

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**

Product : Wireless Keyboard
Model : (1)HSA-S001K
(2)HP Wireless Collaboration Keyboard
(3)HSA-S003K
(4)HP Wireless Premium Keyboard
Brand : hp
FCC ID : J75HSAS001K
IC : 7090A-HSAS001K

Prepared by: : AUDIX Technology Corporation,
EMC Department



TABLE OF CONTENTS

Description	Page
TEST REPORT CERTIFICATION	4
1. REPORT HISTORY.....	4
2. SUMMARY OF TEST RESULTS	5
3. GENERAL INFORMATION	6
3.1. Description of Application	6
3.2. Description of EUT	7
3.3. EUT Specifications Assessed in Current Report	8
3.4. Antenna Information	8
3.5. Test Configuration	9
3.6. Tested Supporting System List	10
3.7. Setup Configuration	10
3.8. Operating Condition of EUT	10
3.9. Description of Test Facility	11
3.10. Measurement Uncertainty	11
4. MEASUREMENT EQUIPMENT LIST	12
4.1. Conducted Emission Measurement	12
4.2. Radiated Emission Measurement	12
4.3. RF Conducted Measurement	12
5. CONDUCTED EMISSION MEASUREMENT	13
5.1. Block Diagram of Test Setup	13
5.2. Power Line Conducted Emission Limit	13
5.3. Test Procedure	13
5.4. Conducted Emission Measurement Results	14
6. RADIATED EMISSION MEASUREMENT	18
6.1. Block Diagram of Test Setup	18
6.2. Radiated Emission Limits	20
6.3. Test Procedure	21
6.4. Measurement Result Explanation	22
6.5. Measurement Result Explanation	23
6.6. Test Results	23
7. OCCUPIED BANDWIDTH 99% POWER MEASUREMENT	52
8. DEVIATION TO TEST SPECIFICATIONS.....	54

APPENDIX A TEST PHOTOGRAPHS

APPENDIX B EUT PHOTOGRAPHS

TEST REPORT CERTIFICATION

Applicant : Sunrex Technology Corp
Factory : Jing Mold Electronic Tech. (Shen Zhen) Co., Ltd.
Product Name : Wireless Keyboard
Model : (1)HSA-S001K (2)HP Wireless Collaboration Keyboard
(3)HSA-S003K (4)HP Wireless Premium Keyboard
Brand : hp

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. 03. 03

Date of Report: 2017. 03. 04

Producer: Sabrina Wang
(Sabrina Wang/Administrator)

Signatory: Ben Cheng
(Ben Cheng/Manager)

1. REPORT HISTORY

Revision	Date	Revision Summary	Report Number
0	2017. 03. 04	Original Report.	EM-F170107

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 Application

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		
Product	Wireless Keyboard		
Model	(1)HSA-S001K (2)HP Wireless Collaboration Keyboard (3)HSA-S003K (4)HP Wireless Premium Keyboard		
Model Difference	Marketing Model Name (MMN)	HP Wireless Collaboration Keyboard	HP Wireless Premium Keyboard
	Regulatory Model Name (RMN)	HSA-S001K	HSA-S003K
	Battery	CY3660124 (3150mAh)	CY303759 (650mAh)
	Material of Cover	Plastics	Premium
	Appearance		
	Above all models have the same circuit and hardware. The differences are in Model Name, Battery, Material of Cover, Appearance and marketing purpose.		
Brand	hp		

3.2. Description of EUT

Test Model	(1)HSA-S001K (2)HSA-S003K
Serial Number	N/A
Power Rating	(1)DC 3.7V (Via Battery) (2)DC 5V (Via USB charge)
Equipment Type	Wireless 2.4 GHz
Sample Status	Mass-production
Date of Receipt	2017. 01. 25
Date of Test	2017. 03. 03
I/O Ports List	USB Type B charge Port
Accessories	Wireless Dongle: hp, Model: ERX-321A FCC ID: J75ERX321A IC: 7090A-ERX321A
	USB Cable: Shielded, Detachable, 1.0m

3.3. EUT Specifications Assessed in Current Report

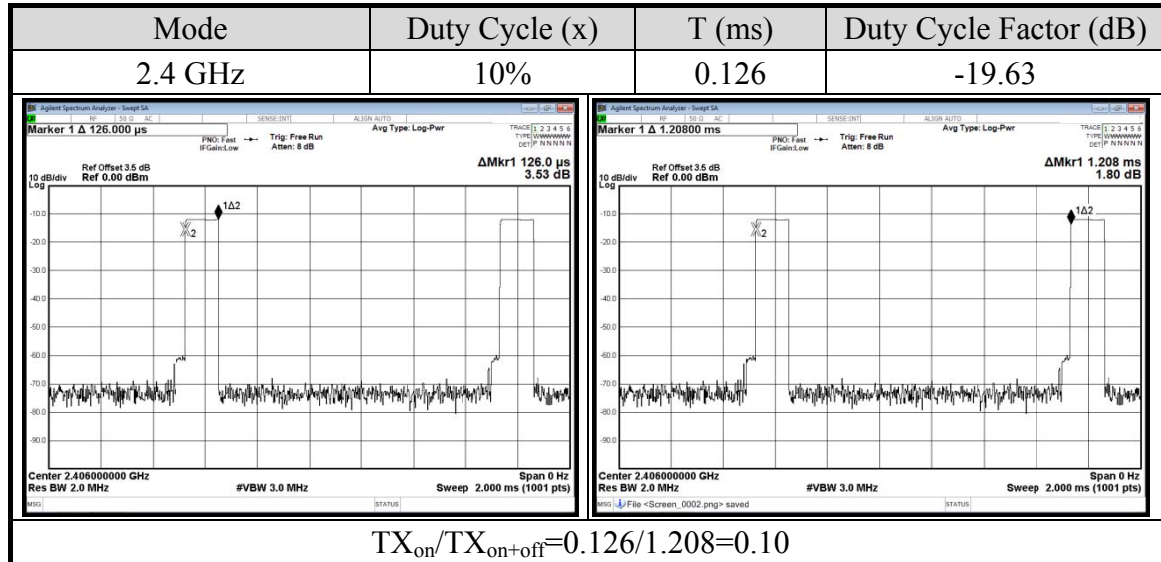
Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (Mbps)
2.4 GHz	2406-2475	70	GFSK	2

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

3.4. Antenna Information

Antenna Part Number	Manufacture	Antenna Type	Frequency	Max Gain (dBi)
---	---	PCB Antenna	2.4GHz	-3.02

3.5. Test Configuration



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		Mode	Test Channel
Radiated Test Case	Radiated Band Edge ^{Note1}	2.4 GHz	34/70
	Radiated Spurious Emission (30MHz-1GHz) ^{Note1}	2.4 GHz	1/34/70
	Radiated Spurious Emission (Above 1GHz) ^{Note1}	2.4 GHz	1/34/70
	Fundamental Frequency	2.4 GHz	1/34/70
	Occupied Bandwidth 99% Power	2.4 GHz	1/34/70

Note 1:

☐ Mobile Device

☒ Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow:

☒ Lie

☐ Side

☐ Stand

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

3.6. Tested Supporting System List

3.6.1. Support Peripheral Unit

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	AC Adapter (Wall-mount, 2C)	SONY	AC-UUD12	N/A	N/A

3.6.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	N/A

3.7. Setup Configuration



3.8. Operating Condition of EUT

Test program installed in EUT is used for enabling EUT RF function under continues transmitting and choosing channel.

3.9. 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. 8 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

3.10. 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	ESR3	101774	2017. 02. 07	1 Year
2.	A.M.N.	R&S	ENV4200	825358/003	2016. 04. 21	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2016. 12. 23	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2017. 01. 16	1 Year
5.	Test Software	Audix	e3	V.6.120424	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

4.2.1. Frequency Range 30MHz~1000MHz (Semi-Anechoic Chamber)

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2016. 09. 19	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2016. 06. 22	1 Year
3.	Amplifier	HP	8447D	2944A06305	2016. 02. 23	1 Year
4.	Bilog Antenna	TESEQ	CBL6112D	33821	2017. 01. 21	1 Year
5.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.2.2. Frequency Range Above 1GHz (Fully Anechoic Chamber)

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A-526	MY53310269	2017. 01. 03	1 Year
2.	Amplifier	HP	8449B	3008A02678	2016. 03. 04	1 Year
3.	Horn Antenna	ETS-Lindgren	3117	00135902	2016. 03. 05	1 Year
	Horn Antenna	EMCO	3116	2653	2016. 10. 24	1 Year
4.	2.4GHz Notch Filter	K&L	7NSL10-2441 .5E130.5-00	1	2016. 07. 27	1 Year
5.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

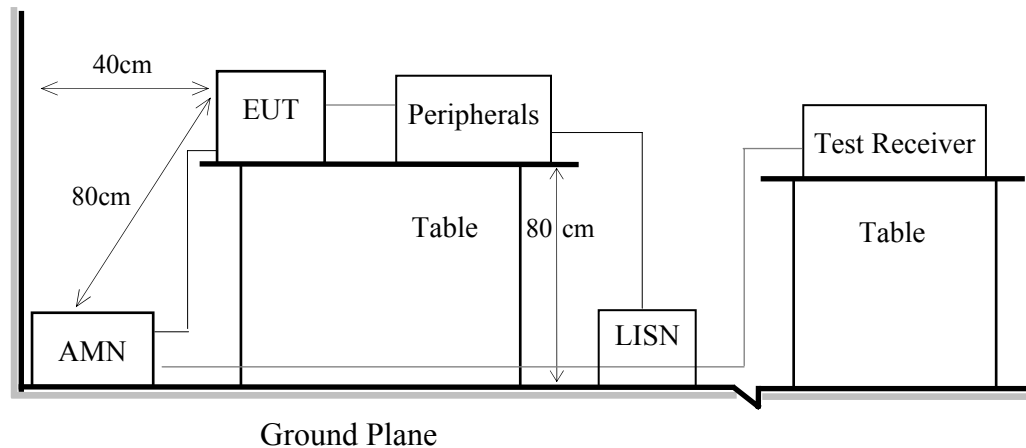
4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A-526	MY53310269	2017. 01. 03	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.

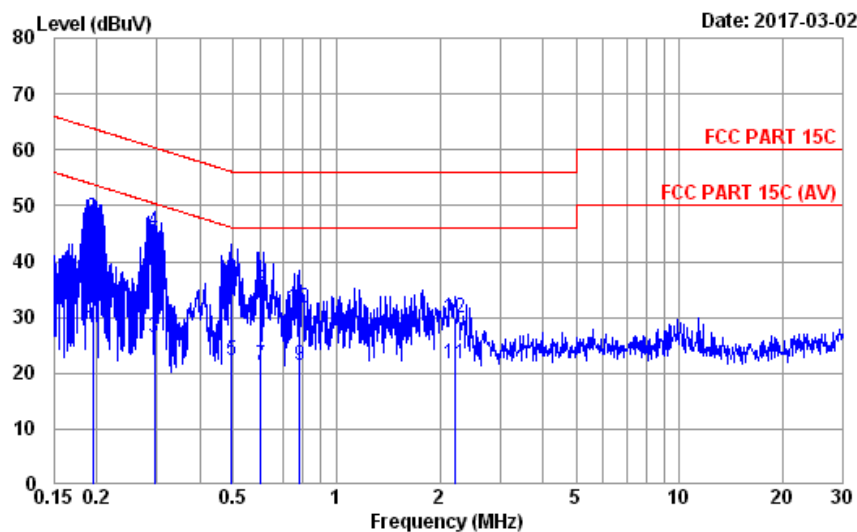
5.3. Test Procedure

- 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	2017/03/02	Temp./Hum.	20°C/53%
Test Model	HSA-S001K		
Test Voltage	AC 120V/60Hz (Charge Mode Via AC Adapter)		



Site no. : No.8 Shielded Room Data no. : 4
Condition : ENV4200 358/003 LISN Phase : NEUTRAL
Limit : FCC PART 15C
Env. / Ins. : 20°C / 53% ESR3 (1774) Engineer : Jemy
EUT : HSA-S001K
Power Rating : 120Vac/60Hz
Test Mode : Charge

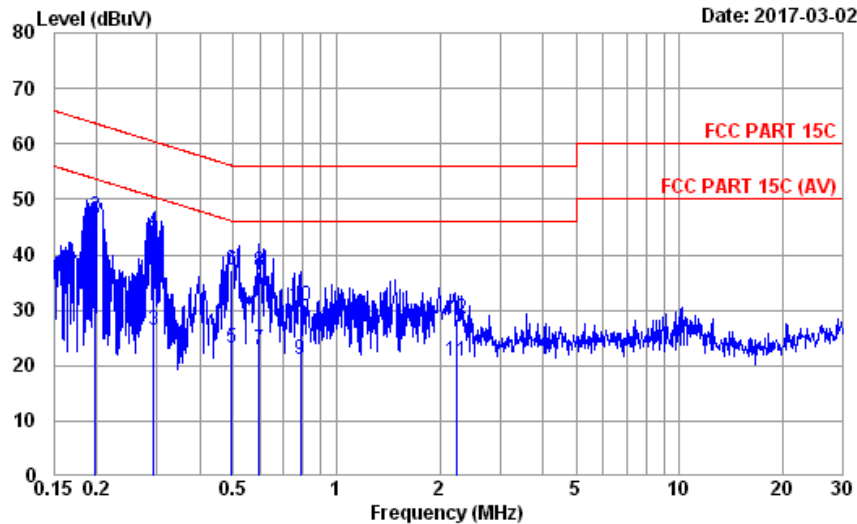
	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.194	10.33	0.03	9.86	7.81	28.03	53.85	25.82	Average
2	0.194	10.33	0.03	9.86	27.63	47.85	63.85	16.00	QP
3	0.294	10.31	0.04	9.86	6.20	26.41	50.41	24.00	Average
4	0.294	10.31	0.04	9.86	25.17	45.38	60.41	15.03	QP
5	0.495	10.29	0.04	9.86	2.07	22.26	46.08	23.82	Average
6	0.495	10.29	0.04	9.86	16.82	37.01	56.08	19.07	QP
7	0.601	10.28	0.05	9.86	1.31	21.50	46.00	24.50	Average
8	0.601	10.28	0.05	9.86	14.60	34.79	56.00	21.21	QP
9	0.780	10.28	0.05	9.86	1.30	21.49	46.00	24.51	Average
10	0.780	10.28	0.05	9.86	11.40	31.59	56.00	24.41	QP
11	2.204	10.27	0.08	9.86	1.40	21.61	46.00	24.39	Average
12	2.204	10.27	0.08	9.86	9.59	29.80	56.00	26.20	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.

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

Tel: +886 2 26099301
Fax: +886 2 26099303

Test Date	2017/03/02	Temp./Hum.	20°C/53%
Test Model	HSA-S001K		
Test Voltage	AC 120V/60Hz (Charge Mode Via AC Adapter)		



Site no. : No.8 Shielded Room Data no. : 3
Condition : ENV4200 358/003 LISN Phase : LINE
Limit : FCC PART 15C
Env. / Ins. : 20°C / 53% ESR3 (1774) Engineer : Jemy
EUT : HSA-S001K
Power Rating : 120Vac/60Hz
Test Mode : Charge

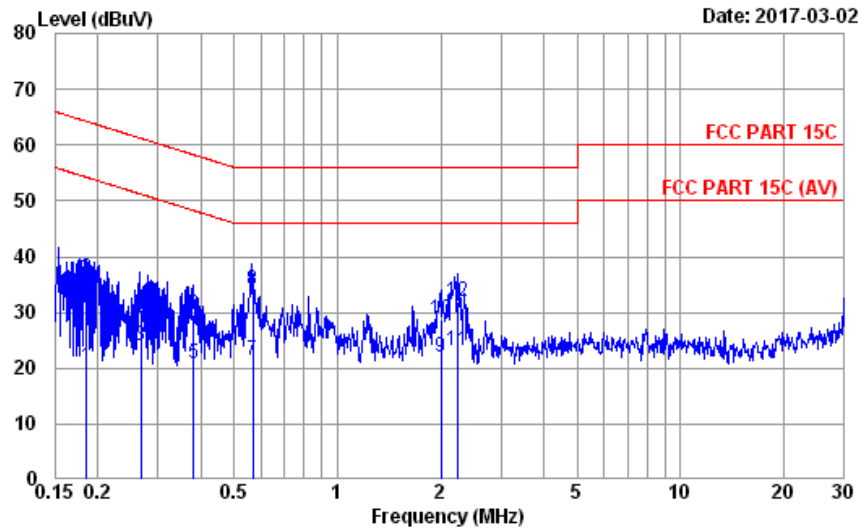
	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.198	10.27	0.03	9.86	7.23	27.39	53.68	26.29	Average
2	0.198	10.27	0.03	9.86	26.76	46.92	63.68	16.76	QP
3	0.294	10.26	0.04	9.86	6.20	26.36	50.42	24.06	Average
4	0.294	10.26	0.04	9.86	23.97	44.13	60.42	16.29	QP
5	0.493	10.25	0.04	9.86	2.95	23.10	46.11	23.01	Average
6	0.493	10.25	0.04	9.86	16.92	37.07	56.11	19.04	QP
7	0.595	10.23	0.05	9.86	2.72	22.86	46.00	23.14	Average
8	0.595	10.23	0.05	9.86	16.84	36.98	56.00	19.02	QP
9	0.785	10.22	0.05	9.86	0.86	20.99	46.00	25.01	Average
10	0.785	10.22	0.05	9.86	10.57	30.70	56.00	25.30	QP
11	2.231	10.24	0.08	9.86	0.74	20.92	46.00	25.08	Average
12	2.231	10.24	0.08	9.86	8.34	28.52	56.00	27.48	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Test Date	2017/03/02	Temp./Hum.	20°C/53%
Test Model	HSA-S003K		
Test Voltage	AC 120V/60Hz (Charge Mode Via AC Adapter)		



