

FCC Part 18

Measurement and Test Report

For

Microsun Lamps LLC

7890 Center Point 70 Blvd., Dayton, OH 45424,USA

FCC ID: 2ART7-4008-SI

Test Rule(s): FCC Part 18

Product Description: LED Portable Luminaire

Tested Model: 4008-SI

Report No.: STR18118140I-2

Sample Receipt Date: 2018-11-13

Tested Date: 2018-11-13 to 2018-12-17

Issued Date: 2018-12-17

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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: Microsun Lamps LLC
Address of applicant: 7890 Center Point 70 Blvd., Dayton, OH 45424, USA

Manufacturer: Adot Lighting Co., Ltd.
Address of manufacturer: No.8 Bldg, Wise-Nest Industrial Park, Caotan 10th Rd., ETDZ, Xi'an, ShaanXi, 710018, P.R.China

General Description of EUT	
Product Name:	LED Portable Luminaire
Trade Name:	/
Model No.:	4008-SI
Adding Model(s):	/
Power Adapter Model:	Model: HN050200AUS4U Input: 100-240V~50/60Hz 0.26A max Output: DC5V, 2A
<i>Note: The test data is gathered from a production sample, provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Frequency Range:	110~205KHz
Modulation Type:	ASK
Antenna Type:	Coil Antenna
Rated Voltage:	DC5V (Wireless output)
Rated Current:	≤1A (Wireless output)
Rated Power:	≤ 5W (Wireless output)

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

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 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	Transmit	Input: DC5V(with a adapter input AC 120V/60Hz)

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
/	/	/	/

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	2018-05-22	2019-05-21
Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2018-05-22	2019-05-21
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2018-05-22	2019-05-21
Amplifier	Agilent	8447F	3113A06717	2018-05-22	2019-05-21
Amplifier	C&D	PAP-1G18	2002	2018-05-22	2019-05-21
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-08	2018-06-07
Horn Antenna	ETS	3117	00086197	2017-06-08	2018-06-07
Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-08	2018-06-07
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2018-05-22	2019-05-21
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2018-05-22	2019-05-21
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2018-05-22	2019-05-21

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:

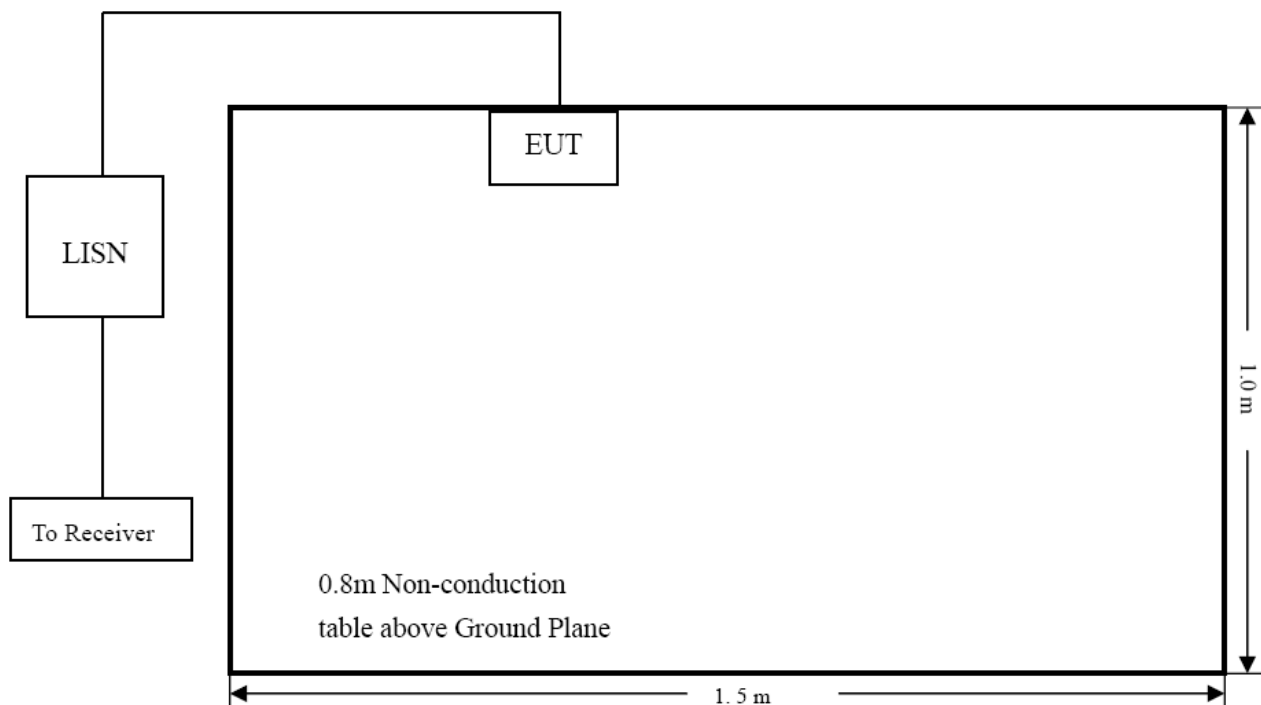
Frequency (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

