

Hisense Ronshen (Guangdong) Refrigerator Co., Ltd.

TEST REPORT

SCOPE OF WORK

EMC TESTING—REFER TO PAGE 5

REPORT NUMBER

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EN 55014+A2:2011 (With electronics)-b

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TEST REPORT

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Manufacturing Site : Same as above
Intertek Report No: GZ12120124-1R10

Test standards

EN 55014-1:2006+A1:2009+A2:2011
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 55014-2:2015

Sample Description

Product : Refrigerator
Model No. : See page 5
Electrical Rating : See page 5
Serial No. : Not Labeled
Date Received : 10 July 2018
Date Test : 10 July 2018 to 20 July 2018
Conducted

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TEST REPORT

CONTENT

TEST REPORT	1
CONTENT	3
1. TEST RESULTS SUMMARY	4
2. EMC RESULTS CONCLUSION	5
3. LABORATORY MEASUREMENTS	9
4. EQUIPMENT USED DURING TEST	10
5. EMI TEST	13
5.1 EN 55014-1 CONTINUOUS CONDUCTED DISTURBANCE VOLTAGE TEST	13
5.1.1 Block Diagram of Test Setup	13
5.1.2 Test Setup and Procedure	13
5.1.3 Test Data and curve	14
5.2 EN 55014-1 DISCONTINUOUS CONDUCTED DISTURBANCE VOLTAGE	16
5.2.1 Block Diagram of Test Setup	16
5.2.2 Test Setup and Procedure	16
5.2.3 Test Data and curve	17
5.3 EN 55014-1 RADIATED DISTURBANCE POWER	18
5.3.1 Block Diagram of Test Setup	18
5.3.2 Test Setup and Procedure	19
5.3.3 Test Data and curve	20
5.4 EN 55014-1 RADIATED DISTURBANCE	21
6. HARMONICS OF CURRENT	21
6.1 BLOCK DIAGRAM OF TEST SETUP	21
6.2 TEST SETUP AND PROCEDURE	21
6.3 TEST DATA	22
7. FLICKER	24
7.1 BLOCK DIAGRAM OF TEST SETUP	24
7.2 TEST SETUP AND PROCEDURE	24
7.3 TEST DATA	25
8. EMS TEST	26
8.1 EN 61000-4-2(PURSUANT TO EN 55014-2) ELECTROSTATIC DISCHARGE IMMUNITY	26
8.2 EN 61000-4-6(PURSUANT TO EN 55014-2) INJECTED CURRENT (0.15 MHz TO 230 MHz)	30
8.3 EN 61000-4-4(PURSUANT TO EN 55014-2) ELECTRICAL FAST TRANSIENT/BURST	31
8.4 EN 61000-4-5(PURSUANT TO EN 55014-2) SURGE IMMUNITY	32
8.5 EN 61000-4-11(PURSUANT TO EN 55014-2) VOLTAGE DIPS AND INTERRUPTIONS	33
8.6 EN 61000-4-3(PURSUANT TO EN 55014-2) RADIATED ELECTROMAGNETIC FIELD IMMUNITY	34
9 APPENDIX I - PHOTOS OF TEST SETUP	35
10 APPENDIX II – PHOTOS OF EUT	39

TEST REPORT

1. TEST RESULTS SUMMARY

Test Item	Standard	Result
Continuous conducted disturbance voltage	EN 55014-1:2006+A1:2009+A2:2011	Pass
Discontinuous conducted disturbance voltage	EN 55014-1:2006+A1:2009+A2:2011	Pass
Radiated disturbance power	EN 55014-1:2006+A1:2009+A2:2011	Pass
Radiated disturbance	EN 55014-1:2006+A1:2009+A2:2011 Reference: CISPR 16-2-3:2006	N/A
Harmonic of current	EN 61000-3-2:2014	Pass
Flicker	EN 61000-3-3:2013	Pass
ESD immunity	EN 55014-2: 2015 Reference: EN 61000-4-2:2009	Pass
Radiated EM field immunity	EN 55014-2:2015 Reference: EN 61000-4-3:2006+A1:2008+A2:2010	N/A
EFT immunity	EN 55014-2:2015 Reference: EN 61000-4-4:2012	Pass
Surge immunity	EN 55014-2:2015 Reference: EN 61000-4-5:2014	Pass
Inject current immunity	EN 55014-2:2015 Reference: EN 61000-4-6:2014	Pass
Voltage dips and interruption immunity	EN 55014-2:2015 Reference: EN 61000-4-11:2004	Pass

Remark:

1. The symbol "N/A" in above table means Not Applicable.
2. When determining the test results, measurement uncertainty of tests has been considered.

TEST REPORT

2. EMC RESULTS CONCLUSION

RE: EMC Testing Pursuant to EMC Directive 2014/30/EU Performed on the Refrigerator, Models: RL475NASS2, RS-47WL4SIA/CSA2, RL475NBIS2, RS-47WL4SIA/CLA2, RL475NBHW2, RS-47WL4SIA/CPA2, RL475N4AS2, RS-47WL4SBA/CLA2, RL475N4BC2, RS-47WL4S2, RS-47WL4SIA/CSA1, RL475N4AS1, RL475NASS1, RL475NBIS1, RL475NBHW1, RS-47WL4S1, RS-47WL4SIA/CLA1, RS-47WL4SBA/CLA1, RL475N4BC1, RS-47WL4SBB/CLA1, RL462N4WC1, RS-47WL4SB1, RS-42WL4SB1, RL423N4AW1, RL423N4AC1, RL423N4ACU, RL423N4AWU, RS-42WL4SB, RS-42WL4SB2, RL423N4A*2 (Note: The * is a letter optional from A to Z and stand for type of front door)

Rating:

220-240V~, 50Hz, Class I, R600a, defrosting power: 120W;

0,4 A for models with suffix "2";

0,5 A for RL423N4ACU, RL423N4AWU, RS-42WL4SB and models with suffix "1";

0,6 A for RS-42WL4SB2, RL423N4A*2 ((Note: The * is a letter optional from A to Z and stand for type of front door);

For RS-42WL4SB1, RL423N4AW1, RL423N4AC1: climatic class: SN, N, ST;

For other models: climatic class: SN, N, ST, T

This report is the revision of the previous test report GZ12120124-1R9 dated 10-April-2018 and shall be used together with it.

This report is issued because of adding alternative new main PCB for all models. This new main PCB is the same as original main PCB except a small change on the schematic diagram and PCB layout.

Based on above, RS-42WL4SB1 with the new PCB was selected for test.

We tested the Refrigerator, Model: RS-42WL4SB1, to determine if it was in compliance with the relevant EN standards as marked on the Test Results Summary. We found that the unit met the requirements of EN 55014-1, EN 61000-3-2, EN 61000-3-3, EN 55014-2 (EN 61000-4-2), EN 55014-2 (EN 61000-4-4), EN 55014-2 (EN 61000-4-6), EN 55014-2 (EN 61000-4-5), & EN 55014-2 (EN 61000-4-11) standards when tested as received. The worst case's test data was presented in this test report.

