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EMC Test report for MAGNETIC CORE DRILL (Drill Press)

Models: MD120/4; MD1204; MR1204.2000; MB1204; MAGPRO100(120); KBE2682848K; KBE2682845E; KBE2682828K; MD500/2; UNI5000; KW1500381; MD502; MD5075; MD-50Q; MR-5075; UNI-5000; MD-50Q; MAGPRO50/2S; AGP-MD500; RN-MD500/2; 50PM; MB502; MD750/4; UNI7500; KW1500382; MCD75; 16082606; MD754; MD7550; MD-75PQ; UNI-7500; MR-7550; MD-75PQ; MAGPRO75/4S; RN-MD750/4; 75PM; HF-750; MB754; MDS750/4; MDS754; MDS7550; MAGPRO75/4S SWIVEL BASE; AGP-DS750; 75PMB; MD100/4; MDS100/4; MD650/2; ME5000/2; ME5075; EVOMAG50; EBO5000/2; 5000/2; Q5000/2; 592581; ME7500/4; ME754; ME7550; EVOMAG75; EBO7500/4; 7500/4; Q7500/4; 592582

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Author : Jerremy Cai

By order of LEE YEONG Industrial Co., Ltd.



author : Jerremy Cai

reviewed : Zuyao Fan

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Document

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1 CONCLUSION

The report is issued to base on original test report Ref. No. 3182249.50 dated on 2016-02-04 including the following modifications:

- Update the standard.

After review, no test is considered necessary.

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 provided by the applicant.

1.1 Model description

The apparatus as supplied for the test is a Magnetic Core Drill (Drill Press). The products have electronic control circuit and earth connection.

According to the declaration from manufacturer, all models share the same construction and components except the motors of MD120/4 are different with others.

Due to the similarity between them, models MD120/4 and MD750/4 were selected for the full tests and the corresponding data is representative for other models as well.



Figure 1 Overview for model MD120/4

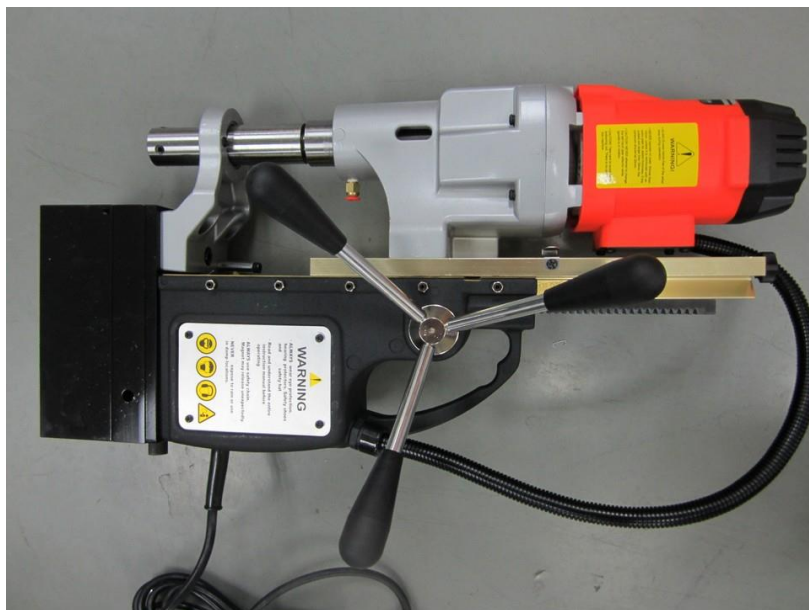


Figure 2 Overview for model MD750/4

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.
	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	2015	Immunity - Household appliances, electric tools and similar
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
Radiated emission	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	Magnetic Core Drill (Drill Press)
Trade mark	AGP
Tested Type	MD120/4 and MD750/4
Representative types	MD1204; MR1204.2000; MB1204; MAGPRO100(120); KBE2682848K; KBE2682845E; KBE2682828K; MD500/2; UNI5000; KW1500381; MD502; MD5075; MD-50Q; MR-5075; UNI-5000; MD-50Q; MAGPRO50/2S; AGP-MD500; RN-MD500/2; 50PM; MB502; UNI7500; KW1500382; MCD75; 16082606; MD754; MD7550; MD-75PQ; UNI-7500; MR-7550; MD-75PQ; MAGPRO75/4S; RN-MD750/4; 75PM; HF-750; MB754; MDS750/4; MDS754; MDS7550; MAGPRO75/4S SWIVEL BASE; AGP-DS750; 75PMB; MD100/4; MDS100/4; MD650/2; ME5000/2; ME5075; EVOMAG50; EBO5000/2; 5000/2; Q5000/2; 592581; ME7500/4; ME754; ME7550; EVOMAG75; EBO7500/4; 7500/4; Q7500/4; 592582;
Ratings	110-120 V; 50-60 Hz; 1700 W; 16 A; Class I or 220-240 V; 50-60 Hz; 2000 W; Class I

3.2 Customer Information

Applicant	LEE YEONG Industrial Co., Ltd.
Address	No.2, Kejia Road, Douliu City, Yunlin County, Taiwan

Manufacturer	LEE YEONG Industrial Co., Ltd.
Address	No.2, Kejia Road, Douliu City, Yunlin County, Taiwan

Factory	LEE YEONG Industrial Co., Ltd.
Address	No.2, Kejia Road, Douliu City, Yunlin County, Taiwan

