

FCC Part 15C Measurement and Test Report

For

Zhejiang Libiao Robotics Co., Ltd.

Building 22 Project Y Xixi art collection Village Fangxi Road Hangzhou City,

Zhejiang

FCC ID: 2AQQMLBAP-102LU-900

FCC Rule(s): FCC Part 15.249

Product Description: Wireless Communication Device

Tested Model: LBAP-102LU-900

Report No.: STR18078258I

Sample Receipt Date: 2017-07-24

Tested Date: 2017-07-25 to 2017-07-30

Issued Date: 2017-07-30

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Mike Shi

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Silin Chen

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM Test Technology Co., Ltd.



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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Zhejiang Libiao Robotics Co., Ltd.
Address of applicant: Building 22 Project Y Xixi art collection Village Fangxi Road
Hangzhou City, Zhejiang

Manufacturer: Zhejiang Libiao Robotics Co., Ltd.
Address of manufacturer: Building 22 Project Y Xixi art collection Village Fangxi Road
Hangzhou City, Zhejiang

General Description of EUT	
Product Name:	Wireless Communication Device
Brand Name:	/
Model No.:	LBAP-102LU-900
Adding Model:	/
Rated Voltage:	USB Port:DC5V/500mA; POE Port: 44~57V/150mA
Battery capacity:	/
Power Adaptor:	/
Software Version:	V0.7
Hardware Version:	V0.7
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Frequency Range:	904.25-926.25MHz
Max. Field Strength:	Antenna 0: 102.65dBuV/m Antenna 1: 101.62 dBuV/m
Modulation:	GFSK
Antenna Type:	SMA-reverse Antenna
Antenna Gain:	5.0dBi
Lowest Internal Frequency of EUT:	8MHz

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Test Facility

FCC – Registration No.: 125990

Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Low Channel	904.25MHz
TM2	Middle Channel	915.25 MHz
TM3	High Channel	926.25 MHz

Test Conditions	
Temperature:	22~25 °C
Relative humidity	50~56 %.
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
USB Cable	1.5	Shielded	With Core
Antenna Cable	1	Unshielded	Without Core

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
RJ45 Cable	4.5	Unshielded	With Core
RJ45 Cable	1.5	Shielded	Without Core

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Computer	Lenovo	ThinkPad Edge E10	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	$\pm 0.42\text{dB}$
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Conducted Spurious Emission	Conducted	$\pm 2.17\text{dB}$
Conducted Emissions	Conducted	9-150kHz $\pm 3.74\text{dB}$
		0.15-30MHz $\pm 3.34\text{dB}$
Transmitter Spurious Emissions	Radiated	30-200MHz $\pm 4.52\text{dB}$
		0.2-1GHz $\pm 5.56\text{dB}$
		1-6GHz $\pm 3.84\text{dB}$
		6-18GHz $\pm 3.92\text{dB}$

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2018-05-22	2019-05-21
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2018-05-22	2019-05-21
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2018-05-22	2019-05-21
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2018-05-22	2019-05-21
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2018-05-22	2019-05-21
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-08	2020-06-07
SEMT-1042	Horn Antenna	ETS	3117	00086197	2017-06-08	2020-06-07
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2017-06-08	2020-06-07
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-08	2020-06-07
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2018-05-22	2019-05-21
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2018-05-22	2019-05-21
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2018-05-22	2019-05-21
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2018-05-22	2019-05-21
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2018-05-22	2019-05-21
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2018-05-22	2019-05-21
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2018-03-19	2021-03-18
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2018-05-22	2019-05-21
SEMT-1048	RF Limiter	ATTEN	AT-BSF-2400~2500	/	2018-05-22	2019-05-21
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2018-05-22	2019-05-21
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	2018-03-19	2019-03-18
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2018-03-19	2019-03-18
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2018-03-19	2019-03-18
SEMT-C004	Cable	Zheng DI	2M0RFC	/	2018-03-19	2019-03-18
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2018-03-19	2019-03-18
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2018-03-19	2019-03-18



2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.203	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§ 15.207(a)	Conducted Emission	Compliant
§ 15.209(a)(f)	Radiated Spurious Emissions	Compliant
§15.249(a)	Field Strength of Emissions	Compliant
§15.249(d)	Out of Band Emission	Compliant
§15.215 (c)	Emission Bandwidth	Compliant

N/A: not applicable

3. Antenna Requirements

3.1 Standard Applicable

According to FCC Part 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.

3.2 Test Result

This product has two SAM-reverse antennas, fulfill the requirement of this section.

4. Radiated Emissions

4.1 Standard Applicable

According to §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 (milli-volts/meter)	Field strength of Harmonics (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(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.

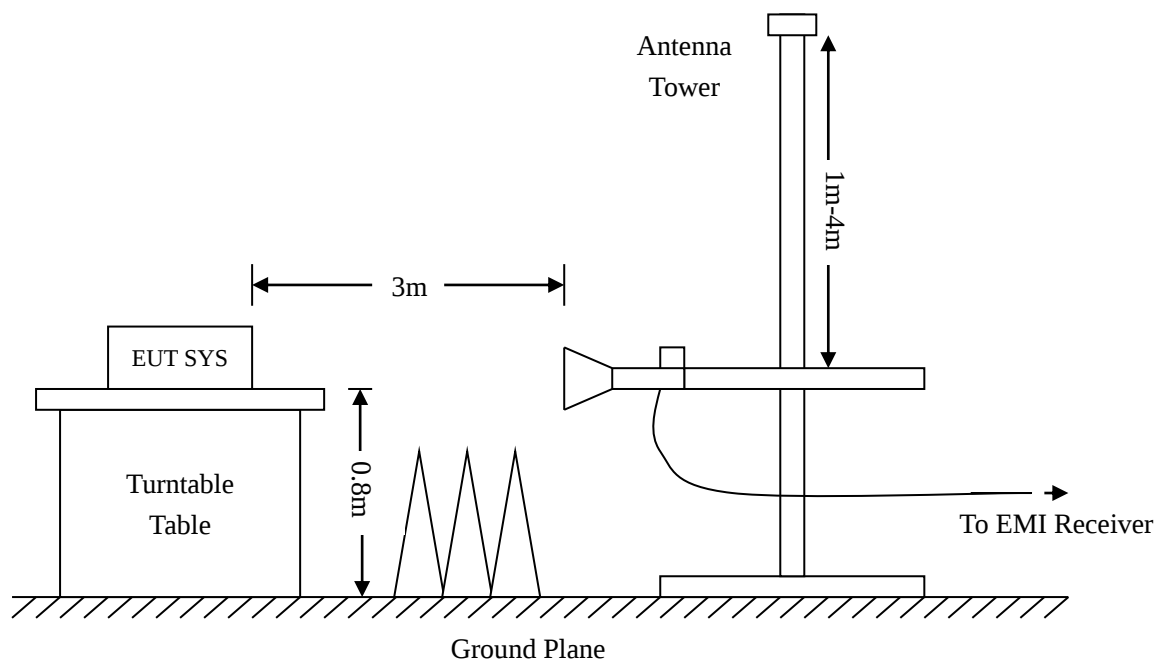
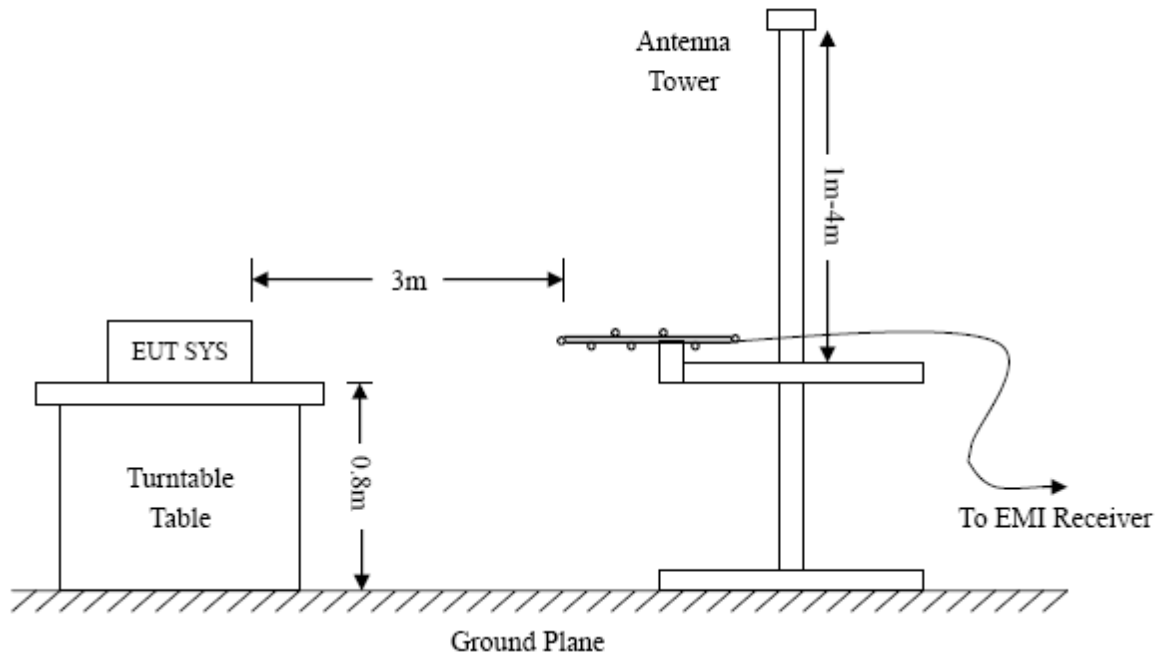
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

4.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.249(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



Frequency :9kHz-30MHz
 RBW=10KHz,
 VBW =30KHz
 Sweep time= Auto
 Trace = max hold
 Detector function = peak

Frequency :30MHz-1GHz
 RBW=120KHz,
 VBW=300KHz
 Sweep time= Auto
 Trace = max hold
 Detector function = peak, QP

Frequency :Above 1GHz
 RBW=1MHz,
 VBW=3MHz(Peak), 10Hz(AV)
 Sweep time= Auto
 Trace = max hold
 Detector function = peak, AV

4.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit. The equation for margin calculation is as follows:

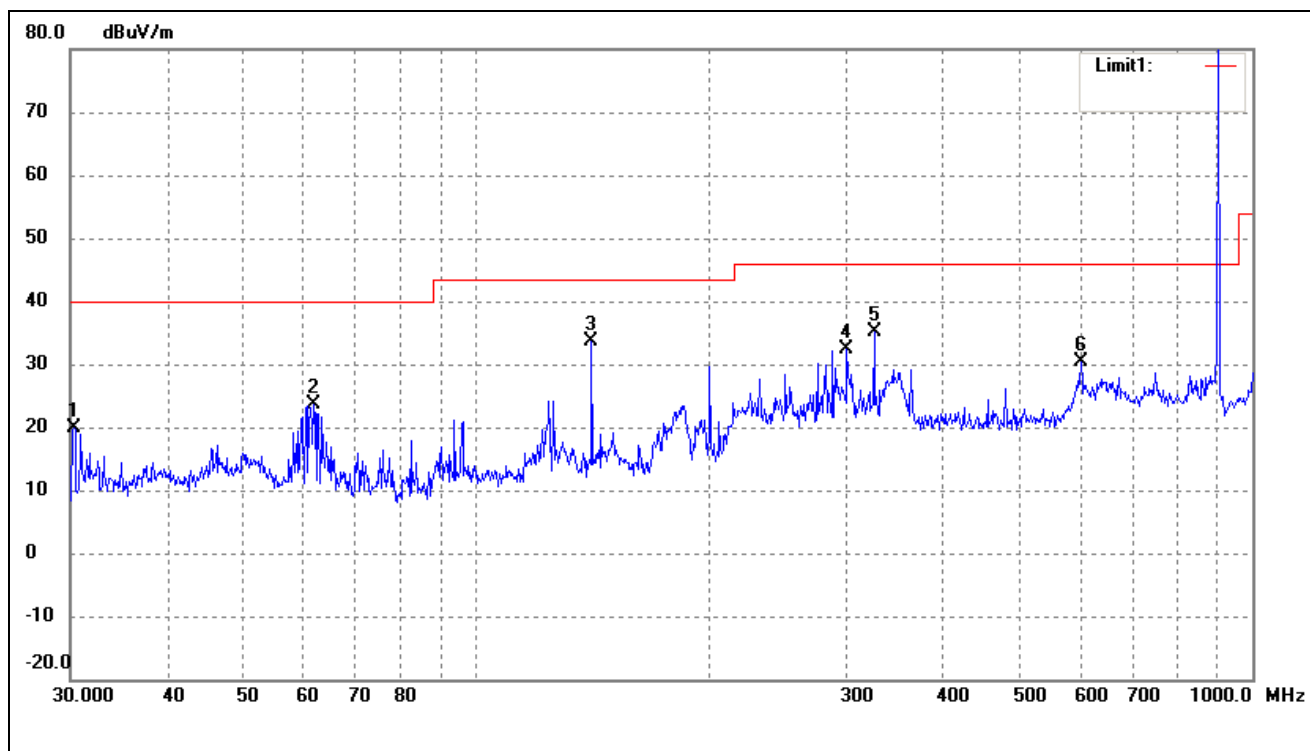
$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15C Limit}$$

4.4 Summary of Test Results/Plots

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

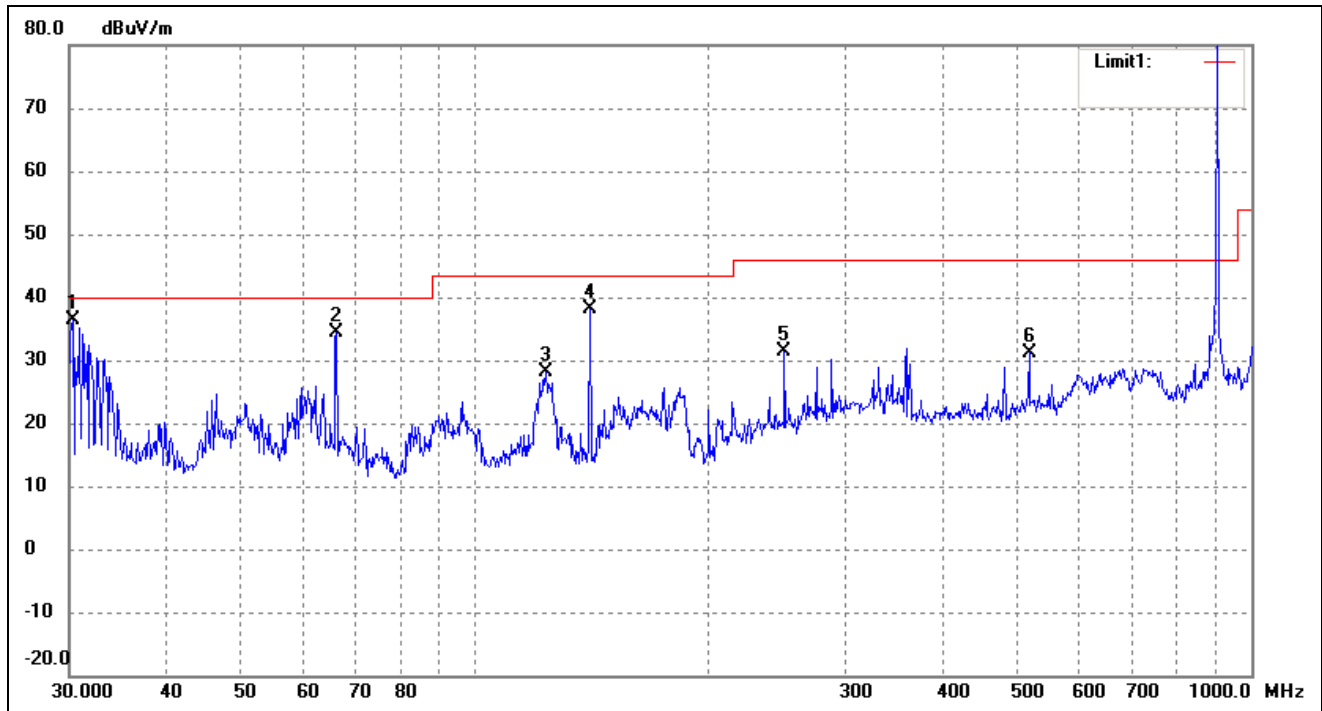
- Spurious Emissions Below 1GHz
- Antenna 0:

Test Channel	Low	Polarity:	Horizontal
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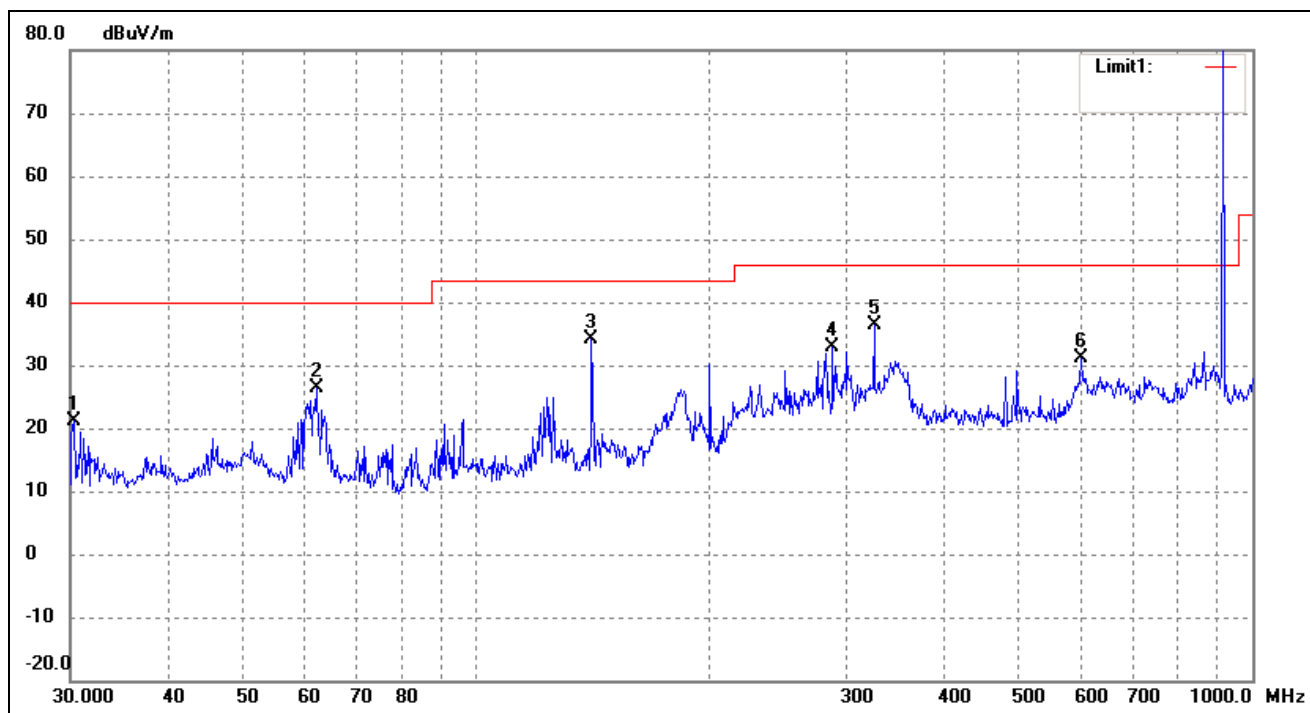
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	30.3173	39.99	-20.10	19.89	40.00	-20.11	212	100	peak
2	61.7781	42.14	-18.60	23.54	40.00	-16.46	91	100	peak
3	140.8351	52.88	-19.15	33.73	43.50	-9.77	105	100	peak
4	300.3672	40.31	-7.91	32.40	46.00	-13.60	105	100	peak
5	325.5958	43.32	-8.13	35.19	46.00	-10.81	113	100	peak
6	601.4265	32.92	-2.66	30.26	46.00	-15.74	113	100	peak
7	904.2500	106.79	-4.14	102.65	114	-11.35	65	100	peak
	904.2500	84.59	-4.14	80.45	94	-13.55	65	100	AV

Test Channel	Low	Polarity:	Vertical
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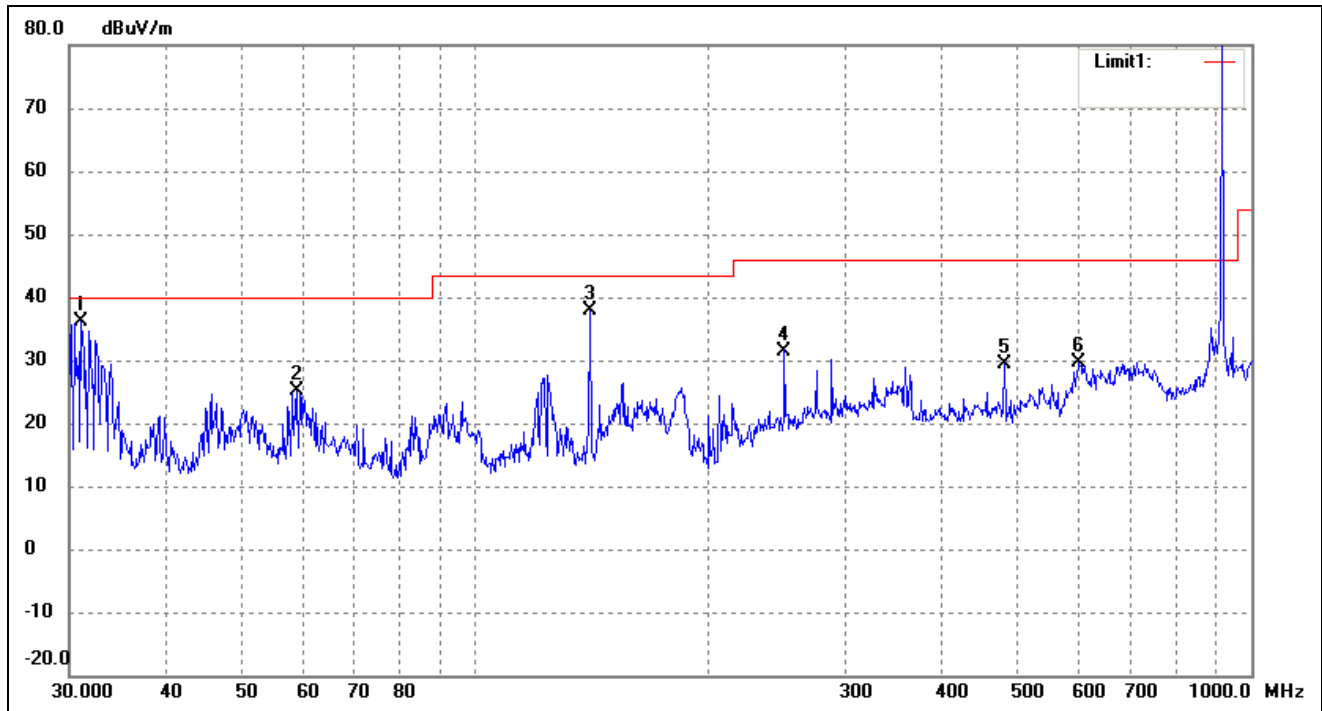
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	30.3173	56.58	-20.10	36.48	40.00	-3.52	174	100	peak
2	66.2662	54.10	-19.61	34.49	40.00	-5.51	267	100	peak
3	123.2655	46.28	-18.07	28.21	43.50	-15.29	85	100	peak
4	140.8351	57.30	-19.15	38.15	43.50	-5.35	335	100	peak
5	250.3012	42.65	-11.26	31.39	46.00	-14.61	343	100	peak
6	517.2480	38.55	-7.30	31.25	46.00	-14.75	280	100	peak
7	904.2500	106.77	-4.14	102.63	114	-11.37	255	100	peak
	904.2500	84.28	-4.14	80.14	94	-13.86	255	100	AV