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:	24° C
Relative Humidity:	56%
ATM Pressure:	1016 mbar

3.5 Test Receiver Setup

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

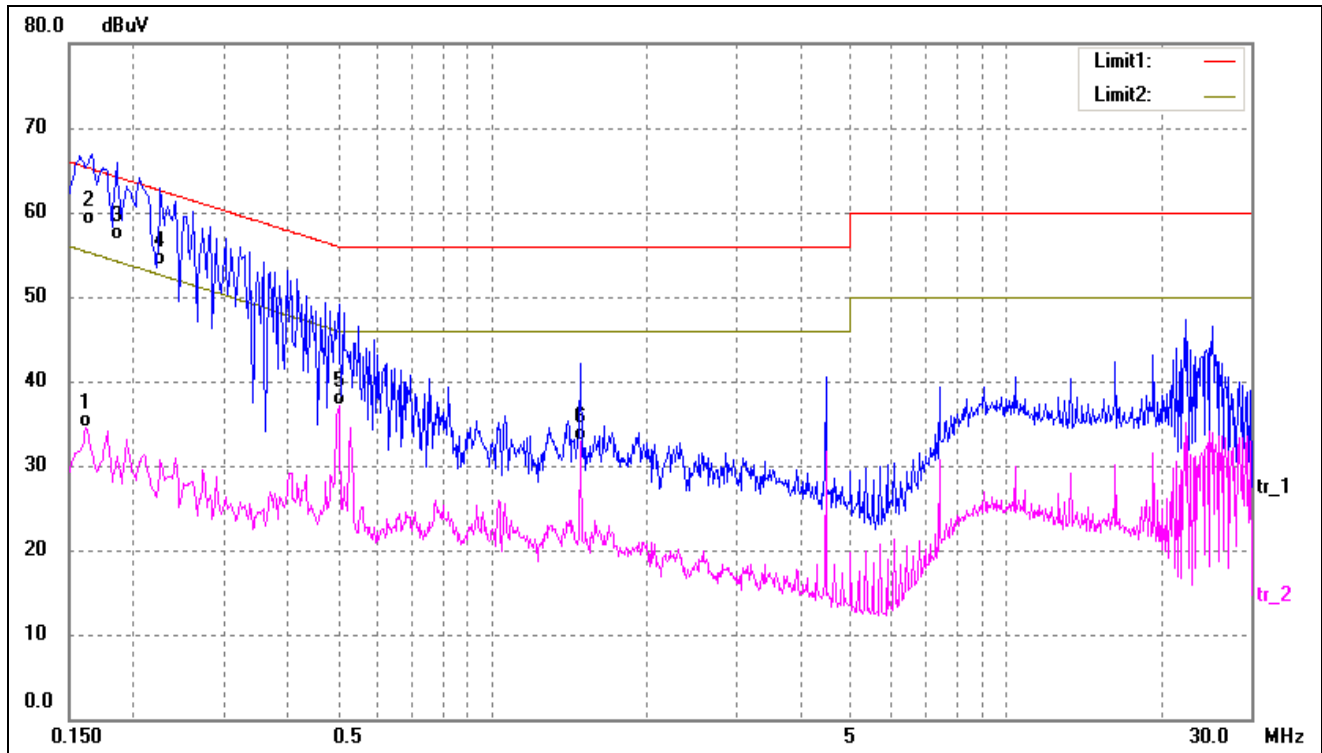
Start Frequency 150 kHz
Stop Frequency..... 30 MHz
Sweep Speed Auto
IF Bandwidth..... 10 kHz
Quasi-Peak Adapter Bandwidth 9 kHz
Quasi-Peak Adapter Mode Normal

