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**EMC Test report for Air Assisted Airless Paint Sprayer
/ Electric Airless Sprayer**

**Models: PM021; SLP-1100A; P21; S1021; EP21T; STPA21T; PM021LF;
SLP-1101; P21LF; S1021LF; QP021; EP21H; STPA21S; PM025;
SLP-1100B; FARBMAX Airless 2700; STPA25T; FE-AIRLESS 4001;
P25; S1025; QP025; EP25; AC023; SLP-A1113; AA23; S1323;
EP23-AC; AIRLESS VERFPOMP FE-7001**

Shanghai, date of issue: 2015-07-14

Author : Richie Tang

By order of Lee Yeong Industrial Co., Ltd. at Douliu City, Yunlin County, Taiwan

A handwritten signature in black ink that reads 'Richie Tang'.

A handwritten signature in black ink that reads 'sky zhang'.

author : Richie Tang

reviewed : Sky Zhang

B 25 pages 0 annexes (sec)

DEKRA Testing and Certification (Shanghai) Ltd.
Document

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1 **CONCLUSION**

The equipment under test (EUT) does meet the essential requirements of the EMC Directive 2004/108/EC.

The tests described in this report do not result in the right to use any approval mark as conferred by DEKRA. As far as the tests were based on certain specifications, these are mentioned in the report.

The conclusion and results stated in this test report are based on a non-recurrent examination of sample(s) provided by the applicant.

1.1 **Model description**

The apparatus as supplied for the test is an air assisted airless paint sprayer, model AC023 intended for residential use. The EUT has electronic control circuit and earth connection.

According to the declaration from manufacturer, all models are identical except the AC023 have an air assistant motor. Model AC023 is an air assisted airless paint sprayer, others are electric airless sprayer.

Due to the similarity between them, model AC023 was selected for the full tests and the corresponding data is representative for other models as well.



Figure 1 Overview



Figure 2 Overview



Figure 3 Overview

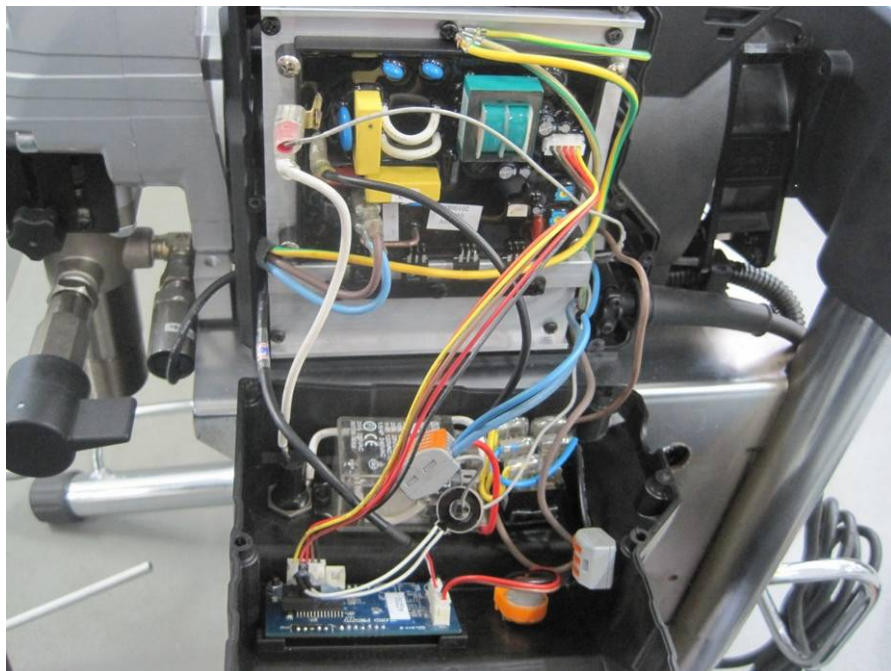


Figure 4 Internal view

1.2 Environment

The requirements and standards apply to equipment intended for use in:

✓	Residential (domestic) environment
	Commercial and light-industrial environment
	Industrial environment
	Medical environment

1.3 Classification

The standard EN 55014-2 is subdivided in four categories. For each category, the specific immunity requirements are formulated.

	Category 1	Apparatus containing no electronic control circuitry
✓	Category 2	Apparatus containing electronic control circuitry with no internal clock or oscillator frequency higher than 15 MHz.
	Category 3	Battery powered apparatus containing electronic control circuitry with no internal clock higher than 15 MHz.
	Category 4	All other apparatus.

