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Compliance test report ID 188614-1TRFEMC

Date of issue
November 7, 2011

- FCC 47 CFR Part 15, Subpart B – Verification
- ICES-003 Issue 4 February 2004
- EN 55022: 2010
- EN 61000-3-2: 2006 + A1: 2009 + A2: 2009
- EN 61000-3-3: 2008

Applicant Nanoptix Inc
Product HSVL Thermal Printer
Model HSVL™

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation

SCC Accredited LAB
LAB Accrédité CCN

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Tested by Kevin Rose, Wireless/EMC Specialist

Reviewed by

Andrey Adelberg, Senior EMC/Wireless Specialist

November 7, 2011
Date

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.

Copyright notification

Table of Contents

Section 1 Report summary

1.1 Test specifications

- FCC 47 CFR Part 15, Subpart B – Verification
- ICES-003 Issue 4 February 2004
- EN 55022: 2010
- EN 61000-3-2: 2006 + A1: 2009 + A2: 2009
- EN 61000-3-3: 2008

1.2 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.

1.3 Exclusions

None

1.4 Test report revision history

None

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
Conducted disturbance at mains port	Pass
Conducted common mode (asymmetric mode) disturbance at telecommunication ports	Not applicable
Notes: Product classification A	

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

Test description	Verdict
Harmonic current emissions	Pass
Notes: The EUT utilizes less than 75 W. No limits are specified for equipment with less than 75 W input rating. See clause 7 of EN 61000-3-2: 2006 + A1 +A2: 2009	

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

Test description	Verdict
Voltage fluctuations and flicker	Pass
Notes The EUT is unlikely to produce significant voltage fluctuations or flicker. No testing required. See clause 6.1 of EN 61000-3-3: 2008	

2.2 North America test results

Table 2.2-1: FCC 47 CFR Part 15, Subpart B for Digital Devices results

Test description	Verdict
Radiated disturbance	Pass
Conducted disturbance at mains port	Pass
Notes: Product classification A	

Table 2.2-2: ICES-003 Issue 4 February 2004 results

Test description	Verdict
Radiated disturbance	Pass
Conducted disturbance at mains port	Pass
Notes: Product classification A	

Section 3 Equipment under test (EUT) details

3.1 Applicant

Company name	Nanoptix Inc
Company address	699 Champlain St Dieppe, NB E1A 1P6

3.2 Sample information

Receipt date	October 27, 2011
Nemko sample ID number	Item # 1

3.3 EUT information

Product name	HSVL Thermal Printer
Model	HSVL™
Serial number	VL00160
Part number	950100
Power requirements	24 V_{DC}, 2.4 A
Manufacturer	Nanoptix Inc 699 Champlain St Dieppe, NB E1A 1P6

Product description and theory of operation

Thermal printer. To put the paper, power the printer and the insert the paper in the paper in slot. The printer will automatically pull the paper. This printer is used in machines like video lottery terminals to print receipts. It can receive print jobs from either USB full speed or RS-232.

Operational frequencies

192 MHz internal to the processor, 96 MHz for memory access.

Software details

Printer firmware version HSV-5.50F

3.4 EUT exercise and monitoring details

To put the paper, power the printer and the insert the paper in the paper in slot. The printer will automatically pull the paper. Press the paper feed button (on the base top) for at least 6 seconds. The printer will start printing continuously until powered off.

3.5 EUT setup details

Table 3.5-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number	Rev.
HSVL Thermal Printer	Nanoptix Inc	HSVL™ / 950100	VL00160	---
ITE Power Supply	GlobTek, Inc.	GT-21126-6024 / GS-1110	RoHS021647013811	---

Table 3.5-2: EUT interface ports

Description	Qty.
DC Power Input	1
RS-232 (DB9 Female Connector)	1
USB (mini-B Connector)	1

Table 3.5-3: Support equipment

Description	Brand name	Model/Part number	Serial number	Rev.
Laptop Computer	Dell	Latitude D600	CN-0G5152-48643-445-0906	A01

Table 3.5-4: Inter-connection cables

Cable description	From	To	Length (m)
2 Conductor DC Power Cable	EUT	AC/DC Power Adapter	2
DB9 to DB9 Null Cable	EUT	Laptop Computer	2
Mini-B to Standard USB Cable	EUT	Laptop Computer	2

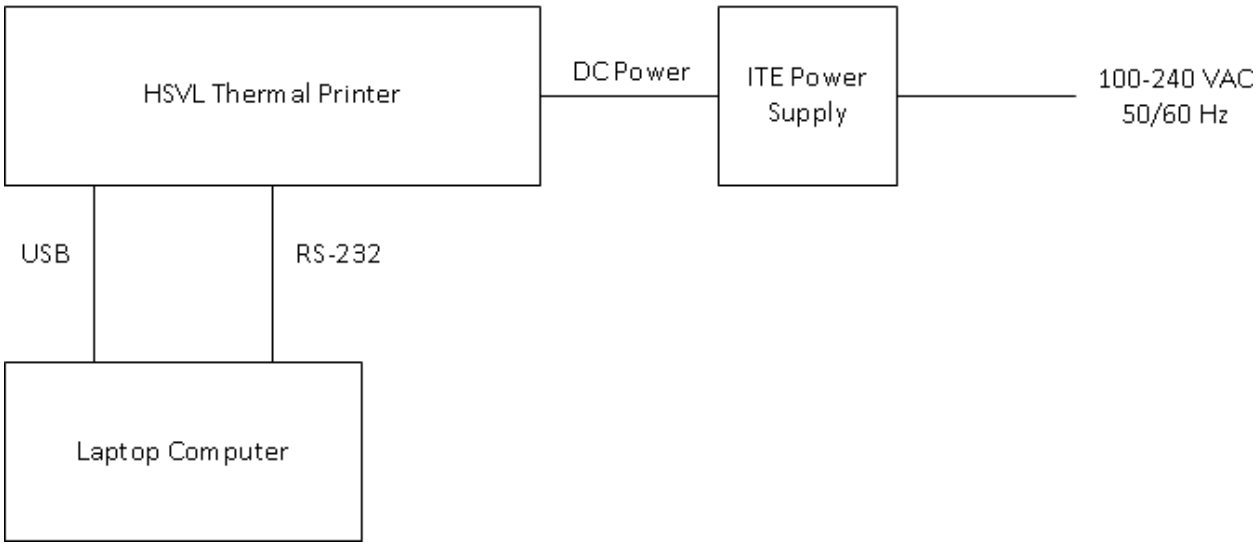


Diagram 3.5-1: Setup diagram

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

None

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

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.

EN 55022

Class B 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.

ICES-003

"Digital apparatus" means an electronic apparatus that generates and uses timing signals at a rate in excess of 10,000 pulses per second and that utilizes radio frequency energy for the purpose of performing functions including computations, operations, transformations, recording, filing, sorting, storage, retrieval and transfer, but does not include an ISM (industrial, scientific or medical) radio frequency generator.

"Class A digital apparatus" means a model of digital apparatus for which, by virtue of its characteristics, it is highly unlikely that any units of the model will be used in a residential environment, which includes a home business. Characteristics considered to be applicable in this assessment include: price, marketing and advertising methodology, the degree to which the functional design inhibits applications suitable to residential environments or any combination of features which would effectively preclude its use in a residential environment.

