TEST REPORT

Application No.:	SHEM2105004201CR
FCC ID:	2AZ6I-ML650
Applicant:	HyECO Smart Tech Co,Ltd.
Address of Applicant:	12Beiqian Lane,Industrial Park,Suzhou,Jiangsu 215000,China
Manufacturer:	HyECO Smart Tech Co,Ltd.
Address of Manufacturer:	12Beiqian Lane,Industrial Park,Suzhou,Jiangsu 215000,China

Equipment Under Test (EUT):

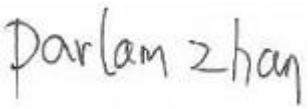
EUT Name:	Lora modular
Model No.:	ML650
Standard(s) :	47 CFR Part 15, Subpart C 15.249
Date of Receipt:	2021-05-12
Date of Test:	2021-05-12 to 2021-07-13
Date of Issue:	2021-07-13
Test Result:	**Pass***

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

Parlam Zhan
E&E Section Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2021-07-13	/

Authorized for issue by:				
				
		Micheal Niu / Project Engineer		
				
		Parlam Zhan / Reviewer		

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
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2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.249	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
20dB Bandwidth	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Field Strength of the Fundamental Signal (15.249(a))	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.5&6.6	47 CFR Part 15, Subpart C 15.249(a)	Pass
Restricted Band Around Fundamental Frequency	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209	Pass
Radiated Emissions	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	Pass

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3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply: DC 3.3V
Test voltage: DC 3.3V
Antenna Gain: 3.0dBi(Provided by manufacturer)
Antenna Type: Spiral Antenna
Modulation Type: FSK
Channel Spacing: 200KHz
Operation Frequency: 902.5-914.9MHz

4.2 Channel list

Channel 1	902.5 MHz	Channel 2	902.7 MHz	Channel 3	902.9 MHz	Channel 4	903.1 MHz
Channel 5	903.3 MHz	Channel 6	903.5 MHz	Channel 7	903.7 MHz	Channel 8	903.9 MHz
Channel 9	904.1 MHz	Channel 10	904.3 MHz	Channel 11	904.5 MHz	Channel 12	904.7 MHz
Channel 13	904.9 MHz	Channel 14	905.1 MHz	Channel 15	905.3 MHz	Channel 16	905.5 MHz
Channel 17	905.7 MHz	Channel 18	905.9 MHz	Channel 19	906.1 MHz	Channel 20	906.3 MHz
Channel 21	906.5 MHz	Channel 22	906.7 MHz	Channel 23	906.9 MHz	Channel 24	907.1 MHz
Channel 25	907.3 MHz	Channel 26	907.5 MHz	Channel 27	907.7 MHz	Channel 28	907.9 MHz
Channel 29	908.1 MHz	Channel 30	908.3 MHz	Channel 31	908.5 MHz	Channel 32	908.7 MHz
Channel 33	908.9 MHz	Channel 34	909.1 MHz	Channel 35	909.3 MHz	Channel 36	909.5 MHz
Channel 37	909.7 MHz	Channel 38	909.9 MHz	Channel 39	910.1 MHz	Channel 40	910.3 MHz
Channel 41	910.5 MHz	Channel 42	910.7 MHz	Channel 43	910.9 MHz	Channel 44	911.1 MHz
Channel 45	911.3 MHz	Channel 46	911.5 MHz	Channel 47	911.7 MHz	Channel 48	911.9 MHz
Channel 49	912.1 MHz	Channel 50	912.3 MHz	Channel 51	912.5 MHz	Channel 52	912.7 MHz
Channel 53	912.9 MHz	Channel 54	913.1 MHz	Channel 55	913.3 MHz	Channel 56	913.5 MHz
Channel 57	913.7 MHz	Channel 58	913.9 MHz	Channel 59	914.1 MHz	Channel 60	914.3 MHz
Channel 61	914.5 MHz	Channel 62	914.7 MHz	Channel 63	914.9 MHz	N/A	N/A

4.3 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Note Book	Lenovo	N/A	N/A

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4×10^{-8}
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Conducted Power	0.6dB
6	RF Power Density	2.9dB
7	Conducted Spurious Emissions	0.75dB
8	RF Radiated Power	5.2dB (Below 1GHz)
		5.9dB (Above 1GHz)
9	Radiated Spurious Emission Test	4.2dB (Below 30MHz)
		4.5dB (30MHz-1GHz)
		5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
10	Temperature Test	1°C
11	Humidity Test	3%
12	Supply Voltages	1.5%
13	Time	3%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.5 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• CNAS (No. CNAS L4354)

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 2541.01)

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• FCC (Designation Number: CN1172)

Compliance Certification Services Inc. has been recognized as an accredited testing laboratory.

Designation Number: CN1172.

• ISED (CAB identifier: CN0072)

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

Company Number: 2324E

• VCCI (Member No.: 1938)

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-1600, C-1707, T-1499, G-10216 respectively.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

5 Equipment List

Item	Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal. Due Date
Conducted Emission at Mains Terminals (150kHz-30MHz)						
1	EMI Test Receive	R&S	ESCI	100781	02/01/2021	01/31/2022
2	LISN	R&S	ENV216	101604	10/19/2020	10/18/2021
3	LISN	Schwarzbeck	NNLK 8129	8129-143	10/19/2020	10/18/2021
4	Pulse Limiter	R&S	ESH3-Z2	100609	02/01/2021	01/31/2022
5	CE test Cable	Thermax	/	14	10/17/2020	10/16/2021
6	Test Software	Farad	EZ-EMC	CCS-03A1	N.C.R	N.C.R
RF Conducted Test						
1	Spectrum Analyzer	Agilent	E4446A	MY44020154	04/16/2021	04/15/2022
2	Spectrum Analyzer	Keysight	N9020A	MY55370209	12/02/2020	12/01/2021
3	Spectrum Analyzer	Keysight	N9010A	MY56480443	02/01/2021	01/31/2022
4	Signal Generator	Agilent	N5182A	MY50142015	09/25/2020	09/24/2021
5	Radio Communication Test Station	Anritsu	MT8000A	6262012849	N/A	N/A
6	Radio Communication Analyzer	Anritsu	MT8821C	6201692222	N/A	N/A
7	Universal Radio Communication Tester	R&S	CMW500	159275	10/19/2020	10/18/2021
8	Universal Radio Communication Tester	R&S	CMW500	167239	04/16/2021	04/15/2022
9	Power Meter	Anritsu	ML2495A	1445010	04/15/2021	04/14/2022
10	Switcher	CCSRF	FY562	KUS2001M001-3	10/19/2020	10/18/2021
11	AC Power Source	EXTECH	6605	1570106	N.C.R	N.C.R
12	DC Power Supply	Aglient	E3632A	MY50340053	N.C.R	N.C.R
13	6dB Attenuator	Mini-Circuits	NAT-6-2W	15542-1	N.C.R	N.C.R
14	Power Divider	AISI	IOWOPE2068	PE2068	N.C.R	N.C.R
15	Filter	MICRO-TRONICS	BRM50701	5	N.C.R	N.C.R
16	Conducted test cable	/	RF01-RF04	/	04/15/2021	04/14/2022
17	Software	BST	TST-PASS	N/A	N/A	N/A
18	Temp. / Humidity Chamber	TERCHY	MHK-120AK	X30109	04/15/2021	04/14/2022
19	Thermometer	Anymetre	TH603	CCS007	10/16/2020	10/15/2021
RF Radiated Test						
1	Spectrum Analyzer	R&S	FSV40	101493	10/19/2020	10/18/2021
2	Signal Generator	Agilent	E8257C	MY43321570	10/19/2020	10/18/2021
3	Loop Antenna	Schwarzbeck	HXYZ9170	9170-108	02/22/2021	02/21/2022
4	Bilog Antenna	TESEQ	CBL 6112D	35403	06/21/2021	06/20/2023
5	Bilog Antenna	SCHWARZBECK	VULB9160	9160-3342	04/13/2021	04/12/2023
6	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	267	10/26/2020	10/25/2022
7	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	00143290	02/22/2021	02/21/2023
8	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	BBHA9170171	02/22/2021	02/21/2022
9	Pre-Amplifier(30MHz~18GHz)	LNA	/	/	04/15/2021	04/14/2022
10	Amplifier(18~40GHz)	COM-POWER	PAM-840A	461332	10/23/2020	10/22/2021
11	Low Pass Filter	MICRO-TRONICS	VLFX-950	RV142900829	N.C.R	N.C.R
12	High Pass Filter	Mini-Circuits	VHF-1200	15542	N.C.R	N.C.R
13	Filter (5450MHz～5770 MHz）	MICRO-TRONICS	BRC50704-01	2	N.C.R	N.C.R
14	Filter (5690 MHz～5930 MHz）	MICRO-TRONICS	BRC50705-01	4	N.C.R	N.C.R
15	Filter (5150 MHz～5350 MHz）	MICRO-TRONICS	BRC50703-01	2	N.C.R	N.C.R

16	Filter (885 MHz～915 MHz）	MICRO-TRONICS	BRM14698	1	N.C.R	N.C.R
17	Filter (815 MHz～860 MHz）	MICRO-TRONICS	BRM14697	1	N.C.R	N.C.R
18	Filter (1745 MHz～1910 MHz)	MICRO-TRONICS	BRM14700	1	N.C.R	N.C.R
19	Filter (1922 MHz～1977 MHz)	MICRO-TRONICS	BRM50715	1	N.C.R	N.C.R
20	Filter (2550 MHz)	MICRO-TRONICS	HPM13362	5	N.C.R	N.C.R
21	Filter (1532 MHz～1845 MHz)	MICRO-TRONICS	BRM50713	1	N.C.R	N.C.R
22	Filter (2.4GHz)	MICRO-TRONICS	BRM50701	5	N.C.R	N.C.R
23	RE test cable	/	RE01-RE04	/	04/15/2021	04/14/2022
24	Software	Faratronic	EZ_EMC-v 3A1	N/A	N/A	N/A

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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

Limit:

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.

