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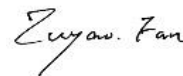
## EMC Test report for MAGNETIC CORE DRILL

**Models: PME3530; PMX3530; PMD3530; CM/705/1; CM/705/3**

Shanghai, date of issue: 2018-07-03

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By order of LEE YEONG INDUSTRIAL CO., LTD.



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reviewed : Zuyao Fan

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DEKRA Testing and Certification (Shanghai) Ltd.

SH-F-PC4-005 v1.1

Document

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## 1 **CONCLUSION**

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 a MAGNETIC CORE DRILL, models PME3530; PMX3530; PMD3530; CM/705/1 and CM/705/3 intended for residential use. The EUT has electronic control but no earth connection.

According to the declaration from manufacturer, all models are identical with each other except model numbers.

Due to the similarity of them, model PME3530 with rated voltage 110-120 V and 220-240 V was selected for the full tests and the corresponding data is representative for other models as well.

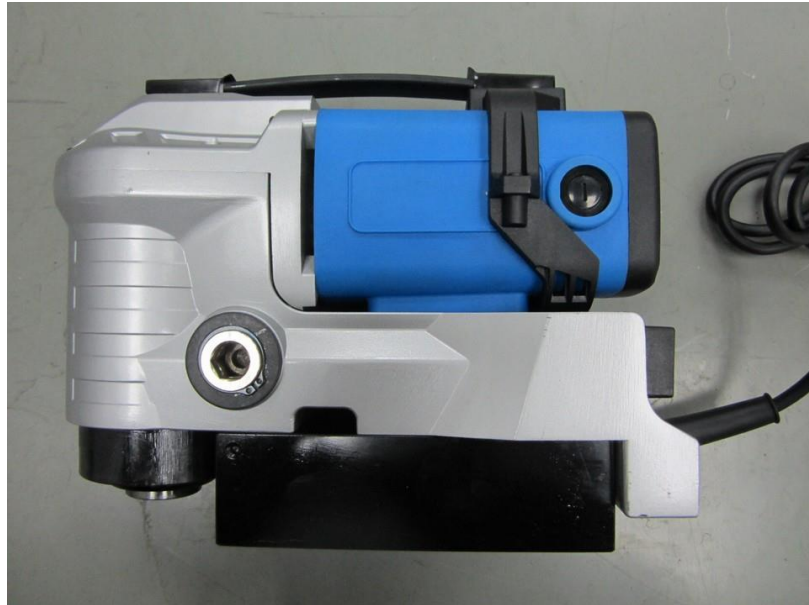


Figure 1 Overview

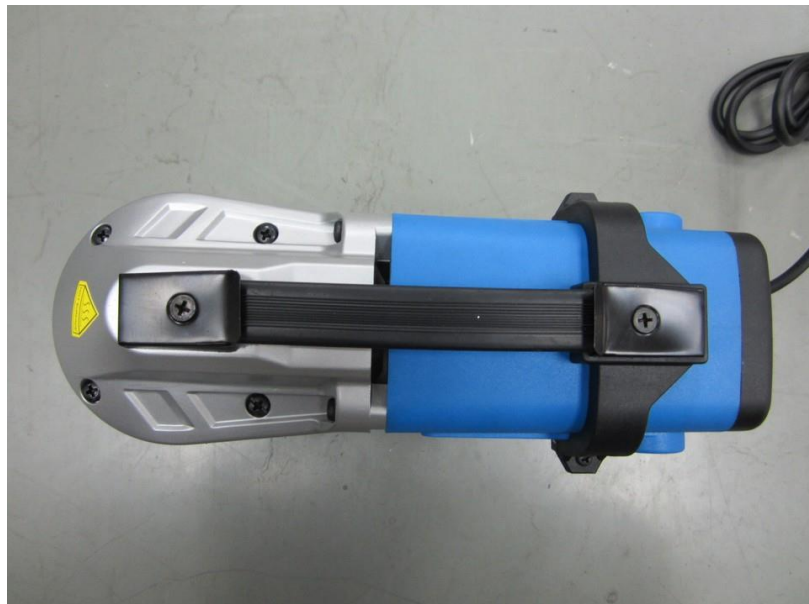


Figure 2 Overview

## 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.

	<b>Category 1</b>	Apparatus containing no electronic control circuitry
✓	<b>Category 2</b>	Apparatus containing electronic control circuitry with no internal clock or oscillator frequency higher than 15 MHz.
	<b>Category 3</b>	Battery powered apparatus containing electronic control circuitry.
	<b>Category 4</b>	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	2017	Emission – Electrical motor-operated and thermal appliances for household and similar purposes, electrical tools and similar electrical apparatus
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	<b>PASS</b>
Disturbance power	<b>PASS</b>
Harmonic current emission	<b>PASS</b>
Limitation of voltage fluctuations (flicker)	<b>PASS</b>

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

### 3 GENERAL INFORMATION

#### 3.1 Product Information

Equipment under test	MAGNETIC CORE DRILL
Trade mark	AGP
Tested Type	PME3530
Representative Type	PMX3530; PMD3530; CM/705/1; CM/705/3
Ratings	PME3530; PMX3530; PMD3530:110-120 V or 220-240 V CM/705/1: 110-120 V CM/705/3: 220-240 V 50-60 Hz; 1100 W; Class I

#### 3.2 Customer Information

Applicant	LEE YEONG INDUSTRIAL CO., LTD.
Address	No.2, Kejia Rd., Douliu City, Yunlin County 64057, Taiwan

Manufacturer	LEE YEONG INDUSTRIAL CO., LTD.
Address	No.2, Kejia Rd., Douliu City, Yunlin County 64057, Taiwan

Factory	LEE YEONG INDUSTRIAL CO., LTD.
Address	No.2, Kejia Rd., Douliu City, Yunlin County 64057, Taiwan

### 3.3 Test data

Location	DEKRA Testing and Certification Co.,Ltd.
Address	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C
Date of receipt of test item	2018-04 (samples provided by applicant)
Date (s) of performance of tests	2018-06
Supervised by	Zuyao Fan

### 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 Emissions

The measurement uncertainty is evaluated as  $\pm 2.26$  dB.

Harmonic Current Emission

The measurement uncertainty is evaluated as 0.1%.

Voltage Fluctuation Flicker

The measurement uncertainty is evaluated as  $\pm 4\%$ .