3.3 Test data

Location	Global Certification Corp.
Address	No.146, Sec. 2, Xiangzhang Rd., Xizhi Dist., New Taipei City 221, Taiwan
Date	Oct. 2011, Nov. 2012
Supervised by	Jerremy Cai

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%

3.1 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

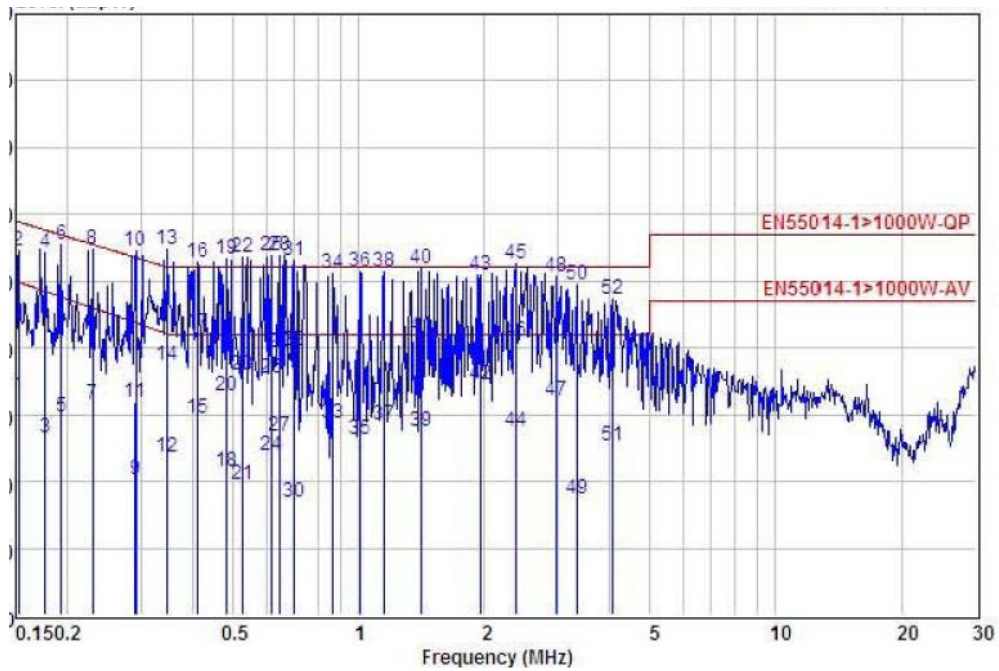
*) Limits decreasing linearly with the logarithm of the frequency

	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 with an artificial hand, no load

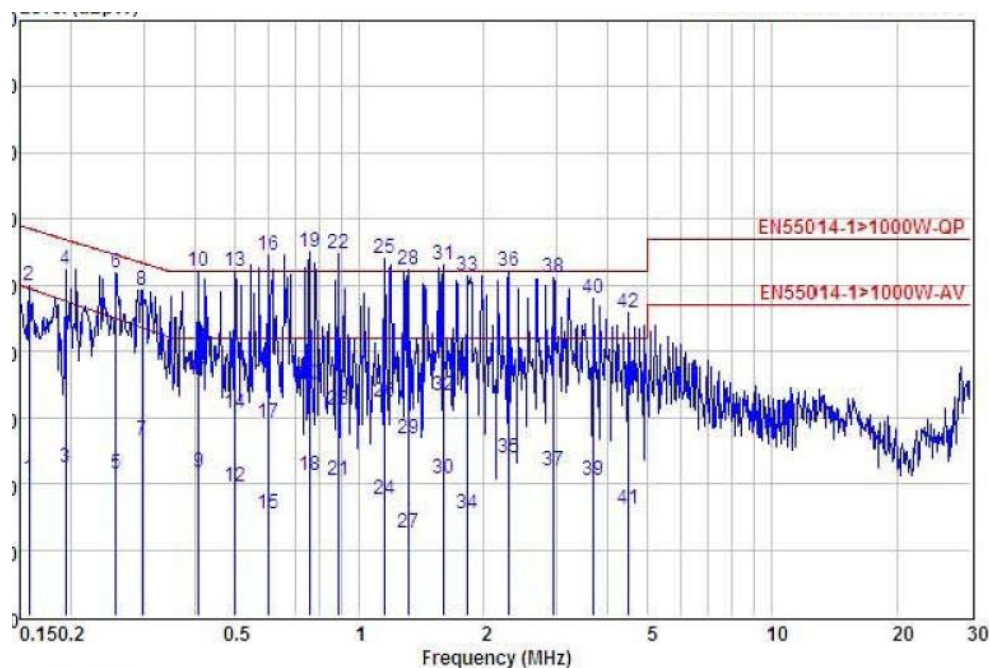
Results for model MD120/4

Line



	Read	Limit	Over				
Freq	Level	Line	Limit	Remark			
MHz	dBuV	dBuV	dB				
1	0.29	48.97	10.25	59.22	69	-9.78	QP
2	0.29	37.47	10.25	47.72	59	-11.28	Average
3	0.35	54.57	10.25	64.82	69	-4.18	QP
4	0.35	40.78	10.25	51.03	59	-7.97	Average
5	0.52	53.08	10.25	63.33	69	-5.67	QP
6	0.52	36.58	10.25	46.83	59	-12.17	Average
7	0.61	52.58	10.25	62.83	69	-6.17	QP
8	0.61	40.98	10.25	51.23	59	-7.77	Average
9	0.65	56.49	10.25	66.74	69	-2.26	QP
10	0.65	43.89	10.25	54.14	59	-4.86	Average
11	0.7	56.69	10.25	66.94	69	-2.06	QP
12	0.7	34.99	10.25	45.24	59	-13.76	Average

