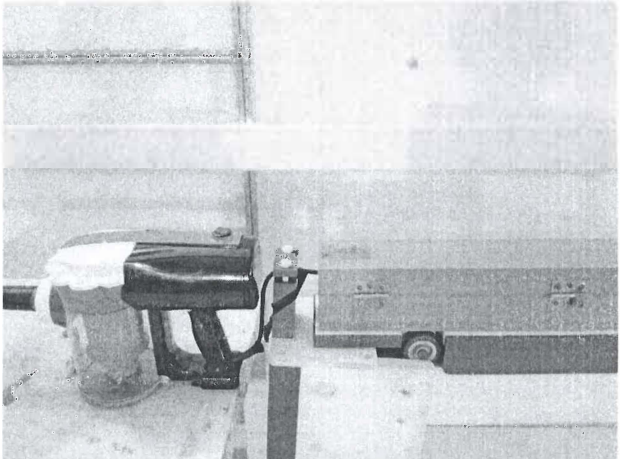


<b>Prüfbericht - Nr.:</b> Test Report No.:	<b>14715767 003</b>	<b>Auftrags-Nr.:</b> Order No.:	<b>1160025821</b>	Seite 1 von 21 Page 1 of 21
<b>Kunden-Referenz-Nr.:</b> Client Reference No.:	N/A	<b>Auftragsdatum:</b> Order date:	06.06.2016	
<b>Auftraggeber:</b> Client:				
<b>Prüfgegenstand:</b> Test item:	Vacuum Cleaner			
<b>Bezeichnung / Typ-Nr.:</b> Identification / Type No.:	Refer to the next page			
<b>Auftrags-Inhalt:</b> Order content:	TÜV Rheinland – EMC Service			
<b>Prüfgrundlage:</b> Test specification:	<b>EN 55014-1:2006+A1+A2</b> <b>EN 55014-2:2015</b> <b>EN 61000-3-3:2013</b> <b>EN 61000-3-2:2014</b>			
<b>Wareneingangsdatum:</b> Date of receipt:	06.06.2016			
<b>Prüfmuster-Nr.:</b> Test sample No.:	N/A			
<b>Prüfzeitraum:</b> Testing period:	02.09.2016-06.09.2016			
<b>Ort der Prüfung:</b> Place of testing:	Refer to section 1.1			
<b>Prüflaboratorium:</b> Testing laboratory:	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
<b>Prüfergebnis*:</b> Test result*:	Pass			
<b>geprüft von/ tested by:</b>		<b>kontrolliert von/ reviewed by:</b>		
19.09.2016 Season Yang/PE		21.09.2016 Feng Liang/TC		
<b>Datum</b> Date	<b>Name/Stellung</b> Name/Position	<b>Unterschrift</b> Signature	<b>Datum</b> Date	<b>Name/Stellung</b> Name/Position
<b>Sonstiges/ Other:</b>				
Refer to page 2 for more information.				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> Condition of the test item at delivery :		<b>Prüfmuster vollständig und unbeschädigt</b> Test item complete and undamaged		
*Legende: 1= Sehr gut 2 = gut 3= befriedigend 4= ausreichend 5 = mangelhaft P(ass) =entspricht o.g. Prüfgrundlage(n) F(ail)= entspricht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T =nicht getestet Legend: 1= very good 2 = good 3= satisfactory 4= sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail)= failed a.m. test specification(s) N/A = not applicable N/T = not tested				
<b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b> <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>				

**Prüfbericht - Nr.: 14715767 003***Test Report No.:***Seite 2 von 21***Page 2 of 21***Model List:**

NO.	Model	Rated Input	Rated Power
1.	SL585A04	AC 220-240V, 50/60Hz	400W
2.	SL585EA04		
3.	SL586A04		
4.	SL585FA04		
5.	SL585GA04		
6.	SL585A06		600W
7.	SL585EA06		
8.	SL586A06		
9.	SL585FA06		
10.	SL585GA06		

