



Test report No:  
NIE: 58599RRF.001

## Test report

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

|                                           |                                                                                                                                                                                                                                                                                                                                                      |                                                    |                                                                                                                      |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| (*) Identification of item tested         | Electronic Lock Series including all mechanical variants.                                                                                                                                                                                                                                                                                            |                                                    |                                                                                                                      |
| (*) Trademark                             | XS4 Locker                                                                                                                                                                                                                                                                                                                                           |                                                    |                                                                                                                      |
| (*) Model and /or type reference          | L0B (type reference: E1011)                                                                                                                                                                                                                                                                                                                          |                                                    |                                                                                                                      |
| Other identification of the product       | HW Version: 1.0<br>SW Version: 0165 (Control firmware) + 0136 (BGM111 Firmware)<br>FCC IC: UKCL0B<br>ID: 10088A-L0B                                                                                                                                                                                                                                  |                                                    |                                                                                                                      |
| (*) Features                              | Contains a certified Bluetooth module (BGM111)                                                                                                                                                                                                                                                                                                       |                                                    |                                                                                                                      |
| Applicant                                 | SALTO Systems, S.L.<br>Calle Arkotz 9, Polígono Lanbarren<br>20180, Oiartzun, Guipúzcoa, SPAIN                                                                                                                                                                                                                                                       |                                                    |                                                                                                                      |
| Test method requested, standard           | USA FCC Part 15.225 (10–1–18 Edition): Operation within the band 13.110 -14.010.<br>USA FCC Part 15.209 (10–1–18 Edition): Radiated emission limits, general requirements.<br>CANADA RSS-210 Issue 9 (August 2016).<br>CANADA RSS-Gen Issue 5 (April 2018).<br>ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices. |                                                    |                                                                                                                      |
| Approved by (name / position & signature) | J. Carlos Luque<br>RF Lab. Supervisor                                                                                                                                                                                                                                                                                                                | 74841983Y<br>JOSE CARLOS<br>LUQUE<br>(C:A29507456) | Firmado digitalmente por<br>74841983Y JOSE<br>CARLOS LUQUE<br>(C:A29507456)<br>Fecha: 2019.11.22<br>11:40:04 +01'00' |
| Summary                                   | IN COMPLIANCE                                                                                                                                                                                                                                                                                                                                        |                                                    |                                                                                                                      |
| Date of issue                             | 2019-11-22                                                                                                                                                                                                                                                                                                                                           |                                                    |                                                                                                                      |
| Report template No                        | FDT08_22<br>(*) "Data provided by the client"                                                                                                                                                                                                                                                                                                        |                                                    |                                                                                                                      |

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## Competences and guarantees

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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

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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

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Uncertainty (factor  $k=2$ ) was calculated according to the DEKRA Testing and Certification S.A.U. 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 consists of a XS4 Locker, with Bluetooth Smart (BGM111 module) and ISO14443A & ISO15693 standard based technology – Mifare.

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 N° | Description     | Model                       | Serial N° | Date of reception |
|------------|-----------------|-----------------------------|-----------|-------------------|
| 58599/006  | Electronic Lock | L0B (type reference: E1011) | ---       | 2019-02-19        |