Neutral

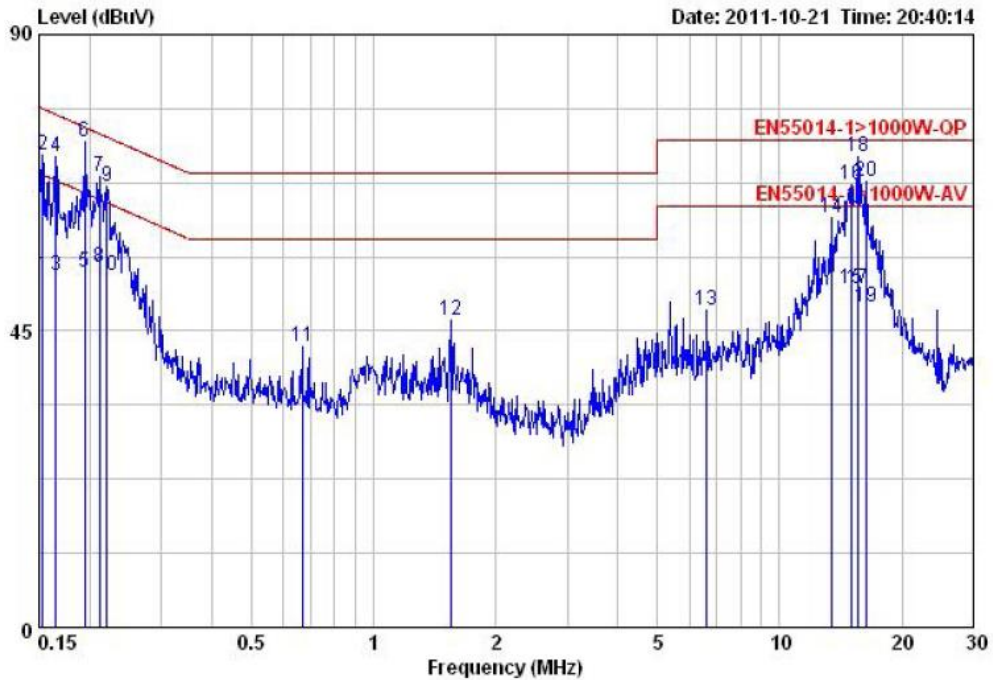


	Read		Limit	Over			
	Freq	Level	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.41	52.9	10.25	63.15	69	-5.85	QP
2	0.41	38.9	10.25	49.15	59	-9.85	Average
3	0.5	47.8	10.25	58.05	69	-10.95	QP
4	0.5	36.7	10.25	46.95	59	-12.05	Average
5	0.75	52.2	10.25	62.45	69	-6.55	QP
6	0.75	38.5	10.25	48.75	59	-10.25	Average
7	0.89	48.39	10.25	58.64	69	-10.36	QP
8	0.89	37.59	10.25	47.84	59	-11.16	Average
9	1.15	49.6	10.25	59.85	69	-9.15	QP
10	1.15	34.8	10.25	45.05	59	-13.95	Average
11	1.59	50.6	10.25	60.85	69	-8.15	QP
12	1.59	37.9	10.25	48.15	59	-10.85	Average

No other significant emissions were recorded at the frequency range of interest employing both the QP and AV detectors.

