

Report No.: GTS201809000028F01

# FCC Report

**Applicant:** Babysense DongGuan Ltd.

**Address of Applicant:** No.1, Park Road, Dong Keng Village, Dong Keng Town, Dong Guan City, Guang Dong Province, China

**Manufacturer/ Factory:** Babysense DongGuan Ltd.

**Address of Manufacturer/ Factory:** No.1, Park Road, Dong Keng Village, Dong Keng Town, Dong Guan City, Guang Dong Province, China

## Equipment Under Test (EUT)

**Product Name:** baby monitor

**Model No.:** V35TX

**FCC ID:** 2AQVL-V35TX

**Applicable standards:** FCC CFR Title 47 Part 15.247

**Date of sample receipt:** September 10, 2018

**Date of Test:** September 11-19, 2018

**Date of report issued:** September 20, 2018

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



A handwritten signature in black ink, appearing to read "Robinson Lo" followed by a date like "2018 Sep".

Robinson Lo  
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

## 2 Version

Version No.	Date	Description
00	September 20, 2018	Original

Prepared By:



Date:

September 20, 2018

Project Engineer

Check By:



Date:

September 20, 2018

Reviewer

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## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(1)	Pass
20dB Occupied Bandwidth	15.247 (a)(1)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(1)	Pass
Dwell Time	15.247 (a)(1)	Pass
Pseudorandom Frequency Hopping Sequence	15.247(b)(4)&TCB Exclusion List (7 July 2002)	Pass
Radiated Emission	15.205/15.209	Pass
Band Edge	15.247(d)	Pass

*Pass: The EUT complies with the essential requirements in the standard.*

*Remark: Test according to ANSI C63.10:2013*

### Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(1)

*Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.*

## 5 General Information

### 5.1 General Description of EUT

Product Name:	baby monitor
Model No.:	V35TX
Serial No.:	00000001
Test sample(s) ID:	GTS201809000028-1
Sample(s) Status	Engineer sample
Hardware version:	V10
Software version:	V07
Operation Frequency:	2410.875MHz~2471.625MHz
Channel Numbers:	19
Channel Separation:	3.375MHz
Modulation Type:	FSK
Antenna Type:	Integral Antenna
Antenna Gain:	0dBi
Power Supply:	Adapter 1 AC ADAPTER MODEL: AW007WR-0500070UV INPUT: AC 100-240V, 50/60Hz, 0.3A OUTPUT: DC 5V, 0.7A OR Adapter 2 I.T.E. POWER SUPPLY MODEL: CS3E050070FU INPUT: AC 100-240V, 50/60Hz, 200mA OUTPUT: DC 5.0V, 700mA

All adapters have been test and found they are meeting the requirements, so only the worst case adapter 2 was report

<b>Operation Frequency each of channel</b>							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2410.875	6	2427.750	11	2444.625	16	2461.500
2	2414.250	7	2431.125	12	2448.000	17	2464.875
3	2417.625	8	2434.500	13	2451.375	18	2468.250
4	2421.000	9	2437.875	14	2454.750	19	2471.625
5	2424.375	10	2441.250	15	2458.125	20	

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2410.875
The middle channel	2441.250
The Highest channel	2471.625

## 5.2 Test mode

Transmitting mode	keep the EUT in continuously transmitting mode
<p><i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i></p>	

## 5.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383, January 08, 2018.

- **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.

## 5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

## 5.5 Other Information Requested by the Customer

None.

## 5.6 Description of Support Units

None.

## 6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 27 2018	June. 26 2019
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 27 2018	June. 26 2019
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 27 2018	June. 26 2019
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 27 2018	June. 26 2019
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 27 2018	June. 26 2019
9	Coaxial Cable	GTS	N/A	GTS211	June. 27 2018	June. 26 2019
10	Coaxial cable	GTS	N/A	GTS210	June. 27 2018	June. 26 2019
11	Coaxial Cable	GTS	N/A	GTS212	June. 27 2018	June. 26 2019
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 27 2018	June. 26 2019
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 27 2018	June. 26 2019
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 27 2018	June. 26 2019
15	Band filter	Amindeon	82346	GTS219	June. 27 2018	June. 26 2019
16	Power Meter	Anritsu	ML2495A	GTS540	June. 27 2018	June. 26 2019
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 27 2018	June. 26 2019
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 27 2018	June. 26 2019
19	Splitter	Agilent	11636B	GTS237	June. 27 2018	June. 26 2019
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 27 2018	June. 26 2019

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 27 2018	June. 26 2019
2	Barometer	ChangChun	DYM3	GTS255	June. 27 2018	June. 26 2019

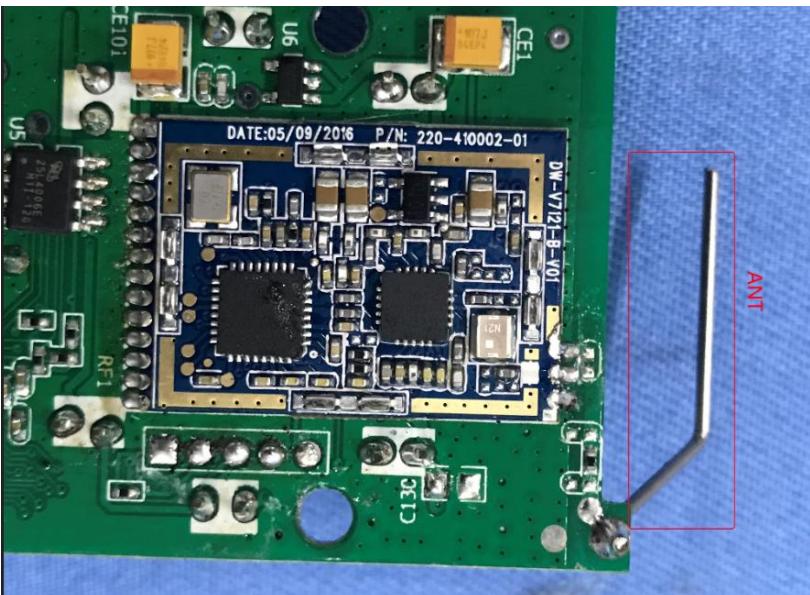
RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 27 2018	June. 26 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 27 2018	June. 26 2019
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 27 2018	June. 26 2019
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 27 2018	June. 26 2019
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 27 2018	June. 26 2019
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 27 2018	June. 26 2019
8	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
9	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 27 2018	June. 26 2019

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.16 2014	May.15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 27 2018	June. 26 2019
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 27 2018	June. 26 2019
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 27 2018	June. 26 2019
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 27 2018	June. 26 2019

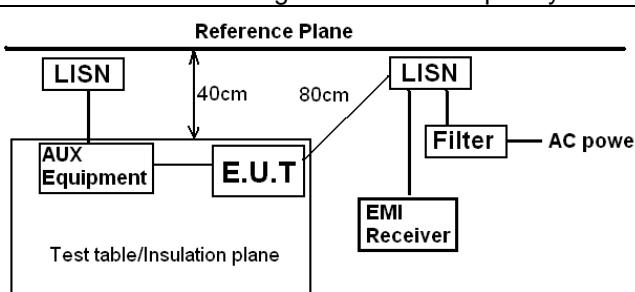
## 7 Test results and Measurement Data

### 7.1 Antenna requirement

<b>Standard requirement:</b>	FCC Part15 C Section 15.203 /247(c)
<p><b>15.203 requirement:</b> 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, 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.</p>	
<p><b>15.247(c) (1)(i) requirement:</b> (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
<p><b>E.U.T Antenna:</b> The antenna is integral antenna, the best case gain of the antenna is 0 dBi</p>	

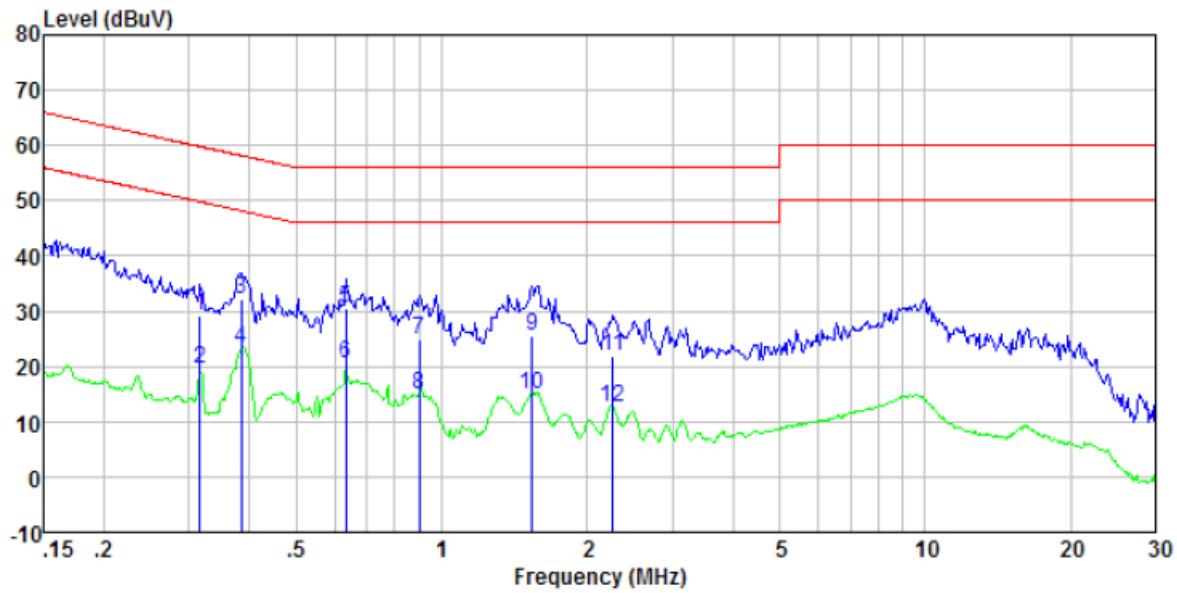


## 7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207																		
Test Method:	ANSI C63.10:2013																		
Test Frequency Range:	150KHz to 30MHz																		
Class / Severity:	Class B																		
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto																		
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>					Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)																		
	Quasi-peak	Average																	
0.15-0.5	66 to 56*	56 to 46*																	
0.5-5	56	46																	
5-30	60	50																	
	* Decreases with the logarithm of the frequency.																		
Test setup:	 <p><i>Remark</i>  <i>E.U.T: Equipment Under Test</i>  <i>LISN: Line Impedance Stabilization Network</i>  <i>Test table height=0.8m</i></p>																		
Test procedure:	<ol style="list-style-type: none"> <li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. 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.</li> </ol>																		
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.: 1012mbar														
Test Instruments:	Refer to section 6.0 for details																		
Test mode:	Refer to section 5.2 for details																		
Test voltage:	AC120V 60Hz																		
Test results:	Pass																		

