

TEST REPORT

Reference No..... : WTF20X11081033W-1
FCC ID : 2AMRO-HLCRIO167
Applicant : iottie.Inc
Address..... : 20W 37th 6th floor 10018 New York
Product Name : Auto Sense Wireless 2
Test Model. : HLCRIO167
Standards : FCC Part 18
Date of Receipt sample : Nov.03, 2020
Date of Test..... : Nov.03, 2020 to Nov.19, 2020
Date of Issue : Nov.20, 2020
Test Result..... : **Pass**

Remarks:

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

Prepared By:

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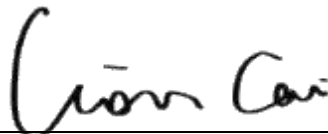
Tested by:

Reviewed By:

Approved & Authorized By:



Jason Su / Project Engineer



Lion Cai / RF Manager



Silin Chen / Manager

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Report version

Version No.	Date of issue	Description
Rev.00	Nov.20, 2020	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: iottie.Inc
Address of applicant: 20W 37th 6th floor 10018 New York

Manufacturer: Shenzhen Elecjar Technology Co., Ltd
Address of manufacturer: Building 3, Tianyanxuan, No.1, Lane 14, Bantian East Village, Bantian Street, Longgang District, Shenzhen

General Description of EUT	
Product Name:	Auto Sense Wireless 2
Trade Name:	iottie
Model No.:	HLCRIO167
Adding Model(s):	HLCRIO166
<i>Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model HLCRIO167, but the circuit and the electronic construction do not change, declared by the manufacturer.</i>	

Technical Characteristics of EUT	
Frequency Range:	110~205kHz
Antenna Type:	Coil Antenna
Rated Voltage:	DC5V / DC9V / DC12V
Rated Current:	1A / 1.1A / 1.25A
Rated Power:	5W / 10W / 15W

1.2 Test Standards

The tests were performed according to following standards:

FCC Part 18 Subpart C: Industrial, Scientific, and medical medical equipment.

ANSI C63.4-2014: American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result 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 C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.4 Test Facility

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C. (518101)

FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) 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 Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark	Power Supply Mode
TM1	Wireless Charging	/	Input DC5V/3A; Output:DC5V/1A
TM2	Wireless Charging	/	Input DC9V/2A; Output:DC9V/1.1A
TM3	Wireless Charging	/	Input DC9V/2A; Output:DC12V/1.25A

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Power Port Speed	ANKER	A2025	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	1.0	Shielded	Without Ferrite

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Conducted Emissions	Conducted	9-150kHz ± 3.74 dB
		0.15-30MHz ± 3.34 dB
Radiated Emissions	Radiated	30-200MHz ± 4.52 dB
		0.2-1GHz ± 5.56 dB
		1-6GHz ± 3.84 dB
		6-18GHz ± 3.92 dB

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2020-04-28	2021-04-27
Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2020-04-28	2021-04-27
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2020-04-28	2021-04-27
Amplifier	Agilent	8447F	3113A06717	2020-04-28	2021-04-27
Amplifier	C&D	PAP-1G18	2002	2020-04-28	2021-04-27
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-05-05	2021-05-04
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2020-04-28	2021-04-27
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2020-04-28	2021-04-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2020-04-28	2021-04-27

Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission)*	Farad	EZ-EMC	RA-03A1

*Remark: indicates software version used in the compliance certification testing

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 18.307 (b)	Conducted Emission	Compliant
§ 18.305 (b)	Radiated Emission	Compliant

3. Conducted Emissions

3.1 Standard Applicable

According to FCC 18.307(b), the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies shall not exceed the limits in the following tables:

Frequency (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

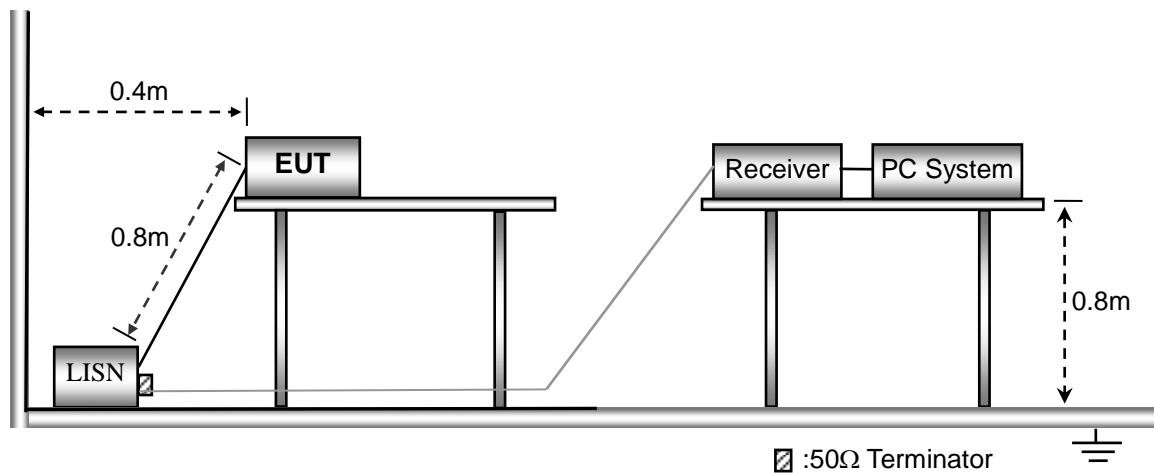
3.2 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 18.307 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.

