



FCC Test Report

Report No.: ACON-ESH-P19112701B-1

Product: Bluetooth Audio Amplifier Board

Model: OEM-05146

Received Date: Nov.27, 2019

Test Date: Dec.02 to Dec.10, 2019

Issued Date: Dec.28, 2019

Applicant: Sure Electronics Co.,Ltd.

Address: 3F,Building F6,No.9,Weidi Road,Qixia Dist.,Nanjing,China

Manufacturer: Sure Electronics Co.,Ltd.

Address: 3F,Building F6,No.9,Weidi Road,Qixia Dist.,Nanjing,China

Issued By: BUREAU VERITAS ADT (Shanghai) Corporation

Address: No. 829, Xinzhuan Road, Shanghai, P.R.China (201612)

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Release Control Record

Issue No.	Description	Date Issued
ACON-ESH-P19112701B-1	Original release	Dec.28, 2019

1. Test Program

Product: Bluetooth Audio Amplifier Board

Brand: Robern

Model: OEM-05146

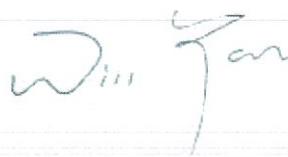
Applicant: Sure Electronics Co.,Ltd.

Test Date: Dec.02 to Dec.10, 2019

Standards: 47 CFR FCC Part 15, Subpart B
ANSI C63.4:2014

The above equipment has been tested by **BUREAU VERITAS ADT (Shanghai) Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :



, Date:

Dec.28, 2019

Will YAN

Project Engineer

Approved by :



, Date:

Dec.28, 2019

Daniel SUN

RF Supervisor

2. Summary of Test Procedure and Test Results

EMISSION		
Test Item	Normative References	Test Result
Conducted Emission	FCC Part 15, Subpart B CLASS B FCC Part 18, Subpart C	Meets the requirements
Radiated Emission	FCC Part 15, Subpart B CLASS B FCC Part 18, Subpart C	Meets the requirements

3. Test Configuration of Equipment under Test

3.1. Manufacturer information

Manufacturer : Sure Electronics Co.,Ltd.

Address : 3F,Building F6,No.9,Weidi Road,Qixia Dist.,Nanjing,China

3.2. Feature of Equipment under Test

Product Name:	Bluetooth Audio Amplifier Board
Test Model:	OEM-05146
Model Discrepancy:	--
Test Mode:	Mode 1:Play with Audio in Mode 2:Play with Bluetooth
EUT Power Rating:	12~24Vdc,0~2A

Note: 1.Please refer to user manual.

2. The power adapters used in the tests are owned by the lab and not sold on the market.

3.3. Description of support units

None.

4. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.55 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.22 dB
Radiated Emissions above 1 GHz	Above 1GHz	4.25 dB

5. Test of Radiated Emission

5.1. Test Limit for FCC Part 15 Subpart B

(1) Up to 1GHz

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 3 meters (dB μ V/m)		
Frequencies (MHz)	FCC 15B, Class A	FCC 15B, Class B
30-88	49.5	40
88-216	54	43.5
216-230	56.9	46
230-960		
960-1000	60	54

- Notes:
1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
 3. QP detector shall be applied if not specified.

(2) Above 1GHz

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 3 meters (dB μ V/m)		
Frequencies (MHz)	FCC 15B, Class A	FCC 15B, Class B
1000-3000	Avg: 60	Avg: 54
Above 3000	Peak: 80	Peak: 74

- Notes:
1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
 3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Frequency Range (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5th harmonic of the highest frequency or 40GHz, whichever is lower

5.2. Test limit for FCC Part 18 Subpart C

The field strength levels of emissions which lie outside the bands specified in §18.301, unless otherwise indicated, shall not exceed the following:

Radiated Emissions Limits at 3 meters (dB μ V/m)			
Equipment	Operating Frequency	RF Power generated by equipment (watts)	Limit
Ultrasonic	>160kHz	Any	43.5

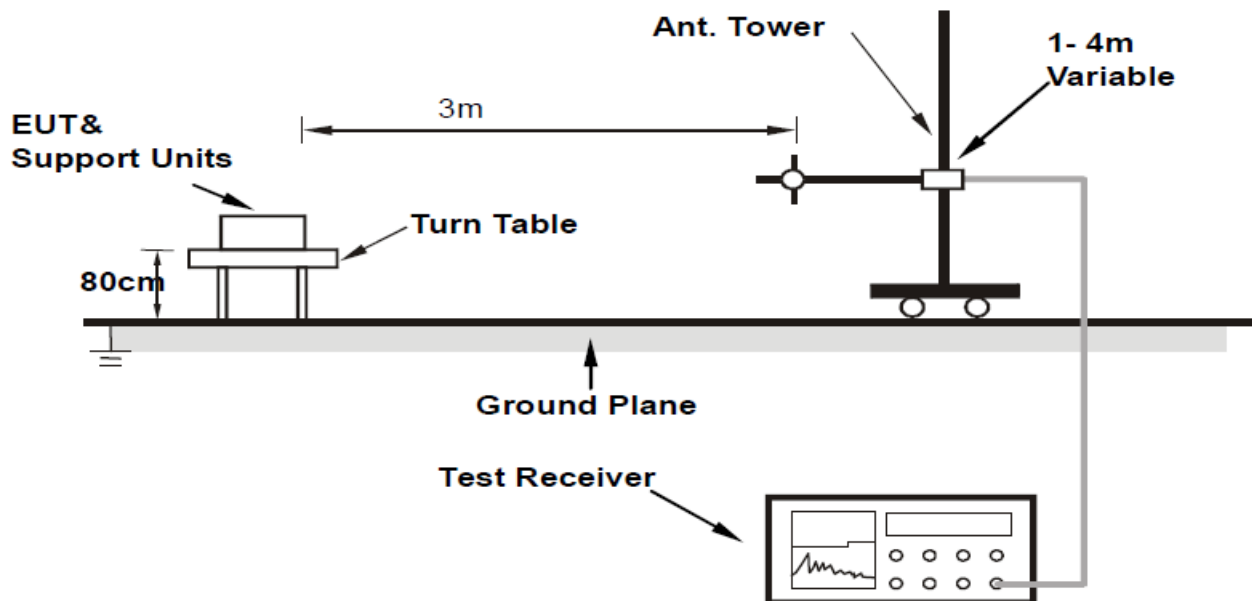
5.3. Test Arrangement

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set at 3meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna(below 1GHz) and a horn antenna(above 1GHz), and its height is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- a. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz. The spectrum analyzer system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

