FCC Test Report

Report No.: AGC04844170602FE05

FCC ID	:	2AFHPKM-W8
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	2.4GHz Wireless Mouse
BRAND NAME	:	AUKEY
MODEL NAME	:	KM-W8, KM-W9, KM-W10, KM-W11, KM-W12, KM-W13, KM-W14, KM-W15, KM-W16, KM-W17, KM-W18, KM-W19, KM-W20
CLIENT	:	SHENZHEN AUKEY E BUSINESS CO., LTD.
DATE OF ISSUE	:	July 11, 2017
STANDARD(S) **TEST PROCEDURE(S)**	:	FCC Part 15 Rules
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd

Report Revise Record

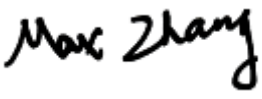
Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	July 11, 2017	Valid	Original Report

TABLE OF CONTENTS

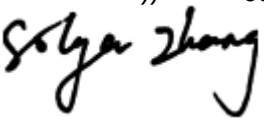
1. VERIFICATION OF CONFORMITY

Applicant	SHENZHEN AUKEY E BUSINESS CO., LTD.
Address	Room 102, Bld P09, Huanan International Zone, No.1 Huanan Rd, PinghuTown Longgang District, Shenzhen, China
Manufacturer	Eastemtimes Technology Co., Ltd.
Address	Fengrun Industrial Park, Youganpu Village Fenggang Town, Donggang, Guangdong, China
Product Designation	2.4GHz Wireless Mouse
Brand Name	AUKEY
Test Model	KM-W8
Series Model	KM-W9, KM-W10, KM-W11, KM-W12, KM-W13, KM-W14, KM-W15, KM-W16, KM-W17, KM-W18, KM-W19, KM-W20
Model Difference	All the same except appearance color.
Date of test	July 10, 2017 to July 11, 2017
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF

We hereby certify that:
The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.249.

Tested by 
Max Zhang(Zhang Yi) July 11, 2017

Reviewed by 
Bart Xie(Xie Xiaobin)) July 11, 2017

Approved by 
Solger Zhang(Zhang Hongyi) July 11, 2017
Authorized Officer

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	2.408 GHz to 2.474GHz
Maximum field strength	85.52dBuV/m@3m(AV)
Modulation	FSK
Number of channels	34
Antenna Gain	0.11dBi
Antenna Designation	Integrated Antenna (Met 15.203 Antenna requirement)
Hardware Version	CHeck Sum: 79D4
Software Version	V01T9-1
Power Supply	DC 1.5V by battery

2.2. TABLE OF CARRIER FREQUENCY

Channel Number	Frequency	Channel Number	Frequency
1	2408MHz	18	2442MHz
2	2410MHz	19	2444MHz
3	2412MHz	20	2446MHz
4	2414MHz	21	2448MHz
5	2416MHz	22	2450MHz
6	2418MHz	23	2452MHz
7	2420MHz	24	2454MHz
8	2422MHz	25	2456MHz
9	2424MHz	26	2458MHz
10	2426MHz	27	2460MHz
11	2428MHz	28	2462MHz
12	2430MHz	29	2464MHz
13	2432MHz	30	2466MHz
14	2434MHz	31	2468MHz
15	2436MHz	32	2470MHz
16	2438MHz	33	2472MHz
17	2440MHz	34	2474MHz

3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U，where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2，providing a level of confidence of approximately 95 %。

No.	Item	Uncertainty
1	Conducted Emission Test	±3.18dB
2	All emissions,radiated	±3.91dB
3	Temperature	±0.5°C
4	Humidity	±2%

4. DESCRIPTION OF TEST MODES

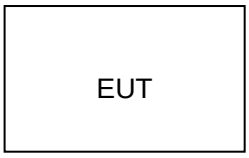
NO.	TEST MODE DESCRIPTION
1	Low channel TX in GFSK modulation
2	Middle channel TX in GFSK modulation
3	High channel TX in GFSK modulation

Note:
1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. The EUT had been programmed in continuous transmission conditions for the test modes.

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure 1:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	2.4GHz Wireless Mouse	KM-W8	2AFHPKM-W8	EUT

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249	Radiated Emission	Compliant
§15.249	Band Edges	Compliant
§15.215	20dB bandwidth	Compliant

6. TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.
Location	Building D, Baoding Technology Park,Guangming Road2, Dongcheng District, Dongguan, Guangdong, China.
FCC Registration No.	371540
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2014.

ALL TEST EQUIPMENT LIST

Radiated Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 2, 2017	July 1, 2018
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 2, 2017	July 1, 2018
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 2, 2017	July 1, 2018
RF Cable	SCHWARZBECK	AK9515E	96221	July 2, 2017	July 1, 2018
3m Anechoic Chamber	CHENGYU	966	PTS-001	July 2, 2017	July 1, 2018
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 2, 2017	June 1, 2018
Spectrum analyzer	Agilent	E4407B	MY46185649	June 2, 2017	June 1, 2018
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	June 2, 2017	June 1, 2018
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 2, 2017	June 1, 2018

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	June 2, 2017	June 1, 2018
Artificial Mains Network	Narda	L2-16B	000WX31025	June 2, 2017	June 1, 2018
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	June 2, 2017	June 1, 2018
RF Cable	SCHWARZBECK	AK9515E	96222	June 2, 2017	June 1, 2018
Shielded Room	CHENGYU	843	PTS-002	June 2, 2017	June 1, 2018

7. RADIATED EMISSION

7.1TEST LIMIT

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark： (1) Emission level dBμ V = 20 log Emission level μ V/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

7.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use minimum resolution bandwidth of 1 MHz. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