"Class B digital apparatus" means any model of digital apparatus that cannot qualify as Class
A digital apparatus.

7.1 Product classifications definitions, continued

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

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.

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.

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

8.1.3 Observations/special notes

The EUT was set up as table top configuration.

8.1.4 Test equipment list

Table 8.1-1: Radiated disturbance equipment list

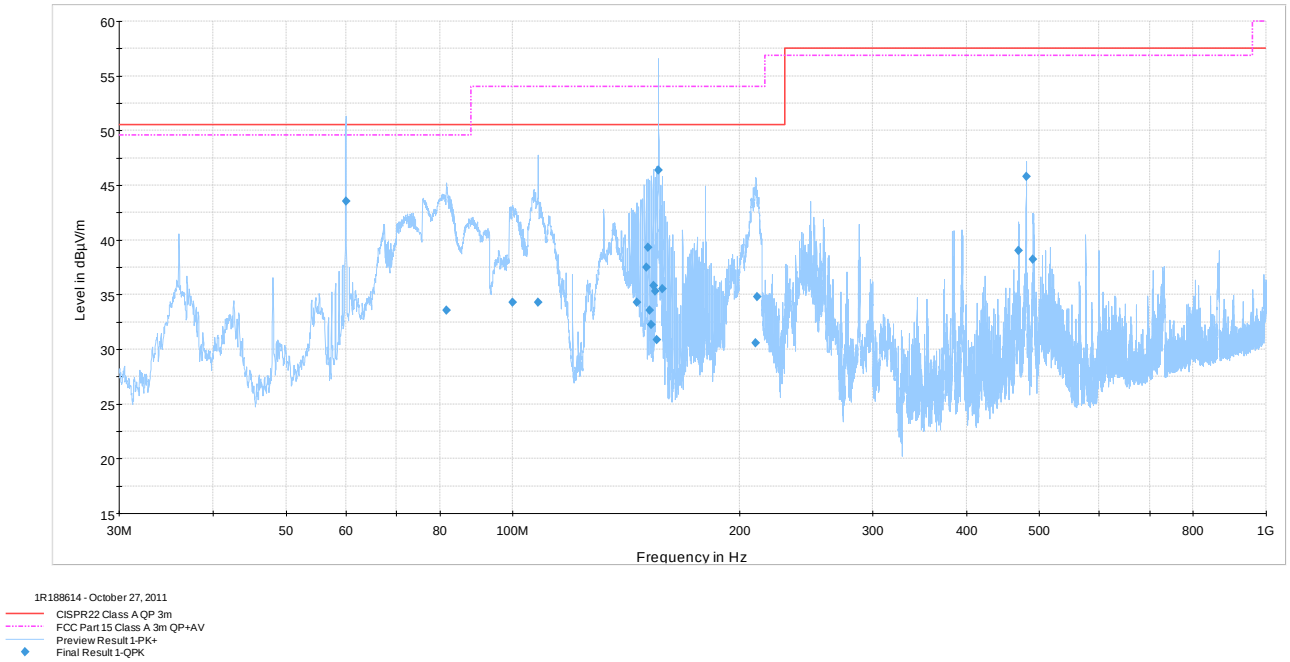
Equipment	Manufacturer	Model no.	Asset no.	Cal./Ver. cycle	Next Cal./Ver.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Mar. 09/12
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Power Source	California Instruments	5001ix	FA001770	1 year	May 03/12
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	April 27/12
Bilog antenna	Sunol	JB3	FA002108	1 year	Jan. 31/12
Horn antenna #2	EMCO	3115	FA000825	1 year	Feb. 04/12
1–18 GHz pre-amplifier	JCA	JCA118-503	FA002091	1 year	Aug. 15/12
Note: NCR - no calibration required					

8.1.5 Test data

Test date	October 27, 2011	**Test engineer**	Kevin Rose		
Temperature	22 °C	**Air pressure**	1001 mbar	**Relative humidity**	23 %

Port under test	Enclosure
Test facility	3 m Semi anechoic chamber
Measuring distance (m)	3
Antenna height variation (m)	1–4
Turn table position (°)	0–360
Receiver/spectrum analyzer settings	30 MHz to 1 GHz: Preview measurements – Receiver: Peak detector (Max hold), RBW = 120 kHz, VBW = 300 kHz, Measurement time = 100 ms Final measurements – Receiver: Q-Peak detector, RBW = 120 kHz, VBW = 300 kHz, Measurement time = 100 ms 1 GHz to 40 GHz: Preview measurements – Spectrum Analyzer: Peak detector (Max hold), RBW = 1 MHz, VBW = 3 MHz, Measurement time = 100 ms Final measurements – Receiver: Peak and average detector, RBW = 1 MHz, VBW = 3 MHz, Measurement time = 100 ms
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.

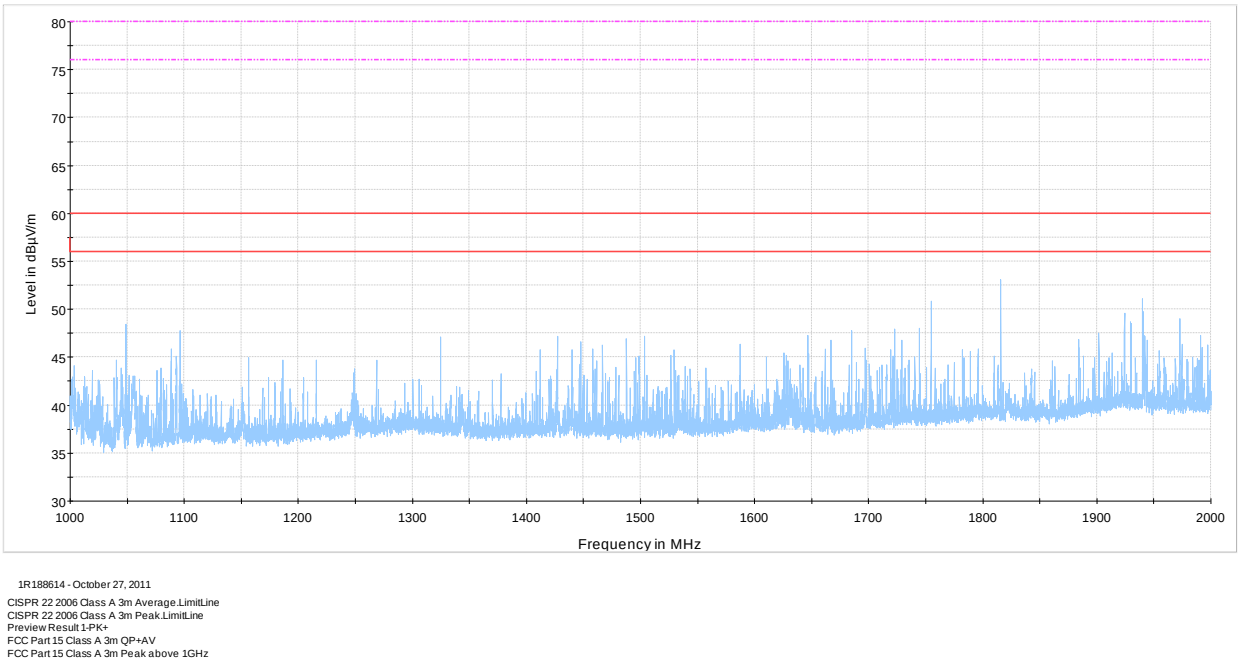
8.1.5 Test data, continued



Plot 8.1-1: Radiated disturbance (30 MHz to 1000 MHz)

Notes:
The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators) for determination of compliance. Limits have been adjusted to reflect 3 m requirements.

