



- The RvA is a signatory to the EA MLA.
- The RvA is a signatory to the ILAC MRA.
- The RvA is a signatory to the IAF MLA.
- FCC Registration Number: NL0002 / 375449
- ISED CABid: NL0003 / Company number: 27051

Test report No:  
2289002.0501A-RSM

## Test Report

### USA FCC Part 15.247, 15.209

### CANADA RSS-247, RSS-Gen

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (*) Identification of item tested         | UHF Long range RFID Reader                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (*) Trademark                             | Nedap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| (*) Model and /or type reference          | NVR2002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| (*) Features                              | UHF RFID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Other identification of the product       | FCC ID: CGDNVR2002<br>IC: 1444A-NVR2002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| (*) Applicant's name / address            | Nedap N.V.<br>Parallelweg 2, 7141 DC Groenlo,<br>The Netherlands.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 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>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. 558074 D01 Meas Guidance v05r02 dated April 2, 2019.<br>CANADA RSS-247 Issue 3 (August 2023).<br>CANADA RSS-Gen Issue 5 Amendment 1 (March 2019) and Amendment 2 (February 2021).<br>ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices. |
| Verdict Summary                           | IN COMPLIANCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Tested by (name / position & signature)   | Jose Carlos Luque<br>Technical Professional EMC&Wireless                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Approved by (name / position & signature) | Sedat Eser<br>Technical Professional EMC&Wireless                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Date of issue                             | 2024-11-29                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Report template No                        | TRF_RSM_FCC R1.0<br>(*) "Data provided by the applicant"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## INDEX

|                                                                                                               | page |
|---------------------------------------------------------------------------------------------------------------|------|
| Competences and Guarantees.....                                                                               | 4    |
| General conditions.....                                                                                       | 4    |
| Uncertainty.....                                                                                              | 4    |
| Environmental conditions.....                                                                                 | 5    |
| Possible test case verdicts .....                                                                             | 5    |
| Definition of symbols used in this test report.....                                                           | 5    |
| Abbreviations .....                                                                                           | 5    |
| Data provided by the applicant .....                                                                          | 6    |
| Document History .....                                                                                        | 6    |
| Conclusion, Remarks and Comments .....                                                                        | 6    |
| 1 General Information.....                                                                                    | 7    |
| 1.1 General Description of the Item(s) .....                                                                  | 7    |
| 1.2 Test data .....                                                                                           | 9    |
| 2 Description of Test Setup .....                                                                             | 10   |
| 2.1 Sample(s) used for tests .....                                                                            | 10   |
| 2.2 Operating mode(s) used for tests.....                                                                     | 10   |
| 2.3 Port(s) of the EUT .....                                                                                  | 10   |
| 2.4 Support / Auxiliary equipment / unit / software for the EUT .....                                         | 11   |
| 2.5 Test Configuration / Block diagram used for tests .....                                                   | 11   |
| 2.6 Test conditions .....                                                                                     | 11   |
| 3 Verdict summary section .....                                                                               | 14   |
| 3.1 Standards .....                                                                                           | 14   |
| 3.2 Overview of results – FHHS equipment.....                                                                 | 14   |
| 3.3 Deviation(s) from the Standard(s) / Test Specification(s) .....                                           | 14   |
| 4 Test Results HFS 902MHz .....                                                                               | 15   |
| 4.1 Product Information .....                                                                                 | 15   |
| 4.2 FCC Section 15.247 (a) (1) / RSS-247 Clause 5.1 (c). 20dB bandwidth and Carrier frequency separation..... | 16   |
| 4.3 FCC Section 15.247 (a) (1) (i) / RSS-247 Clause 5.1 (c). Number of hopping channels .....                 | 20   |
| 4.4 FCC Section 15.247 Subclause (a) (1) (i) / RSS-247 Clause 5.1 (c). Time of occupancy (Dwell Time) .....   | 22   |
| 4.5 FCC Section 15.247 (b) (2) / / RSS-247 Clause 5.4 (a). Maximum output power and antenna gain ...          | 24   |
| 4.6 FCC Section 15.247 Subclause (d) / RSS-247 Clause 5.5. Band-edge emissions compliance (Transmitter).....  | 26   |
| 4.7 FCC Section 15.247 Subclause (d). Emission limitations radiated (Transmitter).....                        | 29   |



5    Annex 1 - Measurement Uncertainties .....43

6    Annex 2: Used Equipment.....44

7    Annex 3: TEST PHOTOS .....45

## COMPETENCES AND GUARANTEES

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The DEKRA is a testing laboratory competent to carry out the tests described in this report.

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

DEKRA 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 in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA 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.

**IMPORTANT:** No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

## GENERAL CONDITIONS

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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.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

## UNCERTAINTY

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Uncertainties have been calculated according to the DEKRA internal document AM#2224. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%. Refer to the Annex 1 for further information.

## ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

|                       |                  |
|-----------------------|------------------|
| Ambient temperature   | 15 °C – 35 °C    |
| Relative Humidity air | 30% - 60%        |
| Atmospheric pressure  | 86 kPa – 106 kPa |

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

## POSSIBLE TEST CASE VERDICTS

|                                         |                 |
|-----------------------------------------|-----------------|
| Test case does not apply to test object | N/A             |
| Test object does meet requirement       | P (Pass) / PASS |
| Test object does not meet requirement   | F (Fail) / FAIL |
| Not measured                            | N/M             |

## DEFINITION OF SYMBOLS USED IN THIS TEST REPORT

|                                                                                                                                        |                          |           |                                               |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------|-----------------------------------------------|
| <input checked="" type="checkbox"/> Indicates that the listed condition, standard or equipment is applicable for this report/test/EUT. |                          |           |                                               |
| <input type="checkbox"/> Indicates that the listed condition, standard or equipment is not applicable for this report/test/EUT.        |                          |           |                                               |
| Decimal separator used in this report                                                                                                  | <input type="checkbox"/> | Comma (,) | <input checked="" type="checkbox"/> Point (.) |

## ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

|      |                          |
|------|--------------------------|
| EUT  | : Equipment Under Test   |
| DUT  | : Device Under Test      |
| QP   | : Quasi-Peak             |
| PK   | : Peak                   |
| AV   | : Average                |
| SAC  | : Semi-Anechoic Chamber  |
| OATS | : Open Area Test Site    |
| RBW  | : Resolution Bandwidth   |
| VBW  | : Video Bandwidth        |
| Tx   | : Transmitter            |
| Rx   | : Receiver               |
| N/A  | : Not Applicable         |
| N/M  | : Not Measured           |
| RGP  | : Reference Ground Plane |
| TX   | : Transmission           |
| RX   | : Reception              |

## DATA PROVIDED BY THE APPLICANT

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' and 'Features').

DEKRA Certification B.V. declines any responsibility with respect to the information provided by the applicant and that may affect the validity of results.

## DOCUMENT HISTORY

| Report nr.        | Date       | Description                                                                                                                                                                                                                                                                                                                                           |
|-------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2289002.0501-RSM  | 2024-11-07 | First release.                                                                                                                                                                                                                                                                                                                                        |
| 2289002.0501A-RSM | 2024-11-29 | Second release. Add the 99% Occupied bandwidth measurements. FCC Listed Registration Number and ISED CABid were added in the cover. The photo annex was removed. This annex will go into a separate report containing only the photos. This revision of the test report cancels and replaces the test report with a reference number 2289002.0501-RSM |
|                   |            |                                                                                                                                                                                                                                                                                                                                                       |

## CONCLUSION, REMARKS AND COMMENTS

The equipment under test (EUT) does meet the requirements of the stated standard(s)/test(s).

