TEST REPORT

DT&C Co., Ltd.
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si,
Gyeonggi-do, Korea 17042
Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DREKCEE2002-0144(1)

2. Client / Applicant

   • Name : INB KOREA LTD.

   • Address : 72, Jomaruro 411 Beon-gil, Bucheon-si, Gyeonggi-do, South Korea

3. Use of Report : CE Approval

4. Product Name / Model Name : Air purifier and sterilizer / VK-102

5. Test Method Used : EN 55014-1 : 2017
   EN 55014-2 : 2015
   EN 61000-3-2 : 2014
   EN 61000-3-3 : 2013

6. Date of Test : Feb. 10. 2020 ~ Feb. 21. 2020

7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

8. Testing Environment : Temperature (20 ~ 25) °C , Humidity (36 ~ 45) % R.H.

9. Test Result : Refer to the attached Test Result

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose.
This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

Affirmation	Tested by	Technical Manager
	Name : MinSu Park (Signature)	Name : KyoungHwan Bae (Signature)

The above test report is the accredited test result by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

Feb. 28. 2020

DT&C Co., Ltd.
Accredited by KOLAS, Republic of KOREA

'KS Q ISO/IEC 17025 and KOLAS accreditation'
* This laboratory is not accredited for the test results marked

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

CONTENTS

1. General Remarks

This report contains the result of tests performed by:

DT&C Co., Ltd.

42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042

http://www.dtnc.net

Tel: +82-31-321-2664 Fax: +82-31-321-1664

2. Test Laboratory

DT&C Co., Ltd. has been accredited / filed / authorized by the agencies listed in the following table;

Certificate	Nation	Agency	Code	Remark
Accreditation	Korea	KOLAS	393	ISO/IEC 17025
	South Africa	SABS	0006	ISO/IEC 17025
	Ghana	NCA	NCA agreement 23rd,Oct,2018	-
Site Filing	USA	FCC	KR0034 101842 678747, 596748, 804488, 165783	Accredited 2.948 Listed
	Canada	IC	5740A-3 5740A-4	Registered
	Japan	VCCI	C-1427, R-3385, R-4076, R-4180, R-4496, T-1442, G-10338, G-754, G-10815, G-20051	Registered
Certification	Korea	KC	KR0034	Designation
	Germany	TUV	CARAT 089112 0006 Rev.00	ISO/IEC 17025
	Russia	RMRS	17.10189.296	ISO/IEC 17025

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competent of calibration and testing laboratory”.

3. General Information of EUT

Applicant	INB KOREA LTD. 72, Jomaruro 411 Beon-gil, Bucheon-si, Gyeonggi-do, South Korea
Manufacturer	INB KOREA LTD. 72, Jomaruro 411 Beon-gil, Bucheon-si, Gyeonggi-do, South Korea
Product Name	Air purifier and sterilizer
Model Name	VK-102
Add Model Name	VK-001, VK-101, VK-002, VK-003, VK-103, VK-004, VK-104. VK-MEDI 02, VK-P-02, VK-P-03
Add Model Difference	There is no electrical or circuit change, adding derivative models to the marketing request
Maximum Internal Frequency	24 MHz
Software Version	INB sw 1.1
Hardware Version	INB hw 2.0
Rated Power	AC 220-240 V, 50/60 Hz
Classification of EUT	☐ CAT I (Category I) ☐ CAT II (Category II) ☐ CAT III (Category III) ☒ CAT IV (Category IV)
Remarks	None

4. EUT Operations and Test Configurations

4.1 Principle of Configuration Selection

Emission :
The equipment under test (EUT) was configured to measure its highest possible radiation level.
The test modes were adapted accordingly in reference to the instructions for use.
For each testing mode different configurations were used,
Refer to the individual tests.

Immunity :
The equipment under test (EUT) was configured to have its highest possible susceptibility against the tested phenomena. The test modes were adapted accordingly in reference to the instructions for use. For each testing mode different configurations were used.
Refer to the individual tests.

4.2 EUT Operation Mode

No.	Mode	Description
1	Normal operating	The EUT receives power and operates continuously.

4.3 Test Configuration Mode

No.	Mode	Description
1	Normal operating	The EUT receives power.

4.4 Supported Equipment

Used*	Product Type	Manufacturer	Model	Remarks
AE	-	-	-	-
*Abbreviations: AE - Auxiliary/Associated Equipment, or SIM - Simulator				

4.5 EUT In/Output Port

Name	Type*	Cable Max. >3m	Cable Shielded	Remarks
POWER	AC	1.9	Non shield	None
*Abbreviations: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal Input or Output Port TP = Telecommunication Ports				

4.6 Test Voltage and Frequency

Case	Voltage (V)	Frequency (DC/AC-Hz)	Phases	Remarks
1	AC 230	50	Single	None

5. Test Summary

Test Items	Applied Standards	Results
I. Emission		
Conducted Disturbance	EN 55014-1 : 2017	**C**
Disturbance power	EN 55014-1 : 2017	**C**
Discontinuous disturbance	EN 55014-1 : 2017	**C**
Radiated Disturbance	EN 55014-1 : 2017	**N/A (Note 1)**
Harmonic Current Emission	EN 61000-3-2 : 2014	**C**
Voltage Change, Fluctuations and Flicker	EN 61000-3-3 : 2013	**C**
II. Immunity		
Electrostatic Discharge	EN 55014-2 : 2015	**C**
	EN 61000-4-2 : 2009	
Radio-Frequency Electromagnetic Field	EN 55014-2 : 2015	**C**
	EN 61000-4-3 : 2006 / A1 : 2008 / A2 : 2010	
Fast Transient	EN 55014-2 : 2015	**C**
	EN 61000-4-4 : 2012	
Surges	EN 55014-2 : 2015	**C**
	EN61000-4-5 : 2014	
Radio-Frequency Continuous Conducted	EN 55014-2 : 2015	**C**
	EN61000-4-6 : 2014	
Voltage Dips	EN 55014-2 : 2015	**C**
	EN 61000-4-11 : 2004	
C=Comply N/C=Not Comply N/T=Not Tested N/A=Not Applicable		
Note 1) The specifications are satisfied with the Disturbance Power test, so the Radiated Disturbance test is excluded.		

The data in this test report are traceable to the national or international standards.

6. Test Environment

Test Items	Test date (YYYY-MM-DD)	Temp. (℃)	Humidity (% R.H.)	Pressure (kPa)
I. Emission				
Conducted Disturbance	2020-02-13	21	39	-
Disturbance power	2020-02-13	20	43	
Discontinuous disturbance	2020-02-13	21	39	
Harmonic Current Emission	2020-02-21	20	36	
Voltage Change, Fluctuations and Flicker	2020-02-19	20	36	
II. Immunity				
Electrostatic Discharge	2020-02-10	23	44	101.2
Radio-Frequency Electromagnetic Field	2020-02-11	25	45	101.3
Fast Transient	2020-02-12	23	45	101.2
Surges	2020-02-12	23	45	101.2
Radio-Frequency Continuous Conducted	2020-02-10	23	44	101.2
Voltage Dips	2020-02-12	23	45	101.2

7. Emission

7.1 Terminal disturbance voltages (150 kHz to 30 MHz)

EN 55014-1	Terminal disturbance voltages				Result
Method: Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks (LISN). Conducted voltage measurements on mains lines were made at the output of the LISN. Conducted voltage on load terminals and additional terminals were made by using a 1500 Ω probe.					Comply
Fully configured sample scanned over the following frequency range	**Frequency range on each side of line**			**Measurement Point**	
	0.15 MHz to 30 MHz			**Mains**	
EUT mode (Refer to clauses 4)	**Test configuration mode**			**1**	
	EUT Operation mode			**1**	
	Power Interface mode			**1**	
Terminal voltage limits for the frequency range 148,5 kHz to 30 MHz	**HOUSEHOLD APPLIANCES AND EQUIPMENT CAUSING SIMILAR DISTURBANCES AND REGULATING CONTROLS INCORPORATING SEMICONDUCTOR DEVICES**				
	Frequency (MHz)	**At mains terminals**		**At load terminals and additional terminals**	
		Quasi-Peak (dBµV)	**Average (dBµV)**	**Quasi-Peak (dBµV)**	**Average (dBµV)**
	0,15 to 0,50	60 to 56	59 to 46	80	70
	0,50 to 5	56	46	74	64
	5 to 30	60	50	74	64
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 0.5 MHz.					

