FCC TEST REPORT

For

Beijing Jia An Electronic Technology Co., Ltd

Transceiver Module

Test Model: AN1312UA-A-915

Prepared for	:	Beijing Jia An Electronic Technology Co., Ltd
Address	:	No.19, Gu Cheng West Street, Shi Jing Shan District, Beijing 100043, China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	May 06, 2021
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	May 06, 2021 ~ June 30, 2021
Date of Report	:	June 30, 2021

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FCC TEST REPORT
FCC CFR 47 PART 15 C(15.249)

Report Reference No.	**:**	**LCS210506018AEA100**
Date of Issue	:	June 30, 2021
Testing Laboratory Name.....	**:**	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Shajing Street, Baoan District, Shenzhen, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	**:**	**Beijing Jia An Electronic Technology Co., Ltd**
Address	:	No.19, Gu Cheng West Street, Shi Jing Shan District, Beijing 100043, China
Test Specification		
Standard.....	:	FCC CFR 47 PART 15 C(15.249) / ANSI C63.10: 2013
Test Report Form No.....	**:**	LCSEMC-1.0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....	:	Dated 2011-03

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EUT Description.	**:**	**Transceiver Module**
Trade Mark	:	Cansec Wireless
Test Model.....	:	AN1312UA-A-915
Ratings	:	DC 3.3V
Result	:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Lh Li	Jin Wang	Gavin Liang
Lh Li/ Administrators	Jin Wang/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : **LCS210506018AEA100**	June 30, 2021 Date of issue

Test Model.....	:	AN1312UA-A-915
EUT.....	:	Transceiver Module
Applicant.....	**:**	**Beijing Jia An Electronic Technology Co., Ltd**
Address.....	:	No.19, Gu Cheng West Street, Shi Jing Shan District, Beijing 100043, China
Telephone.....	:	
Fax.....	:	
Manufacturer.....	**:**	**Beijing Jia An Electronics Technology Co., Ltd.**
Address.....	:	No.19, Gucheng West Street, Shijingshan District, Beijing, 100043, China
Telephone.....	:	
Fax.....	:	
Factory.....	**:**	**Beijing Jia An Electronics Technology Co., Ltd.**
Address.....	:	No.19, Gucheng West Street, Shijingshan District, Beijing, 100043, China
Telephone.....	:	
Fax.....	:	

Test Result	**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	June 30, 2021	Initial Issue	Gavin Liang
100	June 30, 2021	update Issue	Gavin Liang

Note: 100-Change history: The EUT is identical to the original supplied for certification except for:

Item of change	Before the change	After the change
new applicant's name and address	Radiocontrolli SRL Via Carditello 10, P.co Nuovo Villaggio 6 81050 San Tammaro -CE Italy	Beijing Jia An Electronic Technology Co., Ltd No.19, Gu Cheng West Street, Shi Jing Shan District, Beijing 100043, China
new model name	RC-CC1312R-915	AN1312UA-A-915
new Trade Mark	Radiocontrolli	Cansec Wireless

TABLE OF CONTENTS

Description ..... Page

1. GENERAL INFORMATION 6
1.1. DESCRIPTION OF DEVICE (EUT) 6
1.2. HOST SYSTEM CONFIGURATION LIST AND DETAILS 6
1.3. EXTERNAL I/O CABLE 6
1.4. DESCRIPTION OF TEST FACILITY 6
1.5. STATEMENT OF THE MEASUREMENT UNCERTAINTY 6
1.6. MEASUREMENT UNCERTAINTY 7
1.7. DESCRIPTION OF TEST MODES 7
1.8. FREQUENCY OF CHANNELS 7

2. TEST METHODOLOGY 8
2.1. EUT CONFIGURATION 8
2.2. EUT EXERCISE 8
2.3. GENERAL TEST PROCEDURES 8

3. SYSTEM TEST CONFIGURATION 9
3.1. JUSTIFICATION 9
3.2. EUT EXERCISE SOFTWARE 9
3.3. SPECIAL ACCESSORIES 9
3.4. BLOCK DIAGRAM/SCHEMATICS 9
3.5. EQUIPMENT MODIFICATIONS 9
3.6. TEST SETUP 9

4. SUMMARY OF TEST RESULTS 10

5. TEST RESULT 11
5.1. ANTENNA REQUIREMENT 11
5.2. POWER LINE CONDUCTED EMISSIONS (NOT APPLICABLE) 12
5.3. RADIATED EMISSION MEASUREMENT 13
5.4. RESULTS FOR BAND EDGE TESTING 25
5.5. 99% OCCUPIED BANDWIDTH AND 20 DB BANDWIDTH MEASUREMENT 29

6. LIST OF MEASURING EQUIPMENT 31

7. TEST SETUP PHOTOGRAPHS OF EUT 32

8. EXTERIOR PHOTOGRAPHS OF THE EUT 32

9. INTERIOR PHOTOGRAPHS OF THE EUT 32

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Transceiver Module
Test Model	:	AN1312UA-A-915
Power Supply	:	DC 3.3V
Hardware Version	:	V1.0
Software Version	:	/
915	:	
Frequency Range	:	905 MHz-925MHz
Channel Number	:	101 channels
Channel Spacing	:	200KHz
Modulation Type	:	GFSK
Antenna Description	:	External Antenna, 1.8 dBi(Max.)

1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
--	--	--	--	--

1.3. External I/O Cable

I/O Port Description	Quantity	Cable
--	--	--

1.4. Description of Test Facility

NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10:2013 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	±3.10dB	(1)
		30MHz~200MHz	±2.96dB	(1)
		200MHz~1000MHz	±3.10dB	(1)
		1GHz~26.5GHz	±3.80dB	(1)
		26.5GHz~40GHz	±3.90dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	±1.63dB	(1)
Power disturbance	:	30MHz~300MHz	±1.60dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.7. Description of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

Worst-case mode and channel used for 9 KHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be Low Channel.