## 1 GENERAL INFORMATION

### 1.1 General Description of the Item(s)

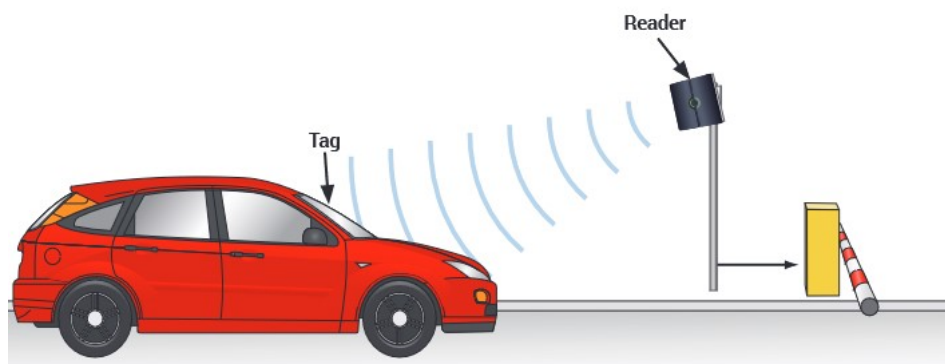
|                               |                                                  |
|-------------------------------|--------------------------------------------------|
| Description of the item ..... | UHF Long range RFID Reader                       |
| Model / Type number .....     | NVR2002                                          |
| Serial number .....           | S718 A03 002                                     |
| Trademark .....               | Nedap                                            |
| Manufacturer .....            | Nedap N.V.                                       |
| Address .....                 | Parallelweg 2, 7141 DC Groenlo, The Netherlands. |

|                                            |                                  |
|--------------------------------------------|----------------------------------|
| Operating frequency range(s) – Tx and RX:: | 902.75 – 927.25 MHz              |
| Number of channel .....                    | 50                               |
| Type of modulation .....                   | PR-ASK                           |
| Antenna type .....                         | Circular polarized Patch Antenna |
| Antenna gain .....                         | 9.45dBi                          |
| Channel bandwidth                          | 200 KHz                          |
| Channel spacing                            | 500 KHz                          |

| Rated power supply .....           | Voltage and Frequency                     |                                | Power connection type    |                          |                          |                          |                          |
|------------------------------------|-------------------------------------------|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                                    |                                           |                                | L1                       | L2                       | L3                       | N                        | PE                       |
|                                    | <input type="checkbox"/>                  | AC: 220 – 240 V, 50/60 Hz      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                                    | <input type="checkbox"/>                  | AC: 100 – 240 V, 50/60 Hz      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                                    | <input checked="" type="checkbox"/>       | DC: 12 – 24 V                  |                          |                          |                          |                          |                          |
|                                    | <input type="checkbox"/>                  | Battery:                       |                          |                          |                          |                          |                          |
| Rated Power .....                  | 15W (24VDC, 0,5A or 12VDC, 1A)            |                                |                          |                          |                          |                          |                          |
| Clock frequencies .....            | 64 MHz                                    |                                |                          |                          |                          |                          |                          |
| Other parameters .....             | UHF RFID                                  |                                |                          |                          |                          |                          |                          |
| Software version .....             | Main: 1.7<br>UHF: 2.00.00<br>LINUX: 0.2.0 |                                |                          |                          |                          |                          |                          |
| Hardware version .....             | NVR2002 A.02                              |                                |                          |                          |                          |                          |                          |
| Dimensions in cm (W x H x D) ..... | 241 x 225 x 102                           |                                |                          |                          |                          |                          |                          |
| Mounting position .....            | <input type="checkbox"/>                  | Table top equipment            |                          |                          |                          |                          |                          |
|                                    | <input checked="" type="checkbox"/>       | Wall/Ceiling mounted equipment |                          |                          |                          |                          |                          |
|                                    | <input type="checkbox"/>                  | Floor standing equipment       |                          |                          |                          |                          |                          |
|                                    | <input type="checkbox"/>                  | Hand-held equipment            |                          |                          |                          |                          |                          |
|                                    | <input type="checkbox"/>                  | Other:                         |                          |                          |                          |                          |                          |

### Intended use of the Equipment Under Test (EUT)

The NVR2002 RFID Transceiver is a transceiver for monitoring access control at the perimeter of a parking space for the purpose of vehicle identification. It operates at 865.7 – 867.5MHz at 33dBm E.R.P for ETSI regions and at 900 – 930MHz at 36dBm EIRP for FCC regions. The transceiver supports all UHF EPC Class 1 Gen 2 tags according to ISO18000-6C standard. Tags are detected at maximum 8m for seamless entry and exit of the parking space. The tagnumber is forwarded to the microcontroller and distributed to the Access control system (not part of the certification) via a communication interface of choice. (USB, RS485, Wiegand / magstripe, Ethernet TCP/IP)



| No | Documents as provided by the applicant - Description | File name                                        | Issue date |
|----|------------------------------------------------------|--------------------------------------------------|------------|
| 1  | General information form                             | NVR2002 - 01 General information form v1.0SIGNED | 2024-08-27 |
| 2  | Antenna information                                  | NVR2002 - Antenna information rev. 0.0           | 2024-03-06 |

|                                                     |                                     |     |                          |  |
|-----------------------------------------------------|-------------------------------------|-----|--------------------------|--|
| Modifications to the test item during testing ..... | <input checked="" type="checkbox"/> | N/A | <input type="checkbox"/> |  |
|-----------------------------------------------------|-------------------------------------|-----|--------------------------|--|



Copy of marking plate:

|                                                                                                                                                                                                                 |                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <br>Nedap N.V.<br>Parallelweg 2, 7141DC Groenlo, Nether<br><b>9234357</b><br>UPASS NVR2002 FCC<br><br>RATING : 12VDC, 1A   24V | <b>9234357</b><br><br>MODEL : NVR2002<br>FCC ID : CGDNVR2002<br>IC : 1444A-NVR2002<br><br>c ( LI [ E |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|

1.2 Test data

|               |                                       |
|---------------|---------------------------------------|
| Test Location | DEKRA Certification B.V., Netherlands |
| Date (start)  | 2024-08-09                            |
| Date (finish) | 2024-08-29                            |

## 2 DESCRIPTION OF TEST SETUP

### 2.1 Sample(s) used for tests

During the tests the following sample(s) has(have) been used.

| Sample                                                                           | Logistics number | Model number | Serial number | Remark(s) / Changes |
|----------------------------------------------------------------------------------|------------------|--------------|---------------|---------------------|
| 01                                                                               | 104692 / 1-1     | NVR2002      | Sample E      | See 1               |
| 02                                                                               | 104692 / 1-8     | NVR2002      | Sample D      | See 2               |
| <u>Supplementary information:</u><br>1. Radiated Sample.<br>2. Conducted Sample. |                  |              |               |                     |

### 2.2 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

| Operating mode                       | Description of the operating mode                                                    | Used for testing                    |
|--------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------|
| 1                                    | EUT ON. MS in TX continuous modulated carrier at 902.15MHz, 916.25MHz and 927.25MHz. | <input checked="" type="checkbox"/> |
| 2                                    | EUT ON. MS in hopping mode. TX continuous modulated carrier in 50 channels.          | <input checked="" type="checkbox"/> |
| <u>Supplemental information:</u> --- |                                                                                      |                                     |

### 2.3 Port(s) of the EUT

| Port name and description            | Connected to / Termination | Cable                       |                                     |                          |
|--------------------------------------|----------------------------|-----------------------------|-------------------------------------|--------------------------|
|                                      |                            | Length used during test [m] | Attached during test                | Shielded                 |
| K0: USB                              | AE0<br>SW0                 | --                          | <input type="checkbox"/>            | <input type="checkbox"/> |
| K1: VDC                              | AE1                        | >2                          | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| K2: WIEGAND                          | AE2                        | --                          | <input type="checkbox"/>            | <input type="checkbox"/> |
| K3: GPIO                             | AE3                        | --                          | <input type="checkbox"/>            | <input type="checkbox"/> |
| K4: RS485                            | AE4                        | --                          | <input type="checkbox"/>            | <input type="checkbox"/> |
| K5: ETHERNET                         | AE5                        | >2                          | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| K6: RELAY                            | AE6                        | --                          | <input type="checkbox"/>            | <input type="checkbox"/> |
| K7: HF+                              | AE7                        | --                          | <input type="checkbox"/>            | <input type="checkbox"/> |
| K8: TAMP                             | AE8                        | --                          | <input type="checkbox"/>            | <input type="checkbox"/> |
| K9: RDIS                             | AE9                        | --                          | <input type="checkbox"/>            | <input type="checkbox"/> |
| <u>Supplemental information:</u> --- |                            |                             |                                     |                          |