Test Channel	Middle	Polarity:	Horizontal
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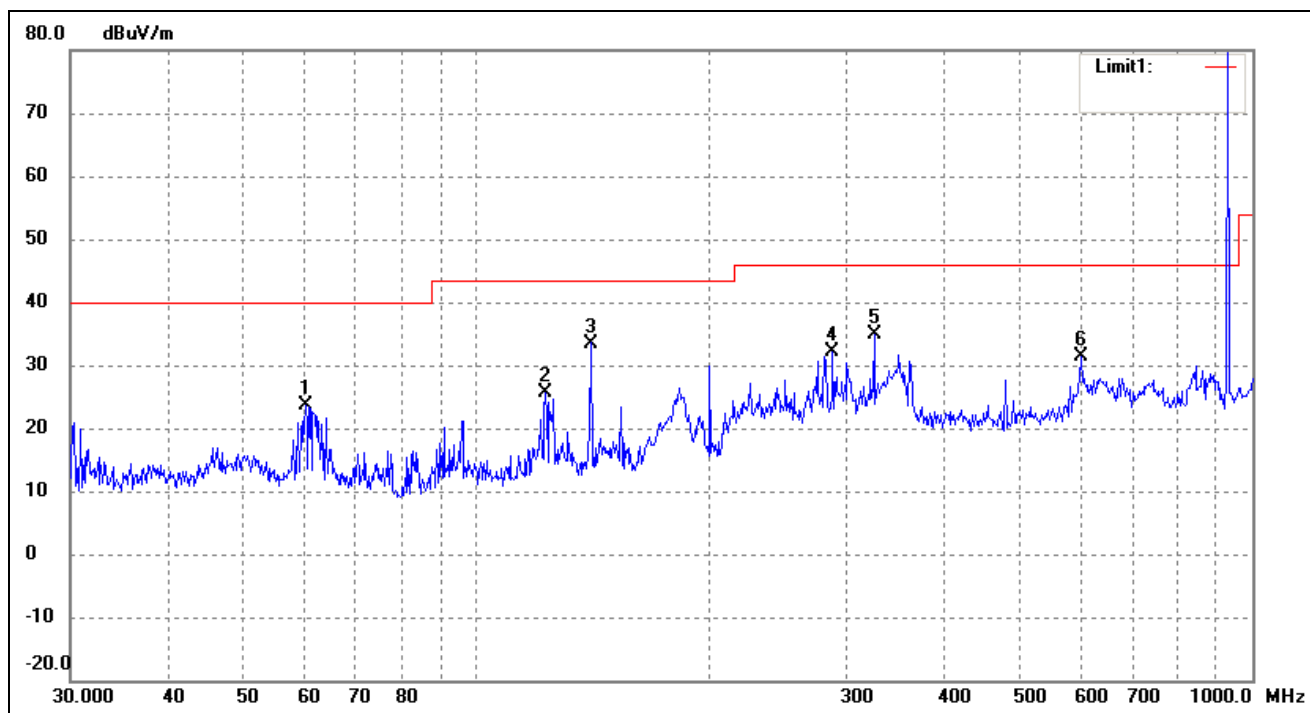
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	30.3173	41.27	-20.10	21.17	40.00	-18.83	205	100	peak
2	62.2128	44.96	-18.70	26.26	40.00	-13.74	273	100	peak
3	140.8351	53.34	-19.15	34.19	43.50	-9.31	59	100	peak
4	287.9904	41.47	-8.58	32.89	46.00	-13.11	294	100	peak
5	325.5958	44.54	-8.13	36.41	46.00	-9.59	199	100	peak
6	601.4265	33.80	-2.66	31.14	46.00	-14.86	129	100	peak
7	915.2500	107.04	-4.88	102.16	114	-11.84	306	100	peak
	915.2500	84.92	-4.88	80.04	94	-13.86	306	100	AV

Test Channel	Middle	Polarity:	Vertical
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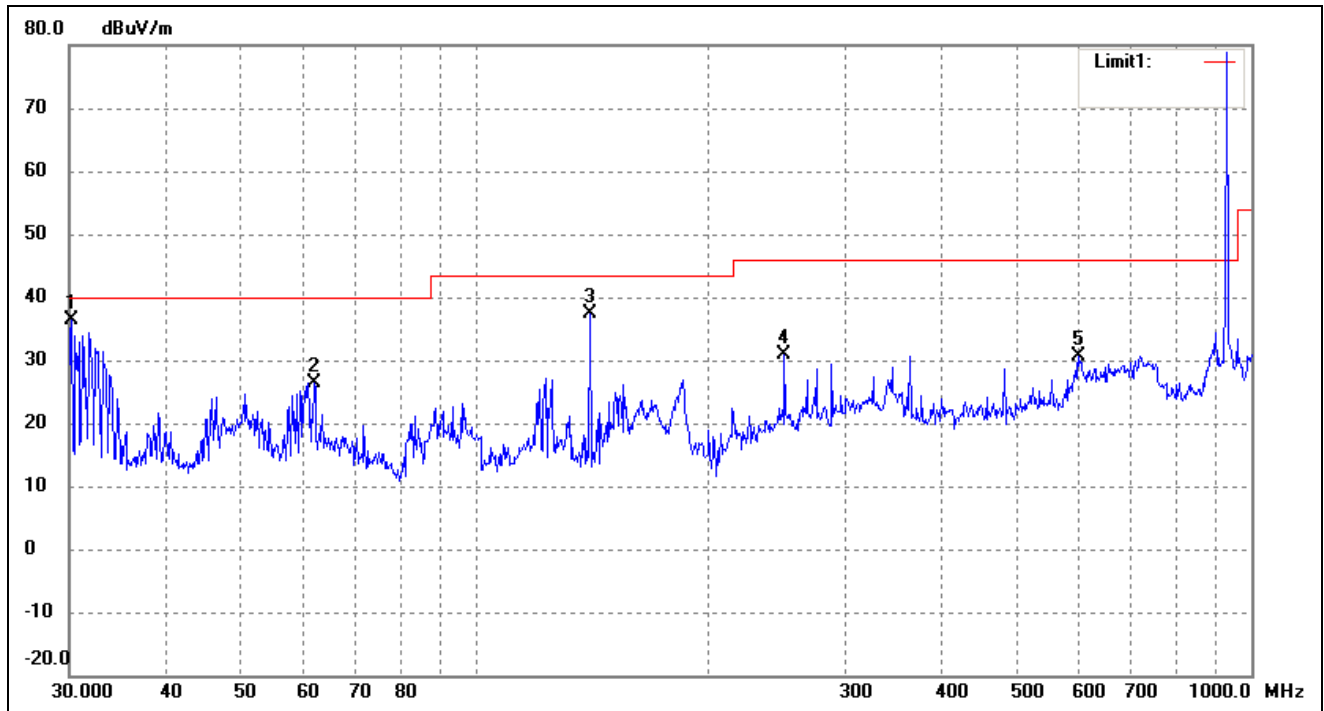
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	31.0706	56.20	-19.98	36.22	40.00	-3.78	65	100	peak
2	58.8185	43.43	-18.25	25.18	40.00	-14.82	156	100	peak
3	140.8351	57.07	-19.15	37.92	43.50	-5.58	130	100	peak
4	250.3012	42.76	-11.26	31.50	46.00	-14.50	144	100	peak
5	480.5276	37.79	-8.29	29.50	46.00	-16.50	121	100	peak
6	599.3212	32.41	-2.68	29.73	46.00	-16.27	184	100	peak
7	915.2500	105.86	-4.88	100.98	114	-13.02	241	100	peak
	915.2500	84.65	-4.88	79.77	94	-14.23	241	100	AV

Test Channel	High	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	60.2801	41.85	-18.27	23.58	40.00	-16.42	33	100	peak
2	122.8340	43.70	-18.04	25.66	43.50	-17.84	90	100	peak
3	140.8351	52.65	-19.15	33.50	43.50	-10.00	57	100	peak
4	287.9904	40.67	-8.58	32.09	46.00	-13.91	92	100	peak
5	325.5958	43.05	-8.13	34.92	46.00	-11.08	275	100	peak
6	601.4265	33.95	-2.66	31.29	46.00	-14.71	254	100	peak
7	926.2500	105.19	-4.69	100.50	114	-13.50	124	100	peak
	926.2500	84.22	-4.69	79.53	94	-14.47	124	100	AV

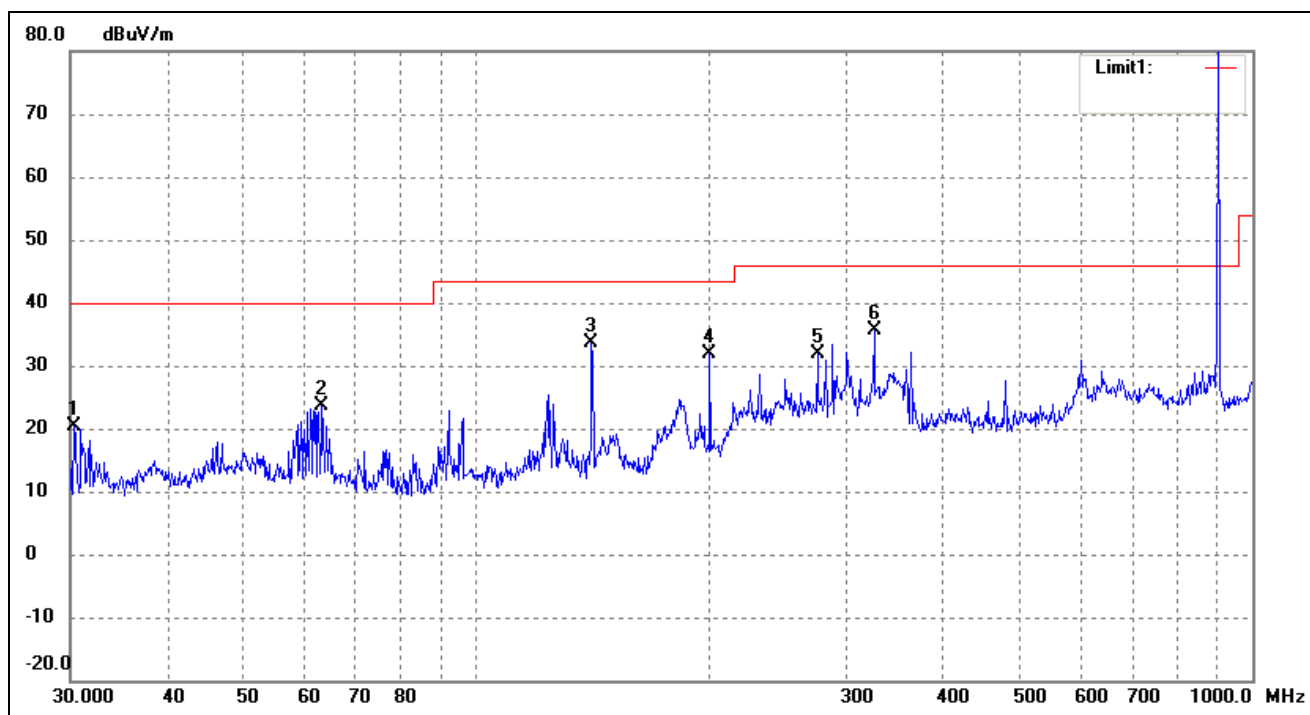
Test Channel	High	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	30.2111	56.38	-20.12	36.26	40.00	-3.74	174	100	peak
2	61.9951	45.11	-18.65	26.46	40.00	-13.54	267	100	peak
3	140.8351	56.62	-19.15	37.47	43.50	-6.03	85	100	peak
4	250.3012	42.10	-11.26	30.84	46.00	-15.16	335	100	peak
5	599.3212	33.31	-2.68	30.63	46.00	-15.37	343	100	peak
6	926.2500	106.68	-4.69	101.99	114	-12.01	114	100	peak
	926.2500	83.55	-4.69	78.86	94	-15.14	114	100	AV