8.1.5 Test data, continued



Plot 8.1-2: Radiated disturbance (1000 MHz to 2000 MHz)

Notes:
The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators) for determination of compliance. Limits have been adjusted to reflect 3 m requirements.

8.1.5 Test data, continued

Table 8.1-2: Radiated disturbance (Quasi-Peak) results for EN55022 and ICES-003

Frequency (MHz)	Q-peak field strength (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Pol.	Turn table position	Correction (dB)	Margin (dB)	Limit (dBµV/m)
60.00	43.5	100	120	110	V	338	8.5	7.0	50.5
81.60	33.6	100	120	111	V	260	8.7	16.9	50.5
99.84	34.3	100	120	99.95	V	245	11.6	16.2	50.5
108.00	34.3	100	120	100.04	V	345	13.2	16.2	50.5
146.04	34.3	100	120	117.04	V	218	14.3	16.2	50.5
150.24	37.5	100	120	100	V	196	14.0	13.0	50.5
151.08	39.3	100	120	124.04	V	230	13.9	11.2	50.5
151.95	33.5	100	120	137.95	V	230	13.9	17.0	50.5
152.79	32.2	100	120	113.04	V	238	13.9	18.3	50.5
153.63	35.9	100	120	107.04	V	215	13.9	14.6	50.5
154.47	35.3	100	120	109	V	245	13.9	15.2	50.5
155.34	30.9	100	120	107	V	215	13.8	19.6	50.5
156.00	46.4	100	120	106.95	V	188	13.8	4.1	50.5
157.86	35.5	100	120	100	V	196	13.7	15.0	50.5
210.18	30.6	100	120	133.56	V	166	12.7	19.9	50.5
211.02	34.8	100	120	99.95	V	168	12.7	15.7	50.5
468.96	39.0	100	120	109	V	254	19.5	18.5	57.5
480.00	45.8	100	120	249	V	284	19.5	11.7	57.5
490.41	38.2	100	120	243.95	V	284	19.7	19.3	57.5

Table 8.1-3: Radiated disturbance (Average) results for FCC

Frequency (MHz)	Q-peak field strength (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Pol.	Turn table position	Correction (dB)	Margin (dB)	Limit (dBµV/m)
60.00	43.5	100	120	110	V	338	8.5	6.1	49.6
81.60	33.6	100	120	111	V	260	8.7	16.0	49.6
99.84	34.3	100	120	99.95	V	245	11.6	19.7	54.0
108.00	34.3	100	120	100.04	V	345	13.2	19.7	54.0
146.04	34.3	100	120	117.04	V	218	14.3	19.7	54.0
150.24	37.5	100	120	100	V	196	14.0	16.5	54.0
151.08	39.3	100	120	124.04	V	230	13.9	14.7	54.0
151.95	33.5	100	120	137.95	V	230	13.9	20.5	54.0
152.79	32.2	100	120	113.04	V	238	13.9	21.8	54.0
153.63	35.9	100	120	107.04	V	215	13.9	18.1	54.0
154.47	35.3	100	120	109	V	245	13.9	18.7	54.0
155.34	30.9	100	120	107	V	215	13.8	23.1	54.0
156.00	46.4	100	120	106.95	V	188	13.8	7.6	54.0
157.86	35.5	100	120	100	V	196	13.7	18.5	54.0
210.18	30.6	100	120	133.56	V	166	12.7	23.4	54.0
211.02	34.8	100	120	99.95	V	168	12.7	19.2	54.0
468.96	39.0	100	120	109	V	254	19.5	17.9	56.9
480.00	45.8	100	120	249	V	284	19.5	11.1	56.9
490.41	38.2	100	120	243.95	V	284	19.7	18.7	56.9

Notes:

Sample calculation:
Correction factor (dB) = antenna factor ACF (dB) + cable loss (dB) − amplifier gain (dB) + attenuator (dB)
Field strength (dBµV/m) = X dBµV (reading from receiver/spectrum analyzer) + Y dB (Correction factor)

Example:
38 dBµV/m = 33.2 dBµV (receiver reading) + 12.6 dB (antenna factor ACF) + 2.2 dB (cable loss) − 20 dB (amplifier gain) + 10 dB (attenuator)

