TEST REPORT

Applicant:	Babysense Dongguan Ltd.
Address of Applicant:	Room 401, Building 1, No. 17, Dongxingyuan 1 Road, Dongkeng Town, Dongguan City
Manufacturer/Factory:	Babysense Dongguan Ltd.
Address of Manufacturer/ Factory:	Room 401, Building 1, No. 17, Dongxingyuan 1 Road, Dongkeng Town, Dongguan City
Equipment Under Test (EUT)	
Product Name:	Baby monitor
Model No.:	V24R
FCC ID:	2AQVL-V24R
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	December 02, 2019
Date of Test:	December 02, 2019- April 13, 2020
Date of report issued:	April 13, 2020
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

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

2 Version

Version No.	Date	Description
00	*April 13, 2020*	*Original*

Prepared By:		***Date:***	*April 13, 2020*
	Project Engineer		
Check By:		***Date:***	*April 13, 2020*
	Reviewer		

3 Contents

Page

1 COVER PAGE 1

2 VERSION 2

3 CONTENTS 3

4 TEST SUMMARY 4

4.1 MEASUREMENT UNCERTAINTY 4

5 GENERAL INFORMATION 5

5.1 GENERAL DESCRIPTION OF EUT 5
5.2 TEST MODE 6
5.3 TEST FACILITY 6
5.4 TEST LOCATION 6
5.5 OTHER INFORMATION REQUESTED BY THE CUSTOMER 6
5.6 DESCRIPTION OF SUPPORT UNITS 7
5.7 DEVIATION FROM STANDARDS 7
5.8 ABNORMALITIES FROM STANDARD CONDITIONS 7

6 TEST INSTRUMENTS LIST 8

7 TEST RESULTS AND MEASUREMENT DATA 10

7.1 ANTENNA REQUIREMENT 10
7.2 CONDUCTED EMISSIONSS 11
7.3 CONDUCTED PEAK OUTPUT POWER 14
7.4 20DB EMISSION BANDWIDTH 16
7.5 CARRIER FREQUENCIES SEPARATION 18
7.6 HOPPING CHANNEL NUMBER 21
7.7 DWELL TIME 23
7.8 PSEUDORANDOM FREQUENCY HOPPING SEQUENCE 25
7.9 BAND EDGE 26
7.9.1 Conducted Emission Method 26
7.9.2 Radiated Emission Method 28
7.10 SPURIOUS EMISSION 30
7.10.1 Conducted Emission Method 30
7.10.2 Radiated Emission Method 32

8 TEST SETUP PHOTO 40

9 EUT CONSTRUCTIONAL DETAILS 40

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.

N/A: Not applicable.

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.:	V24R
Test sample(s) ID:	GTS201912000233-1
Sample(s) Status:	Engineer sample
Serial No.:	N/A
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	2410.875MHz-2471.625MHz
Channel numbers:	19
Channel separation:	3.375MHz
Modulation technology:	GFSK
Antenna Type:	Integral Antenna
Antenna gain:	0dBi
Power supply:	Adapter 1 AC ADAPTER MODEL:AW007WR-0500070UV INPUT:100-240V-50/60Hz 0.3A OUTPUT:5V/0.7A OR Adapter 2 AC ADAPTER MODEL:AW007WR-0500060UV INPUT:100-240V-50/60Hz 0.3A OUTPUT:5V/0.6A All adapters were tested, and this report shows only the worst data (adapter 1)

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2410.875	6	2427.750	11	2444.625	16	2461.500
2	2414.250	7	2431.125	12	2448.000	17	2464.875
3	2417.625	8	2434.500	13	2451.375	18	2468.250
4	2421.000	9	2437.875	14	2454.750	19	2471.625
5	2424.375	10	2441.250	15	2458.125	20	

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	2410.875
The middle channel	2441.250
The Highest channel	2471.625

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

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.

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. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 26 2019	June. 25 2020
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 26 2019	June. 25 2020
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 26 2019	June. 25 2020
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 26 2019	June. 25 2020
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 26 2019	June. 25 2020
9	Coaxial Cable	GTS	N/A	GTS211	June. 26 2019	June. 25 2020
10	Coaxial cable	GTS	N/A	GTS210	June. 26 2019	June. 25 2020
11	Coaxial Cable	GTS	N/A	GTS212	June. 26 2019	June. 25 2020
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 26 2019	June. 25 2020
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 26 2019	June. 25 2020
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 26 2019	June. 25 2020
15	Band filter	Amindeon	82346	GTS219	June. 26 2019	June. 25 2020
16	Power Meter	Anritsu	ML2495A	GTS540	June. 26 2019	June. 25 2020
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 26 2019	June. 25 2020
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 26 2019	June. 25 2020
19	Splitter	Agilent	11636B	GTS237	June. 26 2019	June. 25 2020
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 26 2019	June. 25 2020
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. 26 2019	June. 25 2020

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. 26 2019	June. 25 2020
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 26 2019	June. 25 2020
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 26 2019	June. 25 2020
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 26 2019	June. 25 2020
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 26 2019	June. 25 2020
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 26 2019	June. 25 2020
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 26 2019	June. 25 2020
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 26 2019	June. 25 2020

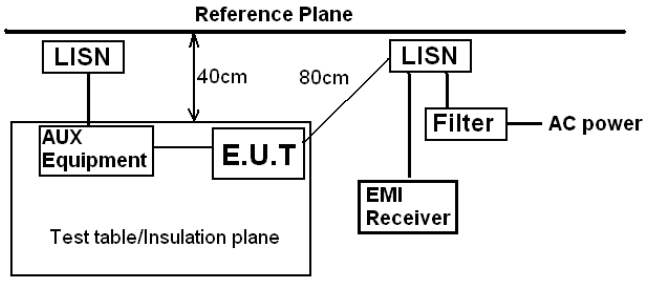
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 26 2019	June. 25 2020
2	Barometer	ChangChun	DYM3	GTS255	June. 26 2019	June. 25 2020

