REPORT

Issued by an FCC listed Laboratory Reg. no. 589866.
The test site complies with RSS-Gen,
IC file no: 10247A-1

Date	Reference	Page
2016-08-16	5P07850-8	1 (2)

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Equipment Authorization measurements on NOVO IP Transceiver Unit
FCC ID: 2AGLF1410104

(10 appendices)

Test object

Product name: NOVO IP
Product number: NE10 14101-04
Serial number: 10000132
Manufacturer NEAT Electronics AB

Summary

See Appendix 1 for general information and Appendix 10 for photos.

Emission measurements as specified below have been performed.

Standard	Compliant	Appendix	Remarks
FCC 47 CFR Part 15 C 15.249 Operation within the band 902-928 MHz	**Yes**		
IC RSS-210, Issue 8, November 2014/ **IC RSS-Gen Issue 4 November 2014** Operation within the band 902-928 MHz	**Yes**		
Duty cycle measurements	N/A	2	Note 1
15.249 (a) / RSS-210 A2.9(a) Field strength of fundamental	**Yes**	3	
15.249 (d) (e) / RSS-210 A2.9(b) Radiated emission	**Yes**	4	
15.207 / RSS-Gen 8.8 AC Conducted emission	**Yes**	5	
15.215 (c) 20 dB bandwidth	**Yes**	6	
2.1049 / RSS-Gen 6.6 Occupied bandwidth	**Yes**	7	
2.1049 / RSS-210 A2.9(b)/RSS-Gen 8.10 Band Edge	**Yes**	8	
2.1093 / RSS-102 2.5.2 RF Exposure	**Yes**	9	

Note 1: No duty cycle could be measured, as the EUT was set to continuous transmission (100% duty cycle) and with normal modulation.

SP Technical Research Institute of Sweden
Electronics - EMC

Performed by

Søren Søltoft

Examined by

Kennet Palm

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Performance test and requirements

The tests were performed to verify that NOVO IP PN: NE10 14101-04 meets the electromagnetic compatibility requirements of FCC 47 CFR part 15 C and IC RSS-Gen/RSS-210.

Test facility

The used semi anechoic chamber is compliant with the requirements of section 2.948 of the FCC rules and listed, registration number 589866, as a facility accepted for certification under parts 15 and 18. The site complies with RSS Gen and is accepted by Industry Canada for the performance of radiated measurements, IC-file number10247A-1.

Test object

Transceiver unit:	NOVO IP
Antenna connector	None
Antenna:	Internal on board
Antenna gain:	Not provided
Transmit frequencies:	916.2375 MHz
Receive frequencies:	916.2125 MHz
Frequencies used during test:	Transmit: 916.2375 MHz Receive: 916.2125 MHz
Modulation:	GFSK
Data rate:	2.4 kbit/s Manchester (4.8 kbit/s in air)
Power supply:	5 VDC from FRIWO 15:4539
Software	Test software

The sample used for test was marked with P/N NE10 14101-01. Manufacture declares that the sample is 100 % identical to the product subject to certification with FCC ID 2AGLF1410104 and P/N NE10 14101-04.

During the test the EUT was powered by a AC/DC adaptor: FRIWO 15:4539 which was placed next to the EUT on the table. The AC/DC adaptor was powered by an amplifier model STA-3000, controlled by a oscillator model B&O TG7 to deliver 120 VAC 60 Hz. The AC/DC-adapter was powered by 120 VAC/60 Hz. The voltage and frequency were measured with a calibrated multimeter Hewlett Packard 34401A.
The STA 3000, B&O TG7 and the Hewlett Packard 34401A were placed outside the chambers during the tests.

Measurement equipment

Description	Model	ID tag	Cal. due
Analyzer 20Hz-26.5GHz	ESI	20763	2016-09-16
Antenna, Broadband, 30MHz-3GHz	HL562	19830	2019-04-14
Antenna Horn 1 – 18 GHz	BBHA 9120 D	20777	2019-02-18
Multimeter	34401A	14885	2016-06-12
Analyzer 20Hz-26.5GHz	ESIB 26	18880	2016-08-26
V-network Two Line	ESH3-Z5	13935	2016-09-11

Operational test mode
Frequency range is less than 1 MHz, thus only one channel 916.2375 MHz was tested

The test was performed with continuous transmission (100 % duty cycle) and with normal modulation.

The difference between the radiated carrier level measured by a RMS and a Quasi peak detector was less than 0.1 dB.

Ancillary and/or support equipment
AC/DC adaptor: FRIWO 15:4539 Engineering sample 05
Ethernet switch: NETGEAR GS108PE SN: 3UJ2585K0044E

Cabling during emission test:

EUT port	Cable type	Termination
DC input	4-wire, unshielded, 2.9 m length.	AC/DC adaptor
Ethernet ports	Ethernet CAT 6 unshielded, 3 m.	Ethernet Switch

Test support equipment

Description	Supplier	Model	ID tag
Oscillator 10Hz-1MHz	B&O	TG7	11199
Multimeter	Hewlett Packard	34401A	14880
Audio power amplifier	img Stage Line	STA-3000	50027

Uncertainties

	Frequency [MHz]	**Polarization**	**Expanded Uncertainty** [dB] (k=2)
Radiated Emission AEC 30 - 3000 MHz (CISPR 16-4) HL562 Antenna	30 - 200	Vertical	**4.73**
	200 - 3000	Vertical	**4.97**
	30 - 200	Horizontal	**4.72**
	200 - 3000	Horizontal	**5.08**
Radiated Emission AEC 1 - 18 GHz (CISPR 16-4)	1000 - 18000	Vertical	**3.76**
	1000 - 18000	Horizontal	**3.77**
Conducted emission (CISPR 16-4)	0.01 - 30		**3.44**

Compliancy evaluation is based on a shared risk principle with respect to the measurement uncertainty.

Reservation
The test results in this report apply only to the particular test object as declared in the report.

Delivery of test object
The test object was delivered: 2016-05-17

Test engineer
Søren Søltoft

Duty cycle measurements

No duty cycle could be measured, as the EUT was set to continuous transmission (100 % duty cycle) and with normal modulation.

Field strength of fundamental measurements according to FCC 47 CFR part 15.249 (a) / RSS-210 A2.9 (a)

Date	Temperature	Humidity
2016-05-18	22°C ± 3 °C	43% ± 5 %

Test set-up and procedure

The measurements were performed according to ANSI C63.10-2013.

The test was performed with continuous transmission (100 % duty cycle) and with normal modulation.

The radiated maximum peak output power measurements were performed in the semi-anechoic chamber.
The fundamental was scanned with peak detector with the EUT in 3 octagonal positions and the turntable was varied between 0-360 degrees for maximum response. The antenna distance during the measurements was 3.0 m.
The EUT height above the reference ground plane was 0.8 m
Final measurement was performed with detector according to the FCC rules.

Test set-up photos during the tests can be found in Appendix 10.

Description	Supplier	Model	ID tag
Analyzer 20Hz-26.5GHz	Rohde&Schwarz	ESI	20763
Antenna, Broadband, 30MHz-3GHz	Rohde&Schwarz	HL562	19830

Results

Field strength of fundamental measurements:
RBW= 120 kHz

916.2375 MHz		Max peak radiated output power Quasi-peak detector		
	EUT axis	X	Y	Z
	Antenna height	1.0 m	1.0 m	1.0
	Antenna polarization	Horizontal	Vertical	Vertical
	Azimuth	278 deg.	332 deg.	54 deg.
T_{nom} 22°C	V_{nom} V DC Note 1	91.7 dBµV/m	92.3 dBµV/m	92.8 dBµV/m

Note 1: According 47CFR 15.31(e), for intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

Fundamental frequency: 916.2375 MHz	Supply voltage	Max Peak level
85 % of Nominal supply voltage	102 VAC	-7.04 dBm
Nominal supply voltage	120VAC	-7.01 dBm
115% of Nominal supply voltage	138 VAC	-7.03 dBm

The fundamental variation was measured radiated. The Max peak level are the reading of the analyser, not compensated for attenuation or antenna gain.

