EMC Test Report

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Applicant: Zhongshan city SPAR Optoelectronics Technology Co, Ltd
NO.9 HenKang Street, GuZhen Town 528421 ZhongShan City, GuangDong Province PEOPLE'S REPUBLIC OF CHINA

Product: LED lamps

Model: refer to model list

COMMERCIAL-IN-CONFIDENCE

Report Number: 64.740.23.00926.01

RESPONSIBLE FOR	NAME	SIGNATURE	DATE
Prepared by	Cathy Huang	Cathy Huang	2024-08-27
Approved by	Wendy Ye	Wendy Ye	2024-08-27

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service control rules.

EXECUTIVE SUMMARY This product was tested and found to be in compliance with	EN IEC 55015:2019+A11:2020 EN IEC 61000-3-2:2019+A1:2021 EN 61000-3-3:2013+A1:2019+A2:2021 EN 61547:2009

Contents

1 Report Summary 3

1.1 Report Modification Record 3
1.2 Introduction 3
1.3 Brief Summary of Results 4
1.4 Test Conditions 5
1.5 Product Information and general remarks 6
1.6 Deviations from the Standard 9
1.7 Test Location 9

2 Test Details 10

2.1 Conducted Disturbance (9kHz-30MHz) 10
2.2 Radiated Disturbance (9KHz to 30MHz) 30
2.3 Radiated Disturbance (30MHz to 1000MHz) 56
2.4 Harmonic current emission 74
2.5 Flicker 110
2.6 Electrostatic discharge immunity test 112
2.7 Radiated, radio-frequency, electromagnetic field immunity test 116
2.8 Electrical fast transient /burst immunity test 118
2.9 Immunity to conducted disturbances, induced by radio-frequency fields 121
2.10 Surge immunity test 124
2.11 Voltage dips, short interruptions and voltage variations immunity tests 127

3 Test Equipment Information 130

4 Measurement Uncertainty 133

5 Photographs 134

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2024-08-27

1.2 Introduction

Any use for advertising purposes must be granted in writing. This technical report may only be quoted in full. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production. For further details please see testing and certification regulation, chapter A-3.4.
The information contained in this report is intended to show verification of the EMC Qualification Approval Testing of the requirements of the standards for the tests listed in Section 1.3.

Applicant	:	Zhongshan city SPAR Optoelectronics Technology Co, Ltd
Address	:	NO.9 HenKang Street, GuZhen Town 528421 ZhongShan City, GuangDong Province PEOPLE'S REPUBLIC OF CHINA
Manufacturer	:	Same as applicant
Address	:	Same as applicant
Model Number(s)	:	Refer to model list
Product Type	:	LED lamps
Trademark	:	SPAR
Date of Receipt of EUT	:	2023-3-1
Start of Test	:	2023-3-2
Finish of Test	:	2023-11-20
Name of Engineer(s)	:	Cathy Huang

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with EN IEC 55015, EN IEC 61000-3-2, EN 61000-3-3 and EN 61547 is shown below.

Specification	Clause	Test Description	Result	Comments/Base Standard
EN IEC 55015:2019/A11:2020	4.3.1	Conducted Disturbance at the electric power supply interface	Pass	---
EN IEC 55015:2019/A11:2020	4.3.2	Conducted Disturbance at wired network interfaces other than power supply	N/A	---
EN IEC 55015:2019/A11:2020	4.4	Conducted Disturbance at local wired ports	N/A	---
EN IEC 55015:2019/A11:2020	4.5.2	Radiated Disturbance (9kHz to 30MHz)	Pass	---
EN IEC 55015:2019/A11:2020	4.5.3	Radiated Disturbance (30MHz to 1GHz)	Pass	---
EN IEC 61000-3-2:2019/A1:2021	7	Harmonic Current Emissions*	Pass	---
EN 61000-3-3:2013/A2:2021	5	Flicker**	Pass	---
EN 61547:2009	5.2	Electrostatic discharge immunity test	Pass	IEC 61000-4-2
EN 61547:2009	5.3	Radiated, radio-frequency, electromagnetic field immunity test	Pass	IEC 61000-4-3
EN 61547:2009	5.4	Power frequency magnetic field immunity test***	N/A	IEC 61000-4-8
EN 61547:2009	5.5	Electrical fast transient /burst immunity test	Pass	IEC 61000-4-4
EN 61547:2009	5.6	Immunity to conducted disturbances, induced by radio-frequency fields	Pass	IEC 61000-4-6
EN 61547:2009	5.7	Surge immunity test	Pass	IEC 61000-4-5
EN 61547:2009	5.8	Voltage dips, short interruptions and voltage variations immunity test	Pass	IEC 61000-4-11

Remark:
"*": no limit for product with power <5W as per EN IEC 61000-3-2:2019/A1:2021.
"**": Incandescent lamp luminaires with ratings less than or equal to 1000W and discharge and LED lamp luminaires with ratings less than 600W, are deemed to comply the d_{max} limits in this standard and are not required to be tested.
"***": This item need only to be applied to equipment containing components susceptible to magnetic fields, such as Hall

1.4 Test Conditions

1.4.1 Environmental Conditions

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:		
Temperature	**Humidity**	**Atmospheric pressure**
15 °C -30 °C	30 % - 75% 30 % - 60 %(for ESD only)	860 hPa – 1060 hPa
If explicitly required in the basic standard or applied product standard the climatic values are recorded and documented separately in this test report.		

1.4.2 Performance Criteria

Performance criterion A: During the test, no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Performance criterion B: During the test, the luminous intensity may change to any value. After the test, the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test, the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Performance criterion C: During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the mains supply and/or operating the regulating control.

Additional requirement for lighting equipment incorporating a starting device: After the test, the lighting equipment is switched off. After half an hour, it is switched on again. The lighting equipment shall start and operate as intended.

1.5 Product Information and general remarks

1.5.1 Technical Description

Ratings : 220-240V AC, 50/60Hz

Protection class : II

1.5.2 Test Configuration

Configuration	Description
AC Powered	230V AC, 50/60Hz

1.5.3 Modes of Operation

Mode	Description
TM1	Light on (for other test models)
TM2	The worst-case test mode light on (for test models: SPARAC-R7S-10W-TG2-6, SPARAC-R7S-19W-TG1-6), detail see test data remark.
TM3	Max light on (for harmonic current test)
Remark: N/A	

1.5.4 General remark:

The product are R7S LED lamps, there have different PCB layouts:

1.Self-ballasted LED lamps for general lighting use.

2.The models with the same letter code for PCB layout in model list have the same circuit diagram and PCB layout. The models with the letter code A1 and A2 for PCB layout have similar circuit diagram and different PCB layout.

3. PCB layouts: G, H use the same circuit diagram, different in PCB layout, LED module number and output rated power. This series models can use the dimming controller in the AC power input port to dim the lamps, but the dimming controller should be provided by end-user.

4.The suffix “-3”, “-4” or “-6” in model name stands for LED color temperare (CCT), “-3” means 3000K, “-4” means 4000K, “-6” means 6500K.

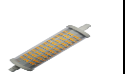
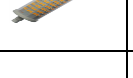
5. For the models with same PCB layout and same rated power, they are same except model name. For the evaluation, the table 1 models were performed EMC full tests.

Table 1:

model	PCB	Power	EMC tests
SPARAC-R7S-7W-002-6	A2	7W	Full tests
SPARAC-R7S-8.5W-001-6	C	8.5W	
SPARAC-R7S-10W-002-6	B	10W	
SPARAC-R7S-12W-001-6	D	12W	
SPARAC-R7S-12W-002-6	E	12W	
SPARAC-R7S-19W-001-6	F	19W	
SPARAC-R7S-10W-TG2-6	G	12W 10W	
SPARAC-R7S-19W-TG1-6	H	19W	

Model list

Item	Photo	Model	Rated power	LED	CCT	Size	PCB layout	Dimming	Mass
1		SPARAC-R7S-4W-C01-3 SPARAC-R7S-4W-C01-4 SPARAC-R7S-4W-C01-6	4W	2835 32PCS	3000K 4000K 6500K	D16* H78mm	A1	No	21g
2		SPARAC-R7S-4.8W-001-3 SPARAC-R7S-4.8W-001-4 SPARAC-R7S-4.8W-001-6	4.8W	2835 32PCS	3000K 4000K 6500K	D16* H78mm	A1	No	
3		SPARAC-R7S-4.8W-002-3 SPARAC-R7S-4.8W-002-4 SPARAC-R7S-4.8W-002-6	4.8W	2835 32PCS	3000K 4000K 6500K	D16* H78mm	A1	No	
4		SPARAC-R7S-4.9W-001-3 SPARAC-R7S-4.9W-001-4 SPARAC-R7S-4.9W-001-6	4.9W	2835 48PCS	3000K 4000K 6500K	D16* H78mm	A2	No	22g
5		SPARAC-R7S-4.9W-002-3 SPARAC-R7S-4.9W-002-4 SPARAC-R7S-4.9W-002-6	4.9W	2835 48PCS	3000K 4000K 6500K	D16* H78mm	A2	No	
6		SPARAC-R7S-7W-001-3 SPARAC-R7S-7W-001-4 SPARAC-R7S-7W-001-6	7W	2835 48PCS	3000K 4000K 6500K	D16* H78mm	A2	No	
7		SPARAC-R7S-7W-002-3 SPARAC-R7S-7W-002-4 SPARAC-R7S-7W-002-6	7W	2835 48PCS	3000K 4000K 6500K	D16* H78mm	A2	No	
8		SPARAC-R7S-8W-C01-3 SPARAC-R7S-8W-C01-4 SPARAC-R7S-8W-C01-6	8W	2835 96PCS	3000K 4000K 6500K	D16* H118mm	B	No	64g
9		SPARAC-R7S-9W-001-3 SPARAC-R7S-9W-001-4 SPARAC-R7S-9W-001-6	9W	2835 96PCS	3000K 4000K 6500K	D16* H118mm	B	No	

10		SPARAC-R7S-9W-002-3 SPARAC-R7S-9W-002-4 SPARAC-R7S-9W-002-6	9W	2835 96PCS	3000K 4000K 6500K	D16* H118mm	B	No	
11		SPARAC-R7S-10W-001-3 SPARAC-R7S-10W-001-4 SPARAC-R7S-10W-001-6	10W	2835 96PCS	3000K 4000K 6500K	D16* H118mm	B	No	
12		SPARAC-R7S-10W-002-3 SPARAC-R7S-10W-002-4 SPARAC-R7S-10W-002-6	10W	2835 96PCS	3000K 4000K 6500K	D16* H118mm	B	No	
13		SPARAC-R7S-8.5W-001-3 SPARAC-R7S-8.5W-001-4 SPARAC-R7S-8.5W-001-6	8.5W	2835 48PCS	3000K 4000K 6500K	D20* H78mm	C	No	33g
14		SPARAC-R7S-12W-001-3 SPARAC-R7S-12W-001-4 SPARAC-R7S-12W-001-6	12W	2835 96PCS	3000K 4000K 6500K	D20* H118mm	D	No	51g
15		SPARAC-R7S-12W-002-3 SPARAC-R7S-12W-002-4 SPARAC-R7S-12W-002-6	12W	2835 192PC S	3000K 4000K 6500K	D28* H78mm	E	No	37g
16		SPARAC-R7S-16W-001-3 SPARAC-R7S-16W-001-4 SPARAC-R7S-16W-001-6	16W	2835 192PC S	3000K 4000K 6500K	D28* H118mm	F	No	97g
17		SPARAC-R7S-19W-001-3 SPARAC-R7S-19W-001-4 SPARAC-R7S-19W-001-6	19W	2835 192PC S	3000K 4000K 6500K	D28* H118mm	F	No	
18		SPARAC-R7S-7W-TG1-3 SPARAC-R7S-7W-TG1-4 SPARAC-R7S-7W-TG1-6	7W	2835 96PCS	3000K 4000K 6500K	D28* H78mm	G	Yes	64g
19		SPARAC-R7S-9W-TG1-3 SPARAC-R7S-9W-TG1-4 SPARAC-R7S-9W-TG1-6	9W	2835 96PCS	3000K 4000K 6500K	D28* H118mm	H	Yes	83g
20		SPARAC-R7S-10W-TG1-3 SPARAC-R7S-10W-TG1-4 SPARAC-R7S-10W-TG1-6	10W	2835 96PCS	3000K 4000K 6500K	D28* H118mm	H	Yes	
21		SPARAC-R7S-10W-TG2-3 SPARAC-R7S-10W-TG2-4 SPARAC-R7S-10W-TG2-6	10W	2835 96PCS	3000K 4000K 6500K	D28* H78mm	G	Yes	64g
22		SPARAC-R7S-12W-TG1-3 SPARAC-R7S-12W-TG1-4 SPARAC-R7S-12W-TG1-6	12W	2835 96PCS	3000K 4000K 6500K	D28* H78mm	G	Yes	
23		SPARAC-R7S-16W-TG1-3 SPARAC-R7S-16W-TG1-4 SPARAC-R7S-16W-TG1-6	16W	2835 192PC S	3000K 4000K 6500K	D28* H118mm	H	Yes	83g
24		SPARAC-R7S-18W-TG1-3 SPARAC-R7S-18W-TG1-4 SPARAC-R7S-18W-TG1-6	18W	2835 192PC S	3000K 4000K 6500K	D28* H118mm	H	Yes	
25		SPARAC-R7S-19W-TG1-3 SPARAC-R7S-19W-TG1-4 SPARAC-R7S-19W-TG1-6	19W	2835 192PC S	3000K 4000K 6500K	D28* H118mm	H	Yes	

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 Test Location

Test Site:
TUV SUD Certification & Testing (China) Co., Ltd. Guangzhou Branch

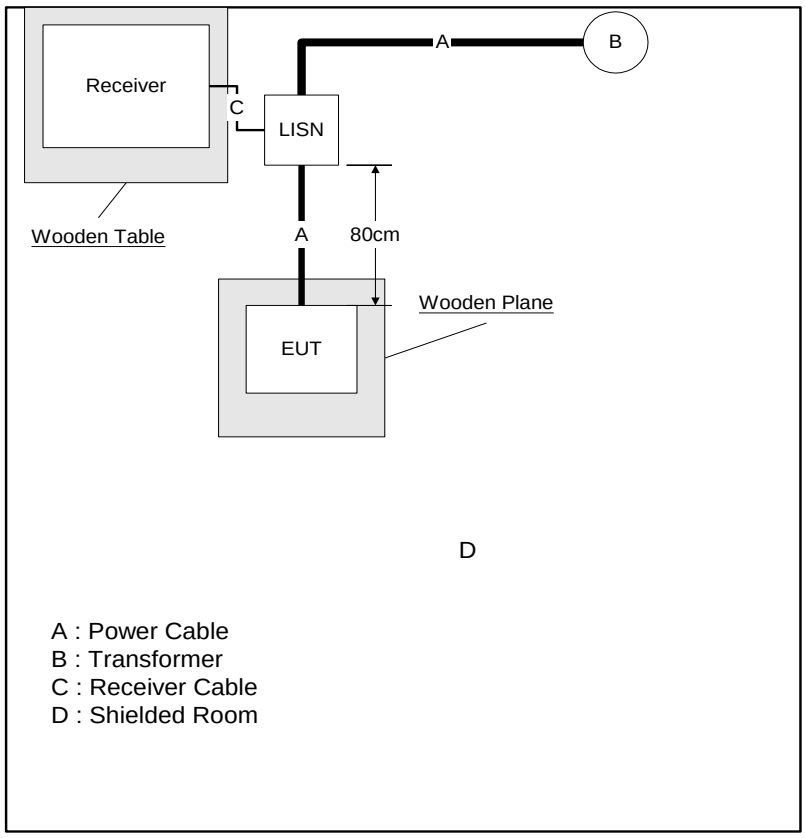
Address:
D1 Buildings, No. 63 Chuangqi Road, Shilou Town, Panyu District, Guangzhou, China

2 Test Details

2.1 Conducted Disturbance (9kHz-30MHz)

2.1.1 Test Method

The EUT was placed on a non-conductive table 0.8m above a reference ground plane.
All power was connected to the EUT through an Artificial Mains Network (AMN). Conducted disturbance voltage measurements on mains lines were made at the output of the AMN.
The AMN was placed 0.8m from the boundary of the EUT and bonded to the reference ground plane.



2.1.2 Specification Limits

Table 1 - Disturbance voltage limits at the electric power supply interface			
Frequency range	Limits dB(µV)[a]		Method
	Quasi-peak	Average	CISPR 16-2-1 and 8.3
9kHz to 50kHz	110	--	
50kHz to 150kHz	90 to 80[b]	--	
150kHz to 0.5MHz	66 to 56[b]	56 to 46[b]	
0.5MHz to 5.0MHz	56[c]	46[c]	
5.0MHz to 30MHz	60	50	

[a] At the transition frequency, the lower limit applies.
[b] The limit decreases linearly with the logarithm of the frequency in the ranges 50 kHz to 150 kHz and 150 kHz to 0,5 MHz.
[c] For lighting equipment incorporating exclusively electrodeless lamps, the limit in the frequency range of 2,2 MHz to 3,0 MHz is 73 dB(µV) quasi-peak and 63 dB(µV) average.

Table 2 - Disturbance voltage limits at wired network interfaces other than power supply			
Frequency range	Limits dB(µV)		Method
	Quasi-peak	Average	CISPR 16-2-1 and 8.4
150kHz to 500kHz	84 to 74	74 to 64	
500kHz to 30MHz	74	64	

NOTE 1 The limits decrease linearly with the logarithm of the frequency in the range 0,15 MHz to 0,5 MHz.

NOTE 2 The voltage disturbance limits are derived for use with an artificial asymmetrical network (AAN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the measured interface.

Table 3 - Disturbance current limits at wired network interfaces other than power supply			
Frequency range	Limits dB(µA)		Method
	Quasi-peak	Average	CISPR 16-2-1 and 8.4
150kHz to 500kHz	40 to 30	30 to 20	
500kHz to 30MHz	30	30	

NOTE 1 The limits decrease linearly with the logarithm of the frequency in the range 0,15 MHz to 0,5 MHz.
NOTE 2 The current disturbance limits are derived for use of a common mode (asymmetric mode) impedance of 150 Ω, and the conversion factor applied is 20 log(150) = 44 dBΩ

Table 4 - Disturbance voltage limits of local wired ports: electric power supply interface of non-restricted ELV lamps			
Frequency range	Limits dB(µV)[a,c,d]		Method
	Quasi-peak	Average	CISPR 16-2-1 and A.5.1
9kHz to 50kHz	136	--	
50kHz to 150kHz	116 to 106	--	
150kHz to 0.5MHz	92 to 82	82 to 72[b]	
0.5MHz to 5.0MHz	82	72	
5.0MHz to 30MHz	86	76	

[a] At the transition frequency, the lower limit applies.
[b] The limit decreases linearly with the logarithm of the frequency in the ranges 50 kHz to 150 kHz and 150 kHz to 0,5 MHz.
[c] The limits in this table apply if no 26 dB attenuator is applied (see Figure A.3).
[d] Disturbance voltage limits for restricted ELV lamps are given in Table 1 (see 6.4.7).

Table 5 - Disturbance voltage limits at local wired network ports: local wired ports other than electrical power supply interface of ELV lamp			
Frequency range	Limits dB(µV)[a]		Method
	Quasi-peak	Average	CISPR 16-2-1 (voltage probe method) see 8.5.2.2)
150kHz to 500kHz	80	70	
500kHz to 30MHz	74	64	

[a] At the transition frequency, the lower limit applies.

Table 6 - Disturbance current limits at local wired network ports: local wired ports other than electrical power supply interface of ELV lamp			
Frequency range	Limits dB(µA)		Method
	Quasi-peak	Average	CISPR 16-2-1. See 8.5.2.3
150kHz to 500kHz	40 to 30	30 to 20	
500kHz to 30MHz	30	20	

NOTE 1 The limits decrease linearly with the logarithm of the frequency in the range 0,15 MHz to 0,5 MHz.
NOTE 2 The current disturbance limits are derived for use of a common mode (asymmetric mode) impedance of 150 Ω, and the conversion factor applied is 20 log(150) = 44 dBΩ

Remark :
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

2.1.3 Test Setup

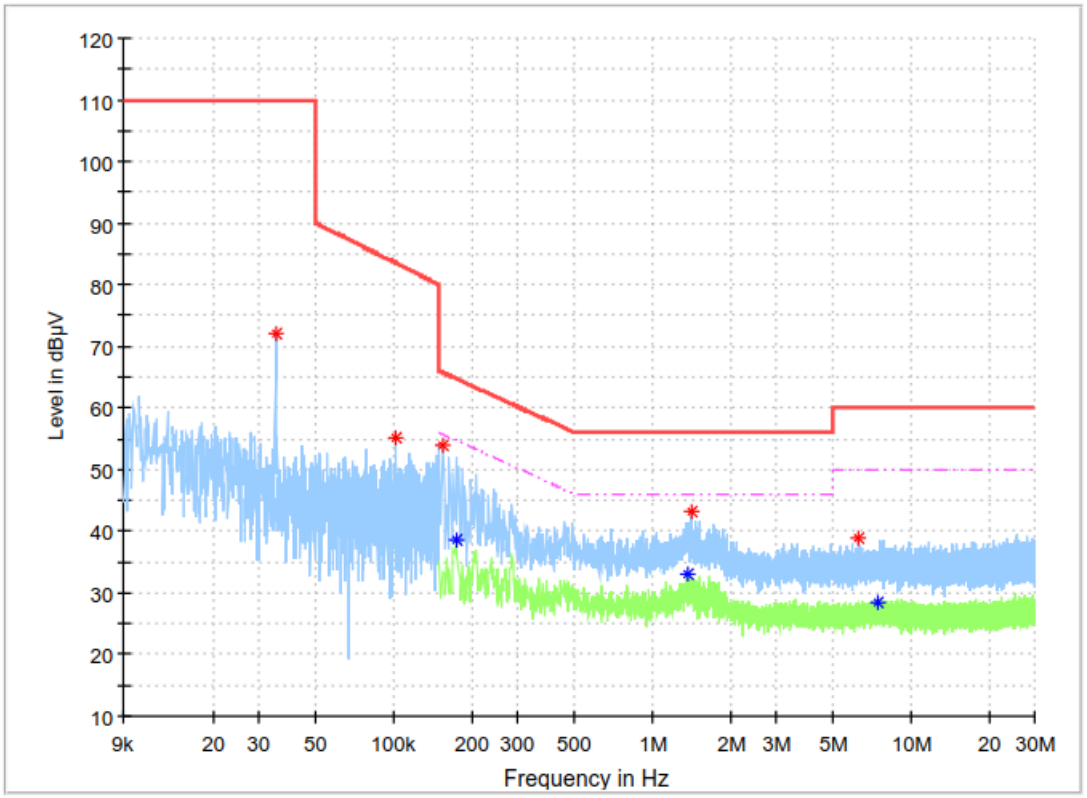


2.1.4 Test Location

This test was carried out in conducted emission shielded room.

2.1.5 Test Results

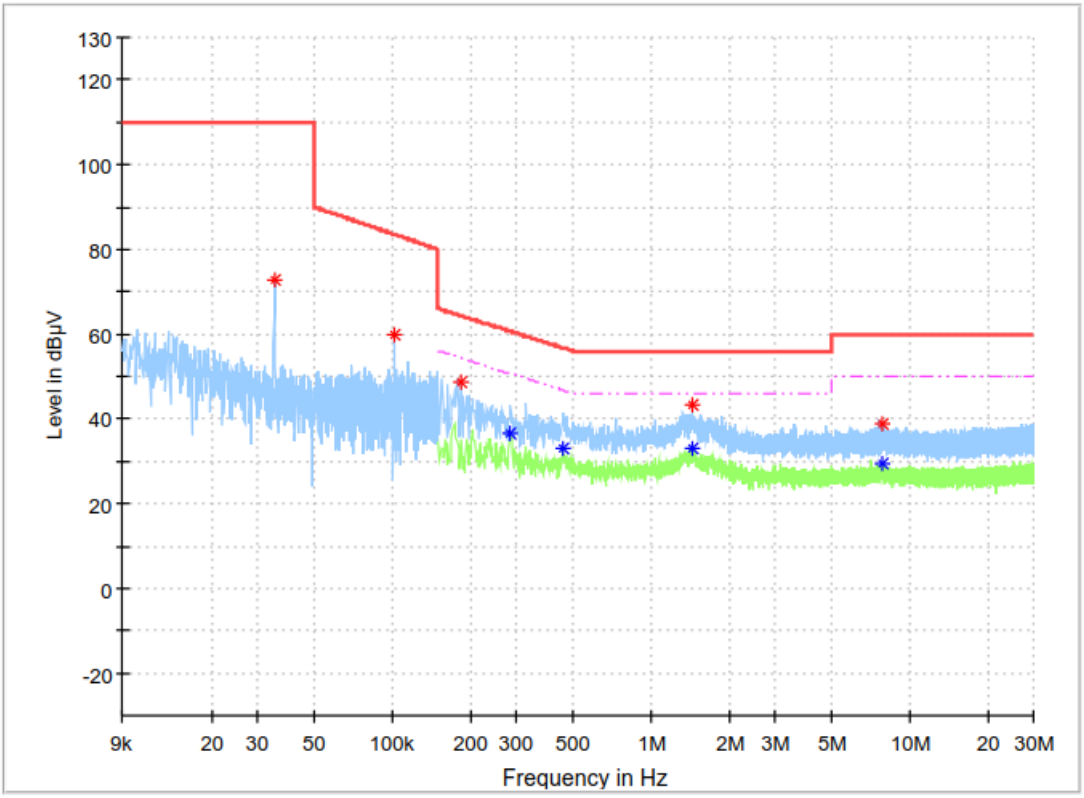
Conducted Emission (9kHz-30MHz)



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Comment
0.034920	72.22	---	110.00	37.78	L1	
0.101480	55.20	---	83.56	28.36	L1	
0.154000	54.03	---	65.78	11.75	L1	
0.174000	---	38.53	54.77	16.24	L1	
1.376000	---	33.13	46.00	12.87	L1	
1.412000	43.07	---	56.00	12.93	L1	
6.294000	38.97	---	60.00	21.03	L1	
7.444000	---	28.32	50.00	21.68	L1	

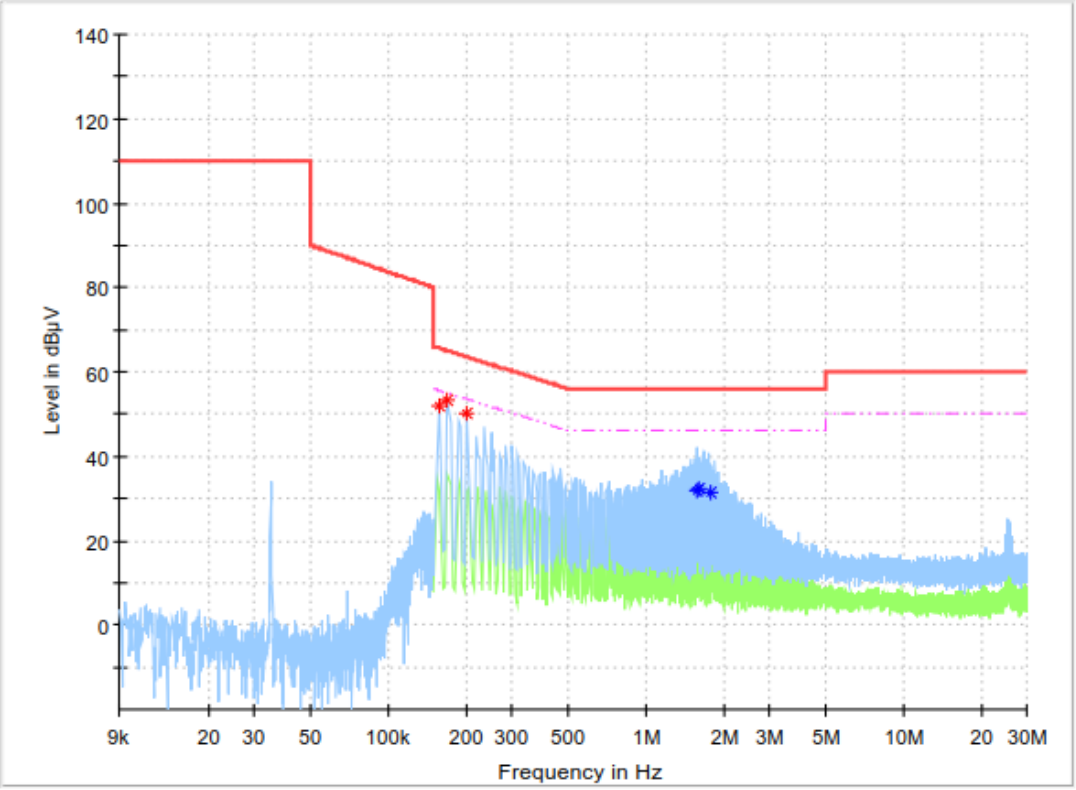
Model : SPARAC-R7S-7W-002-6
Operating Mode : Light on
Test Date : 2023-11-17



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Comment
0.034920	72.60	---	110.00	37.40	N	
0.101560	59.73	---	83.55	23.82	N	
0.184000	48.85	---	64.30	15.45	N	
0.286000	---	36.55	50.64	14.09	N	
0.452000	---	32.83	46.84	14.00	N	
1.448000	---	33.12	46.00	12.88	N	
1.448000	43.30	---	56.00	12.70	N	
7.820000	---	29.26	50.00	20.74	N	
7.842000	38.88	---	60.00	21.12	N	

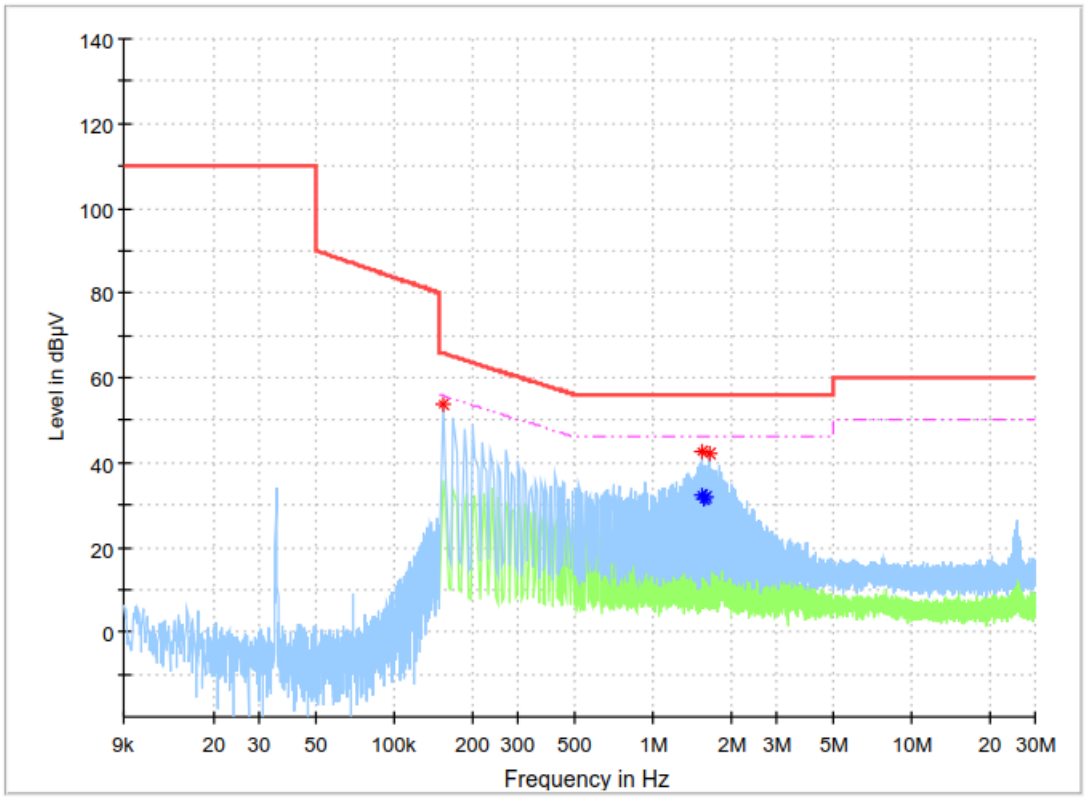
Model : SPARAC-R7S-7W-002-6
Operating Mode : Light on
Test Date : 2023-11-17



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.158000	51.77	---	65.57	13.80	L	20.56	
0.170000	53.26	---	64.96	11.70	L	20.56	
0.202000	50.34	---	63.53	13.19	L	20.35	
1.578000	---	32.04	46.00	13.96	L	20.53	
1.610000	---	32.19	46.00	13.81	L	20.54	
1.790000	---	31.49	46.00	14.51	L	20.54	

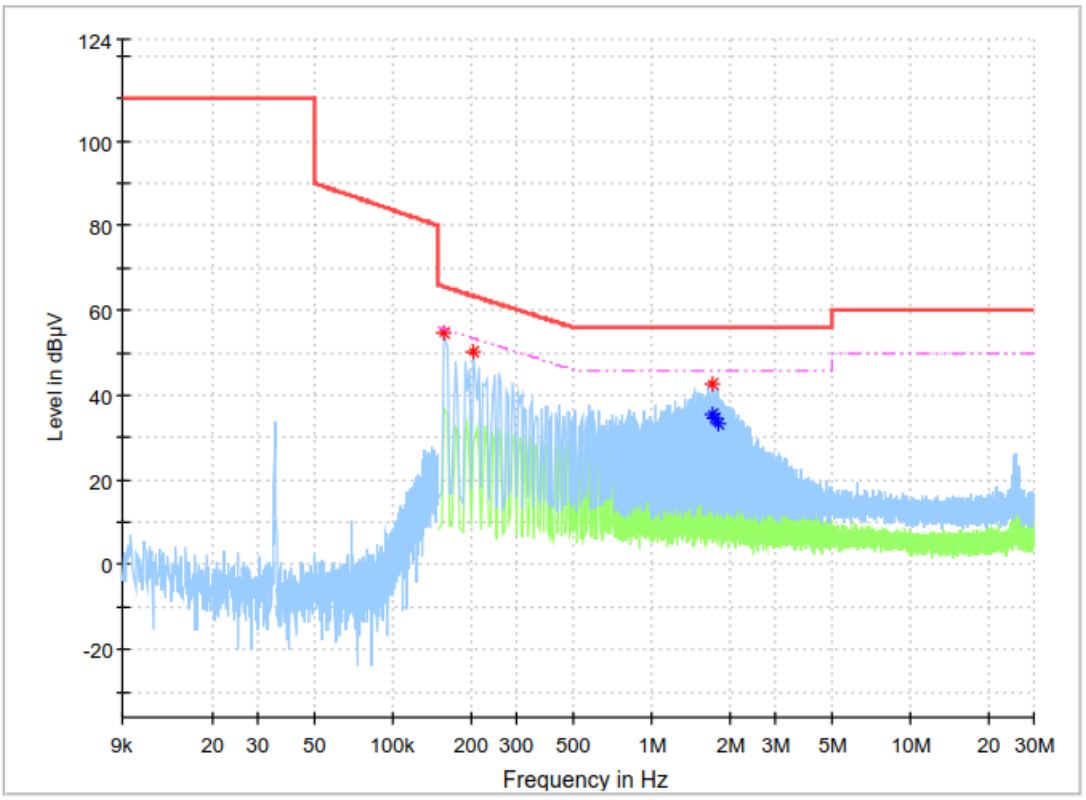
Model : SPARAC-R7S-8.5W-001-6
Operating Mode : Light on
Test Date : 2023-3-2



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.154000	53.54	---	65.78	12.24	N	20.53	
1.550000	---	32.10	46.00	13.90	N	20.53	
1.550000	42.43	---	56.00	13.57	N	20.53	
1.566000	---	31.55	46.00	14.45	N	20.53	
1.598000	---	31.84	46.00	14.16	N	20.54	
1.650000	42.12	---	56.00	13.88	N	20.54	

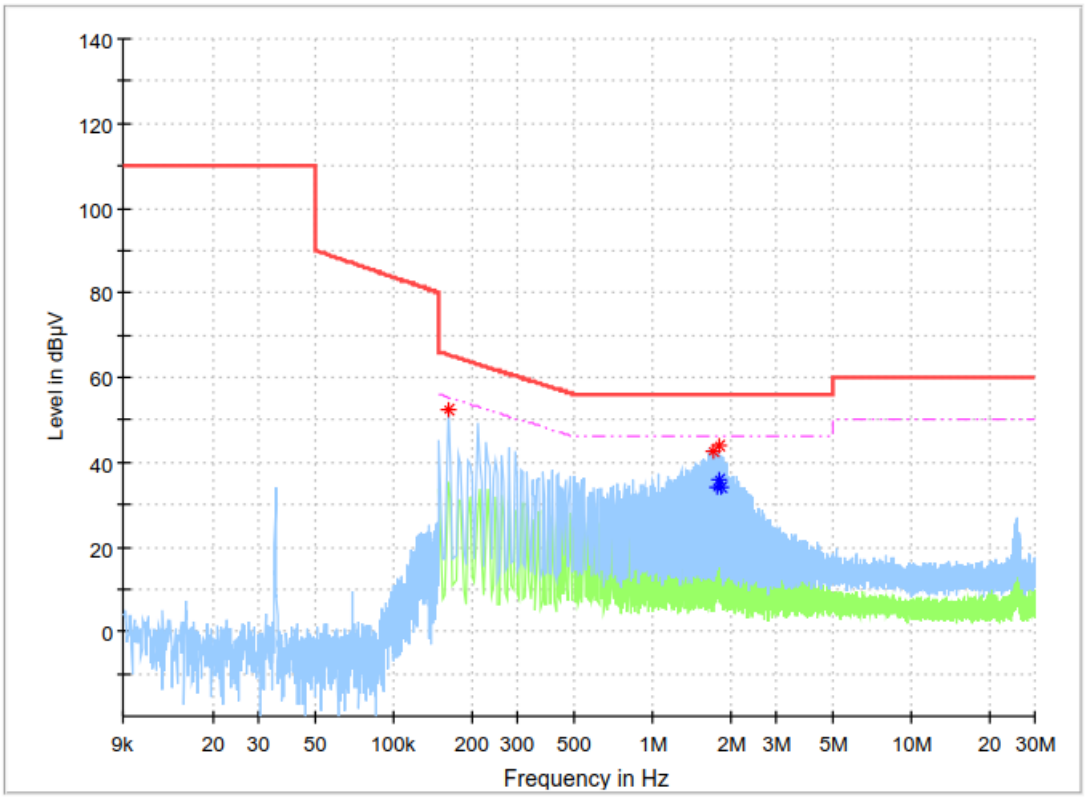
Model : SPARAC-R7S-8.5W-001-6
Operating Mode : Light on
Test Date : 2023-3-2



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.158000	54.63	---	65.57	10.93	L	20.56	
0.206000	50.07	---	63.37	13.30	L	20.36	
1.702000	42.79	---	56.00	13.21	L	20.54	
1.702000	---	35.55	46.00	10.45	L	20.54	
1.734000	---	34.54	46.00	11.46	L	20.54	
1.814000	---	33.48	46.00	12.52	L	20.54	

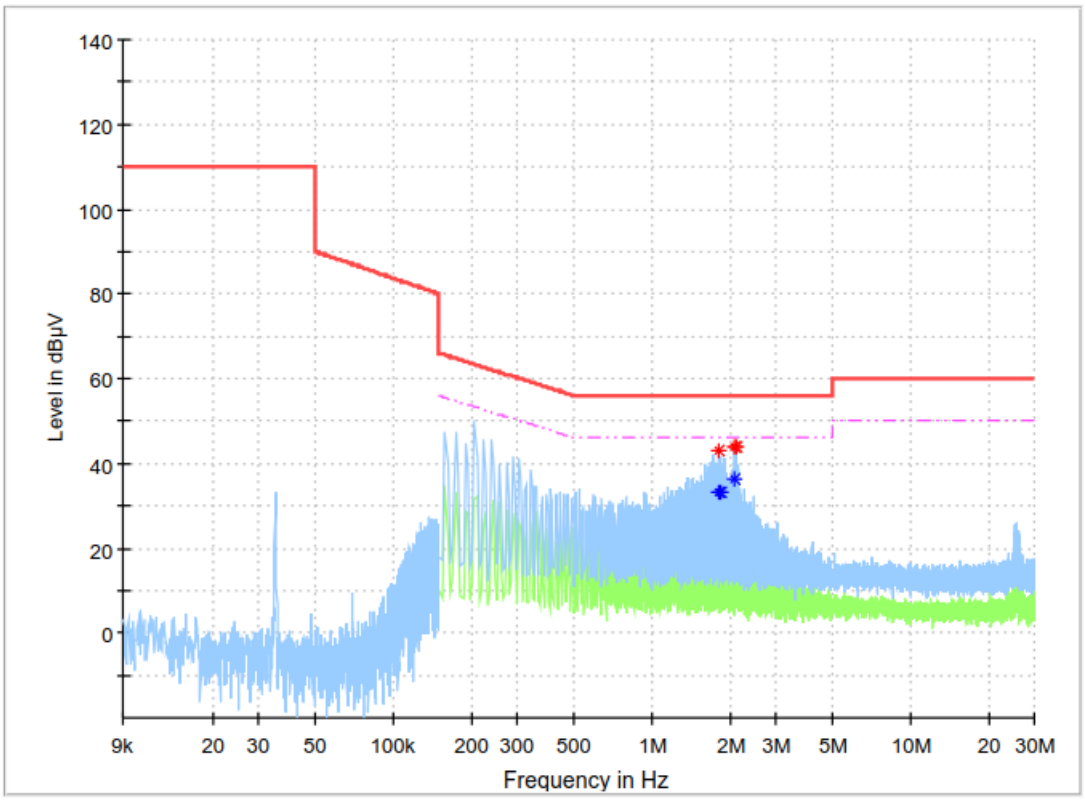
Model : SPARAC-R7S-10W-002-6
Operating Mode : Light on
Test Date : 2023-3-2



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.162000	52.24	---	65.36	13.12	N	20.56	
1.706000	42.50	---	56.00	13.50	N	20.54	
1.786000	---	34.27	46.00	11.73	N	20.54	
1.802000	---	35.92	46.00	10.08	N	20.54	
1.802000	43.82	---	56.00	12.18	N	20.54	
1.850000	---	33.95	46.00	12.05	N	20.55	

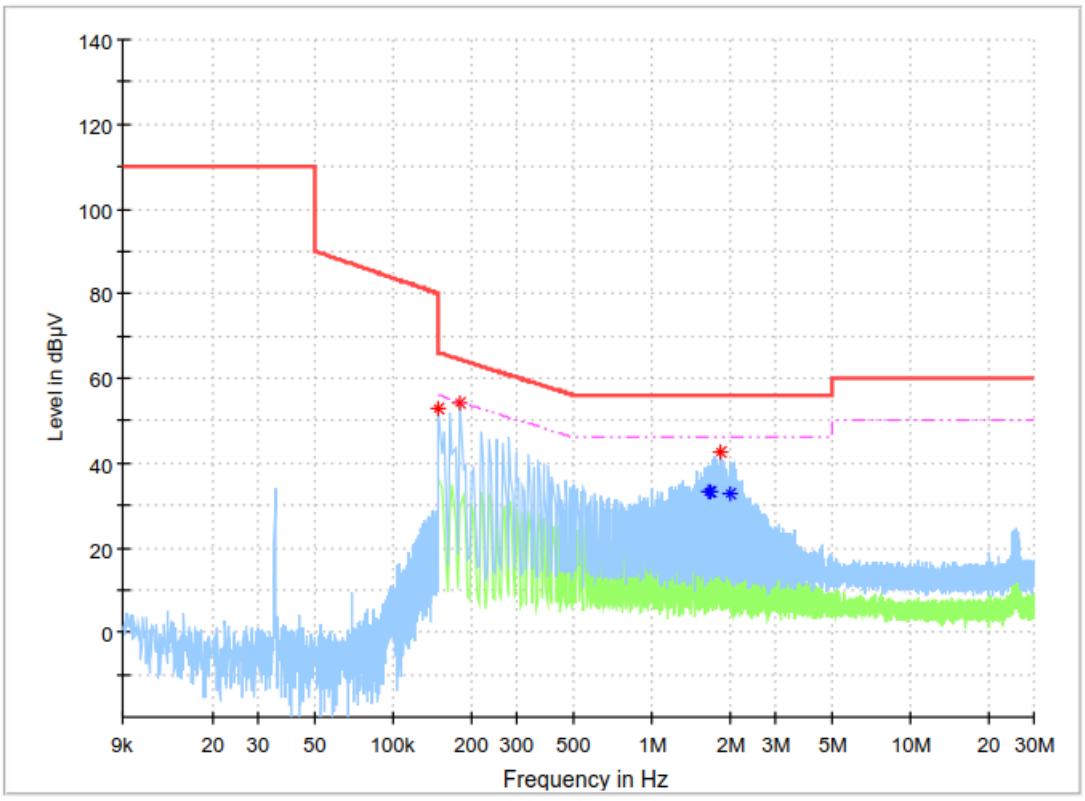
Model : SPARAC-R7S-10W-002-6
Operating Mode : Light on
Test Date : 2023-3-2



