**DEKRA Testing and Certification, S.A.U.**
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29507456

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:
80539RRF.006A2

# Partial Test Report

## USA FCC Part 15.247, 15.209
## CANADA RSS-247, RSS-Gen

| | |
|---|---|
| (*) Identification of item tested | ASOH |
| (*) Trademark | Nokia |
| (*) Model and /or type reference | ASOH 476255A |
| Other identification of the product | FCC ID: 2AD8UASOHWIFI-01<br>IC: 109D-ASOHWIFI01 |
| (*) Features | Wi-Fi IEEE 802.11B/G/N/A/AC<br>HW version: ASOH A102<br>SW version: MB_PS_REL_2024_07_0021 |
| Applicant | Nokia<br>Nokia Headquarter Karakaari 7, 02610 Espoo |
| Test method requested, standard | USA FCC Part 15.247 (10-1-23 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.<br>USA FCC Part 15.209 (10-1-23 Edition): Radiated emission limits; general requirements.<br>CANADA RSS-247 Issue 3 (August 2023).<br>CANADA RSS-Gen Issue 5 amendment 2 (February 2021).<br>Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules.<br>558074 D01 Meas Guidance v05r02 dated April 2, 2019.<br>ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices. |
| Approved by (name / position & signature) | José Manuel Gómez Galván<br>EMC Consumer & RF<br>Lab. Manager<br>Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456) |
| Date of issue | 2025-01-28 |
| Report template No | FDT08_25<br>(*) "Data provided by the client" |

# Index

# Acronyms

| Acronym ID | Acronym Description |
|---|---|
| Detector | Detector used |
| Equipment | Equipment Type |
| Freq | Frequency |
| Freq Rng | Frequency Range |
| MP | Measurement Point |
| Mod | Modulation |
| Mode | MIMO Mode |
| Pol | Polarization |
| Port | Active Port |
| Unwanted Freq | Unwanted Emissions Frequency |
| Unwanted Lvl | Unwanted Emissions Level |

# Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification S.A.U. is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification S.A.U. is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.



# General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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# Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the radiated emissions of EUT from 30 MHz to 1 GHz is: Measurement uncertainty ≤ ± 5,35 dB with factor (k = 2).

The total uncertainty of the measurement system for the radiated emissions of EUT from 1 GHz to 17 GHz is: Measurement uncertainty ≤ ± 4,32 dB with factor (k = 2).

The total uncertainty of the measurement system for the radiated emissions of EUT from 17 GHz to 26 GHz is: Measurement uncertainty ≤ ± 5,51 dB with factor (k = 2).

# Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. The sample consists of a ASOH device.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results. The laboratory is not responsible for such information and it is not covered by accreditation.

# Usage of samples

Samples undergoing test have been selected by: The client.

| Id | Control Number | Description | Model | Serial Nº | Date of Reception | Application |
|---|---|---|---|---|---|---|
| S/01 | 80539B_1 | Mobile Network Equipment | ASOH 476255A | L1243307851 | 2024-10-03 | Element Under Test |

Notes referenced to samples during the project:

| Id | Type |
|---|---|
| S/01 | Samples used for Conducted and radiated tests. |

# Test sample description

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ports…… : | **Port name and description** | **Cable** | | | | | |
| | | **Specified max length [m]** | **Attached during test** | **Shielded** | **Coupled to patient(3)** | | |
| | LMP RJ45 | 100m | [X] | [X] | [ ] | | |
| | -48V PSU connector | - | [X] | [X] | [ ] | | |
| | EIF1-2 SFP | optical | [ ] | [X] | [ ] | | |
| | EIF3 RJ45 | 100m | [ ] | [X] | [ ] | | |
| | SEI SFP | optical | [ ] | [X] | [ ] | | |
| | RF1-12 SFP | optical | [ ] | [X] | [ ] | | |
| | EAC 19-pin | - | [ ] | [X] | [ ] | | |
| | SIN 19-pin | - | [ ] | [X] | [ ] | | |
| | SOUT 19-pin | - | [ ] | [X] | [ ] | | |
| Supplementary information to the ports…… : | ..... | | | | | | |
| Rated power supply .....: | **Voltage and Frequency** | | **Reference poles** | | | | |
| | | | **L1** | **L2** | **L3** | **N** | **PE** |
| | [ ] | AC: - | [ ] | [ ] | [ ] | [ ] | [ ] |
| | [ ] | AC: - | [ ] | [ ] | [ ] | [ ] | [ ] |
| | [X] | DC: -49V | | | | | |
| | [ ] | DC: -- | | | | | |
| Rated Power .....: | 248.55 W | | | | | | |
| Clock frequencies.....: | - | | | | | | |
| Other parameters .....: | - | | | | | | |
| Software version .....: | MB_PS_REL_2024_07_0021 | | | | | | |
| Hardware version .....: | ASOH A102 | | | | | | |
| Dimensions in cm (W x H x D) ....: | 440mm x 365mm x 43.5mm (1U) | | | | | | |
| Mounting position .....: | [X] | Table top equipment | | | | | |
| | [X] | Wall/Ceiling mounted equipment | | | | | |

