TEST REPORT

Applicant:	Babysense Dongguan Ltd.
Address of Applicant:	No. 1, Park Road, Dong keng Village, Dong Keng Town, Dong Guan City,Guang Dong Province, China
Manufacturer/Factory:	Babysense Dongguan Ltd.
Address of Manufacturer/Factory:	No. 1, Park Road, Dong keng Village, Dong Keng Town, Dong Guan City,Guang Dong Province, China
Equipment Under Test (EUT)	
Product Name:	baby monitor
Model No.:	HD S2RX, V50 RX
Trade Mark:	Babysense
FCC ID:	2AQVL-HDS2RX
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	Sep. 02, 2020
Date of Test:	Sep. 02 - 24, 2020
Date of report issued:	Sep. 24, 2020
Test Result :	PASS *

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

Authorized Signature:

Robinson Luo
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	*Sep. 24, 2020*	*Original*

Prepared By:	***Project Engineer***	***Date:***	*Sep. 24, 2020*
Check By:	***Reviewer***	***Date:***	*Sep. 24, 2020*

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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:	baby monitor
Model No.:	HD S2RX, V50 RX
Test Model No.:	HD S2RX
Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The only difference is the model name for commercial purpose.	
Serial No.:	N/A
Hardware Version:	N/A
Software Version:	N/A
Test sample(s) ID:	GTS202009000032-1
Sample(s) Status	Engineer sample
Operation Frequency:	2410.001MHz~2477.001MHz
Channel numbers:	20
Channel Separation:	3.5MHz and 4MHz
Modulation technology:	GFSK
Antenna Type:	Integral Antenna
Antenna gain:	1.00dBi
Power supply:	DC 3.7V 4000mAh Rechargeable Lithium-ion Battery
Adapter Information:	Adapter 1: Model:EP19-050100WXLA Input:AC 100-240V, 50/60Hz, 200mA Output:DC 5.0V, 1.0A Adapter 2: Model:AW007WR-0500070UV Input:AC 100-240V, 50/60Hz, 0.3A Output:DC 5.0V, 0.7A

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	**2410.001**	6	2427.501	11	2445.001	16	2462.501
2	2413.501	7	2431.001	12	2448.501	17	2466.001
3	2417.001	8	2434.501	13	2452.001	18	2469.501
4	2420.501	9	2438.001	14	2455.501	19	2473.001
5	2424.001	**10**	**2441.501**	15	2459.001	**20**	**2477.001**

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	2410.001MHz
The middle channel	2441.501MHz
The Highest channel	2477.001MHz

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 Other Information Requested by the Customer

None.

5.6 Description of Support Units

None

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Additional Instructions

Test Software	Special test command provided by manufacturer
Power level setup	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. 19 2019	Oct. 18 2020
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 19 2019	Oct. 18 2020
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 19 2019	Oct. 18 2020
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 1.00dBi, reference to the appendix II for details	

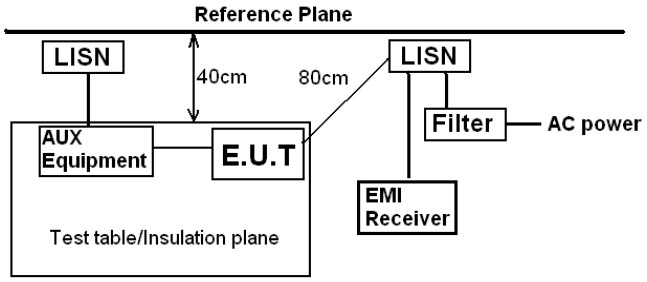
7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
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.

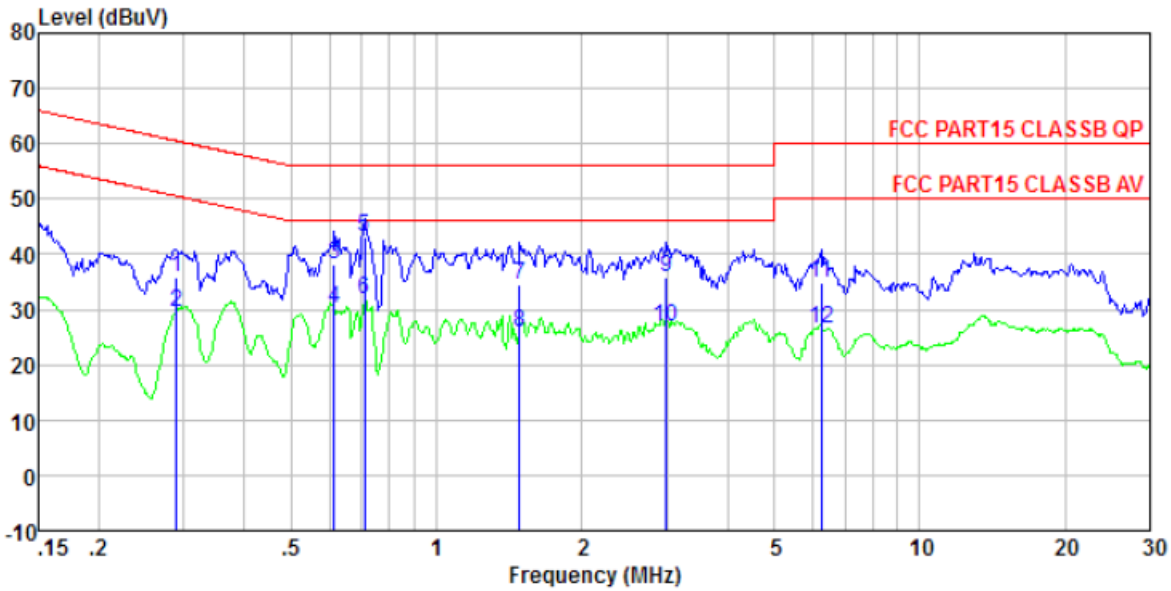
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Remark: 1. Both high and low voltages have been tested to show only the worst low voltage test data.

2. Both adapter 1 and adapter 2 are tested. Only show the worst case adapter 1 test data on the report.

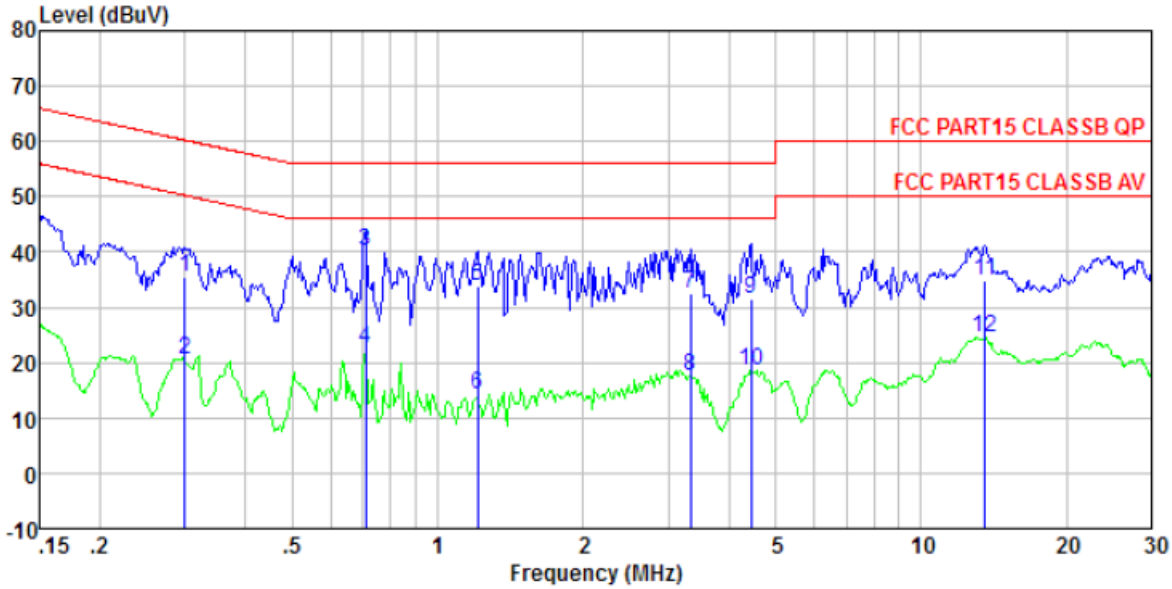
Measurement data

Line:



