

TEST REPORT

Reference No...... : WTX21X09101508W
FCC ID : FHO-E2023
Applicant : IKEA of Sweden AB
Address : Box 702, SE-343 81 ÄLMHULT, SWEDEN
Product Name : LILLHULT Lightning cable
Test Model : E2023
Standards : **FCC PART15 SUBPART B**
Date of Receipt sample : Sept. 23, 2021
Date of Test..... : Sept. 23, 2021 to Sept. 27, 2021
Date of Issue : Sept. 27, 2021
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:

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

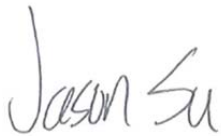
Tel.: +86-755-33663308

Fax.: +86-755-33663309

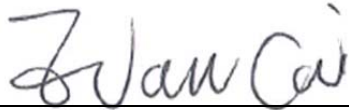
Tested by:

Reviewed By:

Approved & Authorized By:



Jason Su / Project Engineer



Evan Cai / EMC Manager



Silin Chen / Manager

TABLE OF CONTENTS

1. GENERAL INFORMATION	4
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
1.2 TEST STANDARDS	5
1.3 TEST METHODOLOGY	5
1.4 TEST FACILITY	5
1.5 EUT SETUP AND OPERATION MODE	6
1.6 MEASUREMENT UNCERTAINTY	7
1.7 TEST EQUIPMENT LIST AND DETAILS	8
2. SUMMARY OF TEST RESULTS	9
3. CONDUCTED EMISSIONS	10
3.1 TEST PROCEDURE	10
3.2 BASIC TEST SETUP BLOCK DIAGRAM	10
3.3 ENVIRONMENTAL CONDITIONS	10
3.4 SUMMARY OF TEST RESULTS	10
4. RADIATED EMISSION	13
4.1 TEST PROCEDURE	13
4.2 BLOCK DIAGRAM OF TEST SETUP	13
4.3 TEST RECEIVER SETUP	13
4.4 CORRECTED AMPLITUDE & MARGIN CALCULATION	14
4.5 ENVIRONMENTAL CONDITIONS	14
4.6 SUMMARY OF TEST RESULTS	14
APPENDIX PHOTOGRAPHS	17

Report version

Version No.	Date of issue	Description
Rev.00	Sept. 27, 2021	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: IKEA of Sweden AB
Address of applicant: Box 702, SE-343 81 ÄLMHULT, SWEDEN

Manufacturer: Unirise Electronics Co.,Ltd.
Address of manufacturer: No.69 Road 15, New Industrial Area,Longyan Village,Humen,Dongguan,Guangdong, China 523920

General Description of EUT	
Product Name:	LILLHULT Lightning cable
Trade Name:	IKEA
Model No.:	E2023
Adding Model(s):	/
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Rated Voltage:	Notebook AC120V for Adapter DC20V; USB-A DC5V; Lighting DC5V
Rated Current:	/
Rated Power:	/
Power Adapter Model:	/
Lowest Internal Frequency:	/
Highest Internal Frequency:	Below 108MHz
Classification of ITE:	Class B

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15 Subpart B:Unintentional Radiators.

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

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.

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	Charging And Downloading	USB-A Connect to the Notebook; Lighting Connect to the iPad	Notebook AC120V for Adapter DC20V; USB-A DC5V; Lighting DC5V

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
/	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Notebook	Lenovo	PFNXB1426207	/
iPad	Apple	A1432	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Conducted Emissions	Conducted	9-150kHz $\pm 3.74\text{dB}$
		0.15-30MHz $\pm 3.34\text{dB}$
Radiated 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

Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2021-03-30	2022-03-29
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2021-04-12	2022-04-11
Amplifier	Agilent	8447F	3113A06717	2021-04-12	2022-04-11
Amplifier	C&D	PAP-1G18	2002	2021-04-12	2022-04-11
Trilog Broadband Antenna	Schwarz beck	VULB9163	9163-333	2021-03-20	2023-03-19
Horn Antenna	ETS	3117	00086197	2021-03-19	2023-03-18
Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-20	2023-03-19
Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2021-04-09	2023-04-08
Amplifier	Agilent	8447D	2944A10179	2021-04-12	2022-04-11
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2021-04-15	2022-04-14

