

FCC TEST REPORT(Bluetooth)

for

London Drugs Limited

Powered speaker system

Model Number : TAPS1L

FCC ID: 2ANQE-TAPS1L

IC:23216-TAPS1L

Prepared for : London Drugs Limited

Address : Riverside Industrial Park, 12831 Horseshoe Place,
Richmond,British Columbia, Canada,V7A 4X5

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Report No. : TR17090140-E-002

Date of Test : Jul.3~10, 2017

Date of Report : Jul.11, 2017

Keyway Testing Technology Co., Ltd.

Applicant:	London Drugs Limited		
Address:	Riverside Industrial Park, 12831 Horseshoe Place, Richmond, British Columbia, Canada, V7A 4X5		
Manufacturer:	London Drugs Limited		
Address:	Riverside Industrial Park, 12831 Horseshoe Place, Richmond, British Columbia, Canada, V7A 4X5		
E.U.T:	Powered speaker system		
Model Number:	TAPS1L		
Trade Name:	-----		
Date of Receipt:	Jul. 3, 2017	Date of Test:	Jul. 3~10, 2017
Test Specification:	FCC Part 15, Subpart C Section 15.247: 2017 ANSI C63.10:2013 KDB558074 D01 DTS Meas Guidance v04 RSS-247 Issue 2: February 2017 RSS-Gen Issue 4: November 2014		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied.		
	Issue Date: Jul. 11, 2017		
Tested by:	Reviewed by:	Approved by:	
 _____	 _____	 _____	
Keven Wu / Engineer	Mark Li / Supervisor	Andy Gao / Supervisor	
Other Aspects:	None.		
<i>Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested</i>			
<i>This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Keyway Testing Technology Co., Ltd.</i>			

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1.TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	15.207/ RSS-Gen clause 8.8	PASS
Radiated Emissions	15.205(a),15.209,15.247(d) /RSS-Gen clause 8.9 & 8.10	PASS
Occupied Bandwidth	15.247(a)(2)/ RSS-247 Issue 2:5.2(1)	PASS
Peak Power Density	15.247(e)/ RSS-247 Issue 2:5.2(2)	PASS
Maximum Peak Output Power	15.247(b)(3)/ RSS-247 Issue 2:5.4(4)	PASS
Emissions from out of band	15.247(d)	PASS
Antenna Requirement	15.203/ RSS-Gen clause 8.3	PASS

2.GENERAL PRODUCT INFORMATION

2.1. Product Function

Refer to Technical Construction Form and User Manual.

2.2. Description of Device (EUT)

Product Name:	Powered speaker system
Model No.:	TAPS1L
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	40 Channels
Channel spacing	2MHz
Modulation technology:	GFSK
Antenna Type:	PCB Antenna
Antenna gain:	0dBi
Power supply:	AC 120V

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

2.3. Independent Operation Modes

EUT work in BT mode, and test mode as below:

Pretest Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39
Mode 4	Link Mode

Remark: According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup”.

2.4. Product Version

Product SW version	V1.0
Product HW version	V1.1
Radio SW version	V1.1_0822
Radio HW version	V1_0224F
Test SW Version	Blue Test 3

Note: SW means software, HW means hardware.

2.5. Test Sites

2.5.1. Test Facilities

Lab Qualifications : Certificated by Industry Canada
Registration No.: 9868A
Date of registration: December 8, 2011

 Certificated by FCC, USA
Registration No.: 370994
Date of registration: February 21, 2012

 Certificated by CNAS China
Registration No.: CNAS L5783
Date of registration: August 8, 2012

2.6. List of Test and Measurement Instruments

2.6.1. For conducted emission at the mains terminals test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 08,17	Apr. 08,18
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr. 08,17	Apr. 08,18
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	Apr. 08,17	Apr. 08,18
RF Cable	FUJIKURA	3D-2W	944 Cable	Apr. 08,17	Apr. 08,18

2.6.2. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 08,17	Apr. 08,18
System Simulator	Agilent	E5515C	GB43130245	Apr. 08,17	Apr. 08,18
Power Splitter	Weinschel	1506A	NW425	Apr. 08,17	Apr. 08,18
Bilog Antenna	ETS-LINDGREEN	3142D	135452	Apr. 09,17	Apr. 09,18
Spectrum Analyzer	Agilent	E4411B	MY4511304	Apr. 08,17	Apr. 08,18
Spectrum Analyzer	R&S	FSV40	132.1.3008K39-100967	Apr. 08,17	Apr. 08,18
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Apr. 09,17	Apr. 09,18
Signal Amplifier	SONOMA	310	187016	Apr. 08,17	Apr. 08,18
Signal Amplifier	Agilent	8449B	3008A00251	Apr. 08,17	Apr. 08,18
RF Cable	IMRO	IMRO-400	966 Cable 1#	N/A	N/A
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A
Horn Antenna	DAZE	ZN30701	11003	Apr. 09,17	Apr. 09,18
Horn Antenna	SCHWARZBECK	BBHA9170	9170-068	Apr. 09,17	Apr. 09,18
Spectrum Analyzer	Agilent	8593E	3911A04271	Apr. 08,17	Apr. 08,18
Spectrum Analyzer	Agilent	E4408B	MY44211125	Apr. 08,17	Apr. 08,18
Signal Amplifier	DAZE	ZN3380C	11001	Apr. 08,17	Apr. 08,18
High Pass filter	Micro	HPM50111	324216	Apr. 08,17	Apr. 08,18
Filter	COM-MW	ZBSF-C836.5-25-X	KW032	Apr. 08,17	Apr. 08,18
Filter	COM-MW	ZBSF-C1747.5-75-X2	KW035	Apr. 08,17	Apr. 08,18
Filter	COM-MW	ZBSF-C1880-60-X2	KW037	Apr. 08,17	Apr. 08,18
DC Power Supply	LongWei	PS-305D	010964729	Apr. 08,17	Apr. 08,18
Constant temperature and humidity box	GF	GTH-800-40-1P	MAA9906-005	Apr. 08,17	Apr. 08,18
Splitter	Agilent	11636B	0025164	Apr. 08,17	Apr. 08,18
Loop Antenna	ARA	PLA-1030/B	1029	Apr. 08,17	Apr. 08,18
Power Meter	Anritsu	ML2495A	1204003	Apr. 08,17	Apr. 08,18
Power Sensor	Anritsu	MA2411B	1126150	Apr. 08,17	Apr. 08,18

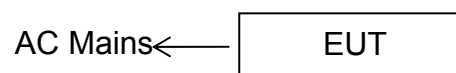
3. TEST SET-UP AND OPERATION MODES

3.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



(EUT: Powered speaker system)

3.3. Test Operation Mode and Test Software

Final Test Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39
Mode 4	Link Mode
Test Software	BlueTest3

3.4. Special Accessories and Auxiliary Equipment

None

3.5. Test Environment:

Ambient conditions in the test laboratory:

Items	Actual
Temperature (°C)	20~25
Humidity (%RH)	50~65

4. EMISSION TEST RESULTS

4.1. Conducted Emission at the Mains Terminals Test

4.1.1. Limit

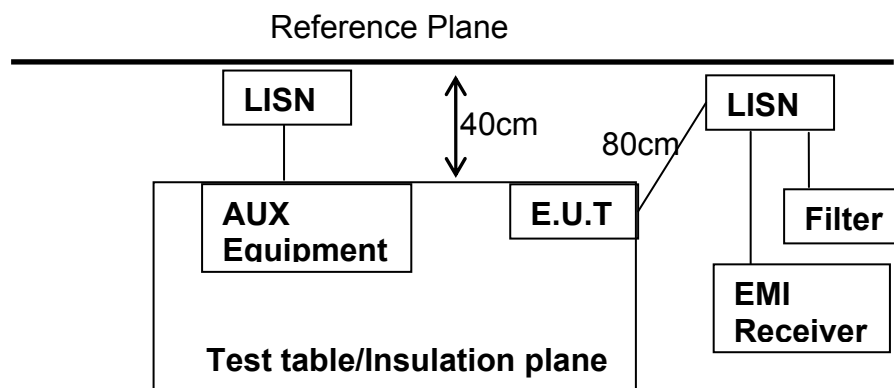
Frequency MHz	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

NOTE: 1.The lower limit shall apply at the transition frequencies.
2.The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.

4.1.2. Test Procedure

- 1.The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the center so as to form a bundle no longer than 0.4 m.
- 2.The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.
- 3.The frequency range from 150 kHz to 30 MHz was investigated.
- 4.The bandwidth of the test receiver was set at 9 kHz.
- 5.Pretest for all mode, the test data of the worst case condition(s) was reported on the following page.

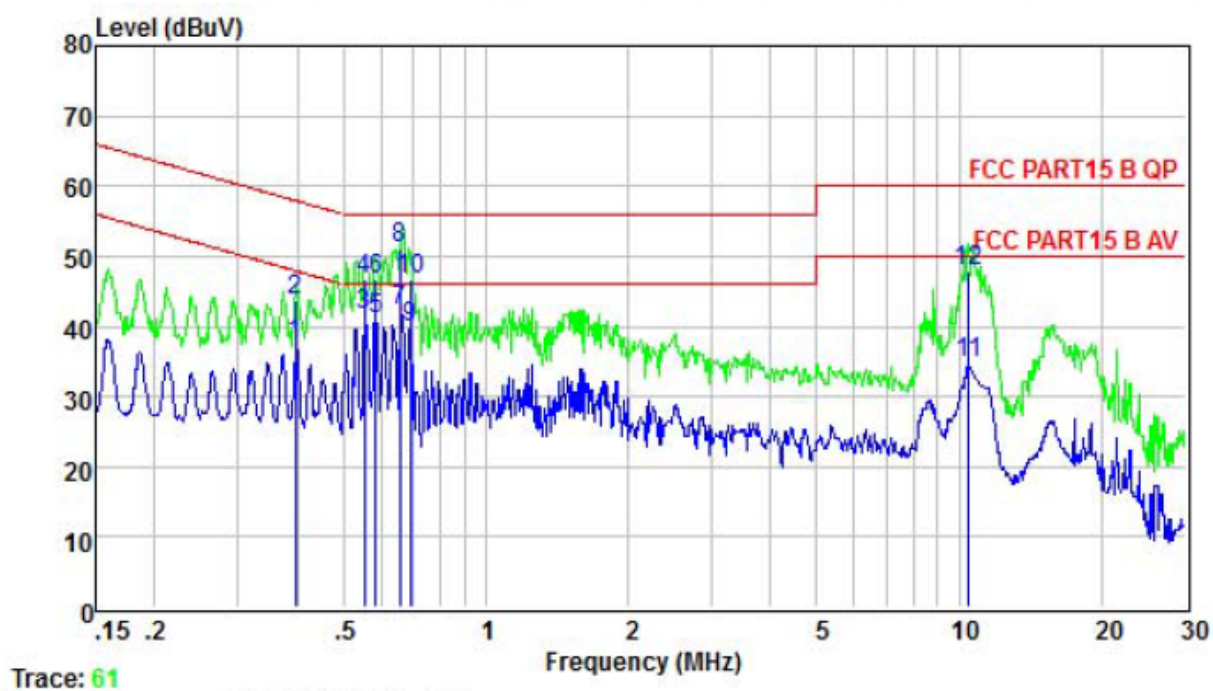
4.1.3. Test Setup



Remark: E.U.T. :Equipment Under Test
LISN: Line Impedance Stabilization Network
Test table height: 0.8m.

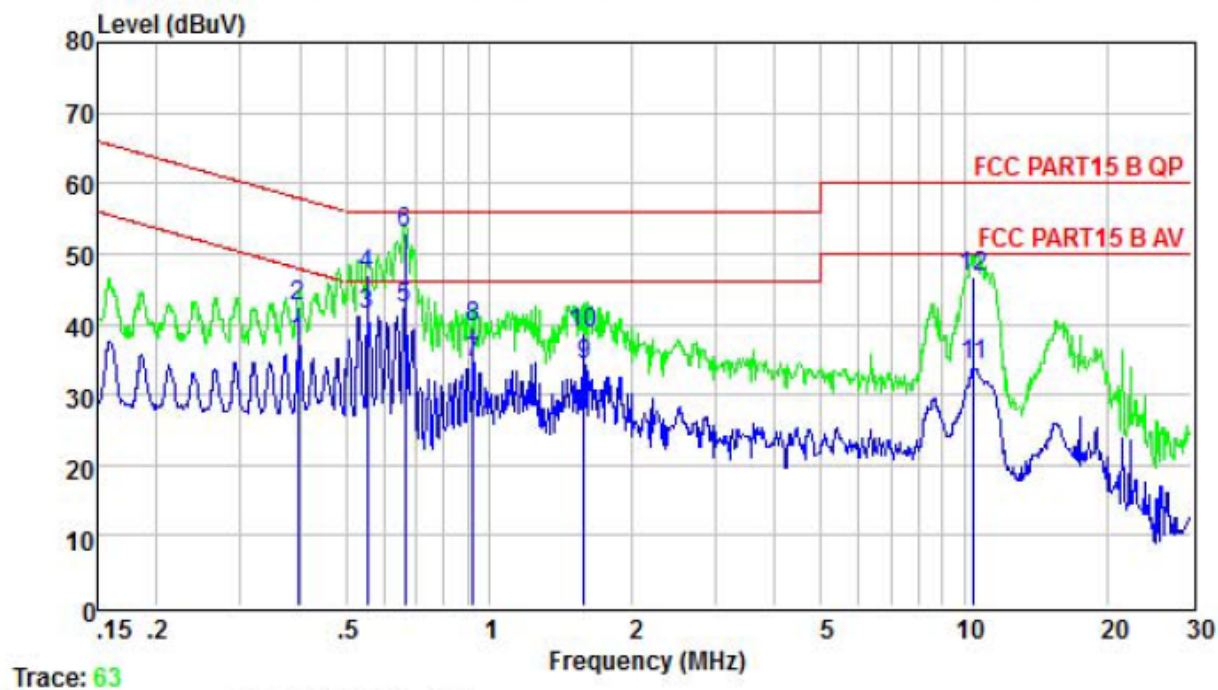
4.1.4. Test Results

EUT :	Powered speaker system	Model Name :	TAPS1L
Temperature :	20 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	Line
Test Voltage :	AC 120V	Test Mode :	Mode 4(worst case)



