EMC TEST REPORT

Report No.	:	61.12.23.1323.01
Applicant	:	Ningbo Hseng Electrical Co.,Ltd
Address	:	NO. 128 Longxia Road Yinzhou District, Ningbo City, Zhejiang Province, P.R. China
Manufacturer	:	Ningbo Hseng Electrical Co.,Ltd
Address	:	NO. 128 Longxia Road Yinzhou District, Ningbo City, Zhejiang Province, P.R. China
Factory	:	Ningbo Hseng Electrical Co.,Ltd
Address	:	NO. 128 Longxia Road Yinzhou District, Ningbo City, Zhejiang Province, P.R. China
Product Type	:	Exhaust Fan
Model No.	:	See model list
Standards	:	EN IEC 55014-1:2021 EN IEC 55014-2:2021 EN IEC 61000-3-2:2019+A1:2021 EN 61000-3-3:2013/A2:2021
Date of Test	:	2023-07-14 to 2023-07-25
Date of Issue	:	2023-08-07
Test Engineer	:	Arvin Hu
Reviewed By	:	Helen Li

GUANGZHOU QUALITY TECHNOLOGY SERVICE CO. LTD. AUTHORIZED

Test Result	:	**PASS ***

* The sample detailed above has been tested to the requirements of Council Directives 2014/30/EU. The test results have been reviewed against the Directives above and found to meet their essential requirement.

Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Conducted disturbance at mains terminals	EN 55014-1	EN 55014-1	Clause 4.3.2, Table 5	PASS
Disturbance Power	EN 55014-1	EN 55014-1	Clause 4.3.4.2, Table 7	PASS
Harmonic current emissions	EN IEC 61000-3-2	EN IEC 61000-3-2	Clause 7 of EN 61000-3-2	N/A
Voltage fluctuations & flicker	EN 61000-3-3	EN 61000-3-3	Clause 5 of EN 61000-3-3	N/A
Electrostatic discharge (ESD)	EN 55014-2	EN 61000-4-2	Contact ±4 kV Air ±8 kV	PASS
Radio-frequency, Continuous radiated disturbance	EN 55014-2	EN 61000-4-3	3V/m, 80%, 1kHz, A.M.	PASS
Electrical fast transient (EFT)	EN 55014-2	EN 61000-4-4	AC ±1.0kV	PASS
Surge (Input a.c. power ports)	EN 55014-2	EN 61000-4-5	±1kV D.M.†	PASS
Radio-frequency, Continuous conducted disturbance	EN 55014-2	EN 61000-4-6	3Vrms(emf), 80%, 1kHz Amp. Mod.	PASS
Voltage Dips and Interruptions on AC	EN 55014-2	EN 61000-4-11	0 % U_T* for 0.5per 40 % U_T* for 10per 70 % U_T* for 25per	PASS

Remark:

The EUT was within the minimum performance (e.g., the EUT made disturbance sound) level set by the applicant.

A.M. Amplitude Modulation.

P.M. Pulse Modulation.

† D.M. – Differential Model

† C.M. – Common Mode

* U_T is the nominal supply voltage

N/A means not applicable.

Contents

1 General Information

1.1 Client Information

Please refer to page 1

1.2 General Description of E.U.T.

Name: Exhaust Fan

Model No.: See model list

1.3 Details of E.U.T.

Rating 220V-240V~, 50Hz, IP20, Class I, other see model list

1.4 Description of Support Units

The EUT has been tested as an independent unit.

1.5 Test Location

All tests were performed at:

LCTECH Guangdong Testing Services Co., Ltd.

Add.: 1/F., Building I & 2, 3, 4/F., Building II, Technology and Enterprise Development Center, Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China

1.6 General product information:

It's the same except for power and shape and the main test model is GDF-315.

Model list

Model	Rating	Power(W)
GDF-100	220-240V~, 50Hz	75
GDF-125		80
GDF-150		120
GDF-160		130
GDF-200		170
GDF-250		180
GDF-315		**250**
S-100P		12
S-125P		16
S-150P		18
BPT10-10A		20
BPT10-12A		24
BPT10-15A		30
BPT10-18A		43

BPT10-20A	220-240V~, 50Hz	52
WW-100Q		12
WW-125Q		16
WW-150Q		18
WW-100R		12
WW-125R		16
WW-150R		18
WW-100Y		12
WW-125Y		16
WW-150Y		18
WW-100A		12
WW-125A		16
WW-150A		18
WW-100B		12
WW-125B		16
WW-150B		18
C10H		13
C15H		22
C20H		25
WW-100B		12
WW-125B		16
WW-150B		18
WW-100E		12
WW-125E		16
WW-150E		18
WW-100L		12
WW-125L		16
WW-150L		18
WW-100M		12
WW-125M		16
WW-150M		18
WW-100J		12
WW-125J		16
WW-150J		18
WW-100P		12
WW-125P		16
WW-150P		18
ZM9A-10S-C LED 3W		13
ZM9A-10X-E LED 4W		14
ZM9A-10G-F LED 5W		15
ZM9A-10G-H LED		22

APB15-3-30	220-240V~, 50Hz	25
APB20-4-30		30
APB25-5-30		35
APB30-6-30		45
LFWW-09E		14
LFWW-11E		17
LFWW-13E		22
LFI-09S		12
LFI-11S		16
LFI-13S		18

2 Equipment Used during Test

Table 1: List of Test and Measurement Equipment

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
Radiated Emission(30MHz to 1000MHz)						☒
1	EMI Test Receiver	R&S	ESCI 7	100965	2023-07-12	2024-07-11
2	Log-periodic Dipole Antenna	Schwarzbeck	VULB 9162	058	2023-07-21	2024-07-20
3	3m Semi-anechoic	Zhongshuo Electronics	9mx6mx6m	N/A	2022-12-14	2023-12-13
4	RF Cable	R&S	R01	10403	2022-12-14	2023-12-13
5	CDNE	KeHuan	KH3663E	36630822	2023-07-12	2024-07-11
Mains Terminal Continuous Disturbance Voltage						☒
6	EMI Test Receiver	Rohde&Schwarz	ESCI	100939	2022-12-14	2023-12-13
7	Artificial Mains Network	Rohde&Schwarz	ENV216	3560655012	2022-12-14	2023-12-13
8	Shield Room	ZhongYu Elertron	8X5X3.5	N/A	2023-07-19	2025-07-18
9	Conducted Emission Software	FALA	EZ-EMC	N/A	N/A	N/A
Harmonics & Flicker						☒
10	Harmonic and Flicker Analyzer	CI	PACS-1	S59176	2023-07-12	2024-07-11
11	AC Power Source	CI	5001ix-CTS-400	59176	2023-07-12	2024-07-11
Radiated electromagnetic disturbances(9kHz to 30MHz)						☐
12	EMI Test Receiver	Rohde&Schwarz	ESCI	100939	2022-12-14	2023-12-13
13	Triple-loop Antenna	SCHWARZBECK	HXYZ9170	HXYZ9170-171	2023-07-12	2024-07-11
Radiated disturbances(CDN)						☐
14	EMI Test Receiver	Rohde&Schwarz	ESCI	100939	2022-12-14	2023-12-13
15	6dB Attenuator	Weinschel	WA59-6-33	2537	2023-07-12	2024-07-11
16	Coupling Decoupling Network	SCHWARZBECK	L-801M2/M3	2531	2023-07-12	2024-07-11
Click						☐
17	Click Analyzer	AFJ	CL55C	55040929140	2023-07-12	2024-07-11
18	Artificial Mains Network	AFJ	LS16C	160108020208	2023-07-12	2024-07-11

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
Disturbance Power						☒
19	EMI Test Receiver	Rohde&Schwarz	ESCI	100939	2022-12-14	2023-12-13
20	Absorbing Clamp	SCHWARZBECK	MDS-21	3892	2023-07-12	2024-07-11
Electrostatic Discharge(ESD)						☒
21	ESD Simulator	TESEQ AG	NSG 437	268	2023-07-12	2024-07-11
Electrical Fast Transient(EFT)						☒
22	Ultra Compact Simulator	EM TEST	UCS 500N5	V0925104927	2023-07-12	2024-07-11
23	Single-Phase Toroidal Transformer with autowinding	EM TEST	V4780S2	2538	2023-07-12	2024-07-11
Surge						☒
24	Ultra Compact Simulator	EM TEST	UCS 500N5	V0925104927	2023-07-12	2024-07-11
25	Single-Phase Toroidal Transformer with autowinding	EM TEST	V4780S2	2538	2023-07-12	2024-07-11
Conducted Susceptibility						☒
26	Conducted Immunity Test System	Frankonia	CIT-10/75	12B1113	2023-07-12	2024-07-11
27	6dB Attenuator	Weinschel	WA59-6-33	2537	2023-07-12	2024-07-11
28	Coupling Decoupling Network	SCHWARZBECK	L-801M2/M3	2531	2023-07-12	2024-07-11
29	Coupling Decoupling Network	SCHWARZBECK	L-801AF2	2536	2023-07-12	2024-07-11
Voltage Dips and Interruptions						☒
30	Ultra Compact Simulator	EM TEST	UCS 500N5	V0925104927	2023-07-12	2024-07-11
31	Single-Phase Toroidal Transformer with autowinding	EM TEST	V4780S2	2538	2023-07-12	2024-07-11
Radio-frequency electromagnetic fields(RS)						☒
32	Signal generator	R&S	SMB 100A	102710	2022-12-14	2023-12-13

