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EMC TEST REPORT – 433532-1R1TRFEMC

Type of assessment:
Complete Assessment

Applicant:
Astus

Product:
Telematic device for vehicle

Models:
QC25-NA1 BLE
QC25-WW BLE

FCC ID
SFPASTUS-QC25

Specifications:

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

Date of issue: June 14, 2021

Abdoulaye Ndiaye, EMC/RF Specialist Tested by	Signature
Daniel Hynes, EMC/RF Lab Manager Tested by	Signature
Yong Huang, EMC/RF Specialist Reviewed by	Signature

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

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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.

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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
TRF	June 14, 2021	Original report issued
R1TRF	December 3, 2021	FCC ID and models updated on first page, page 8 & 10

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

There were no model variants declared by the applicant.

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	(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 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	Astus
Applicant address	101 boulevard Roland-Therrien (suite 500), Longueuil, Quebec, Canada, J4H 4B9
Manufacturer name	Same as applicant
Manufacture address	Same as applicant

5.3 EUT information

Product	Telematic device for vehicle
Models	QC25-NA1 BLE QC25-WW BLE
Serial numbers	QC25-NA: NA-3600117 QC25-WW: WW-3660046
Part number	QC25-NA & QC25-WW
Power requirements	8 – 33 V_{DC} (typical 12 V_{DC})
Description/theory of operation	Collect telematic data from the vehicle, including CAN bus data and GPS positions. Transmit the data to a remote server with its embedded cellular radio. The QC25 is also equipped with a BLE module.
Operational frequencies	CPU internal clock @ 40 MHz, Cellular radios can go up to 2600 MHz
Software details	QC25 Bootloader: 2.15.116 QC25 Firmware: 2.16.15.1 Telit ME910G1-WW cellular radio (in QC25-WW): 37.00.413 Telit LE910-NA1 cellular radio (in QC25-NA): 20.00.527 uBlox BMD-300 BLE radio (in all EUT): 2.14.243.0

5.4 EUT setup details

5.4.1 EUT Exercise and monitoring

Methods used to exercise the EUT and all relevant ports:

- The EUT is powered through a 6 meters harness and a 12.5 VDC power is applied.
- The I/O is set as an input to simulate the vehicle's ignition. A 85mA resistive load is installed on the power output at the auxiliary connector on a 2 meters harness.
- The CAN bus #1 is terminated with a 120 ohms resistor and used as the command and status port for the test operator. It is wired outside the semi anechoic chamber.
- The CAN bus #2 from the auxiliary connector is set in loopback mode on a 2 meters unterminated wire pair, while the CAN bus #2 from the main OBD2 connector, set in loopback mode is wired pair with 2 meters long and terminated with a 120 ohms resistor.
- Therefore, the GPS is enabled, when the BLE & Cellular modem are turned ON (transmitter OFF)

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 sub-assemblies

Description	Brand name	Serial number, Part number, Model, Revision level
QC25 WW BLE	ASTUS	SN: WW-3660046, PN: QC25-WW, RL: 7, Mezzanine board RL: 5
QC25 NA1 BLE	ASTUS	SN: NA-3600117, PN: QC25-NA, RL: 7, Mezzanine board RL: 5

Table 5.4-2: EUT interface ports

Description	Qty.
CAN Bus port	2
I/O port	1
Power Output	1
Auxiliary connector port	1

Table 5.4-3: Support equipment

Description	Brand name	Serial number, Part number, Model, Revision level
Laptop	Vostro	SN: 34735277773
CAN to USB adaptor (PEAK)	GridConnect	MN: EH-002021-303499
0-30 Vdc power supply	BK Precision 1550	SN: 1150083307

Table 5.4-4: Inter-connection cables

Cable description	From	To	Length (m)
Twisted pair non shielded cable CAN	EUT Can Bus port 1 on OBD2 connector. Terminated with 120 ohms between the two wires.	Monitoring laptop. Wire pair terminated with a 120 ohms resistor.	6
Twisted pair non shielded cable CAN	EUT Can Bus port 2 on Auxiliary connector	Unterminated wire pair	2
Twisted pair non shielded cable CAN	EUT Can Bus port 2 on OBD2 connector	Terminated with a 120 ohms resistor.	2
Single non shielded wire	DC power supply	EUT I/O** on OBD2 connector	6
Pair non shielded cable	EUT Power output port on Auxiliary connector	Terminated with a resistive load	2
Non shielded power (12 Vdc typical) and GND	DC power supply	EUT power input port on OBD2 connector	6

(**) Used as an input.

