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Test report

317747-2TRFEMC

Date of issue: November 22, 2016

Applicant:

Nanoptix Inc.

Product:

PayCheck NextGen

Model:

950050

Product variant:

PayCheck Desktop II

Model variant:

950051

Specifications:

- FCC 47 CFR Part 15, Subpart B – Verification
- ICES-003 Issue 5 August 2012
- EN 55022: 2010
- EN 61000-3-2: 2006 + A1: 2009 + A2: 2009
- EN 61000-3-3: 2008

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Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 1 Report summary

1.1 Test specifications

FCC 47 CFR Part 15, Subpart B – Verification	Title 47: Telecommunication; PART 15—RADIO FREQUENCY DEVICES
ICES-003 Issue 5 August 2012	Information Technology Equipment (ITE) – Limits and methods of measurement
EN 55022: 2010	Information technology equipment Radio disturbance characteristics Limits and methods of measurement
EN 61000-3-2: 2006 + A1: 2009 + A2: 2009	Limits for harmonic current emissions (equipment input current <= 16 A per phase)
EN 61000-3-3: 2008	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

1.2 Exclusions

None

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.4 Test report revision history

Table 1.4-1: *Test report revision history*

Revision #	Details of changes made to test report
TRF	Original report issued

Section 2 Summary of test results

2.1 International test results

Table 2.1-1: *EN 55022: 2010, results*

Test description	Verdict
Radiated disturbance	Pass [1]
Conducted disturbance at mains port	Pass [1]
Conducted common mode (asymmetric mode) disturbance at telecommunication ports	Not applicable [1]

Notes: [1] Product classification A

Table 2.1-2: *EN 61000-3-2: 2006 + A1: 2009 + A2: 2009 results*

Test description	Verdict
Harmonic current emissions	Pass [1]

Notes: [1] Harmonic classification A

Table 2.1-3: *EN 61000-3-3: 2008 results*

Test description	Verdict
Voltage fluctuations and flicker	Pass

Notes: None

2.2 North America test results

Table 2.2-1: *FCC 47 CFR Part 15, Subpart B and ICES-003 Issue 5 results*

Test description	Verdict
Radiated disturbance	Pass [1]
Conducted disturbance at mains port	Pass [1]

Notes: [1] Product classification A

Section 3 Equipment under test (EUT) details

3.1 Applicant and Manufacturer

Company name	Nanoptix Inc.
Address	699 Champlain St., Dieppe, New Brunswick, Canada, E1A 7P1

3.2 Sample information

Receipt date	September 23, 2016
Nemko sample ID number	133-002513

3.3 EUT information

Product name (s)	PayCheck NextGen
Model (s)	950050
Serial number	NG00286
Product name Variant	PayCheck Desktop II
Model Variant	950051
Power requirements	24 V_{DC} @ 2.4 Amps (Via 100-240 V_{AC} power supply)
Description/theory of operation	The EUT is a thermal ticket printer. This printer is used in casino game terminal to print tickets used to cash out credits from the game. It can receive print jobs from either USB full speed or RS-232.
Operational frequencies	1GHz internal processor, 400MHz for memory access
Software details	Firmware version is 1.14B

3.4 EUT exercise and monitoring details

The printer was printing a “standard” ticket. Every 6 seconds.

3.5 EUT setup details

Table 3.5-1: *EUT interface ports*

Description	Qty.
RS232 – printer connector	1

Table 3.5-2: *Support equipment*

Description	Brand name	Model/Part number	Serial number	Rev.
Power supply	FSP Group INC	FSP060-RTAAN2	-	-

Table 3.5-3: *Inter-connection cables*

Cable description	From	To	Length (m)
RS232	Host	Network	5

Figure 3.5-1: *Setup diagram*

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

The PayCheck Desktop II, model number 950051 was tested as a representative sample for both models. Customer has stated the EUT uses different plastic enclosure and EUT uses the same firmware. The EUT Is electrically identical.

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Nemko Canada Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

Section 7 Terms and definitions

7.1 Product classifications definitions

7.1.1 Title 47: Telecommunication – Part 15-Radio Frequency devices, Subpart A – General

Class A digital device	A digital device that is marketed for use in a commercial, industrial or business environment, exclusive of a device which is marketed for use by the general public or is intended to be used in the home.
Class B digital device	A digital device that is marketed for use in a residential environment notwithstanding use in commercial, business and industrial environments. Examples of such devices include, but are not limited to, personal computers, calculators, and similar electronic devices that are marketed for use by the general public. Note: The responsible party may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B digital device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B digital device, regardless of its intended use.