8.1.6 Setup photos

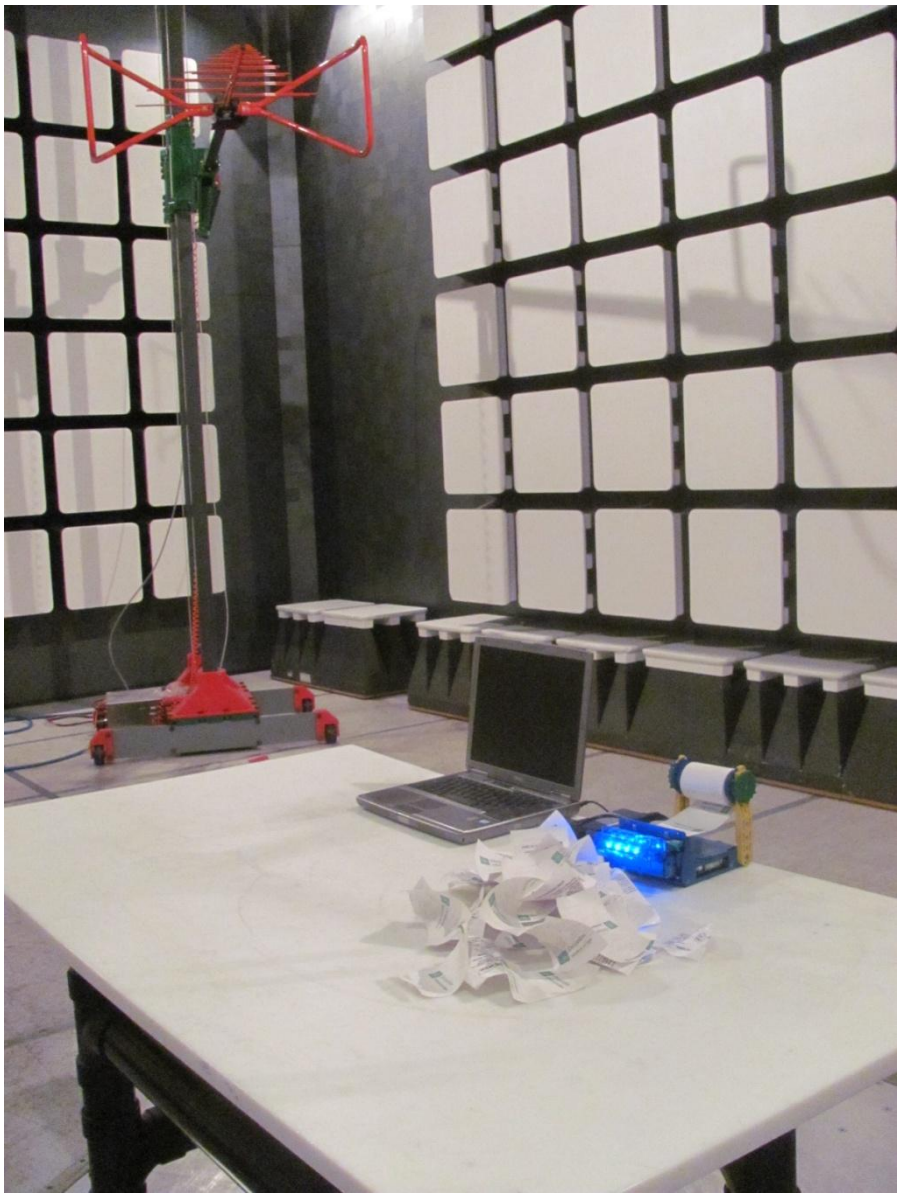


Photo 8.1-1: Radiated disturbance setup

8.1.6 Setup photos, continued

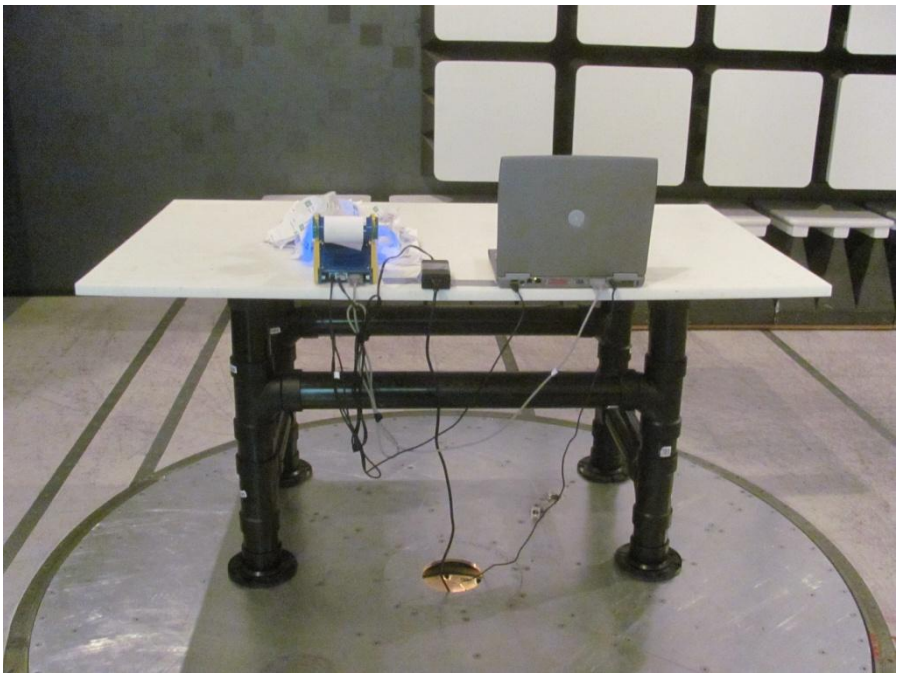


Photo 8.1-2: Radiated disturbance setup

8.2 Conducted disturbance at mains port

8.2.1 References

CISPR 22

8.2.2 Test summary

Verdict Pass

8.2.3 Observations/special notes

The EUT was set up as table top configuration.

8.2.4 Test equipment list

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

Equipment	Manufacturer	Model no.	Asset no.	Cal./Ver. cycle	Next Cal./Ver.
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	April 27/12
Power Source	California Instruments	5001ix	FA001770	1 year	May 03/12
LISN	Rohde & Schwarz	ENV216	FA002023	1 year	Nov. 09/11

8.2.5 Test data

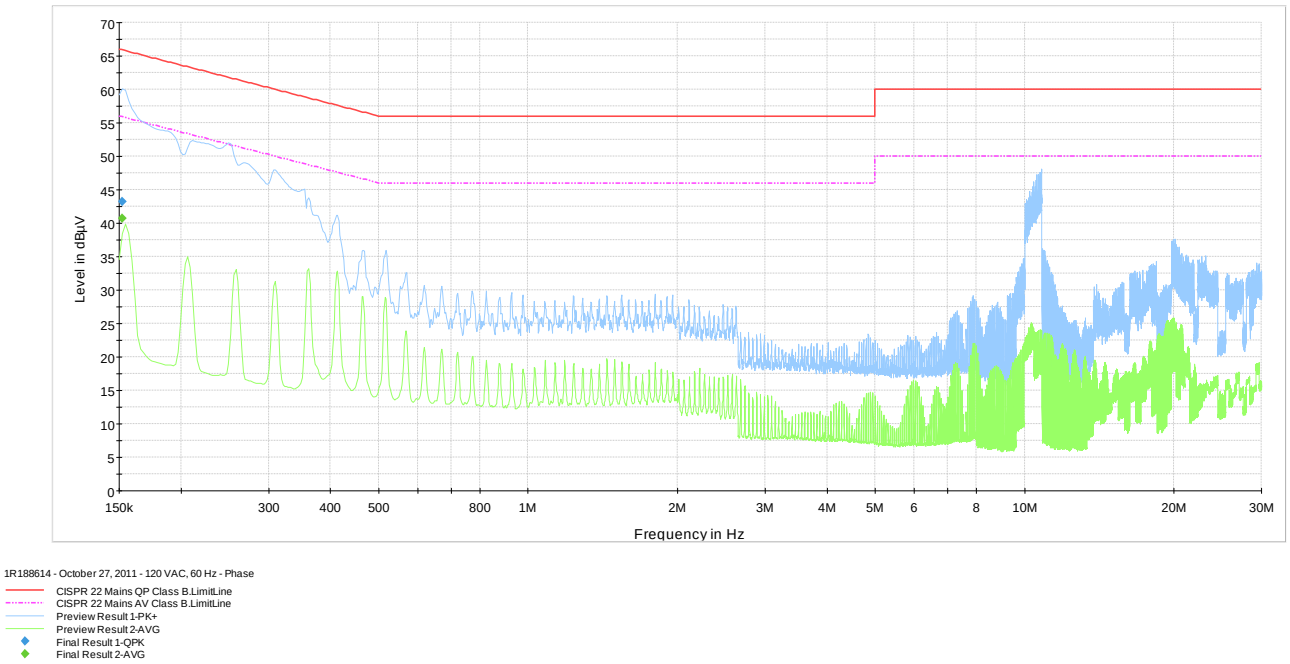
Test date October 27, 2011 **Test engineer** Kevin Rose
Temperature 22 °C **Air pressure** 1001 mbar **Relative humidity** 23 %

Port under test AC Mains

Receiver/spectrum analyzer settings
Preview measurements – Receiver:
Peak and Average detector (Max hold), RBW = 9 kHz, VBW = 30 kHz, Measurement time = 100 ms
Final measurements – Receiver:
Q-Peak and Average detector, RBW = 9 kHz, VBW = 30 kHz, Measurement time = 100 ms

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.

