

TEST REPORT

Reference No..... : WTX23X04075074W001
FCC ID : 2AFKNPF2200
Applicant : Spigen Korea Co., Ltd.
Address : Spigen HQ-A, 446, Bongeunsa-ro, Gangnam-gu, Seoul, 06153, South Korea
Manufacturer : The same as Applicant
Address : The same as Applicant
Product Name : ArcField Wireless Charger
Model No..... : PF2200
Standards : FCC Part 15C
Date of Receipt sample : 2023-04-10
Date of Test..... : 2023-04-10 to 2023-04-20
Date of Issue : 2023-04-20
Test Report Form No. : WTX_Part 15_207_209W
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 approver.

Prepared By:

Waltek Testing Group (Shenzhen) Co., Ltd.

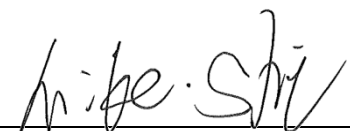
Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road,

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Tested by:

Approved by:



Mike Shi



Silin Chen

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Report version

Version No.	Date of issue	Description
Rev.00	2023-04-20	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Factory 1#: SuiChuan CE LINK LIMITED
 Address of factory 1#: SuiChuan county industrial park east zone, Ji'an city,
 Jiang xi province, China.

Factory 2#: CE LINK VIET NAM COMPANY LIMITED.
 Address of factory 2#: Lot CNSG04&CNSG06 Van Trung Industrial Zone,
 Viet Yen district, Bac Giang Province, Vietnam

General Description of EUT	
Product Name:	ArcField Wireless Charger
Trade Name:	Spigen 
Model No.:	PF2200
Adding Model(s):	/
Rated Voltage:	/
Power Adapter Model:	/
<i>Note: The test data is gathered from a production sample, provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Frequency Range:	112-205kHz/ 363.26kHz
Modulation Type:	ASK
Antenna Type:	Coil Antenna
Input:	DC9V =2.22A
Wireless output:	5W/15W
Adapter	/
Antenna Gain	/

1.2 Test Standards

The tests were performed according to following standards:

FCC Part 15 Subpart C: Intentional Radiators.

FCC Rules Part 15.207: Conducted limits.

FCC Rules Part 15.209: Radiated emission limits; general requirements.

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 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 C63.10-2013, 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

Address of the test laboratory

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

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

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 and the CAB identifier is CN0057.

1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission. 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 (112-205kHz)	Wireless output(5W)	/
TM2	Wireless charging (363.26kHz)	Wireless output(15W)	/

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC CABLE	2.0	Shielded	Without Ferrite

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

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
AC Adapter	/	PN453C	/
Wireless charging tester	/	YBZ	/

1.6 Measurement Uncertainty

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

1.7 Test Equipment List and Details

Fixed asset Number	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
WTXE1004A 1-001	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2023-02-25	2024-02-24
☒ Chamber A: Below 1GHz						
WTXE1005A 1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/03 5	2023-02-25	2024-02-24
WTXE1007A 1001	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/00 5	2023-02-25	2024-02-24
WTXE1007A 1001	Amplifier	HP	8447F	2805A034 75	2023-02-25	2024-02-24
WTXE1010A 1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-20	2024-03-19
WTXE1010A 1006	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2023-03-20	2026-03-19
☒ Chamber A: Above 1GHz						
WTXE1005A 1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/03 5	2023-02-25	2024-02-24
WTXE1007A 1001	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/00 5	2023-02-25	2024-02-24
WTXE1065A 1001	Amplifier	C&D	PAP-1G18	14918	2023-02-25	2024-02-24
WTXE1010A 1005	Horn Antenna	ETS	3117	00086197	2021-03-19	2024-03-18
WTXE1010A 1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2021-03-19	2024-03-18
WTXE1003A 1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2023-02-25	2024-02-24
☐ Chamber B:Below 1GHz						
WTXE1010A 1006	Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2021-04-09	2024-04-08
WTXE1038A 1001	Amplifier	Agilent	8447D	2944A101 79	2023-02-25	2024-02-24
WTXE1001A 1002	EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2023-02-25	2024-02-24
☐ Chamber C:Below 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2023-02-25	2024-02-24

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WTXE1010A 1013-1	Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2021-05-28	2024-05-27
WTXE1007A 1002	Amplifier	HP	8447F	2944A038 69	2023-02-25	2024-02-24
☐ Chamber C: Above 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2023-02-25	2024-02-24
WTXE1103A 1005	Horn Antenna	POAM	RTF-11A	LP228060 221	2023-03-10	2026-03-09
WTXE1103A 1006	Amplifier	Tonscend	TAP01018050	AP22E806 235	2023-02-25	2024-02-24
☒ Conducted Room 1#						
WTXE1001A 1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2023-02-25	2024-02-24
WTXE1002A 1001	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2023-02-25	2024-02-24
WTXE1003A 1001	AC LISN	Schwarz beck	NSLK8126	8126-224	2023-02-25	2024-02-24
☐ Conducted Room 2#						
WTXE1001A 1004	EMI Test Receiver	Rohde & Schwarz	ESPI	101259	2023-02-25	2024-02-24
WTXE1003A 1003	LISN	Rohde & Schwarz	ENV 216	100097	2023-02-25	2024-02-24

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

Description of Test	Result
§15.207(a) Conducted Emission	Compliant
§15.209(a) Radiated Emission	Compliant
§15.215 20dB Emission Bandwidth	Compliant

N/A: not applicable.

3. RF Exposure

3.1 Standard Applicable

According to §1.1307 and §2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF Exposure Report.

4. Antenna Requirement

4.1 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.

4.2 Test Result

This product has a Coil Antenna, fulfill the requirement of this section.

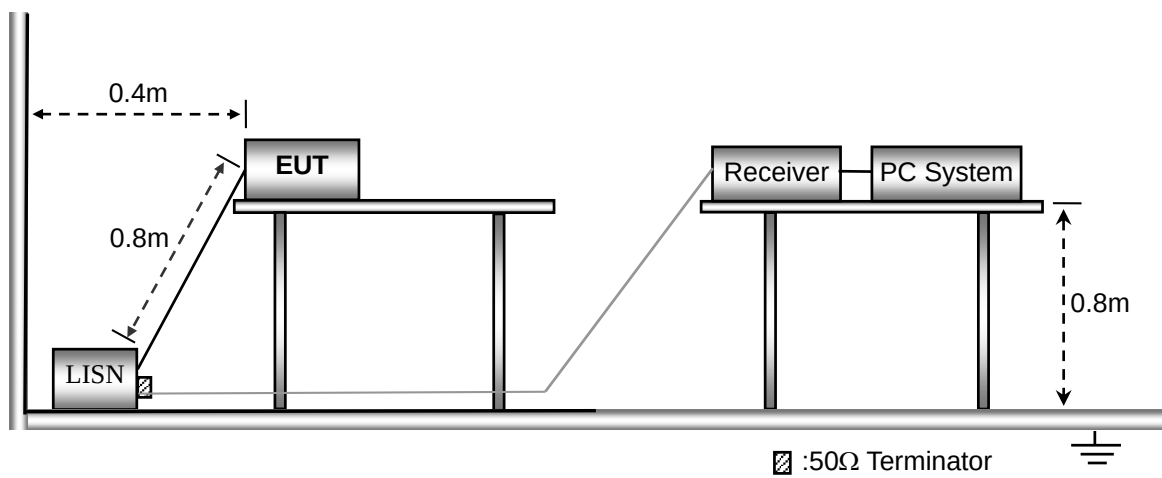
5. Conducted Emissions

5.1 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 40cm long in the middle. The spacing between the peripherals was 10cm.

