


<b>Prüfbericht - Nr.:</b> <i>Test Report No.:</i>	<b>50167893 002</b>	<b>Auftrags-Nr.:</b> <i>Order No.:</i>	1160051918	Seite 1 von 19 <i>Page 1 of 19</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client Reference No.:</i>	N/A	<b>Auftragsdatum:</b> <i>Order date:</i>	25.10.2018	
<b>Auftraggeber:</b> <i>Client:</i>	Ningbo Dahua Electric Appliance Co., Ltd. Xiaodong Industrial Zone, Yuyao, Zhejiang 315408 P.R. China			
<b>Prüfgegenstand:</b> <i>Test item:</i>	Vacuum Cleaner			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>	Refer to page 2.			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	TÜV Rheinland – EMC Service			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	<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> <i>Date of receipt:</i>	01.11.2018			
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>	A000831090-001			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	01.11.2018-02.11.2018			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	Refer to section 1.1.			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass			
<b>geprüft von/ tested by:</b>		<b>kontrolliert von/ reviewed by:</b>		
11.12.2018 Tracy Zhang/PE <i>Tracy Zhang</i>		11.12.2018 Season Yang/TC <i>Season Yang</i>		
<b>Datum</b> <i>Date</i>	<b>Name/Stellung</b> <i>Name/Position</i>	<b>Unterschrift</b> <i>Signature</i>	<b>Datum</b> <i>Date</i>	<b>Name/Stellung</b> <i>Name/Position</i>
				<b>Unterschrift</b> <i>Signature</i>
<b>Sonstiges/ Other:</b>				
Refer to page 2 for further information.				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
*Legende:	1= Sehr gut P(ass)=entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail)= entspricht o.g. Prüfgrundlage(n)	3= befriedigend N/A = nicht anwendbar	4= ausreichend N/T =nicht getestet
Legend:	1= very good P(ass) = passed a.m. test specification(s)	2 = good F(ail)= failed a.m. test specification(s)	3= satisfactory N/A = not applicable	4= sufficient 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>				

V04

**-Model List:**

NO.	Model	Motor	Rated Input	Rated Power
1.	SL586A04	DH-08-04AL	AC 220-240V, 50/60Hz	400W
2.	SL585FA04			
3.	SL585GA04			
4.	SL585HA04			
5.	SL585IA04			
6.	SL585JA04			
7.	SL585KA04			
8.	SL586A06	DH-08-06 AL	AC 220-240V, 50/60Hz	600W
9.	SL585FA06			
10.	SL585GA06			
11.	SL594A06			
12.	SL585HA06			
13.	SL585IA06			
14.	SL585JA06			
15.	SL585KA06	DH-08-05 AL	AC 220-240V, 50/60Hz	500W
17.	SL592A05			500W
18.	SL594A05	DH-08-45 AL	AC 220-240V, 50/60Hz	450W
19.	SL594A45			450W

*Others:*

1. As a request's of the client, change motor DH-08-04 AL and DH-08-06 AL which have been approved in test reports 14715767 001-004 and 50167893 001. Add alternative new motors DH-08-05 AL and DH-08-45 AL for models as above table.
2. In electrical characteristics, motors DH-08-04 AL, DH-08-45 AL, DH-08-05 AL and DH-08-06 AL are same except the motor marking plates. Therefore, add DV, DP and Harmonics were performed on model SL585HA06 with motor DH-08-06 AL.
3. This test report is valid with test reports 14715767 001-004 and 50167893 001.

## TEST SUMMARY

4.1.1 HARMONICS ON AC MAINS

*Result:*

*Pass*

4.1.2 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

*Result:*

*Pass*

4.1.3 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*

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## 1 Test Sites

### 1.1 Test Facilities

Laboratory: TÜV Rheinland /CCIC(Ningbo) Co., Ltd.

**1<sup>st</sup> Floor, Building 11, Scholar Innovation Park, No.1188 Zhongguan Road,  
Zhenhai District, Ningbo 315200 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	ESR3	102331	2019.12.05
2	LISN	ENV216	102250	2019.12.05
3	Test Receiver	ESR3	102362	2019.12.05
4	Absorbing Clamp	MDS-21	100857	2019.12.11
5	Harmonics/voltage fluctuation Analyser	PACS-1	1736A00799	2019.12.05
6	Harmonic power supply	5001IX-CTS-400-413	1735A02292	2019.01.03

## 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 : AC 220-240V  
Rated Frequency : 50/60Hz  
Rated Input power : Refer to page 2  
Protection class : II

Identifies and differences:

Refer to the User's Manual for further information.