1.8. Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	**905**	26	910.2	52	915.4	78	920.6
1	905.2	27	910.4	53	915.6	79	920.8
2	905.4	28	910.6	54	915.8	80	921
3	905.6	29	910.8	55	916	81	921.2
4	905.8	30	911	56	916.2	82	921.4
5	906	31	911.2	57	916.4	83	921.6
6	906.2	32	911.4	58	916.6	84	921.8
7	906.4	33	911.6	59	916.8	85	922
8	906.6	34	911.8	60	917	86	922.2
9	906.8	35	912	61	917.2	87	922.4
10	907	36	912.2	62	917.4	88	922.6
11	907.2	37	912.4	63	917.6	89	922.8
12	907.4	38	912.6	64	917.8	90	923
13	907.6	39	912.8	65	918	91	923.2
14	907.8	40	913	66	918.2	92	923.4
15	908	41	913.2	67	918.4	93	923.6
16	908.2	42	913.4	68	918.6	94	923.8
17	908.4	43	913.6	69	918.8	95	924
18	908.6	44	913.8	70	919	96	924.2
19	908.8	45	914	71	919.2	97	924.4
20	909	46	914.2	72	919.4	98	924.6
21	909.2	47	914.4	73	919.6	99	924.8
22	909.4	48	914.6	74	919.8	**100**	**925**
23	909.6	49	914.8	75	920	/	/
24	909.8	**50**	**915**	76	920.2	/	/
25	910	51	915.2	77	920.4	/	/

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd.

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the normal operating mode that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.249 under the FCC Rules Part 15 Subpart C.

2.3. General Test Procedures

2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013.

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmits condition. Continuous transmitting was pre-programmed. It'll keep transmitting with modulated signal at the lowest, middle and highest channel by installing the battery.

3.2. EUT Exercise Software

The system was configured for testing in a continuous transmits condition and change test channels by Keys on the auxiliary test circuit provided by application.

3.3. Special Accessories

No.	Equipment	Manufacturer	Model No.	Serial No.	Length	shielded/ unshielded	Notes
--	--	--	--	--	--	--	--

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 15 Subpart C §15.249		
FCC Rules	**Description Of Test**	**Result**
§15.203	Antenna Requirement	Compliant
§15.207(a)	Power Line Conducted Emissions	N/A*
§15.205(a), §15.209(a), §15.249(a), §15.249(c)	Radiated Emissions Measurement	Compliant
§15.249 (d)	Band Edges Measurement	Compliant
§2.1049	99% and 20 dB Bandwidth	Compliant

Remark:
N/A - Not Applicable for this device!!!*

5. TEST RESULT

5.1. ANTENNA REQUIREMENT

5.1.1. Standard Applicable

According to § 15.203 and RSS-Gen, 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 shall be considered sufficient to comply with the provisions of this section. 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.

5.1.2. Antenna Connected Construction

The EUT use an internal antenna and maximum antenna gain is 1.8 dBi, antenna cannot replacement, meets FCC Part §15.203 antenna requirement. Please see EUT photo for details.

Users may replace it with other antennas with lower antenna gain, but once selected, they cannot be replaced.

5.1.3. Results

Compliance.

5.2. Power line conducted emissions (NOT APPLICABLE)

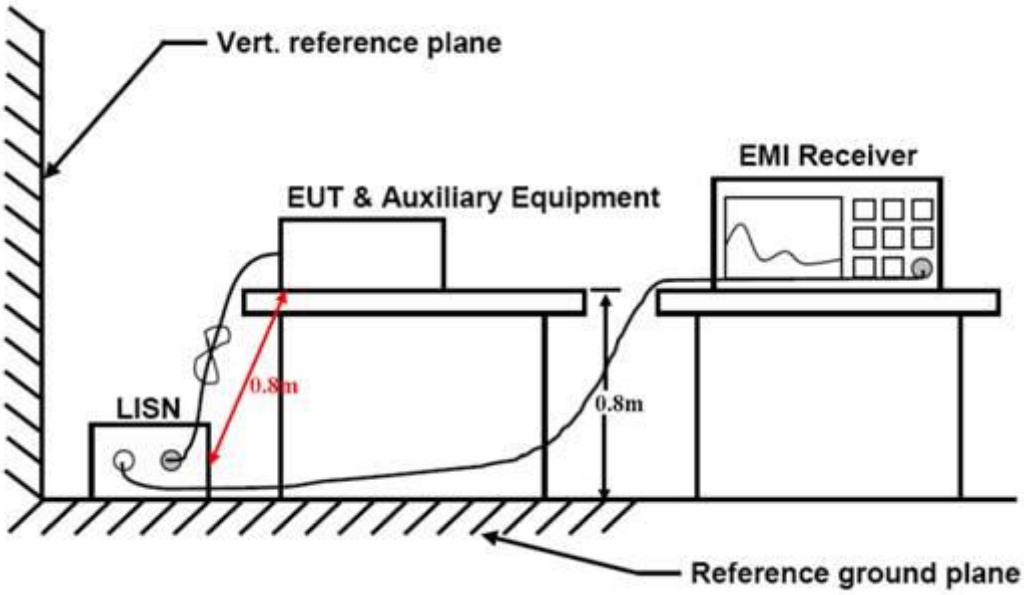
5.2.1. Standard Applicable

According to §15.207 (a) & RSS-Gen § 8.8: For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

5.2.2. Block Diagram of Test Setup



5.2.3. Test Results

Not applicable!!!

5.3. RADIATED EMISSION MEASUREMENT

5.3.1. Standard Applicable

According to FCC § 15.249: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) and 15.249 limit in the table below has to be followed.

Fundamental Frequency	Field Strength of fundamental (millivolts/meter)	Field Strength of harmonics (microvolts/meter)
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

According to RSS-210 B.10:

The field strength of fundamental and harmonic emissions, measured at 3 m, shall not exceed 50 mV/m and 0.5 mV/m respectively.

The field strength limits shall be measured using an average detector, except for the fundamental emission in the frequency band 902-928 MHz, which is based on measurements using an International Special Committee on Radio Interference (CISPR) quasi-peak detector.

Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

5.3.2. Instruments Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz for QP

5.3.3. Test Procedure

1) Sequence of testing 9 kHz to 30 MHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 1.0 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

Premeasurement:

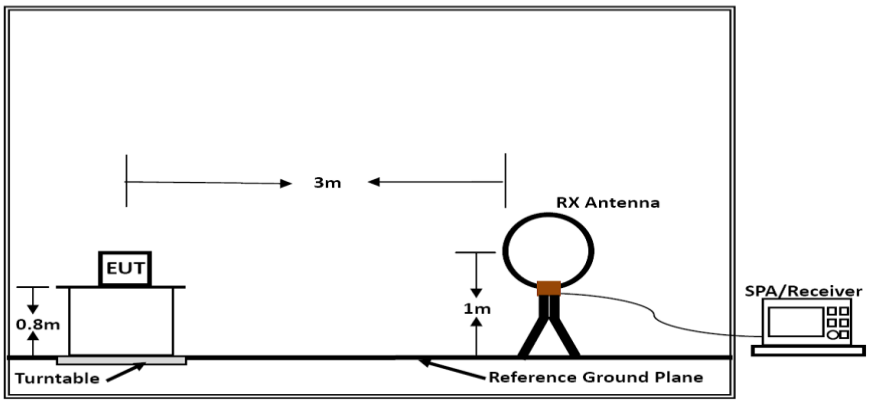
--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

Final measurement:

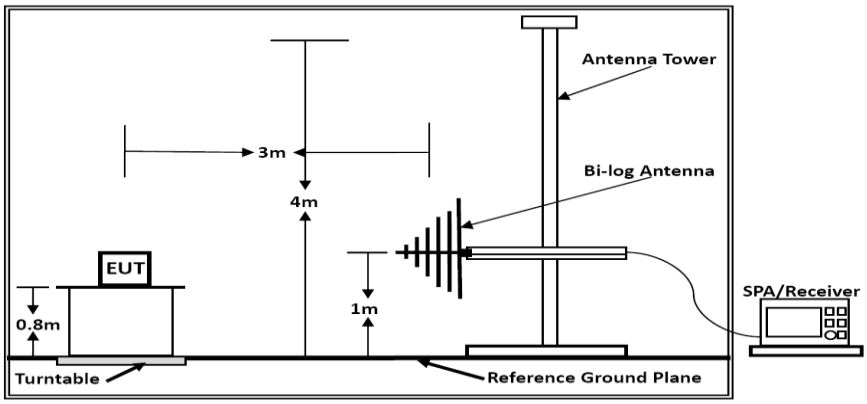
--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

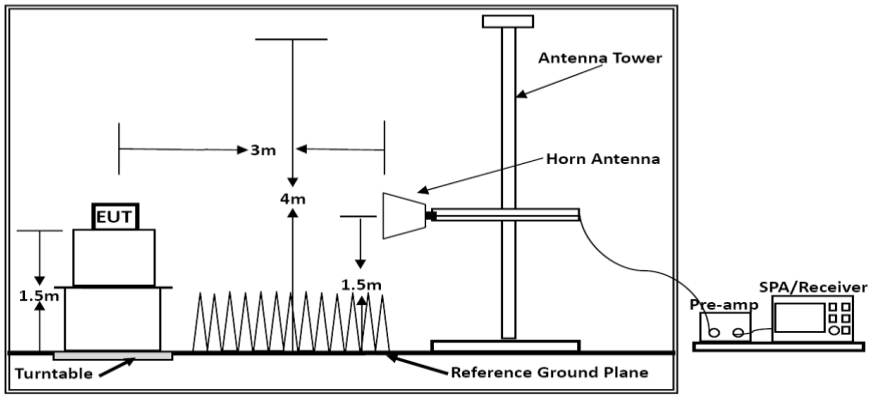
5.3.4. Block Diagram of Test Setup



Below 30MHz



Below 1GHz



Above 1GHz

Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.3.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.3.6. Test Results of Radiated Emissions (9 KHz~30 MHz)

Temperature	21.6℃	Humidity	52.7%
Test Engineer	Carl Fu	Configurations	TX

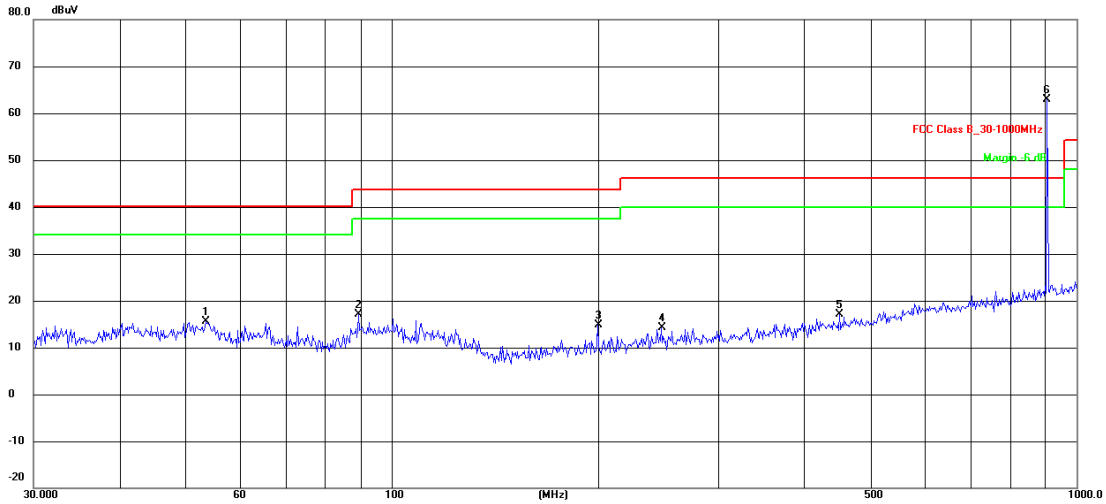
Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	Remark
-	-	-	-	See Note

Note:
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

5.3.7. Test Results of Radiated Emissions (30 MHz – 1000 MHz)

Temperature	21.6℃	Humidity	52.7%
Test Engineer	Carl Fu	Configurations	TX(905 MHz)

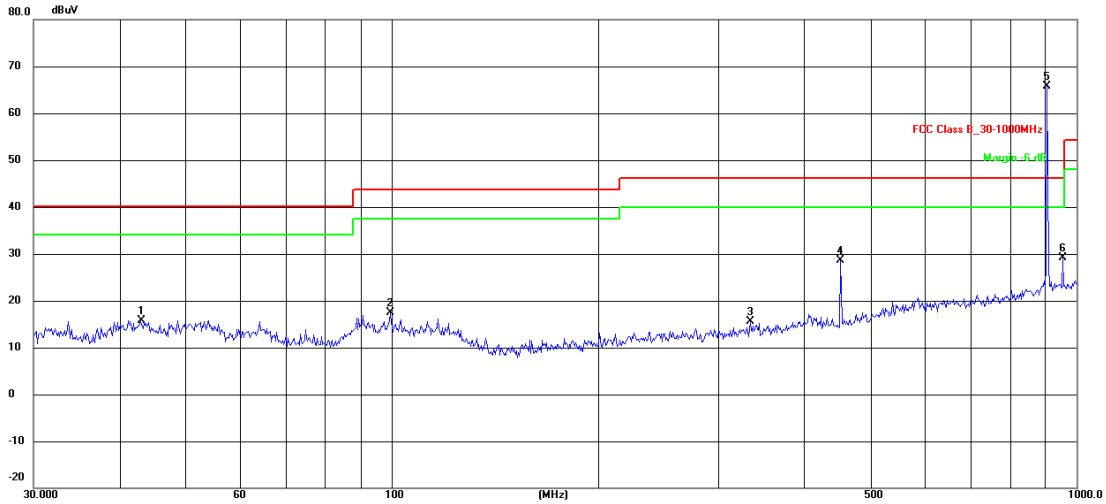
Vertical



Limit:	**FCC Class B_30-1000MHz**	**Antenna::Vertical**	**Temperature(C):21.6(C)**
Power Rating:	**DC 3.3V**		**Humidity(%):52.7%**