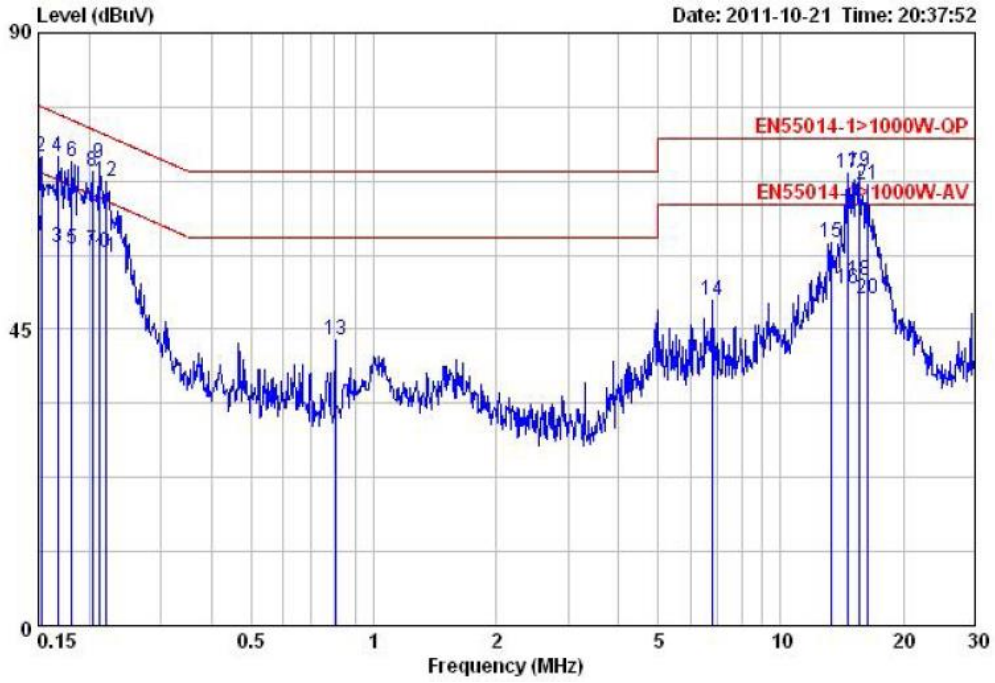
Results for model MD750/4

Line



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.15	43.16	10.25	53.41	68.75	-15.34	Average
2	0.15	61.42	10.25	71.67	78.75	-7.08	Peak
3	0.17	43.10	10.25	53.35	67.87	-14.52	Average
4	0.17	61.17	10.25	71.42	77.87	-6.45	Peak
5	0.19	43.62	10.24	53.86	65.94	-12.08	Average
6	0.19	63.37	10.24	73.61	75.94	-2.33	Peak
7	0.21	58.25	10.24	68.49	74.94	-6.45	Peak
8	0.21	44.47	10.24	54.71	64.94	-10.23	Average
9	0.22	56.77	10.24	67.01	74.44	-7.43	Peak
10	0.22	43.21	10.24	53.45	64.44	-10.99	Average
11	0.67	32.48	10.26	42.74	69.00	-26.26	Peak
12	1.55	36.26	10.26	46.52	69.00	-22.48	Peak
13	6.63	37.92	10.25	48.17	74.00	-25.83	Peak
14	13.48	51.87	10.24	62.11	74.00	-11.89	Peak
15	15.07	41.09	10.24	51.33	64.00	-12.67	Average
16	15.07	56.84	10.24	67.08	74.00	-6.92	Peak
17	15.55	41.19	10.23	51.42	64.00	-12.58	Average

Neutral



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.15	47.90	11.15	59.05	68.81	-9.76	Average
2	0.15	60.01	11.15	71.16	78.81	-7.65	Peak
3	0.17	46.36	11.15	57.51	67.69	-10.18	Average
4	0.17	59.95	11.15	71.10	77.69	-6.59	Peak
5	0.18	45.97	11.14	57.11	66.75	-9.64	Average
6	0.18	59.26	11.14	70.40	76.75	-6.35	Peak
7	0.20	45.86	11.14	57.00	65.37	-8.37	Average
8	0.20	57.72	11.14	68.86	75.37	-6.51	Peak
9	0.21	59.15	11.14	70.29	74.94	-4.65	Peak
10	0.21	45.57	11.14	56.71	64.94	-8.23	Average
11	0.22	44.71	11.14	55.85	64.50	-8.65	Average
12	0.22	56.38	11.14	67.52	74.50	-6.98	Peak

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 *)

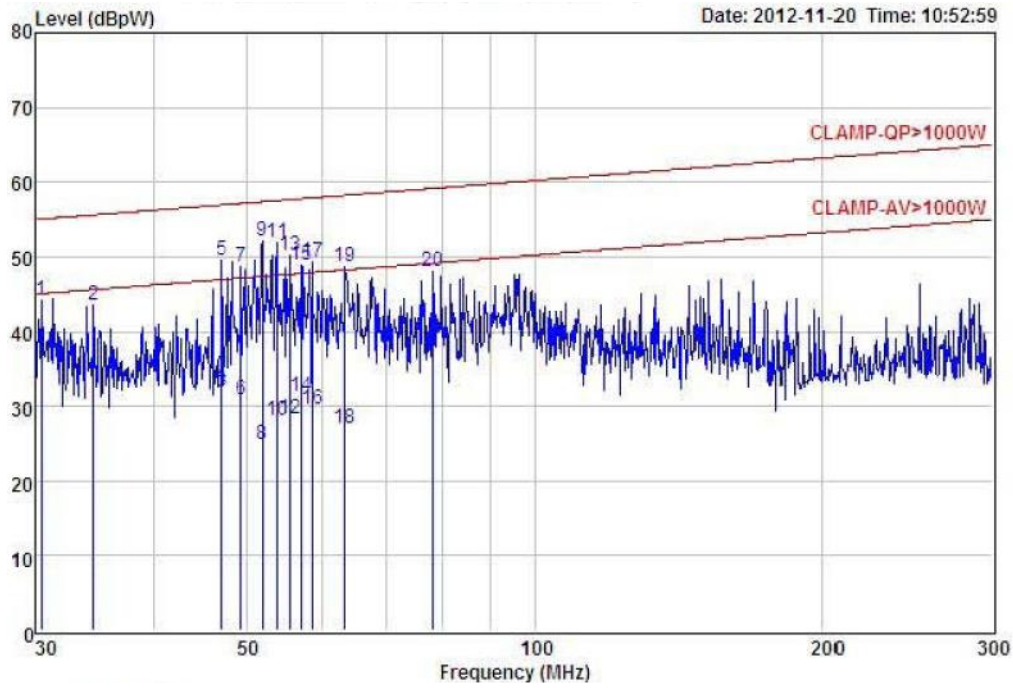
*) Limits increasing linearly with the frequency