6.1.2 Conclusion

Standard 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.

EUT Antenna:

The antenna is Spiral Antenna and no consideration of replacement. The gain of the antenna is 3 dBi.

Antenna location: Refer to Appendix (Internal Photos)

7 Radio Spectrum Matter Test Results

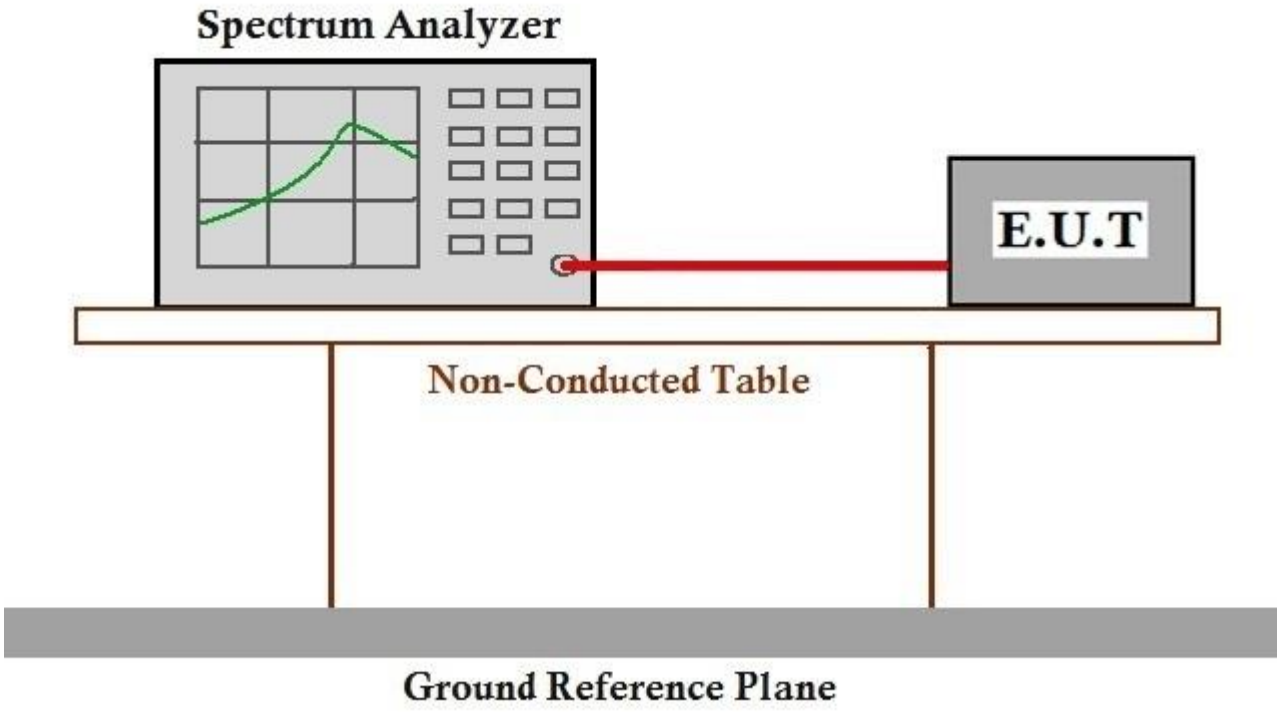
7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215
Test Method: ANSI C63.10 (2013) Section 6.9
Limit: N/A

7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 25 °C Humidity: 49 % RH Atmospheric Pressure: 1006 mbar
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.1.2 Test Setup Diagram

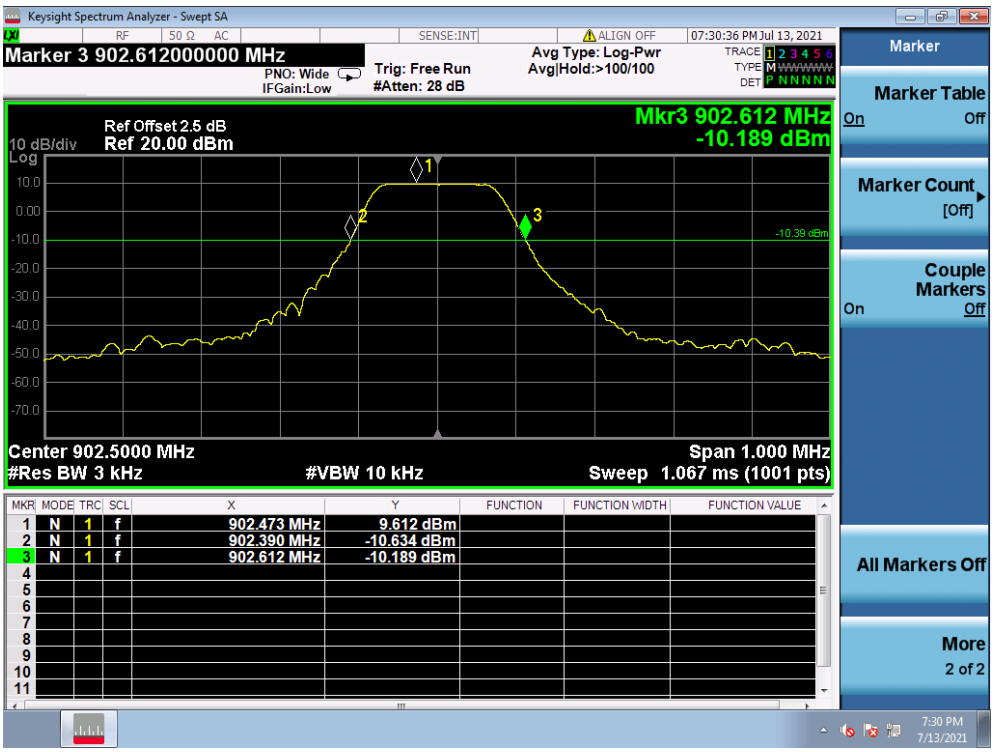


7.1.3 Measurement Procedure and Data

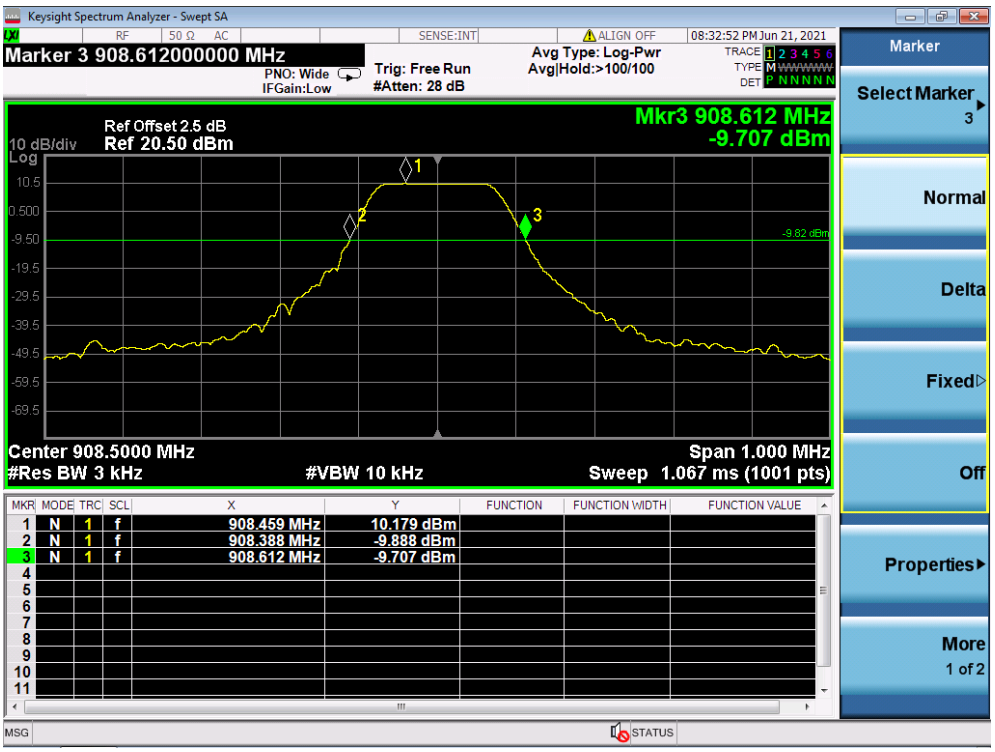
According to Option 2 in ANSI C63.10 Chapter 11.8.2

