



- 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 IC: 1444A-NVR2002
(*) Applicant's name / address	Nedap N.V. Parallelweg 2, 7141 DC Groenlo, 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. USA FCC Part 15.209 (10-1-23) Edition: Radiated emission limits; general requirements. 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. CANADA RSS-247 Issue 3 (August 2023). CANADA RSS-Gen Issue 5 Amendment 1 (March 2019) and Amendment 2 (February 2021). ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Verdict Summary	IN COMPLIANCE
Tested by (name / position & signature)	Jose Carlos Luque Technical Professional EMC&Wireless
Approved by (name / position & signature)	Sedat Eser Technical Professional EMC&Wireless
Date of issue	2024-11-29
Report template No	TRF_RSM_FCC R1.0 (*) "Data provided by the applicant"

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COMPETENCES AND GUARANTEES

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

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

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

☒ Indicates that the listed condition, standard or equipment is applicable for this report/test/EUT.			
☐ Indicates that the listed condition, standard or equipment is not applicable for this report/test/EUT.			
Decimal separator used in this report	☐	Comma (,)	☒ 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)

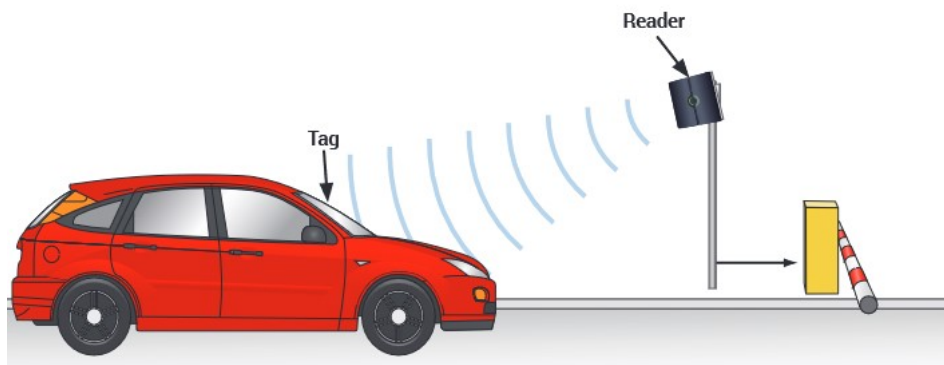
Description of the item	UHF Long range RFID Reader
Model / Type number	NVR2002
Serial number	S718 A03 002
Trademark	Nedap
Manufacturer	Nedap N.V.
Address	Parallelweg 2, 7141 DC Groenlo, The Netherlands.

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
	☐	AC: 220 – 240 V, 50/60 Hz	☐	☐	☐	☐	☐
	☐	AC: 100 – 240 V, 50/60 Hz	☐	☐	☐	☐	☐
	☒	DC: 12 – 24 V					
	☐	Battery:					
Rated Power	15W (24VDC, 0,5A or 12VDC, 1A)						
Clock frequencies	64 MHz						
Other parameters	UHF RFID						
Software version	Main: 1.7 UHF: 2.00.00 LINUX: 0.2.0						
Hardware version	NVR2002 A.02						
Dimensions in cm (W x H x D)	241 x 225 x 102						
Mounting position	☐	Table top equipment					
	☒	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
	☐	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 tag number 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	☒	N/A	☐	
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Copy of marking plate:

 Nedap N.V. Parallelweg 2, 7141DC Groenlo, Nether 9234357 UPASS NVR2002 FCC RATING : 12VDC, 1A 24V	9234357 MODEL : NVR2002 FCC ID : CGDNVR2002 IC : 1444A-NVR2002 c (LI [E
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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> 1. Radiated Sample. 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.	☒
2	EUT ON. MS in hopping mode. TX continuous modulated carrier in 50 channels.	☒
<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 SW0	--	☐	☐
K1: VDC	AE1	>2	☒	☐
K2: WIEGAND	AE2	--	☐	☐
K3: GPIO	AE3	--	☐	☐
K4: RS485	AE4	--	☐	☐
K5: ETHERNET	AE5	>2	☒	☐
K6: RELAY	AE6	--	☐	☐
K7: HF+	AE7	--	☐	☐
K8: TAMP	AE8	--	☐	☐
K9: RDIS	AE9	--	☐	☐
<u>Supplemental information:</u> ---				