EUT test configuration continued

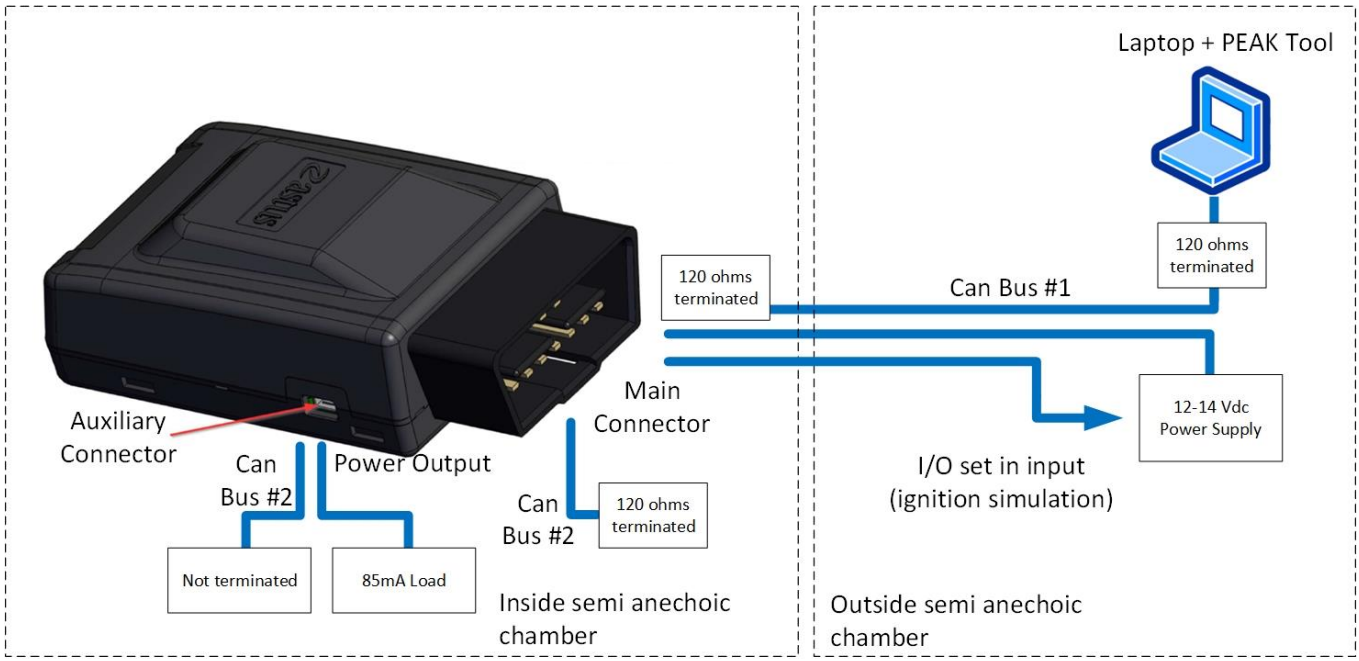


Figure 5.4-1: block diagram

Section 6 Summary of test results

6.1 Testing location

Test location (s)	Montreal

6.2 Testing period

Test start date	May 10, 2021	Test end date	May 14, 2021

6.3 Sample information

Receipt date	May 10, 2021	Nemko sample ID number	1 & 2

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		
§15.109	Radiated emissions limits[1]	Pass
§15.107	Conducted emissions limits (AC mains) [1]	Not applicable [2]
ICES-003 Issue 7		
3.2.1	AC Power Line Conducted Emissions Limits[1]	Not applicable [2]
3.2.2	Radiated Emissions Limits[1]	Pass

Notes: [1] Product classification B
[2] The EUT is DC powered

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	This 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

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	Abdoulaye Ndiaye and Daniel Hynes	Test date	May 10 & 13, 2021

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 15 GHz.
- There is no visual difference in the EUTs. Setup photos are representative of both units tested.

