FCC Report

Applicant:	FLYSKY RC MODEL TECHNOLOGY CO., LTD
Address of Applicant:	West building3, Huangjianyuan Ind, Park QIAOLI North Gate Changping Town Dongguan CN.
Equipment Under Test (EUT)	
Product Name:	Digital propotional radio control system
Model No.:	FS-i10
FCC ID:	N4ZFLYSKYI10
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247:2013
Date of sample receipt:	April 30, 2014
Date of Test:	May 05-28, 2014
Date of report issued:	May 28, 2014
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
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2 Version

Version No.	Date	Description
00	*May 28, 2014*	*Original*

Prepared By:	Hank. yan	***Date:***	*May 28, 2014*
	Project Engineer		
Check By:	Hans. Hu	***Date:***	*May 28, 2014*
	Reviewer		

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4 Test Summary

Test Item	Section	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(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.

5 General Information

5.1 Client Information

Applicant:	FLYSKY RC MODEL TECHNOLOGY CO., LTD
Address of Applicant:	West building3, Huangjianyuan Ind, Park QIAOLI North Gate Changping Town Dongguan CN.
Manufacturer:	FLYSKY RC MODEL TECHNOLOGY CO., LTD
Address of Manufacturer:	West building3, Huangjianyuan Ind, Park QIAOLI North Gate Changping Town Dongguan CN.
Factory:	FLYSKY RC MODEL TECHNOLOGY CO., LTD
Address of Factory:	West building3, Huangjianyuan Ind, Park QIAOLI North Gate Changping Town Dongguan CN.

5.2 General Description of EUT

Product Name:	Digital propotional radio control system
Model No.:	FS-i10
Operation Frequency:	2405.5MHz~2475.0MHz
Channel numbers:	140
Modulation technology:	GFSK
Antenna Type:	Integral
Antenna gain:	2dBi
Power supply:	DC 3.7V Li-ion Polymer Battery

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2405.50	36	2423.00	71	2440.50	106	2458.00
2	2406.00	37	2423.50	72	2441.00	107	2458.50
3	2406.50	38	2424.00	73	2441.50	108	2459.00
4	2407.00	39	2424.50	74	2442.00	109	2459.50
5	2407.50	40	2425.00	75	2442.50	110	2460.00
6	2408.00	41	2425.50	76	2443.00	111	2460.50
7	2408.50	42	2426.00	77	2443.50	112	2461.00
8	2409.00	43	2426.50	78	2444.00	113	2461.50
9	2409.50	44	2427.00	79	2444.50	114	2462.00
10	2410.00	45	2427.50	80	2445.00	115	2462.50
11	2410.50	46	2428.00	81	2445.50	116	2463.00
12	2411.00	47	2428.50	82	2446.00	117	2463.50
13	2411.50	48	2429.00	83	2446.50	118	2464.00
14	2412.00	49	2429.50	84	2447.00	119	2464.50
15	2412.50	50	2430.00	85	2447.50	120	2465.00
16	2413.00	51	2430.50	86	2448.00	121	2465.50
17	2413.50	52	2431.00	87	2448.50	122	2466.00
18	2414.00	53	2431.50	88	2449.00	123	2466.50
19	2414.50	54	2432.00	89	2449.50	124	2467.00
20	2415.00	55	2432.50	90	2450.00	125	2467.50
21	2415.50	56	2433.00	91	2450.50	126	2468.00
22	2416.00	57	2433.50	92	2451.00	127	2468.50
23	2416.50	58	2434.00	93	2451.50	128	2469.00
24	2417.00	59	2434.50	94	2452.00	129	2469.50
25	2417.50	60	2435.00	95	2452.50	130	2470.00
26	2418.00	61	2435.50	96	2453.00	131	2470.50
27	2418.50	62	2436.00	97	2453.50	132	2471.00
28	2419.00	63	2436.50	98	2454.00	133	2471.50
29	2419.50	64	2437.00	99	2454.50	134	2472.00
30	2420.00	65	2437.50	100	2455.00	135	2472.50
31	2420.50	66	2438.00	101	2455.50	136	2473.00
32	2421.00	67	2438.50	102	2456.00	137	2473.50
33	2421.50	68	2439.00	103	2456.50	138	2474.00
34	2422.00	69	2439.50	104	2457.00	139	2474.50
35	2422.50	70	2440.00	105	2457.50	140	2475.00

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	2405.5MHz
The middle channel	2440.0MHz
The Highest channel	2475.0MHz

5.3 Test mode

Transmitting mode	Keep the EUT in transmitting mode.
Remark: During the test, the full charged battery was used.	

5.4 Test Facility

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

● **CNAS —Registration No.: CNAS L5775**

CNAS has accredited Global United Technology Services Co., Ltd. To ISO/IEC 17025 General Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 28, 2013.

● **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, June 26, 2013.

5.5 Test Location

All other tests were performed at:

Global United Technology Services Co., Ltd.
Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China
Tel: 0755-27798480
Fax: 0755-27798960

5.6 Other Information Requested by the Customer

None.

5.7 Description of Support Units

None.

5.8 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	Mar. 29 2013	Mar. 28 2015
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS536	Nov. 20, 2013	Nov. 19, 2014
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 02 2013	Jul. 01 2014
5	Loop Antenna	ZHINAN	ZN30900A	GTS534	Feb. 23 2014	Feb. 22 2015
6	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Feb. 23 2014	Feb. 22 2015
7	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 28 2013	June 27 2014
8	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 29 2013	Mar. 28 2015
9	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
10	Coaxial Cable	GTS	N/A	GTS213	Mar. 29 2013	Mar. 28 2015
11	Coaxial Cable	GTS	N/A	GTS211	Mar. 29 2013	Mar. 28 2015
12	Coaxial cable	GTS	N/A	GTS210	Mar. 29 2013	Mar. 28 2015
13	Coaxial Cable	GTS	N/A	GTS212	Mar. 29 2013	Mar. 28 2015
14	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 02 2013	Jul. 01 2014
15	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 02 2013	Jul. 01 2014
16	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 28 2013	June 27 2014
17	Band filter	Amindeon	82346	GTS219	Mar. 29 2013	Mar. 28 2015

6 Test results and Measurement Data

6.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

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.

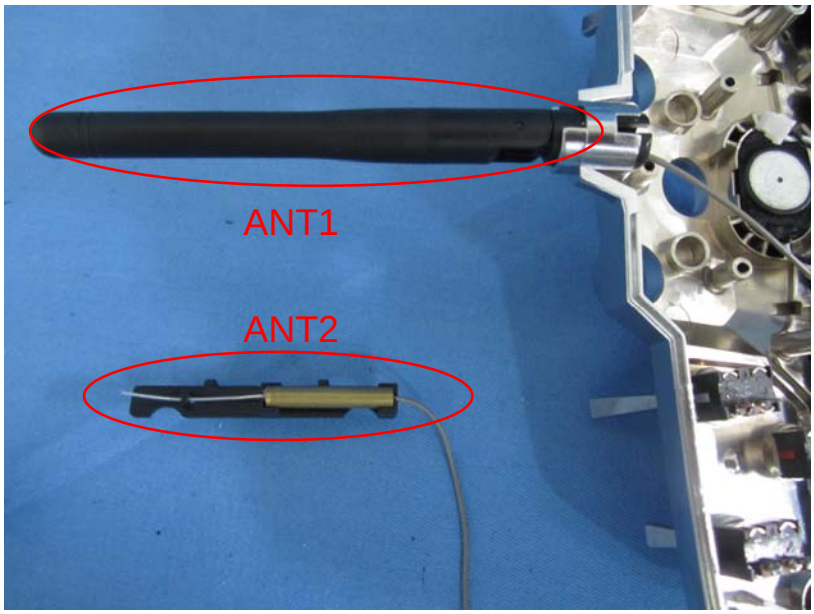
15.247(c) (1)(i) requirement:

(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.

E.U.T Antenna:

The antenna is Integral Antenna, the best case gain of two antenna are 2dBi

Two antenna can't transmit at the same time. While the ANT1 transmitting, the ANT2 act as a receiver antenna and vice versa.



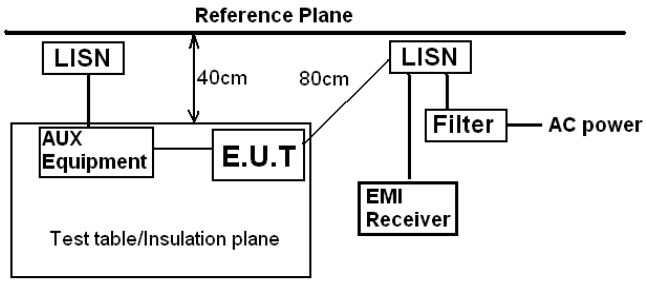
6.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.4:2003
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	

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:



Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

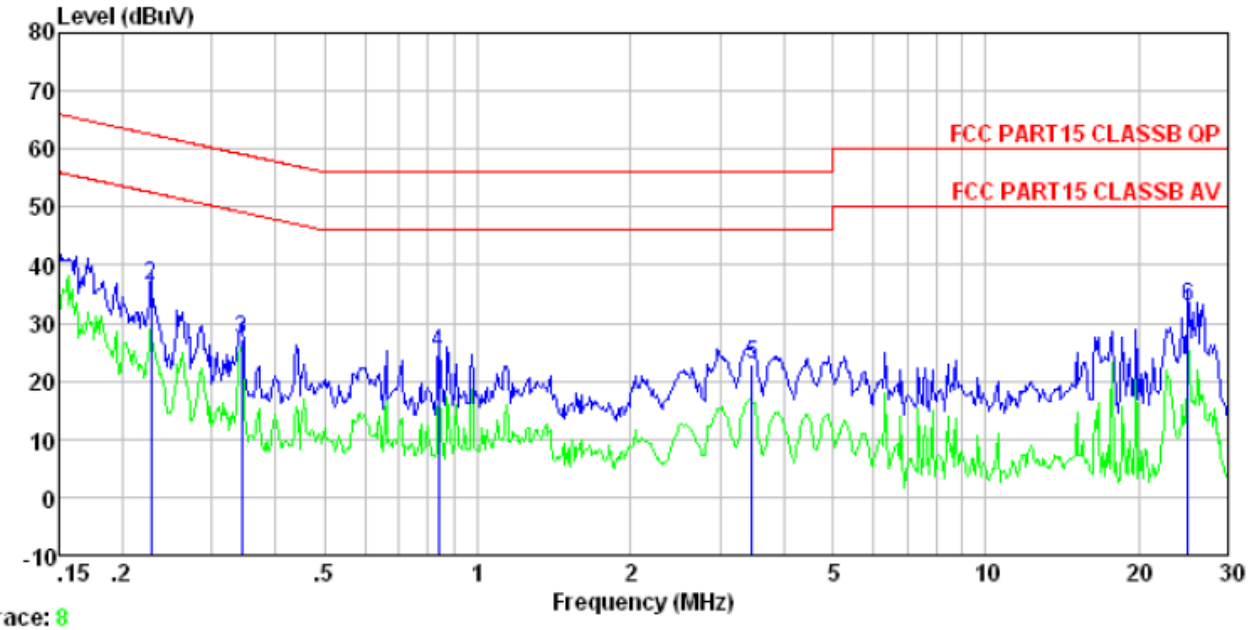
Test procedure:

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.
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).
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 C63.4: 2003 on conducted measurement.

Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement data

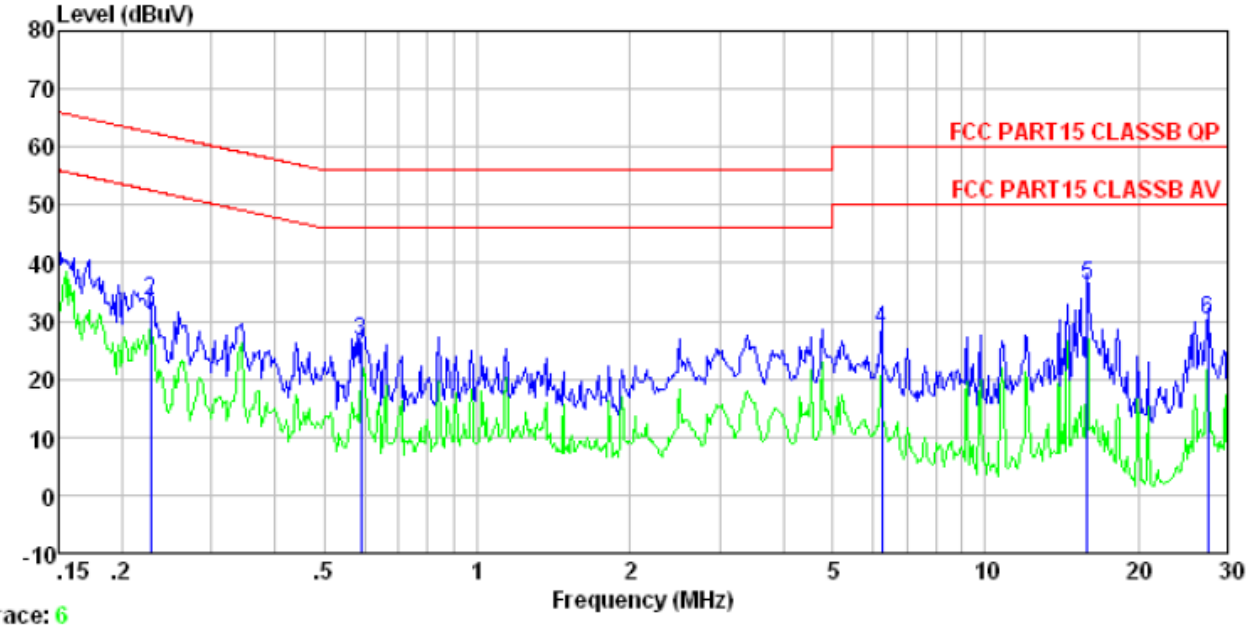
Line:



Condition : FCC PART15 CLASSB QP LISN-2013 LINE
Job No. : 0682RF
Test mode : Transmitting mode
Test Engineer: Qing

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	30.32	0.15	10.12	40.59	66.00	-25.41	QP
2	0.228	26.38	0.12	10.13	36.63	62.52	-25.89	QP
3	0.343	16.84	0.11	10.15	27.10	59.13	-32.03	QP
4	0.839	14.44	0.14	10.18	24.76	56.00	-31.24	QP
5	3.472	12.40	0.18	10.23	22.81	56.00	-33.19	QP
6	25.055	21.37	1.15	10.29	32.81	60.00	-27.19	QP

Neutral:



Trace: 6

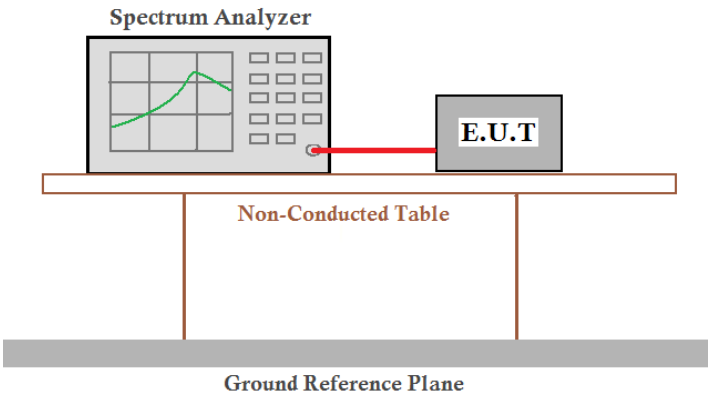
Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL
Job No. : 0682RF
Test mode : Transmitting mode
Test Engineer: Qing

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	30.70	0.07	10.12	40.89	66.00	-25.11	QP
2	0.228	23.45	0.06	10.13	33.64	62.52	-28.88	QP
3	0.592	16.16	0.07	10.16	26.39	56.00	-29.61	QP
4	6.252	18.11	0.17	10.25	28.53	60.00	-31.47	QP
5	15.885	25.47	0.35	10.28	36.10	60.00	-23.90	QP
6	27.416	19.13	0.86	10.30	30.29	60.00	-29.71	QP

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.*

6.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(1)
Test Method:	DA 00-705, ANSI C63.10:2009
Limit:	20.97dBm
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Antenna 1:

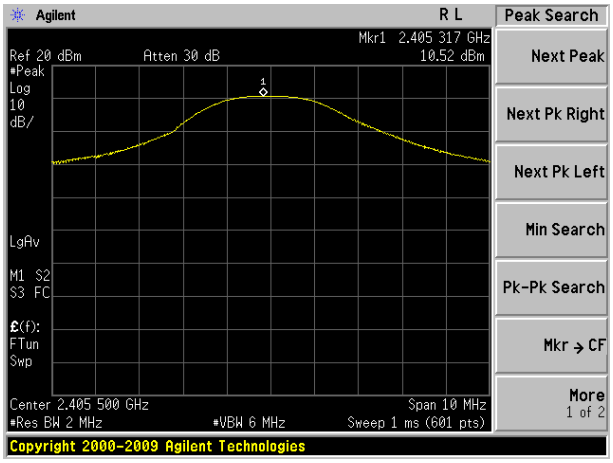
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	10.52	20.97	Pass
Middle	8.78		
Highest	7.53		

Antenna 2:

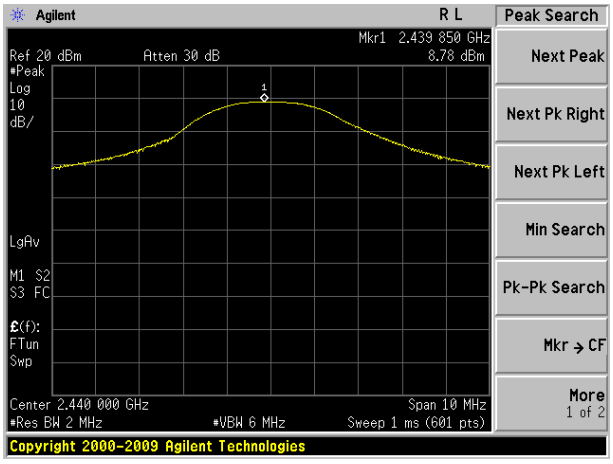
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	9.39	20.97	Pass
Middle	7.85		
Highest	6.89		

Test plot as follows:

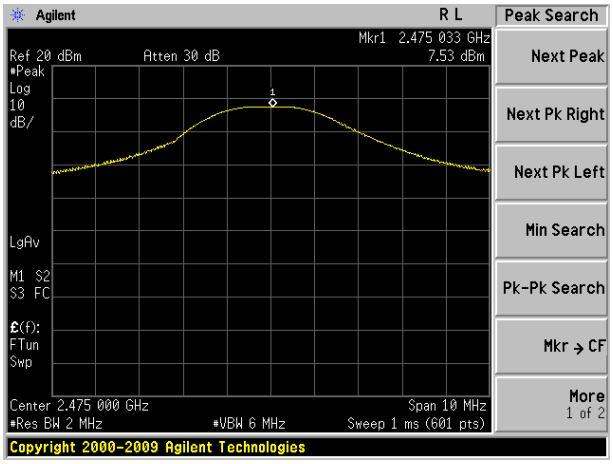
		Antenna:	Antenna 1



Lowest channel

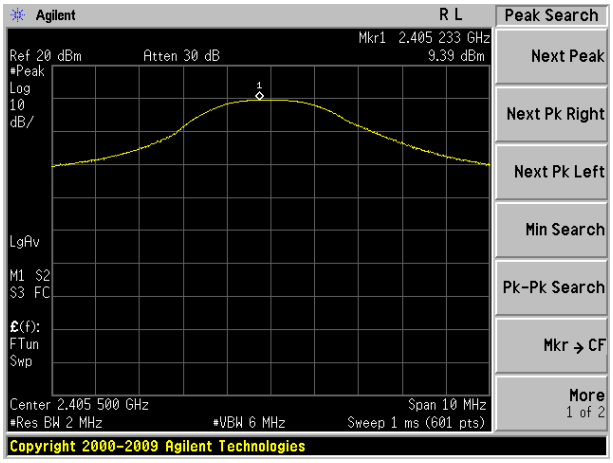


Middle channel

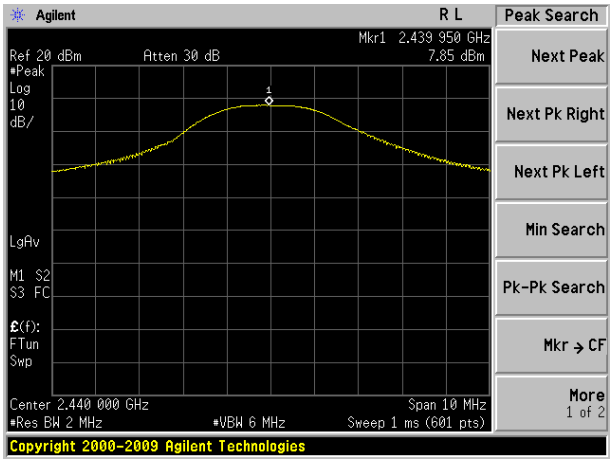


Highest channel

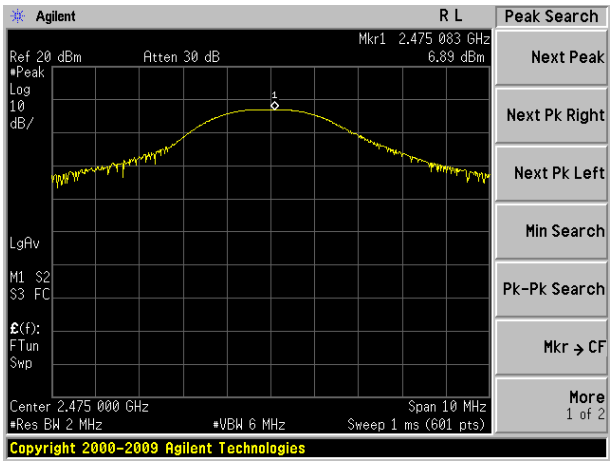
		Antenna:	Antenna 2



Lowest channel

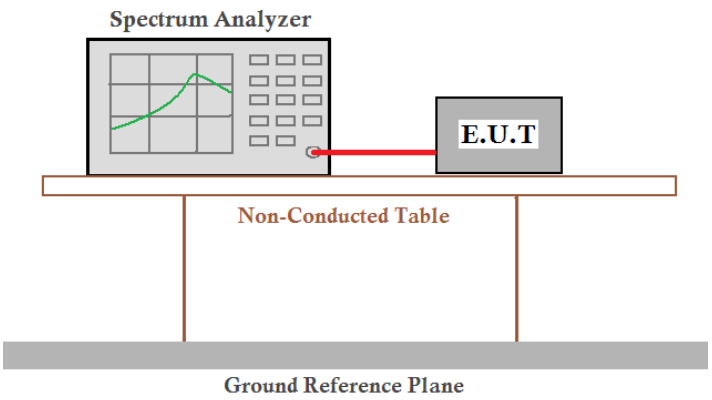


Middle channel



Highest channel

6.4 20dB Emission Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	DA 00-705, ANSI C63.10:2009
Limit:	N/A
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Antenna 1:

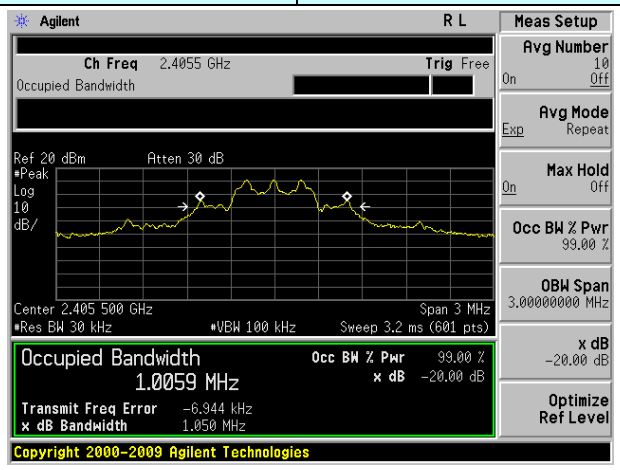
Test channel	20dB Emission Bandwidth (MHz)	Result
Lowest	1.050	Pass
Middle	1.050	
Highest	1.050	

Antenna 2:

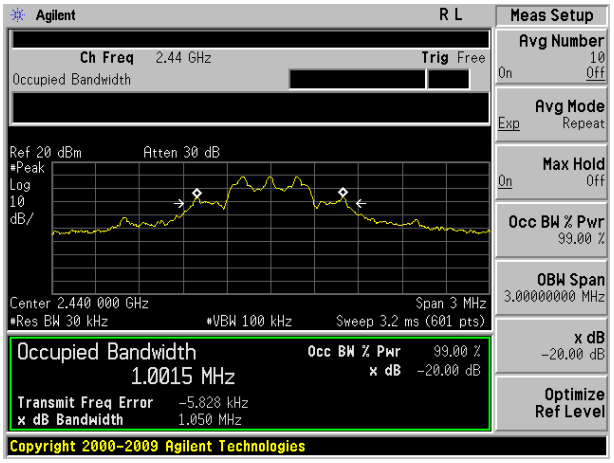
Test channel	20dB Emission Bandwidth (MHz)	Result
Lowest	1.052	Pass
Middle	1.049	
Highest	1.048	

Test plot as follows:

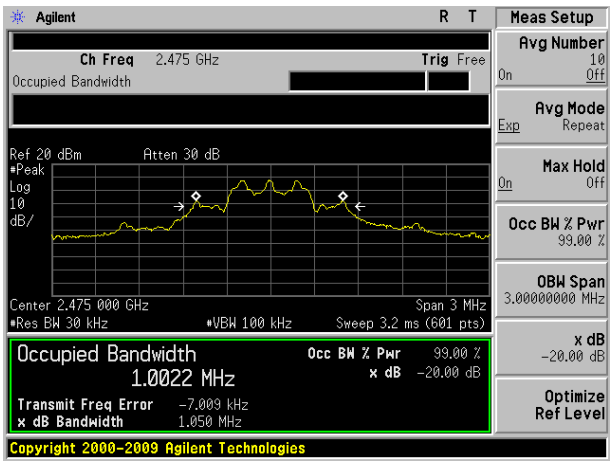
		Antenna:	Antenna 1



Lowest channel

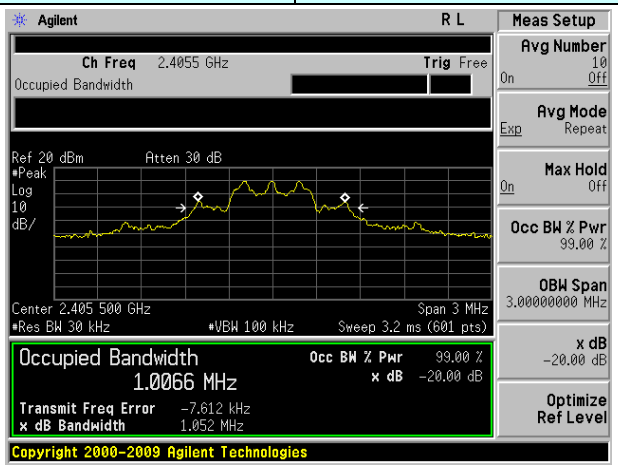


Middle channel

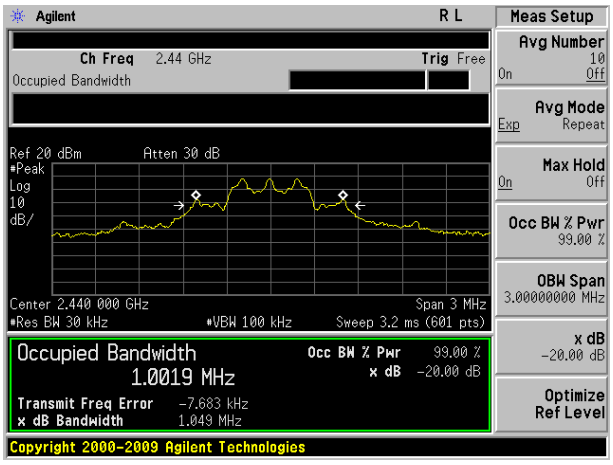


Highest channel

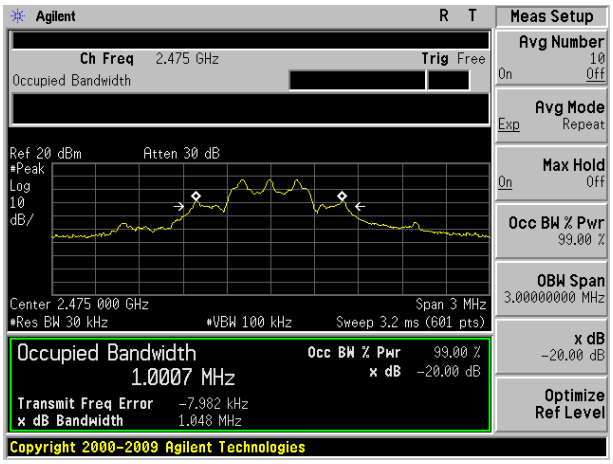
		Antenna:	Antenna 2



Lowest channel

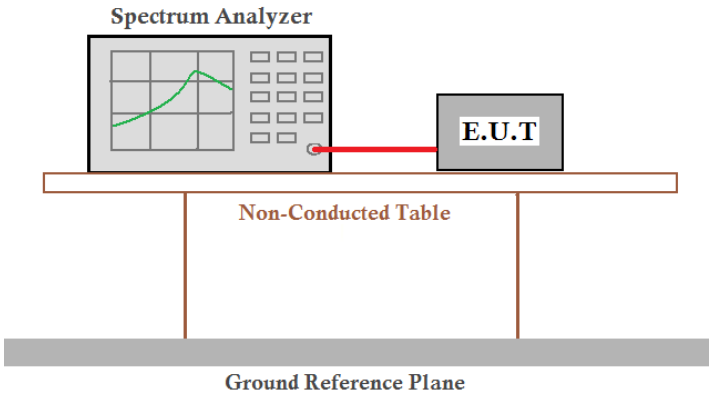


Middle channel



Highest channel

6.5 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	DA 00-705, ANSI C63.10:2009
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 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Antenna 1:

Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	4500	*700*	Pass
Middle	5500	*700*	Pass
Highest	2500	*700*	Pass

Note: According to section 6.3

20dB bandwidth (kHz) (worse case)	*Limit (kHz) (Carrier Frequencies Separation)*
1050	*700*

Antenna 2:

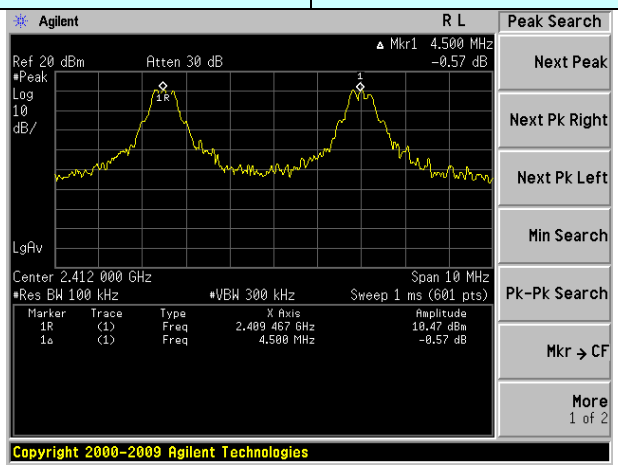
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	4500	*701*	Pass
Middle	5500	*701*	Pass
Highest	2500	*701*	Pass

Note: According to section 6.3

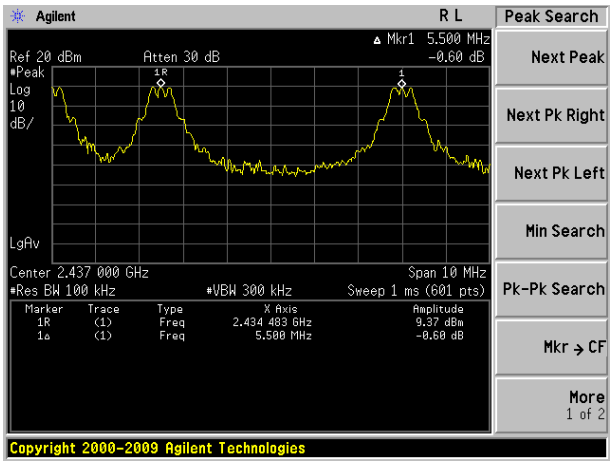
20dB bandwidth (kHz) (worse case)	*Limit (kHz) (Carrier Frequencies Separation)*
1052	*701*

Test plot as follows:

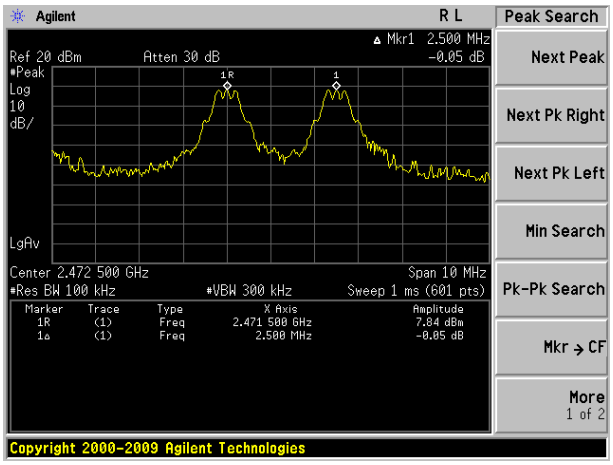
		Antenna:	Antenna 1



Lowest channel

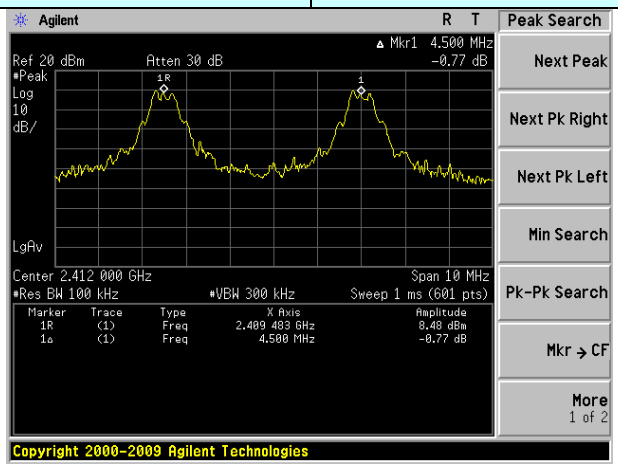


Middle channel

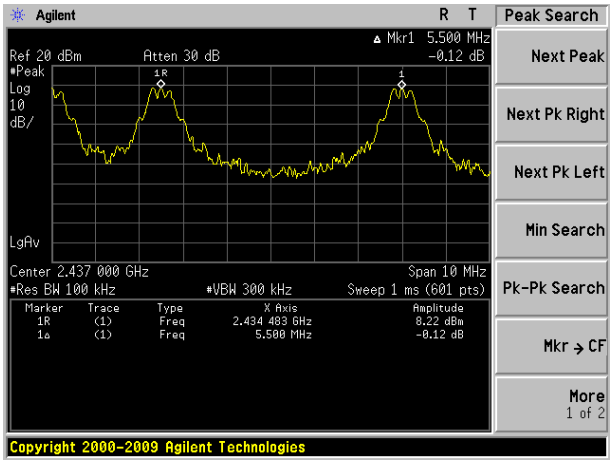


Highest channel

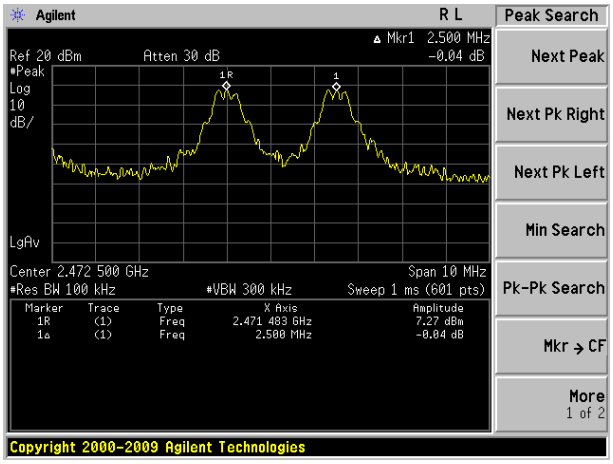
		Antenna:	Antenna 2



Lowest channel

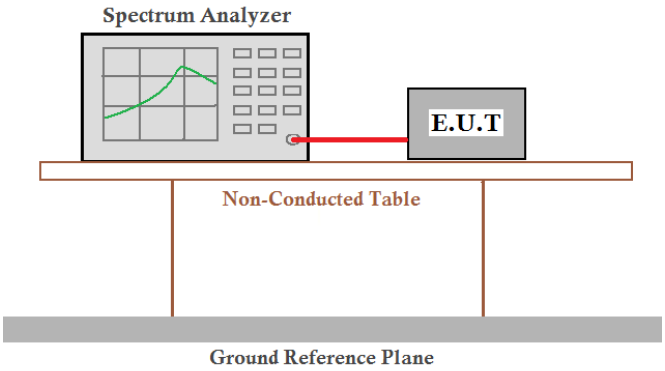


Middle channel



Highest channel

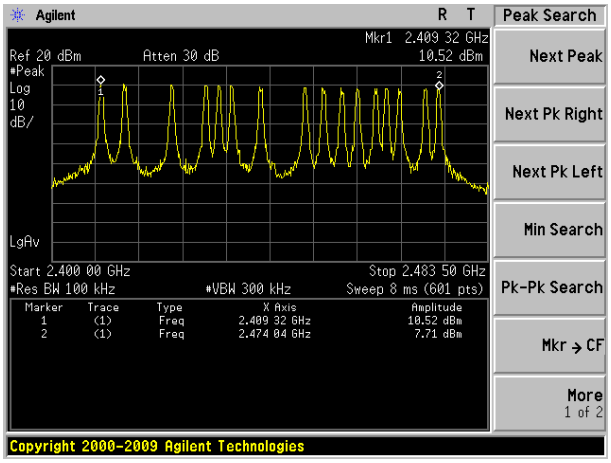
6.6 Hopping Channel Number

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
Test Method:	DA 00-705, ANSI C63.10:2009
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data:

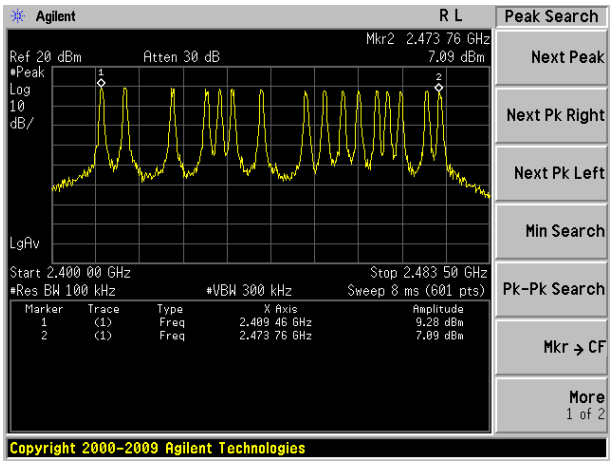
Antenna 1:

Hopping channel numbers	Limit	Result
16	15	Pass

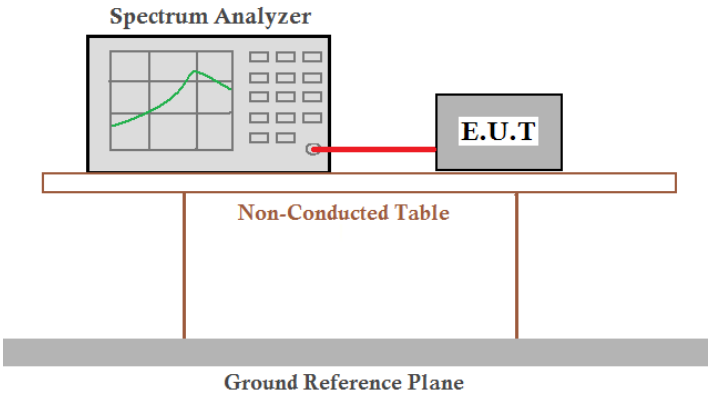


Antenna 2:

Hopping channel numbers	Limit	Result
16	15	Pass



6.7 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
Test Method:	DA 00-705, ANSI C63.10:2009
Receiver setup:	RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Antenna 1:

Frequency	Ton (ms)	Dwell time(ms)	Limit(ms)	Result
2.4055GHz	1.295	66.304	400	Pass
2.440GHz	1.295	66.304	400	Pass
2.475GHz	1.295	66.304	400	Pass

The formula as below:

2405.5MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.295ms*8*0.4*16=66.304ms

2440MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.295ms*8*0.4*16=66.304ms

2475MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.295ms*8*0.4*16=66.304ms

Antenna 2:

Frequency	Ton (ms)	Dwell time(ms)	Limit(ms)	Result
2.4055GHz	1.295	66.304	400	Pass
2.440GHz	1.295	66.304	400	Pass
2.475GHz	1.295	66.304	400	Pass

The formula as below:

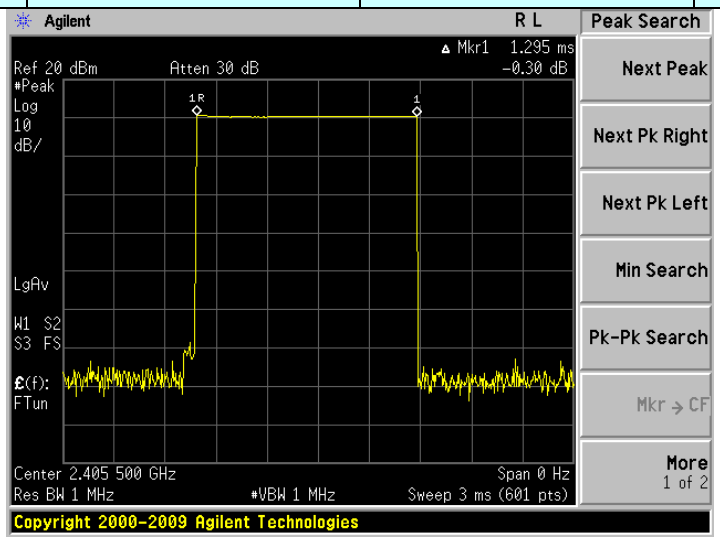
2405.5MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.295ms*8*0.4*16=66.304ms

2440MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.295ms*8*0.4*16=66.304ms

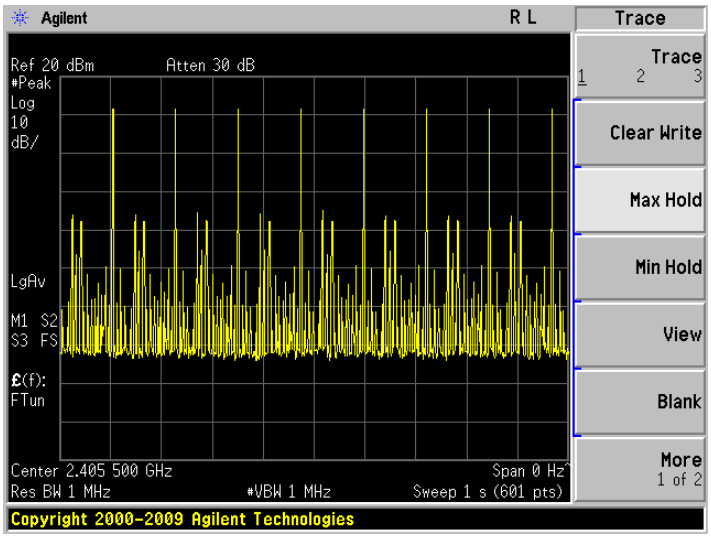
2475MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.295ms*8*0.4*16=66.304ms

Test plot as follows:

Channel:	Lowest	Antenna:	Antenna 1

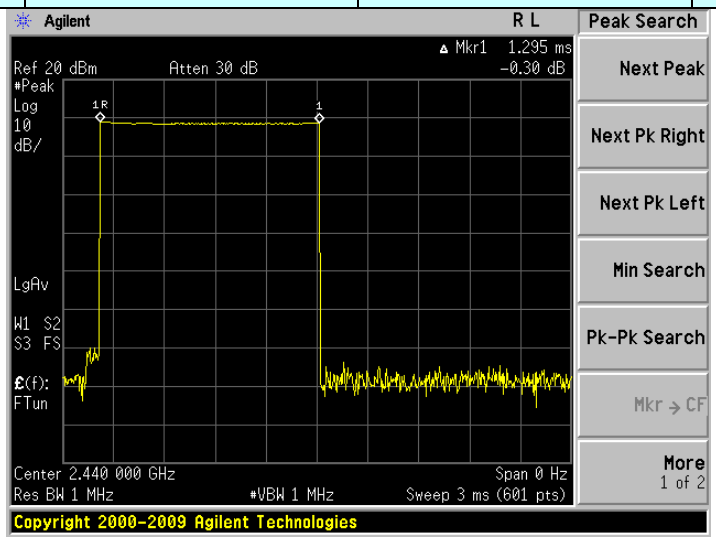


Ton

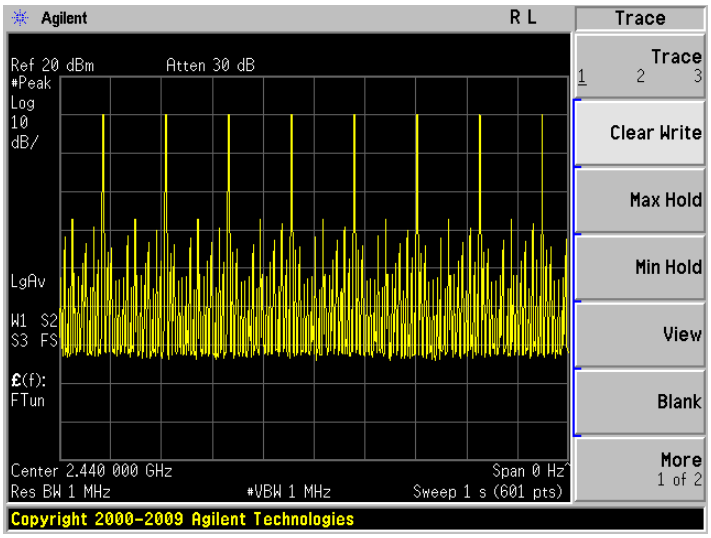


Ton times in 1s

Channel:	Middle	Antenna:	Antenna 1

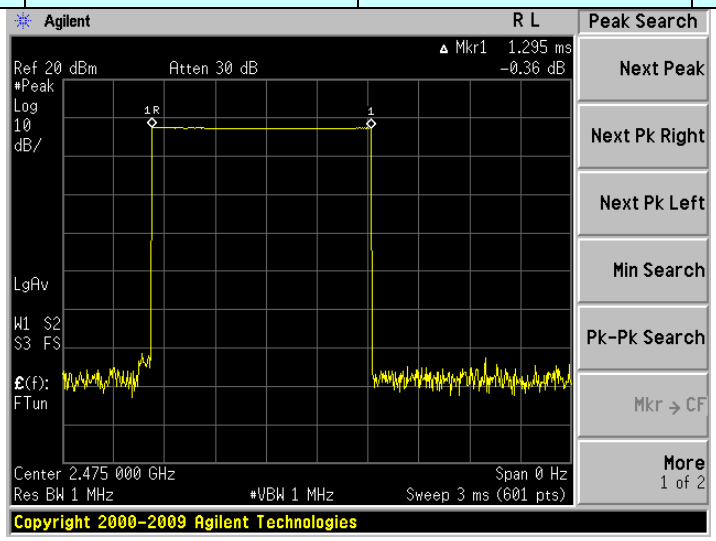


Ton

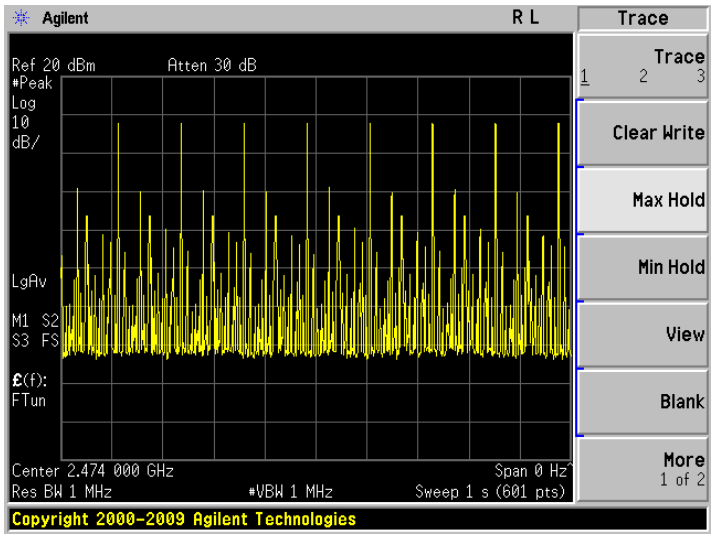


Ton times in 1s

Channel:	Highest	Antenna:	Antenna 1

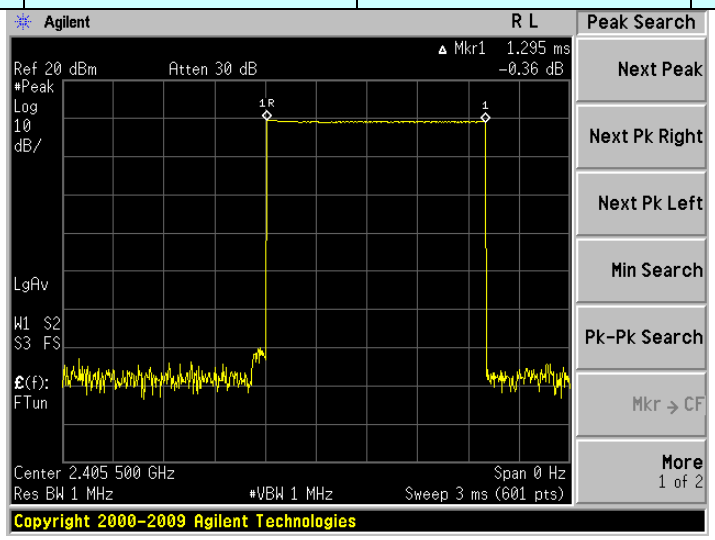


Ton

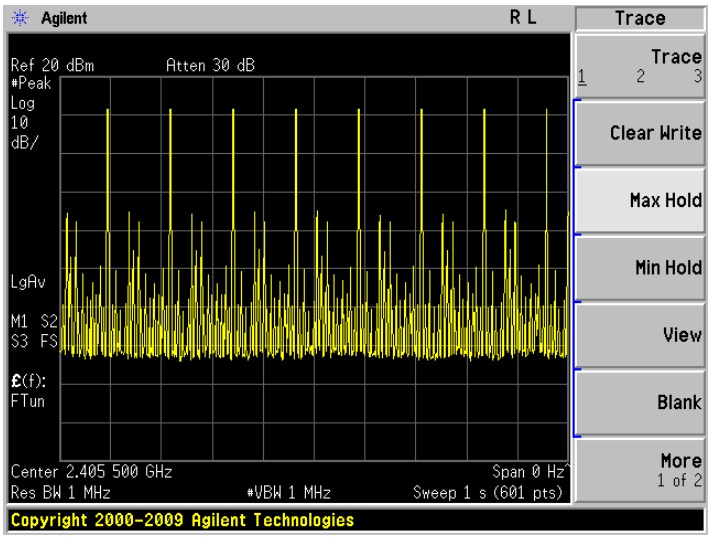


Ton times in 1s

Channel:	Lowest	Antenna:	Antenna 2

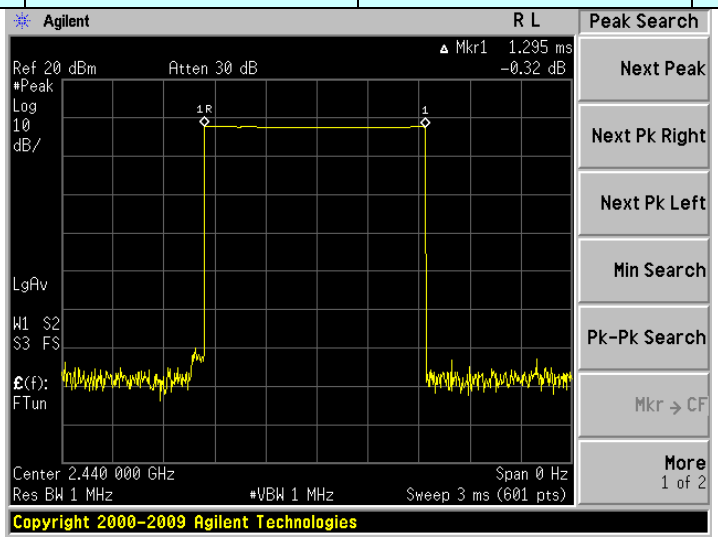


Ton

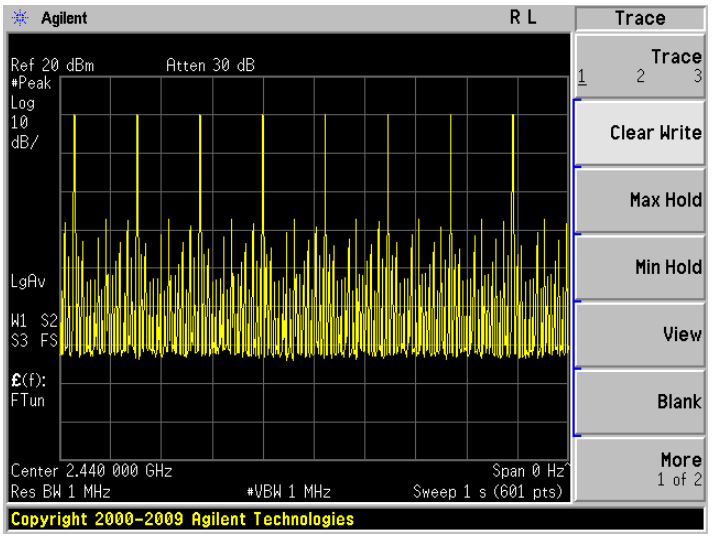


Ton times in 1s

Channel:	Middle	Antenna:	Antenna 2

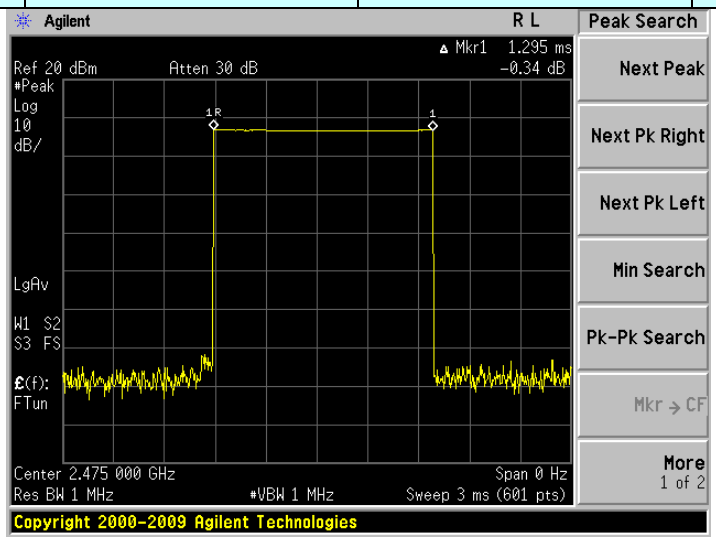


Ton

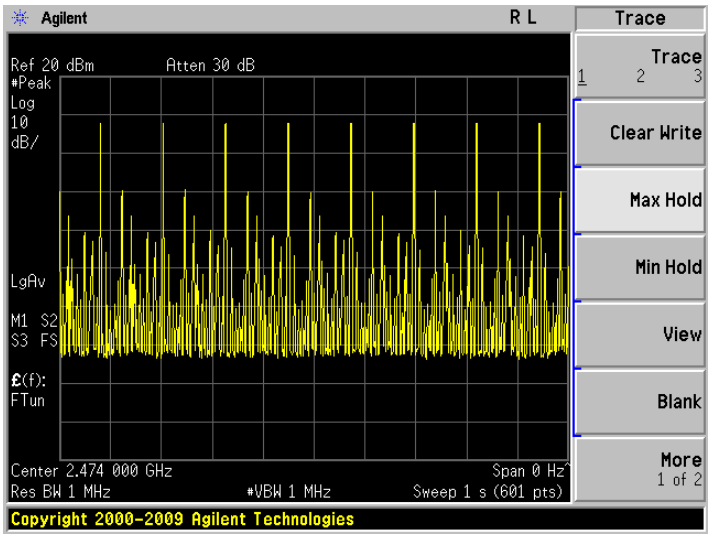


Ton times in 1s

Channel:	Highest	Antenna:	Antenna 2



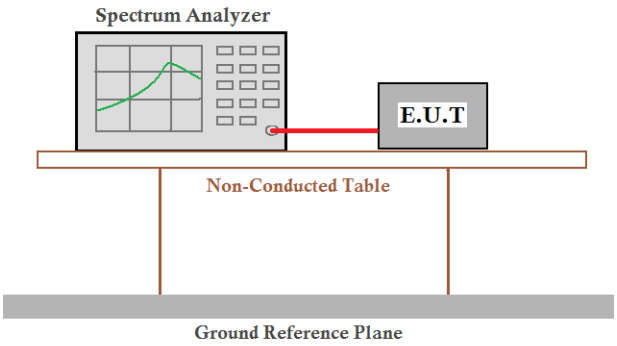
Ton



Ton times in 1s

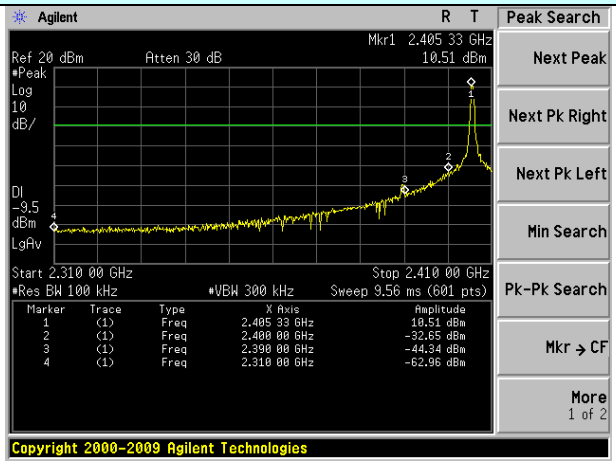
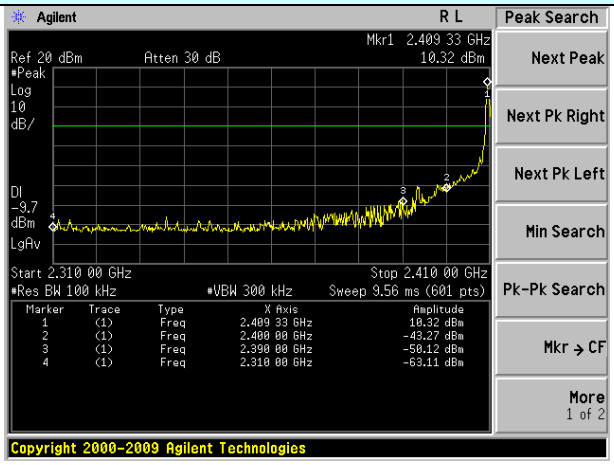
6.8 Band Edge

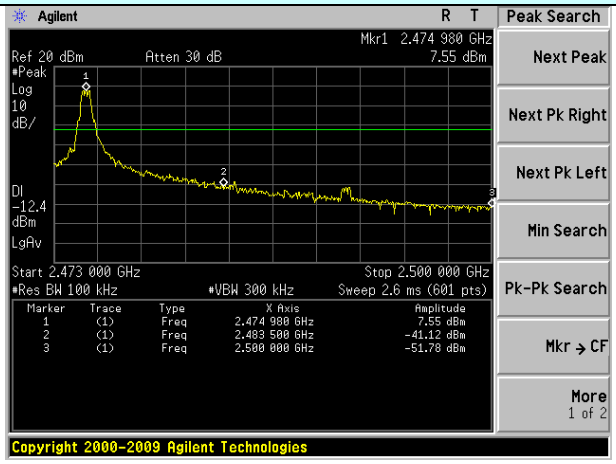
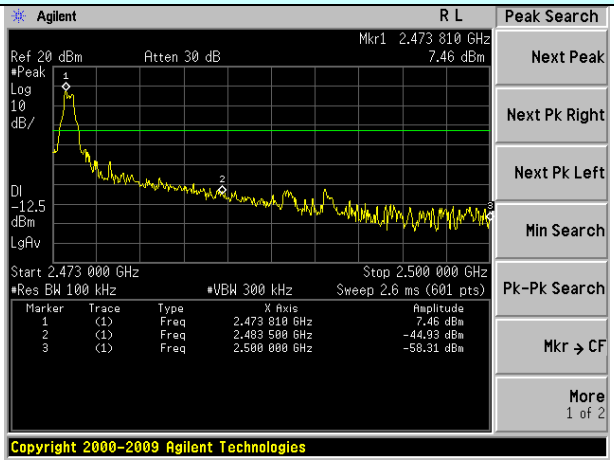
6.8.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	DA 00-705, ANSI C63.10:2009
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 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

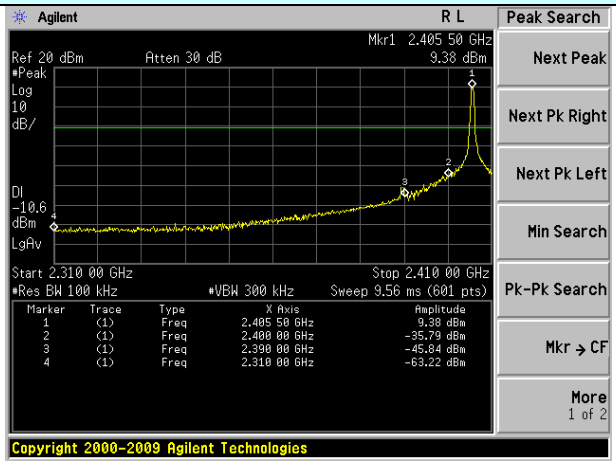
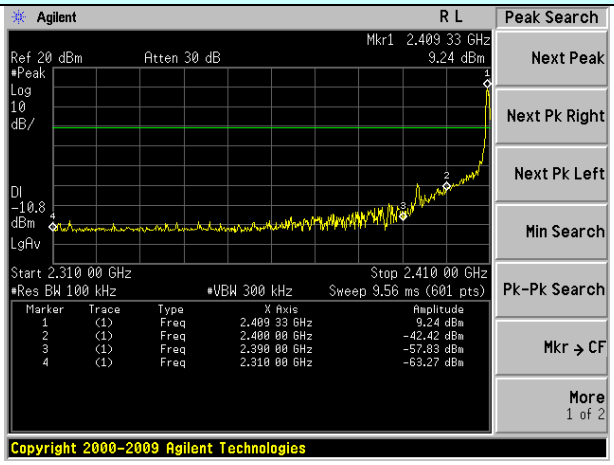
Test plot as follows:

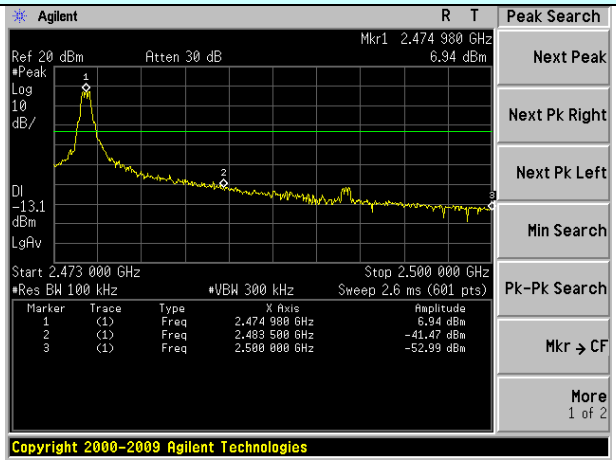
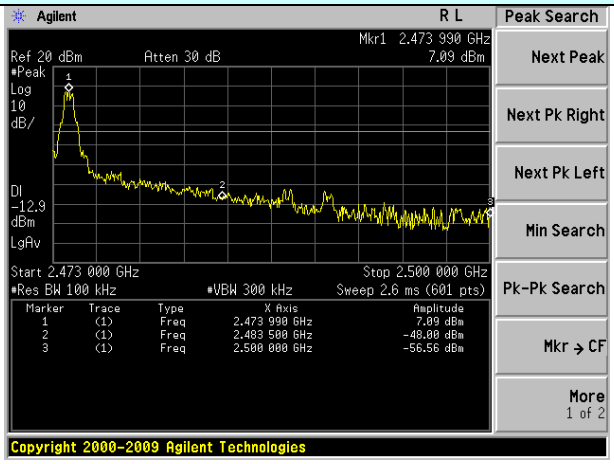
Antenna 1:

Test channel:	Lowest channel
	
No-hopping mode	Hopping mode

Test channel:	Highest channel
	
No-hopping mode	Hopping mode

Antenna 2:

Test channel:	Lowest channel
	
No-hopping mode	Hopping mode

Test channel:	Highest channel
	
No-hopping mode	Hopping mode

6.8.2 Radiated Emission Method

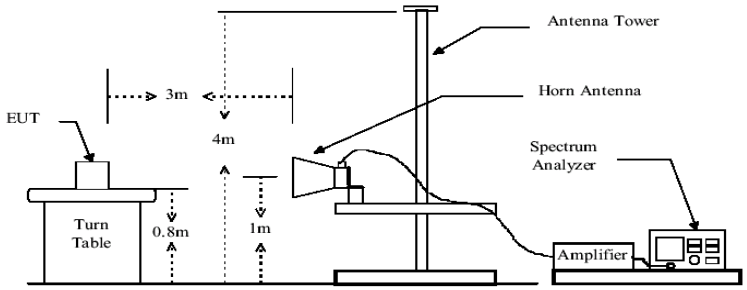
Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2009
Test Frequency Range:	All restriction band have been tested, and 2.3GHz to 2.5GHz band is the worse case
Test site:	Measurement Distance: 3m
Receiver setup:	

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:

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
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.
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.
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.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
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.

Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

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. *Two antenna were tested and found the antenna1 is worse. So only the data of antenna1 is reported.*

Test channel:	Lowest

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	48.43	27.59	5.38	30.18	51.22	74.00	-22.78	Horizontal
2400.00	66.02	27.58	5.39	30.18	68.81	74.00	-5.19	Horizontal
2390.00	49.51	27.59	5.38	30.18	52.30	74.00	-21.70	Vertical
2400.00	68.65	27.58	5.39	30.18	71.44	74.00	-2.56	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
2390.00	37.73	27.59	5.38	30.18	40.52	54.00	-13.48	Horizontal
2400.00	43.99	27.58	5.39	30.18	46.78	54.00	-7.23	Horizontal
2390.00	38.07	27.59	5.38	30.18	40.86	54.00	-13.14	Vertical
2400.00	47.19	27.58	5.39	30.18	49.98	54.00	-4.02	Vertical

Test channel:	Highest

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	51.20	27.53	5.47	29.93	54.27	74.00	-19.73	Horizontal
2500.00	49.31	27.55	5.49	29.93	52.42	74.00	-21.58	Horizontal
2483.50	52.97	27.53	5.47	29.93	56.04	74.00	-17.96	Vertical
2500.00	50.84	27.55	5.49	29.93	53.95	74.00	-20.05	Vertical

Average value:

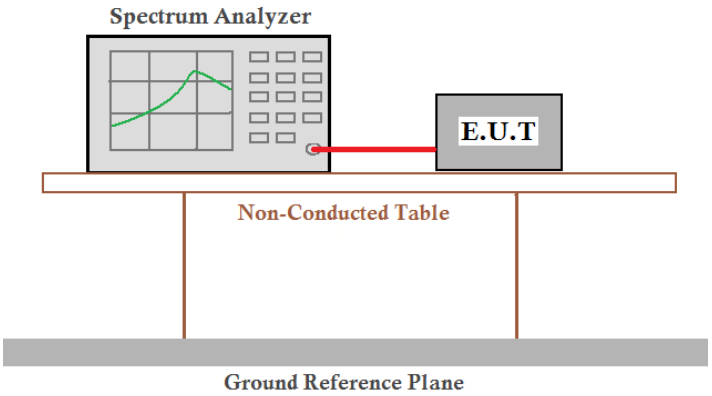
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	40.62	27.53	5.47	29.93	43.69	54.00	-10.31	Horizontal
2500.00	37.83	27.55	5.49	29.93	40.94	54.00	-13.06	Horizontal
2483.50	42.30	27.53	5.47	29.93	45.37	54.00	-8.63	Vertical
2500.00	38.21	27.55	5.49	29.93	41.32	54.00	-12.68	Vertical

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.*

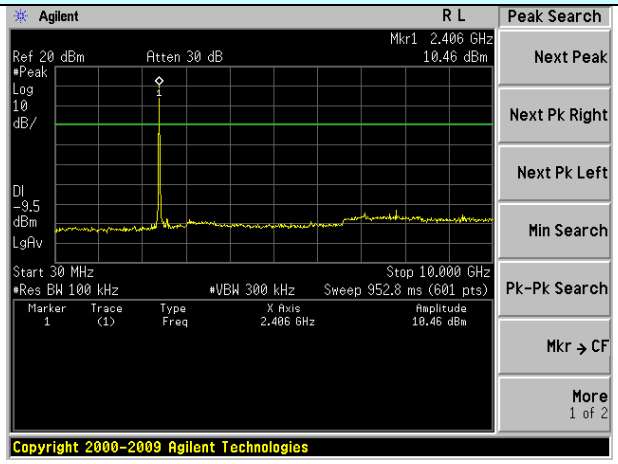
6.9 Spurious Emission

6.9.1 Conducted Emission Method

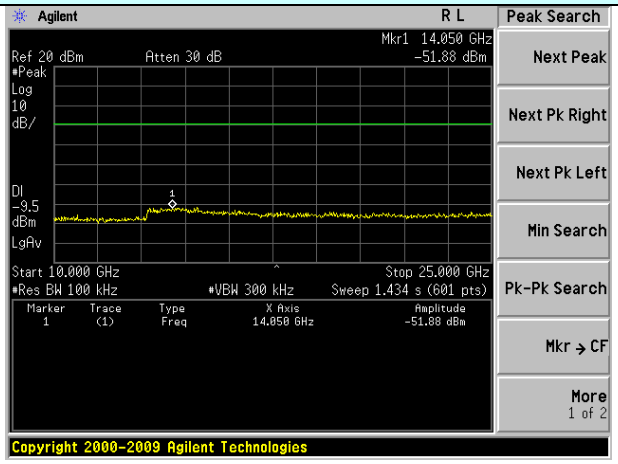
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2009
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below 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 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Antenna 1:

Test channel:	Lowest channel

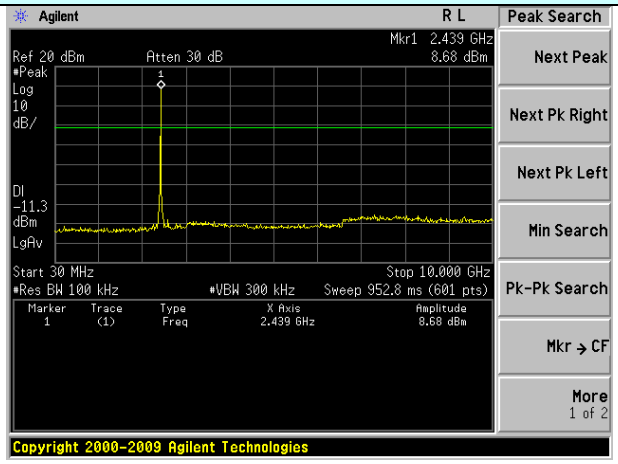


30MHz~10GHz

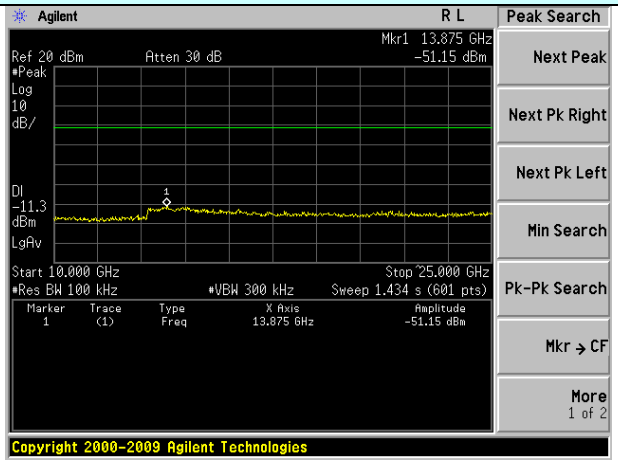


10GHz~25GHz

Test channel:	Middle channel

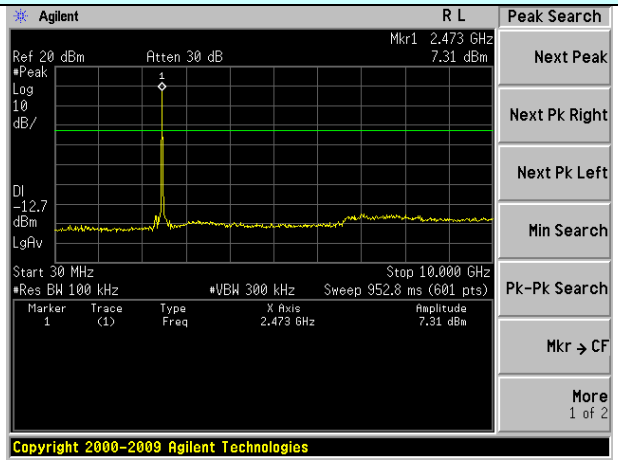


30MHz~10GHz

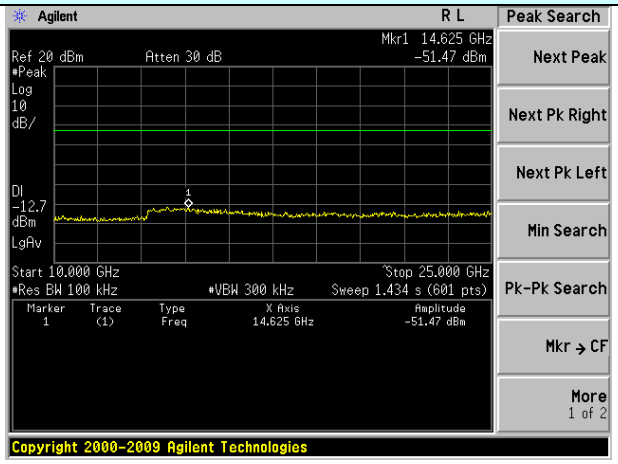


10GHz~25GHz

Test channel:	Highest channel



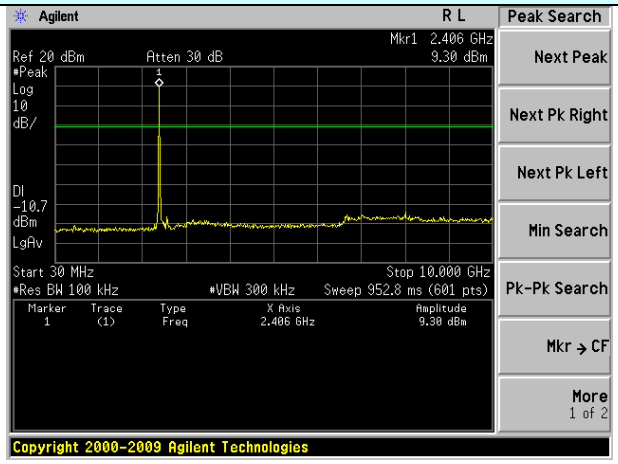
30MHz~10GHz



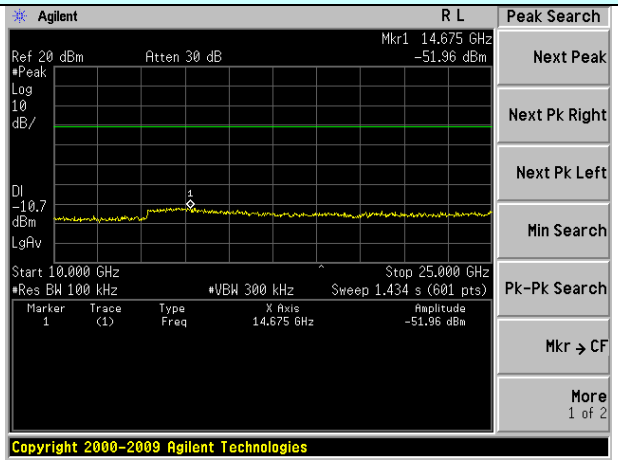
10GHz~25GHz

Antenna 2:

Test channel:	Lowest channel

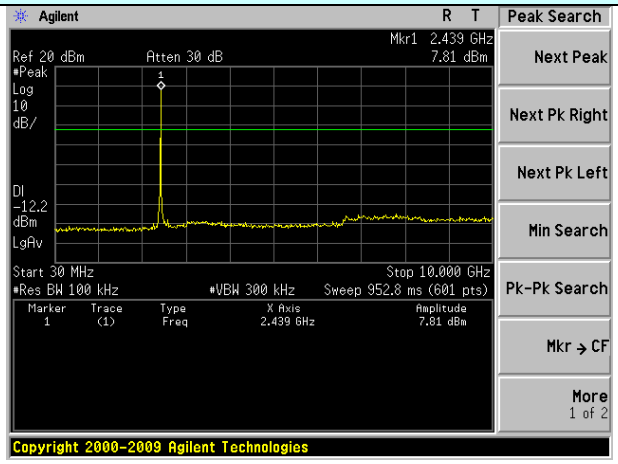


30MHz~10GHz

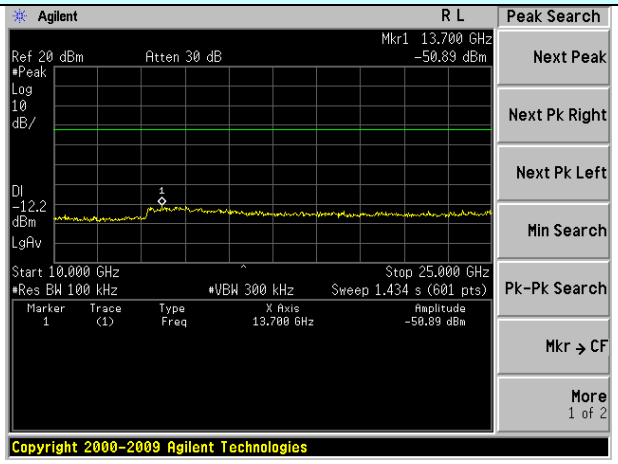


10GHz~25GHz

Test channel:	Middle channel

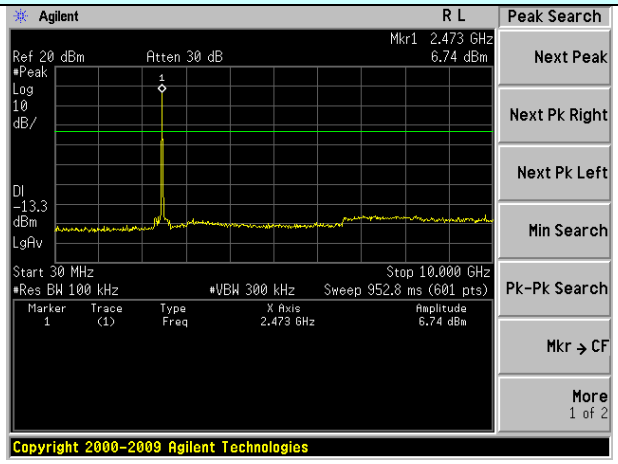


30MHz~10GHz

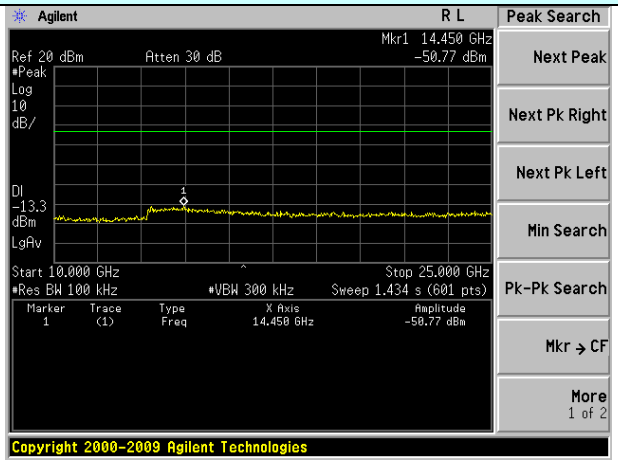


10GHz~25GHz

Test channel:	Highest channel



30MHz~10GHz



10GHz~25GHz

6.9.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10: 2009
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:
(Field strength of the fundamental signal)

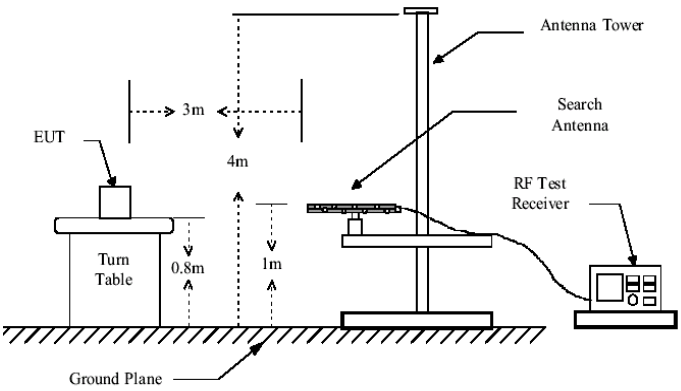
Frequency	Limit (dBuV/m @3m)	Remark
2400MHz-2483.5MHz	94.00	Average Value
	114.00	Peak Value

Limit:
(Spurious Emissions)

