TEST REPORT

Applicant:	FLYSKY RC MODEL TECHNOLOGY CO., LTD
Address of Applicant:	West building3, Huangjianyuan Ind, Park QIAOLI North Gate Changping Town, Dongguan, China
Manufacturer:	ShenZhen FLYSKY Technology Co.,Ltd
Address of Manufacturer:	ADD 16F, Huafeng Building, No. 6006 Shennan Road, Futian District, Shenzhen, Guangdong, China
Factory:	Dongguan Flysky RC Model technology Co.,Ltd
Address of Factory:	West building 3, HuangjinyuanInd Park, QIAOLI North Gate, Changping Town, Dongguan, China
Equipment Under Test (EUT)	
Product Name:	MINI RECEIVER
Model No.:	TMr
Trade Mark:	FLYSKY
FCC ID:	N4ZTMR000
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	May 20, 2021
Date of Test:	May 20-27, 2021
Date of report issued:	May 28, 2021
Test Result :	PASS *

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

Authorized Signature:

Robinson Luo
Laboratory Manager

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2 Version

Version No.	Date	Description
00	*May 28, 2021*	*Original*

Prepared By: ***Date:*** *May 28, 2021*

Project Engineer

Check By: ***Date:*** *May 28, 2021*

Reviewer

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4 Test Summary

Test Item	Section	Result
Antenna Requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	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:	MINI RECEIVER
Model No.:	TMr
Serial No.:	N/A
Hardware version:	TMr-V1.3
Software version:	TMr V1.0.2
Test sample(s) ID:	GTS202105000124-1
Sample(s) Status	Engineer sample
Operation Frequency:	2402.15MHz~2479.85MHz
Channel numbers:	171
Modulation technology:	FLRC
Antenna Type:	Integral Antenna
Antenna gain:	ANT 1: -1dBi ANT 2: -1dBi
Power supply:	DC 3.5-9V

Remark: The system works in the frequency range of 2402.15MHz to 2479.85MHz. This band has been divided to 171 independent channels. Each radio system uses 32 different channels; the minimum channel separation is ≥2.2MHz. 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.

Note：SISO mode only

The test frequencies are below:

Channel	Frequency
The lowest channel	2402.15MHz
The middle channel	2440.40MHz
The Highest channel	2479.85MHz

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402.15	45	2421.95	89	2441.75	133	2462.75
2	2402.60	46	2422.40	90	2442.20	134	2463.20
3	2403.05	47	2422.85	91	2442.65	135	2463.65
4	2403.50	48	2423.30	92	2443.10	136	2464.10
5	2403.95	49	2423.75	93	2444.75	137	2464.55
6	2404.40	50	2424.20	94	2445.20	138	2465.00
7	2404.85	51	2424.65	95	2445.65	139	2465.45
8	2405.30	52	2425.10	96	2446.10	140	2465.90
9	2405.75	53	2425.55	97	2446.55	141	2466.35
10	2406.20	54	2426.00	98	2447.00	142	2466.80
11	2406.65	55	2426.45	99	2447.45	143	2467.25
12	2407.10	56	2426.90	100	2447.90	144	2467.70
13	2407.55	57	2427.35	101	2448.35	145	2468.15
14	2408.00	58	2427.80	102	2448.80	146	2468.60
15	2408.45	59	2428.25	103	2449.25	147	2469.05
16	2408.90	60	2428.70	104	2449.70	148	2469.50
17	2409.35	61	2429.15	105	2450.15	149	2469.95
18	2409.80	62	2429.60	106	2450.60	150	2470.40
19	2410.25	63	2430.05	107	2451.05	151	2470.85
20	2410.70	64	2430.50	108	2451.50	152	2471.30
21	2411.15	65	2430.95	109	2451.95	153	2471.75
22	2411.60	66	2431.40	110	2452.40	154	2472.20
23	2412.05	67	2431.85	111	2452.85	155	2472.65
24	2412.50	68	2432.30	112	2453.30	156	2473.10
25	2412.95	69	2432.75	113	2453.75	157	2473.55
26	2413.40	70	2433.20	114	2454.20	158	2474.00
27	2413.85	71	2433.65	115	2454.65	159	2474.45
28	2414.30	72	2434.10	116	2455.10	160	2474.90
29	2414.75	73	2434.55	117	2455.55	161	2475.35
30	2415.20	74	2435.00	118	2456.00	162	2475.80
31	2415.65	75	2435.45	119	2456.45	163	2476.25
32	2416.10	76	2435.90	120	2456.90	164	2476.70
33	2416.55	77	2436.35	121	2457.35	165	2477.15
34	2417.00	78	2436.80	122	2457.80	166	2477.60
35	2417.45	79	2437.25	123	2458.25	167	2478.05
36	2417.90	80	2437.70	124	2458.70	168	2478.50
37	2418.35	81	2438.15	125	2459.15	169	2478.95
38	2418.80	82	2438.60	126	2459.60	170	2479.40

39	2419.25	83	2439.05	127	2460.05	171	2479.85
40	2419.70	84	2439.50	128	2460.50		
41	2420.15	85	2439.95	129	2460.95		
42	2420.60	86	2440.40	130	2461.40		
43	2421.05	87	2440.85	131	2461.85		
44	2421.50	88	2441.30	132	2462.30		

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting mode.
Remark: DC 3.5 to 9V all have been pretested, only worse case DC 9V is reported	

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
ShenZhen FLYSKY Technology Co.,Ltd	Remote control	F6S	N/A
MEILI	DC POWER SUPPLY	MCH-305A	011121168

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

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

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

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 -1dBi, reference to the appendix II for details.	

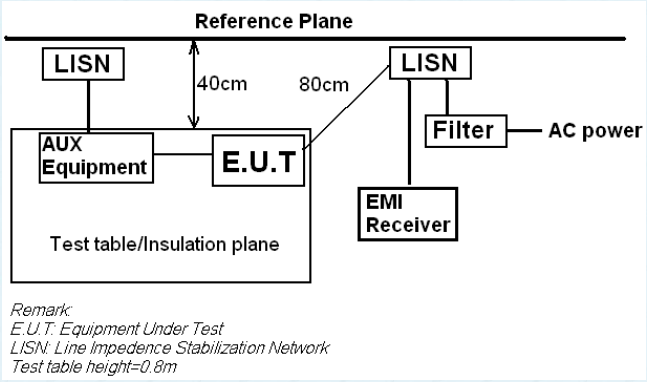
7.2 Conducted Emission

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:



Test procedure:

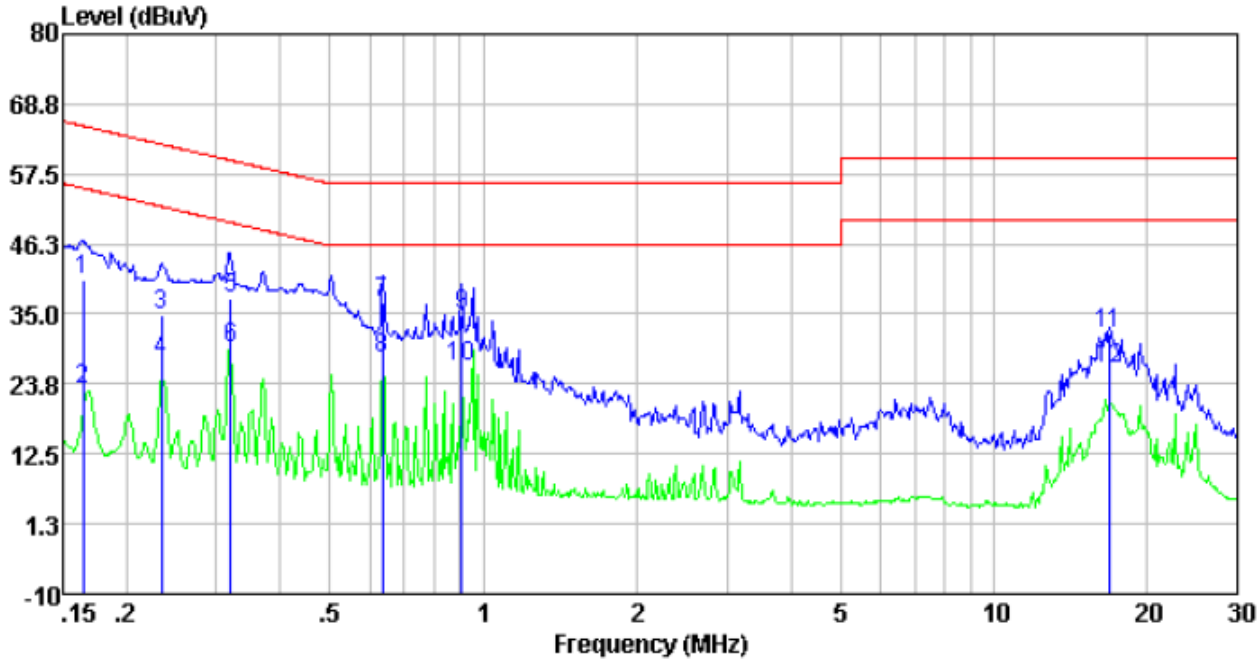
1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling 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 voltage:	AC 120V, 60Hz					
Test results:	Pass					

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

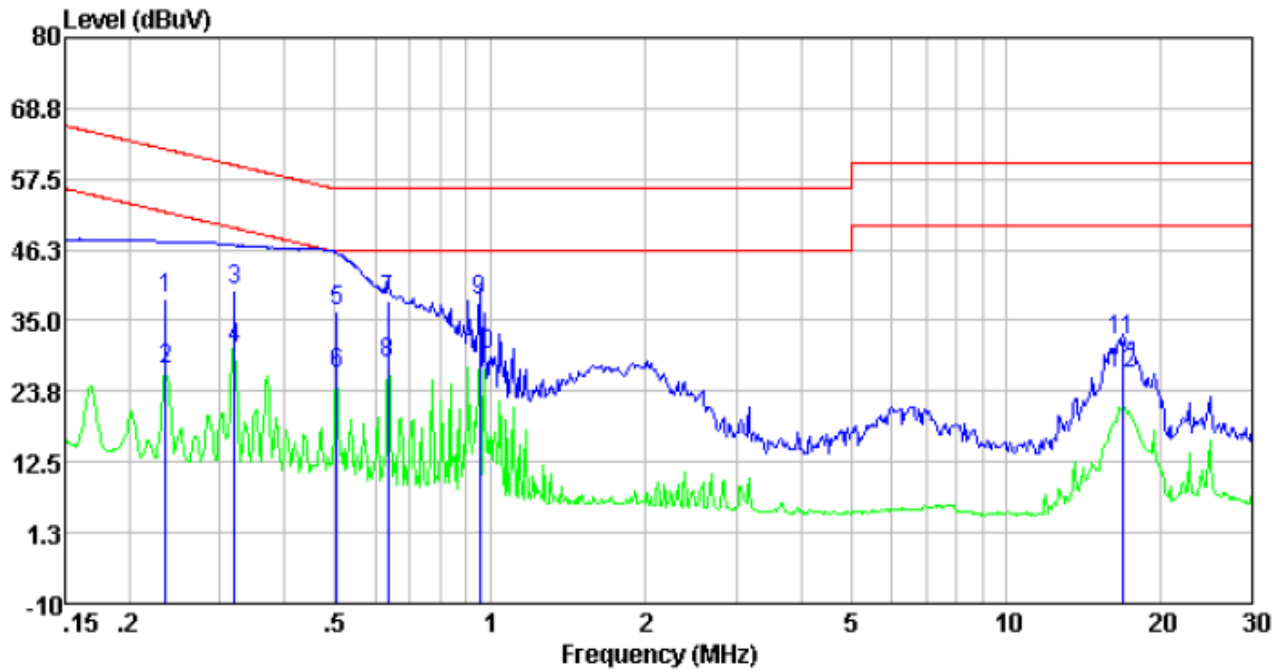
Measurement data:

Line:



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.16	20.01	20.40	0.01	40.42	65.25	-24.83	QP
0.16	2.50	20.40	0.01	22.91	55.25	-32.34	Average
0.23	14.59	20.40	0.01	35.00	62.30	-27.30	QP
0.23	7.03	20.40	0.01	27.44	52.30	-24.86	Average
0.32	16.98	20.39	0.01	37.38	59.71	-22.33	QP
0.32	8.99	20.39	0.01	29.39	49.71	-20.32	Average
0.63	16.69	20.28	0.02	36.99	56.00	-19.01	QP
0.63	7.53	20.28	0.02	27.83	46.00	-18.17	Average
0.91	14.49	20.22	0.03	34.74	56.00	-21.26	QP
0.91	6.39	20.22	0.03	26.64	46.00	-19.36	Average
16.84	11.33	20.24	0.17	31.74	60.00	-28.26	QP
16.84	5.78	20.24	0.17	26.19	50.00	-23.81	Average

Neutral:

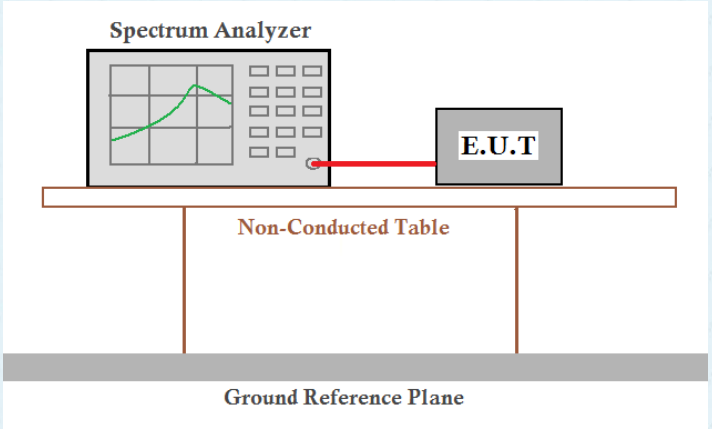


Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.24	18.08	20.40	0.01	38.49	62.26	-23.77	QP
0.24	6.66	20.40	0.01	27.07	52.26	-25.19	Average
0.32	19.32	20.39	0.01	39.72	59.71	-19.99	QP
0.32	9.97	20.39	0.01	30.37	49.71	-19.34	Average
0.50	16.24	20.31	0.01	36.56	56.00	-19.44	QP
0.50	6.36	20.31	0.01	26.68	46.00	-19.32	Average
0.63	17.91	20.28	0.02	38.21	56.00	-17.79	QP
0.63	7.74	20.28	0.02	28.04	46.00	-17.96	Average
0.95	17.86	20.21	0.03	38.10	56.00	-17.90	QP
0.95	9.39	20.21	0.03	29.63	46.00	-16.37	Average
16.84	11.58	20.24	0.17	31.99	60.00	-28.01	QP
16.84	6.26	20.24	0.17	26.67	50.00	-23.33	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss

7.3 Conducted Peak Output Power

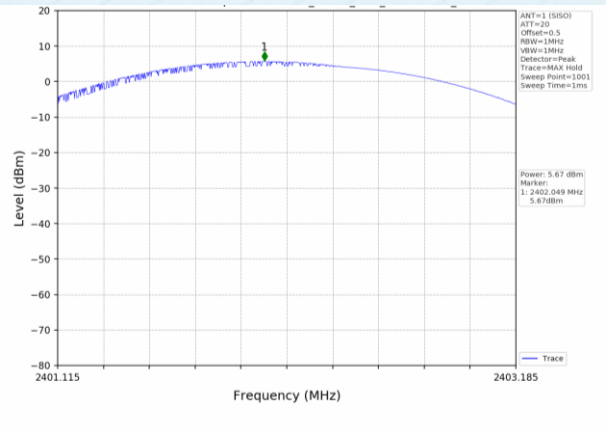
Test Requirement:	FCC Part15 C Section 15.247 (b)(1)
Test Method:	ANSI C63.10:2013
Limit:	20.97dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

