Nemko

ONE WORLD ○ OUR APPROVAL

EMC TEST REPORT – 339236-1TRFEMC

Applicant:

ROTRONIC AG

Product:

Rotronic Monitoring System (RMS)

Models:

RMS-GW-915

RMS-MLOG-T-915

RMS-MLOG-T10-915

RMS-MLOG-B-915

RMS-LOG-915

RMS-MADC-915-A

Specifications:

- FCC 47 CFR Part 15, Subpart B – Verification
- ICES-003 Issue 6 January 2016

Date of issue: November 2, 2017

Test engineer(s):	Yong Huang, Wireless/EMC Specialist	Signature:	[signature]
Reviewed by:	Daniel Hynes, Senior EMC Specialist	Signature:	Daniel Hynes

Lab and test locations

Company name	Nemko Canada Inc.		
Facilities	Ottawa site: 303 River Road, Ottawa, ON, Canada, K1V 1H2 Tel: +1 613 737 9680 Fax: +1 613 737 9691	Montreal site: 292 Labrosse Avenue, Pointe-Claire, QC, Canada, H9R 5L8 Tel: +1 514 694 2684 Fax: +1 514 694 3528	Almonte site: 1500 Peter Robinson Road, West Carleton, ON, Canada, K0A 1L0 Tel: +1 613 256-9117 Fax: +1 613 256-8848
Test site registration	**Organization**	**Recognition numbers and location**	
	FCC	CA2040 (Ottawa); CA2041 (Montreal)	
	ISED	CA2040A-4 (Ottawa); CA2040G-5 (Montreal); CA2040A-3 (Almonte)	
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 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	Title 47: Telecommunication; Part 15—Radio Frequency Devices
ICES-003 Issue 6 January 2016	Information Technology Equipment (ITE) – Limits and methods of measurement

1.2 Exclusions

None

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.2 above. 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
TRF	November 2, 2017	Original report issued

Section 2 Summary of test results

2.1 Testing period

Test start date	October 24, 2017
Test end date	October 24, 2017

2.2 North America test results

Table 2.2-1: *Result summary for emissions*

Standard	Clause	Test description	Verdict
FCC 47 CFR Part 15, Subpart B	§15.109	Radiated emissions limits[1]	Pass
FCC 47 CFR Part 15, Subpart B	§15.107	Conducted emissions limits (AC mains) [1]	Pass
ICES-003 Issue 6	6.1	AC Power Line Conducted Emissions Limits[1]	Pass
ICES-003 Issue 6	6.2	Radiated Emissions Limits[1]	Pass

Notes: [1] Product classification A

[2] The EUT can be powered by 24 V_{DC} adapter or PoE; both configurations were tested.

Section 3 Equipment under test (EUT) details

3.1 Applicant

Company name	ROTRONIC AG
Address	Grindelstrasse 6, CH-8303 Bassersdorf, Switzerland

3.2 Manufacturer

Company name	ROTRONIC AG
Address	Grindelstrasse 6, CH-8303 Bassersdorf, Switzerland

3.3 Sample information

Receipt date	October 20, 2017
Nemko sample ID number	Item #1, #2, #3, #4, #5, #7

3.4 EUT information

Product name	Rotronic Monitoring System (RMS)
Models	RMS-MLOG-T10-915 RMS-MLOG-B-915 RMS-MLOG-T-915 RMS-MADC- 915-A RMS-LOG-915 RMS-GW-915
Serial numbers	SN:61739430 (RMS-MLOG-T10-915) SN: 61739431 (RMS-MLOG-B-915) SN: 61739429 (RMS-MLOG-T-915) SN:61739433 (RMS-MADC-915-A) SN: 0061700498 (RMS-LOG-915) SN: 0061700531 (RMS-GW-915)
Part numbers	RMS-MLOG-T10-915 RMS-MLOG-B-915 RMS-MLOG-T-915 RMS-MADC- 915-A RMS-LOG-915 RMS-GW-915
Power requirements	24 V_{DC} via AC/DC adapter or 48 V_{DC} PoE (Gateway RMS-GW-915) 24 V_{DC} via AC/DC adapter (RMS-LOG-915) 3.6V AA-batterie (RMS-MLOG-T10-915, RMS-MLOG-B-915, RMS-MLOG-T-915, RMS-MADC- 915-A)
Description/theory of operation	The Rotronic Monitoring System is a wireless data logging system for real-time monitoring of critical environments. The wireless data loggers communicate to the monitoring system via the gateway. Transmission of the data loggers to the gateway are as frequent as 10 seconds up to 15 minutes.
Operational frequencies	Radio frequencies: 912.5, 913, 913.5, 914, 914.5, 915, 915.5, 916, 916.5, 917, 917.5 MHz 16 MHz internal clock: RMS-MLOG-T10-915, RMS-MLOG-B-915, RMS-MLOG-T-915, RMS-MADC- 915-A 32 MHz internal clock: RMS-LOG-915 32 MHz, 125 MHz internal clock: RMS-GW-915
Software details	RMS-MLOG-T10-915: v1.3 RMS-MLOG-B-915: v1.1 RMS-MLOG-T-915: v1.3 RMS-MADC- 915-A: v1.2 RMS-LOG-915: v1.5 RMS-GW-915: v1.5

3.5 EUT setup details

EUT description of the methods used to exercise the EUT and all relevant ports:

- All the EUTs being exercised were powered either by battery, 24 V_{DC} adapter or POE injector.
- The RF transmitting function was disabled and communication between the EUTs and the RMS software/database was prohibited.
- The EUTs functioned as expected under these conditions.

EUT setup/configuration rationale:

- 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. Cables with mitigation features (for example, screening, tighter/more twists per length, ferrite beads) have been noted below:
- The following deviations were:
- None
- 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. Any deviations from typical arrangements have been noted below:
- The following deviations were:
- None

EUT monitoring method:

- The devices were first paired to the software system to ensure they were online and communication.
- The device reset buttons were each applied one at a time to stop RF transmitting and communication.
- Loss of communication to the software cloud confirmed that RF communication had stopped.
- The gateway device, additionally, was disabled in the software to ensure no RF communication was taking place during the test

3.5 EUT setup details, continued

Table 3.5-1: *EUT sub assemblies*

Description	Brand name	Model, Part number, Serial number, Revision level
Gateway	Rotronic	MN: RMS-GW-915, SN: 0061700531
Internal Temperature Logger	Rotronic	MN: RMS-MLOG-T-915, SN: 61739429
External Temperature Logger	Rotronic	MN: RMS-MLOG-T10-915, SN: 61739430
Internal Temperature and Humidity Logger	Rotronic	MN: RMS-MLOG-B-915, SN: 61739431
Temperature and Humidity Data Logger, External Probe	Rotronic	MN: RMS-LOG-915, SN: 0061700498
Analog Input Module	Rotronic	MN: RMS-MADC-915-A, SN:61739433
AC/DC Adapter for Gateway	TRIAD	PN: WSU240-0500, MN: WS2U240-500
AC/DC Adapter for Temperature and Humidity Data Logger, External Probe	None	MN: SKTC24001000

Table 3.5-2: *EUT interface ports*

Description	Qty.
Gateway – Ethernet	1
Gateway – DC input	1
Temperature and Humidity Data Logger, External Probe – Antenna port	1
Temperature and Humidity Data Logger, External Probe – DC input	1

Table 3.5-3: *Support equipment*

Description	Brand name	Model, Part number, Serial number, Revision level
PoE Injector	TP-LINK	MN: TL-POE150S, SN: 2173728013622
AC Adapter	TP-LINK	MN: T480050-2B1

Table 3.5-4: *Inter-connection cables*

Cable description	From	To	Length (m)
Ethernet	Gateway	PoE injector	1

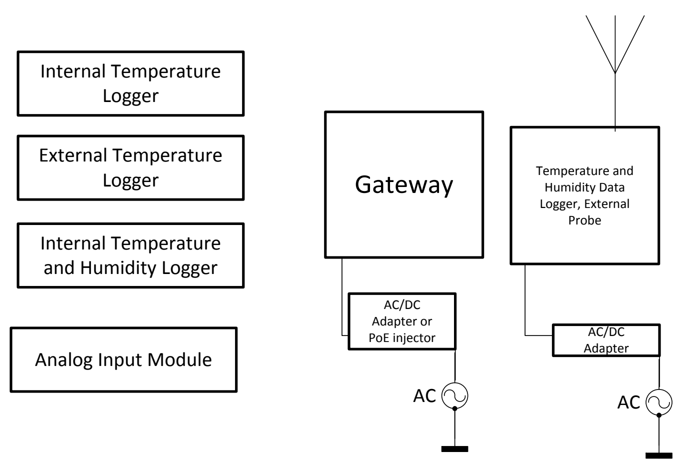


Figure 3.5-1: *block diagram*

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT for compliance

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

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-003 – Equipment classification

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.

7.2 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

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.

Section 8 Testing data

8.1 Conducted emissions – from AC mains power ports

8.1.1 References and limits

- FCC 47 CFR Part 15, Subpart B: Clause §15.107 (Test method ANSI C63.4:2014)
- ICES-003: Section 6.1

Table 8.1-1: *Requirements for conducted emissions from the AC mains power ports for Class A*

Frequency range [MHz]	Measurement		Limits
	Coupling device	Detector type/ bandwidth	[dBµV]
0.15–0.5	AMN	Quasi Peak/9 kHz	79
0.5–30			73
0.15–0.5	AMN	CAverage/9 kHz	66
0.5–30			60

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

8.1.2 Test summary

Verdict	Pass		
Test date	October 24, 2017	Temperature	24 °C
Test engineer	Yong Huang	Air pressure	1010 mbar
Test location	Montreal	Relative humidity	40 %

8.1.3 Notes

- Where tabular data has not been provided, no emissions were observed within 10 dB of the specified limit when measured with the appropriate detector.
- Where less than 6 measurements per detector has 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 was tested with a power converter. Where the power converter was provided by the manufacturer, the provided converter was used.