5.2 Basic Test Setup Block Diagram

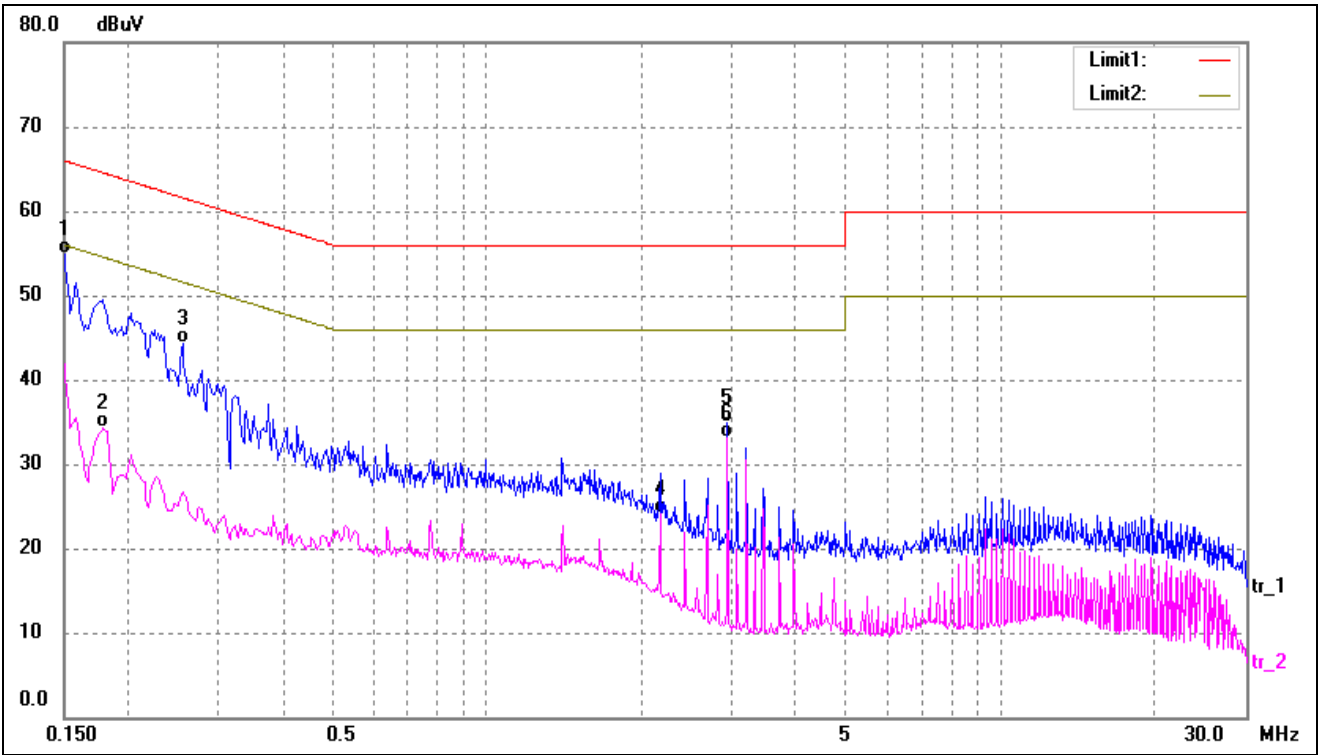


5.3 Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	54 %
ATM Pressure:	1011 mbar

