DEKRA Testing and Certification, S.A.U.
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C.I.F. A29507456

ISED CABid: ES1909

Test Report No:
NIE: 71412RRF.001

Test Report
USA FCC Part 15.225, 15.209
CANADA RSS-210, RSS-Gen

(*) Identification of item tested	Design XS - Wall Reader including all mechanical variants
(*) Trademark	SALTO
(*) Model and/or type reference	WRD0M Type reference: P1619
Other identification of the product	HW version: 1.0 SW version: 0194 (Control FW) FCC ID: UKCWRD0M IC ID: 10088A-WRD0M
(*) Features	Contains a certified Bluetooth LE module
Applicant	SALTO SYSTEMS, S.L. Arkotz 9, Polígono Lanbarren, 20180, Oiartzun, Guipúzcoa, Spain
Test method requested, standard	USA FCC Part 15.225 (10-1-20 Edition): Operation within the band 13.110 -14.010. USA FCC Part 15.209 (10-1-20 Edition): Radiated emission limits, general requirements. CANADA RSS-210 Issue 10 (December 2019). CANADA RSS-Gen Issue 5 (March 2019). ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López EMC Consumer & RF Lab. Manager 2022.06.03 08:21:37 +02'00'
Date of issue	2022-06-03
Report template No	FDT08_24 (*) "Data provided by the client"

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Competences and guarantees

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

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory, CABid: ES1909, 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 has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification 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 at the time of performance of the test.

DEKRA Testing and Certification 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.

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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 Testing and Certification.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification and the Accreditation Bodies.

Uncertainty

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

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 of the model WRD0M is a Design XS - Wall Reader with Mifare (ISO 14443A & ISO 15693 standard based) and Bluetooth LE technology.

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.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Reception
71412B/006	Design XS - Wall Reader including all mechanical variants	WRD0M	--	2022/03/11

Auxiliary elements used with the Sample S/01:

Control Nº	Description	Model	Serial Nº	Reception
71412B/011	Control Unit	CU4200	--	2022/03/11
71412B/013	Power Supply	6A-181WP12	--	2022/03/11

Sample S/01 has undergone the test(s): The Radiated tests indicated in the Appendix A.

- Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Reception
71412B/008	Design XS - Wall Reader including all mechanical variants	WRD0M	--	2022/03/11

Auxiliary elements used with the Sample S/02:

Control Nº	Description	Model	Serial Nº	Reception
71412B/011	Control Unit	CU4200	--	2022/03/11

Sample S/01 has undergone the test(s): The Conducted tests indicated in the Appendix A

Test sample description

Ports……:	Port name and description	Cable				
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)	
	-		☐	☐	☐	
	-		☐	☐	☐	
Supplementary information to the ports……:	-					
Rated power supply .....:	Voltage and Frequency	Reference poles				
		L1	L2	L3	N	PE
	☐ AC:	☐	☐	☐	☐	☐
	☒ DC: 12 Vdc from CU42xx					
Rated Power .....:	-					
Clock frequencies .....:	27.12 MHz					
Other parameters.....:	RS-485					
Software version .....:	0194 (Control FW)					
Hardware version.....:	1.0					
Dimensions in cm (W x H x D)....:	9.55 x 9.55 x 2.2/2.7 (conical/square base) cm / 9,55 x 14,1 x 2,95 cm (rectangular housing)					
Mounting position.....:	☐ Table top equipment					
	☒ Wall/Ceiling mounted equipment					
	☐ Floor standing equipment					
	☐ Hand-held equipment					
	☐ Other:					
Modules/parts .....:	Module/parts of test item	Type	Manufacturer			
	Bluetooth LE certified module	BLE	INSIGHT			
	-					
	-					
Accessories (not part of the test item).....:	Description	Type	Manufacturer			
	-					
	-					
Documents as provided by the applicant.....:	Description	File name	Issue date			
	User manual					
	FW Explanation					

(3) Only for Medical Equipment

Identification of the client

SALTO SYSTEMS, S.L.
Arkotz 9, Polígono Lanbarren, 20180, Oiartzun, Guipúzcoa, Spain

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2022-03-19
Date (finish)	2022-05-23

Document history

Report number	Date	Description
71412RRF.001	2022-06-03	First release.

Environmental conditions

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Miguel Manuel López, Javier Miguel Nadales and Rafael Fernñandez.

Used instrumentation:

Conducted Measurements:

		Last Calibration	Due Calibration
1.	Shielded Room ETS LINDGREN S101	N/A	N/A
2.	Climatic chamber BINDER MK 56	2022/03	2023/03
3.	DC Power Supply 40V/40A ROHDE AND SCHWARZ NGPE 40/40	N.A.	N.A.
4.	Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV 40	2021/02	2023/02
5.	Digital Multimeter FLUKE 175	2021/12	2022/12

Radiated Measurements:

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N/A	N/A
2.	Shielded Room ETS LINDGREN S101	N/A	N/A
3.	Active Loop Antenna HEWLETT PACKARD 11966A	2020/07	2022/07
4.	EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7	2021/11	2023/11
5.	AC Power Supply 135/270 V, 5/10/20/40 A ELGAR CS-AC35(351SL)	2019/09	2022/09
6.	Digital Multimeter FLUKE 179	2021/10	2022/10
7.	Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2020/10	2023/10
8.	RF Preamplifier 40 dB, 10 MHz - 6 GHz BONN ELEKTRONIK BLNA 0160-01N	2022/03	2023/03
9.	Digital Multimeter FLUKE 175	2021/11	2022/11

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

FCC PART 15 PARAGRAPH / RSS-247		
Requirement – Test case	**Verdict**	**Remark**
FCC 15.225 (a) / RSS-210 B.6 (a)(i) Field strength of emissions within the band 13.553 MHz -13.567 MHz	P	
FCC 15.225 (b) / RSS-210 B.6 (a)(ii) Field strength of emissions within the band 13.410 - 13.553 MHz and 13.567 – 13.710 MHz	P	
FCC 15.225 (c) / RSS-210 B.6 (a)(iii) Field strength of emissions within the band 13.110 - 13.410 MHz and 13.710 – 14.010 MHz	P	
FCC 15.225 (d) / RSS-210 B.6 (a)(iv) Field strength of emissions outside of the band 13.110 MHz -14.010 MHz	P	
FCC 15.225 (e) / RSS-210 B.6 (b) Frequency tolerance of the carrier signal	P	
Supplementary information and remarks: None.		

Appendix A: Test results

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FCC 15.225 (b) / RSS-210 B.6 (b). Field strength of emissions within the band 13.410 - 13.553 MHz and 13.567 - 13.710 MHz 17

FCC 15.225 (c) / RSS-210 B.6 (c). Field strength of emissions within the band 13.110 - 13.410 MHz and 13.710 - 14.010 MHz 21

FCC 15.225 (d) / RSS-210 B.6 (a)(iv) Field Strength of Emissions outside of the band 13.110 MHz - 14.010 MHz 25

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TEST CONDITIONS

(*) Data provided by the Applicant.

POWER SUPPLY (*):

Vnominal:	12 Vdc
Vminimum:	10.2 Vdc
Vmaximum:	13.8 Vdc
Type of Power Supply:	External DC.

ANTENNA (*):

Type of Antenna:	Integral, PCB.
Maximum Declared Antenna Gain:	0 dBi

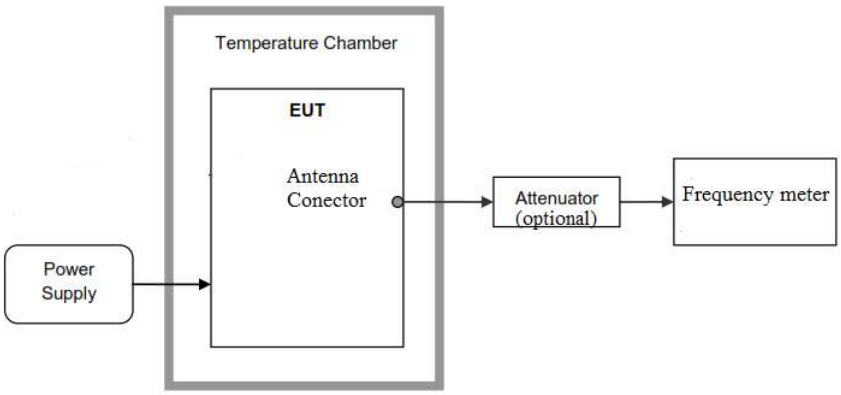
TEST FREQUENCY (*):

Nominal Operating Frequency: 13.56 MHz

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is directly connected to the spectrum analyzer.

For frequency stability test the EUT was placed inside a climatic chamber and connected to a frequency meter using a low loss cable. An external DC power supply was connected to the EUT for voltage variation test.



