

FCC Test Report

Client Information:

Applicant: KEY MOUSE ELECTRONIC ENTERPRISE CO., LTD.
Applicant add.: No.3, Wugong 5th Rd., Sinjhuang City, Taipei County 242, Taiwan

EUT Information:

EUT Name: Wireless Mouse
Model No.: MA-C233, MA-xyyy(x=0~9, A~Z; y=0~9, A~Z)
Brand Name: N/A

Prepared By:

Asia Institute Technology (Dongguan) Limited
Add. : No.6 Binhe Road, Tianxin Village, Huangjiang,
Dongguan, Guangdong, China.
Date of Receipt: Aug. 20, 2009 Date of Test: Aug.20. ~ Aug.26, 2009
Date of Issue: Aug. 26, 2009 Test Result: **Pass**

Test procedure used: ANSI C63.4-2003

This device described above has been tested by Asia Institute Technology (Dongguan) Limited, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

*This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. government.

NVLAP Lab. Code: 200800-0

Reviewed by: Foney Yang
Test director

Approved by: Helen Lin
Technical director

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2 Test Summary

2.1 Compliance with FCC Part 15 subpart C

Test	Test Requirement	Standard Paragraph	Result
Antenna requirement	FCC Part 15 C:2008	Section 15.203	PASS
Conduction Emissions	FCC Part 15 C:2008	Section 15.249	N/A
Radiated Emissions	FCC Part 15 C:2008	Section 15.249(a) Section 15.249(d)	PASS
Band edges	FCC Part 15 C:2008	Section 15.249(d)	PASS
Occupied Bandwidth	FCC Part 15 C:2008	Section 15.215	PASS

2.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, The following measurements uncertainty Level have estimated based on ANSI C63.4:2003, the maximum value of the uncertainty as below

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	Radiated Emission Test	$\pm 3.57\text{dB}$

3 Test Facility

The test facility is recognized, certified or accredited by the following organizations:

.NVLAP- Lab Code: 200800-0

Asia Institute Technology (Dongguan) Limited has been accredited by NVLAP on April 29, 2008.

.FCC- Registration No: 248337

The 3m Semi-Anechoic Chamber, 3m/10m Open Area Test Site and Shielding Room of Asia Institute Technology (Dong guan) Limited have been registered by Federal Communications Commission (FCC) on Dec.07, 2006.

.Industry Canada(IC)-Registration No: IC6819A-1 & IC6819A-2

The 3m Semi-Anechoic Chamber and 3m/10m Open Area Test Site of Asia Institute Technology (Dongguan) Limited have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing on Nov.07, 2006.

.VCCI- Registration No: R-2482 & C-2730

The 3m/10m Open Area Test Site and Shielding Room of Asia Institute Technology (Dongguan) Limited have been registered by Voluntary Control Council for Interference on Jan.24, 2007.

.TUV Rhineland

Asia Institute Technology (Dongguan) Limited has been assessed on Jan.16, 2007 that it can carry out EMC tests by order and under supervision of TUV Rhineland.

.ITS- Registration No: TMPSHA031

Asia Institute Technology (Dongguan) Limited has been assessed and included in Intertek Shanghai TMP Program regarding Laboratory facilities and test equipment on Nov.10, 2006.

