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EMC TEST REPORT

Report ID
REP004252

Project ID
PRJ0025795

Type of assessment:
Complete Assessment

Applicant:
Bosch Security Systems, Inc.

Product:
Professional Series Detectors Curtain

Model:
ISC-PDL1-WAC30G

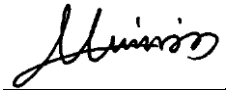
Model variant(s):
ISC-PDL1-WC30G

Specifications:

- FCC 47 CFR Part 15, Subpart B – Verification
- ICES-003 Issue 7 October 2020

Date of issue: January 16, 2023

Alvin Liu, EMC/RF Specialist
Tested by


Signature

Fahar Abdul Sukkoor, EMC/RF Specialist
Reviewed by


Signature

Lab locations

Company name	Nemko Canada Inc.			
Facilities	Ottawa site: 303 River Road Ottawa, Ontario Canada K1V 1H2 Tel: +1 613 737 9680 Fax: +1 613 737 9691	Montréal site: 292 Labrosse Avenue Pointe-Claire, Québec Canada H9R 5L8 Tel: +1 514 694 2684 Fax: +1 514 694 3528	Cambridge site: 1-130 Saltsman Drive Cambridge, Ontario Canada N3E 0B2 Tel: +1 519 650 4811	Almonte site: 1500 Peter Robinson Road West Carleton, Ontario Canada K0A 1L0 Tel: +1 613 256-9117
Test site registration	**Organization**	**Recognition numbers and location**		
	FCC/ISED	FCC: CA2040; IC: 2040A-4 (Ottawa/Almonte); FCC: CA2041; IC: 2040G-5 (Montreal); CA0101 (Cambridge)		
Website	www.nemko.com			

Limits of responsibility

Note that this report's results 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 this report.
This test report has been completed following the requirements of ISO/IEC 17025. All results contained 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	Title 47: Telecommunication; Part 15—Radio Frequency Devices
ICES-003 Issue 7 October 2020	Information Technology Equipment (including Digital Apparatus)
ICES-Gen Issue 1 July 2018	General Requirements for Compliance of Interference-Causing Equipment

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*

Revision #	Date of issue	Details of changes made to test report
REP004252	January 16, 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 ISC-PDL1-WAC30G has been chosen to be representative for all other models in the model family. The model family includes ISC-PDL1-WAC30G and ISC-PDL1-WC30G, and the description of the variations are as follows:

ISC-PDL1-WC30G is a 30m PIR/microwave curtain detector, ISC-PDL1-WAC30G is a 30m PIR/microwave curtain detector with Anti-Mask feature.
Both detectors, AM and non-AM, PCBs are identical as is the main PCB however the AM detector unit will have components populated on the main PCB for the AM function.
SW version numbers for ISC-PDL1-WC30G and ISC-PDL1-WAC30G are tracked differently. Current version of ISC-PDL1-WC30G is v6.00 and ISC-PDL1-WAC30G has v2.00.

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 present document, the nominal voltage shall be the declared voltage, or any of the stated 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.

Table 4.1-1: *Measurement uncertainty calculations*

Measurement		U_{cispr} **dB**	U_{lab} **dB**			
			Ottawa	**Montreal**	**Cambridge**	**Almonte**
Conducted disturbance at AC mains and other port power using a V-AMN	(150 kHz to 30 MHz)	3.4	2.3	2.2	2.2	N/A
Radiated disturbance (electric field strength at an OATS or in a SAC)	(30 MHz to 1 GHz)	6.3	5.7	5.5	5.5	5.5

Notes: Compliance assessment:

If U_{lab} is less than or equal to U_{cispr} then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit

If U_{lab} is greater than U_{cispr} then:

- compliance is deemed to occur if no measured disturbance level, increased by (U_{lab} - U_{cispr}), exceeds the disturbance limit
- non-compliance is deemed to occur if any measured disturbance level, increased by (U_{lab} - U_{cispr}), exceeds the disturbance limit

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 within this section and its impact on the test plan and resulting measurements.