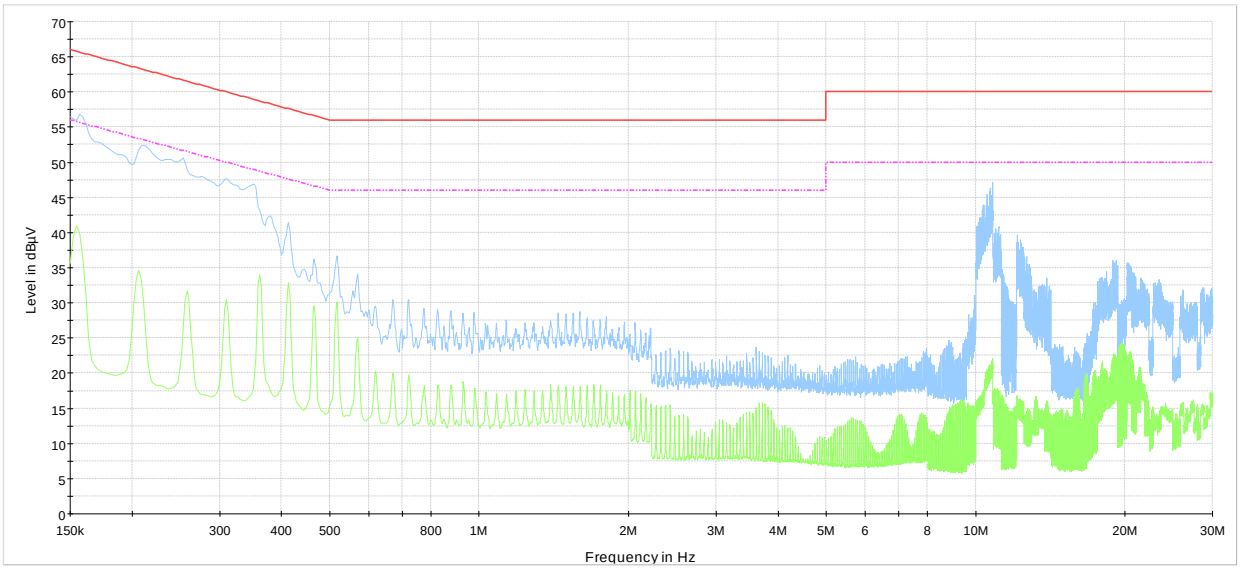
8.2.5 Test data, continued



Plot 8.2-1: Conducted disturbance on phase line

Notes:
The spectral plot has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

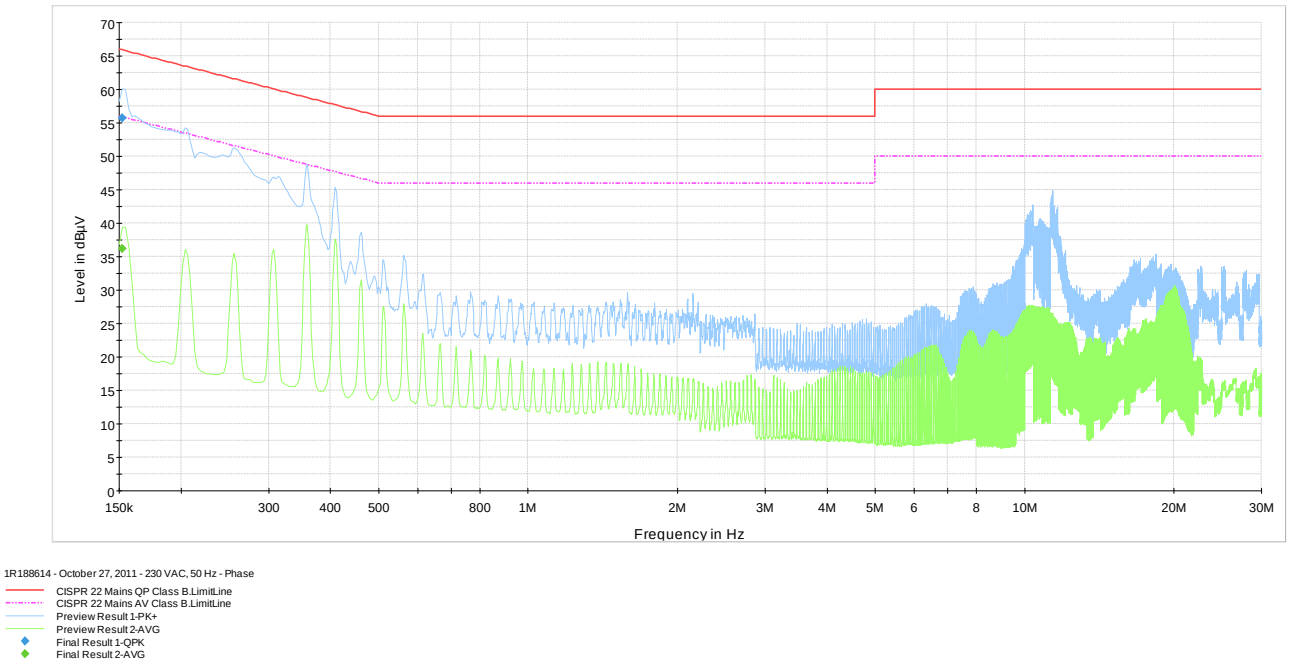
8.2.5 Test data, continued



Plot 8.2-2: Conducted disturbance on neutral line

Notes:
The spectral plot has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

