1.6.1(2013-08)
EN 60950-1:2006+A11:2009+A1:2010+A12:2011

and fulfils testing requirement of the R&TTE Directive 1995/5/EC.



Signed for and on behalf of
CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Wu Li An

Wu Li An, Vice Director



Date of Issue: Dec .18 . 2014

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

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Report No. : SET2014-14148

检测
CNAS L1659

RF TEST REPORT

Report No.: SET2014-14148
Product: Wireless Mouse
Model No.: MS-295OR
Applicant: SHENZHEN TIANJIE ELECTRONIC CO. , LTD
Address: Address: Bld 18,3rd industry area,Xitian town,Gongming street,
Guangming new district, Shenzhen,Guangdong,China.
Issued by: CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.
Lab Location: Electronic Testing Building, Shahe Road, Xili, Nanshan District,
Shenzhen, 518055, P. R. China
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查询码: U6Y7DYRX



Test Report

Product.....: Wireless Mouse

Model No.: MS-295OR

Brand Name.....: N/A

Trade Name.....: N/A

Applicant.....: SHENZHEN TIANJIE ELECTRONIC CO. , LTD


Applicant Address.....: Address: Bld 18,3rd industry area,Xitian town,Gongming street,
Guangming new district, Shenzhen, Guangdong, China.

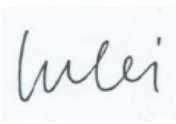
Manufacturer.....: SHENZHEN TIANJIE ELECTRONIC CO. , LTD

Manufacturer Address....: Address: Bld 18,3rd industry area,Xitian town,Gongming street,
Guangming new district, Shenzhen, Guangdong, China.

Test Standards.....: ETSI EN 300 440-1 V1.6.1 (2010-08) Electromagnetic
compatibility and Radio spectrum Matters (ERM);Short range
devices; Radio equipment to be usedin the 1 GHz to 40 GHz
frequency range; Part 1: Technical characteristics andtest
methods.
ETSI EN 300 440-2 V1.4.1 (2010-08) Electromagnetic
compatibility and Radio spectrum Matters (ERM);Short range
devices; Radio equipment to be usedin the 1 GHz to 40 GHz
frequency range; Part 2: Harmonized EN covering the essential
requirements of article 3.2 of the R&TTE Directive

Test Result.....: Pass

Tested by.....: 
2014.12.17
Haigang He, Test Engineer

Reviewed by.....: 
2014.12.17
Lu Lei, Senior Engineer


Approved by.....: 
2014.12.17
Wu Li'an, Manager



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Change History		
Issue	Date	Reason for change
1.0	2014.12.17	First edition

1. General Information

1.1. Description of EUT

EUT Type: Wireless Mouse
Hardware Version: N/A
Software Version: N/A
Modulation technology.....: GFSK
Modulation Type: Please see section 1.3
Frequency Range.....: 2.4GHz – 2483.5GHz
Frequency Separation.....: Refer to Table 1
Channel bandwidth.....: 1MHz
Bit Rate of Transmission.....: 1MHz
Antenna Type.....: PCB Antenna
Antenna Gain.....: -1dBi

Note 1: The EUT is a 2.4GHz wireless mouse. It contains Module operating at 2.4GHz ISM band. And the lowest (1 channel), middle (9 channel) and the highest channel (16 channel) was tested in this report.

Note 2: Please refer to ANNEX A for the photographs of the EUT. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacture.

1.2. Classification of SRD equipment

The product family of Short Range Devices is divided into three classes of equipment, each having its own set of minimum performance criteria. This classification is based upon the impact on persons and/or goods in case the equipment does not operate above the specified minimum performance level under EMC stress. The classification of SRD equipment as follow:

Class of SRD equipment	Risk assessment of receiver performance
1	Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person)
2	Medium reliable SRD communication media; e.g. causing inconvenience to persons, which cannot simply be overcome by other means
3	Standard reliable SRD communication media; e.g. inconvenience to persons, which can simply be overcome by other means (e.g. manual)

Note: The EUT belongs to Class 3 SRD equipment, the receiver categories belongs to 3.

1.3. Types of SRD equipment

For the purpose of the present document Short Range Devices are divided into three types of equipment, based on the technical nature of the primary function. The types of SRD equipment as follow:

Equipment Type	Technical nature of the primary function
I	Transfer of messages (digital or analogue signals)
II	Transfer of audio (speech or music)
III	Others

Note: The EUT belongs to type I SRD equipment.

1.4. Test list

ETSI EN 300 440-1 V1.6.1 (2010-08)			
Clause	Test Items	Channel	Result
7.1	Maximum transmit power	1/9/16	Pass
7.2	Frequency Range	1/9/16	Pass
7.3	Transmitter spurious emissions	1/9/16	Pass
7.4	Duty cycle	1/9/16	N/A
8.1	Adjacent channel selectivity	1/9/16	N/A
8.2	Blocking or desensitization	1/9/16	N/A
8.3	Receiver Spurious emissions	1/9/16	Pass

1.5. List of Equipments Used

Description	Manufacturer	Model No.	Serial No.	Cal.Due Date
Broadband Antenna	R&S	HL562	A0304224	2015.06.10
EMI Horn Antenna	R&S	HF906	A0304225	2015.06.10
EMI TEST RECEIVER	R&S	ESI 26	A0304228	2015.06.10
Loop Antenna	R&S	HFH2-Z2	A0304231	2015.06.10
Horn Antenna	R&S	9120D	A0304229	2015.06.10
Signal Generator	R&S	SMT03	A0304252	2015.06.10
Vector signal genertor	R&S	SMU200A	A0304235	2015.06.10
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2015.06.10
Constant Temperature humidity chamber	Dongguan gaoda instrument CO.LTD.	GD-7005-100	A130301254	2015.06.10
Anechoic Chamber	Albatross Projects GmbH	(n.a)	(n.a)	2015.06.10

NOTE 1: Equipments listed above have been calibrated and are in the period of validation.