Limits

According to 47CFR 15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

According to RSS-210 A2.9 (a), the field strength measured at 3 meter shall not exceed the following:

Fundamental Frequency	Field strength of fundamental
902-928 MHz	50 mV/m = 94 dBµV/m

Complies?	Yes

Radiated emission measurements according to FCC 47 CFR part 15.249 (d) (e) / RSS 210-210 A2.9 (b)

Date	Temperature	Humidity
2016-05-18	22°C ± 3 °C	43% ± 5 %
2016-05-19	22°C ± 3 °C	40% ± 5 %

Test set-up and procedure

The measurements were performed according to ANSI C63.10-2013.

The test was performed continuous transmission (100% duty cycle) and with normal modulation.
A Ethernet CAT 6 unshielded cables was connected between the Ethernet port of the EUT and a shielded CAT 6 cables placed under the chamber floor connecting to outside the chamber. The cable was connected through a Ethernet switch.to a PC. The EUT was continuously pinged from the PC.
The ACDC adaptor FRIWO 15:4539 was placed on table next to the EUT. The ACDC adaptor was supplied with 120 VAC 60 Hz from outside the chamber. The voltage was generated by a B&O TG7 oscillator feed through a STA-3000 power amplifier. The voltage and frequency was supervised by a calibrated Hewlett Packard 34401A multimeter.

The test of radiated emission was performed in a semi anechoic chamber. The measurements were performed with both horizontal and vertical polarizations of the antenna. The antenna distance during the measurements was 3.0 m.
The EUT height above the reference ground plane was 0.8 m in the frequency range 30 MHz - 1000 MHz and 1.5 m in the frequency range 1GHz - 10 GHz.

The measurement procedure is as follows:

1. A pre-measurement is performed with peak detector. The test object is measured in eight directions with the antenna in the frequency range 30-1000 MHz and in eighteen directions at frequencies above 1 GHz, with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m.
2. If the emission is close or above the limit during the pre-measurement, the test object is scanned 360 degrees and the antenna height scanned from 1 to 4 m for maximum response. Then the emission is measured with the quasi-peak detector on frequencies below 1 GHz and with the CISPR-average detector above 1 GHz.

The following RBW were used:
30 MHz - 1 GHz: RBW=120 kHz
1 GHz - 10 GHz: RBW=1 MHz

Test set-up photos during the tests can be found in Appendix 10.

Description	Supplier	Model	ID tag
Analyzer 20Hz-26.5GHz	Rohde&Schwarz	ESI	20763
Antenna, Ultra Broadband, 30MHz-3GHz	Rohde&Schwarz	HL562	19830
Antenna Horn 1 – 18 GHz	Schwarzbeck	BBHA 9120 D	20031

Results

The pre-measurement emission spectra can be found in the diagrams below:

Diagram 1:	Ambient, 30-1000 MHz vertical and horizontal polarization
Diagram 2:	Ambient, 1-3 GHz vertical and horizontal polarization
Diagram 3:	Ambient, 3-10 GHz vertical and horizontal polarization
Diagram 4:	30-1000 MHz, vertical and horizontal polarization
Diagram 5:	1-3 GHz, vertical and horizontal polarization
Diagram 6:	3-10 GHz, vertical and horizontal polarization

The highest detected levels during the final measurement in the frequency range
EUT in X position. 30 MHz – 1 GHz

Frequency (MHz)	**QuasiPeak** (dBµV/m)	RBW (kHz)	Height (cm)	Polar.	Azi. (deg.)	Margin (dB)	Limit (dBµV/m)
43.807054	**35.6**	120	100.1	V	1.0	4.4	40.0
74.568737	**36.9**	120	127.1	V	0.0	3.1	40.0
81.221723	**33.0**	120	100.1	V	278.0	7.0	40.0
145.290501	**39.2**	120	100.1	V	134.0	4.3	43.5
163.908377	**35.3**	120	99.8	V	280.0	8.2	43.5
168.818116	**36.3**	120	99.8	V	225.0	7.2	43.5
449.659399	**38.6**	120	100.0	H	207.0	7.4	46.0
500.000401	**38.6**	120	100.1	H	187.0	7.4	46.0
874.989900	**39.1**	120	136.0	V	329.0	6.9	46.0

EUT in Y position. 30 MHz – 1 GHz

Frequency (MHz)	**QuasiPeak** (dBµV/m)	RBW (kHz)	Height (cm)	Polar.	Azi. (deg.)	Margin (dB)	Limit (dBµV/m)
43.807054	**34.1**	120	99.8	V	203.0	5.9	40.0
874.989900	**39.2**	120	147.1	H	208.0	6.8	46.0

EUT in X position. 1 GHz – 10 GHz

Frequency (MHz)	**MaxPeak** (dBµV/m)	RBW (kHz)	Height (cm)	Polar.	Azi. (deg.)	Margin (dB)	Limit (dBµV/m)
1500.002996	**42.1**	1000	155.6	V	186.0	31.9	74.0
2795.107190	**35.9**	1000	100.1	V	120.0	38.1	74.0
3665.016145	**42.4**	1000	149.9	V	213.0	31.6	74.0
6928.446671	**43.9**	1000	135.9	V	121.0	30.1	74.0
8731.387450	**44.5**	1000	150.1	H	106.0	29.5	74.0

Frequency (MHz)	**Average** (dBµV/m)	RBW (kHz)	Height (cm)	Polar.	Azi. (deg.)	Margin (dB)	Limit (dBµV/m)
1500.002996	**37.0**	1000	155.6	V	186.0	17.0	54.0
2795.107190	**23.5**	1000	100.1	V	120.0	30.5	54.0
3665.016145	**38.7**	1000	149.9	V	213.0	15.3	54.0
6928.446671	**31.3**	1000	135.9	V	121.0	22.7	54.0
8731.387450	**31.0**	1000	150.1	H	106.0	23.0	54.0

EUT in Y position. 1 GHz – 10 GHz

Frequency (MHz)	**MaxPeak** (dBµV/m)	RBW (kHz)	Height (cm)	Polar.	Azi. (deg.)	Margin (dB)	Limit (dBµV/m)
1481.768908	**42.0**	1000	152.2	V	154.0	32.0	74.0
2184.622770	**36.9**	1000	396.9	V	352.0	37.1	74.0
3665.016145	**43.3**	1000	200.0	H	234.0	30.7	74.0
6910.631691	**43.7**	1000	377.9	V	32.0	30.3	74.0
8716.527530	**43.3**	1000	210.2	V	38.0	30.7	74.0

Frequency (MHz)	**Average** (dBµV/m)	RBW (kHz)	Height (cm)	Polar.	Azi. (deg.)	Margin (dB)	Limit (dBµV/m)
1481.768908	**32.5**	1000	152.2	V	154.0	21.5	54.0
2184.622770	**24.2**	1000	396.9	V	352.0	29.8	54.0
3665.016145	**40.1**	10000	200.0	H	234.0	13.9	54.0
6910.631691	**31.0**	1000	377.9	V	32.0	23.0	54.0
8716.527530	**30.9**	1000	210.2	V	38.0	23.1	54.0

Limits

According to 47CFR 15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental	Field strength of harmonics
902 MHz - 928 MHz	50 mV/m = 94 dBµV/m	500 µV/m = 54 dBµV/m

According to 47CFR 15.249(d), emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in section 15.209, whichever is the lesser attenuation.

