

FCC 15.249 & RSS-210 2.4 GHz Report

for

Sunrex Technology Corp

**No. 475, Sec. 4, Chang Ping Road, Daya Dist.,
Taichung City 428, Taiwan**

Brand : hp
Product Name : Wireless Mouse
**Model Name : (1)HSA-S002M (2)HP Wireless
Premium Mouse**
FCC ID : J75HSA-S002M
IC : 7090A-HSAS002M

**Prepared by: : AUDIX Technology Corporation,
EMC Department**



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TEST REPORT CERTIFICATION

Applicant : Sunrex Technology Corp
Factory : Jing Mold Electronic Tech. (Shen Zhen) Co., Ltd.
Product Name : Wireless Mouse
Model No. : (1)HSA-S002M (2)HP Wireless Premium Mouse
Serial No. : N/A
Brand : hp
Power Supply : DC 5V

Rules of Compliance and Measurement Standards:

FCC CFR 47 Part 15 Subpart C
RSS-Gen (Issue 4): 2014
RSS-210 (Issue 9): 2016
ANSI C63.10:2013

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Test: 2017. 04. 13 ~ 25

Date of Report: 2017. 04. 26

Producer: 
(Annie Yu/Administrator)

Signatory: 
(Ben Cheng/Manager)

1. REPORT HISTORY

Revision	Date	Revision Summary	Report Number
0	2017. 04. 26	Original Report.	EM-F170131

2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	PASS
15.205/ 15.209/ 15.249(a)	RSS-Gen §8.9 RSS-210 Annex B §B.10	Radiated Band Edge and Radiated Spurious Emission Fundamental Frequency	PASS
----	----	Occupied Bandwidth 99% Power	Reference only
15.203	----	Antenna Requirement	PASS

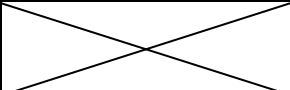
3. GENERAL INFORMATION

3.1. Description of EUT

Product	Wireless Mouse		
Model Number	(1)HSA-S002M (2)HP Wireless Premium Mouse The difference between above models please refer to the following table. The model HSA-S002M was tested in this report.		
	Difference Model	Model Name	Marketing Purpose
	HP Wireless Premium Mouse	Marketing Model Name (MMN)	Different
	HSA-S002M	Regulatory Model Name (RMN)	Different
	Above all models have the same circuit and hardware. The differences are in model name and marketing purpose.		
Serial Number	N/A		
Brand Name	hp		
Applicant	Sunrex Technology Corp No. 475, Sec. 4, Chang Ping Road, Daya Dist., Taichung City 428, Taiwan		
Factory	Jing Mold Electronic Tech. (Shen Zhen) Co., Ltd. Xin Qiao 3rd Industrial Estate Sha Jing, Bao An, Shenzhen, Guangdong, P.R. China		
Transmit Type	1T1R		
USB Cable	Shielded, Detachable, 1.8 m		
Wireless Dongle	hp, Model: ERX-321A FCC ID: J75ERX321A IC: 7090A-ERX321A		
Battery	M/N: CY403035, 3.7V, 400mAh		
Date of Receipt of Sample	2017. 02. 21		

3.2. EUT Specifications Assessed in Current Report

Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (kbps)
2403-2480	89	GFSK	1

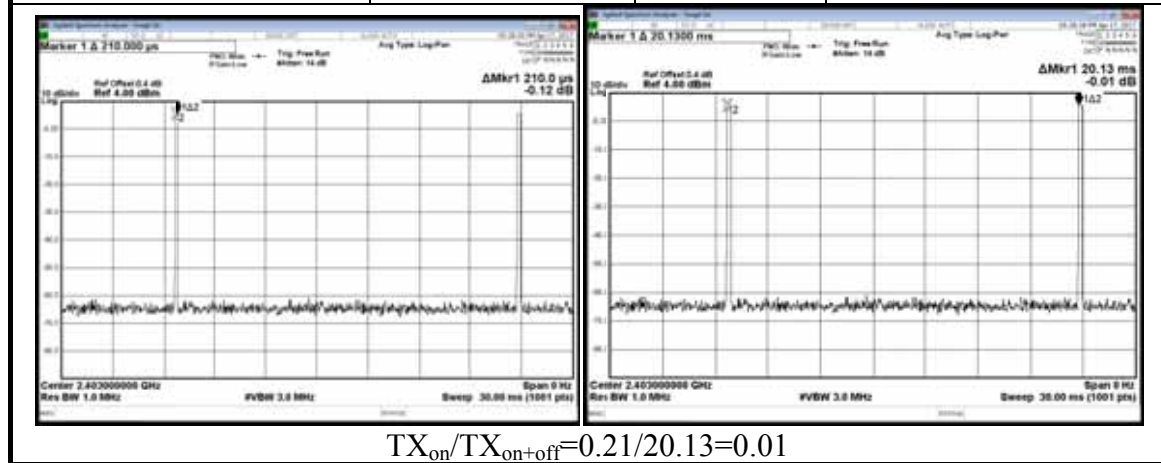
Channel List							
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		
20	2422	40	2442	60	2462		

3.3. Antenna Information

Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
---	Sunrex Technology Corp.	PCB Printed Antenna	2400 ~ 2483.5	2.42105dBi

3.4. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Duty Cycle Factor (dB)
GFSK	0.01	21	-39.63



Note: When duty cycle is less than 98% (0.98) that duty cycle factor $10\log(1/x)$ is needed to add in conducted test items measured in average detector.

AC Conduction	
Test Case	Normal operation

Item		Modulation	Test Channel
Radiated Test Case	Radiated Band Edge ^{Note1}	GFSK	1/78
	Radiated Spurious Emission (30MHz-1GHz) ^{Note1}	GFSK	1/39/78
	Radiated Spurious Emission (Above 1GHz) ^{Note1}	GFSK	1/39/78
	Fundamental Frequency	GFSK	1/39/78
	Occupied Bandwidth 99% Power	GFSK	1/39/78

Note 1:

☐ Mobile Device

☒ Portable Device, and it is operated as lie axis. The worst scenario for Radiated Spurious Emission as follow:

☒ Lie

☐ Side

☐ Stand

Note 2: We performed testing of the highest and lowest data rate.

3.5. Tested Supporting System List

3.5.1. Support Peripheral Unit

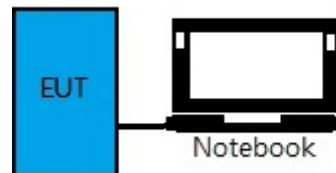
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Notebook PC	lenovo	TP00034A	895097	N/A

3.5.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	Adapter: Chicony, M/N CPA09-A065N1, DC Cord: Unshielded, Undetachable, 1.8m, Bonded two ferrite cores AC Power Cord: Non-Shielded, Detachable, 1.8m

3.6. Setup Configuration

3.6.1. EUT Configuration for Power Line Emission



3.6.2. EUT Configuration for Radiated Emission



3.6.3. EUT Configuration for Conducted Test Items



3.7. Operating Condition of EUT

To press the whole button of EUT is used for enabling EUT RF function under continues transmitting and choosing data rate/ channel.