3.6 Summary of Test Results/Plots

According to the data in this section, the EUT complied with the FCC Part 18C Conducted margin for Any non-ISM frequency device, with the *worst* margin reading of:

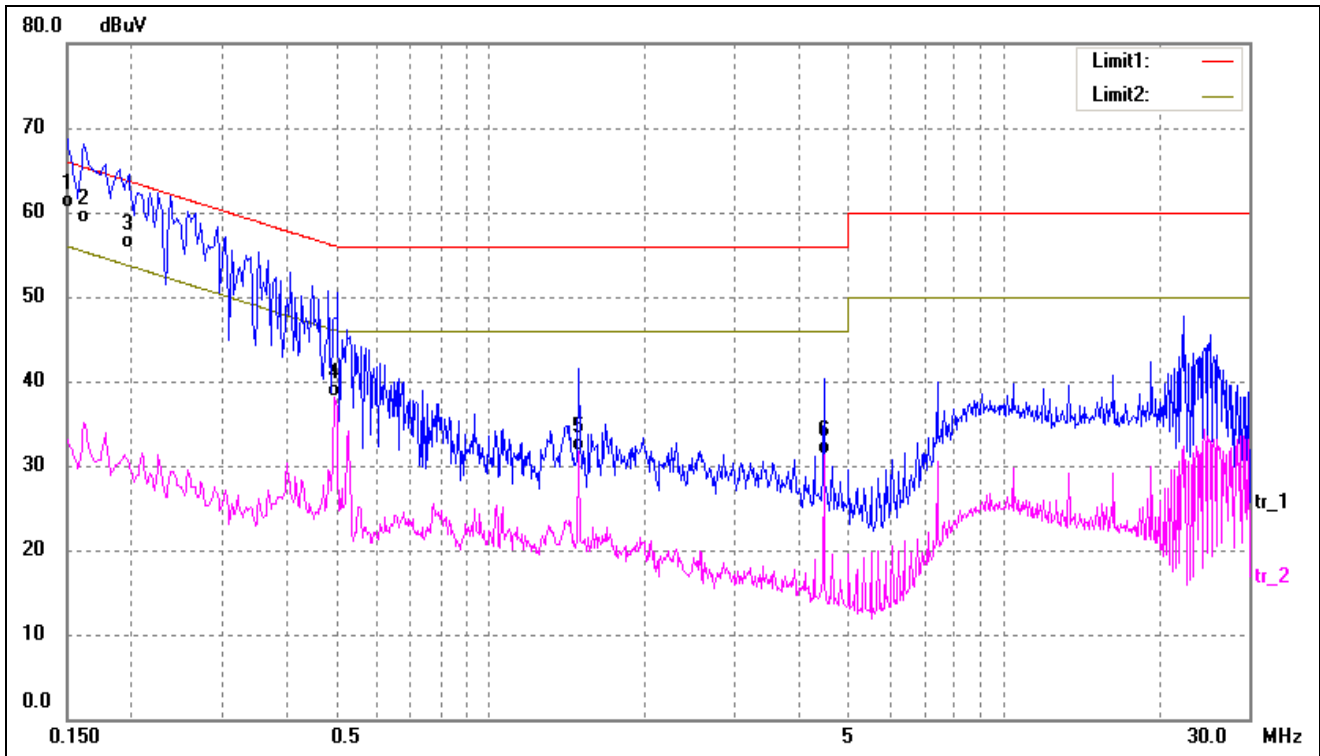
-5.50 dB at 0.1500 MHz in the Neutral, QP detector, 0.15-30MHz