According to 47CFR 15.249(e), the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

According to RSS-210 A2.9(b), emissions radiated the outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to table 2 limits, whichever is the less stringent.

Complies?	Yes

Diagram 1

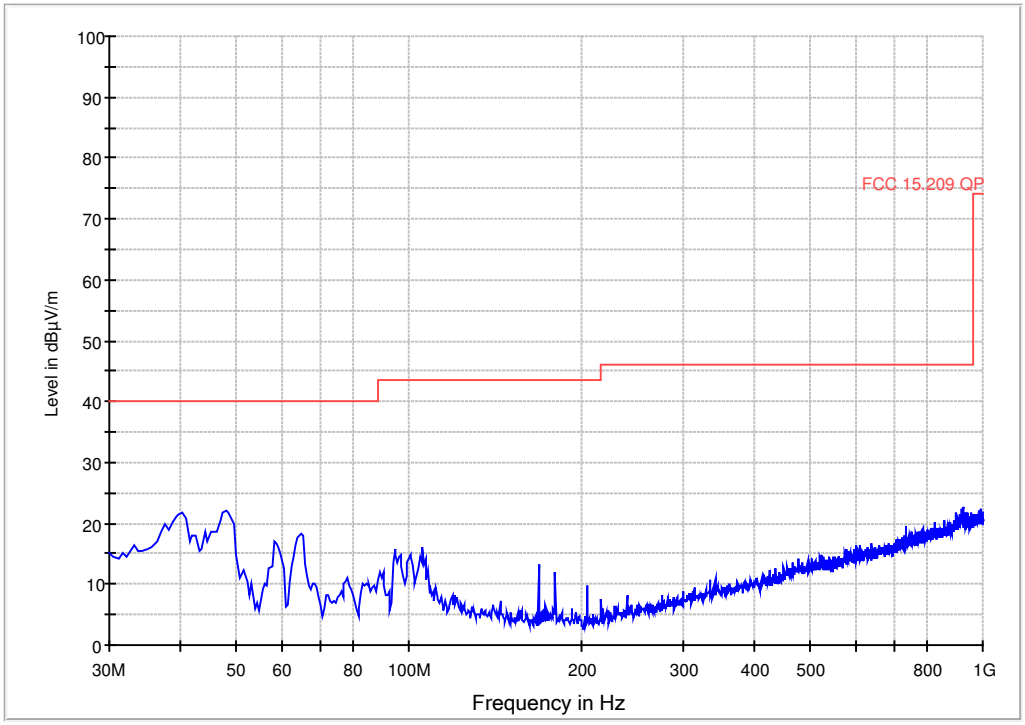


Diagram 2

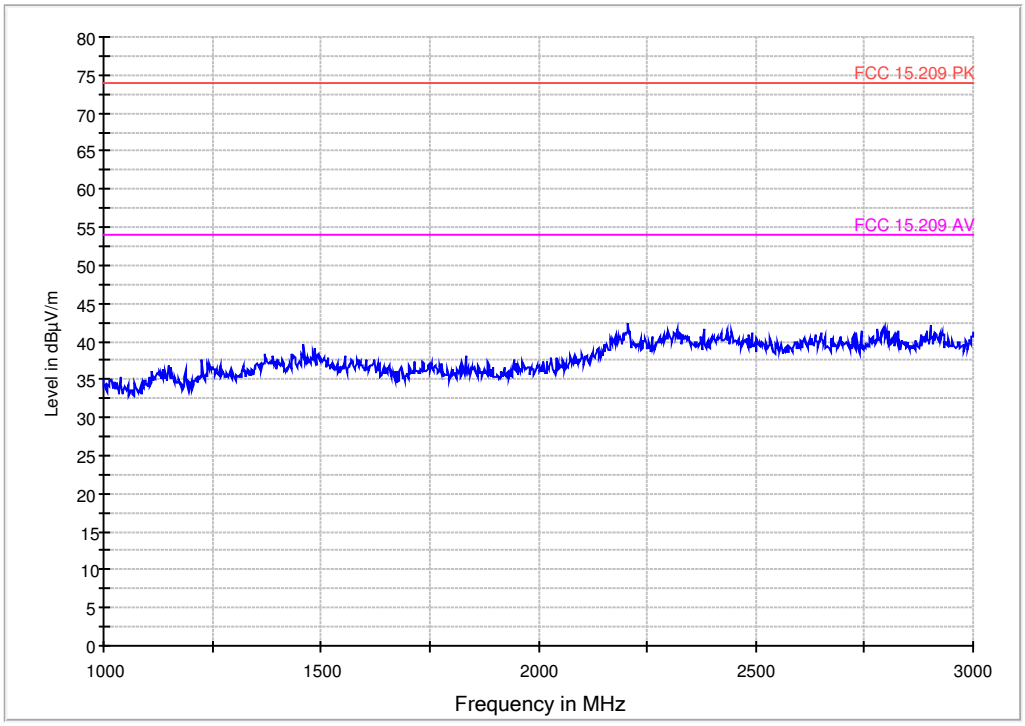


Diagram 3

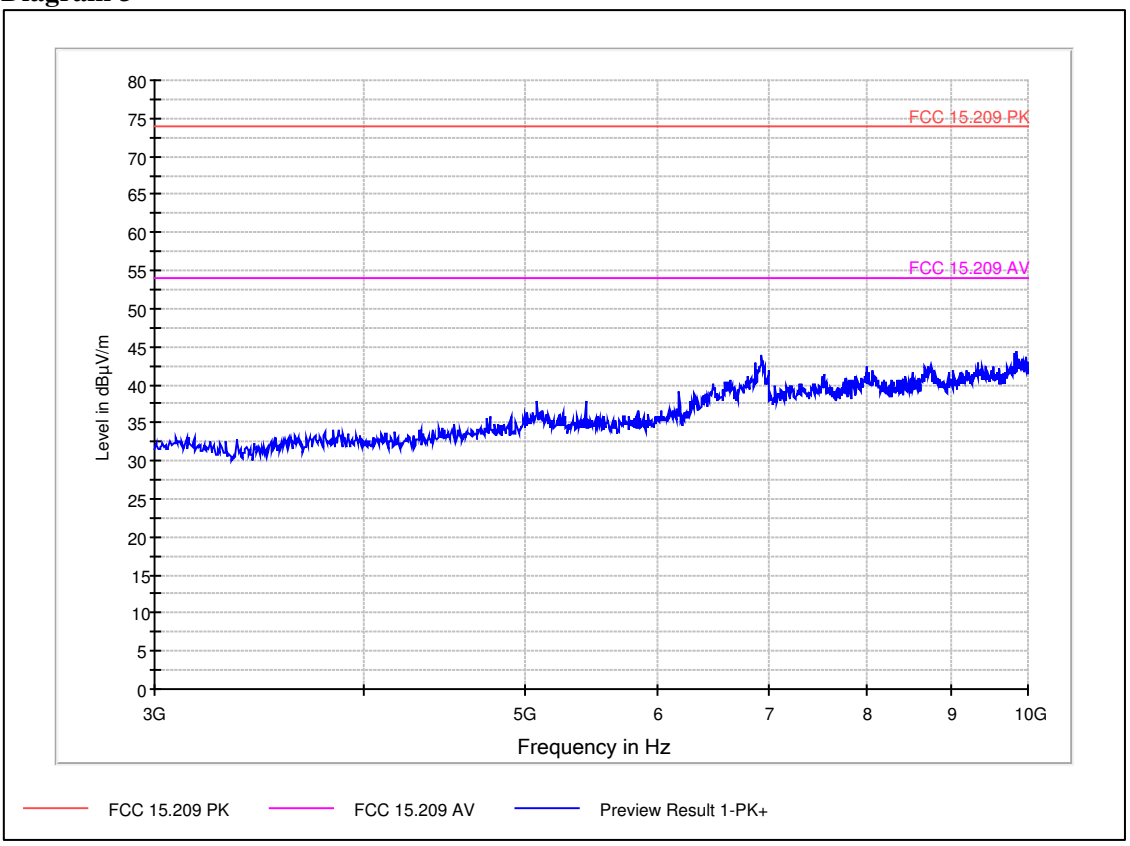


Diagram 4

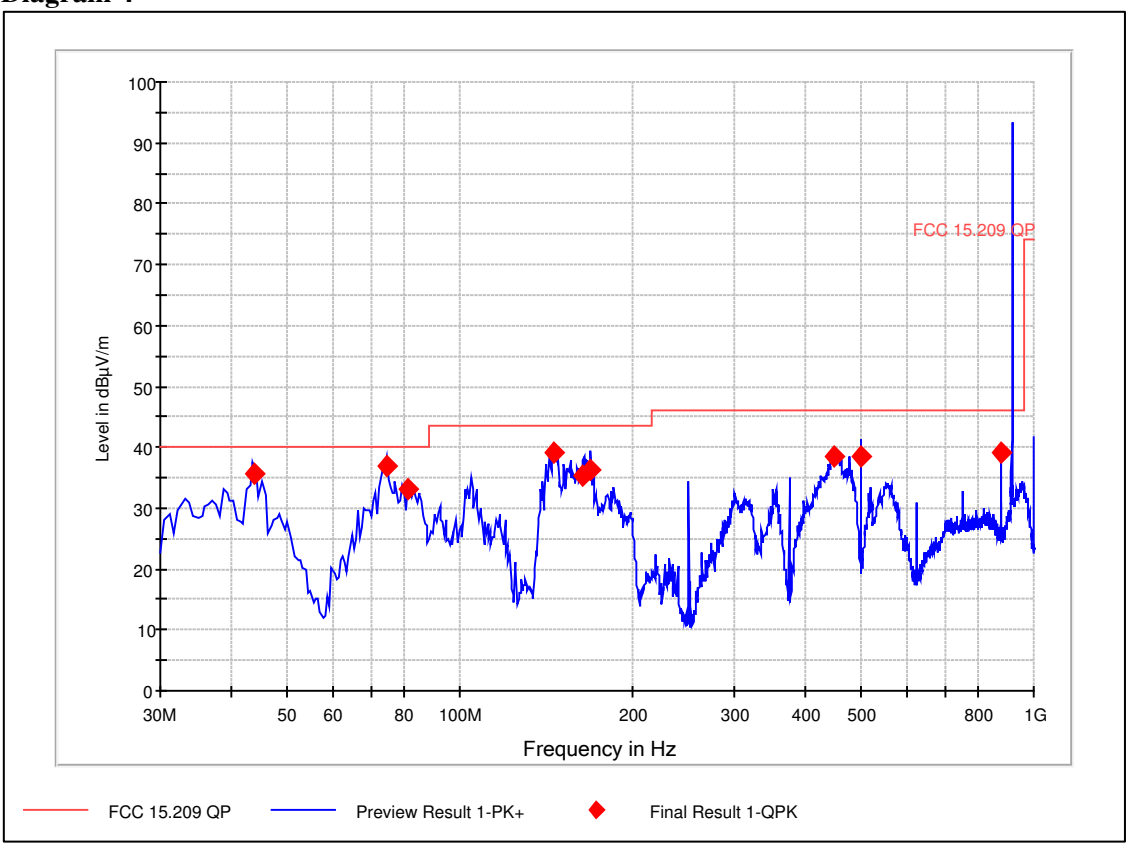


Diagram 5

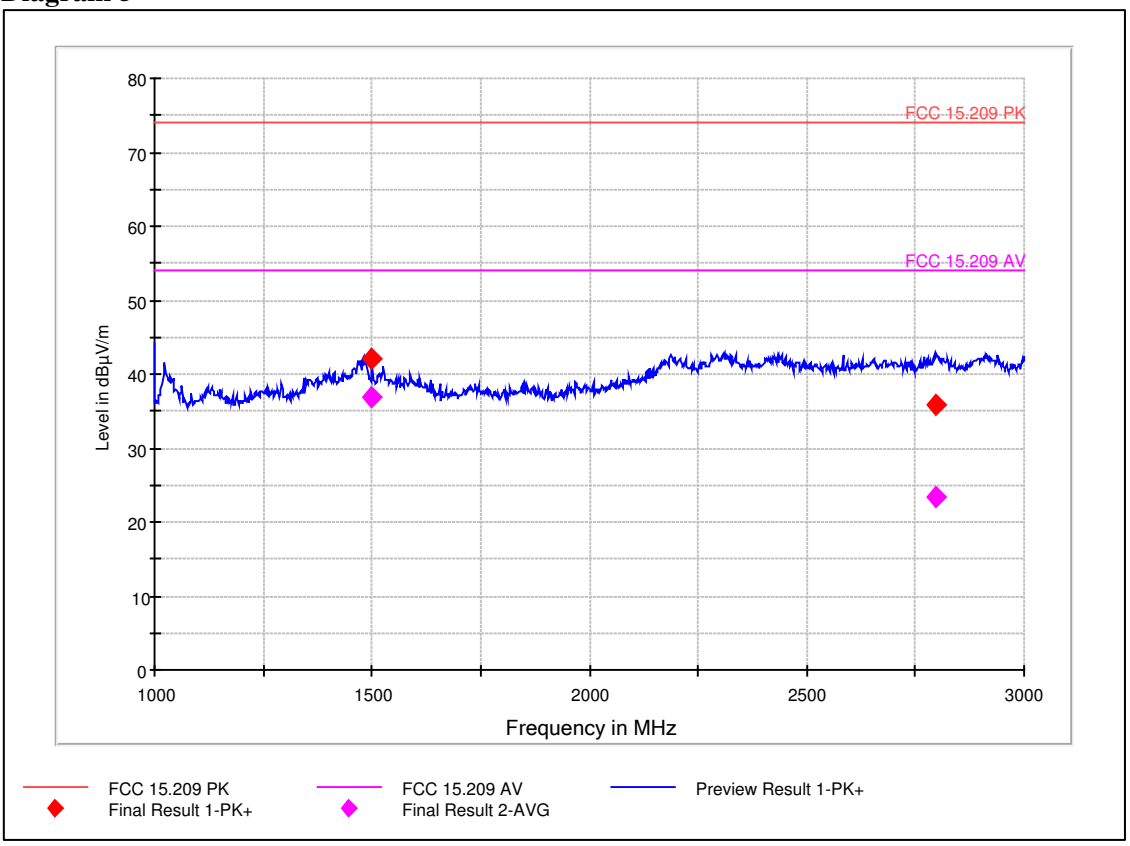
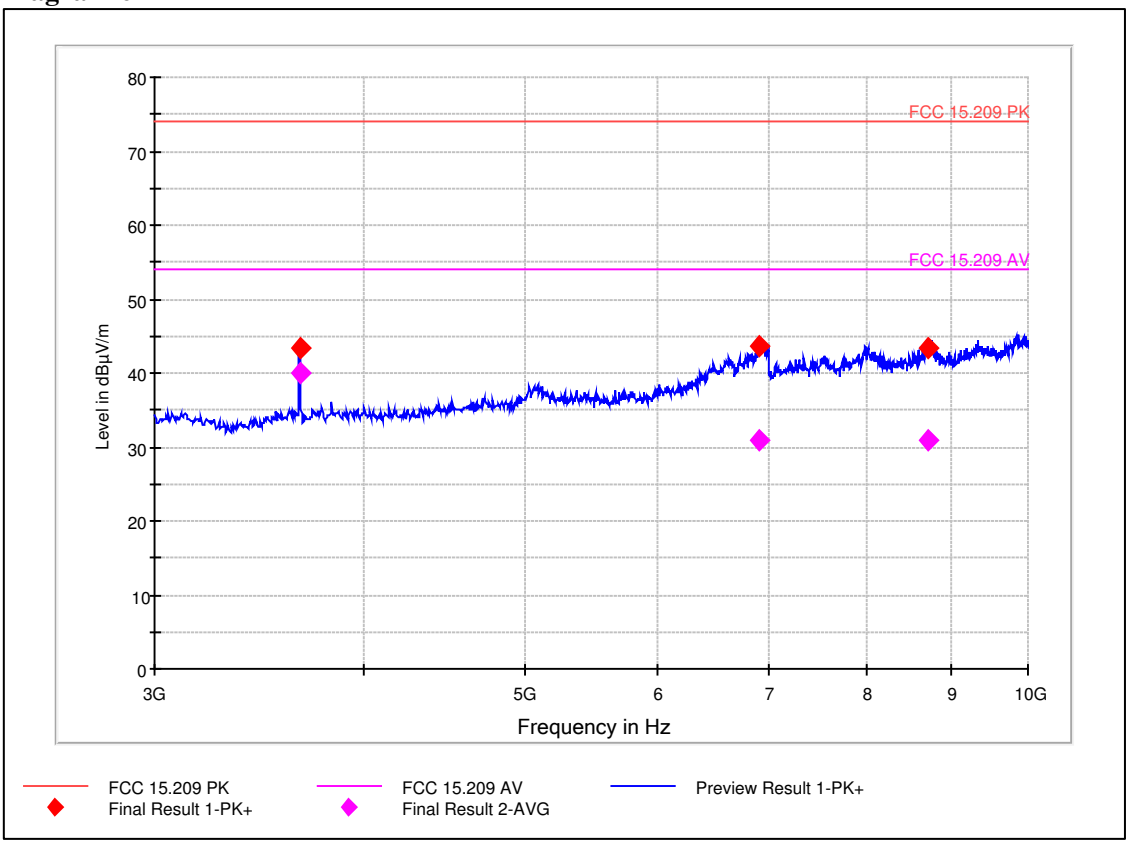