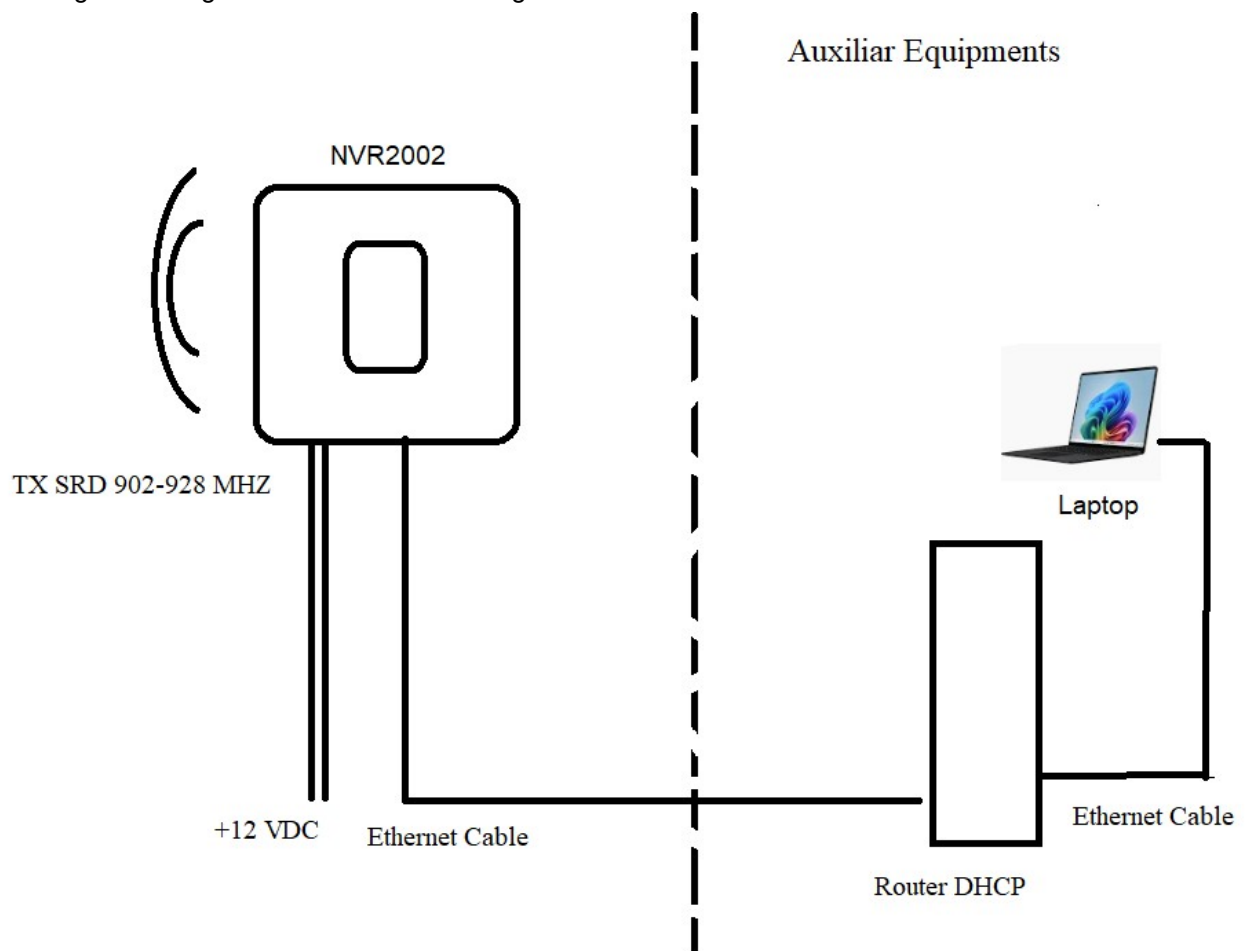
## 2.4 Support / Auxiliary equipment / unit / software for the EUT

The EUT has been tested with the following auxiliary equipment / unit / software:

| Auxiliary equipment / unit / software | Type / Version | Manufacturer | Supplied by |
|---------------------------------------|----------------|--------------|-------------|
| Ethernet Switch with DHCP             | 6690           | Fritz!Box    | DEKRA B.V.  |
| Laptop                                | 5420           | DELL         | DEKRA B.V.  |
| <u>Supplemental information:</u> ---  |                |              |             |

## 2.5 Test Configuration / Block diagram used for tests

The following block diagram has been used during the tests:



The sensor was connected to auxiliary board in order to configure the sample in transmission mode and maintain the battery voltage at maximum.

## 2.6 Test conditions

Temperature (C):

Tn = +15 to +35.

Tmin= N/A

Tmax= N/A

The NVR2002 is placed inside an anechoic chamber on a turntable.

## TEST Setup

All radiated tests were performed in a semi-anechoic chamber. The used measurement antenna's are:

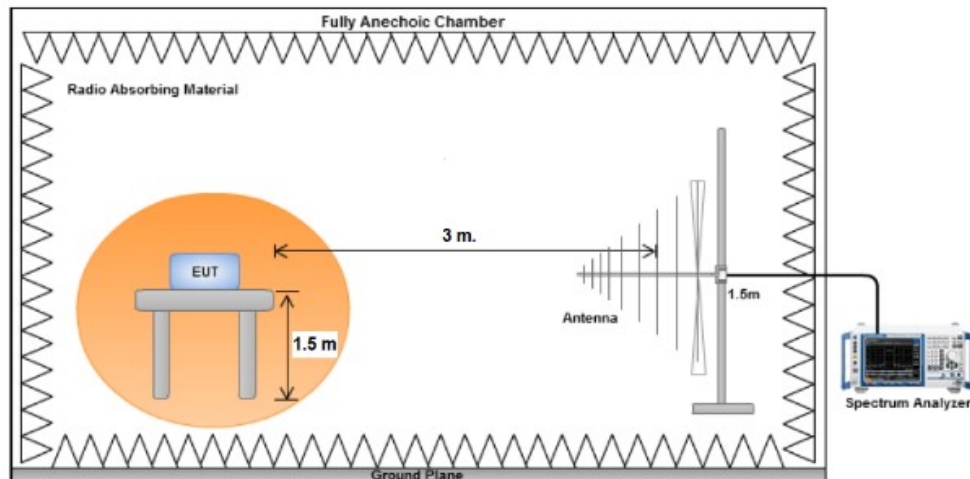
- Ultralog antenna situated at a distance of 3 m for the range between 30 MHz to 1000 MHz.
- Double ridge horn antenna is situated at a distance of 3 m for the frequency range of 1 GHz to 10 GHz.

The equipment under test was set up on a non-conductive platform at a height of 1.5 m above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission. The antenna is used in TILT mode for measurements above 1 GHz.