3.8. Description of Test Facility

Test Firm Name	:	AUDIX Technology Corporation EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
Test Location & Facility	:	No. 7 Shielded Room No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Semi-Anechoic Chamber No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan IC Test Site Registration No.: 5183B-1 Renewal on September 17, 2014 Fully Anechoic Chamber No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan IC Test Site Registration No.: 5183B-4 Renewal on August 31, 2015
NVLAP Lab. Code	:	200077-0
TAF Accreditation No	:	1724
FCC OET Designation	:	TW1004 & TW1090

3.9. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.5dB
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 3.68dB
	Above 1GHz	± 5.82dB

Remark : Uncertainty = $k_{uc}(y)$

Test Item	Uncertainty
Occupied Bandwidth 99% Power	± 1kHz

4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESCI	101276	2017. 03. 23	1 Year
2.	A.M.N.	R&S	ESH2-Z5	100366	2016. 07. 27	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-1539-3	2017. 01. 23	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	101495	2017. 01. 16	1 Year
5.	Test Software	Audix	e3	V.120619C	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2016. 09. 19	1 Year
2.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2016. 09. 19	1 Year
3.	Test Receiver	R & S	ESCS30	100338	2016. 06. 22	1 Year
4.	Amplifier	HP	8447D	2944A06305	2017. 02. 16	1 Year
5.	Amplifier	HP	8449B	3008A02678	2017. 03. 06	1 Year
6.	Bilog Antenna	TESEQ	CBL6112D	33821	2017. 01. 21	1 Year
7.	Horn Antenna	ETS-Lindgren	3117	00135902	2017. 03. 08	1 Year
8.	2.4GHz Notch Filter	K&L	7NSL10-244 1.5E130.5-00	1	2016. 07. 27	1 Year
9.	Test Software	Audix	e3	V.6.1206197	N.C.R.	N.C.R.
10.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

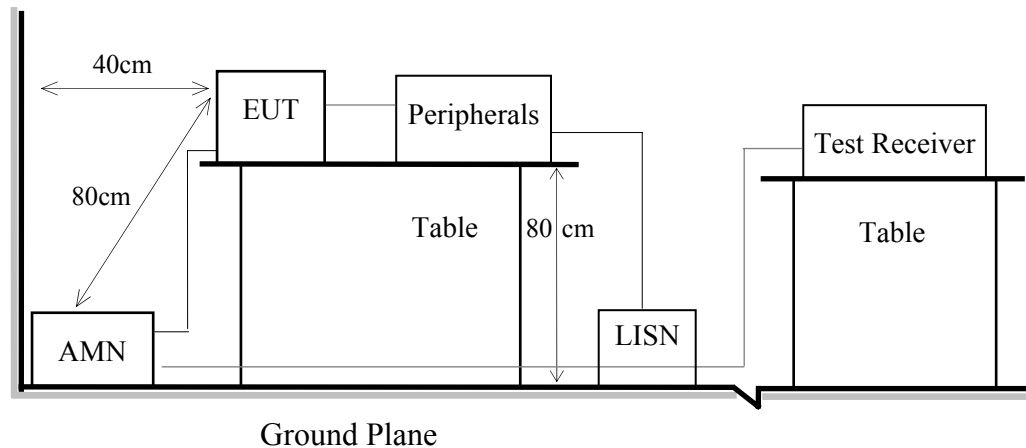
4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	2016. 06. 07	1 Year

5. CONDUCTED EMISSION MEASUREMENT

5.1. Block Diagram of Test Setup

Shielded Room Setup Diagram



5.2. Power Line Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

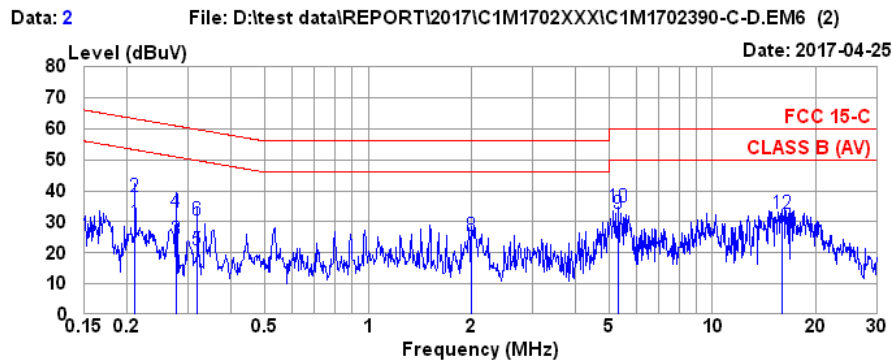
5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Conducted Emission Measurement Results

PASSED.

Test Date	2017/04/25	Temp./Hum.	25 /50%
Test Voltage	AC 120V/60Hz (via USB)		



Site no. : No.7 Shielded Room Data no. : 2
Condition : ESH2-Z5 366(ADAPTER) Phase : NEUTRAL
Limit : FCC 15-C
Env. / Ins. : 25°C / 50% ESCI(1276) Engineer : Nick Du
EUT : HSA-S002M
Power Rating : 120Vac/60Hz
Test Mode : Charge

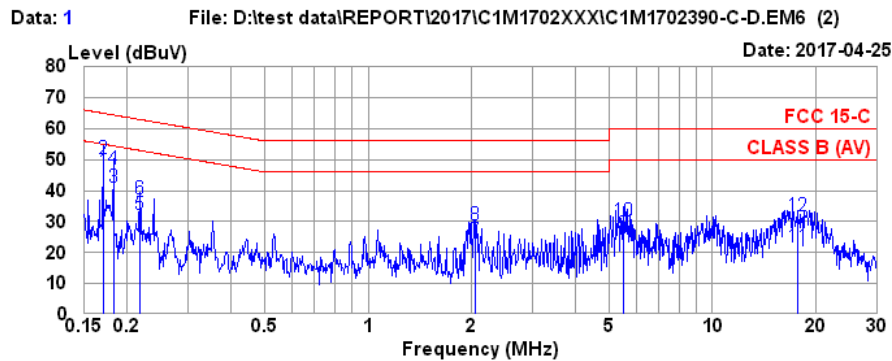
	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.211	0.17	0.04	9.85	19.76	29.82	53.18	23.36	Average
2	0.211	0.17	0.04	9.85	28.24	38.30	63.18	24.88	QP
3	0.277	0.18	0.04	9.85	14.06	24.13	50.90	26.77	Average
4	0.277	0.18	0.04	9.85	22.93	33.00	60.90	27.90	QP
5	0.320	0.18	0.04	9.85	10.92	20.99	49.71	28.72	Average
6	0.320	0.18	0.04	9.85	20.51	30.58	59.71	29.13	QP
7	1.991	0.25	0.07	9.96	10.91	21.19	46.00	24.81	Average
8	1.991	0.25	0.07	9.96	15.35	25.63	56.00	30.37	QP
9	5.333	0.39	0.12	9.86	22.17	32.54	50.00	17.46	Average
10	5.333	0.39	0.12	9.86	24.34	34.71	60.00	25.29	QP
11	15.970	0.84	0.22	9.91	13.29	24.26	50.00	25.74	Average
12	15.970	0.84	0.22	9.91	21.73	32.70	60.00	27.30	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector,
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

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New Taipei City244, Taiwan

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Fax: +886 2 26099303

Test Date	2017/04/25	Temp./Hum.	25 /50%
Test Voltage	AC 120V/60Hz (via USB)		



Site no. : No.7 Shielded Room Data no. : 1
Condition : ESH2-Z5 366(ADAPTER) Phase : LINE
Limit : FCC 15-C
Env. / Ins. : 25°C / 50% ESCI(1276) Engineer : Nick Du
EUT : HSA-S002M
Power Rating : 120Vac/60Hz
Test Mode : Charge

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.170	0.17	0.03	9.85	36.24	46.29	54.94	8.65	Average
2	0.170	0.17	0.03	9.85	40.05	50.10	64.94	14.84	QP
3	0.182	0.17	0.04	9.85	31.02	41.08	54.37	13.29	Average
4	0.182	0.17	0.04	9.85	37.00	47.06	64.37	17.31	QP
5	0.217	0.16	0.04	9.85	22.27	32.32	52.92	20.60	Average
6	0.217	0.16	0.04	9.85	27.28	37.33	62.92	25.59	QP
7	2.044	0.25	0.07	9.96	13.60	23.88	46.00	22.12	Average
8	2.044	0.25	0.07	9.96	18.81	29.09	56.00	26.91	QP
9	5.505	0.41	0.13	9.87	15.41	25.82	50.00	24.18	Average
10	5.505	0.41	0.13	9.87	19.94	30.35	60.00	29.65	QP
11	17.661	1.02	0.23	9.92	10.48	21.65	50.00	28.35	Average
12	17.661	1.02	0.23	9.92	20.72	31.89	60.00	28.11	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector,
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

