



FCC TEST REPORT

FCC ID: 2A2CV-C87B

On Behalf of

youxianjiaochushangmaoyouxiangongsi

MP3 Player FM Transmitters

Model No.: C87B

Prepared for : youxianjiaochushangmaoyouxiangongsi
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TABLE OF CONTENTS

<u>Description</u>	<u>Page</u>
1. SUMMARY OF STANDARDS AND RESULTS	6
1.1. Description of Standards and Results	6
2. GENERAL INFORMATION.....	7
2.1. Description of Device (EUT)	7
2.2. Accessories of Device (EUT)	8
2.3. Tested Supporting System Details	8
2.4. Block Diagram of Connection Between EUT and Simulators	8
2.5. Test Mode Description.....	8
2.6. Test Conditions	9
2.7. Test Facility	9
2.8. Measurement Uncertainty	10
2.9. Test Equipment List.....	11
3. POWER LINE CONDUCTED EMISSION TEST	12
3.1. Block Diagram of Test Setup.....	12
3.2. Test Limits	12
3.3. Configuration of EUT on Test	13
3.4. Operating Condition of EUT	13
3.5. Test Procedure	13
3.6. Test Results	13
4. RADIATED EMISSION TEST.....	15
4.1. Block Diagram of Test Setup.....	15
4.2. Test Limit.....	16
4.3. Configuration of EUT on Test	18
4.4. Operating Condition of EUT	18
4.5. Test Procedure	18
4.6. Test Results.....	19
5. BAND EDGE TEST	22
5.1. Block Diagram of Test Setup.....	22
5.2. Test Limit.....	22
5.3. Configuration of EUT on Test	23
5.4. Operating Condition of EUT	23
5.5. Test Procedure	23
5.6. Test Results.....	25
6. OCCUPIED BANDWIDTH TEST	26
6.1. Block Diagram of Test Setup.....	26
6.2. Test Limit.....	26
6.3. Test Procedure	26
6.4. Test Results.....	26
7. ANTENNA REQUIREMENT	28
7.1. Standard Requirement.....	28
7.2. Antenna Connected Construction	28

7.3. Results.....	28
8. PHOTOGRAPH	29
8.1. Photos of Radiated Emission Test	29
8.2. Photos of Power Line Conducted Emission Test.....	29
9. PHOTOS OF THE EUT	30

TEST REPORT DECLARATION

Applicant : youxianjiaochushangmaoyouxiangongsi
Address : hunansheng zhuzhoushi youxiantanqiaojiedaomazhibeicunluojiawen
Manufacturer : youxianjiaochushangmaoyouxiangongsi
Address : hunansheng zhuzhoushi youxiantanqiaojiedaomazhibeicunluojiawen
EUT Description : MP3 Player FM Transmitters
(A) Model No. : C87B
(B) Trademark : **TRUDIN**

Measurement Standard Used:

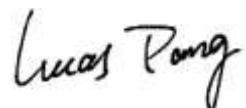
FCC Rules and Regulations Part 15 Subpart C Section 15.239
ANSI C63.10:2013

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the FCC Part 15 requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....:

Lucas Pang
Project Engineer



Approved by (name + signature).....:

Simple Guan
Project Manager



Date of issue.....: July 9, 2021

Revision History

Revision	Issue Date	Revisions	Revised By
V0	July 9, 2021	Initial released Issue	Lucas Pang

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

EMISSION			
Description of Test Item	Test Requirement	Standard Paragraph	Results
Power Line Conducted Emission Test	FCC Part 15	Section 15.207	P
Spurious Emission Test	FCC Part 15	Section 15.239&15.209	P
Occupied bandwidth	FCC Part 15	Section 15.239	P
Band edge Requirement	FCC Part 15	Section 15.239	P
Antenna Requirement	FCC Part 15	Section 15.203	P

Note: 1. P is an abbreviation for Pass.
2. F is an abbreviation for Fail.
3. N/A is an abbreviation for Not Applicable.

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT Name : MP3 Player FM Transmitters

Trademark : **TRUDIN**

Model No. : C87B

DIFF. : N/A

Power supply : DC 12V from DC Power or DC 24v from DC Power

FM

Operation frequency : 88.1-107.9MHz

Channel No. : 199

Modulation type : FM

Antenna Type : Internal antenna, Maximum Gain is 0dBi

Hardware version : V1.0

Software version : V3

Remark: The worst-case simultaneous transmission configuration was evaluated with no non-compliance found.
Results in this report are only for FM function, and there is no other transmitter involved.

