REPORT No. : KH18110035W01

TEST REPORT

MANUFACTURER	:	Xiamen Four-Faith Communication Technology Co., Ltd.
PRODUCT NAME	:	F8L10D-N LoRa Module
MODEL NAME	:	F8L10D-N-NS-U F8L10D-N-NS-S
BRAND NAME	:	Four-Faith
FCC ID	:	2ALUW-F8L10D-N
STANDARD(S)	:	47 CFR Part 15 Subpart C
TEST DATE	:	2018-11-12 to 2018-11-15
ISSUE DATE	:	2018-11-20

Tested by: Lion Xiao

Lion Xiao(Project engineer)

Approved by:

Anne Liu (Supervisor)

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DIRECTORY

Change History		
Issue	**Date**	**Reason for change**
1.0	2018-11-20	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Xiamen Four-Faith Communication Technology Co., Ltd.
Applicant Address:	11th Floor, A-06 Area, No.370, Chengyi Street, Jimei, Xiamen, Fujian, China.
Manufacturer:	Xiamen Four-Faith Communication Technology Co., Ltd.
Manufacturer Address:	11th Floor, A-06 Area, No.370, Chengyi Street, Jimei, Xiamen, Fujian, China.

1.2. Equipment Under Test (EUT) Description

Product Name:	F8L10D-N LoRa Module
Serial No:	(N/A, marked #1 by test site)
Hardware Version:	V1.2
Software Version:	V2.3
Operating Frequency Range:	903MHz – 927MHz
Modulation	FSK
Channel Number:	25
Install Antenna Type:	Stick Antenna
Install Antenna Gain:	2 dBi

Note 1: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 2: The series product, models F8L10D-N-NS-U, F8L10D-N-NS-S are have same circuit diagram and function, the differences between them are antenna connector, we selected F8L10D-N-NS-U for fully testing, the details were explained in the Annex C declaration letter.

1.3. The channel number and frequency of EUT

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	**903**	14	916
2	904	15	917
3	905	16	918
4	906	17	919
5	907	18	920
6	908	19	921
7	909	20	922
8	910	21	923
9	911	22	924
10	912	23	925
11	913	24	926
12	914	**25**	**927**
13	**915**	/	/

Note: EUT was tested with Channel 1, 13, 25.

1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 15 (10-1-15 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result
1	15.203	Antenna Requirement	N/A	N/A	PASS
2	15.215	Bandwidth	Nov 15, 2018	Scott Chen	PASS
3	15.207	Conducted Emission	Nov 12, 2018	Jinxin Huang	PASS
4	15.249	Field strength & Bandedge	Nov 12, 2018	Jinxin Huang	PASS
5	15.209, 15.249	Radiated Emission and field strength of harmonics	Nov 12, 2018	Jinxin Huang	PASS
Note 1: The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013.					

1.5. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

2. 47 CFR Part 15C Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 15.203, 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.

2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna connector. Please refer to the EUT external photos.

The install antenna is stick antenna and max gain 2dBi

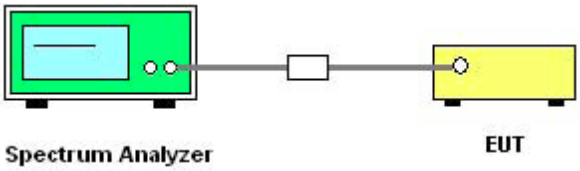
2.2. Bandwidth

2.2.1. Requirement

Refer to FCC 15.215

2.2.2. Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. In order to make an accurate measurement, set the span greater than RBW.

B. Equipments List:

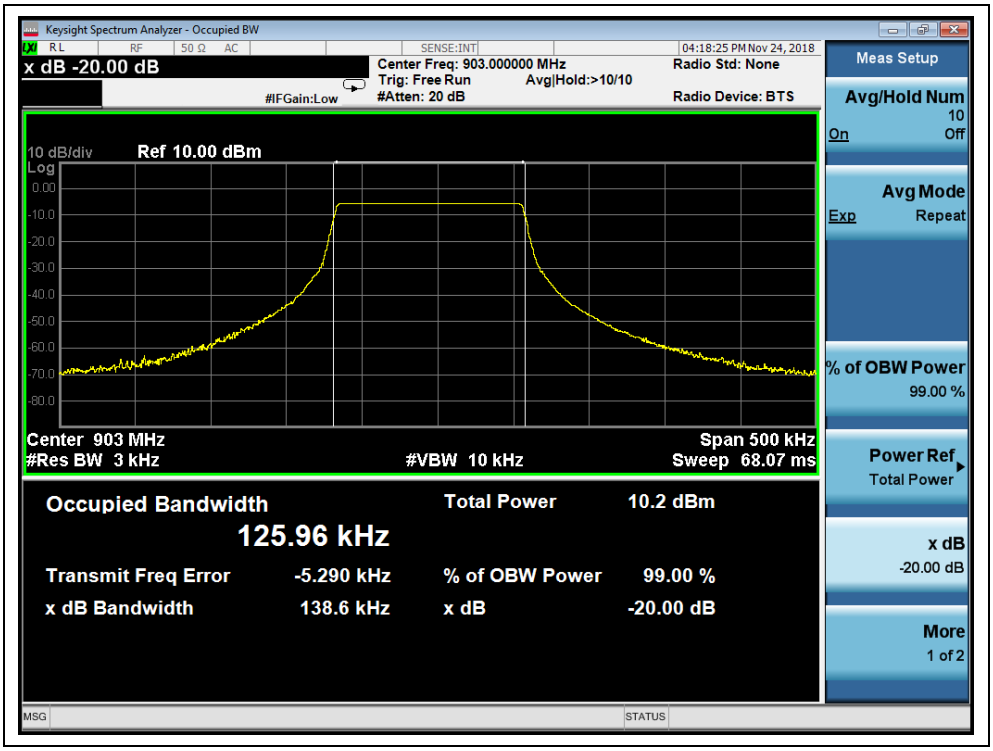
Please reference ANNEX B(4).

2.2.3. Test Result

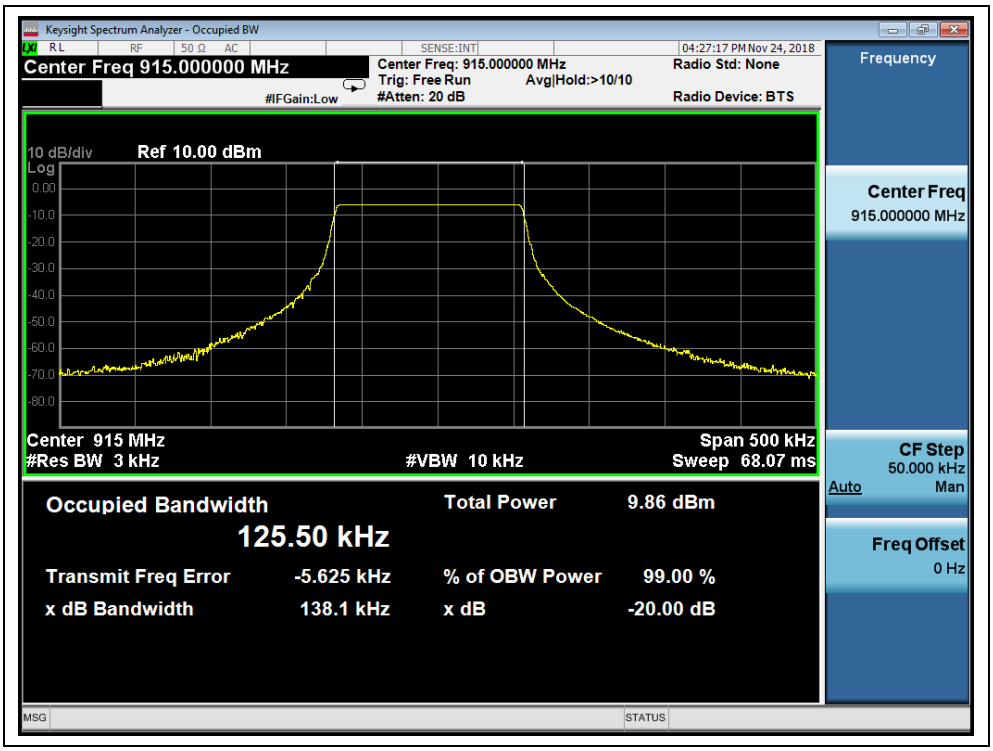
A. Test Verdict:

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	Result
1	903	138.6	PASS
13	915	138.1	PASS
25	927	138.1	PASS

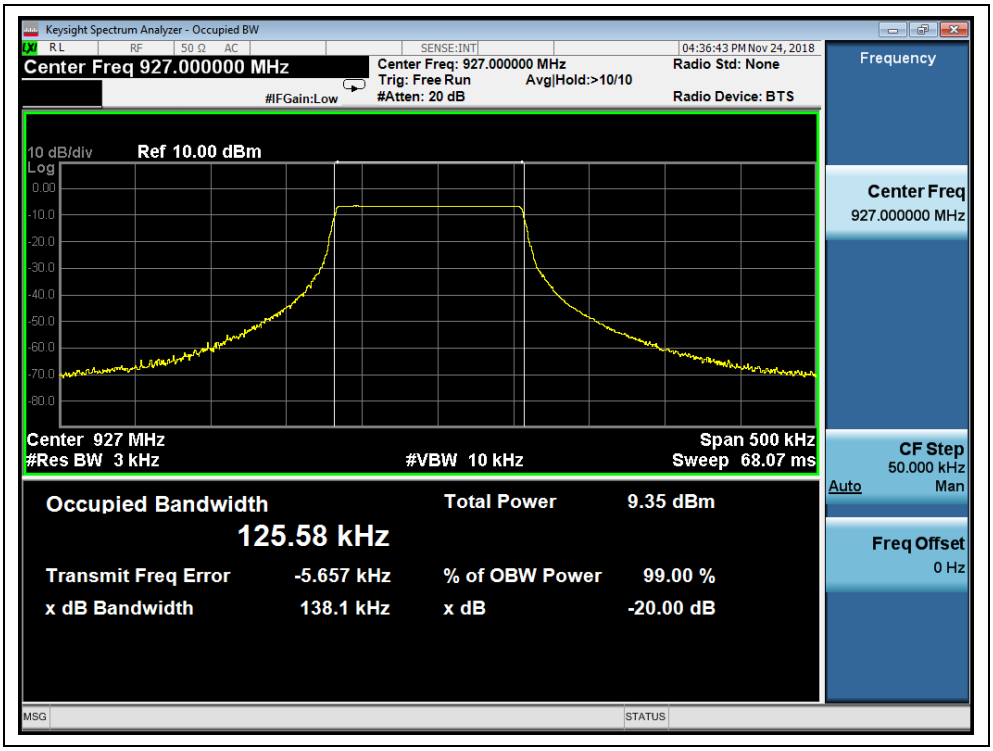
B. Test Plots:



(Channel 1, 903MHz)



(Channel 13, 915 MHz)



(Channel 25, 927 MHz)

2.3. Conducted Emission

2.3.1. Requirement

According to FCC section 15.207, for an intentional radiator that 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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

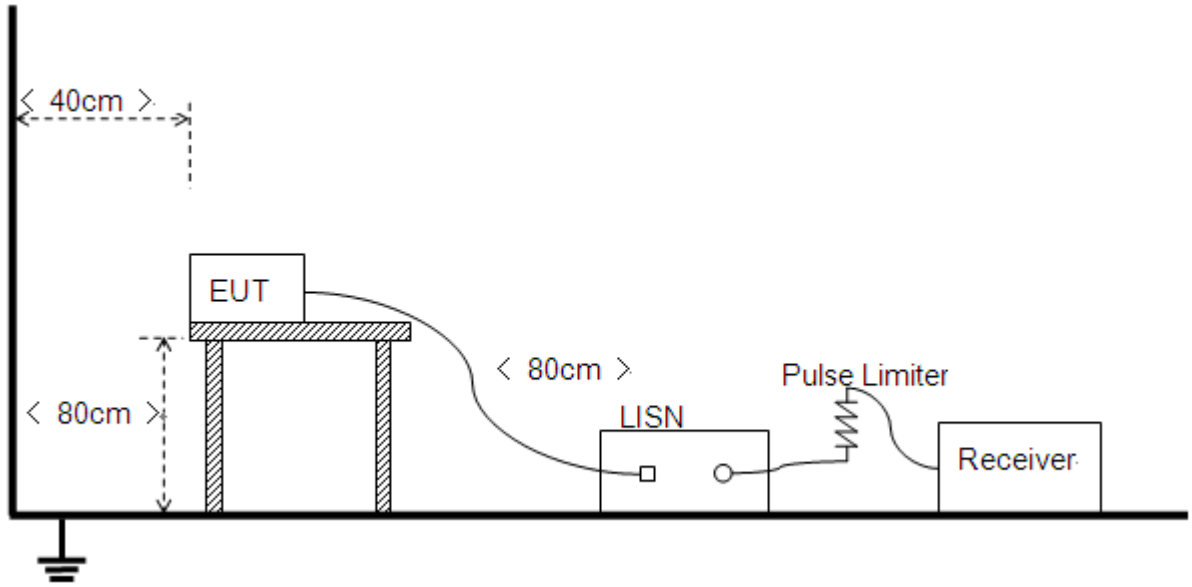
NOTE:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.3.2. Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

B. Equipments List:

Please reference ANNEX B(4).