5.2 Applicant/Manufacturer

Applicant name	Bosch Security Systems
Applicant address	130 Perinton Parkway, Fairport, NY, USA 14450
Manufacturer name	Same as applicant
Manufacturer address	Same as applicant

5.3 EUT information

Product	Professional Series Detectors Curtain
Model	ISC-PDL1-WAC30G
Serial number	NO MW
Model variant	ISC-PDL1-WC30G
Power requirements	9 – 15 V_{DC} (via a Panel with battery backup and direct plug-in AC transformer)
Description/theory of operation	The device is a 30 m PIR/microwave curtain detector with Anti-Mask feature, microwave is in 10.50–10.55 GHz range.
Operational frequencies	The highest digital frequency 8 MHz
Software details	V 2.00

5.4 EUT setup details

5.4.1 EUT Exercise and monitoring

Methods used to exercise the EUT and all relevant ports:

- EUT was connected to a Panel with battery backup and direct plug-in AC transformer.
- EUT was powered with the microwave transmitter disabled.

Configuration details:

- The EUT was set up 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 setup were consistent with normal or typical use. Cables with mitigation features (for example, screening, tighter/more twists per length, ferrite beads) have been noted below:
  - None
- The EUT was set up 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. Any deviations from typical arrangements have been noted below:
  - None

5.4.2 EUT test configuration

Table 5.4-1: *EUT interface ports*

Description	Qty.
Interface connected to panel (including DC power and signal)	1

Table 5.4-2: *Support equipment*

Description	Brand name	Serial number, Part number, Model, Revision level
Panel with battery backup	BOSCH	SN: 092064603952341411, PN: XXXXX, MN: B6512,
AC Transformer INPUT: 120VAC 60Hz 30VA OUTPUT: 18VAC 1.22A 22VA	TDCpower	MN: DA-22-18

Table 5.4-3: *Inter-connection cables*

Cable description	From	To	Length (m)
Multi wires cable (including DC power and signal wires)	EUT	Panel	< 3
AC cable	Panel	AC Transformer	< 3

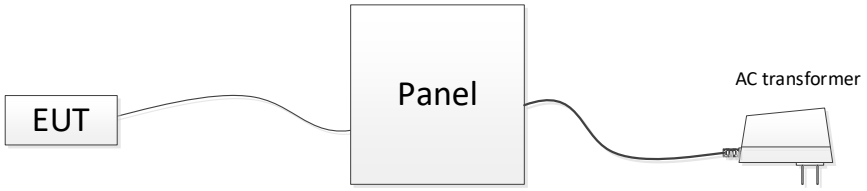


Figure 5.4-1: *Block diagram*

Section 6 Summary of test results

6.1 Testing location

Test location (s)	Cambridge

6.2 Testing period

Test start date	December 12, 2022	Test end date	December 12, 2022

6.3 Sample information

Receipt date	December 9, 2022	Nemko sample ID number	1

6.4 Test results

Table 6.4-1: *FCC 47 CFR Part 15, Subpart B and ICES-003 Issue 7 result summary*

Clause	Test description	Verdict
FCC 47 CFR Part 15, Subpart B		
§15.107	Conducted emissions limits (AC mains) [1]	Pass
§15.109	Radiated emissions limits[1]	Pass
ICES-003 Issue 7		
3.2.1	AC Power Line Conducted Emissions Limits[1]	Pass
3.2.2	Radiated Emissions Limits[1]	Pass

Notes: [1] Product classification B

Section 7 Terms and definitions

7.1 Product classifications and definitions

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

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 ICES-GEN – Equipment classification

Class A	Equipment that is, by virtue of its characteristics, highly unlikely to be used in a residential environment, including a home business shall be classified as Class A and shall comply with the Class A limits specified in the applicable ICES standard. Characteristics considered 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 that would effectively preclude the use of such equipment in a residential environment.
Class B	Equipment that cannot be classified as Class A shall comply with the Class B limits specified in the applicable ICES standard.