### 2.3 Independent Operation Modes

The basic operation modes are: "On" or "Off", with power regulation means.

Refer to the User's Manual for further information.

### 2.4 Noise Generating and Noise Suppressing Parts

Noise suppression components are used to suppress the noise.

Refer to the Circuit Diagram for more information.

### 2.5 Submitted Documents

Circuit diagram, PCB layout, 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 to achieve EMC compliance. 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

**Result:**

**Pass**

Date of testing : 2018.11.02  
Test procedure : EN 61000-3-2:2014  
Test duration : 2.5min  
Harmonic order : 2 – 40<sup>th</sup>  
Frequency range : 0 – 2kHz  
Test voltage : AC 230V, 50Hz

The harmonics on AC Mains in the frequency from 0 to 2 kHz 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 result**

Equipment category: Class A;

Fundamental current I1: 2.203A; Power factor: 0.992; Active input power: 505.2W.

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.001	1.620	N/A	Pass
3	0.325	2.300	14.1	0.335	3.450	9.7	Pass
4	0.001	0.430	N/A	0.001	0.645	N/A	Pass
5	0.045	1.140	4.0	0.047	1.710	2.8	Pass
6	0.000	0.300	N/A	0.000	0.450	N/A	Pass
7	0.009	0.770	N/A	0.010	1.155	N/A	Pass
8	0.000	0.230	N/A	0.000	0.345	N/A	Pass
9	0.002	0.400	N/A	0.002	0.600	N/A	Pass
10	0.000	0.184	N/A	0.000	0.276	N/A	Pass
11	0.001	0.330	N/A	0.002	0.495	N/A	Pass
12	0.001	0.153	N/A	0.001	0.230	N/A	Pass
13	0.001	0.210	N/A	0.007	0.315	N/A	Pass
14	0.001	0.131	N/A	0.002	0.197	N/A	Pass
15	0.001	0.150	N/A	0.005	0.225	N/A	Pass
16	0.000	0.115	N/A	0.002	0.173	N/A	Pass
17	0.001	0.132	N/A	0.001	0.198	N/A	Pass
18	0.000	0.102	N/A	0.000	0.153	N/A	Pass
19	0.001	0.118	N/A	0.001	0.178	N/A	Pass
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass
21	0.000	0.107	N/A	0.001	0.161	N/A	Pass
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass
23	0.001	0.098	N/A	0.004	0.147	N/A	Pass
24	0.001	0.077	N/A	0.001	0.115	N/A	Pass
25	0.001	0.090	N/A	0.008	0.135	N/A	Pass
26	0.002	0.071	N/A	0.003	0.107	N/A	Pass
27	0.001	0.083	N/A	0.008	0.125	N/A	Pass
28	0.002	0.066	N/A	0.004	0.099	N/A	Pass
29	0.001	0.078	N/A	0.007	0.116	N/A	Pass
30	0.001	0.061	N/A	0.004	0.092	N/A	Pass
31	0.001	0.073	N/A	0.005	0.109	N/A	Pass
32	0.001	0.058	N/A	0.004	0.086	N/A	Pass
33	0.001	0.068	N/A	0.006	0.102	N/A	Pass
34	0.001	0.054	N/A	0.003	0.081	N/A	Pass
35	0.000	0.064	N/A	0.004	0.096	N/A	Pass
36	0.000	0.051	N/A	0.003	0.077	N/A	Pass
37	0.000	0.061	N/A	0.003	0.091	N/A	Pass
38	0.000	0.048	N/A	0.003	0.073	N/A	Pass
39	0.001	0.058	N/A	0.003	0.087	N/A	Pass
40	0.000	0.046	N/A	0.003	0.069	N/A	Pass

### 4.1.2 Mains Terminal Continuous Disturbance Voltage

<b>Result:</b>	<b>Pass</b>
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Date of testing : 2018.11.02  
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 length of the power cord of the tested object was about 5.0 m. The EUT was set 0.8m away from the AMN. The EUT (Equipment under Test) was wrapped with artificial hand which was earthed through the Artificial Mains Network (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.