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

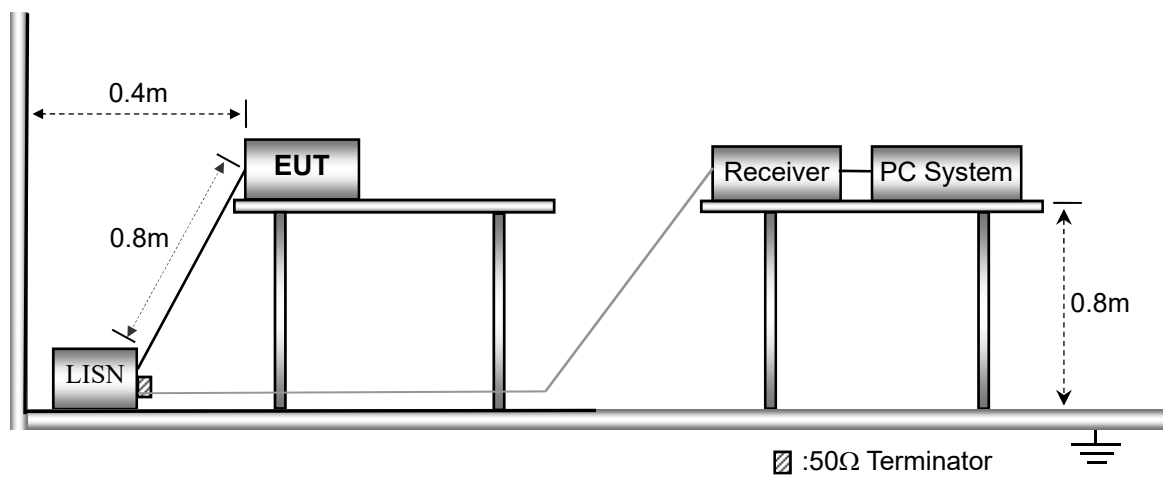
Description of Test	Result
§15.107(a) Conducted Emission	Compliant
§15.109(a) Radiated Emission	Compliant

3. Conducted Emissions

3.1 Test Procedure

Test is conducting under the description of 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.