7.2 General definitions

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

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 ICES-003 – Definitions

ICES	The Interference-Causing Equipment Standard (ICES) sets out limits and methods of measurement of radio frequency emissions, as well as administrative requirements for information technology equipment (ITE), including digital apparatus. This includes devices or systems that generate and/or use timing signals or pulses having a rate of at least 9 kHz and employ digital techniques for purposes such as computation, display, control, data processing and storage.

Section 8 Testing data

8.1 Radiated emissions

8.1.1 References and limits

- FCC 47 CFR Part 15, Subpart B: Clause §15.109 (Test method ANSI C63.4:2014)
- ICES-003 Issue 7, October 2020: Section 3.2.2

References and limits, continued

Table 8.1-1: *Requirements for radiated emissions for Class B*

Facility	Frequency range [MHz]	Measurement		limits
		Distance [m]	Detector type/ bandwidth	[dBµV/m]
FCC Part 15 Subpart B				
OATS/SAC	30–88	3	Quasi Peak/120 kHz	40.0
	88–216			43.5
	216–960			46.0
	960–1000			54.0
FSOATS	>1000	3	Linear average/1 MHz	54.0
			Peak/1 MHz	74.0
ICES-003				
OATS/SAC	30–88	3	Quasi Peak/120 kHz	40.0
	88–216			43.5
	216–230			46.0
	230–960			47.0
	960–1000			54.0
FSOATS	>1000	3	Linear average/1 MHz	54.0
			Peak/1 MHz	74.0

Notes:
- OATS – Open Area Test Site, SAC – Semi Anechoic Chamber, FSOATS – Free Space Open Area Test Site
- Where there is a step in the applicable limit, the lower value was applied at the transition frequency.

8.1.2 Test summary

Verdict	Pass		
Tested by	Alvin Liu	Test date	December 12, 2022

8.1.3 Notes

- The spectral plots within this section are a summation of vertical and horizontal scans. The spectral plots within this section have been corrected with all relevant transducer factors.
- Where tabular data has not been provided, no emissions were observed within 10 dB of the specified limit when measured with the appropriate detector. Additionally, where less than 6 measurements per detector have been provided, fewer than 6 emissions were observed within 10 dB of the specified limit when measured with the appropriate detector.
- The spectrum was scanned from 30 MHz up to 1 GHz.

8.1.4 Setup details

Port under test	Enclosure Port
EUT power input during test	120 V_{AC}, 60 Hz
EUT setup configuration	Table top
Test facility	Semi anechoic chamber
Measuring distance	3 m
Antenna height variation	1–4 m
Turntable position	0–360°
Measurement details	A preview measurement was generated with the receiver in continuous scan or sweep mode while the EUT was rotated and the antenna adjusted to maximize radiated emission. Selected emissions detected were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver/spectrum analyzer settings.

Resolution bandwidth	120 kHz
Video bandwidth	300 kHz
Detector mode	Peak (Preview), Quasi-peak (Final)
Trace mode	Max Hold
Measurement time	100 ms

Table 8.1-2: *Radiated emissions equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Receiver/spectrum analyzer	Rohde & Schwarz	ESR26	FA002969	1 year	December 31, 2023
3 m EMI test chamber	TDK	SAC-3	FA003012	1 year	February 7, 2023
Flush mount turntable	SUNAR	FM2022	FA003006	—	NCR
Controller	SUNAR	SC110V	FA002976	—	NCR
Antenna mast	SUNAR	TLT2	FA003007	—	NCR
Bilog antenna (30–2000 MHz)	SUNAR	JB1	FA003010	1 year	June 21, 2023
50 Ω coax cable	Huber + Suhner	None	FA003047	1 year	July 13, 2023
50 Ω coax cable	Huber + Suhner	None	FA003043	1 year	July 13, 2023

