Test Report No.9912323206

Applicant: **MANAL Ltd.**

Equipment Under Test: **Dishwasher**

Name: **FreshCup**

Model: **001**

Issued by:
The Standards Institution of Israel
Industry Division
Electronics & Telematics Laboratory
EMC Branch

ACCREDITED
ISO/IEC 17025
TESTING LABORATORY

Certificate Number: AT-1359

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Applicant:	MANAL Ltd.
Address:	19 Timna St., Holon. Israel
Sample for test selected by:	The customer
The date of test:	19/09, 22/09 & 7/11 /2019.

Description of Equipment under Test (EUT):	Dishwasher
Name:	FreshCup
Model:	001
Serial No.:	300000
Manufactured by:	MANAL Ltd.

Reference Documents:

- ❖ EN 55014-1 — Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus Part 1: Emission (2017).
- ❖ EN 55014-2 — Electromagnetic Compatibility; Requirements for household appliances, electric tools and similar apparatus Part 2: Immunity - Product family standard (2015).
- ❖ EN 61000-3-2/-3: — Electromagnetic Compatibility (EMC); Part 3. Limits. Section 2: Limits for harmonic current emissions (equipment input current ≤ 16A per phase (2014). Section 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 subjected to conditional connection" (2013).
- ❖ CFR 47 FCC: — Rules and Regulations: Part 15. "Radio frequency devices", Subpart B: Unintentional radiators (2015).

Test Results:

The EUT was found to be in compliance with the following standards:

- o EN 55014-1
- o EN 55014-2
- o EN 61000-3-2/-3
- o FCC Part 15 Subpart B Class B

For details refer to clause 1.

This Test Report contains 33 pages and may be used only in its entirety.	This Test Report applies only to the specimen tested and may not be applied to other specimens of the same product.

Table of Contents

1. Summary of Test Results

Test Description	Ref. Standard	Class/ Severity level/lines	Test result
Emission			
Radiated emission Freq. range: 30 - 1000 MHz	EN 55014-1 CISPR 32	Class B	Complies
Conducted emission Freq. range: 0.15 - 30 MHz		Class B *230VAC mains*	Complies
Radiated emission Freq. range: 30 - 1000 MHz	FCC Part 15 Subpart B	Class B	Complies
Conducted emission Freq. range: 0.15 - 30 MHz		Class B *120VAC mains*	Complies
Harmonic current test	EN 61000-3-2	*230VAC mains*	Complies
Flicker tests	EN 61000-3-3	*230VAC mains*	Complies
Immunity per EN 55014-2			
Immunity from Electrostatic discharge (ESD)	EN 61000-4-2	4 kV contact, 8 kV air discharge	Complies
Immunity from Radiated electromagnetic fields	EN 61000-4-3	3 V/m 80 MHz ÷ 2.7GH, 80 % AM 1 kHz	Complies
Immunity from Electrical Fast transient (EFT)	EN 61000-4-4	*AC mains :* ±1.0 kV Tr/Th – 5/50 ns, 5 kHz	Complies
Immunity from Surge	EN 61000-4-5	*AC mains:* ±1.0 kV DM / ±2.0 kV CM Tr/Th – 1.2/50 (8/20) μs	Complies
Immunity from conducted disturbances induced by radio-frequency fields	EN 61000-4-6	*AC mains:* 3 VRMS 0.15 - 230MHz 80 % AM 1 kHz	Complies
Immunity from voltage dips, interruptions and variations	EN 61000-4-11	*AC mains:* 0% - 10ms// 40% - 200ms // 70% - 1s	Complies

Name: Eng. Yuri Rozenberg
Position: Head of EMC Branch

Written by: Galit Gorodetsky
Position: Technical Writer

Electronics and Telematics Laboratory
November 18, 2019

Tested by: Alex Konkov
Position: Testing Engineer

Tested by: Piter Sapir
Position: Testing Engineer

2. EUT Description

Note: All information in this section was provided by the customer.

2.1. General description:

The Equipment under Test (hereinafter: EUT) is small and fast dishwasher which clean and sanitized dishes in second by using combination of hot water and 2 types of detergent.
The EUT may be used in office and at home.

Power supply: 100-230VAC 5A.

EUT dimensions: 30 x 45 x 38 cm approx.

Figure 1.
EUT front/ rear panel view

2.2. EUT's sub-assemblies list:

Table 1. Sub-assemblies list

Description	Manufacturer	Model
LEDS PCBA	MANAL Ltd.	-
MAIN PCBA	MANAL Ltd.	-
OPTO PCBA	MANAL Ltd.	-
Switches PCBA	MANAL Ltd.	-

2.3. EUT connector / cable list:

Table 2: Connector / Cable list

No.	Connector description	Connector type	Type of Cable	Length (m)	No. of identical connectors
1	AC mains	AC power inlet	Unshielded	<3	1

2.4. RF Suppression Measures:

One ferrite P/N 742 758 12 mfr WE was installed on the power cable, see Picture 6 Appendix 4.

2.5. EUT setup and operation:

Tested mode – washing.
The list of tests is detailed in table 3.

Table 3. List of performed tests

Mains voltage	Emission tests				Immunity tests						
	EN 55014-1 FCC Part 15		EN 61000-3-x		EN 55014-2// EN 61000-4-x						
	Cond.	Rad.	-2	-3	-2	-3	-4	-5	-6	-8	-11
230 VAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA See Note	✓
120 VAC	✓	✓	NA								

Notes: EUT does not contain components, susceptible to magnetic field.

3. Test specification, Methods and Procedures

Test Specification:

- EN 55014-1 — Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus. Part 1: Emission (2017).
- EN 55014-2 — Electromagnetic Compatibility; Requirements for household appliances, electric tools and similar apparatus. Part 2: Immunity - Product family standard (2015).
- EN 61000-3-2/-3: — Electromagnetic Compatibility (EMC); Part 3. Limits. Section 2. "Limits for harmonic current emissions (equipment input current ≤ 16A per phase" (2014). Section 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 subjected to conditional connection" (2013).
- CFR 47 FCC: — "Rules and Regulations": Part 15. "Radio frequency devices", Subpart B: Unintentional radiators (2015).