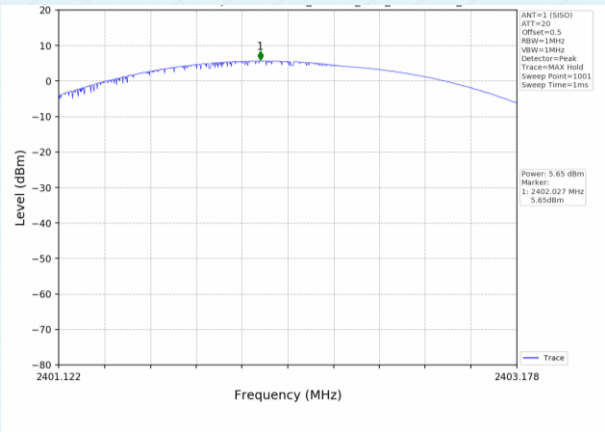
Antenna	Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
ANT 1	Lowest	5.67	20.97	Pass
	Middle	5.50		Pass
	Highest	5.37		Pass
ANT 2	Lowest	5.65		Pass
	Middle	5.49		Pass
	Highest	5.32		Pass

Test plot as follows:

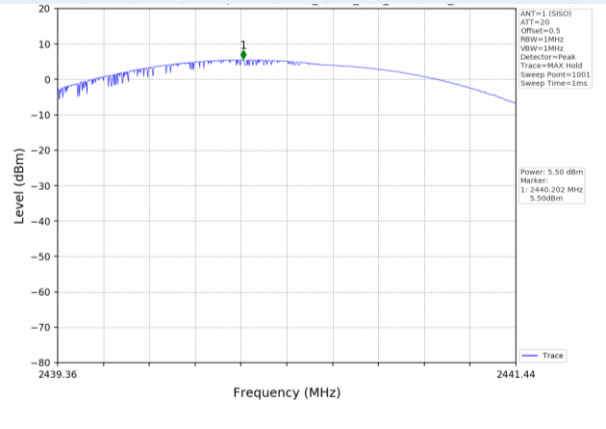
ANT 1

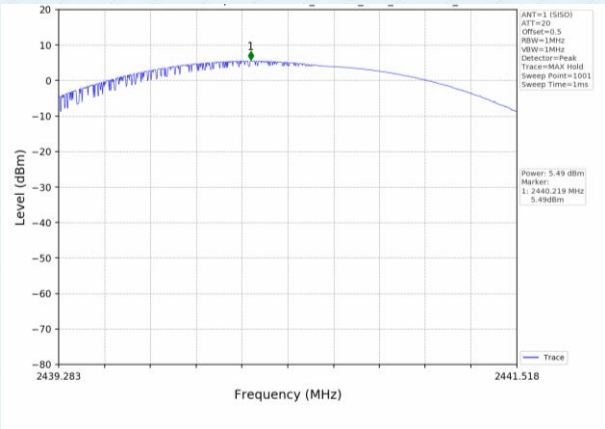


ANT 2

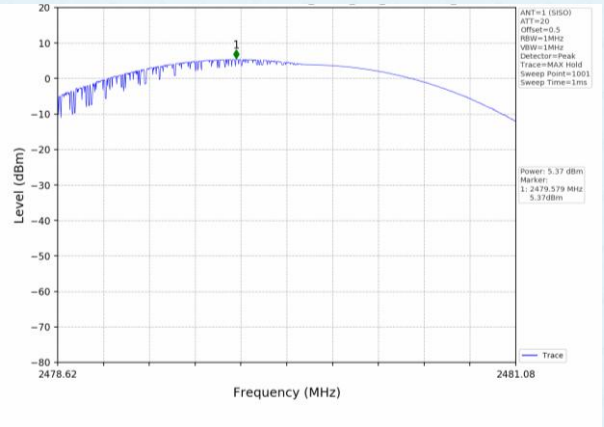


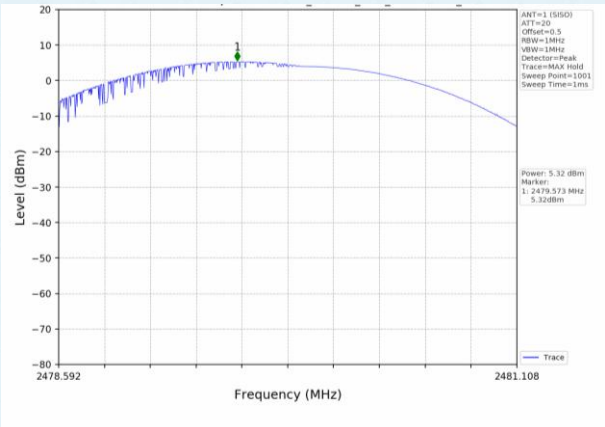
Lowest channel





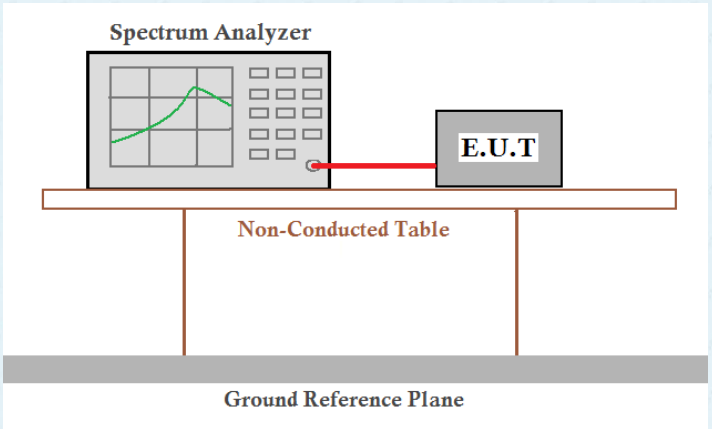
Middle channel





Highest channel

7.4 20dB Emission Bandwidth

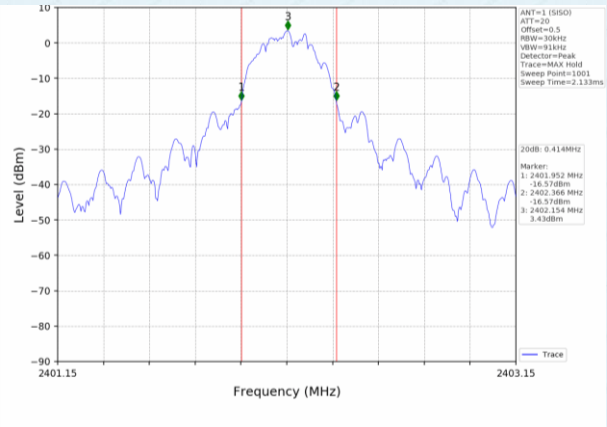
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

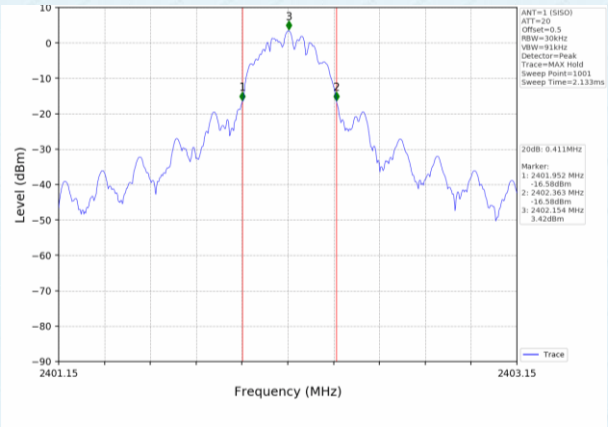
Antenna	Test channel	20dB Emission Bandwidth (MHz)	Result
ANT 1	Lowest	0.414	Pass
	Middle	0.416	Pass
	Highest	0.492	Pass
ANT2	Lowest	0.411	Pass
	Middle	0.447	Pass
	Highest	0.503	Pass

Test plot as follows:

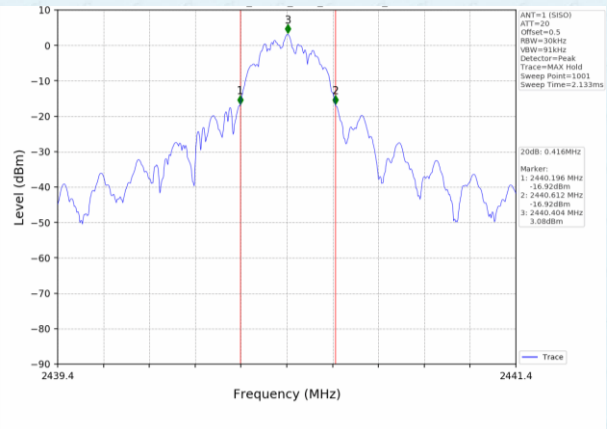
ANT 1

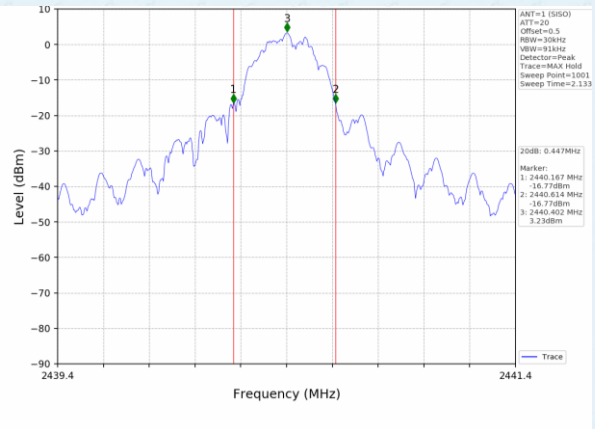


ANT 2

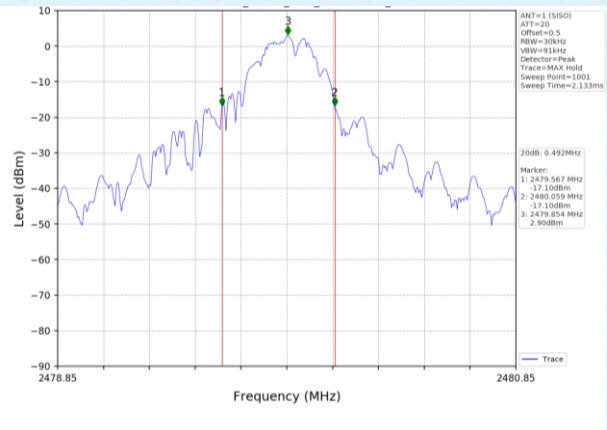


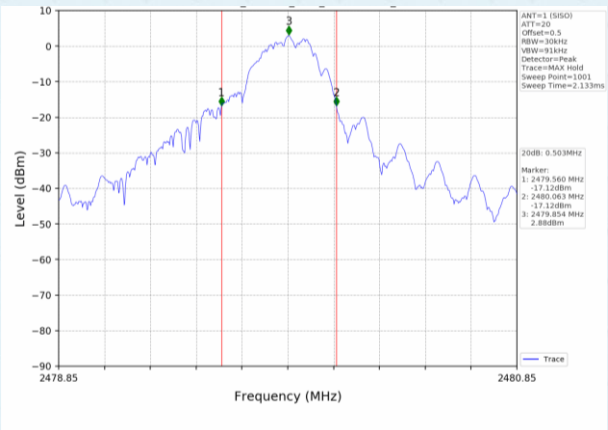
Lowest channel





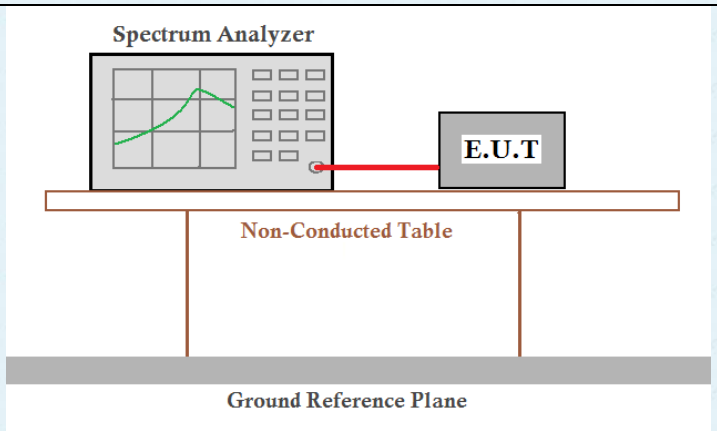
Middle channel





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

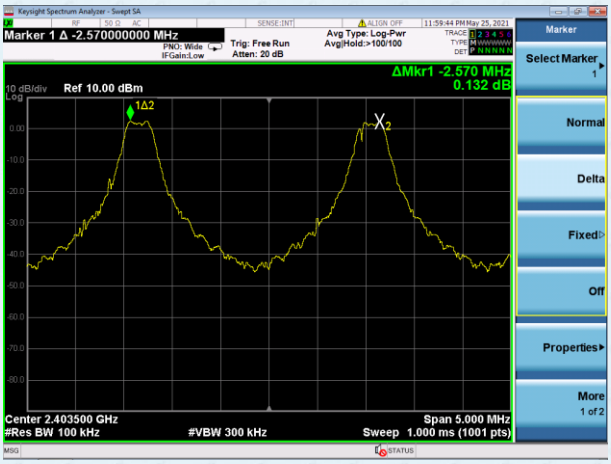
Measurement Data

Antenna	Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
ANT 1	Lowest	2565	503	Pass
	Middle	2695	503	Pass
	Highest	2245	503	Pass
ANT 2	Lowest	2570	503	Pass
	Middle	2780	503	Pass
	Highest	2410	503	Pass

Test plot as follows:

ANT 1

ANT 2

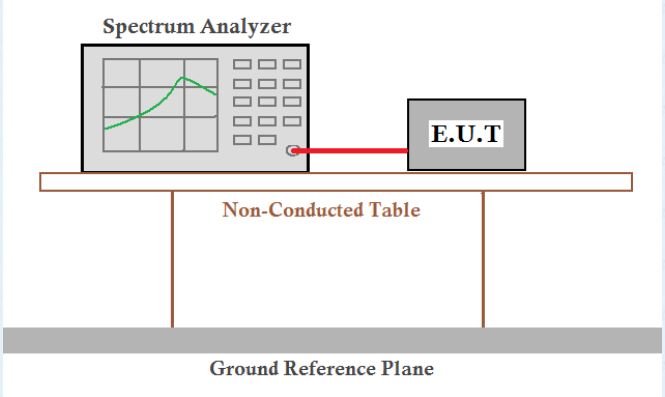


Lowest channel

Middle channel

Highest channel

7.6 Hopping Channel Number

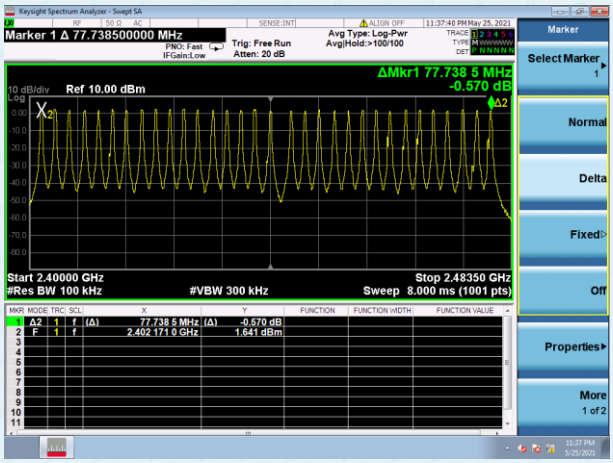
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test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

Measurement Data:

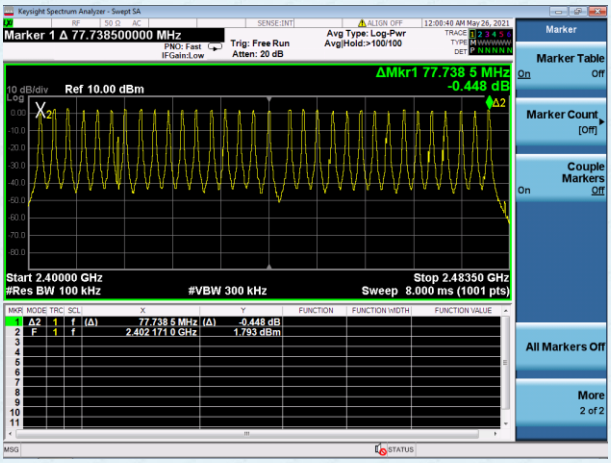
Antenna	Hopping channel numbers	Limit	Result
ANT 1	32	15	Pass
ANT 2	32	15	Pass

