

TEST REPORT

EMC tests

Ocean Swipe 360

CRIQ File 670-54765

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CRIQ DECLARATION

Testing took place from November 27 to November 30, 2017. The sample was received at CRIQ on November 27, 2017.

Testing was completed and supervised by the undersigned; they attest to the accuracy of the results.

Performed by: Sylvain Benjamin

Performed by: Alain Cocozza

Supervised by: Patrick Fokom, P.Eng.

This report was written by: Patrick Fokom

REVISION HISTORY

Revision No. Date		Ву	Description	
	00	December 15, 2017	Patrick Fokom	First publication

The latest revision replaces previous revisions.

Une version française de ce rapport est également disponible.

The client cited on the cover page of this report may reproduce the document in its entirety or integral text of the report without the appendices. Any other form of reproduction by anyone is subject to prior written approval from the CRIQ.

Total number of pages: 58 including 31 pages in appendices.

The results presented in this report refer only to the products described in this report.

The equipment and instrumentation used during this test were verified and/or calibrated. The calibration certificates are retraceable to the National Research Council of Canada (NRC) and/or to the American National Institute of Standards and Technology (NIST) standards and can be provided on request. For standards identified in our scope of accreditation, the existing reports identifying measurement uncertainty or the performance of test apparatus are available upon request.

CRIQ is registered ISO 9001, certificate no. 008999, and this testing laboratory is accredited ISO 17025 by the Standards Council of Canada for specific tests as listed on <u>www.scc.ca</u>.

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1. INTRODUCTION

1.1. Object

The object of this project is to perform electromagnetic compatibility tests on the product *Ocean Swipe 360.*

1.2. Description of equipment under test

Table 1 identifies the equipment under test (EUT). The configuration submitted to the tests is representative of a typical installation.

Model Type		Manufacturer	Serial no.	CRIQ no.
Ocean Swipe 360	Aquarium cleaner	Services Diversifiés	Proto	E36411
PA-1650-86	Power supply	Lite-On	2543207602	E36412

Table 1: Description of equipment under test

1.3. Field of application

The tests are performed on a sample of the product in compliance with the standards listed in Table 2 of Section 1.4. Test methods comply with those prescribed by the latter standards.

1.4. Results

Table 2 summarizes the results of the tests described herein.

Test name Standard	Limit Test level	EUT	Results
Radiated electromagnetic field immunity – radio frequencies IEC 61000-4-3: 2006 A1: 2007 A2: 2010	3V/m (80 – 1000 MHz) 3V/m (1400 – 2700 MHz)	E36411 E36412	Pass
Conducted immunity	3V power	E36411	Pass
IEC 61000-4-6: 2013	3V I/O E36412		N/A ¹
Electrostatic discharge immunity IEC 61000-4-2: 2008	±4kV contact ±8kV air	E36411 E36412	Pass
Electrical fast transient immunity	±1kV power	E36411	Pass
IEC 61000-4-4: 2012	±0.5kV I/O	E36412	N/A ¹
Surge immunity IEC 61000-4-5: 2014	±1kV L - L ±2kV L - Ground	E36411 E36412	Pass
Power frequency magnetic field immunity IEC 61000-4-8: 2009	3 A/m	E36411 E36412	Pass
Voltage dips, short interruptions and voltage variation immunity IEC 61000-4-11: 2004	0% - 0.5 cycle 0% - 1 cycle 70%, 25 cycles 0% - 250 cycles	E36411 E36412	Pass
Harmonic current emission limits IEC 61000-3-2: 2014	Class A	E36411 E36412	Pass
Voltage fluctuation and flicker limitations IEC 61000-3-3: 2013	Pst: 10 minutes Plt: 120 minutes	E36411 E36412	Pass

Note 1: The EUT has no I/O.

Table 2: Summary of the results

1.5. List of test and measurement equipment

The test and measurement equipment used for the purpose of these tests is described in Table 3.