Frequency (MHz)	Bandwidth (kHz)	Result
902.5	222	PASS
908.5	224	PASS
914.9	223	PASS

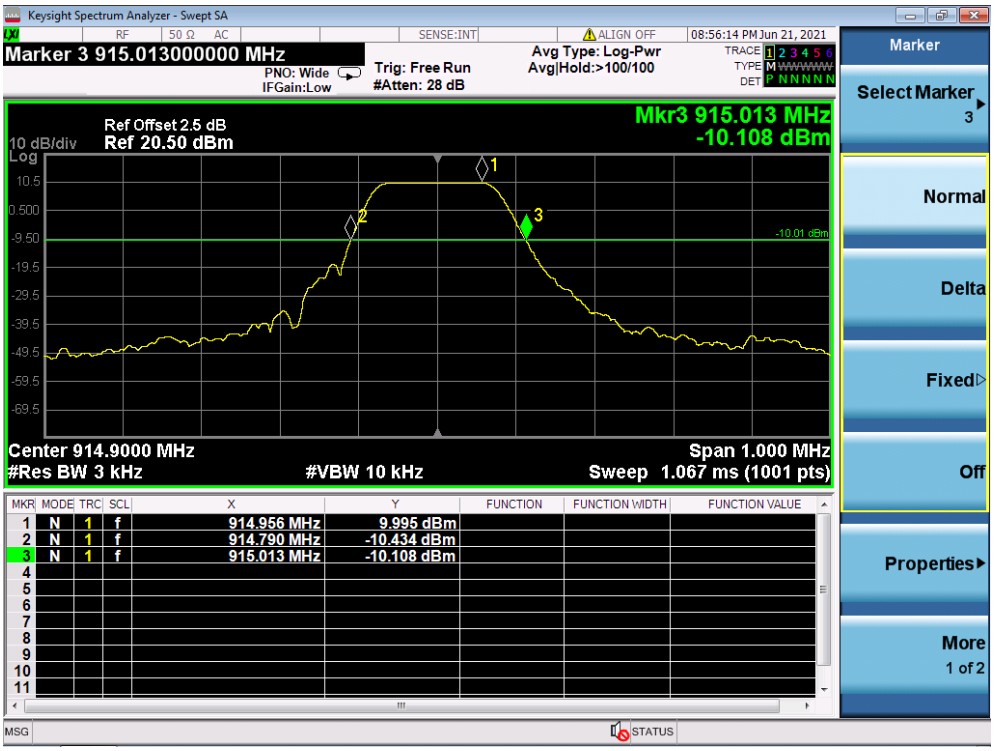
902.5MHz:



908.5MHz:



914.9MHz:



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7.2 Field Strength of the Fundamental Signal (15.249(a))

Test Requirement 47 CFR Part 15, Subpart C 15.249(a)

Test Method: ANSI C63.10 (2013) Section 6.5&6.6

Limit:

Fundamental frequency(MHz)	Field strength of fundamental(millivolts/meter)	Field strength of harmonics(microvolts/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500
Remark: The frequencies above 1000MHz are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For fundamental frequency in “902-928MHz”, the field strength of fundamental is based on Quasi-Peak.		

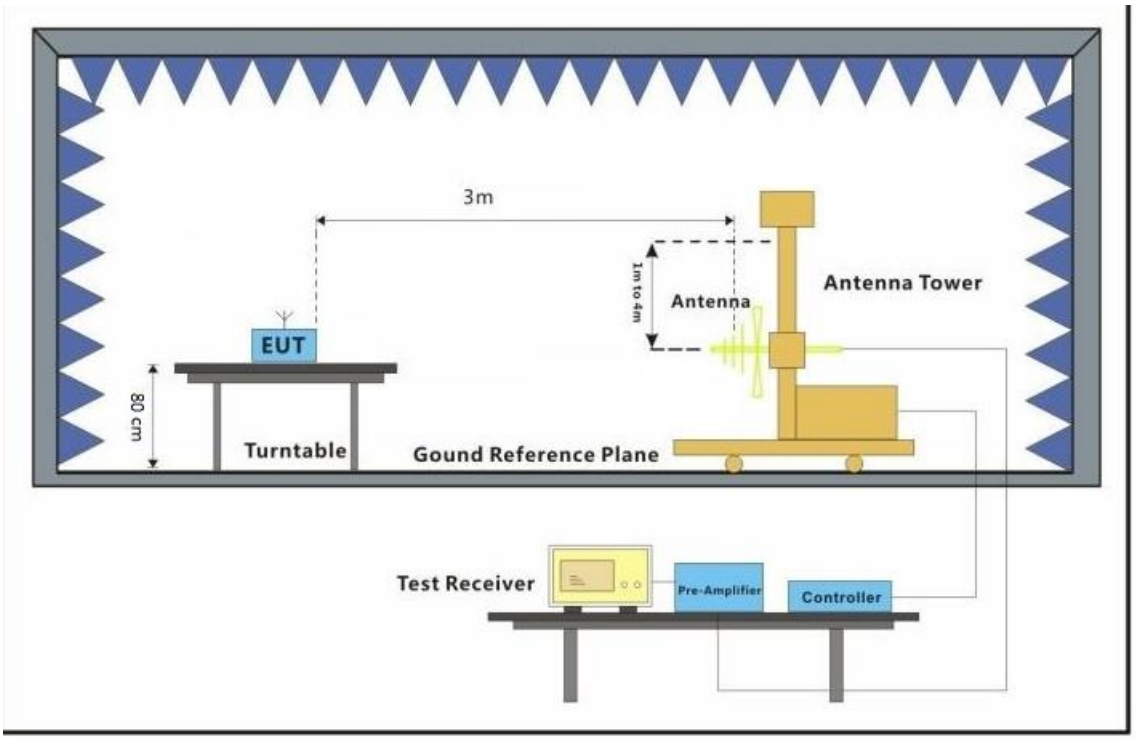
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 49 % RH Atmospheric Pressure: 1007 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. 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.

e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. 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.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
902.5	76.86	28.71	105.57	114.00	-8.43	Peak	Horizontal
	63.29	28.71	92.05	94.00	-1.95	QP	Horizontal
	66.70	28.71	95.41	114.00	-18.59	Peak	Vertical
	53.65	28.71	82.36	94.00	-11.64	QP	Vertical

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
908.5	76.54	28.76	105.30	114.00	-8.70	Peak	Horizontal
	63.60	28.76	92.36	94.00	-1.64	QP	Horizontal
	66.49	28.76	95.25	114.00	-18.75	Peak	Vertical
	53.40	28.76	82.16	94.00	-11.84	QP	Vertical

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
914.9	76.71	29.03	105.74	114.00	-8.26	Peak	Horizontal
	63.42	29.03	92.45	94.00	-1.55	QP	Horizontal
	68.49	29.03	97.52	114.00	-16.48	Peak	Vertical
	55.25	29.03	84.28	94.00	-9.72	QP	Vertical

Remark:

1) The basic equation with a sample calculation is as follows: Level = Read Level + Factor.

(The Factor is calculated by adding the Antenna Factor, Cable Loss and Preamp Factor)

7.3 Restricted Band Around Fundamental Frequency

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6

Limit:

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
Above 1GHz	74.0	Peak Value
Emission 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 Section 15.209,whichever is the lesser attenuation.		