**Other aspects:**

1. All above models except SL585FA04, SL585GA04, SL585FA06 and SL585GA06 have been EMC approved in test reports 14715767 001-002.
2. In this report, the standard EN 55014-2:1997+A1+A2 has been updated to EN 55014-2:2015. According to the contents of update, no additional test is needed.
3. Models SL585FA04 and SL585FA06 are the same except nameplates. Models SL585GA04 and SL585GA06 are the same except nameplates.  
For models SL585FA06 and SL585GA06, they are same except a little difference of enclosure.
4. Therefor all EMC tests were performed on model SL585GA06.
5. This report is valid with test report 14715767 001-002.

## TEST SUMMARY

4.1.1 HARMONICS ON AC MAINS

Result:

Pass

4.1.2 VOLTAGE CHANGES, VOLTAGE FLUCTUATIONS AND FLICKER ON AC MAINS

Result:

Pass

4.1.3 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

Result:

Pass

4.1.4 DISCONTINUOUS INTERFERENCE ON AC MAINS

Result:

N/A

4.2.1 DISTURBANCE POWER ON MAINS

Result:

Pass

4.2.2 RADIATED DISTURBANCE IN THE FREQUENCY RANGE FROM 30MHZ TO 1000MHZ

Result:

Pass

5 IMMUNITY

Result:

Pass

## Contents

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## 1 Test Sites

### 1.1 Test Facilities

Laboratory: Ningbo Entry-Exit Inspection and Quarantine Bureau.  
Electrical Safety Testing Center for Optics & Electronics products

**5-9 Zhufeng Road Ningbo Export Processing Zone, Beilun Ningbo,  
Zhejiang province, 315800, P. R. China**

The used test equipments of Laboratory are in accordance with CISPR 16-1 series standards for measurement of radio interference.

### 1.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment of Laboratory**

No.	Equipment	Model	Serial No.	Cal. due date
1	EMI test receiver	ESCI	100708	2017.04.28
2	Artificial mains network	ENV216	101022	2017.04.28
3	Absorbing clamp	ADS-Z21	100309	2017.04.28
4	Harmonics/flicker analyzer	DPA503	V0828104013	2017.04.28

## **2 General Product Information**

### **2.1 Product Function and Intended Use**

The EUT (equipment under test) is an ordinary Vacuum Cleaner for household and similar use. For the further information, refer to the user's manual.

### **2.2 Ratings and System Details**

System input voltage : Refer to page 2  
Frequency : Refer to page 2  
Rated Input : Refer to page 2  
Protection Class : II

Refer to the user's manual for further information.

### **2.3 Independent Operation Modes**

The basic operation modes are: "On" or "Off, without power regulation means.

Refer to the user's manual for further information.

### **2.4 Noise Generating and Noise Suppressing Parts**

Refer to the circuit diagram for further information.

### **2.5 Submitted Documents**

Circuit diagram, user's manual, labels, etc.

## **3 Test Set-up and Operation Modes**

### **3.1 Principle of Configuration Selection**

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

**Immunity:**

Refer to the related paragraph of this report.

### **3.2 Physical Configuration for Testing**

Refer to the related paragraph of this report.

### **3.3 Test Operation and Test Software**

Refer to the related paragraph of this report. No software was used.

### **3.4 Special Accessories and Auxiliary Equipment**

None.

### **3.5 Countermeasures to achieve EMC Compliance**

The tested sample contained noise suppression components as described in the circuit diagram. No special measure is employed to achieve the requirement.

## **4 Test Results EMISSION**

### **4.1 Emission in the Frequency Range up to 30 MHz**

#### **4.1.1 Harmonics on AC Mains**

<b>Result:</b>	<b>Pass</b>
----------------	-------------

Date of testing : 2016.09.02  
Test procedure : EN 61000-3-2:2014  
Test duration : 2.5min  
Harmonic order : 2 – 40<sup>th</sup>  
Frequency range : 0 – 2kHz  
Test voltage : 230V, 50Hz

The harmonics on AC Mains in the frequency from 0 to 2kHz were measured in accordance with EN 61000-3-2:2014.

