FCC Report

Applicant:	ALIGN CORPORATION LIMITED
Address of Applicant:	No.345, Shuiyuan Rd., Fengyuan Dist., Taichung City 42076, Taiwan
Manufacturer:	ALIGN CORPORATION LIMITED
Address of Manufacturer:	No.345, Shuiyuan Rd., Fengyuan Dist., Taichung City 42076, Taiwan
Factory:	FLYSKY RC MODEL TECHNOLOGY CO., LTD
Address of Factory:	West building3,Huangjianyuan Ind Park QIAOLI North Gate Changping Town Dongguan CN.

Equipment Under Test (EUT)

Product Name:	Radio control system
Model No.:	A6B
Trade Mark:	ALIGN
FCC ID:	Y6IA6B
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	June 05, 2018
Date of Test:	June 06- June 21, 2018
Date of report issued:	June 22, 2018
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*June 22, 2018*	*Original*

Prepared By: *Tiger Chen* ***Date:*** *June 22, 2018*

Project Engineer

Check By: *Andy Wu* ***Date:*** *June 22, 2018*

Reviewer

3 Contents

Page

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)	Pass
Radiated Emission	15.205/15.209	Pass
Band Edge	15.247(d)	Pass

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

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

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	Radio control system
Model No.:	A6B
Operation Frequency:	2405.5MHz~2475.0MHz
Channel numbers:	140
Modulation technology:	GFSK
Antenna Type:	Integral Antenna
Antenna gain:	2dBi
Power supply:	DC 4.0V ~ 8.4V

Remark: The system works in the frequency range of 2405.5MHz to 2475MHz. This band has been divided to 140 independent channels. Each radio system uses 16 different channels, the minimum channel separation is ≥2MHz. By using various switch-on times, hopping scheme and channel frequencies, the system can guarantee a jamming free radio transmission. The channel list is below.

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

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting mode.

5.3 Test Facility

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

● **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration No.: 381383, January 08, 2018.

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

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

5.4 Test Location

All other tests were performed at:

Global United Technology Services Co., Ltd.
Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: 0755-27798480
Fax: 0755-27798960

5.5 Other Information Requested by the Customer

None.

5.6 Description of Support Units

None.

5.7 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	ESU EMI Test Receiver	R&S	ESU26	GTS203	June 28 2017	June 27 2018
4	Loop Antenna	Zhinan	ZN30900A	GTS534	June 28 2017	June 27 2018
5	BiConiLog Antenna	SCHWARZBECK	VULB9163	GTS214	June 28 2017	June 27 2018
6	Double-ridged horn antenna	SCHWARZBECK	9120D	GTS208	June 28 2017	June 27 2018
7	Horn Antenna	ETS-LINDGREN	3160-09	GTS218	June 28 2017	June 27 2018
8	RF Amplifier	HP	8347A	GTS204	June 28 2017	June 27 2018
9	RF Amplifier	HP	8349B	GTS206	June 28 2017	June 27 2018
10	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	June 28 2017	June 27 2018
11	Spectrum Analyzer	Keysight	N9010A	GTS536	March 02 2018	March 01 2019
12	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
13	Coaxial Cable	GTS	N/A	GTS210	June 28 2017	June 27 2018
14	Coaxial Cable	GTS	N/A	GTS211	June 28 2017	June 27 2018
15	Coaxial Cable	GTS	N/A	GTS210	June 28 2017	June 27 2018
16	Coaxial Cable	GTS	N/A	GTS212	June 28 2017	June 27 2018
17	Thermo meter	N/A	N/A	GTS256	June 28 2017	June 27 2018
18	D.C. Power Supply	Instek	PS-3030	GTS232	June 28 2017	June 27 2018
19	Loop Antenna	ZHINAN	ZN30900A	GTS534	June 28 2017	June 27 2018

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.16 2014	May 15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June 28 2017	June 27 2018
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June 28 2017	June 27 2018
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June 28 2017	June 27 2018
5	High voltage probe	SCHWARZBECK	TK9420	GTS537	June 28 2017	June 27 2018
6	ISN	SCHWARZBECK	NTFM 8158	GTS565	June 28 2017	June 27 2018
7	Coaxial Cable	GTS	N/A	GTS227	June 28 2017	June 27 2018
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Thermo meter	KTJ	TA328	GTS233	June 28 2017	June 27 2018
10	10dB Pulse Limiter	Rohde & Schwarz	N/A	GTS224	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

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.

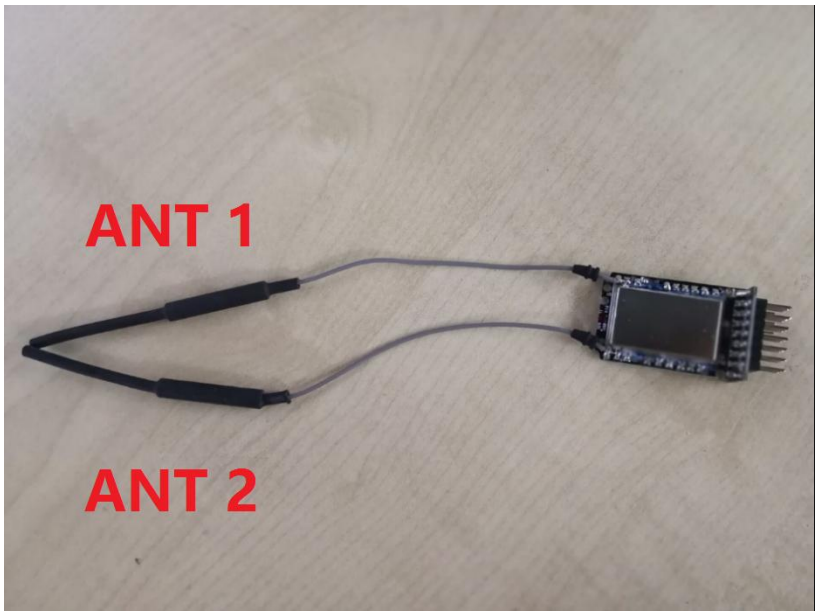
15.247(c) (1)(i) requirement:

(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.

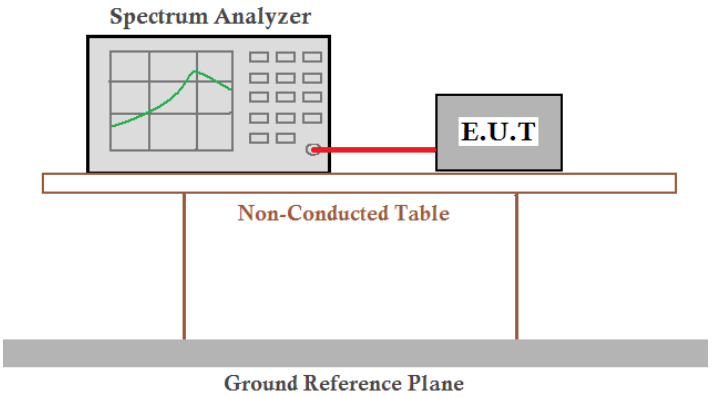
EUT Antenna:

The antenna is integral Antenna, the best case gain of the antenna is 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 Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2013
Limit:	20.97dBm
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Antenna 1:

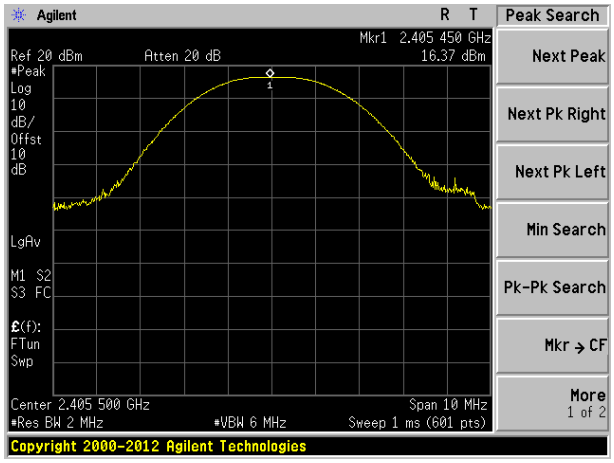
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	16.37	20.97	Pass
Middle	15.77		
Highest	15.16		

Antenna 2:

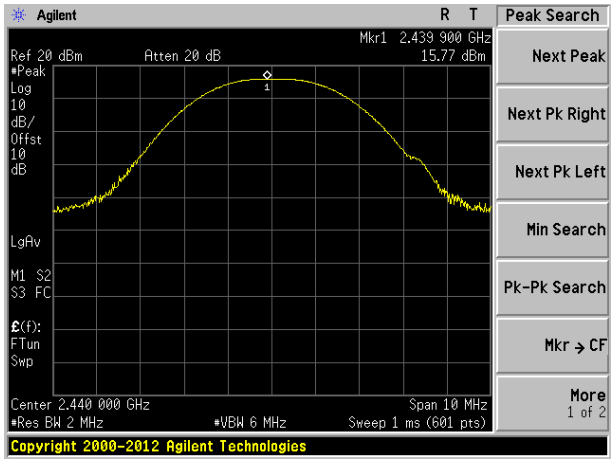
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	16.18	20.97	Pass
Middle	16.53		
Highest	15.84		

Test plot as follows:

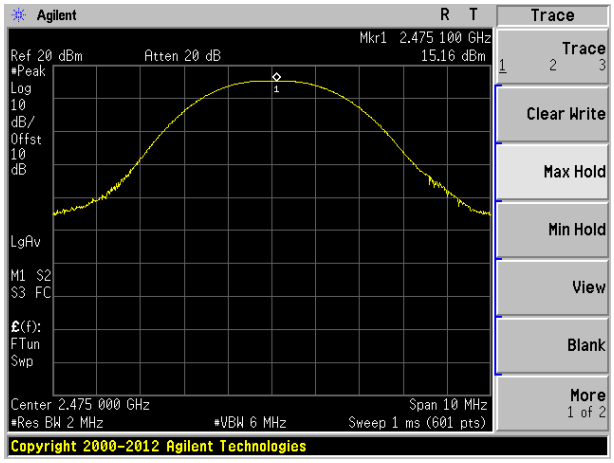
		Antenna:	Antenna 1



Lowest channel

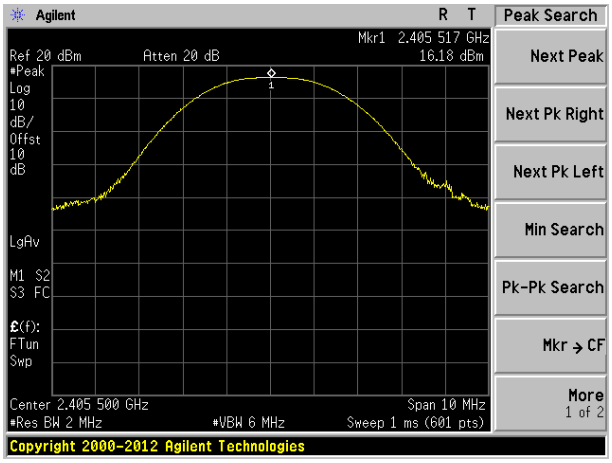


Middle channel

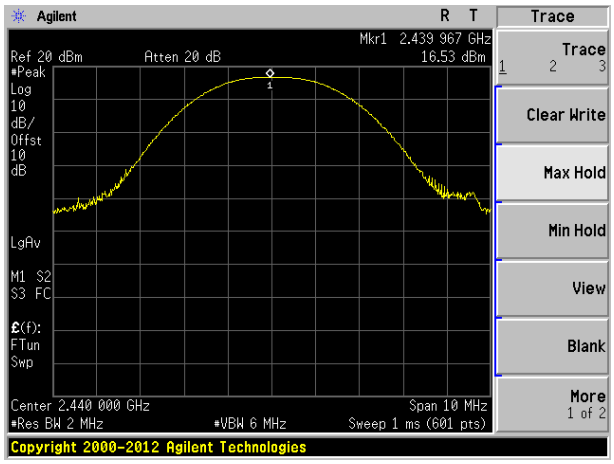


Highest channel

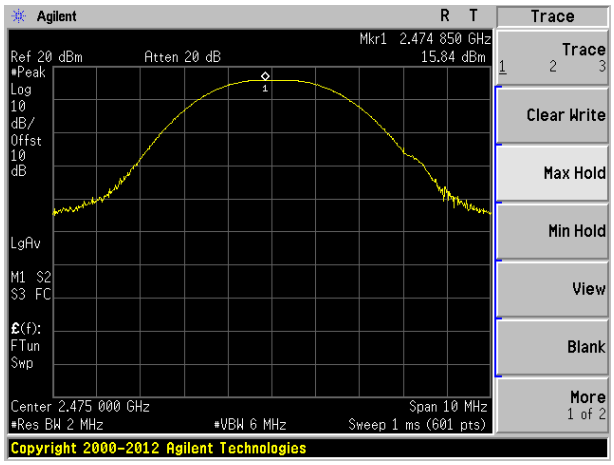
		Antenna:	Antenna 2



Lowest channel

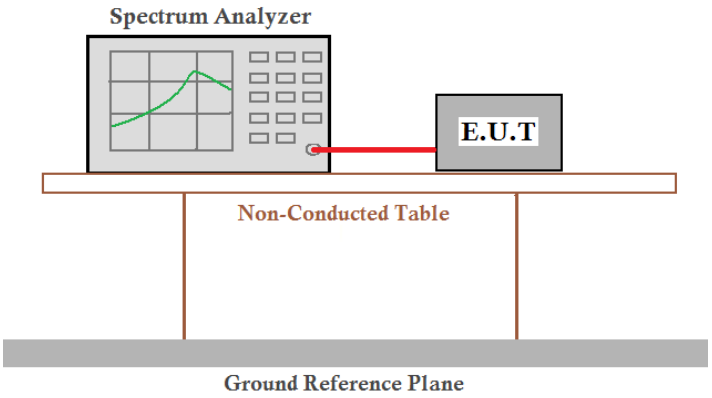


Middle channel



Highest channel

6.3 20dB Emission Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Antenna 1:

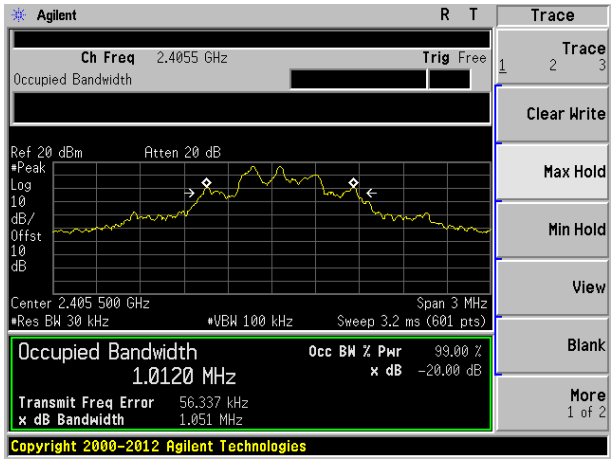
Test channel	20dB Emission Bandwidth (MHz)	Result
Lowest	1.051	Pass
Middle	1.052	
Highest	1.048	

Antenna 2:

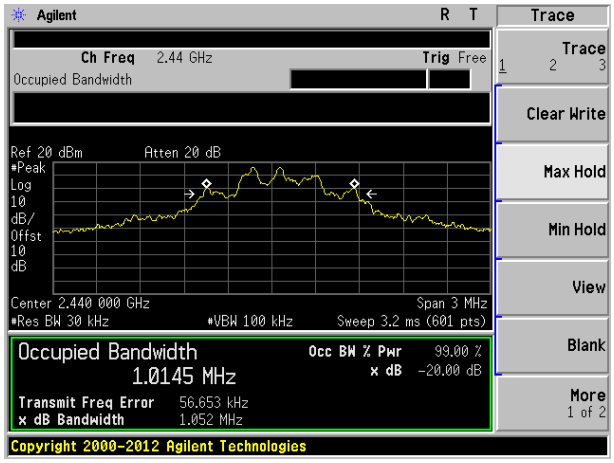
Test channel	20dB Emission Bandwidth (MHz)	Result
Lowest	1.050	Pass
Middle	1.047	
Highest	1.047	

Test plot as follows:

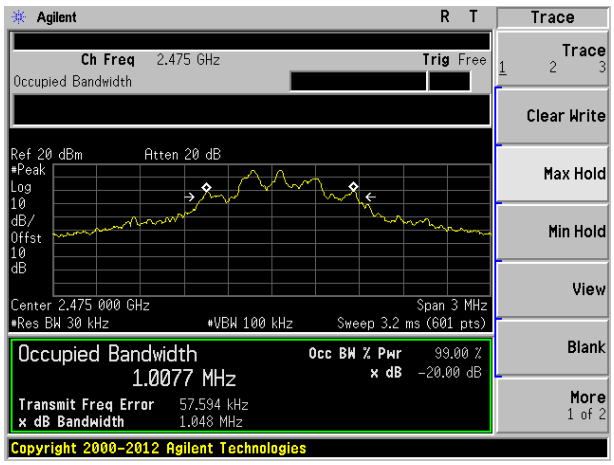
		Antenna:	Antenna 1



Lowest channel

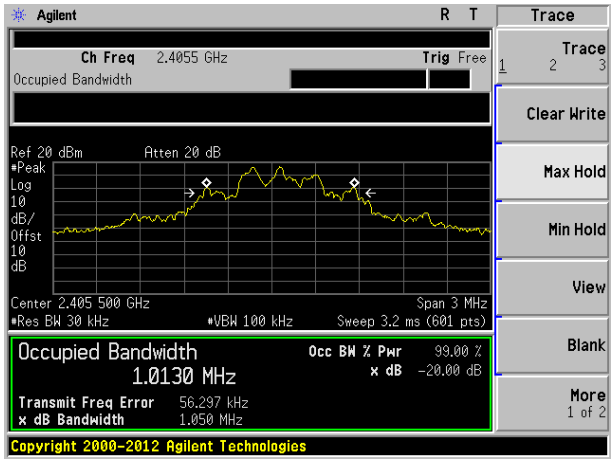


Middle channel

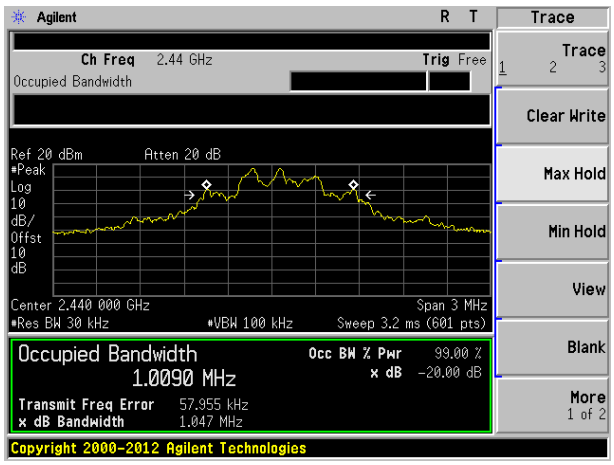


Highest channel

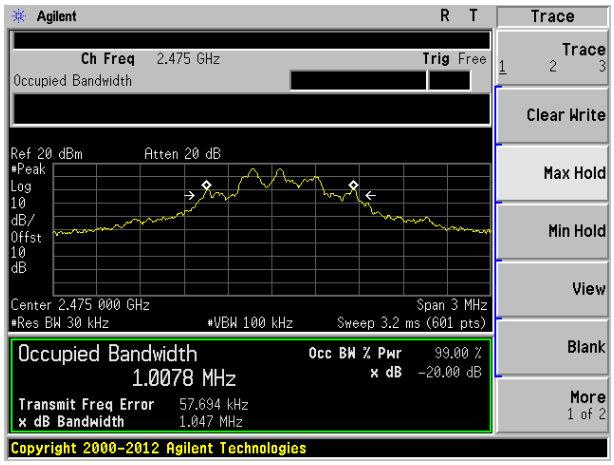
		Antenna:	Antenna 2



Lowest channel

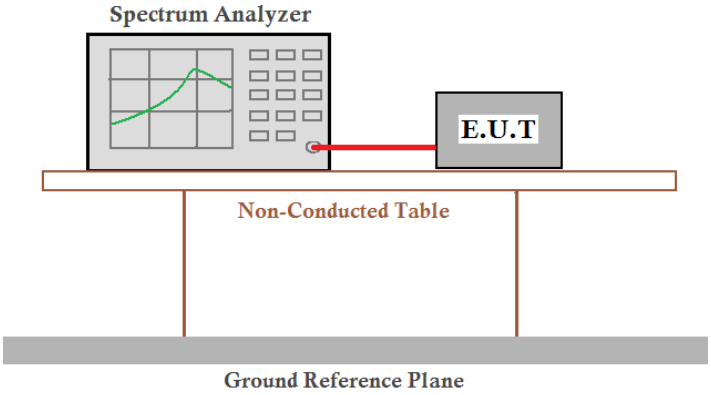


Middle channel



Highest channel

6.4 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100KHz, VBW=300KHz, detector=Peak
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Antenna 1:

Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	4533	*701*	Pass
Middle	2000	*701*	Pass
Highest	3008	*701*	Pass

Note: According to section 6.3

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

Antenna 2:

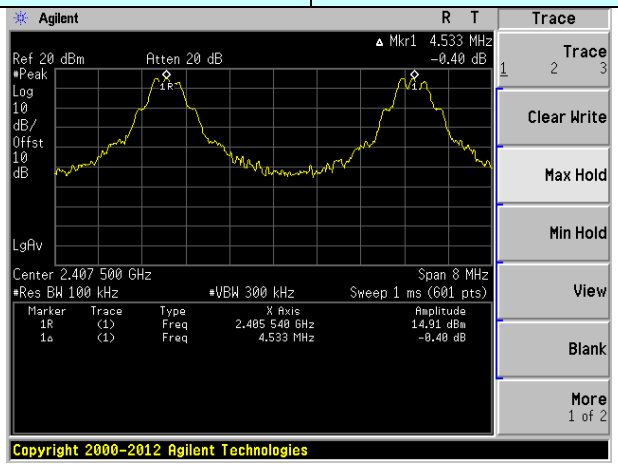
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	4507	*700*	Pass
Middle	2000	*700*	Pass
Highest	3083	*700*	Pass

Note: According to section 6.3

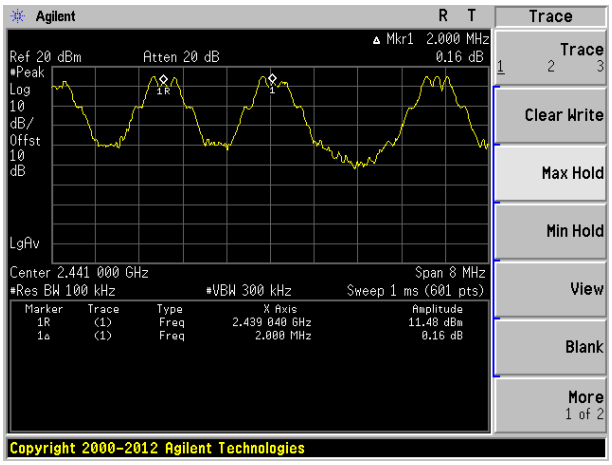
Mode	*20dB bandwidth (kHz) (worse case)*	*Limit (kHz) (Carrier Frequencies Separation)*
GFSK	*1050*	*700*