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
MEASUREMENT SOFTWARE	EMI-C VER. 2.00.0171	TSJ	N/A	N/A	N/A
EMI TEST RECEIVER	ESU8	ROHDE&SCHWARZ	100299	2019.02.26	2020.02.26
PULSE LIMITER	ESH3-Z2	ROHDE&SCHWARZ	102491	2019.07.29	2020.07.29
LISN	NNLK 8129	SCHWARZBECK	8129-272	2019.07.17	2020.07.17

Mains terminal disturbance voltage _ Test setup photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**

Mains terminal disturbance voltage _ Measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**1**
Test voltage (V)	**230**	**Frequency (DC/AC-Hz)**	**50**

Results of Conducted Emission

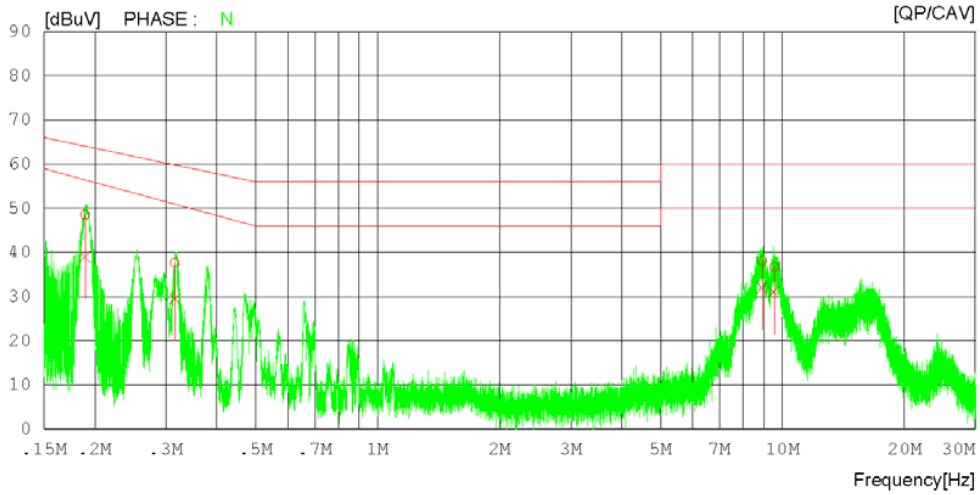
DT&C

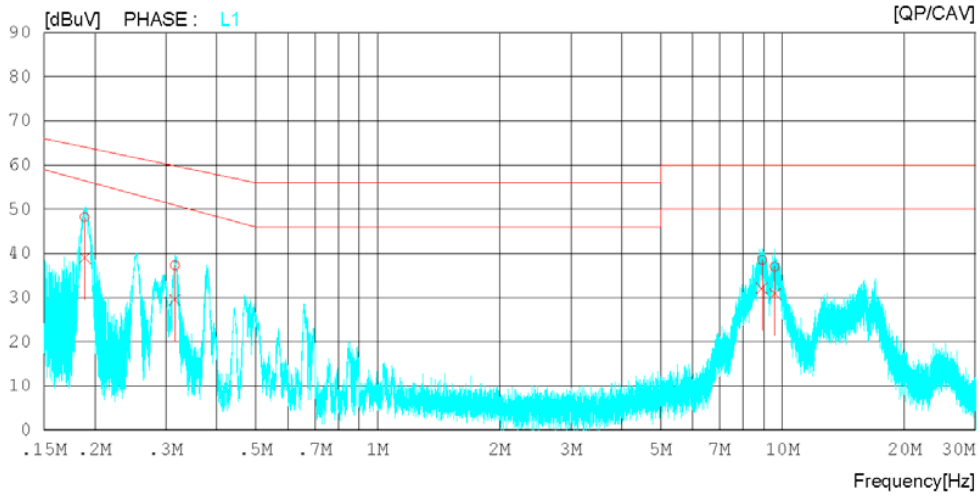
Date 2020-02-13

Order No. DTNC2002-01012
Power Supply 230 V 50 Hz
Temp/Humi. 21 `C 39 % R.H.
Atm

Memo

LIMIT : CISPR14-1 QP(Mains)
CISPR14-1 AV(Mains)





Results of Conducted Emission

DT&C Date 2020-02-13

Order No. DTNC2002-01012
Power Supply 230 V 50 Hz
Temp/Humi. 21 `C 39 % R.H.
Atm

Memo

LIMIT : CISPR14-1 QP(Mains)
CISPR14-1 AV(Mains)

NO	FREQ	READING QP	READING CAV	C.FACTOR	RESULT QP	RESULT CAV	LIMIT QP	LIMIT CAV	MARGIN QP	MARGIN CAV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.18952	38.47	28.97	10.12	48.59	39.09	64.06	56.47	15.47	17.38	N
2	0.31567	27.48	19.35	10.15	37.63	29.50	59.82	50.97	22.19	21.47	N
3	8.90247	27.68	21.64	10.36	38.04	32.00	60.00	50.00	21.96	18.00	N
4	9.53387	26.39	20.70	10.37	36.76	31.07	60.00	50.00	23.24	18.93	N
5	0.18913	38.05	28.83	10.12	48.17	38.95	64.07	56.50	15.90	17.55	L1
6	0.31589	27.15	19.28	10.14	37.29	29.42	59.81	50.96	22.52	21.54	L1
7	8.90312	28.14	21.67	10.36	38.50	32.03	60.00	50.00	21.50	17.97	L1
8	9.57522	26.64	20.49	10.37	37.01	30.86	60.00	50.00	22.99	19.14	L1

Calculation

N : Neutral phase, L1 : Live phase
C.FACTOR(dB) : Pulse Limiter(dB) + Cable loss(dB) + Insertion loss of LISN(dB)
Result(dBμV) : Reading Value(dBμV) + C.FACTOR(dB)
Margin(dB) : Limit(dBμV) - Result(dBμV)

7.2 Disturbance power - 30 MHz to 300 MHz

EN 55014-1	Disturbance power	Result
Method: Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks (LISN). The lead to be measured on is stretched in a straight line for a distance sufficient to accommodate the absorbing clamp, and to permit the necessary measuring adjustment of position for tuning. The clamp is placed around the lead so as to measure a quantity proportional to the disturbance on the lead.		Comply

Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point
	30 MHz to 300 MHz	Mains
EUT mode (Refer to clauses 4)	Test configuration mode	1
	EUT Operation mode	1
	Power Interface mode	1

Disturbance power limits for the frequency range 30 MHz to 300 MHz

Frequency (MHz)	General		Tools					
	Quasi-Peak dB (pW)	Average dB (pW) (Note1)	Quasi-Peak dB (pW))	Average dB (pW) (Note1)	Quasi-Peak dB (pW)	Average dB (pW) (Note1)	Quasi-Peak dB (pW)	Average dB (pW) (Note1)
30 to 300	45 to 55	35 to 45	45 to 55	35 to 45	49 to 59	39 to 49	55 to 65	45 to 55

Note 1 If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.
Note 2 The limit increases linearly with the logarithm of the frequency in the range 30 MHz to 300 MHz.

Margin when performing disturbance power measurement in the frequency range 30 MHz to 300 MHz

Frequency (MHz)	General		Tools					
	Quasi-Peak dB (pW)	Average dB (pW)	Quasi-Peak dB (pW)	Average dB (pW)	Quasi-Peak dB (pW)	Average dB (pW)	Quasi-Peak dB (pW)	Average dB (pW)
200 to 300	0 to 10 dB	-	0 to 10 dB	-	0 to 10 dB	-	0 to 10 dB	-

Note 1 This table only applies if specified in 4.1.2.3.2.
Note 2 The measured result at a particular frequency shall be less than the relevant limit minus the corresponding margin (at that frequency).

Measurement Instrument					
Description	Model	Manufacturer	Identifier	Cal. Date	Cal. Due
EMI TEST RECEIVER	ESR	ROHDE&SCHWARZ	101767	2019.12.17	2020.12.17
ABSORBING CLAMP	MDS21	LUTHI	3582	2019.12.07	2020.12.07
ATTENUATOR	CFA-03	TME	N/A	2019.12.07	2020.12.07
COMMON MODE ABSORPTION DEVICE	CMAD 1614	SCHWARZBECK	1614-128	2019.03.22	2020.03.22

Disturbance power _ Test setup photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**

Disturbance power _ Measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**1**
Test voltage (V)	**230**	**Frequency (DC/AC-Hz)**	**50**

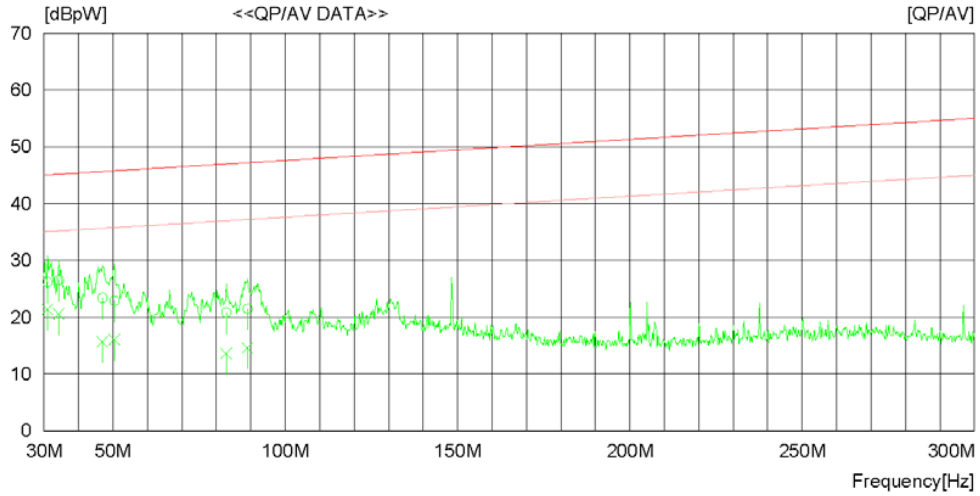
Disturbance Power

Dt&C
Date : 2020-02-13

Order No. : DTNC2002-01012
Power Supply : 230 V 50 Hz
Temp/Humi. : 20 'C 43 % R.H.
Test Condition : N/A