2 SUMMARY

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

2.1 Applied standards

Standard	Year	Title
EN 55014-1	2006	Emission – Electrical motor-operated and thermal appliances for household and similar purposes, electrical tools and similar electrical apparatus
A1	2009	
A2	2011	
EN 55014-2	1997	Immunity - Household appliances, electric tools and similar
A1	2001	
A2	2008	
EN 61000-3-2	2014	Limits for harmonic currents emissions
EN 61000-3-3	2013	Limitation of voltage fluctuations and flicker

2.2 Overview of results

Emission tests	Result
Mains conducted disturbance voltage	PASS
Disturbance Power	PASS
Harmonic current emission	PASS
Limitation of voltage fluctuations (flicker)	PASS

Immunity tests	Result
Electrostatic Discharges (ESD)	PASS
Electrical fast transient (EFT)	PASS
Surge transients	PASS
Conducted RF disturbances	PASS
Power supply voltage interruptions & dips	PASS

3 GENERAL INFORMATION

3.1 Product Information

Equipment under test	Air Assisted Airless Paint Sprayer / Electric Airless Sprayer
Trade mark	AGP
Tested Type	AC023
Representative types	PM021; SLP-1100A; P21; S1021; EP21T; STPA21T; PM021LF; SLP-1101; P21LF; S1021LF; QP021; EP21H; STPA21S; PM025; SLP-1100B; FARBMAX Airless 2700; STPA25T; FE-AIRLESS 4001; P25; S1025; QP025; EP25; AC023; SLP-A1113; AA23; S1323; EP23-AC; AIRLESS VERFPOMP FE-7001
Ratings	PM021; SLP-1100A; P21; S1021; EP21T; STPA21T; PM021LF; SLP-1101; P21LF; S1021LF; QP021; EP21H; STPA21S: 110-120 V or 220-240 V; 50-60 Hz; 1000 W; Class I PM025; SLP-1100B; FARBMAX Airless 2700; STPA25T; FE-AIRLESS 4001; P25; S1025; QP025; EP25: 110-120 V or 220-240 V; 50-60 Hz; 1300 W; Class I AC023; SLP-A1113; AA23; S1323; EP23-AC; AIRLESS VERFPOMP FE-7001: 110-120 V or 220-240 V; 50-60 Hz; 1300 W; Class I

3.2 Customer Information

Applicant	Lee Yeong Industrial Co., Ltd.
Address	No.2, Kejia Road, Douliu City, Yunlin County 64057, Taiwan

Manufacturer	Lee Yeong Industrial Co., Ltd.
Address	No.2, Kejia Road, Douliu City, Yunlin County 64057, Taiwan

Factory	Lee Yeong Industrial Co., Ltd.
Address	No.2, Kejia Road, Douliu City, Yunlin County 64057, Taiwan

3.3 Test data

Location	Global Certification Corp.
Address	No.146, Sec. 2, Xiangzhang Rd., Xizhi Dist., New Taipei City 221, Taiwan
Date	Sep. 2011
Supervised by	Richie Tang

3.4 Environmental conditions

Tests have been performed in a controlled laboratory environment, where the environmental conditions are maintained within the applicable ranges.

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

3.5 Measurement Uncertainty

Conducted Emission Expanded Uncertainty: $U = 3.38$ dB

Disturbance Power Expanded Uncertainty: $U = 3.92$ dB

4 EMISSION TEST RESULTS

4.1 Mains conducted disturbance voltage

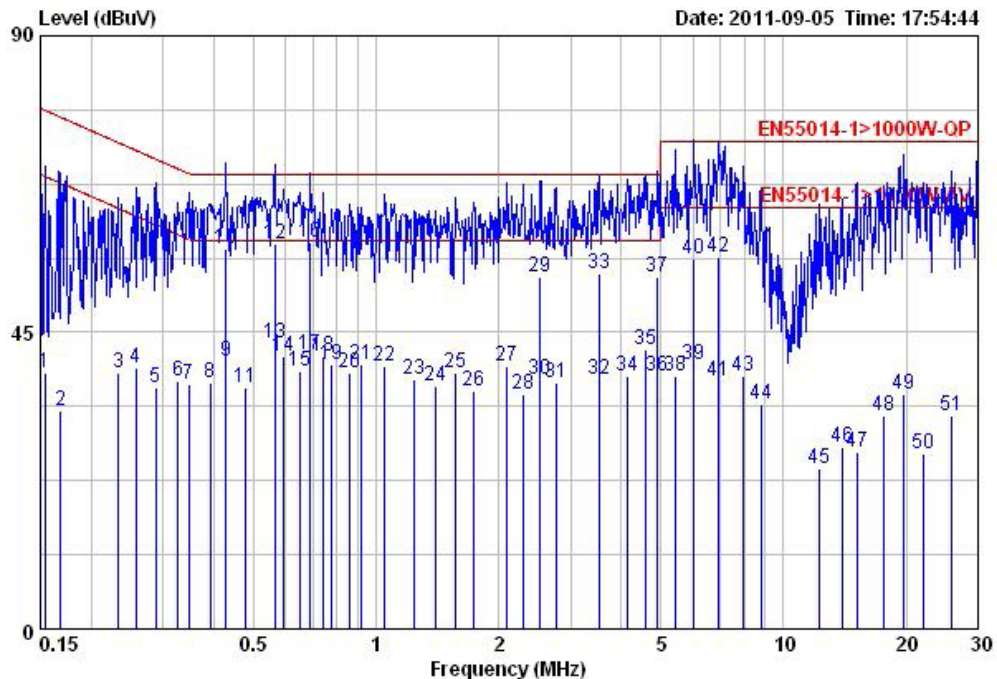
Standard			EN 55014-1 (Tools)					
Frequency [MHz]			QP [dB(μV)]		AV [dB(μV)]			
0,15	–	0,35	66	–	59 *)	59	–	49 *)
0,35	–	5	59		49			
5	–	30	64		54			

