Electromagnetic Compatibility (EMC)

TEST REPORT

TR_2020392_1

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Test Report

Electromagnetic Compatibility (EMC)

Report Number	:	TR_2020392_1
Date of issue	:	18.08.2020
Date of receipt of test item	:	02.06.2020
Date (s) of performance of tests	:	03.06.2020 - 05.06.2020
Total number of pages	:	31
Test item description	:	Multi Cooker
Model/Type reference	:	See page 5
Trade Mark	:	TANDIRIM, OPTIMUM, AKSOY, REKAZ ALKHAFJI
Manufacturer **Address**	:	Aksoy Elektrikli Ev Aletleri San. Tic. Ltd. Şti. Organize Sanayi Bölgesi Karpuzsekisi Mh. 51. Cd. No:6 Hacılar/Kayseri
Applicant's name **Address**	:	Same as manufacturer

Tested by (name + signature)	**Approved by (name + signature)**	**Reviewed by (name + signature)**
Niyazi Çekiç Eldaş A.Ş.	Füsun Aksaz SGS Turkey	Saffettin Kılıççan SGS Turkey

The report was signed electronically

1 DOCUMENTATION

1.1 Test Standards

The Equipment Under Test Complies with Following Standard(s)

Title of the standard	Reference standard	Publication Year	Amendment(s) of the standard
Emission-Product family standard -Household appliances, electric tools and similar apparatus	EN 55014-1	2017	
	CISPR 14-1	2016	
Immunity-Product family standard -Household appliances, electric tools and similar apparatus	EN 55014-2	2015	
	CISPR 14-2	2015	
Product family standard -Harmonic current emissions	EN IEC 61000-3-2	2019	
	IEC 61000-3-2	2018	
Product family standard -Voltage fluctuations and flicker sensation	EN 61000-3-3	2013	A1:2019
	IEC 61000-3-3	2013	A1:2017

1.2 Overview of Test Results

Emission tests	Result
Conducted Emissions In The Frequency Range	**Pass**
Radiated Power In The Frequency Range	**Pass**
Discontinuous Interference (click)	**Pass**
Harmonic Currents Emissions	**Pass**
Voltage Fluctuation And Flicker Sensation	**Pass**

Immunity tests	Result
Electrostatic Discharge Immunity (ESD)	**N/A**
Electrical Fast Transient Immunity (EFT)	**N/A**
Surge Immunity Test	**N/A**
RF-Electromagnetic Conducted Immunity	**N/A**
Voltage Dips And Short Interruptions Immunity	**N/A**
Radiated, Radio Frequency, Electromagnetic Field Immunity	**N/A**

Possible test case verdicts:	
- test case does not apply to the test object	**:** N/A
- test object does meet the requirement	**:** P (Pass)
- test object does not meet the requirement	**:** F (Fail)

1.3 Testing Location/address

Note: All tests have been performed Eldaş Test ve Kalibrasyon Elektrik Sanayi Ticaret A.Ş. under supervision of SGS Engineer. The address of test location as below;

Organize Sanayi Bölgesi Büyük
Selçuklu Blv. No:2 Sincan
06930 ANKARA / TURKEY
Türkak Accreditation Number: AB-1532-T

2 PRODUCT DESCRIPTION

2.1 Equipment Under Test (EUT) Information

Test item description : Multi Cooker

Model/Type reference : See table

Rated Voltage : 220-240 Vac

Rated Frequency : 50-60 Hz

Rated Power/Current : See table

The model AP 003 has been tested and this model is representative of the range. They shared the similar construction except for ratings, heating elements and appearance. The applicant declares that the models given table enclose similar electrical components with the tested model. The EUT was tested 50 Hz.

General product information:

- AP 003 and AP 004 appliances are incorporated with upper and bottom heating elements, AP 001 and AP 002 appliances are incorporated only bottom heating element.
- All models have thermostat and the differences are visual features between the models.

Trademarks	Models	Rated Voltage and frequency	Rated power	Protection Class
TANDIRIM OPTIMUM AKSOY REKAZ ALKHAFJI	AP 001	220-240 Vac 50-60 Hz	750 W	Class I
	AP 002		1750 W	
	AP 003		2000 W	
	AP 004		1500 W	

Classification of EUT according to EN 55014-2:

The EUT is classified as	Category I	☒
	Category II	☐
	Category III	☐
	Category IV	☐

3 TEST CONDITIONS

3.1 Performance Criteria A for Immunity Testing

During testing the EUT shall operate without any degradation of performance.

3.2 Performance Criteria B for Immunity Testing

During testing temporary degradation of performance or loss of function, which is self-recovered are allowed.

3.3 Performance Criteria C for Immunity Testing

Temporary loss of function is allowed if the function is self-recoverable or can be restored by the operation of controls.