Methods and Procedures:

- CISPR 32 — Electromagnetic Compatibility of multimedia equipment – Emissions requirements Ed. 2.0 (2015).
- EN 61000-3-2/-3: — Electromagnetic Compatibility (EMC); Part 3. Limits. Section 2. "Limits for harmonic current emissions (equipment input current ≤ 16A per phase" (2014). Section 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 subjected to conditional connection" (2013).
- EN 61000-4-x: — Part 4. "Testing and measurement techniques;"
  - Section 2: "Electrostatic discharge immunity tests" (2009)
  - Section 3: "Radiated, radio-frequency, electromagnetic field immunity test" (2010).
  - Section 4: "Electrical Fast Transient/burst immunity test (2012)."
  - Section 5: "Surge immunity tests" (2014).
  - Section 6: "Immunity to conducted disturbances induced by radio-frequency fields" (2009).
  - Section 11: "Voltage dips, short interruptions and voltage variations immunity tests" (2004).
- ANSI C63.4:2014: — "American National Standard for Method of Measurement of Radio Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range 9 kHz to 40 GHz".

4. Additional deviations or exclusions from the test specifications

Not applicable

5. General conditions

5.1. Location of the Test Site:

All tests were carried out in the EMC laboratory of the Standards Institution of Israel in Tel-Aviv.

5.2. Emission tests:

- For both radiated and conducted measurements, initial scans were made using a peak detector but still using the appropriate CISPR 16 (Quasi-Peak) detector IF bandwidth.
- For conducted emissions, a tolerance limit was set 6 dB below the specification limit. Levels above the tolerance limit were retested using the Quasi-Peak detector or an average detector.
- For radiated emissions, a tolerance limit was set 10 dB below the specification limit. Levels above the tolerance limit were retested using the Quasi-Peak detector.

5.3. Initial visual check and functional test:

Initial visual check and brief built- in- test of the EUT was performed before testing. No external damages were found. The test on the EUT passed successfully.

6. Emissions

6.1. Radiated Emission Summary

Ref. Standard	Frequency range	Polar.	Table/ Plot	Result	Remarks
EN 55014-1// CISPR 32 Class B	30 -1000 MHz	V/H	Table 4 Plot 1	**PASS**	All emissions are 4.7dB at least below limit
FCC Part 15 Subpart B Class B	30 -1000 MHz	V/H	Table 5 Plot 1	**PASS**	All emissions are 3.7dB at least below limit

NOTE: Test PASS with ferrite , see sec.2.4

Test Procedure:

Since the highest internal EUT clock in 32MHz, the frequency range was investigated from 30 MHz up to 1 GHz.

The measurements were conducted in 3m semi-anechoic chamber.
Antennas used: Biconilog Antenna, 30 -2000 MHz.

The measurements were performed at each frequency where the signal was 10 dB below the limit or less. The levels were maximized by changing antenna polarization from vertical to horizontal, rotating turntable through 360 degree, varying antenna height from 1m to 4m and rerouting EUT cables.

Unless stated otherwise, the measuring equipment settings were:

Initial scan:	
Detector type	Peak
Mode	Max hold
Bandwidth	120 kHz
Step size	Continuous sweep
Sweep time	>1 seconds/MHz

Measurements	
Detector type	Quasi-peak (CISPR)
Bandwidth	120 kHz
Measurement time	20 seconds/MHz
Observation	>15 seconds

Results: **Pass**
Frequency range: 30-1000 MHz
Test distance: 3m
Reference stnd: EN 55014-1/ EN 55032 Class B

Table 4.
Radiated emission test results.

No	Frequency (MHz)	Antenna Polariz	Antenna Height (m)	Turntable angle (°)	Emission Level (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Results
1	77.34	V	1.00	355.0	26.3	40.0	-13.7	Complies
2	83.70	V	1.00	350.0	31.0	40.0	-9.0	Complies
3	101.76	H	1.20	5.0	33.7	40.0	-6.3	Complies
4	127.20	V	1.00	185.0	28.7	40.0	-11.3	Complies
5	181.93	V	1.00	170.0	34.0	40.0	-6.0	Complies
6	194.95	V	1.00	165.0	31.1	40.0	-8.9	Complies
7	488.12	V	1.00	190.0	38.1	47.0	-8.9	Complies
8	590.48	H	1.20	10.0	42.3	47.0	-4.7	Complies
9	610.40	V	1.00	270.0	39.2	47.0	-7.8	Complies
10	937.30	V	1.00	45.0	40.5	47.0	-6.5	Complies

Reference stnd: FCC Part 15 Class B

Table 5.
Radiated emission test results.

No	Frequency (MHz)	Antenna Polariz	Antenna Height (m)	Turntable angle (°)	Emission Level (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Results
1	77.34	V	1.00	355.0	26.3	40.0	-13.7	Complies
2	83.70	V	1.00	350.0	31.0	40.0	-9.0	Complies
3	101.76	H	1.20	5.0	33.7	43.5	-9.8	Complies
4	181.93	V	1.00	170.0	34.0	43.5	-9.5	Complies
5	194.95	V	1.00	165.0	31.1	43.5	-12.4	Complies
6	488.12	V	1.00	190.0	38.1	46.0	-7.9	Complies
7	590.48	H	1.20	10.0	42.3	46.0	-3.7	Complies
8	610.40	V	1.00	270.0	39.2	46.0	-6.8	Complies
9	937.30	V	1.00	45.0	40.5	46.0	-5.5	Complies

Note: Emission level = E Reading (dBμV) + Cable loss (dB) + Antenna Factor (dB/m) For Cable Loss and Antenna Factor refer to Appendix 2.