*) Limits decreasing linearly with the logarithm of the frequency

	Rated motor power not exceeding 700 W	Limits as above
	Rated motor power above 700 and not exceeding 1000 W	Limits +4 dB
✓	Rated motor power above 1000 W	Limits +10 dB

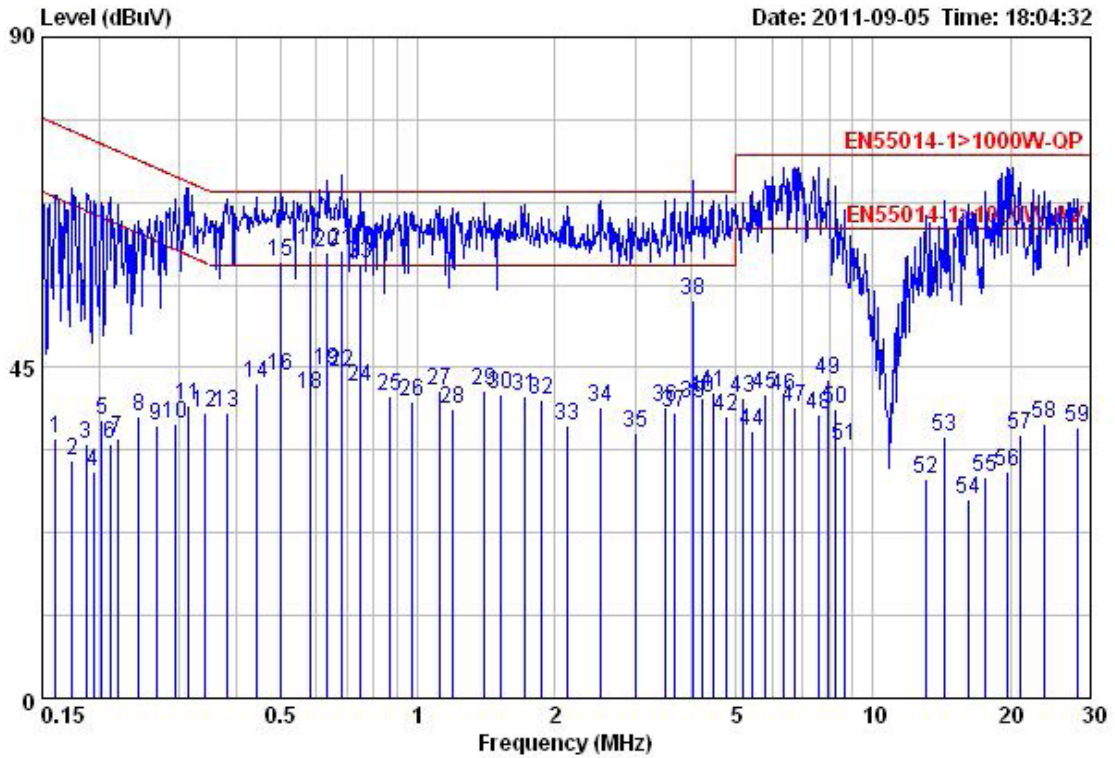
Port	AC mains
Test method	LISN
Mode	On mode

Line



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.15	28.48	10.25	38.73	68.69	-29.96	Average
2	0.17	22.81	10.25	33.06	67.62	-34.56	Average
3	0.23	28.54	10.24	38.78	63.81	-25.03	Average
4	0.26	29.29	10.24	39.53	62.62	-23.09	Average
5	0.29	26.27	10.25	36.52	61.31	-24.79	Average
6	0.33	27.37	10.25	37.62	59.81	-22.19	Average
7	0.35	26.75	10.25	37.00	59.12	-22.12	Average
8	0.39	27.23	10.25	37.48	59.00	-21.52	Average
9	0.43	30.40	10.25	40.65	59.00	-18.35	Average
10	0.43	47.31	10.25	57.56	69.00	-11.44	QP
11	0.48	26.40	10.25	36.65	59.00	-22.35	Average
12	0.56	48.09	10.25	58.34	69.00	-10.66	QP
13	0.56	33.15	10.25	43.40	59.00	-15.60	Average
14	0.59	31.00	10.25	41.25	59.00	-17.75	Average
15	0.65	28.73	10.26	38.99	59.00	-20.01	Average
16	0.69	48.31	10.26	58.57	69.00	-10.43	QP
17	0.69	31.41	10.26	41.67	59.00	-17.33	Average
18	0.74	31.01	10.25	41.26	59.00	-17.74	Average
19	0.78	29.81	10.25	40.06	59.00	-18.94	Average
20	0.86	28.58	10.25	38.83	59.00	-20.17	Average
21	0.92	29.76	10.25	40.01	59.00	-18.99	Average
22	1.05	29.65	10.25	39.90	59.00	-19.10	Average
23	1.24	27.68	10.25	37.93	59.00	-21.07	Average
24	1.40	26.55	10.25	36.80	59.00	-22.20	Average
25	1.56	28.55	10.26	38.81	59.00	-20.19	Average
26	1.73	25.73	10.25	35.98	59.00	-23.02	Average
27	2.10	29.66	10.26	39.92	59.00	-19.08	Average
28	2.30	25.40	10.25	35.65	59.00	-23.35	Average
29	2.53	43.15	10.25	53.40	69.00	-15.60	QP
30	2.53	27.66	10.25	37.91	59.00	-21.09	Average
31	2.76	27.04	10.25	37.29	59.00	-21.71	Average
32	3.55	27.71	10.24	37.95	59.00	-21.05	Average
33	3.55	43.62	10.24	53.86	69.00	-15.14	QP
34	4.14	28.11	10.24	38.35	59.00	-20.65	Average
35	4.60	32.08	10.24	42.32	59.00	-16.68	Average
36	4.90	28.07	10.24	38.31	59.00	-20.69	Average
37	4.90	43.16	10.24	53.40	69.00	-15.60	QP
38	5.45	28.17	10.25	38.42	64.00	-25.58	Average
39	6.02	29.94	10.24	40.18	64.00	-23.82	Average
40	6.02	45.93	10.24	56.17	74.00	-17.83	QP
41	6.91	27.29	10.25	37.54	64.00	-26.46	Average
42	6.91	46.27	10.25	56.52	74.00	-17.48	QP
43	7.98	28.11	10.25	38.36	64.00	-25.64	Average
44	8.82	23.93	10.25	34.18	64.00	-29.82	Average
45	12.25	14.17	10.24	24.41	64.00	-39.59	Average
46	13.91	17.22	10.25	27.47	64.00	-36.53	Average
47	15.15	16.47	10.24	26.71	64.00	-37.29	Average
48	17.57	22.18	10.20	32.38	64.00	-31.62	Average
49	19.64	25.44	10.17	35.61	64.00	-28.39	Average
50	22.06	16.40	10.19	26.59	64.00	-37.41	Average
51	25.73	22.03	10.18	32.21	64.00	-31.79	Average

