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FCC TEST REPORT



Under
FCC 15 Subpart C, Paragraph 15.239
Operation in the band 88–108 MHz.
DXX - Part 15 Low Power Communication Device Transmitter

Prepared For :

Shenzhen Hanrongda Electronic Co., Ltd.

No.21, LiYuanxia, Xin Li Road, Ping Hu Town, Long Gang District, Shenzhen, China

FCC ID: 2APU9HRD-831
EUT: Portable FM Transmitter
Model: HRD-831

June 22, 2018 Issue Date:
Original Report Report Type:
 Test Engineer: Jacky Huang
 Review By: Apollo Liu / Manager

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Report Revision History

Report #	Version	Description	Issued Date
KSZ2018030701J	Rev.01	Initial issue of report	May 2, 2018
KSZ2018030701J	Rev.02	Update section 1.6 & 4.4 & 5.7 & 7.2	June 22, 2018

1. General Information

1.1 Notes

The test results of this report relate exclusively to the test item specified in 1.6. The KMO Lab does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the KMO Lab.

1.2 Testing Laboratory

Test Firm Name:	Ke Mei Ou Lab Co., Ltd.
Test Firm Address:	2013-2016, 20th Floor, Business Center, Jiahui Xin Cheng, No 3027, Shen Nan Road, Fu Tian, Shen Zhen, Guang Dong, P. R. China
FCC Designation Number:	CN1532
Test Firm Registration Number:	344480
Internet:	www.kmolab.com
Email:	kmo@kmolab.com
ANSI-ASQ National Accreditation Board/ACLASS ISO/IEC 17025 Accredited Lab for telecommunication standards. The Registration Number is AT-1532. The testing quality system meets with ISO/IEC-17025 requirements, This approval results is accepted by MRA of ILAC.	

1.3 Details of Applicant

Name: Shenzhen Hanrongda Electronic Co., Ltd.
Address: No.21, LiYuanxia,Xin Li Road, Ping Hu Town, Long Gang District, Shenzhen, China

1.4 Application Details

Date of Receipt of Application: March 7, 2018
Date of Receipt of Test Item: March 7, 2018
Date of Test : March 28~May 2, 2018

1.5 Details of Manufacturer

Name: Shenzhen Hanrongda Electronic Co., Ltd.
Address: No.21, LiYuanxia,Xin Li Road, Ping Hu Town, Long Gang District, Shenzhen, China

1.6 Test Item

EUT Feature	
EUT Description:	Portable FM Transmitter
Brand Name:	N/A
Model Name:	HRD-831
EUT RF Technology:	<input checked="" type="checkbox"/> DXX - Part 15 Low Power Communication Device Transmitter
HW Version:	v1.4
SW Version:	v7.0
EUT Stage:	Identical Prototype
Note: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.	

Standard Product Specification	
Channel Frequency:	88.1~107.9 MHz
Channel Number:	100
Carrier Frequency of Each Channel:	88.1 + n*200 kHz, n=0~99
Channel Spacing :	200 kHz
Antenna Type / Gain:	Internal Antenna / gain 0 dBi
Type of Modulation:	FM
EUT Operational Condition:	<input type="checkbox"/> AC <input checked="" type="checkbox"/> DC → <input checked="" type="checkbox"/> From Battery<3.7V/400mA> <input type="checkbox"/> External AC adapter <input type="checkbox"/> POE

Additional Information

Specification of Accessory				
<input type="checkbox"/> AC/DC Adapter #1 (US)	Brand Name	-	Model Name	-
	Power Rating	-		
<input type="checkbox"/> AC/DC Adapter #2 (US)	Brand Name	-	Model Name	-
	Power Rating	-		

1.7 Applicable Standards

Applicable Standards
According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards: FCC Part 15 Subpart C ANSI C63.10-2013
Note: All test items were verified and recorded according to the standards and without any deviation during the test.

2. Technical Test

2.1 Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Limit	Result	Notes
15.203	Antenna Requirement	FCC 15.203	PASS	Complies
15.207	AC Power Line Conducted Emissions	FCC 15.207	N/A	Complies
15.239(b)	Field Strength of Fundamental	FCC 15.239	PASS	Complies
15.239(a)	20dB Bandwidth	FCC 15.239(a)	PASS	Complies
15.239(c)	Transmitter Unwanted Emissions	FCC 15.209	PASS	Complies.

2.2 Antenna Requirement

A. Regulation

FCC 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. 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 Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

B. Result

The EUT has one internal antenna, which was permanently attached and the gain is 0 dBi, Therefore the EUT complies with Section 15.203 of the FCC rules.

Antenna Information	
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	Temporary RF connector provided
<input type="checkbox"/>	No temporary RF connector provided
<input checked="" type="checkbox"/>	Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.
<input type="checkbox"/>	External antenna (dedicated antennas)
<input type="checkbox"/>	Single power level with corresponding antenna(s).
<input type="checkbox"/>	Multiple power level and corresponding antenna(s).

2.3 Measurement Uncertainty

Measurement	Frequency	Uncertainty
Conducted emissions	0.15MHz~30MHz	1.72
Radiated emissions	30MHz ~ 300MHz	3.88
Radiated emissions	300MHz ~1000MHz	3.86
Radiated emissions	>1000MHz	4.42

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. EUT Modifications

No modification by test lab.

4. Conducted Power Line Test

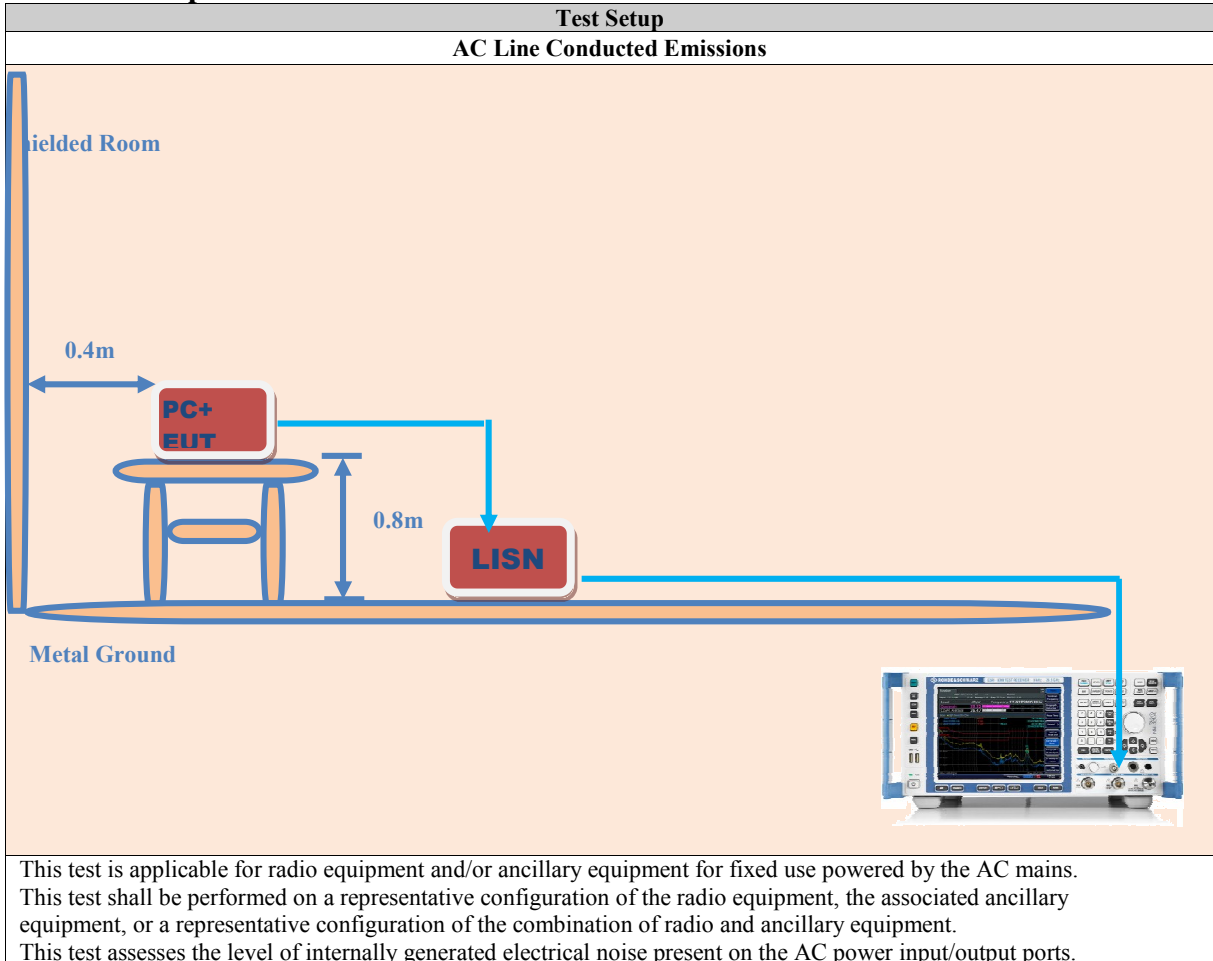
4.1 Test Equipment

Please refer to Section 8 this report.

4.2 Test Procedure

Test Method	
<input type="checkbox"/>	<p>The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.</p> <p>Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission., the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.</p>

4.3 Test Setup



4. 4 Configuration of the EUT

The EUT was configured according to ANSI C63.10:2013. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

EUT Operation Test Setup			
<input checked="" type="checkbox"/>	Operated Mode for Worst Duty Cycle		
<input checked="" type="checkbox"/>	Operated normal mode for worst duty cycle	<input type="checkbox"/>	Operated test mode for worst duty cycle
<input checked="" type="checkbox"/>	Test Signal Duty Cycle (x)		
<input checked="" type="checkbox"/>	100.00%	<input type="checkbox"/>	Other
<input checked="" type="checkbox"/>	Modulation		
<input checked="" type="checkbox"/>	FM	<input type="checkbox"/>	Other
<input checked="" type="checkbox"/>	Test Channel Frequencies (MHz)		
<input checked="" type="checkbox"/>	88.1 / 98.1 /107.9	<input type="checkbox"/>	Other

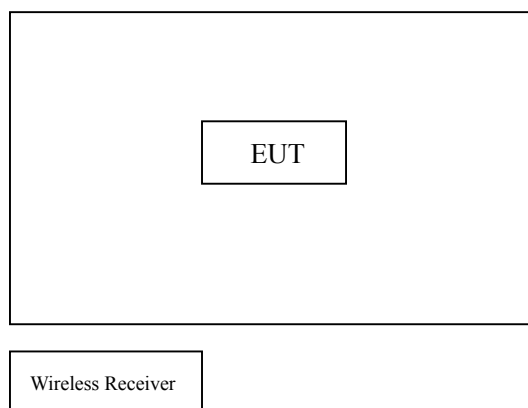
The Worst Case Mode for Following Conformance Tests			
<input checked="" type="checkbox"/>	Tests Item		
<input type="checkbox"/>	AC power-line conducted emissions	<input checked="" type="checkbox"/>	Emission Bandwidth, Field Strength of Fundamental Emissions Transmitter Radiated Unwanted Emissions
<input checked="" type="checkbox"/>	Condition		
<input type="checkbox"/>	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz	<input checked="" type="checkbox"/>	Radiated measurement
<input checked="" type="checkbox"/>	Operating Mode		
<input checked="" type="checkbox"/>	Operating Mode Description	<input type="checkbox"/>	Other
<input checked="" type="checkbox"/>	Orthogonal Planes of EUT		
<input type="checkbox"/>	X Plane	<input type="checkbox"/>	Y Plane
<input checked="" type="checkbox"/>	Y Plane	<input type="checkbox"/>	Other

Support Unit				
Device	Manufacturer	Model # Serial #	FCC ID	Cable
-	-	-	-	-
-	-	-	-	-

4.5 EUT Operating Condition

Operating condition is according to ANSI C63.10-2013

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- A. Modulate output capacity of EUT up to specification.