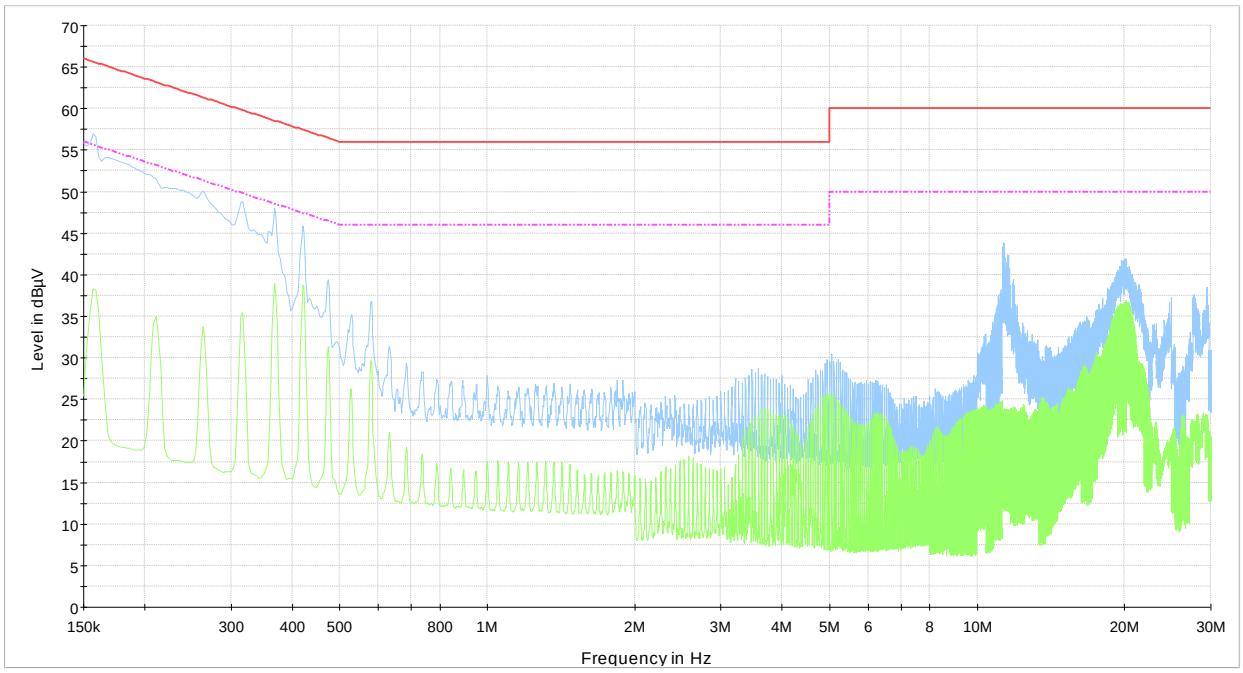
8.2.5 Test data, continued



Plot 8.2-3: Conducted disturbance on phase line

Notes:
The spectral plot has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

8.2.5 Test data, continued



Plot 8.2-4: Conducted disturbance on neutral line

Notes:
The spectral plot has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

8.2.6 Setup photos

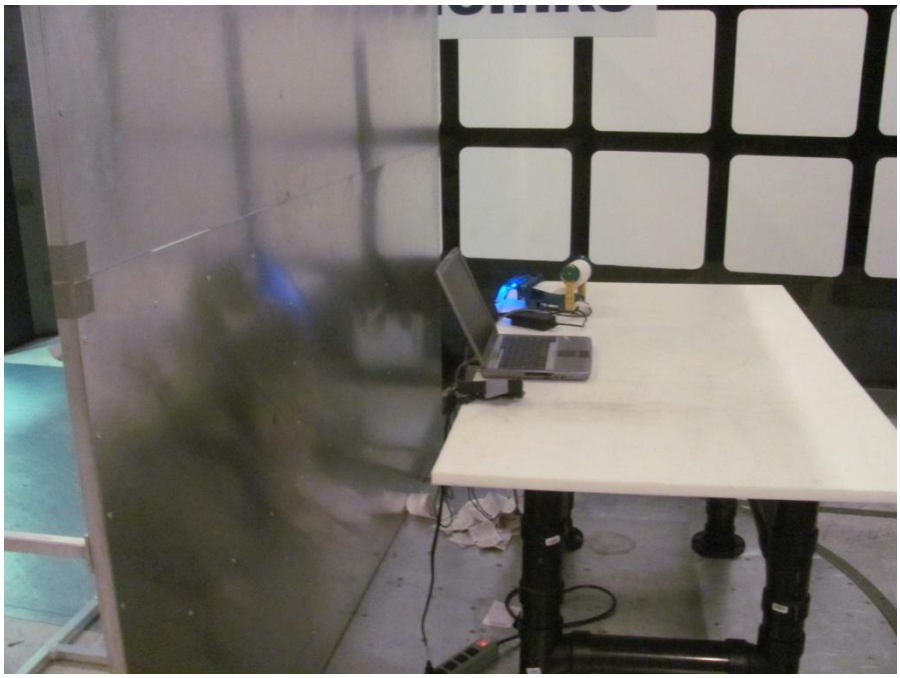


Photo 8.2-1: Conducted disturbance setup

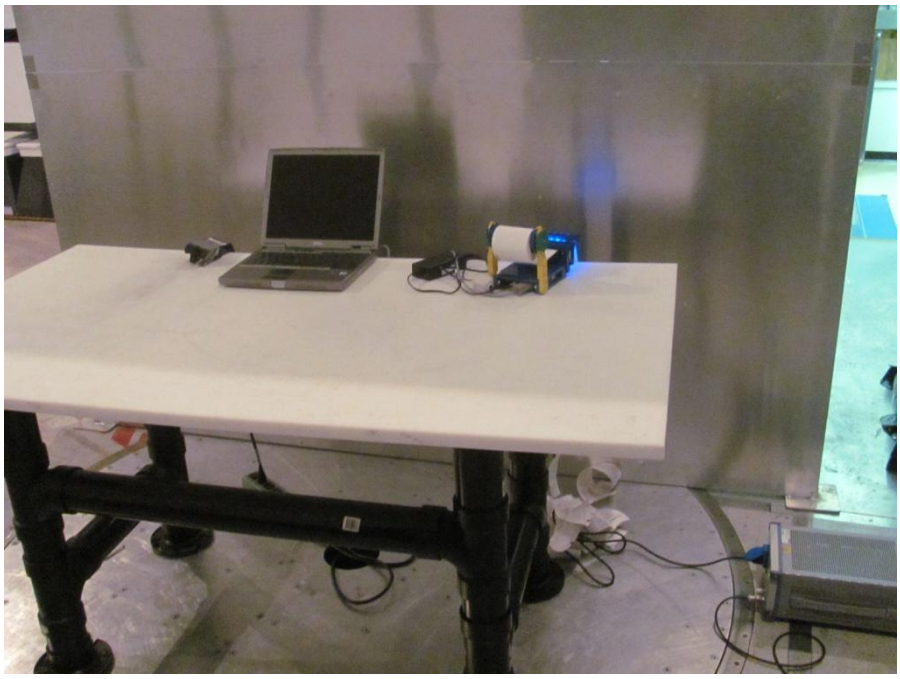
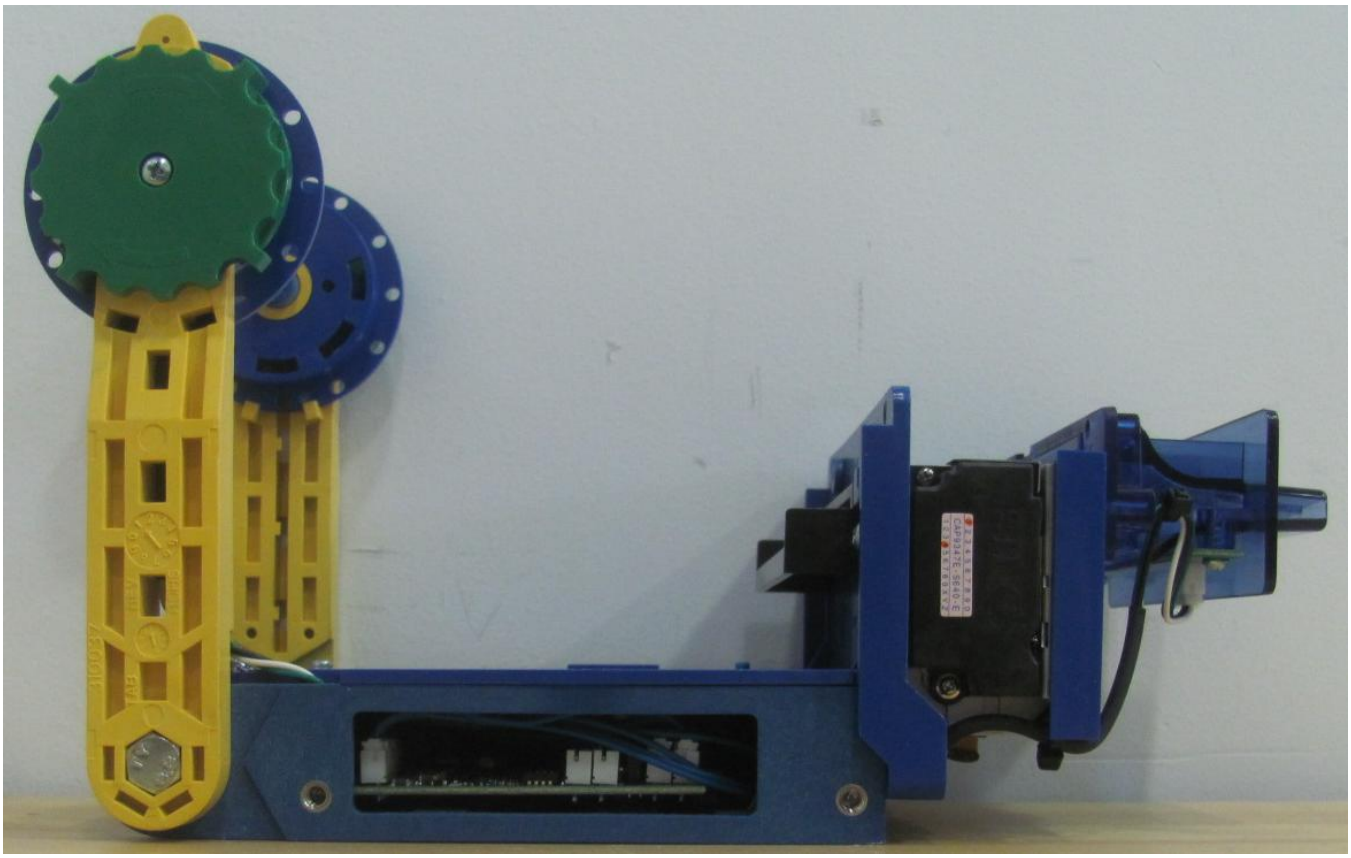