			Calibration	
Equipment	Manufacturer; Model	Serial No.	Interval (months)	Expiration (y-m-d)
RF and C Immunity software	Rohde & Schwarz; EMC32-S (1052)	100365		N/A
Power meter	Rohde & Schwarz; NRP2 (1058)	101409	24	2019-08-22
Power sensor	Rohde & Schwarz; NRP-Z91 (1060)	101263	24	2019-08-22
Signal generator	Rohde & Schwarz; SMB100A (1056)	104688	24	2019-08-21
Signal generator	Rohde & Schwarz; SMF100A (1057)	101994	24	2019-09-06
VHF/UHF antenna	Rohde & Schwarz; HL046E (1108)	100133		N/A
Coupling/decoupling network	Chase EMC; CDN-1000-M3-16 (425)	9708	12	2018-08-18
Discharge generator	Thermo; MZ-15/EC (666)	503359	12	2018-05-18
Hygrometer/Thermometer	Omega; RH-411 (295)	HO100828	12	2018-08-04
Hygrometer/Thermometer	Omega; RH-411 (327)	H0104496	12	2017-12-08
Barometer	Omega; IBTX-M (742)	6300707	24	2019-04-12
EFT generator	NoiseKen; FNS-AX3 B50 (794)	FNS0760577	24	2019-09-05
Surge generator	Haefely; PIM 100 (496)	149384	24	2019-11-07
Surge coupler	Haefely; PCD 300 (500)	149456	24	2019-11-07
Magnetic field probe	NARDA; EFA-200 (706)	O-0009	24	2018-05-25
Ultra compact simulator	EM TEST; UCS 500-M4 (705)	V0507100151		N/A
Electronic output switch	California Instruments; EOS-1 (566)	72194	24	2017-12-22
Programmable source	California Instruments; 5001ix (564)	55498	24	2017-12-22
Programmable source	Teseq; Profline 2105-208 (997)	60104/72837	24	2018-06-10
Harmonic rate and fluctuation analyzer	Teseq; CCN-1000-1 (997)	72836	24	2018-06-10

Table 3: List of test and measurement equipment

1.6. Operating conditions and monitoring of EUT during testing

Measurements of harmonic current and voltage fluctuation / flicker limitation (IEC 61000-3-2 and IEC 61000-3-3) were performed on the system in *Charging* mode; the Ocean Swipe 360 equipment is connected to its power supply and not moving.

In the case of immunity tests, the system is in *Continuous* mode; the Ocean Swipe 360 equipment being in motion. It should be noted, however, that electrostatic discharge tests were performed with the system in *Charging* mode.

The configuration of the system under test is featured on photographs presented in appendix.

1.7. Technical comments applicable to all tests

No particular component or method was used to improve the electromagnetic performance of the EUT during testing.

No change or deviation was made to test specifications.

1.8. Definition of performance criteria

For immunity tests, the EN 61000-6-1 generic standard defines performance criteria as follows:

Performance criteria A: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum admissible performance or loss of performance level is not specified by the manufacturer, it can be derived from the product description and documentation and from what the user can reasonably expect from the apparatus if used as intended.

Performance criteria B: The apparatus shall continue to operate as intended once the test is completed. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. No change of actual operating state or stored data is allowed. If the minimum admissible performance or loss of performance level is not specified by the manufacturer, it can be derived from the product description and documentation and from what the user can reasonably expect from the apparatus if used as intended.

Performance criteria C: A temporary loss of function is allowed, provided such function is self-recoverable when the test stimulus is suppressed or can be re-activated via operator intervention.

2. RADIATED ELECTROMAGNETIC FIELD IMMUNITY

Test Standard Specifications	Radiated electromagnetic field immunity – radio frequencies IEC 61000-4-3: 2006 A1: 2007 A2: 2010 Test level: 3 V/m (80 – 1000 MHz) and 3 V/m (1.4 – 2.7 GHz) Test distance: 3 m Sweep from 80 MHz to 1 GHz and from 1.4 GHz to 2.7 GHz Amplitude modulation: 80% / 1 kHz Dwell time: 0.5 s Front face identification: EUT's side opposite to the glass Number of exposed faces: 4
Date Temperature / Humidity Atmospheric pressure	2017-11-27 21ºC / 16% Ambient
Operator	Sylvain Benjamin
EUT	E36411 and E36412
Supply	230 V / 50 Hz

2.1. Performance criteria

This test calls for performance criteria A.