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

## Test sample description

|                                               |                                                  |                                 |                          |                          |                                   |   |
|-----------------------------------------------|--------------------------------------------------|---------------------------------|--------------------------|--------------------------|-----------------------------------|---|
| Ports..... :                                  | Port name and description                        | Cable                           |                          |                          |                                   |   |
|                                               |                                                  | Specified max length [m]        | Attached during test     | Shielded                 | Coupled to patient <sup>(3)</sup> |   |
|                                               |                                                  | --                              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>          |   |
|                                               |                                                  |                                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>          |   |
| Supplementary information to the ports..... : | --                                               |                                 |                          |                          |                                   |   |
| Rated power supply .....                      | Voltage and Frequency                            |                                 | Reference poles          |                          |                                   |   |
|                                               |                                                  |                                 | L1                       | L2                       | L3                                | N |
|                                               | <input checked="" type="checkbox"/>              | DC: Internal battery (3x1.5Vdc) |                          |                          |                                   |   |
| Rated Power .....                             | Not provided data                                |                                 |                          |                          |                                   |   |
| Clock frequencies .....                       | 27.12 MHz                                        |                                 |                          |                          |                                   |   |
| Other parameters..... :                       | Not provided data                                |                                 |                          |                          |                                   |   |
| Software version .....                        | 0165 (Control Firmware) + 0136 (BGM111 Firmware) |                                 |                          |                          |                                   |   |
| Hardware version..... :                       | 1.0                                              |                                 |                          |                          |                                   |   |
| Dimensions in cm (W x H x D).... :            | 5.2 x 10.3 x 1.5 & 10.6 x 9.8 x 2                |                                 |                          |                          |                                   |   |
| Mounting position..... :                      | <input checked="" type="checkbox"/>              | Wall/Ceiling mounted equipment  |                          |                          |                                   |   |
| Modules/parts .....                           | Module/parts of test item                        |                                 | Type                     |                          | Manufacturer                      |   |
|                                               | BGM111                                           |                                 | BLE Module               |                          | Silicon Labs                      |   |
| Accessories (not part of the test item) ..... | Description                                      |                                 | Type                     |                          | Manufacturer                      |   |
|                                               | N/A                                              |                                 |                          |                          |                                   |   |

| Documents as provided by the applicant.....: | Description             | File name | Issue date |
|----------------------------------------------|-------------------------|-----------|------------|
|                                              | User manual             |           |            |
|                                              | FW explanation document |           |            |

## Identification of the client

SALTO Systems, S.L.  
Arkotz 9, Polígono Lanbarren  
20180, Oiartzun, Gipuzkoa, SPAIN

## Testing period and place

|               |                                        |
|---------------|----------------------------------------|
| Test Location | DEKRA Testing and Certification S.A.U. |
| Date (start)  | 2019-02-19                             |
| Date (finish) | 2019-03-06                             |

## Document history

| Report number | Date       | Description   |
|---------------|------------|---------------|
| 58599RRF.001  | 2019-11-22 | First release |

## Environmental conditions

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

|                   |                                     |
|-------------------|-------------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C        |
| Relative humidity | Min. = 20 %<br>Max. = 75 %          |
| Air pressure      | Min. = 860 mbar<br>Max. = 1060 mbar |

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

|                   |                                     |
|-------------------|-------------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C        |
| Relative humidity | Min. = 20 %<br>Max. = 75 %          |
| Air pressure      | Min. = 860 mbar<br>Max. = 1060 mbar |

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

|                   |                                     |
|-------------------|-------------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C        |
| Relative humidity | Min. = 20 %<br>Max. = 35 %          |
| Air pressure      | Min. = 860 mbar<br>Max. = 1060 mbar |

## Remarks and comments

The tests have been performed by the technical personnel: Verónica García, Miguel Ángel Torres, Nicolas Salguero, Francisco José Alcaide.

Used instrumentation:

### Conducted measurements:

|                                                                         | Last Calibration | Due Calibration |
|-------------------------------------------------------------------------|------------------|-----------------|
| 1. Chamber HERAEUS VMT 04/35                                            | 2018/06          | 2020/06         |
| 2. Signal and Spectrum analyser 10Hz – 40GHz<br>RODHE AND SCHWARZ FSV40 | 2018/02          | 2020/02         |
| 3. DC Power Supply 40V/40A GW INSTEK GPS-3030D                          | N/A              | N/A             |
| 4. Digital multimeter FLUKE 179                                         | 2019/04          | 2020/04         |

### Radiated measurements:

|                                                                           | Last Calibration | Due Calibration |
|---------------------------------------------------------------------------|------------------|-----------------|
| 1. Semianechoic Absorber Lined Chamber ETS<br>LINDGREN FACT 3 200 STP     | N.A.             | N.A.            |
| 2. EMI Test Receiver 9kHz – 7GHz ROHDE AND<br>SCHWARZ ESR7                | 2018/10          | 2020/10         |
| 3. Active Loop Antenna SCHWARZBECK FMZB<br>1519B                          | 2018/01          | 2020/01         |
| 4. RF Pre-amplifier, 40 dB, 10 MHz-6 GHz BONN<br>ELEKTRONIK BLNA 0160-01N | 2019/02          | 2020/02         |
| 5. Biconical/Log Antenna 30 MHz - 6 GHz ETS<br>LINDGREN 3142E             | 2017/09          | 2020/09         |