Photo 8.2-2: Conducted disturbance setup

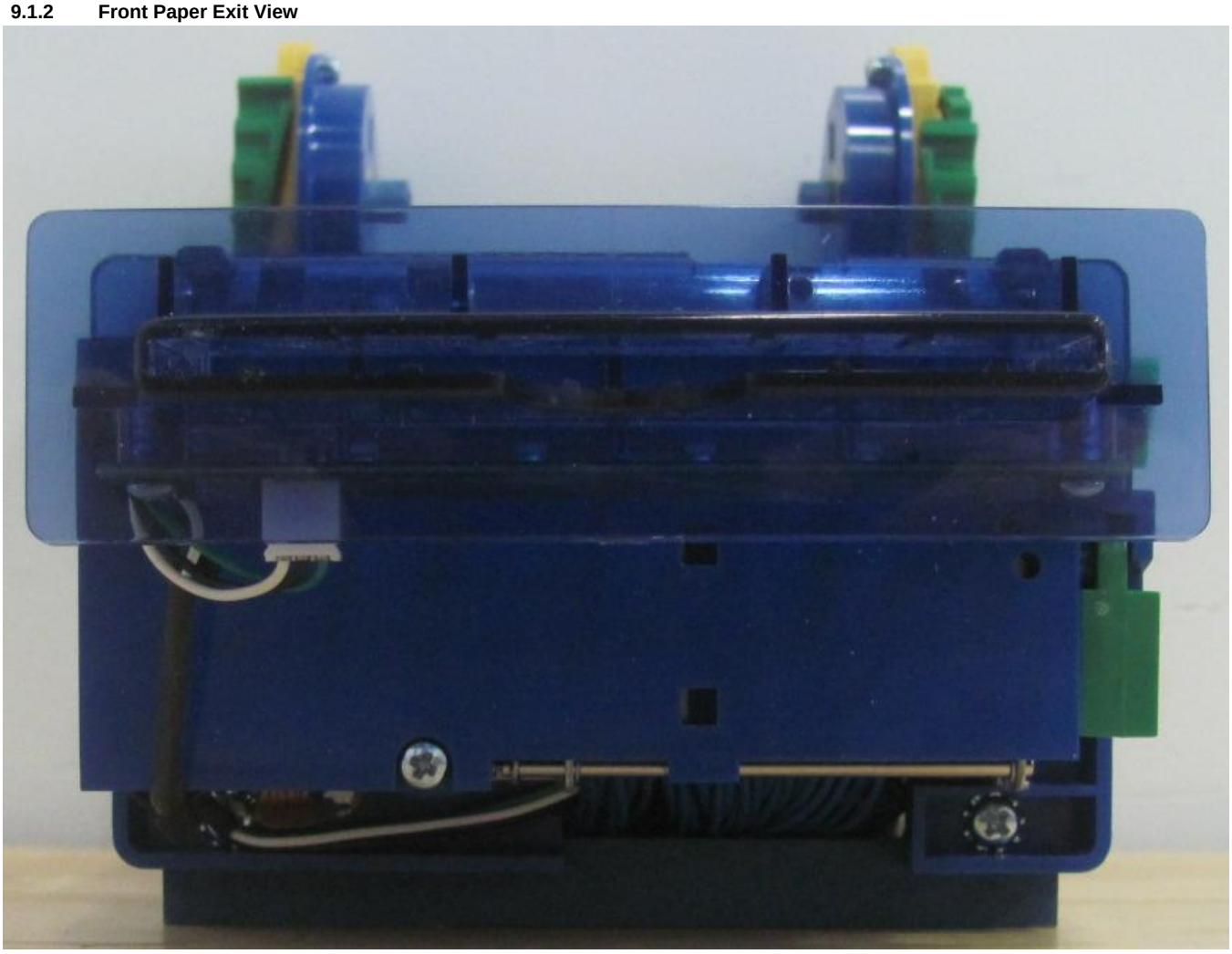
Section 9 EUT photos

9.1 External photos

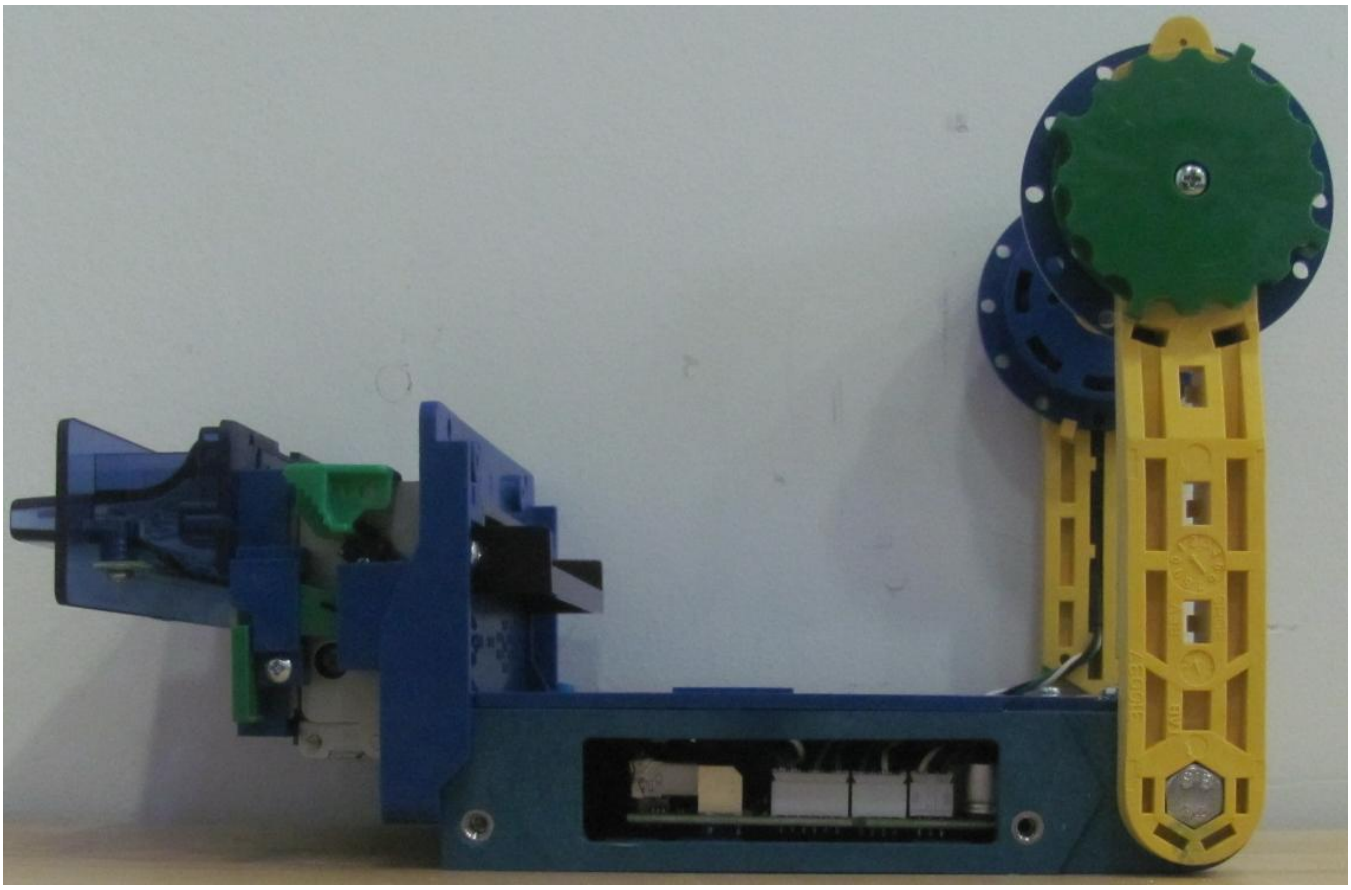