Site no. : No.8 Shielded Room Data no. : 2
Condition : ENV4200 358/003 LISN Phase : NEUTRAL
Limit : FCC PART 15C
Env. / Ins. : 20°C / 53% ESR3 (1774) Engineer : Jemy
EUT : HSA-S003K
Power Rating : 120Vac/60Hz
Test Mode : Charge

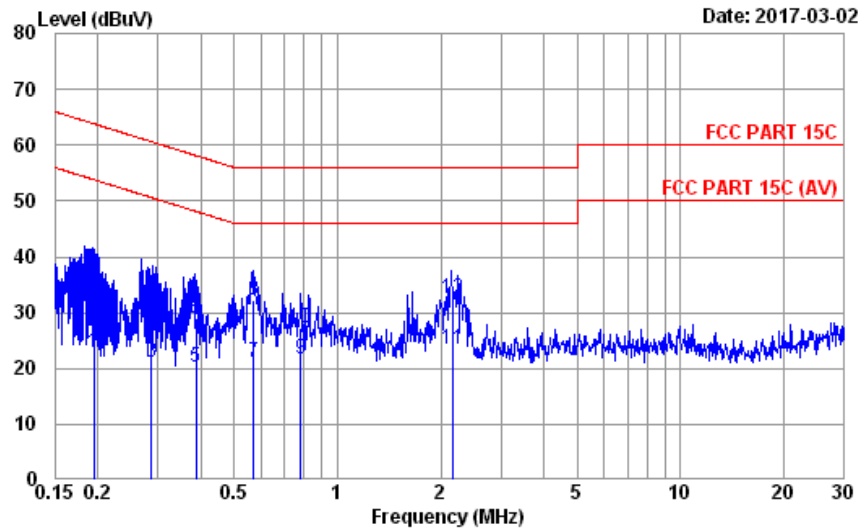
	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.185	10.32	0.03	9.86	-0.03	20.18	54.24	34.06	Average
2	0.185	10.32	0.03	9.86	15.72	35.93	64.24	28.31	QP
3	0.268	10.31	0.03	9.86	3.69	23.89	51.18	27.29	Average
4	0.268	10.31	0.03	9.86	10.34	30.54	61.18	30.64	QP
5	0.381	10.29	0.04	9.86	0.60	20.79	48.25	27.46	Average
6	0.381	10.29	0.04	9.86	9.43	29.62	58.25	28.63	QP
7	0.567	10.28	0.05	9.86	1.29	21.48	46.00	24.52	Average
8	0.567	10.28	0.05	9.86	13.87	34.06	56.00	21.94	QP
9	2.001	10.27	0.08	9.86	1.75	21.96	46.00	24.04	Average
10	2.001	10.27	0.08	9.86	8.53	28.74	56.00	27.26	QP
11	2.230	10.27	0.08	9.86	2.85	23.06	46.00	22.94	Average
12	2.230	10.27	0.08	9.86	11.64	31.85	56.00	24.15	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Test Date	2017/03/02	Temp./Hum.	20°C/53%
Test Model	HSA-S003K		
Test Voltage	AC 120V/60Hz (Charge Mode Via AC Adapter)		



Site no. : No.8 Shielded Room Data no. : 1
Condition : ENV4200 358/003 LISN Phase : LINE
Limit : FCC PART 15C
Env. / Ins. : 20°C / 53% ESR3 (1774) Engineer : Jemy
EUT : HSA-S003K
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	0.194	10.26	0.03	9.86	2.67	22.82	53.84	31.02	Average
2	0.194	10.26	0.03	9.86	15.71	35.86	63.84	27.98	QP
3	0.287	10.26	0.04	9.86	1.07	21.23	50.60	29.37	Average
4	0.287	10.26	0.04	9.86	11.45	31.61	60.60	28.99	QP
5	0.386	10.26	0.04	9.86	0.15	20.31	48.15	27.84	Average
6	0.386	10.26	0.04	9.86	8.80	28.96	58.15	29.19	QP
7	0.571	10.24	0.05	9.86	0.91	21.06	46.00	24.94	Average
8	0.571	10.24	0.05	9.86	12.11	32.26	56.00	23.74	QP
9	0.779	10.22	0.05	9.86	1.42	21.55	46.00	24.45	Average
10	0.779	10.22	0.05	9.86	7.22	27.35	56.00	28.65	QP
11	2.159	10.24	0.08	9.86	3.39	23.57	46.00	22.43	Average
12	2.159	10.24	0.08	9.86	12.49	32.67	56.00	23.33	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.

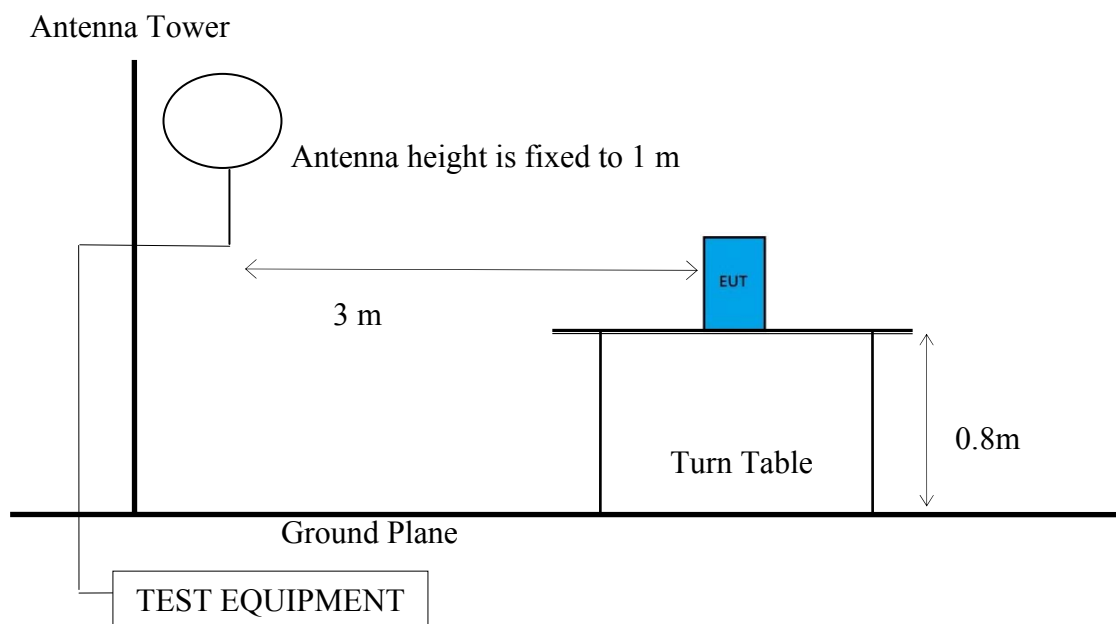
6. RADIATED EMISSION MEASUREMENT

6.1. Block Diagram of Test Setup

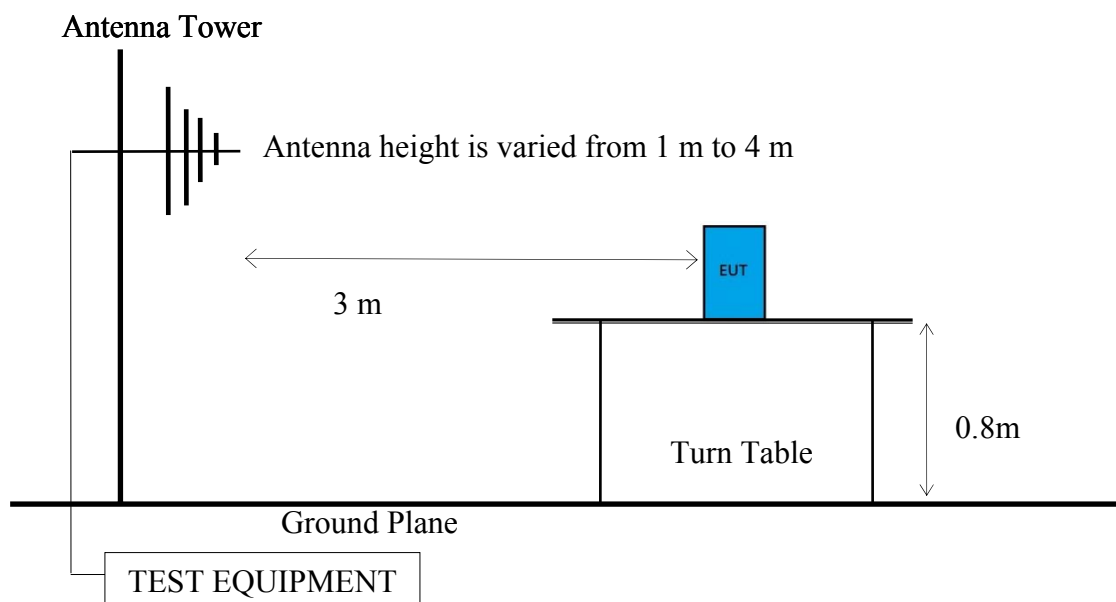
6.1.1. Block Diagram of connection between EUT and simulators

Indicated as section 3.7

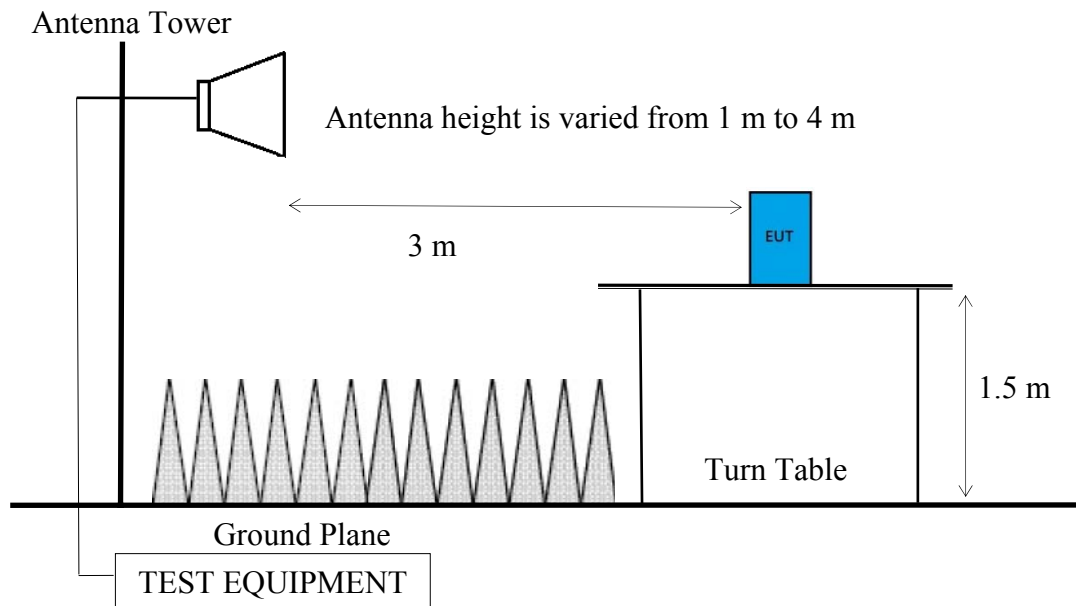
6.1.2. Semi Anechoic Chamber (3m) Setup Diagram for 9kHz-30MHz



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	
		dBμV/m	μV/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 dBμV/m (Peak) 54.0 dBμV/m (Average)	

Remark : (1) $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

- (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	dBμV/m	μV/m	dBμV/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: $\text{mV/m} = 1000\mu\text{V/m}$; $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

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 ~ 40GHz:

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 $\geq 1/T$.

Modulation Type	T (ms)	1/ T (Hz)	VBW Setting
GFSK	0.126	7.9	8.2 KHz

N/A: 1/ T is not implemented when duty cycle presented in section 3.5 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 + DCCF

Duty Cycle Correction Factor (DCCF) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.3

☐ ERP = Peak Emission Level - 95.2dB - 2.14dB

6.5. 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 + DCCF
Duty Cycle Correction Factor (DCCF) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.4

6.6. Test Results

PASSED.

Test Date	2017/03/02	Temp./Hum.	24°C/52%
Test Voltage	(1) AC 120V/60Hz (Charge Mode Via AC Adapter) (2) DC 3.7V (Transmitting Mode Via Battery)		

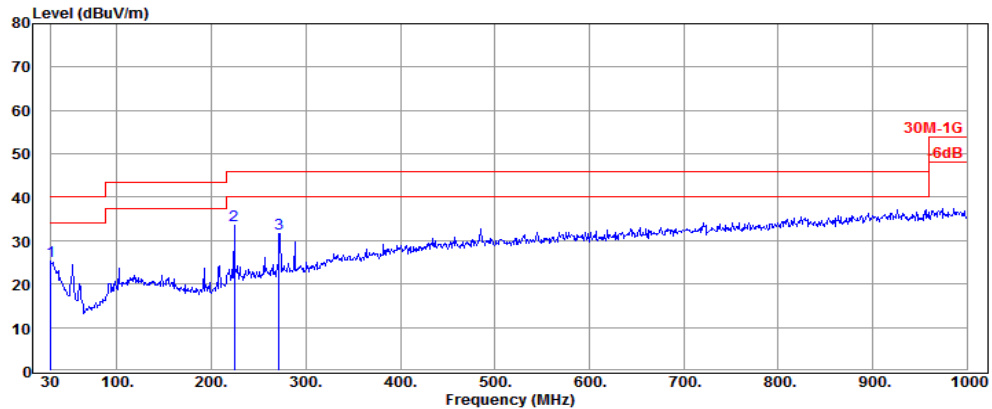
6.6.1. Emissions within Restricted Frequency Bands

6.6.1.1. Frequency 9kHz~30MHz

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

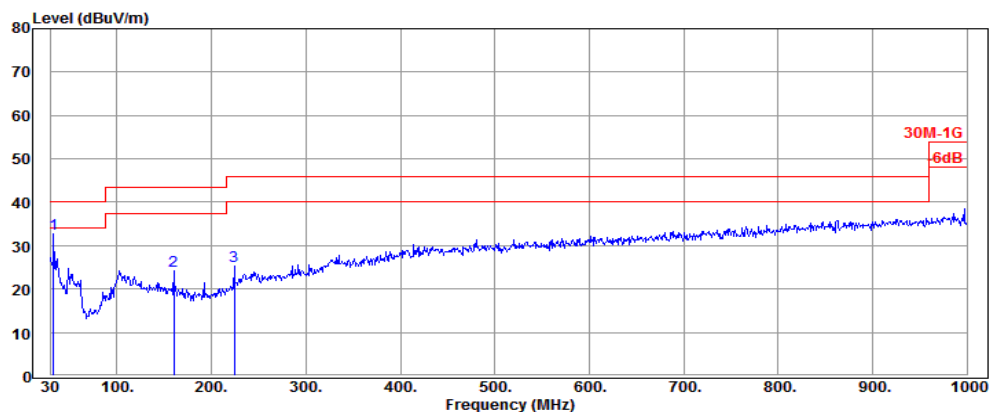
6.6.1.2. Frequency Below 1 GHz

Test Model	HSA-S001K	Mode	Charge
------------	-----------	------	--------



Antenna at Horizontal Polarization

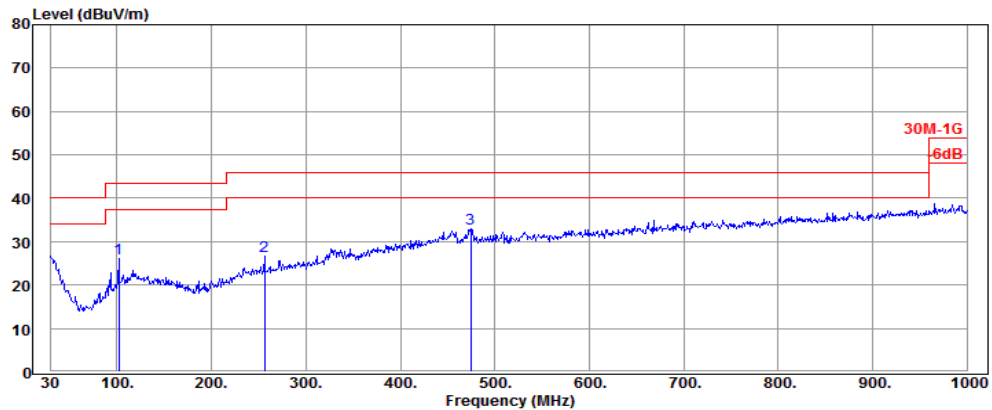
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.00	24.78	1.20	-0.66	25.32	40.00	14.68	Peak
224.00	17.34	3.57	12.56	33.47	46.00	12.53	Peak
271.53	19.30	4.03	8.40	31.73	46.00	14.27	Peak