The measurement was conducted with an automatic current harmonic analyzing system. This equipment is in compliance with the requirements of EN 61000-3-2:2014.

The results indicated in the following tables and figures were those measured and recorded by an automatic measuring system.

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**Table 2: Harmonic currents measurement results**

Equipment category: Class A;

Fundamental current I<sub>1</sub>: 2.050 A; Power factor: 0.982; Active input power: 481.5W.

**Average harmonic current results**

Hn	I <sub>eff</sub> [A]	% of Limit	Limit [A]	Result
2	1.790E-3	16.418	2.30	PASS
3	377.603E-3			PASS
4	1.120E-3	4.865	1.14	PASS
5	55.458E-3			PASS
6	1.090E-3			PASS
7	10.373E-3			PASS
8	1.196E-3			PASS
9	1.526E-3			PASS
10	1.663E-3			PASS
11	1.492E-3			PASS
12	8.873E-3			PASS
13	1.531E-3			PASS
14	8.728E-3			PASS
15	1.750E-3			PASS
16	1.327E-3			PASS
17	1.385E-3			PASS
18	1.202E-3			PASS
19	1.268E-3			PASS
20	1.187E-3			PASS
21	2.293E-3			PASS
22	1.193E-3			PASS
23	3.824E-3			PASS
24	1.317E-3			PASS
25	15.815E-3	11.715	135.00E-3	PASS
26	2.349E-3	10.273	124.99E-3	PASS
27	12.841E-3			PASS
28	2.727E-3			PASS
29	3.017E-3			PASS
30	1.289E-3			PASS
31	2.100E-3			PASS
32	1.078E-3			PASS
33	1.211E-3			PASS
34	1.052E-3			PASS
35	1.139E-3			PASS
36	1.053E-3			PASS
37	1.048E-3			PASS
38	1.691E-3			PASS
39	1.166E-3			PASS
40	1.501E-3			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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### Maximum harmonic current results

Hn	leff [A]	% of Limit	Limit [A]	Result
2	1.960E-3			PASS
3	387.366E-3	11.228	3.45	PASS
4	1.272E-3			PASS
5	56.667E-3	3.314	1.71	PASS
6	1.210E-3			PASS
7	10.893E-3			PASS
8	1.517E-3			PASS
9	1.810E-3			PASS
10	1.977E-3			PASS
11	1.810E-3			PASS
12	10.302E-3			PASS
13	1.684E-3			PASS
14	10.390E-3			PASS
15	2.281E-3			PASS
16	1.817E-3			PASS
17	1.531E-3			PASS
18	1.417E-3			PASS
19	1.468E-3			PASS
20	1.335E-3			PASS
21	2.633E-3			PASS
22	1.368E-3			PASS
23	4.197E-3			PASS
24	1.605E-3			PASS
25	17.688E-3	13.102	135.00E-3	PASS
26	3.322E-3			PASS
27	14.719E-3	11.775	124.99E-3	PASS
28	3.847E-3			PASS
29	4.229E-3			PASS
30	1.533E-3			PASS
31	2.445E-3			PASS
32	1.277E-3			PASS
33	1.373E-3			PASS
34	1.251E-3			PASS
35	1.272E-3			PASS
36	1.202E-3			PASS
37	1.182E-3			PASS
38	2.475E-3			PASS
39	1.417E-3			PASS
40	2.154E-3			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

#### 4.1.2 Voltage changes, voltage fluctuations and flicker on AC mains

<b>Result:</b>	<b>Pass</b>
----------------	-------------

Date of testing : 2016.09.02  
Test procedure : EN 61000-3-3:2013

According to the A.7 of the EN 61000-3-3:2013:

“For vacuum cleaners,  $P_{st}$  and  $P_{lt}$  shall not be evaluated.”