Neutral



	Freq	Read Level	Read Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.16	24.18	11.15	35.33	68.19	-32.86	Average
2	0.17	21.20	11.14	32.34	67.19	-34.85	Average
3	0.19	23.54	11.14	34.68	66.37	-31.69	Average
4	0.19	19.59	11.14	30.73	65.94	-35.21	Average
5	0.20	26.64	11.14	37.78	65.44	-27.66	Average
6	0.21	23.44	11.14	34.58	64.94	-30.36	Average
7	0.22	24.19	11.14	35.33	64.50	-29.17	Average
8	0.24	27.22	11.14	38.36	63.25	-24.89	Average
9	0.27	26.02	11.14	37.16	62.18	-25.02	Average
10	0.29	26.19	11.13	37.32	61.06	-23.74	Average
11	0.31	28.72	11.13	39.85	60.25	-20.40	Average
12	0.34	27.72	11.13	38.85	59.25	-20.40	Average
13	0.38	27.76	11.13	38.89	59.00	-20.11	Average
14	0.44	31.64	11.13	42.77	59.00	-16.23	Average
15	0.50	48.32	11.13	59.45	69.00	-9.55	QP
16	0.50	32.80	11.13	43.93	59.00	-15.07	Average
17	0.58	49.85	11.13	60.98	69.00	-8.02	QP

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
18	0.58	30.20	11.13	41.33	59.00	-17.67	Average
19	0.63	33.37	11.13	44.50	59.00	-14.50	Average
20	0.63	49.55	11.13	60.68	69.00	-8.32	QP
21	0.68	49.75	11.13	60.88	69.00	-8.12	QP
22	0.68	33.37	11.13	44.50	59.00	-14.50	Average
23	0.75	48.12	11.12	59.24	69.00	-9.76	QP
24	0.75	31.22	11.12	42.34	59.00	-16.66	Average
25	0.87	29.97	11.12	41.09	59.00	-17.91	Average
26	0.97	29.20	11.12	40.32	59.00	-18.68	Average
27	1.12	30.82	11.13	41.95	59.00	-17.05	Average
28	1.20	28.31	11.12	39.43	59.00	-19.57	Average
29	1.40	30.79	11.12	41.91	59.00	-17.09	Average
30	1.52	30.11	11.13	41.24	59.00	-17.76	Average
31	1.73	29.99	11.12	41.11	59.00	-17.89	Average
32	1.88	29.39	11.13	40.52	59.00	-18.48	Average
33	2.13	26.00	11.13	37.13	59.00	-21.87	Average
34	2.51	28.44	11.12	39.56	59.00	-19.44	Average
35	3.01	24.91	11.12	36.03	59.00	-22.97	Average
36	3.49	28.50	11.12	39.62	59.00	-19.38	Average
37	3.66	27.78	11.11	38.89	59.00	-20.11	Average
38	4.01	43.13	11.11	54.24	69.00	-14.76	QP
39	4.01	28.92	11.11	40.03	59.00	-18.97	Average
40	4.22	29.84	11.11	40.95	59.00	-18.05	Average
41	4.45	30.39	11.11	41.50	59.00	-17.50	Average
42	4.77	27.36	11.11	38.47	59.00	-20.53	Average
43	5.17	29.71	11.11	40.82	64.00	-23.18	Average
44	5.45	25.32	11.11	36.43	64.00	-27.57	Average
45	5.80	30.27	11.10	41.37	64.00	-22.63	Average
46	6.35	29.94	11.11	41.05	64.00	-22.95	Average
47	6.73	28.52	11.11	39.63	64.00	-24.37	Average
48	7.61	27.51	11.10	38.61	64.00	-25.39	Average
49	7.94	32.35	11.10	43.45	64.00	-20.55	Average
50	8.28	28.35	11.10	39.45	64.00	-24.55	Average
51	8.64	23.22	11.11	34.33	64.00	-29.67	Average
52	13.06	18.74	11.05	29.79	64.00	-34.21	Average
53	14.36	24.53	11.03	35.56	64.00	-28.44	Average
54	16.23	15.94	11.05	26.99	64.00	-37.01	Average
55	17.57	19.09	11.06	30.15	64.00	-33.85	Average
56	19.64	19.86	11.09	30.95	64.00	-33.05	Average
57	21.04	24.78	11.04	35.82	64.00	-28.18	Average
58	23.76	26.44	10.95	37.39	64.00	-26.61	Average
59	28.00	26.15	10.73	36.88	64.00	-27.12	Average