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
33	Power amplifier	BONN Elektronik	BLWA 0810-160/100D	149644	2022-12-14	2023-12-13
34	Isotropic Field Probe	Narda	EP-601	511WX30620	2022-12-14	2023-12-13
35	Log-periodic Antenna	SCHWARZBECK	STLP 9128D	078	2022-12-14	2023-12-13
36	Power Meter	FEANKONIA	PMS 1084	108B1289	2022-12-14	2023-12-13

☐***: Not Used***

☒***: Used***

3 Emission Test Results

3.1 Mains Terminals Disturbance Voltage, 150 kHz to 30MHz

Test Requirement :	EN 55014-1
Test Method :	EN 55014-1
Test Date :	2023-07-14
Frequency Range:	150kHz to 30MHz
Class/Severity:	Clause 4.3.2, Table 5
Detector:	Peak for pre-scan
	Quasi-Peak if maximised peak within 6dB of Quasi-Peak limit

3.1.1 E.U.T. Operation

Operating Environment:

Temperature :	25.1 °C
Humidity :	50.3 % RH
Atmospheric Pressure :	1006 mbar

EUT Operation :

Compliance test was performed in ON mode.

Compliance test was performed test in on normal and reverse mode, we choose worse status.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

3.1.2 Measurement Data

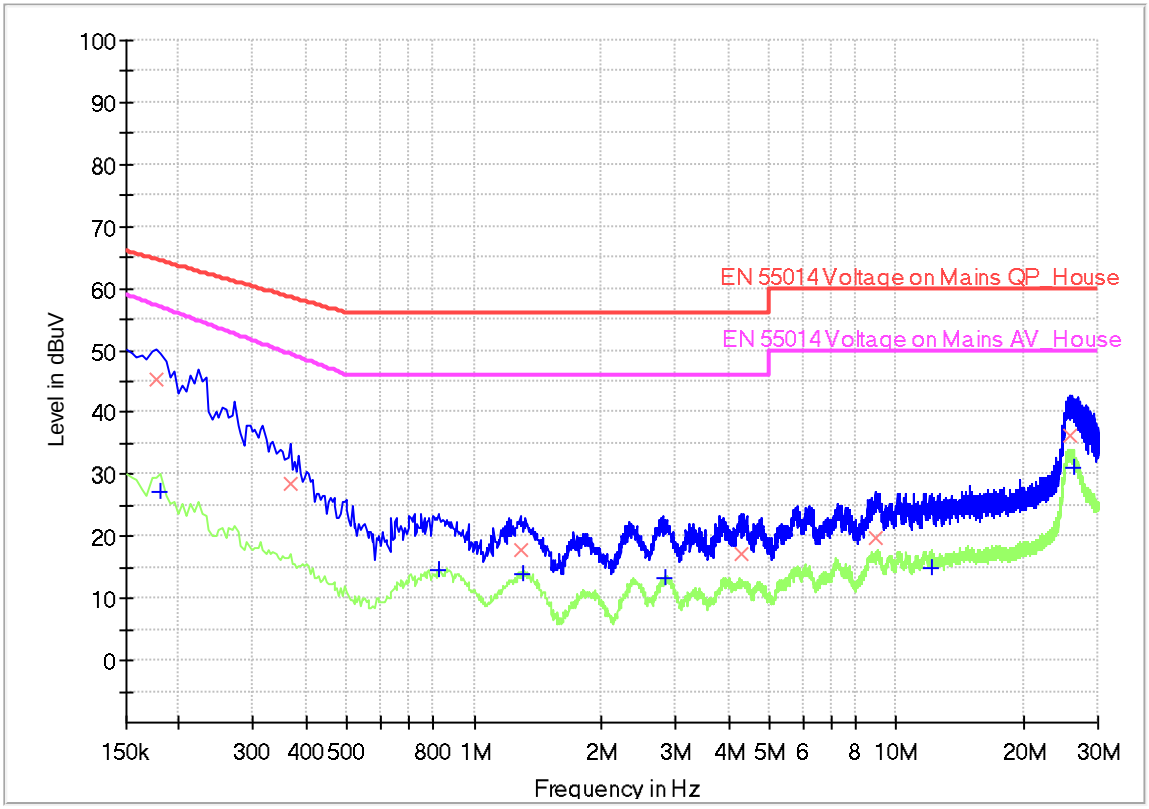
An initial pre-scan was performed on the live and neutral lines.

Please refer to the following peak scan graph for reference.

3.1.3 Conducted Emissions Test Data

Live Line

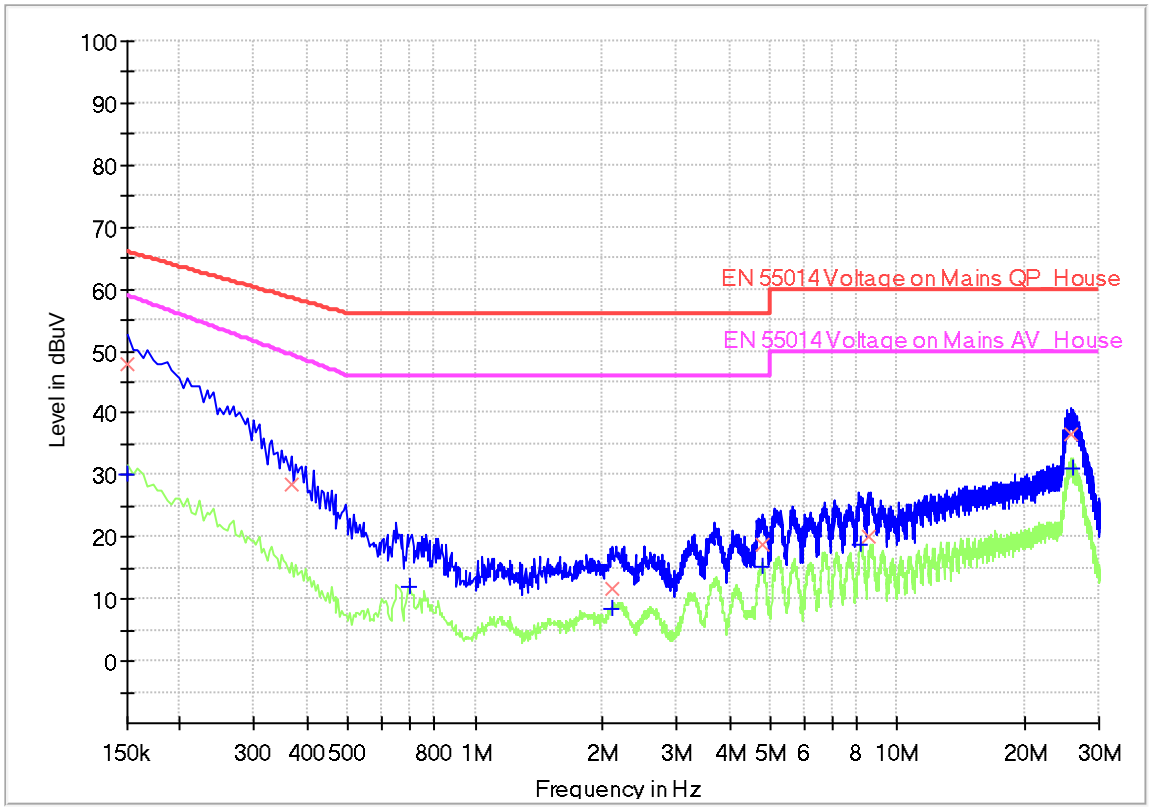
Model: GDF-315



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.177000	45.31	---	64.63	19.32	1000.0	9.000	L1	19.4
0.181500	---	27.10	56.94	29.84	1000.0	9.000	L1	19.4
0.366000	28.61	---	58.59	29.98	1000.0	9.000	L1	19.4
0.825000	---	14.50	46.00	31.50	1000.0	9.000	L1	19.4
1.284000	17.76	---	56.00	38.24	1000.0	9.000	L1	19.5
1.311000	---	13.89	46.00	32.11	1000.0	9.000	L1	19.5
2.823000	---	13.44	46.00	32.56	1000.0	9.000	L1	19.5
4.285500	17.18	---	56.00	38.82	1000.0	9.000	L1	19.5
8.947500	19.92	---	60.00	40.08	1000.0	9.000	L1	19.7
12.088500	---	15.03	50.00	34.97	1000.0	9.000	L1	19.7
25.876500	36.37	---	60.00	23.63	1000.0	9.000	L1	20.0
26.182500	---	31.19	50.00	18.81	1000.0	9.000	L1	20.0