TEST REPORT

Models information summary:

Models with outside condenser:

Series	Model	Door panel / Display board position	LED light location	Compressor and rated current
Series 1 models	RL475NASS2, RS-47WL4SIA/CSA2, RL475N4AS2	Stainless steel / On the door	Top+back 2W + 1W	NE1080Y, MH1050Y, MG1050Y / 0,4A
	RL475NBIS2, RS-47WL4SIA/CLA2	Imitating stainless steel / On the door	Top+back 2W + 1W	NE1080Y, MH1050Y, MG1050Y / 0,4A
	RL475NBHW2, RS-47WL4SIA/CPA2	White paint / On the door	Top+back 2W + 1W	NE1080Y, MH1050Y, MG1050Y / 0,4A
Series 2 models	RS-47WL4SBA/CLA2, RL475N4BC2, RS-47WL4S2	Silver grey steel / On the door	Top 1W	NE1080Y, MH1050Y, MG1050Y / 0,4A
Series 3 models	RS-47WL4SIA/CSA1, RL475N4AS1	stainless steel / On the door	Top 1W	PZ59E1C, QD35YV, HYB35MHJ a / 0,5A
Series 4 models	RL475NASS1	Imitating stainless steel / On the door	Top 1W	PZ59E1C, QD35YV, HYB35MHJ a / 0,5A
	RL475NBIS1	Imitating stainless steel / On the door	Top 1W	PZ59E1C, QD35YV, HYB35MHJ a / 0,5A
	RL475NBHW1	White paint / On the door	Top+back 2W + 1W	PZ59E1C, QD35YV, HYB35MHJ a / 0,5A
	RS-47WL4SBA/CLA1, RL475N4BC1, RS-47WL4S1	Silver grey steel / On the door	Top 1W	PZ59E1C, QD35YV, HYB35MHJ a / 0,5A
	RS-47WL4SIA/CLA1	Silver grey steel / On the door	Top 1W	PZ59E1C, QD35YV, HYB35MHJ a / 0,5A

TEST REPORT

Series 5 models	RS-47WL4SBB/CLA1, RL462N4WC1, RS- 47WL4SB1	Silver grey steel (with water dispensing device) / On the door	Top 1W	PZ59E1C, QD35YV, HYB35MHJ a / 0,5A
<p>Note:</p> <p>1. All models are similar in construction except door handle and the difference listed above. Models in the same cell in above table are the same.</p> <p>2. Models which contain the suffix "1" in model name use the compressor PZ59E1C and QD35YV. Models with suffix "2" use the compressor NE1080Y and MH1050Y.</p>				

TEST REPORT

Models with built-in condenser models:

Series	Model	Door panel / Display board position	LED light location	Compressor and rated current
Series 6 models	RS-42WL4SB1	Silver grey steel / In storage compartment	Top 1W	QD35YV, HYB35MHJ a / 0,5A
	RL423N4AW1	White paint / In storage compartment	Top 1W	QD35YV, HYB35MHJ a / 0,5A
	RL423N4AC1	Imitating stainless steel / In storage compartment	Top 1W	QD35YV, HYB35MHJ a / 0,5A
Series 7 models	RL423N4ACU	Imitating stainless steel / In storage compartment	Top 1W	QD35YV, HYB35MHJ a / 0,5A
	RL423N4AWU	White paint / In storage compartment	Top 1W	QD35YV, HYB35MHJ a / 0,5A
	RS-42WL4SB	Silver grey steel / In storage compartment	Top 1W	QD35YV, HYB35MHJ a / 0,5A
Series 8 models	RL423N4A*2 (Note: The * is a letter optional from A to Z and stand for type of front door).	streamer silver, streamer gold, white / In storage compartment	Top 1W	MG1050Y / 0,6A
	RS-42WL4SB2			
Note: All models are the same except door handle, climatic class and the difference listed above.				

The production units are required to conform to the initial sample as received when the units are placed on the market.

TEST REPORT

3. LABORATORY MEASUREMENTS

Configuration Information

Support Equipment:	N/A
Rated Voltage and frequency under test:	220-240 V~; 50 Hz
Condition of Environment:	Temperature: 22~28°C
	Relative Humidity:35~60%
	Atmosphere Pressure:86~106kPa

Notes:

1. The EMI measurements had been made in the operating mode produced the largest emission in the frequency band being investigated consistent with normal applications. An attempt had been made to maximize the emission by varying the configuration of the EUT.
2. The EMS measurements had been made in the frequency bands being investigated, with the EUT in the most susceptible operating mode consistent with normal applications. The configuration of the test sample had been varied to achieve maximum susceptibility.
3. Test Location:
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
All tests were performed at:
Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, China
Except Radiated Disturbance and Radiated Susceptibility were performed at:
Room102/104, No 203, KeZhu Road, Science City, GETDD Guangzhou, China

4. Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conduction Emission (9 kHz-150 kHz)	2.51 dB
2	Conduction Emission (150 kHz-30 MHz)	2.69 dB
3	Disturbance Power (30 MHz-300 MHz)	3.21 dB
4	Radiated Emission (30 MHz-1 GHz)	4.79 dB
5	Radiated Emission (1 GHz-6 GHz)	5.02 dB
6	Radiated Emission (6 GHz-18 GHz)	5.17 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.

Measurement uncertainty is calculated in accordance with CISPR16-4-2:2011

The measurement uncertainty is given with a confidence of 95%, k=2.

TEST REPORT

4. EQUIPMENT USED DURING TEST

Conducted Disturbance-Mains Terminal(1)

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (DD-MM-YYYY)	Calibration Interval
EM080-05	EMI receiver	ESCI	R&S	24/07/2018	1Y
EM006-05	LISN	ENV216	R&S	06/06/2019	1Y
SA047-112	Digital Temperature-Humidity Recorder	RS210	YIJIE	03/11/2018	1Y
EM004-04	EMC shield Room	8m×3m×3m	Zhongyu	07/01/2019	1Y

Click(2)

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (DD-MM-YYYY)	Calibration Interval
EM008-02	Click Tester	DDA55	AFJ	12/11/2018	1Y
EM008-02-01	Switch Box	SW04/32 CL55C	AFJ	12/11/2018	1Y
EM006-04	LISN	ESH2-Z5	R&S	14/09/2018	1Y
SA047-111	Digital Temperature-Humidity Recorder	RS210	YIJIE	03/11/2018	1Y
EM004-03	EMC shield Room	8m×4m×3m	Zhongyu	07/01/2019	1Y

Disturbance Power

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (DD-MM-YYYY)	Calibration Interval
EM080-05	EMI receiver	ESCI	R&S	24/07/2018	1Y
EM081-04	Absorb Power Clamp	MDS-21	R&S	11/03/2019	1Y
SA047-112	Digital Temperature-Humidity Recorder	RS210	YIJIE	03/11/2018	1Y
EM004-04	EMC shield Room	8m×3m×3m	Zhongyu	07/01/2019	1Y

Harmonic Currents and Flicker(2)

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (DD-MM-YYYY)	Calibration Interval
EM001-03	3-Phase Harmonic & Flicker Measuring System	Proflin2145- 400	TESEQ	08/10/2018	1Y
EM001-03-01	AC Power Source	NSG1007	TESEQ	14/09/2018	1Y
SA047-140	Digital Temperature-Humidity Recorder	AW5145Y	ASAIR	30/01/2019	1Y

TEST REPORT

Electrostatic Discharge(1)

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (DD-MM-YYYY)	Calibration Interval
EM077-04	ESD Simulator	NSG437	TESEQ	16/04/2019	1Y
SA047-143	Digital Temperature-Humidity Recorder	AW5145Y	ASAIR	23/09/2018	1Y

Electrical Fast Transient/Burst(1)

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (DD-MM-YYYY)	Calibration Interval
EM005-12	EFT Generator	NX5 b-1-300-16	EM TEST	03/04/2019	1Y
EM005-10-01	Capacitive Coupling Clamp	CDN8014	TESEQ	27/04/2019	1Y
SA047-140	Digital Temperature-Humidity Recorder	AW5145Y	ASAIR	30/01/2019	1Y

Surge(3)

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (DD-MM-YYYY)	Calibration Interval
EM005-09	Surge/DIP Generator	NSG3040	TESEQ	07/05/2019	1Y
SA047-140	Digital Temperature-Humidity Recorder	AW5145Y	ASAIR	30/01/2019	1Y

Conducted Susceptibility(2)

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (DD-MM-YYYY)	Calibration Interval
EM019-01	Conducted Immunity Testing System	NSG4070-75	Teseq GmbH	14/09/2018	1Y
EM019-01-01	Current Electromagnetic injection clamp	KEMZ801S	Teseq GmbH	14/09/2018	1Y
EM019-01-02	Coupling&Decoupling Network	CDNM016	Teseq GmbH	14/09/2018	1Y
EM019-01-03	6dB Attenuator	ATN6075	Teseq GmbH	14/09/2018	1Y
EM019-03	Current Clamp	CIP 9136A	Teseq GmbH	30/07/2018	1Y
SA047-140	Digital Temperature-Humidity Recorder	AW5145Y	ASAIR	30/01/2019	1Y

TEST REPORT

Voltage Dips and Interruptions(2)

Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (DD-MM-YYYY)	Calibration Interval
EM005-09	Surge/DIP Generator	NSG3040	TESEQ	07/05/2019	1Y
EM005-09-01	Voltage Regulator	INA6501	TESEQ	07/05/2019	1Y
SA047-140	Digital Temperature-Humidity Recorder	AW5145Y	ASAIR	30/01/2019	1Y

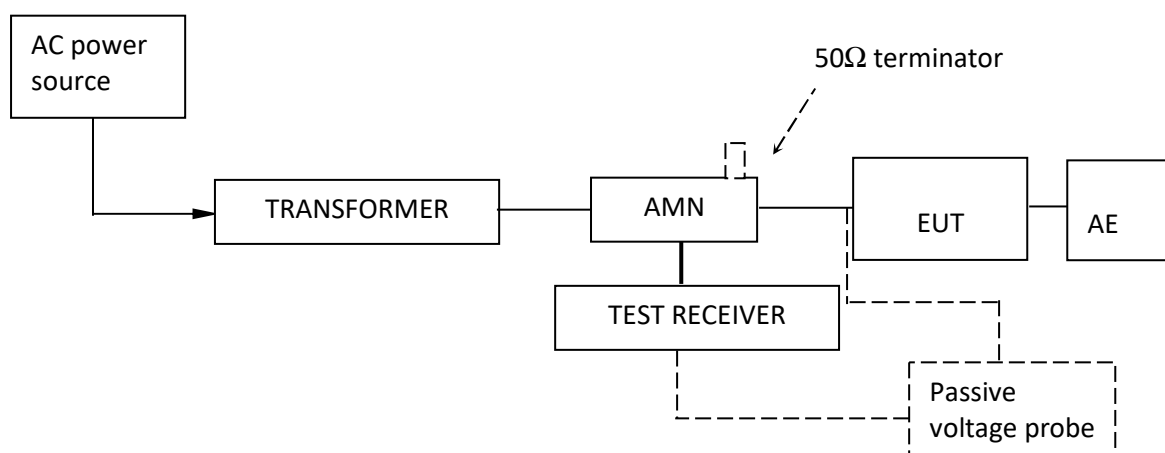
TEST REPORT

5. EMI TEST

5.1 EN 55014-1 Continuous Conducted Disturbance Voltage Test

Test Result: Pass

5.1.1 Block Diagram of Test Setup



5.1.2 Test Setup and Procedure

The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a 50Ω linear impedance. Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.

The table-top EUT was placed on a 0.4m high non-metallic table above earthed ground plane (Ground Reference Plane). And for floor standing EUT, was placed on a 0.1m high non-metallic supported on GRP. The EUT keeps a distance of at least 0.8m from any other of the metallic surface. The Artificial Mains Network is situated at a distance of 0.8m from the EUT.

During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.

The bandwidth of test receiver was set at 9 kHz. The frequency range from 150 kHz to 30MHz was checked.

When measurements of disturbance are being made, the appliance shall be operated under the conditions defined in clause 7.

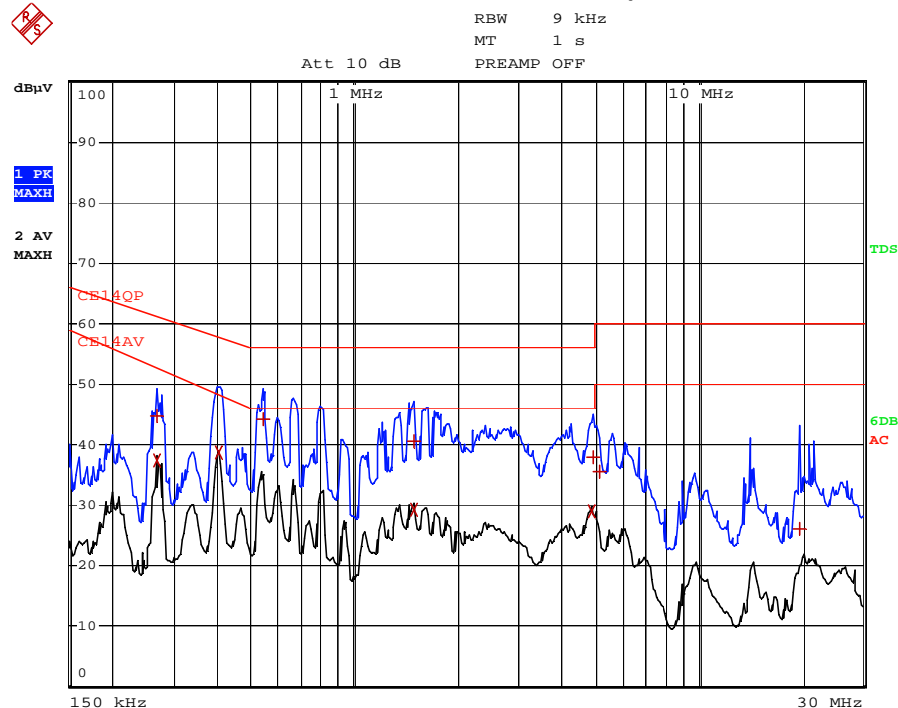
TEST REPORT

5.1.3 Test Data and curve

At mains terminal:

Tested Wire: Live

Operation Mode: EUT ON COOLING



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CE14QP			
Trace2:	CE14AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB	
1 Quasi Peak	266 kHz	44.82 L1	-16.41	
2 Average	266 kHz	37.27 L1	-15.54	
2 Average	402 kHz	38.73 L1	-9.62	
1 Quasi Peak	542 kHz	44.11 L1	-11.89	
1 Quasi Peak	1.498 MHz	40.62 L1	-15.37	
2 Average	1.498 MHz	29.19 L1	-16.80	
2 Average	4.906 MHz	28.88 L1	-17.11	
1 Quasi Peak	4.962 MHz	38.03 L1	-17.97	
1 Quasi Peak	5.138 MHz	35.68 L1	-24.31	
1 Quasi Peak	19.67 MHz	26.21 L1	-33.78	

Remark:

1. Corr. (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Level (dBμV) = Corr. (dB) + Read Level (dBμV)
3. Delta Limit (dB) = Level (dBμV)-Limit (dBμV)

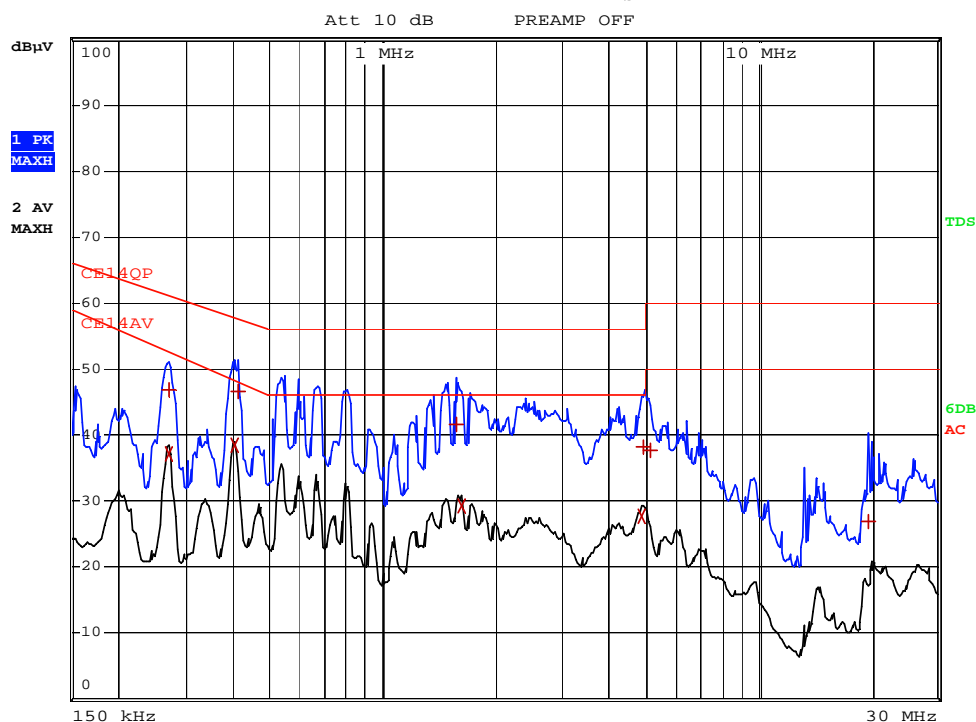
TEST REPORT

Tested Wire: Neutral

Operation Mode: EUT ON COOLING



RBW 9 kHz
MT 1 s
PREAMP OFF



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CE14QP			
Trace2:	CE14AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1 Quasi Peak	270 kHz	46.82	L1	-14.29
2 Average	270 kHz	37.16	L1	-15.49
2 Average	402 kHz	38.37	L1	-9.98
1 Quasi Peak	410 kHz	46.47	L1	-11.17
1 Quasi Peak	1.578 MHz	41.55	L1	-14.44
2 Average	1.63 MHz	29.28	L1	-16.71
2 Average	4.91 MHz	27.65	L1	-18.34
1 Quasi Peak	4.926 MHz	38.11	L1	-17.88
1 Quasi Peak	5.142 MHz	37.65	L1	-22.34
1 Quasi Peak	19.642 MHz	26.94	L1	-33.05