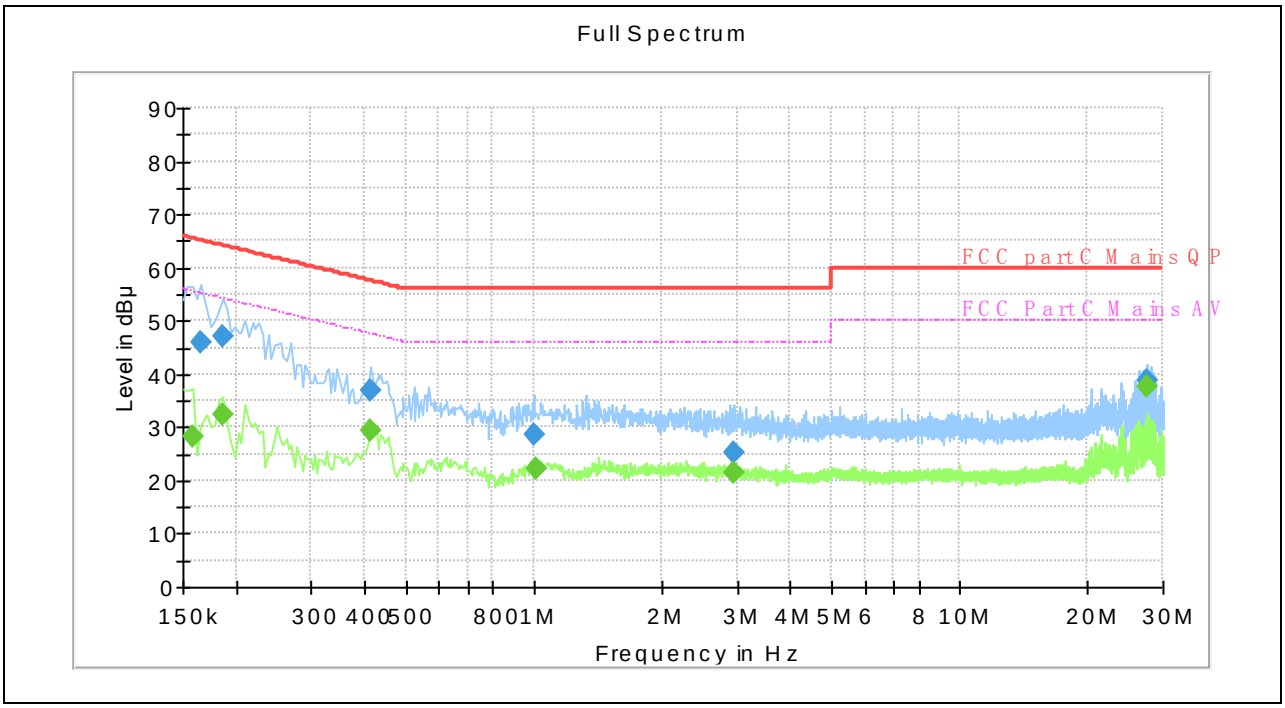
2.3.3. Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Test Setup:EUT+Laptop

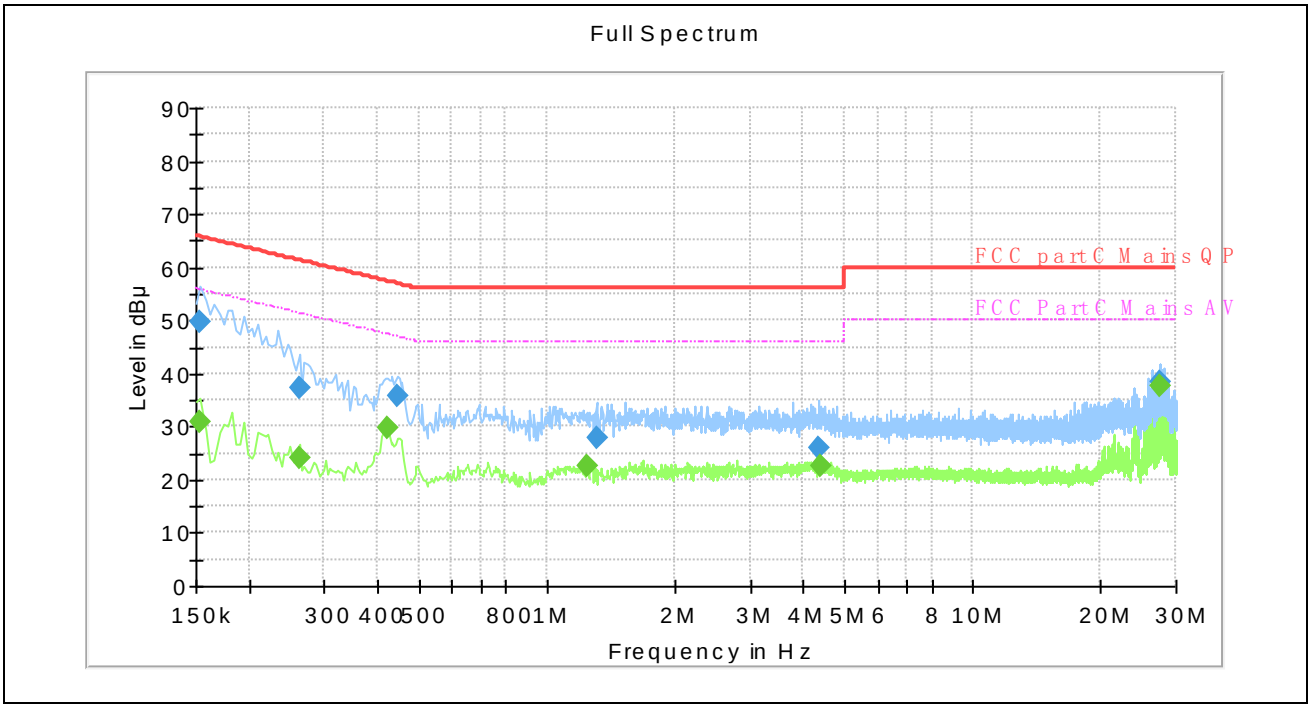
Note: The test voltage is AC 120V/60Hz

Tset Plots



(Plot A: L Phase)

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.158000	---	28.36	55.57	27.21	L1	10.2
0.166000	46.04	---	65.16	19.12	L1	10.2
0.186000	---	32.21	54.21	22.00	L1	10.2
0.186000	47.12	---	64.21	17.09	L1	10.2
0.414000	---	29.29	47.57	18.28	L1	10.2
0.414000	36.89	---	57.57	20.68	L1	10.2
0.998000	28.46	---	56.00	27.54	L1	10.3
1.018000	---	22.37	46.00	23.63	L1	10.3
2.962000	25.32	---	56.00	30.68	L1	10.4
2.962000	---	21.62	46.00	24.38	L1	10.4
27.438000	38.70	---	60.00	21.30	L1	10.6
27.478000	---	37.75	50.00	12.25	L1	10.6



(Plot B: N Phase)

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.154000	---	30.96	55.78	24.83	N	10.2
0.154000	49.73	---	65.78	16.05	N	10.2
0.262000	---	24.16	51.37	27.20	N	10.2
0.262000	37.32	---	61.37	24.05	N	10.2
0.422000	---	29.66	47.41	17.74	N	10.2
0.446000	35.96	---	56.95	20.99	N	10.2
1.238000	---	22.45	46.00	23.55	N	10.3
1.306000	27.82	---	56.00	28.18	N	10.3
4.354000	25.81	---	56.00	30.19	N	10.4
4.394000	---	22.78	46.00	23.22	N	10.4
27.438000	38.44	---	60.00	21.56	N	10.5
27.518000	---	37.66	50.00	12.34	N	10.5

2.4. Fundamental&Bandedge

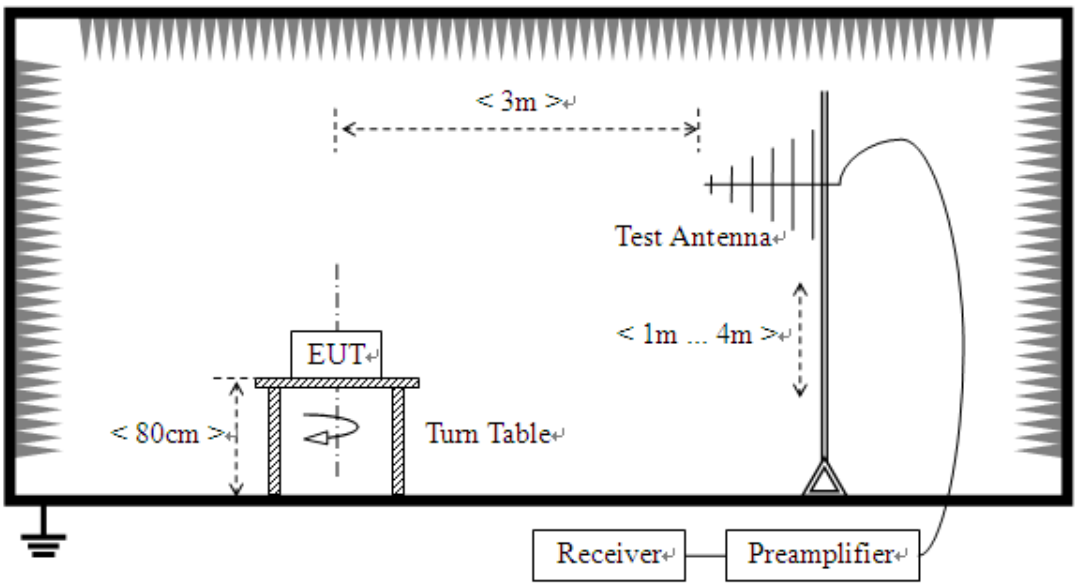
2.4.1. Requirement

According to FCC section 15.249(a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

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

2.4.2. Test Description

A. Test Setup:



The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

B. Equipments List:

Please reference ANNEX B(4).

2.4.3. Test Procedure

The measurement results are obtained as below:

$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

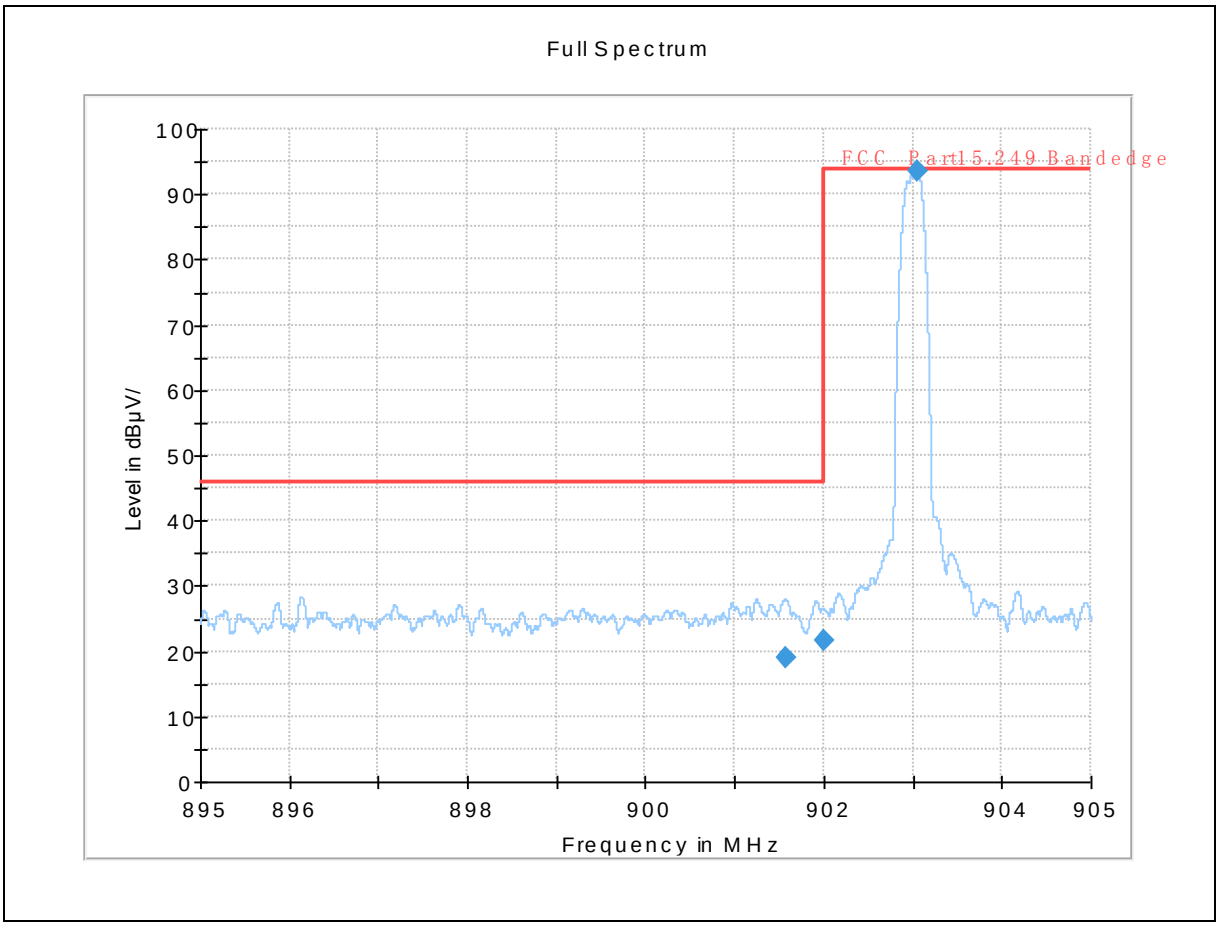
During the test, the total correction Factor AT and A_{Factor} were built in test software.