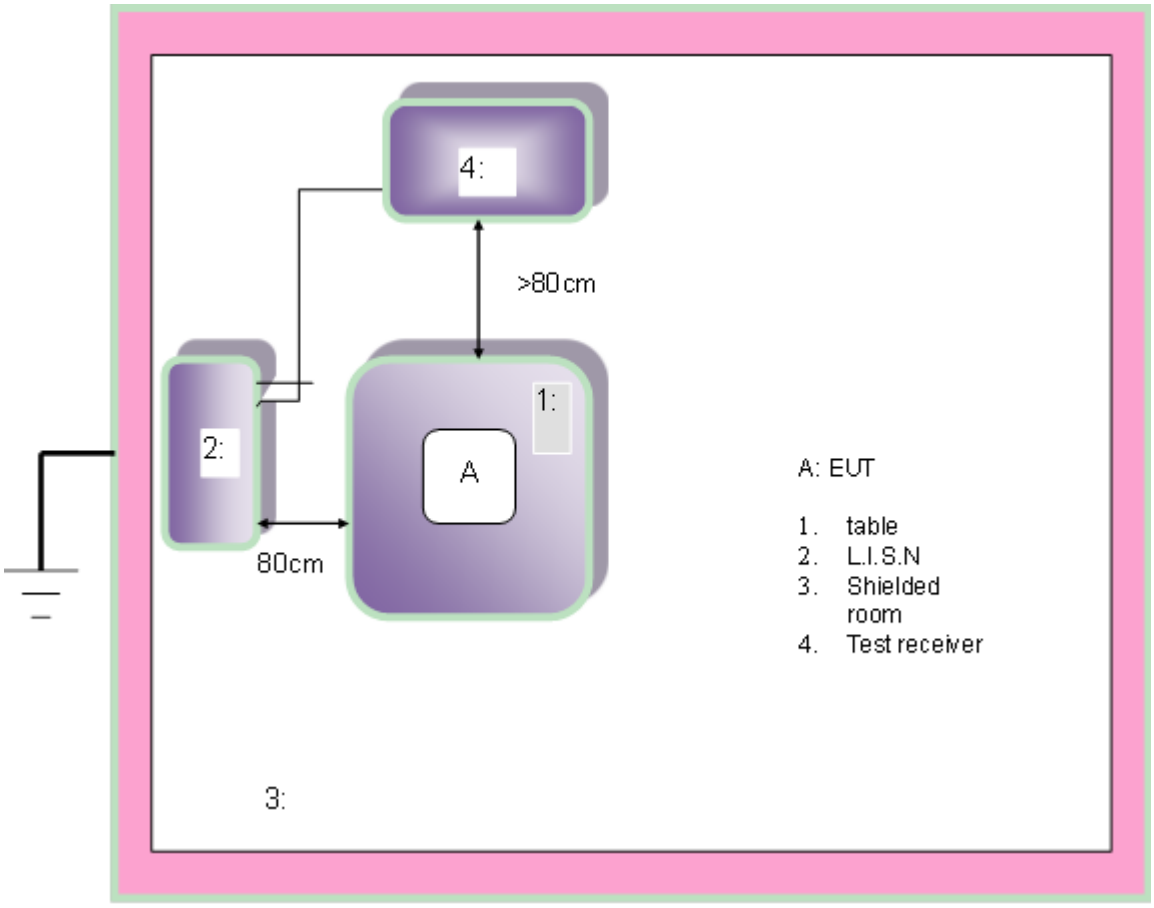
Neutral Line
Model: GDF-315



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	30.18	59.00	28.82	1000.0	9.000	N	19.6
0.150000	47.98	---	66.00	18.02	1000.0	9.000	N	19.6
0.366000	28.54	---	58.59	30.05	1000.0	9.000	N	19.6
0.699000	---	11.93	46.00	34.07	1000.0	9.000	N	19.5
2.121000	11.57	---	56.00	44.43	1000.0	9.000	N	19.6
2.121000	---	8.45	46.00	37.55	1000.0	9.000	N	19.6
4.762500	---	15.18	46.00	30.82	1000.0	9.000	N	19.6
4.789500	18.95	---	56.00	37.05	1000.0	9.000	N	19.6
8.218500	---	18.66	50.00	31.34	1000.0	9.000	N	19.7
8.497500	20.02	---	60.00	39.98	1000.0	9.000	N	19.7
25.678500	36.55	---	60.00	23.45	1000.0	9.000	N	20.1
25.908000	---	31.19	50.00	18.81	1000.0	9.000	N	20.1

3.1.4 Mains Terminal Disturbance Voltage on AC Test Setup Drawing



Test Setup: Conducted Emission 0.1/0.15 - 30MHz

For reference only

3.2 Radiated Disturbance Power: 9 kHz to 30MHz

Test Requirement :	EN 55014-1
Test Method :	EN 55014-1
Test Date :	2023-07-17
Frequency Range:	9KHz to 30MHz
Class/Severity:	Clause 4.3.4.2, Table 7
Detector:	Peak for pre-scan (120kHz resolution bandwidth)
	Quasi-Peak & average if pre-scan peak within 15dB of average limit.

3.2.1 E.U.T. Operation

Temperature:	25.1 °C
Humidity:	50.3 % RH
Atmospheric Pressure:	1006 mbar

EUT Operation:

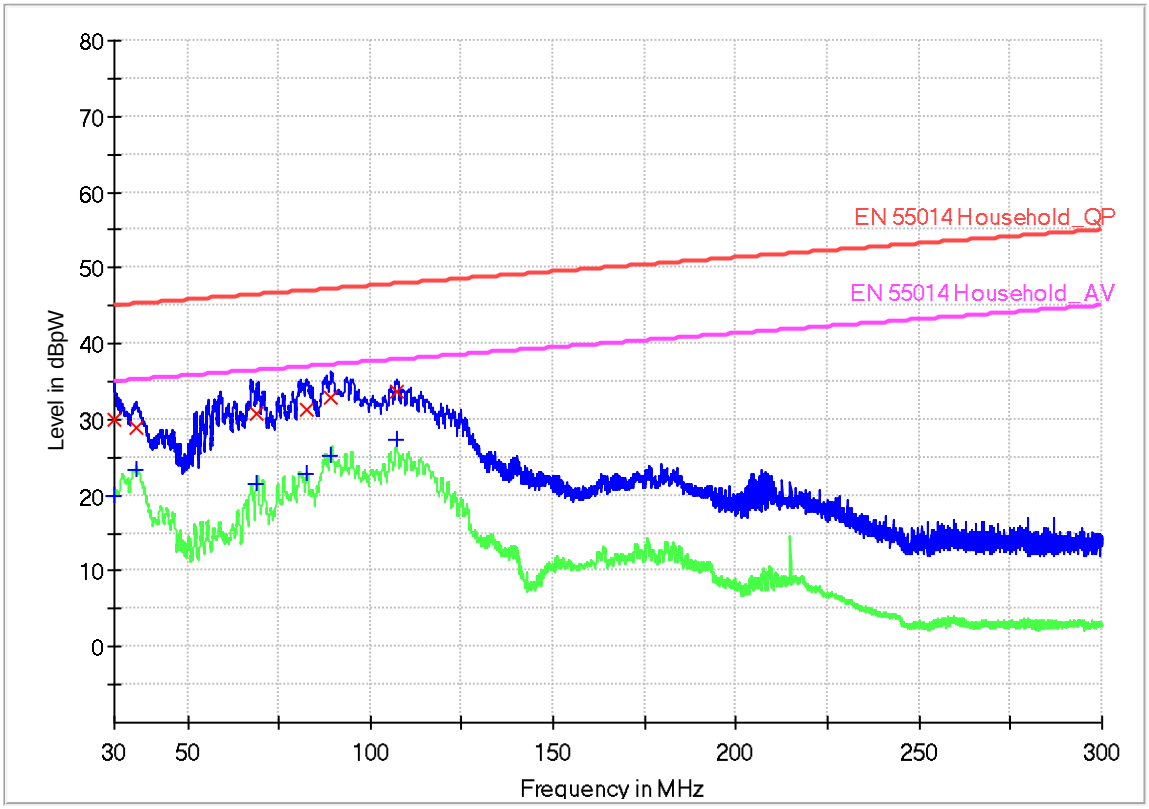
Compliance test was performed in ON mode.

3.2.2 Measurement Data

Peak Scan was performed on the AC mains cable, Quasi-Peak value were detected, no further Average-Peak measurements were performed for the EUT since no quasi-peak emissions were detected within 15dB of the average limit line.

Please see the attached Peak measurement data for reference.