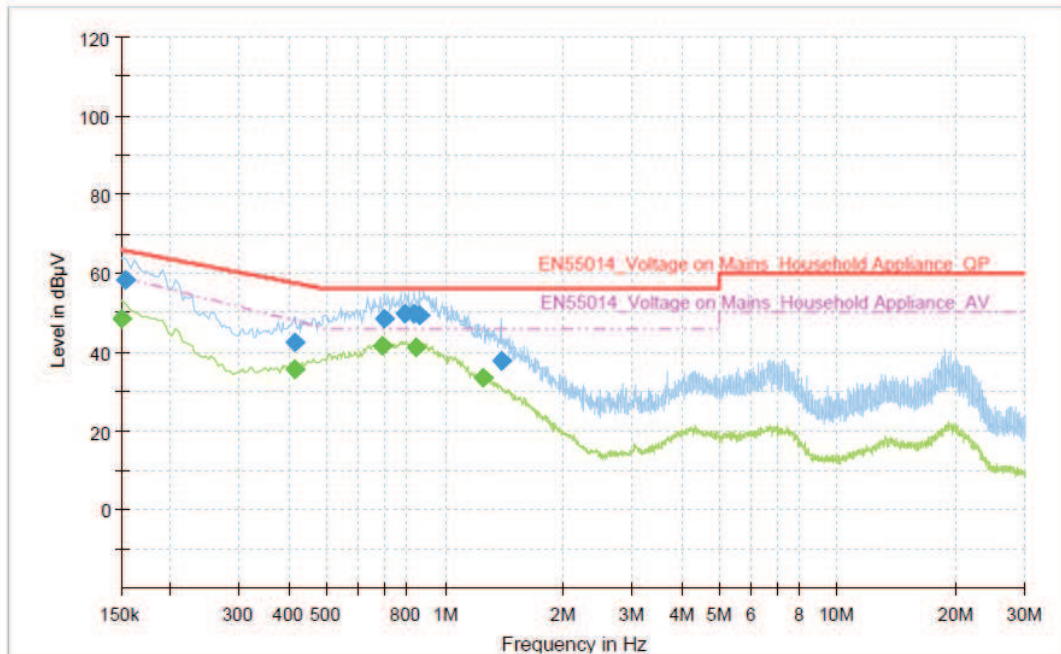
The Interference Voltage was determined according to clause 5 of EN 55014-1:2006+A1+A2 while measuring the line and neutral conductor by turns.

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. In the figures, the symbol “◆” in blue color means Quasi-Peak Value and the symbol “◆” in green color means Average Value which was measured in final measurement.

The worst data was recorded in the report.