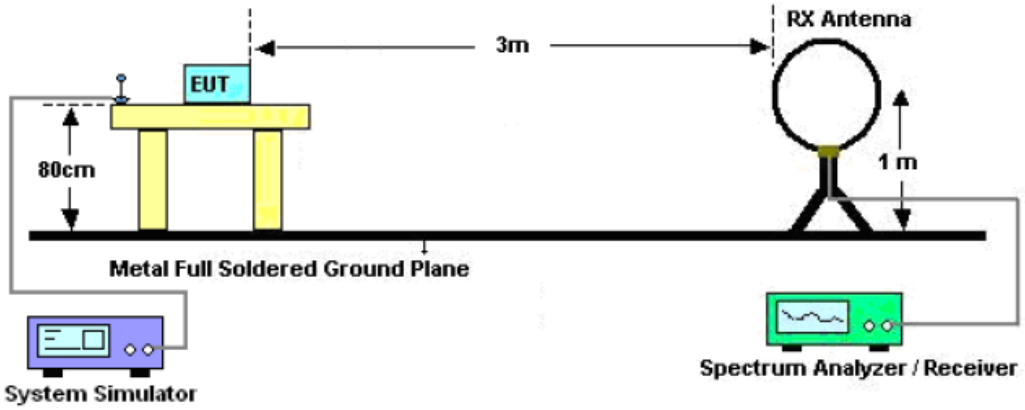
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz RBW 3MHz/VBW 10MHz for Peak, RBW 3MHz/VBW 10Hz for Average

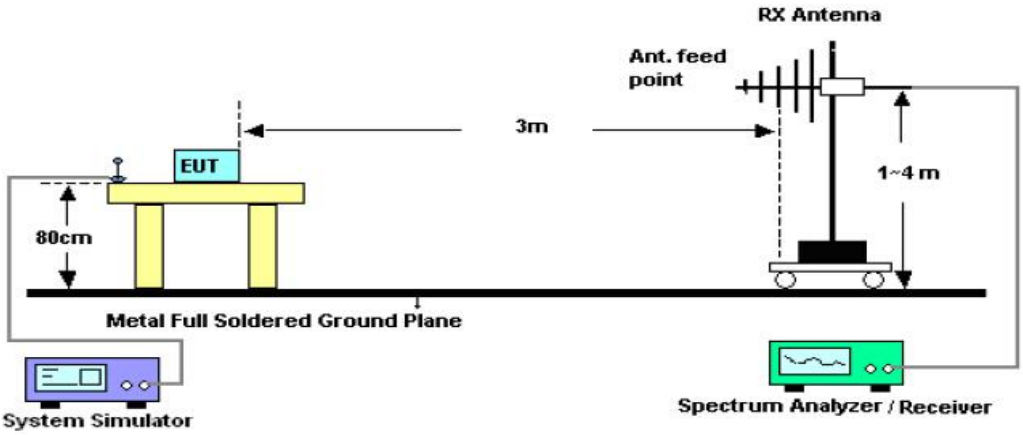
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

7.3. TEST SETUP

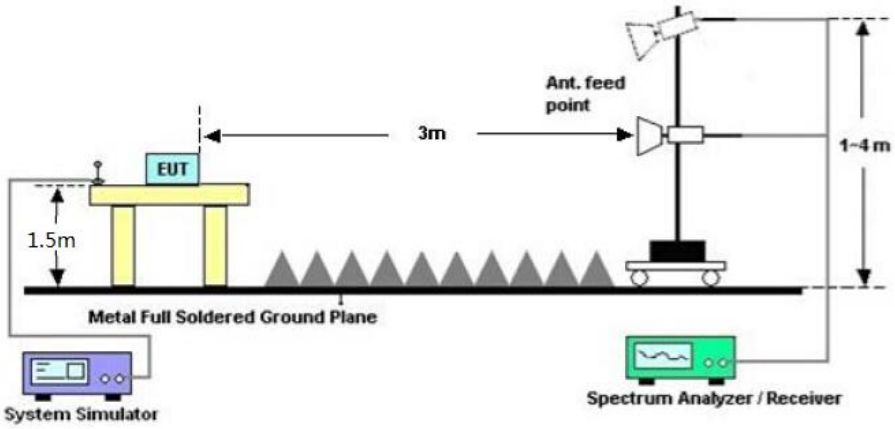
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