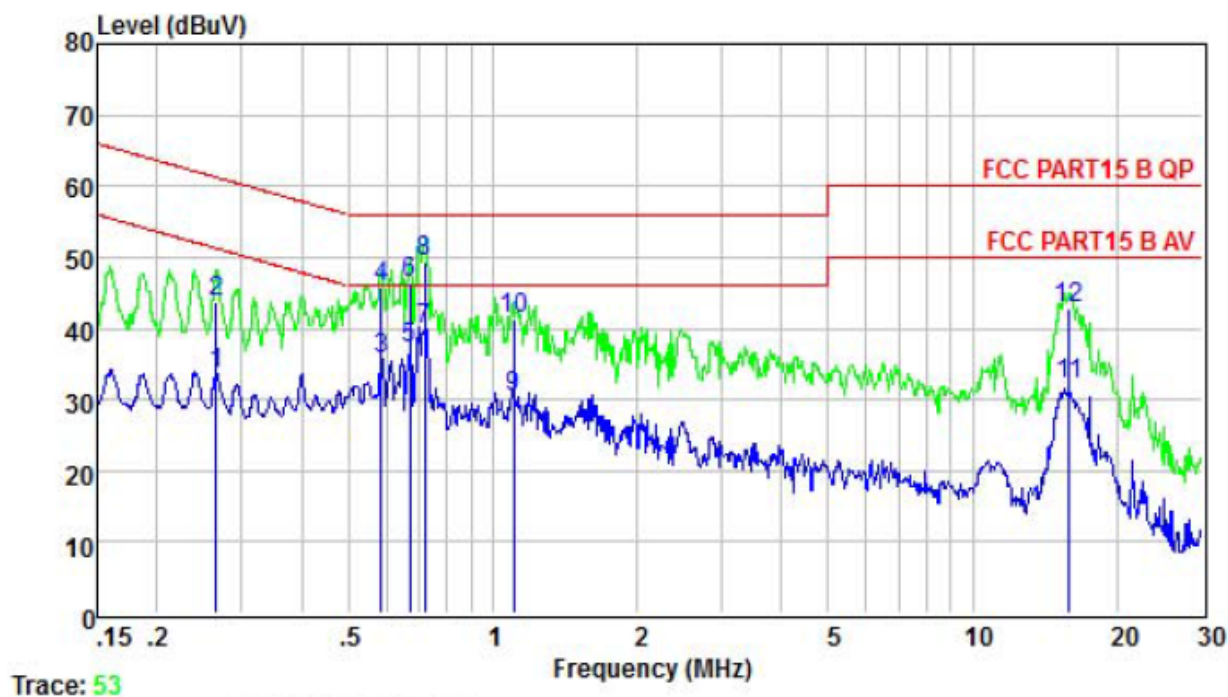
	Freq	Level	Limit	Over	
	MHz	dBuV	Line	Limit	Remark
	MHz	dBuV	dBuV	dB	
1	0.396	37.44	47.95	-10.51	Average
2	0.396	43.57	57.95	-14.38	QP
3	0.555	41.58	46.00	-4.42	Average
4	0.555	46.84	56.00	-9.16	QP
5	0.585	41.06	46.00	-4.94	Average
6	0.585	46.79	56.00	-9.21	QP
7	0.658	42.37	46.00	-3.63	Average
8	0.658	51.24	56.00	-4.76	QP
9	0.694	39.83	46.00	-6.17	Average
10	0.694	46.83	56.00	-9.17	QP
11	10.452	34.83	50.00	-15.17	Average
12	10.452	47.81	60.00	-12.19	QP

EUT :	Powered speaker system	Model Name :	TAPS1L
Temperature :	20 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	Neutral
Test Voltage :	AC 120V	Test Mode :	Mode 4(worst case)



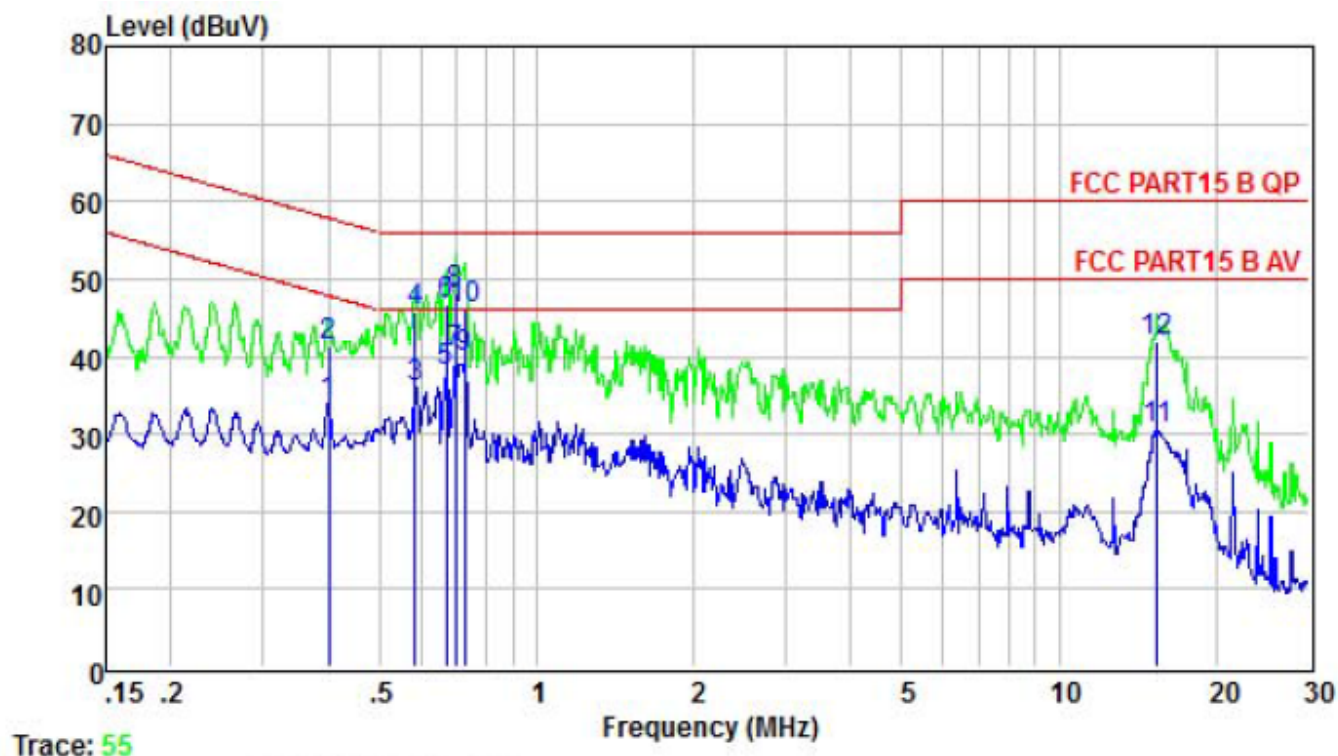
	Freq	Level	Limit	Over	Remark
	MHz	dBuV	Line	Limit	
			dBuV	dB	
1	0.396	37.56	47.95	-10.39	Average
2	0.396	42.57	57.95	-15.38	QP
3	0.555	41.43	46.00	-4.57	Average
4	0.555	46.87	56.00	-9.13	QP
5	0.665	42.25	46.00	-3.75	Average
6	0.665	52.79	56.00	-3.21	QP
7	0.923	34.36	46.00	-11.64	Average
8	0.923	39.62	56.00	-16.38	QP
9	1.585	34.21	46.00	-11.79	Average
10	1.585	38.64	56.00	-17.36	QP
11	10.452	34.23	50.00	-15.77	Average
12	10.452	46.75	60.00	-13.25	QP

EUT :	Powered speaker system	Model Name :	TAPS1L
Temperature :	20 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	Line
Test Voltage :	AC 240V	Test Mode :	Mode 4(worst case)



	Freq	Level	Limit	Over	
	MHz	dBuV	Line	Limit	Remark
1	0.266	33.58	51.25	-17.67	Average
2	0.266	43.69	61.25	-17.56	QP
3	0.585	35.55	46.00	-10.45	Average
4	0.585	45.78	56.00	-10.22	QP
5	0.672	37.27	46.00	-8.73	Average
6	0.672	46.38	56.00	-9.62	QP
7	0.720	39.96	46.00	-6.04	Average
8	0.720	49.35	56.00	-6.65	QP
9	1.106	30.33	46.00	-15.67	Average
10	1.106	41.47	56.00	-14.53	QP
11	15.885	32.00	50.00	-18.00	Average
12	15.885	42.95	60.00	-17.05	QP

EUT :	Powered speaker system	Model Name :	TAPS1L
Temperature :	20 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	Neutral
Test Voltage :	AC 240V	Test Mode :	Mode 4(worst case)



	Freq	Level	Limit	Over	Remark
	MHz	dBuV	Line	Limit	
			dBuV	dB	
1	0.400	33.99	47.86	-13.87	Average
2	0.400	41.32	57.86	-16.54	QP
3	0.585	36.01	46.00	-9.99	Average
4	0.585	45.78	56.00	-10.22	QP
5	0.672	38.08	46.00	-7.92	Average
6	0.672	46.57	56.00	-9.43	QP
7	0.701	40.34	46.00	-5.66	Average
8	0.701	48.17	56.00	-7.83	QP
9	0.727	39.73	46.00	-6.27	Average
10	0.727	46.18	56.00	-9.82	QP
11	15.388	30.67	50.00	-19.33	Average
12	15.388	42.08	60.00	-17.92	QP

4.2. Radiated Emission Test

4.2.1. Limit

15.209 limits

Frequency MHz	Distance Meters	Filed Strengths Limit	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
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	74.0dB(μV)/m(Peak) 54.0dB(μV)/m(Average)	

RSS-Gen 8.9 limits

Frequency of Emission (MHz)	Field Strength		Measurement Distance (meters)
	$\mu\text{V}/\text{m}$	$\text{dB}\mu\text{V}/\text{m}$	
0.009-0.49	2400/F(kHz)		300
0.49-1.705	24000/F(kHz)		30
1.705-30	30		30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

4.2.2. Restricted bands of operation

MHz	MHz	MHz	GHz
0.009-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	
All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.			

4.2.3. Test Procedure

The EUT was placed on a turn table which was 0.8 m (above 1GHz, the table was 1.5m) above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz, Both PK and AV measure, PK detector is used.

The frequency range from 30MHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

Notes: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamplifier Factor.

2. Measurement Uncertainty: ± 3.2 dB at a level of confidence of 95%.

3. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

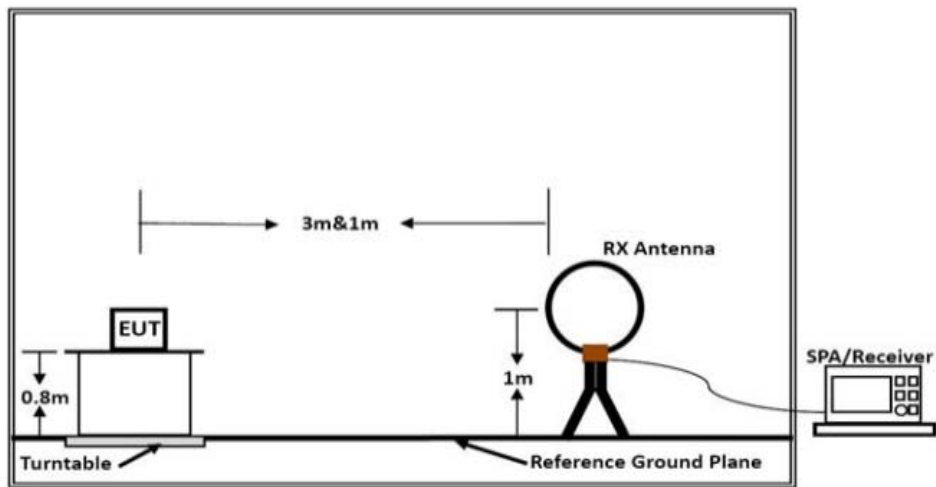
4. For emissions below 1GHz, pretest for all mode, The test data of the worst case condition(s) was reported on the following pages.

5. For Both PK and AV value above 1GHz, PK detector is used.

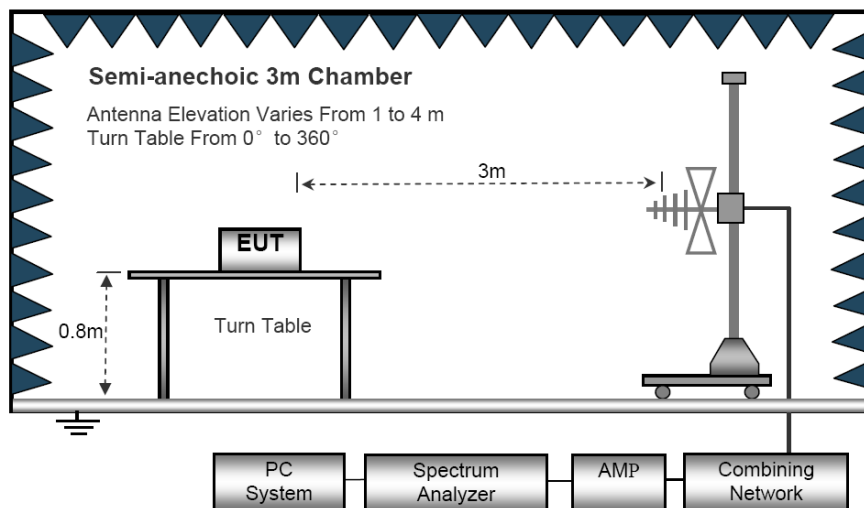
6. EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report (Z orientation).