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Det.
1	53.5052	44.76	-29.26	15.50	40.00	-24.50	QP
2	89.5899	46.33	-29.30	17.03	43.50	-26.47	QP
3	199.9856	45.32	-30.49	14.83	43.50	-28.67	QP
4	247.6819	43.61	-29.38	14.23	46.00	-31.77	QP
5	451.1350	42.06	-24.91	17.15	46.00	-28.85	QP
6 *	905	81.15	-18.22	62.93	46.00	16.93	QP

Horizontal

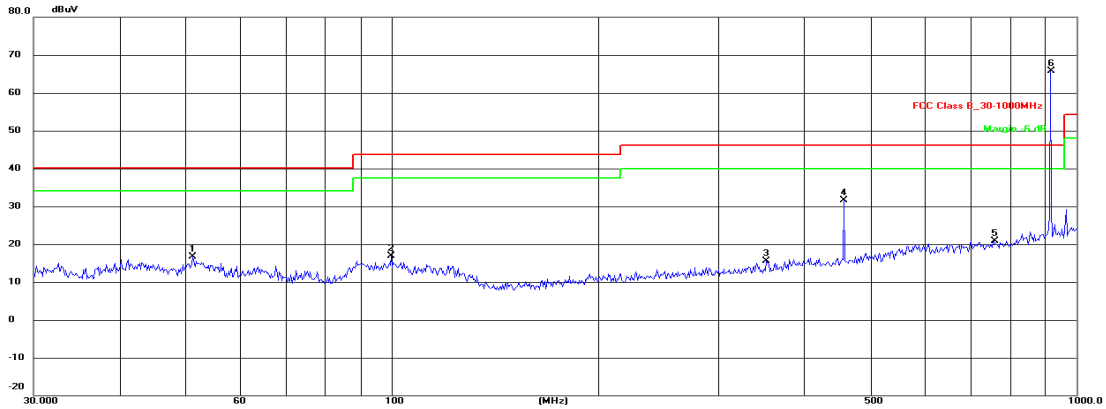


Limit:	**FCC Class B_30-1000MHz**	**Antenna::Horizontal**	**Temperature(C):21.6(C)**
Power Rating:	**DC 3.3V**		**Humidity(%):52.7%**

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Det.
1	43.0505	45.11	-29.29	15.82	40.00	-24.18	QP
2	99.5281	44.96	-27.49	17.47	43.50	-26.03	QP
3	333.6867	43.02	-27.44	15.58	46.00	-30.42	QP
4	452.7197	53.47	-24.89	28.58	46.00	-17.42	QP
5 *	905	83.97	-18.22	65.75	46.00	19.75	QP
6	955.4381	46.86	-17.75	29.11	46.00	-16.89	QP

Temperature	21.6℃	Humidity	52.7%
Test Engineer	Carl Fu	Configurations	TX(915 MHz)

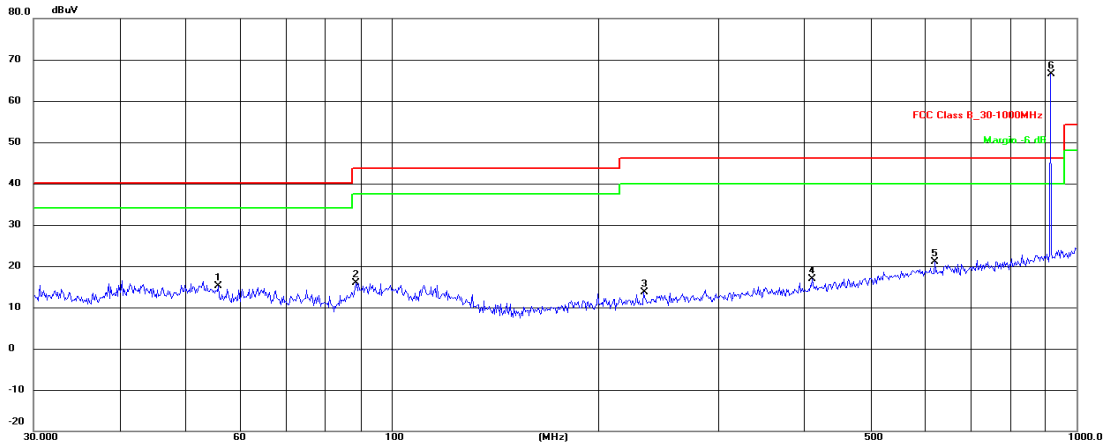
Horizontal



Limit:	**FCC Class B_30-1000MHz**	**Antenna::Horizontal**	**Temperature(C):21.6(C)**
Power Rating:	**DC 3.3V**		**Humidity(%):52.7%**

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Det.
1	51.3005	45.58	-28.97	16.61	40.00	-23.39	QP
2	99.8777	44.33	-27.43	16.90	43.50	-26.60	QP
3	352.9433	42.52	-26.99	15.53	46.00	-30.47	QP
4	457.5073	56.44	-24.80	31.64	46.00	-14.36	QP
5	758.0408	41.01	-20.11	20.90	46.00	-25.10	QP
6 *	915	83.89	-18.12	65.77	46.00	19.77	QP