8.1.4 Setup details

Port under test – Coupling device	AC Mains – Artificial Mains Network (AMN)
EUT power input during test	120 V_{AC}, 60 Hz (via PoE Injector or AC/DC adapter)
EUT setup configuration	Table top
Measurement details	A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 10 dB or above the 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 CAverage (Final measurement)
Trace mode	Max Hold
Measurement time	– 100 ms (Peak and Average preview measurement) – 100 ms (Quasi-peak final measurement) – 160 ms (CAverage final measurement)

***Table 8.1-2:** Conducted emissions – from AC mains power ports equipment list*

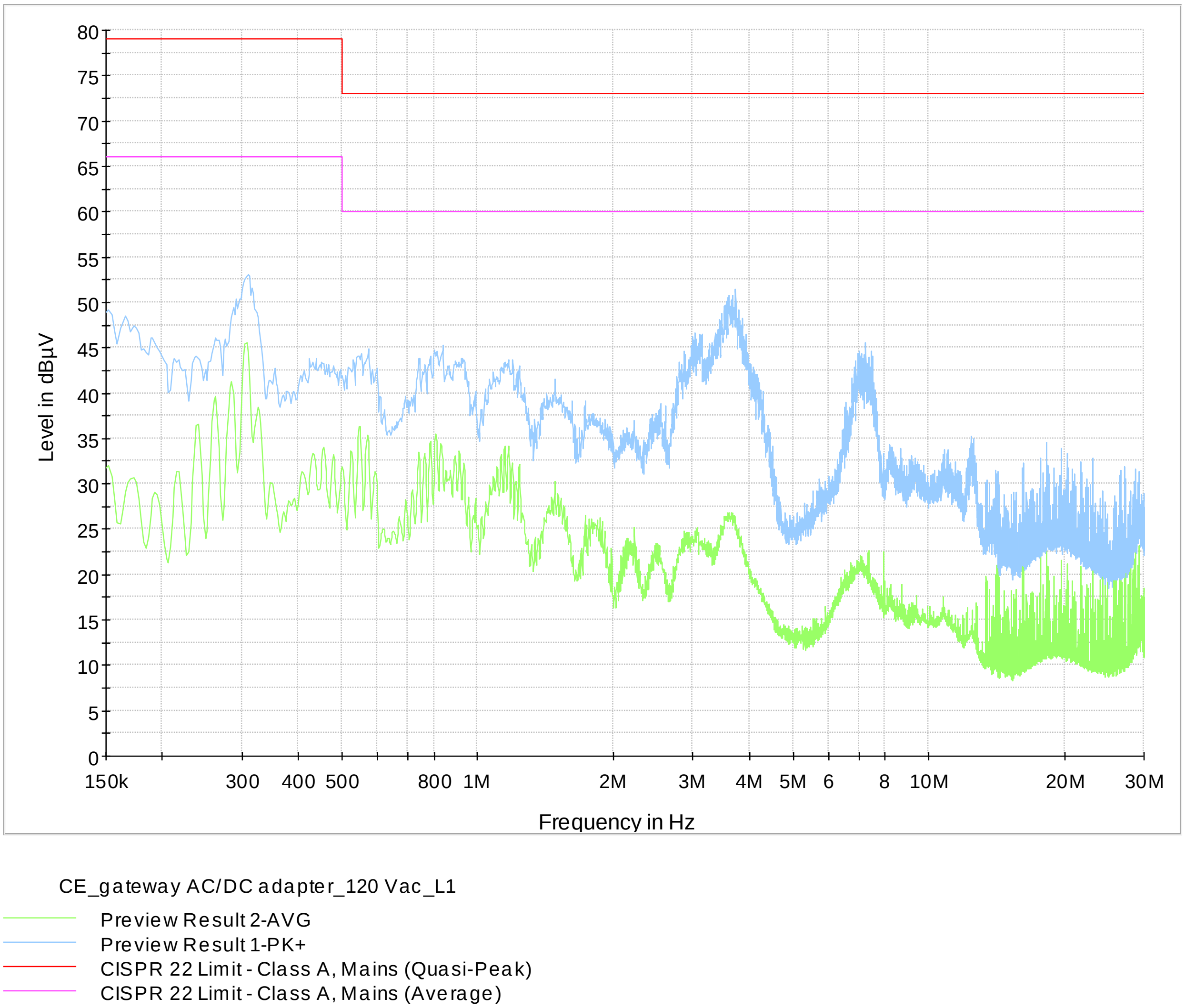
Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 40	FA002071	1 year	Sept. 18/18
Power source	California Instruments	5001ix	FA001770	1 year	Feb. 1/18
LISN	Rohde & Schwarz	ENV216	FA002514	1 year	Nov. 25/17

Notes: None

***Table 8.1-3:** Conducted emissions – from AC mains power ports test software details*

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

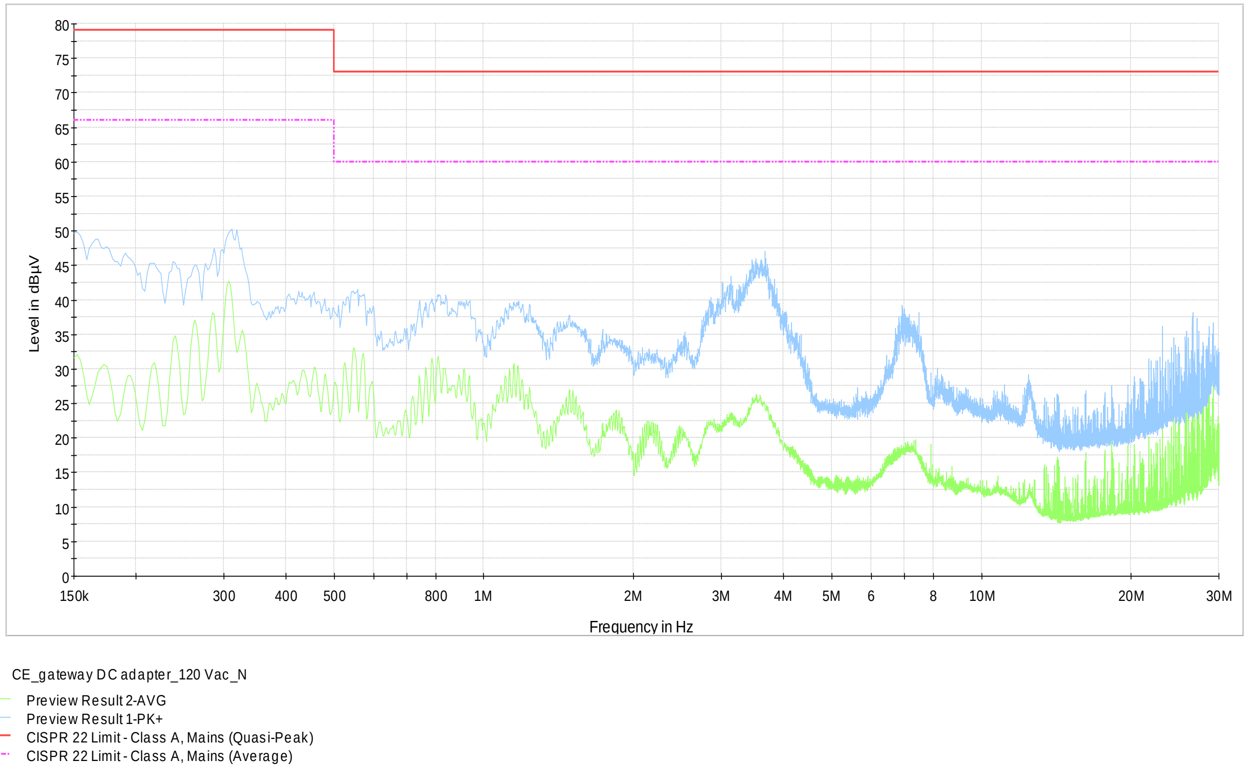
8.1.5 Test data



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

Figure 8.1-1: *Conducted emissions – from AC mains power ports spectral plot on phase line, Gateway with AC/DC adapter*

