FCC TEST REPORT

FCC ID: 2AVQJ-VAP11001

Product	:	Anal Plug
Model Name	:	VAP11001, VAP11011, VAP11021, VAP11031,VAP11041
Brand	:	N/A
Report No.	:	PTC20010302001E-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	:	VAP11001, VAP11011, VAP11021, VAP11031, VAP11041
Standards	:	FCC CFR47 Part 15 Section 15.231
Test procedure	:	ANSI C63.10:2013
Test Date	:	Jan 5, 2020 to Jan 15, 2020
Date of Issue	:	Jan 15,2020
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	N/A
Radiated Emission	15.231(a) 15.209 15.205(a)	PASS
Periodic Operation	15.35(c)	PASS
Outside of Band Emission	15.231(a) 15.205 15.209	PASS
20dB Bandwidth	15:215(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 : VAP11001

Additional model : VAP11011, VAP11021, VAP11031,VAP11041

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

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

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

4.2 Measurement Uncertainty

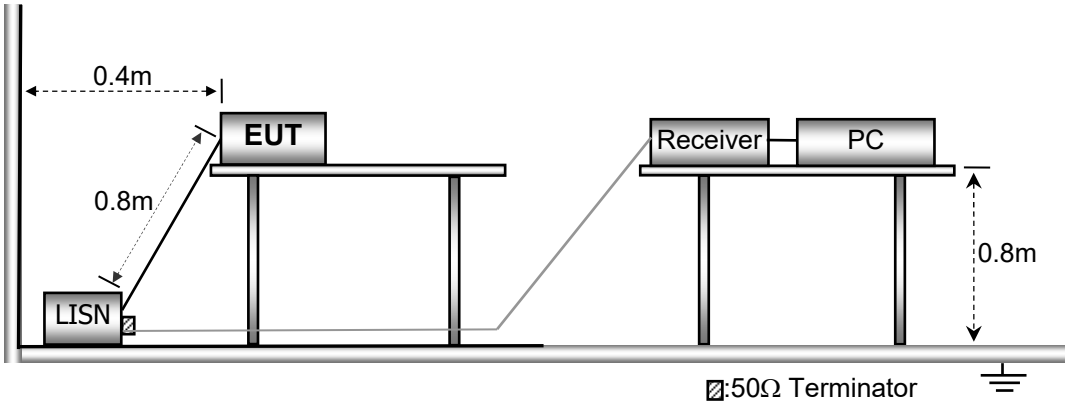
Parameter	**Uncertainty**
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	$\pm 1 \times 10^{-6}$
Bandwidth	$\pm 1.5 \times 10^{-6}$
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB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

5 Conducted Emission

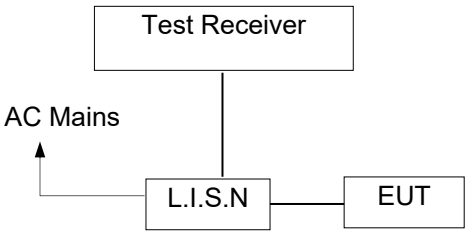
Test Requirement:	:	FCC CFR 47 Part 15 Section 15.207
Test Method:	:	ANSI C63.10:2013
Frequency Range:	:	150kHz to 30MHz
Detector:	:	Peak for pre-scan (9kHz Resolution Bandwidth)

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

N/A.

6 Periodic Operation

The duty cycle was determined by the following equation:

To calculate the actual field intensity, the duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion

Duty Cycle(%)=Total On interval in a complete pulse train/ Length of a complete pulse train * %

Duty Cycle Correction Factor (dB)=20 * Log_{10}(Duty Cycle(%))