8.1.4 Setup details

Port under test	Enclosure Port
EUT power input during test	12.5 V_{DC}
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 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	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

Table 8.1-2: Radiated emissions equipment list

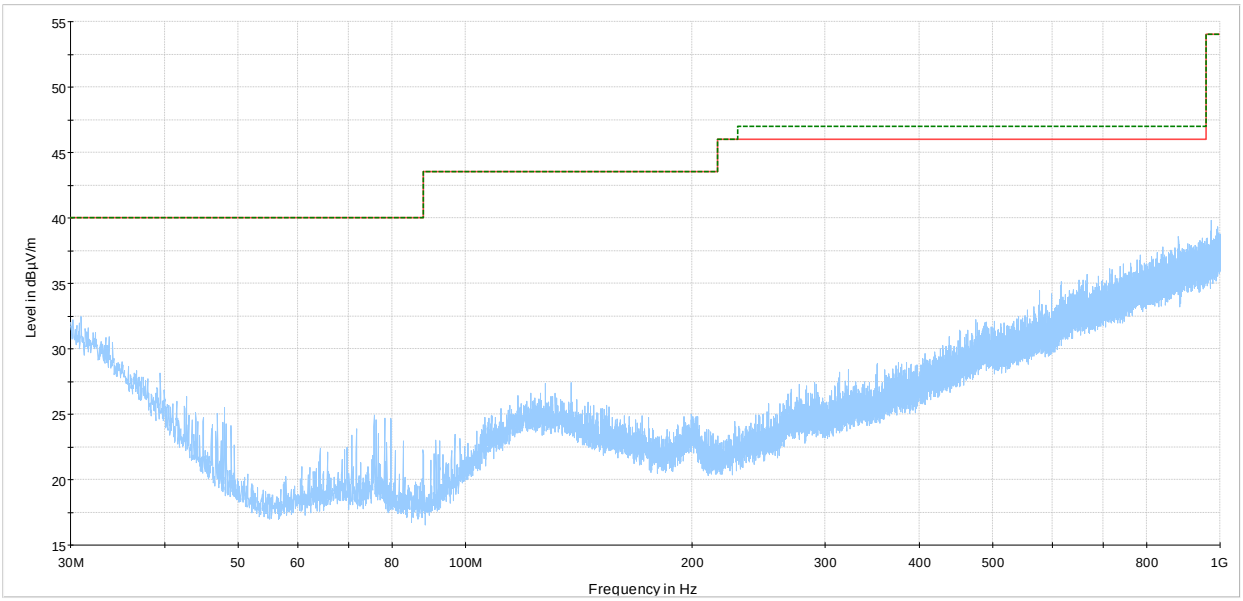
Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber (Emissions)	TDK	SAC-3	FA002532e	2 year	February 25, 2022
Flush mount turntable	Sunol	FM2022	FA002550	—	NCR
Controller	Sunol	SC104V	FA002551	—	NCR
Antenna mast	Sunol	TLT2	FA002552	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 40	FA002071	1 year	March 16, 2022
Bilog antenna (20–2000 MHz)	Sunol	JB1	FA002517	1 year	March 3, 2022
Horn antenna (1–18 GHz)	EMCO	3115	FA001451	1 year	February 16, 2022
Pre-amplifier (0.5–18 GHz)	Com-Power	PAM-118A	FA002561	1 year	September 22, 2021

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 10.60.20

8.1.5 Test data



NEX-433532 - May 13, 2021 - NA unit
Preview Result 1-PK+
FCC Part 15 Limit - Class B (QP), 3 m
ICES-003 Limit - Class B (QP), 3 m