Refer to chapter 6 for the test set-up.

Conclusion:

PASS

4.2 Disturbance power

Standard	EN 55014-1	
Frequency [MHz]	QP [dB(pW)]	AV [dB(pW)]
30 – 300	45 – 55 *)	35 – 45 *)

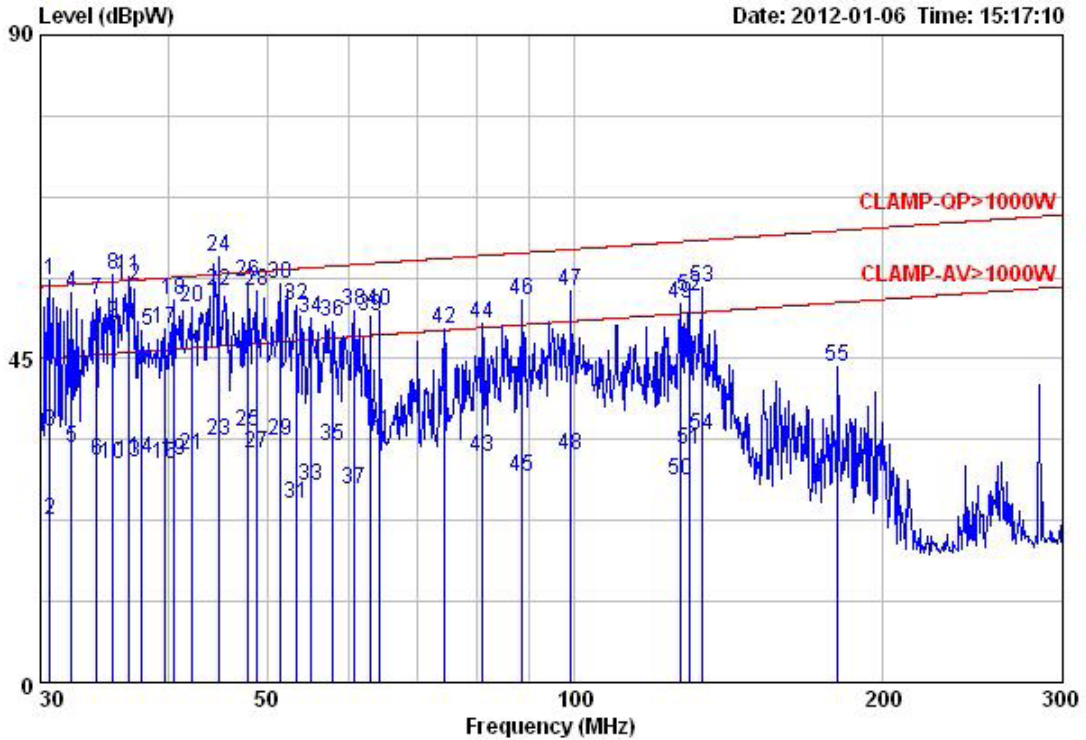
*) Limits increasing linearly with the frequency

For tools the following limits apply to the AC Mains port:

	Rated motor power not exceeding 700 W	Limits as above
	Rated motor power above 700 and not exceeding 1000 W	Limits +4 dB
✓	Rated motor power above 1000 W	Limits +10 dB

Port	AC Mains
Mode	On mode with no load

Results



		Read		Limit	Over			
	Freq	Level	Factor	Level	Limit	Remark		
	MHz	dBpW	dB	dBpW	dBpW	dB		
1	X	30.63	40.08	15.78	55.86	55.10	0.76	Peak
2		30.63	6.83	15.78	22.61	45.10	-22.49	Average
3		30.63	18.96	15.78	34.74	55.10	-20.36	QP
4		32.15	38.44	15.72	54.16	55.31	-1.15	Peak
5		32.15	16.80	15.72	32.52	45.31	-12.79	Average
6		34.05	15.11	15.66	30.77	45.56	-14.79	Average
7		34.05	37.45	15.66	53.11	55.56	-2.45	Peak
8	X	35.33	40.90	15.63	56.53	55.72	0.81	Peak
9		35.33	34.22	15.63	49.85	55.72	-5.87	QP
10		35.33	14.74	15.63	30.37	45.72	-15.35	Average
11	X	36.57	40.83	15.59	56.42	55.87	0.55	Peak
12		36.57	39.55	15.59	55.14	55.87	-0.73	QP
13		36.57	14.97	15.59	30.56	45.87	-15.31	Average
14		37.68	15.61	15.56	31.17	46.00	-14.83	Average
15		37.68	33.37	15.56	48.93	56.00	-7.07	Peak
16		39.64	14.93	15.51	30.44	46.22	-15.78	Average
17		39.64	33.68	15.51	49.19	56.22	-7.03	Peak