Memo :

LIMIT : QP
AV



No.	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FAC [dB]	RESULT QP [dBpW]	RESULT AV [dBpW]	LIMIT QP [dBpW]	LIMIT AV [dBpW]	MARGIN QP [dBpW]	MARGIN AV [dBpW]	CLAMP [cm]
1	31.080	15.4	10.6	10.8	26.2	21.4	45.0	35.0	18.8	13.6	210
2	34.320	16.1	10.2	10.4	26.5	20.6	45.2	35.2	18.7	14.6	160
3	47.010	14.6	6.9	8.8	23.4	15.7	45.6	35.6	22.2	19.9	170
4	50.520	14.4	7.6	8.5	22.9	16.1	45.8	35.8	22.9	19.7	100
5	82.920	12.6	5.4	8.2	20.8	13.6	47.0	37.0	26.2	23.4	110
6	89.130	13.1	6.2	8.4	21.5	14.6	47.2	37.2	25.7	22.6	140

Calculation

C.FACTOR(dB) : Attenuator(dB) + Cable loss(dB) + Insertion loss of ABSORBING CLAMP (dB)
Result(dBμV) : Reading Value(dBμW) + C.FACTOR(dB)
Margin(dB) : Limit(dBμW) - Result(dBμW)

7.3 Discontinuous Disturbance

EN 55014-1	Discontinuous Disturbance	Result
Method: Measurement of a disturbance, the amplitude of which exceeds the quasi-peak limit of continuous disturbance, the duration of which is not longer than 200 ms which is separated from a subsequent disturbance by at least 200 ms.		Comply

Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point
	0,15 MHz, 0,5 MHz, 1.4 MHz, 30 MHz	Mains
EUT mode (Refer to clauses 4)	Test configuration mode	1
	EUT Operation mode	1
	Power Interface mode	1

The test include Run A and Run B. The first one is to detect the Click rate and Run B is to detect how many clicks overtap the limits that are calculated according the formula below;
The sensitivity = Run A + 20 * log (30/Click rate) for 0.2 ≤ N < 30,
The Sensitivity = Run A + 44 for N < 0.2,

- First test run A

Frequency range (MHz)	0.15	0.50	1.40	30.00
Permitted limit for Continuous interference (dBμV)	66	56	56	60

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.

- Second test run B

Frequency range (MHz)	0.15	0.50	1.40	30.00
Permitted limit for clicks (dBμV)	L_q	L_q	L_q	L_q

$\triangle L$ = 44 dB for N < 0,2
$\triangle L$ = [20 log (30/N)] dB for 0,2 ≤ N < 30

The click limit L_q is determined from the formula :
$L_q = L + \triangle L$

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
LISN	NNLK 8129	SCHWARZBECK	8129-272	2019.07.17	2020.07.17
DIGITAL DISCONTINUOUS DISTURBANCE ANALYSER	DDA55	AFJ INSTRUMENTS	14041744118	2019.03.20	2020.03.20
SWITCHING OPERATION BOX	SW04/100A	AFJ INSTRUMENTS	SW041748133	N/A	N/A

Discontinuous Disturbance _ Test setup photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**

Discontinuous Disturbance at 0.15, 0.5, 1.4, 30 MHz _ Measurement data			
Test configuration mode	1	EUT Operation mode	1
Test voltage (V)	230	Frequency (DC/AC-Hz)	50

DDA55 TEST REPORT

TEST PASS

13/2/2020

Title	**DTNC2002-01012**	Time Test	**02:00:00.00**
Required		Executed by	**PMS**
Description			
Model	**VK-102**		
Type		SN	
Report	21 °C 39 % R.H. 99.6 kPa		

Mode	**Click Measurements**		
Type of Eut	**Air cleaners**		
Rx 150 KHz Att. [dB]	**20**	Rx 500 kHz Att. [dB]	**20**
Rx 1.4 MHz Att. [dB]	**20**	Rx 30 MHz Att. [dB]	**20**
Rx 150 kHz Input Offset [dB]	**0.06**	Rx 500 kHz Input Offset [dB]	**0.06**
Rx 1.4 MHz Input Offset [dB]	**0.08**	Rx 30 MHz Input Offset [dB]	**0.46**
External Att. [dB]	**NONE**		
Remote	**SW04 LT100 - NEUTRAL**		

	150 kHz	500 kHz	1.4 MHz	30 MHz
First Run				
Short	0	0	0	0
Long	0	0	0	0
Long (10< t ≤20 ms)	0	0	0	0
Tot. Clicks Corr	0	0	0	0
Events	0	0	0	0
Time(s)	0.00	0.00	0.00	0.00
Sw.Op.	1	1	1	1
5.4.3.5 events	0	0	0	0
Limit dBuV	66	56	56	60
N	0.00	0.00	0.00	0.00
	PASS	**PASS**	**PASS**	**PASS**

150 kHz	No Clicks	500 kHz	No Clicks
1.4 MHz	No Clicks	30 MHz	No Clicks

New Limit [dBuV]

Allowed Clicks

SECOND PASS NOT ALLOWED

Short

Long

Tot. Clicks Corr

Events

Time(s)

5.4.3.5 events

7.4 Radiated Disturbance

EN 55014-1	Radiated disturbance 30 MHz - 1 GHz	Result
Method: Measurements were made on a 10 meters open area test site that complies to CISPR 16. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meters with the receive antenna located at 1 meter height in both horizontal and vertical polarities. Final measurements (quasi-peak) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		**Not Applicable**

Fully configured sample scanned over the following frequency range	**Frequency range**	**Measurement distance**
	30 MHz - 1 GHz	**10 m measurement distance**
EUT mode (Refer to clauses 4)	**Test configuration mode**	**N/A**
	EUT Operation mode	**N/A**
	Power Interface mode	**N/A**

Radiated disturbance limits and testing methods for the frequency range 30 MHz to 1 000 MHz

Standard	Frequency range (MHz)	Limit / dBµV/m Quasi-peak	Remark
CISPR 16-2-3	30 - 230	30	Measurement distance 10 m
	230 - 300	37	
	300 - 1 000	37	

NOTE The lower limit is applicable at the transition frequency.

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
-	-	-	-	-	-

Radiated disturbance _ Test setup photo			
Test configuration mode	**N/A**	**EUT Operation mode**	**N/A**
N/A			
N/A			

Radiated disturbance at (30 ~ 1000) MHz _ Measurement data			
Test configuration mode	**N/A**	**EUT Operation mode**	**N/A**
Test voltage (V)	**N/A**	**Frequency (DC/AC-Hz)**	**N/A**

Calculation

Result(dBμV/m) : Reading Value(dBμV) + Cable loss(dB) - Pre amplifier gain(dB) + Ant. Factor(dB)
Margin(dB) : Limit(dBμV/m) - Result(dBμV/m)

7.5 Harmonic current emissions

EN 61000-3-2	Harmonic current emissions		Result
Method: This test consists on the measurement of harmonics components of the input current which may be produced by equipment having an input current up to and including 16 A per phase, and intended to be connected to public low-voltage distribution systems. The equipment is tested under specified conditions of operation.			**Comply**
EUT mode (Refer to clauses 4)	**Test configuration mode**	**1**	
	EUT Operation mode	**1**	
	Power Interface mode	**1**	
Classification in accordance with the standard	☒	Class A	
	☐	Class B	
	☐	Class C with active input power > 25 W	
	☐	Class C with active input power ≤ 25 W (First requirement, Table 3 column 2)	
	☐	Class C with active input power ≤ 25 W (Second requirement)	
	☐	Class D	
Classification of equipment	Class A	- balanced three-phase equipment - household appliances, excluding equipment identified as class D - tools, excluding portable tools - dimmers for incandescent lamps - audio equipment - equipments not specified in one of the three other classes	
	Class B	- portable tools - arc welding equipment which is not professional equipment	
	Class C	- lighting equipment	
	Class D	- Equipment specified power less than or equal to 600 W of the following types - personal computers and personal computer monitors - television receiver – refrigerators and freezers having one or more variable-speed drives to control compressor motor(s)	

1) According to EN 61000-3-2 the manufacturer shall specify the power of the apparatus. This value shall be used for establishing limits; the specified power shall be within ±10 % of the measured power.
2) Limit are not specified for
- Equipment with a rated power of 75 W or less (other than lighting equipment)
- Professional equipment with a total rated power greater than 1 kW
- Symmetrically controlled heating elements with a rated power less than or equal to 200 W
- Independent dimmers for incandescent lamps with a rated power less than or equal to 1 kW