3.3 Basic Test Setup Block Diagram



3.4 Environmental Conditions

Temperature:	22.5° C
Relative Humidity:	54%
ATM Pressure:	1016 mbar

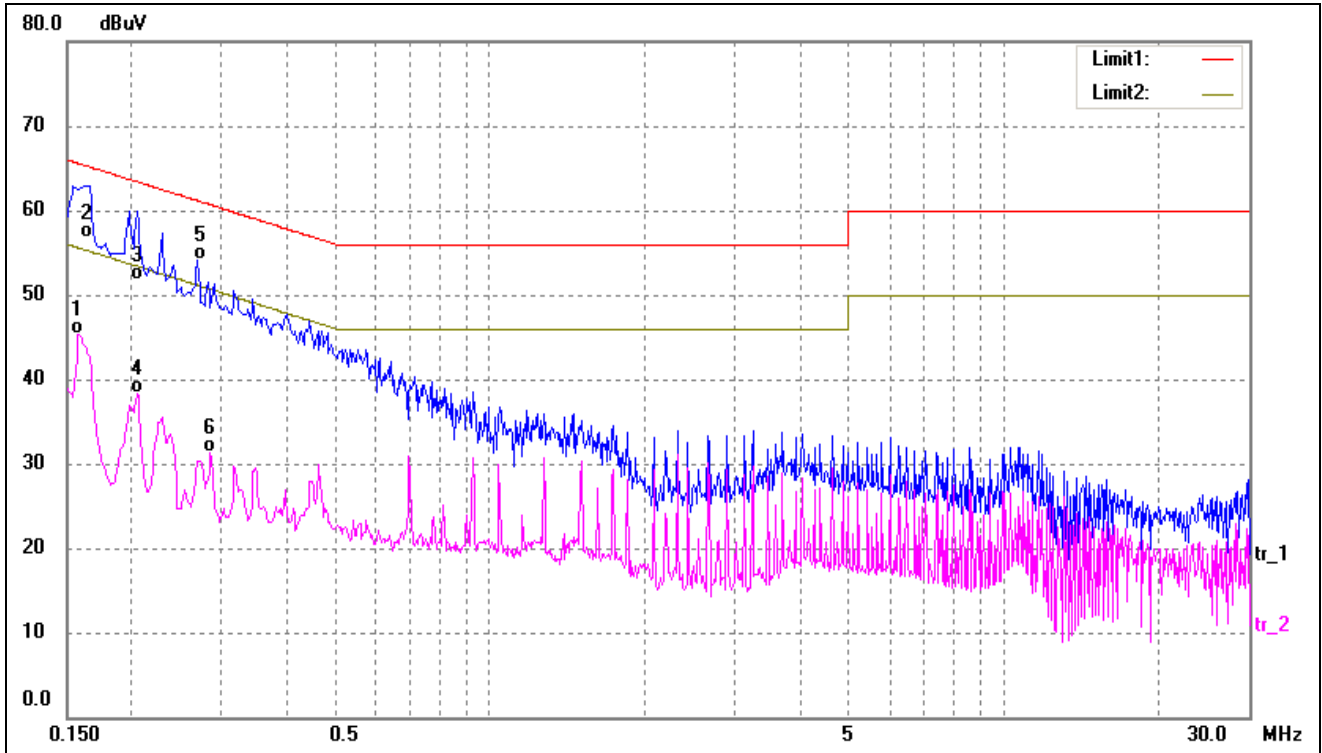
3.5 Test Receiver Setup

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

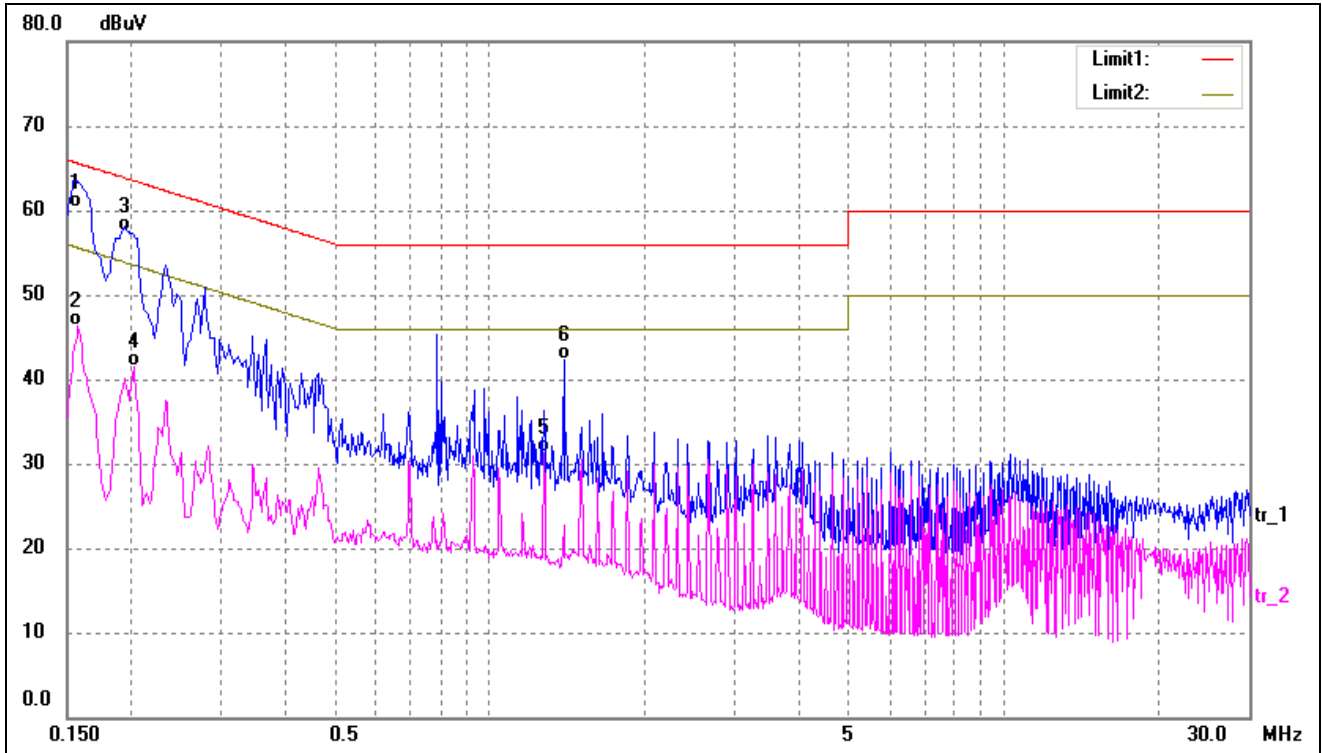
3.6 Summary of Test Results/Plots

Test mode:	TM1	Polarity:	Line
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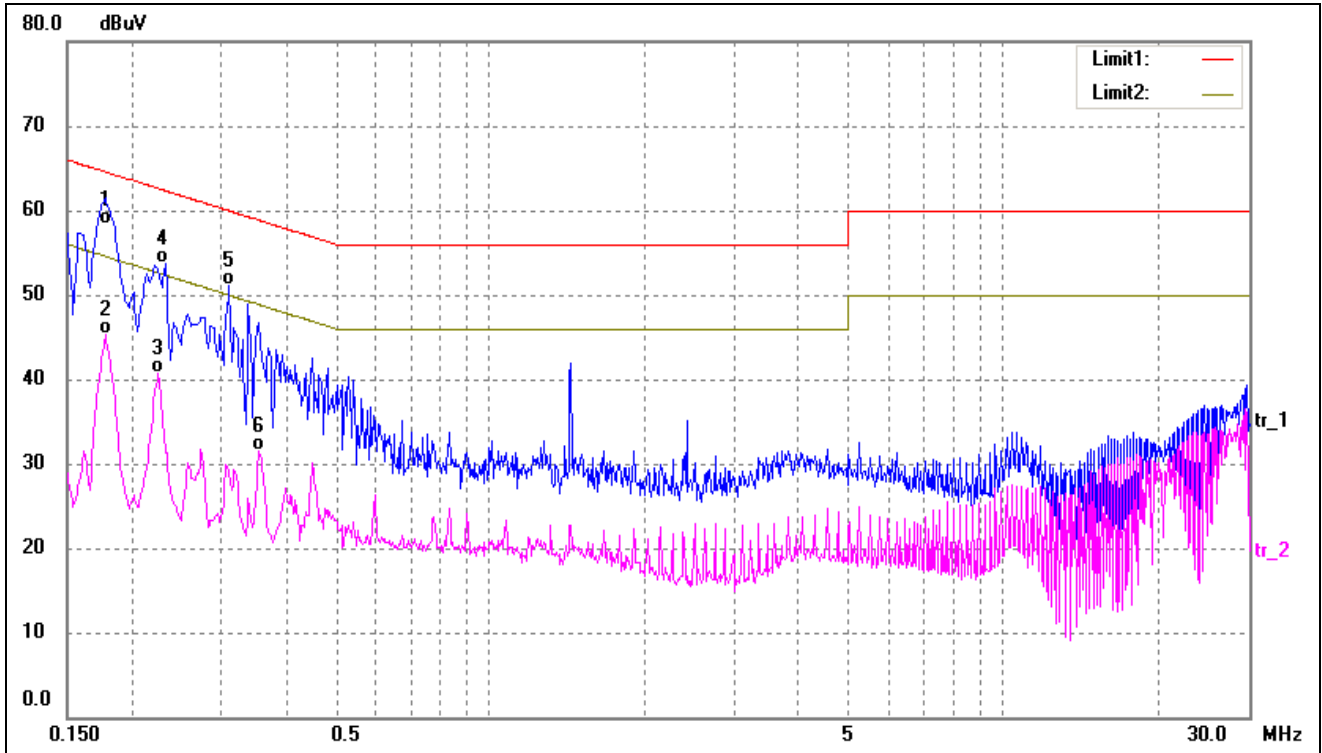
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1580	35.12	10.25	45.37	55.56	-10.19	AVG
2	0.1660	46.52	10.26	56.78	65.15	-8.37	QP
3	0.2060	41.37	10.27	51.64	63.36	-11.72	QP
4	0.2060	27.96	10.27	38.23	53.36	-15.13	AVG
5*	0.2700	43.88	10.25	54.13	61.12	-6.99	QP
6	0.2860	21.13	10.25	31.38	50.64	-19.26	AVG

Test mode:	TM1	Polarity:	Neutral
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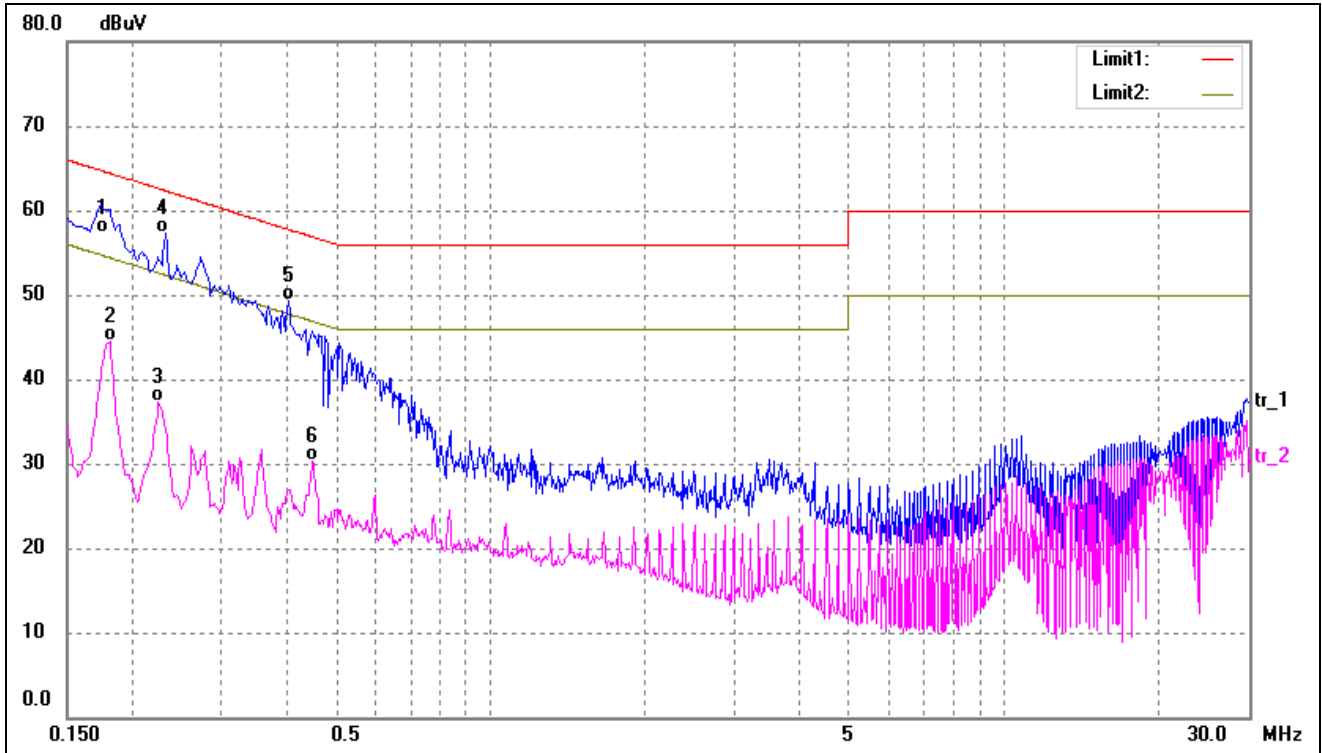
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1539	50.13	10.25	60.38	65.78	-5.40	QP
2	0.1539	35.99	10.25	46.24	55.78	-9.54	AVG
3	0.1965	47.33	10.26	57.59	63.75	-6.16	QP
4	0.2020	31.27	10.27	41.54	53.52	-11.98	AVG
5	1.2740	21.00	10.21	31.21	46.00	-14.79	AVG
6	1.3900	32.16	10.22	42.38	56.00	-13.62	QP