3.1 Deviation from standard

None

3.2 Abnormalities from standard conditions

None

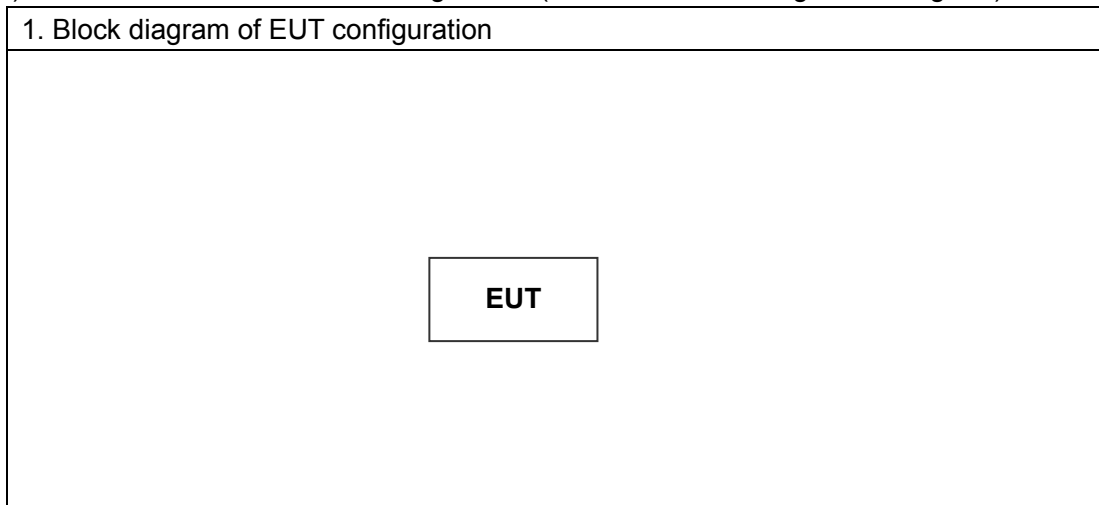
4 General Information

4.1 General Description of EUT

Manufacturer:	DONGGUAN EASTECH ELECTRICAL PRODUCTS CO., LTD.				
Manufacturer Address:	No.182, Kuiqing Rd., Qinghuang Industrial District, Qingxi Town, Dongguan City, Guangdong, 523650, China				
EUT Name:	Wireless Mouse				
Model No:	MA-C233(x=0~9, A~Z; y=0~9, A~Z)				
Operation frequency:	2402 MHz to 2480MHz				
Channel Number:	32				
Modulation Technology:	GFSK				
Antenna Type:	extended wire lay on PCB				
Brand Name:	N/A				
Serial No:	N/A				
Power Supply Range:	DC 3V from battery				
Power Supply:	DC 3V from battery				
Power Cord:	N/A				
Model description: MA-C233 (x=0~9, A~Z; y=0~9, A~Z) All the models are totally identical, 'x' means the product's color depend on different markets' requirement. 'y' means the export country depend on different markets' requirement.					
Description of Channel:					
Frequency Group1 (MHz)			Frequency Group2 (MHz)		
2402	2435	2460	2403	2425	2455
2407	2436	2461	2404	2429	2456
2412	2437	2468	2405	2430	2462
2414	2438	2469	2406	2432	2463
2417	2439	2472	2410	2434	2464
2420	2442	2473	2411	2443	2466
2421	2451	2475	2413	2444	2467
2422	2452	2476	2415	2446	2470
2427	2457	2478	2416	2448	2477
2428	2458	2480	2418	2449	2479
2431	2459		2419	2453	

4.2 Description of Test conditions

(1) EUT was tested in normal configuration (Please See following Block diagram)



(2) E.U.T. test conditions:

15.31(e): For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

(3) Test frequencies:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required. Reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

(4) Frequency range of radiated measurements:

According to the 15.33, the test range will be up to the tenth harmonic of the highest fundamental frequency

4.3 Peripheral List

No.	Equipment	Manufacturer	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A

5 Equipments List for All Test Items

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2009.04.17	2010.04.16
2	EMI Measuring Receiver	Schaffner	SCR3501	235	2009.03.09	2009.09.08
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2009.03.09	2009.09.08
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2009.04.08	2010.04.07
5	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2009.07.15	2010.07.14
6	Broadband Horn Antenna	SCHWARZBECK	BBHA9120A	451	2009.07.15	2010.07.14
7	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2009.03.09	2009.09.08
8	EMI Test Receiver	R&S	ESCI	100124	2008.12.29	2009.12.28
9	LISN	Kyoritsu	KNW-242	8-837-4	2009.04.08	2010.04.07
10	LISN	Kyoritsu	KNW-407	8-1789-3	2009.04.08	2010.04.07
11	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2009.03.10	2009.09.09

6 Test Result

6.1 Antenna requirement

6.1.1 Standard requirement

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

6.1.2 EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement.

6.2 Conduction Emissions Measurement

6.2.1 limit

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

Note:Decreases with the logarithm of the frequency.

6.2.2 Test procedure

EUT was placed upon a wooden test table 0.8m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and placed at a distance of 10cm from each other. A spectrum and receiver was connected to the RF output port of the AMN. Both average and quasi-peak value were detected.

