FCC TEST REPORT
FCC ID: 2AVQJ-RAP31001

Product	:	Anal Plug
Model Name	:	RAP31001, RAP31011, RAP31021, RAP31031, RAP31041
Brand	:	N/A
Report No.	:	PTC20010302003E-FC01

Prepared for

Dongguan Lexuan Silicone Co., Ltd.

Floor2, No.413, XiabianMainRoad, Xiabian Comuminty, Changan Town, Dongguan, Guangdong

Prepared by

DongGuan Precise Testing Service Co.,Ltd.

Building D, Baoding Technology Park, Guangming Road 2, Guangming Community

Dongcheng District, Dongguan, Guangdong, China

1 TEST RESULT CERTIFICATION

Applicant's name	:	Dongguan Lexuan Silicone Co., Ltd.
Address	:	Floor2, No.413, XiabianMainRoad, Xiabian Comuminty, Changan Town, Dongguan, Guangdong
Manufacture's name	:	Dongguan Lexuan Silicone Co., Ltd.
Address	:	Floor2, No.413, XiabianMainRoad, Xiabian Comuminty, Changan Town, Dongguan, Guangdong
Product	:	Anal Plug
Model	:	RAP31001, RAP31011, RAP31021, RAP31031,RAP31041
Standards	:	FCC CFR47 Part 15 Section 15.231
Test procedure	:	ANSI C63.10:2013
Test Date	:	January 03, 2020 to January 16, 2020
Date of Issue	:	February 13, 2020
Test Result	:	Pass

This device described above has been tested by PTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Testing Engineer:

Leo Yang

Leo Yang / Engineer

Technical Manager:

Chris Du / Manager

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2 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
Radiated Emission	15.231(b) 15.209 15.205(a)	PASS
Duty Cycle	15.35(c)	PASS
Release Time	15.231 (a)(1)	PASS
20dB Bandwidth	15:231(c)	PASS
Antenna Requirement	15.203	PASS
Remark: N/A: Not Applicable		

3 General Information

3.1 General Description of E.U.T.

Product Name	:	Anal Plug
Model Name	:	RAP31001
Additional model	:	RAP31011, RAP31021, RAP31031,RAP31041
Operation Frequency:	:	433.92MHz
Antenna installation:	:	Integrated Antenna
Antenna Gain:	:	4dBi
Type of Modulation	:	ASK
The lowest oscillator	:	433.92MHz
Power supply	:	DC 1.5V for TX

3.2 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Modulation	Test mode	Low channel	Middle channel	High channel
ASK	continuously Transmitting	433.92MHz	\	\

3.3 Test Site

Dongguan Precise Testing Service Co., Ltd.

Building D,Baoding Technology Park,Guangming Road2, Dongcheng District, Dongguan,

Guangdong, China, Dongguan, 523129

China

FCC Registration Number: 790290

4 Equipment During Test

4.1 Equipments List

RF Conducted Test

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
MXG Signal Analyzer	Agilent	N9020A	MY56070279	10Hz-30GHz	July 15, 2019
Coaxial Cable	CDS	79254	46107086	10Hz-30GHz	July 15, 2019
Power Meter	Anritsu	ML2495A	0949003	300MHz-40GHz	July 15, 2019
Power Sensor	Anritsu	MA2411B	0917017	300MHz-40GHz	July 15, 2019

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

Radiated Emissions

Radiated Emissions							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 15, 2019	July 14, 2020	1 year
2	EMC Analyzer (9k~26.5GHz)	Agilent	E4407B	MY45109572	Aug.04, 2019	Aug.03, 2020	1 year
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3355	July 15, 2019	July 14, 2020	1 year
4	Amplifier	EM	EM-30180	060538	July 15, 2019	July 14, 2020	1 year
5	Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1246	July 15, 2019	July 14, 2020	1 year
6	Coaxial Cable(below 1GHz)	LARGE	CALB1	-	July 15, 2019	July 14, 2020	1 year
7	Coaxial Cable(above 1GHz)	LARGE	CALB2	-	July 15, 2019	July 14, 2020	1 year

Conducted Emission

Name of Equipment	Manufacturer	Model	Serial No.	Characteristics	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI	101417	9KHz-3GHz	July 15, 2019
Artificial Mains Network	Rohde&Schwarz	ENV216	102453	9KHz-300MHz	July 15, 2019
Artificial Mains Network	Rohde&Schwarz	ENV216	101342	9KHz-300MHz	July 15, 2019

4.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

4.3 Description of Support Units

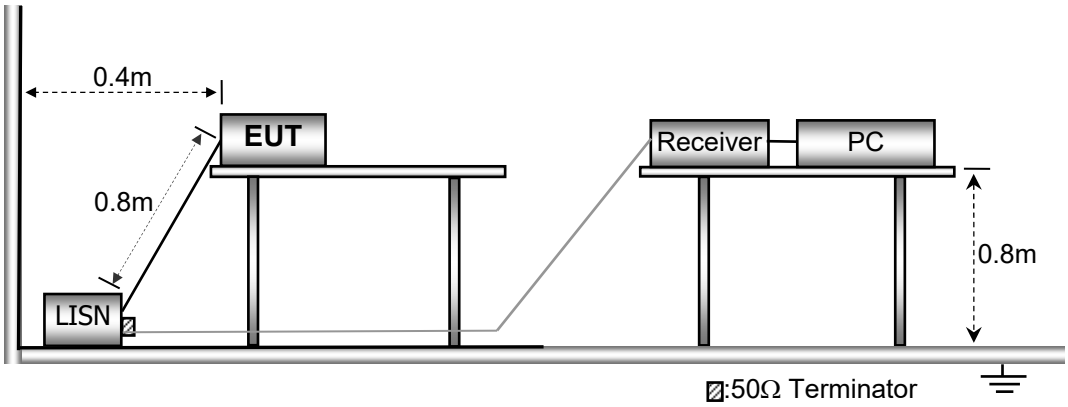
Equipment	Model No.	Series No.
Adapter	PS65B150Y3000S Input: AC 120V, 60Hz, 1.5A Output: DC 5V, 3000mA	N/A

5 Conducted Emission

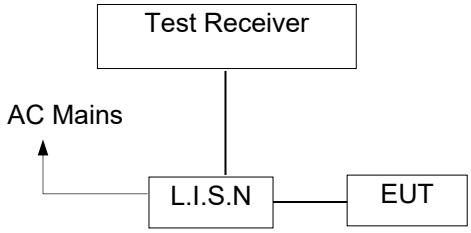
Test Requirement:	:	FCC CFR 47 Part 15 Section 15.207
Test Method:	:	ANSI C63.10:2013
Frequency Range:	:	150kHz to 30MHz
Detector:	:	Peak for pre-scan (9kHz Resolution Bandwidth)
Test Voltage	:	For RX: DC 5V come from adapter AC 120V/60Hz