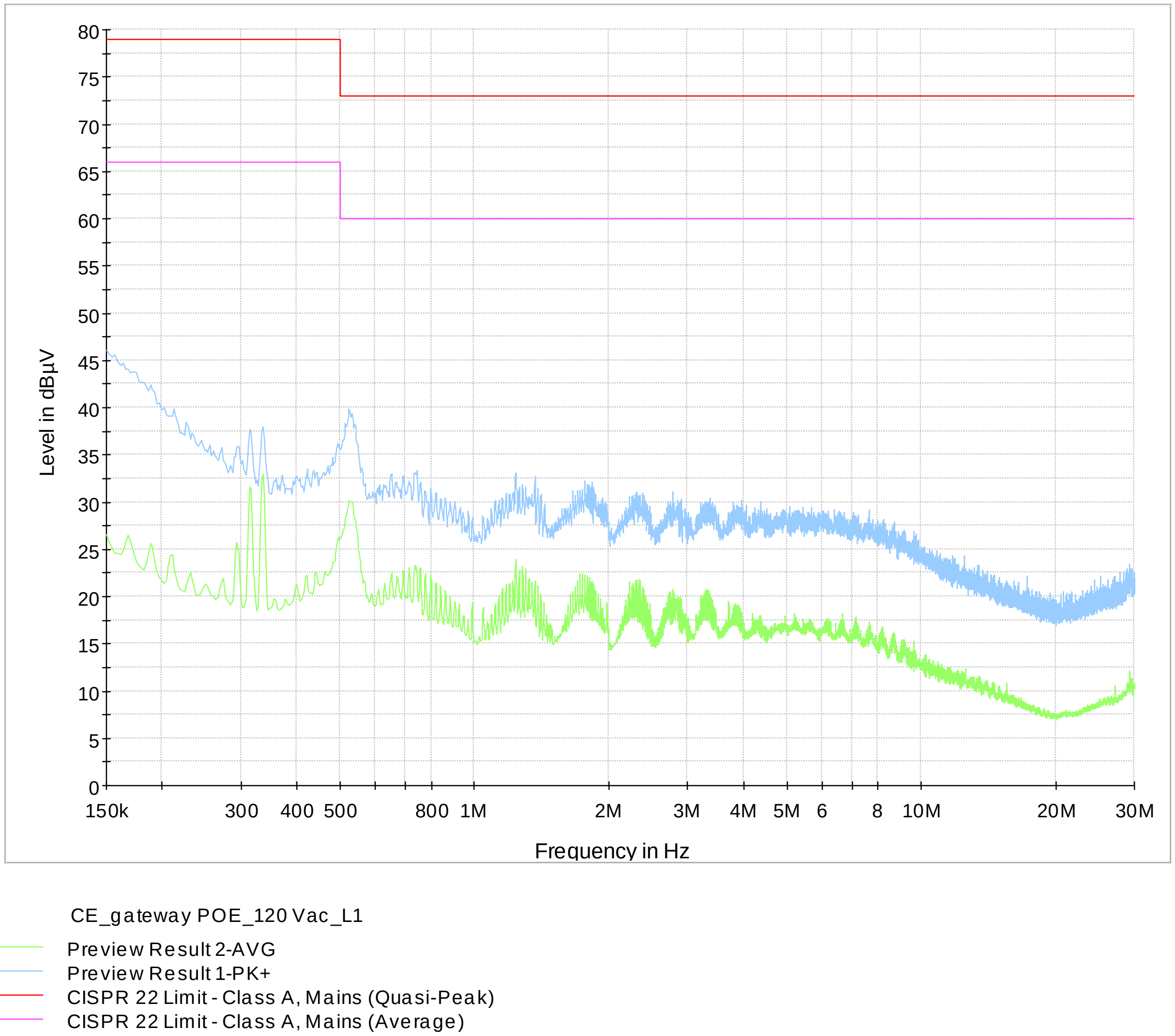
8.1.5 Test data, continued



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

Figure 8.1-2: *Conducted emissions – from AC mains power ports spectral plot on neutral line, Gateway with AC/DC adapter*

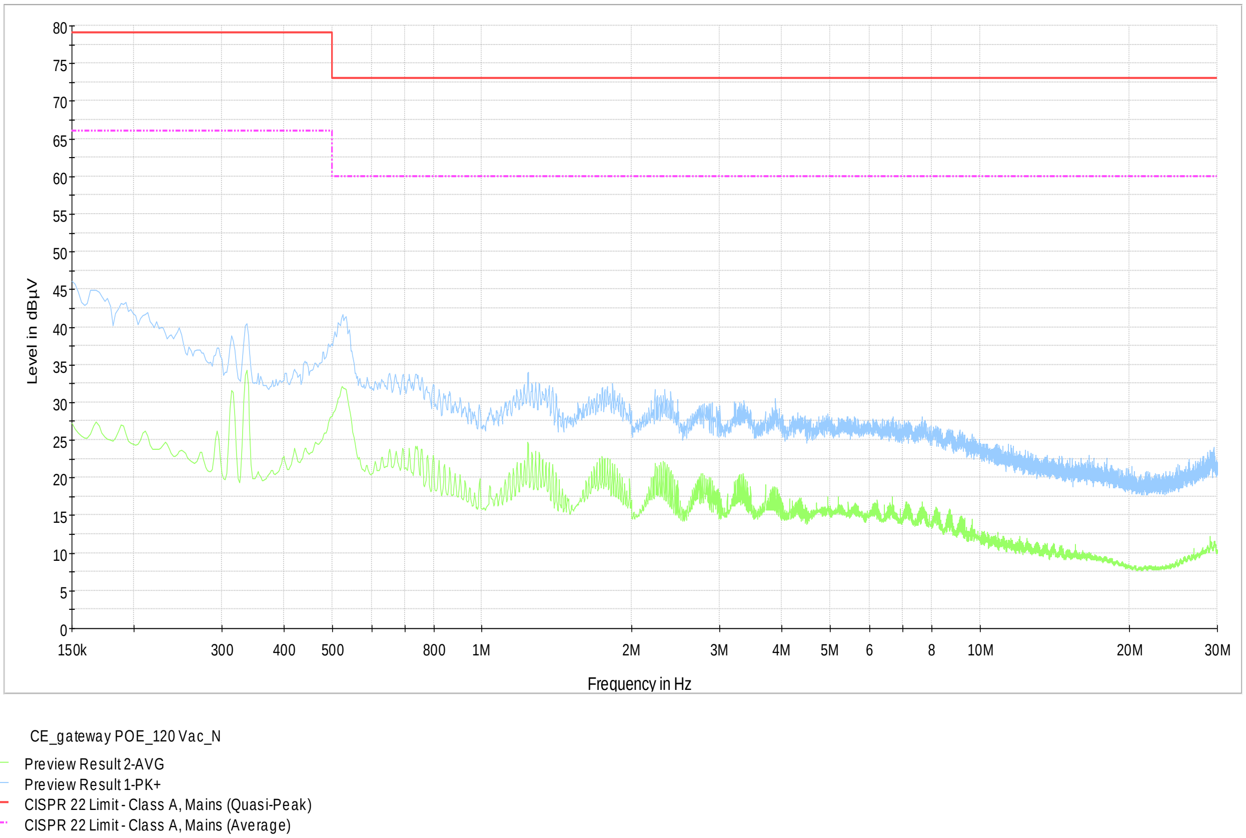
8.1.5 Test data, continued



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

Figure 8.1-3: *Conducted emissions – from AC mains power ports spectral plot on phase line, Gateway with PoE Injector*

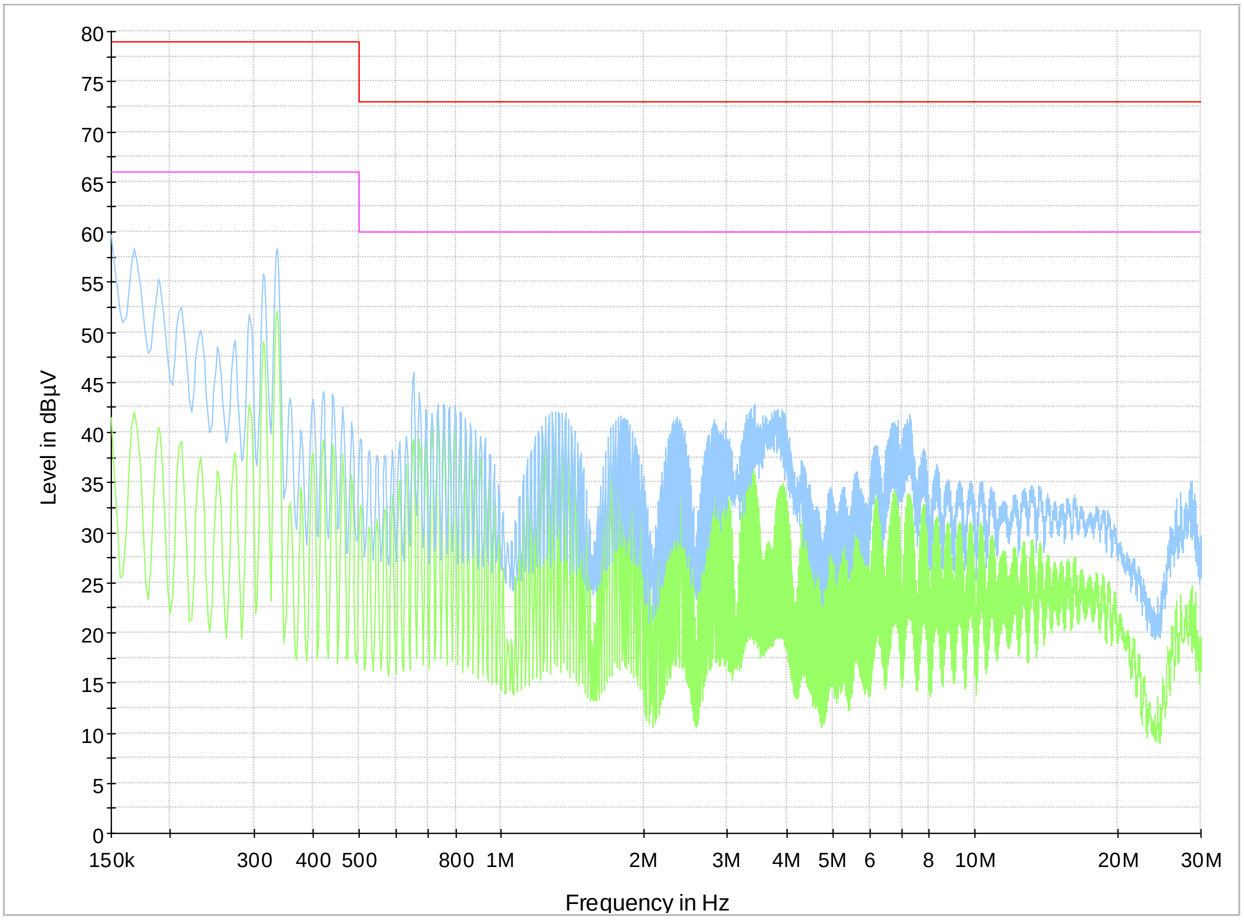
8.1.5 Test data, continued



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

Figure 8.1-4: *Conducted emissions – from AC mains power ports spectral plot on neutral line, Gateway with PoE Injector*