2.2. Test results

Table 4 presents the test results.

EUT	JT Polarization Modulation (MHz)		Result or comment		
position			From	То	
Test at 3 V	/m	•		-	
А	Horizontal	Sine	80	1000	No degradation
А	Vertical	Sine	80	1000	No degradation
В	Horizontal	Sine	80	1000	No degradation
В	Vertical	Sine	80	1000	No degradation
С	Horizontal	Sine	80	1000	No degradation
С	Vertical	Sine	80	1000	No degradation
D	Horizontal	Sine	80	1000	No degradation
D	Vertical	Sine	80	1000	No degradation
Test at 3 V	/m			-	
А	Horizontal	Sine	1400	2700	No degradation
А	Vertical	Sine	1400	2700	No degradation
В	Horizontal	Sine	1400	2700	No degradation
В	Vertical	Sine	1400	2700	No degradation
С	Horizontal	Sine	1400	2700	No degradation
С	Vertical	Sine	1400	2700	No degradation
D	Horizontal	Sine	1400	2700	No degradation
D	Vertical	Sine	1400	2700	No degradation

Table 4: RF immunity test results



Figure 1: EUT faces definition

2.3. Test data

Please refer to APPENDIX A for photographs of the test setup.

2.4. Test method

The EUT, powered up and functional, is set up in the CRIQ anechoic room in accordance with the test standard specifications while the support equipment is set up in an adjacent shielded room, offering electromagnetic isolation. Each face of the EUT is exposed to a precalibrated electromagnetic field, in horizontal and vertical polarization.

The frequency band is swept from 80 MHz to 1000 MHz and from 1.4 to 2.7 GHz, with a signal modulated in amplitude by a 1 kHz sine wave to a depth of 80%. Step size is set at 1% with a dwell time of 0.5s.

3. CONDUCTED IMMUNITY

Test Standard Specifications	Conducted immunity IEC 61000-4-6 : 2013 Test level: 130 dB μ V (3 Vrms) Sweep from 150 kHz to 80 MHz Amplitude modulation: 80% / 1 kHz Dwell time: 0.5 s
Date Temperature / humidity Atmospheric pressure	2017-11-27 21ºC / 16% Ambient
Operator	Sylvain Benjamin
EUT	E36411 and E36412
Supply	230 V / 50 Hz

3.1. Performance criteria

This test calls for performance criteria A.

3.2. Test results

Table 5 presents the cables under test, the coupling/decoupling device used to test each of them and the test results.

Coupling device	Cable(s)	Result or comment
M3 Network	Supply	No degradation

Table 5: Conducted immunity test results

3.3. Test data

Please refer to APPENDIX B for photographs of the test setup and charts of the actual current levels applied to the clamp.

3.4. Test method

The EUT, powered up and functional, is set up in the CRIQ anechoic room in accordance with the test standard specifications while the support equipment is set up in an adjacent shielded room, offering electromagnetic isolation. Each cable connected to the EUT is tested using the appropriate coupling and decoupling device. The frequency band is swept from 150 kHz to 80 MHz with a signal modulated in amplitude by a 1 kHz sine wave to a depth of 80%. Step size is set at 1% with a dwell time of 0.5s.

4. ELECTROSTATIC DISCHARGE IMMUNITY

Test Standard Specifications	Electrostatic discharge immunity IEC 61000-4-2 : 2008 Test level – contact: ±4 kV Test level – air: ±8 kV Number of discharges: +10 / -10 Test configuration: Floor standing equipment
Date Temperature / Humidity Atmospheric pressure	2017-11-28 19⁰C / 44% 101.51 kPa
Operator	Alain Cocozza
EUT	E36411 and E36412
Supply	230 V / 50 Hz

4.1. Performance criteria

This test generally calls for performance criteria B.

4.2. Test results

Tables 6 and 7 present the discharge points and test results.