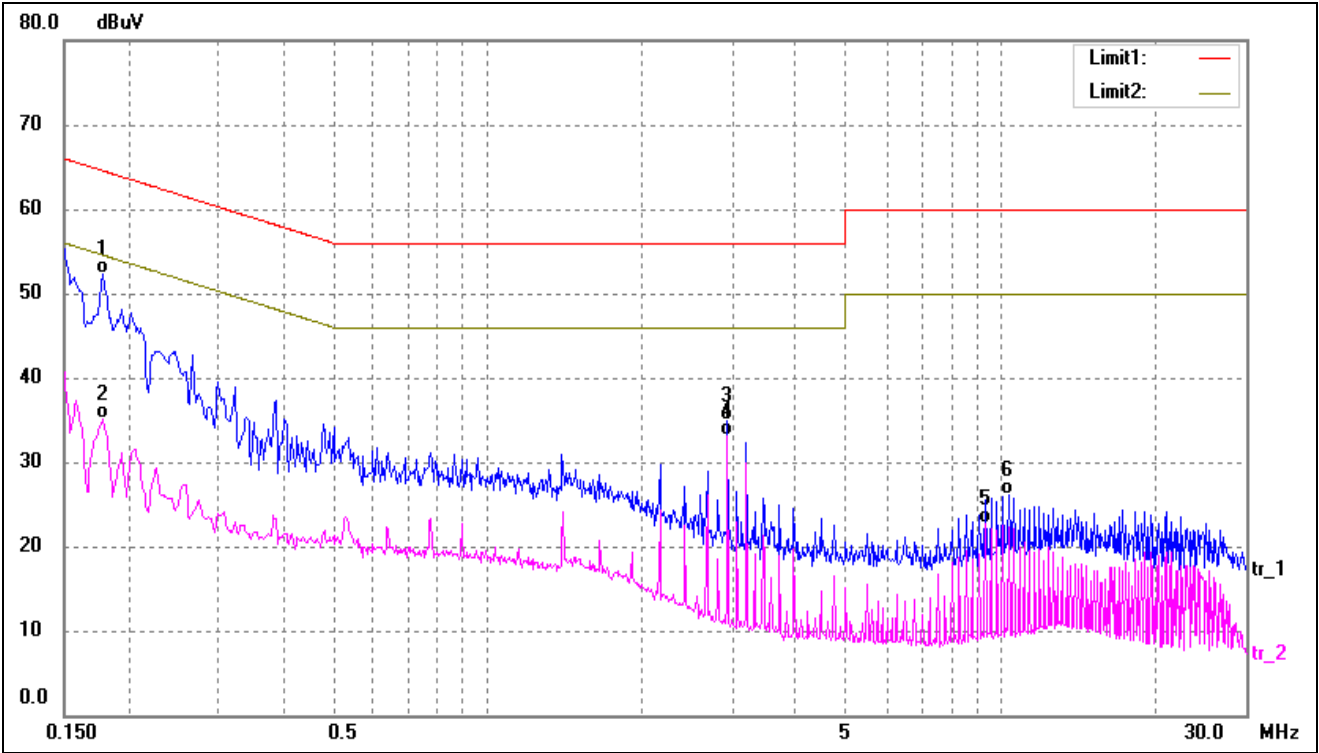
5.4 Summary of Test Results/Plots

Test mode:	TM1	Polarity:	Line
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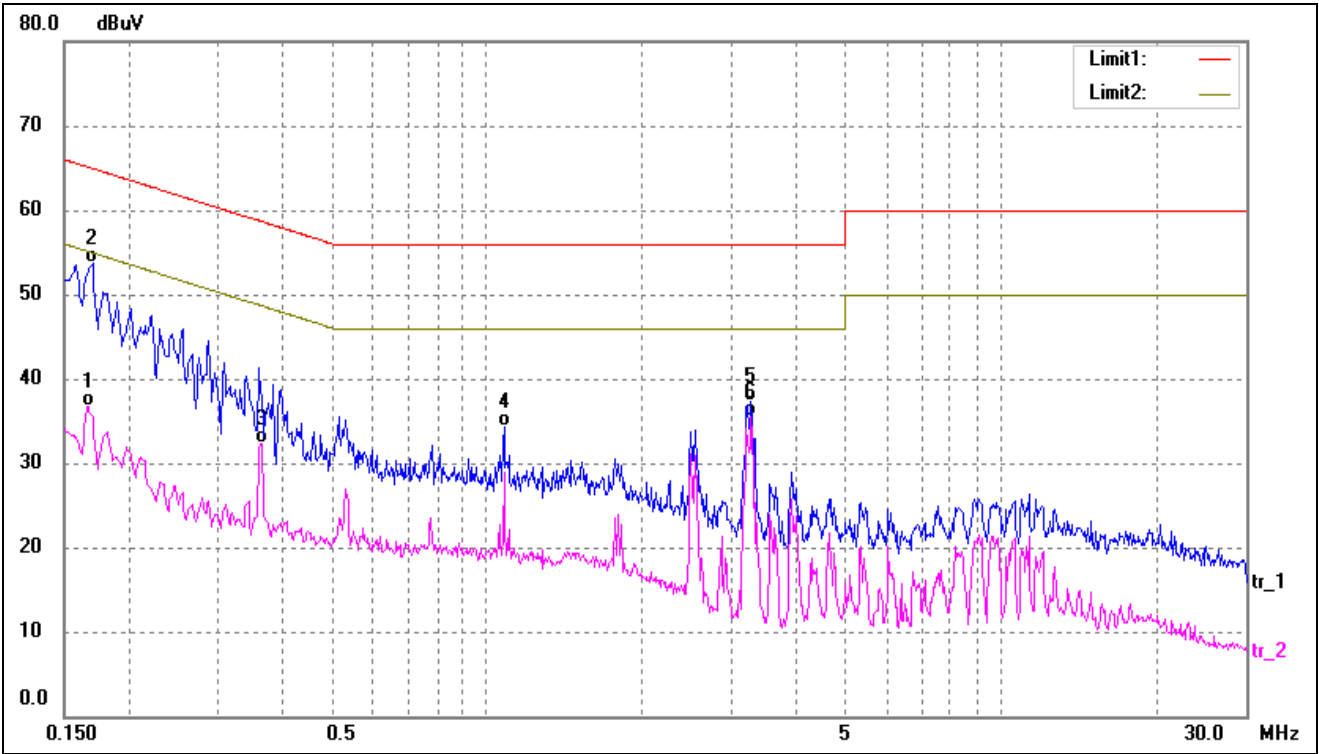
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1500	44.65	10.32	54.97	66.00	-11.03	QP
2	0.1780	23.92	10.31	34.23	54.58	-20.35	AVG
3	0.2540	33.96	10.26	44.22	61.63	-17.41	QP
4	2.1740	13.95	10.25	24.20	46.00	-21.80	AVG
5	2.9380	24.54	10.28	34.82	56.00	-21.18	QP
6	2.9380	22.85	10.28	33.13	46.00	-12.87	AVG

Test mode:	TM1	Polarity:	Neutral
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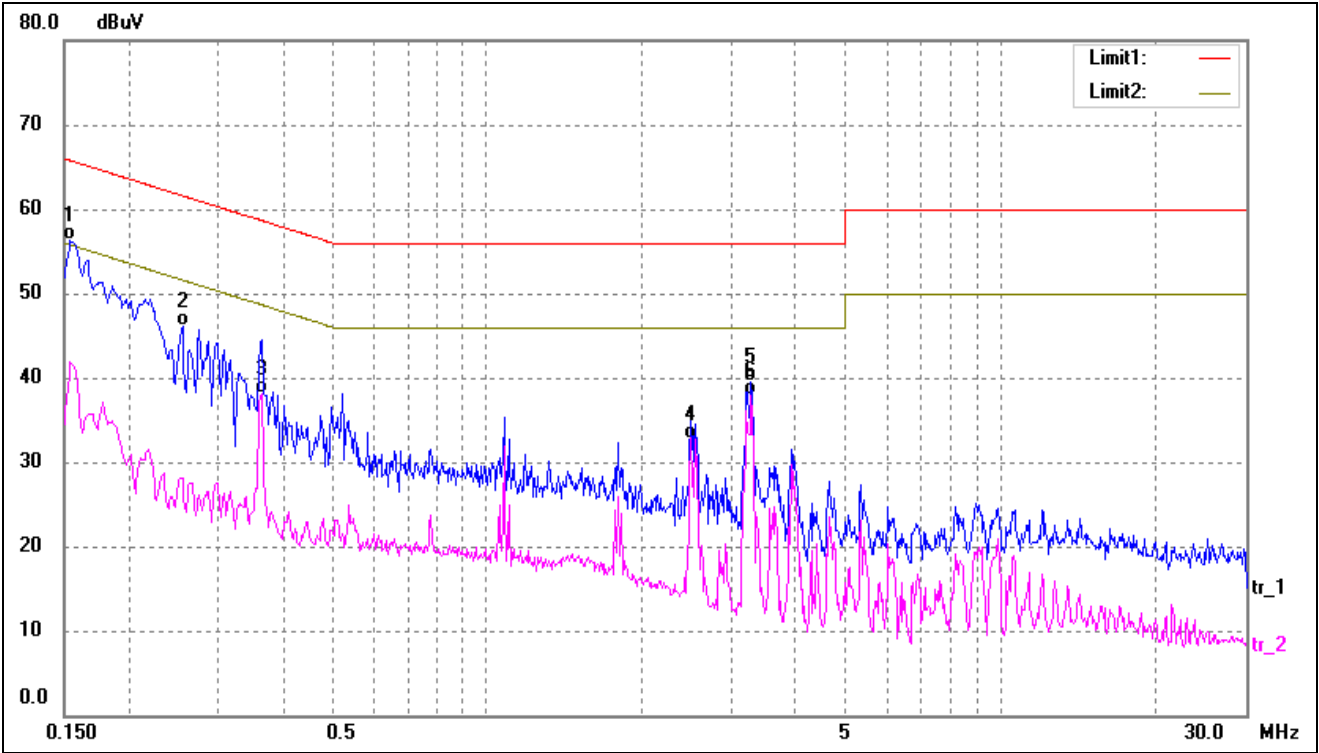
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1780	41.94	10.31	52.25	64.58	-12.33	QP
2	0.1780	24.72	10.31	35.03	54.58	-19.55	AVG
3	2.9380	24.66	10.28	34.94	56.00	-21.06	QP
4	2.9380	22.90	10.28	33.18	46.00	-12.82	AVG
5	9.3260	12.37	10.35	22.72	50.00	-27.28	AVG
6	10.3500	15.82	10.34	26.16	60.00	-33.84	QP