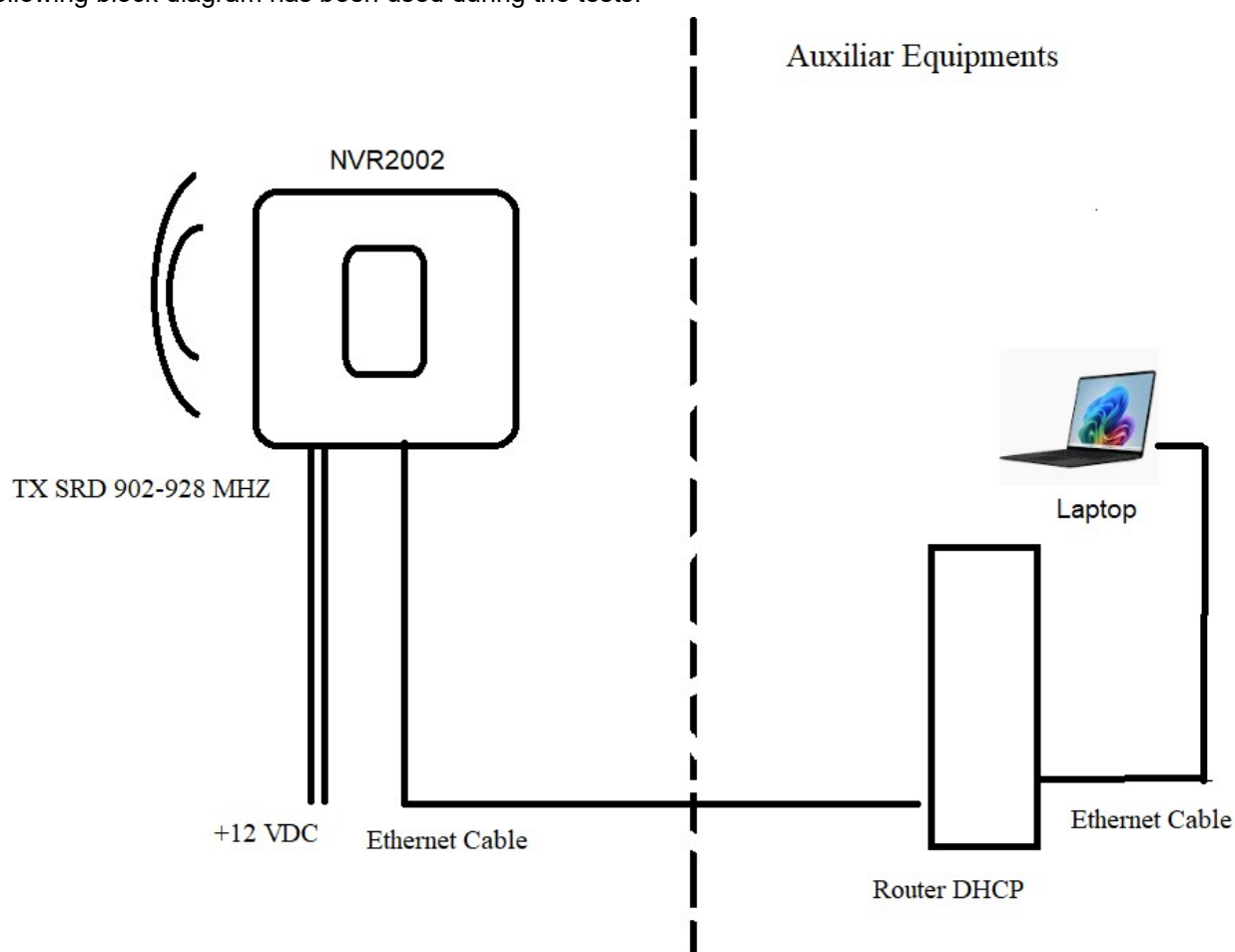
2.4 Support / Auxiliary equipment / unit / software for the EUT

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:

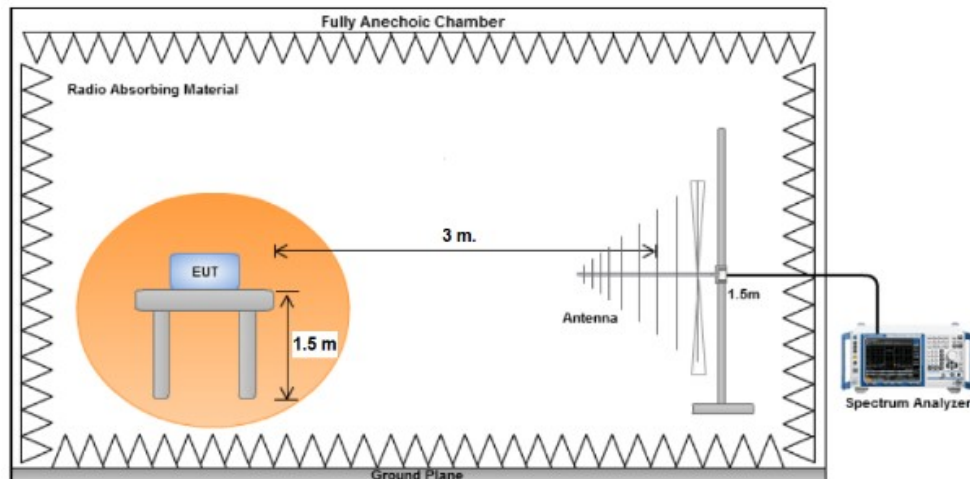
- Ultralog antenna situated at a distance of 3 m for the range between 30 MHz to 1000 MHz.
- Double ridge horn antenna is situated at a distance of 3 m for the frequency range of 1 GHz to 10 GHz.

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.

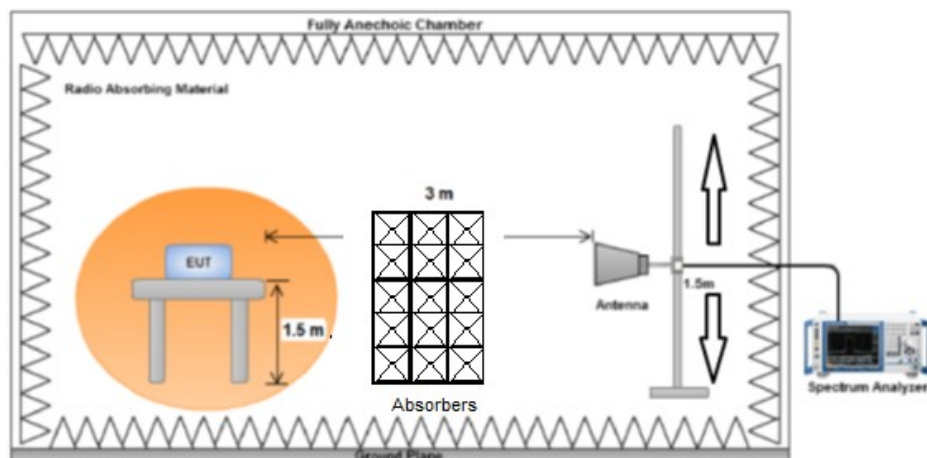
Measurements were made in both horizontal and vertical planes of polarization.

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.