## Testing verdicts

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

## Summary

| FCC Part 15.225, 15.209<br>CANADA RSS-210, RSS-Gen                                                                                     |         |        |
|----------------------------------------------------------------------------------------------------------------------------------------|---------|--------|
| Requirement – Test case                                                                                                                | Verdict | Remark |
| 15.225 Subclause (a) / RSS-210 Clause B.6 (a). Field strength of emissions within the band 13.553 - 13.567 MHz                         | P       |        |
| 15.225 Subclause (b) / RSS-210 Clause B.6 (b). Field strength of emissions within the band 13.410 - 13.553 MHz and 13.567 – 13.710 MHz | P       |        |
| 15.225 Subclause (c) / RSS-210 Clause B.6 (c). Field strength of emissions within the band 13.110 - 13.410 MHz and 13.710 – 14.010 MHz | P       |        |
| 15.225 Subclause (d) / RSS-210 Clause B.6 (d). Field strength of emissions outside of the band 13.110 MHz -14.010 MHz                  | P       |        |
| 15.225 Subclause (e) / RSS-210 Clause B.6. Frequency tolerance of the carrier signal                                                   | P       |        |
| <u>Supplementary information and remarks:</u>                                                                                          |         |        |
| None                                                                                                                                   |         |        |

## Appendix A: Test results.

|                                                                                                                                                     |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|----|
| TEST CONDITIONS.....                                                                                                                                | 10 |
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| Section 15.225 Subclause (a) / RSS-210 Clause B.6 (a). Field strength of emissions within the band 13.553 - 13.567 MHz .....                        | 15 |
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## TEST CONDITIONS

### POWER SUPPLY (V):

Vn: 4.5 Vdc (\*)

Vmin: 3.825 Vdc

Vmax: 5.175 Vdc

Type of Power Supply: Battery.

The subscripts 'n', 'min' and 'max' mean nominal, minimum and maximum respectively.

(\*): Declared by applicant.

### ANTENNA:

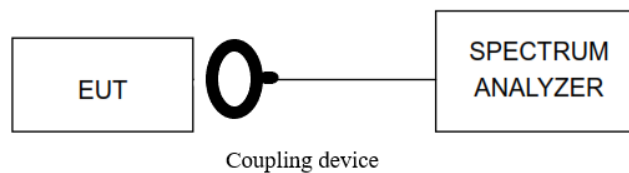
Type of Antenna: Integral (PCB).

### TEST FREQUENCY:

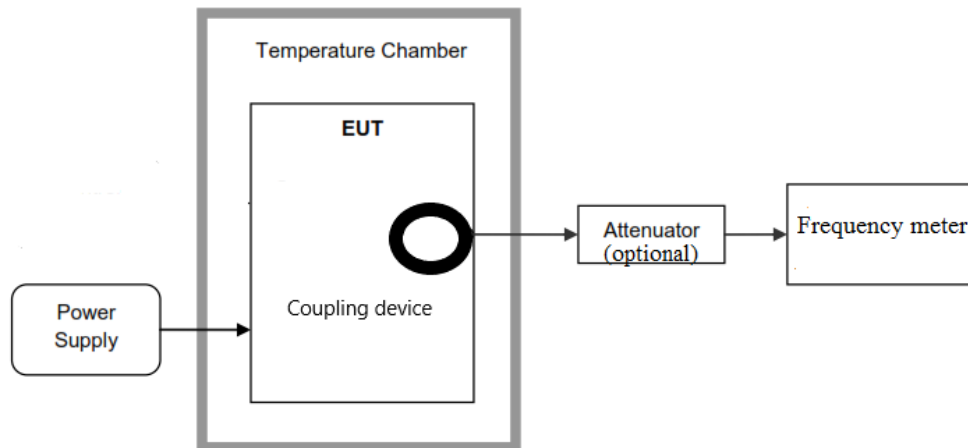
Nominal Operating Frequency: 13.56 MHz

## CONDUCTED MEASUREMENTS

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



For frequency stability test the EUT was placed inside a climatic chamber and connected to a frequency meter using a low loss cable and a coupling device. 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.

