

# FCC Report

**Applicant:** Radiolink Electronic Limited

**Address of Applicant:** 3/F,BLD2,FuGuo industrial park,KaiFeng North Road, MeiLin, Shenzhen, China

**Manufacturer/Factory:** Radiolink Electronic Limited

**Address of Manufacturer/Factory:** 3/F,BLD2,FuGuo industrial park,KaiFeng North Road, MeiLin, Shenzhen, China

**Equipment Under Test (EUT)**

Product Name: Pistol grip transmitter

Model No.: RC4GS

**FCC ID:** U2BRL039RC4GS

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.247:2017

**Date of sample receipt:** December 19, 2017

**Date of Test:** December 20-29, 2017

**Date of report issued:** January 02, 2018

**Test Result :** PASS \*

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

Authorized Signature:

A circular blue ink stamp from GTS Global United Technology Services Co., Ltd. is visible. The stamp contains the text 'GTS', 'GLOBAL UNITED TECHNOLOGY SERVICES CO., LTD.', and '12000111F01'. A handwritten signature in black ink is written across the stamp.

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	January 02, 2018	Original

Prepared By:

*Bill. Yuan*

Date:

January 02, 2018

Project Engineer

Check By:

*Andy. Wu*

Date:

January 02, 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	N/A
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(a)(1)	Pass
Radiated Emission	15.205/15.209	Pass
Band Edge	15.247(d)	Pass

*Remark: Test according to ANSI C63.4:2014 and ANSI C63.10:2013*

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

### Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	$\pm 4.34\text{dB}$	(1)
Radiated Emission	30MHz ~ 1000MHz	$\pm 4.24\text{dB}$	(1)
Radiated Emission	1GHz ~ 26.5GHz	$\pm 4.68\text{dB}$	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	$\pm 3.45\text{dB}$	(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:	Pistol grip transmitter
Model No.:	RC4GS
Operation Frequency:	2408MHz~2477.6MHz
Channel numbers:	59
Channel separation:	1.2MHz
Modulation type:	GFSK
Antenna Type:	Integral antenna
Antenna gain:	2.0dBi(declared by Applicant)
Power supply:	4.8~15.0V DC, 4*AA or 2S-4S Lithium battery for Transmitter 4.8~10.0V DC, 4*AA or 2S-4S Lithium battery for Receiver

Operation Frequency each of channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2408.0MHz	21	2432.0MHz	41	2456.0MHz
2	2409.2MHz	22	2433.2MHz	42	2457.2MHz
3	2410.4MHz	23	2434.4MHz	43	2458.4MHz
4	2411.6MHz	24	2435.6MHz	44	2459.6MHz
5	2412.8MHz	25	2436.8MHz	45	2460.8MHz
6	2414.0MHz	26	2438.0MHz	46	2462.0MHz
7	2415.2MHz	27	2439.2MHz	47	2463.2MHz
8	2416.4MHz	28	2440.4MHz	48	2464.4MHz
9	2417.6MHz	29	2441.6MHz	49	2465.6MHz
10	2418.8MHz	30	2442.8MHz	50	2466.8MHz
11	2420.0MHz	31	2444.0MHz	51	2468.0MHz
12	2421.2MHz	32	2445.2MHz	52	2469.2MHz
13	2422.4MHz	33	2446.4MHz	53	2470.4MHz
14	2423.6MHz	34	2447.6MHz	54	2471.6MHz
15	2424.8MHz	35	2448.8MHz	55	2472.8MHz
16	2426.0MHz	36	2450.00MHz	56	2474.0MHz
17	2427.2MHz	37	2451.2MHz	57	2475.2MHz
18	2428.4MHz	38	2452.4MHz	58	2476.4MHz
19	2429.6MHz	39	2453.6MHz	59	2477.6MHz
20	2430.8MHz	40	2454.8MHz		

## 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	2408.0MHz
The middle channel	2441.6MHz
The Highest channel	2477.6MHz

## 5.2 Test mode

Transmitting mode	Keep the EUT in transmitting mode.
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## 5.3 Test Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"><li>• <b>Industry Canada (IC) —Registration No.: 9079A-2</b></li></ul> <p>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.</p>
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## 5.4 Test Location

All tests were performed at:
<p>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</p>

## 5.5 Other Information Requested by the Customer

None.
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## 5.6 Description of Support Units

None.
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## 6 Test Instruments list

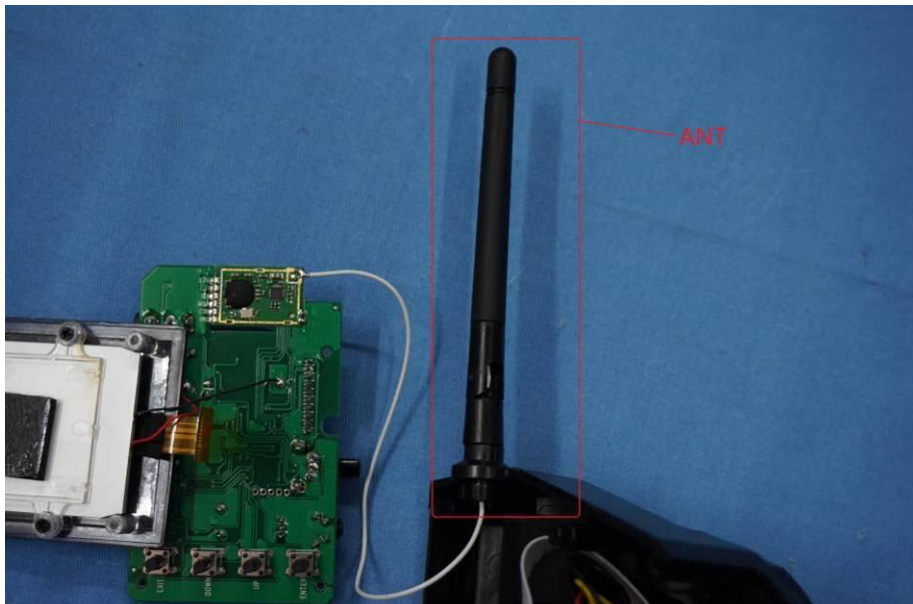
Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June 28 2017	June 27 2018
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June 28 2017	June 27 2018
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June 28 2017	June 27 2018
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 28 2017	June 27 2018
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 28 2017	June 27 2018
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	June 28 2017	June 27 2018
10	Coaxial Cable	GTS	N/A	GTS211	June 28 2017	June 27 2018
11	Coaxial cable	GTS	N/A	GTS210	June 28 2017	June 27 2018
12	Coaxial Cable	GTS	N/A	GTS212	June 28 2017	June 27 2018
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June 28 2017	June 27 2018
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June 28 2017	June 27 2018
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 28 2017	June 27 2018
16	Band filter	Amindeon	82346	GTS219	June 28 2017	June 27 2018

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	June 28 2017	June 27 2018

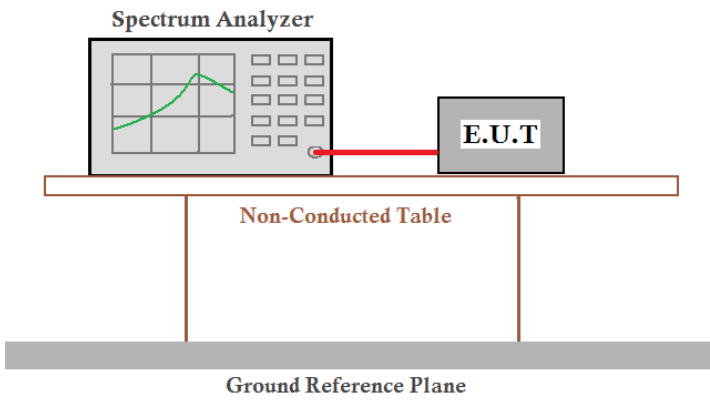


## 7 Test results and Measurement Data

### 7.1 Antenna requirement

<b>Standard requirement:</b>	FCC Part15 C Section 15.203 /247(c)
<p><b>15.203 requirement:</b></p> <p>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></p> <p>(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>	
<b>E.U.T Antenna:</b>	
<p><i>The antenna is Integral antenna, the best case gain of the antenna is 2.0dBi</i></p> 	

## 7.2 Conducted Peak Output Power

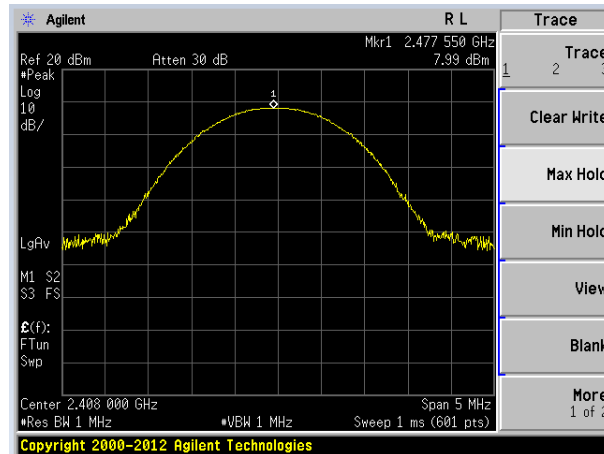
Test Requirement:	FCC Part15 C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2013
Limit:	20.97dBm
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a 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

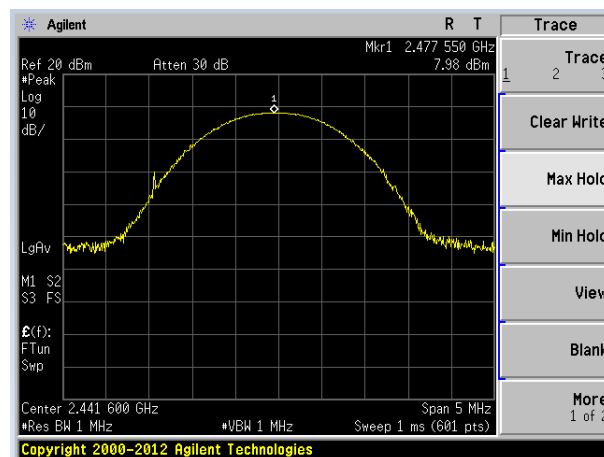
Mode	Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
GFSK	Lowest	7.99	20.97	Pass
	Middle	7.98		
	Highest	7.93		

Test plot as follows:

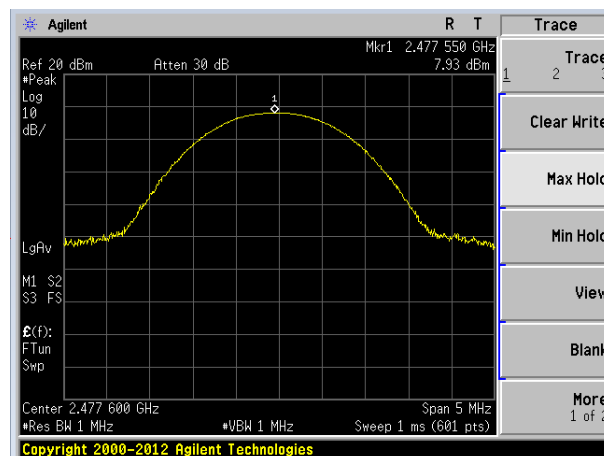
Test mode:	GFSK mode
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Lowest channel

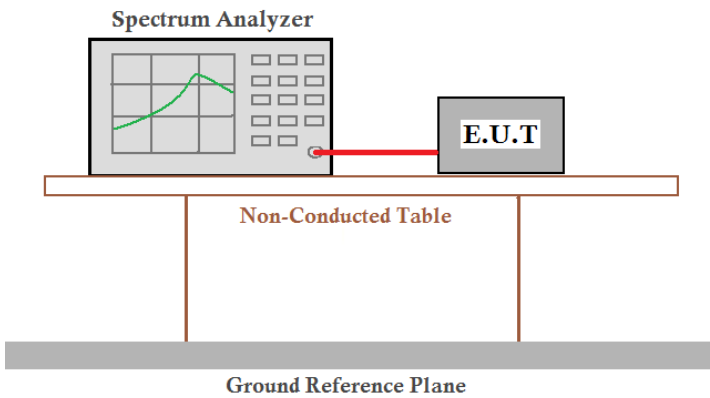


Middle channel



Highest channel

## 7.3 20dB Emission Bandwidth

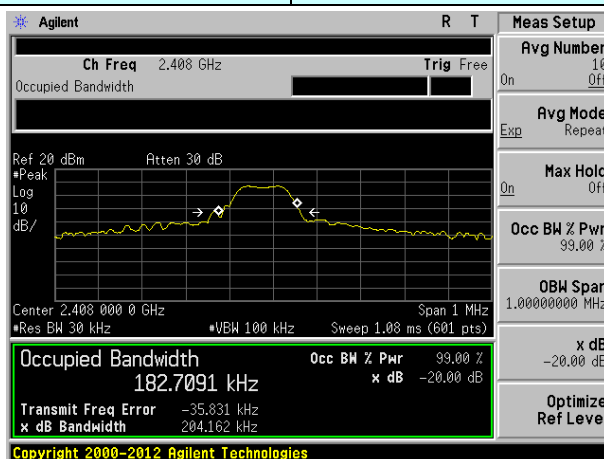
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	DA 00-705,ANSI C63.10:2013
Limit:	N/A
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a 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

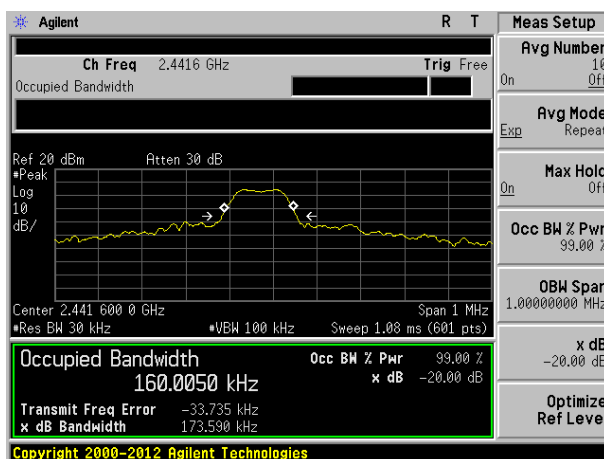
Mode	Test channel	20dB Emission Bandwidth (MHz)	Result
GFSK	Lowest	0.204	Pass
	Middle	0.174	
	Highest	0.178	

Test plot as follows:

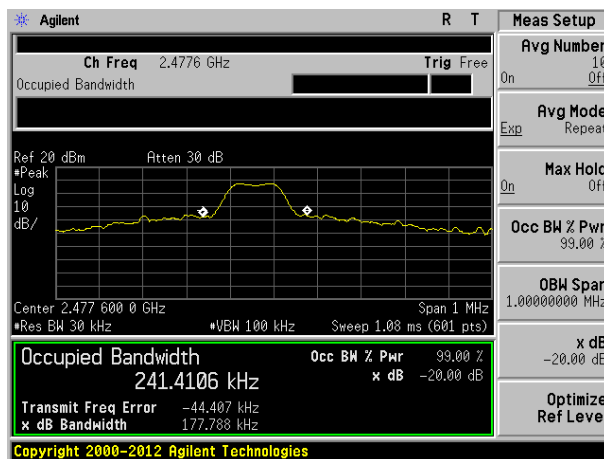
Test mode:	GFSK mode
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Lowest channel

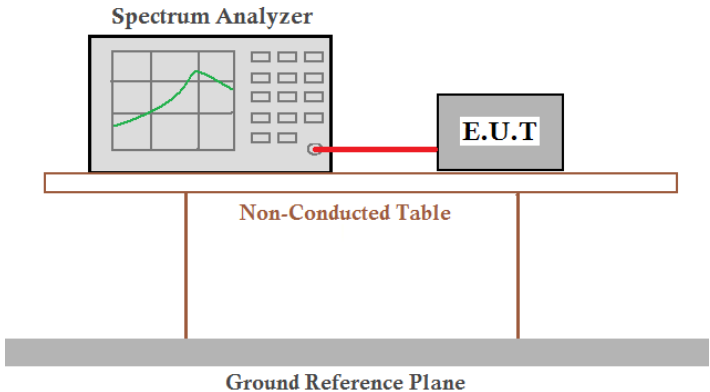


Middle channel



Highest channel

## 7.4 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	DA 00-705, 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:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer and an E.U.T. (Equipment Under Test) are connected by a red cable. They are positioned on a 'Non-Conducted Table' which has two vertical legs. Below this table is a '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

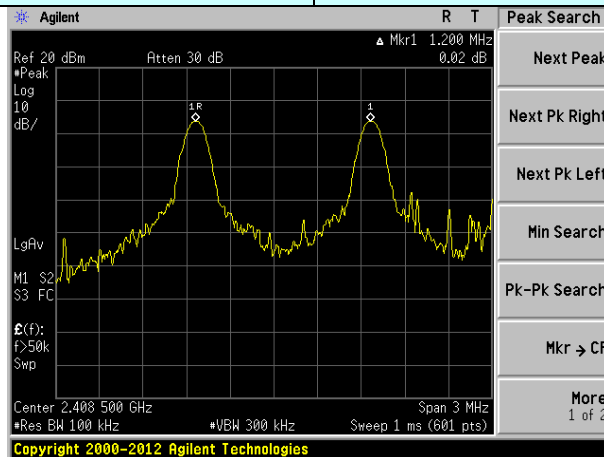
Mode	Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
GFSK	Lowest	1200	136	Pass
	Middle	1200	136	Pass
	Highest	1200	136	Pass

Note: According to section 7.3

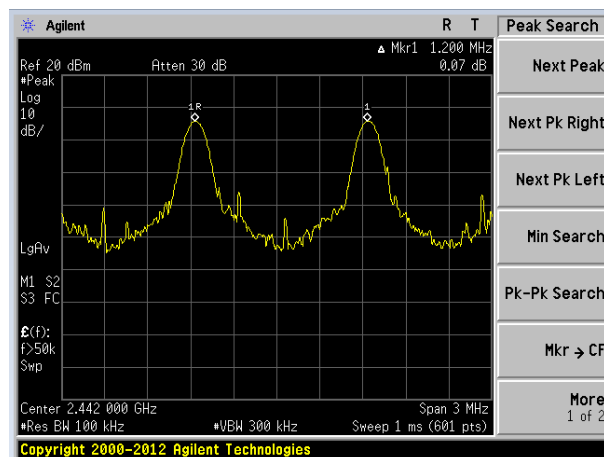
Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
GFSK	204.162	136

**Test plot as follows:**

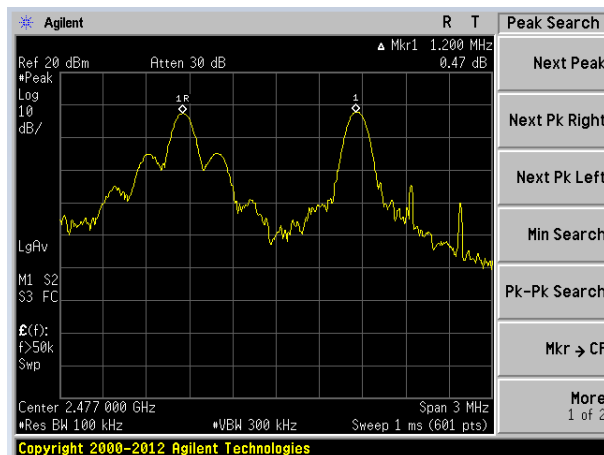
Modulation mode:	GFSK
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Lowest channel

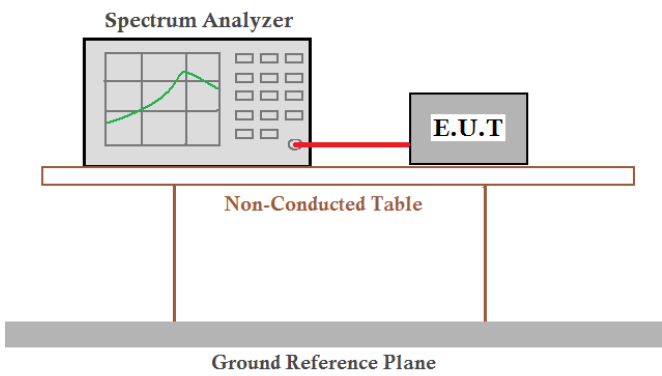


Middle channel



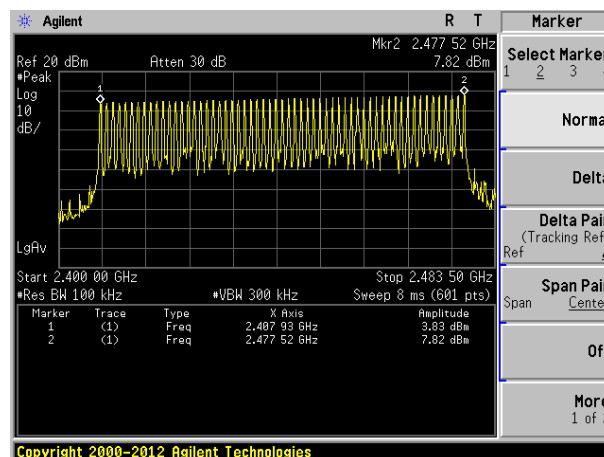
Highest channel

## 7.5 Hopping Channel Number

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
Test Method:	DA 00-705, ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a 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

