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EMC TEST REPORT

Report ID
REP003934

Project ID
PRJ0025383

Type of assessment:
Complete Assessment

Applicant:
Nanoptix Inc.

Product:	Model:	Model variant (s):
Thermal Printer	Paycheck NextGen (950050)	Paycheck Desktop 2 [950051] Paycheck NextGen SE [950055]

Specification:

- EN 55035:2017/A11:2020
- CISPR 35:2016

Date of issue: January 9, 2023

Predrag Golic, EMC/RF Specialist
Tested by

Signature

David Duchesne, EMC/RF Lab Manager
Reviewed by

Signature

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SCC File Number: 15064 (Ottawa/Almonte); 151100 (Montreal); 151097 (Cambridge)

Lab and test locations

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Website	www.nemko.com			

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 contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Table of Contents

Section 1 Report summary

1.1 Test specifications

EN 55035:2017/A11:2020	Electromagnetic compatibility of multimedia equipment Immunity requirements
CISPR 35:2016	Electromagnetic compatibility of multimedia equipment Immunity requirements

1.2 Exclusions

None

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant.

Unless noted in section 1.2, all testing was performed 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*

Report ID.	Date of issue	Details of changes made to test report
REP003934	January 9, 2023	Original report issued

Section 2 Engineering considerations

2.1 Modifications incorporated in the EUT for compliance

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

2.2 Technical judgment

None

2.3 Model variant declaration

As declared by the applicant, the EUT model 950050 has been chosen to be representative for all other models in the model family. The model family, and the description of the variations, are as follows:

- 950050 (Full featured printer)
- 950051 (950050 in a plastic enclosure)
- 950055 950055 (same as 950050 except no HDMI, one USB host instead of 3, no Netplex interface)

2.4 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 3 Test conditions

3.1 Atmospheric conditions

Temperature	15 °C – 35 °C
Relative humidity	30 % – 60 %
Air pressure	86 kPa (860 mbar) – 106 kPa (1060 mbar)

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.

3.2 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 4 Measurement uncertainty

4.1 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 16-4-2 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Measurement instrumentation uncertainty. The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

Section 5 Information provided by the applicant

5.1 Disclaimer

This section contains information provided by the applicant and has been utilized to support the test plan. Inaccurate information provided by the applicant can affect the validity of the results contained within this test report. Nemko accepts no responsibility for the information contained within this section and the impact it may have on the test plan and resulting measurements.

5.2 Applicant/Manufacture

Name	Nanoptix Inc.
Address	699 Champlain Street; Dieppe, New Brunswick, E1A 1P6; Canada

5.3 EUT information

Product	Thermal Printer
Model	Paycheck NextGen (950050)
Model variant	Paycheck Desktop 2 [950051] and Paycheck NextGen SE [950055]
Serial number	NG19418
Part number	950050
Power requirements	24 V_{DC} (via external 100–240 V_{AC}, 50/60 Hz power adapter)
Description/theory of operation	The EUT is a 24 V_{DC} thermal printer. This printer is mainly used in casino game terminal to print cash out tickets. It receives print jobs from either USB high speed or RS-232 serial communication.
Operational frequencies	1 GHz internal processor, 400 MHz for memory access.
Software details	PayCheck NextGen firmware NGP-1.24L PC software to send print jobs to the printer for testing is “Nanoptix Printer Status”, revision 5.4.2.6

5.4 EUT setup details

5.4.1 EUT Exercise and monitoring

Methods used to exercise the EUT and all relevant ports:

- A print ticket job was sent every 10 seconds [fastest possible time due to EUT limitation].
- Ethernet was connected to a switch.

Configuration details:

- The EUT setup in a configuration that was expected to produce the highest amplitude emissions relative to the limit and that satisfy normal operation/installation practice by the end user.
- The type and construction of cables used in the measurement set-up were consistent with normal or typical use.
- The EUT was setup in a manner that was consistent with its typical arrangement and use. The measurement arrangement of the EUT, local AE and associated cabling was representative of normal practice.

Monitoring details:

- Watched for paper jam and paper out
- Watched for continuity of Ethernet communication

5.4.2 EUT test configuration

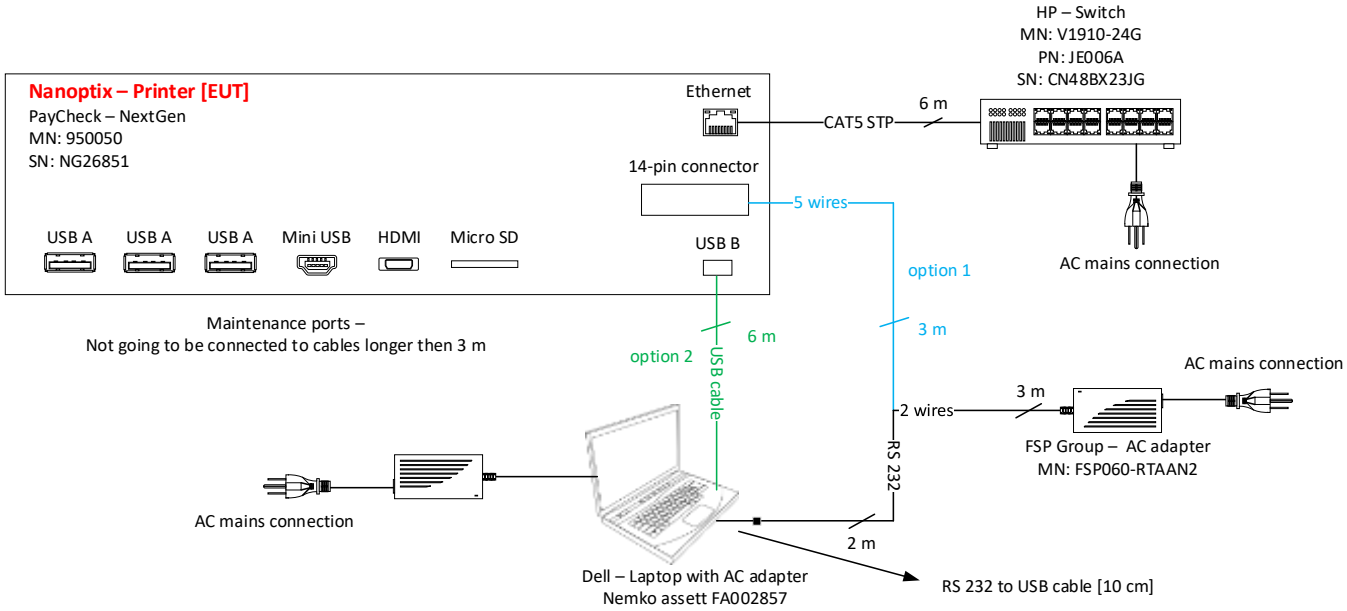

Figure 5.4-1: *Block diagram*

Section 6 Summary of test results

6.1 Testing location

Test location (s)	Ottawa

6.2 Testing period

Test start date	December 14, 2022	Test end date	December 19, 2022

6.3 Sample information

Receipt date	December 7, 2022	Nemko sample ID number	PRJ00253830002

6.4 Test results

Table 6.4-1: *Result summary*

Test description	Verdict
Enclosure ports	
Power frequency magnetic field	Not applicable[1]
Continuous RF electromagnetic field disturbances, swept test	Pass
Continuous RF electromagnetic field disturbances, spot test	Pass
ESD	Pass
Analogue/digital data ports	
Continuous induced RF disturbances	Pass
Broadband impulse noise disturbances, repetitive	Not applicable[2]
Broadband impulse noise disturbances, isolated	Not applicable[2]
Surges	Not applicable[3]
Electrical fast transients/burst	Pass
DC network power ports[4]	
Continuous induced RF disturbances	Not applicable
Surges	Not applicable
Electrical fast transients/burst	Not applicable
AC mains power ports	
Continuous induced RF disturbances	Pass
Voltage dips	Pass
Voltage interruptions	Pass
Surges	Pass
Electrical fast transients/burst	Pass