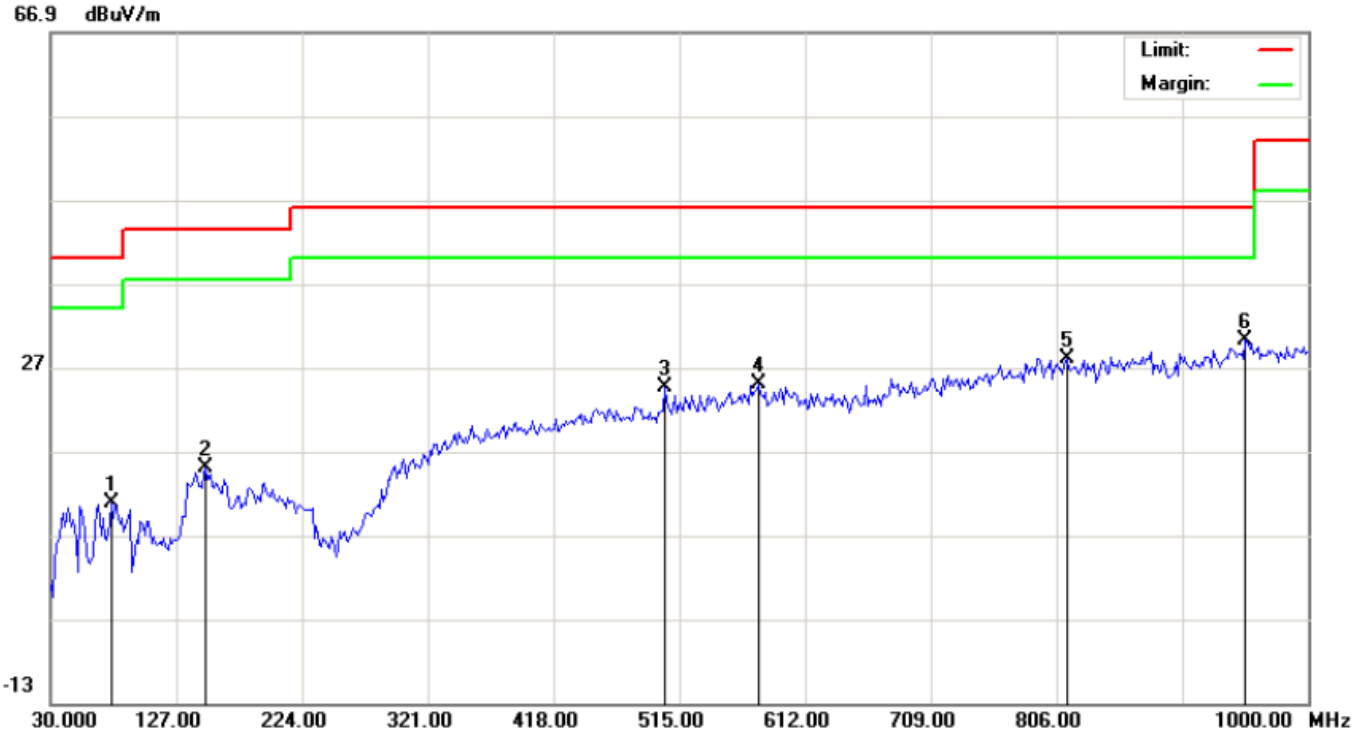
7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION 30MHz- 1GHZ

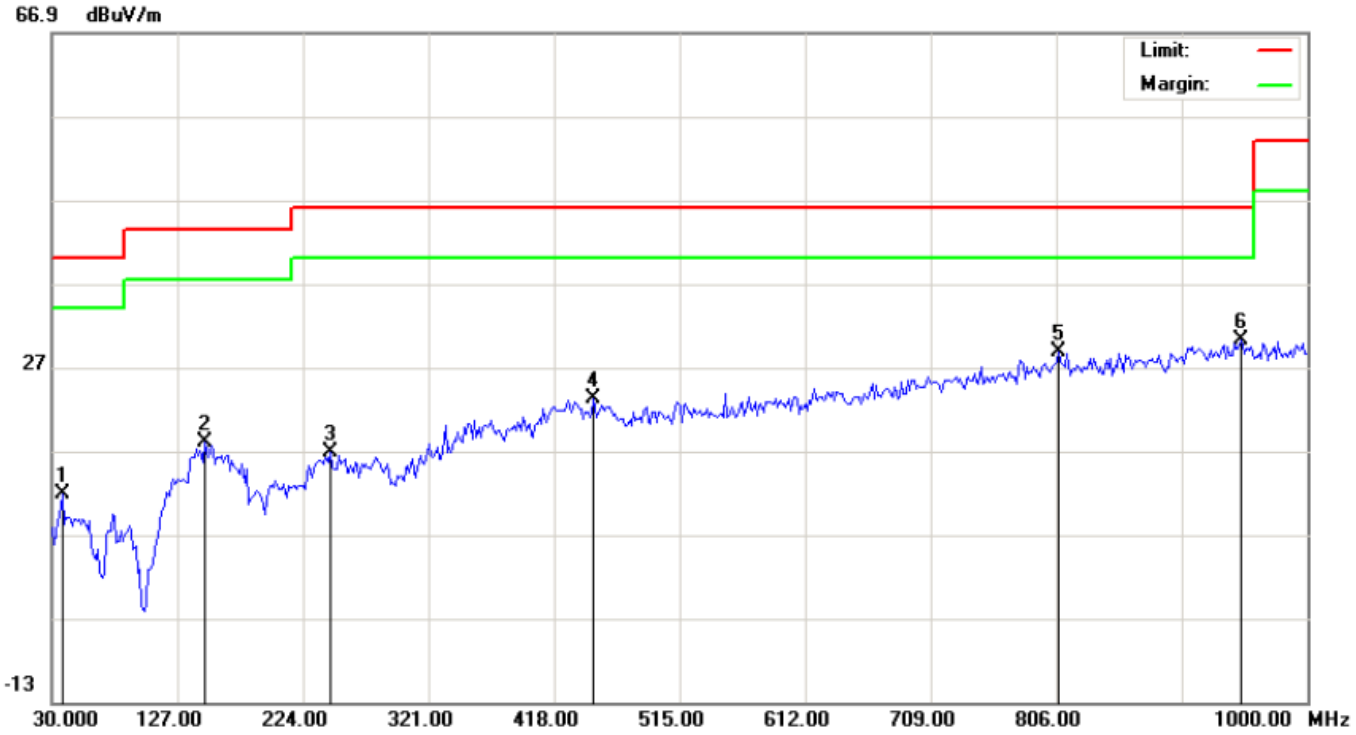
EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 1	Polarization :	Horizontal



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		76.8833	7.28	3.54	10.82	40.00	-29.18	peak			
2		149.6332	2.15	12.85	15.00	43.50	-28.50	peak			
3		503.6832	3.38	21.23	24.61	46.00	-21.39	peak			
4		576.4333	1.82	23.14	24.96	46.00	-21.04	peak			
5		814.0833	0.71	27.32	28.03	46.00	-17.97	peak			
6	*	951.5000	0.15	29.99	30.14	46.00	-15.86	peak			

RESULT: PASS

EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 1	Polarization：	Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		38.0833	5.34	6.39	11.73	40.00	-28.27	peak			
2		148.0166	2.71	15.25	17.96	43.50	-25.54	peak			
3		245.0166	3.33	13.41	16.74	46.00	-29.26	peak			
4		448.7167	2.59	20.55	23.14	46.00	-22.86	peak			
5		807.6167	1.46	27.32	28.78	46.00	-17.22	peak			
6	*	948.2667	0.30	29.95	30.25	46.00	-15.75	peak			

RESULT: PASS

Note:

Factor=Antenna Factor + Cable loss, Margin=Result-Limit.