7.1.2 EN 55022

Class B ITE	ITE (Information technology equipment) is intended primarily for use in the domestic environment and may include: – Equipment with no fixed place of use; for example, portable equipment powered by built-in batteries; – Telecommunication terminal equipment powered by a telecommunication network; – Personal computers and auxiliary connected equipment.
Class A ITE	is a category of all other ITE, which satisfies the class A ITE limits but not the class B ITE limits. Such equipment should not be restricted in its sale but the following warning shall be included in the instructions for use: WARNING This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

7.1.3 ICES-003

Class B ITE	limits of radio noise for ITE for residential operation
Class A ITE	limits of radio noise for ITE for non-residential operation
Conditions	Only ITE intended strictly for non-residential use in commercial, industrial or business environments, and whose design or other characteristics strongly preclude the possibility of its use in a residential environment, shall be permitted to comply with the less stringent Class A limits. All ITE that cannot meet the conditions for Class A operation shall comply with the Class B limits. The ITE shall comply with both the power line – conducted and the radiated emissions limits within the same Class, with no intermixing.

7.1 Product classifications definitions, continued

7.1.4 EN 61000-3-2

For the purpose of harmonic current limitation, equipment is classified as follows:

Class A	– Balanced three-phase equipment; – Household appliances excluding equipment identified as Class D; – Tools excluding portable tools; – Dimmers for incandescent lamps; – Audio equipment. Equipment not specified in one of the three other classes shall be considered as Class A equipment.
Class B	– Portable tools; – Arc welding equipment, which is not professional equipment.
Class C	– Lighting equipment.
Class D	Equipment having a specified power according to 6.2.2 less than or equal to 600 W, of the following types: – Personal computers and personal computer monitors; – Television receivers.

7.2 General definitions

7.2.1 Title 47: Telecommunication – Part 15-Radio Frequency devices, Subpart A – General

Digital device (Previously defined as a computing device)	An unintentional radiator (device or system) that generates and uses timing signals or pulses at a rate in excess of 9,000 pulses (cycles) per second and uses digital techniques; inclusive of telephone equipment that uses digital techniques or any device or system that generates and uses radio frequency energy for the purpose of performing data processing functions, such as electronic computations, operations, transformations, recording, filing, sorting, storage, retrieval, or transfer. A radio frequency device that is specifically subject to an emanation requirement in any other FCC Rule part or an intentional radiator subject to subpart C of this part that contains a digital device is not subject to the standards for digital devices, provided the digital device is used only to enable operation of the radio frequency device and the digital device does not control additional functions or capabilities. Note: Computer terminals and peripherals that are intended to be connected to a computer are digital devices.

7.2.2 EN 55022

Information technology equipment (ITE)	Any equipment: a) Which has a primary function of either (or a combination of) entry, storage, display, retrieval, transmission, processing, switching, or control, of data and of telecommunication messages and which may be equipped with one or more terminal ports typically operated for information transfer; b) With a rated supply voltage not exceeding 600 V. It includes, for example, data processing equipment, office machines, electronic business equipment and telecommunication equipment.
Telecommunications/network port	Point of connection for voice, data and signaling transfers intended to interconnect widely dispersed systems via such means as direct connection to multi-user telecommunications networks (e.g. public switched telecommunications networks (PSTN) integrated services digital networks (ISDN), x-type digital subscriber lines (xDSL), etc.), local area networks (e.g. Ethernet, Token Ring, etc.) and similar networks NOTE A port generally intended for interconnection of components of an ITE system under test (e.g. RS-232, IEEE Standard 1284 (parallel printer), Universal Serial Bus (USB), IEEE Standard 1394 (“Fire Wire”), etc.) and used in accordance with its functional specifications (e.g. for the maximum length of cable connected to it), is not considered to be a telecommunications/network port under this definition.

7.2.1 ICES-003

Information technology equipment (ITE)	Information Technology Equipment (ITE) is defined as devices or systems that use digital techniques for purposes such as data processing and computation. ITE is any unintentional radiator (device or system) that generates and/or uses timing signals or pulses having a rate of at least 9 kHz and employs digital techniques for purposes such as computation, display, data processing and storage, and control.

7.2.2 EN 61000-3-3

Voltage fluctuation	Series of changes of r.m.s voltage evaluated as a single value for each successive half-period between zero-crossings of the source voltage.
Flicker	Impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time.
Short-term flicker indicator, *P*st	The flicker severity evaluated over a short period (in minutes); *P*st = 1 is the conventional threshold of irritability.
Long-term flicker indicator, *P*lt	The flicker severity evaluated over a long period (a few hours) using successive *P*st values.