1.6. Table for Carrier Frequency

The EUT has been tested under Operating and standby condition. The Test Sample work and stay in continuous transmitting mode through its serial ports. Test frequency 2407MHz(1channel), , 2440MHz(9channel), 2477MHz(16channel) are chosen for tested.

Table 1

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2407MHz	9	2440MHz
2	2408MHz	10	2441MHz
3	2410MHz	11	2442MHz
4	2414MHz	12	2449MHz
5	2421MHz	13	2455MHz
6	2428MHz	14	2467MHz
7	2435MHz	15	2468MHz
8	2437MHz	16	2477MHz

1.7. Environmental Conditions

Ambient temperature: 15~35 ℃

Relative humidity: 30~60%

Atmosphere pressure: 86-106kPa

1.8. Measurement Uncertainty

Parameters	Uncertainty
Radio frequency	150Hz
RF power (conducted)	0.75 dB
Radiated emission of transmitter, valid to 26,5 GHz	2.5 dB
Radiated emission of transmitter, valid between 26,5 GHz and 40 GHz	3.0 dB
Radiated emission of receiver, valid to 26,5 GHz	2.5 dB
Radiated emission of receiver, valid between 26,5 GHz and 40 GHz	3.0 dB
Temperature	0.5 °C
Humidity	2.0 %
Voltage (DC)	0.5 %
Voltage (AC, < 10 kHz)	1 %

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in according with TR 100 028-1[2] and shall correspond to an expansion to expansion factor (coverage factor) $k=1.96$ or $k=2$ (which provide confidence levels of respectively 95% and 95.45% in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

1.9. Test Facility

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8*6.8*6.4(m) fully anechoic chamber was used for the radiated spurious emissions test.

2. Transmitter Parameters

2.1. Maximum transmit power

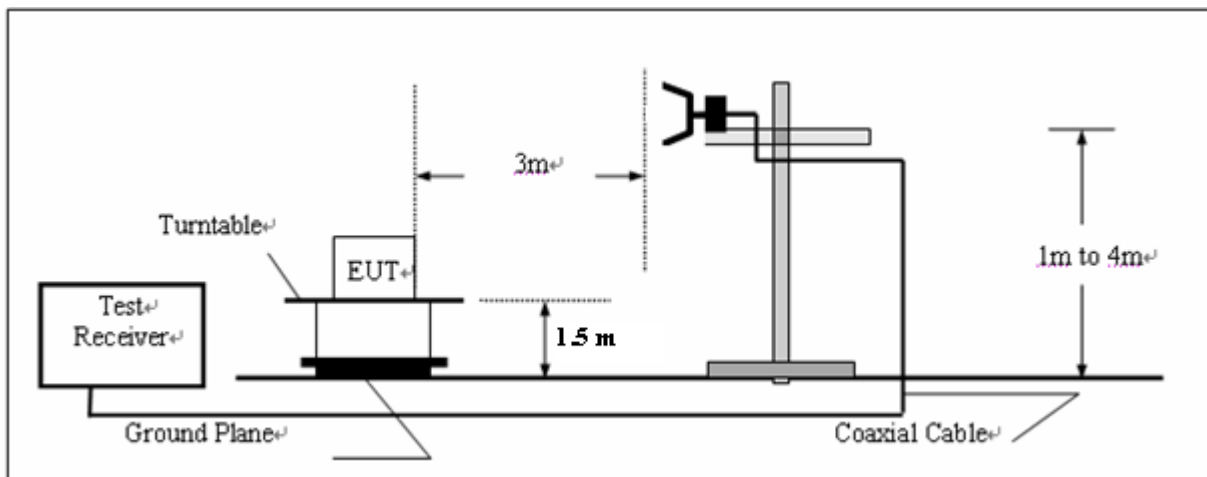
The e.i.r.p. is defined as the maximum radiated power of the transmitter and its antenna, and is measured and calculated according to the procedure given in the following clause. See clause 5 for the test conditions.

2.1.1. Limits:

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

Frequency Bands	Power	Application
2400MHz to 2483.5MHz	10 mW e.i.r.p./10dBm	Generic use

2.1.2. Test Configuration



2.1.3. Test Procedure

1. Please refer to ETSI EN 300 440 Sub-clause 5.3 for the test conditions.
2. Please refer to ETSI EN 300 440 Sub-clause 7.1.2 for the measurement method.

2.1.4. Test Results

Channel	Frequency (MHz)	Maximum Reading (dBm)	Antenna Polarity	Limit (dBm)	Result
Low	2407.00	-24.44	Horizontal	10	Pass
	2407.00	-26.52	Vertical		Pass
Middle	2440.00	-23.69	Horizontal	10	Pass
	2440.00	-26.38	Vertical		Pass
High	2477.00	-22.78	Horizontal	10	Pass
	2477.00	-24.56	Vertical		Pass

Conclusion: Pass

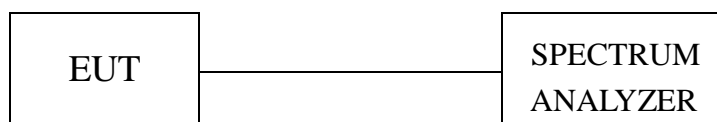
2.2. Frequency Range

The permitted range of operating frequencies includes all frequencies on which the equipment may operate within an assigned frequency band.

2.2.1. Limits

The width of the power spectrum envelope is $f_H - f_L$ for a given operating frequency. In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allowed band. The frequency range is determined by the lowest value of f_L and the highest value of f_H resulting from the adjustment of the equipment to the lowest and highest operating frequencies. The occupied bandwidth (i.e. the bandwidth in which 99 % of the wanted emission is contained) and the necessary bandwidth of the transmitter shall fall within the assigned frequency band. For all equipment the frequency range shall lie within the frequency band given by clause 7.1.3, table 4. For non-harmonized frequency bands the available frequency range may differ between national administrations.