According to the characteristics of the sample, as specified by clause 5 of the basic standard, following limits apply:

- the value of  $d(t)$  during a voltage change shall not exceed 3.3% for more than 500ms;
- the relative steady-state voltage change,  $d_c$ , shall not exceed 3.3%;
- the maximum relative voltage change  $d_{max}$ , shall not exceed 7%;

are the measurement results obtained via an automatic testing system.

**Table 3: Voltage fluctuations and flicker measurement results**

	$d_c$	$d_{max}(average)$	$d(t)$	$P_{st}$	$P_{lt}$
Limits	3.3%	7%	3.3%/500ms	n.a.	n.a.
Result	0.526%	3.002%	0.00ms	-	-

### 4.1.3 Mains Terminal Continuous Disturbance Voltage

<b>Result:</b>	<b>Pass</b>
----------------	-------------

Date of testing : 2016.09.09  
Test procedure : EN 55014-1:2006+A1+A2 and CISPR 16-1 series standards  
Frequency range : 0.15 – 30MHz  
Kind of test site : EMC chamber

#### Test Setup

Input Voltage : AC 220-240V, 50/60Hz  
Operational mode : ON  
Artificial hand : Applied  
Earthing : No (as class II equipment)

The measurement setup was made according to EN 55014-1:2006+A1+A2 in an EMC chamber.

The measurement equipment like test receivers, quasi-peak detector and Artificial Mains Network (AMN) are in compliance with CISPR 16-1 series standards. The tested object was operated under its rated voltage and its rated frequency. Prior to the measurements the test object operated about 15 minutes (warm-up) in order to stabilize its operating conditions and to ensure reliable measurement values.

Furthermore an internal calibration with the test receiver was conducted prior to each measurement.

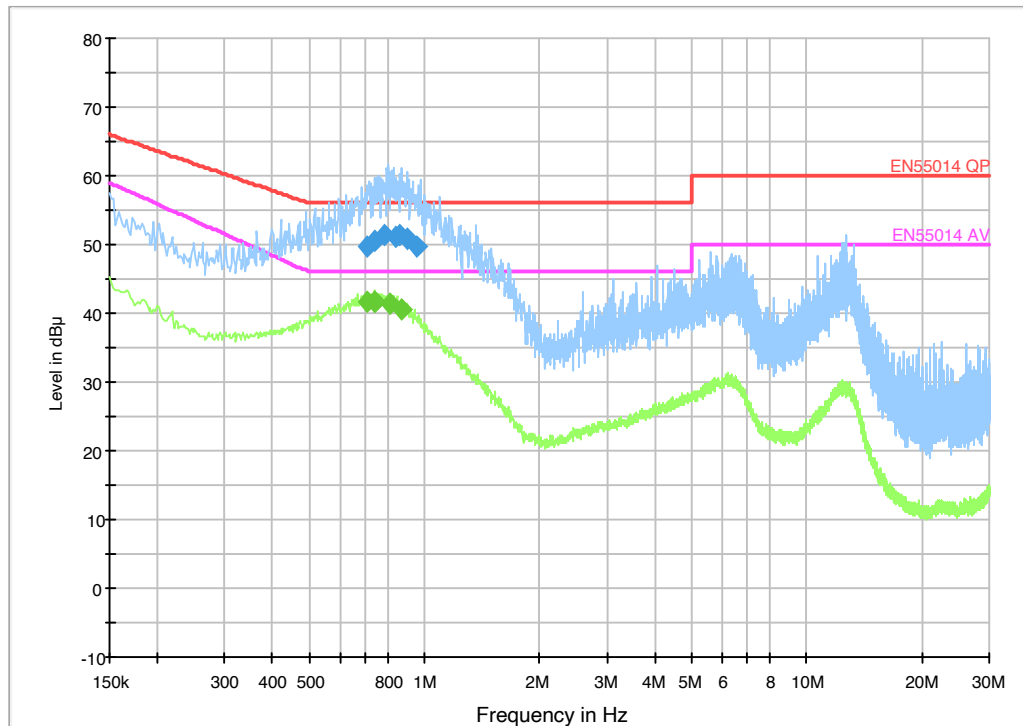
The tested object was set-up on a wooden table. The EUT was set 0.8m away from the AMN. The cord longer than necessary to be connected to the AMN was folded forth and back parallel so as to form a bundle with a length between 0.3m and 0.4m.