6.2. Conducted Emission Summary

Line Description	Ref. standard	Coupling Network	Plot #	Result	Remarks
230VAC mains	EN 55014-1	LISN	#2-3	**PASS**	All peaks are below limit to 6dB at least
120VAC mains	FCC Part 15 Class B		#4-5	**PASS**	All peaks are below limit to 7dB at least

Test procedure:

Test equipment (EMI receiver) setup was as follow:

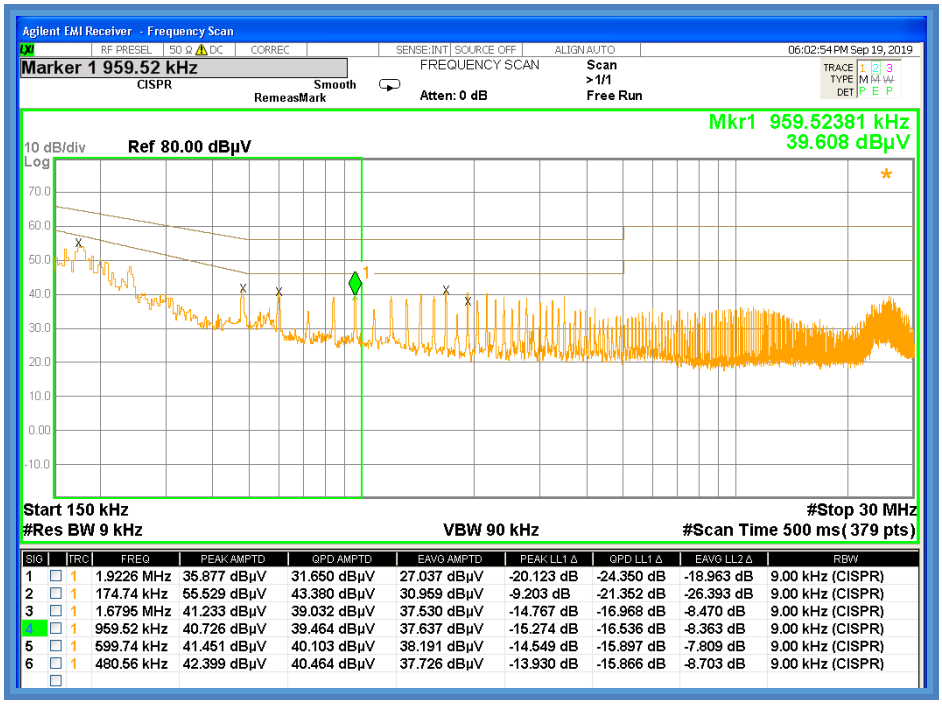
Initial scan:	
Detector type	Peak
Mode	Max hold
Bandwidth	9 kHz
Step size	Continuous sweep
Sweep time	>100 msec

Measurements	
Detector type	Quasi-peak (CISPR)
Bandwidth	9 kHz
Observation	>15 seconds

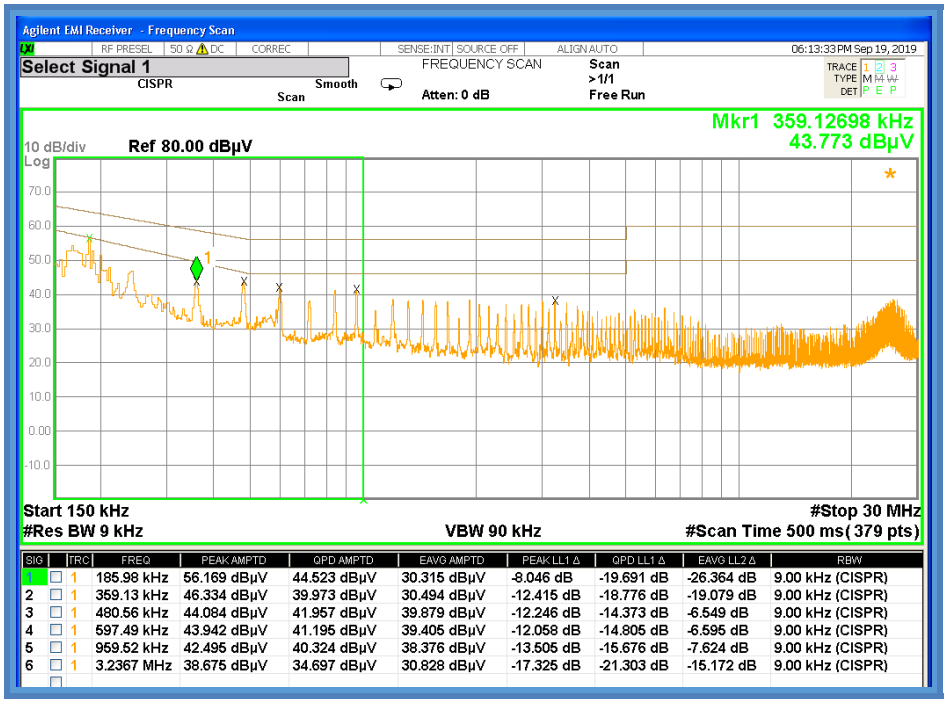
Results: Pass

Ref. Standard: EN 55014-1

Plot 1 - Plot 2: Conducted emission. 230 Vac Phase/ Neutral



SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	EAVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	EAVG LL2 Δ	RBW
1	1	1.9226 MHz	35.877 dBµV	31.650 dBµV	27.037 dBµV	-20.123 dB	-24.350 dB	-18.963 dB	9.00 kHz (CISPR)
2	1	174.74 kHz	55.529 dBµV	43.380 dBµV	30.959 dBµV	-9.203 dB	-21.352 dB	-26.393 dB	9.00 kHz (CISPR)
3	1	1.6795 MHz	41.233 dBµV	39.032 dBµV	37.530 dBµV	-14.767 dB	-16.968 dB	-8.470 dB	9.00 kHz (CISPR)
4	1	959.52 kHz	40.726 dBµV	39.464 dBµV	37.637 dBµV	-15.274 dB	-16.536 dB	-8.363 dB	9.00 kHz (CISPR)
5	1	599.74 kHz	41.451 dBµV	40.103 dBµV	38.191 dBµV	-14.549 dB	-15.897 dB	-7.809 dB	9.00 kHz (CISPR)
6	1	480.56 kHz	42.399 dBµV	40.464 dBµV	37.726 dBµV	-13.930 dB	-15.866 dB	-8.703 dB	9.00 kHz (CISPR)