Test mode:	TM2	Polarity:	Line
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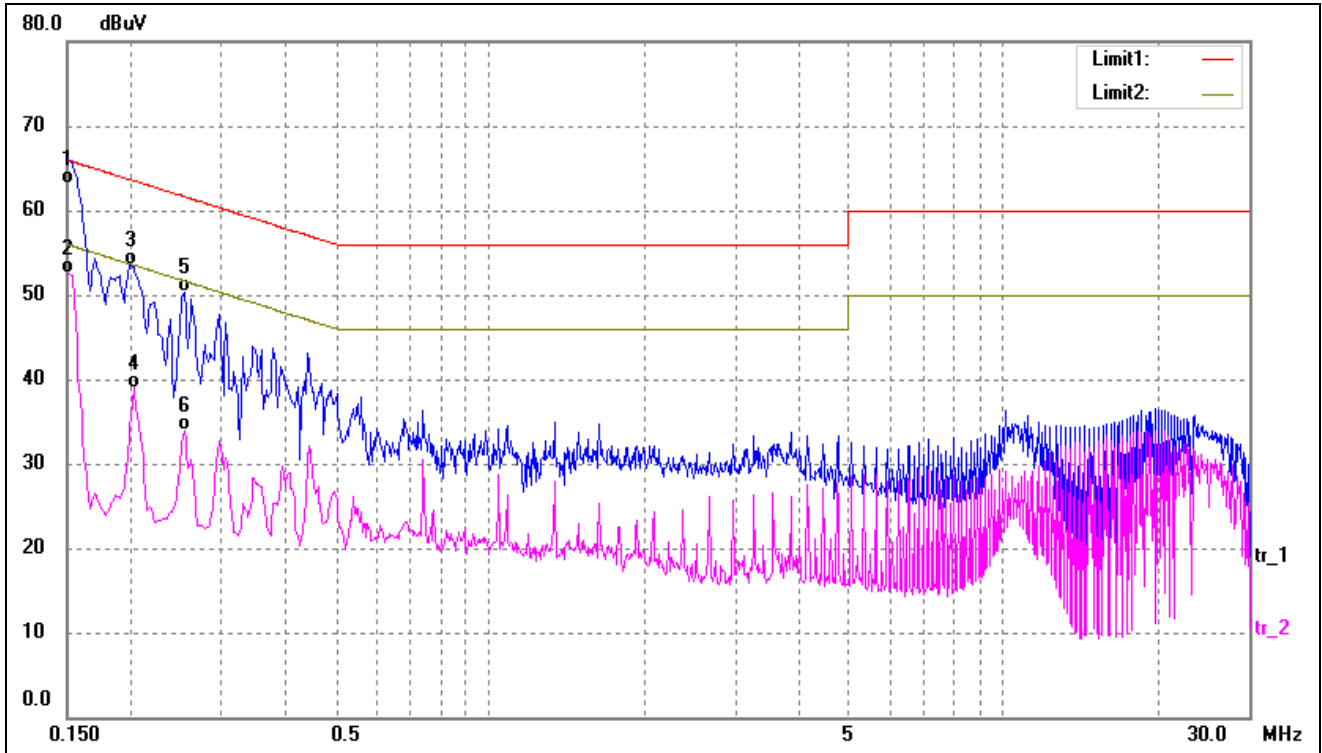
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1780	48.09	10.26	58.35	64.57	-6.22	QP
2	0.1780	34.99	10.26	45.25	54.57	-9.32	AVG
3	0.2260	30.47	10.26	40.73	52.59	-11.86	AVG
4	0.2340	43.50	10.26	53.76	62.30	-8.54	QP
5	0.3100	40.85	10.24	51.09	59.97	-8.88	QP
6	0.3540	21.25	10.26	31.51	48.87	-17.36	AVG

Test mode:	TM2	Polarity:	Neutral
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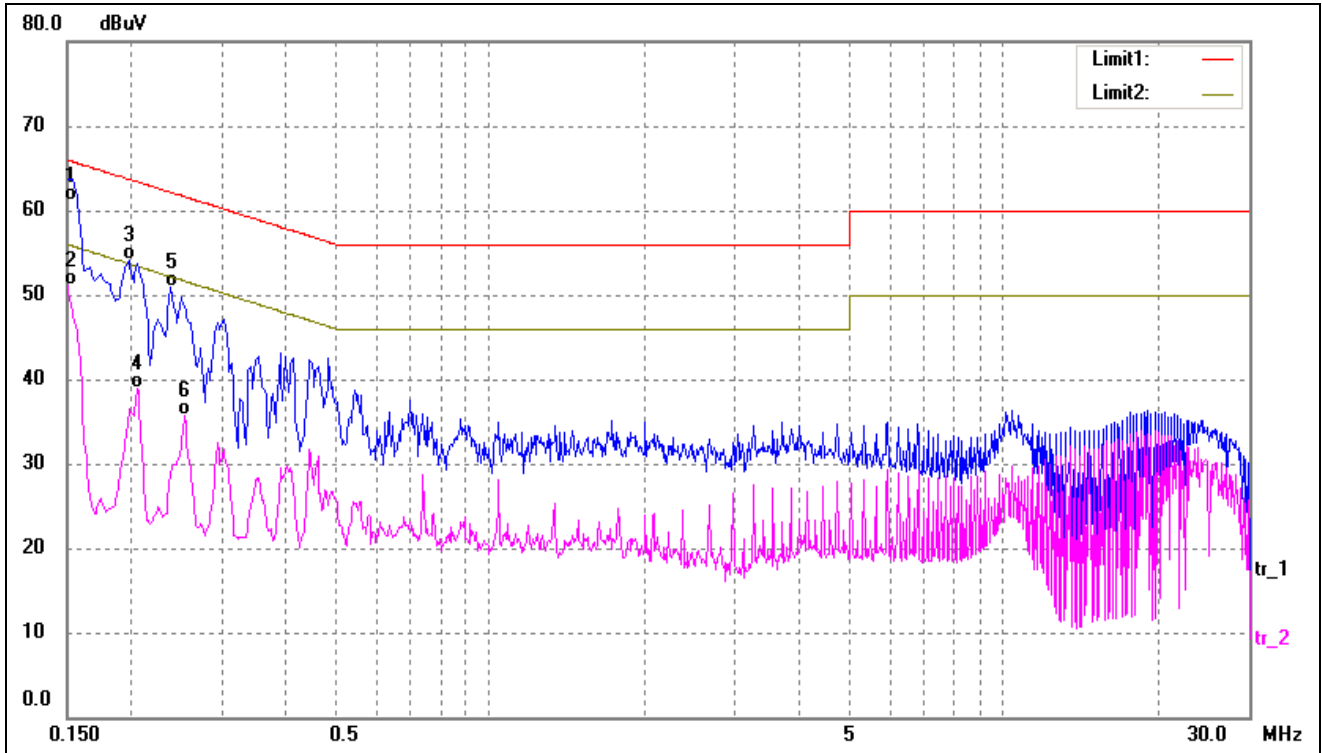
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1740	47.04	10.25	57.29	64.76	-7.47	QP
2	0.1819	34.32	10.26	44.58	54.39	-9.81	AVG
3	0.2260	26.95	10.26	37.21	52.59	-15.38	AVG
4*	0.2340	46.95	10.26	57.21	62.30	-5.09	QP
5	0.4060	38.98	10.23	49.21	57.73	-8.52	QP
6	0.4500	20.11	10.22	30.33	46.87	-16.54	AVG