Test plot as follows:

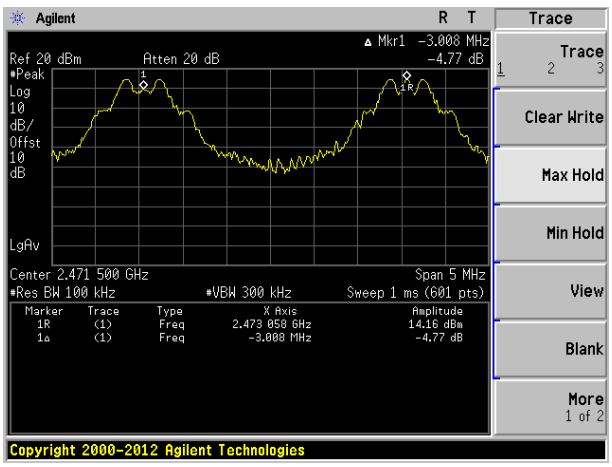
		Antenna:	Antenna 1



Lowest channel

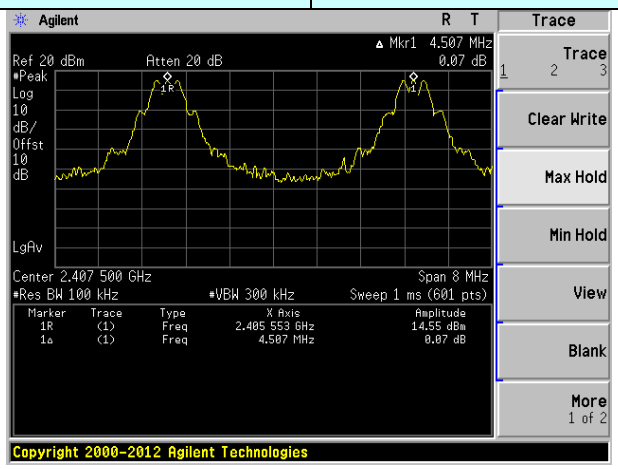


Middle channel

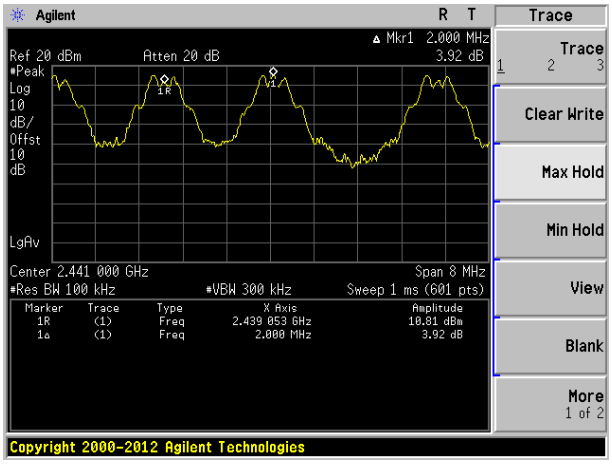


Highest channel

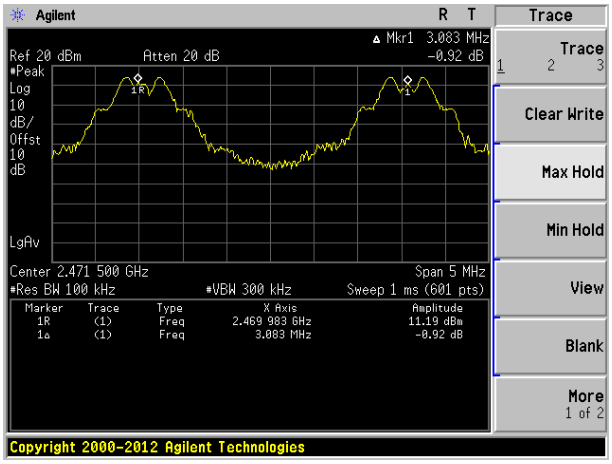
		Antenna:	Antenna 2



Lowest channel

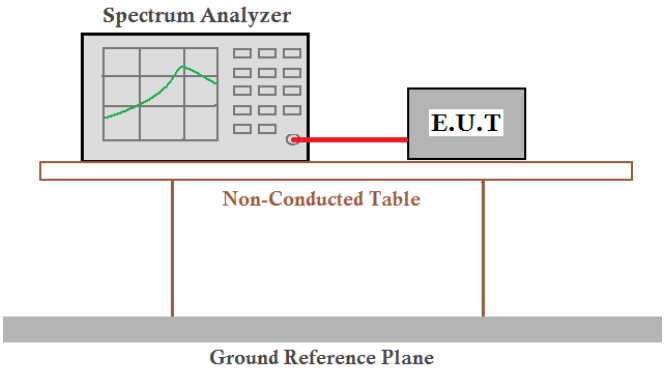


Middle channel



Highest channel

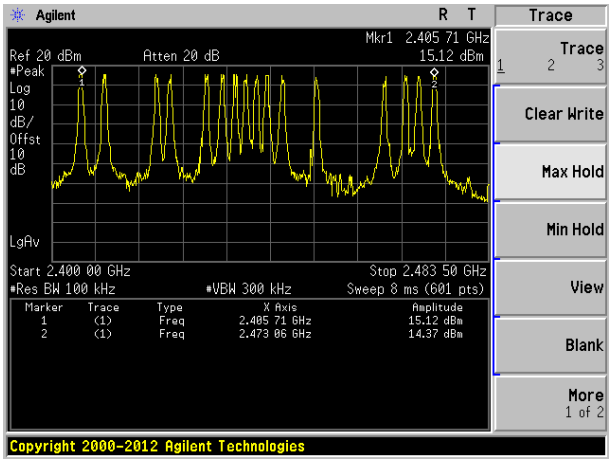
6.5 Hopping Channel Number

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data:

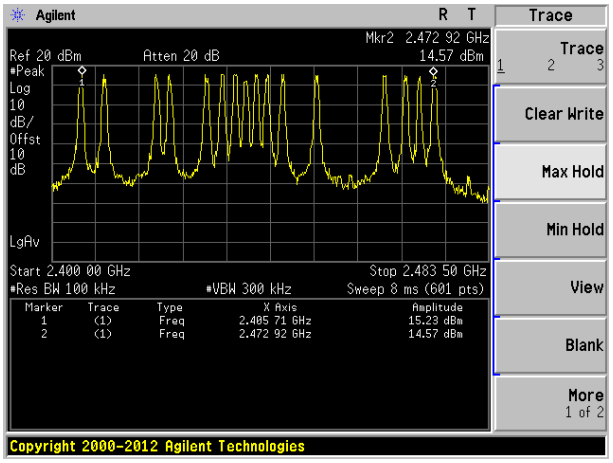
Antenna 1:

Hopping channel numbers	Limit	Result
16	15	Pass

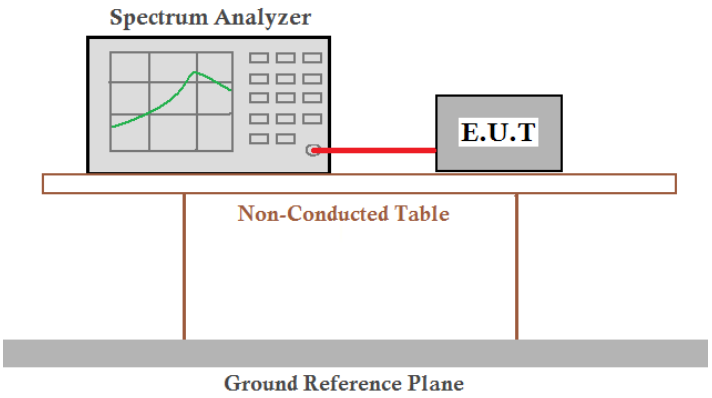


Antenna 2:

Hopping channel numbers	Limit	Result
16	15	Pass



6.6 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Antenna 1:

Frequency	Ton (ms)	Dwell time(ms)	Limit(ms)	Result
2.4055GHz	1.315	134.66	400	Pass
2.440GHz	1.310	134.14	400	Pass
2.475GHz	1.310	134.14	400	Pass

The formula as below:

2405.5MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.315ms*16*0.4*16=134.66ms

2440MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.315ms*16*0.4*16=134.14ms

2475MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.310ms*16*0.4*16=134.14ms

Antenna 2:

Frequency	Ton (ms)	Dwell time(ms)	Limit(ms)	Result
2.4055GHz	1.310	134.14	400	Pass
2.440GHz	1.310	134.14	400	Pass
2.475GHz	1.310	134.14	400	Pass

The formula as below:

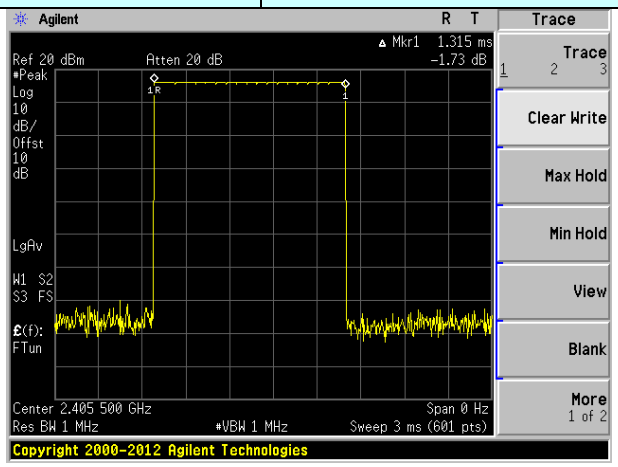
2405.5MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.310ms*16*0.4*16=134.14ms

2440MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.310ms*16*0.4*16=134.14ms

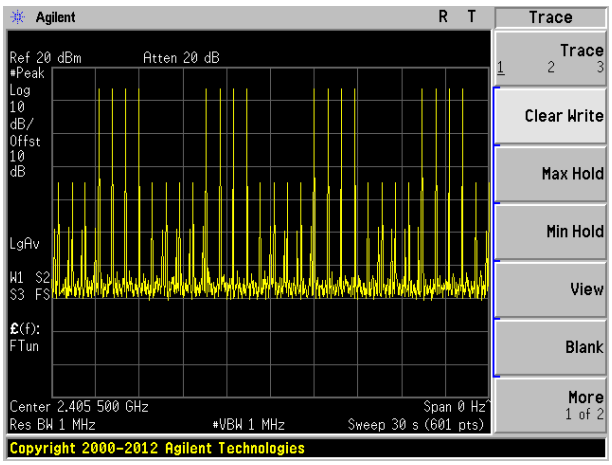
2475MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.310ms*16*0.4*16=134.14ms

Test plot as follows:

Frequency:	2405.5MHz	Antenna:	Antenna 1

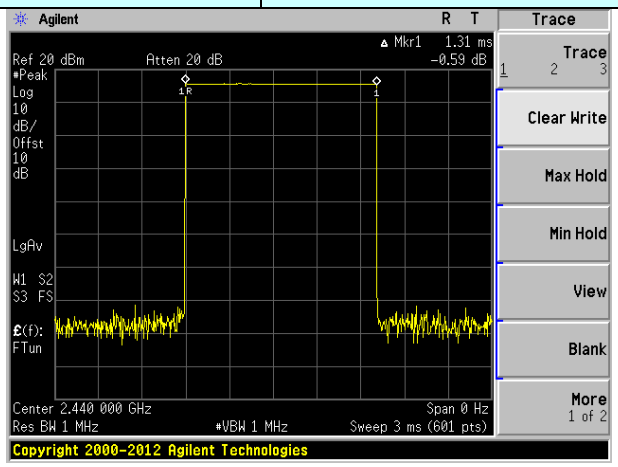


Ton

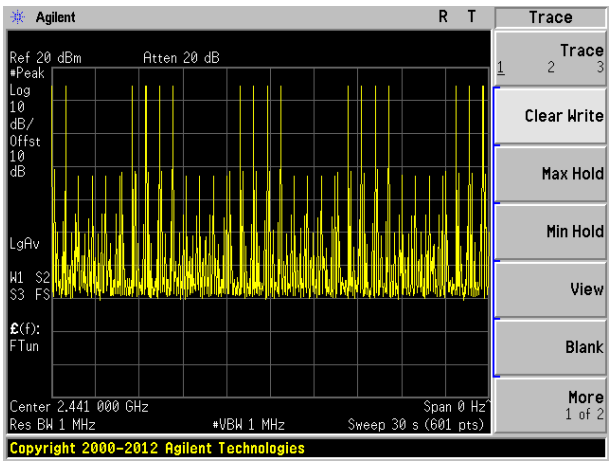


Ton times in 1s

Frequency:	2440MHz	Antenna:	Antenna 1

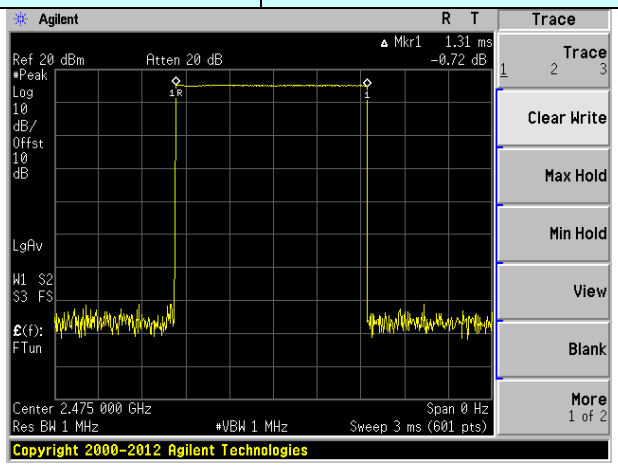


Ton

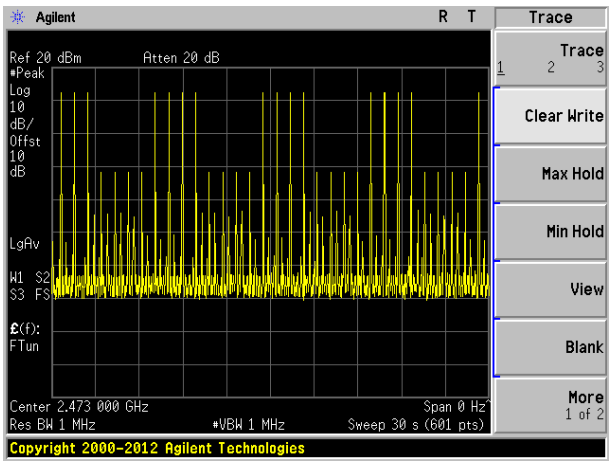


Ton times in 1s

Frequency:	2475MHz	Antenna:	Antenna 1

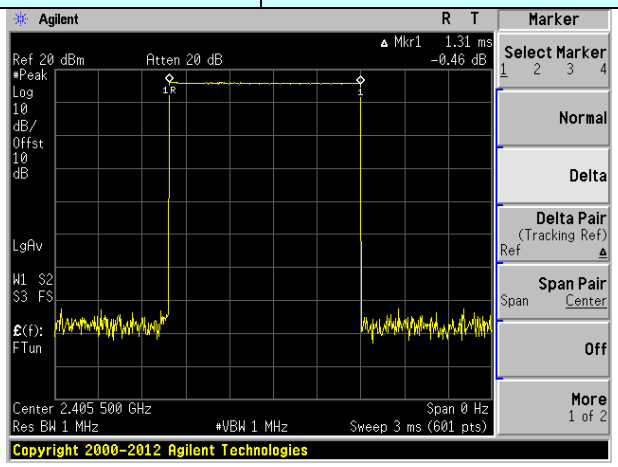


Ton

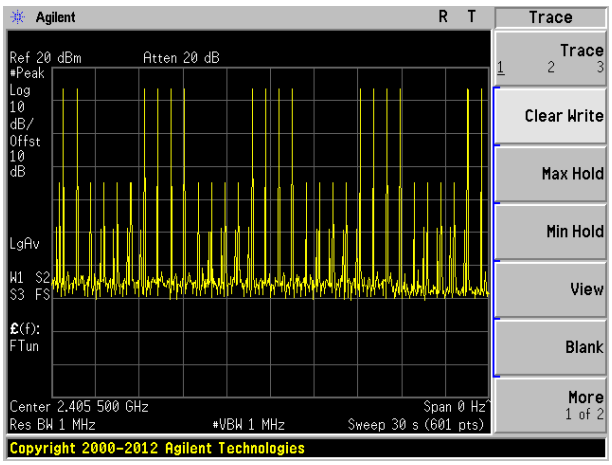


Ton times in 1s

Frequency:	2405.5MHz	Antenna:	Antenna 2

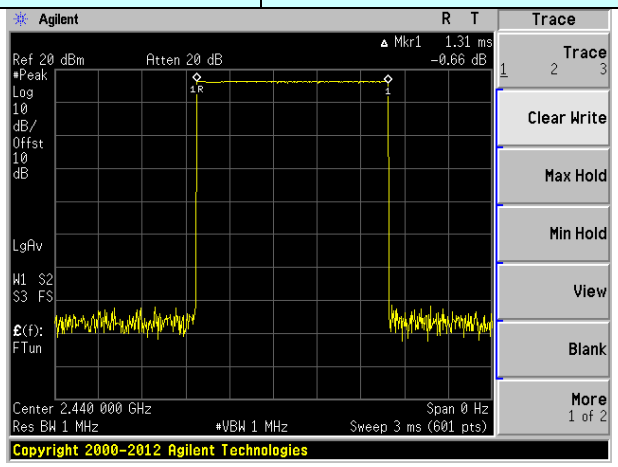


Ton

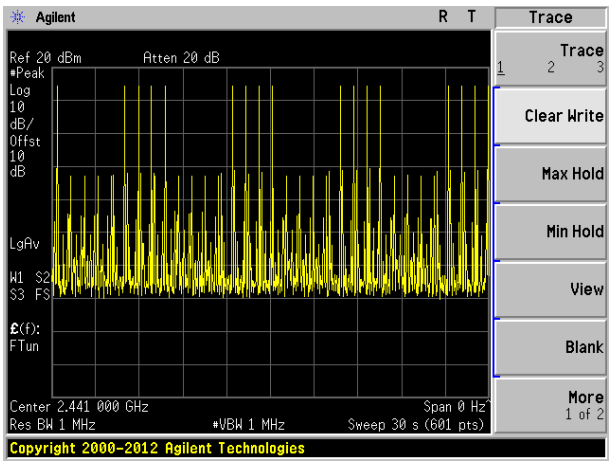


Ton times in 1s

Frequency:	2440MHz	Antenna:	Antenna 2

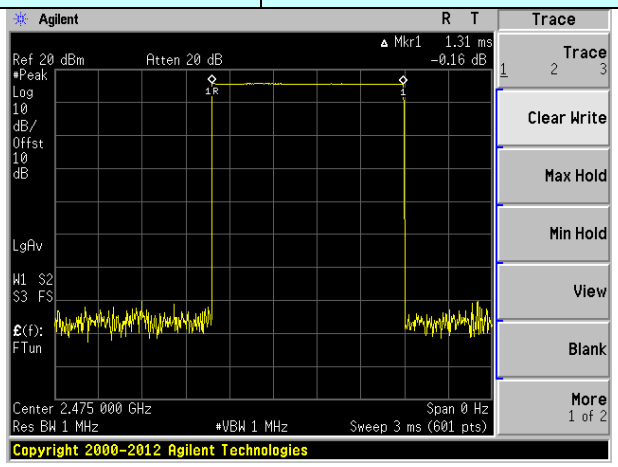


Ton

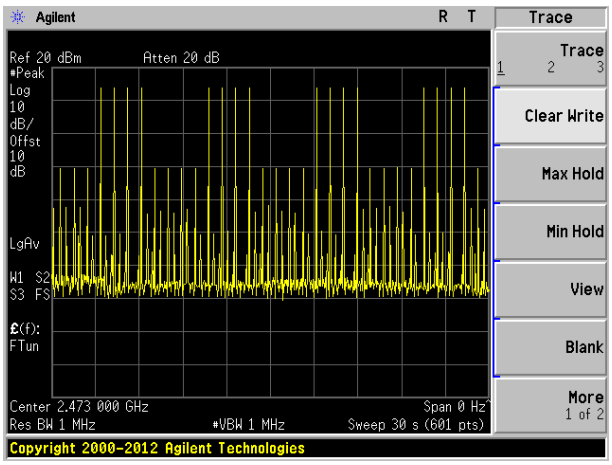


Ton times in 1s

Frequency:	2475MHz	Antenna:	Antenna 2



Ton



Ton times in 1s

6.7 Pseudorandom Frequency Hopping Sequence

Test Requirement:	FCC Part15 C Section 15.247 (a)(1) requirement:

a(1): 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.

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.

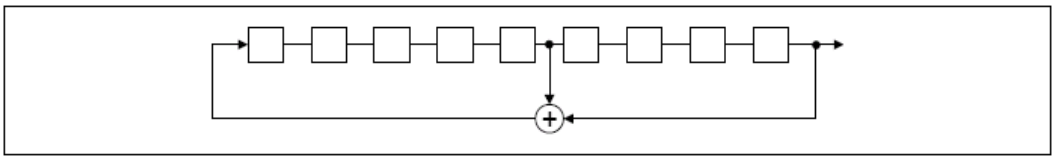
(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

EUT Pseudorandom Frequency Hopping Sequence

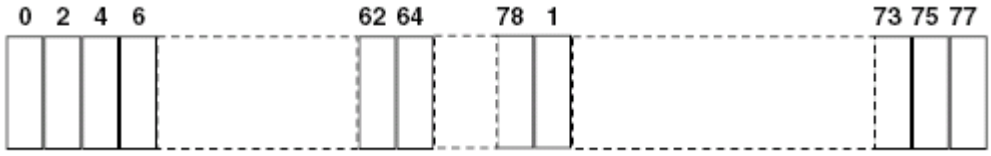
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- *Number of shift register stages: 9*
- *Length of pseudo-random sequence: 2^9 -1 = 511 bits*
- *Longest sequence of zeros: 8 (non-inverted signal)*



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



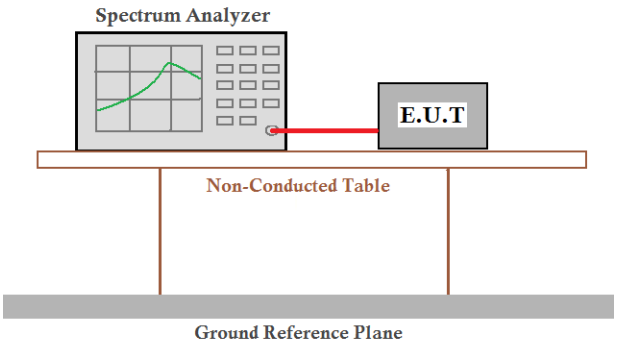
Each frequency used equally on the average by each transmitter.