Contact discharge					
Discharge point	harge point Polarity, level [kV] Result and comments				
1 - 25	±4	No degradation			
31	±4	No degradation			
Air discharge					
Discharge point	Polarity, level [kV]	Result and comments			
26 – 30	±2, ±4 and ±8	No degradation			

Table 6: Direct ESD test results – Control cabinet

Discharge point	Polarity, level [kV]	Coupling	Result and comments
FF	±4	Н	No degradation
FF, RR, L, R	±4	V	No degradation

Table 7: Indirect ESD test results (coupling plan)

4.3. Test data

Please refer to APPENDIX C for pictures of the test setup and for the locations of the discharge application points.

4.4. Test method

Electrostatic discharges are applied using a test generator in compliance with the specified standard:

- energy storing capacitance: 150 pF ±10%
- discharge resistance: 330 Ω ±10%

The EUT, powered up and functional, is set up in accordance with the test standard specifications.

Direct application of discharges is carried out on points or surfaces of the EUT which are accessible to the operator during normal use. If the contact discharge cannot be applied, the air discharge method is recommended. Absence of arcing can result in a smaller number of discharges to be applied for air discharges.

Indirect discharges are applied to the horizontal coupling plane (discharge points on each side of the EUT) and to the vertical coupling plane (coupling plane positioned in order to illuminate the 4 sides of the EUT).

The delay between two consecutive discharges is set at 1 s.

5. ELECTRICAL FAST TRANSIENT IMMUNITY

Test Standard Specifications	Electrical fast transient immunity IEC 61000-4-4 : 2012 Test level: ±1 kV on power lines
Date Temperature / humidity Atmospheric pressure	2017-11-27 22ºC / 42% 101.38kPa
Operator	Sylvain Benjamin
EUT	E36411 and E36412
Supply	230 V / 50 Hz

5.1. Performance criteria

This test generally calls for performance criteria B.

5.2. Test results

Table 8 presents the cable under test, the coupling and decoupling device used and test results.

Line under test	Coupling mode	Polarity, level [kV]	Repetition rate [kHz]	Result or comment
Supply line	Coupling / decoupling network	±1	5	No degradation

Table 8: EFT test results

5.3. Test data

Please refer to APPENDIX D for photographs of the test setup.

5.4. Test method

Electrical fast transients are applied using a test generator in compliance with the specified test standard:

- rise time: 5 ns \pm 30%
- duration to mid-height: 50 ns \pm 30% (pulse width)
- output impedance: 50 $\Omega \pm 20\%$
- output energy: 4 mJ per pulse
- burst duration: 15 ms ± 20%
- burst period: $300 \text{ ms} \pm 20\%$

The EUT, powered up and functional, is set up in accordance with the test standard specifications. Each cable connected to the EUT is tested using the appropriate coupling and decoupling device. Fast transients are applied to power lines between a reference ground plane and each power line conductor and between the reference ground plane and the protective earth conductor using a generator with a built-in coupling/decoupling network. On other lines, transients are applied in common mode using a capacitive coupling clamp. In both cases, transients are successively applied at the specified voltage level for one (1) minute, in positive and negative polarities.

6. SURGE IMMUNITY

Test Standard Specifications	Surge immunity IEC 61000-4-5 : 2014 ±1 kV on power supply, line to line (L-L) ±2 kV on power supply, between lines and ground (L-PE)
Date Temperature / humidity Atmospheric pressure	2017-11-30 21ºC / 38% 101.08kPa
Operator	Alain Cocozza
EUT	E36411 and E36412
Supply	230 V / 50 Hz

6.1. Performance criteria

This test generally calls for performance criteria B.

6.2. Test results

Table 9 presents the test results.