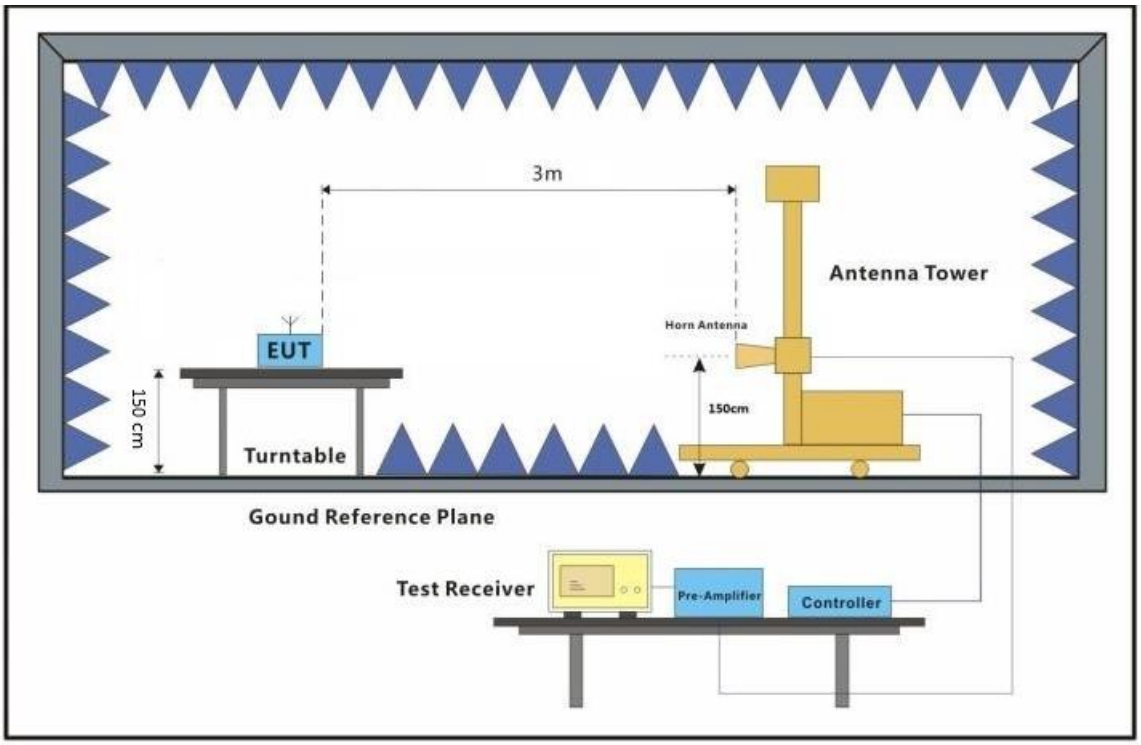
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 49 % RH Atmospheric Pressure: 1007 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

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b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. 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.

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g. 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.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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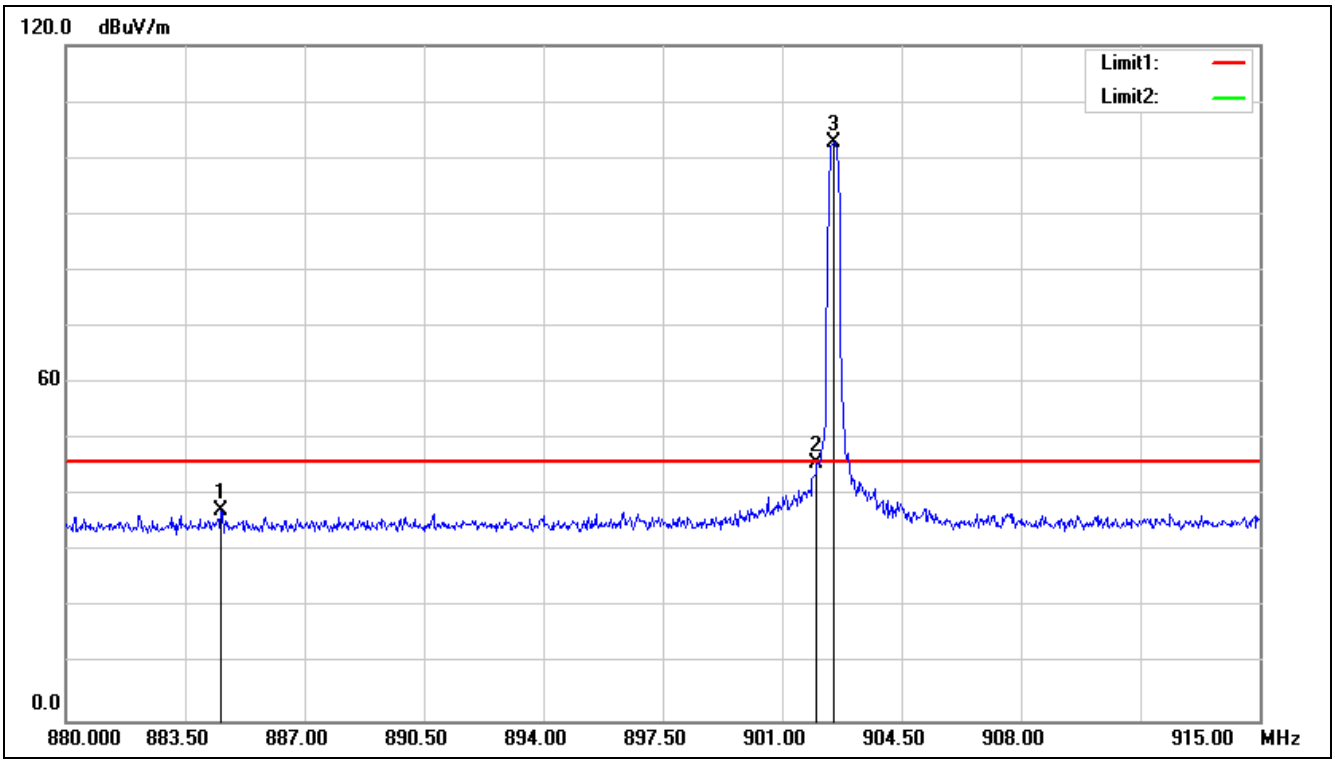
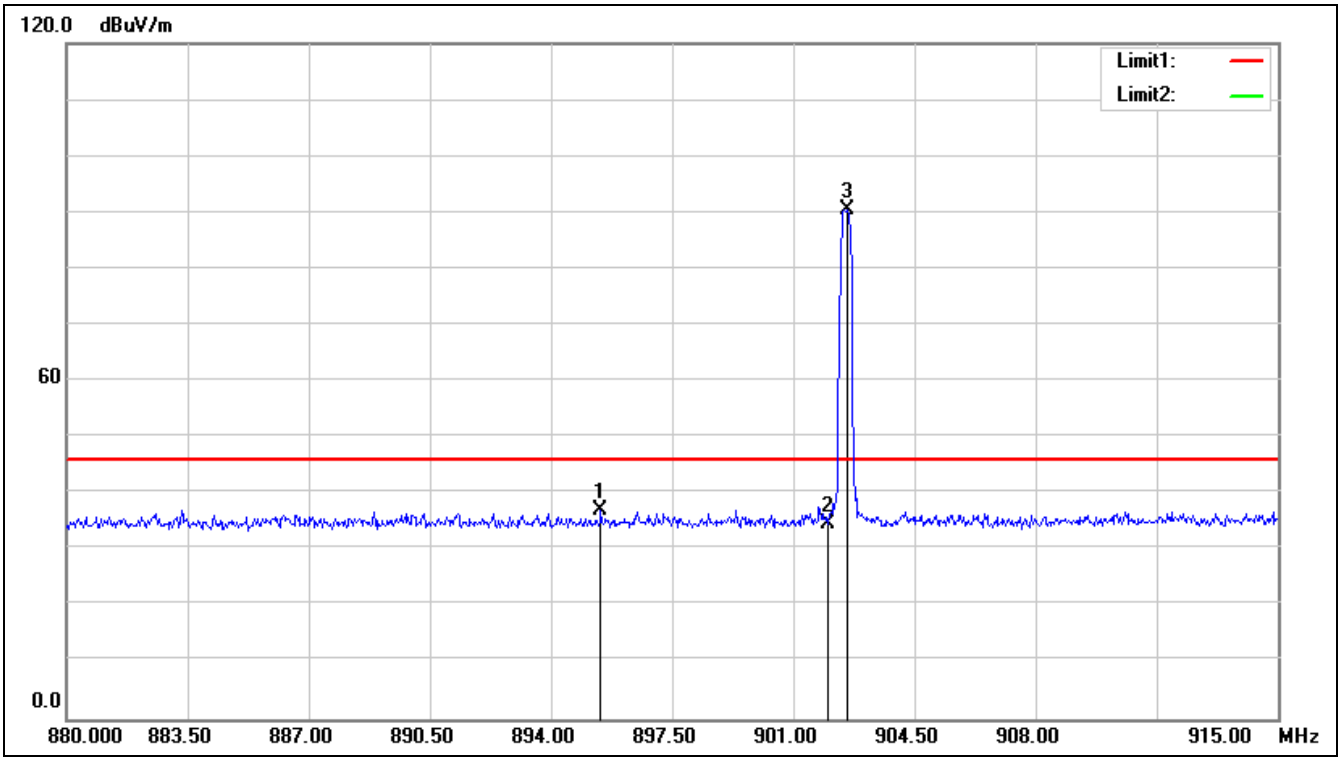
880MHz~915MHz Horizontal