The “Factor” value can be calculated automatically by software of measurement system.

The mode 1 is the worst case, and only the data of the worst case recorded in this test report.

RADIATED EMISSION ABOVE 1GHZ

EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 1	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2408.013	99.71	-9.37	90.34	114	-23.66	peak
2408.013	94.54	-9.37	85.17	94	-8.83	AVG
4816.026	42.36	3.74	46.1	74	-27.9	peak
4816.026	37.74	3.74	41.48	54	-12.52	AVG
7224.039	39.42	8.14	47.56	74	-26.44	peak
7224.039	34.11	8.14	42.25	54	-11.75	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 1	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2408.013	97.21	-9.37	87.84	114	-26.16	peak
2408.013	92.74	-9.37	83.37	94	-10.63	AVG
4816.026	41.55	3.74	45.29	74	-28.71	peak
4816.026	37.08	3.74	40.82	54	-13.18	AVG
7224.039	39.42	8.14	47.56	74	-26.44	peak
7224.039	34.81	8.14	42.95	54	-11.05	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 2	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2440.016	99.35	-9.63	89.72	114	-24.28	peak
2440.016	94.02	-9.63	84.39	94	-9.61	AVG
4880.032	41.75	3.76	45.51	74	-28.49	peak
4880.032	37.27	3.76	41.03	54	-12.97	AVG
7320.048	39.18	8.17	47.35	74	-26.65	peak
7320.048	34.57	8.17	42.74	54	-11.26	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 2	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2440.016	97.53	-9.63	87.9	114	-26.1	peak
2440.016	92.18	-9.63	82.55	94	-11.45	AVG
4880.032	41.64	3.76	45.4	74	-28.6	peak
4880.032	37.12	3.76	40.88	54	-13.12	AVG
7320.048	38.54	8.17	46.71	74	-27.29	peak
7320.048	34.02	8.17	42.19	54	-11.81	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 3	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2474.021	101.09	-9.61	91.48	114	-22.52	peak
2474.021	95.13	-9.61	85.52	94	-8.48	AVG
4948.042	41.85	3.83	45.68	74	-28.32	peak
4948.042	36.24	3.83	40.07	54	-13.93	AVG
7422.063	40.54	8.21	48.75	74	-25.25	peak
7422.063	35.18	8.21	43.39	54	-10.61	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 3	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2474.021	99.12	-9.61	89.51	114	-24.49	peak
2474.021	93.18	-9.61	83.57	94	-10.43	AVG
4948.042	41.66	3.83	45.49	74	-28.51	peak
4948.042	36.02	3.83	39.85	54	-14.15	AVG
7422.063	39.85	8.21	48.06	74	-25.94	peak
7422.063	34.71	8.21	42.92	54	-11.08	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Note: Other emissions from 8G to 25 GHz are considered as ambient noise. No recording in the test report.
Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.
The “Factor” value can be calculated automatically by software of measurement system.

8. BAND EDGE EMISSION

8.1. MEASUREMENT PROCEDURE

1. The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.

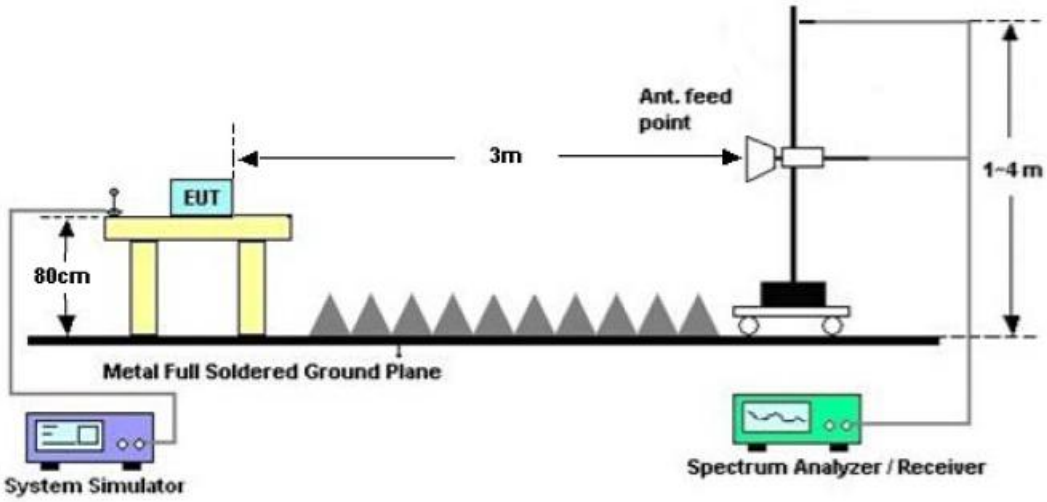
2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz ; VBW=1/on time(1KHz) / Sweep=AUTO

3. Other procedures refer to clause 7.2.

8.2 TEST SETUP

RADIATED EMISSION TEST SETUP



8.3 RADIATED TEST RESULT

Note:

1. Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level
2. The factor had been edited in the “Input Correction” of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μV) to represent the Amplitude. Use the F dB(μV/m) to represent the Field Strength. So A=F.

EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 1	Polarization：	Horizontal

PK Value

AV Value

EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 1	Polarization：	Vertical

PK Value

AV Value

EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 3	Polarization：	Horizontal

PK Value

AV Value

EUT：	2.4GHz Wireless Mouse	Model Name. ：	KM-W8
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC1.5V
Test Mode ：	Mode 3	Polarization：	Vertical

PK Value

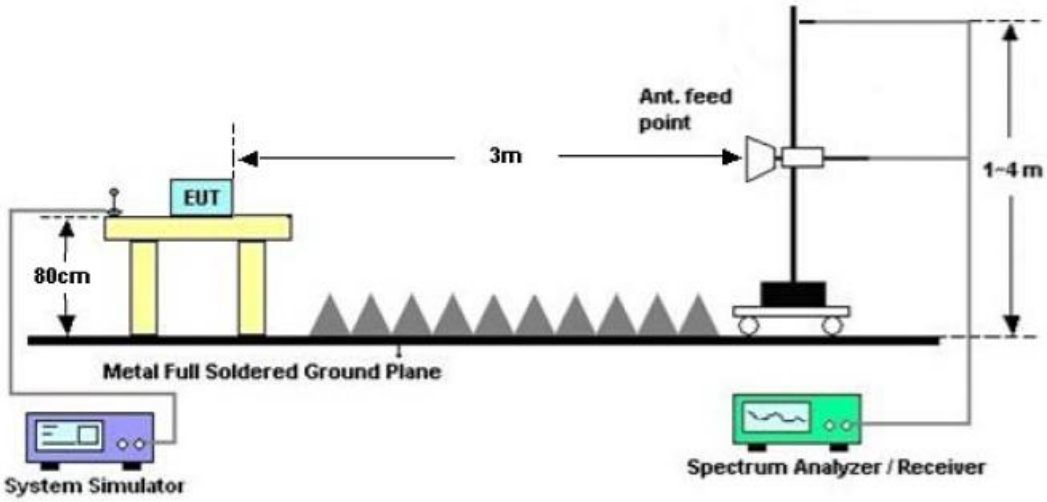
AV Value

9. 20DB BANDWIDTH

9.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hoping channel
   The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