Test plot as follows:

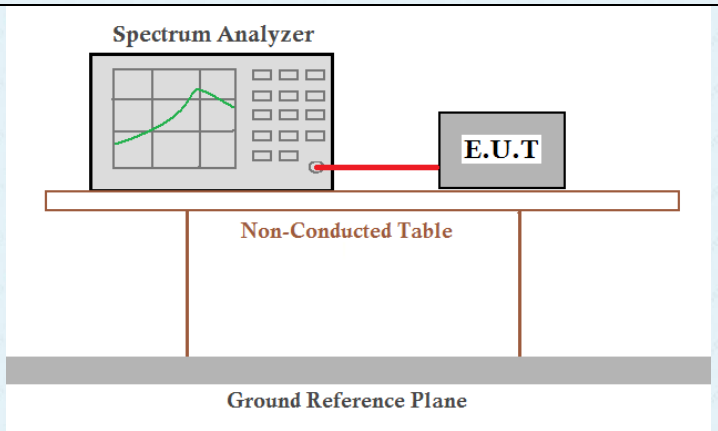
ANT 1



ANT 2



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

ANT 1:

Frequency(MHz)	Ton (ms)	Dwell time(ms)	Limit(ms)	Result
2402.15	2.450	94.08	400	Pass
2440.40	2.440	93.70	400	Pass
2479.85	2.440	93.70	400	Pass

The formula as below:

2402.15MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=2.450ms*3*0.4*32=94.08ms

2440.40MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=2.440ms*3*0.4*32=93.70ms

2479.85MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=2.440ms*3*0.4*32=93.70ms

ANT 2:

Frequency(MHz)	Ton (ms)	Dwell time(ms)	Limit(ms)	Result
2402.15	2.440	93.70	400	Pass
2440.40	2.440	93.70	400	Pass
2479.85	2.440	93.70	400	Pass

The formula as below:

2402.15MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=2.440ms*3*0.4*32=93.70ms

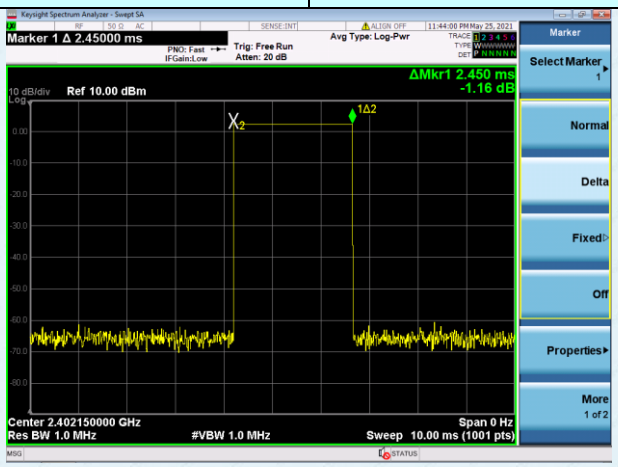
2440.40MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=2.440ms*3*0.4*32=93.70ms

2479.85MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=2.440ms*3*0.4*32=93.70ms

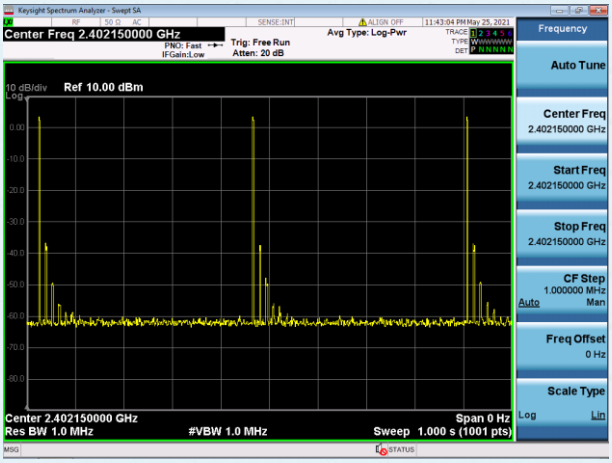
Test plot as follows:

ANT 1:

Frequency:	2402.15MHz

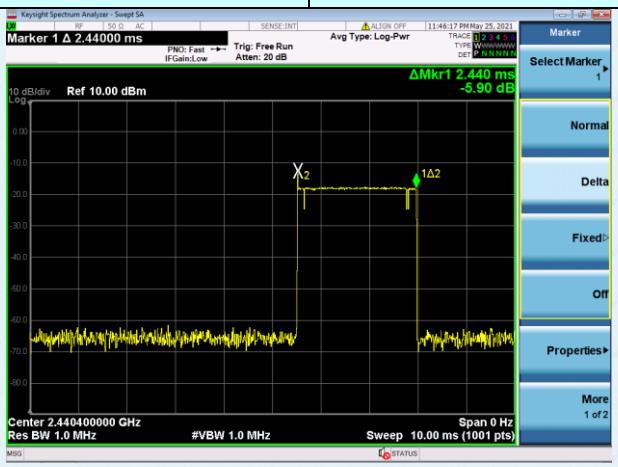


Ton

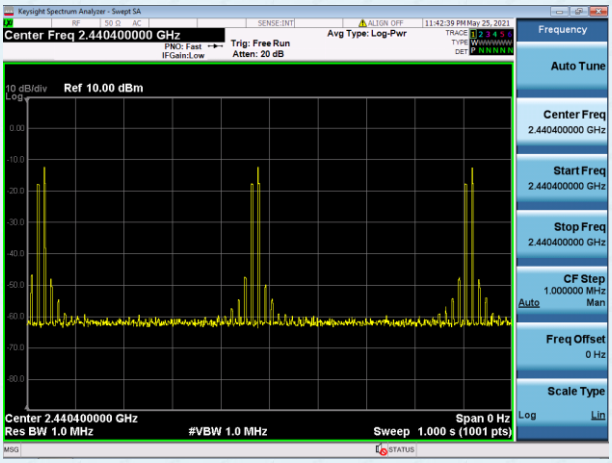


Ton times in 1s

Frequency:	2440.40MHz

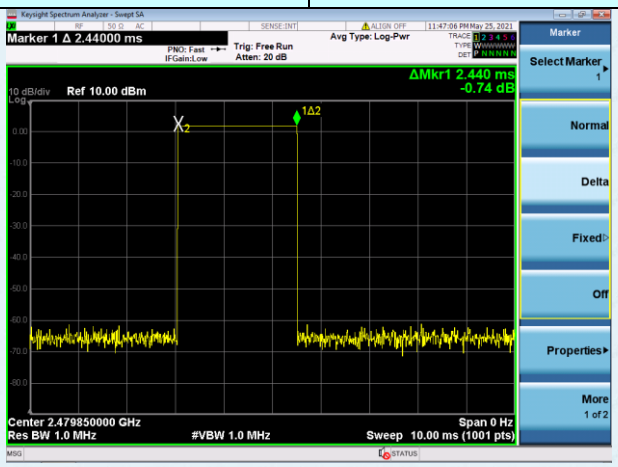


Ton

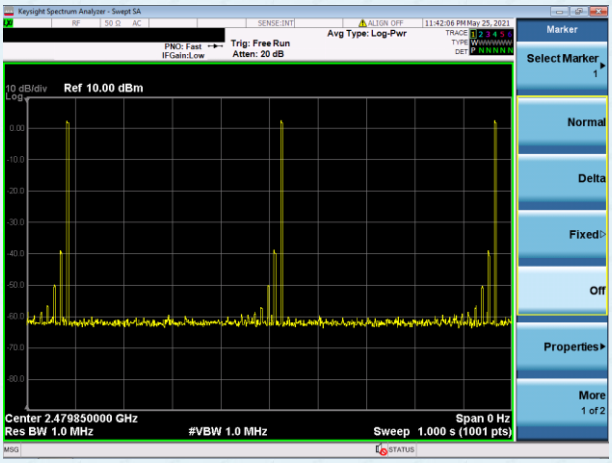


Ton times in 1s

Frequency:	2479.85MHz



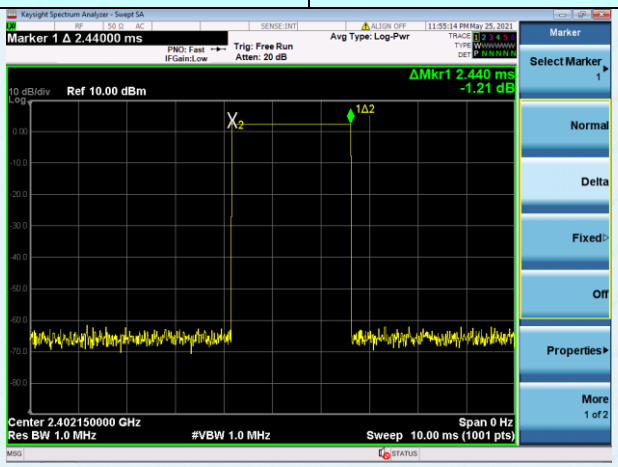
Ton



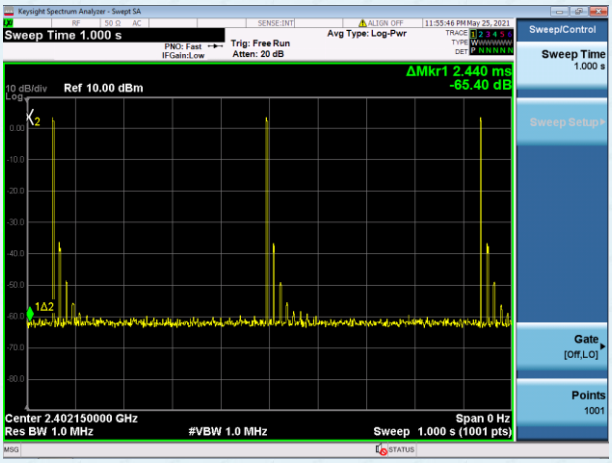
Ton times in 1s

ANT 2:

Frequency:	2402.15MHz

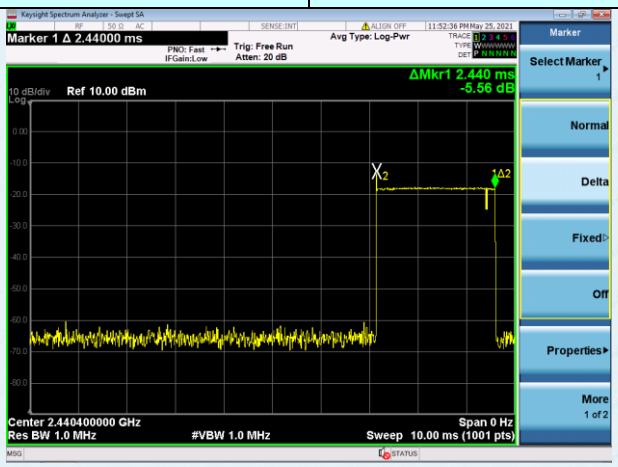


Ton

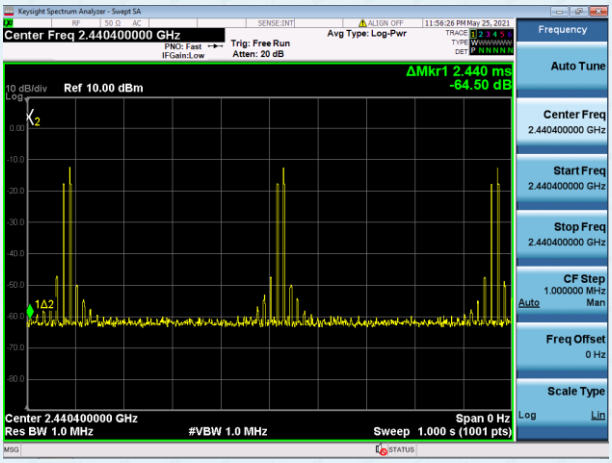


Ton times in 1s

Frequency:	2440.40MHz

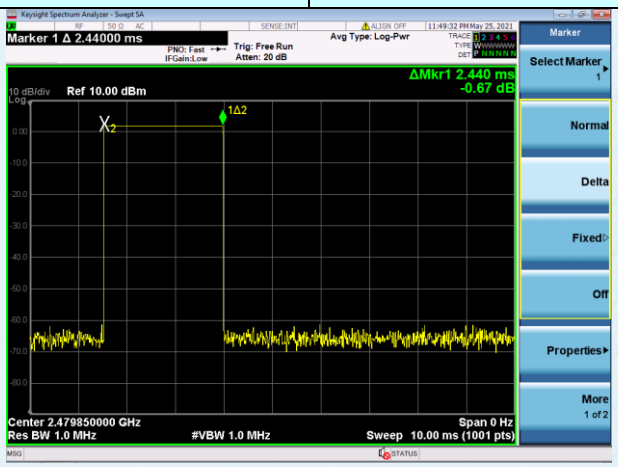


Ton

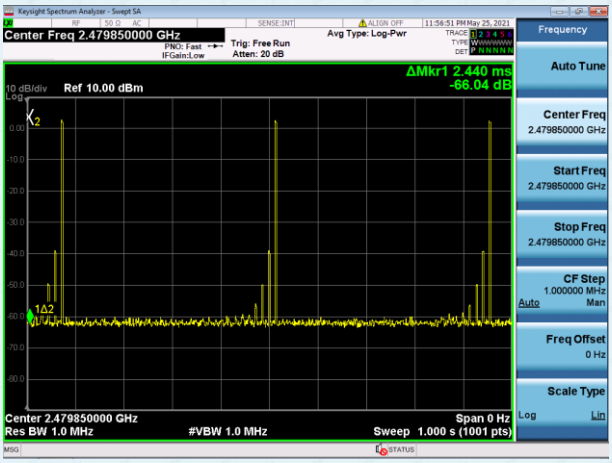


Ton times in 1s

Frequency:	2479.85MHz



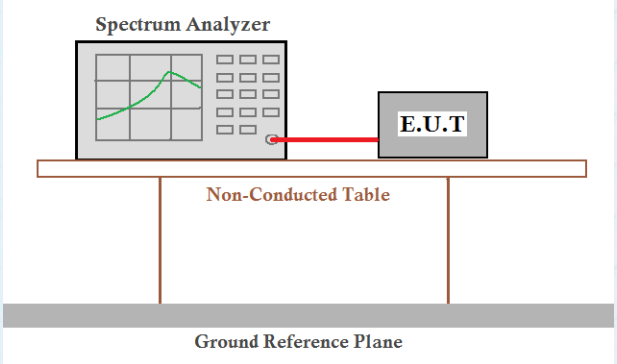
Ton



Ton times in 1s

7.8 Spurious Emission in Non-restricted & restricted Bands

7.8.1 Conducted Emission Method

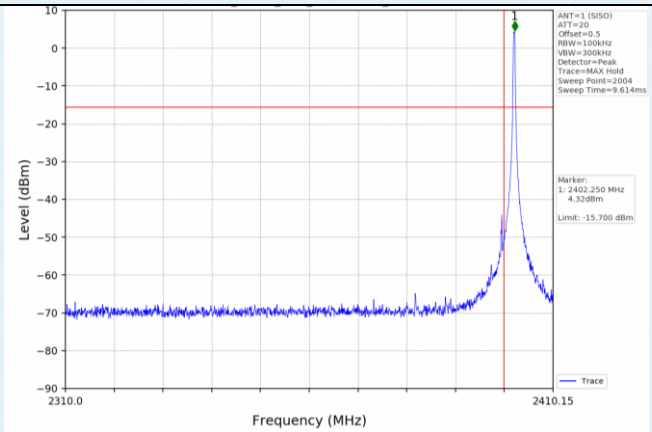
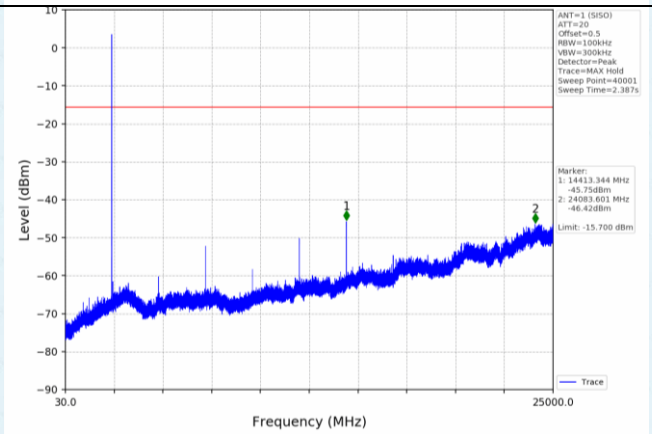
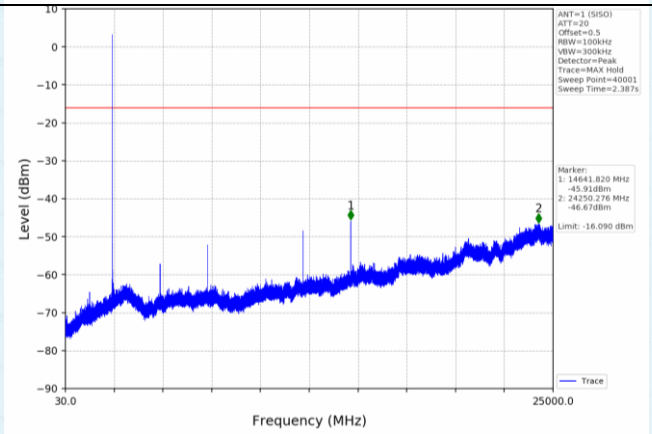
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by 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