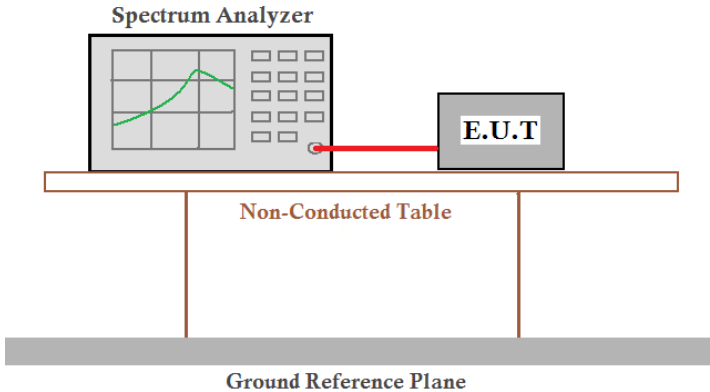
### Measurement Data:

Mode	Hopping channel numbers	Limit	Result
GFSK	59	15	Pass





## 7.6 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
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
2408.0MHz	9.3	219.48	400	Pass
2441.6MHz	9.3	219.48	400	Pass
2477.6MHz	9.3	219.48	400	Pass

The formula as below:

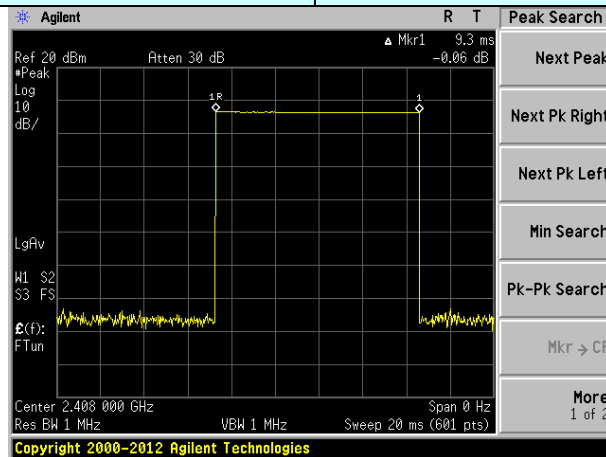
2408.0MHz: Dwell time = Ton \* Ton times in 1s \* 0.4s \* channel numbers=9.3ms\*1\*0.4\*59=219.48ms

2441.6MHz: Dwell time = Ton \* Ton times in 1s \* 0.4s \* channel numbers=9.3ms\*1\*0.4\*59=219.48ms

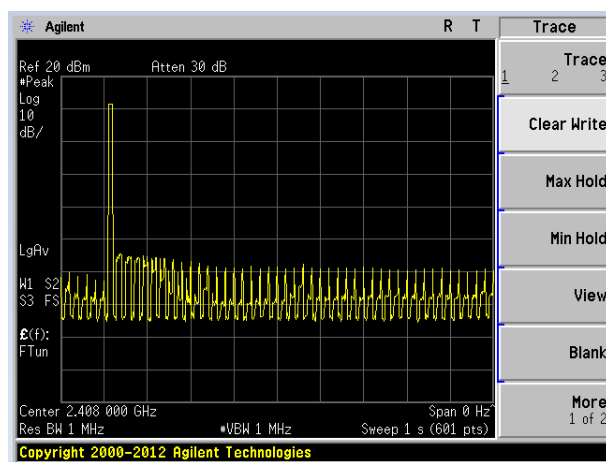
2477.6MHz: Dwell time = Ton \* Ton times in 1s \* 0.4s \* channel numbers=9.3ms\*1\*0.4\*59=219.48ms

Test plot as follows:

Test channel:	2480MHz
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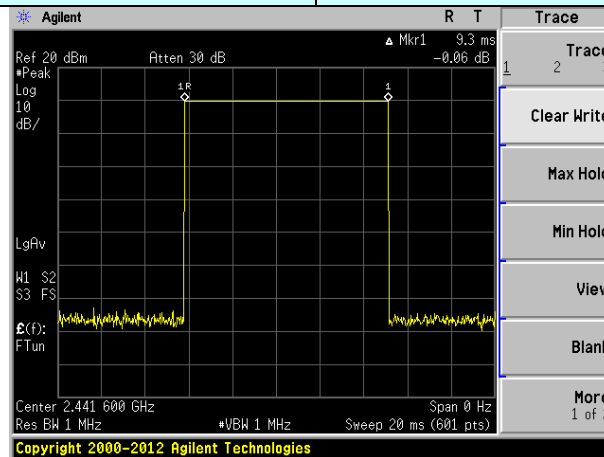


Ton

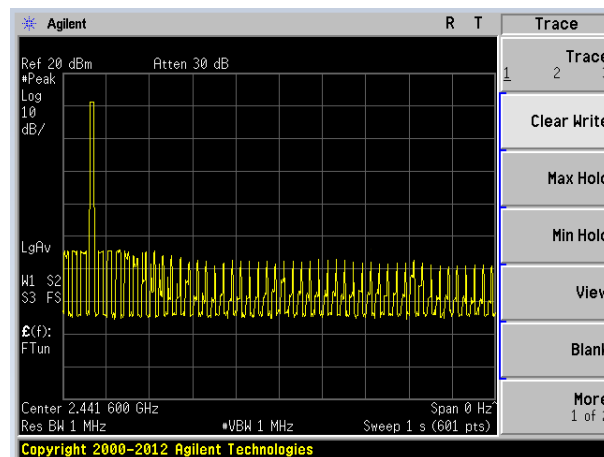


Ton times in 1s

Test channel:	2441.6MHz
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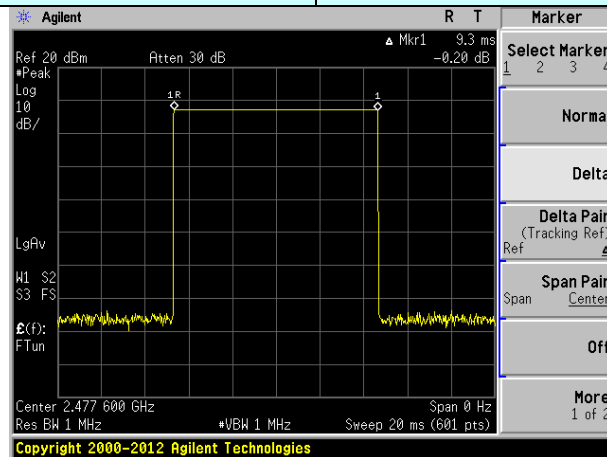


Ton

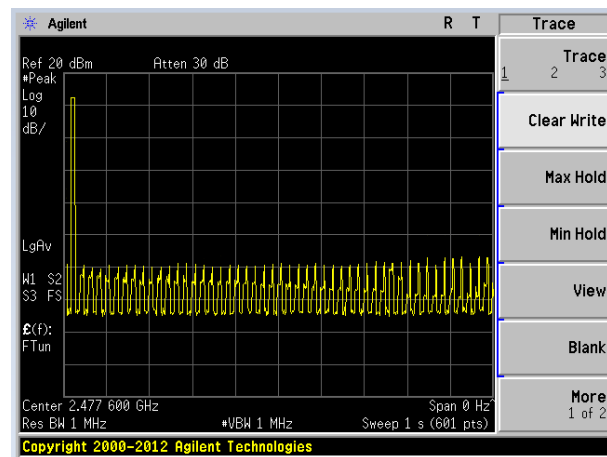


Ton times in 1s

Test channel:	2477.6MHz
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Ton



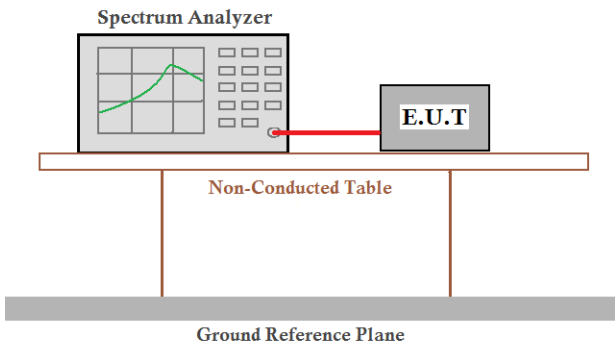
Ton times in 1s

## 7.7 Pseudorandom Frequency Hopping Sequence

Test Requirement:	FCC Part15 C Section 15.247 (a)(1) requirement:
<p><i>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.</i></p> <p><i>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.</i></p>	
EUT Pseudorandom Frequency Hopping Sequence	
<p><i>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.</i></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> <div data-bbox="242 1012 1299 1164"> </div> <p><i>Linear Feedback Shift Register for Generation of the PRBS sequence</i></p> <p><i>Each frequency used equally on the average by each transmitter.</i></p> <p><i>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.</i></p>	

## 7.8 Band Edge

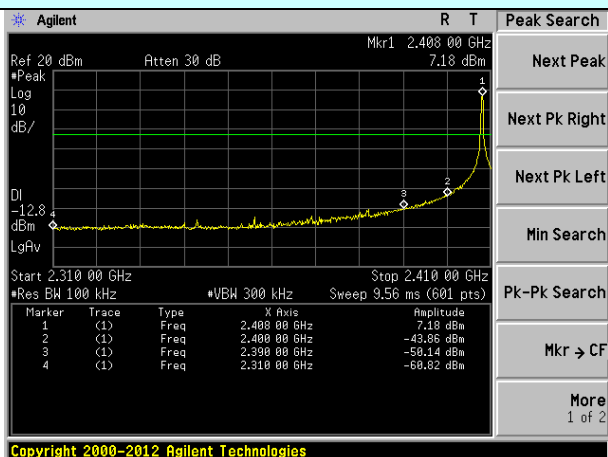
### 7.8.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	DA 00-705,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:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a 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