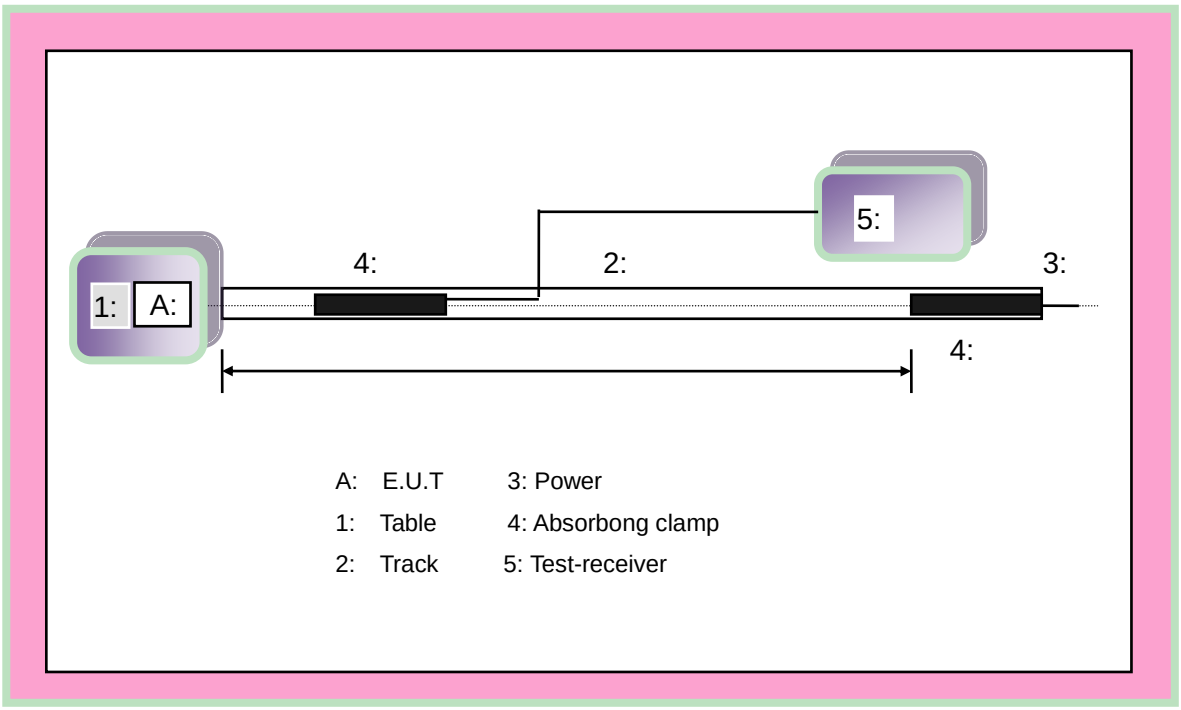
3.2.2 Radiated Power Test Data



Limit and Margin

Frequency (MHz)	QuasiPeak (dBpW)	CAverage (dBpW)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBpW	Margin - CAV (dB)	Limit - CAV (dBpW
30.080000	30.1	19.9	1000.	120.000	8.2	14.9	45.0	15.1	35.0
36.080000	28.9	23.4	1000.	120.000	8.1	16.4	45.2	11.8	35.2
69.000000	30.9	21.5	1000.	120.000	7.0	15.6	46.4	14.9	36.4
82.400000	31.4	22.8	1000.	120.000	6.0	15.6	46.9	14.2	36.9
89.280000	32.8	25.2	1000.	120.000	6.2	14.4	47.2	12.0	37.2
107.000000	33.6	27.3	1000.	120.000	5.2	14.3	47.9	10.6	37.9

3.2.3 Radiated Electromagnetic Disturbance Test Setup Drawing



Test-setup: Interference power 30MHz-300MHz

For reference only

3.3 Harmonics Test Results

Test requirement:	EN IEC 61000-3-2
Test Method:	EN IEC 61000-3-2
Test Date :	2023-07-18
Frequency Range:	100Hz to 2kHz
Measurement Time:	2.5min
Class/Severity:	Class A
Test Result:	PASS

3.3.1 E.U.T. Operation

Temperature:	25.1 °C
Humidity:	50.3 % RH
Atmospheric Pressure:	1006 mbar

EUT Operation:

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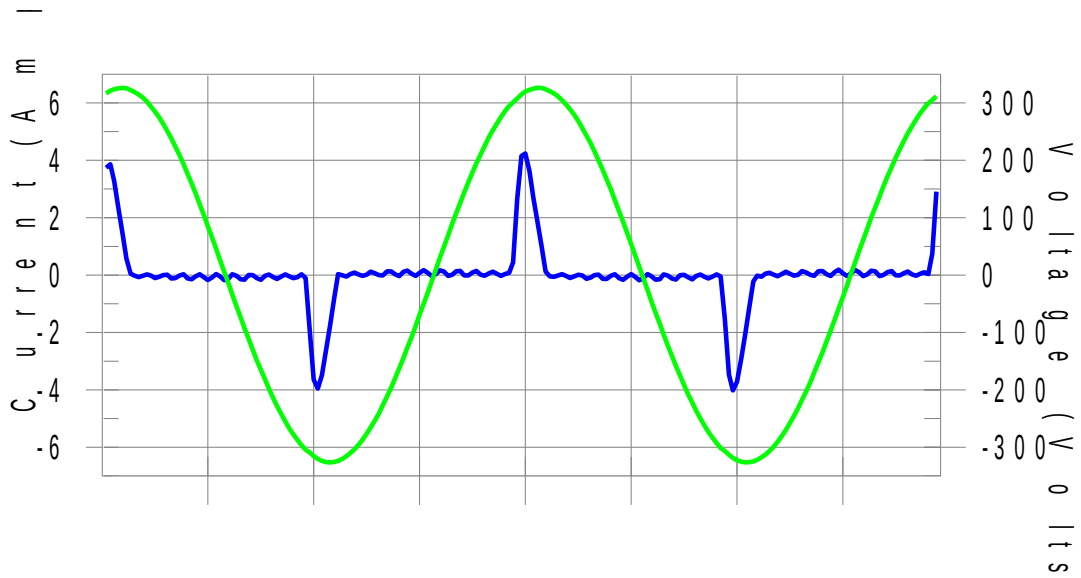
3.3.2 Measurement Data

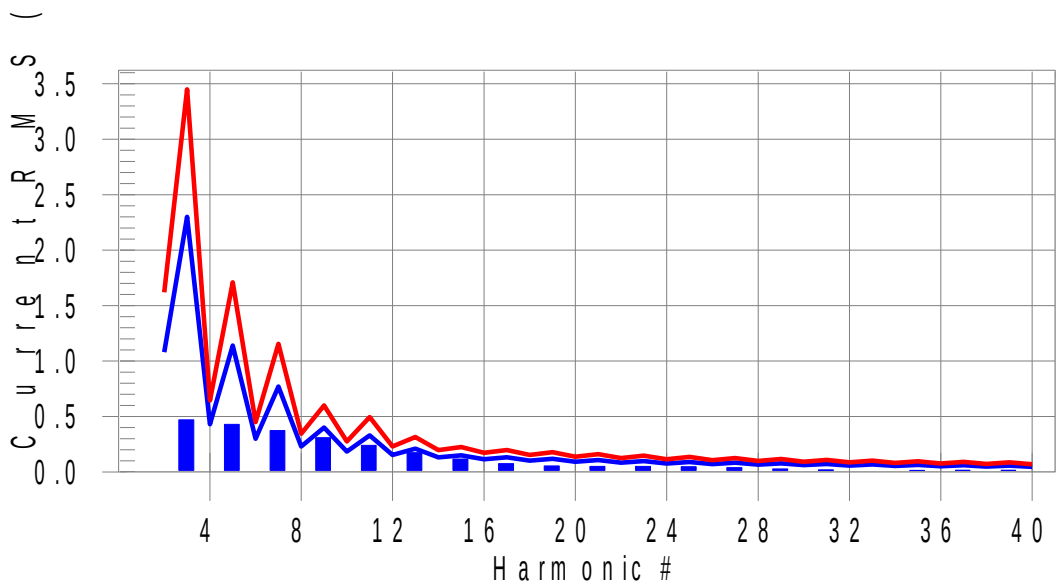
Harmonics – Class-A per IEC 61000-3-2:2018/AMD1:2020(Run time) incl. inter-harmonics

Model:GDF-315
Test category: Class-A **Test Margin: 100**
Test date: 2023-07-18 **Start time: 16:16:45** **End time: 16:19:36**
Test duration (min): 2.5 **Data file name: H-000487.cts_data**
Customer: Customer information
Test Result: Pass **Source qualification: Normal**

Current & voltage waveforms



Harmonics and Class A limit line **European Limits**



Test result: Pass **Worst harmonics H13-60.0% of 150% limit, H13-82.8% of 100% limit**

Harmonics – Class-A per IEC 61000-3-2:2018/AMD1:2020(Run time) incl. inter-harmonics

Model:GDF-315
Test category: Class-A **Test Margin: 100**
Test date: 2023-07-18 **Start time: 16:16:45** **End time: 16:19:36**
Test duration (min): 2.5 **Data file name: H-000487.cts_data**
Customer: Customer information
Test Result: Pass **Source qualification: Normal**
THC(A): 0.872 **I-THD(%): 172.6** **POHC(A): 0.103** **POHC Limit(A): 0.251**