Freq MHz	Reading level dBuV	lISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.289	35.49	0.40	0.10	35.99	60.54	-24.55	QP
0.289	29.15	0.40	0.10	29.65	50.54	-20.89	Average
0.614	37.92	0.28	0.12	38.32	56.00	-17.68	QP
0.614	29.90	0.28	0.12	30.30	46.00	-15.70	Average
0.708	42.61	0.26	0.13	43.00	56.00	-13.00	QP
0.708	31.45	0.26	0.13	31.84	46.00	-14.16	Average
1.487	34.23	0.20	0.16	34.59	56.00	-21.41	QP
1.487	25.56	0.20	0.16	25.92	46.00	-20.08	Average
2.993	35.45	0.20	0.19	35.84	56.00	-20.16	QP
2.993	26.49	0.20	0.19	26.88	46.00	-19.12	Average
6.252	34.55	0.20	0.18	34.93	60.00	-25.07	QP
6.252	26.22	0.20	0.18	26.60	50.00	-23.40	Average

Neutral:

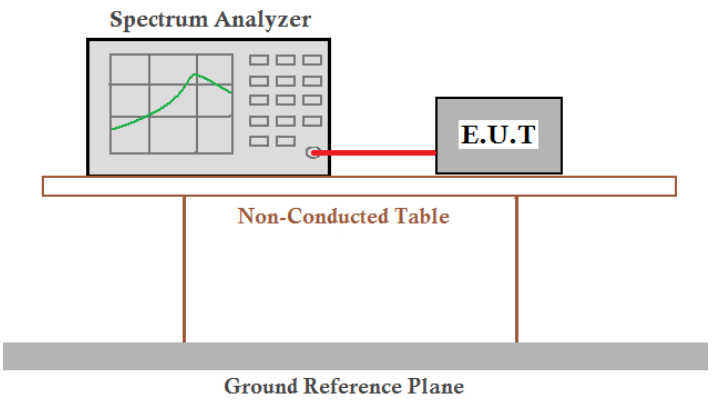


Freq MHz	Reading level dBuV	lISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.300	35.11	0.40	0.10	35.61	60.24	-24.63	QP
0.300	20.09	0.40	0.10	20.59	50.24	-29.65	Average
0.708	39.79	0.26	0.13	40.18	56.00	-15.82	QP
0.708	22.00	0.26	0.13	22.39	46.00	-23.61	Average
1.210	33.54	0.20	0.16	33.90	56.00	-22.10	QP
1.210	13.77	0.20	0.16	14.13	46.00	-31.87	Average
3.328	32.15	0.20	0.19	32.54	56.00	-23.46	QP
3.328	17.29	0.20	0.19	17.68	46.00	-28.32	Average
4.454	31.09	0.20	0.17	31.46	56.00	-24.54	QP
4.454	18.25	0.20	0.17	18.62	46.00	-27.38	Average
13.551	34.39	0.20	0.21	34.80	60.00	-25.20	QP
13.551	23.98	0.20	0.21	24.39	50.00	-25.61	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
4. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

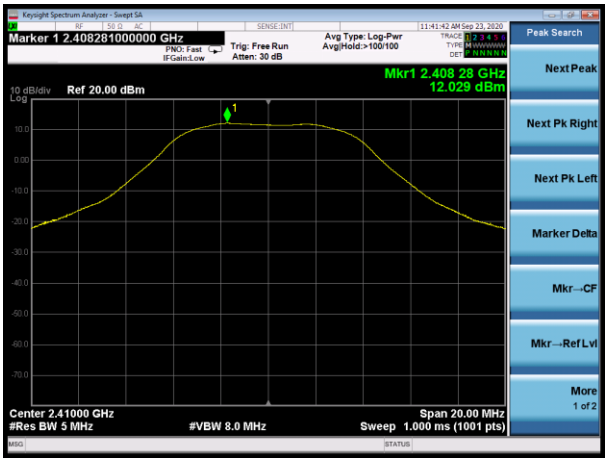
7.3 Conducted Peak Output Power

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

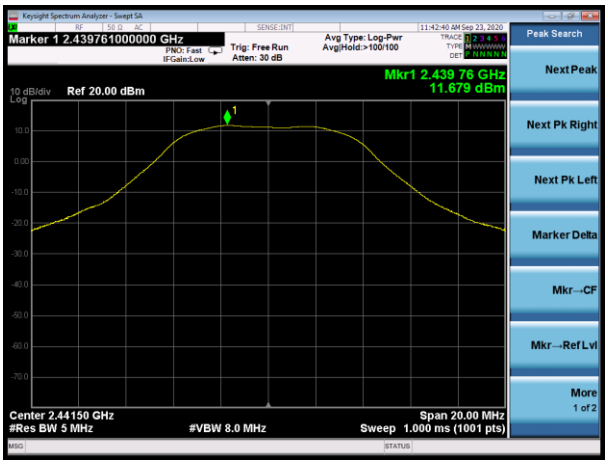
Measurement Data

Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	12.029	20.97	Pass
Middle	11.679		
Highest	12.392		

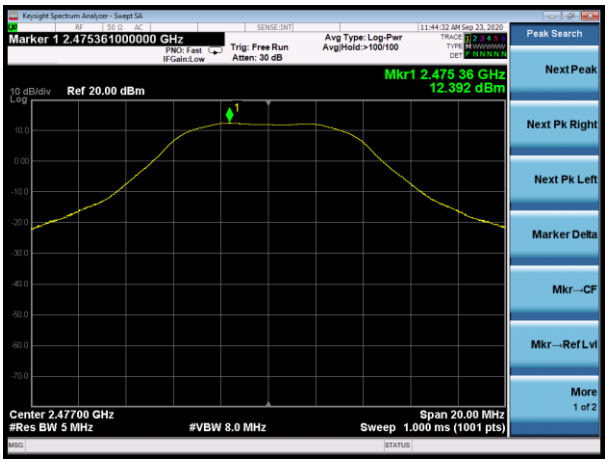
Test plot as follows:



Lowest channel

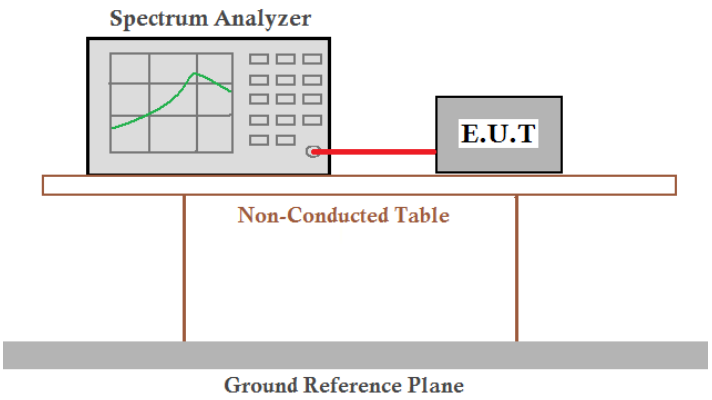


Middle channel



Highest channel

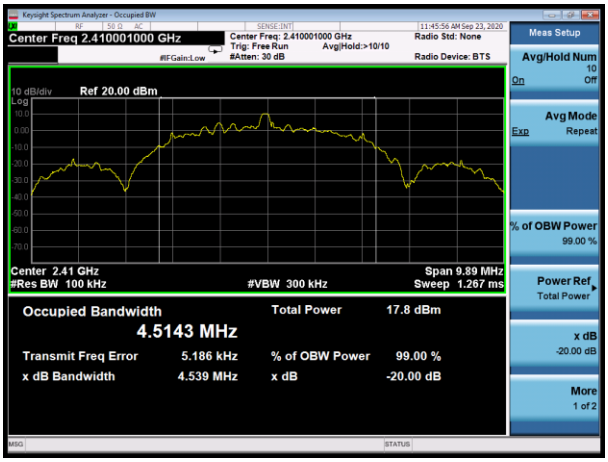
7.4 20dB Emission Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
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

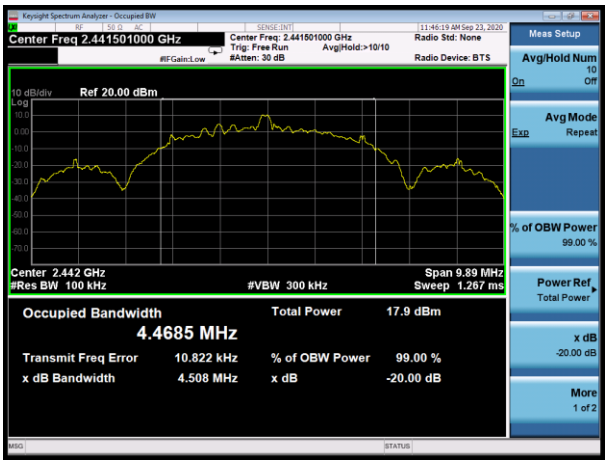
Measurement Data

Test channel	20dB Emission Bandwidth (MHz)	Result
Lowest	4.539	Pass
Middle	4.508	
Highest	4.597	

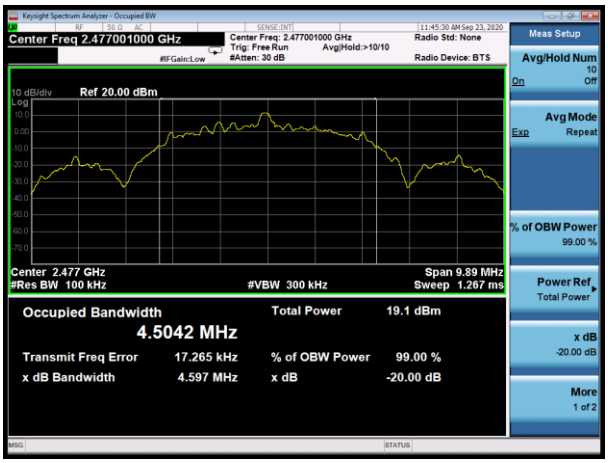
Test plot as follows:



Lowest channel

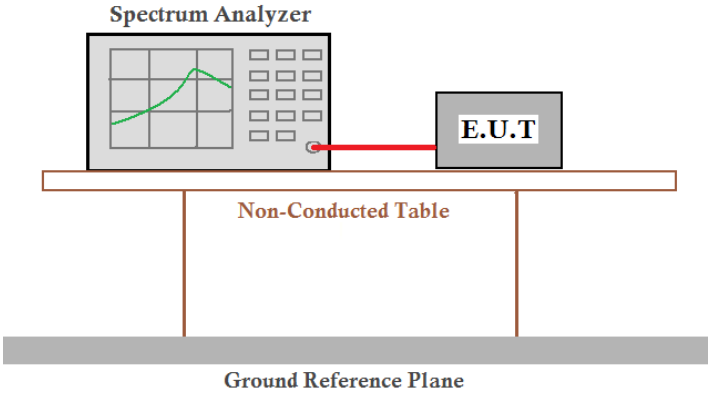


Middle channel



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

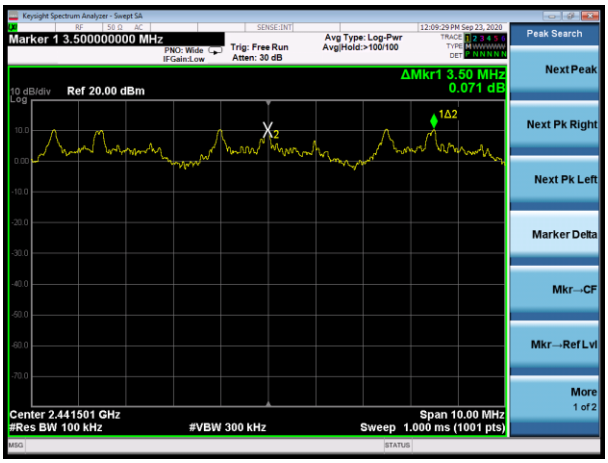
Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result
Lowest	3.49	3.065	Pass
Middle	3.50	3.065	Pass
Highest	4.00	3.065	Pass

Note: According to section 7.4

Mode	20dB bandwidth (MHz) (worse case)	Limit (MHz) (Carrier Frequencies Separation)
GFSK	4.597	3.065

Test plot as follows:

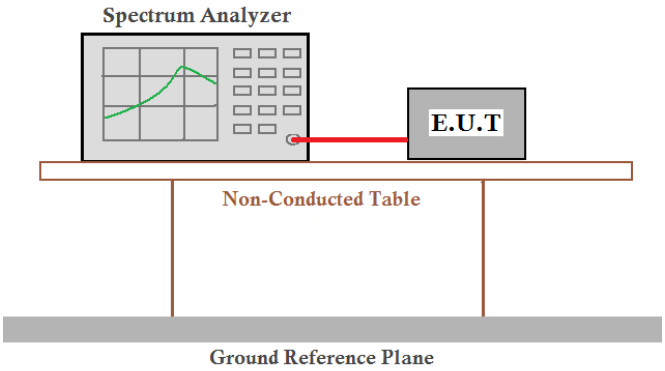
Lowest channel



Middle channel

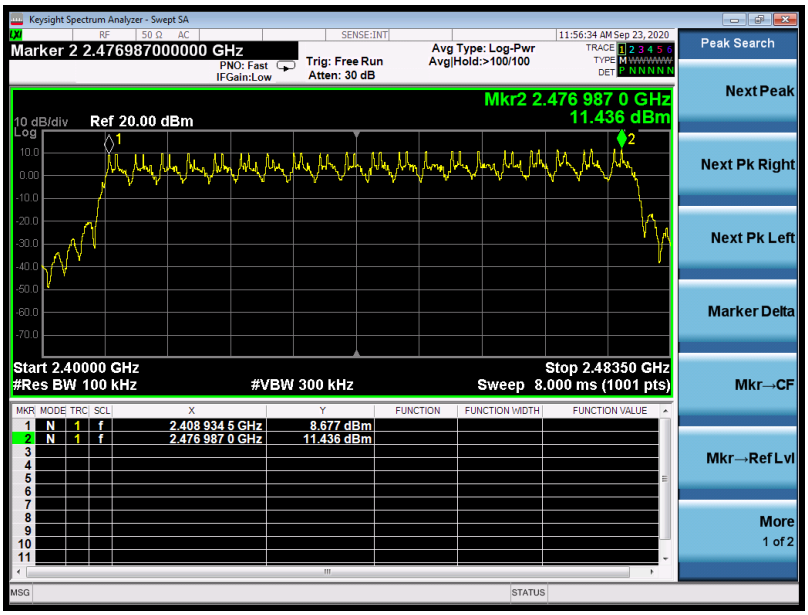
Highest channel

7.6 Hopping Channel Number

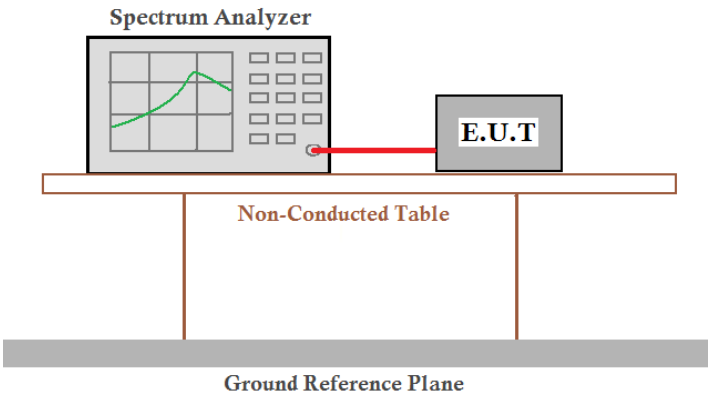
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test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

Measurement Data:

Hopping channel numbers	Limit	Result
20	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

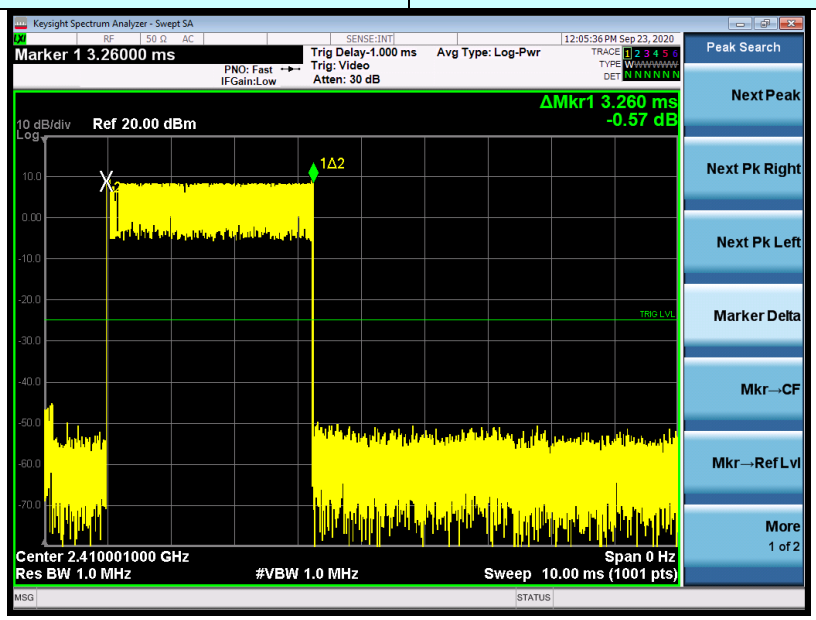
Measurement Data

Frequency	Ton (ms)	Dwell time(ms)	Limit(ms)	Result
2410.001MHz	3.26	234.72	400	Pass
2441.701MHz	3.26	234.72	400	Pass
2477.001MHz	3.26	234.72	400	Pass

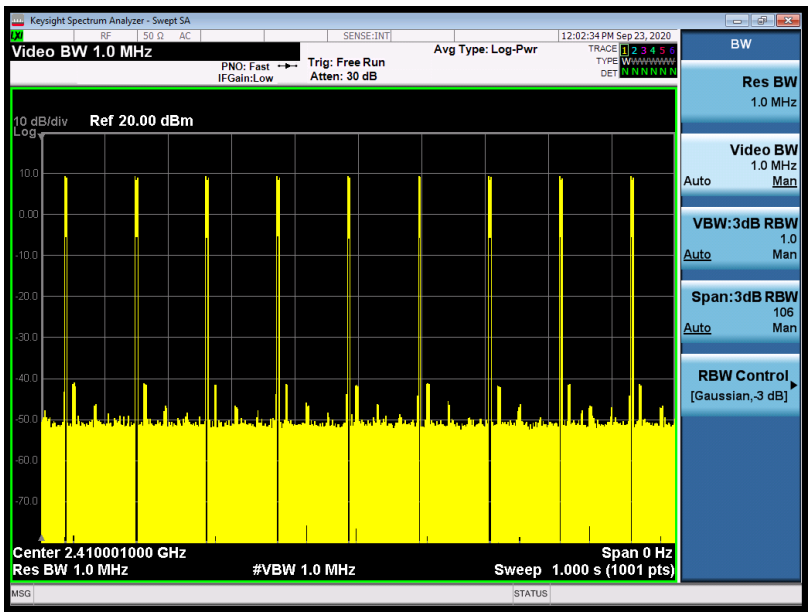
The formula as below:
2410.001MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=3.26ms*9*0.4*20=234.72ms
2441.501MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=3.26ms*9*0.4*20=234.72ms
2477.001MHz: Dwell time = Ton * Ton times in 1s * 0.4s * channel numbers=3.26ms*9*0.4*20=234.72ms

Test plot as follows:

Frequency:	2410.001MHz



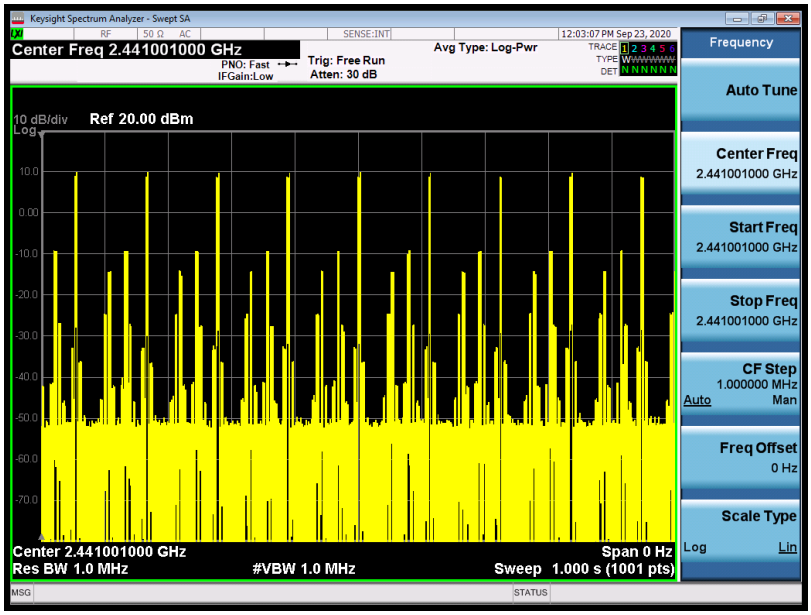
Ton



Ton times in 1s

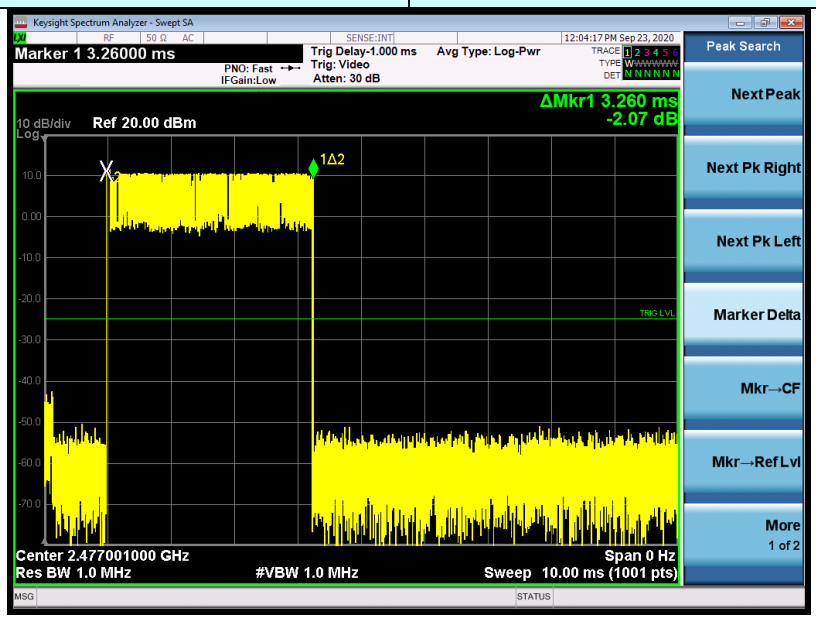
Frequency:	2441.501MHz

Ton

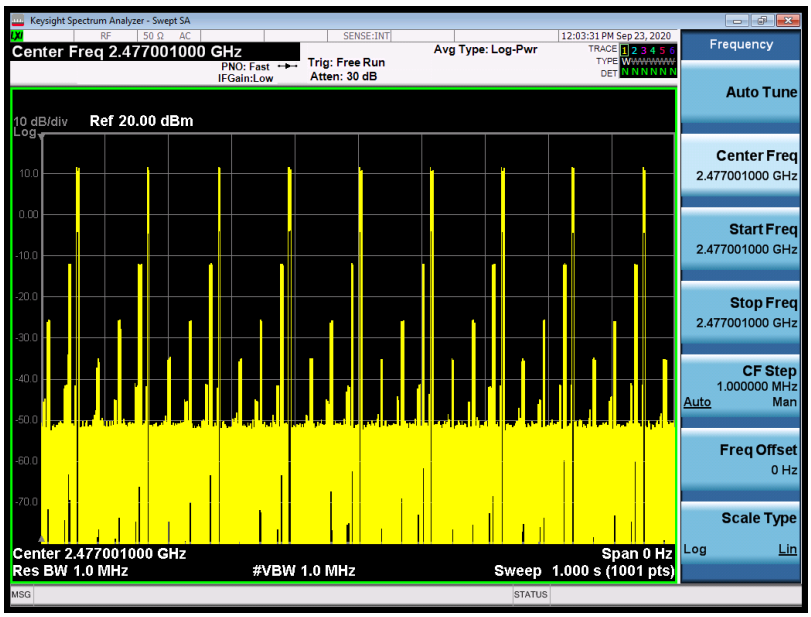


Ton times in 1s

Frequency:	2477.001MHz



Ton



Ton times in 1s

7.8 Pseudorandom Frequency Hopping Sequence

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

a(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively. Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

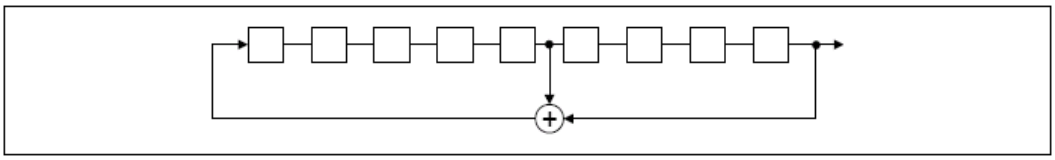
(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be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

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

EUT Pseudorandom Frequency Hopping Sequence

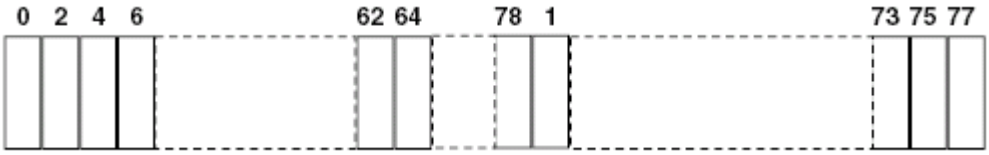
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized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

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



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



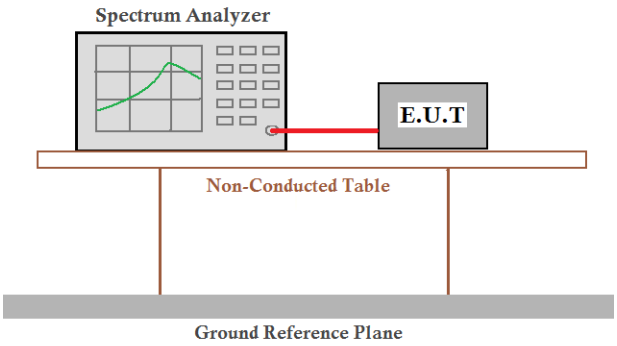
Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

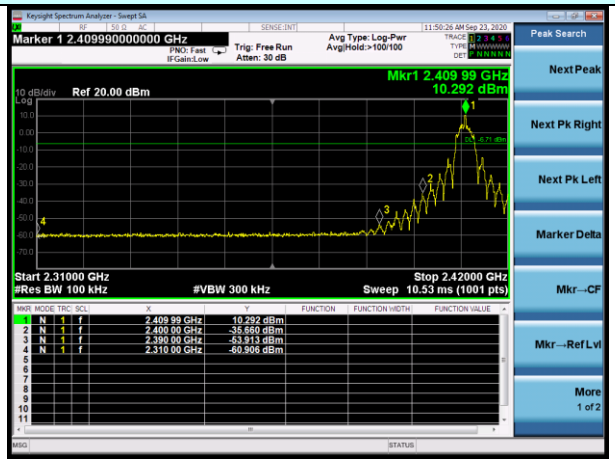
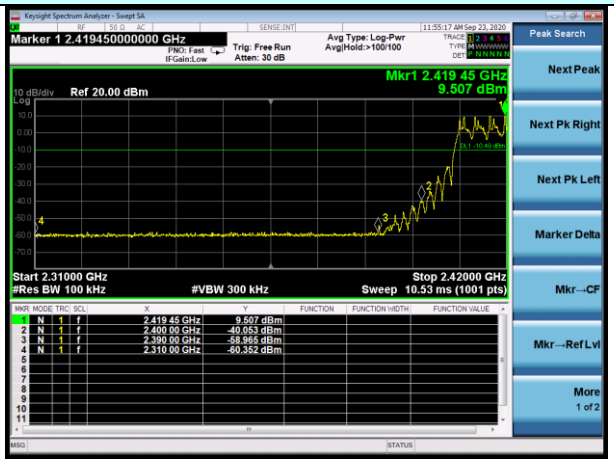
it permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted.