Vertical

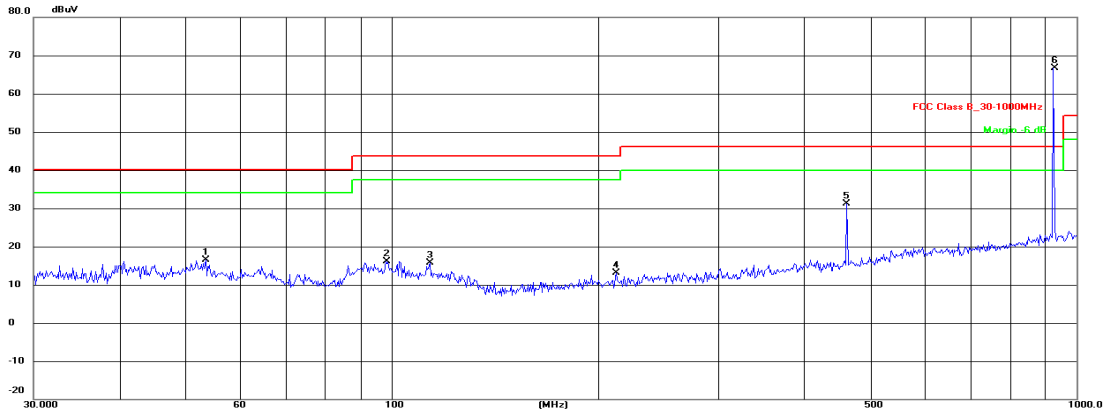


Limit:	**FCC Class B_30-1000MHz**	**Antenna::Vertical**	**Temperature(C):21.6(C)**
Power Rating:	**DC 3.3V**		**Humidity(%):52.7%**

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Det.
1	55.8047	44.77	-29.57	15.20	40.00	-24.80	QP
2	88.6524	45.54	-29.64	15.90	43.50	-27.60	QP
3	233.3487	43.38	-29.78	13.60	46.00	-32.40	QP
4	411.8240	42.48	-25.63	16.85	46.00	-29.15	QP
5	620.7096	42.62	-21.57	21.05	46.00	-24.95	QP
6 *	915	84.54	-18.12	66.42	46.00	20.42	QP

Temperature	21.6℃	Humidity	52.7%
Test Engineer	Carl Fu	Configurations	TX(925 MHz)

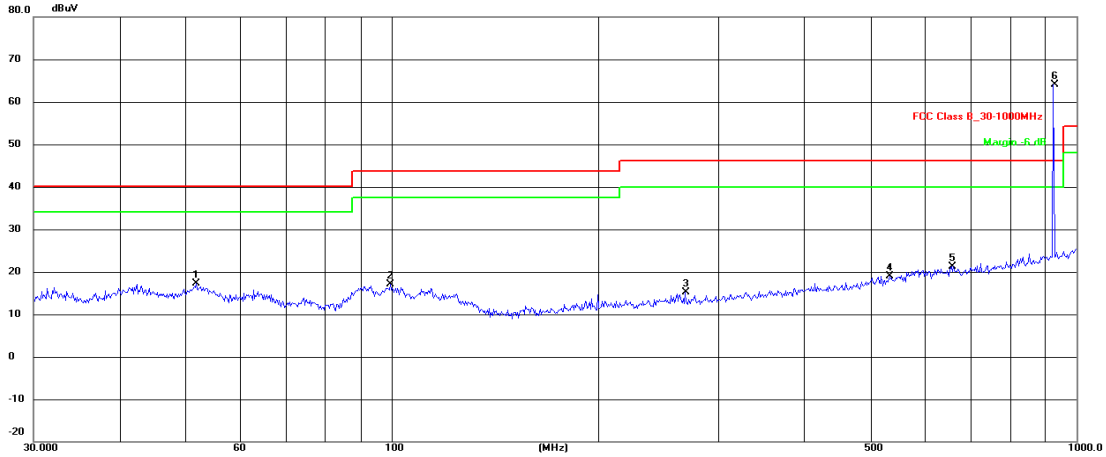
Horizontal



Limit:	FCC Class B_30-1000MHz	Antenna::Horizontal	Temperature(C):21.6(C)
Power Rating:	DC 3.3V		Humidity(%):52.7%

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Det.
1	53.5052	45.74	-29.26	16.48	40.00	-23.52	QP
2	98.1419	43.81	-27.68	16.13	43.50	-27.37	QP
3	113.7143	44.13	-28.34	15.79	43.50	-27.71	QP
4	213.0151	43.25	-30.22	13.03	43.50	-30.47	QP
5	462.3455	55.86	-24.71	31.15	46.00	-14.85	QP
6 *	925	84.69	-18.04	66.65	46.00	20.65	QP

Vertical



Limit:	FCC Class B_30-1000MHz	Antenna::Vertical	Temperature(C):21.6(C)
Power Rating:	DC 3.3V		Humidity(%):52.7%

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Det.
1	51.8430	46.23	-29.04	17.19	40.00	-22.81	QP
2	99.5281	44.55	-27.49	17.06	43.50	-26.44	QP
3	268.4853	44.13	-28.91	15.22	46.00	-30.78	QP
4	533.8321	42.27	-23.22	19.05	46.00	-26.95	QP
5	656.5300	42.57	-21.25	21.32	46.00	-24.68	QP
6 *	925	82.03	-18.04	63.99	46.00	17.99	QP

Note:

1). Pre-scan all modes and recorded the worst case results in this report (GFSK).

2). Emission level (dBuV/m) = 20 log Emission level (uV/m).

3). Corrected Reading: Antenna Factor + Cable Loss = Factor

Factor + Reading Level = Level.

Margin = Limit - Measured Level

5.3.8. Results for Radiated Emissions (1 – 26 GHz)

Horizontal

Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit（AVG） (dBuV)	Margin (dB)	Det.
905	83.97	-18.22	65.75	94.00	-28.25	QP
915	83.89	-18.12	65.77	94.00	-28.23	QP
925	84.69	-18.04	66.65	94.00	-27.35	QP

Vertical

Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit（AVG） (dBuV)	Margin (dB)	Det.
905	81.15	-18.22	62.93	94.00	-31.07	QP
915	84.54	-18.12	66.42	94.00	-27.58	QP
925	82.03	-18.04	63.99	94.00	-30.01	QP

Note: The peak is smaller than AVG limit, so you not need evaluate AVG.