Highest parameter values during test:

V_RMS (Volts):	230.31	Frequency(Hz):	50.00
I_Peak (Amps):	4.838	I_RMS (Amps):	1.206
I_Fund (Amps):	1.196	Crest Factor:	4.012
Power (Watts):	250.8	Power Factor:	0.903

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.003	1.080	N/A	0.004	1.620	N/A	Pass
3	0.470	2.300	20.4	0.472	3.450	13.7	Pass
4	0.003	0.430	N/A	0.004	0.645	N/A	Pass
5	0.429	1.140	37.7	0.433	1.710	25.3	Pass
6	0.003	0.300	N/A	0.004	0.450	N/A	Pass
7	0.374	0.770	48.5	0.381	1.155	33.0	Pass
8	0.003	0.230	N/A	0.004	0.345	N/A	Pass
9	0.309	0.400	77.1	0.319	0.600	53.2	Pass
10	0.003	0.184	N/A	0.004	0.276	N/A	Pass
11	0.240	0.330	72.7	0.253	0.495	51.1	Pass
12	0.003	0.153	N/A	0.004	0.230	N/A	Pass
13	0.174	0.210	82.8	0.189	0.315	60.0	Pass
14	0.003	0.131	N/A	0.004	0.197	N/A	Pass
15	0.117	0.150	77.9	0.132	0.225	58.7	Pass
16	0.003	0.115	N/A	0.003	0.173	N/A	Pass
17	0.075	0.132	56.9	0.088	0.198	44.3	Pass
18	0.002	0.102	N/A	0.003	0.153	N/A	Pass
19	0.054	0.118	45.9	0.061	0.178	34.3	Pass
20	0.002	0.092	N/A	0.003	0.138	N/A	Pass
21	0.051	0.107	47.3	0.052	0.161	32.7	Pass
22	0.002	0.084	N/A	0.003	0.125	N/A	Pass
23	0.051	0.098	51.8	0.052	0.147	35.2	Pass
24	0.002	0.077	N/A	0.002	0.115	N/A	Pass
25	0.047	0.090	52.1	0.049	0.135	36.3	Pass
26	0.002	0.071	N/A	0.002	0.107	N/A	Pass
27	0.038	0.083	46.2	0.042	0.125	33.9	Pass
28	0.002	0.066	N/A	0.002	0.099	N/A	Pass
29	0.028	0.078	35.5	0.032	0.116	27.8	Pass
30	0.001	0.061	N/A	0.002	0.092	N/A	Pass
31	0.018	0.073	24.3	0.021	0.109	19.7	Pass
32	0.001	0.058	N/A	0.002	0.086	N/A	Pass
33	0.013	0.068	18.8	0.015	0.102	14.8	Pass
34	0.001	0.054	N/A	0.001	0.081	N/A	Pass
35	0.014	0.064	21.3	0.017	0.096	17.8	Pass
36	0.001	0.051	N/A	0.001	0.077	N/A	Pass
37	0.015	0.061	25.4	0.017	0.091	18.3	Pass
38	0.001	0.048	N/A	0.001	0.073	N/A	Pass
39	0.015	0.058	26.3	0.016	0.087	18.1	Pass
40	0.001	0.046	N/A	0.001	0.069	N/A	Pass

3.4 Flicker Test Result

Test Requirement : EN 61000-3-3
Test Method : EN 61000-3-3

Test Date : --

Class/Severity: Clause 5 of EN 61000-3-3
Measurement Time: --
Detector: As per EN 61000-3-3

3.4.1 E.U.T. Operation

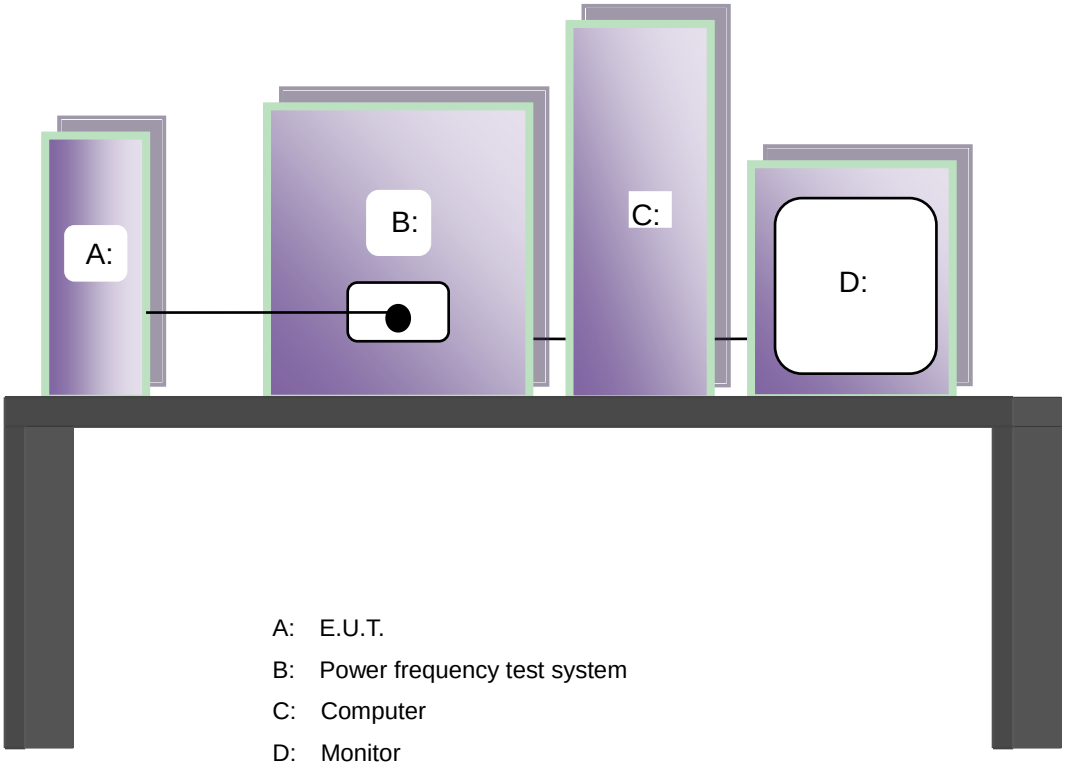
Temperature: --
Humidity: --
Atmospheric Pressure: --

EUT Operation:
--

3.4.2 Measurement Data

--

3.4.3 Harmonics and Flicker Test Setup Drawing



A: E.U.T.
B: Power frequency test system
C: Computer
D: Monitor

Test-setup: Steady State Harmonics Test & Voltage Fluctuations (Flicker Meter Test)

For reference only

4 Immunity Test Results

4.1 Performance Criteria Description

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 permissible 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 permissible 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 instructions for use.

4.2 ESD

Test requirement:	EN 55014-2	
Test Method:	IEC 61000-4-2	
Test Date:	2023-07-18	
Discharge Impedance:	330 Ω / 150 pF	
Discharge Voltage:	Air Discharge:	±4,8,10kV
	Contact Discharge:	±6kV
	HCP & VCP:	±6kV
Polarity:	Positive & Negative	
Number of Discharge:	Minimum 10 times at each test point	
Discharge Mode:	Single Discharge	
Discharge Period:	1 Second minimum	

4.2.1 E.U.T Operation

Operating Environment:

Temperature:	23.8 °C
Humidity:	51.0% RH
Atmospheric Pressure:	1006 mbar

EUT Operation:

Compliance test was performed in ON mode.

4.2.2 Direct Application Test Results

Observations: Test points: 1. All Exposed Surface & Seams;
2. All metallic part

Direct Application			Test Results	
Discharge Level (kV)	**Polarity(+/-)**	**Test Point**	**Contact Discharge**	**Air Discharge**
8	+/-	1	N/A	A
4	+/-	2	A	N/A

Results:

A: No degradation in the performance of the E.U.T. was observed.

