TEST REPORT

Applicant:	Hoyt PDX Electric, LLC
Address of Applicant:	922 NW 11th Ave 104, Portland, OR 97209, United States
Manufacturer:	Hoyt PDX Electric, LLC
Address of Manufacturer:	922 NW 11th Ave 104, Portland, OR 97209, United States
Factory:	Dongguan Flysky RC Model technology Co.,Ltd
Address of Factory:	West building3,Huangjianyuan Ind Park QIAOLI North Gate Changping Town Dongguan ,China

Equipment Under Test (EUT)

Product Name:	Hoyt puck 1
Model No.:	HP1
Trade Mark:	Hoyt St
FCC ID:	2AZE4-HP1
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	December 03, 2020
Date of Test:	December 04-15, 2020
Date of report issued:	December 16, 2020
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

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

2 Version

Version No.	Date	Description
00	*December 16, 2020*	*Original*

Prepared By: ***Date:*** *December 16, 2020*

Project Engineer

Check By: ***Date:*** *December 16, 2020*

Reviewer

3 Contents

Page

1 COVER PAGE 1

2 VERSION 2

3 CONTENTS 3

4 TEST SUMMARY 4

4.1 MEASUREMENT UNCERTAINTY 4

5 GENERAL INFORMATION 5

5.1 GENERAL DESCRIPTION OF EUT 5
5.2 TEST MODE 8
5.3 TEST FACILITY 8
5.4 TEST LOCATION 8
5.5 DESCRIPTION OF SUPPORT UNITS 8
5.6 DEVIATION FROM STANDARDS 8
5.7 ABNORMALITIES FROM STANDARD CONDITIONS 8
5.8 ADDITIONAL INSTRUCTIONS 8

6 TEST INSTRUMENTS LIST 9

7 TEST RESULTS AND MEASUREMENT DATA 11

7.1 ANTENNA REQUIREMENT 11
7.2 CONDUCTED EMISSIONS 12
7.3 CONDUCTED PEAK OUTPUT POWER 15
7.4 20DB EMISSION BANDWIDTH 17
7.5 CARRIER FREQUENCIES SEPARATION 19
7.6 HOPPING CHANNEL NUMBER 21
7.7 DWELL TIME 22
7.8 BAND EDGE 26
7.8.1 Conducted Emission Method 26
7.8.2 Radiated Emission Method 28
7.9 SPURIOUS EMISSION 33
7.9.1 Conducted Emission Method 33
7.9.2 Radiated Emission Method 35

8 TEST SETUP PHOTO 46

9 EUT CONSTRUCTIONAL DETAILS 46

4 Test Summary

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

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

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

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(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:	Hoyt puck 1
Model No.:	HP1
Serial No.:	N/A
Test sample(s) ID:	GTS202012000049-1
Sample(s) Status	Engineer sample
Operation Frequency:	2408MHz~2475MHz
Channel separation:	500kHz
Modulation technology:	GFSK
Antenna Type:	Integral Antenna
Antenna gain:	0dBi
Power supply:	DC 3.7V

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	----	36	2423.00	71	2440.50	106	2458.00
2	----	37	2423.50	72	2441.00	107	2458.50
3	----	38	2424.00	73	2441.50	108	2459.00
4	----	39	2424.50	74	2442.00	109	2459.50
5	----	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	2408MHz/2410MHz
The middle channel	2440MHz
The Highest channel	2475MHz/2474MHz

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 fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

● **IC —Registration No.: 9079A**

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

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.4 Test Location

All other tests were performed at:

Global United Technology Services Co., Ltd.
Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: 0755-27798480
Fax: 0755-27798960

5.5 Description of Support Units

Manufacturer	Description	Model	Serial Number
Apple adapter	USB Charger	A1443	N/A

5.6 Deviation from Standards

None.

5.7 Abnormalities from Standard Conditions

None.

5.8 Additional Instructions

Software (Used for test) from client

Built-in by manufacturer, power set default.

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 18 2020	Oct. 17 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 18 2020	Oct. 17 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 18 2020	Oct. 17 2021
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021

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.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 25 2020	June. 24 2021
4	ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	GTS226	June. 25 2020	June. 24 2021
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 25 2020	June. 24 2021
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 25 2020	June. 24 2021
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 25 2020	June. 24 2021

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

7 Test results and Measurement Data

7.1 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 0dBi, reference to the appendix II for details.	

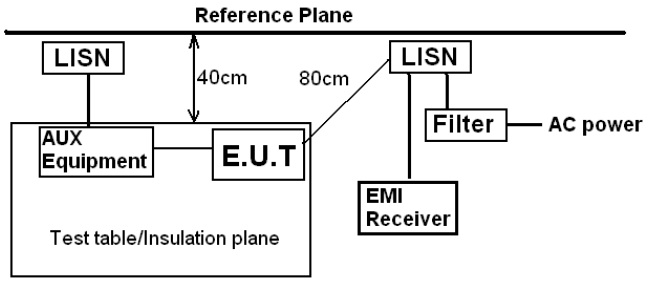
7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	

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:

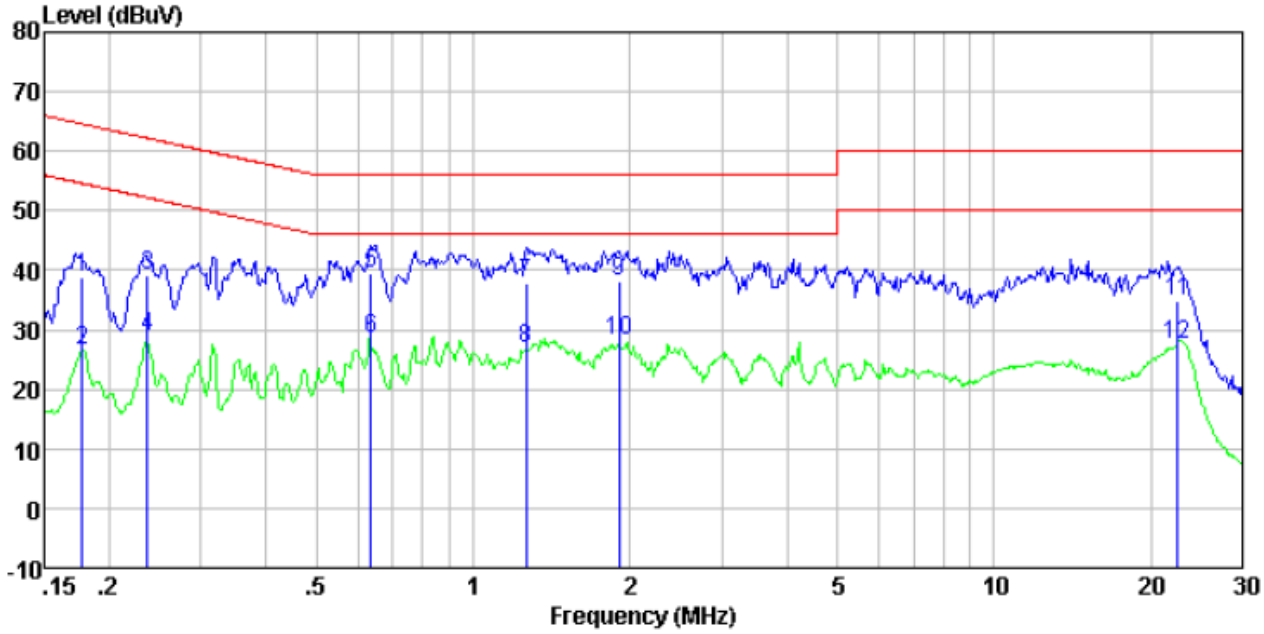
1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling 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 C63.10:2013 on conducted measurement.

Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test results:	Pass					

Measurement data:

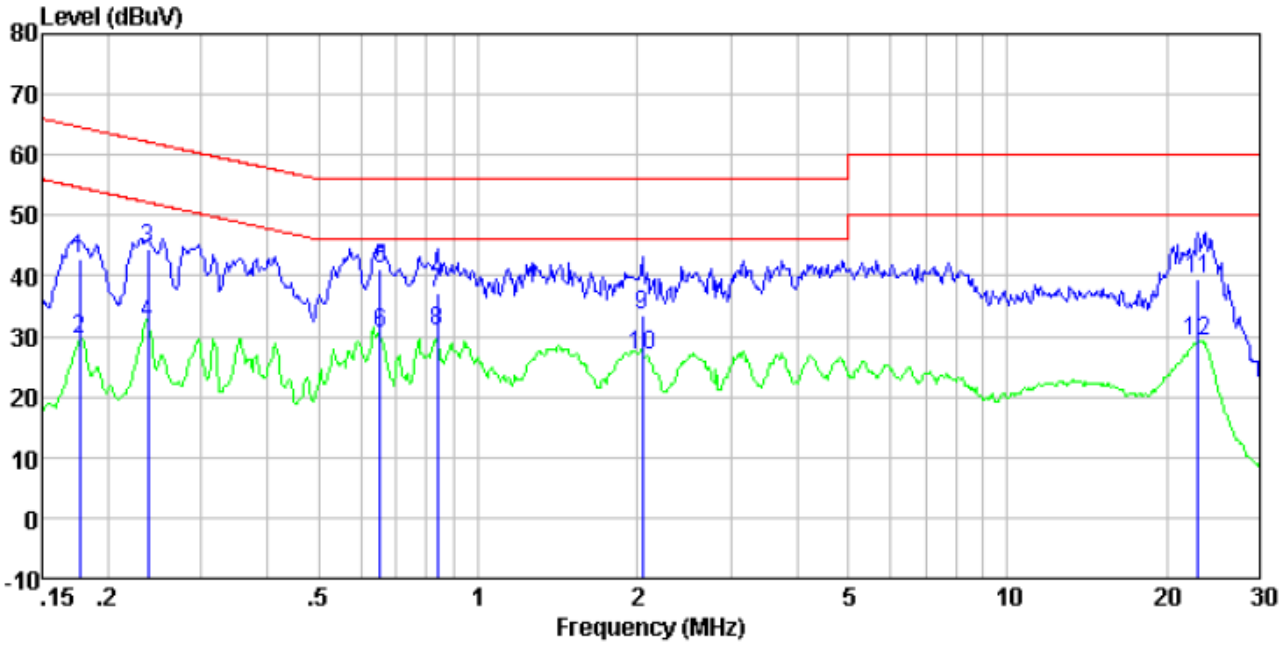
Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

Line:



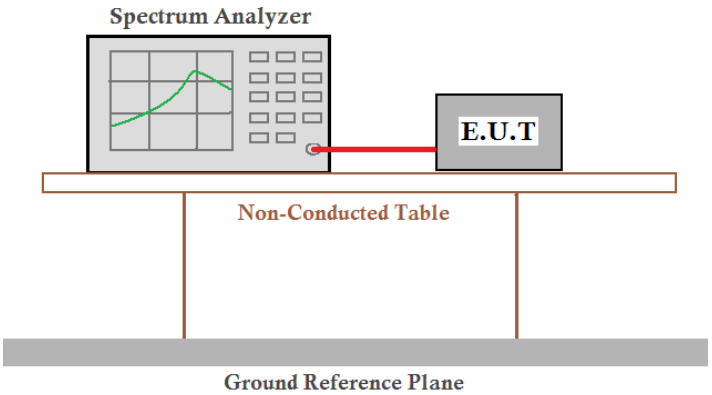
Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.18	18.20	20.40	0.09	38.69	64.59	-25.90	QP
0.18	6.01	20.40	0.09	26.50	54.59	-28.09	Average
0.24	18.54	20.40	0.11	39.05	62.22	-23.17	QP
0.24	8.46	20.40	0.11	28.97	52.22	-23.25	Average
0.64	19.05	20.27	0.12	39.44	56.00	-16.56	QP
0.64	8.20	20.27	0.12	28.59	46.00	-17.41	Average
1.26	17.45	20.20	0.16	37.81	56.00	-18.19	QP
1.26	6.55	20.20	0.16	26.91	46.00	-19.09	Average
1.91	17.94	20.20	0.17	38.31	56.00	-17.69	QP
1.91	7.70	20.20	0.17	28.07	46.00	-17.93	Average
22.54	14.41	20.33	0.23	34.97	60.00	-25.03	QP
22.54	7.09	20.33	0.23	27.65	50.00	-22.35	Average

Neutral:



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.18	22.41	20.40	0.09	42.90	64.64	-21.74	QP
0.18	9.18	20.40	0.09	29.67	54.64	-24.97	Average
0.24	23.81	20.40	0.11	44.32	62.17	-17.85	QP
0.24	11.72	20.40	0.11	32.23	52.17	-19.94	Average
0.65	20.84	20.27	0.13	41.24	56.00	-14.76	QP
0.65	10.07	20.27	0.13	30.47	46.00	-15.53	Average
0.84	16.91	20.23	0.14	37.28	56.00	-18.72	QP
0.84	10.56	20.23	0.14	30.93	46.00	-15.07	Average
2.04	13.00	20.20	0.18	33.38	56.00	-22.62	QP
2.04	6.33	20.20	0.18	26.71	46.00	-19.29	Average
22.90	18.93	20.33	0.23	39.49	60.00	-20.51	QP
22.90	8.64	20.33	0.23	29.20	50.00	-20.80	Average

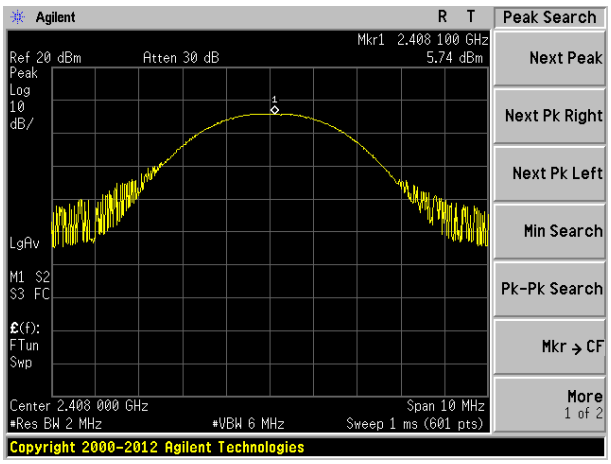
7.3 Conducted Peak Output Power

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

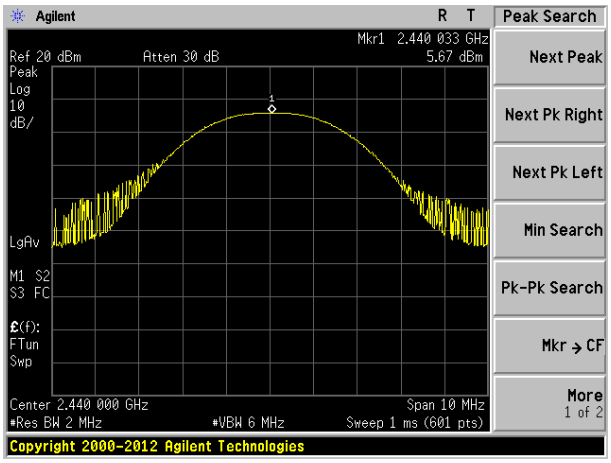
Measurement Data

Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	5.74	20.97	Pass
Middle	5.67		
Highest	6.70		

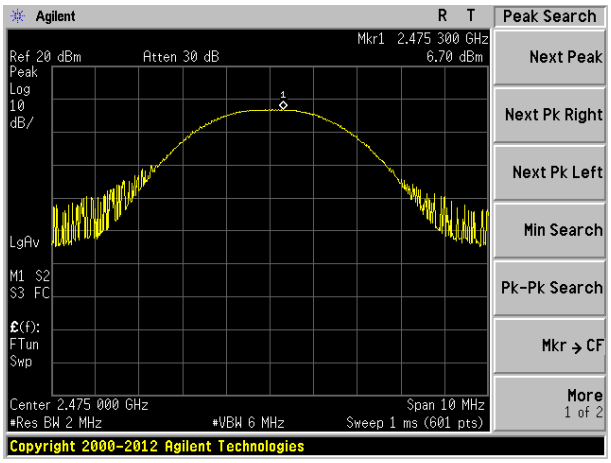
Test plot as follows:



Lowest channel

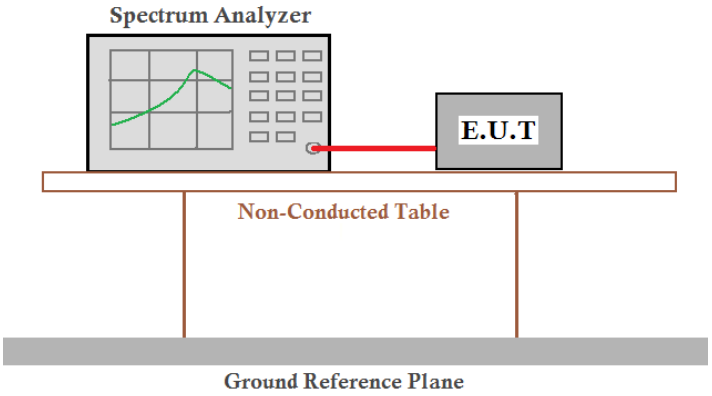


Middle channel



Highest channel

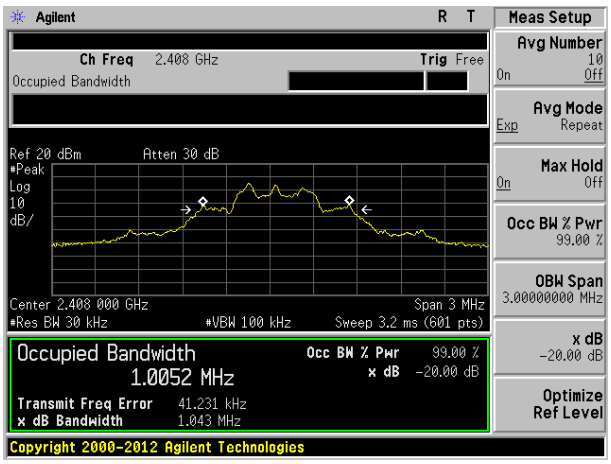
7.4 20dB Emission Bandwidth

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

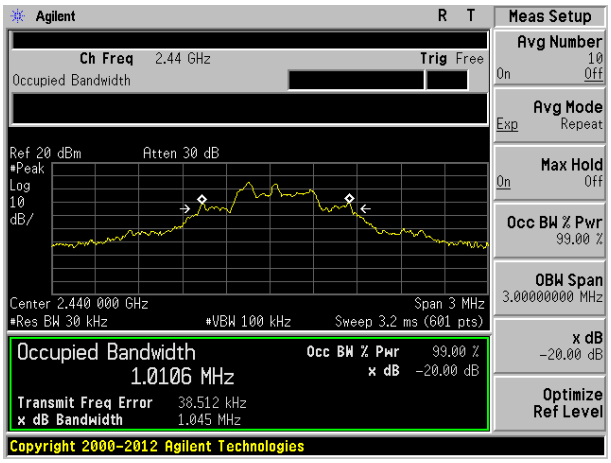
Measurement Data

Test channel	20dB Emission Bandwidth (MHz)	Result
Lowest	1.043	Pass
Middle	1.045	
Highest	1.048	

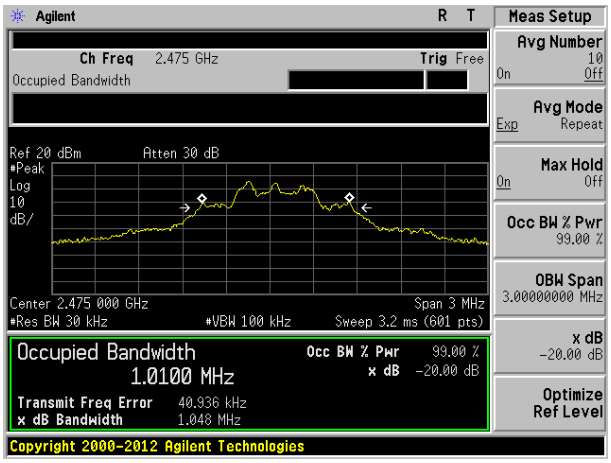
Test plot as follows:



Lowest channel

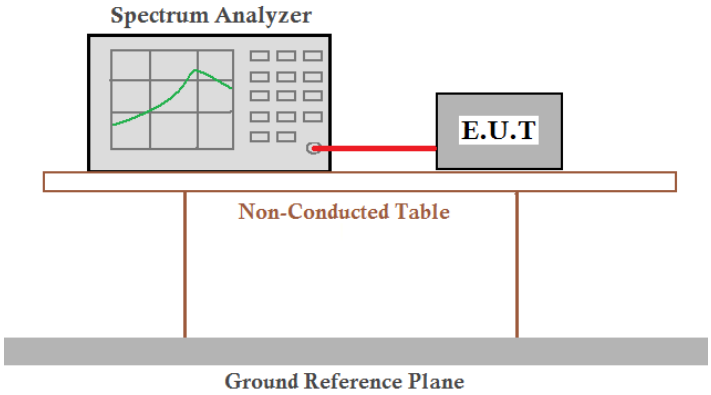


Middle channel



Highest channel

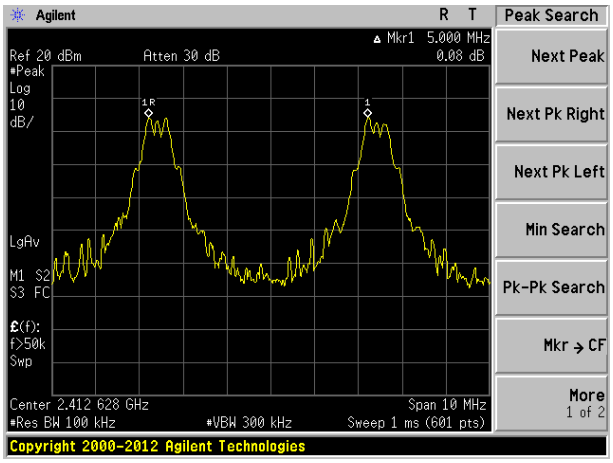
7.5 Carrier Frequencies Separation

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

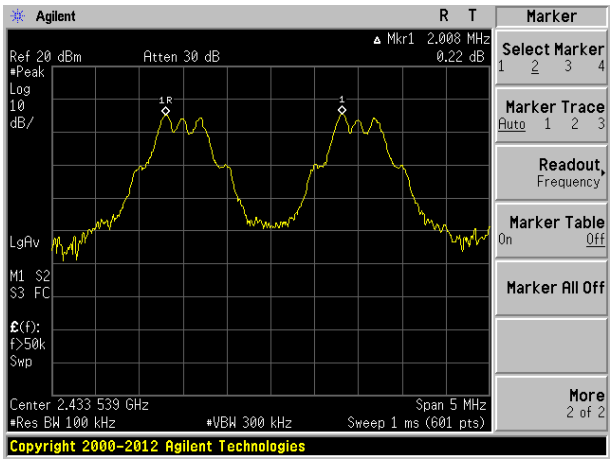
Measurement Data

Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	5000	698.67	Pass
Middle	2008	698.67	Pass
Highest	5000	698.67	Pass

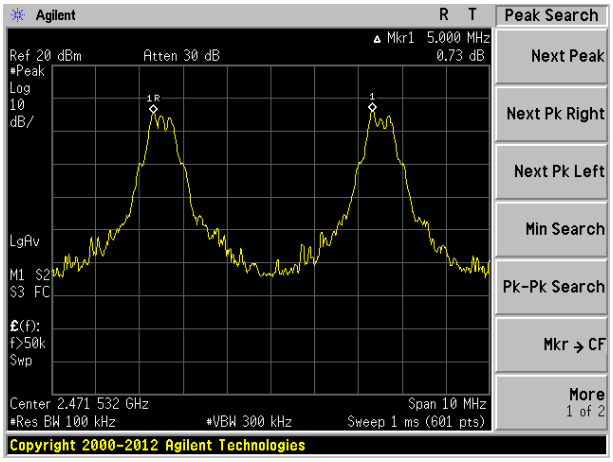
Test plot as follows:



Lowest channel

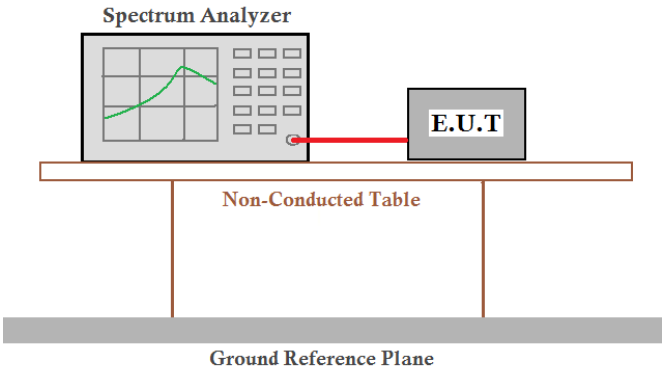


Middle channel



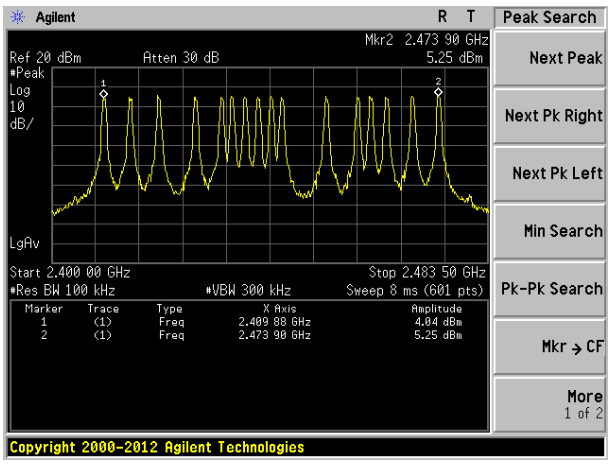
Highest channel

7.6 Hopping Channel Number

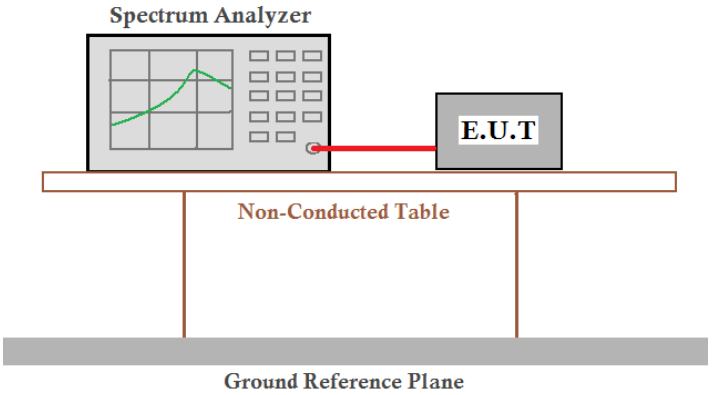
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data:

Hopping channel numbers	Limit	Result
16	15	Pass



7.7 Dwell Time

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

Measurement Data

Channel	**Ton (ms)**	**Dwell time(ms)**	**Limit(ms)**	**Result**
Lowest	1.302	133.32	400	Pass
Middle	1.288	131.89	400	Pass
Highest	1.288	133.32	400	Pass

The formula as below:

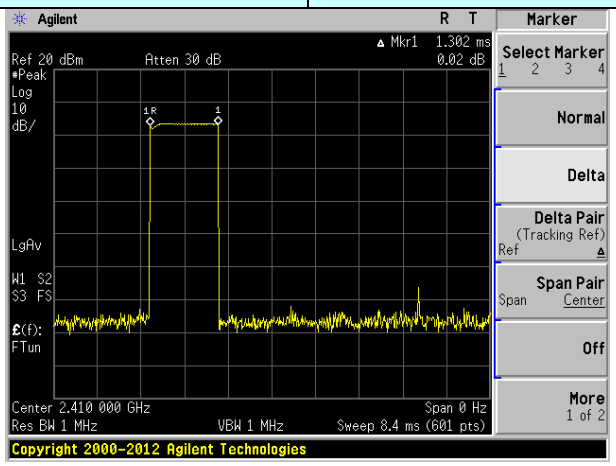
Lowest: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.302ms*16*0.4*16=133.32ms

Middle: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.288ms*16*0.4*16=131.89ms

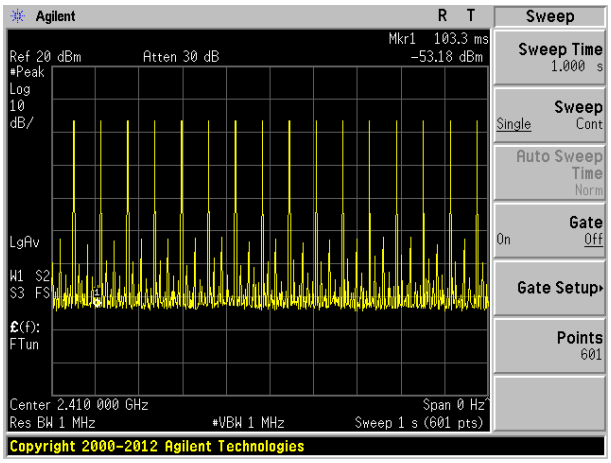
Highest: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=1.302ms*16*0.4*16=133.32ms

Test plot as follows:

Channel	Lowest

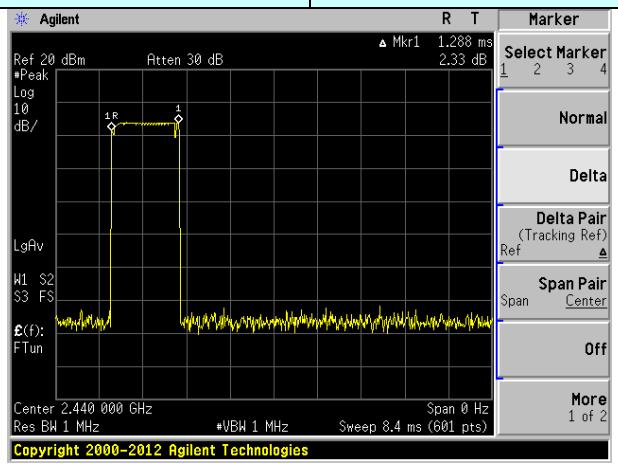


Ton

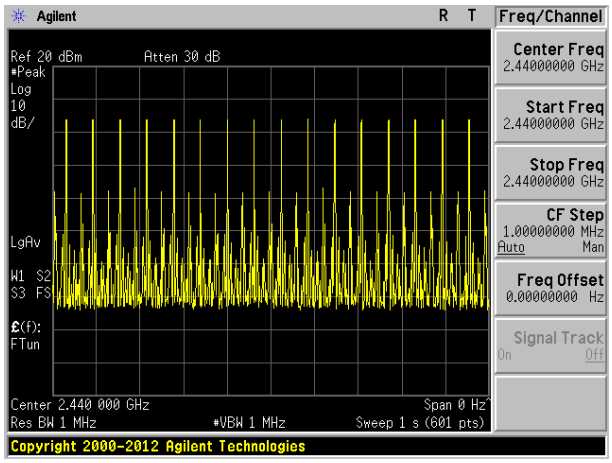


Ton times in 1s

Channel	Middle

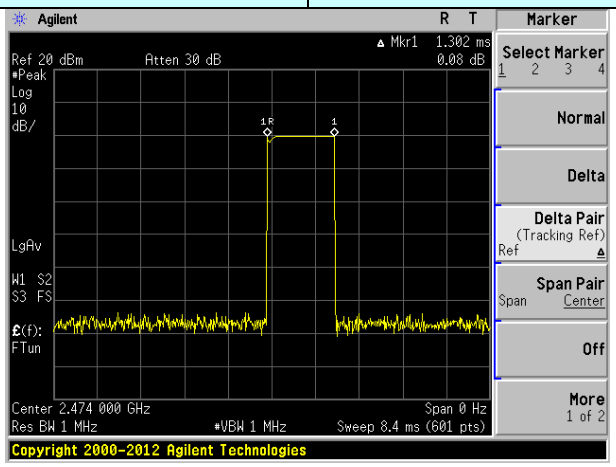


Ton

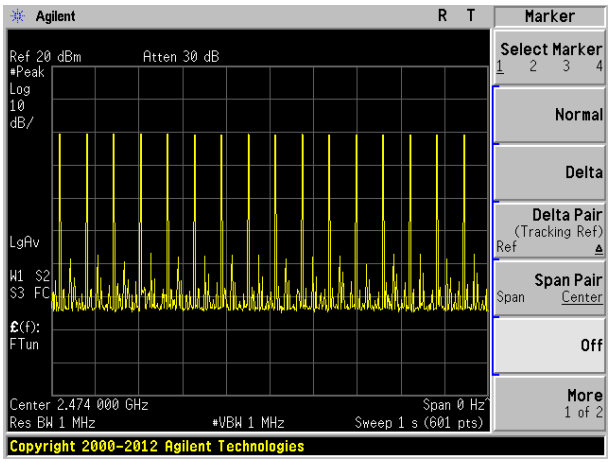


Ton times in 1s

Channel	Highest



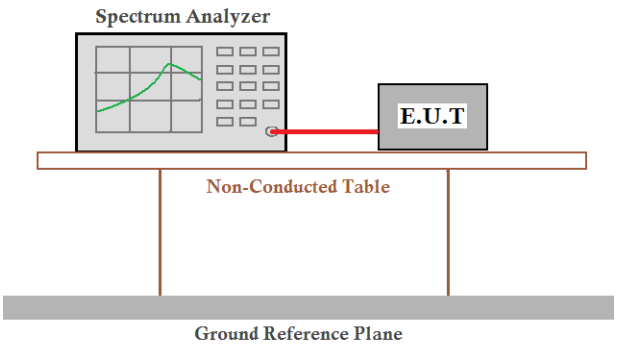
Ton



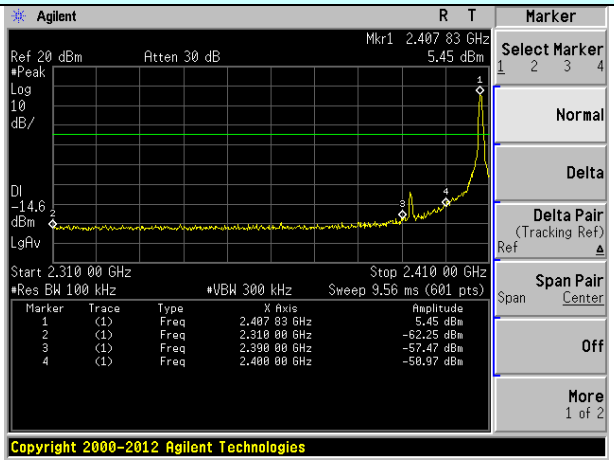
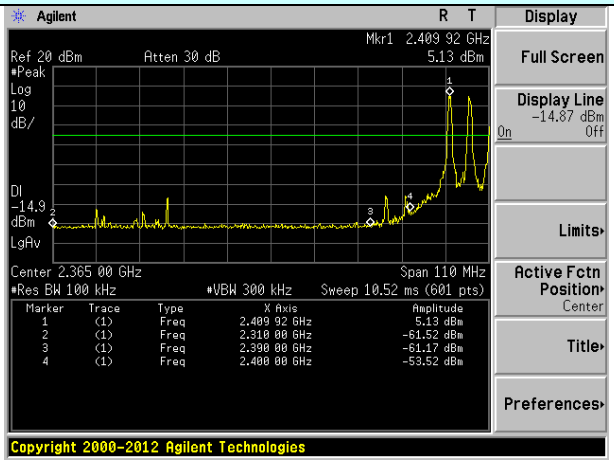
Ton times in 1s

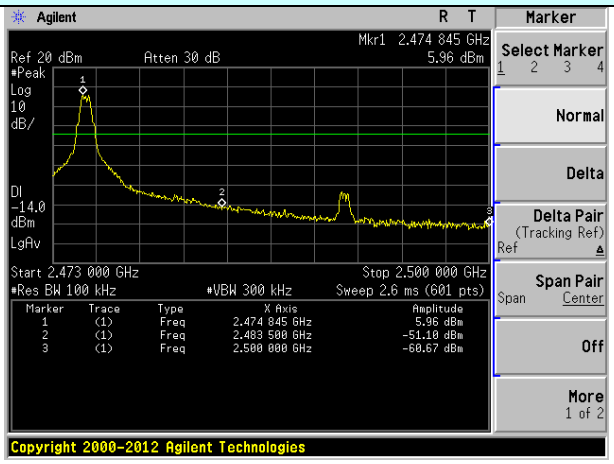
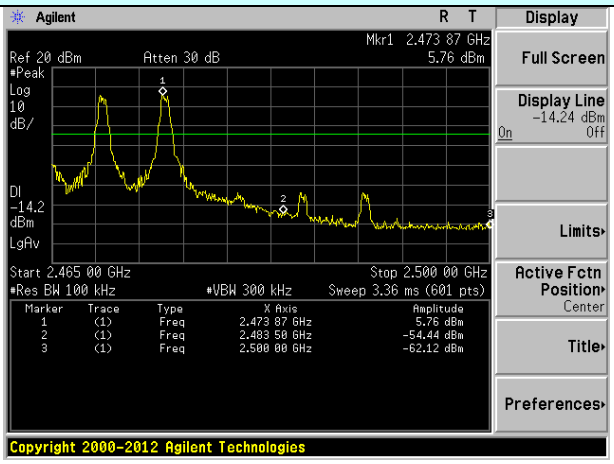
7.8 Band Edge

7.8.1 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 section6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Test plot as follows:

Test channel:	Lowest channel
	
No-hopping mode	Hopping mode

Test channel:	Highest channel
	
No-hopping mode	Hopping mode

7.8.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10:2013
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.
Test site:	Measurement Distance: 3m

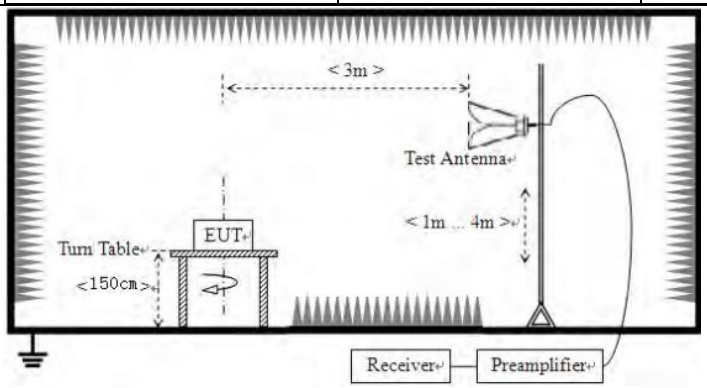
Receiver setup:

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.

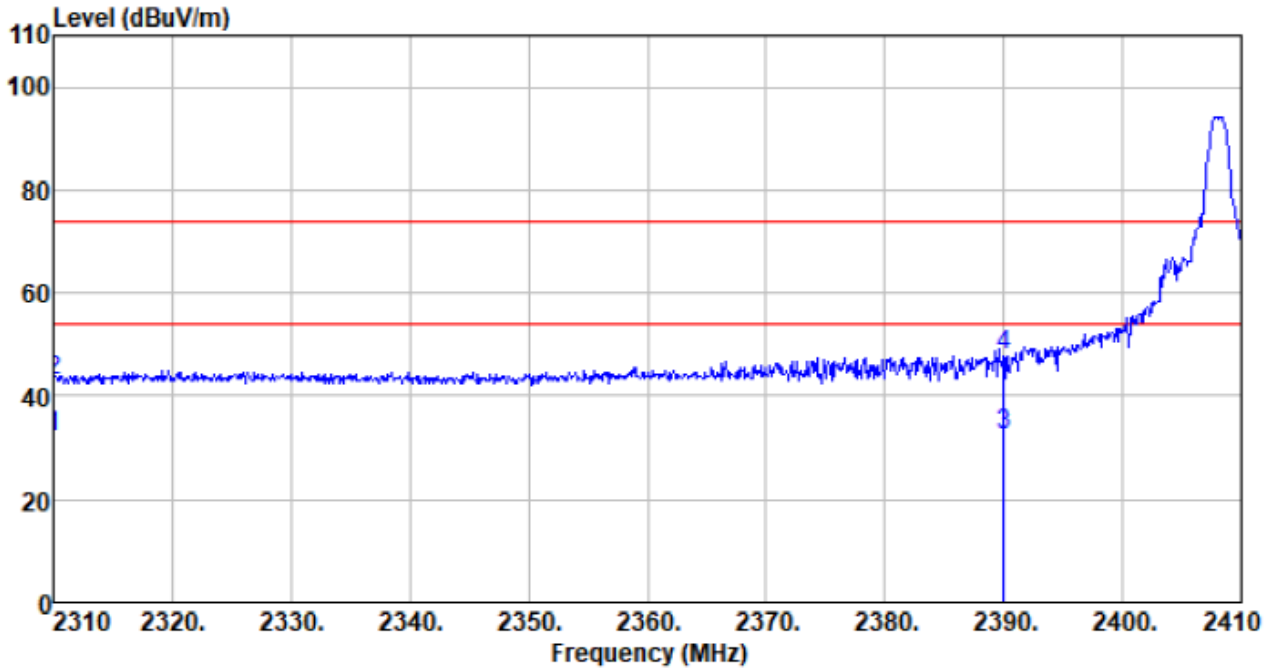
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Temp. / Hum.	Temp.:	25 °C	Humid.:	52%	Press.:	1 012mbar
Test results:	Pass					

Measurement Data

Remark:

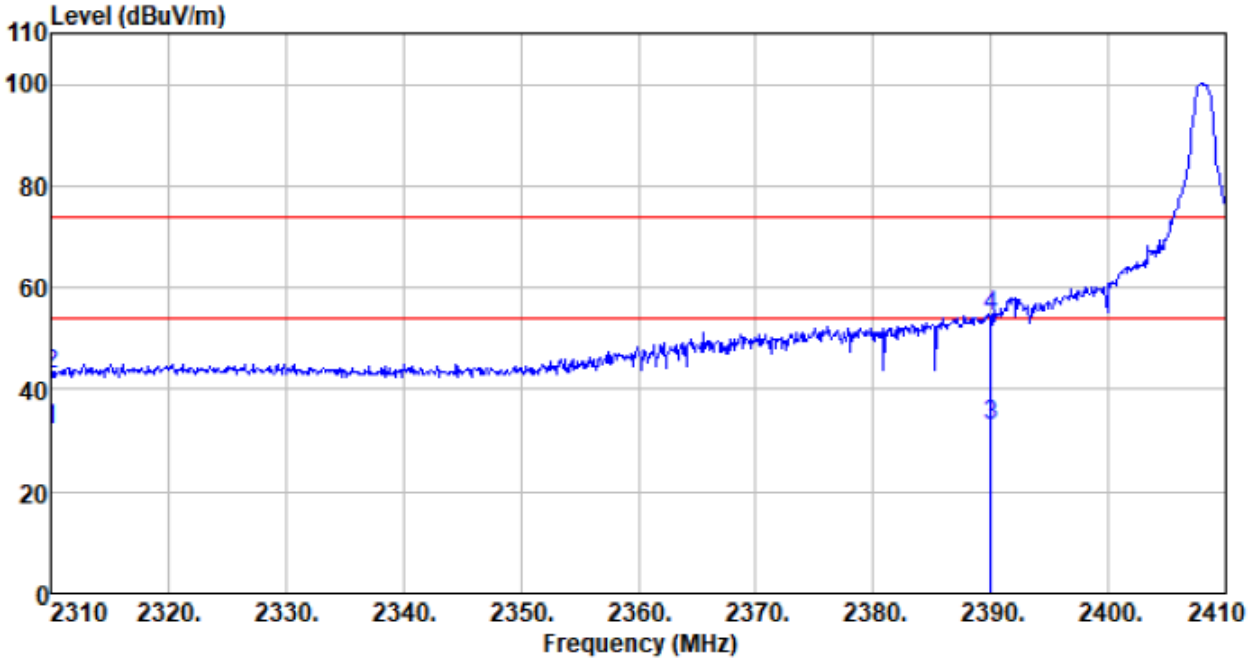
1. *Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.*

Test channel:	Lowest	Polarization:	Vertical



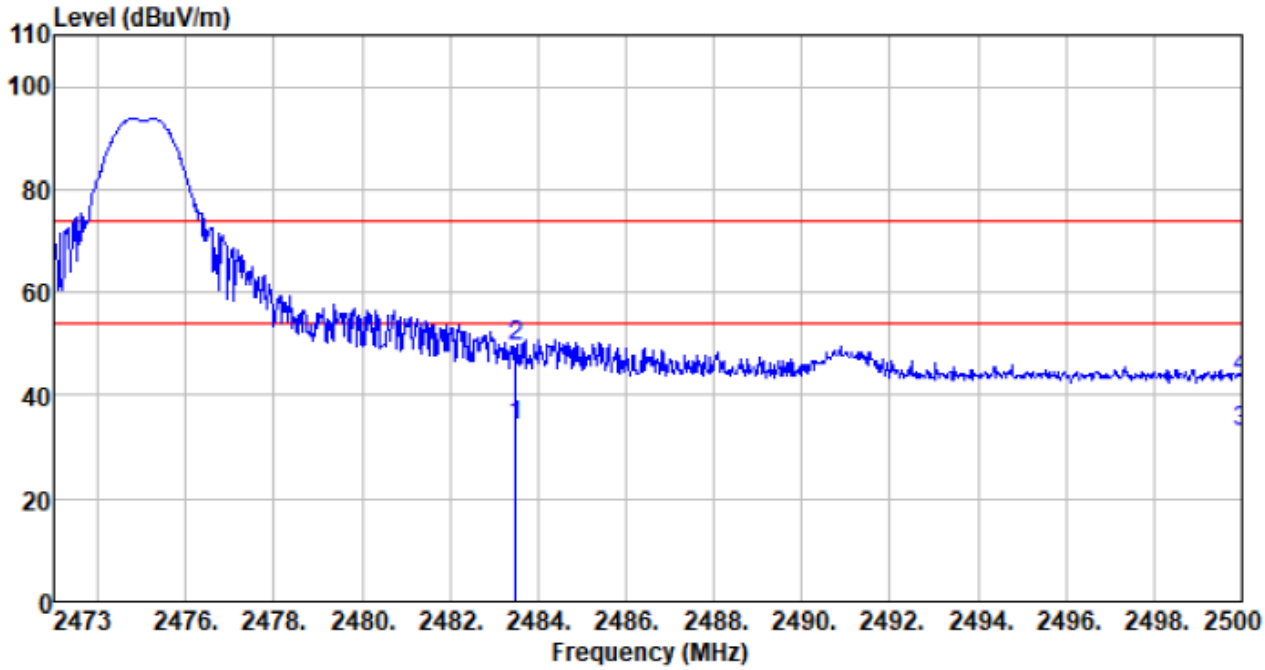
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	32.40	27.14	2.81	30.43	31.92	54.00	-22.08	Average
2310.000	43.54	27.14	2.81	30.43	43.06	74.00	-30.94	Peak
2390.000	32.38	27.37	2.91	30.24	32.42	54.00	-21.58	Average
2390.000	47.73	27.37	2.91	30.24	47.77	74.00	-26.23	Peak

Test channel:	Lowest	Polarization:	Horizontal



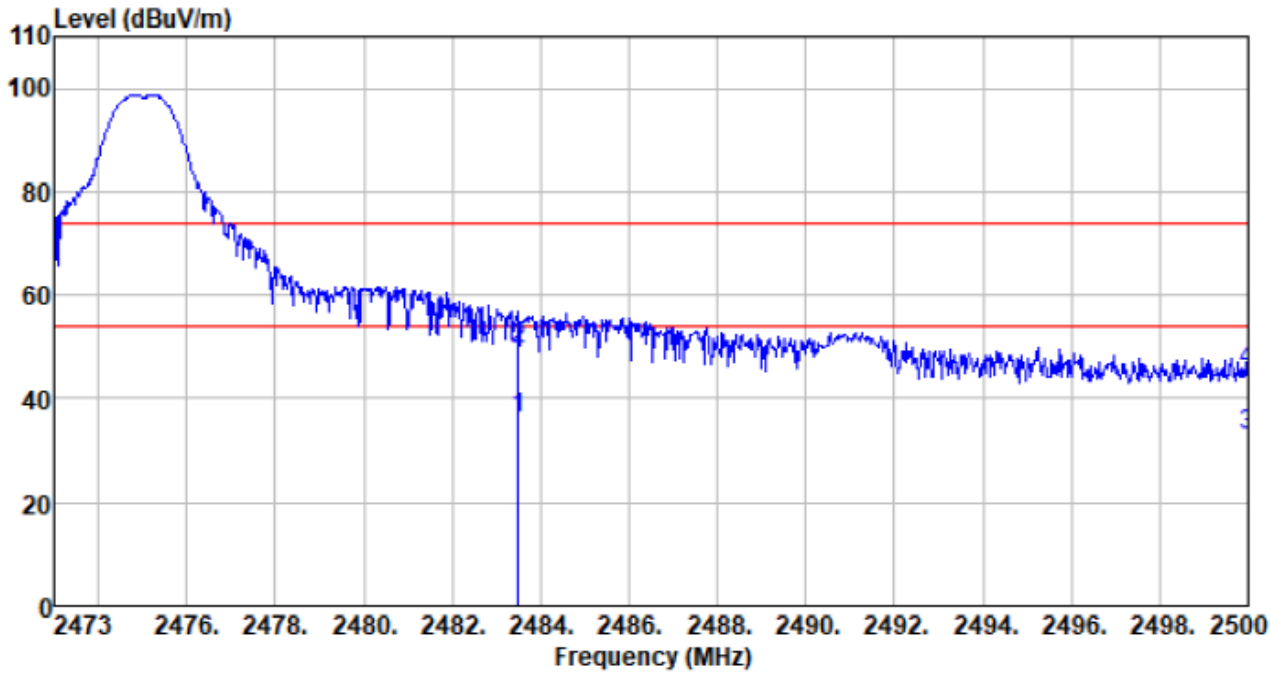
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	32.43	27.14	2.81	30.43	31.95	54.00	-22.05	Average
2310.000	43.49	27.14	2.81	30.43	43.01	74.00	-30.99	Peak
2390.000	32.80	27.37	2.91	30.24	32.84	54.00	-21.16	Average
2390.000	54.39	27.37	2.91	30.24	54.43	74.00	-19.57	Peak

Test channel:	Highest	Polarization:	Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2483.500	33.56	27.66	2.99	30.12	34.09	54.00	-19.91	Average
2483.500	49.03	27.66	2.99	30.12	49.56	74.00	-24.44	Peak
2500.000	32.22	27.70	3.01	30.13	32.80	54.00	-21.20	Average
2500.000	42.72	27.70	3.01	30.13	43.30	74.00	-30.70	Peak

Test channel:	Highest	Polarziation:	Horizontal



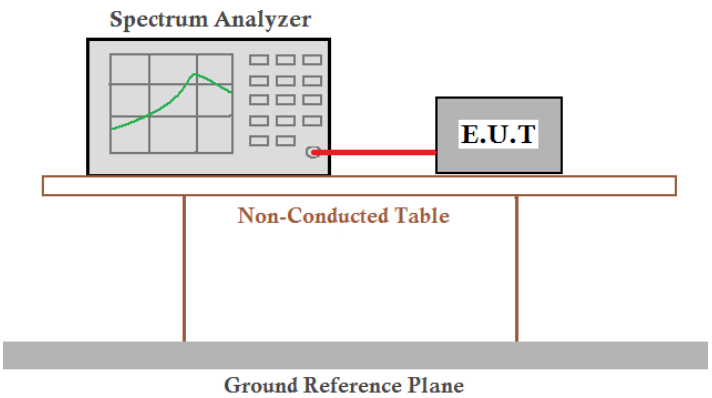
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2483.500	35.48	27.66	2.99	30.12	36.01	54.00	-17.99	Average
2483.500	49.17	27.66	2.99	30.12	49.70	74.00	-24.30	Peak
2500.000	32.24	27.70	3.01	30.13	32.82	54.00	-21.18	Average
2500.000	44.88	27.70	3.01	30.13	45.46	74.00	-28.54	Peak

Remark:

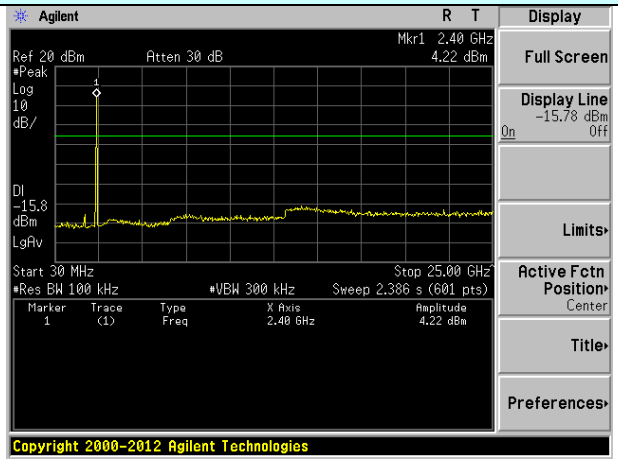
1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

7.9 Spurious Emission

7.9.1 Conducted Emission Method

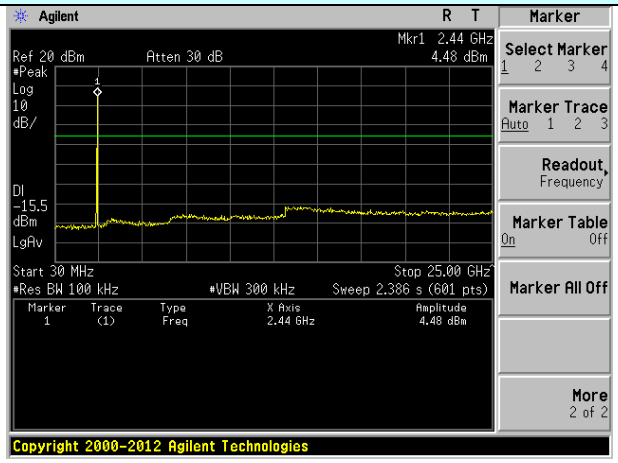
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below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

Lowest channel



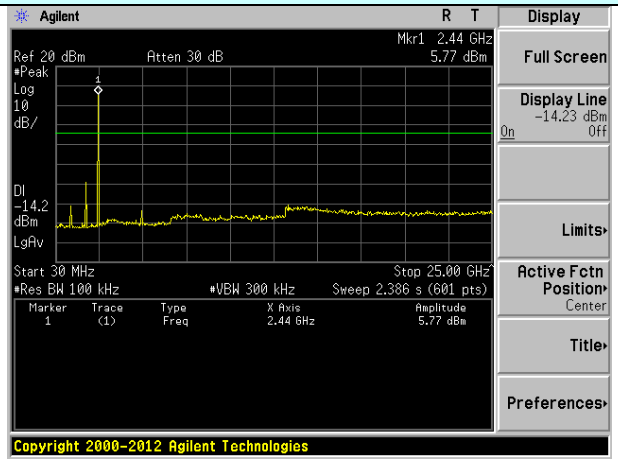
30MHz~25GHz

Middle channel



30MHz~25GHz

Highest channel



30MHz~25GHz

7.9.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 25GHz
Test site:	Measurement Distance: 3m

Receiver setup:

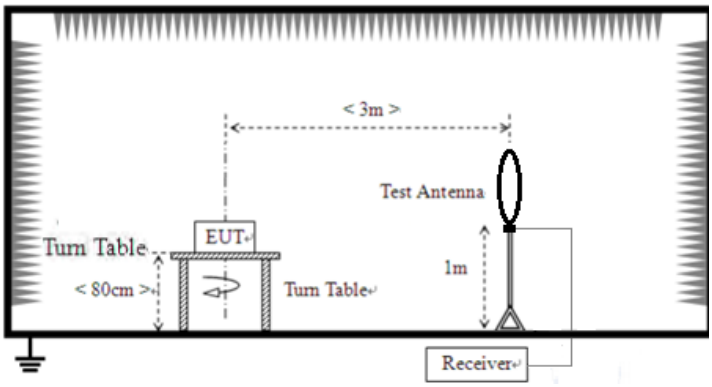
Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:
(Spurious Emissions)

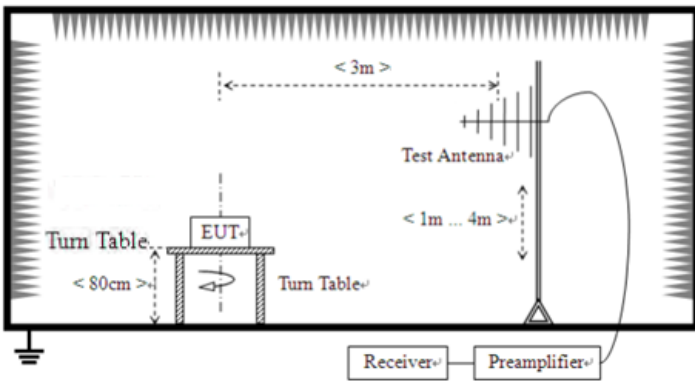
Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	30m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

Test setup:

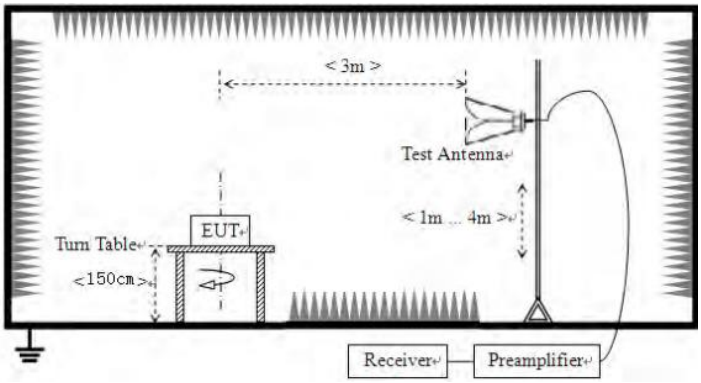
Below 30MHz



Below 1GHz



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.	Temp.:	25 °C	Humid.:	52%	Press.:	1 012mbar

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.

Measurement data:

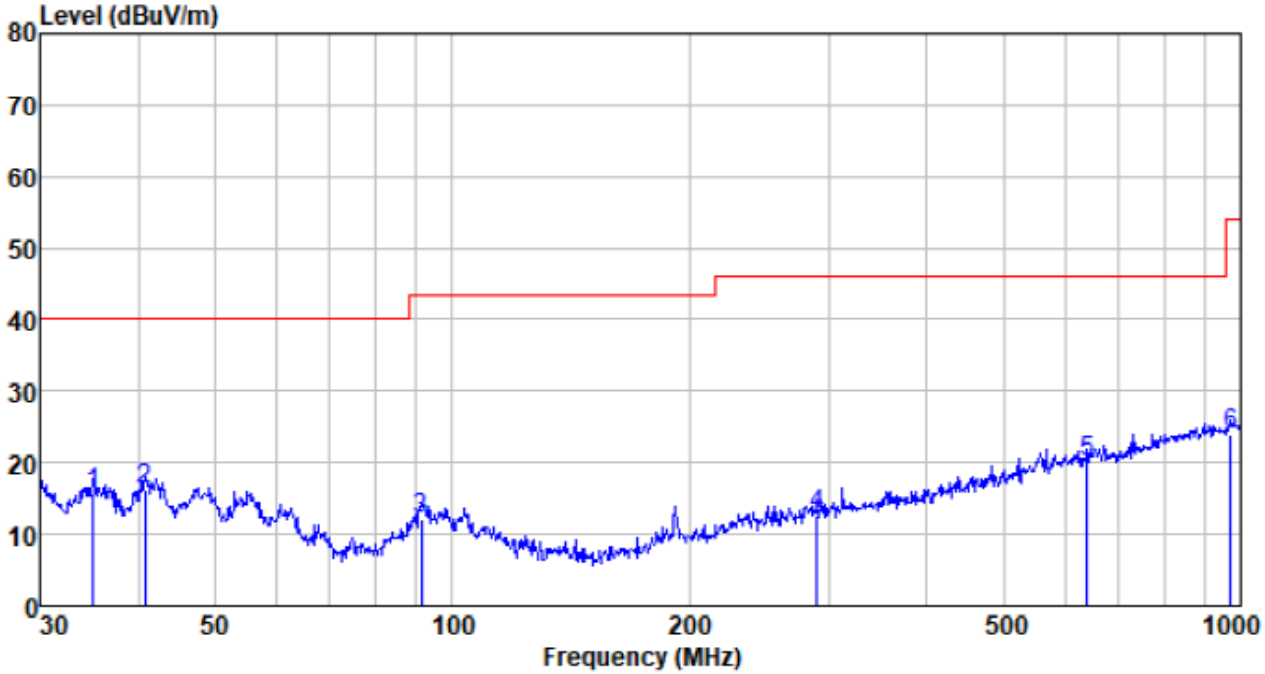
- **Below 30MHz**

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.

■ **30MHz ~ 1GHz**

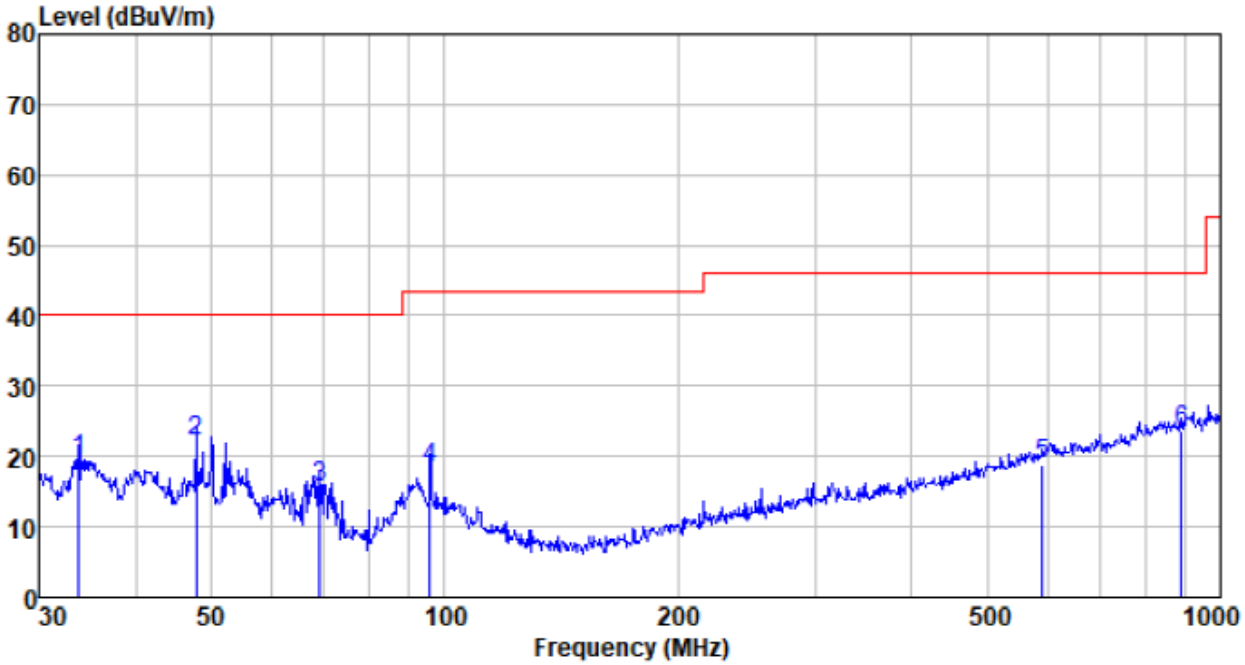
Pre-scan all test modes, found worst case at 2406MHz, and so only show the test result of 2406MHz

Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
35.005	39.14	11.33	0.61	35.36	15.72	40.00	-24.28	QP
40.702	38.96	12.21	0.67	35.70	16.14	40.00	-23.86	QP
91.495	36.72	10.90	1.12	36.65	12.09	43.50	-31.41	QP
290.017	34.58	13.35	2.31	37.41	12.83	46.00	-33.17	QP
638.369	34.16	19.54	3.87	37.58	19.99	46.00	-26.01	QP
972.337	33.77	22.59	5.12	37.53	23.95	54.00	-30.05	QP

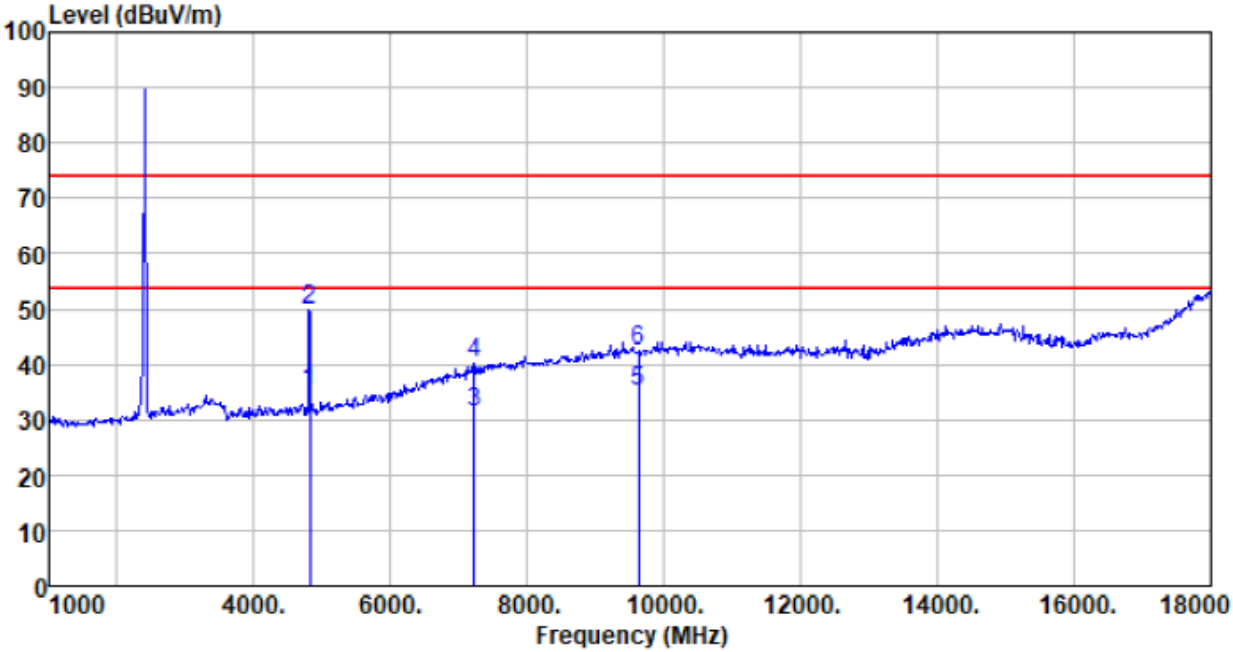
Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
33.799	42.85	11.28	0.59	35.28	19.44	40.00	-20.56	QP
47.826	45.27	12.28	0.75	36.08	22.22	40.00	-17.78	QP
69.114	43.23	7.85	0.93	36.43	15.58	40.00	-24.42	QP
95.762	42.33	11.59	1.16	36.69	18.39	43.50	-25.11	QP
588.905	33.66	19.23	3.68	37.54	19.03	46.00	-26.97	QP
890.728	34.10	22.20	4.82	37.60	23.52	46.00	-22.48	QP

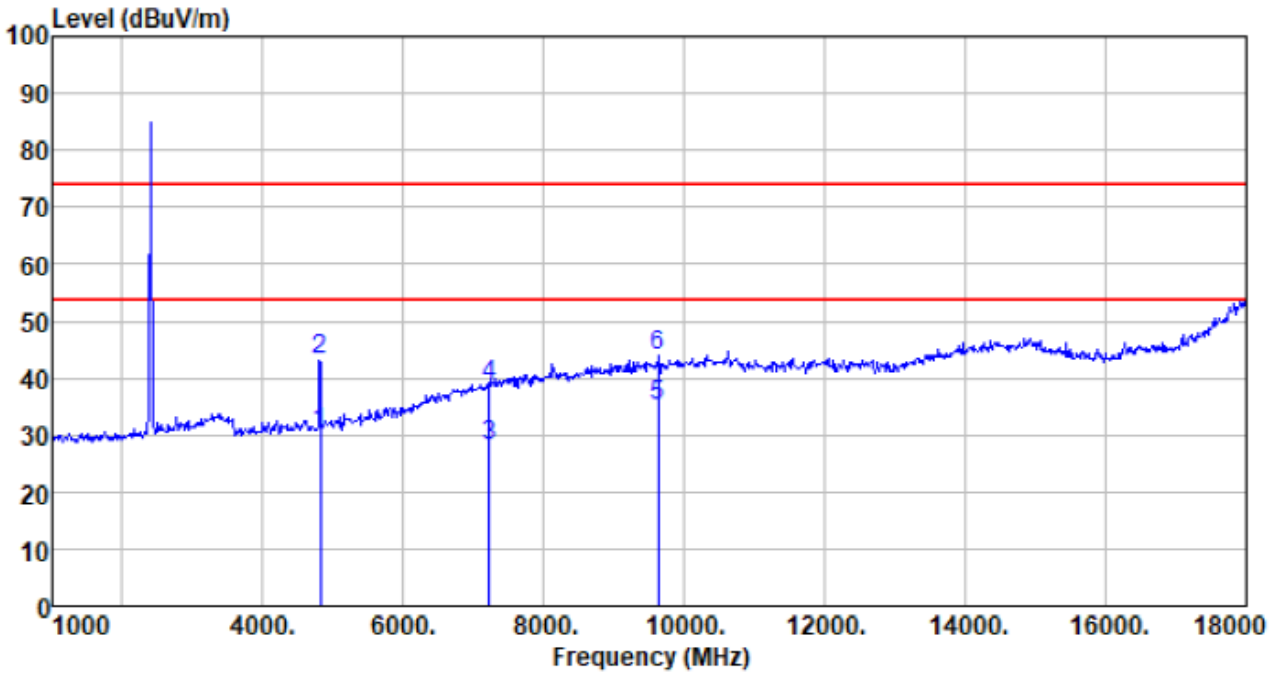
■ **Above 1GHz**

Test channel:	Lowest	Polarization:	Horizontal



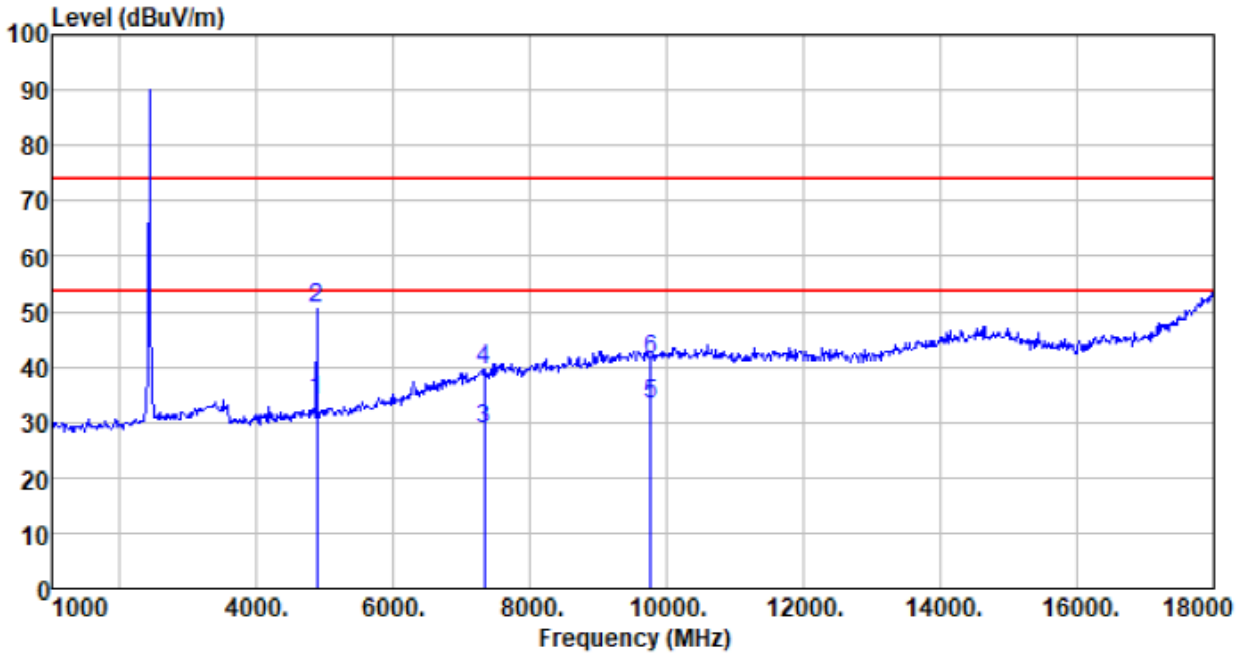
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4816.000	37.09	31.22	4.61	37.73	35.19	54.00	-18.81	Average
4816.000	51.69	31.22	4.61	37.73	49.79	74.00	-24.21	Peak
7224.000	24.27	36.20	6.50	35.63	31.34	54.00	-22.66	Average
7224.000	33.30	36.20	6.50	35.63	40.37	74.00	-33.63	Peak
9632.000	24.03	37.97	7.98	34.95	35.03	54.00	-18.97	Average
9632.000	31.35	37.97	7.98	34.95	42.35	74.00	-31.65	Peak