2.2. Accessories of Device (EUT)

Accessories1 : /
 Manufacturer : /
 Model : /
 Power supply : /

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1.	N/A	N/A	N/A	N/A	N/A

2.4. Block Diagram of Connection Between EUT and Simulators



2.5. Test Mode Description

Test mode:

Mode	Channel	Frequency (MHz)
FSK	Low :CH1	88.1
FSK	Middle: CH100	98
FSK	High: CH199	107.9

Note:

1. The test was used to control EUT work in Continuous TX mode, and select test channel, wireless mode
2. The EUT has been tested as an independent unit. And Continual Transmitting in maximum power.
3. New battery is used during all tests.
4. For the relevant Conducted Measurement, the temporary antenna connector is used during the measurement. Antenna Connector Impedance: 50Ω , Cable Loss: 1.0 dB

Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1CH	88.1	...	...	101CH	98.1	...	...
2CH	88.2	92CH	97.2	102CH	98.2	192CH	107.2
3CH	88.3	93CH	97.3	103CH	98.3	193CH	107.3
4CH	88.4	94CH	97.4	104CH	98.4	194CH	107.4
5CH	88.5	95CH	97.5	105CH	98.5	195CH	107.5
6CH	88.6	96CH	97.6	106CH	98.6	196CH	107.6
7CH	88.7	97CH	97.7	107CH	98.7	197CH	107.7
8CH	88.8	98CH	97.8	108CH	98.8	198CH	107.8
9CH	88.9	99CH	97.9	109CH	98.9	199CH	107.9
...	....	100CH	98	...	...

2.6. Test Conditions

Temperature range	21-25°C
Humidity range	40-75%
Pressure range	86-106kPa

2.7. Test Facility

Shenzhen Alpha Product Testing Co., Ltd.
 Building i, No.2, Lixin Road, Fuyong Street, Bao'an District,
 518103, Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission
 Registration Number: 293961

July 15, 2019 Certificated by IC
 Registration Number: CN0085

2.8.Measurement Uncertainty

(95% confidence levels, k=2)

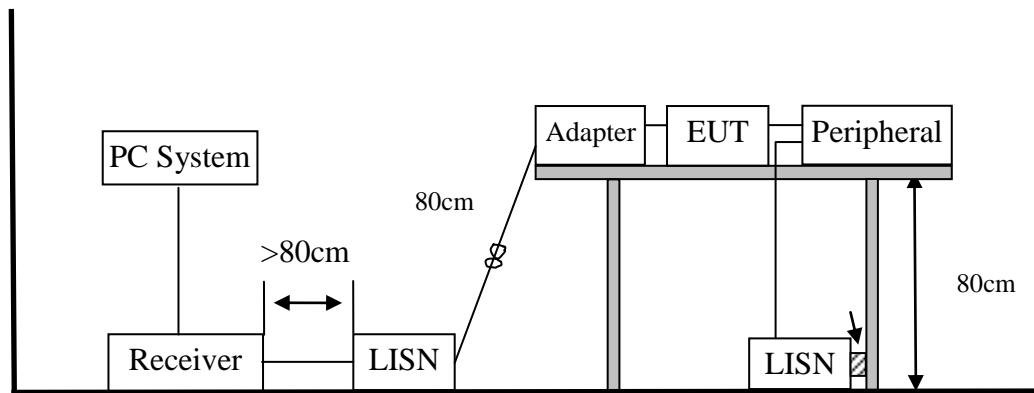
Item	Uncertainty
Uncertainty for Power point Conducted Emissions Test	2.74dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB(Polarize: V)
	2.57dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.77 dB (Distance: 3m Polarize: V)
	3.80 dB (Distance: 3m Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.13 dB (Distance: 3m Polarize: V)
	4.16 dB (Distance: 3m Polarize: H)
Uncertainty for radio frequency	5.8×10^{-8}
Uncertainty for conducted RF Power	0.37dB
Uncertainty for temperature	0.2°C
Uncertainty for humidity	1%
Uncertainty for DC and low frequency voltages	0.06%

2.9. Test Equipment List

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	CHENYU	9*6*6	N/A	2020.09.02	1 Year
Spectrum analyzer	ROHDE&SCHW ARZ	FSU	1166.1660.26	2020.09.02	1 Year
Spectrum analyzer	Agilent	N9020A	MY499100060	2020.09.02	1 Year
Receiver	ROHDE&SCHW ARZ	ESR	1316.3003K03-10208 2-Wa	2020.09.02	1 Year
Receiver	R&S	ESCI	101165	2020.09.02	1 Year
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-438	2019.09.07	2 Year
Horn Antenna	SCHWARZBEC K	BBHA 9120 D	BBHA 9120 D(1201)	2020.04.12	2 Year
Loop Antenna	SCHWARZBEC K	FMZB 1519B	00059	2019.09.07	2 Year
Cable	Resenberger	N/A	No.1	2020.09.02	1 Year
Cable	SCHWARZBEC K	N/A	No.2	2020.09.02	1 Year
Cable	SCHWARZBEC K	N/A	No.3	2020.09.02	1 Year
Pre-amplifier	HP	HP8347A	2834A00455	2020.09.02	1 Year
Pre-amplifier	Agilent	8449B	3008A02664	2020.09.02	1 Year
Temperature controller	Terchy	MHQ	120	2020.09.02	1 Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126-466	2020.09.02	1 Year
L.I.S.N.#2	ROHDE&SCHW ARZ	ENV216	101043	2020.09.02	1 Year
20db Attenuator	ICPROBING	IATS1	82347	2020.09.02	1 Year

3. POWER LINE CONDUCTED EMISSION TEST

3.1. Block Diagram of Test Setup



3.2. Test Limits

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. Emission level=Read level + LISN factor-Preamp factor + Cable loss

2. * Decreasing linearly with logarithm of frequency.