5.1 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



5.2 Test SET-UP (Block Diagram of Configuration)



5.3 Measurement Procedure

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

5.4 Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

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

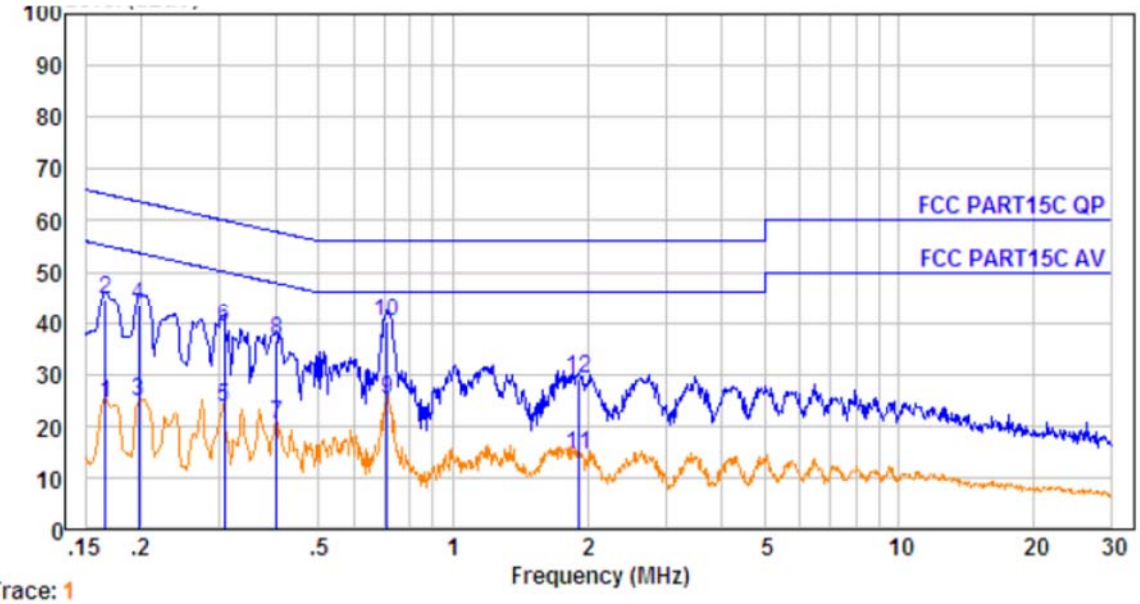
5.5 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

5.6 Conducted Emission Test Result

Pass.

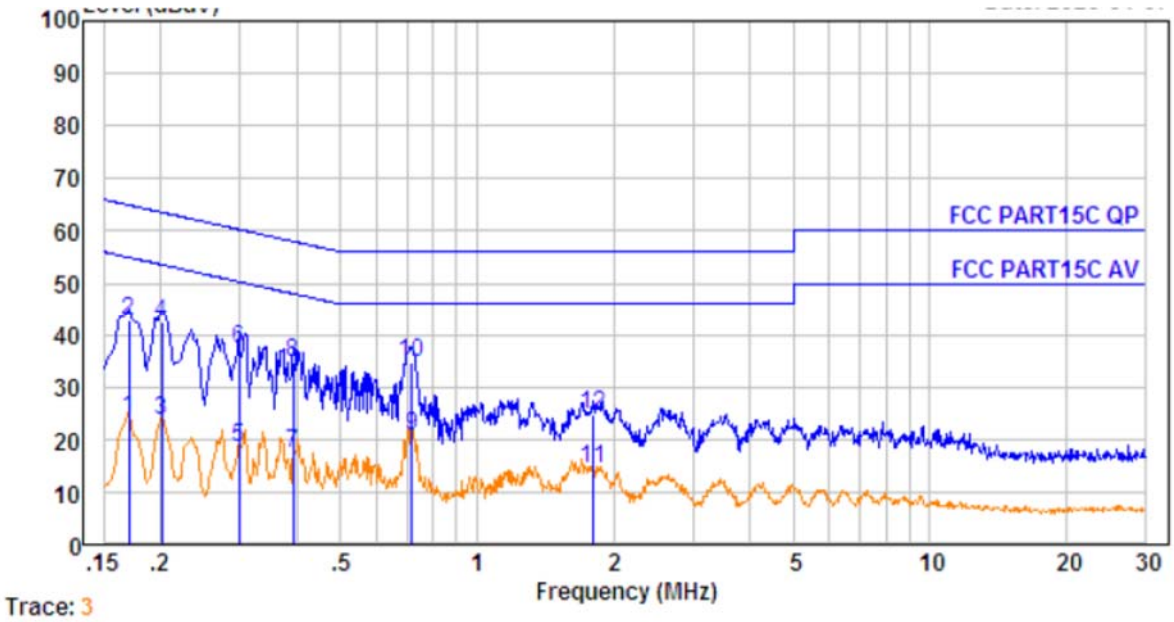
Line:



Trace: 1

No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBμV	Emission Level dBμV	Limit dBμV	Over Limit dB	Remark
1.	0.166	0.23	9.59	14.38	24.20	55.16	-30.96	Average
2.	0.166	0.23	9.59	34.76	44.58	65.16	-20.58	QP
3.	0.198	0.28	9.59	14.87	24.74	53.71	-28.97	Average
4.	0.198	0.28	9.59	33.69	43.56	63.71	-20.15	QP
5.	0.307	0.37	9.60	13.62	23.59	50.06	-26.47	Average
6.	0.307	0.37	9.60	29.14	39.11	60.06	-20.95	QP
7.	0.402	0.40	9.61	10.22	20.23	47.81	-27.58	Average
8.	0.402	0.40	9.61	26.41	36.42	57.81	-21.39	QP
9.	0.712	0.44	9.61	15.21	25.26	46.00	-20.74	Average
10.	0.712	0.44	9.61	30.09	40.14	56.00	-15.86	QP
11.	1.908	0.47	9.61	4.30	14.38	46.00	-31.62	Average
12.	1.908	0.47	9.61	18.98	29.06	56.00	-26.94	QP

Neutral



No.	Freq MHz	Cable Loss dB	AMN Factor dB	Receiver Reading dBμV	Emission Level dBμV	Limit dBμV	Over Limit dB	Remark
1.	0.170	0.24	9.60	14.17	24.01	54.94	-30.93	Average
2.	0.170	0.24	9.60	33.12	42.96	64.94	-21.98	QP
3.	0.202	0.28	9.61	13.71	23.60	53.54	-29.94	Average
4.	0.202	0.28	9.61	32.38	42.27	63.54	-21.27	QP
5.	0.299	0.37	9.62	8.39	18.38	50.28	-31.90	Average
6.	0.299	0.37	9.62	27.38	37.37	60.28	-22.91	QP
7.	0.393	0.40	9.62	7.49	17.51	47.99	-30.48	Average
8.	0.393	0.40	9.62	24.85	34.87	57.99	-23.12	QP
9.	0.720	0.44	9.64	10.56	20.64	46.00	-25.36	Average
10.	0.720	0.44	9.64	24.65	34.73	56.00	-21.27	QP
11.	1.800	0.47	9.64	4.24	14.35	46.00	-31.65	Average
12.	1.800	0.47	9.64	14.45	24.56	56.00	-31.44	QP

6 Duty Cycle

6.1 Test Procedure

6.1.1 The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (Highest percentage on) duty cycle is used for the calculation.

6.1.2 Set SPA Center Frequency = fundamental frequency. RBW =100KHz, VBW = 300KHz, Span= 0Hz

6.1.3 Set EUT as normal operation.

6.1.4 Set SPA view. Delta Mark Time.

6.2 Measurement Result

The duty cycle is simply the on time divided by the period:

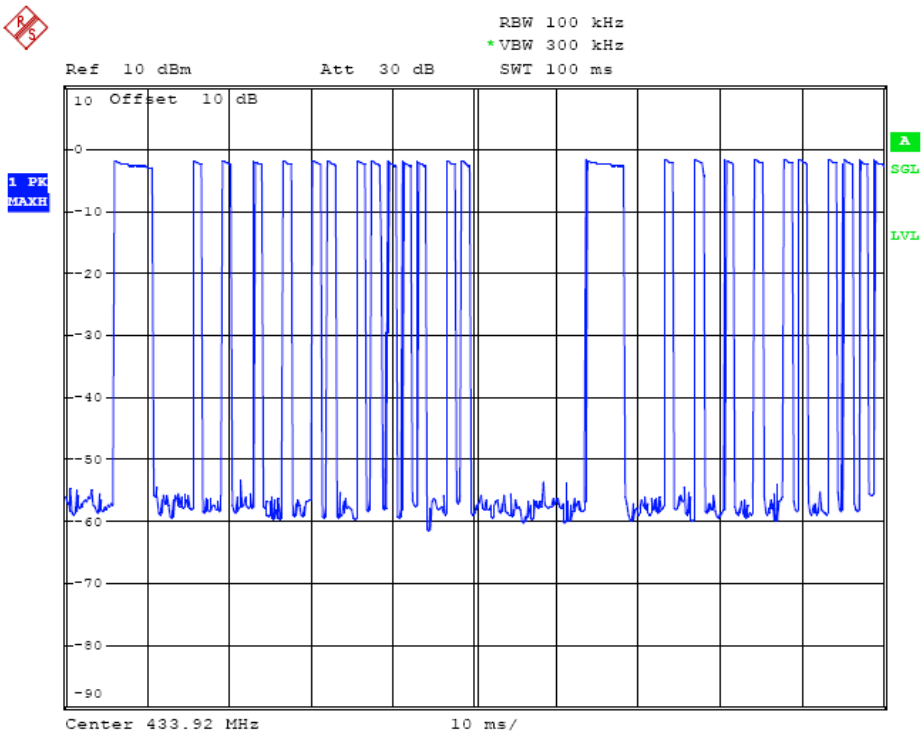
The duration of one cycle = 100.0ms

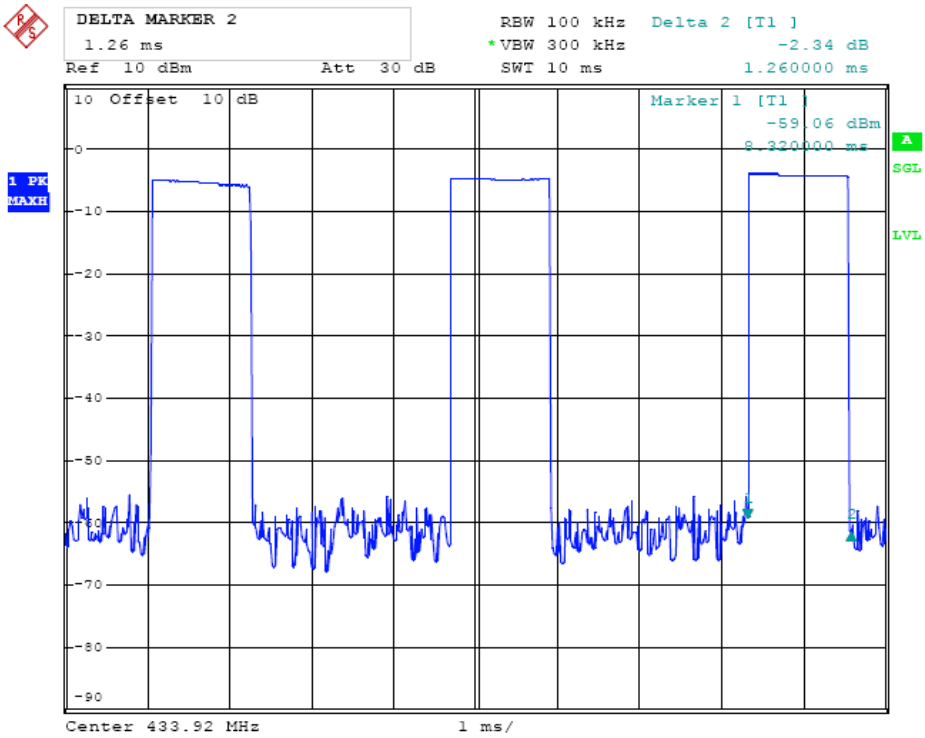
Effective period of the cycle= (1.26* 23)+(4.90*2)ms=38.78ms

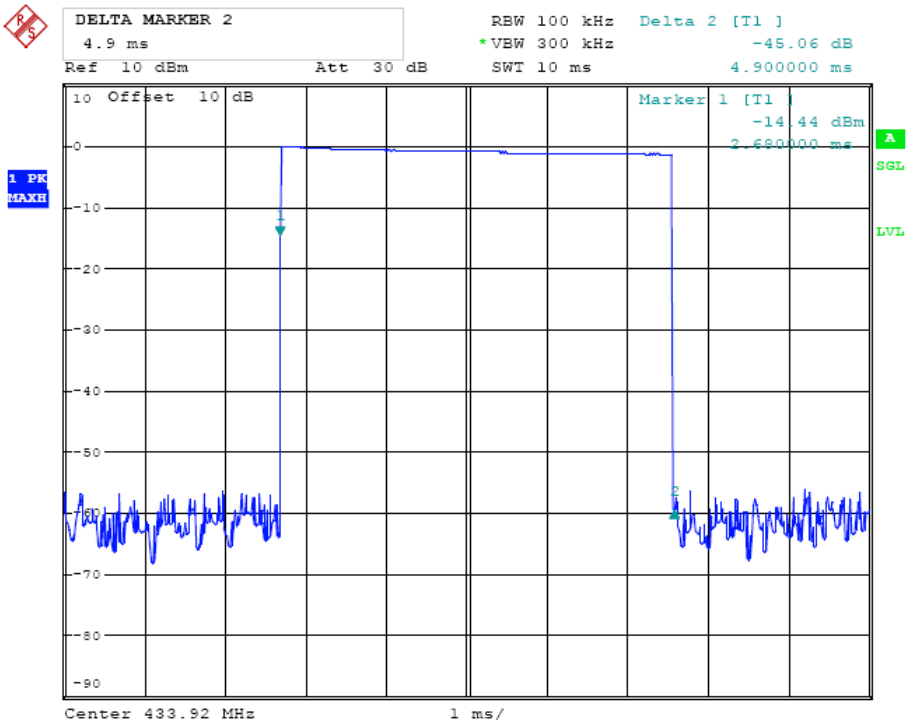
Duty Cycle=39.68ms/100.0ms=0.3878

Therefore, the average factor is found by 20log0.3878= -8.23dB

Note: A sample is RBW(100KHz) >2/PW, so PDCF is not required.




DELTA MARKER 2
1.26 ms
RBW 100 kHz
*VBW 300 kHz
SWT 10 ms
Delta 2 [T1]
-2.34 dB
1.260000 ms
Ref 10 dBm
Att 30 dB
10 Offset 10 dB
Marker 1 [T1]
-59.06 dBm
8.320000 ms
1 PK
MAXH
A
SGL
LVL
0
-10
-20
-30
-40
-50
-70
-80
-90
Center 433.92 MHz
1 ms/


DELTA MARKER 2
4.9 ms
RBW 100 kHz
*VBW 300 kHz
SWT 10 ms
Delta 2 [T1]
-45.06 dB
4.900000 ms
Ref 10 dBm
Att 30 dB
10 Offset 10 dB
Marker 1 [T1]
-14.44 dBm
2.680000 ms
1 PK
MAXH
A
SGL
LVL
0
-10
-20
-30
-40
-50
-70
-80
-90
Center 433.92 MHz
1 ms/

7 Release Time Measurement

7.1 Limit

According to FCC Part 15 Section 15.231(a)

