3132457.50

EMC Test report for Rechargeable Electric Shaver

Models: YD-367, YD-356, YD-368, YD-377, YD-388, YD-8900, YD-7088, YD-7098, YD-366, YD-8088, YD-398

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Document

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CONTENTS

1 CONCLUSION

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

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 rechargeable Electric Shaver, model YD-367 intended for residential use. The product has electronic control unit but no earth connection.

According to the declaration from manufacturer, all models are identical except the enclosure and shape.

Due to the similarity between them, model YD-367 was selected for the full tests and the corresponding data is representative for models YD-356, YD-368, YD-377, YD-388, YD-8900, YD-7088, YD-7098, YD-366, YD-8088 and YD-398 as well.

Figure 1 Over view

1.2 Environment

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

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

1.3 Classification

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

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

2 SUMMARY

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

2.1 Applied standards

Standard	Year	Title
EN 55014-1	2006	Emission – Electrical motor-operated and thermal appliances for household and similar purposes, electrical tools and similar electrical apparatus
A1	2009	
A2	2011	
EN 55014-2	1997	Immunity - Household appliances, electric tools and similar
A1	2001	
A2	2008	
EN 61000-3-2	2006	Limits for harmonic currents emissions
A1	2009	
A2	2009	
EN 61000-3-3	2008	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	Rechargeable Electric Shaver
Trade mark	
Tested Type	YD-367
Representative types	YD-356, YD-368, YD-377, YD-388, YD-8900, YD-7088, YD-7098, YD-366, YD-8088, YD-398
Ratings	220-240 Vac, 50 Hz; 3 W; Class II

3.2 Customer Information

Applicant/Manufacturer	
Contact person	Mr. Vicky
Telephone	+86 577 8815 8863
Telefax	+86 577 8815 5603
Address	No. 7, Yanjiang Road, Fangqiao Industry Zone
Postal Code/ Place	Yuyao City, Zhejiang Province
Country	P. R. China

Factory	
Contact person	Mr. Vicky
Telephone	+86 577 8815 8863
Telefax	+86 577 8815 5603
Address	
Postal Code/ Place	
Country	

3.3 Test data

Location	Audix Technology (Shanghai) Co., Ltd.
Address	3 F., 34 Building, No.680, Guiping Road, Shanghai City, China
Date	Jan. 2013
Supervised by	Richie Tang

3.4 Environmental conditions

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

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

Measurement Uncertainty

Conducted Emission Expanded Uncertainty: U = 3.38 dB
Radiated Emission Expanded Uncertainty (30-200MHz):
U = 4.14 dB (horizontal)
U = 4.28 dB (vertical)
Radiated Emission Expanded Uncertainty (200M-1000MHz):
U = 4.18 dB (horizontal)
U = 4.26 dB (vertical)

4 EMISSION TEST RESULTS

4.1 Mains conducted disturbance voltage

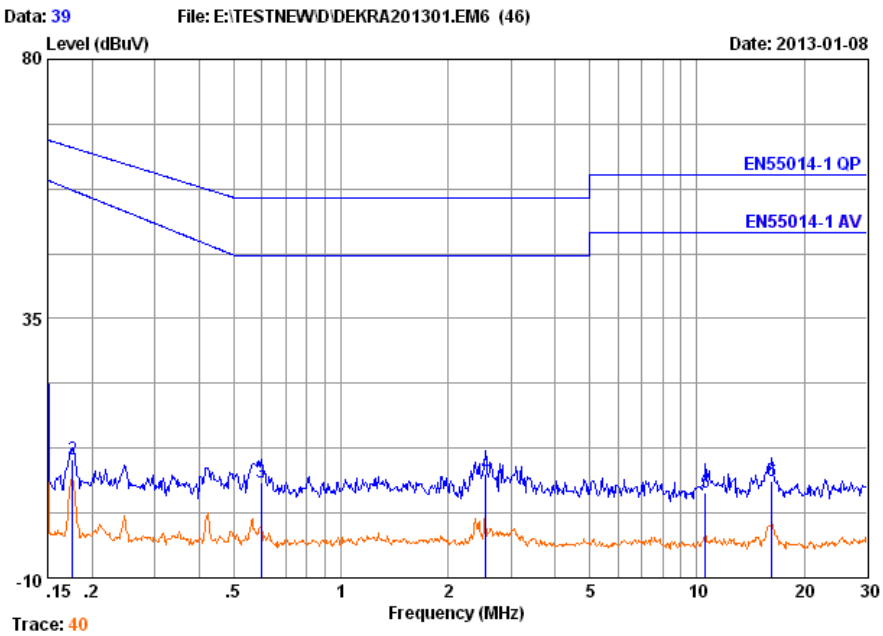
Standard	EN 55014-1	
Frequency [MHz]	QP [dB(µV)]	AV [dB(µV)]
0,15 – 0,50	66 – 56 *)	59 – 46 *)
0,50 – 5	56	46
5 – 30	60	50