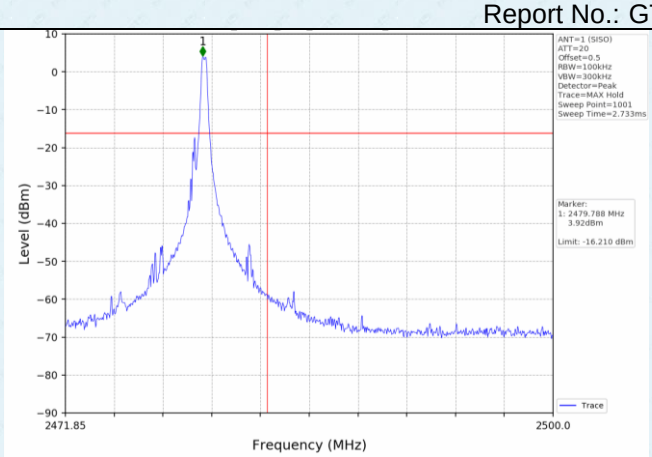
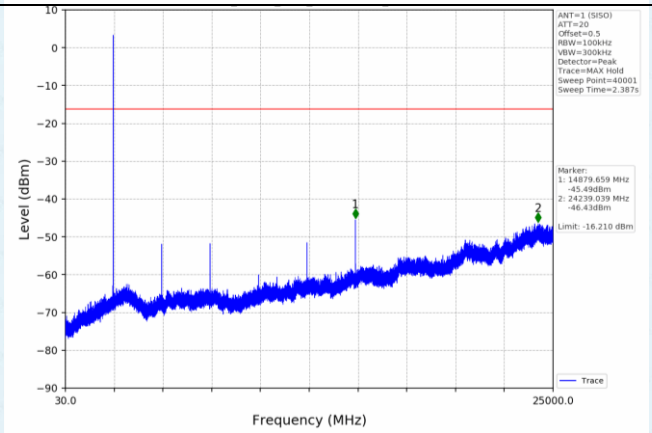
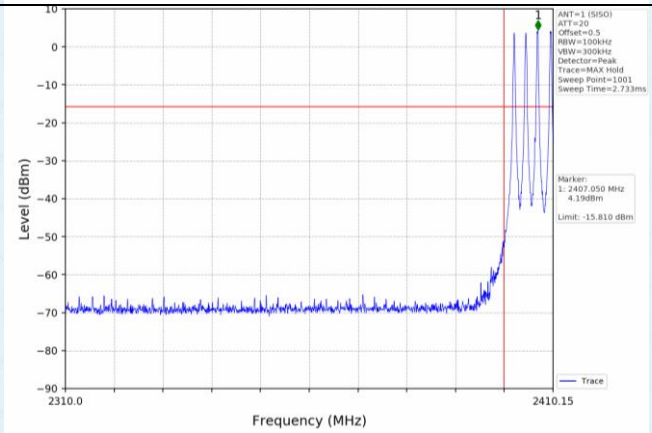
Measurement data:

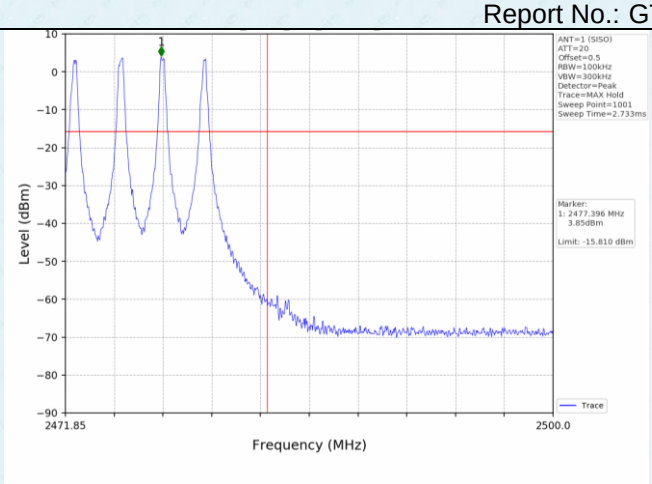
Test Mode	Frequency (MHz)	TX Type	ANT No.	Spurious Conducted Emission (dBm)	Limits (dBm)	Verdict
ANT 1	2402.15	SISO	1	Refer to test graph	-15.70	PASS
	2440.4	SISO	1	Refer to test graph	-16.09	PASS
	2479.85	SISO	1	Refer to test graph	-16.21	PASS
	Hopping	SISO	1	Refer to test graph	-15.81	PASS
ANT 2	2402.15	SISO	1	Refer to test graph	-15.72	PASS
	2440.4	SISO	1	Refer to test graph	-15.98	PASS
	2479.85	SISO	1	Refer to test graph	-16.29	PASS
	Hopping	SISO	1	Refer to test graph	-15.67	PASS

Test plot as follows:

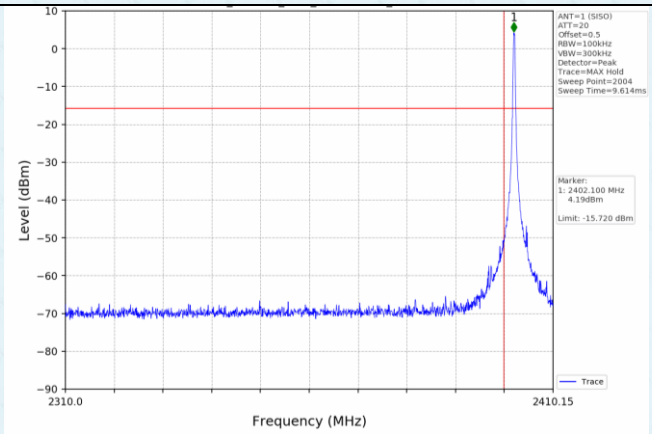
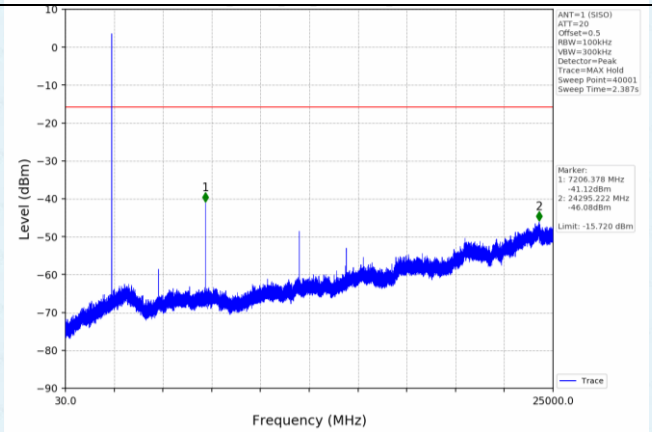
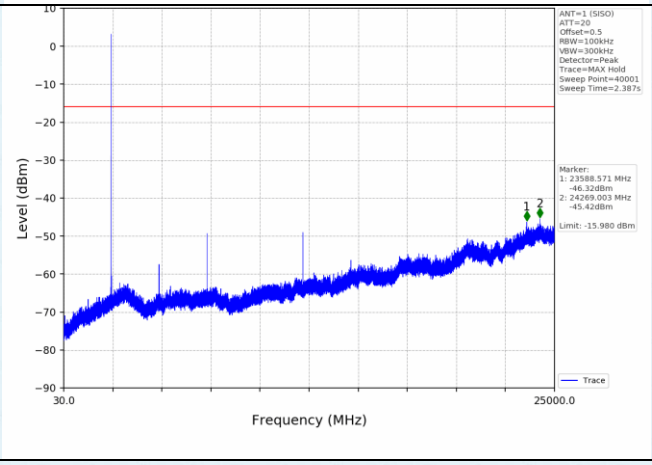
ANT 1:

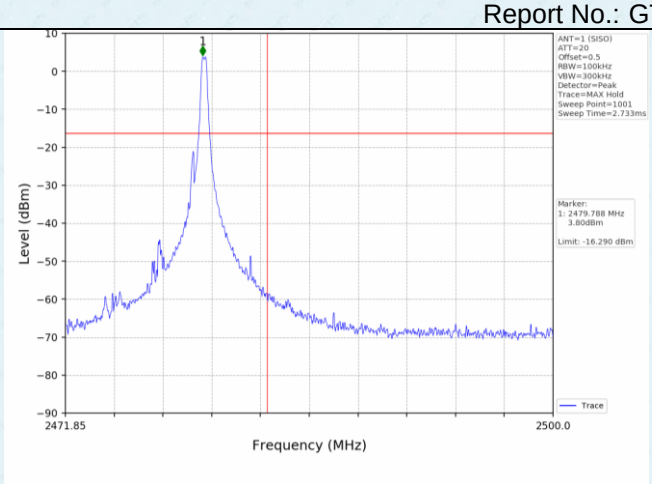
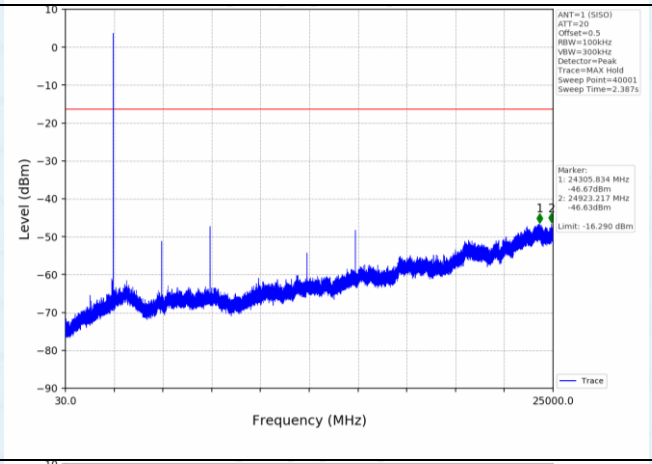
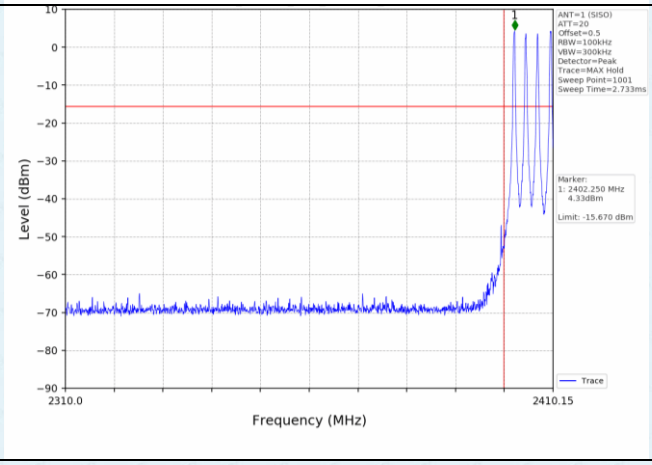
	
LCH	
MCH	

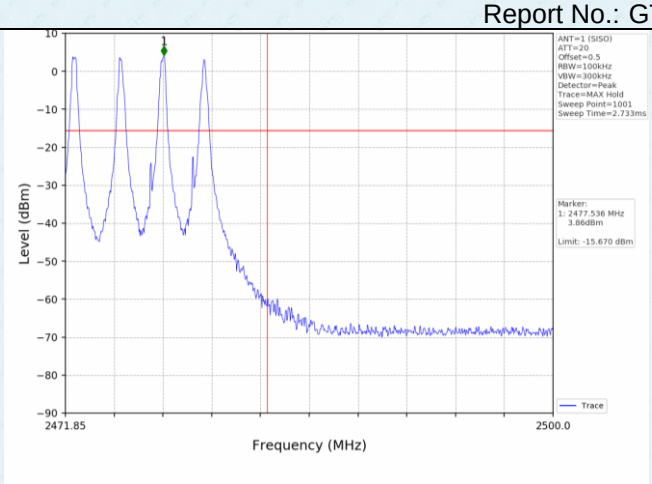
	 ANT=1 (SISO) ATT=20 Offset=0.5 RBW=100kHz VBW=300kHz Detector=Peak Trace=MAX Hold Sweep Point=1001 Sweep Time=2.733ms Marker: 1: 2479.788 MHz 3.92dBm Limit: -16.210 dBm Trace Level (dBm) Frequency (MHz) 2471.85 2500.0
HCH	 ANT=1 (SISO) ATT=20 Offset=0.5 RBW=100kHz VBW=300kHz Detector=Peak Trace=MAX Hold Sweep Point=40001 Sweep Time=2.387s Marker: 1: 14879.659 MHz -45.49dBm 2: 24239.039 MHz -46.43dBm Limit: -16.210 dBm Trace Level (dBm) Frequency (MHz) 30.0 25000.0
	 ANT=1 (SISO) ATT=20 Offset=0.5 RBW=100kHz VBW=300kHz Detector=Peak Trace=MAX Hold Sweep Point=1001 Sweep Time=2.733ms Marker: 1: 2407.050 MHz 4.19dBm Limit: -15.810 dBm Trace Level (dBm) Frequency (MHz) 2310.0 2410.15


ANT=1 (SISO)
ATT=20
Offset=0.5
RBW=100kHz
VBW=300kHz
Detector=Peak
Trace=MAX Hold
Sweep Point=1001
Sweep Time=2.733ms
Marker:
1: 2477.396 MHz
3.85dBm
Limit: -15.810 dBm
Trace
Level (dBm)
Frequency (MHz)
2471.85
2500.0

ANT 2:

	 ANT=1 (SISO) ATT=20 Offset=0.5 RBW=100kHz VBW=300kHz Detector=Peak Trace=MAX Hold Sweep Point=2004 Sweep Time=9.614ms Marker: 1: 2402.100 MHz 4.19dBm Limit: -15.720 dBm Trace Level (dBm) Frequency (MHz) 2310.0 2410.15
LCH	 ANT=1 (SISO) ATT=20 Offset=0.5 RBW=100kHz VBW=300kHz Detector=Peak Trace=MAX Hold Sweep Point=40001 Sweep Time=2.387s Marker: 1: 7206.378 MHz -41.12dBm 2: 24295.222 MHz -46.08dBm Limit: -15.720 dBm Trace Level (dBm) Frequency (MHz) 30.0 25000.0
MCH	 ANT=1 (SISO) ATT=20 Offset=0.5 RBW=100kHz VBW=300kHz Detector=Peak Trace=MAX Hold Sweep Point=40001 Sweep Time=2.387s Marker: 1: 23588.571 MHz -46.32dBm 2: 24269.003 MHz -45.42dBm Limit: -15.980 dBm Trace Level (dBm) Frequency (MHz) 30.0 25000.0