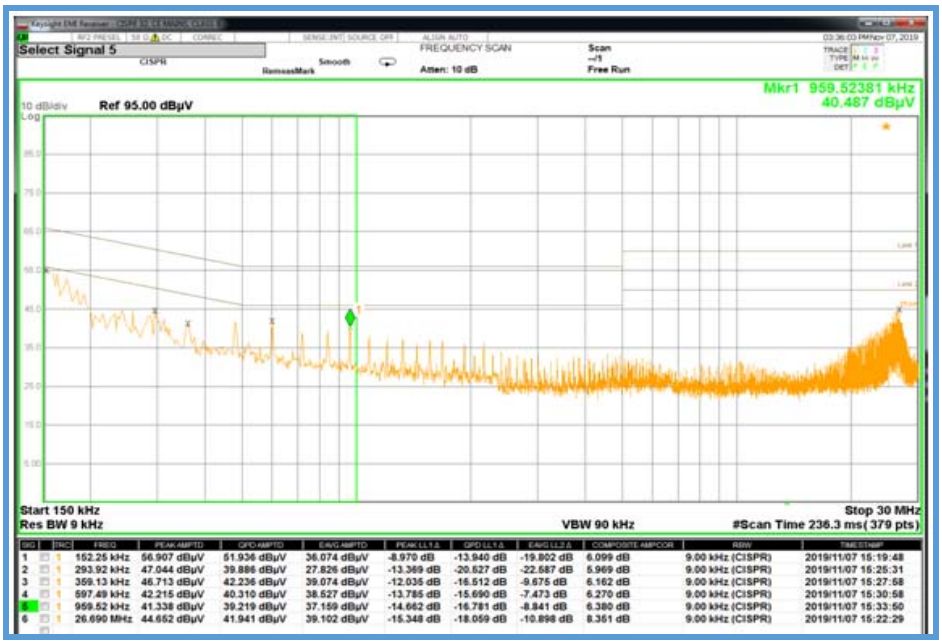
SIG	TRC	FREQ	PEAK AMPTD	QPD AMPTD	EAVG AMPTD	PEAK LL1 Δ	QPD LL1 Δ	EAVG LL2 Δ	RBW
1	1	185.98 kHz	56.169 dBµV	44.523 dBµV	30.315 dBµV	-8.046 dB	-19.691 dB	-26.364 dB	9.00 kHz (CISPR)
2	1	359.13 kHz	46.334 dBµV	39.973 dBµV	30.494 dBµV	-12.415 dB	-18.776 dB	-19.079 dB	9.00 kHz (CISPR)
3	1	480.56 kHz	44.084 dBµV	41.957 dBµV	39.879 dBµV	-12.246 dB	-14.373 dB	-6.549 dB	9.00 kHz (CISPR)
4	1	597.49 kHz	43.942 dBµV	41.195 dBµV	39.405 dBµV	-12.058 dB	-14.805 dB	-6.595 dB	9.00 kHz (CISPR)
5	1	959.52 kHz	42.495 dBµV	40.324 dBµV	38.376 dBµV	-13.505 dB	-15.676 dB	-7.624 dB	9.00 kHz (CISPR)
6	1	3.2367 MHz	38.675 dBµV	34.697 dBµV	30.828 dBµV	-17.325 dB	-21.303 dB	-15.172 dB	9.00 kHz (CISPR)

Results: **Pass**

Ref. Standard: FCC Part 15 Class B

Plot 3 - Plot 4: Conducted emission. 120 Vac Phase/ Neutral

1		1	163.49 kHz	56.880 dBµV	51.158 dBµV	36.225 dBµV	-8.405 dB	-14.127 dB	-19.059 dB	6.067 dB	9.00 kHz (CISPR)	2019/11/07 14:53:20
2		1	241.05 kHz	50.913 dBµV	47.737 dBµV	43.741 dBµV	-11.147 dB	-14.322 dB	-8.318 dB	6.150 dB	9.00 kHz (CISPR)	2019/11/07 14:54:00
3		1	356.88 kHz	46.743 dBµV	42.373 dBµV	37.129 dBµV	-12.057 dB	-16.427 dB	-11.671 dB	6.161 dB	9.00 kHz (CISPR)	2019/11/07 14:57:18
4		1	480.56 kHz	34.771 dBµV	30.468 dBµV	23.521 dBµV	-21.558 dB	-25.862 dB	-22.809 dB	6.170 dB	9.00 kHz (CISPR)	2019/11/07 14:58:38
5		1	25.259 MHz	44.028 dBµV	40.643 dBµV	34.921 dBµV	-15.972 dB	-19.357 dB	-15.079 dB	8.299 dB	9.00 kHz (CISPR)	2019/11/07 15:12:02
6		1	25.977 MHz	46.281 dBµV	43.814 dBµV	39.680 dBµV	-13.719 dB	-16.186 dB	-10.320 dB	8.325 dB	9.00 kHz (CISPR)	2019/11/07 15:07:30



1		1	152.25 kHz	56.907 dBµV	51.936 dBµV	36.074 dBµV	-8.970 dB	-13.940 dB	-19.802 dB	6.099 dB	9.00 kHz (CISPR)	2019/11/07 15:19:48
2		1	293.92 kHz	47.044 dBµV	39.886 dBµV	27.826 dBµV	-13.369 dB	-20.527 dB	-22.587 dB	5.969 dB	9.00 kHz (CISPR)	2019/11/07 15:25:31
3		1	359.13 kHz	46.713 dBµV	42.236 dBµV	39.074 dBµV	-12.035 dB	-16.512 dB	-9.675 dB	6.162 dB	9.00 kHz (CISPR)	2019/11/07 15:27:58
4		1	597.49 kHz	42.215 dBµV	40.310 dBµV	38.527 dBµV	-13.785 dB	-15.690 dB	-7.473 dB	6.270 dB	9.00 kHz (CISPR)	2019/11/07 15:30:58
5		1	959.52 kHz	41.338 dBµV	39.219 dBµV	37.159 dBµV	-14.662 dB	-16.781 dB	-8.841 dB	6.380 dB	9.00 kHz (CISPR)	2019/11/07 15:33:50
6		1	26.690 MHz	44.652 dBµV	41.941 dBµV	39.102 dBµV	-15.348 dB	-18.059 dB	-10.898 dB	8.361 dB	9.00 kHz (CISPR)	2019/11/07 15:22:29