3.4 EUT Test Conditions During EMC-Testing

Configuration of the EUT will be made corresponding and actual assembling conditions as far as possible.

3.5 Environmental Conditions

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

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

4 TEST RESULTS AND CONDITIONS

4.1 Emission Test Results

4.1.1 Conducted Emissions In The Frequency Range

Standard	EN 55014-1

Frequency [MHz]	QP [dB(µV)]	AV [dB(µV)]
0,15 – 0,50	66 – 56	59 – 46
0,50 – 5	56	46
5 – 30	60	50

Test Plan/Test Description

Conducted disturbance voltage will be measured with an artificial main network from 150 kHz to 30 MHz with 5 kHz steps and a resolution bandwidth of 10 kHz. Measurements will be carried out with Peak- and Average-detectors from Phase-line and Neutral-line.

If the Peak-values are more than 6 dB below the Quasi Peak-limit no final Quasi Peak-measurement will be made otherwise Quasi Peak-values and Average-values will be recorded from the worst points. Rest of the sub ranges will be measured by using the same procedure.

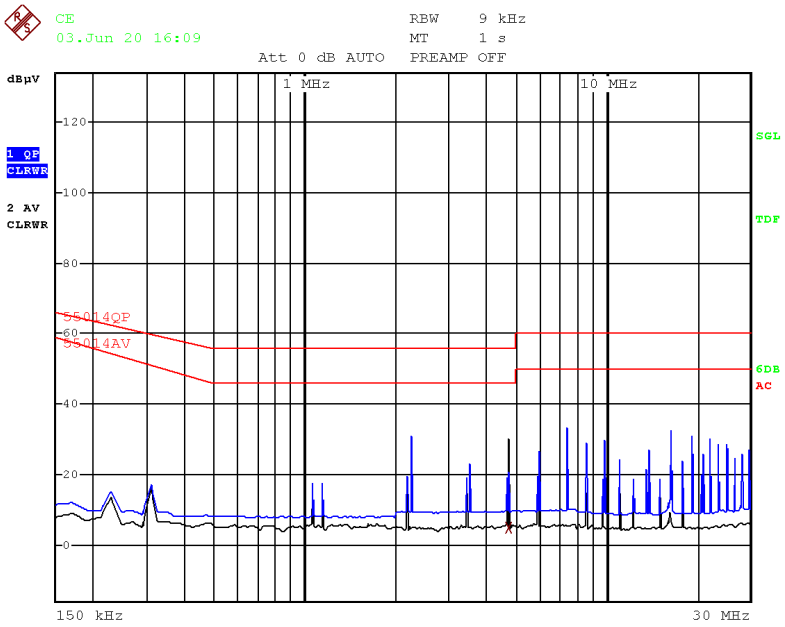
This measurement will be made from the AC-mains lines. The EUT is working as described in the section “EUT Test Conditions”. Test results are presented at the next page.

Operating mode

Measurements were performed at max. position.

Test Results

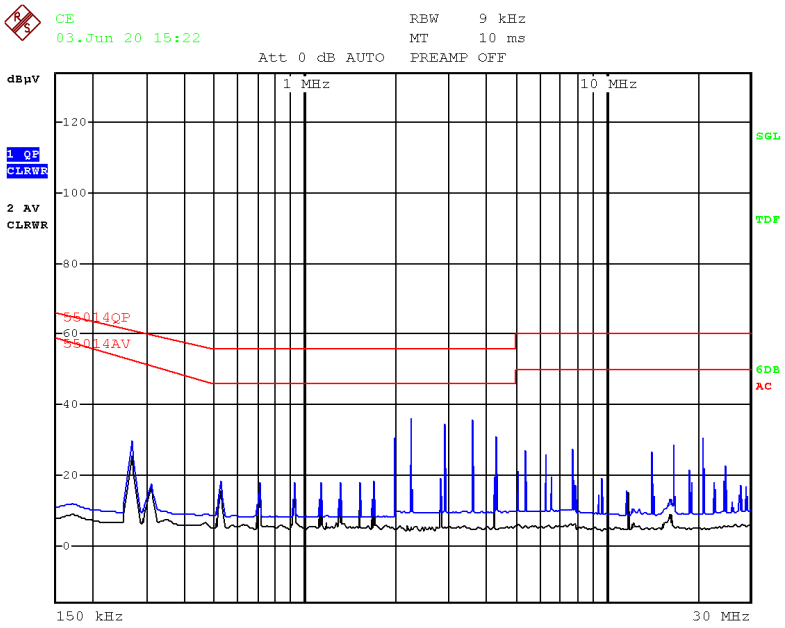
Line port



AP 003 LINE

Date: 3.JUN.2020 16:09:08

Neutral port



AP 003 NOTR

Date: 3.JUN.2020 15:22:45

Test setup : Conducted Emissions In The Frequency Range

TEST SUMMARY P

The EUT fulfills the requirements of the EN 55014-1 Conducted Emission part.