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

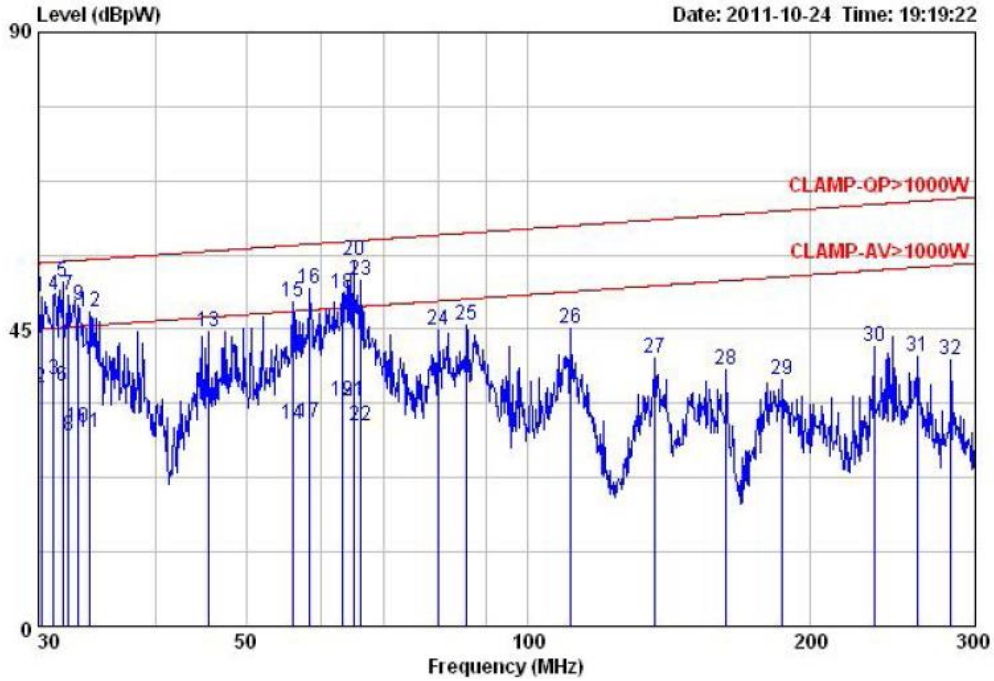
Results for model MD120/4



	Read Freq	Read Level	Level	Factor	Over Limit	Limit Line	Remark
	MHz	dBpW	dBpW	dB	dB	dBpW	
1	30.42	25.88	44.12	18.24	-10.95	55.07	Peak
2	34.52	25.23	43.44	18.21	-12.18	55.62	Peak
3	47.00	14.50	31.92	17.42	-15.04	46.96	Average
4	47.00	15.50	32.92	17.42	-14.04	46.96	Average
5	47.00	32.09	49.51	17.42	-7.45	56.96	Peak
6	49.22	13.80	30.98	17.18	-16.18	47.16	Average
7	49.22	31.59	48.77	17.18	-8.39	57.16	Peak
8	51.89	7.70	24.96	17.26	-22.43	47.39	Average
9	51.89	34.78	52.04	17.26	-5.35	57.39	Peak
10	53.72	10.60	28.01	17.41	-19.53	47.54	Average
11	53.72	34.41	51.82	17.41	-5.72	57.54	Peak
12	55.48	10.70	28.26	17.56	-19.42	47.68	Average
13	55.48	32.61	50.17	17.56	-7.51	57.68	Peak
14	56.90	13.60	31.28	17.68	-16.51	47.79	Average
15	56.90	31.22	48.90	17.68	-8.89	57.79	Peak
16	58.50	11.80	29.61	17.81	-18.30	47.91	Average
17	58.50	31.60	49.41	17.81	-8.50	57.91	Peak
18	63.26	9.90	26.97	17.07	-21.28	48.25	Average
19	63.26	31.69	48.76	17.07	-9.49	58.25	Peak
20	78.18	32.90	48.14	15.24	-11.03	59.17	Peak

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Results for model MD750/4



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBpW	dB	dBpW	dBpW	dB	
1	30.21	34.07	15.79	49.86	55.04	-5.18	Peak
2	30.21	20.19	15.79	35.98	45.04	-9.06	Average
3	31.13	21.67	15.76	37.43	45.17	-7.74	Average
4	31.13	34.31	15.76	50.07	55.17	-5.10	Peak
5	31.85	36.50	15.74	52.24	55.27	-3.03	Peak
6	31.85	20.63	15.74	36.37	45.27	-8.90	Average
7	32.29	34.51	15.73	50.24	55.33	-5.09	Peak
8	32.29	13.17	15.73	28.90	45.33	-16.43	Average
9	33.12	32.97	15.69	48.66	55.44	-6.78	Peak
10	33.12	14.44	15.69	30.13	45.44	-15.31	Average
11	34.05	13.80	15.66	29.46	45.56	-16.10	Average
12	34.05	31.91	15.66	47.57	55.56	-7.99	Peak
13	45.51	29.30	15.27	44.57	56.82	-12.25	Peak
14	55.99	15.56	14.91	30.47	47.72	-17.25	Average
15	55.99	34.16	14.91	49.07	57.72	-8.65	Peak
16	58.50	36.38	14.85	51.23	57.91	-6.68	Peak
17	58.50	15.97	14.85	30.82	47.91	-17.09	Average

