EMC TEST REPORT

No. 1609197STO-002 Ed. 1

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment:	Modeling Percussion Synthesizer
Type/Model:	Nord Drum 3P
Manufacturer:	Clavia DMI AB
Tested by request of:	Clavia DMI AB

SUMMARY

Referring to the emission limits, and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards:

FCC 47 CFR Part 15 (2015): Radio frequency device, Subpart B: Unintentional radiators. Class B equipment.

ICES-003 Issue 6: Information Technology Equipment (ITE) – Limits and methods of measurement, Class B.

For details, see clause 2 – 4.

Date of issue: May 17, 2016

Tested by: Andreas Isaksson

Approved by: Hans Kohlén

Revision History

Edition	Date	Description	Changes
1	2016-05-17	First release	

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1. CLIENT INFORMATION

The EUT has been tested by request of

Company	Clavia DMI AB Box 4214 102 65 Stockholm Sweden
Name of contact	Mikael Norlin Phone +46 8 442 73 60

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment	Modeling Percussion Synthesizer
Type/Model	Nord Drum 3P
Brand name	nord
Serial Number	-
Manufacturer	Clavia DMI AB
Rating	DC: 12V, 500 mA, 6 W AC:100 - 240 V, 50/60 Hz, 0.2 A
Class	II
Highest clock frequency	68 MHz

Photo of EUT and rating plate

2.2 Purpose of the test.

The purpose of the tests was to verify that the EUT fulfills the requirements according to FCC 47 CFR Part 15 (2015) and ICES-003 Issue 6.

2.3 Additional information about the EUT

The EUT was tested in a tabletop configuration.
The EUT consists of the following units:

Unit	Type
Modeling Percussion Synthesizer	Nord Drum 3P
Switching Mode Power Supply	Nord, GPE053-120050-Z

The EUT was tested with the following cables

Port	Type	Length [m]	Specifications
Outputs and Inputs	Instrument cable	6	¼" jack to ¼" jack
Midi IN and OUT	Midi cable	6	DIN plugs

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3. TEST SPECIFICATIONS

3.1 Standards

Requirements:
FCC 47 CFR Part 15: Radio frequency device, Subpart B: Unintentional radiators (2015).

ICES-003 Issue 6: Information Technology Equipment (ITE) – Limits and methods of measurement (2016).

Test methods:
ANSI C63.4: 2014: 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

3.2 Additions, deviations and exclusions from standards and accreditation

No additions, deviations or exclusions have been made from standards and accreditation.

3.3 Test site

Measurements were performed at:

Intertek Semko AB.
Torshamnsgatan 43,
P.O. Box 1103
SE-164 22 Kista

Intertek Semko AB is a FCC listed test site with site registration number 90913
Intertek Semko AB is a FCC accredited conformity assessment body with designation number SE0002
Intertek Semko AB is an Industry Canada listed test facility with IC assigned code 2042G

Measurement chambers

Measurement Chamber	Type of chamber	IC Site filing #
STORA HALLEN	Semi-anechoic 10 m and 3 m	2042G-2

3.4 Mode of operation during the test

The EUT was tested with 120 V, 60 Hz.

The EUT was tested in active mode.

3.5 Compliance

The EUT shall comply with the emission limits according to the standards as listed below

Conducted emission requirements:
The EUT shall meet the limits for the standards.
Reference: 47 CFR §15.107
ICES-003, section 6.1

Limits for conducted emission according to FCC and ICES-003

Class B

Frequency range [MHz]	Limits [dBµV]	
	Quasi-Peak	Average
0.15 – 0.50	66 – 56	56 – 46
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Radiated Emission requirements:
The EUT shall meet the limits for the standards.
Reference: 47 CFR §15.109
ICES-003, section 6.2

Limits for radiated emission according to FCC and ICES-003

Class B

Frequency range [MHz]	Field strength at 3 m (dBµV/m)	Detector (dBµV/m)
30 – 88	40.0	Quasi Peak
88 – 216	43.5	Quasi Peak
216 – 960	46.0	Quasi Peak
960 – 1000	54.0	Quasi Peak
Above 1000	54.0 / 74.0	Average / Peak

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4. TEST SUMMARY

The results in this report apply only to sample tested:

Standard	Description	Result
	Emission	
FCC Part 15 subpart B **ICES-003**	**Conducted continuous emission in the frequency range 0.150 – 30 MHz, AC Power input port** The EUT complies with the Class B limits. The margin to the limit was at least 8.0 dB at 0.403 MHz See clause 5.4.	**PASS**
FCC Part 15 subpart B **ICES-003**	**Radiated emission of electromagnetic fields in the frequency range 30 – 1000 MHz** The EUT complies with the Class B limits. The margin to the limit was at least 9.4 dB at 863.985 MHz. See clause 6.5.	**PASS**

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5. CONDUCTED CONTINUOUS DISTURBANCES in the frequency-range 0.15 – 30 MHz

5.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
2016-05-03	21 [°C]	32 [%]

5.2 Test set-up and test procedure

The test method is in accordance with ANSI C63.4.

The EUT was connected to the power via Artificial Mains Networks AMN.
The EUT was placed on an insulating support 0.8 m above the floor, 0.4 m from the vertical reference ground plane (RGP) and 0.8 m from the AMN/ISN.
Overview sweeps were performed for each lead.
During the tests the EUT was operated according to the mode of operation mentioned in clause 3.4.

Photo of the test set-up for conducted emission

5.3 Measurement uncertainty

Continuous conducted disturbances with AMN
in the frequency range 150 kHz to 30 MHz ± 3.3 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2: 2011.
The measurement uncertainty is given with a confidence of 95 %.

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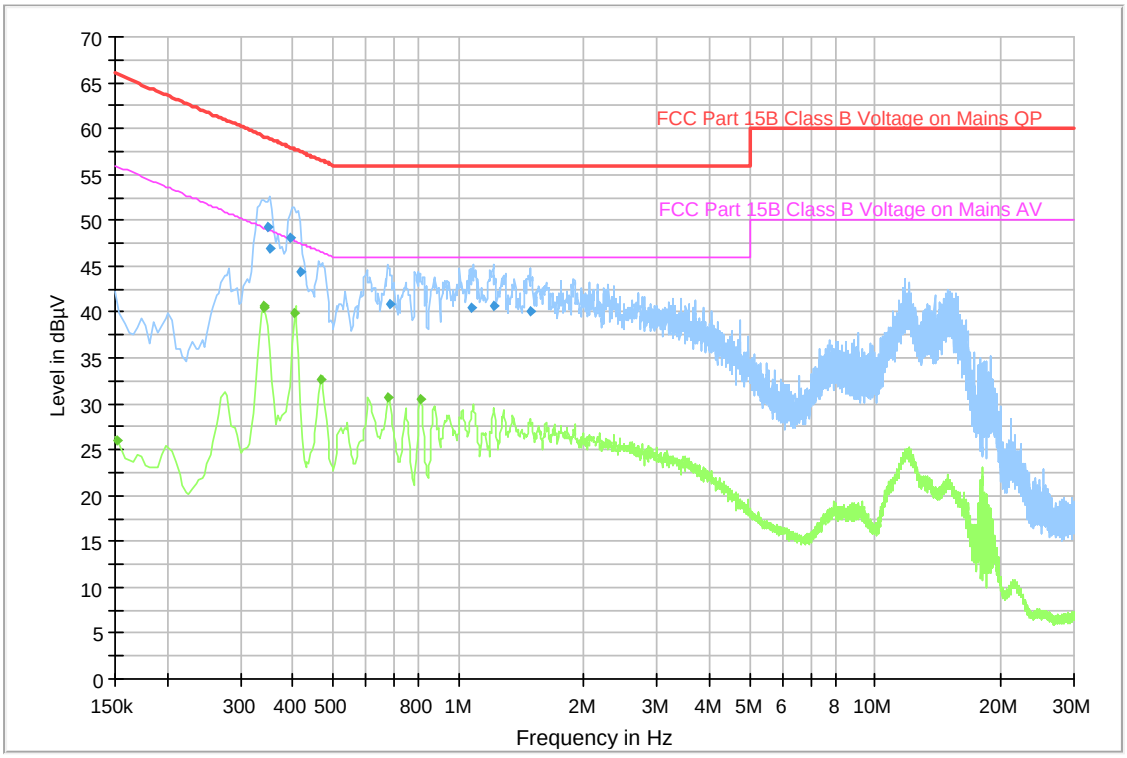
5.4 Test results, AC Power input port, Class B