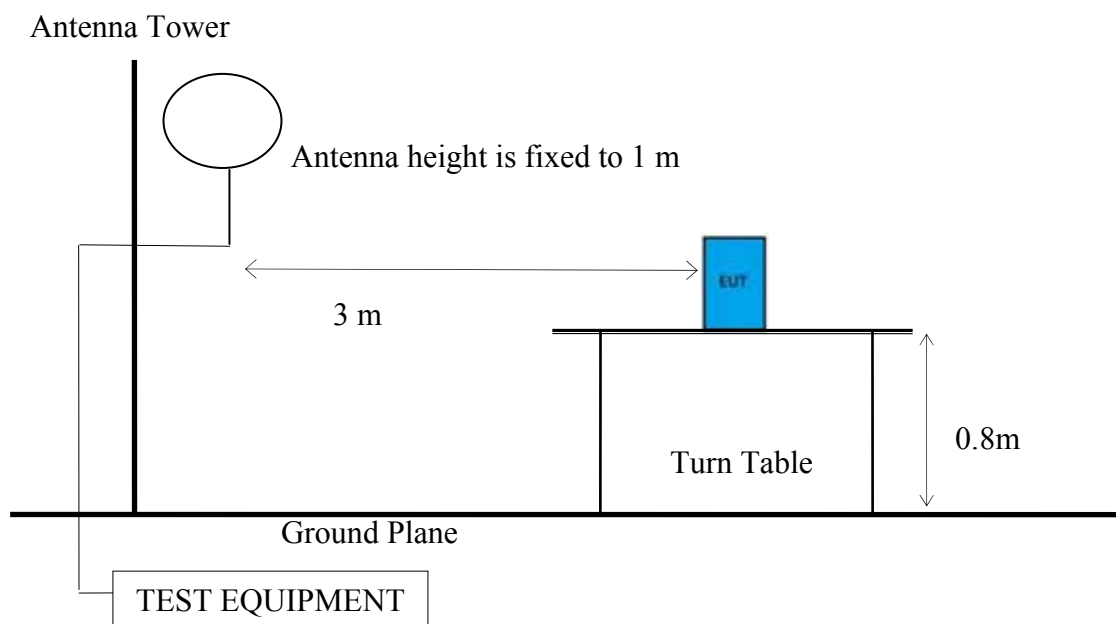
6. RADIATED EMISSION MEASUREMENT

6.1. Block Diagram of Test Setup

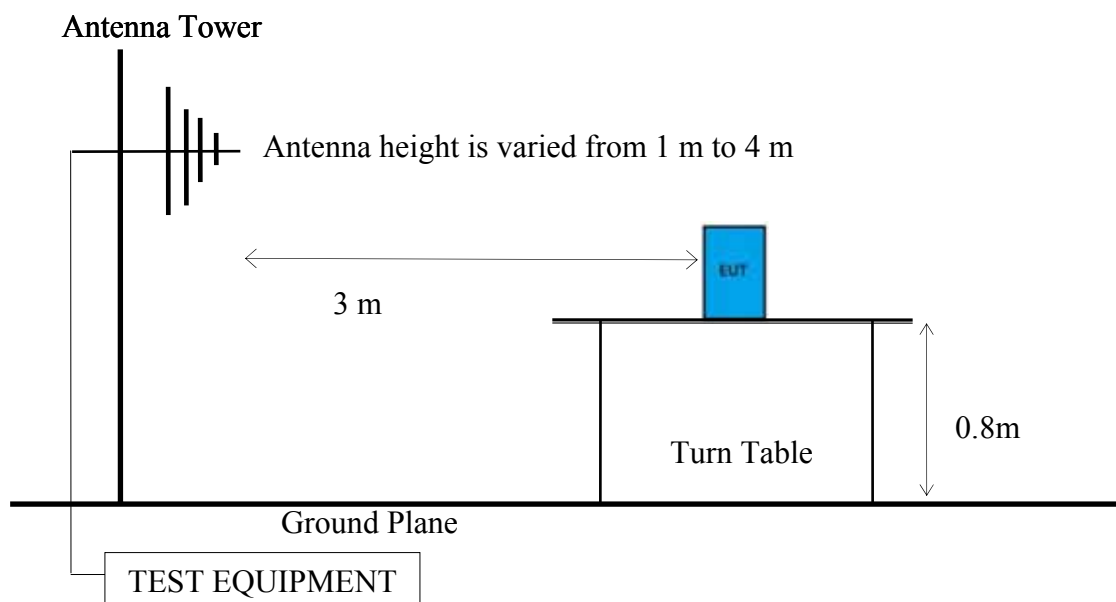
6.1.1. Block Diagram of EUT

Indicated as section 3.6

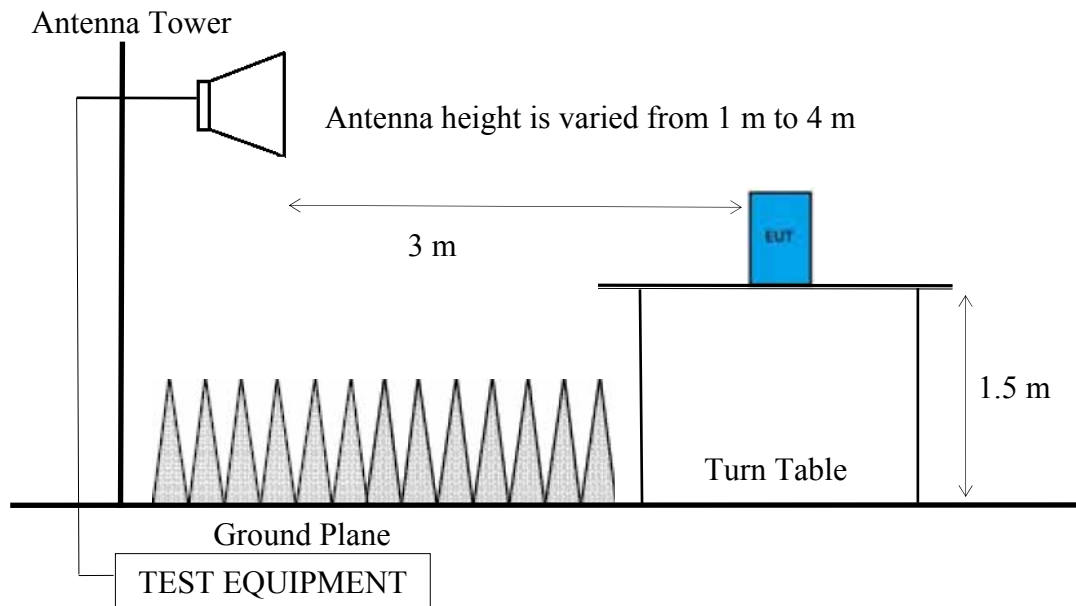
6.1.2. Semi Anechoic Chamber (3m) Setup Diagram for 9kHz-30MHz



6.1.3. Semi Anechoic Chamber (3m) Setup Diagram for 30-1000 MHz



6.1.4. Fully Anechoic Chamber (3m) Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

6.2.1. General Limit

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance (m)	Limits	
		dB μ V/m	μ V/m
0.009 - 0.490	300	67.6	2400/kHz
0.490 - 1.705	30	87.6	24000/kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dB μ V/m (Peak) 54.0 dB μ V/m (Average)	

Remark : (1) dB μ V/m = 20 log (μ V/m)

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.2.2. Limite for Fundamental & Harmonics Frequency

Fundamental Frequency	Field strength of fundamental		Field strength of harmonics	
	mV/m	dB μ V/m	μ V/m	dB μ V/m
902-928MHz	50	114 (Peak)	500	74 (Peak)
		94 (Average)		54 (Average)
2400-2483.5MHz	50	114 (Peak)	500	74 (Peak)
		94 (Average)		54 (Average)
5725-5875MHz	50	114 (Peak)	500	74 (Peak)
		94 (Average)		54 (Average)
24.0-24.25GHz	250	128 (Peak)	2500	88 (Peak)
		108 (Average)		68 (Average)

Remark: mV/m=1000 μ V/m; dB μ V/m = 20 log (μ V/m)

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 25GHz:

The EUT setup on the turn find table which has 80 cm (for 30-1000 MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1 GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required. Otherwise using Q.P. for finally measurement.

Frequency above 1GHz to 10th harmonic:

Peak Detector:

- (1) RBW = 1MHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the average detector is not required. Otherwise using average for finally measurement.

Average Detector:☐ **Option 1:**

(1) RBW = 1MHz

(2) VBW $\geq$ 1/ T.N/A: 1/ T is not implemented when duty cycle presented in section 3.4 is $\geq$ 98 %.

(1) Detector = Peak.

(2) Sweep time = auto.

(3) Trace mode = max hold.

(4) Allow sweeps to continue until the trace stabilizes.