4.1.2 Radiated Power In The Frequency Range

Standard	EN 55014-1

Frequency [MHz]	QP [dB(pW)]	AV [dB(pW)]
30 – 300	45 – 55	35 – 45
Margin		
200 - 300	0 – 10	-

Test plan/Test Description

Radiated absorbing power will be measured with an absorbing clamp from 30 MHz to 300 MHz with 100 kHz steps using the resolution bandwidth of 120 kHz. The maximum interference level will be found by moving the clamp along the cable. Final measurements will be made from the worst peaks only with QuasiPeak-detector and Average-detector. No QuasiPeak- or Average-measurements will be made if the Peak-values are more than 10 dB below the QP-limit.

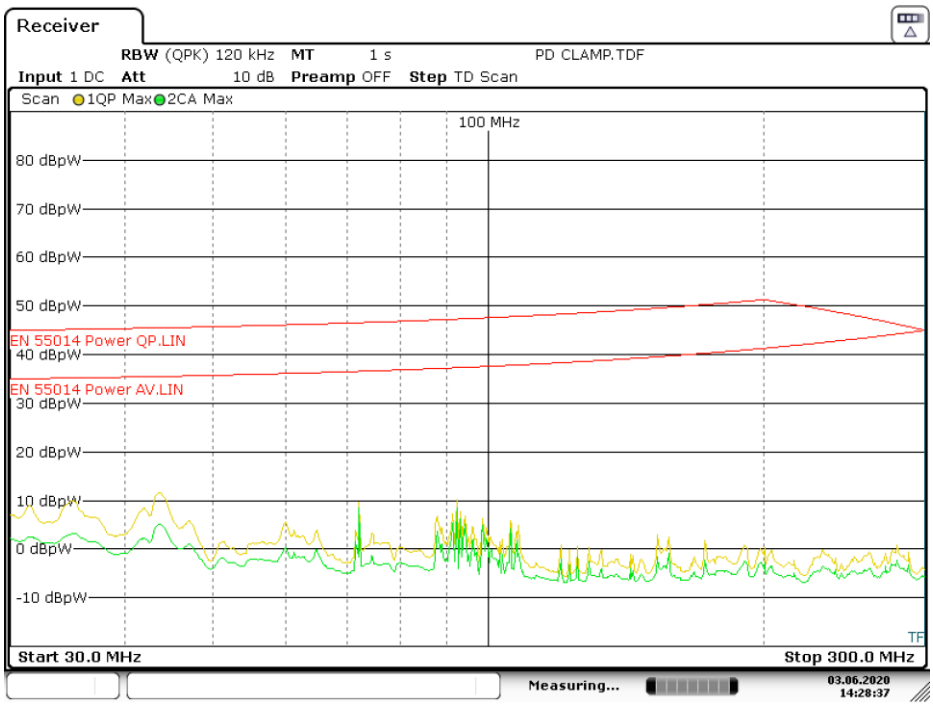
This measurement will be made from the AC-mains.

The EUT is working as described in the section “EUT Test Conditions”.

Operating mode

Measurements were performed at max. position.