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
1.798000	43.11	---	56.00	12.89	L	20.54	
1.798000	---	33.33	46.00	12.67	L	20.54	
1.846000	---	33.29	46.00	12.71	L	20.55	
2.094000	---	36.49	46.00	9.51	L	20.56	
2.094000	44.03	---	56.00	11.97	L	20.56	
2.122000	43.97	---	56.00	12.03	L	20.56	

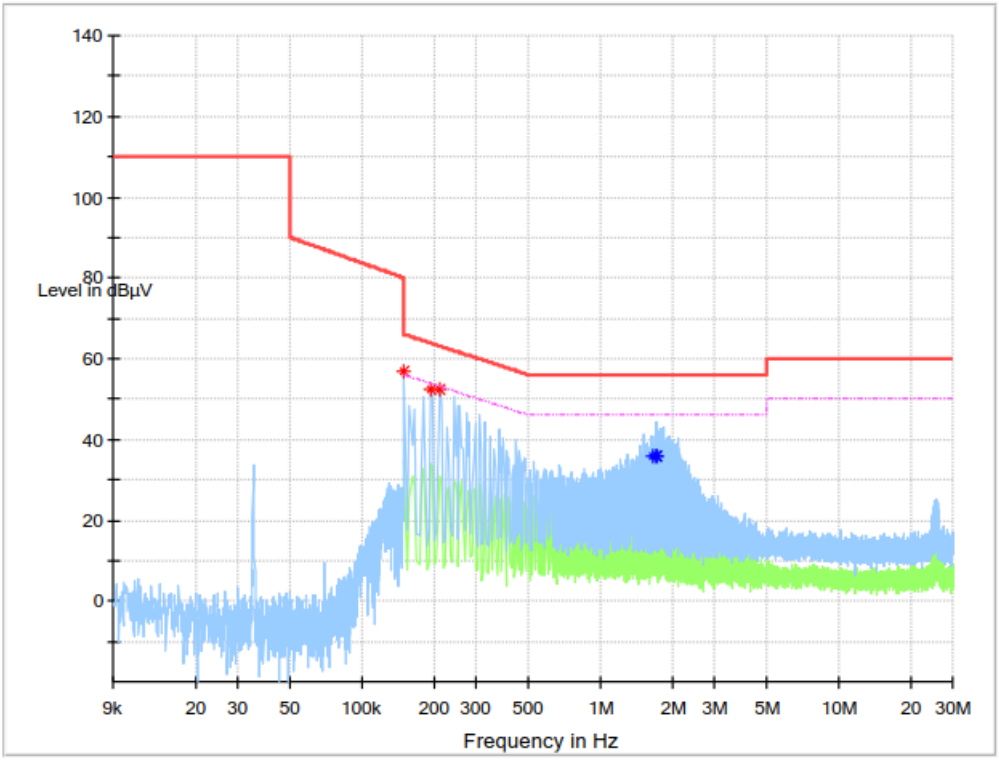
Model : SPARAC-R7S-12W-001-6
Operating Mode : Light on
Test Date : 2023-3-2



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.150000	52.98	---	66.00	13.02	N	20.53	
0.182000	54.12	---	64.39	10.27	N	20.56	
1.662000	---	33.01	46.00	12.99	N	20.54	
1.694000	---	33.00	46.00	13.00	N	20.54	
1.838000	42.77	---	56.00	13.23	N	20.55	
2.002000	---	32.92	46.00	13.08	N	20.56	

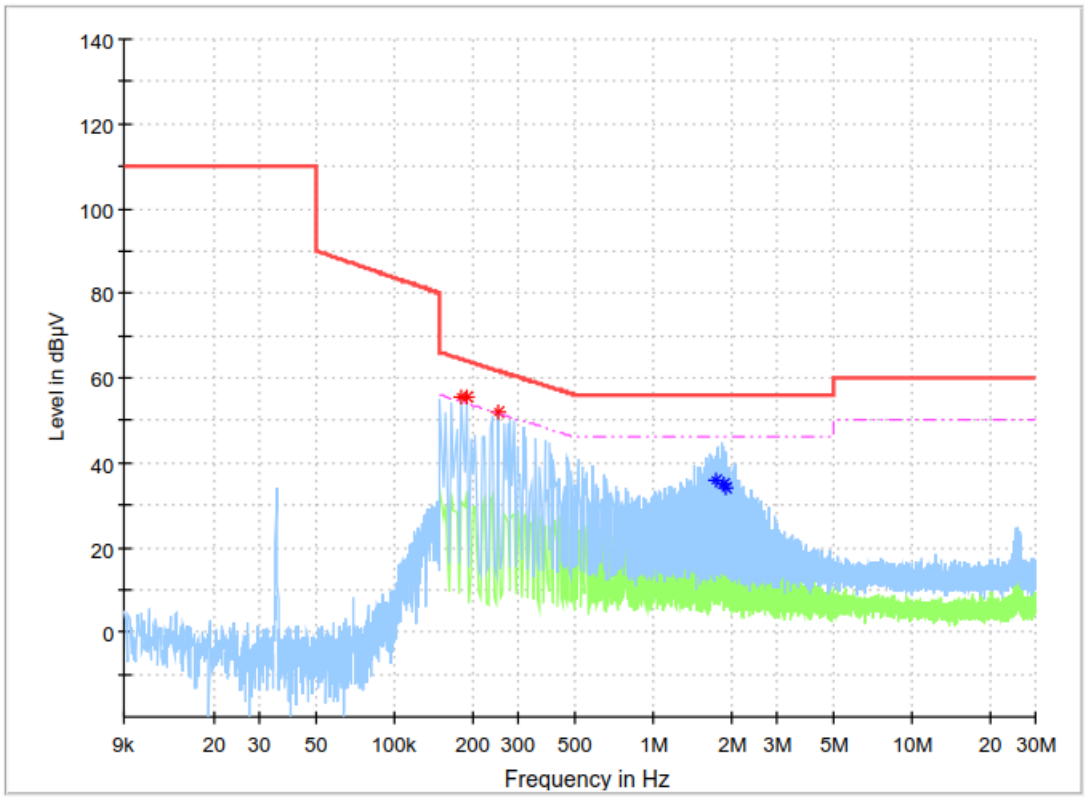
Model : SPARAC-R7S-12W-001-6
Operating Mode : Light on
Test Date : 2023-3-2



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.150000	57.02	---	66.00	8.98	L	20.53	
0.194000	52.60	---	63.86	11.26	L	20.65	
0.210000	52.26	---	63.21	10.95	L	20.37	
1.654000	---	35.73	46.00	10.27	L	20.54	
1.702000	---	35.65	46.00	10.35	L	20.54	
1.718000	---	35.98	46.00	10.02	L	20.54	

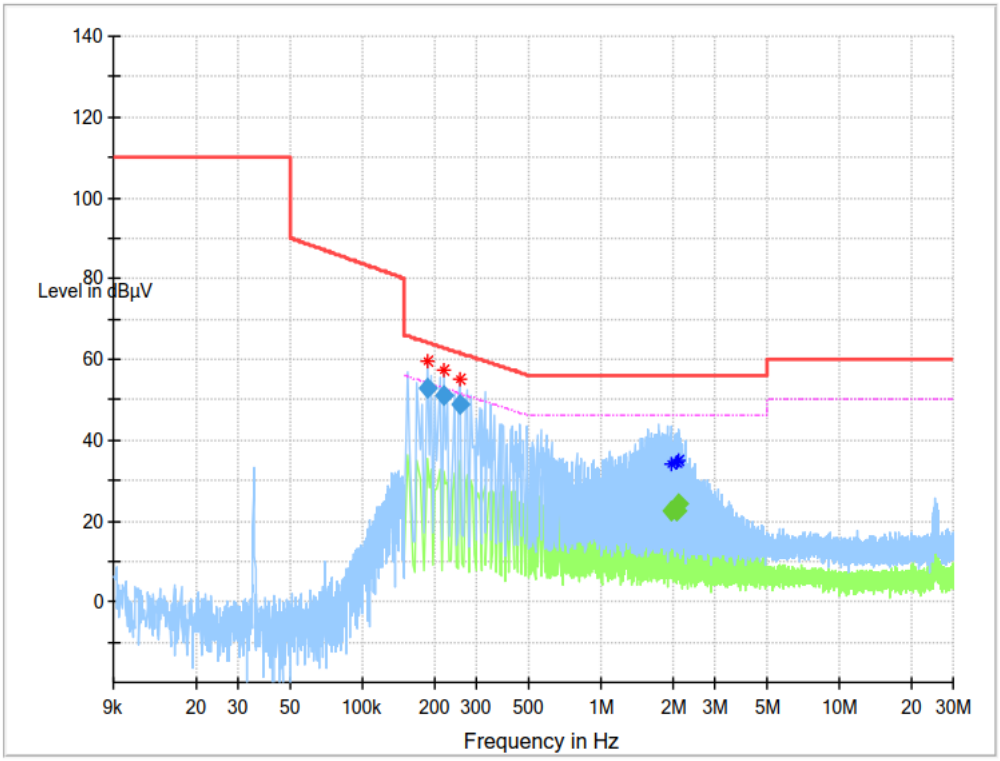
Model : SPARAC-R7S-12W-002-6
Operating Mode : Light on
Test Date : 2023-3-2



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.182000	55.63	---	64.39	8.76	N	20.56	
0.190000	55.49	---	64.04	8.54	N	20.59	
0.250000	51.89	---	61.76	9.86	N	20.39	
1.742000	---	35.78	46.00	10.22	N	20.54	
1.858000	---	34.87	46.00	11.13	N	20.55	
1.906000	---	34.16	46.00	11.84	N	20.55	

Model : SPARAC-R7S-12W-002-6
Operating Mode : Light on
Test Date : 2023-3-2



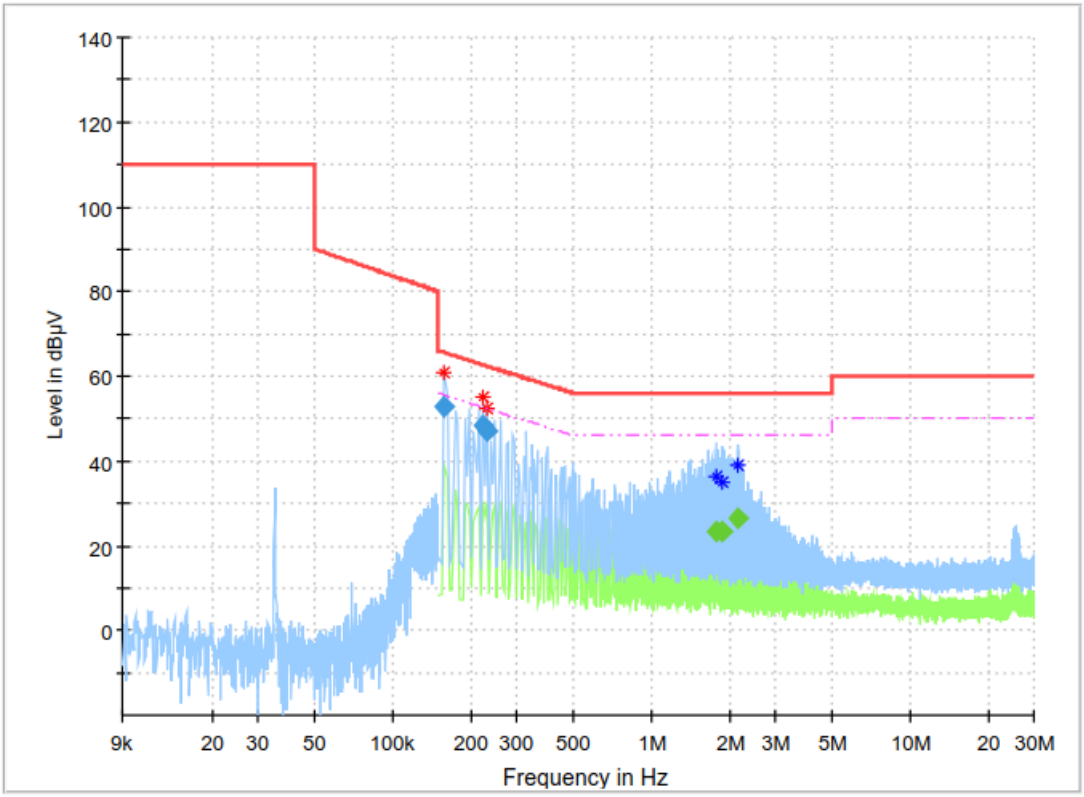
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.186000	59.42	---	64.21	4.79	L	20.57	
0.218000	57.44	---	62.90	5.45	L	20.38	
0.258000	55.11	---	61.50	6.39	L	20.39	
1.958000	---	34.30	46.00	11.70	L	20.55	
2.074000	---	34.36	46.00	11.64	L	20.56	
2.118000	---	34.90	46.00	11.10	L	20.56	

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.186000	52.95	---	64.21	11.26	L	20.57	
0.218000	50.99	---	62.90	11.91	L	20.38	
0.258000	48.88	---	61.50	12.62	L	20.39	
1.958000	---	22.56	46.00	23.44	L	20.55	
2.074000	---	22.54	46.00	23.46	L	20.56	
2.118000	---	24.21	46.00	21.79	L	20.56	

Model : SPARAC-R7S-19W-001-6
Operating Mode : Light on
Test Date : 2023-3-2



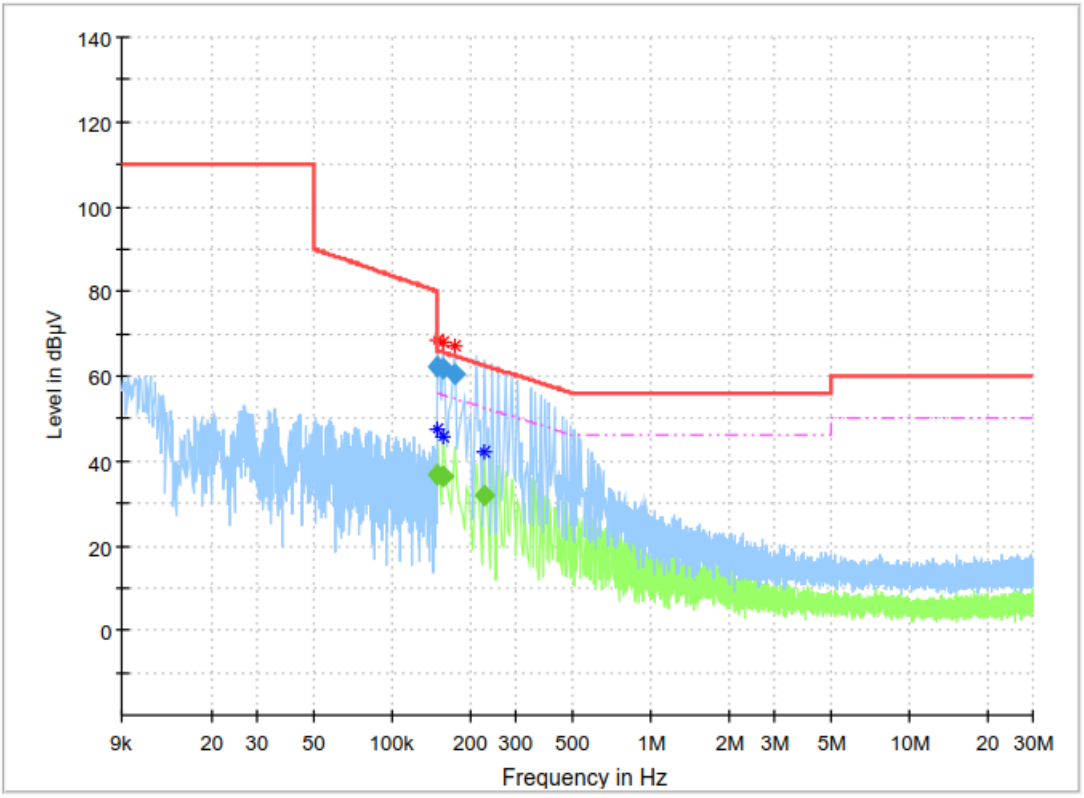
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.158000	60.74	---	65.57	4.83	N	20.56	
0.222000	55.17	---	62.74	7.57	N	20.38	
0.230000	52.49	---	62.45	9.96	N	20.39	
1.766000	---	36.32	46.00	9.68	N	20.54	
1.862000	---	34.76	46.00	11.24	N	20.55	
2.138000	---	38.79	46.00	7.21	N	20.56	

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.158000	52.86	---	65.57	12.71	N	20.56	
0.222000	48.50	---	62.74	14.24	N	20.38	
0.230000	47.08	---	62.45	15.37	N	20.39	
1.766000	---	23.43	46.00	22.57	N	20.54	
1.862000	---	23.45	46.00	22.55	N	20.55	
2.138000	---	26.27	46.00	19.73	N	20.56	

Model : SPARAC-R7S-19W-001-6
Operating Mode : Light on
Test Date : 2023-3-2



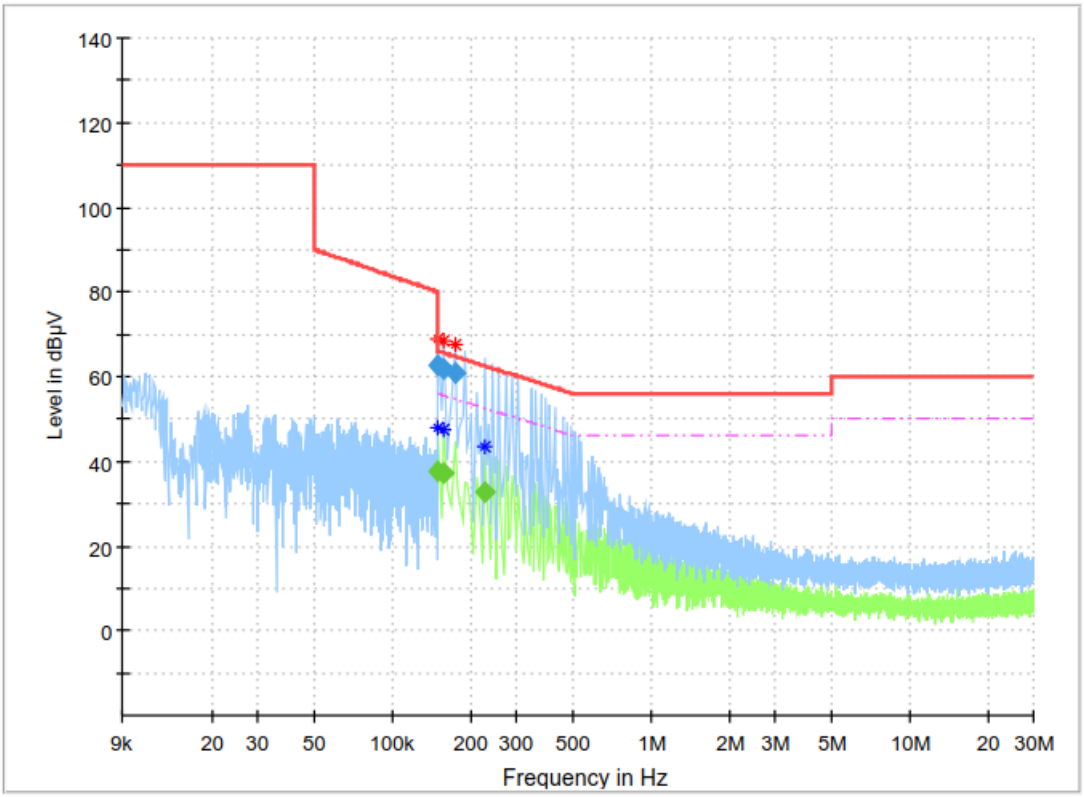
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.150000	68.69	---	66.00	-2.69	L1	20.32	
0.150000	---	47.38	56.00	8.62	L1	20.32	
0.158000	68.19	---	65.57	-2.62	L1	20.34	
0.158000	---	45.63	55.57	9.94	L1	20.34	
0.174000	67.23	---	64.77	-2.46	L1	20.32	
0.226000	---	41.97	52.60	10.62	L1	20.14	

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.150000	---	36.81	56.00	19.19	L1	20.32	
0.150000	62.18	---	66.00	3.82	L1	20.32	
0.158000	---	36.13	55.57	19.44	L1	20.34	
0.158000	61.56	---	65.57	4.00	L1	20.34	
0.174000	60.58	---	64.77	4.19	L1	20.32	
0.226000	---	31.84	52.60	20.76	L1	20.14	

Model : SPARAC-R7S-19W-TG1-6
Operating Mode : Max light on, the worst mode
Test Date : 2023-4-11



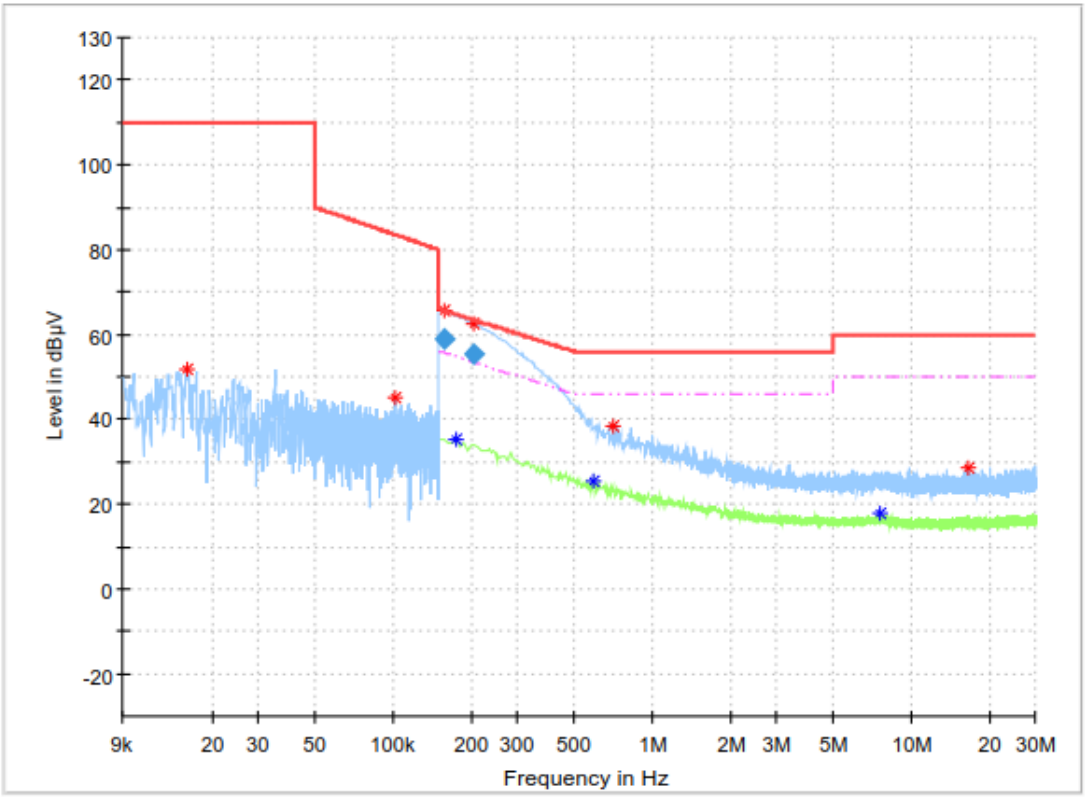
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.150000	---	47.92	56.00	8.08	N	20.34	
0.150000	68.93	---	66.00	-2.93	N	20.34	
0.158000	---	47.27	55.57	8.30	N	20.36	
0.158000	68.66	---	65.57	-3.09	N	20.36	
0.174000	67.43	---	64.77	-2.66	N	20.35	
0.226000	---	43.60	52.60	8.99	N	20.16	

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.150000	62.64	---	66.00	3.36	N	20.34	
0.150000	---	37.63	56.00	18.37	N	20.34	
0.158000	61.96	---	65.57	3.61	N	20.36	
0.158000	---	37.02	55.57	18.55	N	20.36	
0.174000	60.97	---	64.77	3.80	N	20.35	
0.226000	---	32.55	52.60	20.04	N	20.16	

Model : SPARAC-R7S-19W-TG1-6
Operating Mode : Max light on, the worst mode
Test Date : 2023-4-11



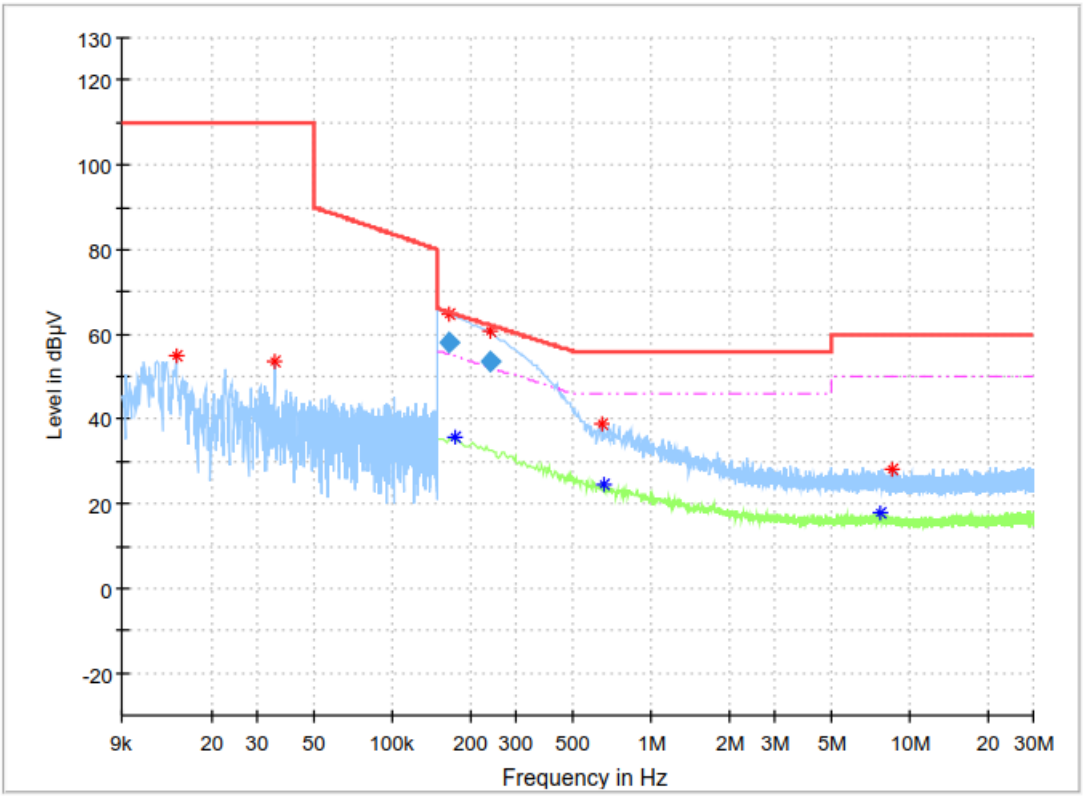
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.016120	51.83	---	110.00	58.17	L1	30.27	
0.101400	45.20	---	83.56	38.36	L1	30.07	
0.158000	65.62	---	65.57	-0.06	L1	30.07	
0.174000	---	35.33	54.77	19.43	L1	30.07	
0.206000	62.54	---	63.37	0.83	L1	30.06	
0.590000	---	25.22	46.00	20.78	L1	30.05	
0.702000	38.25	---	56.00	17.75	L1	30.05	
7.534000	---	17.69	50.00	32.31	L1	30.51	
16.498000	28.33	---	60.00	31.67	L1	30.82	

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.158000	58.77	---	65.57	6.79	L1	30.07	
0.206000	55.51	---	63.37	7.86	L1	30.06	

Model : SPARAC-R7S-10W-TG2-6
Operating Mode : Max light on, the worst mode
Test Date : 2023-11-29



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.014600	54.70	---	110.00	55.30	N	30.85	
0.034920	53.51	---	110.00	56.49	N	30.35	
0.166000	64.95	---	65.16	0.21	N	30.11	
0.174000	---	35.61	54.77	19.16	N	30.11	
0.238000	60.52	---	62.17	1.64	N	30.10	
0.650000	38.63	---	56.00	17.37	N	30.09	
0.658000	---	24.46	46.00	21.54	N	30.09	
7.762000	---	17.67	50.00	32.33	N	30.60	
8.586000	28.16	---	60.00	31.84	N	30.67	

Final Result

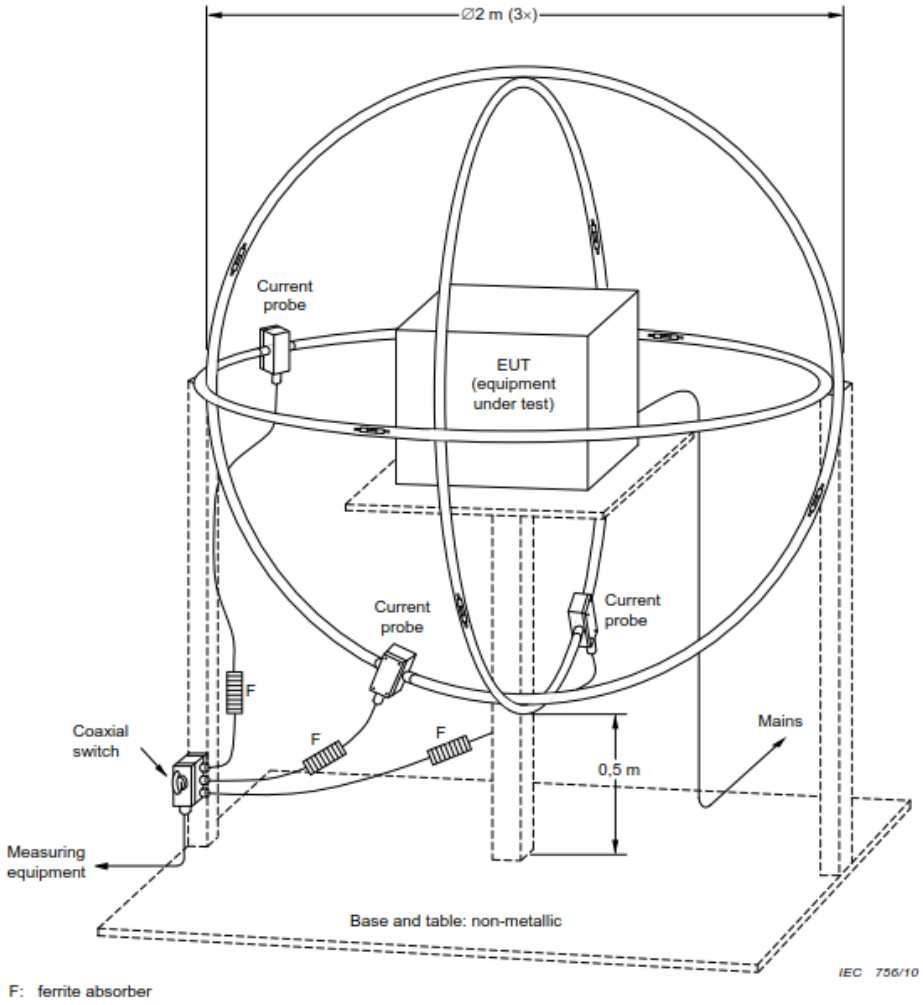
Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	Comment
0.166000	58.01	---	65.16	7.15	N	30.11	
0.238000	53.42	---	62.17	8.74	N	30.10	

Model : SPARAC-R7S-10W-TG2-6
Operating Mode : Max light on, the worst mode
Test Date : 2023-11-29

2.2 Radiated Disturbance (9KHz to 30MHz)

2.2.1 Test Method

The magnetic component shall be measured by means of a loop antenna. The lighting equipment shall be placed in the center of the antenna.
The induced current in the loop antenna is measured by means of a current probe and the CISPR measuring receiver. By means of a coaxial switch, the three field directions can be measured in sequence.



F: ferrite absorber

2.2.2 Specification Limits

Radiated disturbance limits in the frequency range 9kHz to 30MHz			
Frequency range	Limits 33dB(µA) for loop diameter		
	2 m	3 m	4 m
9kHz to 70kHz	88	81	75
70kHz to 150kHz	88 to 58	81 to 51	75 to 45
150kHz to 3.0MHz	58 to 22	51 to 15	45 to 9
3.0MHz to 30MHz	22	15 to 16	9 to 12

Remark :
Level=Reading Level + Correction Factor
Correction Factor=Loop Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)

2.2.3 Test Setup

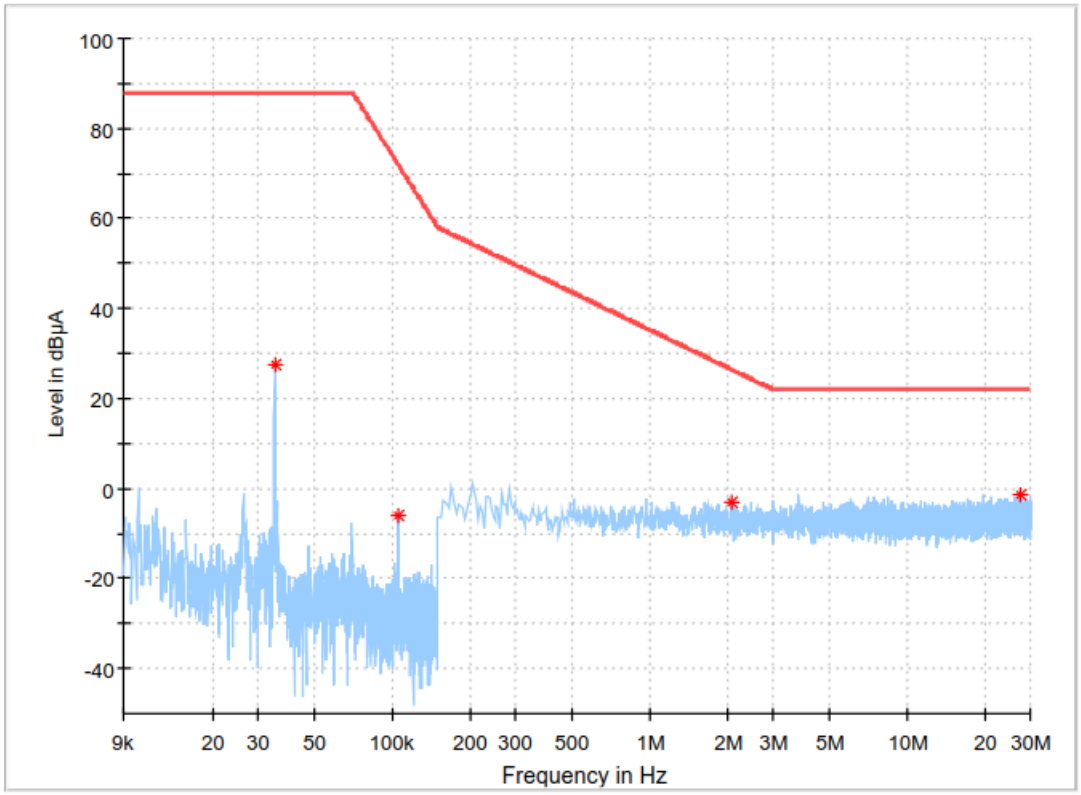


2.2.4 Test Location

This test was carried out in conducted emission shielded room.

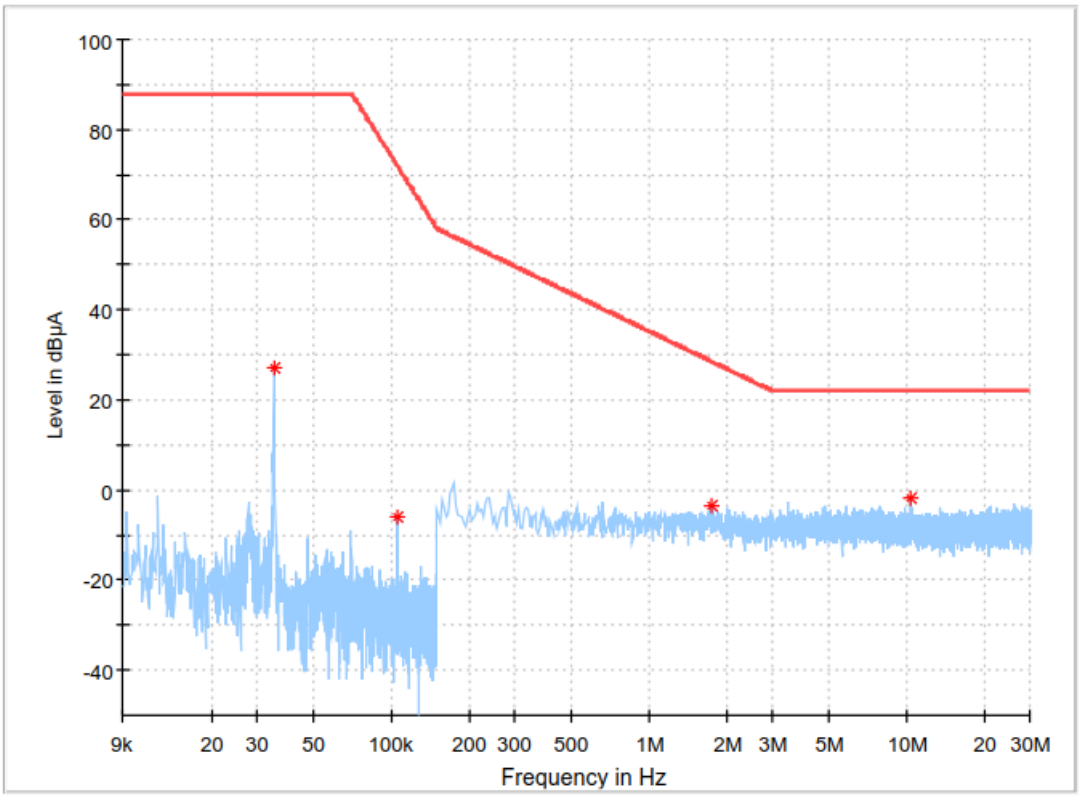
2.2.5 Test Results

Radiated Emission (9 kHz-30MHz)



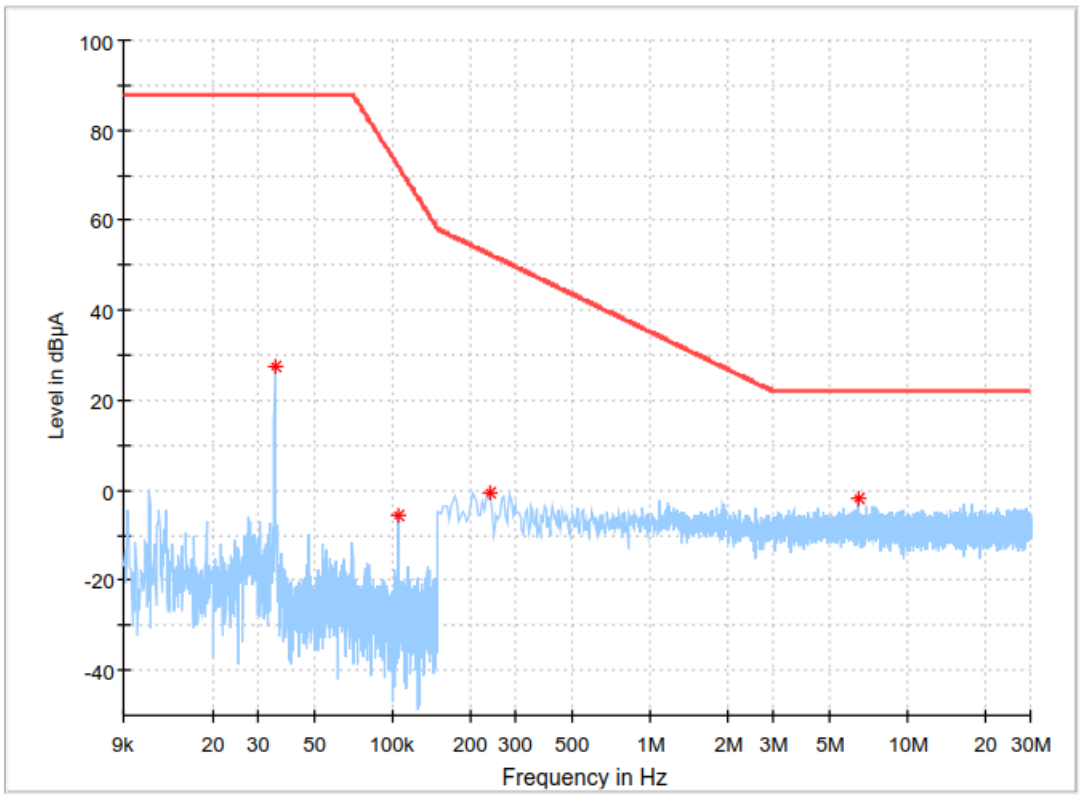
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-7W-002-6
Operating Mode	:	Light on
Antenna	:	LOOP X
Test Date	:	2023-12-21



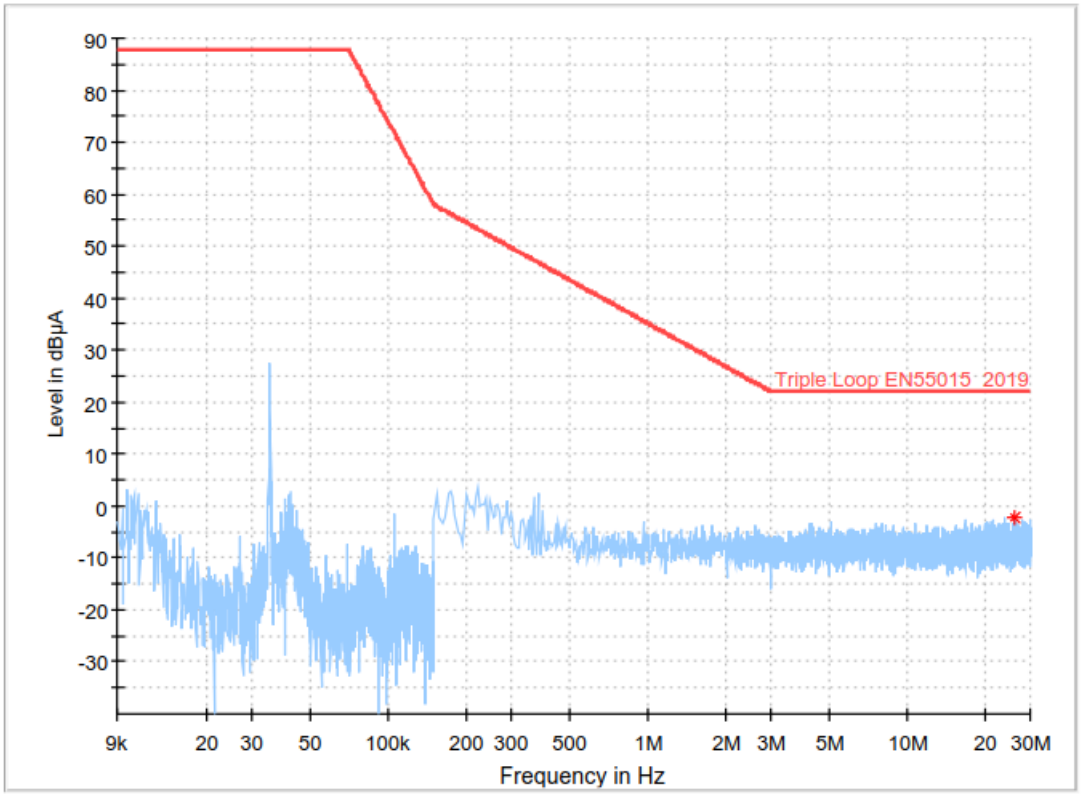
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-7W-002-6
Operating Mode	:	Light on
Antenna	:	LOOP Y
Test Date	:	2023-12-21