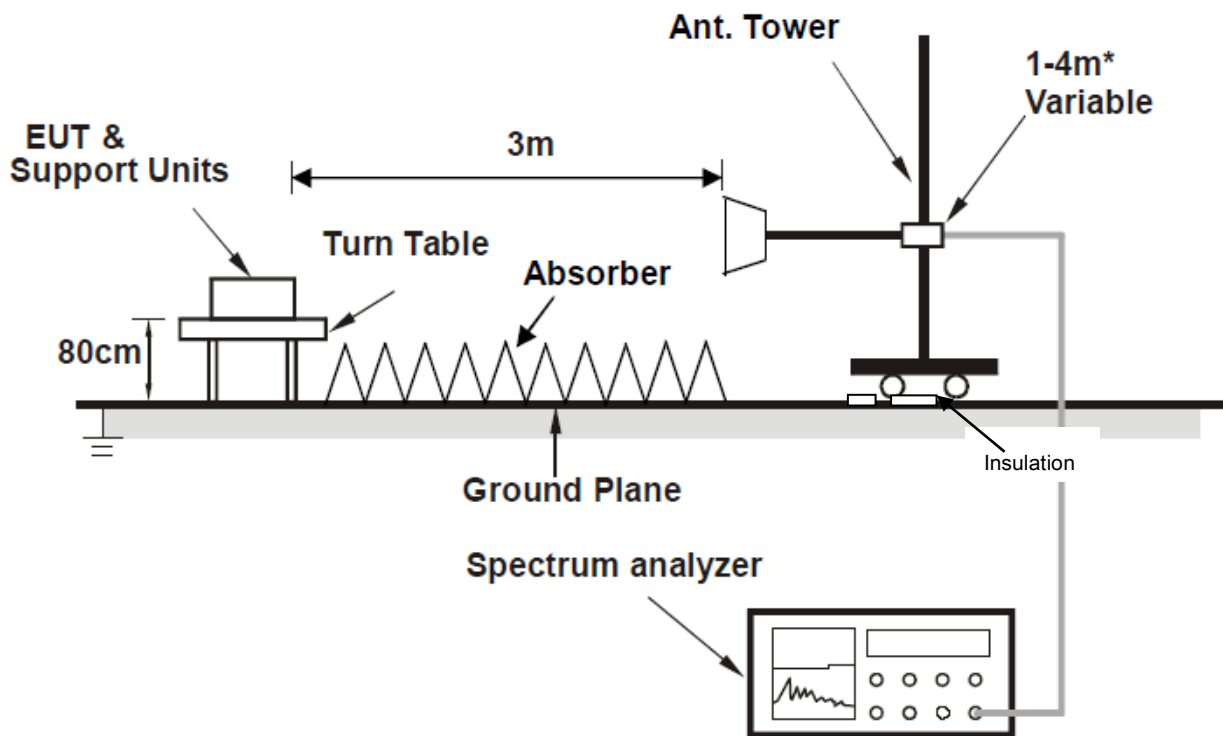
Note: 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth of spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz. The resolution bandwidth of spectrum analyzer is 1 MHz and Video bandwidth is 1Hz for Average(AV) measurement at frequency above 1GHz.

<Frequency 30MHz~1000MHz>



<Frequency above 1GHz>



5.4. Measurement Equipment

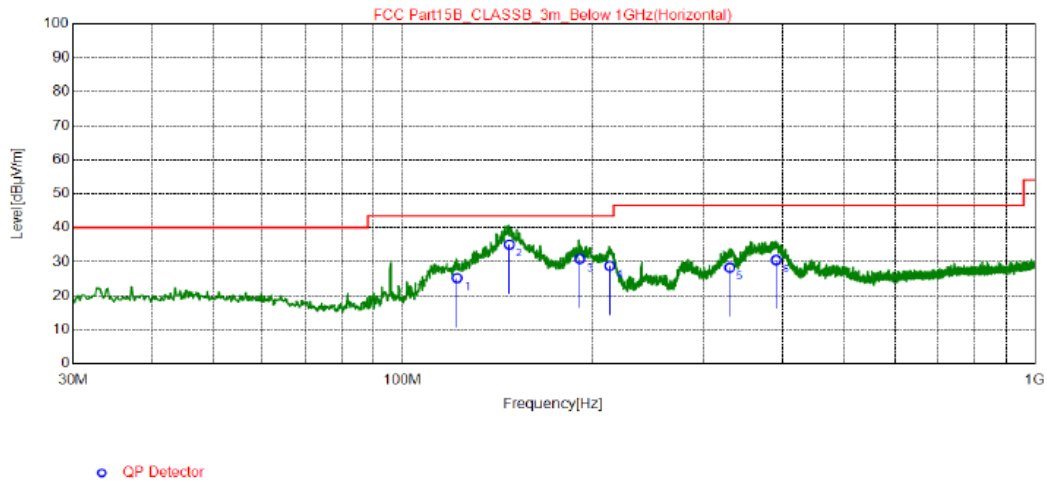
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
EMI Test Receiver(Below 1GHz) Rohde & Schwarz	ESR7	E1R1005	Dec.02, 2019	Dec.01, 2020
Spectrum Analyzer(Above 1GHz) Keysight	N9030B	E1S1003	Jun.25, 2019	Jun.24, 2020
Broad-Band Antenna Schwarzbeck	VULB9168	E1A1012	Jul.29,2019	Jul.28, 2020
Double Riaged Vroadband Horn Antenna Schwarzbeck	BBHA9120D	E1A1017	Jan.27,2019	Jan.26, 2020
Preamplifier(Below 1GHz) Agilent	8447D	E1A2001	Jun.25, 2019	Jun.24, 2020
Preamplifier(Above 1GHz) EMCI	EMC051845SE	E1A2009	Jun.25, 2019	Jun.24, 2020

5.5. Test Result and Data (30MHz ~ 1GHz)

Mode 1: Audio in

Position: Horizontal

Test Graph



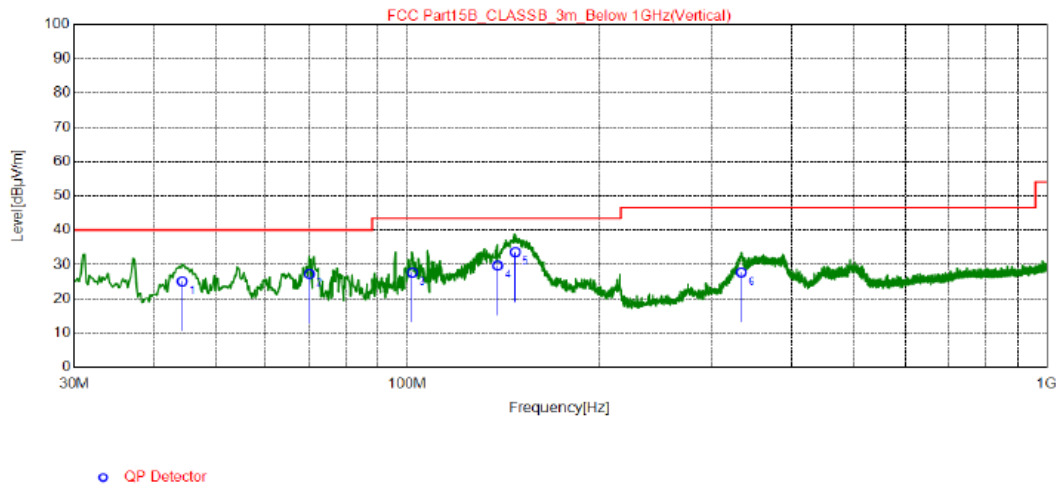
NO.	Freq. [MHz]	QP Reading [dBμV/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	121.9	36.69	-11.53	25.16	43.50	18.34	100	155	Horizontal
2	147.5	44.55	-9.51	35.04	43.50	8.46	200	93	Horizontal
3	190.8	42.78	-11.96	30.82	43.50	12.68	200	159	Horizontal
4	212.9	40.56	-11.78	28.78	43.50	14.72	100	142	Horizontal
5	329.9	37.05	-8.80	28.25	46.50	18.25	100	171	Horizontal
6	390.8	38.31	-7.83	30.48	46.50	16.02	100	177	Horizontal

REMARKS:

1. Q.P. is abbreviation of quasi-peak individually.
2. The emission levels of other frequencies were very low against the limit.
3. QP Margin value = QP Limit value – QP value
4. Factor = Antenna Factor + Amplifier Factor + Cable loss
5. QP value = Factor + Reading Value.