Test Results

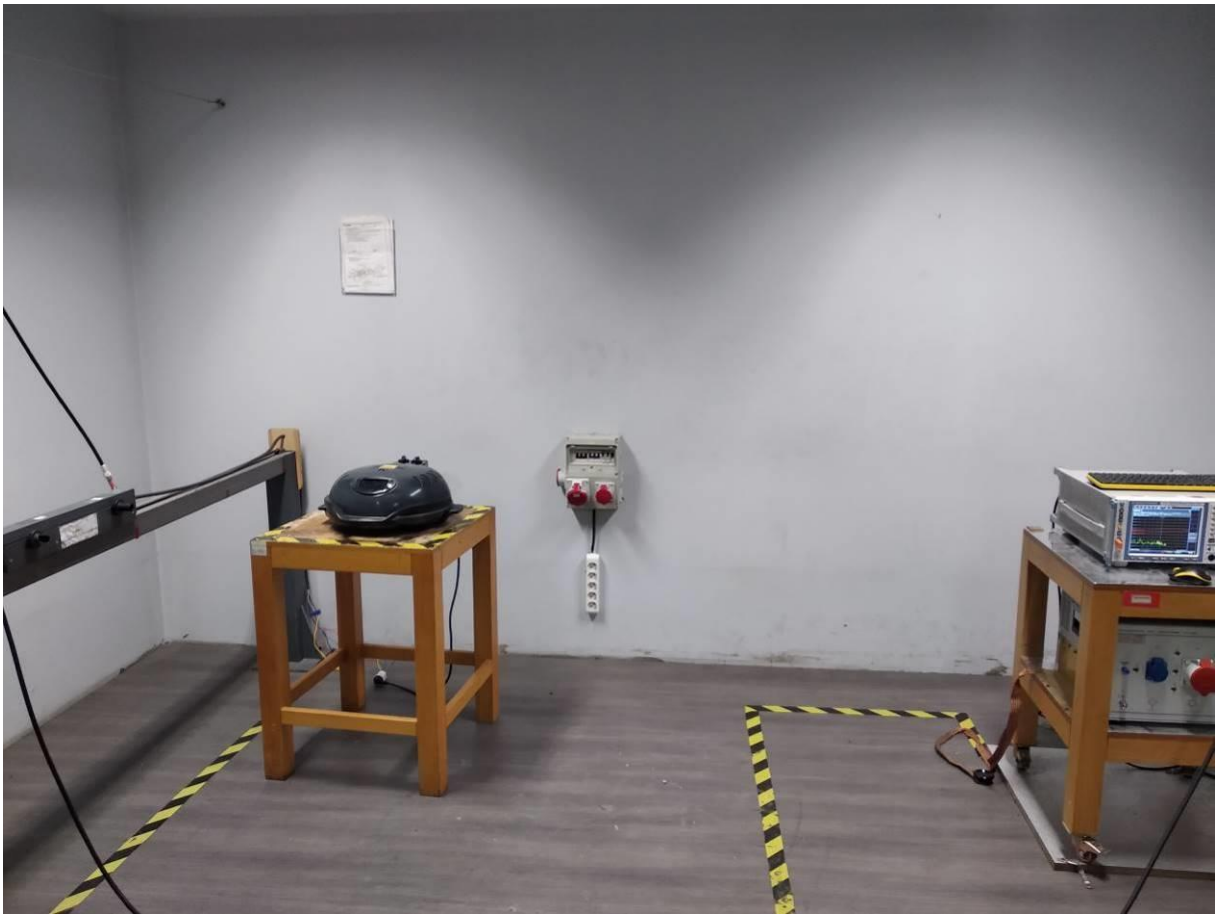


AP003

Date: 3.JUN.2020 14:28:37

According to clause 4.3.4.2 procedure (a) of the EN 55014-1 standard the EUT is deemed to comply in the frequency range from **300 MHz to 1000 MHz** without further measurements.

Test setup : Radiated Power In The Frequency Range



TEST SUMMARY P

The EUT fulfills the requirements of the EN 55014-1 Radiated Power part.

4.1.3 Discontinuous Interference (click)

Standard	EN 55014-1

Frequency [MHz]	QP [dB(µV)]
0,15	66
0,50	56
1,40	56
30,00	60

Test plan/Test Description

The EUT will be exercised as intended for. The click rate analysis will be made with four frequencies and with different continuous interference limits (e.g. sensitivity (dBµV)). Measured frequencies will be 0.15 MHz, 0.55 MHz, 1.40 MHz and 30 MHz. The limits are 66 dBµV for 0.15 MHz, 56 dBµV for both 0.55 MHz and 1.40 MHz and 60 dBµV for 30 MHz at the first test run (Run A).

The test time (T) is 120 min. If the total number of switching operations (n_2) is measured to be 40 before the time of 120 min is passed, the test shall be interrupted and the test time will be recorded. After that the test will be repeated with the new sensitivity limits. If the click rate $N \leq 5$, all click durations are $\leq$ 20 ms and 90 % of the click durations are $\leq$ 10 ms, repeating the test is not necessary.

The sensitivity of the second test run will be calculated from the following formula:

Sensitivity (Run B) = Run A + 20 * log (30/(Run A switching operations * 0.5)).

The time for second test run will be the same as the time taken for the first test run.

If the total number of the counted clicks (run B) will be $\leq 0.25 \times n_1$ and the click duration will not exceed 200 ms during the test, EUT fulfils the requirements of the standard.

Test will be made with all the operations of the EUT, which are controlled by either the thermostat or the energy regulators. Different operations will be tested separately. Both lines (neutral and phase L) will be tested separately.

The click rate N is half of the number of switching operations per minute for duty cycle 50 ±10% of the control devices.

The test results are shown on the following pages.

Operating mode

Measurements were performed at max. position.