### 3.6 Equipment List

#### Conducted Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
Test Receiver	R&S	ESCS 30	825442/014	2019.03.12
Artificial Mains Network	R&S	ENV4200	848411/010	2019.01.21
LISN	R&S	ENV216	100092	2018.07.30
Coaxial Cable	Harbour	RG-400	SR2-H	2018.08.14
Quietek EMI system	Quietek	Version 2.2	SR2-H	N/A

#### Power Harmonics /SR3-H

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
EMC Emission Tester	EMC-Partner	HAR-1000-1P	109	2019.01.15

#### Voltage fluctuation and flicker / SR3-H

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
EMC Emission Tester	EMC-Partner	HAR-1000-1P	109	2019.01.15

## 4 EMISSION TEST RESULTS

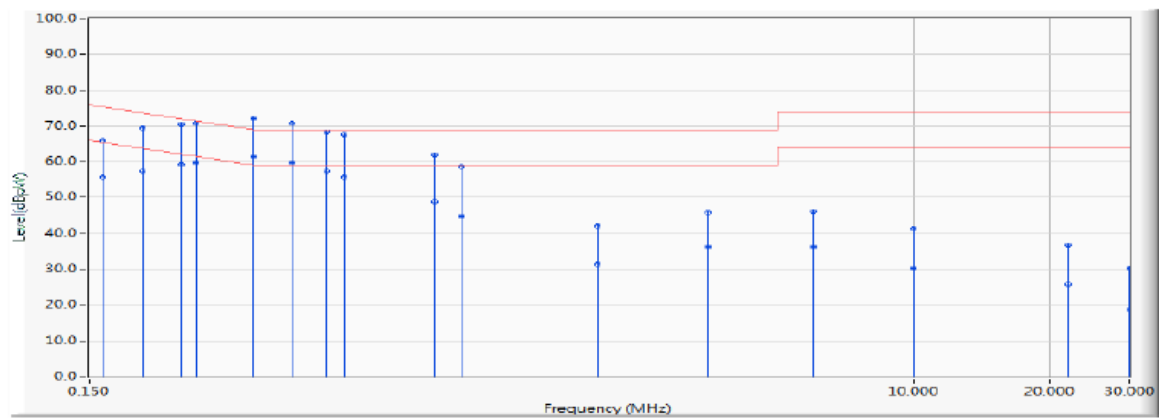
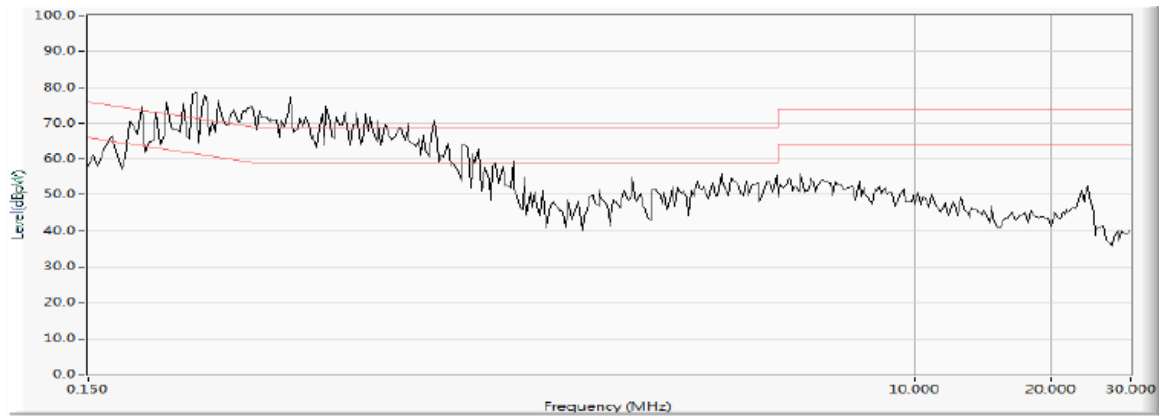
### 4.1 Mains conducted disturbance voltage

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		

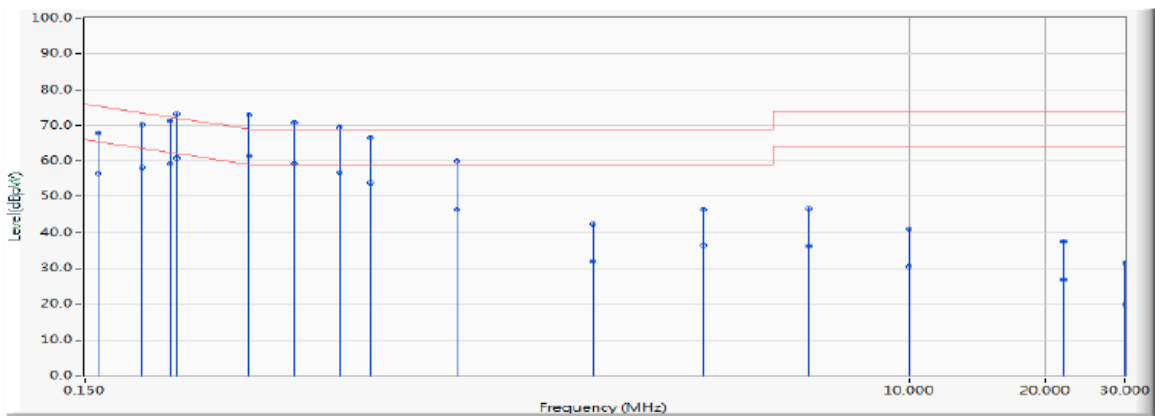
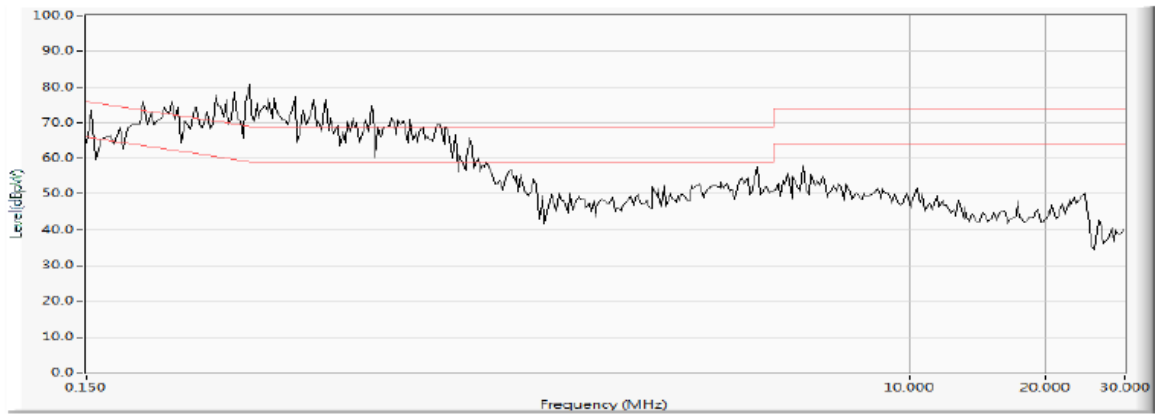
\*) Limits decreasing linearly with the logarithm of the frequency