Notes:
[1] EUT does not contain devices intrinsically susceptible to magnetic fields, such as CRT monitors, Hall effect elements, electro-dynamic microphones, magnetic field sensors or audio frequency transformers.
[2] EUT does not contain CPE xDSL ports.
[3] EUT does not contain ports which may connect directly to outdoor cables.
[4] EUT does not contain DC network power ports

Section 7 Terms and definitions

7.1 Performance terms and definitions

General performance criteria, Reference Clause 8.1 of EN 55035:2017/A11:2020 and CISPR 35:2016	General performance criteria are defined in 8.2, 8.3 and 8.4. These criteria shall be used during the testing of primary functions where no relevant annex is applicable. When assessing the impact of a disturbance on a function, the assessment should take into consideration the function's performance prior to the application of the disturbance and only identify as failures those changes in performance that are a result of the disturbance.
Performance criterion A, Reference Clause 8.2 of EN 55035:2017/A11:2020 and CISPR 35:2016	The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. 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 reasonably expect from the equipment if used as intended.
Performance criterion B, Reference Clause 8.3 of EN 55035:2017/A11:2020 and CISPR 35:2016	During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, 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 the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level (or the permissible performance loss), or recovery time, 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 reasonably expect from the equipment if used as intended.
Performance criterion C, Reference Clause 8.4 of EN 55035:2017/A11:2020 and CISPR 35:2016	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

7.2 General definitions

7.2.1 EN 61000-4-2 (Electrostatic discharge)

Electrostatic discharge; ESD	A transfer of electric charge between bodies of different electrostatic potential in proximity or through direct contact.
Contact discharge method	A method of testing, in which the electrode of the test generator is held in contact with the EUT, and the discharge actuated by the discharge switch within the generator.
Air discharge method	A method of testing, in which the charged electrode of the test generator is brought close to the EUT, and the discharge actuated by a spark to the EUT.
Direct application	Application of the discharge directly to the EUT.
Indirect application	Application of the discharge to a coupling plane in the vicinity of the EUT, and simulation of personnel discharge to objects, which are adjacent to the EUT.
Coupling plane	A metal sheet or plate, to which discharges are applied to simulate electrostatic discharge to objects adjacent to the EUT. HCP: Horizontal Coupling Plane; VCP: Vertical Coupling Plane.

7.2.2 EN 61000-4-3: (Radiated, radio-frequency, electromagnetic field)

Continuous waves (CW)	Electromagnetic waves, the successive oscillations of which are identical under steady-state conditions, which can be interrupted or modulated to convey information.
Electromagnetic (EM) wave	Radiant energy produced by the oscillation of an electric charge characterized by oscillation of the electric and magnetic fields.
Field strength	The term “field strength” is applied only to measurements made in the far field. The measurement may be of either the electric or the magnetic component of the field and may be expressed as V/m, A/m or W/m2; any one of these may be converted into the others.
Sweep	Continuous or incremental traverse over a range of frequencies.

7.2.3 EN 61000-4-4 (Electrical fast transient/burst)

Burst	Sequence of a limited number of distinct pulses or an oscillation of limited duration.
Common mode (coupling)	Simultaneous coupling to all lines versus the ground reference plane.
Ground reference plane	Flat conductive surface whose potential is used as a common reference.
Coupling clamp	Device of defined dimensions and characteristics for common mode coupling of the disturbance signal to the circuit under test without any galvanic connection to it.
Transient	Pertaining to or designating a phenomenon or a quantity which varies between two consecutive steady states during a time interval which is short compared with the time-scale of interest.

General definitions, continued

7.2.4 EN 61000-4-5 (Surge)

Surge	Transient wave of electrical current, voltage, or power propagating along a line or a circuit and characterized by a rapid increase followed by a slower decrease.
Ground (reference)	Part of the Earth considered as conductive, the electrical potential of which is conventionally taken as zero, being outside the zone of influence of any earthing (grounding) arrangement.

7.2.5 EN 61000-4-6 (Immunity to conducted disturbances, induced by radio-frequency fields)

Clamp injection	Clamp injection is obtained by means of a clamp-on “current” injecting device on the cable.
Coupling/decoupling network (CDN)	Electrical circuit incorporating the functions of both the coupling and decoupling networks.
Sweep	Continuous or incremental traverse over a range of frequencies.

7.2.6 EN 61000-4-8 (Power frequency magnetic field)

Induction coil	Conductor loop of defined shape and dimensions, in which flows a current, generating a magnetic field of defined constancy in its plane and in the enclosed volume.
Immersion method	Method of application of the magnetic field to the EUT, which is placed in the centre of an induction coil.
Proximity method	Method of application of the magnetic field to the EUT, where a small induction coil is moved along the side of the EUT in order to detect particularly sensitive areas.
Ground	A flat conductive surface whose potential is used as a common reference for the magnetic field generator and the auxiliary equipment (the ground plane can be used to close the loop of the induction coil.

7.2.7 EN 61000-4-11 (Voltage dips, short interruptions and voltage variations)

Voltage dip	A sudden reduction of the voltage at a particular point of an electricity supply system below a specified dip threshold followed by its recovery after a brief interval.
Short interruption	A sudden reduction of the voltage on all phases at a particular point of an electric supply system below a specified interruption threshold followed by its restoration after a brief interval.

Section 8 Testing data

8.1 ESD

8.1.1 References and limits

- EN 55035:2017/A11:2020
- CISPR 35:2016
- EN 61000-4-2:2009
- IEC 61000-4-2:2008

Table 8.1-1: *ESD specification*

Test specification	Performance criterion
±4 (Contact discharge), ±8 (Air discharge)	B

Notes: Electrostatic discharges shall be applied only to points and surfaces of the EUT which are expected to be touched during normal operation, including user access operations specified in the user manual, for example cleaning or adding consumables when the EUT is powered. The application of discharges to the contacts of open connectors is not required.

8.1.2 Test summary

Verdict	Pass		
Tested by	Predrag Golic	Test date	December 16 & 17, 2022

8.1.3 Notes

There are two ways to communicate with the printer. Both are formally assessed.