6.2.3 Test result

Cause the EUT only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Measurements to demonstrate compliance with the conducted limits are not required for devices

6.3 Radiated Emissions Measurement

6.3.1 Limit

Fcc part15.249 (a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequency of Emission (MHz)	Field Strength of fundamental (dB μ V/m)	Field Strength of Harmonics(dB μ V/m)
902-928	94	54
2400-2483.5	94	54
5725-5875	94	54
24000-24250	108	68

Note: Field strength limits are specified at a distance of 3 meters. the above field strength limits in paragraphs of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Fcc part15.249 (d)Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Frequency of Emission (MHz)	Field Strength		Measurement Distance (meters)
	μ V/m	dB μ V/m	
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

6.3.2 Test procedure

EUT was placed upon a wooden test table which was placed on the turn table 0.8m above the horizontal metal ground plane, and operating in the mode as mentioned above. A receiving antenna was placed 3m away from the EUT. During testing, turn around the turn table and move the antenna from 1m to 4m to find the maximum field-strength reading. All peripherals were placed at a distance of 10cm between each other. Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

6.3.3 Test Result

Test Data: 2009-8-24

Frequency Range: 30MHz to 1GHz

RBW/VBW: 100KHz/300KHz for spectrum, RBW=120KHz for receiver

Measurement Distance: 3 m

Operating Environment: 20.3°C, 58% RH, 102 Kpa

(a) Antenna polarization: Horizontal

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
62.010	14.220	0.268	14.488	-25.512	40.000	QUASIPeAK
159.980	16.630	1.753	18.383	-25.117	43.500	QUASIPeAK
276.380	16.430	1.502	17.932	-28.068	46.000	QUASIPeAK
436.430	20.900	2.513	23.413	-22.587	46.000	QUASIPeAK
717.730	26.920	0.948	27.868	-18.132	46.000	QUASIPeAK
*935.980	30.130	0.587	30.717	-15.283	46.000	QUASIPeAK

(b) Antenna polarization: vertical

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
39.700	14.000	1.110	15.110	-24.890	40.000	QUASIPeAK
114.390	13.780	2.818	16.598	-26.902	43.500	QUASIPeAK
288.990	16.810	2.251	19.061	-26.939	46.000	QUASIPeAK
445.160	21.130	1.558	22.688	-23.312	46.000	QUASIPeAK
674.080	25.810	1.582	27.392	-18.608	46.000	QUASIPeAK
*870.990	29.120	1.029	30.149	-15.851	46.000	QUASIPeAK

Note: '*' means the worst case

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

Test Data: 2009-8-24

Frequency Range: 1GHz to 25GHz

RBW/VBW: 1MHz/1MHz for Peak, 1MHz/10Hz for Average

Measurement Distance: 3 m

Operating Environment: 20.3°C, 58% RH, 102 Kpa

(a) Antenna polarization: Horizontal

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1075.000	28.827	11.055	39.882	-34.118	74.000	PEAK
1630.000	30.095	11.589	41.684	-32.316	74.000	PEAK
2155.000	32.586	14.322	46.909	-27.091	74.000	PEAK
2400.000	33.897	17.301	51.198	-22.802	74.000	PEAK
2402.000	33.897	58.090	91.987	-22.013	114.000	PEAK
*2402.148	33.897	56.548	90.445	-3.555	94.000	AVERAGE
3200.000	36.160	11.101	47.261	-26.739	74.000	PEAK
4810.000	40.020	3.718	43.738	-30.262	74.000	PEAK
4810.478	40.020	3.298	43.318	-10.682	54.000	AVERAGE

(b) Antenna polarization: vertical

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1615.000	30.007	10.837	40.844	-33.156	74.000	PEAK
2205.000	32.880	14.013	46.893	-27.107	74.000	PEAK
2400.000	33.897	11.301	45.198	-28.802	74.000	PEAK
2402.000	33.897	50.645	84.542	-29.458	114.000	PEAK
2402.500	33.897	50.145	84.042	-9.958	94.000	AVERAGE
3085.000	35.977	11.528	47.505	-26.495	74.000	PEAK
4804.000	40.020	5.319	45.339	-28.661	74.000	PEAK
*4804.750	40.020	5.319	45.339	-8.661	54.000	AVERAGE