4.6 Conducted Power Line Emission Limits

FCC Part 15 Paragraph 15.207 (dBuV)	
Frequency Range (MHz)	QP/AV
0.15 – 0.5	66-56/56-46
0.5 – 5.0	56/46
5.0 - 30	60/50

Note: In the above table, the tighter limit applies at the band edges.

4.7 Conducted Power Line Test Result

The EUT is power by battery so there is no need to do this test.

5. Radiated Emission Test

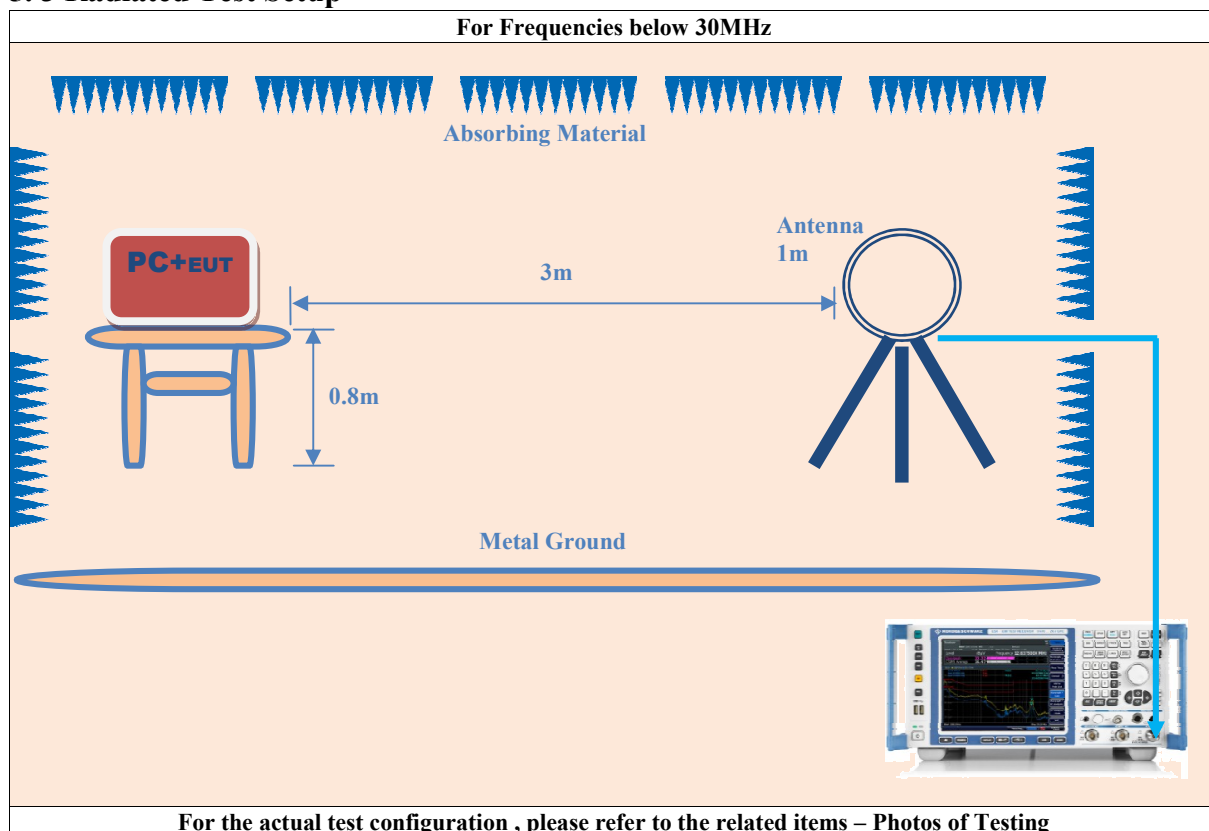
5.1 Test Equipment

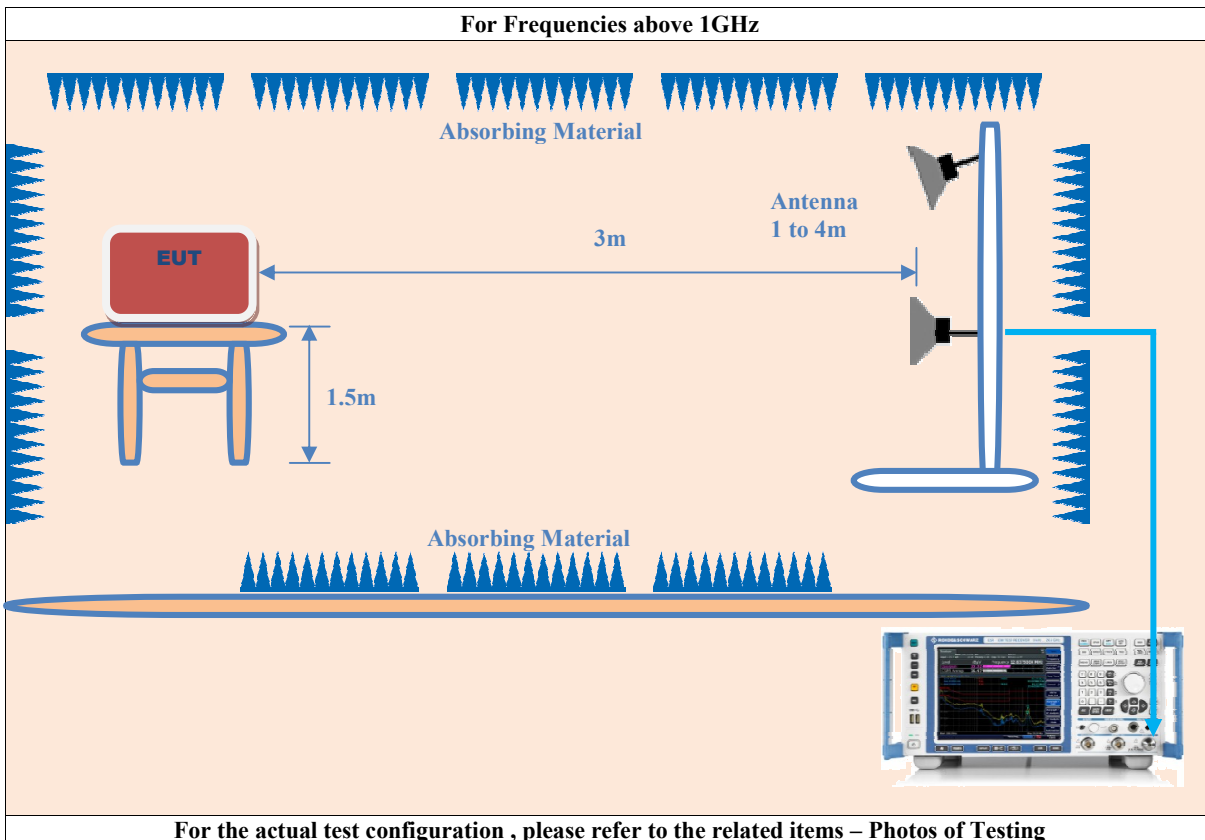
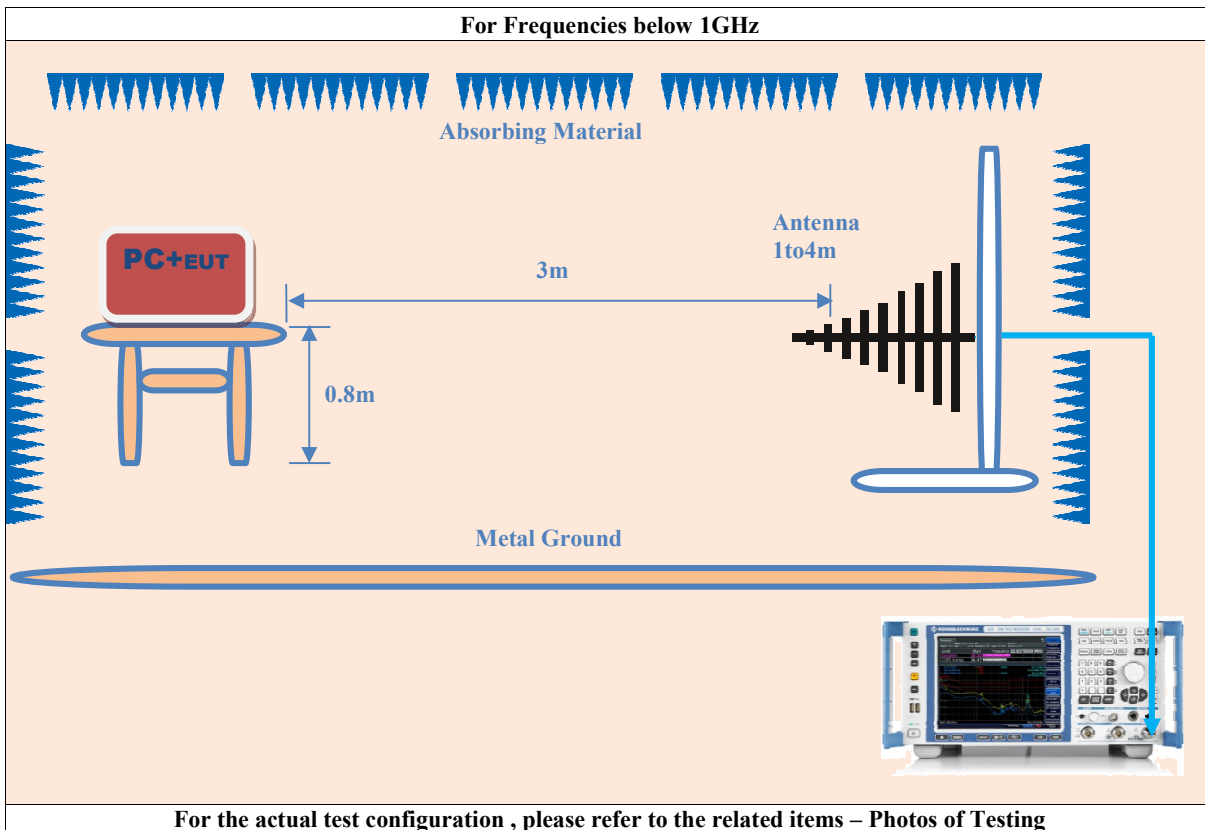
Please refer to Section 8 this report.

5.2 Test Procedure

1. The EUT was tested according to ANSI C63.10:2013.
2. The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8m. All set up is according to ANSI C63.10:2013.
3. The frequency spectrum from 9kHz to 25 GHz was investigated. All readings from 9kHz to 150kHz are quasi-peak values with a resolution bandwidth of 200 Hz. All readings from 150kHz to 30MHz are quasi-peak values with a resolution bandwidth of 9 KHz. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. Measurements were made at 3 meters. (Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz. The frequency bands 9-90 kHz, 110-490 kHz measurements employing an average detector and other below 30MHz measurements employing a CISPR quasi-peak detector. Test distance is 3m.)
4. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. The Receiving antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency. Emissions below 30MHz were measured with a loop antenna while emission above 30MHz were measured using a broadband E-field antenna.
5. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.10:2013.