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBpW	dB	dBpW	dBpW	dB	
18	63.26	35.66	14.73	50.39	58.25	-7.86	Peak
19	63.26	19.44	14.73	34.17	48.25	-14.08	Average
20	65.03	40.74	14.69	55.43	58.37	-2.94	Peak
21	65.03	19.48	14.69	34.17	48.37	-14.20	Average
22	66.24	15.59	14.67	30.26	48.45	-18.19	Average
23	66.24	37.70	14.67	52.37	58.45	-6.08	Peak
24	80.01	30.13	14.80	44.93	59.27	-14.34	Peak
25	85.93	31.25	14.50	45.75	59.58	-13.83	Peak
26	110.95	31.11	14.03	45.14	60.69	-15.55	Peak
27	136.50	26.77	13.89	40.66	61.59	-20.93	Peak
28	162.60	25.00	13.96	38.96	62.35	-23.39	Peak
29	186.69	23.15	14.30	37.45	62.95	-25.50	Peak
30	233.95	28.27	14.17	42.44	63.93	-21.49	Peak
31	260.69	26.66	14.23	40.89	64.40	-23.51	Peak
32	282.57	25.26	15.04	40.30	64.75	-24.45	Peak

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

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

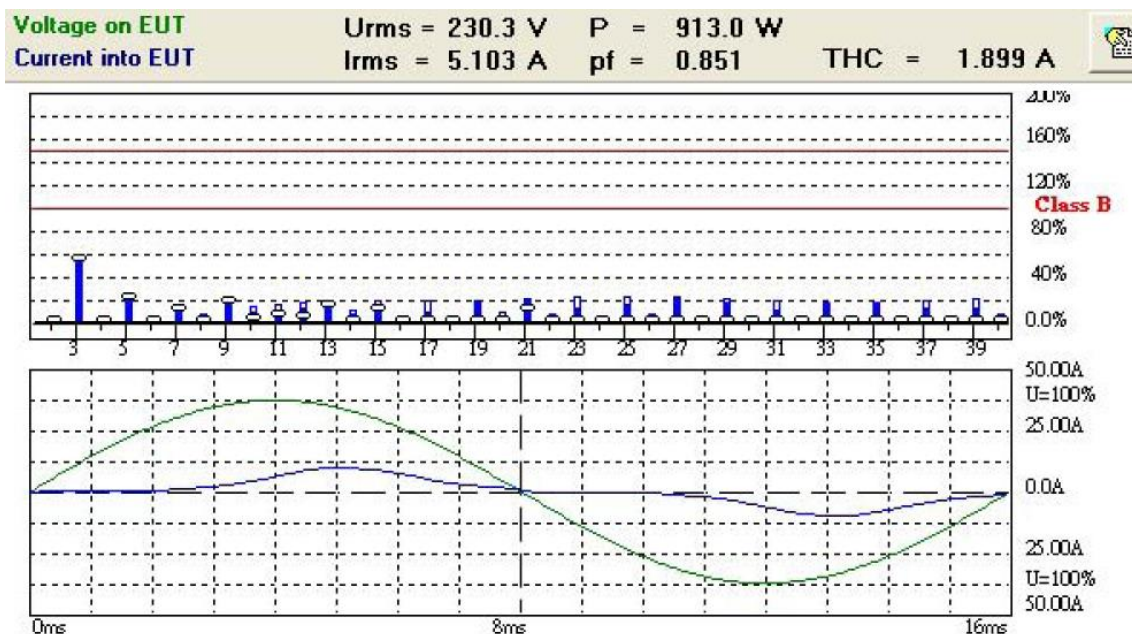
Standard	EN 61000-3-2
Port	AC Mains supply
Rated power	2000 W
Mode	On mode

	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

Results for model MD120/4

Urms = 230.3V Freq = 59.981 Range: 50 A
 Irms = 5.103A Ipk = 10.06A cf = 1.971
 P = 913.0W S = 1073VA pf = 0.851
 THDi = 37.3 % THDu = 0.20 % Class B