Diagram 6



AC Conducted emission measurements according to FCC 47 CFR part 15.207, class B / RSS-Gen 8.8

Date	Temperature	Humidity
2016-05-24	22 °C ± 3 °C	44 % ± 5 %

Test set-up and procedure

The measurements were performed according to ANSI C63.4-2014.

Measurements were performed with continuous transmission (100% duty cycle) and with normal modulation.
Measurements were performed on the 120 VAC 60 Hz, phase and neutral terminals, at the AC/DC adapter FRIWO 15:4539.
During test the EUT was pinged from a PC through a Ethernet switch.

Test set-up photos during the tests can be found in Appendix 10.

Description	Supplier	Model	ID tag
Analyzer 20Hz-26.5GHz	Rohde&Schwarz	ESIB 26	18880
V-network Two Line	Rohde&Schwarz	ESH3-Z5	13935

Result

The conducted emission spectra can be found in the diagrams below:

Diagram 1:	Ambient phase and neutral. 120 VAC 60 Hz applied,
Diagram 2:	Phase and neutral 120 VAC 60 Hz

Limits

According to 47CFR 15.207 and according to RSS-Gen 8.8,

Frequency (MHz)	Quasi-peak value (dBµV)	Average value (dBµV/m)
0.15-0.5	66-56*	56-46*
0.5-5	56	46
5-30	60	50

*=Decreases with the logarithm of the frequency

Complies?	Yes

Diagram 1

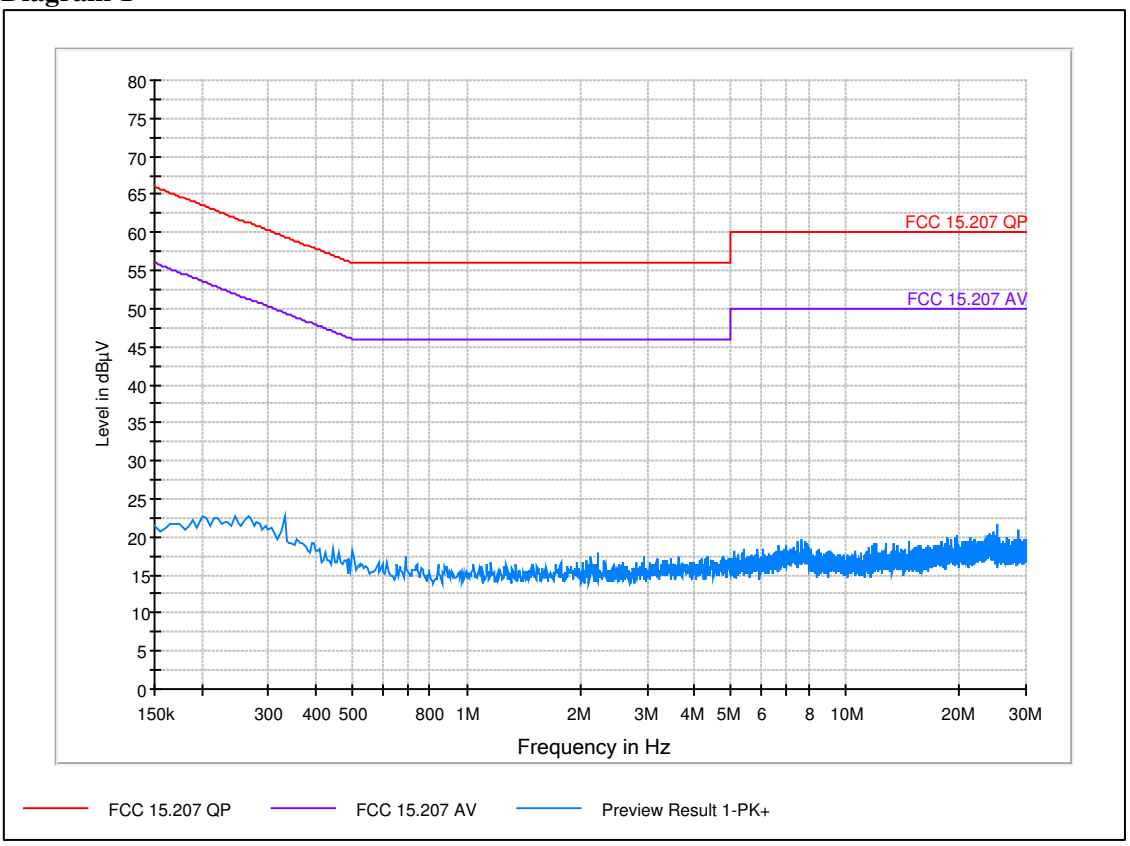
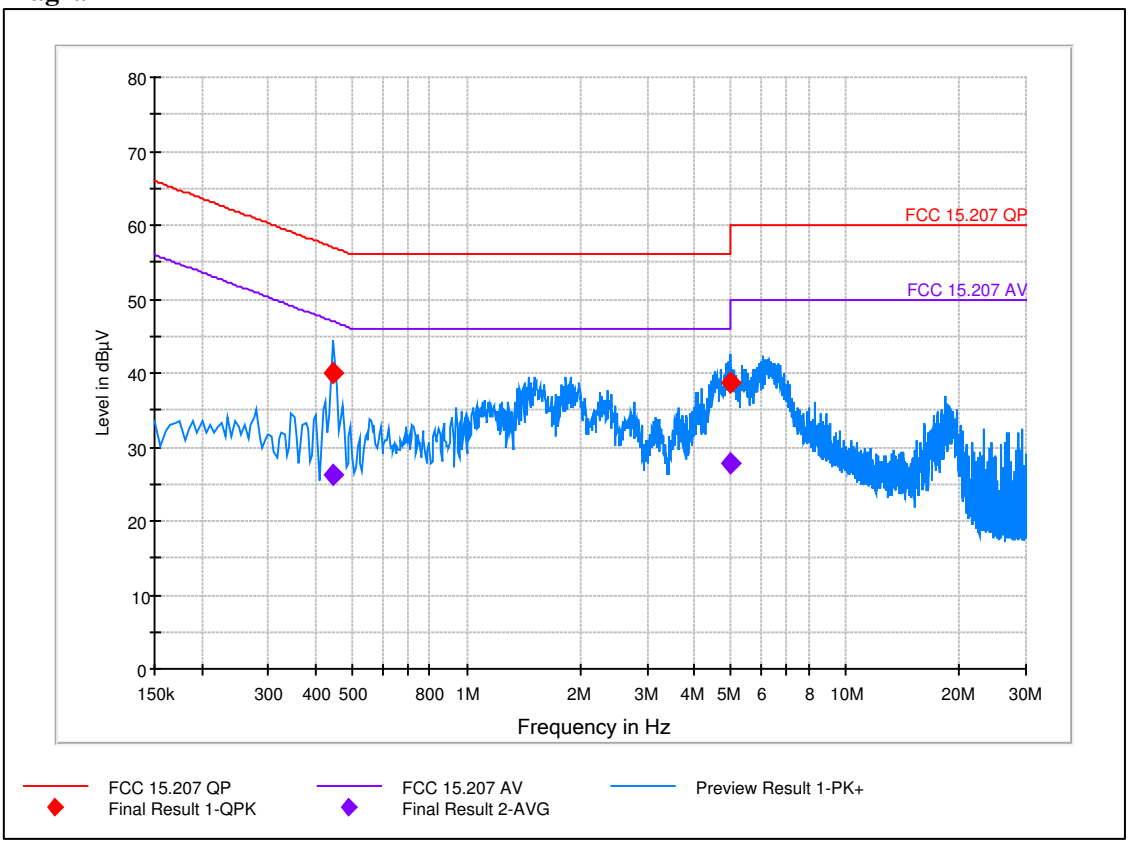