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	0.1620	24.44	10.10	34.54	55.36	-20.82	AVG
2*	0.1660	48.36	10.11	58.47	65.16	-6.69	QP
3	0.1860	46.56	10.11	56.67	64.21	-7.54	QP
4	0.2260	43.61	10.14	53.75	62.60	-8.85	QP
5	0.5020	26.87	10.29	37.16	46.00	-8.84	AVG
6	1.4860	22.40	10.56	32.96	46.00	-13.04	AVG

Test mode:	TM1	Polarity:	Neutral
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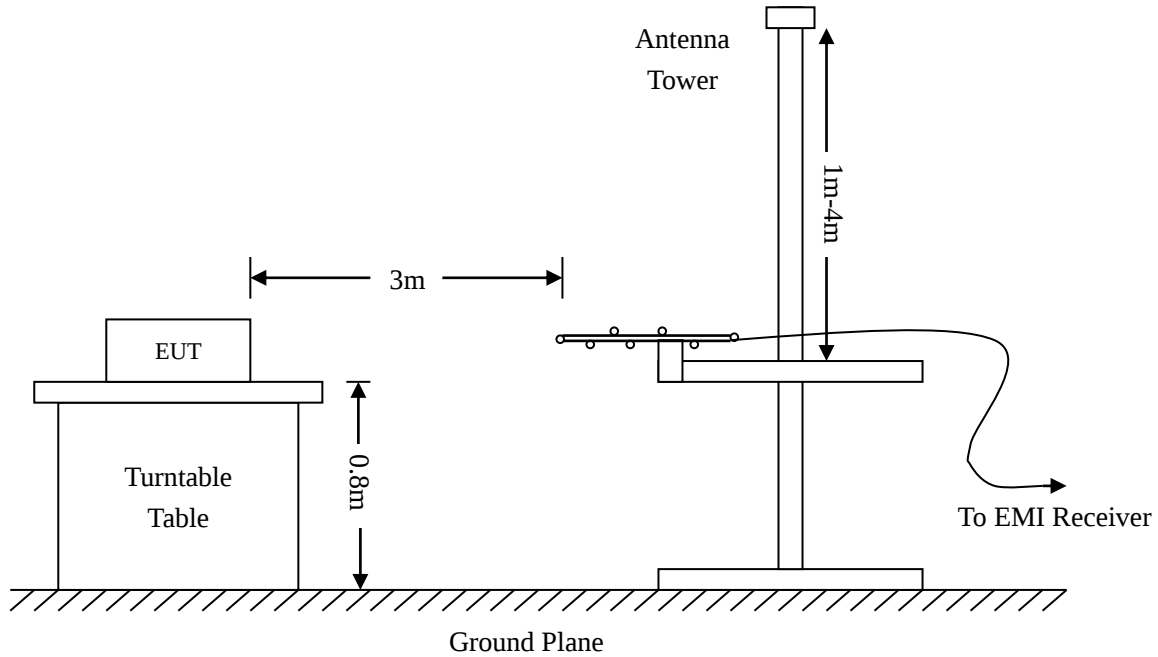
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1500	50.40	10.10	60.50	66.00	-5.50	QP
2	0.1620	48.55	10.10	58.65	65.36	-6.71	QP
3	0.1980	45.62	10.12	55.74	63.69	-7.95	QP
4	0.4980	27.78	10.29	38.07	46.03	-7.96	AVG
5	1.4860	21.16	10.56	31.72	46.00	-14.28	AVG
6	4.4660	20.64	10.74	31.38	46.00	-14.62	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.