Section 15.231(a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

7.2 Test Procedure

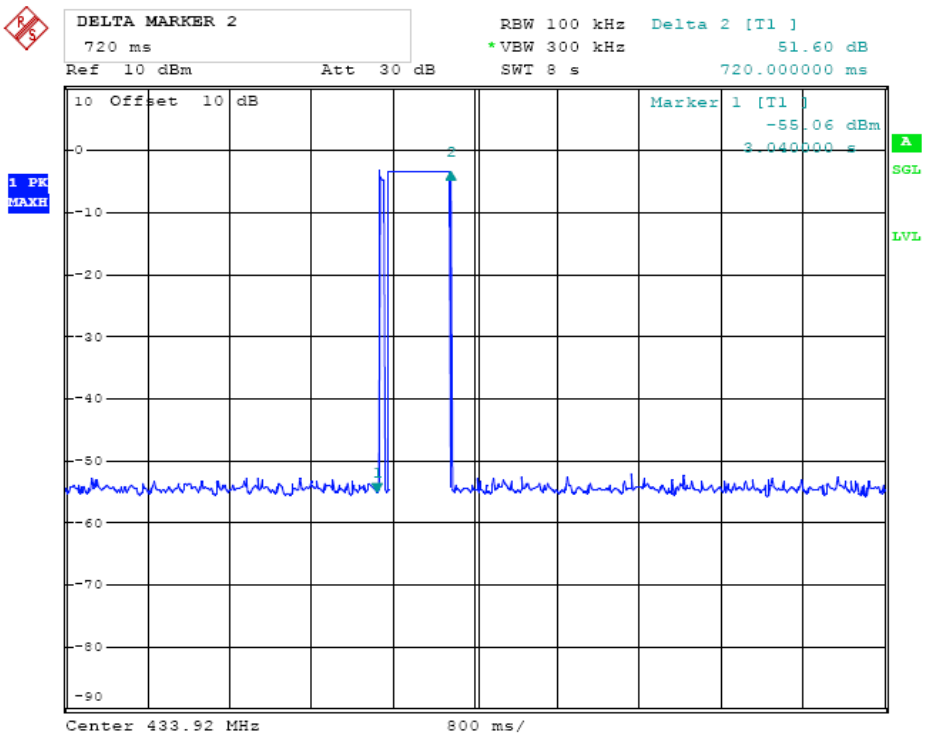
7.2.1 Set SPA Center Frequency = Fundamental frequency, RBW = 100KHz, VBW= 300KHz, Span=0Hz, Sweep time = 10s

7.2.2 Set EUT as normal operation and press Transmitter button

7.2.3 Set SPA View. Delta Mark time.

7.3 Measurement Result

Frequency(MHz)	Release Time(S)	Limit: Not more than 5 seconds of being released(s)	Conclusion
433.92	0.72	5	PASS



8 Radiated Spurious Emissions

Test Requirement: : FCC CFR47 Part 15 Section 15.231 & 15.207 &15.205

Test Method: : ANSI C63.10:2013

Test Result: : PASS

Measurement Distance: : 3m

Limit: : See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment :

Temperature: : 23.5 °C

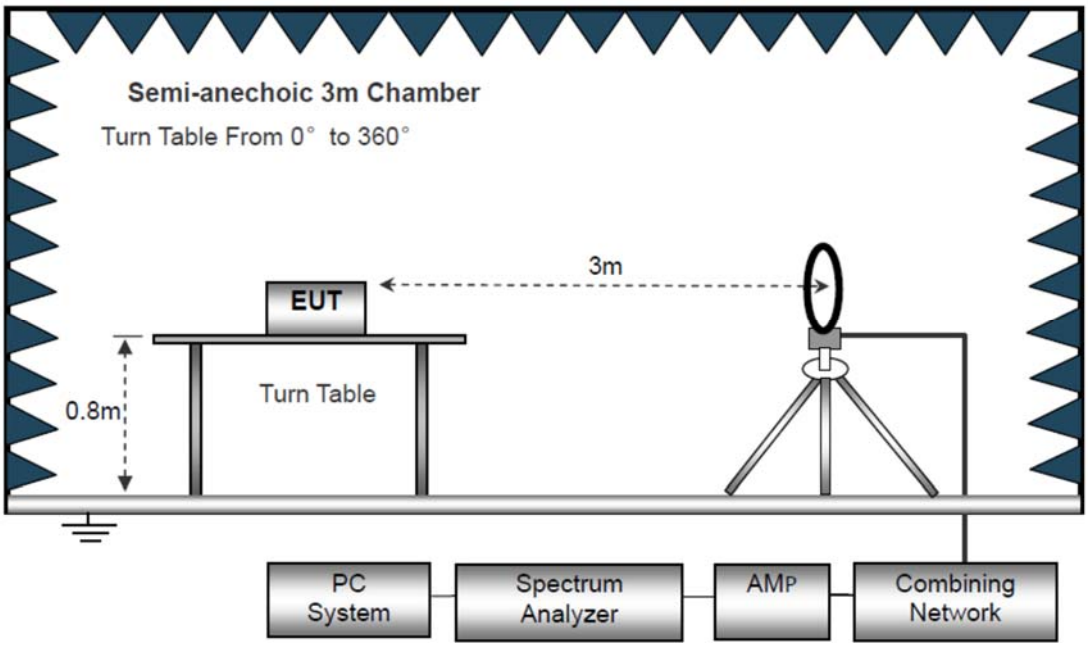
Humidity: : 51.1 % RH

Atmospheric Pressure: : 101.2kPa

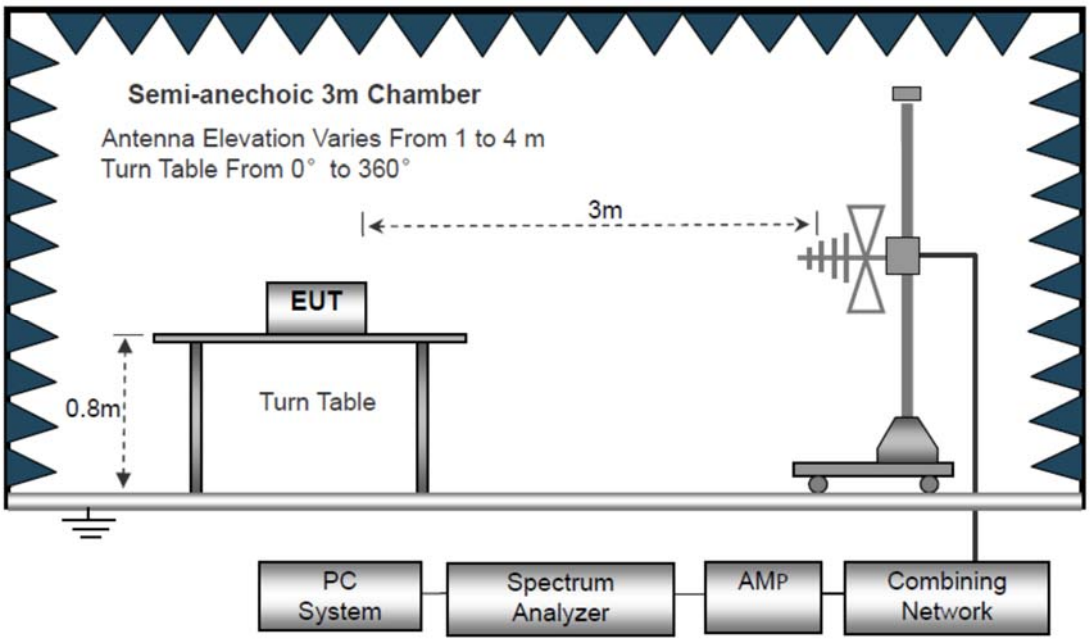
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

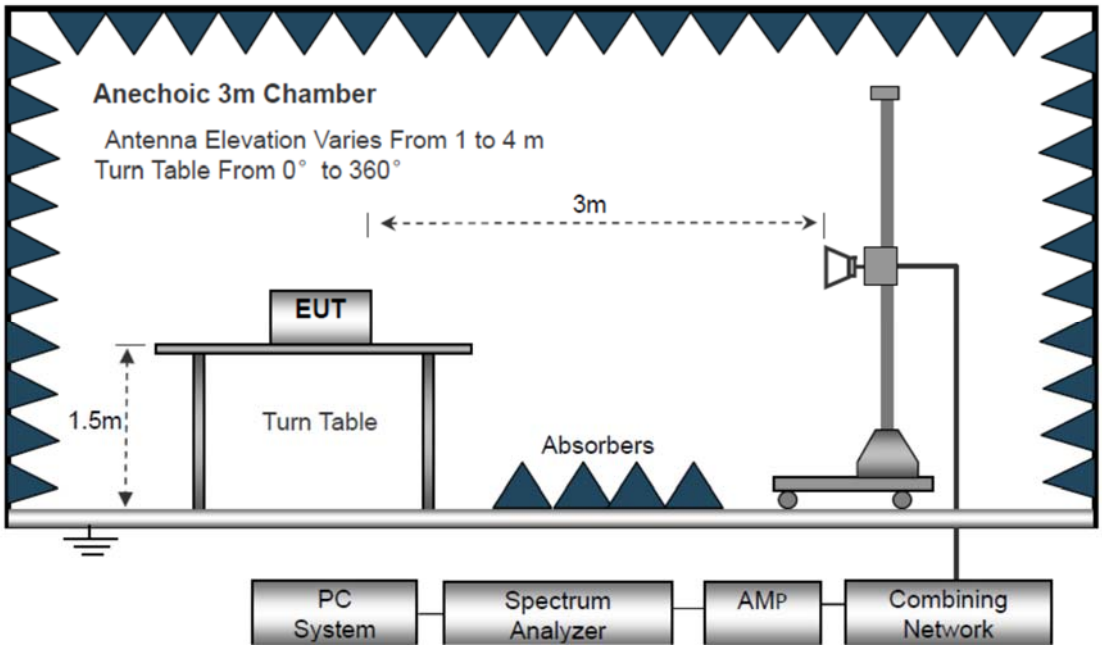
The test setup for emission measurement below 30MHz