Antenna at Vertical Polarization

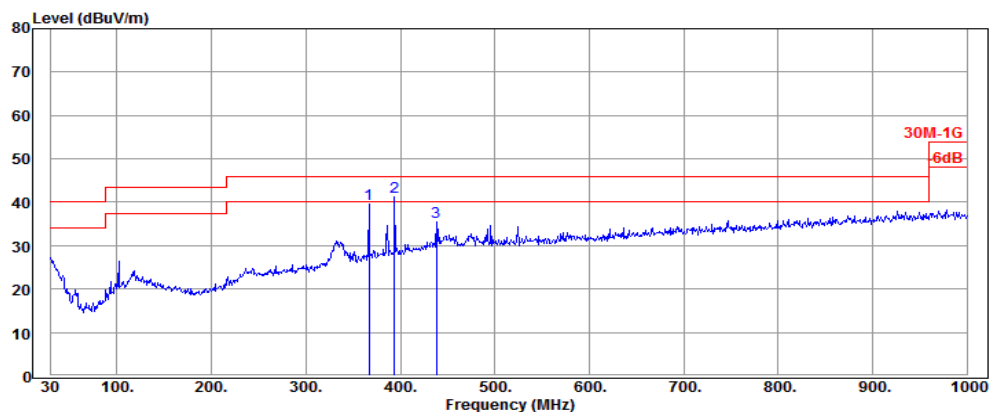
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
32.91	23.33	1.26	8.22	32.81	40.00	7.19	Peak
159.98	16.26	2.93	4.92	24.11	43.50	19.39	Peak
224.00	17.34	3.57	4.32	25.23	46.00	20.77	Peak

Test Model	HSA-S001K	Mode	TX 2406MHz
------------	-----------	------	------------



Antenna at Horizontal Polarization

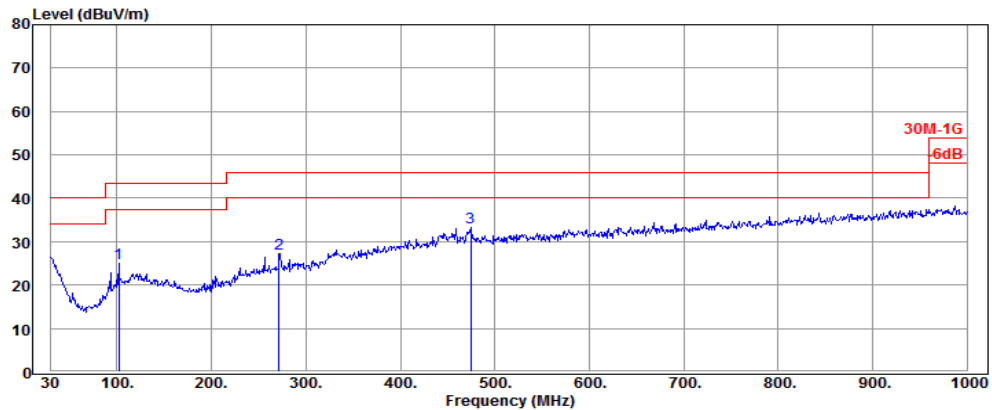
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
101.78	17.38	2.29	6.31	25.98	43.50	17.52	Peak
256.01	19.01	3.87	3.90	26.78	46.00	19.22	Peak
474.26	23.51	6.22	3.35	33.08	46.00	12.92	Peak



Antenna at Vertical Polarization

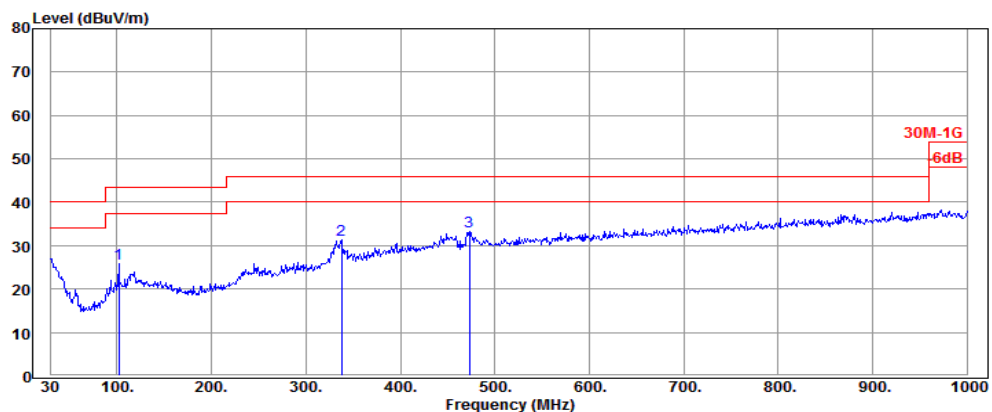
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
366.59	21.85	5.18	12.44	39.47	46.00	6.53	Peak
393.75	22.57	5.48	13.22	41.27	46.00	4.73	Peak
438.37	23.16	5.91	6.47	35.54	46.00	10.46	Peak

Test Model	HSA-S001K	Mode	TX 2439MHz
------------	-----------	------	------------



Antenna at Horizontal Polarization

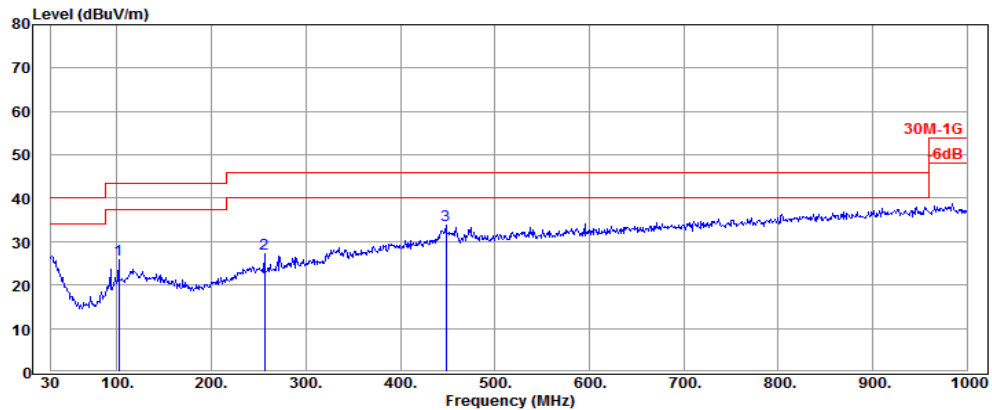
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
101.78	17.38	2.29	5.45	25.12	43.50	18.38	Peak
271.53	19.30	4.03	3.96	27.29	46.00	18.71	Peak
474.26	23.51	6.22	3.46	33.19	46.00	12.81	Peak



Antenna at Vertical Polarization

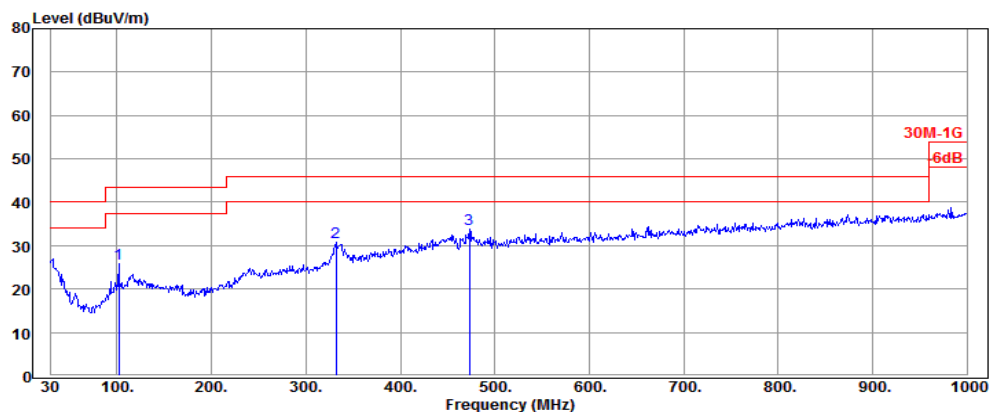
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
101.78	17.38	2.29	6.17	25.84	43.50	17.66	Peak
337.49	20.98	4.81	5.49	31.28	46.00	14.72	Peak
473.29	23.51	6.22	3.58	33.31	46.00	12.69	Peak

Test Model	HSA-S001K	Mode	TX 2475MHz
------------	-----------	------	------------



Antenna at Horizontal Polarization

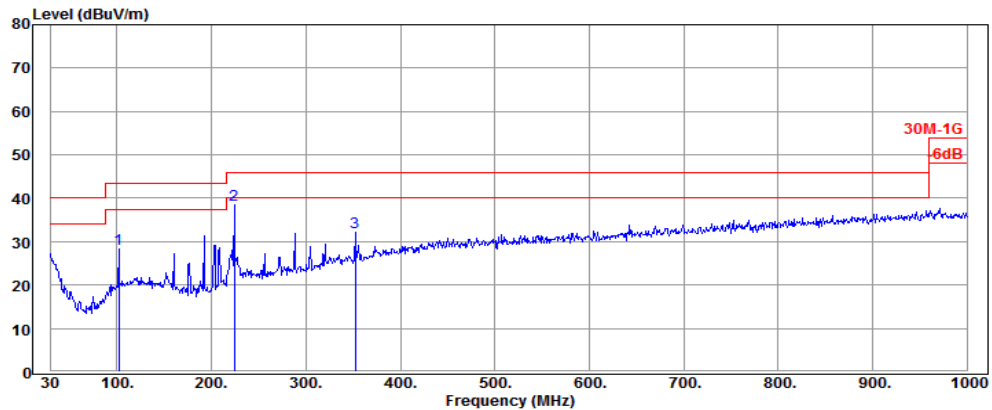
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
101.78	17.38	2.29	6.21	25.88	43.50	17.62	Peak
256.01	19.01	3.87	4.32	27.20	46.00	18.80	Peak
448.07	23.26	6.00	4.49	33.75	46.00	12.25	Peak



Antenna at Vertical Polarization

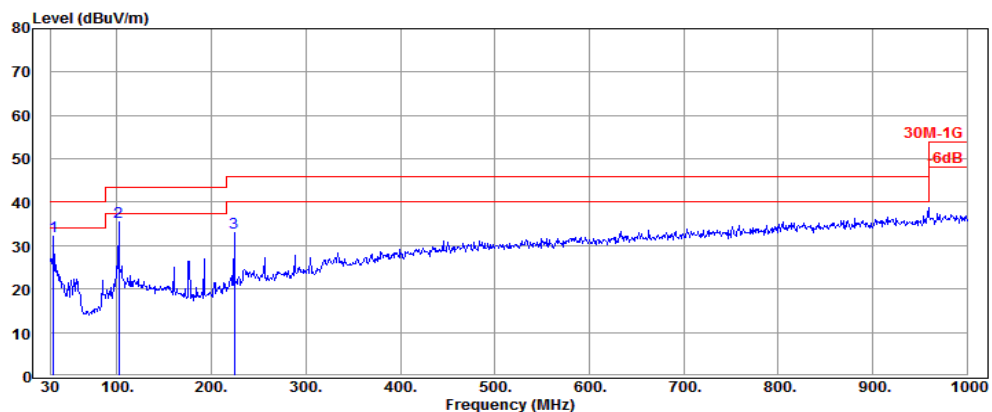
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
101.78	17.38	2.29	6.12	25.79	43.50	17.71	Peak
331.67	20.80	4.74	5.31	30.85	46.00	15.15	Peak
473.29	23.51	6.22	4.11	33.84	46.00	12.16	Peak

Test Model	HSA-S003K	Mode	Charge
------------	-----------	------	--------



Antenna at Horizontal Polarization

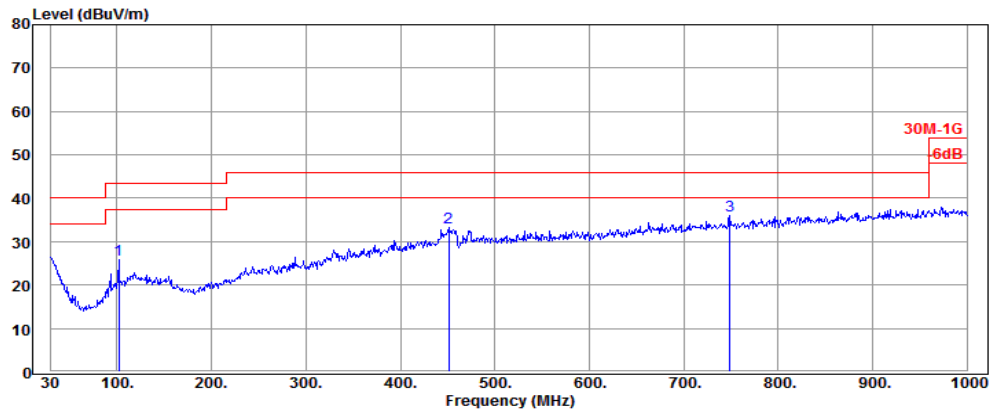
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
101.78	17.38	2.29	8.73	28.40	43.50	15.10	Peak
224.00	17.34	3.57	17.62	38.53	46.00	7.47	Peak
352.04	21.41	5.00	5.84	32.25	46.00	13.75	Peak



Antenna at Vertical Polarization

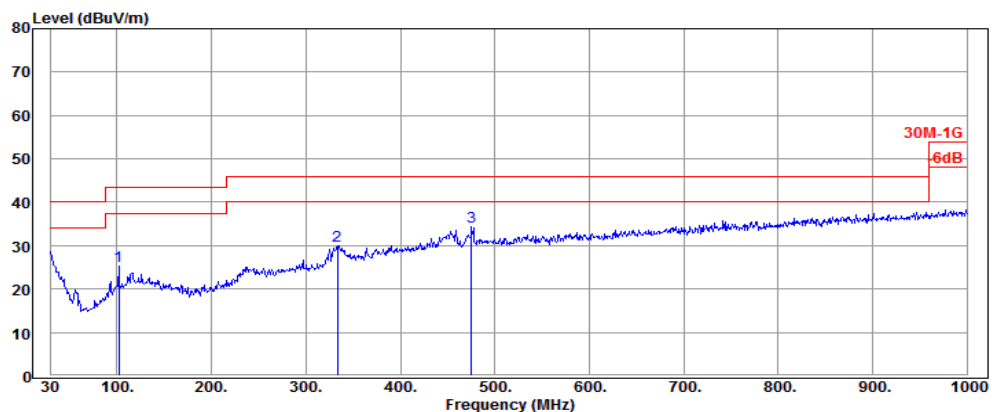
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
32.91	23.33	1.26	7.50	32.09	40.00	7.91	Peak
101.78	17.38	2.29	15.90	35.57	43.50	7.93	Peak
224.00	17.34	3.57	12.04	32.95	46.00	13.05	Peak

Test Model	HSA-S003K	Mode	TX 2406MHz
------------	-----------	------	------------



Antenna at Horizontal Polarization

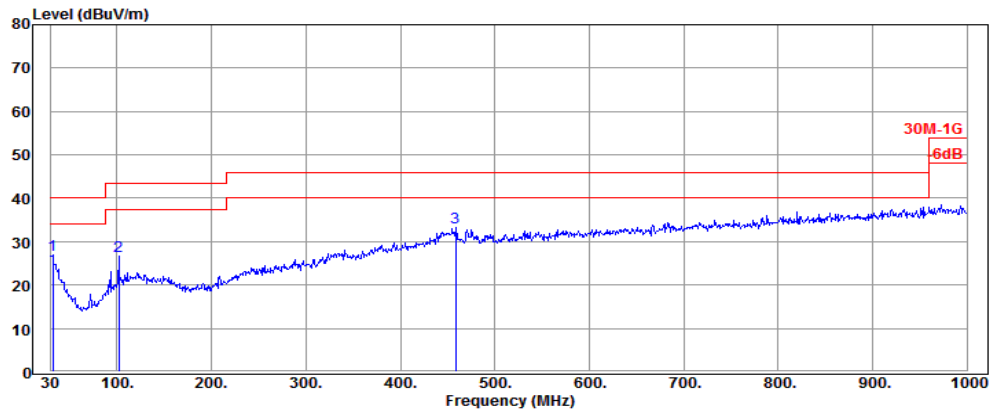
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
101.78	17.38	2.29	6.17	25.84	43.50	17.66	Peak
450.98	23.29	6.02	4.07	33.38	46.00	12.62	Peak
748.77	26.10	7.34	2.58	36.02	46.00	9.98	Peak



Antenna at Vertical Polarization

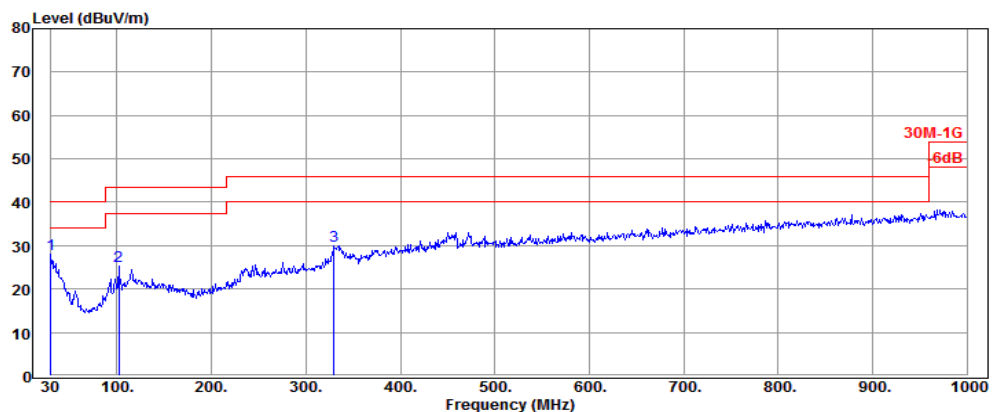
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
101.78	17.38	2.29	5.68	25.35	43.50	18.15	Peak
333.61	20.87	4.77	4.33	29.97	46.00	16.03	Peak
475.23	23.53	6.23	4.68	34.44	46.00	11.56	Peak