2.2.2. Test Configuration



2.2.3. Test Procedure

1. Please refer to ETSI EN 300 440 Sub-clause 5.3 for the test conditions.
2. Please refer to ETSI EN 300 440 Sub-clause 7.2.2 for the measurement method.

2.2.4. Test Result

Test Condition			Frequency Range	
			Low Frequency	High Frequency
Temperature	Voltage		MHz	MHz
25°C	V _{nor}	1.50	2406.581	2477.649
-20°C	V _{min}	1.35	2406.435	2477.538
55°C	V _{min}	1.35	2406.613	2477.718
Measured frequencies (lowest and Highest)			2406.435	2477.718
Limit			F _L > 2400MHz	F _H < 2483.5MHz

Conclusion: Pass

2.3. Transmitter Spurious Emissions

Transmitter spurious emissions are those at frequencies beyond the limit of 250 % of the necessary bandwidth above and below the centre frequency of the emission.

The level of spurious emissions shall be measured as either:

- a) i) their power level in a specified load (conducted emission); and
ii) their effective radiated power when radiated by the cabinet and structure of the equipment (cabinet radiation); or
- b) Their effective radiated power when radiated by the cabinet and the integral or dedicated antenna, in the case of equipment fitted with such an antenna and no permanent RF connector. For measurements above 1 000 MHz the peak value shall be measured using a spectrum analyser. The "max hold" function of a spectrum analyser shall be used. For measurements up to 1 000 MHz the quasi-peak detector set in accordance with the specification of CISPR 16 [1] shall be used.

2.3.1 Limit

The power of any spurious emission shall not exceed the following values given in table 5.

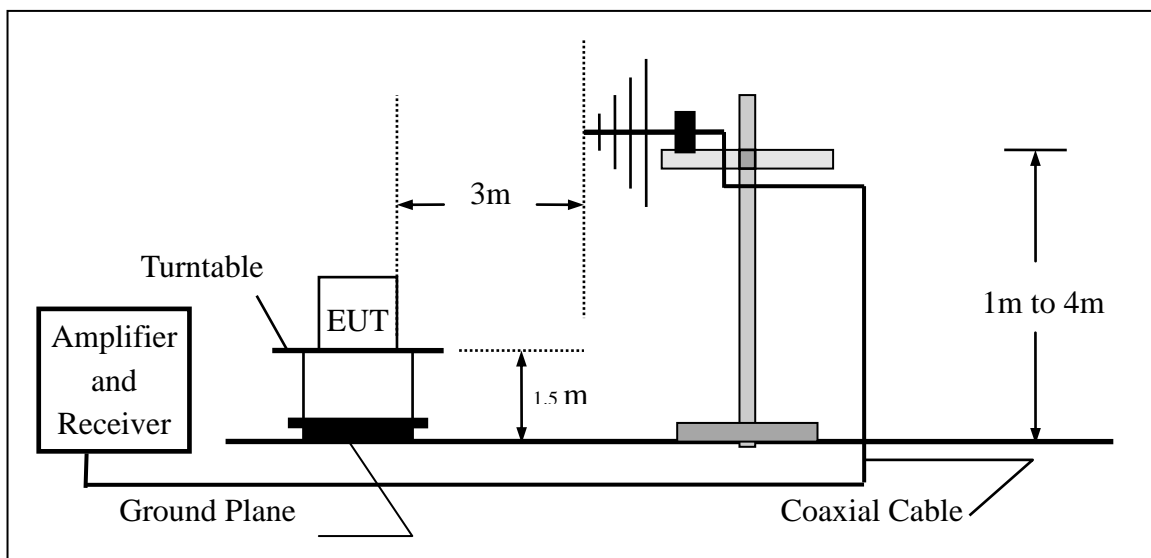
Table 5: Spurious emissions

Frequency ranges State	47MHz to 74MHz 87.5MHz to 108MHz 174MHz to 230MHz 470MHz to 862MHz	Other frequencies ≤1000MHz	Other frequencies >1000MHz
Operating	4nW(-54dBm)	250nW(-36dBm)	1μW(-30dBm)
Standby	2nW(-57dBm)	2nW(-57dBm)	20nW(-47dBm)

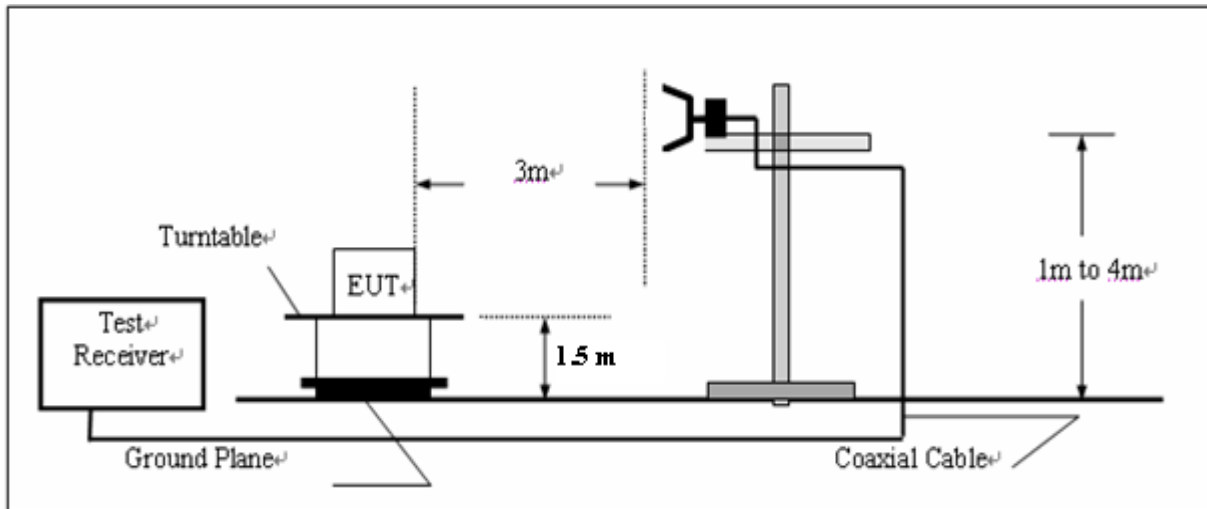
2.3.2 Test Configuration

Effective Radiated Power measurement (30 MHz to 40 GHz)