Test mode:	TM2	Polarity:	Line
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1660	26.43	10.31	36.74	55.16	-18.42	AVG
2	0.1700	43.44	10.31	53.75	64.96	-11.21	QP
3	0.3620	22.10	10.23	32.33	48.68	-16.35	AVG
4	1.0820	24.09	10.15	34.24	56.00	-21.76	QP
5	3.2620	26.93	10.28	37.21	56.00	-18.79	QP
6*	3.2620	25.25	10.28	35.53	46.00	-10.47	AVG

Test mode:	TM2	Polarity:	Neutral
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1540	45.98	10.32	56.30	65.78	-9.48	QP
2	0.2540	35.86	10.26	46.12	61.63	-15.51	QP
3	0.3620	27.83	10.23	38.06	48.68	-10.62	AVG
4	2.4980	22.54	10.26	32.80	46.00	-13.20	AVG
5	3.2620	29.15	10.28	39.43	56.00	-16.57	QP
6*	3.2620	27.55	10.28	37.83	46.00	-8.17	AVG

6. RADIATED EMISSION

6.1 Standard Applicable

According to §15.209(a), Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:.

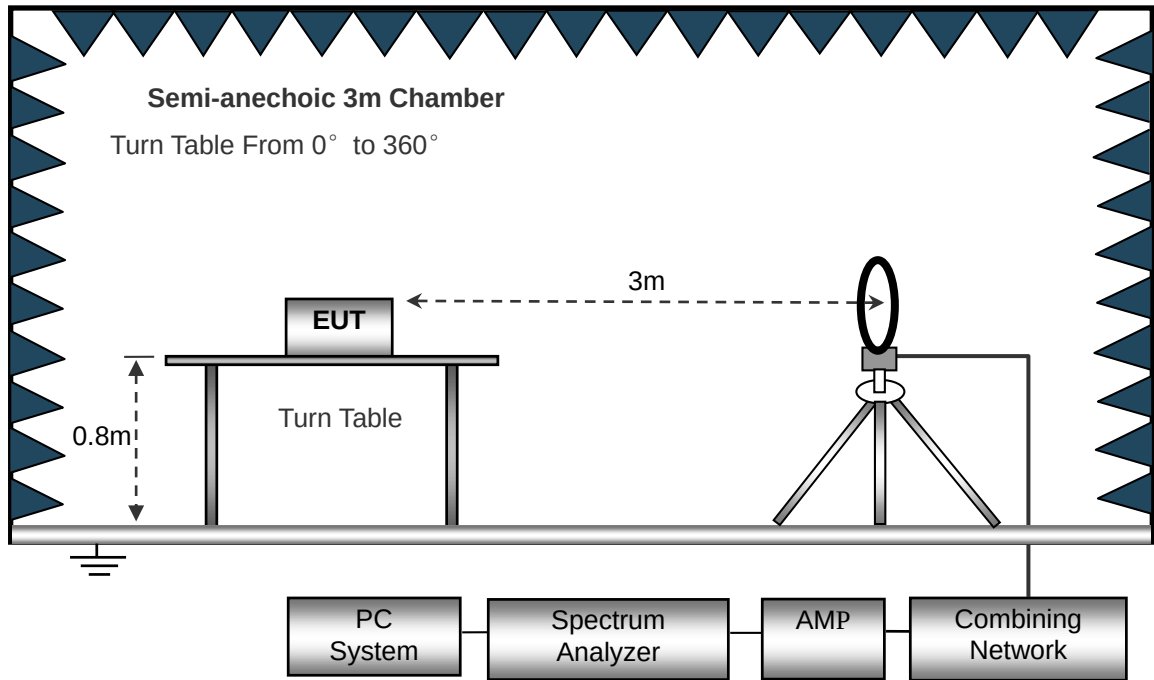
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

6.2 Test Procedure

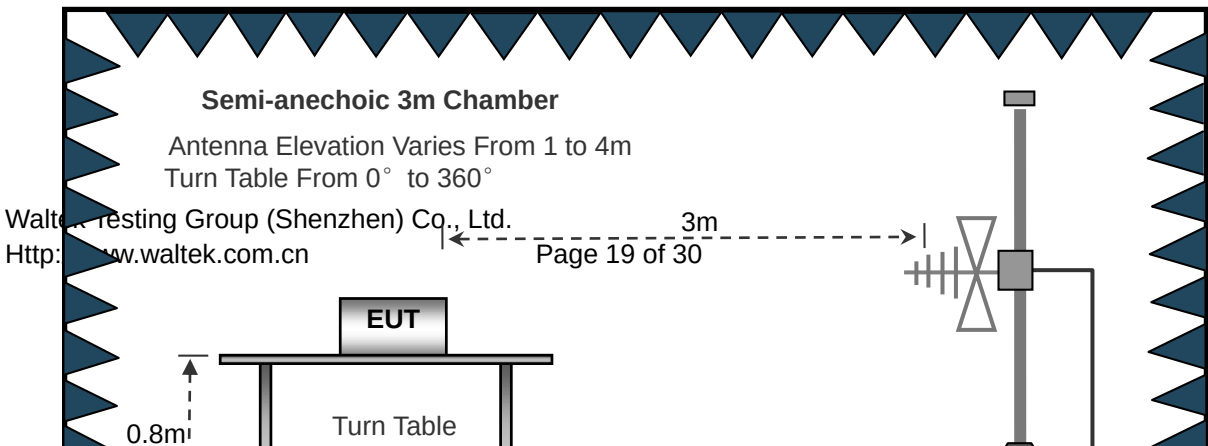
The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.209 Limit.

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

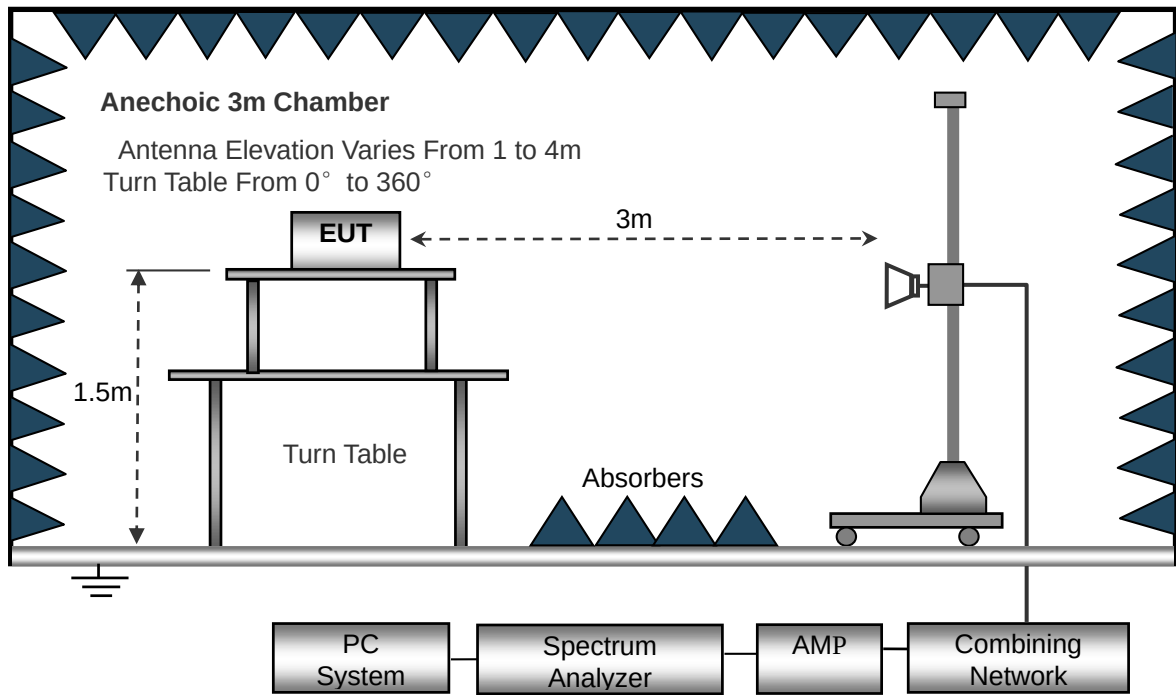
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1GHz.