Test mode:	TM3	Polarity:	Line
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1500	52.87	10.25	63.12	65.99	-2.87	QP
2	0.1500	42.29	10.25	52.54	55.99	-3.45	AVG
3	0.1980	43.27	10.27	53.54	63.69	-10.15	QP
4	0.2020	28.73	10.27	39.00	53.52	-14.52	AVG
5	0.2540	39.98	10.26	50.24	61.62	-11.38	QP
6	0.2540	23.71	10.26	33.97	51.62	-17.65	AVG

Test mode:	TM3	Polarity:	Neutral
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1539	50.80	10.25	61.05	65.78	-4.73	QP
2*	0.1539	40.91	10.25	51.16	55.78	-4.62	AVG
3	0.1980	43.79	10.27	54.06	63.69	-9.63	QP
4	0.2060	28.58	10.27	38.85	53.36	-14.51	AVG
5	0.2380	40.57	10.26	50.83	62.16	-11.33	QP
6	0.2540	25.36	10.26	35.62	51.62	-16.00	AVG

4. Radiated Emissions

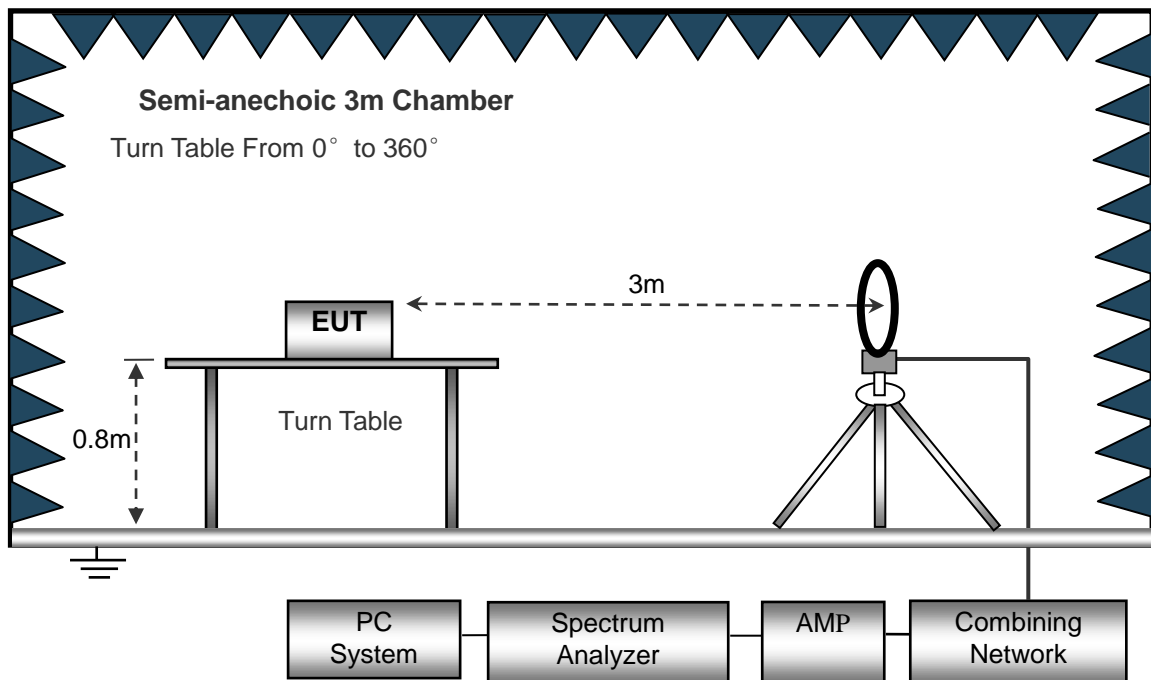
4.1 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 18.305 Limit.

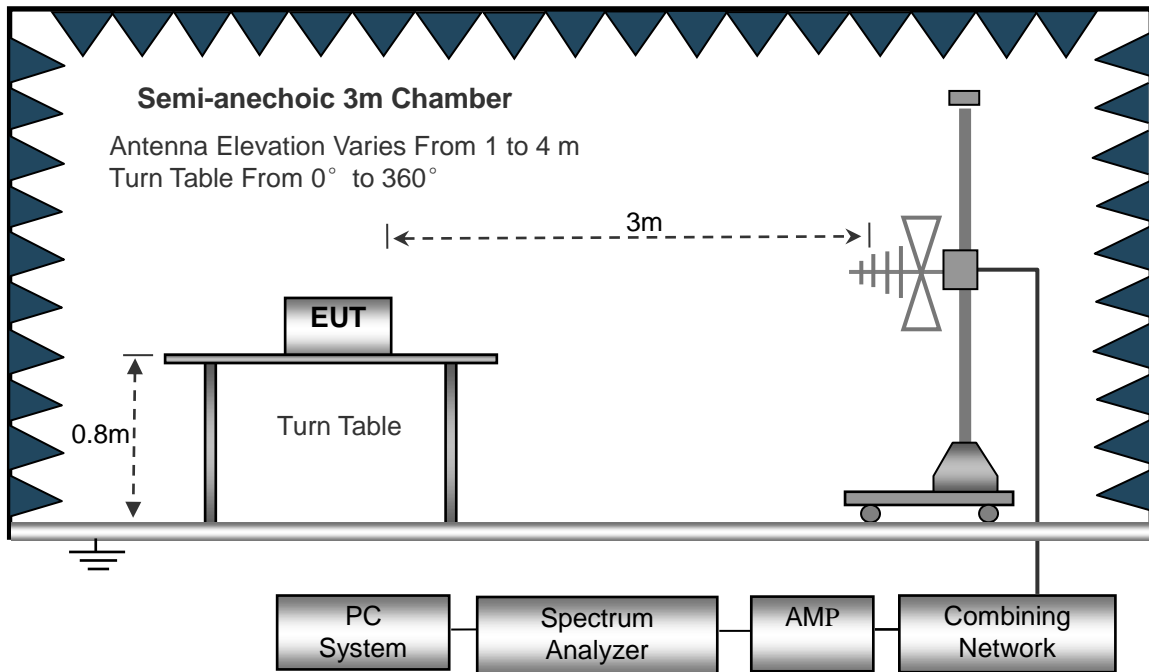
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

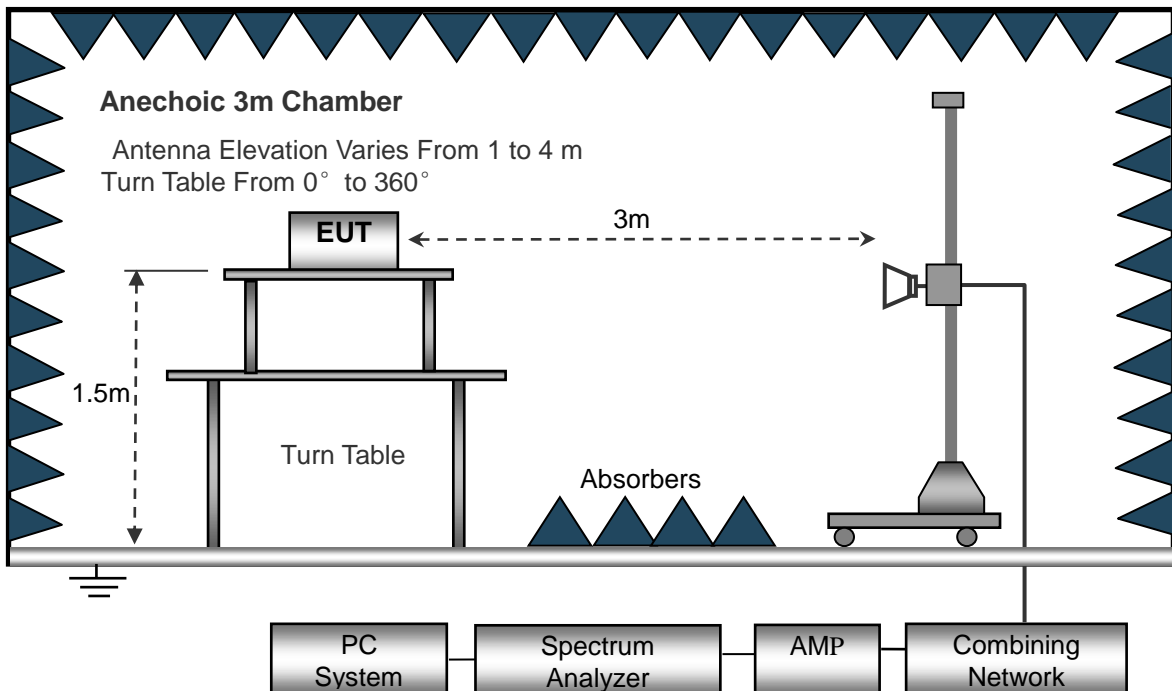
The test setup for emission measurement below 30MHz..