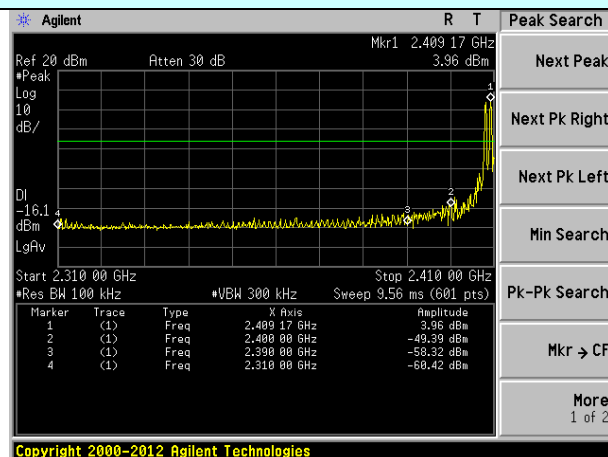
Test plot as follows:

## GFSK Mode:

Test channel:	Lowest channel
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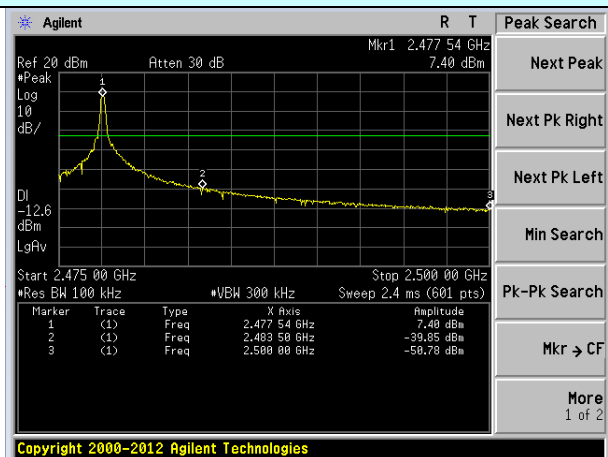


No-hopping mode

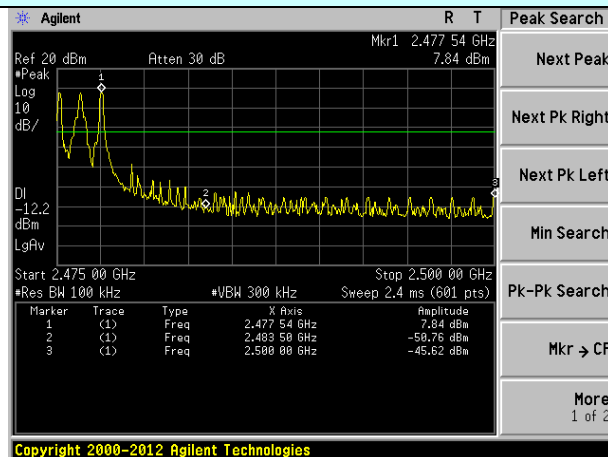


Hopping mode

Test channel:	Highest channel
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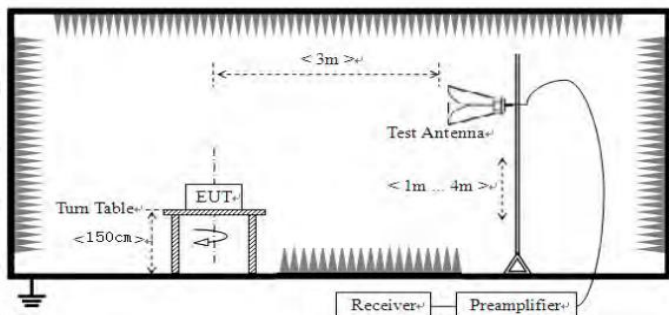


No-hopping mode



Hopping mode

## 7.8.2 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
		Peak	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>1. 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>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 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 Instruments:	Refer to section 6.0 for details				
Test mode:	Refer to section 5.2 for details				
Test results:	Pass				



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
2390.00	64.60	27.59	5.38	30.18	67.39	74.00	-6.61	Vertical
2400.00	64.66	27.58	5.39	30.18	67.45	74.00	-6.55	Vertical
2390.00	58.92	27.59	5.38	30.18	61.71	74.00	-12.29	Horizontal
2400.00	64.68	27.58	5.39	30.18	67.47	74.00	-6.53	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
2390.00	45.72	27.59	5.38	30.18	48.51	54.00	-5.49	Vertical
2400.00	46.88	27.58	5.39	30.18	49.67	54.00	-4.33	Vertical
2390.00	45.42	27.59	5.38	30.18	48.21	54.00	-5.79	Horizontal
2400.00	47.94	27.58	5.39	30.18	50.73	54.00	-3.27	Horizontal

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	63.95	27.53	5.47	29.93	67.02	74.00	-6.98	Vertical
2500.00	61.02	27.55	5.49	29.93	64.13	74.00	-9.87	Vertical
2483.50	60.51	27.53	5.47	29.93	63.58	74.00	-10.42	Horizontal
2500.00	54.44	27.55	5.49	29.93	57.55	74.00	-16.45	Horizontal

**Average value:**

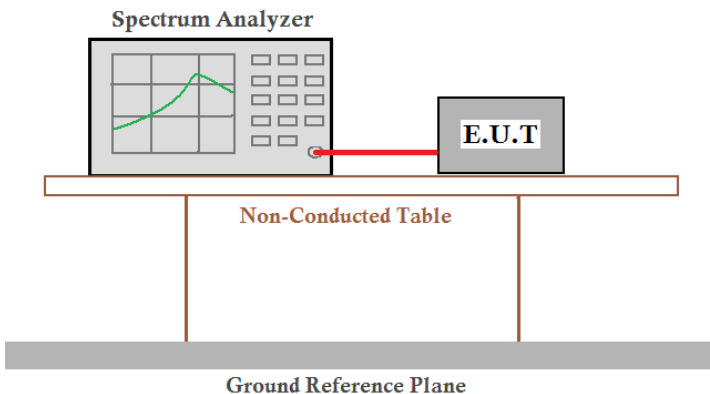
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	46.12	27.53	5.47	29.93	49.19	54.00	-4.81	Vertical
2500.00	43.97	27.55	5.49	29.93	47.08	54.00	-6.92	Vertical
2483.50	46.61	27.53	5.47	29.93	49.68	54.00	-4.32	Horizontal
2500.00	41.97	27.55	5.49	29.93	45.08	54.00	-8.92	Horizontal

**Remark:**

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

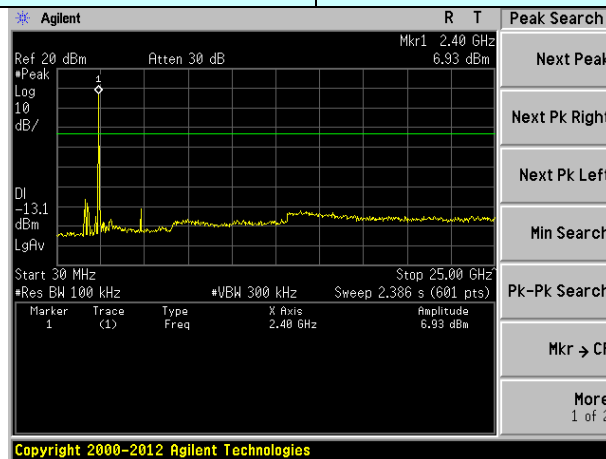
## 7.9 Spurious Emission

### 7.9.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
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:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. The table is supported by two vertical legs. Below the table is a 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

Test channel:

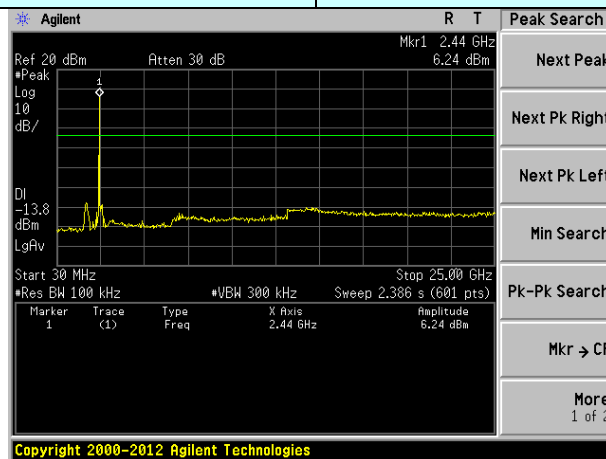
Lowest channel



30MHz~25GHz

Test channel:

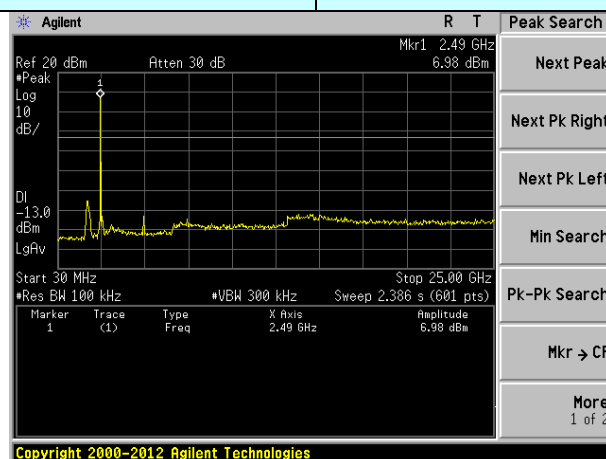
Middle channel



30MHz~25GHz

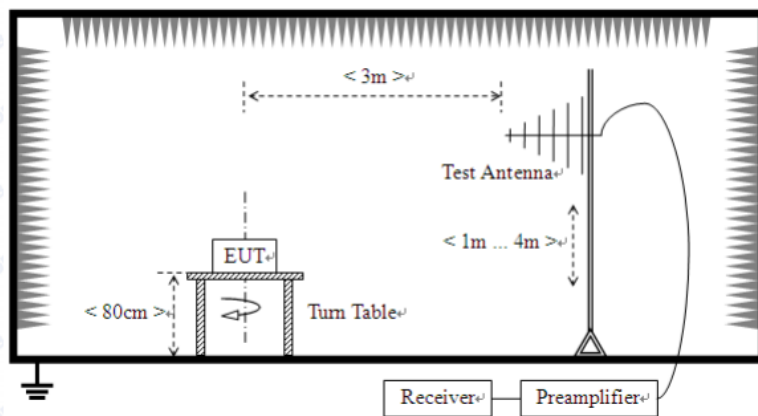
Test channel:

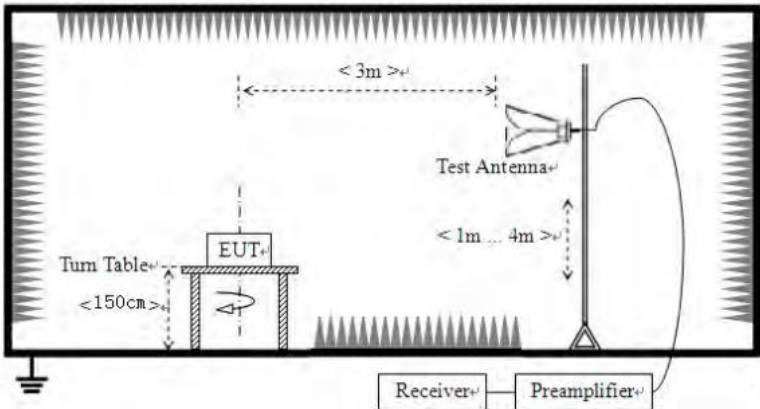
Highest channel



30MHz~25GHz

## 7.9.2 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	Remark
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Above 1GHz		54.0		Average Value
			74.0		Peak Value
Test setup:	Below 1GHz				
	<div></div>				
Test setup:	Above 1GHz				

	
<p>Test Procedure:</p>	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table (0.8 meters below 1G and 1.5 meters 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 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>
<p>Test Instruments:</p>	<p>Refer to section 6.0 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.2 for details</p>
<p>Test results:</p>	<p>Pass</p>

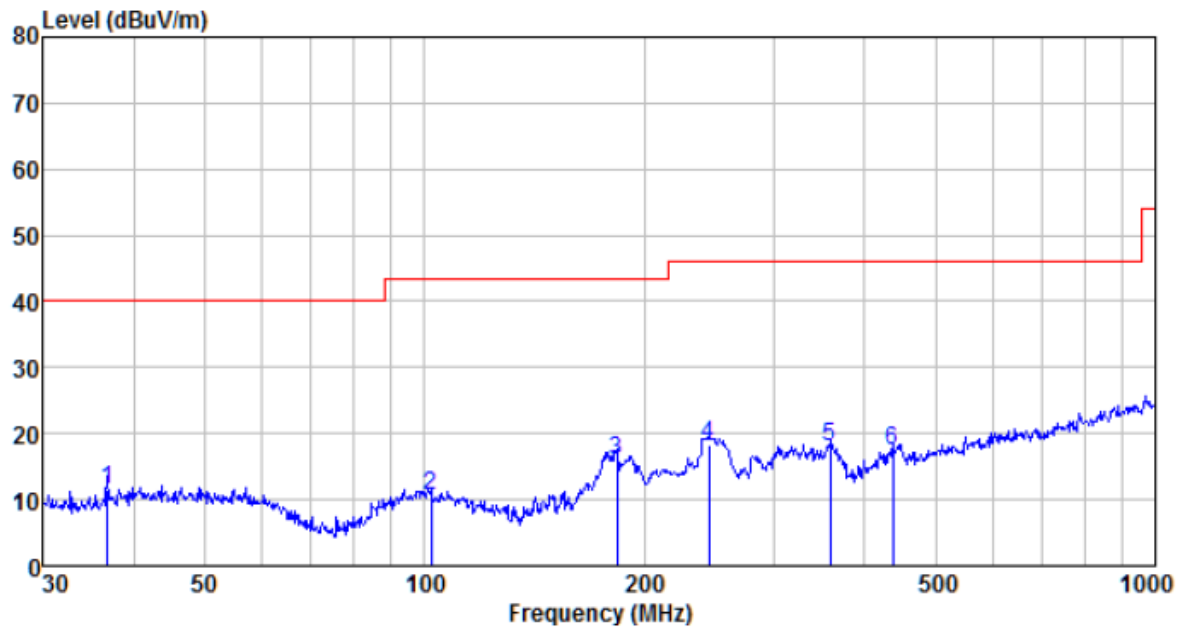
**Remark:**

1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.
2. The measured filed strength at frequencies below 30MHz are lower than the limit over 30dB. So the data isn't reported.

## Measurement data:

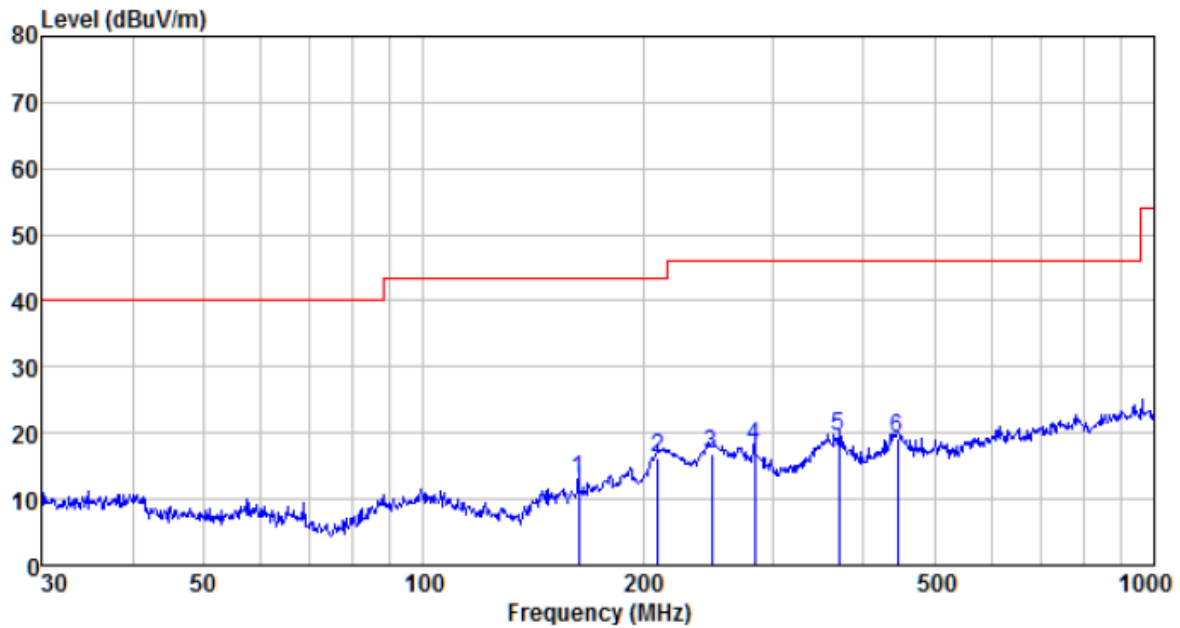
### ■ Below 1GHz

Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamplifier factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
36.766	26.31	14.77	0.63	30.06	11.65	40.00	-28.35	QP
102.001	24.11	14.97	1.21	29.69	10.60	43.50	-32.90	QP
183.201	31.40	11.92	1.75	29.26	15.81	43.50	-27.69	QP
245.090	31.80	14.08	2.10	29.61	18.37	46.00	-27.63	QP
359.186	28.58	16.40	2.67	29.69	17.96	46.00	-28.04	QP
437.120	26.31	17.55	3.03	29.42	17.47	46.00	-28.53	QP

Vertical:



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
163.182	29.90	10.77	1.65	29.34	12.98	43.50	-30.52	QP
209.313	30.65	12.87	1.89	29.29	16.12	43.50	-27.38	QP
247.682	30.16	14.07	2.11	29.63	16.71	46.00	-29.29	QP
283.979	30.85	14.75	2.29	29.90	17.99	46.00	-28.01	QP
370.702	29.75	16.51	2.72	29.64	19.34	46.00	-26.66	QP
444.851	27.86	17.57	3.07	29.41	19.09	46.00	-26.91	QP

## ■ Above 1GHz

Test channel:	Lowest
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### Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4816.00	56.12	31.79	8.61	32.09	64.43	74.00	-9.57	Vertical
7224.00	31.18	36.19	11.66	31.99	47.04	74.00	-26.96	Vertical
9632.00	32.73	38.01	14.16	31.58	53.32	74.00	-20.68	Vertical
12040.00	*					74.00		Vertical
14448.00	*					74.00		Vertical
4816.00	52.50	31.79	8.61	32.09	60.81	74.00	-13.19	Horizontal
7224.00	30.11	36.19	11.66	31.99	45.97	74.00	-28.03	Horizontal
9632.00	29.60	38.01	14.16	31.58	50.19	74.00	-23.81	Horizontal
12040.00	*					74.00		Horizontal
14448.00	*					74.00		Horizontal

### Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4816.00	41.71	31.79	8.61	32.09	50.02	54.00	-3.98	Vertical
7224.00	21.21	36.19	11.66	31.99	37.07	54.00	-16.93	Vertical
9632.00	21.33	38.01	14.16	31.58	41.92	54.00	-12.08	Vertical
12040.00	*					54.00		Vertical
14448.00	*					54.00		Vertical
4816.00	42.59	31.79	8.61	32.09	50.90	54.00	-3.10	Horizontal
7224.00	20.44	36.19	11.66	31.99	36.30	54.00	-17.70	Horizontal
9632.00	18.17	38.01	14.16	31.58	38.76	54.00	-15.24	Horizontal
12040.00	*					54.00		Horizontal
14448.00	*					54.00		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.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.