3. The lower limit shall apply at the transition frequencies.

3.3. Configuration of EUT on Test

The following equipment are installed on Power Line Conducted Emission Test to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Operating Condition of EUT

- (1) Setup the EUT as shown as Section 3.1.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode taking the test.

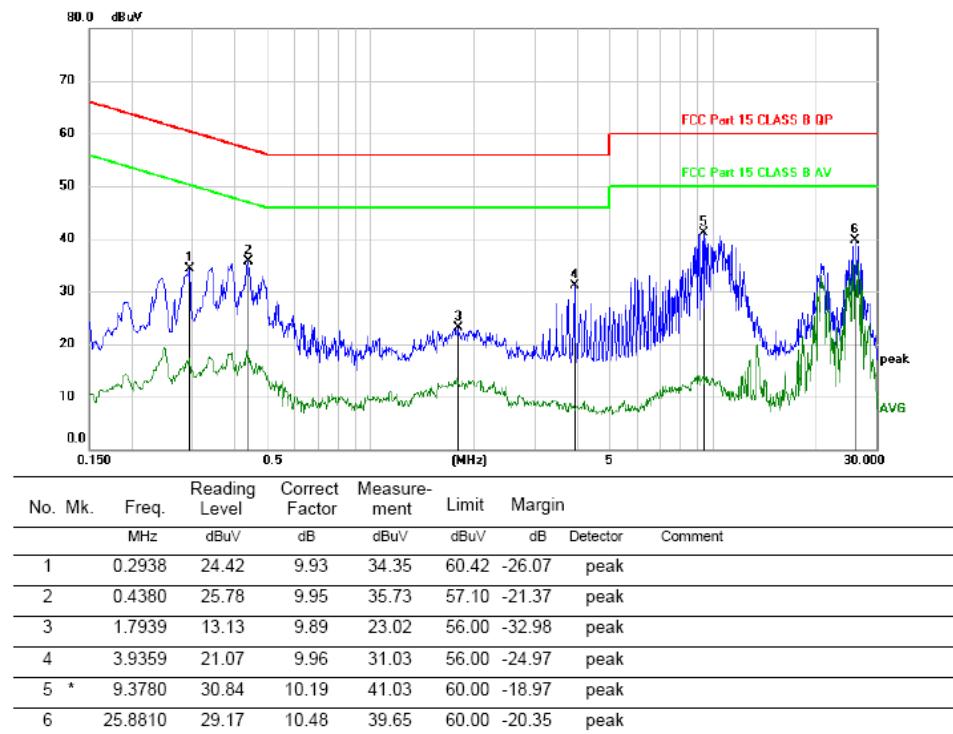
3.5. Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.#2). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10:2013 on conducted Emission test.
- (2) The frequency range from 150kHz to 30MHz is checked, the bandwidth of test receiver is set at 9kHz.
- (3) The frequency range from 30MHz to 1000MHz was pre-scanned with a Peak detector and all final readings of measurement from Test Receiver are Quasi-Peak and Average values.
- (4) The test results are reported on Section 3.6.