Section 8 Testing data

8.1 Radiated disturbance

8.1.1 References

CISPR 22 and ANSI C63.4-2003

8.1.2 Test summary

Verdict	Pass		
Test date	October 24, 2016	Temperature	23 °C
Test engineer	Kevin Rose	Air pressure	1005 mbar
Test location	Ottawa	Relative humidity	32 %

8.1.3 Notes

None

8.1.4 Setup details

EUT setup configuration	Table top
Test facility	3 m Semi anechoic chamber
Measuring distance	3 m
Antenna height variation	1–4 m
Turn table position	0–360°
Measurement details	A preview measurement was generated with receiver in continuous scan or sweep mode while the EUT was rotated and antenna adjusted to maximize radiated emission. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver/spectrum analyzer settings for frequencies below 1 GHz:

Resolution bandwidth	120 kHz
Video bandwidth	300 kHz
Detector mode	Peak (preview measurement); Quasi-peak (final measurement)
Trace mode	Max Hold
Measurement time	100 ms (preview measurement); 1000 ms (final measurement)

Receiver/spectrum analyzer settings for frequencies above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak (preview); Peak and Average (final)
Trace mode	Max Hold
Measurement time	100 ms (preview); 1000 ms (final)

8.1.4 Setup details, continued

Table 8.1-1: *Radiated disturbance equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Dec. 01/16
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
AC Power source	California Instruments	3001i	FA001021	1 year	Sept. 08/17
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	Jan. 07/17
Bilog antenna (20–3000 MHz)	Sunol	JB3	FA002108	1 year	Apr. 28/17
Pre-amplifier (1–18 GHz)	JCA	JCA118-503	FA002091	1 year	April 26/17
Horn antenna (1–18 GHz)	EMCO	3115	FA000825	1 year	Apr. 26/17
50 Ω coax cable	Huber + Suhner	None	FA002074	1 year	April 26/17
50 Ω coax cable	Huber + Suhner	None	FA002830	1 year	July 29/17

Notes: NCR - no calibration required

Table 8.1-2: *Radiated disturbance test software details*

Manufacturer of Software	Details
Rhode & Schwarz	EMC32, Software for EMC Measurements, Version 9.26.01

Notes: None

8.1.5 Test data

The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators.

Figure 8.1-1: *Radiated disturbance spectral plot (30 to 1000 MHz)*

The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators.

Figure 8.1-2: *Radiated disturbance spectral plot (1 to 6 GHz)*

8.1.5 Test data, continued

Table 8.1-3: *Radiated disturbance (Quasi-Peak) results*

Frequency (MHz)	Quasi-Peak field strength[1] (dBµV/m)	Measurement time (ms)	Bandwidth (kHz)	Antenna height (cm)	Pol. (V/H)	Turn table position (°)	Correction factor[2] (dB)	Margin (dB)	3 m Quasi-Peak limit [3] (dBµV/m)
EN 55022									
36.120	26.47	1000	120	165	V	199	18.9	24.03	50.5
197.550	40.26	1000	120	229	H	149	14.3	10.24	50.5
203.010	41.50	1000	120	213	H	156	14.1	9.00	50.5
203.790	40.97	1000	120	227	H	166	14.0	9.53	50.5
204.570	40.25	1000	120	211	H	170	13.8	10.25	50.5
205.350	38.91	1000	120	204	H	176	13.7	11.59	50.5
206.160	39.58	1000	120	98	V	267	13.5	10.92	50.5
336.000	35.23	1000	120	103	H	218	16.8	22.27	57.5
432.000	44.34	1000	120	150	V	115	19.3	13.16	57.5
528.000	44.54	1000	120	173	H	73	20.9	12.96	57.5
624.030	40.53	1000	120	145	H	19	22.4	16.97	57.5
672.000	44.16	1000	120	267	H	271	23.1	13.34	57.5
720.000	46.92	1000	120	116	H	271	23.6	10.58	57.5
816.030	38.59	1000	120	113	H	93	25.0	18.91	57.5
912.000	45.46	1000	120	171	V	26	25.8	12.04	57.5
FCC and ICES-003									
36.120	26.47	1000	120	165	V	199	18.9	23.03	49.5
197.550	40.26	1000	120	229	H	149	14.3	14.24	54.5
203.010	41.5	1000	120	213	H	156	14.1	13.00	54.5
203.790	40.97	1000	120	227	H	166	14	13.53	54.5
204.570	40.25	1000	120	211	H	170	13.8	14.25	54.5
205.350	38.91	1000	120	204	H	176	13.7	15.59	54.5
206.160	39.58	1000	120	98	V	267	13.5	14.92	54.5
336.000	35.23	1000	120	103	H	218	16.8	20.77	56.0
432.000	44.34	1000	120	150	V	115	19.3	11.66	56.0
528.000	44.54	1000	120	173	H	73	20.9	11.46	56.0
624.030	40.53	1000	120	145	H	19	22.4	15.47	56.0
672.000	44.16	1000	120	267	H	271	23.1	11.84	56.0
720.000	46.92	1000	120	116	H	271	23.6	9.08	56.0
816.030	38.59	1000	120	113	H	93	25	17.41	56.0
912.000	45.46	1000	120	171	V	26	25.8	10.54	56.0