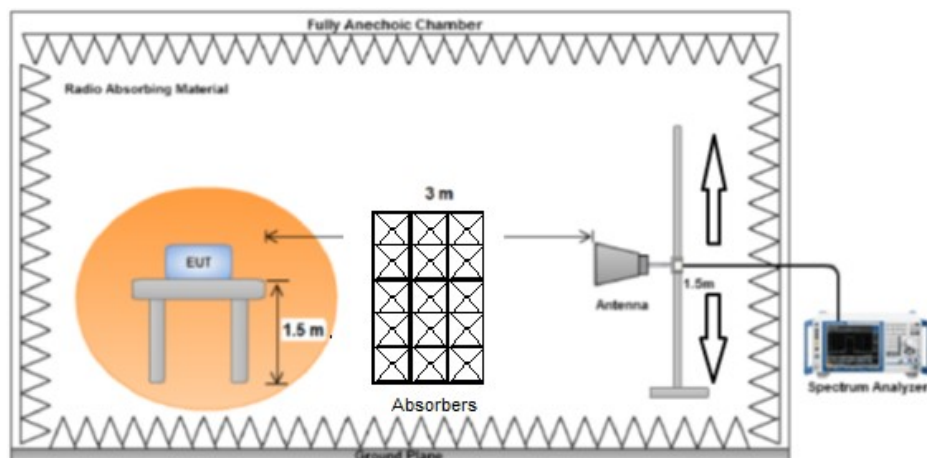
Measurements were made in both horizontal and vertical planes of polarization.

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.

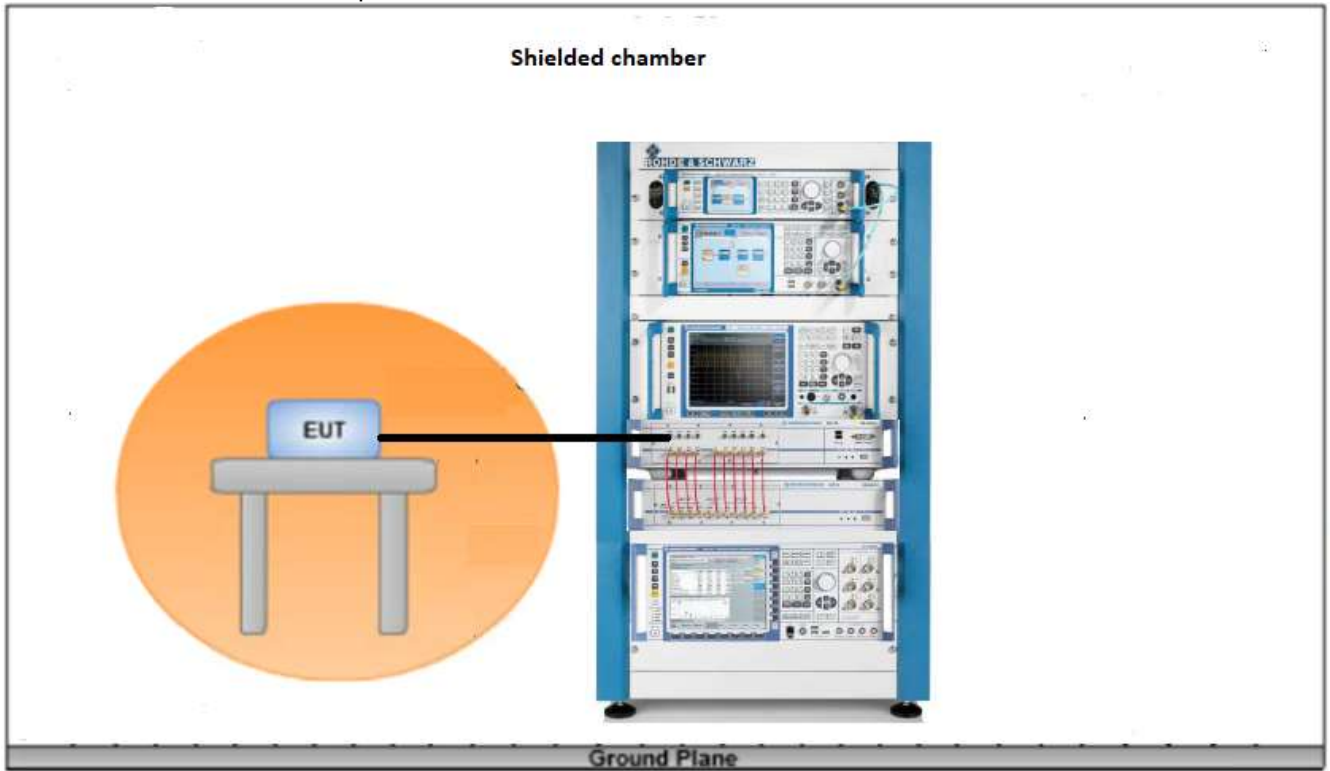
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 10 GHz (tilting of the antenna is not shown):



Conducted measurement setup:



### 3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

#### 3.1 Standards

| Standard                                                                   | Year    | Description                                                                                                                   |
|----------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------|
| FCC Rules & Regulations 47 CFR Chapter I - Part 15 Subpart C Clause 15.247 | 2022-01 | Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.                                                   |
| RSS-247                                                                    | 2023-08 | Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices. |

#### 3.2 Overview of results – FHHS equipment

| Test case                                                 | Standard                                      | Verdict | Remarks |
|-----------------------------------------------------------|-----------------------------------------------|---------|---------|
| 20 dB Bandwidth and Carrier frequency separation          | FCC 15.247 (a)(1) / RSS-247 Clause 5.1 (c)    | Pass    | --      |
| Number of hopping channels                                | FCC 15.247 (a)(1)(i) / RSS-247 Clause 5.1 (c) | Pass    | --      |
| Time of occupancy (Dwell Time)                            | FCC 15.247 (a)(1)(i) / RSS-247 Clause 5.1 (c) | Pass    | --      |
| Maximum output power and antenna gain                     | FCC 15.247 (b) / RSS-247 Clause 5.4 (a)       | Pass    | --      |
| Band-edge compliance of conducted emissions (Transmitter) | FCC 15.247 (d) / RSS-247 Clause 5.5           | Pass    | --      |
| Emission limitations radiated (Transmitter)               | FCC 15.247 (d) / RSS-247 Clause 5.5           | Pass    | --      |
| Supplementary information: --                             |                                               |         |         |

#### 3.3 Deviation(s) from the Standard(s) / Test Specification(s)

The following deviation(s) was / were made from the published requirements of the listed standards:  
N/A.

## 4 TEST RESULTS HFS 902MHZ

### 4.1 Product Information

The following information is provided by the supplier, in accordance with clause 5.3.1:

| Information                                | Description                      |
|--------------------------------------------|----------------------------------|
| Modulation                                 | PR-ASK                           |
| Frequency band/Range                       | 902 - 928MHz                     |
| Maximum RF Output Power (e.i.r.p.)         | < 36 dBm                         |
| Operation mode 1: Single Antenna Equipment | Equipment with one antenna       |
| - Operating Frequency Range                | 902.75 MHz to 927.25 MHz         |
| - Channel Spacing                          | 500 kHz                          |
| - Number of Channels                       | 50                               |
| Extreme operating conditions               |                                  |
| - Temperature range                        | -30°C to +60°C                   |
| Antenna type                               | Circular polarized Patch Antenna |
| Antenna gain "Antenna port 1"              | 9.45 dBi.                        |
| Nominal Voltage                            |                                  |
| - Supply Voltage                           | 12.0-24.0 V                      |
| - Type of power source                     | DC powered                       |
| Equipment type                             | Wall/Ceiling mounted equipment   |