5.3 Radiated Test Setup





5. 4 Configuration of the EUT

Same as section 4.4 of this report

5. 5 EUT Operating Condition

Same as section 4.5 of this report.

5. 6 Radiated Emission Limit

In any 100 KHz bandwidth outside the operating frequency band, the radio frequency power that is produced by modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 KHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in section 15.209(a), which lesser attenuation.

All other emissions inside restricted bands specified in section 15.205(a) shall not exceed the general radiated emission limits specified in section 15.209(a)

Note:

Applies to harmonics/spurious emissions that fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

47 CFR §15.237(c): The emission limits as specified above are based on measurement instrument employing an average detector. The provisions in section 15.35 for limiting peak emissions apply.

FCC CFR 47, Part 15, Subpart C, Para, 15.205(a) – Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090–0.110.....	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	(²)
13.36–13.41.....			

¹Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.
²Above 38.6

FCC 47 CFR, Part 15.209(a) – Field Strength Limits within Restricted Frequency Bands

Frequency(MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490.....	2400/F(kHz)	300
0.490–1.705.....	24000/F(kHz)	30
1.705–30.0.....	30	30
30–88.....	100**	3
88–216.....	150**	3
216–960.....	200**	3
Above 960.....	500	3

FCC Part 15 Subpart C Paragraph 15.239 Limit

(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.

Fundamental Frequency (MHz)	Field Strength of Fundamental (3m)	
	Peak (dBuV/m)	Average (dBuV/m)
88 to 108	67.96	47.96

5.7 Radiated Emission Test Result

Tx Radiated Emissions (Below 30MHz)						
Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Emission (dBuV/m)	Face/Side	Limit QP (dBuV/m)	Margin QP (dB)
-						
-						
-						
-						
-						
-						

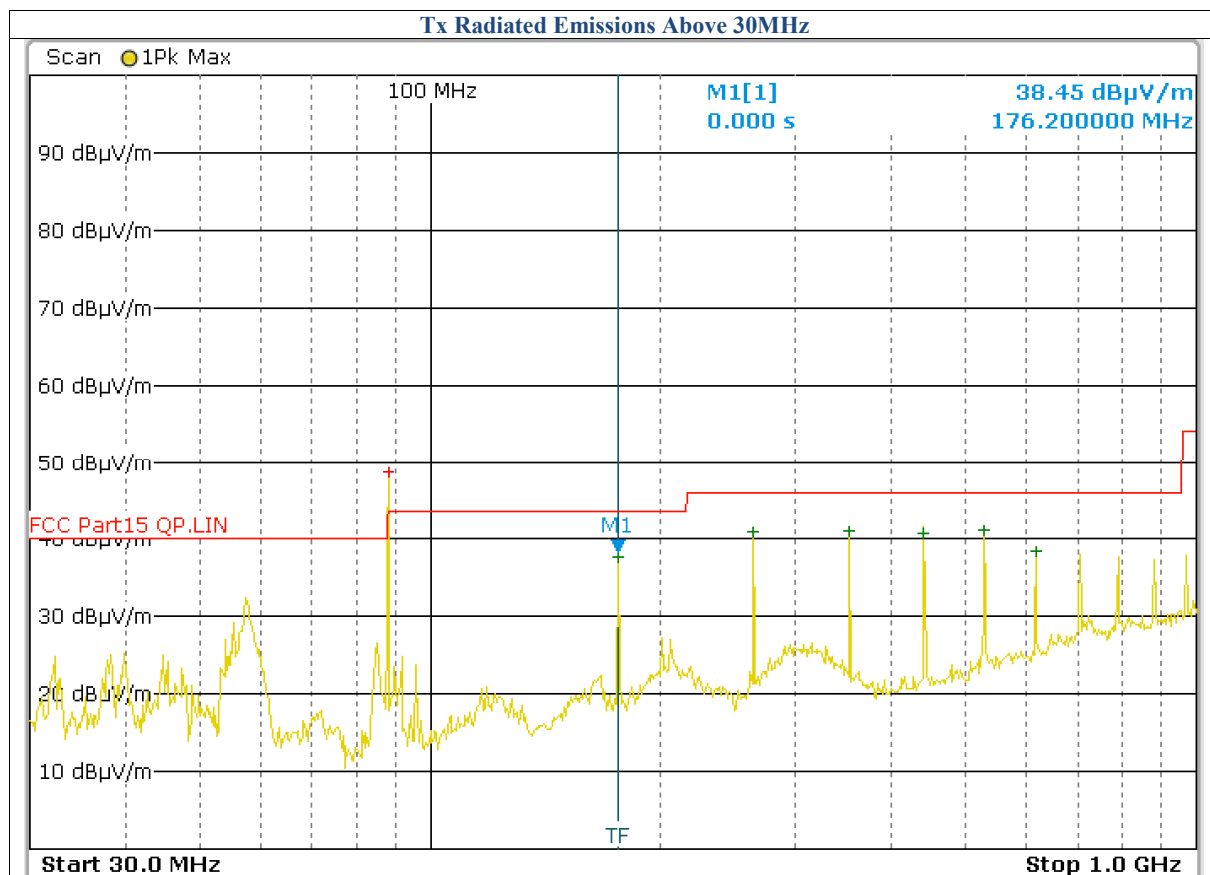
Note:
 (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
 (2) "-" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
 (3) Emission Level = Reading Level + Probe Factor + Cable Loss

Tx Fundamental Radiated Emissions <88.1~107.9MHz>										
Frequency (MHz)	Read Level (dBuV)		Factor (dB)	Emission (dBuV/m)		Hori./Vert.	Limit (dBuV/m)		Margin(dB)	
	PK	AV		PK	AV		PK	AV	PK	AV
88.100	39.73	33.11	7.43	47.16	40.54	Hori./	67.96	47.96	-20.80	-7.42
88.100	45.64	35.96	7.43	53.07	43.39	Vert.	67.96	47.96	-14.89	-4.57
98.100	41.75	33.71	7.93	49.68	41.64	Hori./	67.96	47.96	-18.28	-6.32
98.100	46.53	36.43	7.93	54.46	44.36	Vert.	67.96	47.96	-13.50	-3.60
107.900	41.62	35.00	8.67	50.29	43.67	Hori./	67.96	47.96	-17.67	-4.29
107.900	45.98	36.25	8.67	54.65	44.92	Vert.	67.96	47.96	-13.31	-3.04

Note:
 (1) All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
 (2) Emission Level = Reading Level + Probe Factor + Cable Loss.

Tx Radiated Emissions Above 30MHz						
☒88.1MHz						
Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Emission (dBuV/m)	Hori./Vert.	Limit (dBuV/m)	Margin (dB)
88.100	-	7.43	-	Hori./	-	-
176.200	22.48	15.18	37.66	Hori./	43.5	-5.84
264.320	25.32	14.94	40.26	Hori./	46.0	-5.74
352.420	19.42	20.91	40.33	Hori./	46.0	-5.67
440.520	24.49	15.59	40.08	Hori./	46.0	-5.92
528.560	22.98	17.29	40.27	Hori./	46.0	-5.73
616.720	18.98	18.87	37.85	Hori./	46.0	-8.15

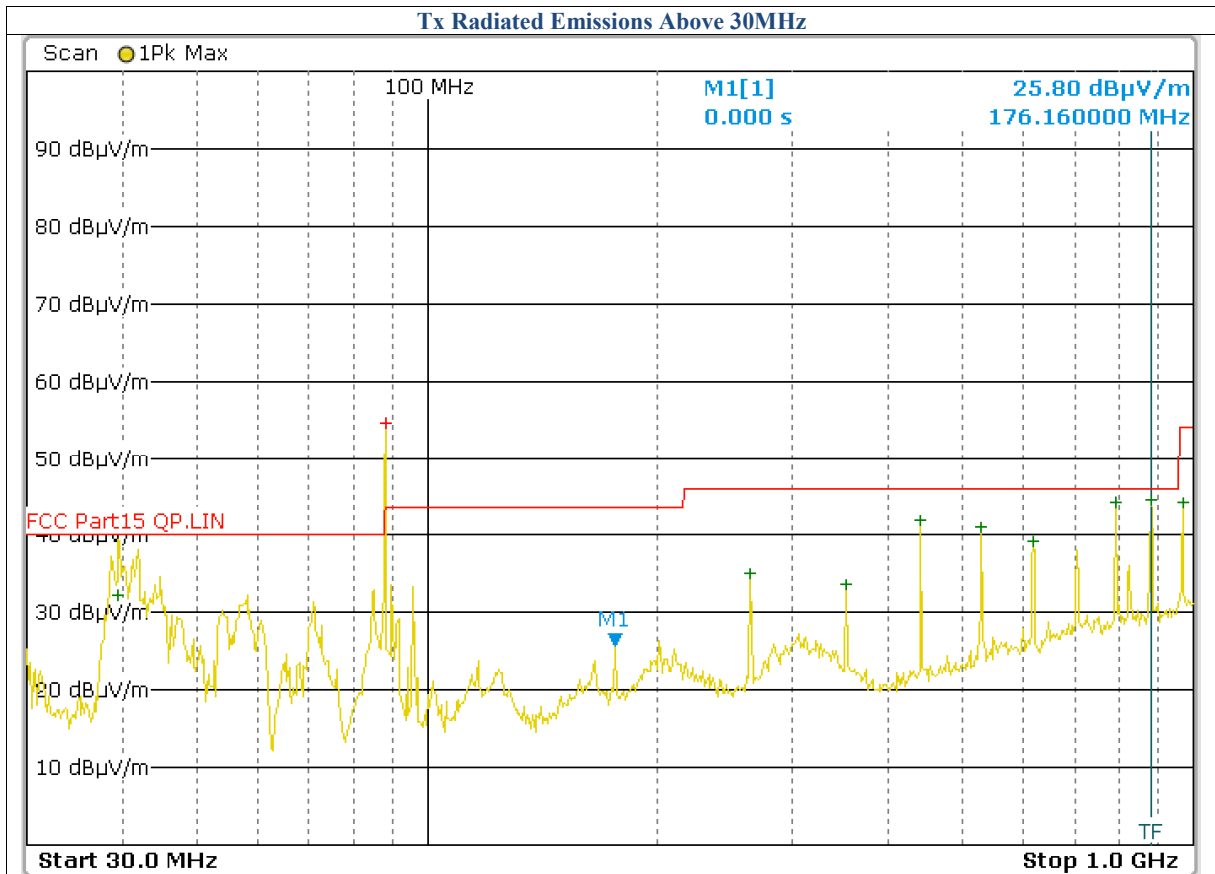
Note:
 a.All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
 b.“N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that’s already beyond the background noise floor.
 c.Emission Level = Reading Level + Probe Factor + Cable Loss.