8.1.5 Test data, continued



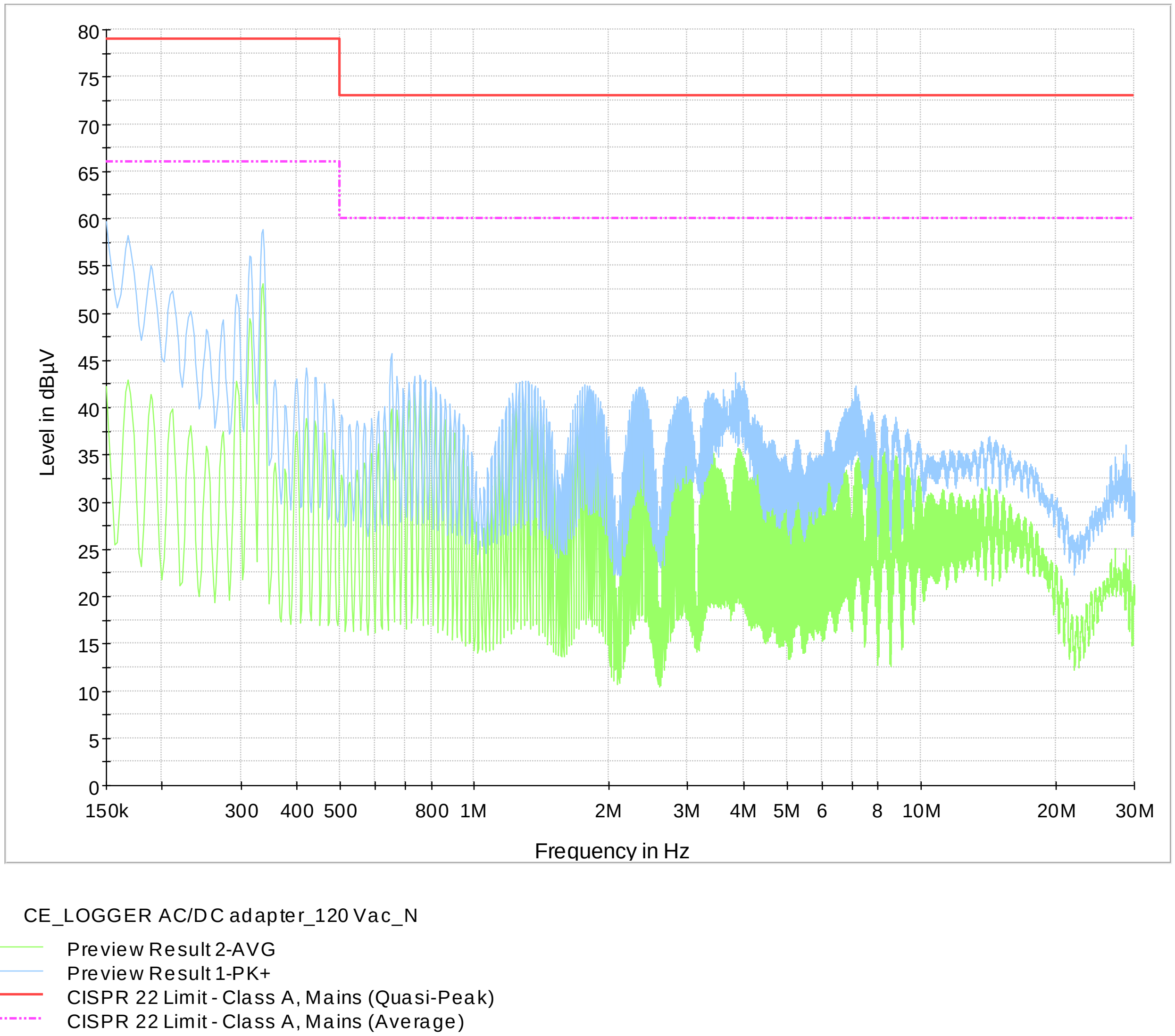
CE_LOGGER AC/DC adapter_120 Vac_L1

- Preview Result 2-AVG
- Preview Result 1-PK+
- CISPR 22 Limit - Class A, Mains (Quasi-Peak)
- CISPR 22 Limit - Class A, Mains (Average)

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

Figure 8.1-5: *Conducted emissions – from AC mains power ports spectral plot on phase line, Logger with AC/DC adapter*

8.1.5 Test data, continued



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

Figure 8.1-6: *Conducted emissions – from AC mains power ports spectral plot on neutral line, Logger with AC/DC adapter*

8.1.6 Setup photos

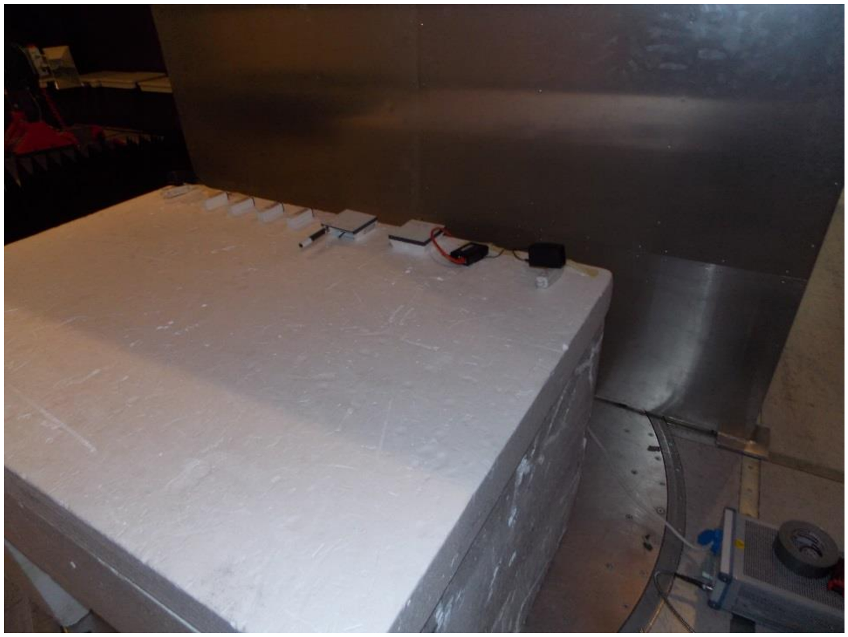


Figure 8.1-7: *Conducted emissions – from AC mains power ports setup photo*

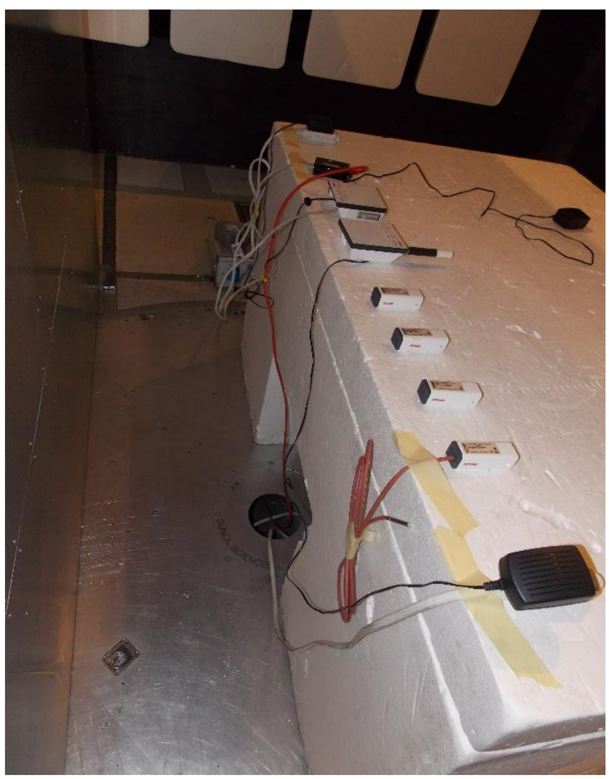


Figure 8.1-8: *Conducted emissions – from AC mains power ports setup photo*

8.2 Radiated emissions

8.2.1 References and limits

- FCC 47 CFR Part 15, Subpart B: Clause §15.109 (Test method ANSI C63.4:2014)
- ICES-003: Section 6.2

Table 8.2-1: *Requirements as per FCC Part 15 Subpart B and ICES-003 for radiated emissions for Class A*

Frequency range [MHz]	Measurement		limits
	Distance [m]	Detector type/ bandwidth	[dBµV/m]
30–88 88–216 216–960 960–1000	10	Quasi Peak/120 kHz	39.0 43.5 46.4 49.5
30–88 88–216 216–960 960–1000	3	Quasi Peak/120 kHz	49.5 54.0 56.9 60.0
>1000	10	Linear average/1 MHz Peak/1 MHz	49.5 69.5
>1000	3	Linear average/1 MHz Peak/1 MHz	60.0 80.0

Notes: Where there is a step in the relevant limit, the lower value was applied at the transition frequency.