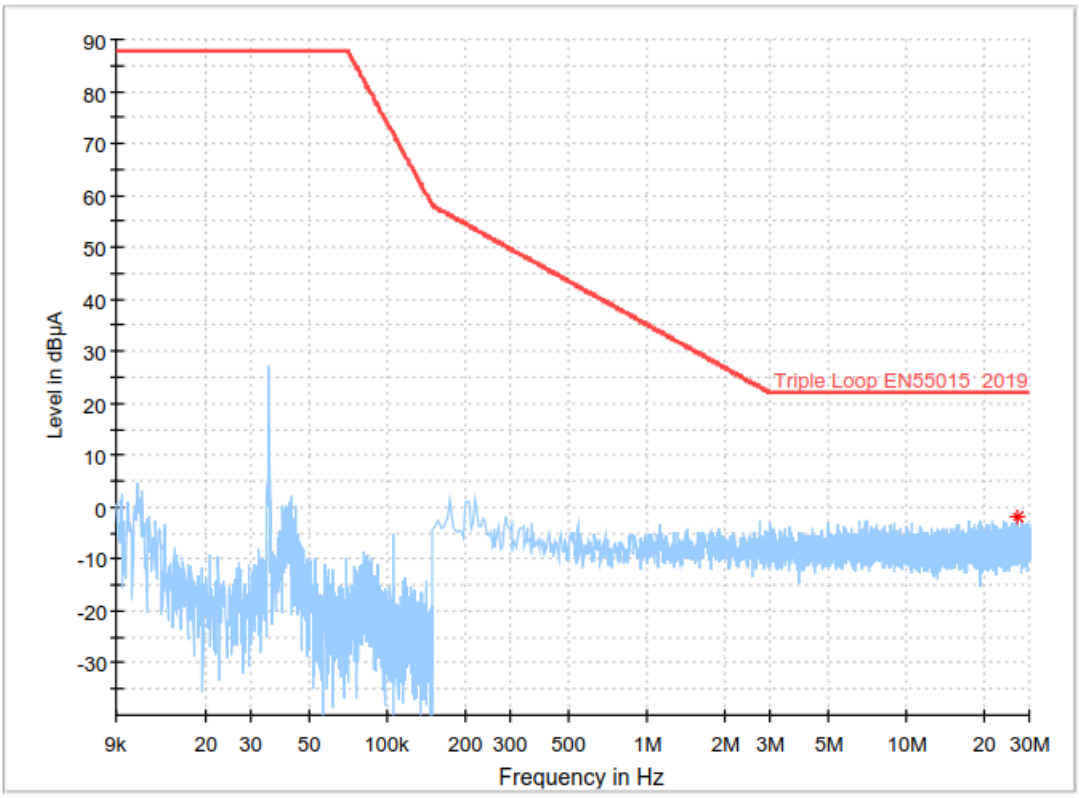
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-7W-002-6
Operating Mode	:	Light on
Antenna	:	LOOP Z
Test Date	:	2023-12-21



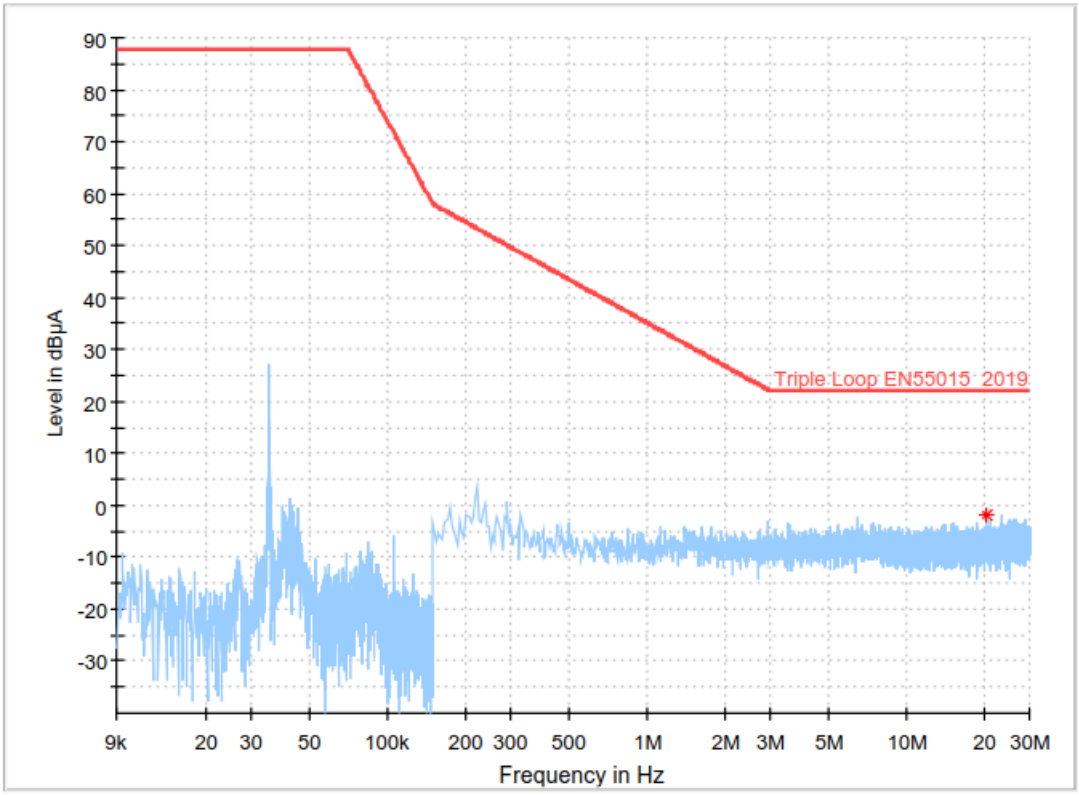
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-8.5W-001-6
Operating Mode	:	Light on
Antenna	:	LOOP X
Test Date	:	2023-3-2



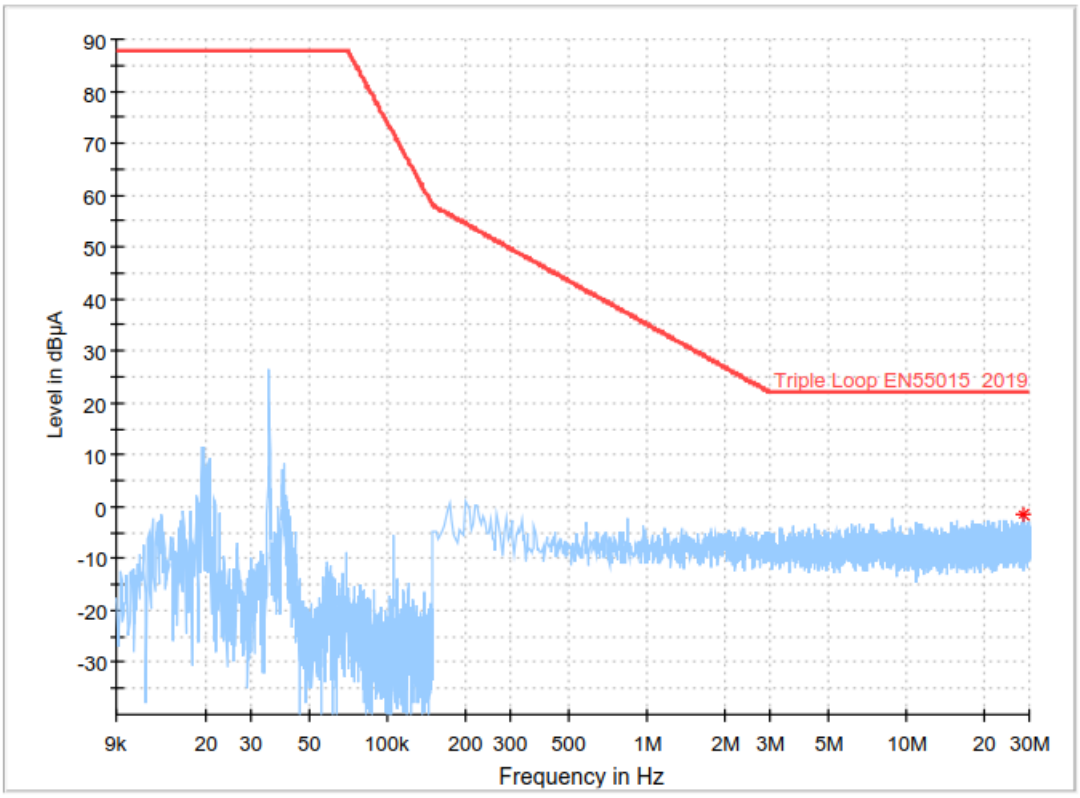
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-8.5W-001-6
Operating Mode	:	Light on
Antenna	:	LOOP Y
Test Date	:	2023-3-2



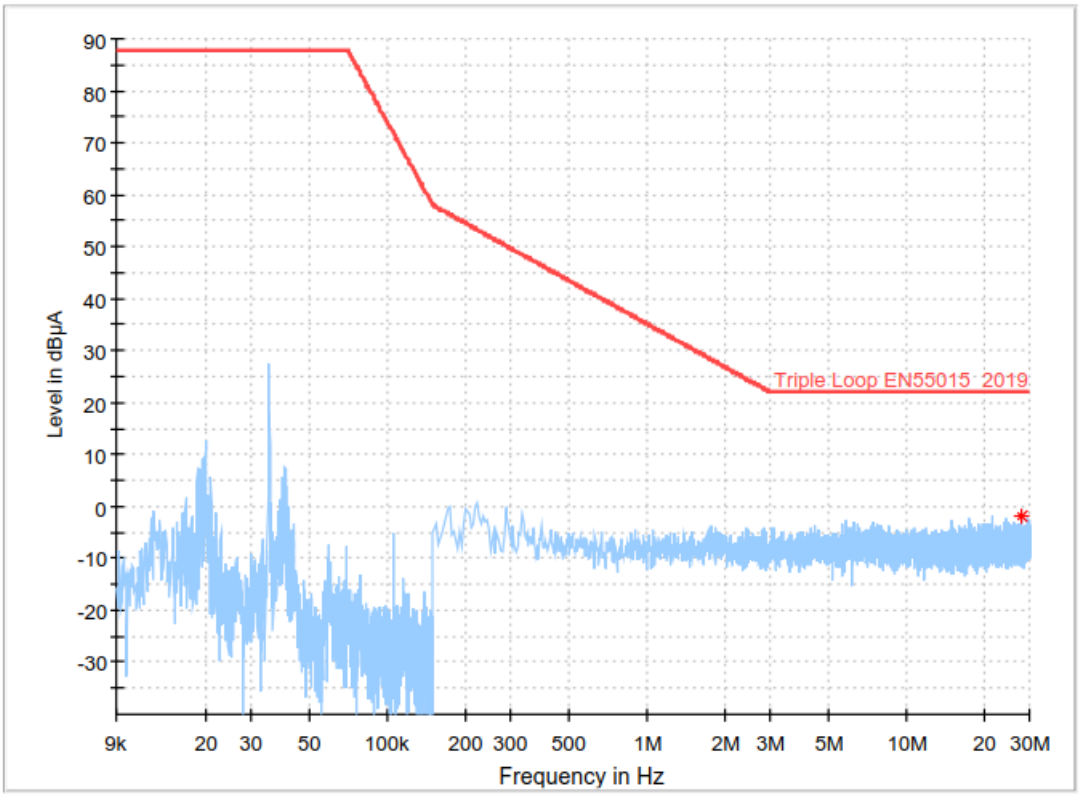
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-8.5W-001-6
Operating Mode	:	Light on
Antenna	:	LOOP Z
Test Date	:	2023-3-2



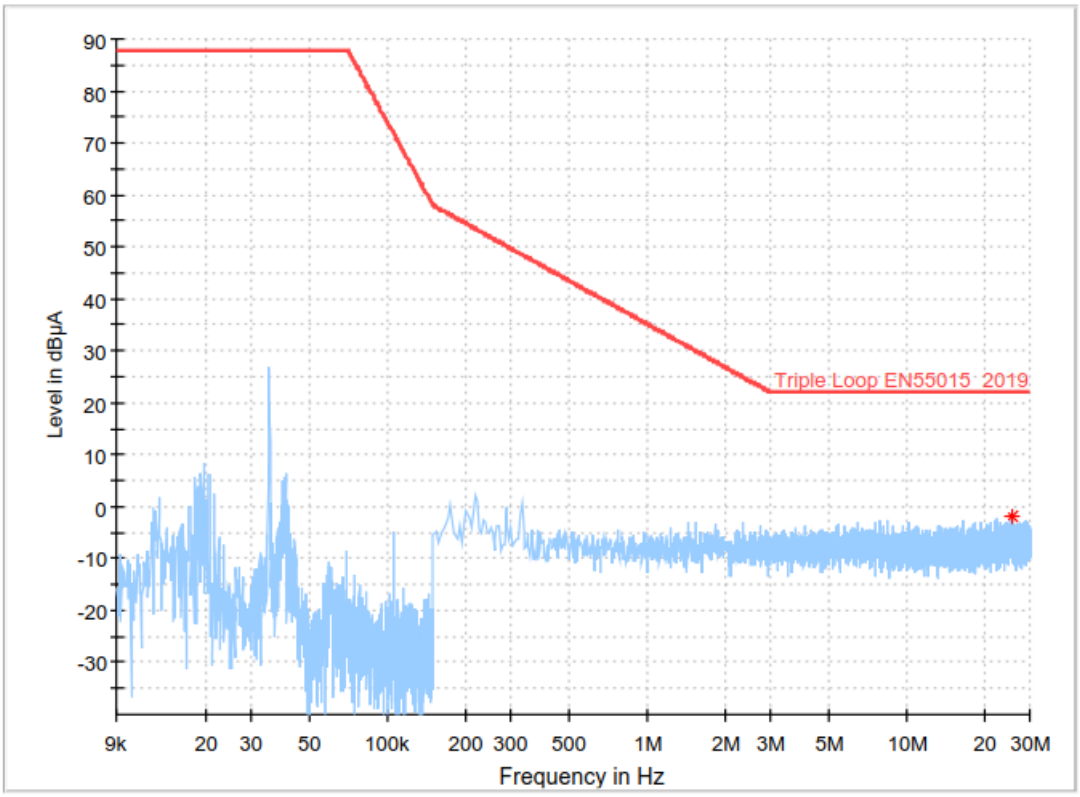
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-10W-002-6
Operating Mode	:	Light on
Antenna	:	LOOP X
Test Date	:	2023-3-2



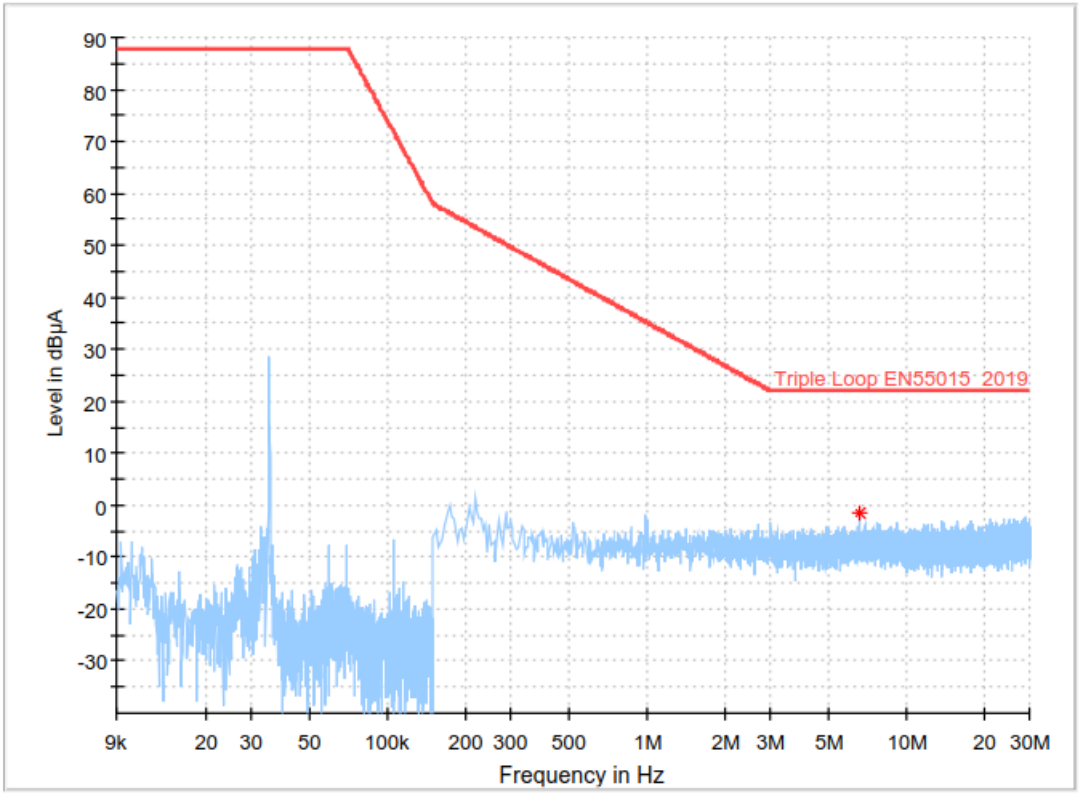
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-10W-002-6
Operating Mode	:	Light on
Antenna	:	LOOP Y
Test Date	:	2023-3-2



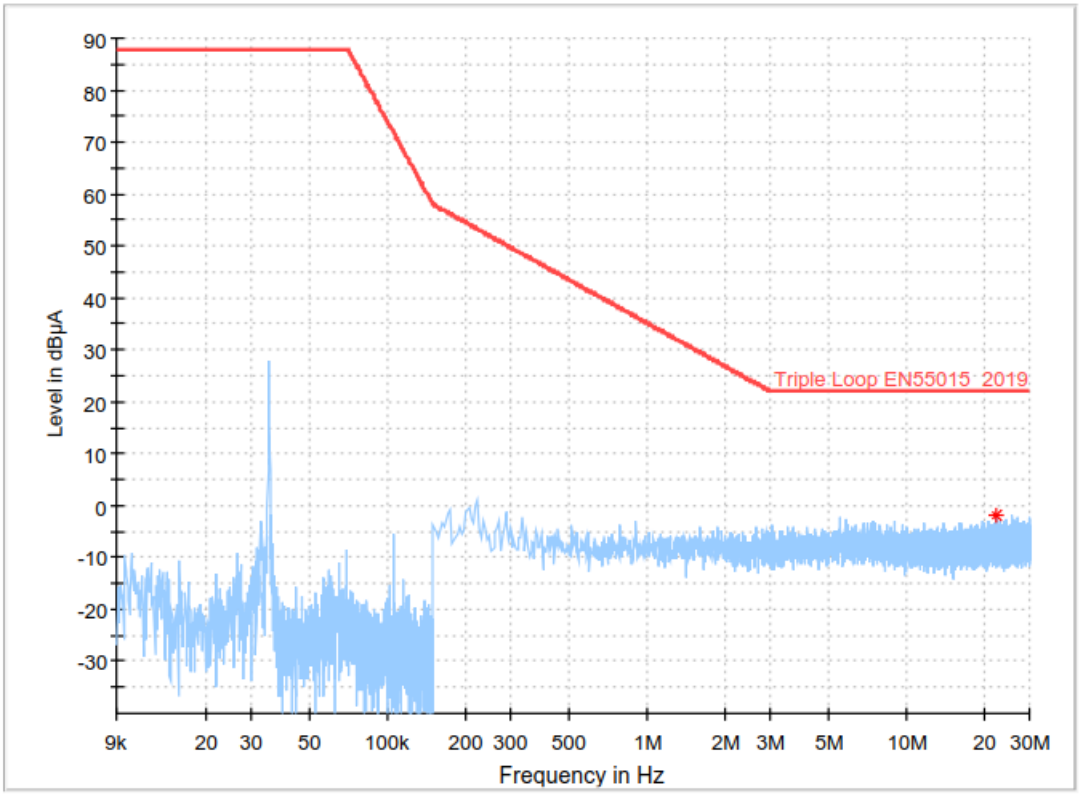
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-10W-002-6
Operating Mode	:	Light on
Antenna	:	LOOP Z
Test Date	:	2023-3-2



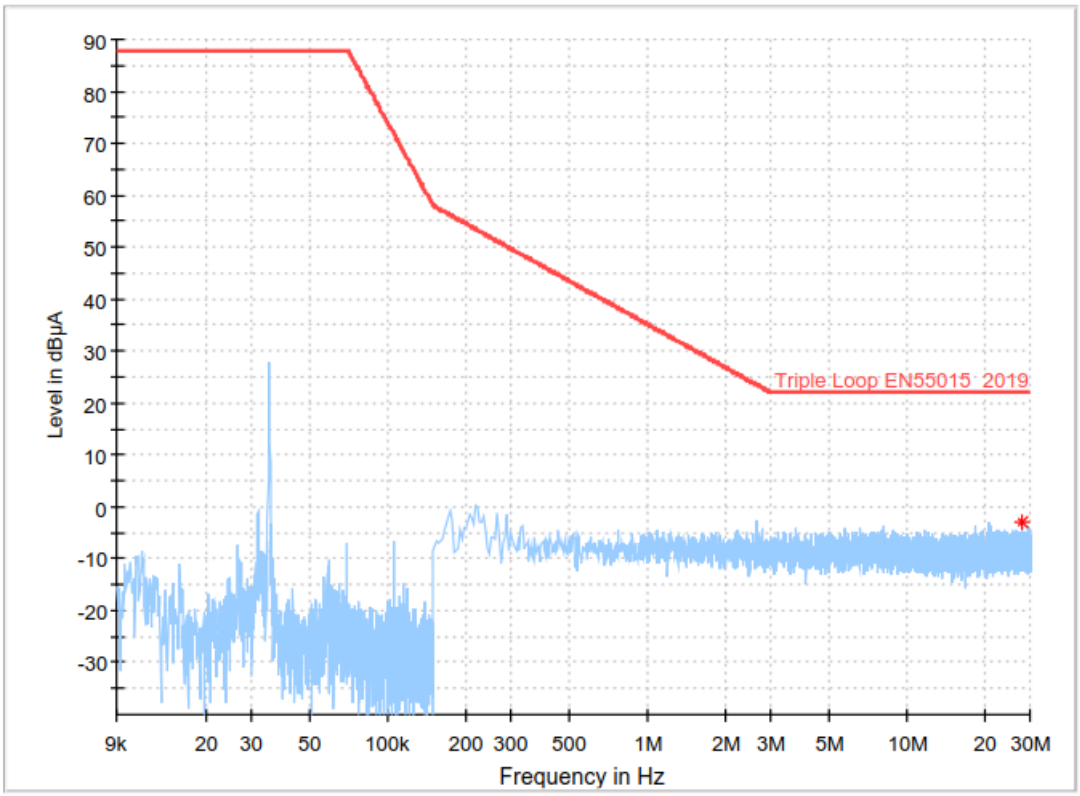
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-12W-001-6
Operating Mode	:	Light on
Antenna	:	LOOP X
Test Date	:	2023-3-2



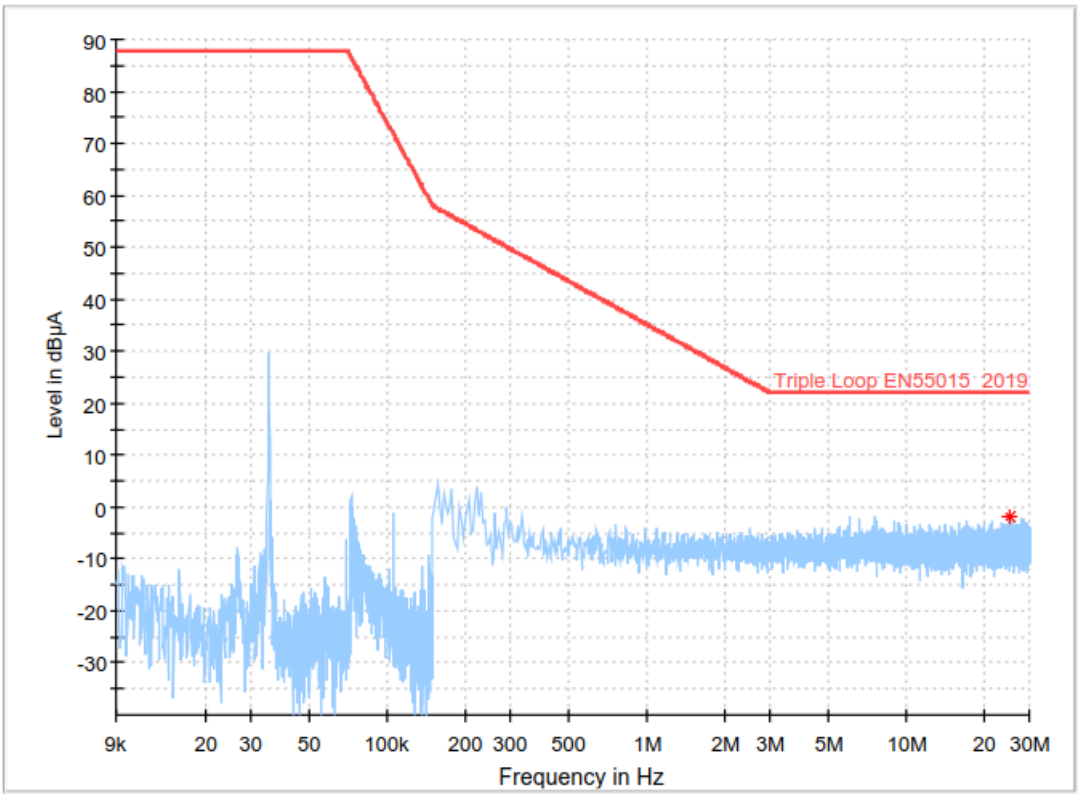
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-12W-001-6
Operating Mode	:	Light on
Antenna	:	LOOP Y
Test Date	:	2023-3-2



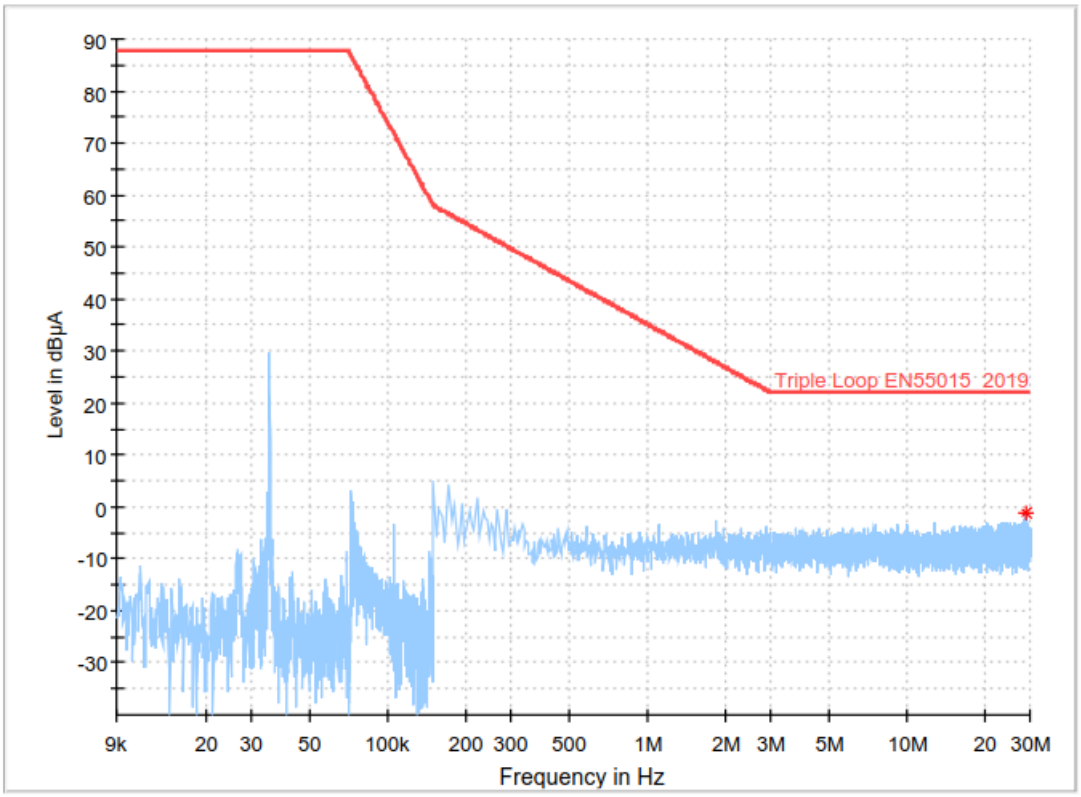
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-12W-001-6
Operating Mode	:	Light on
Antenna	:	LOOP Z
Test Date	:	2023-3-2



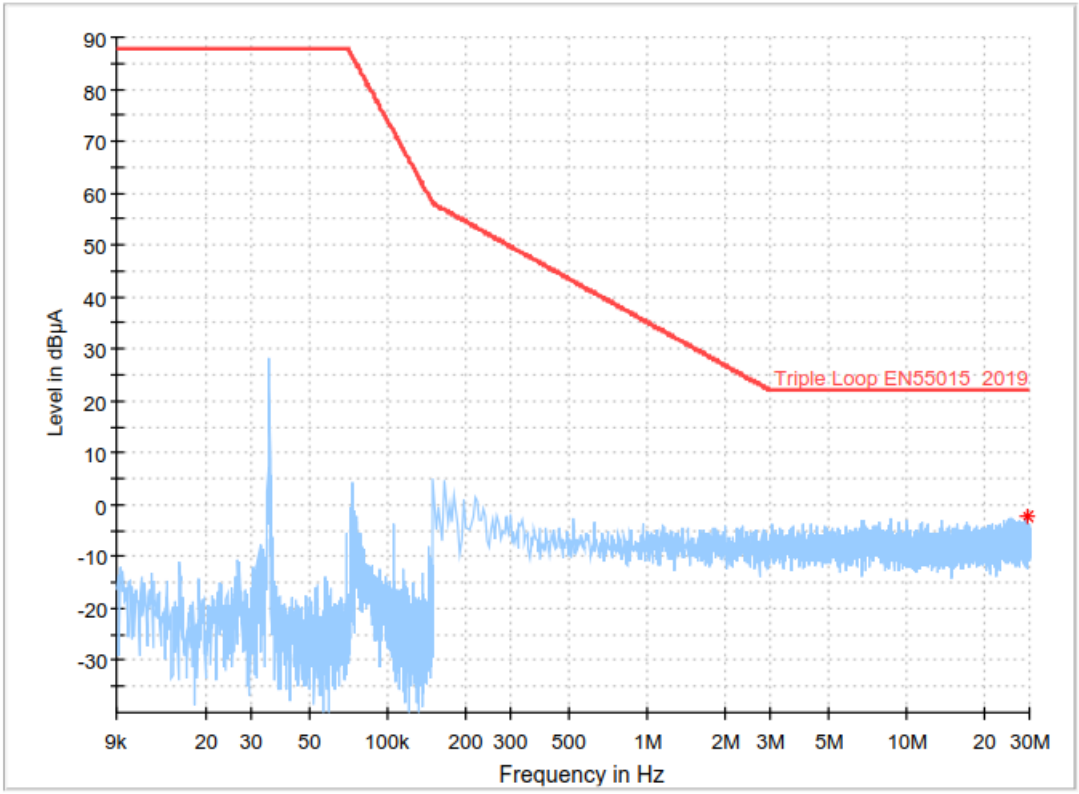
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-12W-002-6
Operating Mode	:	Light on
Antenna	:	LOOP X
Test Date	:	2023-3-2



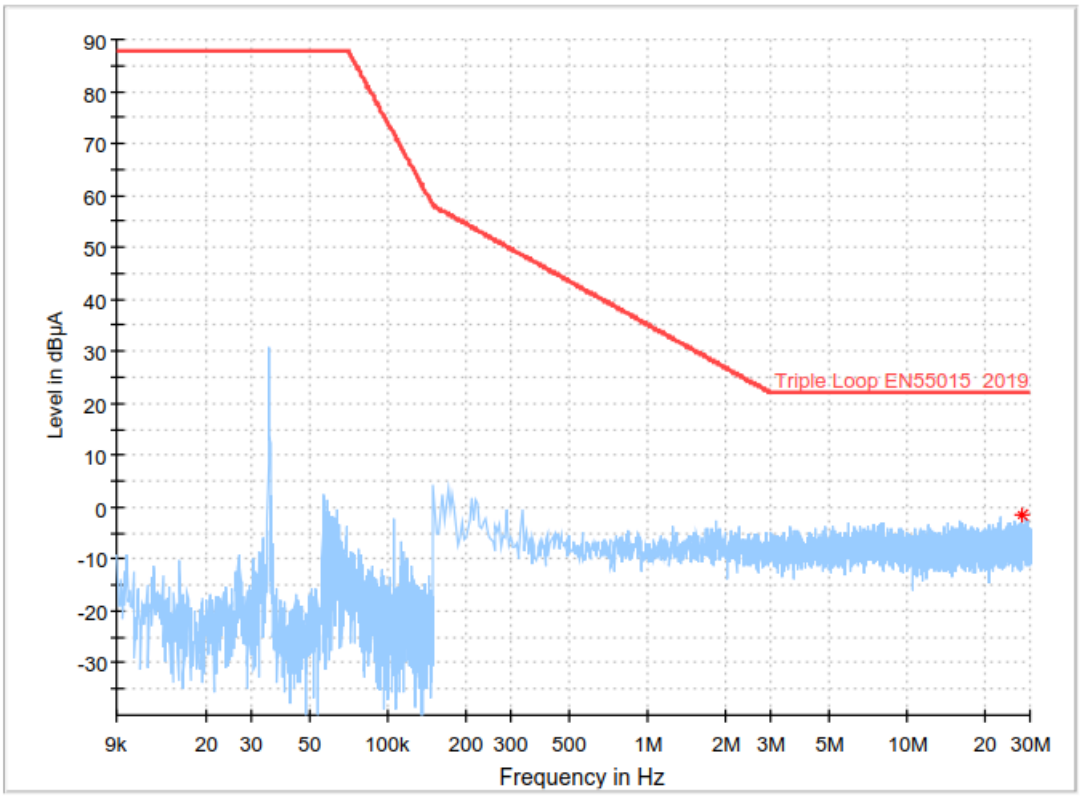
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-12W-002-6
Operating Mode	:	Light on
Antenna	:	LOOP Y
Test Date	:	2023-3-2



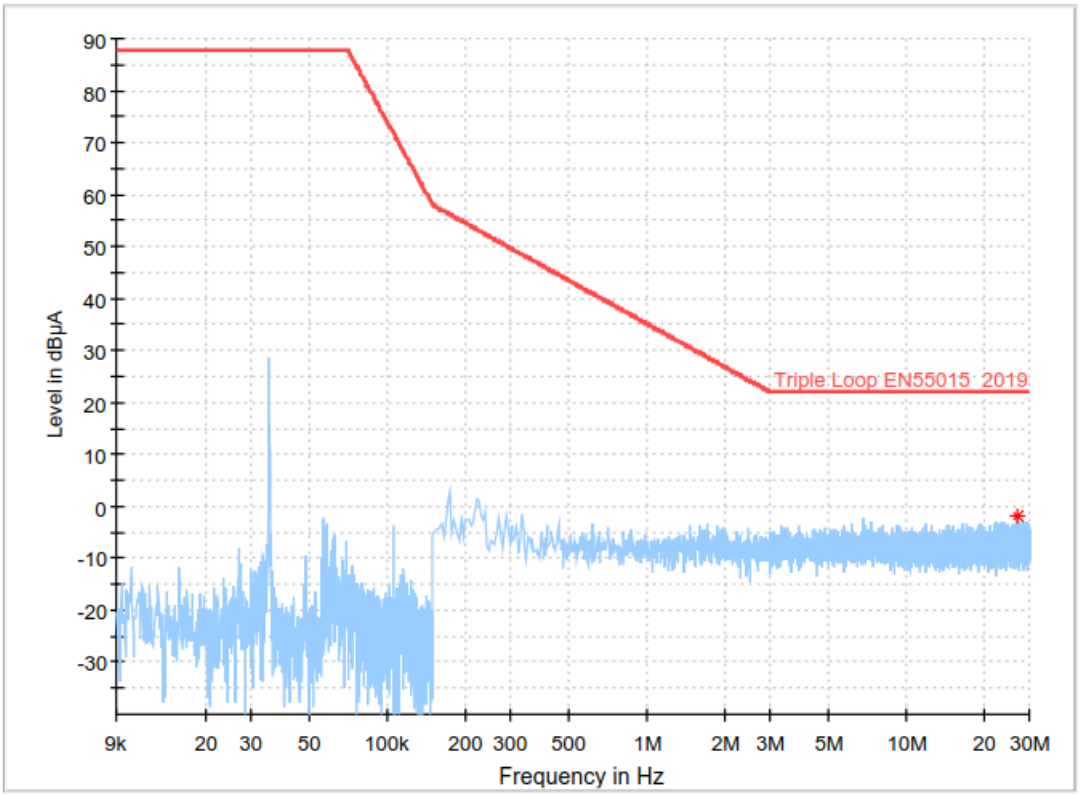
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-12W-002-6
Operating Mode	:	Light on
Antenna	:	LOOP Z
Test Date	:	2023-3-2



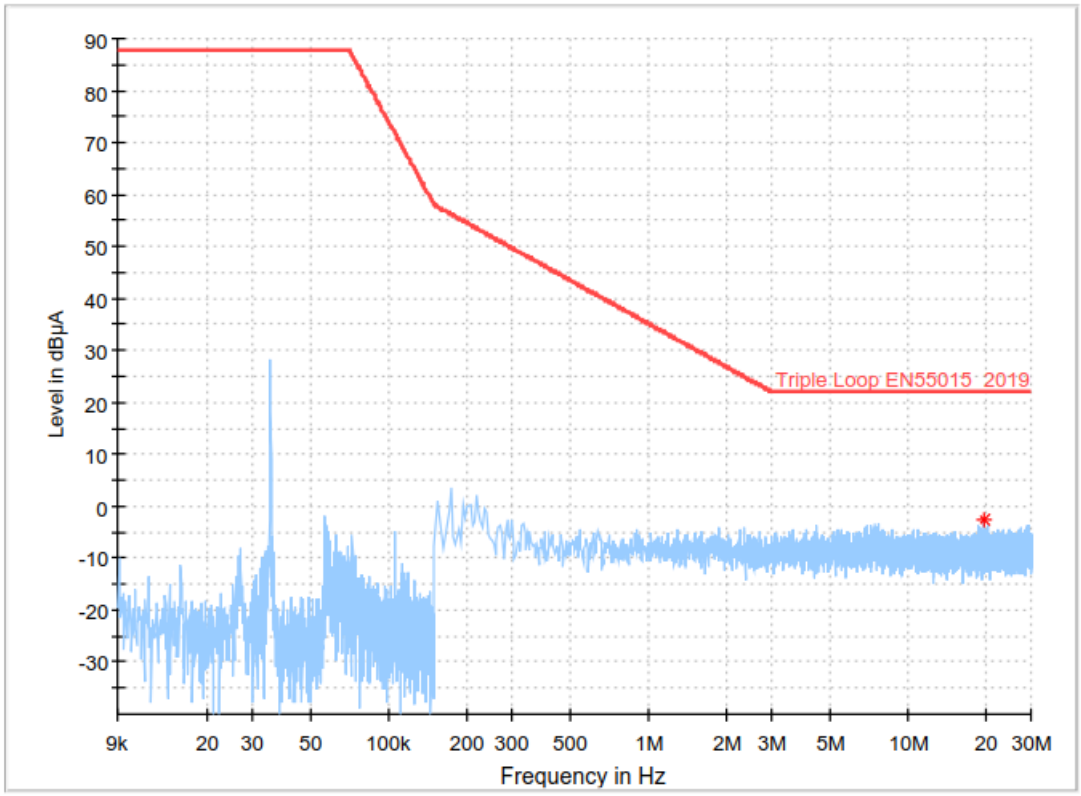
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-19W-001-6
Operating Mode	:	Light on
Antenna	:	LOOP X
Test Date	:	2023-3-2



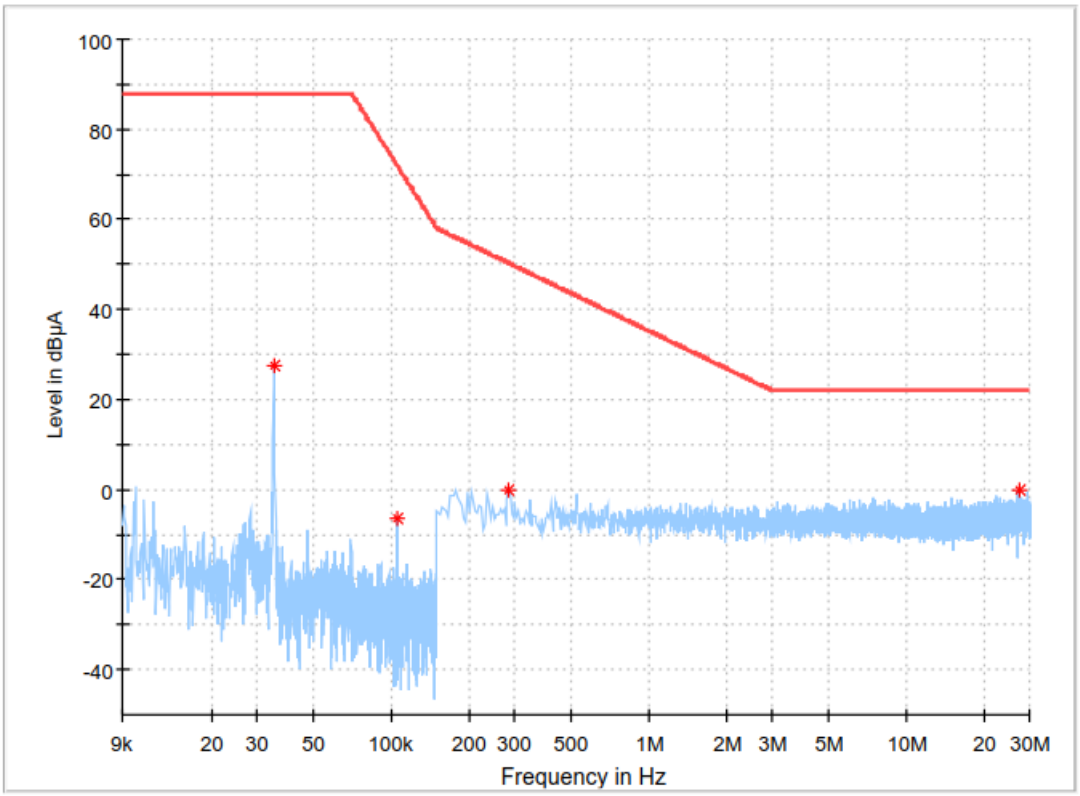
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-19W-001-6
Operating Mode	:	Light on
Antenna	:	LOOP Y
Test Date	:	2023-3-2



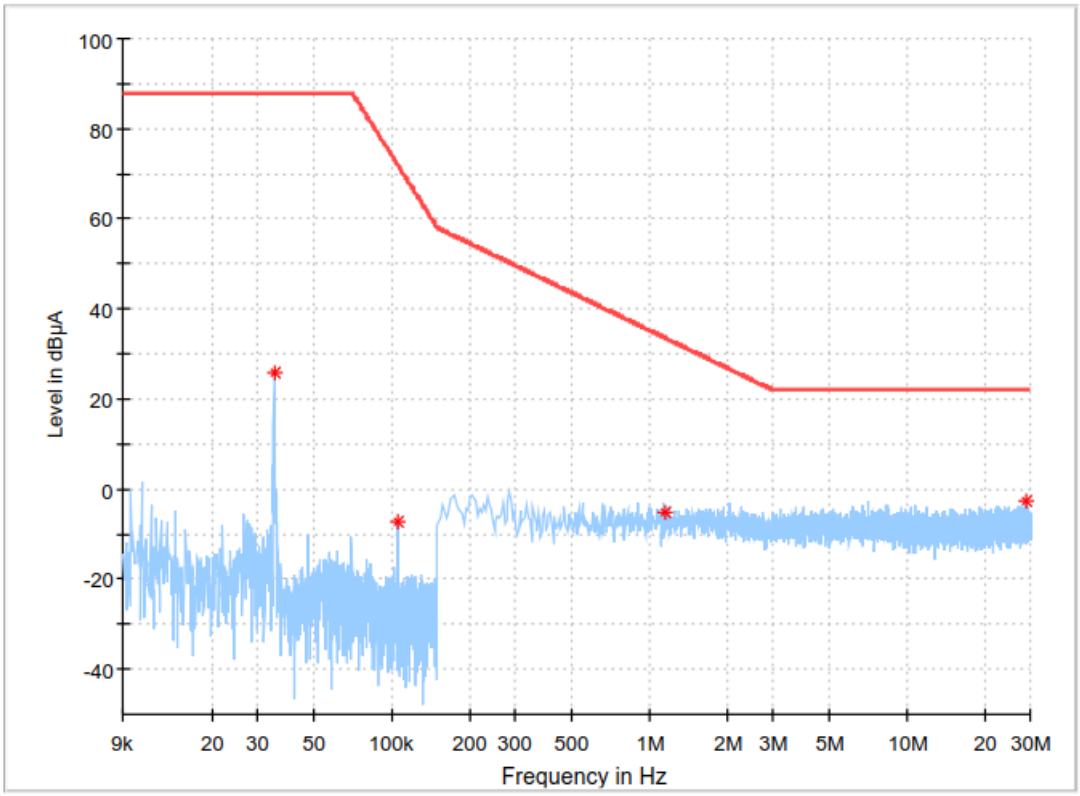
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-19W-001-6
Operating Mode	:	Light on
Antenna	:	LOOP Z
Test Date	:	2023-3-2