At load/control terminal:

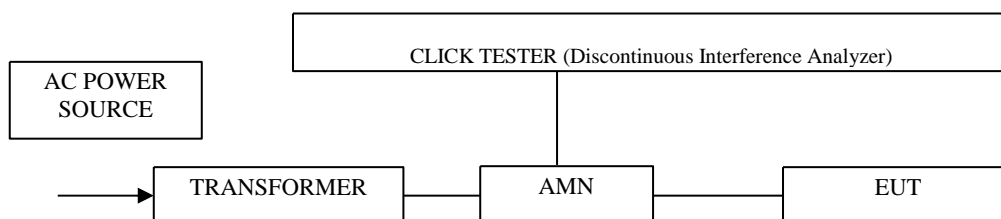
Not Applicable.

TEST REPORT

5.2 EN 55014-1 Discontinuous Conducted Disturbance Voltage

Test Result: Pass

5.2.1 Block Diagram of Test Setup



5.2.2 Test Setup and Procedure

The EUT was placed on a 0.8m high non-metallic table in shielded room, the wall of shielded room used as Ground Reference Plane (GRP), and keeps a distance of at least 0.8m from any of the other metallic surface.

The EUT was connected to an artificial mains network and at a distance of 0.8m from it, the excess lead of EUT was bundled with a length of 0.3m to 0.4m parallel to the main lead. The number of counted clicks above the permitted limit for continuous interference and their duration, spacing and rate were measured during the observation time. When relevant, a permitted(relaxed) limit for clicks was calculated and a second measurement was performed. Determination of compliance with the permitted limit according to the upper quartile method was applied. The frequency 150kHz, 500 kHz, 1.4 MHz and 30 MHz was checked.

When measurements of disturbance are being made, the appliance shall be operated under the conditions defined in clause 7.

TEST REPORT

5.2.3 Test Data and curve

Frequency (MHz)	0.15	0.50	1.40	30.00
Permitted limit for continuous interference (dB μ V)	66	56	56	60
Short Clicks [T<10ms]	1	1	0	0
Mid. Clicks [10ms<T<20ms]	0	0	0	0
Long Clicks [T>20ms]	0	0	0	0
Total clicks (number)	1	1	0	0
Switching operation (number)	2			
Factor	--			
Observation time (min.)	120			
Click rate, N	0.01	0.01	0.01	0.01
Value to be added (dB)	--	--	--	--
Counted clicks allowed to exceed the permitted limit (number)	--	--	--	--
Permitted limit for clicks (dB μ V)	--	--	--	--
Counted clicks exceeding the limit (number)	--	--	--	--
Complies with the limit (Pass/Fail)	Pass	Pass	Pass	Pass

The appliance was deemed to comply with the limits if fulfilling the three conditions below:

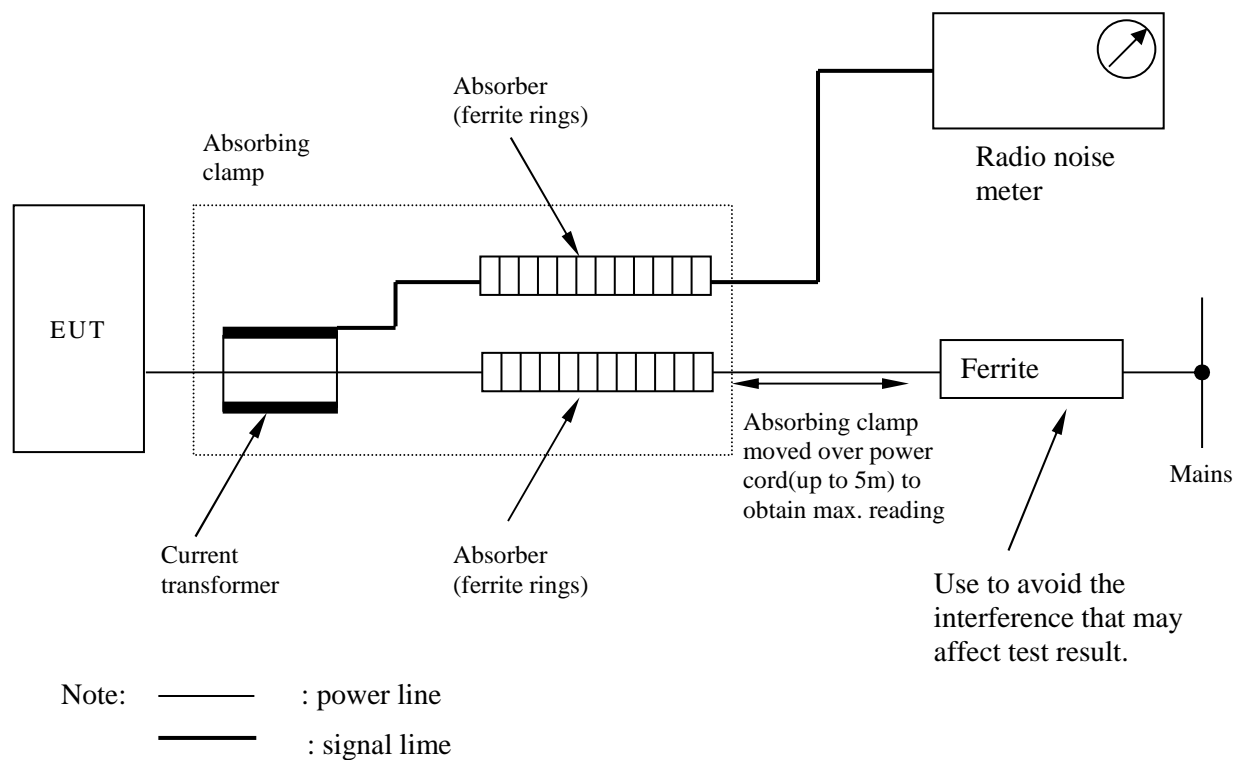
- the click rate is not more than 5.
- none of the caused clicks has a duration longer than 20 ms.
- 90 % of the caused clicks have a duration less than 10 ms.

TEST REPORT

5.3 EN 55014-1 Radiated Disturbance Power

Test Result: Pass

5.3.1 Block Diagram of Test Setup



TEST REPORT

5.3.2 Test Setup and Procedure

The disturbance power was measured with the EUT in a shielded room. The height of the table shall be $0,1\text{ m} \pm 0,025\text{ m}$ for appliances primarily intended to be positioned on the floor in normal use, and $0,8\text{ m} \pm 0,05\text{ m}$ for other appliances. The EUT was placed on a non-metallic table at least 0.8m from other metallic surface and the mains lead of EUT was extended to about 6m long. The auxiliary lead longer than 0.25m but shorter than twice length of absorbing clamp was extend to twice length of clamp and those longer than twice length was extend to 6 meters.