Polarity,	Applic	ation be	etween	Output	Trigger	Result or comment	
level [kV]	L1	Ν	PE	resistance [Ω]	[degrees]		
±0.5	Х		Х	10	0, 90, 180, 270	No degradation	
±0.5		Х	Х	10	0, 90, 180, 270	No degradation	
±0.5	Х	Х		0	0, 90, 180, 270	No degradation	
±1	Х		Х	10	0, 90, 180, 270	No degradation	
±1		Х	Х	10	0, 90, 180, 270	No degradation	
±1	Х	Х		0	0, 90, 180, 270	No degradation	
±2	Х		Х	10	0, 90, 180, 270	No degradation	
±2		Х	Х	10	0, 90, 180, 270	No degradation	

Table 9: Surge immunity test results

6.3. Test data

Please refer to APPENDIX E for photographs of the test setup.

6.4. Test method

Surges are applied using a test generator in compliance with the specified test standard:

- rise time: 1.2 ms ± 30%
- duration to mid-height: 50 ms \pm 20% (pulse width)
- output impedance: $2 \Omega \pm 20\%$

The EUT, powered up and functional, is set up in accordance with the test standard specifications. The delay between each application is set to 60 seconds.

For the tests on the power supply, surges are usually applied at various trigger angles, in common mode (L-PE) and in differential mode (L-L). Test voltage is increased gradually from the minimal value to the specified level.

7. MAGNETIC FIELD IMMUNITY

Test Standard Specifications	Power frequency magnetic field immunity IEC 61000-4-8 : 2009 Continuous field: 3 A/m during 60 s Front face identification: EUT's side opposite to the glass Field frequency : 50 Hz
Date Temperature / humidity Atmospheric pressure	2017-11-30 23ºC / 40% 101.58kPa
Operator	Alain Cocozza
EUT	E36411 and E36412
Supply	230 V / 50 Hz

7.1. Acceptation criteria

This test calls for performance criteria A.

7.2. Test results

Table 10 presents the test results.

Frame antenna position	Frequency [Hz]	Test level [A/m]	Duration [s]	Result or comments
А	50	3	60	No degradation
В	50	3	60	No degradation
С	50	3	60	No degradation

Table 10: Magnetic field immunity test results



Figure 2: Frame antenna position

7.3. Test data

See APPENDIX F for photographs of the test setup.

7.4. Test method

The EUT, powered up and functional, is set up in accordance with the test standard specifications. Prior to each test, the magnetic field intensity in the induction coil is verified by means of a magnetic field probe having its bandwidth set to the specified test frequency (50 Hz). The dimensions of the standard induction coil are as follows: 2 m x 2 m. The field is then applied using the immersion method on three faces of the EUT.

8. VOLTAGE VARIATION IMMUNITY

Test Standard Specifications	Voltage dips, short interruptions and voltage variation immunity IEC 61000-4-11: 2004 See Section 8.2
Date Temperature / humidity Atmospheric pressure	2017-11-27 21ºC / 45% 101.38kPa
Operator	Sylvain Benjamin
EUT	E36411 and E36412
Supply	230 V / 50 Hz

8.1. Performance criteria

This test generally calls for performance criteria B and C.

8.2. Test results

Table 11 and presents the test results.

Level [% of Ut]	Trigger [degrees]	Duration of dips or interruptions [period]	Result or comments
70 (30% dip)	0, 45, 90, 135, 180, 225, 270, 315	25	No degradation
0 (100% interruption)	0, 45, 90, 135, 180, 225, 270, 315	1	No degradation
0 (100% interruption)	0, 45, 90, 135, 180, 225, 270, 315	0.5	No degradation
0 (100% interruption)	0, 45, 90, 135, 180, 225, 270, 315	250	No degradation The system has a battery.

Table 11: Voltage variation immunity test results

8.3. Test data

Please refer to APPENDIX G for photographs of the test setup.

8.4. Test method

The EUT, powered up and functional, is set up in accordance with the test standard specifications.

Each voltage variation is repeated 3 times. The minimal duration between dips or interruptions is 10 seconds. However, this duration can be increased so that the EUT recovers its normal operating mode between each variation.