Test Model	HSA-S003K	Mode	TX 2439MHz
------------	-----------	------	------------



Antenna at Horizontal Polarization

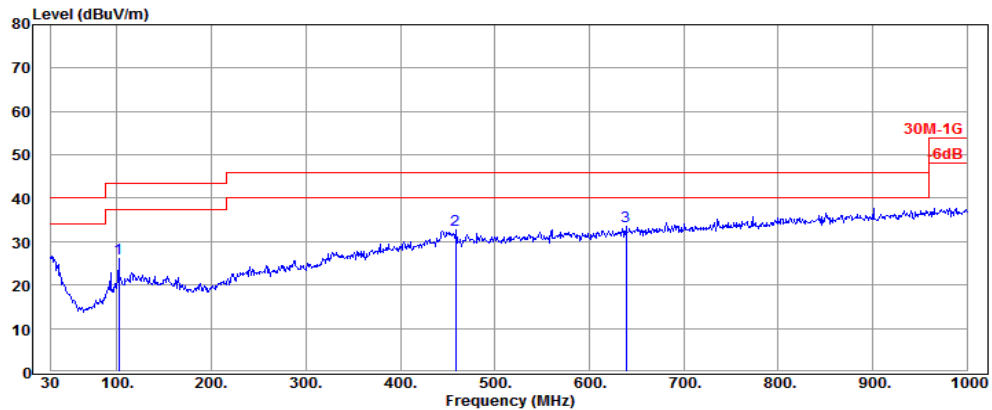
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
31.94	23.78	1.25	1.93	26.96	40.00	13.04	Peak
101.78	17.38	2.29	6.90	26.57	43.50	16.93	Peak
458.74	23.37	6.09	3.92	33.38	46.00	12.62	Peak



Antenna at Vertical Polarization

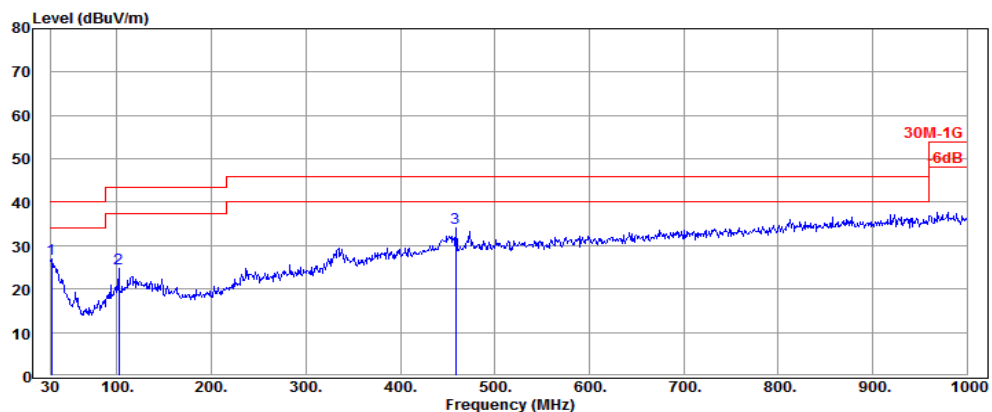
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.00	24.78	1.20	1.96	27.94	40.00	12.06	Peak
101.78	17.38	2.29	5.63	25.30	43.50	18.20	Peak
329.73	20.76	4.72	4.60	30.08	46.00	15.92	Peak

Test Model	HSA-S003K	Mode	TX 2475MHz
------------	-----------	------	------------



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
101.78	17.38	2.29	6.35	26.02	43.50	17.48	Peak
458.74	23.37	6.09	3.32	32.78	46.00	13.22	Peak
639.16	25.11	6.88	1.61	33.60	46.00	12.40	Peak



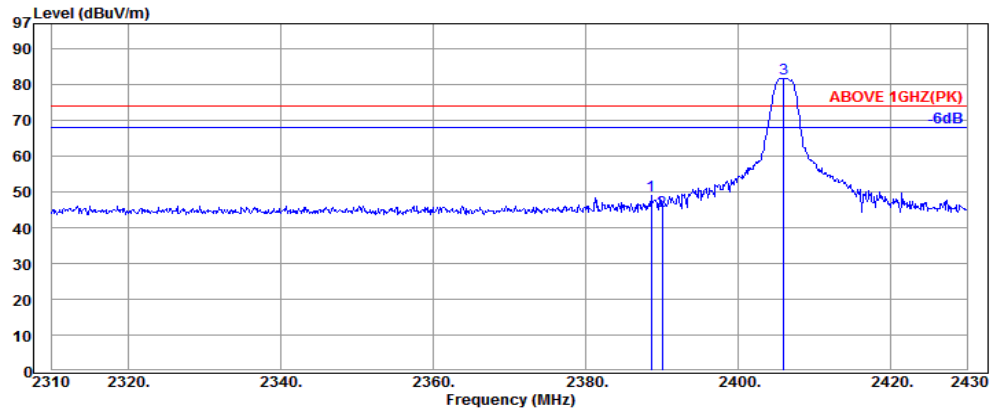
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.97	24.28	1.22	1.37	26.87	40.00	13.13	Peak
101.78	17.38	2.29	5.00	24.67	43.50	18.83	Peak
458.74	23.37	6.09	4.55	34.01	46.00	11.99	Peak

6.6.1.3. Frequency Above 1 GHz to 10th harmonics

Band Edge:

Test Model	HSA-S001K	Mode	TX 2406MHz
------------	-----------	------	------------



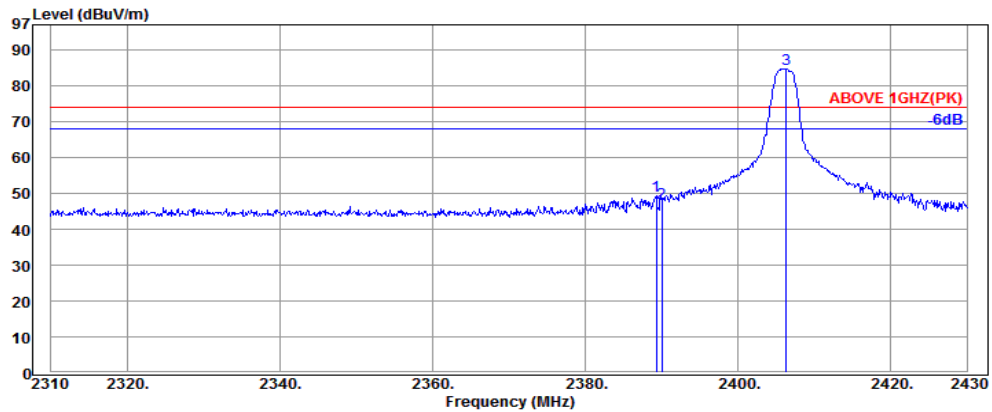
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.60	32.16	6.08	10.59	48.83	74.00	25.17	Peak
2390.04	32.16	6.08	6.44	44.68	74.00	29.32	Peak
2406.00	32.18	6.10	43.42	81.70	---	---	Peak

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2388.60	48.83	-19.63	29.20	54.00	24.80	Average
2390.04	44.68	-19.63	25.05	54.00	28.95	Average

Test Model	HSA-S001K	Mode	TX 2406MHz
------------	-----------	------	------------



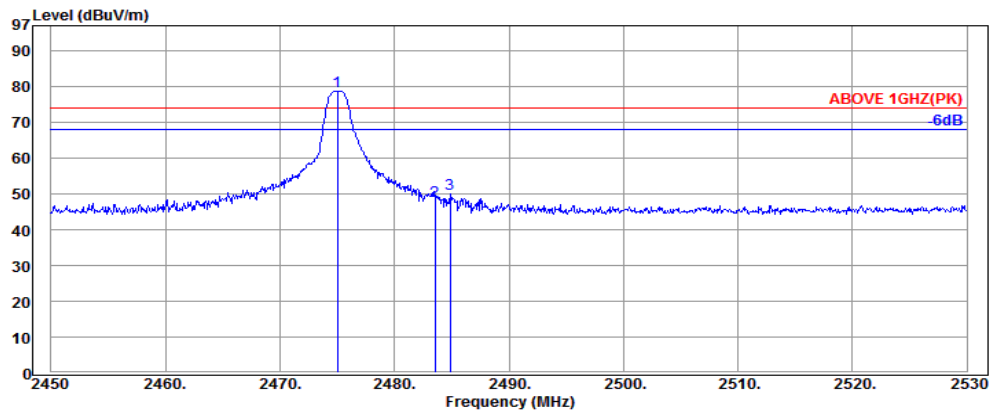
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.32	32.16	6.08	10.95	49.19	74.00	24.81	Peak
2390.04	32.16	6.08	8.99	47.23	74.00	26.77	Peak
2406.36	32.18	6.10	46.30	84.58	---	---	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2389.32	49.19	-19.63	29.56	54.00	24.44	Average
2390.04	47.23	-19.63	27.60	54.00	26.40	Average

Test Model	HSA-S001K	Mode	TX 2475MHz
------------	-----------	------	------------



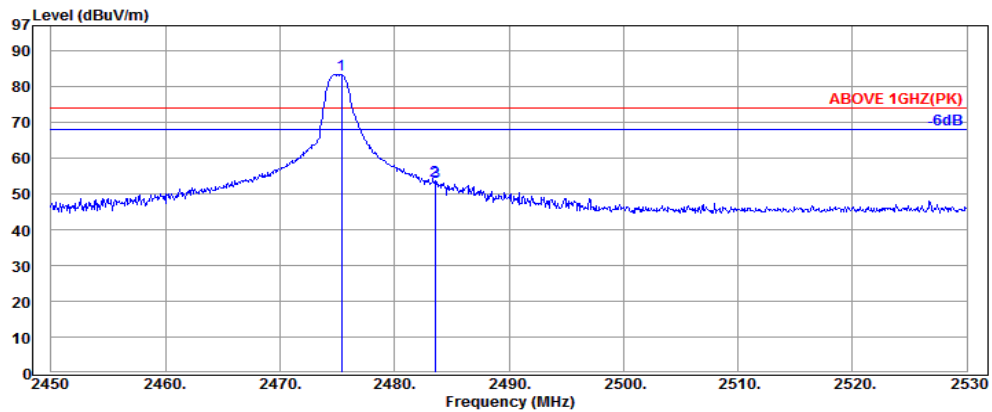
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2475.04	32.28	6.18	40.32	78.78	---	---	Peak
2483.52	32.28	6.19	9.43	47.90	74.00	26.10	Peak
2484.88	32.28	6.19	11.54	50.01	74.00	23.99	Peak

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2483.52	47.90	-19.63	28.27	54.00	25.73	Average
2484.88	50.01	-19.63	30.38	54.00	23.62	Average

Test Model	HSA-S001K	Mode	TX 2475MHz
------------	-----------	------	------------



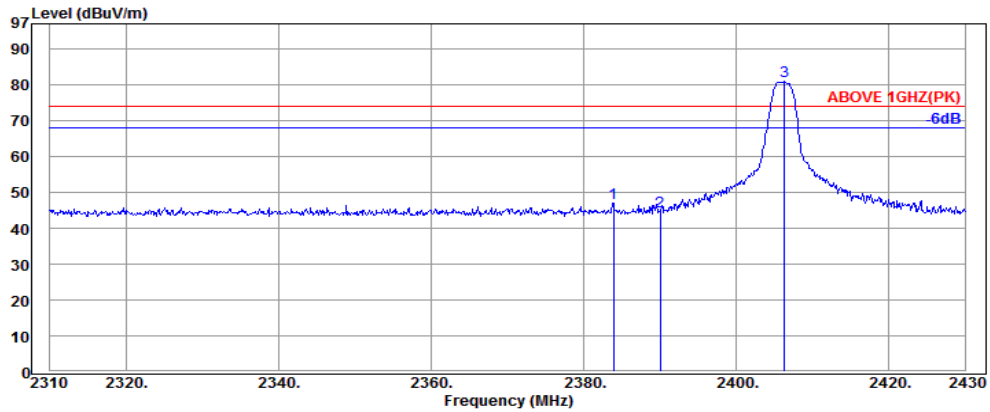
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2475.36	32.28	6.18	44.80	83.26	---	---	Peak
2483.52	32.28	6.19	15.31	53.78	74.00	20.22	Peak
2483.60	32.28	6.19	14.97	53.44	74.00	20.56	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2483.52	53.78	-19.63	34.15	54.00	19.85	Average
2483.60	53.44	-19.63	33.81	54.00	20.19	Average

Test Model	HSA-S003K	Mode	TX 2406MHz
------------	-----------	------	------------



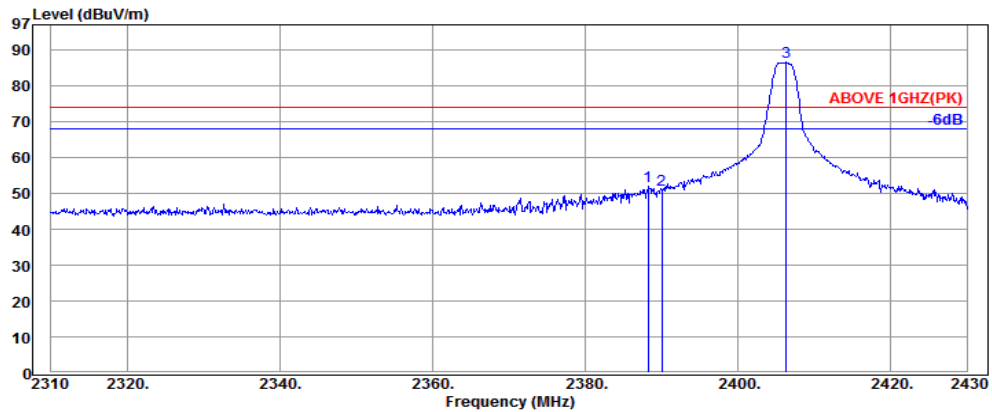
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2383.92	32.13	6.07	8.80	47.00	74.00	27.00	Peak
2390.04	32.16	6.08	6.44	44.68	74.00	29.32	Peak
2406.36	32.18	6.10	42.56	80.84	---	---	Peak

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2383.92	47.00	-19.63	27.37	54.00	26.63	Average
2390.04	44.68	-19.63	25.05	54.00	28.95	Average

Test Model	HSA-S003K	Mode	TX 2406MHz
------------	-----------	------	------------



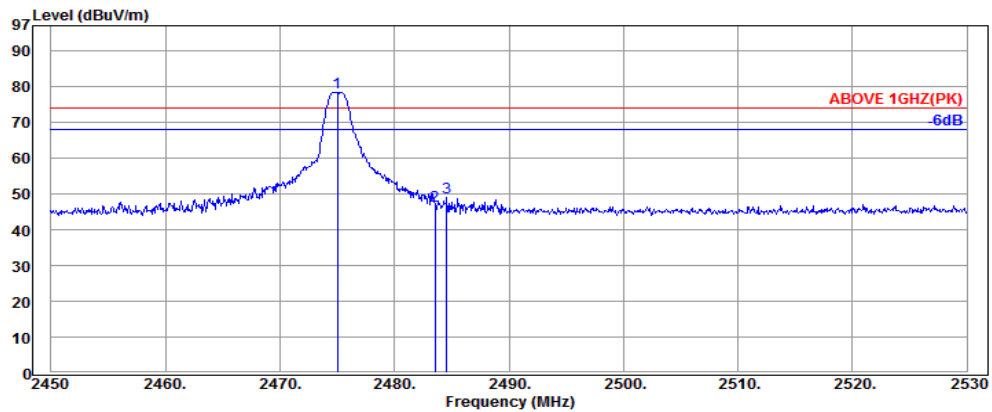
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2388.24	32.16	6.08	13.74	51.98	74.00	22.02	Peak
2390.04	32.16	6.08	12.91	51.15	74.00	22.85	Peak
2406.36	32.18	6.10	48.26	86.54	---	---	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2388.24	51.98	-19.63	32.35	54.00	21.65	Average
2390.04	51.15	-19.63	31.52	54.00	22.48	Average

Test Model	HSA-S003K	Mode	TX 2475MHz
------------	-----------	------	------------