Note: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report

2.4.4. Test Result

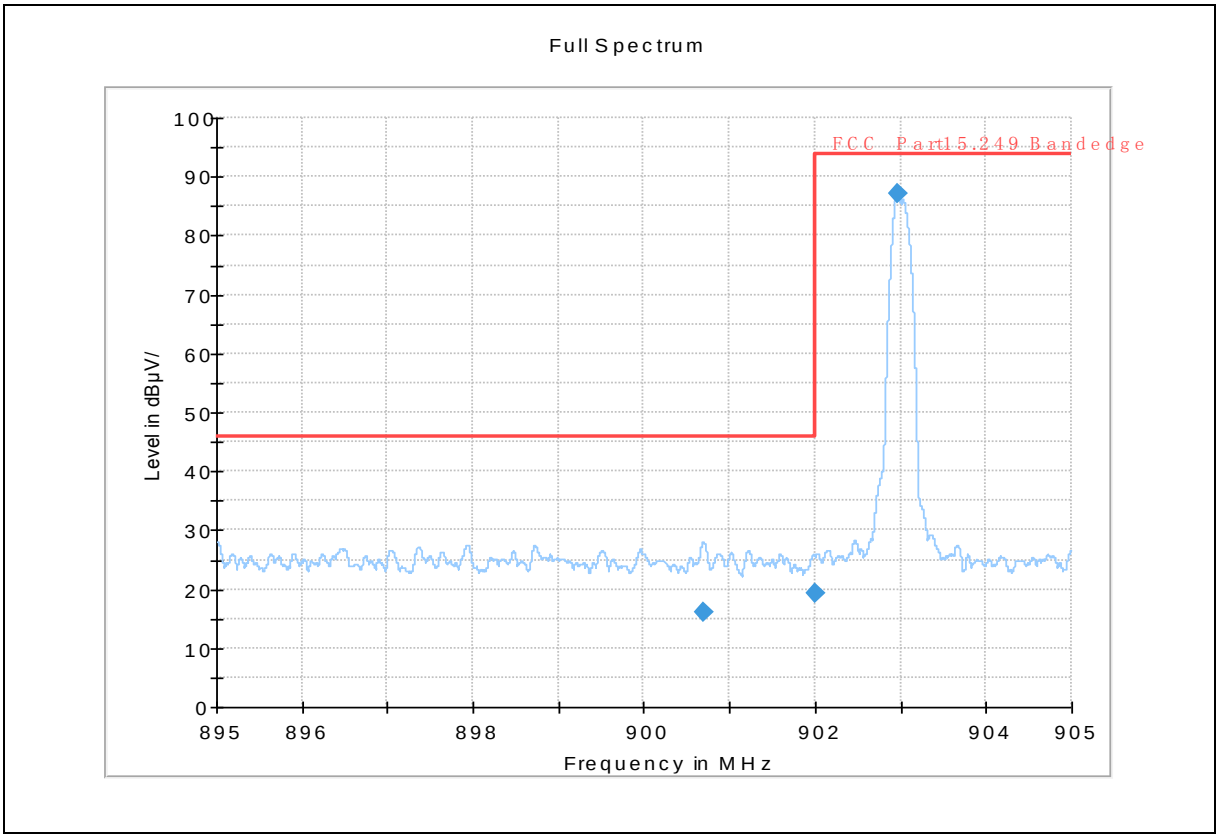
Channel	Frequency (MHz)	Detector	Limit (dBμV/m)	Antenna	Verdict
1	903	QuasiPeak	94	Horizontal	Pass
1	903	QuasiPeak	94	Vertical	Pass
13	915	QuasiPeak	94	Horizontal	Pass
13	915	QuasiPeak	94	Vertical	Pass
25	927	QuasiPeak	94	Horizontal	Pass
25	927	QuasiPeak	94	Vertical	Pass

Plots for Channel=1:



(Channel 1, 903MHz, Antenna Horizontal)

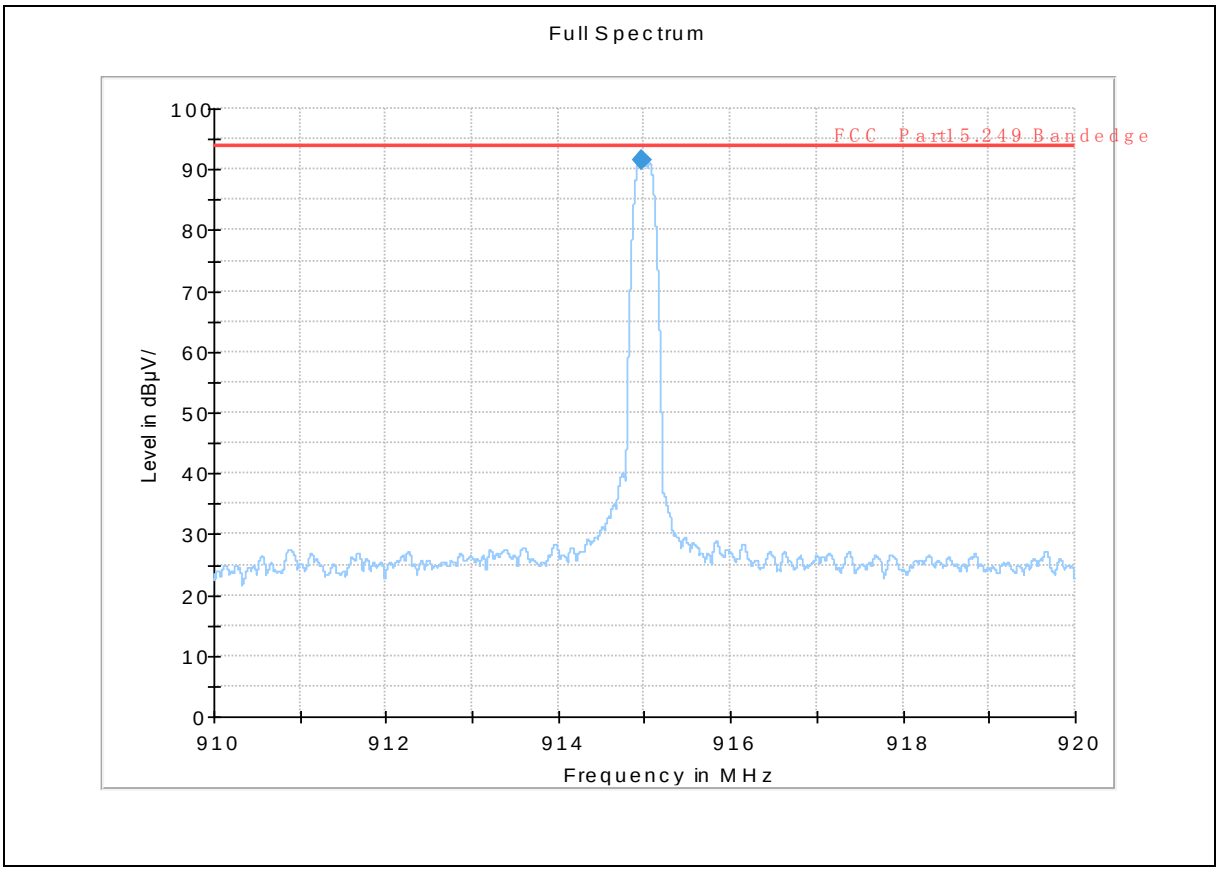
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
901.563333	18.87	46.00	27.13	H	28.1
902.000000	21.63	46.00	24.37	H	28.1
903.051667	93.50	94.00	0.50	H	28.1



(Channel 1, 903MHz, Antenna Vertical)

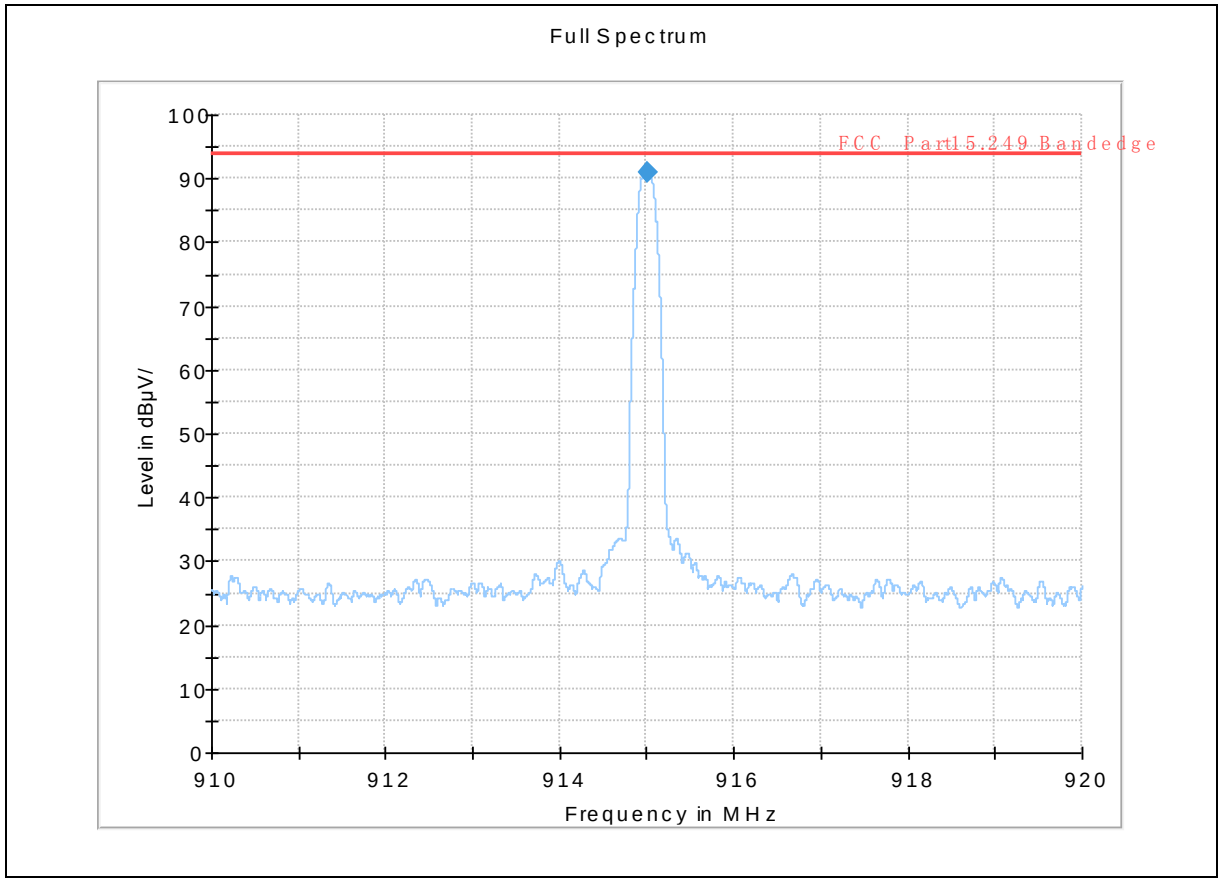
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
900.690000	16.18	46.00	29.82	V	28.1
902.000000	19.36	46.00	26.64	V	28.1
902.963889	87.11	94.00	6.89	V	28.1

Plots for Channel=13:



(Channel 13, 915MHz, Antenna Horizontal)

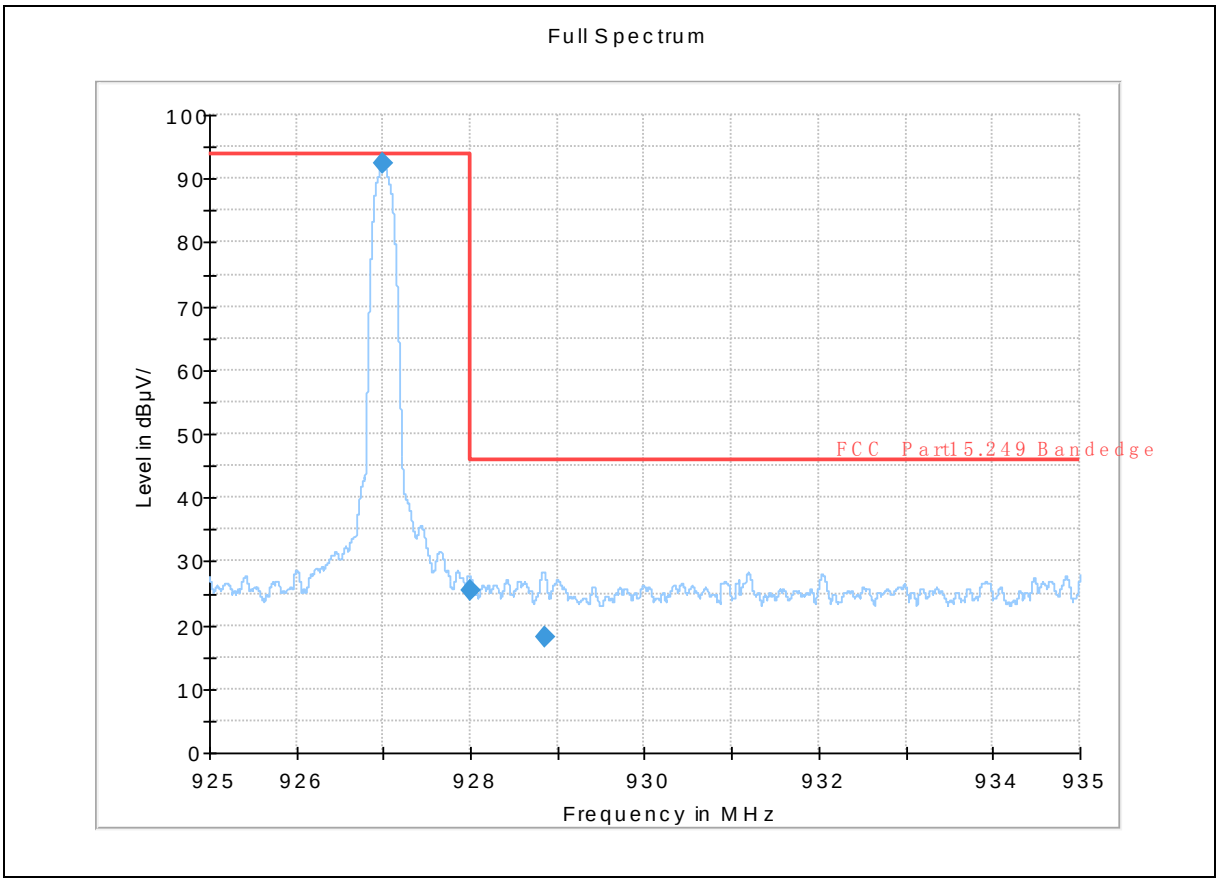
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
914.957222	91.42	94.00	2.58	H	28.0