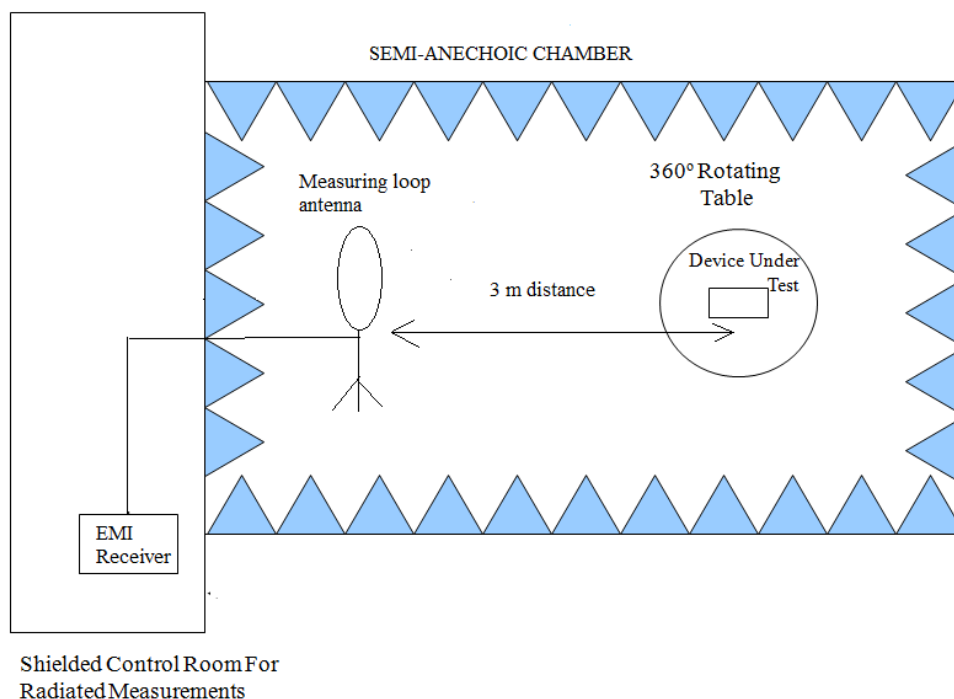
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and in the range between 30 MHz and 200 MHz the antenna height was varied from 1 to 4 meters to find the 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.

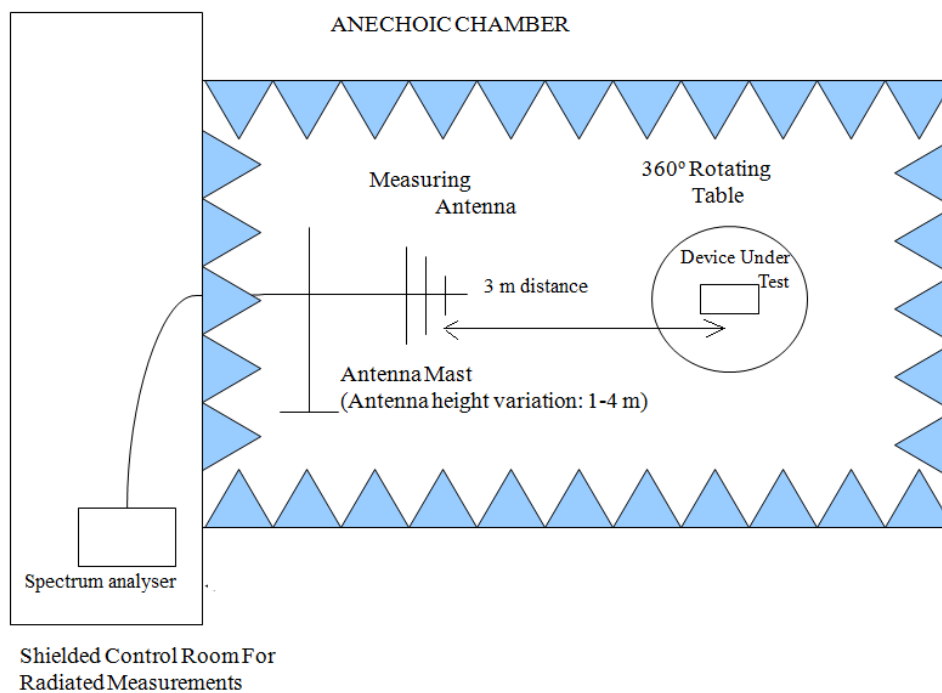
In the range between 30 MHz and 200 MHz the measurements were made in both horizontal and vertical planes of polarization.