Test results

Test results, measured phase L

Table 3. Run A

Used frequencies [MHz]:	0,15	0,5	1,4	30
Sensitivity [dB(μV)]:	66	56	56	60
Number of counted clicks, (short):	28	34	0	0
Number of counted clicks, (long):	0	0	0	0
Total number of clicks ($\mathbf{n_1}$):	28	34	0	0

Duration over 200 ms [s]	0	0	0	0

Switching operations rate 0
Total time of run (T): 120 minutes

Table 4. Run B

Sensitivity dB(μV) ($L+L_q$)	-	-	-	-
Number of clicks allowed above permitted limits:	-	-	-	-
Number of counted clicks, (short):	-	-	-	-
Number of counted clicks, (long):	-	-	-	-
Total number of clicks ($\mathbf{n_1}$):	-	-	-	-

Click rate used: -
Total time of run (T): -

Test result: PASS

Test results, measured phase N

Table 5. Run A

Used frequencies [MHz]:	0,15	0,5	1,4	30
Sensitivity [dB(μV)]:	66	56	56	60
Number of counted clicks, (short):	26	27	0	0
Number of counted clicks, (long):	0	0	0	0
Total number of clicks ($\mathbf{n_1}$):	26	27	0	0

Duration over 200 ms [s]	0	0	0	0

Switching operations rate 0
Total time of run (T): 120 minutes

Table 6. Run B

Sensitivity dB(μV) (L+L_q)	-	-	-	-
Number of clicks allowed above permitted limits:	-	-	-	-
Number of counted clicks, (short):	-	-	-	-
Number of counted clicks, (long):	-	-	-	-
Total number of clicks (**n_1**):	-	-	-	-

Click rate used: -
Total time of run (T): -

Test result: PASS

TEST SUMMARY **P**
The EUT fulfills the requirements of EN 55014-1 Discontinuous Interference part.

4.1.4 Harmonic Currents Emissions

Standard	**EN 61000-3-2**

Test Plan/Test Description

Depending on the type of EUT, the test class will be determined by the test engineer.

Concerning all products the maximum peak current A (pk), the fundamental current and power factor (PF) will be measured prior to measurement. These values are used in order to set the limits in actual test depending on the class.

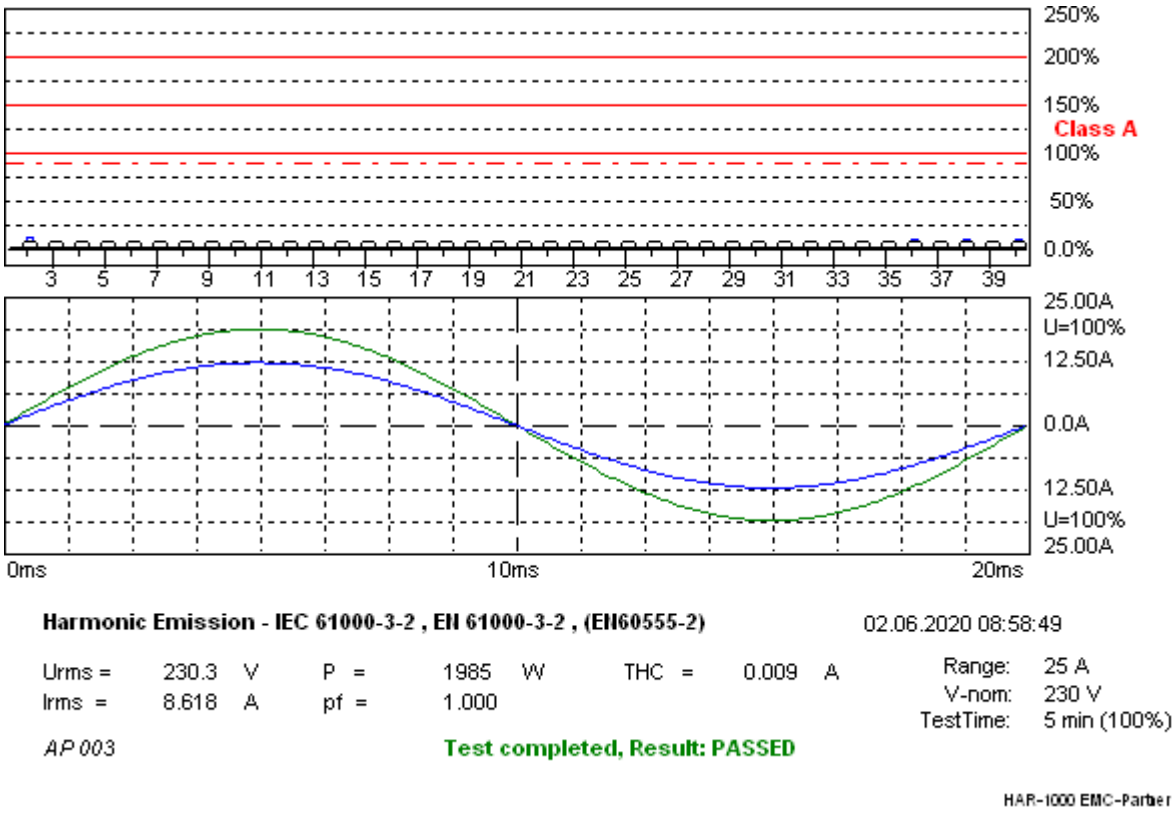
Preliminary measurements will be made in order to find out the state, which produces the maximum amount of harmonics. Harmonics up to 40 will be measured.