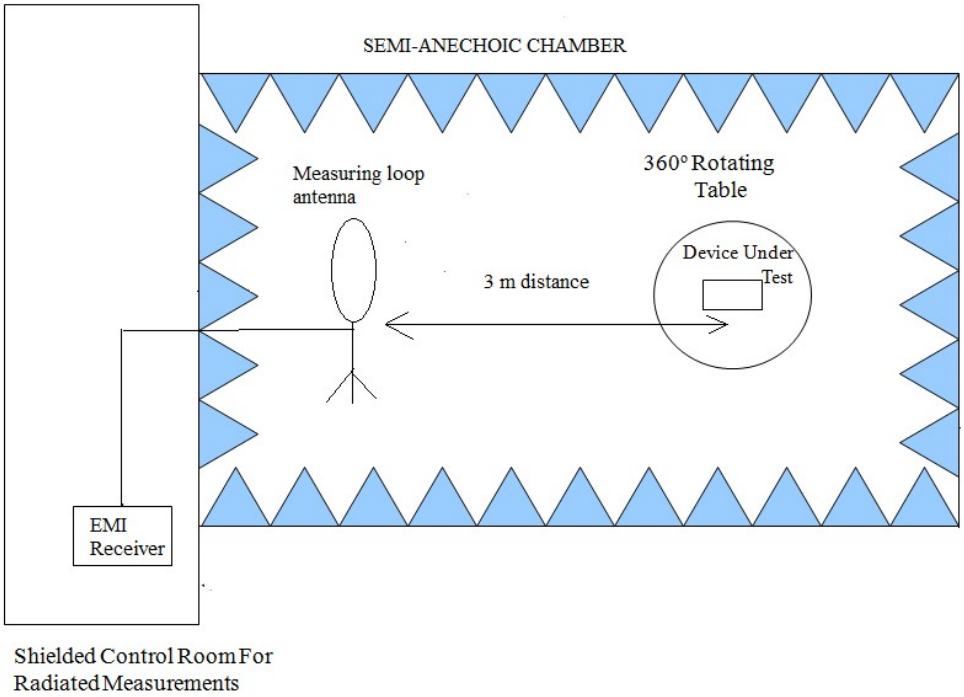
RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Loop antenna for the range between 9 kHz to 30 MHz and Bilog antenna for the range between 30 MHz to 200 MHz) is situated at a distance of 3 m.

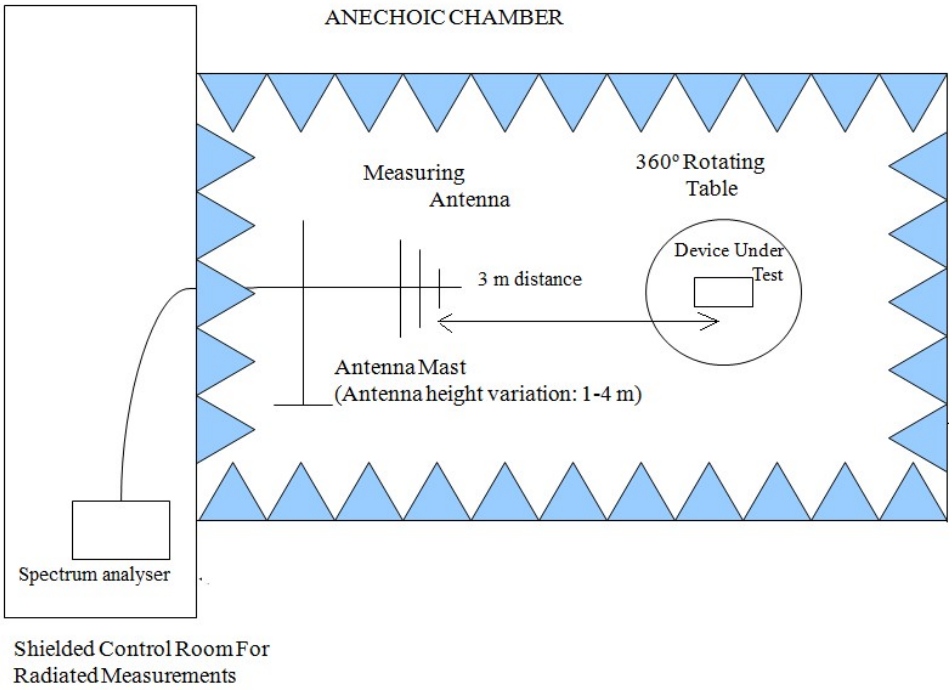
For radiated emissions in the range 9 kHz to 30 MHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 40 dB per decade is used to normalize the measured data for determining compliance.

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 in the range between 30 MHz and 200 MHz the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.
In the range between 9 kHz and 30 MHz the measurements were made in the three different orientation planes of the loop antenna to determine the maximum received field.
In the range between 30 MHz and 200 MHz the measurements were made in both horizontal and vertical planes of polarization.

Radiated measurements setup 9 kHz to 30 MHz:



Radiated measurements setup 30 MHz to 200 MHz:



Occupied Bandwidth

RESULTS:

99 % Occupied Bandwidth and 20 dB Bandwidth.

- **NFC mode ISO 14443A:**

Operation mode	99% Occupied Bandwidth (kHz)	20 dB Bandwidth (kHz)
NFC 13.56 MHz mode ISO 14443A	638.25	270.55
Measurement uncertainty (kHz)	<±0.38	

- **NFC mode ISO 15693:**

Operation mode	99% Occupied Bandwidth (kHz)	20 dB Bandwidth (kHz)
NFC 13.56 MHz mode ISO 15693	32.28	2.64
Measurement uncertainty (kHz)	<±0.38	

Verdict: PASS

FCC 15.225 (a) / RSS-210 B.6 (a). Field strength of emissions within the band 13.553 -13.567 MHz

SPECIFICATION:

The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts/meter (84 dBµV/m) at 30 meters.

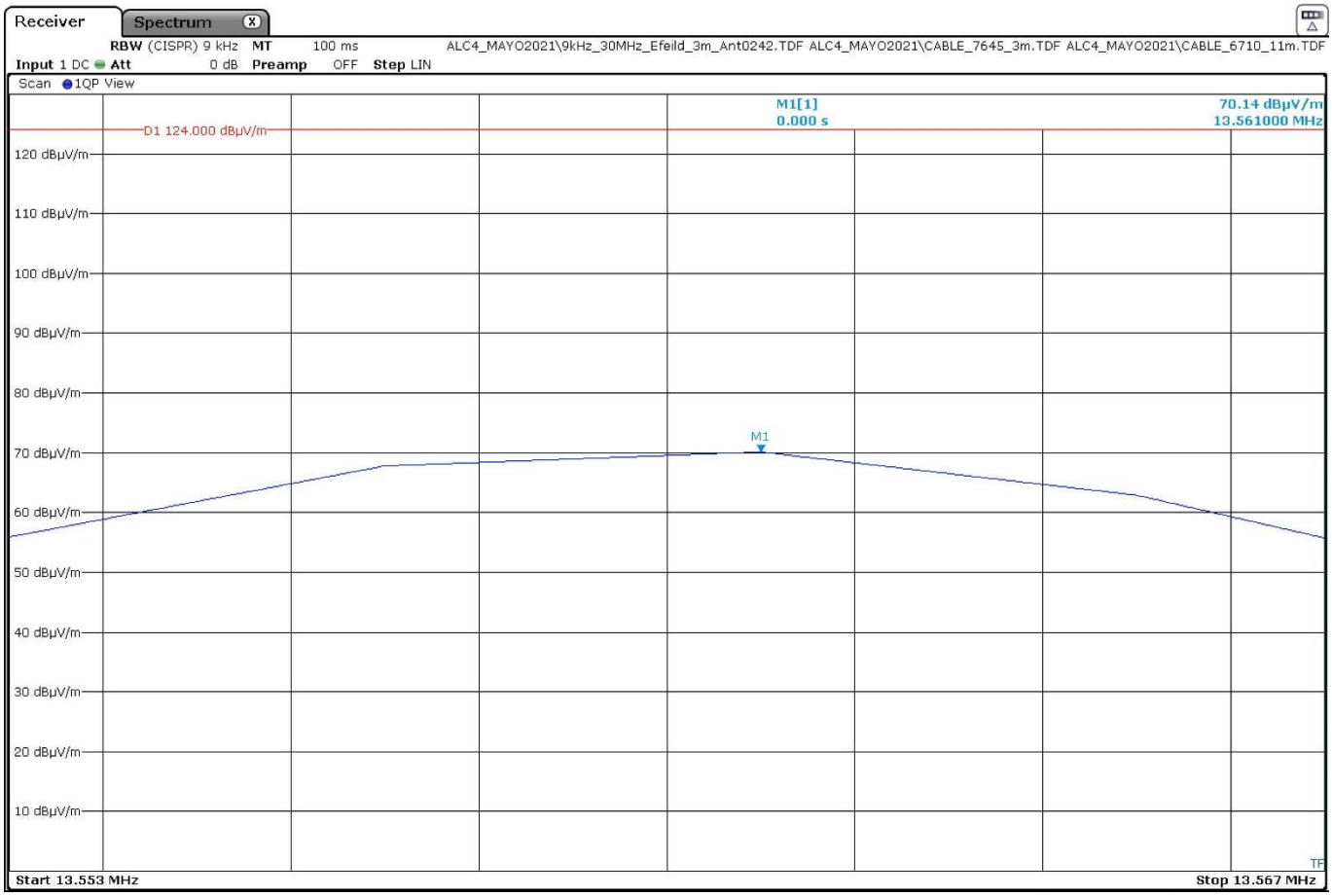
RESULTS:

Measurement distance: 3 meters.