	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

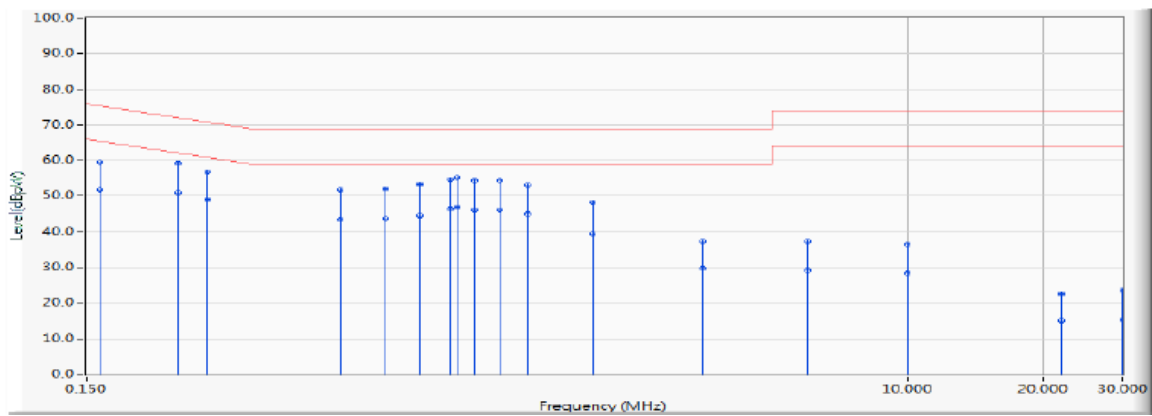
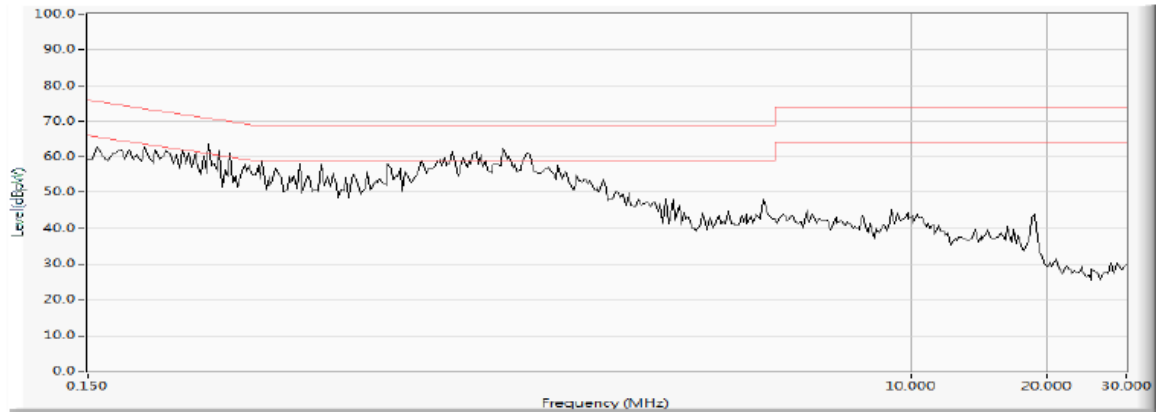
Port	AC mains, 230/110 Vac
Test method	LISN
Mode	On mode with an artificial hand, no load

**Results for 220v-240v model****Line**

	Frequency (MHz)	Correct Factor (dB)	Reading Level (dB $\mu$ W)	Measure Level (dB $\mu$ W)	Margin (dB)	Limit (dB $\mu$ W)	Detector Type	
1	0.160	9.690	56.270	65.960	-9.507	75.467	QUASIPeAK	
2	0.160	9.690	46.020	55.710	-12.528	68.238	AVERAGE	
3	0.197	9.690	59.690	69.380	-4.368	73.748	QUASIPeAK	
4	0.197	9.690	47.790	57.480	-8.303	65.783	AVERAGE	
5	0.240	9.690	60.910	70.600	-1.517	72.117	QUASIPeAK	
6	0.240	9.690	49.470	59.160	-4.293	63.453	AVERAGE	
7	0.259	9.690	60.960	70.650	-0.838	71.488	QUASIPeAK	
8	0.259	9.690	50.160	59.850	-2.704	62.554	AVERAGE	
9	*	0.345	9.690	62.480	72.170	3.051	69.119	QUASIPeAK
10	0.345	9.690	51.590	61.280	2.110	59.170	AVERAGE	
11	0.420	9.690	61.020	70.710	1.710	69.000	QUASIPeAK	
12	0.420	9.690	50.150	59.840	0.840	59.000	AVERAGE	
13	0.502	9.694	58.710	68.403	-0.597	69.000	QUASIPeAK	
14	0.502	9.694	47.680	57.373	-1.627	59.000	AVERAGE	
15	0.550	9.703	57.890	67.592	-1.408	69.000	QUASIPeAK	
16	0.550	9.703	45.970	55.672	-3.328	59.000	AVERAGE	
17	0.869	9.772	52.240	62.011	-6.989	69.000	QUASIPeAK	
18	0.869	9.772	38.940	48.711	-10.289	59.000	AVERAGE	
19	1.000	9.800	48.840	58.640	-10.360	69.000	QUASIPeAK	
20	1.000	9.800	34.940	44.740	-14.260	59.000	AVERAGE	
21	2.000	9.810	32.360	42.170	-26.830	69.000	QUASIPeAK	
22	2.000	9.810	21.650	31.460	-27.540	59.000	AVERAGE	
23	3.500	9.817	36.020	45.837	-23.163	69.000	QUASIPeAK	
24	3.500	9.817	26.340	36.157	-22.843	59.000	AVERAGE	
25	6.000	9.877	36.270	46.147	-27.853	74.000	QUASIPeAK	
26	6.000	9.877	26.370	36.247	-27.753	64.000	AVERAGE	
27	10.000	10.070	31.090	41.160	-32.840	74.000	QUASIPeAK	
28	10.000	10.070	20.100	30.170	-33.830	64.000	AVERAGE	
29	22.000	10.286	26.450	36.736	-37.264	74.000	QUASIPeAK	
30	22.000	10.286	15.530	25.816	-38.184	64.000	AVERAGE	
31	30.000	10.370	19.810	30.180	-43.820	74.000	QUASIPeAK	
32	30.000	10.370	8.390	18.760	-45.240	64.000	AVERAGE	