(Channel 13, 915MHz, Antenna Vertical)

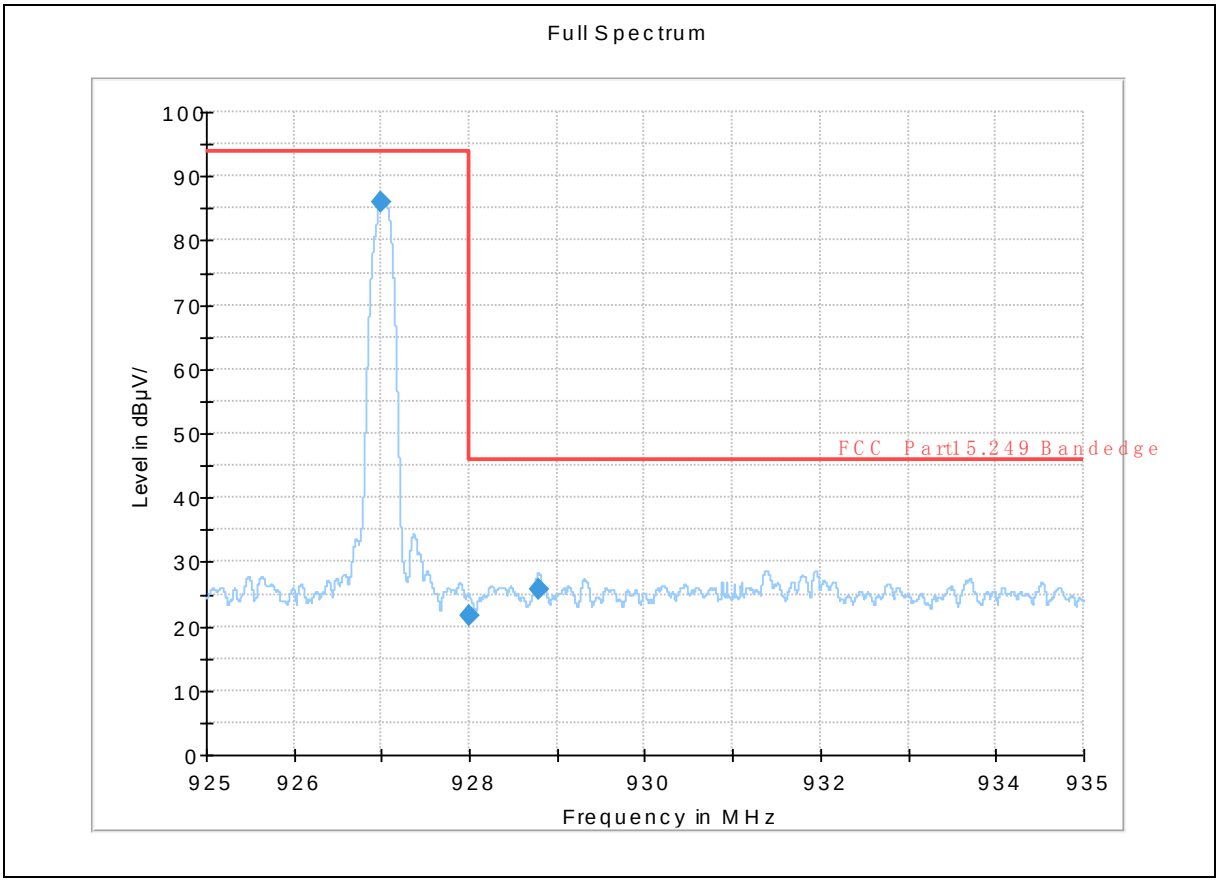
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
915.013333	90.81	94.00	3.19	V	28.0

Plots for Channel=25:



(Channel 25, 927MHz, Antenna Horizontal)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
926.994445	92.47	94.00	1.53	H	28.0
928.000000	25.33	46.00	20.67	H	28.0
928.845000	18.15	46.00	27.85	H	28.1



(Channel 25, 927MHz, Antenna Vertical)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
926.994445	85.82	94.00	8.18	V	28.0
928.000000	21.66	46.00	24.34	V	28.0
928.845000	25.62	46.00	20.38	V	28.1

2.5. Radiated Emission and field strength of harmonics

2.5.1. Requirement

According to section 15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

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

According to section 15.249(d), Emission Radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in Section 15.209:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)	Field Strength Limitation at 3m Measurement Distance	
			(uV/m)	(dBuV/m)
0.009 - 0.490	2400/F(kHz)	300	10000* 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 - 1.705	24000/F(kHz)	30	100* 2400/F(KHz)	20log 2400/F(KHz) + 40
1.705 - 30.0	30	30	100*30	20log 30 + 40
30 - 88	100	3	100	20log 100
88 - 216	150	3	150	20log 150
216 - 960	200	3	200	20log 200
Above 960	500	3	500	20log 500

According to section 15.249(e), for frequencies above 1000MHz, the above field strength limits are based on average limits. The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.

Note:

1) The tighter limit shall apply at the boundary between two frequency range.

2) Limitation expressed in dBuV/m is calculated by 20log Emission Level(uV/m).

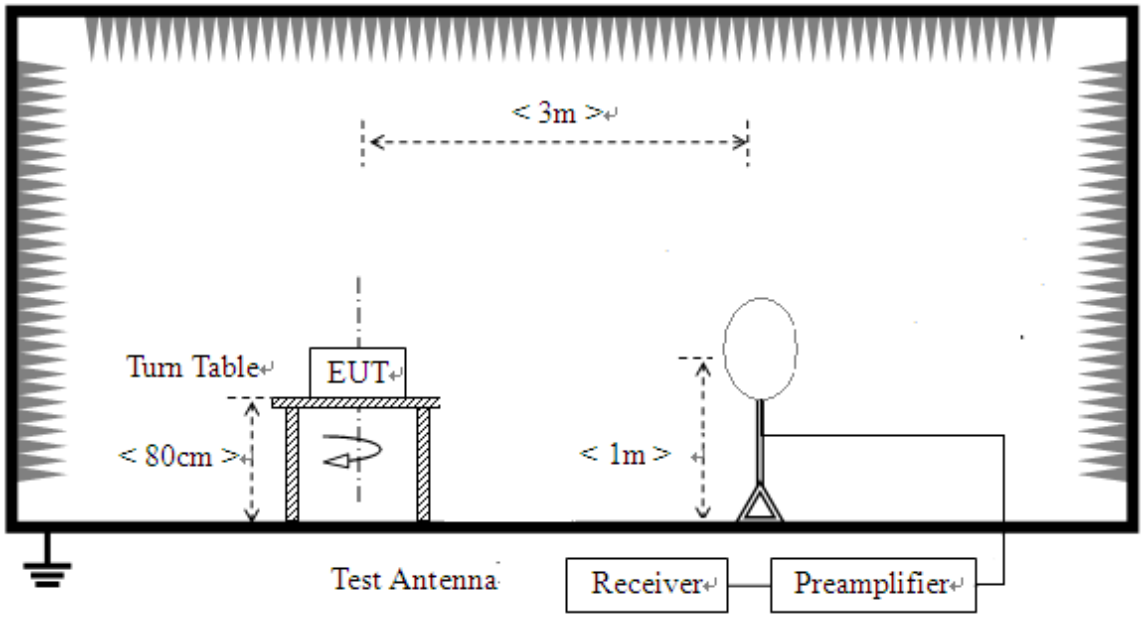
3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using theformula of Ld1 = Ld2 * $(d2/d1)^2$.

Example: F.S Limit at 30m distance is 30uV/m, then F.S Limitation at 3m distance is adjusted as Ld1 = L1 = 30uV/m * $(10)^2$ = 100 * 30uV/m

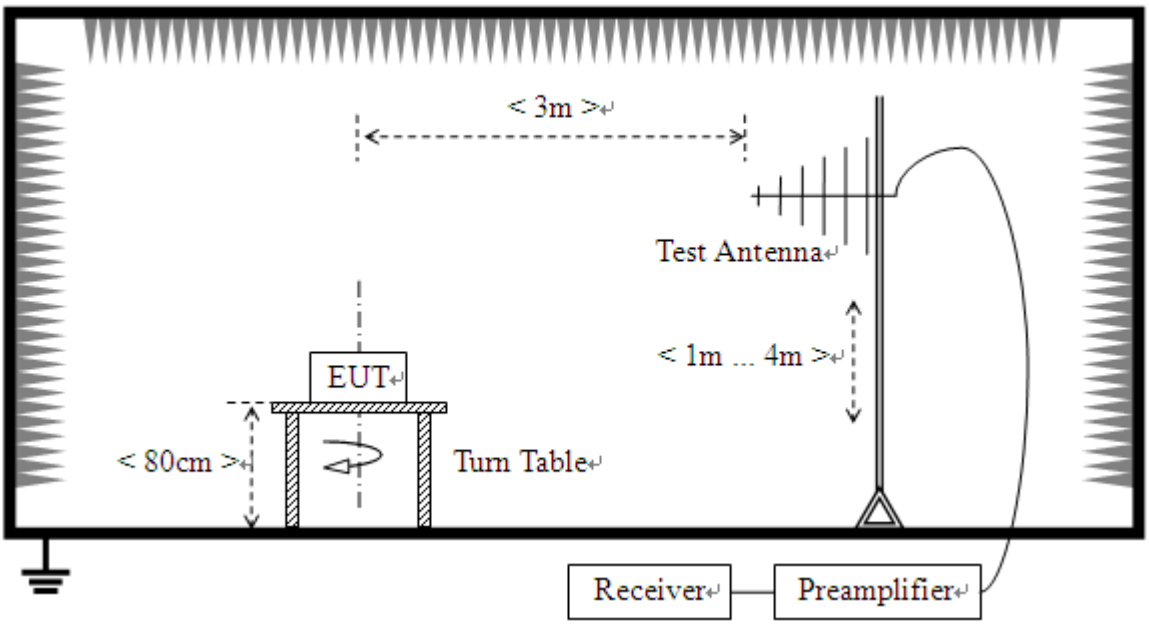
2.5.2. Test Description

A. Test Setup:

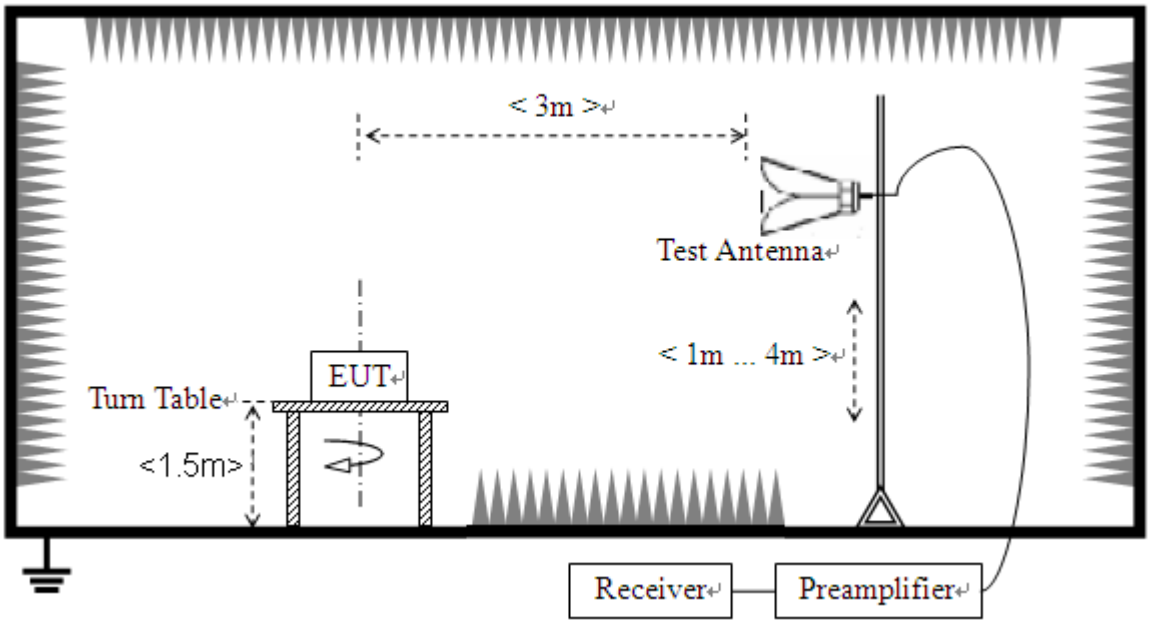
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The RF absorbing material used on the reference ground plane and on the turntable have a maximum height (thickness) of 30 cm (12 in) and have a minimum-rated attenuation of 20 dB at all frequencies from 1 GHz to 18 GHz. Test site have a minimum area of the ground plane covered with RF absorbing material as specified in Figure 6 of ANSI C63.4: 2014.