## 4.2 FCC Section 15.247 (a) (1) / RSS-247 Clause 5.1 (c). 20dB bandwidth and Carrier frequency separation

### SPECIFICATION

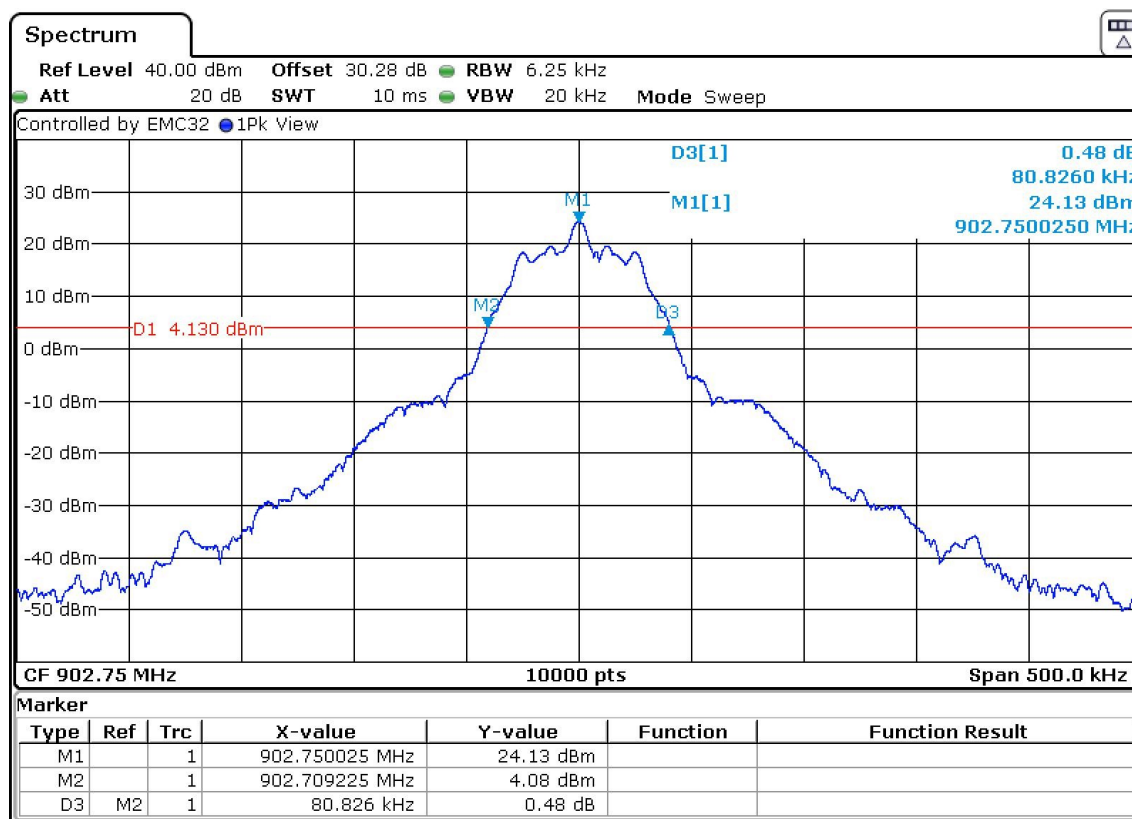
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater

### RESULTS:

|                              | Low Channel<br>902.75 MHz | Middle Channel<br>916.25 MHz | Highest Channel<br>927.25 MHz |
|------------------------------|---------------------------|------------------------------|-------------------------------|
| 20dB Bandwidth (KHz)         | 80.8260                   | 81.3000                      | 80.3013                       |
| 99% Occupied Bandwidth (KHz) | 75.150                    | 74.900                       | 75.050                        |

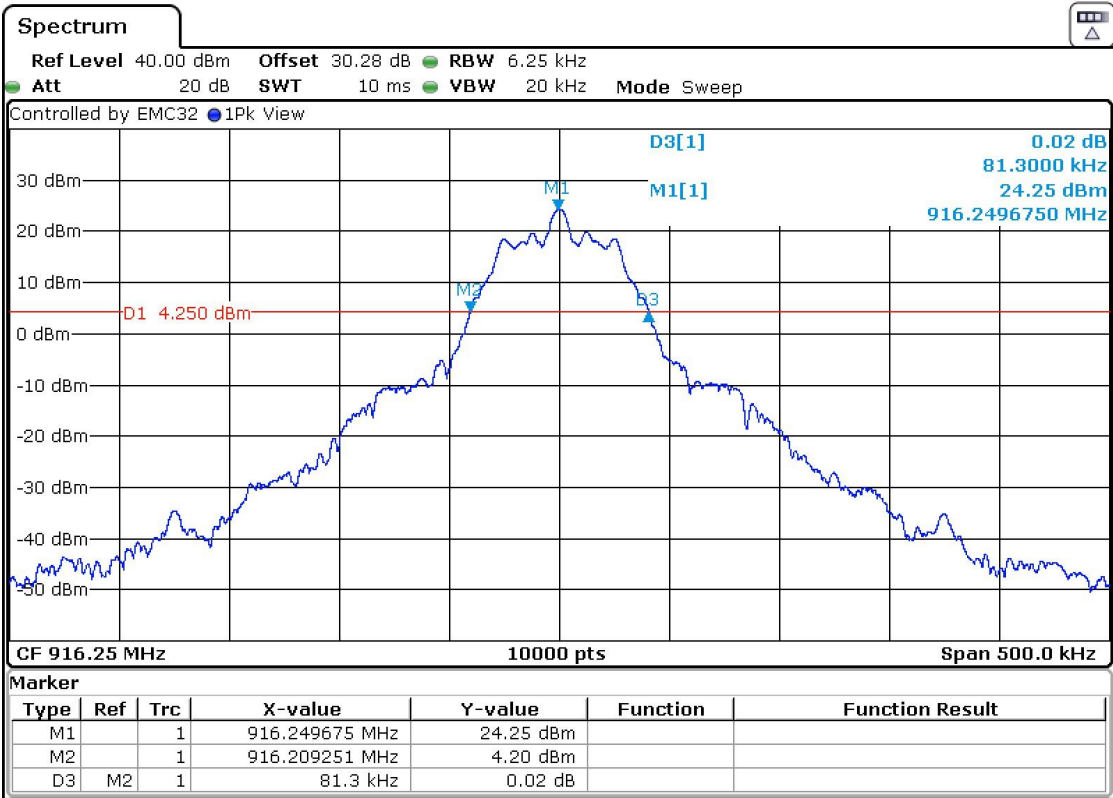
### 20dB Bandwidth:

- Low Channel:

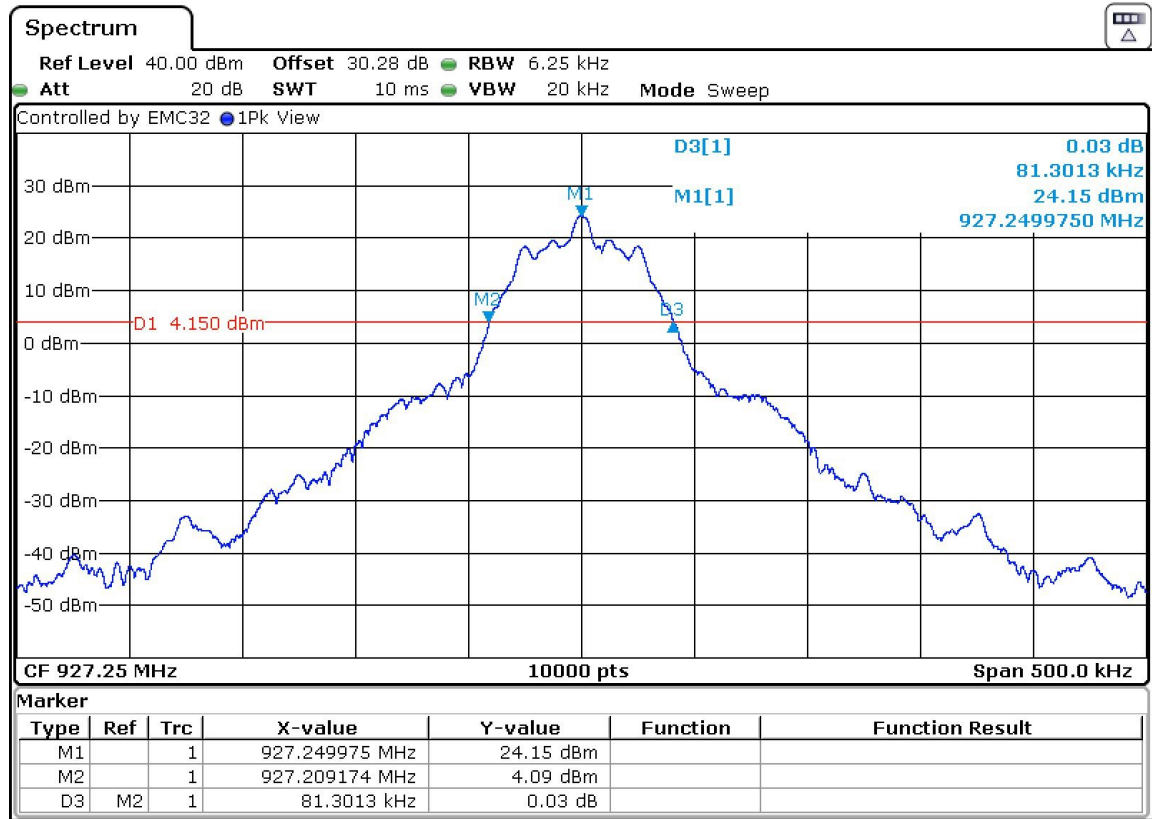




- Middle Channel:

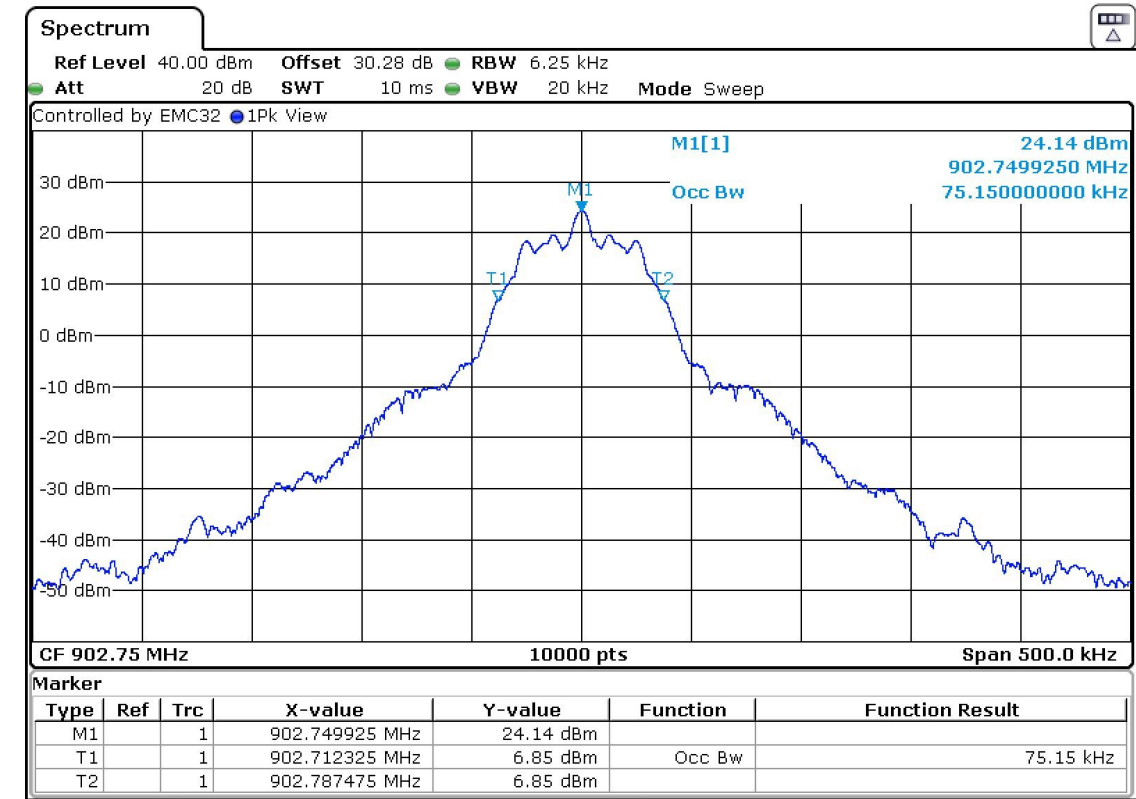


- High Channel:

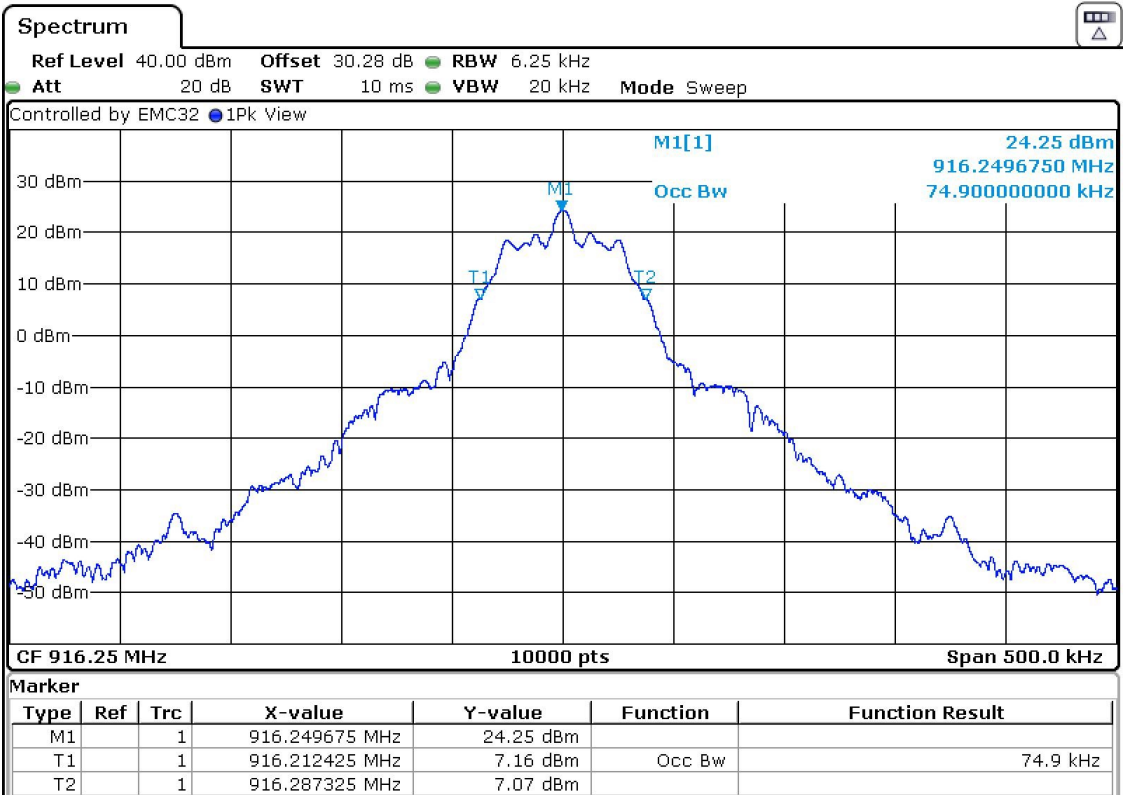


99% Occupied Bandwidth (KHz):