| | | |
|---|---|---|
| | [ ] | Floor standing equipment |
| | [ ] | Hand-held equipment |
| | [X] | Other: Server rack, mobile tower |

| Modules/parts.....: | **Module/parts of test item** | **Type** | **Manufacturer** |
|---|---|---|---|
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |

| Accessories (not part of the test item) .....: | **Description** | **Type** | **Manufacturer** |
|---|---|---|---|
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |

| Documents as provided by the applicant.....: | **Description** | **File name** | **Issue date** |
|---|---|---|---|
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |

(3) Only for Medical Equipment

# Identification of the client

Nokia Solutions and Networks GmbH & Co. KG
Lise-Meitner-Straße 7/1-2, 89081 Ulm, Germany

# Testing period and place

| | |
|---|---|
| **Test Location** | DEKRA Testing and Certification S.A.U. |
| **Date (start)** | 2024-11-08 |
| **Date (finish)** | 2024-11-08 |

# Document history

| Report number | Date | Description |
|---|---|---|
| 80539RRF.006 | 2024-11-14 | First release. |
| 80539RRF.006A1 | 2024-11-22 | Second release. Modification due to typos. This modification test report cancels and replaces the test report 80539RRF.006. |
| 80539RRF.006A2 | 2025-01-28 | Third release. Modification due to changes in the antenna specification. This modification test report cancels and replaces the test report 80539RRF.006A1. |

# Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

| | |
|---|---|
| **Temperature** | Min. = 15 ºC<br>Max. = 35 ºC |
| **Relative humidity** | Min. = 20 %<br>Max. = 75 % |

In the semianechoic chamber, the following limits were not exceeded during the test.

| | |
|---|---|
| **Temperature** | Min. = 15 ºC<br>Max. = 35 ºC |
| **Relative humidity** | Min. = 20 %<br>Max. = 75 % |

# Remarks and comments

The tests have been performed by the technical personnel: Sergio Carrasco.

Used instrumentation:

| Control No. | Equipment | Model | Manufacturer | Next Calibration |
|---|---|---|---|---|
| 07445 | DC POWER SUPPLY 30V/5A | U8002A | KEYSIGHT TECHNOLOGIES | N/A |
| 07760 | DIGITAL MULTIMETER | 175 | FLUKE | 2025-11-07 |
| 07817 | EMI TEST RECEIVER 2Hz-44GHz | ESW44 | ROHDE AND SCHWARZ | 2026-07-01 |
| 06615 | ETHERNET TEMPERATURE AND HUMIDITY LOGGER | HWg-STE | HW GROUP | 2025-04-04 |
| 06609 | ETHERNET TEMPERATURE AND HUMIDITY LOGGER | HWg-STE | HW GROUP | 2025-04-22 |
| 04953 | HIGH PASS FILTER 1.1-8GHz | WHK10-990-1100-8000-40SS | WAINWRIGHT INSTRUMENTS | 2025-02-14 |
| 09029 | HIGH PASS FILTER 17-40 GHZ | STHP-17-40G-92 | TEMSTRON/TEMWELL | 2025-03-29 |
| 08770 | HIGH PASS FILTER 3-18 GHZ | ST-3GA2833-HS | TEMSTRON/TEMWELL | 2025-08-02 |
| 06496 | HORN ANTENNA 1-18GHz | BBHA 9120 D | SCHWARZBECK | 2026-12-01 |
| 04657 | HORN ANTENNA 18-40GHz | BBHA 9170 | SCHWARZBECK | 2026-06-12 |
| 06143 | HYBRID BILOG ANTENNA 30MHz-6GHz | 3142E | ETS LINDGREN | 2027-01-22 |
| 07656 | LOW PASS FILTER TEMSTRON/TEMWELL DC - 1 GHZ | ST-1GA3250-LS | TEMSTRON/TEMWELL | 2025-02-02 |
| 07193 | MULTI-DEVICE CONTROLLER | CO3000 | INNCO | N/A |
| 08856 | PRE-AMPLIFIER G>30dB 18-40GHz | BLMA 1840-4A | BONN ELEKTRONIK | 2025-02-27 |
| 03783 | PRE-AMPLIFIER G>30dB 1GHz-18GHz | BLMA 0118-3A | BONN ELEKTRONIK | 2025-03-15 |
| 06142 | PRE-AMPLIFIER G>38dB 30MHz-6GHz | BLNA 0360-01N | BONN ELEKTRONIK | 2025-07-25 |
| 06144 | PRE-AMPLIFIER G>40dB 10MHz-6GHz | BLNA 0160-01N | BONN ELEKTRONIK | 2025-07-22 |
| 06791 | SEMIANECHOIC ABSORBER LINED CHAMBER IV | FACT 3 200 STP | ETS LINDGREN | N/A |
| 04848 | SOFTWARE FOR EMC/RF TESTING | EMC32 | ROHDE AND SCHWARZ | N/A |