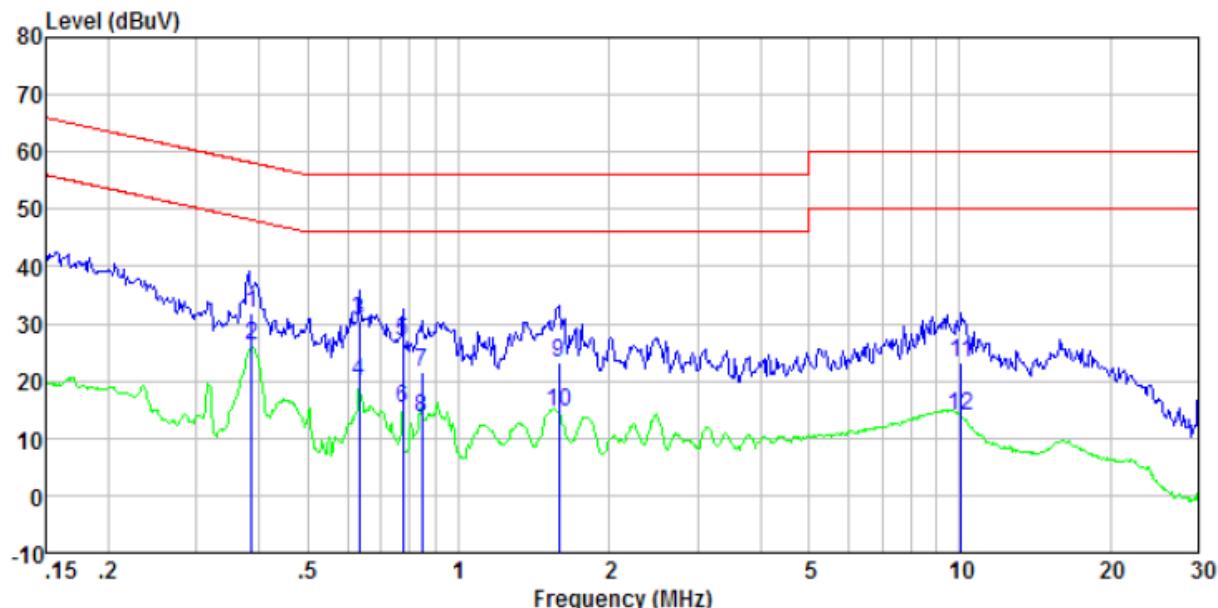
**Measurement data:**

Test mode:	Transmitting mode	Probe:	Line
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Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.32	28.79	0.39	0.10	29.28	59.80	-30.52	QP
0.32	19.00	0.39	0.10	19.49	49.80	-30.31	Average
0.39	31.67	0.36	0.10	32.13	58.17	-26.04	QP
0.39	22.79	0.36	0.10	23.25	48.17	-24.92	Average
0.63	30.09	0.28	0.12	30.49	56.00	-25.51	QP
0.63	20.21	0.28	0.12	20.61	46.00	-25.39	Average
0.90	24.62	0.22	0.14	24.98	56.00	-31.02	QP
0.90	14.64	0.22	0.14	15.00	46.00	-31.00	Average
1.54	25.18	0.20	0.17	25.55	56.00	-30.45	QP
1.54	14.45	0.20	0.17	14.82	46.00	-31.18	Average
2.26	21.50	0.20	0.18	21.88	56.00	-34.12	QP
2.26	12.25	0.20	0.18	12.63	46.00	-33.37	Average

Test mode:	Transmitting mode	Probe:	Neutral
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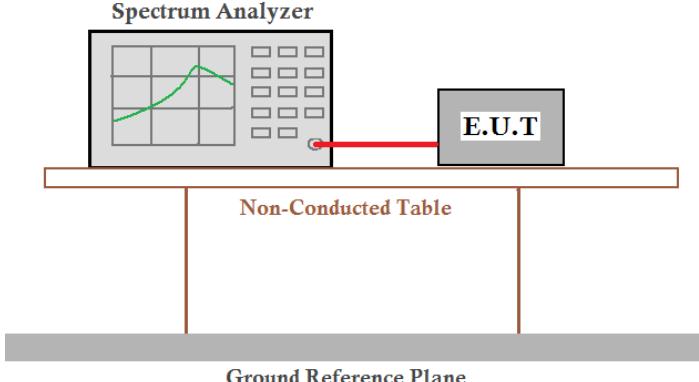


Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.39	31.35	0.36	0.11	31.82	58.12	-26.30	QP
0.39	25.60	0.36	0.11	26.07	48.12	-22.05	Average
0.63	30.04	0.28	0.12	30.44	56.00	-25.56	QP
0.63	19.47	0.28	0.12	19.87	46.00	-26.13	Average
0.78	26.53	0.24	0.14	26.91	56.00	-29.09	QP
0.78	15.01	0.24	0.14	15.39	46.00	-30.61	Average
0.84	21.09	0.23	0.14	21.46	56.00	-34.54	QP
0.84	13.37	0.23	0.14	13.74	46.00	-32.26	Average
1.59	22.92	0.20	0.17	23.29	56.00	-32.71	QP
1.59	14.14	0.20	0.17	14.51	46.00	-31.49	Average
10.07	22.66	0.20	0.20	23.06	60.00	-36.94	QP
10.07	13.64	0.20	0.20	14.04	50.00	-35.96	Average

#### Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss
4. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

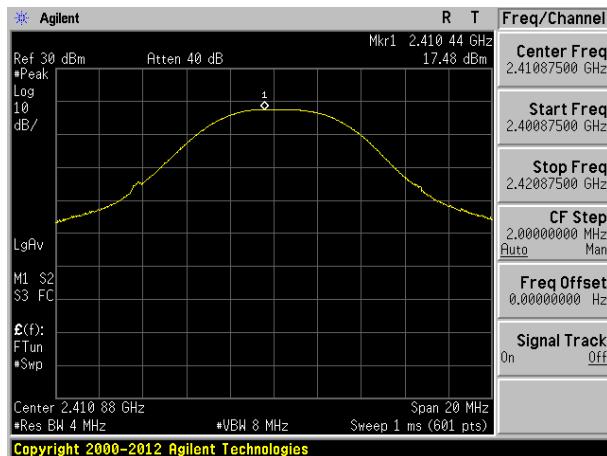
## 7.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013
Limit:	20.97dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

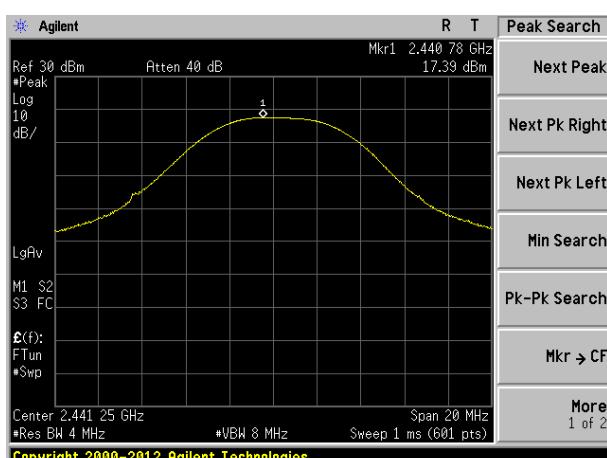
### Measurement Data

Test channel	Peak Output Power (dBm)	Limit(dBm)	Result
Lowest	17.48	20.97	Pass
Middle	17.39		
Highest	17.40		

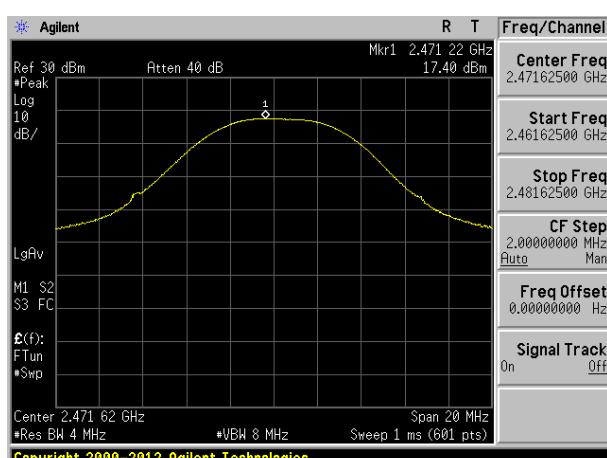
**Test plot as follows:**



Lowest channel

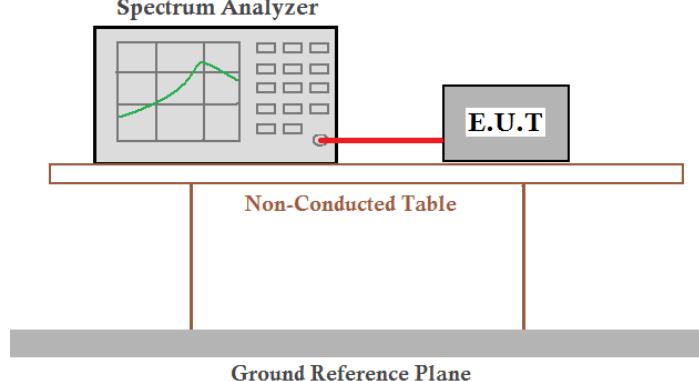


Middle channel



Highest channel

## 7.4 20dB Emission Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

### Measurement Data

Test channel	Channel Bandwidth (MHz)	Limit(KHz)	Result
Lowest	3.663	N/A	Pass
Middle	3.850		
Highest	3.910		