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10:2013. For radiated emissions below or equal to 1GHz, The EUT was set-up on insulator 80cm above the Ground Plane, For radiated emissions above 1GHz, The EUT was set-up on insulator 150cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10:2013.

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

(a) In the frequency range of 9 kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Place the test antenna at 3m away from area of the EUT, while keeping the test antenna aimed at the source of emissions at each frequency of significant

emissions, with polarization oriented for maximum response. The test antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final test antenna elevation shall be that which maximizes the emissions. The test antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. The emission levels at both horizontal and vertical polarizations should be tested.

B. Equipments List:

Please reference ANNEX B(4).

2.5.3. Test Result Test Procedure

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

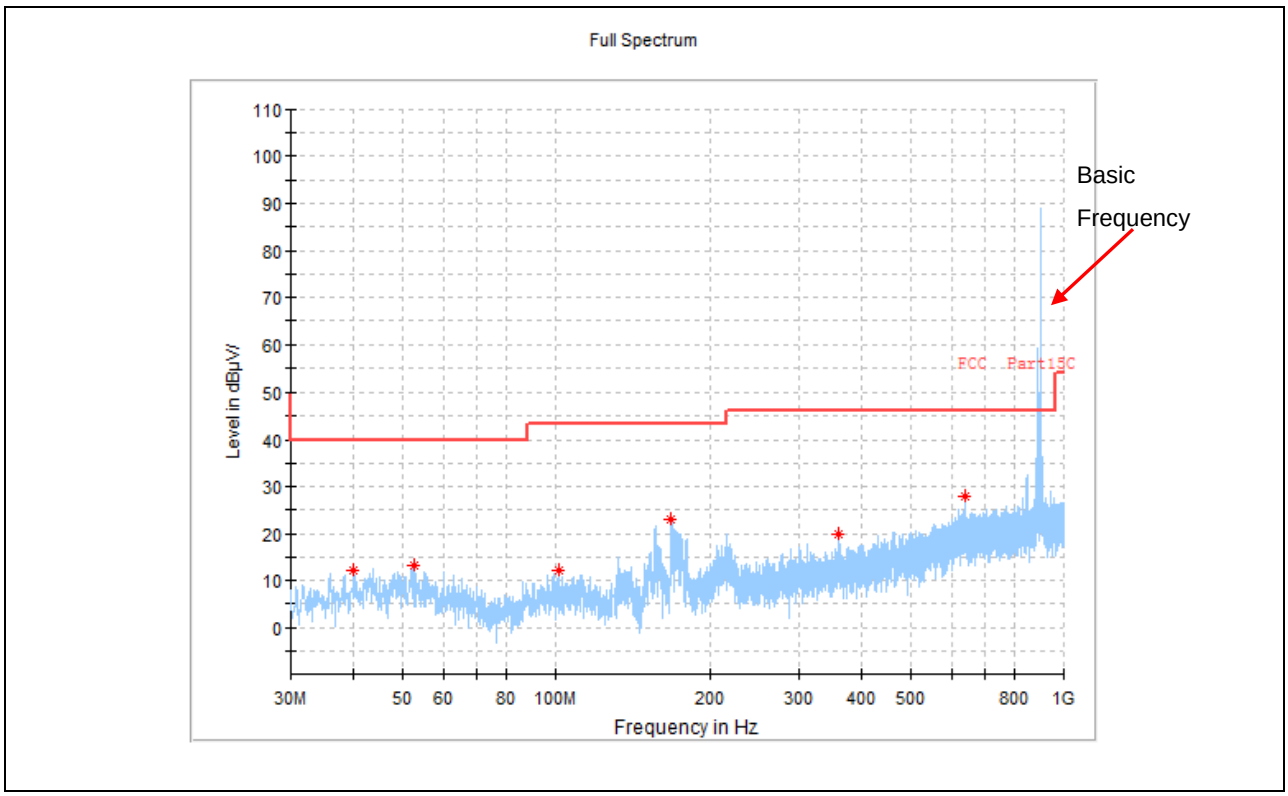
A_{Factor}: Antenna Factor at 3m

During the test, the total correction Factor A_T and A_{Factor} were built in test software.

Note: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

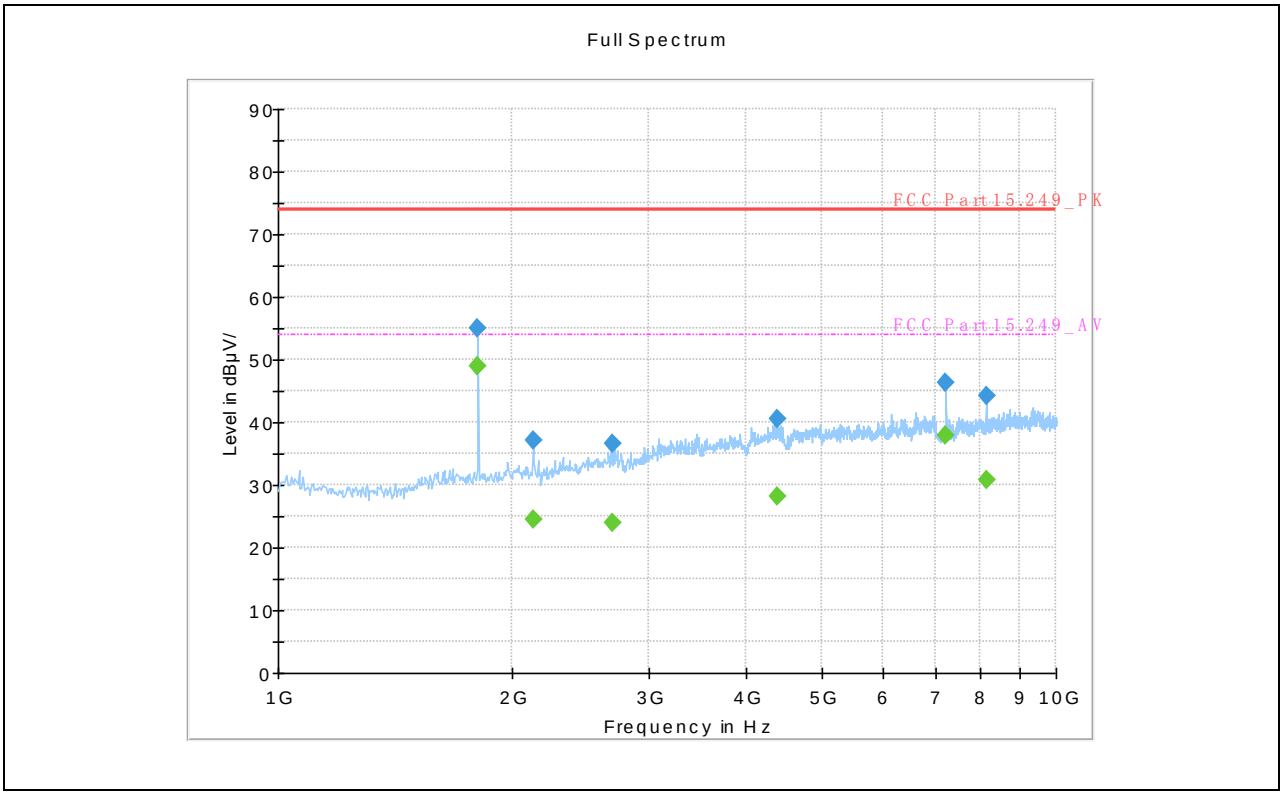
The low frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

2.5.4. Test Result



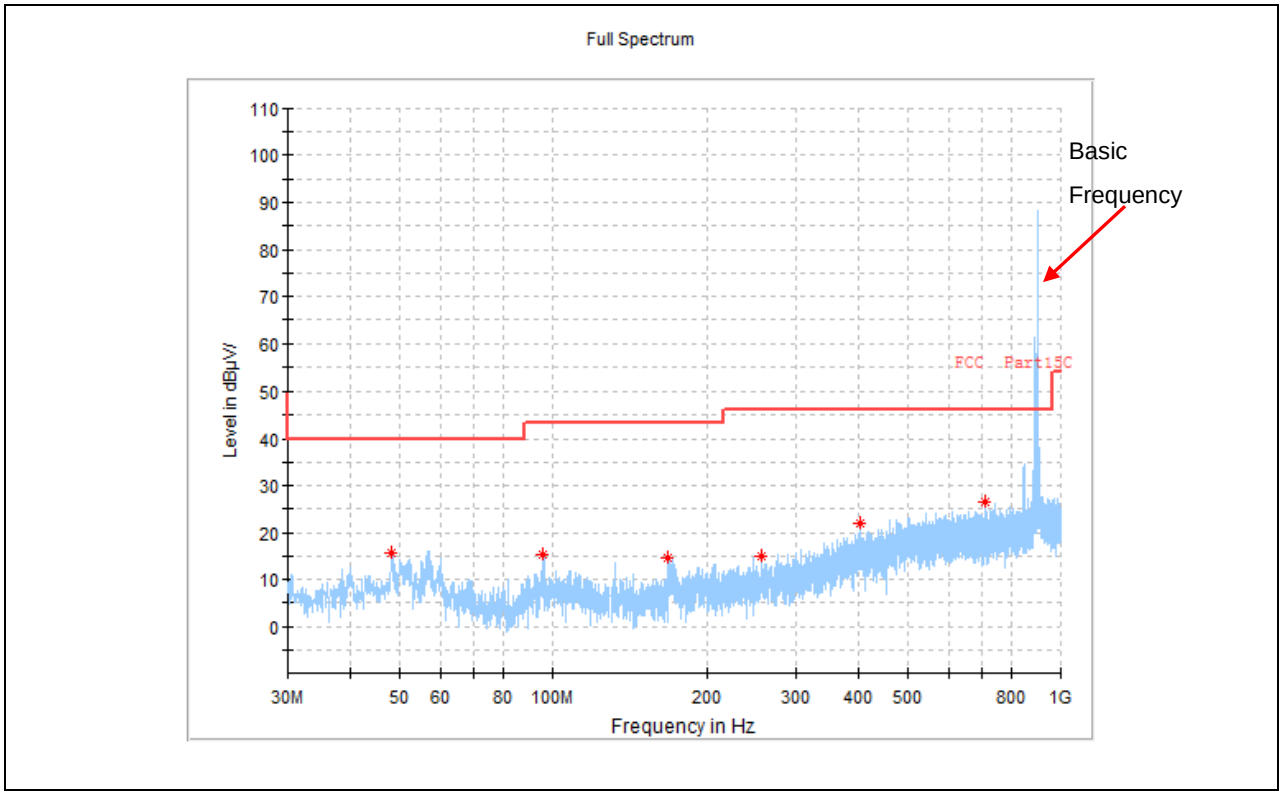
(Channel 1, 903MHz, 30MHz to 1GHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
39.915556	12.03	---	40.00	27.97	H	15.5
52.633333	13.23	---	40.00	26.77	H	13.1
101.456667	12.26	---	43.50	31.25	H	11.6
168.063333	22.85	---	43.50	20.65	H	14.6
358.345000	19.67	---	46.00	26.33	H	20.1
640.022222	27.78	---	46.00	18.22	H	28.1