Test completed, Result: PASSED

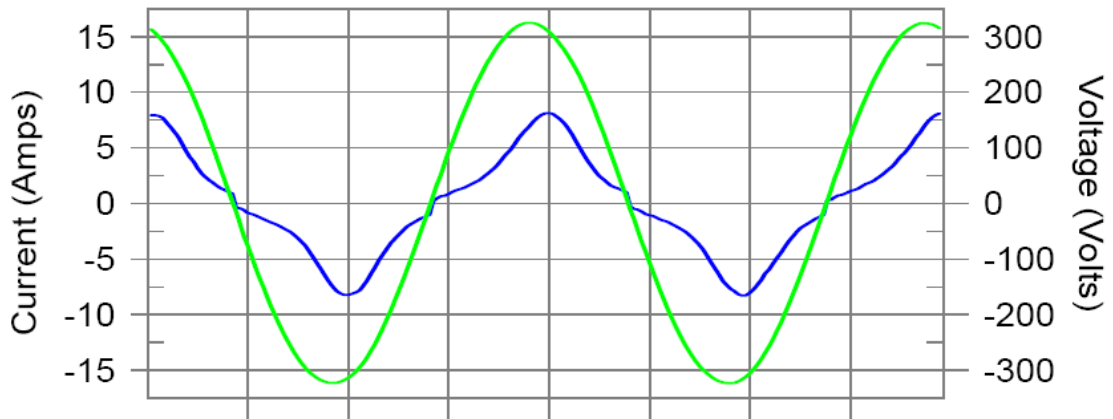


Order	Freq.	Iavg	Irms	I _{max}	Limit
	[Hz]	[A]	[A]	[A]	
1	60	4.9808	4.7211	5.7739	
2	120	0.0000	0.0214	0.0244	1.6200
3	180	1.8242	1.8524	1.8646	3.4500
4	240	0.0000	0.0092	0.0183	0.6450
5	300	0.3496	0.3693	0.3754	1.7100
6	360	0.0000	0.0061	0.0092	0.4500
7	420	0.1182	0.1373	0.1373	1.1550
8	480	0.0000	0.0092	0.0153	0.3450
9	540	0.1026	0.0854	0.1251	0.6000
10	600	0.0049	0.0183	0.0336	0.2760
11	660	0.0204	0.0397	0.0641	0.4950
12	720	0.0077	0.0214	0.0336	0.2300
13	780	0.0383	0.0549	0.0549	0.3150
14	840	0.0000	0.0092	0.0153	0.1971
15	900	0.0246	0.0275	0.0366	0.2250
16	960	0.0000	0.0031	0.0061	0.1725
17	1020	0.0002	0.0122	0.0336	0.1985
18	1080	0.0000	0.0031	0.0061	0.1533
19	1140	0.0001	0.0305	0.0305	0.1776
20	1200	0.0000	0.0031	0.0092	0.1380
21	1260	0.0154	0.0275	0.0305	0.1607
22	1320	0.0000	0.0031	0.0061	0.1255
23	1380	0.0002	0.0153	0.0305	0.1467
24	1440	0.0000	0.0000	0.0031	0.1150
25	1500	0.0000	0.0183	0.0275	0.1350
26	1560	0.0000	0.0031	0.0061	0.1062
27	1620	0.0000	0.0244	0.0244	0.1250
28	1680	0.0000	0.0000	0.0031	0.0986
29	1740	0.0000	0.0183	0.0214	0.1164
30	1800	0.0000	0.0000	0.0031	0.0920
31	1860	0.0000	0.0092	0.0183	0.1089
32	1920	0.0000	0.0000	0.0031	0.0862
33	1980	0.0000	0.0153	0.0153	0.1023
34	2040	0.0000	0.0000	0.0000	0.0812
35	2100	0.0000	0.0153	0.0153	0.0964
36	2160	0.0000	0.0000	0.0031	0.0767
37	2220	0.0000	0.0092	0.0153	0.0912
38	2280	0.0000	0.0000	0.0031	0.0726
39	2340	0.0000	0.0092	0.0153	0.0865
40	2400	0.0000	0.0031	0.0031	0.0690

Results for model MD750/4

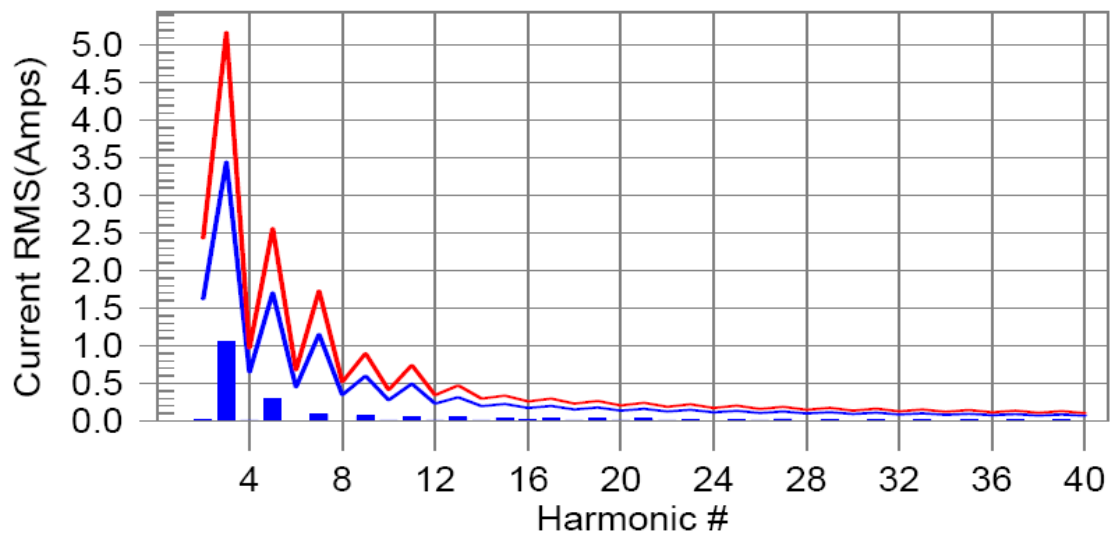
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class B limit line

European Limits



Test result: Pass Worst harmonic was #3 with 24.67% of the limit.

Test Result: Pass Source qualification: Normal
 THC(A): 0.90 I-THD(%): 22.74 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): 8.474	I_RMS (Amps): 4.603
I_Fund (Amps): 4.444	Crest Factor: 1.846
Power (Watts): 1001.7	Power Factor: 0.964