6.3 Test Receiver Setup

Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10kHz,	RBW=120kHz,	RBW=1MHz,
VBW =30kHz	VBW=300kHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak, QP	Detector function = peak, AV

6.4 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 -6dBμV means the emission is 6dBμV below the maximum limit for a Class B device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15.209(a) Limit}$$

6.5 Environmental Conditions

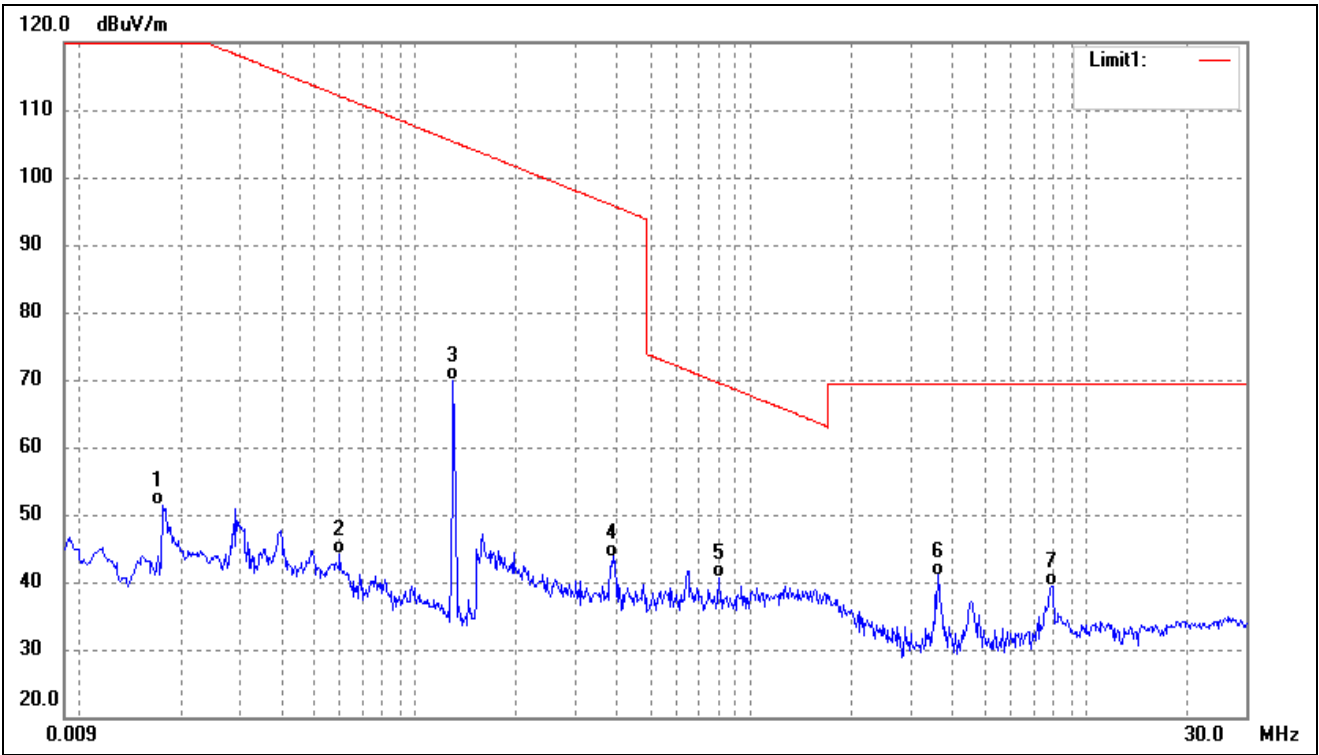
Temperature:	24 °C
Relative Humidity:	56 %
ATM Pressure:	1011 mbar