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz



8.3 Spectrum Analyzer Setup

Below 30MHz

IF Bandwidth		10kHz
Resolution Bandwidth		10kHz
Video Bandwidth		10kHz

30MHz ~ 1GHz

Detector	:	PK
Resolution Bandwidth	:	100kHz
Video Bandwidth	:	300kHz
Detector	:	QP
Resolution Bandwidth	:	120kHz
Video Bandwidth	:	300kHz

Above 1GHz

Detector	:	PK
Resolution Bandwidth	:	1MHz
Video Bandwidth	:	3MHz
Detector	:	AV
Resolution Bandwidth	:	1MHz
Video Bandwidth	:	10Hz

8.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m or 1.5m above ground plane.

2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

6. Repeat above procedures until the measurements for all frequencies are complete.

7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

8. The test above 1GHz must be use the fully anechoic room, and the test below 1GHz use the half anechoic room

8.5 Summary of Test Results

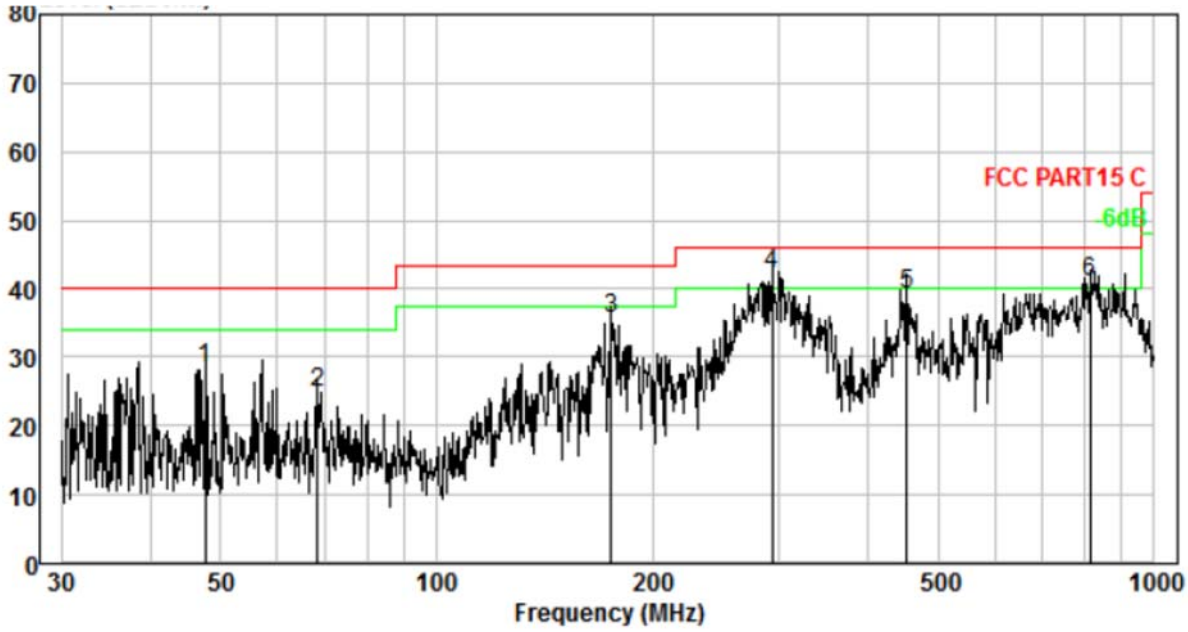
Test Frequency: Below 30MHz

The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

Test Frequency: 30MHz ~ 1GHz

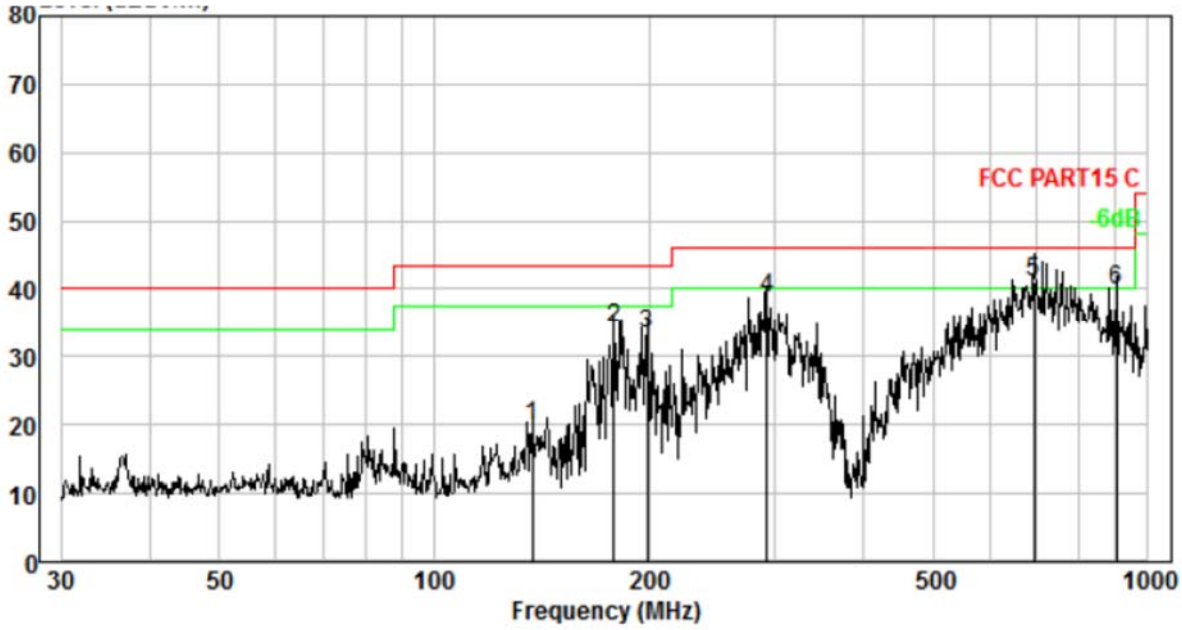
Horizontal



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	47.659	2.00	12.19	44.02	29.92	28.29	40.00	-11.71	QP
2.	68.151	2.61	10.43	41.71	29.95	24.80	40.00	-15.20	QP
3.	175.037	4.23	12.88	48.49	30.03	35.57	43.50	-7.93	QP
4.	294.114	5.13	13.12	54.32	30.31	42.26	46.00	-3.74	QP
5.	452.720	5.87	15.97	48.13	30.81	39.16	46.00	-6.84	QP
6.	815.968	6.88	21.47	43.71	31.15	40.91	46.00	-5.09	QP

Fundamental and Harmonics Result						
Freq.(MHz)	Peak Level (dBuV/m)	AV Factor (dBuV/m)	Average Level (dBuV/m)	Limit (average) (dBuV/m)	Limit (Peak) (dBuV/m)	Conclusion
433.92	39.24	-8.23	31.01	80.82	100.82	PASS
867.84	40.25	-8.23	32.02	60.82	80.82	PASS