N/A: Not applicable

4.2.3 Indirect Application Test Results

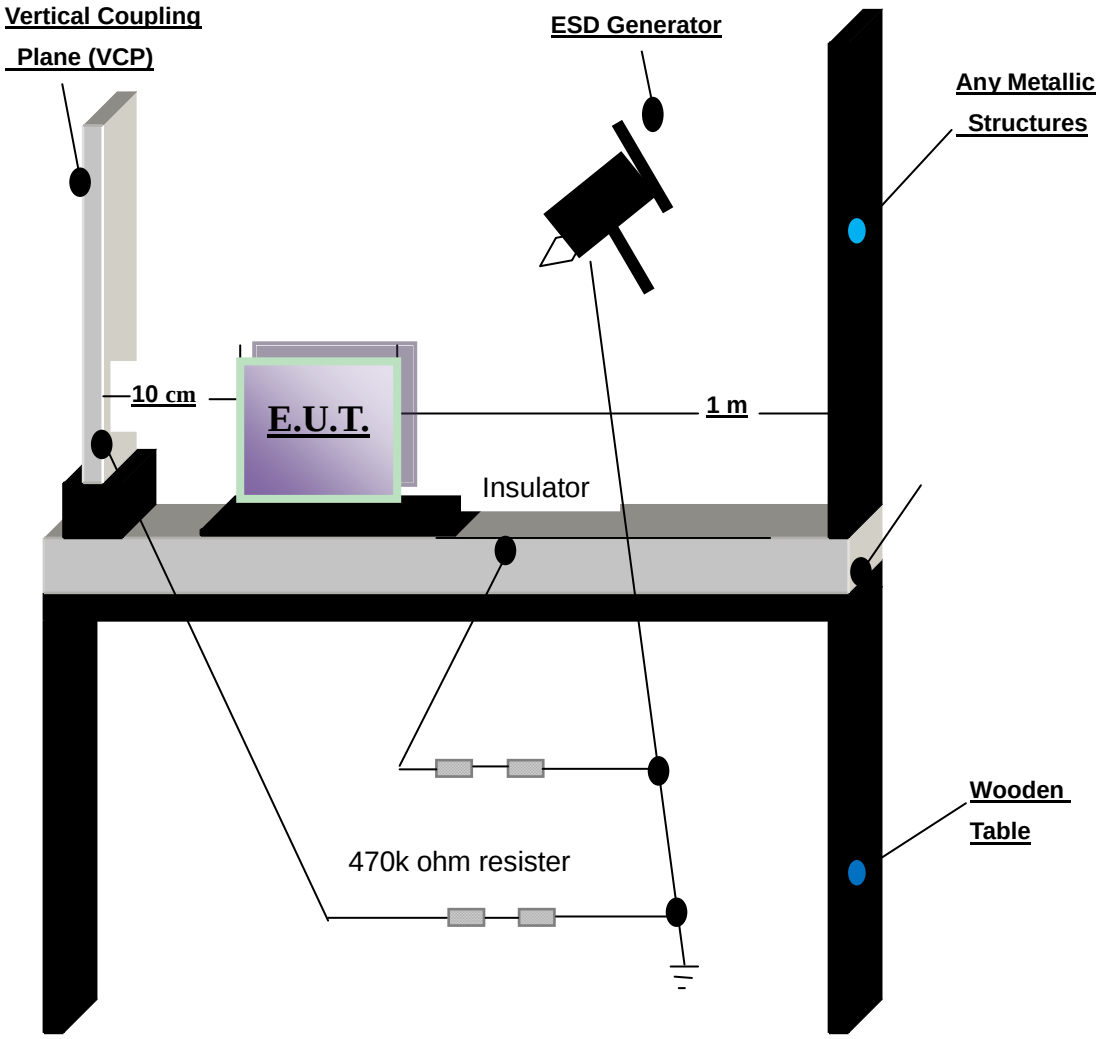
Observations: Test points: 1. All Sides.

Indirect Application			Test Results	
Discharge Level (kV)	**Polarity(+/-)**	**Test Point**	**Horizontal Coupling**	**Vertical Coupling**
2	+/-	1	A	A
4	+/-	1	A	A

Results: PASS

A: No degradation in the performance of the E.U.T. was observed.

4.2.4 ESD Test Setup Drawing



Test Setup: Electrostatic Discharge (ESD)

For reference only

4.3 Radiated Immunity

Test requirement : EN 61547
Test Method : IEC 61000-4-3
Test Date: 2023-07-19
Frequency Range: 80MHz–1GHz
Face Under Test: Three Mutually Orthogonal Faces
Severity: 3V/m, 1kHz, 80% Amp. Mod. from 80MHz to 1GHz

4.3.1 E.U.T Operation

Operating Environment

Temperature: 23.9 °C
Humidity: 51.0 % RH
Barometric Pressure: 1010 mbar

EUT Operation:
Compliance test was performed in ON mode.

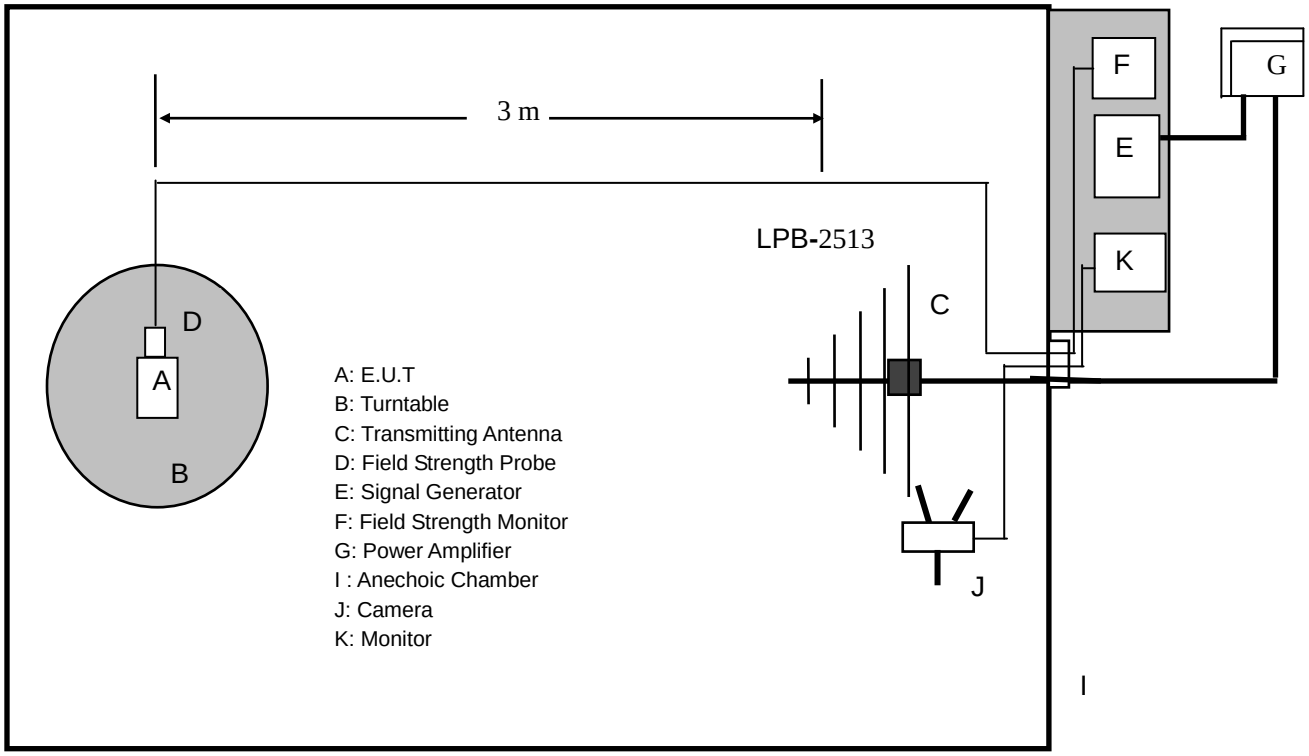
4.3.2 Test Results

EUT Position towards antenna	Antenna: Horizontal	Antenna: Vertical	Result
	Observation	Observation	(Pass/Fail)
Front	A	A	Pass
Right	A	A	Pass
Rear	A	A	Pass
Left	A	A	Pass

Results: Pass

A: No degradation in the performance of the E.U.T. was observed.

4.3.3 Radiated Immunity Test Setup Drawing



Test-setup: Radiated Immunity

For reference only

4.4 Electrical Fast Transients (EFT)

Test requirement:	EN 55014-2
Test Method:	IEC 61000-4-4
Test Date:	2023-07-20
Polarity:	Positive & Negative
Repetition Frequency:	5kHz
Burst Duration:	300ms
Test Duration:	2 minutes per level & polarity

4.4.1 E.U.T Operation

Operating Environment

Temperature:	23.8 °C
Humidity:	51.0% RH
Barometric Pressure:	1006 mbar

EUT Operation:

Compliance test was performed in ON mode.