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

### Full Spectrum

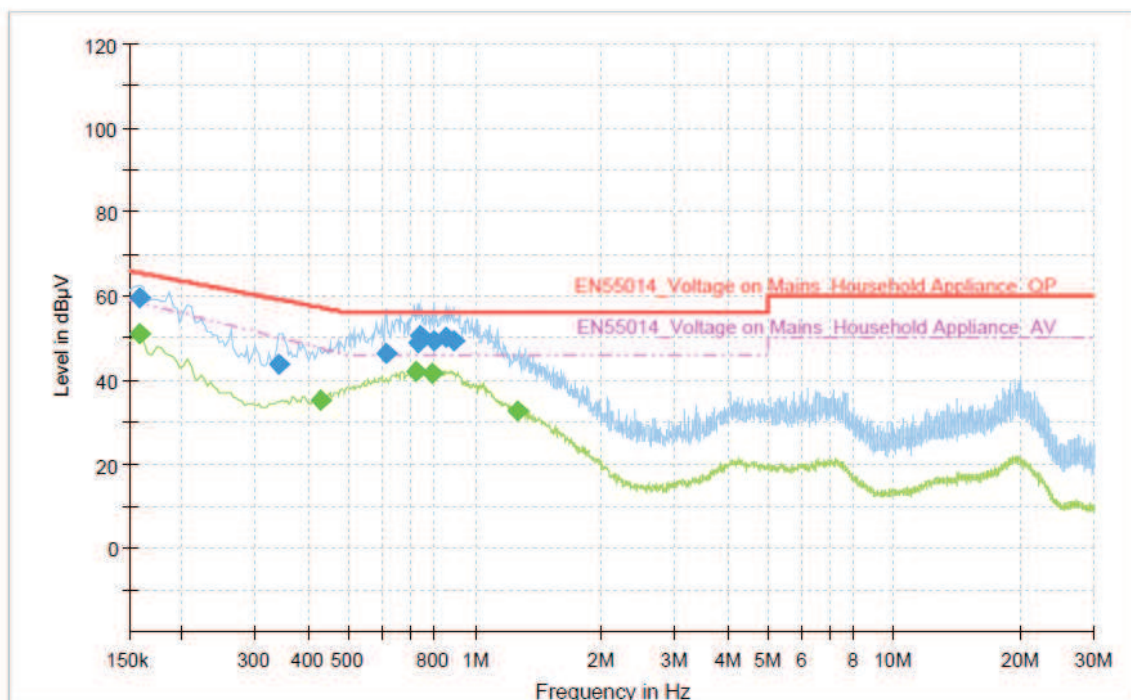


### Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.150000	---	48.69	59.00	10.31	1000.0	9.000	L1	ON	9.8
0.154000	58.33	---	65.78	7.46	1000.0	9.000	L1	ON	9.8
0.414000	42.38	---	57.57	15.18	1000.0	9.000	L1	ON	9.8
0.414000	---	35.48	48.04	12.56	1000.0	9.000	L1	ON	9.8
0.694000	---	41.74	46.00	4.26	1000.0	9.000	L1	ON	9.8
0.702000	48.57	---	56.00	7.43	1000.0	9.000	L1	ON	9.8
0.790000	49.75	---	56.00	6.25	1000.0	9.000	L1	ON	9.8
0.838000	49.82	---	56.00	6.18	1000.0	9.000	L1	ON	9.8
0.846000	---	41.40	46.00	4.60	1000.0	9.000	L1	ON	9.8
0.862000	49.15	---	56.00	6.85	1000.0	9.000	L1	ON	9.8
1.254000	---	33.73	46.00	12.27	1000.0	9.000	L1	ON	9.8
1.386000	37.88	---	56.00	18.12	1000.0	9.000	L1	ON	9.8

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

### Full Spectrum



### Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.158000	59.71	---	65.57	5.85	1000.0	9.000	N	ON	9.7
0.158000	---	50.87	58.44	7.57	1000.0	9.000	N	ON	9.7
0.342000	43.60	---	59.16	15.55	1000.0	9.000	N	ON	9.7
0.430000	---	35.40	47.63	12.23	1000.0	9.000	N	ON	9.7
0.614000	46.53	---	56.00	9.47	1000.0	9.000	N	ON	9.8
0.722000	---	42.04	46.00	3.96	1000.0	9.000	N	ON	9.8
0.730000	48.92	---	56.00	7.08	1000.0	9.000	N	ON	9.8
0.738000	50.53	---	56.00	5.47	1000.0	9.000	N	ON	9.8
0.790000	---	41.85	46.00	4.15	1000.0	9.000	N	ON	9.8
0.794000	49.49	---	56.00	6.51	1000.0	9.000	N	ON	9.8
0.850000	50.39	---	56.00	5.61	1000.0	9.000	N	ON	9.8
0.890000	49.44	---	56.00	6.56	1000.0	9.000	N	ON	9.8
1.262000	---	32.82	46.00	13.18	1000.0	9.000	N	ON	9.8

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### 4.1.3 Discontinuous Interference on AC Mains

<b>Result:</b>	<b>N.A.</b>
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## 4.2 Emission in the Frequency Range above 30 MHz

### 4.2.1 Disturbance Power on Mains

<b>Result:</b>	<b>Pass</b>
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Date of testing	: 2018.11.01
Port	: Mains
Basic Standard	: EN 55014-1:2006+A1+A2
Frequency Range	: 30 – 300MHz
Limit	: EN 55014-1:2006+A1+A2, clause 4.1.2.1, Household and similar appliances