**Test plot as follows:**



Lowest channel

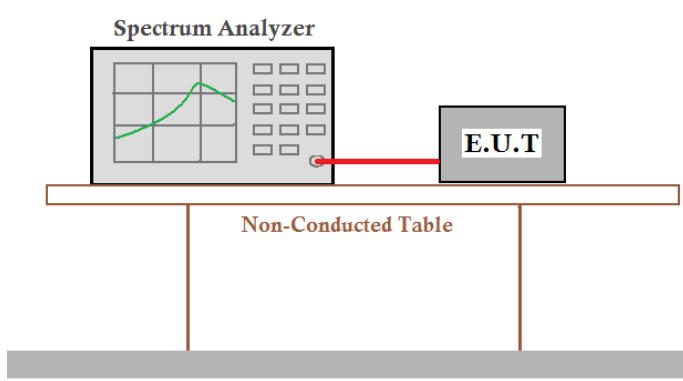


Middle channel



Highest channel

## 7.5 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100KHz, VBW=300KHz, detector=Peak
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

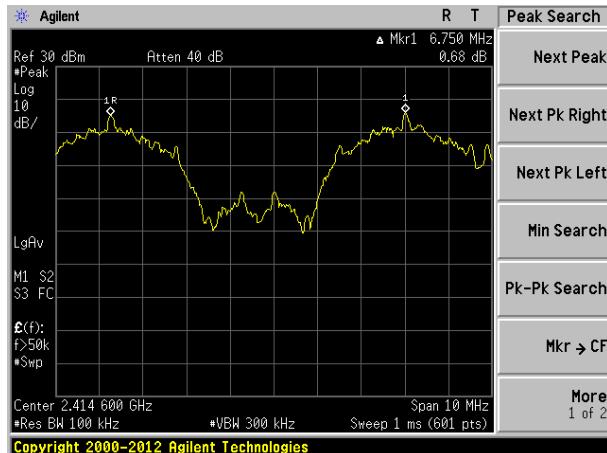
### Measurement Data

Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	6750	2442	Pass
Middle	3390	2567	Pass
Highest	6750	2607	Pass

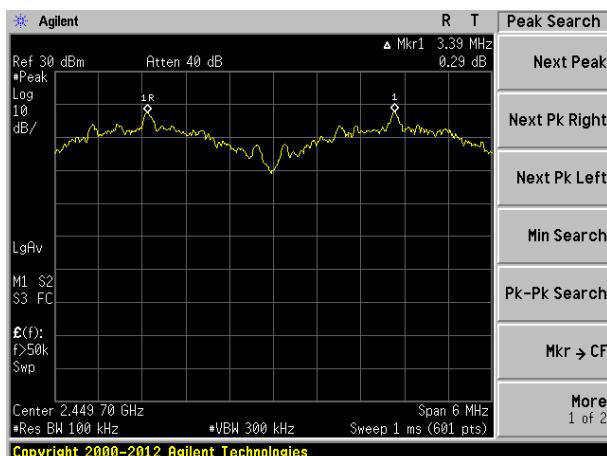
Note: According to section 7.4

Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
Lowest	3663	2442
Middle	3850	2567
Highest	3910	2607

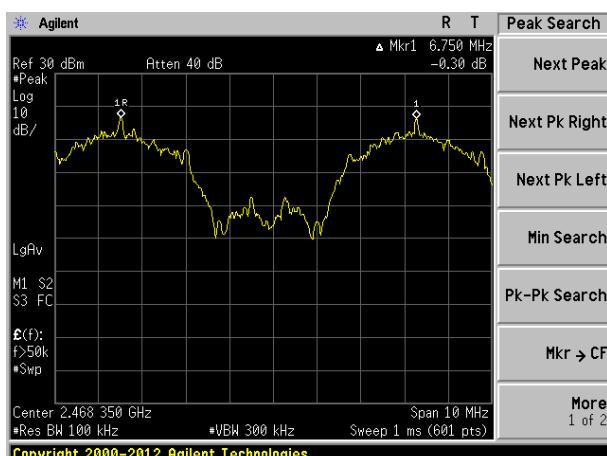
**Test plot as follows:**



Lowest channel

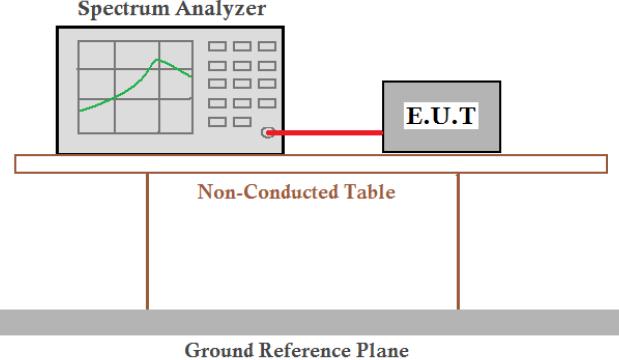


Middle channel



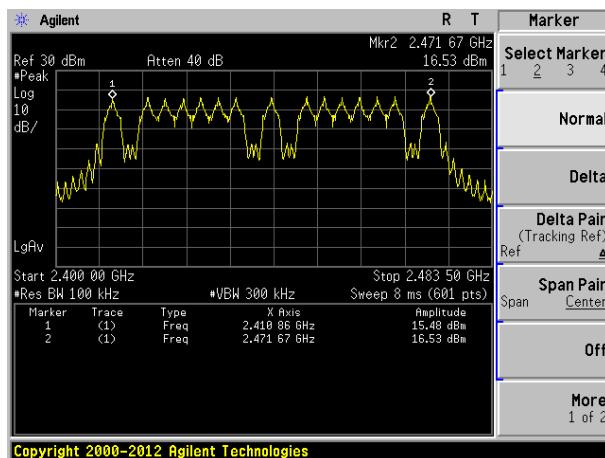
Highest channel

## 7.6 Hopping Channel Number

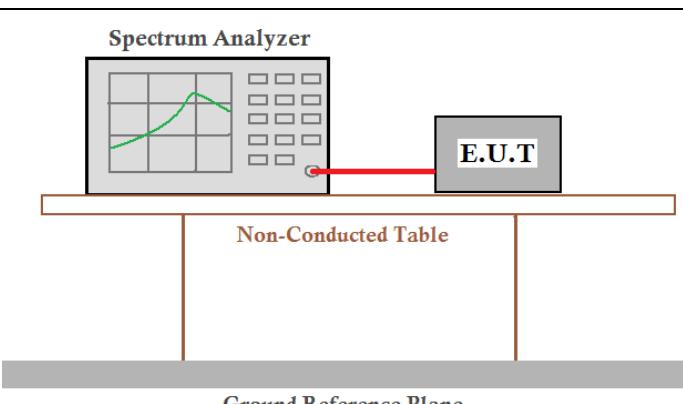
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	<p style="text-align: center;"><b>Spectrum Analyzer</b></p>  <p style="text-align: center;">Non-Conducted Table</p> <p style="text-align: center;">Ground Reference Plane</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

### Measurement Data:

Hopping channel numbers	Limit	Result
15	15	Pass



## 7.7 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

### Measurement Data

Frequency	Ton (ms)	Dwell time(ms)	Limit(ms)	Result
2410.875MHz	0.805	188.37	400	Pass
2441.250MHz	0.805	183.54	400	Pass
2471.625MHz	0.805	188.37	400	Pass