Figure 8.1-1: Radiated emissions spectral plot (30 to 1000 MHz) – QC25-NA Unit

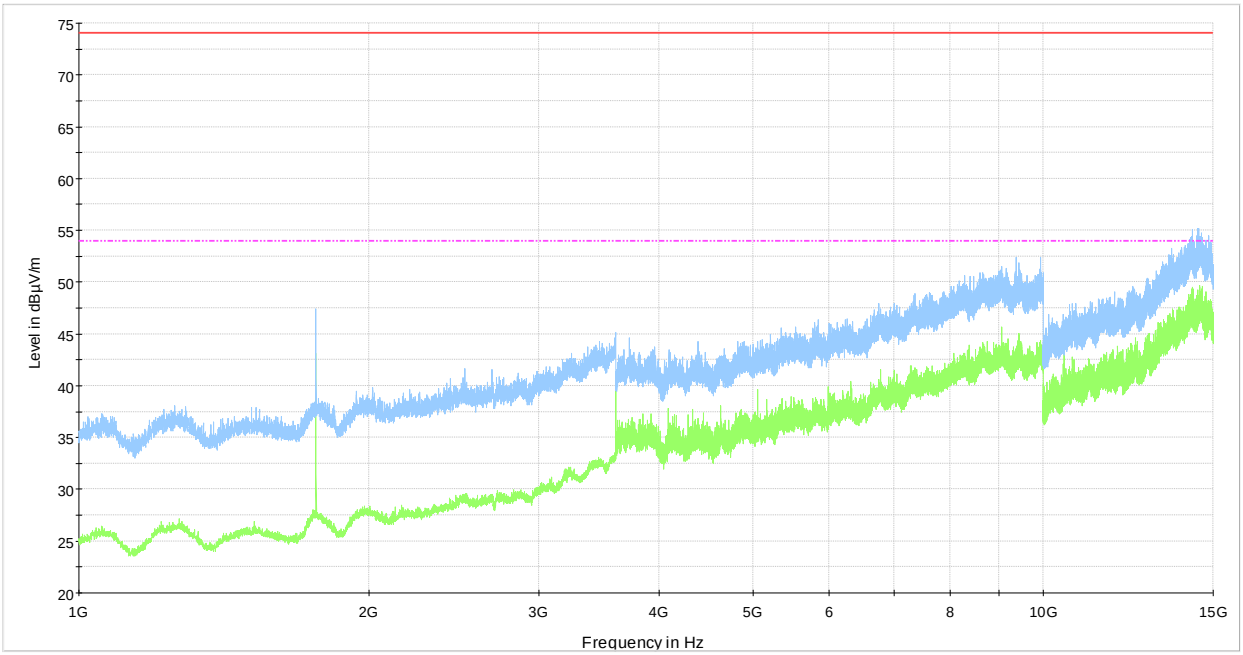
Table 8.1-4: Radiated emissions results – QC25-NA Unit

Frequency (MHz)	Quasi-Peak field strength[1] (dBµV/m)	Quasi-Peak limit [3] (dBµV/m)	Quasi-Peak margin (dB)	Correction factor[2] (dB)
FCC				
47.985	23.3	40.0	16.7	13.7
881.013	29.0	46.0	17.0	29.7
784.337	28.3	46.0	17.7	28.6
31.010	22.2	40.0	17.8	24.9
39.458	20.6	40.0	19.4	19.2
615.597	25.5	46.0	20.5	25.9
ICES-003				
47.985	23.3	40.0	16.7	13.7
31.010	22.2	40.0	17.8	24.9
881.013	29.0	47.0	18.0	29.7
784.337	28.3	47.0	18.7	28.6
39.458	20.6	40.0	19.4	19.2
42.731	19.1	40.0	20.9	16.8

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factor = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (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: 23.3 dBµV/m (field strength) = 9.6 dBµV (receiver reading) + 13.7 dB (Correction factor)

Test data continued



NEX-433533, May 10, 2021, NA1 unit
Preview Result 2-AVG
Preview Result 1-PK+
FCC Part 15 and ICES-003 Limit - Class B (PK), 3 m
FCC Part 15 and ICES-003 Limit - Class B (Avg), 3 m