Tx Radiated Emissions Above 30MHz						
☒88.1MHz						
Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Emission (dBuV/m)	Horiz./Vert.	Limit (dBuV/m)	Margin (dB)
88.100	-	7.43	-	Vert.	-	-
39.480	20.52	11.78	32.3	Vert.	40.0	-7.70
176.200	9.44	15.18	24.62	Vert.	43.5	-18.88
264.320	19.70	14.94	34.64	Vert.	46.0	-11.36
352.420	12.36	20.91	33.27	Vert.	46.0	-12.73
440.520	27.10	15.59	42.69	Vert.	46.0	-3.31
528.560	23.78	17.29	41.07	Vert.	46.0	-4.93
616.720	19.34	18.87	38.21	Vert.	46.0	-7.79
792.840	22.12	20.89	43.01	Vert.	46.0	-2.99
881.040	20.27	22.68	42.95	Vert.	46.0	-3.05
969.160	19.66	22.99	42.65	Vert.	54.0	-11.35

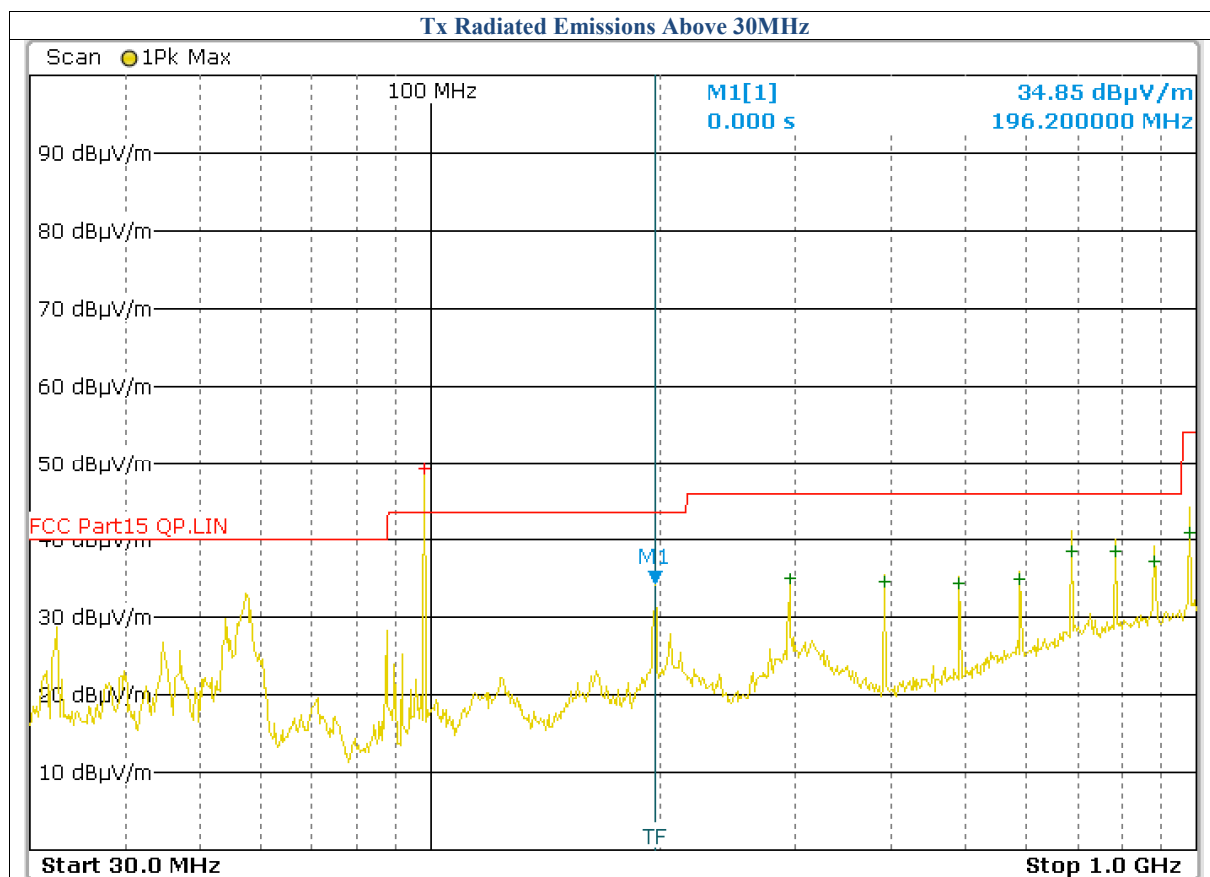
Note:

- a. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
- b. "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
- c. Emission Level = Reading Level + Probe Factor + Cable Loss.



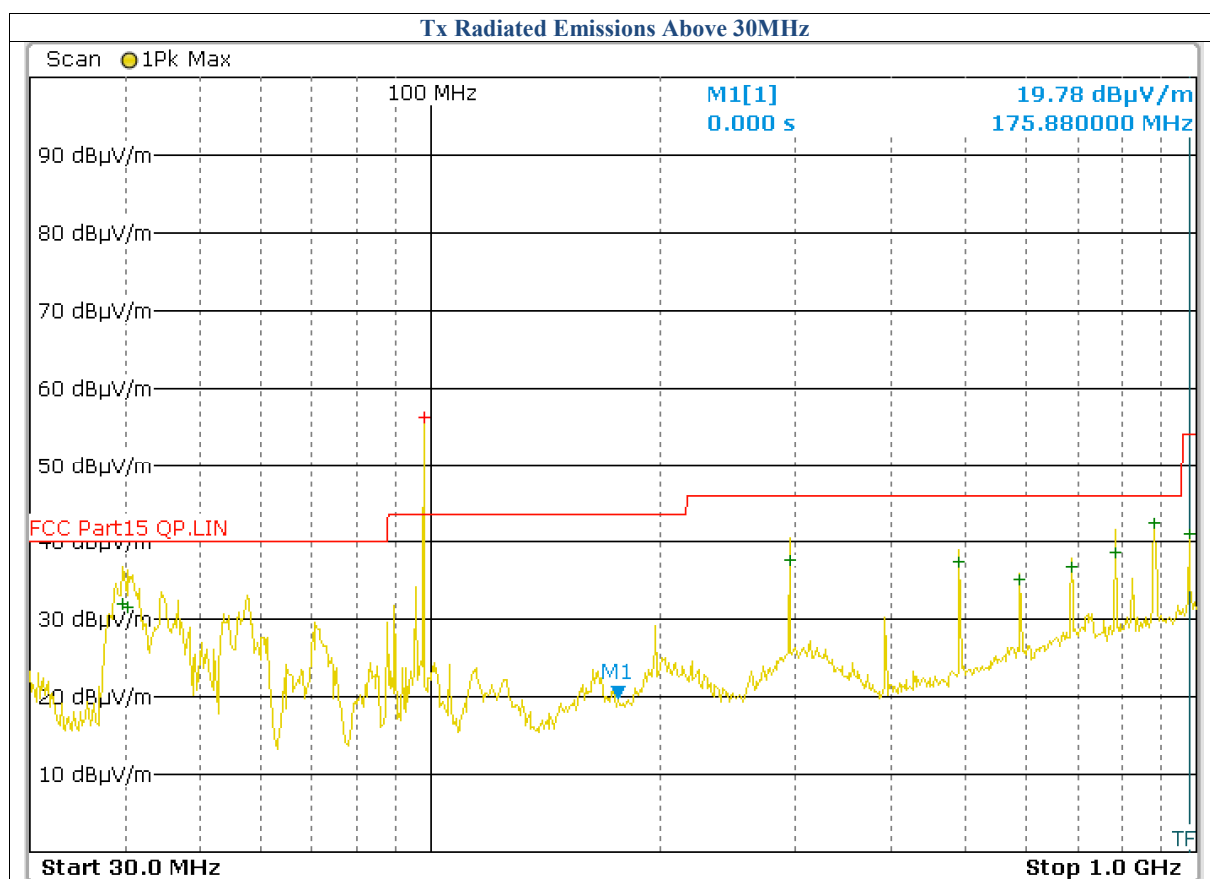
Tx Radiated Emissions Above 30MHz						
☒98.1MHz						
Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Emission (dBuV/m)	Hori./Vert.	Limit (dBuV/m)	Margin (dB)
98.100	-	7.93	-	Hori./	-	-
196.200	20.10	13.87	33.97	Hori./	43.5	-9.53
294.280	18.34	14.94	33.28	Hori./	46.0	-12.72
392.360	12.30	20.91	33.21	Hori./	46.0	-12.79
490.440	17.53	15.59	33.12	Hori./	46.0	-12.88
588.520	16.06	17.29	33.35	Hori./	46.0	-12.65
686.680	18.02	18.87	36.89	Hori./	46.0	-9.11
784.840	15.38	20.89	36.27	Hori./	46.0	-9.73
882.840	12.78	22.68	35.46	Hori./	46.0	-10.54
980.920	16.65	22.99	39.64	Hori./	54.0	-14.36

Note:
 a. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
 b. "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
 c. Emission Level = Reading Level + Probe Factor + Cable Loss.



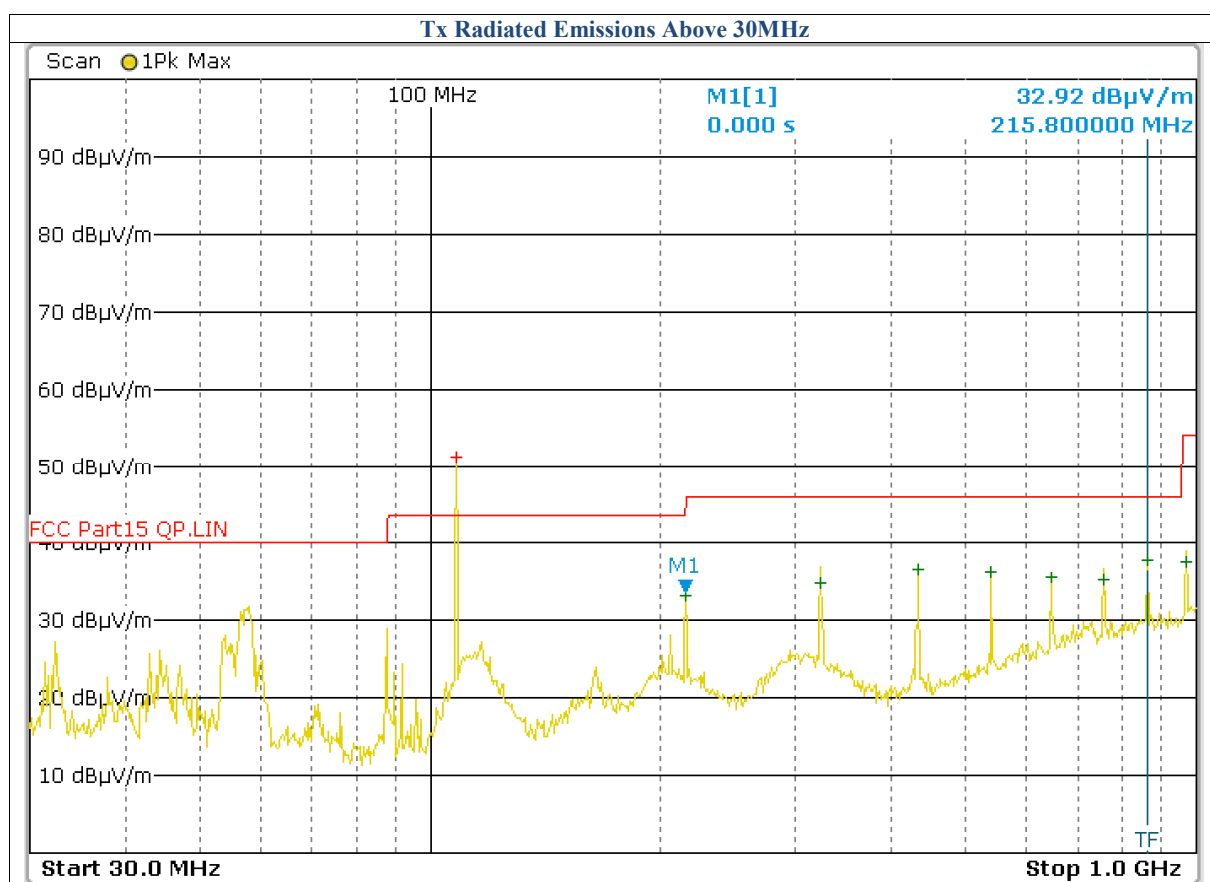
Tx Radiated Emissions Above 30MHz						
☒98.1MHz						
Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Emission (dBuV/m)	Hori./Vert.	Limit (dBuV/m)	Margin (dB)
98.100	-	7.93	-	Vert.	-	-
39.600	20.27	11.78	32.05	Vert.	40.0	-7.95
40.240	20.02	11.54	31.56	Vert.	40.0	-8.44
196.200	14.66	13.87	28.53	Vert.	43.5	-14.97
294.280	21.34	14.94	36.28	Vert.	46.0	-9.72
392.360	8.96	20.91	29.87	Vert.	46.0	-16.13
490.440	20.10	15.59	35.69	Vert.	46.0	-10.31
588.520	17.32	17.29	34.61	Vert.	46.0	-11.39
686.680	16.10	18.87	34.97	Vert.	46.0	-11.03
784.840	15.36	20.89	36.25	Vert.	46.0	-9.75
882.840	15.14	22.68	37.82	Vert.	46.0	-8.18
980.920	17.22	22.99	40.21	Vert.	54.0	-13.79

Note:
 a. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
 b. "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
 c. Emission Level = Reading Level + Probe Factor + Cable Loss.