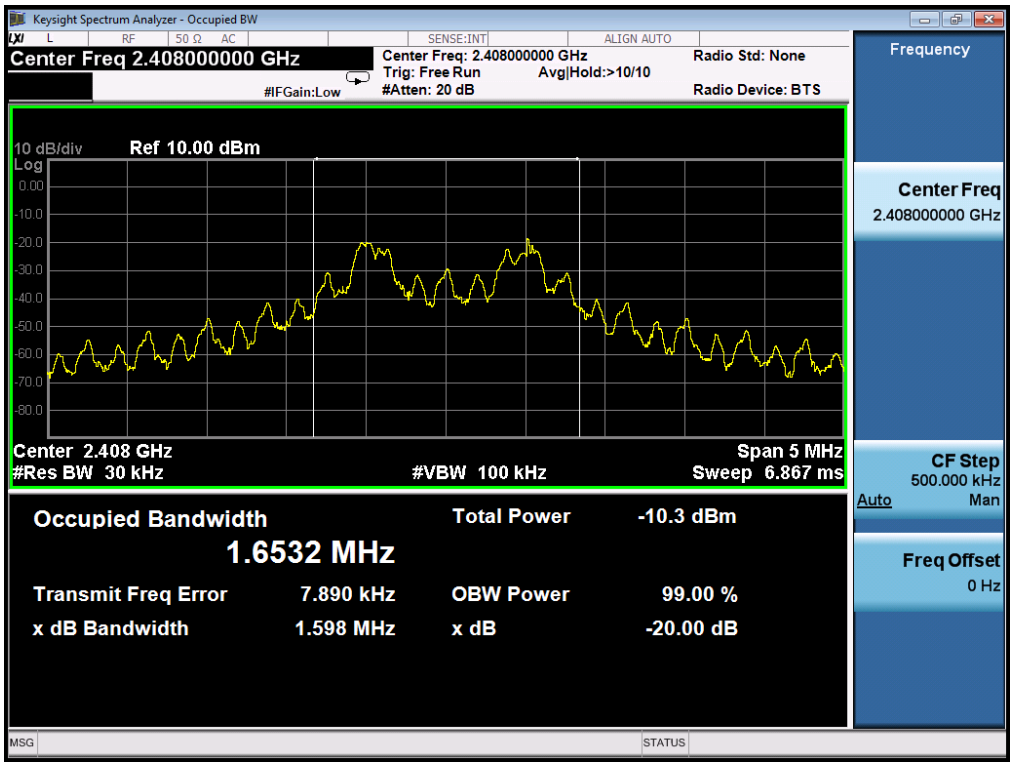


9.3. MEASUREMENT RESULTS

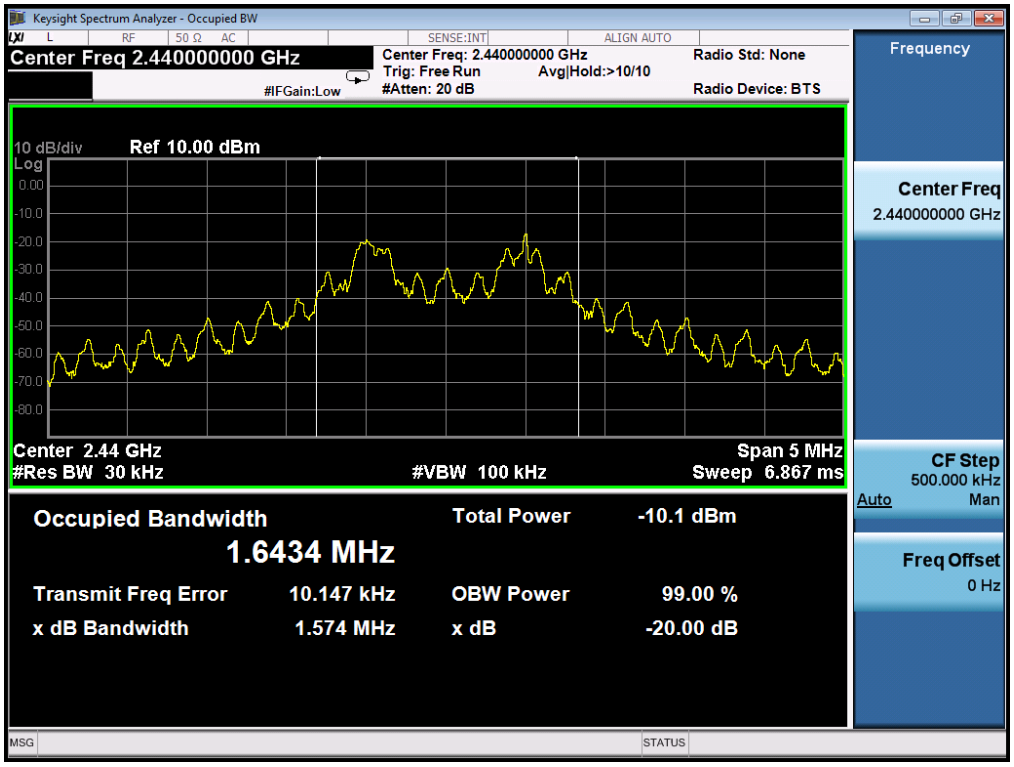
TEST ITEM	20DB BANDWIDTH
TEST MODE	Mode1;Mode2;Mode3

Test Data (MHz)		**Criteria**
Low Channel	1.598	PASS
Middle Channel	1.574	PASS
High Channel	1.735	PASS

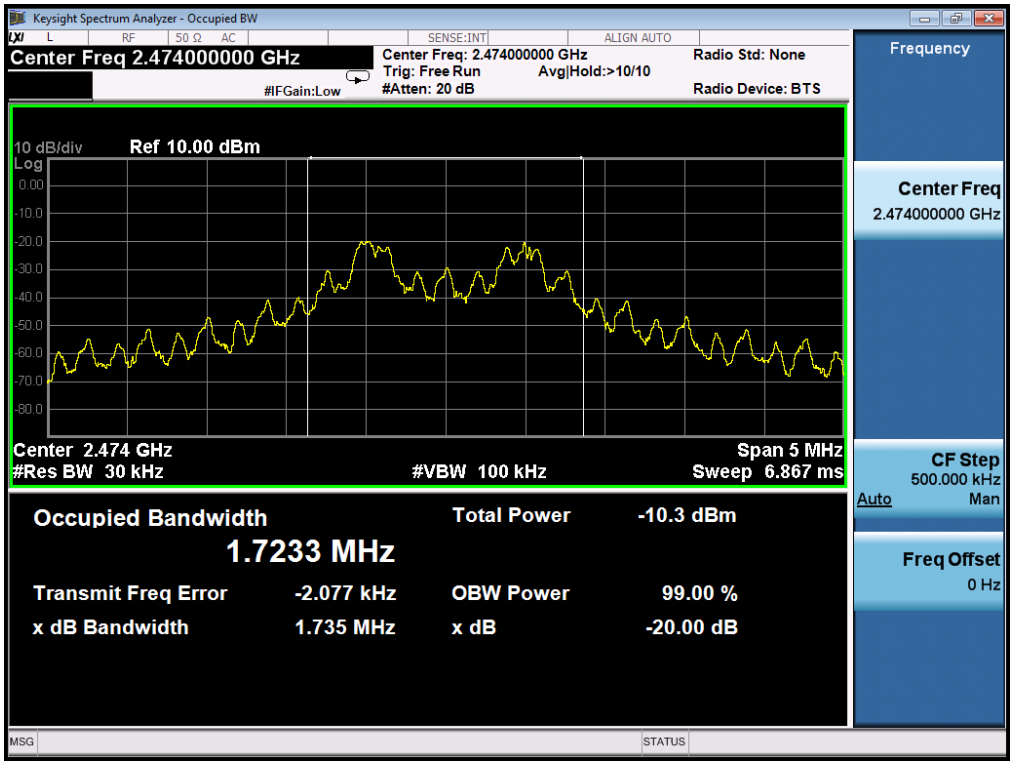
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