*) Limits decreasing linearly with the logarithm of the frequency

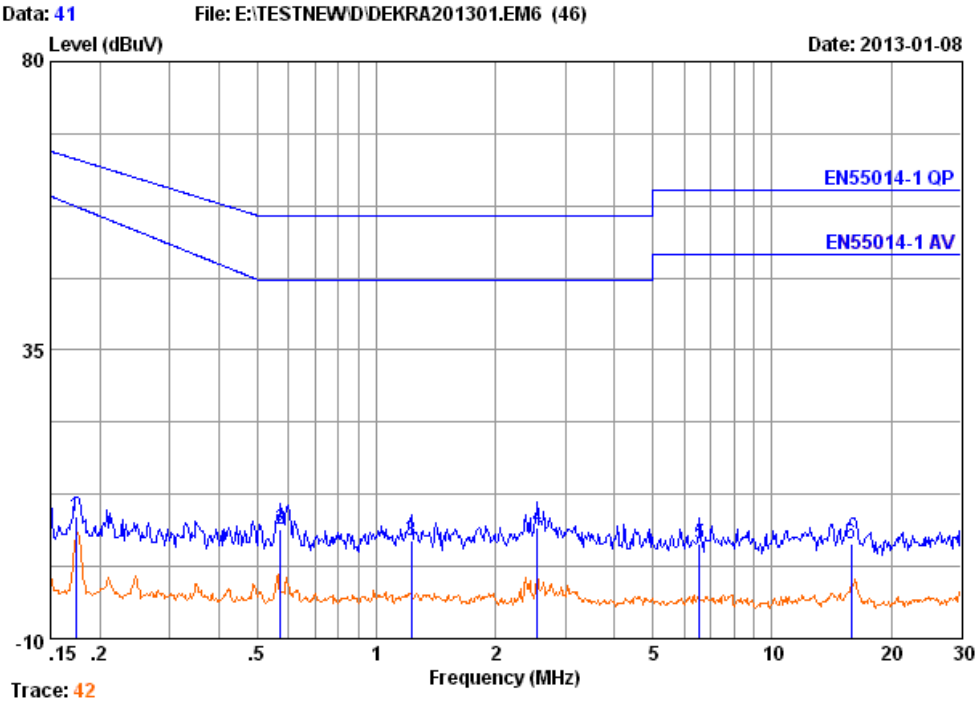
Port	AC mains
Test method	LISN
Mode	Charging

Results

Line



Neutral



Frequency [MHz]	QP [dB(µV)]		AV [dB(µV)]	
	Level	Limit	Level	Limit
0,150-30,0	More than 20 dB below the limit			

"QP" and "AV" are levels and limits referring to measurements with the quasi-peak and average detector. If the measured level "QP" does not exceed the limit for "AV", then no average measurement is necessary.

No 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.

Conclusion:

PASS

4.2 Radiated emission

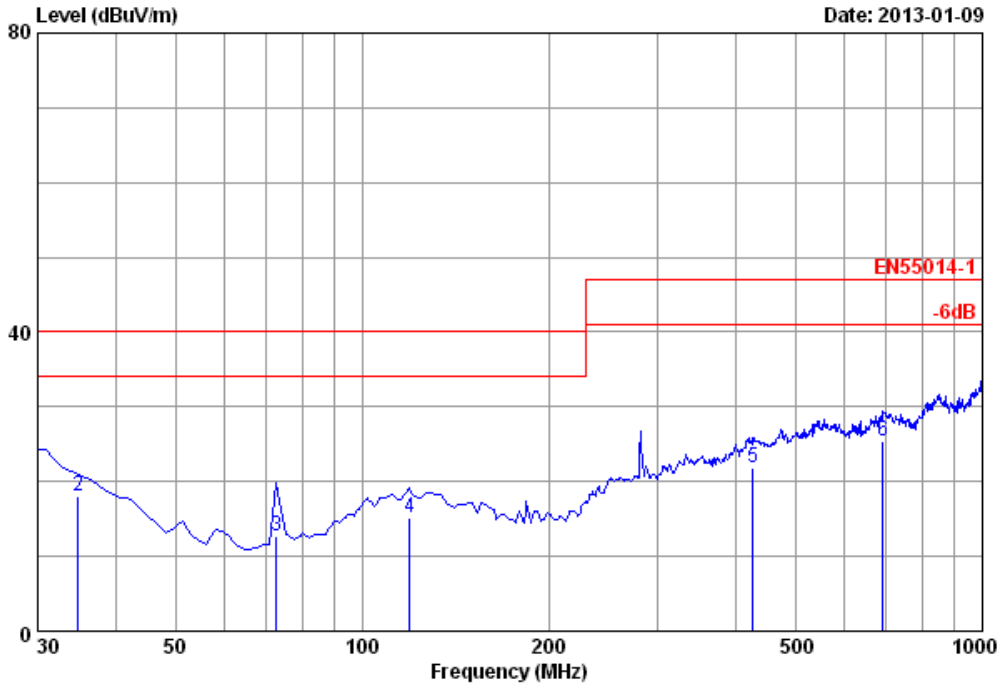
Standard	EN 55014-1
Measuring distance	3 meters