- **NFC mode ISO 14443A:**

The maximum field strength of fundamental emission:

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.561	70.14	30.14
Measurement uncertainty (dB)	<±3.44	



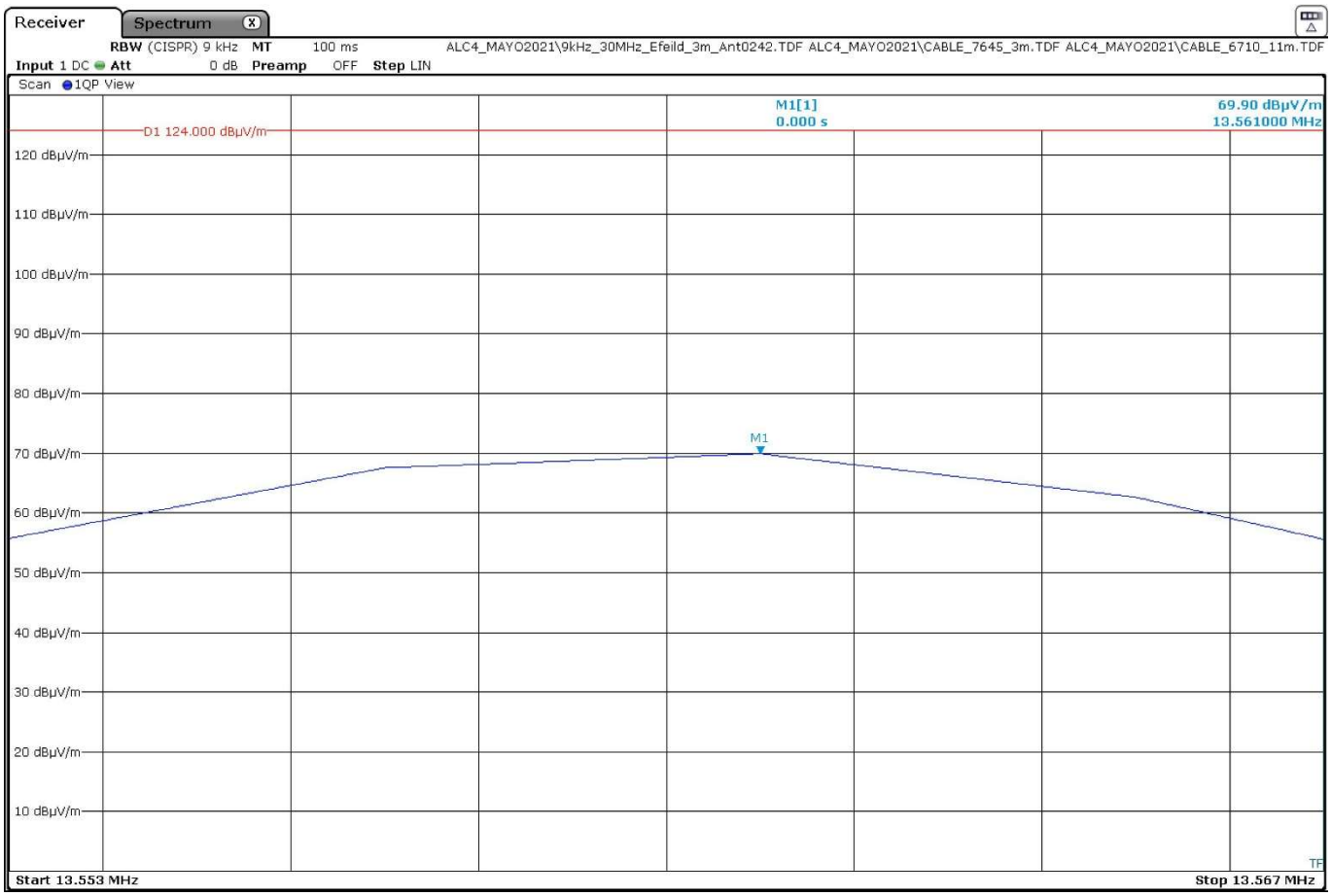
The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- **NFC mode ISO 15693:**

The maximum field strength of fundamental emission:

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.561	69.90	29.90
Measurement uncertainty (dB)	<±3.44	



The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

FCC 15.225 (b) / RSS-210 B.6 (b). Field strength of emissions within the band 13.410 - 13.553 MHz and 13.567 - 13.710 MHz

SPECIFICATION:

Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter (50.47 dBµV/m) at 30 meters.

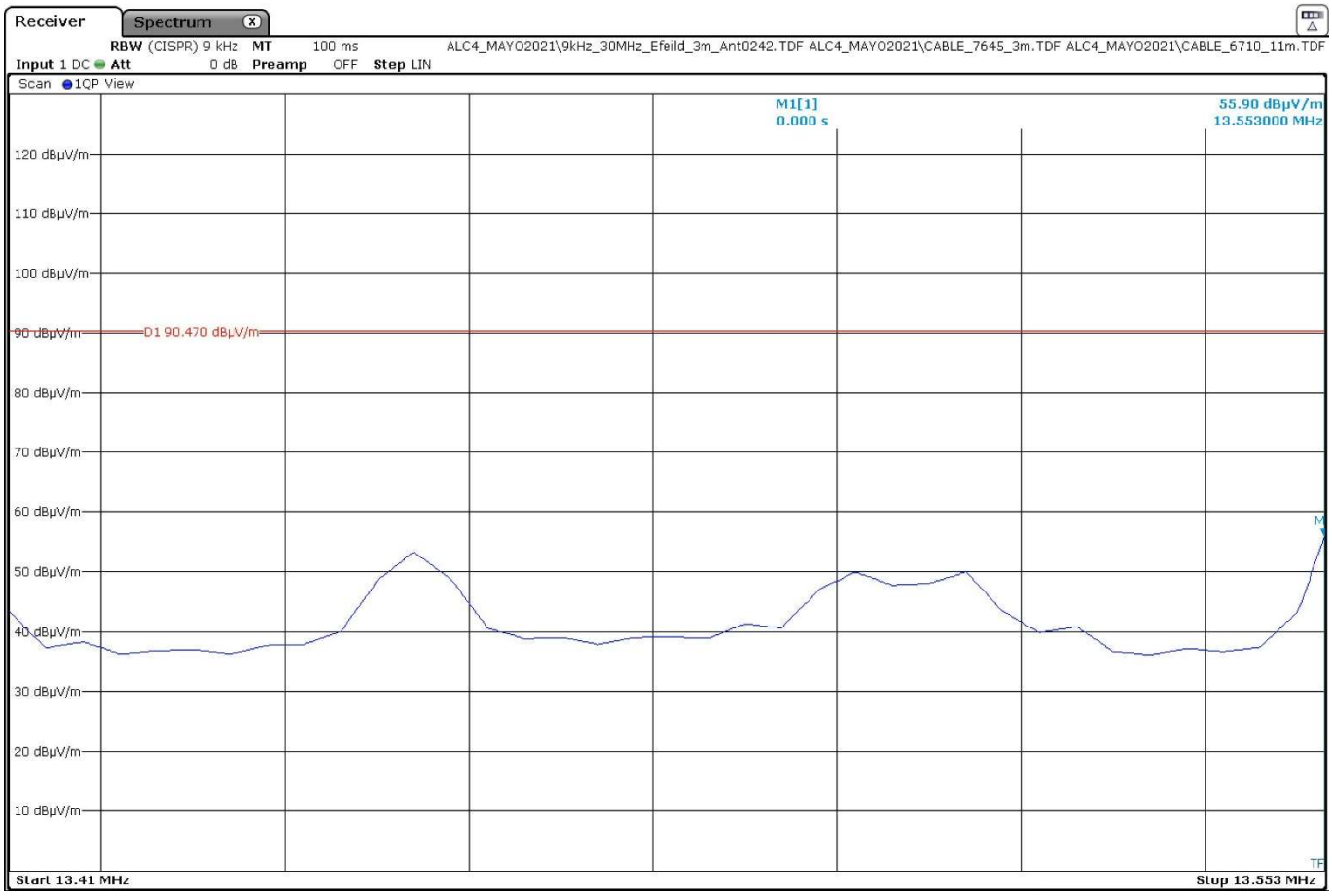
RESULTS:

Measurement distance: 3 meters.