8.1.4 Setup details

Table 8.1-2: *ESD equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
ESD gun	TESEQ	NSG 435	FA002682	1 year	March 17, 2023

Notes: None

8.1.5 Test data

Table 8.1-3: *ESD results* ***[results are identical for both options]***

EUT setup configuration	Table top	
EUT power input during test	24 V_{DC} (via external 100–240 V_{AC}, 50/60 Hz power adapter)	
ESD repetition rate	1 pulse per second	
Discharges	10 contact discharges and 10 air discharges at each polarity	
Contact discharge	**Test voltage (±kV)**	**Comments**
Please refer to "ESD test location points" photos of this section	4	No degradation
Indirect discharge	**Test voltage (±kV)**	**Comments**
HCP (all sides)	4	No degradation
VCP (all sides)	4	No degradation
Air discharge	**Test voltage (±kV)**	**Comments**
Please refer to "ESD test location points" photos of this section	2, 4, 8	No degradation

Notes: None

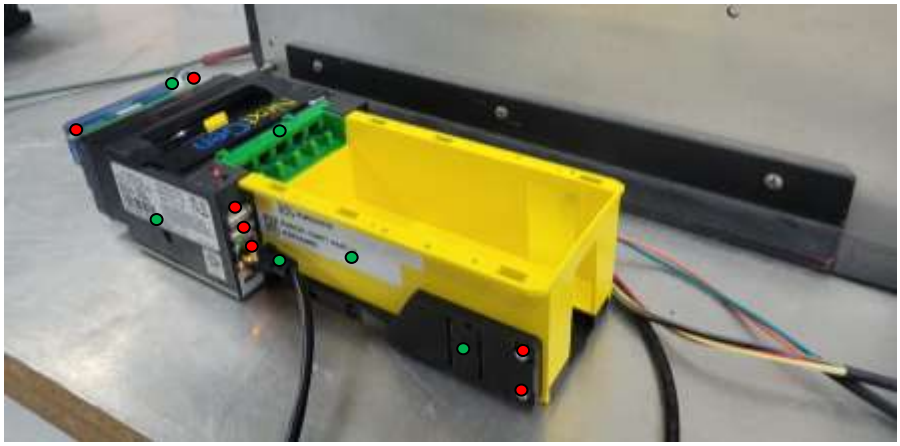

Figure 8.1-1: *ESD test location point's photo* ***[points are identical for both options]***

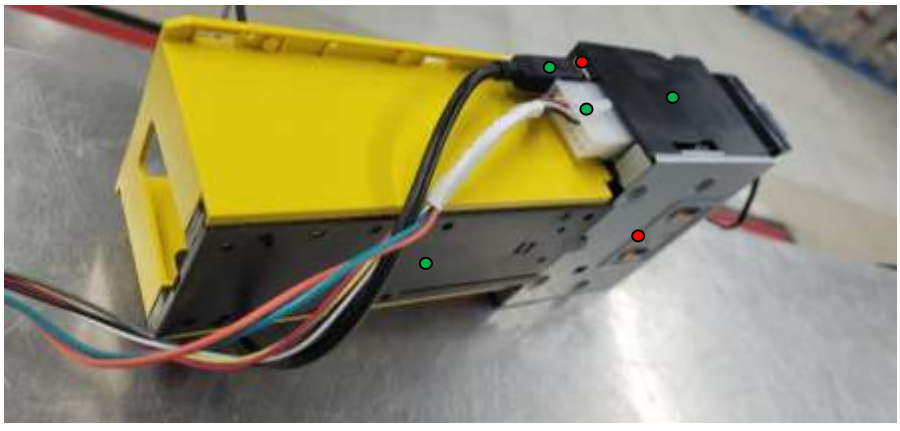

Figure 8.1-2: *ESD test location point's photo* ***[points are identical for both options]***

Red points = contact discharge
Green points = air discharge

8.1.6 Setup photos

Figure 8.1-3: *ESD setup photo* ***[points are identical for both options]***

8.2 Continuous RF electromagnetic field disturbances

8.2.1 References and limits

- EN 55035:2017/A11:2020
- CISPR 35:2016
- EN/IEC 61000-4-3:2006 + A1:2008 + A2:2010

Table 8.2-1: *Continuous RF electromagnetic field disturbances, specification*

Test specification	Performance criterion
Swept test	
80–1000 MHz, 3 or 6 V/m (unmodulated), 80 % AM (1 kHz)	A
Spot test	
1800, 2600, 3500, 5000 MHz, 3 V/m (unmodulated), 80 % AM (1 kHz)	A

Notes: None

8.2.2 Test summary

Verdict	Pass		
Tested by	Predrag Golic	Test date	December 15, 2022

8.2.3 Notes

There are two ways to communicate with the printer. Both are formally assessed.

8.2.4 Setup details

Table 8.2-2: *Continuous RF electromagnetic field disturbances, equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	January 20, 2023
Biconilog antenna (26–3000 MHz)	ETS	3140B	FA002233	—	NCR
Horn antenna (1–18 GHz)	EMCO	3115	FA000825	1 year	June 3, 2023
Starprobe (2 MHz–40 GHz)	AR	FL7040	FA002592	1 year	March 21, 2023
Laser probe interface (monitor)	AR	FL7000	FA002593	—	NCR
Directional coupler (80–1000 MHz)	AR	DC6180A	FA002090	1 year	May 3, 2023
Signal generator	Rohde & Schwarz	SMB100A	FA002174	1 year	February 1, 2023
Amplifier (80–1000 MHz, 250 W)	AR	250W1000A	FA002038	—	NCR
Amplifier (0.8–6.0 GHz, 100 W)	Teseq	CBA 6G-100D	FA003390	—	NCR
Power meter	Rohde & Schwarz	NRP	FA002485	1 year	May 27, 2023
Power sensor	Rohde & Schwarz	NRP-Z91	FA002488	1 year	May 25, 2023

Notes: NCR - no calibration required

Table 8.2-3: *Continuous RF electromagnetic field disturbances, software details*

Manufacturer of Software	Details
Rohde & Schwarz	EMC32, Software for EMC Measurements, Version 11.20.00

8.2.5 Test data

Table 8.2-4: *Swept frequency – Continuous RF electromagnetic field disturbances, results*

Step size increment	1 %
Dwell time	5 s[1]
Antenna polarization	Vertical and Horizontal
Modulation	CW signal amplitude modulated (AM) with 80 % depth with a 1 kHz sine wave
EUT setup configuration	Table top
EUT power input during test	24 V_{DC} (via external 100–240 V_{AC}, 50/60 Hz power adapter)
EUT position facing antenna	Front side, back side, left side and right side

Frequency range, MHz		Test level, V/m	Comments
Option 1_RS232			
80	1000	3	No degradation
Option 2_USB			
80	1000	3	No degradation

Notes: [1]The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond. However, the dwell time shall not exceed 5 seconds at each of the frequencies during the scan. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.

Table 8.2-5: *Spot frequencies – Continuous RF electromagnetic field disturbances, results*

Dwell time	5 s[1]
Antenna polarization	Vertical and Horizontal
Modulation	CW signal amplitude modulated (AM) with 80 % depth with a 1 kHz sine wave
EUT setup configuration	Table top
EUT power input during test	24 V_{DC} (via external 100–240 V_{AC}, 50/60 Hz power adapter)
EUT position facing antenna	Front side, back side, left side and right side

Frequency, MHz	Test level, V/m	Comments
Option 1_RS232		
1800	3	No degradation
2600	3	No degradation
3500	3	No degradation
5000	3	No degradation
Option 2_USB		
1800	3	No degradation
2600	3	No degradation
3500	3	No degradation
5000	3	No degradation

Notes: [1]The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond. However, the dwell time shall not exceed 5 seconds at each of the frequencies during the scan. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.