☒ **Option 2:**

Average Emission Level= Peak Emission Level+ D.C.C.F.

6.4. Measurement Result Explanation☒ Peak Emission Level=Antenna Factor + Cable Loss + Meter Reading☐ Average Emission Level=Antenna Factor + Cable Loss + Meter Reading☒ Average Emission Level= Peak Emission Level+ DCCFDuty Cycle Correction Factor (DCCF)= $20\log(TX_{on}/TX_{on+off})$ presented in section 3.4☐ EPR= Peak Emission Level-95.2dB-2.14dB**6.5. Test Results****PASSED.**

Test Date	2017/04/13	Temp./Hum.	26 /43%
Test Voltage	DC 3.7V (Via Battery)		

6.5.1. Emissions within Restricted Frequency Bands

6.5.1.1. Frequency 9kHz~30MHz

The emissions (9kHz~30MHz) not reported for there is no emission be found.

6.5.1.2. Frequency Below 1 GHz

Modulation	Charge	Frequency	---
------------	--------	-----------	-----

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
245.34	18.62	3.77	10.15	32.54	46.00	13.46	Peak
375.32	22.10	5.29	2.09	29.48	46.00	16.52	Peak
474.26	23.51	6.22	3.61	33.34	46.00	12.66	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
236.61	18.12	3.69	5.55	27.36	46.00	18.64	Peak
474.26	23.51	6.22	1.91	31.64	46.00	14.36	Peak
964.11	27.60	8.61	2.55	38.76	54.00	15.24	Peak

Modulation	GFSK	Frequency	TX 2403MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
328.76	20.73	4.71	2.74	28.18	46.00	17.82	Peak
481.05	23.58	6.27	2.48	32.33	46.00	13.67	Peak
859.35	26.91	7.95	2.27	37.13	46.00	8.87	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
232.73	17.88	3.66	4.77	26.31	46.00	19.69	Peak
476.20	23.53	6.23	2.83	32.59	46.00	13.41	Peak
589.69	24.64	6.72	2.25	33.61	46.00	12.39	Peak

Modulation	GFSK	Frequency	TX 2441MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
338.46	21.02	4.83	2.46	28.31	46.00	17.69	Peak
474.26	23.51	6.22	2.38	32.11	46.00	13.89	Peak
580.96	24.56	6.69	1.25	32.50	46.00	13.50	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
230.79	17.78	3.64	5.50	26.92	46.00	19.08	Peak
335.55	20.95	4.80	1.95	27.70	46.00	18.30	Peak
473.29	23.51	6.22	2.93	32.66	46.00	13.34	Peak

Modulation	GFSK	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
331.67	20.80	4.74	3.73	29.27	46.00	16.73	Peak
476.20	23.53	6.23	1.70	31.46	46.00	14.54	Peak
636.25	25.09	6.88	1.54	33.51	46.00	12.49	Peak

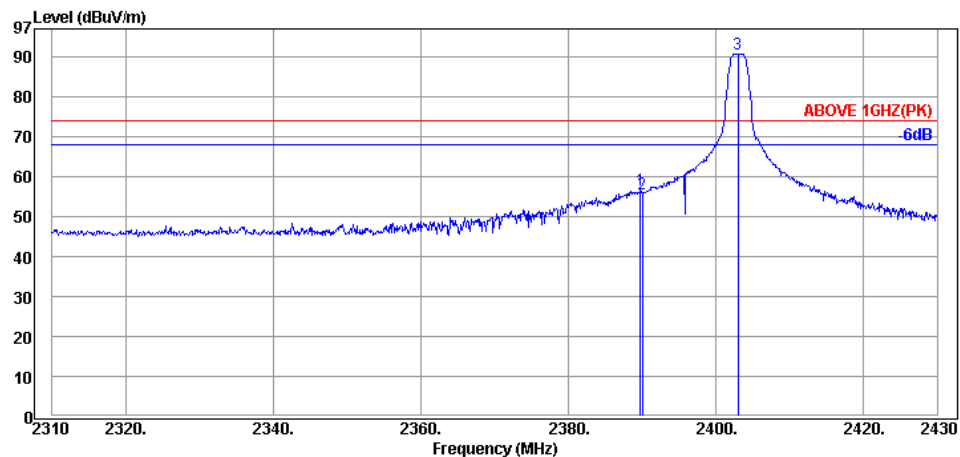
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
240.49	18.37	3.73	5.16	27.26	46.00	18.74	Peak
471.35	23.50	6.20	2.30	32.00	46.00	14.00	Peak
630.43	25.03	6.86	2.04	33.93	46.00	12.07	Peak

6.5.1.3. Frequency Above 1 GHz to 10th harmonics

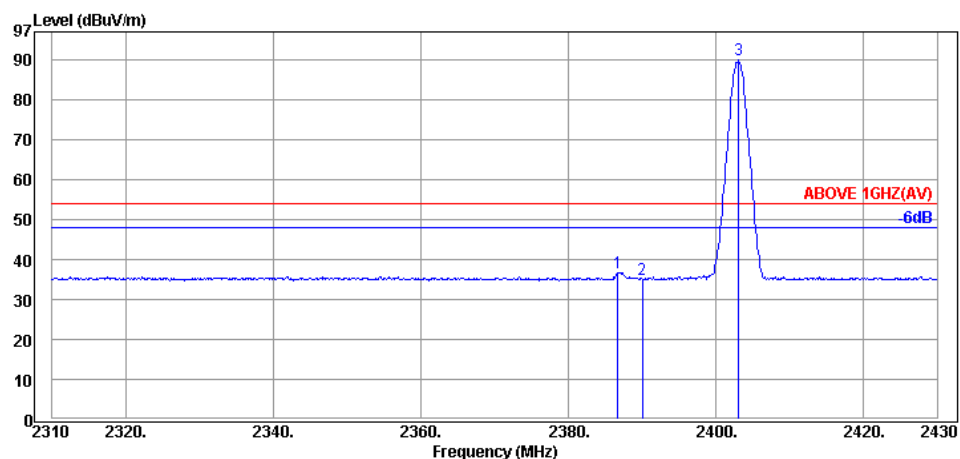
Band Edge:

Modulation	GFSK	Frequency	TX 2403MHz
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Antenna at Horizontal Polarization

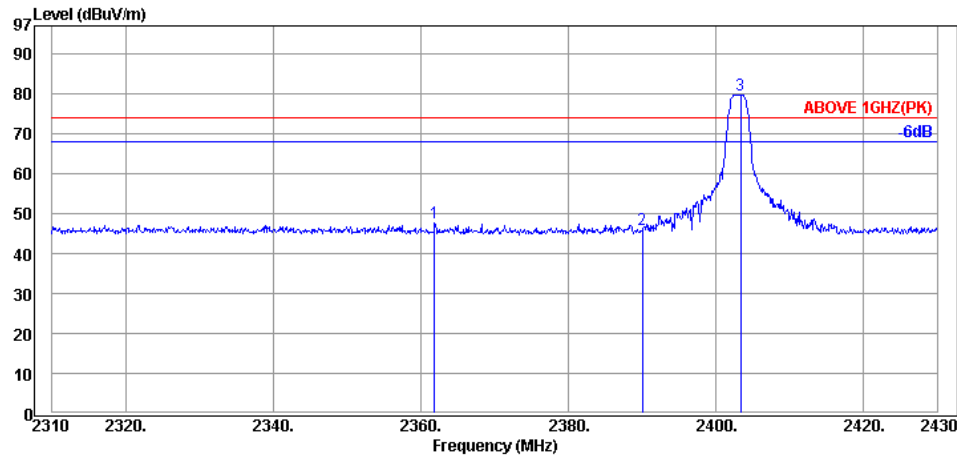
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.80	31.68	6.08	18.76	56.52	74.00	17.48	Peak
2390.04	31.68	6.08	17.82	55.58	74.00	18.42	Peak
2403.00	31.69	6.10	52.83	90.62	---	---	Peak



