



EMC TEST REPORT

Applicant	Guangzhou Micron Vending Technology Co., Ltd. No.1, Tiantai 1st Road, Huangpu District, Guangzhou, Guangdong, China
Manufacturer	Guangzhou Micron Vending Technology Co., Ltd. No.1, Tiantai 1st Road, Huangpu District, Guangzhou, Guangdong, China
Equipment under test (EUT)	
Product Name	Vending Machine
Model No.	WM800, WM500, WM22-CWGZ, WM22-W, WM22-AL, WM5-W, WM10-W, WM700, WM0-W
Standards	EN 61000-3-2:2014 EN 61000-3-3:2013 EN 55014-1:2017+A11:2020 EN 55014-2:1997+A1:2001+A2:2008
Date of Test	From 2024-06-14 to 2024-06-28
Date of issue	2024-06-28
Project Engineer	Jack Zhou <i>Jack Zhou</i>
Reviewed by	Carr Lin <i>Carr Lin</i>
Testing laboratory	Guangzhou Certitek Testing Services Co., Ltd.
Testing location	Room703/7F, Development Building, Tian An Hi-Tech Ecological Park, No.555 North Road Panyu Avenue, Panyu District, Guangzhou, 511400, China
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 requirements.



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1 Test Summary

1.1 Disturbance Test Items

Test Item	Test Required	Test Results
Conducted Disturbance	EN 55014-1:2017+A11:2020	PASS
Disturbance Power	EN 55014-1:2017+A11:2020	PASS
Harmonic Current Emissions	EN 61000-3-2:2014	PASS
Flicker and Voltage Fluctuations	EN 61000-3-3:2013	PASS

1.2 Immunity Test Items

Test Item	Test Required	Test Results
Electrostatic Discharges (ESD)	EN 55014-2:1997+A1:2001+A2:2008 EN 61000-4-2:2009	PASS
Radio-Frequency Electromagnetic Field(RS)	EN 55014-2:1997+A1:2001+A2:2008 EN IEC 61000-4-3:2020	N/A
Electrical Fast Transients (EFT)	EN 55014-2:1997+A1:2001+A2:2008 EN 61000-4-4:2012	PASS
Surges	EN 55014-2:1997+A1:2001+A2:2008 EN 61000-4-5:2014+A1:2017	PASS
Conducted Immunity	EN 55014-2:1997+A1:2001+A2:2008 EN 61000-4-6:2014+AC:2015	PASS
Voltage Dips and Interruptions	EN 55014-2:1997+A1:2001+A2:2008 EN IEC 61000-4-11:2020	PASS

Note:

PASS: Indicates that the test is applicable.

N/A: Indicates that the test is not applicable.

1.3 Test Uncertainty

Radiated Disturbance:±2.2dB

Conducted Disturbance:±1.8dB

2 General Information

2.1 Client Information

Applicant	:	Guangzhou Micron Vending Technology Co., Ltd.
Address	:	No.1, Tiantai 1st Road, Huangpu District, Guangzhou, Guangdong, China
Manufacturer	:	Guangzhou Micron Vending Technology Co., Ltd.
Address	:	No.1, Tiantai 1st Road, Huangpu District, Guangzhou, Guangdong, China

2.2 Detail of EUT

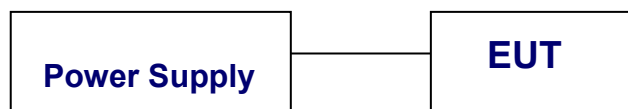
Product	:	Vending Machine
Model No.	:	WM800
Technical	:	220-240V~, 50/60Hz, 230W, Class I

2.3 Principle of Configuration Selection

Emission Test: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

Immunity Test: The equipment under test (EUT) was configured to the representative operating mode and conditions.

2.4 Block Diagram of EUT Configuration during the Test



2.5 Test Instruction

All the tests were performed in the condition of 240V input on model WM800.

2.6 Classification of EUT

- Category I** : Apparatus containing no electronic control circuitry
- Category II** : Apparatus containing electronic control circuitry with no internal clock frequency or oscillator frequency higher than 15 MHz
- Category III** : Apparatus battery powered apparatus, which in normal use is not connected to the mains, containing an electronic control circuitry with no internal clock frequency or oscillator frequency higher than 15 MHz
- Category IV** : All other apparatus

Due to the oscillator frequency of EUT lower than 15MHz, According to EN 55014-2 EUT to belong to Category II device, so the Radio-Frequency Electromagnetic Field test not apply.

3 Test Equipment

Equipment Name	Manufacturer Model	Equipment No.	Internal No	Specification	Cal. Date	Due Date
EMC Analyzer	Agilent/ E7405A	MY451149 43	W2008001	9k-26.5GHz	2023-8-2	2024-8-1
Trilog Broadband Antenne 30-3000 MHz	SCHWARZBEC K MESS-ELEKTR OM/ VULB9163	336	W2008002	30-3000 MHz	2023-8-2	2024-8-1
Broadband Preamplifier 0.5-18 GHz	SCHWARZBEC K MESS-ELEKTR OM/ BBV 9718	9718-148	W2008004	0.5-18GHz	2023-8-2	2024-8-1
10m Coaxial Cable with N-male Connectors usable up to 18GHz,	SCHWARZBEC K MESS-ELEKTR OM/ AK 9515 H	--	--	--	2023-8-2	2024-8-1
10m 50 Ohm Coaxial Cable with N-plug,individual length,usable up to 3(5)GHz, Connector	SCHWARZBEC K MESS-ELEKTR OM/ AK 9513	--	--	--	2023-8-2	2024-8-1
Positioning Controller	C&C LAB/ CC-C-IF	--	--	--	N/A	N/A
Color Monitor	SUNSP0/ SP-14C	--	--	--	N/A	N/A
Test Receiver	ROHDE&SCHW ARZ/ ESPI 3	101155	W2005001	9k-3GHz	2023-8-2	2024-8-1
EMI Receiver	Beijingkehuan	KH3931	--	9k-1GHz	2023-8-2	2024-8-1
Two-Line V-Network	ROHDE&SCHW ARZ/ ENV216	100115	W2005002	50Ω/50μH	2023-8-2	2024-8-1
V—LISN	SCHWARZBEC K MESS— ELEKTRONIK	NSLK8128	8128-259	9k-30MHz	2023-8-2	2024-8-1
Absorbing Clamp	ROHDE&SCHW ARZ/ MDS-21	100205	W2005003	impandance 50Ω loss : 17 dB	2023-8-2	2024-8-1
10m 50 Ohm Coaxial Cable with N-plug,individual length,usable up to 3(5)GHz, Connectors	SCHWARZBEC K MESS-ELEKTR OM/ AK 9514	--	--	--	2023-8-2	2024-8-1
Digital Power Analyzer	Em Test AG/Switzerland/ DPA 500	V07451 03095	W2008012	Power: 2000VA Vol-range:	2023-8-2	2024-8-1



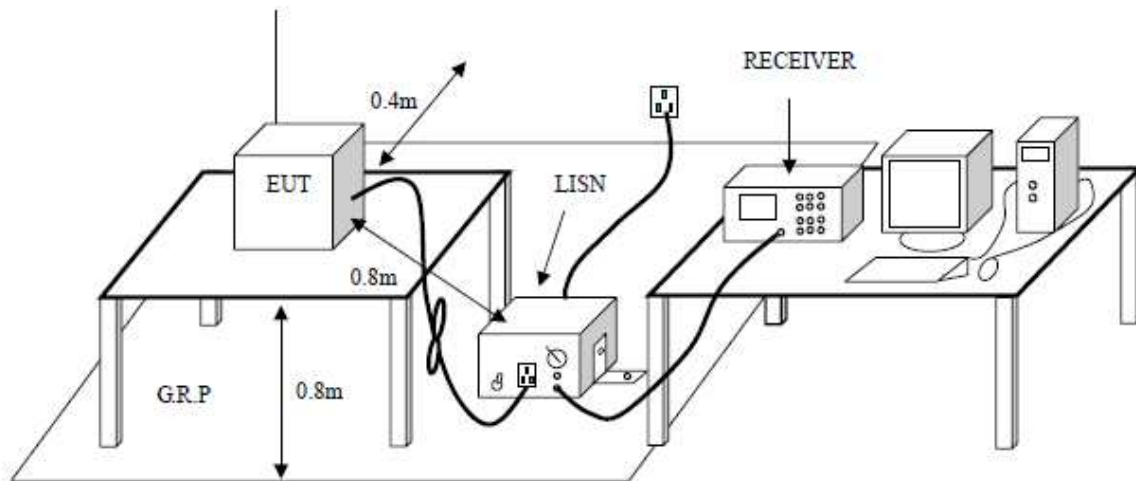
Equipment Name	Manufacturer Model	Equipment No.	Internal No	Specification	Cal. Date	Due Date
				0-300V Freq_range : 10-80Hz		
Power Source	Em Test AG/Switzerland/ ACS 500	V07451 03096	W2008013	Vol-range: 0-300V Power_freq : 10-80Hz	2023-8-2	2024-8-1
Electrostatic Discharge Simulator	Em Test AG/Switzerland/ DITO	V07451 03094	W2008005	Contact discharge: 500V-10KV Air discharge: 500V-16.5K V	2023-8-2	2024-8-1
RF Generator	TESEQ GmbH/ NSG4070	25781	W2008008	Fraq-range : 9K-1GHz RF voltage: -60 dBm-+10dB m	2023-8-2	2024-8-1
CDN M-Type	TESEQ GmbH/ CDN M016	25112	W2008009	Voltage correct factor 9.5 dB	2023-8-2	2024-8-1
EM-Clamp	TESEQ GmbH/ KEMZ 801	25453	W2008010	Freq_range : 0.15-1000 MHz	2023-8-2	2024-8-1
Attenuator 6dB	TESEQ GmbH/ ATN6050	25365	--	--	2023-8-2	2024-8-1
All Modules Generator	SCHAFFNER/61 50	34579	W2008006	voltage:200V -4.4KV Pulse current: 100A-2.2KA	2023-8-2	2024-8-1
Capacitive Coupling Clamp	SCHAFFNER/ CDN 8014	25311	--	--	2023-8-2	2024-8-1
Signal and Data Line Coupling Network	SCHAFFNER/ CDN 117	25627	W2008011	1.2/50μS	2023-8-2	2024-8-1
AC Power Supply	TONGYUN/ DTDGC-4	--	--	--	2023-8-2	2024-8-1