Vertical



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	137.420	3.82	13.14	32.71	30.01	19.66	43.50	-23.84	QP
2.	178.758	4.27	12.59	47.27	30.03	34.10	43.50	-9.40	QP
3.	198.588	4.45	11.10	47.83	30.04	33.34	43.50	-10.16	QP
4.	293.084	5.12	13.11	50.63	30.30	38.56	46.00	-7.44	QP
5.	691.987	6.60	20.02	45.61	31.07	41.16	46.00	-4.84	QP
6.	903.309	7.06	22.11	41.85	31.04	39.98	46.00	-6.02	QP

Fundamental and Harmonics Result						
Freq.(MHz)	Peak Level (dBuV/m)	AV Factor (dBuV/m)	Average Level (dBuV/m)	Limit (average) (dBuV/m)	Limit (Peak) (dBuV/m)	Conclusion
433.92	36.10	-8.23	27.87	80.82	100.82	PASS
867.84	38.35	-8.23	30.12	60.82	80.82	PASS

Test Frequency: Above 1GHz

Peak Value				
Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization
1301.76	48.13	74	-25.87	Horizontal
1735.68	48.25	74	-25.75	Horizontal
1301.76	47.48	74	-26.52	Vertical
1735.68	46.82	74	-27.18	Vertical

Average Value						
Frequency (MHz)	Peak Level (dBuV/m)	Duty Cycle Factor	Average Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization
1301.76	48.13	-8.23	39.9	54	-14.1	Horizontal
1735.68	48.25	-8.23	40.02	54	-13.98	Horizontal
1301.76	47.48	-8.23	39.25	54	-14.75	Vertical
1735.68	46.82	-8.23	38.59	54	-15.41	Vertical

Remark:

1. Measuring Frequencies from 9KHz-10th harmonic (ex. 5GHz), no emission found between lowest internal used/generated frequency to 30MHz

2. Data of measurement within the frequency range shown – in the table above means the reading of emissions are attenuated morn than 20dB below the permissible limits or the field strength is too small to be measured.

3. Average value = peak reading level - Duty Cycle Factor.

9 20dB Bandwidth Measurement

Test Requirement	:	FCC Part15.231(c)
Test Method	:	FCC Part15.231(c)
Test Mode	:	Refer to section 3.3
Limit	:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

9.1 Test Procedure

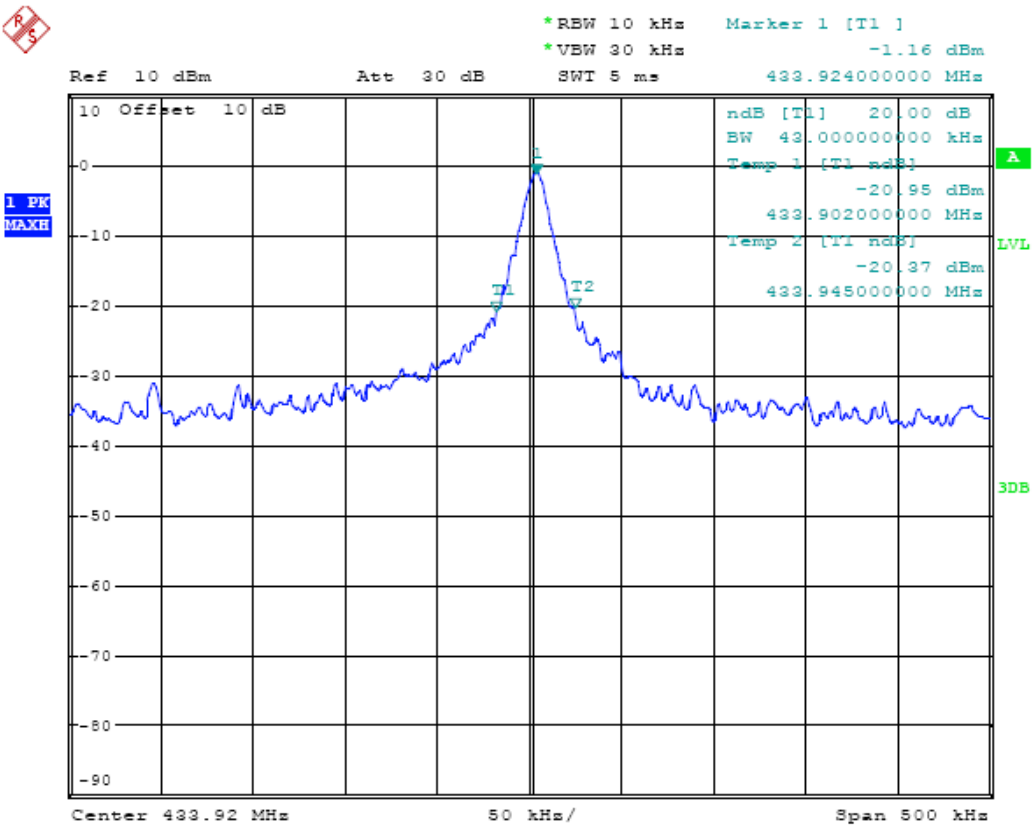
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: RBW = 10 kHz, VBW = 30kHz.

9.2 Test Result

Test Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
433.92	43	1084.80	pass

Test plots



10 Antenna Requirement

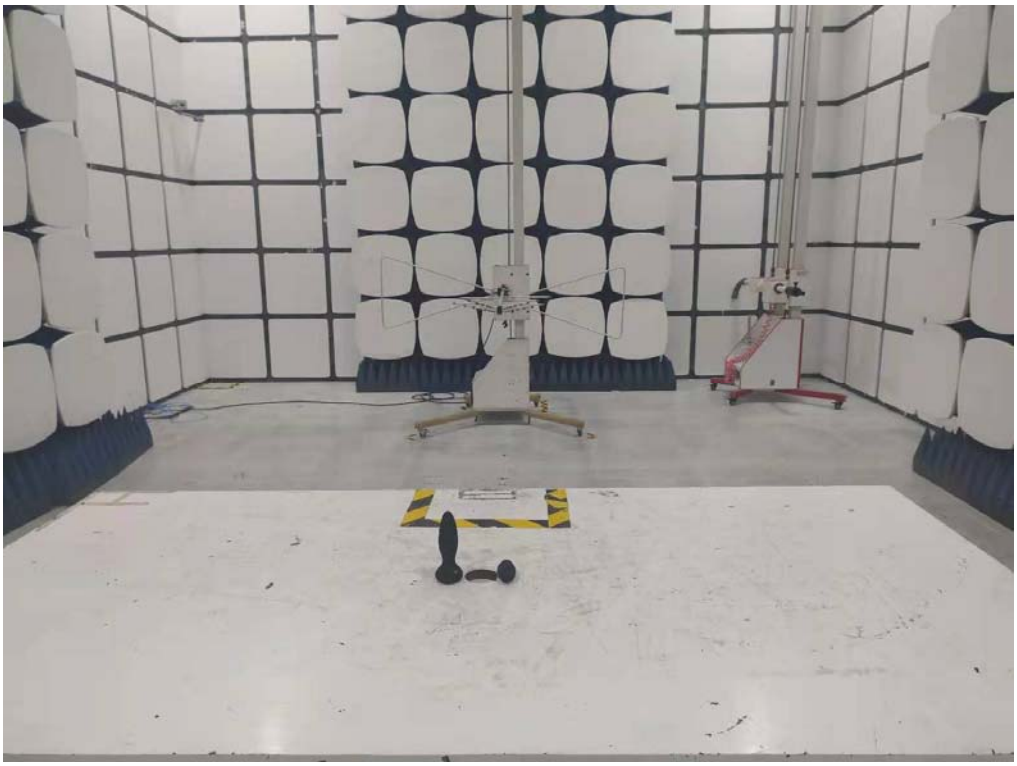
According to the FCC part15.203, a transmitter can only be sold or operated with antennas with which it was approved. This product has an internal permanent antenna which meet the requirement of this section.