4.2.4. Test Setup

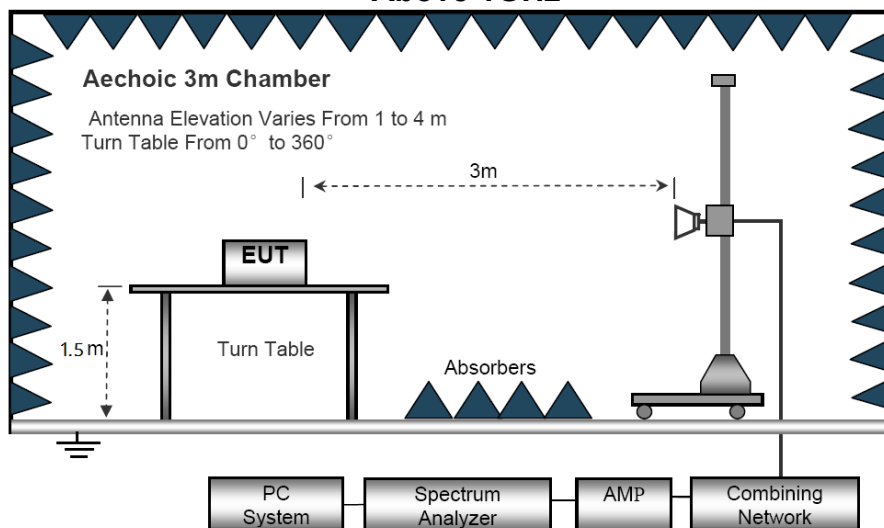
Below 30MHz



30MHz- 1GHz



Above 1GHz



4.2.5. Test Results

Below 30MHz

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

Note:

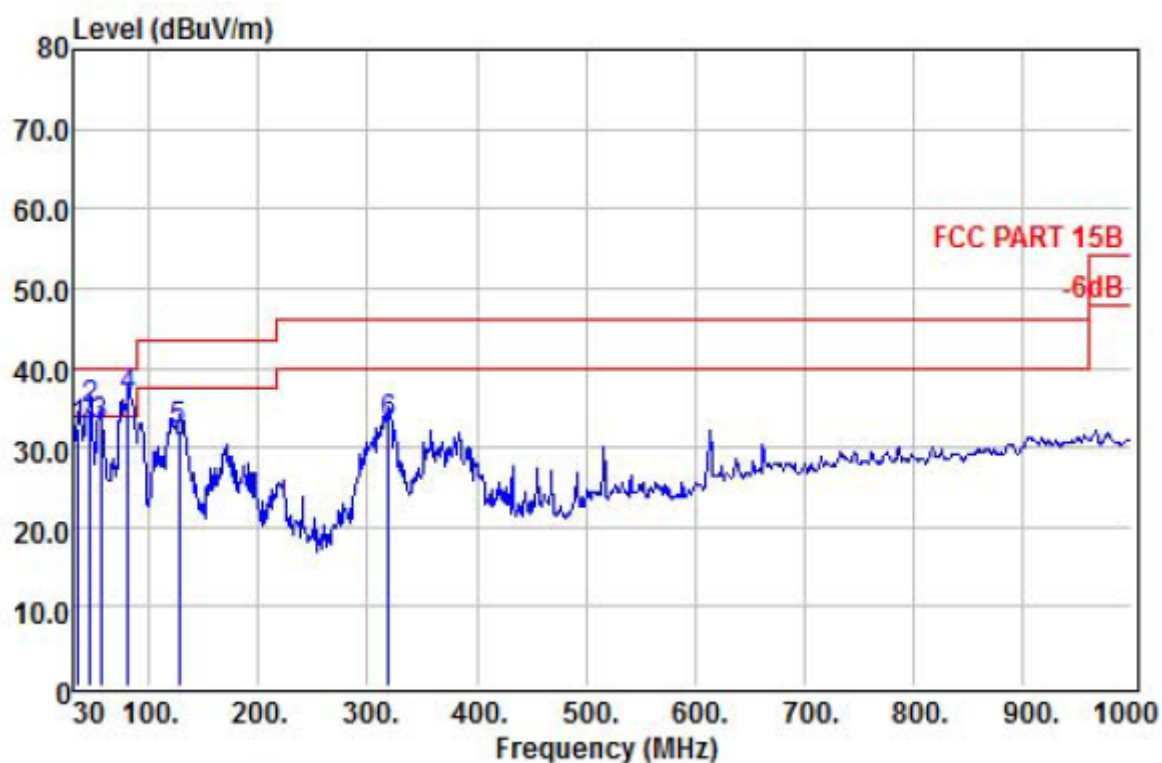
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuV) + distance extrapolation factor.

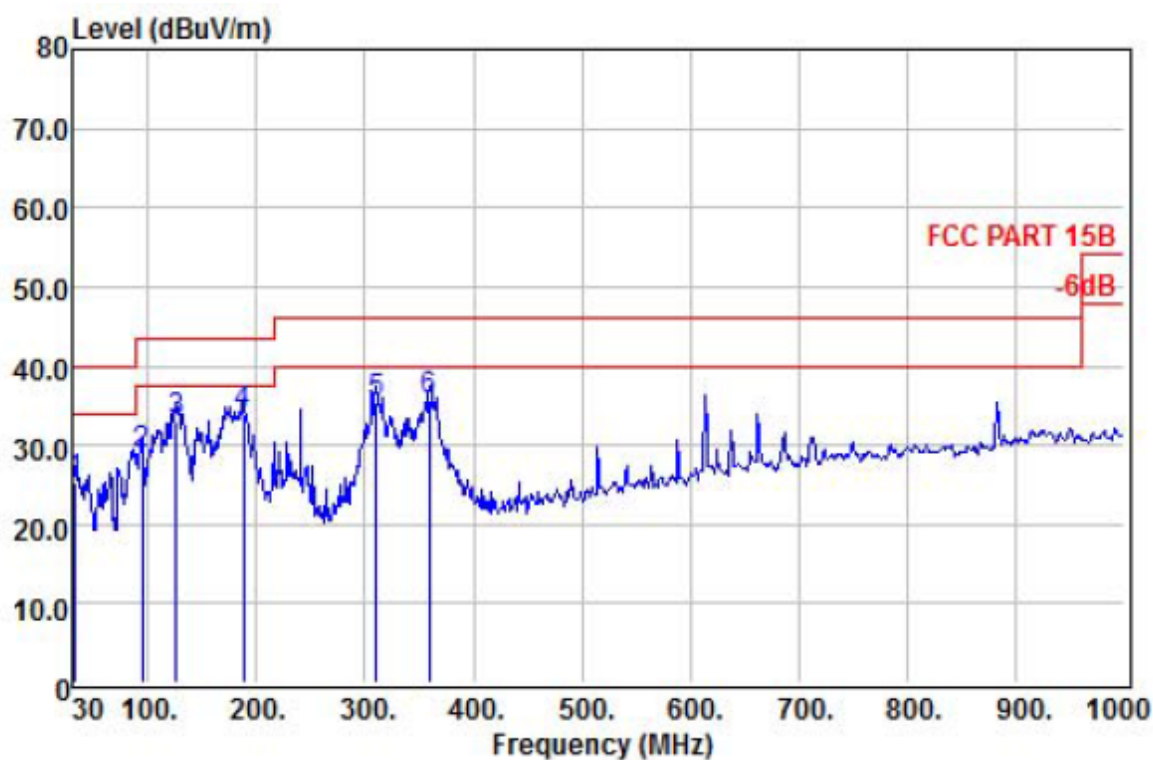
Below 1GHz			
EUT :	Powered speaker system	Model Name :	TAPS1L
Temperature :	20 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Mode :	TX- 2480
Test Voltage :	AC 120V		

Vertical



	Freq	Read Level	Antenna Factor	Cable Loss	Level	Limit	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB	
1	34.85	16.36	15.94	0.23	32.53	40.00	-7.47	QP
2 !	45.52	23.91	10.64	0.12	34.67	40.00	-5.33	QP
3	55.22	24.52	8.02	0.13	32.67	40.00	-7.33	QP
4 !	80.44	27.96	8.05	0.15	36.16	40.00	-3.84	QP
5	127.00	23.54	8.36	0.21	32.11	43.50	-11.39	QP
6	319.06	18.06	14.33	0.69	33.08	46.00	-12.92	QP

Horizontal



	Freq	ReadAntenna	Cable		Limit	Over	
	MHz	Level	Factor	Loss	Level	Line	Limit Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1	32.91	7.89	17.08	0.27	25.24	40.00	-14.76 QP
2	94.02	19.44	9.30	0.16	28.90	43.50	-14.60 QP
3	126.03	24.44	8.38	0.21	33.03	43.50	-10.47 QP
4	188.11	23.62	10.16	0.27	34.05	43.50	-9.45 QP
5	310.33	20.72	14.09	0.67	35.48	46.00	-10.52 QP
6	358.83	18.64	16.11	0.80	35.55	46.00	-10.45 QP

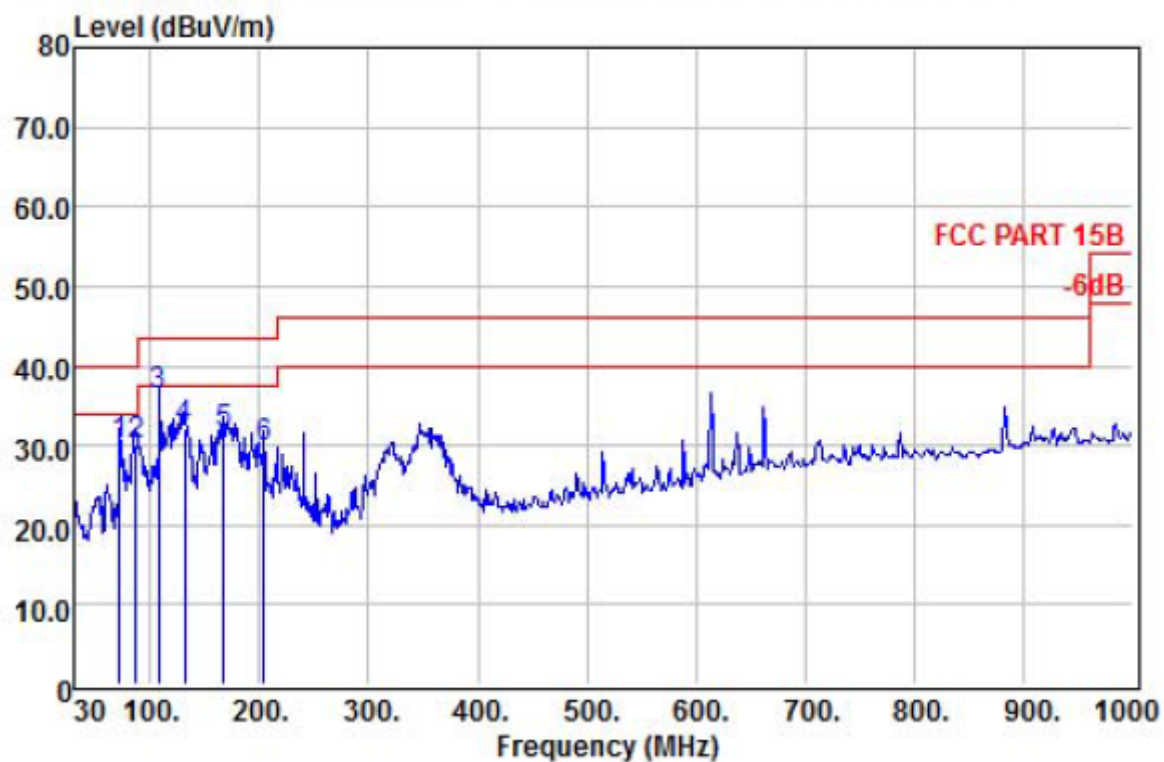
NOTE: Absolute Level= Reading Level + Antenna Factor + Cable Loss,

Over Limit= Absolute Level – Limit;

Mode 1 is the worst mode, and only the worst case is presented in the report .

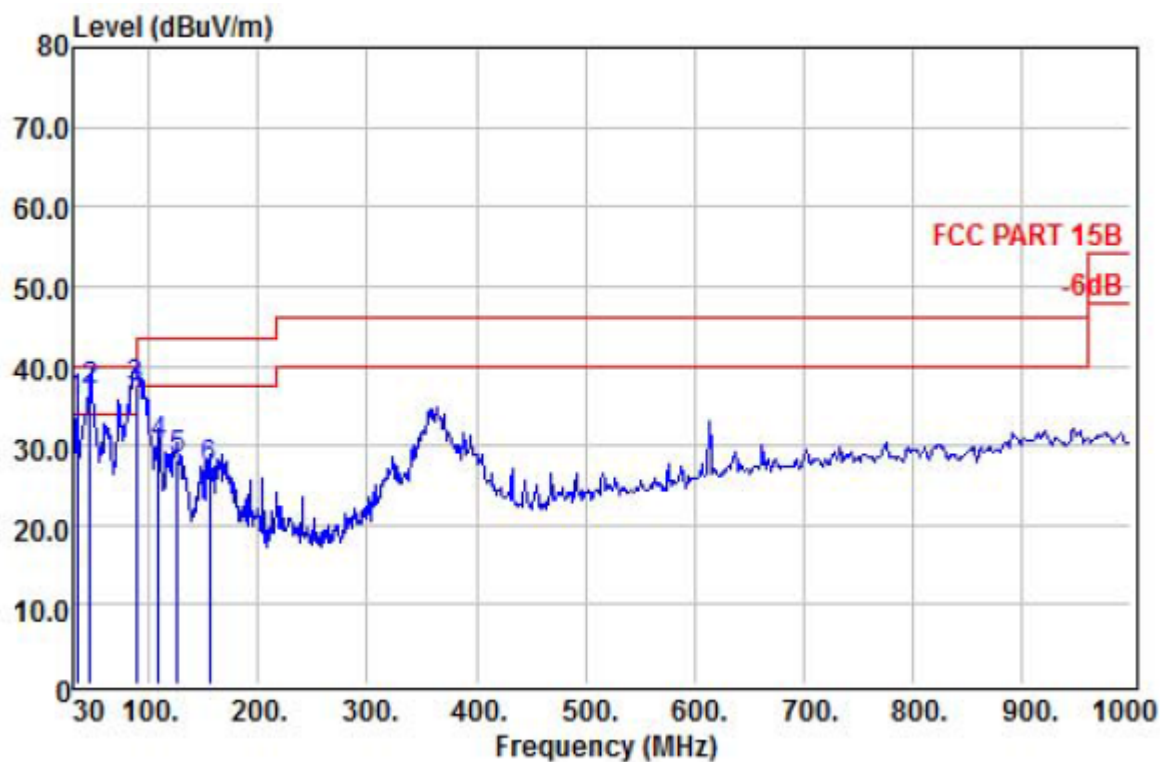
Below 1GHz			
EUT :	Powered speaker system	Model Name :	TAPS1L
Temperature :	20 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Mode :	TX- 2480
Test Voltage :	AC 240V		

Vertical



	Freq	Read Level	Antenna Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB	
1	71.71	22.45	7.59	0.14	30.18	40.00	-9.82	QP
2	87.23	21.02	8.80	0.16	29.98	40.00	-10.02	QP
3	107.89	26.71	9.36	0.18	36.25	43.50	-7.25	QP
4	131.85	23.65	8.32	0.22	32.19	43.50	-11.31	QP
5	167.74	21.34	9.90	0.23	31.47	43.50	-12.03	QP
6	204.60	18.22	11.22	0.33	29.77	43.50	-13.73	QP

Horizontal



		ReadAntenna	Cable		Limit	Over	
	Freq	Level	Factor	Loss	Level	Line	Limit
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1 !	33.88	18.66	16.51	0.25	35.42	40.00	-4.58
2 !	46.02	26.41	10.43	0.12	36.96	40.00	-3.04
3	88.34	28.20	8.92	0.16	37.28	43.50	-6.22
4	108.57	20.58	9.34	0.19	30.11	43.50	-13.39
5	126.03	19.70	8.38	0.21	28.29	43.50	-15.21
6	155.13	17.66	9.10	0.23	26.99	43.50	-16.51

Above 1GHz			
EUT :	Powered speaker system	Model Name :	TAPS1L
Temperature :	20 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Mode :	TX-GFSK
Test Voltage :	AC 120V		