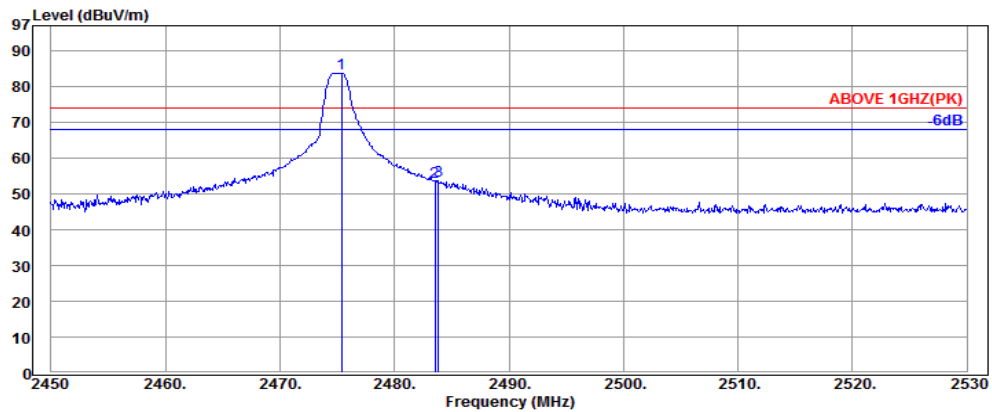
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2475.04	32.28	6.18	39.81	78.27	---	---	Peak
2483.52	32.28	6.19	8.26	46.73	74.00	27.27	Peak
2484.56	32.28	6.19	10.51	48.98	74.00	25.02	Peak

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2483.52	46.73	-19.63	27.10	54.00	26.90	Average
2484.56	48.98	-19.63	29.35	54.00	24.65	Average

Test Model	HSA-S003K	Mode	TX 2475MHz
------------	-----------	------	------------



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
2475.36	32.28	6.18	45.37	83.83	---	---	Peak
2483.52	32.28	6.19	14.86	53.33	74.00	20.67	Peak
2483.84	32.28	6.19	15.28	53.75	74.00	20.25	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2483.52	53.33	-19.63	33.70	54.00	20.30	Average
2483.84	53.75	-19.63	34.12	54.00	19.88	Average

6.6.2. Emissions outside the frequency band:

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

Test Model	HSA-S001K	Mode	TX 2406MHz
------------	-----------	------	------------

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
1770.00	29.92	4.91	7.51	42.34	54.00	11.66	Peak
1964.00	31.36	5.23	6.22	42.81	54.00	11.19	Peak
4815.00	34.22	8.93	7.24	50.39	54.00	3.61	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
1784.00	30.04	4.94	6.62	41.60	54.00	12.40	Peak
2250.00	31.96	5.90	6.09	43.95	54.00	10.05	Peak
4815.00	34.22	8.93	5.10	48.25	54.00	5.75	Peak

Test Model	HSA-S001K	Mode	TX 2439MHz
------------	-----------	------	------------

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
1766.00	29.92	4.91	10.04	44.87	54.00	9.13	Peak
1984.00	31.48	5.26	6.45	43.19	54.00	10.81	Peak
4880.00	34.25	9.14	8.22	51.61	54.00	2.39	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
1880.00	30.76	5.10	7.23	43.09	54.00	10.91	Peak
2246.00	31.94	5.90	5.54	43.38	54.00	10.62	Peak
4880.00	34.25	9.14	6.10	49.49	54.00	4.51	Peak

Test Model	HSA-S001K	Mode	TX 2475MHz
------------	-----------	------	------------

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
1764.00	29.92	4.90	9.79	44.61	54.00	9.39	Peak
2066.00	31.70	5.45	5.92	43.07	54.00	10.93	Peak
4950.00	34.28	9.35	7.94	51.57	54.00	2.43	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
1768.00	29.92	4.91	9.07	43.90	54.00	10.10	Peak
2196.00	31.87	5.78	5.31	42.96	54.00	11.04	Peak
4950.00	34.28	9.35	6.83	50.46	54.00	3.54	Peak

Test Model	HSA-S003K	Mode	TX 2406MHz
------------	-----------	------	------------

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
1764.00	29.92	4.90	10.17	44.99	54.00	9.01	Peak
1958.00	31.24	5.22	7.44	43.90	54.00	10.10	Peak
4810.00	34.22	8.87	5.42	48.51	54.00	5.49	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
1766.00	29.92	4.91	10.70	45.53	54.00	8.47	Peak
1982.00	31.48	5.26	6.09	42.83	54.00	11.17	Peak
4810.00	34.22	8.87	4.37	47.46	54.00	6.54	Peak

Test Model	HSA-S003K	Mode	TX 2439MHz
------------	-----------	------	------------

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
1758.00	29.92	4.89	8.27	43.08	54.00	10.92	Peak
1912.00	31.00	5.15	6.08	42.23	54.00	11.77	Peak
4880.00	34.25	9.14	6.45	49.84	54.00	4.16	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
1758.00	29.92	4.89	8.14	42.95	54.00	11.05	Peak
2160.00	31.82	5.69	5.37	42.88	54.00	11.12	Peak
4880.00	34.25	9.14	6.75	50.14	54.00	3.86	Peak

Test Model	HSA-S003K	Mode	TX 2475MHz
------------	-----------	------	------------

Antenna at Horizontal Polarization

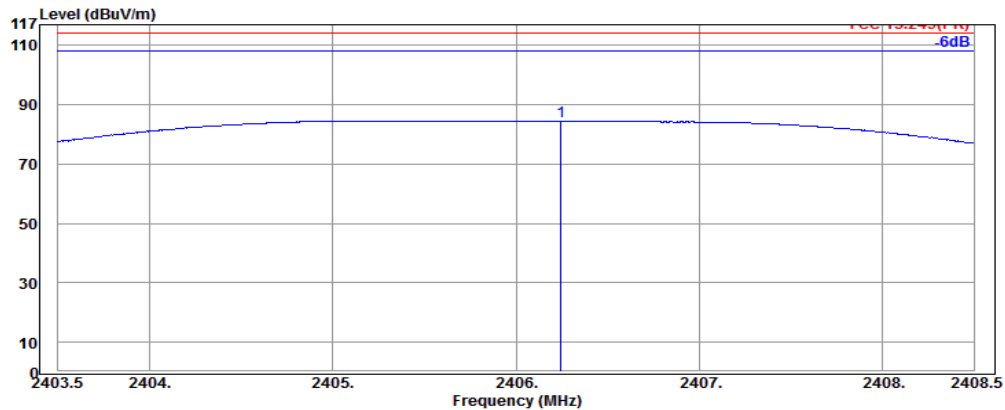
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1786.00	30.04	4.94	5.99	40.97	54.00	13.03	Peak
2078.00	31.70	5.48	7.13	44.31	54.00	9.69	Peak
4950.00	34.28	9.35	9.00	52.63	54.00	1.37	Peak

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
1688.00	29.32	4.80	6.80	40.92	54.00	13.08	Peak
1978.00	31.48	5.25	6.65	43.38	54.00	10.62	Peak
4950.00	34.28	9.35	7.33	50.96	54.00	3.04	Peak

6.6.3. Fundamental Frequency:

Test Model	HSA-S001K	Mode	TX 2406MHz
------------	-----------	------	------------



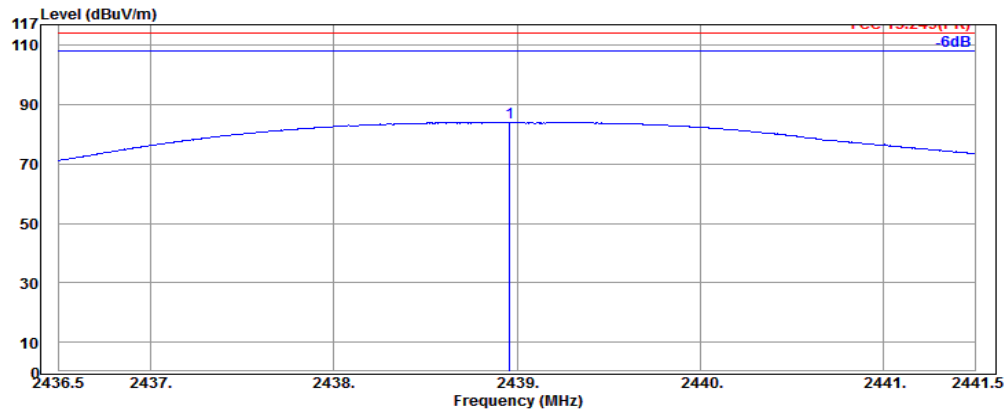
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2406.25	32.18	6.10	46.30	84.58	114.00	29.42	Peak

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2406.25	84.58	-19.63	64.95	94.00	29.05	Average

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

Test Model	HSA-S001K	Mode	TX 2439MHz
------------	-----------	------	------------



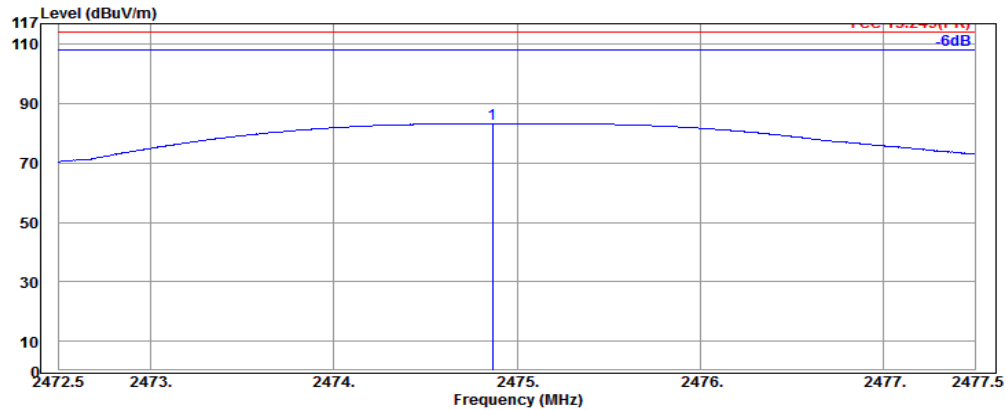
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2438.96	32.23	6.13	45.57	83.93	114.00	30.07	Peak

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2438.96	83.93	-19.63	64.30	94.00	29.70	Average

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

Test Model	HSA-S001K	Mode	TX 2475MHz
------------	-----------	------	------------



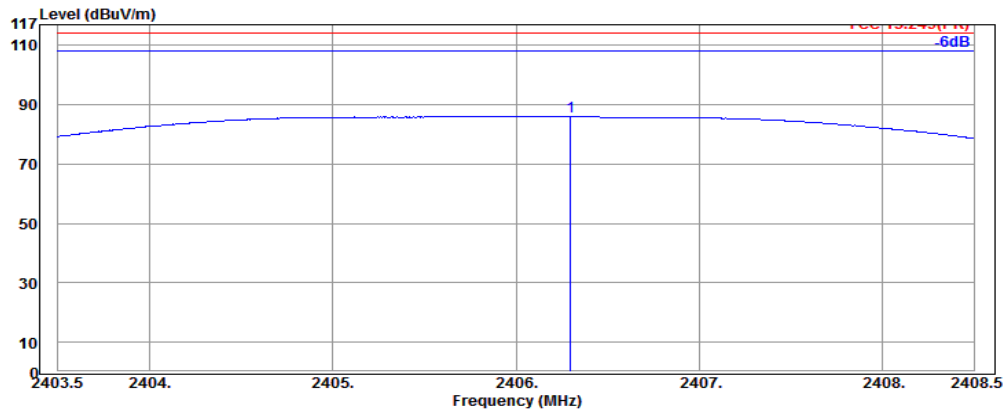
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2474.87	32.28	6.18	44.75	83.21	114.00	30.79	Peak

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2474.87	83.21	-19.63	63.58	94.00	30.42	Average

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

Test Model	HSA-S003K	Mode	TX 2406MHz
------------	-----------	------	------------



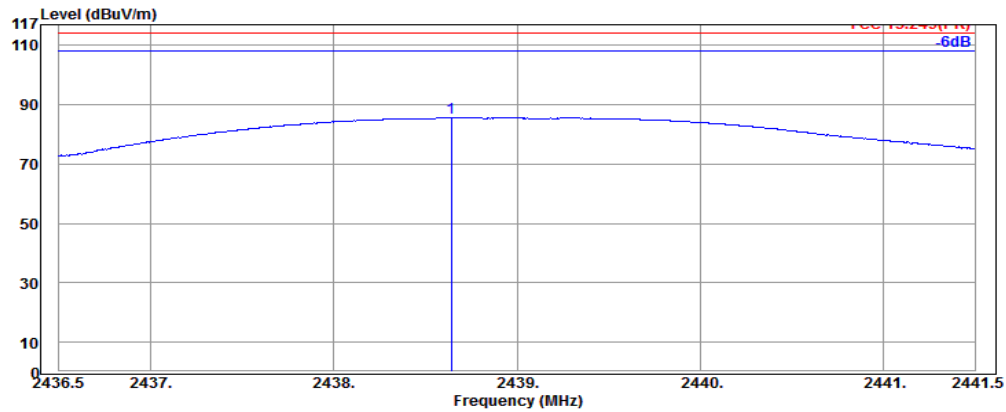
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2406.30	32.18	6.10	47.65	85.93	114.00	28.07	Peak

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2406.30	85.93	-19.63	66.30	94.00	27.70	Average

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

Test Model	HSA-S003K	Mode	TX 2439MHz
------------	-----------	------	------------



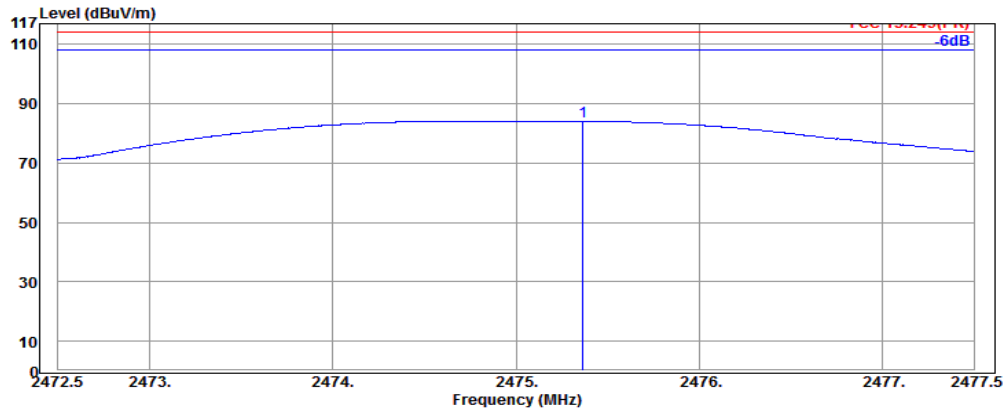
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2438.64	32.23	6.13	47.14	85.50	114.00	28.50	Peak

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2438.64	85.50	-19.63	65.87	94.00	28.13	Average

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

Test Model	HSA-S003K	Mode	TX 2475MHz
------------	-----------	------	------------



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
2475.37	32.28	6.18	45.69	84.15	114.00	29.85	Peak

Emission Frequency (MHz)	Peak Emission Level (dB/m)	DCCF (dB)	Average Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
2475.37	84.15	-19.63	64.52	94.00	29.48	Average

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

7. OCCUPIED BANDWIDTH 99% POWER MEASUREMENT

Test Date	2017/03/02	Temp./Hum.	24°C/52%
Test Voltage	DC 3.7V (Transmitting Mode Via Battery)		

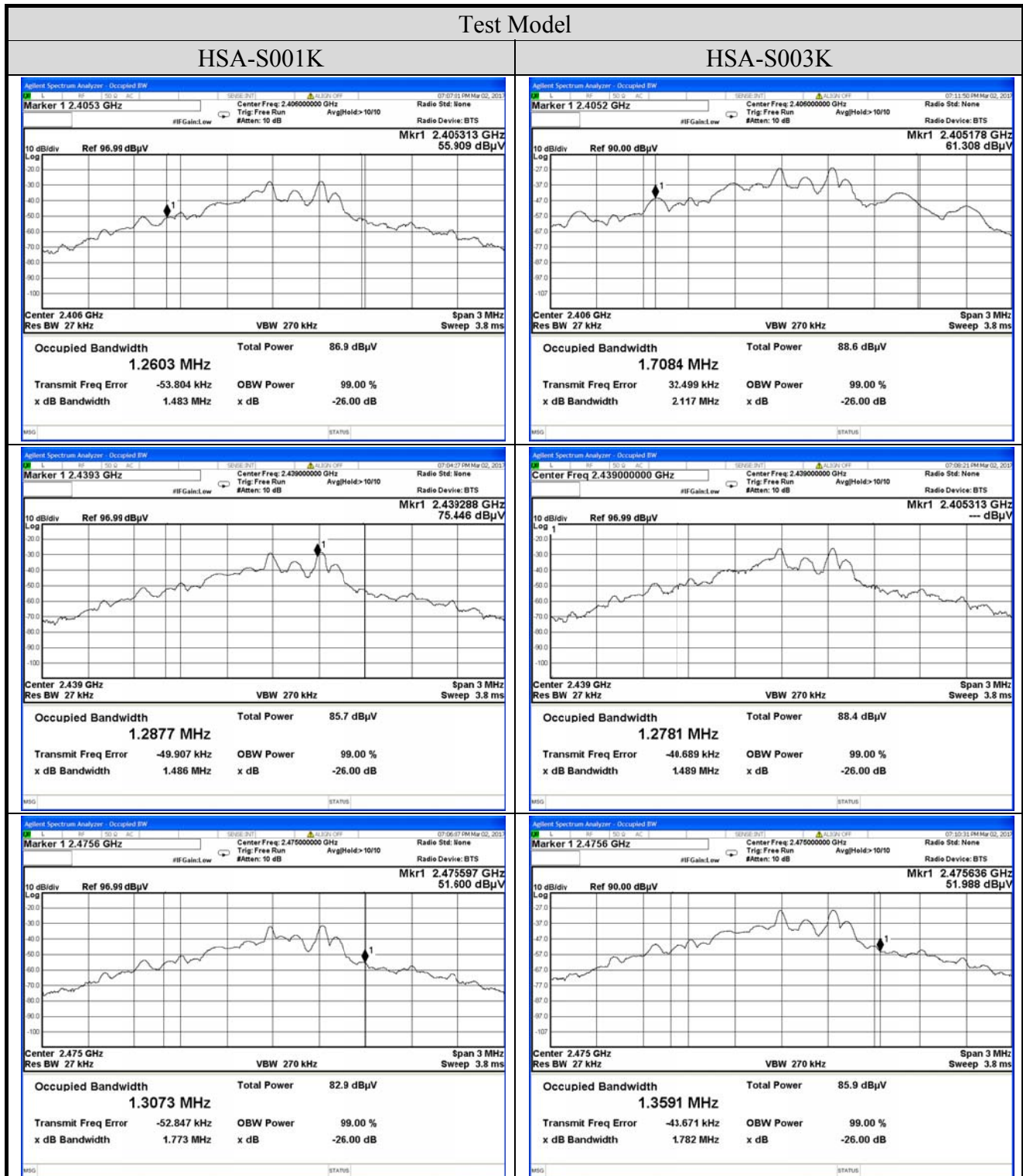
7.1.1. Occupied Bandwidth 99% Power Result