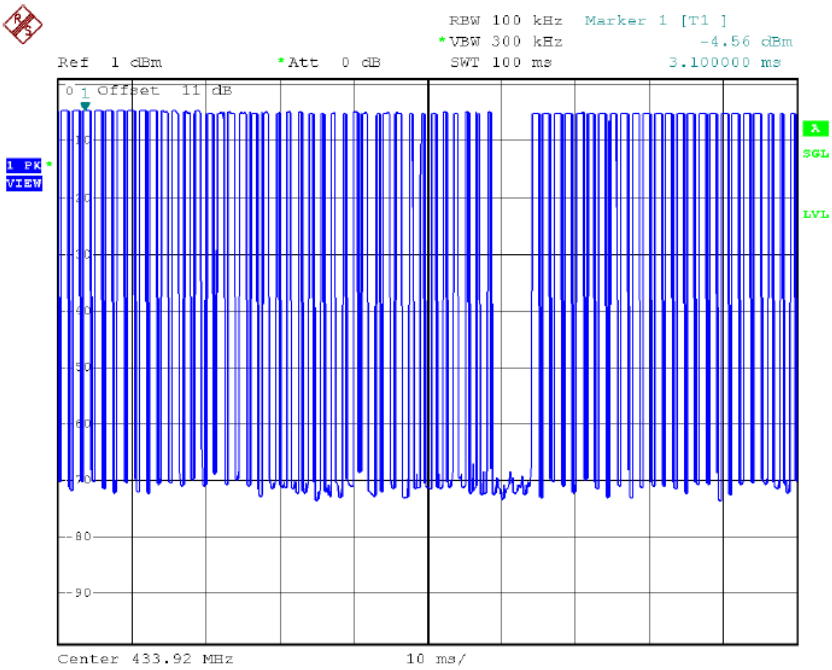
Total transmission time(ms)	43*1.06+20*0.56=56.78
Length of a complete transmission period(ms)	100
Duty Cycle(%)	56.78
Duty Cycle Correction Factor(dB)	-4.92

Refer to the duty cycle plot (as below), This device meets the FCC requirement.

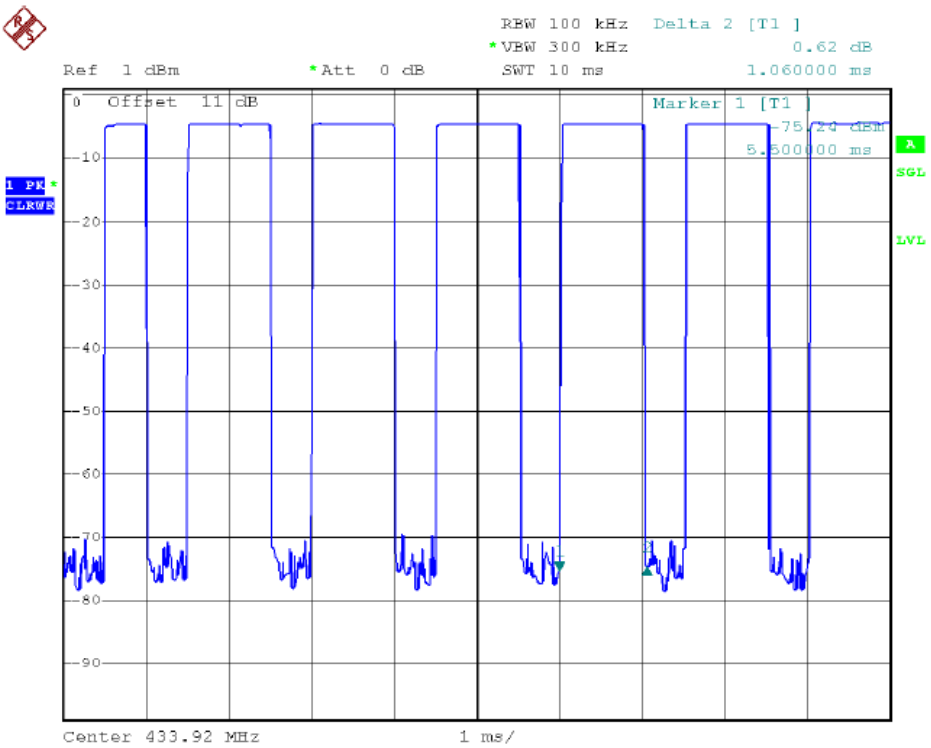
Length of a complete pulse train:

Remark: FCC part15.35(c) required that a complete pulse train is more than 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