#### 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.

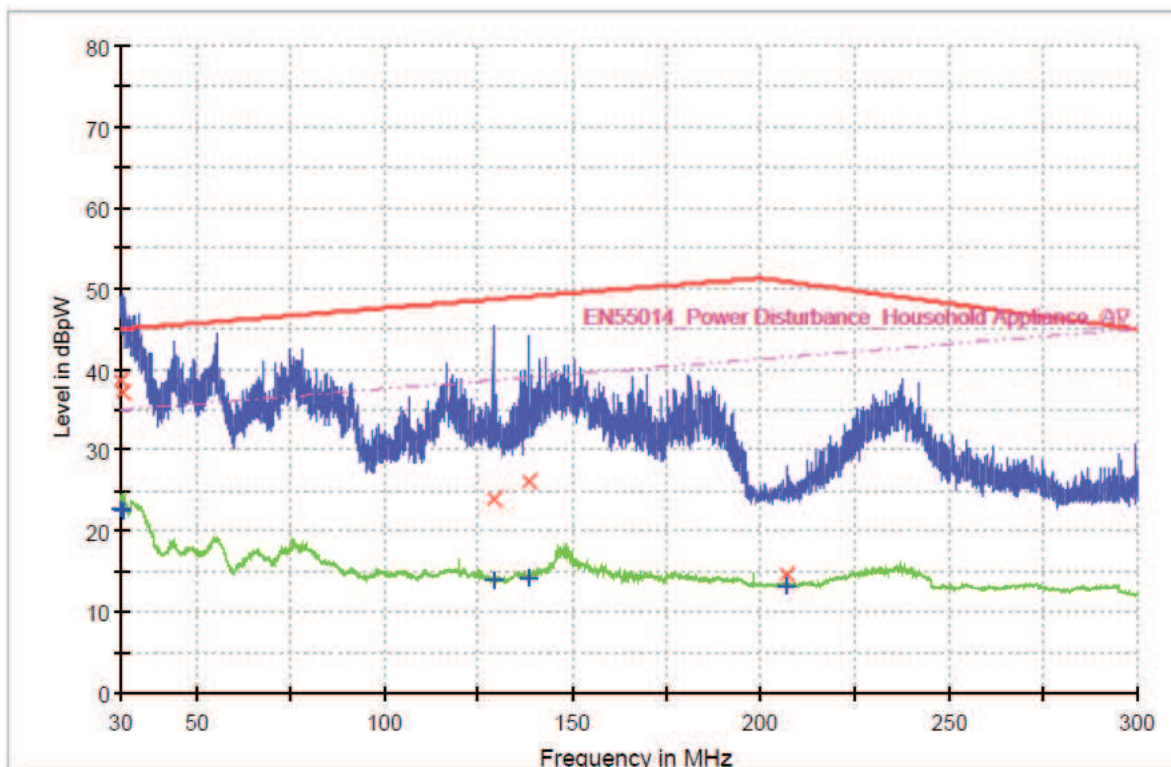
The measurement equipment like test receivers and absorption clamp are in compliance with CISPR 16-1 series standards. The test object has been operated by its rated voltage, rated frequency. Prior to the measurements the test objects operated about 10 minutes (warm-up) in order to stabilize their operating 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 the power cord of the test object was about 3.0m. 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 red color means Quasi-Peak Value and the symbol “+” in blue 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)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBpW)
30.240000	38.6	1000.0	120.000	11.0	6.4	45.0
30.600000	37.3	1000.0	120.000	11.0	7.8	45.0
128.880000	23.9	1000.0	120.000	5.7	24.8	48.7
138.520000	26.2	1000.0	120.000	5.7	22.9	49.0
206.720000	14.6	1000.0	120.000	5.4	36.3	50.9

### Limit and Margin-AV

Frequency (MHz)	Average (dBpW)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBpW)
30.240000	22.6	1000.0	120.000	11.0	12.4	35.0
30.600000	22.6	1000.0	120.000	11.0	12.4	35.0
128.880000	14.0	1000.0	120.000	5.7	24.7	38.7
138.520000	14.1	1000.0	120.000	5.7	24.9	39.0
206.720000	13.2	1000.0	120.000	5.4	28.3	41.5

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

**Result:**

**Pass**

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.