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

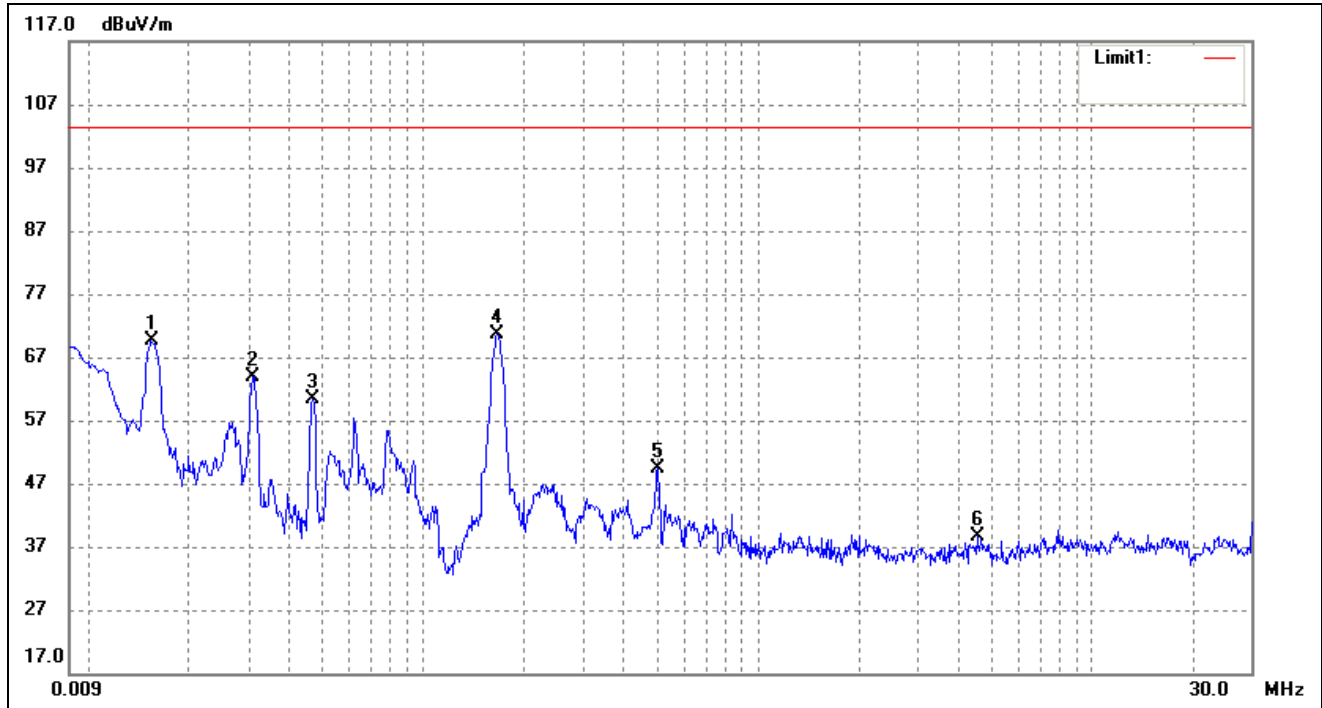
4.5 Summary of Test Results/Plots

According to the data, the EUT complied with the FCC Part 18.305 rule, and had the worst margin of:

-24.10 dB at 93.1132 MHz in the Horizontal polarization, TM1 mode, 9kHz to 1GHz, 3Meters

Plot of Radiated Emissions Test Data (Below 30MHz)