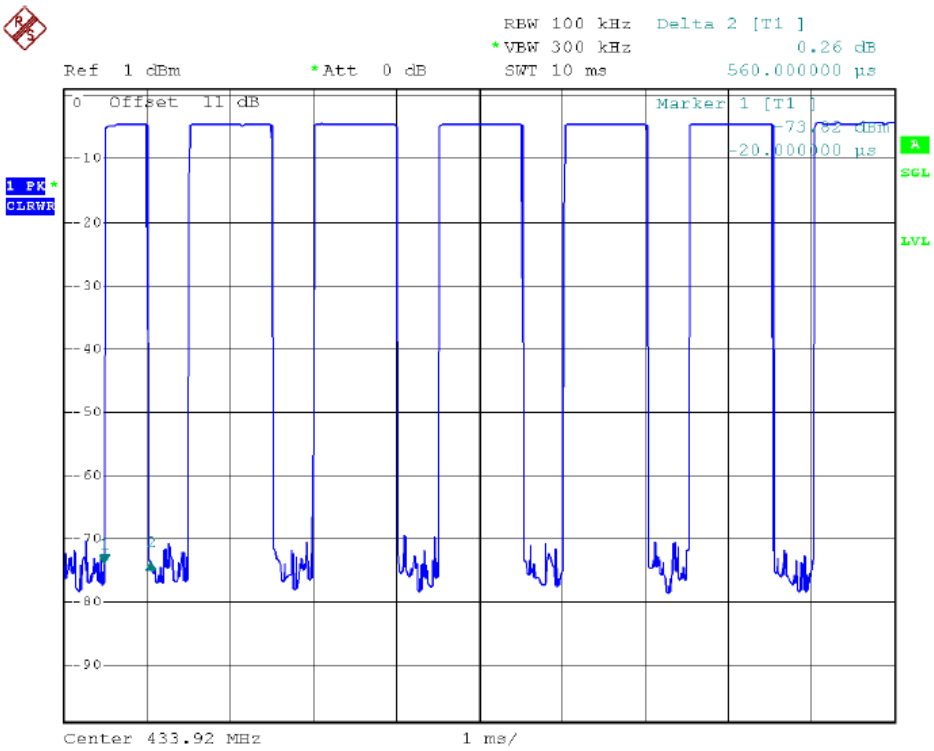
Tp



Pulse 1

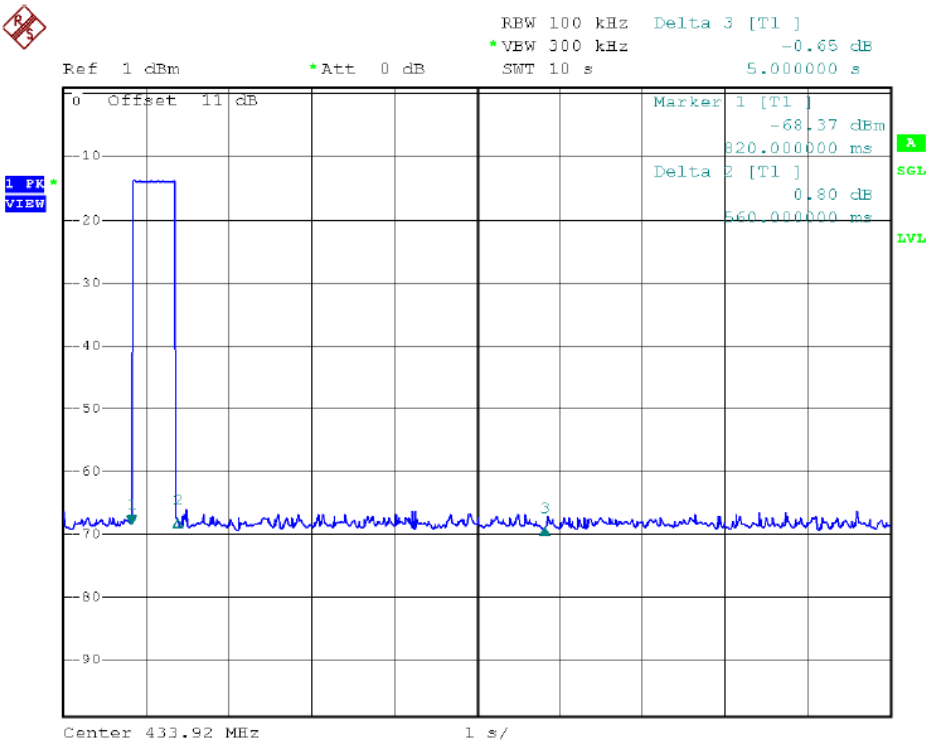


Pulse 2



FCC Part15.231 (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.