7.9 Band Edge

7.9.1 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

7.9.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10:2013
Test Frequency Range:	All restriction band have been tested, and 2.3GHz to 2.5GHz band is the worse case
Test site:	Measurement Distance: 3m

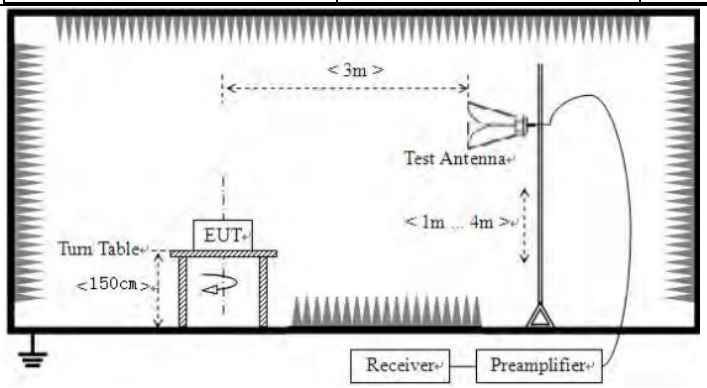
Receiver setup:

Frequency	Detector	RBW	VBW	Remark
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Peak	1MHz	10Hz	Average Value

Limit:

Frequency	Limit (dBuV/m @3m)	Remark
Above 1GHz	54.00	Average Value
	74.00	Peak Value

Test setup:



Test Procedure:

1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Test Instruments:	Refer to section 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

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	52.73	27.59	5.38	34.01	51.69	74.00	-22.31	Horizontal
2400.00	61.59	27.58	5.39	34.01	60.55	74.00	-13.45	Horizontal
2390.00	54.56	27.59	5.38	34.01	53.52	74.00	-20.48	Vertical
2400.00	63.59	27.58	5.39	34.01	62.55	74.00	-11.45	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	39.39	27.59	5.38	34.01	38.35	54.00	-15.65	Horizontal
2400.00	47.79	27.58	5.39	34.01	46.75	54.00	-7.25	Horizontal
2390.00	41.00	27.59	5.38	34.01	39.96	54.00	-14.04	Vertical
2400.00	48.98	27.58	5.39	34.01	47.94	54.00	-6.06	Vertical

Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	53.28	27.53	5.47	33.92	52.36	74.00	-21.64	Horizontal
2500.00	49.26	27.55	5.49	29.93	52.37	74.00	-21.63	Horizontal
2483.50	55.63	27.53	5.47	33.92	54.71	74.00	-19.29	Vertical
2500.00	51.91	27.55	5.49	29.93	55.02	74.00	-18.98	Vertical

Average value:

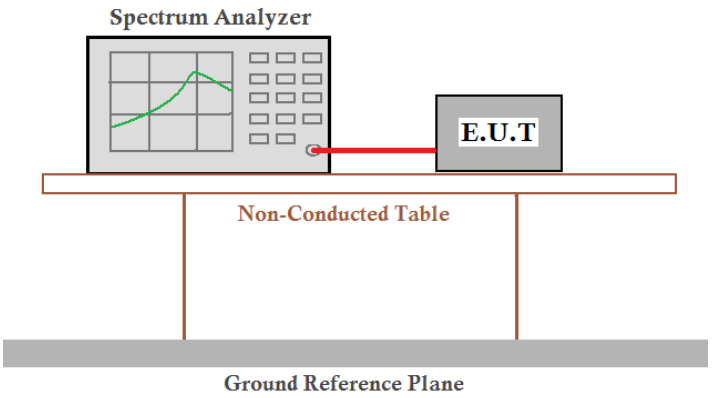
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	39.68	27.53	5.47	33.92	38.76	54.00	-15.24	Horizontal
2500.00	35.84	27.55	5.49	29.93	38.95	54.00	-15.05	Horizontal
2483.50	41.87	27.53	5.47	33.92	40.95	54.00	-13.05	Vertical
2500.00	37.58	27.55	5.49	29.93	40.69	54.00	-13.31	Vertical

Remark:

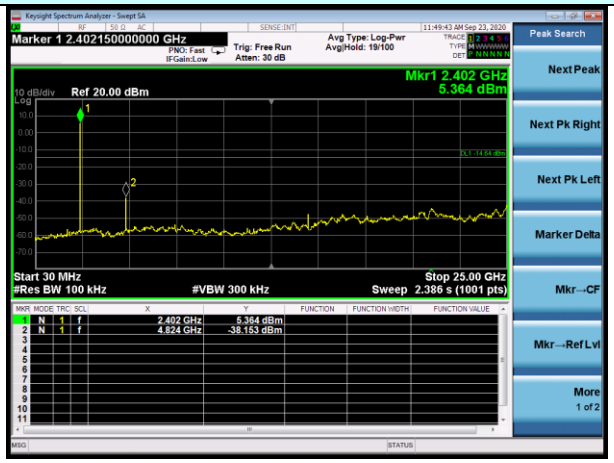
1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

7.10 Spurious Emission

7.10.1 Conducted Emission Method

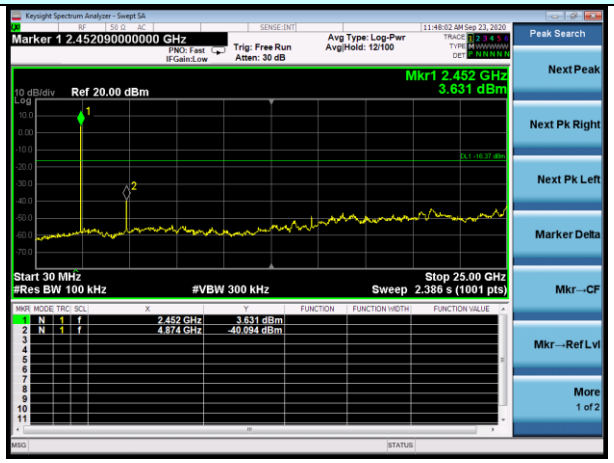
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 Meas Guidance V04
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Lowest channel



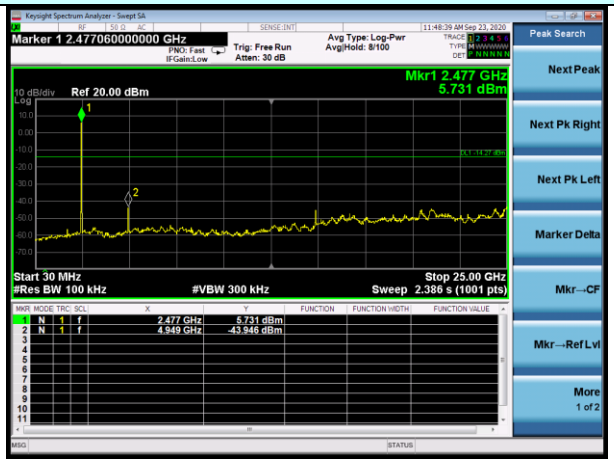
30MHz~25GHz

Middle channel



30MHz~25GHz

Highest channel



30MHz~25GHz

7.10.2 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:

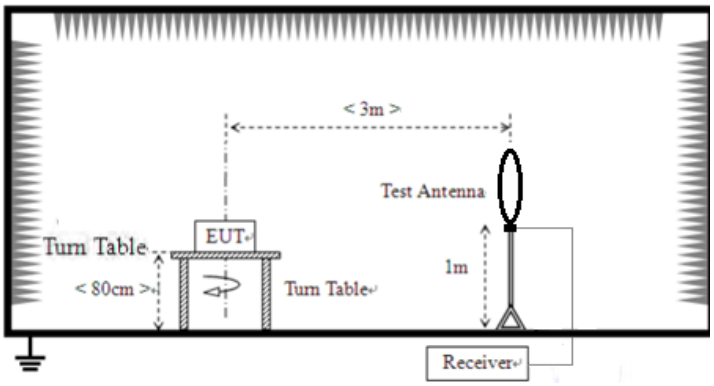
Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:
(Spurious Emissions)

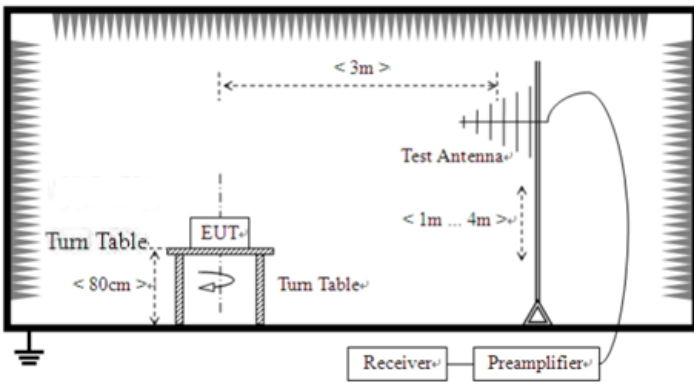
Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	300m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

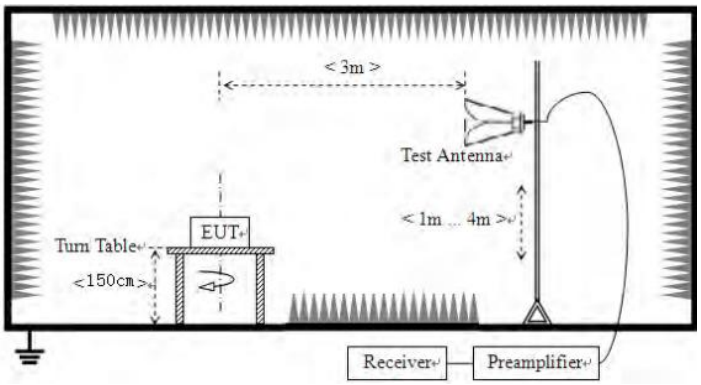
Test setup:

Below 30MHz



Below 1GHz

<table>
<tr><td></td><td colspan="6">


Above 1GHz


</td></tr>
<tr><td>Test Procedure:</td><td colspan="6">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.</td></tr>
<tr><td>Test Instruments:</td><td colspan="6">Refer to section 5.8 for details</td></tr>
<tr><td>Test mode:</td><td colspan="6">Refer to section 5.2 for details</td></tr>
<tr><td>Temp. / Hum.</td><td>Temp.:</td><td>25 °C</td><td>Humid.:</td><td>52%</td><td>Press.:</td><td>1 012mbar</td></tr>
<tr><td>Test results:</td><td colspan="6">Pass</td></tr>
</table>

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:

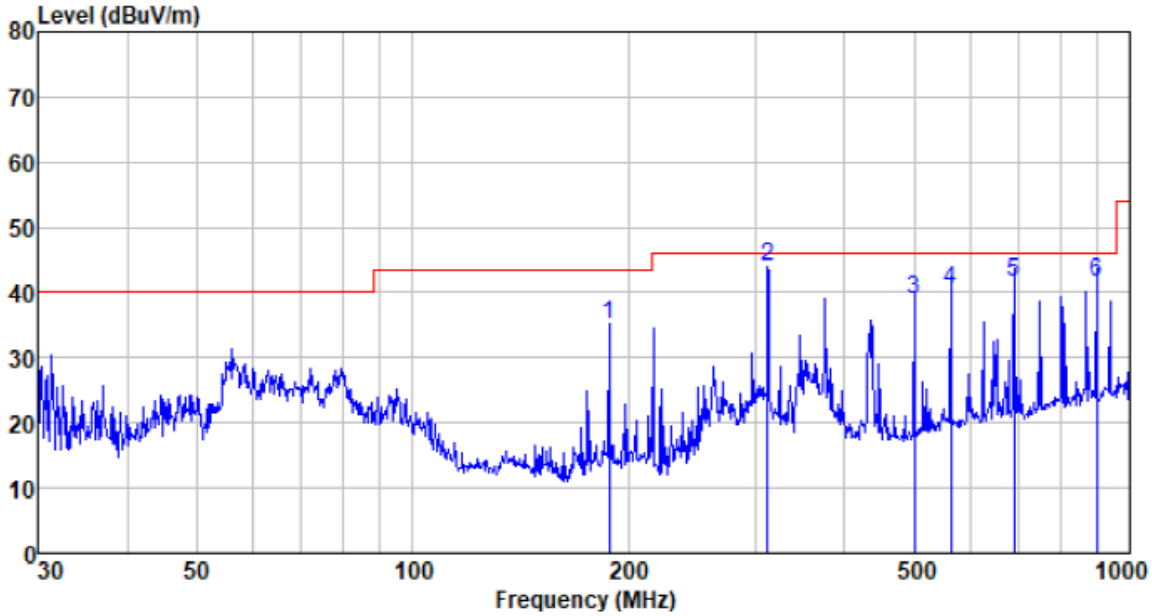
- **Below 30MHz**

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**

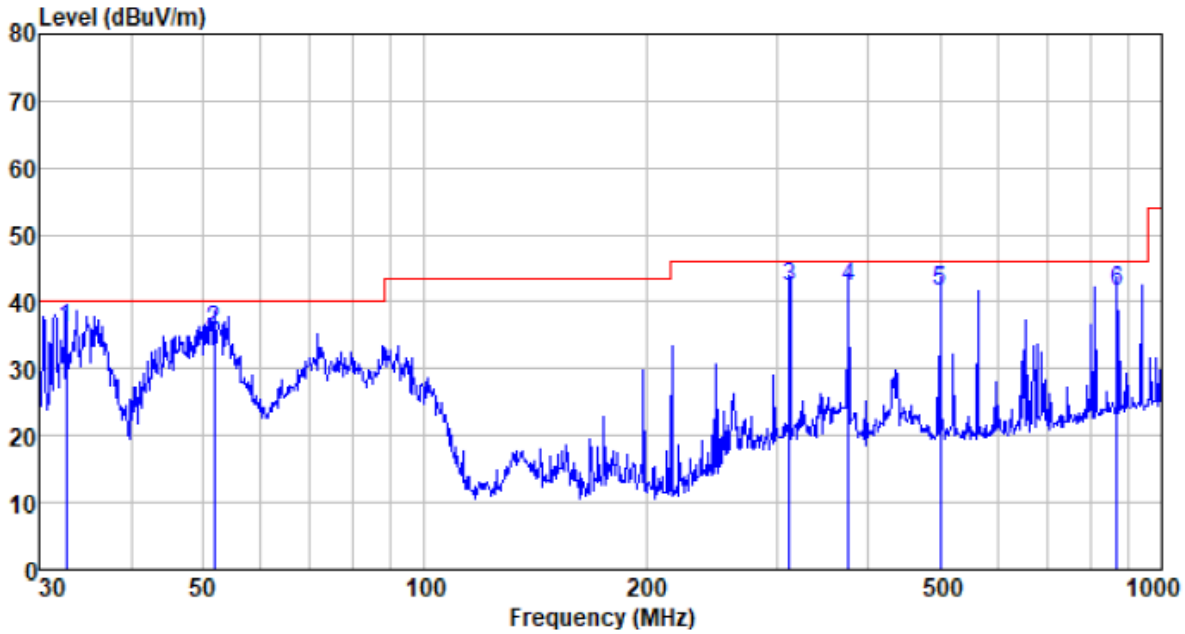
Pre-scan all test modes paired with adapter 1 and adapter 2, found worst case at 2441.501MHz of adapter 1, and so only show the test result adapter 1 of 2441.501MHz on the report.

Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
187.753	61.11	9.65	1.78	37.27	35.27	43.50	-8.23	QP
312.179	65.00	13.85	2.42	37.43	43.84	46.00	-2.16	QP
501.179	55.97	17.30	3.31	37.51	39.07	46.00	-6.93	QP
562.662	55.68	18.73	3.57	37.53	40.45	46.00	-5.55	QP
689.565	55.55	19.59	4.05	37.62	41.57	46.00	-4.43	QP
900.147	52.17	22.30	4.85	37.60	41.72	46.00	-4.28	QP

Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
32.634	59.27	11.25	0.58	35.19	35.91	40.00	-4.09	QP
51.843	58.95	12.10	0.79	36.21	35.63	40.00	-4.37	QP
312.179	63.29	13.85	2.42	37.43	42.13	46.00	-3.87	QP
375.939	62.10	14.94	2.75	37.50	42.29	46.00	-3.71	QP
501.179	58.63	17.30	3.31	37.51	41.73	46.00	-4.27	QP
869.130	52.59	22.02	4.74	37.61	41.74	46.00	-4.26	QP

■ **Above 1GHz**

Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4820.00	41.19	31.78	8.60	32.09	49.48	74.00	-24.52	Vertical
7230.00	34.87	36.15	11.65	32.00	50.67	74.00	-23.33	Vertical
9640.00	33.45	37.95	14.14	31.62	53.92	74.00	-20.08	Vertical
12050.01	*					74.00		Vertical
14460.01	*					74.00		Vertical
16870.01	*					74.00		Vertical
4820.00	39.75	31.78	8.60	32.09	48.04	74.00	-25.96	Horizontal
7230.00	34.76	36.15	11.65	32.00	50.56	74.00	-23.44	Horizontal
9640.00	32.67	37.95	14.14	31.62	53.14	74.00	-20.86	Horizontal
12050.01	*					74.00		Horizontal
14460.01	*					74.00		Horizontal
16870.01	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4820.00	30.24	31.78	8.60	32.09	38.53	54.00	-15.47	Vertical
7230.00	23.73	36.15	11.65	32.00	39.53	54.00	-14.47	Vertical
9640.00	23.79	37.95	14.14	31.62	44.26	54.00	-9.74	Vertical
12050.01	*					54.00		Vertical
14460.01	*					54.00		Vertical
16870.01	*					54.00		Vertical
4820.00	29.26	31.78	8.60	32.09	37.55	54.00	-16.45	Horizontal
7230.00	23.33	36.15	11.65	32.00	39.13	54.00	-14.87	Horizontal
9640.00	22.41	37.95	14.14	31.62	42.88	54.00	-11.12	Horizontal
12050.01	*					54.00		Horizontal
14460.01	*					54.00		Horizontal
16870.01	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*

Test channel:	Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4883.00	40.17	31.85	8.67	32.12	48.57	74.00	-25.43	Vertical
7324.50	34.90	36.37	11.72	31.89	51.10	74.00	-22.90	Vertical
9766.00	34.43	38.35	14.25	31.62	55.41	74.00	-18.59	Vertical
12207.51	*					74.00		Vertical
14649.01	*					74.00		Vertical
17090.51	*					74.00		Vertical
4883.00	40.55	31.85	8.67	32.12	48.95	74.00	-25.05	Horizontal
7324.50	33.68	36.37	11.72	31.89	49.88	74.00	-24.12	Horizontal
9766.00	33.97	38.35	14.25	31.62	54.95	74.00	-19.05	Horizontal
12207.51	*					74.00		Horizontal
14649.01	*					74.00		Horizontal
17090.51	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4883.00	30.99	31.85	8.67	32.12	39.39	54.00	-14.61	Vertical
7324.50	23.20	36.37	11.72	31.89	39.40	54.00	-14.60	Vertical
9766.00	23.68	38.35	14.25	31.62	44.66	54.00	-9.34	Vertical
12207.51	*					54.00		Vertical
14649.01	*					54.00		Vertical
17090.51	*					54.00		Vertical
4883.00	30.65	31.85	8.67	32.12	39.05	54.00	-14.95	Horizontal
7324.50	22.76	36.37	11.72	31.89	38.96	54.00	-15.04	Horizontal
9766.00	23.68	38.35	14.25	31.62	44.66	54.00	-9.34	Horizontal
12207.51	*					54.00		Horizontal
14649.01	*					54.00		Horizontal
17090.51	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*

Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4954.00	45.96	31.93	8.73	32.16	54.46	74.00	-19.54	Vertical
7431.00	35.74	36.59	11.79	31.78	52.34	74.00	-21.66	Vertical
9908.00	37.85	38.81	14.38	31.88	59.16	74.00	-14.84	Vertical
12385.01	*					74.00		Vertical
14862.01	*					74.00		Vertical
17339.01	*					74.00		Vertical
4954.00	45.13	31.93	8.73	32.16	53.63	74.00	-20.37	Horizontal
7431.00	34.76	36.59	11.79	31.78	51.36	74.00	-22.64	Horizontal
9908.00	33.66	38.81	14.38	31.88	54.97	74.00	-19.03	Horizontal
12385.01	*					74.00		Horizontal
14862.01	*					74.00		Horizontal
17339.01	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4954.00	36.82	31.93	8.73	32.16	45.32	54.00	-8.68	Vertical
7431.00	25.64	36.59	11.79	31.78	42.24	54.00	-11.76	Vertical
9908.00	26.34	38.81	14.38	31.88	47.65	54.00	-6.35	Vertical
12385.01	*					54.00		Vertical
14862.01	*					54.00		Vertical
17339.01	*					54.00		Vertical
4954.00	35.46	31.93	8.73	32.16	43.96	54.00	-10.04	Horizontal
7431.00	24.14	36.59	11.79	31.78	40.74	54.00	-13.26	Horizontal
9908.00	22.91	38.81	14.38	31.88	44.22	54.00	-9.78	Horizontal
12385.01	*					54.00		Horizontal
14862.01	*					54.00		Horizontal
17339.01	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*

8 Test Setup Photo

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

9 EUT Constructional Details

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

---End---