Antenna at Horizontal Polarization

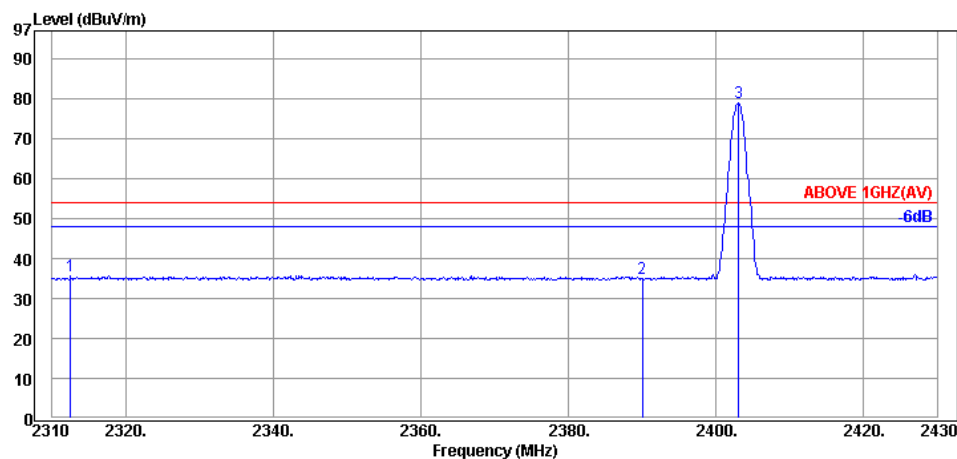
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2386.68	31.68	6.07	-1.12	36.63	54.00	17.37	Average
2390.04	31.68	6.08	-2.65	35.11	54.00	18.89	Average
2403.12	31.69	6.10	52.08	89.87	---	---	Average

Modulation	GFSK	Frequency	TX 2403MHz
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Antenna at Vertical Polarization

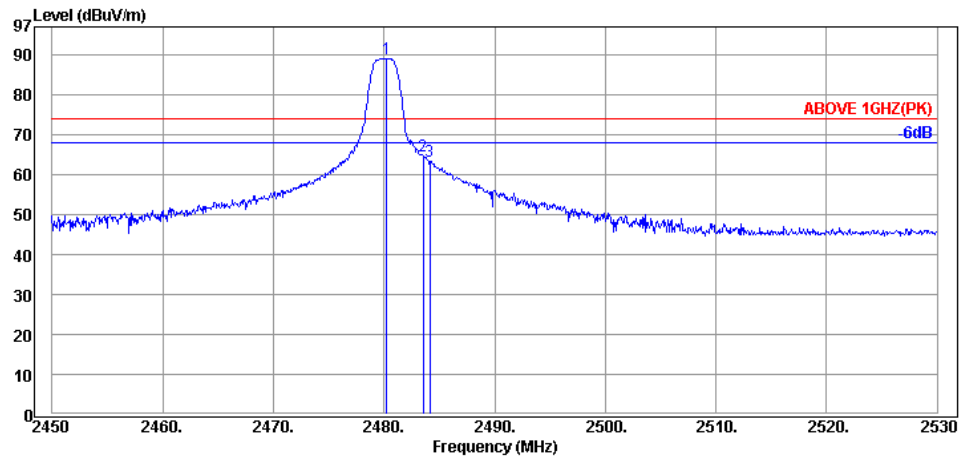
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2361.84	31.64	6.04	9.84	47.52	74.00	26.48	Peak
2390.04	31.68	6.08	8.39	46.15	74.00	27.85	Peak
2403.36	31.69	6.10	41.88	79.67	---	---	Peak



Antenna at Vertical Polarization

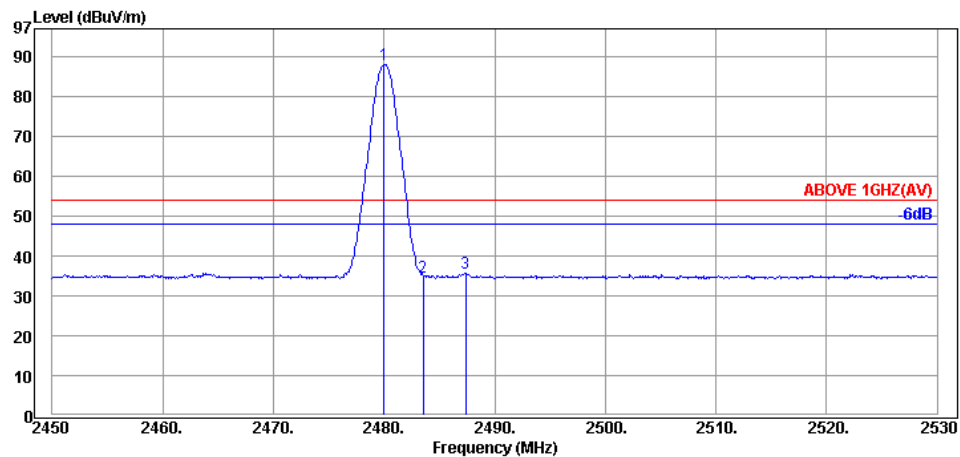
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2312.52	31.59	5.98	-1.87	35.70	54.00	18.30	Average
2390.04	31.68	6.08	-2.74	35.02	54.00	18.98	Average
2403.12	31.69	6.10	41.34	79.13	---	---	Average

Modulation	GFSK	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

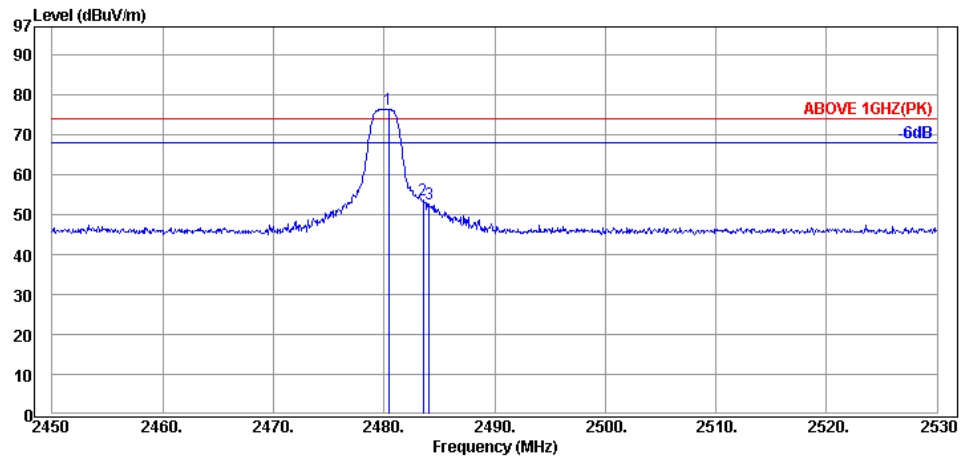
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.24	31.78	6.18	50.92	88.88	---	---	Peak
2483.52	31.78	6.19	26.75	64.72	74.00	9.28	Peak
2484.16	31.78	6.19	25.31	63.28	74.00	10.72	Peak



Antenna at Horizontal Polarization

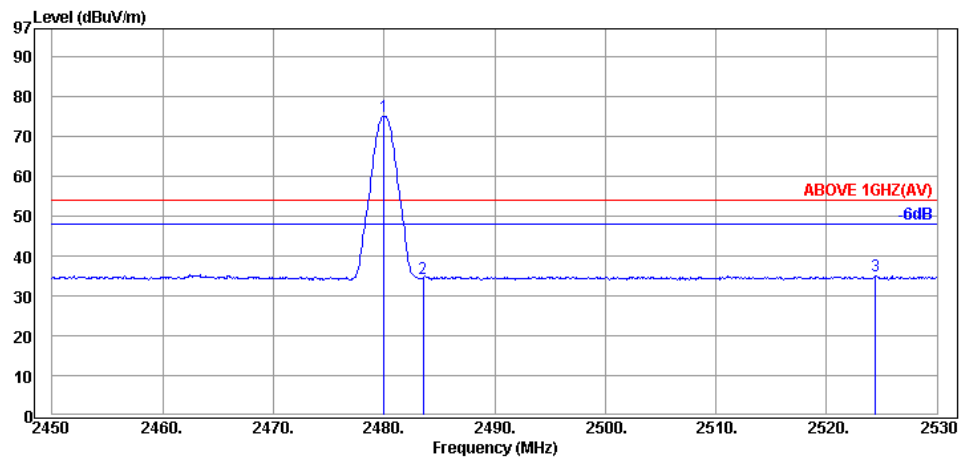
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.00	31.78	6.18	50.11	88.07	---	---	Average
2483.52	31.78	6.19	-3.15	34.82	54.00	19.18	Average
2487.36	31.78	6.19	-2.30	35.67	54.00	18.33	Average

Modulation	GFSK	Frequency	TX 2480MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.40	31.78	6.18	38.31	76.27	---	---	Peak
2483.52	31.78	6.19	15.62	53.59	74.00	20.41	Peak
2484.08	31.78	6.19	14.59	52.56	74.00	21.44	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.00	31.78	6.18	37.17	75.13	---	---	Average
2483.52	31.78	6.19	-3.74	34.23	54.00	19.77	Average
2524.40	31.82	6.25	-2.93	35.14	54.00	18.86	Average

6.5.2. Emissions outside the frequency band:

The emissions (up to 25GHz) not reported for there is no emission be found.