Notes: NCR - no calibration required

Table 8.1-3: *Radiated emissions test software details*

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

8.1.5 Test data

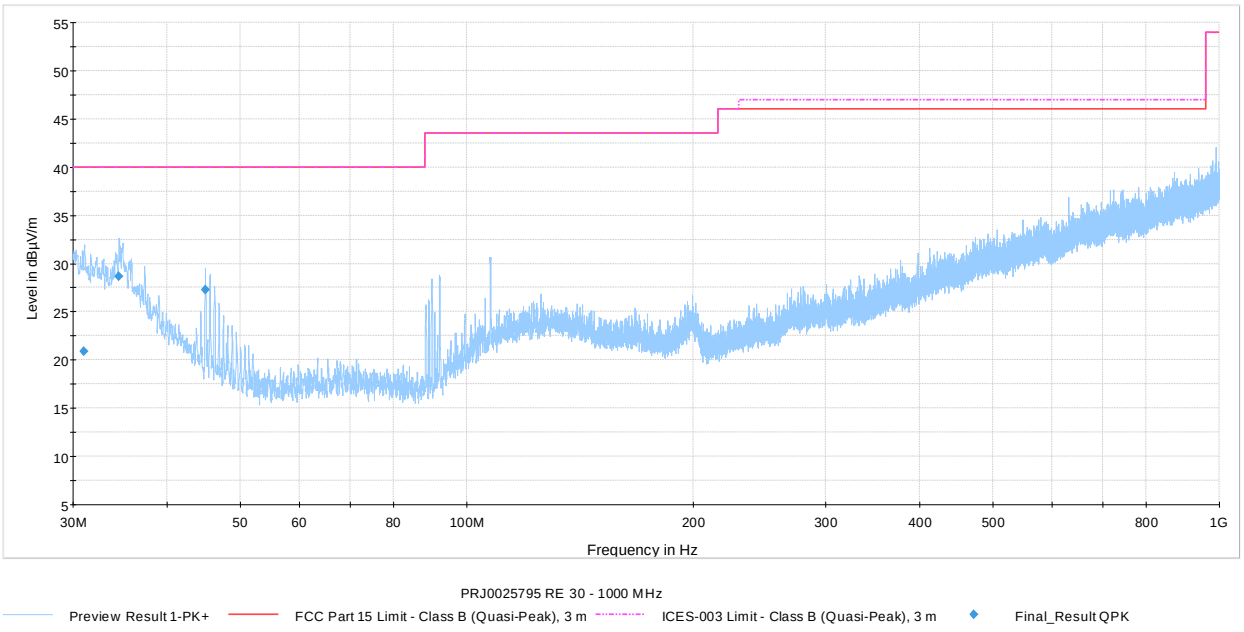


Figure 8.1-1: *Radiated emissions spectral plot (30 to 1000 MHz)*

8.1.6 Setup photos

Figure 8.1-2: *Radiated emissions setup photo – below 1 GHz*

Figure 8.1-3: *Radiated emissions setup photo – below 1 GHz*

8.2 Conducted emissions – from AC mains power ports

8.2.1 References and limits

- FCC 47 CFR Part 15, Subpart B: Clause §15.109 (Test method ANSI C63.4:2014)
- ICES-003 Issue 7, October 2020: Section 3.2.2

Table 8.2-1: *Requirements for conducted emissions from the AC mains power ports for Class B*

Frequency range [MHz]	Measurement		Limits
	Coupling device	Detector type/ bandwidth	[dBµV]
0.15–0.5	AMN	Quasi Peak/9 kHz	66.0–56.0
0.5–5			56.0
5–30			60.0
0.15–0.5	AMN	CAverage/9 kHz	56.0–46.0
0.5–5			46.0
5–30			50.0

Notes: The lower limit shall apply at the transition frequency.