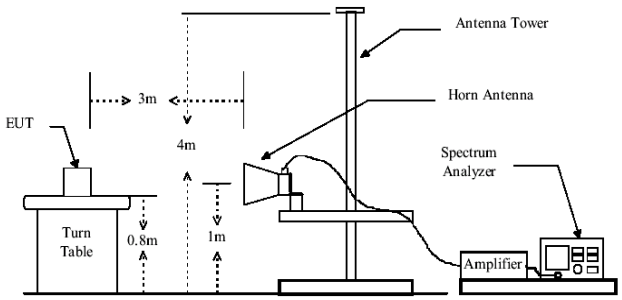
Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-1.705MHz	2400/F(KHz)	QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	300m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

Test setup:

Below 1GHz



Above 1GHz

	
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 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. 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. 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. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

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. *Two antenna were tested and found the antenna1 is worse. So only the data of antenna1 is reported.*
3. *The measured filed strength at frequencies below 30MHz are lower over 30dB than the limit. So the data isn't reported.*

Measurement data:

■ **Below 1GHz**

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
131.76	53.71	10.82	1.45	31.91	34.07	43.50	-9.43	Vertical
171.39	56.53	11.03	1.69	32.06	37.19	43.50	-6.31	Vertical
211.53	53.25	12.93	1.91	32.15	35.94	43.50	-7.56	Vertical
263.82	56.68	14.17	2.19	32.17	40.87	46.00	-5.13	Vertical
356.68	49.07	16.38	2.65	32.00	36.10	46.00	-9.90	Vertical
462.35	47.06	17.65	3.14	31.68	36.17	46.00	-9.83	Vertical
131.76	55.63	10.82	1.45	31.91	35.99	43.50	-7.51	Horizontal
153.74	58.38	10.42	1.59	32.00	38.39	43.50	-5.11	Horizontal
175.04	58.72	11.29	1.72	32.07	39.66	43.50	-3.84	Horizontal
189.74	57.87	12.48	1.79	32.11	40.03	43.50	-3.47	Horizontal
263.82	58.11	14.17	2.19	32.17	42.30	46.00	-3.70	Horizontal
661.15	48.95	20.67	3.95	31.13	42.44	46.00	-3.56	Horizontal

■ **Above 1GHz**

Test channel:	Lowest

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
4811.00	34.58	31.78	8.60	32.09	42.87	74.00	-31.13	Vertical
7216.50	29.29	36.15	11.66	31.99	45.11	74.00	-28.89	Vertical
9622.00	23.65	38.01	14.14	31.60	44.20	74.00	-29.80	Vertical
12027.50	25.94	39.08	15.05	35.54	44.53	74.00	-29.47	Vertical
14433.00	18.94	42.46	17.17	33.41	45.16	74.00	-28.84	Vertical
16838.50	21.52	42.13	18.82	33.66	48.81	74.00	-25.19	Vertical
4811.00	34.11	31.78	8.60	32.09	42.40	74.00	-31.60	Horizontal
7216.50	29.51	36.15	11.66	31.99	45.33	74.00	-28.67	Horizontal
9622.00	24.40	38.01	14.14	31.60	44.95	74.00	-29.05	Horizontal
12027.50	25.23	39.08	15.05	35.54	43.82	74.00	-30.18	Horizontal
14433.00	20.25	42.46	17.17	33.41	46.47	74.00	-27.53	Horizontal
16838.50	19.06	42.13	18.82	33.66	46.35	74.00	-27.65	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
4811.00	24.85	31.78	8.60	32.09	33.14	54.00	-20.86	Vertical
7216.50	19.93	36.15	11.66	31.99	35.75	54.00	-18.25	Vertical
9622.00	13.97	38.01	14.14	31.60	34.52	54.00	-19.48	Vertical
12027.50	15.77	39.08	15.05	35.54	34.36	54.00	-19.64	Vertical
14433.00	8.84	42.46	17.17	33.41	35.06	54.00	-18.94	Vertical
16838.50	11.37	42.13	18.82	33.66	38.66	54.00	-15.34	Vertical
4811.00	25.47	31.78	8.60	32.09	33.76	54.00	-20.24	Horizontal
7216.50	19.75	36.15	11.66	31.99	35.57	54.00	-18.43	Horizontal
9622.00	14.72	38.01	14.14	31.60	35.27	54.00	-18.73	Horizontal
12027.50	15.73	39.08	15.05	35.54	34.32	54.00	-19.68	Horizontal
14433.00	10.76	42.46	17.17	33.41	36.98	54.00	-17.02	Horizontal
16838.50	9.55	42.13	18.82	33.66	36.84	54.00	-17.16	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)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4880.00	33.44	31.85	8.66	32.12	41.83	74.00	-32.17	Vertical
7320.00	29.16	36.37	11.72	31.89	45.36	74.00	-28.64	Vertical
9760.00	25.16	38.35	14.25	31.59	46.17	74.00	-27.83	Vertical
12200.00	26.58	38.92	15.14	35.65	44.99	74.00	-29.01	Vertical
14640.00	20.28	42.21	17.28	34.32	45.45	74.00	-28.55	Vertical
17080.00	16.60	44.30	18.99	33.31	46.58	74.00	-27.42	Vertical
4880.00	33.57	31.85	8.66	32.12	41.96	74.00	-32.04	Horizontal
7320.00	29.75	36.37	11.72	31.89	45.95	74.00	-28.05	Horizontal
9760.00	26.37	38.35	14.25	31.59	47.38	74.00	-26.62	Horizontal
12200.00	25.15	38.92	15.14	35.65	43.56	74.00	-30.44	Horizontal
14640.00	18.46	42.21	17.28	34.32	43.63	74.00	-30.37	Horizontal
17080.00	15.81	44.30	18.99	33.31	45.79	74.00	-28.21	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
4880.00	23.74	31.85	8.66	32.12	32.13	54.00	-21.87	Vertical
7320.00	19.77	36.37	11.72	31.89	35.97	54.00	-18.03	Vertical
9760.00	15.49	38.35	14.25	31.59	36.50	54.00	-17.50	Vertical
12200.00	16.74	38.92	15.14	35.65	35.15	54.00	-18.85	Vertical
14640.00	10.76	42.21	17.28	34.32	35.93	54.00	-18.07	Vertical
17080.00	6.72	44.30	18.99	33.31	36.70	54.00	-17.30	Vertical
4880.00	23.74	31.85	8.66	32.12	32.13	54.00	-21.87	Horizontal
7320.00	19.47	36.37	11.72	31.89	35.67	54.00	-18.33	Horizontal
9760.00	16.49	38.35	14.25	31.59	37.50	54.00	-16.50	Horizontal
12200.00	15.55	38.92	15.14	35.65	33.96	54.00	-20.04	Horizontal
14640.00	8.74	42.21	17.28	34.32	33.91	54.00	-20.09	Horizontal
17080.00	5.92	44.30	18.99	33.31	35.90	54.00	-18.10	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

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
4950.00	33.06	31.91	8.71	32.16	41.52	74.00	-32.48	Vertical
7425.00	28.18	36.56	11.79	31.80	44.73	74.00	-29.27	Vertical
9900.00	24.86	38.81	14.35	31.85	46.17	74.00	-27.83	Vertical
12375.00	25.68	38.78	15.25	35.33	44.38	74.00	-29.62	Vertical
14850.00	23.25	41.52	17.37	35.30	46.84	74.00	-27.16	Vertical
17325.00	15.71	46.19	18.98	34.31	46.57	74.00	-27.43	Vertical
4950.00	34.38	31.91	8.71	32.16	42.84	74.00	-31.16	Horizontal
7425.00	29.97	36.56	11.79	31.80	46.52	74.00	-27.48	Horizontal
9900.00	26.39	38.81	14.35	31.85	47.70	74.00	-26.30	Horizontal
12375.00	26.25	38.78	15.25	35.33	44.95	74.00	-29.05	Horizontal
14850.00	23.24	41.52	17.37	35.30	46.83	74.00	-27.17	Horizontal
17325.00	16.04	46.19	18.98	34.31	46.90	74.00	-27.10	Horizontal

Average value:

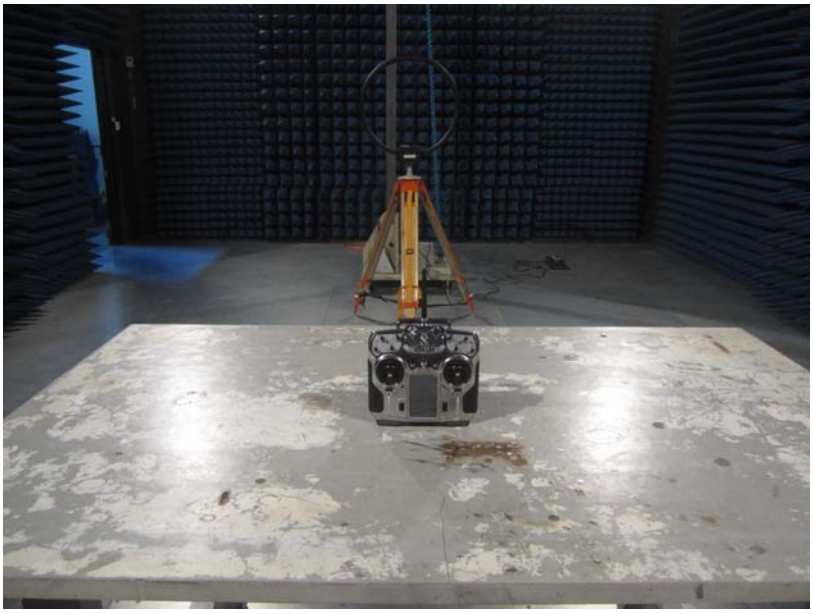
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4950.00	23.48	31.91	8.71	32.16	31.94	54.00	-22.06	Vertical
7425.00	18.50	36.56	11.79	31.80	35.05	54.00	-18.95	Vertical
9900.00	14.72	38.81	14.35	31.85	36.03	54.00	-17.97	Vertical
12375.00	15.76	38.78	15.25	35.33	34.46	54.00	-19.54	Vertical
14850.00	13.73	41.52	17.37	35.30	37.32	54.00	-16.68	Vertical
17325.00	5.71	46.19	18.98	34.31	36.57	54.00	-17.43	Vertical
4950.00	23.92	31.91	8.71	32.16	32.38	54.00	-21.62	Horizontal
7425.00	19.76	36.56	11.79	31.80	36.31	54.00	-17.69	Horizontal
9900.00	16.75	38.81	14.35	31.85	38.06	54.00	-15.94	Horizontal
12375.00	16.76	38.78	15.25	35.33	35.46	54.00	-18.54	Horizontal
14850.00	13.56	41.52	17.37	35.30	37.15	54.00	-16.85	Horizontal
17325.00	6.42	46.19	18.98	34.31	37.28	54.00	-16.72	Horizontal

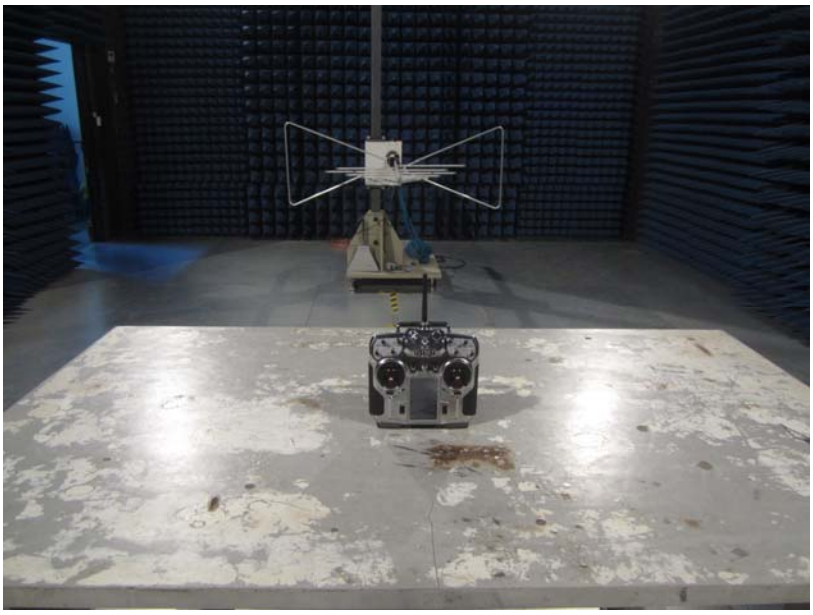
Remark:

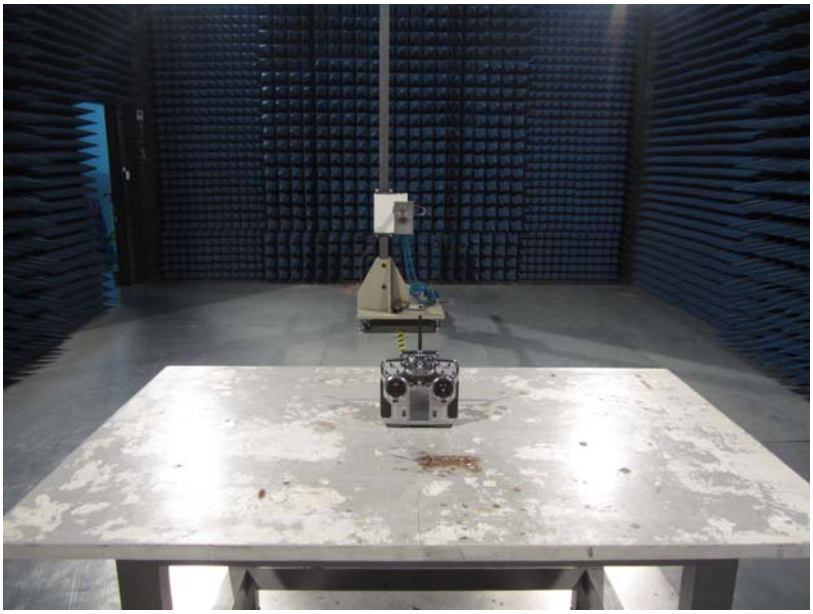
1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