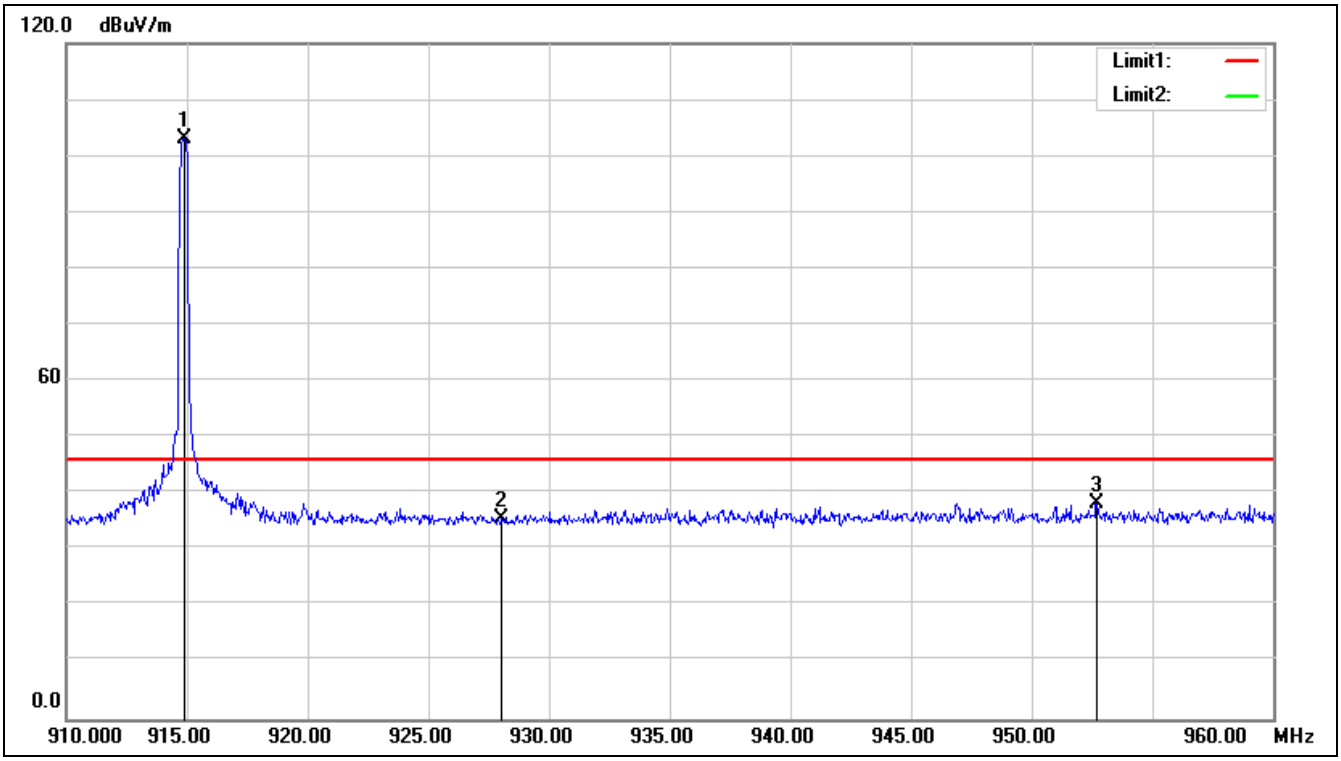
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	884.5500	8.74	28.49	37.23	46.00	-8.77	QP
2	902.0000	16.98	28.70	45.68	46.00	-0.32	QP
3	902.5050	74.07	28.70	102.77	46.00	56.77	peak

880MHz~915MHz Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	895.4350	8.32	28.62	36.94	46.00	-9.06	QP
2	902.0000	5.88	28.70	34.58	46.00	-11.42	QP
3	902.5750	61.73	28.70	90.43	46.00	44.43	peak

910MHz~960MHz Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	914.9000	74.12	28.86	102.98	46.00	56.98	peak
2	928.0000	6.60	29.02	35.62	46.00	-10.38	QP
3	952.7000	8.99	29.29	38.28	46.00	-7.72	QP

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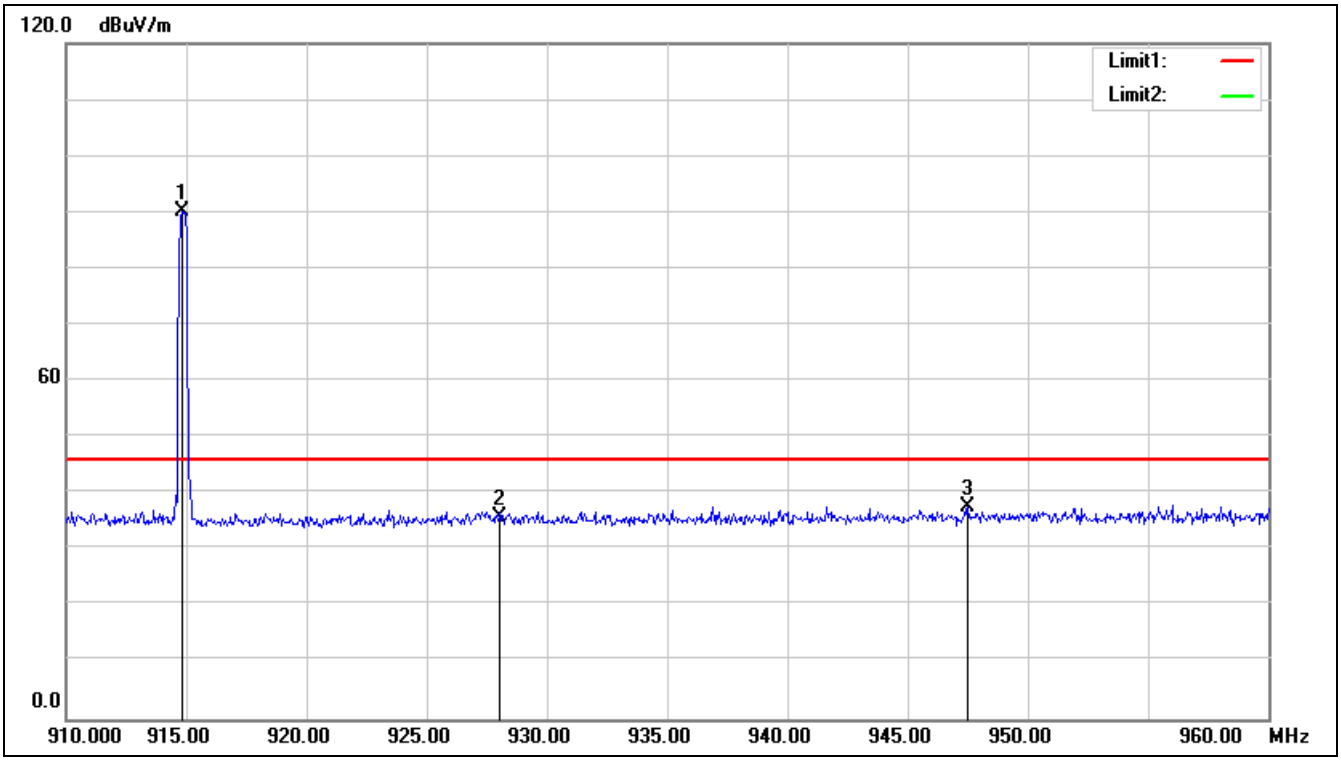
910MHz~960MHz Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	914.8000	61.26	28.86	90.12	46.00	44.12	peak
2	928.0000	6.97	29.02	35.99	46.00	-10.01	QP
3	947.5000	8.46	29.27	37.73	46.00	-8.27	QP

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7.4 Radiated Emissions

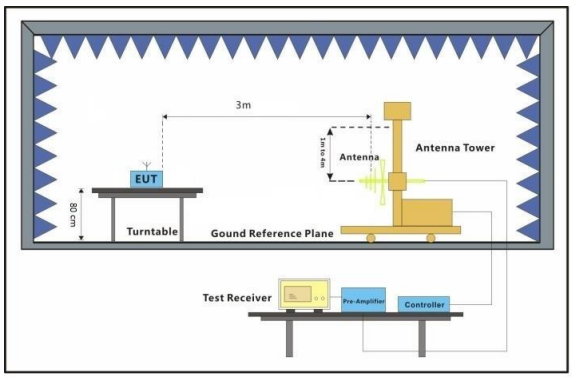
Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)
Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6
Limit:

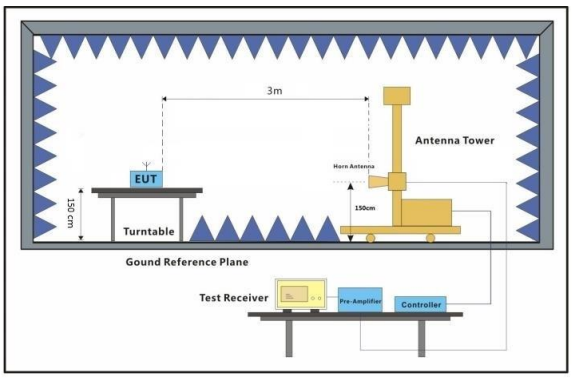
Frequency(MHz)	Field strength (microvolts/meter)	Limit (dBuV/m)	Detector	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	-	300
0.490-1.705	24000/F(kHz)	-	-	30
1.705-30	30	-	-	30
30-88	100	40.0	QP	3
88-216	150	43.5	QP	3
216-960	200	46.0	QP	3
960-1000	500	54.0	QP	3
Above 1000	500	54.0	AV	3