Test channel:	Lowest	Polarization:	Vertical



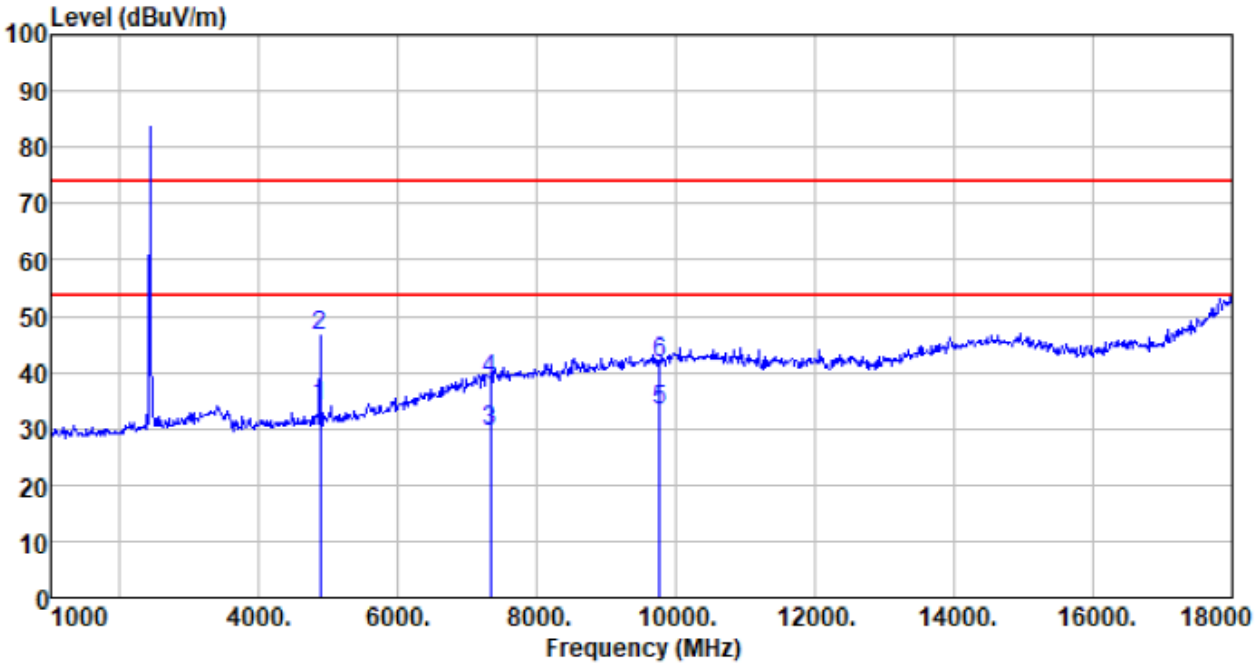
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4816.000	32.31	31.22	4.61	37.73	30.41	54.00	-23.59	Average
4816.000	45.06	31.22	4.61	37.73	43.16	74.00	-30.84	Peak
7224.000	20.83	36.20	6.50	35.63	27.90	54.00	-26.10	Average
7224.000	31.54	36.20	6.50	35.63	38.61	74.00	-35.39	Peak
9632.000	24.04	37.97	7.98	34.95	35.04	54.00	-18.96	Average
9632.000	32.80	37.97	7.98	34.95	43.80	74.00	-30.20	Peak

Test channel:	Middle	Polarization:	Horizontal



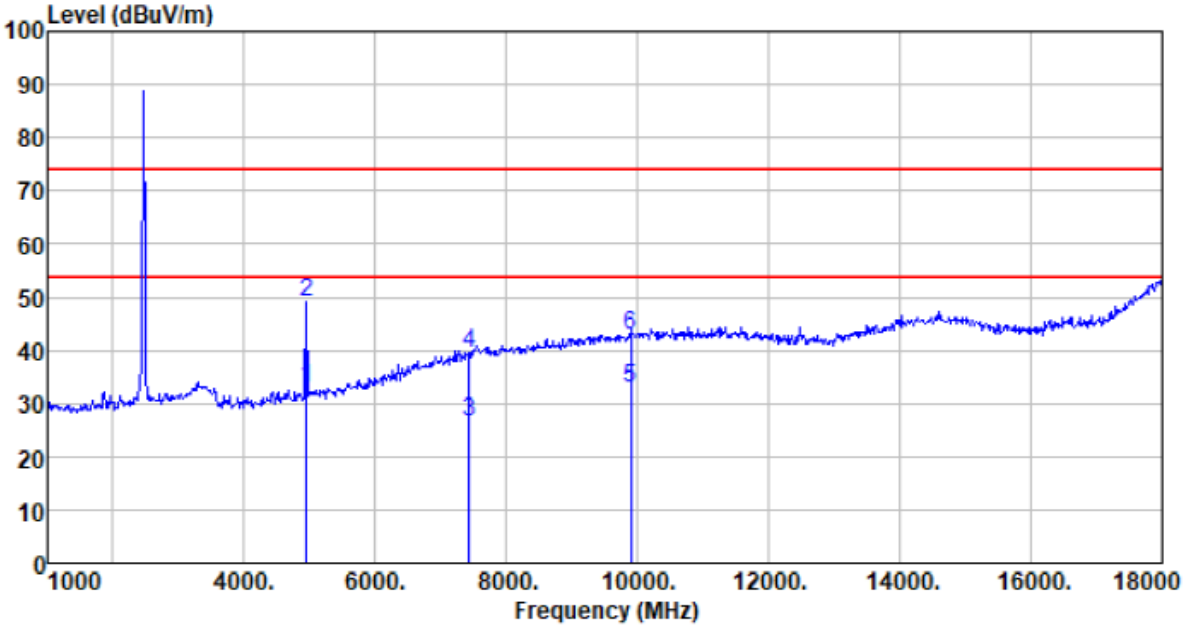
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4880.000	35.86	31.31	4.69	37.75	34.11	54.00	-19.89	Average
4880.000	52.13	31.31	4.69	37.75	50.38	74.00	-23.62	Peak
7320.000	21.22	36.43	6.63	35.60	28.68	54.00	-25.32	Average
7320.000	31.90	36.43	6.63	35.60	39.36	74.00	-34.64	Peak
9760.000	22.02	38.10	8.03	35.03	33.12	54.00	-20.88	Average
9760.000	30.25	38.10	8.03	35.03	41.35	74.00	-32.65	Peak

Test channel:	Middle	Polarization:	Vertical



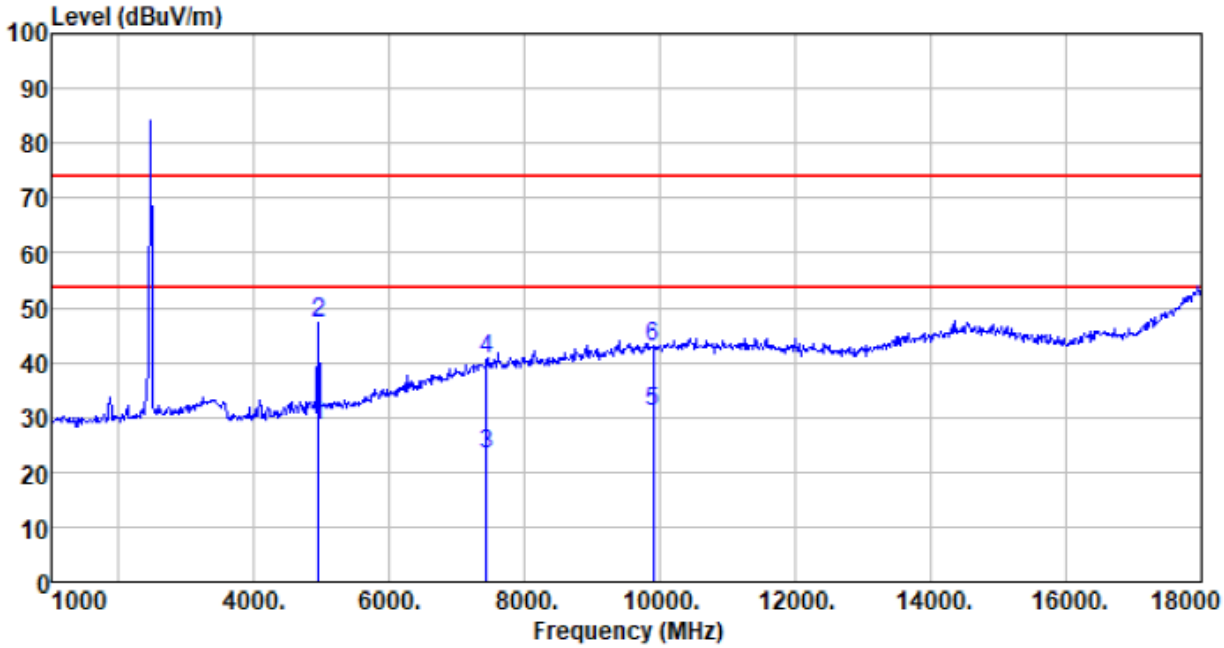
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4880.000	35.62	31.31	4.69	37.75	33.87	54.00	-20.13	Average
4880.000	48.25	31.31	4.69	37.75	46.50	74.00	-27.50	Peak
7320.000	22.02	36.43	6.63	35.60	29.48	54.00	-24.52	Average
7320.000	31.40	36.43	6.63	35.60	38.86	74.00	-35.14	Peak
9760.000	22.25	38.10	8.03	35.03	33.35	54.00	-20.65	Average
9760.000	30.77	38.10	8.03	35.03	41.87	74.00	-32.13	Peak

Test channel:	Highest	Polarization:	Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4950.000	34.62	31.41	4.77	37.78	33.02	54.00	-20.98	Average
4950.000	50.82	31.41	4.77	37.78	49.22	74.00	-24.78	Peak
7425.000	18.73	36.66	6.75	35.56	26.58	54.00	-27.42	Average
7425.000	31.71	36.66	6.75	35.56	39.56	74.00	-34.44	Peak
9900.000	21.73	38.27	8.09	35.12	32.97	54.00	-21.03	Average
9900.000	31.66	38.27	8.09	35.12	42.90	74.00	-31.10	Peak

Test channel:	Highest	Polarization:	Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4950.000	29.92	31.41	4.77	37.78	28.32	54.00	-25.68	Average
4950.000	48.70	31.41	4.77	37.78	47.10	74.00	-26.90	Peak
7425.000	15.31	36.66	6.75	35.56	23.16	54.00	-30.84	Average
7425.000	32.64	36.66	6.75	35.56	40.49	74.00	-33.51	Peak
9900.000	19.64	38.27	8.09	35.12	30.88	54.00	-23.12	Average
9900.000	31.69	38.27	8.09	35.12	42.93	74.00	-31.07	Peak

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *No emission found in frequency above 18GHz.*

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

---End---