- Band 13.410 - 13.553 MHz

- **NFC mode ISO 14443A:**

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.553	55.90	15.90
Measurement uncertainty (dB)	<±3.44	

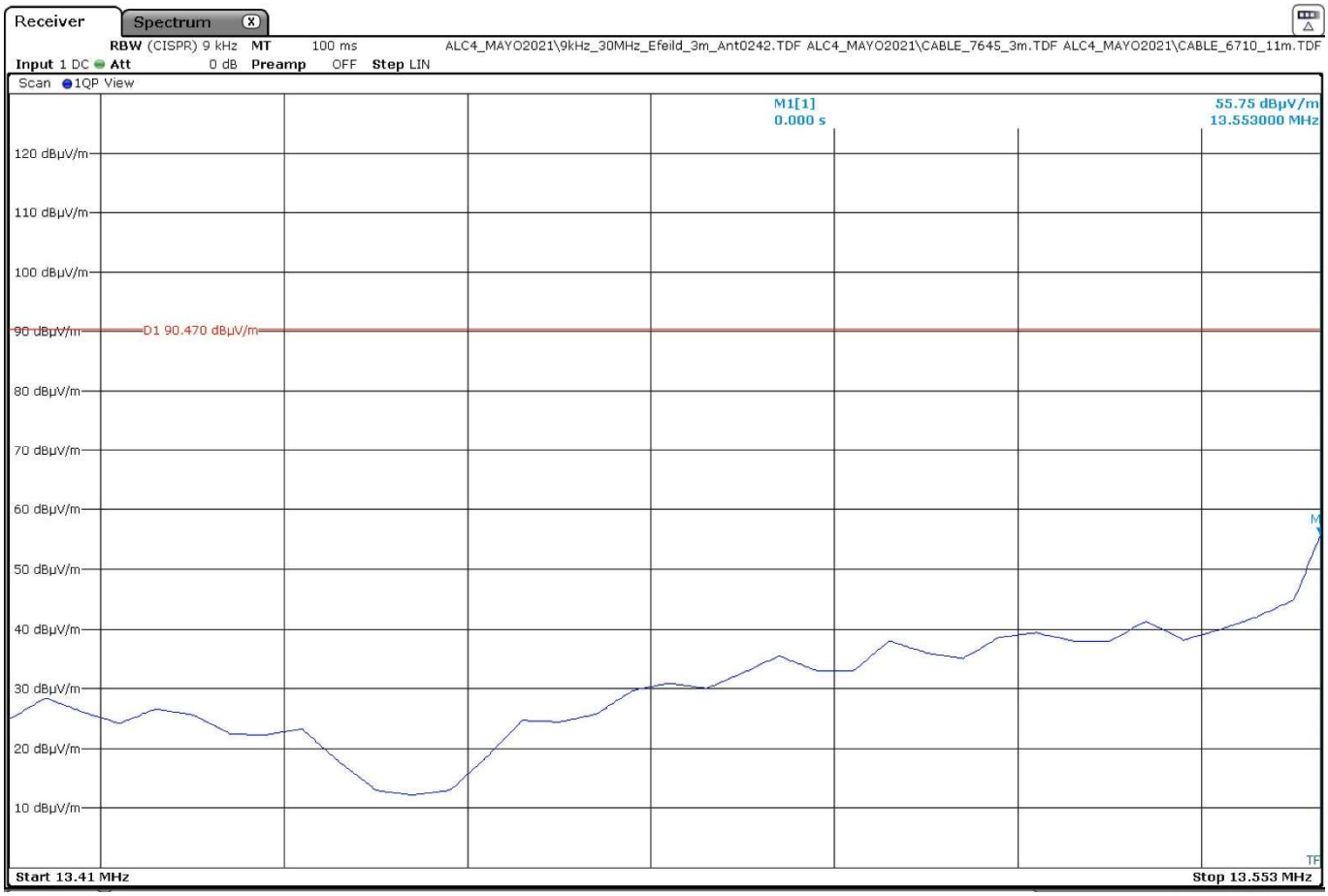


The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- **NFC mode ISO 15693:**

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.553	55.75	15.75
Measurement uncertainty (dB)	<±3.44	



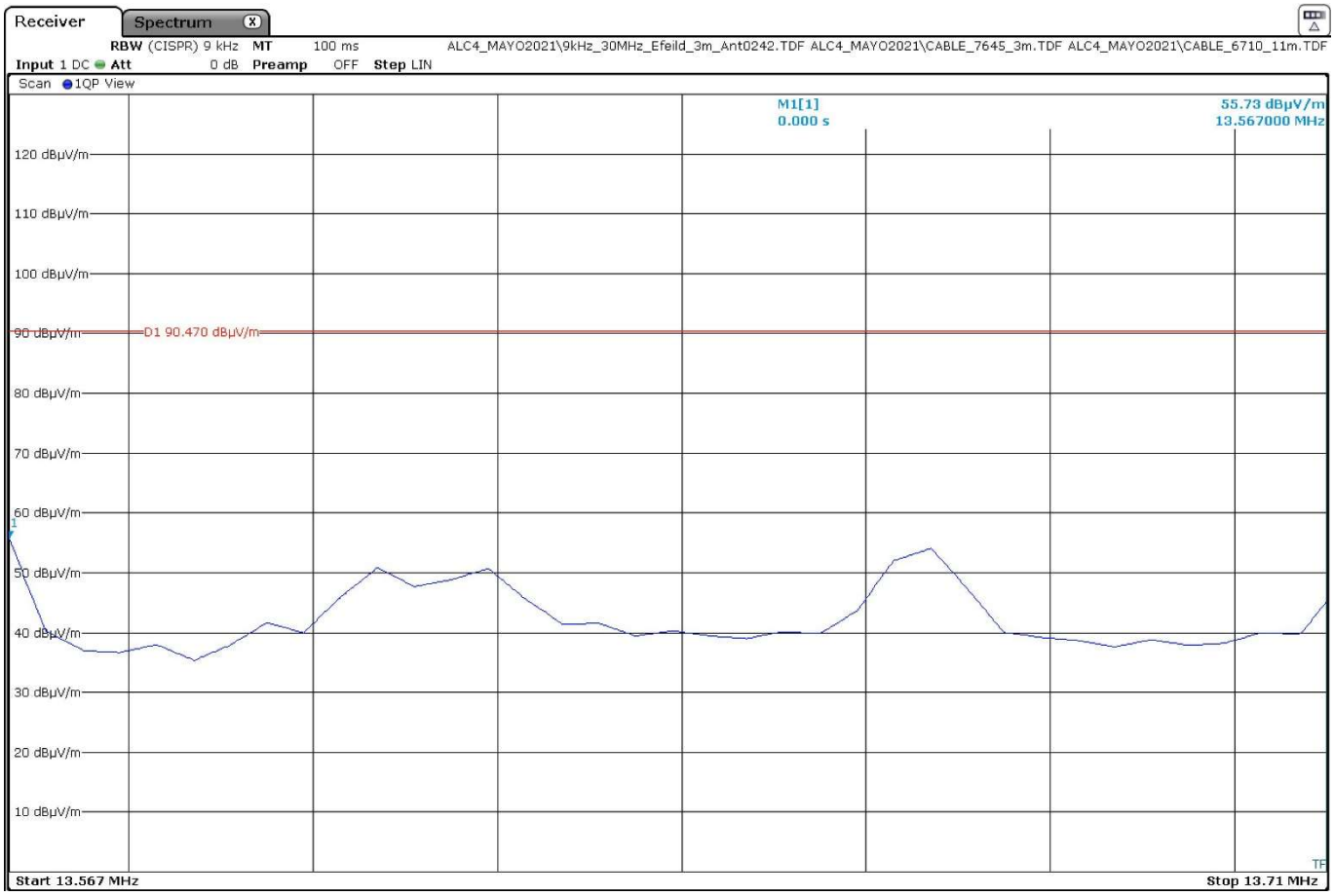
The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- Band 13.567-13.710 MHz

- **NFC mode ISO 14443A:**

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.567	55.73	15.73
Measurement uncertainty (dB)	<±3.44	