Below 1GHz



Above 1GHz



2.3.3 Test Procedure

1. Please refer to ETSI EN 300 440 Sub-clause 5.3 for the test conditions.
2. Please refer to ETSI EN 300 440 Sub-clause 7.3.2 for the measurement method.

2.3.4 Test Results

Cable loss(dB) = 0.5dB

Antenna gain = -1dBi

Level ERP(dBm) = Signal Source Readings(dBm)+Antenna Gain(dBb)-Cable loss(dB)

Transmitter Operating Mode

No.	Frequency (MHz)	Measurement Bandwidth (kHz)	Signal Source Readings(dBm)	Level ERP(dBm)	Limit (dBm)	Margin (dB)
Tx: 2407MHz; Antenna Polarization: Vertical						
1	4814.00	100	-68.53	-70.03	-30	>10
2	7221.00	100	(n.a)	(n.a)	-30	>10
3	9628.00	100	(n.a)	(n.a)	-30	>10
4	12035.00	100	(n.a)	(n.a)	-30	>10
5	Other(30M Hz-40GHz)	100	(n.a)	(n.a)	-30	>10
Tx: 2407MHz; Antenna Polarization: Horizontal						
6	4814.00	100	-67.32	-68.82	-30	>10
7	7221.00	100	(n.a)	(n.a)	-30	>10
8	9628.00	100	(n.a)	(n.a)	-30	>10
9	12035.00	100	(n.a)	(n.a)	-30	>10
10	Other(30M Hz-40GHz)	100	(n.a)	(n.a)	-30	>10

Tx: 2440MHz; Antenna Polarization: Vertical

11	4880.00	100	-68.14	-69.64	-30	>10
12	7320.00	100	(n.a)	(n.a)	-30	>10
13	9760.00	100	(n.a)	(n.a)	-30	>10
14	12200.00	100	(n.a)	(n.a)	-30	>10
15	Other(30M Hz-40GHz)	100	(n.a)	(n.a)	-30	>10

Tx: 2440MHz; Antenna Polarization: Horizontal

16	4880.00	100	-67.03	-68.53	-30	>10
17	7320.00	100	(n.a)	(n.a)	-30	>10
18	9760.00	100	(n.a)	(n.a)	-30	>10
19	12200.00	100	(n.a)	(n.a)	-30	>10
20	Other(30M Hz-40GHz)	100	(n.a)	(n.a)	-30	>10

Tx: 2477MHz; Antenna Polarization: Vertical

21	4954.00	100	-66.18	-67.68	-30	>10
22	7431.00	100	(n.a)	(n.a)	-30	>10
23	9908.00	100	(n.a)	(n.a)	-30	>10
24	12385.00	100	(n.a)	(n.a)	-30	>10
25	Other(30M Hz-40GHz)	100	(n.a)	(n.a)	-30	>10

Tx: 2477MHz; Antenna Polarization: Horizontal

26	4954.00	100	-69.34	-70.84	-30	>10
27	7431.00	100	(n.a)	(n.a)	-30	>10
28	9908.00	100	(n.a)	(n.a)	-30	>10
29	12385.00	100	(n.a)	(n.a)	-30	>10
30	Other(30M Hz-40GHz)	100	(n.a)	(n.a)	-30	>10

Measurement uncertainty: $\pm 3.4\text{dB}$
Transmitter Standby Mode

No.	Frequency (MHz)	Measurement Bandwidth (kHz)	Signal Source Readings(dBm)	Level ERP(dBm)	Limit (dBm)	Margin (dB)
Standby Antenna Polarization: Vertical						
1	30-1000	100	(n.a)	(n.a)	-57	>10
2	1000-40000	100	(n.a)	(n.a)	-47	>10
Standby Antenna Polarization: Horizontal						
1	30-1000	100	(n.a)	(n.a)	-57	>10
2	1000-40000	100	(n.a)	(n.a)	-47	>10

Measurement uncertainty: $\pm 1.3\text{dB}$

Notes:

- (1) Both radiated measurement method and conducted measurement method were used. For the radiated method, the antenna polarization was set to vertical and horizontal respectively.
- (2) The measurement was performed at the lowest, middle and highest operating frequencies.
- (3) The test receiver (spectrum analyzer) was set to Peak detector and 100kHz resolution bandwidth. For measuring emissions that exceed the level of 6 dB below the applicable limit the resolution bandwidth shall be switched to 30 kHz. 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.
- (4) “(n.a)” in the table above means that the emissions are too small to be measured and are at least 10 dB below the limit.

Conclusion: Pass

3. Receiver Parameters

3.1. Receiver Spurious Emissions

Spurious radiations from the receiver are components at any frequency, radiated by the equipment and antenna. The level of spurious radiations shall be measured by either:

- a)
 - i) their power level in a specified load (conducted spurious emission); and
 - ii) their effective radiated power when radiated by the cabinet and structure of the equipment (cabinet radiation); or
 - b) Their effective radiated power when radiated by the cabinet and the integral or dedicated antenna in the case of portable equipment fitted with such an antenna and no permanent RF connector.
- For measurements above 1 000 MHz the peak value shall be measured using a spectrum analyser. The "max hold" function of a spectrum analyser shall be used. For measurements up to 1 000 MHz the quasi-peak detector set in accordance with the specification of CISPR 16 [1] shall be used.