Frequency (MHz)	Meter Reading (dBμV)	Antenna Factor (dB)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
TX-2402									
4804	27.59	32.94	11.94	27.49	44.98	54	-9.02	Average	Vertical
4804	37.28	32.94	11.94	27.49	54.67	74	-19.33	peak	Vertical
7206	26.34	25.28	18.04	27.94	41.72	54	-12.28	Average	Vertical
7206	35.84	25.28	18.04	27.94	51.22	74	-22.78	peak	Vertical
4804	29.48	32.94	11.94	27.49	46.87	54	-7.13	Average	Horizontal
4804	39.75	32.94	11.94	27.49	57.14	74	-16.86	peak	Horizontal
7206	28.89	25.28	18.04	27.94	44.27	54	-9.73	Average	Horizontal
7206	38.65	25.28	18.04	27.94	54.03	74	-19.97	peak	Horizontal
TX-2440									
4880	28.57	32.11	12.15	27.53	45.30	54	-8.70	Average	Vertical
4880	41.05	32.11	12.15	27.53	57.78	74	-16.22	peak	Vertical
7320	27.48	24.33	18.09	27.96	41.94	54	-12.06	Average	Vertical
7320	37.85	24.33	18.09	27.96	52.31	74	-21.69	peak	Vertical
4880	25.34	32.11	12.15	27.53	42.07	54	-11.93	Average	Horizontal
4880	36.29	32.11	12.15	27.53	53.02	74	-20.98	peak	Horizontal
7320	24.76	24.33	18.09	27.96	39.22	54	-14.78	Average	Horizontal
7320	36.18	24.33	18.09	27.96	50.64	74	-23.36	peak	Horizontal
TX-2480									
4960	30.25	31.32	12.31	27.58	46.30	54	-7.70	Average	Vertical
4960	41.02	31.32	12.31	27.58	57.07	74	-16.93	peak	Vertical
7440	28.65	24.38	18.16	27.99	43.20	54	-10.80	Average	Vertical
7440	38.41	24.38	18.16	27.99	52.96	74	-21.04	peak	Vertical
4960	31.24	31.32	12.31	27.58	47.29	54	-6.71	Average	Horizontal
4960	41.87	31.32	12.31	27.58	57.92	74	-16.08	peak	Horizontal
7440	30.35	24.38	18.16	27.99	44.90	54	-9.10	Average	Horizontal
7440	40.56	24.38	18.16	27.99	55.11	74	-18.89	peak	Horizontal

NOTE:1.Absolute Level= ReadingLevel+antenna Factor+cable loss-preamp factor.

2.Over Limit= Absolute Level – Limit.

3.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported.

4.EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report (Z orientation)

5. BAND EDGE COMPLIANCE TEST

5.1. Limits

For FCC ID:

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 30dB below the fundamental emissions, or comply with 15.209 limits.

For IC ID:

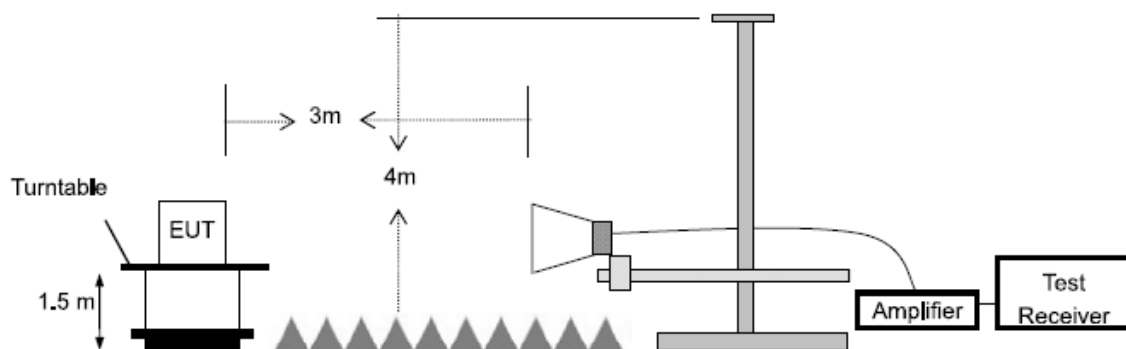
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30dB instead of 20dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

5.2. Test Setup

For Conducted Test



For Radiated emission Test



5.3. Test Procedure

For Conducted Test		
1.	The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100KHz. The video bandwidth is set to 300KHz.	
2.	The spectrum from 30MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.	
EMI Test receiver		Setting
Attenuation		Auto
RBW		100KHz
VBW		300KHz
Detector		Peak
trace		Max hold
For Radiated Emission Test		
1.	The EUT was placed on a styrofoam table which is 1.5m above ground plane.	
2.	The measurement procedure at the band edges was simplified by performing the measurement in just one plot. Both, the in-band-emission and the unwanted emission were be encompassed by the span. After trace stabilization, the maxium peak was be determined by a peak detector and the value was marked by an appropriate limit line. The second limit line, which is 20dB below the first, marks the limits for the emissions in the unrestricted band next to the band edge.	
3.	The measurements were performed at the lower end of the 2.4GHz band.	
4.	Use the following spectrum analyzer settings	
EMI Test receiver		Setting
Attenuation		Auto
RBW		1MHz
VBW		3MHz
Detector		Peak
trace		Max hold

5.4. Deviation from standard

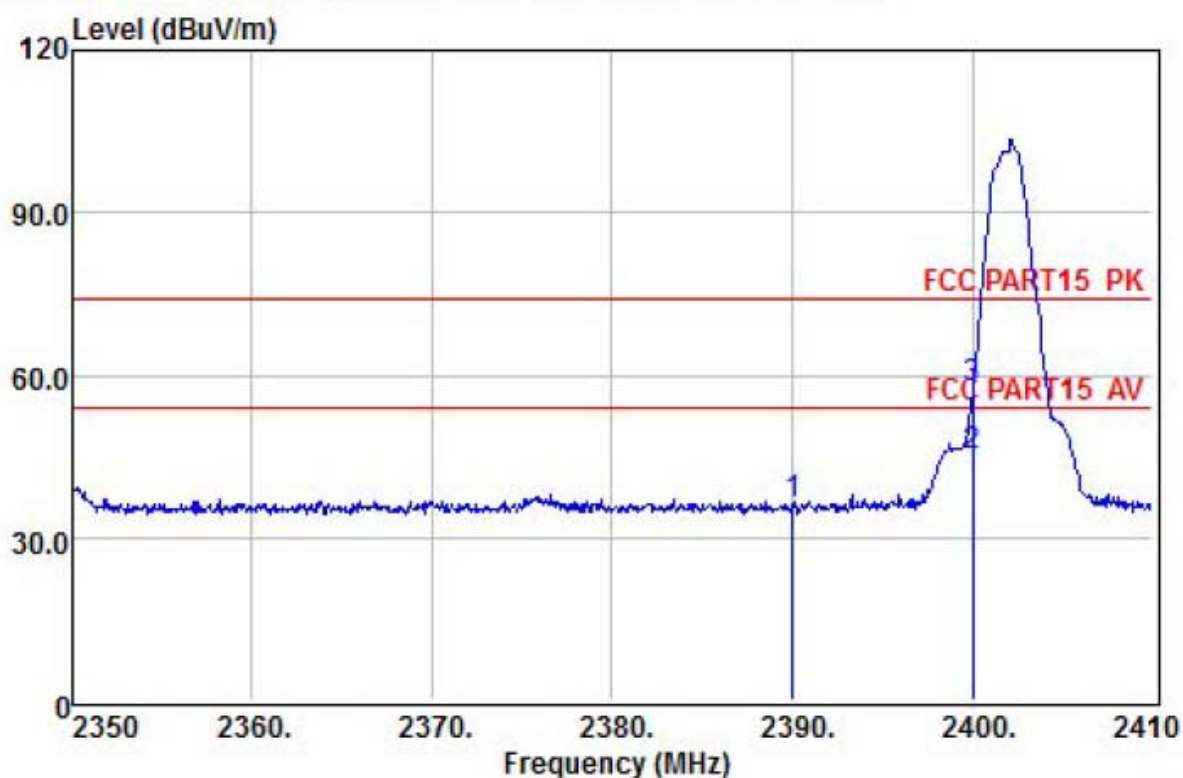
No deviation.

5.5. Test Results

Radiated band-edge test results

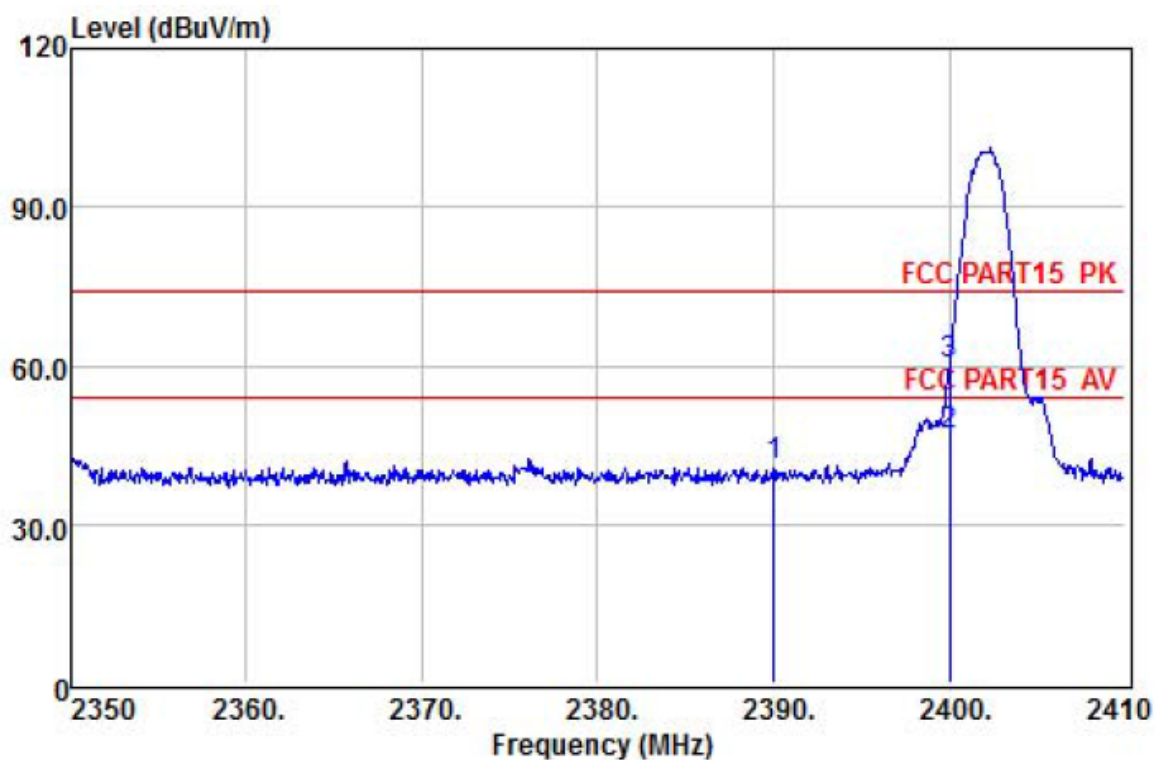
EUT :	Powered speaker system	Model Name :	TAPS1L
Temperature :	20 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Mode :	TX-2402
Test Voltage :	AC 120V		

Vertical



	Freq	Preamp Factor	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	2390.00	26.32	26.61	7.34	36.35	74.00	-37.65	Peak
2	2400.00	26.32	35.26	7.34	45.00	54.00	-9.00	Average
3	2400.00	26.32	47.74	7.34	57.48	74.00	-16.52	Peak

Horizontal



		Preamp	Read	Cable		Limit	Over	
	Freq	Factor	Level	Loss	Level	Line	Limit	Remark
	MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	2390.00	26.32	31.26	7.34	41.00	74.00	-33.00	Peak
2	2400.00	26.32	37.18	7.34	46.92	54.00	-7.08	Average
3	2400.00	26.32	50.66	7.34	60.40	74.00	-13.60	Peak

NOTE: 1.Absolute Level= Reading Level+Antenna Factor+Cable Loss-Preamp Factor,

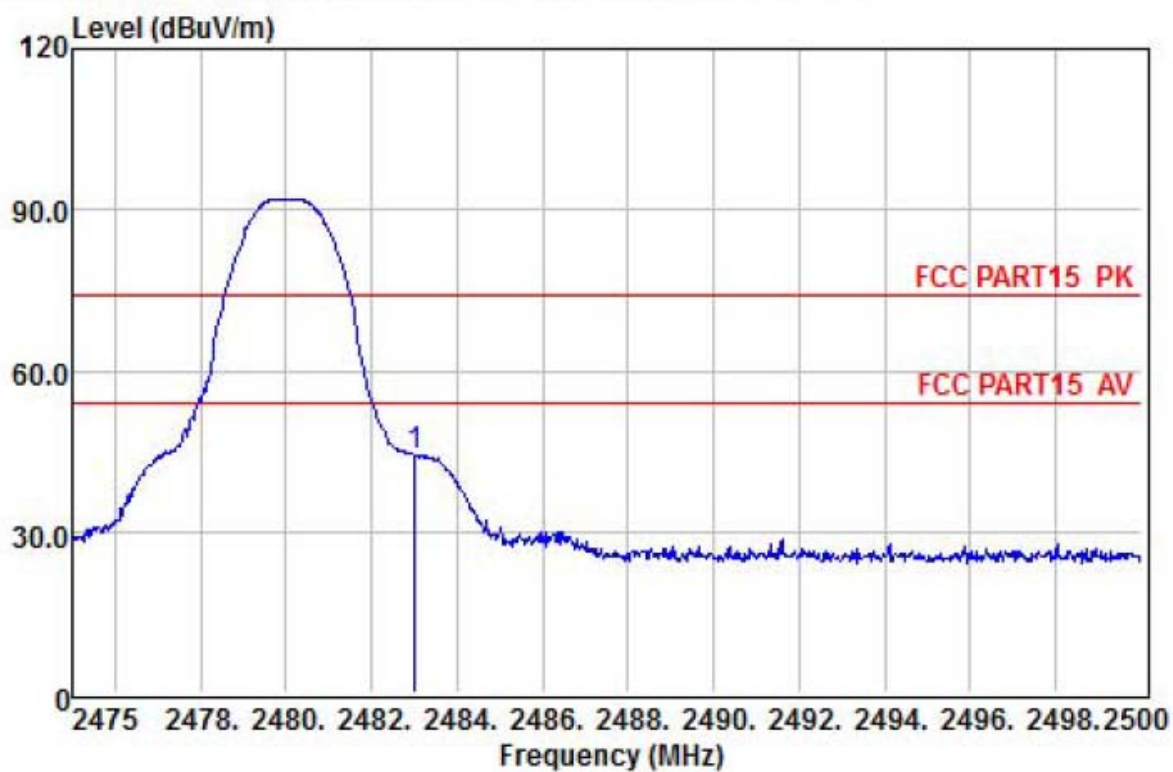
Over Limit= Absolute Level – Limit;

2.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported.