The Interference Voltage was determined according to clause 5 of EN 55014-1:2006+A1+A2 while measuring the line and neutral conductor by turns.

The following figures and tables were those measured by an automatic measuring system. Both Quasi Peak and Average Value were measured. Quasi-Peak and Average Value were measured and listed respectively where they had a maximum in previous scanning survey. The symbol “◆” in blue color refers to Quasi-peak value and the symbol “◆” in green color refers Average value which was measured in the final measurement.

Figure 1: Spectral Diagrams, Conducted Emission, 150kHz - 30MHz, L

Voltage with 4-Line-LISN



## Final Result 1

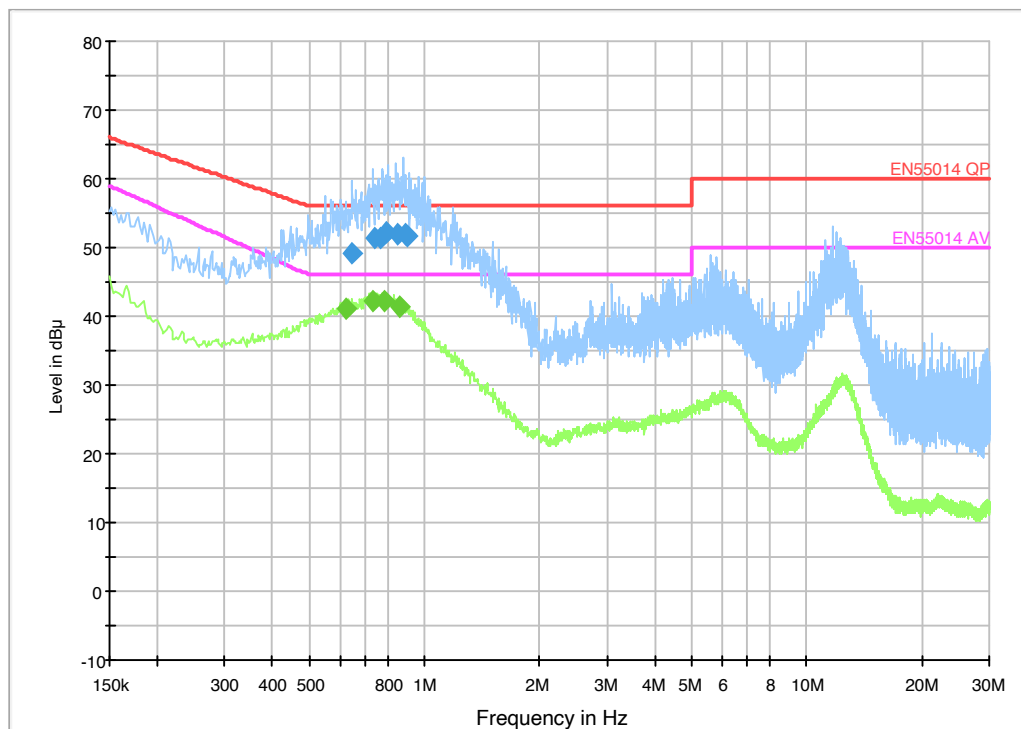
Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.705000	49.7	1000.0	9.000	GN	L1	10.1	6.3	56.0	
0.738000	50.5	1000.0	9.000	GN	L1	10.1	5.5	56.0	
0.788000	51.4	1000.0	9.000	GN	L1	10.1	4.6	56.0	
0.839000	51.1	1000.0	9.000	GN	L1	10.2	4.9	56.0	
0.860000	51.3	1000.0	9.000	GN	L1	10.2	4.7	56.0	
0.896000	50.7	1000.0	9.000	GN	L1	10.2	5.3	56.0	
0.954000	49.6	1000.0	9.000	GN	L1	10.1	6.4	56.0	