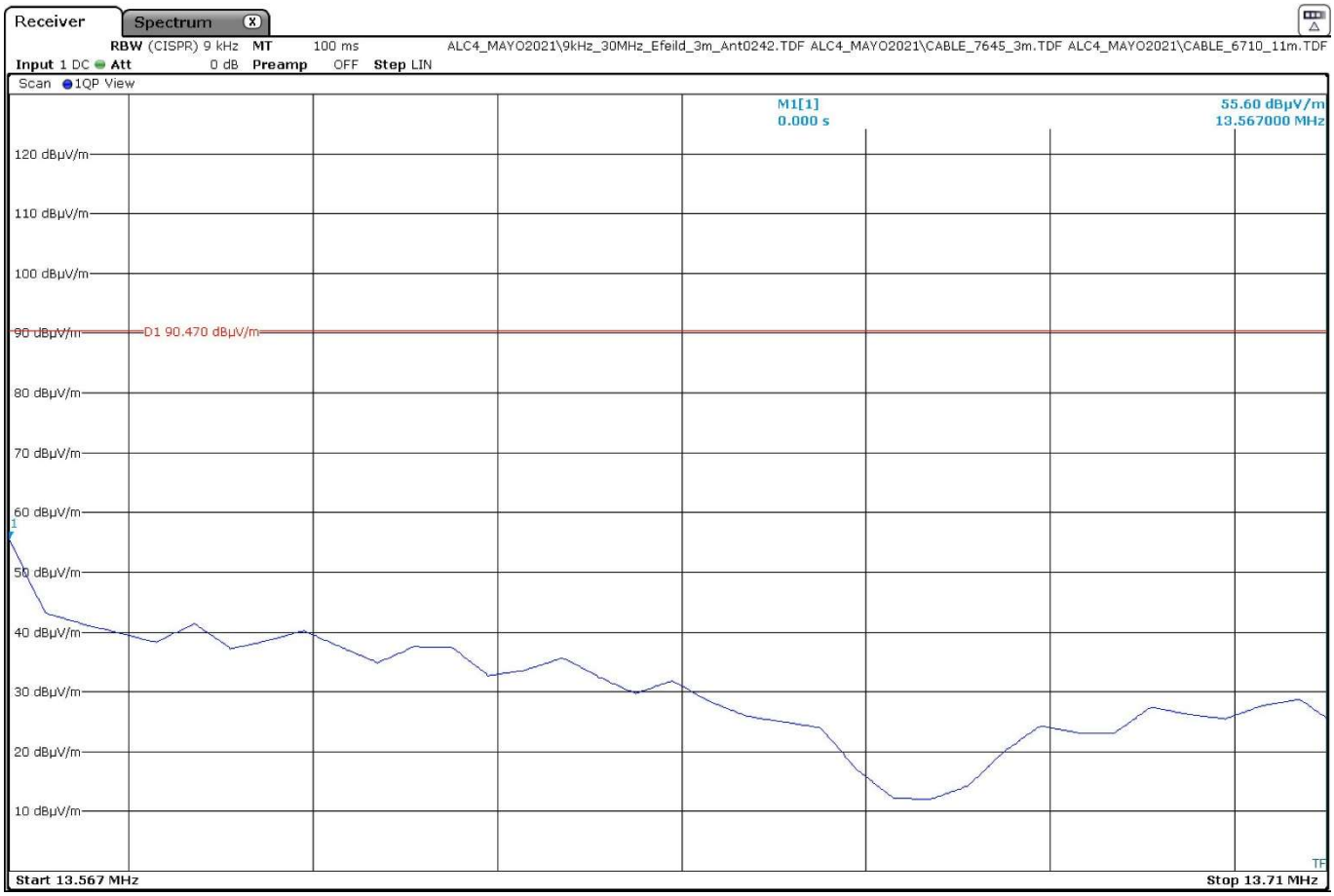


The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- **NFC mode ISO 15693:**

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.567	55.60	15.60
Measurement uncertainty (dB)	<±3.44	



The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

FCC 15.225 (c) / RSS-210 B.6 (c). Field strength of emissions within the band 13.110 - 13.410 MHz and 13.710 - 14.010 MHz

SPECIFICATION:

Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz, the field strength of any emissions shall not exceed 106 microvolts/meter (40.51 dBµV/m) at 30 meters.

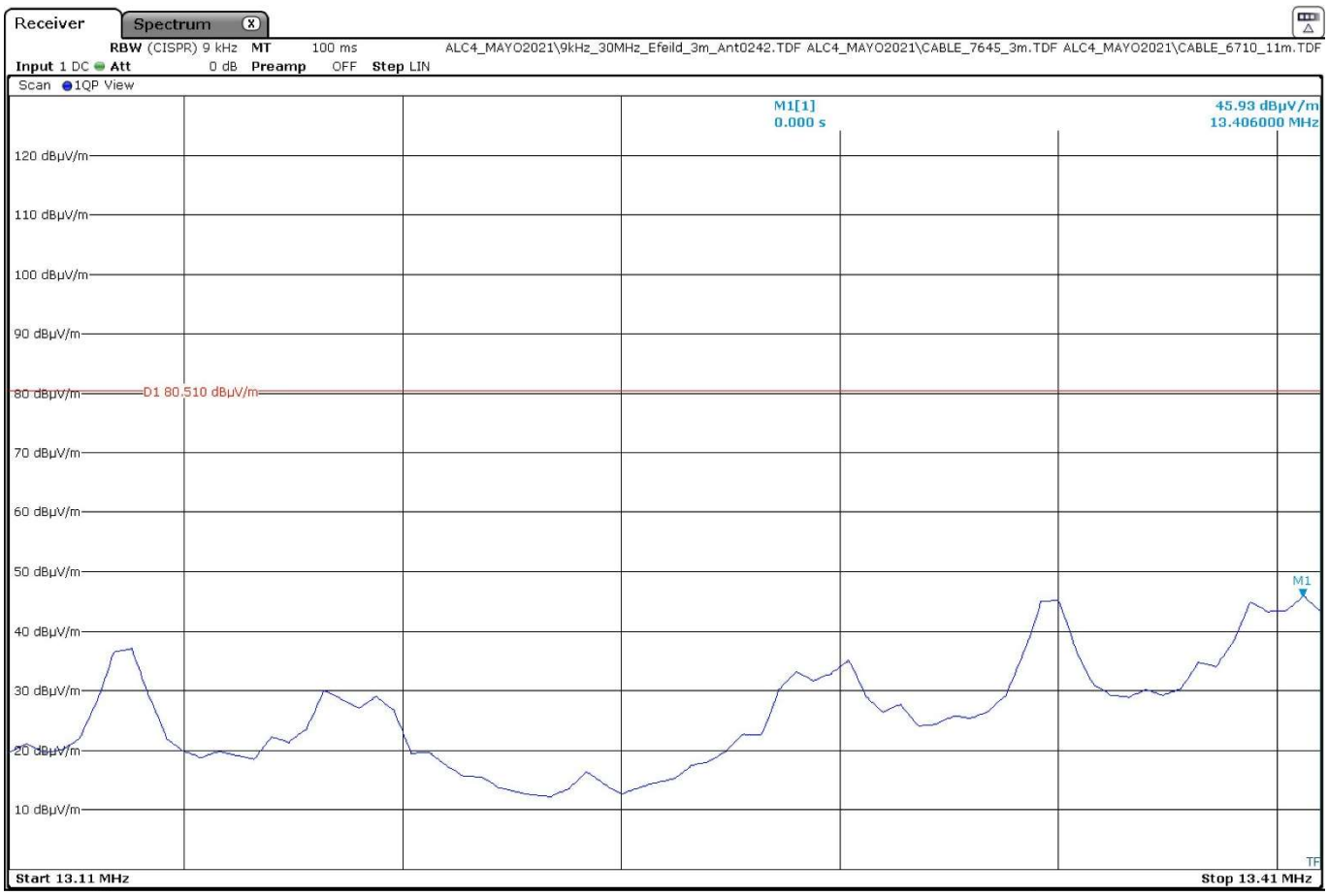
RESULTS:

Measurement distance: 3 meters.

- Band 13.110-13.410 MHz

- **NFC mode ISO 14443A:**

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.406	45.93	5.93
Measurement uncertainty (dB)	<±3.44	

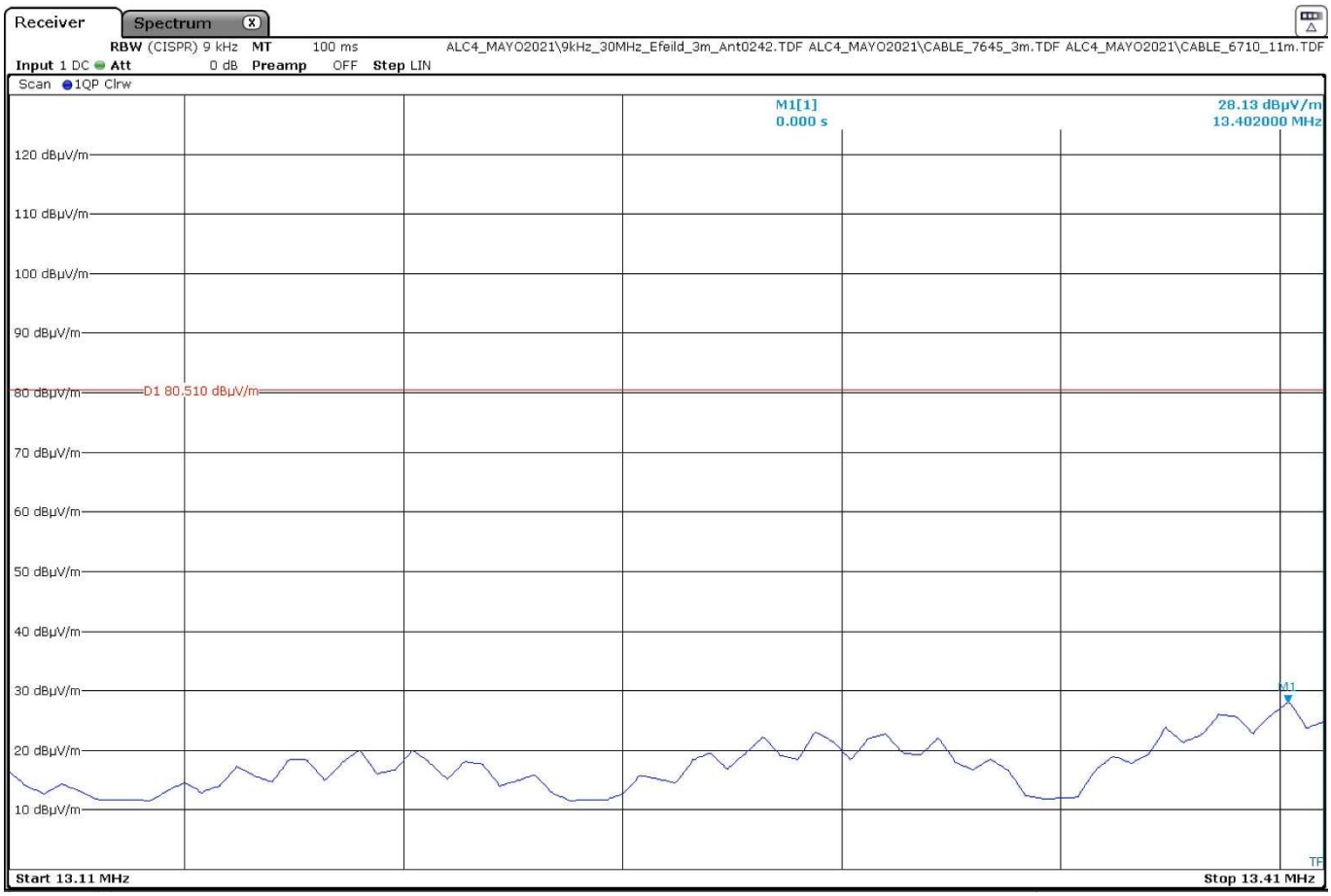


The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- **NFC mode ISO 15693:**