Frequency [MHz]			QP [dB(μV/m)] @ 3 m
30	–	230	40
230	–	1000	47

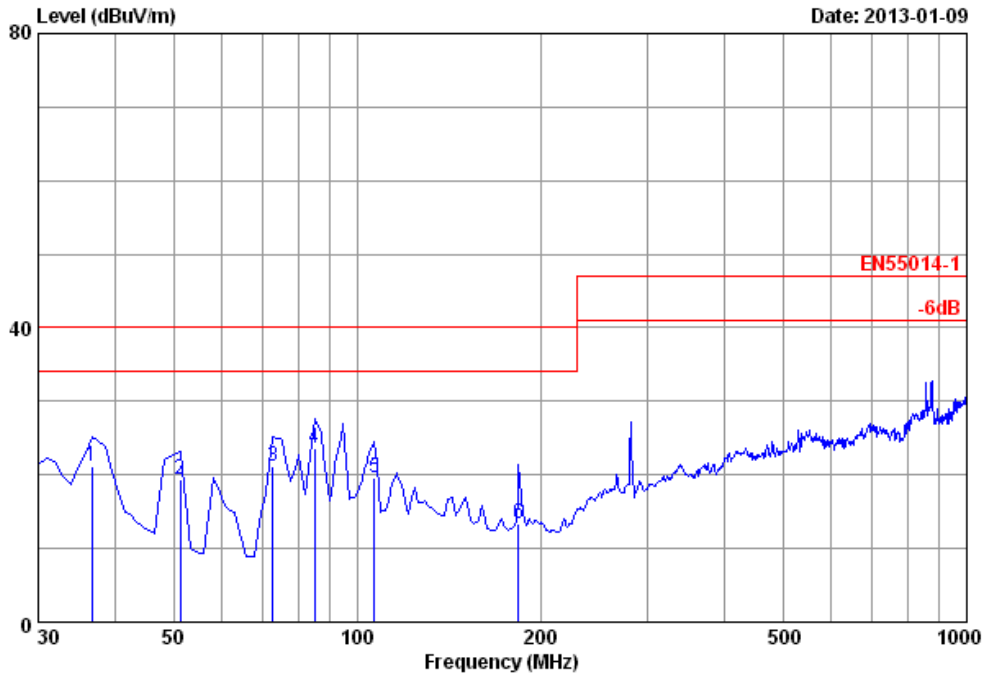
Port	Enclosure
Mode	Shaving, charging

Results of Charging mode

Horizontal



Vertical

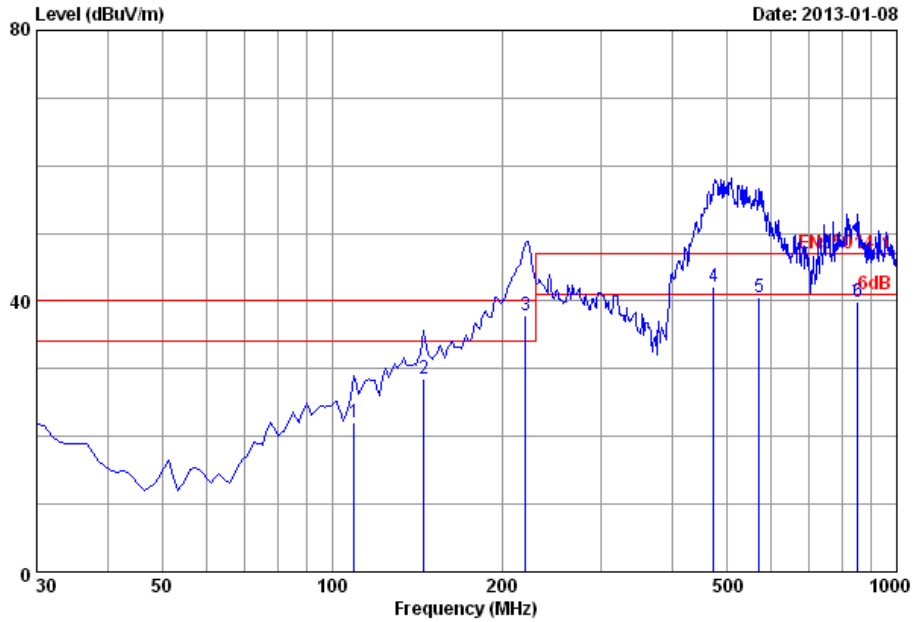


Polarization	Frequency [MHz]	QP [dB(μV/m)] @ 3m	
		Level	Limit
H	30,00	20,30	40,00
V	36,79	21,26	40,00
V	72,68	21,16	40,00
V	85,29	23,65	40,00

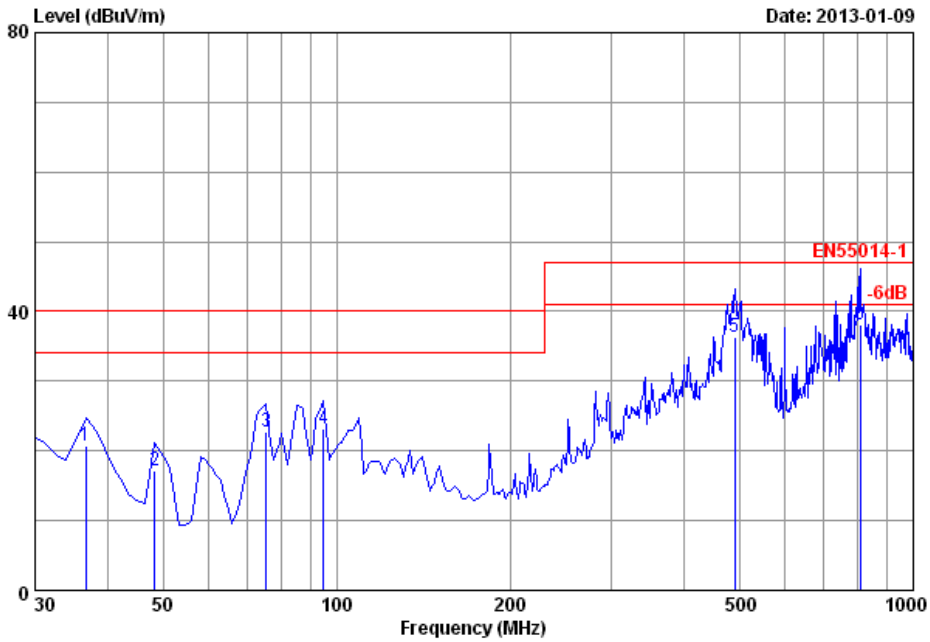
No other significant emissions were recorded at the frequency range of interest employing the QP detector.

Results of shaving mode

Horizontal



Vertical



Polarization	Frequency [MHz]	QP [dB(μV/m)] @ 3m	
		Level	Limit
H	145,43	28,57	40,00
H	**219,89**	**37,84***	**40,00**
H	474,53	42,13	47,00
V	489,78	36,28	47,00
H	570,29	40,52	47,00
V	807,94	38,16	47,00
H	851,59	39,87	47,00

* Notice that the disturbance reaches the limits and at these frequencies precautions are advised.

No other significant emissions were recorded at the frequency range of interest employing the QP detector.

Refer to chapter 6 for the test set-up.