	 ANT=1 (SISO) ATT=20 Offset=0.5 RBW=100kHz VBW=300kHz Detector=Peak Trace=MAX Hold Sweep Point=1001 Sweep Time=2.733ms Marker: 1: 2479.788 MHz 3.80dBm Limit: -16.290 dBm Trace Level (dBm) Frequency (MHz) 2471.85 2500.0
HCH	 ANT=1 (SISO) ATT=20 Offset=0.5 RBW=100kHz VBW=300kHz Detector=Peak Trace=MAX Hold Sweep Point=40001 Sweep Time=2.387s Marker: 1: 24305.834 MHz -46.67dBm 2: 24923.217 MHz -46.63dBm Limit: -16.290 dBm Trace Level (dBm) Frequency (MHz) 30.0 25000.0
	 ANT=1 (SISO) ATT=20 Offset=0.5 RBW=100kHz VBW=300kHz Detector=Peak Trace=MAX Hold Sweep Point=1001 Sweep Time=2.733ms Marker: 1: 2402.250 MHz 4.33dBm Limit: -15.670 dBm Trace Level (dBm) Frequency (MHz) 2310.0 2410.15


ANT=1 (SISO)
ATT=20
Offset=0.5
RBW=100kHz
VBW=300kHz
Detector=Peak
Trace=MAX Hold
Sweep Point=1001
Sweep Time=2.733ms
Marker:
1: 2477.536 MHz
3.86dBm
Limit: -15.670 dBm
Trace
Level (dBm)
Frequency (MHz)
2471.85
2500.0
10
0
−10
−20
−30
−40
−50
−60
−70
−80
−90

7.8.2 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:

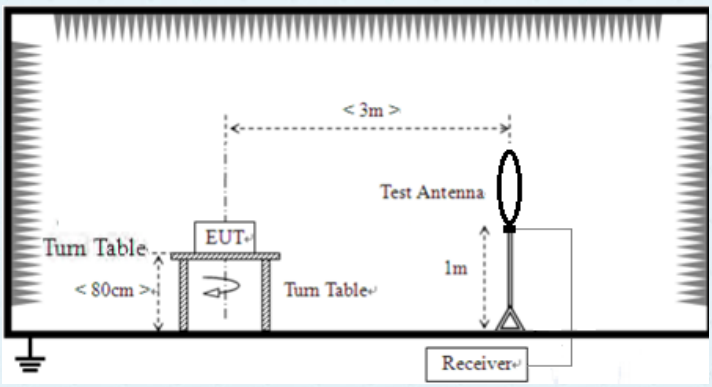
Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:
(Spurious Emissions)

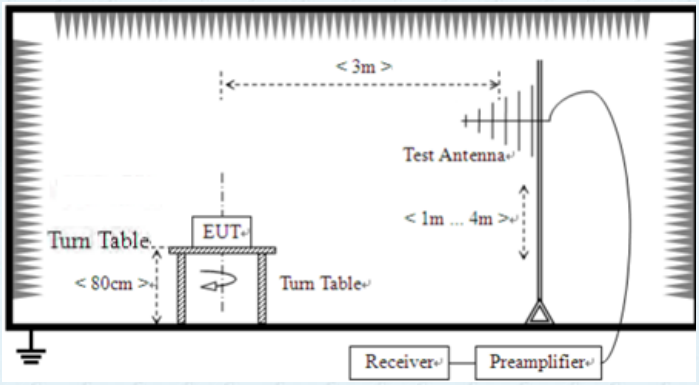
Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	PK,AV,QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	30m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

Test setup:

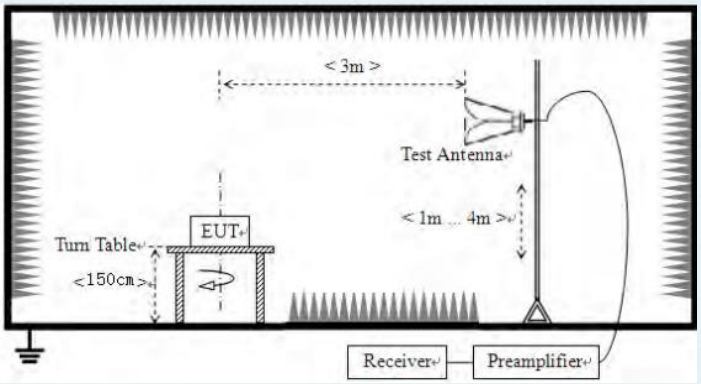
Below 30MHz



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**

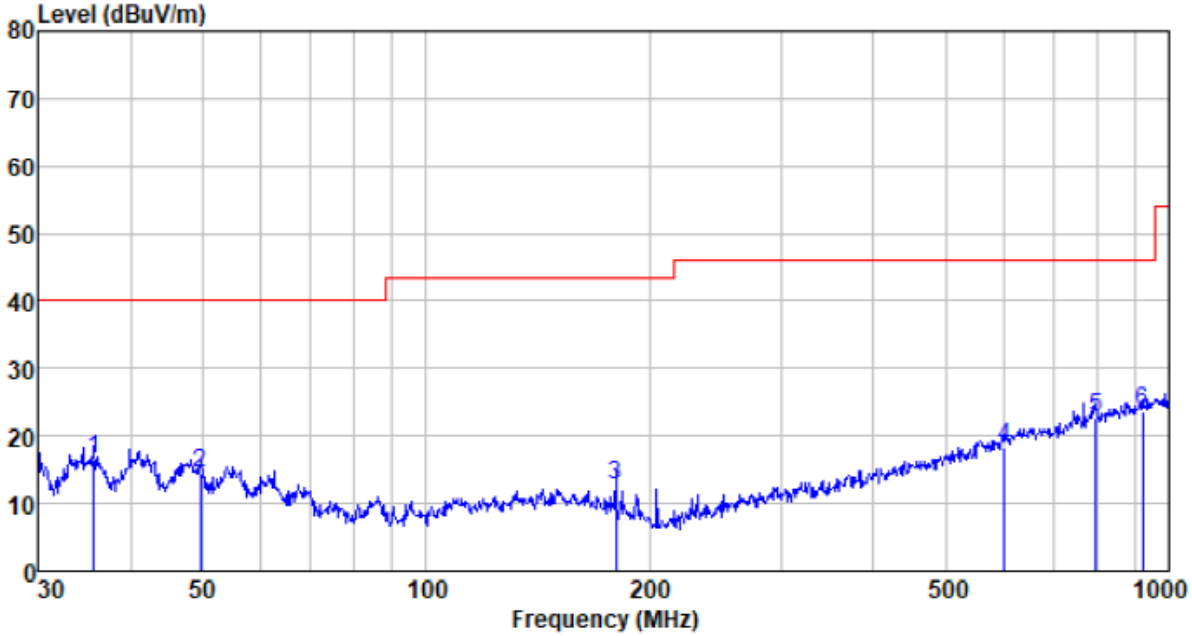
The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Remark:
1. ANT 1 and ANT 2 modes all have been tested， worse case ANT 1 mode is reported for radiated emission .
2. No emission found in frequency above 18GHz.

All antennas have test, only the worst case ANT 1 report.

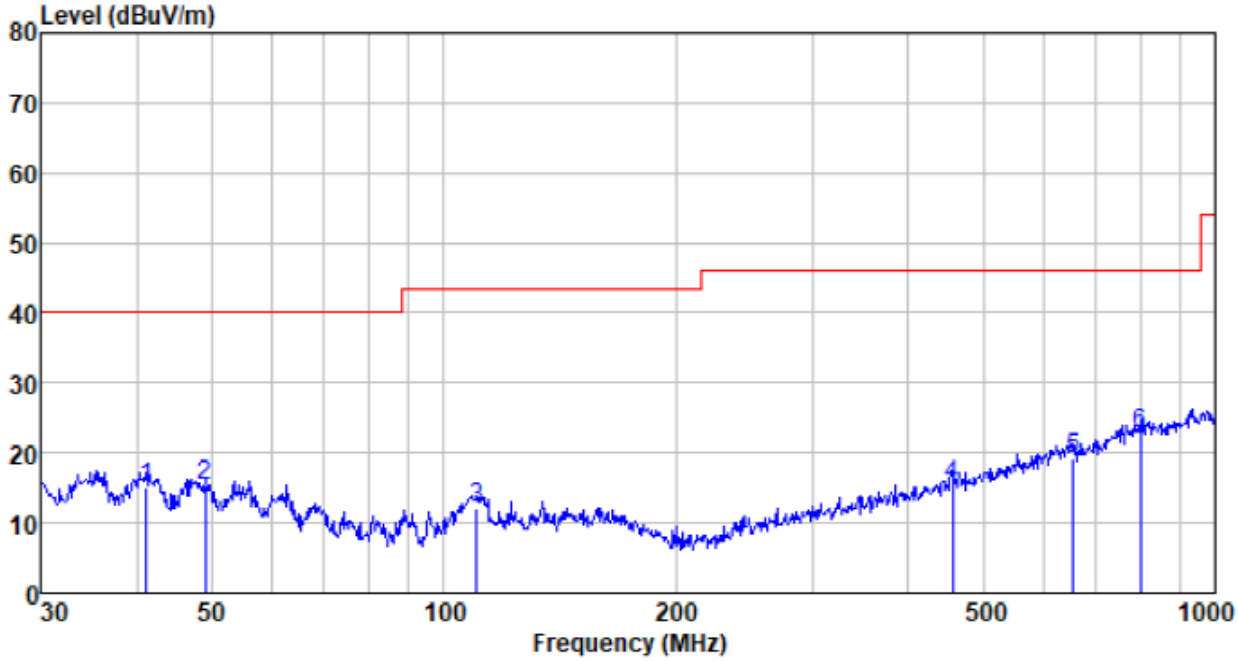
■ **30MHz ~ 1GHz**

Test channel:	Lowest	Polarization:	Horizontal



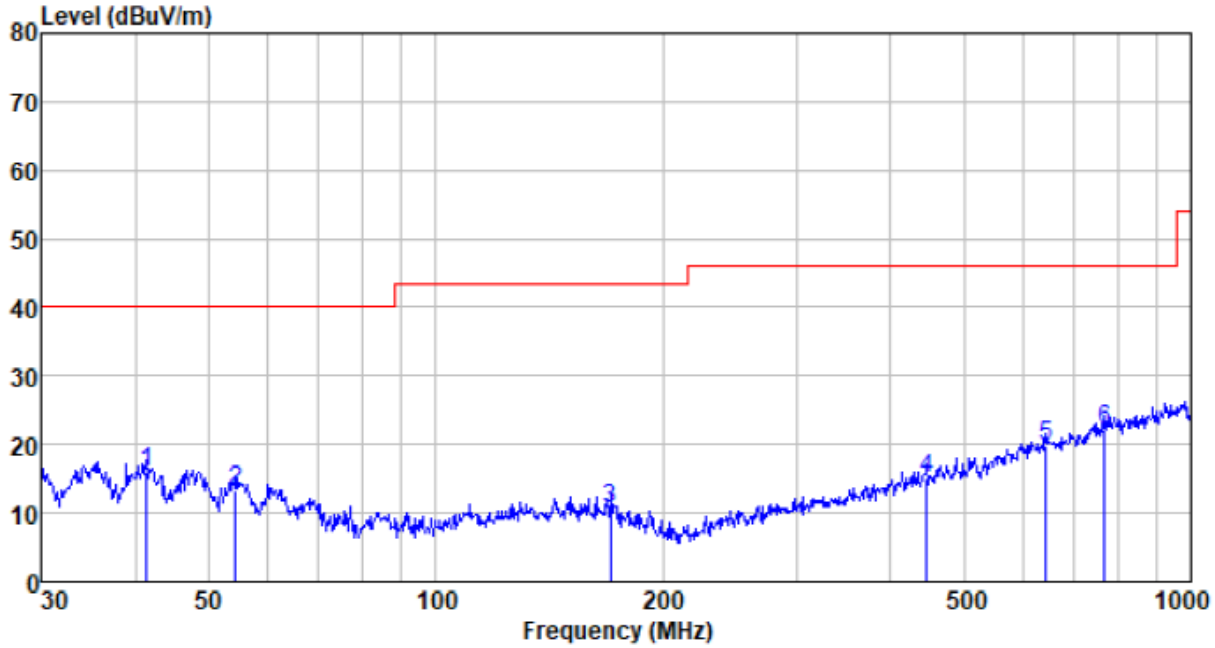
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
35.749	38.71	12.61	0.62	35.41	16.53	40.00	-23.47	QP
49.707	36.91	13.04	0.77	36.17	14.55	40.00	-25.45	QP
180.017	37.17	10.97	1.74	37.24	12.64	43.50	-30.86	QP
601.427	32.91	19.26	3.73	37.54	18.36	46.00	-27.64	QP
796.183	33.76	22.19	4.45	37.62	22.78	46.00	-23.22	QP
922.516	32.75	23.41	4.93	37.58	23.51	46.00	-22.49	QP

Test channel:	Lowest	Polarization:	Vertical



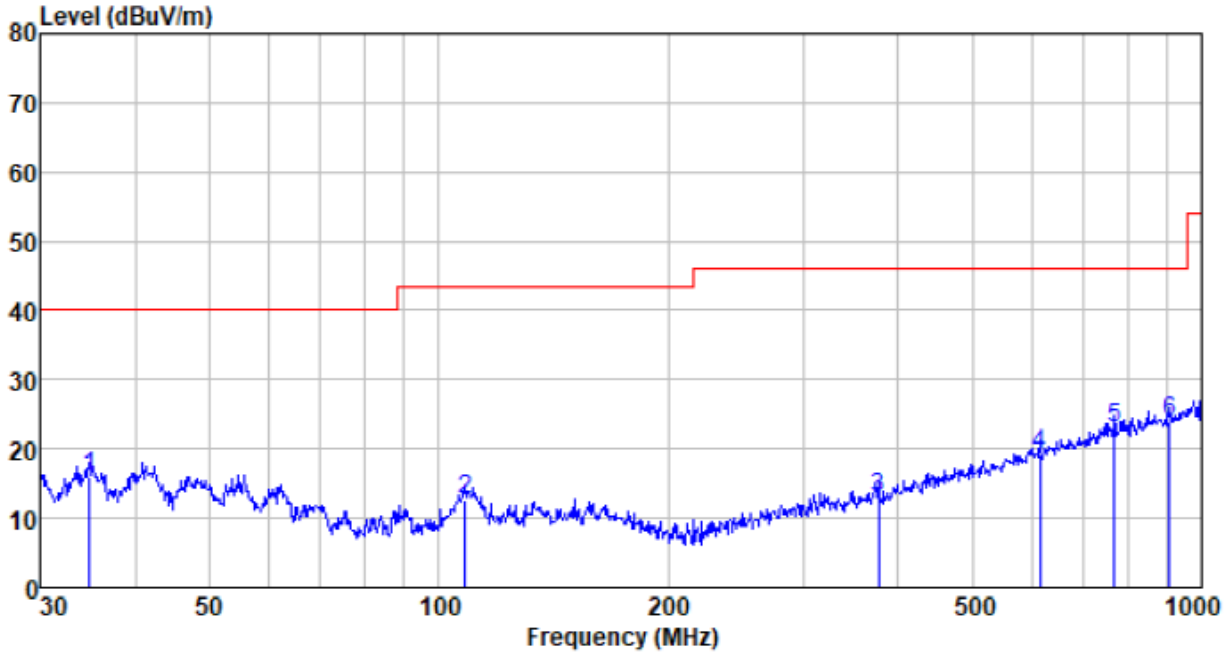
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
41.132	36.98	13.19	0.67	35.73	15.11	40.00	-24.89	QP
49.014	37.83	13.02	0.76	36.13	15.48	40.00	-24.52	QP
110.182	37.51	10.00	1.28	36.81	11.98	43.50	-31.52	QP
455.906	33.72	16.08	3.11	37.51	15.40	46.00	-30.60	QP
654.232	32.93	19.96	3.93	37.59	19.23	46.00	-26.77	QP
798.980	33.76	22.23	4.45	37.62	22.82	46.00	-23.18	QP