7 Test results and Measurement Data

7.1 Antenna requirement

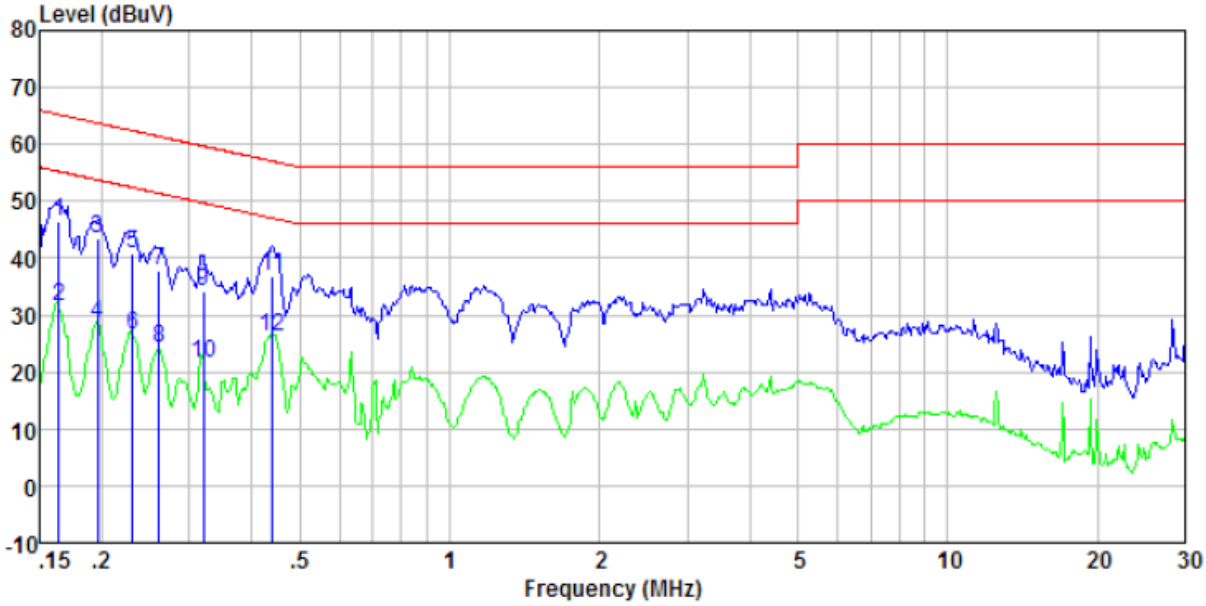
Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. **15.247(c) (1)(i) requirement:** (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
EUT Antenna:	
The antenna is integral Antenna, the best case gain of the antenna is 0dBi, reference to the appendix II for details	

7.2 Conducted Emissionss

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

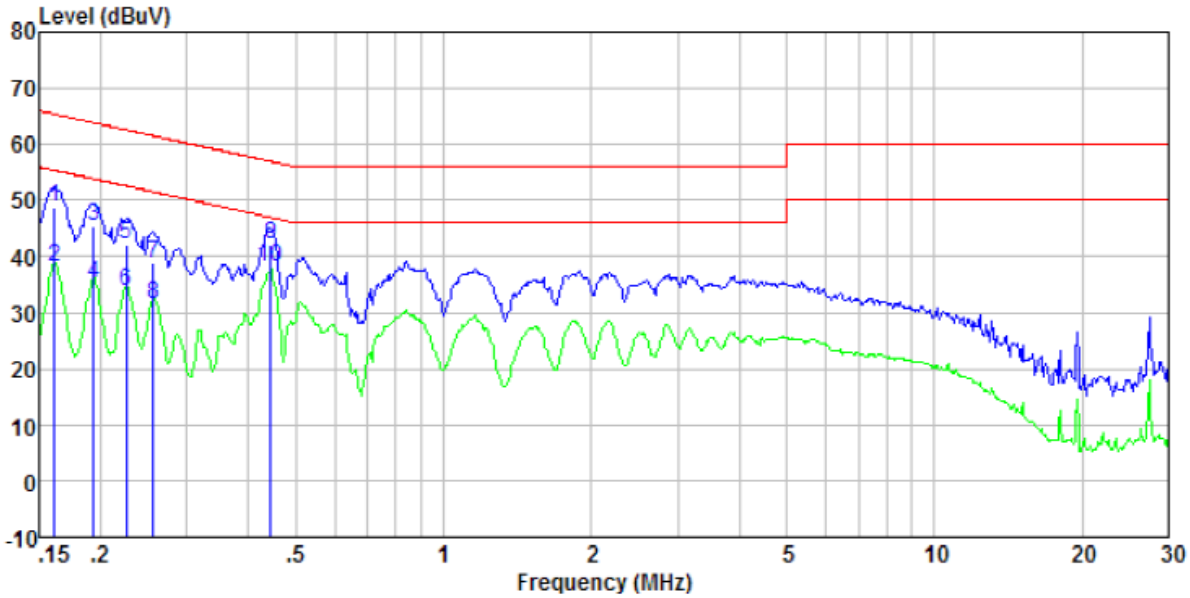
Measurement data:

Line:



Freq MHz	Reading level dBuV	lISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.164	45.97	0.42	0.12	46.51	65.25	-18.74	QP
0.164	30.89	0.42	0.12	31.43	55.25	-23.82	Average
0.197	42.93	0.43	0.13	43.49	63.76	-20.27	QP
0.197	27.96	0.43	0.13	28.52	53.76	-25.24	Average
0.230	40.23	0.43	0.12	40.78	62.44	-21.66	QP
0.230	25.97	0.43	0.12	26.52	52.44	-25.92	Average
0.260	37.40	0.44	0.11	37.95	61.42	-23.47	QP
0.260	23.55	0.44	0.11	24.10	51.42	-27.32	Average
0.320	33.79	0.44	0.10	34.33	59.71	-25.38	QP
0.320	20.95	0.44	0.10	21.49	49.71	-28.22	Average
0.440	36.47	0.40	0.11	36.98	57.07	-20.09	QP
0.440	25.66	0.40	0.11	26.17	47.07	-20.90	Average

Neutral:

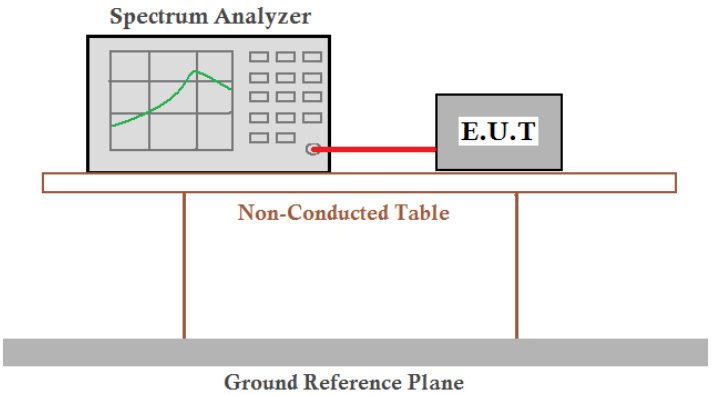


Freq MHz	Reading level dBuV	lISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.162	48.09	0.41	0.12	48.62	65.38	-16.76	QP
0.162	37.55	0.41	0.12	38.08	55.38	-17.30	Average
0.193	44.84	0.41	0.13	45.38	63.89	-18.51	QP
0.193	34.57	0.41	0.13	35.11	53.89	-18.78	Average
0.226	41.70	0.42	0.12	42.24	62.61	-20.37	QP
0.226	33.44	0.42	0.12	33.98	52.61	-18.63	Average
0.256	38.16	0.42	0.11	38.69	61.56	-22.87	QP
0.256	30.87	0.42	0.11	31.40	51.56	-20.16	Average
0.444	41.76	0.38	0.11	42.25	56.98	-14.73	QP
0.444	37.74	0.38	0.11	38.23	46.98	-8.75	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. Both 120V and 240V are tested, only show the worst case 120V test data on the report.
5. 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.