TX(905MHz)

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
1810.00	45.67	33.06	35.04	3.94	47.63	74.00	-26.37	Peak	Horizontal
1810.00	35.06	33.06	35.04	3.94	37.02	54.00	-16.98	Average	Horizontal
1810.00	48.73	33.06	35.04	3.94	50.69	74.00	-23.31	Peak	Vertical
1810.00	31.98	33.06	35.04	3.94	33.94	54.00	-20.06	Average	Vertical

TX(915MHz)

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
1830.00	45.16	33.06	35.04	3.94	47.12	74.00	-26.88	Peak	Horizontal
1830.00	36.74	33.06	35.04	3.94	38.70	54.00	-15.30	Average	Horizontal
1830.00	48.28	33.06	35.04	3.94	50.24	74.00	-23.76	Peak	Vertical
1830.00	33.12	33.06	35.04	3.94	35.08	54.00	-18.92	Average	Vertical

TX(925MHz)

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
1850.00	45.17	33.06	35.04	3.94	47.13	74.00	-26.87	Peak	Horizontal
1850.00	33.65	33.06	35.04	3.94	35.61	54.00	-18.39	Average	Horizontal
1850.00	46.15	33.06	35.04	3.94	48.11	74.00	-25.89	Peak	Vertical
1850.00	30.27	33.06	35.04	3.94	32.23	54.00	-21.77	Average	Vertical

Notes:

1). Measuring frequencies from 9 KHz - 10th harmonic (ex. 26GHz), No emission found between lowest internal used/generated frequency to 30 MHz.

2). Radiated emissions measured in frequency range from 9 KHz - 10th harmonic (ex. 26GHz) were made with an instrument using Peak detector mode.

3). 18~25 GHz at least have 20dB margin. No recording in the test report.

4). Corrected Reading: Ant.Fac. + Cab.Loss + Reading Level - Pre.Fac. = Measured Level.

Margin = Limit - Measured Level

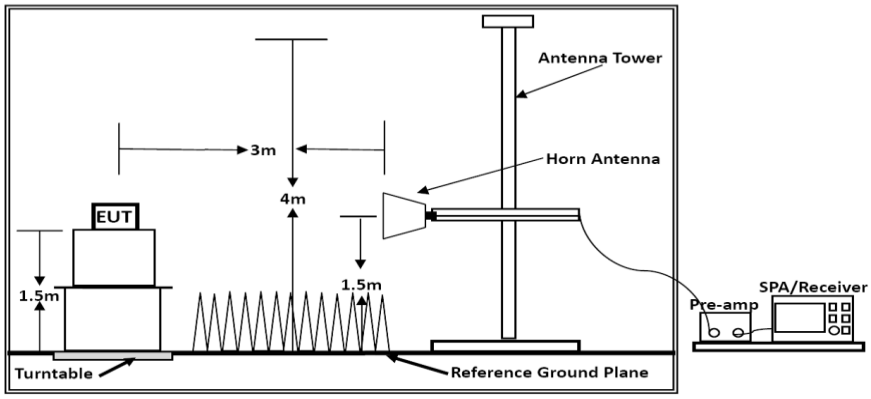
5.4. Results for Band edge Testing

5.4.1. Standard Applicable

According to FCC §15.249 (d): Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

According to RSS-210 B.10 (b): Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

5.4.2. Test Setup Layout



Above 1GHz

5.4.3. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of Spectrum Analyzer.

5.4.4. Test Procedures

3) Sequence of testing 1 GHz to 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

5.4.5. Measuring Instruments and Setting

Temperature	21.6℃	Humidity	52.7%
Test Engineer	Carl Fu		

PASS

Remark:

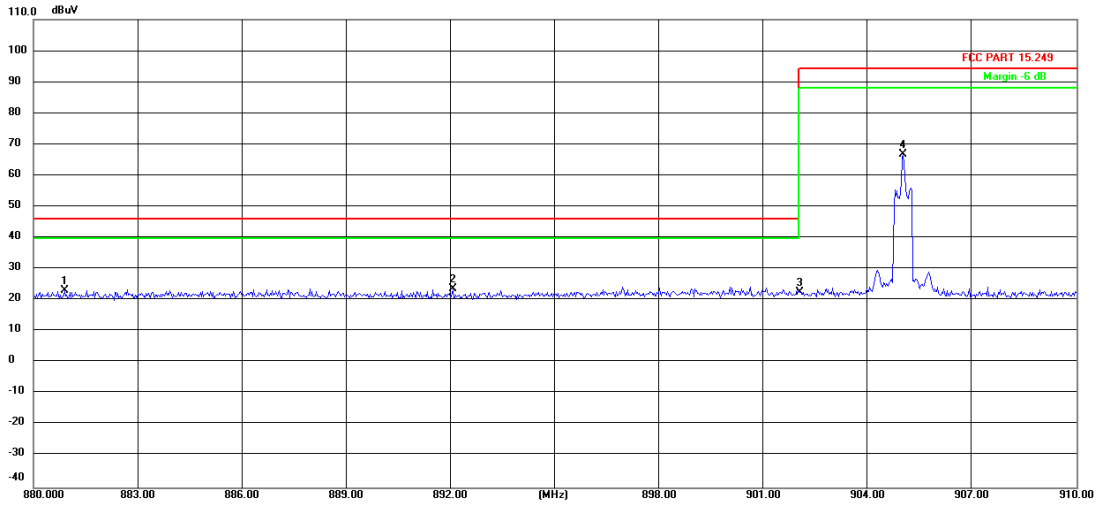
1. The other emission levels were very low against the limit.

2. The average measurement was not performed when the peak measured data under the limit of average detection.

3. Detector AV is setting spectrum/receiver. RBW=1MHz/VBW=10Hz/Sweep time=Auto/Detector=Peak;

4. Please refer to following test plots;

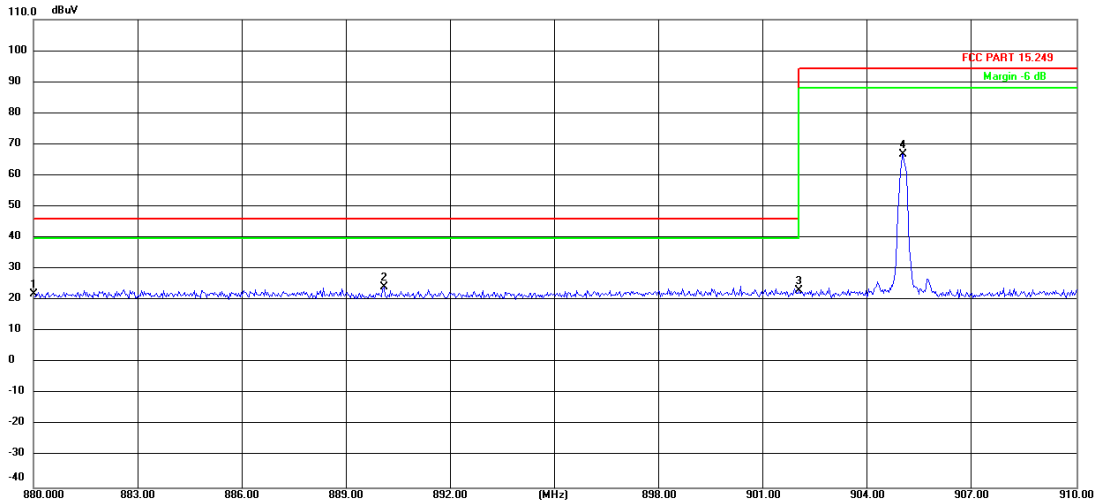
Horizontal



Limit:	**FCC PART 15.249**	**Antenna::Horizontal**	**Temperature(C):21.6(C)**
Power Rating:	**DC 3.3V**		**Humidity(%):52.7%**