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBpW	dB	dBpW	dBpW	dB	
18	40.47	37.66	15.48	53.14	56.31	-3.17	Peak
19	40.47	15.28	15.48	30.76	46.31	-15.55	Average
20	42.18	36.86	15.40	52.26	56.49	-4.23	Peak
21	42.18	16.18	15.40	31.58	46.49	-14.91	Average
22	44.78	39.20	15.30	54.50	56.75	-2.25	QP
23	44.78	18.26	15.30	33.56	46.75	-13.19	Average
24	44.78	43.87	15.30	59.17	56.75	2.42	Peak
25	47.88	19.76	15.18	34.94	47.04	-12.10	Average
26	47.88	40.45	15.18	55.63	57.04	-1.41	Peak
27	48.77	16.76	15.15	31.91	47.12	-15.21	Average
28	48.77	39.31	15.15	54.46	57.12	-2.66	Peak
29	51.54	18.45	15.05	33.50	47.36	-13.86	Average
30	51.54	40.41	15.05	55.46	57.36	-1.90	Peak
31	53.35	9.70	15.00	24.70	47.51	-22.81	Average
32	53.35	37.42	15.00	52.42	57.51	-5.09	Peak
33	55.22	12.41	14.93	27.34	47.66	-20.32	Average
34	55.22	35.61	14.93	50.54	57.66	-7.12	Peak
35	57.96	18.00	14.86	32.86	47.87	-15.01	Average
36	57.96	35.17	14.86	50.03	57.87	-7.84	Peak
37	60.69	11.93	14.79	26.72	48.07	-21.35	Average
38	60.69	36.78	14.79	51.57	58.07	-6.50	Peak
39	62.97	36.10	14.74	50.84	58.23	-7.39	Peak
40	64.43	36.97	14.71	51.68	58.33	-6.65	Peak
41	64.43	20.22	14.71	34.93	48.33	-13.40	Average
42	74.49	34.40	14.69	49.09	58.96	-9.87	Peak
43	81.12	16.61	14.74	31.35	49.33	-17.98	Average
44	81.12	35.05	14.74	49.79	59.33	-9.54	Peak

Refer to chapter 6 for the test set-up.

According to clause 4.1.2.3.2 (EN 55014-1):

Appliances are deemed to comply in the frequency range from 300 MHz to 1 000 MHz if both of the following conditions (1) and 2)) are fulfilled:

- 1) all emission readings from the equipment under test shall be lower than the applicable limits (Table 2a) reduced by the margin (Table 2b);
- 2) the maximum clock frequency shall be less than 30 MHz.

Conclusion:

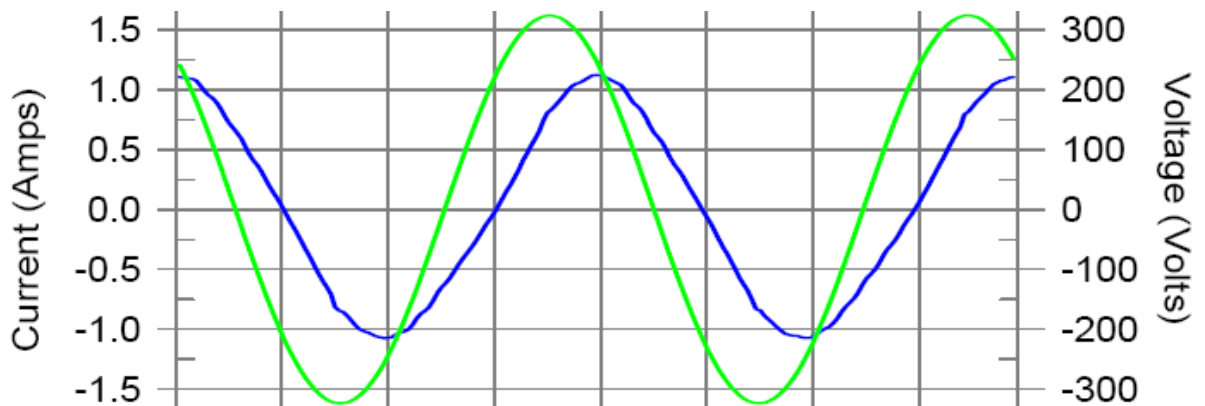
PASS

4.3 Harmonic currents

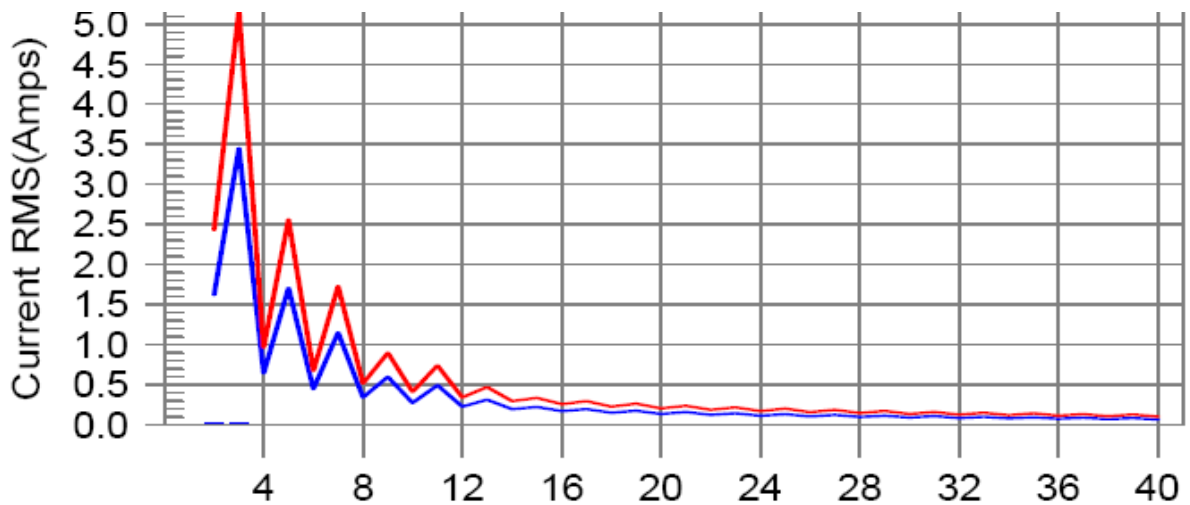
Standard	EN 61000-3-2
Port	AC Mains supply
Rated power	1300 W
Mode	On mode

	Class A	All apparatus not classified as Class B, C or D
✓	Class B	Portable tools
	Class C	Lighting equipment
	Class D	Personal computers, television receivers

Current & voltage waveforms



Harmonics and Class B limit line European Limits



Test Result: Pass **Source qualification: Normal**
 THC(A): 0.03 I-THD(%): 4.35 POHC(A): 0.000 POHC Limit(A): 0.480
Highest parameter values during test:
 V_RMS (Volts): 229.36 Frequency(Hz): 50.00
 I_Peak (Amps): 1.129 I_RMS (Amps): 0.752
 I_Fund (Amps): 0.743 Crest Factor: 1.611
 Power (Watts): 131.0 Power Factor: 0.776

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.016	1.620	1.0	0.017	2.430	0.70	Pass
3	0.027	3.450	0.8	0.028	5.175	0.55	Pass
4	0.001	0.645	0.0	0.001	0.968	0.00	Pass
5	0.007	1.710	0.4	0.007	2.565	0.28	Pass
6	0.000	0.450	0.0	0.000	0.675	0.00	Pass
7	0.004	1.155	0.0	0.004	1.733	0.00	Pass
8	0.000	0.345	0.0	0.000	0.518	0.00	Pass
9	0.002	0.600	0.0	0.002	0.900	0.00	Pass
10	0.000	0.276	0.0	0.000	0.414	0.00	Pass
11	0.002	0.495	0.0	0.002	0.743	0.00	Pass
12	0.000	0.230	0.0	0.000	0.344	0.00	Pass
13	0.002	0.315	0.0	0.002	0.473	0.00	Pass
14	0.000	0.197	0.0	0.000	0.296	0.00	Pass
15	0.002	0.225	0.0	0.002	0.338	0.00	Pass
16	0.000	0.173	0.0	0.000	0.259	0.00	Pass
17	0.002	0.199	0.0	0.002	0.297	0.00	Pass
18	0.000	0.153	0.0	0.000	0.230	0.00	Pass
19	0.002	0.178	0.0	0.002	0.266	0.00	Pass
20	0.000	0.138	0.0	0.000	0.207	0.00	Pass
21	0.002	0.161	0.0	0.002	0.241	0.00	Pass
22	0.000	0.125	0.0	0.000	0.188	0.00	Pass
23	0.002	0.147	0.0	0.002	0.220	0.00	Pass
24	0.000	0.115	0.0	0.000	0.173	0.00	Pass
25	0.002	0.135	0.0	0.002	0.203	0.00	Pass
26	0.000	0.106	0.0	0.000	0.159	0.00	Pass
27	0.001	0.125	0.0	0.001	0.188	0.00	Pass
28	0.000	0.099	0.0	0.000	0.148	0.00	Pass
29	0.001	0.116	0.0	0.001	0.175	0.00	Pass
30	0.000	0.092	0.0	0.000	0.138	0.00	Pass
31	0.001	0.110	0.0	0.001	0.163	0.00	Pass
32	0.000	0.086	0.0	0.000	0.129	0.00	Pass
33	0.001	0.102	0.0	0.001	0.153	0.00	Pass
34	0.000	0.081	0.0	0.000	0.122	0.00	Pass
35	0.001	0.096	0.0	0.001	0.145	0.00	Pass
36	0.000	0.077	0.0	0.000	0.115	0.00	Pass
37	0.001	0.092	0.0	0.001	0.137	0.00	Pass
38	0.000	0.073	0.0	0.000	0.109	0.00	Pass
39	0.001	0.087	0.0	0.001	0.130	0.00	Pass
40	0.000	0.069	0.0	0.000	0.104	0.00	Pass

Conclusion:

PASS

4.4 Voltage fluctuations (Flicker)

Standard	EN 61000-3-3
Port	AC Mains supply
Voltage	230 V _{AC}
Mode	On mode

Equipment intended to be connected to 230/400 V_{AC} 50 Hz supply systems may not produce voltage fluctuations in the supply systems due to variation of the input current above the limits as stated below.