Position: Vertical

Test Graph



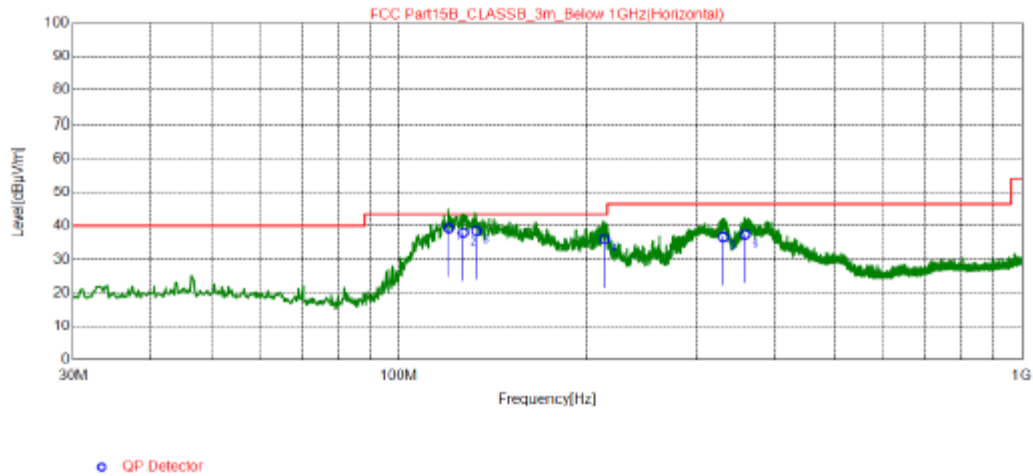
NO.	Freq. [MHz]	QP Reading [dBμV/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	44.35	34.59	-9.56	25.03	40.00	14.97	100	82	Vertical
2	70.15	39.34	-12.13	27.21	40.00	12.79	100	126	Vertical
3	101.7	40.87	-13.22	27.65	43.50	15.85	200	106	Vertical
4	138.4	39.95	-10.26	29.69	43.50	13.81	100	356	Vertical
5	147.5	43.09	-9.51	33.58	43.50	9.92	100	17	Vertical
6	333.6	36.55	-8.86	27.69	46.50	18.81	100	176	Vertical

REMARKS:

1. Q.P. is abbreviation of quasi-peak individually.
2. The emission levels of other frequencies were very low against the limit.
3. QP Margin value = QP Limit value – QP value
4. Factor = Antenna Factor + Amplifier Factor + Cable loss
5. QP value = Factor + Reading Value.

Mode 2: Bluetooth
Position: Horizontal

Test Graph



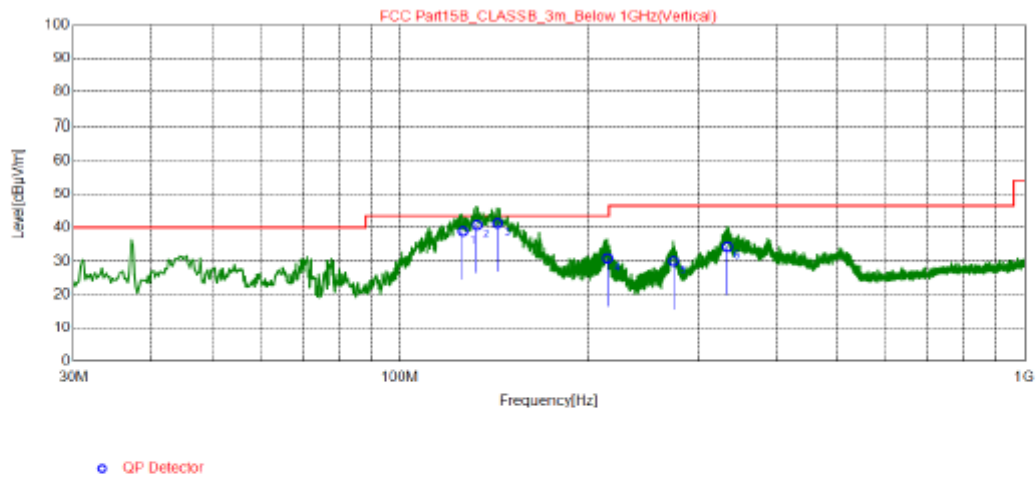
NO.	Freq. [MHz]	QP Reading [dBμV/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	120.2	50.94	-11.70	39.24	43.50	4.26	100	163	Horizontal
2	126.8	48.94	-11.05	37.89	43.50	5.61	100	160	Horizontal
3	133.0	49.1	-10.57	38.53	43.50	4.97	200	125	Horizontal
4	213.7	47.7	-11.75	35.95	43.50	7.55	100	150	Horizontal
5	331.6	45.5	-8.83	36.67	46.50	9.83	100	115	Horizontal
6	359.6	45.87	-8.50	37.37	46.50	9.13	100	172	Horizontal

REMARKS:

1. Q.P. is abbreviation of quasi-peak individually.
2. The emission levels of other frequencies were very low against the limit.
3. QP Margin value = QP Limit value – QP value
4. Factor = Antenna Factor + Amplifier Factor + Cable loss
5. QP value = Factor + Reading Value.

Position: Vertical

Test Graph



NO.	Freq. [MHz]	QP Reading [dBµV/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	126.0	50.00	-11.13	38.87	43.50	4.63	121.4	33.3	Vertical
2	132.7	51.34	-10.58	40.76	43.50	2.74	112.4	157.3	Vertical
3	143.1	51.15	-9.89	41.26	43.50	2.24	115.2	108.3	Vertical
4	214.8	42.48	-11.70	30.78	43.50	12.72	100	274	Vertical
5	274.0	39.76	-9.81	29.95	46.50	16.55	100	104	Vertical
6	334.3	43.17	-8.87	34.30	46.50	12.20	100	211	Vertical

REMARKS:

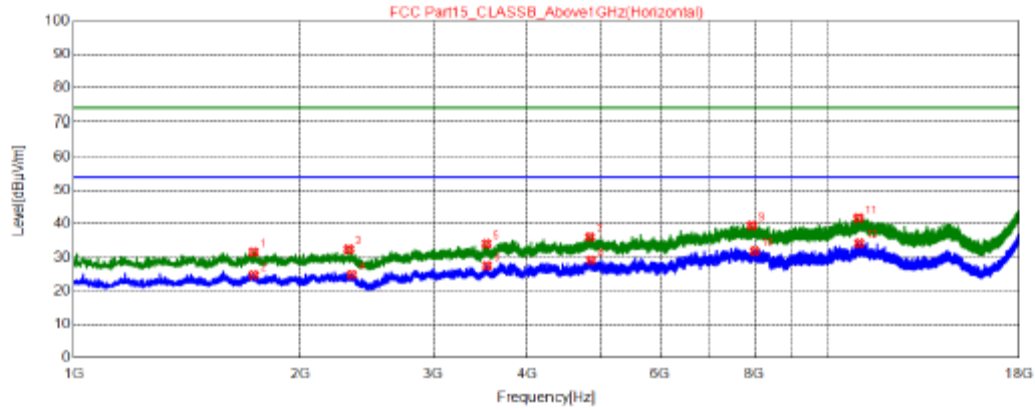
1. Q.P. is abbreviation of quasi-peak individually.
2. The emission levels of other frequencies were very low against the limit.
3. QP Margin value = QP Limit value – QP value
4. Factor = Antenna Factor + Amplifier Factor + Cable loss
5. QP value = Factor + Reading Value.

