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EMC TEST REPORT – 388352-1R2TRFEMC

Applicant:

Lotek Wireless Inc.

Product name:

Telemetry Receiver

Model:

SRX1200, SRX1200-D

FCC ID:

FW9SRX1200

IC Registration number:

4272A-SRX1200

Specification:

- FCC 47 CFR Part 15, Subpart B
- RSS-215 Issue 2, June 2009

Date of issue: March 25, 2020

Alvin Liu, Wireless/EMC Specialist	
Test engineer(s)	Signature
Andrey Adelberg, Senior Wireless/EMC Specialist	
Reviewed by	Signature

Lab and test locations

Company name	Nemko Canada Inc.
Facilities	Cambridge site: 1-130 Saltsman Drive Cambridge, Ontario Canada N3E 0B2 Tel: +1 519 650 4811
Test Firm Registration Number	FCC: 332406, ISED:24676
Test site registration	**Organization** **Recognition numbers** FCC/ISED CA0101
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

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Section 1. Report summary

1.1 Applicant and manufacturer

Company name:	Lotek Wireless Inc.
Address:	115 Pony Drive
City:	Newmarket
Province/State:	Ontario
Postal/Zip code:	L3Y 7B5
Country:	Canada

1.2 Test specifications

FCC 47 CFR Part 15, Subpart B	Title 47: Telecommunication; Part 15—Radio Frequency Devices
RSS-215, Issue 2, June 2009	Analogue Scanner Receivers

1.3 Test methods

ANSI C63.4 v2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
RSS-Gen, Issue 5 Amendment 1, March 2019	General Requirements for Compliance of Radio Apparatus

1.4 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.

1.5 Exclusions

None

1.6 Test report revision history

Table 1.6-1: Test report revision history

Revision #	Date of issue	Details of changes made to test report
TRF	January 10, 2020	Original report issued
R1TRF	March 16, 2020	Update Receiver Spurious Emissions spectral plots for low, mid, high three frequency testing with the scan mode stopped and with the scanning mode turned on as per RSS-215 and add test specification FCC 47 CFR Part 15, Subpart B.
R2TRF	March 25, 2020	Update description about EUT exercise details

Section 2. Summary of test results

2.1 FCC Part 15 Subpart B, test results

Part	Test description	Verdict
§15.107(a)	Conducted emission limits	Pass
§15.109(a)	Radiated emission limits	Pass
§15.111	Antenna power conduction limits for receivers	Pass

Notes: SRX1200 is an AC powered device, SRX1200-D is a DC powered device. The test is only available for SRX1200.

2.2 RSS-215, Issue 2, test results

Part	Test description	Verdict
5.1	Receiver Spurious Emissions	Pass

2.3 RSS-Gen, Issue 5, test results

Part	Test description	Verdict
7.2	AC power-line conducted emissions limits	Pass
7.3	Receiver radiated emissions limits	Pass
7.4	Receiver conducted emissions limits	Pass

Notes: SRX1200 is an AC powered device, SRX1200-D is a DC powered device. The test is only available for SRX1200.

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	December 9, 2019
Nemko sample ID number	1, 3

3.2 EUT information

Product name	Telemetry Receiver
Model	SRX1200, SRX1200-D
Serial number	None

3.3 Technical information

Frequency Band	138–176 MHz
Frequencies tested	Low: 138.3 MHz, middle: 149.800 MHz, high: 170 MHz
Power requirements	SRX1200: 9 V_{DC} (or via external 100–240 V_{AC}, 50/60 Hz power adapter), SRX1200-D: 12 V_{DC}
Description/theory of operation	The telemetry receiver is a VHF receiver receiving VHF signals, with a burst interval in the range of seconds. The system consists of: CPU board, RF receiver board (including audio amplifier and speaker), power management and interconnect board, keypad, LCD display, and GPS receiver). The CPU controls the system and is collecting information from the RF board, which is then displayed on the LCD. The receiving of the signal is also signaled via the incorporated speaker. The user can operate the receiver via a keypad.
Operational frequencies	The highest frequencies on the new CPU board: – 24 MHz (on the DART module) – 12 MHz (active oscillator on the MSP430 coprocessor) On the VHF receiver board, the main oscillator is 26 MHz
Software details	Master firmware: V1.0.952.21/ Slave firmware V1.0738.1/ Windows host software 1.07254.20220

3.4 EUT exercise details

The EUT was receiving RF ID tags. Three tags were used for test, which separately transmitted different frequency signals at low/middle/high frequency. The test was performed while EUT was set on low/middle/high frequency of operation in scanning mode or scanning stopped mode, as below:

1. Scanning at low frequency: 138.3 MHz;
2. Scanning at middle frequency: 149.8 MHz;
3. Scanning at high frequency: 170 MHz;
4. Scanning stopped at low frequency:138.3 MHz;
5. Scanning stopped at middle frequency: 149.8 MHz;
6. Scanning stopped at high frequency: 170 MHz.

3.5 EUT setup

Table 3.5-1: EUT sub assemblies

Description	Brand name	Model/Part number	Rev.
CPU Board	Lotek	200-3065	1.5
RF board	Lotek	200-2490	2.0
Power management and interconnect board (SRX1200)	Lotek	200-2508	5
Power management and interconnect board (SRX1200D)	Lotek	200-2607	6
Keypad Assembly	Lotek	011-1351	N/A
LCD Display	Lotek	011-1245	N/A
GPS antenna assembly	Lotek	200-1249	N/A

Table 3.5-2: EUT interface ports

Description	Qty.
DC power input	1
USB	2
Headphone	1
VHF antenna input (BNC)	1 (SRX1200), 4 (SRX1200-D)
GPS antenna connector (SMA female)	1
WiFi antenna connector (SMA female)	1

Table 3.5-3: Support equipment

Description	Brand name	Model, Part number, Serial number, Revision level
Switching Adaptor	None	PN: S6-092A5P, MN: FJ-SW0902500N
Tag	Lotek	138.3 MHz, 149.800 MHz, 170 MHz
GPS Antenna	Trimble	SN:156130439, PN: 66800-50
GPS Antenna	Trimble	SN:22180661, PN: 66800-50
WiFi antenna	Laird	PN: 001-009
VHF antenna	Lotek	Larsen KDA-150-HQ, PN: SLA/FT-2
Headphone	Maxell	MN: EB-125

Table 3.5-4: Inter-connection cables

Cable description	From	To	Length (m)
DC power cable	SRX1200	Switching Adaptor	1.4
DC power cable	SRX1200-D	DC power supply	1.4
USB cable	EUT USB port	—	1.8

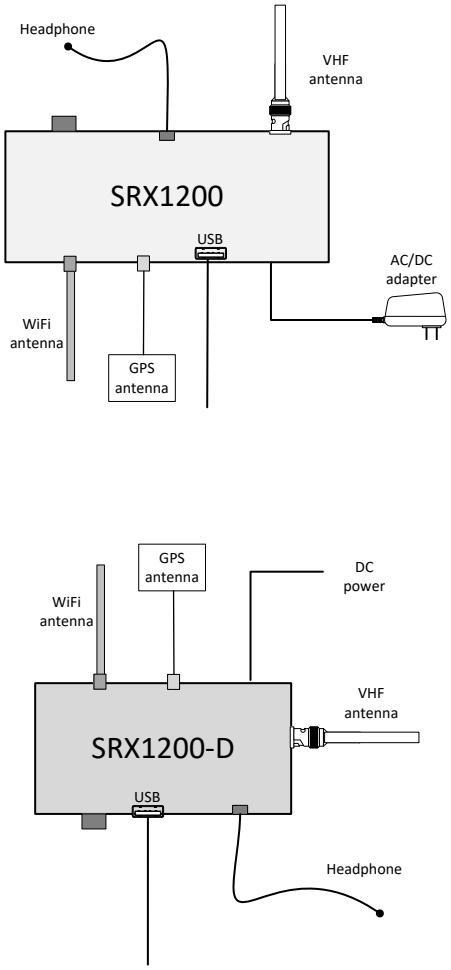


Figure 3.5-1: Setup diagram

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

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

4.2 Technical judgment

This product has two models, SRX1200 and SRX1200-D:

- Same RF board and CPU board
- Battery powered, from non-vehicular source
- SRX1200: LCD & keypad, 9 V_{DC}, can be powered by an AC/DC adaptor.
- SRX1200-D: rugged box, no LCD nor keypad, 12V_{DC}

All tests have been conducted for both models.