Diagram, Peak and Average overview sweep

Measurement results, Quasi-peak, Class B

Frequency [MHz]	Level [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.349	49.2	59.0	N	9.8
0.354	47.0	58.9	N	11.9
0.396	48.2	57.9	N	9.7
0.417	44.4	57.5	N	13.1
0.682	40.9	56.0	N	15.1
1.078	40.5	56.0	N	15.5
1.213	40.8	56.0	N	15.2
1.484	40.0	56.0	N	16.0

Measurement results, Average, Class B

Frequency [MHz]	Level [dBµV]	Limit [dBµV]	Line L/N	Margin [dB]
0.151	26.0	56.0	N	30.0
0.340	40.6	49.2	N	8.6
0.342	40.6	49.2	N	8.6
0.403	39.8	47.8	N	8.0
0.465	32.7	46.6	N	13.9
0.678	30.7	46.0	N	15.3
0.810	30.6	46.0	N	15.4

Result [dBµV] = Analyser reading [dBµV] + cable loss [dB] + LISN insertion loss [dB]

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5.5 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - 9.21	--	--	--
Receiver	Rohde & Schwarz	ESCI	12741	07 – 2015	1 year
AMN / LISN	Rohde & Schwarz	ESH3-Z5	32711	09 – 2014	3 year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	32798	08 – 2015	1 year

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6. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHZ – 1000 MHZ

6.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
2016-04-05	20 [°C]	29 [%]

6.2 Test set-up and test procedure

The test method is in accordance with ANSI C63.4.

The EUT was set up in order to emit maximum disturbances.
The EUT was placed on an insulating support 0.8 m above the turntable which is part of the reference ground plane.
Overview sweeps were performed with the measurement receiver in max-hold mode and the peak detector activated in the frequency-range 30 – 1000 MHz.

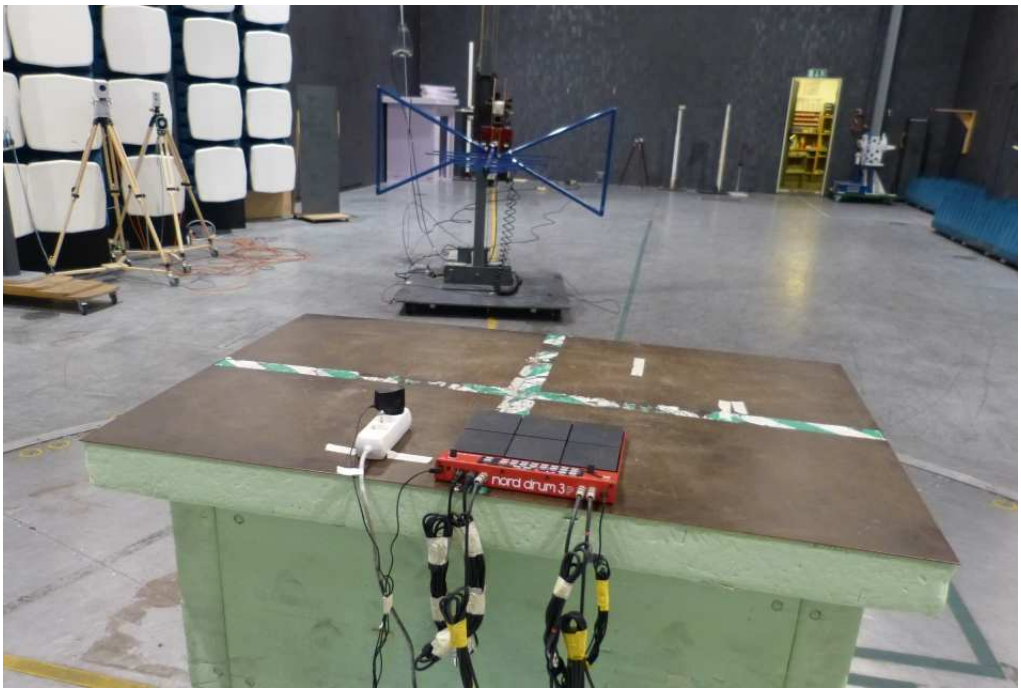

Photo of the test set-up for radiated emission

6.3 Test conditions

Test set-up:	**30 – 1000 MHz**		
Test receiver set-up:			
Preview test:	Peak,	RBW 120 kHz	VBW 1 MHz
Final test:	Quasi-Peak,	RBW 120 kHz	
Measuring distance:	3 m		
Measuring angle:	0 – 359°		
Antenna			
Height above ground plane:	1 – 4 m		
Polarisation:	Vertical and Horizontal		
Type:	Bilog		

6.4 Measurement uncertainty

Measurement uncertainty for radiated disturbance

Uncertainty for the frequency range 30 to 1000 MHz at 3 m	± 5.1 dB

Measurement uncertainty is calculated in accordance with EN 55016-4-2: 2011.
The measurement uncertainty is given with a confidence of 95 %.