## Final Result 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.707000	41.7	1000.0	9.000	GN	L1	10.1	4.3	46.0	
0.741000	41.7	1000.0	9.000	GN	L1	10.1	4.3	46.0	
0.745000	41.6	1000.0	9.000	GN	L1	10.1	4.4	46.0	
0.810000	41.4	1000.0	9.000	GN	L1	10.1	4.6	46.0	
0.866000	40.5	1000.0	9.000	GN	L1	10.1	5.5	46.0	

Figure 2: Spectral Diagrams, Conducted Emission, 150kHz - 30MHz, N

Voltage with 4-Line-LISN



## Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.649000	49.2	1000.0	9.000	GN	N	10.1	6.8	56.0	
0.745000	51.5	1000.0	9.000	GN	N	10.1	4.5	56.0	
0.769000	51.5	1000.0	9.000	GN	N	10.1	4.5	56.0	
0.790000	52.2	1000.0	9.000	GN	N	10.2	3.8	56.0	
0.849000	52.1	1000.0	9.000	GN	N	10.2	3.9	56.0	
0.890000	51.9	1000.0	9.000	GN	N	10.2	4.1	56.0	
0.904000	51.6	1000.0	9.000	GN	N	10.1	4.4	56.0	

## Final Result 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.621000	41.2	1000.0	9.000	GN	N	10.1	4.8	46.0	
0.733000	42.3	1000.0	9.000	GN	N	10.1	3.7	46.0	
0.783000	42.2	1000.0	9.000	GN	N	10.1	3.8	46.0	
0.862000	41.4	1000.0	9.000	GN	N	10.2	4.6	46.0	

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#### **4.1.4 Discontinuous Interference on AC Mains**

<b>Result:</b>	<b>N/A</b>
----------------	------------

According to the electrical characteristics and usage of the equipment, the EUT does not produce discontinuous radio interference voltages on AC Mains. Therefore this test item has been skipped.

## 4.2 Emission in the Frequency Range above 30 MHz

### 4.2.1 Disturbance Power on Mains

<b>Result:</b>	<b>Pass</b>
----------------	-------------

Date of testing : 2016.09.09  
Port : Mains  
Basic Standard : EN 55014-1:2006+A1+A2  
Frequency Range : 30 – 300MHz  
Limit : EN 55014-1:2006+A1+A2, clause 4.1.2, Household appliance

#### Test Setup

Input Voltage : AC 220-240V, 50/60Hz  
Operational mode : ON  
Earthing : No (as class II equipment)

#### Measuring configuration and description

The measurement setup was made according to EN 55014-1:2006+A1+A2.