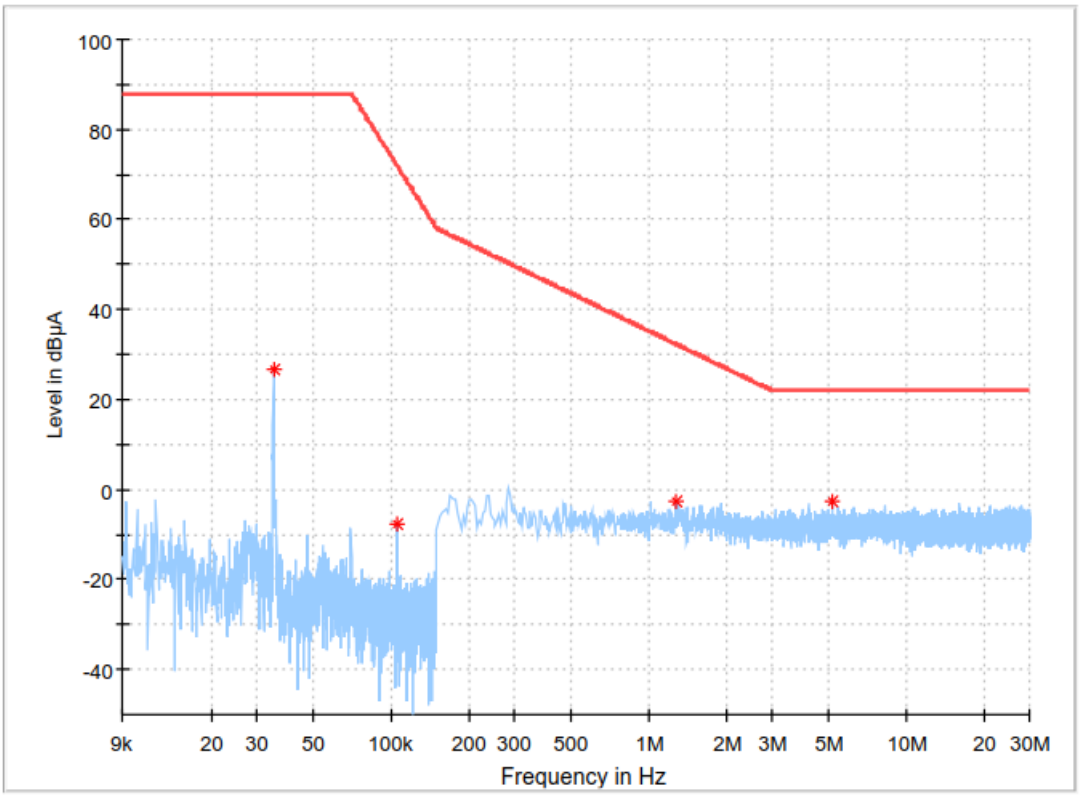
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-10W-TG2-6
Operating Mode	:	Light on
Antenna	:	LOOP X
Test Date	:	2023-11-21



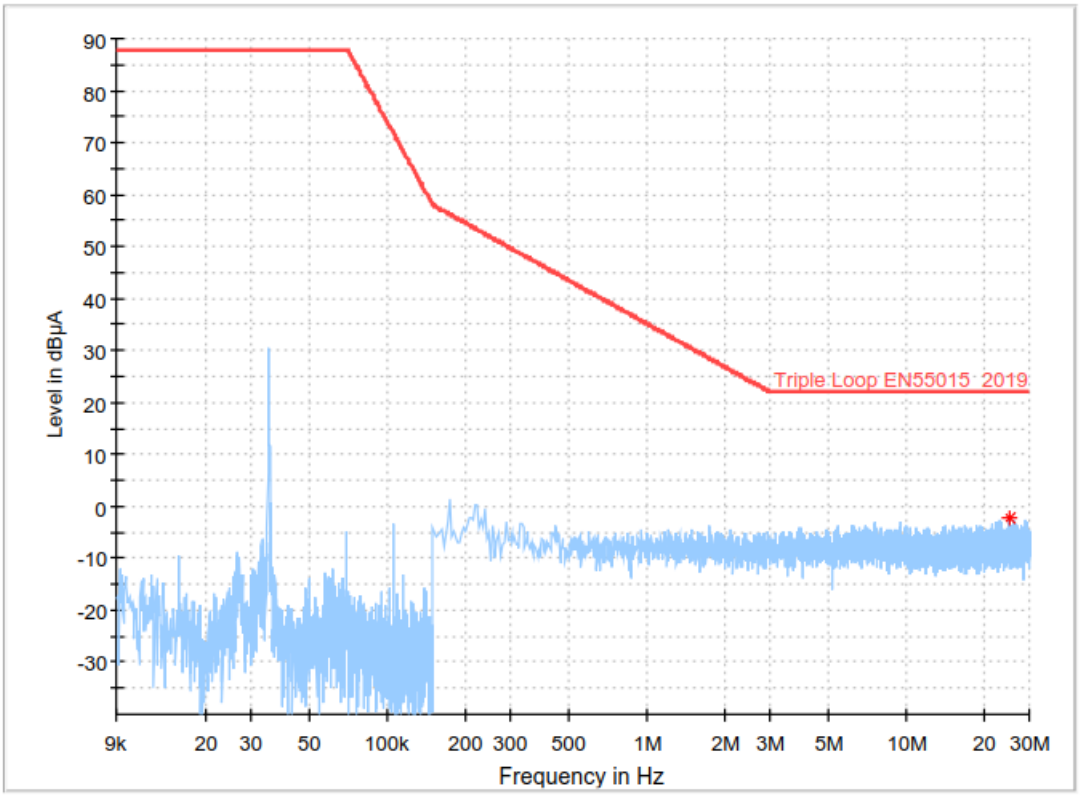
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-10W-TG2-6
Operating Mode	:	Light on
Antenna	:	LOOP Y
Test Date	:	2023-11-21



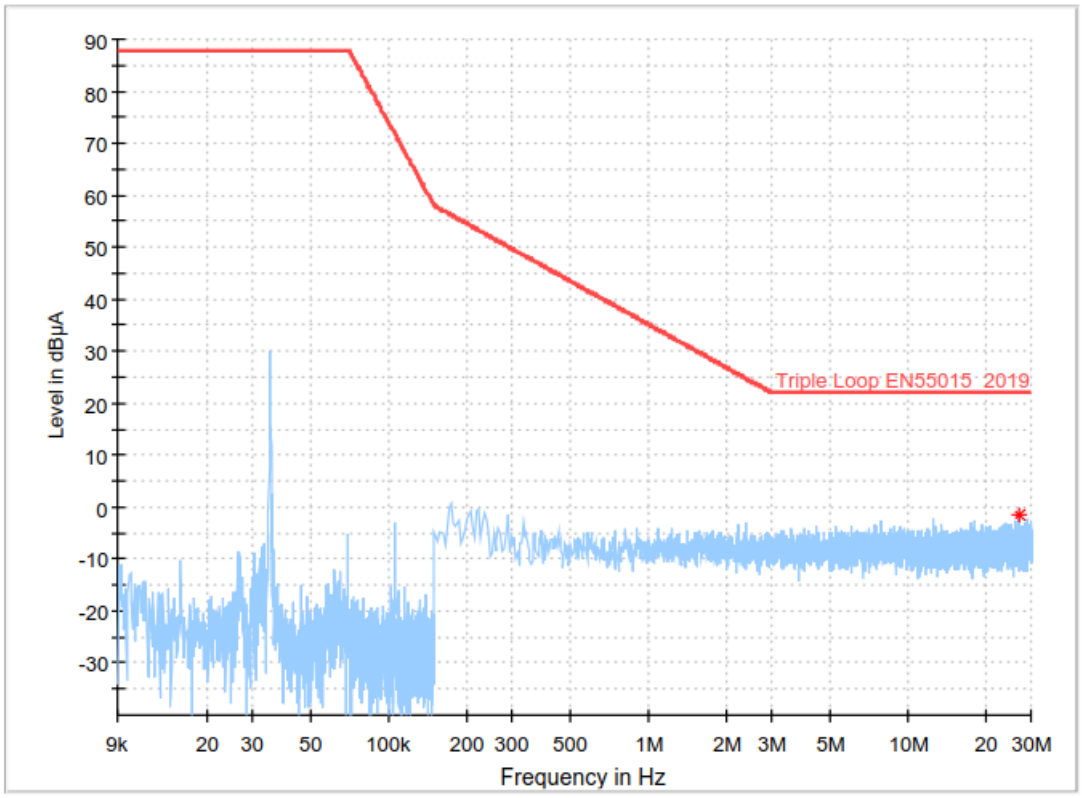
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-10W-TG2-6
Operating Mode	:	Light on
Antenna	:	LOOP Z
Test Date	:	2023-11-21



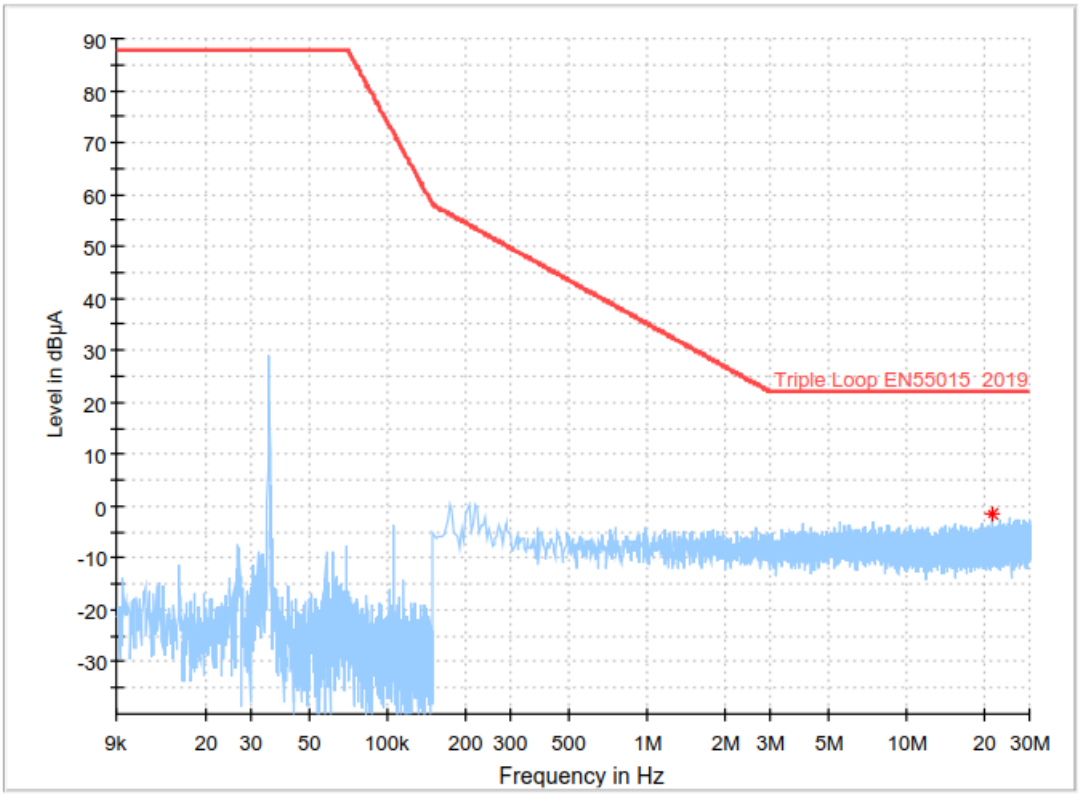
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-19W-TG1-6
Operating Mode	:	Light on
Antenna	:	LOOP X
Test Date	:	2023-3-2



No significant interference is detected within 10dB

Model	:	SPARAC-R7S-19W-TG1-6
Operating Mode	:	Light on
Antenna	:	LOOP Y
Test Date	:	2023-3-2



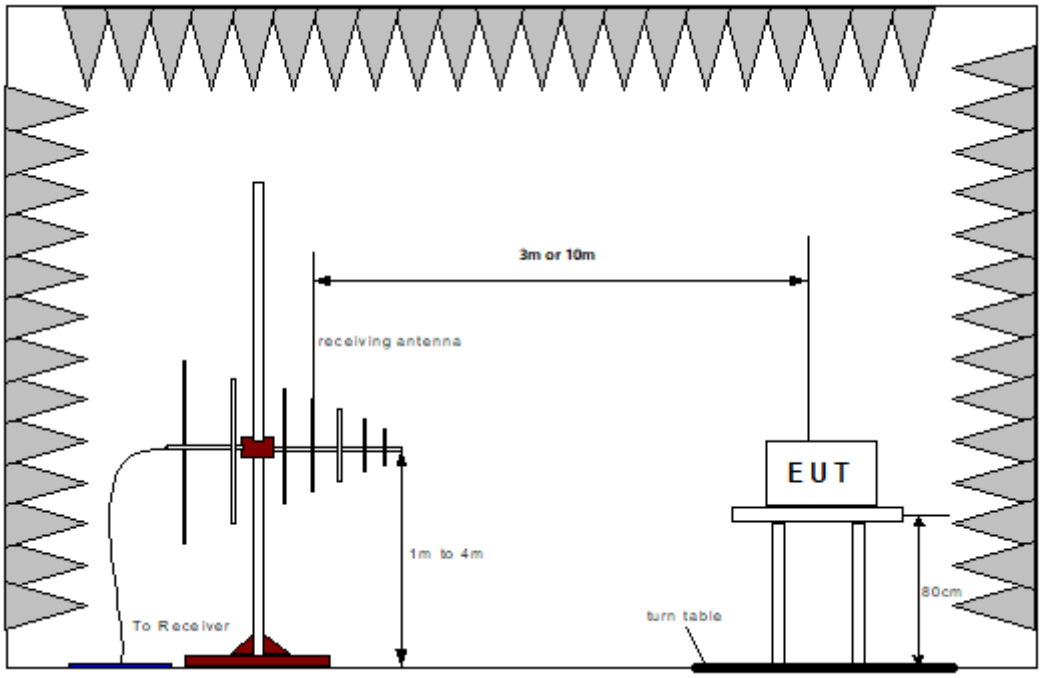
No significant interference is detected within 10dB

Model	:	SPARAC-R7S-19W-TG1-6
Operating Mode	:	Light on
Antenna	:	LOOP Z
Test Date	:	2023-3-2

2.3 Radiated Disturbance (30MHz to 1000MHz)

2.3.1 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive. Guidance on how to arrange the luminaire during the measurements can be found in Annex C.
A prescan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarization using a peak detector; measurements were taken at a 3m distance. Using the prescan list of the highest emissions detected, their bearing and associated antenna polarization, the EUT was then formally measured using a Quasi-Peak detector. The readings were maximized by adjusting the antenna height, polarization and turntable azimuth, in accordance with the specification.



2.3.2 Specification Limits

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 3 m	
Frequency range MHz	Quasi-peak limits dB(µV/m)
30 to 230	40
230 to 1000	47

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 10 m	
Frequency range MHz	Quasi-peak limits dB(µV/m)
30 to 230	30
230 to 1000	37

Remark :
Level=Reading Level + Correction Factor
Correction Factor=Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)

2.3.3 Test Setup

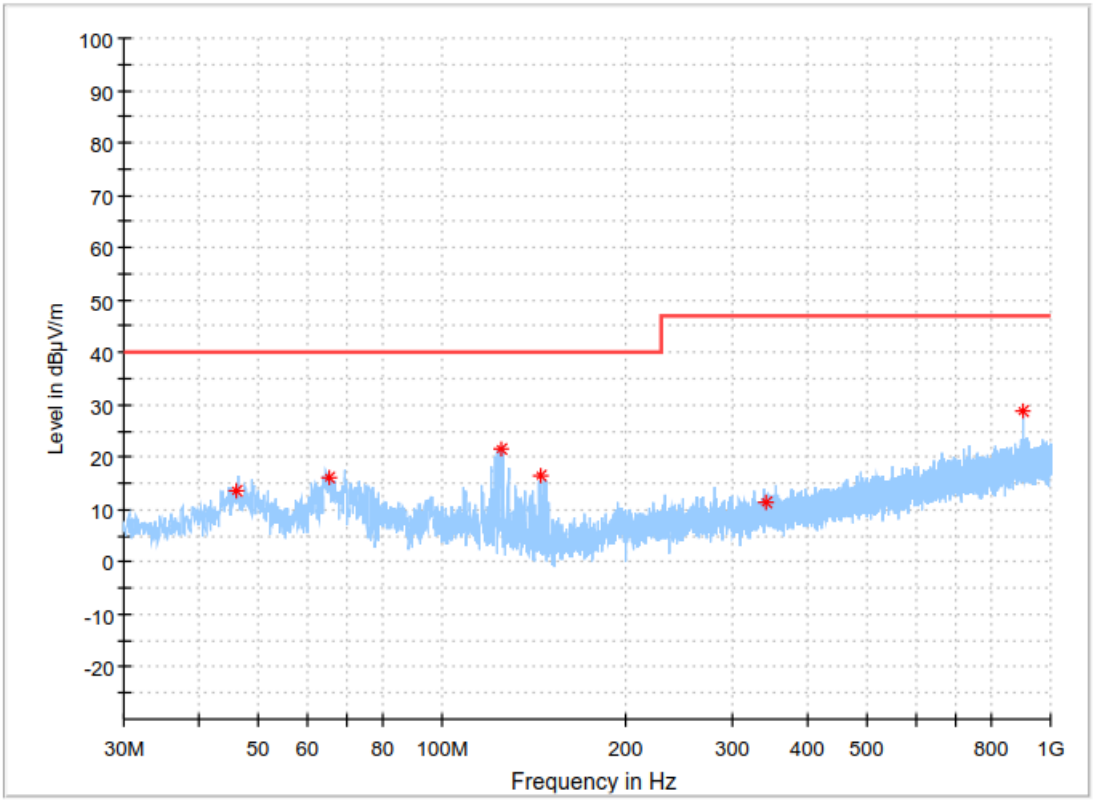


2.3.4 Test Location

This test was carried out in 3m anechoic chamber.

2.3.5 Test Results

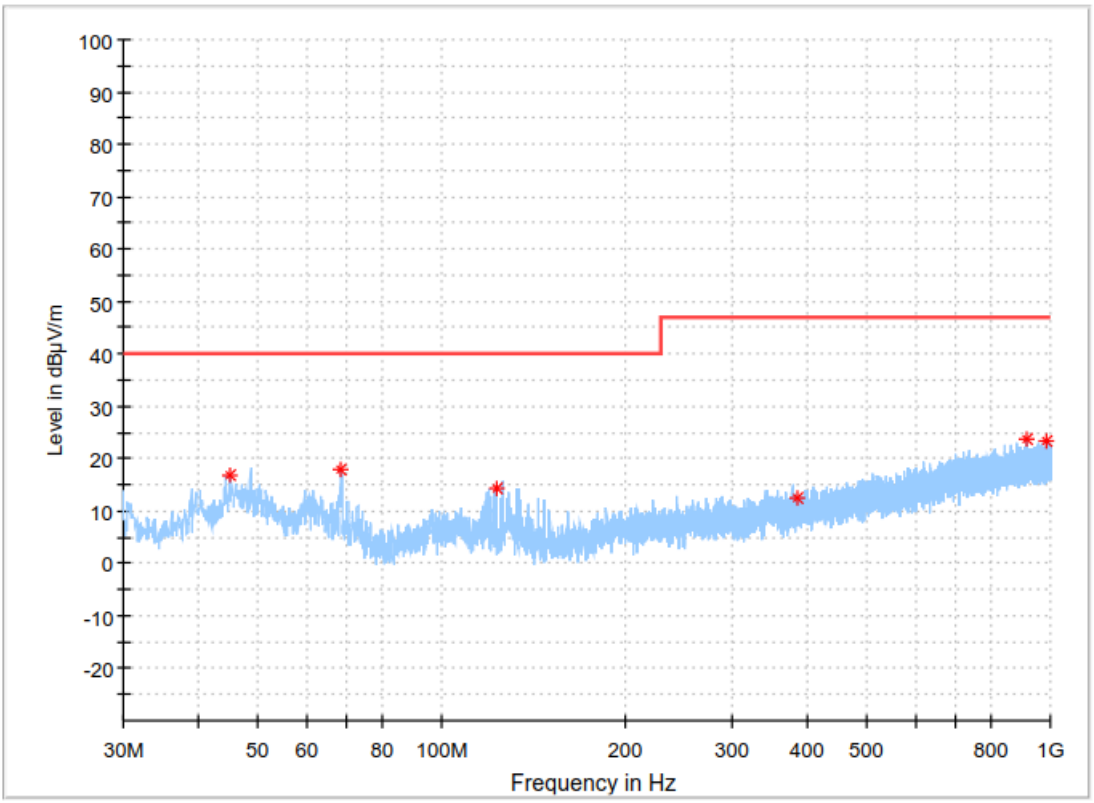
Radiated Emission (30MHz-1000MHz)



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
46.005000	13.67	40.00	26.33	H	-18.3
65.512778	16.02	40.00	23.98	H	-22.3
125.113889	21.71	40.00	18.29	H	-24.5
145.645556	16.44	40.00	23.56	H	-25.5
340.938889	11.42	47.00	35.58	H	-18.3
899.173889	28.75	47.00	18.25	H	-8.8

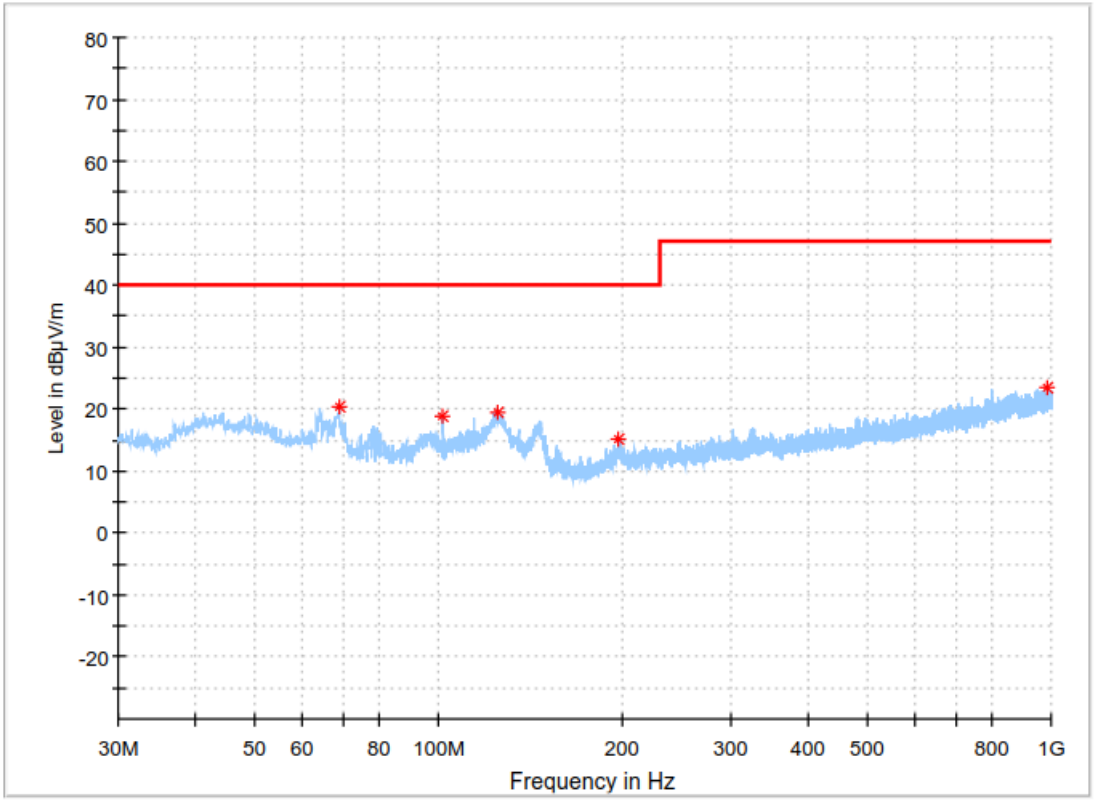
Model	:	SPARAC-R7S-7W-002-6
Operating Mode	:	Light on
Antenna polarity	:	Horizontal
Test Date	:	2023-11-16



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
44.819444	16.97	40.00	23.03	V	-18.5
68.476667	17.82	40.00	22.18	V	-23.6
123.012222	14.48	40.00	25.52	V	-24.2
384.103889	12.64	47.00	34.36	V	-18.0
911.245000	23.81	47.00	23.19	V	-8.7
988.090556	23.43	47.00	23.57	V	-8.0

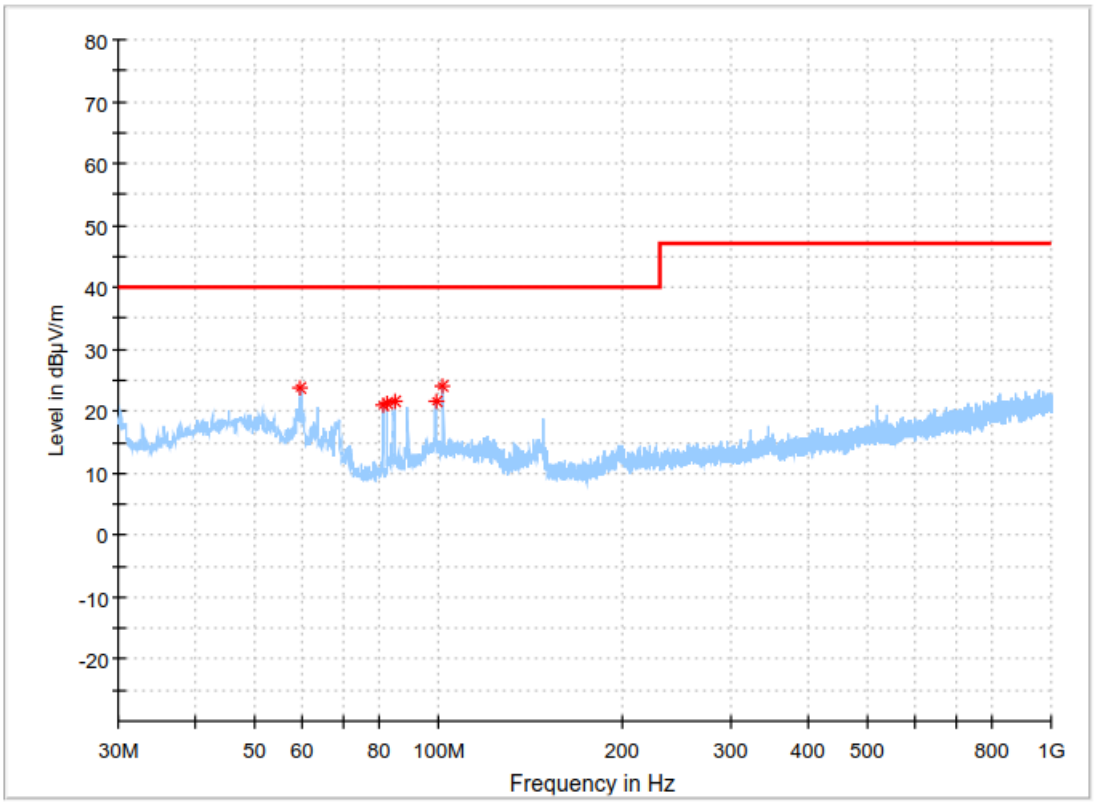
Model	:	SPARAC-R7S-7W-002-6
Operating Mode	:	Light on
Antenna polarity	:	Vertical
Test Date	:	2023-11-16



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
101.672222	18.83	40.00	21.17	H	-35.3
988.629444	23.36	47.00	23.64	H	-23.5
125.006111	19.60	40.00	20.40	H	-37.9
68.853889	20.42	40.00	19.58	H	-37.2
196.840000	15.16	40.00	24.84	H	-35.2

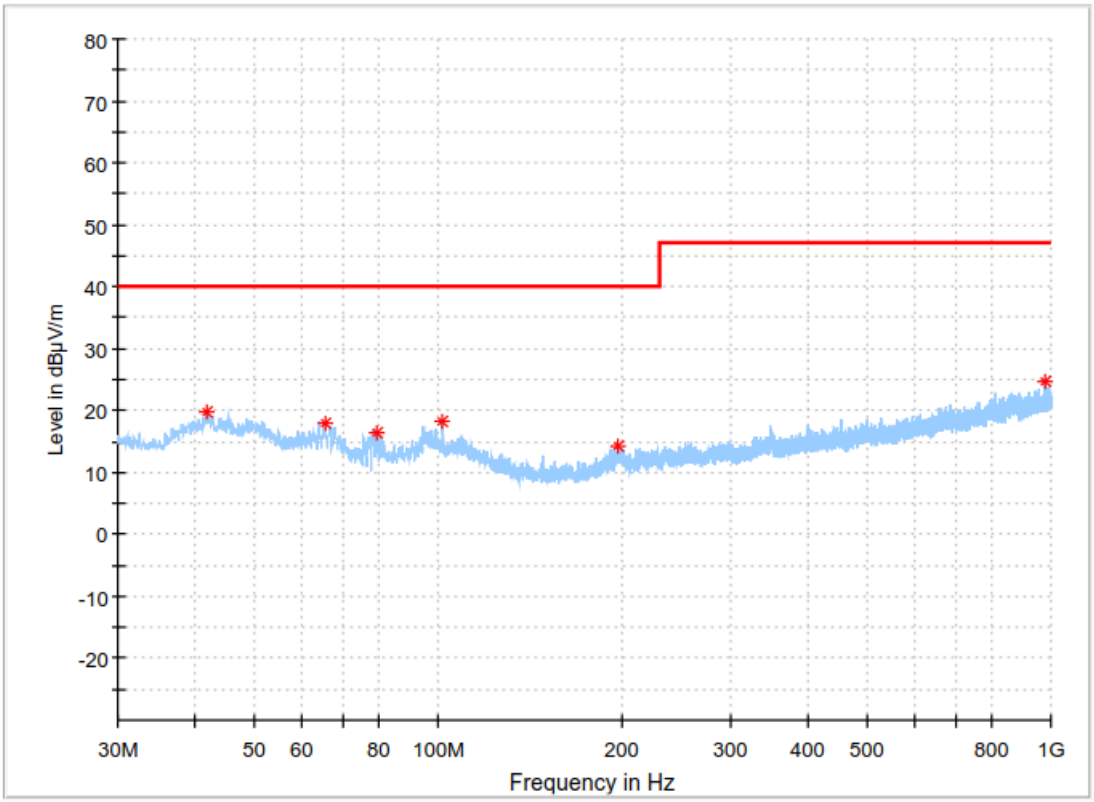
Model : SPARAC-R7S-8.5W-001-6
Operating Mode : Light on
Antenna polarity : Horizontal
Test Date : 2023-3-5



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
98.870000	21.54	40.00	18.46	V	-35.3
101.672222	24.01	40.00	15.99	V	-35.3
84.751111	21.64	40.00	18.36	V	-39.4
59.638889	23.89	40.00	16.11	V	-33.9
82.380000	21.39	40.00	18.61	V	-39.9
81.194444	21.06	40.00	18.94	V	-40.0

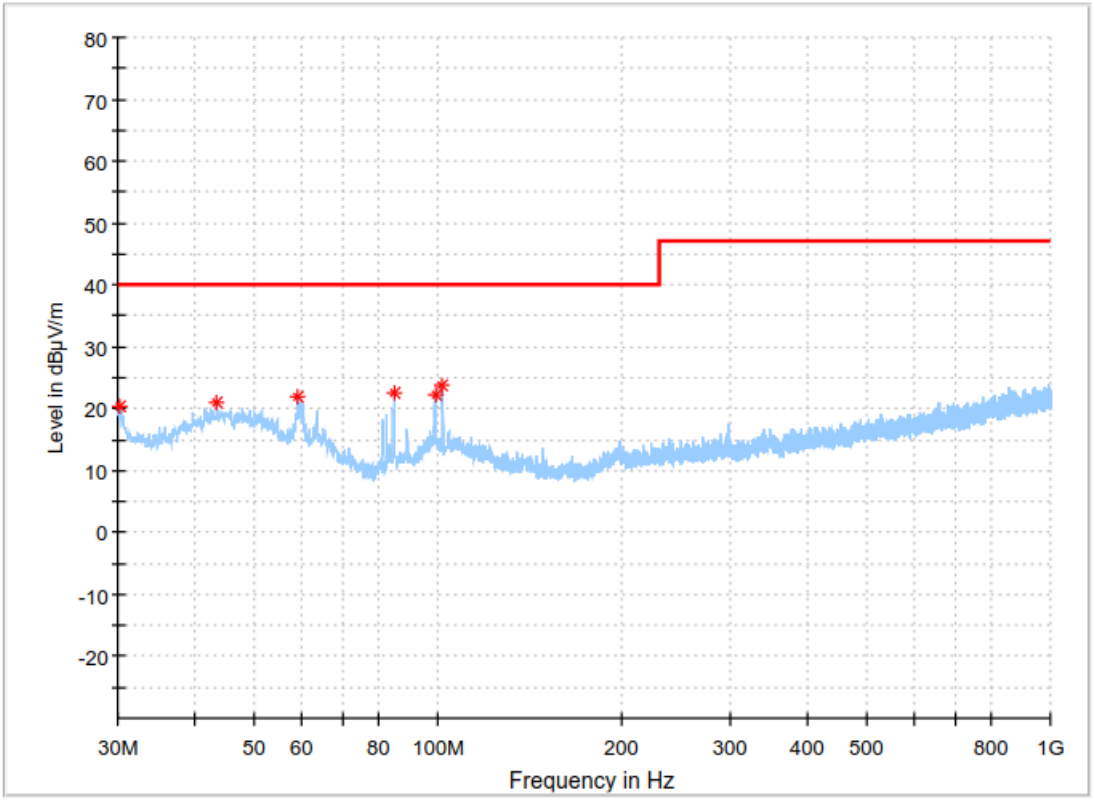
Model : SPARAC-R7S-8.5W-001-6
Operating Mode : Light on
Antenna polarity : Vertical
Test Date : 2023-3-5



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
41.801667	19.82	40.00	20.18	H	-33.1
65.297222	17.96	40.00	22.04	H	-36.1
79.308333	16.46	40.00	23.54	H	-39.9
101.672222	18.31	40.00	21.69	H	-35.3
196.840000	14.31	40.00	25.69	H	-35.2
978.175000	24.75	47.00	22.25	H	-23.5

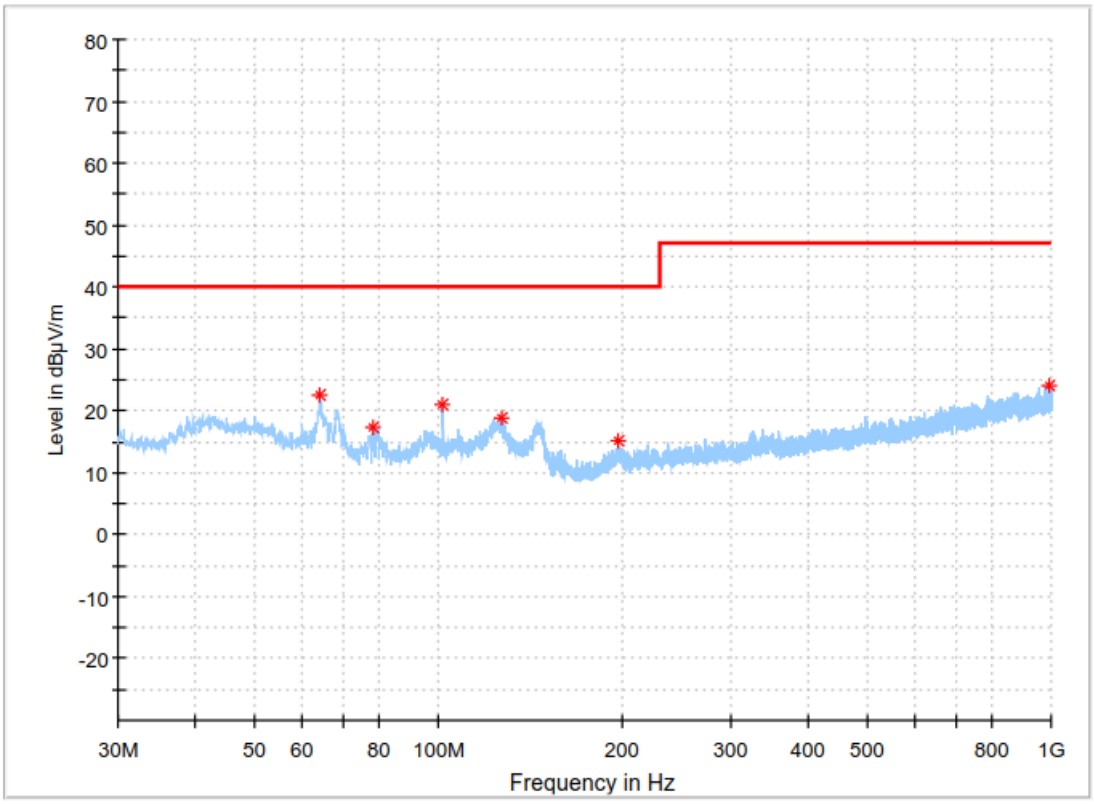
Model : SPARAC-R7S-10W-002-6
Operating Mode : Light on
Antenna polarity : Horizontal
Test Date : 2023-3-5



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
43.580000	20.99	40.00	19.01	V	-32.8
30.161667	20.52	40.00	19.48	V	-36.1
59.046111	21.98	40.00	18.02	V	-33.7
101.726111	23.68	40.00	16.32	V	-35.3
84.751111	22.50	40.00	17.50	V	-39.4
98.870000	22.30	40.00	17.70	V	-35.3

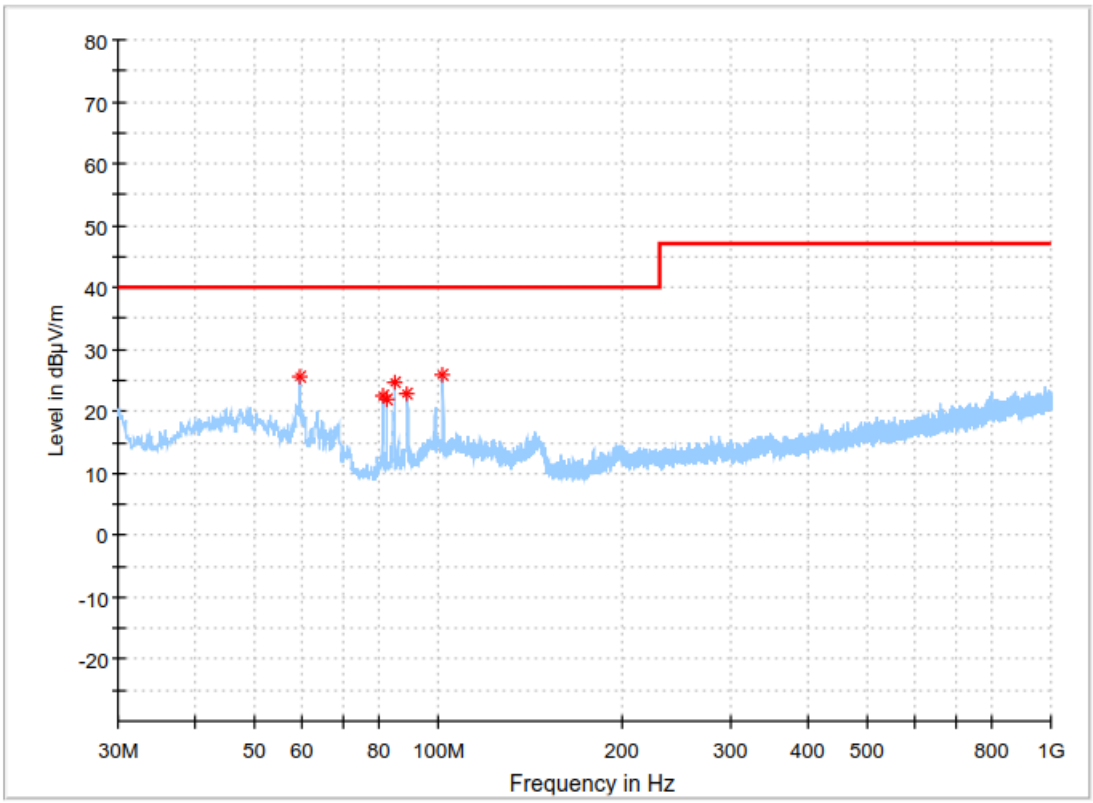
Model : SPARAC-R7S-10W-002-6
Operating Mode : Light on
Antenna polarity : Vertical
Test Date : 2023-3-5



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
994.718889	24.11	47.00	22.89	H	-23.3
78.230556	17.30	40.00	22.70	H	-39.8
126.407222	18.93	40.00	21.07	H	-38.1
64.111667	22.40	40.00	17.60	H	-35.7
101.672222	20.95	40.00	19.05	H	-35.3
196.085556	15.06	40.00	24.94	H	-35.2

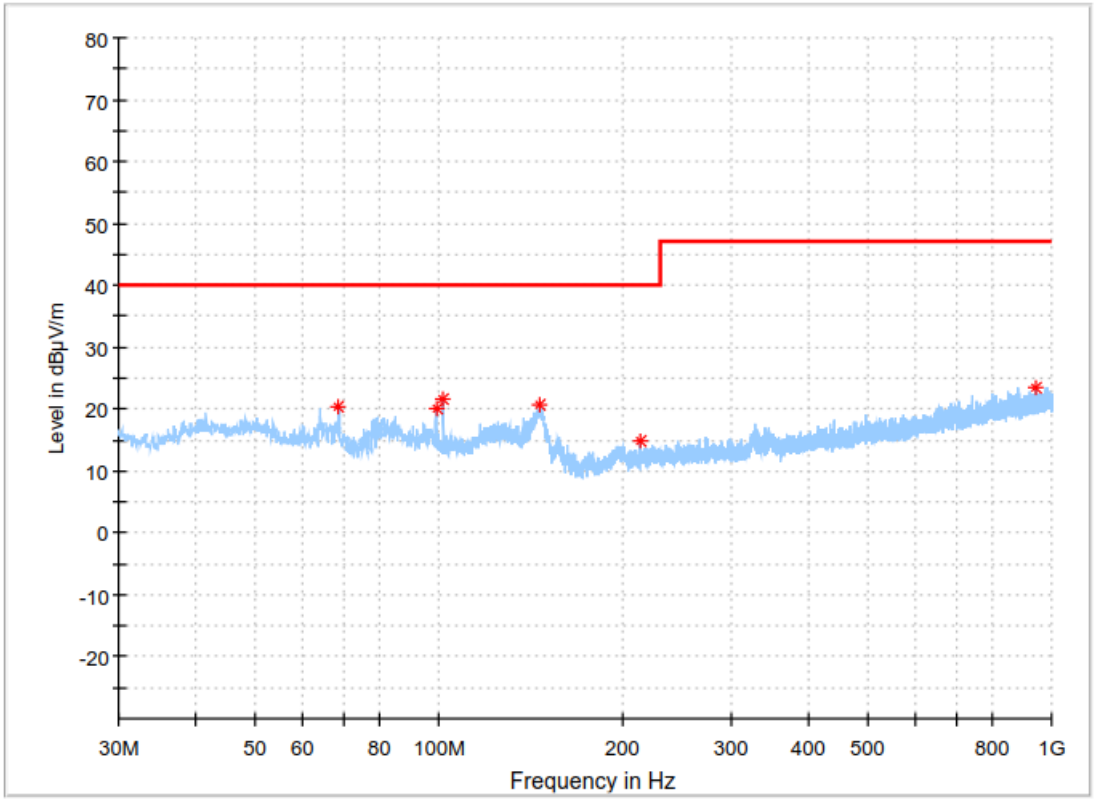
Model : SPARAC-R7S-12W-001-6
Operating Mode : Light on
Antenna polarity : Horizontal
Test Date : 2023-3-5