Test channel:	Middle
---------------	--------

## Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4883.20	50.39	31.85	8.66	32.12	58.78	74.00	-15.22	Vertical
7324.80	31.69	36.37	11.72	31.89	47.89	74.00	-26.11	Vertical
9766.40	31.59	38.35	14.25	31.59	52.60	74.00	-21.40	Vertical
12208.00	*					74.00		Vertical
14649.60	*					74.00		Vertical
4883.20	50.73	31.85	8.66	32.12	59.12	74.00	-14.88	Horizontal
7324.80	30.71	36.56	11.79	31.80	47.26	74.00	-26.74	Horizontal
9766.40	28.00	38.81	14.35	31.85	49.31	74.00	-24.69	Horizontal
12208.00	*					74.00		Horizontal
14649.60	*					74.00		Horizontal

## Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4883.20	40.50	31.85	8.66	32.12	48.89	54.00	-5.11	Vertical
7324.80	20.65	36.37	11.72	31.89	36.85	54.00	-17.15	Vertical
9766.40	20.58	38.35	14.25	31.59	41.59	54.00	-12.41	Vertical
12208.00	*					54.00		Vertical
14649.60	*					54.00		Vertical
4883.20	41.91	31.85	8.66	32.12	50.30	54.00	-3.70	Horizontal
7324.80	21.60	36.37	11.72	31.89	37.80	54.00	-16.20	Horizontal
9766.40	19.19	38.35	14.25	31.59	40.20	54.00	-13.80	Horizontal
12208.00	*					54.00		Horizontal
14649.60	*					54.00		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.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test channel:	Highest
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## Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4955.20	51.78	31.91	8.71	32.16	60.24	74.00	-13.76	Vertical
7432.80	30.65	36.56	11.79	31.8	47.20	74.00	-26.80	Vertical
9910.40	29.72	38.81	14.35	31.85	51.03	74.00	-22.97	Vertical
12388.00	*					74.00		Vertical
14865.60	*					74.00		Vertical
4955.20	50.44	31.91	8.71	32.16	58.90	74.00	-15.10	Horizontal
7432.80	29.12	36.56	11.79	31.80	45.67	74.00	-28.33	Horizontal
9910.40	29.45	38.81	14.35	31.85	50.76	74.00	-23.24	Horizontal
12388.00	*					74.00		Horizontal
14865.60	*					74.00		Horizontal

## Average value:

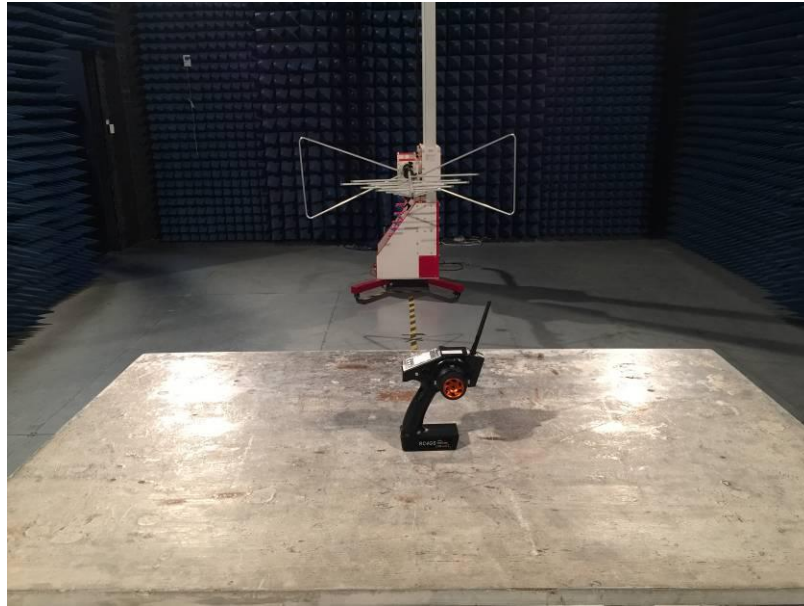
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4955.20	41.90	31.91	8.71	32.16	50.36	54.00	-3.64	Vertical
7432.80	21.96	36.56	11.79	31.80	38.51	54.00	-15.49	Vertical
9910.40	20.31	38.81	14.35	31.85	41.62	54.00	-12.38	Vertical
12388.00	*					54.00		Vertical
14865.60	*					54.00		Vertical
4955.20	39.66	31.91	8.71	32.16	48.12	54.00	-5.88	Horizontal
7432.80	21.22	36.56	11.79	31.80	37.77	54.00	-16.23	Horizontal
9910.40	18.66	38.81	14.35	31.85	39.97	54.00	-14.03	Horizontal
12388.00	*					54.00		Horizontal
14865.60	*					54.00		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.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

## 8 Test Setup Photo

Radiated Emission



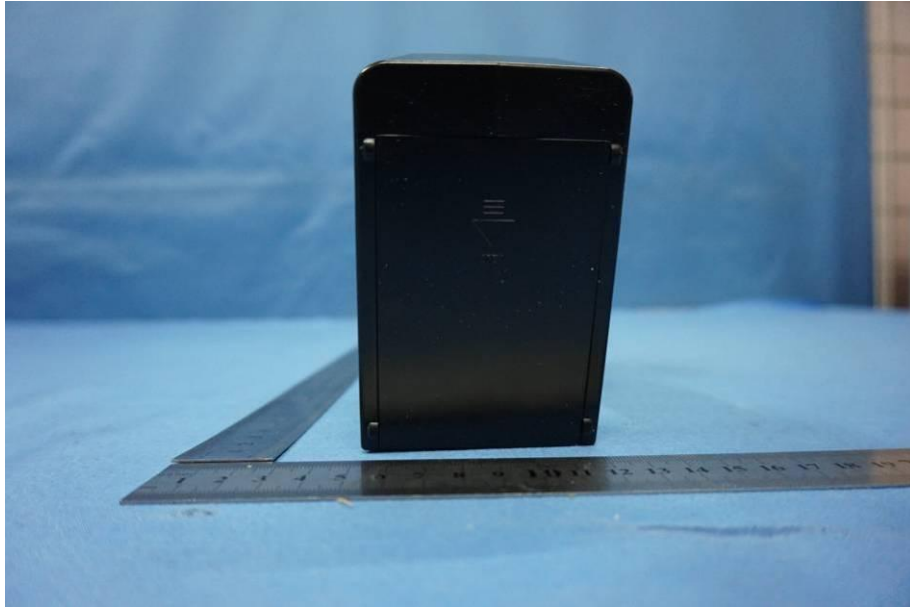
## 9 EUT Constructional Details

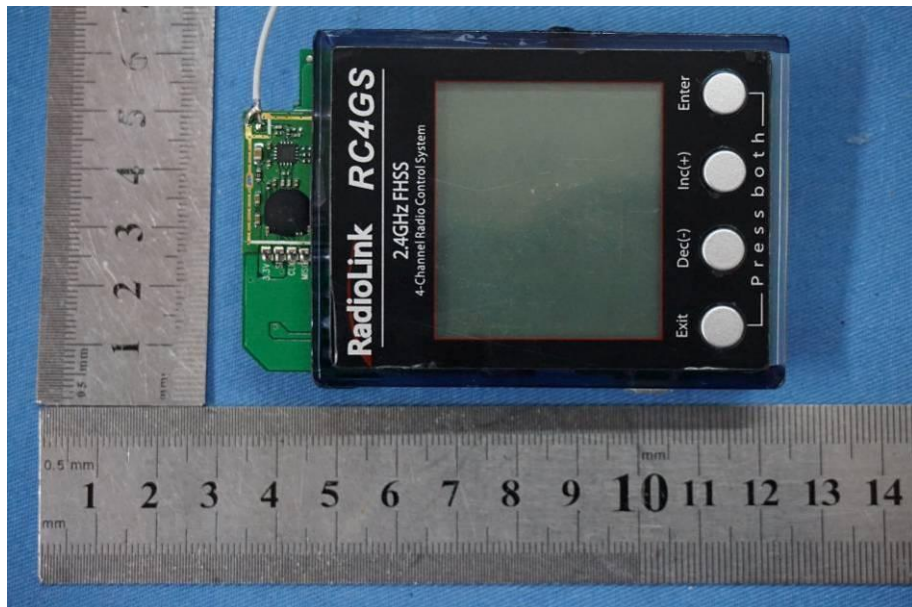
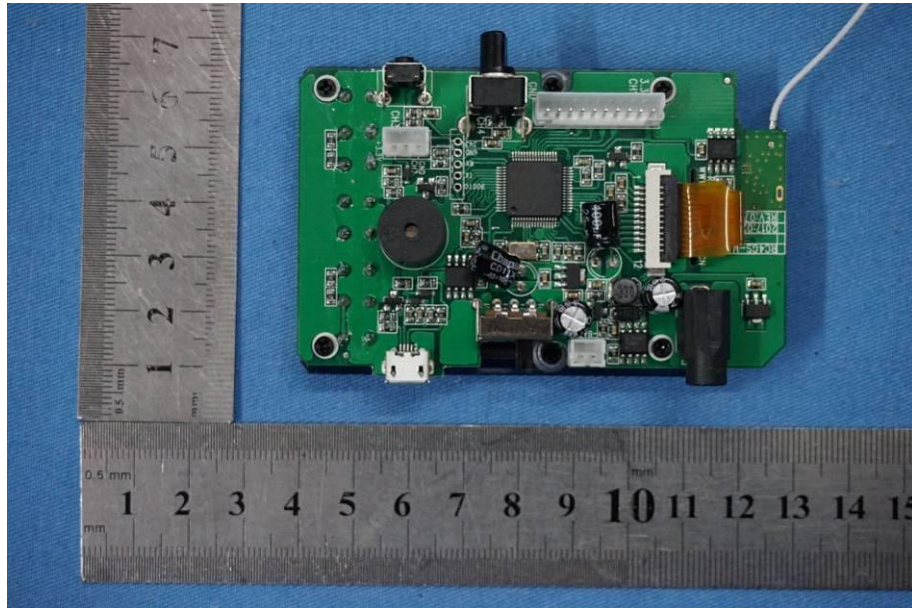