6.3. Harmonic current emission summary:

Results:	**PASS** (See Tab.#5-7)
Ref. Standard:	EN 61000-3-2
Mains:	230VAC

Table 6. Harmonic current emission data. Part 1

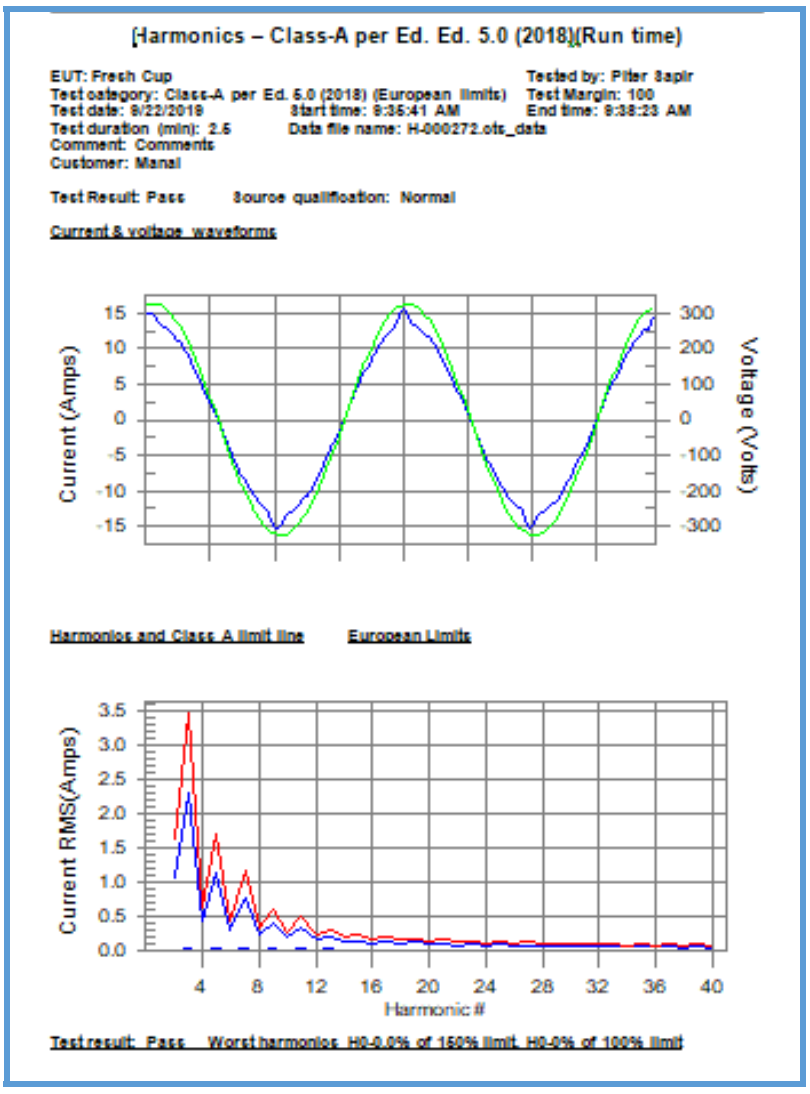


Table 7. Harmonic current emission data. Part 2

Current Test Result Summary (Run time)

EUT: Fresh Cup
Test category: Class-A per Ed. 5.0 (2018) (European limits)
Test date: 9/22/2019
Test duration (min): 2.5
Comment: Comments
Customer: Manal

Tested by: Pitar Sapir
Test Margin: 100
Start time: 9:35:41 AM
End time: 9:38:23 AM
Data file name: H-000272.ots_data

Test Result: Pass
Source qualification: Normal
THC(A): 0.089
I-THD(%): 0.7
POHC(A): 0.026
POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts):	230.39	Frequency(Hz):	50.00
I_Peak (Amps):	15.549	I_RMS (Amps):	9.715
I_Fund (Amps):	9.801	Crest Factor:	6.385
Power (Watts):	2210.5	Power Factor:	1.000