(2)A transmitter activated automatically shall cease transmission within 5 seconds after activation.



7 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	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment :

Temperature: : 23.5 °C

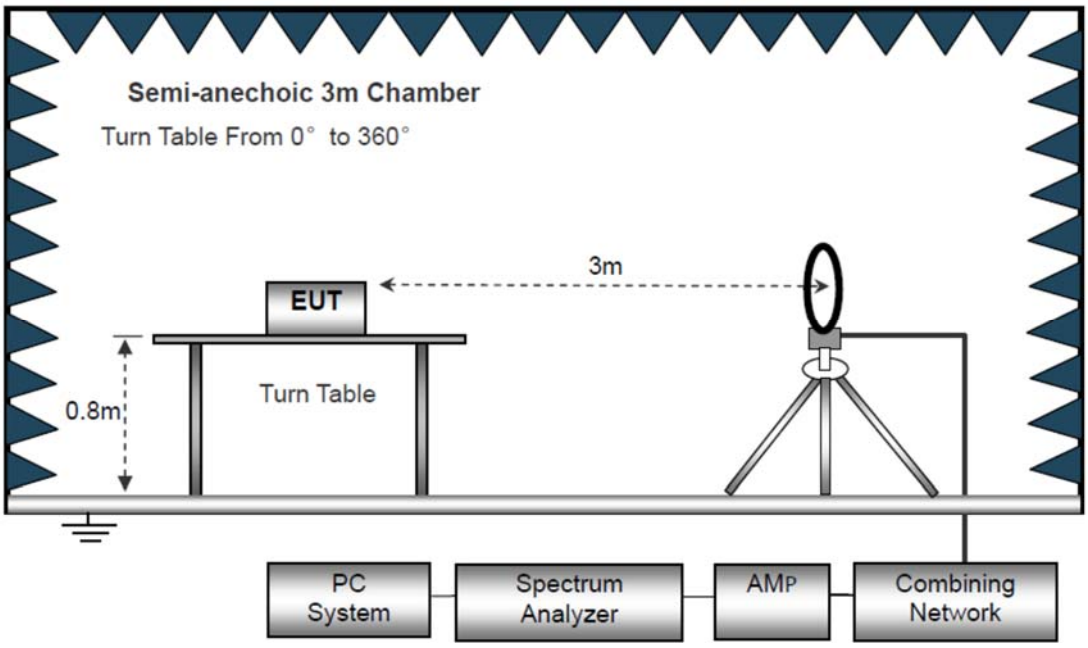
Humidity: : 51.1 % RH

Atmospheric Pressure: : 101.2kPa

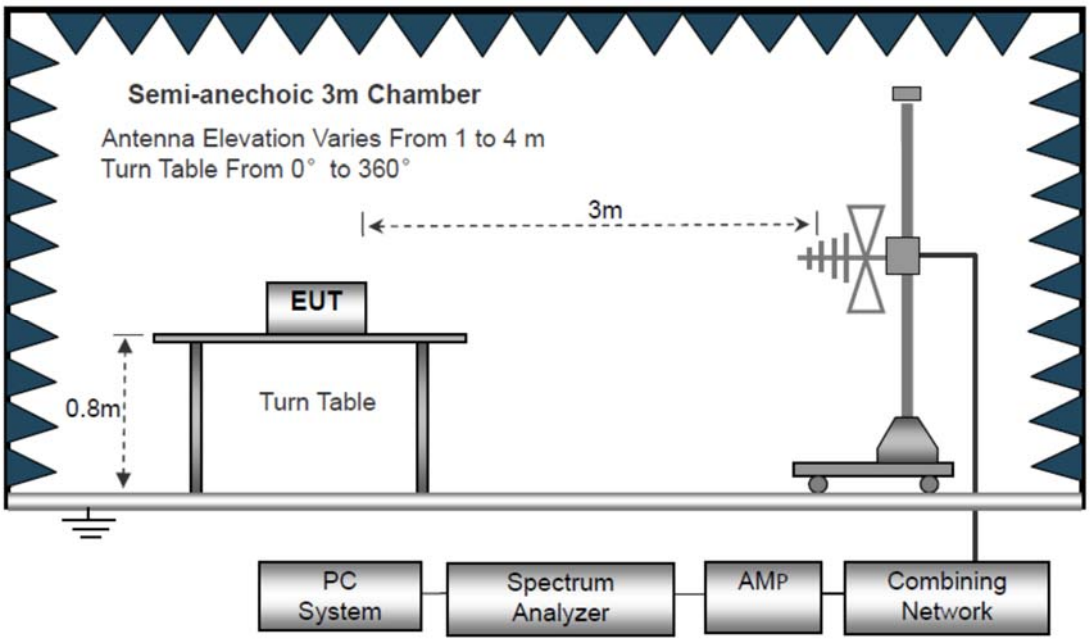
7.2 Test Setup

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