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.402	28.13	-11.87
Measurement uncertainty (dB)	<±3.44	



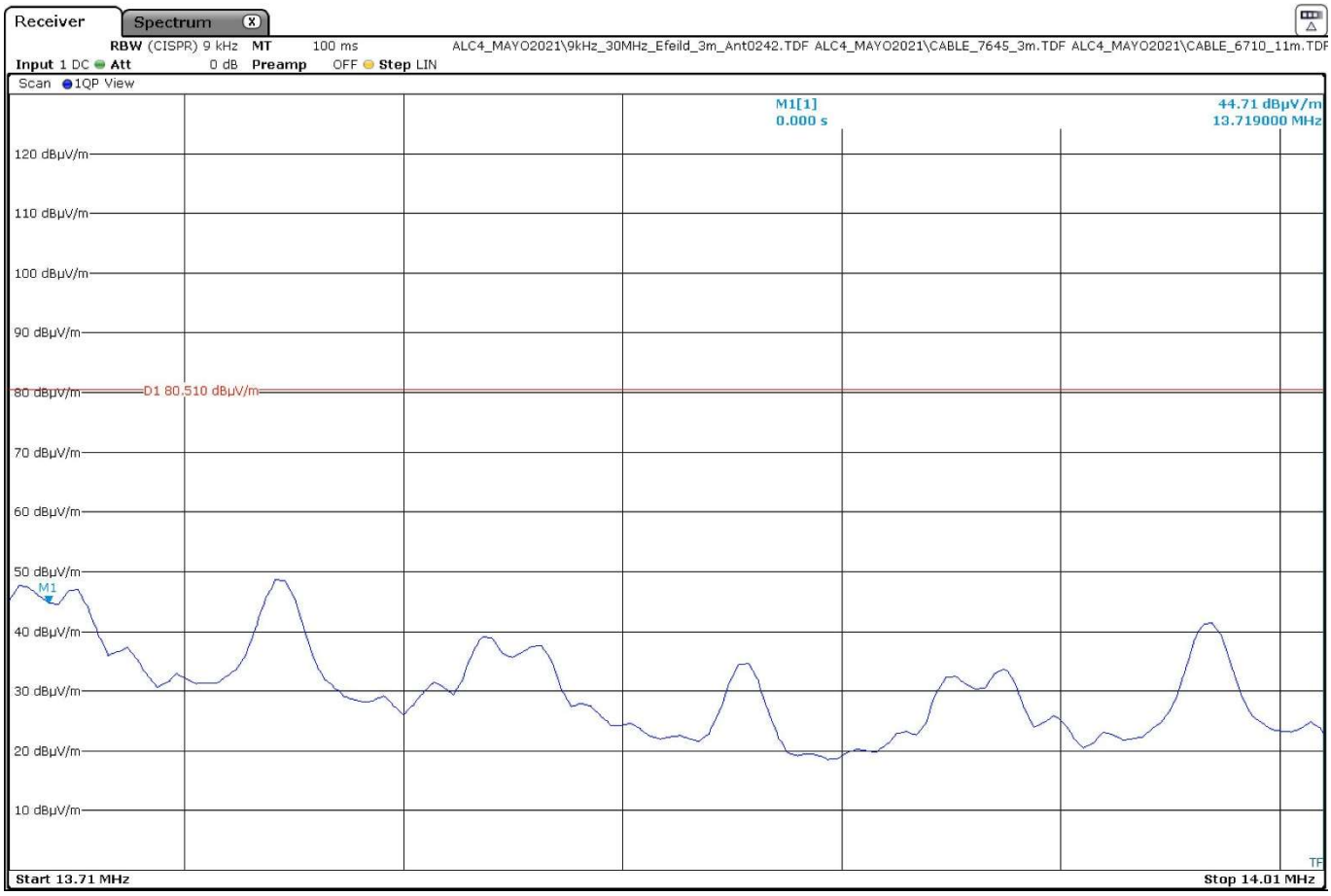
The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- Band 13.710-14.010 MHz

- **NFC mode ISO 14443A:**

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.771	48.59	8.59
Measurement uncertainty (dB)	±3.44	

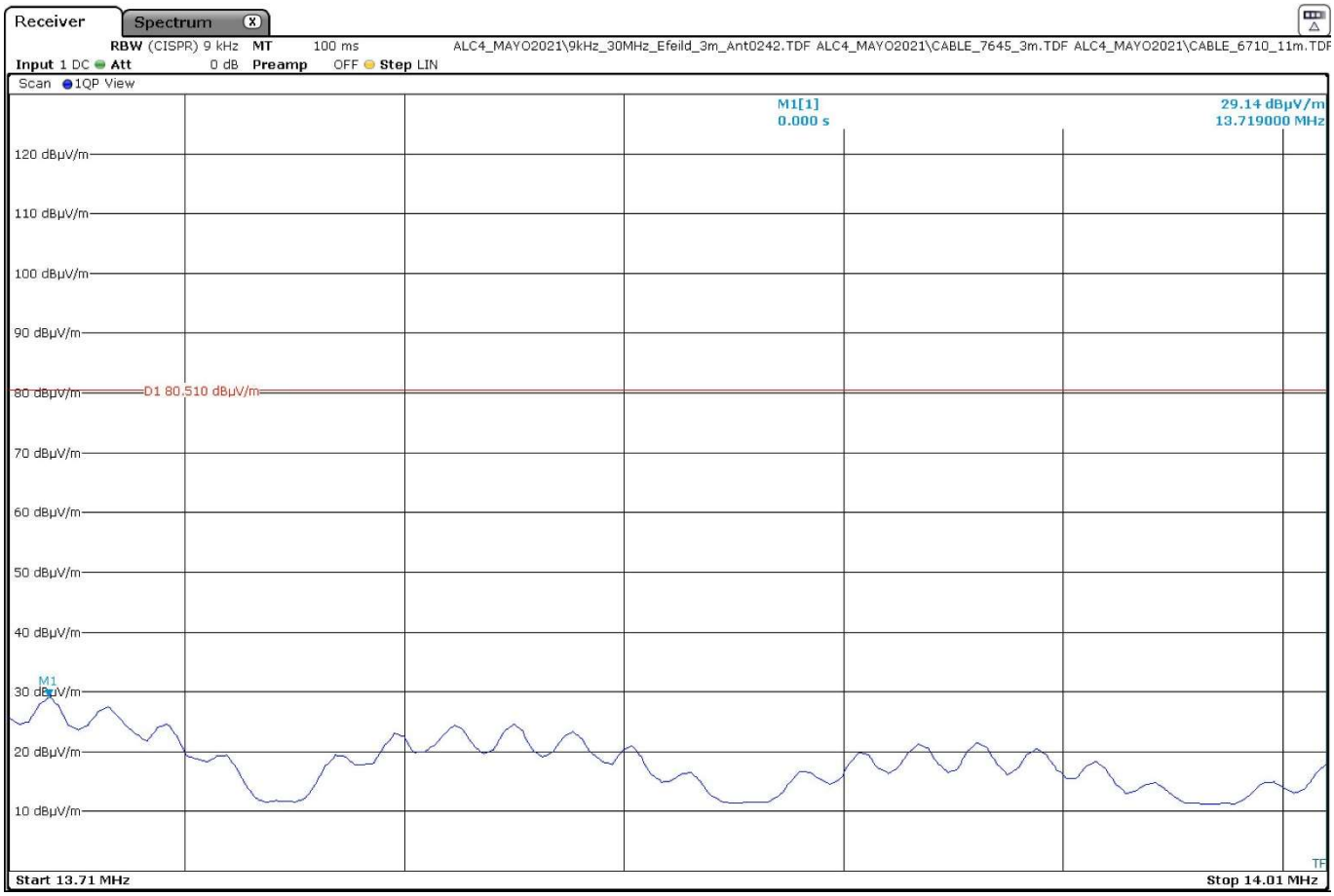


The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- **NFC mode ISO 15693:**

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.719	29.14	-10.86
Measurement uncertainty (dB)	±3.44	



The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

FCC 15.225 (d) / RSS-210 B.6 (a)(iv) Field Strength of Emissions outside of the band 13.110 MHz - 14.010 MHz

SPECIFICATION:

Field strength of any emissions appearing outside of the band 13.110 MHz - 14.010 MHz band shall not exceed the general radiated emission limits in 15.209/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	29.54	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

RESULTS:

All tests were performed in a semi-anechoic chamber at a distance of 3 m.