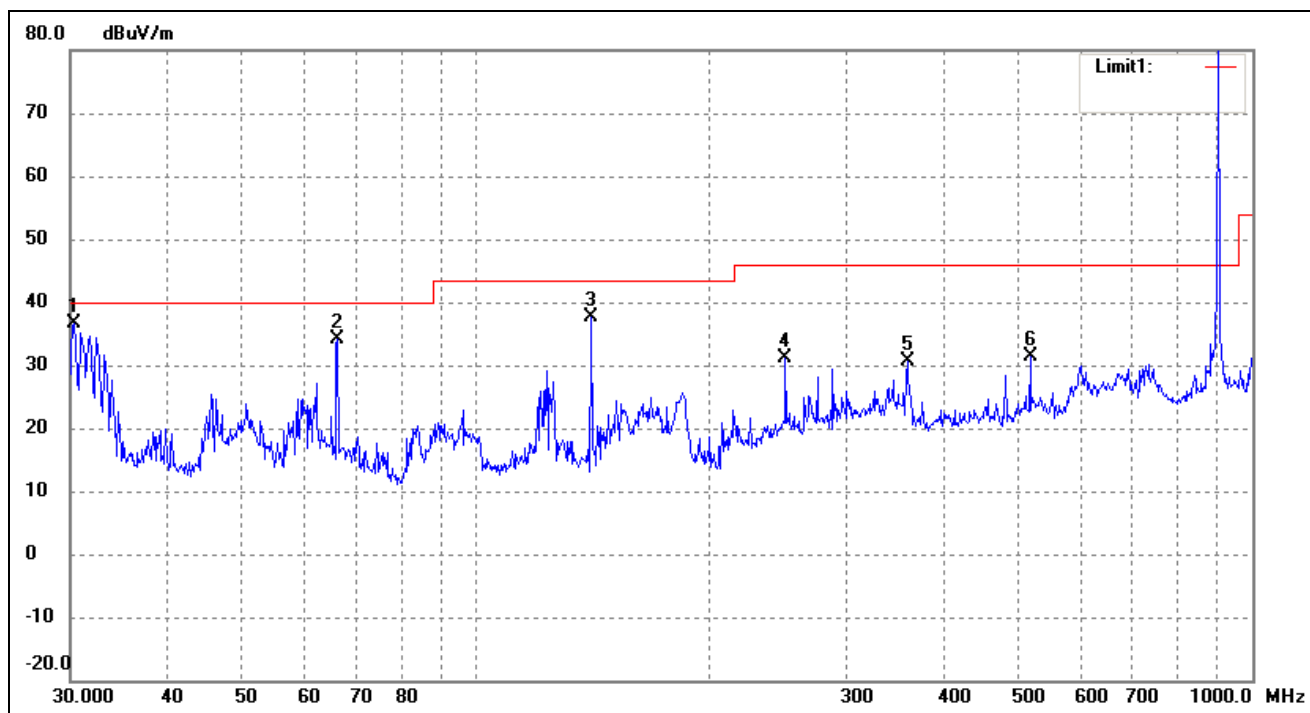
➤ Antenna 1:

Test Channel	Low	Polarity:	Horizontal
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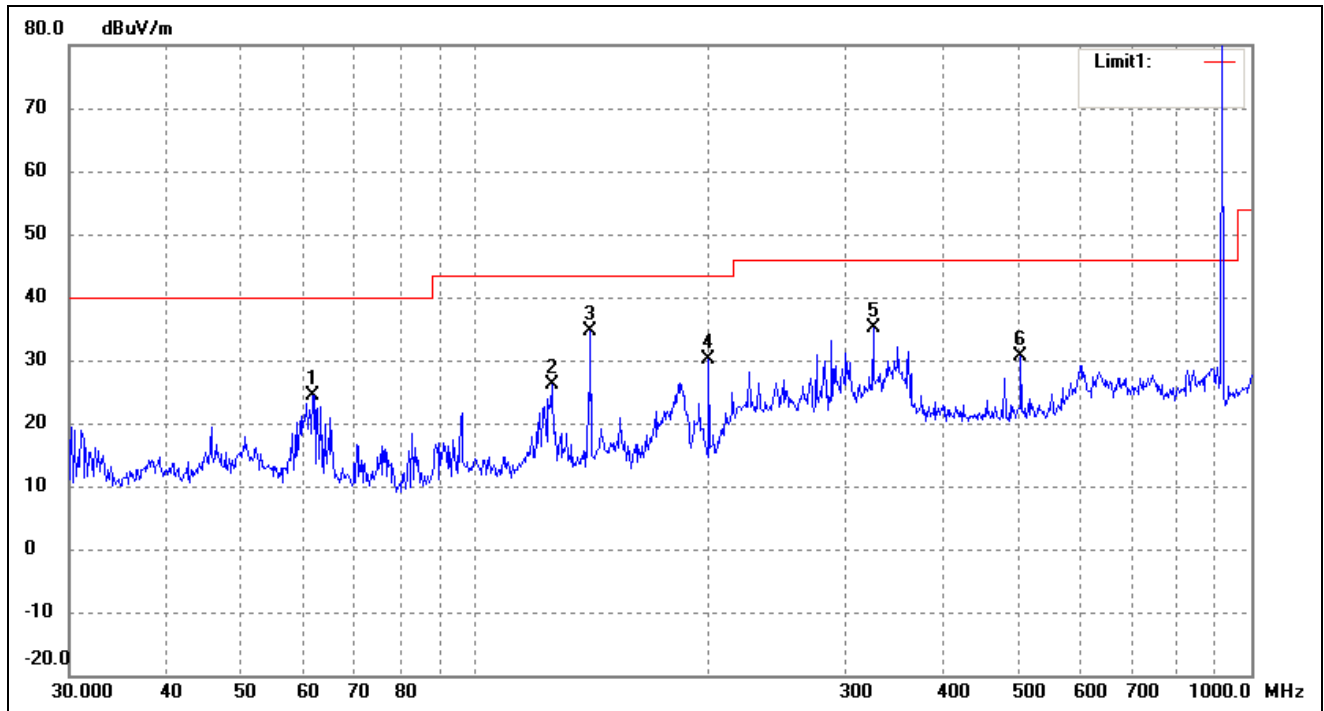
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	30.3173	40.40	-20.10	20.30	40.00	-19.70	209	100	peak
2	63.3132	42.56	-18.95	23.61	40.00	-16.39	99	100	peak
3	140.8351	52.84	-19.15	33.69	43.50	-9.81	90	100	peak
4	199.9856	50.52	-18.67	31.85	43.50	-11.65	111	100	peak
5	275.1570	41.42	-9.45	31.97	46.00	-14.03	151	100	peak
6	325.5958	43.69	-8.13	35.56	46.00	-10.44	115	100	peak
7	904.2500	104.78	-4.14	100.64	114	-13.36	266	100	peak
	904.2500	84.86	-4.14	80.72	94	-13.28	266	100	AV

Test Channel	Low	Polarity:	Vertical
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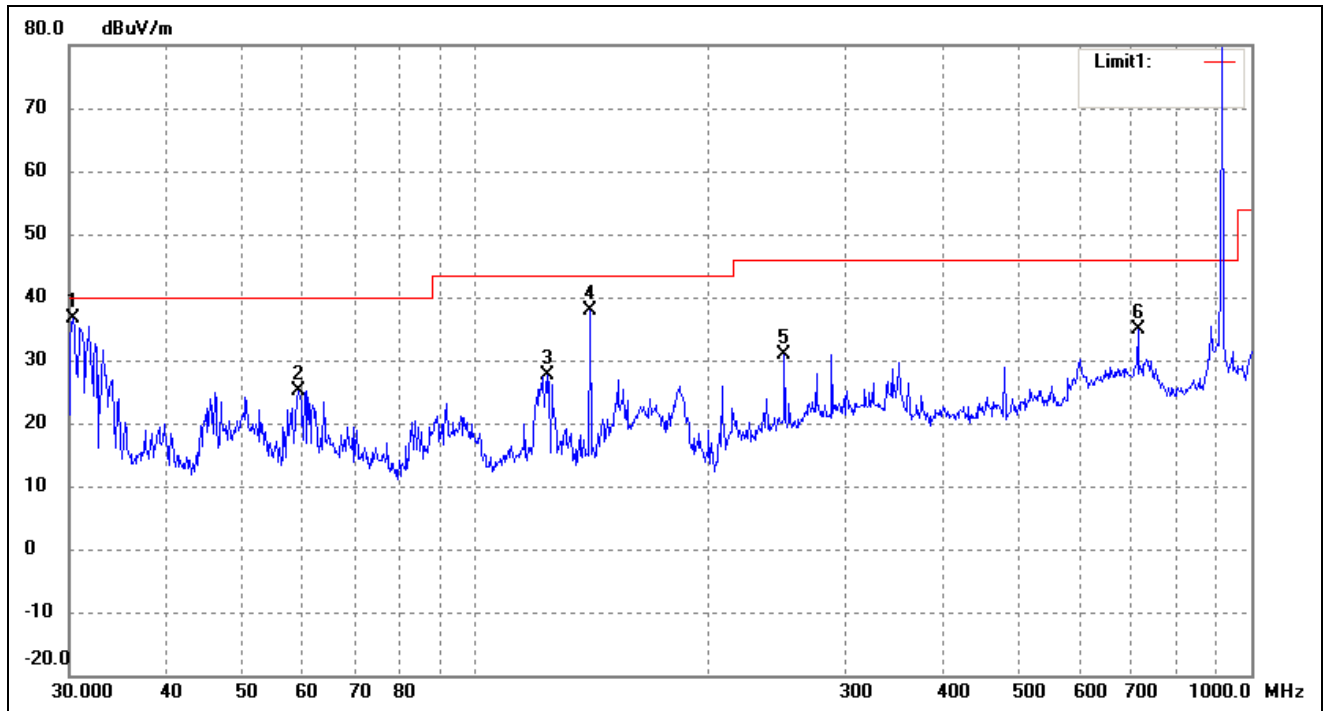
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	30.3173	56.63	-20.10	36.53	40.00	-3.47	238	100	peak
2	66.2662	53.76	-19.61	34.15	40.00	-5.85	90	100	peak
3	140.8351	56.82	-19.15	37.67	43.50	-5.83	314	100	peak
4	250.3012	42.51	-11.26	31.25	46.00	-14.75	109	100	peak
5	359.1860	38.84	-8.27	30.57	46.00	-15.43	137	100	peak
6	517.2480	38.56	-7.30	31.26	46.00	-14.74	91	100	peak
7	904.2500	105.02	-4.14	100.88	114	-13.12	236	100	peak
	904.2500	85.06	-4.14	80.92	94	-13.08	236	100	AV