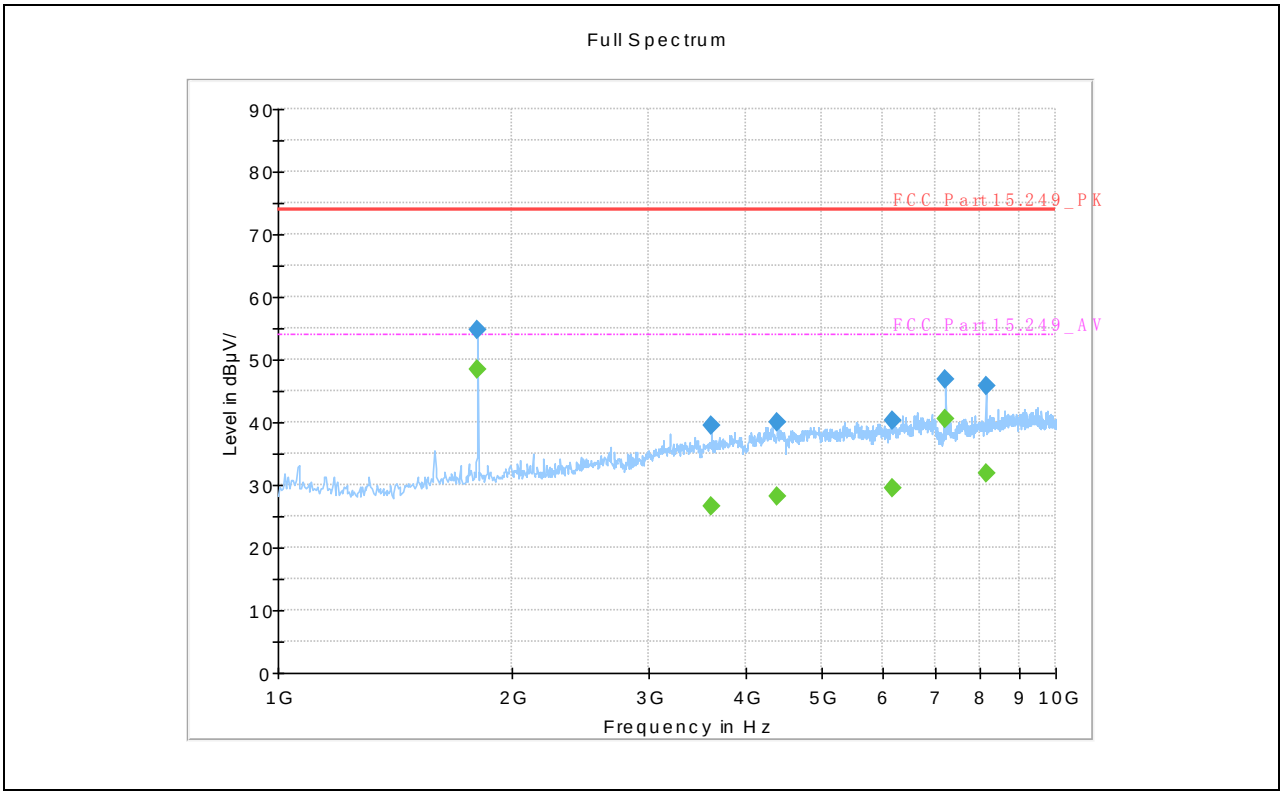
(Channel 1, 903MHz, 1GHz to 10GHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
1805.500000	55.04	---	74.00	18.96	H	-14.7
1805.500000	---	48.85	54.00	5.15	H	-14.7
2125.000000	---	24.41	54.00	29.59	H	-13.2
2125.000000	37.01	---	74.00	36.99	H	-13.2
2696.500000	---	23.99	54.00	30.01	H	-10.5
2696.500000	36.66	---	74.00	37.34	H	-10.5
4393.000000	---	28.28	54.00	25.72	H	-4.8
4393.000000	40.52	---	74.00	33.48	H	-4.8
7223.500000	---	37.96	54.00	16.04	H	-1.5
7223.500000	46.42	---	74.00	27.58	H	-1.5
8128.000000	44.09	---	74.00	29.91	H	-0.5
8128.000000	---	30.87	54.00	23.13	H	-0.5



(Channel 1, 903MHz_30MHz to 1GHz, Antenna Vertical)

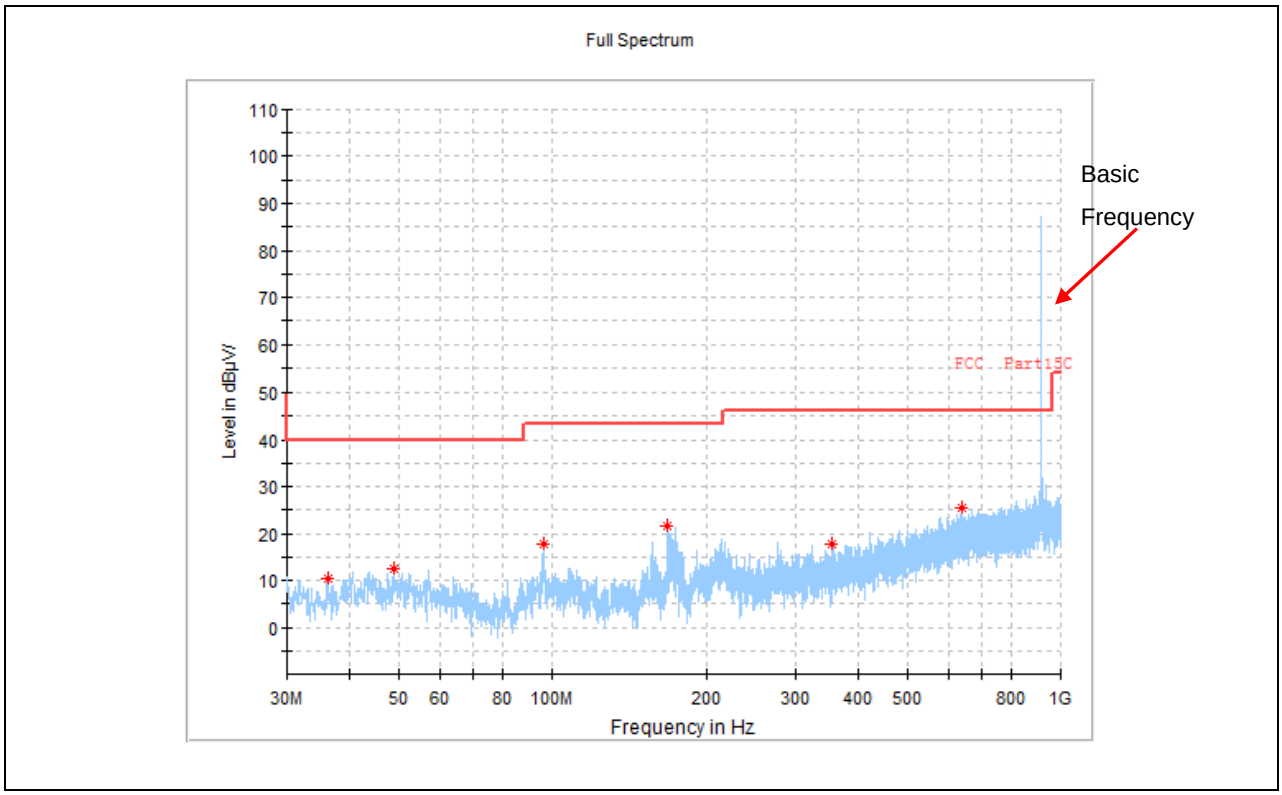
Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
47.998889	15.69	---	40.00	24.31	V	15.5
95.852222	15.11	---	43.50	28.39	V	13.2
168.009444	14.73	---	43.50	28.77	V	11.9
256.117778	15.09	---	46.00	30.91	V	15.2
401.078889	21.88	---	46.00	24.12	V	19.6
706.952222	26.65	---	46.00	19.35	V	24.9



(Channel 1, 903MHz, 1GHz to 10GHz, Antenna Vertical)

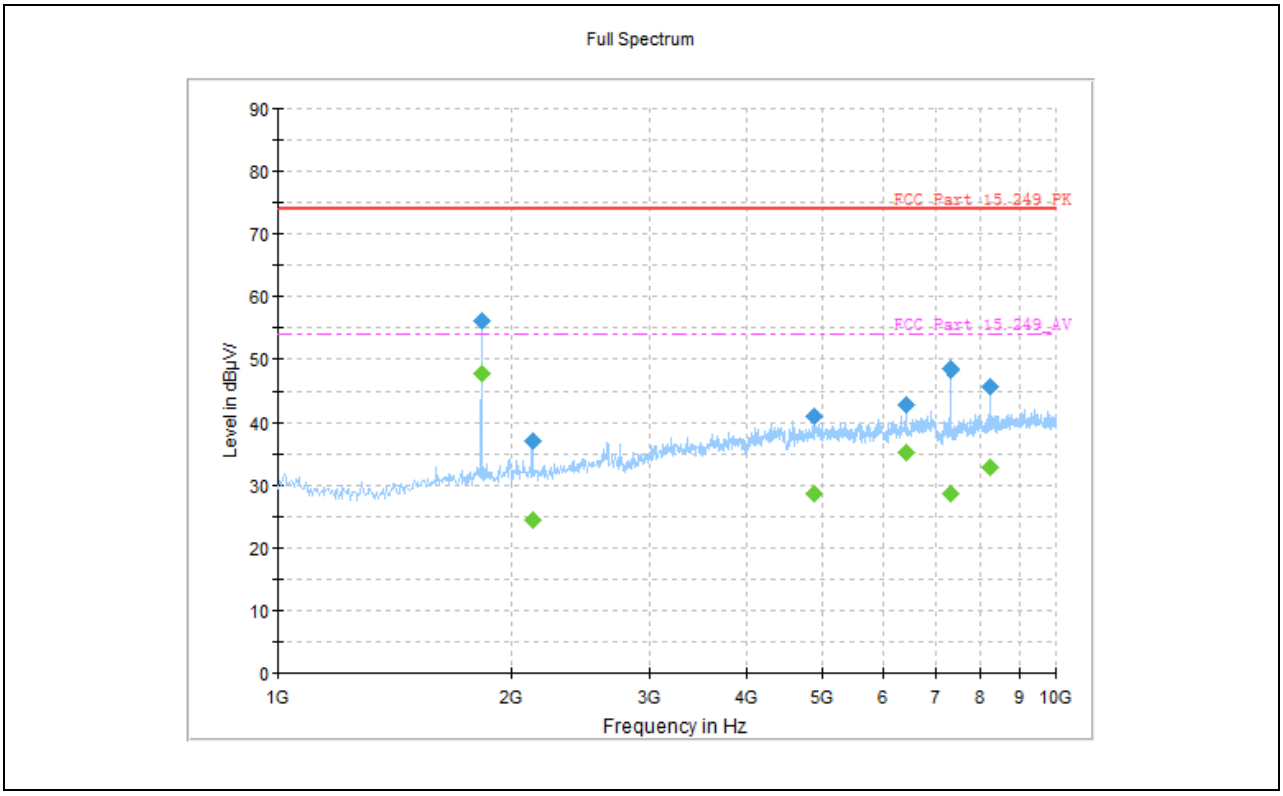
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
1805.500000	54.65	---	74.00	19.35	V	-14.7
1805.500000	---	48.45	54.00	5.55	V	-14.7
3610.000000	---	26.69	54.00	27.31	V	-6.8
3610.000000	39.56	---	74.00	34.44	V	-6.8
4393.000000	39.91	---	74.00	34.09	V	-4.8
4393.000000	---	28.28	54.00	25.72	V	-4.8
6175.000000	---	29.54	54.00	24.46	V	-2.6
6175.000000	40.28	---	74.00	33.72	V	-2.6
7223.500000	---	40.47	54.00	13.53	V	-1.5
7223.500000	46.78	---	74.00	27.22	V	-1.5
8128.000000	---	31.90	54.00	22.10	V	-0.5
8128.000000	45.82	---	74.00	28.18	V	-0.5

Plots for Channel=13:



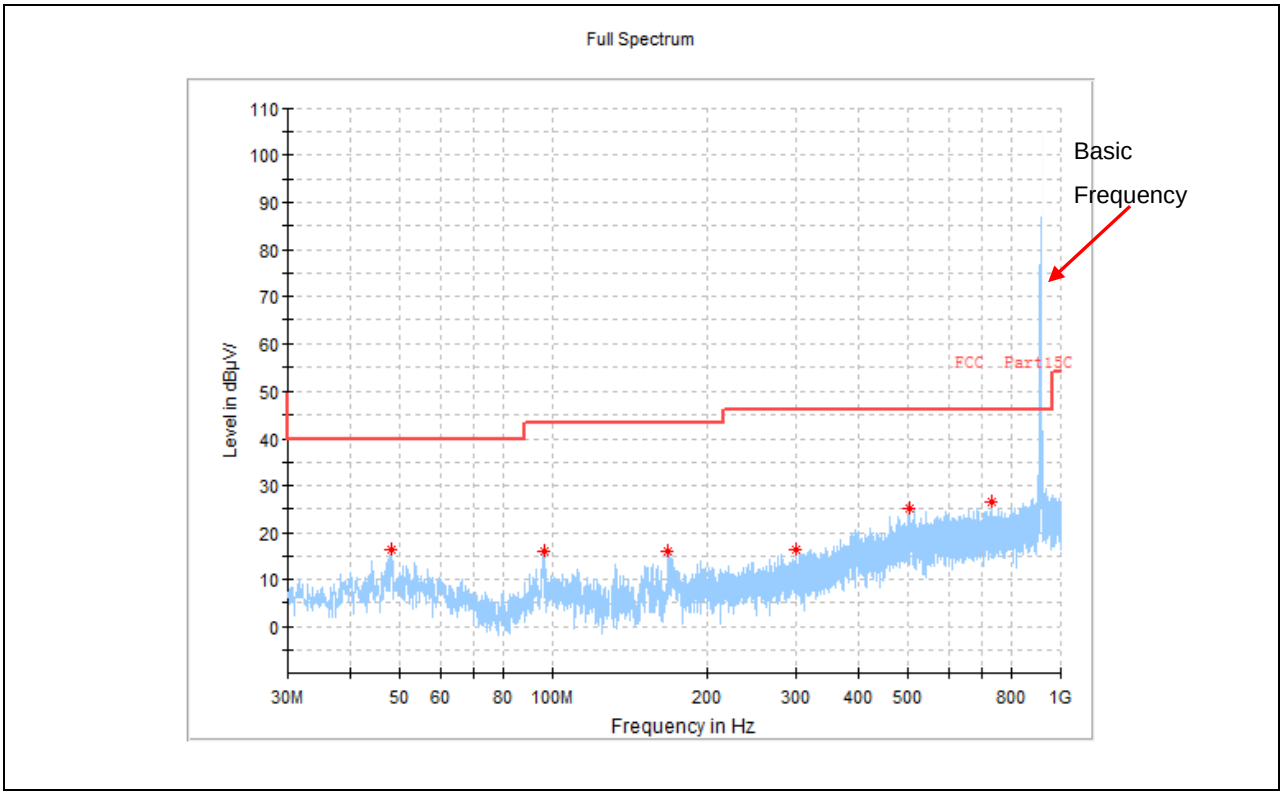
Channel 13, 915MHz, 30MHz to 1GHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
36.035556	10.28	---	40.00	29.72	H	13.1
48.699444	12.53	---	40.00	27.47	H	15.5
96.013889	17.80	---	43.50	25.70	H	13.2
168.009444	21.42	---	43.50	22.08	H	11.9
353.333333	17.86	---	46.00	28.14	H	18.0
639.968333	25.56	---	46.00	20.44	H	24.1