4 Conducted Disturbance Test

4.1 Test Standard

EN IEC 55014-1:2021

4.2 Diagram Test Setup



4.3 Test Equipment's Used

Refer to see section 3.

4.4 Test Description

4.4.1 Equipment Test Setup

EMI Test Receiver Setting:

Detector: Quasi-Peak and Average

Band Width: 9 KHz

Frequency Range: 150 KHz to 30MHz

4.4.2 EUT Operation

Turn on the EUT.

Let the EUT work in normal operation mode.

4.5 Test Procedure

During the test the EUT was placed on a non-conductive table which is 0.8 meter above the grounded reference plane. Connected the power line of the LISN and connected the receiver to LISN by coaxial line. Detected the disturbance signals of the live line and neutral line.

4.6 Conducted Disturbance Limit

Frequency Range MHz	Limits(dBuV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56	59 to 46
0.5 to 5	56	46
5 to 30	60	50
NOTE 1 The lower limit shall apply at the transition frequencies.		
NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

4.7 Test Result and Test Data

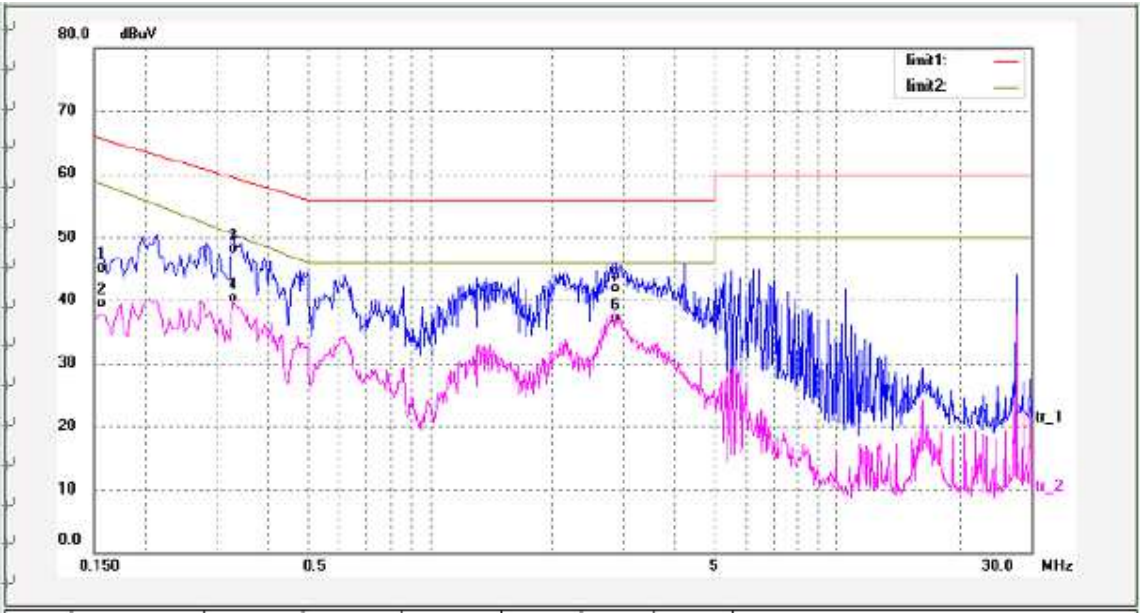
Test Result: PASS

Test Data:

Test data refer to see following pages.



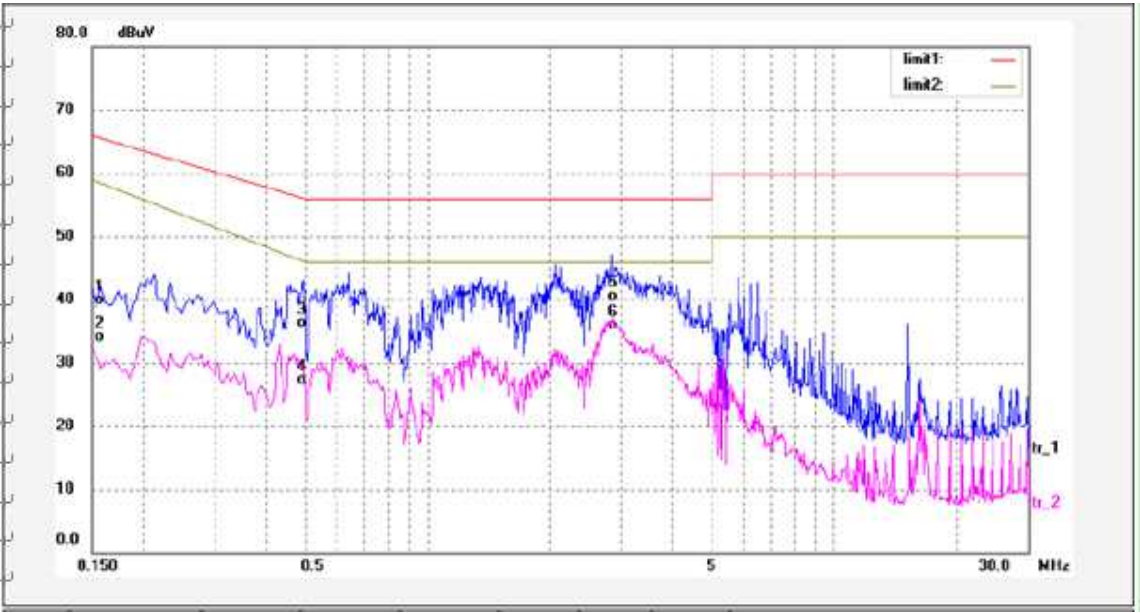
Live Line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.1582	34.02	10.35	44.35	65.53	-21.22	QP	Pass
2	0.1582	28.34	10.35	38.68	58.43	-19.73	AVG	Pass
3	0.3308	36.80	10.35	47.26	59.44	-12.21	QP	Pass
4	0.3308	29.15	10.35	39.48	50.48	-11.01	AVG	Pass
5	2.8620	30.3	10.38	41.13	56.02	-14.91	QP	Pass
6	2.8620	26.05	10.38	36.38	46.09	-9.63	AVG	Pass



Neutral Line:



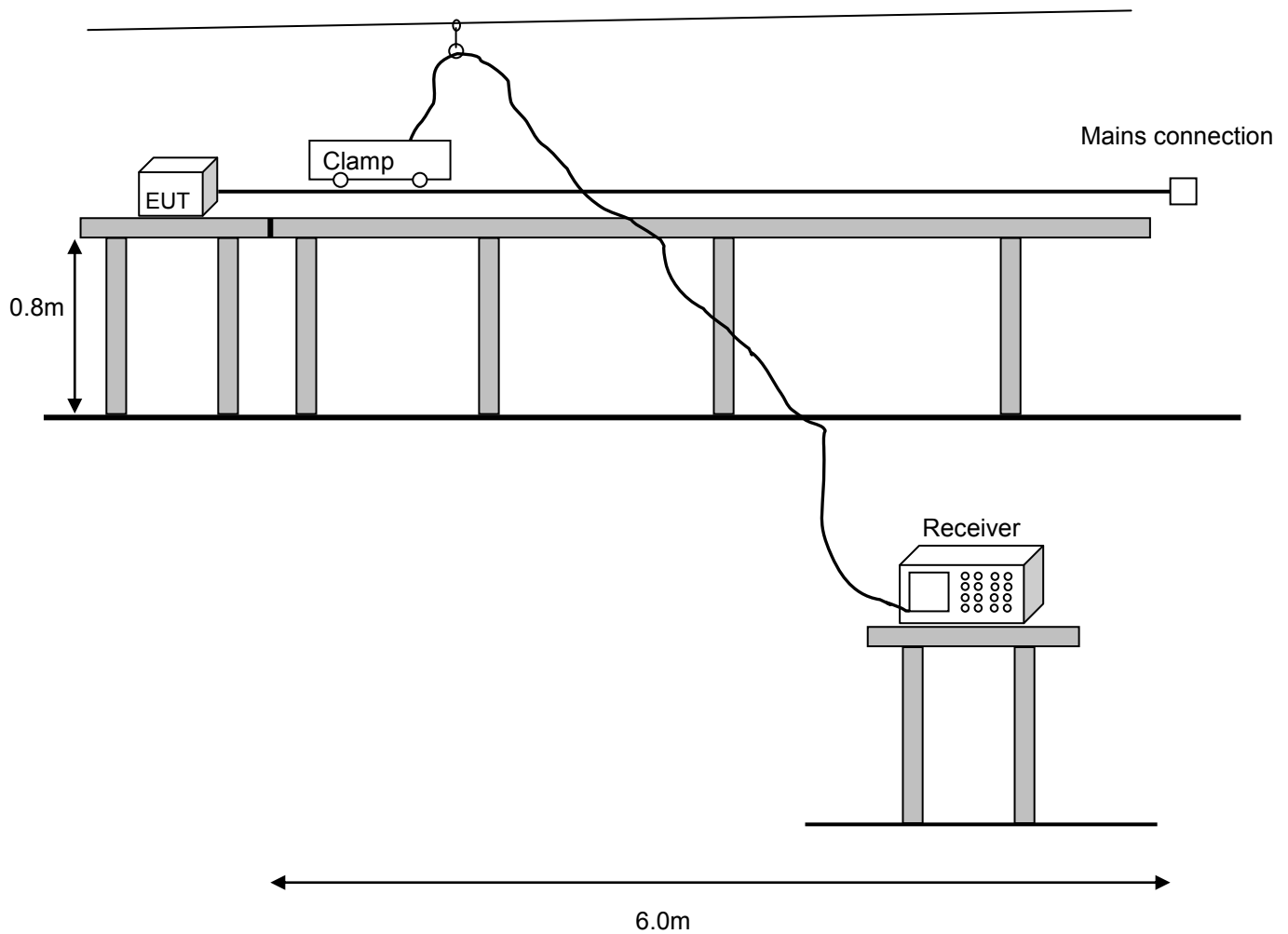
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.1582	28.85	10.35	39.25	65.53	-26.31	QP	Pass
2	0.1582	22.90	10.35	33.28	58.43	-25.20	AVG	Pass
3	0.4980	25.14	10.35	35.50	56.04	-20.58	QP	Pass
4	0.4980	16.05	10.35	26.50	54.18	-19.50	AVT	Pass
5	2.8520	29.40	10.38	39.85	56.02	-16.53	QP	Pass
6	2.8520	24.75	10.38	35.10	46.09	-10.10	AVG	Pass

5 Disturbance Power Test

5.1 Test Standard

EN 55014-1:2017+A11:2020

5.2 Diagram Test Setup



5.3 Test Equipment's Used

Refer to see section 3.

5.4 Test Description

5.4.1 Equipment Test Setup

Detector: Quasi-Peak and Average

Band Width: 120 KHz

Frequency Range: 30MHz to 300MHz

Clamp slide: 0 to 6 m

5.4.2 EUT Operation

The operation mode of EUT is same as Section 3.4.2.

5.5 Test Procedure

The EUT is placed on the table which is high 0.8m by insulating support and away from other metallic surface at least 0.8m. It is connected to the power mains through an extension cord of 6m minimums. The absorber clamp was clamps the cord and moves from the far end to EUT to measure the disturbing energy emitted from the cord.

5.6 Radiated Disturbance Limit

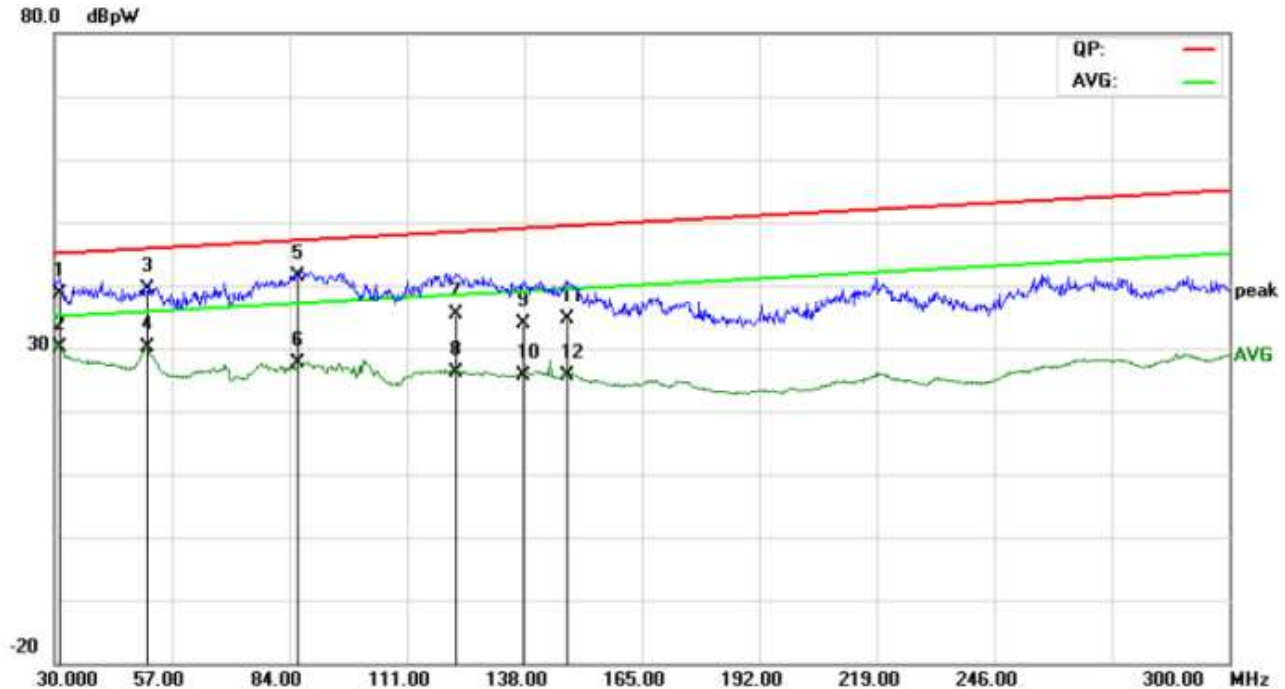
Frequency Range MHz	Limits(dBpW)	
	Quasi-Peak	Average
30 to 300	45 to 55	35 to 45
NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 30 MHz to 300 MHz		

5.7 Test Result and Test Data

Test Result: PASS

Test Data:

Test data refer to see following pages.



No.	Mk.	Freq. MHz	Reading Level dBpW	Correct Factor dB	Measure- ment dBpW	Limit dBpW	Over dB	Detector
1		31.3600	10.96	27.74	38.70	45.05	-6.35	QP
2	*	31.3600	2.47	27.74	30.21	35.05	-4.84	AVG
3		51.3600	13.32	26.01	39.33	45.79	-6.46	QP
4		51.3600	4.22	26.01	30.23	35.79	-5.56	AVG
5		86.1200	15.76	25.50	41.26	47.08	-5.82	QP
6		86.1200	2.12	25.50	27.62	37.08	-9.46	AVG
7		122.4800	11.23	24.12	35.35	48.43	-13.08	QP
8		122.4800	1.94	24.12	26.06	38.43	-12.37	AVG
9		137.9200	9.45	24.41	33.86	49.00	-15.14	QP
10		137.9200	1.26	24.41	25.67	39.00	-13.33	AVG
11		148.1200	10.80	23.74	34.54	49.37	-14.83	QP
12		148.1200	1.92	23.74	25.66	39.37	-13.71	AVG

Remark:

1. Corr. Factor (dB) = Clamp Factor (dB) + Cable Loss (dB)

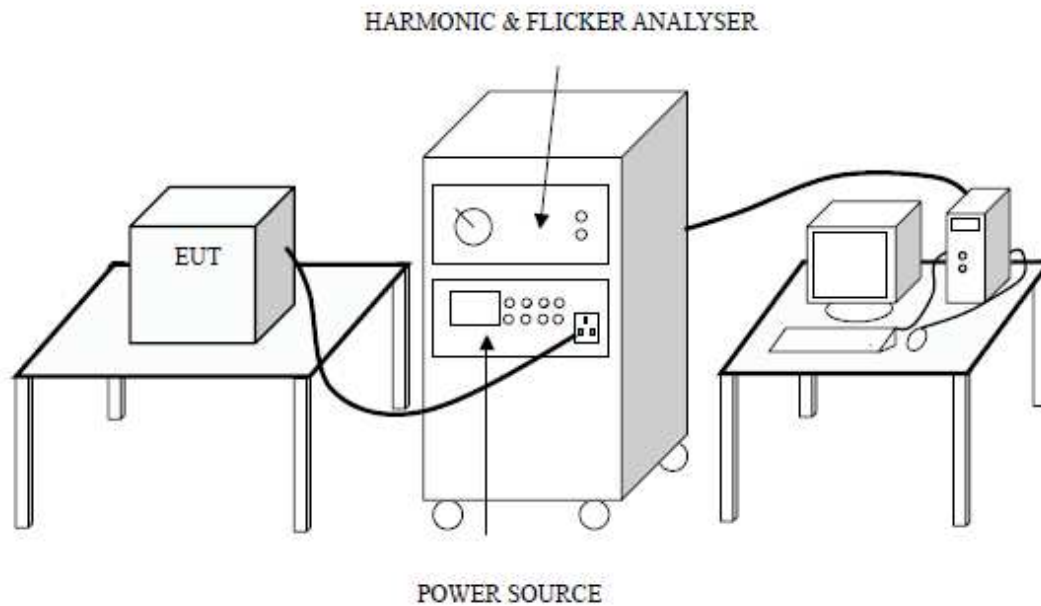
2. Margin (dB) = QuasiPeak/Average (dBpW)–Limit (dBpW)

6 Harmonic Current Emissions on AC Mains

6.1 Test Standard

EN 61000-3-2:2014

6.2 Diagram Test Setup



6.3 Test Equipment's Used

Refer to see section 3.

6.4 Test Description

Test Procedure see clause 6 of standard EN61000-3-2.

6.5 Test Result and Test Data

Test Result: PASS

E. U. T. Result

Check harmonics 2..40 [exception odd 21..39]:

Harmonic(s) > 150%:	
Order (n):	None
Harmonic(s) with average > 100%:	
Order (n):	None

Check odd harmonics 21..39:

All Partial Odd Harmonics below partial limits.	
Harmonic(s) > 150%:	
Order (n):	None
Harmonic(s) with average > 150%:	
Order (n):	None

Power Source Result

First dataset out of limit:	
DS (time):	None
Harmonic(s) out of limit:	
Order (n):	None

Average harmonic current results

Hn	I _{eff} [A]	I _{eff} [%]	Limit [A]	Result
1	3.250	100.000		
2	316.293E-3	9.713	1.05	PASS
3	89.630E-3	2.755	2.35	PASS
4	60.263E-3	1.853	430.00E-3	PASS
5	41.594E-3	1.277	1.14	PASS
6	28.008E-3	0.862	300.00E-3	PASS
7	38.027E-3	1.168	770.00E-3	PASS
8	19.432E-3	0.594	230.00E-3	PASS
9	28.003E-3	0.860	400.00E-3	PASS
10	14.378E-3	0.442	184.00E-3	PASS
11	26.417E-3	0.811	330.00E-3	PASS
12	11.736E-3	0.360	153.33E-3	PASS
13	21.863E-3	0.670	210.00E-3	PASS
14	9.644E-3	0.294	131.43E-3	PASS
15	18.593E-3	0.571	150.00E-3	PASS
16	8.227E-3	0.253	115.00E-3	PASS
17	15.900E-3	0.488	132.34E-3	PASS
18	7.487E-3	0.233	102.22E-3	PASS
19	13.683E-3	0.420	118.42E-3	PASS
20	6.783E-3	0.208	92.00E-3	PASS
21	13.530E-3	0.416	160.71E-3	PASS
22	6.493E-3	0.199	83.64E-3	PASS
23	11.018E-3	0.338	146.74E-3	PASS
24	5.473E-3	0.168	76.66E-3	PASS
25	10.484E-3	0.322	135.00E-3	PASS
26	5.587E-3	0.172	70.77E-3	PASS
27	8.320E-3	0.255	124.99E-3	PASS
28	5.029E-3	0.154	65.71E-3	PASS
29	8.682E-3	0.267	116.39E-3	PASS
30	4.968E-3	0.153	61.33E-3	PASS
31	6.878E-3	0.211	108.87E-3	PASS
32	4.341E-3	0.133	57.50E-3	PASS
33	6.740E-3	0.207	102.27E-3	PASS
34	4.482E-3	0.138	54.12E-3	PASS
35	5.710E-3	0.175	96.44E-3	PASS
36	4.297E-3	0.132	51.11E-3	PASS
37	5.861E-3	0.180	91.21E-3	PASS
38	3.960E-3	0.122	48.42E-3	PASS
39	5.423E-3	0.167	86.53E-3	PASS
40	3.812E-3	0.117	46.00E-3	PASS