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	860–1060 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.

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 16-4-2 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 6.1-1: 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	(9 kHz to 150 kHz)	3.8	2.9	2.8	2.8	N/A
	(150 kHz to 30 MHz)	3.4	2.3	2.2	2.2	N/A
Conducted disturbance at telecommunication port using AAN	(150 kHz to 30 MHz)	5.0	4.3	4.3	4.3	N/A
Conducted disturbance at telecommunication port using CVP	(150 kHz to 30 MHz)	3.9	2.9	2.8	2.8	N/A
Conducted disturbance at telecommunication port using CP	(150 kHz to 30 MHz)	2.9	1.4	1.1	1.1	N/A
Conducted disturbance at telecommunication port using CP and CVP	(150 kHz to 30 MHz)	4.0	3.1	3.0	3.0	N/A
Disturbance power	(30 MHz to 300 MHz)	4.0	3.7	3.7	3.7	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
Radiated disturbance (electric field strength in a FAR)	(1 GHz to 6 GHz)	5.2	4.8	5.1	4.8	N/A
Radiated disturbance (electric field strength in a FAR)	(6 GHz to 18 GHz)	5.5	5.1	5.0	4.7	N/A

Notes: Compliance assessment:

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

- compliance is deemed to occur is 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 is 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 7. Test equipment

7.1 Test equipment list

Table 7.1-1: Equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA003012	1 year	Oct. 10/20
Flush mount turntable	SUNAR	FM2022	FA003006	—	NCR
Controller	SUNAR	SC110V	FA002976	—	NCR
Antenna mast	SUNAR	TLT2	FA003007	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESR26	FA002969	1 year	June 04/20
Bilog antenna (30–2000 MHz)	SUNAR	JB1	FA003010	1 year	Sept. 17/20
Horn antenna (1–18 GHz)	ETS-Lindgren	3117	FA002911	1 year	Sept. 11/20
Preamp (1–18 GHz)	ETS-Lindgren	124334	FA002956	1 year	Sept. 26/20
50 Ω coax cable	Huber + Suhner	None	FA003047	1 year	Sept 30/20
50 Ω coax cable	Huber + Suhner	None	FA003044	1 year	Oct. 7/20
Two-Line V-Network	Rohde & Schwarz	ENV216	FA002965	1 year	June 20/20
50 Ω coax cable	Rohde & Schwarz	None	FA003074	1 year	Oct. 2/20

Notes: NCR - no calibration required

Table 7.1-2: Test software details

Test description	Manufacturer of Software	Details
Radiated spurious	Rohde & Schwarz	EMC32, Software for EMC Measurements, Version 10.40.10

Section 8. Testing data

8.1 Radiated emissions

8.1.1 Definition and limits

FCC § 15.109 Radiated emissions limit

The field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Table 8.1-1: FCC § 15.109 – Radiated emission limits

Frequency, MHz	Field strength of emissions		Measurement distance,
	µV/m	dBµV/m	m
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

In the emission table above, the tighter limit applies at the band edges. Sections 15.33 and 15.35, which specify the frequency range over which radiated emissions, are to be measured and the detector functions and other measurement standards apply.

For CB receivers, the field strength of radiated emissions within the frequency range of 25–30 MHz shall not exceed 40 µV/m at a distance of 3 meters. The field strength of radiated emissions above 30 MHz from such devices shall comply with the limits in paragraph (a) of this section.

For a receiver which employs terminals for the connection of an external receiving antenna, the receiver shall be tested to demonstrate compliance with the provisions of this section with an antenna connected to the antenna terminals unless the antenna conducted power is measured as specified in §15.111(a). If a permanently attached receiving antenna is used, the receiver shall be tested to demonstrate compliance with the provisions of this section.

FCC § 15.111 Antenna power conduction limits for receivers

In addition to the radiated emission limits, receivers that operate (tune) in the frequency range 30 to 960 MHz and CB receivers that provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the provisions of §15.109 with the antenna terminals shielded and terminated with a resistive termination equal to the impedance specified for the antenna, provided these receivers also comply with the following: With the receiver antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in §15.33 shall not exceed 2.0 nW (-57 dBm).

8.1.1 Definition and limits, continued

RSS-215 § 5.1 Receiver Spurious Emissions

The scanner receiver spurious emissions are to be measured when the receiver is in the scanning mode and repeated when the scanning is stopped. Receiver spurious emissions shall comply with the limits specified in RSS-Gen.

RSS-Gen § 7.3 Receiver radiated emissions limits

Radiated emission measurements shall be performed with the receiver antenna connected to the receiver antenna ports. The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is higher, to at least five times the highest tunable or local oscillator frequency, whichever is higher, without exceeding 40 GHz. Spurious emissions from receivers shall not exceed the radiated emissions limits shown in following table:

Table 8.1-2: RSS-Gen – Radiated emission limits

Frequency, MHz	Field strength of emissions		Measurement distance,
	µV/m	dBµV/m	m
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes: In the emission table above, the tighter limit applies at the band edges.

RSS-Gen § 7.4 Receiver conducted emissions limits

If the receiver has a detachable antenna of known impedance, an antenna-conducted spurious emissions measurement is permitted as an alternative to radiated measurement. However, the radiated method of section 7.3 is preferred.4
The antenna-conducted test shall be performed with the antenna disconnected and with the receiver antenna port connected to a measuring instrument having equal input impedance to that specified for the antenna. The RF cable connecting the receiver under test to the measuring instrument shall also have the same impedance to that specified for the receiver's antenna.
The spurious emissions from the receiver at any discrete frequency, measured at the antenna port by the antenna-conducted method, shall not exceed 2 nW in the frequency range 30-1000 MHz and 5 nW above 1 GHz.

8.1.2 Test summary

Verdict	Pass	Test location	Cambridge
Tested by	Alvin Liu	Test start date	December 11, 2019

8.1.3 Notes

- The spectral plots within this section are a summation of a vertical and horizontal scans. The spectral scans have been corrected with the associated applicable 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 has 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 to 2 GHz according to the EUT highest operating frequency.

Table 8.1-3: Maximum frequency test range based on highest digital operating frequency

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 (ANSI C63.4)

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.

8.1.4 Setup details

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

Receiver/spectrum analyzer settings:

Resolution bandwidth	Measurements below 1 GHz: 120 kHz, Measurements above 1 GHz: 1 MHz
Video bandwidth	Measurements below 1 GHz: 300 kHz, Measurements above 1 GHz: 3 MHz
Detector mode	Measurements below 1 GHz: Peak (Preview), Quasi-peak (Final) Measurements above 1GHz: Peak (Preview), Peak and CAverage (Final)
Trace mode	Max Hold
Measurement time	100 ms

8.1.5 Test data

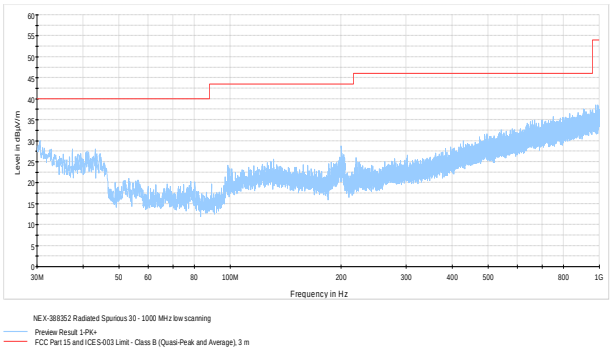


Figure 8.1-1: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning at low frequency, SRX1200

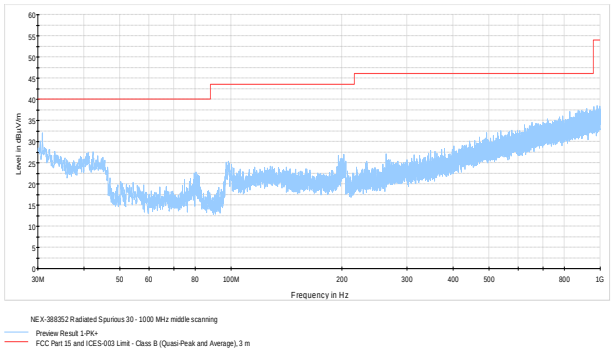


Figure 8.1-2: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning at middle frequency, SRX1200