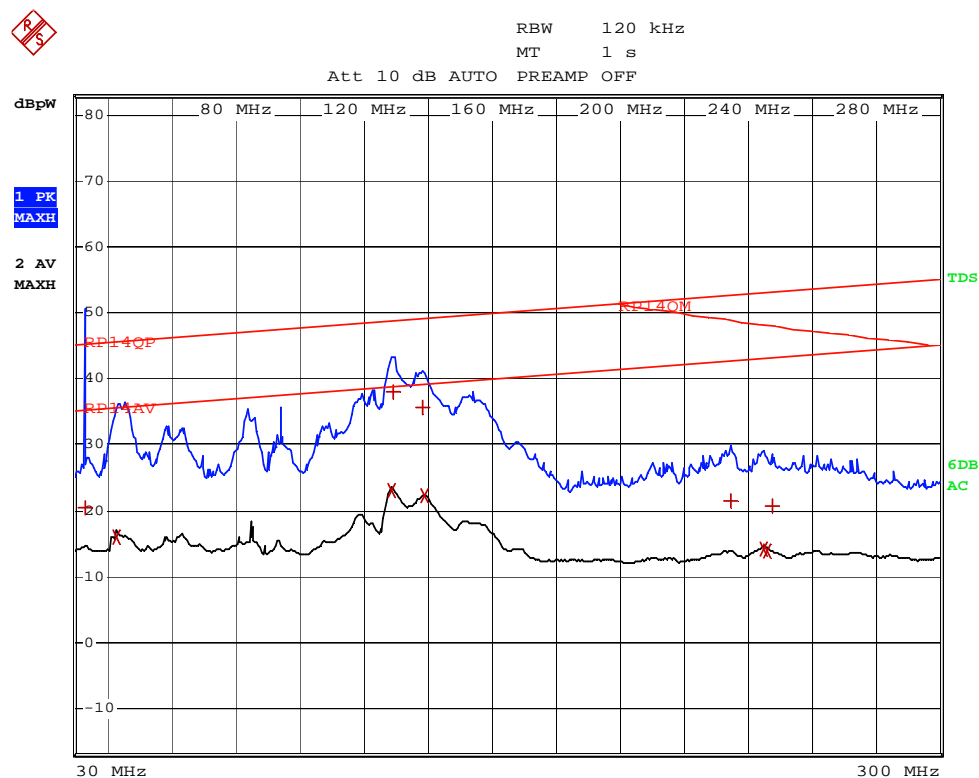
The absorbing clamp was moved along the lead to obtain maximum disturbance. The EUT was set to achieve the maximum emission level, and for each point which appears a relevant high emission level, the absorbing clamp was moved around the lead to get the maximum disturbance value.

The bandwidth of test receiver was set at 120 kHz. The frequency range from 30MHz to 300MHz was checked.

When measurements of disturbance are being made, the appliance shall be operated under the conditions defined in clause 7.

TEST REPORT

5.3.3 Test Data and curve



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	RP14QP			
Trace2:	RP14AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBpW	DELTA	LIMIT dB
1 Quasi Peak	33.16 MHz	20.48 L1	-24.63	
2 Average	42.96 MHz	15.96 L1	-19.51	
2 Average	128.88 MHz	23.03 L1	-15.62	
1 Quasi Peak	129.12 MHz	38.08 L1	-10.58	
1 Quasi Peak	138.32 MHz	35.60 L1	-13.41	
2 Average	139.08 MHz	22.22 L1	-16.81	
1 Quasi Peak	234.44 MHz	21.49 L1	-31.08	
2 Average	244.88 MHz	14.01 L1	-28.94	
2 Average	246.04 MHz	13.79 L1	-29.20	
1 Quasi Peak	247.44 MHz	20.77 L1	-32.27	

The measurement quasi-peak data of disturbance power is lower than applicable limit reduced by the margin (0 to 10dB) at frequency range 200 to 300 MHz and the maximum clock frequency is less than 30MHz

TEST REPORT

5.4 EN 55014-1 Radiated Disturbance

Test Result: Not Applicable

Remark:

☒ Radiated disturbance shall not be conducted, if the measurement quasi-peak data of disturbance power is lower than applicable limit reduced by the margin (0 to 10dB) at frequency range 200 to 300 MHz and the maximum clock frequency is less than 30MHz,.

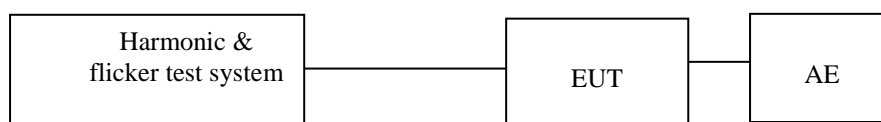
☐ Radiated disturbance (300-1000MHz) shall be conducted, if the measurement quasi-peak data of disturbance power is between the limit and limit reduced by the margin (0 to 10dB) at frequency range 200 to 300 MHz or the maximum clock frequency is not less than 30MHz,.

☐ Radiated disturbance(30-1000MHz) is applied to battery-operated appliance

6. Harmonics of current

Test Result: Pass

6.1 Block Diagram of Test Setup



6.2 Test Setup and Procedure

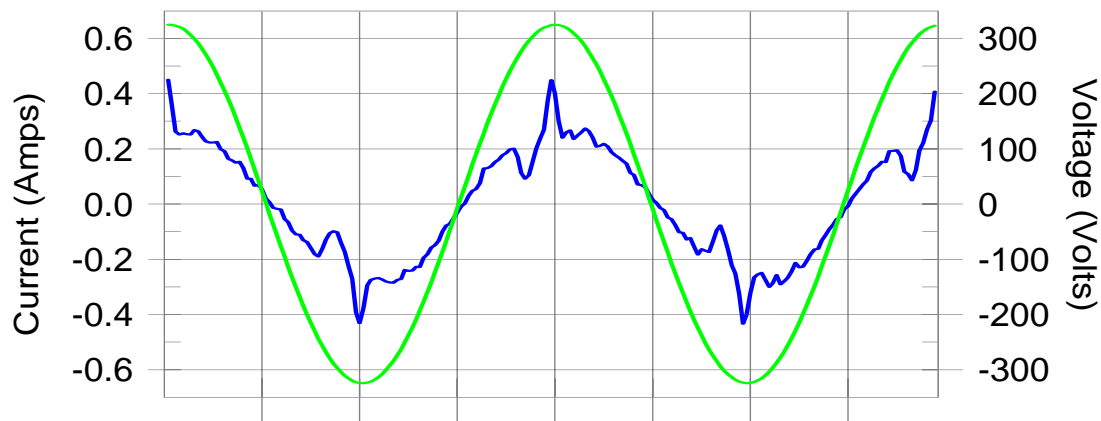
Harmonics of the fundamental current were measured up to 40 order harmonics using a digital power meter with an analogue output and frequency analyser which was integrated in the harmonic & flicker test system. The measurements were carried out under steady conditions.

TEST REPORT

6.3 Test Data

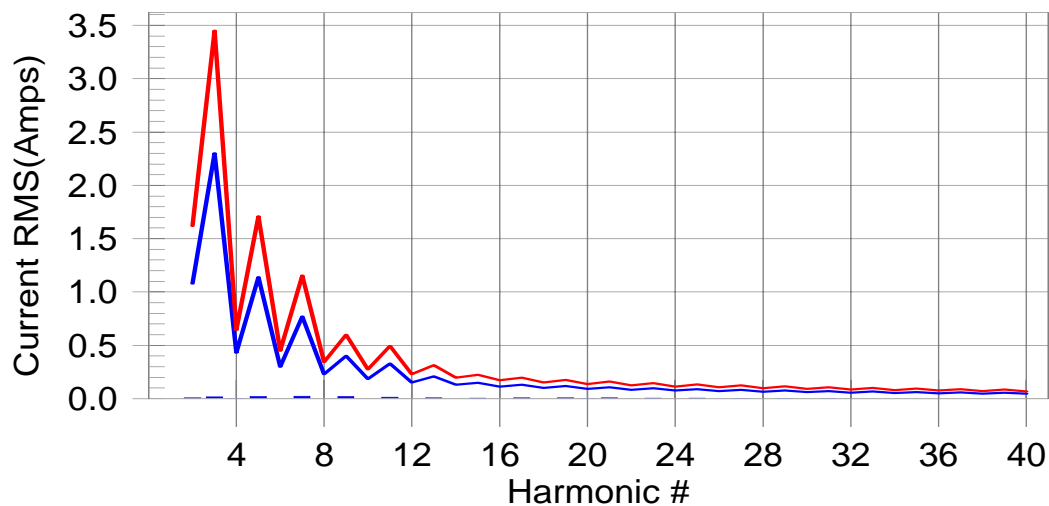
Harmonics – Class-A per Ed. 4.0 (incl. inter-harmonics)