Maximum harmonic current results

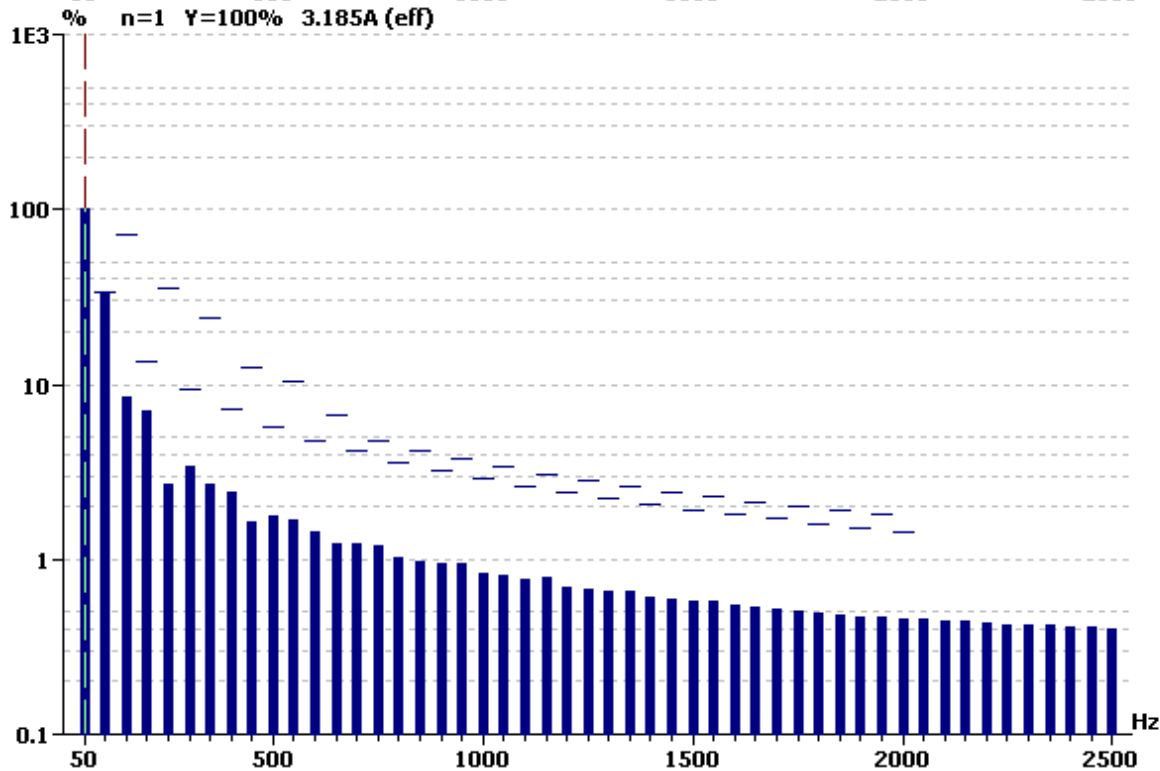
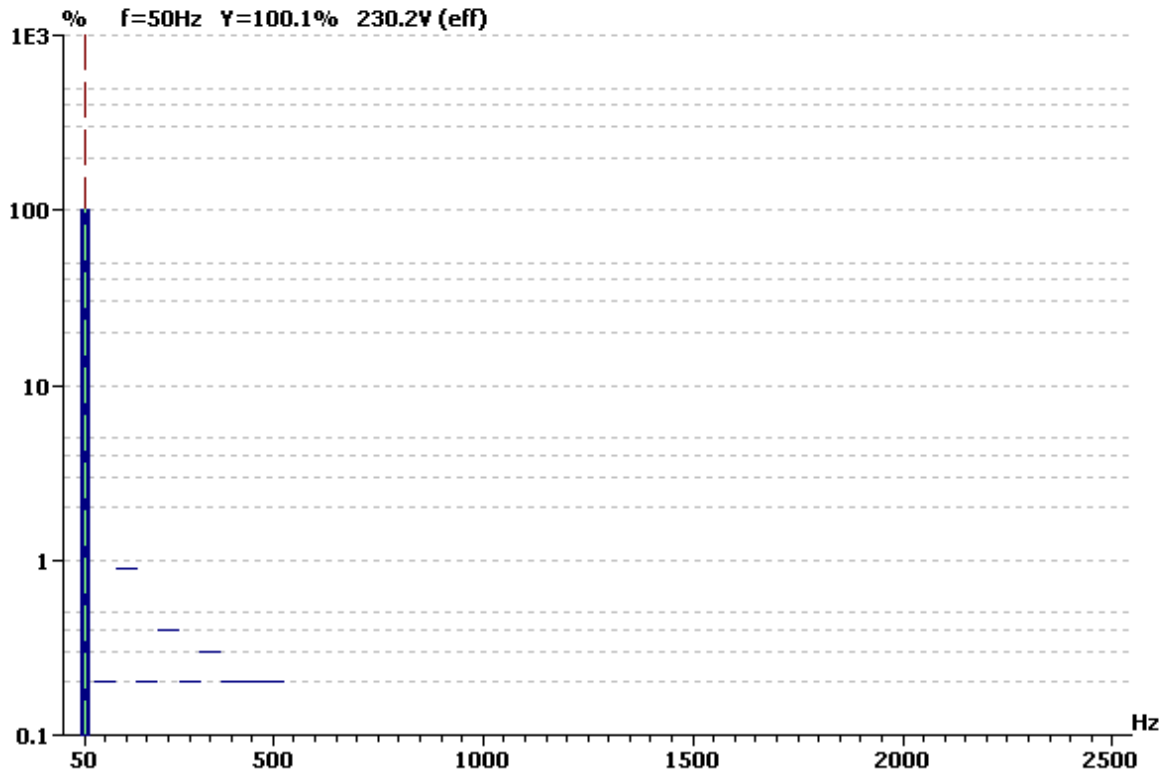
Hn	I _{eff} [A]	I _{eff} [%]	Limit [A]	Result
1	6.110	100.000		
2	1.121	18.311	1.64	PASS
3	272.223E-3	4.455	3.45	PASS
4	233.754E-3	3.823	645.00E-3	PASS
5	84.5609E-3	1.385	1.71	PASS
6	111.062E-3	1.818	450.00E-3	PASS
7	86.201E-3	1.411	1.15	PASS
8	77.490E-3	1.269	345.00E-3	PASS
9	52.394E-3	0.858	600.00E-3	PASS
10	56.371E-3	0.920	276.00E-3	PASS
11	52.766E-3	0.864	495.00E-3	PASS
12	45.715E-3	0.745	229.99E-3	PASS
13	39.038E-3	0.639	315.00E-3	PASS
14	39.117E-3	0.640	197.15E-3	PASS
15	38.421E-3	0.629	225.00E-3	PASS
16	32.888E-3	0.538	172.50E-3	PASS
17	30.891E-3	0.500	198.52E-3	PASS
18	29.988E-3	0.491	153.33E-3	PASS
19	30.180E-3	0.494	177.63E-3	PASS
20	26.224E-3	0.429	138.00E-3	PASS
21	25.895E-3	0.424	160.71E-3	PASS
22	24.489E-3	0.405	125.46E-3	PASS
23	24.914E-3	0.408	146.74E-3	PASS
24	22.067E-3	0.363	114.99E-3	PASS
25	21.691E-3	0.355	135.00E-3	PASS
26	21.000E-3	0.344	106.16E-3	PASS
27	21.179E-3	0.352	124.99E-3	PASS
28	19.375E-3	0.317	98.57E-3	PASS
29	19.044E-3	0.316	116.39E-3	PASS
30	18.263E-3	0.299	92.00E-3	PASS
31	18.488E-3	0.303	108.87E-3	PASS
32	17.466E-3	0.286	86.25E-3	PASS
33	16.901E-3	0.278	102.27E-3	PASS
34	16.389E-3	0.268	81.18E-3	PASS
35	16.392E-3	0.268	96.44E-3	PASS
36	15.843E-3	0.259	76.66E-3	PASS
37	15.335E-3	0.255	91.21E-3	PASS
38	15.061E-3	0.247	72.63E-3	PASS
39	15.101E-3	0.247	86.53E-3	PASS
40	14.625E-3	0.238	69.00E-3	PASS