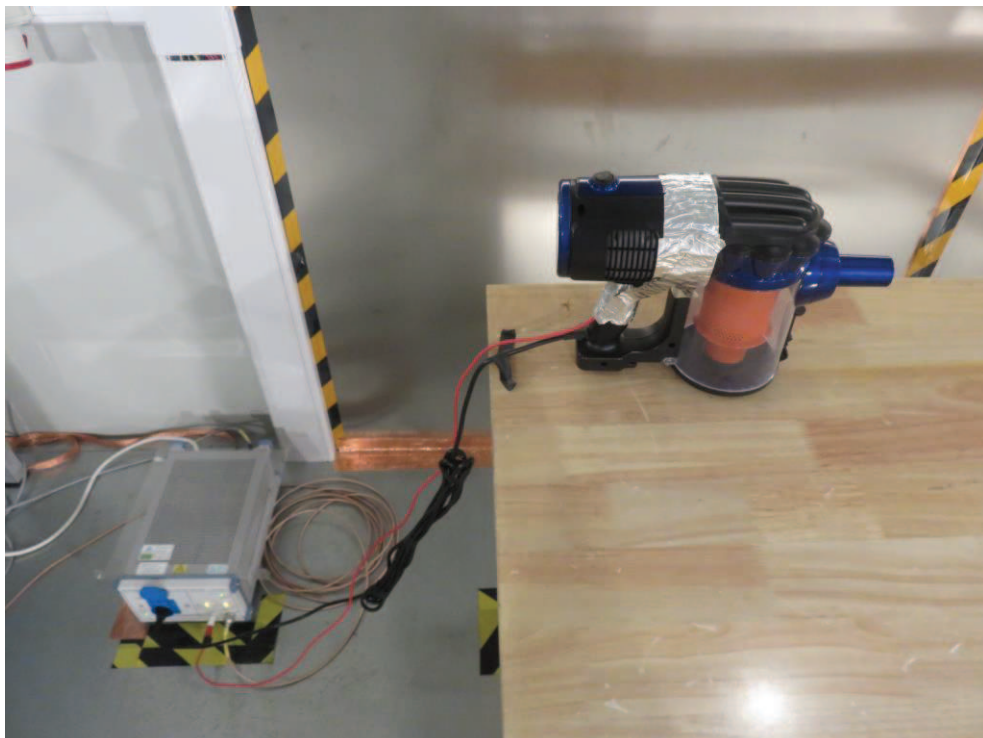
Because the EUT meets the two conditions mentioned above, the EUT is deemed to meet the radiated requirements without actual testing.

## 5 Photographs of the Test Set-Up

**Photograph 1: Set-up for Harmonics**



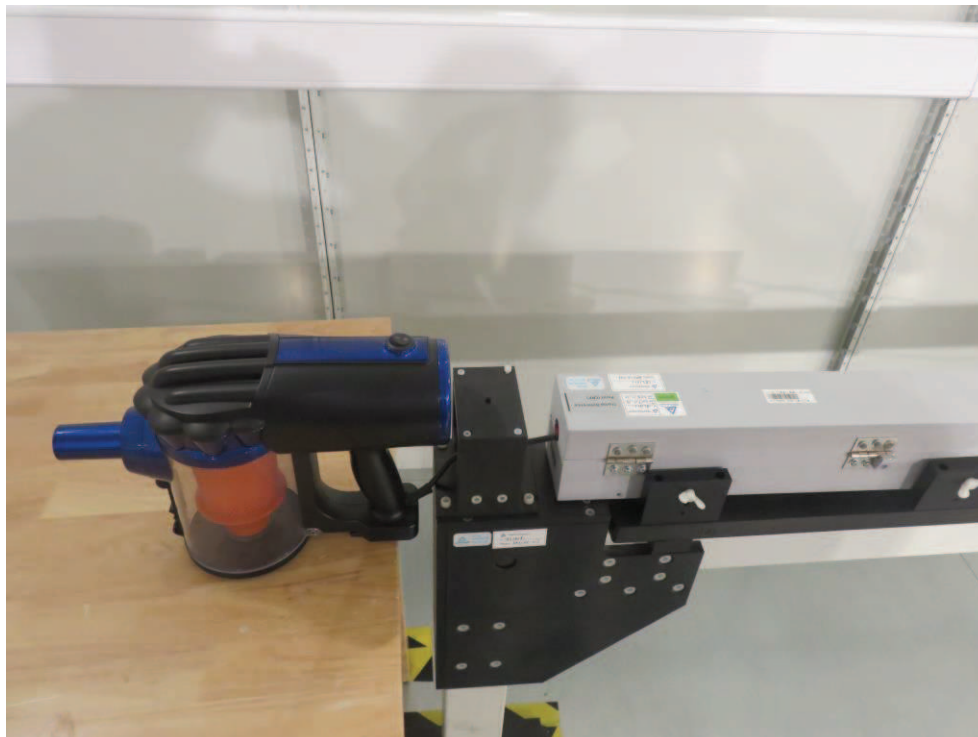
**Photograph 2: Set-up for Disturbance Voltage on AC mains terminal**



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**Photograph 3: Set-up for Disturbance Power on AC mains**



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