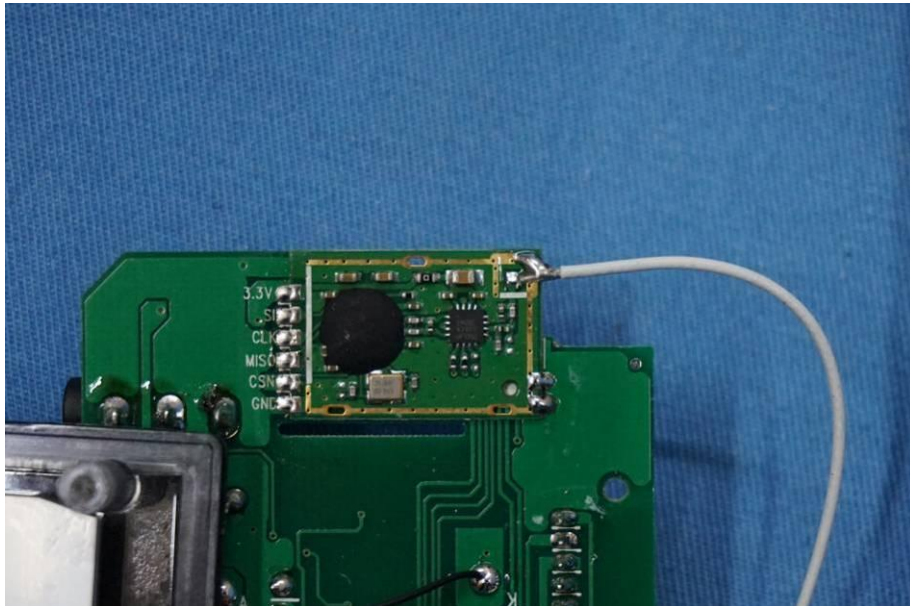
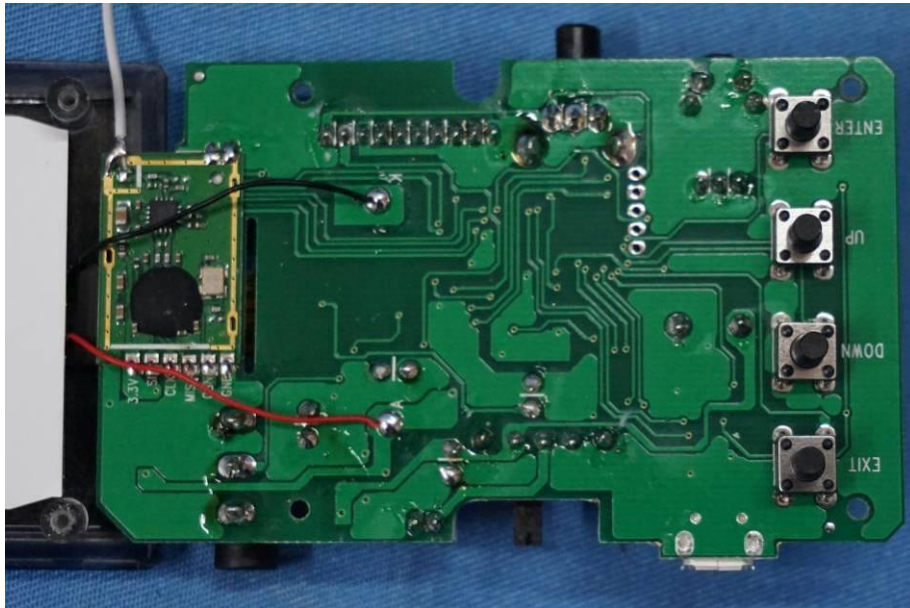


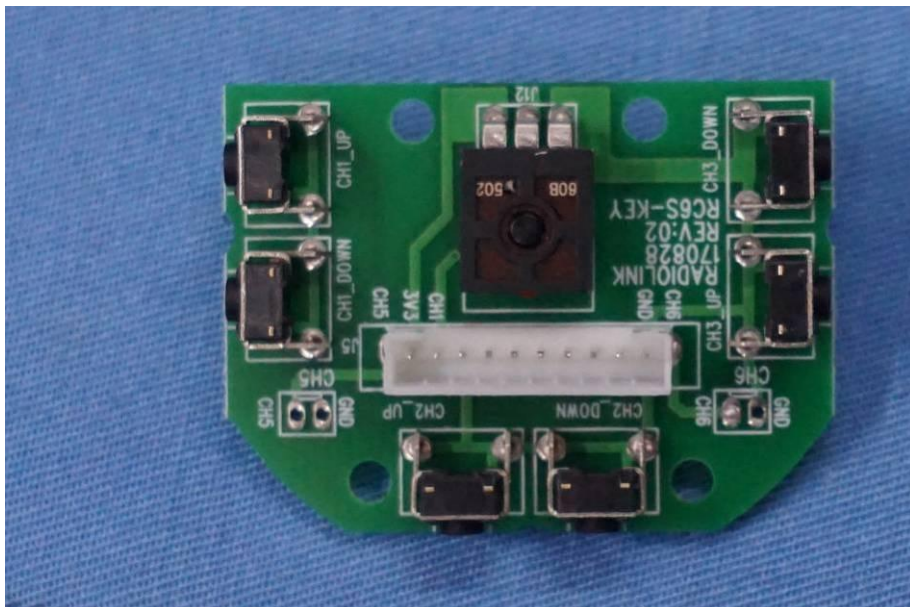
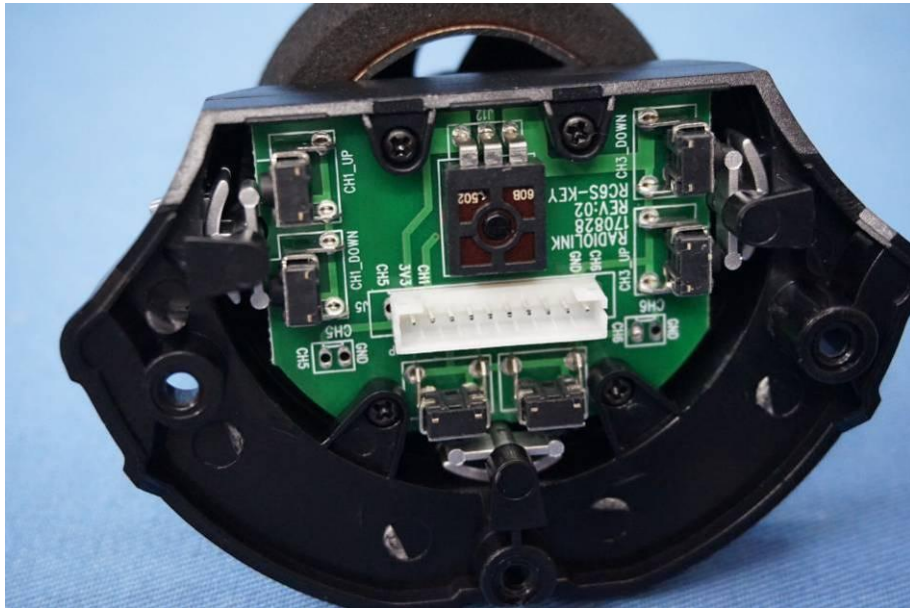


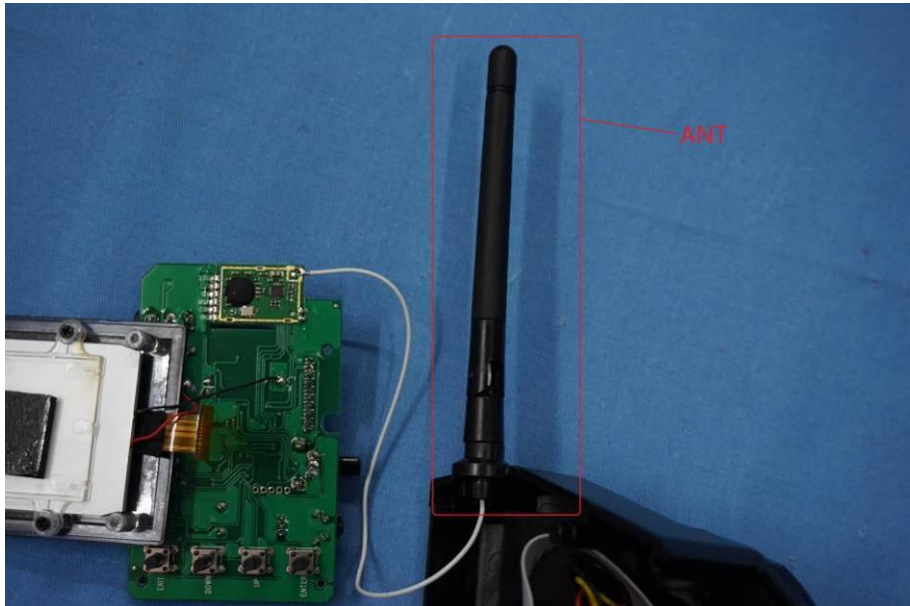
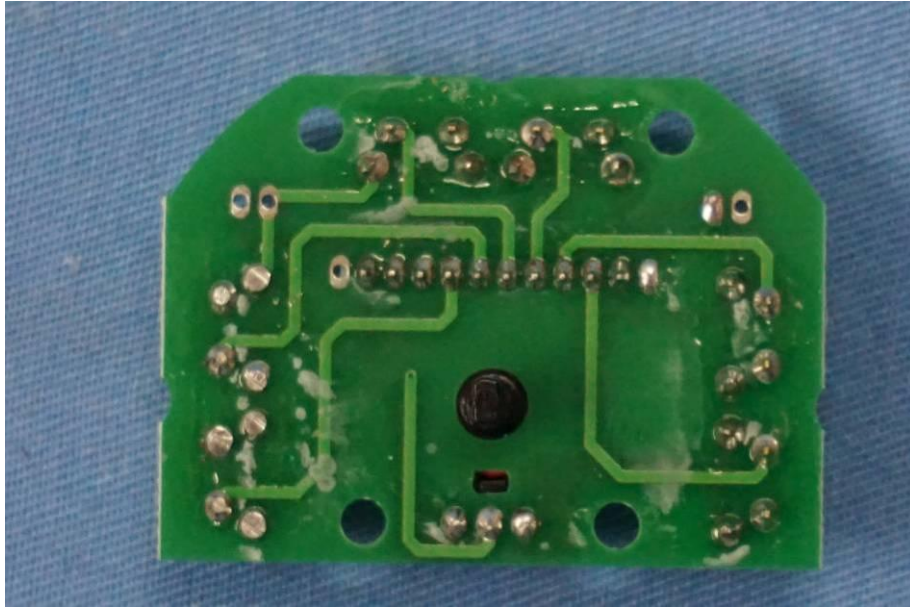