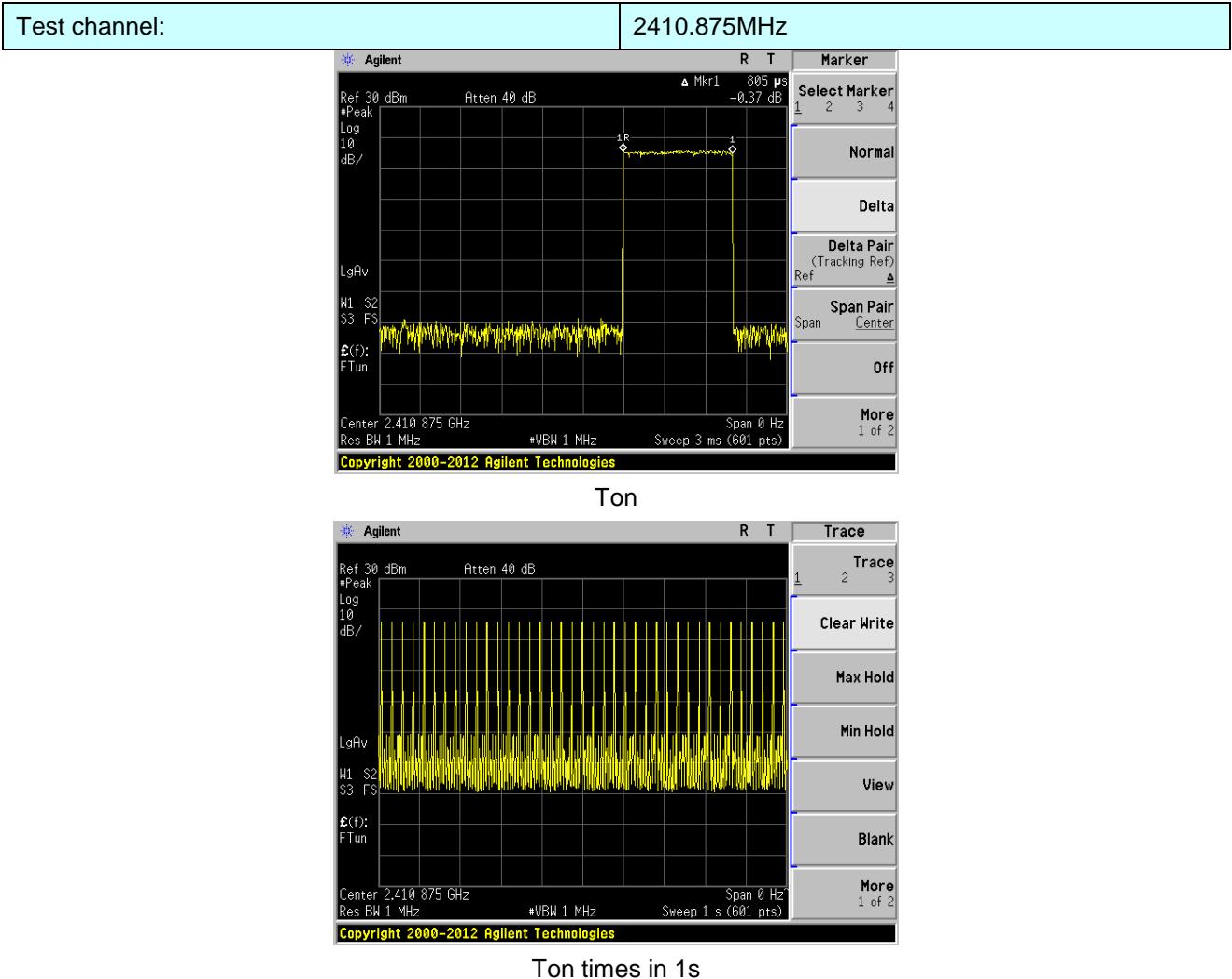
The formula as below:

2410.875MHz: Dwell time = Ton \* Ton times in 1s \* 0.4s \* channel numbers=0.805ms\*39\*0.4\*15=188.37ms

2441.250MHz: Dwell time = Ton \* Ton times in 1s \* 0.4s \* channel numbers=0.805ms\*38\*0.4\*15=183.54ms

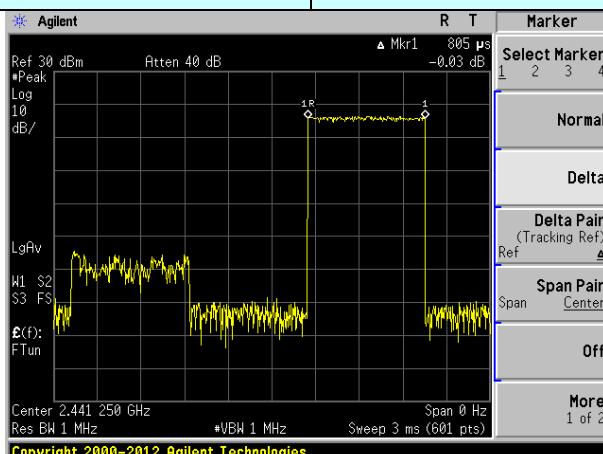
2471.625MHz: Dwell time = Ton \* Ton times in 1s \* 0.4s \* channel numbers=0.805ms\*39\*0.4\*15=188.37ms

**Test plot as follows:**

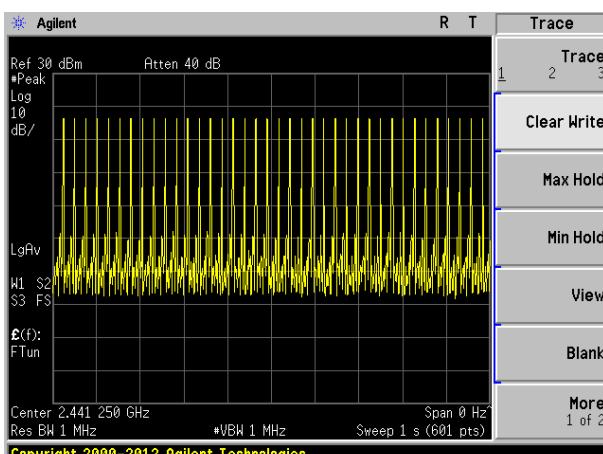


Test channel:

2441.250MHz



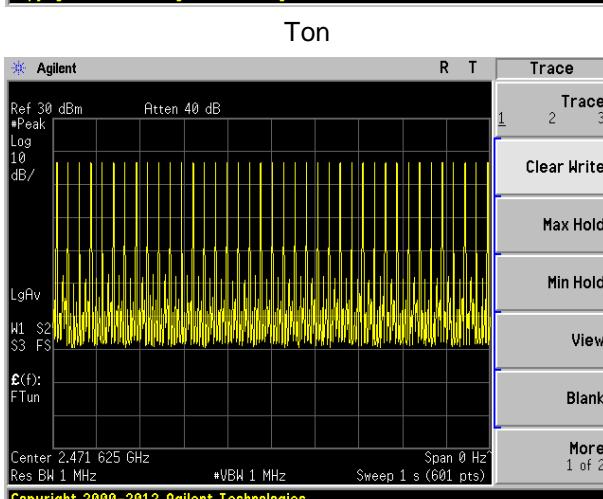
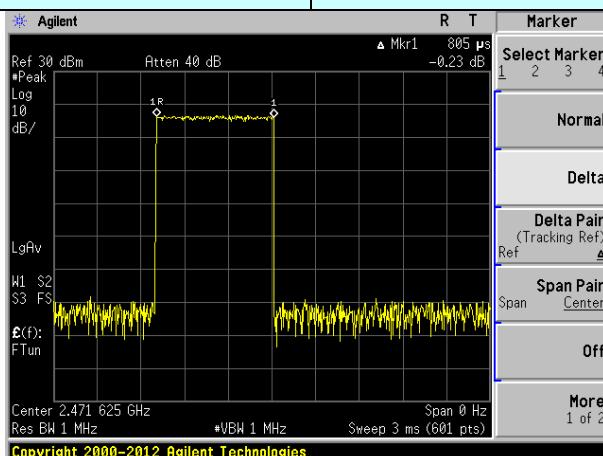
Ton



Ton times in 1s

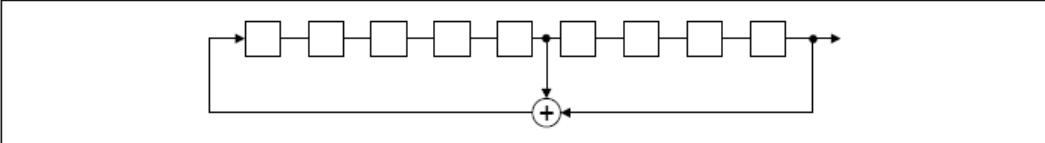
Test channel:

2471.625MHz



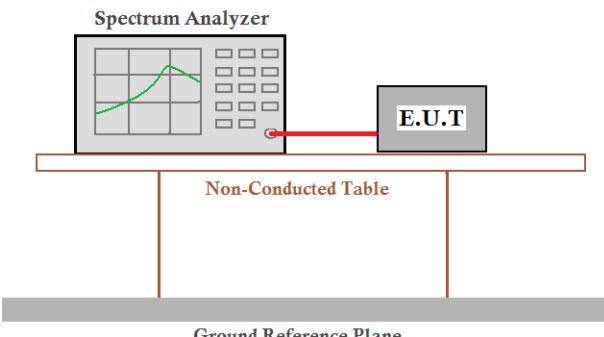
Ton times in 1s

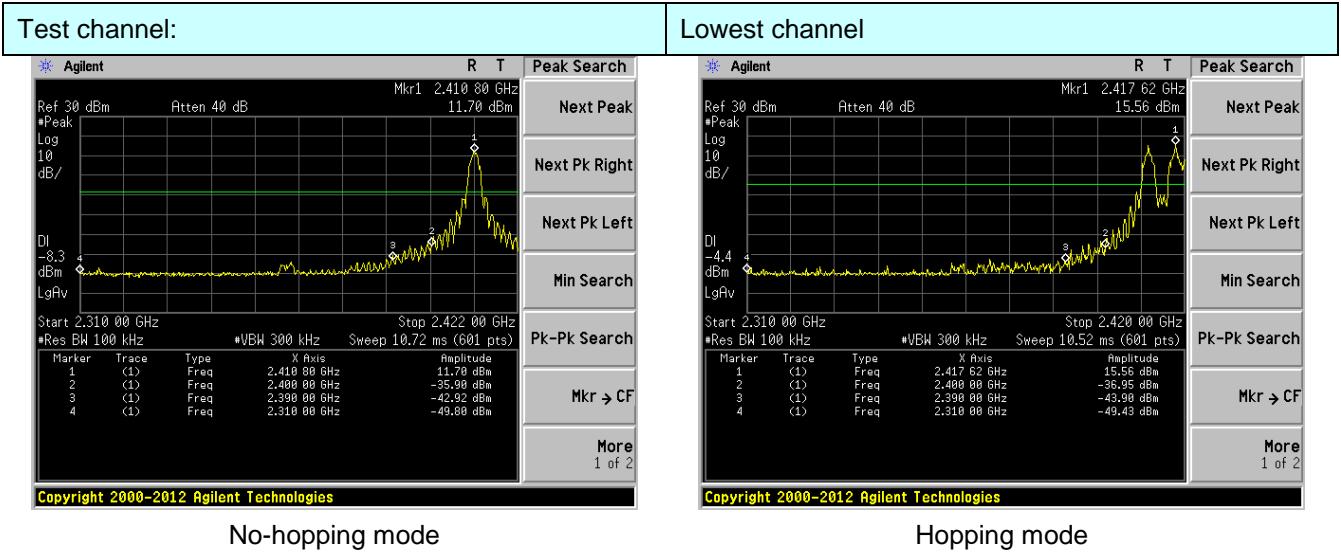
## 7.8 Pseudorandom Frequency Hopping Sequence