8.2.2 Test summary

Verdict	Pass		
Test date	October 24, 2017	Temperature	24 °C
Test engineer	Yong Huang	Air pressure	1008 mbar
Test location	Montreal	Relative humidity	45 %

8.2.3 Notes

- Where tabular data has not been provided, no emissions were observed within 10 dB of the specified limit when measured with the appropriate detector.
- Where less than 6 measurements per detector has been provided, fewer than 6 emissions were observed within 10 dB of the specified limit when measured with the appropriate detector.
- The highest operating digital frequency of the EUT as provided by the client was 125 MHz. The spectrum was scanned to 6 GHz for information purpose.

Table 8.2-2: *Frequency range for FCC Part 15 Subpart B and ICES-003 Issue 6*

Highest internal frequency [F_X]	Highest measured frequency
$F_X \leq 108$ MHz	1 GHz
108 MHz < $F_X \leq 500$ MHz	2 GHz
500 MHz < $F_X \leq 1$ GHz	5 GHz
$F_X > 1$ GHz	5 × F_X up to a maximum of 40 GHz

Notes: Highest internal frequency [F_X] – highest fundamental frequency generated or used within the EUT or highest frequency at which it operates. This includes frequencies which are solely used within an integrated circuit.
For FM and TV broadcast receivers F_X is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.

8.2.4 Setup details

Port under test	Enclosure Port
EUT power input during test	24 V_{DC} via AC/DC adapter 48 V_{DC} via PoE injector
EUT setup configuration	Table top
Test facility	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 10 dB or above the 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 (Peak preview measurement), 100 ms (Quasi-peak final measurement)

Receiver/spectrum analyzer settings for frequencies above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak (Preview measurement) Peak and CAverage (Final measurement)
Trace mode	Max Hold
Measurement time	100 ms (Peak preview measurement), 100 ms (Peak and CAverage final measurement)

Table 8.2-3: *Radiated emissions equipment list*

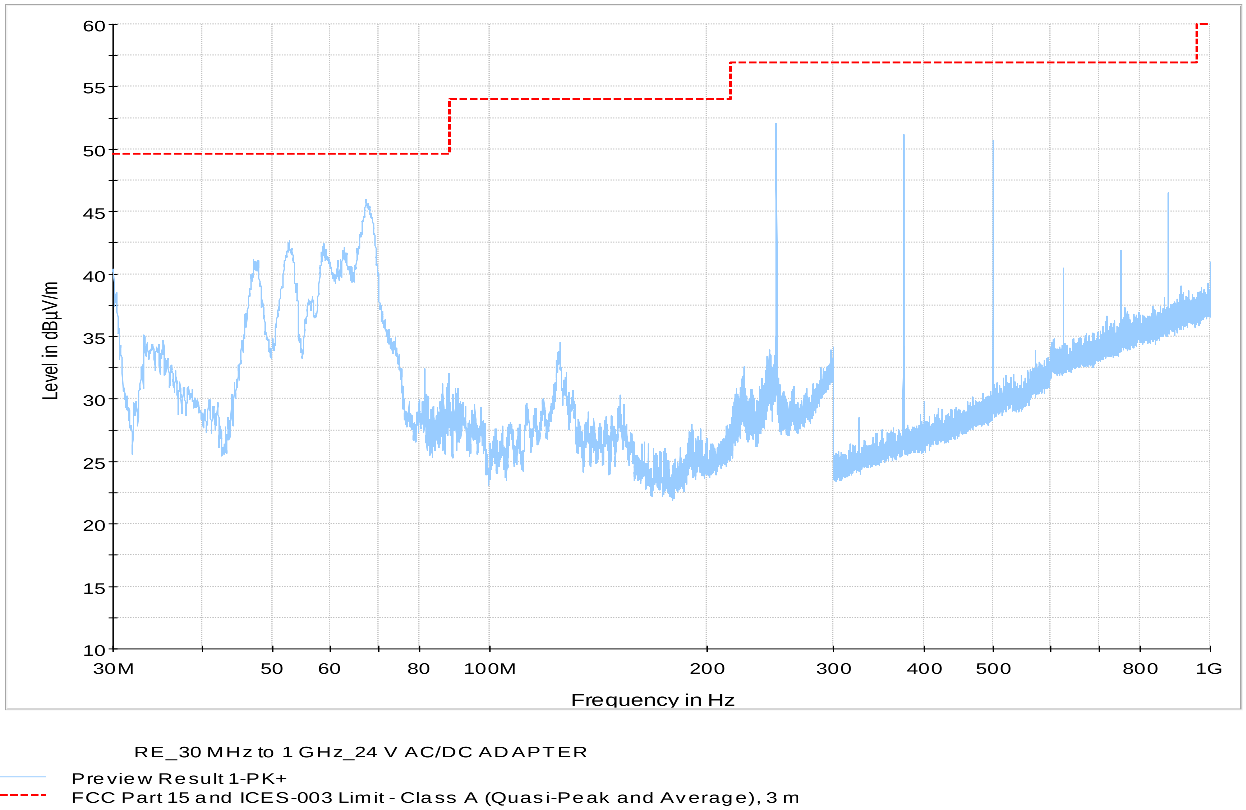
Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Flush mount turntable	Sunol	FM2022	FA002550	—	NCR
Controller	Sunol	SC104V	FA002551	—	NCR
Antenna mast	Sunol	TLT2	FA002552	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 40	FA002071	1 year	Sept. 18/18
Biconical antenna (30–300 MHz)	Sunol	BC2	FA002078	1 year	May 8/18
Log periodic antenna (200–5000 MHz)	Sunol	LP5	FA002077	1 year	May 8/18
Horn antenna (1–18 GHz)	EMCO	RGA-60	FA002577	1 year	May 5/18
Pre-amplifier (0.5–18 GHz)	COM-POWER	PAM-118A	FA002561	1 year	Sept. 21/18

Notes: NCR - no calibration required

Table 8.2-4: *Radiated emissions test software details*

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

8.2.5 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 8.2-1:** Radiated emissions spectral plot (30 to 1000 MHz), Gateway with AC/DC adapter*

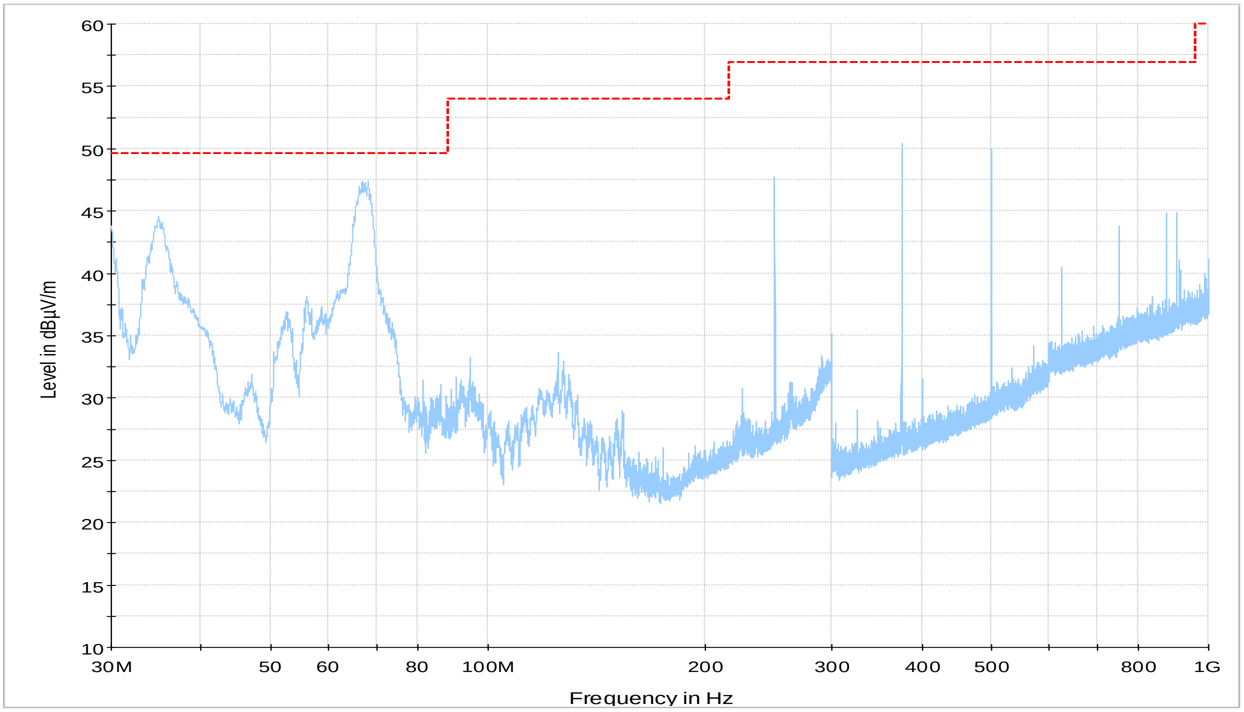
***Table 8.2-5:** Radiated emissions (Quasi-Peak) results*

Frequency (MHz)	Quasi-Peak field strength[1] (dBµV/m)	3 m Quasi-Peak limit [3] (dBµV/m)	Margin (dB)	Measurement time (ms)	Bandwidth (kHz)	Antenna height (cm)	Pol. (V/H)	Turn table position (°)	Correction factor[2] (dB)
67.38	41.4	50.0	8.6	100	120	105	V	11	10.2
47.01	41.2	50.0	8.8	100	120	100	V	57	10.0
52.65	42.7	50.0	7.3	100	120	100	V	215	9.8
250.02	53.2	57.0	3.8	100	120	136	H	28	18.5
375.03	45.8	57.0	11.2	100	120	137	V	6	17.9
500.04	50.7	57.0	6.3	100	120	100	V	322	20.6

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factor = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions have been recorded.