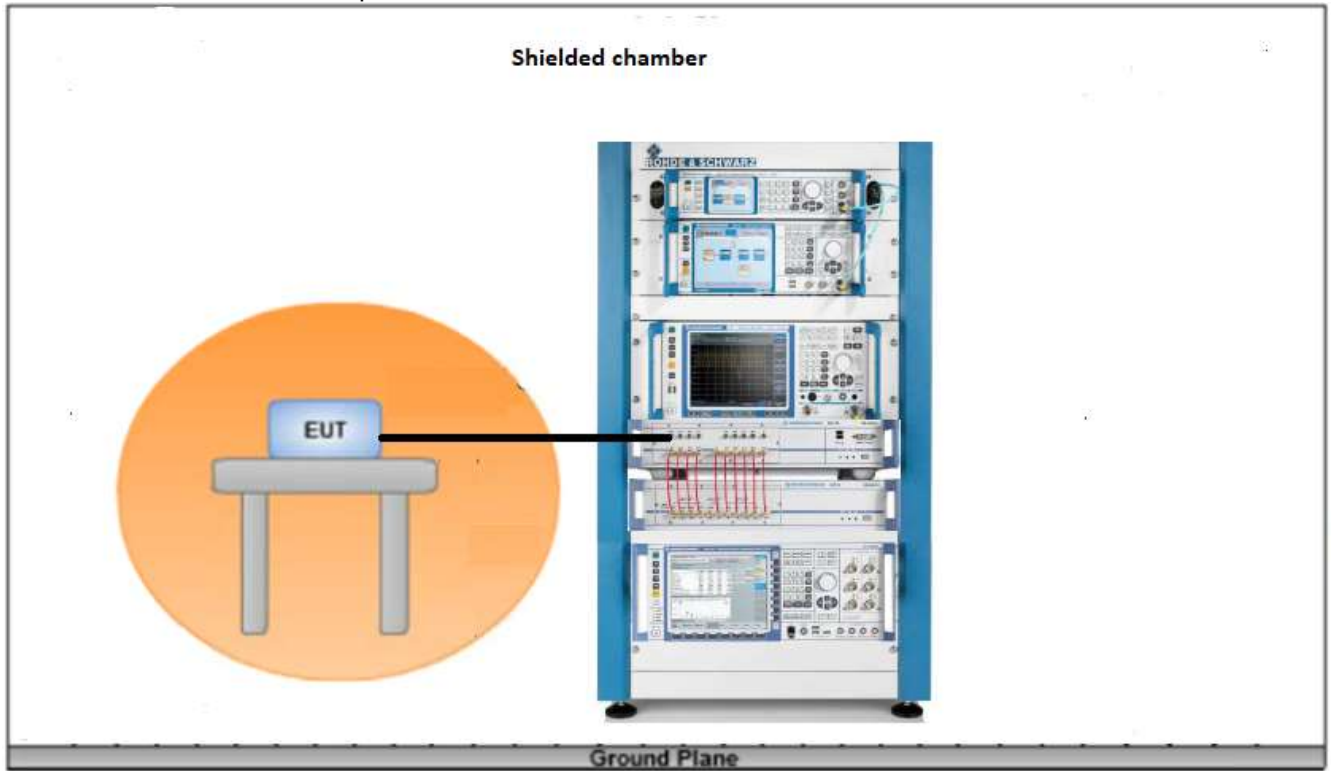
Radiated measurements setup from 30 MHz to 1 GHz:



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

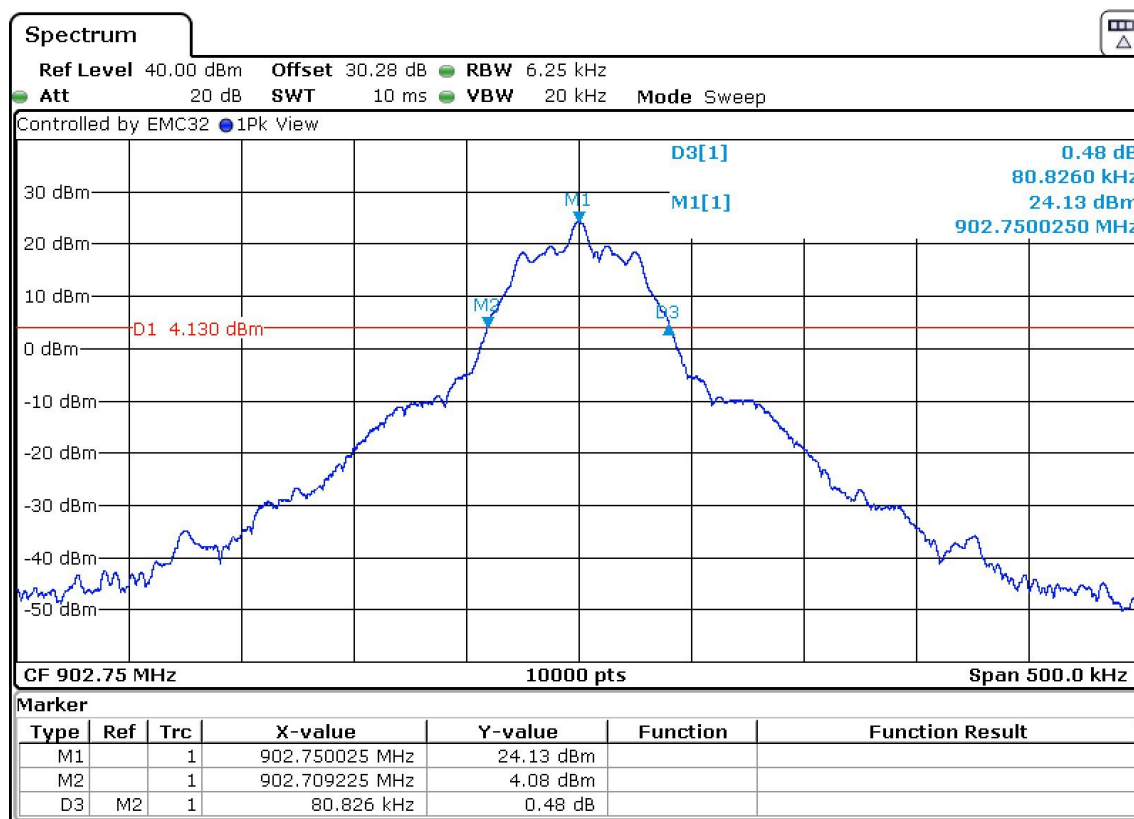
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater

RESULTS:

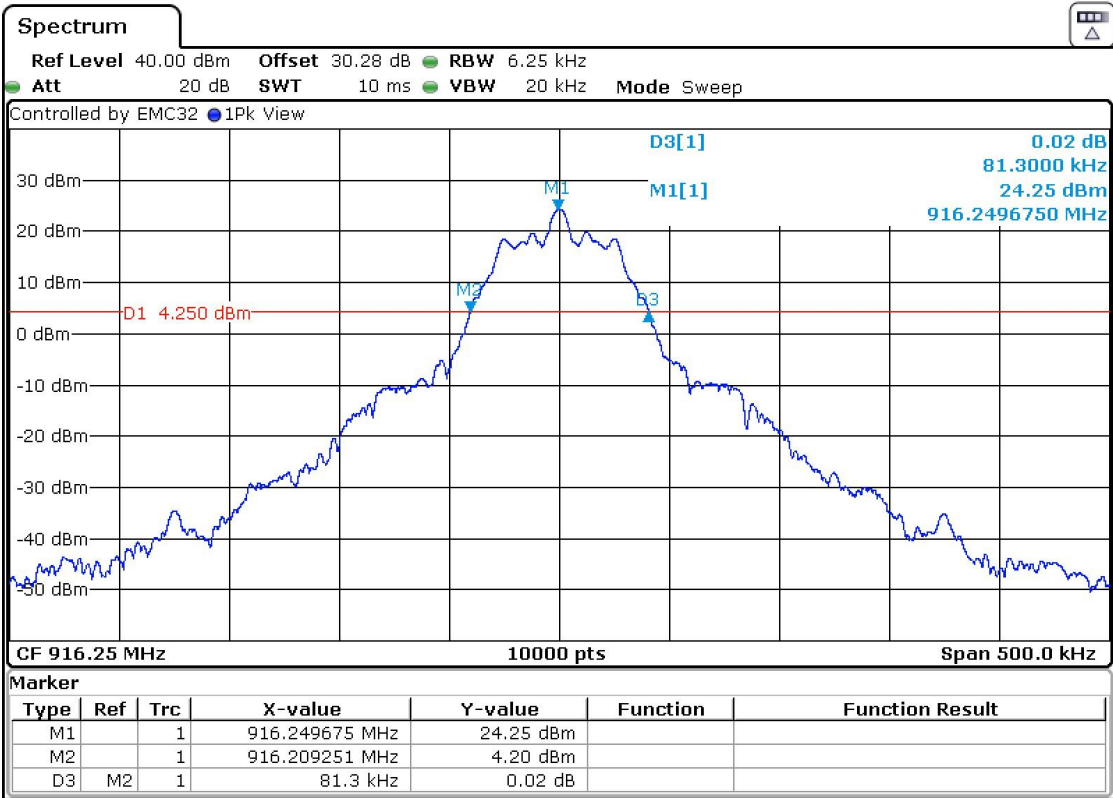
	Low Channel 902.75 MHz	Middle Channel 916.25 MHz	Highest Channel 927.25 MHz
20dB Bandwidth (KHz)	80.8260	81.3000	80.3013
99% Occupied Bandwidth (KHz)	75.150	74.900	75.050

20dB Bandwidth:

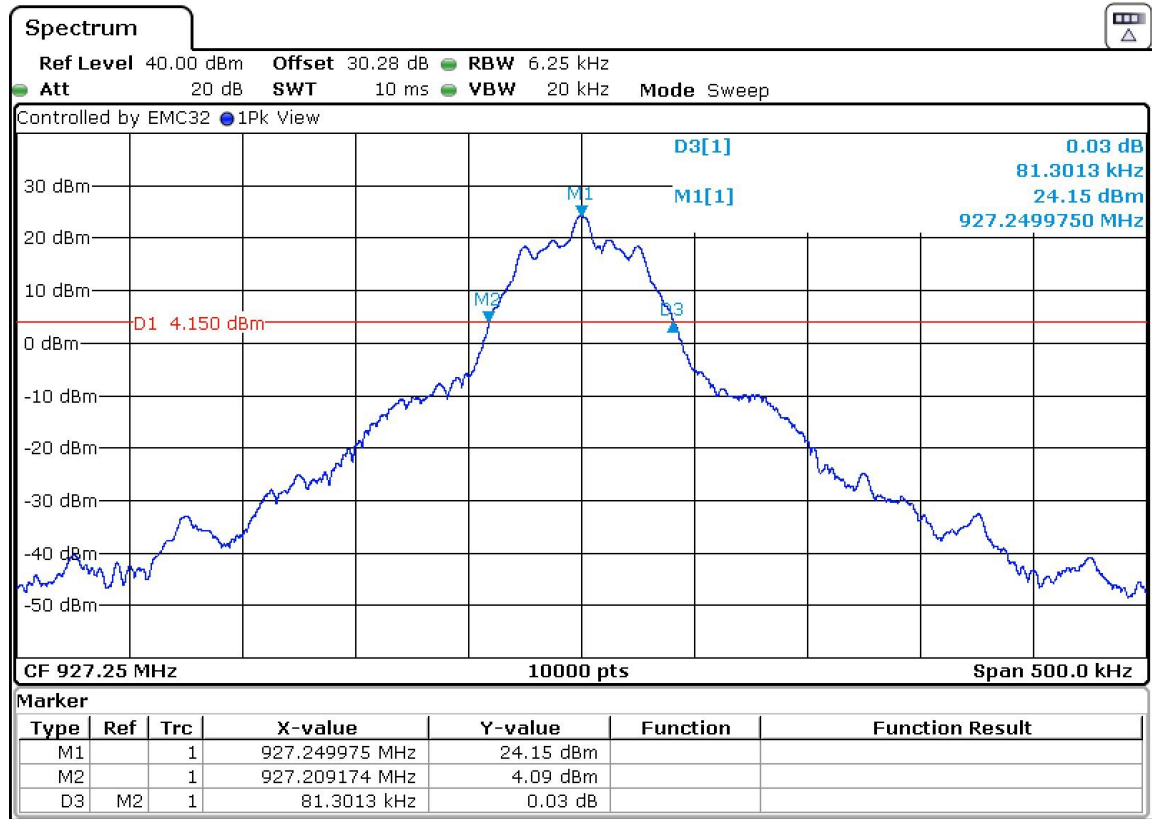
- Low Channel:



- Middle Channel:

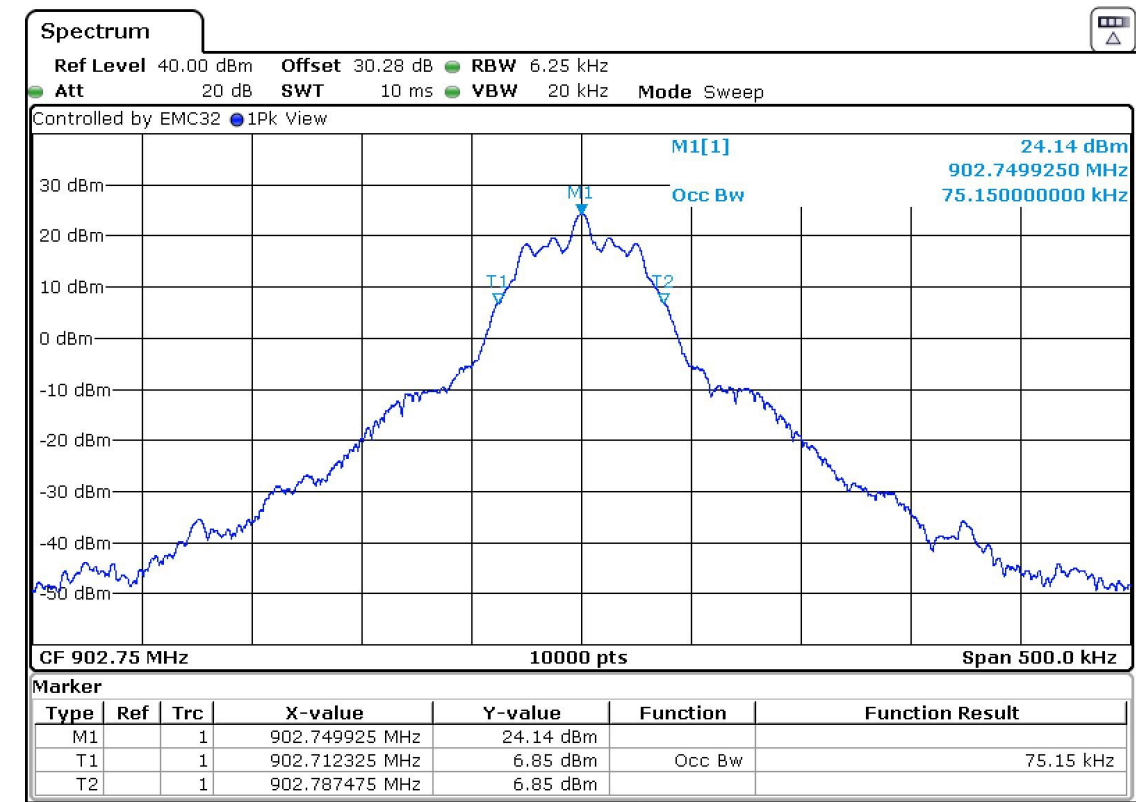


- High Channel:

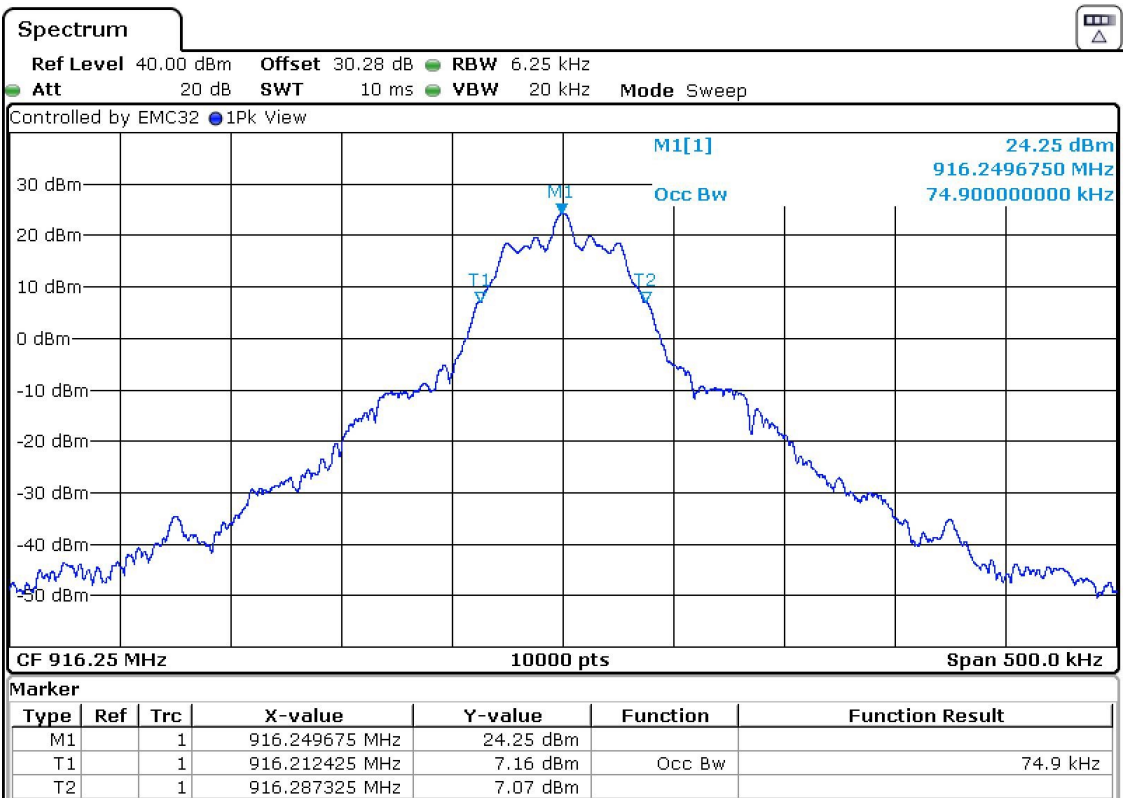


99% Occupied Bandwidth (KHz):

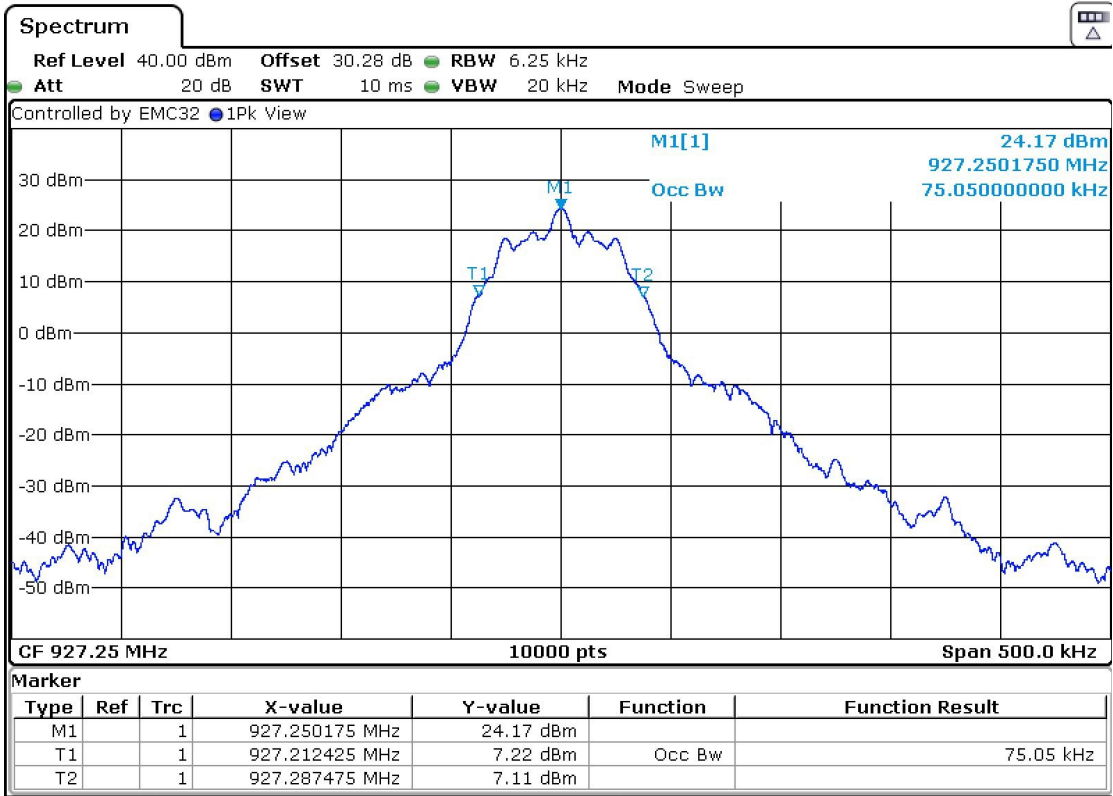
- Low Channel:



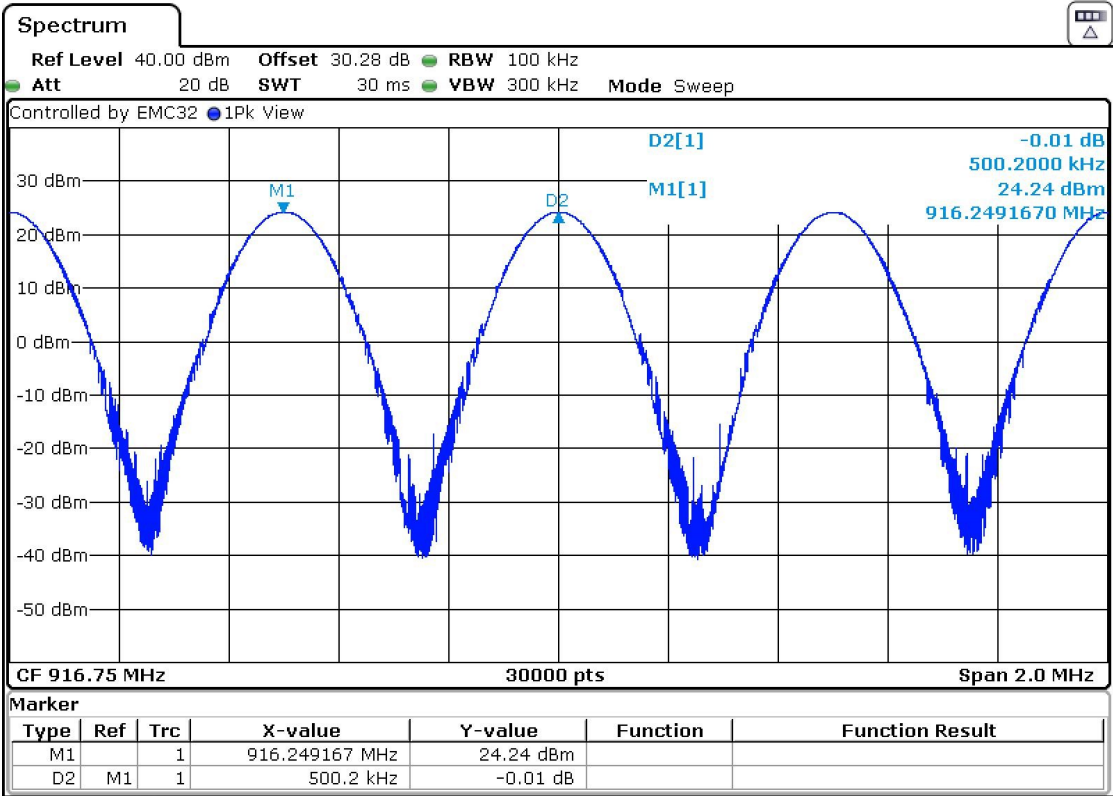
- Middle Channel:



- 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

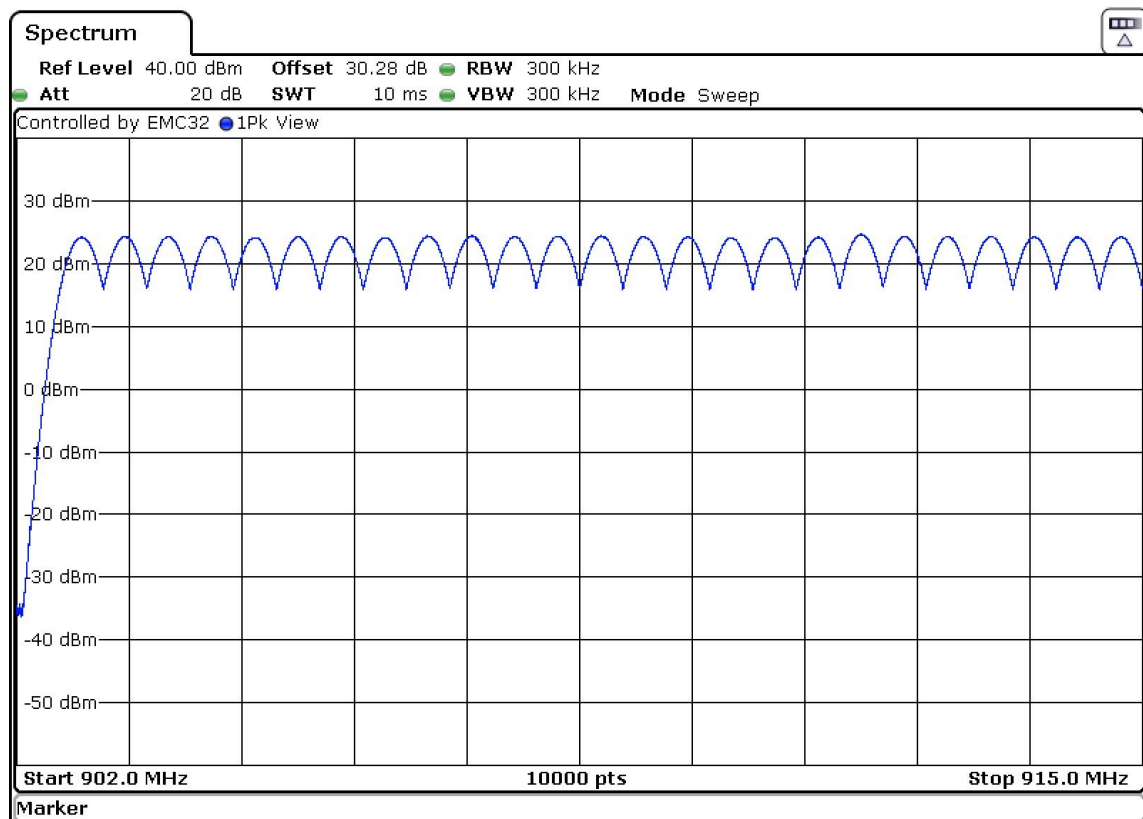
4.3 FCC Section 15.247 (a) (1) (i) / RSS-247 Clause 5.1 (c). Number of hopping channels

SPECIFICATION:

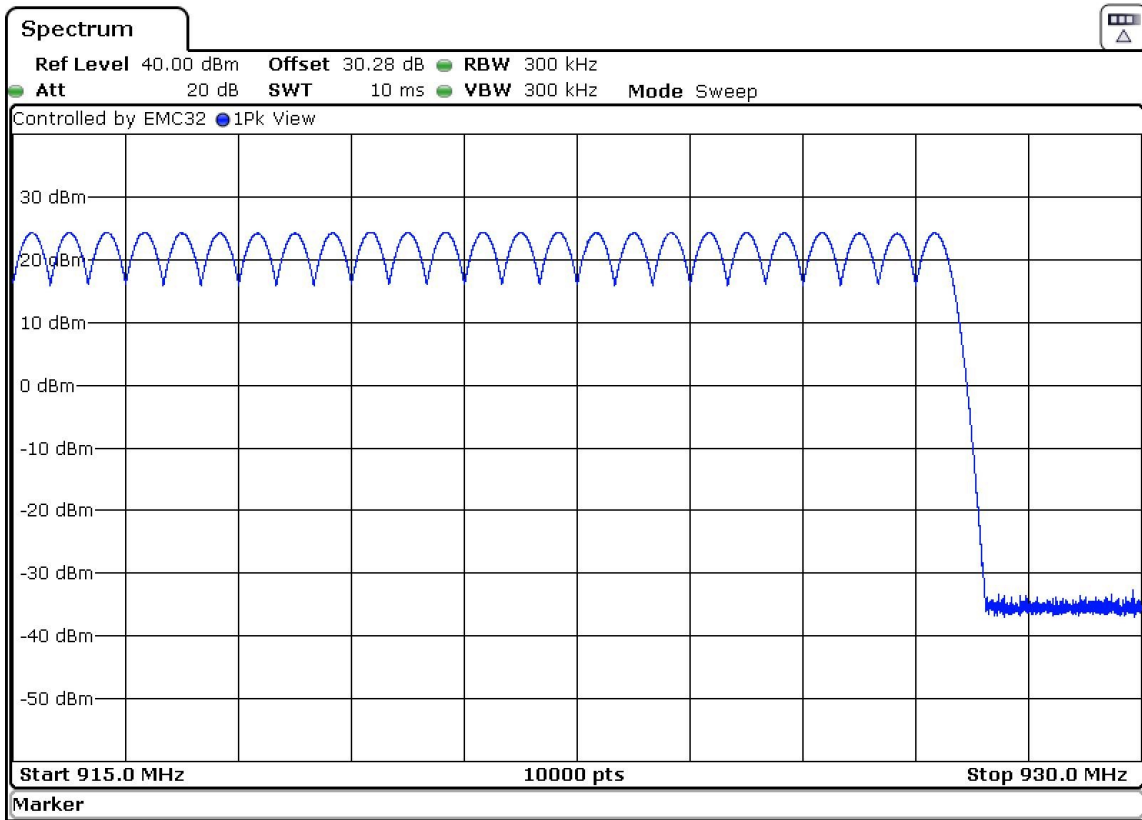
Frequency hopping system in the 902-928 MHz band shall use at least 50 hopping frequencies.

RESULTS:

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



Number of hopping frequencies: 25



Number of hopping frequencies: 25

Verdict: PASS

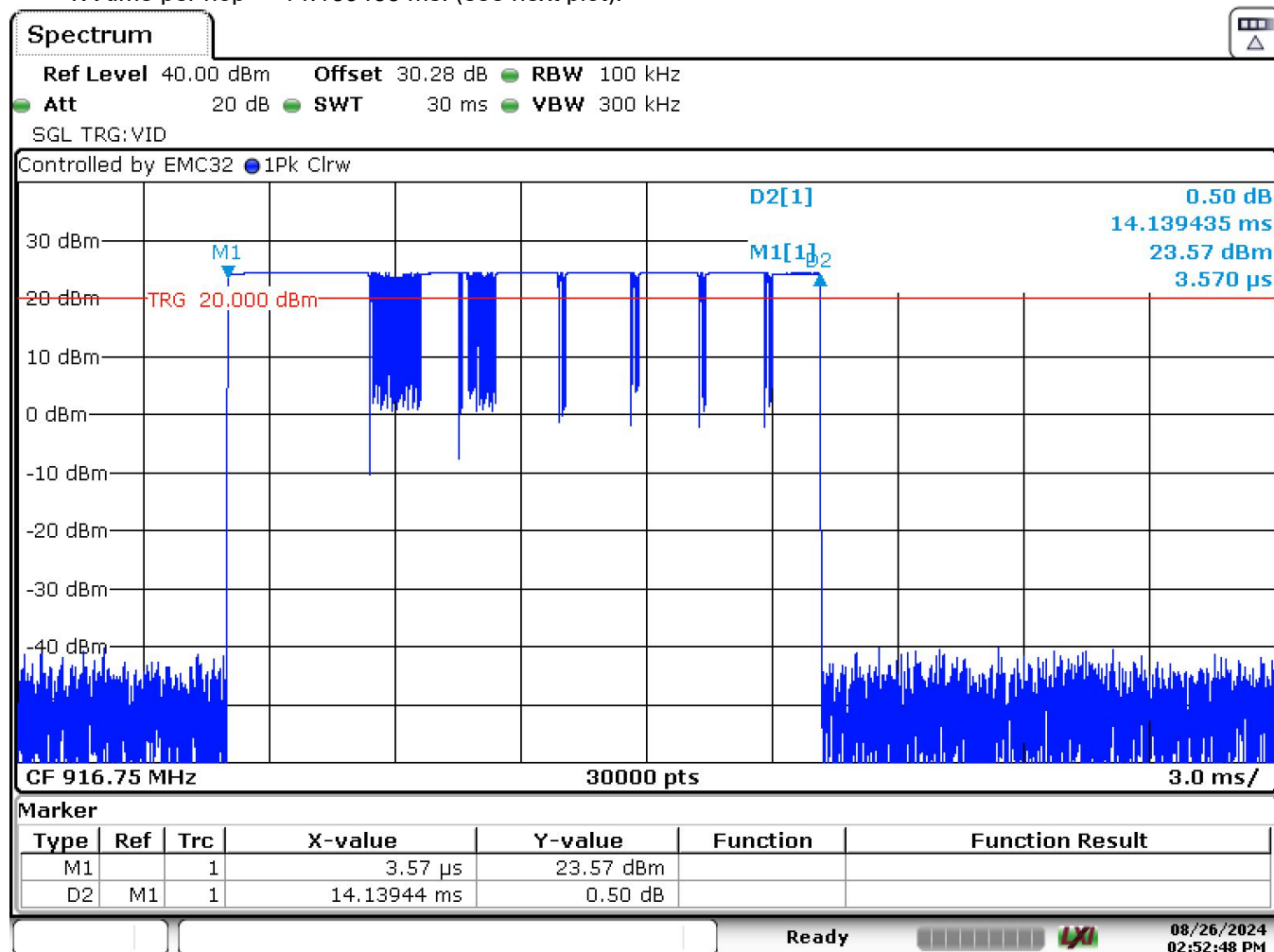
4.4 FCC Section 15.247 Subclause (a) (1) (i) / RSS-247 Clause 5.1 (c). Time of occupancy (Dwell Time)

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).



Date: 26.AUG.2024 14:52:49