Harmonic Current Emission Limit			
- Limit for Class A equipment			
Harmonic order (n) **Odd harmonics**	**Maximum permissible Harmonic current (A)**	**Harmonic order (n)** **Even harmonics**	**Maximum permissible Harmonic current (A)**
3 5 7 9 11 13 15 ≤ n ≤ 39	2.30 1.14 0.77 0.40 0.33 0.21 0.15 15/n	2 4 6 8 ≤ n ≤ 40	1.08 0.43 0.3 0.23 8/n
- Limit for Class B equipment			
It shall not exceed the value give in Class A multiplied by a factor of 1.5.			
- Limit for Class C equipment			
Harmonic order (n)	**Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency %**		
2 3 5 7 9 11 ≤ n ≤ 39 (odd harmonics only)	2 30·λ(λ is the circuit power factor) 10 7 5 3		
- Limit for Class D equipment			
Harmonic order (n)	**Maximum permissible Harmonic current per watt (mA/W)**	**Maximum permissible Harmonic current (A)**	
3 5 7 9 11 13 ≤ n ≤ 39 (odd harmonics only)	3.4 1.9 1.0 0.5 0.35 3.85/n	2.30 1.14 0.77 0.40 0.33 See Class A	

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
MULTIFUNCTION AC / DC POWER SOURCE	NETWAVE 60-400	EMTEST	P1311115470	2020.02.14	2021.02.14
DIGITAL POWER ANALYZER	DPA 503N	EMTEST	P1303109858	2020.02.14	2021.02.14
THREE-PHASE FLICKER IMPEDANCE	AIF 503N63	EMTEST	P1311114936	2020.02.14	2021.02.14

Harmonic current emissions _ Test setup photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**

Harmonic current emissions _ Measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**1**
Test voltage (V)	**230**	**Frequency (DC/AC-Hz)**	**50**

Test Report

Report Number :	DTNC2002-01012
Test Standard :	IEC 61000-3-2 (Edition 5) Limits for harmonic current emissions (equipment input current < 16 A per phase)
Test Date :	2/21/2020 10:35:27 AM

Result

E.U.T. :	PASS	Source :	PASS

Climatic Conditions

Temperature :	20 °C	Pressure :	101 kPa	Humidity :	36 %

Measures & Analysis

Measure Window :	10 periods	Voltage Range :	500 V
Refresh Interval :	2 s	Current Range :	10 A
Sampling Rate :	6.4 kS/s		
Scaled Window :	Rectangular		
According :	IEC 61000-3-2 (Edition 5) Limits for harmonic current emissions (equipment input current < 16 A per phase)		
Observation Period :	Quasi-stationary		

Measure Results

Standard Specific Results for IEC 61000-3-2 (Edition 5)

Standard Group:	Industry
Standard Name:	IEC 61000-3-2 (Edition 5) Limits for harmonic current emissions (equipment input current < 16 A per phase)
Device Under Test:	PASS
Power Source:	PASS
Connection Type:	L - N
Classification:	Class A
Appli. of Limits:	less than or equal to 150 %

Check Harmonics 2..40 [exception odd 21..39]	
First detected harmonic order > 150 %	
Line 1:	None
Harmonics orders > 150 %	

Line 1:	None
Harmonics orders with average > 100 %	
Line 1:	None

Check Odd Harmonics 21..39			
First detected time window with partial > partial limits			
	time window (time)	*measured value*	*limit*
Line 1:	None		0.251 A
Maximal time window with partial > partial limits			
	time window (time)	*measured value*	*limit*
Line 1:	None		0.251 A
First detected harmonic order > 150 %			
Line 1:	None		
Harmonics orders > 150 %			
Line 1:	None		
Harmonics orders with average > 150 %			
Line 1:	None		

Measured values	
Fundamental Current	
Line 1:	1.029 A
Active input Power	
Line 1:	234.946 W *
Circuit power factor	
Line 1:	0.979 *

** Absolute value.*

Current Test Result

Average and Maximum harmonic current results									
Hn	Average (100% / 150% *)				Maximum (150%)				Harmonic Result
	Ieff [A]	of Limit [%]	Limit [A]	Result	Ieff [A]	of Limit [%]	Limit [A]	Result	
1	1.024				1.028				
2	0.002	0.213	1.080	n/a	0.002	0.146	1.620	n/a	n/a
3	0.094	4.105	2.300	PASS	0.095	2.749	3.450	PASS	PASS
4	0.001	0.138	0.430	n/a	0.001	0.098	0.645	n/a	n/a
5	0.035	3.097	1.140	PASS	0.035	2.069	1.710	PASS	PASS
6	0.001	0.374	0.300	n/a	0.001	0.269	0.450	n/a	n/a
7	0.094	12.247	0.770	PASS	0.095	8.185	1.155	PASS	PASS
8	0.001	0.486	0.230	n/a	0.001	0.340	0.345	n/a	n/a
9	0.031	7.765	0.400	PASS	0.031	5.188	0.600	PASS	PASS
10	0.000	0.261	0.184	n/a	0.001	0.188	0.276	n/a	n/a
11	0.016	4.715	0.330	PASS	0.016	3.165	0.495	PASS	PASS
12	0.001	0.470	0.153	n/a	0.001	0.333	0.230	n/a	n/a

13	0.031	14.678	0.210	PASS	0.031	9.829	0.315	PASS	PASS
14	0.001	0.599	0.131	n/a	0.001	0.430	0.197	n/a	n/a
15	0.018	12.307	0.150	PASS	0.019	8.241	0.225	PASS	PASS
16	0.001	0.518	0.115	n/a	0.001	0.376	0.173	n/a	n/a
17	0.008	6.117	0.132	PASS	0.008	4.108	0.199	PASS	PASS
18	0.001	1.385	0.102	n/a	0.001	0.965	0.153	n/a	n/a
19	0.017	14.740	0.118	PASS	0.018	9.864	0.178	PASS	PASS
20	0.002	1.802	0.092	n/a	0.002	1.265	0.138	n/a	n/a
21	0.022	13.911	0.161	PASS	0.022	13.957	0.161	PASS	PASS
22	0.001	1.040	0.084	n/a	0.001	0.743	0.125	n/a	n/a
23	0.005	3.306	0.147	n/a	0.005	3.388	0.147	n/a	n/a
24	0.000	0.529	0.077	n/a	0.000	0.392	0.115	n/a	n/a
25	0.004	3.316	0.135	n/a	0.005	3.359	0.135	n/a	n/a
26	0.001	0.989	0.071	n/a	0.001	0.720	0.106	n/a	n/a
27	0.016	12.447	0.125	PASS	0.016	12.508	0.125	PASS	PASS
28	0.001	1.278	0.066	n/a	0.001	0.917	0.099	n/a	n/a
29	0.008	6.578	0.116	PASS	0.008	6.713	0.116	PASS	PASS
30	0.001	0.817	0.061	n/a	0.001	0.622	0.092	n/a	n/a
31	0.006	5.420	0.109	n/a	0.006	5.518	0.109	n/a	n/a
32	0.001	1.167	0.058	n/a	0.001	0.864	0.086	n/a	n/a
33	0.009	9.069	0.102	PASS	0.009	9.158	0.102	PASS	PASS
34	0.001	1.132	0.054	n/a	0.001	0.858	0.081	n/a	n/a
35	0.009	9.849	0.096	PASS	0.010	9.983	0.096	PASS	PASS
36	0.001	1.328	0.051	n/a	0.001	1.004	0.077	n/a	n/a
37	0.002	2.507	0.091	n/a	0.002	2.641	0.091	n/a	n/a
38	0.001	1.084	0.048	n/a	0.001	0.782	0.073	n/a	n/a
39	0.006	6.662	0.087	n/a	0.006	6.804	0.087	n/a	n/a
40	0.001	1.500	0.046	n/a	0.001	1.115	0.069	n/a	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.
** Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.*

Voltage Source Verification

Harmonic voltage results				
Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	230.640	100.278		
2	0.175	0.076	0.200	PASS
3	0.065	0.028	0.900	PASS
4	0.071	0.031	0.200	PASS
5	0.042	0.018	0.400	PASS
6	0.051	0.022	0.200	PASS
7	0.061	0.026	0.300	PASS
8	0.035	0.015	0.200	PASS
9	0.058	0.025	0.200	PASS
10	0.029	0.013	0.200	PASS
11	0.035	0.015	0.100	PASS

12	0.026	0.011	0.100	PASS
13	0.033	0.014	0.100	PASS
14	0.026	0.011	0.100	PASS
15	0.020	0.009	0.100	PASS
16	0.019	0.008	0.100	PASS
17	0.021	0.009	0.100	PASS
18	0.022	0.010	0.100	PASS
19	0.015	0.006	0.100	PASS
20	0.019	0.008	0.100	PASS
21	0.012	0.005	0.100	PASS
22	0.018	0.008	0.100	PASS
23	0.018	0.008	0.100	PASS
24	0.013	0.006	0.100	PASS
25	0.012	0.005	0.100	PASS
26	0.011	0.005	0.100	PASS
27	0.015	0.006	0.100	PASS
28	0.017	0.007	0.100	PASS
29	0.018	0.008	0.100	PASS
30	0.009	0.004	0.100	PASS
31	0.020	0.009	0.100	PASS
32	0.015	0.007	0.100	PASS
33	0.018	0.008	0.100	PASS
34	0.013	0.006	0.100	PASS
35	0.019	0.008	0.100	PASS
36	0.014	0.006	0.100	PASS
37	0.018	0.008	0.100	PASS
38	0.011	0.005	0.100	PASS
39	0.010	0.005	0.100	PASS
40	0.011	0.005	0.100	PASS