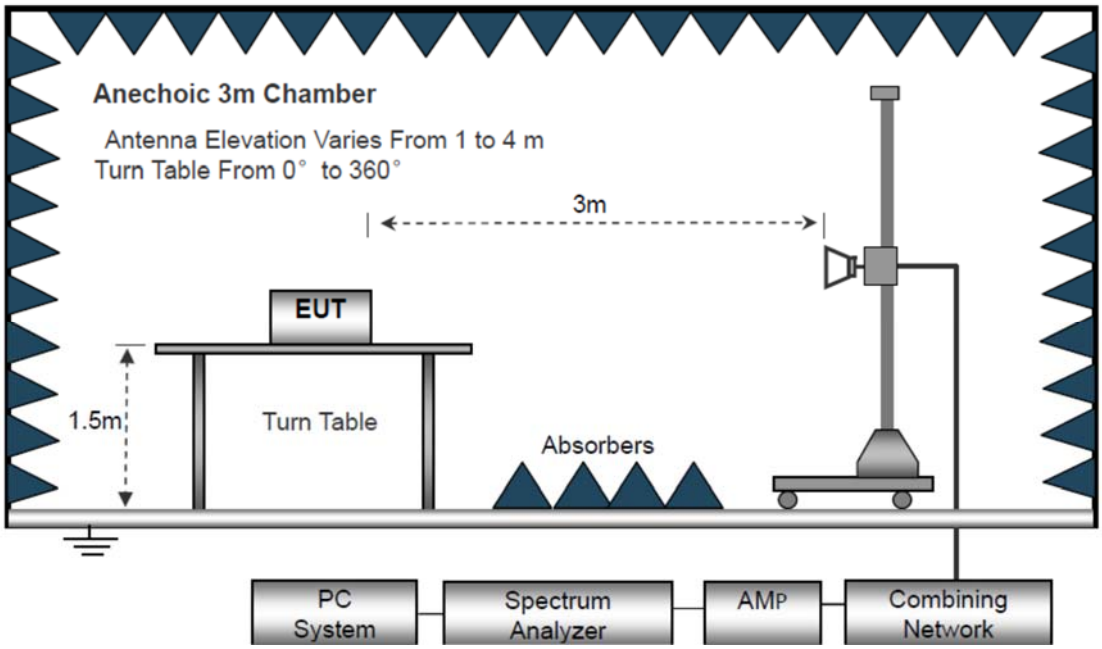
The test setup for emission measurement below 30MHz



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



The test setup for emission measurement above 1 GHz



7.3 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

7.4 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

7.5 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 ~ 5GHz

All applicable test modes have been tested with TX mode(433.92MHz)