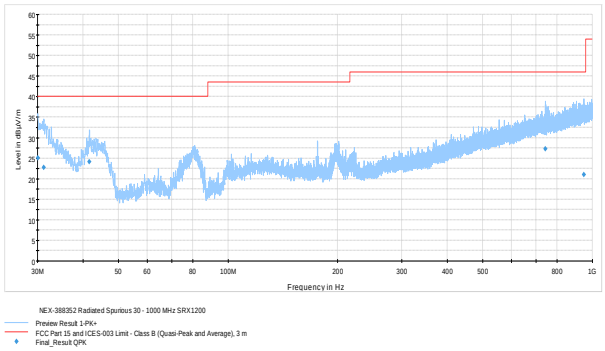


Figure 8.1-3: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning at high frequency, SRX1200

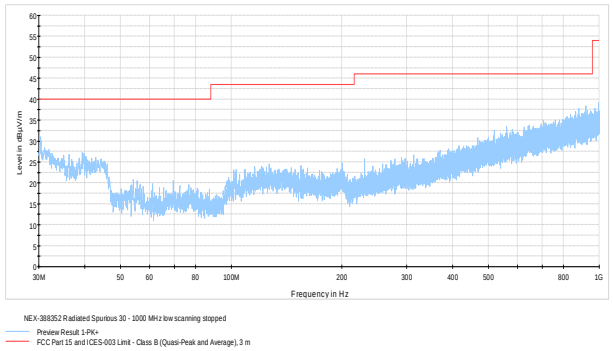


Figure 8.1-4: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning stopped at low frequency, SRX1200

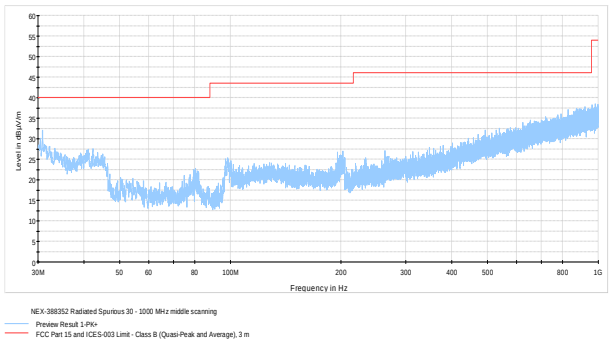


Figure 8.1-5: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning stopped at middle frequency, SRX1200

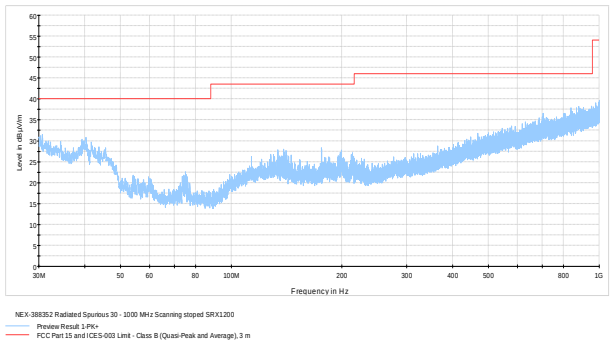


Figure 8.1-6: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning stopped at high frequency, SRX1200

8.1.5 Test data, continued

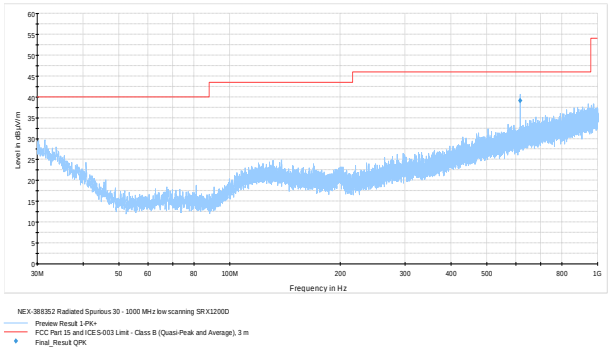


Figure 8.1-7: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning at low frequency, SRX1200-D

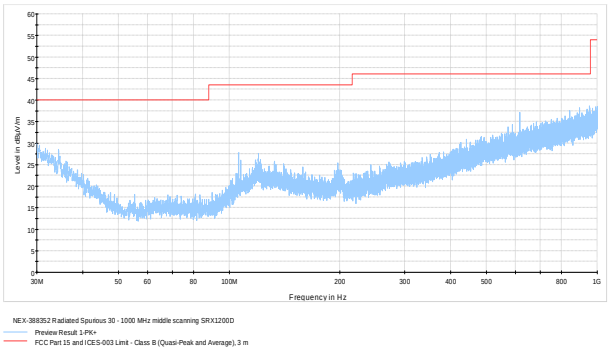


Figure 8.1-8: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning at middle frequency, SRX1200-D

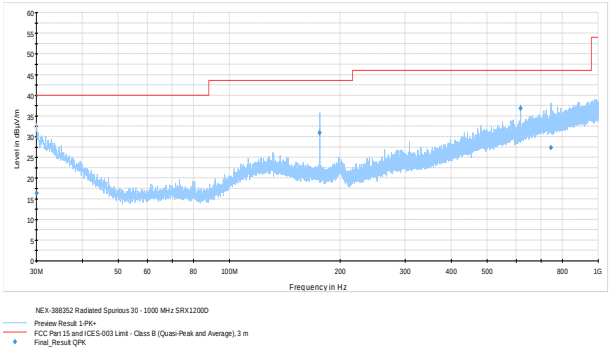


Figure 8.1-9: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning at high frequency, SRX1200-D

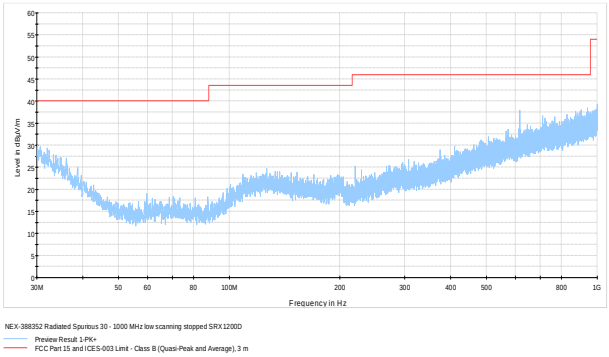


Figure 8.1-10: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning stopped at low frequency, SRX1200-D

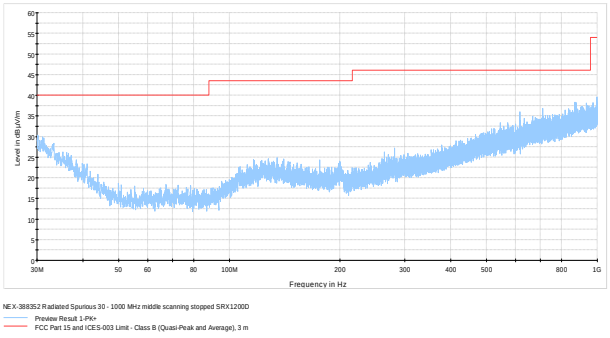


Figure 8.1-11: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning stopped at middle frequency, SRX1200-D

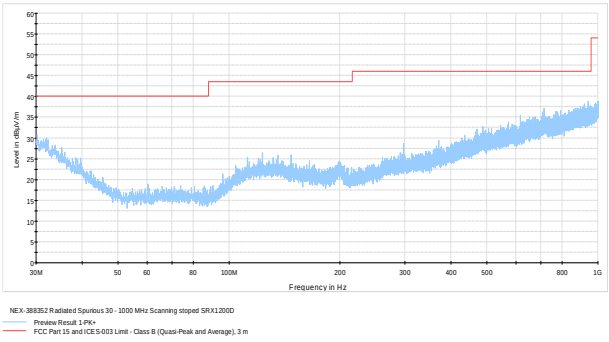


Figure 8.1-12: Radiated disturbance spectral plot (30 to 1000 MHz), Scanning stopped at high frequency, SRX1200-D