Diagram 2



Final measurements Quasi Peak detector

Frequency (MHz)	**QuasiPeak** (dBµV)	RBW (kHz)	Line	Meas. time (s)	Margin (dB)	Limit (dBµV)
0.445000	**40.1**	9	L1	15	16.80	57.00
4.949900	**38.6**	9	L1	15	17.40	56.00

Final measurements Average detector

Frequency (MHz)	**Average** (dBµV)	RBW (kHz)	Line	Meas. time (s)	Margin (dB)	Limit (dBµV)
0.445000	**26.3**	9	L1	15	20.70	47.00
4.949900	**27.7**	9	L1	15	18.30	46.00

20 dB bandwidth measurements according to FCC 47 CFR part 15.215 (c)

Date	Temperature	Humidity
2016-05-19	22°C ± 3 °C	40% ± 5 %

Test set-up and procedure

The measurements were performed according to ANSI C63.10-2013 cl. 6.9.2.

The test was performed with continuous transmission (100% duty cycle) and with normal modulation. The test was performed with peak detector.

The measurements were performed radiated with EUT 0.8 m above the floor.

Test set-up photos during the tests can be found in Appendix 10.

Description	Supplier	Model	ID tag
Analyzer 20Hz-26.5GHz	Rohde&Schwarz	ESI	20763

Results

The 20 dB BW measurements can be found in the diagram below:

Diagram 1	916.2375 MHz	20 dB BW = **9.92 kHz**

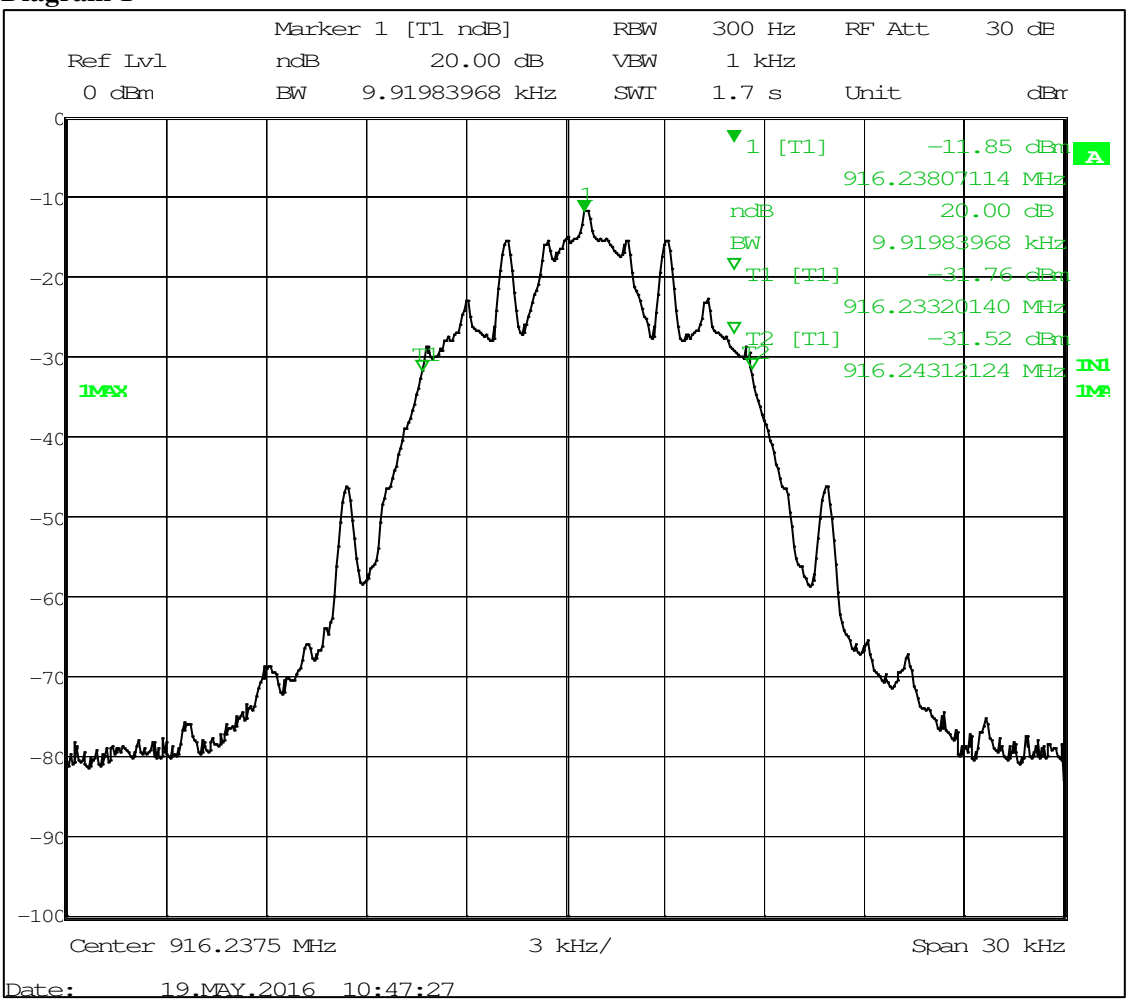
Limits

According to 47CFR 15.215(c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Complies?	Yes

FCC ID: 2AGLF1410104 Appendix 6

Diagram 1



Occupied bandwidth measurements according to 47CFR 2.1049 / RSS-Gen 6.6

Date	Temperature	Humidity
2016-05-19	22°C ± 3 °C	40% ± 5 %

Test set-up and procedure

The measurements were performed according to ANSI C63.10-2013, cl. 6.9.3.