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factor = antenna factor ACF (dB) + cable loss (dB)

Sample calculation: 38.9 dBµV/m (field strength) = 27.9 dBµV (receiver reading) + 11.0 dB (Correction factor)

8.1.6 Setup photos

Figure 8.1-3: *Radiated disturbance setup photo*

Figure 8.1-4: *Radiated disturbance setup photo*

8.2 Conducted disturbance at mains port

8.2.1 References

CISPR 22 and ANSI C63.4-2003

8.2.2 Test summary

Verdict	Pass		
Test date	October 24, 2016	Temperature	23 °C
Test engineer	Kevin Rose	Air pressure	1005 mbar
Test location	Ottawa	Relative humidity	32 %

8.2.3 Notes

None

8.2.4 Setup details

Port under test	AC mains
EUT setup configuration	Table top
Measurement details	A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver settings:

Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Detector mode	Peak and Average (preview measurement); Quasi-peak and Average (final measurement)
Trace mode	Max Hold
Measurement time	100 ms (preview measurement); 1000 ms (final measurement)

Table 8.2-1: *Conducted disturbance at mains port equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	Jan. 07/17
AC Power source	Chenwa	2700M-10k	FA002716	—	VOU
LISN	Rohde & Schwarz	ENV216	FA002023	1 year	Mar. 08/17

Table 8.2-2: *Conducted disturbance at mains port test software details*

Manufacturer of Software	Details
Rhode & Schwarz	EMC32, Software for EMC Measurements, Version 9.26.01

Notes: None

8.2.5 Test data

NEX-317747 CE Scan 120 Vac 60 Hz Phase

- Preview Result 2-AVG
- Preview Result 1-PK+
- CISPR 22 Mains Q-Peak Class B Limit
- CISPR 22 Mains Average Class B Limit
- Final_Result QPK
- Final_Result CAV

The spectral plot has been corrected with transducer factors. (i.e. cable loss, LISN factors, and attenuators)

Figure 8.2-1: *Conducted disturbance at mains port spectral plot on phase line*

8.2.5 Test data, continued

NEX-317747 CE Scan 120 Vac 60 Hz Neutral

- Preview Result 2-AVG
- Preview Result 1-PK+
- CISPR 22 Mains Q-Peak Class B Limit
- CISPR 22 Mains Average Class B Limit
- Final_Result QPK
- Final_Result CAV

The spectral plot has been corrected with transducer factors. (i.e. cable loss, LISN factors, and attenuators)

Figure 8.2-2: *Conducted disturbance at mains port spectral plot on neutral line*

8.2.5 Test data, continued

The spectral plot has been corrected with transducer factors. (i.e. cable loss, LISN factors, and attenuators)

Figure 8.2-3: *Conducted disturbance at mains port spectral plot on phase line*

8.2.5 Test data, continued

NEX-317747 CE Scan 230 Vac 50 Hz Neutral
- Preview Result 2-AVG
- Preview Result 1-PK+
- CISPR 22 Mains Q-Peak Class B Limit
- CISPR 22 Mains Average Class B Limit
- Final_Result QPK
- Final_Result CAV

The spectral plot has been corrected with transducer factors. (i.e. cable loss, LISN factors, and attenuators)

Figure 8.2-4: *Conducted disturbance at mains port spectral plot on neutral line*