11 Test Setup

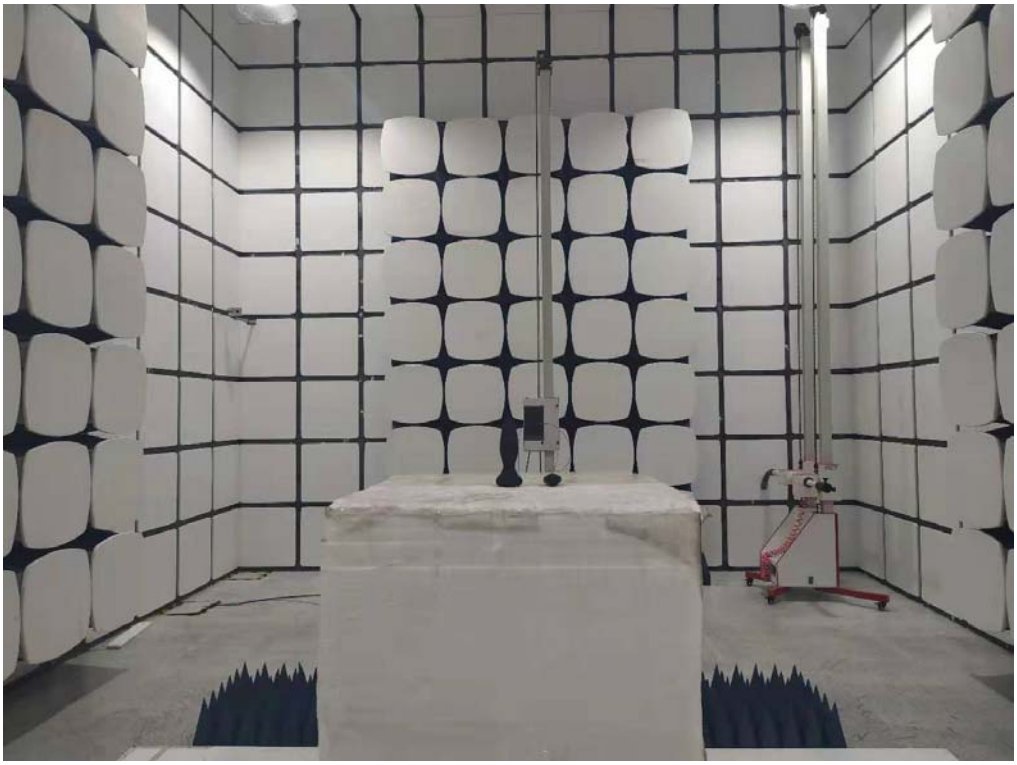
Conducted Emission

Radiated Spurious Emissions

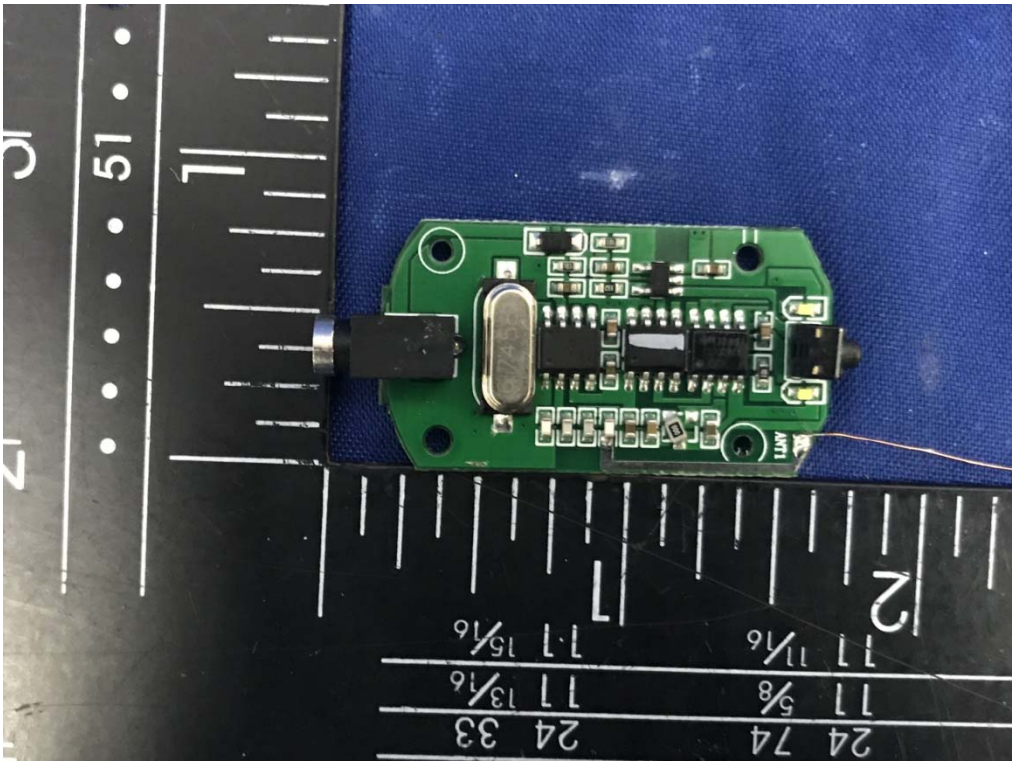
From 30MHz-1000MHz

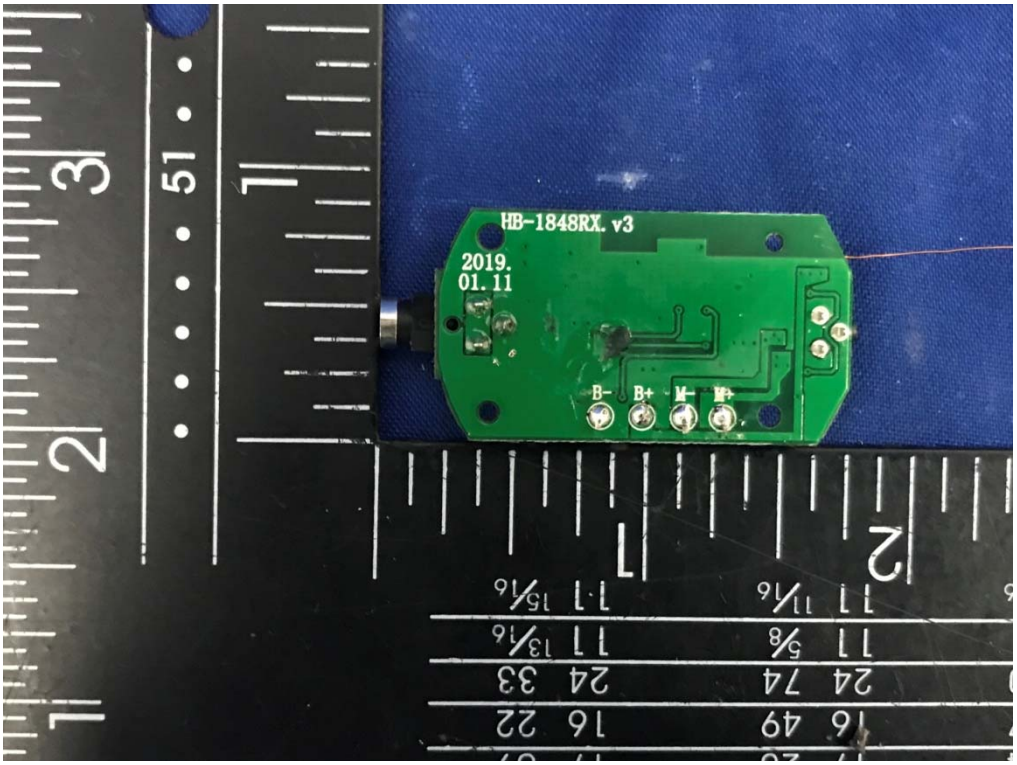


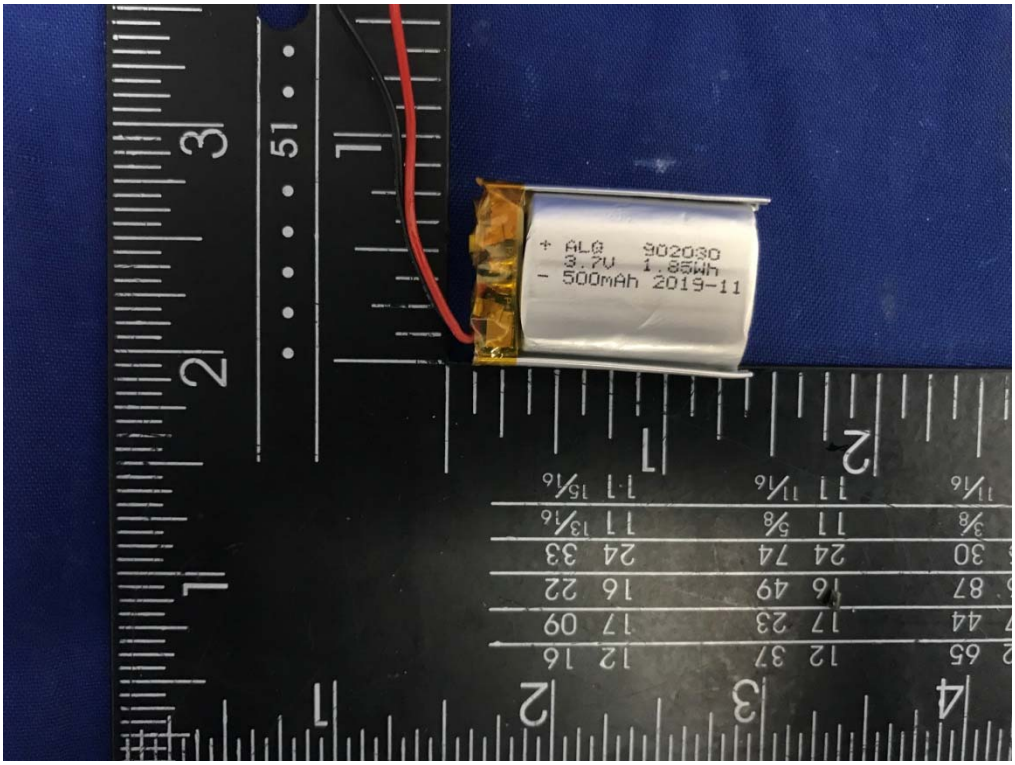