3.2 Basic Test Setup Block Diagram



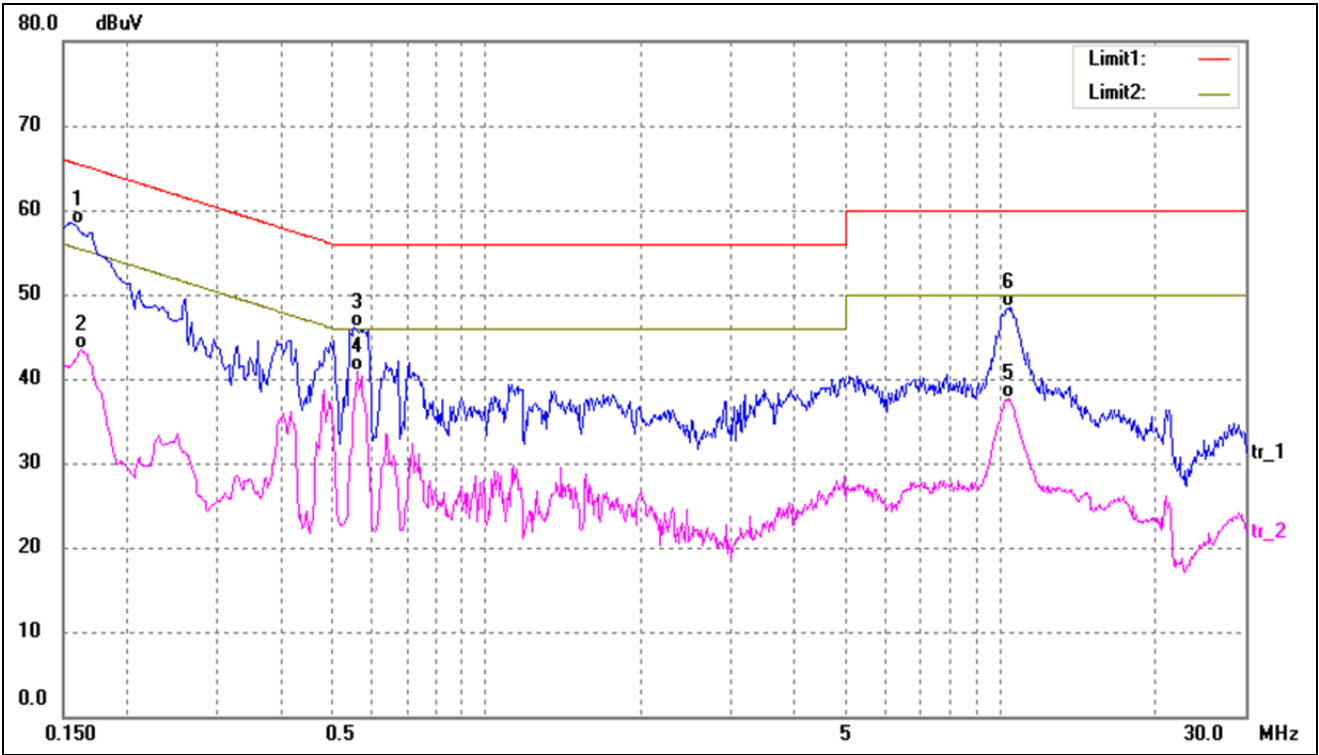
3.3 Environmental Conditions

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

3.4 Summary of Test Results

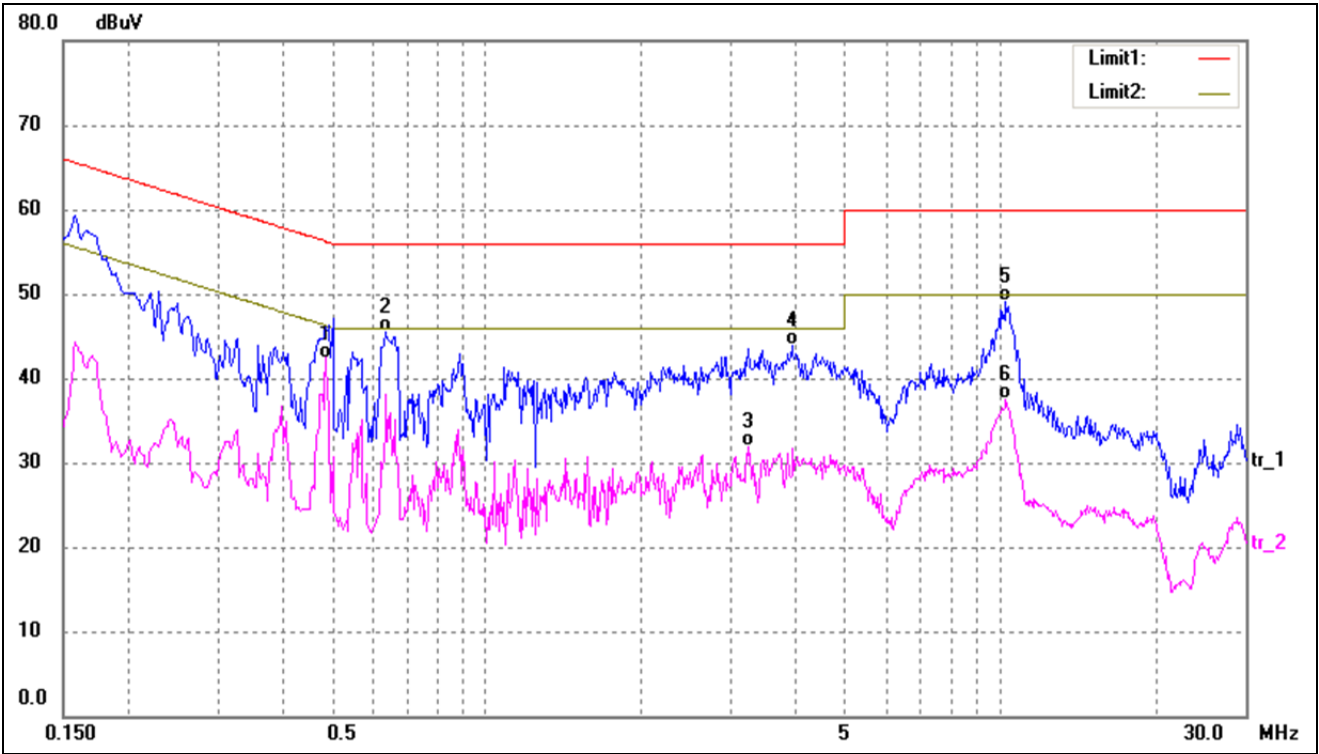
Look at the graphs and data below:

Test mode:	TM1	Polarity:	Line
------------	-----	-----------	------



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1580	48.02	10.25	58.27	65.56	-7.29	QP
2	0.1620	33.17	10.26	43.43	55.36	-11.93	AVG
3	0.5540	35.89	10.21	46.10	56.00	-9.90	QP
4*	0.5580	30.63	10.21	40.84	46.00	-5.16	AVG
5	10.3780	27.42	10.30	37.72	50.00	-12.28	AVG
6	10.4819	38.16	10.30	48.46	60.00	-11.54	QP

Test mode:	TM1	Polarity:	Neutral
------------	-----	-----------	---------



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.4860	32.18	10.22	42.40	46.24	-3.84	AVG
2	0.6340	35.23	10.19	45.42	56.00	-10.58	QP
3	3.2340	21.57	10.26	31.83	46.00	-14.17	AVG
4	3.9300	33.70	10.25	43.95	56.00	-12.05	QP
5	10.2820	38.81	10.29	49.10	60.00	-10.90	QP
6	10.2820	27.12	10.29	37.41	50.00	-12.59	AVG

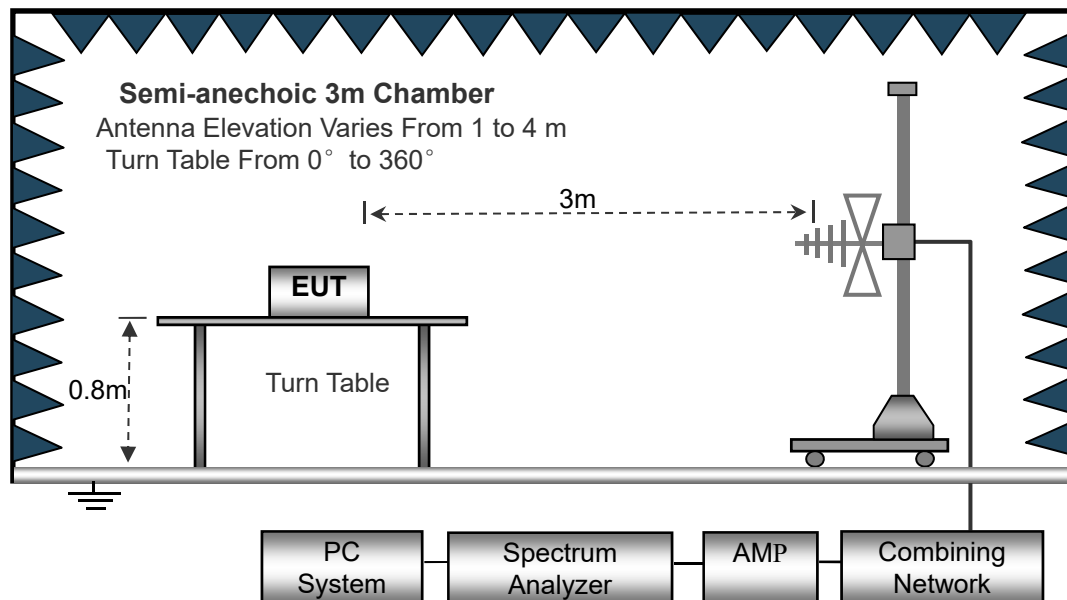
4. RADIATED EMISSION

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 15.109 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.