8.1.5 Test data, continued

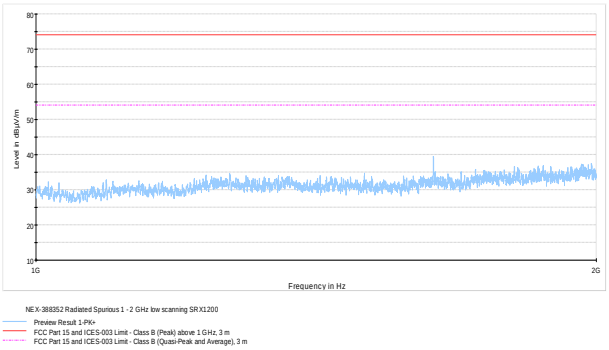


Figure 8.1-13: Radiated disturbance spectral plot (1 to 2 GHz), Scanning at low frequency, SRX1200

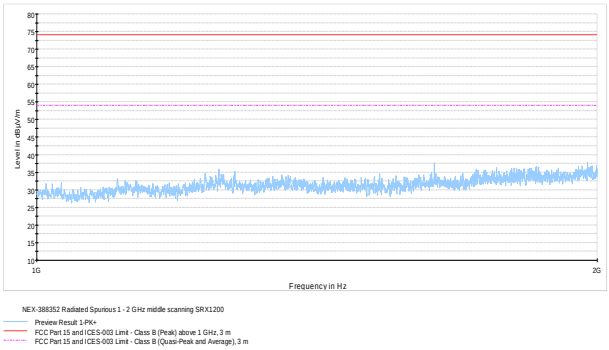


Figure 8.1-14: Radiated disturbance spectral plot (1 to 2 GHz), Scanning at middle frequency, SRX1200

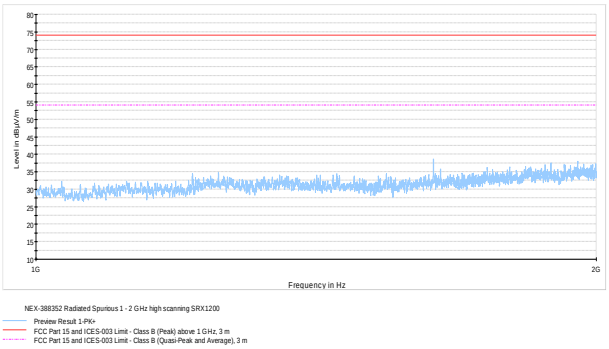


Figure 8.1-15: Radiated disturbance spectral plot (1 to 2 GHz), Scanning at high frequency, SRX1200

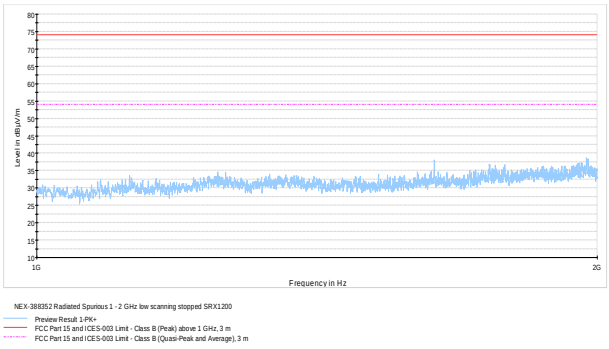


Figure 8.1-16: Radiated disturbance spectral plot (1 to 2 GHz), Scanning stopped at low frequency, SRX1200

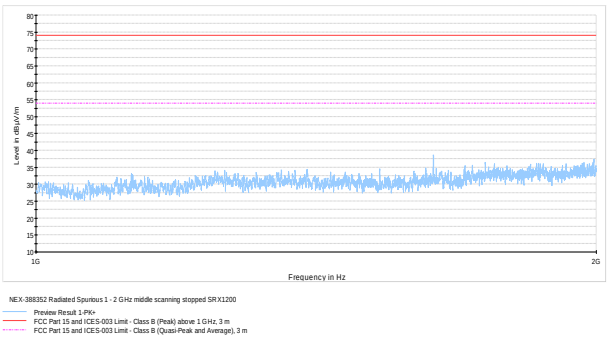


Figure 8.1-17: Radiated disturbance spectral plot (1 to 2 GHz), Scanning stopped at middle frequency, SRX1200

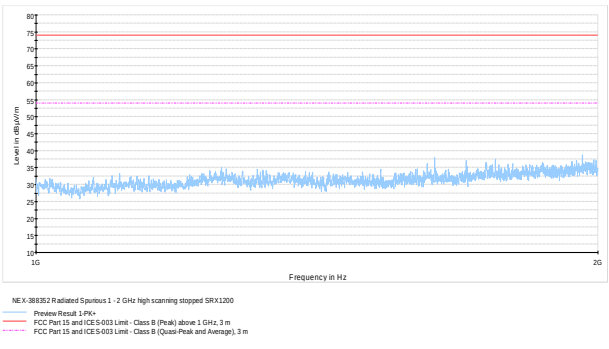


Figure 8.1-18: Radiated disturbance spectral plot (1 to 2 GHz), Scanning stopped at high frequency, SRX1200

8.1.5 Test data, continued

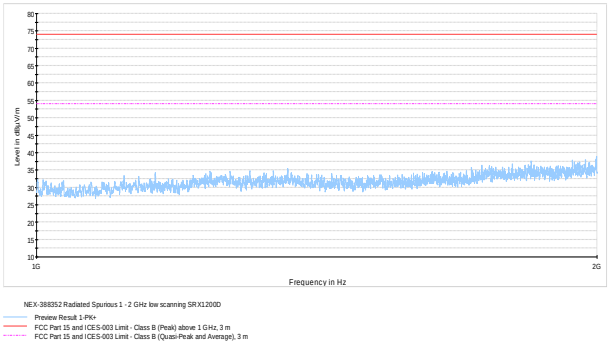


Figure 8.1-19: Radiated disturbance spectral plot (1 to 2 GHz), Scanning at low frequency, SRX1200-D

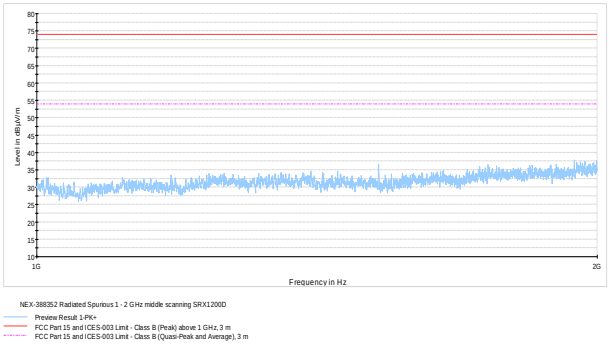


Figure 8.1-20: Radiated disturbance spectral plot (1 to 2 GHz), Scanning at middle frequency, SRX1200-D

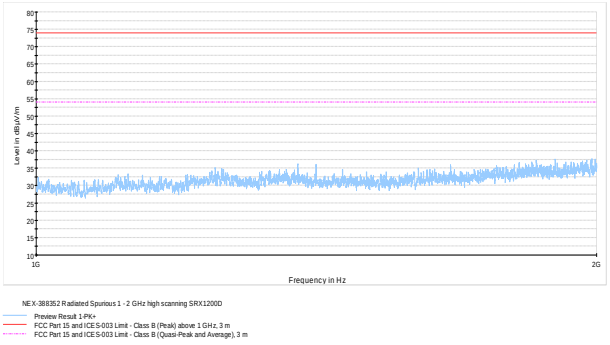


Figure 8.1-21: Radiated disturbance spectral plot (1 to 2 GHz), Scanning at high frequency, SRX1200-D

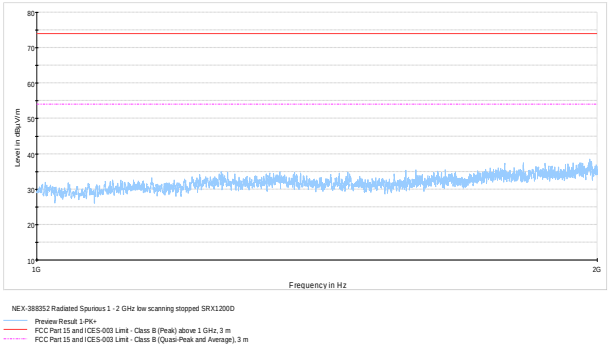


Figure 8.1-22: Radiated disturbance spectral plot (1 to 2 GHz), Scanning stopped at low frequency, SRX1200-D