**Neutral**

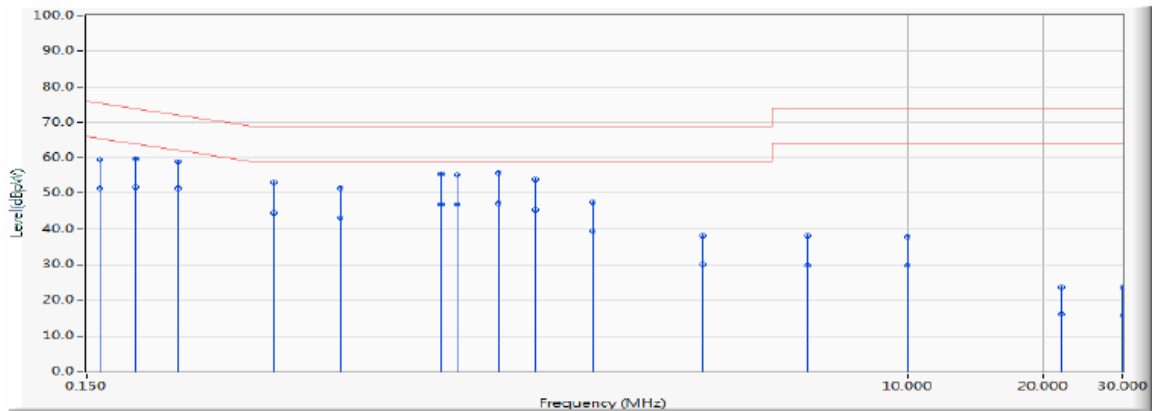
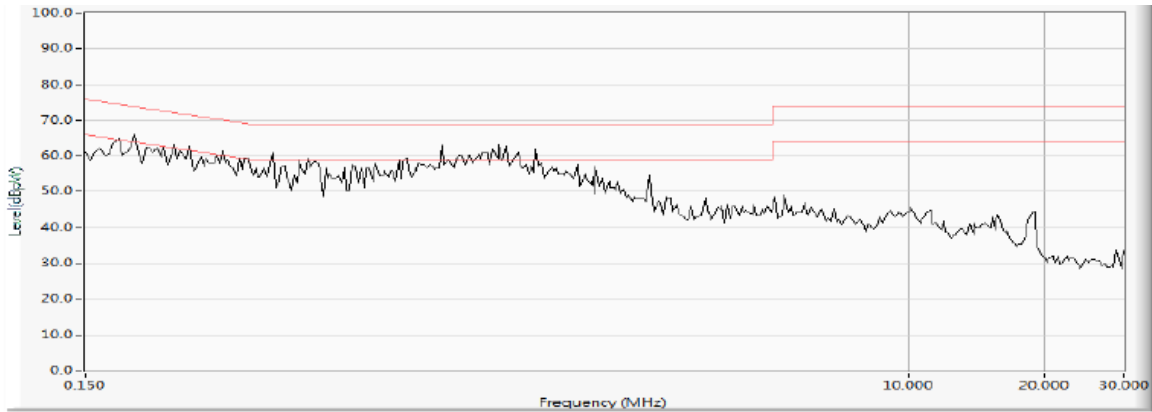
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBpW)	Measure Level (dBpW)	Margin (dB)	Limit (dBpW)	Detector Type
1	0.160	9.680	58.120	67.800	-7.667	75.467	QUASIPeAK
2	0.160	9.680	46.800	56.480	-11.758	68.238	AVERAGE
3	0.201	9.680	60.550	70.230	-3.352	73.582	QUASIPeAK
4	0.201	9.680	48.560	58.240	-7.306	65.546	AVERAGE
5	0.232	9.680	61.600	71.280	-1.117	72.397	QUASIPeAK
6	0.232	9.680	49.690	59.370	-4.483	63.853	AVERAGE
7	0.240	9.680	63.410	73.090	0.973	72.117	QUASIPeAK
8	0.240	9.680	51.100	60.780	-2.673	63.453	AVERAGE
9	0.345	9.680	63.250	72.930	3.811	69.119	QUASIPeAK
10	0.345	9.680	51.590	61.270	2.100	59.170	AVERAGE
11	0.435	9.681	60.980	70.661	1.661	69.000	QUASIPeAK
12	0.435	9.681	49.610	59.291	0.291	59.000	AVERAGE
13	0.550	9.693	59.630	69.322	0.322	69.000	QUASIPeAK
14	0.550	9.693	47.210	56.902	-2.098	59.000	AVERAGE
15	0.642	9.712	56.740	66.452	-2.548	69.000	QUASIPeAK
16	0.642	9.712	44.300	54.012	-4.988	59.000	AVERAGE
17	1.000	9.790	50.240	60.030	-8.970	69.000	QUASIPeAK
18	1.000	9.790	36.490	46.280	-12.720	59.000	AVERAGE
19	2.000	9.800	32.620	42.420	-26.580	69.000	QUASIPeAK
20	2.000	9.800	22.060	31.860	-27.140	59.000	AVERAGE
21	3.500	9.807	36.470	46.277	-22.723	69.000	QUASIPeAK
22	3.500	9.807	26.640	36.447	-22.553	59.000	AVERAGE
23	6.000	9.877	36.690	46.567	-27.433	74.000	QUASIPeAK
24	6.000	9.877	26.420	36.297	-27.703	64.000	AVERAGE
25	10.000	10.090	30.970	41.060	-32.940	74.000	QUASIPeAK
26	10.000	10.090	20.420	30.510	-33.490	64.000	AVERAGE
27	22.000	10.424	27.220	37.644	-36.356	74.000	QUASIPeAK
28	22.000	10.424	16.410	26.834	-37.166	64.000	AVERAGE
29	30.000	10.580	20.710	31.290	-42.710	74.000	QUASIPeAK
30	30.000	10.580	9.290	19.870	-44.130	64.000	AVERAGE