4.4.2 Test Results

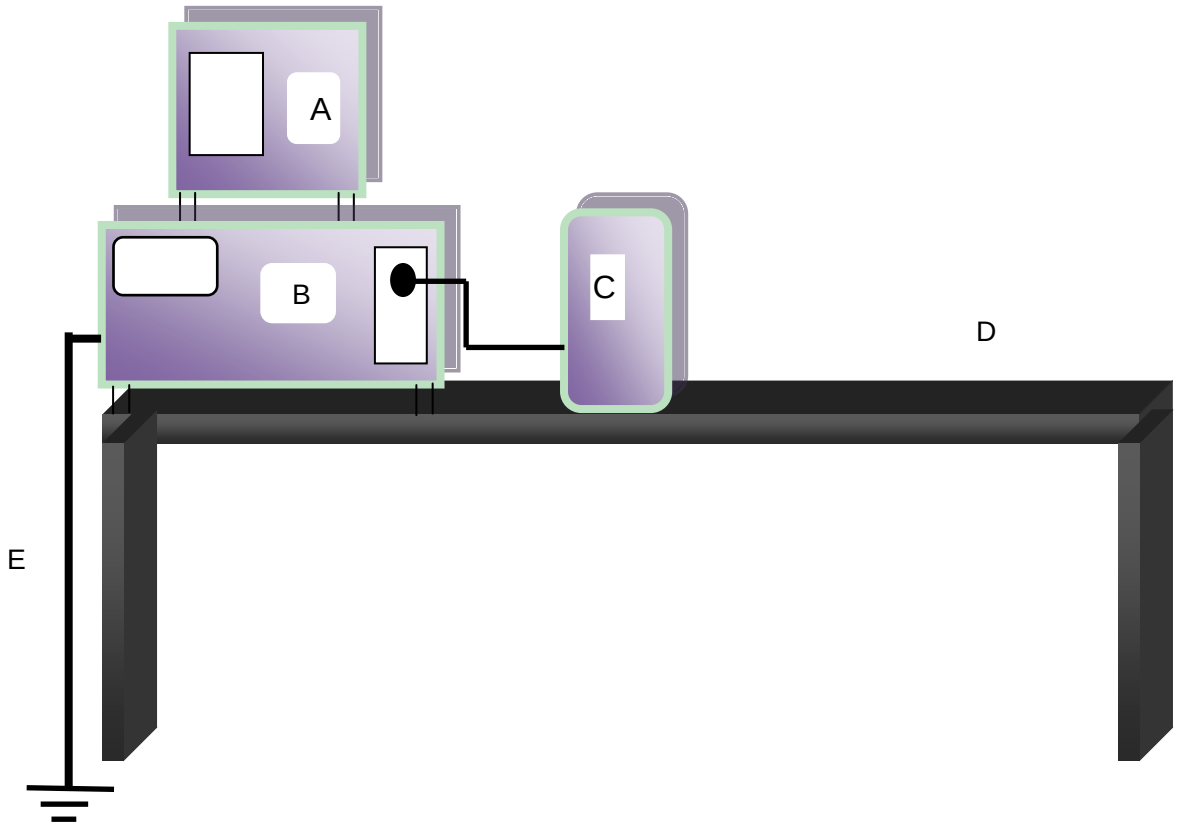
AC mains of AC Cable

Led under Test	Lever (±kV)	Coupling Direct/Clamp	EUT operating mode	Observations (Performance Criterion)
Live	±1.0	Direct	ON	A
Neutral	±1.0	Direct	ON	A

Results: Pass

4.4.3 Fast Transients (Burst) Test Setup Drawing

A: Digital Oscilloscope
B: Burst Generator
C: EUT
D: Wooden Table
E: Ground Wire



Test-setup: Fast Transients (Burst)

For reference only

4.5 Surge

Test requirement:	EN 55014-2
Test Method:	IEC 61000-4-5
Test Date:	2023-07-21
Performance criterion:	B
Test Level:	±1kV Live to Neutral
Polarity:	2Ω
Trigger Mode:	Internal
No. of surges:	5 positive at 90°, 5 negative at 270°
Performance criterion:	B

4.5.1 E.U.T Operation

Operating Environment

Temperature:	23.8 °C
Humidity:	51.0% RH
Atmospheric Pressure:	1006 mbar

EUT Operation:

Compliance test was performed in ON mode.

4.5.2 Test Results

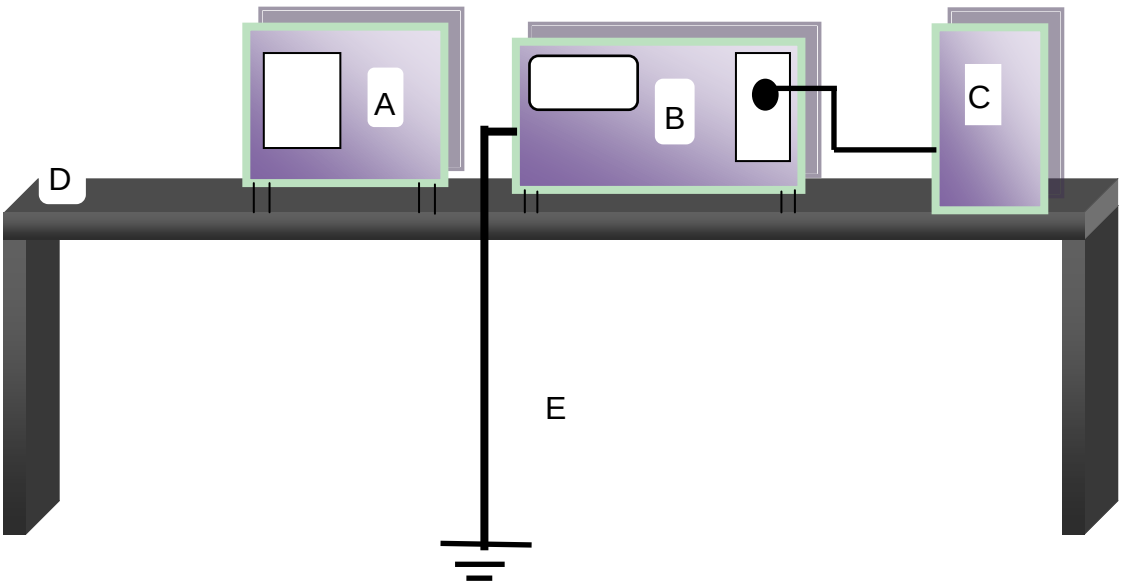
Coupling Line	Test Level	Repetition Rate	# of surges	Phase Angle	Test Result
L-N	±1000V	60S	5	90, 270	A

Results: Pass

A: No degradation in the performance of the E.U.T. was observed.

4.5.3 Surge Test Setup Drawing

A: Digital Oscilloscope
B: Surge Generator
C: EUT
D: Wooden Table
E: Ground Wire



Test-setup: Surges tests

For reference only

4.6 Conducted Immunity 0.15MHz to 80MHz

Test requirement: EN 55014-2
Test Method: IEC 61000-4-6
Test Date: 2023-07-24
Performance Criterion: A
Frequency Range: 0.15MHz to 230MHz
Test level: 3V rms on AC Ports (unmodulated emf into 150 Ω)
Modulation : 80%, 1kHz Amplitude Modulation.

4.6.1 E.U.T Operation

Operating Environment
Temperature: 23.8 °C
Humidity: 51.0% RH
Atmospheric Pressure: 1006 mbar

EUT Operation:
Compliance test was performed in ON mode.

4.6.2 Test Results

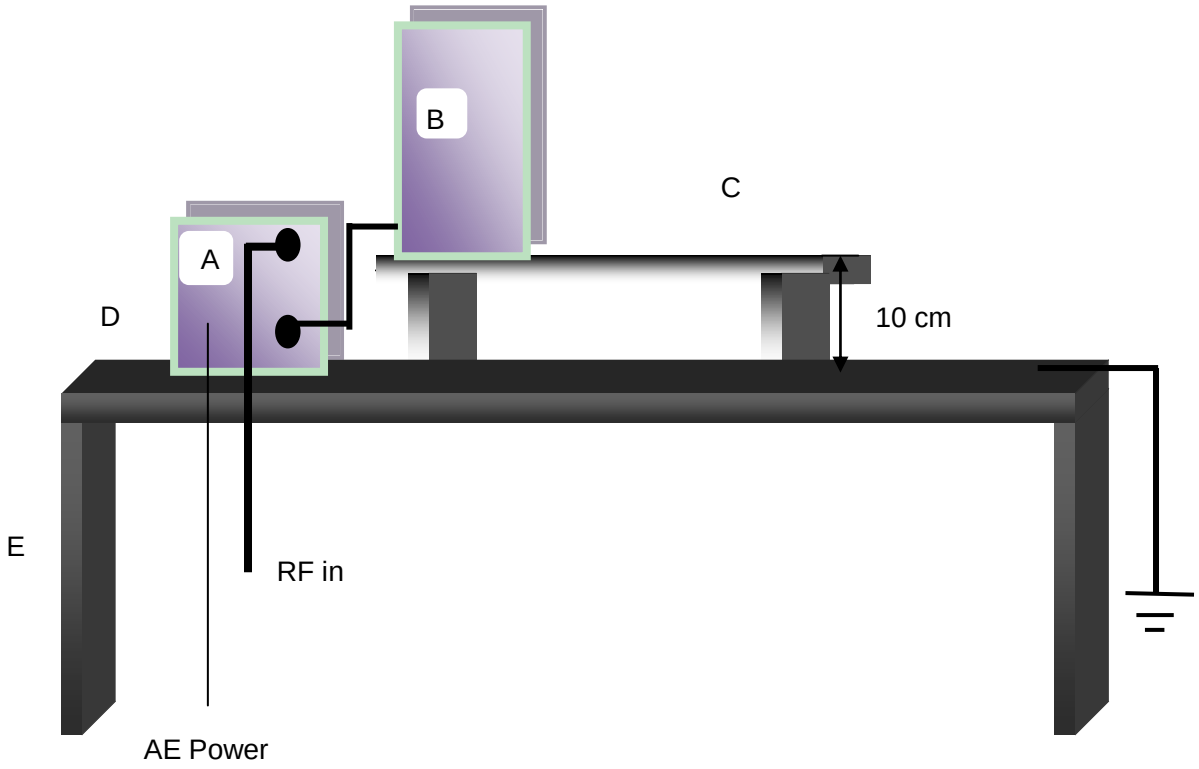
AC mains of AC Cable

Frequency	Line	Test Level	Modulation	Step Size	Dwell Time	Observations (Performance Criterion)
150kHz to 230MHz	3 Wire AC Supply Cable	3Vrms	80%, 1kHz Amp. Mod.	1%	1s	A

Results: Pass
A: No degradation in the performance of the E.U.T. was observed.