3.1.1. Limits

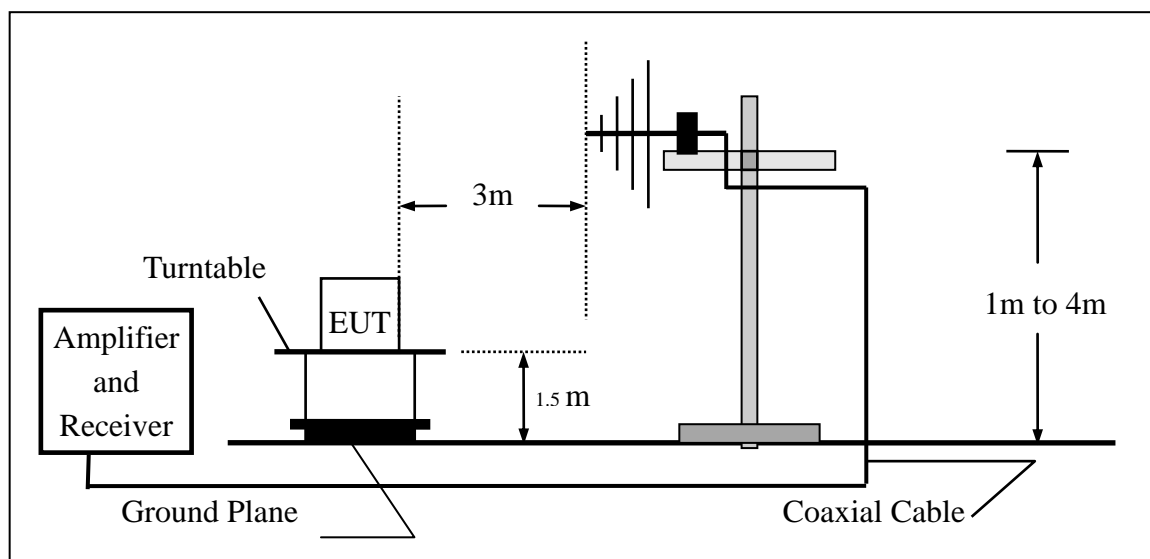
ETSI EN 300 440 Sub-clause 8.3.5

The power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.

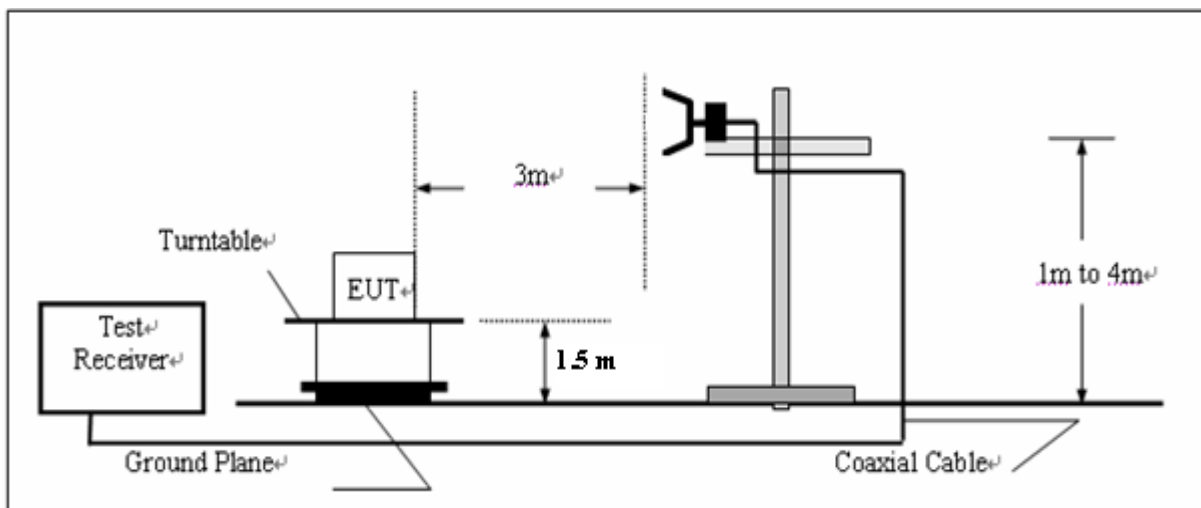
3.1.2. Test Configuration

Effective Radiated Power measurement (25 MHz to 40 GHz)

Below 1GHz



Above 1GHz



3.1.3. Test Procedure

1. Please refer to ETSI EN 300 440 Sub-clause 5.3 for the test conditions.
2. Please refer to ETSI EN 300 440 Sub-clause 8.3.4 for the measurement method.

3.1.4. Test Results

Start Frequency (MHz)	Stop Frequency (MHz)	Antenna Polarization	Res Bandwidth (KHz)	Maximum Emission Observed		Limit (dBm)	Margin (dB)
				Frequency (MHz)	Datum (dBm)		
25	1000	Vertical	100	189.75	-70.36	-57	13.36
1000	25000	Vertical	1000	11453.46	-68.52	-47	21.52
25	1000	Horizontal	100	253.04	-70.21	-57	13.21
1000	25000	Horizontal	1000	10799.52	-69.85	-47	22.85

Notes:

- (1) Both radiated measurement method and conducted measurement method were used. For the radiated method, the antenna polarization was set to vertical and horizontal respectively.
- (2) The measurement was performed at the lowest and highest operating frequencies.
- (3) The test receiver (spectrum analyzer) was set to Peak detector and 100 kHz resolution bandwidth. For measuring emissions that exceed the level of 6 dB below the applicable limit the resolution bandwidth shall be switched to 30 kHz. 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.