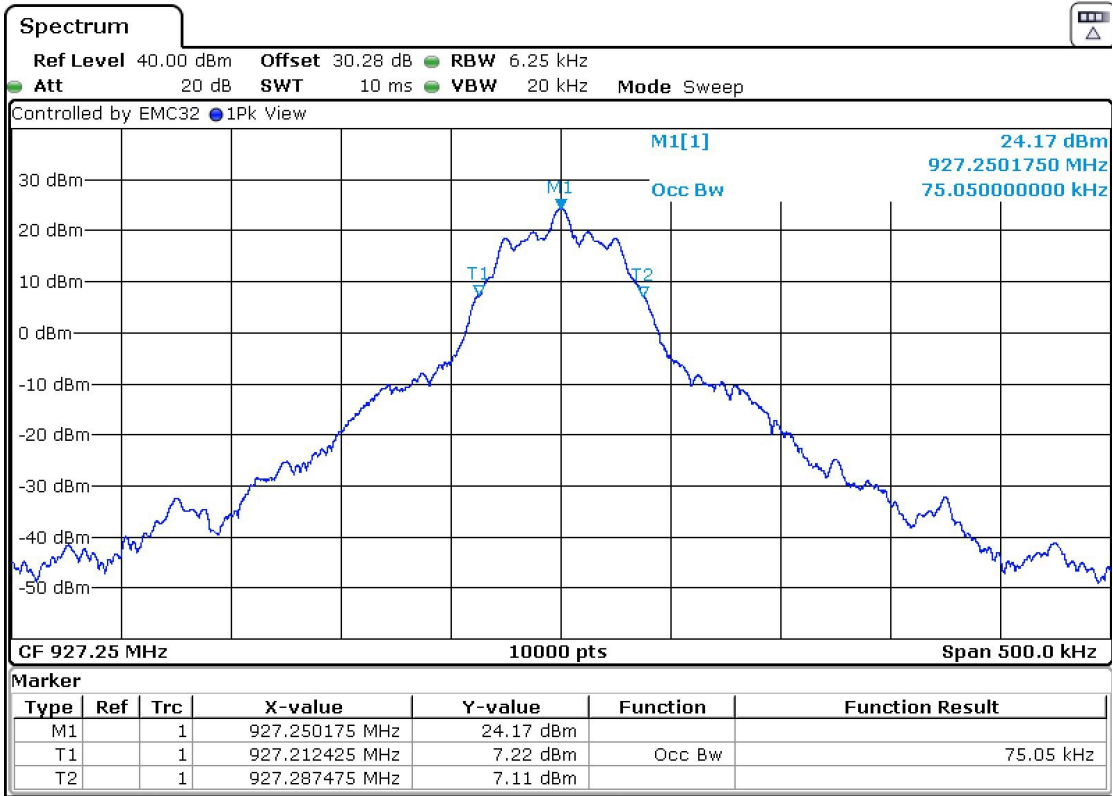
- Low Channel:



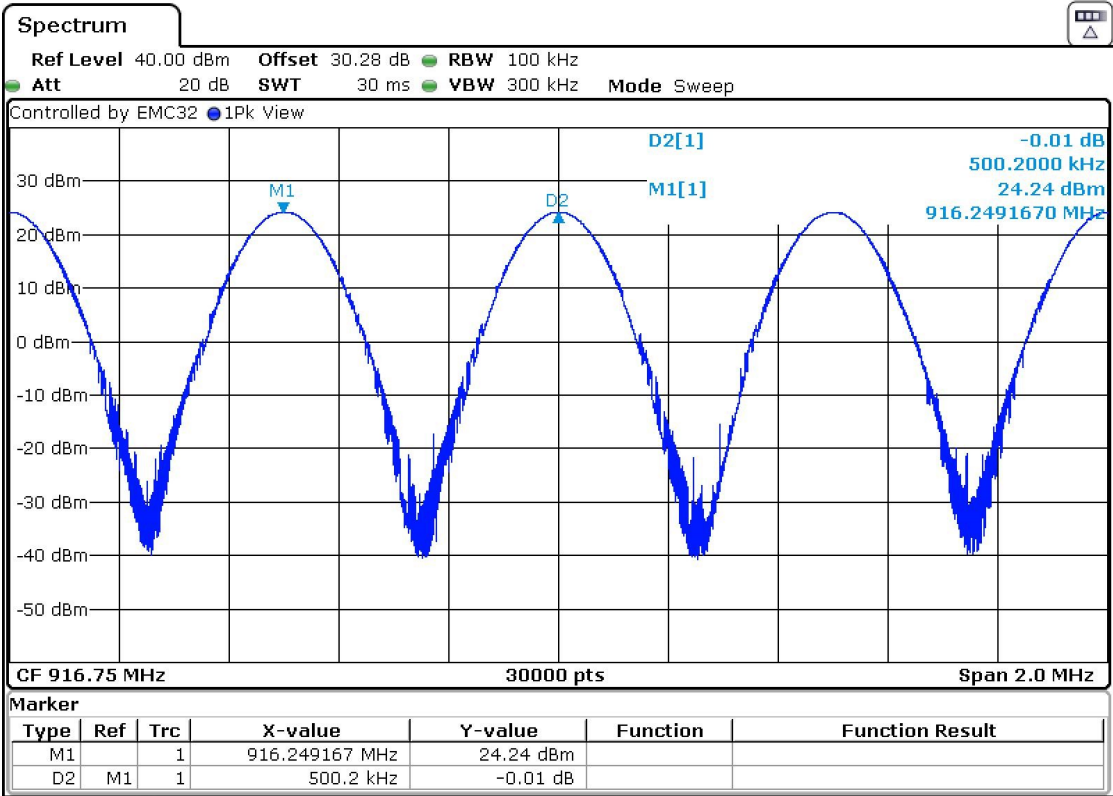
- Middle Channel:



- High Channel:



Carrier frequency separation



The hopping channel carrier frequencies are separated by a minimum of the of the 20 dB bandwidth of the hopping channel.

Verdict: PASS

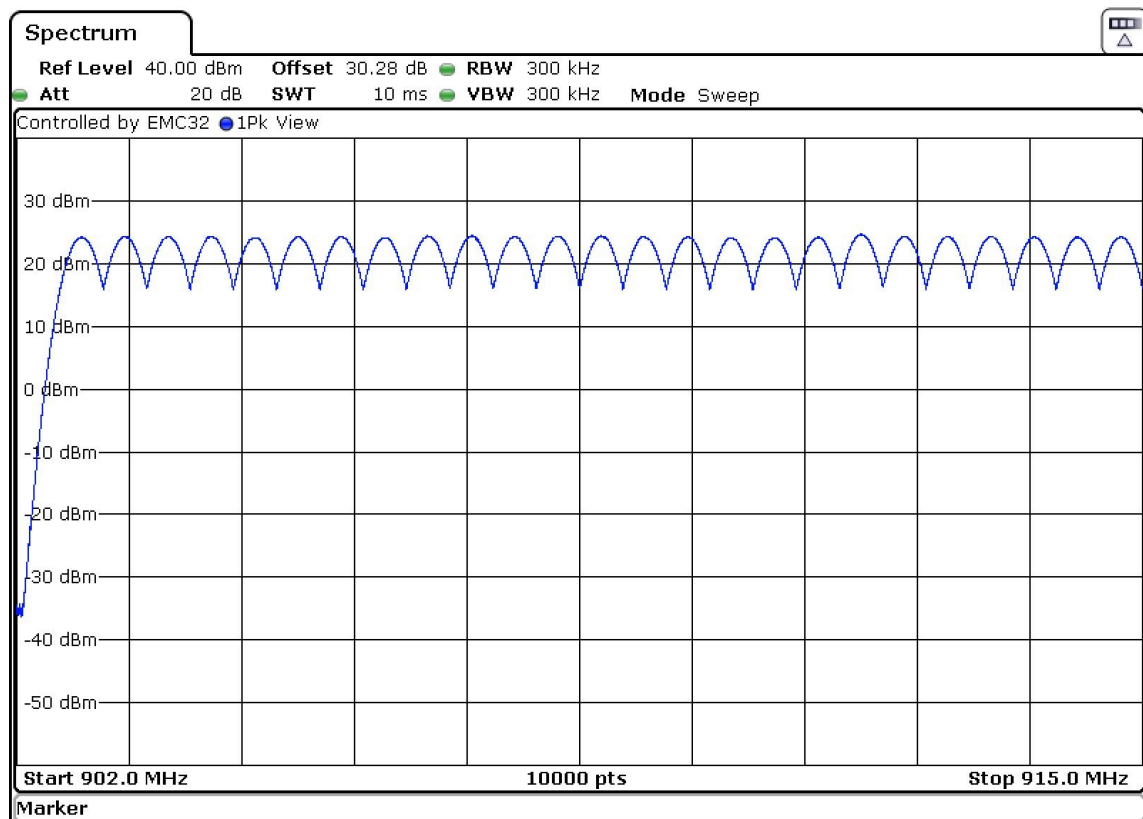
#### 4.3 FCC Section 15.247 (a) (1) (i) / RSS-247 Clause 5.1 (c). Number of hopping channels