8.2.2 Test summary

Verdict	Pass		
Tested by	Alvin Liu	Test date	December 12, 2022

8.2.3 Notes

- The spectral plots within this section have been corrected with all relevant transducer factors.
- Where tabular data has not been provided, no emissions were observed within 10 dB of the specified limit when measured with the appropriate detector. Additionally, where less than 6 measurements per detector have been provided, fewer than 6 emissions were observed within 10 dB of the specified limit when measured with the appropriate detector.
- Equipment with a DC power port powered by a dedicated AC/DC power converter is considered to be AC mains powered equipment and tested with a power converter. Where the manufacturer provided the power converter, the supplied converter was used.

8.2.4 Setup details

Port under test – Coupling device	AC mains input of panel – Artificial Mains Network (AMN)
EUT power input during test	120 V_{AC}, 60 Hz
EUT setup configuration	Table top
Measurement details	A preview measurement was generated with the receiver in continuous scan mode. Selected emissions detected 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), Quasi-peak and CAverage (Final)
Trace mode	Max Hold
Measurement time	100 ms (Preview), 160 ms (Final)

Table 8.2-2: *Conducted emissions – from AC mains power ports equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Receiver/spectrum analyzer	Rohde & Schwarz	ESR26	FA002969	1 year	December 31, 2021
Two-line v-network	Rohde & Schwarz	ENV216	FA002965	1 year	December 31, 2021
50 Ω coax cable	Rohde & Schwarz	None	FA003074	1 year	July 13, 2023

Notes: None

Table 8.2-3: *Conducted emissions – from AC mains power ports test software details*

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

8.2.5 Test data

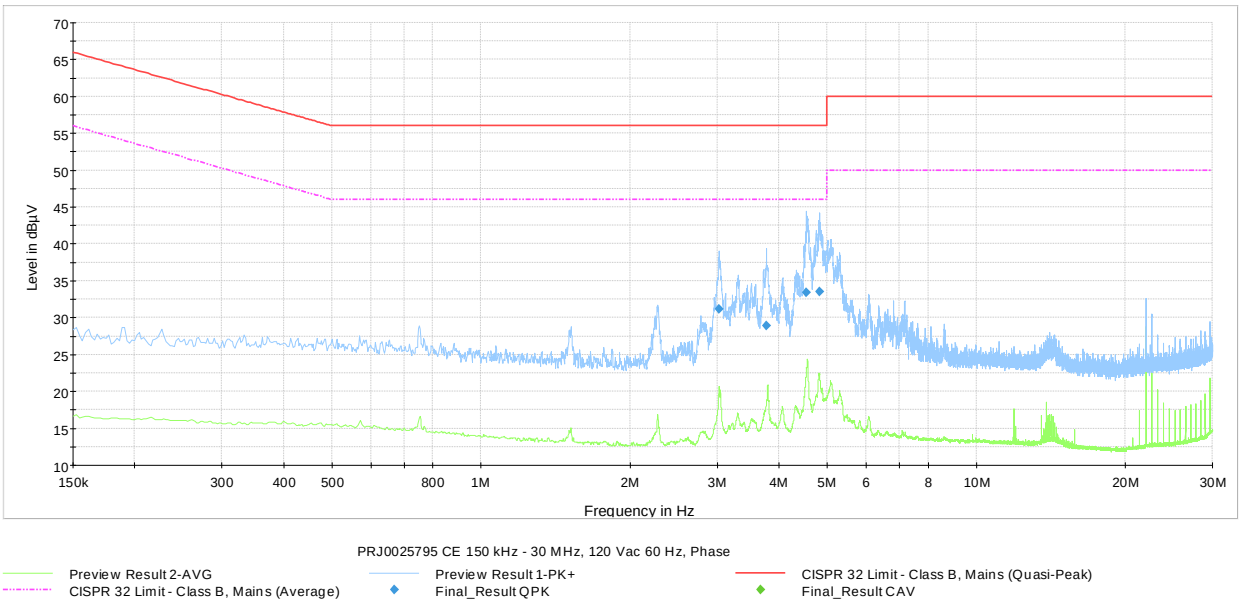


Figure 8.2-1: *Conducted emissions – from AC mains power ports spectral plot on the phase line*