3.If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

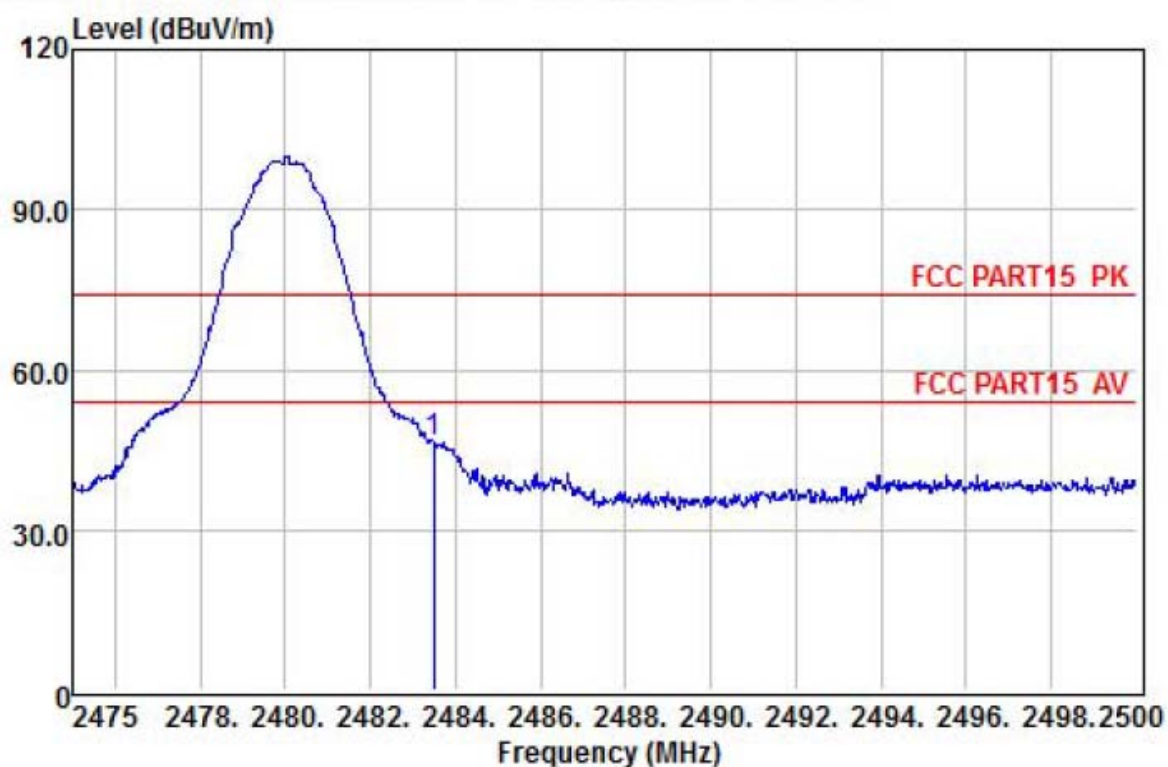
EUT :	Powered speaker system	Model Name :	TAPS1L
Temperature :	20 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Mode :	TX-2480
Test Voltage :	AC 120V		

Vertical



	Freq	Preamp Factor	Read Level	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	2483.00	26.34	34.28	7.57	44.30	74.00	-29.70	Peak

Horizontal



	Preamp	Read	Cable		Limit	Over	
Freq	Factor	Level	Loss	Level	Line	Limit	Remark
MHz	dB	dBuV	dB	dBuV/m	dBuV/m	dB	
1	2483.50	26.34	36.28	7.57	46.30	74.00	-27.70 Peak

NOTE: 1.Absolute Level= Reading Level+Antenna Factor+Cable Loss-Preamp Factor,

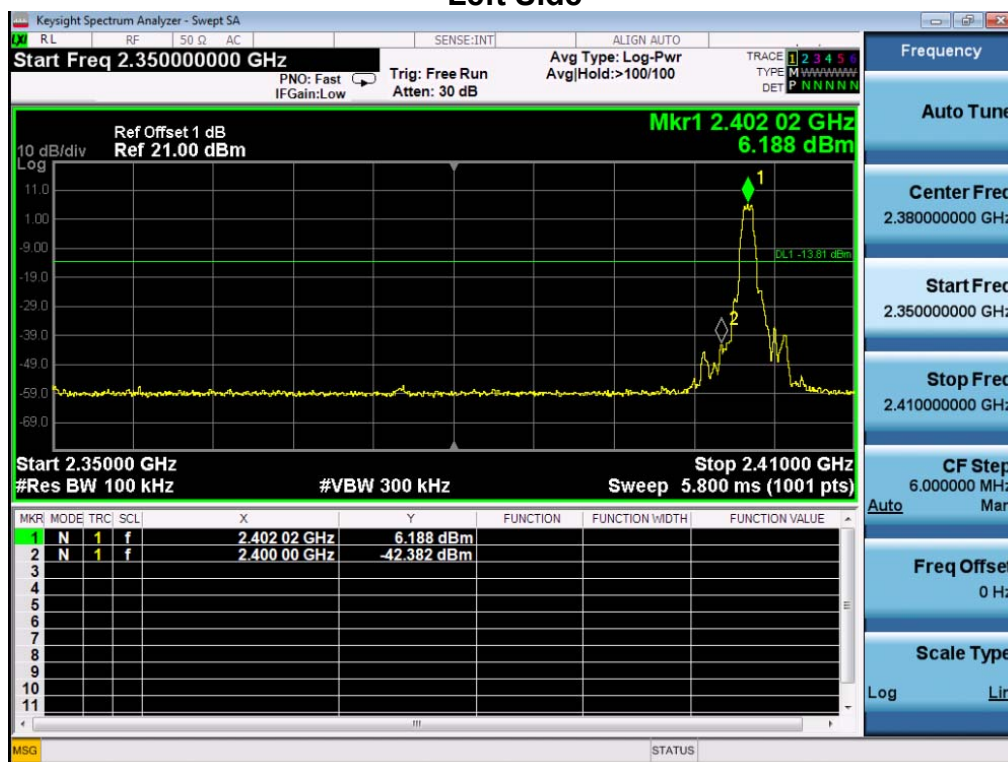
Over Limit= Absolute Level – Limit;

2.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported.

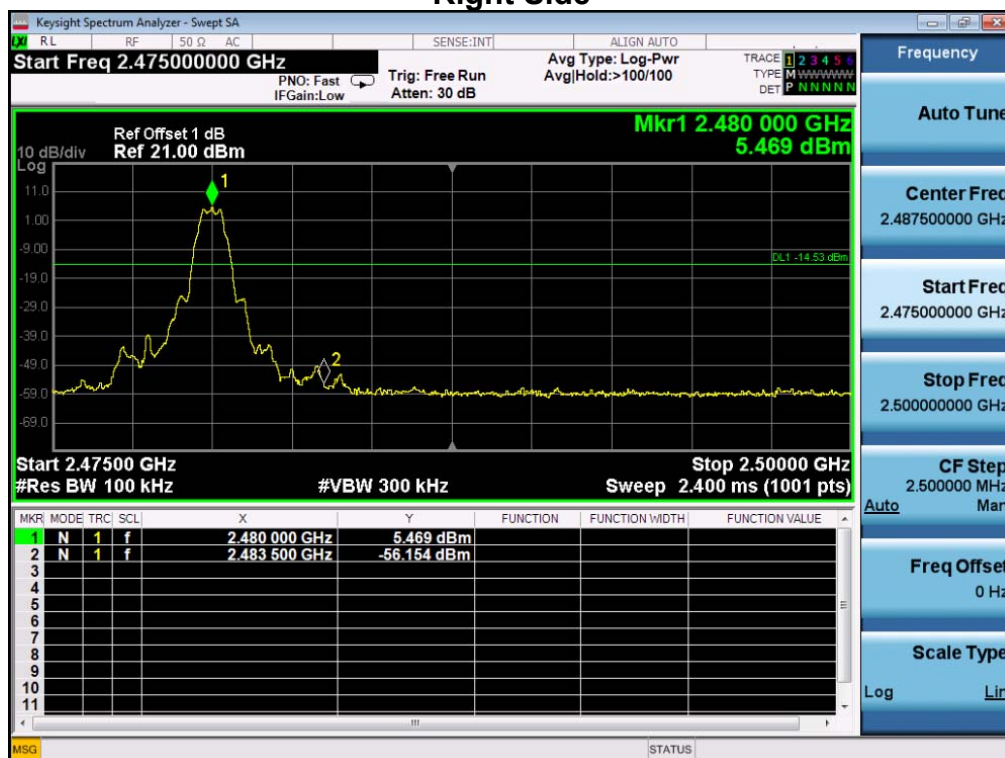
3.If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

Conducted band-edge test results

Left Side



Right Side



6. OCCUPY BANDWIDTH TEST

6.1. Limits

DTSs include systems that employ digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to the bands 902-928 MHz and 2400- 2483. 5 MHz.

The minimum 6 dB bandwidth shall be 500 kHz

6.2. Test Procedure

The testing follows FCC KDB publication No. 558074 D01 DTS Meas. Guidance v04.

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3. Deviation from standard

No deviation.

6.4. Test Setup

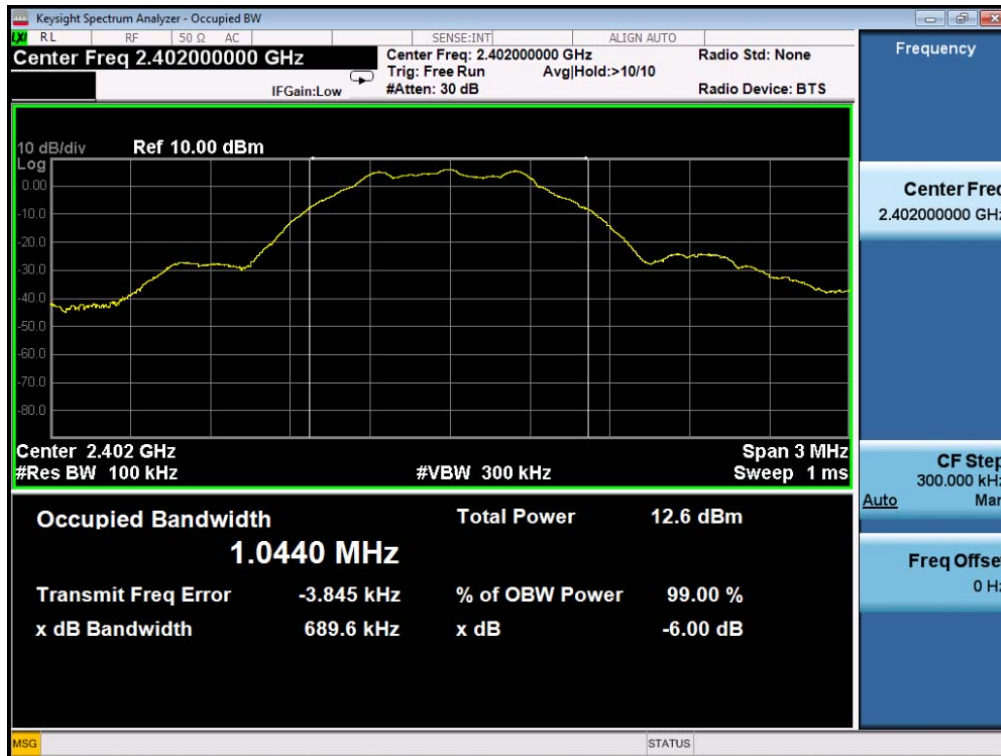


6.5. Test Results

Channel Frequency (MHz)	-6dB Bandwidth (KHz)	Limit (KHz)	Result
2402	689.6	500	Pass
2440	689.4	500	Pass
2480	690.5	500	Pass

Test plot as follows

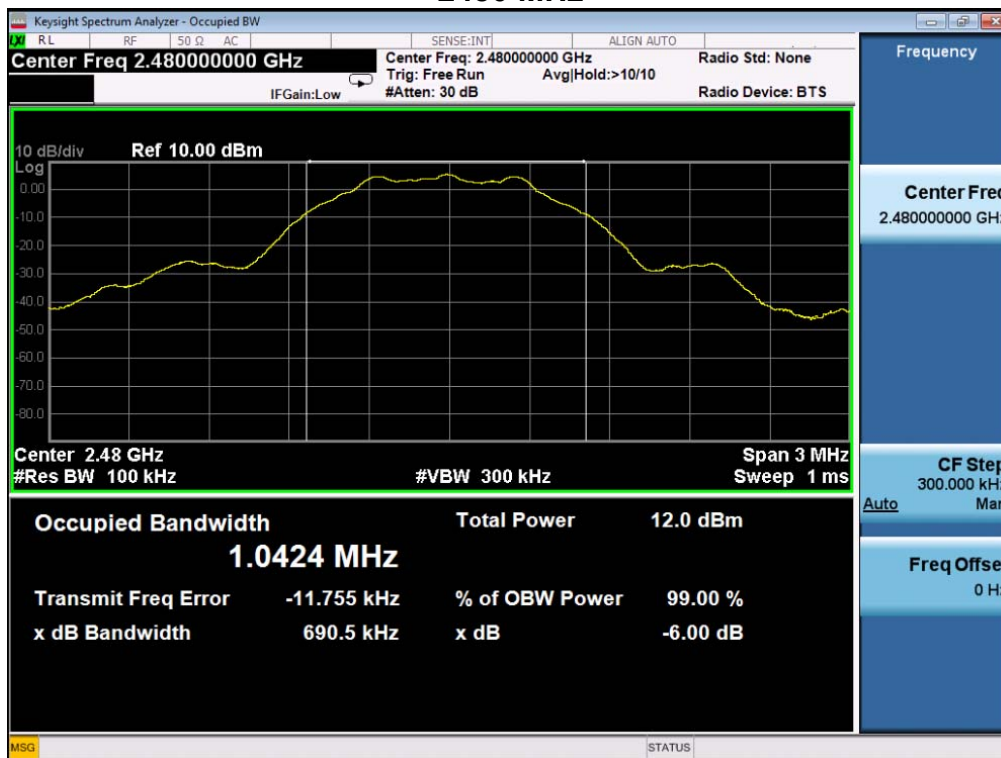
2402MHz



2440 MHz



2480 MHz



7. OUTPUT POWER TEST

7.1. Limits

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

7.2. Test Procedure

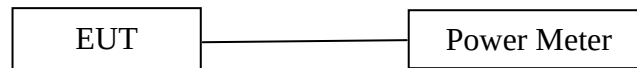
The testing follows FCC KDB publication No. 558074 D01 DTS Meas. Guidance v04

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
2. Spectrum Setting: $RBW \geq \text{Bandwidth}$, $VBW \geq 3 \times RBW$, Sweep time = Auto, Span $\geq 3 \times RBW$.
3. Detector = peak. Trace mode = max hold.
4. Use peak marker function to determine the peak amplitude level.