Conclusion:

PASS

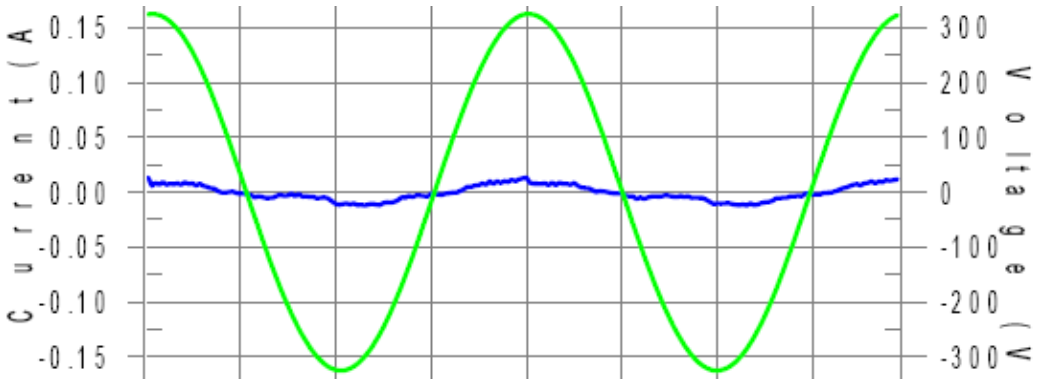
4.3 Harmonic currents

Standard	EN 61000-3-2
Port	AC Mains supply
Mode	Charging

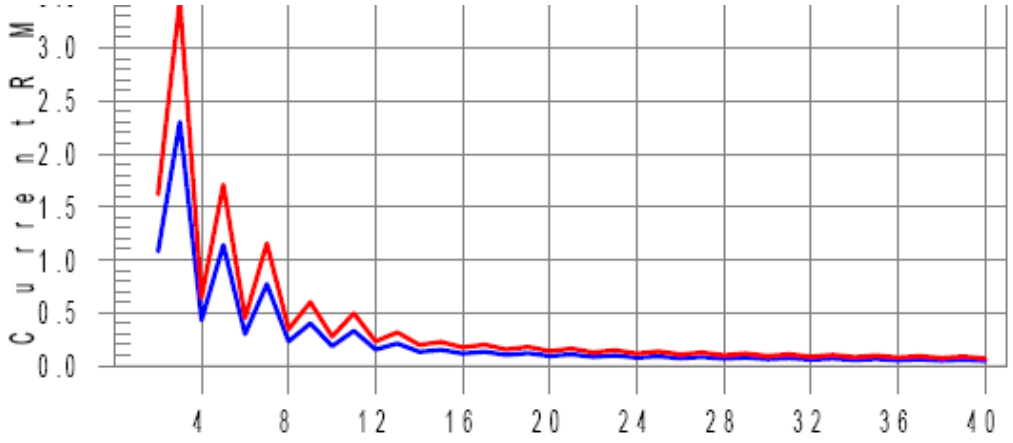
✓	Class A	All apparatus not classified as Class B, C or D
	Class B	Portable tools
	Class C	Lighting equipment
	Class D	Personal computers, television receivers

Results and limits

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test Result: Pass Source qualification: Normal
THC(A): 0.00 I-THD(%): 0.00 POHC(A): 0.000 POHC Limit(A): 0.251
Highest parameter values during test:

V_RMS (Volts):	230.05	Frequency(Hz):	50.00
I_Peak (Amps):	0.016	I_RMS (Amps):	0.007
I_Fund (Amps):	0.007	Crest Factor:	2.656
Power (Watts):	1.5	Power Factor:	0.956