Harm#	Harmo(avg)	100%Limit	%of Limit	Harmo(max)	150%Limit	%of Limit	Status
2	0.005	1.080	N/A	0.034	1.620	N/A	Pass
3	0.029	2.300	N/A	0.095	3.450	N/A	Pass
4	0.004	0.430	N/A	0.011	0.645	N/A	Pass
5	0.025	1.140	N/A	0.093	1.710	N/A	Pass
6	0.002	0.300	N/A	0.007	0.450	N/A	Pass
7	0.024	0.770	N/A	0.086	1.155	N/A	Pass
8	0.001	0.230	N/A	0.005	0.345	N/A	Pass
9	0.023	0.400	N/A	0.079	0.600	N/A	Pass
10	0.001	0.184	N/A	0.004	0.278	N/A	Pass
11	0.021	0.330	N/A	0.068	0.495	N/A	Pass
12	0.001	0.153	N/A	0.003	0.230	N/A	Pass
13	0.019	0.210	N/A	0.058	0.315	N/A	Pass
14	0.001	0.131	N/A	0.002	0.197	N/A	Pass
15	0.017	0.150	N/A	0.048	0.225	N/A	Pass
16	0.001	0.115	N/A	0.002	0.173	N/A	Pass
17	0.016	0.132	N/A	0.038	0.198	N/A	Pass
18	0.001	0.102	N/A	0.002	0.153	N/A	Pass
19	0.015	0.118	N/A	0.030	0.178	N/A	Pass
20	0.001	0.092	N/A	0.002	0.138	N/A	Pass
21	0.013	0.107	N/A	0.024	0.161	N/A	Pass
22	0.001	0.084	N/A	0.002	0.125	N/A	Pass
23	0.011	0.098	N/A	0.021	0.147	N/A	Pass
24	0.001	0.077	N/A	0.001	0.115	N/A	Pass
25	0.010	0.090	N/A	0.017	0.135	N/A	Pass
26	0.001	0.071	N/A	0.001	0.107	N/A	Pass
27	0.008	0.083	N/A	0.014	0.125	N/A	Pass
28	0.001	0.066	N/A	0.001	0.099	N/A	Pass
29	0.007	0.078	N/A	0.012	0.116	N/A	Pass
30	0.000	0.061	N/A	0.001	0.092	N/A	Pass
31	0.006	0.073	N/A	0.010	0.109	N/A	Pass
32	0.000	0.058	N/A	0.001	0.088	N/A	Pass
33	0.005	0.068	N/A	0.008	0.102	N/A	Pass
34	0.000	0.054	N/A	0.001	0.081	N/A	Pass
35	0.004	0.064	N/A	0.006	0.096	N/A	Pass
36	0.000	0.051	N/A	0.001	0.077	N/A	Pass
37	0.003	0.061	N/A	0.005	0.091	N/A	Pass
38	0.000	0.048	N/A	0.001	0.073	N/A	Pass
39	0.003	0.058	N/A	0.004	0.087	N/A	Pass
40	0.000	0.046	N/A	0.001	0.069	N/A	Pass

Table 8. Voltage Source Verification Data

Voltage Source Verification Data (Run time)

EUT: Fresh Cup — Tested by: Piter Sapir
Test category: Class-A per Ed. 5.0 (2018) (European limits) — Test Margin: 100
Test date: 9/22/2019 — Start time: 9:35:41 AM — End time: 9:38:23 AM
Test duration (min): 2.5 — Data file name: H-000272.ots_data
Comment: Comments
Customer: Manal

Test Result: Pass — Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	230.39	Frequency (Hz):	50.00
I_Peak (Amps):	15.548	I_RMS (Amps):	8.715
I_Fund (Amps):	8.601	Crest Factor:	8.385
Power (Watts):	2210.5	Power Factor:	1.000

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.074	0.460	16.09	OK
3	0.487	2.071	23.53	OK
4	0.087	0.460	18.82	OK
5	0.043	0.921	4.70	OK
6	0.057	0.460	12.42	OK
7	0.045	0.891	6.58	OK
8	0.025	0.460	5.40	OK
9	0.049	0.460	10.75	OK
10	0.019	0.460	4.04	OK
11	0.027	0.230	11.88	OK
12	0.030	0.230	13.09	OK
13	0.036	0.230	15.48	OK
14	0.017	0.230	7.57	OK
15	0.032	0.230	14.00	OK
16	0.012	0.230	5.37	OK
17	0.018	0.230	7.82	OK
18	0.011	0.230	4.71	OK
19	0.029	0.230	12.52	OK
20	0.019	0.230	8.09	OK
21	0.027	0.230	11.71	OK
22	0.005	0.230	2.22	OK
23	0.017	0.230	7.53	OK
24	0.006	0.230	2.70	OK
25	0.016	0.230	6.48	OK
26	0.004	0.230	1.95	OK
27	0.018	0.230	8.82	OK
28	0.003	0.230	1.19	OK
29	0.015	0.230	6.48	OK
30	0.003	0.230	1.31	OK
31	0.013	0.230	5.83	OK
32	0.003	0.230	1.43	OK
33	0.012	0.230	5.31	OK
34	0.003	0.230	1.23	OK
35	0.011	0.230	4.81	OK
36	0.002	0.230	1.08	OK
37	0.010	0.230	4.41	OK
38	0.003	0.230	1.21	OK
39	0.008	0.230	3.52	OK
40	0.009	0.230	3.73	OK

6.4. Flicker summary

Results: **Pass**
Ref. Standard: EN 61000-3-3
Mains: 230VAC

Table 9. Flicker data

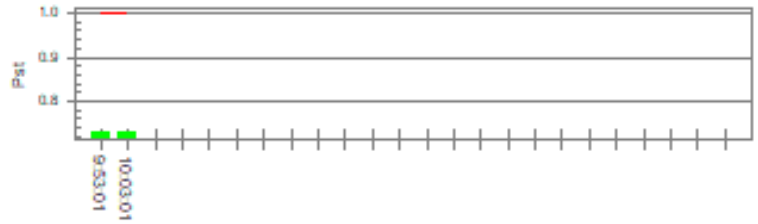
Flicker Test Summary per EN/IEC61000-3-3 Ed. 3.0 (2013) (Run time)

EUT: Fresh Cup
Test category: All parameters (European limits)
Test date: 9/22/2019
Test duration (min): 20
Comment: Comments
Customer: Manal

Tested by: Pitar Bapir
Test Margin: 100
Start time: 9:42:40 AM
End time: 10:03:13 AM
Data file name: F-000273.ols_data

Test Result: Pass
Status: Test Completed

Pst and limit line — European_Limits



Plt and limit line

Parameter values recorded during the test:

Vrms at the end of test (Volt):	230.38			
T-max (ms):	0	Test limit (ms):	500.0	Pass
Highest d0 (%):	1.72	Test limit (%):	3.30	Pass
Highest dmax (%):	1.75	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.733	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.402	Test limit:	0.650	Pass

7. Immunity Tests

7.1. Performance criteria

Performance criteria A:

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by manufacturer, when the equipment 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 by what the user may be expect from the equipment if used as intended.

Performance criteria B:

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and what the user may reasonably expect from the equipment if used as intended.