7.6 Voltage change, fluctuations and flicker

EN 61000-3-3	Voltage change, fluctuations and flicker		Result
Method: EUT was connected to the Power Analyzer system. Measurements were conducted to obtain the desired flicker parameters. The measuring time depends on which parameters are to be measured. The measurement was performed with the test software			Comply
EUT mode (Refer to clauses 4)	Test configuration mode	1	
	EUT Operation mode	1	
	Power Interface mode	1	
parameters	P_{st}	the short-term flicker indicator, P_{st}, shall not be greater than 1.0	
	P_{lt}	the long-term flicker indicator, P_{lt}, shall not be greater than 0.65	
	T_{max}	T_{max} the accumulated time value of d(t) with a deviation exceeding 3,3 % during a single voltage change at the EUT terminals, shall not exceed 500 ms	
	d_c	The maximum relative steady-state voltage change, d_c, shall not exceed 3.3 %	
	d_{max}	The maximum relative voltage change d_{max}, shall not exceed 4 % without additional conditions 6 % for equipment which is switched manually, if any 7 % for equipment which is attended whilst in use	

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
MULTIFUNCTION AC / DC POWER SOURCE	NETWAVE 60-400	EMTEST	P1311115470	2020.02.14	2021.02.14
DIGITAL POWER ANALYZER	DPA 503N	EMTEST	P1303109858	2020.02.14	2021.02.14
THREE-PHASE FLICKER IMPEDANCE	AIF 503N63	EMTEST	P1311114936	2020.02.14	2021.02.14

Voltage change, fluctuations and flicker _ Test setup photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**

Voltage change, fluctuations and flicker _ Measurement data			
Test configuration mode	**1**	**EUT Operation mode**	**1**
Test voltage (V)	**230**	**Frequency (DC/AC-Hz)**	**50**

Test Report

Report Number :	DTNC2002-01012
Test Standard :	IEC 61000-3-3 (Edition 3) Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
Test Date :	2/19/2020 6:33:47 PM

Result

E.U.T. : Test passed

Climatic Conditions

Temperature : 20 °C Pressure : 101 kPa Humidity : 36 %

Flicker Results

Standard Specific Results for IEC 61000-3-3 (Edition 3)

Standard Group:	Industry
Standard Name:	IEC 61000-3-3 (Edition 3) Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
Test Condition:	General Test Conditions
Analysis Status:	PASS

Flicker Measurements Settings	
Main line:	230V, 50Hz
Flicker Meter:	230V / 50Hz
Flicker Impedance:	Zref
Observation Time:	12 × 10 min
Measurements performed:	12

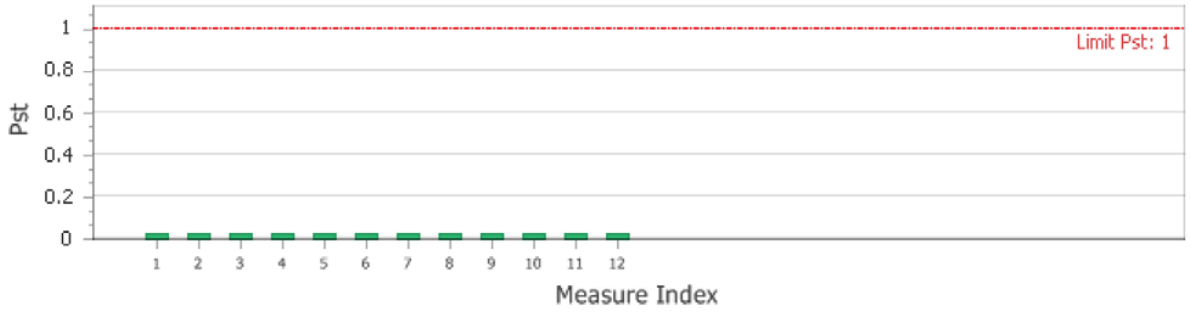
Flicker Measurements					
	P_{lt}	Max P_{st}	Max D_c	Max D_{max}	Max T_{max}
Line 1:	0.028	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

Pst Data

Flicker (Line 1)

Meas. Number	P0,1	P1s	P3s	P10s	P50s	Pst	dc [%]	dmax [%]	Tmax [s]
1	0	0	0	0.001	0.005	0.028	0	0.192	0
2	0	0	0	0.001	0.005	0.028	0	0.051	0
3	0	0	0	0.001	0.005	0.028	0	0.047	0
4	0	0	0	0.001	0.005	0.028	0	0.049	0
5	0	0	0	0.001	0.005	0.028	0	0.048	0
6	0	0	0	0.001	0.005	0.028	0	0.05	0
7	0	0	0	0.001	0.005	0.028	0	0.049	0
8	0	0	0	0.001	0.005	0.028	0	0.05	0
9	0	0	0	0.001	0.005	0.028	0	0.048	0
10	0	0	0	0.001	0.005	0.028	0	0.049	0
11	0	0	0	0.001	0.005	0.028	0	0.047	0
12	0	0	0	0.001	0.005	0.028	0	0.047	0

Short-term Flicker Severity (Pst) (Line 1)



Long-term Flicker Severity (Plt) (Line 1)

8. Test Results : Immunity

Application of tests for the different categories of apparatus

Category I apparatus is deemed to fulfill the relevant immunity requirements without testing.

Category II apparatus shall fulfill the following requirements :
- electrostatic discharge with performance criterion B
- fast transients with performance criterion B
- injected currents up to 230 MHz with performance criterion A
- surges with performance criterion B
- voltage dips with performance criterion C

Category III apparatus shall fulfill the following requirements :
- electrostatic discharge with performance criterion B
  A performance criterion C could be applied to toys not using score or data entered by the user. Examples are musical soft toys, sounding toys, etc.
- radio frequency electromagnetic fields with performance criterion A
  For toys, the radio frequency electromagnetic fields test is only applicable for ride on toys.

Category IV apparatus shall fulfill the following requirements :
- electrostatic discharge with performance criterion B
- fast transients with performance criterion B
- injected currents up to 80 MHz with performance criterion A
- radio frequency electromagnetic fields with performance criterion A
- surges with performance criterion B
- voltage dips with performance criterion C

Performance criteria as defined by the standard	
Criterion	**Description from standard**
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.
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 to persist after the test. 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.
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.
Other:	-

Functions (non-exhaustive)	Criteria			
	A	B [b]	C1 [c]	C2 [c]
Motor speed	10 % a	-	+	–
Torque	10 % a	-	+	–
Movement	10 % a	-	+	–
Power (consumption, input)	10 % a	-	+	–
Switching (change of state)	–	-	+	–
Heating	10 % a	-	+	–
Timing (programme, delay, duty cycle)	10 % a	-	+	–
Stand-by	-	-	d	–
Data storage	-	-	e	e
Sensor functions (signal transmission)	f	-	g	-
Indicators (visual and acoustic)	f	-	g	-
Audio function	f	-	g	-
Illumination	f	-	g	-

- \- No change allowed.
- \+ Change allowed.
- a Values are exclusive of the measurement accuracy.
- b For criterion B, measurement or verification is performed during the stable operations of the Equipment Under Test before and after the application of the specified phenomenon.
- c For criterion C, distinction is made between
  C1: before resetting and
  C2: after resetting.
- d Switching-off is allowed, switching-on is not allowed.
- e Loss or change of data is allowed.
- f Lower performance as specified by the manufacturer is allowed, but no loss of correct function.
- g Loss of correct functions allowed.

The apparatus covered by this standard is subdivided into categories. For each category, specific requirements are formulated.	
Category	**Description from standard**
I	Apparatus containing no electronic control circuitry. All appliances having no electronic control circuitry are considered to be category I. Electric circuits consisting of passive components (such as radio interference suppression capacitors or inductors, mains transformers, mains frequency rectifiers and heating elements) are not considered to be electronic control circuitry. EXAMPLES Appliances operated with a motor and mechanical switch only; lighting toys with a battery and a LED or incandescent lamp without additional electronic control circuitry; track sets without electronic control circuitry; heating or cooling appliances without electronic control circuitry; tools without electronic controls and all other apparatus containing only electromechanical components (e. g. switches or thermostats).
II	Transformer toys, dual supply toys, mains powered motor operated appliances, tools, heating appliances and similar electric apparatus (for example – UV radiators, IR radiators and microwave ovens) containing electronic control circuitry with no clock frequency higher than 15 MHz. NOTE For toys, examples include educational computers, organs, track sets with electronic control units.
III	Equipment which in normal use, is not connected to a power network and has no cables attached. This category includes apparatus provided with rechargeable batteries, solar or other similar d.c. power sources which can be charged or operated by connecting the apparatus to the mains power. However, this apparatus shall also be tested as an apparatus in category II while it is connected to the mains network. NOTE For toys, examples include musical soft toys, cord-controlled toys and motor-operated electronic toys.
IV	All other apparatus covered by the scope of this standard.