# Testing verdicts

| | |
|---|---|
| Fail | F |
| Inconclusive | I |
| Not applicable | N/A |
| Not measured | N/M |
| Pass | P |

# Summary

| FCC PART 15 PARAGRAPH/ RSS-247 | | | |
|---|---|---|---|
| **Requirement – Test case** | | **Verdict** | **Remark** |
| FCC 15.247 (a)(2) / RSS-247 5.2. (a) | 6 dB Bandwidth | N/M | |
| FCC 15.247 (b) / RSS-247 5.4. (d) | Maximum output power and antenna gain | N/M | |
| FCC 15.247 (d) / RSS-247 5.5. | Band-edge emissions compliance (Transmitter) | N/M | |
| FCC 15.247 (e) / RSS-247 5.2. (b) | Power spectral density | N/M | |
| FCC 15.247 (d) / RSS-247 5.5. | Emission limitations radiated (Transmitter) | P* | (1) |
| Supplementary information and remarks:<br>1. Spot-check of Radiated Spurious Emission has been requested for worst modulation and channel. | | | |

# **Appendix A:** Test results

# INDEX

# TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

| | |
|---|---|
| Vnominal: | -48V |
| Type of Power Supply: | -48V |

ANTENNA (*):

| | |
|---|---|
| Type of Antenna: | Rod Antenna |
| Maximum Declared Antenna Gain: | 3.03 dBi |

TEST FREQUENCIES (*):

| Modulation | Data rates | High Channel |
|---|---|---|
| 802.11b: | 1 Mbit/s | 2462 MHz |

Worst modulation and channel determine according to the higher power spectral density testing.
During transmitter test the EUT was controlled by a SW tool provided by the client to operate in a continuous transmit mode on the modulation schemes and test channels as required.

POWER SETTING (*):
For all modes, the EUT was configured in test mode using a software application. The application was used to enable a continuous transmission and to select the test channels as required. The client supplied instructions to configure the EUT. The customer supplied a power setting table with the maximum level for each mode and band:

| Mode | POWER SETTING |
|---|---|
| | CH11 |
| 11b | 18 |

RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

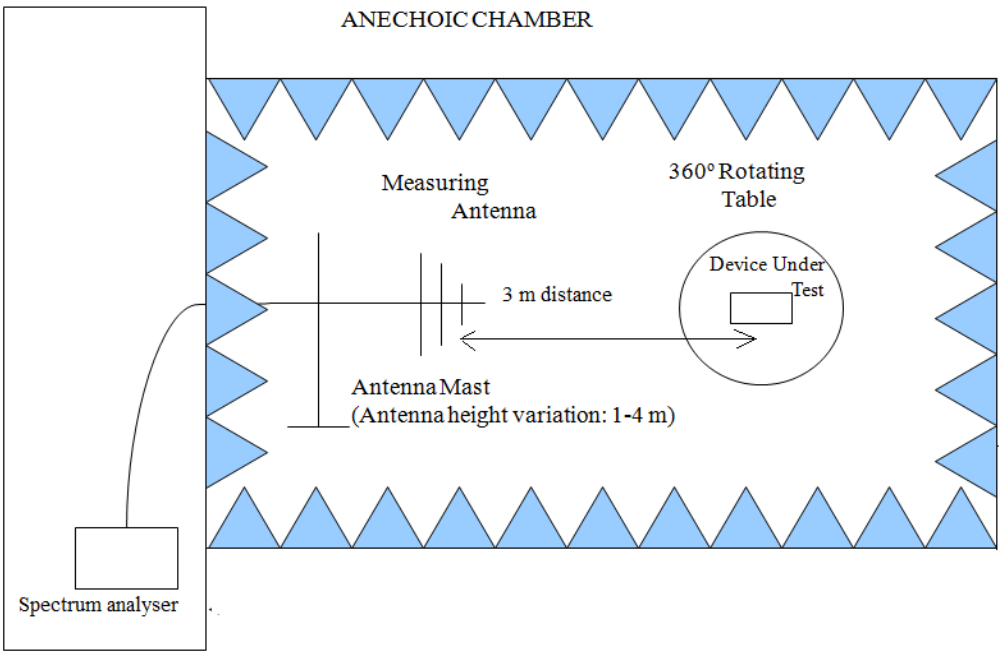
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

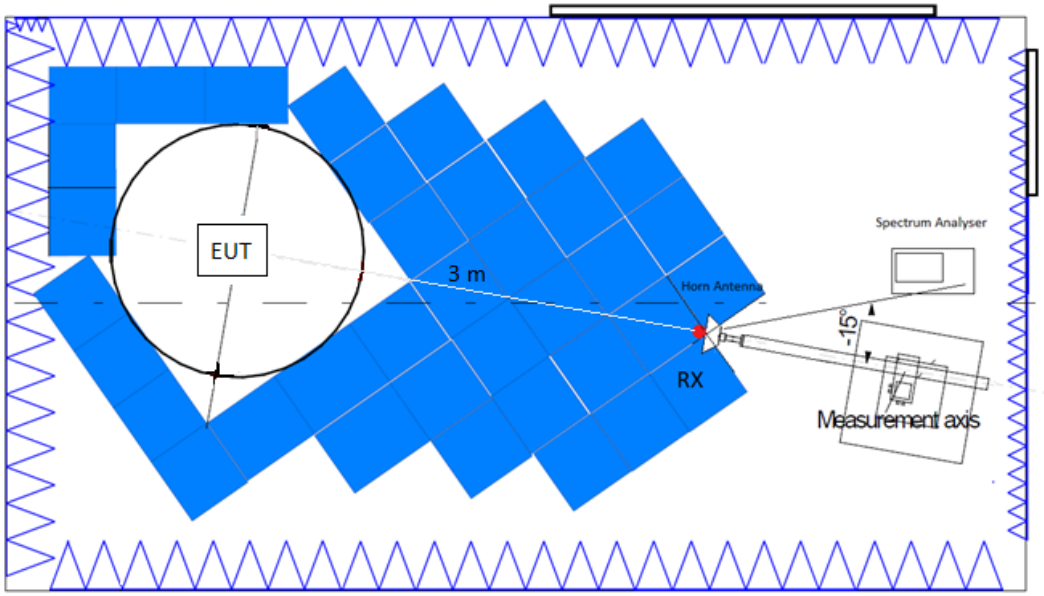
A resolution bandwidth/video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

Radiated measurements setup from 30 MHz to 1 GHz:

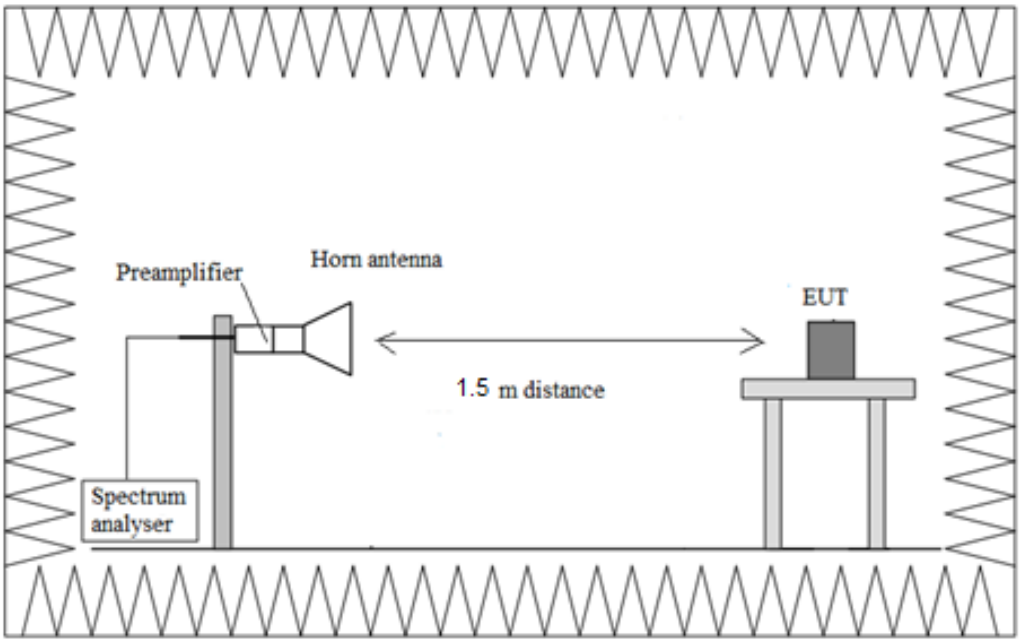



Shielded Control Room For Radiated Measurements

Radiated measurements setup from 1 GHz to 17 GHz:




Radiated measurements setup f > 17 GHz:



# TEST CASES DETAILS

## FCC 47 CFR Part 15.247 / RSS-247

## RSS-247 5.5 / FCC 15.247 (d) [RSE] Emission limitations radiated (Transmitter)

***Limits***

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)/RSS-Gen):

| Frequency Range (MHz) | Field strength (µV/m) | Field strength (dBµV/m) | Measurement distance (m) |
|---|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | - | 300 |
| 0.490-1.705 | 24000/F(kHz) | - | 30 |
| 1.705 - 30.0 | 30 | - | 30 |
| 30 - 88 | 100 | 40 | 3 |
| 88 - 216 | 150 | 43.5 | 3 |
| 216 - 960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247: Attenuation below the general field strength limits specified in RSS-Gen is not required.

***Frequency range tested for Radiated emissions:***

Start frequency: no radiofrequency signal generated in the device found below 10$^{th}$ sub-harmonic, no further investigation required.
Stop frequency: it has been performed the radiated spurious emissions until 10$^{th}$ harmonic.

### *Results*

Modulation: 802.11b (DSSS 1 Mbit/s)

MIMO Mode: SISO

| Freq Rng (GHz) | Equipment | Freq (MHz) | Port | Unwanted Freq (MHz) | Unwanted Lvl (dBµV/m) | Pol | Detector |
|---|---|---|---|---|---|---|---|
| [0.03, 1] | Digital Transmission System (DTS) | 2462.00000 | 1 | 33.249 | 35.17 | V | PK |
| | | | | 33.249 | 32.79 | V | QP |
| | | | | 124.963 | 26.42 | V | PK |
| | | | | 124.963 | 24.11 | V | QP |
| | | | | 187.480 | 32.28 | V | QP |
| | | | | 187.480 | 33.25 | V | PK |
| | | | | 704.441 | 34.11 | H | QP |
| | | | | 704.441 | 38.17 | H | PK |