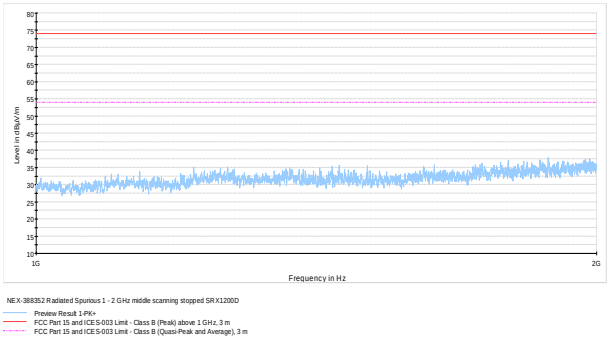


Figure 8.1-23: Radiated disturbance spectral plot (1 to 2 GHz), Scanning stopped at middle frequency, SRX1200-D

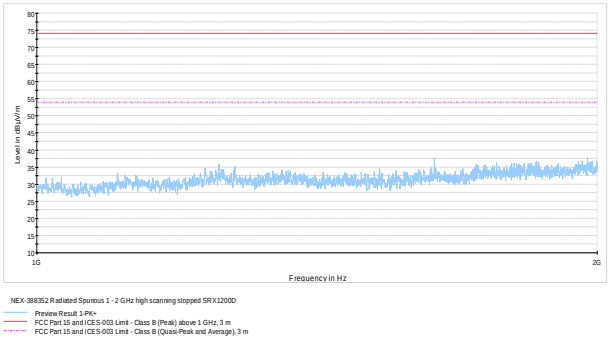


Figure 8.1-24: Radiated disturbance spectral plot (1 to 2 GHz), Scanning stopped at high frequency, SRX1200-D

8.1.5 Test data, continued

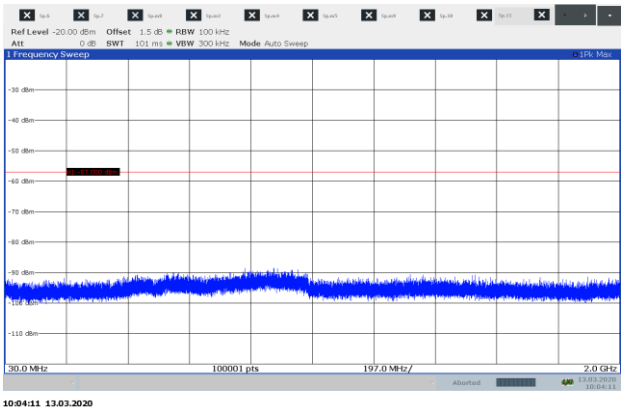


Figure 8.1-25: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning at low frequency, SRX1200

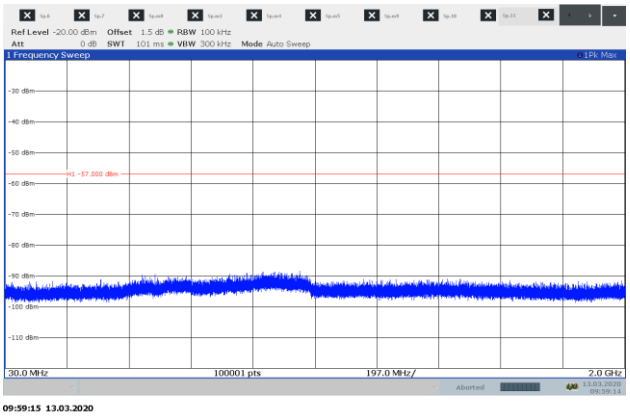


Figure 8.1-26: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning at middle frequency, SRX1200

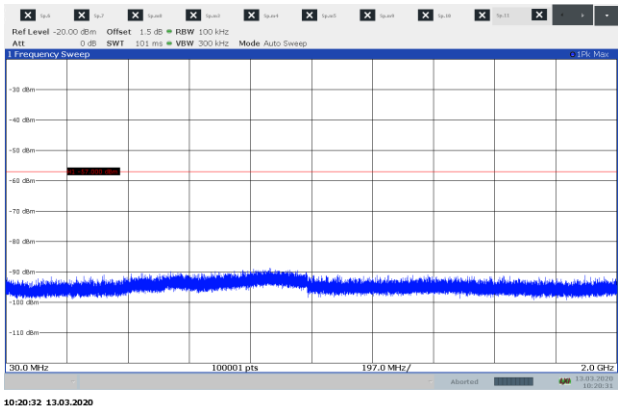


Figure 8.1-27: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning at high frequency, SRX1200

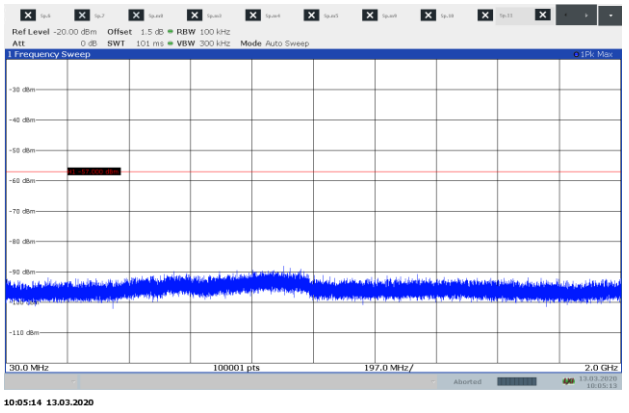


Figure 8.1-28: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning stopped at low frequency, SRX1200

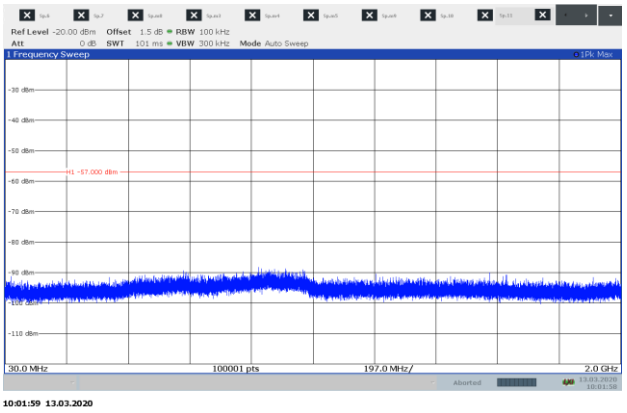


Figure 8.1-29: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning stopped at middle frequency, SRX1200

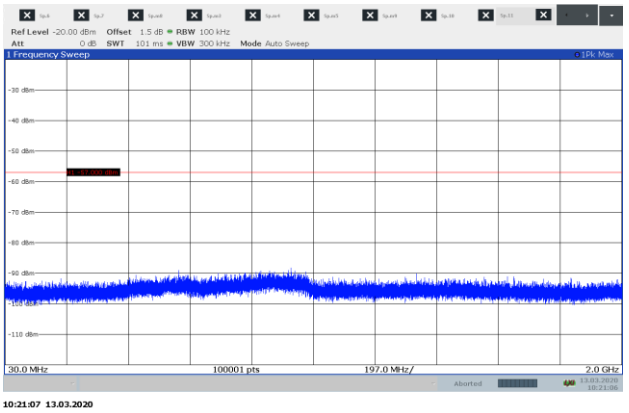


Figure 8.1-30: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning stopped at high frequency, SRX1200

8.1.5 Test data, continued

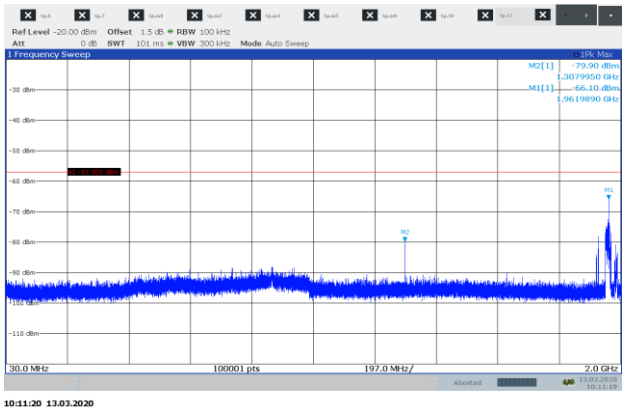


Figure 8.1-31: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning at low frequency, SRX1200-D