Test Requirement:	FCC Part15 C Section 15.247 (a)(1) requirement:																						
	<p>Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.</p> <p>Alternatively, Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.</p>																						
<b>EUT Pseudorandom Frequency Hopping Sequence</b>																							
<p>The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.</p> <ul style="list-style-type: none"> <li>Number of shift register stages: 9</li> <li>Length of pseudo-random sequence: <math>2^9 - 1 = 511</math> bits</li> <li>Longest sequence of zeros: 8 (non-inverted signal)</li> </ul>  <p>Linear Feedback Shift Register for Generation of the PRBS sequence</p> <p>An example of Pseudorandom Frequency Hopping Sequence as follow:</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>0</td><td>2</td><td>4</td><td>6</td><td colspan="2">62 64</td><td>78</td><td>1</td><td colspan="3">73 75 77</td> </tr> <tr> <td>  </td><td>  </td> </tr> </table> <p>Each frequency used equally on the average by each transmitter.</p> <p>The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.</p>		0	2	4	6	62 64		78	1	73 75 77													
0	2	4	6	62 64		78	1	73 75 77															

## 7.9 Band Edge

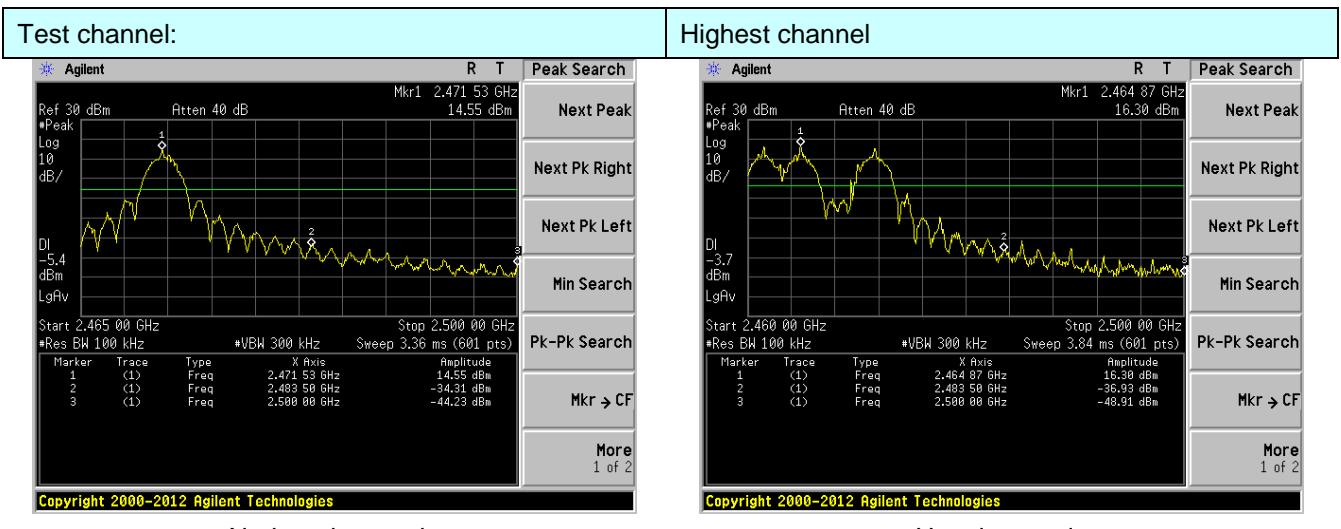
### 7.9.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

**Test plot as follows:**


No-hopping mode

Hopping mode



No-hopping mode

Hopping mode

## 7.9.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205								
Test Method:	ANSI C63.10:2013								
Test Frequency Range:	All restriction band have been tested, and 2.3GHz to 2.5GHz band is the worse case								
Test site:	Measurement Distance: 3m								
Receiver setup:	Frequency	Detector	RBW	VBW	Remark				
	Above 1GHz	Peak	1MHz	3MHz	Peak Value				
		Average	1MHz	10Hz	Average Value				
Limit:	Frequency	Limit (dBuV/m @3m)		Remark					
	Above 1GHz	54.00		Average Value					
		74.00		Peak Value					
Test setup:									
Test Procedure:	<ol style="list-style-type: none"> <li>The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>								
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1 012mbar			

Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2for details
Test results:	Pass

Remark:

Test channel:	Lowest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	43.85	27.91	5.30	24.64	52.42	74.00	-21.58	Horizontal
2390.00	47.77	27.59	5.38	24.71	56.03	74.00	-17.97	Horizontal
2310.00	44.49	27.91	5.30	24.64	53.06	74.00	-20.94	Vertical
2390.00	47.91	27.59	5.38	24.71	56.17	74.00	-17.83	Vertical

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	34.18	27.91	5.30	24.64	42.75	54.00	-11.25	Horizontal
2390.00	35.47	27.59	5.38	24.71	43.73	54.00	-10.27	Horizontal
2310.00	34.19	27.91	5.30	24.64	42.76	54.00	-11.24	Vertical
2390.00	36.21	27.59	5.38	24.71	44.47	54.00	-9.53	Vertical

Test channel:	Highest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	46.07	27.53	5.47	24.80	54.27	74.00	-19.73	Horizontal
2500.00	45.05	27.55	5.49	24.86	53.23	74.00	-20.77	Horizontal
2483.50	47.07	27.53	5.47	24.80	55.27	74.00	-18.73	Vertical
2500.00	46.15	27.55	5.49	24.86	54.33	74.00	-19.67	Vertical

**Average value:**

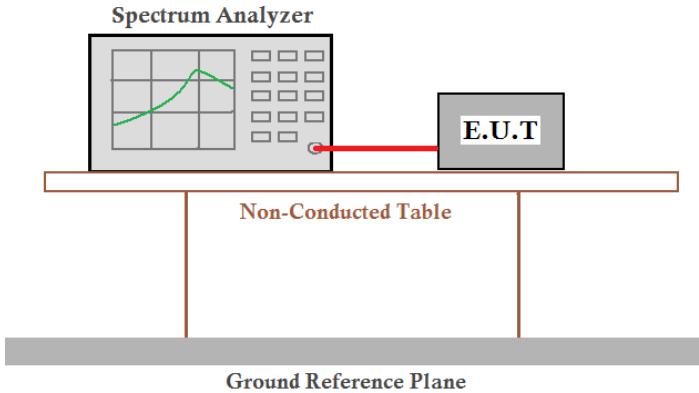
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	35.02	27.53	5.47	24.80	43.22	54.00	-10.78	Horizontal
2500.00	34.88	27.55	5.49	24.86	43.06	54.00	-10.94	Horizontal
2483.50	35.54	27.53	5.47	24.80	43.74	54.00	-10.26	Vertical
2500.00	34.88	27.55	5.49	24.86	43.06	54.00	-10.94	Vertical

Remark:

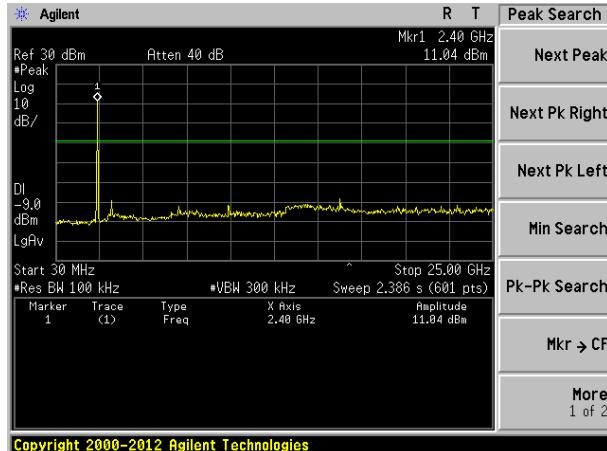
- Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
- The emission levels of other frequencies are very lower than the limit and not show in test report.

## 7.10 Spurious Emission

### 7.10.1 Conducted Emission Method

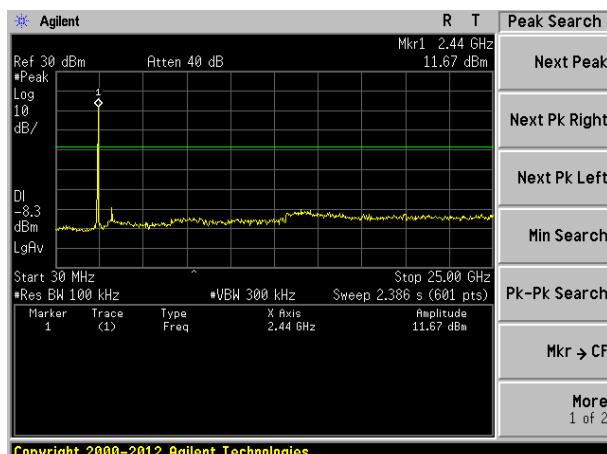
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 Meas Guidance
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Lowest channel