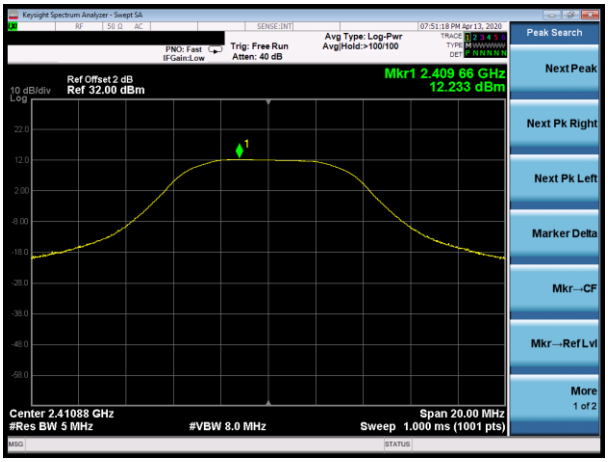
7.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(1)
Test Method:	DA 00-705, 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

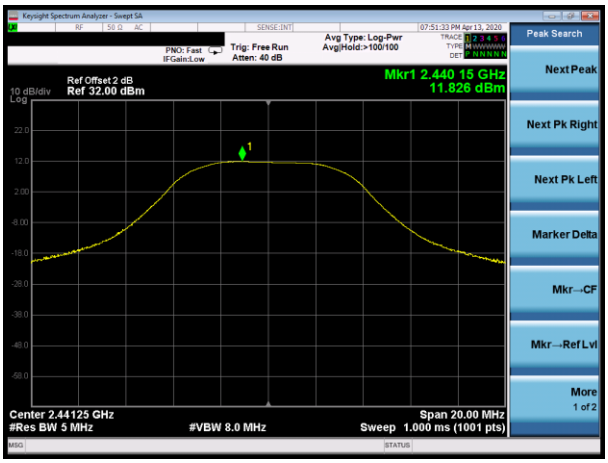
Measurement Data

Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	12.233	20.97	Pass
Middle	11.826		
Highest	11.142		

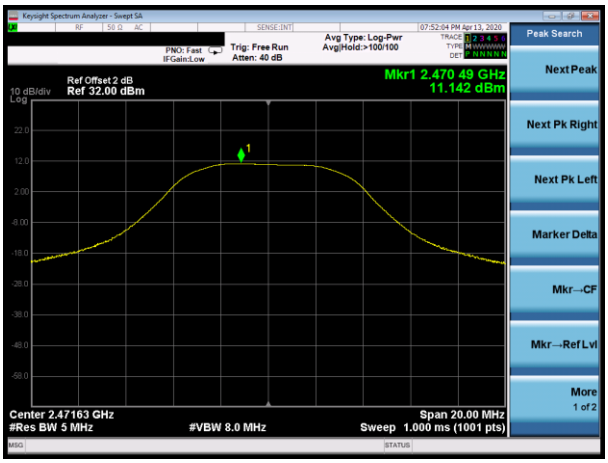
Test plot as follows:



Lowest channel

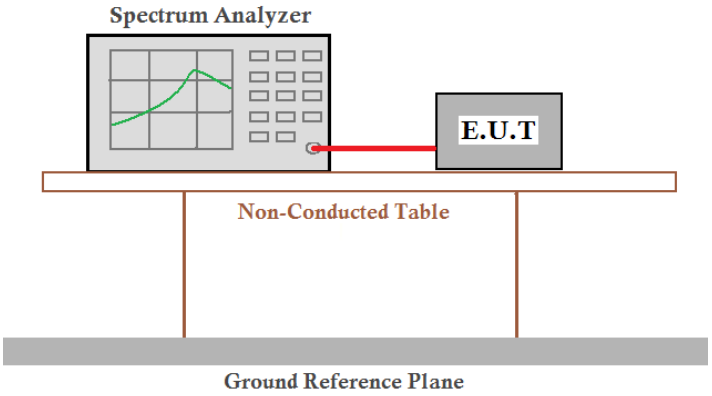


Middle channel



Highest channel

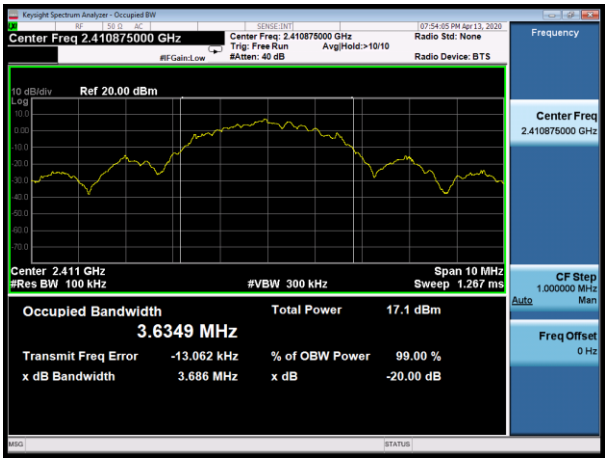
7.4 20dB Emission Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	DA 00-705, 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

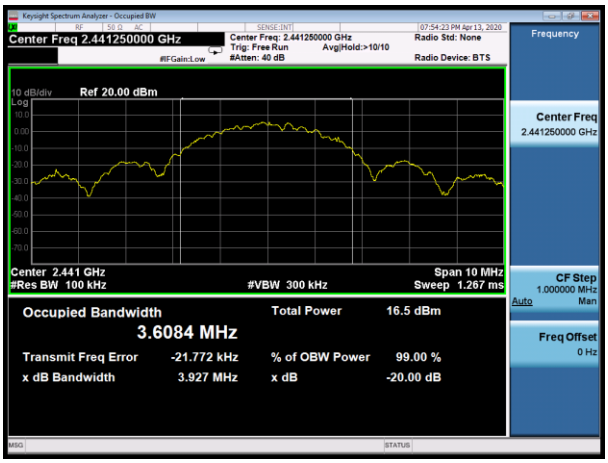
Measurement Data

Test channel	20dB Emission Bandwidth (MHz)	Result
Lowest	3.686	Pass
Middle	3.927	
Highest	3.935	

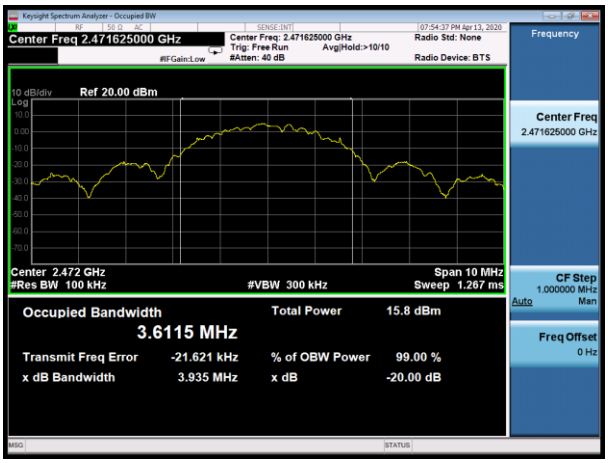
Test plot as follows:



Lowest channel

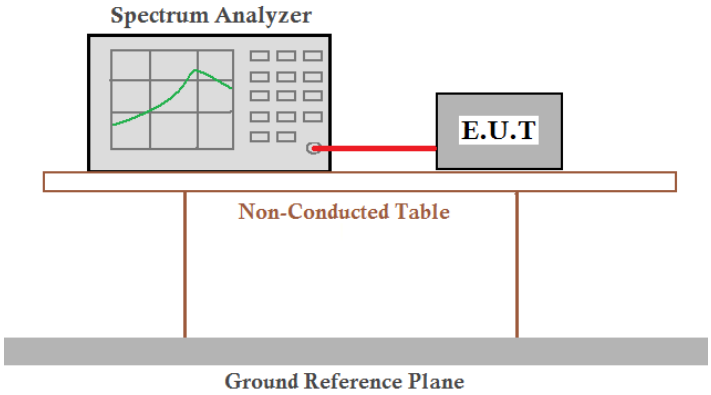


Middle channel



Highest channel

7.5 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	DA 00-705, ANSI C63.10:2013
Receiver setup:	RBW=100KHz, VBW=300KHz, detector=Peak
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	3378	*2457*	Pass
Middle	3378	*2457*	Pass
Highest	3372	*2457*	Pass