8.2.6 Setup photos

Figure 8.2-1: *Continuous RF electromagnetic field disturbances, setup photo (swept test)* ***[set up is identical for both options]***

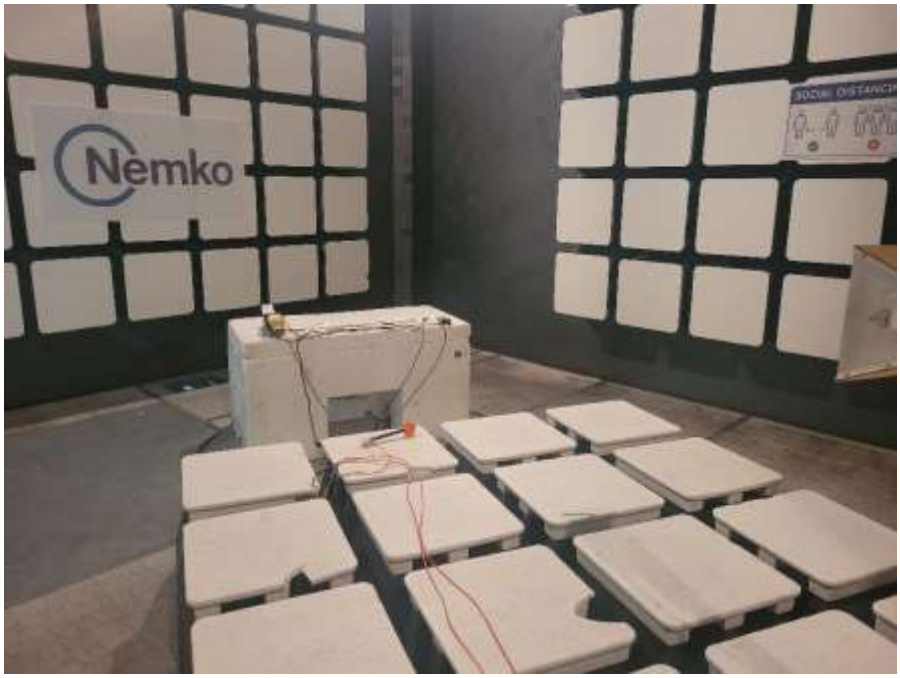

Figure 8.2-2: *Continuous RF electromagnetic field disturbances, setup photo (spot test)* ***[set up is identical for both options]***

8.3 Electrical fast transients/burst

8.3.1 References and limits

- EN 55035:2017/A11:2020
- CISPR 35:2016
- EN/IEC 61000-4-4:2012

Table 8.3-1: *Electrical fast transients/burst specification*

Test specification	Performance criterion
Analogue/digital data ports [1]	
±0.5 kV (peak), 5/50 Tr/Th ns, 5 kHz (repetition rate)	B
AC mains power ports	
±1 kV (peak), 5/50 Tr/Th ns, 5 kHz (repetition rate)	B

Notes: [1] Applicable only to ports which, according to the manufacturer's specification, supports cable lengths greater than 3 m.

8.3.2 Test summary

Verdict	Pass		
Tested by	Predrag Golic	Test date	December 20, 2022

8.3.3 Notes

There are two ways to communicate with the printer. Test on AC port was performed in option 1_RS232 as a representative for both configurations.

8.3.4 Setup details

Table 8.3-2: *Electrical fast transients/burst equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Surge/EFT generator/Ringwave	TESEQ	NSG 3060	FA002177	1 year	December 14, 2023
Surge/EFT coupler/Decoupler	TESEQ	NSG 3063	FA002177a	1 year	November 15, 2023

Notes: None

Table 8.3-3: *Fast transients test software details*

Manufacturer of Software	Details
TESEQ	WIN 3000, Version 1.3.2

8.3.5 Test data

Table 8.3-4: *Electrical fast transients/burst results*

Wave shape (Tr / Td)	5/50 ns (Tr = rise time, Td= duration time)
Burst duration	15 ms @ 5 kHz repetition frequency
Burst period	300 ms
Test duration	60 s
EUT power input during test	24 V_{DC} (via external 100–240 V_{AC}, 50/60 Hz power adapter)

Test port	Repetition frequency (kHz)	Test voltage (±kV)	Comments
AC input of AC adapter[1 and 2] [option 1_RS232]	5	0.5, 1	No degradation
AC input of AC adapter[1 and 2] [option 2_USB]	5	0.5, 1	No degradation
14-pin connector [option 1_RS232][3]	5	0.5	No degradation
USB B [option 2_USB][3]	5	0.5	No degradation
Ethernet [option 1_RS232][3]	5	0.5	No degradation

Notes: [1]Transient applied asynchronous (relation to power supply)
[2]The test voltage was applied simultaneously between a ground reference plane and all of the power supply terminals and the protective or functional earth port on the EUT cabinet
[3]The test voltage was applied via capacitive coupling clamp