Note: '*' means the worst case

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

Low Channel: 2402 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
2150.000	32.564	14.218	46.782	-27.218	74.000	PEAK
2439.000	33.997	45.228	79.225	-34.775	114.000	PEAK
2439.000	33.997	44.228	78.225	-15.775	94.000	AVERAGE
2500.000	34.183	14.299	48.482	-25.518	74.000	PEAK
2955.000	35.758	11.277	47.035	-26.965	74.000	PEAK
3280.000	35.946	10.955	46.901	-27.099	74.000	PEAK
4870.000	40.125	3.593	43.718	-30.282	74.000	PEAK
*4870.536	40.125	3.193	43.318	-10.682	54.000	AVERAGE

(b) Antenna polarization: vertical

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
2050.000	31.964	13.366	45.330	-28.670	74.000	PEAK
2435.000	33.997	53.267	87.264	-26.736	114.000	PEAK
*2435.756	33.997	52.736	86.726	-7.274	94.000	AVERAGE
2500.000	34.183	16.776	50.959	-23.041	74.000	PEAK
3205.000	36.152	10.573	46.725	-27.275	74.000	PEAK
4870.000	40.125	2.083	42.208	-31.792	74.000	PEAK
4870.000	40.125	1.956	42.208	-11.919	54.000	AVERAGE

Note: '*' means the worst case

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

Middle Channel :2439 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1455.000	29.919	11.123	41.042	-32.958	74.000	PEAK
2165.000	32.639	14.763	47.403	-26.597	74.000	PEAK
2480.000	34.123	55.208	89.331	-24.669	114.000	PEAK
*2480.156	34.123	54.568	88.691	-5.309	94.000	AVERAGE
2483.500	34.135	12.791	46.926	-27.074	74.000	PEAK
3245.000	36.038	10.429	46.468	-27.532	74.000	PEAK
4960.000	40.280	7.019	47.299	-26.701	74.000	PEAK
4960.135	40.280	6.119	46.399	-7.601	54.000	AVERAGE

(b) Antenna polarization: vertical

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1405.000	29.923	12.048	41.971	-32.029	74.000	PEAK
2190.000	32.793	13.769	46.562	-27.438	74.000	PEAK
2480.000	34.123	50.700	84.823	-29.177	114.000	PEAK
*2480.478	34.123	49.700	83.823	-10.177	94.000	AVERAGE
2483.500	34.135	15.056	49.191	-24.809	74.000	PEAK
4960.000	40.280	3.838	44.118	-29.882	74.000	PEAK
4960.358	40.280	2.538	42.818	-11.182	54.000	AVERAGE

Note: '*' means the worst case

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

High Channel :2480 MHz

6.4 Band edges

6.4.1 Limit

Fcc part15.249 (d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

6.4.2 Test procedure

- (1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as RBW=100Hz,VBW \geq RBW, Sweep time=Auto, Detector Function=Peak
- (2) The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission.
- (3) The above procedure shall be repeated at the lowest, and the highest frequency of the stated frequency range.

6.4.3 Test Result

Please refer to report section 6.2.3 which met the requirement of limits in 15.209