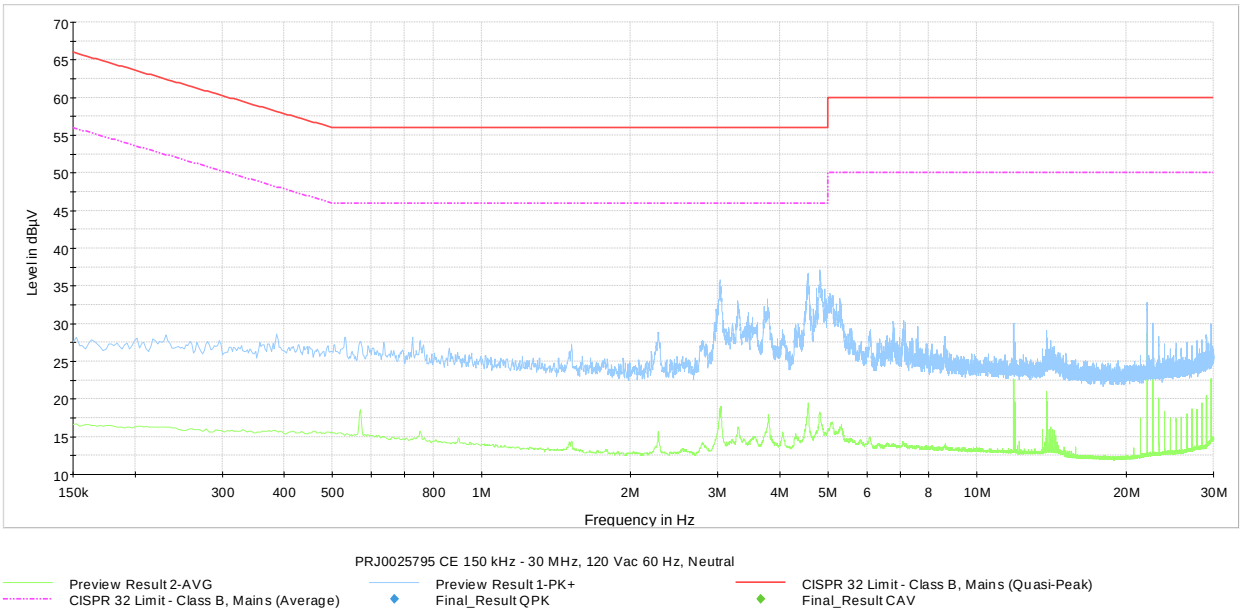


Figure 8.2-2: *Conducted emissions – from AC mains power ports spectral plot on the neutral line*