8.3.6 Setup photos

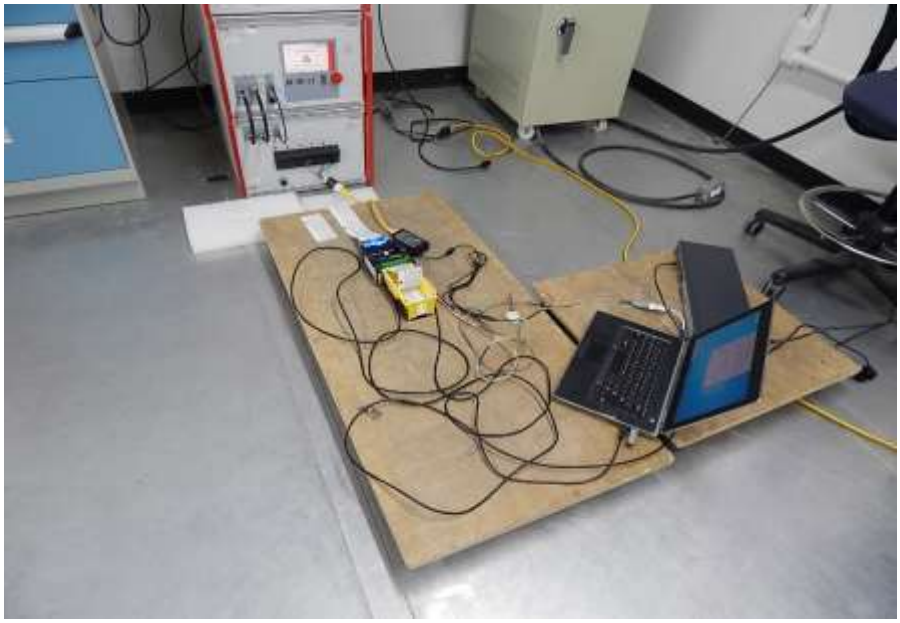

Figure 8.3-1: *Electrical fast transients/burst setup photo (Power port)*

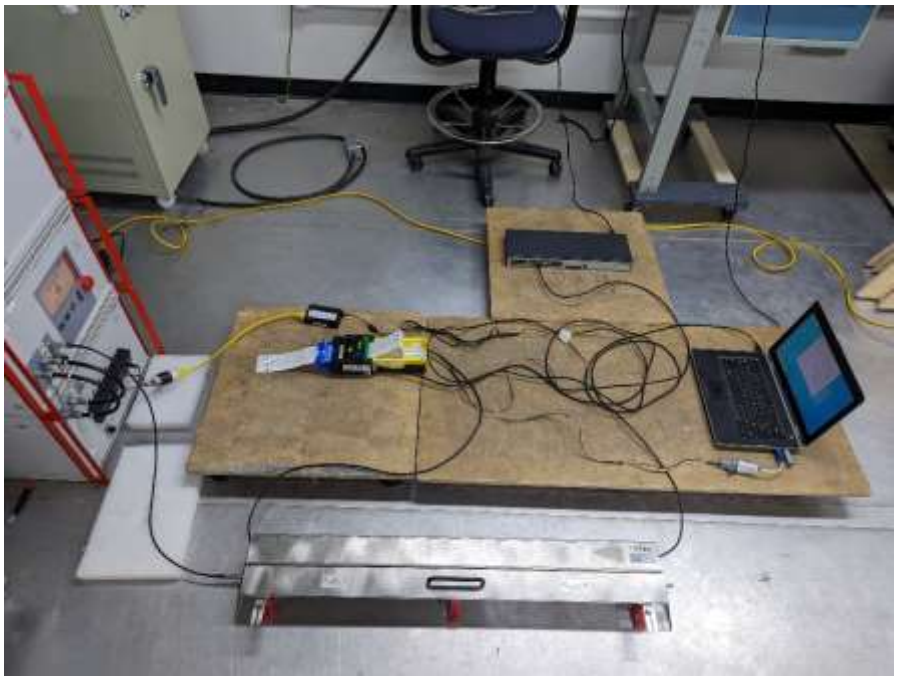

Figure 8.3-2: *Electrical fast transients/burst setup photo (USB B)*

Setup photos, continued

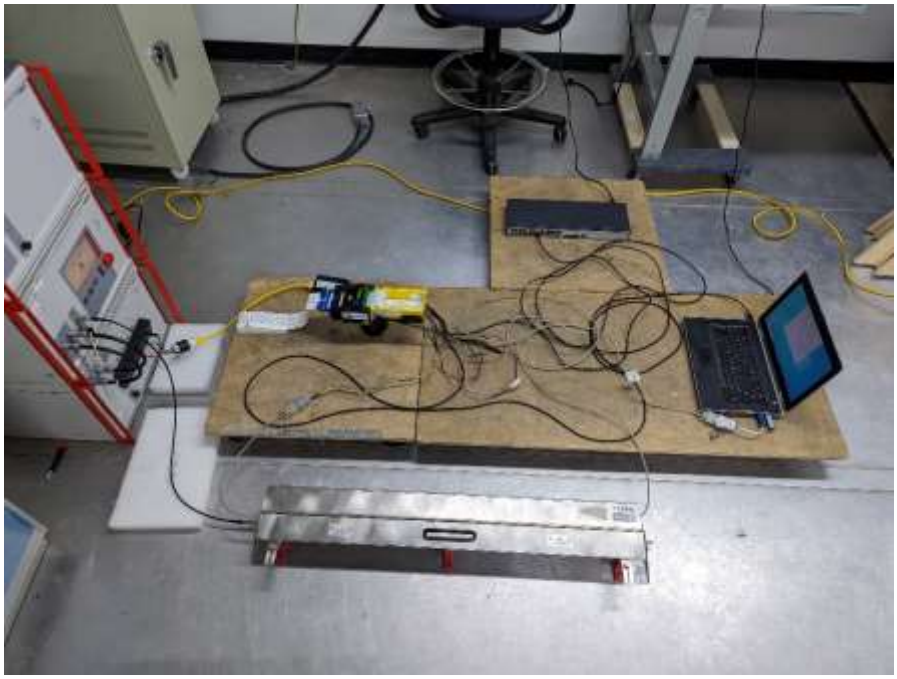

Figure 8.3-3: *Electrical fast transients/burst setup photo (RS 232)*

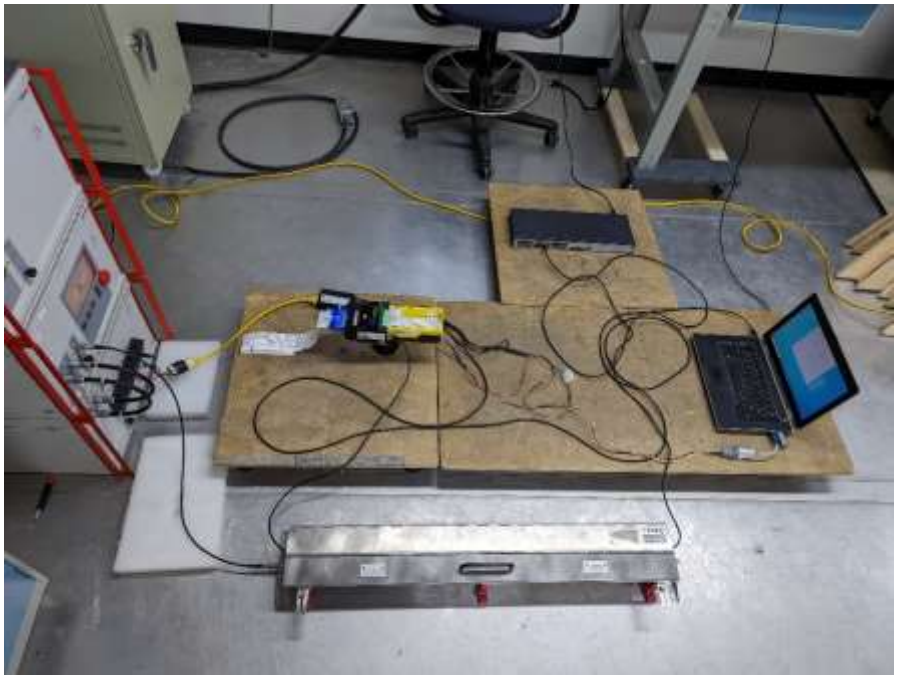

Figure 8.3-4: *Electrical fast transients/burst setup photo (Ethernet)*

8.4 Surges

8.4.1 References and limits

- EN 55035:2017/A11:2020
- CISPR 35:2016
- EN 61000-4-5:2006
- IEC 61000-4-5:2005

Table 8.4-1: *Surges specification*

Test specification	Performance criterion
AC mains power ports	
±1 kV (line to line), 1.2/50 (8/20) Tr/Th μs ±2 kV (line to ground), 1.2/50 (8/20) Tr/Th μs	B

Notes: None

8.4.2 Test summary

Verdict	Pass		
Tested by	Predrag Golic	Test date	December 20, 2022

8.4.3 Notes

There are two ways to communicate with the printer. Both are formally assessed.