4.6.3 Conducted Immunity Test Setup Drawing

A: CDN
B: EUT
C: Wooden table
D: Reference Ground Plane
E: Wooden table
F: Ground Wire



Test-setup: <u>Conducted Immunity</u>

For reference only

4.7 Voltage Dips and Interruptions

Test requirement:	EN 55014-2
Test Method:	IEC 61000-4-11
Test Date:	2023-07-25
Performance Criterion:	C
Test Level:	0% & of U_T (Supply Voltage) for 0.5 Periods 40% & of U_T (Supply Voltage) for 10 Periods 70 % & of U_T (Supply Voltage) for 25 Periods
No. of Dips/ Interruptions :	3 per Level

4.7.1 E.U.T Operation

Operating Environment

Temperature:	23.8 °C
Humidity:	51.0% RH
Atmospheric Pressure:	1006 mbar

EUT Operation:

Compliance test was performed in ON mode.

4.7.2 Test Results

EUT operating mode	Dropout % U_T	Phase	Duration of dropout in Periods	No of dropout	Time between dropout	Observations (Performance Criterion)
On mode	0	0°	0.5	3	10s	A
On mode	40	0°	10	3	10s	B
On mode	70	0°	25	3	10s	B

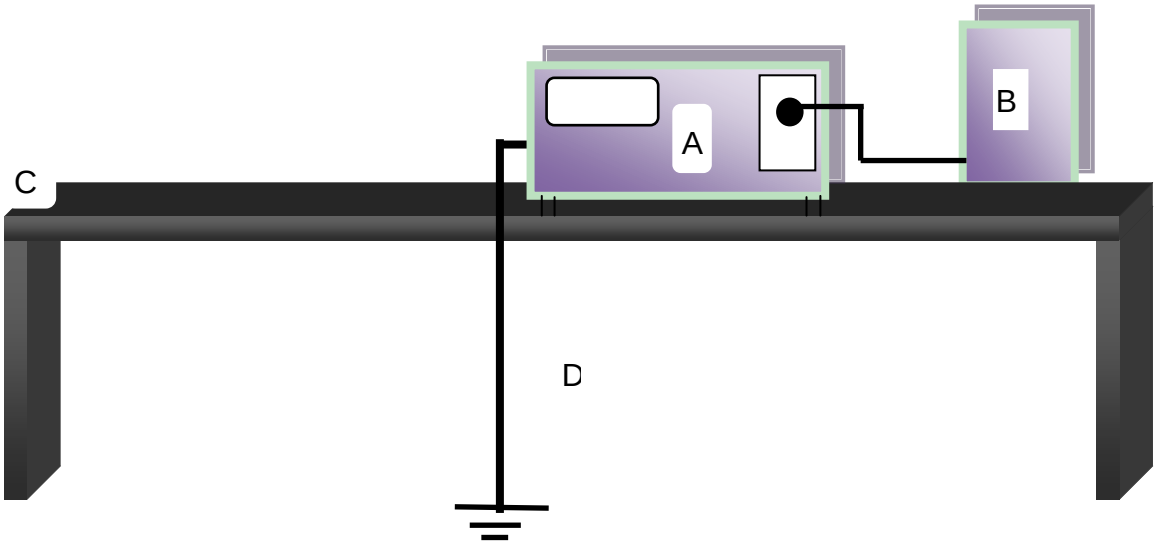
Results: Pass

A: No loss of function was observed.

B: Speed of the motor become slow during the test, but it can recover automatically after test.

4.7.3 Voltage Dips and Interruptions Test Setup Drawing

A: Mains Drop out Simulator
B: EUT
C: Wooden Table
D: Ground Wire



Test-setup: Voltage Dips, Interruptions & Variations

For reference only

5 Photographs - Constructional Details

Details of: General view of GDF-315

Details of: General view of GDF-315

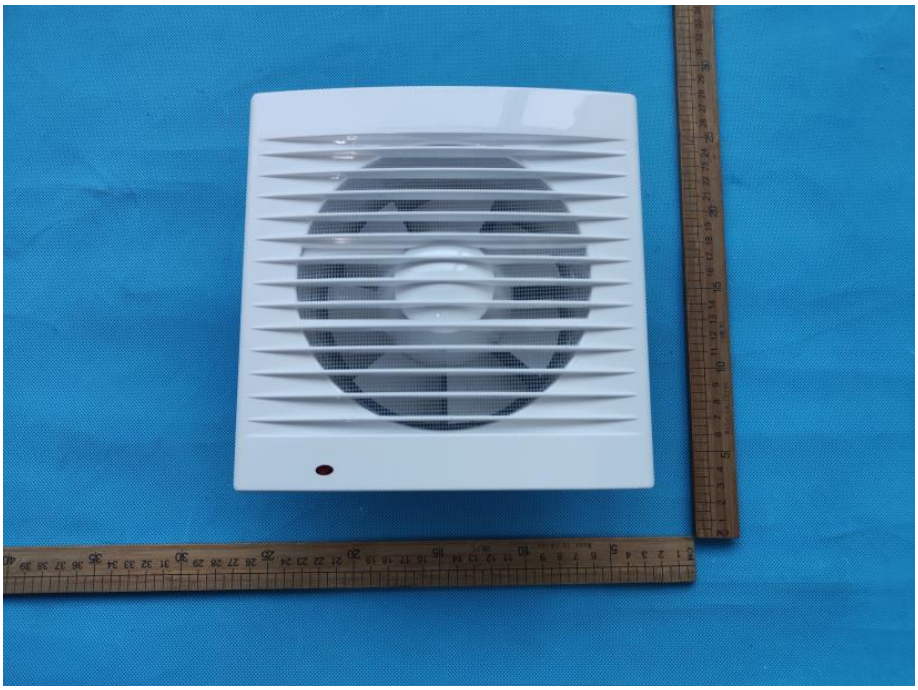
Details of: General view of GDF-315

Details of: Inner view for model GDF-315

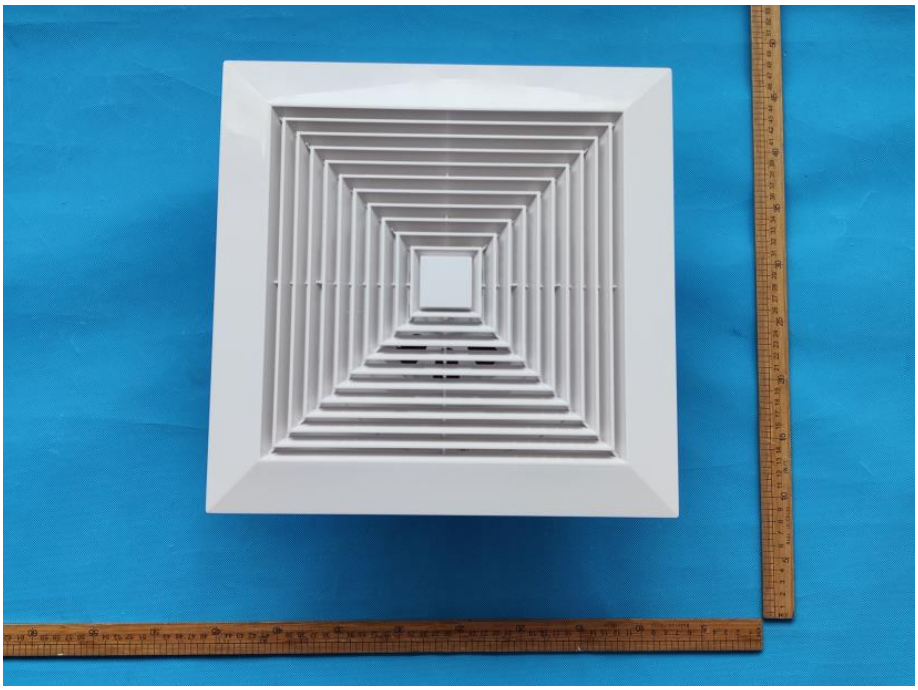
Details of: Inner view for model GDF-315

Details of: CBB for model GDF-315

Details of: General view for model WW-150E



Details of: General view for model BPT15-20A



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