Modulation	GFSK	Frequency	TX 2403MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4805.00	33.82	8.87	20.82	63.51	74.00	10.49	Peak
7905.00	35.76	11.59	-0.77	46.58	74.00	27.42	Peak
9610.00	36.61	12.50	-1.21	47.90	74.00	26.10	Peak

Emission Frequency (MHz)	Peak Emission Level (dBμV/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
4805	63.51	-39.63	23.88	54.00	30.12	Average
7090	46.58	-39.63	6.95	54.00	47.05	Average
9610	47.9	-39.63	8.27	54.00	45.73	Average

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4805.00	33.82	8.87	15.08	57.77	74.00	16.23	Peak
7090.00	35.68	10.89	-1.30	45.27	74.00	28.73	Peak
9610.00	36.61	12.50	-1.19	47.92	74.00	26.08	Peak

Emission Frequency (MHz)	Peak Emission Level (dBμV/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
4805	57.77	-39.63	18.14	54.00	35.86	Average
7090	45.27	-39.63	5.64	54.00	48.36	Average
9610	47.92	-39.63	8.29	54.00	45.71	Average

Modulation	T-FHSS	Frequency	TX 2441MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4885.00	33.86	9.14	57.68	66.17	74.00	7.83	Peak
7325.00	35.63	11.95	34.28	47.04	74.00	26.96	Peak
9760.00	36.75	13.48	-1.16	49.07	74.00	24.93	Peak

Emission Frequency (MHz)	Peak Emission Level (dBμV/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
4885	66.17	-39.63	26.54	54.00	27.46	Average
7325	47.04	-39.63	7.41	54.00	46.59	Average
9760	49.07	-39.63	9.44	54.00	44.56	Average

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.00	33.85	9.14	16.42	59.41	74.00	14.59	Peak
7325.00	35.63	11.95	0.07	47.65	74.00	26.35	Peak
9760.00	36.75	13.48	-2.12	48.11	74.00	25.89	Peak

Emission Frequency (MHz)	Peak Emission Level (dBμV/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
4880	59.41	-39.63	19.78	54.00	34.22	Average
7325	47.65	-39.63	8.02	54.00	45.98	Average
9760	48.11	-39.63	8.48	54.00	45.52	Average

Modulation	GFSK	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4960.00	33.88	9.40	23.94	67.22	74.00	6.78	Peak
7440.00	35.61	12.56	-1.76	46.41	74.00	27.59	Peak
9920.00	36.92	13.51	-0.81	49.62	74.00	24.38	Peak

Emission Frequency (MHz)	Peak Emission Level (dBμV/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
4960	67.22	-39.63	27.59	54.00	26.41	Average
7440	46.41	-39.63	6.78	54.00	47.22	Average
9920	49.62	-39.63	9.99	54.00	44.01	Average

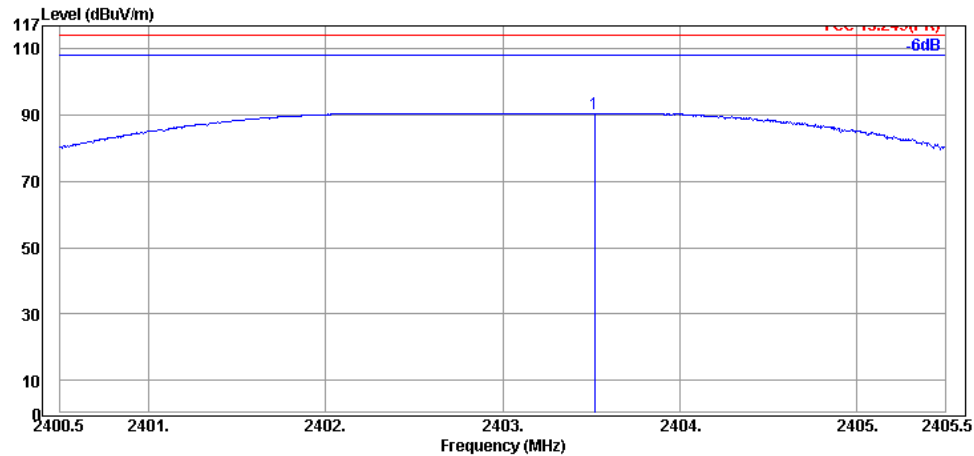
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4960.00	33.88	9.40	20.37	63.65	74.00	10.35	Peak
7440.00	35.61	12.56	-0.82	47.35	74.00	26.65	Peak
9920.00	36.92	13.51	-1.37	49.06	74.00	24.94	Peak

Emission Frequency (MHz)	Peak Emission Level (dBμV/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
4960	63.65	-39.63	24.02	54.00	29.98	Average
7440	47.35	-39.63	7.72	54.00	46.28	Average
9920	49.06	-39.63	9.43	54.00	44.57	Average

6.5.3. Fundamental Frequency:

Modulation	GFSK	Frequency	TX 2403MHz
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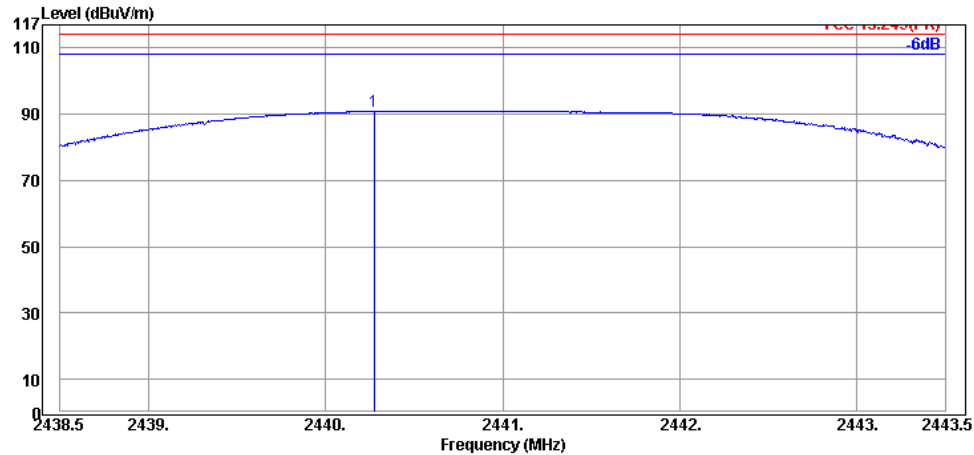
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2403.52	31.69	6.10	52.87	90.66	114.00	23.34	Peak

Emission Frequency (MHz)	Peak Emission Level (dBμV/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2403.52	90.66	-39.63	51.03	94.00	42.97	Average

Remark: Horizontal is the strongest polarization and peak value has complied with limit, so vertical won't be listed in test report.