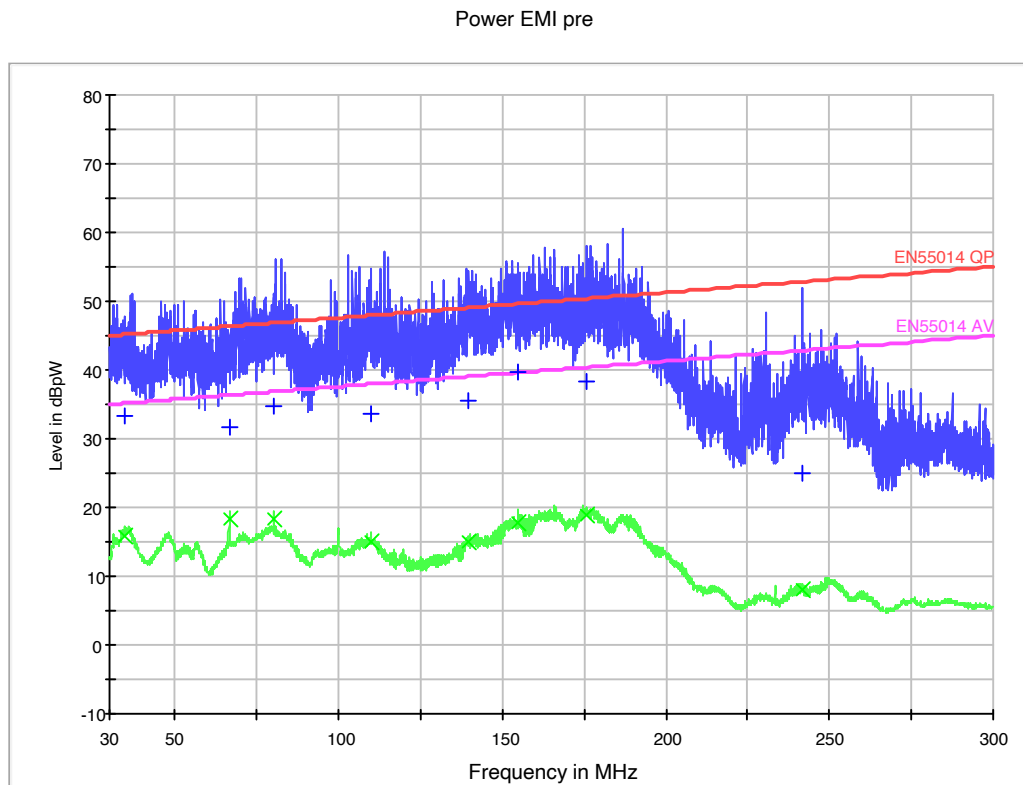
The measurement equipment like test receivers and absorption clamp are in compliance with CISPR 16-1 series standards. The test object has been operated by its rated voltage, rated frequency. Prior to the measurements the test objects operated about 10 minutes (warm-up) in order to stabilize their operating conditions and to ensure reliable measurement values.

Furthermore an internal calibration with the test receiver was conducted prior to each measurement.

The disturbance power was determined according to clause 6 of EN 55014-1:2006+A1+A2. The tested object was set-up on a wooden bench. The length of power cord of EUT plus that of the extension cord was approximately 6.0m.

The measurement was performed by operating the EUT in normal operation mode. The figures and tables below were those measured in the operation mode. Both Quasi Peak and Average Value were measured. In final measurement, by moving the absorption clamp along the power supply cord and the extension-power cord from the test object, Quasi-Peak and Average Value were measured and listed respectively where they had a maximum in previous scanning survey. In the Figures, the symbol “+” in blue color means Quasi-Peak Value and the symbol “x” in green color means Average Value which was measured in final measurement.

Figure 3: Spectral Diagrams, Power Disturbance, Mains, 30–300MHz



### Limit and Margin-QP

Frequency (MHz)	QuasiPeak (dBpW)	Meas. Time (ms)	Bandwidth (kHz)	Margin - QPK (dB)	Limit - QPK (dBpW)	Comment
34.800000	33.3	1000.0	120.000	11.9	45.2	
79.980000	34.6	1000.0	120.000	12.3	46.9	
66.600000	31.7	1000.0	120.000	14.7	46.4	
154.800000	39.7	1000.0	120.000	9.9	49.6	
175.560000	38.2	1000.0	120.000	12.2	50.4	
241.680000	25.0	1000.0	120.000	27.8	52.8	
139.920000	35.5	1000.0	120.000	13.6	49.1	
109.680000	33.7	1000.0	120.000	14.3	48.0	

### Limit and Margin-AV

Frequency (MHz)	Average (dBpW)	Meas. Time (ms)	Bandwidth (kHz)	Margin - AVG (dB)	Limit - AVG (dBpW)	Comment
34.800000	15.7	1000.0	120.000	19.5	35.2	
79.980000	18.4	1000.0	120.000	18.5	36.9	
66.600000	18.5	1000.0	120.000	17.9	36.4	
154.800000	17.8	1000.0	120.000	21.8	39.6	
175.560000	19.0	1000.0	120.000	21.4	40.4	
241.680000	8.0	1000.0	120.000	34.8	42.8	
139.920000	15.0	1000.0	120.000	24.1	39.1	
109.680000	15.0	1000.0	120.000	23.0	38.0	

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#### **4.2.2 Radiated Disturbance in the Frequency Range from 30MHz to 1000MHz**

<b>Result:</b>	<b>Pass</b>
----------------	-------------

Port : Enclosure  
Basic Standard : EN 55014-1:2006+A1+A2 and CISPR16-2-3  
Frequency Range : 30 –1000MHz  
Limit : EN 55014-1:2006+A1+A2, clause 4.1.2.2, Table 3.