Test Model	Centre Frequency (MHz)	Occupied Bandwidth 99% Power (MHz)
HSA-S001K	2406	1.2603
	2439	1.2877
	2445	1.3073
Test Model	Centre Frequency (MHz)	Occupied Bandwidth 99% Power (MHz)
HSA-S003K	2406	1.7084
	2439	1.2781
	2445	1.3591

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

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

Tel: +886 2 26099301
Fax: +886 2 26099303

APPENDIX A

TEST PHOTOGRAPHS

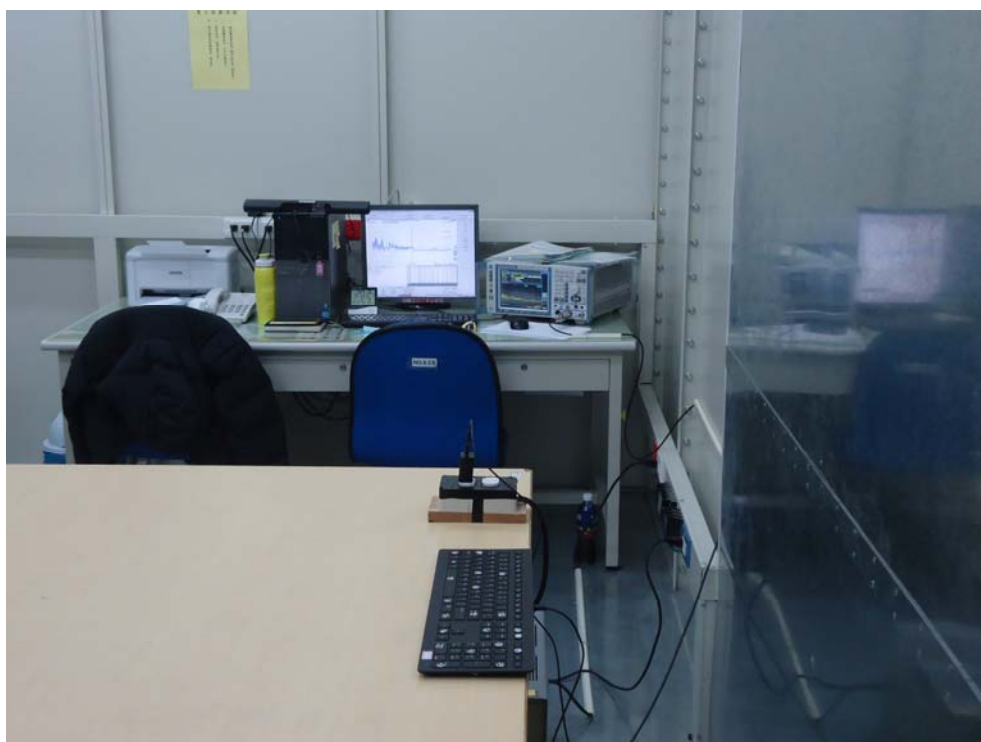
(Model: (1)HSA-S001K (2)HSA-S003K)

B.1. Conducted Emission Measurement

Model: HSA-S001K



FRONT VIEW

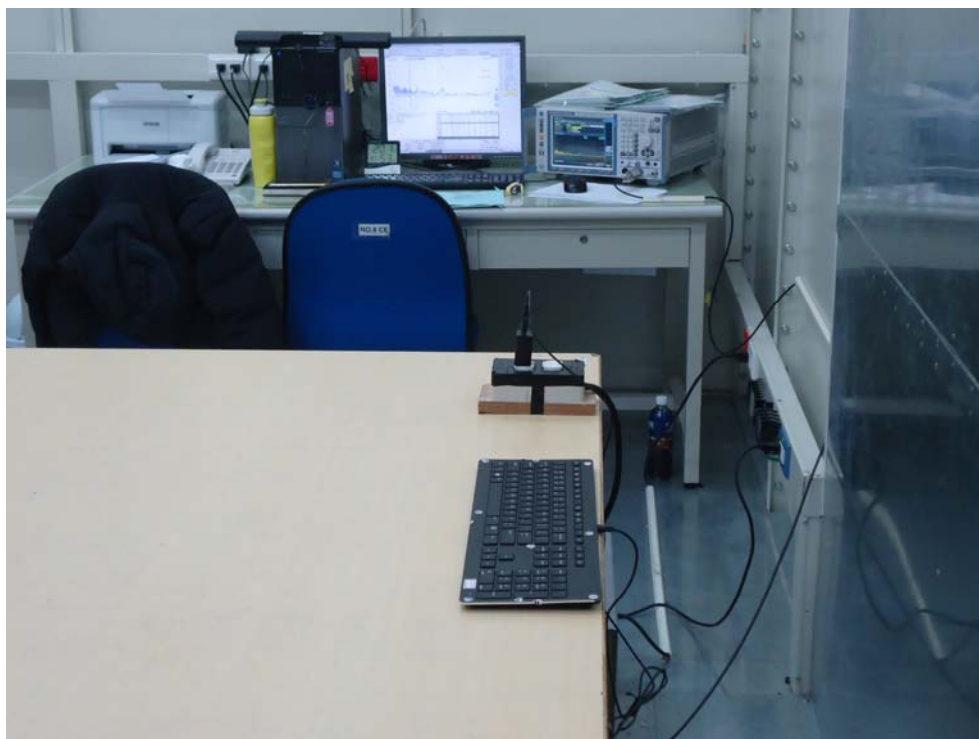


SIDE VIEW

Model: HSA-S003K



FRONT VIEW

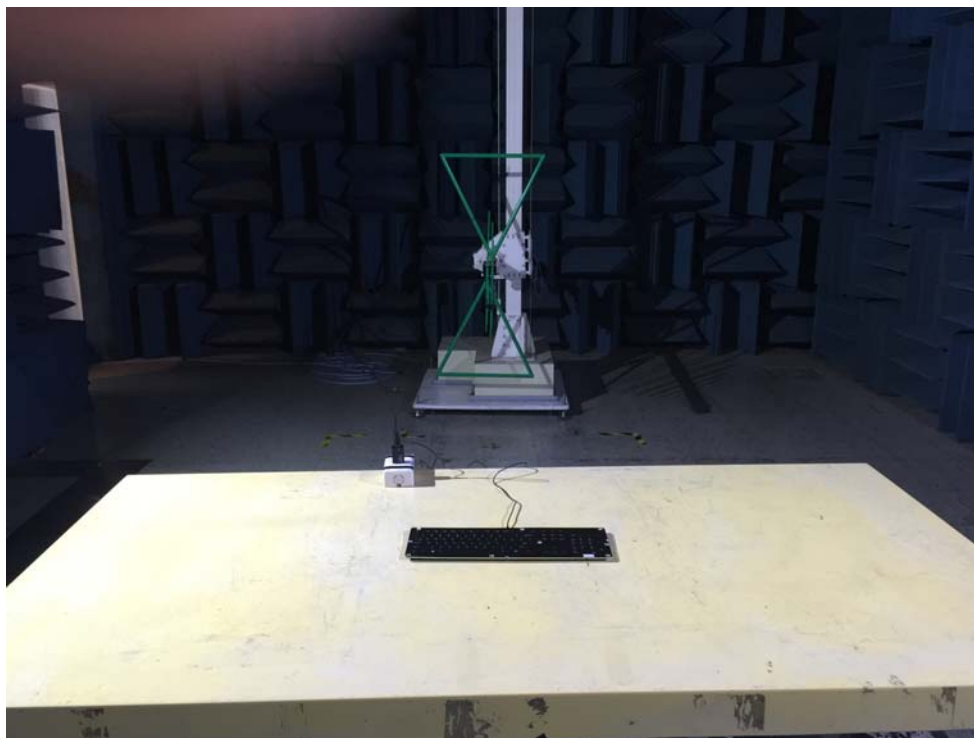


SIDE VIEW

B.2. Radiated Measurement at Semi-Anechoic Chamber

Frequency Below 1GHz

Model: HSA-S001K (Charge Mode)

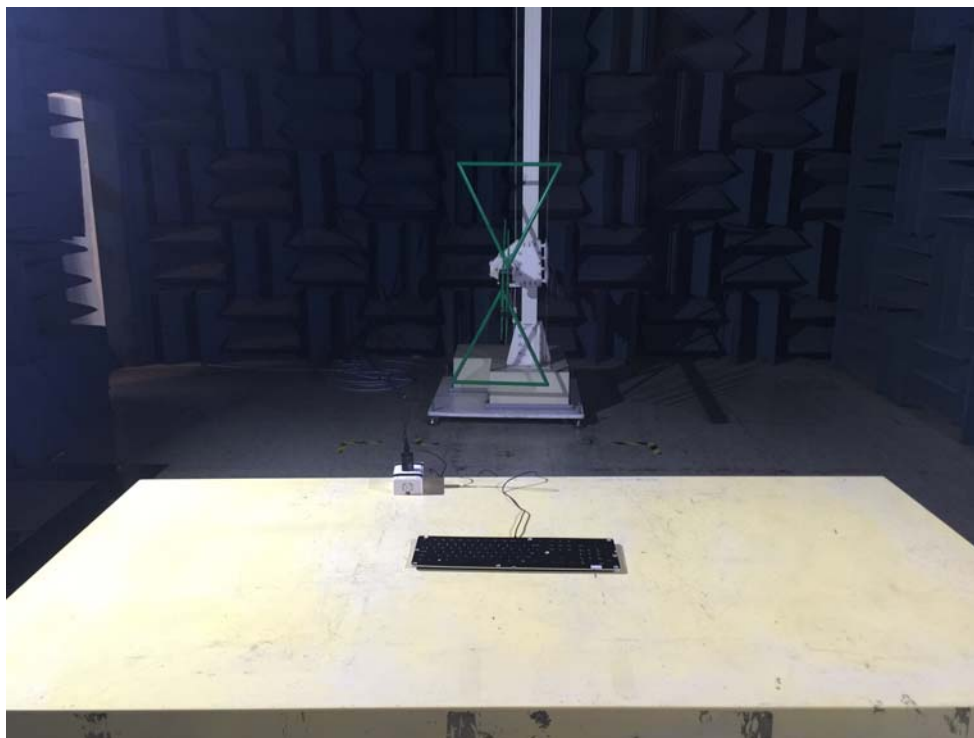


Model: HSA-S001K (Transmitting Mode)

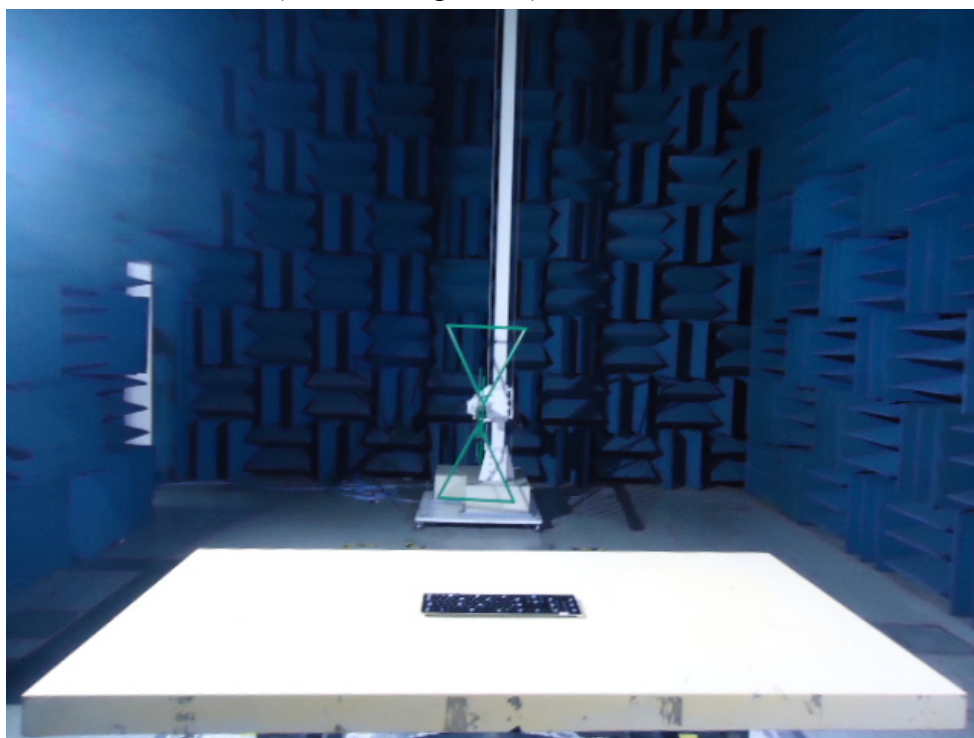


Frequency Below 1GHz

Model: HSA-S003K (Charge Mode)



Model: HSA-S003K (Transmitting Mode)



Frequency Above 1GHz

Model: HSA-S001K



Model: HSA-S003K





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

APPENDIX B

Tel: +886 2 26099301
Fax: +886 2 26099303

APPENDIX B

EUT PHOTOGRAPHS

(Model: (1)HSA-S001K (2)HSA-S003K)

Figure 1
M/M: HSA-S001K, General Appearance (Front View)



Figure 2
M/M: HSA-S001K, General Appearance (Back View)



Figure 3
M/M: HSA-S001K, General Appearance (Side View)



Figure 4
M/M: HSA-S001K, General Appearance (Side View)



Figure 5
M/M: HSA-S001K, General Appearance (Top View)



Figure 6
M/M: HSA-S001K, General Appearance (Bottom View)



Figure 7
M/M: HSA-S001K, Internal View (Removed Cover)

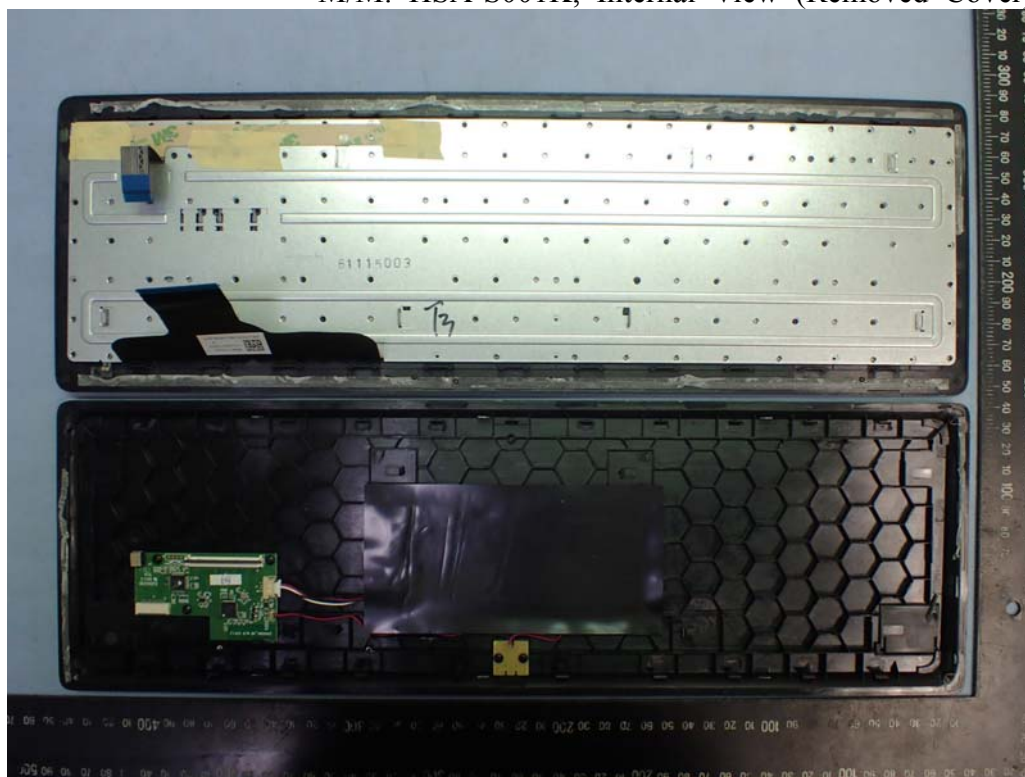


Figure 8
M/M: HSA-S001K, Internal View (Battery View)