8.1 Electrostatic Discharge

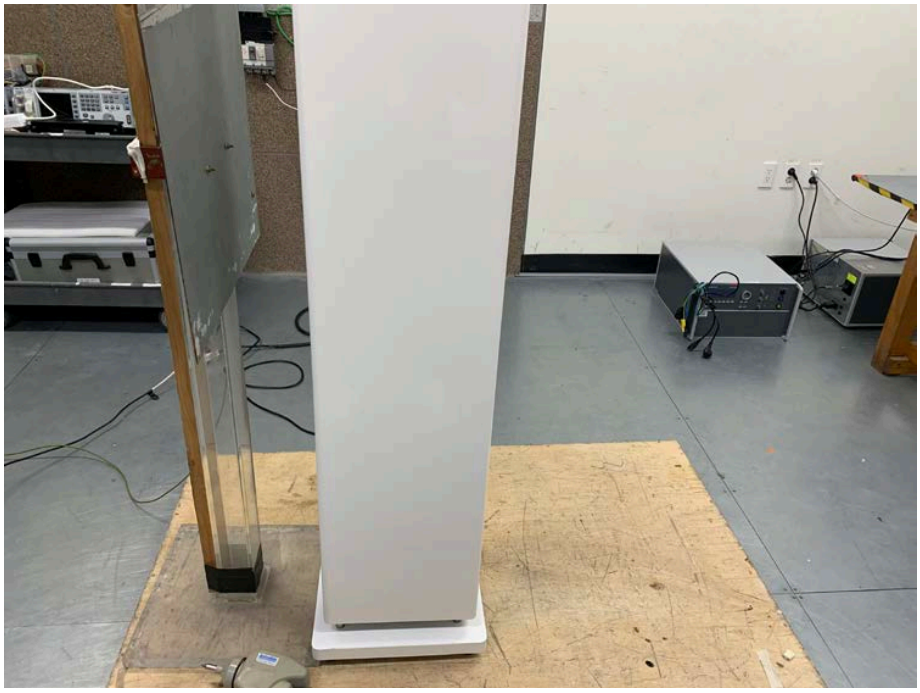
EN 55014-2	Electrostatic Discharge	Result
Method: The test set-up was made accordance with **EN 61000-4-2**. A ground reference plane was located on the floor, and connected to earth via a low impedance connection. The return cable of the ESD generator was connected to the reference plane. In case of table top equipment, EUT was placed on the reference plane on 80 cm of insulating support. And a vertical coupling plane (VCP) of (0.5 x 0.5) m was located 10 cm from the EUT's sides. The VCP was connected to the reference plane via a cable with a 470 kΩ (2ea) resistor. The test was made by applying contact and air discharges to the EUT and contact discharges to the VCP/HCP. When applying the discharges to the VCP the tip of the generator was located at the middle edge of the VCP. The VCP was located 10 cm from each side of the EUT. Contact discharges were applied to various points of the EUT at conductive surfaces and to the HCP/VCP. Air discharges were applied to various points of the EUT at non-conductive surfaces. Tests with other (lower) voltages than those given in below table are not required.		**Comply**

EUT mode (Refer to clauses 4)	**Test configuration mode**	**1**
	EUT Operation mode	**1**
	Power Interface mode	**1**

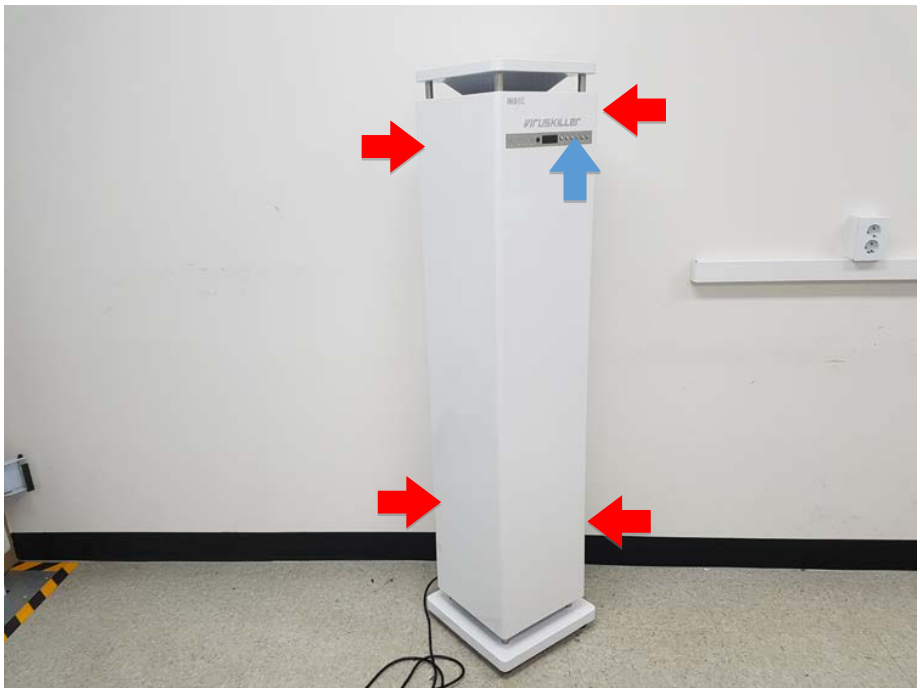
Test spec	
Direct : Air Discharges Contact Discharges	8 kV 4 kV
Indirect : HCP (Floor-stand product excluded) VCP	4 kV
Polarity	+ and -
Number of discharges per point for each voltage and polarity Air Discharge Contact Discharge	 10 10
Discharge impedance	330 Ω / 150 pF
Discharge Repetition	≥1 sec
Performance criteria	B

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
ELECTROSTATIC DISCHARGE SYSTEM	ESS-B3011	NOISEKEN	ESS1438118	2019.12.06	2020.12.06
ESD GUN	GT-30R	NOISEKEN	N/A	2019.12.06	2020.12.06

Electrostatic discharge _ Test setup photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**



Electrostatic discharge position photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**



Air Discharge : ——→ Contact Discharge : ——→

Electrostatic discharge _ Test result					
Test configuration mode	**1**	**EUT Operation mode**		**1**	
Indirect Discharge					
No.	**Position**	**Kind of Discharge**	**Test level**	**Performance Criteria**	**Result**
1	Horizontal Coupling Plane	Contact	±4 kV	B	Note1)
2	Vertical Coupling Plane				A
Direct Discharge					
No.	**Position**	**Kind of Discharge**	**Test level**	**Performance Criteria**	**Result**
1	Enclosure	Contact	±4 kV	B	A
2	Screw				A
3	Button	Air	±8 kV		A
Note 1) The indirect discharge method wasn't tested because the EUT is floorstanding equipment.					

8.2 Radio-Frequency Electromagnetic Field

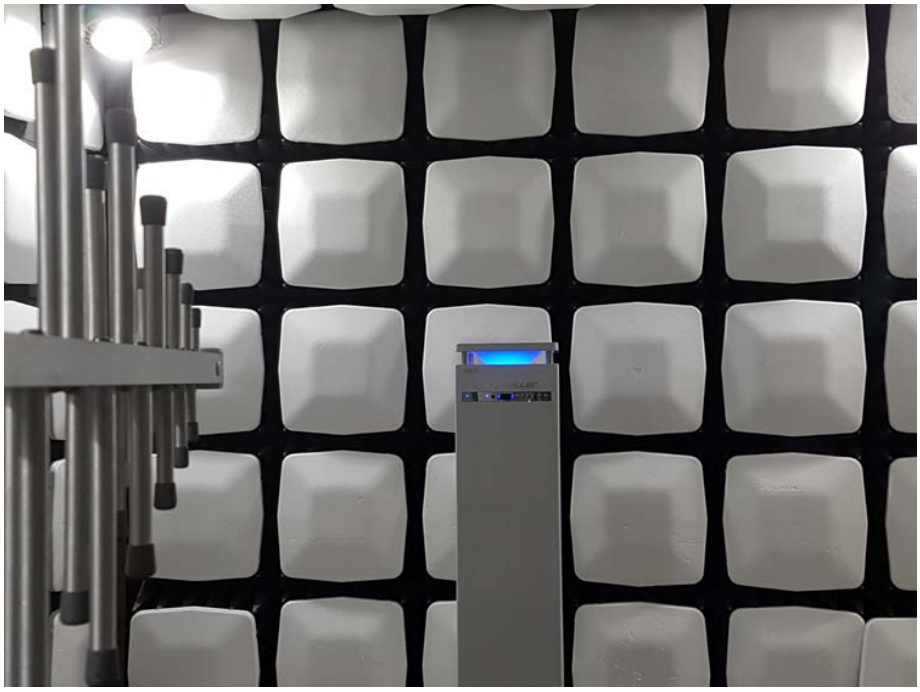
EN 55014-2	Radio-frequency electromagnetic field	Result
Method: The test set-up was made accordance with **EN 61000-4-3** in semi-anechoic chamber. The EUT has been placed in center of a non-metallic turntable. The height of this table was 0.8 m. The field strength was monitored by an isotropic sensor during the complete test. The isotropic sensor was located beside the equipment. The antenna has been orientated for both horizontal and vertical polarization. The distance between antennas the equipment under testing was at least 3 m. The tests have been performed with the antenna facing each of the four side of the EUT.		**Compy**