Figure 8.1-2: Radiated emissions spectral plot (1 to 15 GHz) – QC25-NA Unit

Table 8.1-5: Radiated emissions results – QC25-NA Unit

Frequency (GHz)	CAverage field strength[1 and 3] (dBµV/m)	CAverage limit (dBµV/m)	CAverage margin (dB)	Correction factor[2] (dB)
17.926	45.8	54.0	8.2	27.9
14.259	41.6	54.0	12.4	23.0
10.000	33.0	54.0	21.0	13.1
3.600	28.3	54.0	25.7	-0.3
5.054	28.2	54.0	25.8	3.6
1.760	24.0	54.0	30.0	-7.8

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factor = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (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: 24.0 dBµV/m (field strength) = 31.8 dBµV (receiver reading) + (-7.8) dB (Correction factor)

Test data continued

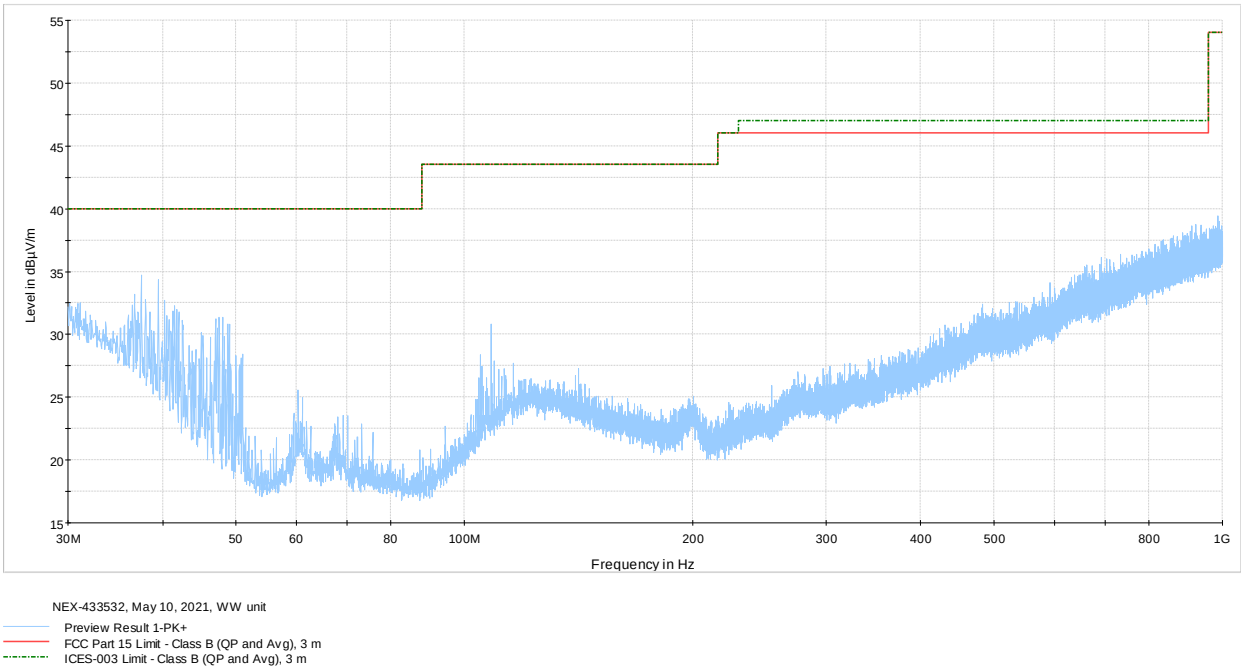


Figure 8.1-3: Radiated emissions spectral plot (30 to 1000 MHz) – QC25-WW Unit

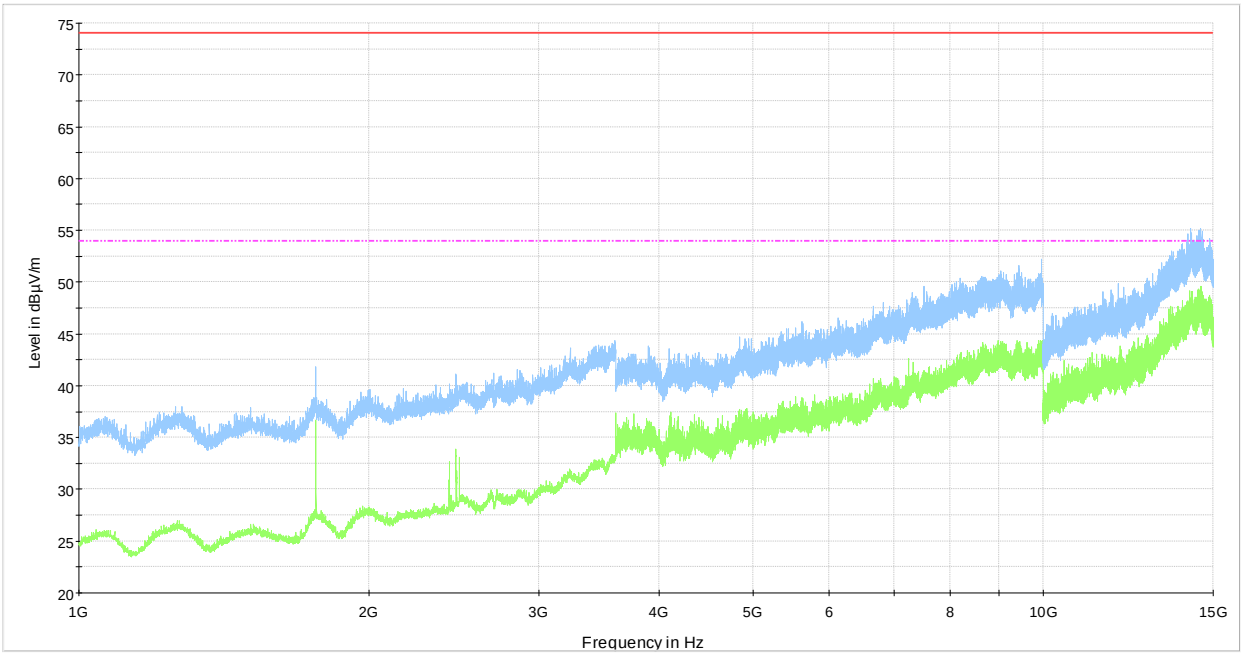
Table 8.1-6: Radiated emissions results – QC25-WW Unit

Frequency (MHz)	Quasi-Peak field strength[1] (dBµV/m)	Quasi-Peak limit [3] (dBµV/m)	Quasi-Peak margin (dB)	Correction factor[2] (dB)
FCC				
37.477	30.4	40.0	9.6	20.7
46.975	27.9	40.0	12.1	14.1
60.352	21.2	40.0	18.8	12.4
108.489	24.7	43.5	18.8	17.5
482.909	22.2	46.0	23.8	24.3
985.530	30.1	54.0	23.9	30.7
ICES-003				