Note: According to section 6.3

Mode	*20dB bandwidth (kHz) (worse case)*	*Limit (kHz) (Carrier Frequencies Separation)*
GFSK	*3686*	*2457*

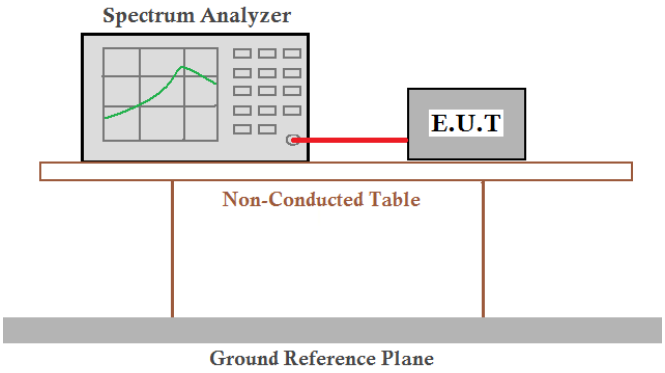
Test plot as follows:

Lowest channel

Middle channel

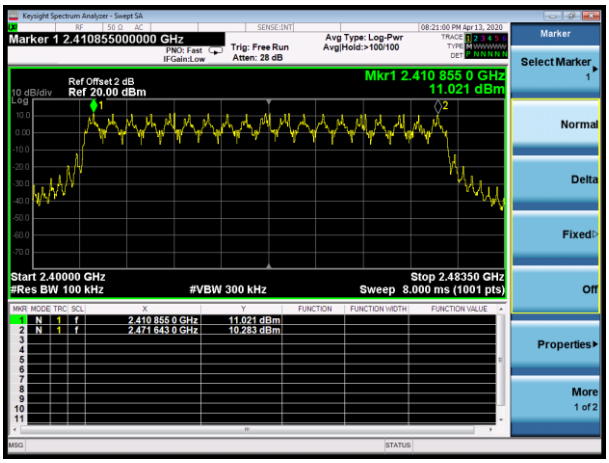
Highest channel

7.6 Hopping Channel Number

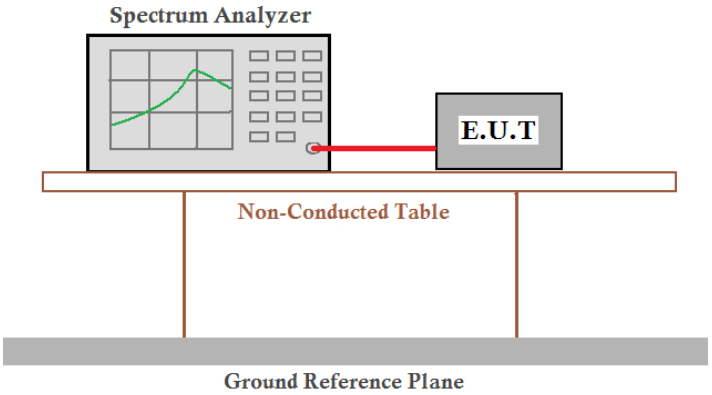
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
Test Method:	DA 00-705, ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data:

Hopping channel numbers	Limit	Result
19	15	Pass



7.7 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)(iii)
Test Method:	DA 00-705, ANSI C63.10:2013
Receiver setup:	RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Channel	Ton(ms)	Dwell time(ms)	Limit(ms)	Result
Lowest	0.113ms	80.7272ms	400	Pass
Middle	0.113ms	86.7388ms	400	Pass
Highest	0.113ms	85.0212ms	400	Pass

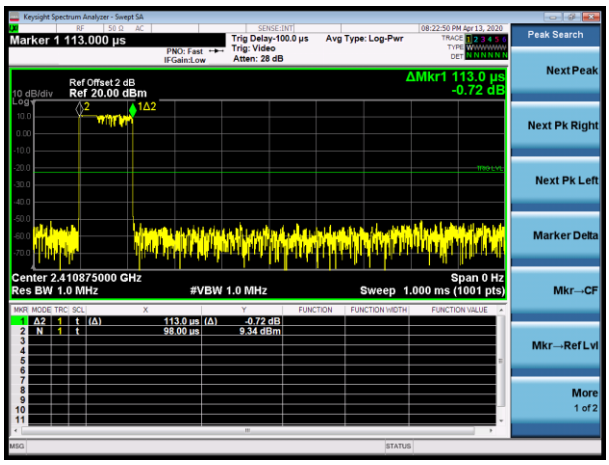
The Formula as bellow:

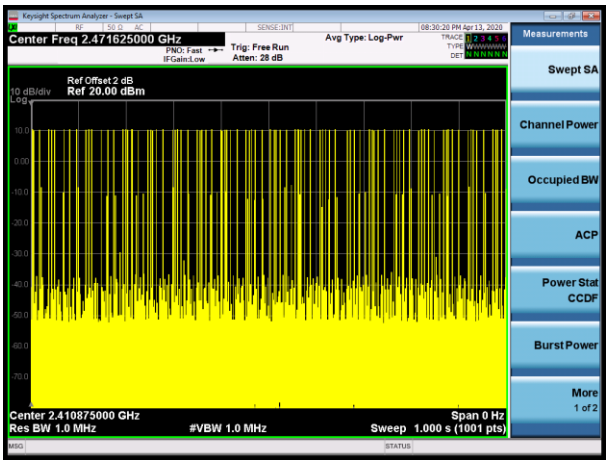
Lowest: Dwell time=Ton* Ton times on 1s*0.4s*channel numbers=0.113*94*0.4*19=80.7272ms

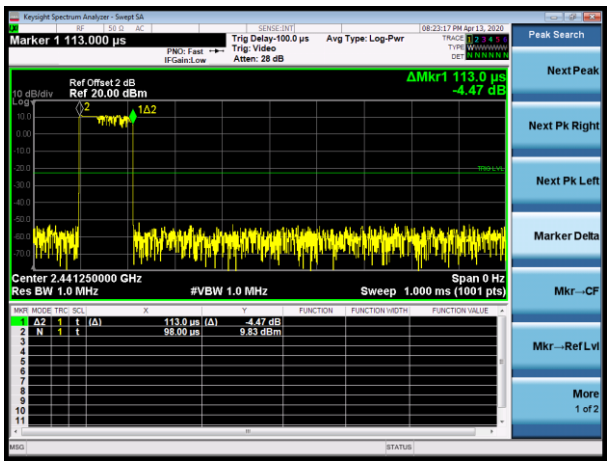
Middle: Dwell time=Ton* Ton times on 1s*0.4s*channel numbers=0.113*101*0.4*19=86.7388ms