7 Test Setup Photo

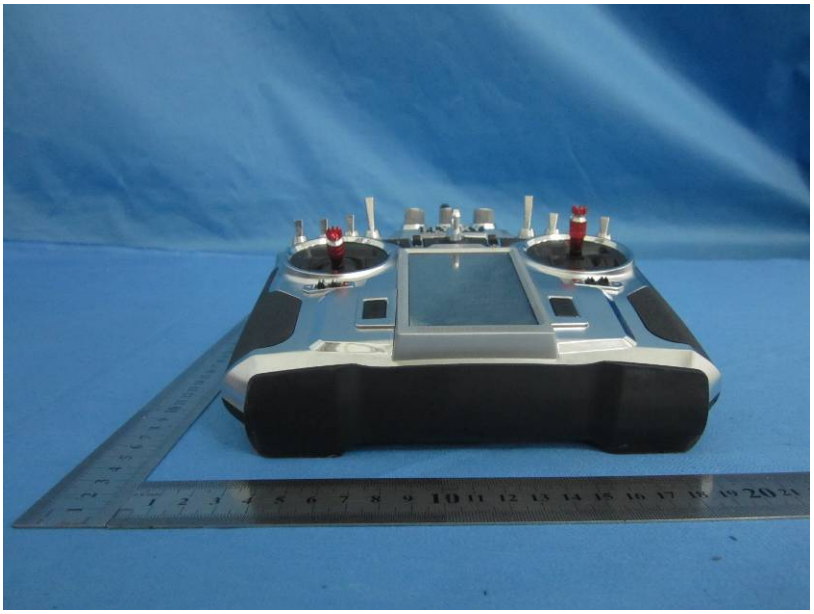
Radiated Emission

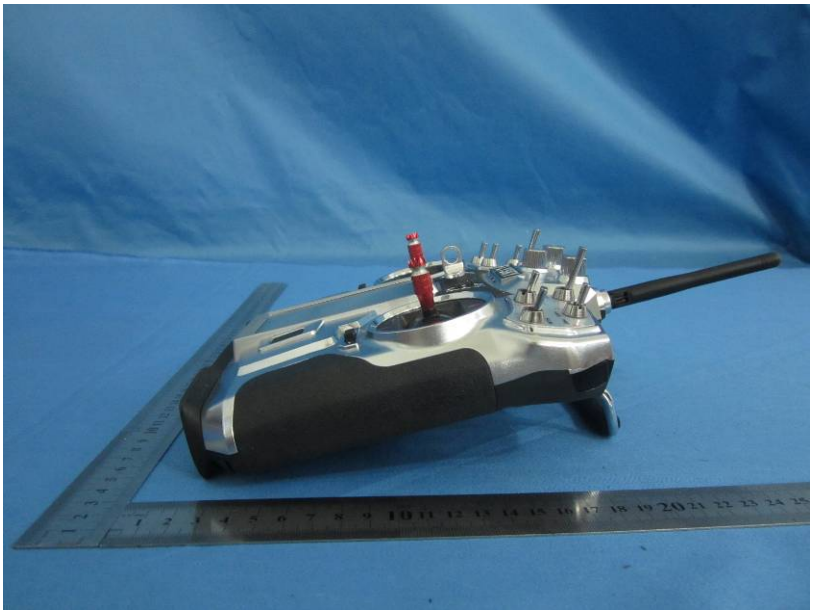


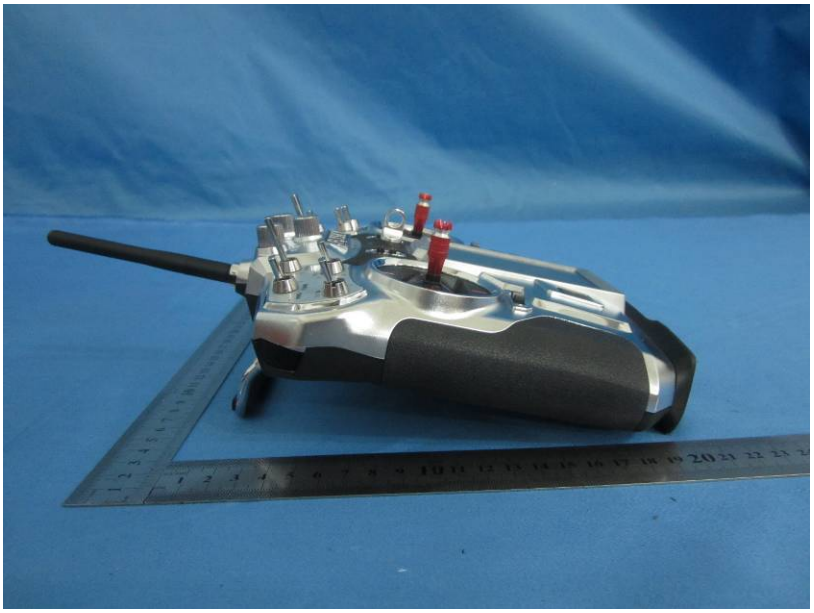




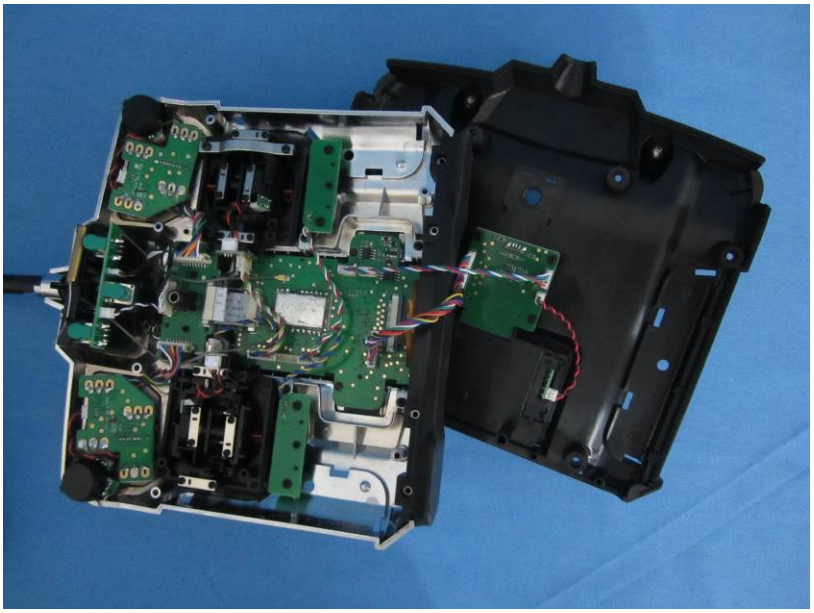
8 EUT Constructional Details

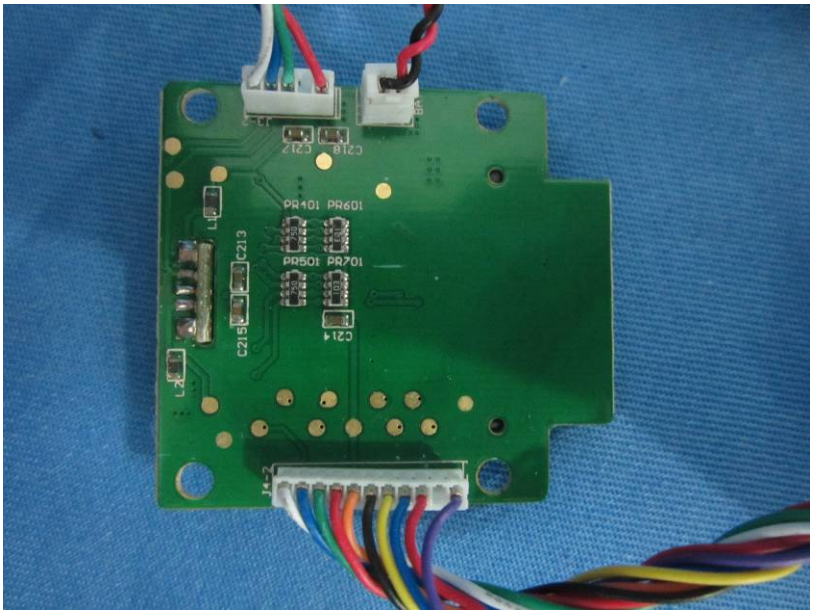


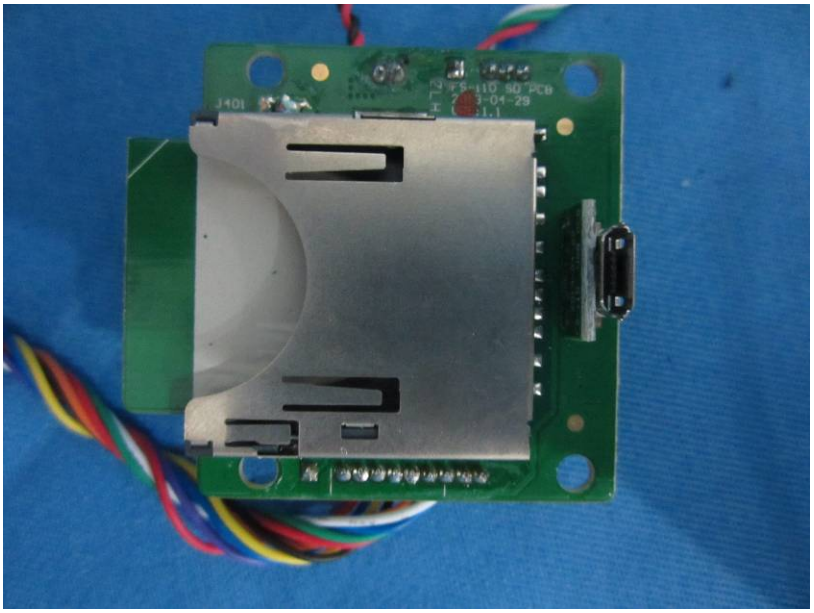




Li-ion Polymer Battery
Model : F5-B1200
Capacity : 1200mAh
Voltage : 3.7V
Warning:




PR401 PR601
PR501 PR701
C213
C215
C214
L1
L2
J4-2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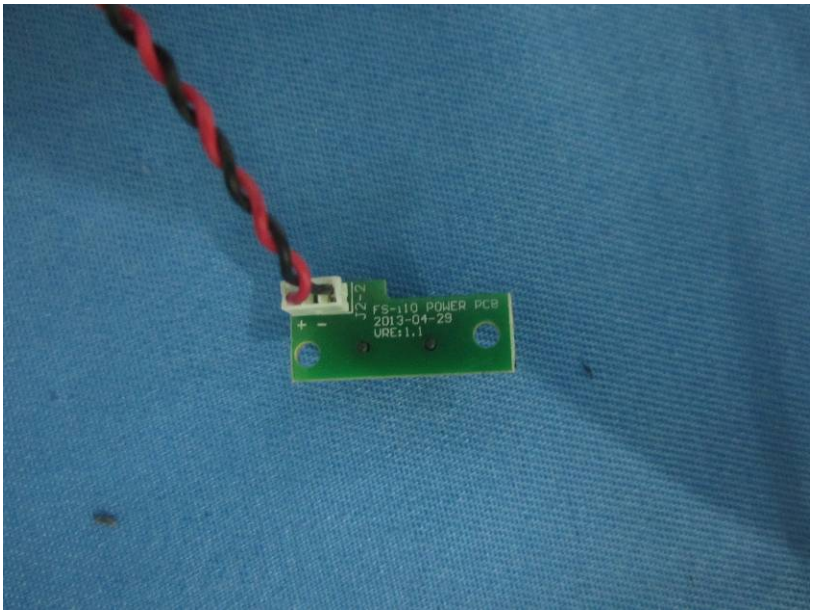
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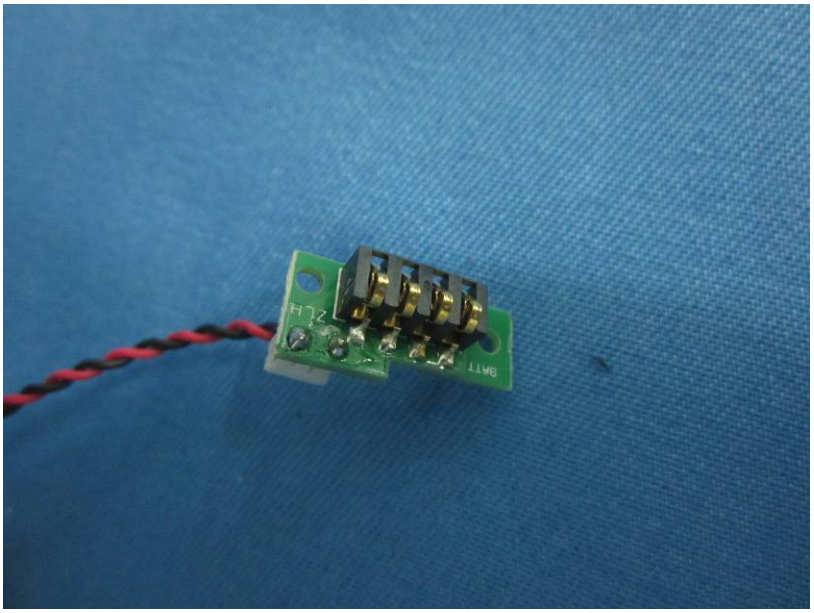

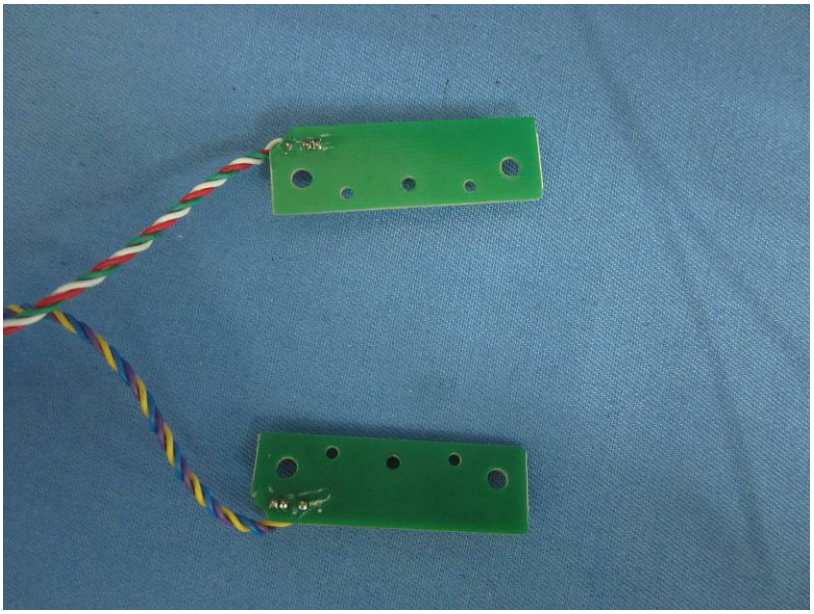

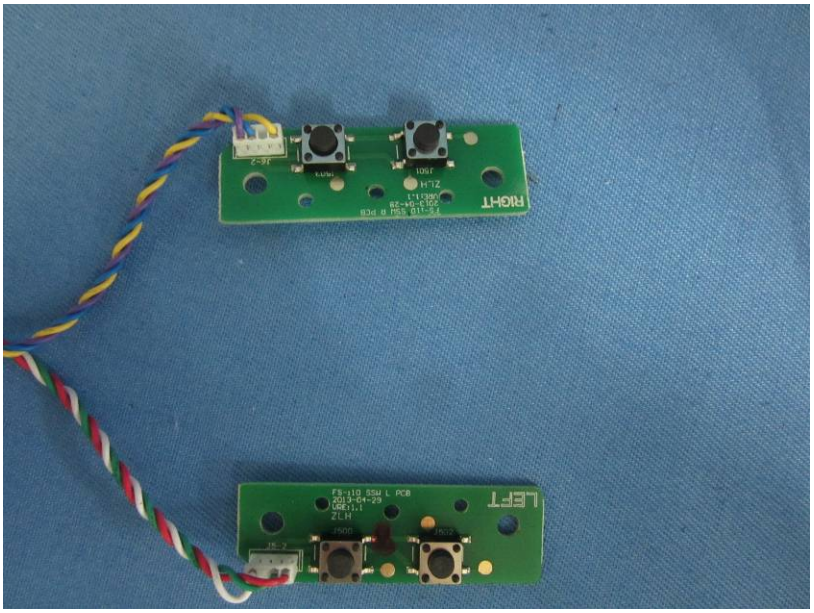
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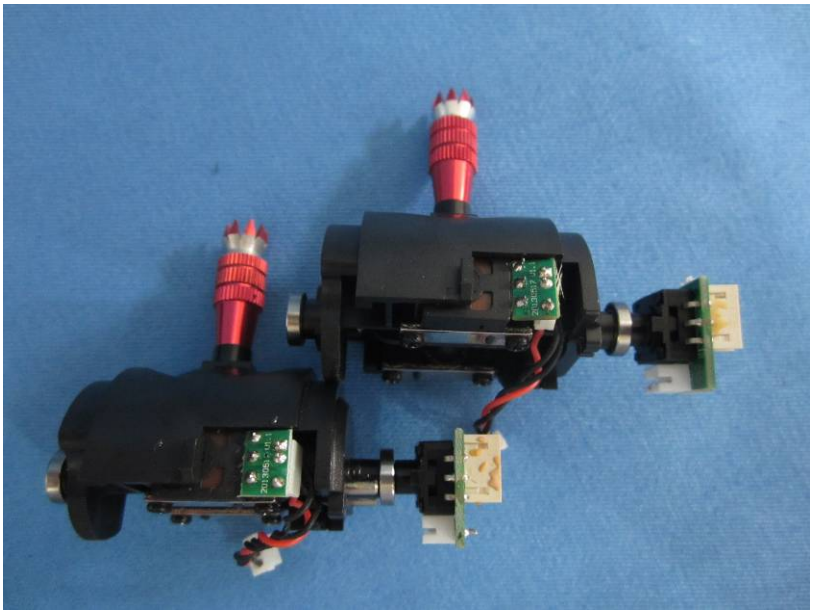