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.

it permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted.

6.8 Band Edge

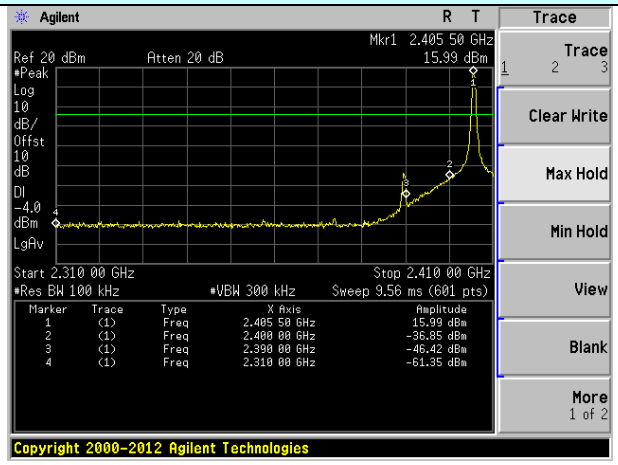
6.8.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

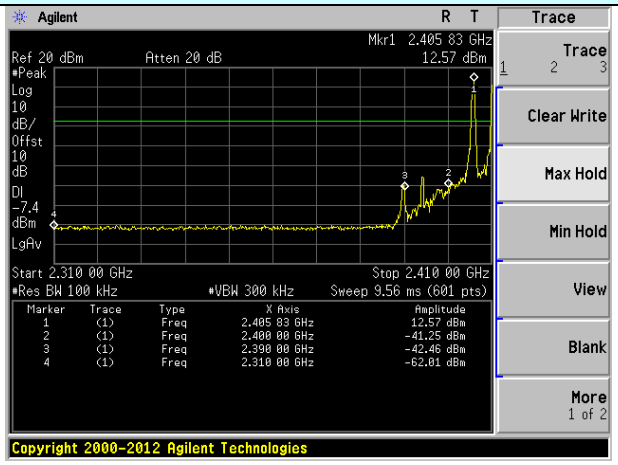
Test plot as follows:

Antenna 1:

Test channel:	Lowest channel

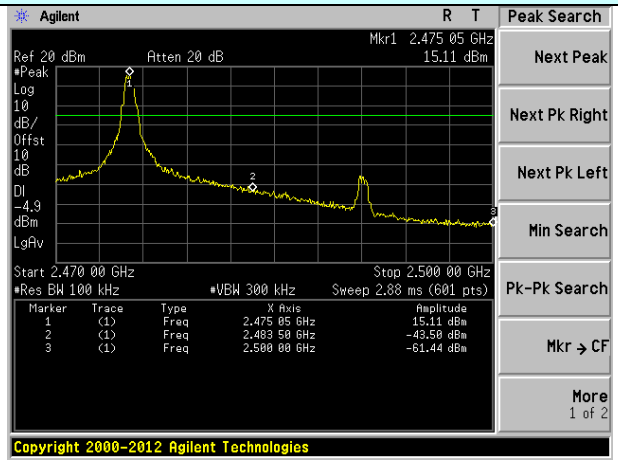


No-hopping mode

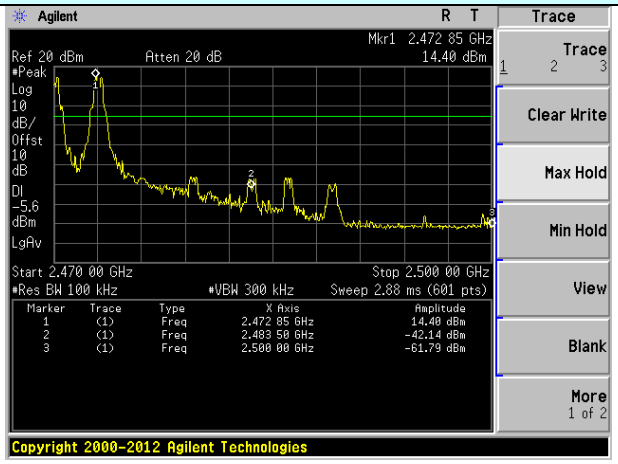


Hopping mode

Test channel:	Highest channel



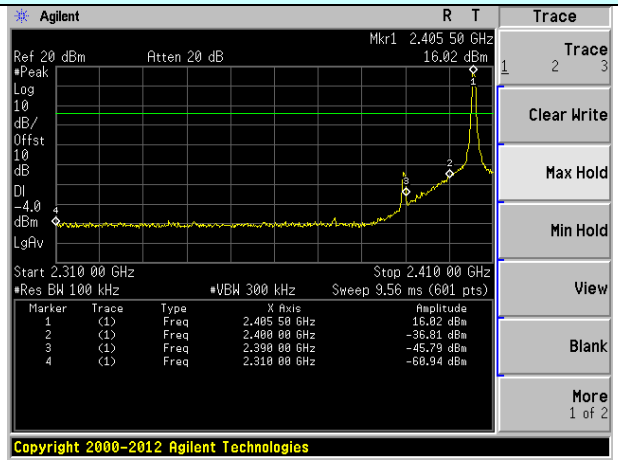
No-hopping mode



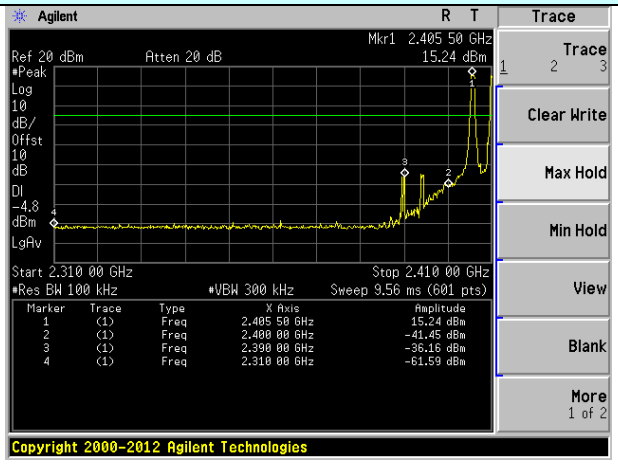
Hopping mode

Antenna 2:

Test channel:	Lowest channel

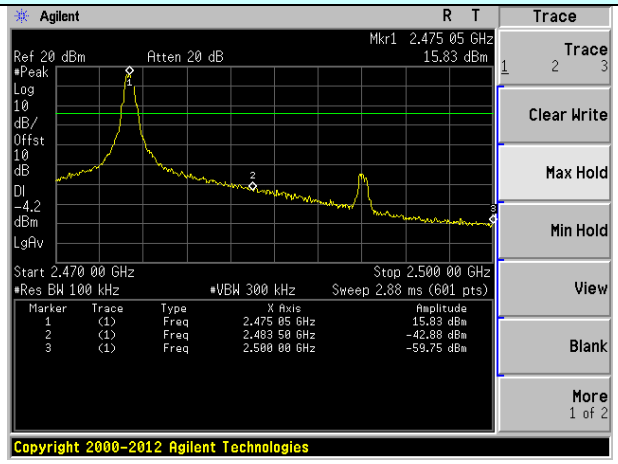


No-hopping mode

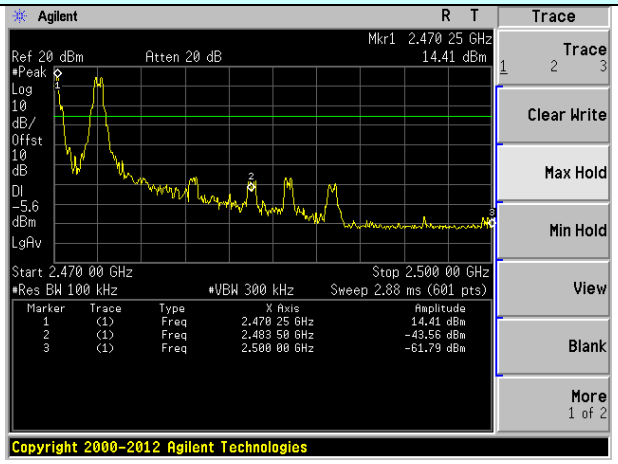


Hopping mode

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 C63.10:2013
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

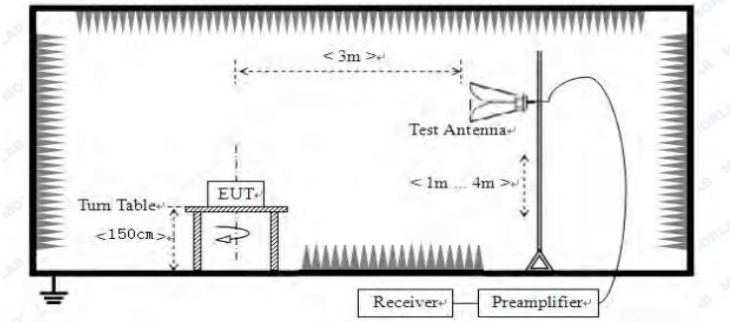
Receiver setup:

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:

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.
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 5.7 for details
Test mode:	Refer to section 5.2 for details
Temp. / Hum.	35℃ / 55%
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.*

Antenna 1:

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	61.46	27.59	5.38	30.18	64.25	74.00	-9.75	Vertical
2400.00	70.58	27.58	5.39	30.18	73.37	74.00	-0.63	Vertical
2390.00	55.49	27.59	5.38	30.18	58.28	74.00	-15.72	Horizontal
2400.00	61.46	27.58	5.39	30.18	64.25	74.00	-9.75	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	46.23	27.59	5.38	30.18	49.02	54.00	-4.98	Vertical
2400.00	51.05	27.58	5.39	30.18	53.84	54.00	-0.16	Vertical
2390.00	42.25	27.59	5.38	30.18	45.04	54.00	-8.96	Horizontal
2400.00	46.51	27.58	5.39	30.18	49.30	54.00	-4.70	Horizontal

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	61.10	27.53	5.47	29.93	64.17	74.00	-9.83	Vertical
2500.00	52.44	27.55	5.49	29.93	55.55	74.00	-18.45	Vertical
2483.50	57.80	27.53	5.47	29.93	60.87	74.00	-13.13	Horizontal
2500.00	51.32	27.55	5.49	29.93	54.43	74.00	-19.57	Horizontal

Average value:

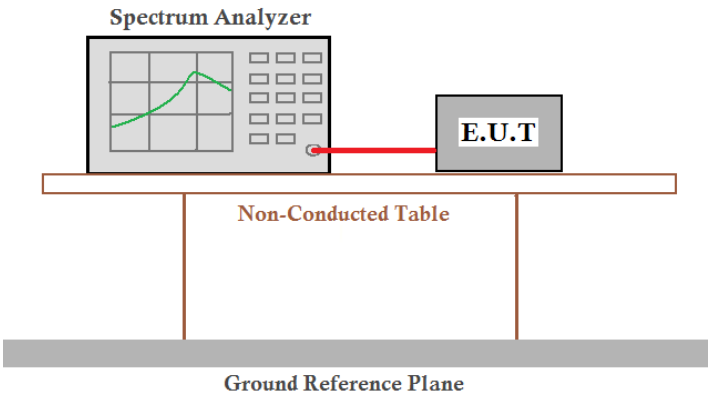
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	45.37	27.53	5.47	29.93	48.44	54.00	-5.56	Vertical
2500.00	39.91	27.55	5.49	29.93	43.02	54.00	-10.98	Vertical
2483.50	44.26	27.53	5.47	29.93	47.33	54.00	-6.67	Horizontal
2500.00	38.75	27.55	5.49	29.93	41.86	54.00	-12.14	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.*