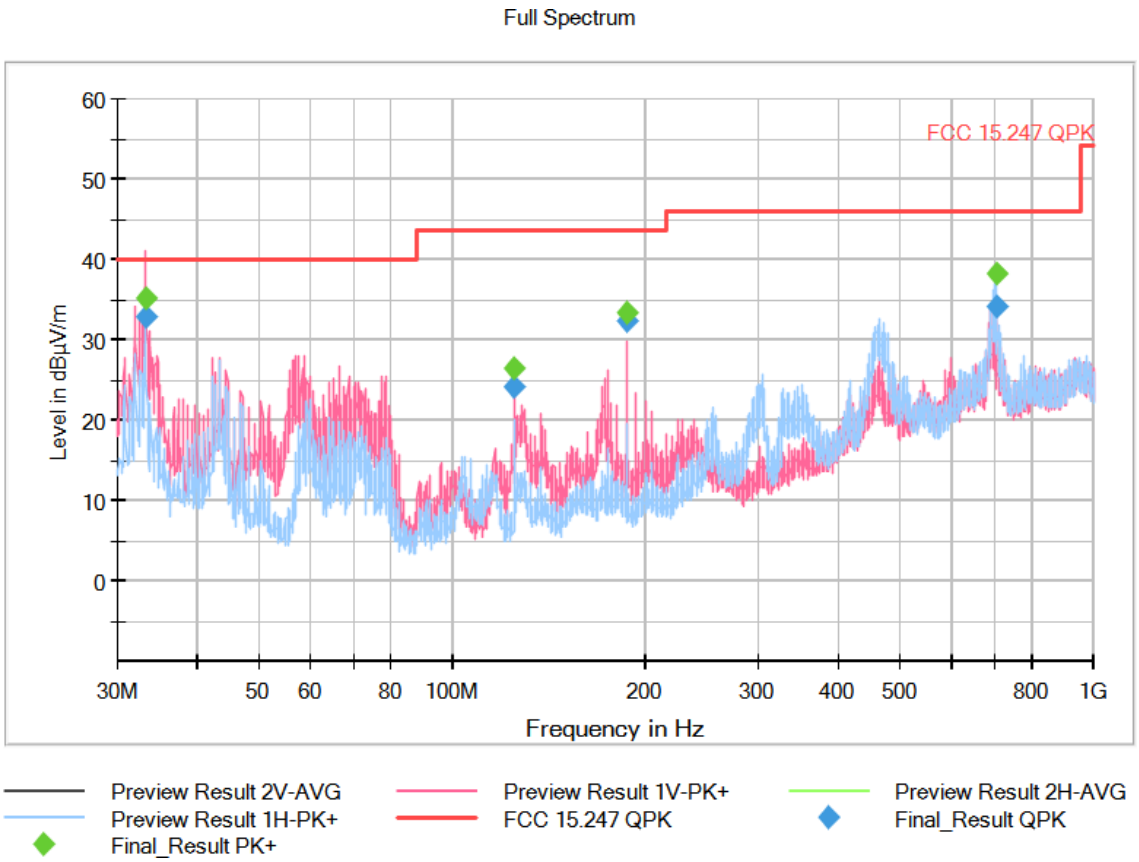
### *Verdict*

Pass

### *Attachments*

| | |
|---|---|
| Frequency Range GHz = [0.03, 1] | Equipment Type = Digital Transmission System (DTS) |
| Modulation = 802.11b (DSSS 1 Mbit/s) | Frequency MHz = 2462.00000 |
| MIMO Mode = SISO | Active Port = 1 |