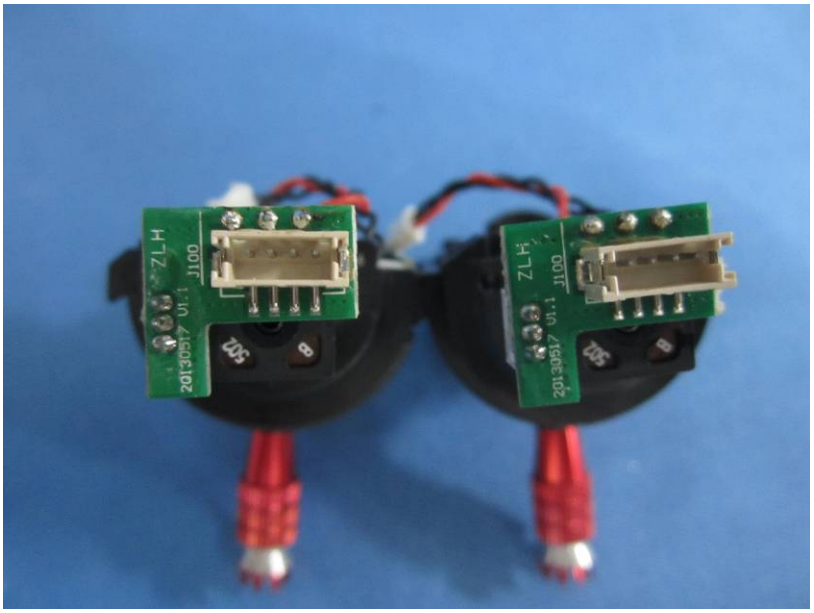
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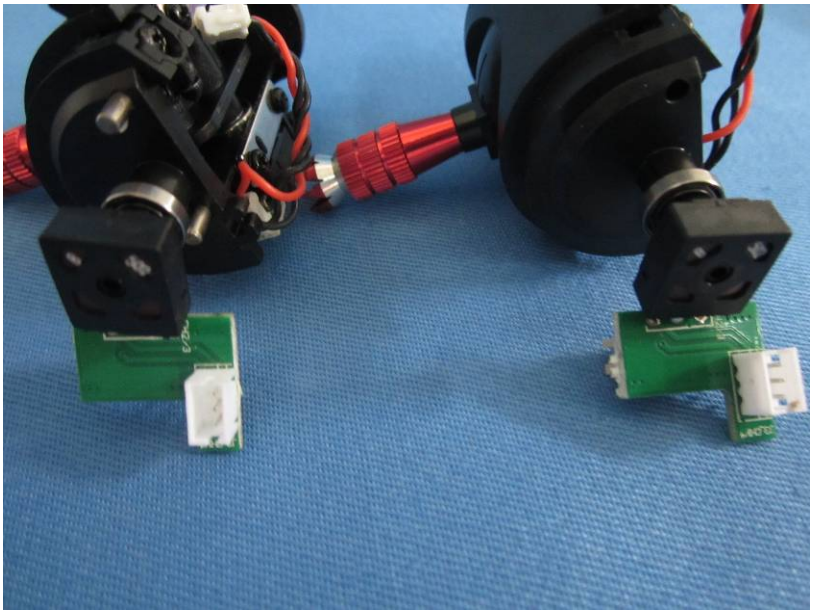
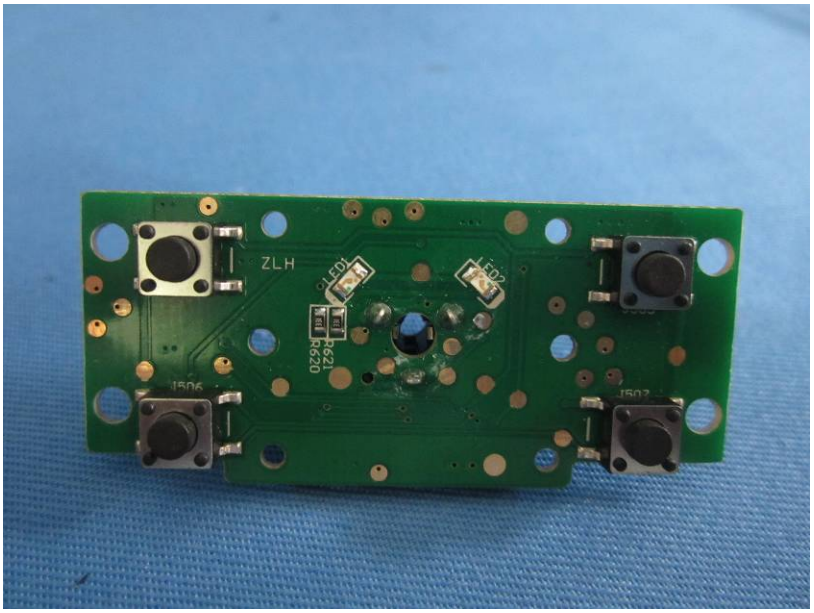
ZLH
J100
20130517 V1.1

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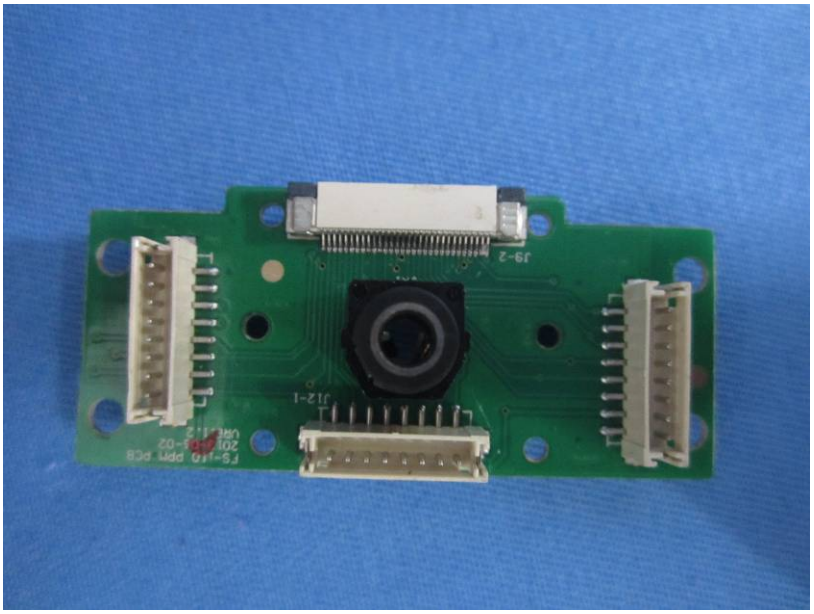
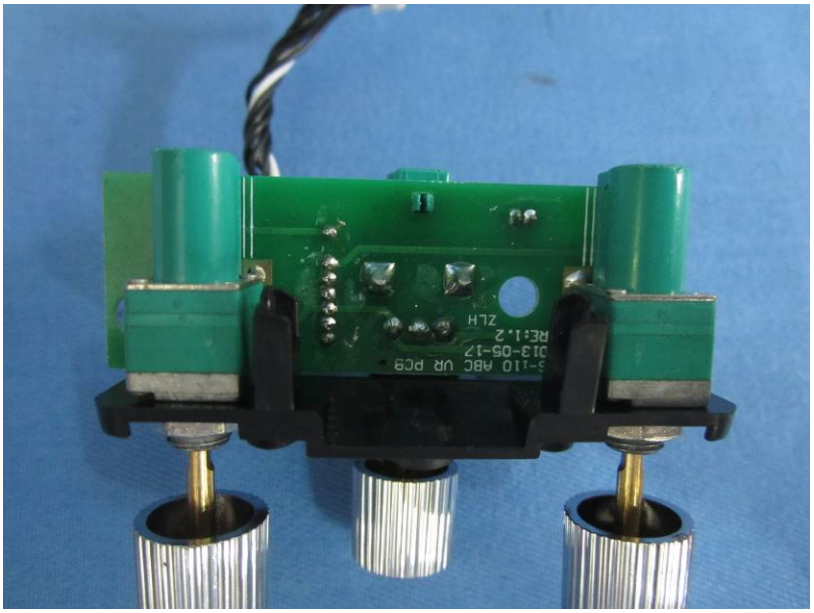
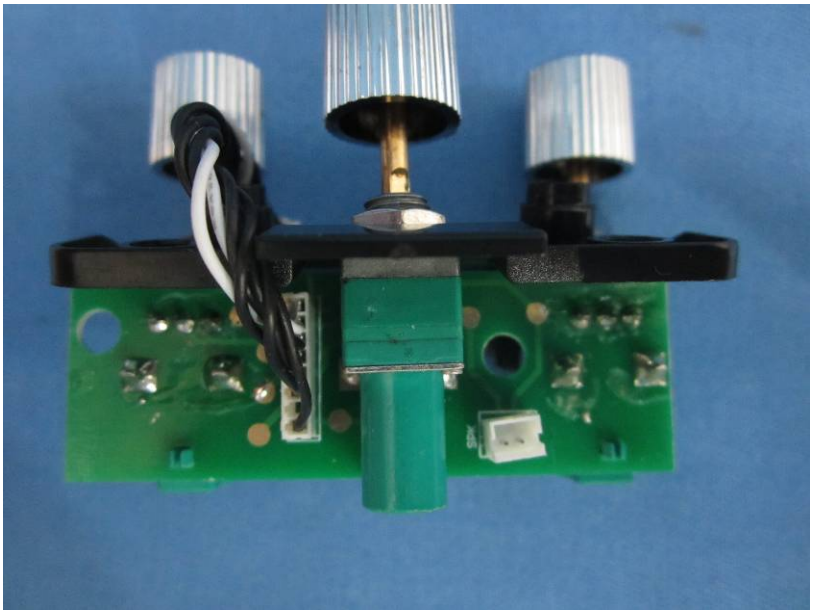
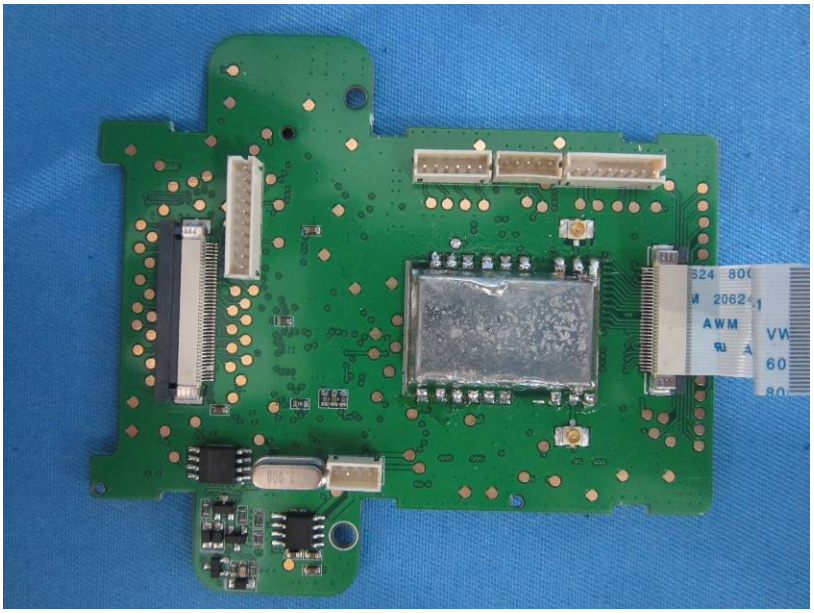
LED2
R621
R620





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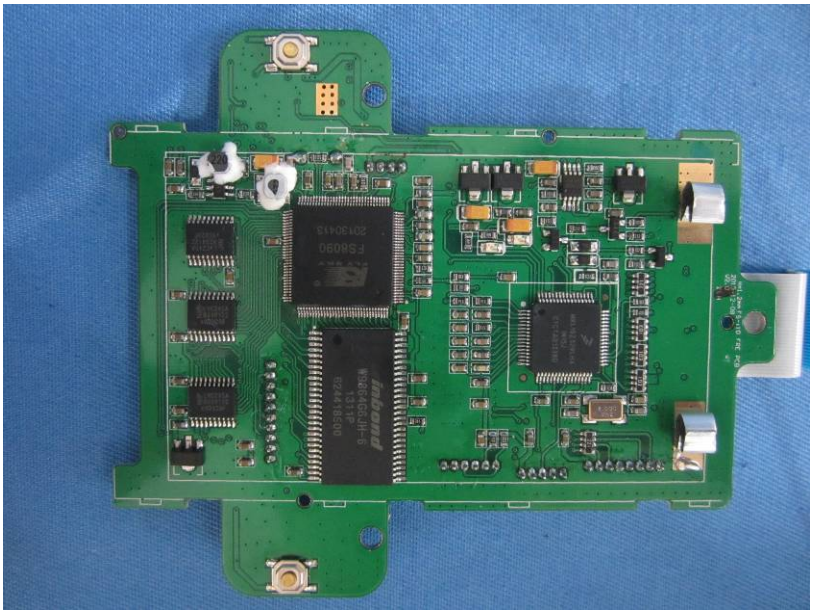

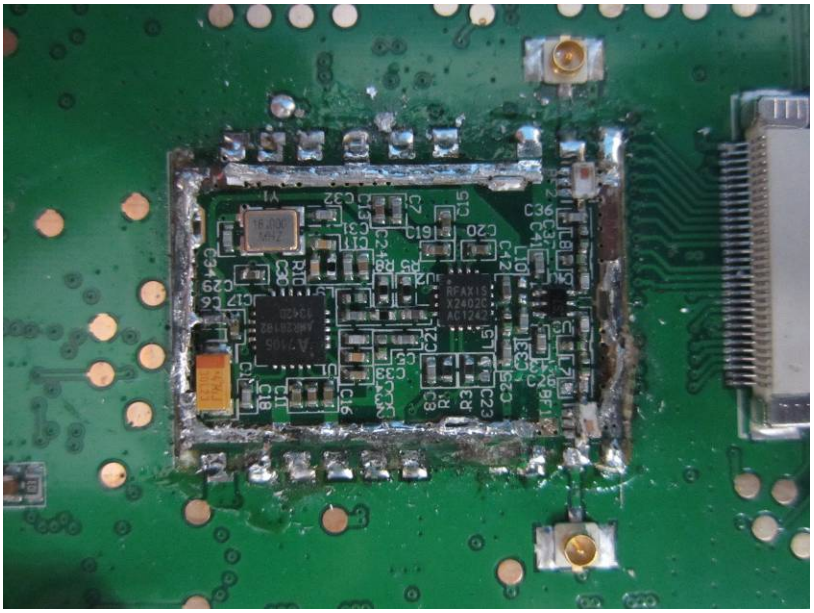

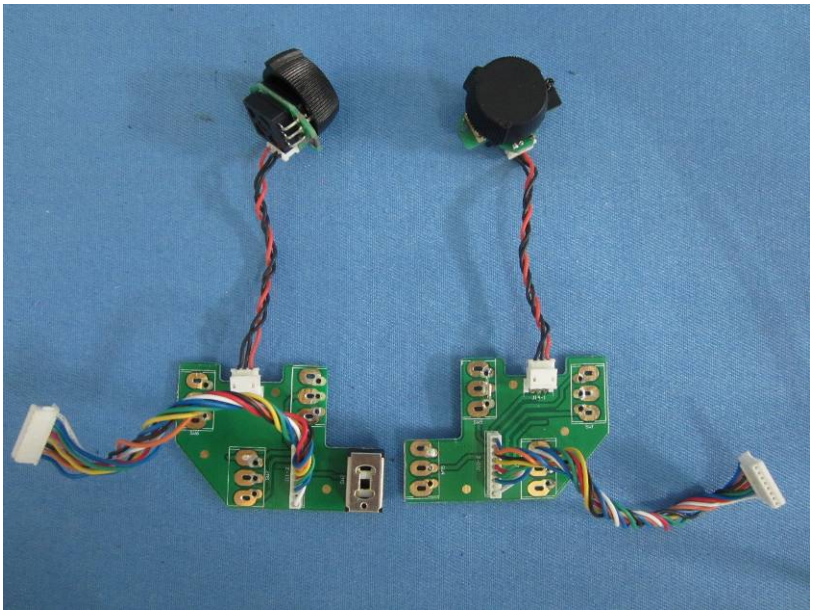

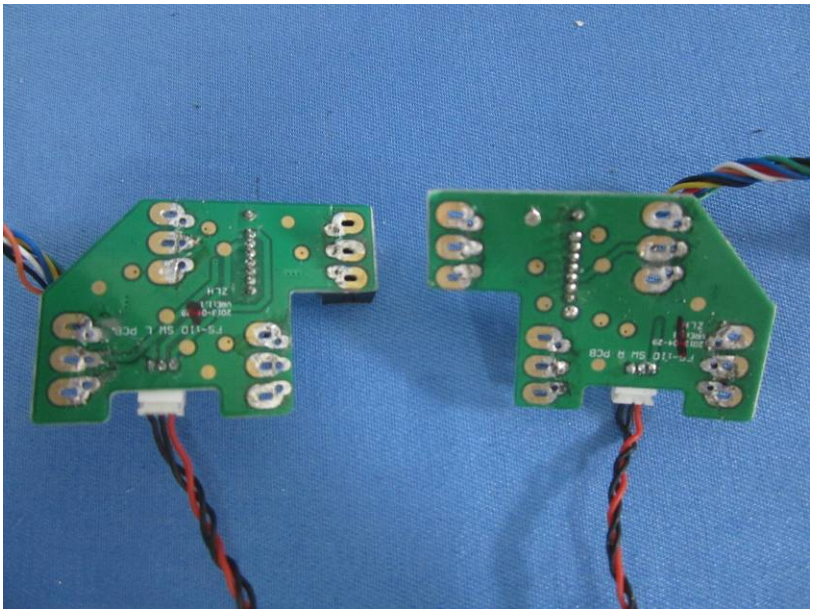

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