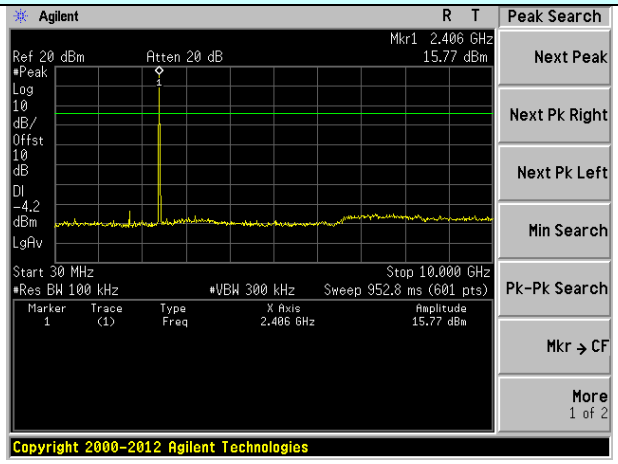
6.9 Spurious Emission

6.9.1 Conducted Emission Method

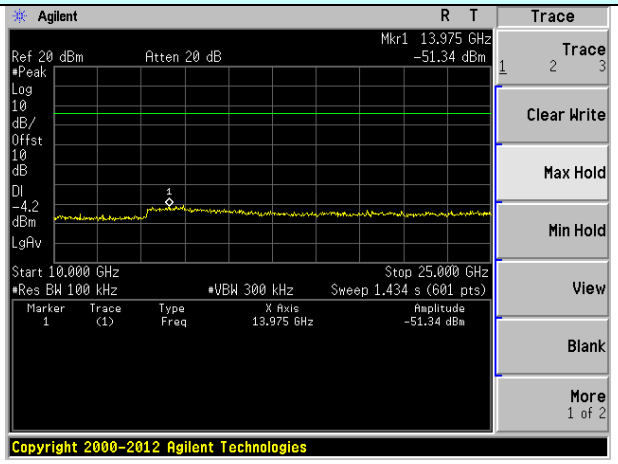
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 Meas Guidance V04
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional 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 5.7 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Antenna 1:

Test channel:	Lowest channel

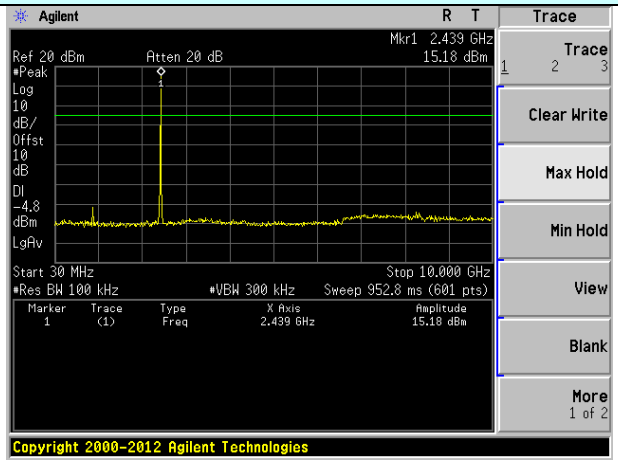


30MHz~10GHz

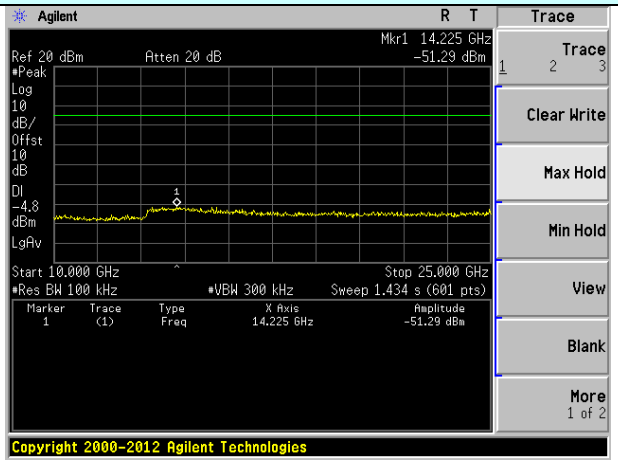


10GHz~25GHz

Test channel:	Middle channel

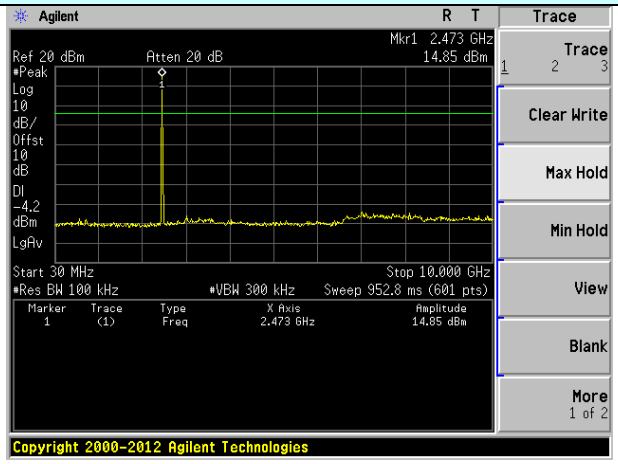


30MHz~10GHz

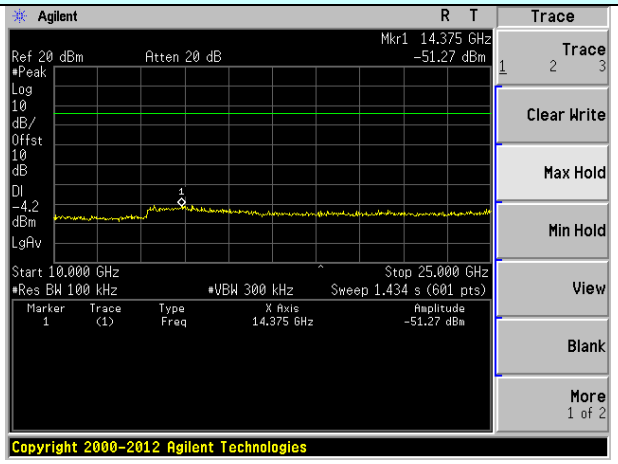


10GHz~25GHz

Test channel:	Highest channel



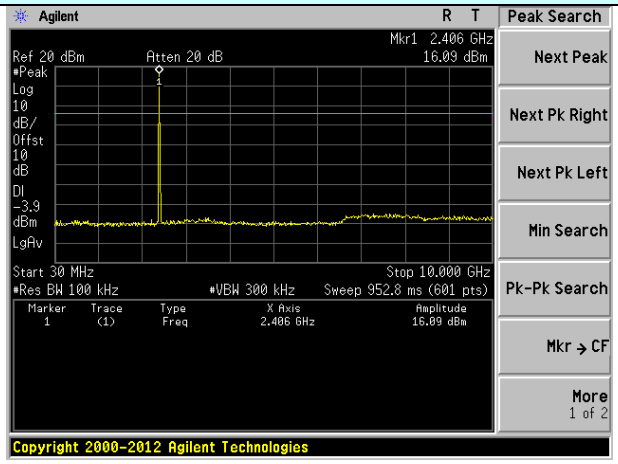
30MHz~10GHz



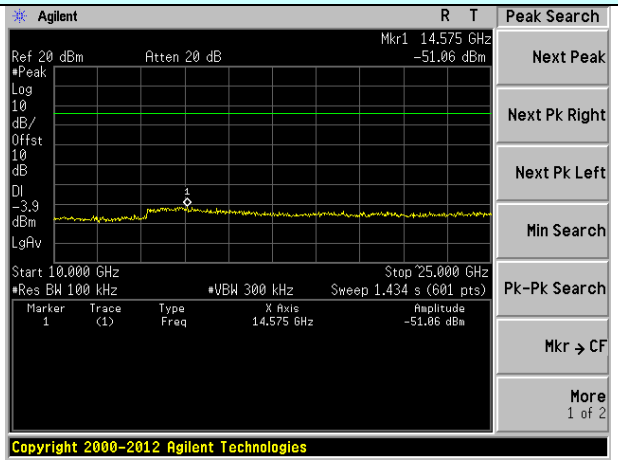
10GHz~25GHz

Antenna 2:

Test channel:	Lowest channel

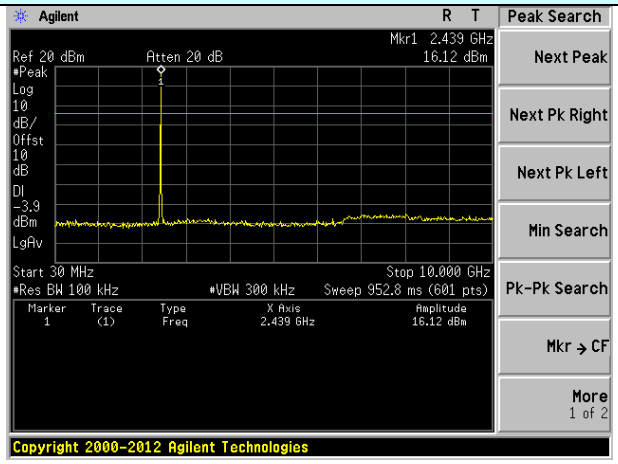


30MHz~10GHz

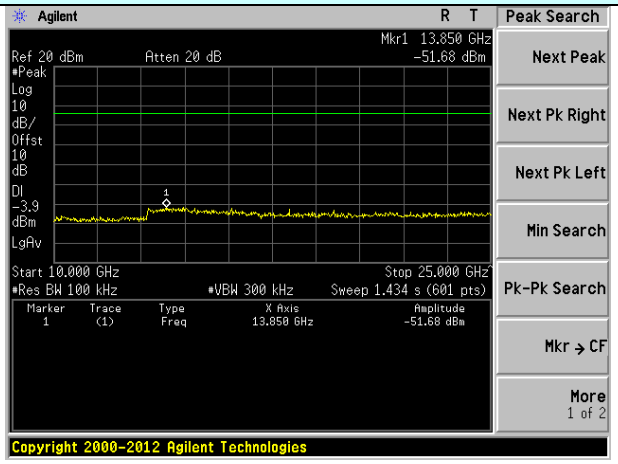


10GHz~25GHz

Test channel:	Middle channel

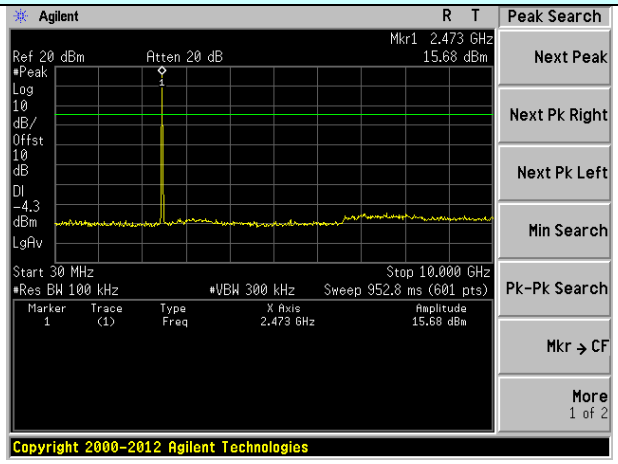


30MHz~10GHz

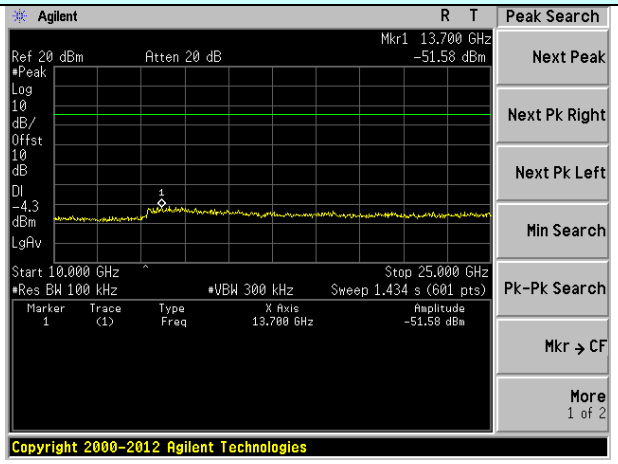


10GHz~25GHz

Test channel:	Highest channel

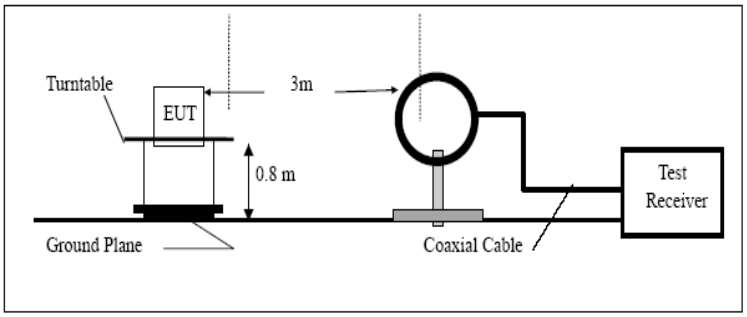


30MHz~10GHz



10GHz~25GHz

6.9.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>9kHz to 25GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr>
<tr><td>9KHz-150KHz</td><td>Quasi-peak</td><td>200Hz</td><td>600Hz</td><td>Quasi-peak</td></tr>
<tr><td>150KHz-30MHz</td><td>Quasi-peak</td><td>9KHz</td><td>30KHz</td><td>Quasi-peak</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average</td></tr>
</table>
</td></tr>
<tr><td>Limit:
(Spurious Emissions)</td><td>
<table>
<tr><th>Frequency</th><th>Limit (uV/m)</th><th>Value</th><th>Measurement Distance</th></tr>
<tr><td>0.009MHz-0.490MHz</td><td>2400/F(KHz)</td><td>QP</td><td>300m</td></tr>
<tr><td>0.490MHz-1.705MHz</td><td>24000/F(KHz)</td><td>QP</td><td>300m</td></tr>
<tr><td>1.705MHz-30MHz</td><td>30</td><td>QP</td><td>30m</td></tr>
<tr><td>30MHz-88MHz</td><td>100</td><td>QP</td><td rowspan="6">3m</td></tr>
<tr><td>88MHz-216MHz</td><td>150</td><td>QP</td></tr>
<tr><td>216MHz-960MHz</td><td>200</td><td>QP</td></tr>
<tr><td>960MHz-1GHz</td><td>500</td><td>QP</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>500</td><td>Average</td></tr>
<tr><td>5000</td><td>Peak</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td>Below 30MHz
 

Below 1GHz</td></tr>
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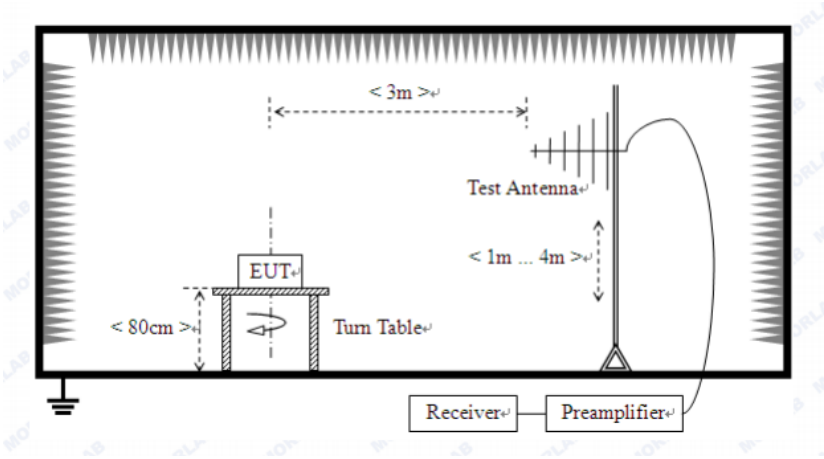
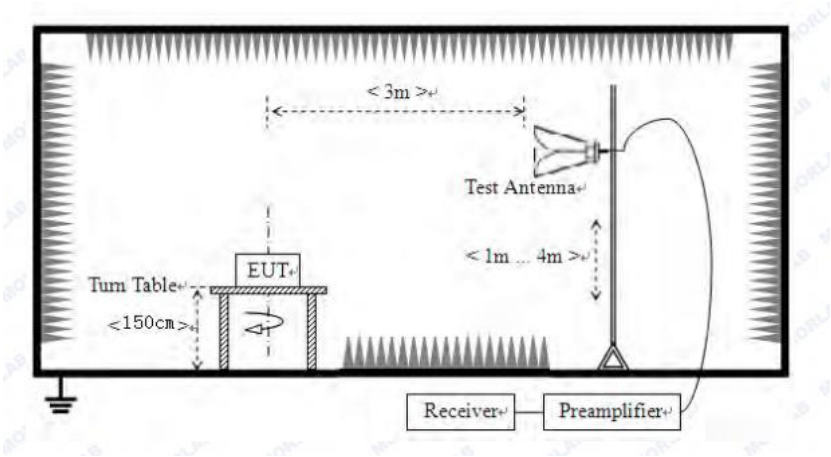


Above 1GHz



Test Procedure:

1. The EUT was placed on the top of a rotating table (0.8 meters for below 1GHz and 1.5meters for above 1GHz) 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 5.2 for details
Temp. / Hum.	35℃ / 55%
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. The measured filed strength at frequencies below 30MHz are lower than the limit over 30dB. So the data isn't reported.

3. Two antenna were tested and found the antenna2 is worse. So only the data of antenna2 is reported.

Measurement data:

■ **Below 30MHz**

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

Antenna 1:

■ **30MHz ~ 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
34.76	23.31	14.30	0.61	30.07	8.15	40.00	-31.85	Vertical
57.39	25.30	14.85	0.84	29.94	11.05	40.00	-28.95	Vertical
99.18	24.83	15.13	1.18	29.70	11.44	43.50	-32.06	Vertical
247.68	38.16	14.07	2.11	29.63	24.71	46.00	-21.29	Vertical
444.85	26.86	17.57	3.07	29.41	18.09	46.00	-27.91	Vertical
938.83	24.09	23.34	4.99	29.10	23.32	46.00	-22.68	Vertical
39.85	24.51	15.53	0.66	30.04	10.66	40.00	-29.34	Horizontal
102.00	24.11	14.97	1.21	29.69	10.60	43.50	-32.90	Horizontal
179.39	40.44	11.62	1.74	29.28	24.52	43.50	-18.98	Horizontal
240.83	46.66	14.09	2.08	29.57	33.26	46.00	-12.74	Horizontal
437.12	26.31	17.55	3.03	29.42	17.47	46.00	-28.53	Horizontal
737.07	24.15	21.29	4.23	29.20	20.47	46.00	-25.53	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	54.23	31.78	8.60	32.09	62.52	74.00	-11.48	Vertical
7216.50	29.61	36.15	11.66	31.99	45.43	74.00	-28.57	Vertical
9622.00	30.64	38.01	14.14	31.60	51.19	74.00	-22.81	Vertical
12027.50	*					74.00		Vertical
14433.00	*					74.00		Vertical
4811.00	51.48	31.78	8.60	32.09	59.77	74.00	-14.23	Horizontal
7216.50	29.24	36.15	11.66	31.99	45.06	74.00	-28.94	Horizontal
9622.00	28.23	38.01	14.14	31.60	48.78	74.00	-25.22	Horizontal
12027.50	*					74.00		Horizontal
14433.00	*					74.00		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	42.25	31.78	8.60	32.09	50.54	54.00	-3.46	Vertical
7216.50	19.52	36.15	11.66	31.99	35.34	54.00	-18.66	Vertical
9622.00	19.98	38.01	14.14	31.60	40.53	54.00	-13.47	Vertical
12027.50	*					54.00		Vertical
14433.00	*					54.00		Vertical
4811.00	41.44	31.78	8.60	32.09	49.73	54.00	-4.27	Horizontal
7216.50	19.50	36.15	11.66	31.99	35.32	54.00	-18.68	Horizontal
9622.00	17.38	38.01	14.14	31.60	37.93	54.00	-16.07	Horizontal
12027.50	*					54.00		Horizontal
14433.00	*					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)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4880.00	48.43	31.85	8.66	32.12	56.82	74.00	-17.18	Vertical
7320.00	29.79	36.37	11.72	31.89	45.99	74.00	-28.01	Vertical
9760.00	29.50	38.35	14.25	31.59	50.51	74.00	-23.49	Vertical
12200.00	*					74.00		Vertical
14640.00	*					74.00		Vertical
4880.00	49.30	31.85	8.66	32.12	57.69	74.00	-16.31	Horizontal
7425.00	29.56	36.56	11.79	31.80	46.11	74.00	-27.89	Horizontal
9900.00	27.25	38.81	14.35	31.85	48.56	74.00	-25.44	Horizontal
12200.00	*					74.00		Horizontal
14640.00	*					74.00		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	38.60	31.85	8.66	32.12	46.99	54.00	-7.01	Vertical
7320.00	19.22	36.37	11.72	31.89	35.42	54.00	-18.58	Vertical
9760.00	19.01	38.35	14.25	31.59	40.02	54.00	-13.98	Vertical
12200.00	*					54.00		Vertical
14640.00	*					54.00		Vertical
4880.00	40.89	31.85	8.66	32.12	49.28	54.00	-4.72	Horizontal
7320.00	20.20	36.37	11.72	31.89	36.40	54.00	-17.60	Horizontal
9760.00	18.32	38.35	14.25	31.59	39.33	54.00	-14.67	Horizontal
12200.00	*					54.00		Horizontal
14640.00	*					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:	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	50.14	31.91	8.71	32.16	58.60	74.00	-15.40	Vertical
7425.00	29.12	36.56	11.79	31.80	45.67	74.00	-28.33	Vertical
9900.00	28.29	38.81	14.35	31.85	49.60	74.00	-24.40	Vertical
12375.00	*					74.00		Vertical
14850.00	*					74.00		Vertical
4950.00	49.16	31.91	8.71	32.16	57.62	74.00	-16.38	Horizontal
7425.00	28.72	36.56	11.79	31.80	45.27	74.00	-28.73	Horizontal
9900.00	28.01	38.81	14.35	31.85	49.32	74.00	-24.68	Horizontal
12375.00	*					74.00		Horizontal
14850.00	*					74.00		Horizontal

Average value:

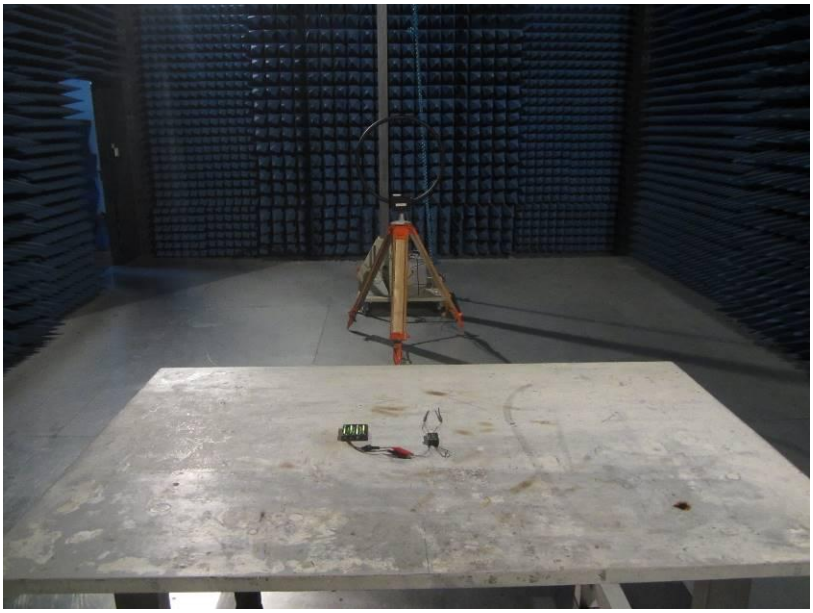
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4950.00	39.81	31.91	8.71	32.16	48.27	54.00	-5.73	Vertical
7425.00	20.06	36.56	11.79	31.80	36.61	54.00	-17.39	Vertical
9900.00	18.71	38.81	14.35	31.85	40.02	54.00	-13.98	Vertical
12375.00	*					54.00		Vertical
14850.00	*					54.00		Vertical
4950.00	38.87	31.91	8.71	32.16	47.33	54.00	-6.67	Horizontal
7425.00	20.00	36.56	11.79	31.80	36.55	54.00	-17.45	Horizontal
9900.00	17.71	38.81	14.35	31.85	39.02	54.00	-14.98	Horizontal
12375.00	*					54.00		Horizontal
14850.00	*					54.00		Horizontal

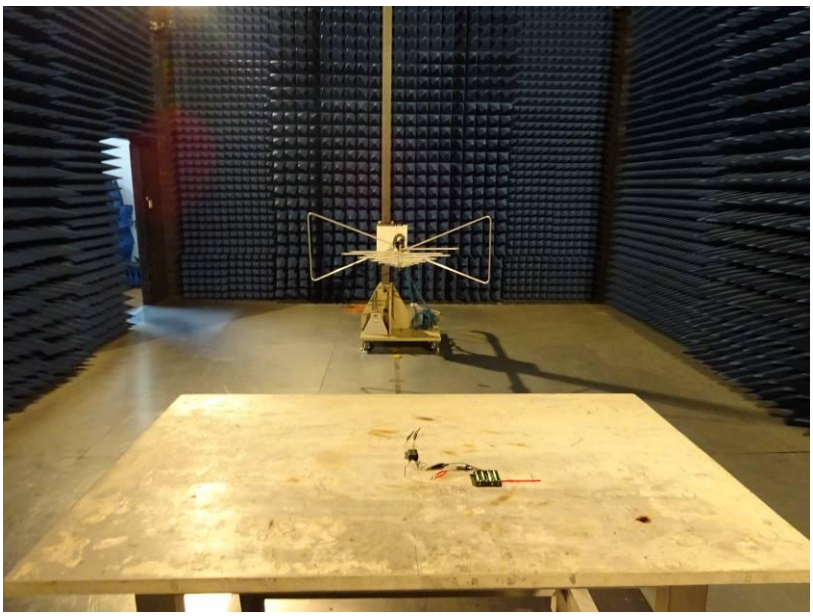
Remark:

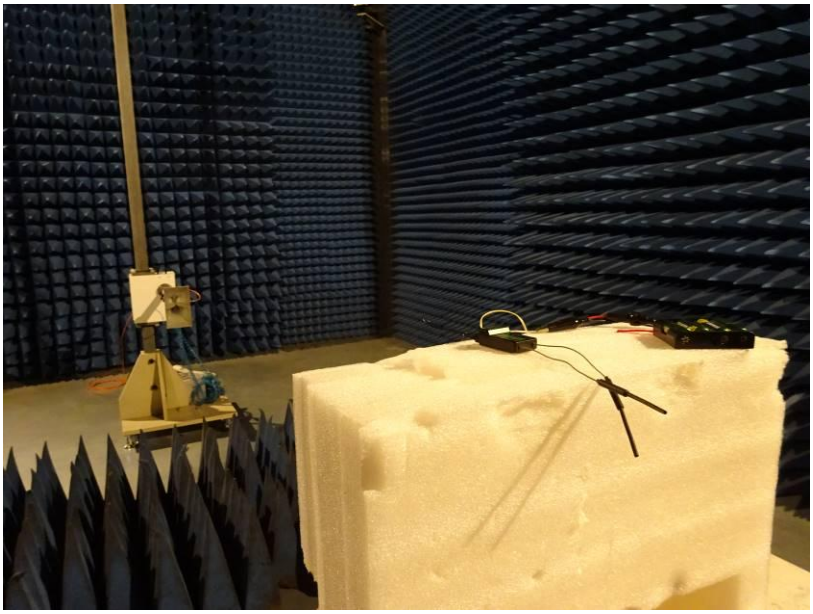
1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

7 Test Setup Photo

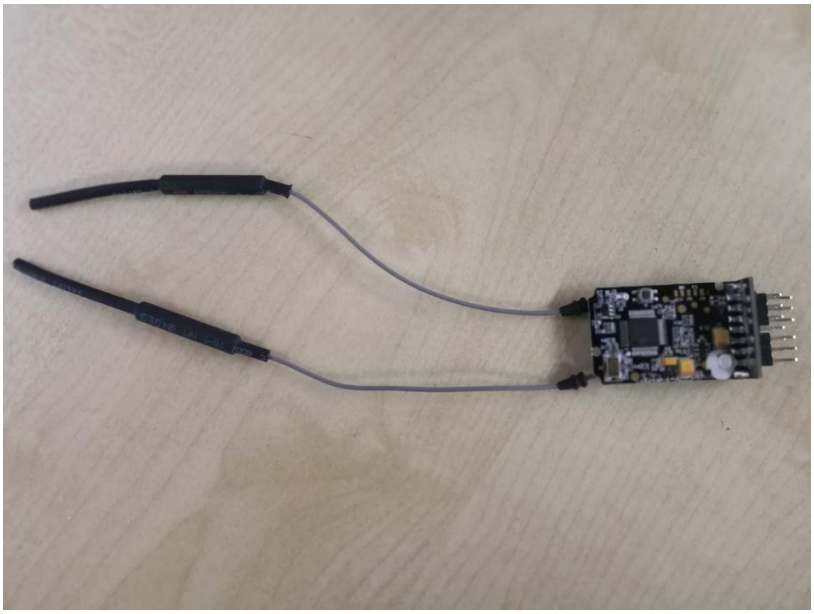
Radiated Emission

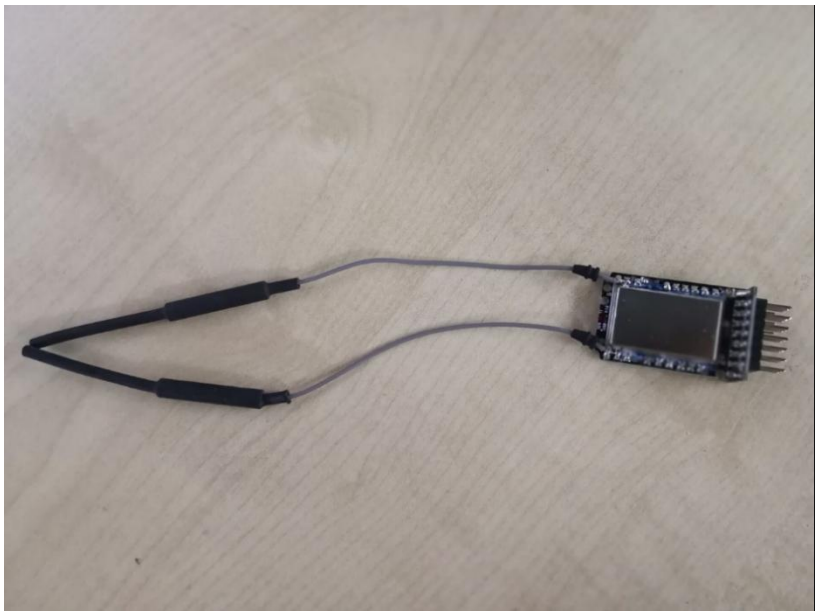


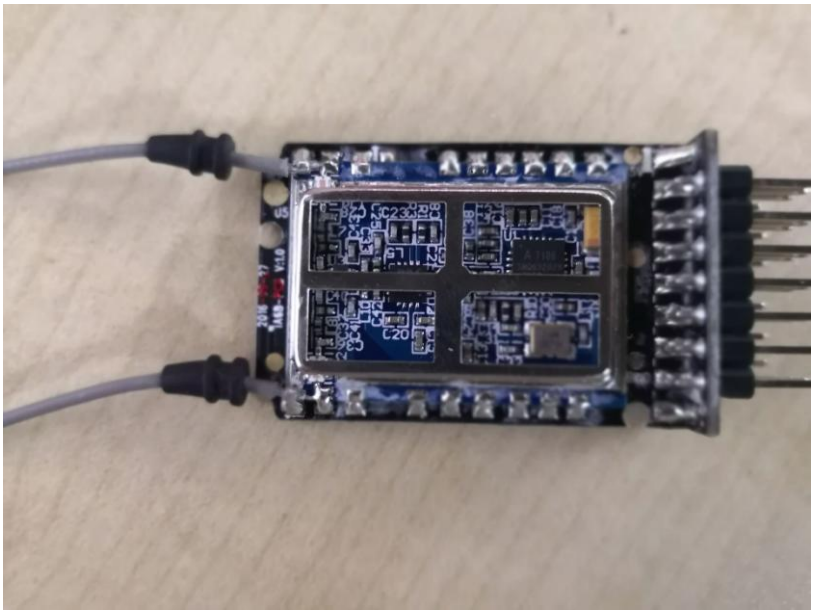


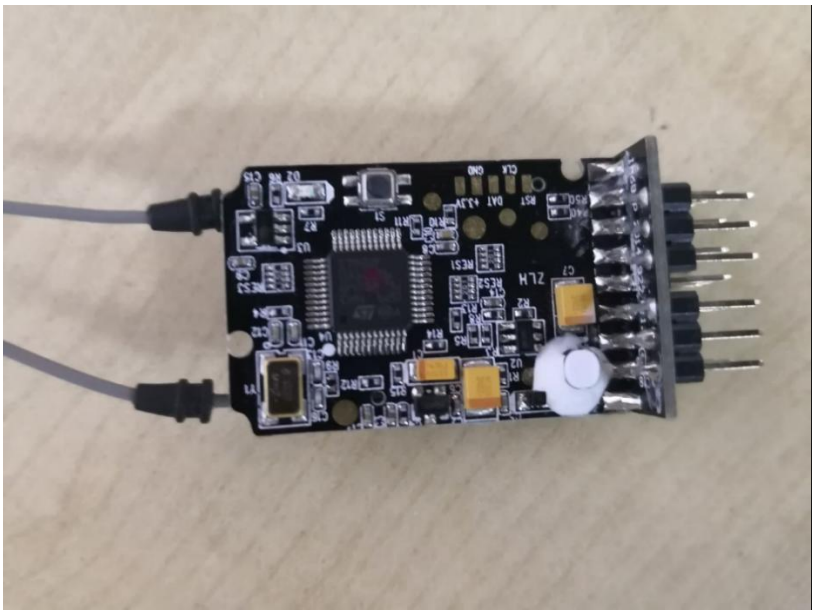


8 EUT Constructional Details









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