9. HARMONIC CURRENT EMISSION LIMITS

Test Standard Specifications	Harmonic current emission limits IEC 61000-3-2 : 2014 Class A
Date Temperature / humidity Atmospheric pressure	2017-11-29 Ambient Ambient
Operator	Alain Cocozza
EUT	E36411 and E36412
Supply	230 V / 50 Hz

9.1. Test results

Limit	Observation period [min]	Result
Class A	10	Compliant

Table 12: Harmonic current emissions results

9.2. Test data

Please refer to APPENDIX H for test data and photographs of the test setup.

9.3. Test method

The measurement device is compliant with the IEC 61000-3-2 standard specifications.

The test shall be performed at the rated supply voltage of the EUT.

10. VOLTAGE FLUCTUATION AND FLICKER LIMITATIONS

Test Standard Specifications	Voltage fluctuation and flicker limitations IEC 61000-3-3 : 2013 Short term observation period: P _{st} : 10 minutes Long term observation period: P _{lt} : 120 minutes
Date Temperature / humidity Atmospheric pressure	2017-11-29 Ambient Ambient
Operator	Sylvain Benjamin
EUT	E36411 and E36412
Supply	230 V / 50 Hz

10.1. Test results

Table 13 presents the test results.

	Limit	Result
Short-term flicker Pst	1.0	Compliant
Long-term flicker Plt	0.65	Compliant
Permanent voltage variation dc	3.3%	Compliant
Maximum voltage variation d _{max}	4%	Compliant
Voltage variation rate d(t)	3.3 %	Compliant

Table 13: Voltage fluctuation and flicker test results

10.2. Test data

Please refer to APPENDIX I for test data.

See APPENDIX H for photographs of the test setup (test setup is identical to that used during the harmonic current emission measurement).

10.3. Test method

The measurement device is compliant with the IEC 61000-3-3 standard specifications.

The test shall be performed at the rated supply voltage of the EUT.

Power lines are analyzed during two distinct periods:

- Minimum short term observation period P_{st}=10 minutes
- Long term observation period P_{It}=12 x P_{st}

The minimum short term observation period must include the part of the operating cycle which generates the worst voltage variations.

A-1

APPENDIX A

RADIATED ELECTROMAGNETIC FIELD IMMUNITY



Radiated electromagnetic field immunity: Test setup

APPENDIX B

CONDUCTED IMMUNITY



Conducted immunity: Test setup

APPENDIX C

ELECTROSTATIC DISCHARGES



ESD immunity: Locations of discharge application points

5



ESD immunity: Locations of discharge application points



ESD immunity: Locations of discharge application points



ESD immunity: Locations of discharge application points



ESD immunity: Locations of discharge application points



ESD immunity: Locations of discharge application points



ESD immunity: Locations of discharge application points



ESD immunity: Locations of discharge application points



ESD immunity: Test setup

APPENDIX D

ELECTRICAL FAST TRANSIENTS



Electrical fast transient immunity: Test setup

APPENDIX E

SURGES



Surge immunity: Test setup

APPENDIX F

MAGNETIC FIELD IMMUNITY





Magnetic field immunity: Test setup



Magnetic field immunity: Test setup

APPENDIX G

VOLTAGE VARIATIONS



Voltage variation immunity: Test setup

APPENDIX H

HARMONIC CURRENT EMISSIONS

Harmonics – Class-A per Ed. 4.0 (2014)(Run time) incl. inter-harmonics

EUT: E36411 (Ocean Swipe) and E36412 (power Supply)Tested by: Alain CocozzaTest category: Class-A per Ed. 4.0 (2014) (European limits)Test Margin: 100Test date: 2017-11-29Start time: 08:59:49End time: 09:10:01Test duration (min): 10Data file name: H-000036.cts_dataComment: Avec inter-harmoniquesCustomer: CRIQCustomer: CRIQProjet: 54765R.P. : P.Fokom

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonics H17-39.2% of 150% limit, H19-49.6% of 100% limit

Current Test Result Summary (Run time)