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
59.315556	25.47	40.00	14.53	V	-33.8
101.618333	25.96	40.00	14.04	V	-35.3
82.380000	21.90	40.00	18.10	V	-39.9
81.194444	22.48	40.00	17.52	V	-40.0
84.751111	24.57	40.00	15.43	V	-39.4
88.954444	22.99	40.00	17.01	V	-37.7

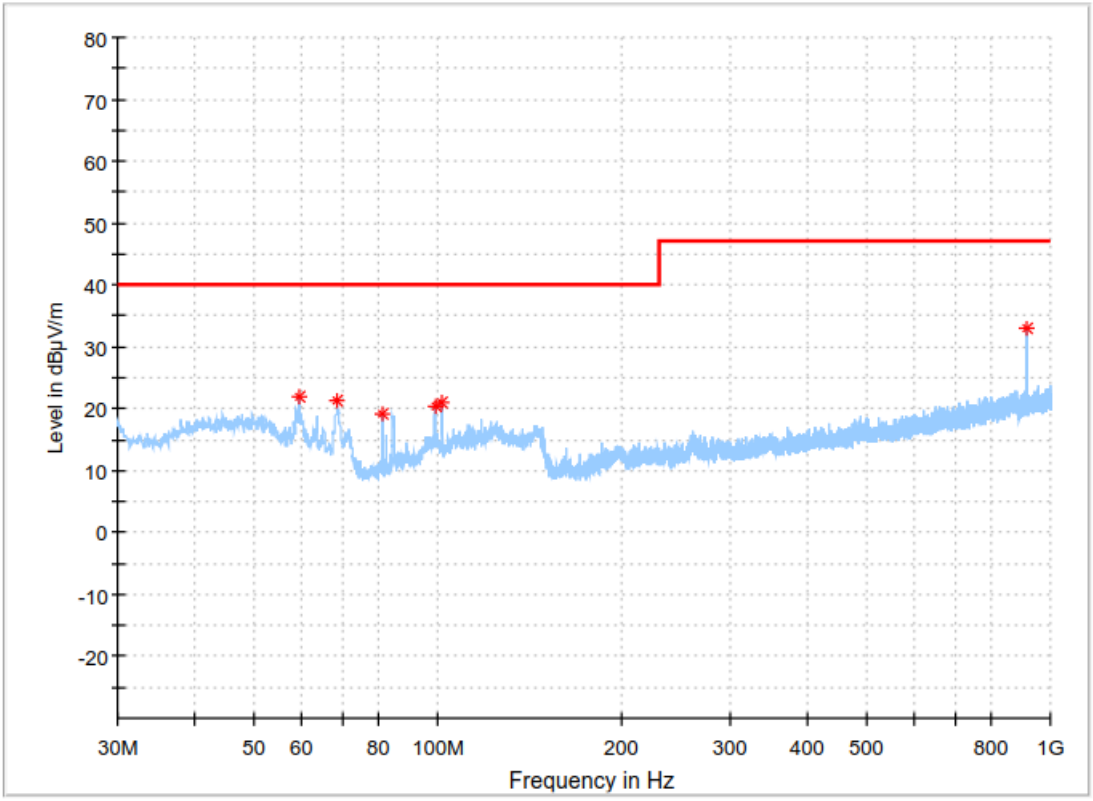
Model : SPARAC-R7S-12W-001-6
Operating Mode : Light on
Antenna polarity : Vertical
Test Date : 2023-3-5



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
213.114444	14.87	40.00	25.13	H	-36.0
68.638333	20.44	40.00	19.56	H	-37.1
101.672222	21.54	40.00	18.46	H	-35.3
146.453889	20.74	40.00	19.26	H	-39.0
98.870000	20.22	40.00	19.78	H	-35.3
939.698333	23.61	47.00	23.39	H	-24.1

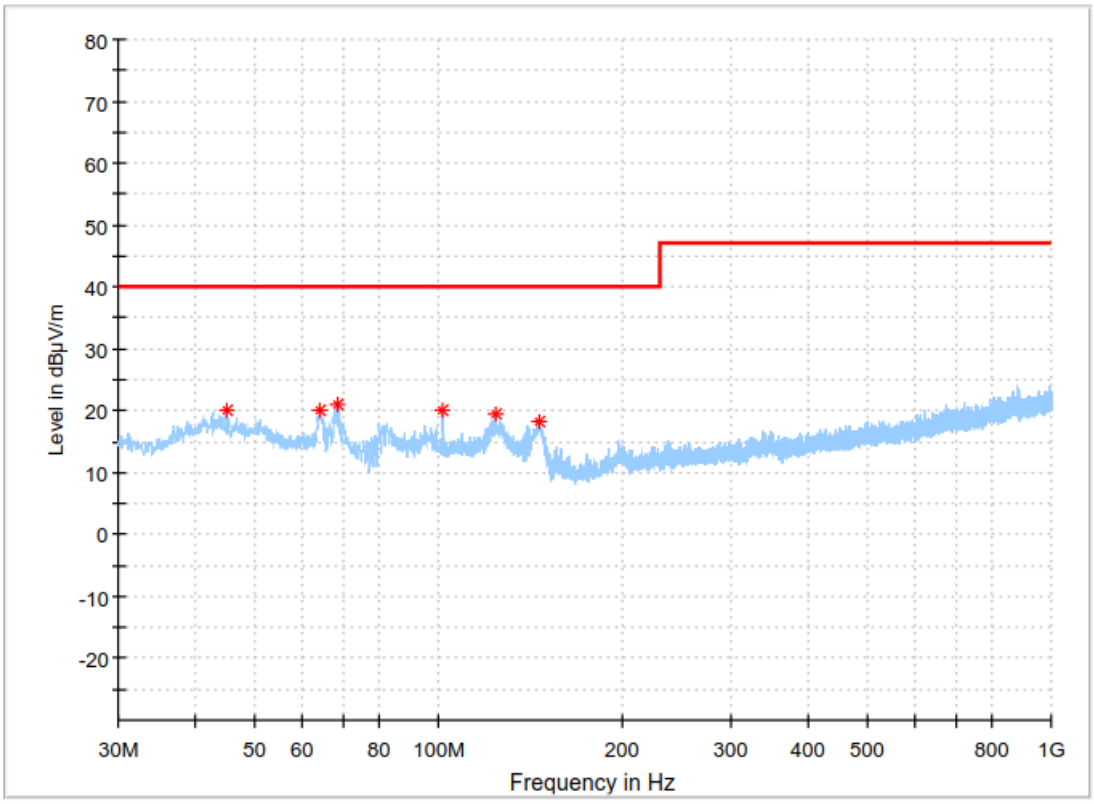
Model : SPARAC-R7S-12W-002-6
Operating Mode : Light on
Antenna polarity : Horizontal
Test Date : 2023-3-5



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
98.870000	20.26	40.00	19.74	V	-35.3
68.422778	21.40	40.00	18.60	V	-37.1
59.315556	21.90	40.00	18.10	V	-33.8
101.672222	20.93	40.00	19.07	V	-35.3
913.454444	33.01	47.00	13.99	V	-24.2
81.248333	19.26	40.00	20.74	V	-40.0

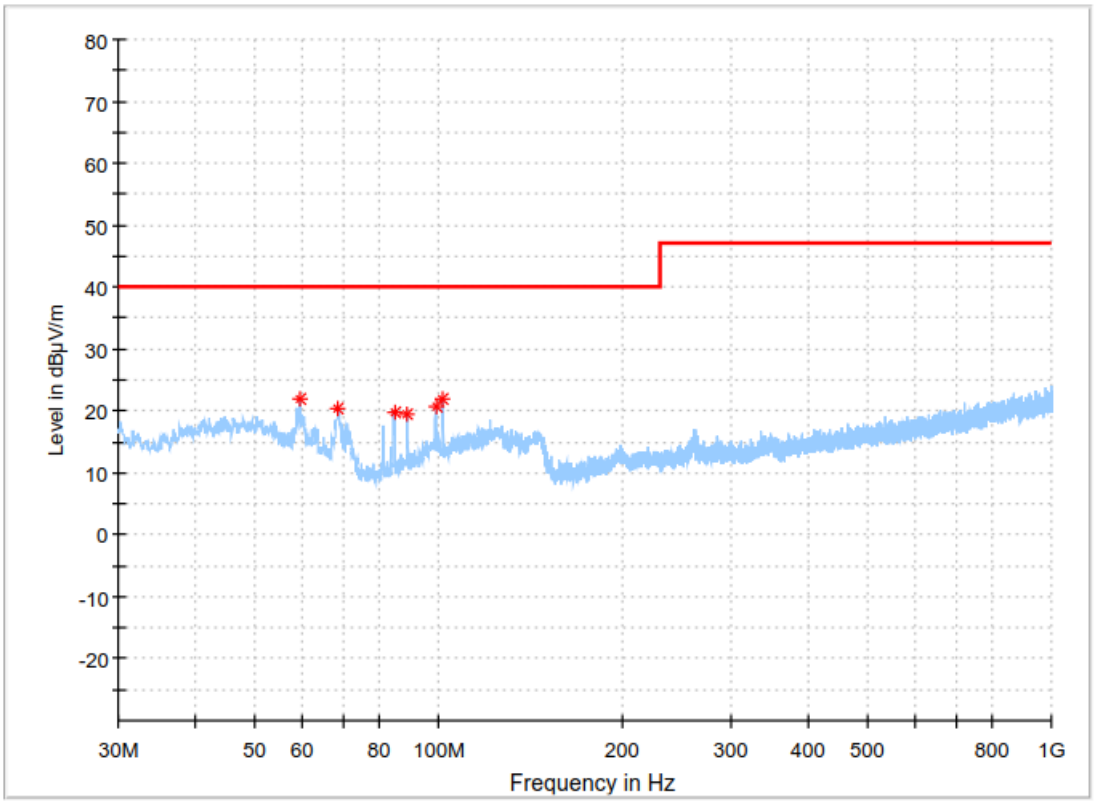
Model : SPARAC-R7S-12W-002-6
Operating Mode : Light on
Antenna polarity : Vertical
Test Date : 2023-3-5



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
45.035000	20.10	40.00	19.90	H	-32.7
101.672222	19.97	40.00	20.03	H	-35.3
68.584444	20.98	40.00	19.02	H	-37.1
123.605000	19.59	40.00	20.41	H	-37.6
64.165556	19.96	40.00	20.04	H	-35.7
145.591667	18.12	40.00	21.89	H	-39.1

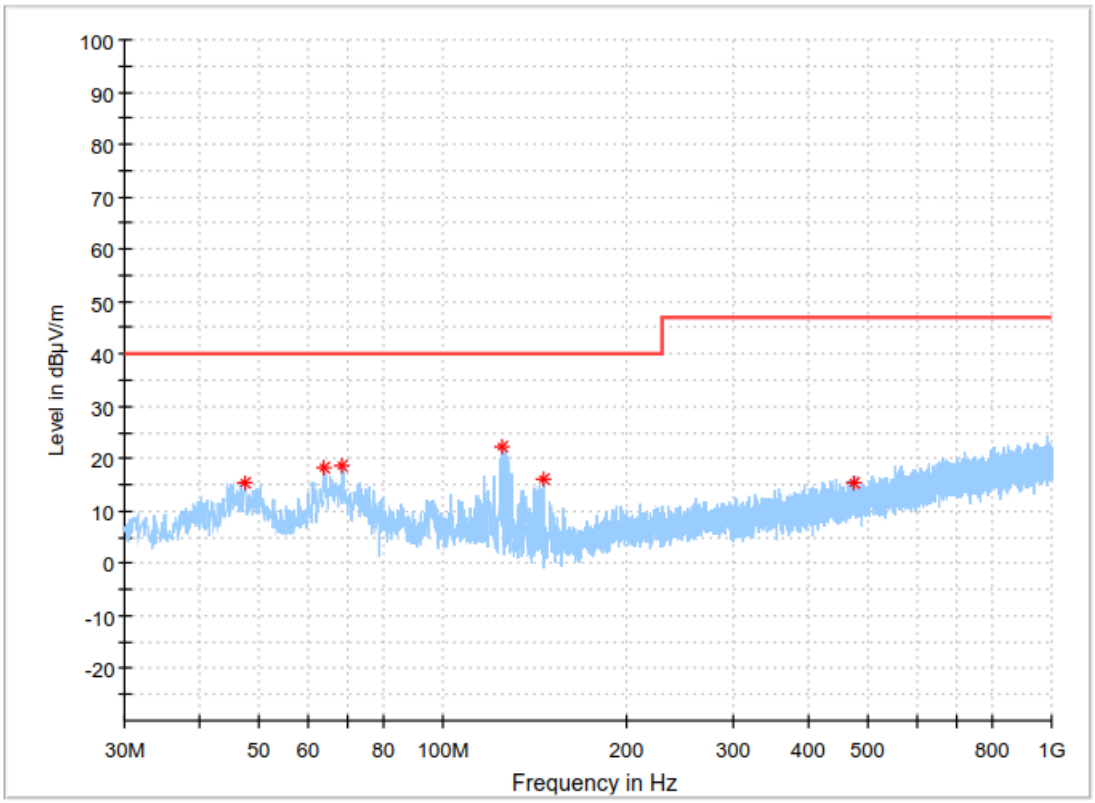
Model : SPARAC-R7S-19W-001-6
Operating Mode : Light on
Antenna polarity : Horizontal
Test Date : 2023-3-5



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
68.638333	20.53	40.00	19.47	V	-37.1
59.315556	21.88	40.00	18.12	V	-33.8
98.870000	20.69	40.00	19.31	V	-35.3
84.751111	19.78	40.00	20.22	V	-39.4
88.954444	19.45	40.00	20.55	V	-37.7
101.672222	22.03	40.00	17.97	V	-35.3

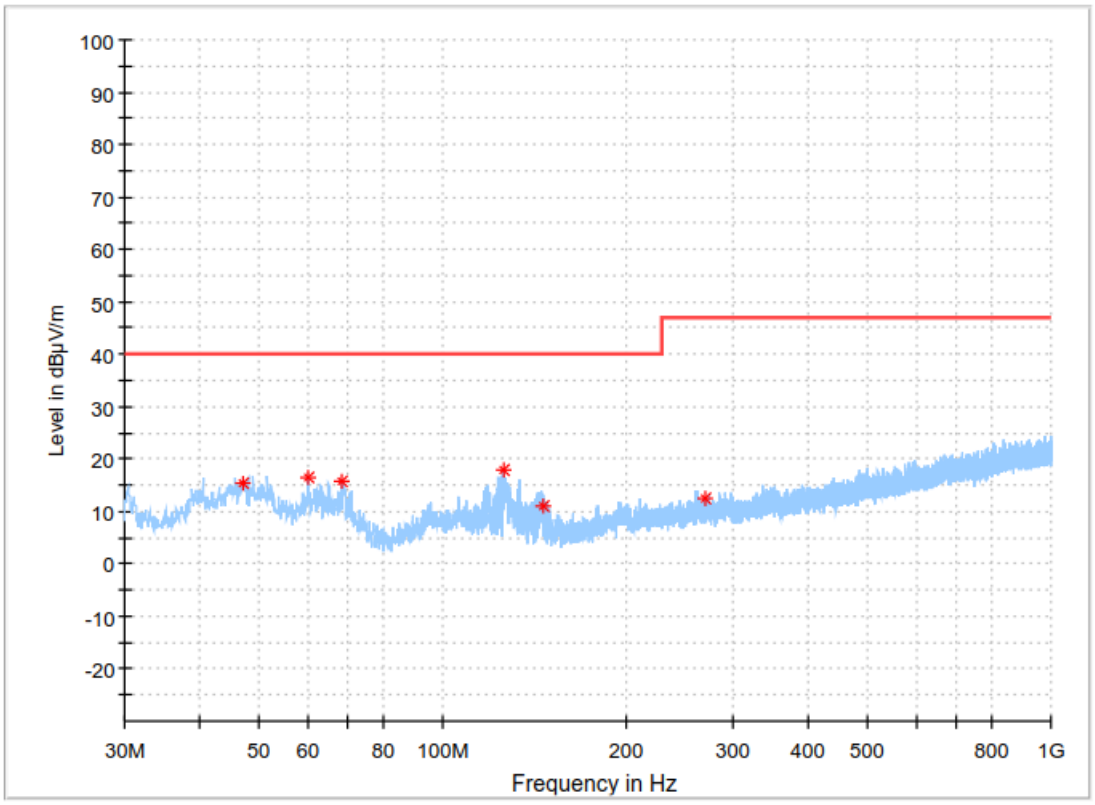
Model	:	SPARAC-R7S-19W-001-6
Operating Mode	:	Light on
Antenna polarity	:	Vertical
Test Date	:	2023-3-5



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
47.406111	15.48	40.00	24.52	H	-18.4
63.680556	18.47	40.00	21.53	H	-21.7
68.530556	18.53	40.00	21.47	H	-23.7
125.383333	22.15	40.00	17.85	H	-24.5
146.453889	15.98	40.00	24.02	H	-25.5
473.990556	15.33	47.00	31.67	H	-16.1

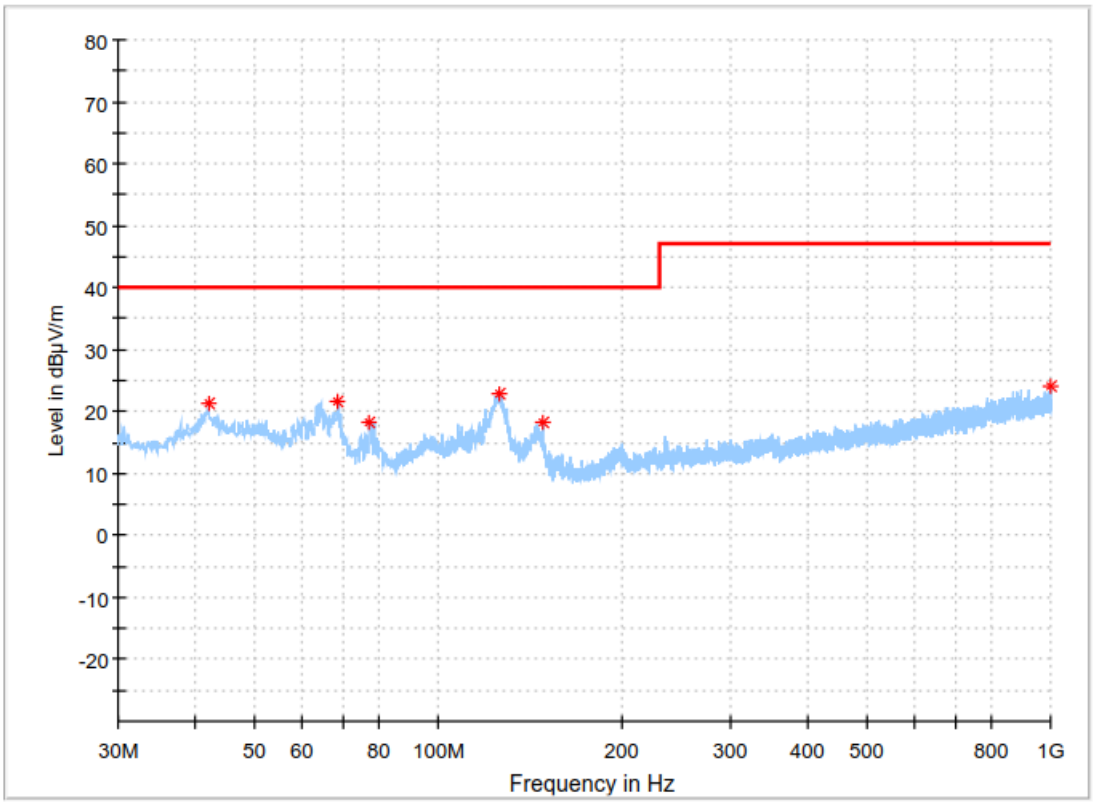
Model	:	SPARAC-R7S-10W-TG2-6
Operating Mode	:	Max light on, the worst mode
Antenna polarity	:	Horizontal
Test Date	:	2023-11-16



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
47.136667	15.45	40.00	24.55	V	-18.4
60.070000	16.66	40.00	23.34	V	-20.5
68.530556	15.70	40.00	24.30	V	-23.7
126.191667	18.09	40.00	21.91	V	-24.6
146.561667	10.98	40.00	29.02	V	-25.5
269.590000	12.43	47.00	34.57	V	-20.7

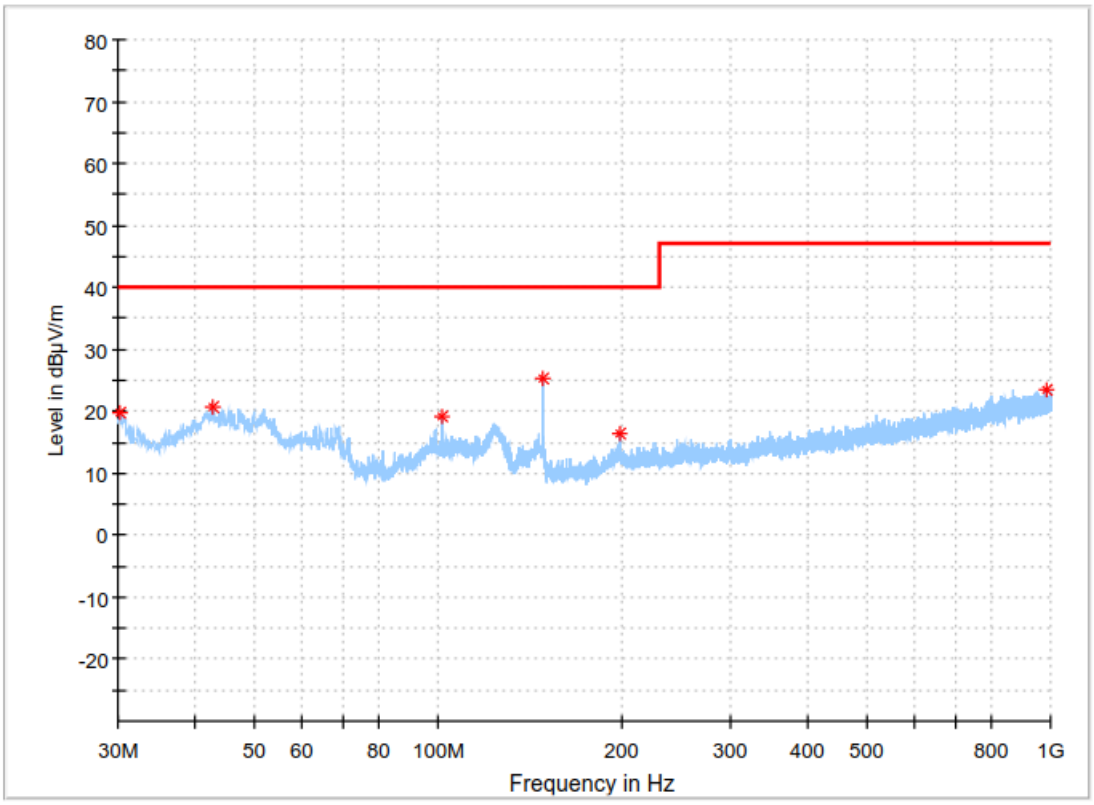
Model	:	SPARAC-R7S-10W-TG2-6
Operating Mode	:	Max light on, the worst mode
Antenna polarity	:	Vertical
Test Date	:	2023-11-16



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
42.232778	21.33	40.00	18.67	H	-33.0
68.638333	21.69	40.00	18.31	H	-37.1
77.314444	18.39	40.00	21.61	H	-39.8
125.868333	22.98	40.00	17.02	H	-38.1
148.340000	18.14	40.00	21.86	H	-39.0
997.305556	23.96	47.00	23.04	H	-23.3

Model : SPARAC-R7S-19W-TG1-6
Operating Mode : Max light on, the worst mode
Antenna polarity : Horizontal
Test Date : 2023-3-16



Critical Freqs

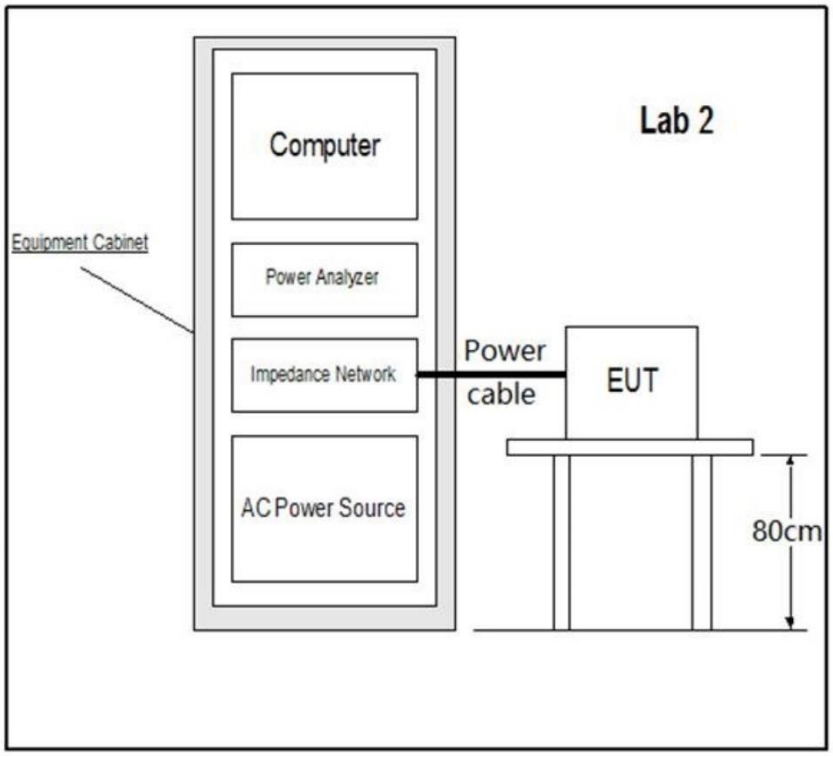
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
30.269444	19.64	40.00	20.36	V	-36.1
42.987222	20.79	40.00	19.21	V	-32.9
101.672222	19.29	40.00	20.71	V	-35.3
148.340000	25.42	40.00	14.58	V	-39.0
198.025556	16.36	40.00	23.64	V	-35.2
986.851111	23.47	47.00	23.53	V	-23.5

Model : SPARAC-R7S-19W-TG1-6
Operating Mode : Max light on, the worst mode
Antenna polarity : Vertical
Test Date : 2023-3-16

2.4 Harmonic current emission

2.4.1 Test Method

Harmonic current test should be conducted with the user's operation control or automatic programs set to the mode expected to produce the maximum total harmonic current under normal operating conditions.
Specific test conditions for the measurement of harmonic currents associated with some types of equipment are given in test equipment list.

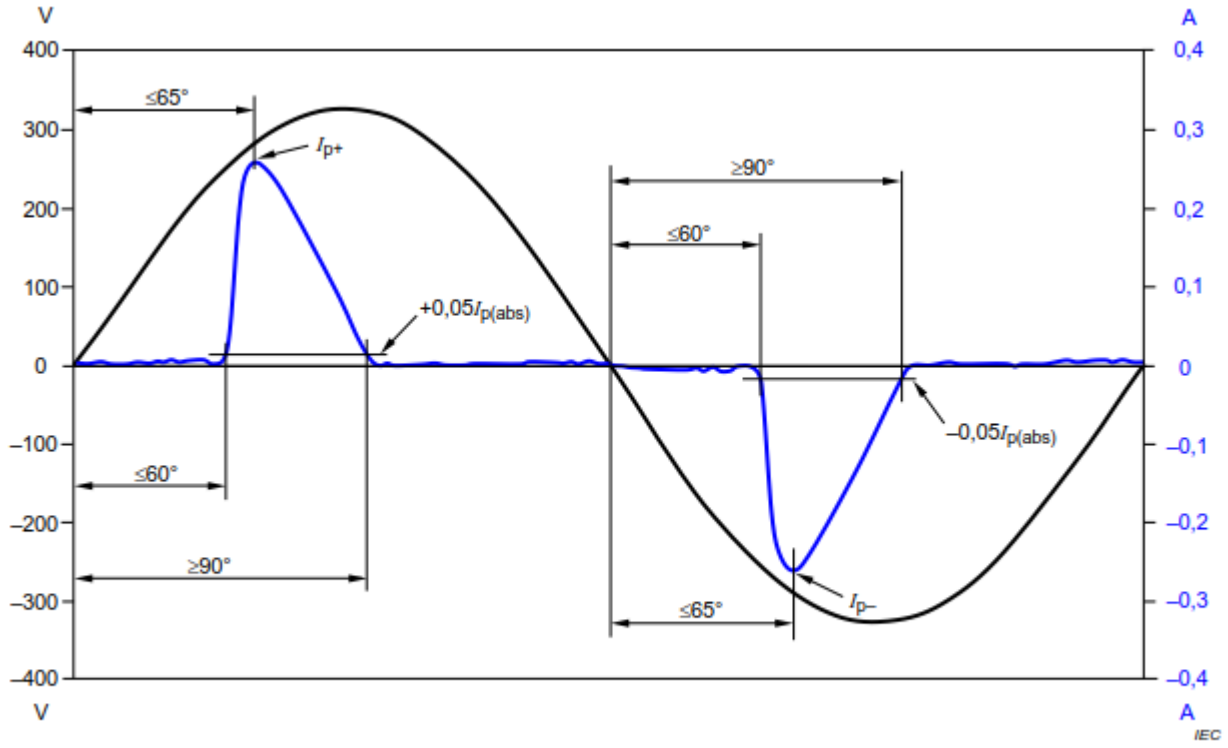


2.4.2 Specification Limits

1. According to EN 61000-3-2:2014, for lighting equipment (Class C) with power ≤25W. no limit is applied. Test is applicable for discharge light below 25W with limit of 1.1, 1.2.
According to EN IEC 61000-3-2:2019/A1:2021, for lighting equipment (Class C) with power <5W, no limit is applied.
For lighting equipment (Class C) with power ≥5W and ≤ 25W. Limit of 1.1, 1.2, or 1.3 are acceptable.
1.1

Limits for class C Equipment active input power ≥5W and ≤ 25W	
Harmonic order h	Maximum permissible harmonic current per watt mA/W
3	3.4
5	1.9
7	1.0
9	0.5
11	0.35
13≤ n≤ 39 (odd harmonic only)	3.85/π

1.2 The third harmonic current, expressed as a percentage of the fundamental current, shall not exceed 86% and the fifth harmonic current shall not exceed 61%.
The waveform of the input current should be such that it reaches the 5% current threshold before or at 60°, has its peak value before or at 65° and does not fall below at 5% current threshold before 90°, referred to any zero crossing of the fundamental supply voltage.



NOTE $I_{p(abs)}$ is the higher absolute value of I_{p+} and I_{p-}.

1.3 The THD shall not exceed 70 %. The third order harmonic current, expressed as a percentage of the fundamental current, shall not exceed 35 %, the fifth order current shall not exceed 25 %, the seventh order current shall not exceed 30 %, the ninth and eleventh order currents shall not exceed 20 % and the second order current shall not exceed 5 %.

If the lighting equipment includes means for control (e.g. dimming, colour), or is specified to drive multiple loads, then the measurement is made only at the control setting and the load of lamps that gives the maximum active input power.

2. For lighting equipment with input power >25W (Class C).

Limits for class C Equipment active input power > 25W	
Harmonic order h	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency %
2	2
3	27
5	10
7	7
9	5
11≤ h≤ 39 (odd harmonic only)	3
[a] λ is the circuit power factor.	

3. For independent phase control dimmers and professional luminaires for stage lighting and studios, and other luminaires not listed in Class C, limit of Class A is applicable.

Limits for class A Equipment	
Harmonic order h	Maximum permissible harmonic current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15≤ h≤ 39	0.15(15/h)
Even harmonics	
2	1.08
4	0.43
6	0.30
8≤ h ≤40	0.23(8/h)

Remark: when active input power <75W, Test is applicable.

2.4.3 Test Setup



2.4.4 Test Location

This test was carried out in Harmonic Flicker Test area.

2.4.5 Test Results

Report Number :	EMS_SPARAC-R7S-7W-002-6_230V 50HZ_HAR_Mod 1
Test Object :	SPARAC-R7S-7W-002-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 50Hz)
Company :	TUV Panyu EMC Lab
Test Date :	11/18/2023 3:11:22 PM

Result			
E.U.T. :	PASS	Source :	PASS

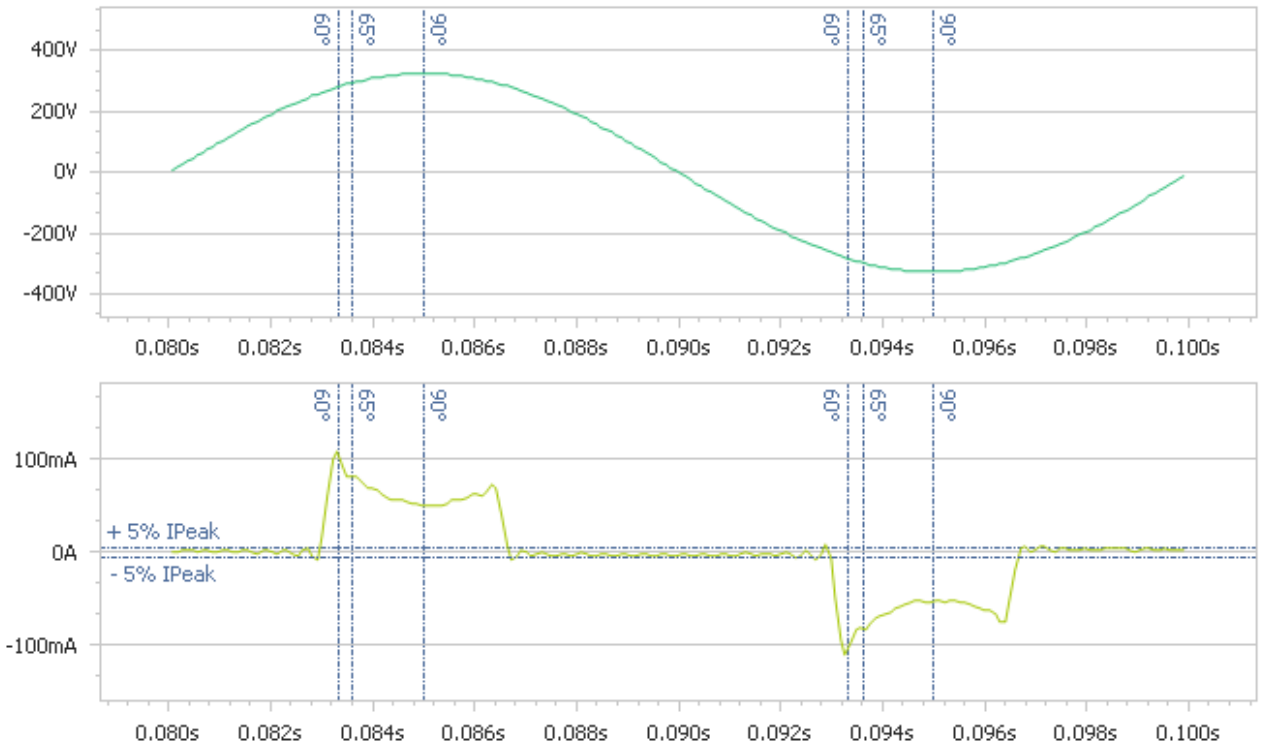
Test Object / Product			
Name :	SPARAC-R7S-7W-002-6	Operation Mode :	Max light on

Measured values			
Fundamental Current			
Line 1:	0.03 A		
Active input Power			
Line 1:	6.877 W *		
Circuit power factor			
Line 1:	0.764 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
6.805 W	-5.863 var	8.982 VA	0.7576
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.015e-3	0.9852
Irms	Crest Factor (I)	THD (I)	
38.99 mA	2.800	0.8177	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	98.999				100.000				
2	0.761				1.074				
3	60.153	69.945	86.000	PASS	62.270	72.407	86.000	PASS	PASS
4	0.782				0.986				
5	8.181	13.412	61.000	n/a	9.785	16.042	61.000	n/a	PASS



Model	:	SPARAC-R7S-7W-002-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 50Hz
Test Date	:	2023-11-18

Report Number :	EMS_SPARAC-R7S-7W-002-6_230V60HZ_HAR_Mod 1
Test Object :	SPARAC-R7S-7W-002-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 60Hz)
Company :	TUV Panyu EMC Lab
Test Date :	11/18/2023 3:17:35 PM

Result			
E.U.T. :	PASS	Source :	PASS

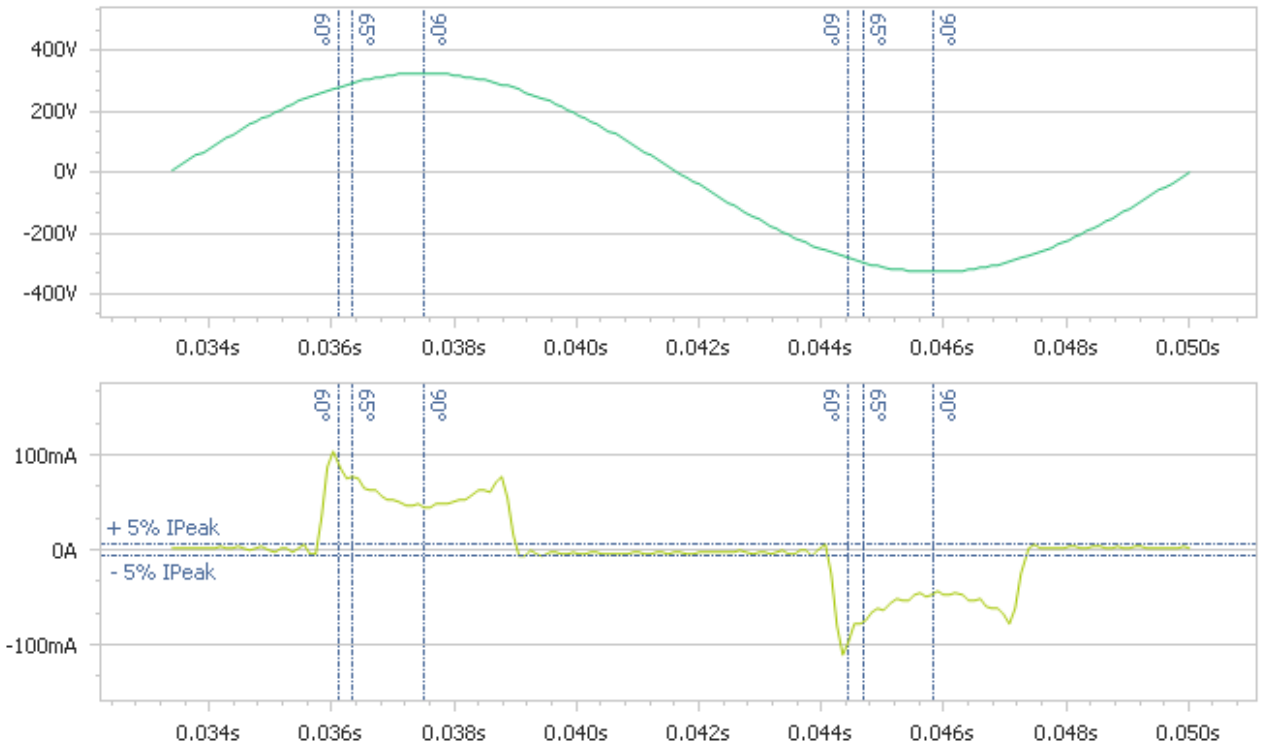
Test Object / Product			
Name :	SPARAC-R7S-7W-002-6	Operation Mode :	Max light on

Measured values			
Fundamental Current			
Line 1:	0.03 A		
Active input Power			
Line 1:	6.852 W *		
Circuit power factor			
Line 1:	0.778 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
6.840 W	-5.530 var	8.796 VA	0.7777
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.027e-3	0.9911
Irms	Crest Factor (I)	THD (I)	
38.18 mA	2.790	0.7827	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	99.829				100.000				
2	0.779				1.059				
3	53.775	62.529	86.000	PASS	54.370	63.221	86.000	PASS	PASS
4	0.976				1.140				
5	8.391	13.756	61.000	n/a	8.709	14.277	61.000	n/a	PASS



Model	:	SPARAC-R7S-7W-002-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 60Hz
Test Date	:	2023-11-18

Report Number :	EMS-SPARAC-R7S-8
Test Object :	SPARAC-R7S-8.5W-001-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 50Hz)
Company :	TUV Panyu EMC Lab
Test Date :	3/4/2023 10:42:36 AM

Result

E.U.T. :	PASS	Source :	PASS

Test Object / Product

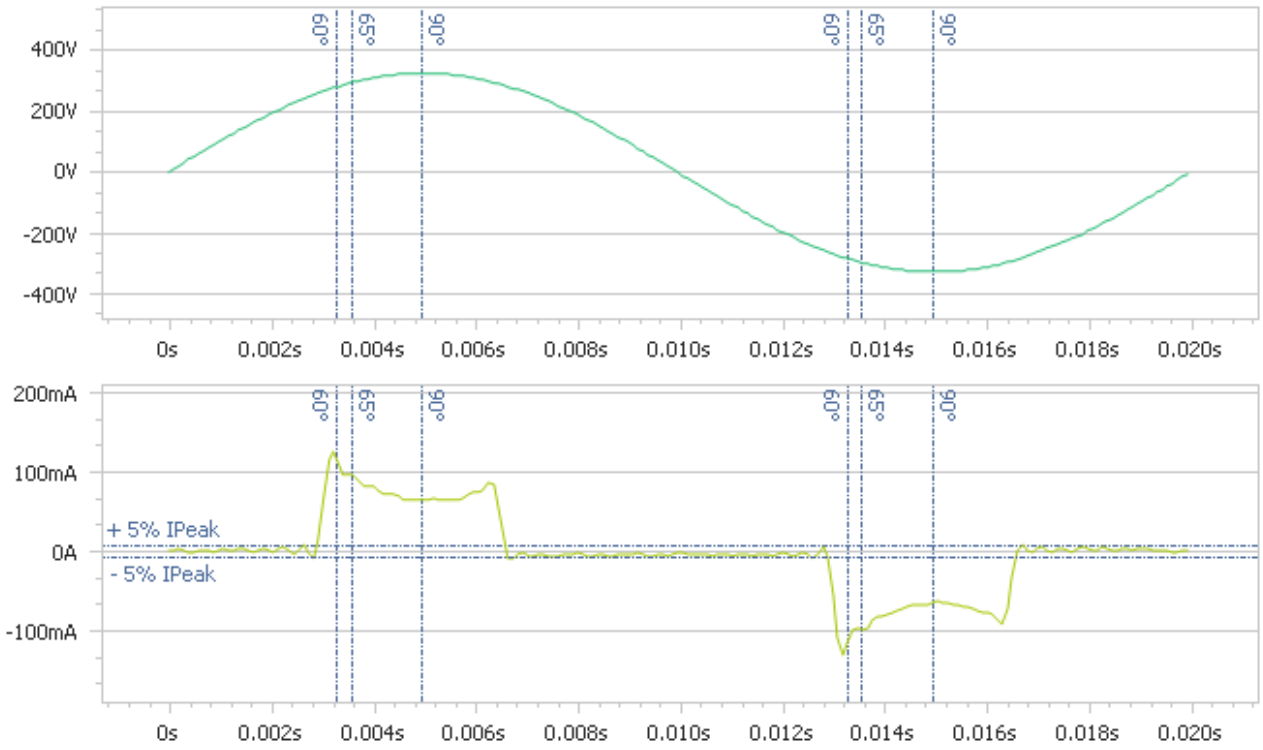
Name :	SPARAC-R7S-8.5W-001-6	Operation Mode :	Max light on

Measured values			
Fundamental Current			
Line 1:	0.037 A		
Active input Power			
Line 1:	8.439 W *		
Circuit power factor			
Line 1:	0.77 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
8.156 W	-6.927 var	10.70 VA	0.7621
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.007e-3	0.9844
Irms	Crest Factor (I)	THD (I)	
46.47 mA	2.720	0.7847	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	96.664				100.000				
2	0.636				0.912				
3	59.154	68.784	86.000	PASS	62.324	72.470	86.000	PASS	PASS
4	0.666				0.867				
5	8.074	13.237	61.000	n/a	9.593	15.725	61.000	n/a	PASS



Model	:	SPARAC-R7S-8.5W-001-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 50Hz
Test Date	:	2023-3-4

Report Number :	EMS-SPARAC-R7S-8
Test Object :	SPARAC-R7S-8.5W-001-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 60Hz)
Company :	TUV Panyu EMC Lab
Test Date :	3/4/2023 10:35:47 AM