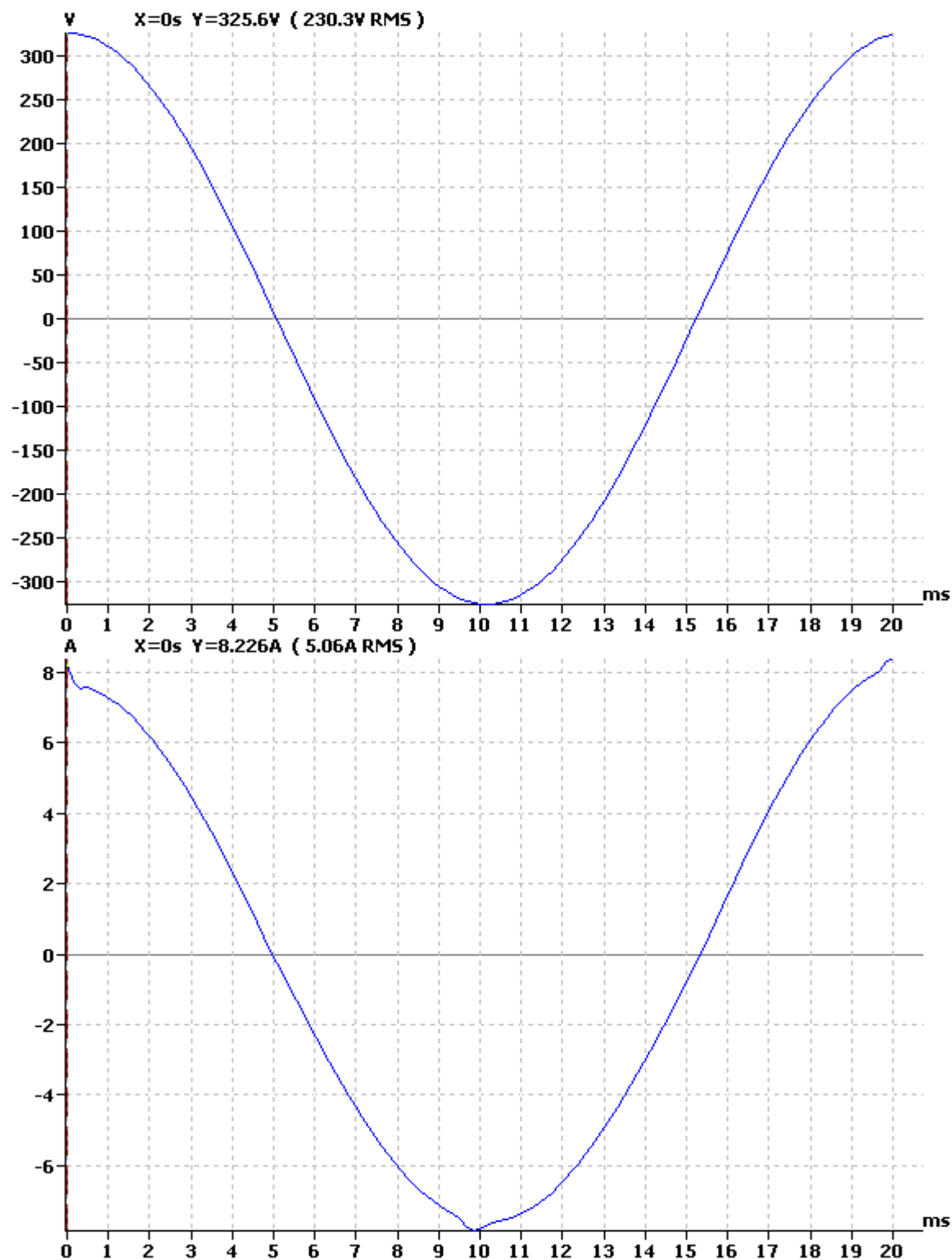
Maximum harmonic voltage results

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	230.43	100.194		
2	79.75E-3	0.035	0.2	PASS
3	112.98E-3	0.049	0.9	PASS
4	13.62E-3	0.006	0.2	PASS
5	54.05E-3	0.023	0.4	PASS
6	11.87E-3	0.005	0.2	PASS
7	76.24E-3	0.033	0.3	PASS
8	21.93E-3	0.010	0.2	PASS
9	65.30E-3	0.028	0.2	PASS
10	15.36E-3	0.007	0.2	PASS
11	67.85E-3	0.029	0.1	PASS
12	32.16E-3	0.014	0.1	PASS
13	85.17E-3	0.037	0.1	PASS
14	40.61E-3	0.018	0.1	PASS
15	94.49E-3	0.042	0.1	PASS
16	35.72E-3	0.016	0.1	PASS
17	77.05E-3	0.032	0.1	PASS
18	21.07E-3	0.009	0.1	PASS
19	69.77E-3	0.030	0.1	PASS
20	42.77E-3	0.019	0.1	PASS
21	91.78E-3	0.040	0.1	PASS
22	53.02E-3	0.023	0.1	PASS
23	65.07E-3	0.028	0.1	PASS
24	32.51E-3	0.014	0.1	PASS
25	50.16E-3	0.022	0.1	PASS
26	32.23E-3	0.014	0.1	PASS
27	82.86E-3	0.036	0.1	PASS
28	58.53E-3	0.025	0.1	PASS
29	69.16E-3	0.030	0.1	PASS
30	52.98E-3	0.023	0.1	PASS
31	52.95E-3	0.023	0.1	PASS
32	16.47E-3	0.007	0.1	PASS
33	52.52E-3	0.023	0.1	PASS
34	47.89E-3	0.021	0.1	PASS
35	75.23E-3	0.033	0.1	PASS
36	58.42E-3	0.025	0.1	PASS
37	42.36E-3	0.018	0.1	PASS
38	35.01E-3	0.015	0.1	PASS
39	37.16E-3	0.016	0.1	PASS
40	28.75E-3	0.013	0.1	PASS



No partial calculation (average odd harmonics [21..39] < 100%)



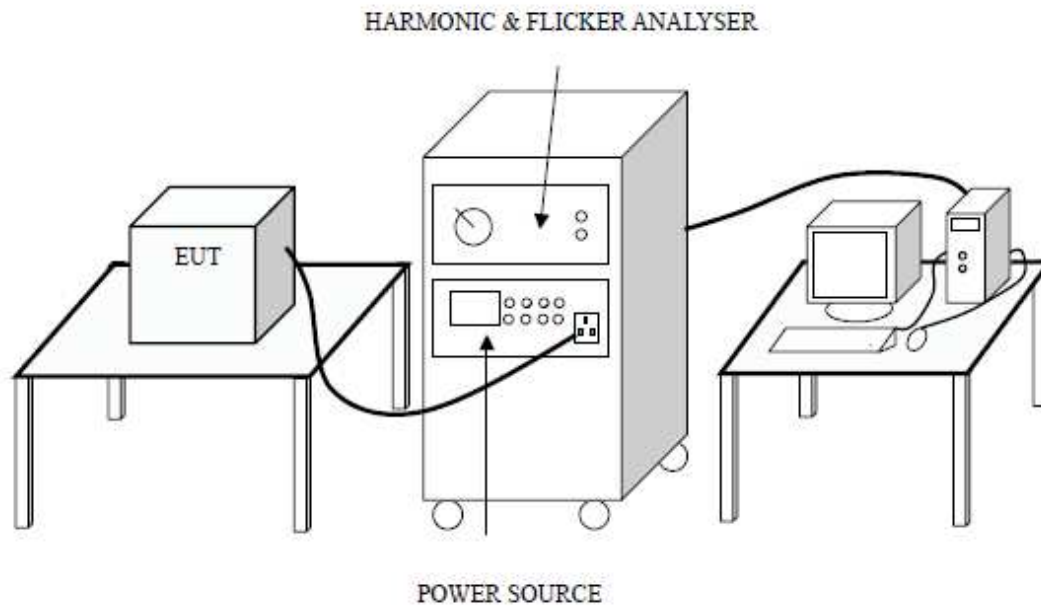


7 Flicker and Voltage Fluctuations

7.1 Test Standard

EN 61000-3-3:2013

7.2 Diagram Test Setup



7.2 Test Equipment's Used

Refer to see section 3.

7.3 Test Description

Test Procedure see clause 6 of standard EN61000-3-3.

7.4 Test Result and Test Data

Test Result: PASS



Maximum Flicker results

	EUT values	Limit	Result
Pst	0.023	1.00	PASS
Plt	0.035	0.65	PASS
dc [%]	0.016	3.30	PASS
dmax [%]	0.450	4.00	PASS
dt [s]	0.004	0.50	PASS

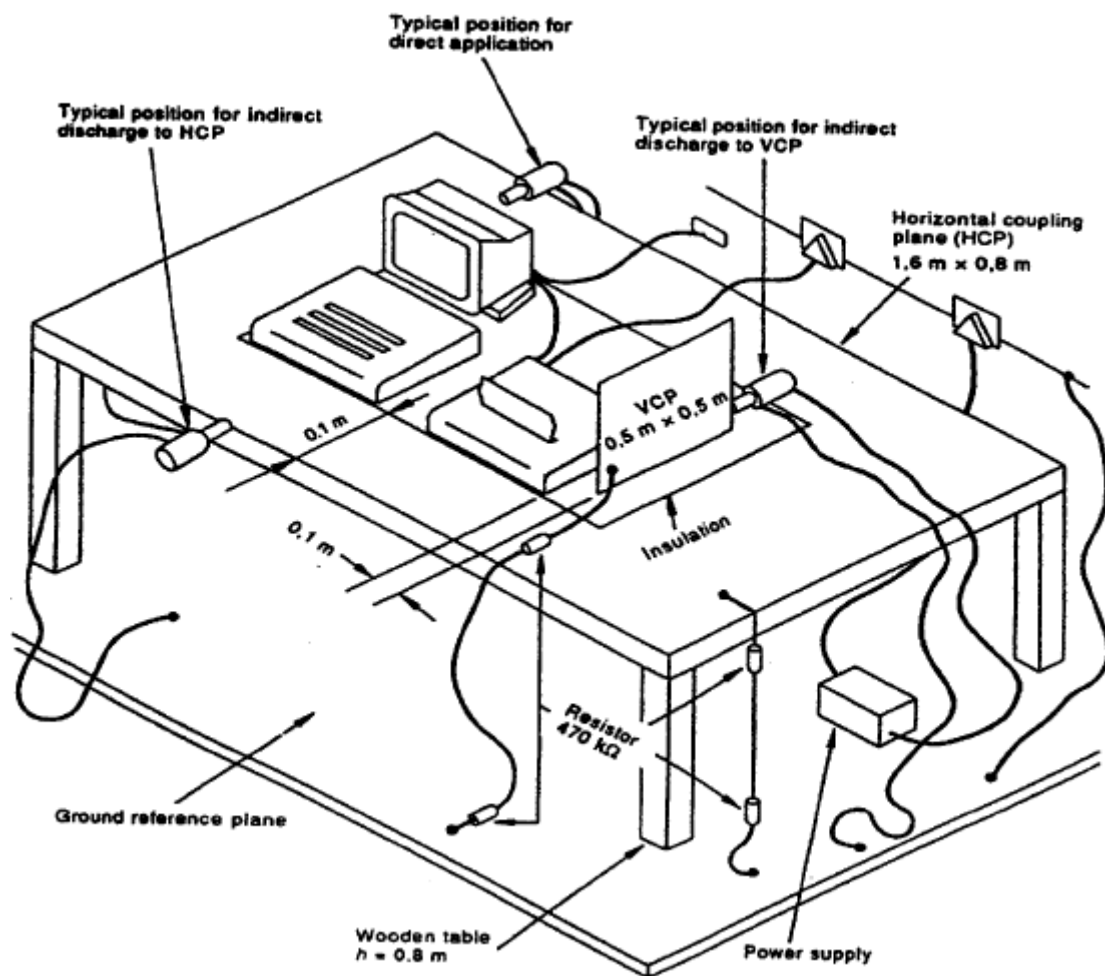
8 Electrostatic Discharges

8.1 Test Standards

EN 55014-2:1997+A1:2001+A2:2008

EN 61000-4-2:2009

8.2 Diagram of Test Setup



8.3 Test Equipment Used

Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
ESD tester	SCHNAFFNER	NSG435	8,1, 2023	1 Year

8.4 Test Required and Performance Criterion

Test method	Test Level	Performance Criterion
Air Discharges	$\pm 8\text{KV}$	B
Contact Discharges or Coupling	$\pm 4\text{KV}$	B

8.5 Test Description

8.5.1 EUT Operation

The operation mode of EUT is same as Section 3.4.2.