9.1.1 Side View



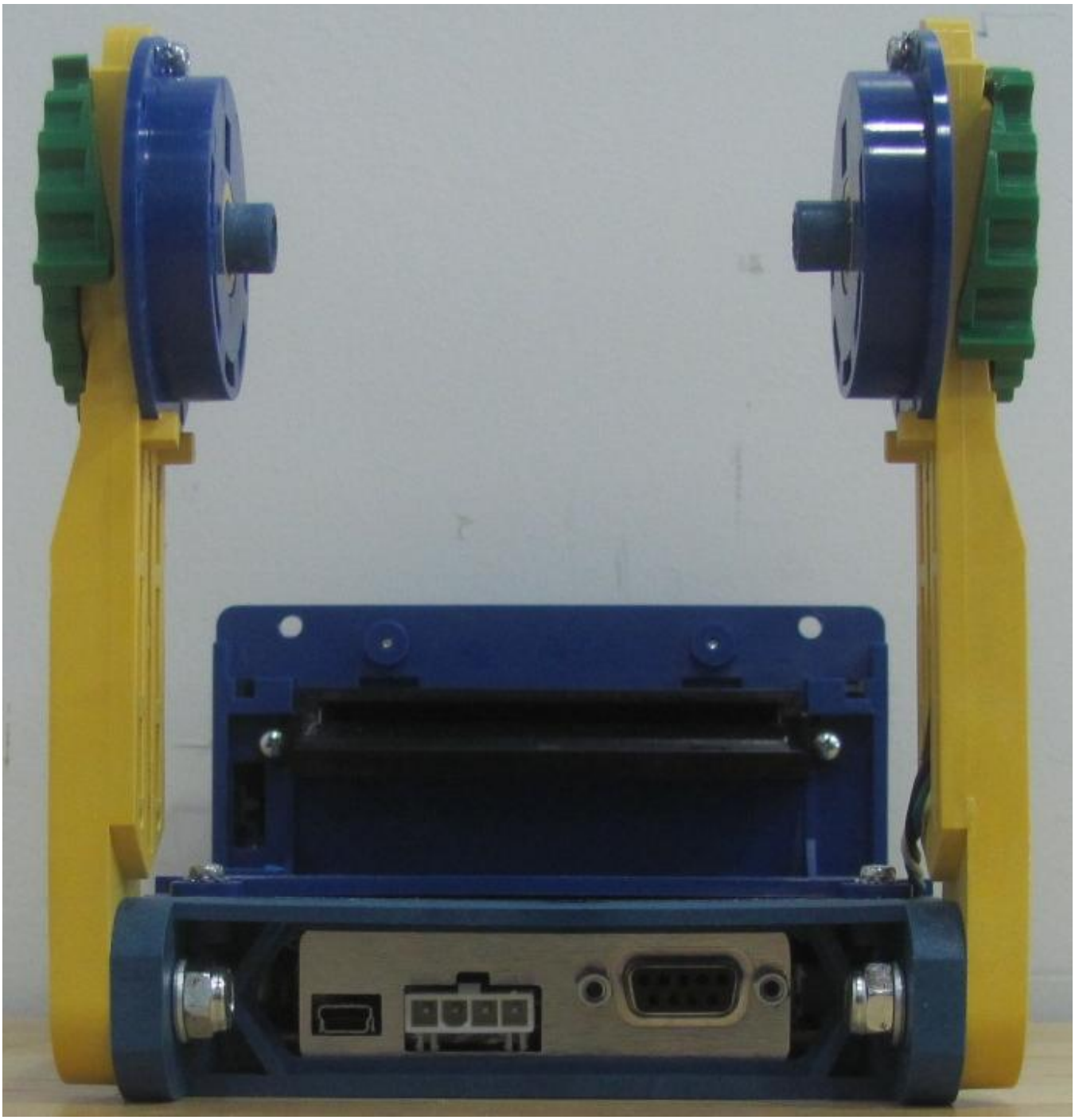
9.1.2 Front Paper Exit View



9.1.3 Side View



9.1.4 Connector Side View



9.1.5 Bottom View

9.1.6 Top View