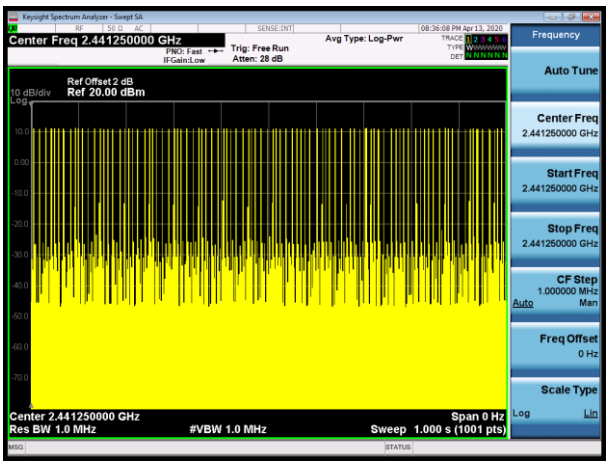
Highest: Dwell time=Ton* Ton times on 1s*0.4s*channel numbers=0.113*99*0.4*19=85.0212ms

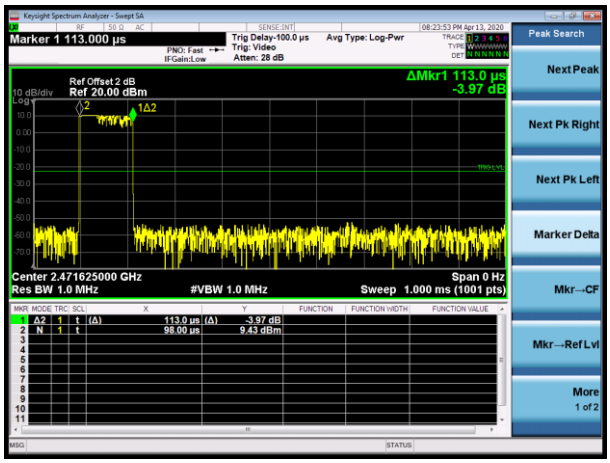
Test plot as follows:

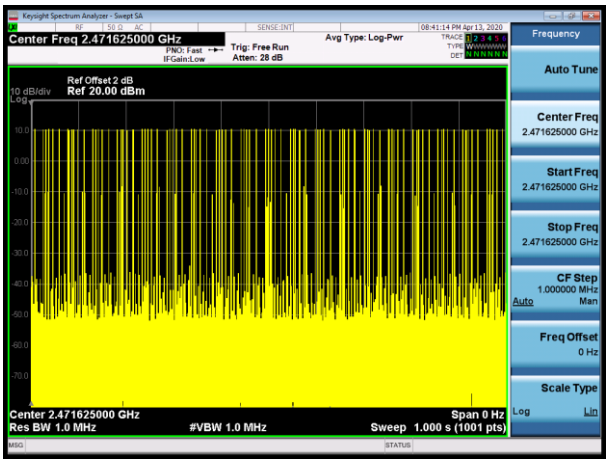












7.8 Pseudorandom Frequency Hopping Sequence

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

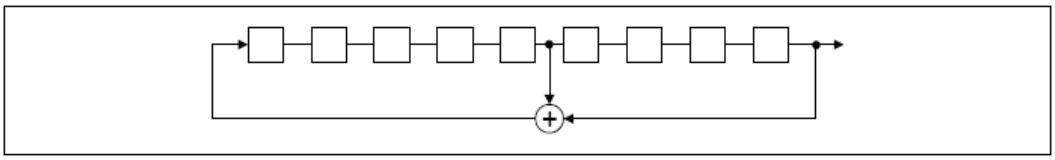
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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.

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)*



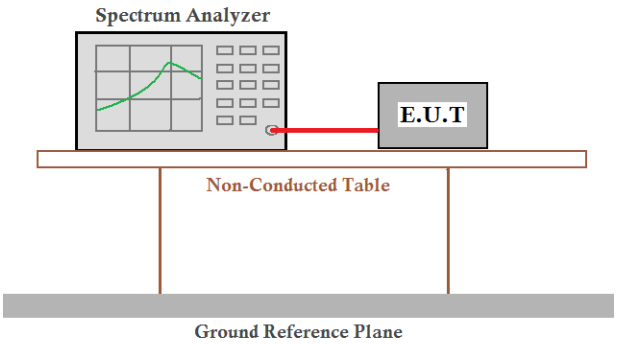
Linear Feedback Shift Register for Generation of the PRBS sequence

Each frequency used equally on the average by each transmitter.

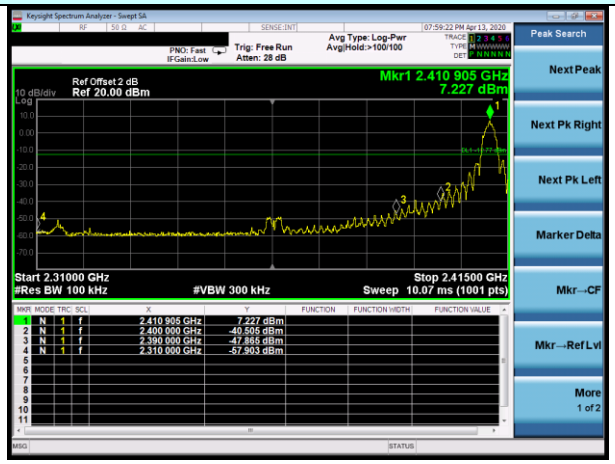
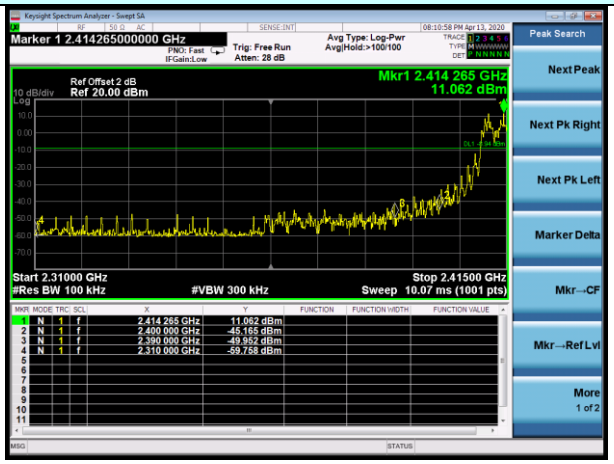
The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

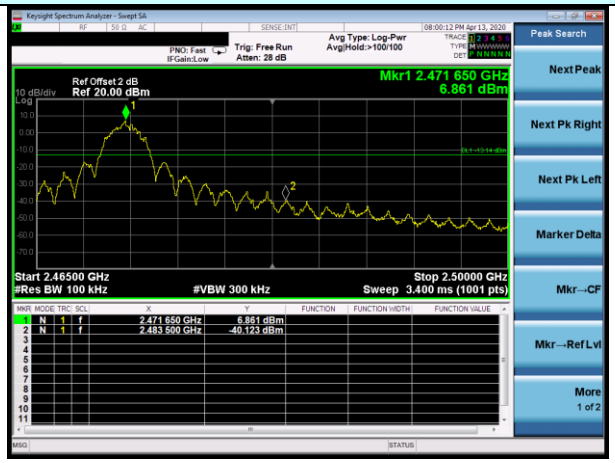
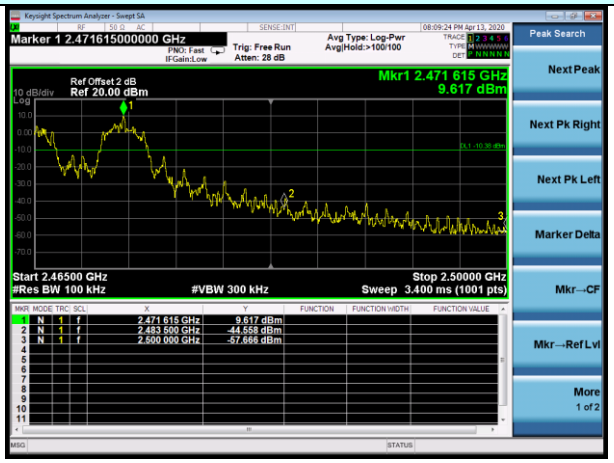
7.9 Band Edge