EUT: E36411 (Ocean Swipe) and E36412 (power Supply)Tested by: Alain CocozzaTest category: Class-A per Ed. 4.0 (2014) (European limits)Test Margin: 100Test date: 2017-11-29Start time: 08:59:49End time: 09:10:01Test duration (min): 10Data file name: H-000036.cts_dataComment: Avec inter-harmoniquesCustomer: CRIQCustomer: CRIQProjet : 54765R.P. : P.Fokom							
Test Result: Pass Source qualification: Normal THC(A): 0.264 I-THD(%): 207.6 POHC(A): 0.093 POHC Limit(A): 0.251							
Highest parameter values during test:V_RMS (Volts):230.98Frequency(Hz):50.00I_Peak (Amps):1.843I_RMS (Amps):0.343I_Fund (Amps):0.127Crest Factor:20.367Power (Watts):27.6Power Factor:0.353							
Harm#	Harms(avg) 1	00%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.003	1.620	N/A	Pass
3	0.098	2.300	4.2	0.119	3.450	3.5	Pass
4	0.001	0.430	N/A	0.004	0.645	N/A	Pass
5	0.095	1.140	8.4	0.116	1.710	6.8	Pass
6	0.001	0.300	N/A	0.003	0.450	N/A	Pass
7	0.092	0.770	12.0	0.112	1.155	9.7	Pass
8	0.001	0.230	N/A	0.003	0.345	N/A	Pass
9	0.088	0.400	22.0	0.107	0.600	17.8	Pass
10	0.001	0.184	N/A	0.003	0.276	N/A	Pass
11	0.083	0.330	25.3	0.101	0.495	20.4	Pass
12	0.001	0.153	N/A	0.003	0.230	N/A	Pass
13	0.078	0.210	37.1	0.094	0.315	29.8	Pass
14	0.001	0.131	N/A	0.003	0.197	N/A	Pass
15	0.072	0.150	48.0	0.086	0.225	38.2	Pass
16	0.001	0.115	N/A	0.003	0.173	N/A	Pass
17	0.066	0.132	49.6	0.078	0.198	39.2	Pass
18	0.001	0.102	N/A	0.002	0.153	N/A	Pass
19	0.059	0.118	49.6	0.069	0.178	38.9	Pass
20	0.001	0.092	N/A	0.002	0.138	N/A	Pass
21	0.052	0.107	48.5	0.060	0.161	37.6	Pass
22	0.001	0.084	N/A	0.002	0.125	N/A	Pass
23	0.045	0.098	46.0	0.052	0.147	35.2	Pass
24	0.001	0.077	N/A	0.002	0.115	N/A	Pass
25	0.038	0.090	42.5	0.043	0.135	32.1	Pass
26	0.001	0.071	N/A	0.002	0.107	N/A	Pass
27	0.032	0.083	38.2	0.036	0.125	28.4	Pass
28	0.001	0.066	N/A	0.002	0.099	N/A	Pass
29	0.026	0.078	33.2	0.029	0.116	24.6	Pass
30	0.001	0.061	N/A	0.001	0.092	N/A	Pass
31	0.020	0.073	27.7	0.023	0.109	21.0	Pass
3 2	0.001	0.058	N/A	0.001	0.086	N/A	Pass
33 24	0.015	0.068	ZZ.1	0.018	0.102	17.3 N/A	Pass
34 25	0.001	0.054	IN/A	0.001	0.001	IN/A	Pass
30 20	0.011	0.004	10.4 N/A	0.013	0.090	13.0 NI/A	Pass
30 37	0.001	0.001	IN/A	0.001	0.077	IN/A	rdss Deee
31 20	0.007	0.001	11.Z	0.009	0.091	9.9 N/A	Pass
30 20	0.000	0.048	IN/A	0.001	0.0/3	N/A	Pass
39 39	0.004	0.000	IN/A N/A	0.005	0.007	IN/A	Pass
40	0.000	0.040	IN/A	0.001	0.009	IN/A	r a 3 3

Voltage Source Verification Data (Run time)