Result

E.U.T. :	PASS	Source :	PASS

Test Object / Product

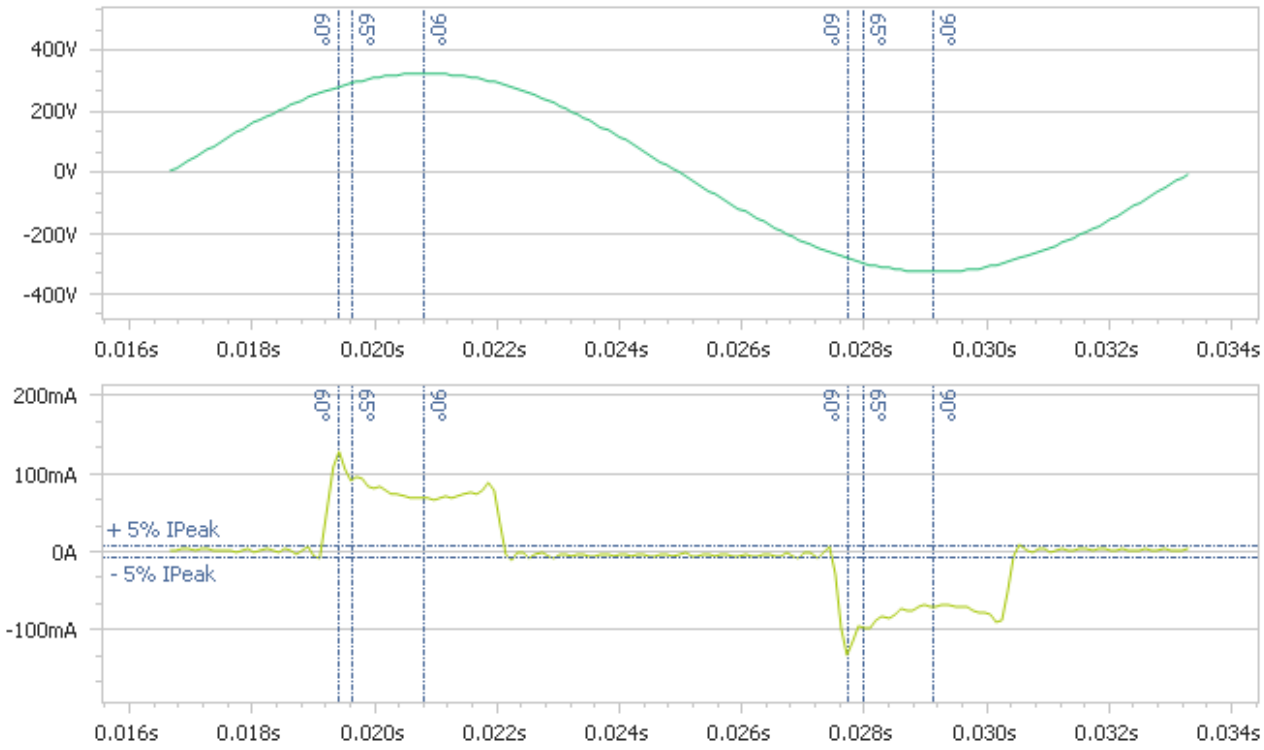
Name :	SPARAC-R7S-8.5W-001-6	Operation Mode :	mode1

Measured values			
Fundamental Current			
Line 1:	0.037 A		
Active input Power			
Line 1:	8.4 W *		
Circuit power factor			
Line 1:	0.765 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
8.328 W	-7.110 var	10.95 VA	0.7605
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
231.0 V	1.415	1.015e-3	0.9863
Irms	Crest Factor (I)	THD (I)	
47.53 mA	2.709	0.8131	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	99.042				100.000				
2	0.908				1.019				
3	62.050	72.151	86.000	PASS	64.041	74.466	86.000	PASS	PASS
4	1.131				1.268				
5	9.929	16.277	61.000	n/a	12.321	20.198	61.000	n/a	PASS



Model	:	SPARAC-R7S-8.5W-001-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 60Hz
Test Date	:	2023-3-4

Report Number :	EMS-SPARAC-R7S-10W-002-6-230V50HZ-HAR-M1-1146
Test Object :	SPARAC-R7S-10W-002-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 50Hz)
Company :	TUV Panyu EMC Lab
Test Date :	3/4/2023 11:47:37 AM

Result

E.U.T. :	PASS	Source :	PASS

Test Object / Product

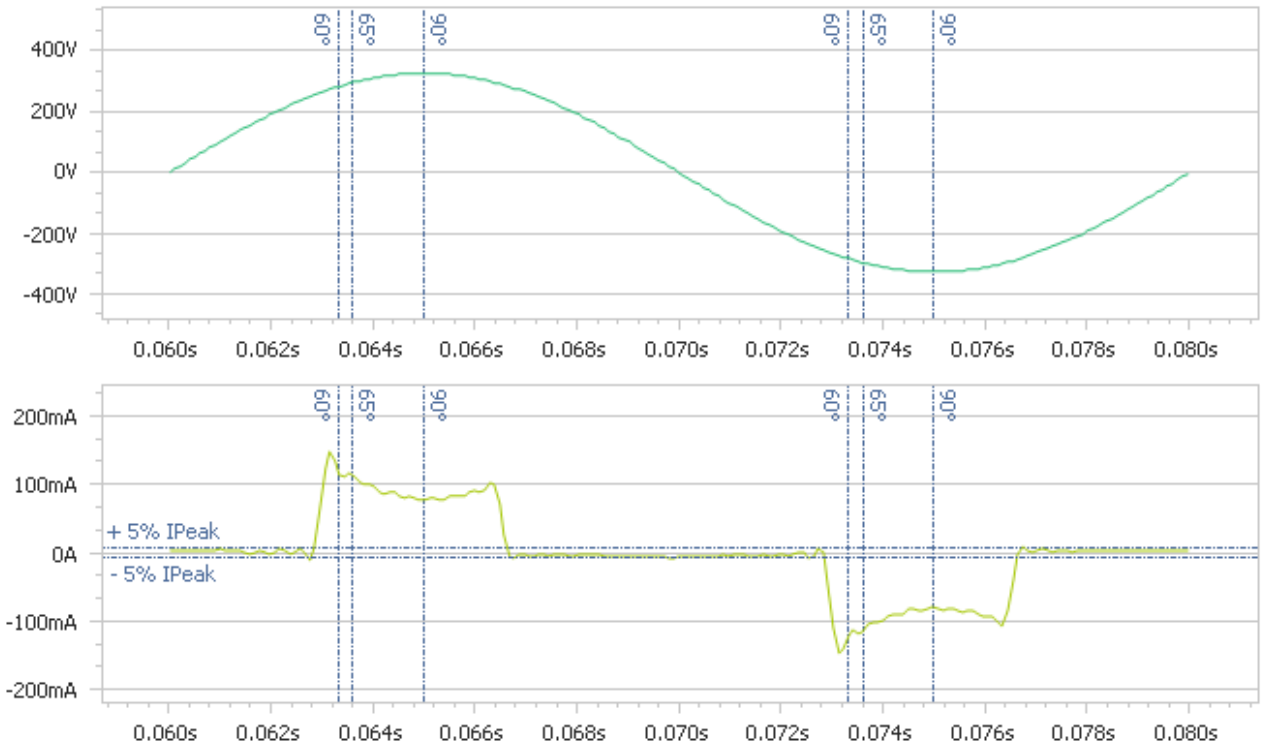
Name :	SPARAC-R7S-10W-002-6	Operation Mode :	mode1

Measured values			
Fundamental Current			
Line 1:	0.046 A		
Active input Power			
Line 1:	10.344 W *		
Circuit power factor			
Line 1:	0.783 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
10.04 W	-8.085 var	12.89 VA	0.7787
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.8 V	1.415	1.008e-3	0.9867
Irms	Crest Factor (I)	THD (I)	
55.97 mA	2.621	0.7492	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	96.894				100.000				
2	0.540				0.929				
3	56.884	66.144	86.000	PASS	59.781	69.512	86.000	PASS	PASS
4	0.503				0.604				
5	7.234	11.860	61.000	n/a	8.281	13.576	61.000	n/a	PASS



Model	:	SPARAC-R7S-10W-002-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 50Hz
Test Date	:	2023-3-4

Report Number :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 60Hz)
Test Object :	SPARAC-R7S-10W-002-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 60Hz)
Company :	TUV Panyu EMC Lab
Test Date :	3/4/2023 11:48:30 AM

Result

E.U.T. :	PASS	Source :	PASS

Test Object / Product

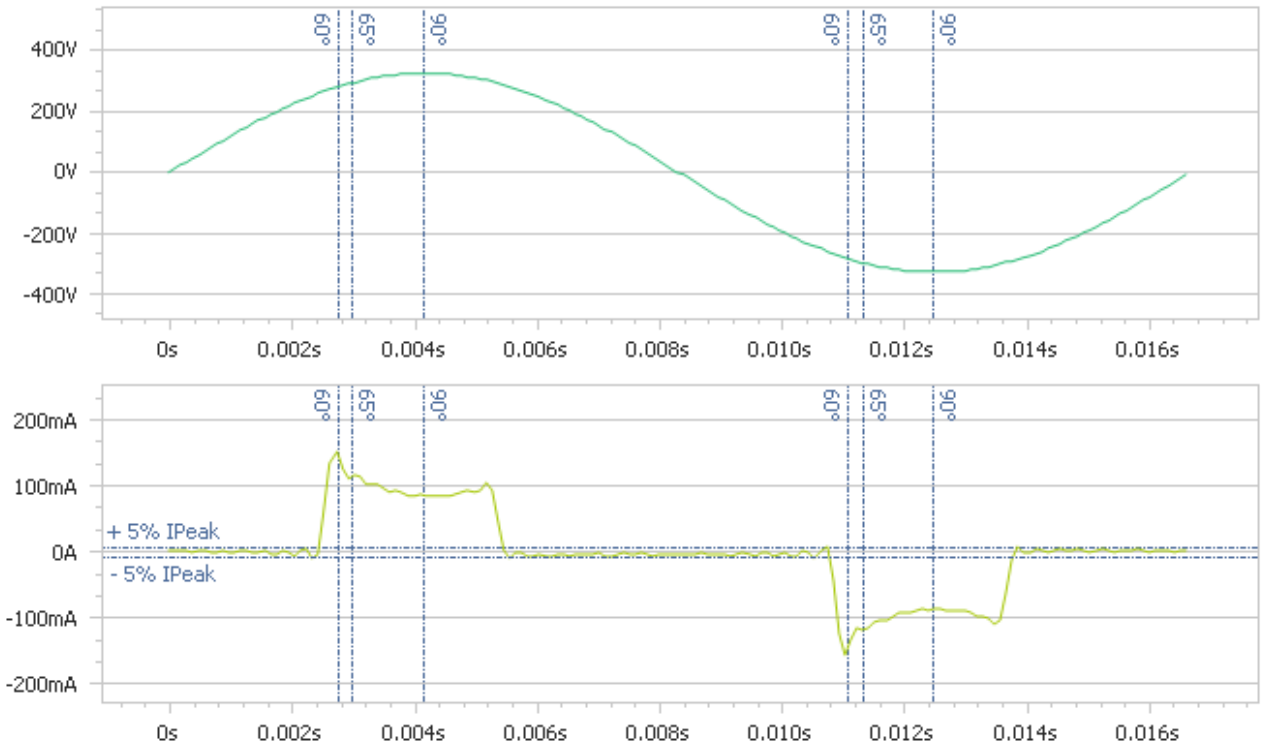
Name :	SPARAC-R7S-10W-002-6	Operation Mode :	mode1

Measured values			
Fundamental Current			
Line 1:	0.045 A		
Active input Power			
Line 1:	10.333 W *		
Circuit power factor			
Line 1:	0.777 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
10.31 W	-8.484 var	13.35 VA	0.7721
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.017e-3	0.9887
Irms	Crest Factor (I)	THD (I)	
57.92 mA	2.622	0.7929	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	99.677				100.000				
2	0.677				0.850				
3	61.288	71.265	86.000	PASS	63.567	73.915	86.000	PASS	PASS
4	0.808				0.887				
5	9.428	15.456	61.000	n/a	12.662	20.758	61.000	PASS	PASS



Model	:	SPARAC-R7S-10W-002-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 60Hz
Test Date	:	2023-3-4

Report Number :	EMS-SPARAC-R7S-12
Test Object :	SPARAC-R7S-12W-001-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 50Hz)
Company :	TUV Panyu EMC Lab
Test Date :	3/4/2023 11:24:07 AM

Result

E.U.T. :	PASS	Source :	PASS

Test Object / Product

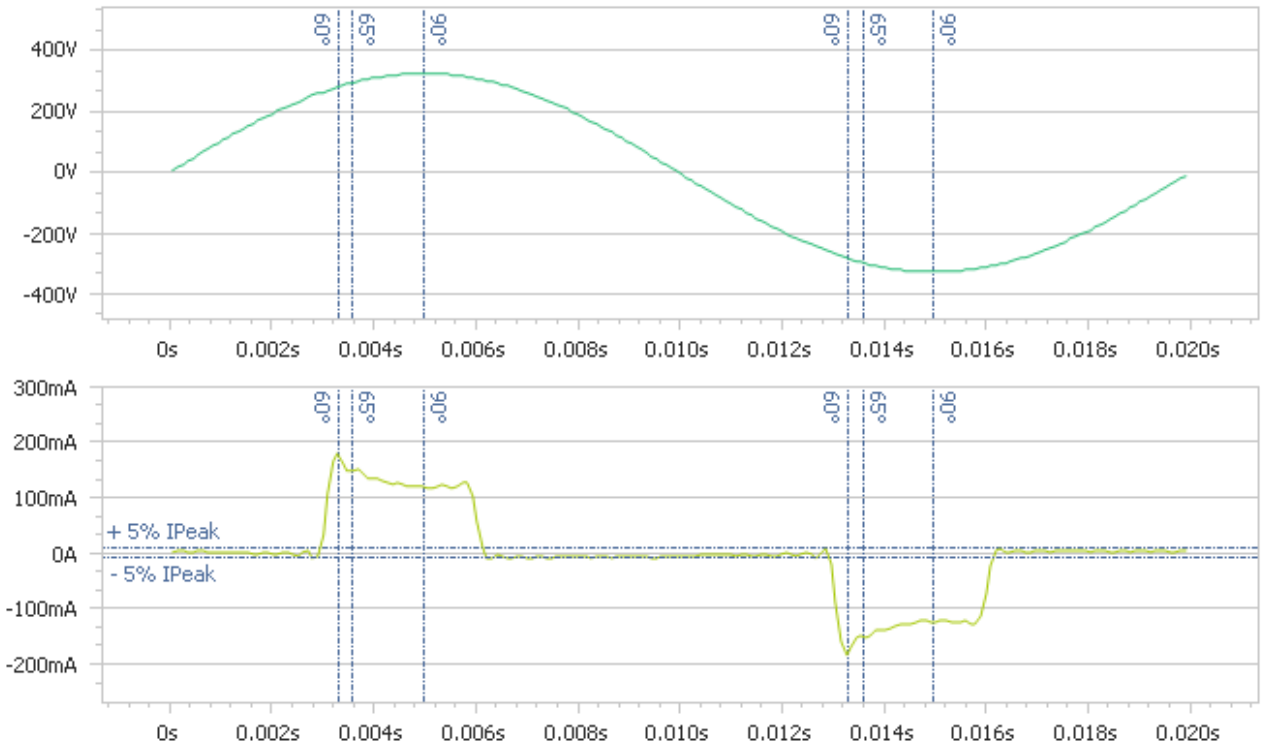
Name :	SPARAC-R7S-12W-001-6	Operation Mode :	mode1

Measured values			
Fundamental Current			
Line 1:	0.054 A		
Active input Power			
Line 1:	12.134 W *		
Circuit power factor			
Line 1:	0.749 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
12.04 W	-11.18 var	16.43 VA	0.7329
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.8 V	1.415	1.009e-3	0.9768
Irms	Crest Factor (I)	THD (I)	
71.22 mA	2.510	0.8748	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	99.563				100.000				
2	0.470				0.731				
3	70.767	82.287	86.000	PASS	74.383	86.492	86.000	PASS	PASS
4	0.459				0.556				
5	26.102	42.790	61.000	PASS	30.784	50.466	61.000	PASS	PASS



Model	:	SPARAC-R7S-12W-001-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 50Hz
Test Date	:	2023-3-4

Report Number :	EMS-SPARAC-R7S-12
Test Object :	SPARAC-R7S-12W-001-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 60Hz)
Company :	TUV Panyu EMC Lab
Test Date :	3/4/2023 11:33:42 AM

Result

E.U.T. :	PASS	Source :	PASS

Test Object / Product

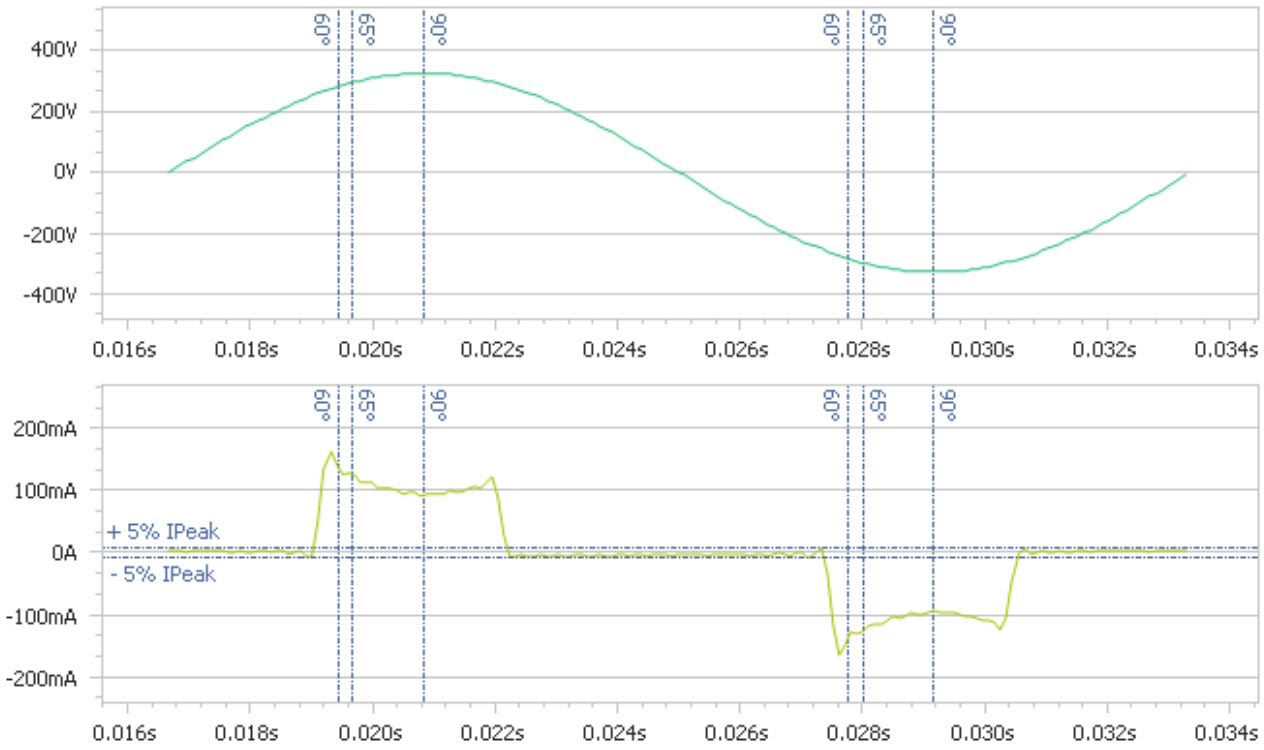
Name :	SPARAC-R7S-12W-001-6	Operation Mode :	mode1

Measured values			
Fundamental Current			
Line 1:	0.053 A		
Active input Power			
Line 1:	11.982 W *		
Circuit power factor			
Line 1:	0.786 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
11.85 W	-9.360 var	15.10 VA	0.7847
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.017e-3	0.9892
Irms	Crest Factor (I)	THD (I)	
65.47 mA	2.486	0.7543	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	98.795				100.000				
2	0.633				0.781				
3	58.904	68.493	86.000	PASS	60.043	69.817	86.000	PASS	PASS
4	0.692				0.784				
5	6.878	11.275	61.000	n/a	7.392	12.118	61.000	n/a	PASS



Model	:	SPARAC-R7S-12W-001-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 60Hz
Test Date	:	2023-3-4

Report Number :	EMS-SPARAC-R7S-12
Test Object :	SPARAC-R7S-12W-002-6L
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 50Hz)
Company :	TUV Panyu EMC Lab
Test Date :	3/4/2023 10:53:14 AM

Result

E.U.T. :	PASS	Source :	PASS

Test Object / Product

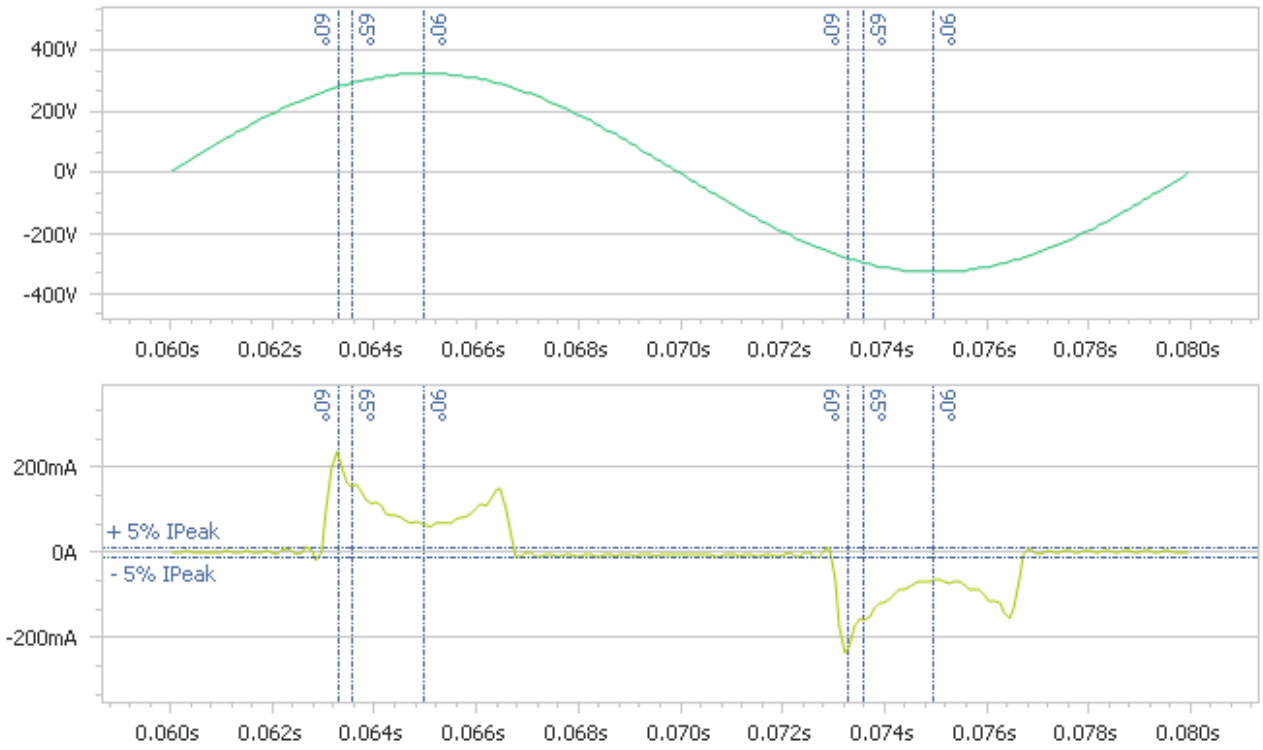
Name :	SPARAC-R7S-12W-002-6L	Operation Mode :	mode1

Measured values			
Fundamental Current			
Line 1:	0.053 A		
Active input Power			
Line 1:	11.986 W *		
Circuit power factor			
Line 1:	0.735 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
11.79 W	-11.07 var	16.18 VA	0.7288
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.009e-3	0.9886
Irms	Crest Factor (I)	THD (I)	
70.38 mA	3.392	0.8922	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	98.383				100.000				
2	1.564				1.857				
3	51.159	59.488	86.000	PASS	53.074	61.714	86.000	PASS	PASS
4	0.806				1.010				
5	18.303	30.004	61.000	PASS	20.995	34.418	61.000	PASS	PASS



Model	:	SPARAC-R7S-12W-002-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 50Hz
Test Date	:	2023-3-4

Report Number :	EMS-SPARAC-R7S-12
Test Object :	SPARAC-R7S-12W-002-6L
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 60Hz)
Company :	TUV Panyu EMC Lab
Test Date :	3/4/2023 11:01:41 AM

Result

E.U.T. :	PASS	Source :	PASS

Test Object / Product

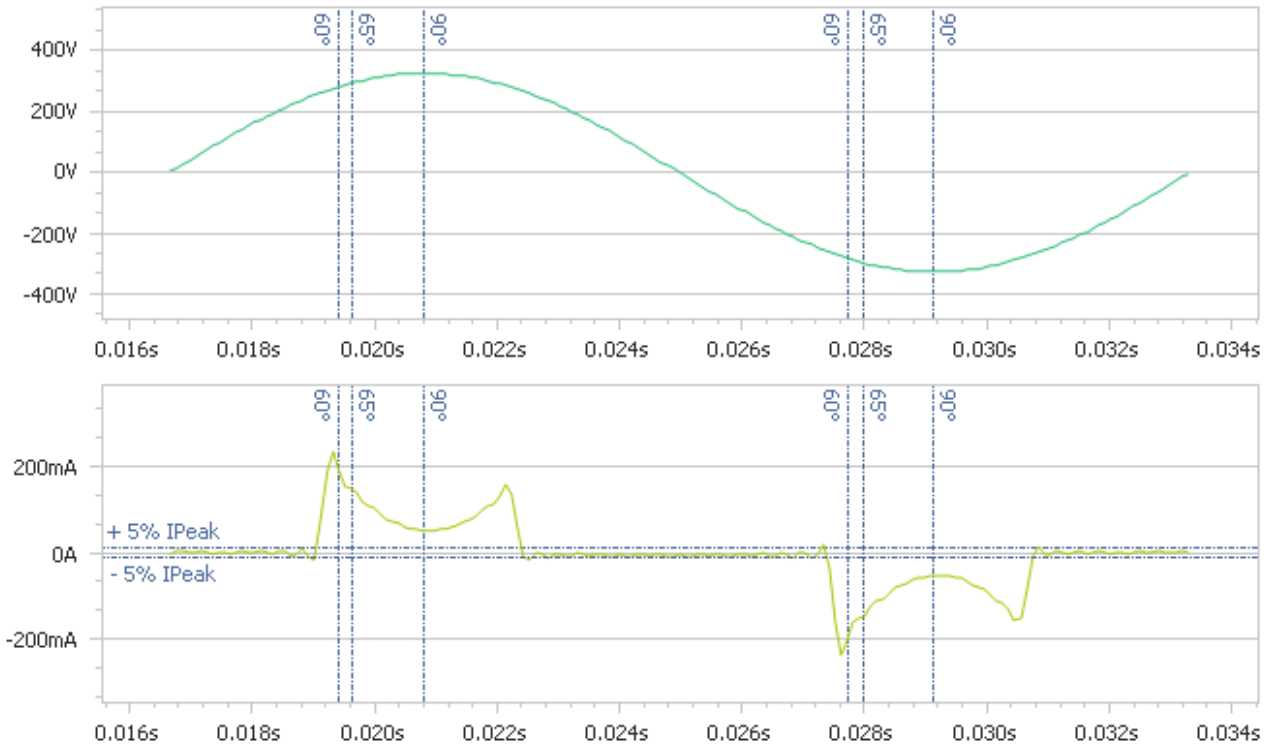
Name :	SPARAC-R7S-12W-002-6L	Operation Mode :	mode1

Measured values			
Fundamental Current			
Line 1:	0.052 A		
Active input Power			
Line 1:	11.793 W *		
Circuit power factor			
Line 1:	0.732 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
11.73 W	-11.01 var	16.09 VA	0.7292
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.018e-3	0.9915
Irms	Crest Factor (I)	THD (I)	
69.95 mA	3.374	0.9084	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	99.463				100.000				
2	0.808				0.970				
3	43.435	50.505	86.000	PASS	44.124	51.307	86.000	PASS	PASS
4	0.820				0.918				
5	28.436	46.616	61.000	PASS	29.302	48.035	61.000	PASS	PASS



Model	:	SPARAC-R7S-12W-002-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 60Hz
Test Date	:	2023-3-4

Report Number :	EMS-SPARAC-R7S-19W-001-6-230V50HZ-HAR-M1-1115
Test Object :	SPARAC-R7S-19W-001-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 50Hz)
Company :	TUV Panyu EMC Lab
Test Date :	3/4/2023 11:15:46 AM

Result

E.U.T. :	PASS	Source :	PASS

Test Object / Product

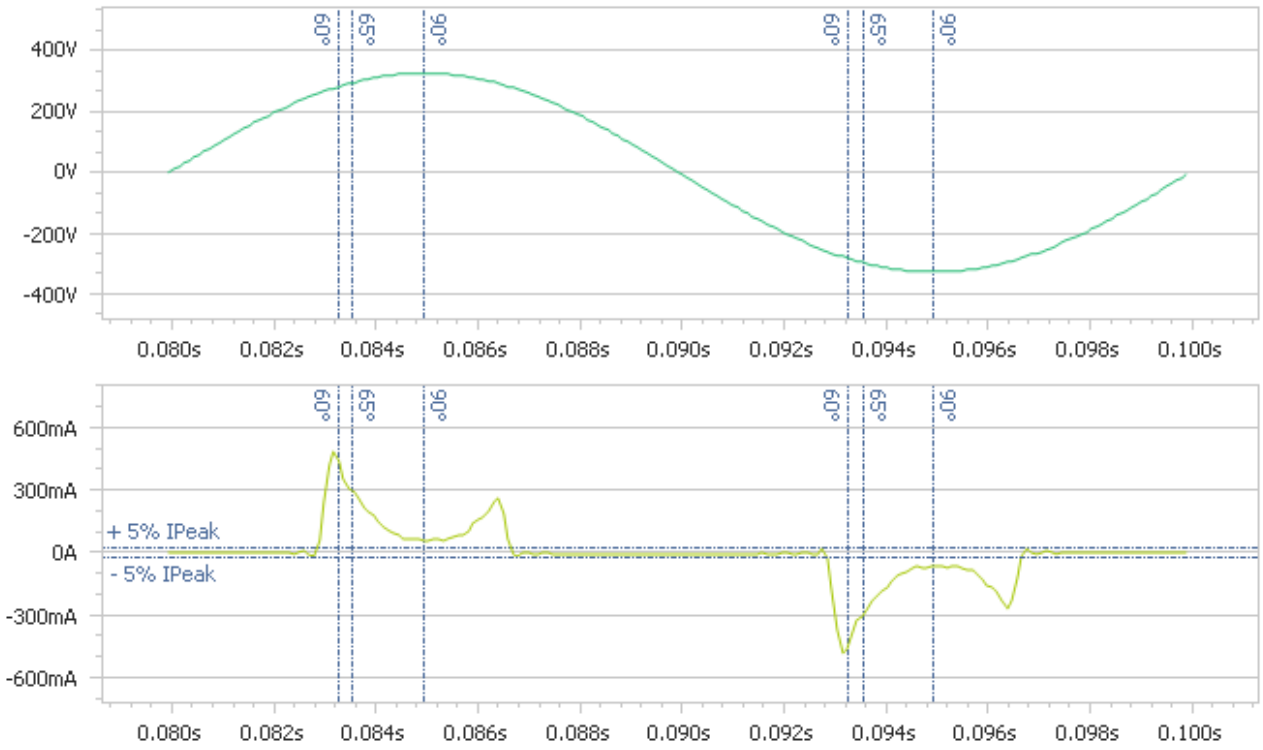
Name :	SPARAC-R7S-19W-001-6	Operation Mode :	mode1

Measured values			
Fundamental Current			
Line 1:	0.083 A		
Active input Power			
Line 1:	18.636 W *		
Circuit power factor			
Line 1:	0.648 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
18.52 W	-21.92 var	28.69 VA	0.6453
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.009e-3	0.9764
Irms	Crest Factor (I)	THD (I)	
124.4 mA	3.939	1.122	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	99.399				100.000				
2	0.364				0.505				
3	49.264	57.283	86.000	PASS	50.272	58.456	86.000	PASS	PASS
4	0.422				0.531				
5	37.907	62.142	61.000	PASS	38.725	63.484	61.000	PASS	PASS



Model	:	SPARAC-R7S-19W-001-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 50Hz
Test Date	:	2023-3-4

Report Number :	EMS-SPARAC-R7S-19W-001-6-230V60HZ-HAR-M1-1107
Test Object :	SPARAC-R7S-19W-001-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 60Hz)
Company :	TUV Panyu EMC Lab
Test Date :	3/4/2023 11:08:53 AM

Result

E.U.T. :	PASS	Source :	PASS

Test Object / Product

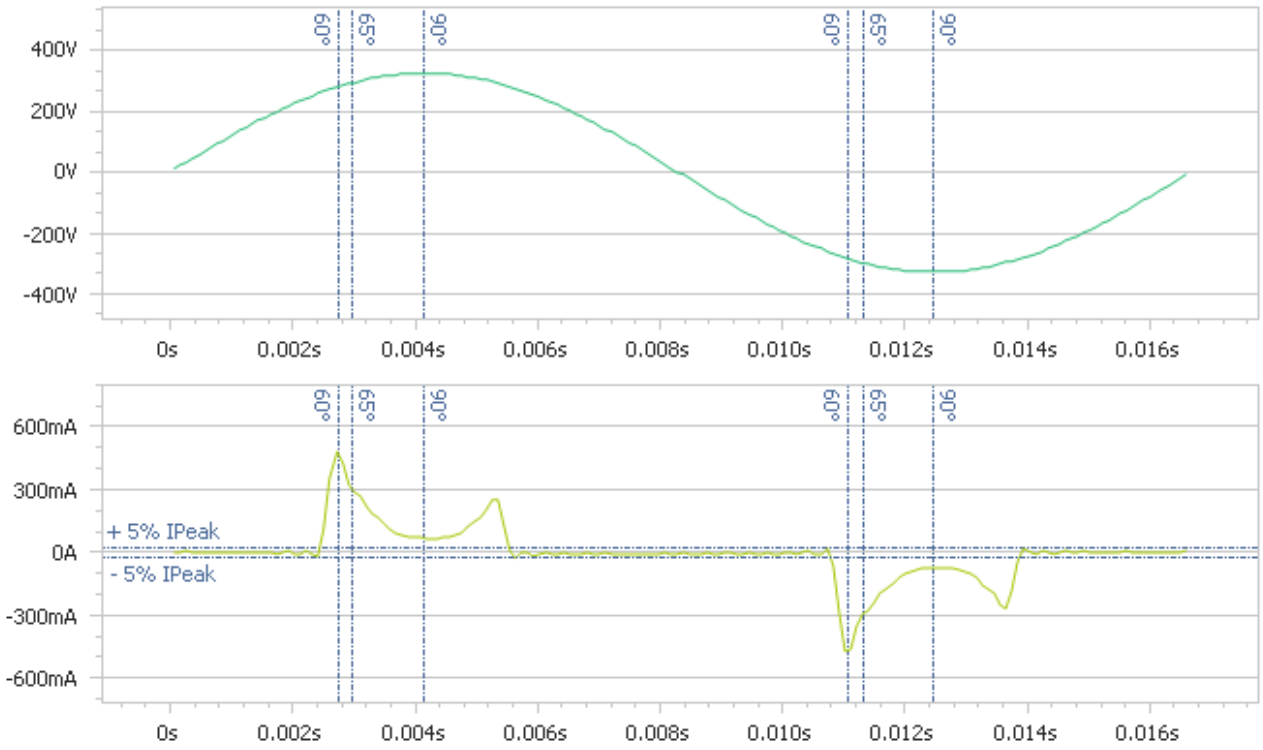
Name :	SPARAC-R7S-19W-001-6	Operation Mode :	mode1

Measured values			
Fundamental Current			
Line 1:	0.083 A		
Active input Power			
Line 1:	18.71 W *		
Circuit power factor			
Line 1:	0.655 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
18.68 W	-21.65 var	28.59 VA	0.6534
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.018e-3	0.9813
Irms	Crest Factor (I)	THD (I)	
123.9 mA	3.947	1.112	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	99.809				100.000				
2	0.347				0.410				
3	50.187	58.357	86.000	PASS	51.989	60.452	86.000	PASS	PASS
4	0.468				0.544				
5	33.314	54.613	61.000	PASS	35.455	58.123	61.000	PASS	PASS



Model	:	SPARAC-R7S-19W-001-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 60Hz
Test Date	:	2023-3-4

Report Number :	EMS_12W_MAX_230V 60HZ_HAR_Mod 1
Test Object :	12W
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 50Hz)
Company :	TUV Panyu EMC Lab
Test Date :	11/29/2023 1:32:51 PM

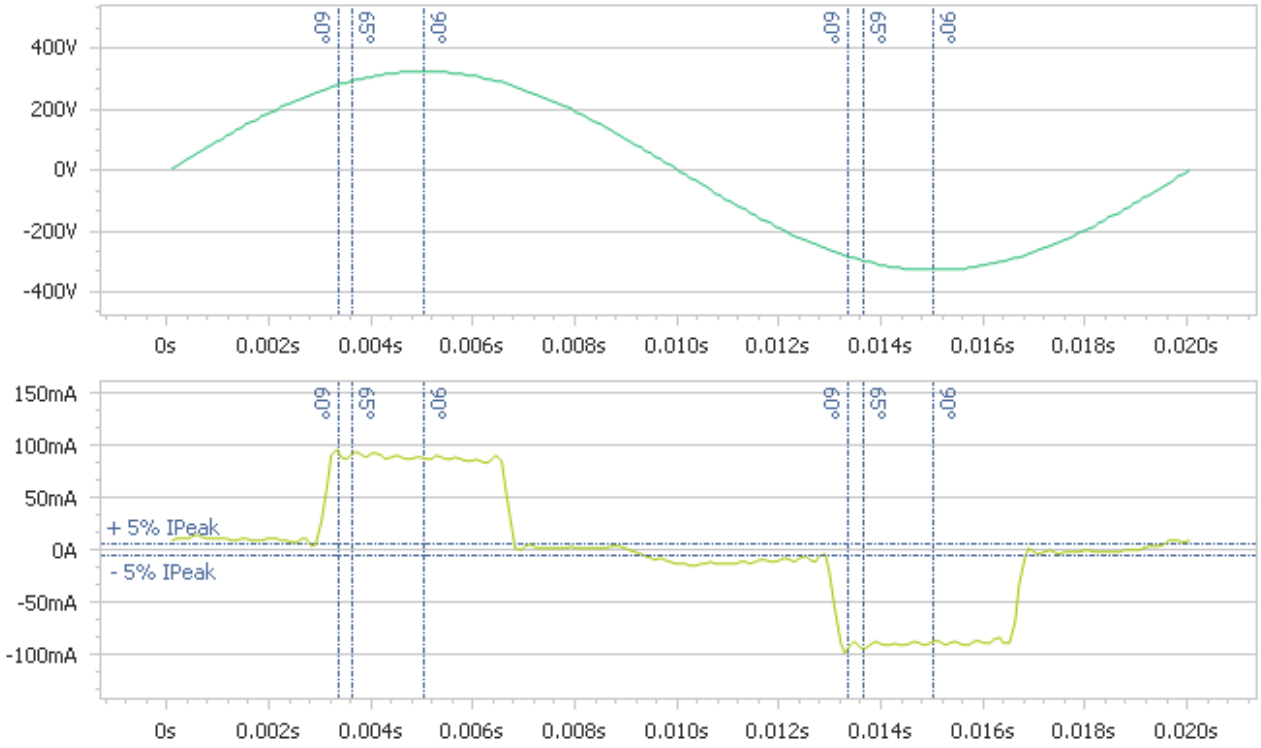
Result			
E.U.T. :	PASS	Source :	PASS

Test Object / Product			
Name :	12W	Operation Mode :	Mode1

Measured values			
Fundamental Current			
Line 1:	0.047 A		
Active input Power			
Line 1:	10.662 W *		
Circuit power factor			
Line 1:	0.856 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
10.59 W	-6.504 var	12.43 VA	0.8521
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.004e-3	0.9905
Irms	Crest Factor (I)	THD (I)	
53.95 mA	1.825	0.5874	

Average and Maximum harmonic current results									
Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	99.407				100.000				
2	0.479				0.916				
3	48.682	56.607	86.000	PASS	50.267	58.450	86.000	PASS	PASS
4	0.448				0.714				
5	11.577	18.978	61.000	PASS	12.499	20.490	61.000	PASS	PASS



Model	:	SPARAC-R7S-10W-TG2-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 50Hz
Test Date	:	2023-3-4

Report Number :	EMS_12W_MAX_230V 50HZ_HAR_Mod 1
Test Object :	12W
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 60Hz)
Company :	TUV Panyu EMC Lab
Test Date :	11/29/2023 1:27:31 PM

Result			
E.U.T. :	PASS	Source :	PASS

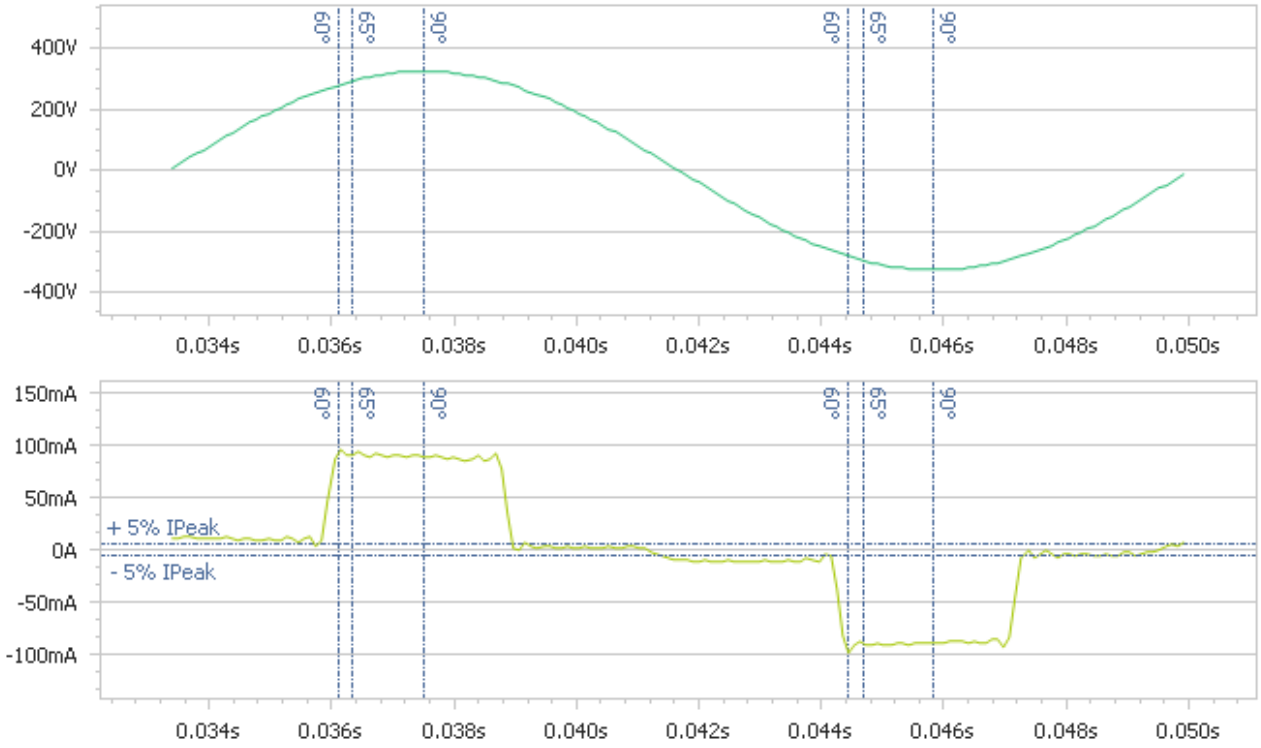
Test Object / Product			
Name :	12W	Operation Mode :	Mode1