8.4.4 Setup details

Table 8.4-2: *Surges equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Surge/EFT generator/Ringwave	TESEQ	NSG 3060	FA002177	1 year	December 14, 2023
Surge/EFT coupler/Decoupler	TESEQ	NSG 3063	FA002177a	1 year	November 15, 2023

Notes: None

Table 8.4-3: *Surges test software details*

Manufacturer of Software	Details
TESEQ	WIN 3000, Version 1.3.2

8.4.5 Test data

Table 8.4-4: *Surges at AC mains power ports/ DC network power ports results*

Open circuit voltage (T_1 / T_2)	1.2/50 µs (T_1 = front time, T_2= time to half value)
Short circuit curent (T_1 / T_2)	8/20 µs (T_1 = front time, T_2= time to half value)
Surge pulse interval	20 s
Number of pulses	5 positive and 5 negative
EUT power input during test	24 V_{DC} (via external 100–240 V_{AC}, 50/60 Hz power adapter)

Test port	Coupling	Test voltage (±kV)	Comments
AC mains power ports			
AC input of AC adapter [option 1_RS232]	Phase to Neutral[1 and 3]	0.5, 1	No degradation
	Phase to ground[2 and 3]	0.5, 1, 2	No degradation
	Neutral to ground[2 and 3]	0.5, 1, 2	No degradation
AC input of AC adapter [option 2_USB]	Phase to Neutral[1 and 3]	0.5, 1	No degradation
	Phase to ground[2 and 3]	0.5, 1, 2	No degradation
	Neutral to ground[2 and 3]	0.5, 1, 2	No degradation

Notes: [1]Surge applied with generator output impedance set to 2 Ω
[2]Surge applied with generator output impedance set to 12 Ω
[3]Surge applied synchronous (relation to power supply): 90 and 270°

8.4.6 Setup photos

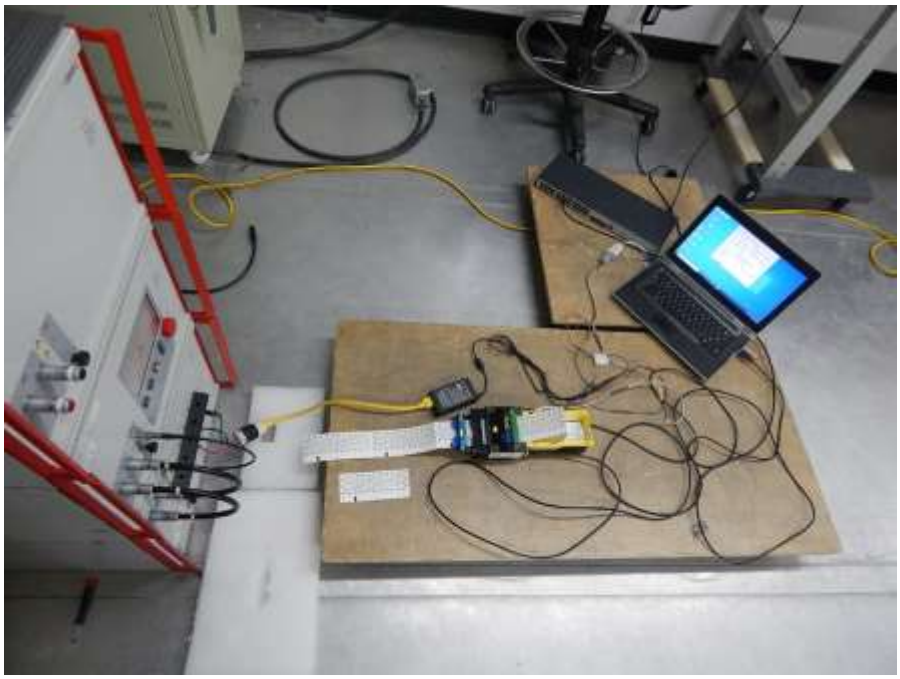

Figure 8.4-1: *Surges setup photo (Power port)* ***[set up is identical for both options]***

8.5 Continuous induced RF disturbances

8.5.1 References and limits

- EN 55035:2017/A11:2020
- CISPR 35:2016
- EN 61000-4-6:2009
- IEC 61000-4-6:2008

Table 8.5-1: *Continuous induced RF disturbances specification*

Test specification	Performance criterion
Analogue/digital data ports [1]	
0.15–10 MHz, 3 V_{RMS} (unmodulated), 80 % AM (1 kHz)	
10–30 MHz, 3 to 1 V_{RMS} (unmodulated), 80 % AM (1 kHz)	A
30–80 MHz, 1 V_{RMS} (unmodulated), 80 % AM (1 kHz)	
AC mains power ports	
0.15–10 MHz, 3 V_{RMS} (unmodulated), 80 % AM (1 kHz)	
10–30 MHz, 3 to 1 V_{RMS} (unmodulated), 80 % AM (1 kHz)	A
30–80 MHz, 1 V_{RMS} (unmodulated), 80 % AM (1 kHz)	

Notes: [1] Applicable only to ports which, according to the manufacturer's specification, supports cable lengths greater than 3 m.

8.5.2 Test summary

Verdict	Pass		
Tested by	Predrag Golic	Test date	December 19, 2022

8.5.3 Notes

- There are two ways to communicate with the printer. Test on AC port was performed in option 1_RS232 as a representative for both configurations.
- Where functionality of the EUT was negatively affected by the implementation of CDNs, the alternative (clamp or direct) injection method has been used to determine compliance.

8.5.4 Setup details

Table 8.5-2: *Continuous induced RF disturbances equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Amplifier (0.01–250 MHz, 75 W)	AR	75A250A	FA001943	—	NCR
Signal generator	Rohde & Schwarz	SMC100A	FA002483	1 year	June 2, 2023
6 dB attenuator	Inmet	64671	FA002215	1 year	March 23, 2023
Directional coupler (0.01–250 MHz)	AR	DC2600A	FA002089	1 year	March 23, 2023
CDN-M3	FCC	FCC-801-M3-16A	FA002066	1 year	March 9, 2023
CDN-M3	FCC	FCC-801-M3-16A	FA002068	1 year	February 2, 2023
Decoupling Network	FCC	F-2031-DCN-23mm	FA001765	—	NCR
Direct Injection 100 Ω resistor	Nemko	N/A	FA001751	1 year	May 11, 2023
EM Clamp	TESEQ	KEMZ801A	FA003115	1 year	October 17, 2023
Avg. Power Sensor	Rohde & Schwarz	NRP-Z91	FA002075	1 year	November 30, 2023
Power Meter	Rohde & Schwarz	NRP	FA002076	1 year	December 1, 2023

Notes: NCR - no calibration required

Table 8.5-3: *Continuous induced RF disturbances test software details*

Manufacturer of Software	Details
Rohde & Schwarz	EMC32, Software for EMC Measurements, Version 10.60.00

8.5.5 Test data

Table 8.5-4: *Continuous induced RF disturbances results*

Frequency range	0.15–10 MHz	10–30 MHz	30–80 MHz
Signal level	3 V_{RMS}	3–1 V_{RMS} [2]	1 V_{RMS}
Step size increment	1 %[1]		
Dwell time	3 s[1]		
EUT power input during test	24 V_{DC} (via external 100–240 V_{AC}, 50/60 Hz power adapter)		
Modulation	CW signal amplitude modulated (AM) with 80 % depth with a 1 kHz sine wave		

Ports investigated	Coupling method	50 Ω termination point	Comments
AC input of AC adapter[1 and 2] [option 1_RS232]	CDN-M3	CDN-M3 [support equipment]	No degradation
AC input of AC adapter[1 and 2] [option 2_USB]	CDN-M3	CDN-M3 [support equipment]	No degradation
14-pin connector [option 1_RS232][3]	EM Clamp	CDN-M3	No degradation
USB B [option 2_USB][3]	Direct Injection	CDN-M3	No degradation
Ethernet [option 1_RS232][3]	Direct Injection	CDN-M3	No degradation