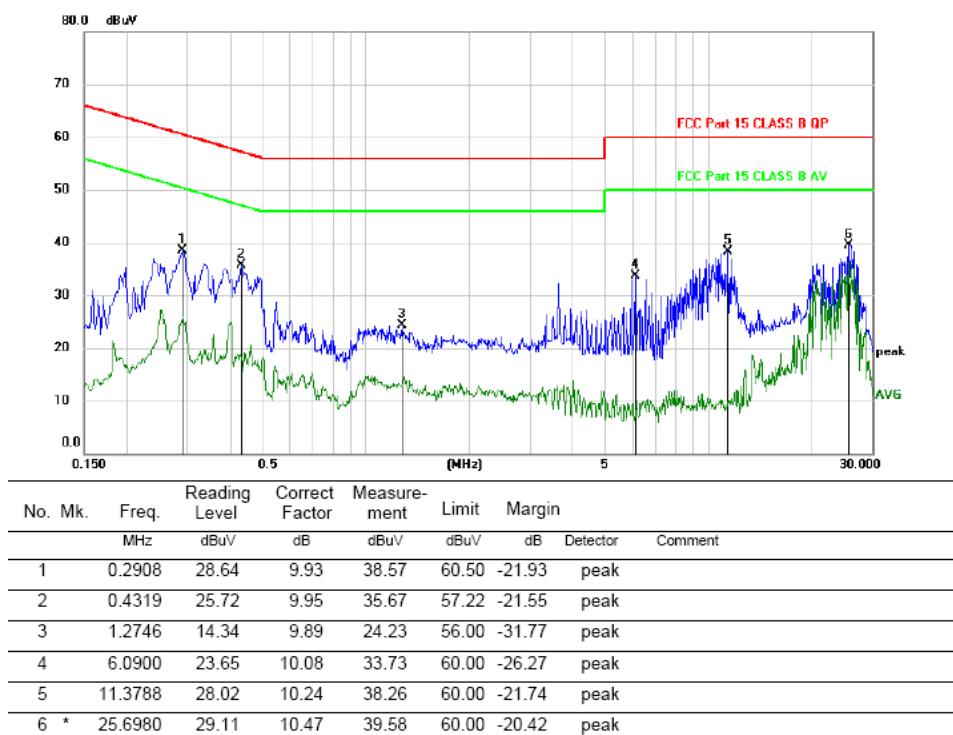
3.6. Test Results

Frequency Range	: 0.15MHz~30MHz
Test Mode	: TX 107.9MHz
Test Results	: PASS
Note: 1. The test results are listed in next pages. 2. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out. 3. If the limits for the measurement with the average detector are met when using a receiver with a quasi-peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.	

Line:



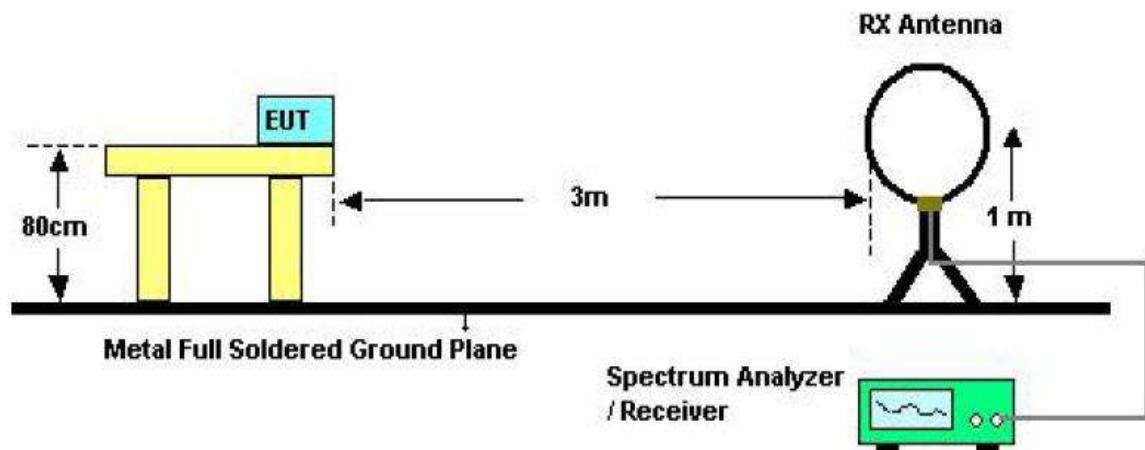
Neutral:



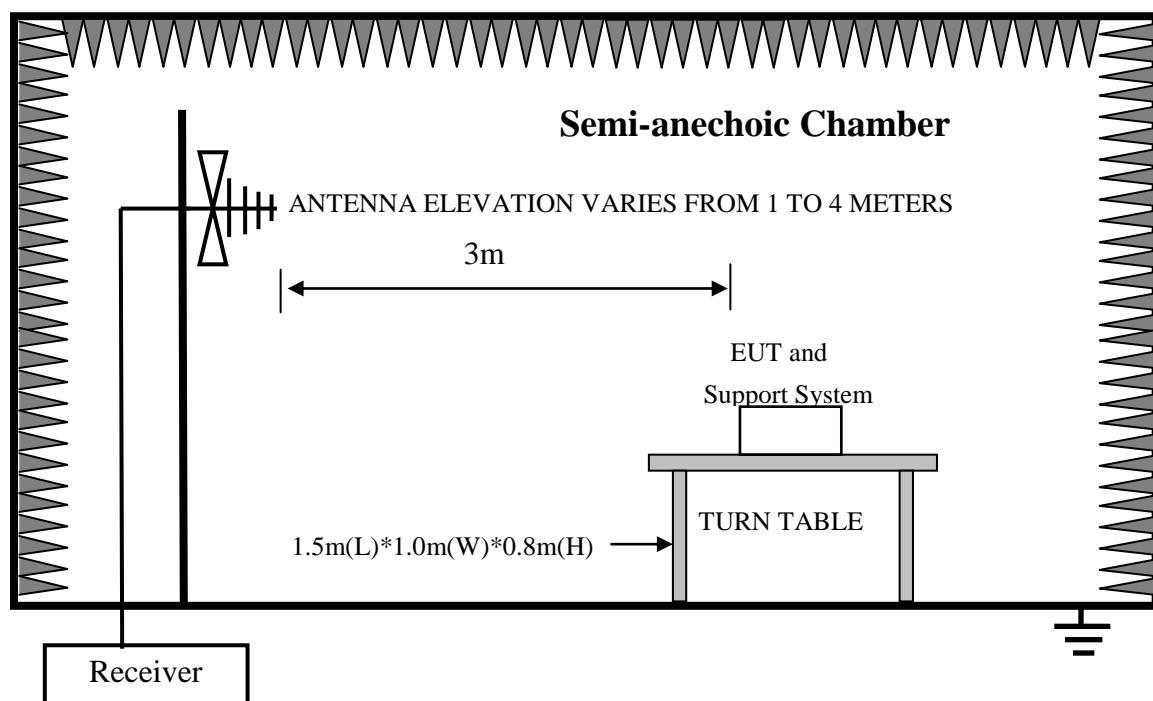
4. RADIATED EMISSION TEST

4.1. Block Diagram of Test Setup

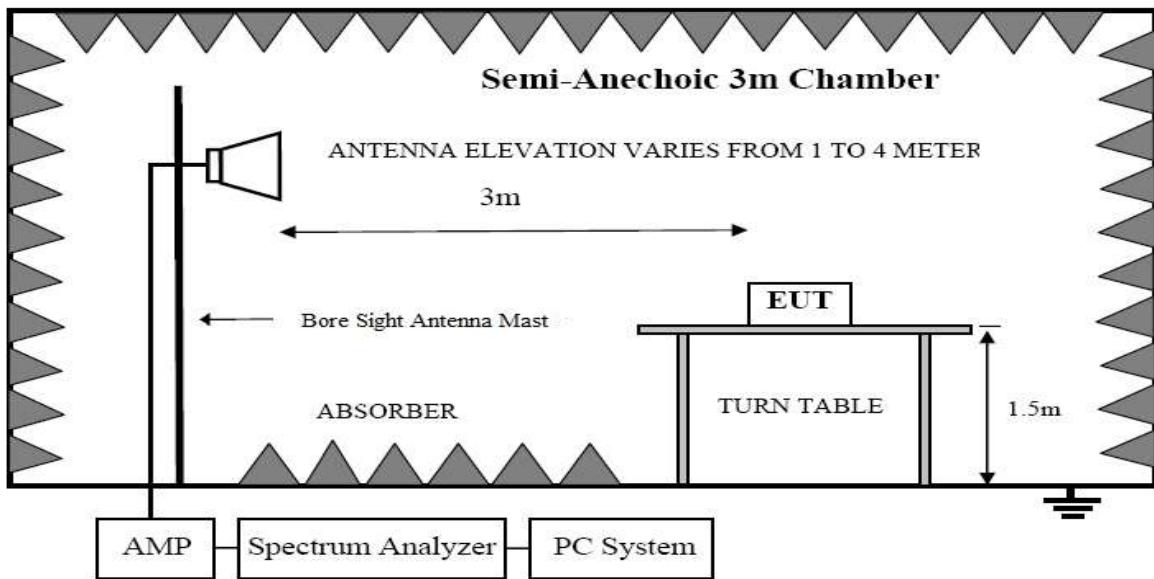
In Semi Anechoic Chamber (3m) Test Setup Diagram for 9KHz~30MHz



In Semi Anechoic Chamber (3m) Test Setup Diagram for 30MHz~1000MHz



In Semi Anechoic Chamber (3m) Test Setup Diagram for Above 1GHz



4.2. Test Limit

Frequency MHz	Distance (Meters)	Field Strengths Limits	
		uV/m	dB uV/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	----
1.705 ~ 30	30	30	29.5
30 ~ 88	3	100(3nW)	40
88 ~ 216	3	150(6.8nW)	43.5
216 ~ 960	3	200(12nW)	46
Above 960	3	500(75nW)	54
Carrier frequency	3	50000(avg)	113.97(peak) 93.97(avg)

Notes:

1. Emission level = Read level + Antenna Factor - Preamp Factor + Cable Loss
2. The smaller limit shall apply at the cross point between two frequency bands.
3. Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.
4. For frequencies above 1000 MHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

According to §15.239(b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Emission Level (dB_uV/m)=20log Emission Level(uV/m)

The field strength of emission limits have been calculated in below table:

Fundamental Frequency(MHz)	Distance (Meters)	Field Strengths of Fundamental	
		uV/m	dB uV/m
88.1~107.9	3	250	48(AVG)

4.3. Configuration of EUT on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

4.4. Operating Condition of EUT

- (1) Setup the EUT as shown as Section 4.1.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode taking the test.

4.5. Test Procedure

- (1) The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1GHz and 150 cm above the ground plane inside a semi-anechoic chamber for above 1GHz. An antenna was located 3m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10: 2013 on Radiated Emission test.
- (2) For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- (3) Test antenna was located 4m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP
- (5) The frequency range from 9KHz to 150KHz is checked, the bandwidth of test receiver is

set at 200Hz.

The frequency range from 150KHz to 30MHz is checked, the bandwidth of test receiver is set at 9KHz.

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

The frequency range from above 1GHz is checked, the bandwidth of Signal Analyzer is set at 1MHz.