The test setup for emission measurement from 30 MHz to 1 GHz..



The test setup for emission measurement above 1 GHz..



4.2 Test Receiver Setup

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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} - \text{Corr. Factor}$$

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 for Any non-ISM frequency device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 18.305 Limit}$$

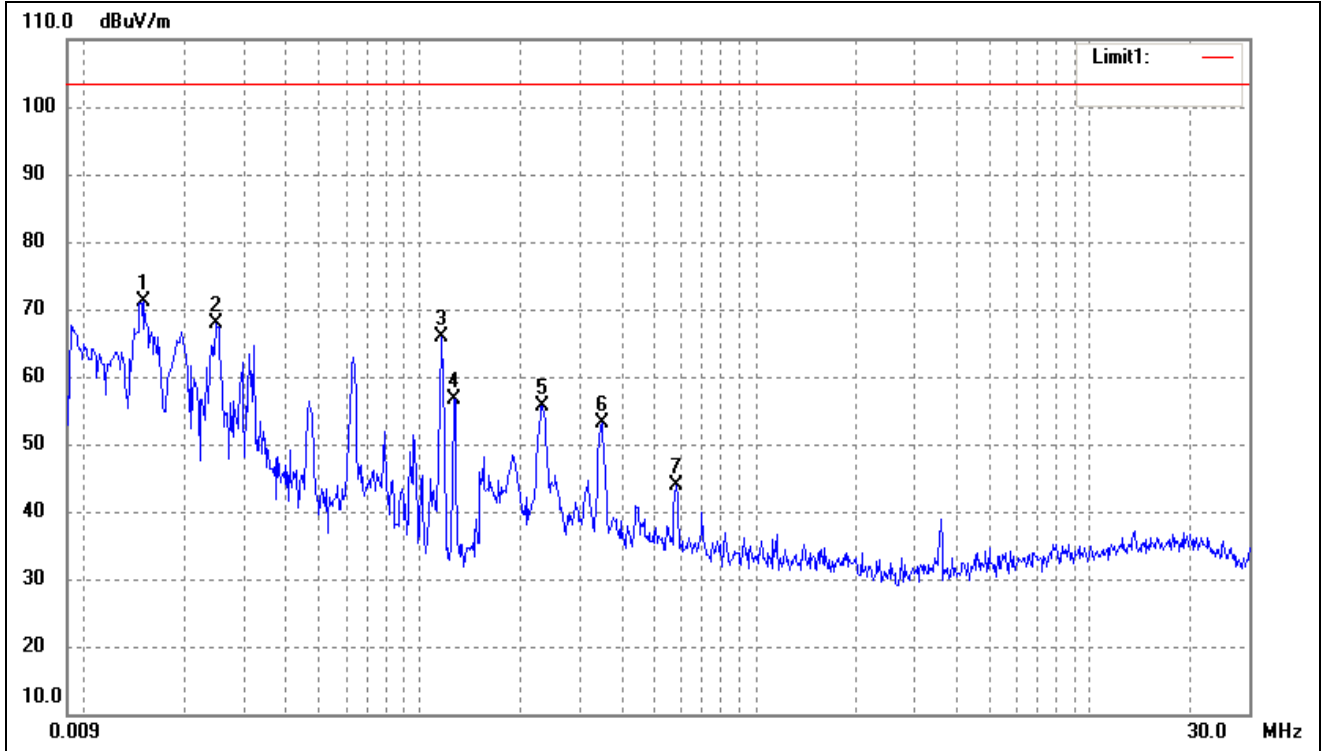
4.4 Environmental Conditions

Temperature:	22 °C
Relative Humidity:	54 %
ATM Pressure:	1011 mbar

4.5 Summary of Test Results/Plots

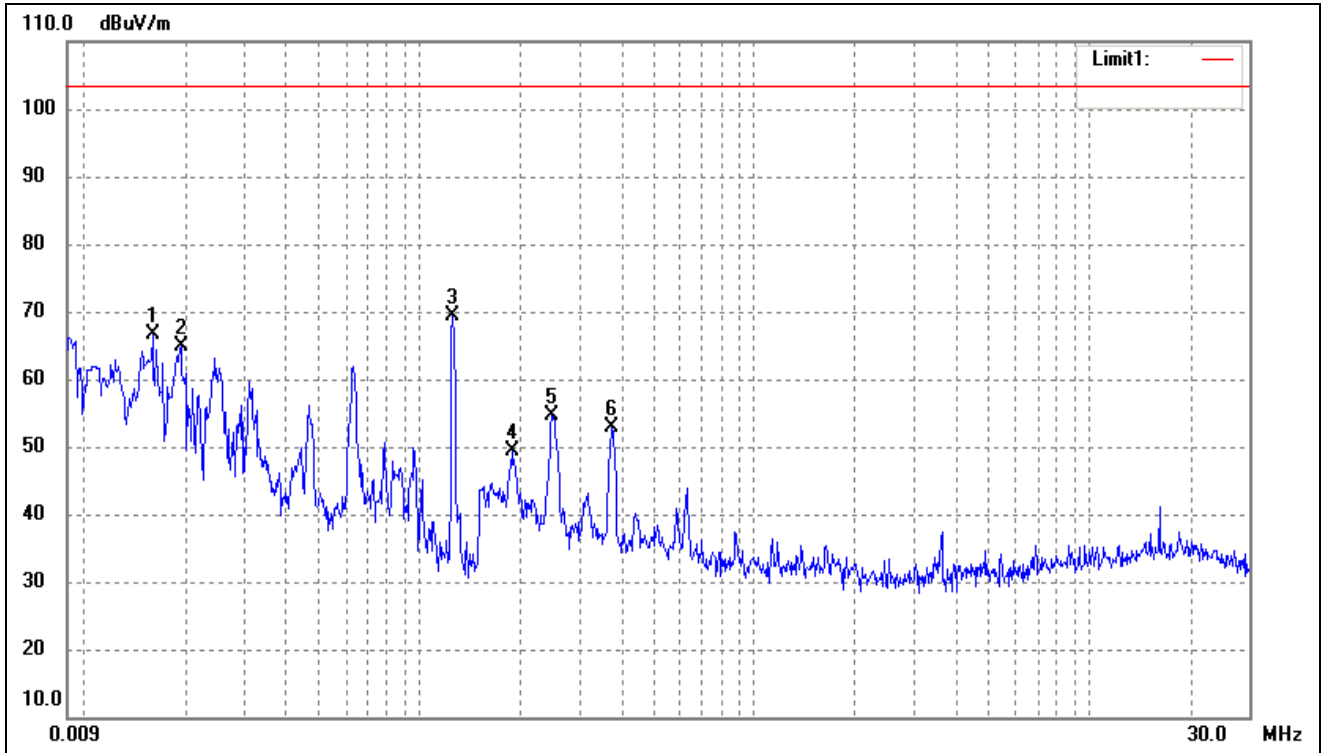
Plot of Radiated Emissions Test Data (Below 30MHz)