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Det.
1	880.9000	41.91	-18.53	23.38	46.00	-22.62	peak
2 *	892.0600	42.09	-18.39	23.70	46.00	-22.30	peak
3	902.0000	40.94	-18.27	22.67	46.00	-23.33	peak
4	905.0200	84.95	-18.23	66.72	94.00	-27.28	peak

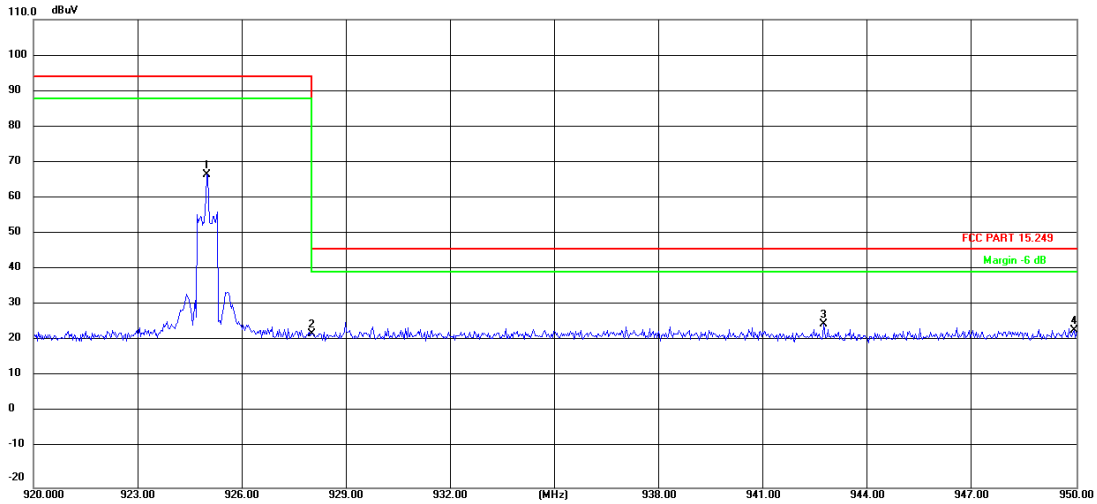
Vertical



Limit:	**FCC PART 15.249**	**Antenna::Vertical**	**Temperature(C):21.6(C)**
Power Rating:	**DC 3.3V**		**Humidity(%):52.7%**

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Det.
1	880.0000	40.66	-18.54	22.12	46.00	-23.88	peak
2 *	890.0800	42.71	-18.41	24.30	46.00	-21.70	peak
3	902.0000	41.42	-18.27	23.15	46.00	-22.85	peak
4	905.0200	84.97	-18.23	66.74	94.00	-27.26	peak

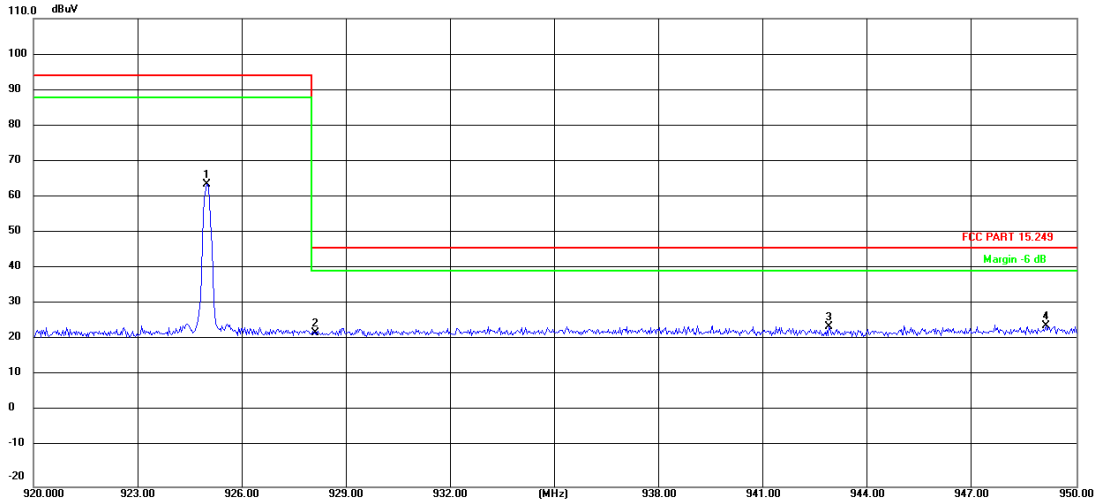
Horizontal



Limit:	**FCC PART 15.249**	**Antenna::Horizontal**	**Temperature(C):21.6(C)**
Power Rating:	**DC 3.3V**		**Humidity(%):52.7%**

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Det.
1	924.9800	84.98	-18.04	66.94	94.00	-27.06	peak
2	928.0100	40.71	-18.01	22.70	46.00	-23.30	peak
3 *	942.7400	43.39	-17.86	25.53	46.00	-20.47	peak
4	949.9400	41.50	-17.80	23.70	46.00	-22.30	peak

Vertical



Limit:	**FCC PART 15.249**	**Antenna::Vertical**	**Temperature(C):21.6(C)**
Power Rating:	**DC 3.3V**		**Humidity(%):52.7%**

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Det.
1	924.9800	82.01	-18.04	63.97	94.00	-30.03	peak
2	928.1000	40.88	-18.01	22.87	46.00	-23.13	peak
3	942.8900	42.40	-17.86	24.54	46.00	-21.46	peak
4 *	949.1300	42.68	-17.81	24.87	46.00	-21.13	peak

Note: The limit for the above tests is the AVG limit. The peak is smaller than AVG limit, so you not need evaluate AVG.