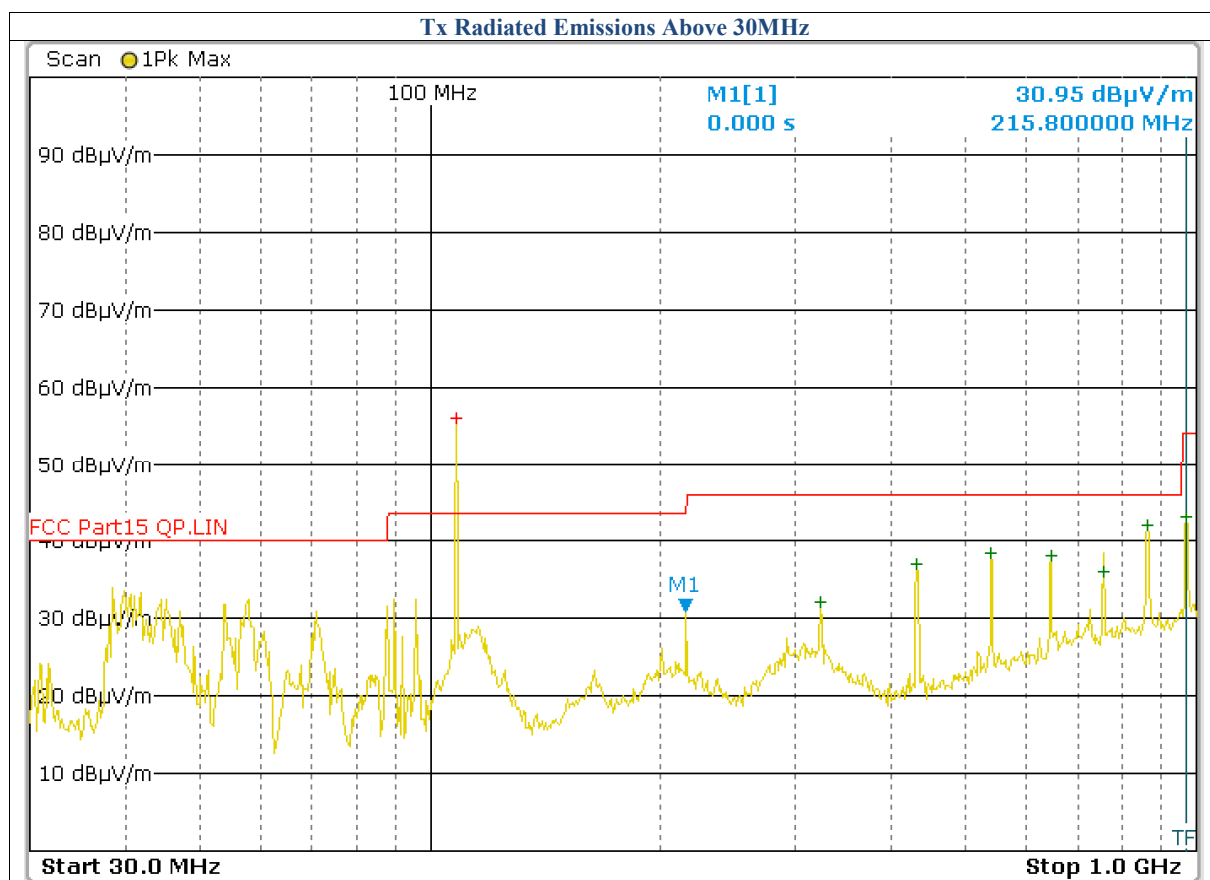
Tx Radiated Emissions Above 30MHz						
☒ 107.9MHz						
Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Emission (dBuV/m)	Hori./Vert.	Limit (dBuV/m)	Margin (dB)
107.900	-	8.67	-	Hori./	-	-
215.800	15.67	18.19	33.86	Hori./	43.5	-9.64
323.680	12.84	20.91	33.75	Hori./	46.0	-12.25
431.600	19.00	15.59	34.59	Hori./	46.0	-11.41
539.480	18.38	17.29	35.67	Hori./	46.0	-10.33
647.360	16.39	18.87	35.26	Hori./	46.0	-10.74
755.240	13.74	20.89	34.63	Hori./	46.0	-11.37
863.160	13.16	22.68	35.84	Hori./	46.0	-10.16
971.040	12.27	22.99	35.26	Hori./	54.0	-18.74

Note:
 a. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
 b. "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
 c. Emission Level = Reading Level + Probe Factor + Cable Loss.



Tx Radiated Emissions Above 30MHz						
☒ 107.9MHz						
Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Emission (dBuV/m)	Hori./Vert.	Limit (dBuV/m)	Margin (dB)
107.900	-	8.67	-	Vert.	-	-
215.800	12.14	18.19	30.33	Vert.	43.5	-13.17
323.680	9.24	20.91	30.15	Vert.	46.0	-15.85
431.600	18.67	15.59	34.26	Vert.	46.0	-11.74
539.480	17.60	17.29	34.89	Vert.	46.0	-11.11
647.360	15.85	18.87	34.72	Vert.	46.0	-11.28
755.240	13.14	20.89	34.03	Vert.	46.0	-11.97
863.160	18.57	22.68	41.25	Vert.	46.0	-4.75
971.040	19.38	22.99	42.37	Vert.	54.0	-11.63

Note:
 a. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
 b. "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
 c. Emission Level = Reading Level + Probe Factor + Cable Loss.



6. Emission Bandwidth

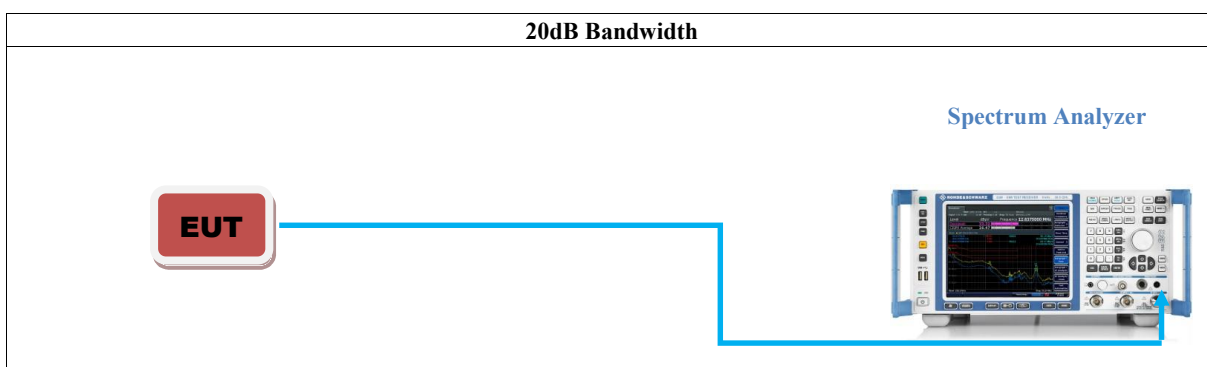
6.1 Test Equipment

Please refer to Section 9 this report.

6.2 Test Procedure

Test Method	
<input checked="" type="checkbox"/>	The EUT was tested according to ANSI C63.10, clause 6.9.2 for occupied bandwidth testing.
<input type="checkbox"/>	For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level

6.3 Radiated Test Setup



6.4 Configuration of the EUT

Same as section 4.4 of this report

6.5 EUT Operating Condition

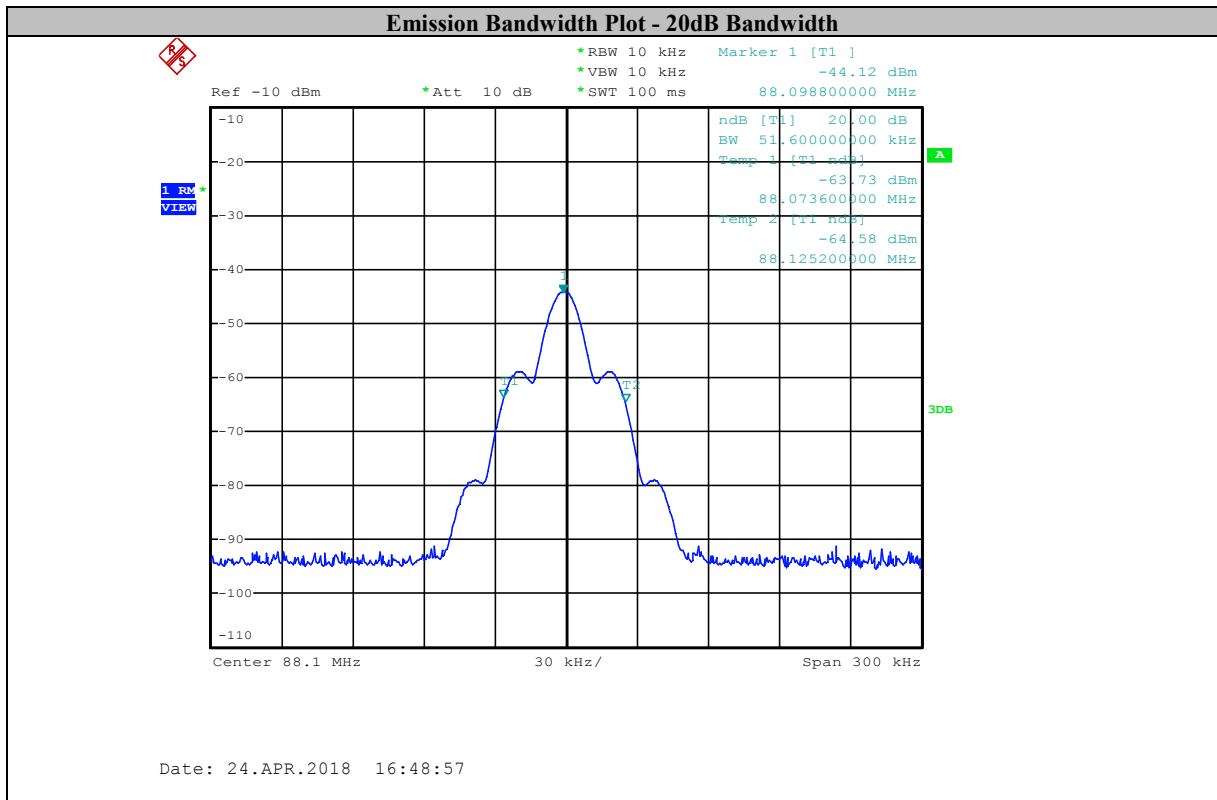
Same as section 4.5 of this report.