Conclusion: Pass

4. EMF Assessment

Refer to the standards EN 62479-2010(Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz), Since the maximum EIRP is lower than 13dBm, SAR test is not required.

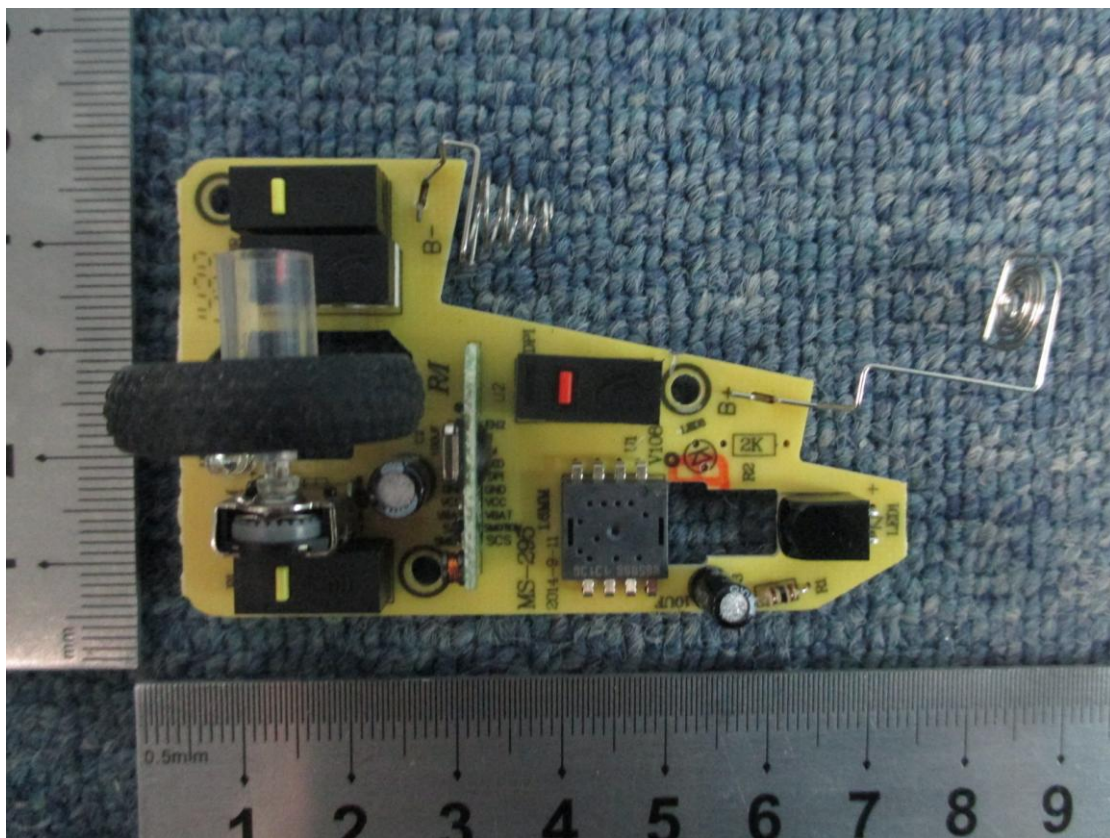


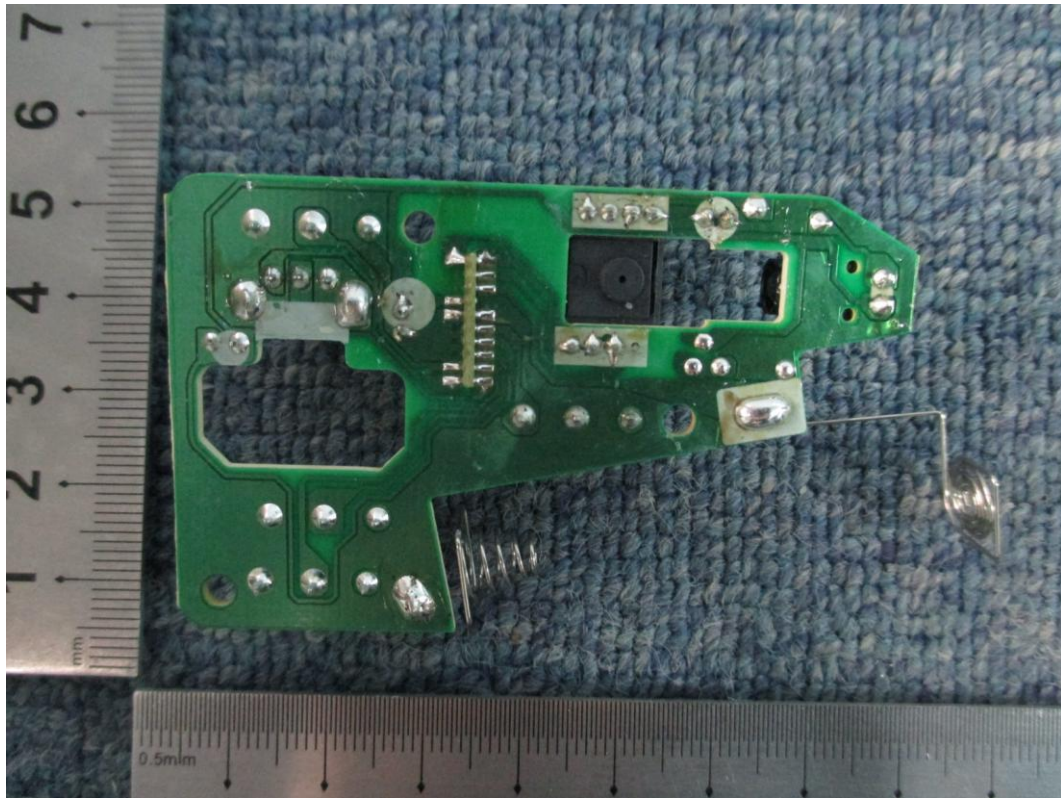
Photos of the EUT

Transmitter

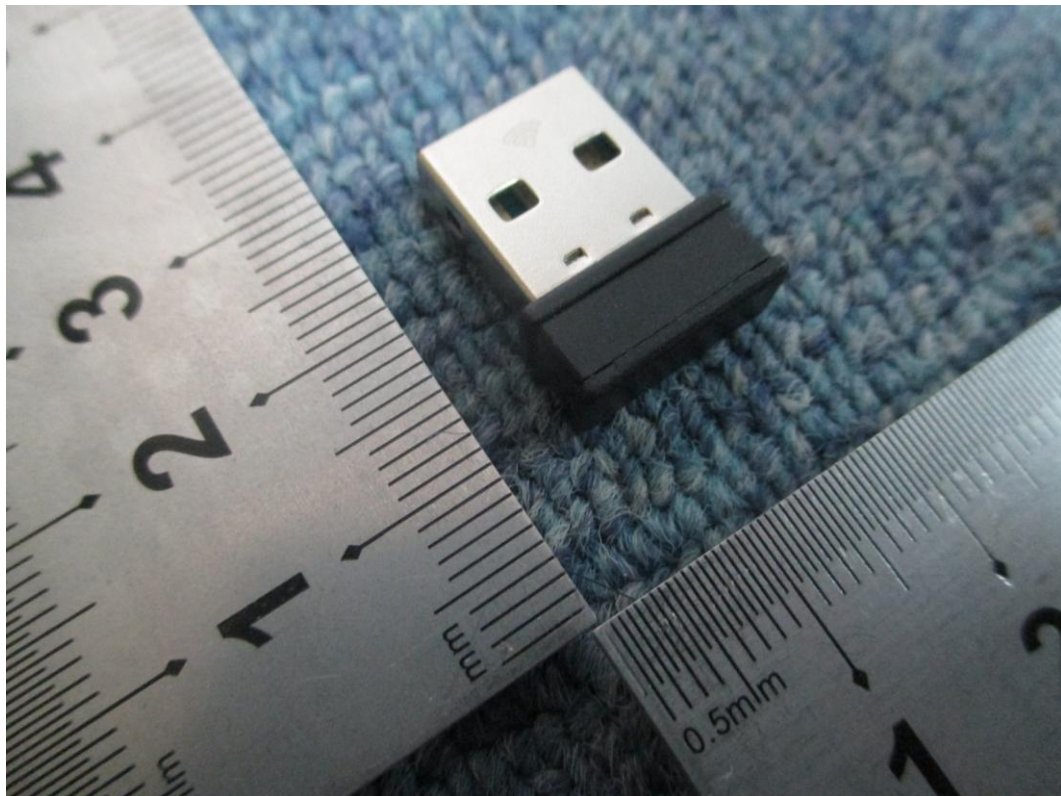


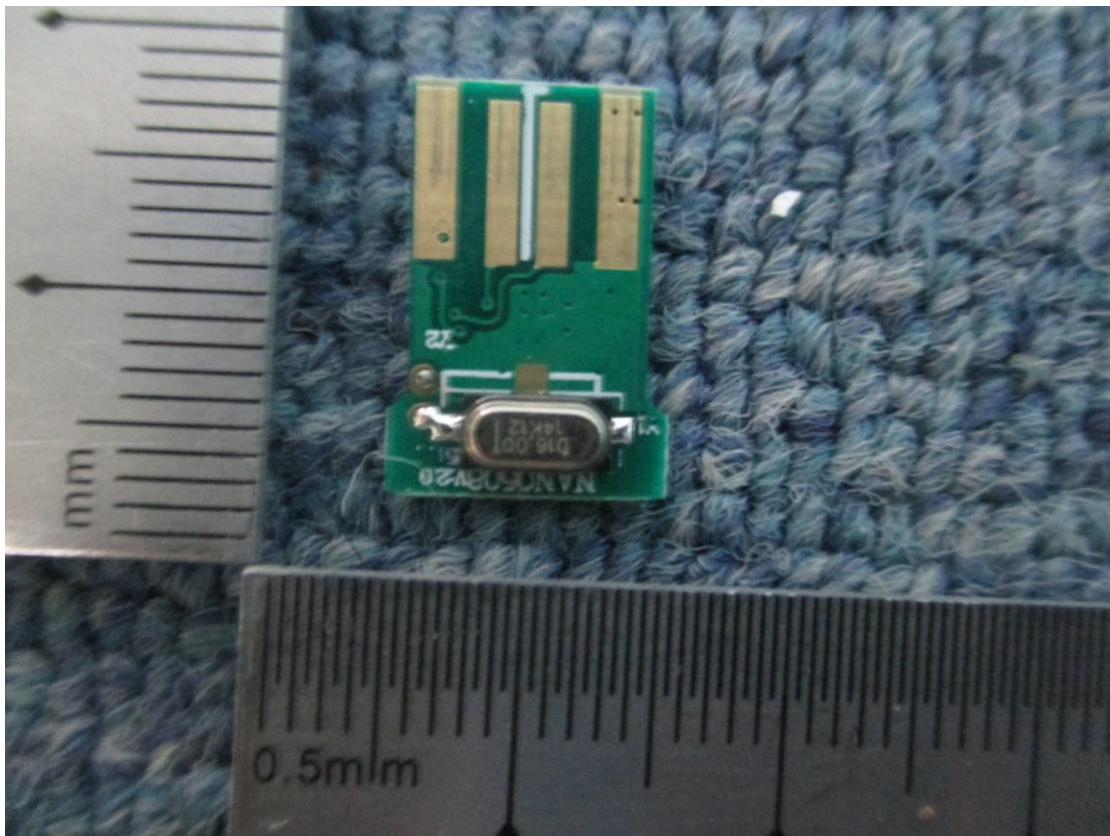