8.2.6 Setup photos

Figure 8.2-5: *Conducted disturbance at mains port setup photo*

Figure 8.2-6: *Conducted disturbance at mains port setup photo*

8.3 Harmonic current emissions

8.3.1 References

EN 61000-3-2: 2006 + A1: 2009 + A2: 2009

8.3.2 Test summary

Verdict	Pass		
Test date	October 24, 2016	Temperature	23 °C
Test engineer	Kevin Rose	Air pressure	1002 mbar
Test location	Ottawa	Relative humidity	36 %

8.3.3 Notes

None

8.3.4 Setup details

Port under test	AC mains
Measurement time	10 min

Table 8.3-1: *Harmonic current emissions equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Single Phase 5kVA, Harmonics, Flicker and Dips system	TESEQ	Profline 2105-208: (NSG1007-5, CCN1000-1, NSG2200-1)	FA002824	1 year	May 26/17

Table 8.3-2: *Harmonic current emissions test software details*

Manufacturer of Software	Details
TESEQ	WIN2110SII, PN CIC924, Version 2.2.0.6, Feb 25, 2010

Notes: None

8.3.5 Test data

California Instruments CTS – V3.0 data

Test category: Class-A per Ed. 4.0 (2014) (European limits) Test Margin: 100
Test date: 10/24/2016 Start time: 6:22:56 PM End time: 6:33:07 PM
Test duration (min): 10 Data file name: H-000077.cts_data

Test Result: Pass Source qualification: Normal

Current & voltage waveforms

Harmonics and Class A limit line European Limits

Test result: Pass Worst harmonic was #17 with 26.8% of the limit.

8.3.5 Test data, continued

California Instruments CTS – V3.0 data, continued

Test category: Class-A per Ed. 4.0 (2014) (European limits) Test Margin: 100
Test date: 10/24/2016 Start time: 6:22:56 PM End time: 6:33:07 PM
Test duration (min): 10 Data file name: H-000077.cts_data
Comment: Verification
Customer: Verification

Test Result: Pass Source qualification: Normal
THC(A): 0.059 I-THD(%): 150.9 POHC(A): 0.032 POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts):	230.07	Frequency(Hz):	50.00
I_Peak (Amps):	3.695	I_RMS (Amps):	0.612
I_Fund (Amps):	0.094	Crest Factor:	15.322
Power (Watts):	18.4	Power Factor:	0.368

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status	
2	0.002	1.080	N/A	0.008	1.620	N/A		Pass
3	0.018	2.300	0.8	0.081	3.450	2.3		Pass
4	0.002	0.430	N/A	0.011	0.645	N/A		Pass
5	0.018	1.140	1.5	0.079	1.710	4.6		Pass
6	0.002	0.300	N/A	0.011	0.450	N/A		Pass
7	0.017	0.770	2.2	0.076	1.155	6.6		Pass
8	0.002	0.230	N/A	0.011	0.345	N/A		Pass
9	0.017	0.400	4.2	0.072	0.600	12.1		Pass
10	0.002	0.184	N/A	0.011	0.276	N/A		Pass
11	0.017	0.330	5.0	0.068	0.495	13.8		Pass
12	0.002	0.153	N/A	0.011	0.230	N/A		Pass
13	0.016	0.210	7.6	0.064	0.315	20.2		Pass
14	0.002	0.131	N/A	0.011	0.197	N/A		Pass
15	0.015	0.150	10.2	0.058	0.225	26.0		Pass
16	0.002	0.115	N/A	0.011	0.173	N/A		Pass
17	0.015	0.132	11.2	0.053	0.198	26.8		Pass
18	0.002	0.102	N/A	0.010	0.153	N/A		Pass
19	0.014	0.118	11.9	0.048	0.178	26.8		Pass
20	0.002	0.092	N/A	0.010	0.138	N/A		Pass
21	0.013	0.107	12.4	0.042	0.161	26.2		Pass
22	0.001	0.084	N/A	0.009	0.125	N/A		Pass
23	0.013	0.098	12.8	0.037	0.147	25.0		Pass
24	0.001	0.077	N/A	0.008	0.115	N/A		Pass
25	0.012	0.090	13.1	0.031	0.135	23.3		Pass
26	0.001	0.071	N/A	0.007	0.107	N/A		Pass
27	0.011	0.083	13.2	0.027	0.125	21.2		Pass
28	0.001	0.066	N/A	0.006	0.099	N/A		Pass
29	0.010	0.078	13.1	0.022	0.116	18.9		Pass
30	0.001	0.061	N/A	0.005	0.092	N/A		Pass
31	0.009	0.073	12.9	0.018	0.109	16.5		Pass
32	0.001	0.058	N/A	0.004	0.086	N/A		Pass
33	0.009	0.068	12.6	0.014	0.102	13.9		Pass
34	0.001	0.054	N/A	0.003	0.081	N/A		Pass
35	0.008	0.064	12.1	0.011	0.096	11.6		Pass
36	0.001	0.051	N/A	0.002	0.077	N/A		Pass
37	0.007	0.061	11.6	0.009	0.091	9.6		Pass
38	0.001	0.048	N/A	0.002	0.073	N/A		Pass
39	0.006	0.058	11.1	0.007	0.087	8.5		Pass
40	0.000	0.046	N/A	0.002	0.069	N/A		Pass