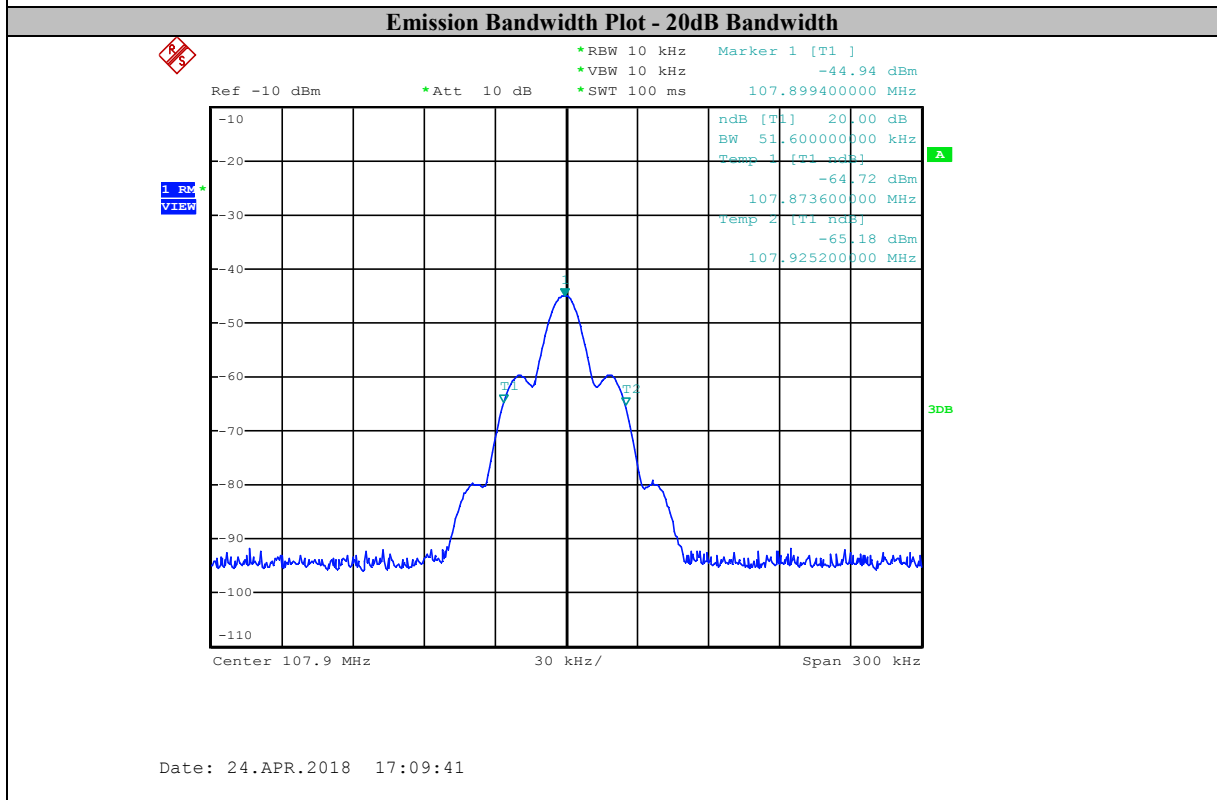
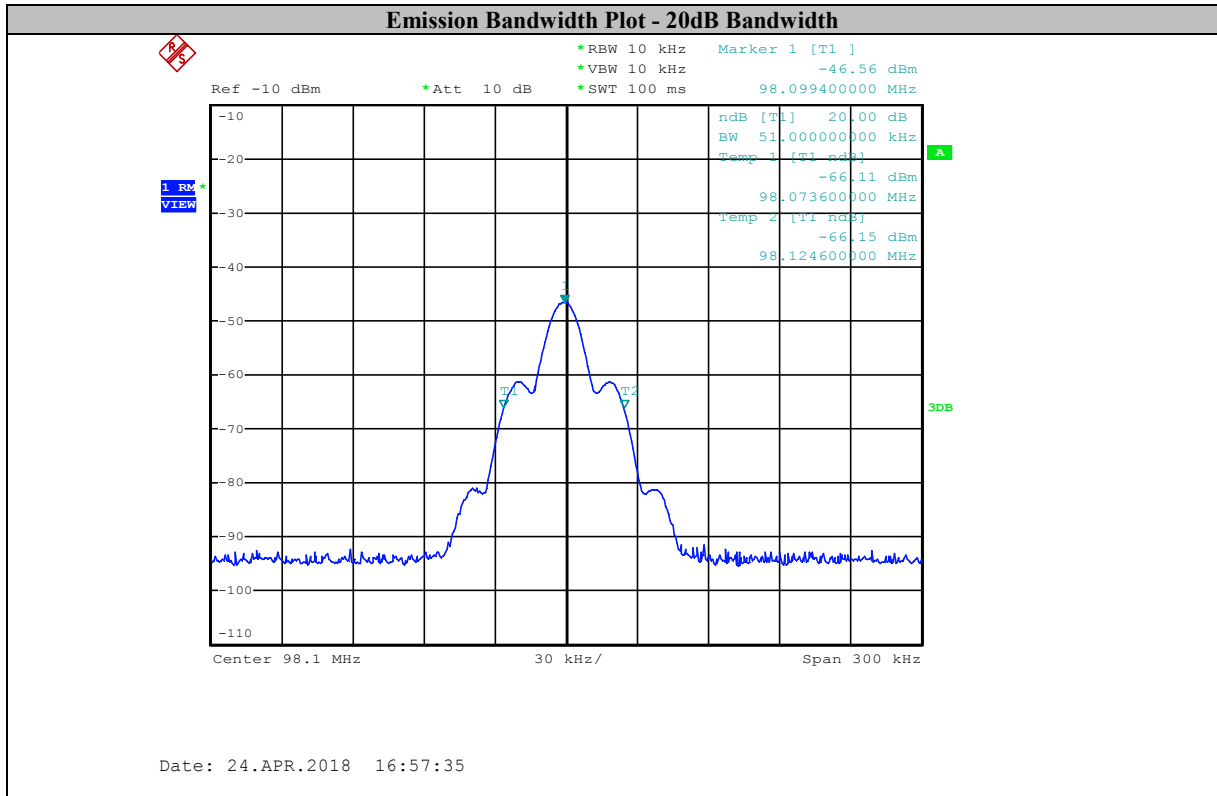
6.6 Emission Bandwidth FCC 15.239 Limit

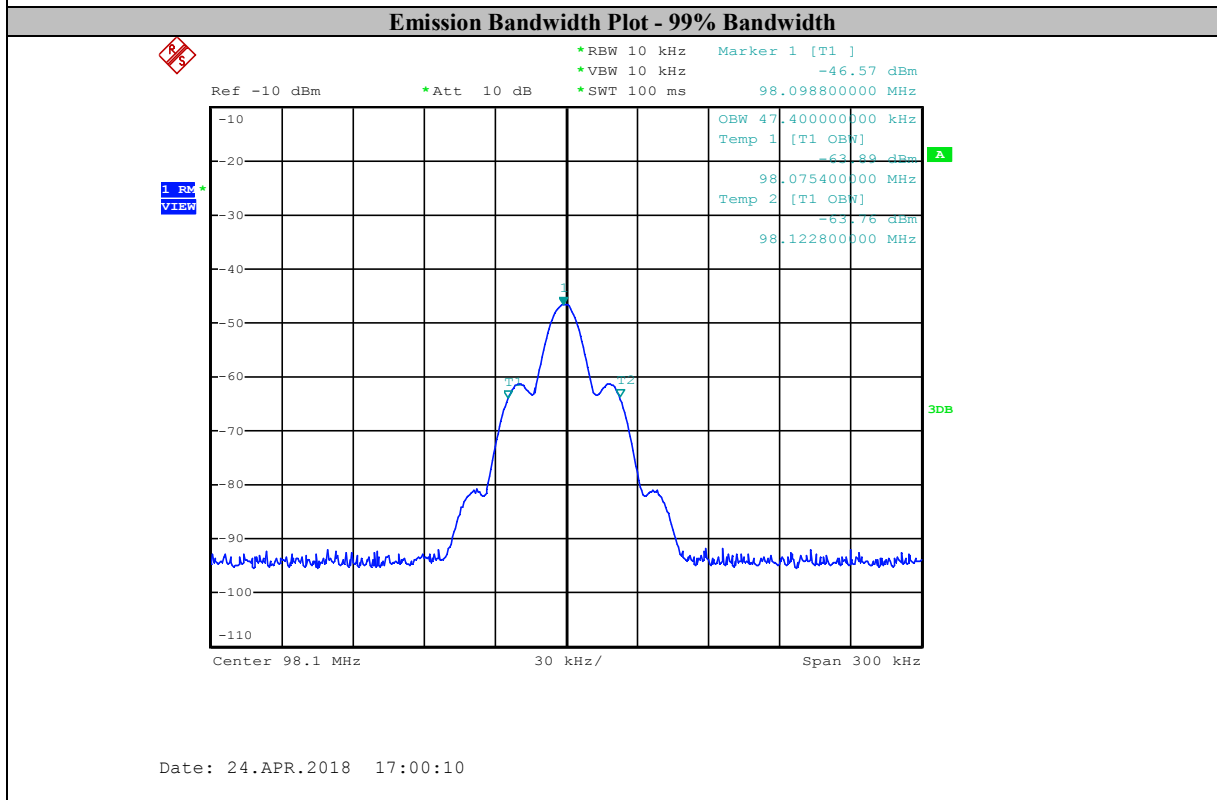
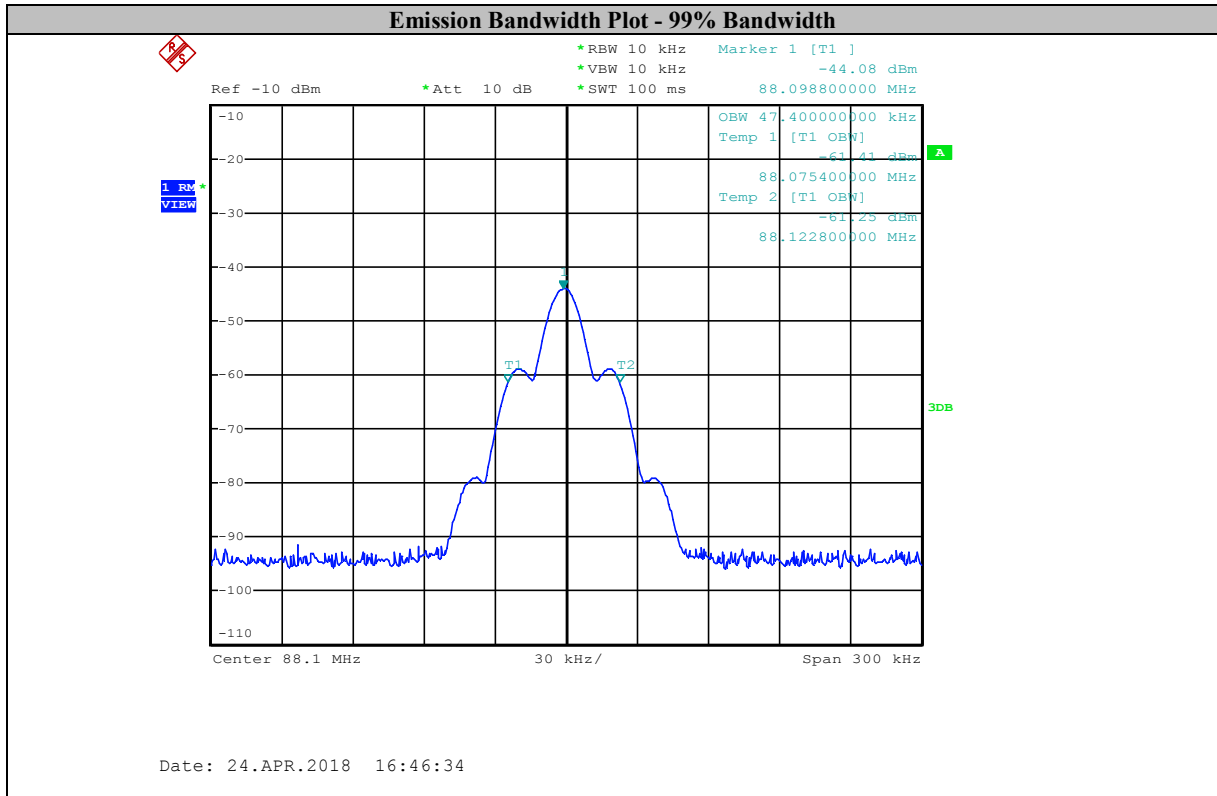
Emission from the intentional radiator shall be confined within a bands 200kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88 to 108 MHz.