Measured values			
Fundamental Current			
Line 1:	0.045 A		
Active input Power			
Line 1:	10.427 W *		
Circuit power factor			
Line 1:	0.85 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
10.36 W	-6.468 var	12.21 VA	0.8482
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
231.0 V	1.415	1.014e-3	0.9931
Irms	Crest Factor (I)	THD (I)	
52.96 mA	1.840	0.6028	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	99.337				100.000				
2	0.435				0.544				
3	49.459	57.511	86.000	PASS	50.215	58.389	86.000	PASS	PASS
4	0.551				0.635				
5	14.811	24.280	61.000	PASS	15.754	25.826	61.000	PASS	PASS



Model	:	SPARAC-R7S-10W-TG2-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 60Hz
Test Date	:	2023-3-4

Report Number :	EMS-SPARAC-R7S-19W-TG1-6-230V50HZ-HAR-M1-2128
Test Object :	SPARAC-R7S-19W-TG1-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 50Hz)
Company :	TUV Panyu EMC Lab
Test Date :	4/10/2023 9:29:54 PM

Result			
E.U.T. :	PASS	Source :	PASS

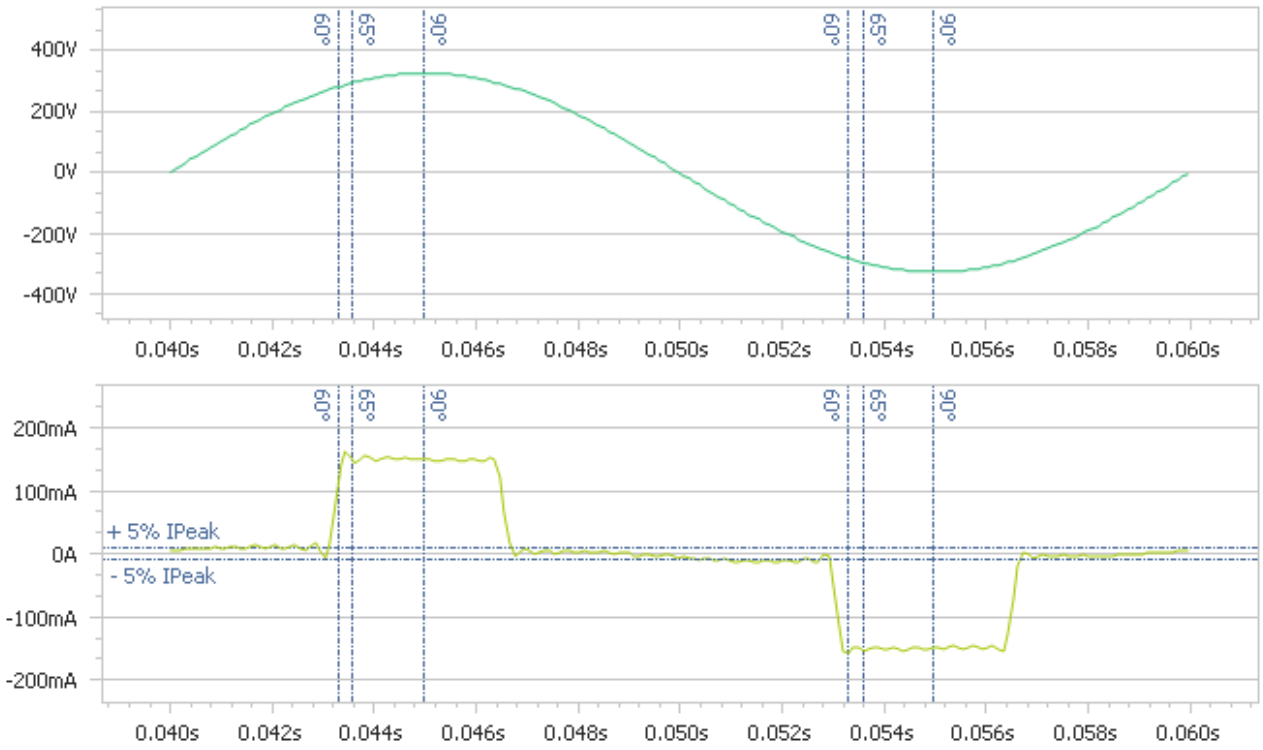
Test Object / Product			
Name :	SPARAC-R7S-19W-TG1-6	Operation Mode :	Mode1

Measured values			
Fundamental Current			
Line 1:	0.072 A		
Active input Power			
Line 1:	16.607 W *		
Circuit power factor			
Line 1:	0.825 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
16.52 W	-11.42 var	20.08 VA	0.8226
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.009e-3	0.9967
Irms	Crest Factor (I)	THD (I)	
87.08 mA	1.886	0.6790	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	99.502				100.000				
2	3.036				3.310				
3	57.127	66.427	86.000	PASS	58.064	67.516	86.000	PASS	PASS
4	2.837				2.994				
5	16.245	26.632	61.000	PASS	17.459	28.621	61.000	PASS	PASS



Model	:	SPARAC-R7S-19W-TG1-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 50Hz
Test Date	:	2023-3-4

Report Number :	EMS-SPARAC-R7S-19W-TG1-6-230V60HZ-HAR-M1-2135
Test Object :	SPARAC-R7S-19W-TG1-6
Test Standard :	IEC 61000-3-2 (Ed5-1) - Class C (230V - 60Hz)
Company :	TUV Panyu EMC Lab
Test Date :	4/10/2023 9:36:11 PM

Result			
E.U.T. :	PASS	Source :	PASS

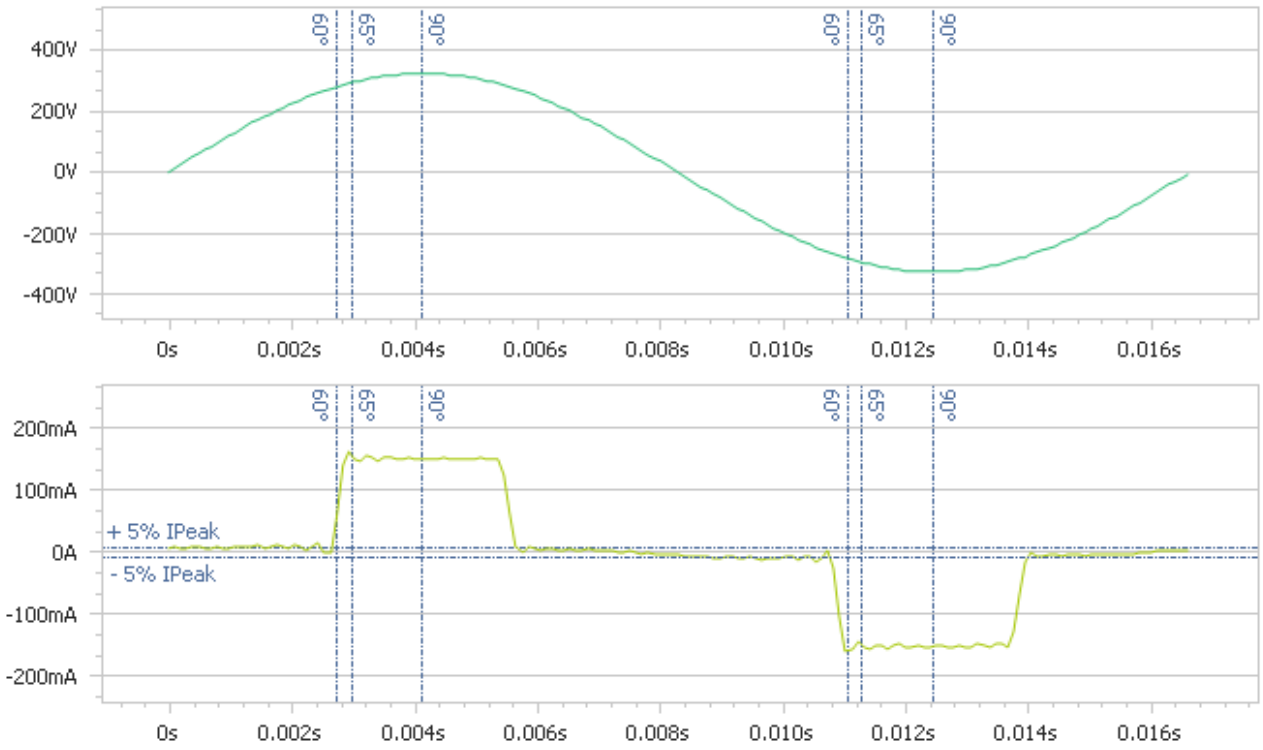
Test Object / Product			
Name :	SPARAC-R7S-19W-TG1-6	Operation Mode :	Mode1

Measured values			
Fundamental Current			
Line 1:	0.073 A		
Active input Power			
Line 1:	16.9 W *		
Circuit power factor			
Line 1:	0.827 *		

Power and THD results			
Active Power (P)	Reactive Power (Q)	Apparent Power (S)	Power Factor
16.84 W	-11.48 var	20.39 VA	0.8262
Vrms	Crest Factor (U)	THD (U)	Displacement Factor
230.9 V	1.415	1.017e-3	0.9987
Irms	Crest Factor (I)	THD (I)	
88.38 mA	1.872	0.6750	

Average and Maximum harmonic current results

Hn	Average				Maximum				Harmonic Result
	Ieff [%]	of Limit [%]	Limit [%]	Result	Ieff [%]	of Limit [%]	Limit [%]	Result	
1	99.649				100.000				
2	3.299				3.393				
3	56.943	66.213	86.000	PASS	57.442	66.793	86.000	PASS	PASS
4	3.157				3.224				
5	15.382	25.217	61.000	PASS	15.719	25.769	61.000	PASS	PASS

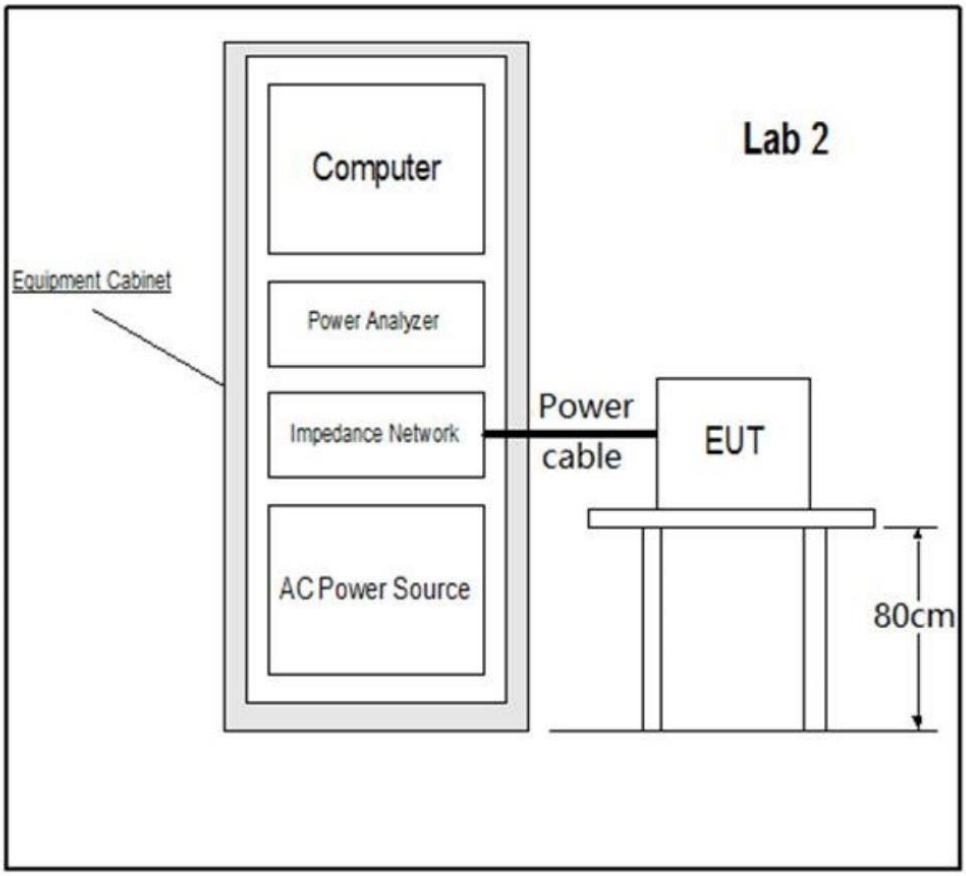


Model	:	SPARAC-R7S-19W-TG1-6
Operating Mode	:	Max light on
Test voltage	:	230VAC, 60Hz
Test Date	:	2023-3-4

2.5 Flicker

2.5.1 Test Method

Flicker test should be conducted with the user's operation controls or automatic programs set to the mode expected to produce the most unfavourable sequence of voltage change, using only those combinations of controls and programmes which are mentioned by the manufacturer in the instruction manual, or are otherwise likely to be used.



2.5.2 Specification Limits

The value of *P*st shall not be greater than 1.0
The value of *P*lt shall not be greater than 0.65
*T*max, the accumulated time value of *d*(t) with a deviation exceeding 3.3% during a single voltage change at the EUT terminals, shall not exceed 500ms
The maximum relative steady-state voltage change, *d*c, shall not exceed 3.3%
The maximum relative voltage change *d*max, shall not exceed
a) 4% without additional conditions

b) 6% for equipment which is:

- Switched manually, or

- Switched automatically more frequently than twice per day, and also has either a delayed start, or manual restart, after a power supply interruption

c) 7% for equipment which is:

- Attended whilst in use, or

- Switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart or manual restart, after a power supply interruption

2.5.3 Test Setup

N/A

2.5.4 Test Location

This test was carried out in Harmonic Flicker Test area.

2.5.5 Test Results

According to 6.1 of EN 61000-3-3:2013/A2:2021, EUT is deemed to meet the requirement without test.

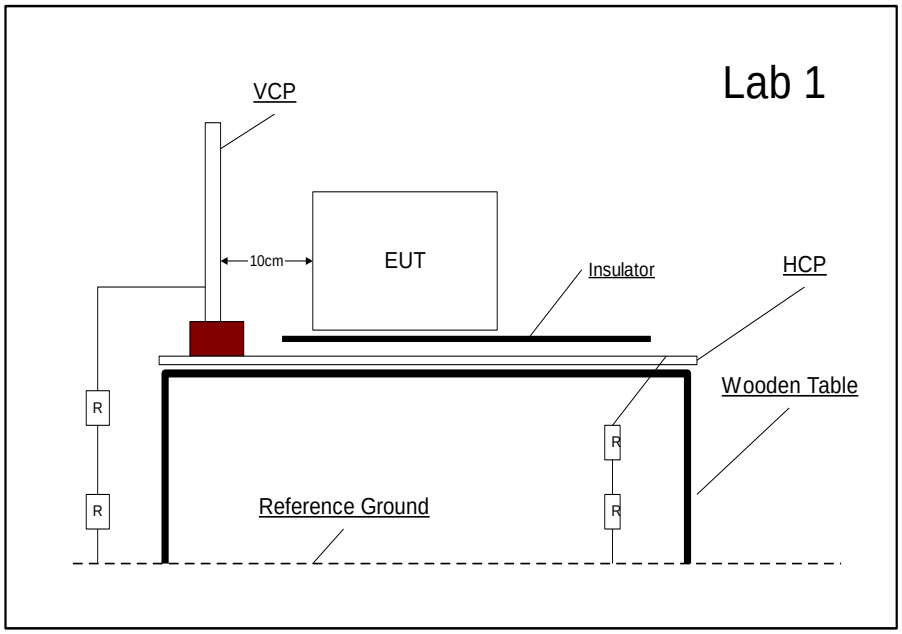
2.6 Electrostatic discharge immunity test

2.6.1 Test Method

The equipment under test including associated cabling was configured on but insulated from, using a 0.5mm isolator, a horizontal coupling plane fitted to the top of a 0.8m non-conductive table for table-top equipment; and on a 0.1m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

Using the air discharge method for non-metallic parts, contact discharge method for metallic parts with both vertical and horizontal couple plane discharge methods for the sides of the equipment under test, the required electrostatic discharge voltage levels in both voltage polarities were applied at the detailed pulse repartition rate.

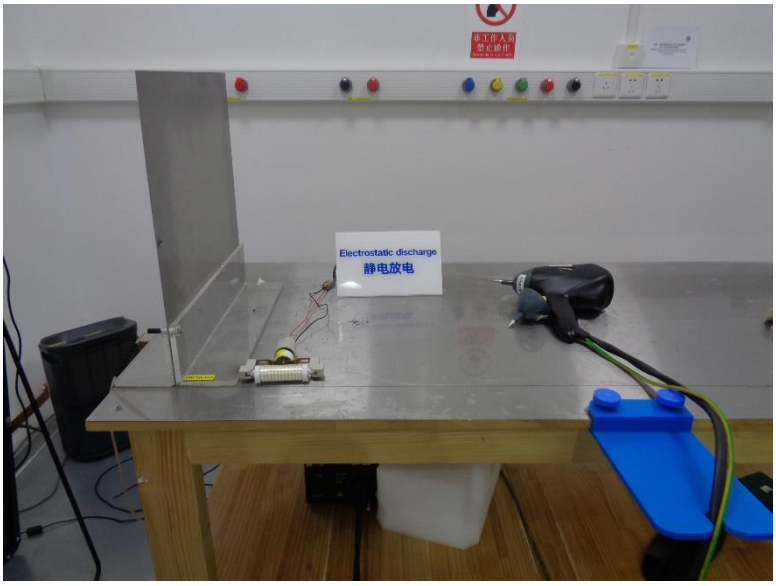
During this testing any anomalies in the equipment under tests performance was recorded.

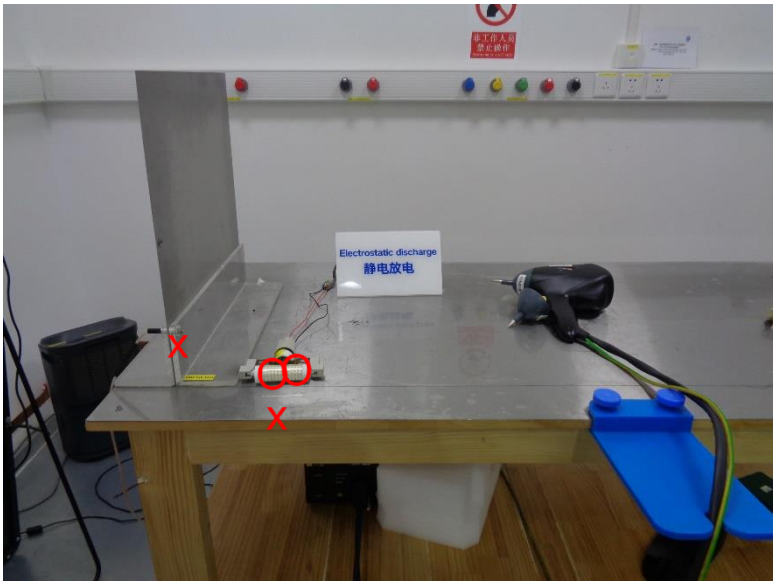


2.6.2 Specification Limits

Required Test Levels				Performance Criteria
Discharge type	Discharge Level (kV)		Number of discharges per location (each polarity)	
	Positive	Negative		
Air – Direct	8	8	10	B
Contact – Direct	4	4	10	B
Contact – Indirect	4	4	10	B

2.6.3 Test Setup





X: Contact Discharge, O: Air Dischage

Test point

2.6.4 Test Location

This test was carried out in ESD room.

2.6.5 Test Results

Test model	SPARAC-R7S-7W-002-6, SPARAC-R7S-8.5W-001-6, SPARAC-R7S-10W-002-6, SPARAC-R7S-12W-001-6, SPARAC-R7S-12W-002-6, SPARAC-R7S-19W-001-6, SPARAC-R7S-10W-TG2-6, SPARAC-R7S-19W-TG1-6
Test mode	Light on
Test date	2023-3-7
Result	Pass
Environments condition:	Temp:23.1℃; R.H.: 47.3%; A.P.:100.7kPa
Remark	No observable change.

Detailed results are shown below.

Test Point	Discharge	Results: Met Performance Criteria									
		2kV		4kV		6kV		8kV		15kV	
		+	-	+	-	+	-	+	-	+	-
HCP	Contact	N/A	N/A	A	A	N/A	N/A	N/A	N/A	N/A	N/A
VCP	Contact	N/A	N/A	A	A	N/A	N/A	N/A	N/A	N/A	N/A
Each conductive location touchable by hand	Contact	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Each nonconductive location touchable by hand	Air	N/A	N/A	N/A	N/A	N/A	N/A	A	A	N/A	N/A
N/A	Not Appliance										

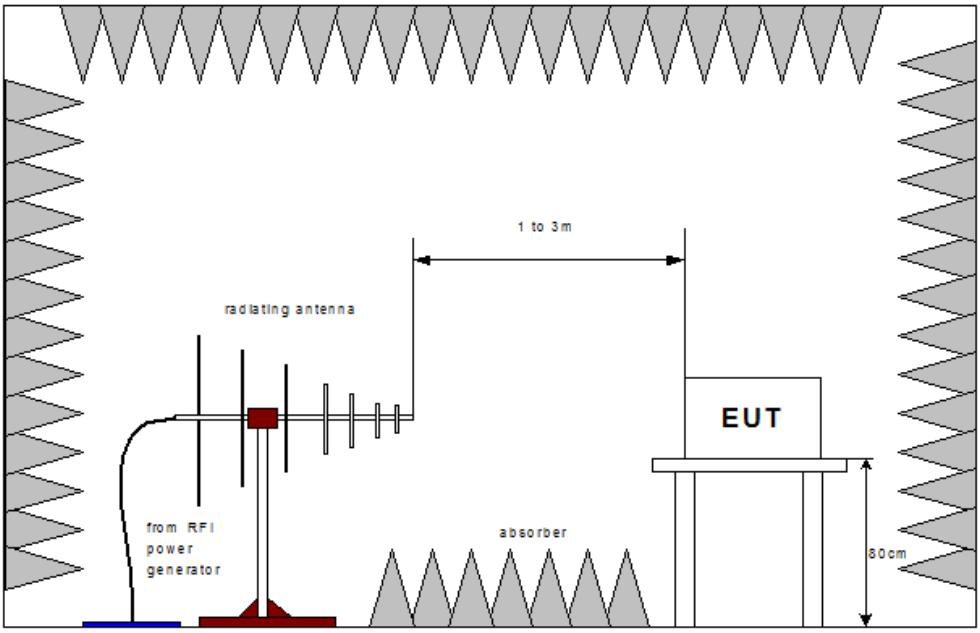
2.7 Radiated, radio-frequency, electromagnetic field immunity test

2.7.1 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment; with a pre-calibrated semi anechoic chamber.

All four side of the equipment under test were subjected to the required RF field strength, modulated as described, swept over the frequency range of test with the antenna positioned in both horizontal and vertical polarizations.

During this testing any anomalies in the equipment under tests performance was recorded.



2.7.2 Specification Limits

Required Test Levels					Performance Criteria
Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
80 to 1000	3	AM (80 %,1 kHz, sine wave)	1	1	A
Note 1. EUT powered at one of the Nominal input voltages and frequencies					

2.7.3 Test Setup



2.7.4 Test Location

This test was carried out in 3m anechoic chamber.

2.7.5 Test Results

Test model	SPARAC-R7S-7W-002-6, SPARAC-R7S-8.5W-001-6, SPARAC-R7S-10W-002-6, SPARAC-R7S-12W-001-6, SPARAC-R7S-12W-002-6, SPARAC-R7S-19W-001-6, SPARAC-R7S-10W-TG2-6, SPARAC-R7S-19W-TG1-6
Test mode	Light on
Test date	2023-3-3
Result	Pass
Remark	No observable change.

Detailed results are shown below.

Tabulated Results for RF Electromagnetic Field 80 - 1000 MHz					
Side of the equipment under test	Antenna polarization	Test Level	Dwell Time	Measuring distance	Results
All sides	Horizontal	3 V/m	1 s	3 m	Pass/(A)
All sides	Vertical	3 V/m	1 s	3 m	Pass/(A)

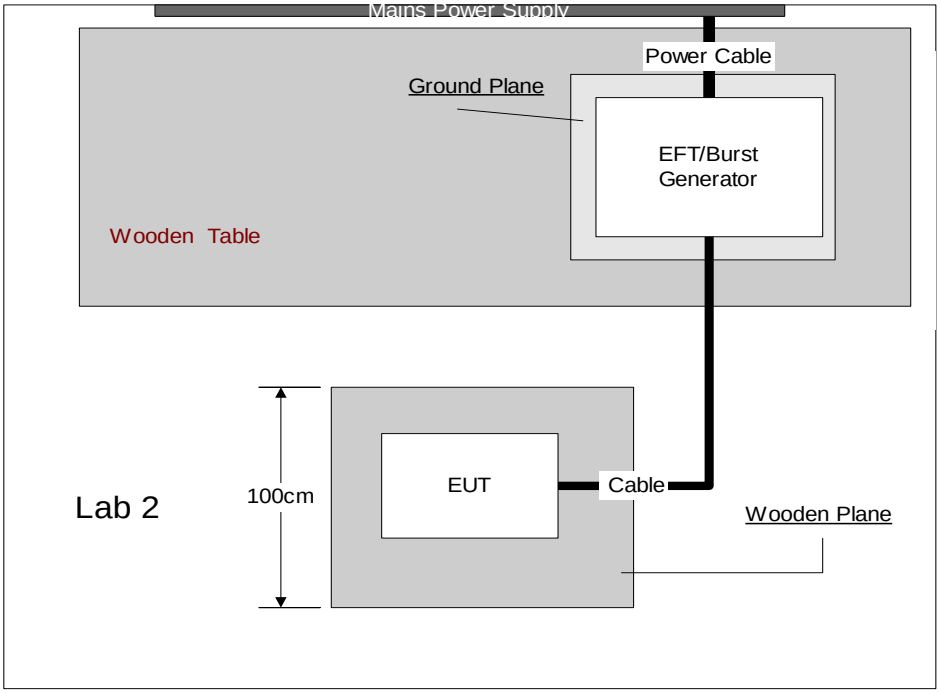
2.8 Electrical fast transient /burst immunity test

2.8.1 Test Method

The equipment under test including associated cabling was configured on but insulated from, using a 0.1 m isolator, a horizontal coupling plane fitted to the top of a 0.8 m non-conductive table for table-top equipment; and on a 0.1 m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

Using a CDN for power ports, capacitive coupling clamp for signal and control ports and a 33nF coupling capacitor for earth ports, the required fast transient burst voltage levels in both voltage polarities were applied at the detailed pulse repartition rate and duration of test.

During this testing any anomalies in the equipment under tests performance was recorded.



2.8.2 Specification Limits

Required Test Levels at input and output a.c. power port					
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	Performance Criteria
AC Power Port	± 1	5 kHz	2 min per polarity	Direct	B
Note 1. EUT powered at one of the Nominal input voltages and frequencies.					

Required Test Levels at input and output d.c. power ports					
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	Performance Criteria
DC Power Port	± 0.5	5 kHz	2 min per polarity	Direct	B
Note Not applicable to equipment not connected to the mains while in use.					

Required Test Levels at ports for signal and control lines					
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	Performance Criteria
signal and control Port	± 0.5	5 kHz	2 min per polarity	Clamp	B
Note 1. Only applicable to ports interfacing with cables whose total length, according to the manufacturer's specification, may exceed 3m. Note 2 Change of state commands are not applied during the test.					

2.8.3 Test Setup



2.8.4 Test Location

This test was carried out in EMS Test Location.

2.8.5 Test Results

Test model	SPARAC-R7S-7W-002-6, SPARAC-R7S-8.5W-001-6, SPARAC-R7S-10W-002-6, SPARAC-R7S-12W-001-6, SPARAC-R7S-12W-002-6, SPARAC-R7S-19W-001-6, SPARAC-R7S-10W-TG2-6, SPARAC-R7S-19W-TG1-6
Test mode	Light on
Test date	2023-3-6
Result	Pass
Remark	No observable change.

Detailed results are shown below.

Tabulated Results for Fast Transient Burst Immunity					
Line under test	Test Level (V/m)	Repetition Rate	Test Duration	Coupling Method	Result
AC power ports	± 1.0 kV	5 kHz	2 min	Direct	Pass/(A)

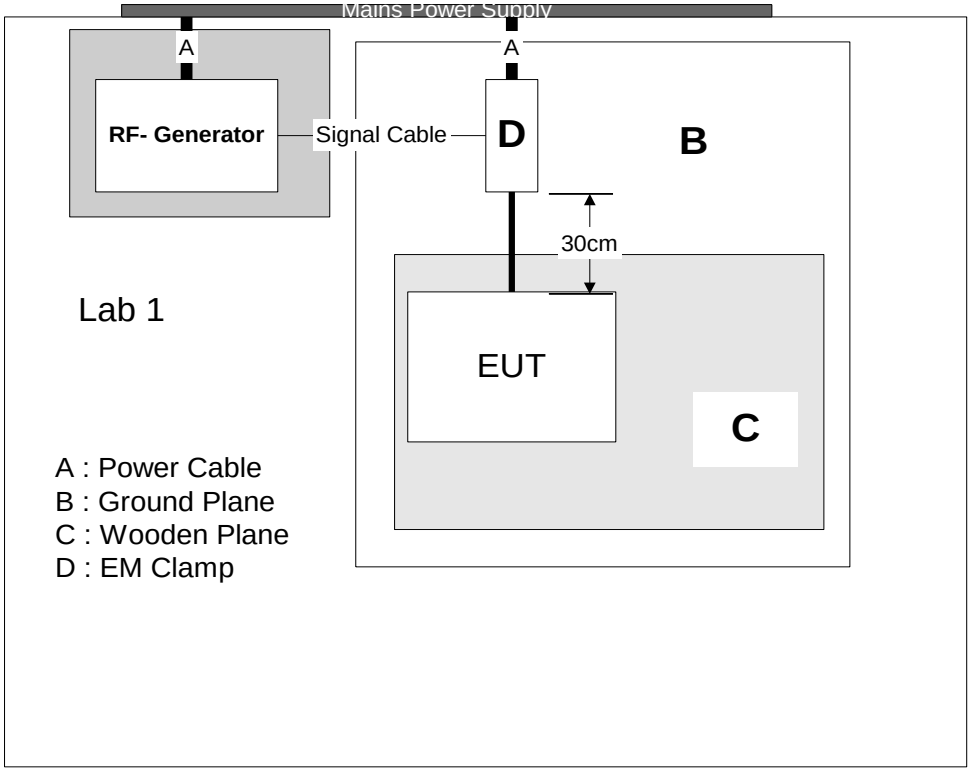
2.9 Immunity to conducted disturbances, induced by radio-frequency fields

2.9.1 Test Method

The equipment under test was configured, on but insulated from, using a 0.1 m isolator, a horizontal coupling plane fitted to the top of a 0.1 m non-conductive table for table-top equipment, above a ground reference plane all within a test laboratory.

All associated cabling was configured, on but insulated from, using a 50 mm isolator, the same horizontal coupling plane as the equipment under test.

Using CDNs, EM Clamps or current clamps as appropriate, the power ports and applicable signal and control ports were subjected to the required, pre calibrated RF injected signal strength, modulated as described, swept over the frequency range of test.
During this testing any anomalies in the equipment under tests performance was recorded.



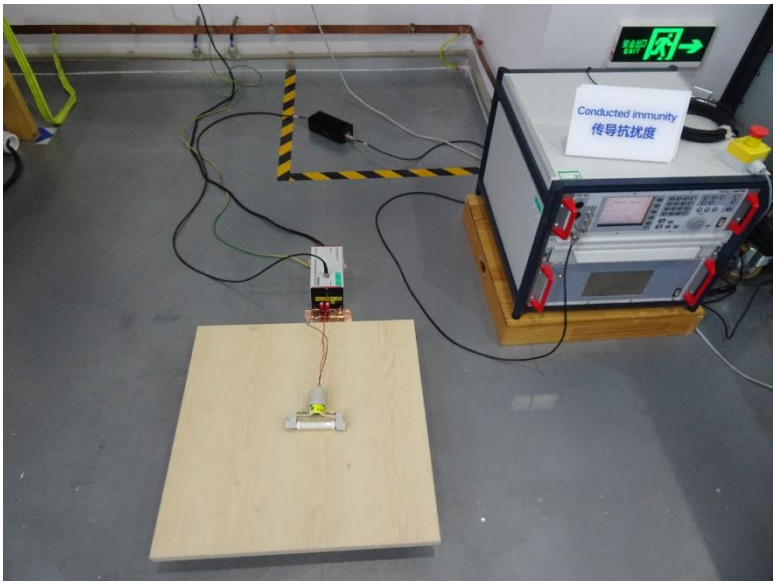
2.9.2 Specification Limits

Required Test Levels at ports for signal and control lines						
Line Under Test	Frequency Range (MHz)	Level (V)	Modulation	Step Size (%)	Dwell (s)	Performance Criteria
Signal and control lines	0.15 to 80	3	AM (80 %,1 kHz, sine wave)	1	1	A
Note Only applicable to ports interfacing with cables whose total length, according to the manufacturer's specification, may exceed 3m						

Required Test Levels at input and output d.c. power ports						
Line Under Test	Frequency Range (MHz)	Level (V)	Modulation	Step Size (%)	Dwell (s)	Performance Criteria
DC power ports	0.15 to 80	3	AM (80 %,1 kHz, sine wave)	1	1	A
Note Only applicable to equipment that is connected to the mains while in use.						

Required Test Levels at input and output a.c. power ports						
Line Under Test	Frequency Range (MHz)	Level (V)	Modulation	Step Size (%)	Dwell (s)	Performance Criteria
AC power ports	0.15 to 80	3	AM (80 %,1 kHz, sine wave)	1	1	A
Note Only applicable to ports interfacing with cables whose total length, according to the manufacturer's specification, may exceed 3m						

2.9.3 Test Setup



2.9.4 Test Location

This test was carried out in EMS Test Location.

2.9.5 Test Results

Test model	SPARAC-R7S-7W-002-6, SPARAC-R7S-8.5W-001-6, SPARAC-R7S-10W-002-6, SPARAC-R7S-12W-001-6, SPARAC-R7S-12W-002-6, SPARAC-R7S-19W-001-6, SPARAC-R7S-10W-TG2-6, SPARAC-R7S-19W-TG1-6
Test mode	Light on
Test date	2023-3-6
Result	Pass
Remark	No observable change.

Detailed results are shown below.

Tabulated Results for Injected current						
Line under test	Test Level	Step	Dwell Time	Coupling Method	Modulation	Results
AC power ports	3V	1%	1 s	CDN	1kHz 80%	Pass/(A)

Remark: No observable change.

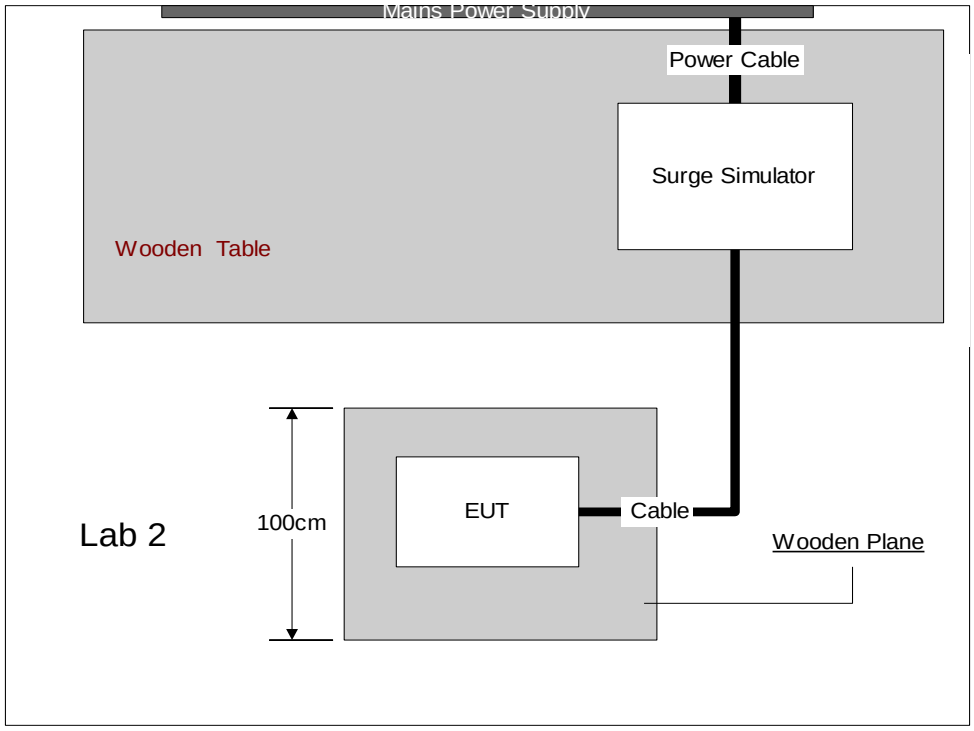
2.10 Surge immunity test

2.10.1 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.

Using CDNs for power ports and appropriate coupling methods for applicable signal and control ports, the required number of surges was applied for each surge voltage level using both positive and negative surge voltage polarities. Surges were applied at the power line frequency phase angles and repartition rates detailed.

During this testing any anomalies in the equipment under tests performance was recorded.



2.10.2 Specification Limits

Characteristics	Test Levels			Performance Criteria
	Device			
	Self-ballasted lamps And semi-luminaires	Luminaires and independent auxiliaries		
		Input power		
		≤25W	>25W	
Wave- shape data Test levels line to line line to ground	1.2/50 µs ± 0.5 kV ±1.0 kV	1.2/50 µs ± 0.5 kV ±1.0 kV	1.2/50 µs ± 1.0 kV ±2.0 kV	B for emergency lighting. C for other luminaires and lamps
Note In addition to the specified test level, all lower levels as detailed in IEC 61000-4-5 should also be satisfied.				

2.10.3 Test Location

This test was carried out in EMS Test Location.

2.10.4 Test Setup



2.10.5 Test Results

Test model	SPARAC-R7S-7W-002-6, SPARAC-R7S-8.5W-001-6, SPARAC-R7S-10W-002-6, SPARAC-R7S-12W-001-6, SPARAC-R7S-12W-002-6, SPARAC-R7S-19W-001-6, SPARAC-R7S-10W-TG2-6, SPARAC-R7S-19W-TG1-6
Test mode	Light on
Test date	2023-3-6
Result	Pass
Remark	No observable change.

Detailed results are shown below.

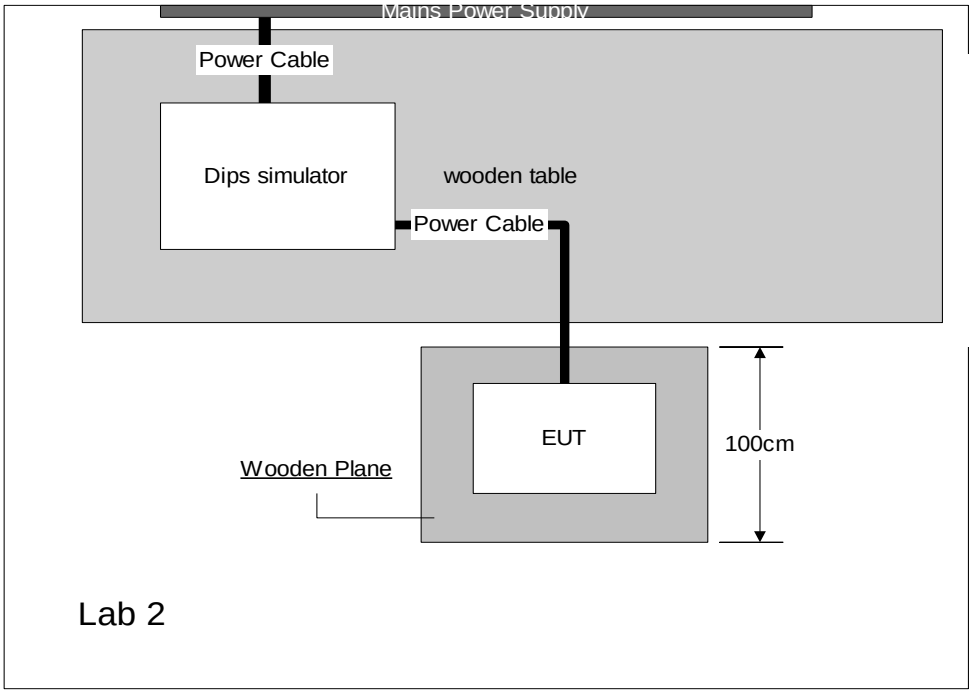
Tabulated Results for Surge Immunity (Power Ports)							
Line Name	Coupling	Level	Polarity	Phase Angle	No of Pulses	Repetition Rate	Result
Power line	Line to line	-0.5kV	NEGATIVE	270 deg	5	60 sec	Pass/(A)
Power line	Line to line	+0.5kV	POSITIVE	90 deg	5	60 sec	Pass/(A)

2.11 Voltage dips, short interruptions and voltage variations immunity tests

2.11.1 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.

Using a programmable power supply the equipment under test was subjected to the detailed supply voltage dips and interruptions. The required supply phase synchronization and test repetition rate, detailed, was controlled by the programmable power supply.
During this testing any anomalies in the equipment under tests performance was recorded.



2.11.2 Specification Limits

Required Test Levels			Performance Criteria
Test	Test Level	Duration	
Voltage Dip	0 % of Vnom	½ cycle	B
Voltage Dip	70 % of Vnom	10/12 cycles	C
Note: EUT powered at one of the Nominal input voltages and frequencies			

2.11.3 Test Setup



2.11.4 Test Location

This test was carried out in EMS Test Location.

2.11.5 Test Results

Test model	SPARAC-R7S-7W-002-6, SPARAC-R7S-8.5W-001-6, SPARAC-R7S-10W-002-6, SPARAC-R7S-12W-001-6, SPARAC-R7S-12W-002-6, SPARAC-R7S-19W-001-6, SPARAC-R7S-10W-TG2-6, SPARAC-R7S-19W-TG1-6
Test mode	Light on
Test date	2023-3-7
Result	Pass
Remark	When the immunity applies on the EUT, LED light flickered, can restored after the tests.

Detailed results are shown below.