8.2.6 Setup photos

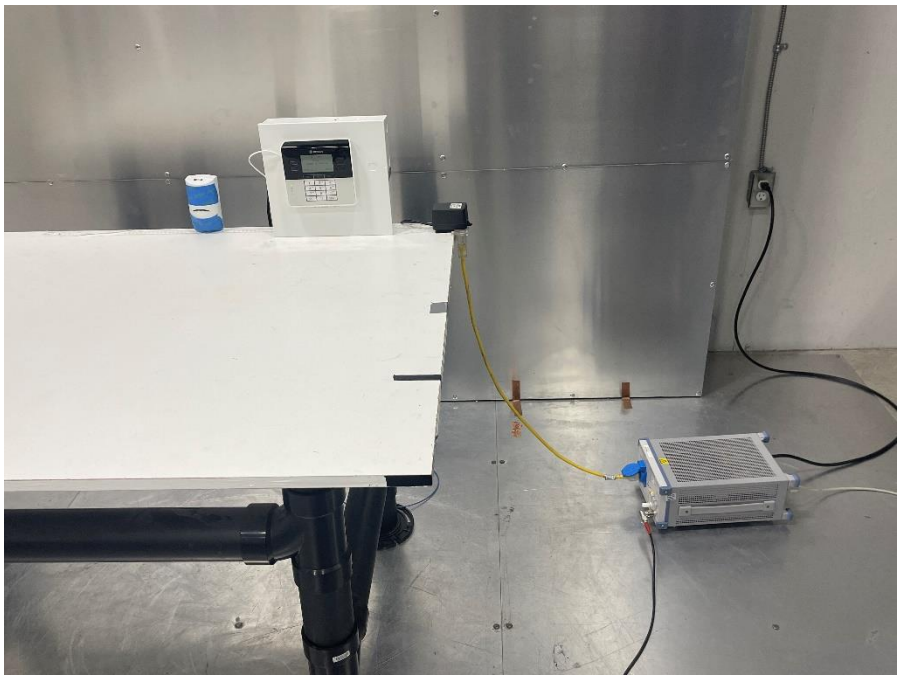


Figure 8.2-3: *Conducted emissions – from AC mains power ports setup photo*

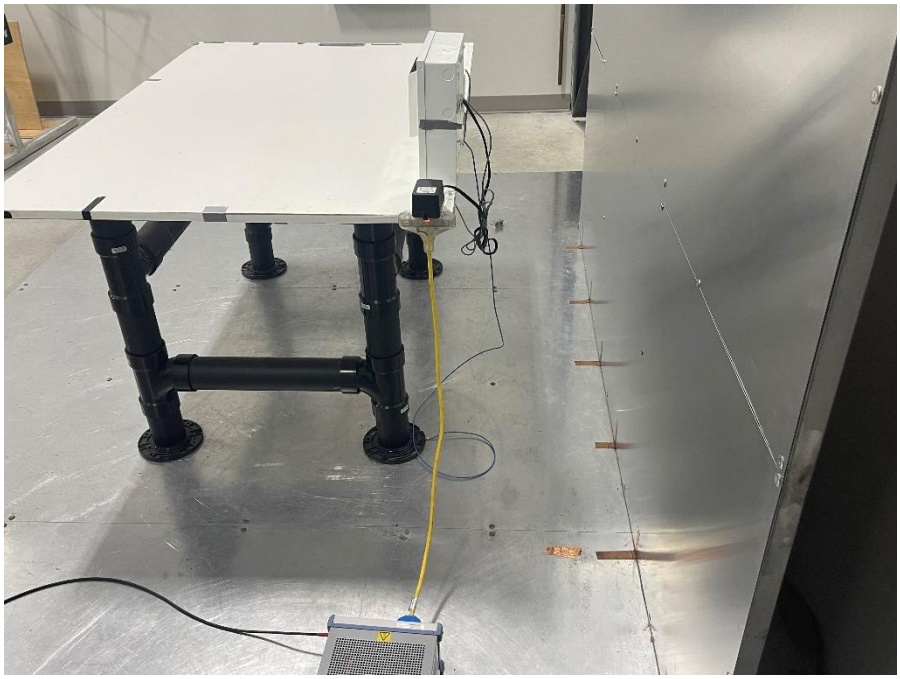


Figure 8.2-4: *Conducted emissions – from AC mains power ports setup photo*

Section 9 EUT photos

9.1 External photos

Figure 9.1-1: *Front view photo*

Figure 9.1-2: *Rear view photo*

External photos continued

Figure 9.1-3: *Top view photo*

Figure 9.1-4: *Bottom view photo*

Figure 9.1-5: *Side view photo*

Figure 9.1-6: *Side view photo*

End of the test report