6.5 Occupied Bandwidth

6.5.1 Limit

Fcc part15.239 (d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

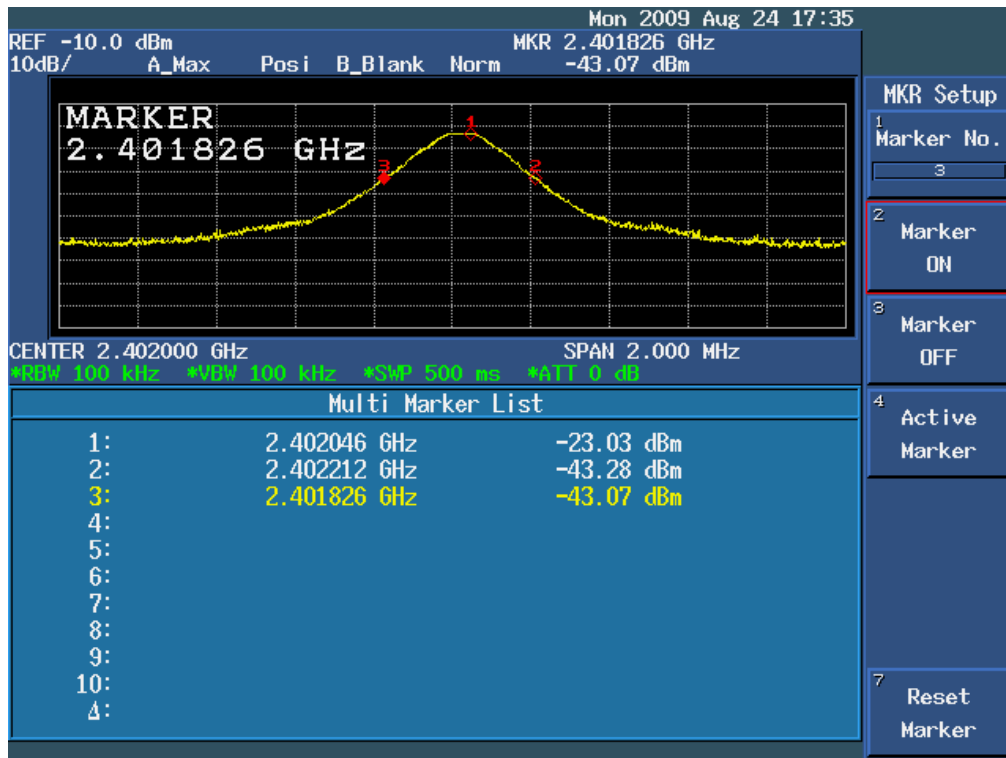
6.5.2 Test procedure

- (1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as RBW=10Hz,VBW \geq RBW, Sweep time=Auto, Detector Function=Peak
- (2) The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission.
- (3) The above procedure shall be repeated at the lowest, and the highest frequency of the stated frequency range with modulated mode.

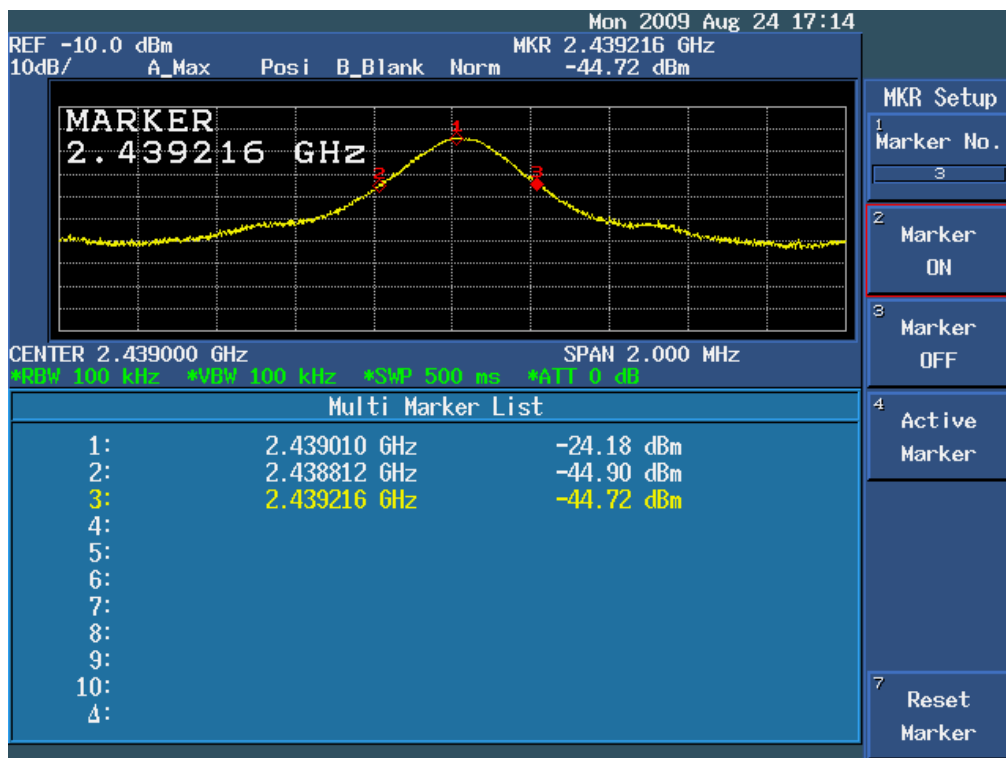
6.5.3 Test Result

channel	Channel frequency (MHz)	20dB bandwidth (KHz)	Limit (KHz)	Conclusion
Low	2402	386	N/A	Pass
Mid	2439	404	N/A	Pass
High	2480	394	N/A	Pass