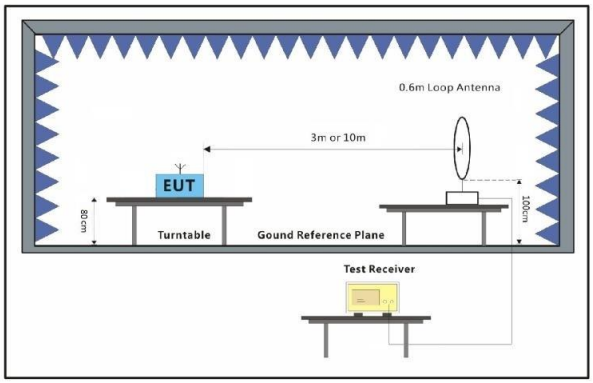
7.4.1 E.U.T. Operation

Operating Environment:
Temperature: 25 °C Humidity: 49 % RH Atmospheric Pressure: 1007 mbar
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.4.2 Test Setup Diagram







7.4.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. 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.

e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. 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.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

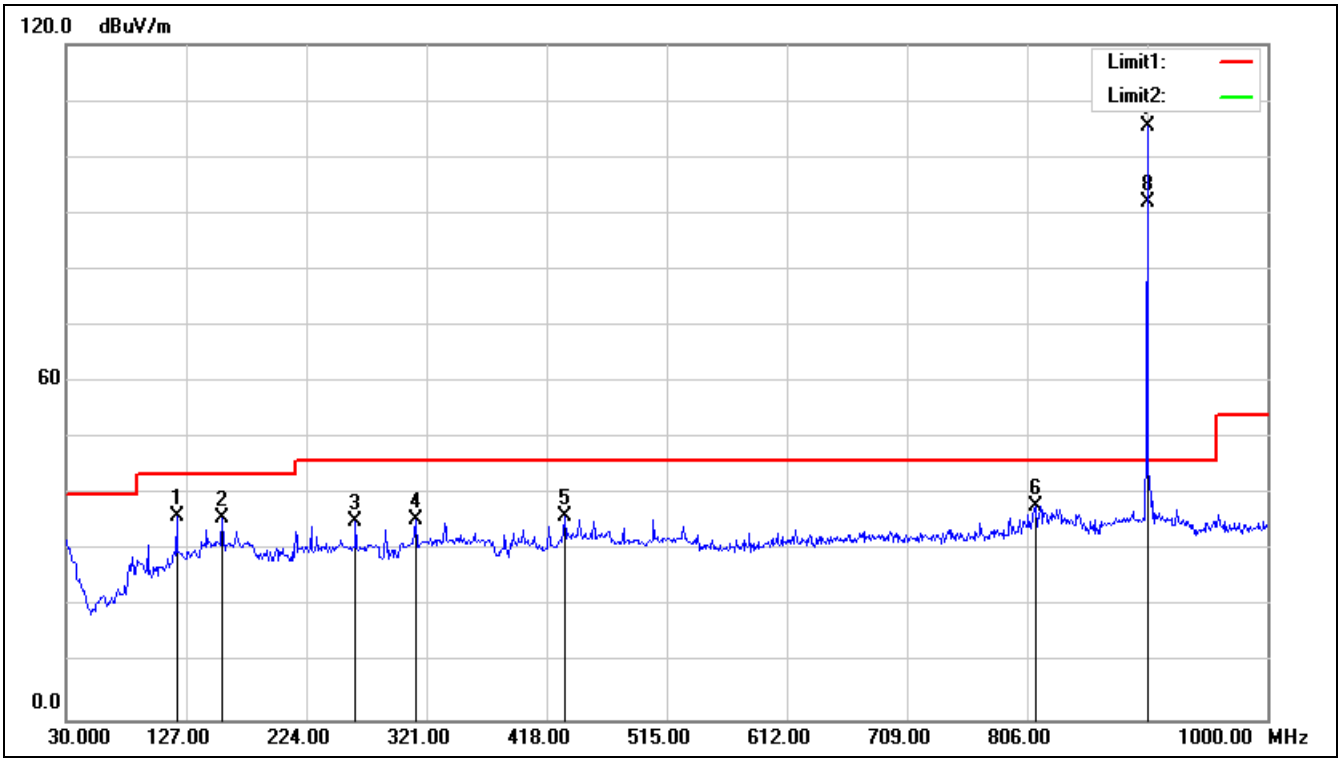
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

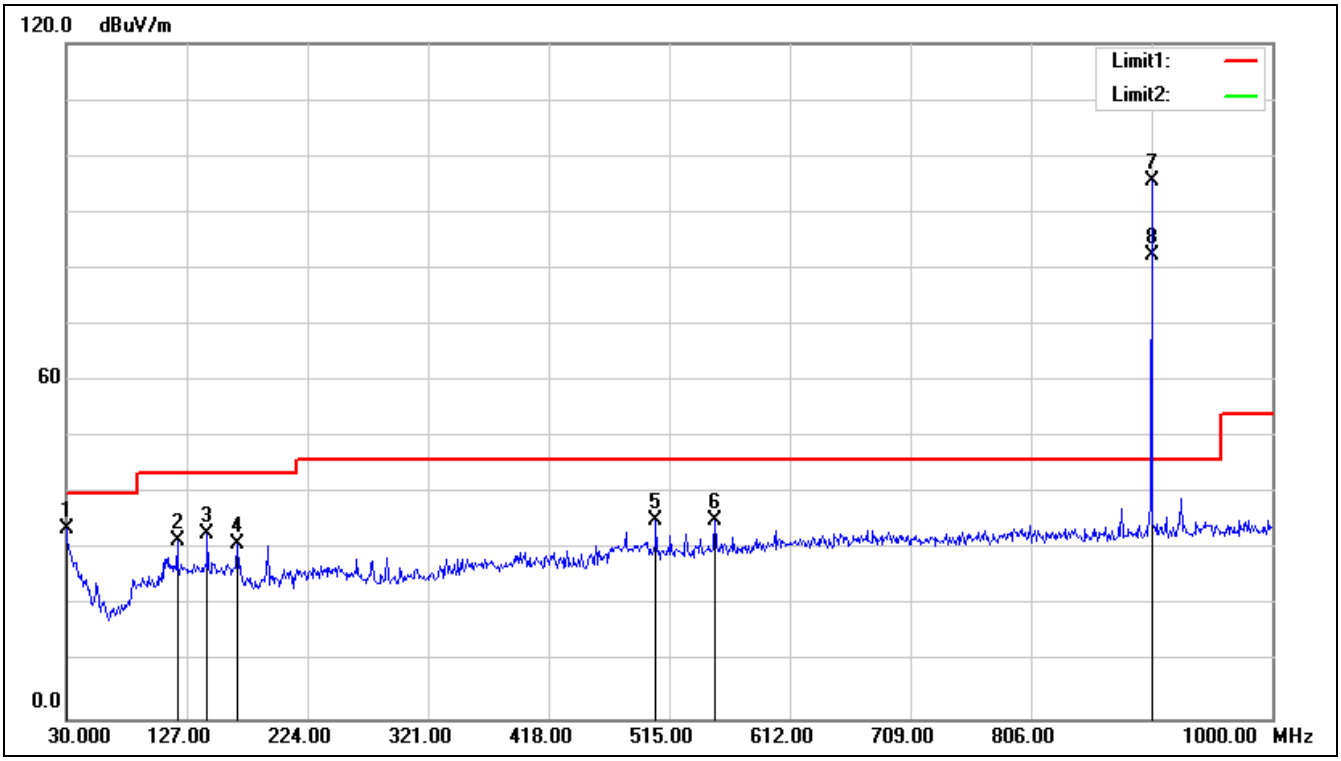
30MHz-1GHz:

Horizontal 902.5MHz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	119.2400	16.90	19.14	36.04	43.50	-7.46	QP
2	156.1000	16.15	19.67	35.82	43.50	-7.68	QP
3	263.7700	15.63	19.68	35.31	46.00	-10.69	QP
4	312.2700	14.46	21.05	35.51	46.00	-10.49	QP
5	432.5500	12.08	24.06	36.14	46.00	-9.86	QP
6	812.7900	10.08	27.89	37.97	46.00	-8.03	QP
7	903.0000	76.86	28.71	105.57	114.00	-8.43	peak
8	903.0000	63.29	28.71	92.05	94.00	-1.95	QP

Vertical 902.5MHz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	30.0000	7.87	25.93	33.80	40.00	-6.20	QP
2	119.2400	12.38	19.14	31.52	43.50	-11.98	QP
3	143.4900	13.07	19.93	33.00	43.50	-10.50	QP
4	167.7400	12.29	18.76	31.05	43.50	-12.45	QP
5	504.3300	9.83	25.29	35.12	46.00	-10.88	QP
6	551.8600	9.25	25.86	35.11	46.00	-10.89	QP
7	903.0000	66.70	28.71	95.41	114.00	-18.59	peak
8	903.0000	53.65	28.71	82.36	94.00	-11.64	QP