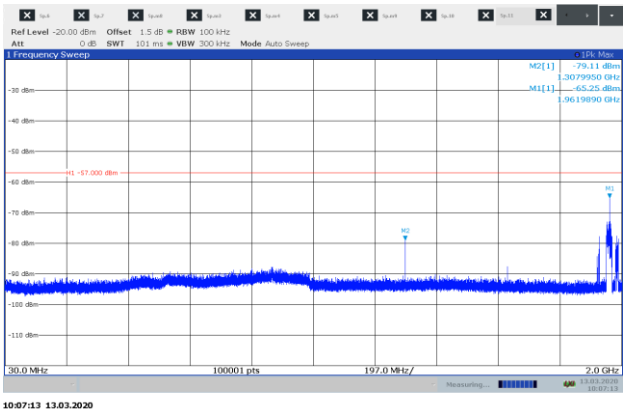


Figure 8.1-32: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning at middle frequency, SRX1200-D

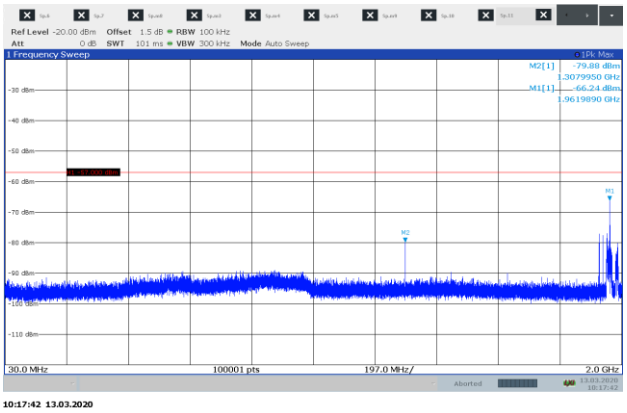


Figure 8.1-33: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning at high frequency, SRX1200-D

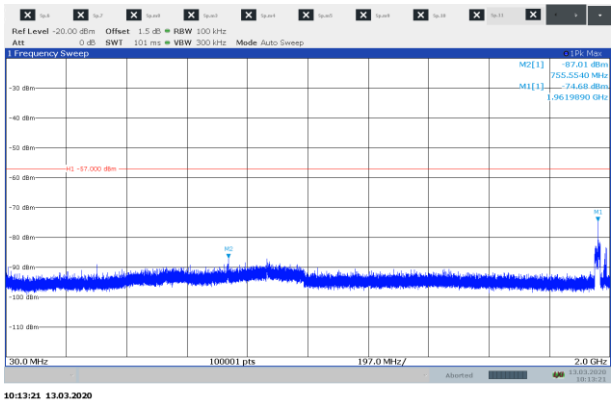


Figure 8.1-34: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning stopped at low frequency, SRX1200-D

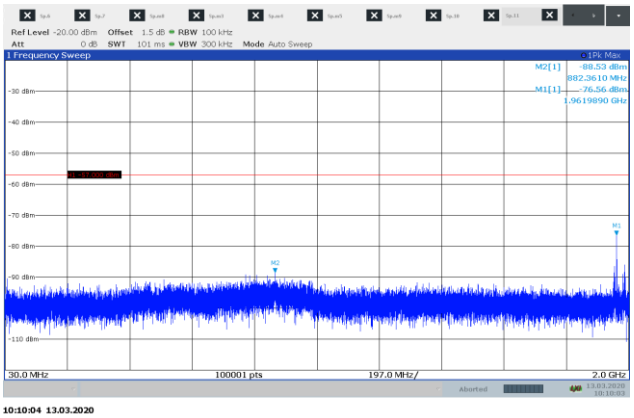


Figure 8.1-35: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning stopped at middle frequency, SRX1200-D

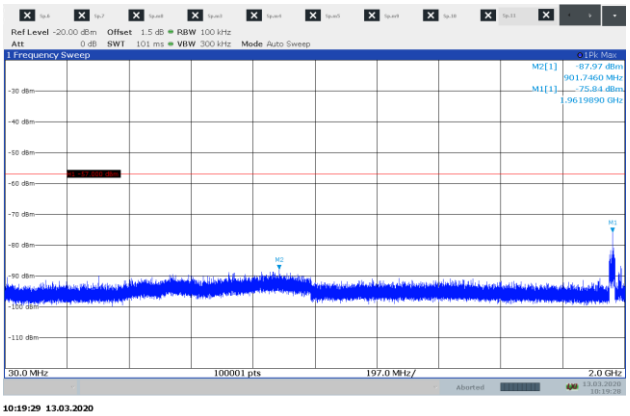


Figure 8.1-36: Receiver antenna power conducted emission spectral plot (30 to 2000 MHz), Scanning stopped at high frequency, SRX1200-D

8.1.6 Setup photos

Figure 8.1-37: Radiated disturbance setup photo (SRX1200)

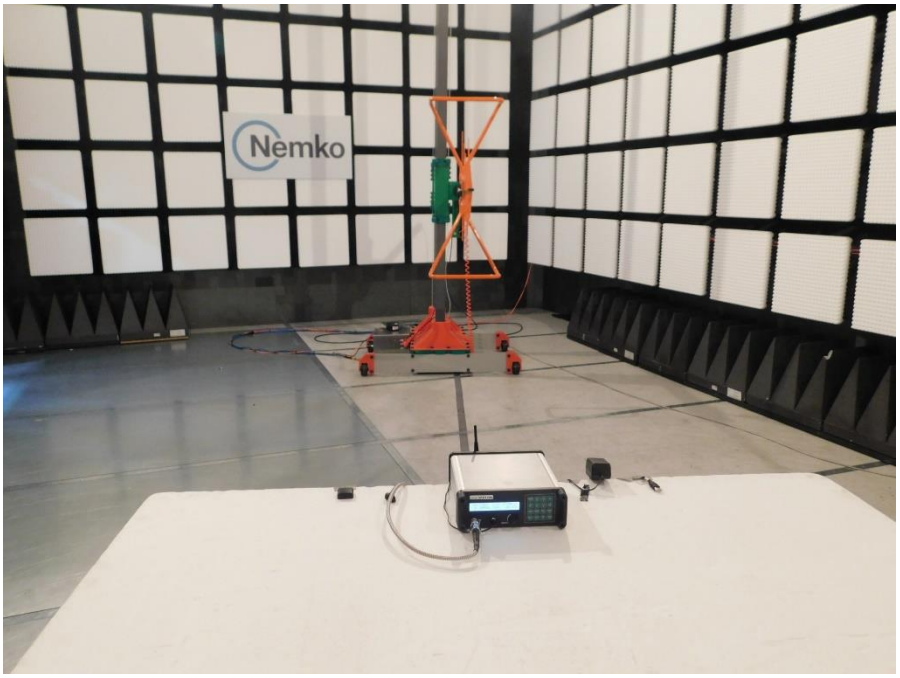


Figure 8.1-38: Radiated disturbance setup photo (SRX1200)

8.1.6 Setup photos, continued

Figure 8.1-39: Radiated disturbance setup photo (SRX1200-D)