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass

TEST REPORT

Current Test Result Summary (Run time)

Test Result: Pass Source qualification: Normal
THC(A): 0.049 I-THD(%): 25.5 POHC(A): 0.012 POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts):	229.581	Frequency(Hz):	50.00
I_Peak (Amps):	0.495	I_RMS (Amps):	0.201
I_Fund (Amps):	0.194	Crest Factor:	2.583
Power (Watts):	44.2	Power Factor:	0.961

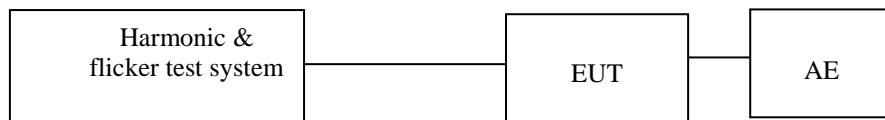
Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.008	1.080	0.8	0.009	1.620	0.5	Pass
3	0.017	2.300	0.7	0.019	3.450	0.5	Pass
4	0.002	0.430	N/A	0.003	0.645	N/A	Pass
5	0.020	1.140	1.8	0.021	1.710	1.2	Pass
6	0.001	0.300	N/A	0.002	0.450	N/A	Pass
7	0.024	0.770	3.2	0.025	1.155	2.2	Pass
8	0.001	0.230	N/A	0.001	0.345	N/A	Pass
9	0.022	0.400	5.4	0.022	0.600	3.7	Pass
10	0.002	0.184	N/A	0.002	0.276	N/A	Pass
11	0.015	0.330	4.6	0.015	0.495	3.1	Pass
12	0.001	0.153	N/A	0.001	0.230	N/A	Pass
13	0.008	0.210	3.7	0.008	0.315	2.6	Pass
14	0.001	0.131	N/A	0.001	0.197	N/A	Pass
15	0.005	0.150	3.4	0.005	0.225	2.4	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.007	0.132	5.4	0.008	0.198	3.9	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.008	0.118	7.1	0.009	0.178	4.9	Pass
20	0.002	0.092	N/A	0.002	0.138	N/A	Pass
21	0.008	0.107	7.4	0.008	0.161	5.1	Pass
22	0.001	0.084	N/A	0.001	0.125	N/A	Pass
23	0.006	0.098	6.2	0.006	0.147	4.2	Pass
24	0.001	0.077	N/A	0.001	0.115	N/A	Pass
25	0.004	0.090	N/A	0.005	0.135	N/A	Pass
26	0.001	0.071	N/A	0.001	0.107	N/A	Pass
27	0.003	0.083	N/A	0.004	0.125	N/A	Pass
28	0.001	0.066	N/A	0.001	0.099	N/A	Pass
29	0.003	0.078	N/A	0.003	0.116	N/A	Pass
30	0.001	0.061	N/A	0.001	0.092	N/A	Pass
31	0.002	0.073	N/A	0.003	0.109	N/A	Pass
32	0.001	0.058	N/A	0.001	0.086	N/A	Pass
33	0.002	0.068	N/A	0.002	0.102	N/A	Pass
34	0.001	0.054	N/A	0.001	0.081	N/A	Pass
35	0.001	0.064	N/A	0.001	0.096	N/A	Pass
36	0.001	0.051	N/A	0.001	0.077	N/A	Pass
37	0.001	0.061	N/A	0.001	0.091	N/A	Pass
38	0.001	0.048	N/A	0.001	0.073	N/A	Pass
39	0.001	0.058	N/A	0.001	0.087	N/A	Pass
40	0.001	0.046	N/A	0.001	0.069	N/A	Pass

TEST REPORT

7. Flicker

Test Result: Pass

7.1 Block Diagram of Test Setup



7.2 Test Setup and Procedure

7.2.1 Definition

Flicker:	impression of unsteadiness of visual sensation induced by a lighting stimulus whose luminance or spectral distribution fluctuates with time.
Pst:	Short-term flicker indicator The flicker severity evaluated over a short period (in minutes); Pst=1 is the conventional threshold of irritability
Plt:	long-term flicker indicator; the flicker severity evaluated over a long period (a few hours). Using successive Pst valuse.
dc:	the relative steady-state voltage change
dmax:	the maximum relative voltage change
d(t):	the value during a voltage change

7.2.2 Test condition

The EUT was set to produce the most unfavourable sequence of voltage changes.

TEST REPORT

7.3 Test Data

Flicker Test Summary (Run time)

Test Result: Pass Status: Test Completed

Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.60		
T-max (mS):	0.0	Test limit (mS): 500.0	Pass
Highest dc (%):	0.00	Test limit (%): 3.30	Pass
Highest dmax (%):	-0.68	Test limit (%): 4.00	Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000 Pass

TEST REPORT

8. EMS TEST

Performance Criteria:

- Criterion A: The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permission loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation and from what the user may reasonably expect from the apparatus if used as intended.
- Criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permission loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however, no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description, and documentation, and from what the user may reasonably expect from the apparatus if used as intended.
- Criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instruction for use.

Note: "N/A" means Not Applicable in below text.

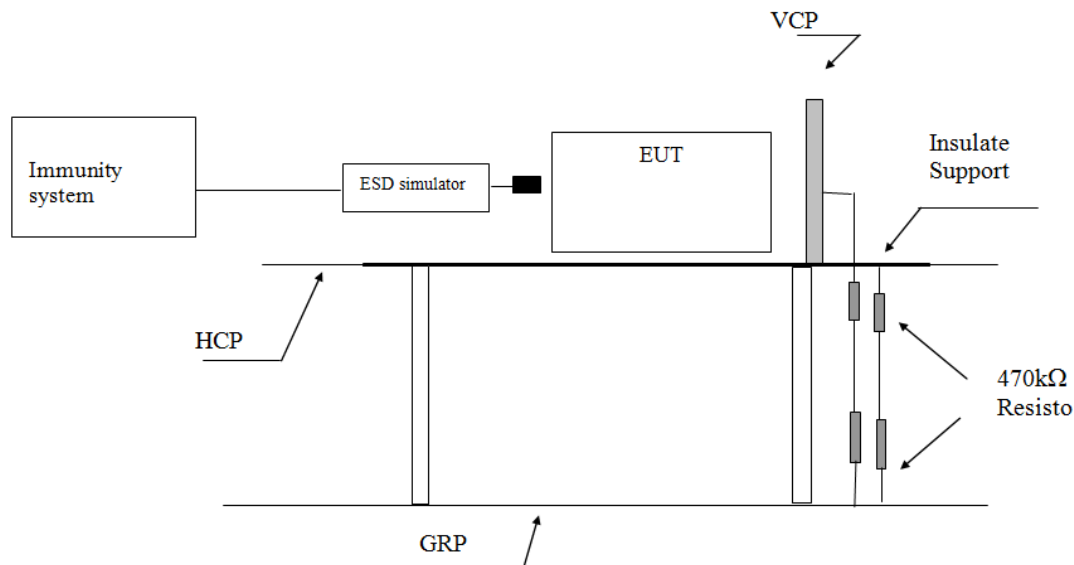
8.1 EN 61000-4-2(Pursuant to EN 55014-2) Electrostatic Discharge Immunity

Performance criterion: B

Test Result: Pass

TEST REPORT

8.1.1 Block Diagram of Test Setup



Note: HCP means Horizontal Coupling Plane,

VCP means Vertical Coupling Plane

GRP means Ground Reference Plane

8.1.2 Test Setup and Procedure

The EUT was put on a 0.8m high wooden table 0.1m high for floor standing equipment standing on the ground reference plane (GRP) 3m by 2m in size, made by iron 1.0 mm thick.