EUT: E36411 (Ocean Swipe) and E36412 (power Supply)Tested by: Alain CocozzaTest category: Class-A per Ed. 4.0 (2014) (European limits)Tested by: Alain CocozzaTest date: 2017-11-29Start time: 08:59:49End time: 09:10:01Test duration (min): 10Data file name: H-000036.cts_dataComment: Avec inter-harmoniquesCustomer: CRIQProjet : 54765R.P. : P.Fokom				
Test Result: P	Pass Source qua	alification: Normal	l	
Highest parameter values during test:Voltage (Vrms):230.98I_Peak (Amps):1.843I_RMS (Amps):0.343				
Power	' (Watts): 27.6	Power	Factor: 20.30	57 }
Harm# H	larmonics V-rms	Limit V-rms	% of Limit	Status
2	0.032	0.462	7.01	ОК
3	0.488	2.079	23.48	OK
4	0.020	0.462	4.26	OK
5	0.029	0.924	3.11	OK
6	0.020	0.462	4.40	OK
7	0.057	0.693	8.22	OK
8	0.004	0.462	0.79	OK
9	0.082	0.462	17.74	OK
10	0.005	0.462	1.16	OK
11	0.102	0.231	44.33	OK
12	0.013	0.231	5.80	OK
13	0.065	0.231	27.99	OK
14	0.002	0.231	1.03	OK
15	0.060	0.231	25.83	OK
16	0.008	0.231	3.46	OK
17	0.067	0.231	28.95	OK
18	0.010	0.231	4.50	OK
19	0.066	0.231	28.52	OK
20	0.012	0.231	5.07	OK
21	0.066	0.231	28.68	OK
22	0.004	0.231	1.88	OK
23	0.054	0.231	23.17	OK
24	0.005	0.231	2.10	OK
25	0.055	0.231	23.60	OK
26	0.004	0.231	1.70	OK
27	0.043	0.231	18.43	OK
28	0.002	0.231	0.96	OK
29	0.042	0.231	18.15	OK
30	0.004	0.231	1.61	OK
31	0.034	0.231	14.79	OK
32	0.003	0.231	1.21	OK
33	0.031	0.231	13.30	OK
34	0.002	0.231	0.94	OK
35	0.022	0.231	9.68	OK
36	0.002	0.231	1.04	OK
37	0.018	0.231	7.70	OK
38	0.003	0.231	1.39	ŌK
39	0.016	0.231	7.06	ŌK
40	0.008	0.231	3.51	OK



Harmonic current emission limits: Test setup

APPENDIX I

VOLTAGE FLUCTUATION AND FLICKER LIMITATIONS

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

EUT: E36411 (Ocean Swipe) and E36412 (power Supply)Tested by: Alain CocozzaTest category: All parameters (European limits)Test Margin: 100Test date: 2017-11-29Start time: 09:12:05End time: 09:22:32Test duration (min): 10Data file name: F-000037.cts_dataComment: Courte DuréCustomer: Services DiversifiésProjet : 54765R.P. : P.Fokom

Test Result: Pass

Status: Test Completed

Psti and limit line

European Limits



Plt and limit line



Parameter values recorded dur	ing the test:			
Vrms at the end of test (Volt):	230.95			
Highest dt (%):	0.00	Test limit (%):	N/A	N/A
T-max (mS):	0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.00	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000	Pass

Highest Plt (2 hr. period):0.028Test limit:0.650PassFlicker Test Summary per EN/IEC61000-3-3 Ed. 3.0 (2013) (Run time)EUT: E36411 (Ocean Swipe) and E36412 (power Supply)Tested by: Alain Cocozza

Test category: All parameters (European limits)Test Margin: 100Test date: 2017-11-29Start time: 09:26:41End time: 11:28:14Test duration (min): 120Data file name: F-000038.cts_dataComment: Longue DuréeCustomer: Services DiversifiésProjet : 54765R.P. : P.Fokom

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Test Result: Pass
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Status: Test Completed

Psti and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:Vrms at the end of test (Volt):230.92Highest dt (%):0.00T-max (mS):0Highest dc (%):0.00Highest dmax (%):0.00Highest Pst (10 min. period):0.064Highest Plt (2 hr. period):0.064

N/A	N/A
500.0	Pass
3.30	Pass
4.00	Pass
1.000	Pass
0.650	Pass
	N/A 500.0 3.30 4.00 1.000 0.650