8.5.2 Test Procedure

Air Discharge:

— This test is done on non-conductive surfaces. The round discharge tip of the Electrostatic Discharge simulator shall be approached as fast as possible then to touch the EUT. After each discharge, the simulator shall be removed from the EUT. The simulator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Contact Discharge:

— All the procedure shall be same as air discharge, except using the acute discharge tip. The top end of the Electrostatic Discharge simulator is touch the EUT all the time when the simulator is re-triggered for a new single discharge and repeated 10 times for each pre-selected test point.

Indirect Discharge:

— The vertical coupling plane (VCP) is placed 0.1m away from EUT. The top end of Electrostatic Discharge simulator should aim at the center of one border of the VCP for at least 10 times discharge.

— The top end of Electrostatic Discharge simulator should place at the point 0.1m away from EUT on the horizontal coupling plane (HCP). At least 10 times discharge should be done for every pre-selected point around EUT.

Recording any performance degradation of the EUT during the test and judge the test result according to performance criterion.



8.6 Test Results

Immunity	ESD Electrostatic Discharge			☒ EN61000-4-2
Criterion:	B			Total: PASS
EUT	Vending Machine			
Ambient:	24.5°C	65% RH	1015mbar	
Test Site:				
Air Discharge:	±8kV	10 Discharges per test		
Contact/Indirect	±4kV	10 Discharges per test		
Operation Mode:	Working.			
Location		Kind	Result	
		Air Cont.		
All Exposed Surface & Seams		Air	PASS	
All metallic part		Cont.	PASS	
HCP		Cont.	PASS	
VCP		Cont.	PASS	
Note: Minimum 10 times at each test point				

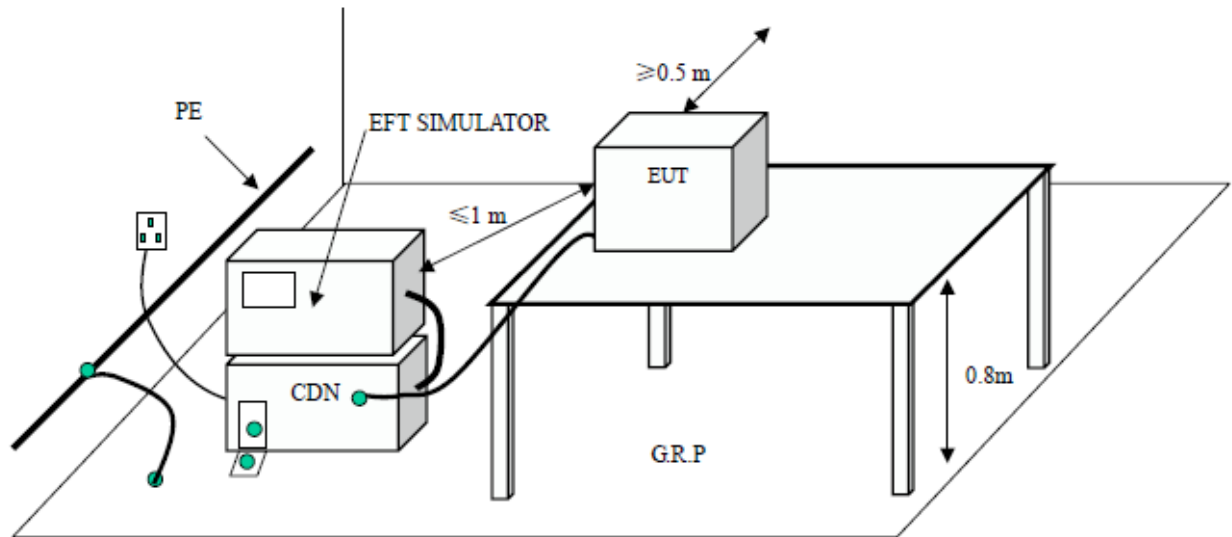
9 Electrical Fast Transients

9.1 Test Standards

EN 55014-2:1997+A1:2001+A2:2008

EN 61000-4-4:2012

9.2 Diagram of Test Setup



9.3 Test Equipment Used

Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
Simulator	EMTEST	UCS500M4	8,1, 2023	1 Year

9.4 Test Required and Performance Criterion

Open Circuit Output Test Voltage And Repetition Rate Of The Impulses					Performance criterion
Level	On Power Supply Port and PE		On I/O (input/output) signal, data and control ports		
	Voltage Peak (kV)	Repetition Rate kHz	Voltage Peak (kV)	Repetition Rate kHz	
1	0.5kV	50 or 100	0.25	50 or 100	B
2	1	50 or 100	0.5	50 or 100	B
3	2	50 or 100	1	50 or 100	B
4	4	50 or 100	2	50 or 100	B
X	Special	Special	Special	Special	B

9.5 Test Description

9.5.1 EUT Operation

The operation mode of EUT is same as Section 3.4.2.

9.5.2 Test Procedure

For AC power input ports:

EUT is connected to coupling/decoupling network which couples the EFT signal to power input lines. During the test, both polarities of the test voltage should be applied and the duration of the test can't be less than 1mins.

For signal / control lines and DC power lines:

The cables of EUT no longer than 3 m, shall not be tested.

EUT and its simulators shall be placed 0.8m high above the ground reference plane which is a minimum 1m*1m with minimum 0.65mm thickness. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

Recording any performance degradation of the EUT during the test and judge the test result according to performance criterion.

9.6 Test Results

Immunity	EFT(Fast Transient / Burst)			☒ EN 61000-4-4		
Criterion:	B			Total: PASS		
EUT:	Vending Machine					
Ambient:	24.5°C	65% RH	1015mbar			
Operation Mode:	Working.					
Line: ☒ AC Mains ☐ DC Supply ☐ Signal:						
Coupling: ☒ Direct ☐ Capacitive Clamp						
Conductor	Voltage	+	-	Voltage	+	-
L	1kV	PASS	PASS			
N	1kV	PASS	PASS			
PE	1kV	PASS	PASS			
L,PE	1kV	PASS	PASS			
N,PE	1kV	PASS	PASS			
L,N,PE	1kV	PASS	PASS			

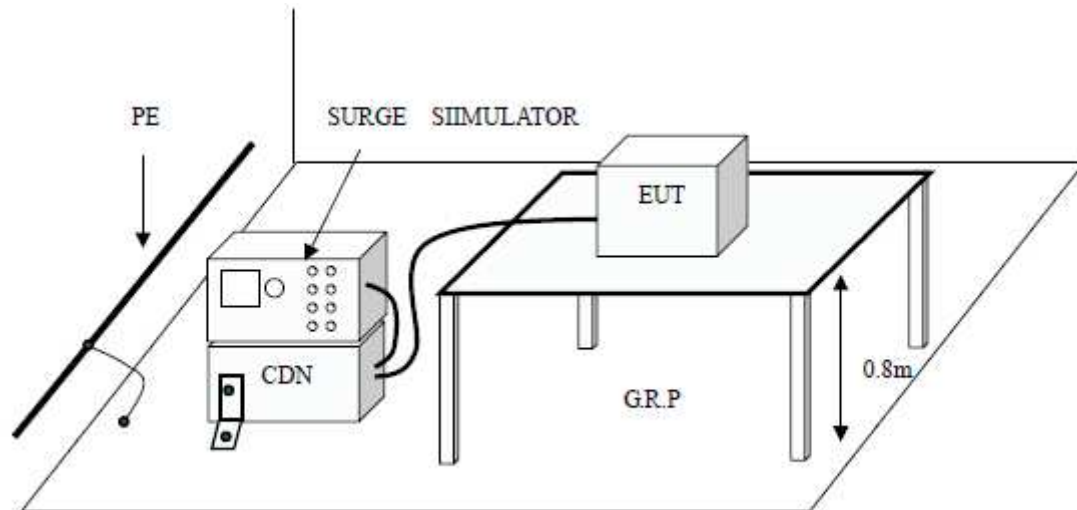
10 Surges

10.1 Test Standards

EN 55014-2:1997+A1:2001+A2:2008

EN 61000-4-5:2014+A1:2017

10.2 Diagram of Test Setup



10.3 Test Equipment Used

Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
Simulator	EMTEST	UCS500M4	8,1, 2023	1 Year

10.4 Test Required and Performance Criterion

Level	Test Voltage kV
1	0.5
2	1.0
3	2.0
4	4.0
X	Special

Performance Criterion: B



Note:

1. At signal ports and telecommunication ports, Applicable only to ports which according to the manufacturer's specification may connect directly to outdoor cables. And where normal functioning cannot be achieved because of the impact of the CDN on the EUT, no test shall be required.
2. At input d.c. power ports, Applicable only to ports which according to the manufacturer's specification may connect directly to outdoor cables. And excluding equipment marketed with an a.c/d.c, power converter

10.5 Test Description

10.5.1 EUT Operation

The operation mode of EUT is same as Section 3.4.2.