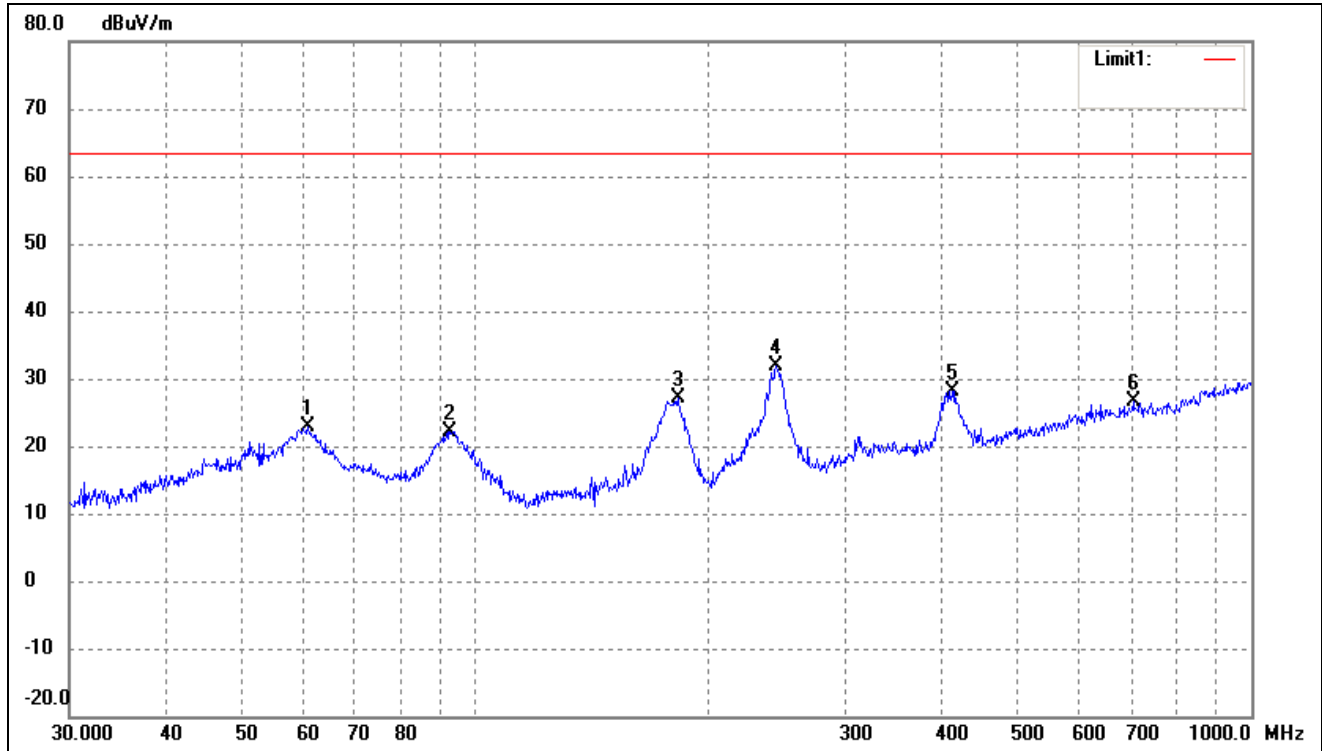
Test mode:	TM1	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	0.0156	76.17	-6.48	69.69	103.5	-33.81	104	100	peak
2	0.0312	71.00	-7.10	63.90	103.5	-39.60	261	100	peak
3	0.0468	67.30	-6.99	60.31	103.5	-43.19	52	100	peak
4	0.1668	76.08	-5.48	70.60	103.5	-32.90	116	100	peak
5	0.5020	58.04	-8.77	49.27	103.5	-54.23	117	100	peak
6	4.5254	49.42	-10.69	38.73	103.5	-64.77	124	100	peak