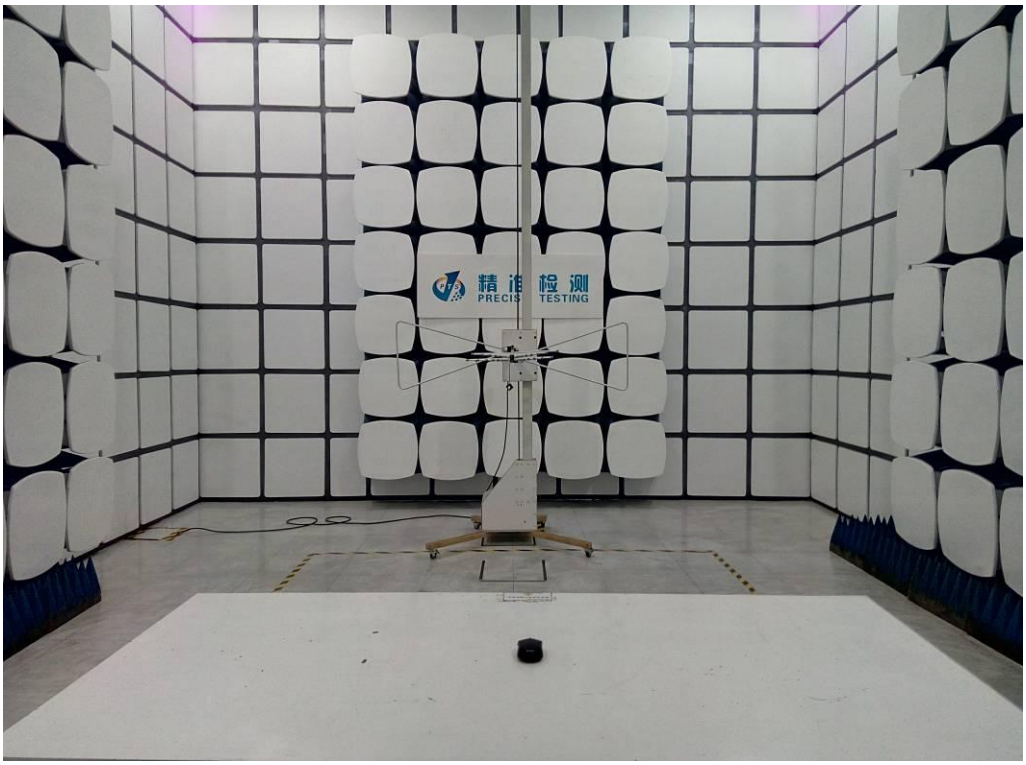


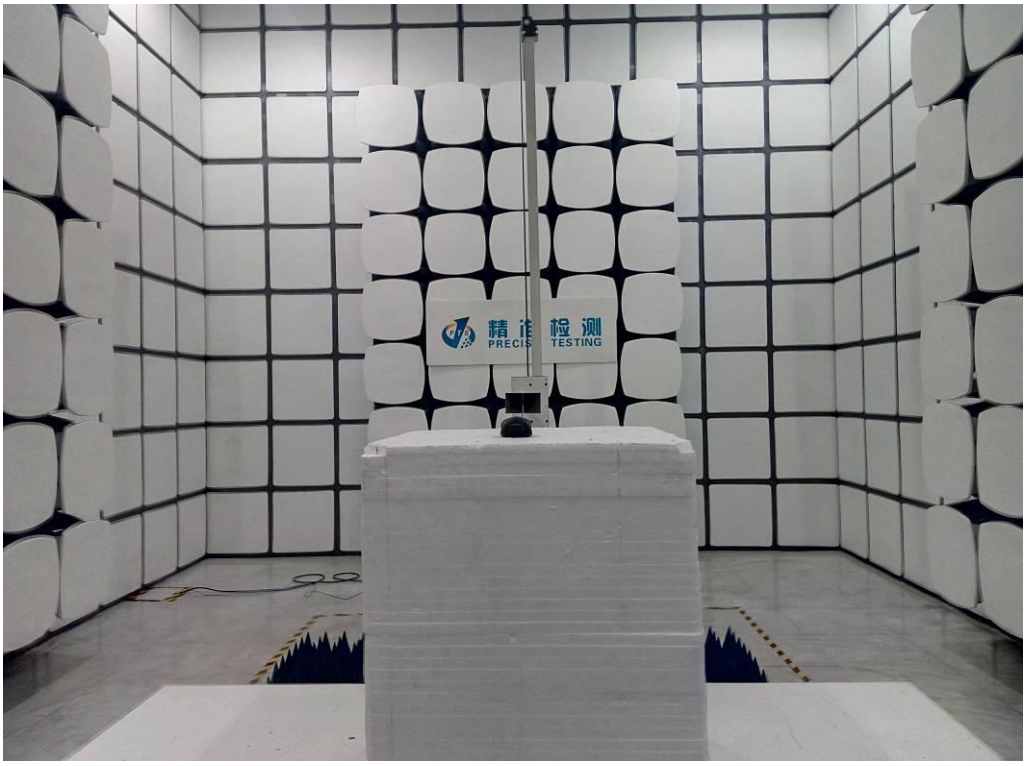
TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP





APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

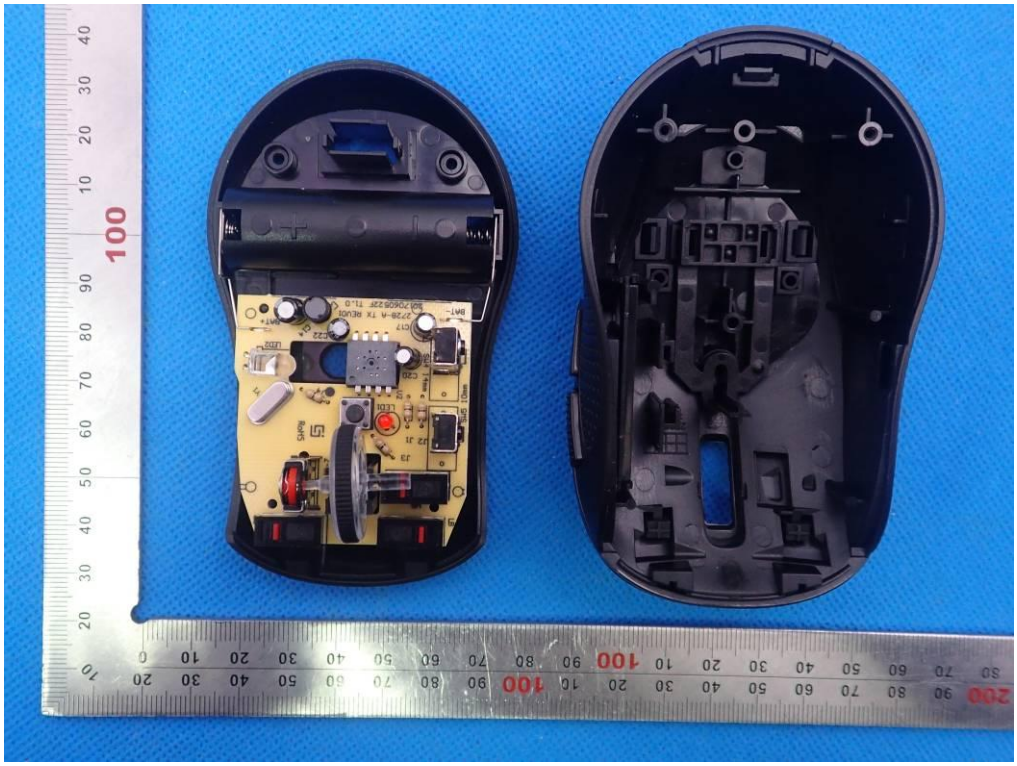
FRONT VIEW OF EUT

BACK VIEW OF EUT

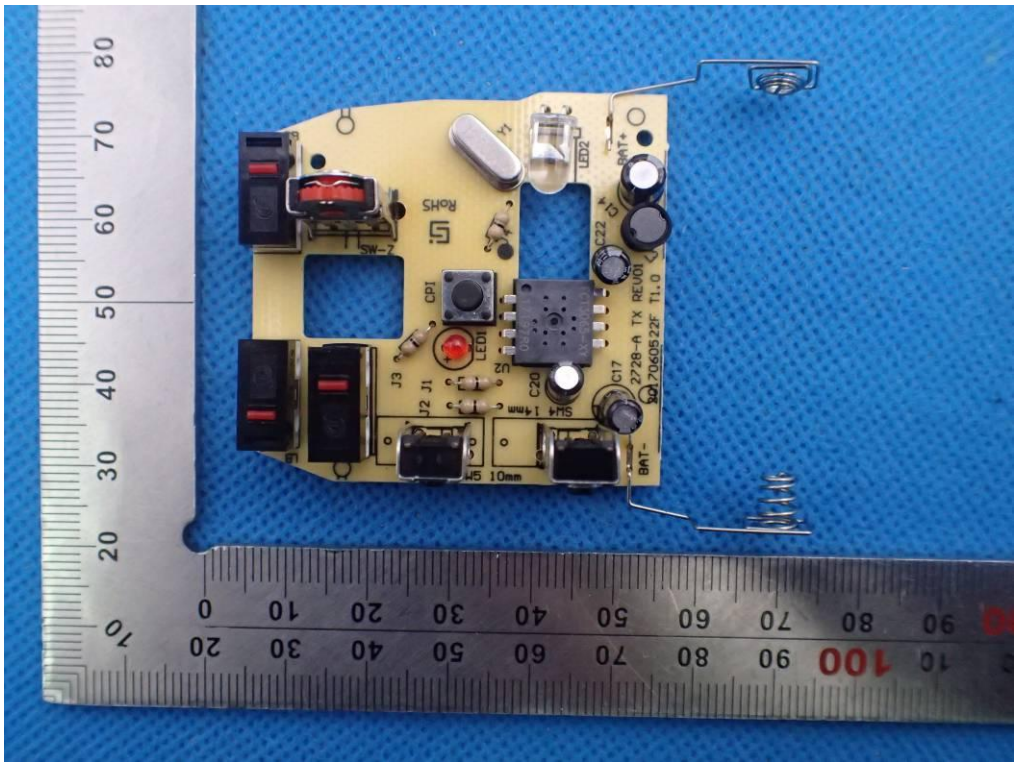
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

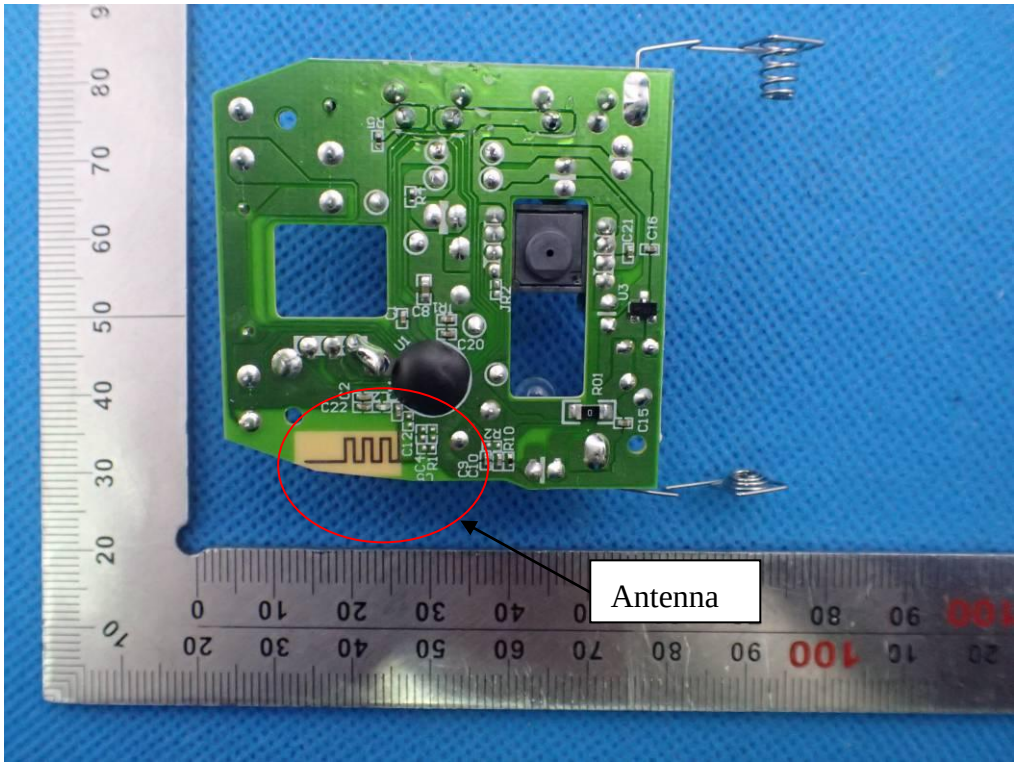
OPEN VIEW OF EUT



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



----END OF REPORT----