4.2 Block Diagram of Test Setup



4.3 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

4.4 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:

$$\begin{aligned}\text{Corr. Ampl.} &= \text{Indicated Reading} + \text{Correct} \\ \text{Correct} &= \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}\end{aligned}$$

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 a Class B device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15.109(a) Limit}$$

4.5 Environmental Conditions

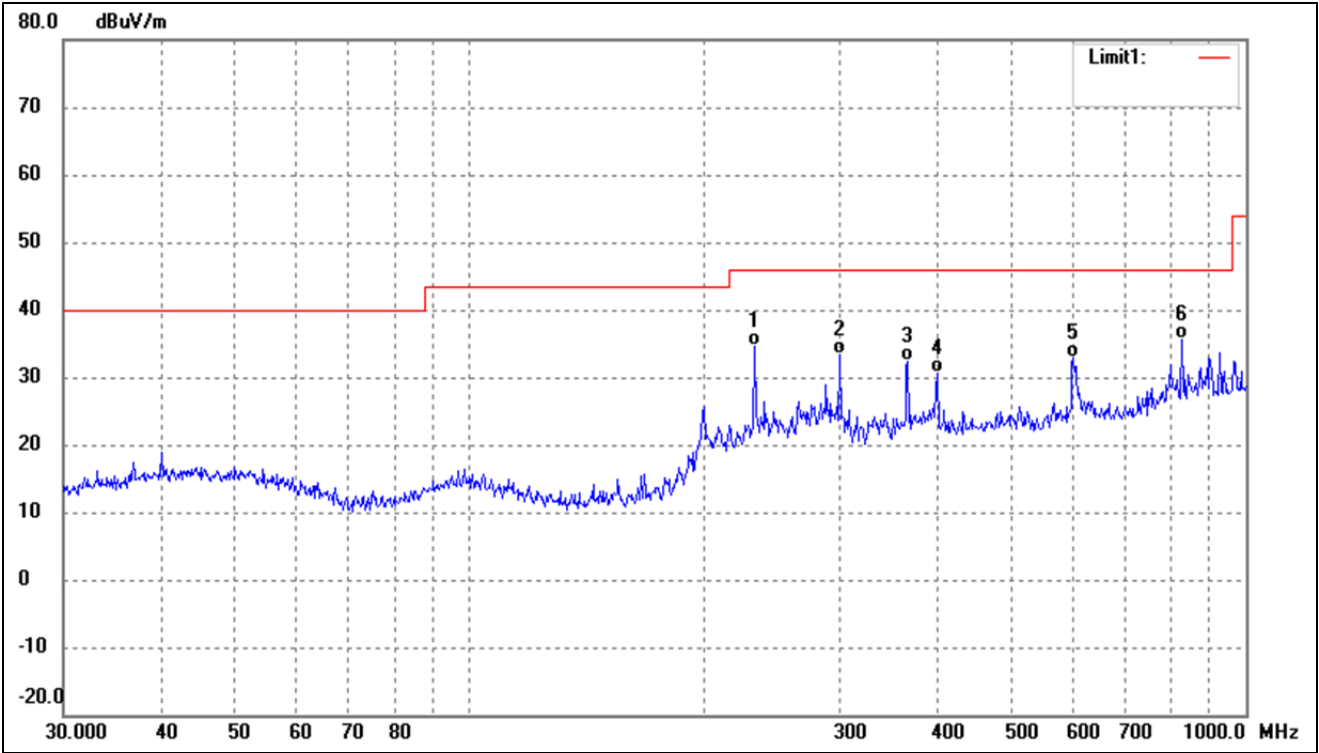
Temperature:	22.5 °C
Relative Humidity:	54 %
ATM Pressure:	1011 mbar

4.6 Summary of Test Results

Look at the graphs and data below:

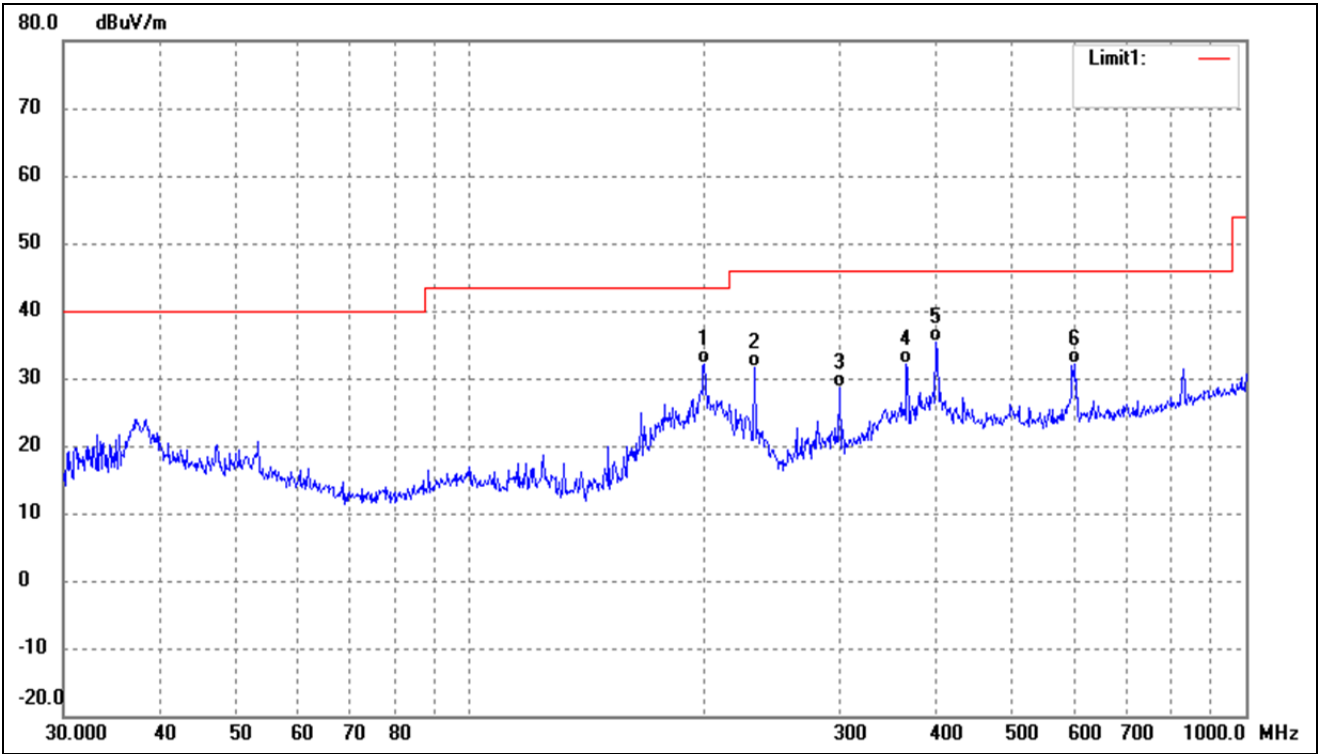
➤ Below 1GHz

Test mode:	TM1	Polarity:	Horizontal
------------	-----	-----------	------------



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	233.3487	46.01	-11.41	34.60	46.00	-11.40			QP
2	300.3673	42.76	-9.32	33.44	46.00	-12.56			QP
3	366.8231	39.60	-7.27	32.33	46.00	-13.67			QP
4	400.4319	36.94	-6.24	30.70	46.00	-15.30			QP
5	599.3213	36.59	-3.76	32.83	46.00	-13.17			QP
6	827.4934	36.64	-0.91	35.73	46.00	-10.27			QP

Test mode:	TM1	Polarity:	Vertical
------------	-----	-----------	----------



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	200.6881	44.49	-12.38	32.11	43.50	-11.39			QP
2	233.3487	42.97	-11.41	31.56	46.00	-14.44			QP
3	299.3158	38.07	-9.35	28.72	46.00	-17.28			QP
4	365.5391	39.44	-7.31	32.13	46.00	-13.87			QP
5	399.0302	41.61	-6.28	35.33	46.00	-10.67			QP
6	601.4265	35.78	-3.74	32.04	46.00	-13.96			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 *******