5.6. Test Result and Data (1GHz ~ 18GHz)

Mode 1: Audio in

Position: Horizontal

Test Graph



★ AV Detector

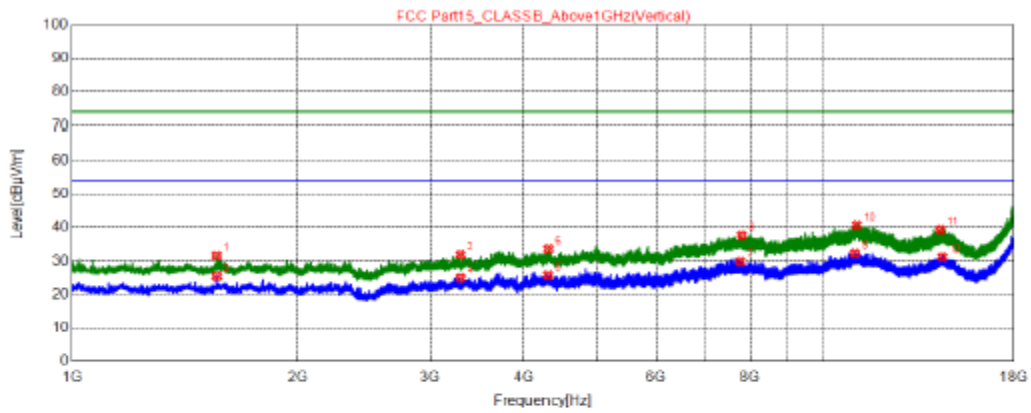
NO.	Freq. [MHz]	Reading [dBµV/m]	Factor [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1731.	48.97	-17.36	31.61	74.00	42.39	100	80	Horizontal
2	1732.	42.10	-17.36	24.74	54.00	29.26	100	80	Horizontal
3	2317.	48.51	-16.12	32.39	74.00	41.61	100	332	Horizontal
4	2340.	40.89	-16.07	24.82	54.00	29.18	100	17	Horizontal
5	3529.	46.76	-12.68	34.08	74.00	39.92	100	238	Horizontal
6	3534.	40.20	-12.67	27.53	54.00	26.47	100	238	Horizontal
7	4844.	45.46	-9.37	36.09	74.00	37.91	100	112	Horizontal
8	4859.	38.51	-9.35	29.16	54.00	24.84	100	17	Horizontal
9	7943.	42.50	-3.04	39.46	74.00	34.54	100	238	Horizontal
10	8017.	34.91	-2.98	31.93	54.00	22.07	100	332	Horizontal
11	11006	40.27	1.39	41.66	74.00	32.34	100	17	Horizontal
12	11032	32.78	1.43	34.21	54.00	19.79	100	143	Horizontal

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin = Limit – Level

Position: Vertical

Test Graph



* AV Detector

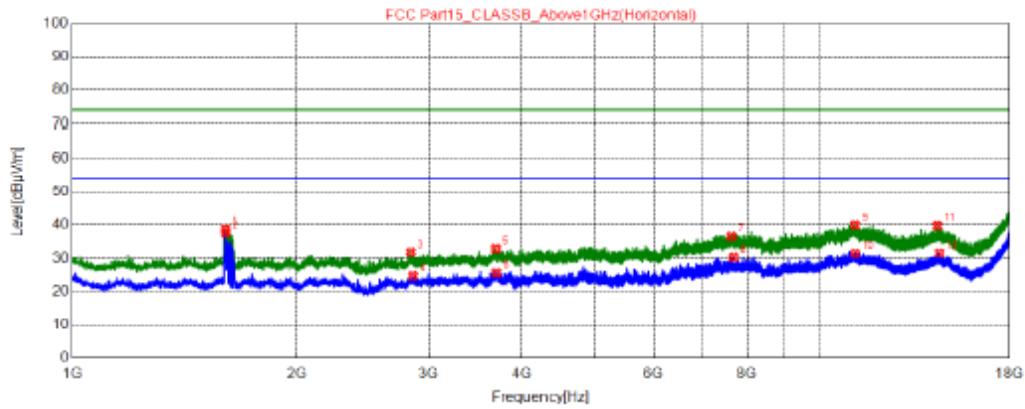
NO.	Freq. [MHz]	Reading [dB μV/m]	Factor [dB]	Level [dB μV/m]	Limit [dB μV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1558.	49.38	-17.76	31.62	74.00	42.38	100	120	Vertical
2	1559.	43.22	-17.76	25.46	54.00	28.54	100	120	Vertical
3	3291.	45.38	-13.46	31.92	74.00	42.08	100	88	Vertical
4	3292.	38.34	-13.46	24.88	54.00	29.12	100	88	Vertical
5	4308.	36.57	-10.80	25.77	54.00	28.23	100	26	Vertical
6	4315.	44.35	-10.78	33.57	74.00	40.43	100	26	Vertical
7	7771.	33.18	-3.32	29.86	54.00	24.14	100	248	Vertical
8	7802.	40.87	-3.26	37.61	74.00	36.39	100	216	Vertical
9	11044	30.83	1.45	32.28	54.00	21.72	100	57	Vertical
10	11109	39.12	1.55	40.67	74.00	33.33	100	88	Vertical
11	14356	35.68	3.56	39.24	74.00	34.76	100	184	Vertical
12	14439	27.40	3.72	31.12	54.00	22.88	100	88	Vertical

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin = Limit – Level

Mode 2: Bluetooth
Position: Horizontal

Test Graph



★ AV Detector

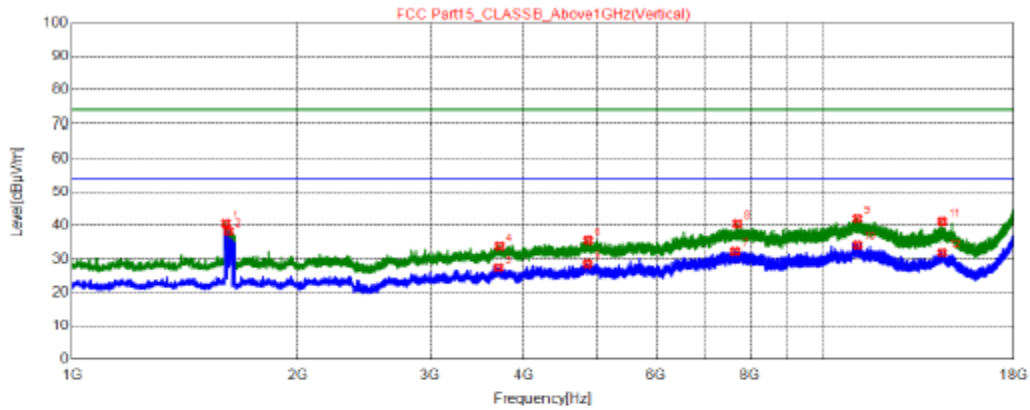
NO.	Freq. [MHz]	Reading [dB µV/m]	Factor [dB]	Level [dB µV/m]	Limit [dB µV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1603.	56.43	-17.65	38.78	74.00	35.22	100	182	Horizontal
2	1604.	55.20	-17.65	37.55	54.00	16.45	100	214	Horizontal
3	2840.	46.63	-14.80	31.83	74.00	42.17	100	21	Horizontal
4	2858.	39.41	-14.75	24.66	54.00	29.34	100	151	Horizontal
5	3691.	45.07	-12.26	32.81	74.00	41.19	100	84	Horizontal
6	3697.	37.87	-12.25	25.62	54.00	28.38	100	248	Horizontal
7	7630.	40.18	-3.59	36.59	74.00	37.41	100	21	Horizontal
8	7685.	33.77	-3.49	30.28	54.00	23.72	100	21	Horizontal
9	11168	38.29	1.62	39.91	74.00	34.09	100	21	Horizontal
10	11173	29.77	1.63	31.40	54.00	22.60	100	119	Horizontal
11	14394	36.07	3.64	39.71	74.00	34.29	100	53	Horizontal
12	14481	27.76	3.79	31.55	54.00	22.45	100	84	Horizontal