Sample calculation: 41.4 dBµV/m (field strength) = 21.2 dBµV (receiver reading) + 10.2 dB (Correction factor)

8.2.5 Test data, continued



RE_30 MHz to 1 GHz_POE
Preview Result 1-PK+
FCC Part 15 and ICES-003 Limit - Class A (Quasi-Peak and Average), 3 m

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 8.2-2: *Radiated emissions spectral plot (30 to 1000 MHz), Gateway with PoE Injector*

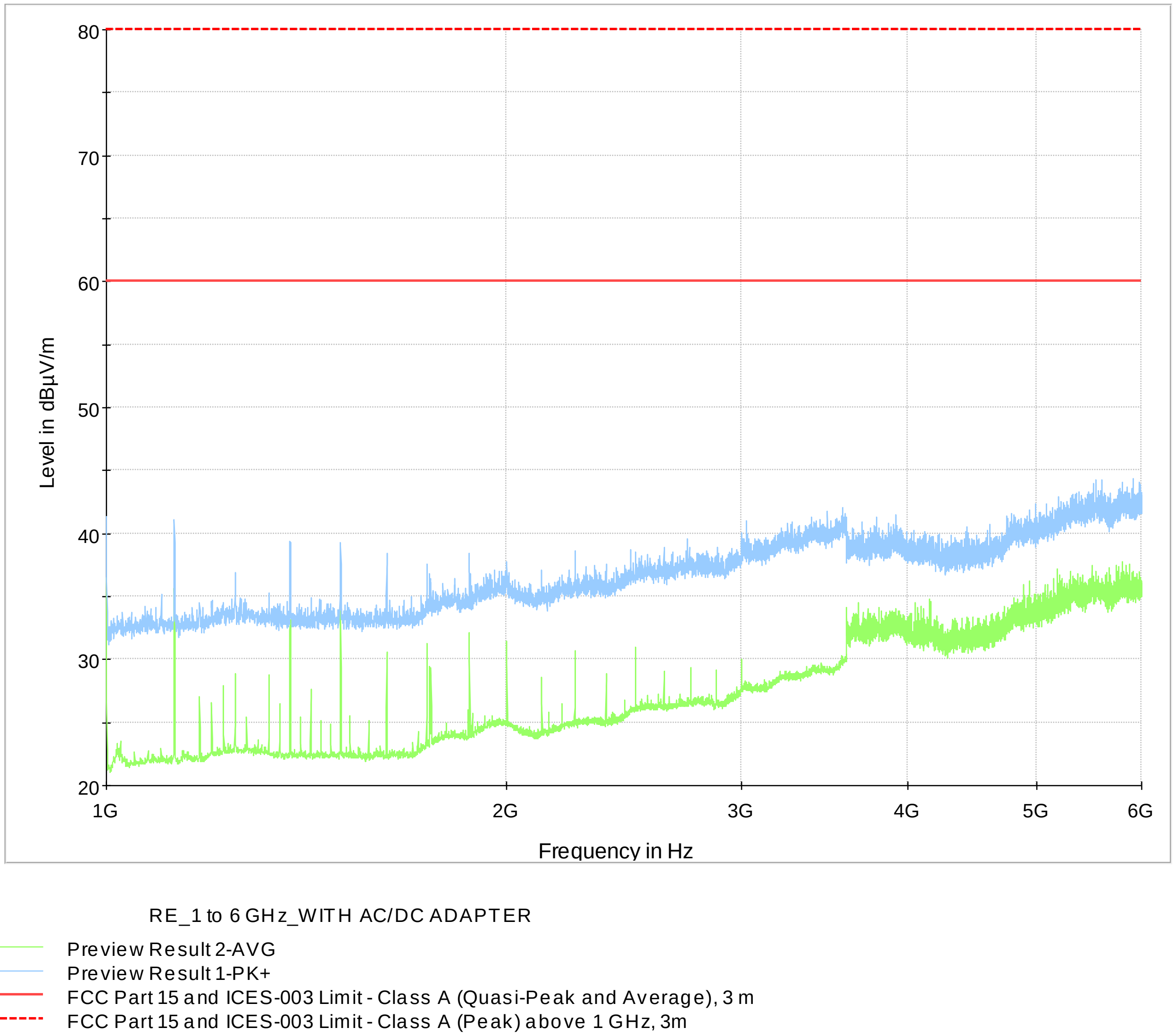
Table 8.2-6: *Radiated emissions (Quasi-Peak) results*

Frequency (MHz)	Quasi-Peak field strength[1] (dBµV/m)	3 m Quasi-Peak limit [3] (dBµV/m)	Margin (dB)	Measurement time (ms)	Bandwidth (kHz)	Antenna height (cm)	Pol. (V/H)	Turn table position (°)	Correction factor[2] (dB)
34.89	40.5	50.0	9.5	100	120	104	V	28	11.8
68.16	42.4	50.0	7.6	100	120	100	V	1	10.2
250.02	45.0	57.0	12.0	100	120	108	V	6	18.5
375.03	49.5	57.0	7.5	100	120	140	V	300	17.9
500.04	50.0	57.0	7.0	100	120	100	V	0	20.6
902.91	44.8	57.0	12.2	100	120	200	H	16	26.5

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factor = antenna factor ACF (dB) + cable loss (dB)
[3] Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions have been recorded.

Sample calculation: 34.9 dBµV/m (field strength) = 23.1 dBµV (receiver reading) + 11.8 dB (Correction factor)

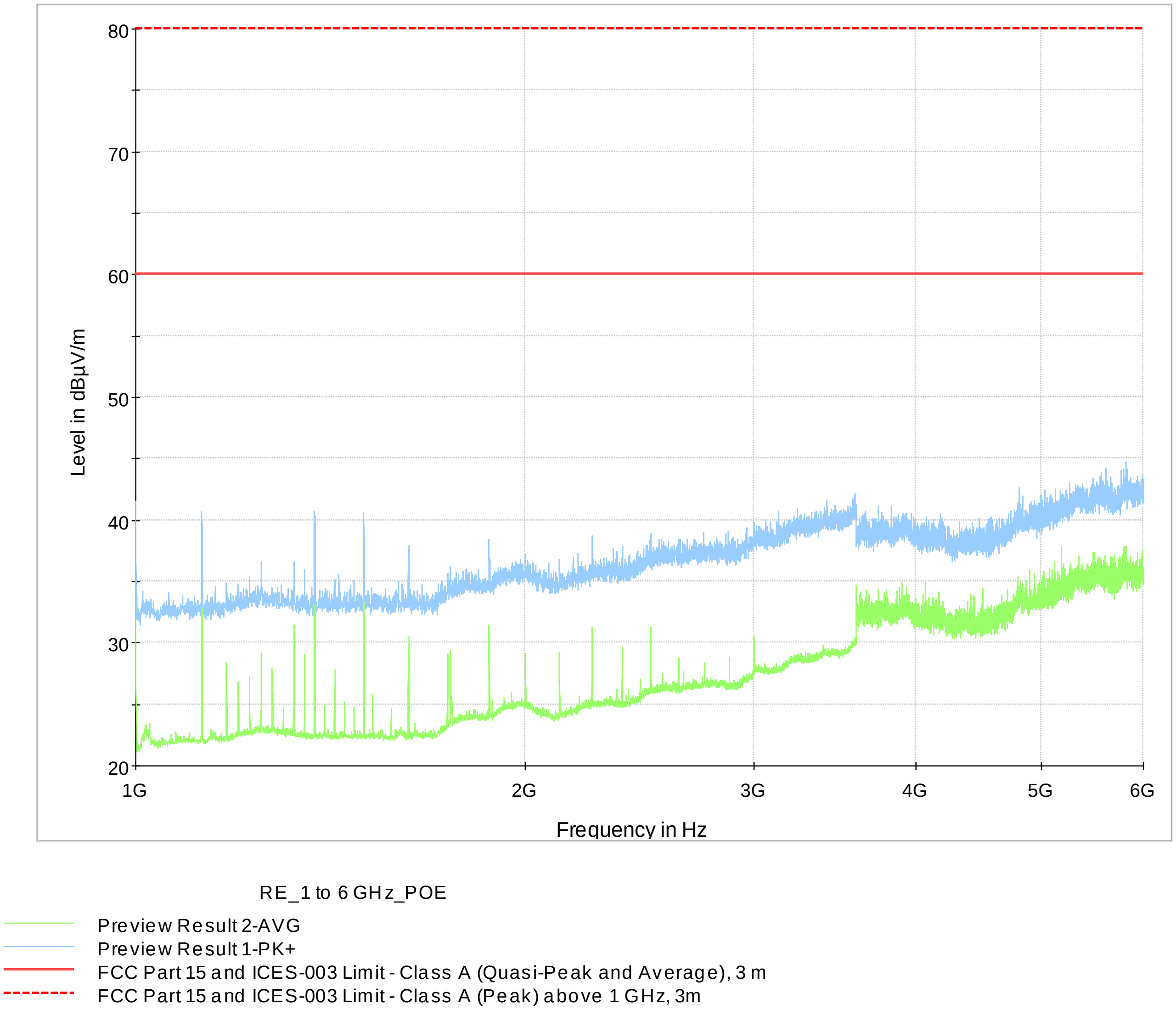
8.2.5 Test data, continued



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 8.2-3:** Radiated emissions spectral plot (1 to 6 GHz), Gateway with AC/DC adapter*