EUT mode (Refer to clauses 4)	**Test configuration mode**	**1**
	EUT Operation mode	**1**
	Power Interface mode	**1**

Test Spec	
Field strength	3 V/m
Frequency range	80 MHz ~ 1 GHz
Amplitude Modulation	AM, 80 %, 1 kHz sine-wave
Step size	1 % of fundamental
Sweep capability	≤1.5 x 10-3 decade/s
Performance criteria	A

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
SIGNAL GENERATOR	SMB 100A	ROHDE&SCHWARZ	113040	2019.12.16	2020.12.16
POWER METER	NRP2	ROHDE&SCHWARZ	104952	2019.12.16	2020.12.16
LOG-PER.ANTENNA	VULP9118E	SCHWARZBECK	917	N/A	N/A
POWER AMPLIFIER	MT200	PRANA	1315	N/A	N/A

Radio-frequency electromagnetic field _ Test setup photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**



Radio-frequency electromagnetic field _ Test result					
Test configuration mode	1	EUT Operation mode	1		
Test Level (V/m)	ANT. Polarization	Position	Performance Criteria	Result	Remark
3	Horizontal	Left	A	A	-
		Right		A	-
		Front		A	-
		Rear		A	-
	Vertical	Left		A	-
		Right		A	-
		Front		A	-
		Rear		A	-
Note 1)					

8.3 Fast Transients

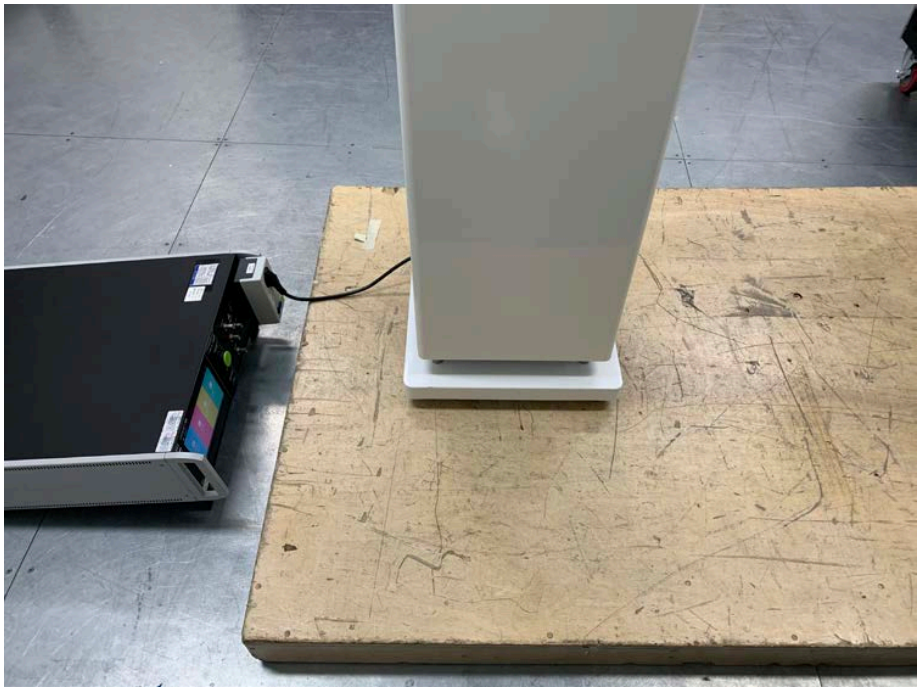
EN 55014-2	Fast Transients	Result
Method: The test set-up was made accordance with **EN 61000-4-4**. The EUT has been placed on a wooden table 10 cm above the reference ground plane. The reference ground plane exceeded the projected geometry of the EUT and the capacitive clamp by more than 20 cm. The clamp has placed directly on the reference ground plane. The distance between the EUT and all other conductive structures except the ground plane beneath the EUT was more than 50 cm. The distance between any coupling devices and the EUT shall be (0,5 − 0/+0,1) m for tabletop equipment testing, and (1,0 ± 0,1) m for floor standing equipment.		**Comply**

EUT mode (Refer to clauses 4)	**Test configuration mode**	**1**
	EUT Operation mode	**1**
	Power Interface mode	**1**

Test Spec		
	AC power ports	DC power ports / Signal ports
Test voltage (kV)	1	0.5
Polarity	+ and -	
Repetition frequency	5 kHz	
Tr/Th ns	5 / 50	
Performance criteria	B	

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
compact NX Generator	compact NX5 bsp-1-300-16	EMTEST	P1602169866	2019.03.04	2020.03.04
Motorized Variac	MV 2616	EMTEST	P1532162317	2019.03.04	2020.03.04

Fast Transients _ Test setup photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**



Fast Transients _ Test result of power port				
Test configuration mode	**1**	**EUT Operation mode**		**1**
Line	**Test Level (kV)**	**Performance Criteria**	**Result**	**Remark**
N - L1 - PE	±1 kV	B	A	-
Note 1) N : Neutral line, L1 : Live line, PE : Ground line				

Fast Transients _Test result of signal port				
Line	**Test Level (kV)**	**Performance Criteria**	**Result**	**Remark**
-	±0.5 kV	B	-	-
Note 1)				

8.4 Surges

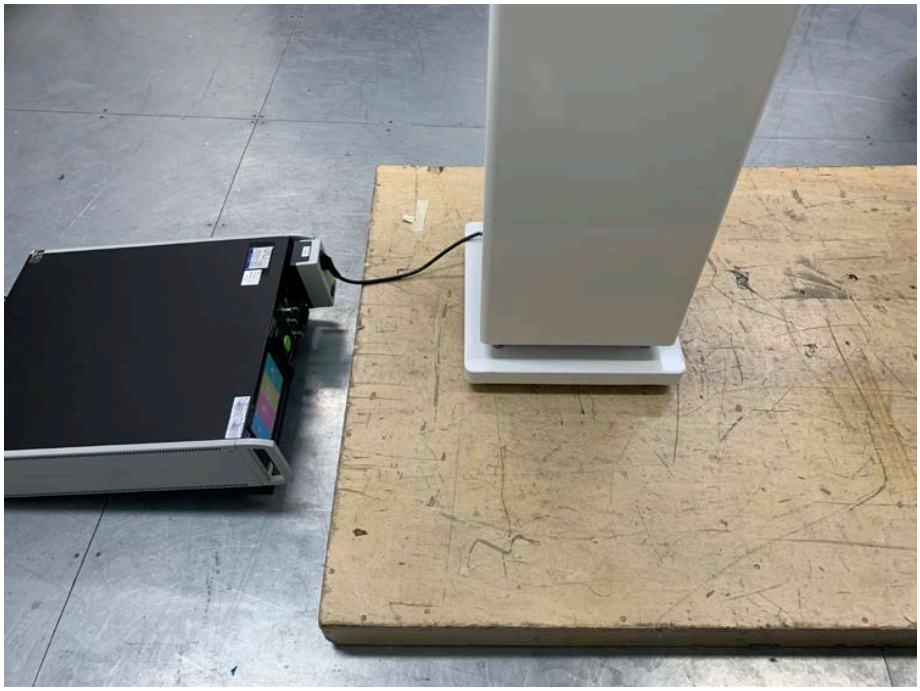
EN 55014-2	Surges	Result
Method: The test set-up was made accordance with **EN 61000-4-5.** The test consists of the injection of slow high energy transients in the AC/DC mains supply lines in both line-to-line and line-to-ground coupling mode, and into the signal and extra low voltage supply lines in line-to-ground coupling mode. The impedance of the transient generator is characterized by the shape of the open-circuit voltage and the circuit current pulses. To simulate typical installation impedances, 40 are inserted when the generator when extra low voltage and signal lines are tested, and 10 are inserted when the line-to-ground test is conducted on the AC/DC mains lines. The test pulses are coupled into the leads to be tested by means of appropriate coupling networks, which maintain the test pulses within their specification. The reference ground plane exceeded the projected geometry of the EUT and the back filler by more than 20 cm. The back filler has been placed directly on a separated reference ground plane. Both ground planes were connected together. The ground terminal of the back filler has been connected directly with its reference ground plane. Tests with other (lower) voltages than those given in below table are not required.		**Comply**

EUT mode **(Refer to clauses 4)**	**Test configuration mode**	**1**
	EUT Operation mode	**1**
	Power Interface mode	**1**