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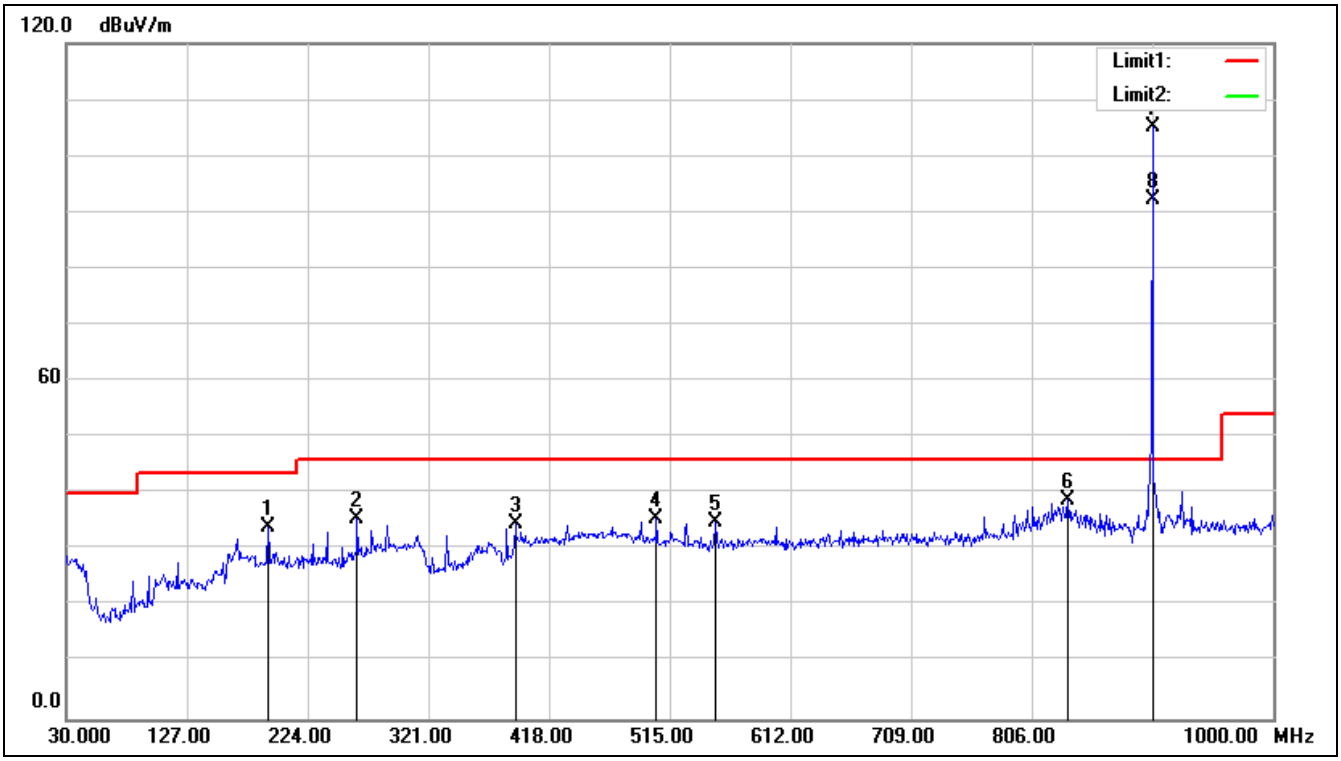
Horizontal 908.5MHz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	191.9900	17.32	16.87	34.19	43.50	-9.31	QP
2	263.7700	15.98	19.68	35.66	46.00	-10.34	QP
3	390.8400	11.38	23.36	34.74	46.00	-11.26	QP
4	504.3300	10.26	25.29	35.55	46.00	-10.45	QP
5	551.8600	9.04	25.86	34.90	46.00	-11.10	QP
6	835.1000	10.85	28.01	38.86	46.00	-7.14	QP
7	908.0000	76.54	28.76	105.30	114.00	-8.70	peak
8	908.0000	63.60	28.76	92.36	94.00	-1.64	QP

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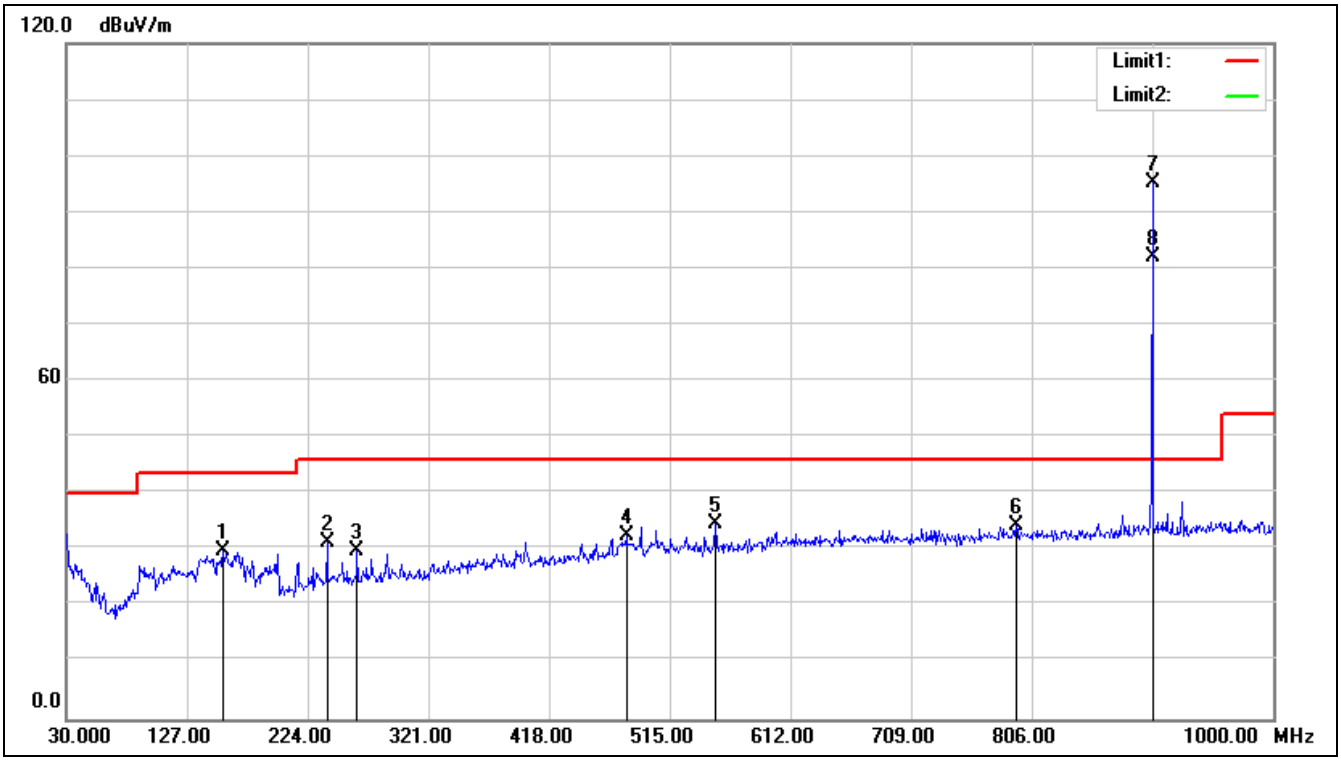
Vertical 908.5MHz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	156.1000	10.27	19.67	29.94	43.50	-13.56	QP
2	239.5200	12.68	18.68	31.36	46.00	-14.64	QP
3	263.7700	10.29	19.68	29.97	46.00	-16.03	QP
4	480.0800	7.60	24.87	32.47	46.00	-13.53	QP
5	551.8600	8.79	25.86	34.65	46.00	-11.35	QP
6	793.3900	6.51	27.78	34.29	46.00	-11.71	QP
7	908.0000	66.49	28.76	95.25	114.00	-18.75	peak
8	908.0000	53.40	28.76	82.16	94.00	-11.84	QP