P _{ST}	Not applicable*
P _{LT}	Not applicable*
T _{max} (dt > 3,3%)	≤ 500 ms
d _C	≤ 3,3%
d _{MAX}	≤ 7%

Results

T _{max} (dt > 3,3%)	0,0 ms
Maximum voltage change d _{MAX}	0,947%
Relative Voltage change d _C	0,468%
Short term flicker P _{ST}	Not applicable*
Long term flicker P _{LT}	Not applicable*

Conclusion:

PASS

5 IMMUNITY TEST RESULTS

5.1 Electrostatic discharge immunity

Electrostatic discharges (ESD) are the result of persons or objects that accumulate static electricity due to for instance walking on synthetic carpets. The ESD can influence the operation of equipment or damage its electronics, either by a direct discharge or indirectly by coupling or radiation. Both effects are simulated during the tests.

Requirements

Standard	EN 55014-2
Basic standard	EN 61000-4-2
Port	Enclosure
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.
Air discharges	8 kV
Contact discharges	4 kV
Mode	On mode

Performed tests

Air discharges	✓	4 kV	✓	8 kV		15 kV		
Contact discharges	✓	2 kV	✓	4 kV		8 kV		
Via coupling planes	✓	Horizontal			✓	Vertical		
Polarity	✓	Positive			✓	Negative		
Set-up		Table-top			✓	Floor standing		
Ambient temperature	21 °C							
Relative Humidity air	48%							

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion:

PASS

5.2 Electrical Fast Transient immunity

The EFT immunity test simulates disturbances by bursts of very short transients caused for example by switching off loads such as an AC motor or bouncing relay contacts. The transients are likely to disturb electronics but less likely to cause damage.

Requirements

Standard	EN 55014-2		
Basic standard	EN 61000-4-4		
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.		
Pulse characteristics	5/50 ns		
Peak Voltage; Port	1 kV; AC input power port		
Repetition frequency	✓	5 kHz	2,5 kHz

Performed tests

Tested Voltage; Port	1 kV; AC input power port		
Mode	On mode		
Injection method	✓	CDN	Capacitive clamp
Polarity	✓	Positive	✓ Negative
Set-up		Table-top	✓ Floor standing

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion:

PASS

5.3 Surge transient immunity

The surge transient immunity test simulates the surges that are caused by overvoltages due to indirect (induced) lightning transients. The pulse is a slow transient with high-energy contents and due to its long duration may cause damage to an unprotected EUT.

Requirements

Standard	EN 55014-2
Basic standard	EN 61000-4-5
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.
Pulse characteristics	1,2/50 μ s
Peak Voltage; Port	1 kV; AC input power port (Line to line) 2 kV; AC input power port (Line to earth)

Performed tests

Tested Voltage; Port	1 kV; AC input power port (Line to line) 2 kV; AC input power port (Line to earth)		
Mode	On mode		
Polarity	<input checked="" type="checkbox"/>	Positive	<input checked="" type="checkbox"/> Negative

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion:

PASS

5.4 RF Conducted immunity

During this test the immunity of the equipment for induced or conducted electromagnetic fields is checked. Fields generated by radio and other transmitters cause RF voltages in long cables like the mains network. This test reproduces these induced disturbing voltages by injecting them to the EUT via the cabling.

Requirements

Standard	EN 55014-2
Basic standard	EN 61000-4-6
Performance criterion	A; Operation as intended
Frequency range	0,15 – 230 MHz
Modulation	1 kHz – 80% AM
Test level; Port	3 V; AC input power port

Performed tests

Tested level; Port	3 V; AC input power port		
Mode	On mode		
Frequency range	0,15 – 230 MHz		
Dwell time	3 seconds		
Injection method	✓	CDN-M3	EM clamp

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion:

PASS

5.5 Power supply interruptions and dips

Requirements

Basic standard	EN 61000-4-11
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed. C; Temporary, self-recoverable loss of function is allowed.

Standard	EN 55014-2		
AC input power port		50 Hz	60 Hz
	C	$U_{NOM} - 30\%$ (50 periods)	(60 periods)
	C	$U_{NOM} - 60\%$ (10 periods)	(12 periods)
	C	$U_{NOM} - 100\%$ (0,5 period)	(0,5 period)

Performed tests

Tested voltage	AC input power port, 240 V _{AC}	
Mode	On mode	
AC input power port	50 Hz	60 Hz
	$U_{NOM} - 30\%$ (50 periods)	$U_{NOM} - 30\%$ (60 periods)
	$U_{NOM} - 60\%$ (10 periods)	$U_{NOM} - 60\%$ (12 periods)
	$U_{NOM} - 100\%$ (0,5 period)	$U_{NOM} - 100\%$ (0,5 period)

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion:

PASS

6 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

The photograph shows the tested device.



Figure 5 Conducted Emission test setup



Figure 6 Disturbance power test setup

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