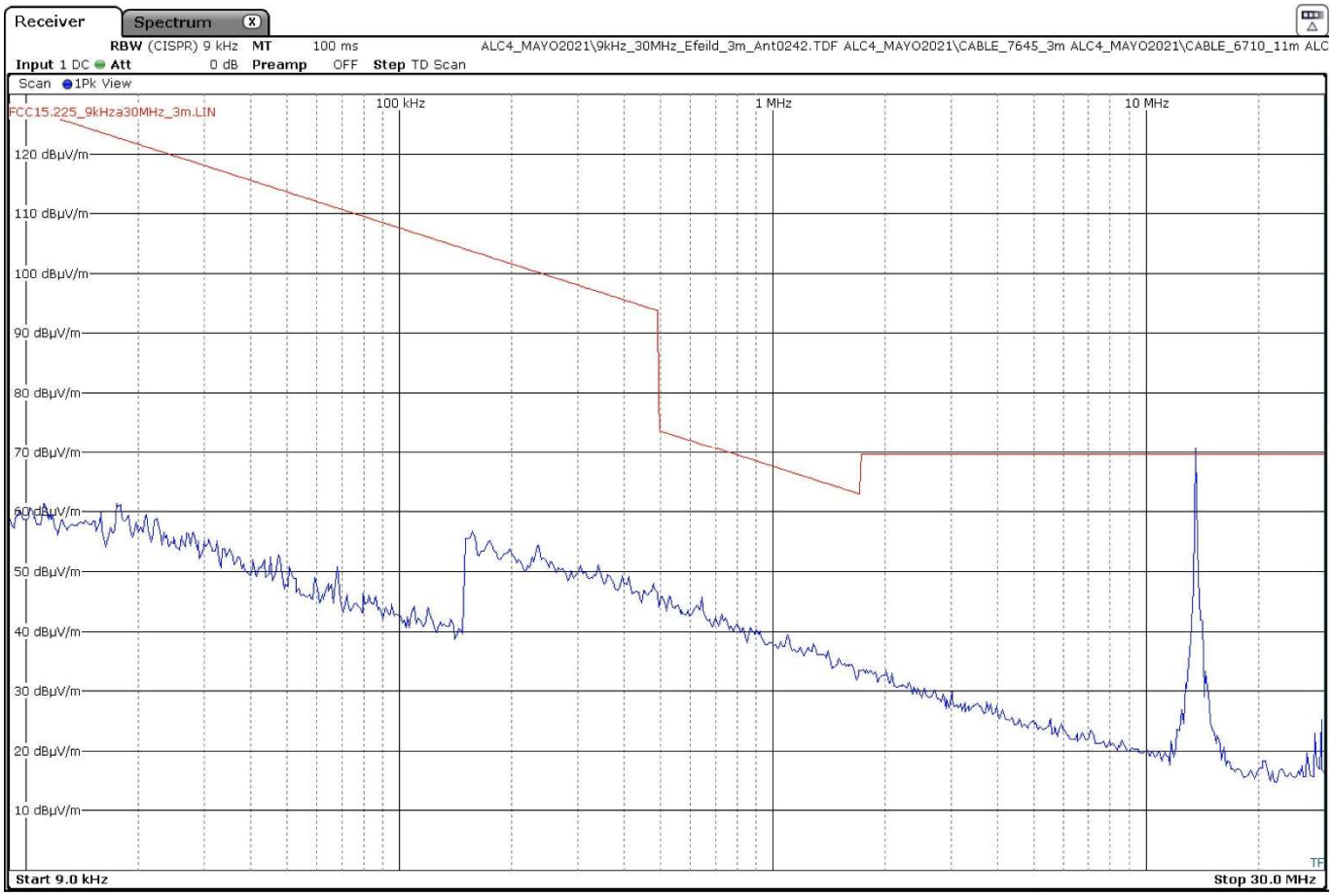
The spectrum was inspected from 9 kHz to 200 MHz searching for spurious signals.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifier gain.

- Frequency range 9 kHz - 30 MHz:

- **NFC mode ISO 14443A:**

No spurious frequencies were found at less than 20 dB of the limit.

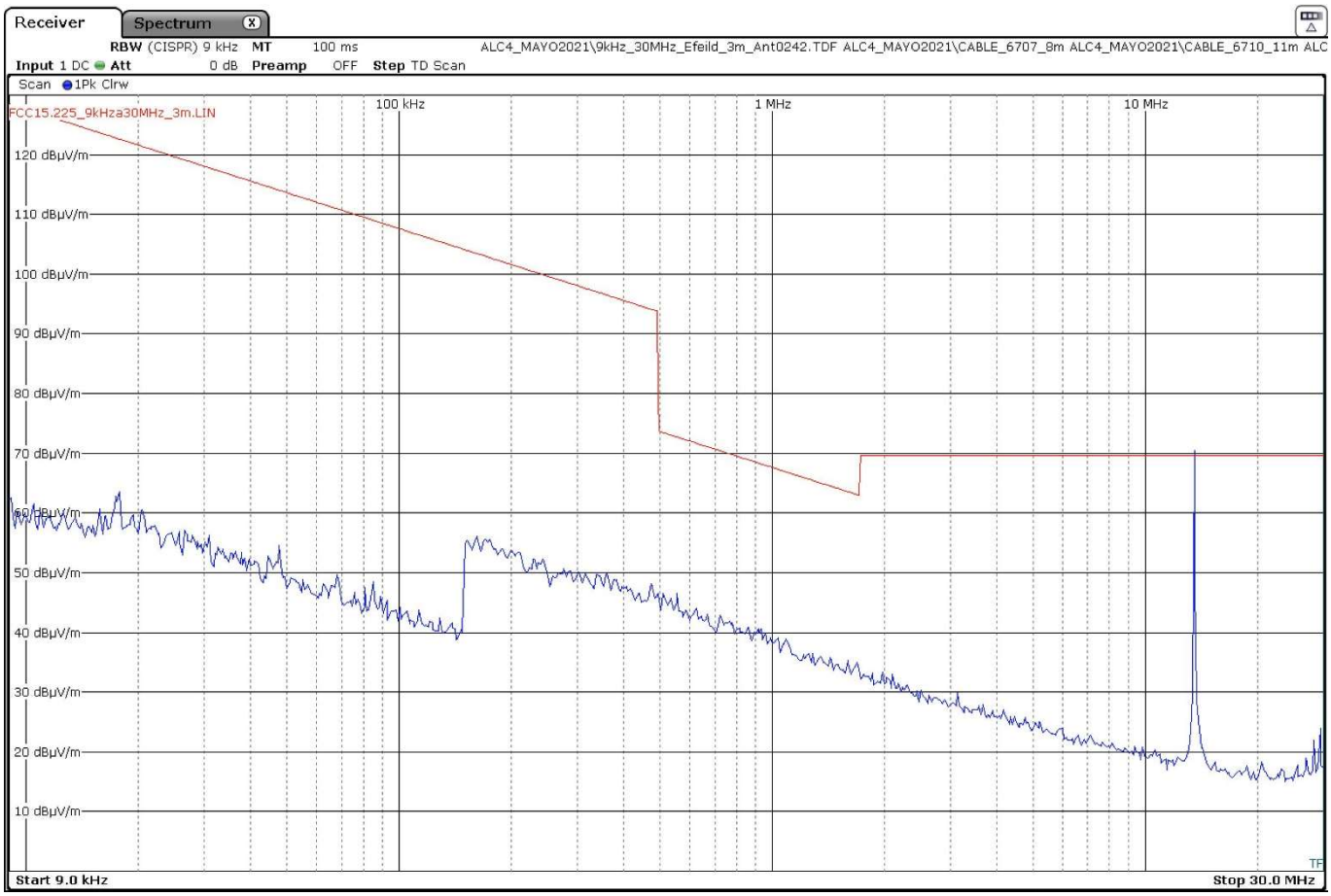


The limits shown in the above plot are extrapolated to 3 meters. The highest peak corresponds to the carrier level.

Resolution bandwidth:
200 Hz for 9 kHz ≤ f ≤ 150 kHz
9 kHz for 150 kHz ≤ f ≤ 30 MHz

- **NFC mode ISO 15693:**

No spurious frequencies were found at less than 20 dB of the limit.