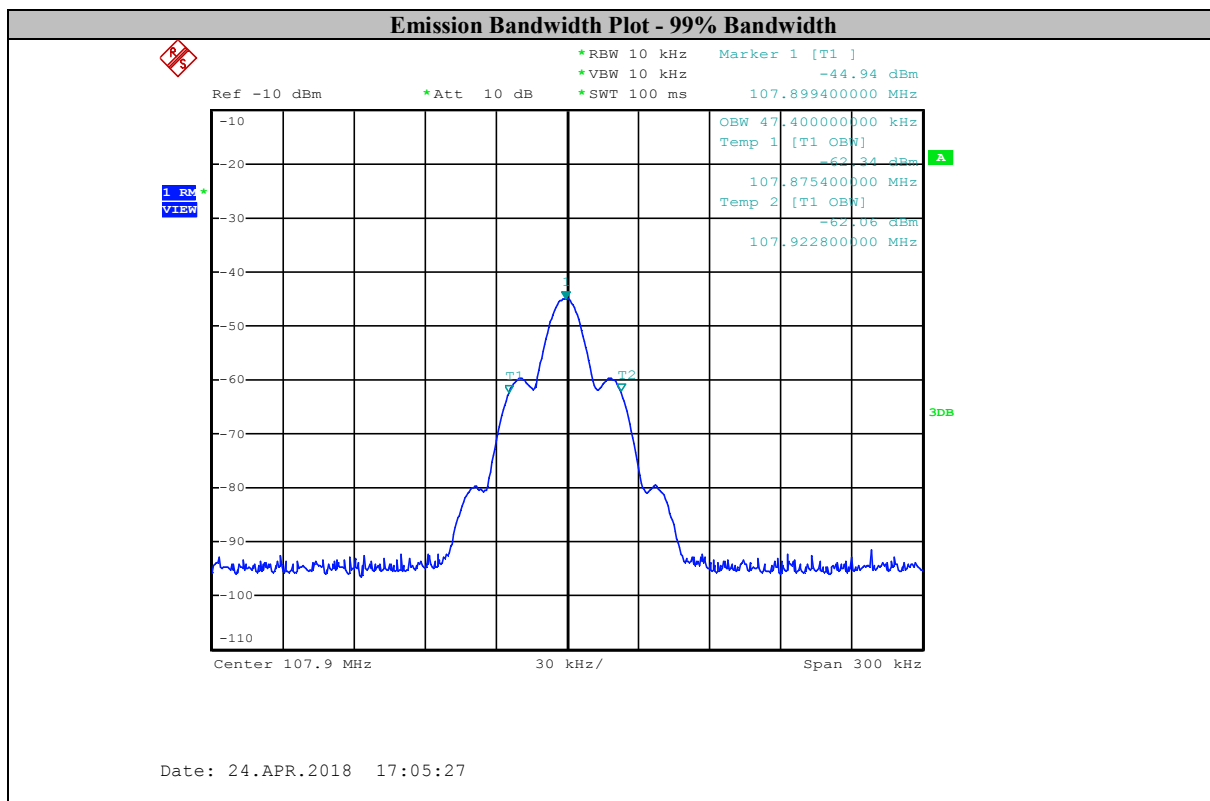
6.7 Emission Bandwidth Test Result

Occupied Channel Bandwidth			
Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)	Frequency Range Limit
88.1	51.6	47.4	f _L ≥ 88MHz and f _H ≤ 108MHz
98.1	51.0	47.4	
107.9	51.6	47.4	
Results:		PASS	









7. Photos of Testing

7.1 Emission test view

Radiated Emission test view (Above 30MHz)



7.2 Photograph - EUT



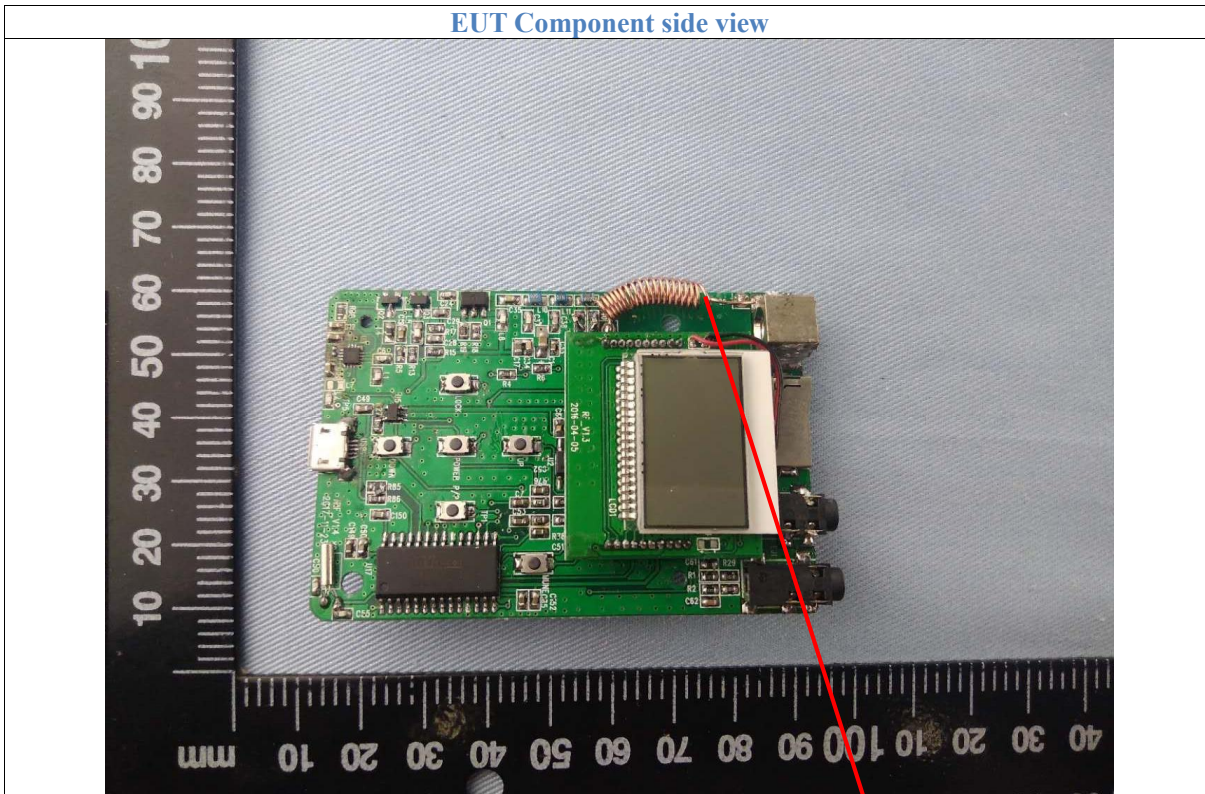
EUT Bottom view



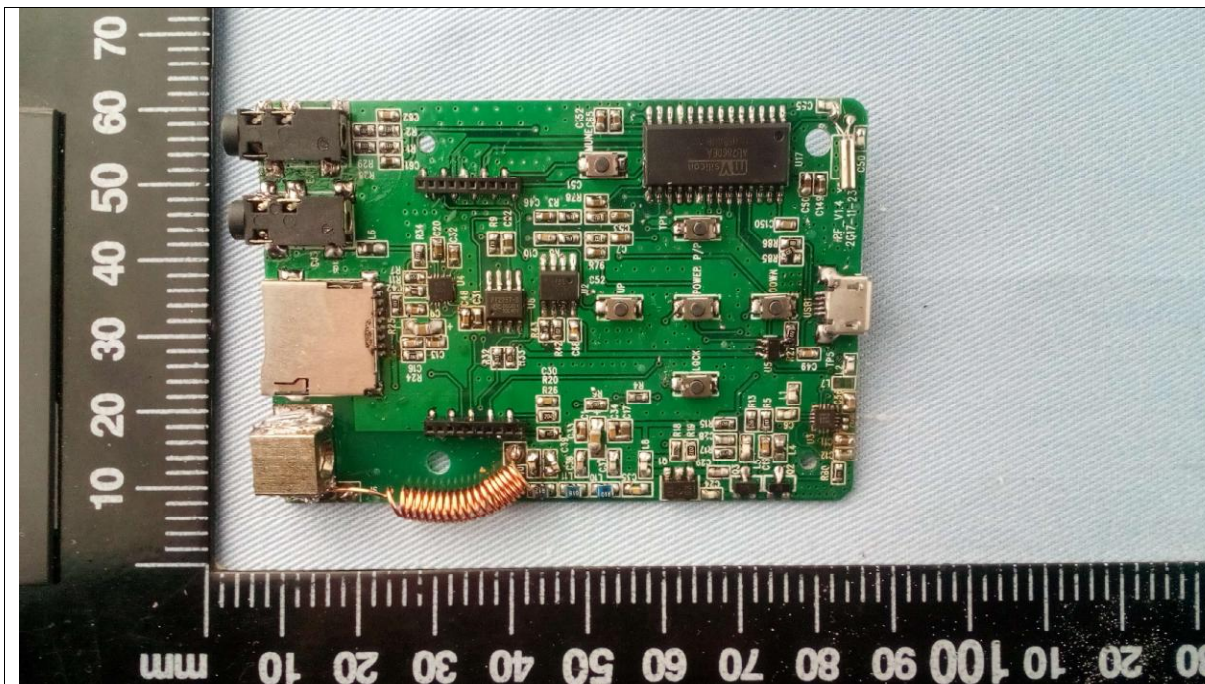
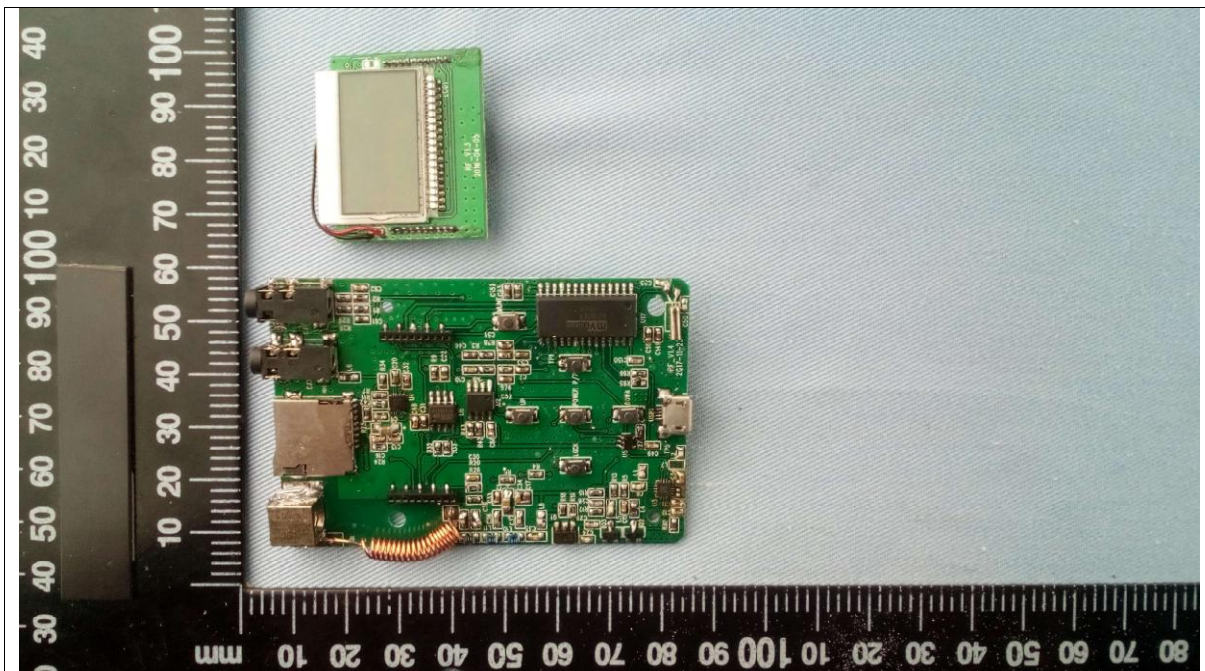
EUT inside whole view