Test channel:	Middle	Polarization:	Horizontal



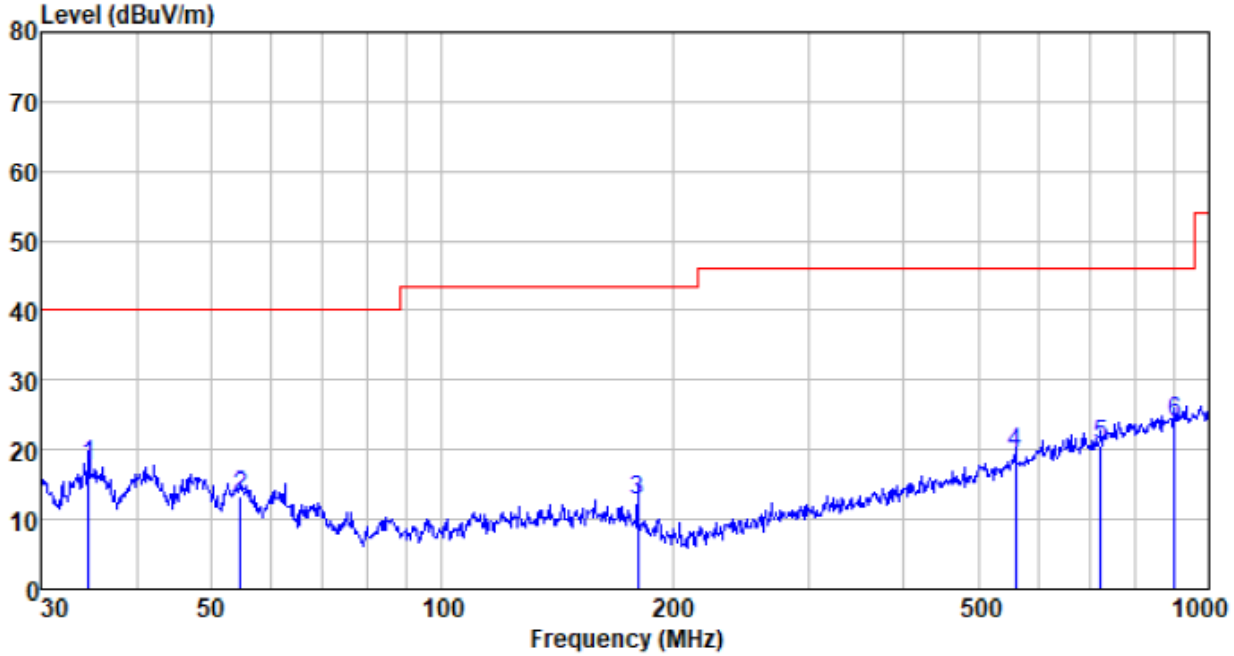
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
41.422	37.74	13.17	0.68	35.75	15.84	40.00	-24.16	QP
54.261	36.08	12.62	0.81	36.24	13.27	40.00	-26.73	QP
170.195	33.72	12.42	1.69	37.19	10.64	43.50	-32.86	QP
446.414	33.62	15.91	3.07	37.52	15.08	46.00	-30.92	QP
642.861	33.48	19.87	3.88	37.58	19.65	46.00	-26.35	QP
768.748	33.70	21.81	4.35	37.62	22.24	46.00	-23.76	QP

Test channel:	Middle	Polarization:	Vertical



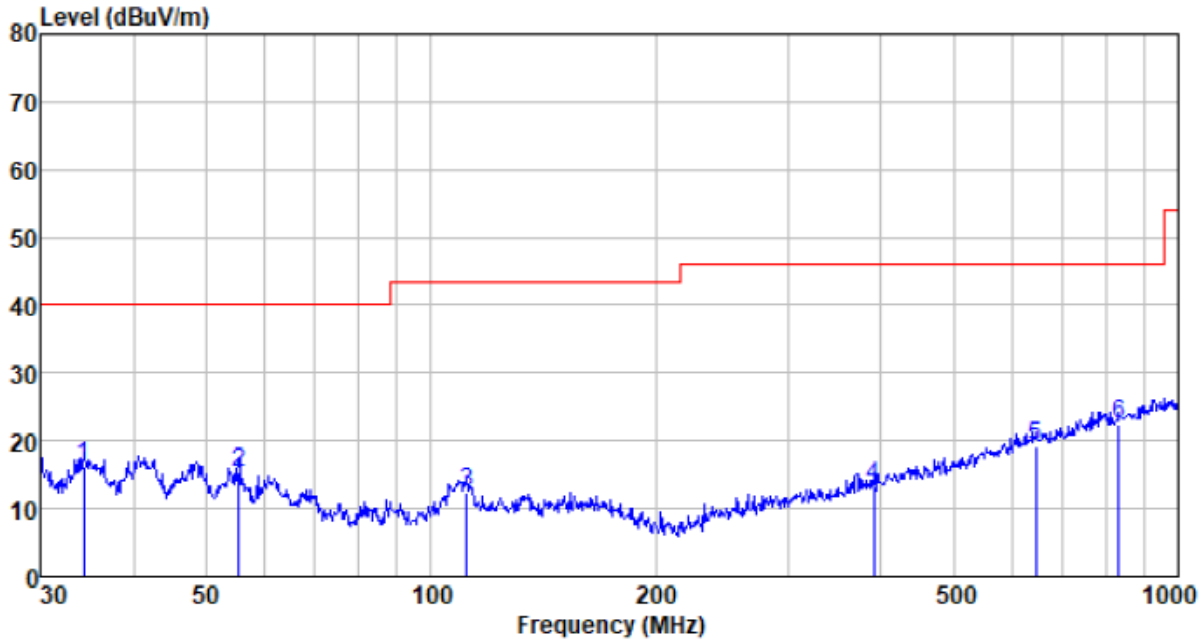
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
34.882	38.22	12.49	0.61	35.35	15.97	40.00	-24.03	QP
108.267	38.31	9.83	1.26	36.79	12.61	43.50	-30.89	QP
377.259	33.51	14.24	2.75	37.50	13.00	46.00	-33.00	QP
614.214	33.42	19.50	3.77	37.55	19.14	46.00	-26.86	QP
768.748	34.37	21.81	4.35	37.62	22.91	46.00	-23.09	QP
906.482	33.56	23.08	4.88	37.59	23.93	46.00	-22.07	QP

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
34.639	39.93	12.48	0.61	35.33	17.69	40.00	-22.31	QP
54.643	36.02	12.58	0.81	36.25	13.16	40.00	-26.84	QP
180.017	37.18	10.97	1.74	37.24	12.65	43.50	-30.85	QP
558.730	35.26	18.16	3.56	37.53	19.45	46.00	-26.55	QP
721.726	33.33	20.89	4.17	37.63	20.76	46.00	-25.24	QP
903.309	33.72	23.02	4.87	37.60	24.01	46.00	-21.99	QP

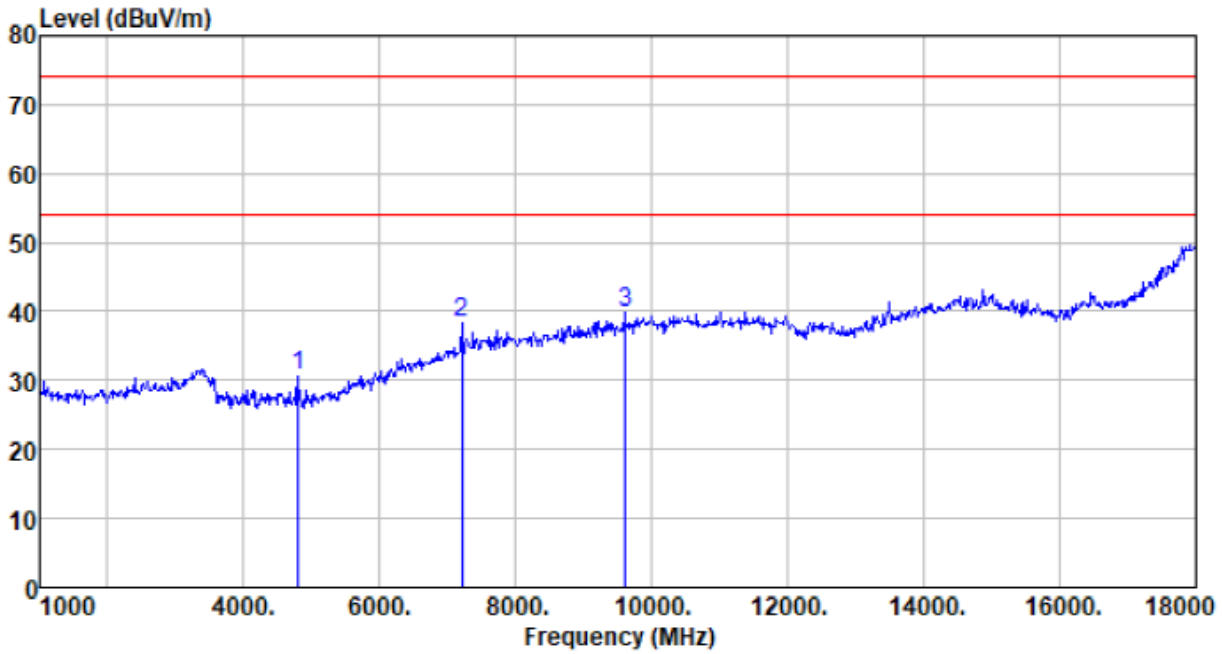
Test channel:	Highest	Polarization:	Vertical



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
34.276	38.46	12.45	0.60	35.31	16.20	40.00	-23.80	QP
55.221	38.19	12.54	0.82	36.26	15.29	40.00	-24.71	QP
111.738	37.91	10.16	1.29	36.82	12.54	43.50	-30.96	QP
390.723	33.46	14.51	2.81	37.51	13.27	46.00	-32.73	QP
645.120	33.04	19.89	3.89	37.58	19.24	46.00	-26.76	QP
833.317	32.87	22.47	4.58	37.61	22.31	46.00	-23.69	QP

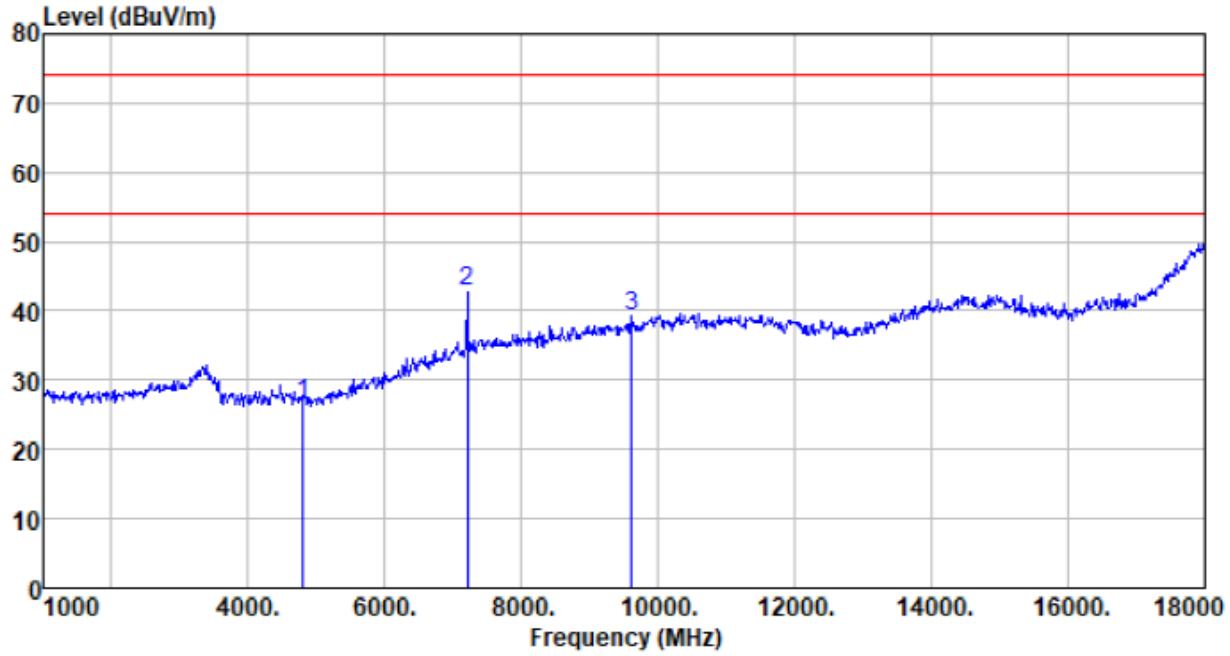
- **Unwanted Emissions in Restricted Frequency Bands**
- **Above 1GHz**

Test channel:	Lowest	Polarization:	Horizontal



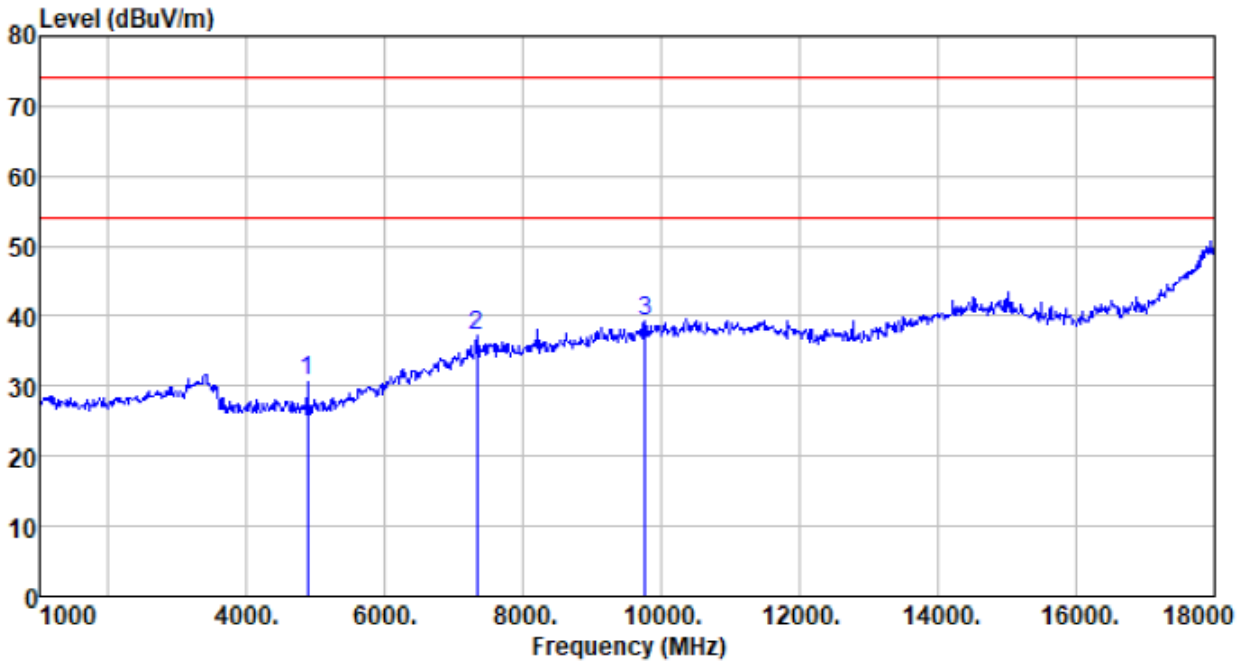
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4804.300	32.63	31.20	4.61	37.73	30.71	74.00	-43.29	Peak
7206.450	31.27	36.16	6.48	35.63	38.28	74.00	-35.72	Peak
9608.600	28.93	37.93	7.97	34.94	39.89	74.00	-34.11	Peak