**Images:**



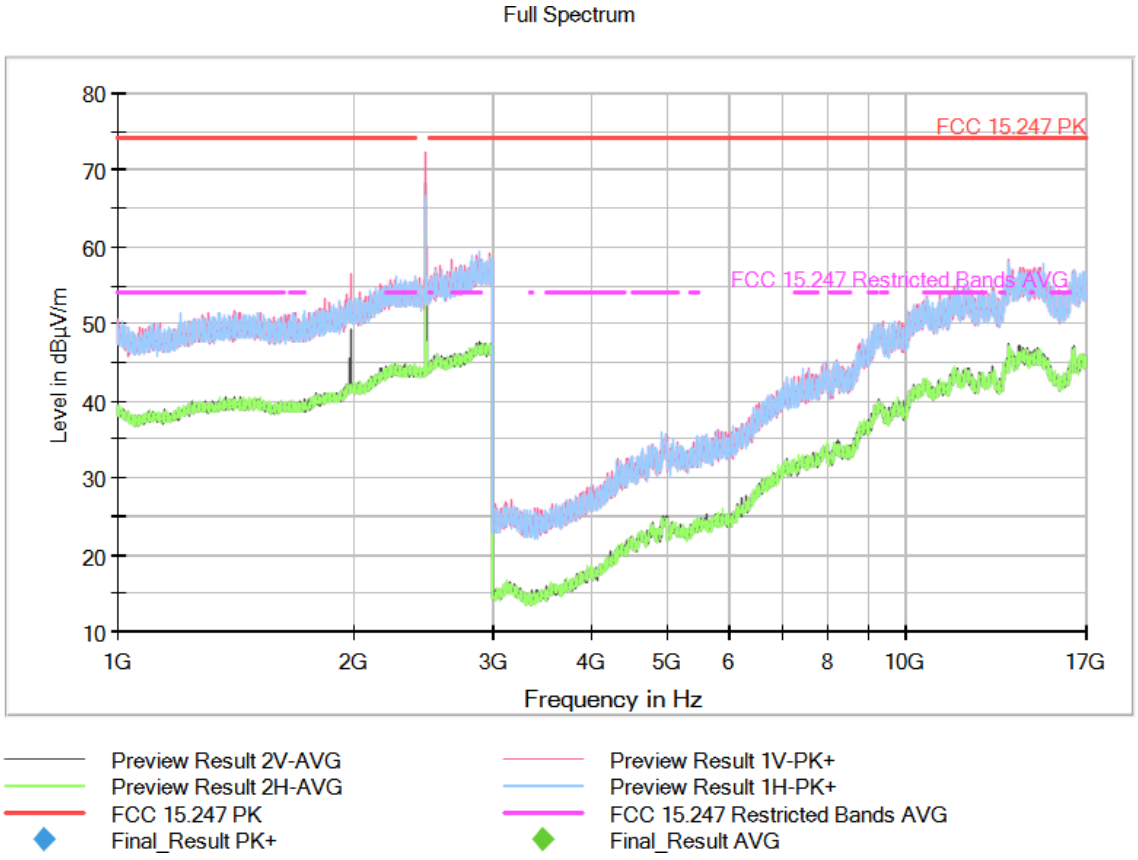

**Tables:**

Spectrum Analyzer Parameters

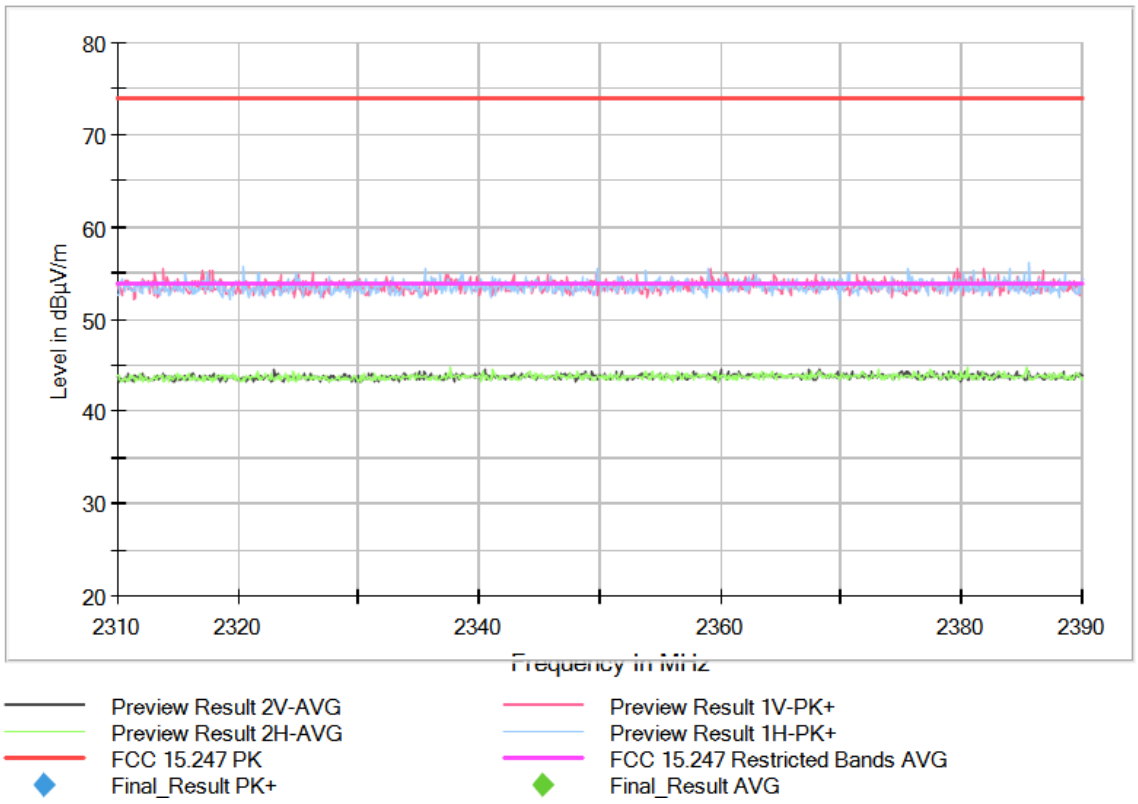
| | Subrange | Step Size | Detectors | Bandwidth | Sweep Time | Preamp |
|---|---|---|---|---|---|---|
| | Receiver: [ESW 44] | | | | | |
| | 30 MHz - 1 GHz | 48,5 kHz | PK+ | 100 kHz | 1 s | 0 dB |