Test time	5	Minutes
Equipment Class	A	

Operating mode

Measurements were performed at max. position.

Test Result



Harmonic Emission - IEC 61000-3-2 , EN 61000-3-2 , (EN60555-2) 02.06.2020 08:58:49

Urms =	230.3	V	P =	1985	W	THC =	0.009	A	Range: 25 A
Irms =	8.618	A	pf =	1.000					V-nom: 230 V
									TestTime: 5 min (100%)

AP 003 **Test completed, Result: PASSED**

HAR-1000 EMC-Partner

Measurement

Urms =	230.3V	Freq =	50.013	Range:	25 A
Irms =	8.618A	Ipk =	12.28A	cf =	1.425
P =	1985W	S =	1985VA	pf =	1.000
THDi =	0.10 %	THDu =	0.10 %	Class A	

Test - Time : 5min (100 %)

Test completed, Result: PASSED

Order	Freq. [Hz]	Iavg [A]	Irms [A]	Imax [A]	Limit [A]	Status
1	50	6.7986	8.6182	8.6456		
2	100	0.0026	0.0061	0.0885	1.0800	
3	150	0.0005	0.0031	0.0381	2.3000	
4	200	0.0002	0.0015	0.0229	0.4300	
5	250	0.0001	0.0015	0.0183	1.1400	
6	300	0.0001	0.0015	0.0137	0.3000	
7	350	0.0000	0.0015	0.0122	0.7700	
8	400	0.0000	0.0000	0.0092	0.2300	
9	450	0.0000	0.0015	0.0092	0.4000	
10	500	0.0000	0.0000	0.0076	0.1840	
11	550	0.0000	0.0015	0.0076	0.3300	
12	600	0.0000	0.0000	0.0061	0.1533	
13	650	0.0000	0.0015	0.0061	0.2100	
14	700	0.0000	0.0000	0.0046	0.1314	
15	750	0.0000	0.0015	0.0046	0.1500	
16	800	0.0000	0.0000	0.0046	0.1150	
17	850	0.0000	0.0000	0.0046	0.1324	
18	900	0.0000	0.0000	0.0046	0.1022	
19	950	0.0000	0.0000	0.0046	0.1184	
20	1000	0.0000	0.0000	0.0046	0.0920	
21	1050	0.0000	0.0000	0.0031	0.1071	
22	1100	0.0000	0.0000	0.0031	0.0836	
23	1150	0.0000	0.0000	0.0031	0.0978	
24	1200	0.0000	0.0000	0.0031	0.0767	
25	1250	0.0000	0.0000	0.0031	0.0900	
26	1300	0.0000	0.0000	0.0031	0.0708	
27	1350	0.0000	0.0000	0.0031	0.0833	
28	1400	0.0000	0.0000	0.0031	0.0657	
29	1450	0.0000	0.0000	0.0031	0.0776	
30	1500	0.0000	0.0000	0.0031	0.0613	
31	1550	0.0000	0.0000	0.0031	0.0726	
32	1600	0.0000	0.0000	0.0031	0.0575	
33	1650	0.0000	0.0000	0.0031	0.0682	
34	1700	0.0000	0.0000	0.0031	0.0541	
35	1750	0.0000	0.0015	0.0031	0.0643	
36	1800	0.0000	0.0000	0.0031	0.0511	
37	1850	0.0000	0.0000	0.0031	0.0608	
38	1900	0.0000	0.0015	0.0031	0.0484	
39	1950	0.0000	0.0015	0.0031	0.0577	
40	2000	0.0000	0.0015	0.0031	0.0460	

Test setup : Harmonic Current Emissions

TEST SUMMARY **P**

The EUT fulfills the requirements of the EN 61000-3-2 for Class A.

4.1.5 Voltage Fluctuation And Flicker Sensation

Standard	**EN 61000-3-3**

Test plan/Test Description

The EUT will be exercised as intended for. Relative steady-state voltage change d_c, maximum relative change d_{max} and the value of d(t) shall be measured with a flicker meter.