Above 1GHz



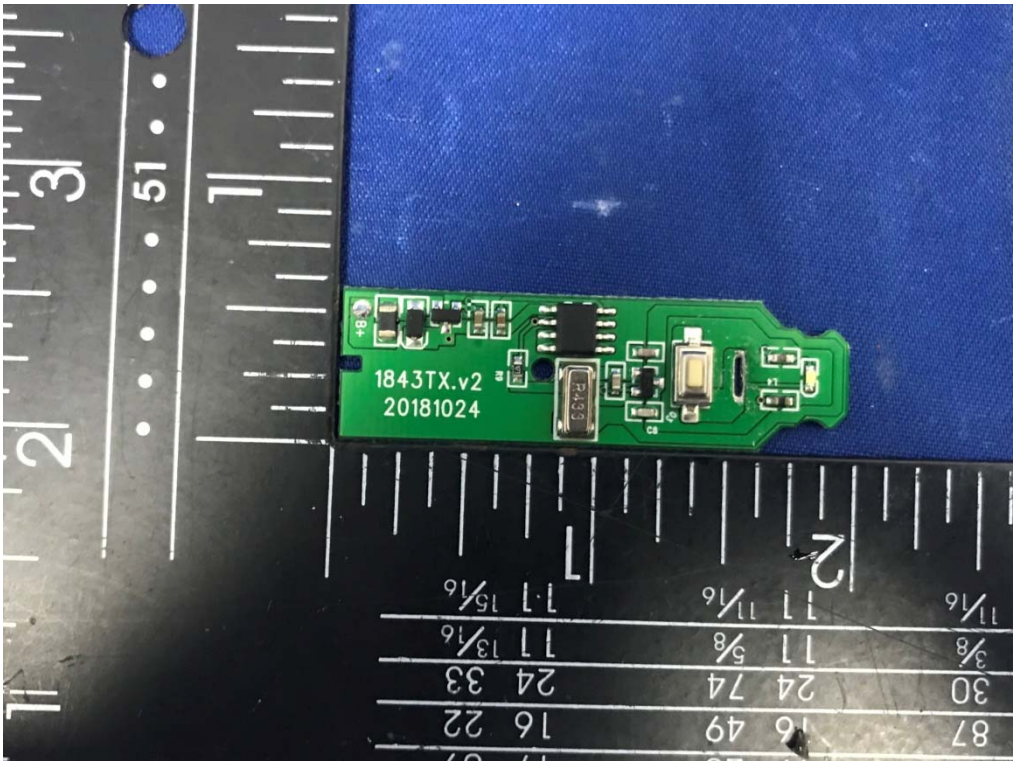
12 EUT Photos

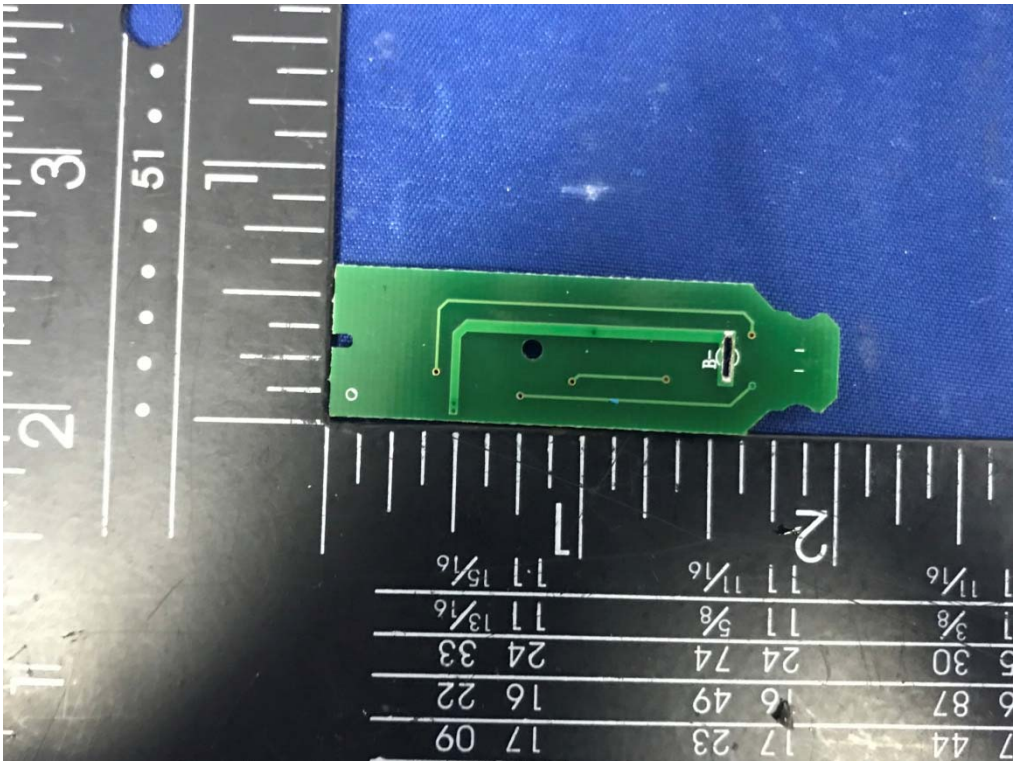



HB-1848RX. v3
2019.
01. 11
B-
B+
M-
M+


+ ALG 902030
3.7V 1.85Wh
- 500mAh 2019-11

8437X-V2
20180324





********THE END REPORT********