Tabulated Results for Voltage Dip and Short Interruption					
Line under test	Vnom	Operating Frequency	Test Level	Duration	Results
Power line	230 VAC	50/60Hz	0% of Vnom	½ cycle	Pass/(B)
Power line	230 VAC	50/60Hz	70% of Vnom	10/12 cycles (50/60Hz)	Pass/(B)

3 Test Equipment Information

Test side: TUV SUD Guangzhou

Radiated Emission Test（SAC-3 area）

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	64-2-63-20-003	101702	2023-05-09	2024-05-08
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9162	64-2-62-20-003	00340	2023-03-01	2024-02-29
Testing Software	R&S	EMC32 (Version: 10.60.20)	64-2-26-20-006	N/A	N/A	N/A
3m Semi-anechoic chamber	TDK	SAC-3	64-2-90-20-004	N/A	2023-09-05	2026-09-04

Conducted Emission Test(CIR area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
Receiver (9K-3GHz)	Rohde & Schwarz	ESCI	64-2-63-08-001	100727	2023-11-10	2024-11-09
LISN	Rohde & Schwarz	ENV216	64-2-60-07-001	3506.6550.05	2023-04-25	2024-04-24
RF Switch Box	Compliance Direction Systems Inc.	RSU-M314-N	64-2-60-08-001	08042801	2023-04-25	2024-04-24
Testing Software	R&S	EMC32 (Version: 10.60.20)	64-2-26-20-001	N/A	N/A	N/A
Shielding Room	TDK	CIR	64-2-90-20-001	N/A	2023-09-07	2026-09-06

Magnetic Field Strength Test(CIR area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
Receiver (9K-3GHz)	Rohde & Schwarz	ESCI	64-2-63-08-001	100727	2023-11-10	2024-11-09
3-LOOP Antenna	SCHWARZBECK	HXYZ9170	64-2-62-10-001	HXYZ9170-193	2023-04-25	2024-04-24
RF Switch Box	Compliance Direction Systems Inc.	RSU-M314-N	64-2-60-08-001	08042801	2023-04-25	2024-04-24
Testing Software	R&S	EMC32 (Version: 10.60.20)	64-2-26-20-001	N/A	N/A	N/A
Shielding Room	TDK	CIR	64-2-90-20-001	N/A	2023-09-07	2026-09-06

Harmonic Test / Flicker Test(EMS area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE

3-phase analyzer for Harmonics and Flicker	EMTEST	DPA 503N	64-2-74-20-003	P2003237205	2023-11-10	2024-11-09
Multifunctional threephase voltage source	EMTEST	NetWave 67.3-400	64-2-09-20-011	P2009239095	2023-11-10	2024-11-09
Testing Software	EMTEST	Net.Control (Version: 3.2.5)	64-2-09-20-011-A01	N/A	N/A	N/A

Electrostatic Discharge Test(ESD area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
ESD Generator	EMTEST	ESD NX30	64-2-75-20-009	23124	2023-08-31	2024-08-30

Radiated Immunity Test(CAC-3 area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
Signal Generator	Rohde & Schwarz	SMB100B	64-2-64-20-001	101903	2023-11-07	2024-11-06
Power Amplifier	Rohde & Schwarz	BBA150-BC500	64-2-28-20-002	104061	2023-11-07	2024-11-06
Power Amplifier	Rohde & Schwarz	BBA150-D110E100	64-2-28-20-003	104048	2023-11-07	2024-11-06
Microwave Log-Periodic Antenna	Schwarzbeck	STLP9129 SET	64-2-62-20-002	3074	N/A	N/A
Average Power Sensor	Rohde & Schwarz	NRP6AN	64-2-32-20-001	101424	2023-11-07	2024-11-06
Average Power Sensor	Rohde & Schwarz	NRP6AN	64-2-32-20-002	101425	2023-11-07	2024-11-06
Testing Software	R&S	EMC32 (Version: 10.60.20)	64-2-26-20-003	N/A	N/A	N/A
3m FAC Chamber	TDK	CAC-3	64-2-90-20-003	N/A	2023-09-06	2026-09-05

Electrical Fast Transients Test(EMS area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
Compact Simulator	EMTEST	UCS 500N7.7	64-2-75-20-010	P1949235471	2023-11-07	2024-11-06
3-phase coupling/decoupling network	EMTEST	CNI 503B9.4	64-2-60-20-054	P1740204286	2023-11-07	2024-11-06
Testing Software	EMTEST	IEC. Control (Version:9.2.3)	64-2-75-20-010-A01	N/A	N/A	N/A

Surges Test(EMS area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE

Compact Simulator	EMTEST	UCS 500N7.7	64-2-75-20-010	P1949235471	2023-11-07	2024-11-06
3-phase coupling/decoupling network	EMTEST	CNI 503B9.4	64-2-60-20-054	P1740204286	2023-11-07	2024-11-06
Testing Software	EMTEST	IEC. Control (Version:9.2.3)	64-2-75-20-010-A01	N/A	N/A	N/A

Conducted Immunity Test(EMS area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
Compact immunity test systemr	TESEQ	NSG 4070C-110	64-2-75-20-008	56172	2022-11-23	2023-11-23
6dB Attenuator	TESEQ	ATN 6150	64-2-65-20-003	20011501	2023-11-07	2024-11-06
Testing Software	EMTEST	ICD.Control (Version: 7.1.3)	64-2-75-20-001-A01	N/A	N/A	N/A
Coupling/Decoupling Network	EM TEST	CDN M016S	64-2-60-20-039	56466	2023-11-09	2024-11-08

AC Voltage Dips and Interruptions Test(EMS area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
Multifunctional threephase voltage source	EMTEST	NetWave 67.3-400	64-2-09-20-011	P2009239095	2023-11-10	2024-11-09
3-phase Power Fail Simulator	EMTEST	PFS 503N63.2	64-2-75-20-007	P1951236233	2023-11-09	2024-11-08
Testing Software	EMTEST	IEC.Control (Version: 9.2.3)	64-2-75-20-007-A01	N/A	N/A	N/A

4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: ±4.96dB; Vertical: ±6.16dB;
Uncertainty for Conducted Emission in shielding room 9kHz-150KHz (for test using AMN ENV216)	±3.26dB
Uncertainty for Conducted Emission in shielding room 150kHz-30MHz (for test using AMN ENV216)	±3.20dB
Uncertainty for Magnetic Field (3-Loop) in shielding room 9KHz-30MHz	±3.02dB
Uncertainty for Harmonic test	0.44%
Uncertainty for Flicker test	0.38%
Uncertainty for RS test	2.08dB,K=2
Uncertainty for CS test	28.0% (CDN), 45.0% (EM Clamp) K=2
Uncertainty for ESD test	The immunity measurement system uncertainty is within standard requirement and is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
Uncertainty for EFT test	
Uncertainty for Surges test	
Uncertainty for PFMF test	
Uncertainty for Voltage Dips, Voltage Variations and Short Interruptions Test	

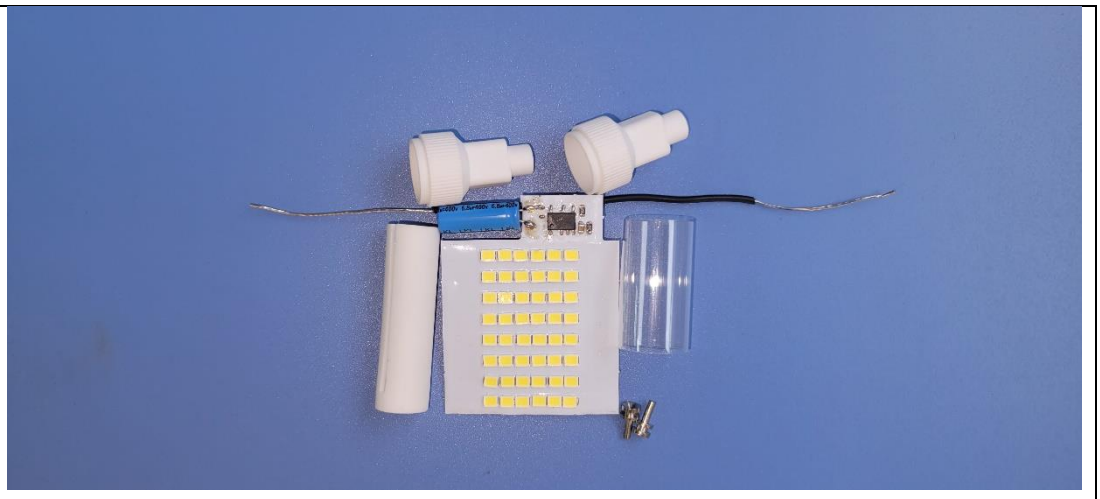
Measurement Uncertainty Decision Rule
Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2023, clause 4.3.3

5 Photographs

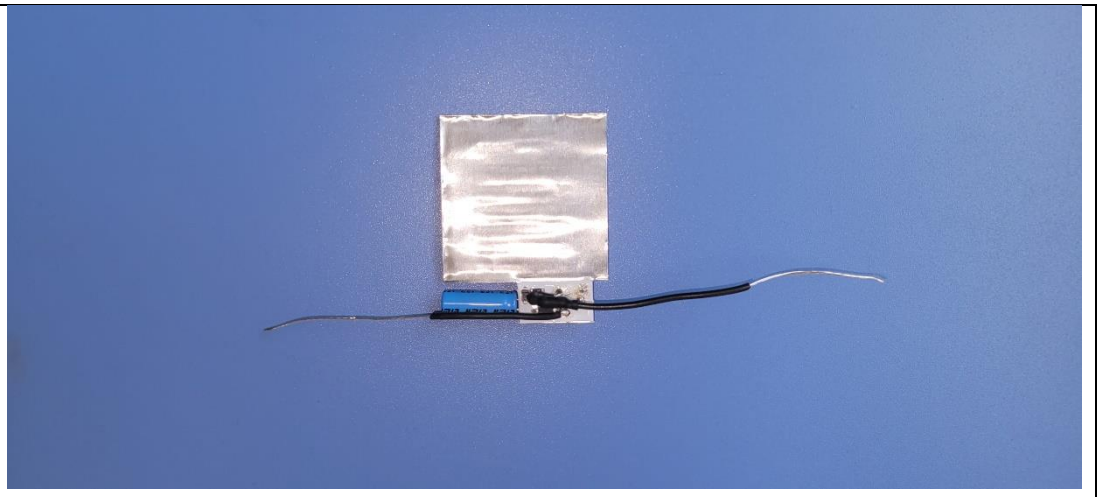
Details of: General view of model SPARAC-R7S-7W-002-6



Details of: PCB view



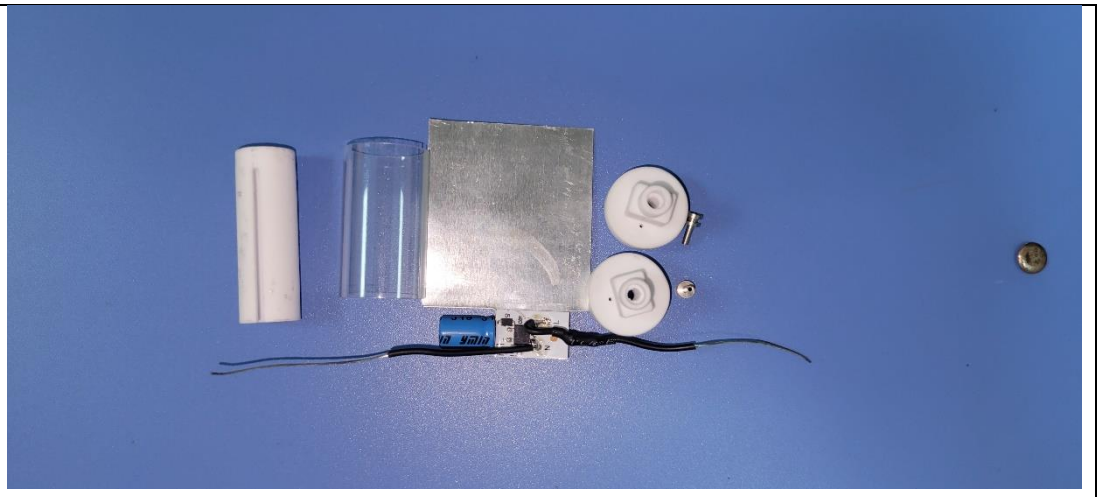
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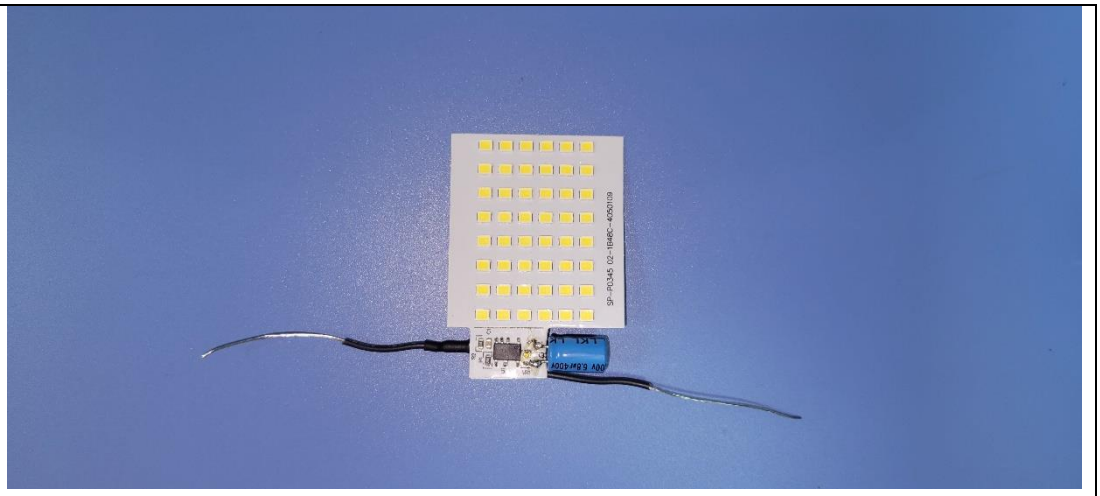
Details of: General view of model SPARAC-R7S-8.5W-001-6



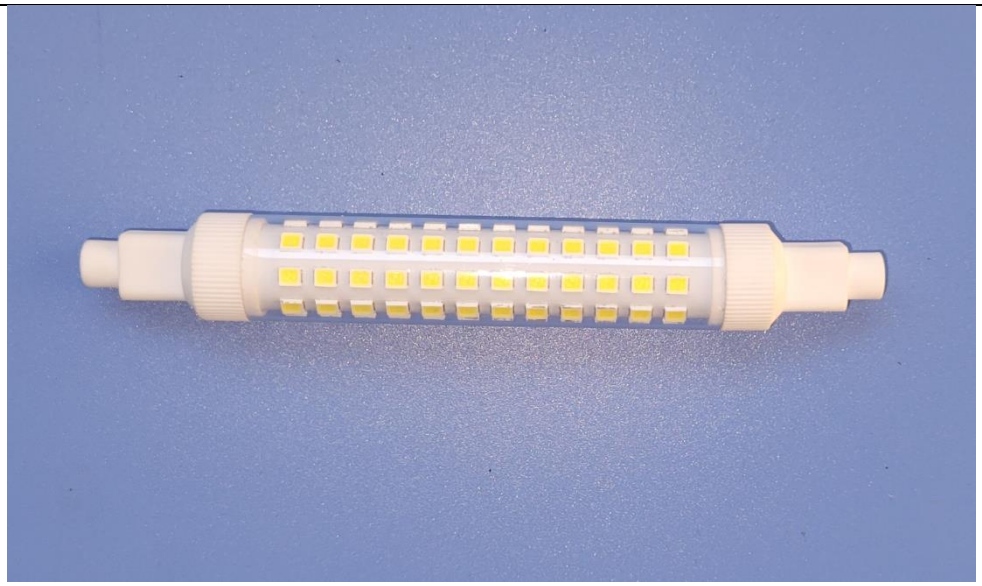
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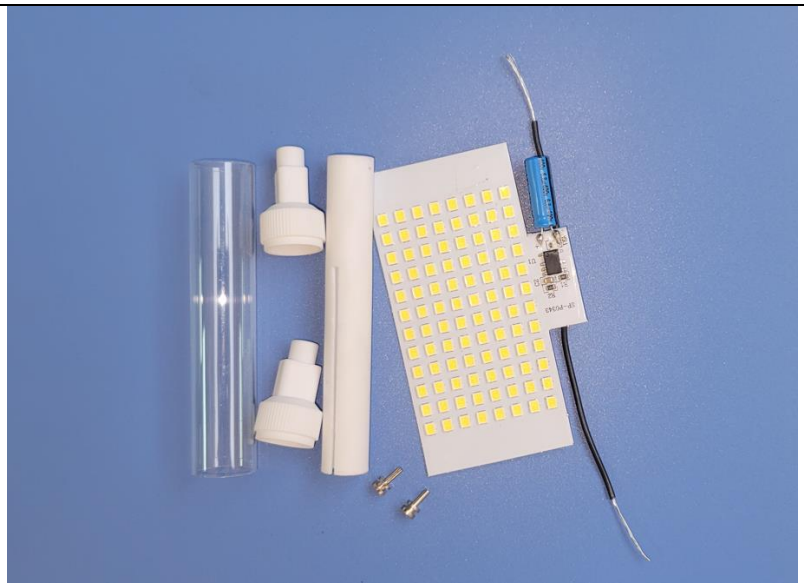
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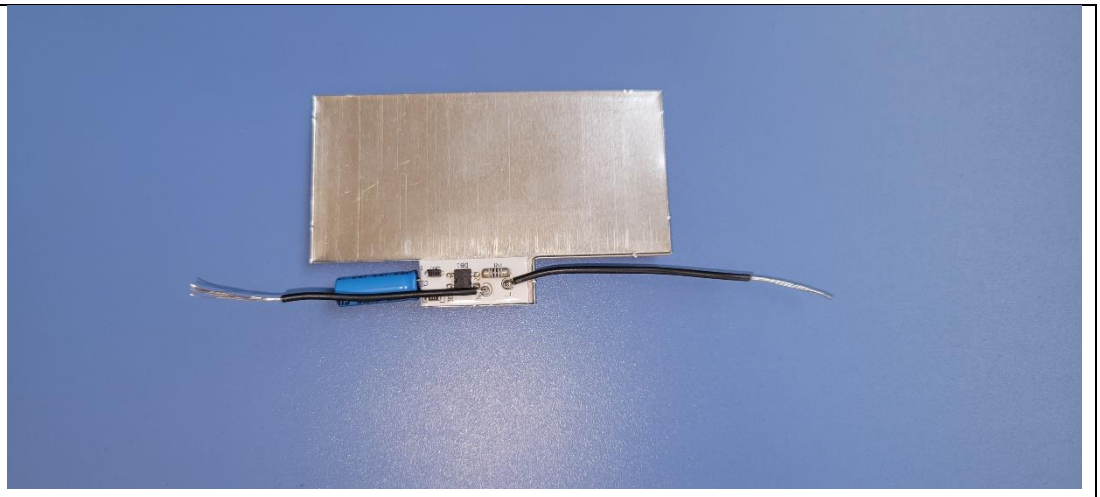
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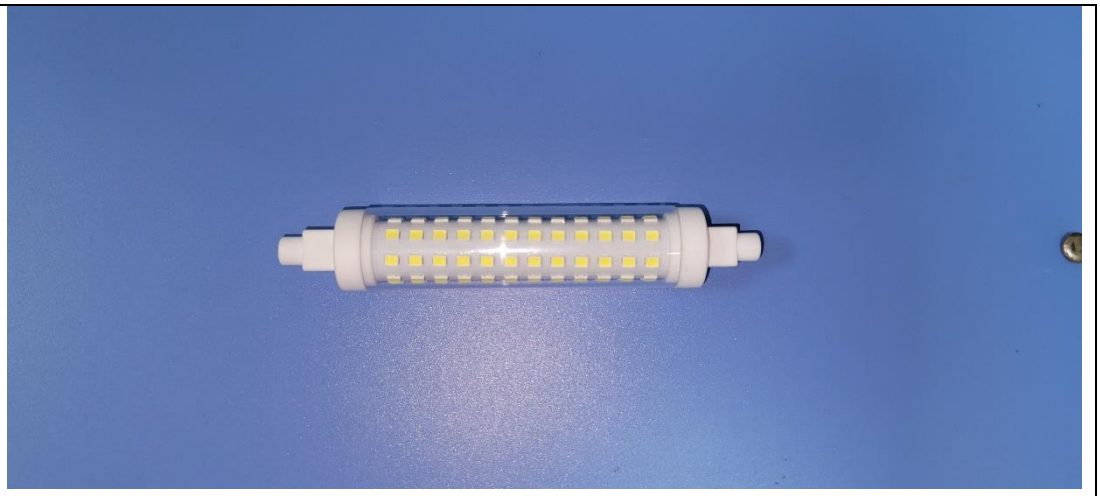
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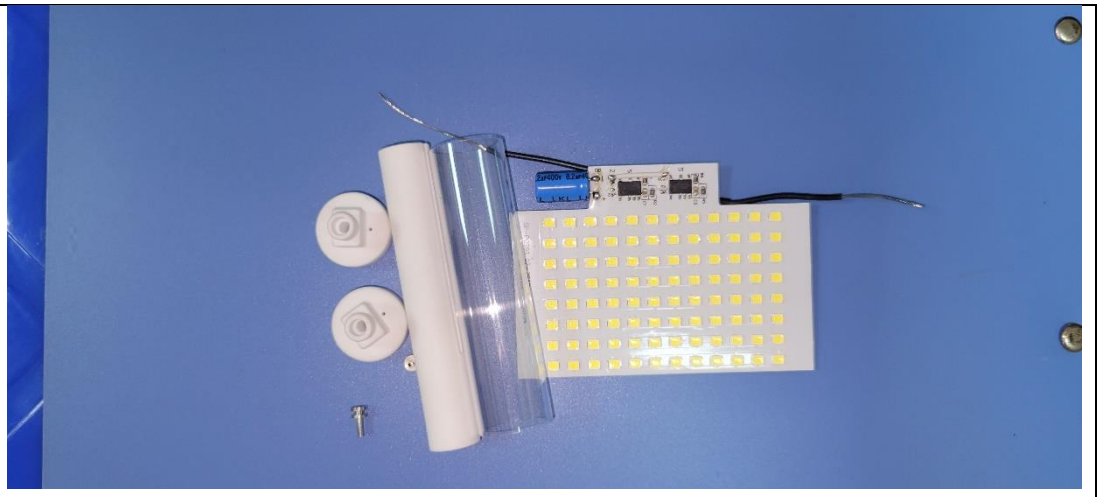
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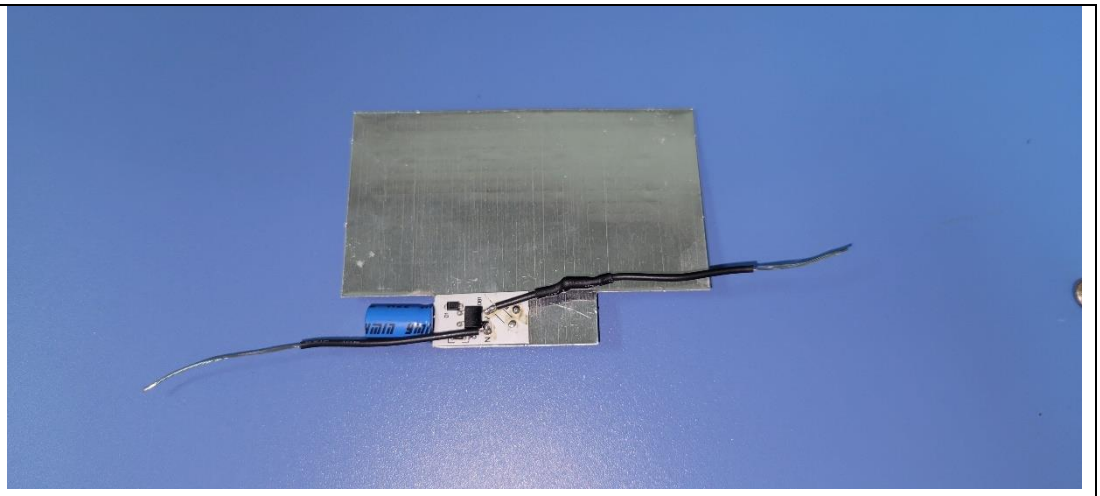
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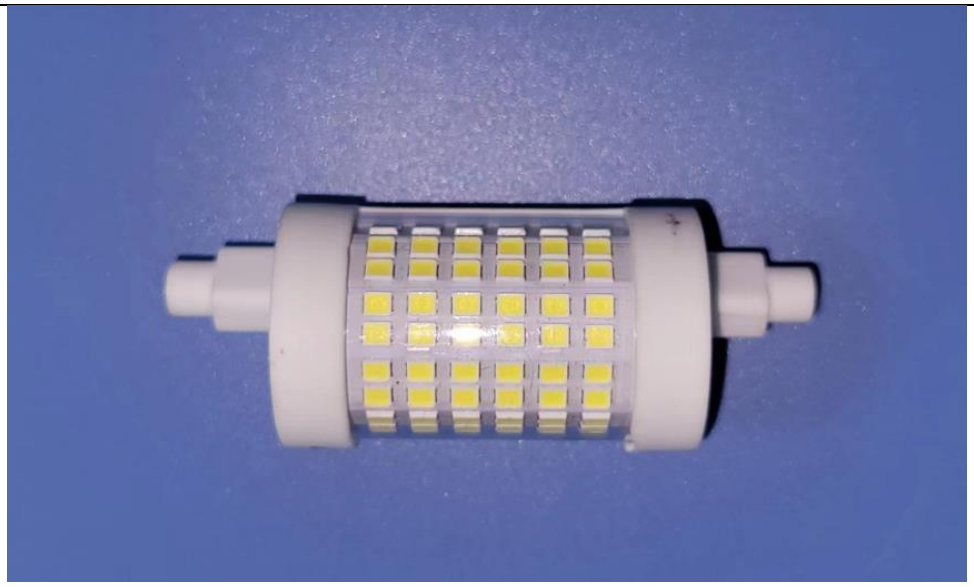
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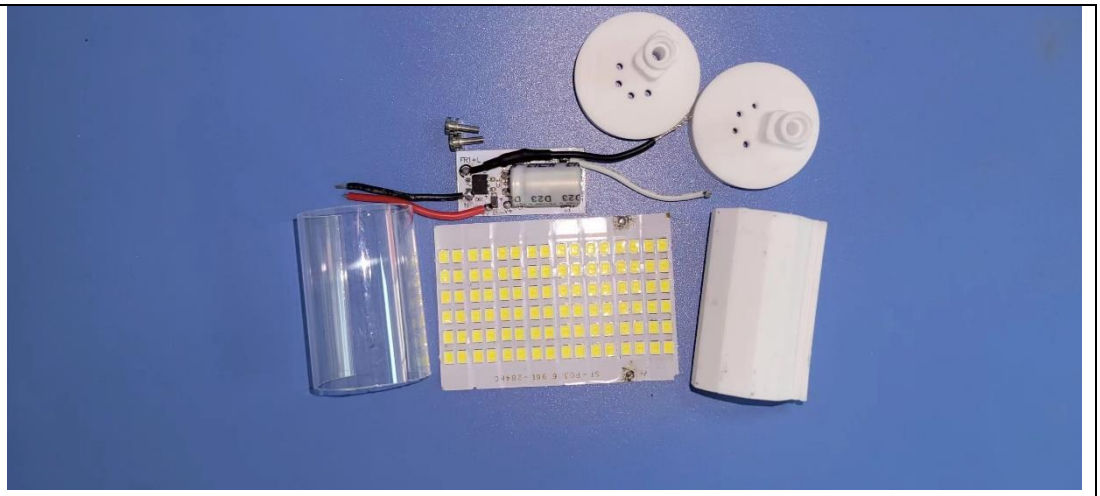
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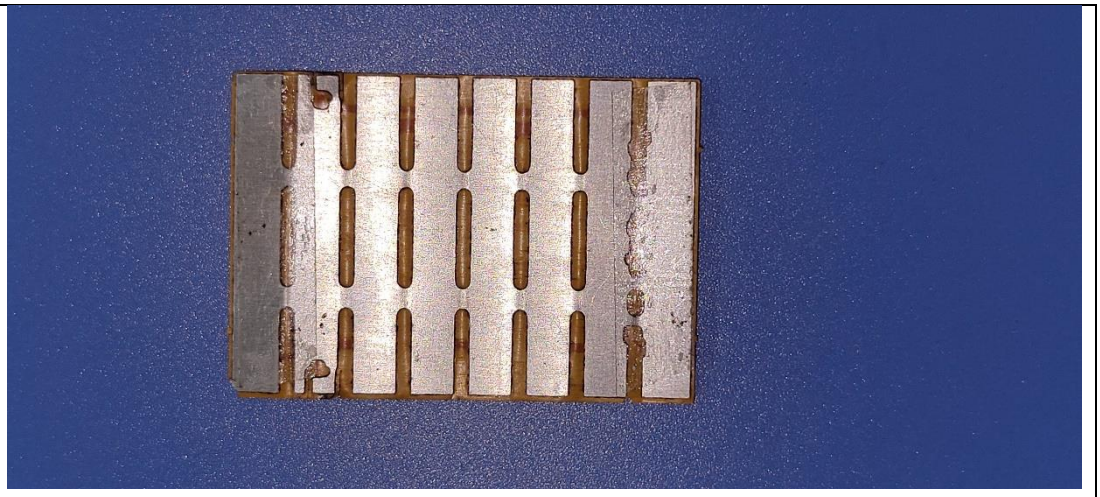
Details of: General view of model SPARAC-R7S-12W-002-6



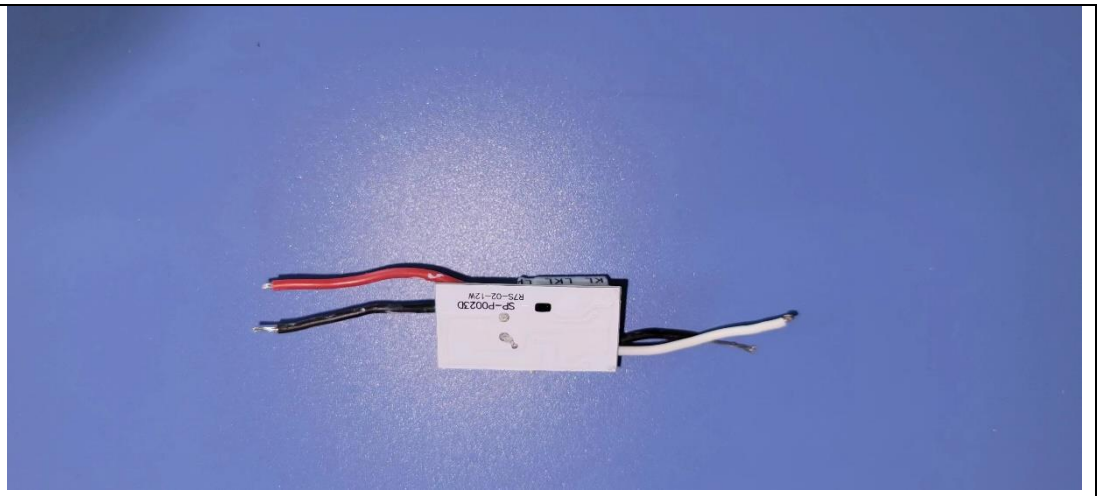
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Details of: PCB view



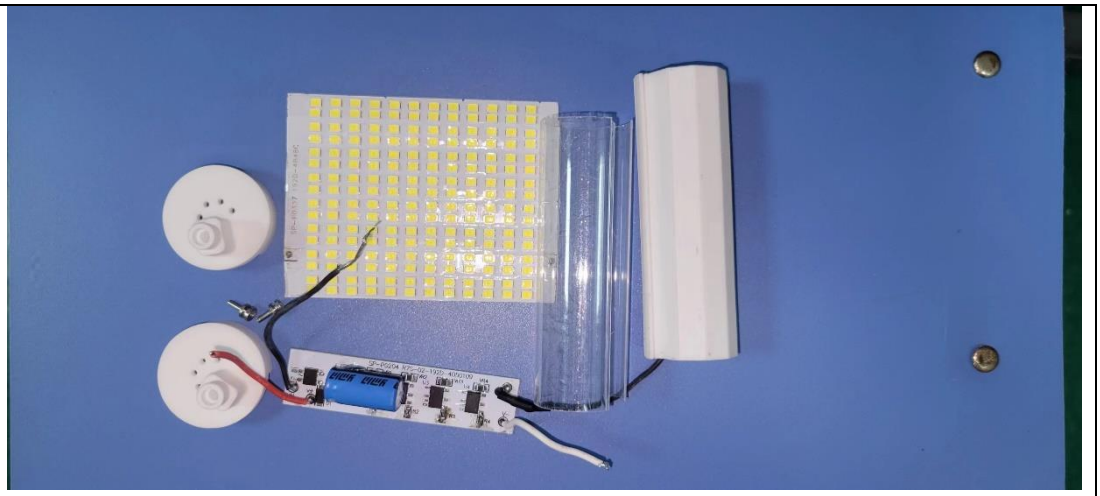
Details of: PCB view



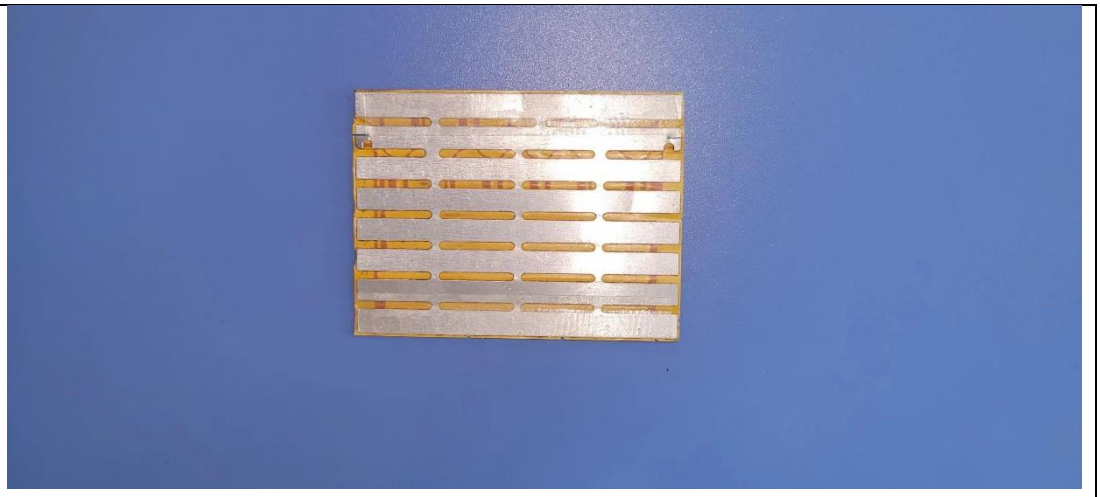
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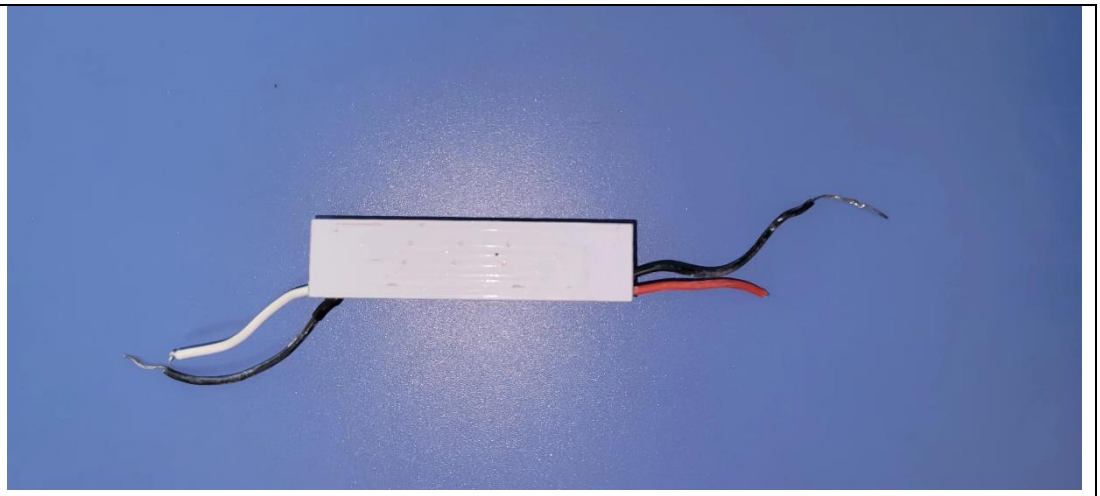
Details of: PCB view



Details of: PCB view



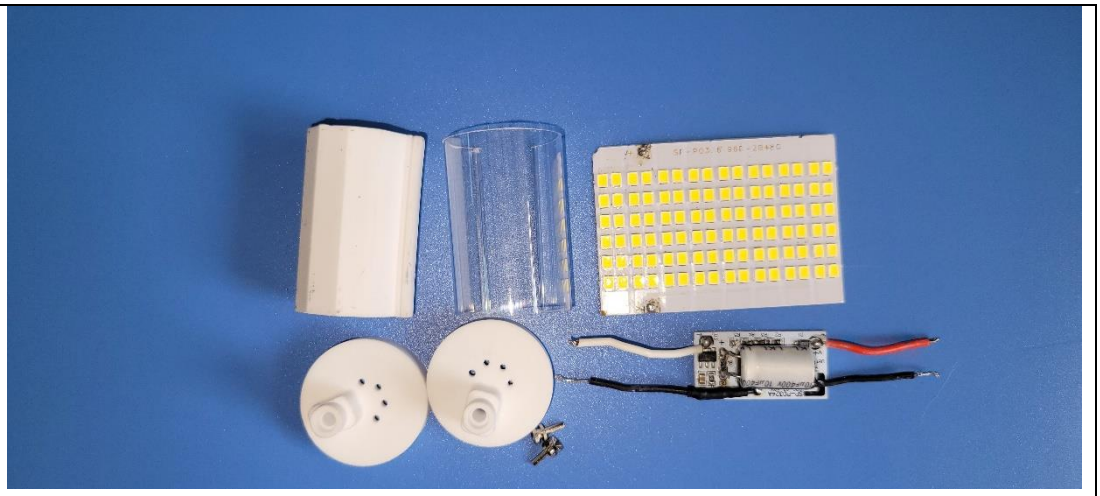
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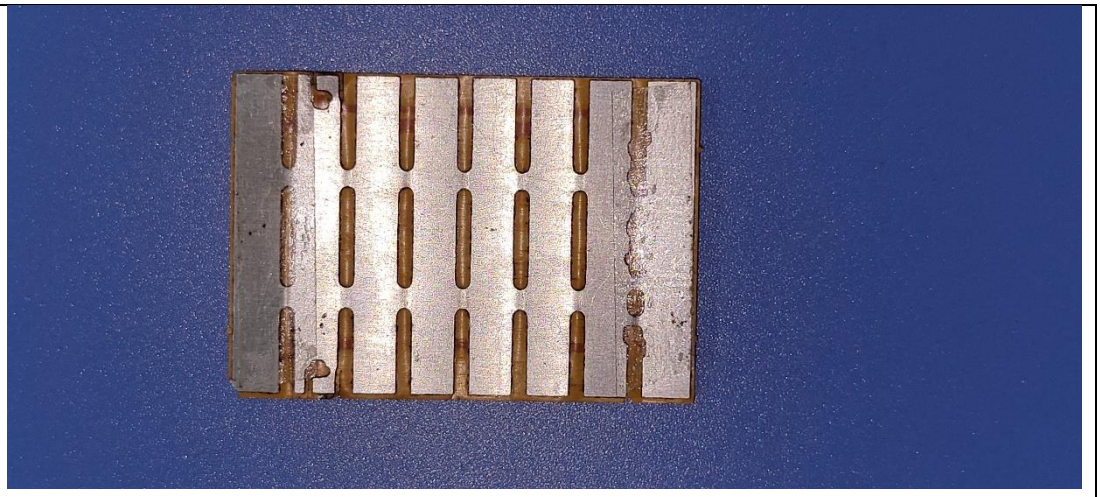
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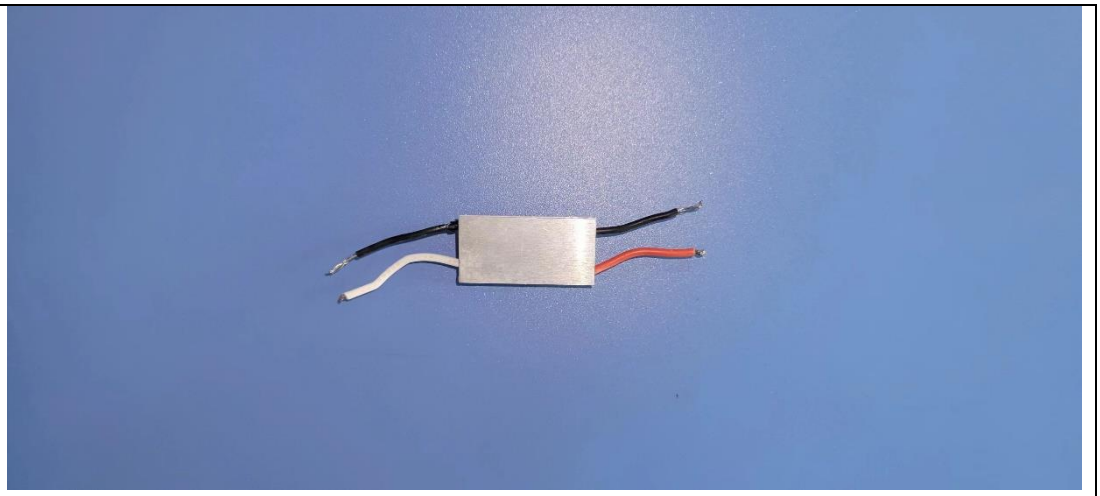
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Details of: PCB view



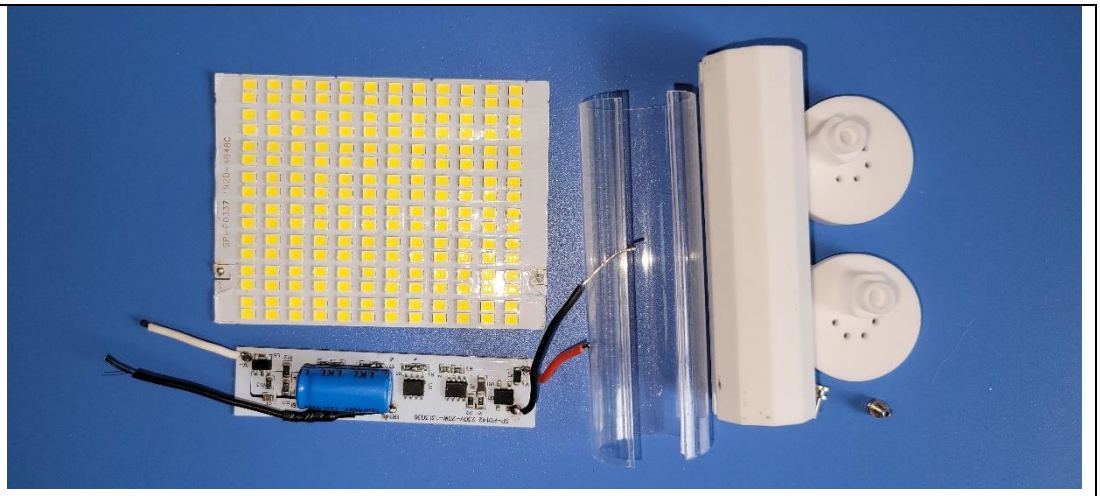
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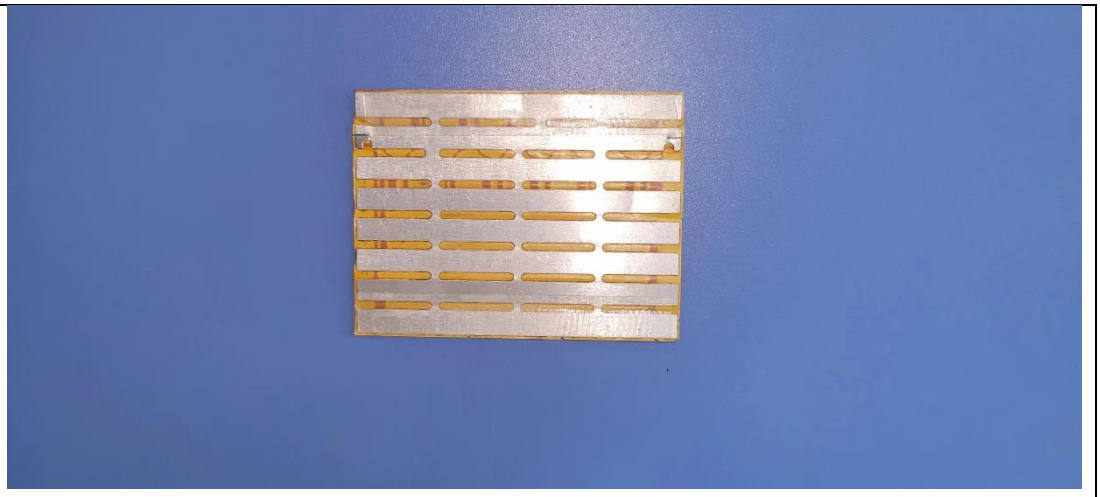
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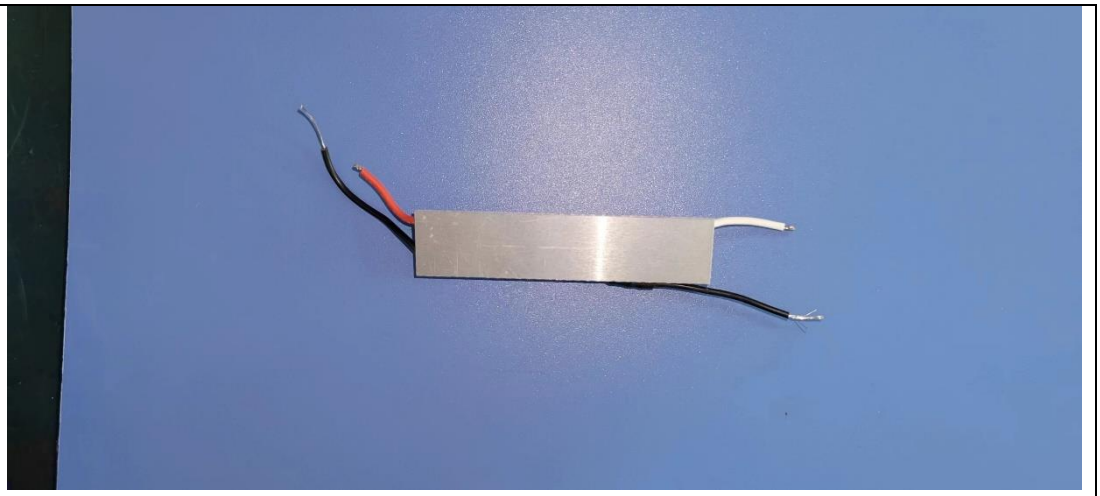
Details of: PCB view



Details of: PCB view



Details of: PCB view



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