The test was performed with continuous transmission (100% duty cycle) and with normal modulation. The test was performed with peak detector.

The measurements were performed radiated with EUT 0.8 m above the floor.

Test set-up photos during the tests can be found in Appendix 10.

Description	Supplier	Model	ID tag
Analyzer 20Hz-26.5GHz	Rohde&Schwarz	ESI	20763

Results

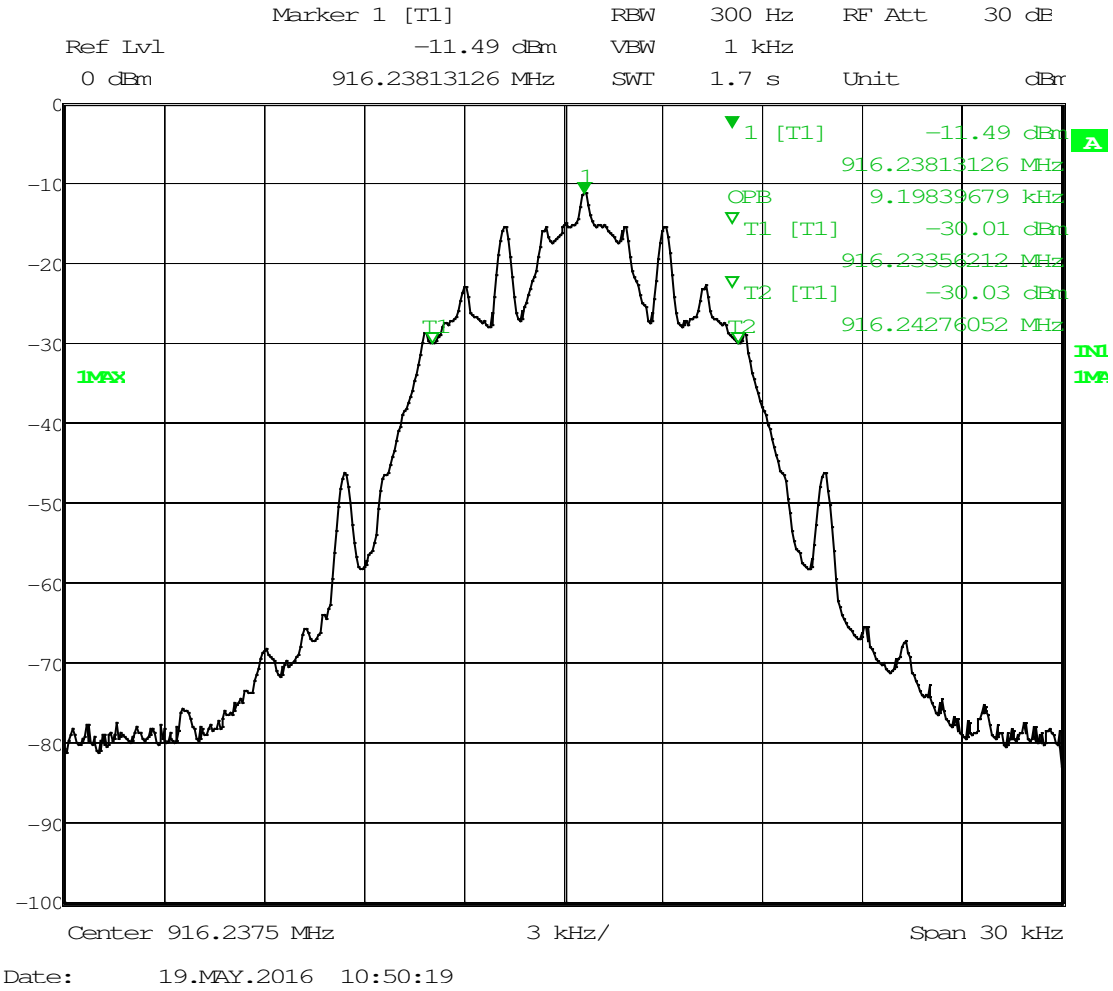
The OBW measurements can be found in the diagram below:

Diagram 1	916.2375MHz	OBW = **9.2 kHz** (99%)

Complies?	Yes

FCC ID: 2AGLF1410104 Appendix 7

Diagram 1



Band edge measurements according to 47CFR 2.1049 / RSS-210 A2.9 (b) / RSS-Gen 8.10

Date	Temperature	Humidity
2016-05-19	22°C ± 3 °C	40% ± 5 %

Test set-up and procedure

The measurements were performed according to ANSI C63.10-2013 cl. 6.10.

The test was performed with continuous transmission (100% duty cycle) and with normal modulation.

The measurements were performed radiated with EUT 0.8 m above the floor.

Test set-up photos during the tests can be found in Appendix 10.

Description	Supplier	Model	ID tag
Analyzer 20Hz-26.5GHz	Rohde&Schwarz	ESI	20763

Results

Operation band 902 MHz - 928 MHz

The pre-measurement diagrams with max. peak detector can be found in the diagrams below.

Diagram 1	916.2375 MHz	Band edge at 902 MHz and 928 MHz

The level is offset to meet the maximal measured radiated power.

No final measurements with QP detector were performed, due to the more than 10 dB margin between limit and max peak level.