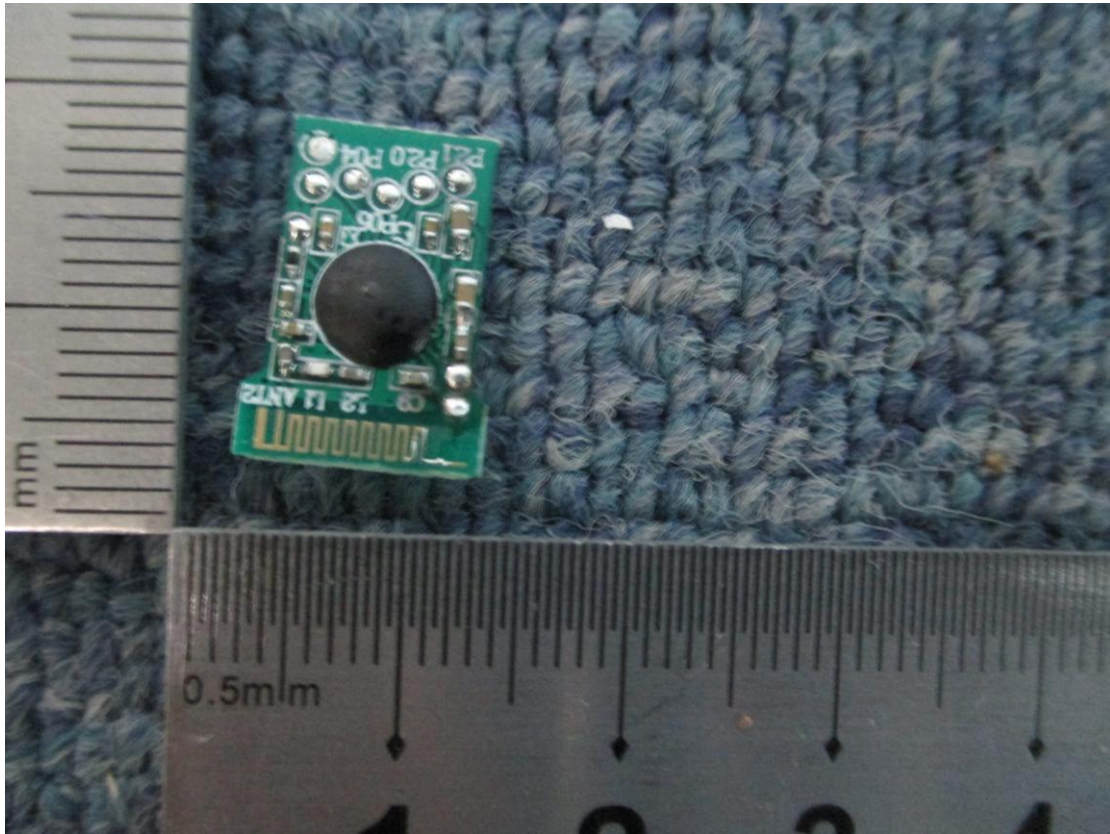






Receiver



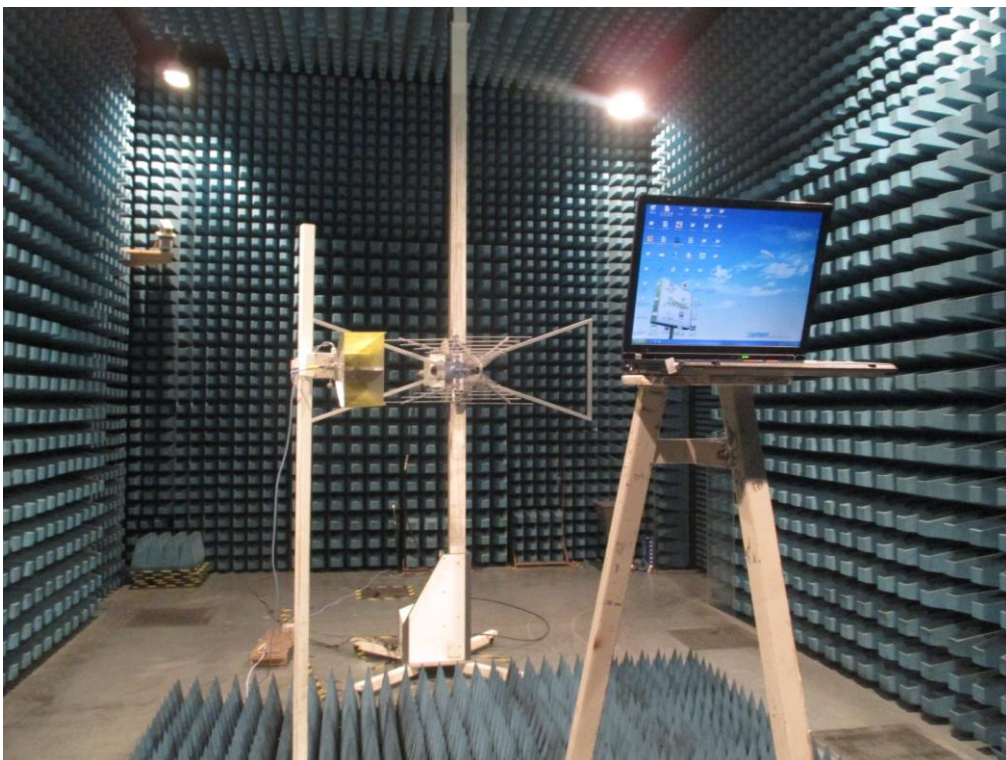


Photos of Test Setup

Transmitter



Receiver





** END OF REPORT **