Frequency	Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.231/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)
35.32	48.85	QP	110	1.4	H	16.56	32.29	40	-7.71
68.64	47.31	QP	215	1.1	V	15.25	32.06	40	-7.94
87.13	45.41	QP	2	2.2	H	13.79	31.62	40	-8.38
74.62	43.46	QP	236	1.4	V	12.71	30.75	40	-9.25
130.36	42.53	QP	108	2.5	H	7.98	34.55	43.5	-8.95
175.87	42.95	QP	252	1.2	V	6.79	36.16	43.5	-7.34
264.16	49.31	QP	164	1.7	H	12.44	36.87	46	-9.13
248.69	50.21	QP	217	2.3	V	11.69	38.52	46	-7.48
428.55	52.08	QP	33	1.6	H	14.14	37.94	46	-8.06
539.64	53.64	QP	19	2.1	V	15.03	38.61	46	-7.39

Frequency	PK	Turn table Angle	RX Antenna		Duty cycle Factor	AV	FCC Part 15.231/209/205	
			Height	Polar			AVLimit	AVMargin
(MHz)	(dBμV/m)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
433.92	77.02	120	1.4	H	-4.92	72.1	80.83	-8.73
433.92	75.84	152	1.5	V	-4.92	70.92	80.83	-9.91
867.84	57.11	110	1.1	H	-4.92	52.19	60.83	-8.64
867.84	56.43	36	1.2	V	-4.92	51.51	60.83	-9.32
1301.76	51.69	200	2.2	H	-4.92	46.77	54	-7.23
1301.76	52.52	155	2	V	-4.92	47.6	54	-6.4
1735.68	48.34	201	1.3	H	-4.92	43.42	54	-10.58
1735.68	47.69	251	1.5	V	-4.92	42.77	54	-11.23

Note: The PK result value is less than the limit of the AV value ,so Result of calculating only AV value.

8 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.

8.1 Test Procedure

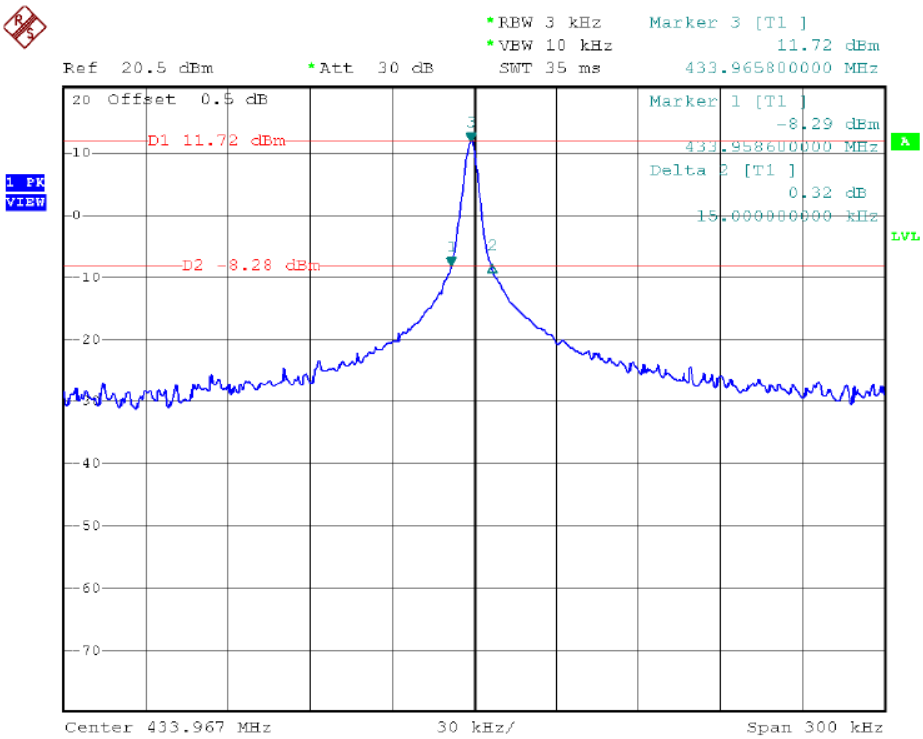
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: For BLE, RBW = 3 kHz, VBW = 10kHz,