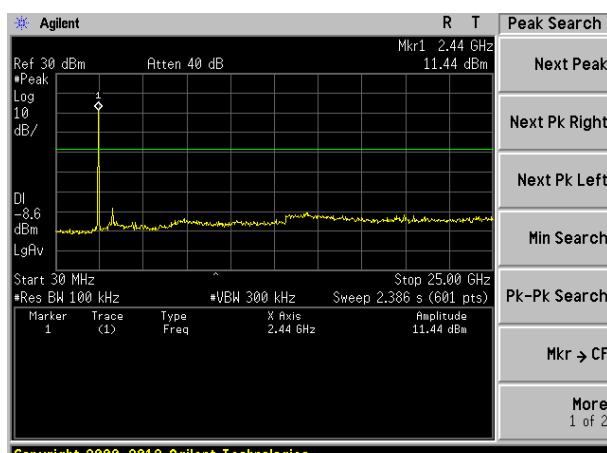
30MHz~25GHz

Middle channel



30MHz~25GHz

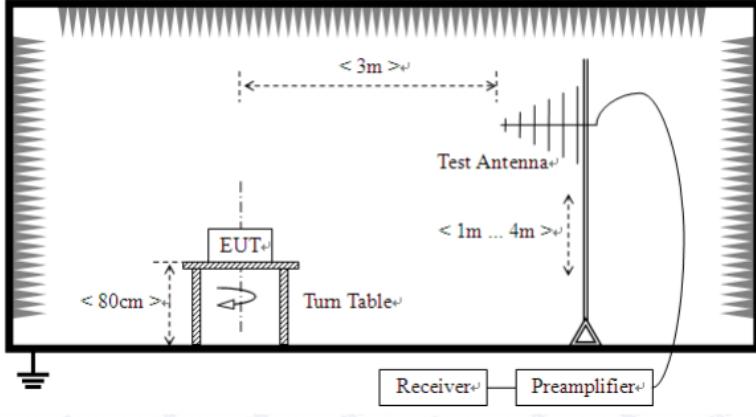
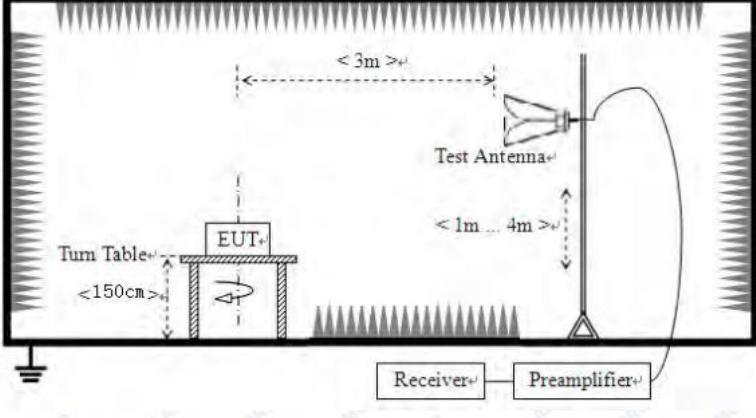
Highest channel



30MHz~25GHz

## 7.10.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209						
Test Method:	ANSI C63.10:2013						
Test Frequency Range:	9kHz to 25GHz						
Test site:	Measurement Distance: 3m						
Receiver setup:	Frequency	Detector	RBW	VBW	Value		
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak		
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak		
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak		
	Above 1GHz	Peak	1MHz	3MHz	Peak		
		Peak	1MHz	10Hz	Average		
Limit:	Frequency	Limit (uV/m)	Value	Measurement Distance			
	0.009MHz-0.490MHz	2400/F(KHz)	QP	300m			
	0.490MHz-1.705MHz	24000/F(KHz)	QP	300m			
	1.705MHz-30MHz	30	QP	30m			
	30MHz-88MHz	100	QP	3m			
	88MHz-216MHz	150	QP				
	216MHz-960MHz	200	QP				
	960MHz-1GHz	500	QP				
	Above 1GHz	500	Average				
		5000	Peak				
Test setup:	For radiated emissions from 9kHz to 30MHz						

	<p>For radiated emissions from 30MHz to1GHz</p>  <p>For radiated emissions above 1GHz</p> 
Test Procedure:	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB</li> </ol>

	margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1 012mbar
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test voltage:	AC120V 60Hz					
Test results:	Pass					

*Remark:*

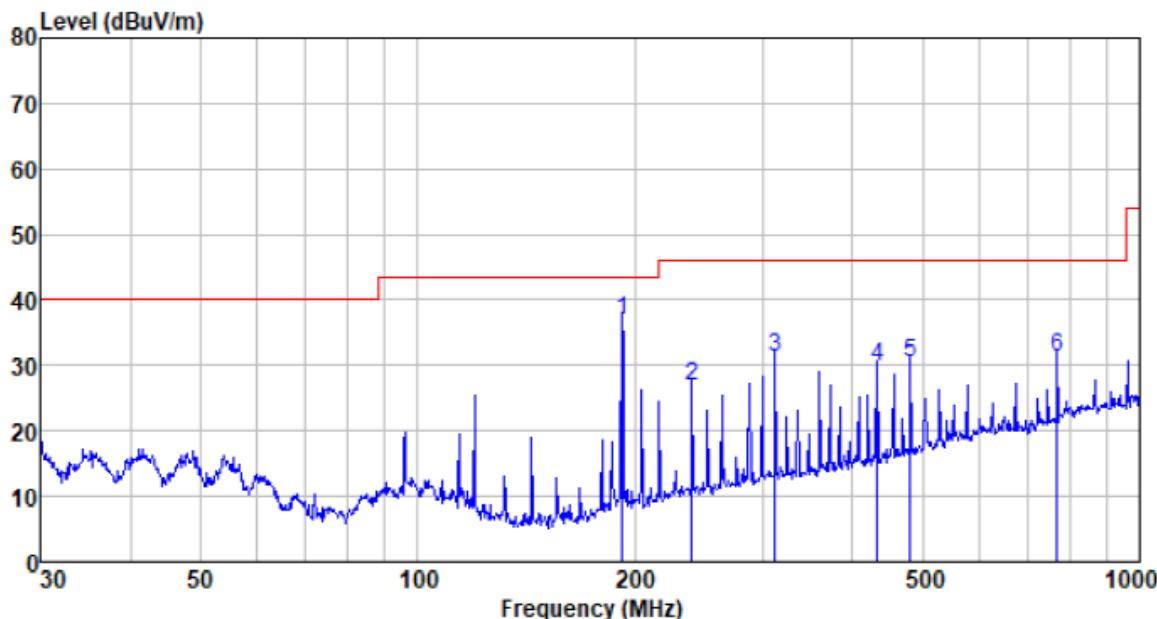
*Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case. Only the worst case shows below.*

■ **9kHz~30MHz**

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

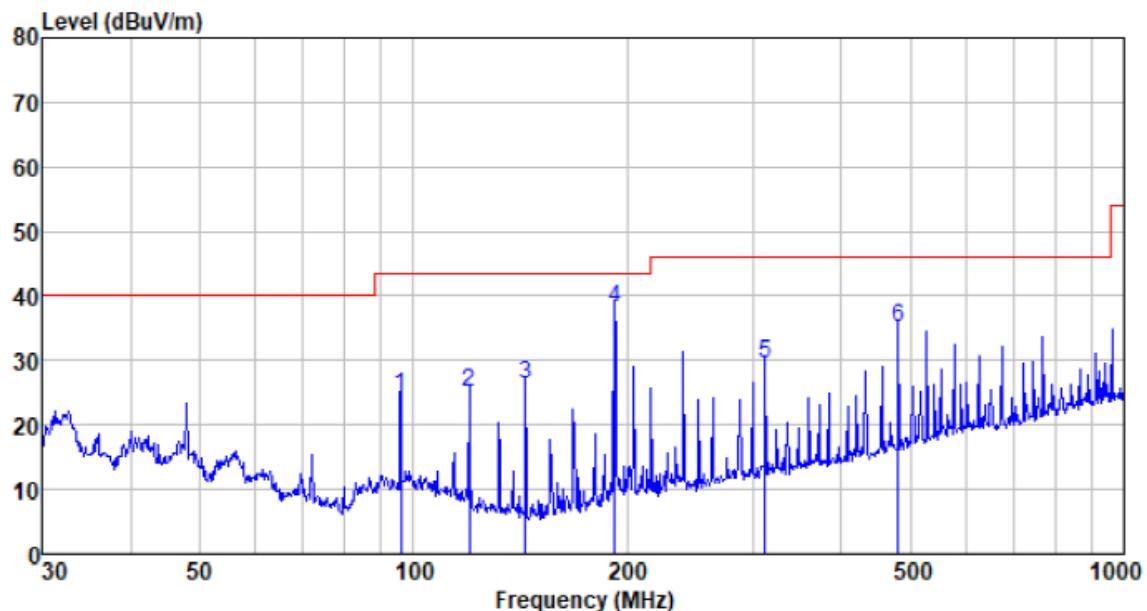
**Measurement data:****■ Below 1GHz**

Test mode:	Bluetooth mode	Probe:	Horizontal
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
191.745	62.54	9.99	1.80	37.29	37.04	43.50	-6.46	QP
239.987	50.28	11.85	2.07	37.37	26.83	46.00	-19.17	QP
312.179	52.43	13.85	2.42	37.43	31.27	46.00	-14.73	QP
432.546	48.22	15.99	3.01	37.52	29.70	46.00	-16.30	QP
480.528	47.86	16.93	3.22	37.51	30.50	46.00	-15.50	QP
768.748	43.64	20.84	4.35	37.62	31.21	46.00	-14.79	QP

Test mode:	Bluetooth mode	Probe:	Vertical
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
96.099	48.28	11.65	1.16	36.69	24.40	43.50	-19.10	QP
119.856	51.05	9.50	1.36	36.88	25.03	43.50	-18.47	QP
143.830	54.33	7.47	1.53	37.04	26.29	43.50	-17.21	QP
191.745	63.65	9.99	1.80	37.29	38.15	43.50	-5.35	QP
312.179	50.78	13.85	2.42	37.43	29.62	46.00	-16.38	QP
480.528	52.56	16.93	3.22	37.51	35.20	46.00	-10.80	QP