Modulation	GFSK	Frequency	TX 2441MHz
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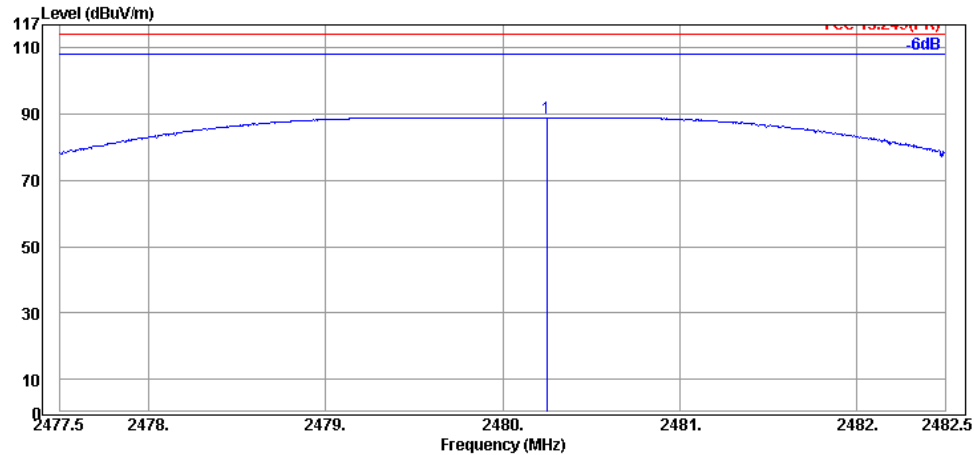
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2440.28	31.74	6.13	52.96	90.83	114.00	23.17	Peak

Emission Frequency (MHz)	Peak Emission Level (dBμV/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2440.28	90.83	-39.63	51.20	94.00	42.80	Average

Remark: Horizontal is the strongest polarization and peak value has complied with limit, so vertical won't be listed in test report.

Modulation	GFSK	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.25	31.78	6.18	50.97	88.93	114.00	25.07	Peak

Emission Frequency (MHz)	Peak Emission Level (dBμV/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2480.25	88.93	-39.63	49.30	94.00	44.70	Average

Remark: Horizontal is the strongest polarization and peak value has complied with limit, so vertical won't be listed in test report.

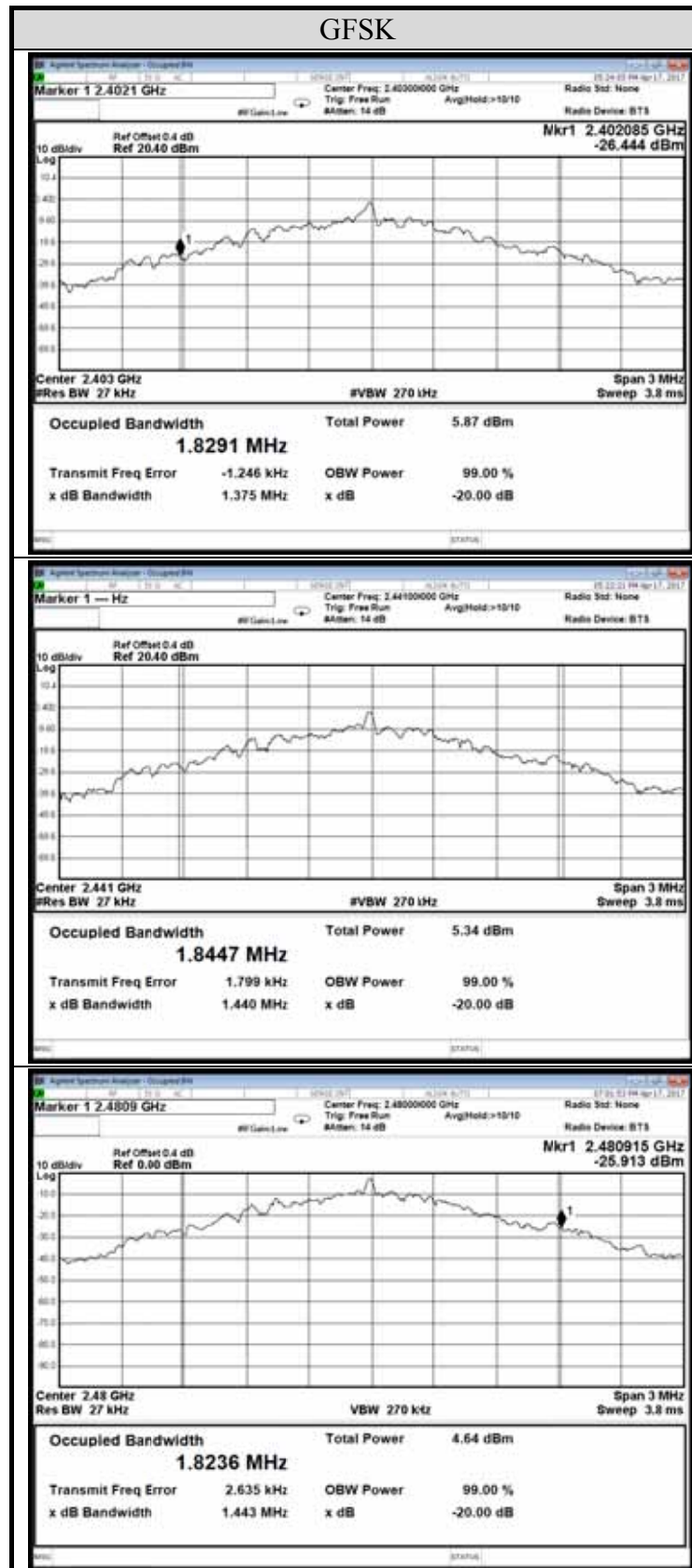
7. OCCUPIED BANDWIDTH 99% POWER MEASUREMENT

Test Date	2017/04/19	Temp./Hum.	26 /43%
Test Voltage	DC 3.7V (Via Battery)		

7.1.1. Occupied Bandwidth 99% Power Result

Modulation Type	Centre Frequency (MHz)	Occupied Bandwidth 99% Power (MHz)
GFSK	2403	1.8291
	2441	1.8447
	2480	1.8236

7.1.2. Measurement Plots



8. DEVIATION TO TEST SPECIFICATIONS

【NONE】



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

APPENDIX A

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APPENDIX A

TEST PHOTOGRAPHS

(Model: (1)HSA-S002M (2)HP Wireless Premium Mouse)

A.1 Conducted Emission Measurement



A.2 Photos of Radiated Emission Measurement

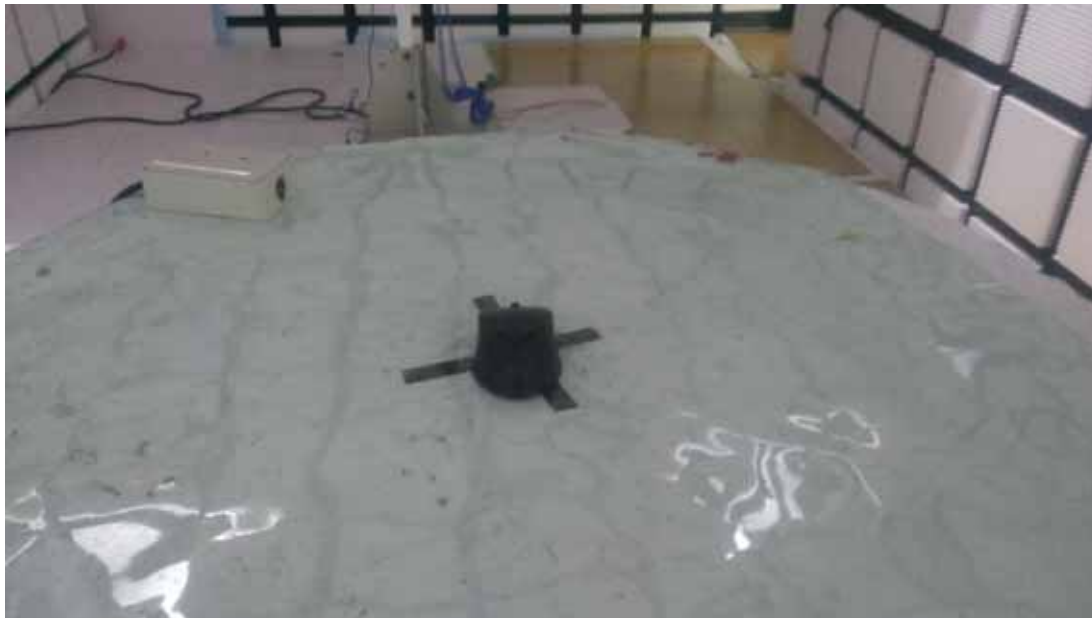
Frequency Below 1GHz



Frequency Above 1GHz



Zoom Size





Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

APPENDIX B

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APPENDIX B

EUT PHOTOGRAPHS

(Model: (1)HSA-S002M (2)HP Wireless Premium Mouse)

Figure 1
General Appearance (Front and Side View)