8.2.5 Test data, continued



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 8.2-4: *Radiated emissions spectral plot (1 to 6 GHz) , Gateway with PoE Injector*

8.2.6 Setup photos

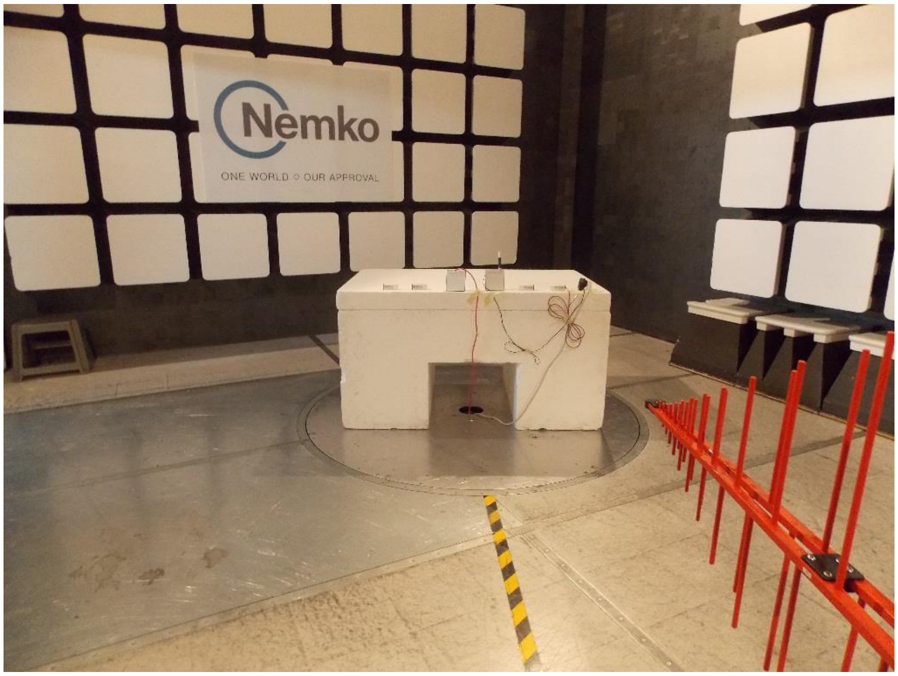


Figure 8.2-5: *Radiated emissions setup photo – below 1 GHz*

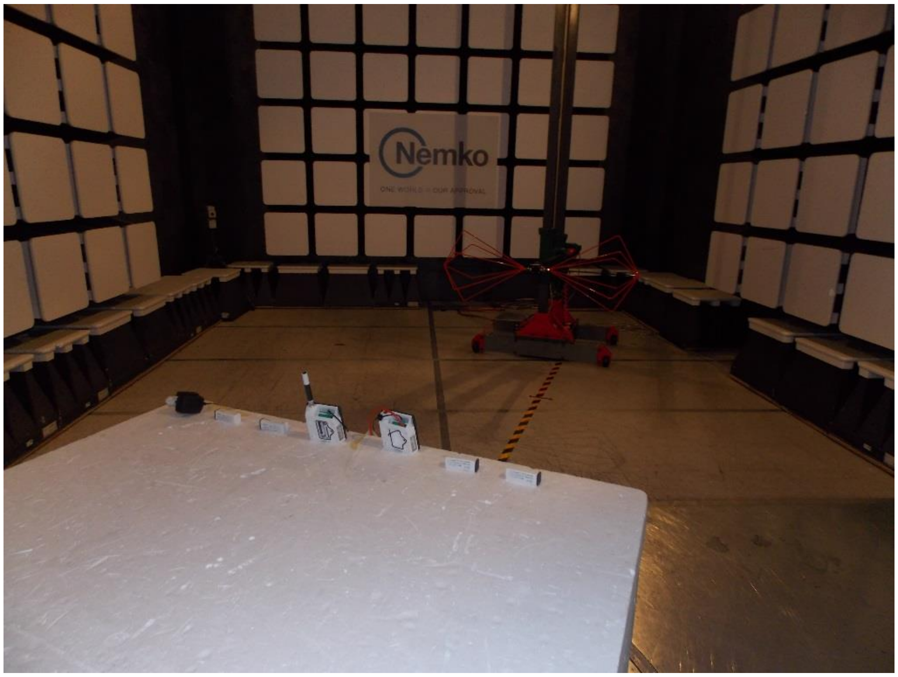


Figure 8.2-6: *Radiated emissions setup photo – below 1 GHz*

8.2.6 Setup photos, continued

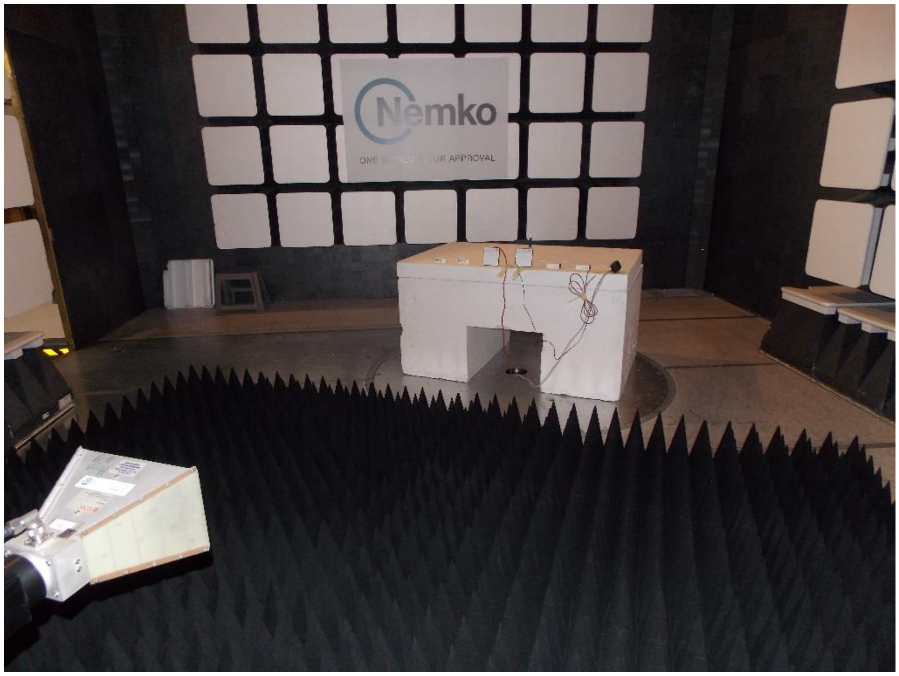


Figure 8.2-7: *Radiated emissions setup photo – above 1 GHz*

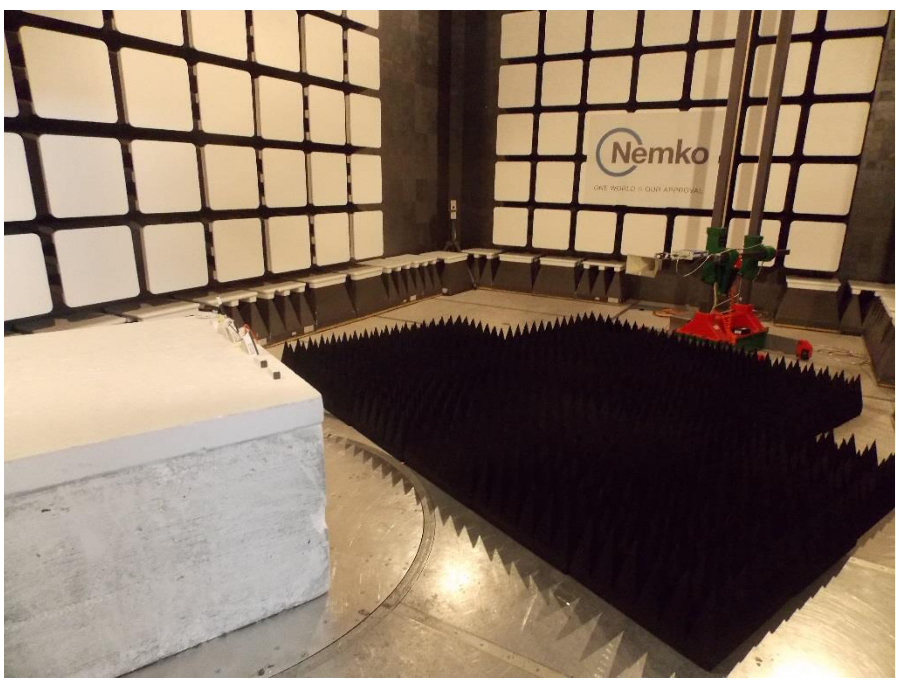


Figure 8.2-8: *Radiated emissions setup photo – above 1 GHz*

Section 9 EUT photos

9.1 External photos

Figure 9.1-1: *Front view photo, Gateway*

Figure 9.1-2: *Rear view photo, Gateway*

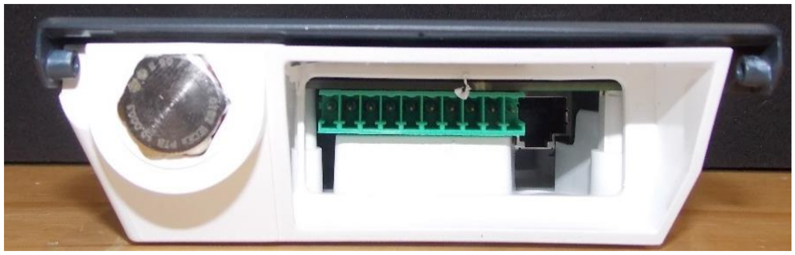


Figure 9.1-3: *Side view photo, Gateway*

Figure 9.1-4: *Side view photo, Gateway*

Figure 9.1-5: *Side view photo, Gateway*

Figure 9.1-6: *Side view photo, Gateway*

Figure 9.1-7: *Front view photo, Temperature and Humidity Data Logger, External Probe*