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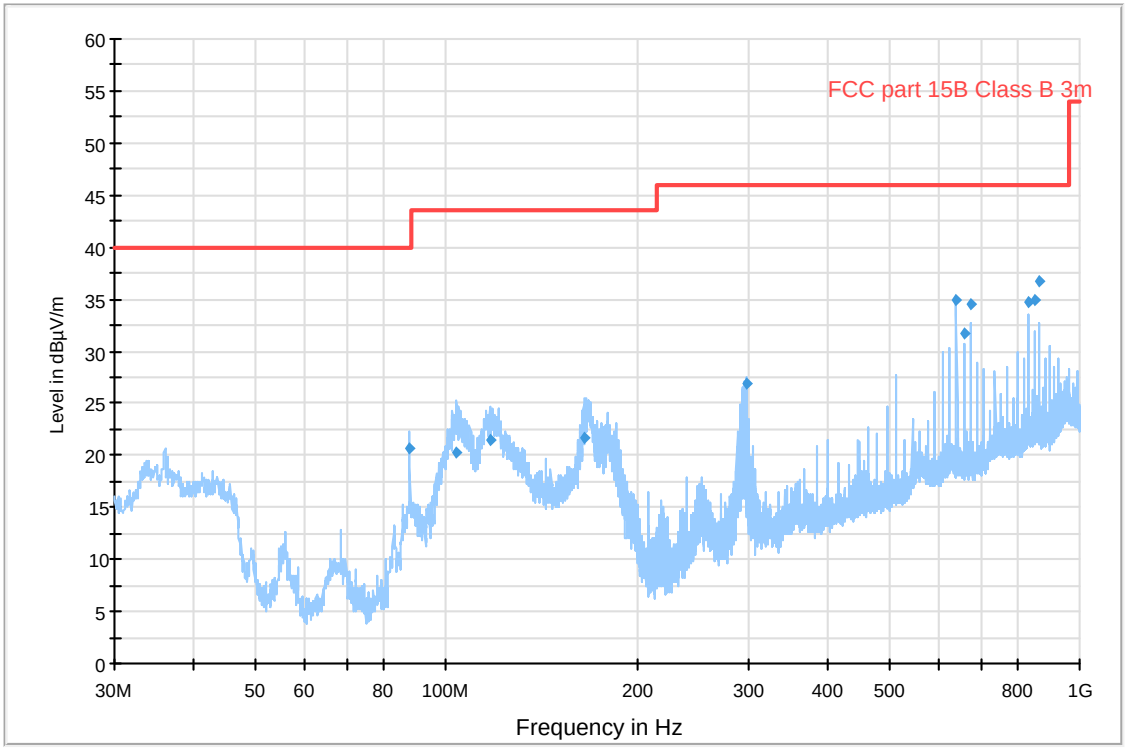
6.5 Test results, 30 – 1000 MHz, Class B



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance.

Measurement results, Quasi Peak, Class B

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
87.768	20.7	40.0	V	19.3
104.161	20.3	43.5	V	23.2
117.601	21.4	43.5	V	22.1
165.743	21.6	43.5	V	21.9
297.299	26.9	46.0	V	19.1
639.978	34.9	46.0	V	11.1
655.999	31.7	46.0	V	14.3
671.995	34.6	46.0	V	11.4
831.974	34.7	46.0	V	11.3
847.979	34.9	46.0	V	11.1
863.985	36.6	46.0	V	9.4

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

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6.6 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement Receiver	Rohde & Schwarz	ESU 8	12866	07-2015	1 year
Bilog antenna	Chase	CBL 6111A	8578	07-2013	3 years
Preamplifier	SEMKO	AM1331	7992	07-2015	1 year
Power supply preamplifier	SEMKO	-	7993	07-2015	1 year

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