8.2 Test Result

Test Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
433.92	15	1084.80	pass

Test plots



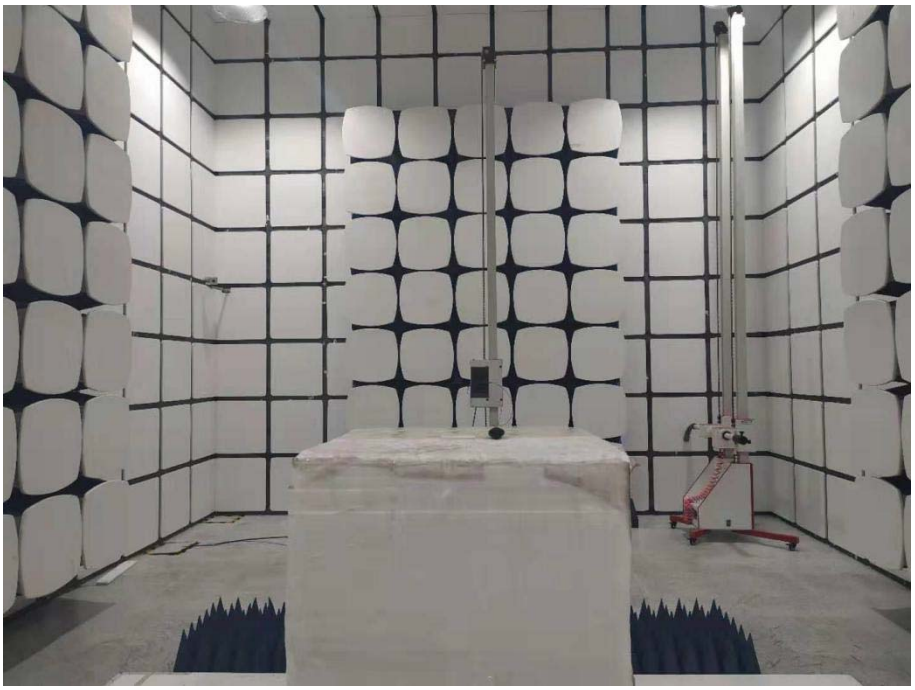
9 Antenna Requirement

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.