37.477	30.4	40.0	9.6	20.7
46.975	27.9	40.0	12.1	14.1
60.352	21.2	40.0	18.8	12.4
108.489	24.7	43.5	18.8	17.5
482.909	22.2	47.0	24.8	24.3
985.530	30.1	54.0	23.9	30.7

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factor = antenna factor ACF (dB) + cable loss (dB) − amplifier gain (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: 30.4 dBµV/m (field strength) = 9.7 dBµV (receiver reading) + 20.7 dB (Correction factor)

Test data continued



NEX-433532, May 10, 2021, WW unit
Preview Result 2-AVG
Preview Result 1-PK+
FCC Part 15 and ICES-003 Limit - Class B (PK), 3 m
FCC Part 15 and ICES-003 Limit - Class B (Avg), 3 m

Figure 8.1-4: Radiated emissions spectral plot (1 to 15 GHz) – WW1 Unit

Table 8.1-7: Radiated emissions results – WW1 Unit

Frequency (MHz)	CAverage field strength[1 and 3] (dBµV/m)	CAverage limit (dBµV/m)	CAverage margin (dB)	Correction factor[2] (dB)
17.830	45.4	54.0	8.6	27.1
14.549	42.7	54.0	11.3	23.3
9.979	34.1	54.0	19.9	13.2
2.459	24.5	54.0	29.5	-5.3

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factor = antenna factor ACF (dB) + cable loss (dB) – amplifier gain (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: 24.5 dBµV/m (field strength) = 29.8 dBµV (receiver reading) + (-5.3) dB (Correction factor)