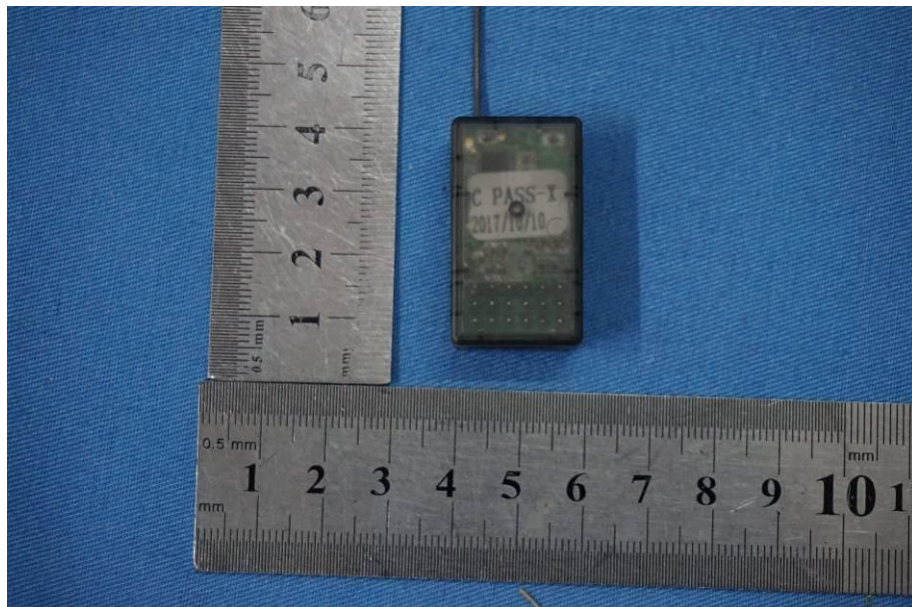
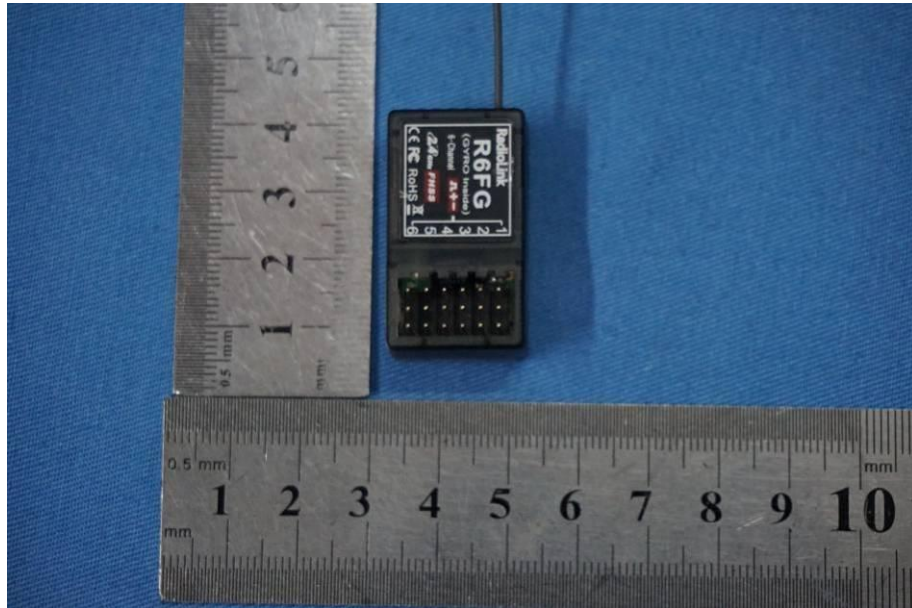


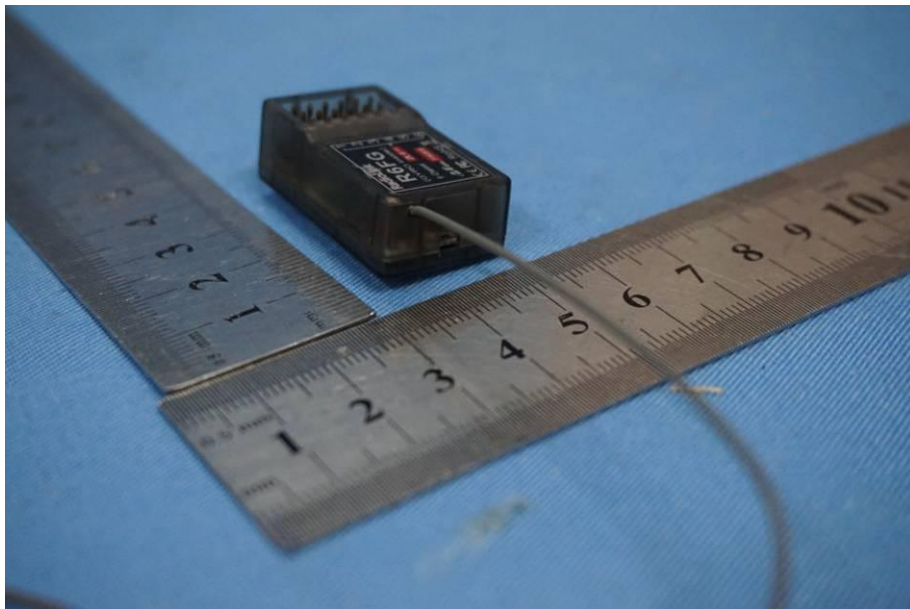
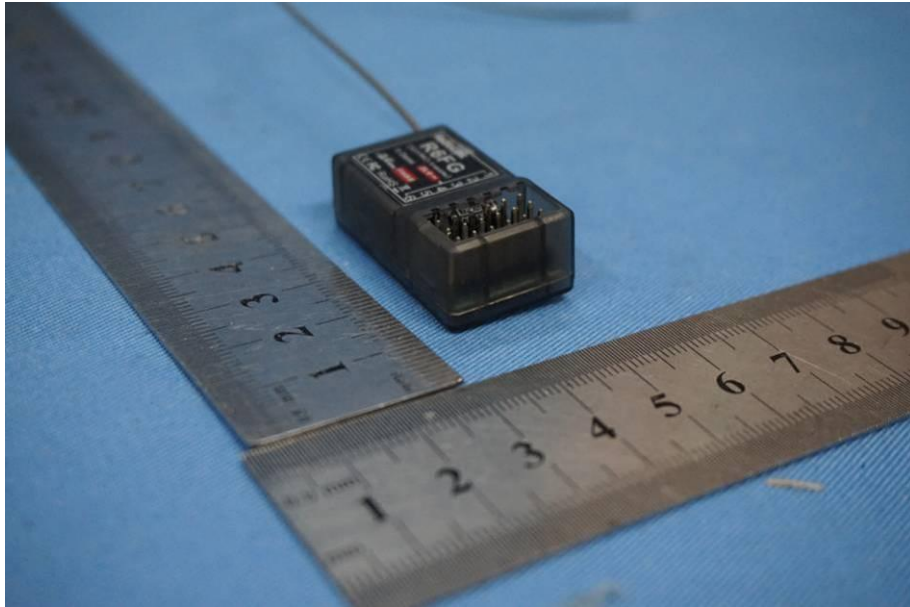




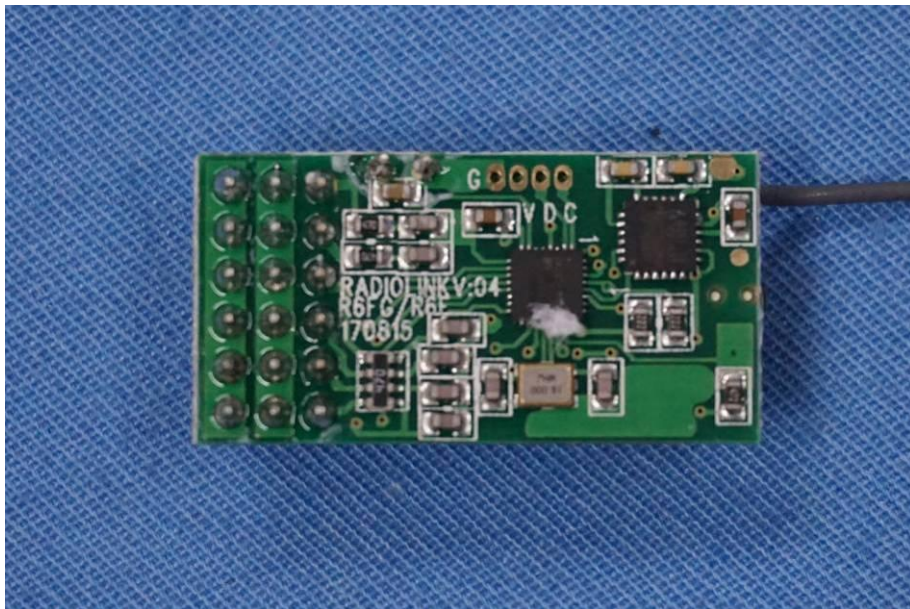
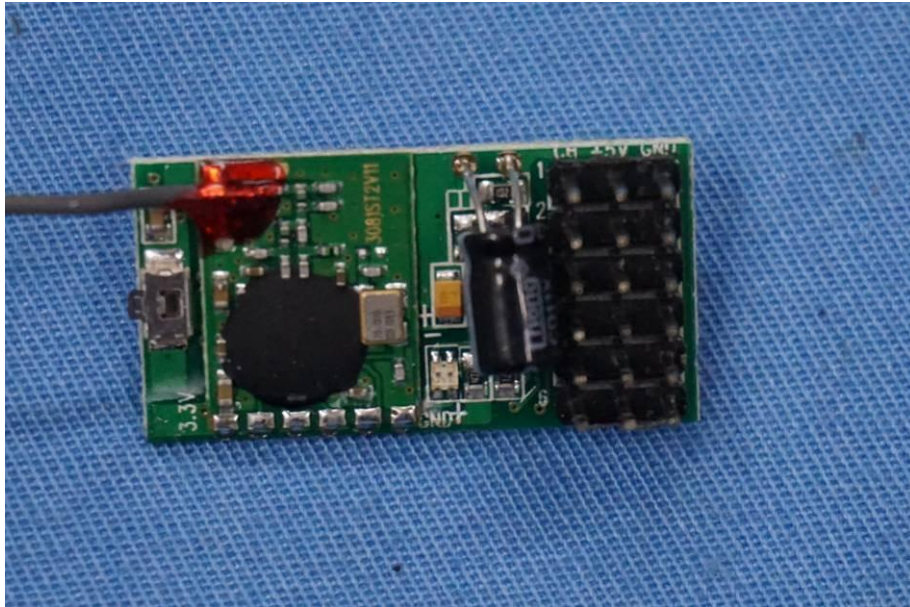












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