**Results for 110v-120v model****Line**

	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBpW)	Measure Level (dBpW)	Margin (dB)	Limit (dBpW)	Detector Type
1	0.160	9.690	49.760	59.450	-16.200	75.650	QUASIPeAK
2	0.160	9.690	42.010	51.700	-13.950	65.650	AVERAGE
3	*	0.240	49.530	59.220	-13.630	72.850	QUASIPeAK
4		0.240	41.380	51.070	-11.780	62.850	AVERAGE
5	0.279	9.690	47.090	56.780	-14.705	71.485	QUASIPeAK
6	0.279	9.690	39.420	49.110	-12.375	61.485	AVERAGE
7	0.550	9.703	41.910	51.612	-17.388	69.000	QUASIPeAK
8	0.550	9.703	33.600	43.302	-15.698	59.000	AVERAGE
9	0.693	9.733	42.400	52.133	-16.867	69.000	QUASIPeAK
10	0.693	9.733	33.930	43.663	-15.337	59.000	AVERAGE
11	0.826	9.762	43.680	53.442	-15.558	69.000	QUASIPeAK
12	0.826	9.762	34.820	44.582	-14.418	59.000	AVERAGE
13	0.963	9.791	44.830	54.622	-14.378	69.000	QUASIPeAK
14	0.963	9.791	36.530	46.322	-12.678	59.000	AVERAGE
15	1.000	9.800	45.390	55.190	-13.810	69.000	QUASIPeAK
16	*	1.000	37.220	47.020	-11.980	59.000	AVERAGE
17	1.087	9.801	44.730	54.531	-14.469	69.000	QUASIPeAK
18	1.087	9.801	36.390	46.191	-12.809	59.000	AVERAGE
19	1.244	9.802	44.600	54.402	-14.598	69.000	QUASIPeAK
20	1.244	9.802	36.440	46.242	-12.758	59.000	AVERAGE
21	1.435	9.804	43.330	53.134	-15.866	69.000	QUASIPeAK
22	1.435	9.804	35.180	44.984	-14.016	59.000	AVERAGE
23	2.000	9.810	38.320	48.130	-20.870	69.000	QUASIPeAK
24	2.000	9.810	29.680	39.490	-19.510	59.000	AVERAGE
25	3.500	9.817	27.460	37.277	-31.723	69.000	QUASIPeAK
26	3.500	9.817	20.010	29.827	-29.173	59.000	AVERAGE
27	6.000	9.877	27.470	37.347	-36.653	74.000	QUASIPeAK
28	6.000	9.877	19.380	29.257	-34.743	64.000	AVERAGE
29	10.000	10.070	26.420	36.490	-37.510	74.000	QUASIPeAK
30	10.000	10.070	18.230	28.300	-35.700	64.000	AVERAGE
31	22.000	10.286	12.140	22.426	-51.574	74.000	QUASIPeAK
32	22.000	10.286	4.720	15.006	-48.994	64.000	AVERAGE
33	30.000	10.370	13.250	23.620	-50.380	74.000	QUASIPeAK
34	30.000	10.370	5.020	15.390	-48.610	64.000	AVERAGE



Neutral



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dB $\mu$ W)	Measure Level (dB $\mu$ W)	Margin (dB)	Limit (dB $\mu$ W)	Detector Type
1	0.160	9.680	49.760	59.440	-16.210	75.650	QUASISPEAK
2	0.160	9.680	41.920	51.600	-14.050	65.650	AVERAGE
3	0.193	9.680	49.990	59.670	-14.825	74.495	QUASISPEAK
4	0.193	9.680	42.100	51.780	-12.715	64.495	AVERAGE
5	0.240	9.680	49.170	58.850	-14.000	72.850	QUASISPEAK
6	0.240	9.680	41.680	51.360	-11.490	62.850	AVERAGE
7	0.392	9.680	43.490	53.170	-15.830	69.000	QUASISPEAK
8	0.392	9.680	34.850	44.530	-14.470	59.000	AVERAGE
9	0.550	9.693	41.910	51.602	-17.398	69.000	QUASISPEAK
10	0.550	9.693	33.540	43.232	-15.768	59.000	AVERAGE
11	0.923	9.773	45.650	55.423	-13.577	69.000	QUASISPEAK
12	0.923	9.773	37.200	46.973	-12.027	59.000	AVERAGE
13	1.000	9.790	45.410	55.200	-13.800	69.000	QUASISPEAK
14	1.000	9.790	37.220	47.010	-11.990	59.000	AVERAGE
15	*	1.236	46.090	55.882	-13.118	69.000	QUASISPEAK
16	*	1.236	37.460	47.252	-11.748	59.000	AVERAGE
17	1.494	9.795	44.120	53.915	-15.085	69.000	QUASISPEAK
18	1.494	9.795	35.610	45.405	-13.595	59.000	AVERAGE
19	2.000	9.800	37.600	47.400	-21.600	69.000	QUASISPEAK
20	2.000	9.800	29.590	39.390	-19.610	59.000	AVERAGE
21	3.500	9.807	28.280	38.087	-30.913	69.000	QUASISPEAK
22	3.500	9.807	20.310	30.117	-28.883	59.000	AVERAGE
23	6.000	9.877	28.200	38.077	-35.923	74.000	QUASISPEAK
24	6.000	9.877	19.910	29.787	-34.213	64.000	AVERAGE
25	10.000	10.090	27.740	37.830	-36.170	74.000	QUASISPEAK
26	10.000	10.090	19.600	29.690	-34.310	64.000	AVERAGE
27	22.000	10.424	13.120	23.544	-50.456	74.000	QUASISPEAK
28	22.000	10.424	5.640	16.064	-47.936	64.000	AVERAGE
29	30.000	10.580	12.970	23.550	-50.450	74.000	QUASISPEAK
30	30.000	10.580	5.120	15.700	-48.300	64.000	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 *)