Notes: [1]The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond. However, the dwell time shall not exceed 5 seconds at each of the frequencies during the scan. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.
[2]The test levels decrease linearly with the logarithm of the frequency in the range 10 MHz to 30 MHz

8.5.6 Setup photos

Figure 8.5-1: *Continuous induced RF disturbances setup photo (Power port)* ***[Option 1_RS232]***

Figure 8.5-2: *Continuous induced RF disturbances setup photo (Analogue/digital data ports)* ***[Option 1_RS232]***

Setup photos, continued

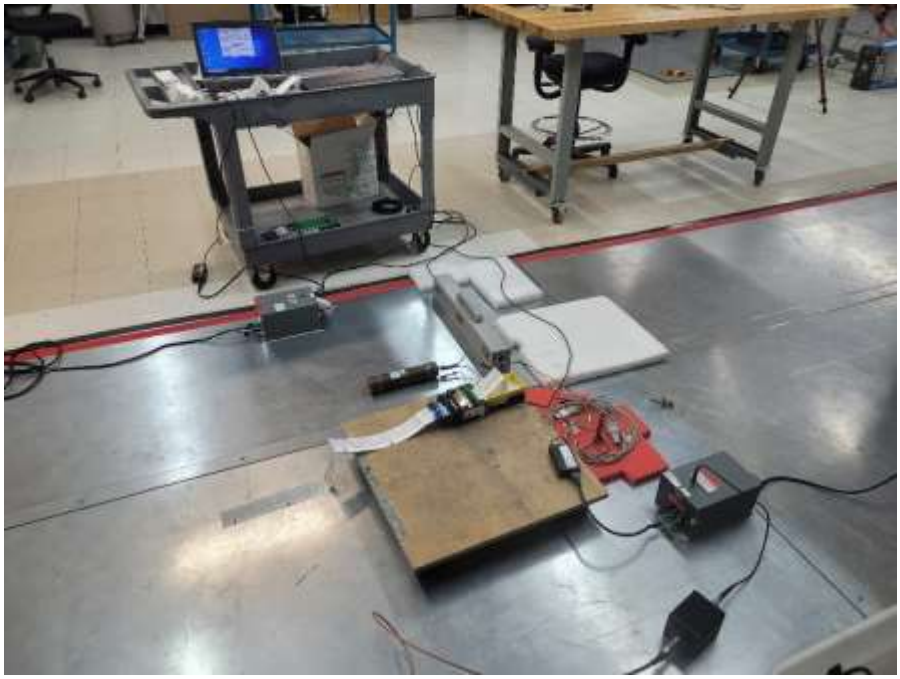

Figure 8.5-3: *Continuous induced RF disturbances setup photo (Power port)* ***[Option 2_USB]***

Figure 8.5-4: *Continuous induced RF disturbances setup photo (Analogue/digital data ports)* ***[Option 2_USB]***

8.6 Voltage dips and voltage interruptions

8.6.1 References and limits

- EN 55035:2017/A11:2020
- CISPR 35:2016
- EN/IEC 61000-4-11:2004

Table 8.6-1: *Voltage dips and voltage interruptions specification*

Test specification	Performance criterion
Input AC power ports (including equipment marketed with a separate a.c./d.c power converter)	
< 5 % residual voltage, 0.5 cycles (Voltage dip) 70 % residual voltage, 25 cycles (Voltage dip)	B
< 5 % residual voltage, 250 cycles (Voltage interruption)	C

Notes: Changes to occur at 0 degree crossover point of the voltage waveform. If the EUT does not demonstrate compliance when tested with 0 degree switching, the test shall be repeated with the switching occurring at both 90 degrees and 270 degrees. If the EUT satisfies these alternative requirements, then it fulfils the requirements.

8.6.2 Test summary

Verdict	Pass		
Tested by	Predrag Golic	Test date	December 17, 2022

8.6.3 Notes

There are two ways to communicate with the printer. Both are formally assessed.

8.6.4 Setup details

Table 8.6-2: *Voltage dips and voltage interruptions 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 20, 2023

Notes: None

Table 8.6-3: *Voltage dips and voltage interruptions test software details*

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

8.6.5 Test data

Table 8.6-4: *Voltage dips results*

Variation/dip repetition	Sequence of three dips/interruptions with an interval of 10 seconds between each test		
Voltage change degree of the voltage waveform	0 and 180		
EUT power input during test	24 V_{DC} (via external 100–240 V_{AC}, 50/60 Hz power adapter)		
Test port	**Residual voltage (%)**	**Cycles**	**Comments**
AC input of AC adapter [option 1_RS232]	< 5	0.5	No degradation
	70	25	No degradation
AC input of AC adapter [option 2_USB]	< 5	0.5	No degradation
	70	25	No degradation

Notes: None

Table 8.6-5: *Voltage interruptions results*

Variation/dip repetition	Sequence of three dips/interruptions with an interval of 10 seconds between each test		
Voltage change degree of the voltage waveform	0 and 180		
EUT power input during test	24 V_{DC} (via external 100–240 V_{AC}, 50/60 Hz power adapter)		
Test port	**Residual voltage (%)**	**Cycles**	**Comments**
AC input of AC adapter [option 1_RS232]	< 5	250	EUT power cycled
AC input of AC adapter [option 2_USB]	< 5	250	EUT power cycled

Notes: None

8.6.6 Setup photo

Figure 8.6-1: *Voltage dips and voltage interruptions setup photo* ***[set up is identical for both options]***