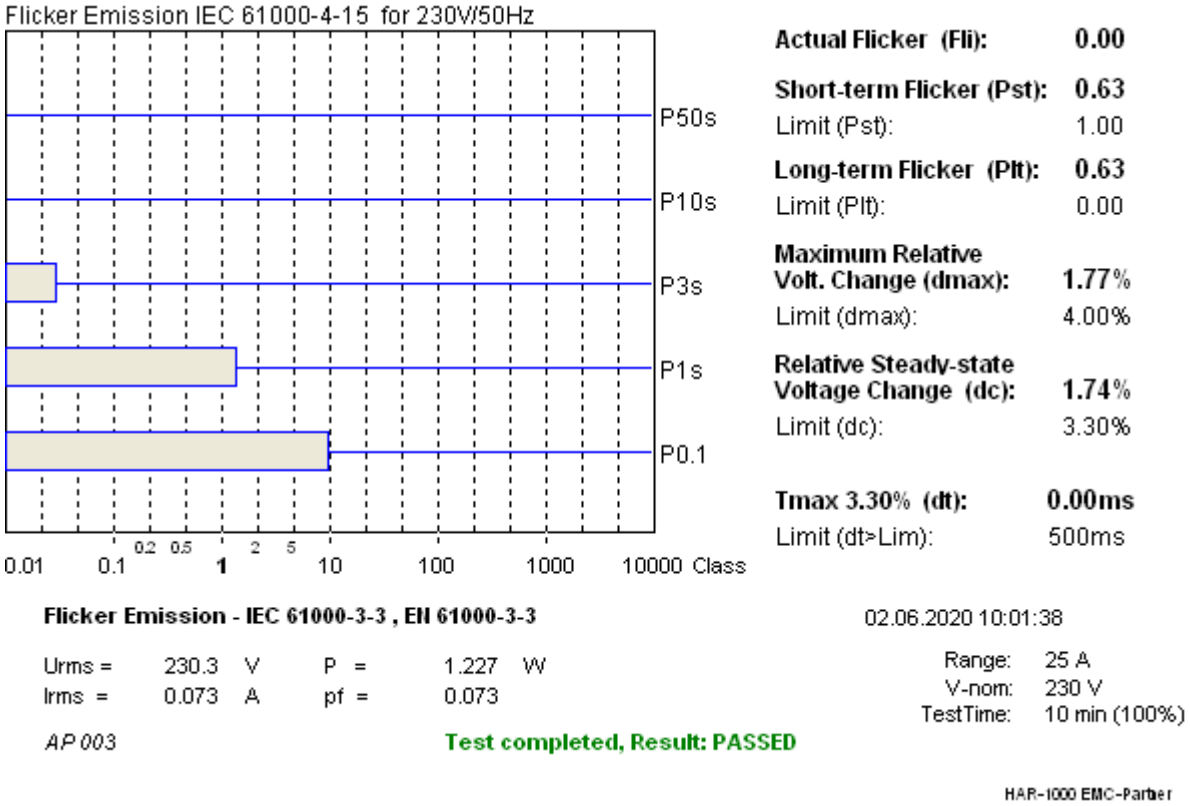
Limits

P_{ST}	≤ 1
P_{LT}	≤ 0,65
d_C	≤ 3,3 %
d_{MAX}	≤ 4 %

Operating mode

Measurements were performed at max. position.

Test Result



Test setup : Voltage Fluctuation And Flicker Sensation

TEST SUMMARY **P**

The EUT fulfills the requirements of the EN 61000-3-3.

4.2 Immunity Test Results

4.2.1 Electrostatic Discharge Immunity (ESD)

Standard	**EN 55014-2**
Basic standard	**EN 61000-4-2**

Test plan/Test Description

Tests will be done using the air discharge on non-conductive parts of the EUT. The contact discharge will be given to all conductive parts of the EUT. Also the indirect contact discharges will be given to vertical coupling planes in order to simulate the objects placed near the EUT. All four sides and the top of the EUT will be tested with both polarities.

At least ten discharges will be given with both polarities to the selected points.

The air discharge will be given with ± 8 kV test levels.

The contact and the indirect contact discharge will be given with ± 4 kV test levels.

Operating mode

Test results

Test setup : Electrostatic Discharge Immunity (ESD)

TEST SUMMARY	**N/A**

4.2.2 Electrical Fast Transient Immunity (EFT)

Standard	**EN 55014-2**
Basic standard	**EN 61000-4-4**

Test plan/Test Description

Tests will be done to the AC-power supply port with the voltage level of ± 1 kV and 5 kHz. First the level will be tested with both polarities. After both polarities have been tested, the coupling path will be changed. Phase line, neutral will be tested separately. Both polarities will be tested with 120 seconds duration time and with 5 seconds recovery time between the tests.

Operating mode

Test results

Test setup : Electrical Fast Transient Immunity (EFT)

TEST SUMMARY	**N/A**

4.2.3 Surge Immunity Test

Standard	**EN 55014-2**
Basic standard	**EN 61000-4-5**

Test plan/Test Description

Test will be done to the AC power supply port with step by step voltage levels starting at:

± 1 kV between phase and phase, Output impedance: 2ohm

± 1 kV between phase and neutral, Output impedance: 2ohm

± 2 kV between phase and protective earth, Output impedance: 12ohm

± 2 kV between neutral and protective earth, Output impedance: 12ohm

Positive and negative pulses will be given with 90° and 270° phase angles. Each pulse will be given five times with 60 seconds repetition rate. First the positive and the negative pulse will be given to the selected coupling path, then the phase angle will be changed and after that the voltage level will be increased to the next test level.