Test Channel	Middle	Polarity:	Horizontal
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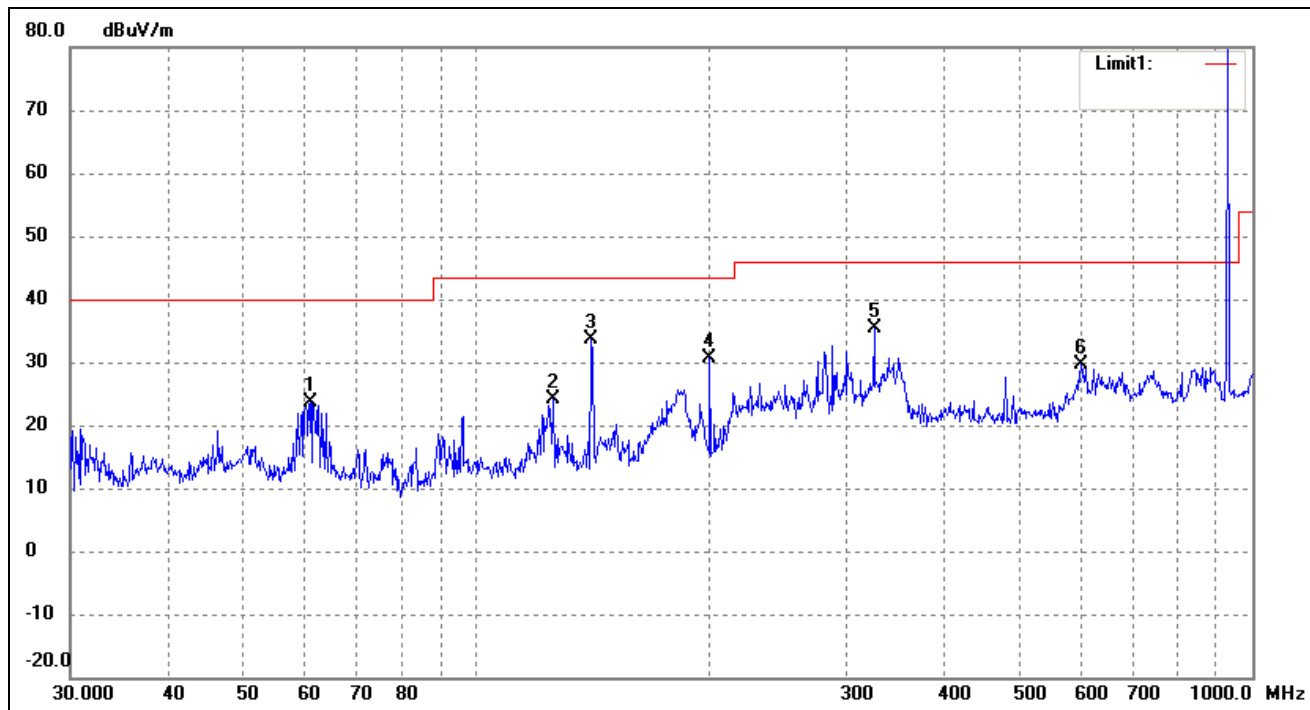
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	61.7781	43.10	-18.60	24.50	40.00	-15.50	255	100	peak
2	125.4457	44.31	-18.20	26.11	43.50	-17.39	122	100	peak
3	140.8351	53.66	-19.15	34.51	43.50	-8.99	119	100	peak
4	199.9856	48.90	-18.67	30.23	43.50	-13.27	106	100	peak
5	325.5958	43.15	-8.13	35.02	46.00	-10.98	210	100	peak
6	504.7062	38.30	-7.60	30.70	46.00	-15.30	155	100	peak
7	915.2500	105.57	-4.88	100.69	114	-13.31	147	100	peak
	915.2500	84.92	-4.88	80.04	94	-13.86	147	100	AV

Test Channel	Middle	Polarity:	Vertical
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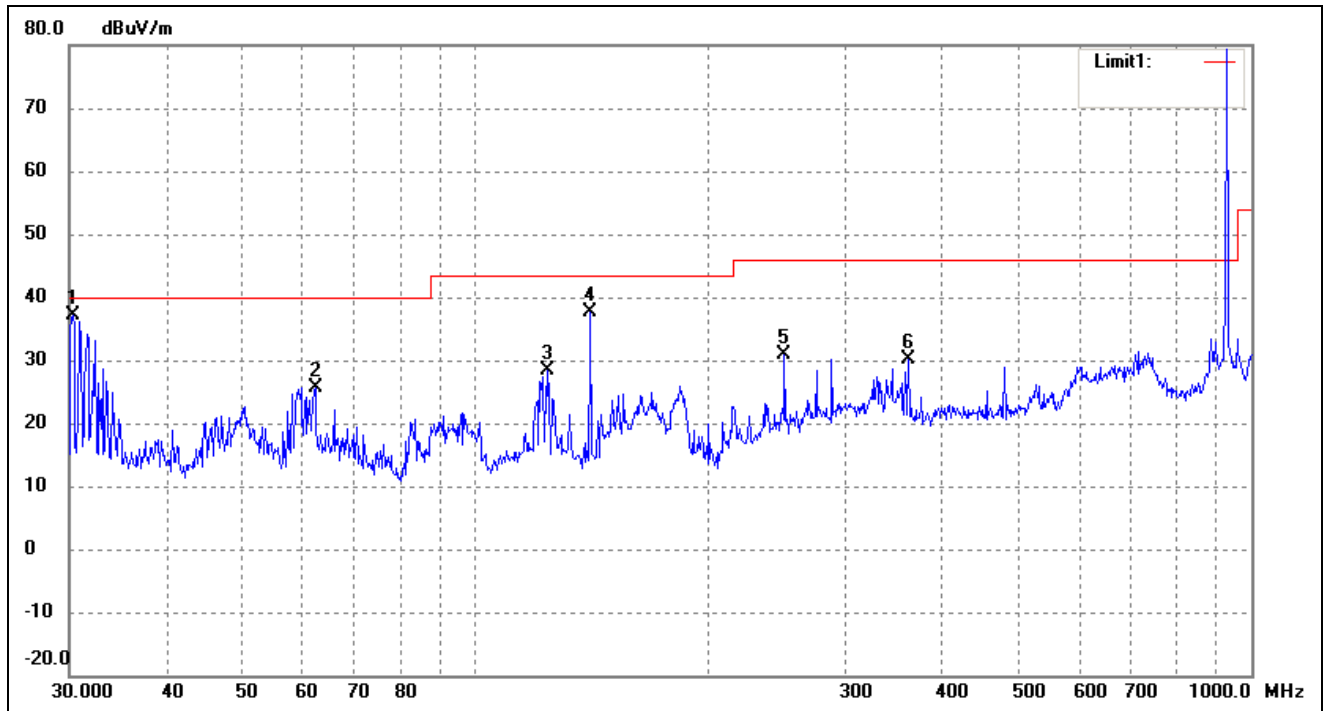
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	30.3173	56.63	-20.10	36.53	40.00	-3.47	209	100	peak
2	59.2325	43.40	-18.24	25.16	40.00	-14.84	220	100	peak
3	124.1330	45.81	-18.13	27.68	43.50	-15.82	98	100	peak
4	140.8351	57.14	-19.15	37.99	43.50	-5.51	324	100	peak
5	250.3012	42.11	-11.26	30.85	46.00	-15.15	114	100	peak
6	714.1734	38.60	-3.72	34.88	46.00	-11.12	252	100	peak
7	915.2500	105.44	-4.88	100.56	114	-13.44	145	100	peak
	915.2500	84.51	-4.88	79.64	94	-14.36	145	100	AV

Test Channel	High	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	61.1316	42.19	-18.46	23.73	40.00	-16.27	275	100	peak
2	125.8864	42.25	-18.24	24.01	43.50	-19.49	159	100	peak
3	140.8351	52.84	-19.15	33.69	43.50	-9.81	65	100	peak
4	199.9856	49.19	-18.67	30.52	43.50	-12.98	243	100	peak
5	325.5958	43.50	-8.13	35.37	46.00	-10.63	106	100	peak
6	601.4265	32.34	-2.66	29.68	46.00	-16.32	295	100	peak
7	926.2500	104.70	-4.69	100.01	114	-13.99	325	100	peak
	926.2500	84.27	-4.69	79.58	94	-14.42	325	100	AV

Test Channel	High	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	30.3173	57.21	-20.10	37.11	40.00	-2.89	85	100	peak
2	62.2128	44.25	-18.70	25.55	40.00	-14.45	92	100	peak
3	124.1330	46.56	-18.13	28.43	43.50	-15.07	123	100	peak
4	140.8351	56.83	-19.15	37.68	43.50	-5.82	92	100	peak
5	250.3012	42.16	-11.26	30.90	46.00	-15.10	358	100	peak
6	361.7139	38.47	-8.27	30.20	46.00	-15.80	273	100	peak
7	926.2500	105.71	-4.69	101.02	114	-12.98	47	100	peak
	926.2500	84.00	-4.69	79.31	94	-14.69	47	100	AV

➤ Spurious Emissions Above 1GHz

Antenna 0:

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-920.625MHz							
1808.50	44.86	10.23	55.09	74	-18.91	H	PK
1808.50	30.18	10.23	40.41	54	-13.59	H	AV
1808.50	45.55	10.23	55.78	74	-18.22	V	PK
1808.50	33.28	10.23	43.51	54	-10.49	V	AV
Middle Channel-922.125MHz							
1830.50	44.14	10.25	54.39	74	-19.61	H	PK
1830.50	32.35	10.25	42.60	54	-11.40	H	AV
1830.50	44.77	10.25	55.02	74	-18.98	V	PK
1830.50	32.08	10.25	42.33	54	-11.67	V	AV
High Channel-924.375MHz							
1852.50	45.15	10.29	55.44	74	-18.56	H	PK
1852.50	31.83	10.29	42.12	54	-11.88	H	AV
1852.50	47.17	10.29	57.46	74	-16.54	V	PK
1852.50	31.07	10.29	41.36	54	-12.64	V	AV

Antenna 1:

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-920.625MHz							
1808.50	43.42	10.23	53.65	74	-20.35	H	PK
1808.50	30.31	10.23	40.54	54	-13.46	H	AV
1808.50	45.07	10.23	55.30	74	-18.70	V	PK
1808.50	31.95	10.23	42.18	54	-11.82	V	AV
Middle Channel-922.125MHz							
1830.50	44.48	10.25	54.73	74	-19.27	H	PK
1830.50	32.62	10.25	42.87	54	-11.13	H	AV
1830.50	44.85	10.25	55.10	74	-18.90	V	PK
1830.50	44.48	10.25	54.73	74	-19.27	V	AV
High Channel-924.375MHz							
1852.50	45.06	10.29	55.35	74	-18.65	H	PK
1852.50	31.30	10.29	41.59	54	-12.41	H	AV
1852.50	45.76	10.29	56.05	74	-17.95	V	PK
1852.50	30.33	10.29	40.62	54	-13.38	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 2th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The measurements greater than 20dB below the limit from 9kHz to 30MHz..

5. Out of Band Emissions

5.1 Standard Applicable

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.

5.2 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2483.5MHz, than mark the higher-level emission for comparing with the FCC rules.