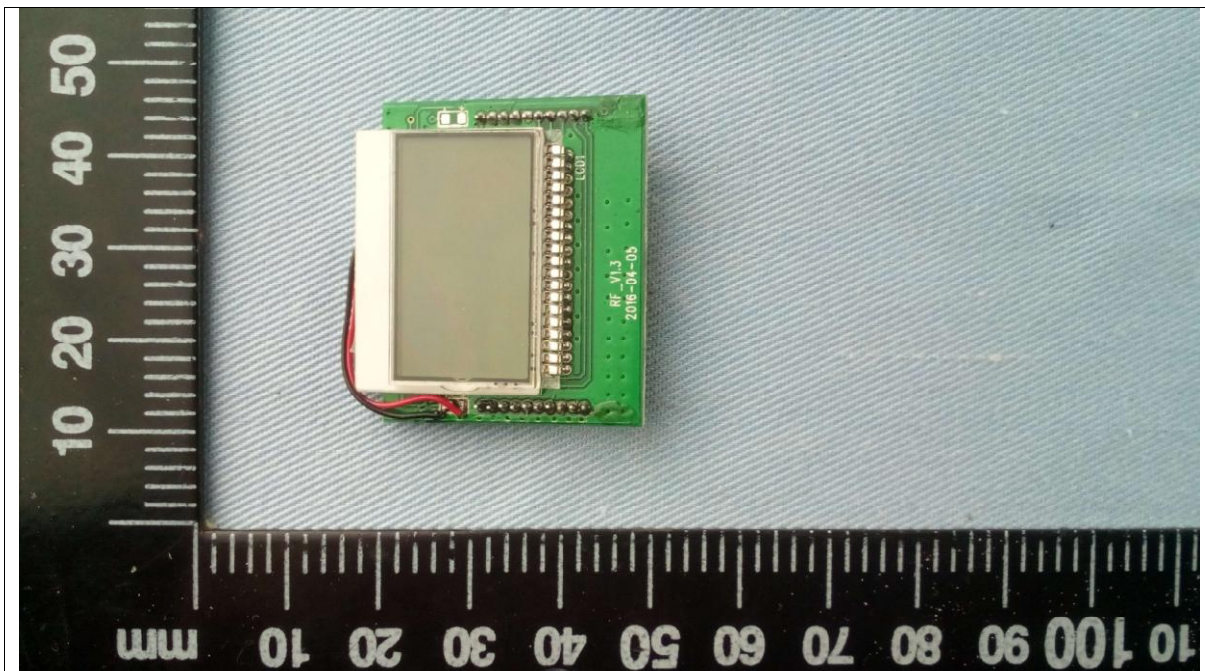


EUT Component side view

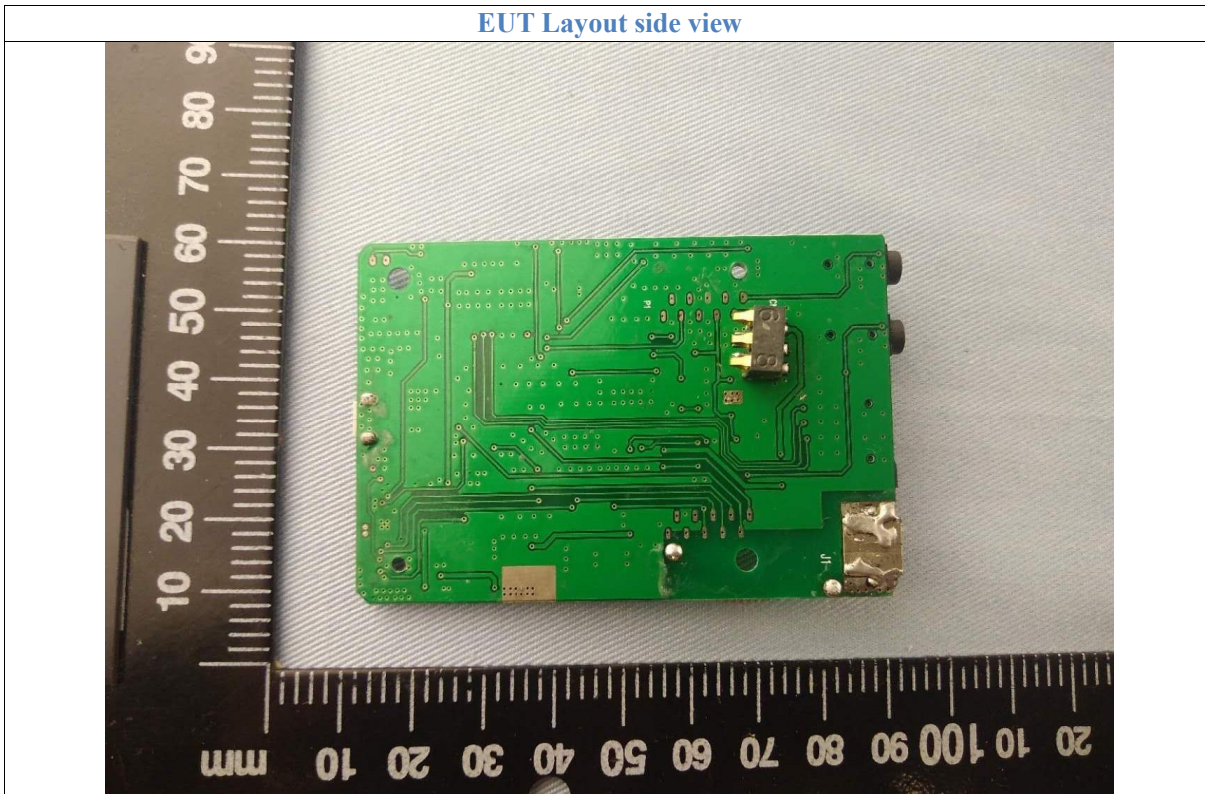


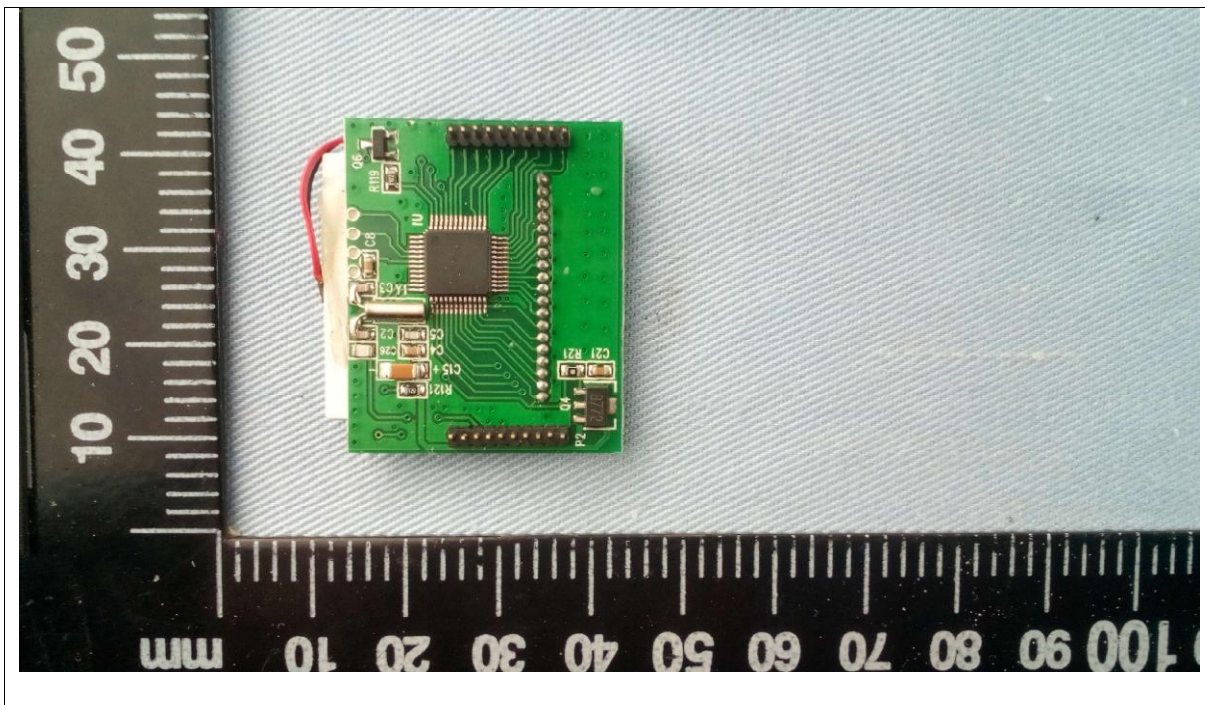
Antenna





EUT Layout side view





8. FCC ID Label

FCC ID: 2APU9HRD-831

The following note shall be conspicuously placed in the user manual: **“Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device.”**

The Label must not be a stick-on paper label. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.



9. Test Equipment

The following test equipments were used during the radiated & conducted emission test:

Equipment/ Facilities	Manufacturer	Model #	Serial No.	Cal/Char Date	Due Date
Turntable	Innco systems GmbH	CT-0801	N/A	NCR	NCR
Antenna Tower	Innco systems GmbH	MA-4640-XP-ET	N/A	NCR	NCR
Controller	Innco systems GmbH	CO3000	955/38850716L	NCR	NCR
EMI Test Receiver	Rohde & Schwarz	ESR7	101091	Dec.6, 2016	Dec.6, 2018
Spectrum Analyzer	Rohde & Schwarz	FSP40	100273	Dec.14, 2017	Dec.14, 2019
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100022	Feb.21, 2018	Feb.21, 2020
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	9161-4079	August 27, 2016	August 27, 2018
KMO Shielded Room	KMO	KMO-001	N/A	NCR	NCR
3m Anechoic Chamber	KMO	KMO-3AC	N/A	Dec.23, 2017	Dec.23, 2019