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin = Limit –Level

Position: Vertical

Test Graph



★ AV Detector

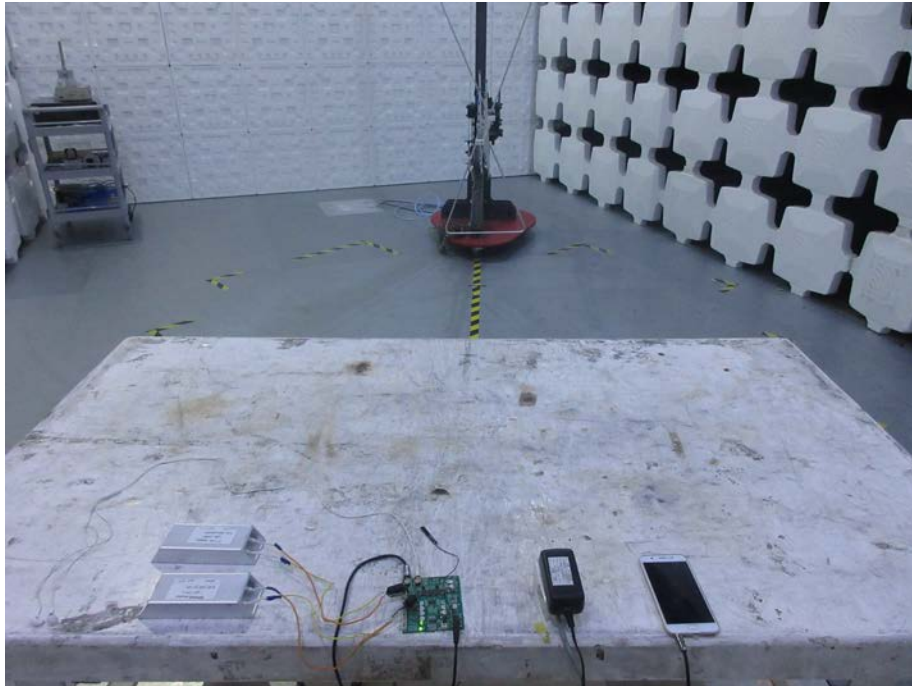
NO.	Freq. [MHz]	Reading [dB μV/m]	Factor [dB]	Level [dB μV/m]	Limit [dB μV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1602.	58.28	-17.65	40.63	74.00	33.37	100	174	Vertical
2	1616.	55.86	-17.62	38.24	54.00	15.76	100	143	Vertical
3	3699.	39.64	-12.25	27.39	54.00	26.61	100	300	Vertical
4	3714.	46.07	-12.21	33.86	74.00	40.14	100	143	Vertical
5	4863.	37.85	-9.34	28.51	54.00	25.49	100	269	Vertical
6	4870.	44.86	-9.33	35.53	74.00	38.47	100	332	Vertical
7	7646.	35.84	-3.56	32.28	54.00	21.72	100	206	Vertical
8	7704.	43.98	-3.45	40.53	74.00	33.47	100	143	Vertical
9	11132	40.49	1.58	42.07	74.00	31.93	100	332	Vertical
10	11132	32.64	1.58	34.22	54.00	19.78	100	300	Vertical
11	14428	37.48	3.70	41.18	74.00	32.82	100	80	Vertical
12	14429	28.20	3.70	31.90	54.00	22.10	100	80	Vertical

REMARKS:

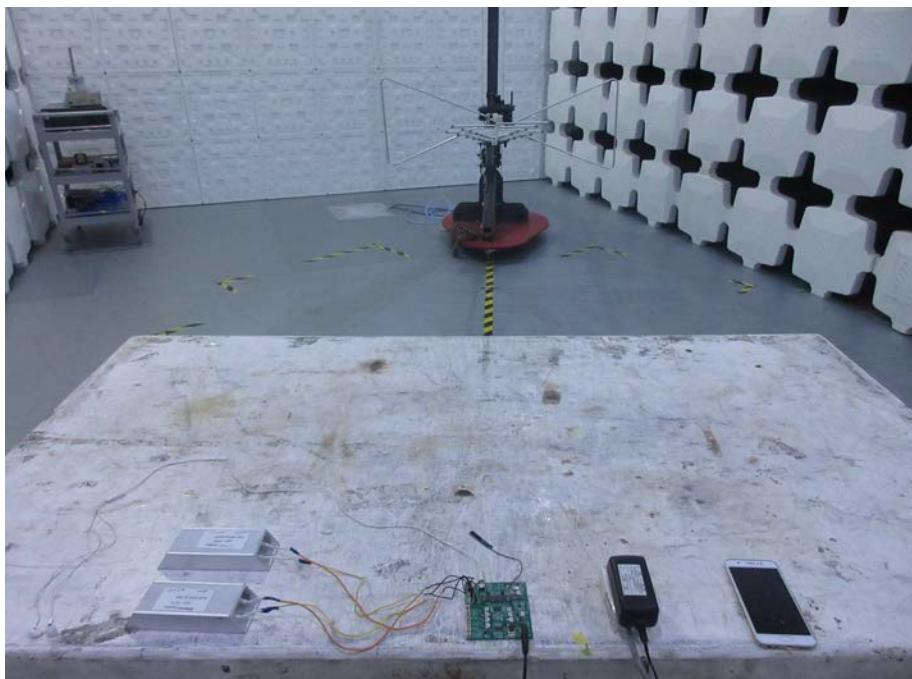
1. The emission levels of other frequencies were very low against the limit.
2. Margin = Limit –Level