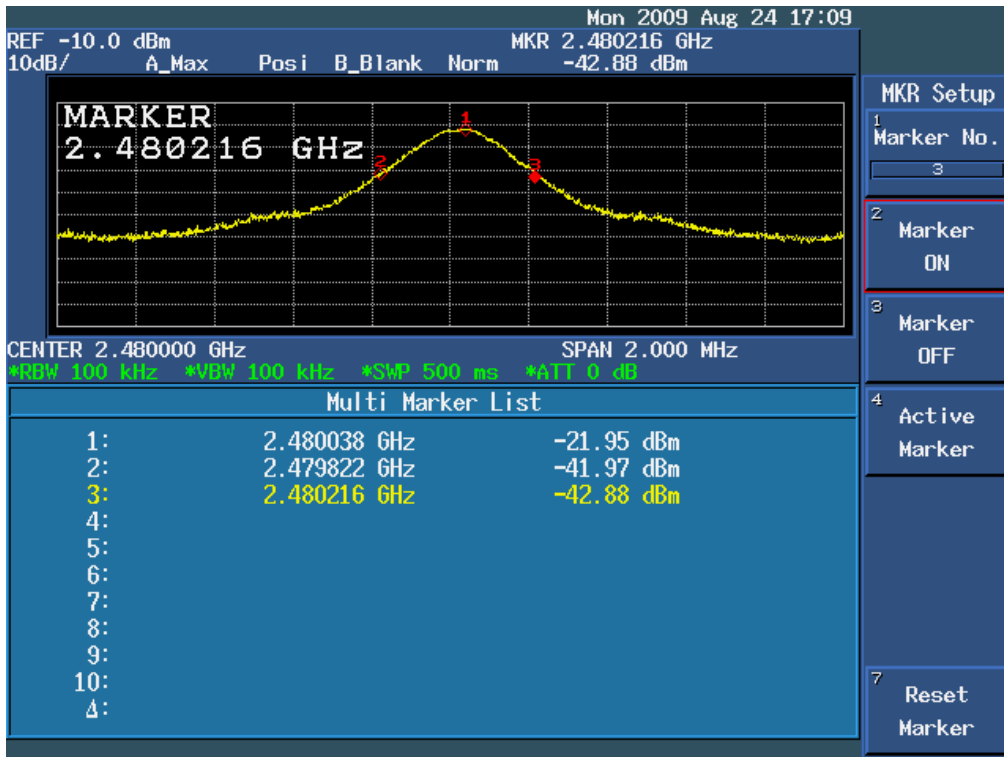
(1) Low: 2402MHz



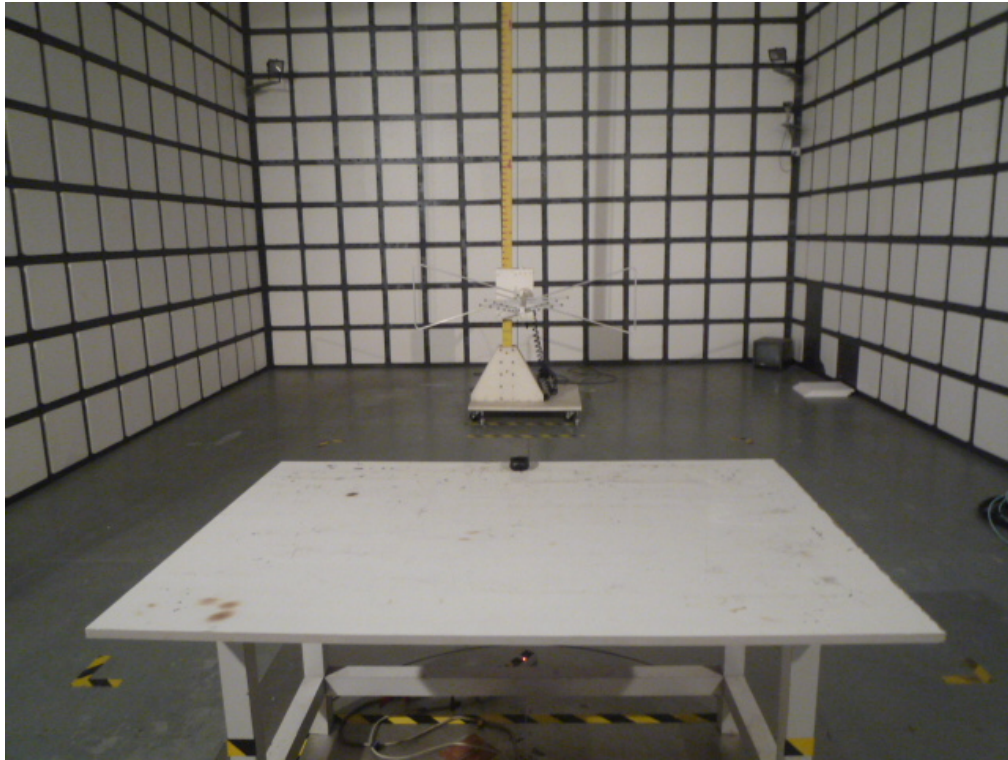
(2) Mid: 2439MHz