Performance criteria C:

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user (the network operator or the subsequent retry by the subscriber) in accordance with the manufacturer's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

7.2. Electrostatic Discharge (ESD)

Results:	**Pass**
Ref. Standard:	EN 55014-2
Test procedure:	EN 61000-4-2
Temperature:	22.9
Relative humidity:	58%
Athmosph. pressure:	1010 mbar

Table 10: ESD Data

ESD type	Test points	Test Voltage (kV)	Number of pulses	EUT perform.	Perform. Criteria	Result
Contact	To HCP	2,4	+/-(4*10)	Normal Performance	B	PASS
	To VCP	2,4	+/-(4*10)	Normal Performance		PASS
Air	Cable	2,4,8	+/-(1*10)	Normal Performance		PASS
	Plastic parts	2,4,8	+/-(6*10)	Normal Performance		PASS
	Control panel	2,4,8	+/-(4*10)	Normal Performance		PASS

7.3. Radiated Immunity Data

Results:	**Pass**
Ref. Standard:	EN 55014-2
Test procedure:	EN 61000-4-3
Temperature:	22.9
Relative humidity:	58%
Athmosph. pressure:	1010 mbar

Table 11: Radiated immunity Data

Frequency MHz	Field strength (V/m)	Modulation	EUT performance	Performance Criteria	Result
80 - 2700	3	80%AM 1K Hz sine wave	Normal Performance	A	PASS

7.4. Electrical Fast Transients (EFT)

Results:	**Pass**
Ref. Standard:	EN 55014-2
Test procedure:	EN 61000-4-4
Temperature:	22.9
Relative humidity:	58%
Athmosph. pressure:	1010 mbar

Table 12: EFT Data

No.	Port / Cable Description	Type of coupling	Test Voltage kV	Impulse	EUT perform.	Perform. Criteria	Result
1	AC mains	CDN	± 1.0	Tr/Th – 5/50ns 5 kHz	Normal Performance	B	PASS

7.5. Surge testing

Results:	**Pass**
Ref. Standard:	EN 55014-2
Test procedure:	EN 61000-4-5
Temperature:	22.9
Relative humidity:	58%
Athmosph. pressure:	1010 mbar

Table 13: Surge Data

No.	Port/Cable Descript.	Test Voltage kV	Type of coupling	Type of Surge, µs	Pulses	EUT perform.	Perform Criteria	Result
1	AC mains	2.0 CM / 1.0 DM	CDN	1.2/50 (8/20)	± 5	Normal Performance	B	PASS

7.6. RF conducted immunity test

Results:	**Pass**
Ref. Standard:	EN 55014-2
Test procedure:	EN 61000-4-6
Temperature:	22.9
Relative humidity:	58%
Athmosph. pressure:	1010 mbar

Table 14: RF Conducted Immunity Data

No.	Port/Cable Description	Type of coupling	Test Parameters	EUT perform.	Perform. Criteria	Result
1	AC mains	CDN	3V RMS 0.15 ÷ 230 MHz AM 80% 1 kHz	Normal Performance	A	PASS

7.7. Voltage dip and interruptions

Results:	**Pass**
Ref. Standard:	EN 55014-2
Test procedure:	EN 61000-4-11
Temperature:	22.9
Relative humidity:	58%
Athmosph. pressure:	1010 mbar

Table 15: Voltage Dips & Interruptions Data

Voltage dips and interruption (% level)	Duration (msec)	EUT performance	Perform. Criteria	Result
0	10.0	Normal Performance	C	PASS
40	200	Normal Performance	C	PASS
70	1000	Normal Performance	C	PASS

8. Appendix 1: Test equipment used

All measurements equipment is on SII calibration schedule with a recalibration interval not exceeding one year.

Instrument	Manufac-turer	Model	SII No.	Last calibration date	Next calibration date
EN55014-1/ EN55032					
EMI Test Receiver 20 Hz - 40 GHz	ROHDE & SCHWARZ	R&S®ESU40	5911	11/18	11/19
Line Impedance Stabilization Network (LISN) 9 kHz-30 MHz, 4X32(50)A, 230/400V	Schwarbeck Mess-Electronik	NSLK 8128	6677	03/19	03/20
Transient limiter 0.009-200 MHz	Agilent Techn	11947A	3107A03104	10/18	10/19
Biconilog Antenna 30 – 2000 MHz	Schaffner	CBL6112D	5866	03/19	03/21
Antenna Mast	Frankonia	FAM6	5952	Antenna Mast	N/A
Software	ROHDE & SCHWARZ	EMC32	Release 8.53.0	N/A	N/A
EN 61000-3-2 / EN 61000-3-3					
15 kVA 3 Ph, AC Power Supply	AMETEK	15003iX	6502589	12/18	12/19
Power Analyzer, 3 Ph	AMETEK	PACS3	6502589	12/18	12/19
Impedance Network, 3 Ph	AMETEK	OMNI 3-18	6502589	12/18	12/19
Software	AMETEK (California Instruments)	CTS 4.0	Version V3.2.0.35	N/A	N/A