According to a) of clause 4.1.2.3.2 of EN 55014-1:2006+A1+A2:

“Appliances are deemed to comply in the frequency range from 300MHz to 1000MHz 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 30MHz.

Because the EUT meets the two conditions mentioned above, the EUT is deemed to meet the radiated requirements without actual testing.

## **5 Test Results I M M U N I T Y**

The immunity test was not necessary for the EUT because it belongs to category I apparatus according to EN 55014-2:2015, i.e. ,

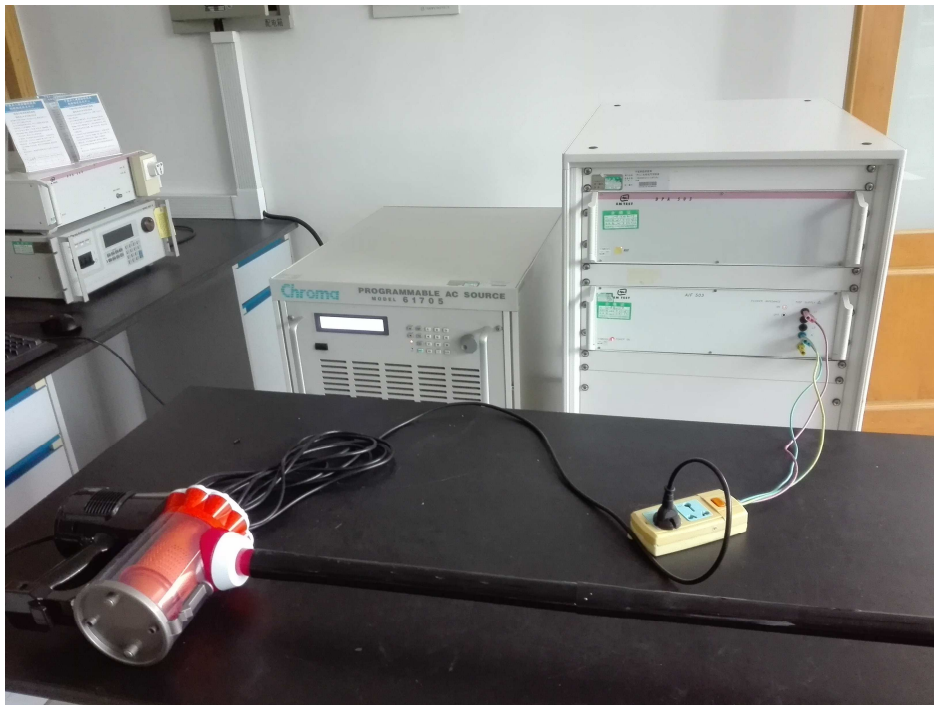
“Category I: Apparatus containing no electronic control circuitry, for example motor operated appliances, toys, tools, heating appliances and similar apparatus (such as UV and IR radiators).

Electric circuits consisting of passive components (such as. radio interference suppression capacitors or inductors, mains transformers and mains frequency rectifiers) are not considered to be electronic control circuitry.”

According to clause 7.2.1 of EN 55014-2:2015, the EUT is deemed to fulfill the relevant immunity requirements without actual testing.

## 6 Photographs of the Test Set-Up

**Photograph 1: Set-up for Harmonics and Voltage Fluctuation and Flicker**



**Photograph 2: Set-up for Continuous Disturbance Voltage**



**Photograph 3: Set-up for Disturbance Power**



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