10.5.2 Test Procedure

In this test, the 1.2/50us& 8/20us surge generator must be used for AC power ports. The voltage for line to earth coupling mode is twice of that for line to line. At least 5 positive and 5 negative (polarity) surge signal with a maximum 1/min repetition rate are injected to AC power lines from 4 different phase angle(0°,90°,180°,270) during the test.

Recording any performance degradation of the EUT during the test and judge the test result according to performance criterion.

10.6 Test Results

Immunity	Surge				☒ EN 61000-4-5						
Criterion:	B				Total: PASS						
EUT:	Vending Machine										
Repetition:	5 times per test		Interval:	60 sec.							
Ambient:	24.3°C		65% RH		1015mbar						
Operation Mode:	Working.										
Line:	☒ AC Mains ☐ DC Supply ☐ Signal:										
	Volt:	500V		1kV		2kV		3kV		4kV	
Conductor	Phase	+	-	+	-	+	-	+	-	+	-
L – PE	0°	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	90°	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐
	180°	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	270°	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
N – PE	0°	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	90°	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐
	180°	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	270°	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
L – N	0°	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	90°	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐
	180°	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	270°	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐

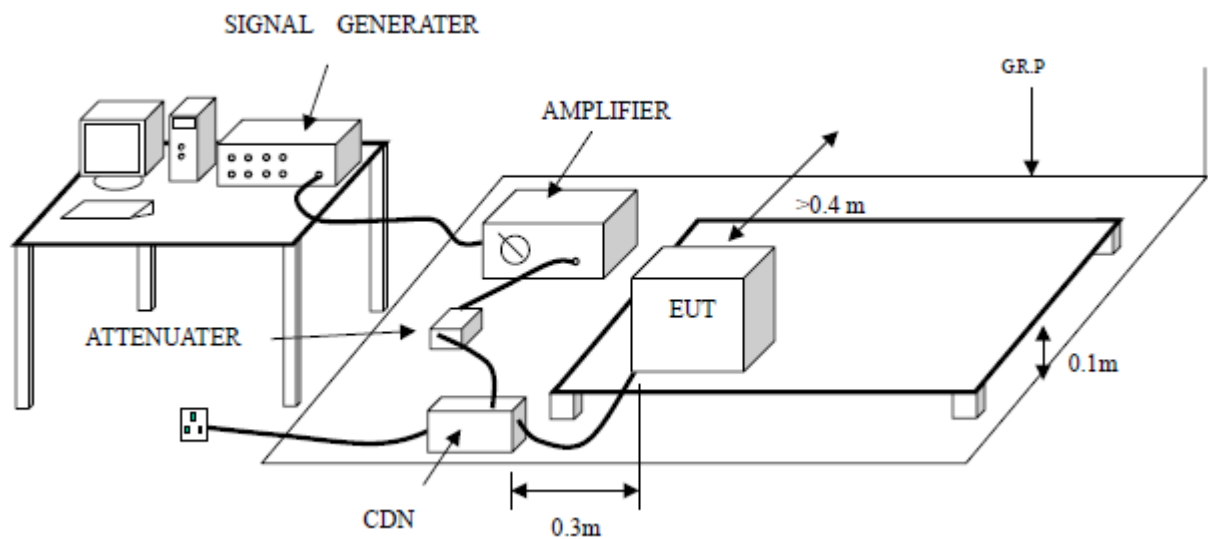
11 Conducted Immunity

11.1 Test Standards

EN 55014-2:1997+A1:2001+A2:2008

EN 61000-4-6:2014+AC:2015

11.2 Diagram of Test Setup



11.3 Test Equipments Used

Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
CW sine Generator	EMTEST	CWS500	8,1, 2023	1 Year
CDN	EMTEST	CDN-M2	8,1, 2023	1 Year

11.4 Test Required and Performance Criterion

Level	Voltage Level
1	0.4
2	1.0
3	2.01
4	4.5
X	Special

Performance Criterion: B

11.5 Test Description

11.5.1 EUT Operation

The operation mode of EUT is same as Section 3.4.2.

11.5.2 Test Procedure

Scanning Frequency: 150 KHz -- 80 MHz

Radiated Signal: 80% amplitude modulated with a 1 KHz sine wave.

Step Size: 1% of the start and thereafter 1% of the preceding frequency value.

Test specifications: 150 Ω source impedance.

EUT is placed on an insulating support of 0.1m high above a ground reference plane. It must be 0.3m away the CDN (coupling and decoupling network) of which the bottom is made of metallic material and placed directly on the ground plane. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible). The disturbance signal amplified by amplifier is injected to EUT through CDN.

Recording any performance degradation of the EUT during the test and judge the test result according to performance criterion.



11.6 Test Results

Immunity	Conducted Immunity			☒ EN 61000-4-6
Voltage level	3 V	Criterion:	B	Total: PASS
EUT:	Vending Machine			
Frequency Range:	150kHz to 80 MHz			
Modulation:	☐ none	☒ AM	☐ Pulse	1 kHz, 80%
Ambient:	24.5°C,	65% RH,	1015mbar	
Operation Mode:	Working.			
Line:	☒ AC Mains ☐ DC Supply ☐ Signal:			
Step Size:	1%			
Coupling:	☐ Cable Shielding, Grounding: ☐ 2 Sides ☐ 1 Side (+ 10nF)			
	☒ CDN			
Frequency	Note			

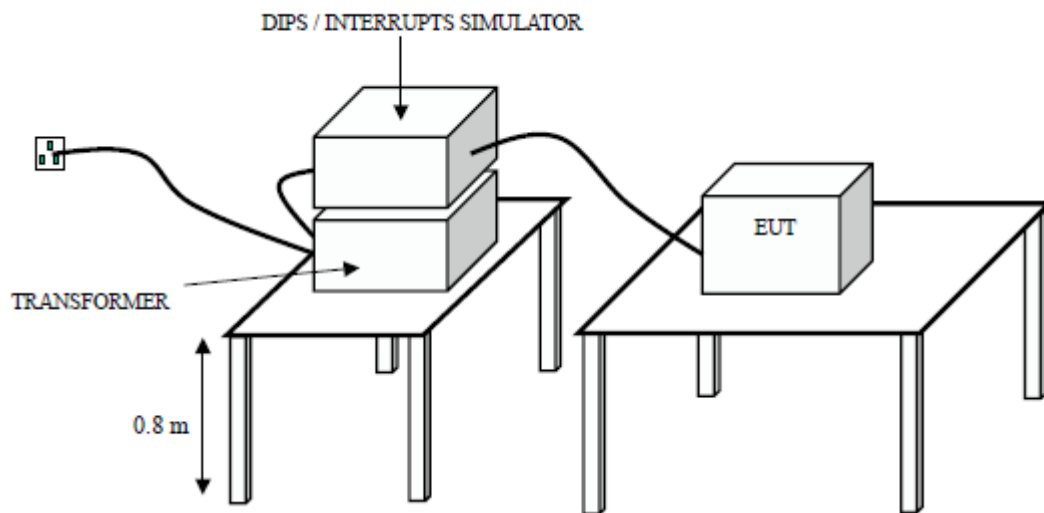
12 Voltage Dips and Interruptions

12.1 Test Standards

EN 55014-2:1997+A1:2001+A2:2008

EN IEC 61000-4-11:2020

12.2 Diagram of Test Setup



12.3 Test Equipment Used

Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
Simulator	EMTEST	UCS500M4	8,1, 2023	1 Year
EMCPRO	EMTEST	----	8,1, 2023	1 Year

12.4 Test Required and Performance Criterion

Level(Dropout % U_T)	Duration (In Period)	Performance Criterion
95	0.5	C
95	250	C
30	25	C

12.5 Test Description

12.5.1 EUT Operation

The operation mode of EUT is same as Section 3.4.2.

12.5.2 Test Procedure

EUT is connected to the simulator. When conducting the test level of 0.5 period duration, make sure that it shall start at the phase angle of 0° and 180°

12.6 Test Results

Immunity		Voltage dips, short interruptions and voltage variations			☒EN61000-4-11	
Criterion:		C			Total: PASS	
EUT:		Vending Machine				
Ambient:		24.5°C	65% RH	1015mbar		
Operation Mode:		Working.				
Voltage dips and short interruptions						
	Test level % UN	Voltage dip and short interruptions % UT	Duration (in period/time)	Result		Observations (Performance Criterion)
				Pass	Fail	
☒	100	0	0.5	☒	☐	C
☒	40	60	10	☒	☐	C
☒	70	30	50	☒	☐	C
Note:						

13 Photographs



Overview - model WM800



Internal view - model WM800

===== End of Test Report =====