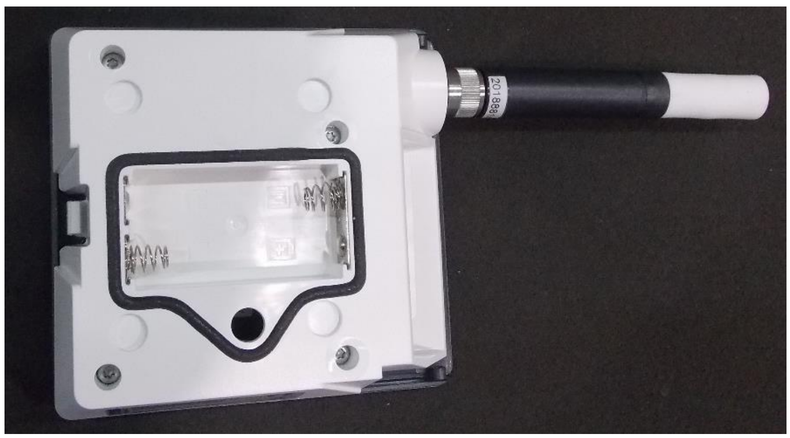


Figure 9.1-8: *Rear view photo, Temperature and Humidity Data Logger, External Probe*

Figure 9.1-9: *Side view photo, Temperature and Humidity Data Logger, External Probe*

Figure 9.1-10: *Side view photo, Temperature and Humidity Data Logger, External Probe*

Figure 9.1-11: *Side view photo, Temperature and Humidity Data Logger, External Probe*

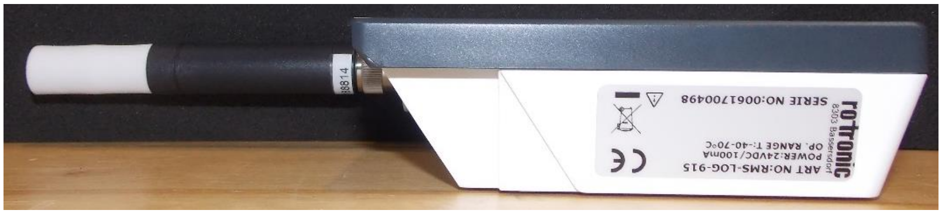


Figure 9.1-12: *Side view photo, Temperature and Humidity Data Logger, External Probe*

Figure 9.1-13: *Front view photo, Analog Input Module*

Figure 9.1-14: *Rear view photo, Analog Input Module*

Figure 9.1-15: *Side view photo, Analog Input Module*

Figure 9.1-16: *Side view photo, Analog Input Module*

Figure 9.1-17: *Side view photo, Analog Input Module*

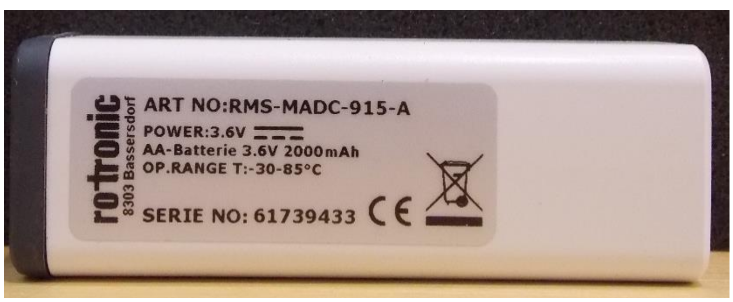


Figure 9.1-18: *Side view photo, Analog Input Module*

Figure 9.1-19: *Front view photo, Internal Temperature and Humidity Logger*

Figure 9.1-20: *Rear view photo, Internal Temperature and Humidity Logger*

Figure 9.1-21: *Side view photo, Internal Temperature and Humidity Logger*

Figure 9.1-22: *Side view photo, Internal Temperature and Humidity Logger*

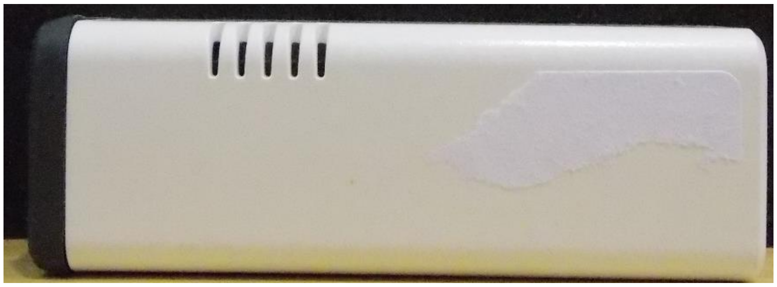


Figure 9.1-23: *Side view photo, Internal Temperature and Humidity Logger*

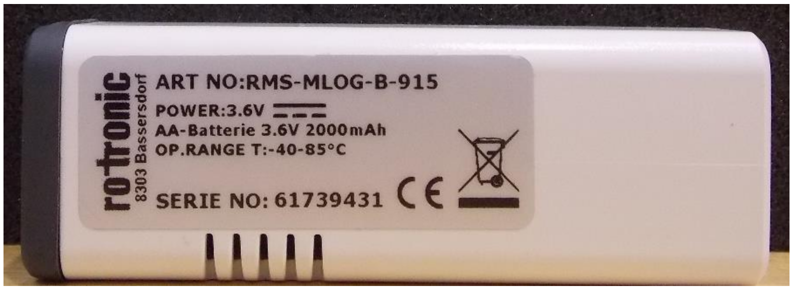


Figure 9.1-24: *Side view photo, Internal Temperature and Humidity Logger*

Figure 9.1-25: *Front view photo, Internal Temperature Logger*

Figure 9.1-26: *Rear view photo, Internal Temperature Logger*

Figure 9.1-27: *Side view photo, Internal Temperature Logger*

Figure 9.1-28: *Side view photo, Internal Temperature Logger*

Figure 9.1-29: *Side view photo, Internal Temperature Logger*

Figure 9.1-30: *Side view photo, Internal Temperature Logger*

Figure 9.1-31: *Front view photo, External Temperature Logger*

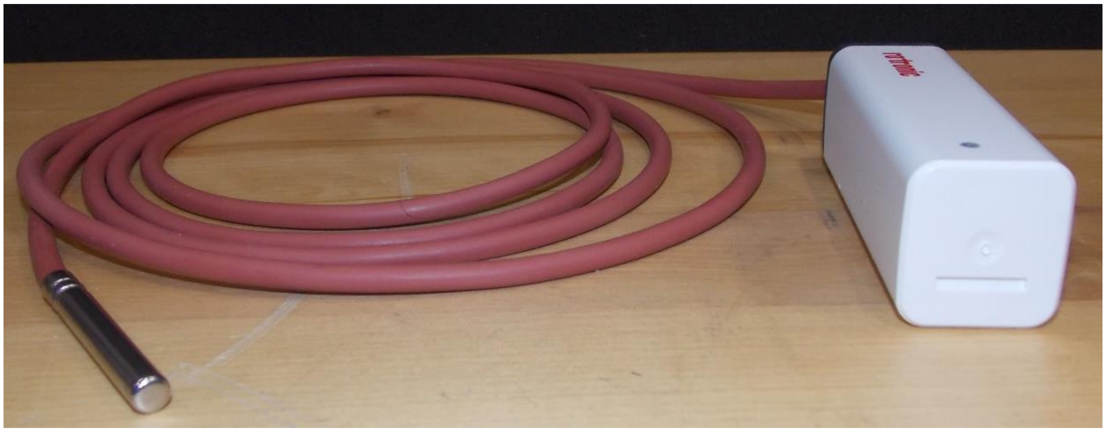


Figure 9.1-32: *Rear view photo, External Temperature Logger*

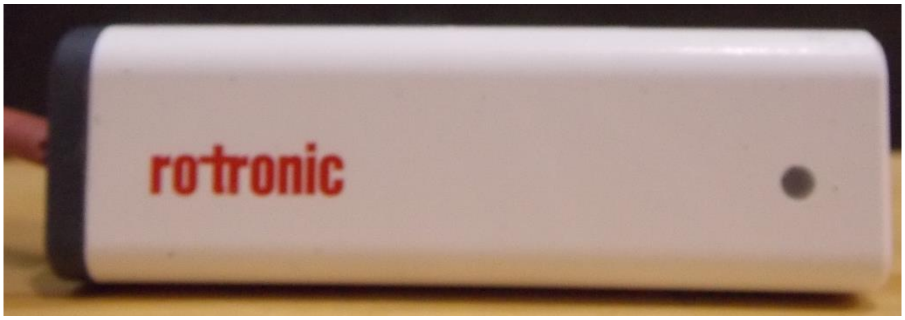


Figure 9.1-33: *Side view photo, External Temperature Logger*

Figure 9.1-34: *Side view photo, External Temperature Logger*

Figure 9.1-35: *Side view photo, External Temperature Logger*

Figure 9.1-36: *Side view photo, External Temperature Logger*