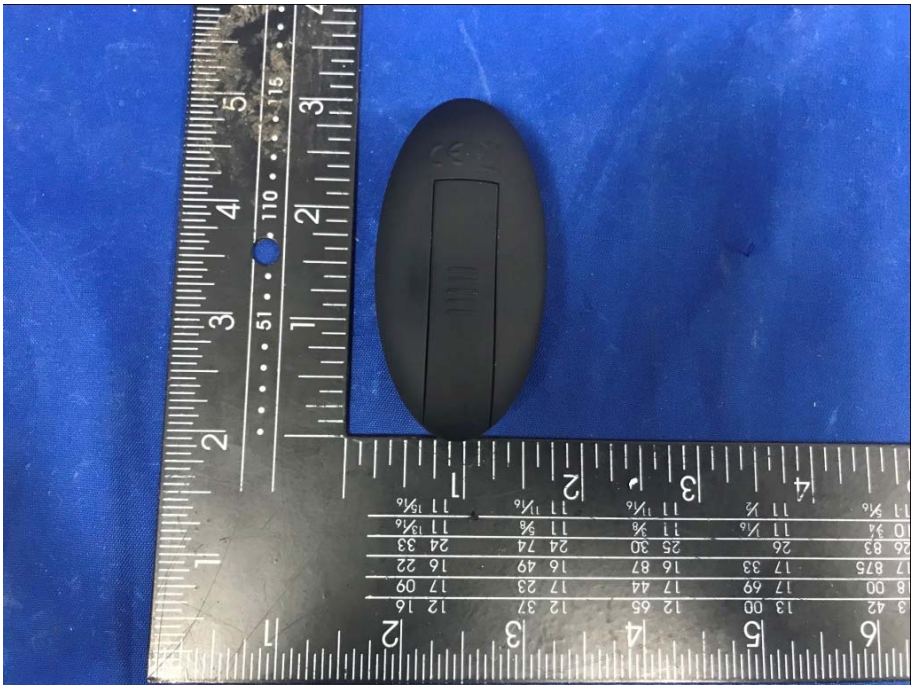
10 Test Setup

Radiated Spurious Emissions
From 30MHz-1000MHz

Above 1GHz



11 EUT Photos



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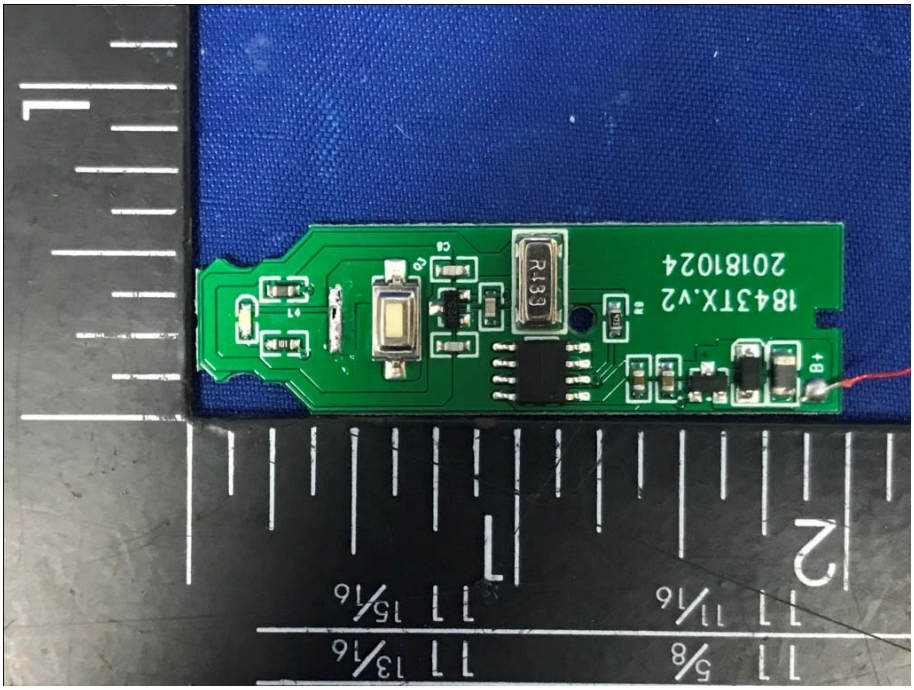

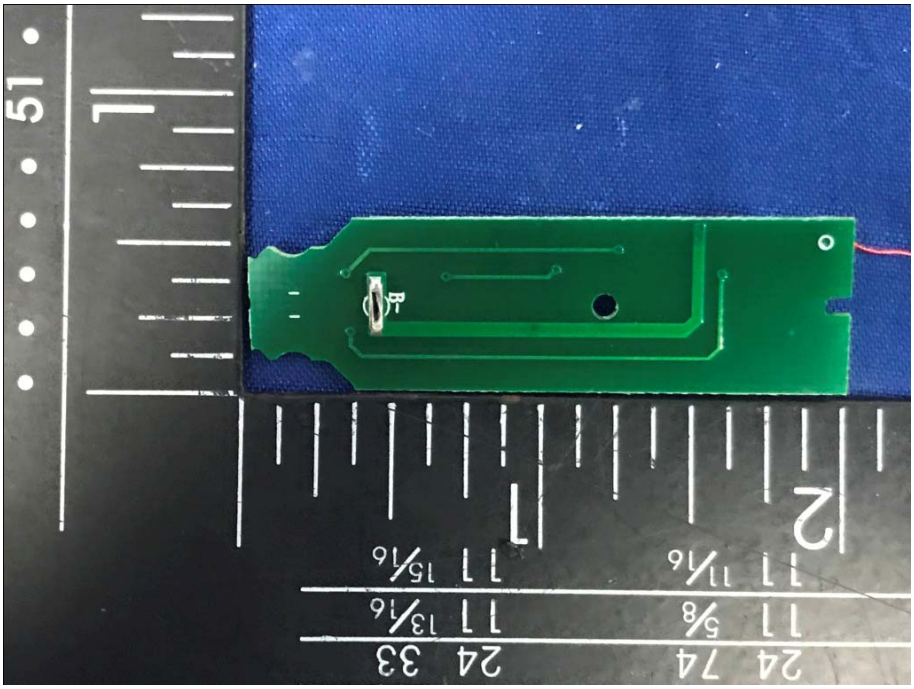

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