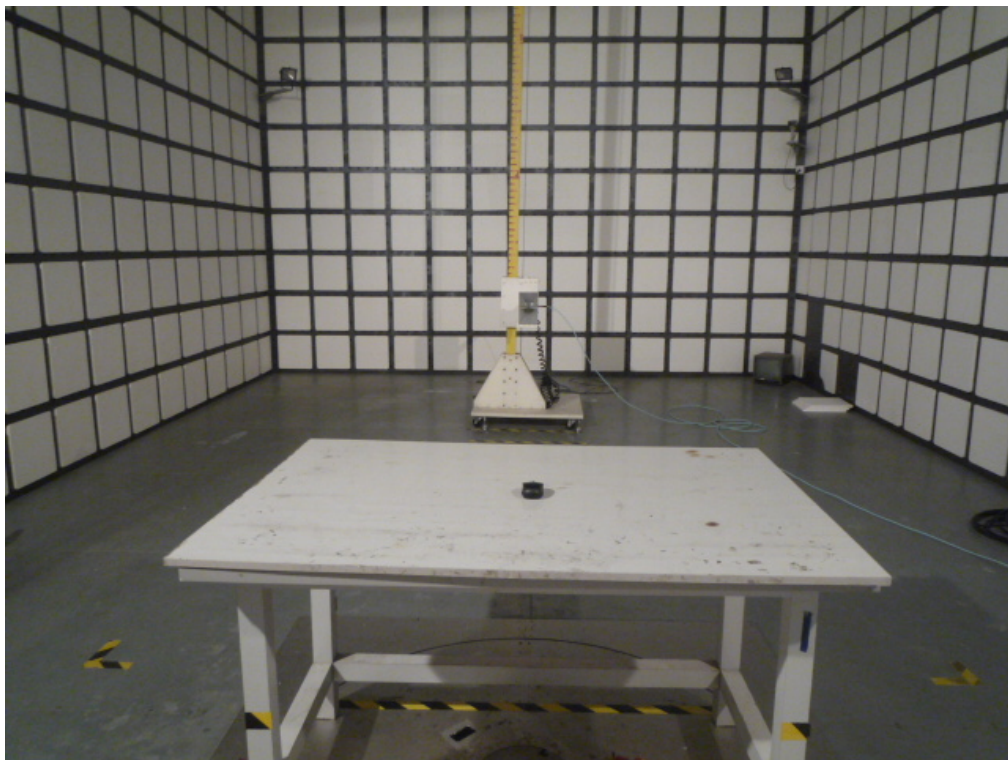
(3) High: 2480MHz



6.6 Test Setup photograph



Radiation(30MHz-1GHz)



Radiation(1GHz-25GHz)