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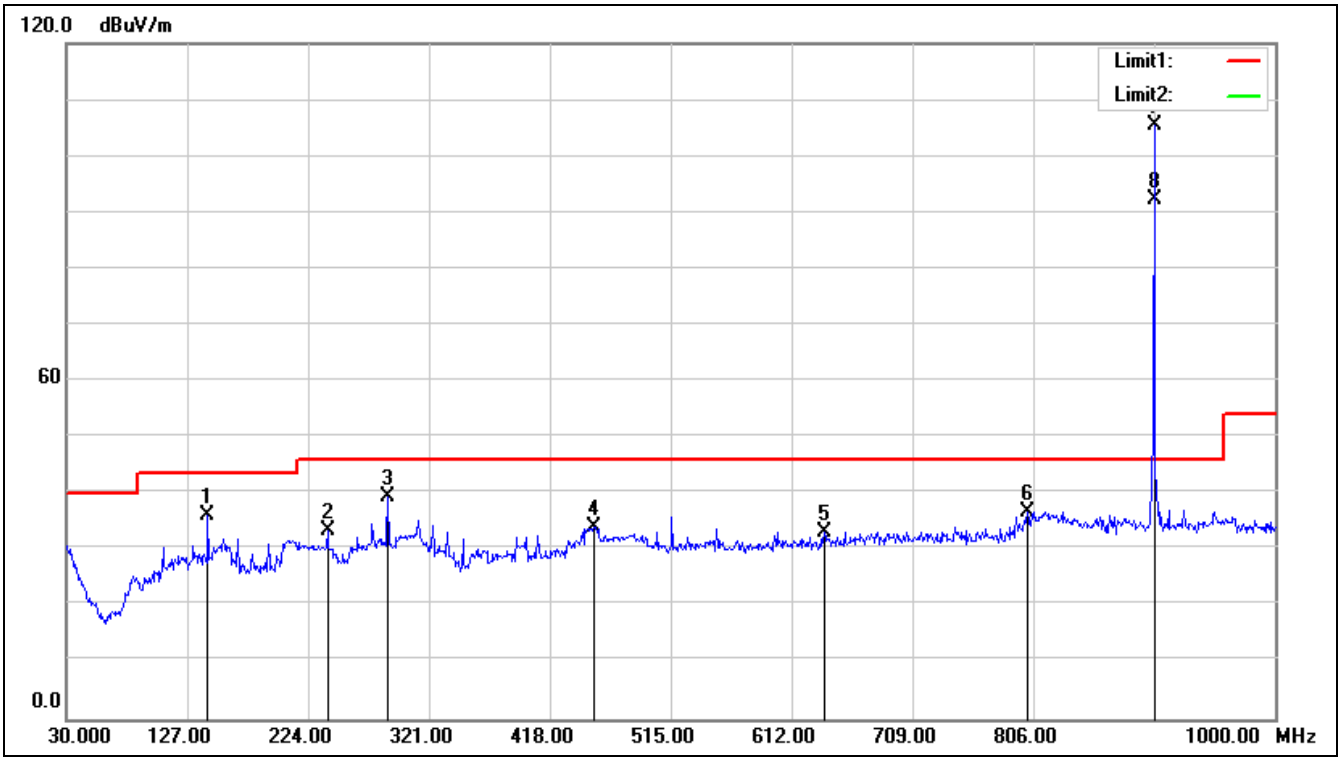
Horizontal 914.9MHz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	143.4900	16.30	19.93	36.23	43.50	-7.27	QP
2	239.5200	14.82	18.68	33.50	46.00	-12.50	QP
3	288.0200	19.04	20.31	39.35	46.00	-6.65	QP
4	453.8900	9.78	24.38	34.16	46.00	-11.84	QP
5	638.1900	6.13	26.97	33.10	46.00	-12.90	QP
6	801.1500	8.91	27.84	36.75	46.00	-9.25	peak
7	915.0000	76.71	29.03	105.74	114.00	-8.26	peak
8	915.0000	63.42	29.03	92.45	94.00	-1.55	QP

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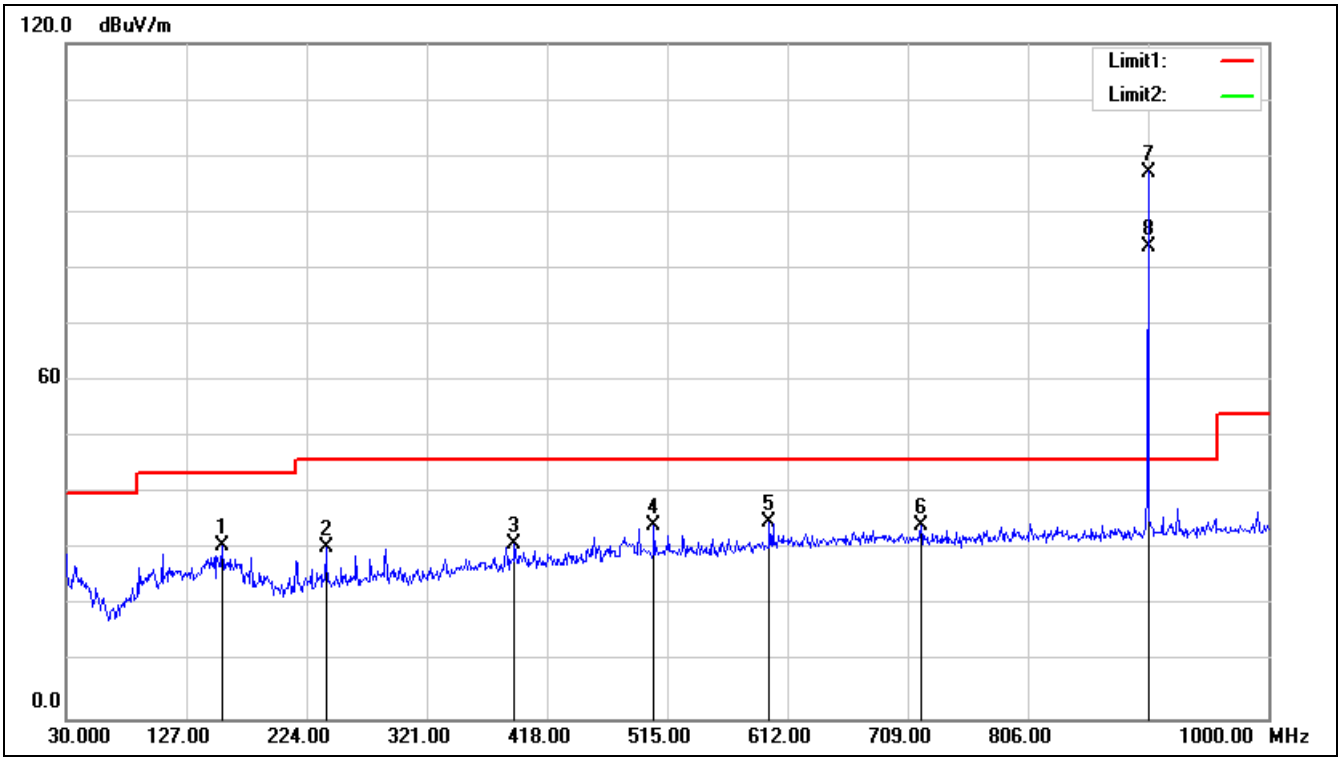
Vertical 914.9MHz



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	156.1000	11.12	19.67	30.79	43.50	-12.71	QP
2	239.5200	11.73	18.68	30.41	46.00	-15.59	QP
3	391.8100	7.65	23.38	31.03	46.00	-14.97	QP
4	504.3300	8.93	25.29	34.22	46.00	-11.78	QP
5	597.4500	8.58	26.48	35.06	46.00	-10.94	QP
6	719.6700	6.75	27.49	34.24	46.00	-11.76	QP
7	915.0000	68.49	29.03	97.52	114.00	-16.48	peak
8	915.0000	55.25	29.03	84.28	94.00	-9.72	QP

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Above 1GHz:

902.5MHz:

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	polarization
1	1981.000	47.75	-8.49	39.26	54.00	-14.74	peak	Vertical
2	2341.000	50.33	-7.45	42.88	54.00	-11.12	peak	Vertical
3	3061.000	48.04	-5.71	42.33	54.00	-11.67	peak	Vertical
4	2305.000	50.53	-7.54	42.99	54.00	-11.01	peak	Horizontal
5	3358.000	48.84	-5.38	43.46	54.00	-10.54	peak	Horizontal
6	3817.000	48.82	-3.63	45.19	54.00	-8.81	peak	Horizontal

908.5MHz:

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	polarization
1	2143.000	49.10	-7.91	41.19	54.00	-12.81	peak	Vertical
2	3277.000	49.88	-5.31	44.57	54.00	-9.43	peak	Vertical
3	4555.000	47.42	-2.37	45.05	54.00	-8.95	peak	Vertical
4	2125.000	49.28	-7.95	41.33	54.00	-12.67	peak	Horizontal
5	2341.000	50.33	-7.45	42.88	54.00	-11.12	peak	Horizontal
6	3214.000	47.86	-5.25	42.61	54.00	-11.39	peak	Horizontal

914.9MHz:

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	polarization
1	2134.000	48.98	-7.93	41.05	54.00	-12.95	peak	Vertical
2	2854.000	48.81	-6.27	42.54	54.00	-11.46	peak	Vertical
3	4015.000	47.92	-3.97	43.95	54.00	-10.05	peak	Vertical
4	2170.000	48.72	-7.85	40.87	54.00	-13.13	peak	Horizontal
5	2926.000	48.19	-6.09	42.10	54.00	-11.90	peak	Horizontal
6	4186.000	48.76	-3.02	45.74	54.00	-8.26	peak	Horizontal

Remark: 1. Test Level = Receiver Reading + Antenna Factor + Cable Loss- Preamplifier Factor

2. No any other emission which falls in restricted bands can be detected and be reported.

3. If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

All frequencies within the "Restricted bands" have been evaluated to compliance. Section 15.205 Restricted bands of operation.

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8 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

9 EUT Constructional Details

Refer to the < External Photos > & < Internal Photos >.

- End of the Report -

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