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.006	1.620	0.0	0.017	2.430	0.00	Pass
3	0.851	3.450	24.7	1.054	5.175	20.37	Pass
4	0.002	0.645	0.0	0.007	0.968	0.00	Pass
5	0.249	1.710	14.6	0.289	2.565	11.25	Pass
6	0.001	0.450	0.0	0.004	0.675	0.00	Pass
7	0.082	1.155	7.1	0.091	1.733	5.23	Pass
8	0.001	0.345	0.0	0.004	0.518	0.00	Pass
9	0.056	0.600	9.4	0.067	0.900	7.43	Pass
10	0.001	0.276	0.0	0.005	0.414	0.00	Pass
11	0.042	0.495	8.5	0.045	0.743	6.12	Pass
12	0.001	0.230	0.0	0.007	0.344	0.00	Pass
13	0.037	0.315	11.8	0.046	0.473	9.74	Pass
14	0.001	0.197	0.0	0.008	0.296	0.00	Pass
15	0.031	0.225	13.8	0.038	0.338	11.37	Pass
16	0.001	0.173	0.0	0.010	0.259	0.00	Pass
17	0.028	0.199	13.9	0.032	0.297	10.63	Pass
18	0.001	0.153	0.0	0.008	0.230	0.00	Pass
19	0.025	0.178	13.9	0.029	0.266	10.90	Pass
20	0.001	0.138	0.0	0.009	0.207	0.00	Pass
21	0.023	0.161	14.2	0.027	0.241	11.08	Pass
22	0.001	0.125	0.0	0.008	0.188	0.00	Pass
23	0.021	0.147	14.0	0.025	0.220	11.27	Pass
24	0.001	0.115	0.0	0.003	0.173	0.00	Pass
25	0.019	0.135	0.0	0.021	0.203	0.00	Pass
26	0.001	0.106	0.0	0.008	0.159	0.00	Pass
27	0.018	0.125	14.8	0.025	0.188	13.54	Pass
28	0.001	0.099	0.0	0.004	0.148	0.00	Pass
29	0.016	0.116	0.0	0.019	0.175	0.00	Pass
30	0.001	0.092	0.0	0.001	0.138	0.00	Pass
31	0.015	0.110	0.0	0.017	0.163	0.00	Pass
32	0.001	0.086	0.0	0.004	0.129	0.00	Pass
33	0.014	0.102	0.0	0.017	0.153	0.00	Pass
34	0.001	0.081	0.0	0.002	0.122	0.00	Pass
35	0.013	0.096	0.0	0.016	0.145	0.00	Pass
36	0.001	0.077	0.0	0.001	0.115	0.00	Pass
37	0.013	0.092	0.0	0.014	0.137	0.00	Pass
38	0.001	0.073	0.0	0.002	0.109	0.00	Pass
39	0.012	0.087	0.0	0.013	0.130	0.00	Pass
40	0.000	0.069	0.0	0.002	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*
dt > 3,3%	≤ 500 ms
d _C	≤ 3,3%
d _{MAX}	≤ 7%

Results for model MD120/4

Tmax (dt > 3,3%)	0,0 ms
Maximum voltage change d _{MAX}	3,674%
Relative Voltage change d _C	1,835%
Short term flicker P _{st}	Not applicable*
Long term flicker P _{lt}	Not applicable*

Results for model MD750/4

Tmax (dt > 3,3%)	0,0 ms
Maximum voltage change d _{MAX}	3,356%
Relative Voltage change d _C	1,753%
Short term flicker P _{st}	Not applicable*
Long term flicker P _{lt}	Not applicable*

In addition, this test was conducted in accordance with Annex B of EN 61000-3-3:2013.

* The EUT belongs to hand-held tools (portable tools without heating elements), according to EN 61000-3-3, clause A.9, P_{ST} and P_{LT} shall not be evaluated.

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	✓	Positive	✓	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	$U_{NOM} - 30\%$	(25 periods)	(30 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			
Mode	On mode			
AC input power port			50 Hz	60 Hz
	$U_{NOM} - 30\%$ (25 periods)		$U_{NOM} - 30\%$ (30 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.

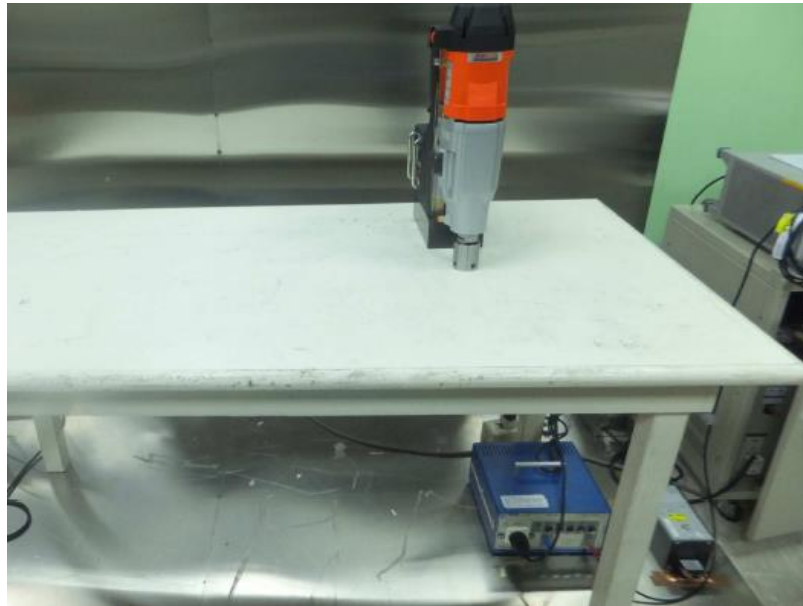


Figure 3 Conducted Emission test setup



Figure 4 Disturbance power test setup



Figure 5 Harmonics & Flicker & Surge & DIPS test setup



Figure 6 ESD test setup



Figure 7 EFT test setup



Figure 8 CS test setup

-----END-----