7.3. Deviation from standard

No deviation.

7.4. Test Setup



7.5. Test Result

Test Mode	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)	Limit (dBm)	Result
GFSK	2402	5.985	30	0	5.985	36	Pass
	2440	6.857	30		6.857	36	Pass
	2480	5.537	30		5.537	36	Pass

8. POWER SPECTRAL DENSITY TEST

8.1. Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

8.2. Test Procedure

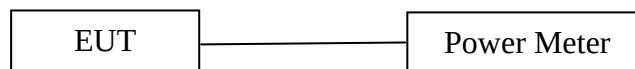
The testing follows Measurement procedure 10.2 Method PKPSD of FCC KDB publication No. 558074 D01 DTS Meas. Guidance v04.

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
2. Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as center frequency to channel center frequency, span=1.5 times the bandwidth, detector = peak, $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$, $\text{VBW} \geq 3 \times \text{RBW}$ kHz, Sweep time=Auto.
3. Trace mode = max hold. Mark the peak.
4. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

8.3. Deviation from standard

No deviation.

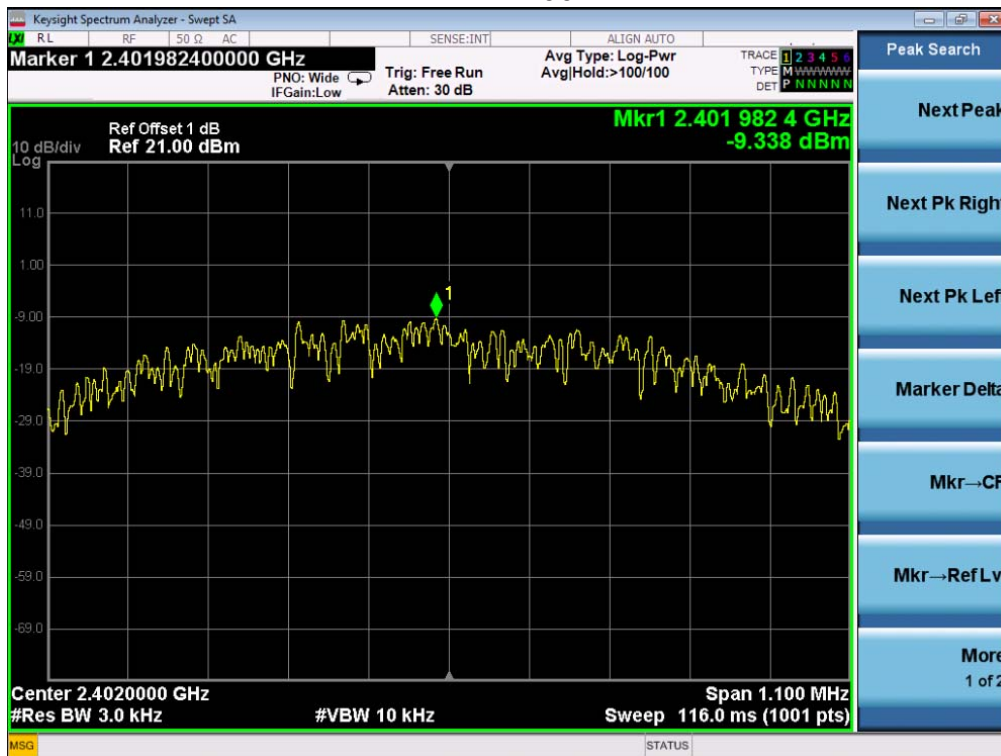
8.4. Test Setup



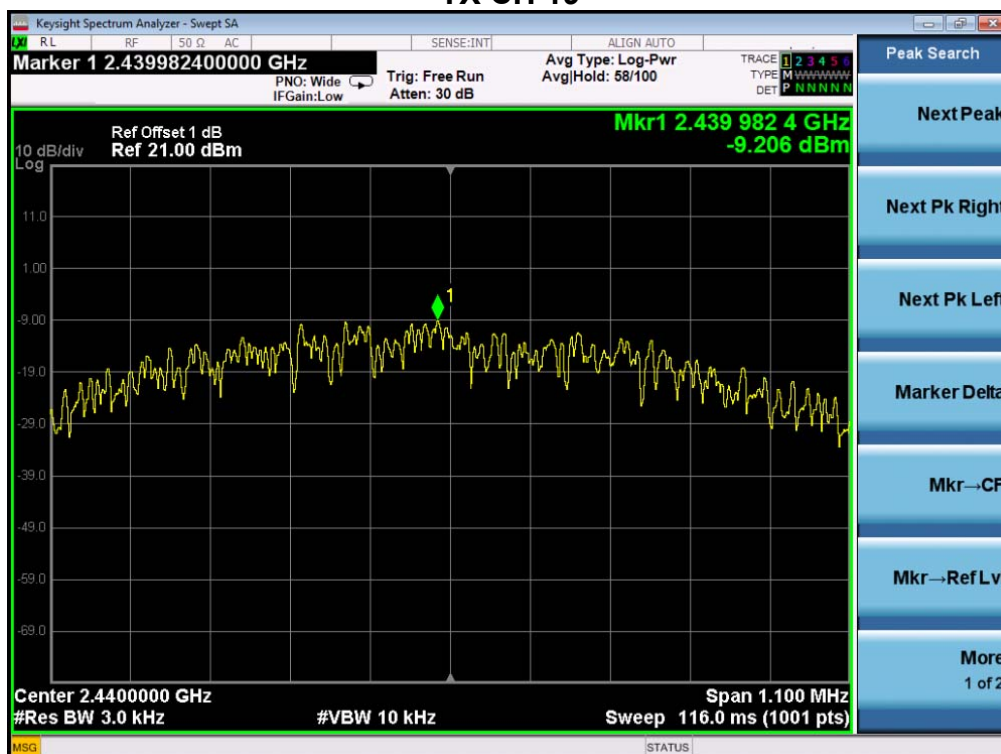
8.5. Test Result

Channel Frequency (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2402	-9.338	8	Pass
2440	-9.026	8	Pass
2480	-10.015	8	Pass

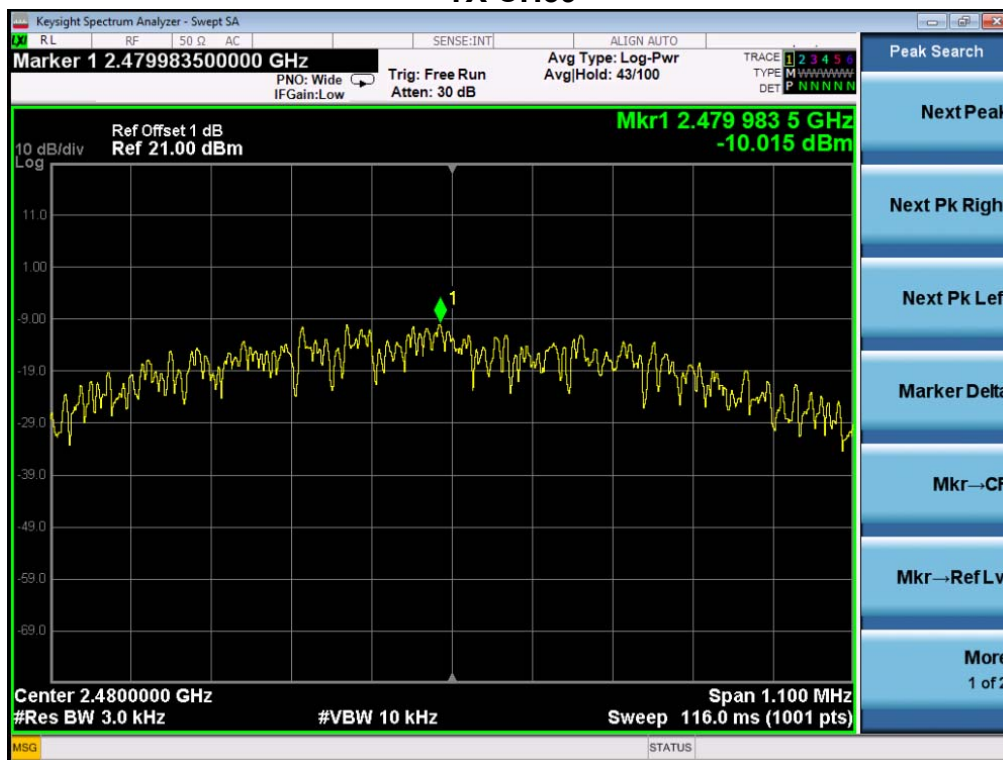
TX CH00



TX CH 19



TX CH39



9. ANTENNA REQUIREMENTS

9.1. Limits

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

According to RSS-GEN section 8.3

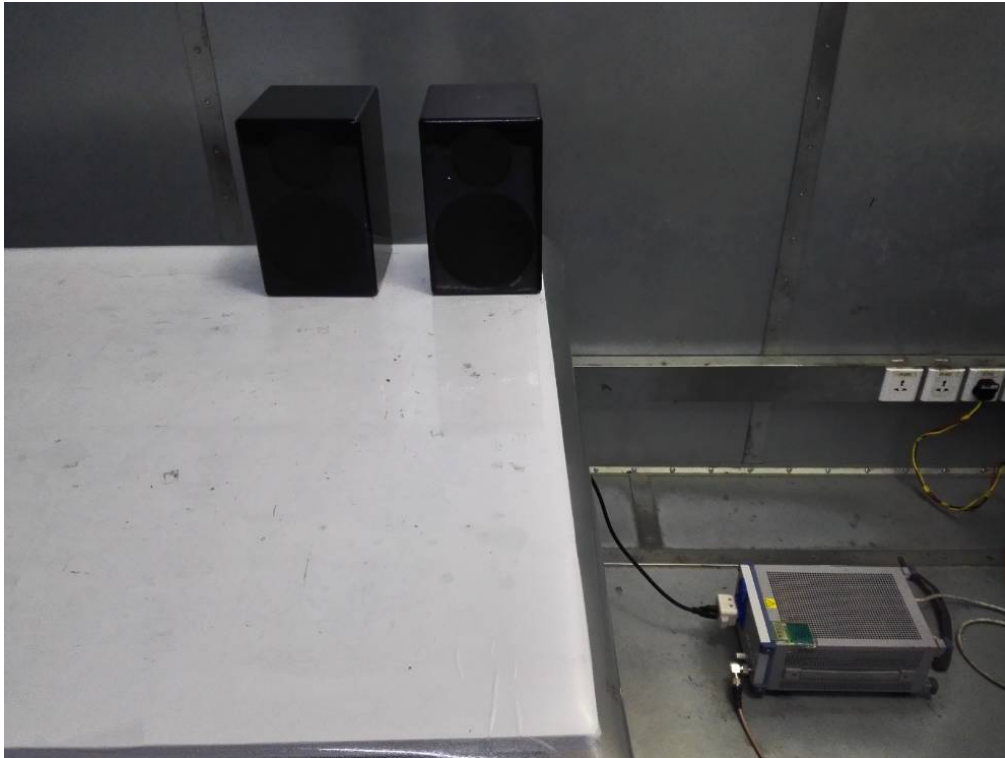
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

9.2. Test Result

The antennas used for this product is PCB antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0dBi. The unit does meet the requirements.