The test was performed with the equipment transmitting first with only the 13.56 MHz radio and repeated with Bluetooth Low Energy 2.4 GHz radio transmitting simultaneously to check the impact of the co-location of the other radio interfaces. The results and plots below show the worst results obtained.

Radiated measurements setup 9 kHz to 30 MHz:



Radiated measurements setup 30 MHz to 200 MHz:



Occupied Bandwidth

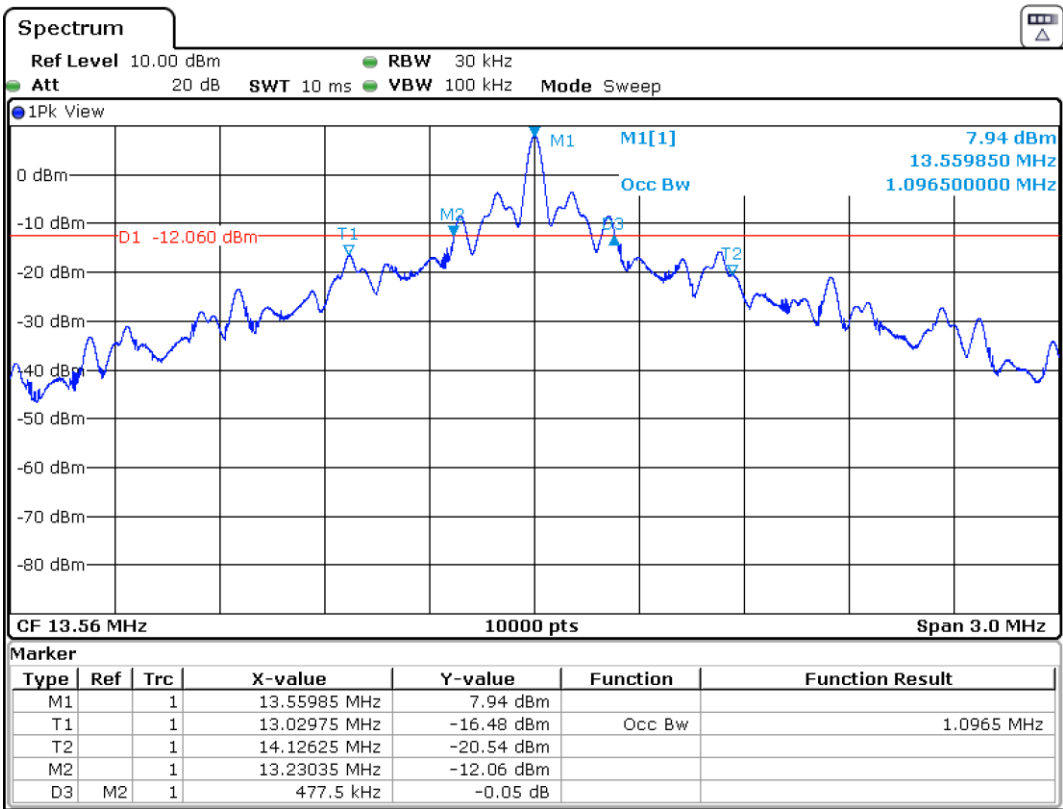
RESULTS:

99 % Occupied Bandwidth and 20 dB Bandwidth.

- NFC mode ISO 14443A

| Operation Mode                | 99% Occupied Bandwidth (kHz) | 20 dB Bandwidth (kHz) |
|-------------------------------|------------------------------|-----------------------|
| NFC mode ISO 14443A           | 1096.5                       | 477.5                 |
| Measurement uncertainty (kHz) | <±0.40                       |                       |

- 99% Occupied Bandwidth and 20 dB Bandwidth:

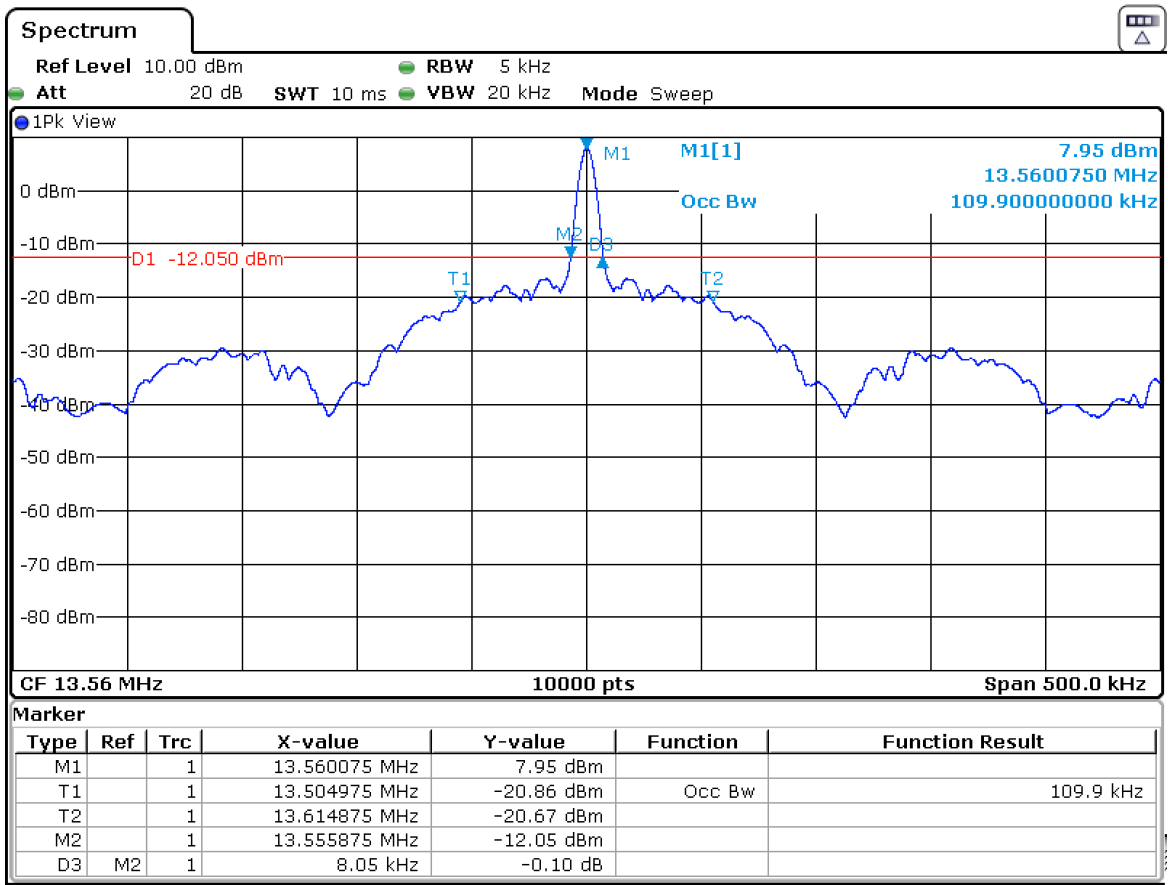


Verdict: PASS

NFC mode ISO 15693

|                               |                              |                       |
|-------------------------------|------------------------------|-----------------------|
| Operation Mode                | 99% Occupied Bandwidth (kHz) | 20 dB Bandwidth (kHz) |
| NFC mode ISO 15693            | 109.9                        | 8.05                  |
| Measurement uncertainty (kHz) | <±0.4                        |                       |

99% Occupied Bandwidth and 20 dB Bandwidth:



Verdict: PASS

## Section 15.225 Subclause (a) / RSS-210 Clause 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 dB $\mu$ V/m) at 30 meters.