5.7. Test Photographs (30MHz ~ 1000MHz)

Mode 1: Audio in

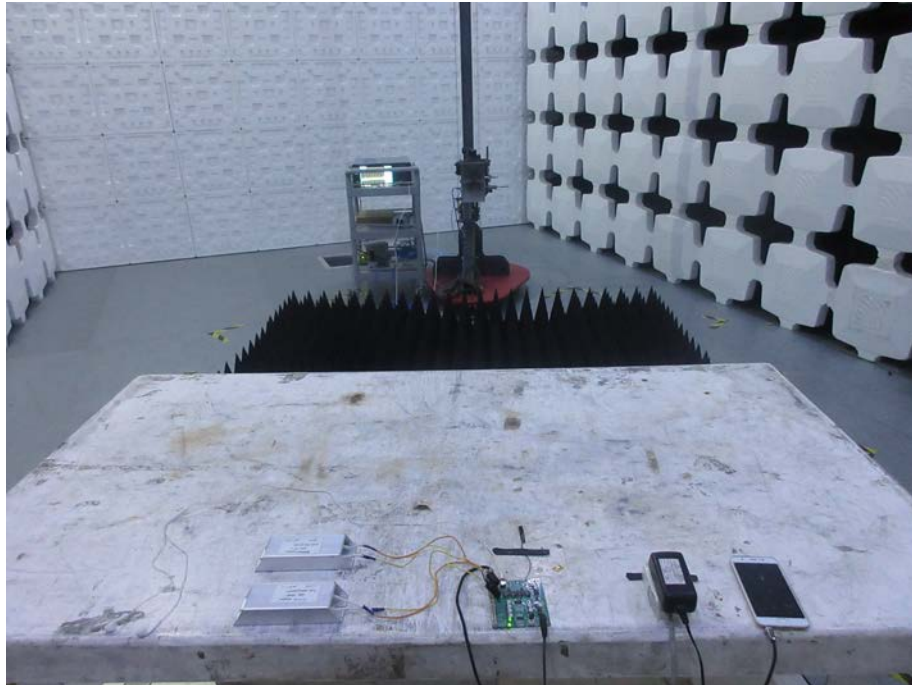


Mode 2: Bluetooth

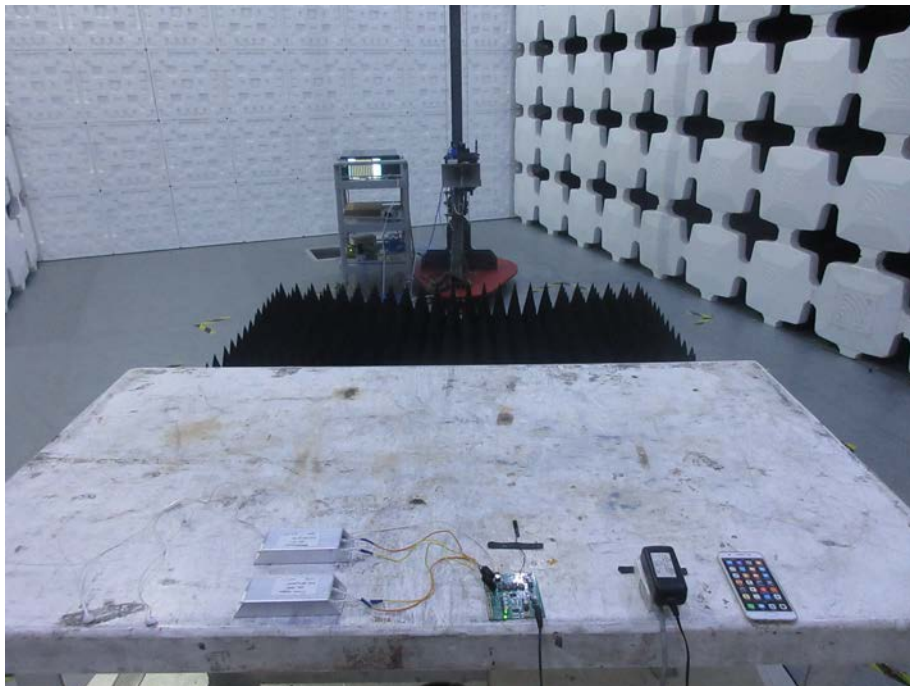


5.8. Test Photographs (1000MHz ~ 6000MHz)

Mode 1: Audio in



Mode 2: Bluetooth



6. Test of Conducted Emissions

6.1. Test Limits

Frequency (MHz)	FCC Part 15 Subpart B CLASS B FCC Part 18 consumer devices	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

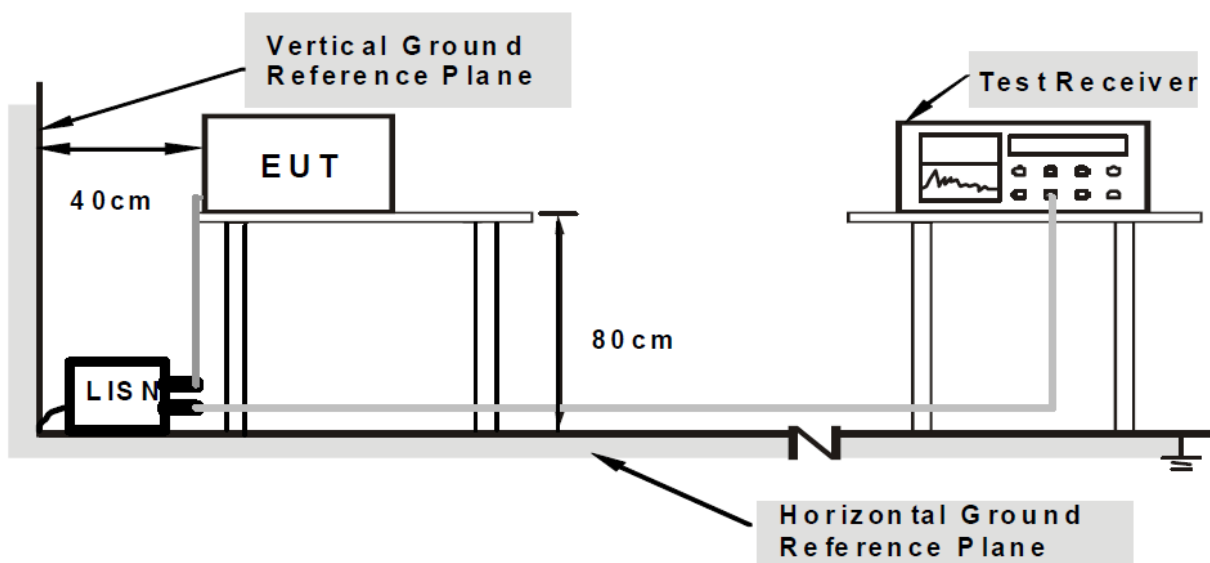
Notes: 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

6.2. Test Arrangement

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note:

- The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.
- Q.P and AV. are abbreviation of Quasi-Peak and Average individually.
- Margin Value=Limit Value-Emission Level
- Correction Factor=Insertion loss+Cable Loss.
- Emission Level=Correction+Reading Level.



6.3. Measurement Equipment

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver Rohde & Schwarz	ESCS30	E1R1001	Mar.05,2019	Mar.04,2020
LISN Rohde& Schwarz	ENV 216	E1L1011	Jun.25,2019	Jun.24,2020
Software ADT	ADT_Cond_V7.3.0	N/A	N/A	N/A