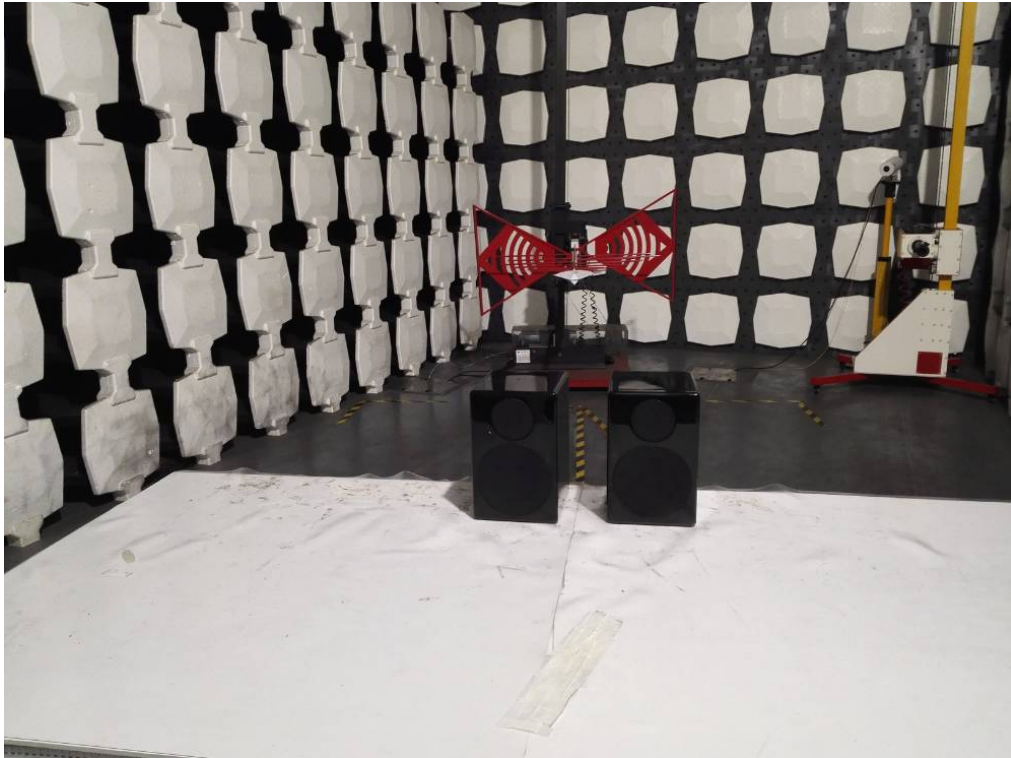
10.PHOTOGRAPHS OF TEST SET-UP

Conducted Emission



Radiated Emission Test

Below 1GHz



Above 1GHz

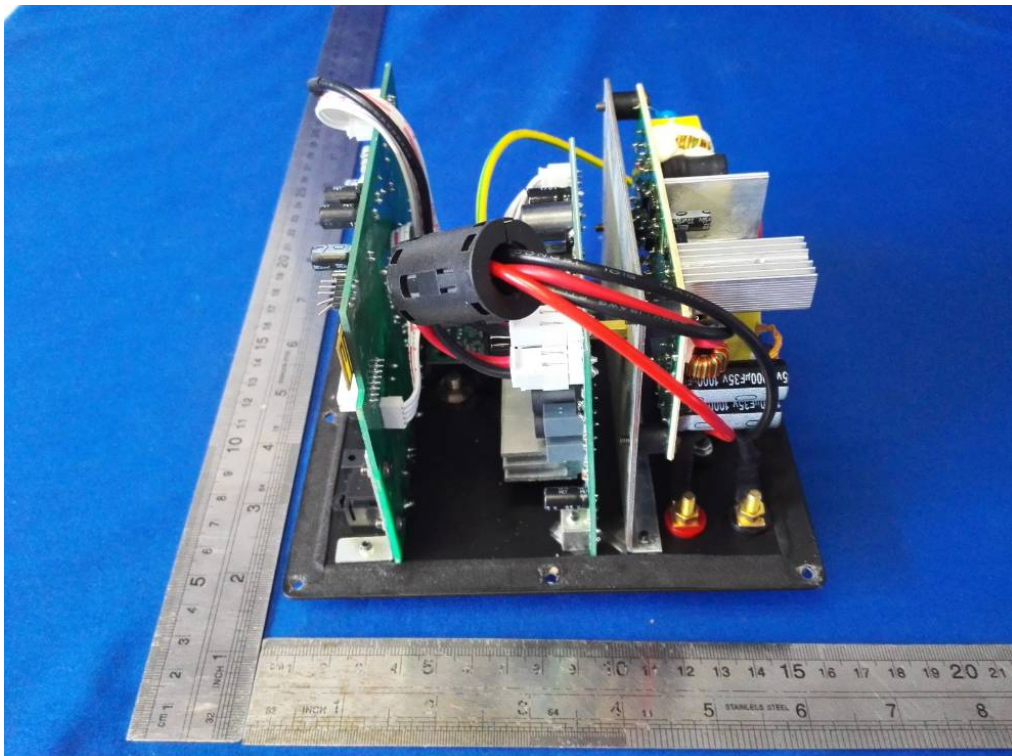
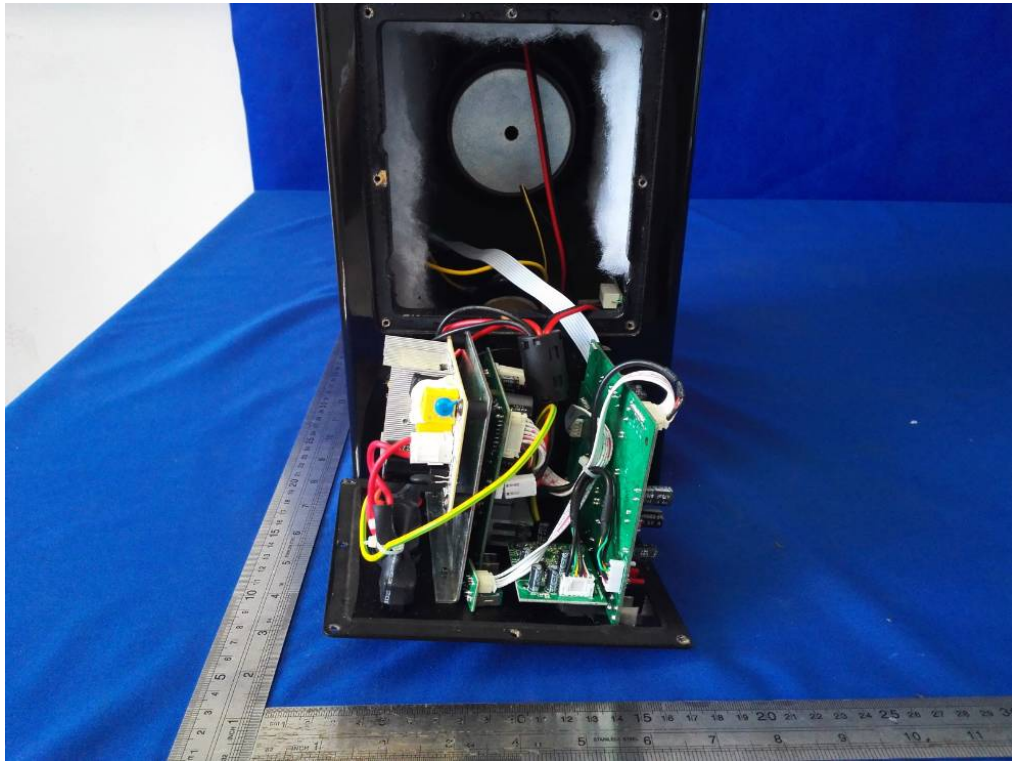


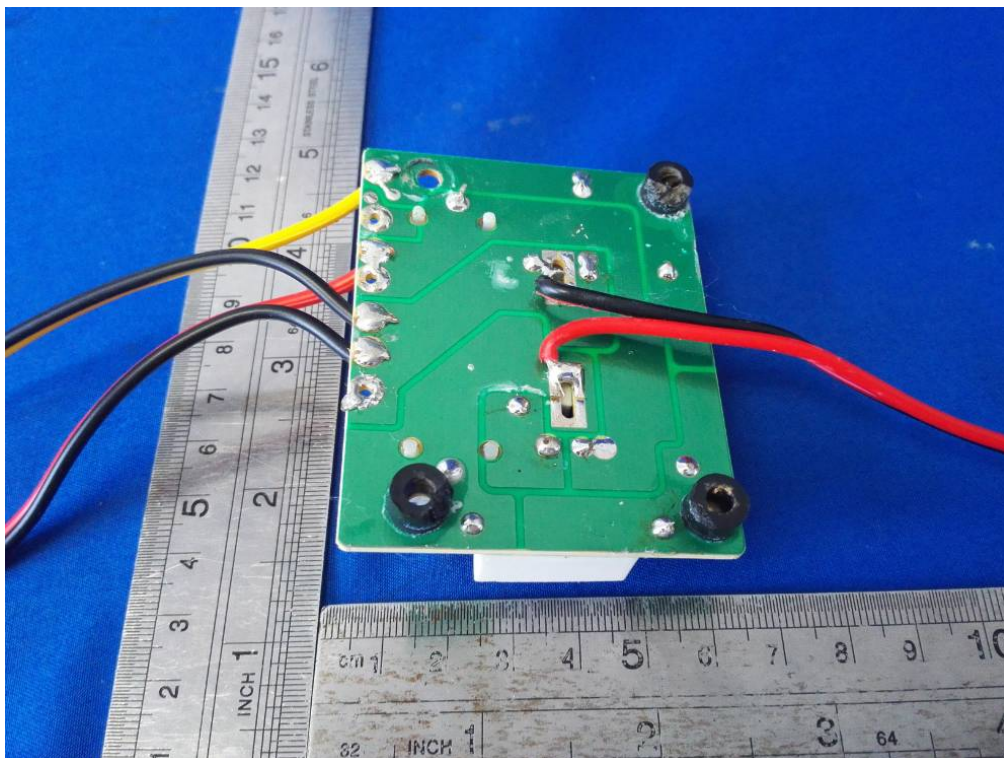
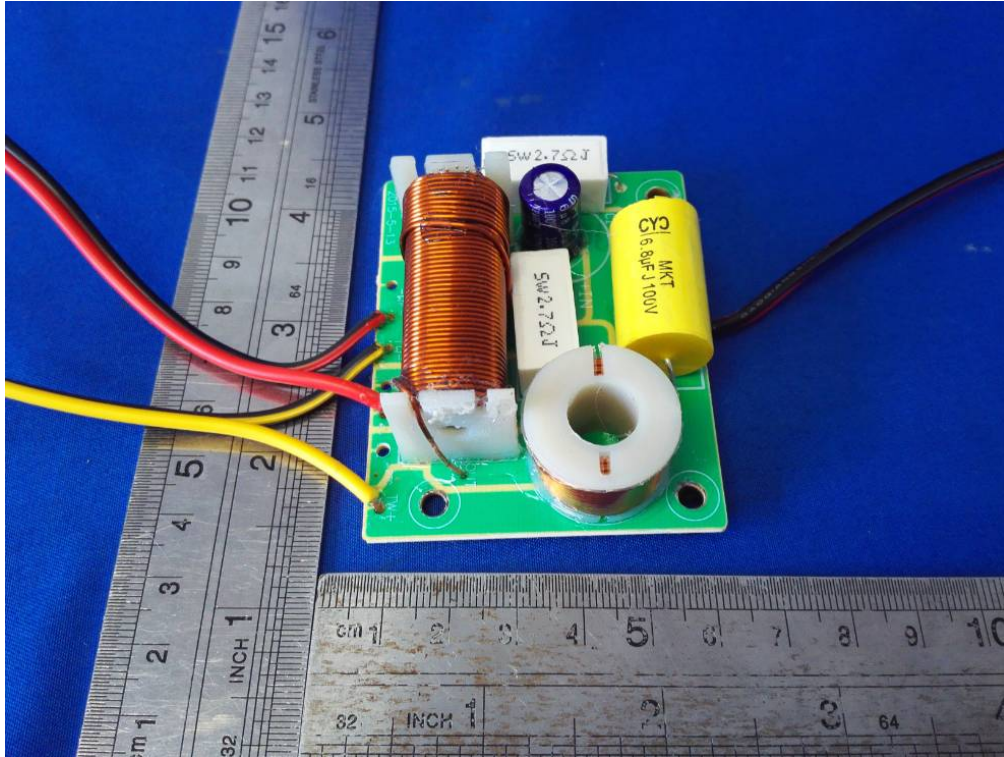
11. PHOTOGRAPHS OF THE EUT

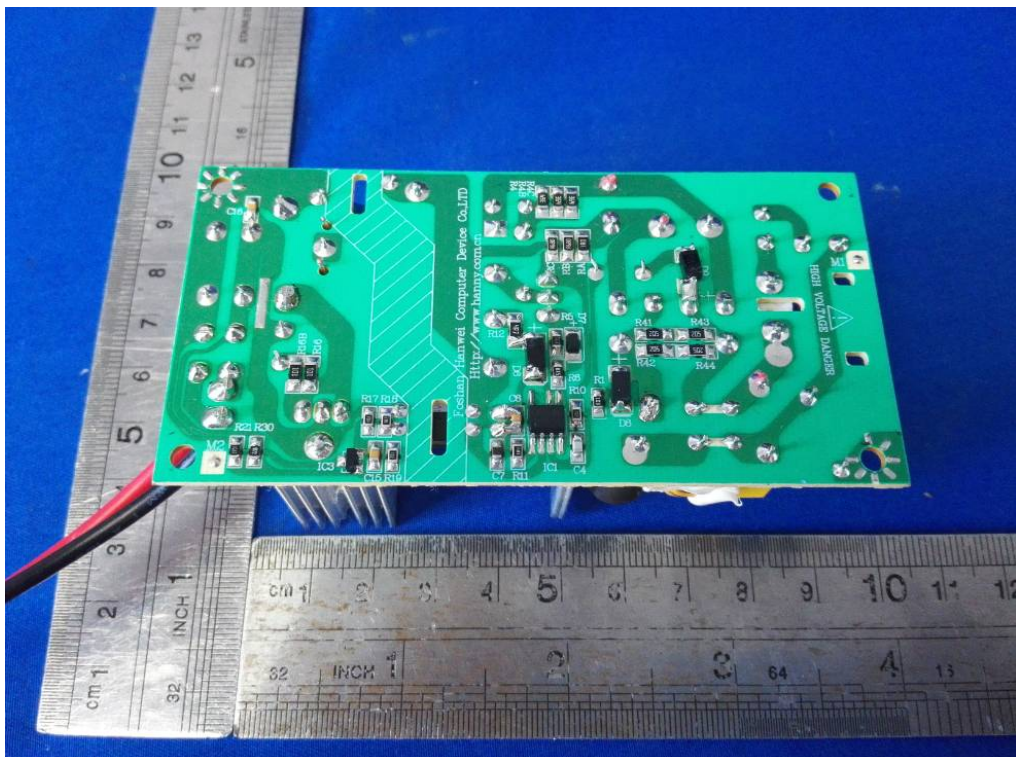
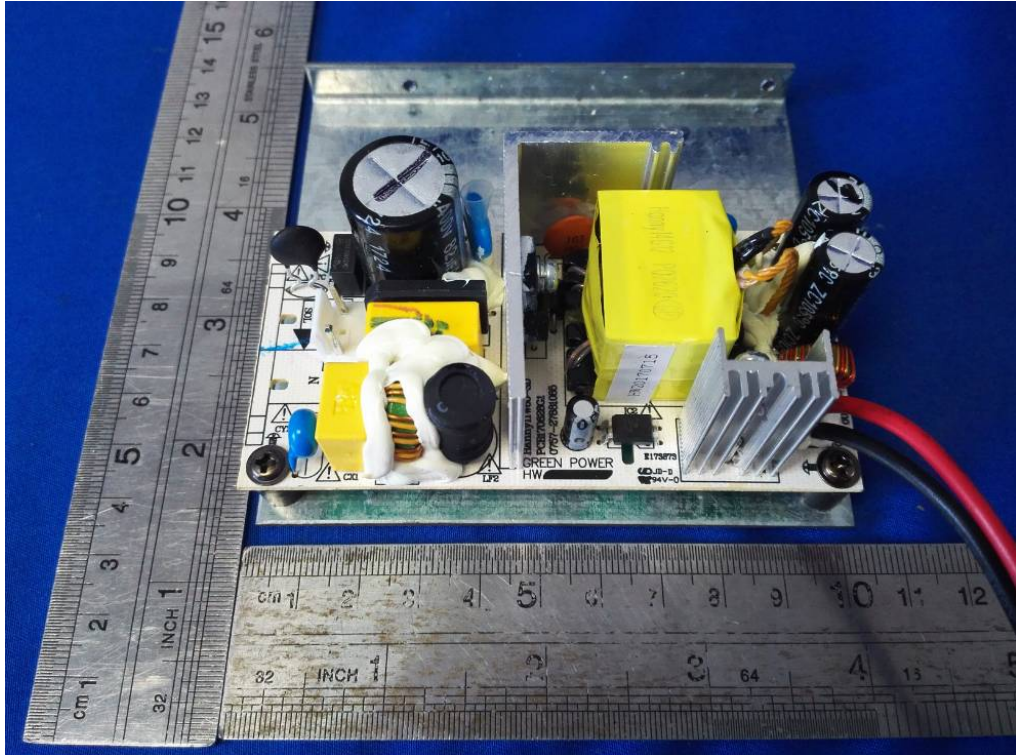