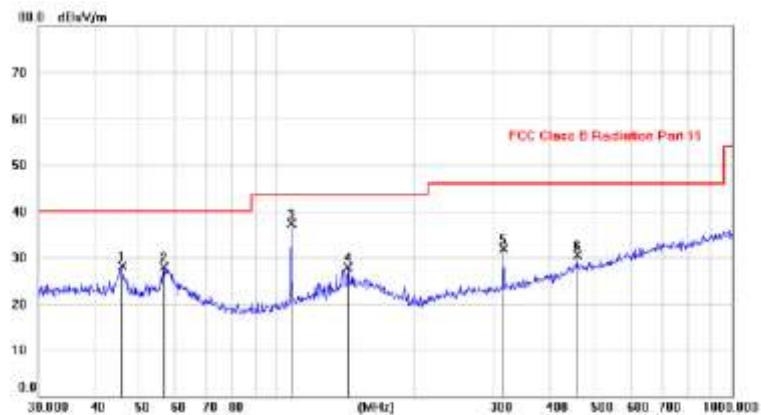
- (6) The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector and all final readings of measurement from Test Receiver are Quasi-Peak values, the frequency range from 1GHz to 6GHz was pre-scanned with a peak detector and all final readings of measurement from Spectrum Analyzer are peak and average values checked, all measurement distance is 3m in 3m semi anechoic chamber.
- (7) Test for all x, y, z axes is performed and only the worst case of X axes was recorded in the test report.
- (8) The test results are reported on Section 4.6.

4.6. Test Results

Frequency Range	: 30MHz~1000MHz
Test Mode	: TX 107.9MHz
Test Results	: PASS

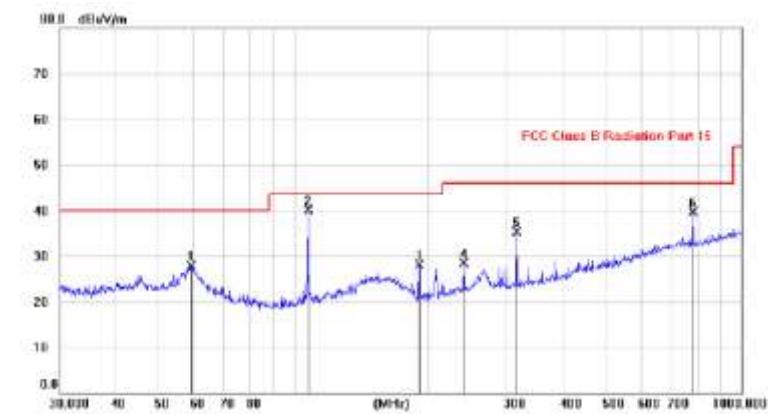
Note: 1. The test results are listed in next pages.
2. This mode is worst case mode, and this report only reflected the worst mode.
3. If the limits for the measurement with the quasi-peak detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the quasi-peak detector need not be carried out.

Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Antenna Height		Table Degree	Comment						
								MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		45.7427	14.08	14.11	28.19	40.00	-11.81	peak									
2		56.6790	14.53	13.46	27.99	40.00	-12.01	peak									
3	*	107.7489	25.69	11.61	37.30	43.50	-6.20	QP									
4		143.4934	13.34	14.57	27.91	43.50	-15.59	peak									
5		314.8543	17.34	14.48	31.82	46.00	-14.18	peak									
6		456.0124	12.90	17.62	30.52	46.00	-15.48	peak									

Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Antenna Height		Table Degree	Comment						
								MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		58.9078	14.71	13.26	27.97	40.00	-12.03	peak									
2	*	107.6987	28.43	11.60	40.03	43.50	-3.47	QP									
3		190.9841	16.66	11.41	28.07	43.50	-15.43	peak									
4		239.9873	15.87	12.55	28.42	46.00	-17.58	peak									
5		314.8543	20.87	14.48	35.35	46.00	-10.65	peak									
6		780.0625	16.85	22.78	39.63	46.00	-6.37	peak									

Note: This report only shall the worst case mode for TX 107.9MHz.