Phase: NEUTRAL

Location: Conduction 1

Date: 12/5/2019

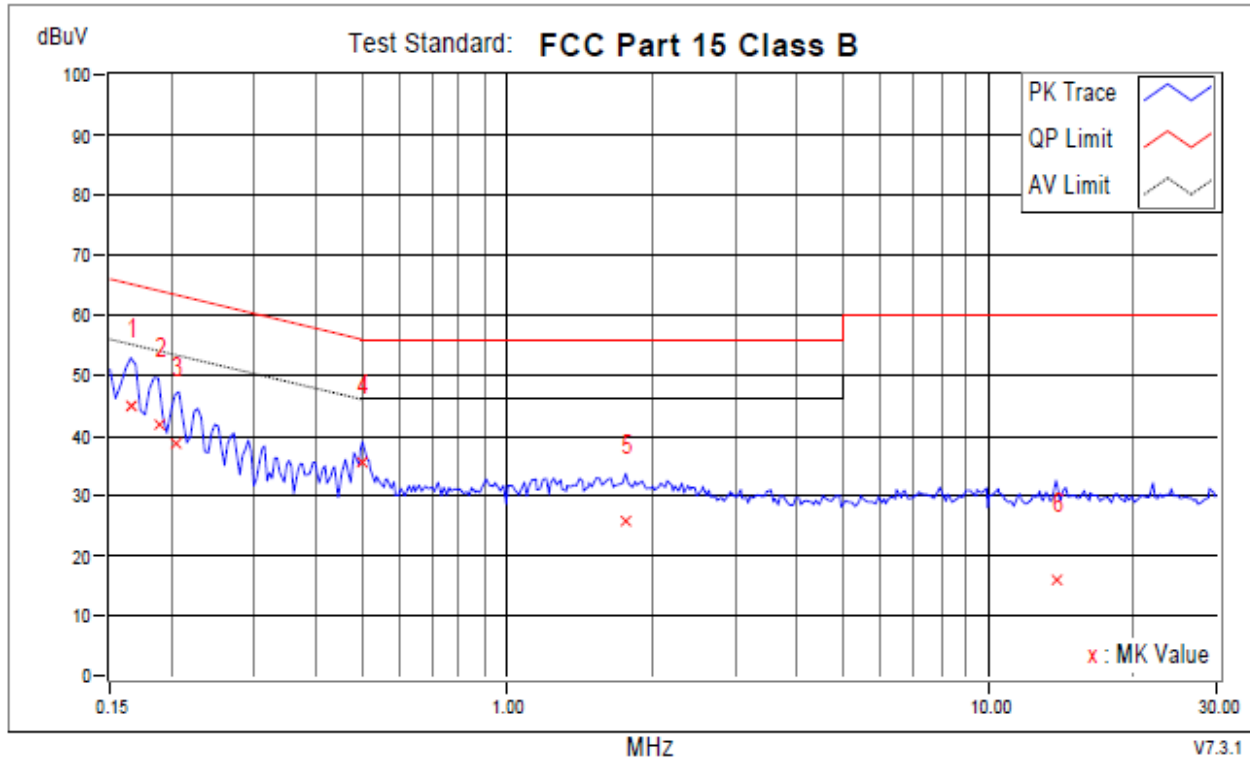
Time: 2:07:31 PM

Phase N

Temperatuer (C): 19

Humidity (%): 53

Approved by:



No.	Frequency MHz	Corr. Factor dB	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
			QP	AV	QP	AV	QP	AV	QP	AV	
+1	0.16564	9.83	35.10	21.43	44.93	31.26	65.18	55.18	-20.24	-23.91	
2	0.18910	9.81	32.16	19.65	41.97	29.46	64.08	54.08	-22.11	-24.62	
3	0.20474	9.80	28.82	16.94	38.62	26.74	63.42	53.42	-24.79	-26.67	
4	0.50190	9.84	25.70	14.61	35.54	24.45	56.00	46.00	-20.46	-21.55	
5	1.77027	9.93	16.03	4.52	25.96	14.45	56.00	46.00	-30.04	-31.55	
6	13.87090	10.39	5.67	-4.55	16.06	5.84	60.00	50.00	-43.94	-44.16	

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin Value = Limit Value-Emission Level
3. Correction Factor = Insertion Loss + Cable Loss
4. Emission Level = Correction Factor + Reading Value

Mode 2: Bluetooth

Phase: LINE

Location: Conduction 1

Date: 12/5/2019

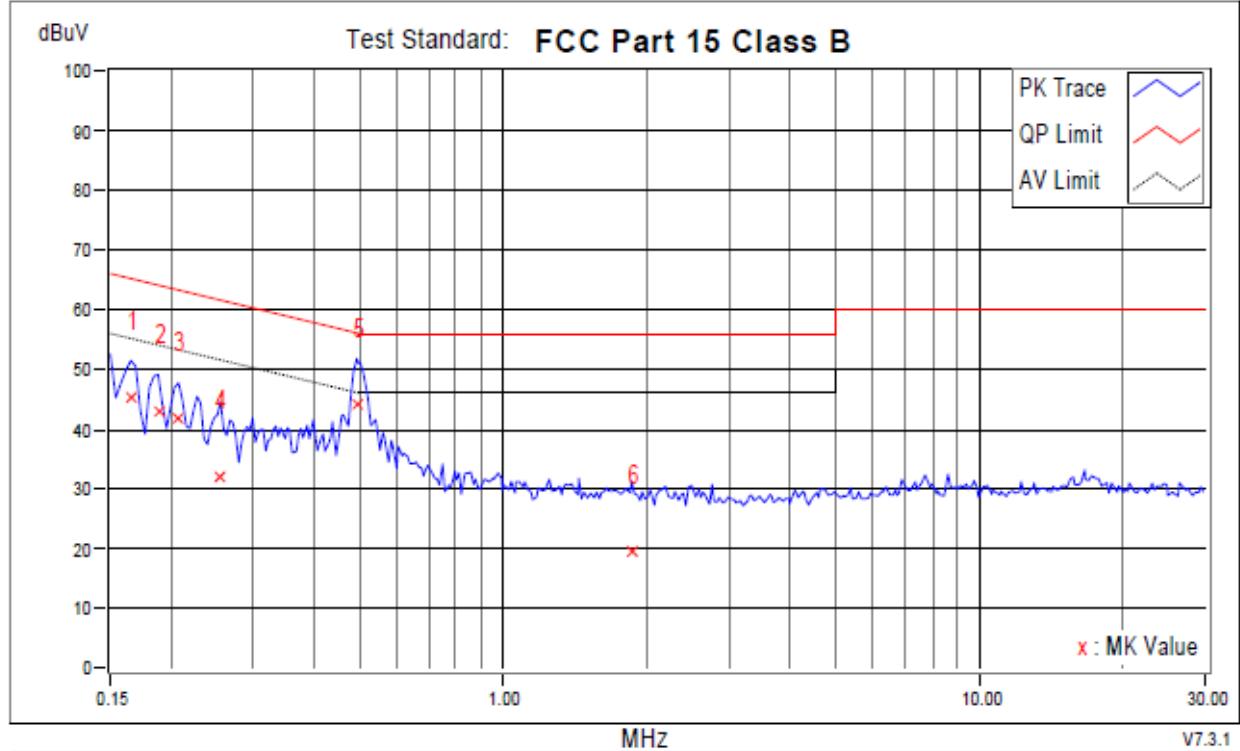
Time: 2:15:50 PM

Phase L1

Temperature (C): 19

Humidity (%): 53

Approved by:



No.	Frequency MHz	Corr. Factor dB	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
			QP	AV	QP	AV	QP	AV	QP	AV	
1	0.16564	9.85	35.28	22.78	45.13	32.63	65.18	55.18	-20.05	-22.55	
2	0.18910	9.86	33.01	22.25	42.87	32.11	64.08	54.08	-21.21	-21.97	
3	0.20865	9.85	31.83	20.26	41.68	30.11	63.26	53.26	-21.58	-23.15	
4	0.25557	9.77	22.33	11.61	32.10	21.38	61.57	51.57	-29.47	-30.19	
+5	0.49408	9.72	34.53	24.28	44.25	34.00	56.10	46.10	-11.85	-12.10	
6	1.86411	9.75	9.91	3.84	19.66	13.59	56.00	46.00	-36.34	-32.41	

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin Value = Limit Value-Emission Level
3. Correction Factor = Insertion Loss + Cable Loss
4. Emission Level = Correction Factor + Reading Value