5.3 Summary of Test Results/Plots

Antenna 0:

Test mode	Frequency	Limit	Result
	MHz	dBuV / dBc	
Lowest	902.00	<46 dBuV	Pass
Highest	928.00	<46 dBuV	Pass

Antenna 1:

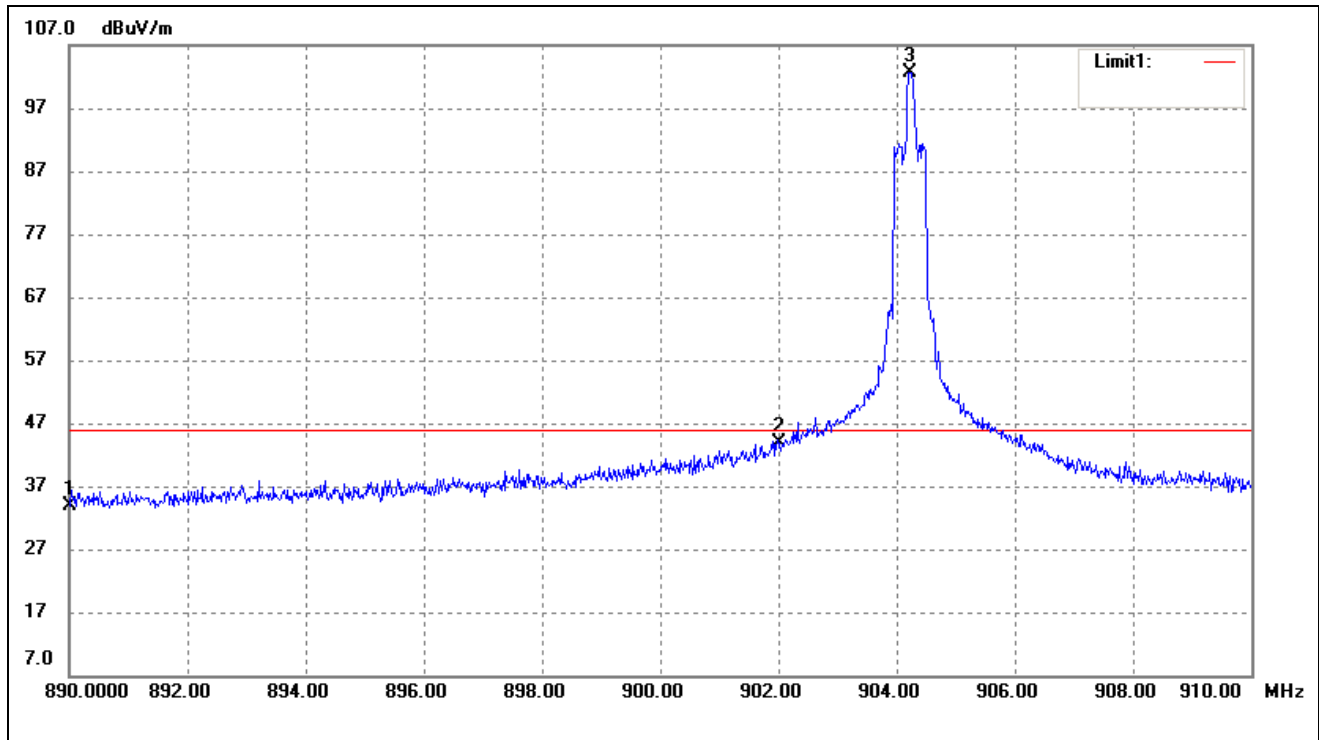
Test mode	Frequency	Limit	Result
	MHz	dBuV / dBc	
Lowest	902.00	<46 dBuV	Pass
Highest	928.00	<46 dBuV	Pass

The edge emissions are below the FCC 15.209 Limits or complies with the 15.249 requirements.

Please refer to the test plots as below.

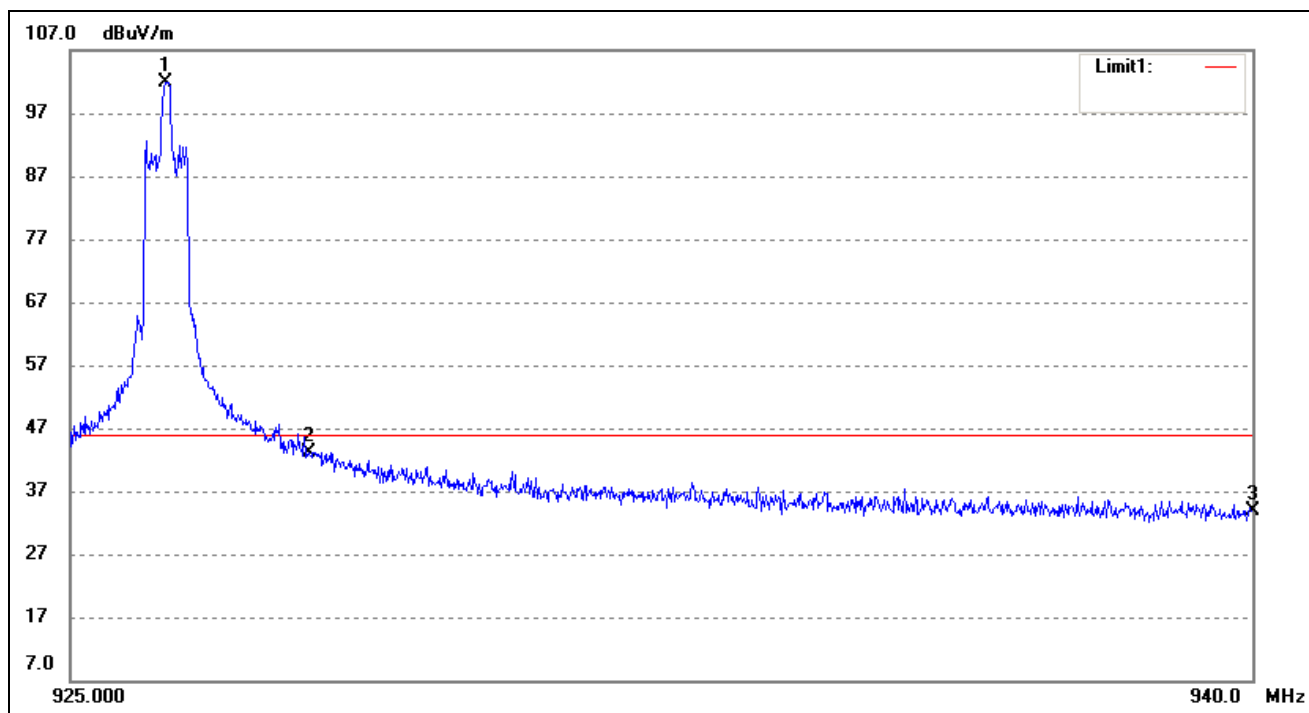
Antenna 0:

Test Channel	Low	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	890.0000	37.51	-3.51	34.00	46.00	-12.00	Peak Detector
2	902.0000	47.90	-4.01	43.89	46.00	-2.11	Peak Detector
3	904.2500	106.77	-4.14	102.63	/	/	Fundamental

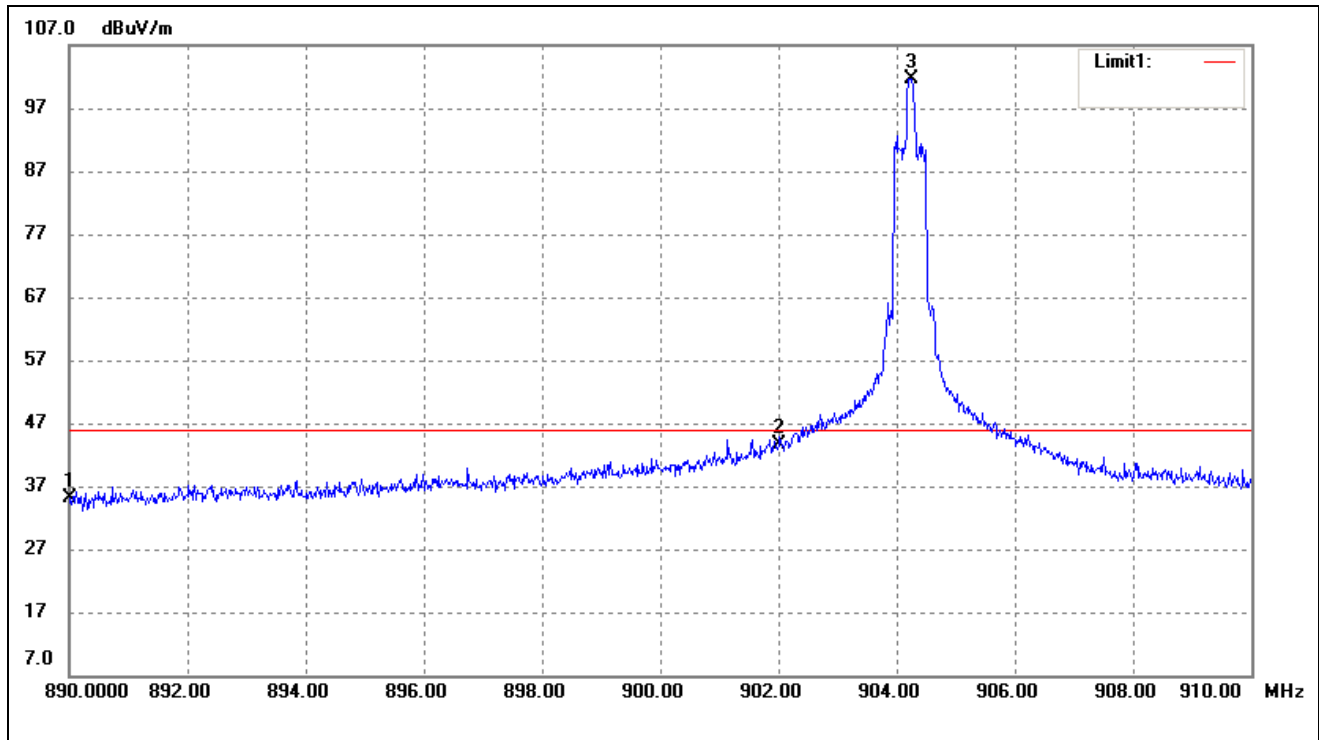
Test Channel	High	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	926.2500	106.68	-4.69	101.99	/	/	Fundamental
2	928.0000	47.90	-4.76	43.14	46.00	-2.86	Peak Detector
3	940.0000	39.37	-5.37	34.00	46.00	-12.00	Peak Detector