Operating mode

Test results

Test setup : Surge Immunity

TEST SUMMARY	**N/A**

4.2.4 RF-Electromagnetic Conducted Immunity

Standard	**EN 55014-2**
Basic standard	**EN 61000-4-6**

Test plan/Test Description

Test will be done from 150 kHz to 230 MHz. The calibration is done with 1 % logarithmic step size with an unmodulated signal. In the calibration setup the signal is fed to coupling network. The required power levels are recorded over the whole frequency range.

The EUT is placed 10 cm above the reference ground plane.

Test will be carried out with a voltage level of 3 V_{rms} (80 % AM- unmodulated, 1 kHz sine signal). Test will be performed to AC-power supply port.

Operating mode

Test results

Test setup : RF-Electromagnetic Conducted Immunity

TEST SUMMARY	**N/A**

4.2.5 Voltage Dips And Short Interruptions Immunity

Standard	**EN 55014-2**
Basic standard	**EN 61000-4-11**

Test plan/Test Description

Test will be done to the AC-power supply port with the following voltage percentage dips of the rated voltage: 30% and 60%. Test will be also done with 100% voltage interruptions of the rated voltage.

Operating mode

Test results

Test setup : Voltage Dips And Short Interruptions Immunity

TEST SUMMARY	**N/A**

4.2.6 Radiated, Radio Frequency, Electromagnetic Field Immunity

Standard	**EN 55014-2**
Basic standard	**EN 61000-4-3**

Test plan/Test Description

The EUT has been supplied with 230 Vac in Full-Anechoic Chamber on a wooden table that was above 10 cm height from floor. The test has been made by turning EUT four dimensions on vertical and horizontal polarizations of the antenna.

Test Level : 3V/m (80MHz to 1GHz)

Modulation : 80% amplitude at 1kHz

Dwell Times : 2 seconds for each step

Operating mode

Test setup : Radiated, Radio Frequency, Electromagnetic Field Immunity

TEST SUMMARY	**N/A**

5 EQUIPMENT UNDER TEST OF PHOTOS

Details of view :	AP 003	[x] general	[ ] front	[ ] rear	[ ] right	[ ] inside

Details of view :	AP 003	[x] general	[ ] front	[ ] rear	[ ] right	[ ] inside

Details of view :	AP 003	[ ] general	[ ] front	[x] rear	[ ] right	[ ] inside

Details of view :	AP 003	[ ] general	[ ] front	[ ] rear	[ ] right	[x] inside

Details of view :	AP 003	[x] general	[ ] front	[ ] rear	[ ] right	[ ] inside

Details of view :	AP 003	[x] general	[ ] front	[ ] rear	[ ] right	[ ] inside

Details of view :	Rating label	[x] general	[ ] front	[ ] rear	[ ] right	[ ] inside

Details of view :	Plug	[x] general	[ ] front	[ ] rear	[ ] right	[ ] inside

6 LIST OF TEST EQUIPMENT USED

Equipment Name	Brand	Model	Serial No	Calibration Due Date
Emi Test Receiver	Rohde&Schwarz	ESR7	101817	03.2021
Emi Test Receiver	Rohde&Schwarz	ESCI	100173	01.2021
Harmonics 1000	EMC PARTNER	HAR1000-1P	HAR1000-1P 230V-0232	07.2021
LISN	EMC Elektronik	LS100A4	16011301	03.2021
Transient Limiter	EMC Elektronik	TL10K30M	121404	04.2021
RF Attenuator	BIRD ELEKTRONIC	8341-200	2382	04.2021
Em Measurement P.D Clamp	EMC Elektronik	EL1000M	1024040602	04.2021

Validation is done on all devices, per six month

7 MEASUREMENT UNCERTAINTIES

Equipment	Uncertainty
Harmonic current emission	± 5.42 %
Voltage fluctuation	± 7.31 %
Mains conducted disturbance voltage	± 3.28 dB 9kHz-150 kHz ± 2.82 dB 150kHz-30 MHz
Discontinuous disturbance (clicks)	± 3.93 dB
Disturbance power	± 2.29 dB
Electrostatic Discharges (ESD)	Interference generator fulfils basic requirements
Electrical fast transient (EFT)	Interference generator fulfils basic requirements
Surge transients	Interference generator fulfils basic requirements
Power supply voltage interruptions & dips	Interference generator fulfils basic requirements

This report relates only to the actual item/items tested.

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End of the Report