Test channel:	Lowest	Polarization:	Vertical



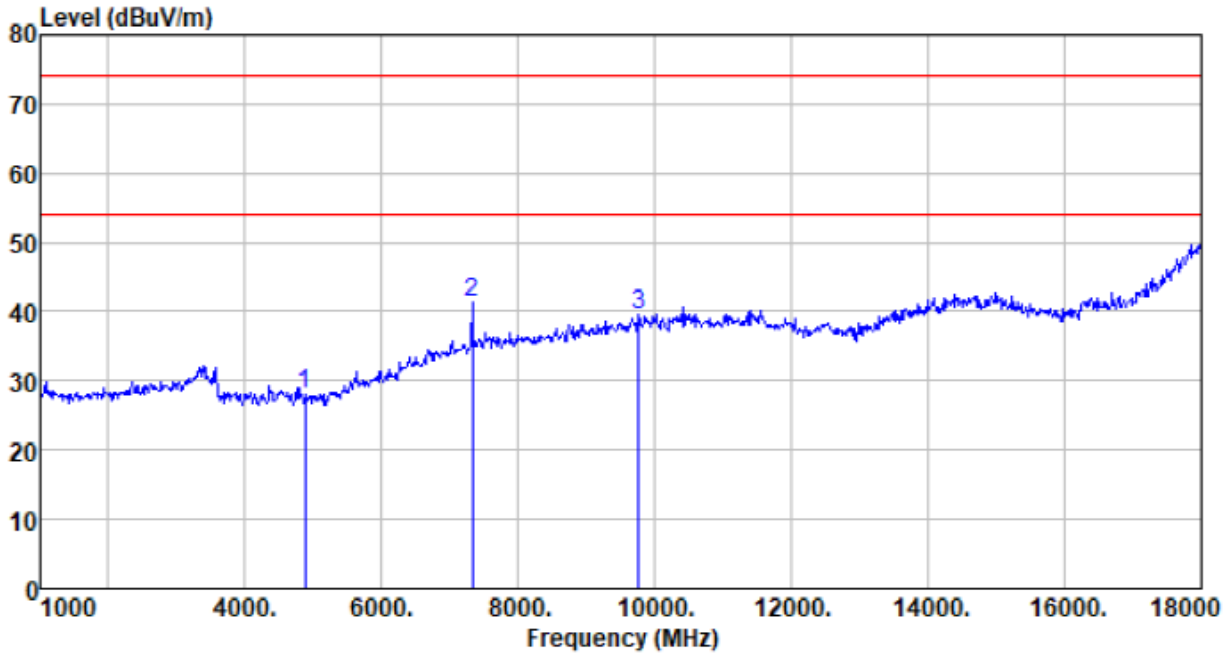
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4804.300	28.56	31.20	4.61	37.73	26.64	74.00	-47.36	Peak
7206.450	35.67	36.16	6.48	35.63	42.68	74.00	-31.32	Peak
9608.600	28.24	37.93	7.97	34.94	39.20	74.00	-34.80	Peak

Test channel:	Middle	Polarization:	Horizontal



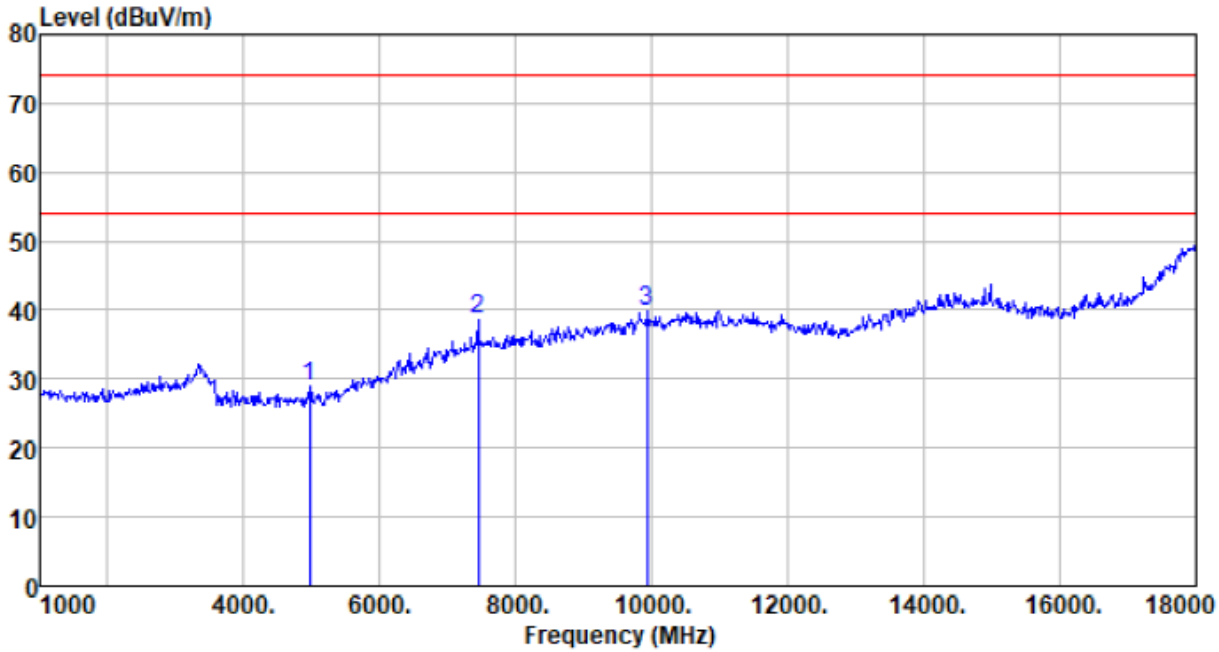
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4880.800	32.34	31.31	4.69	37.75	30.59	74.00	-43.41	Peak
7321.200	29.74	36.43	6.63	35.60	37.20	74.00	-36.80	Peak
9761.600	28.13	38.10	8.03	35.03	39.23	74.00	-34.77	Peak

Test channel:	Middle	Polarization:	Vertical



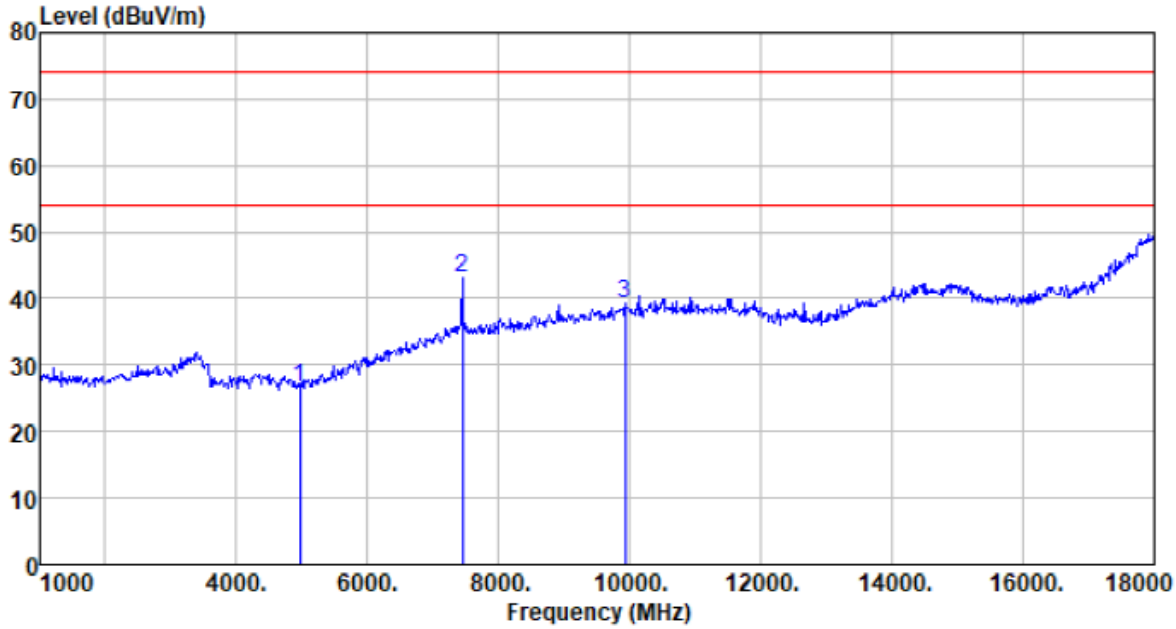
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4880.800	29.66	31.31	4.69	37.75	27.91	74.00	-46.09	Peak
7321.200	33.80	36.43	6.63	35.60	41.26	74.00	-32.74	Peak
9761.600	28.35	38.10	8.03	35.03	39.45	74.00	-34.55	Peak

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
4959.700	30.41	31.44	4.79	37.78	28.86	74.00	-45.14	Peak
7439.550	30.92	36.66	6.77	35.56	38.79	74.00	-35.21	Peak
9919.400	28.60	38.30	8.09	35.14	39.85	74.00	-34.15	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
4959.700	28.19	31.44	4.79	37.78	26.64	74.00	-47.36	Peak
7439.550	35.08	36.66	6.77	35.56	42.95	74.00	-31.05	Peak
9919.400	27.98	38.30	8.09	35.14	39.23	74.00	-34.77	Peak

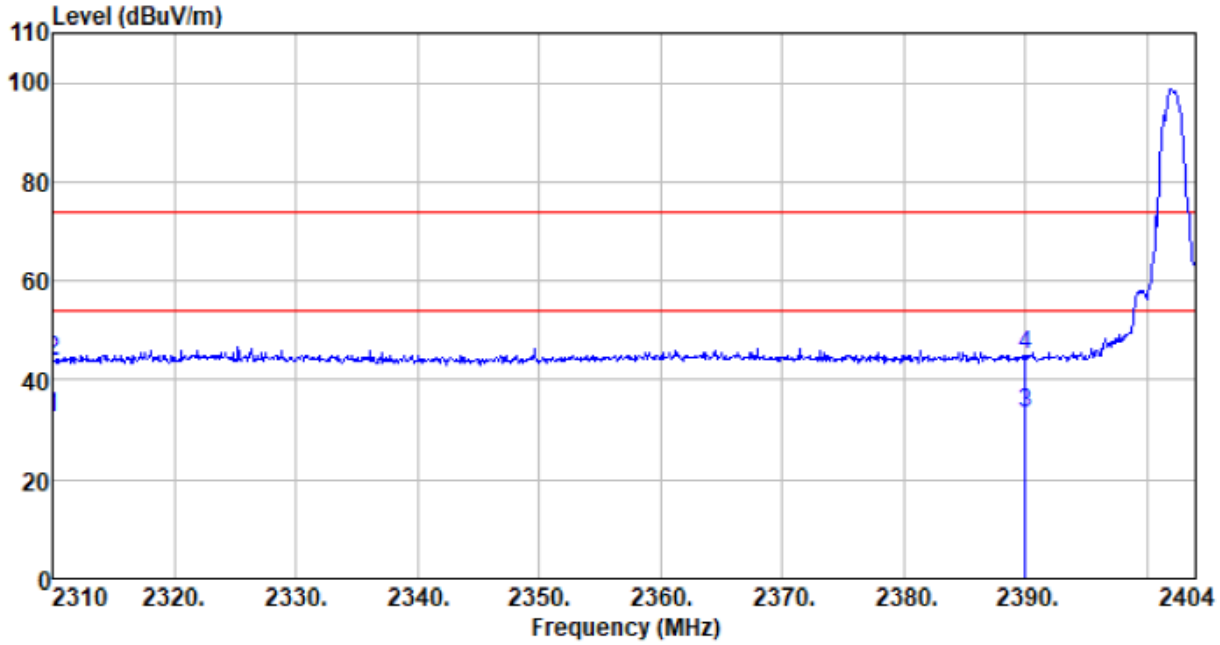
Remark:

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.*

Unwanted Emissions in Non-restricted Frequency Bands

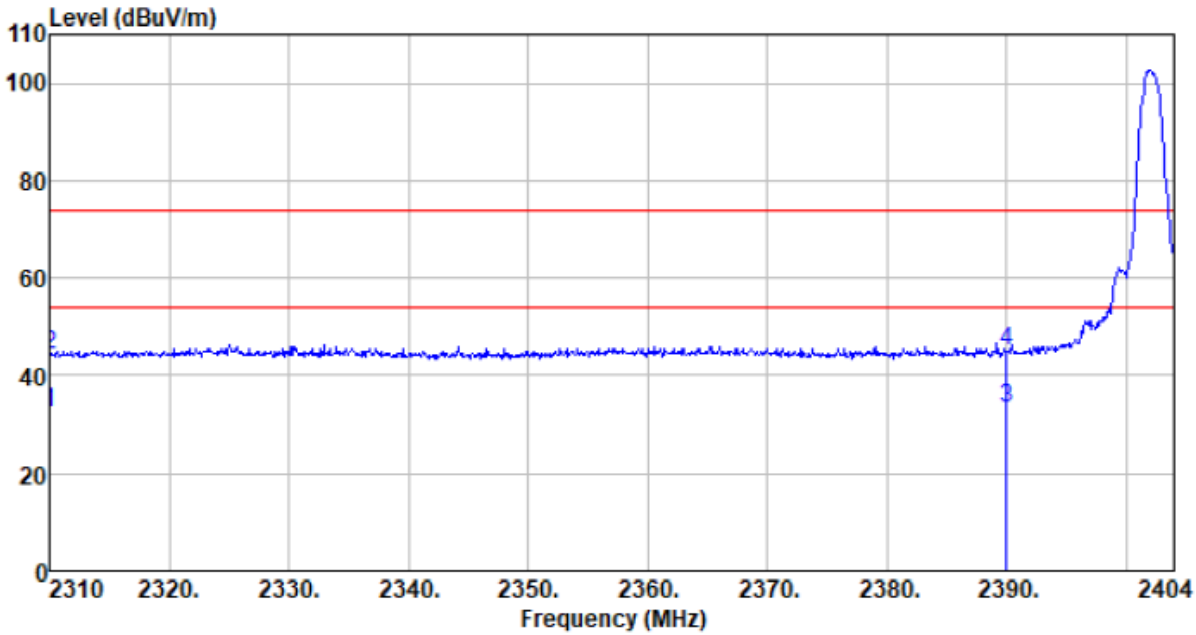
ANT 1:

Test channel:	Lowest	Polarization:	Horizontal



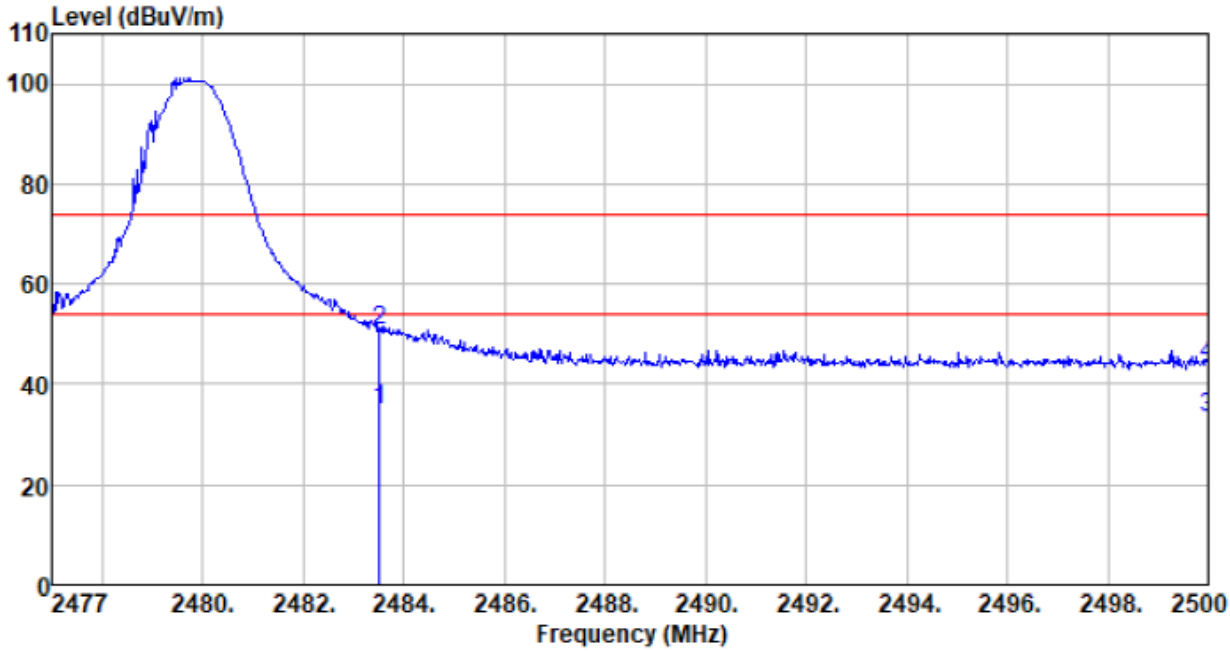
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	32.85	27.14	2.81	30.43	32.37	54.00	-21.63	Average
2310.000	44.25	27.14	2.81	30.43	43.77	74.00	-30.23	Peak
2390.000	33.08	27.37	2.91	30.24	33.12	54.00	-20.88	Average
2390.000	45.10	27.37	2.91	30.24	45.14	74.00	-28.86	Peak