6.6 Summary of Test Results/Plots

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

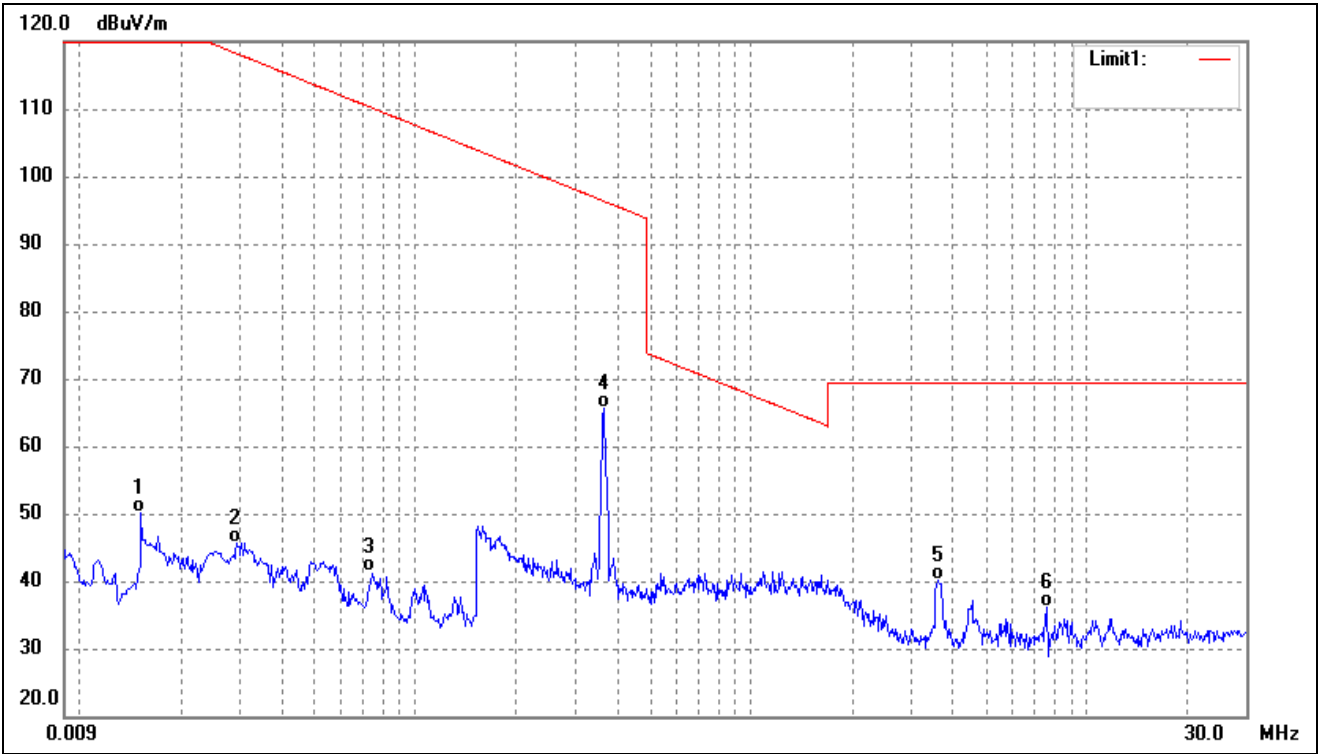
➤ Below 30MHz

Test mode:	TM1	Polarity:	X (worst case)
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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	0.0173	58.44	-7.03	51.41	122.75	-71.34	-	-	QP
2	0.0585	49.95	-5.78	44.17	112.20	-68.03	-	-	QP
3	0.1276	76.25	-6.45	69.80	105.45	-35.65	-	-	QP
4	0.3811	51.46	-7.71	43.75	95.98	-52.23	-	-	QP
5	0.7960	46.92	-6.37	40.55	69.60	-29.05	-	-	QP
6	3.5843	46.87	-5.88	40.99	69.50	-28.51	-	-	QP
7	7.8677	44.99	-5.56	39.43	69.50	-30.07	-	-	QP

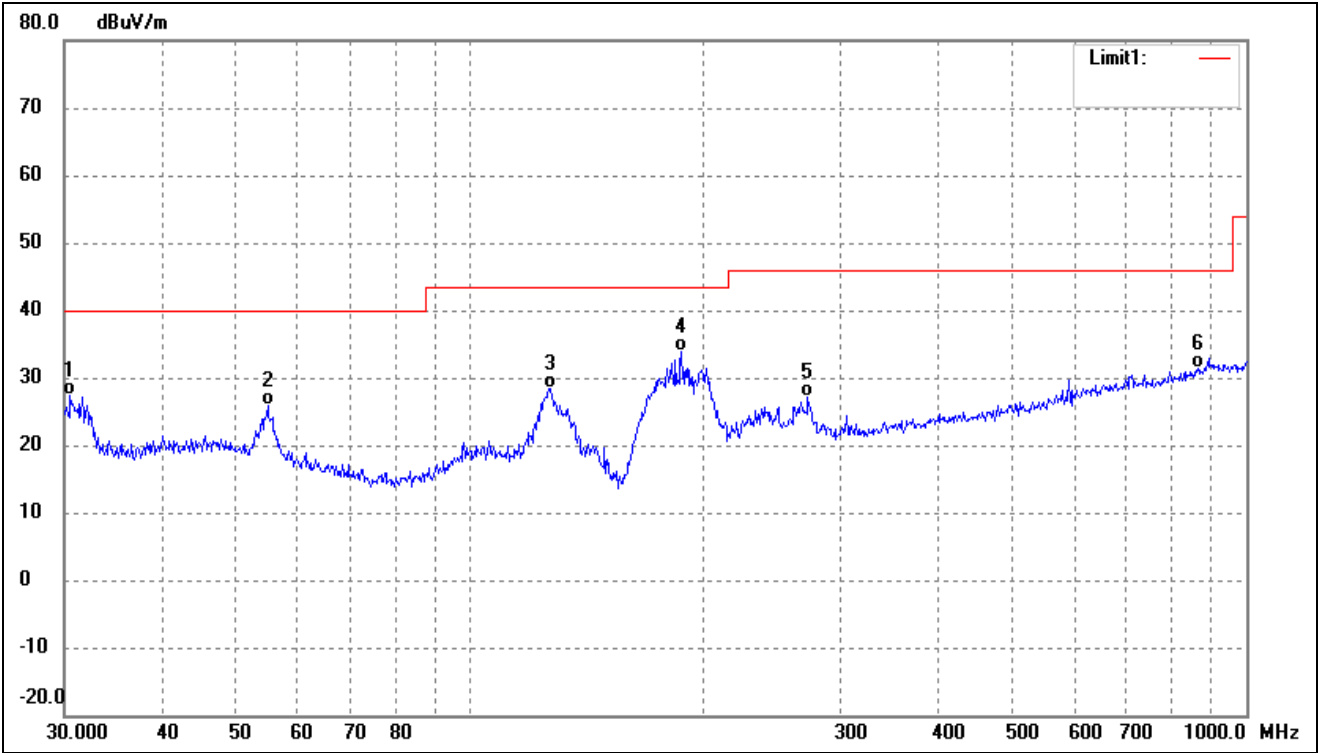
Test mode:	TM2	Polarity:	X (worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	0.0149	57.24	-7.02	50.22	124.12	-73.90	-	-	QP
2	0.0288	52.24	-6.57	45.67	118.40	-72.73	-	-	QP
3	0.0728	47.62	-6.34	41.28	110.35	-69.07	-	-	QP
4	0.3595	73.32	-7.75	65.57	96.49	-30.92	-	-	QP
5	3.5843	45.92	-5.88	40.04	69.50	-29.46	-	-	QP
6	7.6165	41.57	-5.55	36.02	69.50	-33.48	-	-	QP