Section 9 EUT photos

9.1 External photos

Figure 9.1-1: *Front view photo*

External photos, continued

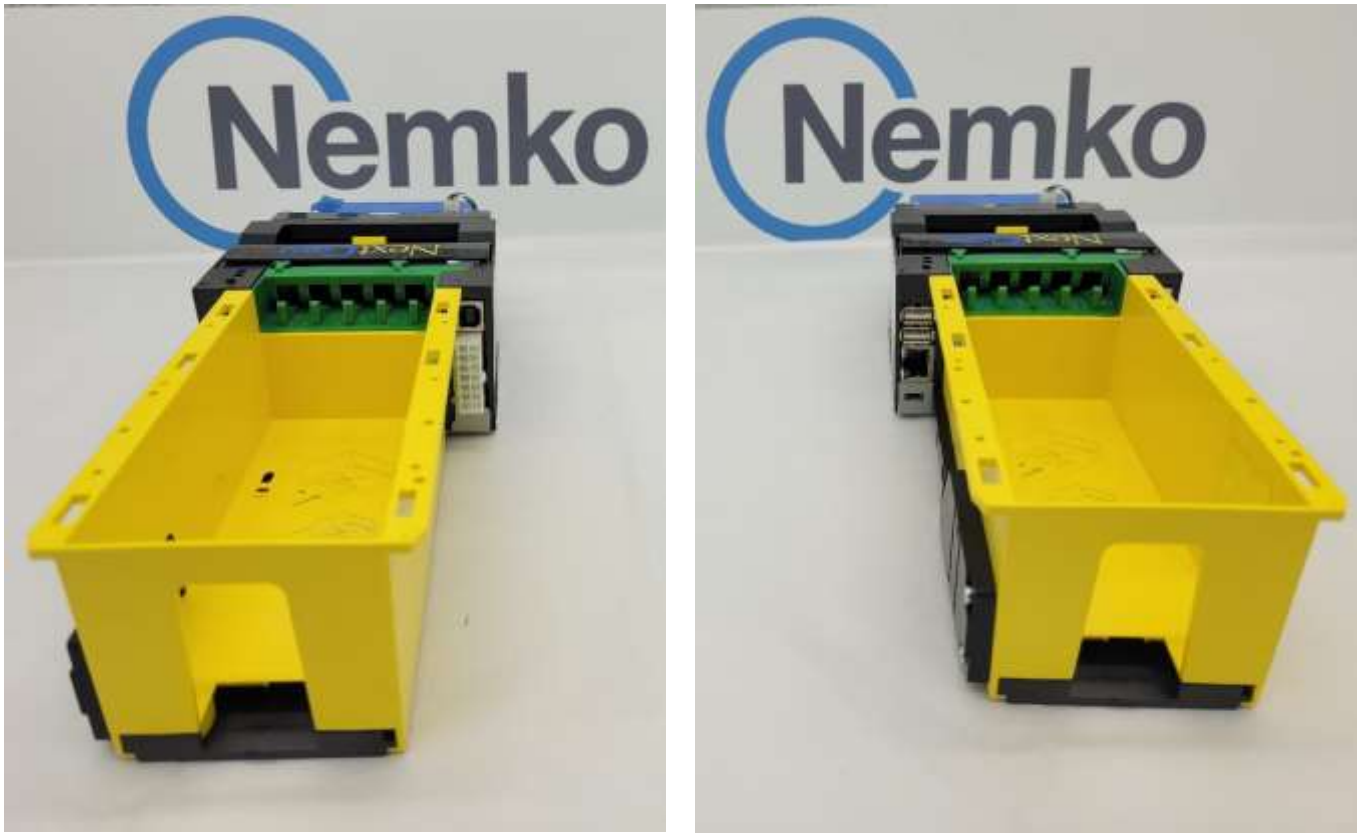

Figure 9.1-2: *Rear view photo*

External photos, continued

Figure 9.1-3: *Side view photo*

External photos, continued

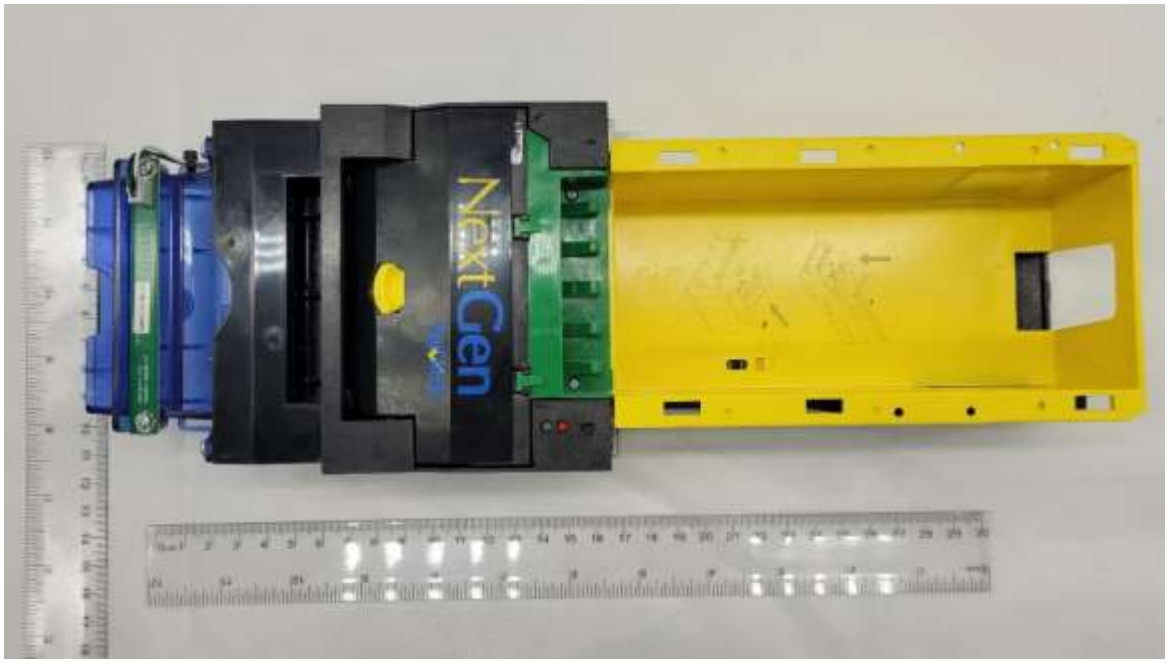

Figure 9.1-4: *Top view photo*

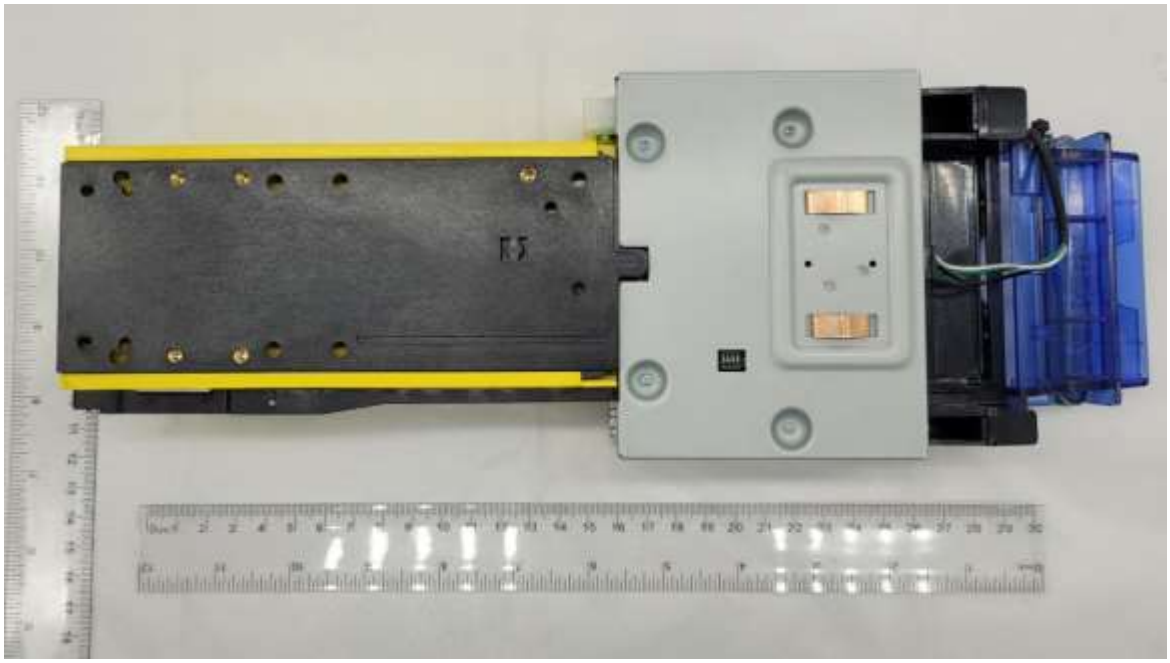

Figure 9.1-5: *Bottom view photo*

End of the test report