Limits

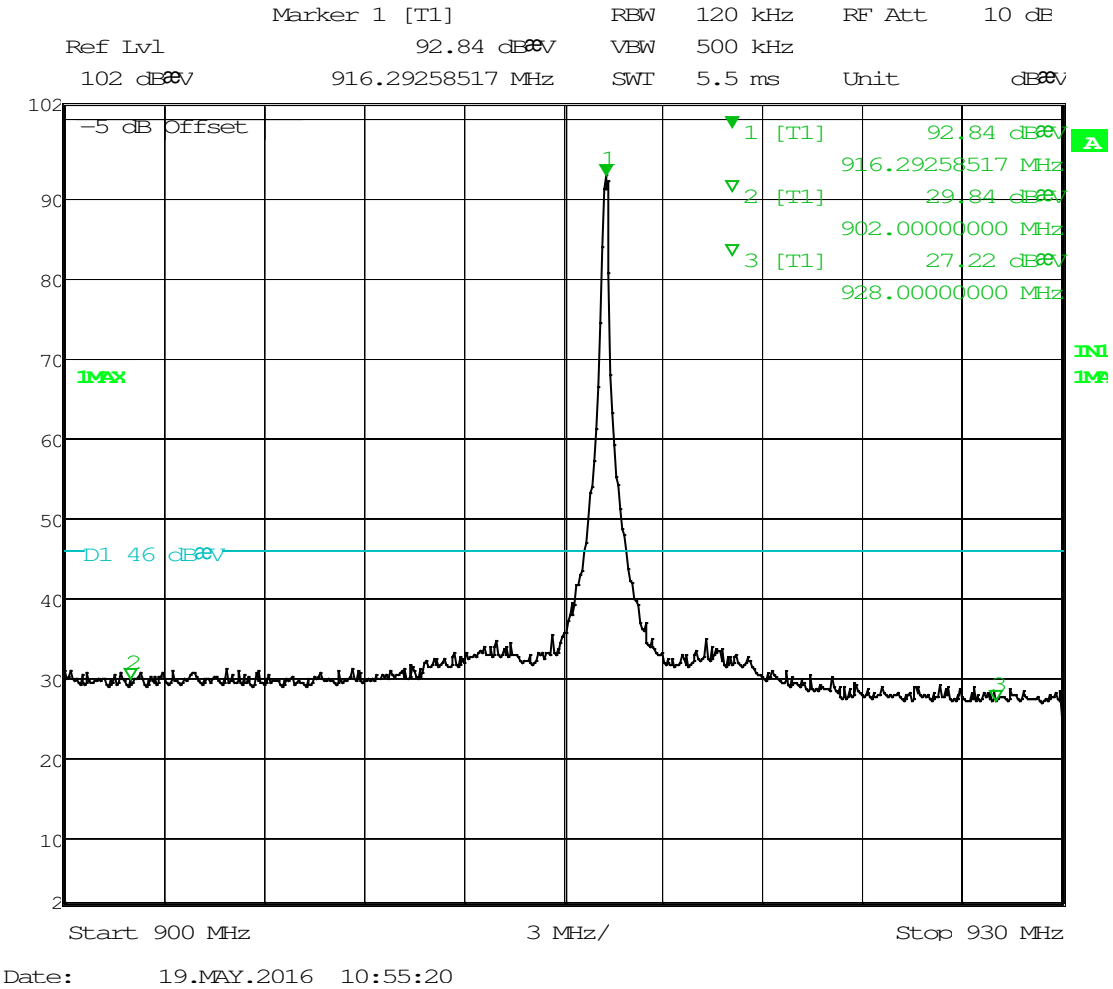
According to 47CFR 15.249(d), emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in section 15.209, whichever is the lesser attenuation.

According to RSS-210 A2.9(b), emissions radiated the outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general field strength limits listed in RSS-Gen, whichever is the less stringent.

Complies?	Yes

FCC ID: 2AGLF1410104 Appendix 8

Diagram 1



RF exposure evaluation: 2.1093 Portable devices / RSS-102 2.5.1

Date	Temperature	Humidity
2016-05-18	22°C ± 3 °C	43% ± 5 %

Procedure

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1093 this device has been defined as a portable device to be used within 20 centimetres of the body of the user.
According to KDB 447498 D01 General RF Exposure Guidance v06.

Results

Standalone SAR exclusion:

The following formula was used to calculate the RF exposure SAR exclusion threshold,
Thld = [Pout/r] x [√f]

where,
Thld = SAR exclusion threshold
Pout = Maximum output power measured with RMS detector, in mW
r = minimum test separation distance , in mm
f=frequency, in GHz
The difference between the output power measured with a RMS detector and a Quasi Peak detector was less than 0.1 dB thus the Quasi peak level measured during maximum fundamental radiation are used for the calculation.

Frequency f, (GHz)	Maximum output power Pout, (mW) Note 2	Distance r, (mm)	Exclusion threshold Thld.	Limit Threshold 1-g SAR	Limit Threshold 10-g SAR
0.9162375	0.75	>5	0.14	< 3	< 7.5

The maximum radiated field strength stated by client was used for calculation.

Max. Field strength (dBµV/m)	Output power Pout (dBm) Note 1	Output power Pout, (mW)
94	-1.2	0.75

Note 1: The measurements were performed in field strength in dBµV/m. The EIRP level was then calculated by the formula $P = (E \times d)^2 / 30 \times G$, with G as unity gain of 1.

Note 2: According to RSS-102 cl. 2.5.1 the RMS value shall be adjusted for tune-up tolerance. According to the client the data sheet for the radio circuit, the RF power accuracy is declared to +0 dB/-7 dB, thus the values at Note 2 are increased with 0 dB.

Limits

FCC- 2.1093 / KDB 447498 D01 General RF Exposure Guidance v06

4.3.1 Standalone SAR exclusion:

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] x [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

• f(GHz) is the RF channel transmit frequency in GHz
• Power and distance are rounded to the nearest mW and mm before calculation
• The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

2) At 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following, , and as illustrated in Appendix B.
a) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
b) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

IC RSS-102 Issue 5 cl. 2.5.1 Exemption from Routine Evaluation Limits – SAR Evaluation

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	193 mW
450	141 mW	159 mW	177 mW	195 mW	123 mW
835	80 mW	92 mW	105 mW	117 mW	67 mW
1900	99 mW	153 mW	225 mW	316 mW	60 mW
2450	83 mW	123 mW	173 mW	235 mW	52 mW
3500	86 mW	124 mW	170 mW	225 mW	55 mW
5800	56 mW	71 mW	85 mW	27 mW	41 mW

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.
For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.

For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.

Complies?	Yes

Photos

The test set-up can be seen in the pictures below.

EUT in X position

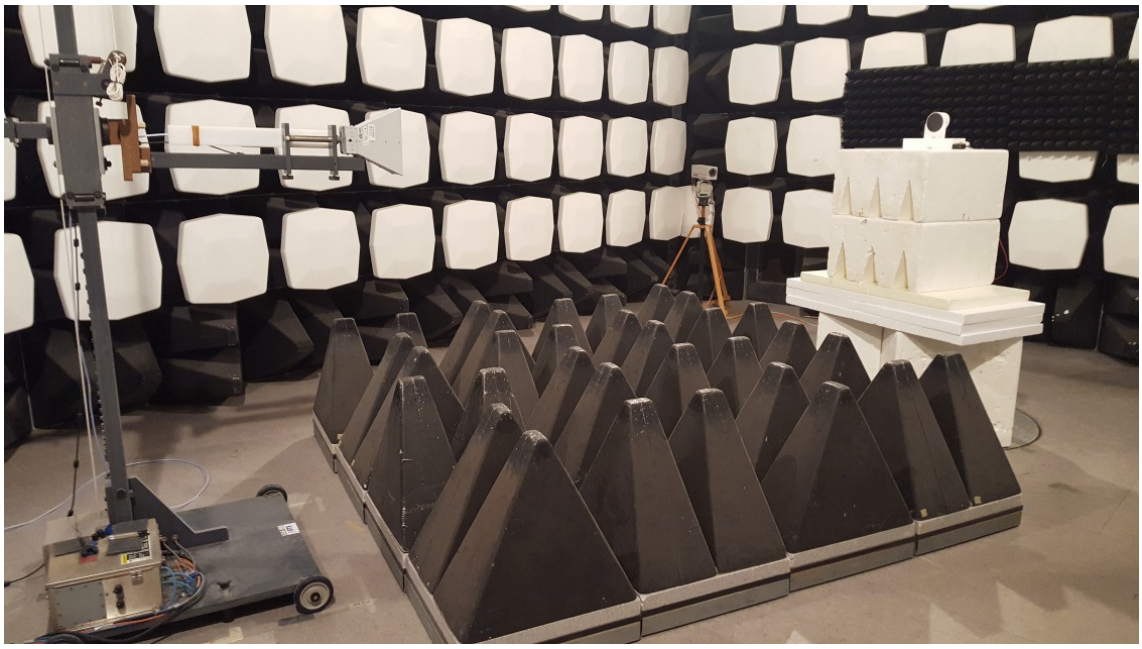
EUT in Y position

EUT in Z position

EUT back view

Radiated measurements below 1 GHz

Radiated measurements 1-10 GHz



Conducted measurements 150 kHz to 30 MHz