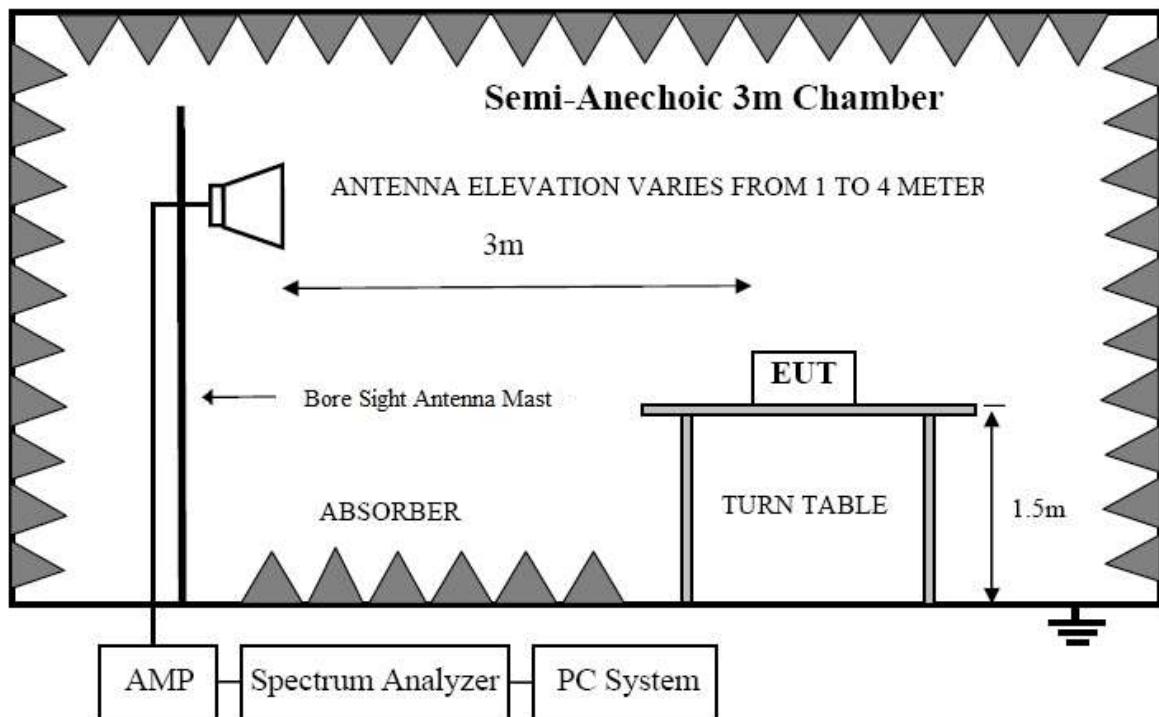
Field strength							
Test Mode	: TX 88.1MHz, 98.1MHz, 107.9MHz						
Test Results	: PASS						

Test Mode: TX88.1MHz							
Freq (MHz)	Read Level (dBuV/m)	Polar	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
88.1	30.56	V	10.01	40.57	68	-27.43	PK
88.1	26.69	V	10.01	36.70	48	-11.30	AV
88.1	29.82	H	10.01	39.83	68	-28.17	PK
88.1	29.32	H	10.01	39.33	48	-8.67	AV
Test Mode: TX 98.1MHz							
98.1	28.56	V	10.7	39.26	68	-28.74	PK
98.1	27.37	V	10.7	38.07	48	-9.93	AV
98.1	29.93	H	10.7	40.63	68	-27.37	PK
98.1	29.78	H	10.7	40.48	48	-7.52	AV
Test Mode: TX 107.9MHz							
107.9	30.34	V	11.62	41.96	68	-26.04	PK
107.9	27.14	V	11.62	38.76	48	-9.24	AV
107.9	30.24	H	11.92	41.95	68	-26.05	PK
107.9	24.99	H	11.92	36.91	48	-11.09	AV

Note: Result = Read level + Factor

5. BAND EDGE TEST

5.1. Block Diagram of Test Setup



5.2. Test Limit

Please refer section 15.239 and section 15.205.

239(b) The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

5.3. Configuration of EUT on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner that tends to maximize its emission characteristics in normal application.

5.4. Operating Condition of EUT

- (1) Setup the EUT as shown as Section 5.1.
- (2) Turn on the power of all equipment.
- (3) Let the EUT work in test mode taking the test.

5.5. Test Procedure

- (1) The EUT was placed on a non-metallic table, 150 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10: 2013 on Radiated Emission test.
- (2) For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- (3) Test antenna was located 4m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions

- (5) The frequency range from above 1GHz is checked, the bandwidth of Signal Analyzer is set at 1MHz.
- (6) The frequency range from 1GHz to 6GHz was pre-scanned with a peak detector and all final readings of measurement from Spectrum Analyzer are peak and average values checked, all measurement distance is 3m in 3m semi anechoic chamber.
- (7) Test for all x, y, z axes is performed and only the worst case of X xes was recorded in the test report.
- (8) The test results are reported on Section 5.6.

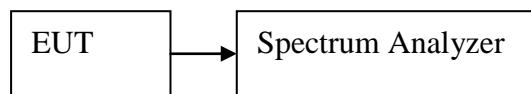
5.6. Test Results

Frequency Range	: 88.1-107.9MHz
Test Mode	: TX 88MHz, TX108MHz
Test Results	: PASS
Note :	<ol style="list-style-type: none">1. The test results are listed in the table below.2. This mode is worst case mode, and this report only reflected the worst mode.

Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
88	22.34	V	11.05	26.83	40	-13.17	QP
88	22.34	H	11.05	21.42	40	-18.58	QP
108	24.41	V	11.61	27.99	43.5	-15.51	QP
108	24.41	H	11.60	21.65	43.5	-21.85	QP

6. OCCUPIED BANDWIDTH TEST

6.1. Block Diagram of Test Setup



6.2. Test Limit

Please refer section 15.239 and section 15.205.

6.3. Test Procedure

- (1) The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.
- (2) The test receiver RBW set 30KHz, VBW set 100KHz, Sweep time set auto.