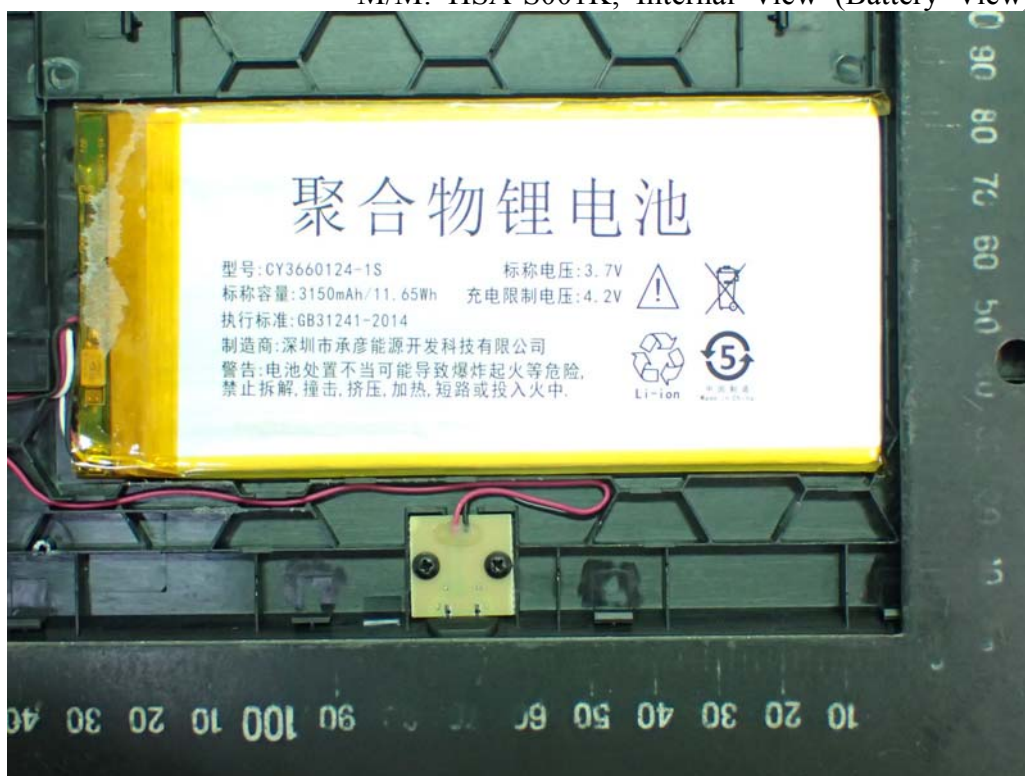


Figure 9

M/M: HSA-S001K, Internal View (Main Board, Front View)

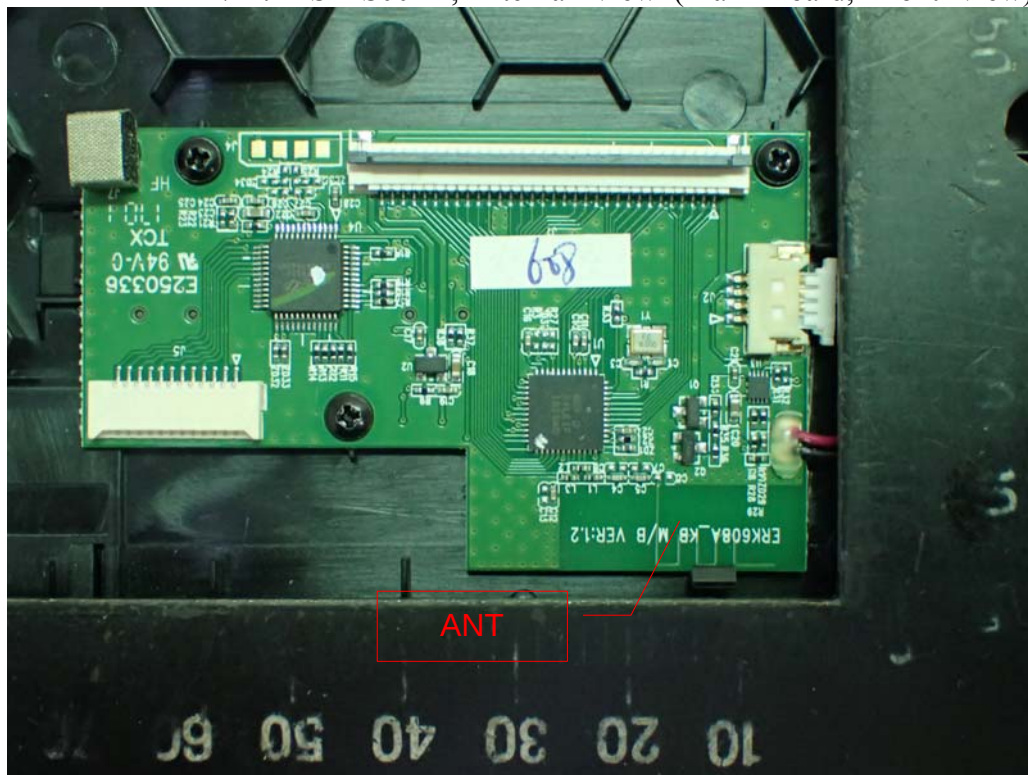


Figure 10

M/M: HSA-S001K, Internal View (Main Board, Back View)

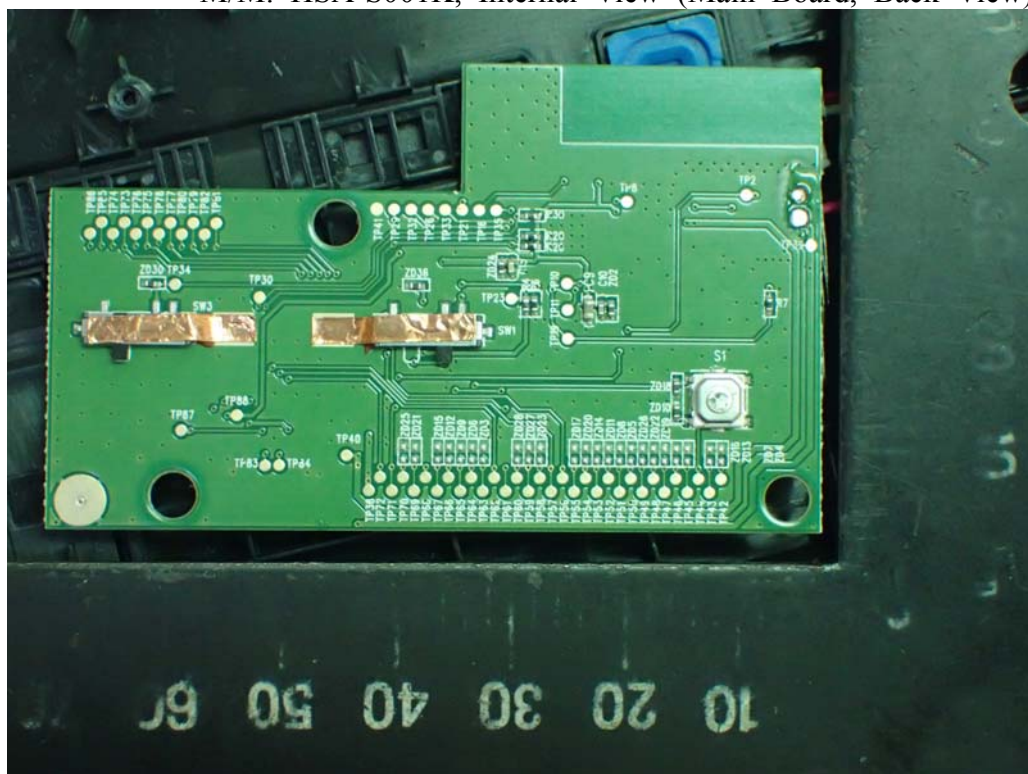


Figure 11

M/M: HSA-S001K, Internal View (Internal Board, Front View)

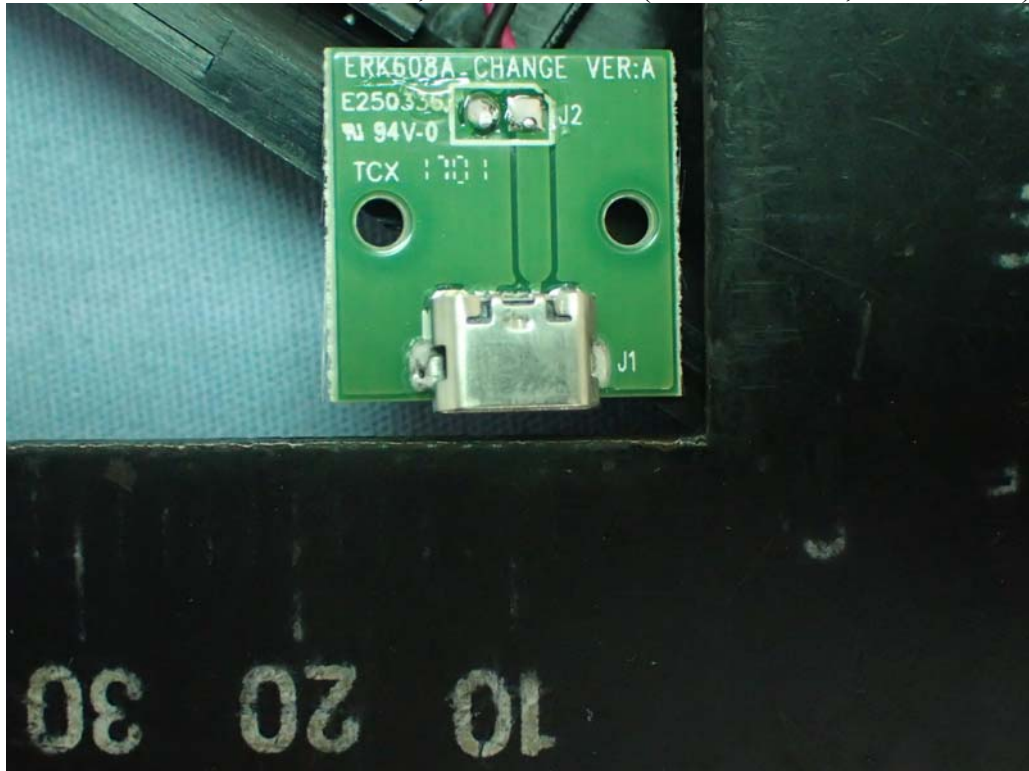


Figure 12

M/M: HSA-S001K, Internal View (Internal Board, Back View)

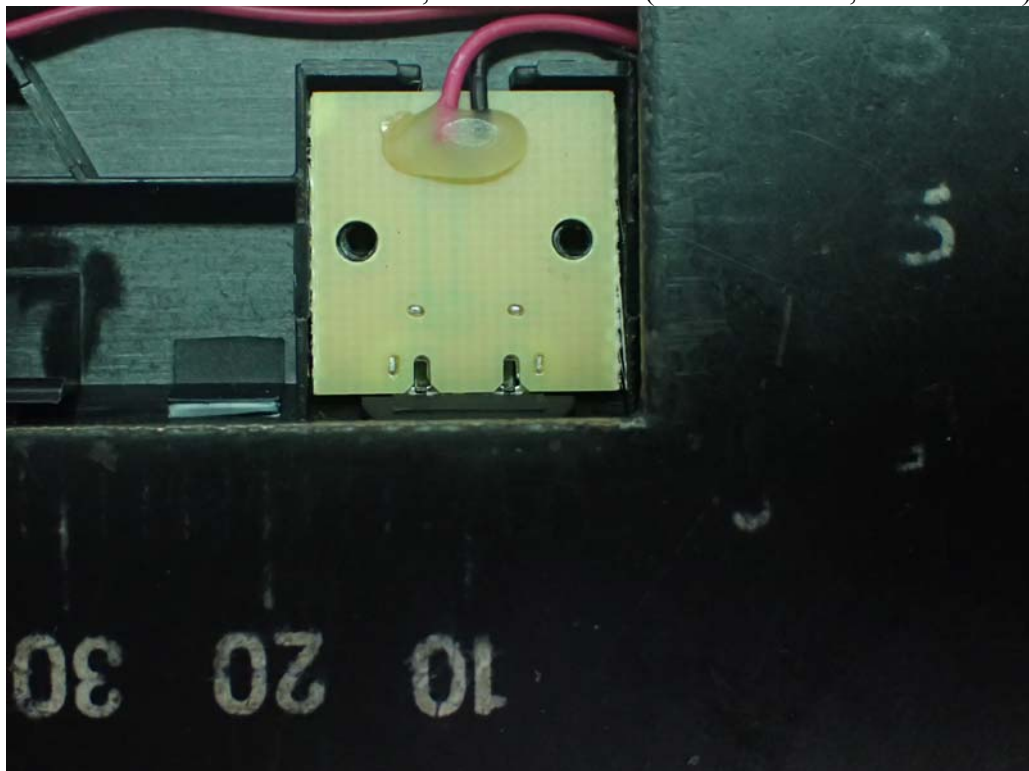


Figure 13
M/M: HSA-S003K, General Appearance (Front View)



Figure 14
M/M: HSA-S003K, General Appearance (Back View)



Figure 15
M/M: HSA-S003K, General Appearance (Side View)



Figure 16
M/M: HSA-S003K, General Appearance (Side View)

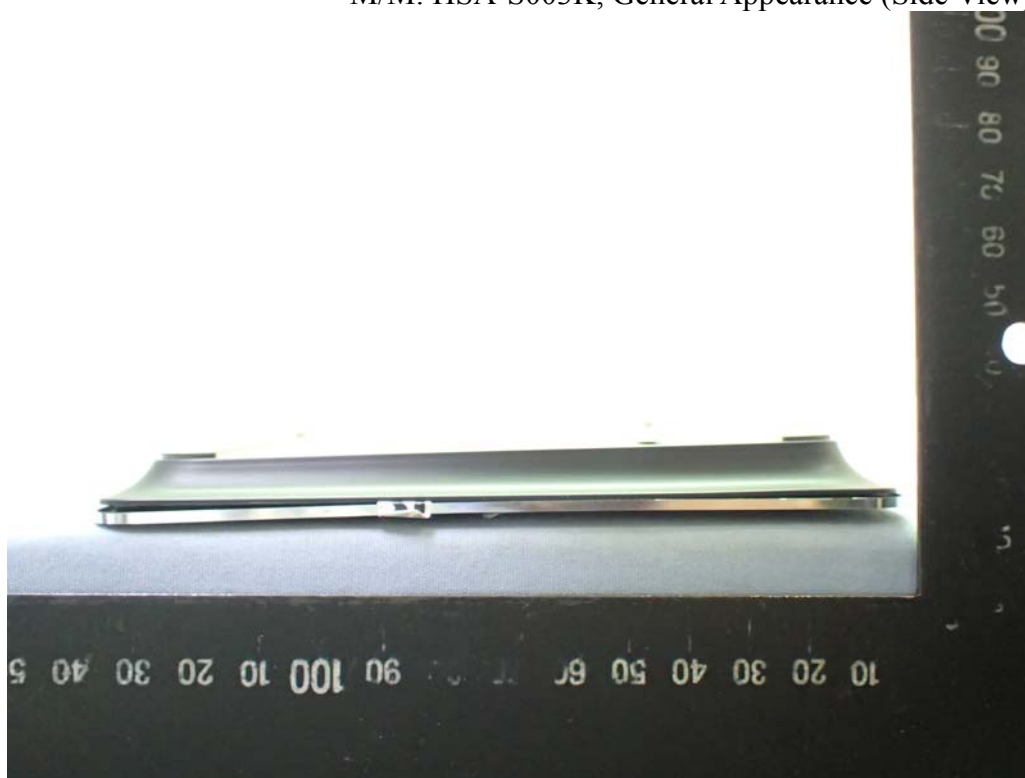


Figure 17
M/M: HSA-S003K, General Appearance (Top View)



Figure 18
M/M: HSA-S003K, General Appearance (Bottom View)



Figure 19
M/M: HSA-S003K, Internal View (Removed Cover)