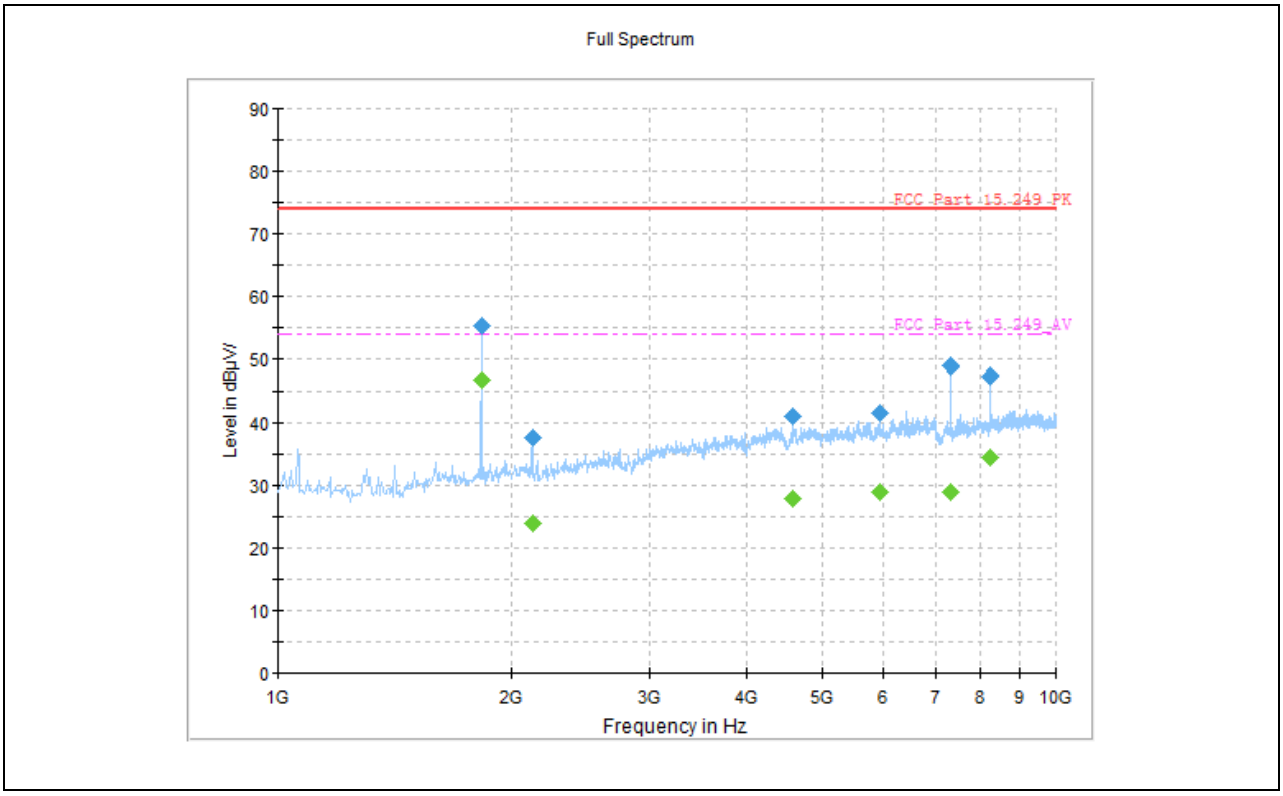
(Channel 13, 915MHz, 1GHz to 10GHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
1828.000000	55.94	---	74.00	18.06	H	-14.3
1828.000000	---	47.78	54.00	6.22	H	-14.3
2129.500000	---	24.38	54.00	29.62	H	-13.3
2129.500000	37.21	---	74.00	36.79	H	-13.3
4870.000000	41.18	---	74.00	32.82	H	-4.1
4870.000000	---	28.63	54.00	25.37	H	-4.1
6404.500000	42.95	---	74.00	31.05	H	-2.7
6404.500000	---	35.33	54.00	18.67	H	-2.7
7322.500000	---	28.78	54.00	25.22	H	-1.3
7322.500000	48.50	---	74.00	25.50	H	-1.3
8236.000000	45.86	---	74.00	28.14	H	-0.2
8236.000000	---	32.77	54.00	21.23	H	-0.2



(Channel 13, 915MHz_30MHz to 1GHz, Antenna Vertical)

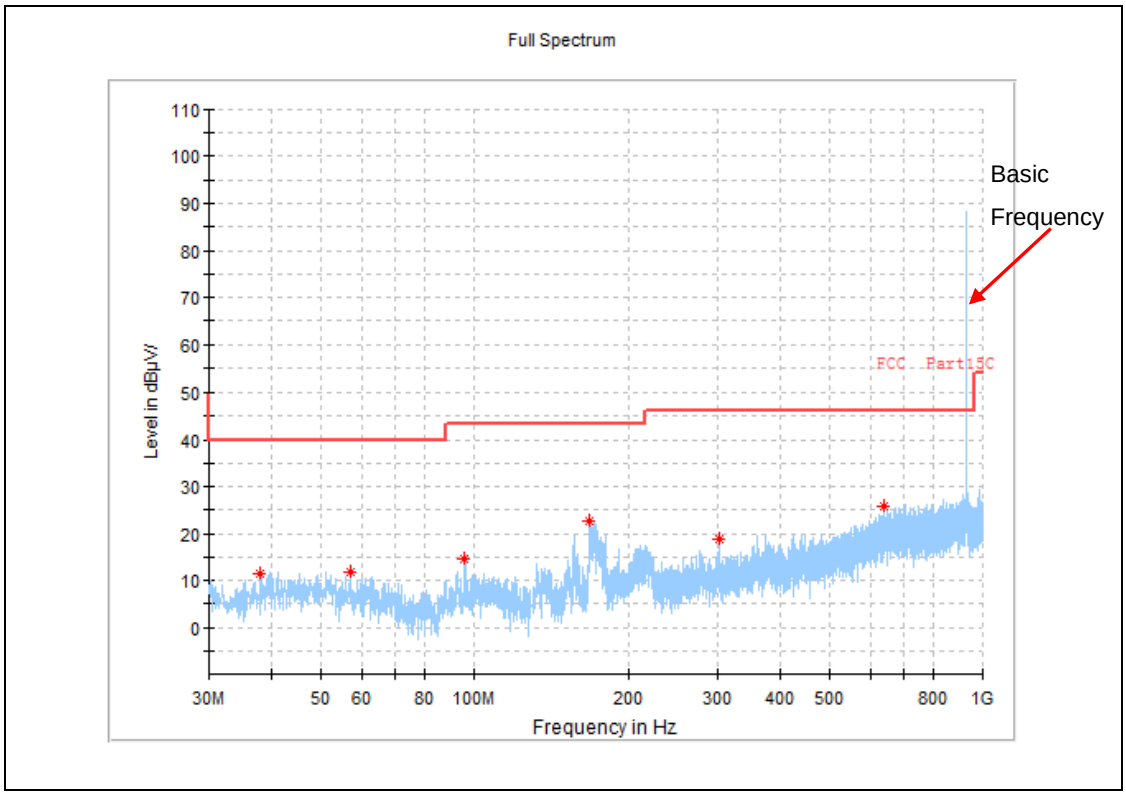
Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
47.945000	16.36	---	40.00	23.64	V	15.5
96.013889	15.97	---	43.50	27.53	V	13.2
168.063333	16.02	---	43.50	27.48	V	11.9
300.468333	16.23	---	46.00	29.77	V	17.4
503.575556	25.01	---	46.00	20.99	V	22.0
729.100556	26.64	---	46.00	19.36	V	25.3



(Channel 13, 915MHz, 1GHz to 10GHz, Antenna Vertical)

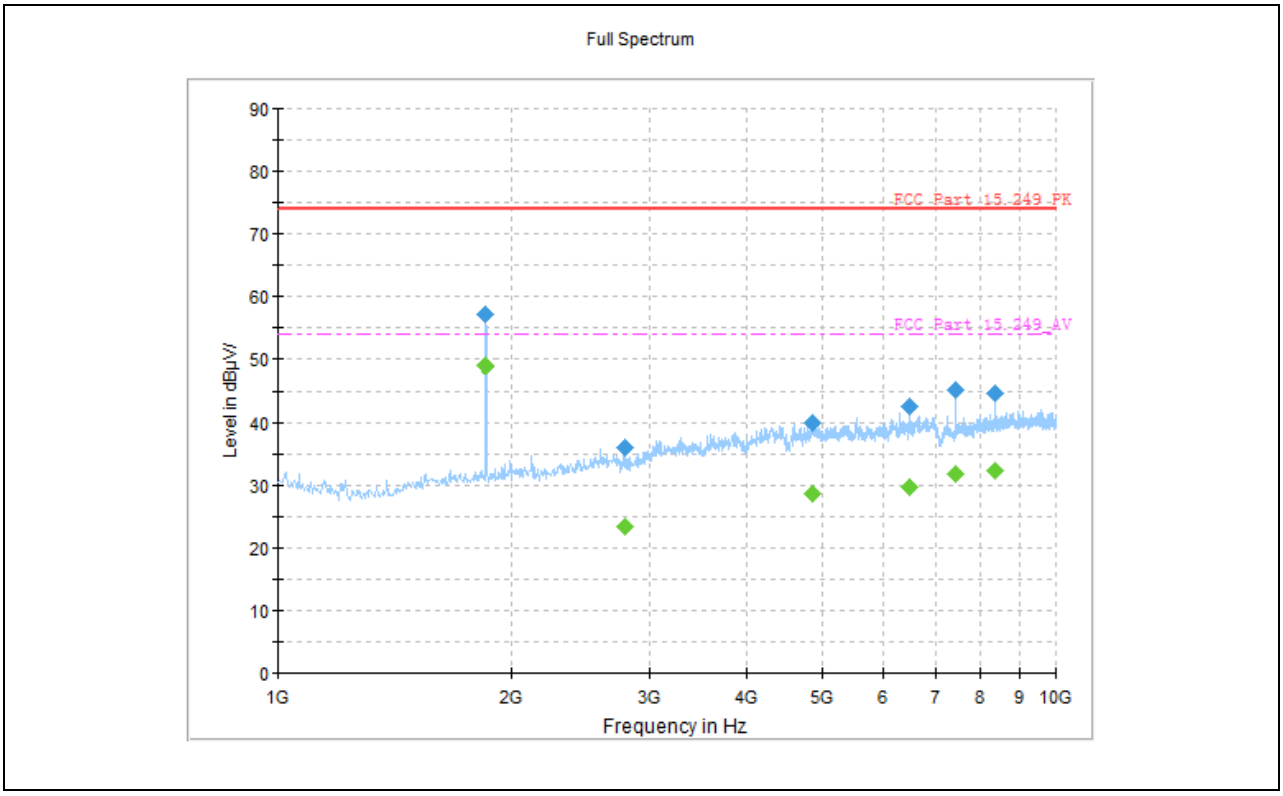
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
1828.000000	---	46.14	54.00	7.86	V	-14.3
1828.000000	55.31	---	74.00	18.69	V	-14.3
2129.500000	---	23.85	54.00	30.15	V	-13.3
2129.500000	37.64	---	74.00	28.36	V	-13.3
4591.000000	---	27.97	54.00	26.03	V	-5.2
4591.000000	40.98	---	74.00	33.02	V	-5.2
5932.000000	41.67	---	74.00	32.33	V	-3.2
5932.000000	---	29.06	54.00	24.94	V	-3.2
7322.500000	---	28.82	54.00	25.18	V	-1.3
7322.500000	48.97	---	74.00	25.03	V	-1.3
8236.000000	47.48	---	74.00	26.52	V	-0.2
8236.000000	---	34.36	54.00	19.64	V	-0.2

Plots for Channel=25:



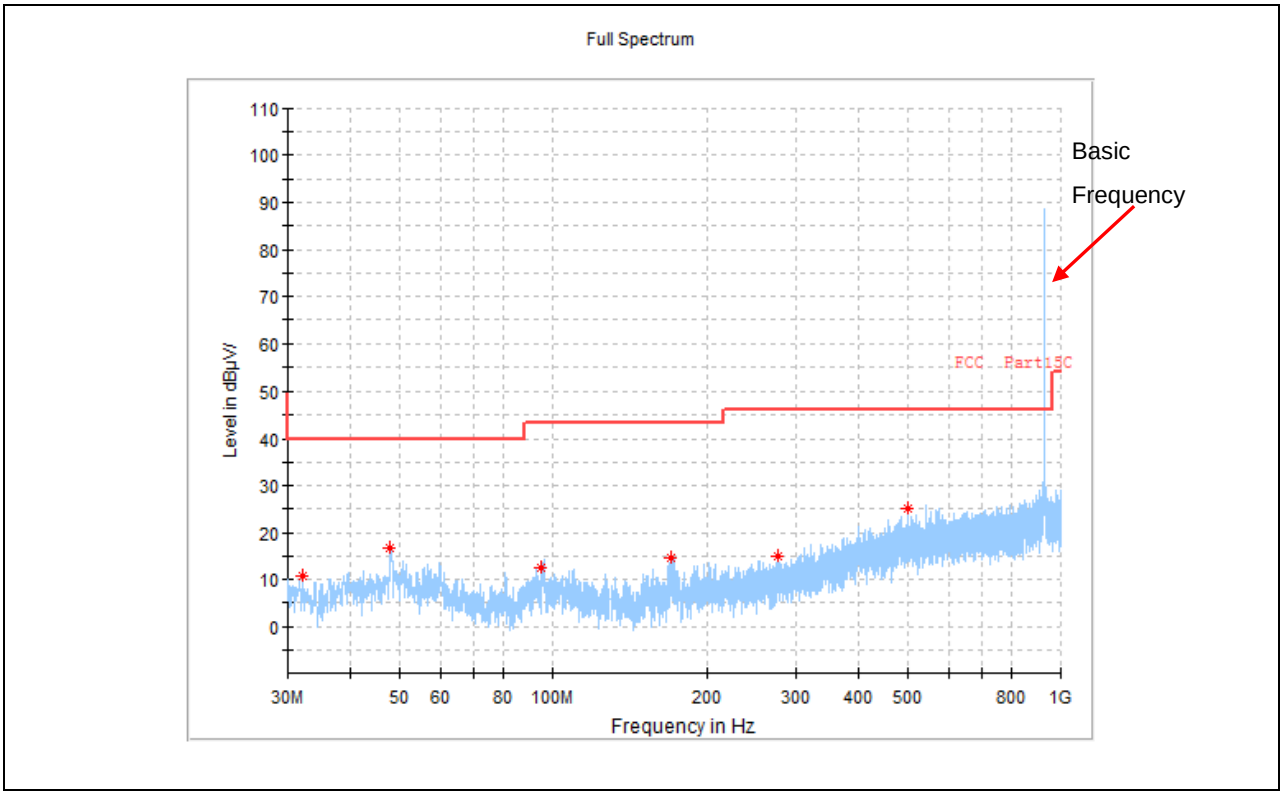
(Channel 25, 927MHz, 30MHz to 1GHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
37.921667	11.45	---	40.00	28.55	H	13.9
57.052222	11.66	---	40.00	28.34	H	14.5
95.906111	14.46	---	43.50	29.04	H	13.2
167.901667	22.56	---	43.50	20.94	H	11.9
301.761667	18.68	---	46.00	27.32	H	17.2
640.022222	25.85	---	46.00	20.15	H	24.1



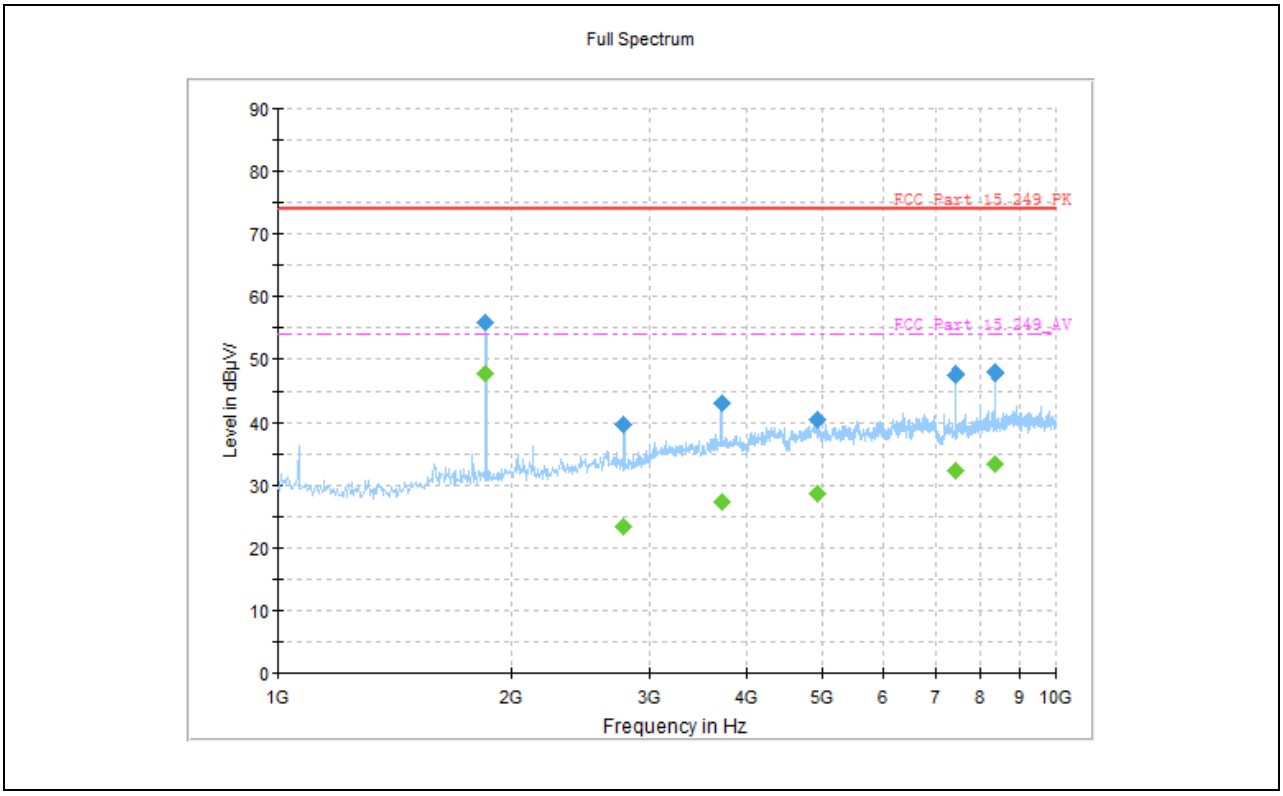
(Channel 25, 927MHz, 1GHz to 10GHz, Antenna Horizontal)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
1850.500000	57.00	---	74.00	17.00	H	-14.2
1850.500000	---	49.73	54.00	4.27	H	-14.2
2782.000000	---	23.49	54.00	30.51	H	-11.2
2782.000000	35.96	---	74.00	38.04	H	-11.2
4852.000000	---	28.59	54.00	25.41	H	-4.1
4852.000000	40.00	---	74.00	34.00	H	-4.1
6490.000000	---	29.61	54.00	24.39	H	-3.2
6490.000000	42.73	---	74.00	31.27	H	-3.2
7417.000000	---	31.93	54.00	22.07	H	-1.6
7417.000000	45.20	---	74.00	28.80	H	-1.6
8344.000000	44.82	---	74.00	29.18	H	-0.2
8344.000000	---	32.44	54.00	21.56	H	-0.2



(Channel 25, 927MHz_30MHz to 1GHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Pol	Corr. (dB/m)
32.101667	10.73	---	40.00	29.27	---	V	12.1
47.837222	16.74	---	40.00	23.26	---	V	15.5
95.097778	12.43	---	43.50	31.07	---	V	13.1
169.518333	14.42	---	43.50	29.08	---	V	12.3
276.541667	15.07	---	46.00	30.93	---	V	15.8
498.294444	25.00	---	46.00	21.00	---	V	21.7



(Channel 25, 927MHz, 1GHz to 10GHz, Antenna Vertical)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
1850.500000	55.82	---	74.00	18.18	V	-14.2
1850.500000	---	47.68	54.00	6.32	V	-14.2
2777.500000	39.63	---	74.00	34.37	V	-11.1
2777.500000	---	23.51	54.00	30.49	V	-11.1
3709.000000	43.12	---	74.00	30.88	V	-6.8
3709.000000	---	27.32	54.00	26.68	V	-6.8
4928.500000	---	28.79	54.00	25.21	V	-3.6
4928.500000	40.44	---	74.00	33.56	V	-3.6
7417.000000	47.63	---	74.00	26.37	V	-1.6
7417.000000	---	32.36	54.00	21.64	V	-1.6
8344.000000	---	33.52	54.00	20.48	V	-0.2
8344.000000	47.93	---	74.00	26.07	V	-0.2

Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test items	Uncertainty
Bandwidth	±5%
Radiated Emission	±2.95dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Company Name:	Kehu-Morlab Test Laboratory
Address:	Unit 101, No.1732 Gangzhong Road, Xiamen Area, Pilot Free Trade Zone (Fujian), P.R. China
Responsible Test Lab Manager:	Mr. Di Dehai
Telephone:	+86-592-5612050
Facsimile:	+86-592-5612095

2. Identification of the Responsible Testing Location

Name:	Kehu-Morlab Test Laboratory
Address:	Unit 101, No.1732 Gangzhong Road, Xiamen Area, Pilot Free Trade Zone (Fujian), P.R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at Unit 101, No.1732 Gangzhong Road, Xiamen Area, Pilot Free Trade Zone (Fujian), P.R. China.

The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1249.

4. Test Equipments Utilized

4.1 Conducted Test Equipments

No.	Equipment Name	Serial No.	Model No.	Manufacturer	Cal.Date	Cal.Due Date
1	MXA Signal Analyzer	MY53421845	N9020A	Keysight	2017.11.30	2018.11.29
2	RF cable (30MHz-26.5GHz)	RF01	N/A	Morlab	N/A	N/A
3	SMA connector	RF03	N/A	Xingbo	N/A	N/A

4.2 Conducted Emission Test Equipments

No.	Equipment Name	Serial No.	Model No.	Manufacturer	Cal.Date	Cal.Due Date
1	EMI Receiver	102174	ESR3	ESR3	2017.11.27	2018.11.26

2	LISN	101338	ENV432	ENV432	2017.11.27	2018.11.26
3	Pulse Limiter (10dB)	317	VTSD 9561 F	VTSD 9561 F	2017.11.27	2018.11.26
4	Coaxial cable(BNC) (30MHz-3GHz)	EMC01	N/A	Morlab	N/A	N/A

4.3 Auxiliary Test Equipment

No.	Equipment Name	Serial No.	Model No.	Manufacturer	Cal.Date	Cal. Due Date
1	Laptop	N/A	A1465	Apple Inc.	N/A	N/A
2	Test jig	N/A	F8913-EVB	Xiamen Four-Faith Communication Technology Co., Ltd.	N/A	N/A

4.4 List of Software Used

No.	Model	Version Number	Producer	Test Item
1	EMC32	V10.00.00	Rode&Schwarz	RE
2	EMC32	V10.20.01	Rode&Schwarz	CE

4.5 Radiated Test Equipments

RSE Test System						
No.	**Equipment Name**	**Serial No.**	**Model No.**	**Manufacturer**	**Cal. Date**	**Cal.Due Date**
1	Anechoic Chamber	N/A	9m*6m*6m	ETS-Lindgren	2017.11.27	2018.11.26
2	Signal Analyzer	101294	FSV40	R&S	2017.12.01	2018.11.30
3	Active Ring Antenna	FMZB 1513 #269	FMZB 1513	Schwarzbeck	2017.11.26	2018.11.25
4	Linear Log Periodic Broad Band Antenna	949	VULB 9163	Schwarzbeck	2017.12.03	2018.12.2
5	Ultra-Wideband Horn Antenna	102615	HF907	R&S	2017.12.03	2018.12.2
6	RF Switch and Control Platform	N/A	RSC	CDSI	N/A	N/A
7	Coaxial cable (N male)	EMC02	N/A	Morlab	N/A	N/A

	(9kHz -3GHz)					
8	Coaxial cable (N male) (9kHz -3GHz)	EMC03	N/A	Morlab	N/A	N/A
9	Coaxial cable (N male) (1GHz-26.5GHz)	EMC04	N/A	Morlab	N/A	N/A
10	Coaxial cable (N male) (1GHz-26.5GHz)	EMC05	N/A	Morlab	N/A	N/A
11	Pre-amplifier (1GHz-18GHz)	8810011	PAP-1G18	CDSI	2017.11.27	2018.11.26

Annex C Declaration Letter

We, Xiamen Four-Faith Communication Technology Co., Ltd. declare that product: F8L10D-N LoRa Module. Mode:F8L10D-N-NS-U and F8L10D-N-NS-S, which was tested by Morlab.
A description of the difference between the tested model and additional models are declared as follows:
The antenna connector of F8L10D-N-NS-U is IPEX connector.
The antenna connector of F8L10D-N-NS-S is SMA connector.
They have same circuit diagram and fucntion, only difference is the antenna connector

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Email: guozhipeng@four-faith.com
Company name: Xiamen Four-Faith Communication Technology Co., Ltd.

END OF REPORT