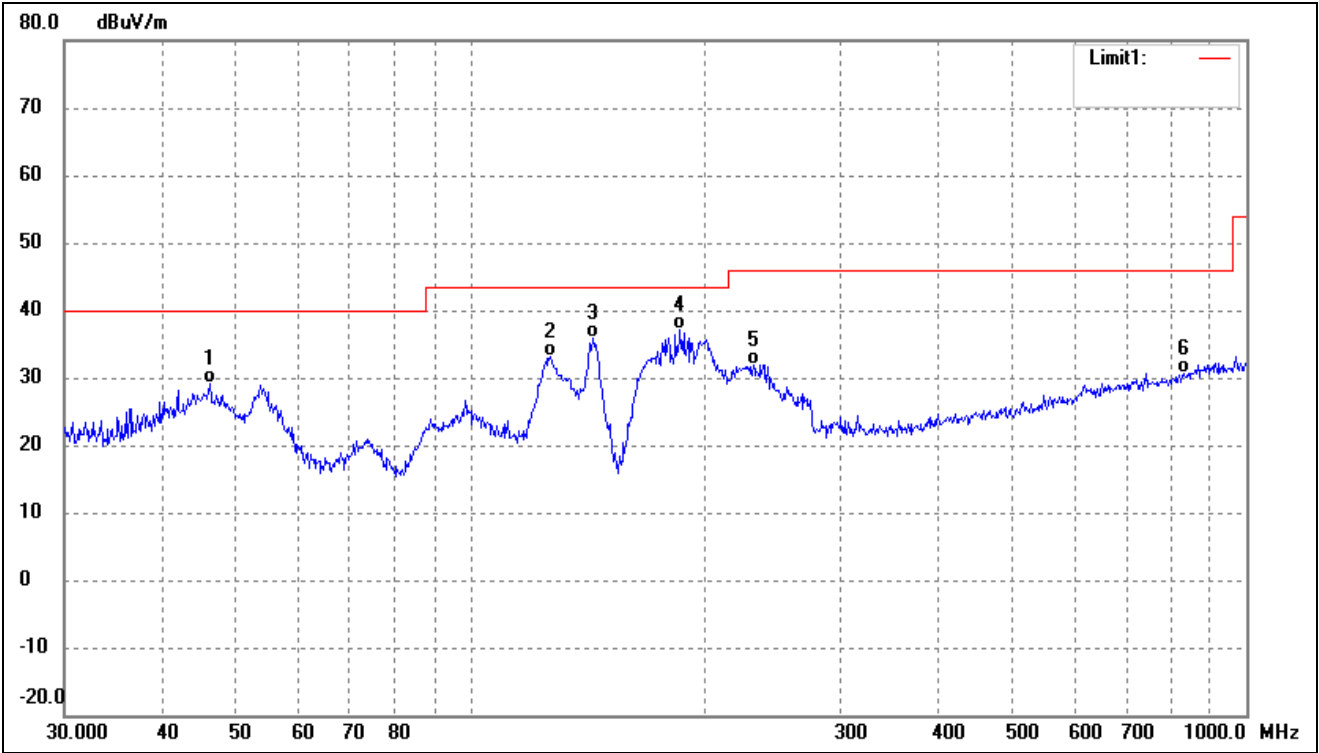
➤ 30MHz-1GHz

Test mode:	TM1	Polarity:	Horizontal
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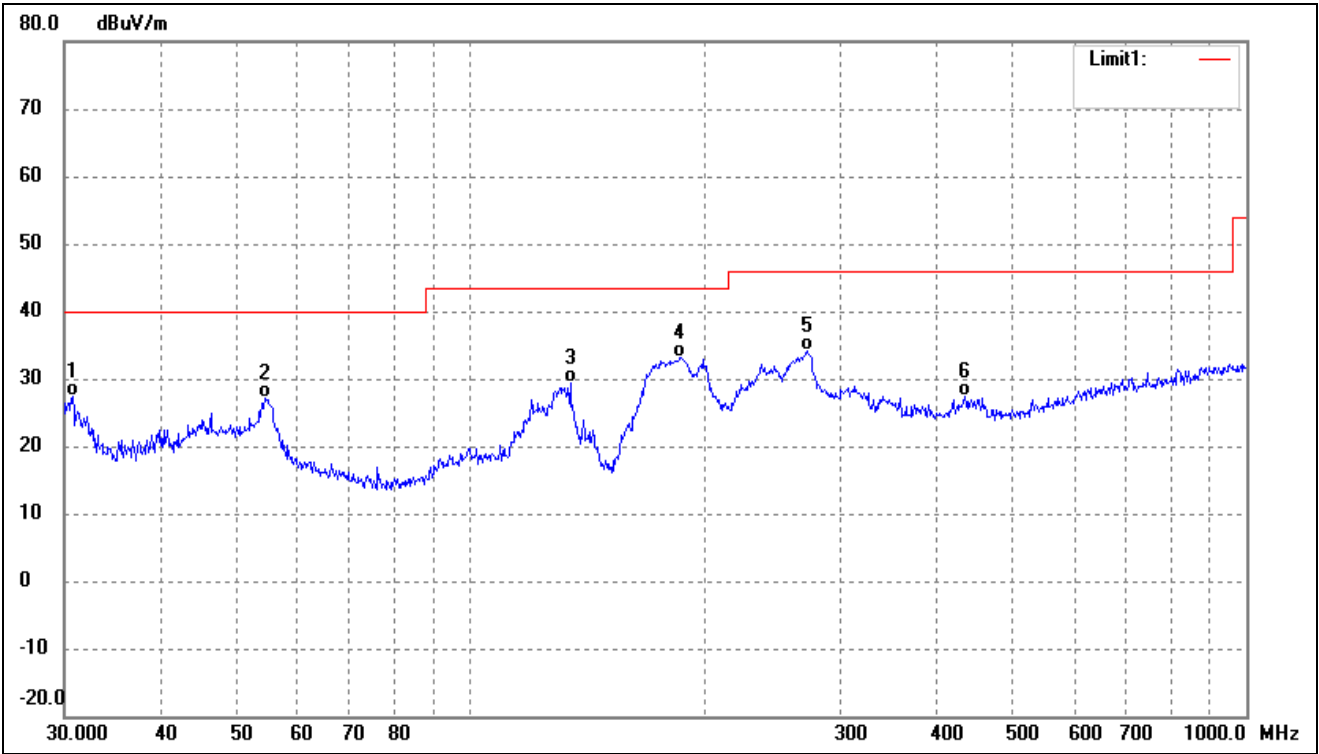
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	30.5306	36.49	-9.20	27.29	40.00	-12.71	-	-	QP
2	54.8348	34.15	-8.16	25.99	40.00	-14.01	-	-	QP
3	126.7723	38.51	-10.03	28.48	43.50	-15.02	-	-	QP
4	187.0958	43.13	-9.21	33.92	43.50	-9.58	-	-	QP
5	272.2776	33.06	-5.95	27.11	46.00	-18.89	-	-	QP
6	866.0879	27.90	3.47	31.37	46.00	-14.63	-	-	QP