##### SPECIFICATION:

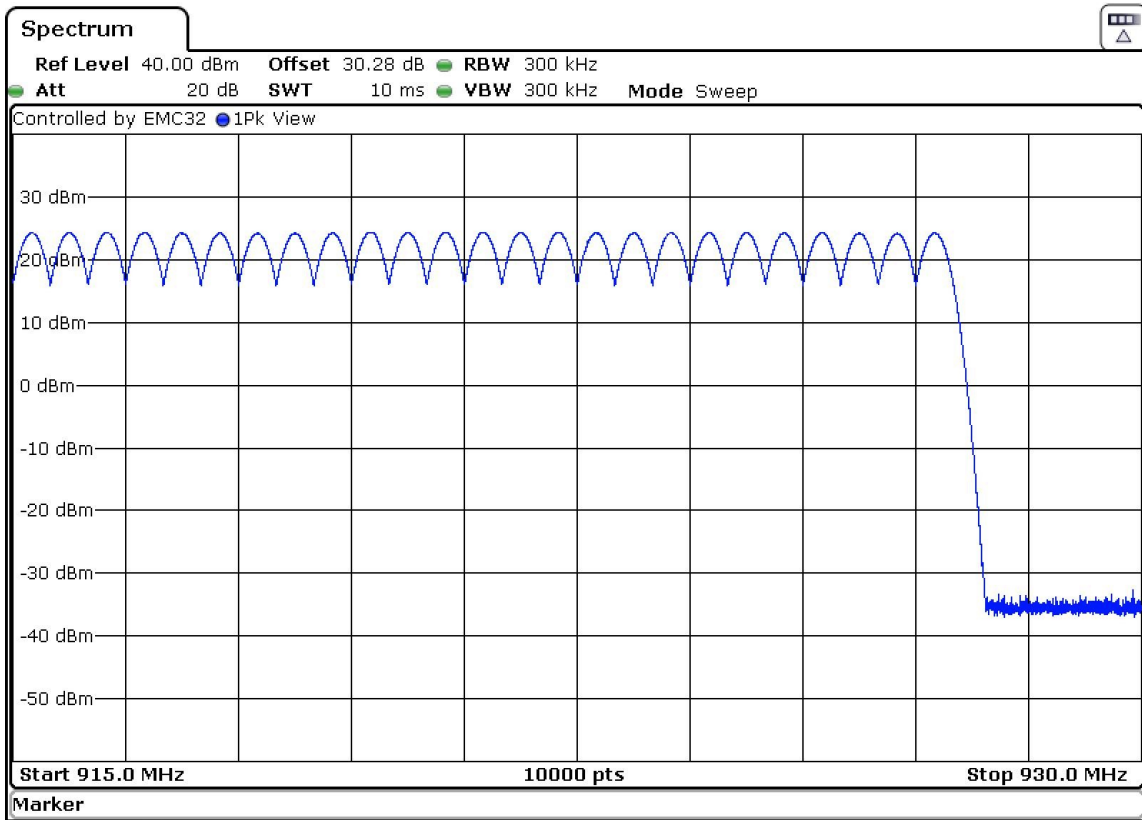
Frequency hopping system in the 902-928 MHz band shall use at least 50 hopping frequencies.

##### RESULTS:

The number of hopping channels is 50 (see next plot).



Number of hopping frequencies: 25



Number of hopping frequencies: 25

Verdict: PASS

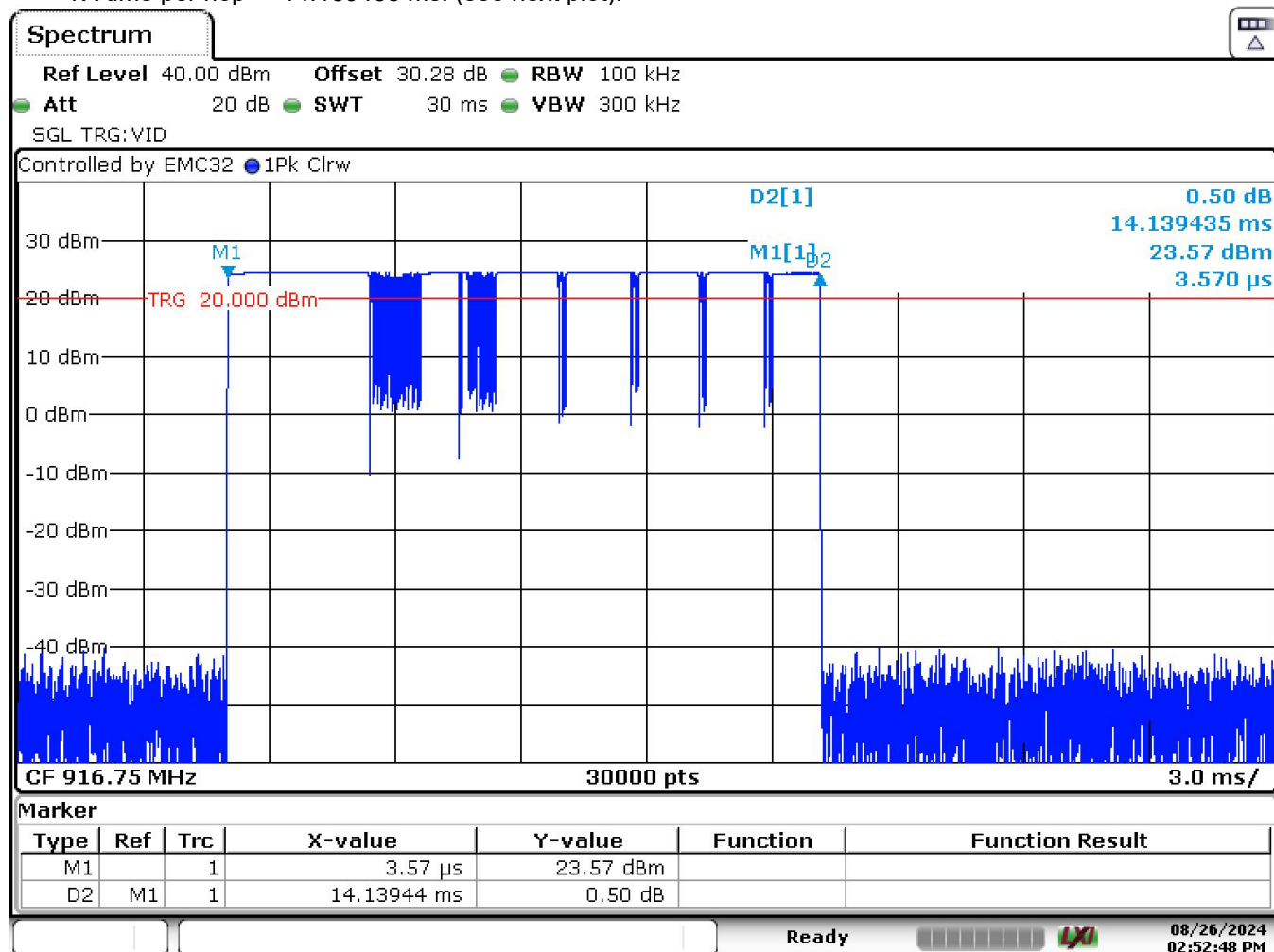
#### 4.4 FCC Section 15.247 Subclause (a) (1) (i) / RSS-247 Clause 5.1 (c). Time of occupancy (Dwell Time)

##### SPECIFICATION:

The average time of occupancy on any frequency shall not be greater than 0.4 seconds (400 ms) within 20 second period.

##### RESULTS:

- TX time per hop = 14.139435 ms. (see next plot).



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