7 APPENDIX-Photographs of EUT Constructional Details

Photo 1



Photo 2



Photo 3

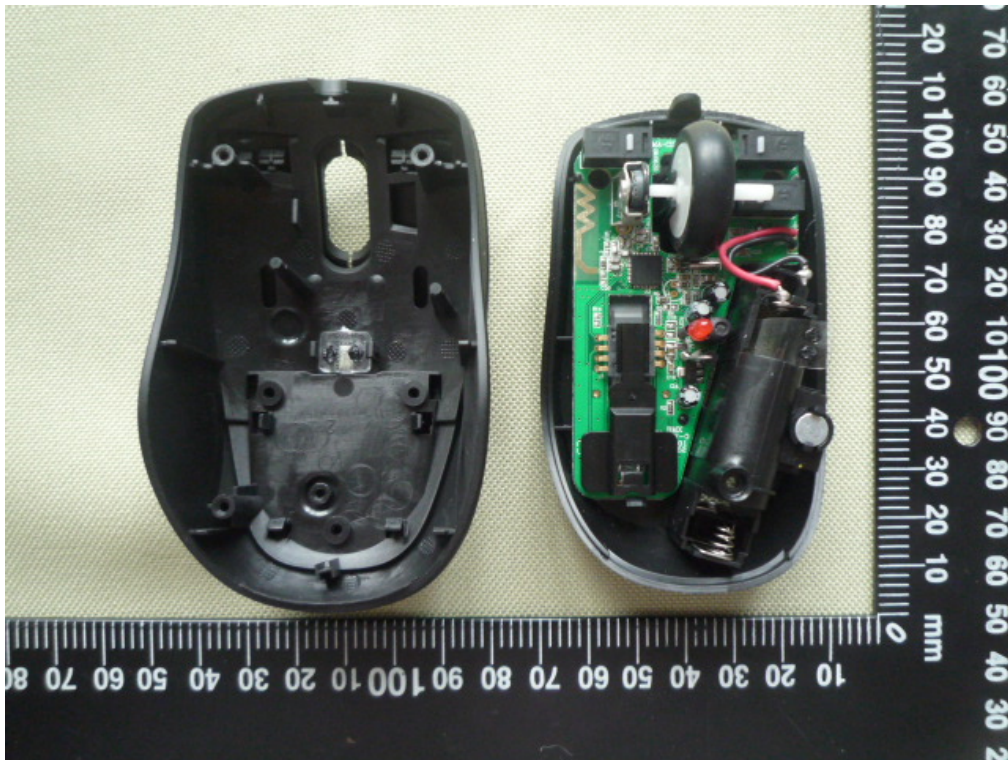


Photo 4

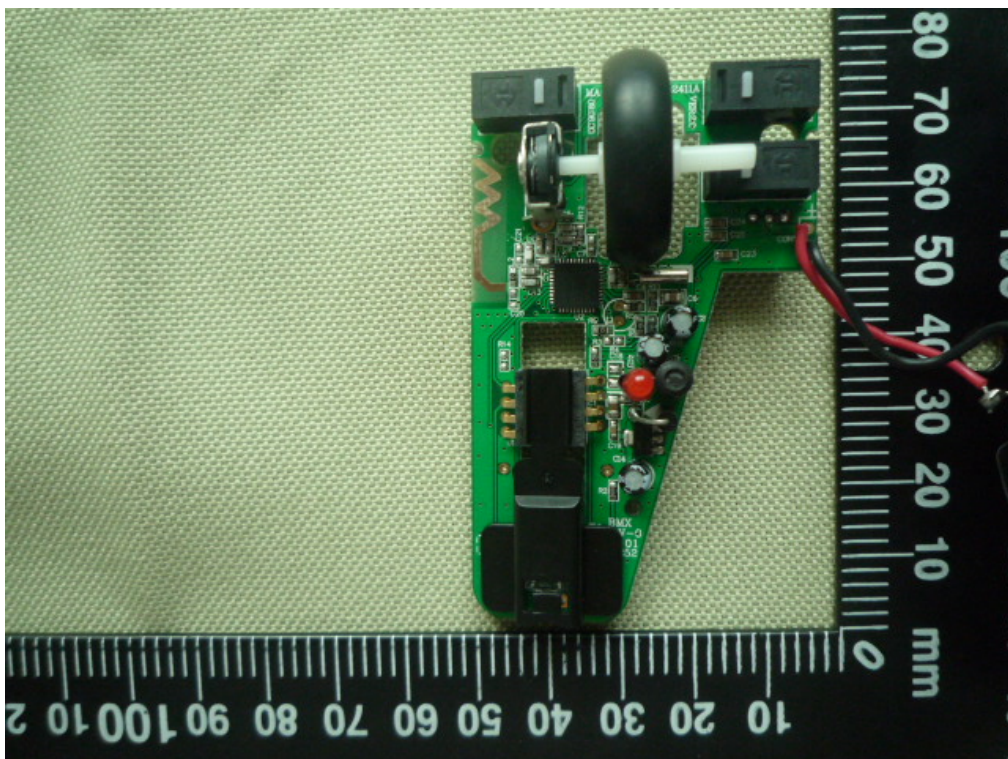


Photo 5