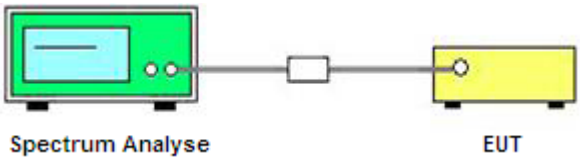
5.5. 99% Occupied Bandwidth and 20 dB Bandwidth Measurement

5.5.1. Standard Applicable

According to § 2.1049 and RSS-Gen section 6.7 “The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.”

In some cases, the “x dB bandwidth” is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

5.5.2. Block Diagram of Test Setup



5.5.3. Test Procedure

Use the following spectrum analyzer settings:

Span = 300 KHz

RBW = 3 KHz

VBW = 10 KHz

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

5.5.4. Test Results

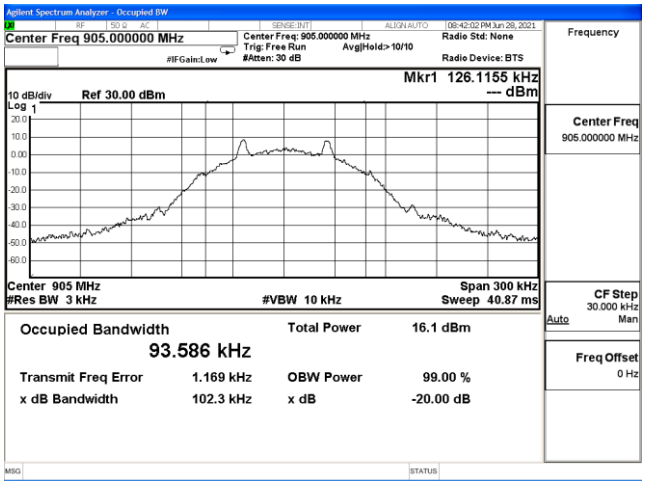
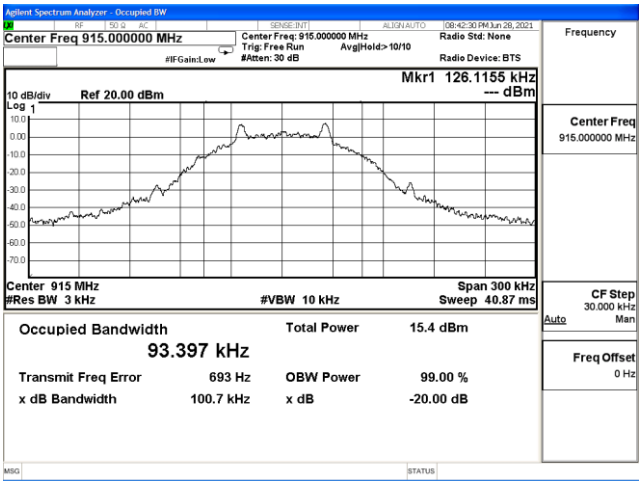
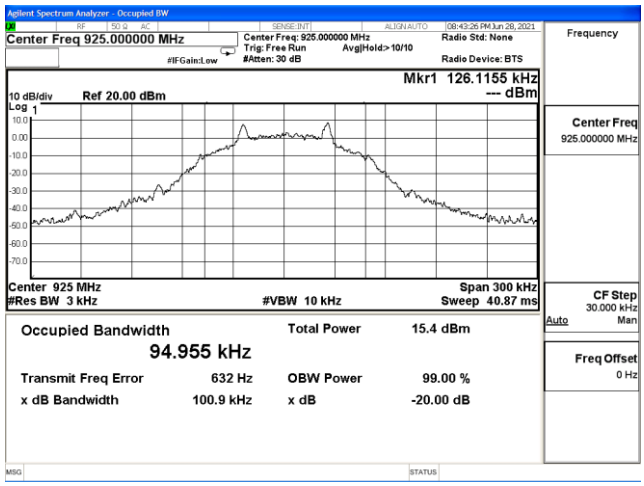
Temperature	25℃	Humidity	50%
Test Engineer	Carl Fu		

Test Result of 99% and 20dB Bandwidth Measurement			
Test Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limit (MHz)
905	102.3	93.586	Non-Specified
915	100.7	93.397	Non-Specified
925	100.9	94.955	Non-Specified

Remark:

1. Test results including cable loss;

2. Please refer following test plots;

GFSK	*GFSK*
	
905 MHz	*915 MHz*
GFSK	*/*
	*/*
925 MHz	*/*

6. LIST OF MEASURING EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Power Meter	R&S	NRVS	100444	2021-06-22	2022-06-21
2	Power Sensor	R&S	NRV-Z81	100458	2021-06-22	2022-06-21
3	Power Sensor	R&S	NRV-Z32	10057	2021-06-22	2022-06-21
4	Test Software	Tonscend	JS1120-2	/	N/A	N/A
5	RF Control Unit	Tonscend	JS0806-2	N/A	2021-06-22	2022-06-21
6	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2020-11-22	2021-11-21
7	DC Power Supply	Agilent	E3642A	N/A	2020-11-14	2021-11-13
8	EMI Test Software	EZ	EZ-EMC	/	N/A	N/A
9	3m Full Anechoic Chamber	MRDIANZI	FAC-3M	MR009	2020-09-27	2021-09-26
10	Positioning Controller	MF	MF7082	MF78020803	2021-06-22	2022-06-21
11	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2021-06-22	2022-06-21
12	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-07-26	2021-07-25
13	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2021-07-25
14	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2021-07-01
15	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-21	2021-09-20
16	Broadband Preamplifier	SCHWARZBECK	BBV9745	9719-025	2021-06-22	2022-06-21
17	EMI Test Receiver	R&S	ESR 7	101181	2021-06-22	2022-06-21
18	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2020-11-14	2021-11-13
19	Broadband Preamplifier	/	BP-01M18G	P190501	2021-06-22	2022-06-21
20	RF Cable-R03m	Jye Bao	RG142	CB021	2021-06-22	2022-06-21
21	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2021-06-22	2022-06-21
22	6dB Attenuator	/	100W/6dB	1172040	2021-06-22	2022-06-21
23	3dB Attenuator	/	2N-3dB	/	2021-06-22	2022-06-21
24	EMI Test Receiver	R&S	ESPI	101840	2021-06-22	2022-06-21
25	Artificial Mains	R&S	ENV216	101288	2021-06-22	2022-06-21
26	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2021-06-22	2022-06-21
Note: All equipment is calibrated through CHINA CEPREI LABORATORY and GUANGZHOU LISAI CALIBRATION AND TEST CO., LTD.						

7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

----------THE END OF REPORT----------