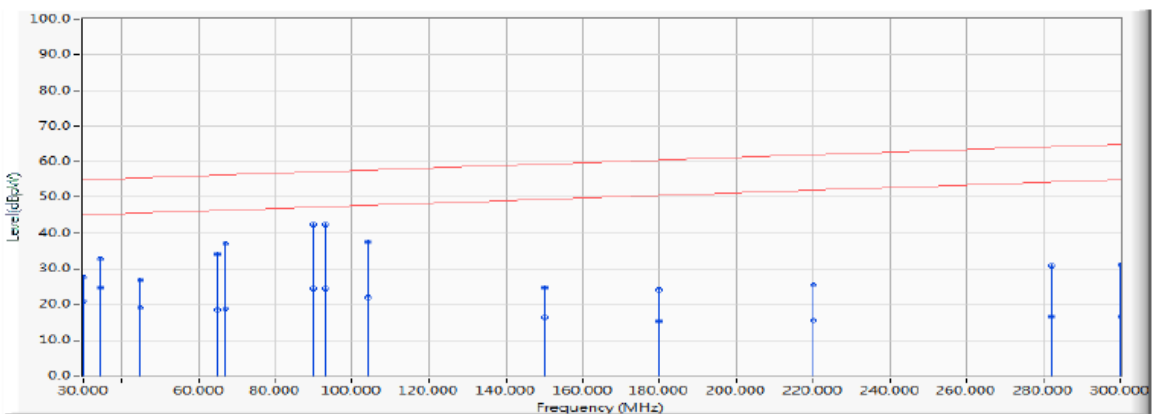
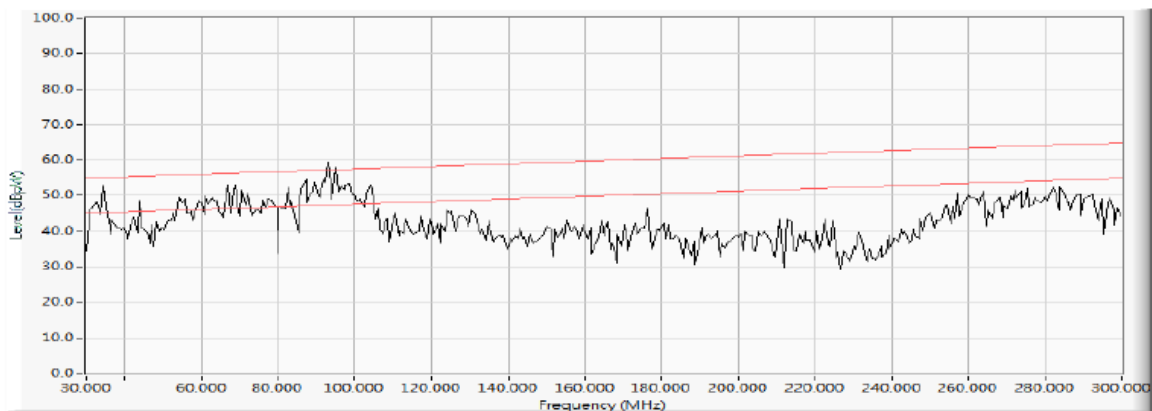
\*) Limits increasing linearly with the frequency

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

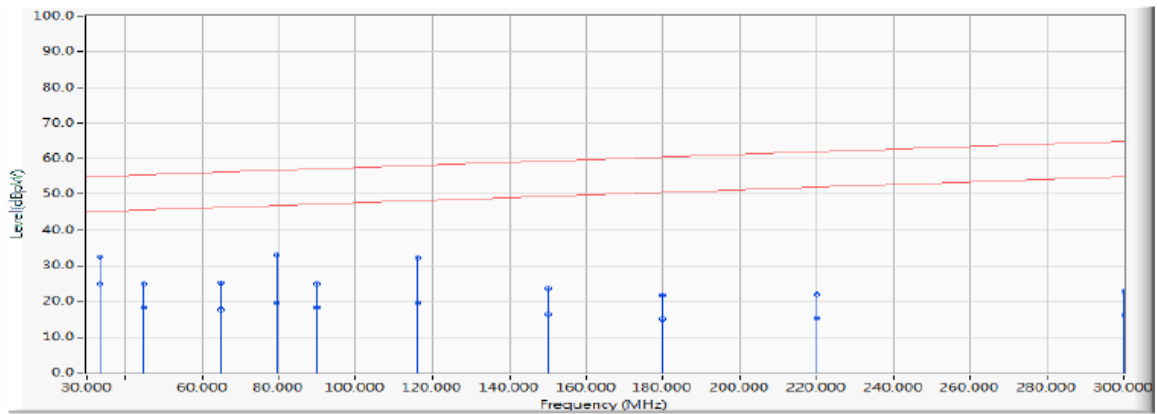
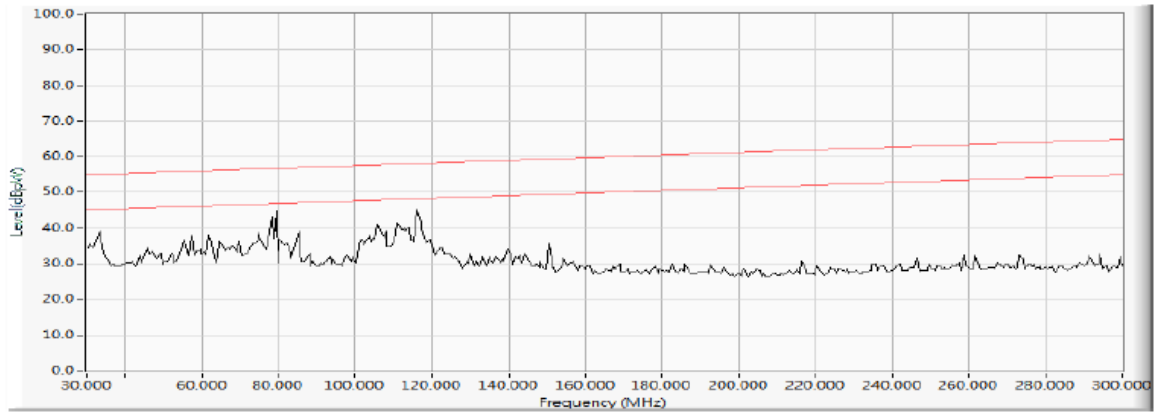
	Rated motor power not exceeding 700 W	Limits as above
	Rated motor power above 700 and not exceeding 1000 W	Limits +4 dB
✓	Rated motor power above 1000 W	Limits +10 dB