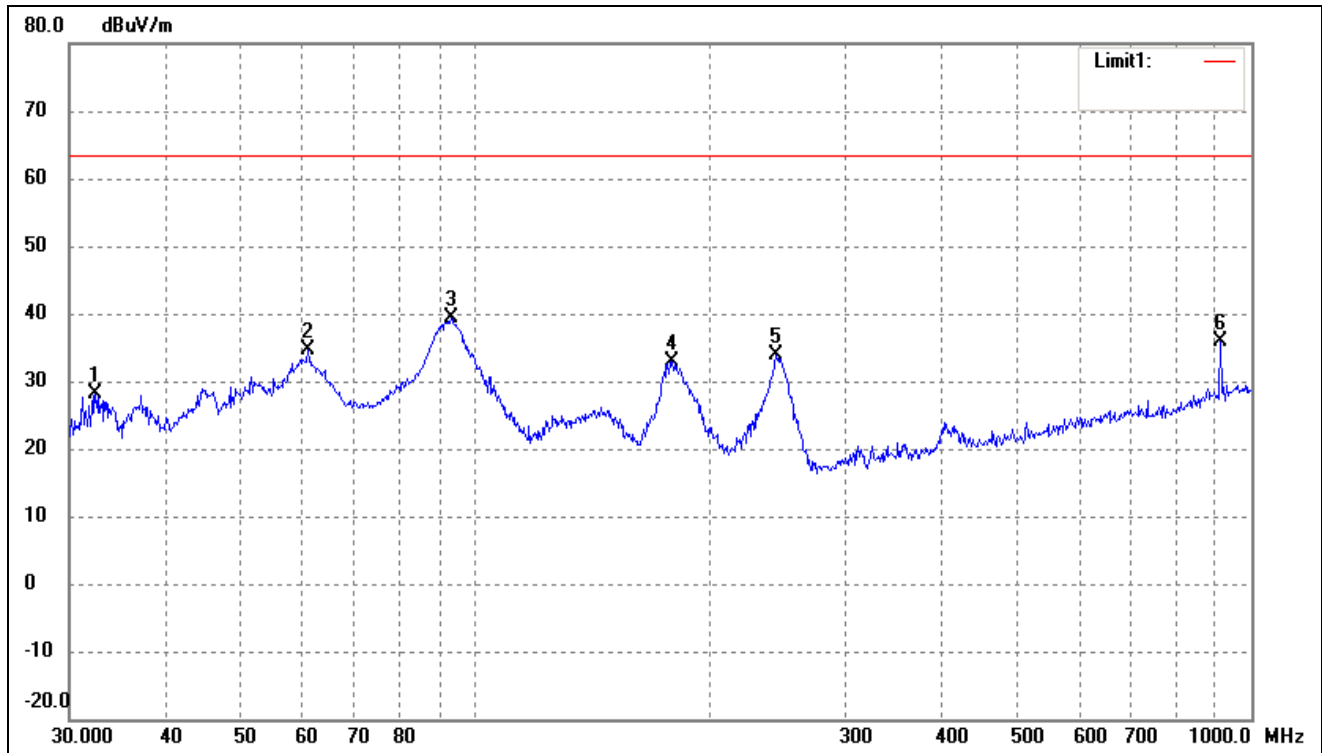
Plot of Radiated Emissions Test Data (30MHz to 1GHz)

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	60.9176	36.34	-13.46	22.88	63.5	-40.62	62	100	peak
2	92.7871	36.11	-13.96	22.15	63.5	-41.35	312	100	peak
3	182.5592	42.24	-15.17	27.07	63.5	-36.43	59	100	peak
4	244.2321	41.92	-10.11	31.81	63.5	-31.69	301	100	peak
5	411.8240	34.65	-6.45	28.20	63.5	-35.30	109	100	peak
6	704.2260	28.48	-1.80	26.68	63.5	-36.82	282	100	peak

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	32.4059	43.01	-14.83	28.18	63.5	-35.32	81	100	peak
2	60.9176	48.14	-13.46	34.68	63.5	-28.82	121	100	peak
3	93.1132	53.42	-14.02	39.40	63.5	-24.10	85	100	peak
4	179.3864	48.39	-15.46	32.93	63.5	-30.57	92	100	peak
5	244.2321	43.88	-10.11	33.77	63.5	-29.73	147	100	peak
6	912.8619	34.59	1.37	35.96	63.5	-27.54	313	100	peak

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