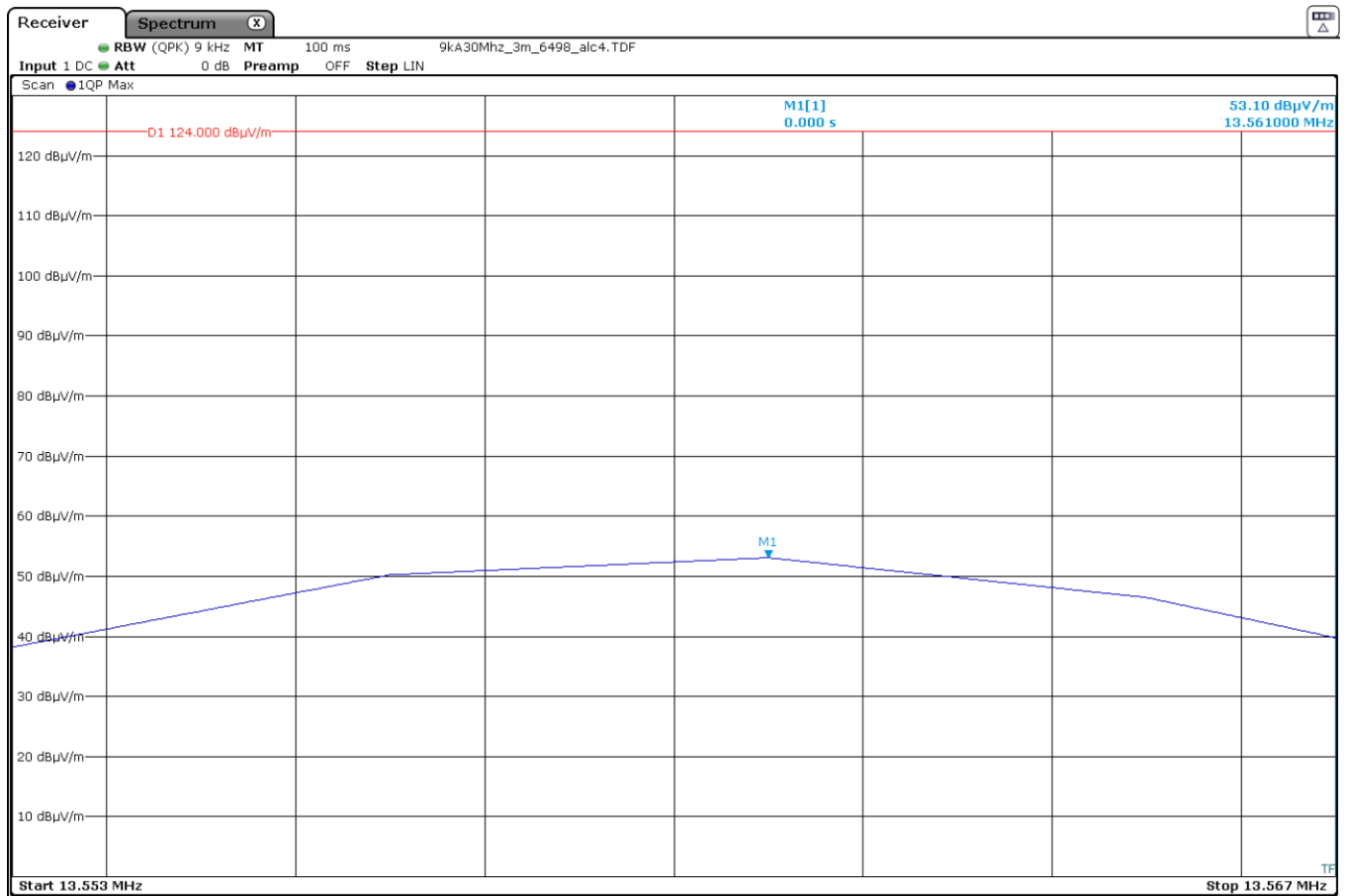
### RESULTS:

Measurement distance: 3 meters.

#### • NFC mode ISO 14443A

The maximum field strength of fundamental emission:

| Frequency (MHz)              | Maximum field strength (dB $\mu$ V/m) measured at 3 m (quasi-peak detector) | Maximum field strength (dB $\mu$ V/m) extrapolated to 30 m (40 dB/decade) |
|------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 13.561                       | 53.1                                                                        | 13.1                                                                      |
| Measurement uncertainty (dB) | $\pm 3.44$                                                                  |                                                                           |