A horizontal coupling plane(HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size & HCP were constructed from the same material type & thickness as that of the GRP, and connected to the GRP via a 470kΩ resistor at each end.

The distance between EUT and any of the other metallic surface excepted the GRP, HCP & VCP was greater than 1m.

The EUT was arranged and connected according to its functional requirements.

Direct static electricity discharges were applied only to those points and surface which were accessible to personnel during normal usage.

TEST REPORT

On each preselected points 10 times of each polarity single discharge were applied. The time interval between successive single discharges was at least 1s.

The ESD generator was held perpendicular to the surface to which the discharge was applied. The discharge return cable of the generator was kept at a distance of 0.2m whilst the discharge was being applied. During the contact discharges, the tip of the discharge electrode was touched the EUT before the discharge switch was operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.

Indirect discharge was conducted to objects placed near the EUT, simulated by applying the discharges of the ESD generator to a coupling plane, in the contact discharge mode.

After each discharge, the ESD generator was removed from the EUT, the generator was then retriggered for a new single discharge. For ungrounded product, a grounded carbon fibre brush with bleeder resistors (2×470 kΩ) in the grounding cable was used after each discharge to remove remnant electrostatic voltage.

For air discharge, a minimum of 10 single air discharges were applied to the selected test point for each such area.

8.1.3 Test Result

Direct Application of ESD

Direct Contact Discharge

Applied Voltage (kV)	No. of Discharge for each point	Result (Pursuant to EN 55014-2)	Discharged Points
4	20	Pass	Accessible metal parts of the EUT Conductive substrate with coating which is not declared to be insulating

Direct Air Discharge

Applied Voltage (kV)	No. of Discharge for each point	Result (Pursuant to EN 55014-2)	Discharged Points
2, 4, 8	20	Pass	All accessible points where contact discharge cannot be applied such as Displays, Indicators light, Keyboard, Button, Switch, Knob, Air gap, Slots, Hole and so on

TEST REPORT

Indirect Application of ESD

Horizontal Coupling Plane under the EUT

Applied Voltage (kV)	No. of Discharge for each point	Result (pursuant to EN 55014-2)	Discharged Point
4	20	Pass	At the front edge of each HCP opposite the centre point of each unit of the EUT

Vertical Coupling Plane beside the EUT

Applied Voltage (kV)	No. of Discharge for each point	Result (pursuant to EN 55014-2 criterion B)	Discharged Point
4	20	Pass	The centre of the vertical edge of the coupling plane

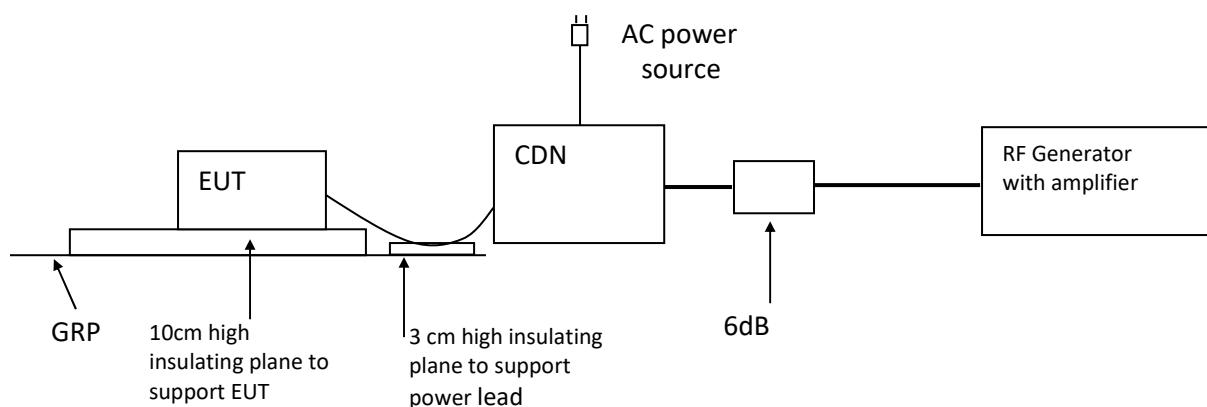
TEST REPORT

8.2 EN 61000-4-6(Pursuant to EN 55014-2) Injected Current (0.15 MHz to 230 MHz)

Performance criterion: A

Test Result: Pass

8.2.1 Block Diagram of Test Setup



8.2.2 Test Setup and Procedure

The EUT was placed on an insulating support of 0.1m height above a ground reference Plane, arranged and connected to satisfy its functional requirement.

All relevant cables were provided with the appropriate coupling and decoupling devices at a distance between 0.1m and 0.3m from the projected geometry of the EUT on an insulating support of 0.03m height above the ground reference plane.

Test voltage was verified before each testing though power meter combined in the RF generator with AMP.

Dwell time was set to 3s and step was set as 1% to keep sufficient response time for EUT. The frequency from 0.15MHz to 230MHz was checked.

8.2.3 Test Result

Port:	Frequency (MHz)	Level (Pursuant to EN55014-2)	Result
A.C. Power Lines	0.15 to 230	3V (r.m.s.)	Pass
D.C. Power Lines	0.15 to 230	1V (r.m.s.)	N/A
Signal Lines	0.15 to 230	1V (r.m.s.)	N/A
Control Lines	0.15 to 230	1V (r.m.s.)	N/A

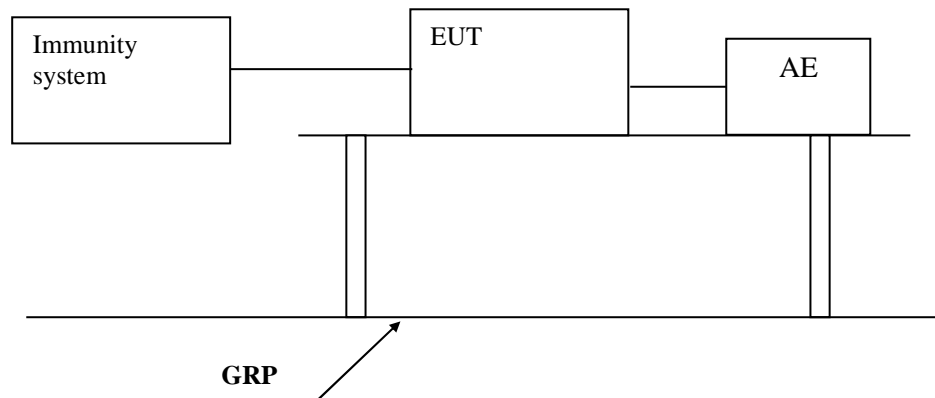
TEST REPORT

8.3 EN 61000-4-4(Pursuant to EN 55014-2) Electrical Fast Transient/Burst

Performance criterion: B

Test Result: Pass

8.3.1 Block Diagram of Test Setup



8.3.2 Test Setup and Procedure

The EUT was placed on a 0.1m high wooden table, standing on the ground reference plane 3m by 2m in size, made by steel 1mm thick.

The distance between the EUT and any other of the metallic surface except the GRP was greater than 0.5m.

The mains lead excess than 0.5m was folded to avoid a flat coil and situated at a distance of 0.1m above the ground reference plane to insure the distance between the coupling device and the EUT was 0.5m.

The EUT was arranged and connected to satisfy its functional requirement and supplied by the coupling-decoupling network.