**Above 1GHz**

Test channel:	Lowest							
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4821.750	39.52	31.22	8.61	37.73	41.62	74	-32.38	Vertical
7232.625	33.73	36.25	11.68	35.62	46.04	74	-27.96	Vertical
9643.500	32.36	37.97	14.16	34.95	49.54	74	-24.46	Vertical
12054.375	27.47	38.51	15.05	36.22	44.81	74	-29.19	Vertical
14465.250	26.62	41.49	17.17	36.06	49.22	74	-24.78	Vertical
16876.125	27.18	39.62	18.88	36.21	49.47	74	-24.53	Vertical
4821.750	38.31	31.22	8.61	37.73	40.41	74	-33.59	Horizontal
7232.625	33.54	36.25	11.68	35.62	45.85	74	-28.15	Horizontal
9643.500	31.97	37.97	14.16	34.95	49.15	74	-24.85	Horizontal
12054.375	27.59	38.51	15.05	36.22	44.93	74	-29.07	Horizontal
14465.250	27.66	41.49	17.17	36.06	50.26	74	-23.74	Horizontal
16876.125	26.13	39.62	18.88	36.21	48.42	74	-25.58	Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4821.750	28.66	31.22	8.61	37.73	30.76	54	-23.24	Vertical
7232.625	22.61	36.25	11.68	35.62	34.92	54	-19.08	Vertical
9643.500	22.72	37.97	14.16	34.95	39.9	54	-14.1	Vertical
12054.375	19.87	38.51	15.05	36.22	37.21	54	-16.79	Vertical
14465.250	20.21	41.49	17.17	36.06	42.81	54	-11.19	Vertical
16876.125	19.93	39.62	18.88	36.21	42.22	54	-11.78	Vertical
4821.750	27.89	31.22	8.61	37.73	29.99	54	-24.01	Horizontal
7232.625	22.13	36.25	11.68	35.62	34.44	54	-19.56	Horizontal
9643.500	21.73	37.97	14.16	34.95	38.91	54	-15.09	Horizontal
12054.375	20.07	38.51	15.05	36.22	37.41	54	-16.59	Horizontal
14465.250	19.54	41.49	17.17	36.06	42.14	54	-11.86	Horizontal
16876.125	19.43	39.62	18.88	36.21	41.72	54	-12.28	Horizontal

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. \*\*, means this data is the too weak instrument of signal is unable to test.

Test channel:	Middle
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882.500	38.71	31.33	8.67	37.76	40.95	74	-33.05	Vertical
7323.750	33.88	36.43	11.72	35.6	46.43	74	-27.57	Vertical
9765.000	33.44	38.1	14.25	35.03	50.76	74	-23.24	Vertical
12206.250	28.53	38.59	15.16	36.33	45.95	74	-28.05	Vertical
14647.500	27.81	41.1	17.28	35.77	50.42	74	-23.58	Vertical
17088.750	27.32	40.22	18.99	36.29	50.24	74	-23.76	Vertical
4882.500	39.29	31.33	8.67	37.76	41.53	74	-32.47	Horizontal
7323.750	32.58	36.43	11.72	35.6	45.13	74	-28.87	Horizontal
9765.000	33.36	38.1	14.25	35.03	50.68	74	-23.32	Horizontal
12206.250	27.6	38.59	15.16	36.33	45.02	74	-28.98	Horizontal
14647.500	25.91	41.1	17.28	35.77	48.52	74	-25.48	Horizontal
17088.750	27.81	40.22	18.99	36.29	50.73	74	-23.27	Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4882.500	29.61	31.33	8.67	37.76	31.85	54	-22.15	Vertical
7323.750	22.21	36.43	11.72	35.6	34.76	54	-19.24	Vertical
9765.000	22.71	38.1	14.25	35.03	40.03	54	-13.97	Vertical
12206.250	20.01	38.59	15.16	36.33	37.43	54	-16.57	Vertical
14647.500	18.36	41.1	17.28	35.77	40.97	54	-13.03	Vertical
17088.750	19.11	40.22	18.99	36.29	42.03	54	-11.97	Vertical
4882.500	29.43	31.33	8.67	37.76	31.67	54	-22.33	Horizontal
7323.750	21.68	36.43	11.72	35.6	34.23	54	-19.77	Horizontal
9765.000	23.08	38.1	14.25	35.03	40.4	54	-13.6	Horizontal
12206.250	19.42	38.59	15.16	36.33	36.84	54	-17.16	Horizontal
14647.500	18.63	41.1	17.28	35.77	41.24	54	-12.76	Horizontal
17088.750	19.85	40.22	18.99	36.29	42.77	54	-11.23	Horizontal

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. "", means this data is the too weak instrument of signal is unable to test.

Test channel:	Highest							
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4943.250	43.78	31.41	8.71	37.78	46.12	74	-27.88	Vertical
7414.875	34.27	36.62	11.77	35.57	47.09	74	-26.91	Vertical
9886.500	36.53	38.27	14.35	35.12	54.03	74	-19.97	Vertical
12358.125	29.18	38.64	15.25	36.42	46.65	74	-27.35	Vertical
14829.750	28.12	40.7	17.37	35.53	50.66	74	-23.34	Vertical
17301.375	26.68	41.26	18.98	36.27	50.65	74	-23.35	Vertical
4943.250	43.25	31.41	8.71	37.78	45.59	74	-28.41	Horizontal
7414.875	33.26	36.62	11.77	35.57	46.08	74	-27.92	Horizontal
9886.500	32.74	38.27	14.35	35.12	50.24	74	-23.76	Horizontal
12358.125	28.72	38.64	15.25	36.42	46.19	74	-27.81	Horizontal
14829.750	27.42	40.7	17.37	35.53	49.96	74	-24.04	Horizontal
17301.375	27.1	41.26	18.98	36.27	51.07	74	-22.93	Horizontal

**Average value:**

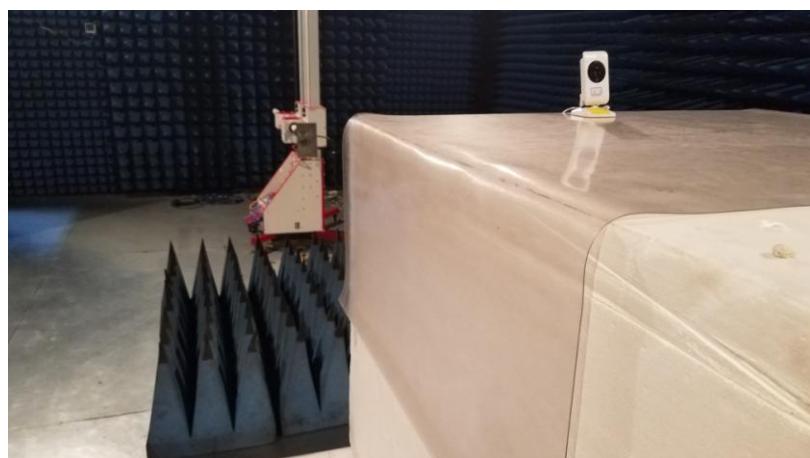
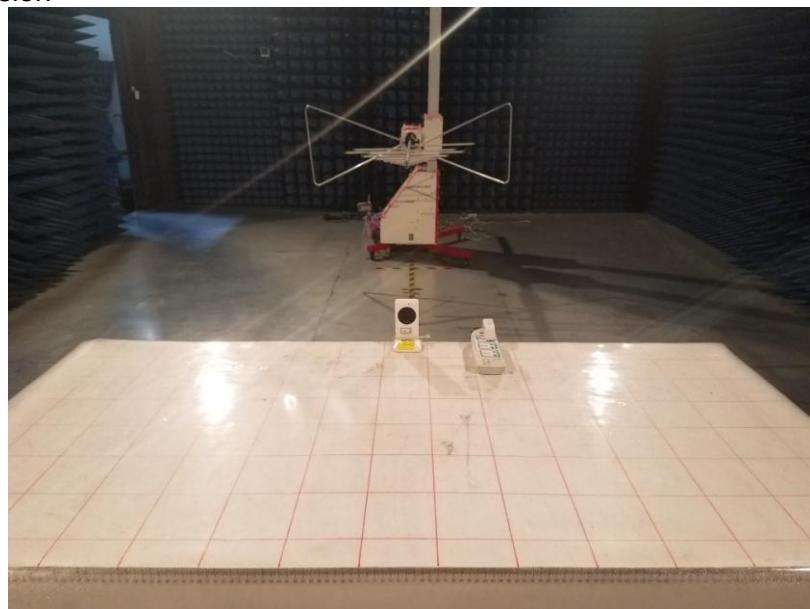
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4943.250	34.78	31.41	8.71	37.78	37.12	54	-16.88	Vertical
7414.875	24.21	36.62	11.77	35.57	37.03	54	-16.97	Vertical
9886.500	25.05	38.27	14.35	35.12	42.55	54	-11.45	Vertical
12358.125	19.46	38.64	15.25	36.42	36.93	54	-17.07	Vertical
14829.750	18.97	40.7	17.37	35.53	41.51	54	-12.49	Vertical
17301.375	19.36	41.26	18.98	36.27	43.33	54	-10.67	Vertical
4943.250	33.68	31.41	8.71	37.78	36.02	54	-17.98	Horizontal
7414.875	22.66	36.62	11.77	35.57	35.48	54	-18.52	Horizontal
9886.500	22.02	38.27	14.35	35.12	39.52	54	-14.48	Horizontal
12358.125	18.77	38.64	15.25	36.42	36.24	54	-17.76	Horizontal
14829.750	19.34	40.7	17.37	35.53	41.88	54	-12.12	Horizontal
17301.375	18.96	41.26	18.98	36.27	42.93	54	-11.07	Horizontal

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. “\*\*” means this data is the too weak instrument of signal is unable to test.