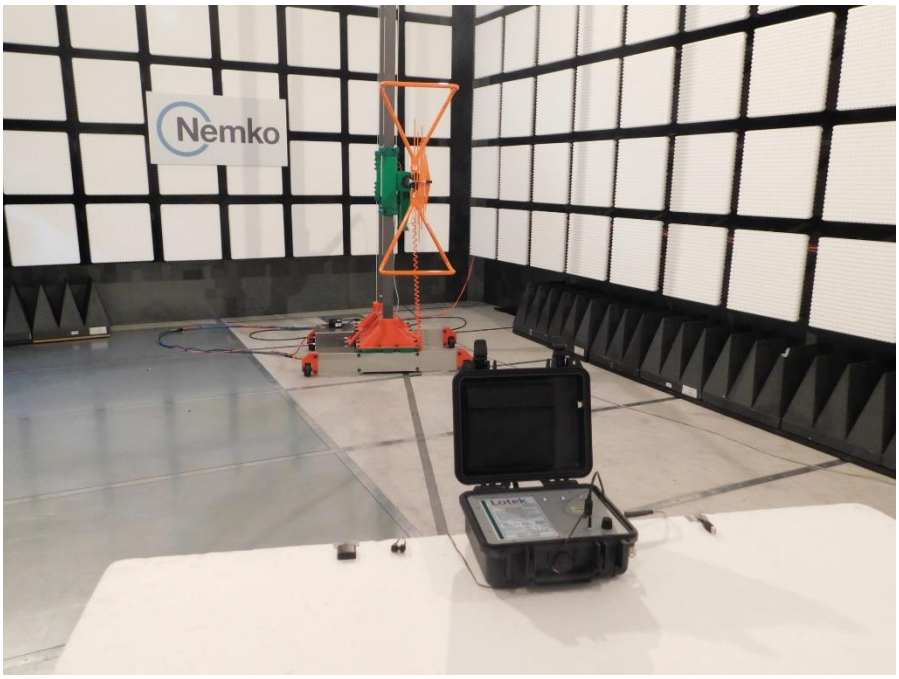


Figure 8.1-40: Radiated disturbance setup photo (SRX1200-D)

8.2 AC power line conducted emissions

8.2.1 Definitions and limits

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz, shall not exceed the limits in table below.

Unless the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in table below. The more stringent limit applies at the frequency range boundaries.

Table 8.2-1: Conducted emissions limit

Frequency of emission, MHz	Conducted limit, dBµV	
	Quasi-peak	Average**
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

Note: * The level decreases linearly with the logarithm of the frequency.
** A linear average detector is required.

8.2.2 Test summary

Verdict	Pass	Test location	Cambridge
Tested by	Alvin Liu	Test date	December 11, 2019

8.2.3 Notes

- The spectral plots within this section have been corrected with applicable 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 has been provided, fewer than 6 emissions were observed within 10 dB of the specified limit when measured with the appropriate detector.

8.2.4 Setup details

Port under test – Coupling device	AC Mains – Artificial Mains Network (AMN)
EUT power input during test	SRX1200: 120 V_{AC}, 60 Hz (via power 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), Quasi-peak and CAverage (Final)
Trace mode	Max Hold
Measurement time	100 ms (Preview), 160 ms (Final)

8.2.5 Test data

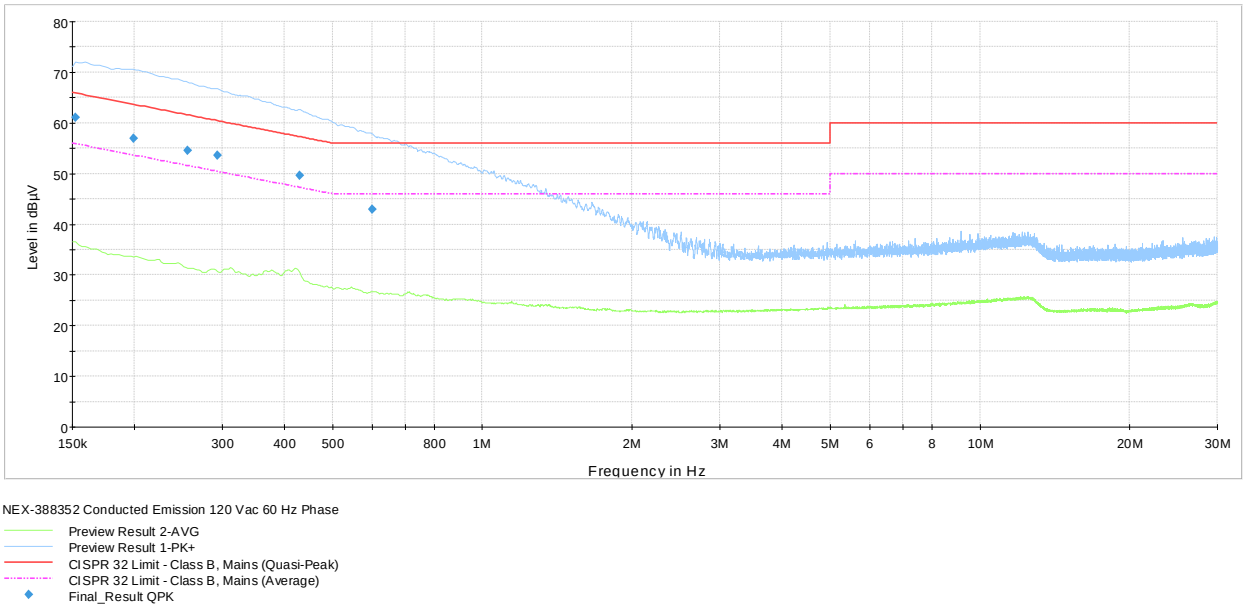


Figure 8.2-1: Conducted emissions – from AC mains power ports spectral plot on phase line (SRX1200)

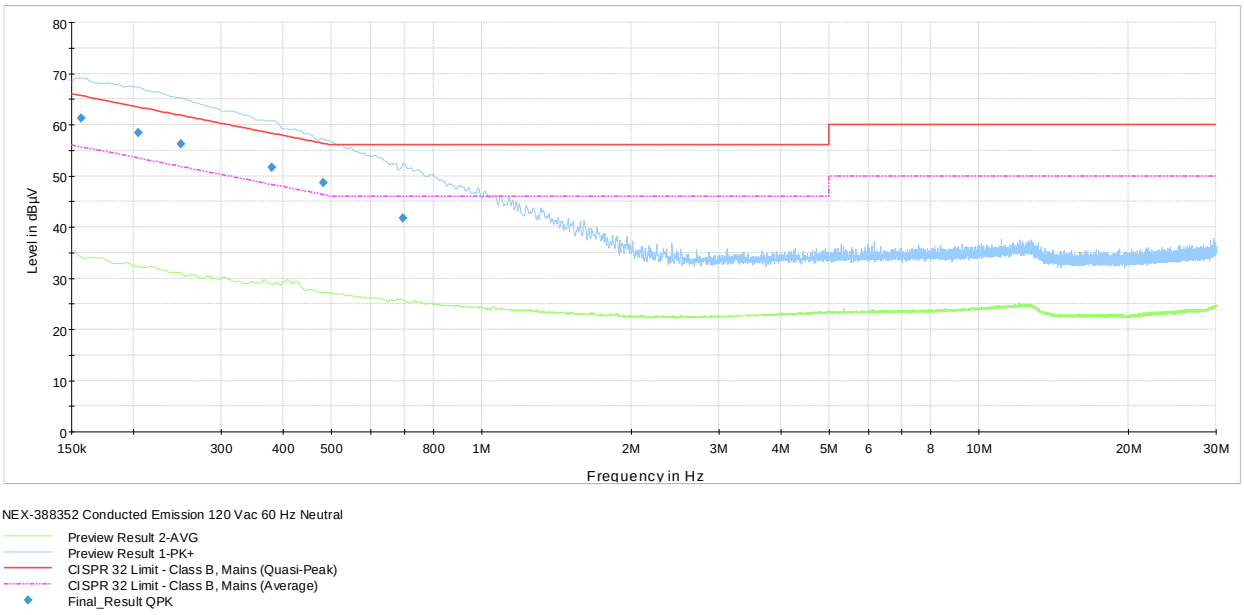


Figure 8.2-2: Conducted emissions – from AC mains power ports spectral plot on neutral line (SRX1200)

8.2.5 Test data, continued

Table 8.2-2: Conducted emissions – from AC mains power ports results

Frequency (MHz)	Quasi-Peak result[1 and 3] (dBµV)	Quasi-Peak limit (dBµV)	Quasi-Peak margin (dB)	Conductor	Correction factor[2] (dB)
0.152	61.2	65.9	4.7	L1	15.4
0.200	56.9	63.6	6.7	L1	15.4
0.256	54.6	61.6	7.0	L1	15.5
0.294	53.6	60.4	6.8	L1	15.5
0.429	49.7	57.3	7.6	L1	15.5
0.600	42.9	56.0	13.1	L1	15.5
0.157	61.2	65.6	4.4	N	15.4
0.204	58.4	63.4	5.0	N	15.4
0.249	56.2	61.8	5.6	N	15.5
0.380	51.7	58.3	6.6	N	15.5
0.481	48.7	56.3	7.6	N	15.5
0.697	41.8	56.0	14.2	N	15.5

Notes:
[1] Result (dBµV) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factor (dB) = LISN factor IL (dB) + cable loss (dB) + attenuator (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 has been recorded.