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	0.0	0.001	1.620	0.08	Pass
3	0.001	2.300	0.0	0.002	3.450	0.05	Pass
4	0.001	0.430	0.0	0.001	0.645	0.12	Pass
5	0.000	1.140	0.0	0.001	1.710	0.03	Pass
6	0.000	0.300	0.0	0.000	0.450	0.04	Pass
7	0.001	0.770	0.0	0.001	1.155	0.05	Pass
8	0.000	0.230	0.0	0.000	0.345	0.10	Pass
9	0.000	0.400	0.0	0.000	0.600	0.06	Pass
10	0.000	0.184	0.0	0.000	0.276	0.11	Pass
11	0.000	0.330	0.0	0.000	0.495	0.06	Pass
12	0.000	0.153	0.0	0.000	0.230	0.06	Pass
13	0.000	0.210	0.0	0.000	0.315	0.09	Pass
14	0.000	0.131	0.0	0.000	0.197	0.10	Pass
15	0.000	0.150	0.0	0.000	0.225	0.14	Pass
16	0.000	0.115	0.0	0.000	0.173	0.11	Pass
17	0.000	0.132	0.0	0.000	0.199	0.11	Pass
18	0.000	0.102	0.0	0.000	0.153	0.07	Pass
19	0.000	0.118	0.0	0.000	0.178	0.11	Pass
20	0.000	0.092	0.0	0.000	0.138	0.10	Pass
21	0.000	0.107	0.0	0.000	0.161	0.15	Pass
22	0.000	0.084	0.0	0.000	0.125	0.12	Pass
23	0.000	0.098	0.0	0.000	0.147	0.13	Pass
24	0.000	0.077	0.0	0.000	0.115	0.08	Pass
25	0.000	0.090	0.0	0.000	0.135	0.14	Pass
26	0.000	0.071	0.0	0.000	0.106	0.12	Pass
27	0.000	0.083	0.0	0.000	0.125	0.15	Pass
28	0.000	0.066	0.0	0.000	0.099	0.20	Pass
29	0.000	0.078	0.0	0.000	0.116	0.14	Pass
30	0.000	0.061	0.0	0.000	0.092	0.16	Pass
31	0.000	0.073	0.0	0.000	0.109	0.15	Pass
32	0.000	0.058	0.0	0.000	0.086	0.24	Pass
33	0.000	0.068	0.0	0.000	0.102	0.15	Pass
34	0.000	0.054	0.0	0.000	0.081	0.15	Pass
35	0.000	0.064	0.0	0.000	0.096	0.14	Pass
36	0.000	0.051	0.0	0.000	0.077	0.11	Pass
37	0.000	0.061	0.0	0.000	0.091	0.15	Pass
38	0.000	0.048	0.0	0.000	0.073	0.13	Pass
39	0.000	0.058	0.0	0.000	0.087	0.15	Pass
40	0.000	0.046	0.0	0.000	0.069	0.11	Pass

Conclusion:

PASS

4.4 Voltage fluctuations (Flicker)

Standard	EN 61000-3-3
Port	AC Mains supply
Voltage	230 V_{AC}
Mode	Charging

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}	≤ 1
P_{LT}	N/A
dt > 3,3%	≤ 500 ms
d_C	≤ 3,3%
d_{MAX}	≤ 4%

Results

Relative voltage change characteristic dt	0,0 ms
Average d_{MAX}	0,590%
Relative Voltage change d_C	< 0,050%
Short term flicker P_{ST}	0,073
Long term flicker P_{LT}	N/A

Tests and mode of operation

The measurements were performed with the following mode of operation: Working, charging

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	Shaving, charging

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	Charging			
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 µs
Peak Voltage; Port	1 kV; AC input power port (Line to line)

Performed tests

Tested Voltage; Port	1 kV; AC input power port (Line to line)			
Mode	Charging			
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	Charging			
Frequency range	0,15 – 230 MHz			
Dwell time	1 second			
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			50 Hz	60 Hz
AC input power port	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	Charging	
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 2 Conducted Emission test setup

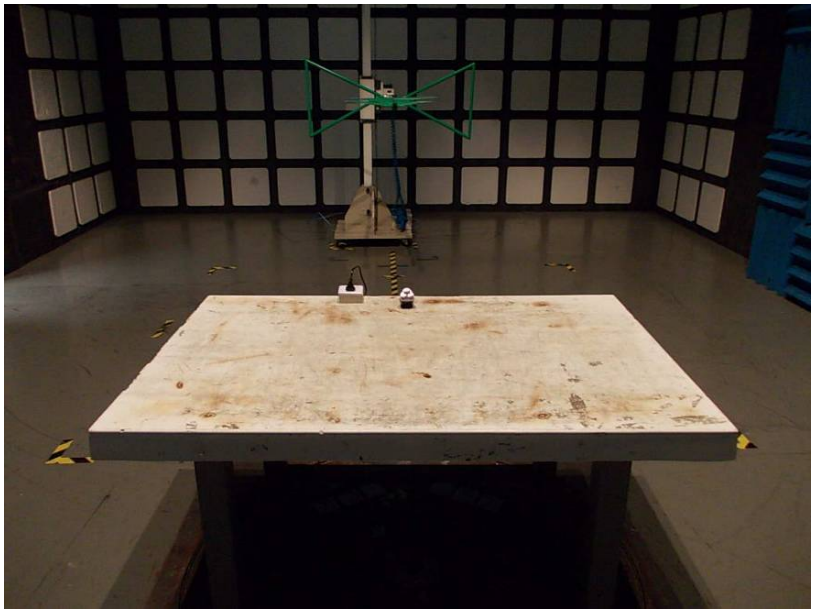


Figure 3 Radiated emission test setup