## 8 Test Setup Photo

Radiated Emission

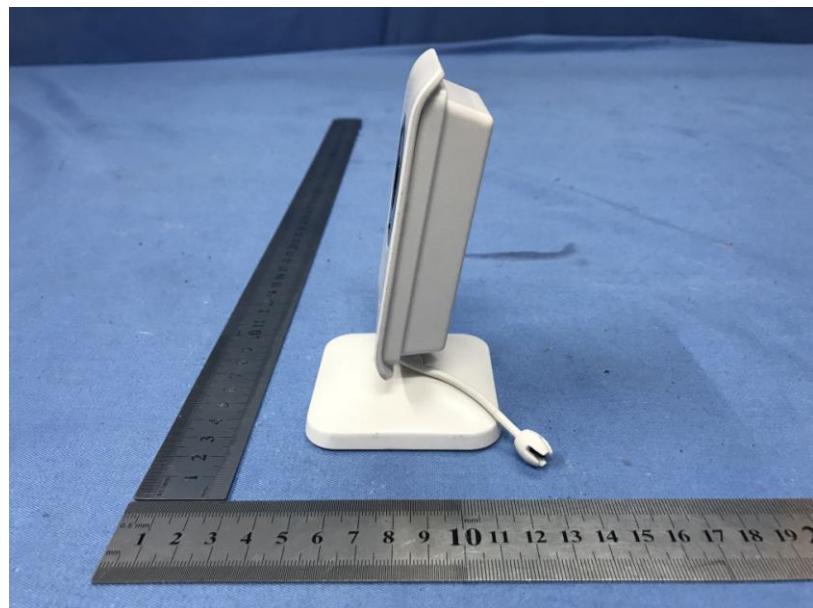


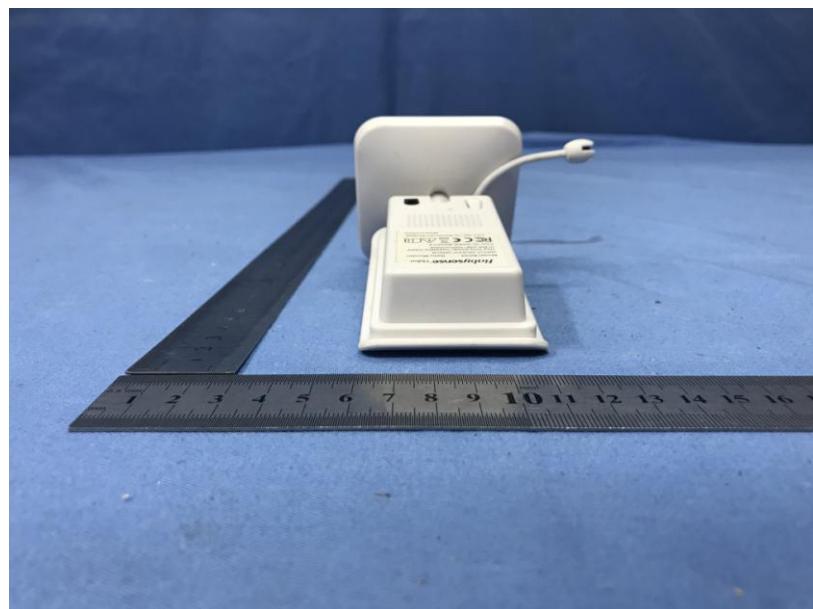
Conducted Emission



## 9 EUT Constructional Details





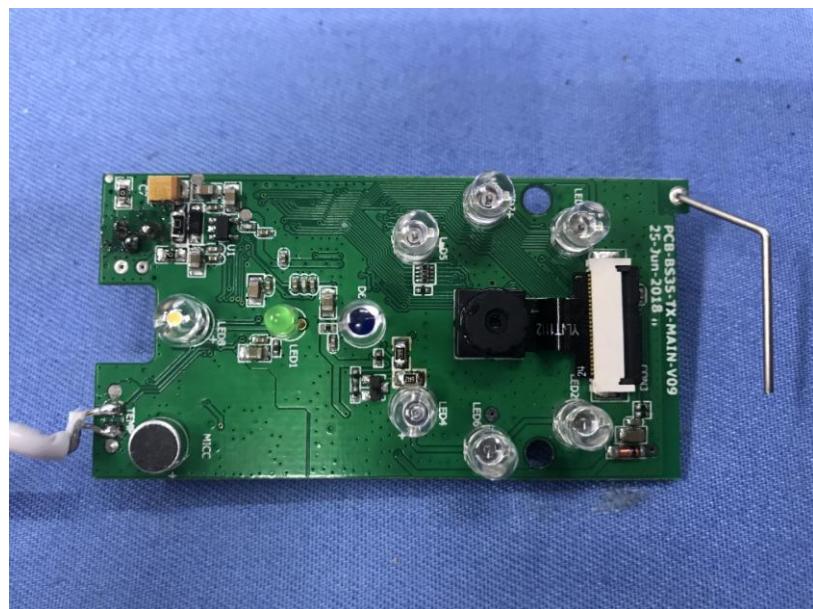
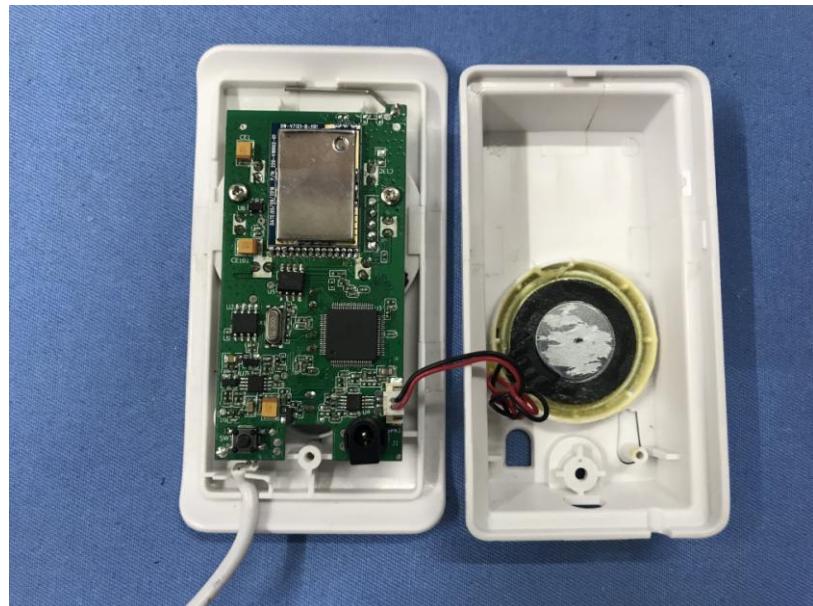


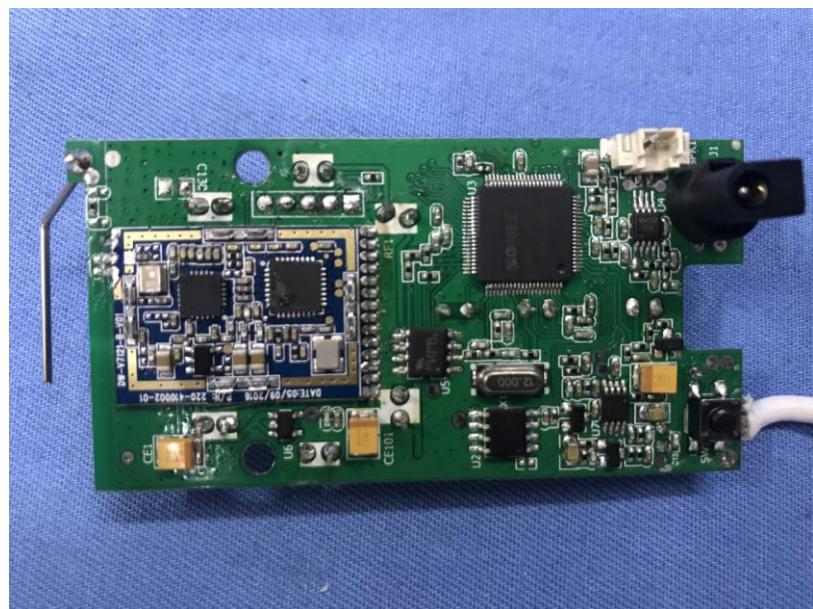
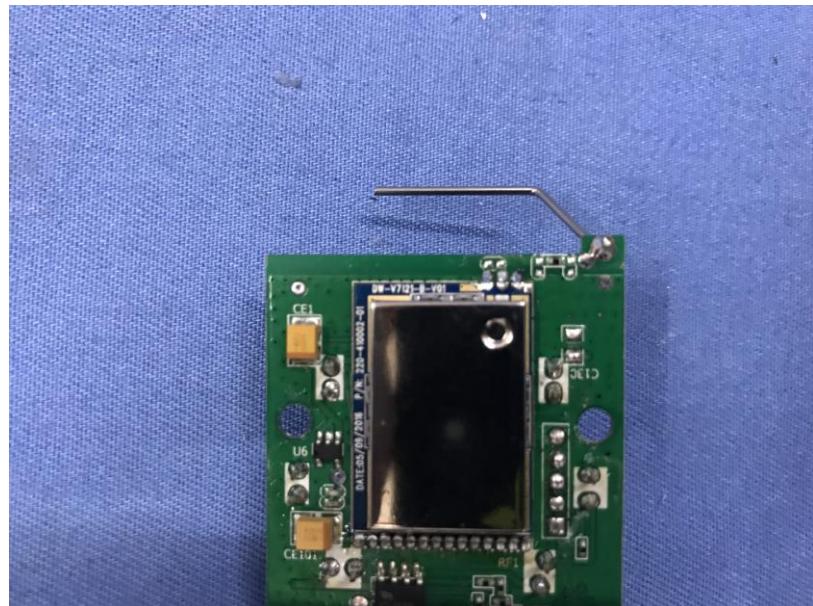
Adapter 1:



Adapter 2:







-----End-----