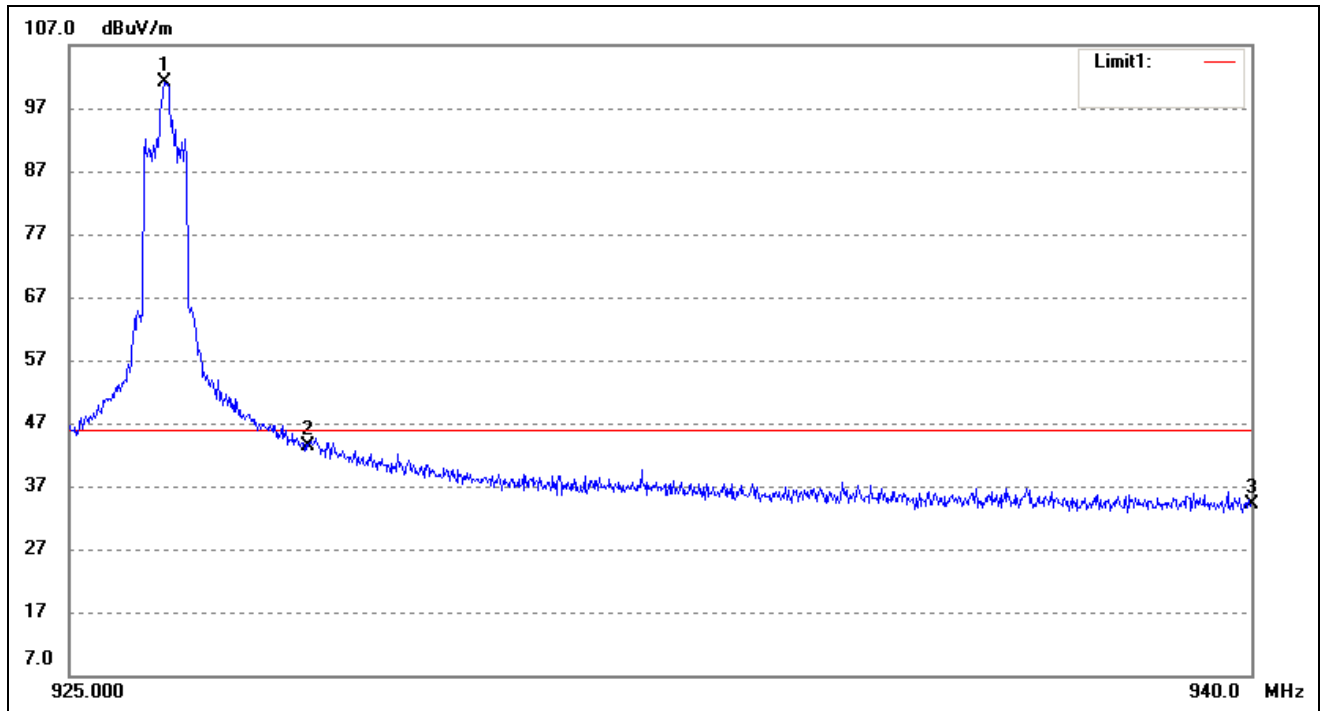
Antenna 1:

Test Channel	Low	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	890.0000	38.53	-3.51	35.02	46.00	-10.98	Peak Detector
2	902.0000	47.62	-4.01	43.61	46.00	-2.39	Peak Detector
3	904.2500	105.76	-4.14	101.62	/	/	Fundamental

Test Channel	High	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	926.2500	105.71	-4.69	101.02	/	/	Fundamental
2	928.0000	48.24	-4.76	43.48	46.00	-2.52	Peak Detector
3	940.0000	39.62	-5.37	34.25	46.00	-11.75	Peak Detector

6. Emission Bandwidth

6.1 Standard Applicable

According to 15.215 (c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

6.2 Test Procedure

According to the ANSI 63.10-2013, the emission bandwidth test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Set span = 1MHz, centered on a transmitting channel

RBW $\geq$ 1% 20dB Bandwidth, VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

All 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 and record the 20dB down and 99% bandwidth of the emission.

6.3 Summary of Test Results/Plots

Antenna 0:

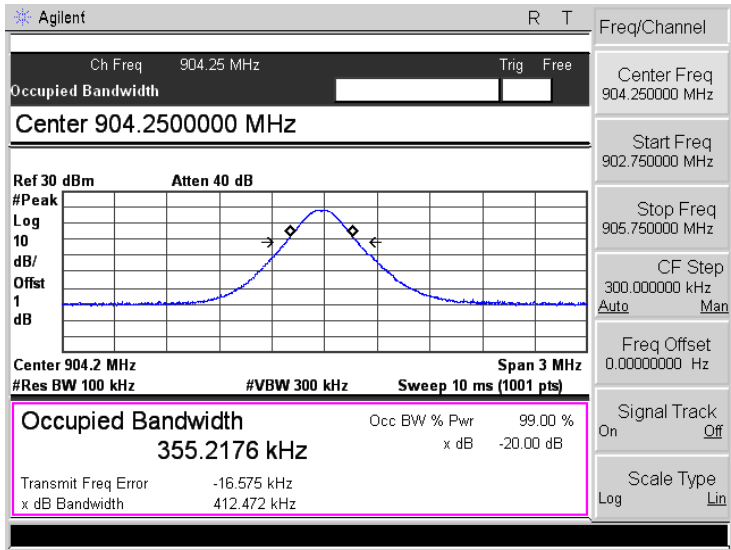
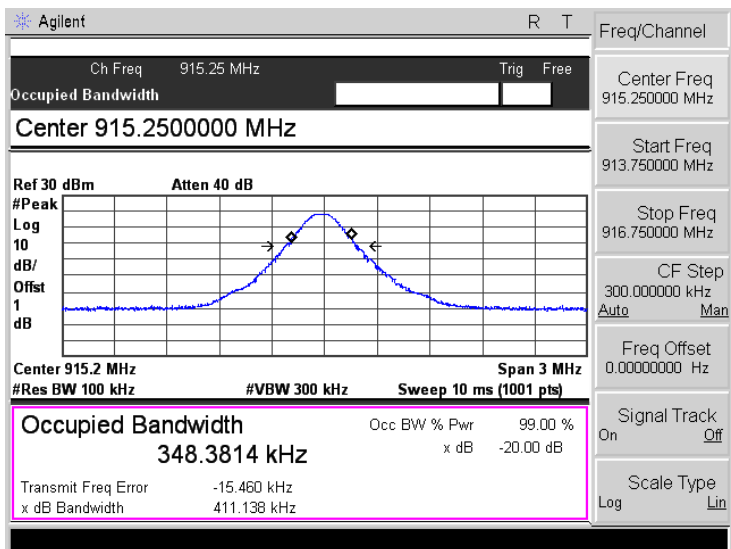
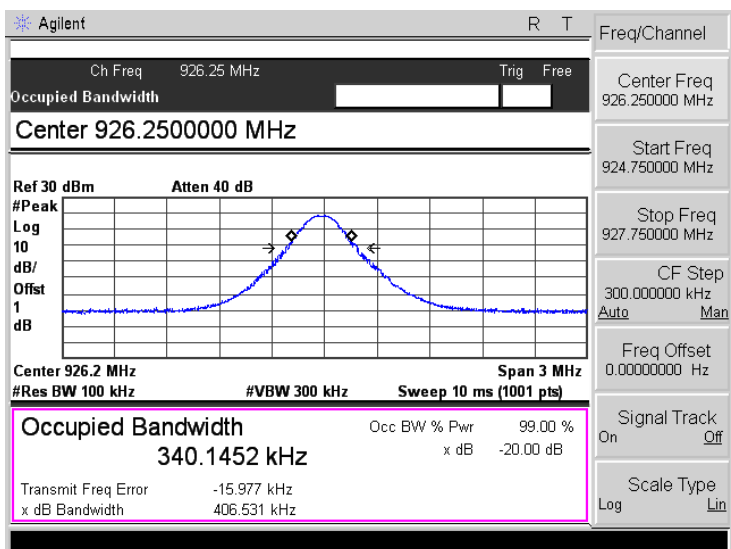
Channel	Frequency MHz	20dB Bandwidth kHz
Low Channel	904.25	412.472
Middle Channel	915.25	411.138
High Channel	926.25	406.531

Antenna 1:

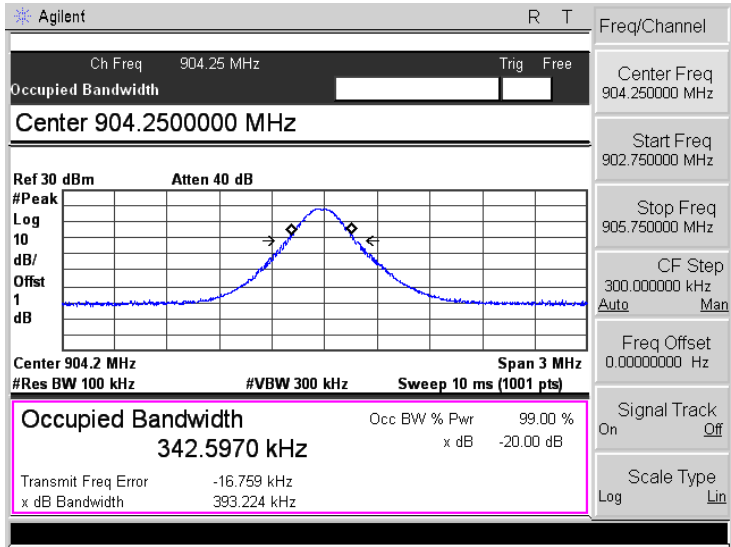
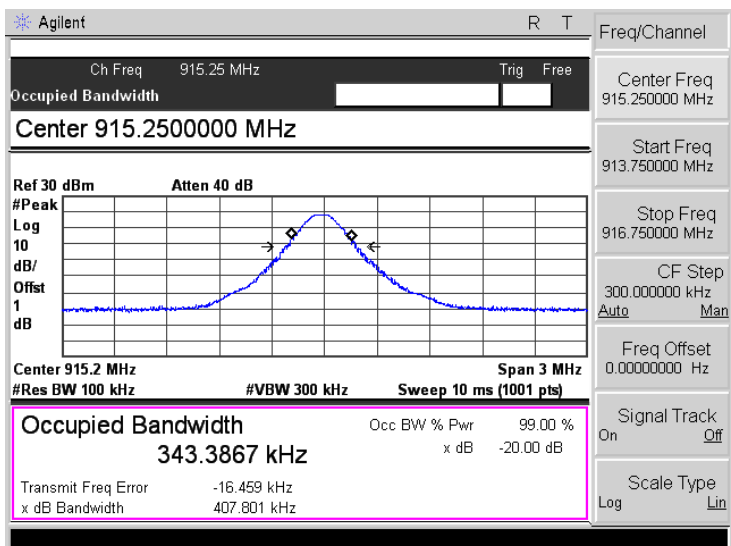
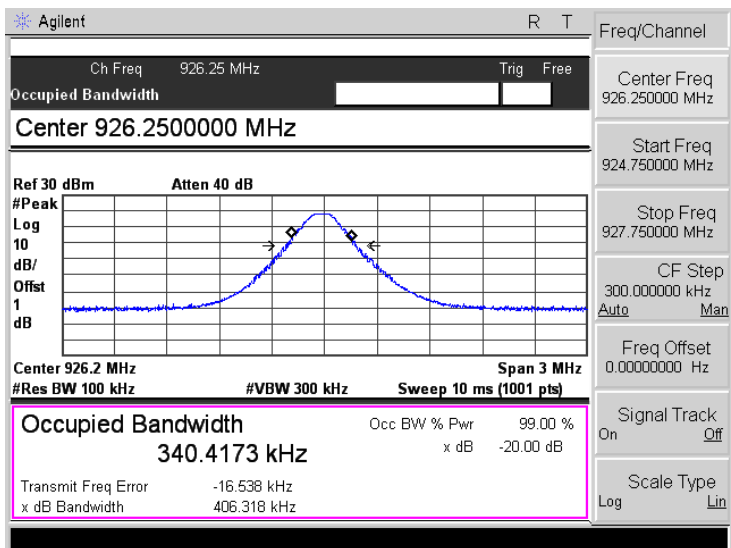
Channel	Frequency MHz	20dB Bandwidth kHz
Low Channel	904.25	393.224
Middle Channel	915.25	407.801
High Channel	926.25	406.318

Please refer to the following test plots

Antenna 0:

Low Channel	 Agilent R T Ch Freq 904.25 MHz Trig Free Occupied Bandwidth Center 904.250000 MHz Ref 30 dBm Atten 40 dB #Peak Log 10 dB/ Offst 1 dB Center 904.2 MHz Span 3 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts) Occupied Bandwidth 355.2176 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -16.575 kHz x dB Bandwidth 412.472 kHz Freq/Channel Center Freq 904.250000 MHz Start Freq 902.750000 MHz Stop Freq 905.750000 MHz CF Step 300.000000 kHz Auto Man Freq Offset 0.0000000 Hz Signal Track On Off Scale Type Log Lin
Middle Channel	 Agilent R T Ch Freq 915.25 MHz Trig Free Occupied Bandwidth Center 915.250000 MHz Ref 30 dBm Atten 40 dB #Peak Log 10 dB/ Offst 1 dB Center 915.2 MHz Span 3 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts) Occupied Bandwidth 348.3814 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -15.460 kHz x dB Bandwidth 411.138 kHz Freq/Channel Center Freq 915.250000 MHz Start Freq 913.750000 MHz Stop Freq 916.750000 MHz CF Step 300.000000 kHz Auto Man Freq Offset 0.0000000 Hz Signal Track On Off Scale Type Log Lin
High Channel	 Agilent R T Ch Freq 926.25 MHz Trig Free Occupied Bandwidth Center 926.250000 MHz Ref 30 dBm Atten 40 dB #Peak Log 10 dB/ Offst 1 dB Center 926.2 MHz Span 3 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts) Occupied Bandwidth 340.1452 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -15.977 kHz x dB Bandwidth 406.531 kHz Freq/Channel Center Freq 926.250000 MHz Start Freq 924.750000 MHz Stop Freq 927.750000 MHz CF Step 300.000000 kHz Auto Man Freq Offset 0.0000000 Hz Signal Track On Off Scale Type Log Lin

Antenna 1:

Low Channel	
Middle Channel	
High Channel	

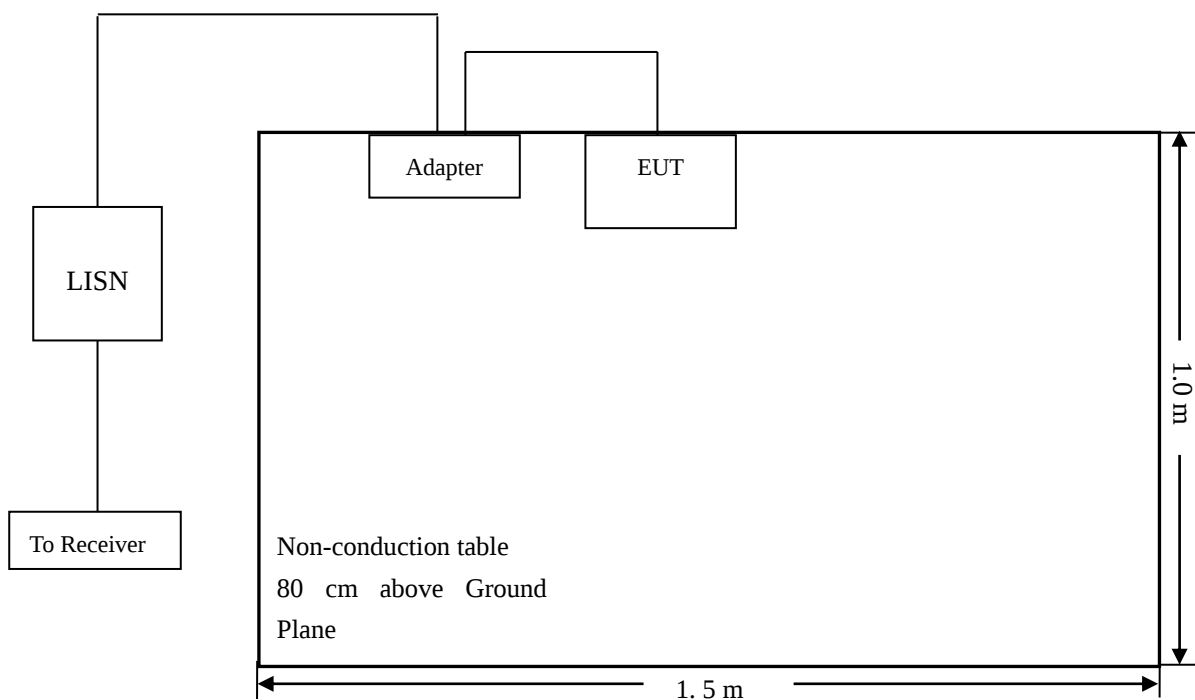
7. Conducted Emissions

7.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

7.2 Basic Test Setup Block Diagram



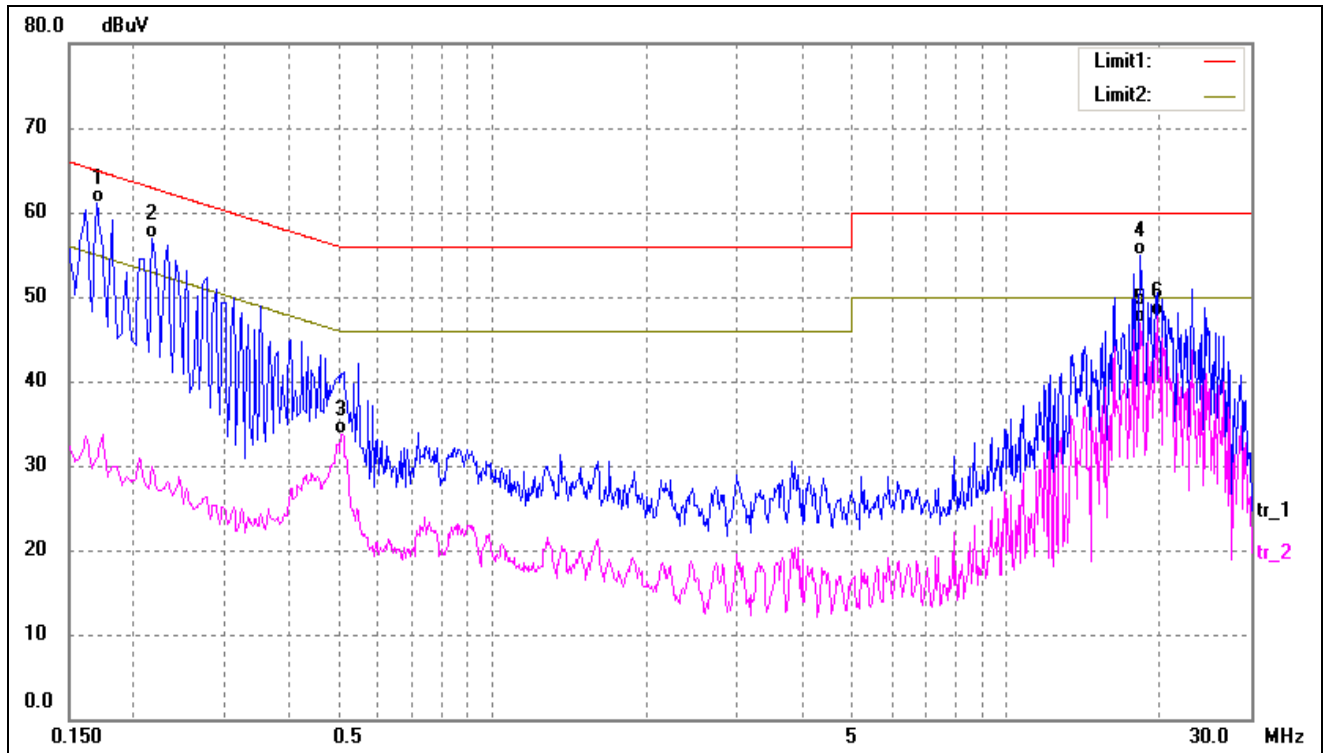
7.3 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency 150 kHz
Stop Frequency 30 MHz
Sweep Speed Auto
IF Bandwidth..... 10 kHz
Quasi-Peak Adapter Bandwidth 9 kHz
Quasi-Peak Adapter Mode Normal

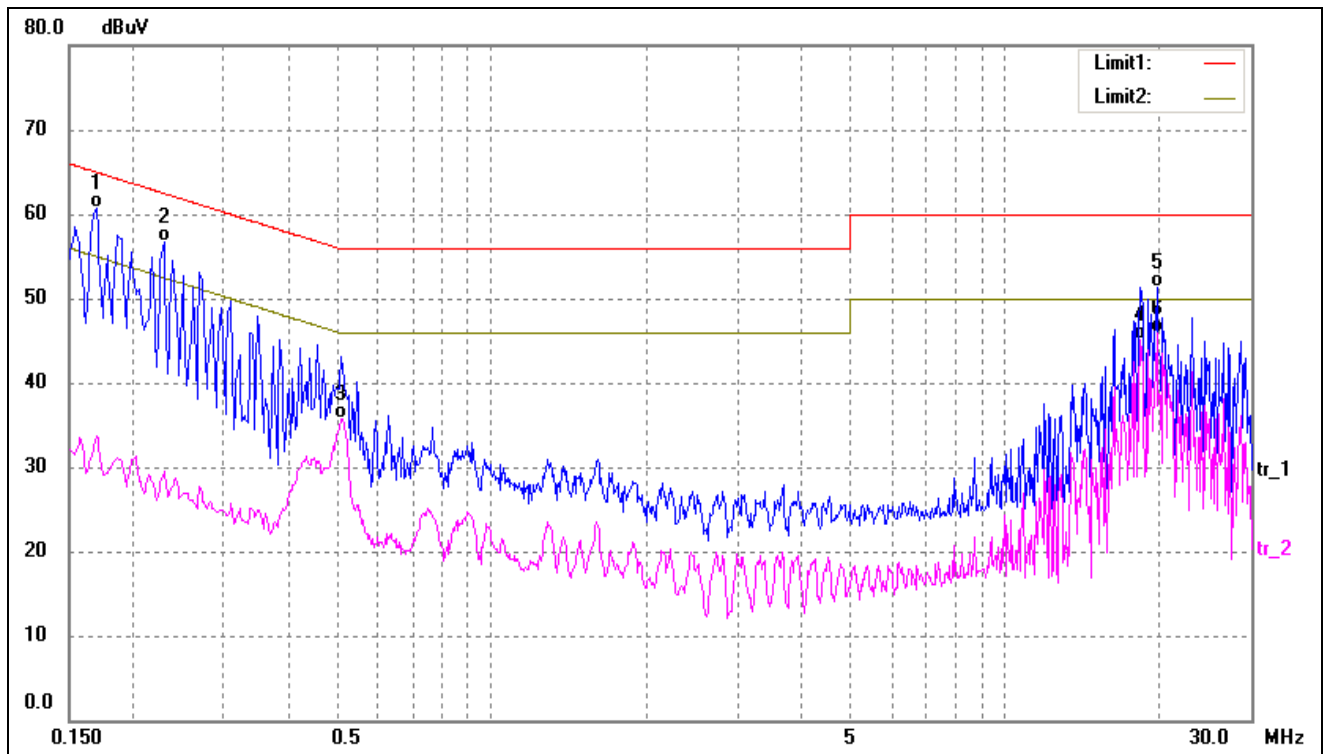
7.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1700	51.05	10.11	61.16	64.96	-3.80	QP
2	0.2180	46.83	10.13	56.96	62.89	-5.93	QP
3	0.5100	23.44	10.29	33.73	46.00	-12.27	AVG
4	18.2460	43.83	11.12	54.95	60.00	-5.05	QP
5	18.2460	35.72	11.12	46.84	50.00	-3.16	AVG
6*	19.7100	36.49	11.16	47.65	50.00	-2.35	AVG

Test Mode	Communication	AC120V 60Hz	Polarity:	Line
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1700	50.50	10.11	60.61	64.96	-4.35	QP
2	0.2300	46.64	10.14	56.78	62.45	-5.67	AVG
3	0.5100	25.48	10.29	35.77	46.00	-10.23	AVG
4	18.2420	34.06	11.12	45.18	50.00	-4.82	QP
5	19.7100	40.09	11.16	51.25	60.00	-8.75	QP
6*	19.7100	34.65	11.16	45.81	50.00	-4.19	AVG

***** END OF REPORT *****