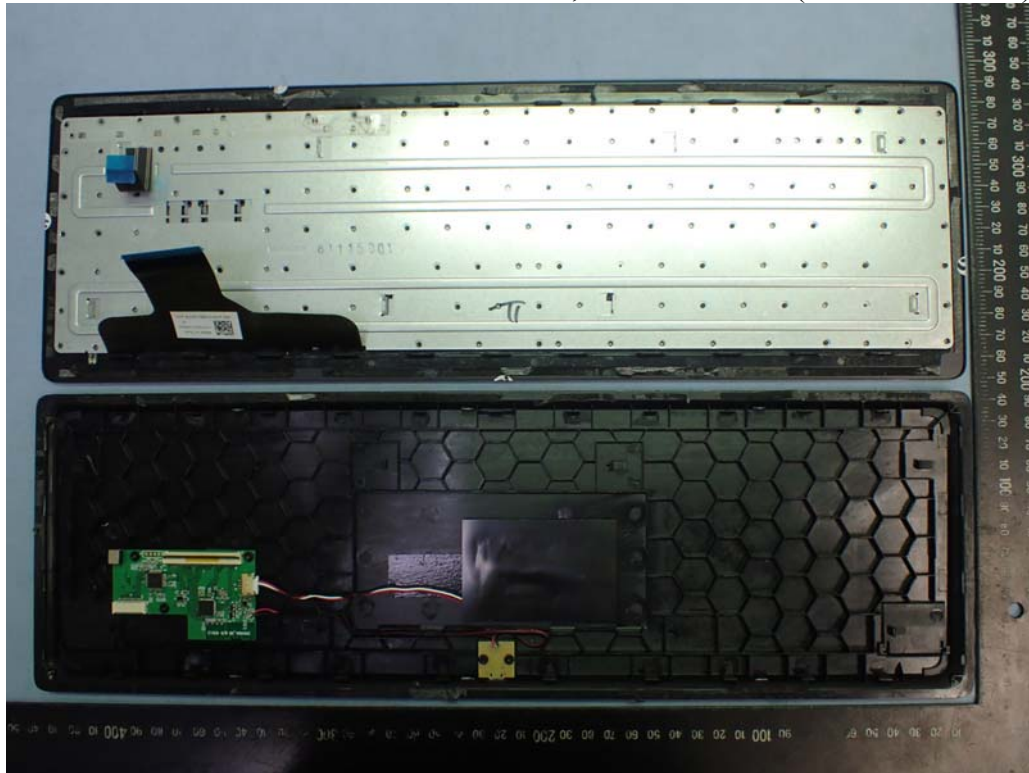


Figure 20
M/M: HSA-S003K, Internal View (Battery View)

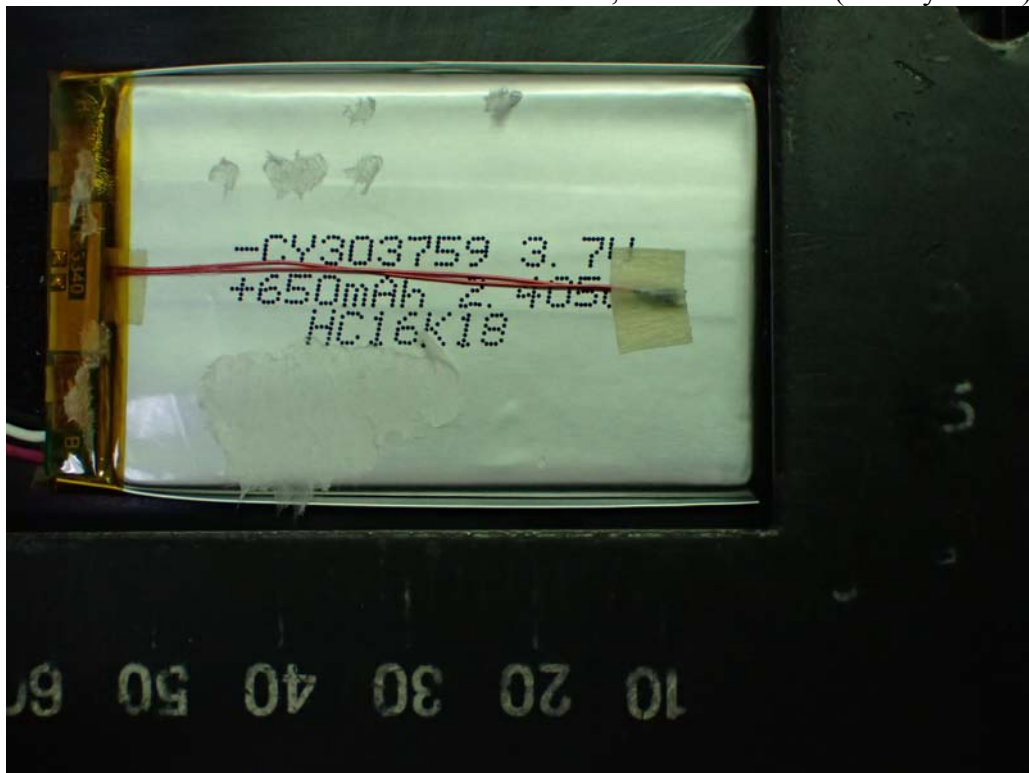


Figure 21

M/M: HSA-S003K, Internal View (Main Board, Front View)

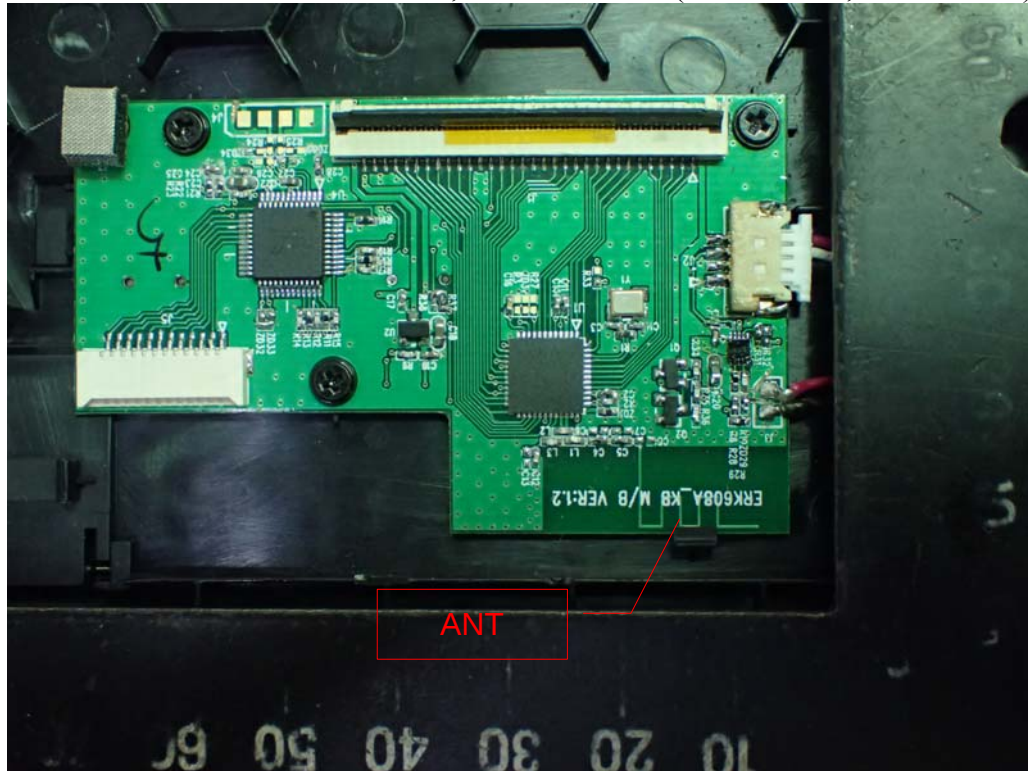


Figure 22

M/M: HSA-S003K, Internal View (Main Board, Back View)

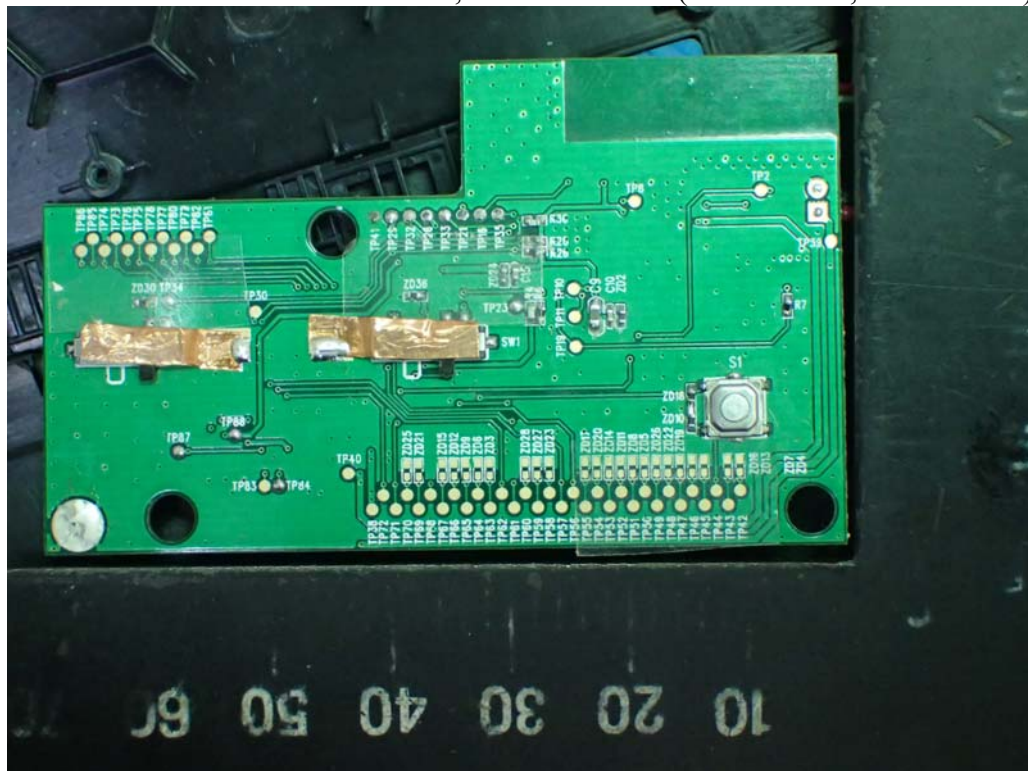


Figure 23

M/M: HSA-S003K, Internal View (Internal Board, Front View)

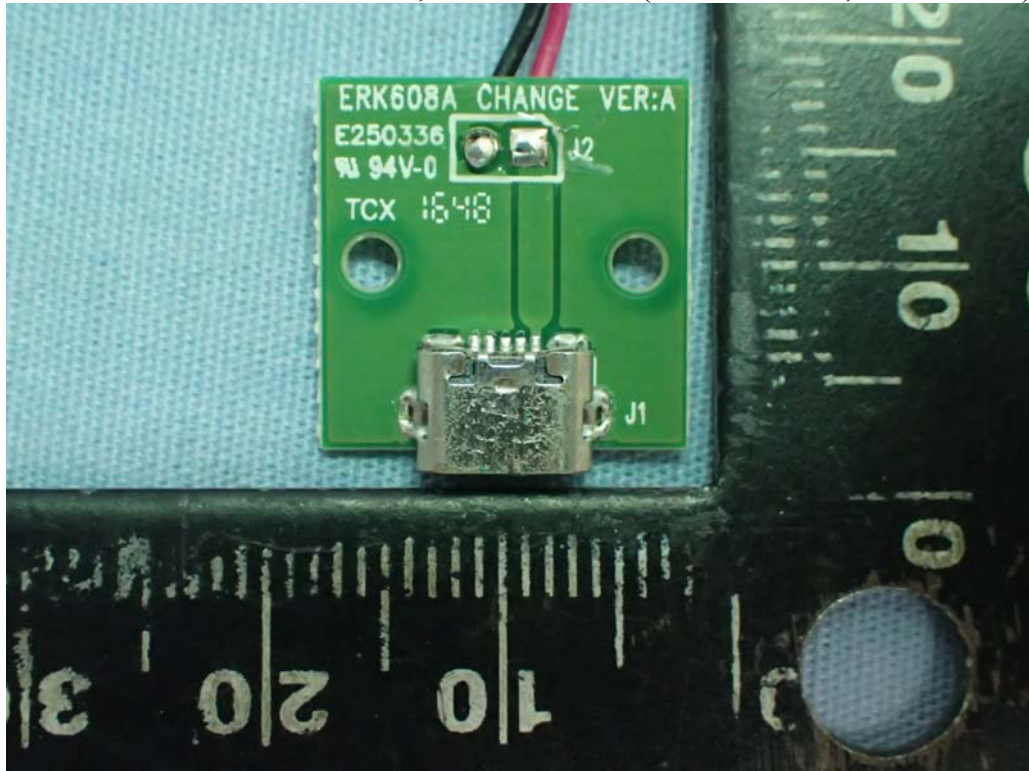


Figure 24

M/M: HSA-S003K, Internal View (Internal Board, Back View)

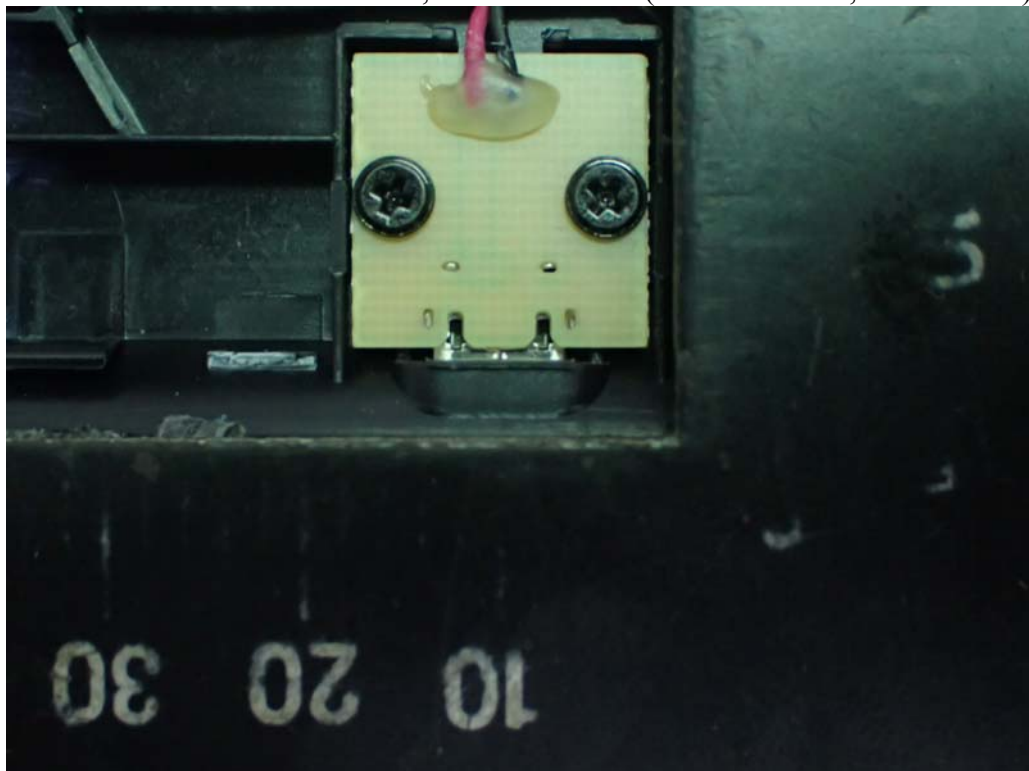


Figure 25
Wireless Dongle (Front View)

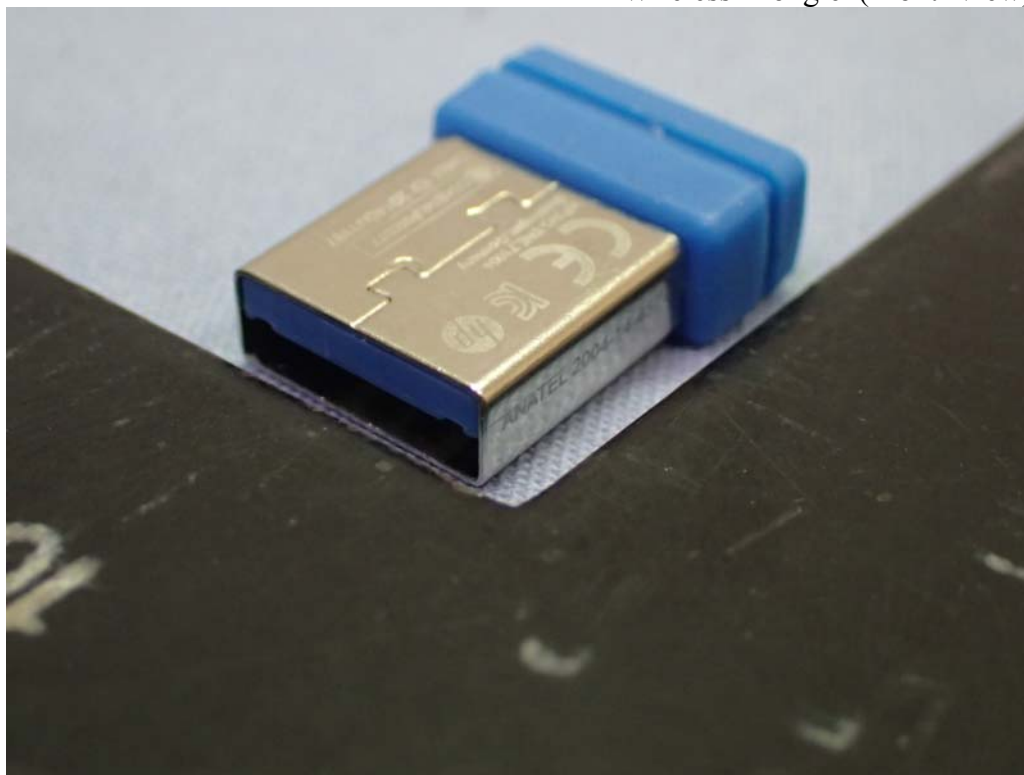


Figure 26
Wireless Dongle (Back View)



Figure 27
Wireless Dongle (Label View)



Figure 28
USB Cable