8.3.3 Test Result

Level (Pursuant to EN55014-2)	Polarity	A.C. Power supply line and protective earth terminal	D.C. Power Lines, Signal Line & Control Line
0.5kV	+	N/A	N/A
0.5kV	-	N/A	N/A
1kV	+	Pass	N/A
1kV	-	Pass	N/A

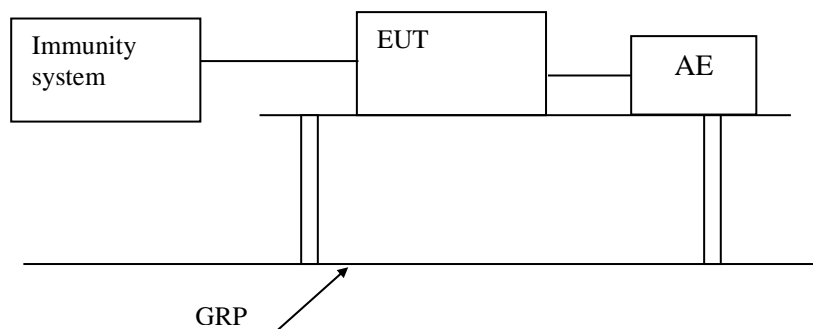
TEST REPORT

8.4 EN 61000-4-5(Pursuant to EN 55014-2) Surge Immunity

Performance criterion: B

Test Result: Pass

8.4.1 Block Diagram of Test Setup



8.4.2 Test Setup and Procedure

The surge was applied to the EUT power supply terminals via the capacitive coupling network.

Decoupling networks were required in order to avoid possible adverse effects on equipment not under test that might be powered by the same lines and to provide sufficient decoupling impedance to the surge wave so that the specified wave might be developed on the lines under test.

The EUT was arranged and connected according to its functional requirements.

The EUT was placed on a 0.1m high wooden support above the GRP), supplied by the coupling-decoupling network, and arranged and connected to satisfy its functional requirement. The power cord between the EUT and the coupling/decoupling network was less than 2 meters.

8.4.3 Test Result

Level (Pursuant to EN 55014-2)		Result
Between Phase And Phase:	1kV	N/A
Between Phase And Neutral:	1kV	Pass
Between Phase And Earth:	2kV	Pass
Between Neutral And Earth:	2kV	Pass

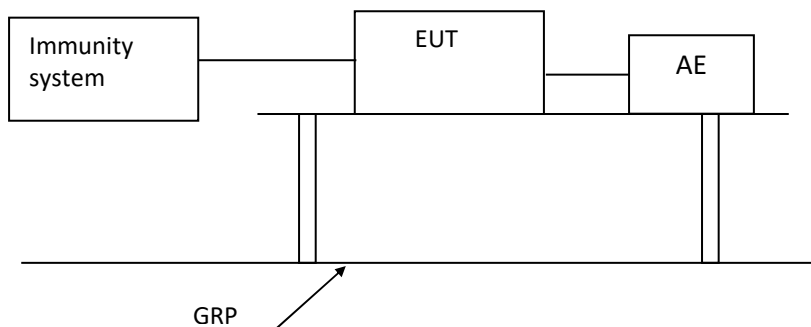
TEST REPORT

8.5 EN 61000-4-11(Pursuant to EN 55014-2) Voltage Dips and Interruptions

Performance criterion: C

Test Result: Pass

8.5.1 Block Diagram of Test Setup



8.5.2 Test Setup and Procedure

The EUT was placed on an insulating support of 0.8m height, standing on a ground reference plane, and arranged and connected to satisfy its functional requirement

The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer.

The EUT was tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals of 10 s minimum. Each representative mode of operation was tested.

Abrupt changes in supply voltage was occur at zero crossings of the voltage.

8.5.3 Test Result

Test condition (Pursuant to EN 55014-2)				
Test Level in %U _T	50 Hz		60 Hz	
	Duration	Result	Duration	Result
0	0.5	Pass	0.5	N/A
40	10	Pass	12	N/A
70	25	Pass	30	N/A

Remark: UT is the rated voltage for the equipment.

TEST REPORT

8.6 EN 61000-4-3(Pursuant to EN 55014-2) Radiated Electromagnetic Field Immunity

Performance criterion: A

Test Result: **Not Applicable**

Remark:

Containing electronic control circuitry with no internal clock frequency or oscillator frequency higher than 15 MHz.

TEST REPORT

9 APPENDIX I - PHOTOS OF TEST SETUP

Conducted Emission



Radiated Power



TEST REPORT

Clicks



Harmonics and Flicker



TEST REPORT

ESD Immunity



Inject current immunity



TEST REPORT

Surge and DIP Immunity

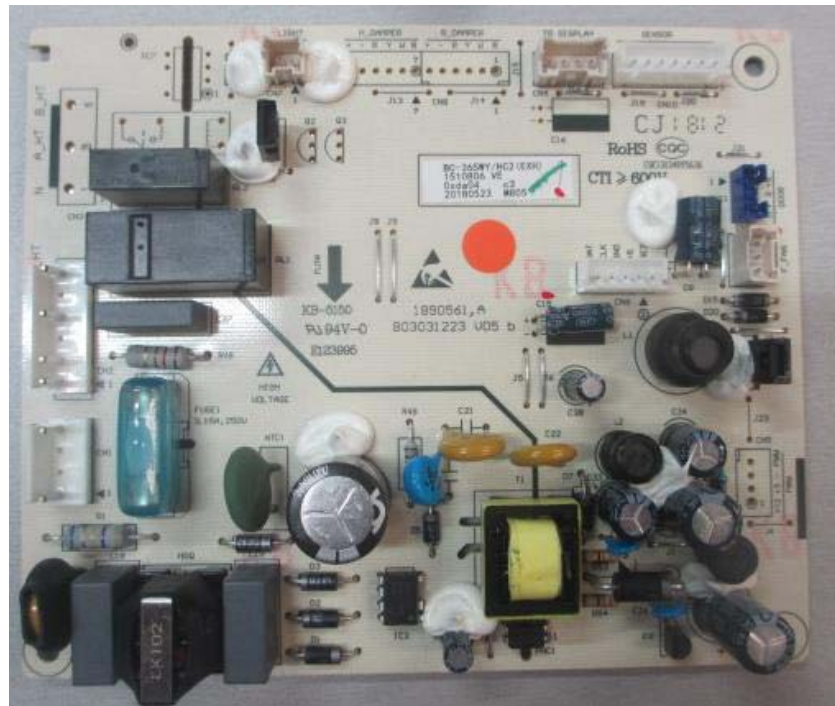


EFT Immunity

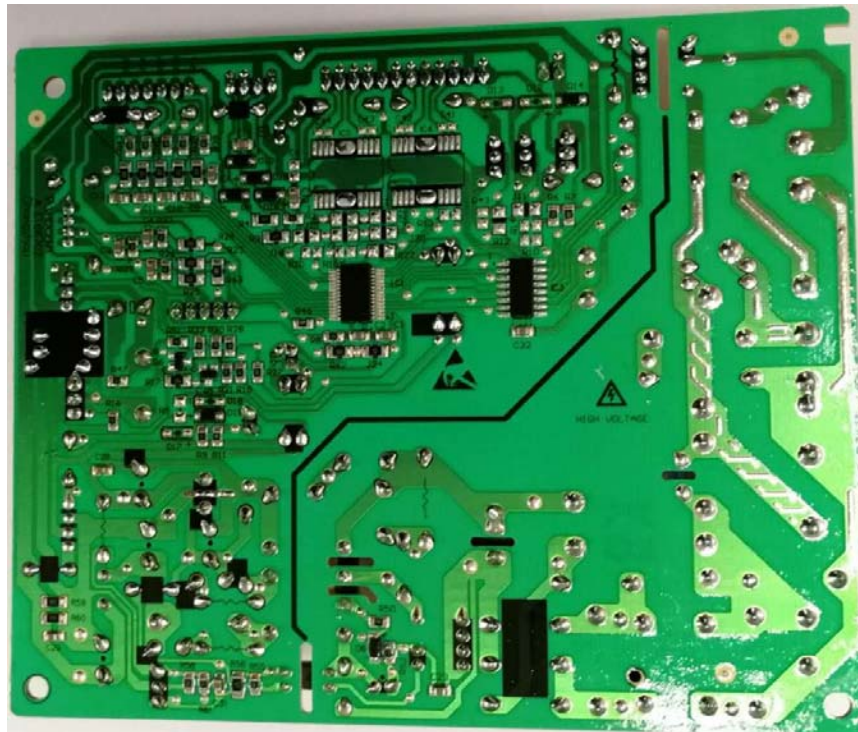


TEST REPORT

10 APPENDIX II – PHOTOS OF EUT



Alternative main PCB



Alternative main PCB

*****End of Report*****