Phase: NEUTRAL

Location: Conduction 1

Date: 12/5/2019

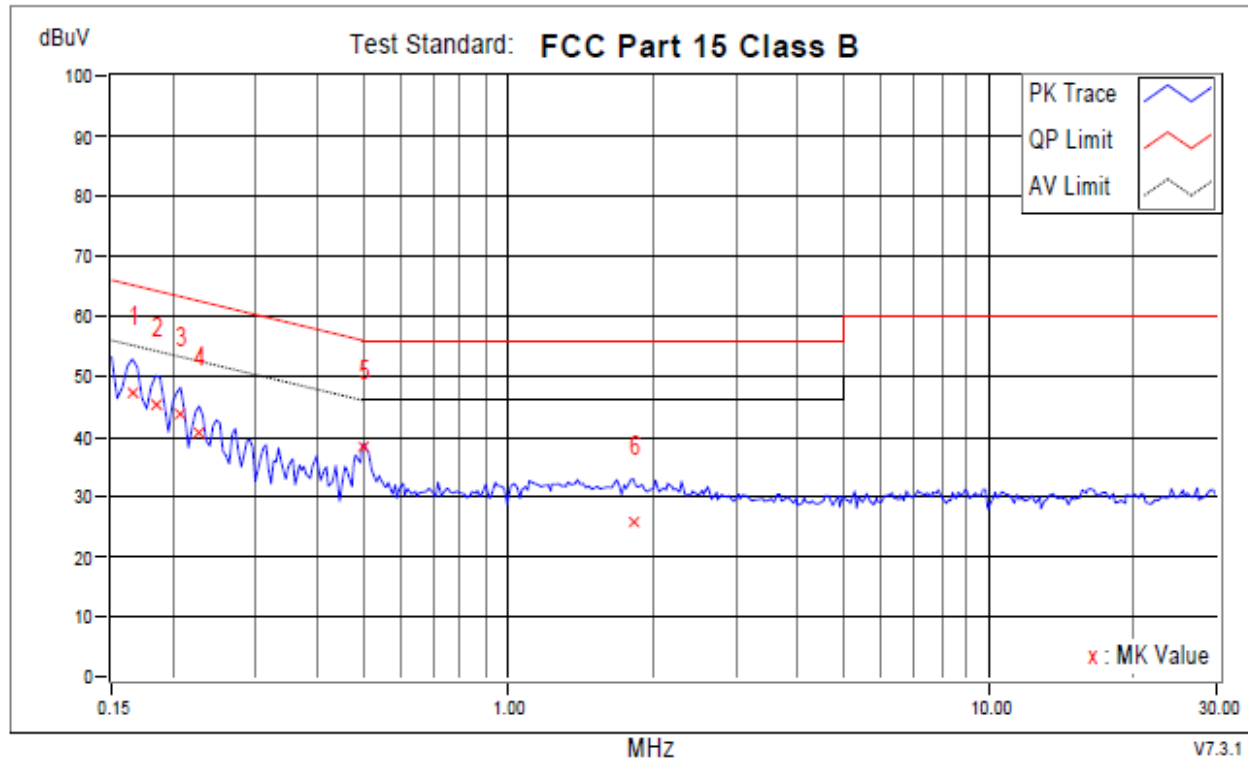
Time: 2:13:02 PM

Phase N

Temperatuer (C): 19

Humidity (%): 53

Approved by:



No.	Frequency	Corr. Factor	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
	MHz	dB	QP	AV	QP	AV	QP	AV	QP	AV	
1	0.16564	9.83	37.32	25.98	47.15	35.81	65.18	55.18	-18.02	-19.36	
2	0.18519	9.81	35.31	25.13	45.12	34.94	64.25	54.25	-19.12	-19.30	
3	0.20865	9.81	34.07	24.45	43.88	34.26	63.26	53.26	-19.38	-19.00	
4	0.22820	9.82	30.80	22.26	40.62	32.08	62.51	52.51	-21.90	-20.44	
+5	0.50190	9.84	28.40	20.90	38.24	30.74	56.00	46.00	-17.76	-15.26	
6	1.82892	9.93	15.66	6.32	25.59	16.25	56.00	46.00	-30.41	-29.75	

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin Value = Limit Value-Emission Level
3. Correction Factor = Insertion Loss + Cable Loss
4. Emission Level = Correction Factor + Reading Value

6.5. Test Photographs

Mode 1: Audio in



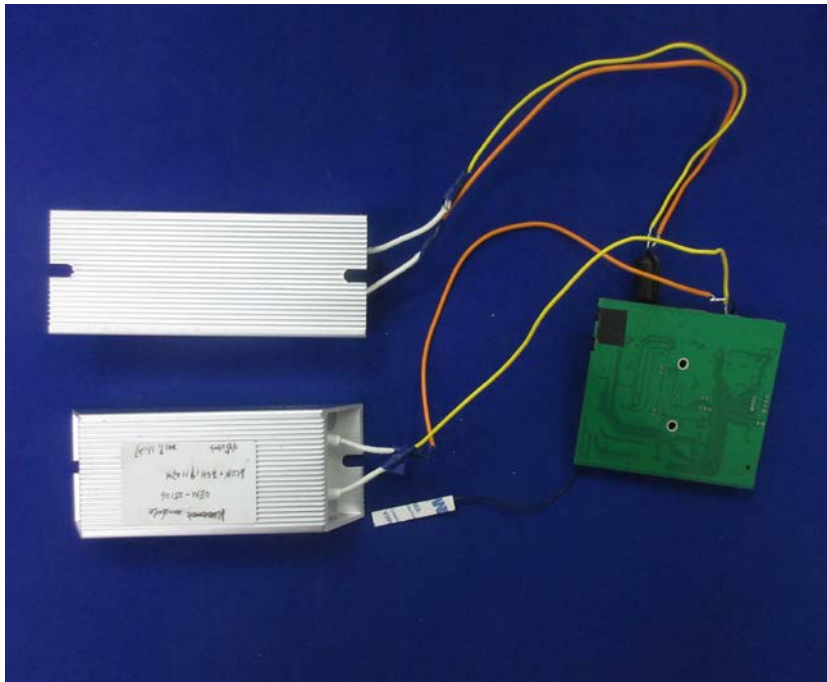
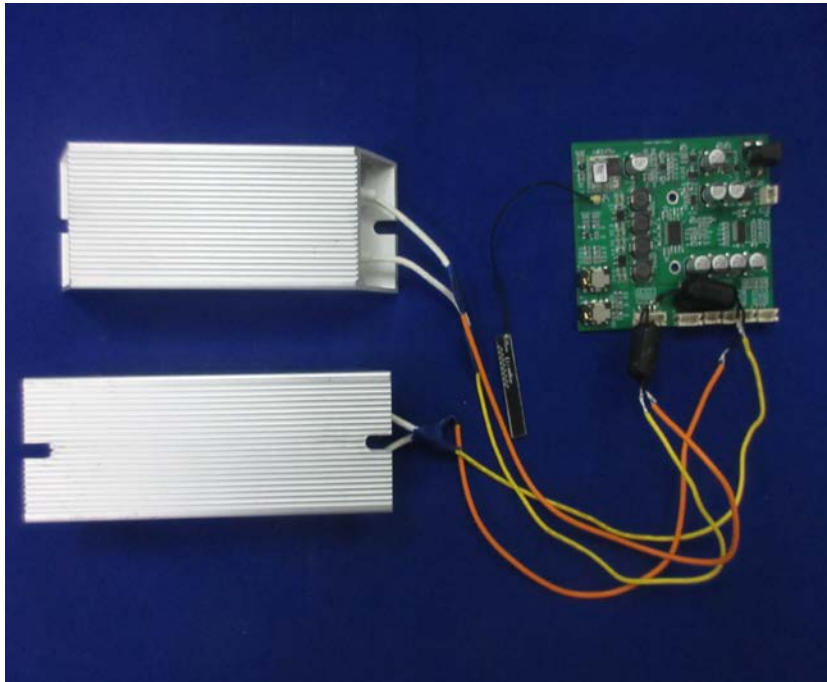
Mode 2: Bluetooth



7. Countermeasure to achieve EMC compliance

According to the customer's request , add a 100MHz magnetic buckle to the output of the sample. Specific result refer to the EUT photos.

8. Photographs of EUT



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