Test mode:	TM1	Polarity:	Vertical
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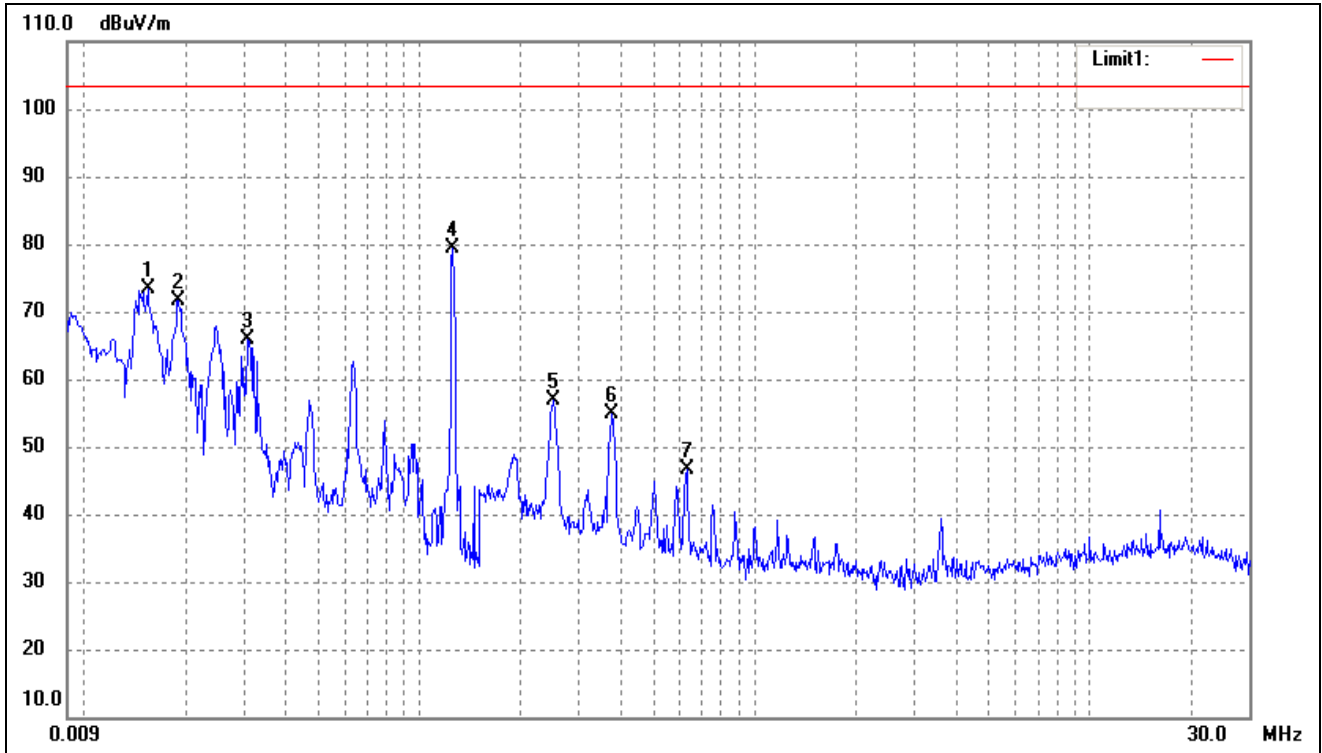
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	0.0151	77.68	-6.59	71.09	103.50	-32.41	-	-	peak
2	0.0249	74.26	-6.49	67.77	103.50	-35.73	-	-	peak
3	0.1161	71.10	-5.11	65.99	103.50	-37.51	-	-	peak
4	0.1267	61.73	-5.13	56.60	103.50	-46.90	-	-	peak
5	0.2316	62.64	-6.97	55.67	103.50	-47.83	-	-	peak
6	0.3483	61.08	-7.88	53.20	103.50	-50.30	-	-	peak
7	0.5823	51.25	-7.29	43.96	103.50	-59.54	-	-	peak

Test mode:	TM2	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	0.0160	73.26	-6.64	66.62	103.50	-36.88	-	-	peak
2	0.0194	71.62	-6.80	64.82	103.50	-38.68	-	-	peak
3	0.1253	74.56	-5.13	69.43	103.50	-34.07	-	-	peak
4	0.1884	55.53	-6.04	49.49	103.50	-54.01	-	-	peak
5	0.2481	62.03	-7.33	54.70	103.50	-48.80	-	-	peak
6	0.3751	60.74	-7.85	52.89	103.50	-50.61	-	-	peak

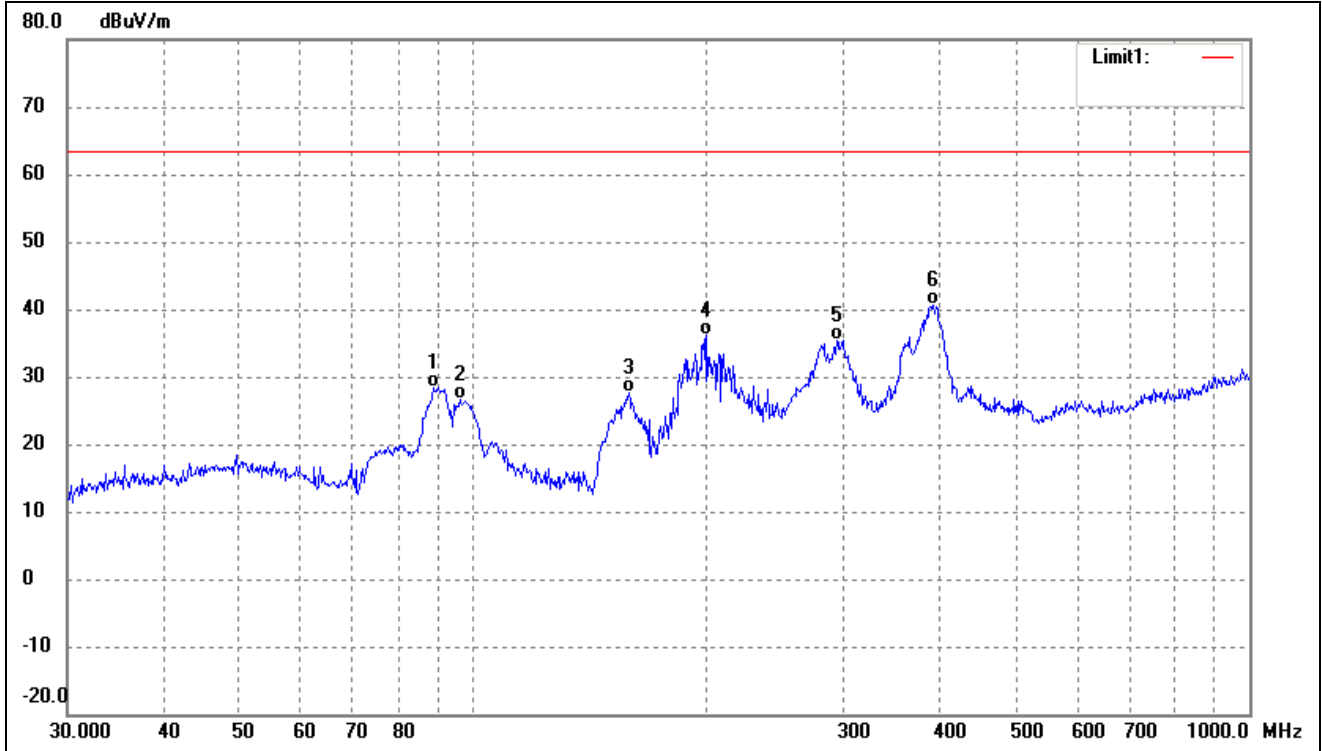
Test mode:	TM3	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	0.0155	79.98	-6.61	73.37	103.50	-30.13	-	-	peak
2	0.0192	78.39	-6.79	71.60	103.50	-31.90	-	-	peak
3	0.0306	71.94	-6.08	65.86	103.50	-37.64	-	-	peak
4	0.1253	84.42	-5.13	79.29	103.50	-24.21	-	-	peak
5	0.2495	64.31	-7.36	56.95	103.50	-46.55	-	-	peak
6	0.3751	62.65	-7.85	54.80	103.50	-48.70	-	-	peak
7	0.6238	53.83	-7.10	46.73	103.50	-56.77	-	-	peak

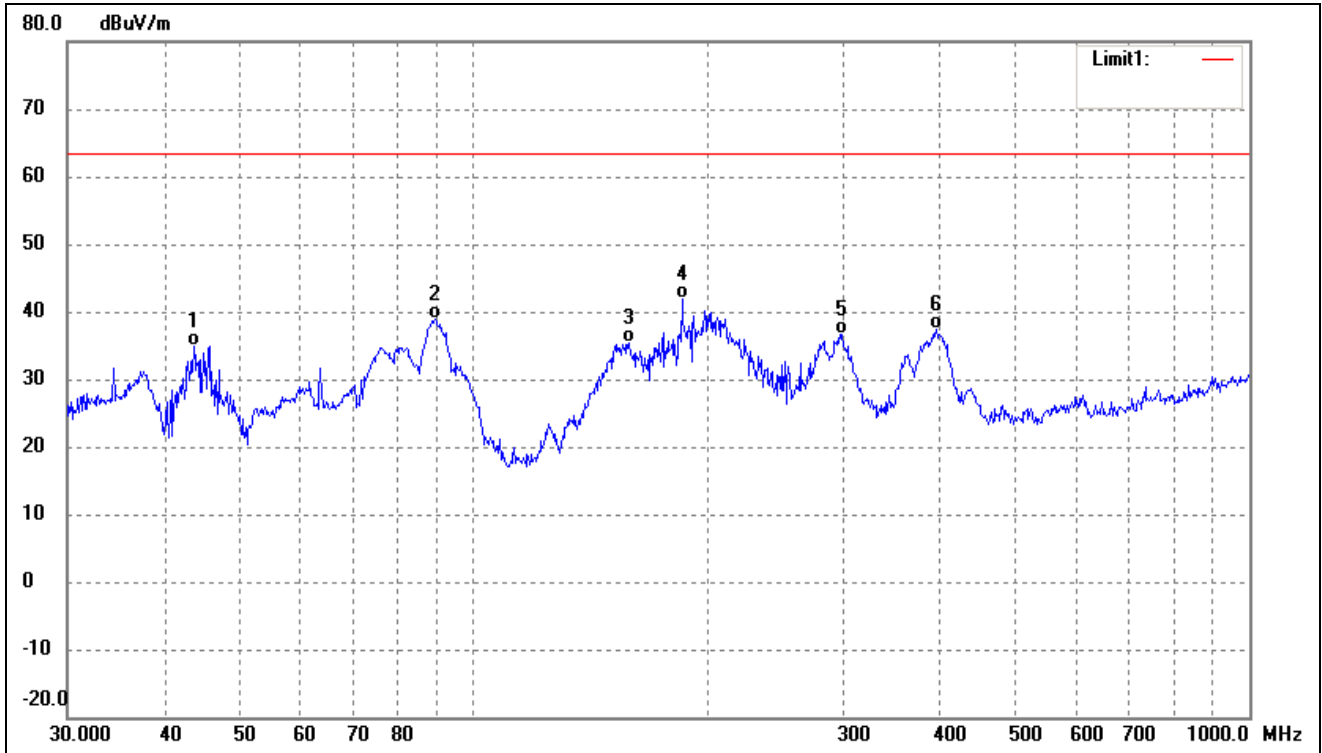
Plot of Radiated Emissions Test Data (Above 30MHz)