6.4. Test Results

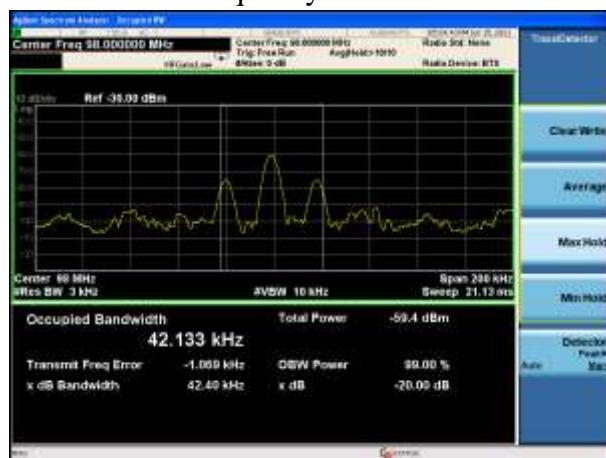
Mode		Frequency MHz	20dB Bandwidth (KHz)	99% Bandwidth (KHz)	20dB Bandwidth Limit (KHz)
FM	ANT1	88.1	42.38	44.875	200
		98	42.40	42.133	200
		107.9	42.77	46.335	200

Note: 1. The test results are listed in next pages.

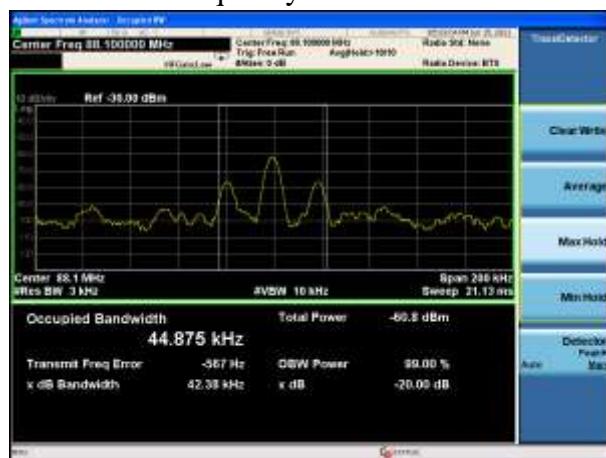
Frequency: 88.1MHz



Frequency: 98MHz



Frequency: 107.9MHz



7. ANTENNA REQUIREMENT

7.1. Standard Requirement

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.

7.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is 0dBi, and the antenna is fixed antenna no consideration of replacement. Please see EUT photo for details.

7.3. Results

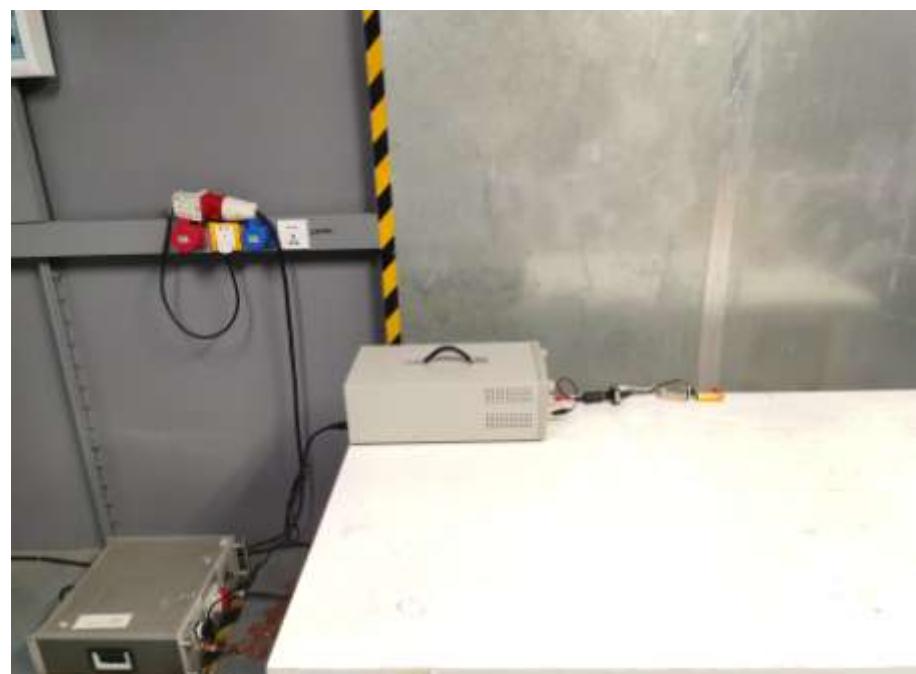
The EUT antenna is PCB Antenna. It complies with the standard requirement.

8. PHOTOGRAPH

8.1.Photos of Radiated Emission Test



8.2.Photos of Power Line Conducted Emission Test



9. PHOTOS OF THE EUT

Please refer to the test report A2105184-C01-R01.

-----THE END OF REPORT-----