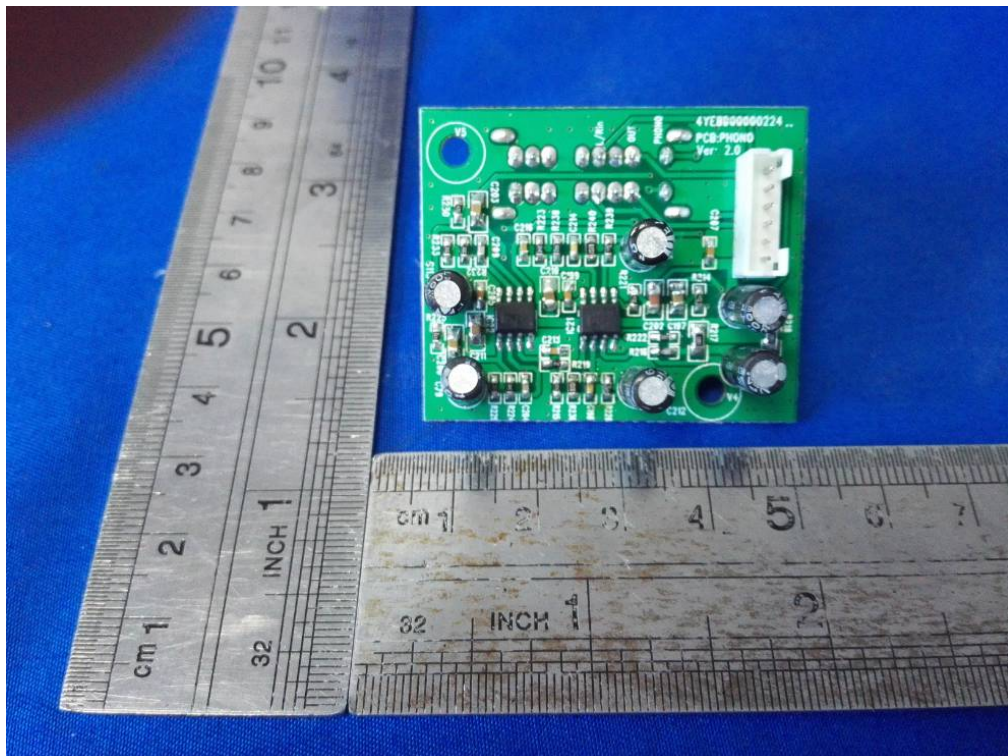
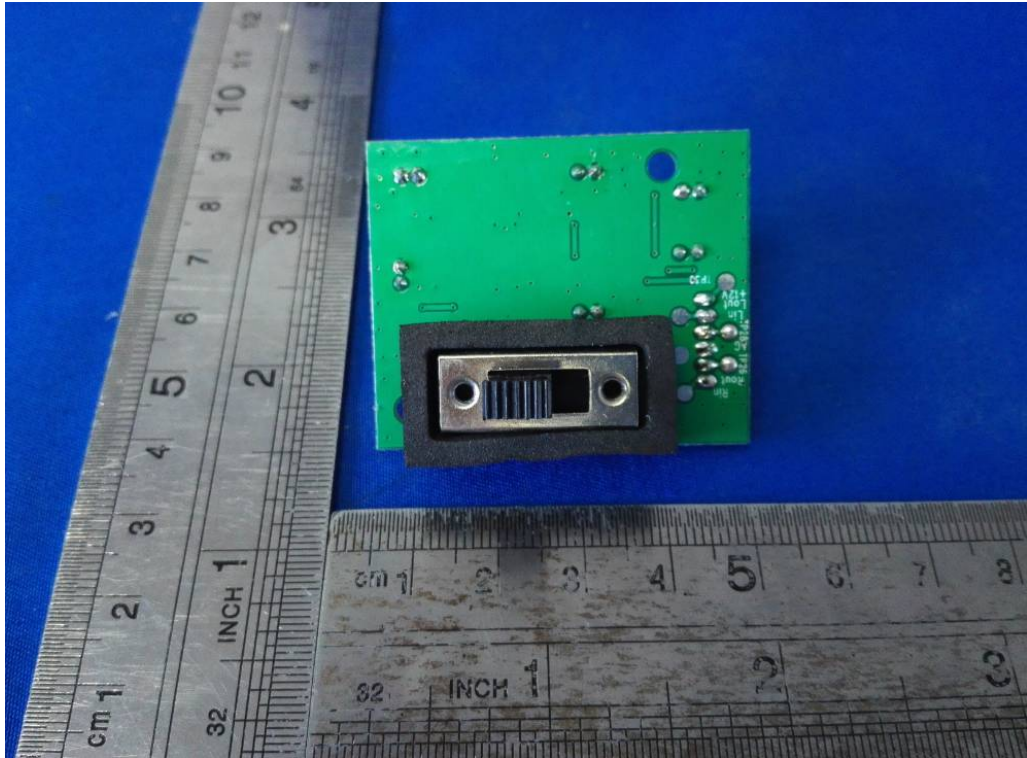


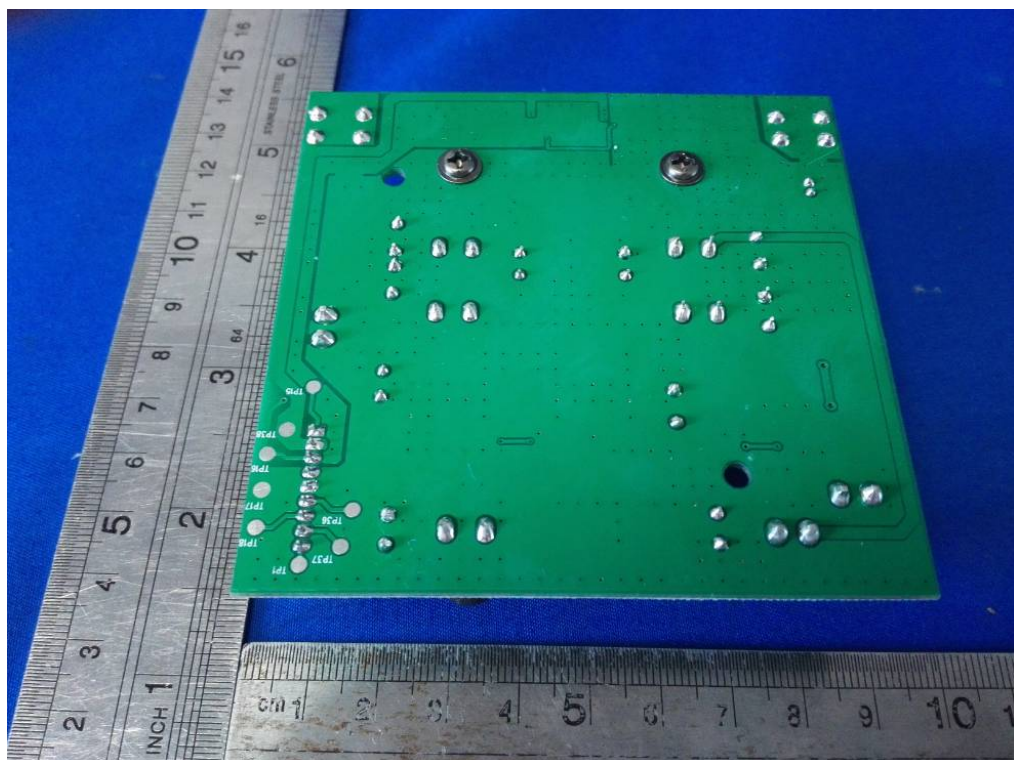
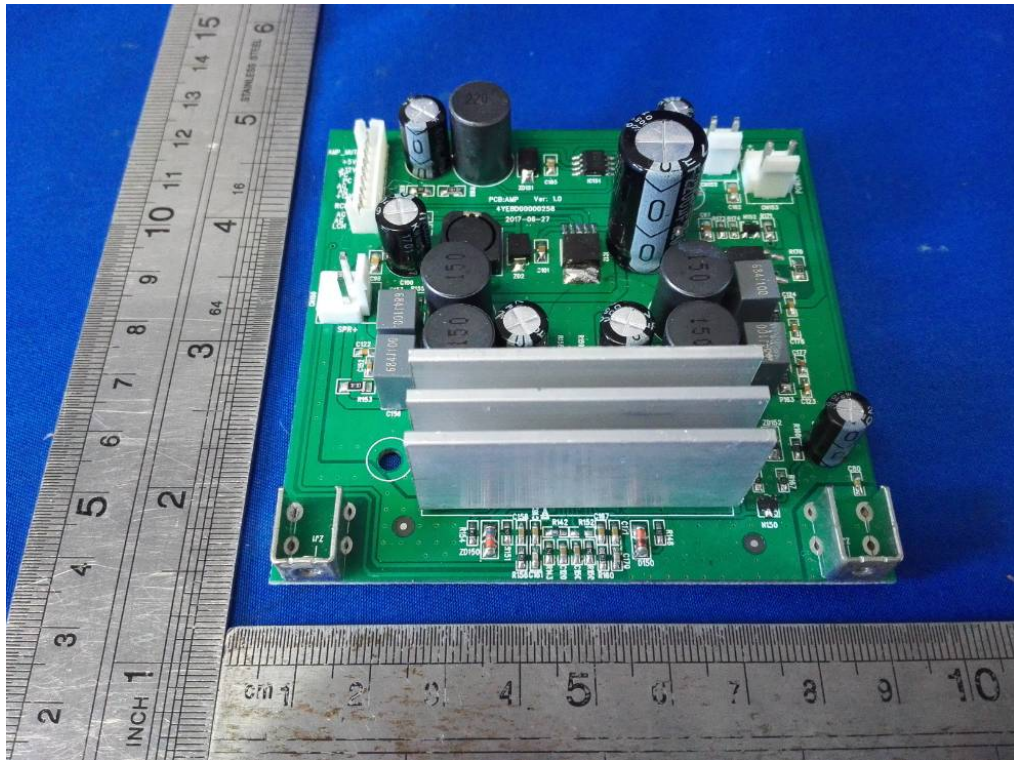


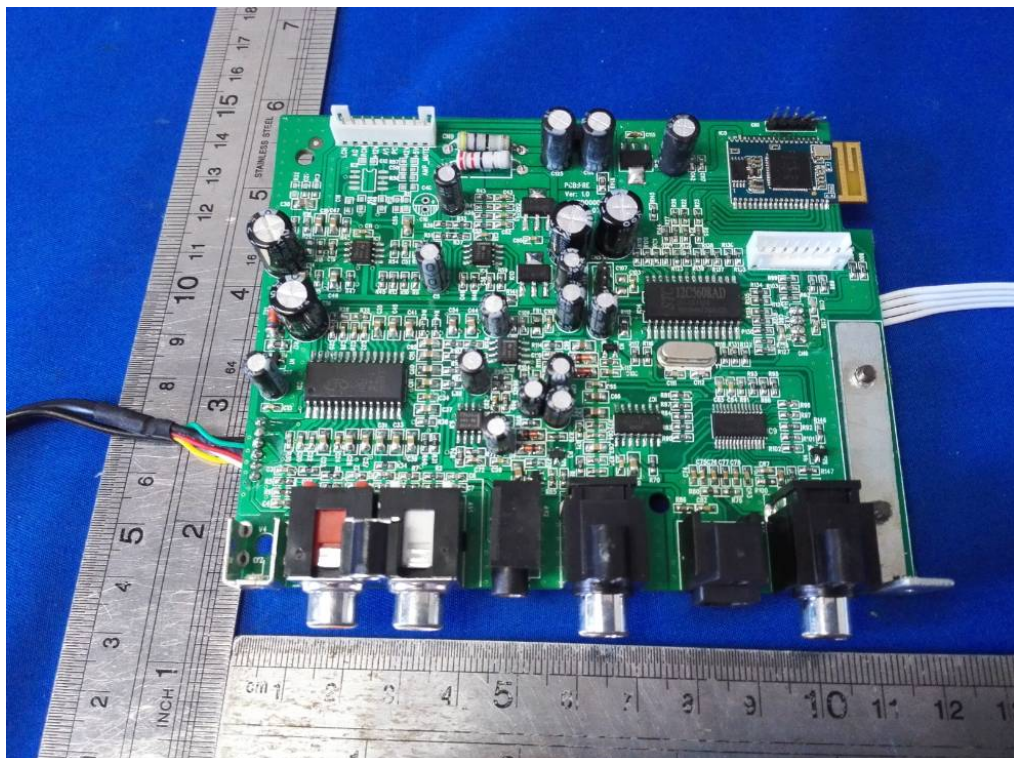
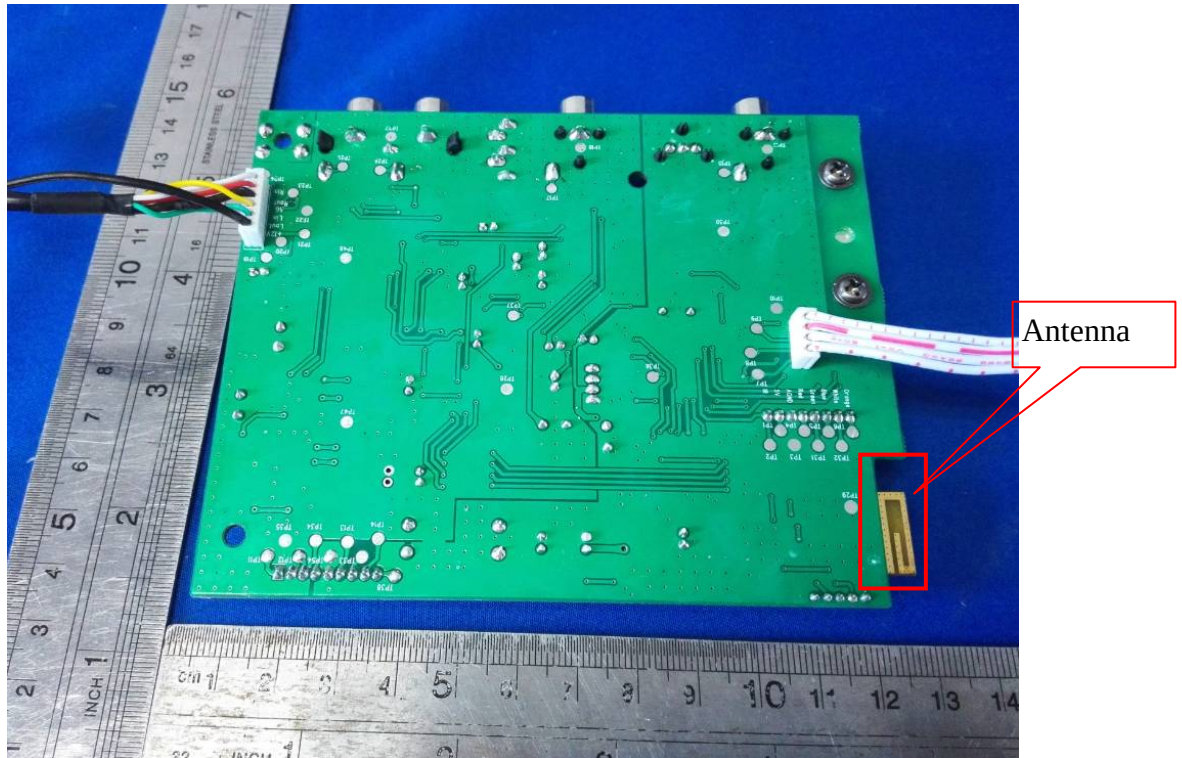












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