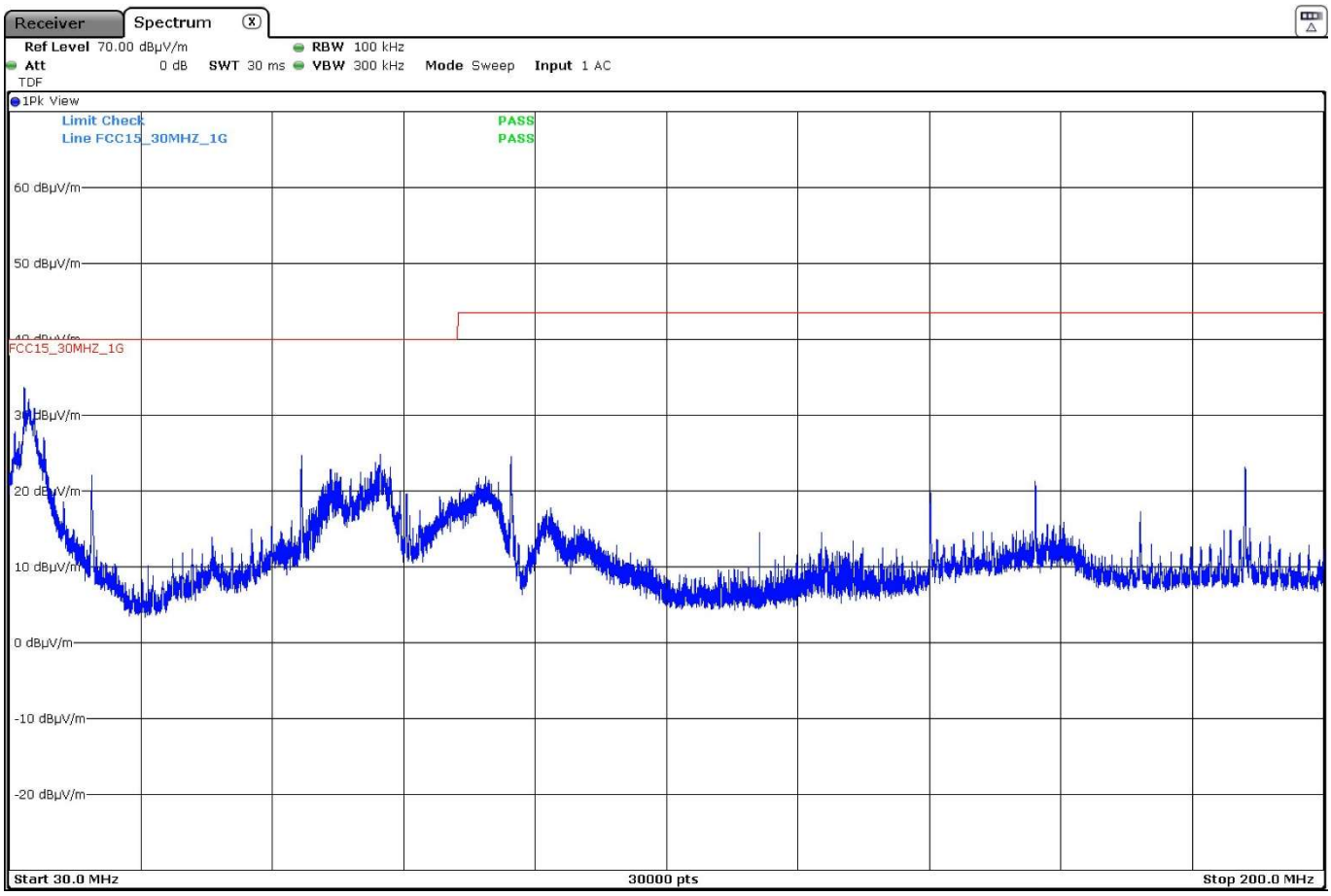
The limits shown in the above plot are extrapolated to 3 meters. The highest peak corresponds to the carrier level.

Resolution bandwidth:
200 Hz for 9 kHz ≤ f ≤ 150 kHz
9 kHz for 150 kHz ≤ f ≤ 30 MHz

- Frequency range 30 - 200 MHz

- **NFC mode ISO 14443A:**

Spurious frequency (MHz)	Emission Level (dBµV/m)	Polarization	Detector
31.9748	31.1	V	Quasi peak
67.8165	24.4	V	Quasi peak
189.8368	23.6	H	Quasi peak

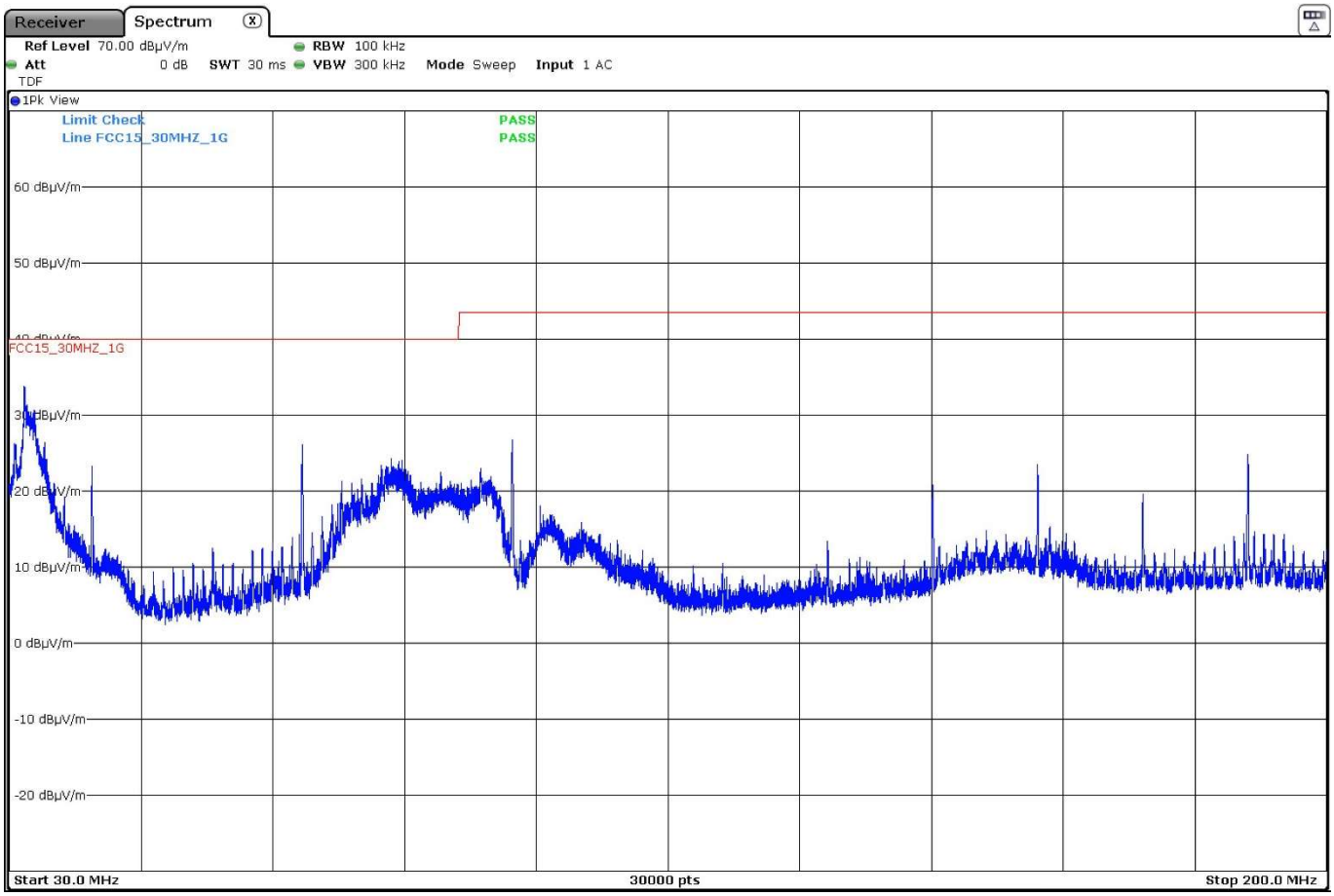


The above plot shows the results of the scan using peak detector.

Verdict: PASS

- **NFC mode ISO 15693:**

Spurious frequency (MHz)	Emission Level (dBµV/m)	Polarization	Detector
31.9635	31	V	Quasi peak
40.6958	22	V	Quasi peak
67.7995	25.7	V	Quasi peak
94.9145	26.4	V	Quasi peak
189.8368	24	H	Quasi peak



The above plot shows the results of the scan using peak detector.

Verdict: PASS

FCC 15.225 (e) / RSS-210 B.6 (b) Frequency Tolerance of the Carrier Signal

SPECIFICATION:

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

RESULTS:

Nominal Operating Frequency: 13.56 MHz.

- **NFC mode ISO 14443A:**

Frequency Stability over Temperature Variations:

Temperature (ºC)	Frequency Error (kHz)	Frequency Error (%)
+50	0.004350	0.000032
+40	0.022350	0.000165
+30	0.044850	0.000331
+20	0.075000	0.000553
+10	0.087000	0.000642
0	0.100500	0.000741
-10	0.100500	0.000741
-20	0.060000	0.000442

Frequency Stability over Voltage Variations:

DC Voltage	Voltage (V)	Temperature (ºC)	Frequency Error (kHz)	Frequency Error (%)
Vmax	13.80	20	0.027600	0.000204
Vmin	10.20	20	0.027600	0.000204

Verdict: PASS

- **NFC mode ISO 15693:**

Frequency Stability over Temperature Variations:

Temperature (ºC)	Frequency Error (kHz)	Frequency Error (%)
+50	0.001350	0.000010
+40	0.025350	0.000187
+30	0.041850	0.000309
+20	0.060000	0.000442
+10	0.094500	0.000697
0	0.100500	0.000741
-10	0.100500	0.000741
-20	0.099000	0.000730

Frequency Stability over Voltage Variations:

DC Voltage	Voltage (V)	Temperature (ºC)	Frequency Error (kHz)	Frequency Error (%)
Vmax	13.80	20	0.026100	0.000192
Vmin	10.20	20	0.029100	0.000215

Verdict: PASS