8.3.5 Test data, continued

California Instruments CTS – V3.0 data, continued

Test category: Class-A per Ed. 4.0 (2014) (European limits) Test Margin: 100
Test date: 10/24/2016 Start time: 6:22:56 PM End time: 6:33:07 PM
Test duration (min): 10 Data file name: H-000077.cts_data
Comment: Verification
Customer: Verification

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	230.07	Frequency(Hz):	50.00
I_Peak (Amps):	3.695	I_RMS (Amps):	0.612
I_Fund (Amps):	0.094	Crest Factor:	15.322
Power (Watts):	18.4	Power Factor:	0.368

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.025	0.460	5.51	OK
3	0.361	2.070	17.45	OK
4	0.012	0.460	2.53	OK
5	0.029	0.920	3.14	OK
6	0.018	0.460	4.00	OK
7	0.032	0.690	4.64	OK
8	0.014	0.460	3.07	OK
9	0.046	0.460	9.92	OK
10	0.009	0.460	2.01	OK
11	0.055	0.230	23.72	OK
12	0.014	0.230	5.96	OK
13	0.039	0.230	16.91	OK
14	0.006	0.230	2.39	OK
15	0.042	0.230	18.36	OK
16	0.007	0.230	3.24	OK
17	0.042	0.230	18.12	OK
18	0.008	0.230	3.58	OK
19	0.044	0.230	18.92	OK
20	0.008	0.230	3.49	OK
21	0.042	0.230	18.27	OK
22	0.005	0.230	2.01	OK
23	0.039	0.230	16.86	OK
24	0.005	0.230	1.96	OK
25	0.035	0.230	15.18	OK
26	0.004	0.230	1.57	OK
27	0.031	0.230	13.43	OK
28	0.003	0.230	1.36	OK
29	0.029	0.230	12.51	OK
30	0.004	0.230	1.88	OK
31	0.025	0.230	10.70	OK
32	0.003	0.230	1.30	OK
33	0.020	0.230	8.72	OK
34	0.002	0.230	1.07	OK
35	0.016	0.230	7.16	OK
36	0.002	0.230	1.05	OK
37	0.013	0.230	5.64	OK
38	0.002	0.230	0.88	OK
39	0.013	0.230	5.55	OK
40	0.006	0.230	2.64	OK

8.3.6 Setup photos

Figure 8.3-1: *Harmonic current emissions setup photo*

8.4 Voltage fluctuations and flicker

8.4.1 References

EN 61000-3-3: 2008

8.4.2 Test summary

Verdict	Pass		
Test date	October 24, 2016	Temperature	23 °C
Test engineer	Kevin Rose	Air pressure	1002 mbar
Test location	Ottawa	Relative humidity	36 %

8.4.3 Notes

None

8.4.4 Setup details

Port under test	AC mains
Measurement time	10 min

Table 8.4-1: *Voltage fluctuations and flicker equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Single Phase 5kVA, Harmonics, Flicker and Dips system	TESEQ	Profline 2105-208: (NSG1007-5, CCN1000-1, NSG2200-1)	FA002824	1 year	May 26/17

Table 8.4-2: *Voltage fluctuations and flicker test software details*

Manufacturer of Software	Details
TESEQ	WIN2110SII, PN CIC924, Version 2.2.0.6, Feb 25, 2010

Notes: None

8.4.5 Test data

California Instruments CTS – V3.0 data

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

Test date: 10/24/2016 Start time: 6:10:36 PM End time: 6:21:06 PM
Test duration (min): 10

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):	230.02			
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):	0.290	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.127	Test limit:	0.650	Pass

8.4.6 Setup photos

Figure 8.4-1: *Voltage fluctuations and flicker setup photo*

Section 9 EUT photos

9.1 External photos

Figure 9.1-1: *Front view photo*

Figure 9.1-2: *Rear view photo*

Figure 9.1-3: *Side view photo*