Test mode:	TM1	Polarity:	Horizontal
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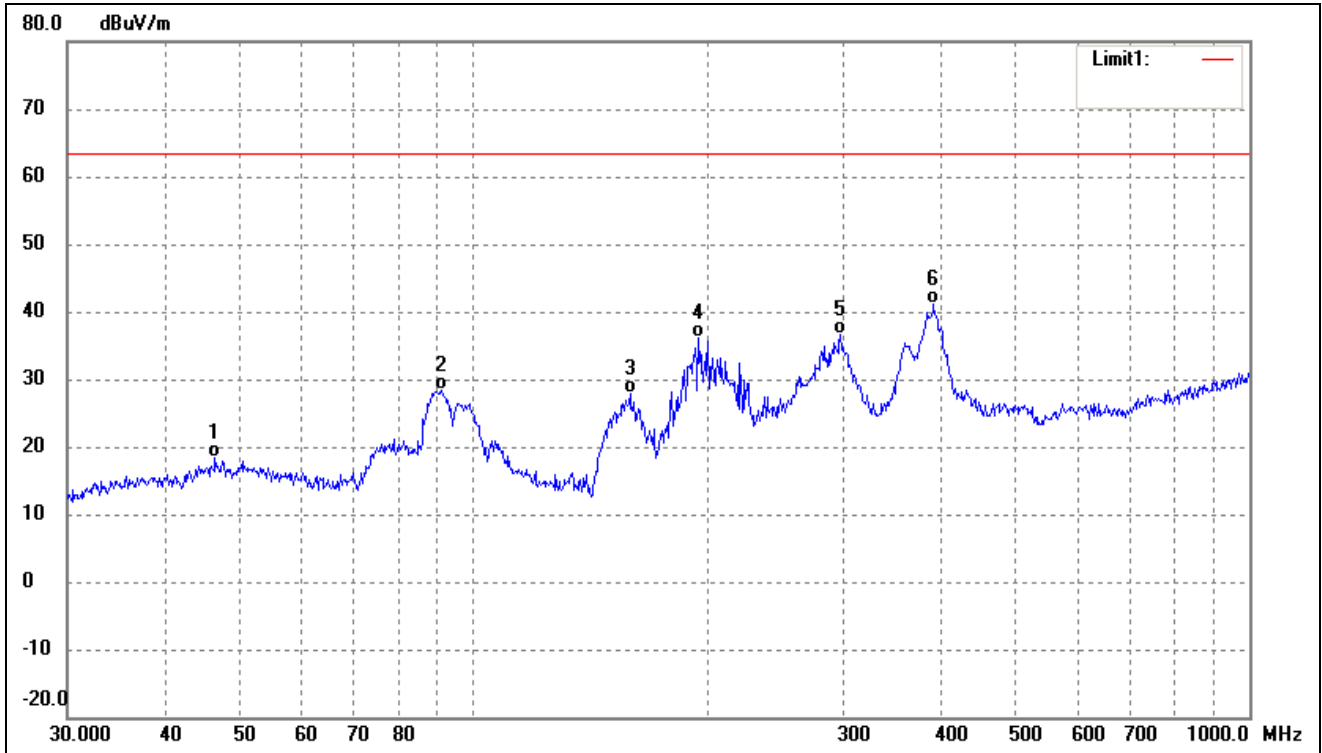
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	88.9639	42.93	-14.53	28.40	63.50	-35.10	-	-	QP
2	96.0986	39.78	-13.17	26.61	63.50	-36.89	-	-	QP
3	158.6677	41.99	-14.38	27.61	63.50	-35.89	-	-	QP
4	199.9856	47.40	-11.30	36.10	63.50	-27.40	-	-	QP
5	294.1137	42.97	-7.58	35.39	63.50	-28.11	-	-	QP
6	390.7226	46.52	-5.78	40.74	63.50	-22.76	-	-	QP

Test mode:	TM1	Polarity:	Vertical
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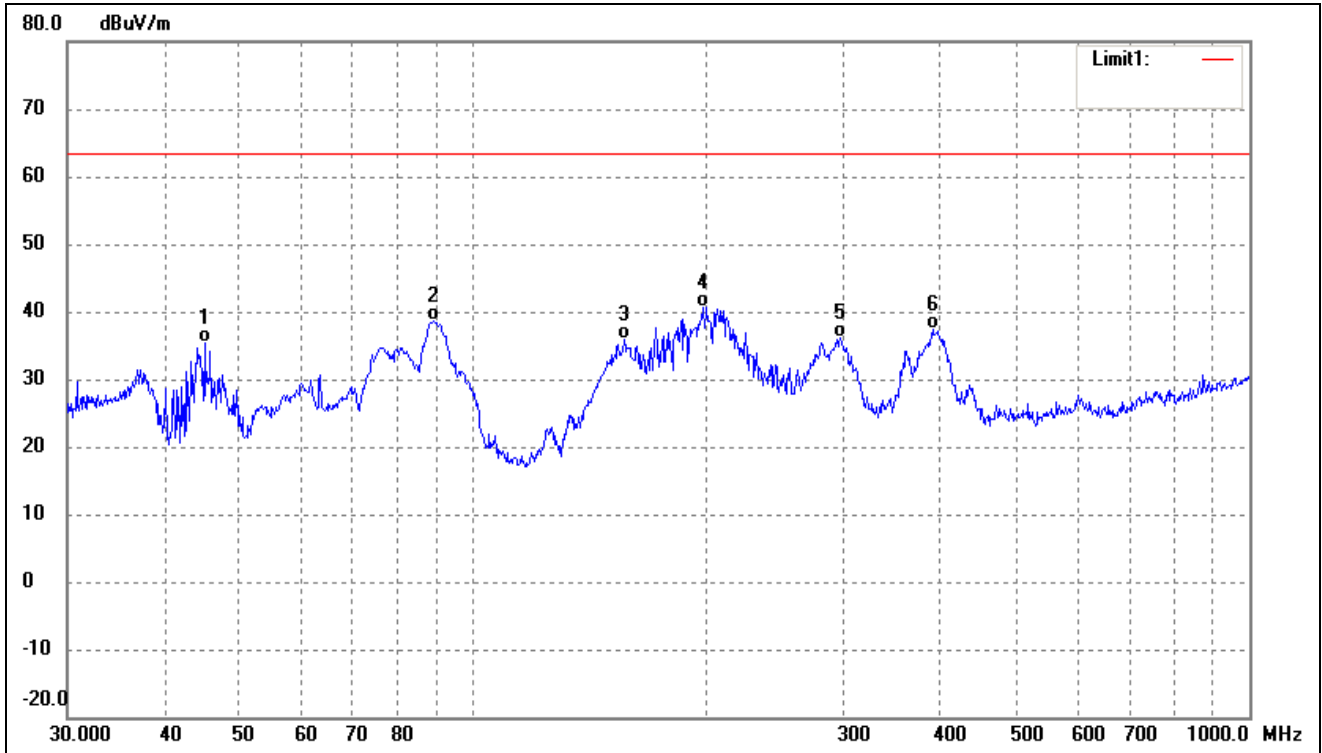
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	43.6584	45.87	-10.90	34.97	63.50	-28.53	-	-	QP
2	89.2764	53.45	-14.55	38.90	63.50	-24.60	-	-	QP
3	158.6677	49.64	-14.38	35.26	63.50	-28.24	-	-	QP
4	185.7882	54.42	-12.59	41.83	63.50	-21.67	-	-	QP
5	298.2681	43.95	-7.34	36.61	63.50	-26.89	-	-	QP
6	394.8545	43.27	-5.81	37.46	63.50	-26.04	-	-	QP