Sample calculation: 41.8 dBµV (result) = 26.3 dBµV (receiver reading) +15.5 dB (Correction factor)

8.2.6 Setup photos

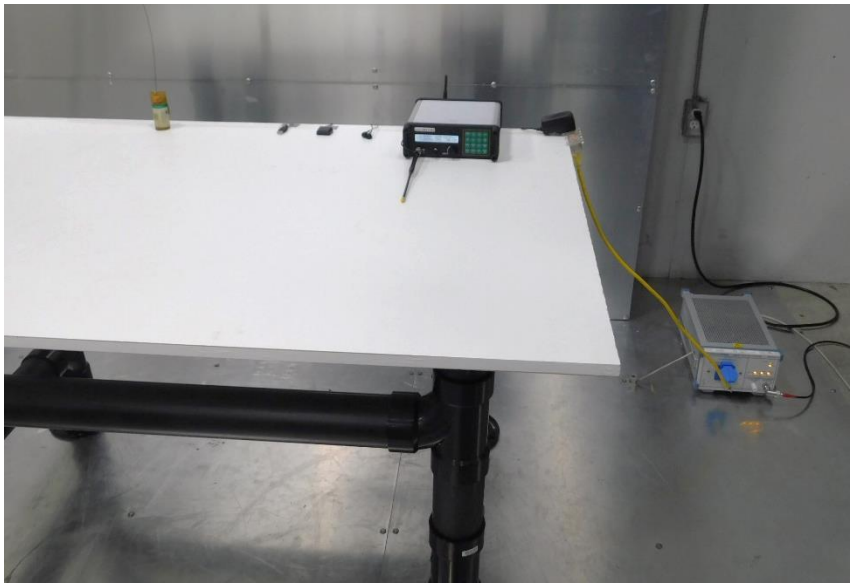


Figure 8.2-3: Conducted emissions – from AC mains power ports setup photo (SRX1200)

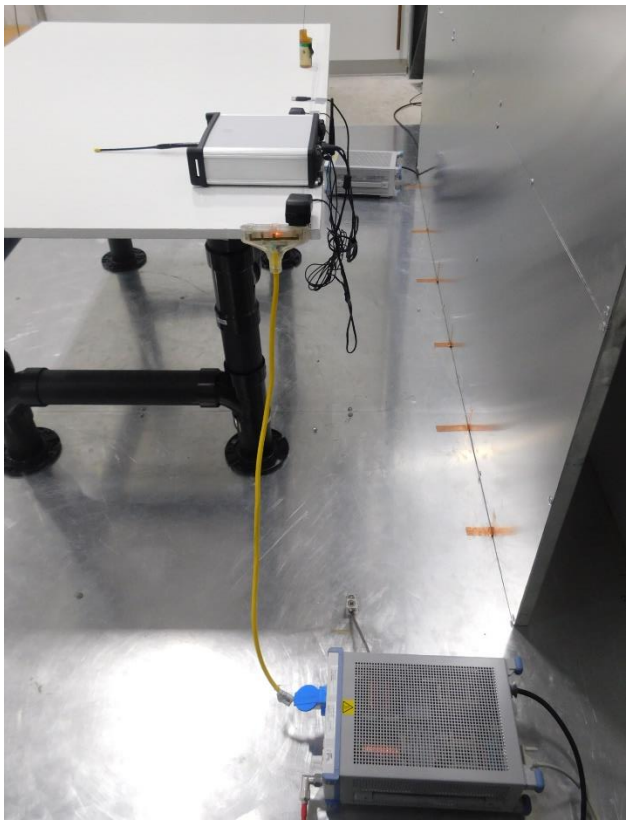
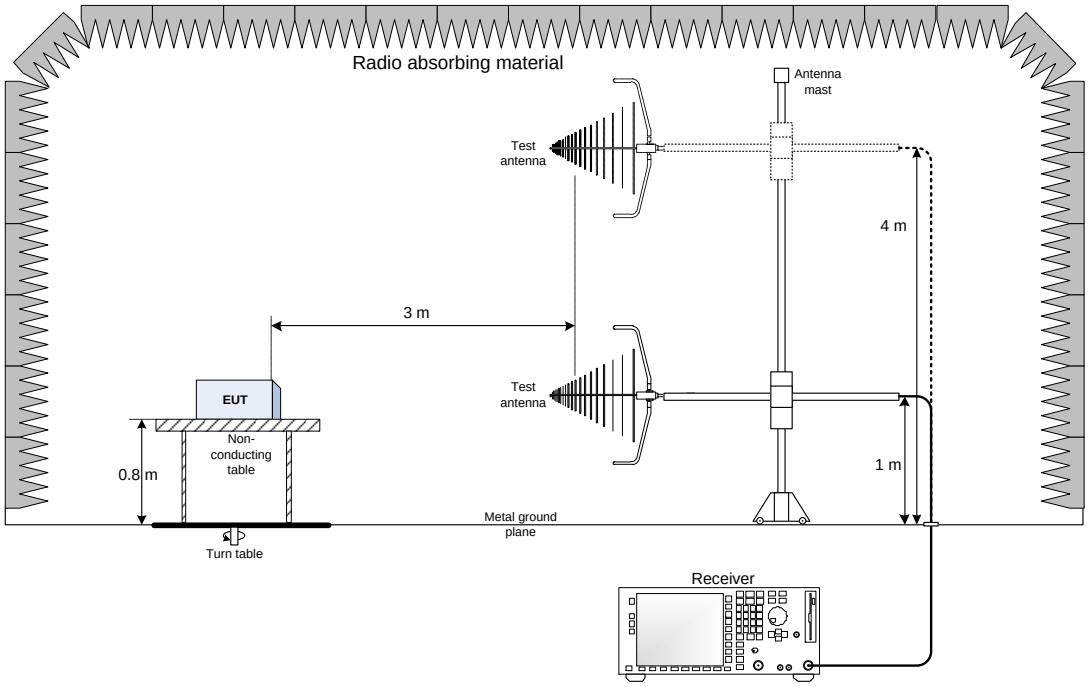


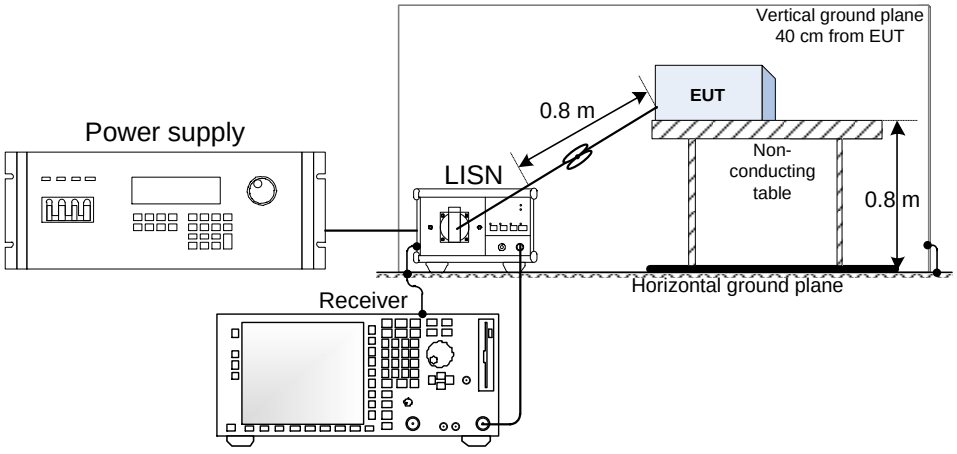
Figure 8.2-4: Conducted emissions – from AC mains power ports setup photo (SRX1200)

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up



9.2 Conducted emissions set-up



9.3 Antenna port set-up