8.1.6 Setup photos

Figure 8.1-5: Radiated emissions setup photo – below 1 GHz

Figure 8.1-6: Radiated emissions setup photo – below 1 GHz

Setup photos continued

Figure 8.1-7: Radiated emissions setup photo – above 1 GHz

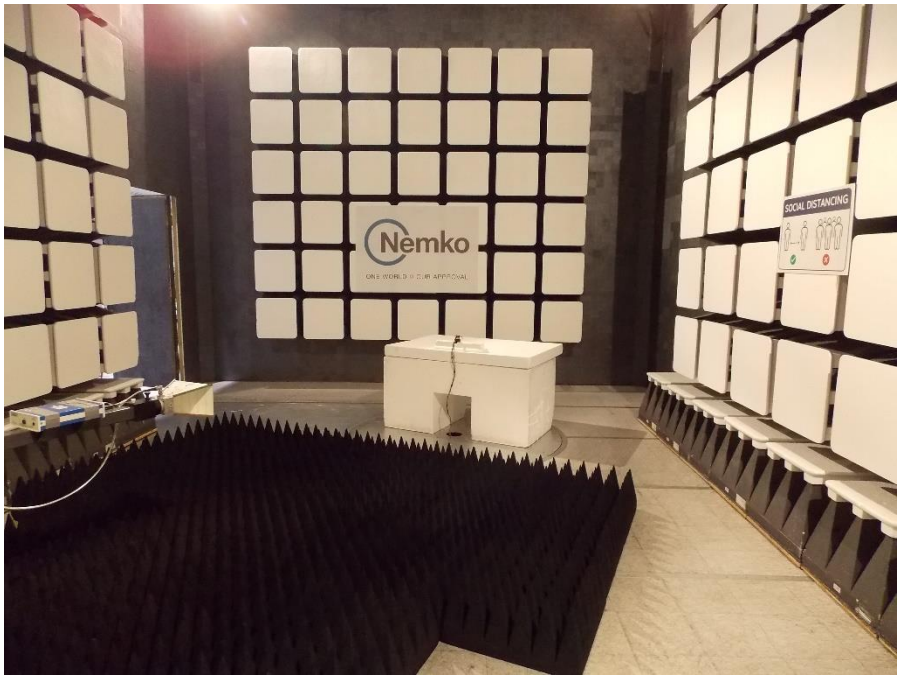


Figure 8.1-8: Radiated emissions setup photo – above 1 GHz

Section 9 EUT photos

9.1 External photos

Figure 9.1-1: Front view photo – NA unit

Figure 9.1-2: Rear view photo - NA unit

External photos continued

Figure 9.1-3: Side view photo – NA unit

Figure 9.1-4: Side view photo – NA unit

External photos continued

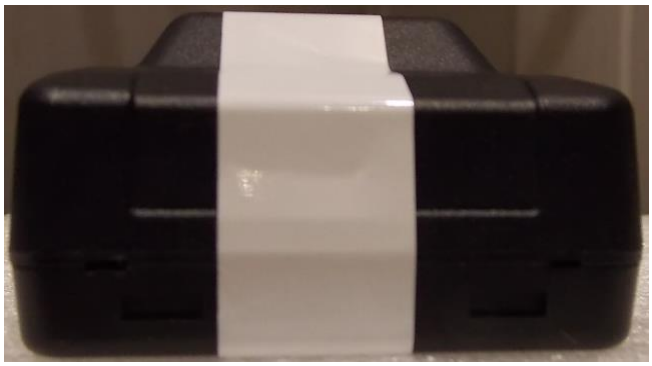


Figure 9.1-5: Top view photo – NA unit

Figure 9.1-6: Bottom view photo – NA unit

External photos continued

Figure 9.1-7: Front view photo – WW unit

Figure 9.1-8: Rear view photo – WW unit

External photos continued

Figure 9.1-9: Side view photo – WW unit

Figure 9.1-10: Side view photo – WW unit

External photos continued

Figure 9.1-11: Top view photo – WW unit

Figure 9.1-12: Bottom view photo – WW unit

(End of the test report)