Test mode:	TM2	Polarity:	Horizontal
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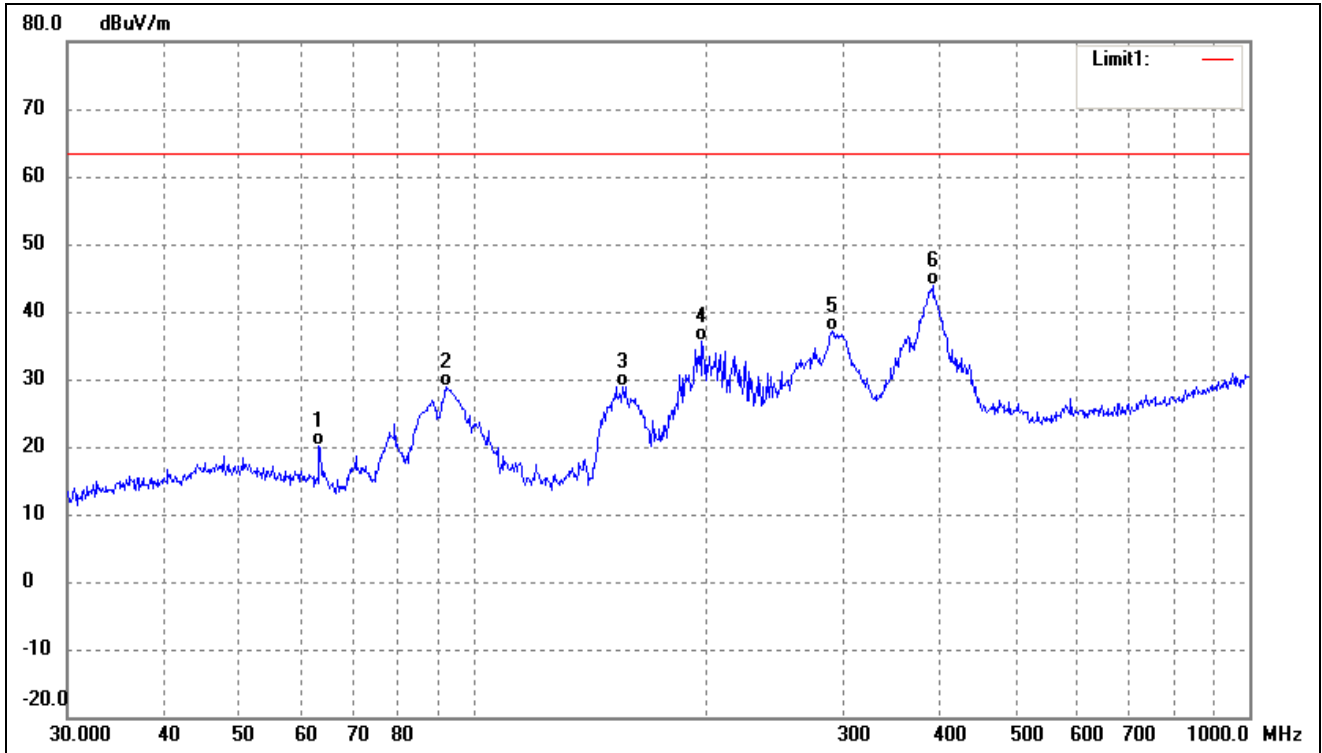
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	46.5030	28.84	-10.45	18.39	63.50	-45.11	-	-	QP
2	90.8554	42.77	-14.36	28.41	63.50	-35.09	-	-	QP
3	159.2251	42.12	-14.35	27.77	63.50	-35.73	-	-	QP
4	195.1365	47.68	-11.66	36.02	63.50	-27.48	-	-	QP
5	297.2241	44.04	-7.39	36.65	63.50	-26.85	-	-	QP
6	392.0951	46.85	-5.79	41.06	63.50	-22.44	-	-	QP

Test mode:	TM2	Polarity:	Vertical
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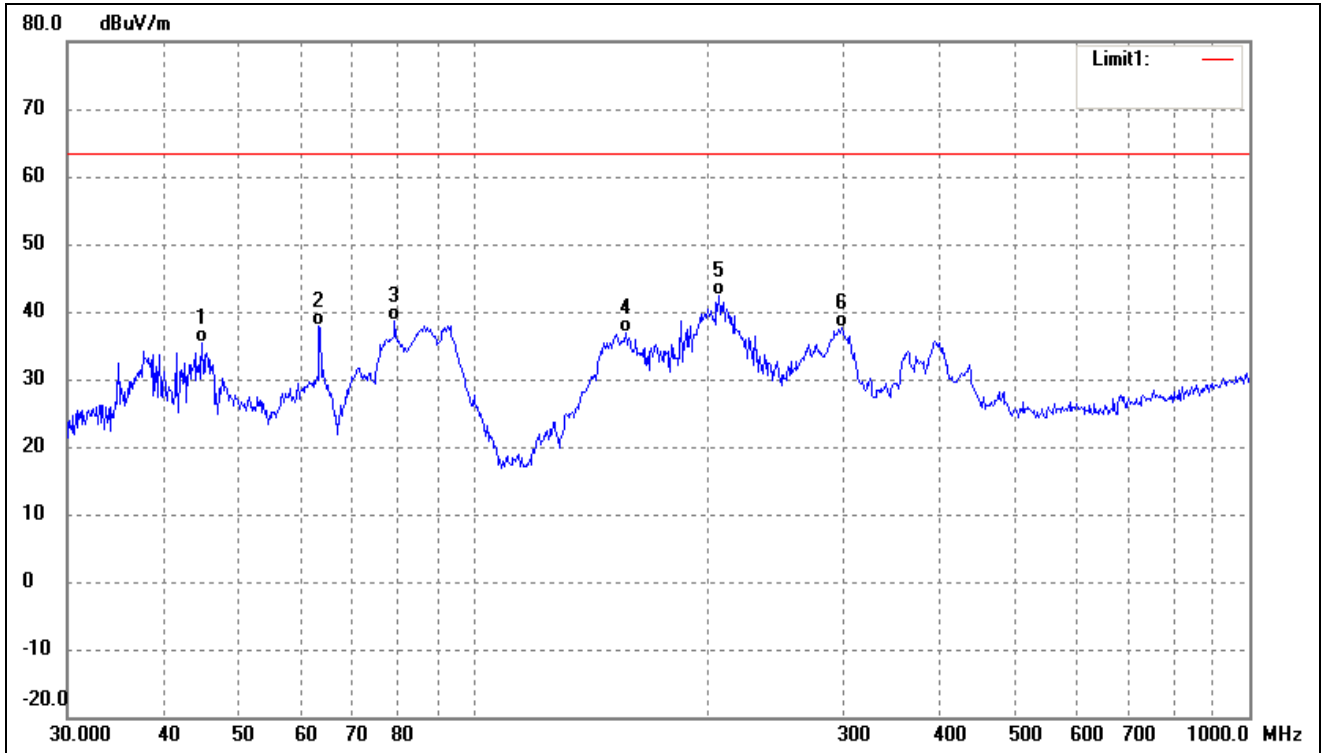
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	45.0583	45.95	-10.56	35.39	63.50	-28.11	-	-	QP
2	88.9639	53.25	-14.53	38.72	63.50	-24.78	-	-	QP
3	156.4578	50.41	-14.50	35.91	63.50	-27.59	-	-	QP
4	197.8928	52.16	-11.46	40.70	63.50	-22.80	-	-	QP
5	297.2241	43.52	-7.39	36.13	63.50	-27.37	-	-	QP
6	390.7226	43.27	-5.78	37.49	63.50	-26.01	-	-	QP

Test mode:	TM3	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	63.3132	33.03	-12.80	20.23	63.50	-43.27	-	-	QP
2	92.1388	43.02	-14.06	28.96	63.50	-34.54	-	-	QP
3	155.9101	43.44	-14.53	28.91	63.50	-34.59	-	-	QP
4	197.2001	47.03	-11.52	35.51	63.50	-27.99	-	-	QP
5	290.0172	45.00	-7.82	37.18	63.50	-26.32	-	-	QP
6	390.7226	49.78	-5.78	44.00	63.50	-19.50	-	-	QP

Test mode:	TM3	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	44.7433	45.99	-10.63	35.36	63.50	-28.14	-	-	QP
2	63.3132	50.59	-12.80	37.79	63.50	-25.71	-	-	QP
3	79.2426	52.65	-14.14	38.51	63.50	-24.99	-	-	QP
4	157.5588	51.25	-14.44	36.81	63.50	-26.69	-	-	QP
5	207.1226	53.49	-11.15	42.34	63.50	-21.16	-	-	QP
6	298.2681	44.96	-7.34	37.62	63.50	-25.88	-	-	QP

Remark: ‘-’Means’ the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

APPENDIX PHOTOGRAPHS

Please refer to “ANNEX”

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