7.9.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	DA 00-705, ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 6.0 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

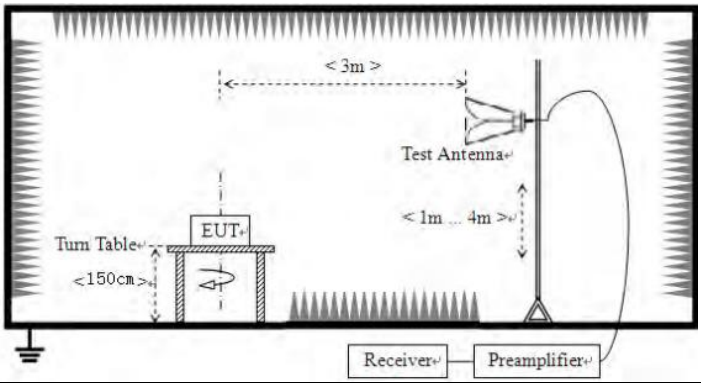
Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10:2013
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.
Test site:	Measurement Distance: 3m
Receiver setup:	

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

Limit:

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

Test setup:



Test Procedure:

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

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

Remark:

1. *Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.*
2. *Two antenna were tested and found the antenna1 is worse. So only the data of antenna1 is reported.*

Measurement Data:

Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	48.82	27.59	5.38	30.18	51.61	74.00	-22.39	Vertical
2400.00	51.17	27.58	5.39	30.18	53.96	74.00	-20.04	Vertical
2390.00	47.75	27.59	5.38	30.18	50.54	74.00	-23.46	Horizontal
2400.00	56.63	27.58	5.39	30.18	59.42	74.00	-14.58	Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	36.48	27.59	5.38	30.18	39.27	54.00	-14.73	Vertical
2400.00	37.95	27.58	5.39	30.18	40.74	54.00	-13.26	Vertical
2390.00	36.71	27.59	5.38	30.18	39.50	54.00	-14.50	Horizontal
2400.00	39.98	27.58	5.39	30.18	42.77	54.00	-11.23	Horizontal

Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	49.40	27.53	5.47	29.93	52.47	74.00	-21.53	Vertical
2500.00	47.82	27.55	5.49	29.93	50.93	74.00	-23.07	Vertical
2483.50	50.90	27.53	5.47	29.93	53.97	74.00	-20.03	Horizontal
2500.00	49.19	27.55	5.49	29.93	52.30	74.00	-21.70	Horizontal

Average value:

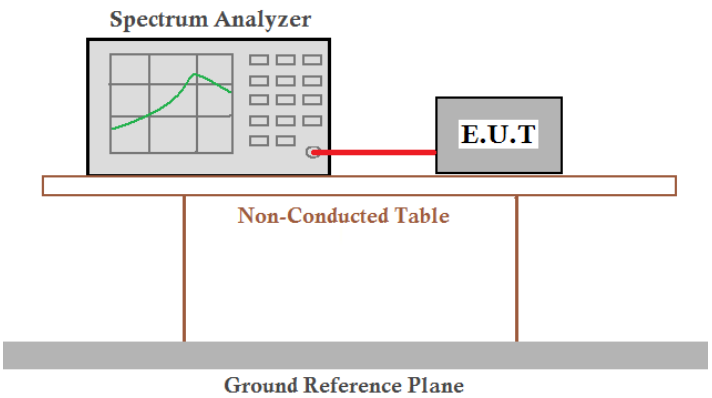
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	39.36	27.53	5.47	29.93	42.43	54.00	-11.57	Vertical
2500.00	36.79	27.55	5.49	29.93	39.90	54.00	-14.10	Vertical
2483.50	40.90	27.53	5.47	29.93	43.97	54.00	-10.03	Horizontal
2500.00	37.04	27.55	5.49	29.93	40.15	54.00	-13.85	Horizontal

Remark:

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

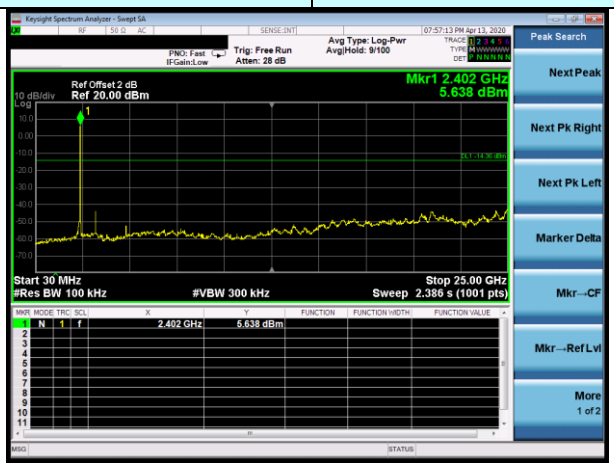
7.10 Spurious Emission

7.10.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
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

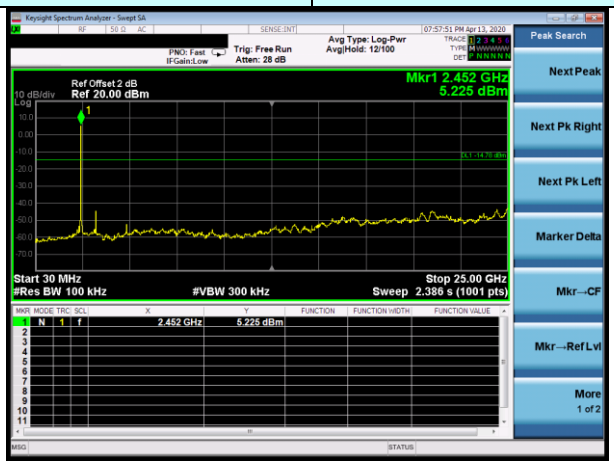
Test plot as follows:

Test channel:	Lowest channel



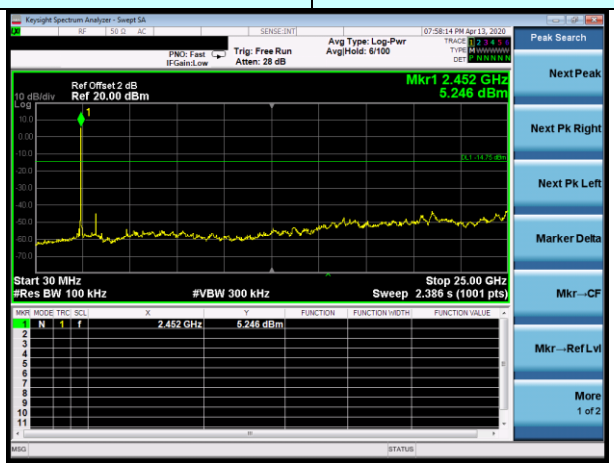
30MHz~25GHz

Test channel:	Middle channel



30MHz~25GHz

Test channel:	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:

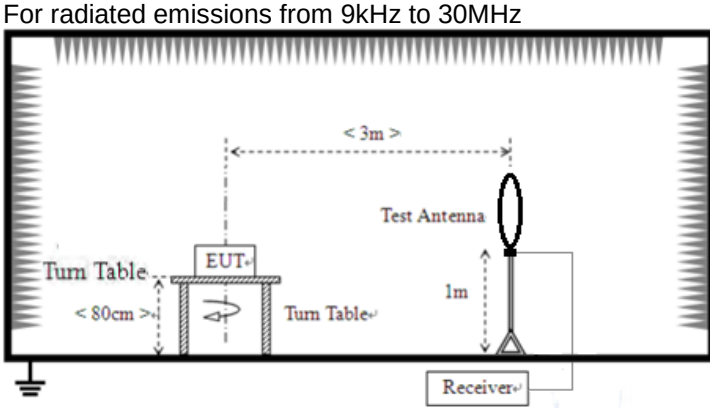
Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:

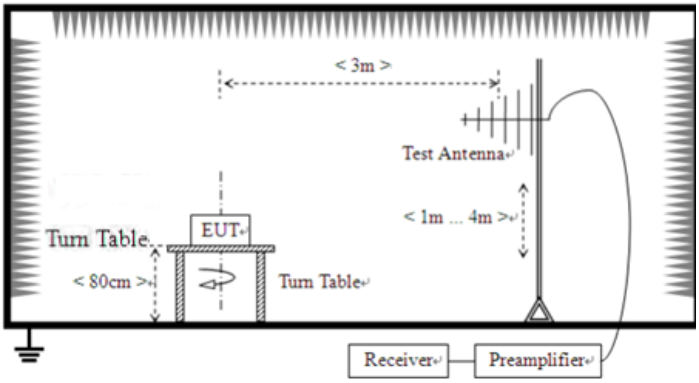
Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	30m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

Test setup:

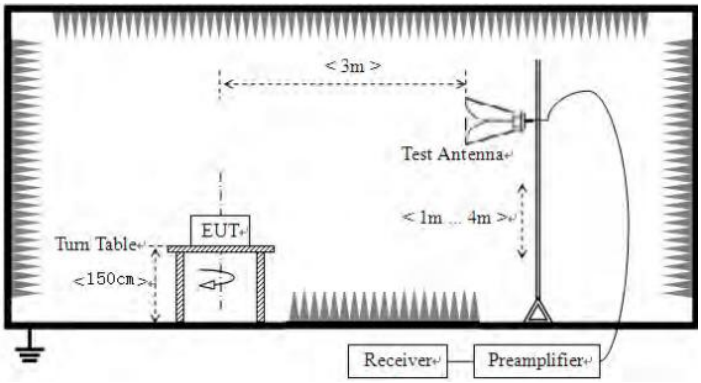
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30MHz to1GHz



For radiated emissions above 1GHz



Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) 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

Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar

Test voltage:	AC 120V, 60Hz
Test results:	Pass

Measurement data:

Remarks:

1. *Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.*
2. *Two antenna were tested and found the antenna1 is worse. So only the data of antenna1 is reported.*

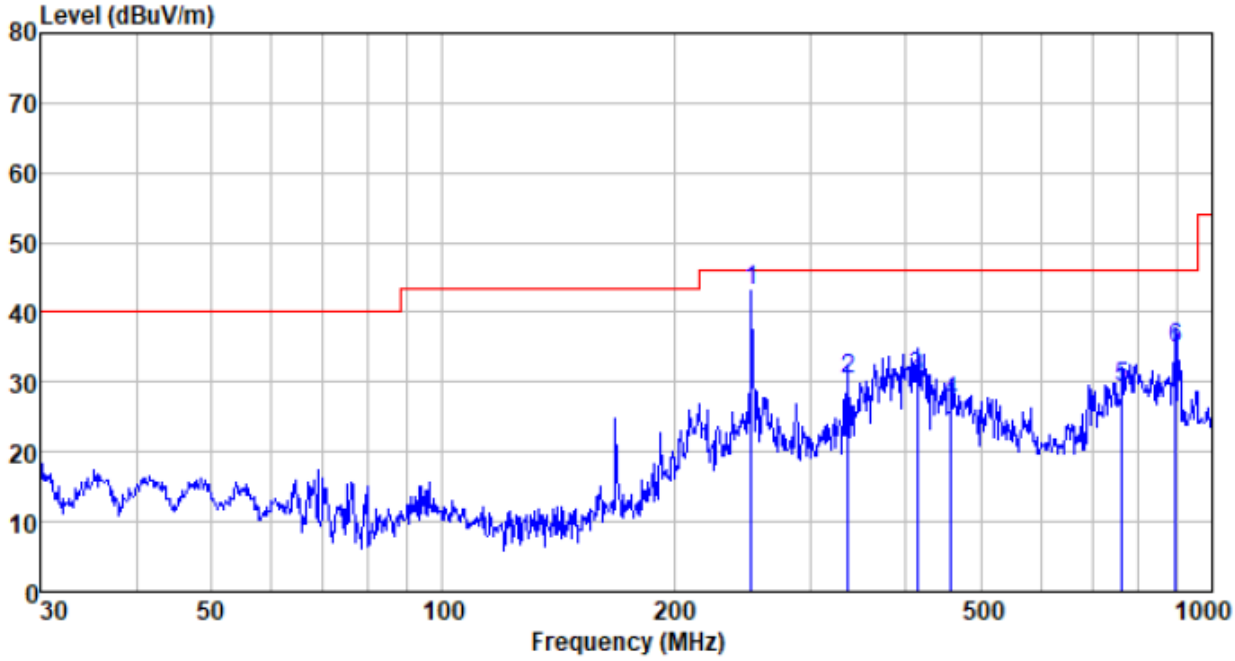
■ **9kHz~30MHz**

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

Antenna 1:

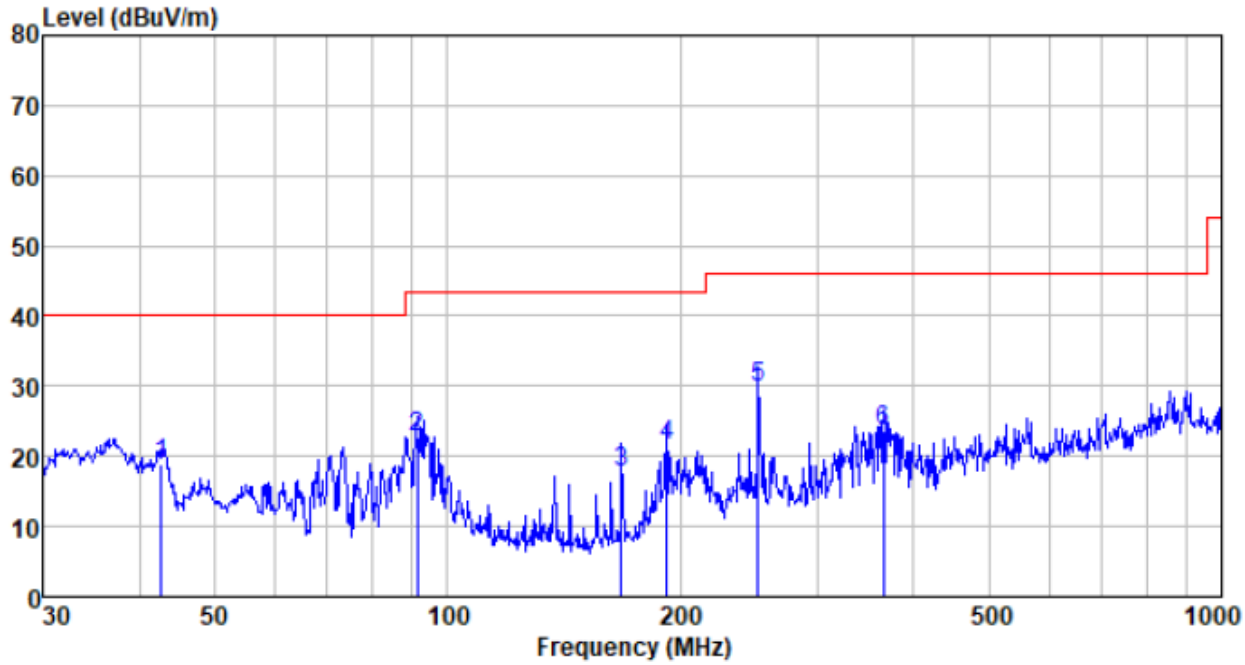
■ **Below 1GHz**

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
252.063	65.99	12.22	2.14	37.38	42.97	46.00	-3.03	QP
336.035	51.11	14.29	2.55	37.46	30.49	46.00	-15.51	QP
413.271	49.81	15.63	2.92	37.52	30.84	46.00	-15.16	QP
457.507	45.13	16.52	3.12	37.51	27.26	46.00	-18.74	QP
763.376	41.67	20.78	4.32	37.62	29.15	46.00	-16.85	QP
896.997	45.42	22.27	4.83	37.60	34.92	46.00	-11.08	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
42.750	41.86	12.23	0.69	35.82	18.96	40.00	-21.04	QP
91.495	47.45	10.90	1.12	36.65	22.82	43.50	-20.68	QP
167.824	44.86	8.46	1.67	37.18	17.81	43.50	-25.69	QP
191.745	47.06	9.99	1.80	37.29	21.56	43.50	-21.94	QP
252.063	52.71	12.22	2.14	37.38	29.69	46.00	-16.31	QP
365.539	43.51	14.78	2.69	37.49	23.49	46.00	-22.51	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
4821.750	44.37	31.79	14.44	37.67	52.93	74.00	-21.07	Vertical
7232.625	35.53	36.19	16.31	35.68	52.35	74.00	-21.65	Vertical
9643.500	33.84	38.07	18.24	34.92	55.23	74.00	-18.77	Vertical
12054.375	*					74.00		Vertical
14465.250	*					74.00		Vertical
16876.125	45.57	31.79	14.44	37.67	54.13	74.00	-19.87	Horizontal
4821.750	34.67	36.19	16.31	35.68	51.49	74.00	-22.51	Horizontal
7232.625	33.87	38.07	18.24	34.92	55.26	74.00	-18.74	Horizontal
9643.500	*					74.00		Horizontal
12054.375	*					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
4821.750	36.87	31.79	14.44	37.67	45.43	54.00	-8.57	Vertical
7232.625	25.77	36.19	16.31	35.68	42.59	54.00	-11.41	Vertical
9643.500	25.87	38.07	18.24	34.92	47.26	54.00	-6.74	Vertical
12054.375	*					54.00		Vertical
14465.250	*					54.00		Vertical
16876.125	35.76	31.79	14.44	37.67	44.32	54.00	-9.68	Horizontal
4821.750	26.88	36.19	16.31	35.68	43.70	54.00	-10.30	Horizontal
7232.625	25.03	38.07	18.24	34.92	46.42	54.00	-7.58	Horizontal
9643.500	*					54.00		Horizontal
12054.375	*					54.00		Horizontal

Remark:

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

Test channel:	Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2441.250	50.03	31.85	14.51	37.68	58.71	74.00	-15.29	Vertical
4882.500	36.89	36.37	16.48	35.64	54.10	74.00	-19.90	Vertical
7323.750	33.41	38.35	18.52	34.99	55.29	74.00	-18.71	Vertical
9765.000								Vertical
12206.250	*	*	*	*	*	*	*	Vertical
4882.500	48.34	31.85	14.51	37.68	57.02	74.00	-16.98	Horizontal
7323.750	37.85	36.37	16.48	35.64	55.06	74.00	-18.94	Horizontal
9765.000	32.54	38.35	18.52	34.99	54.42	74.00	-19.58	Horizontal
12206.250								Horizontal
14647.500	*	*	*	*	*	*	*	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
2441.250	38.63	31.85	14.51	37.68	47.31	54.00	-6.69	Vertical
4882.500	30.71	36.37	16.48	35.64	47.92	54.00	-6.08	Vertical
7323.750	25.85	38.35	18.52	34.99	47.73	54.00	-6.27	Vertical
9765.000								Vertical
12206.250	*	*	*	*	*	*	*	Vertical
4882.500	37.02	31.85	14.51	37.68	45.70	54.00	-8.30	Horizontal
7323.750	29.22	36.37	16.48	35.64	46.43	54.00	-7.57	Horizontal
9765.000	26.54	38.35	18.52	34.99	48.42	54.00	-5.58	Horizontal
12206.250								Horizontal
14649.00	*					54.00		Horizontal

Remark:

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

Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4943.250	49.12	31.91	14.61	37.69	57.95	74.00	-16.05	Vertical
7414.875	37.06	36.56	16.63	35.60	54.65	74.00	-19.35	Vertical
9886.500	33.44	38.72	18.51	35.05	55.62	74.00	-18.38	Vertical
12358.125								Vertical
14829.750	*	*	*	*	*	*	*	Vertical
4943.250	46.71	31.91	14.61	37.69	55.54	74.00	-18.46	Horizontal
7414.875	33.58	36.56	16.63	35.60	51.17	74.00	-22.83	Horizontal
9886.500	32.02	38.72	18.51	35.05	54.20	74.00	-19.80	Horizontal
12358.125								Horizontal
14829.750	*	*	*	*	*	*	*	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
4943.250	36.64	31.91	14.61	37.69	45.47	54.00	-8.53	Vertical
7414.875	31.52	36.56	16.63	35.60	49.11	54.00	-4.89	Vertical
9886.500	26.74	38.72	18.51	35.05	48.92	54.00	-5.08	Vertical
12358.125								Vertical
14829.750	*	*	*	*	*	*	*	Vertical
4943.250	35.47	31.91	14.61	37.69	44.30	54.00	-9.70	Horizontal
7414.875	32.01	36.56	16.63	35.60	49.60	54.00	-4.40	Horizontal
9886.500	26.54	38.72	18.51	35.05	48.72	54.00	-5.28	Horizontal
12358.125								Horizontal
14838.00	*							Horizontal

Remark:

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

8 Test Setup Photo

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

9 EUT Constructional Details

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

---End---