Test channel:	Lowest	Polarization:	Vertical



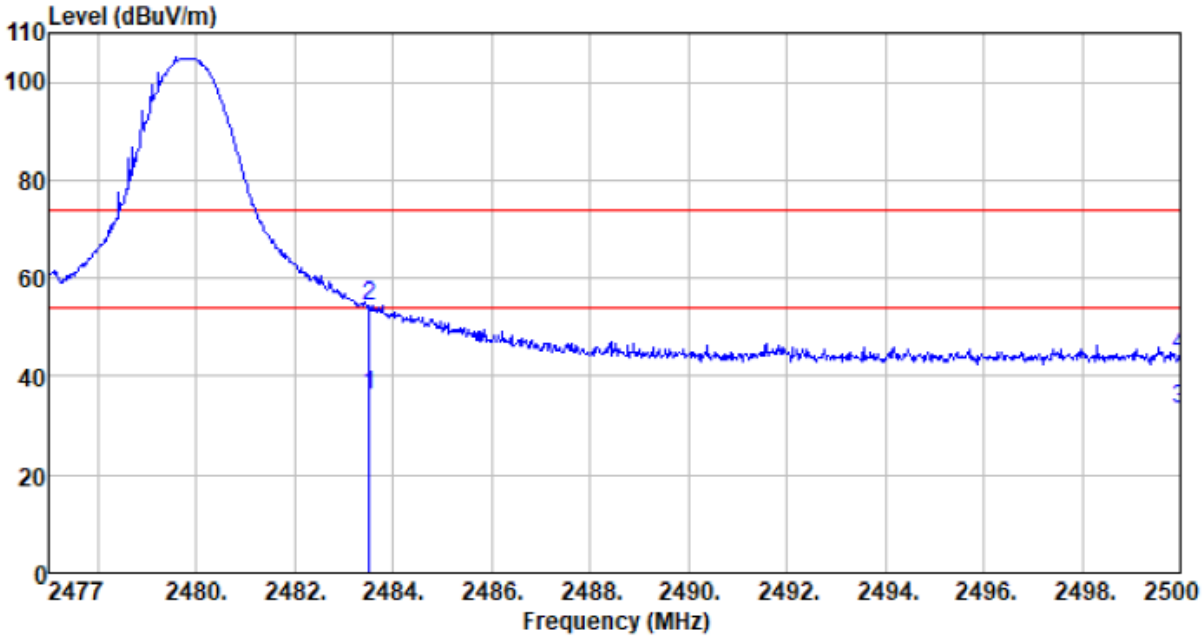
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	32.93	27.14	2.81	30.43	32.45	54.00	-21.55	Average
2310.000	44.84	27.14	2.81	30.43	44.36	74.00	-29.64	Peak
2390.000	33.05	27.37	2.91	30.24	33.09	54.00	-20.91	Average
2390.000	45.16	27.37	2.91	30.24	45.20	74.00	-28.80	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
2483.509	34.54	27.66	2.99	30.12	35.07	54.00	-18.93	Average
2483.509	50.40	27.66	2.99	30.12	50.93	74.00	-23.07	Peak
2500.000	32.68	27.70	3.01	30.13	33.26	54.00	-20.74	Average
2500.000	43.37	27.70	3.01	30.13	43.95	74.00	-30.05	Peak

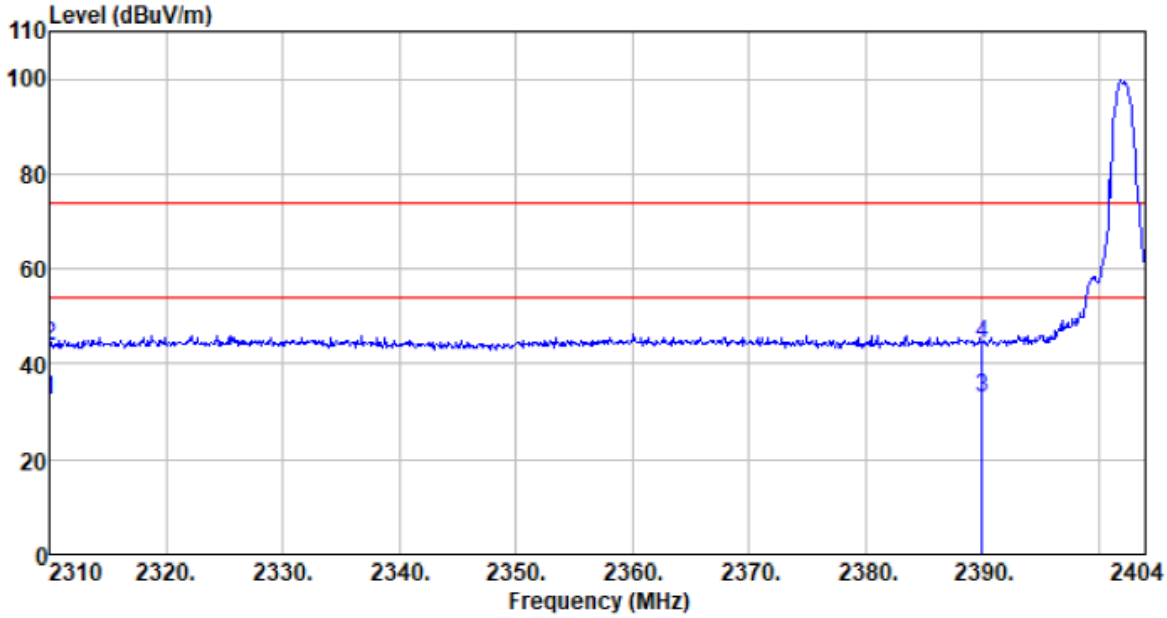
Test channel:	Highest	Polarziation:	Vertical



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
2483.509	35.65	27.66	2.99	30.12	36.18	54.00	-17.82	Average
2483.509	53.75	27.66	2.99	30.12	54.28	74.00	-19.72	Peak
2500.000	32.72	27.70	3.01	30.13	33.30	54.00	-20.70	Average
2500.000	43.46	27.70	3.01	30.13	44.04	74.00	-29.96	Peak

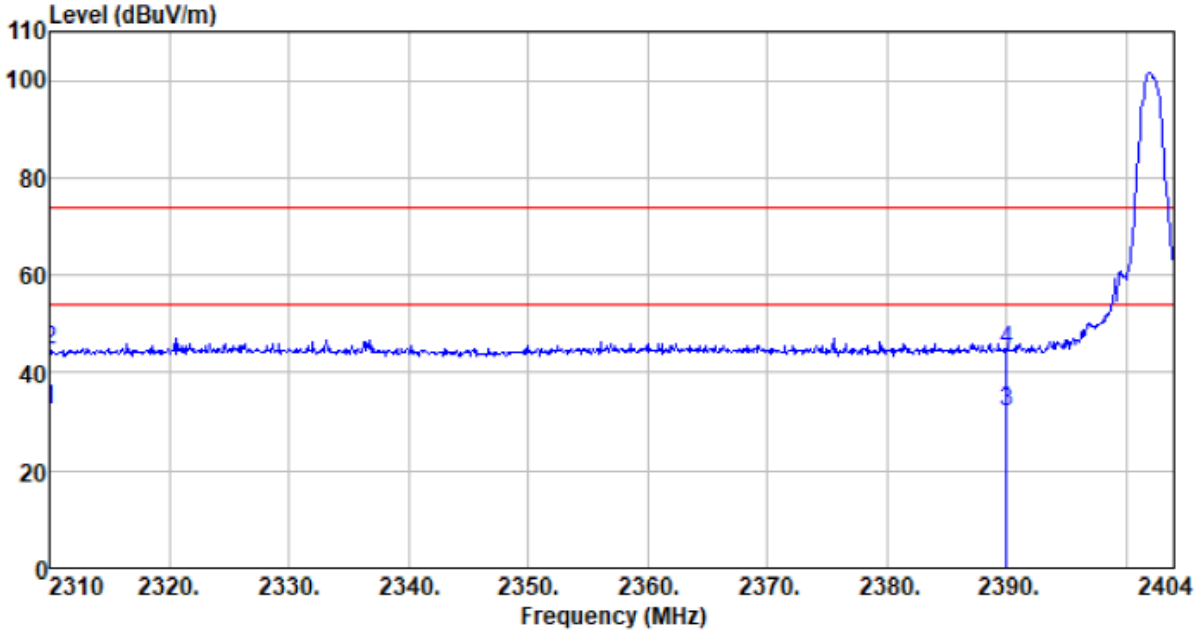
ANT 2:

Test channel:	Lowest	Polarization:	Horizontal



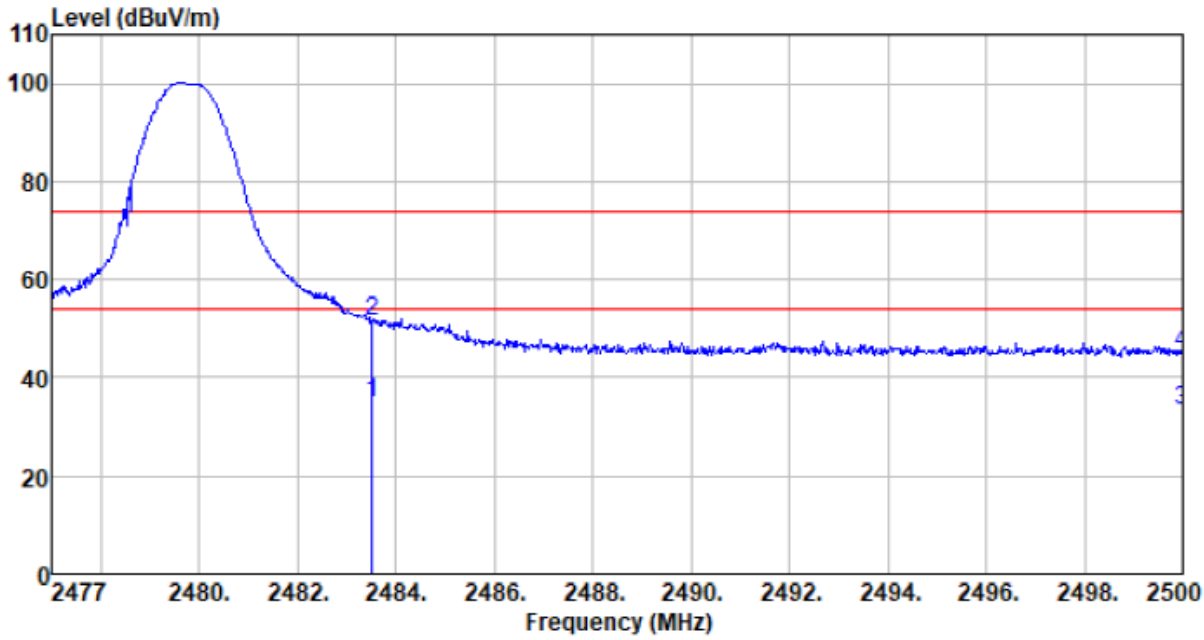
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	33.00	27.14	2.81	30.43	32.52	54.00	-21.48	Average
2310.000	44.39	27.14	2.81	30.43	43.91	74.00	-30.09	Peak
2390.000	33.04	27.37	2.91	30.24	33.08	54.00	-20.92	Average
2390.000	44.06	27.37	2.91	30.24	44.10	74.00	-29.90	Peak

Test channel:	Lowest	Polarization:	Vertical



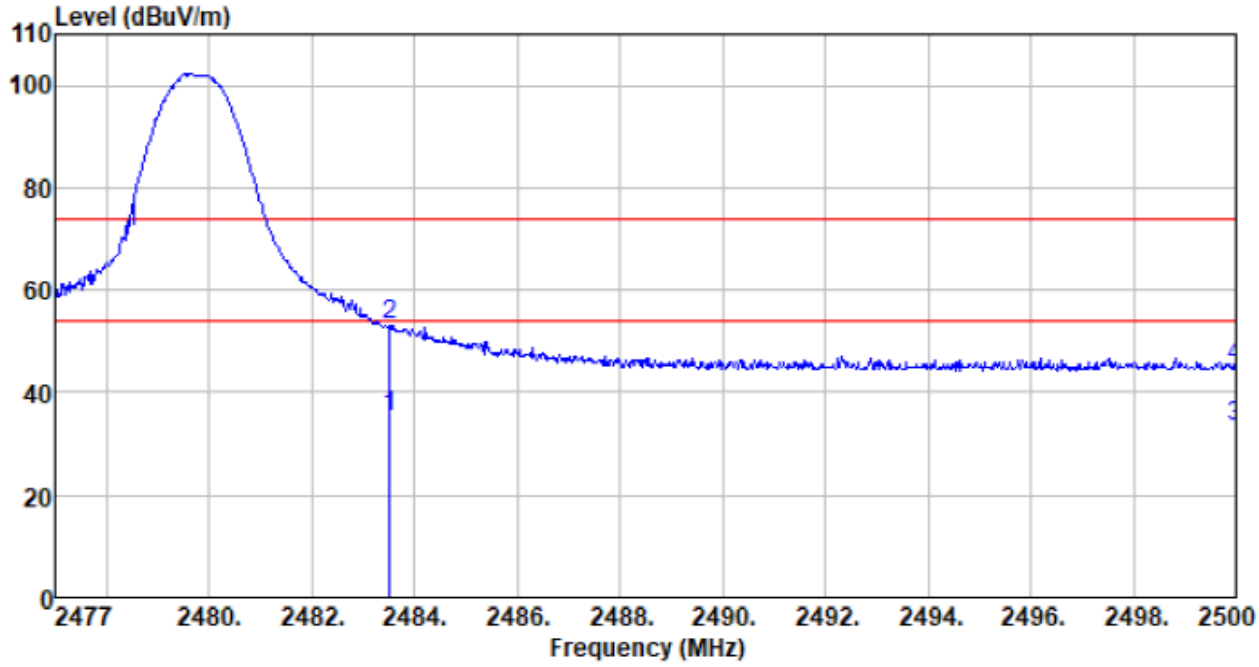
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	32.99	27.14	2.81	30.43	32.51	54.00	-21.49	Average
2310.000	45.30	27.14	2.81	30.43	44.82	74.00	-29.18	Peak
2390.000	32.04	27.37	2.91	30.24	32.08	54.00	-21.92	Average
2390.000	44.65	27.37	2.91	30.24	44.69	74.00	-29.31	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
2483.509	34.48	27.66	2.99	30.12	35.01	54.00	-18.99	Average
2483.509	50.88	27.66	2.99	30.12	51.41	74.00	-22.59	Peak
2500.000	32.83	27.70	3.01	30.13	33.41	54.00	-20.59	Average
2500.000	44.39	27.70	3.01	30.13	44.97	74.00	-29.03	Peak

Test channel:	Highest	Polarziation:	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
2483.509	34.83	27.66	2.99	30.12	35.36	54.00	-18.64	Average
2483.509	52.54	27.66	2.99	30.12	53.07	74.00	-20.93	Peak
2500.000	32.81	27.70	3.01	30.13	33.39	54.00	-20.61	Average
2500.000	44.45	27.70	3.01	30.13	45.03	74.00	-28.97	Peak

Remarks:

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.*
3. *"*", means this data is the too weak instrument of signal is unable to test.*

8 Test Setup Photo

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

9 EUT Constructional Details

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

---End---