Port	AC Mains, 230 Vac
Mode	On mode with no load

### Results for 220v-240v model



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dB $\mu$ W)	Measure Level (dB $\mu$ W)	Margin (dB)	Limit (dB $\mu$ W)	Detector Type
1	30.000	8.700	18.950	27.650	-27.350	55.000	QUASISPEAK
2	30.000	8.700	12.320	21.020	-23.980	45.000	AVERAGE
3	34.562	8.199	24.480	32.678	-22.491	55.169	QUASISPEAK
4	34.562	8.199	16.450	24.648	-20.521	45.169	AVERAGE
5	45.000	7.460	19.330	26.790	-28.766	55.556	QUASISPEAK
6	45.000	7.460	11.570	19.030	-26.526	45.556	AVERAGE
7	65.000	6.670	27.260	33.930	-22.366	56.296	QUASISPEAK
8	65.000	6.670	11.710	18.380	-27.916	46.296	AVERAGE
9	67.062	6.286	30.640	36.926	-19.447	56.373	QUASISPEAK
10	67.062	6.286	12.420	18.706	-27.667	46.373	AVERAGE
11	90.000	6.715	35.660	42.375	-14.847	57.222	QUASISPEAK
12	90.000	6.715	17.610	24.325	-22.897	47.222	AVERAGE
13	93.000	6.708	35.580	42.288	-15.045	57.333	QUASISPEAK
14	93.000	6.708	17.570	24.278	-23.055	47.333	AVERAGE
15	104.125	6.694	30.770	37.464	-20.281	57.745	QUASISPEAK
16	104.125	6.694	15.210	21.904	-25.841	47.745	AVERAGE
17	150.000	5.755	18.780	24.535	-34.909	59.444	QUASISPEAK
18	150.000	5.755	10.500	16.255	-33.189	49.444	AVERAGE
19	180.000	5.171	18.990	24.161	-36.395	60.556	QUASISPEAK
20	180.000	5.171	10.220	15.391	-35.165	50.556	AVERAGE
21	220.000	5.174	20.350	25.524	-36.513	62.037	QUASISPEAK
22	220.000	5.174	10.400	15.574	-36.463	52.037	AVERAGE
23	281.875	6.088	24.730	30.817	-33.512	64.329	QUASISPEAK
24	281.875	6.088	10.660	16.747	-37.582	54.329	AVERAGE
25	300.000	5.585	25.400	30.985	-34.015	65.000	QUASISPEAK
26	300.000	5.585	11.060	16.645	-38.355	55.000	AVERAGE

**Results for 110v-120v model**

		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBpW)	Measure Level (dBpW)	Margin (dB)	Limit (dBpW)	Detector Type
1	*	33.625	8.301	24.040	32.341	-22.793	55.134	QUASIPeAK
2	*	33.625	8.301	16.680	24.981	-20.153	45.134	AVERAGE
3		45.000	7.460	17.440	24.900	-30.656	55.556	QUASIPeAK
4		45.000	7.460	10.780	18.240	-27.316	45.556	AVERAGE
5		65.000	6.670	18.610	25.280	-31.016	56.296	QUASIPeAK
6		65.000	6.670	10.920	17.590	-28.706	46.296	AVERAGE
7		79.562	6.360	26.680	33.040	-23.796	56.836	QUASIPeAK
8		79.562	6.360	13.120	19.480	-27.356	46.836	AVERAGE
9		90.000	6.715	18.140	24.855	-32.367	57.222	QUASIPeAK
10		90.000	6.715	11.440	18.155	-29.067	47.222	AVERAGE
11		116.312	6.737	25.560	32.297	-25.900	58.197	QUASIPeAK
12		116.312	6.737	12.930	19.667	-28.530	48.197	AVERAGE
13		150.000	5.755	17.740	23.495	-35.949	59.444	QUASIPeAK
14		150.000	5.755	10.580	16.335	-33.109	49.444	AVERAGE
15		180.000	5.171	16.500	21.671	-38.885	60.556	QUASIPeAK
16		180.000	5.171	9.890	15.061	-35.495	50.556	AVERAGE
17		220.000	5.174	16.810	21.984	-40.053	62.037	QUASIPeAK
18		220.000	5.174	10.140	15.314	-36.723	52.037	AVERAGE
19		300.000	5.585	17.140	22.725	-42.275	65.000	QUASIPeAK
20		300.000	5.585	10.460	16.045	-38.955	55.000	AVERAGE

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:**

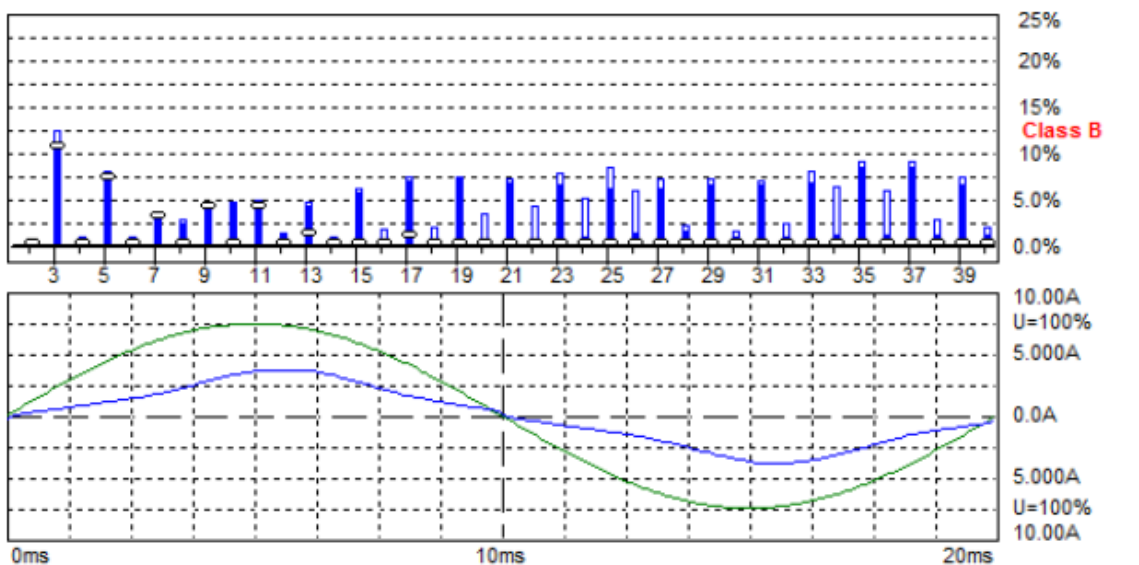
**PASS**

### 4.3 Harmonic currents

Standard	EN 61000-3-2
Port	AC Mains supply
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 220-240 model



Harmonic Emission - IEC 61000-3-2, EN 61000-3-2, (EN60555-2)