Figure 2
General Appearance (Back and Side View)



Figure 3
General Appearance (Bottom View)



Figure 4
Internal View (Removed Cover)



Figure 5
Internal View (Battery)



Figure 6
Internal View (Removed Main Board)



Figure 7
Internal View (Main Board, Front View)

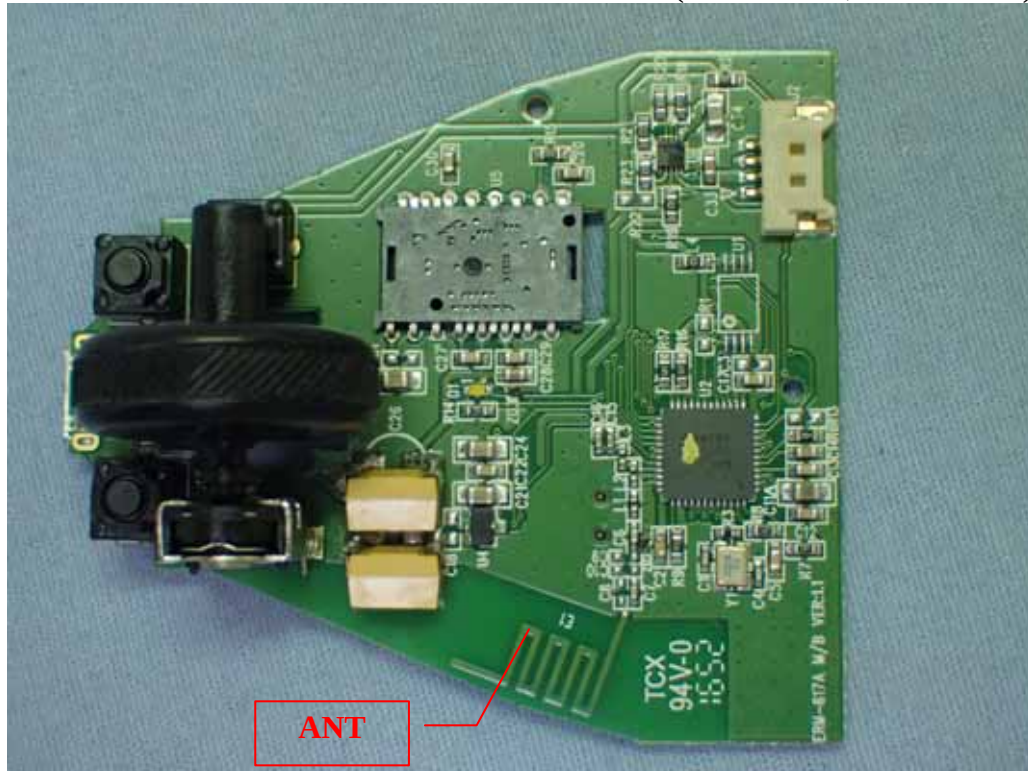


Figure 8
Internal View (Main Board, Back View)

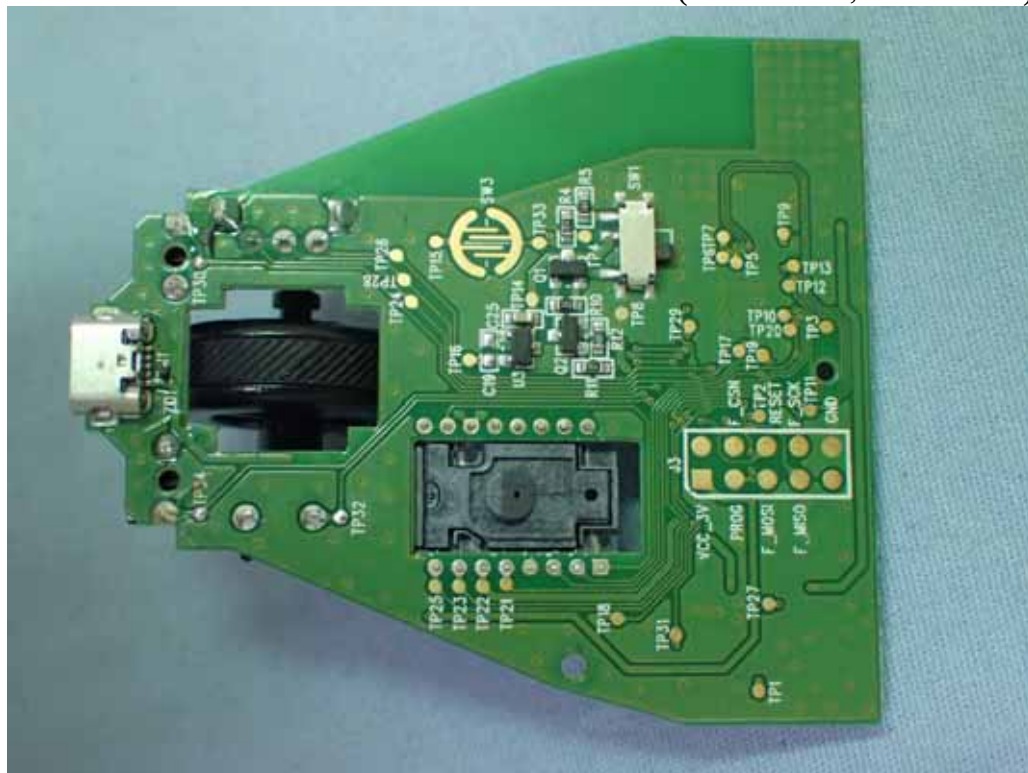


Figure 9
Wireless Dongle (Front View)

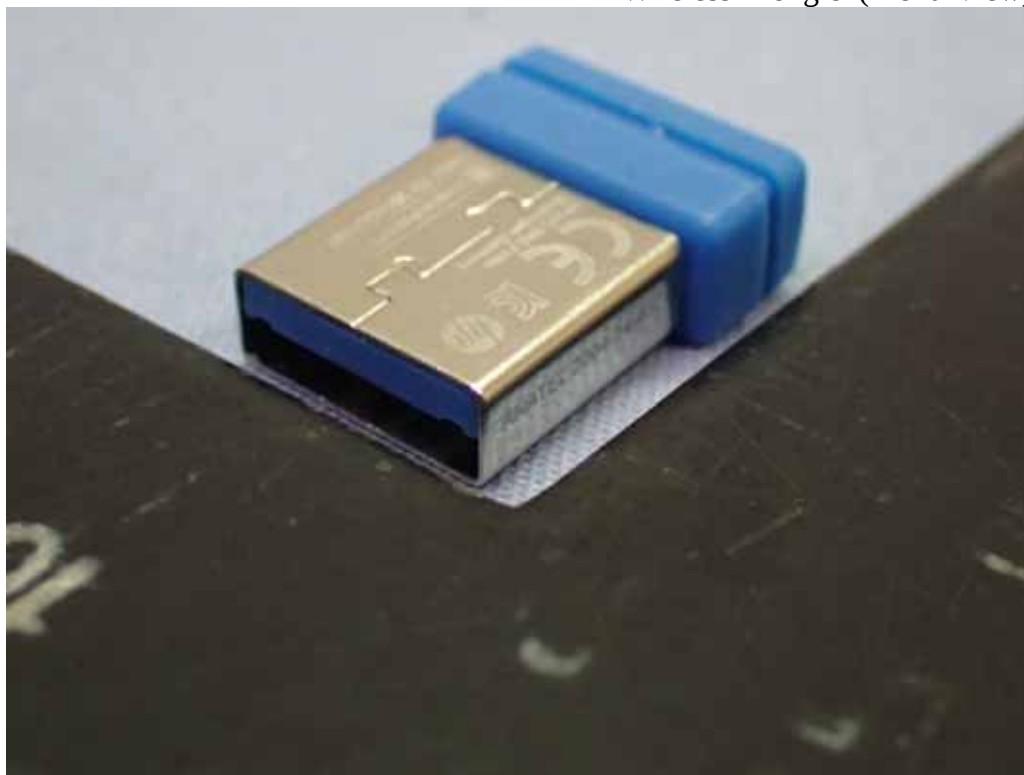


Figure 10
Wireless Dongle (Back View)



Figure 11
Wireless Dongle (Label View)



Figure 12
USB Cable