Instrument	Manufac-turer	Model	SII No.	Last calibration date	Next calibration date
IEC 61000-4-2					
ESD Simulator 200 V- 16.5 kV	Teseq AG	NSG.435	606332	04/19	04/20
IEC 61000-4-3					
Spectrum Analyzer 9 kHz - 6 GHz	ROHDE & SCHWARZ	R&S®FSL6	5912	08/18	08/19
MXG Analog Microwave Signal generator 100 KHz - 20 GHz	Agilent	N5183A	6501148	11/18	11/19
RF power amplifier 80-1000 MHz, 100W	Amplifier Research	100W1000M1	4883	N/A	N/A
Biconilog Antenna 30 – 2000 MHz	Schaffner	CBL 6112D 23181	5866	03/19	03/21
Horn Antenna High-Gain 0.8 – 4.2 GHz; 20 W	Amplifier Research	AT4002A	4966	N/A	N/A
RF Power Amplifier 0.8 - 4.2 GHz; 25 W	Amplifier Research	25S1G4A	4991	N/A	N/A
Electric Field Probe 100 kHz - 3000 MHz	PMM	EP 330	5448	03/19	03/20
Field Monitor 0.15 - 3000 V/m	Amplifier Research	FM5004	4956	N/A	N/A
Anechoic chamber	Chase	Euroshield	4806	N/A	N/A
Software for EMC measurements	ROHDE & SCHWARZ	EMC32	Release 8.53.0	N/A	N/A
IEC 61000-4-4					
Set Multifunction Generator CDN, 1 Phase	Teseq	NSG-3060 CDN- 3061	6502113	12/18	12/19
Coupling Network, 3 PH 32 A	Teseq	NSG 3063	6502116	12/18	12/19
Capacitive coupling clamp	Teseq	CDN-3425	6502117	12/18	12/19
Software	Teseq	WIN 3000 SDR	Ver. 1.3.2	N/A	N/A
IEC 61000-4-5					
Set Multifunction Generator CDN, 1 Phase	Teseq	NSG-3060 CDN- 3061	6502113	12/18	12/19
Coupling Network, 3 PH 32 A	Teseq	NSG 3063	6502116	12/18	12/19
Telecom Surge Pulse Generator (10 x 700 μs)	Teseq	NSG-3060 Telocom	6502114	12/18	12/19

Instrument	Manufac-turer	Model	SII No.	Last calibration date	Next calibration date
IEC 61000-4-6					
RF Generator 100 KHz - 20 GHz	Agilent	N5183A	6501148	11/18	11/19
RF Generator 10 kHz - 1050 MHz	Fluke	6060B	2384	07/18	07/19
RF power amplifier 10 kHz - 250 MHz; 75 W	Ampl Research	75A250	4847	N/A	N/A
RF power amplifier 250 kHz - 150 MHz; 150 W	ENI	3100LA - 11401	3758	N/A	N/A
RF power amplifier 150 kHz - 300 MHz; 10 W	ENI	411LA	SII 3757 SN: 797F	N/A	N/A
Digital Oscilloscope, 1 GHz , 4 channels	ROHDE&S CHWARZ	RTE1104	6503858	02/19	02/20
CDN 150 kHz – 80 MHz	TESEQ AG	CDN 800	606307	02/18	02/19
Attenuator 6 dB, 50W	Huber-Suhner AG	5906.17.0005	6502577	08/18	08/19
Bulk Current Injection Probe 10 kHz – 230 MHz	FCC	F-120-9A	53923	02/18	02/19
IEC 61000-4-11					
Set Multifunction Generator CDN, 1 phase StepTransformer	Teseq	NSG-3060 CDN- 3061 INA-6502	6502113	12/18	12/19
Immunity Test System , 1 Phase	HAEFELY TEST AG	AXOS 5	6502105	01/19	01/20
Software	Teseq	WIN 3000 SDR	Ver. 1.3.2	N/A	N/A

9. Appendix 2: Antenna Factor and Cable Loss

Cable Loss (10m cable + Mast)

Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)
1	30	0.53	15	700	3.06	28	1700	4.85
2	50	0.75	16	750	3.201	29	1800	4.98
3	100	1.08	17	800	3.27	30	1900	5.19
4	150	1.39	18	850	3.38	31	2000	5.34
5	200	1.61	19	900	3.46	32	2100	5.51
6	250	1.752	20	950	3.55	33	2200	5.69
7	300	2.00	21	1000	3.68	34	2300	5.89
8	350	2.15	22	1100	3.82	35	2400	6.07
9	400	2.26	23	1200	4.07	36	2500	6.22
10	450	2.383	30	1900	5.19	37	2600	6.28
11	500	2.52	24	1300	4.24	38	2700	6.41
12	550	2.606	25	1400	4.43	39	2800	6.53
13	600	2.75	26	1500	4.6	40	2900	6.84
14	650	2.856	27	1600	4.7			

Antenna Factor

Biconilog Antenna Model Number: CBL6112D, S/N: 23181, Alt. ID: 5866, 3 m distance

No.	f / MHz	AF / dB/m	f / MHz	AF / dB/m
1	30	19.7	200	10.1
2	35	16.6	250	12.5
3	40	13.7	300	13.3
4	45	11.9	400	16.4
5	50	8.2	500	17.7
6	60	6.3	600	18.7
7	70	7.1	700	19.5
8	80	9.0	800	21.0
9	90	10.9	900	21.0
10	100	12.2	1000	21.6
11	120	13.3	1250	24.0
12	140	12.2	1500	25.6
13	160	11.1	1750	28.2
14	180	10.5	2000	29.5

10. Appendix 3: Measurement uncertainty

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error.
The laboratory calibrates its standards by a third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements.
In the following table the uncertainty calculation is given.
Calculated uncertainty **U LAB** are less than **U CISPR**, therefore compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit.

Type of disturbance Test description	Calculated uncertainty, U LAB	U CISPR
Conducted disturbance at mains port (9 kHz to 150 kHz)	3.3 dB	3.8 dB
Conducted disturbance at mains port (150 kHz to 30 MHz)	2.8 dB	3.4 dB
Disturbance power (30 MHz to 300 MHz)	3.3 dB	4.5 dB
Radiated disturbance (electric field strength at an OATS at 10 m distance) (30 MHz to 1 000 MHz)	4.18 dB	6.3 dB
Radiated disturbance (electric field strength in a SAR at 3 m distance) (30 MHz to 1 000 MHz)	4.32 dB	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	4.47 dB	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	4.47 dB	5.5 dB

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by coverage factor of 2.

11. Appendix 4: Test illustrations

Picture #1 Radiated emission test setup

Picture #2 Conducted emission test setup per EN55014-1

Picture #2 Conducted emission test setup per FCC Part 15

Picture #3 EFT, Surge & Voltage interruptions immunity test setup

Picture #4 RF Conducted immunity test setup

Picture #5 ESD immunity test setup.
Tested point - control panel

Picture #6 ESD immunity test setup

Picture #7 Ferrite installed on the power cable

End of the Document