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Urms = 231.1 V P = 516.1 W THC = 0.372 A  
 Irms = 2.280 A pf = 0.979

Range: 10 A  
 V-nom: 231 V  
 TestTime: 5 min (100%)

**Test completed, Result: PASSED**

Urms = 231.1V Freq = 49.987 Range: 10 A  
 Irms = 2.280A Ipk = 3.896A cf = 1.709  
 P = 516.1W S = 526.9VA pf = 0.979  
 THDi = 16.5 % THDu = 0.10 % Class B

Test - Time : 5min ( 100 %)

Test completed, Result: PASSED

Order	Freq.	Iavg	Irms	Irms%	Irms%L	Imax	Imax%	Imax%L	Limit
	Status	[A]	[A]	[%]	[%]	[A]	[%]	[%]	[A]
1	50	2.3019	2.2510	98.715		3.4290	150.37		
2	100	0.0000	0.0031	0.1338	0.1884	0.0043	0.1874	0.2637	1.6200
3	150	0.3592	0.3473	15.230	10.066	0.4169	18.282	12.083	3.4500
4	200	0.0000	0.0012	0.0535	0.1893	0.0037	0.1606	0.5678	0.6450
5	250	0.1222	0.1196	5.2463	6.9958	0.1331	5.8351	7.7811	1.7100
6	300	0.0000	0.0012	0.0535	0.2713	0.0031	0.1338	0.6782	0.4500
7	350	0.0336	0.0323	1.4186	2.8007	0.0366	1.6060	3.1707	1.1550
8	400	0.0000	0.0073	0.3212	2.1230	0.0085	0.3747	2.4768	0.3450
9	450	0.0240	0.0232	1.0171	3.8656	0.0256	1.1242	4.2725	0.6000
10	500	0.0000	0.0116	0.5086	4.2017	0.0122	0.5353	4.4228	0.2760
11	550	0.0197	0.0189	0.8298	3.8224	0.0226	0.9904	4.5622	0.4950
12	600	0.0000	0.0018	0.0803	0.7961	0.0024	0.1071	1.0615	0.2300
13	650	0.0032	0.0128	0.5621	4.0690	0.0140	0.6156	4.4565	0.3150
14	700	0.0000	0.0006	0.0268	0.3096	0.0012	0.0535	0.6192	0.1971
15	750	0.0000	0.0122	0.5353	5.4253	0.0134	0.5889	5.9679	0.2250
16	800	0.0000	0.0006	0.0268	0.3538	0.0024	0.1071	1.4153	0.1725
17	850	0.0018	0.0134	0.5889	6.7636	0.0140	0.6156	7.0710	0.1985
18	900	0.0000	0.0006	0.0268	0.3981	0.0024	0.1071	1.5922	0.1533
19	950	0.0000	0.0122	0.5353	6.8721	0.0128	0.5621	7.2157	0.1776
20	1000	0.0000	0.0006	0.0268	0.4423	0.0043	0.1874	3.0960	0.1380
21	1050	0.0000	0.0104	0.4550	6.4562	0.0110	0.4818	6.8359	0.1607
22	1100	0.0000	0.0006	0.0268	0.4865	0.0049	0.2141	3.8921	0.1255
23	1150	0.0000	0.0092	0.4015	6.2391	0.0110	0.4818	7.4870	0.1467
24	1200	0.0000	0.0006	0.0268	0.5307	0.0055	0.2409	4.7767	0.1150
25	1250	0.0000	0.0079	0.3480	5.8775	0.0110	0.4818	8.1380	0.1350
26	1300	0.0000	0.0012	0.0535	1.1499	0.0061	0.2677	5.7497	0.1062



27	1350	0.0000	0.0073	0.3212	5.8594	0.0085	0.3747	6.8359	0.1250
28	1400	0.0000	0.0012	0.0535	1.2384	0.0018	0.0803	1.8576	0.0986
29	1450	0.0000	0.0073	0.3212	6.2934	0.0079	0.3480	6.8179	0.1164
30	1500	0.0000	0.0006	0.0268	0.6634	0.0012	0.0535	1.3269	0.0920
31	1550	0.0000	0.0067	0.2944	6.1668	0.0073	0.3212	6.7274	0.1089
32	1600	0.0000	0.0006	0.0268	0.7077	0.0018	0.0803	2.1230	0.0862
33	1650	0.0000	0.0067	0.2944	6.5647	0.0079	0.3480	7.7582	0.1023
34	1700	0.0000	0.0006	0.0268	0.7519	0.0049	0.2141	6.0151	0.0812
35	1750	0.0000	0.0079	0.3480	8.2284	0.0085	0.3747	8.8614	0.0964
36	1800	0.0000	0.0006	0.0268	0.7961	0.0043	0.1874	5.5728	0.0767
37	1850	0.0000	0.0073	0.3212	8.0295	0.0079	0.3480	8.6986	0.0912
38	1900	0.0000	0.0006	0.0268	0.8403	0.0018	0.0803	2.5210	0.0726
39	1950	0.0000	0.0055	0.2409	6.3477	0.0061	0.2677	7.0530	0.0865
40	2000	0.0000	0.0006	0.0268	0.8846	0.0012	0.0535	1.7691	0.0690

**Conclusion:**

**PASS**

#### 4.4 Voltage fluctuations (Flicker)

Standard	EN 61000-3-3
Port	AC Mains supply
Voltage	230 V <sub>AC</sub>
Mode	On mode

P <sub>st</sub>	N/A
P <sub>lt</sub>	N/A
Tmax (dt > 3,3%)	≤ 500 ms
d <sub>C</sub>	≤ 3,3%
d <sub>MAX</sub>	≤ 7%

#### Results for model 220-240V model

Tmax (dt > 3,3%)	0,0 ms
Maximum voltage change d <sub>MAX</sub>	1,78%
Relative Voltage change d <sub>C</sub>	0,39%
Short term flicker P <sub>ST</sub>	Not applicable
Long term flicker P <sub>LT</sub>	Not applicable

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

\* The EUT belongs to hand-held tools (portable tools without heating elements), according to EN 61000-3-3, clause A.9, P<sub>ST</sub> and P<sub>LT</sub> 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	✓	2 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	20 °C							
Relative Humidity air	52 %							

#### 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 overvoltage 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 $\mu$ s
Peak Voltage; Port	1 kV; AC input power port

#### Performed tests

Tested Voltage; Port	1 kV; AC input power port		
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-M2	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

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