Test mode:	TM1	Polarity:	Vertical
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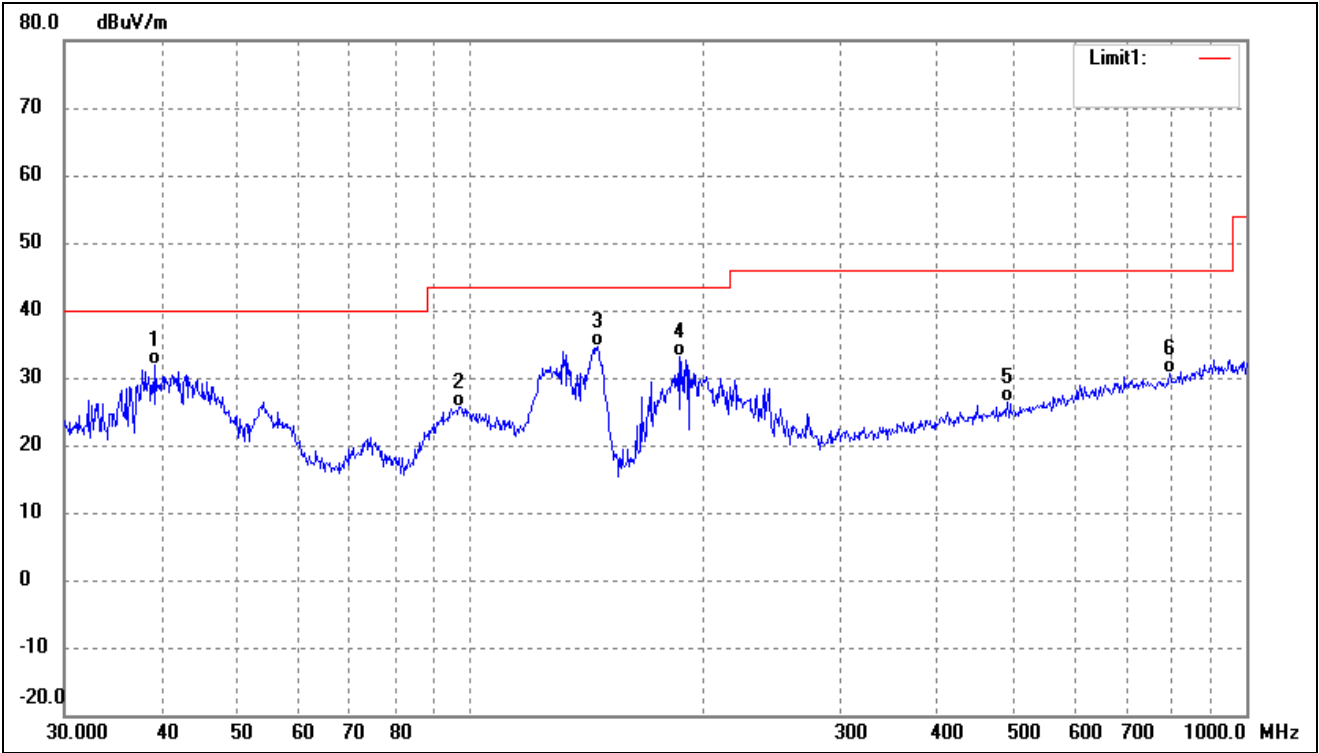
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	46.1779	36.29	-7.25	29.04	40.00	-10.96	-	-	QP
2	126.7723	43.09	-10.03	33.06	43.50	-10.44	-	-	QP
3	143.8295	47.31	-11.49	35.82	43.50	-7.68	-	-	QP
4	186.4409	46.35	-9.30	37.05	43.50	-6.45	-	-	QP
5	231.7179	39.23	-7.33	31.90	46.00	-14.10	-	-	QP
6	830.4002	27.71	2.88	30.59	46.00	-15.41	-	-	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	30.7454	36.63	-9.15	27.48	40.00	-12.52	-	-	QP
2	54.4515	35.15	-8.09	27.06	40.00	-12.94	-	-	QP
3	134.5592	40.36	-10.96	29.40	43.50	-14.10	-	-	QP
4	186.4408	42.35	-9.30	33.05	43.50	-10.45	-	-	QP
5	271.3245	40.07	-5.98	34.09	46.00	-11.91	-	-	QP
6	434.0650	30.21	-2.95	27.26	46.00	-18.74	-	-	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	39.2991	39.16	-7.27	31.89	40.00	-8.11	-	-	QP
2	96.7749	34.69	-8.96	25.73	43.50	-17.77	-	-	QP
3	145.8611	46.13	-11.55	34.58	43.50	-8.92	-	-	QP
4	185.7882	42.52	-9.39	33.13	43.50	-10.37	-	-	QP
5	492.4685	28.55	-2.27	26.28	46.00	-19.72	-	-	QP
6	796.1830	28.36	2.30	30.66	46.00	-15.34	-	-	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.

7. Occupied Bandwidth

7.1 Standard Applicable

According to 15.215,20dB emission bandwidth.

7.2 Test Procedure

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

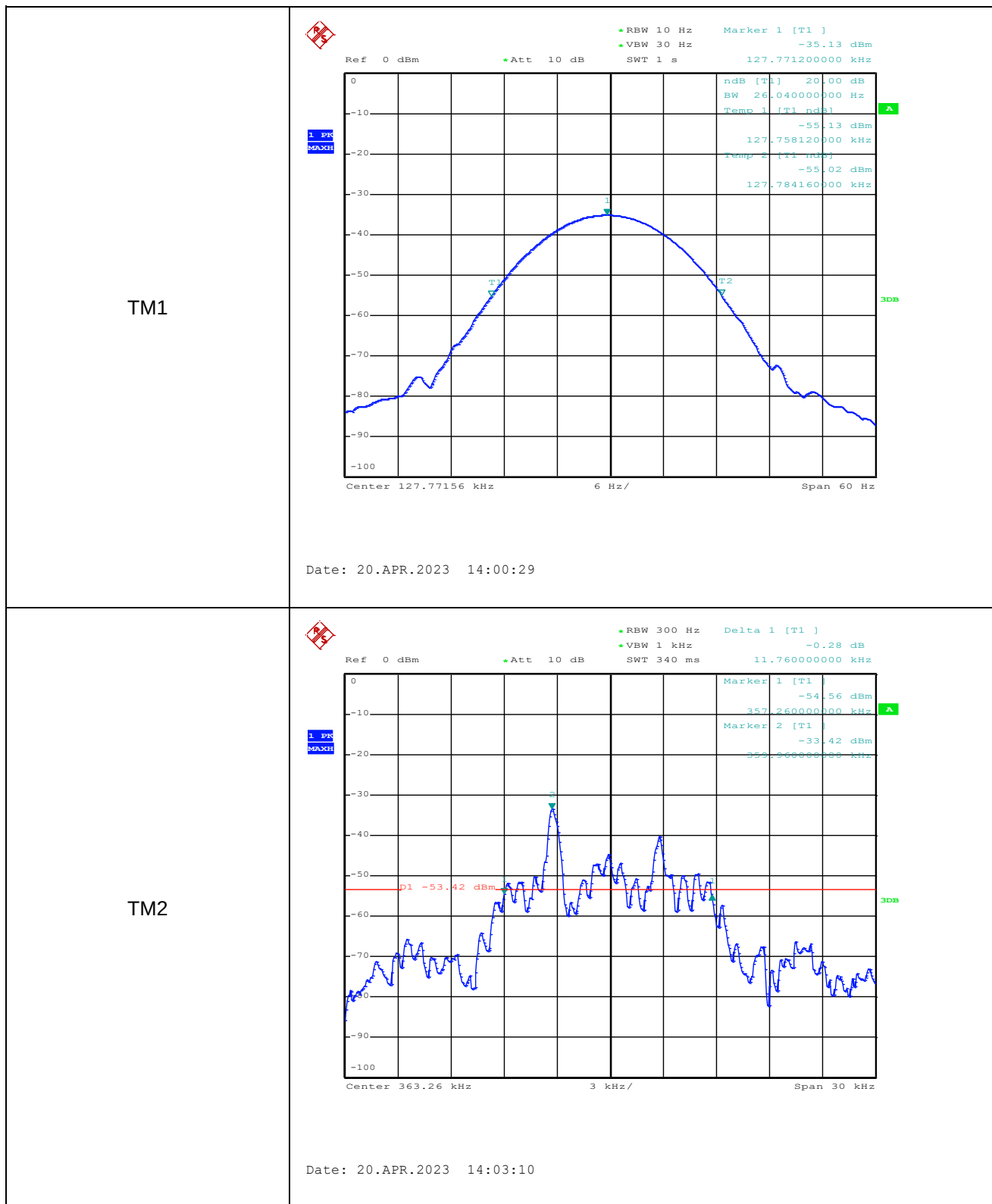
7.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

7.4 Summary of Test Results/Plots

Test mode	Test Channel(kHz)	20dB Bandwidth
TM1	127.77	26.04Hz
TM2	363.26	11.76kHz

Please refer to the attached plots.



Note: The RBW of the analyzer measuring Bandwidth cannot be adjusted to 1%-5% OBW, the RBW of the test setting is the closest value.

APPENDIX PHOTOGRAPHS

Please refer to “ANNEX”

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