Test Spec	
	AC power ports
Test voltage (kV)	Line to Line : 1 Line to Ground : 2
Polarity	+ and -
Waveshape, open circuit voltage	1.2 μs / 50 μs
Waveshape, short circuit current	8 μs / 20 μs
Phase shifting	90° (positive puses), 270° (negative pulses)
Repetition rate	≤60 sec
Number of surges	5
Performance criteria	B

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
compact NX Generator	compact NX5 bsp-1-300-16	EMTEST	P1602169866	2019.03.04	2020.03.04
Motorized Variac	MV 2616	EMTEST	P1532162317	2019.03.04	2020.03.04

Surges _ Test setup photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**



Surges _Test result of power port				
Test configuration mode	**1**	**EUT Operation mode**		**1**
Line	**Test Level (kV)**	**Performance Criteria**	**Result**	**Remark**
N - L1	±0.5 kV	B	A	-
	±1 kV		A	-
N – PE	±0.5 kV		A	-
	±1 kV		A	-
	±2 kV		A	-
L1 - PE	±0.5 kV		A	-
	±1 kV		A	-
	±2 kV		A	-
Note 1) N : Neutral line, L1 : Live line, PE : Ground line				

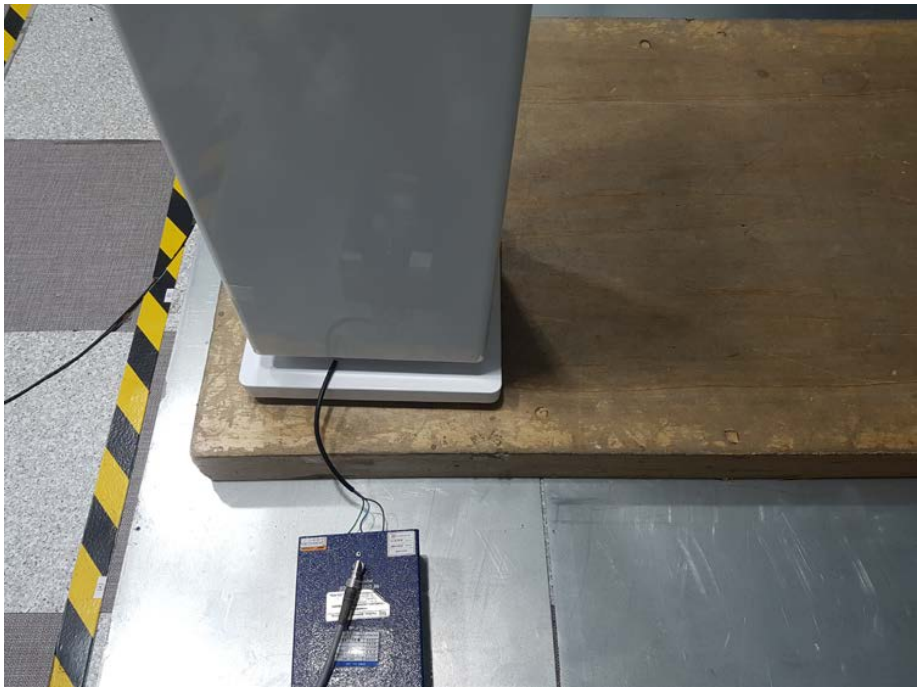
8.5 Radio-Frequency Continuous Conducted

EN 55014-2	Radio-frequency continuous conducted		Result
Method: Test set-up was made according to **EN 61000-4-6.** The EUT has been placed on a wooden table 10 cm above the reference ground plane. The reference ground plane exceeded the projected geometry of the EUT and the Coupling /Decoupling Network (CDN) by more than 30 cm. The CDN has been placed directly on the reference ground plane. The cable between CDN and EUT has a length of 30 cm.			**Comply**
EUT mode (Refer to clauses 4)	**Test configuration mode**	**1**	
	EUT Operation mode	**1**	
	Power Interface mode	**1**	

Test Spec			
Applied voltage	Ports for signal lines and control lines	Input and output d.c. power ports	Input and output a.c. power ports
	1 V	1 V	3 V
Frequency range	150 kHz ~ 80 MHz (Category IV) 150 kHz ~ 230 MHz(Category II)		
Modulation	AM, 80 %, 1 kHz sine-wave		
Step size	1 % of fundamental		
Sweep capability	1.5 x 10^{-3} decade/s		
Performance criteria	A		

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
SIGNAL GENERATOR	8657B	H.P	3630U08728	2019.06.12	2020.06.12
POWER METER	NRVD	ROHDE&SCHWARZ	102364	2019.02.19	2020.02.19
RF Power Amplifier	FLL75	Frankonia	0072	N/A	N/A
CDN	TSCDN-M3-16A	TSJ / FCC	2008	2019.02.21	2020.02.21

Radio-frequency continuous conducted _Test setup photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**



Radio-frequency continuous conducted _Test result of power port				
Test configuration mode	1	EUT Operation mode		1
Port	Test Level (V)	Performance Criteria	Result	Remark
Mains	3	A	A	-
Note 1)				

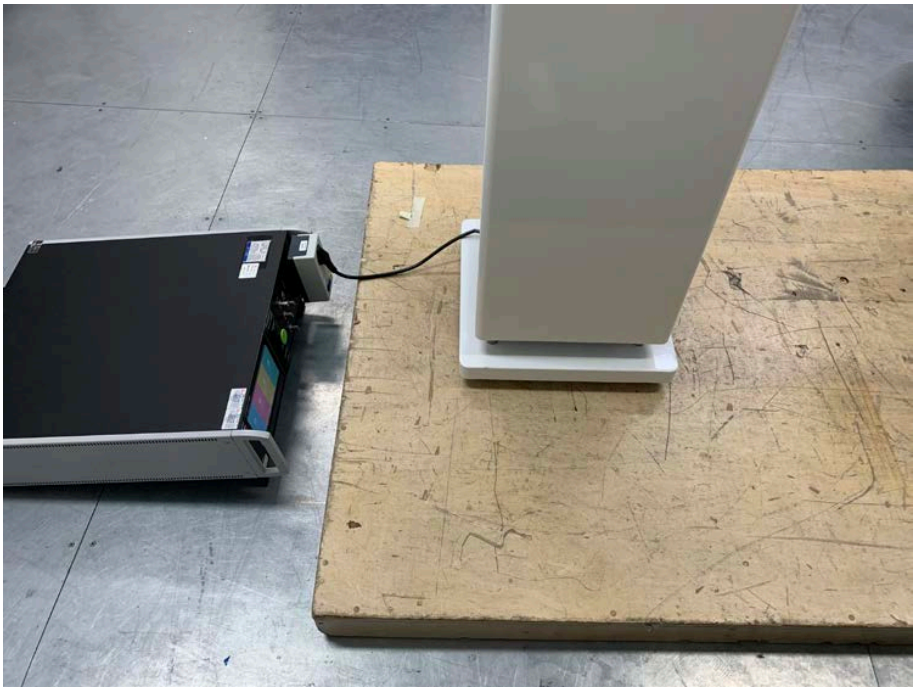
Radio-frequency continuous conducted _Test result of signal and DC port				
Port	Test Level (V)	Performance Criteria	Result	Remark
-	1	A	-	-
Note 1)				

8.6 Voltage Dips

EN 55014-2	Voltage Dips						Result
Method: The test set-up was made accordance in with **EN 61000-4-11**. The dips test is only applicable to AC mains. Voltage change shall occur at zero crossing							**Comply**
EUT mode (Refer to clauses 4)	**Test configuration mode**			**1**			
	EUT Operation mode			**1**			
	Power Interface mode			**1**			
Test Spec							
Voltage Dips							
Frequency range	**50 Hz**			**60 Hz**			
Voltage reduction	30 %	60 %	100 %	30 %	60 %	100 %	
Number of periods (cycle)	25	10	0.5	30	12	0.5	
Number of reductions (periods) at each duration	3						
Interval between reductions	≥10 s						
Performance criteria	C						

Measurement Instrument					
Description	**Model**	**Manufacturer**	**Identifier**	**Cal. Date**	**Cal. Due**
compact NX Generator	compact NX5 bsp-1-300-16	EMTEST	P1602169866	2019.03.04	2020.03.04
Motorized Variac	MV 2616	EMTEST	P1532162317	2019.03.04	2020.03.04

Voltage dips and interruptions _Test setup photo			
Test configuration mode	**1**	**EUT Operation mode**	**1**



Voltage dips and interruptions _Test result					
Test configuration mode	**1**	**EUT Operation mode**		**1**	
Voltage Dips					
Test Level % Ut	**Voltage dips % Ut**	**Number of periods**	**Performance Criteria**	**Result**	**Remark**
0	100	0.5	C	A	-
40	60	10		B	Note1)
70	30	25		B	Note1)
Note1) During the test EUT wind weakens but it operated normally again after the test without operator's intervention.					

9. Photographs of EUT

Front View of Product

Rear View of Product


Inside View of Product


10. Revision History

Date	Description	Revised By	Reviewed By
Feb. 26. 2020	Initial report	MinSu Park	KyoungHwan Bae
Feb. 28. 2020	Changed product name (Air Purifier > Air purifier and sterilizer)	MinSu Park	KyoungHwan Bae

-End of test report-