| | |
|---|---|
| Frequency Range GHz = [1, 17] | Equipment Type = Digital Transmission System (DTS) |
| Modulation = 802.11b (DSSS 1 Mbit/s) | Frequency MHz = 2462.00000 |
| MIMO Mode = SISO | Active Port = 1 |

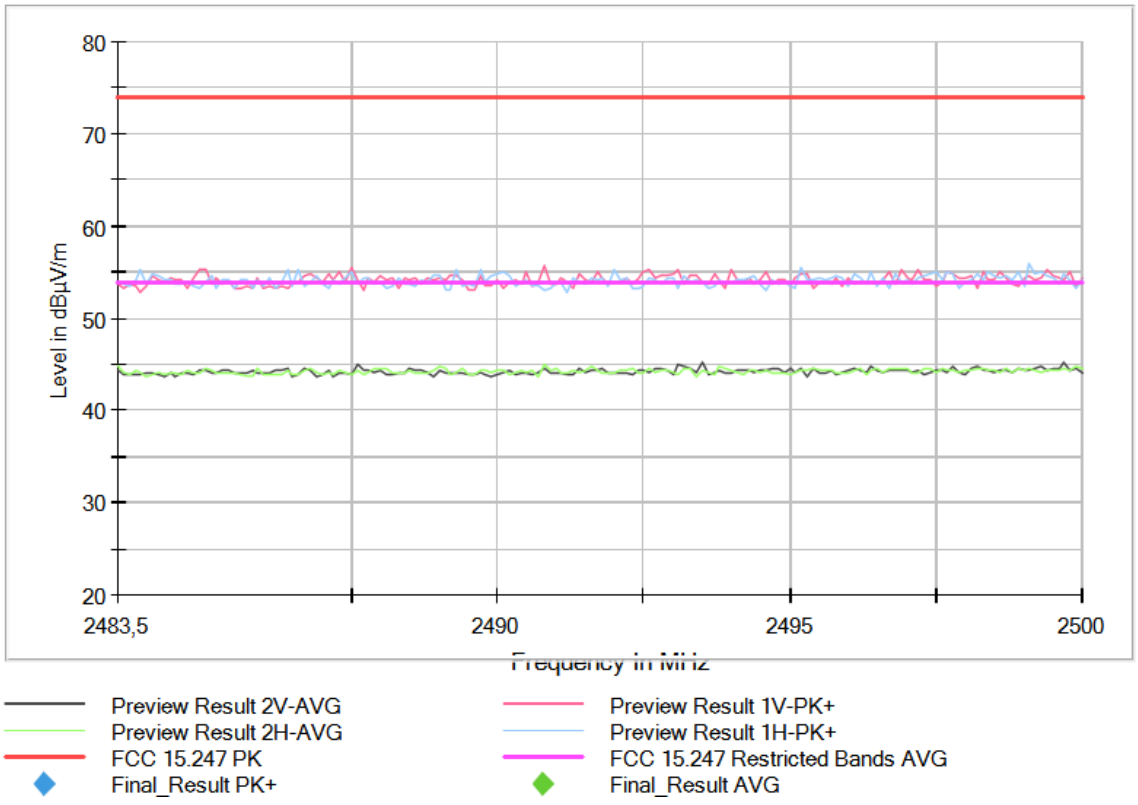
**Images:**



Full Spectrum




Full Spectrum



| | |
|---|---|
| Frequency Range GHz = [17, 26] | Equipment Type = Digital Transmission System (DTS) |
| Modulation = 802.11b (DSSS 1 Mbit/s) | Frequency MHz = 2462.00000 |
| MIMO Mode = SISO | Active Port = 1 |

**Images:**