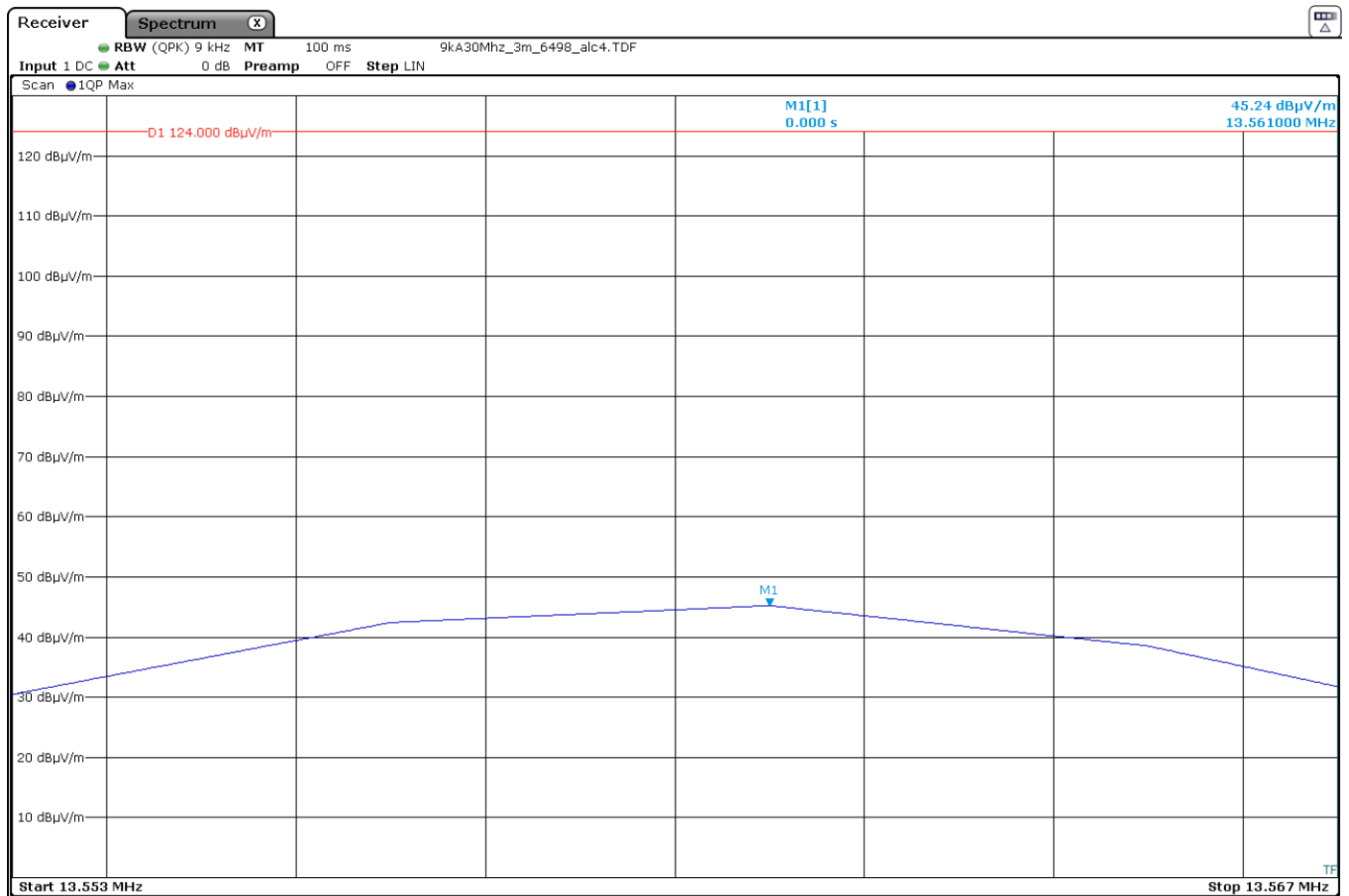
The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- **NFC mode ISO 15693**

The maximum field strength of fundamental emission:

| Frequency (MHz)              | Maximum field strength (dB $\mu$ V/m)<br>measured at 3 m (quasi-peak<br>detector) | Maximum field strength (dB $\mu$ V/m)<br>extrapolated to 30 m (40<br>dB/decade) |
|------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| 13.561                       | 45.24                                                                             | 5.24                                                                            |
| Measurement uncertainty (dB) | < $\pm$ 3.44                                                                      |                                                                                 |



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

Verdict: PASS

Section 15.225 Subclause (b) / RSS-210 Clause 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.

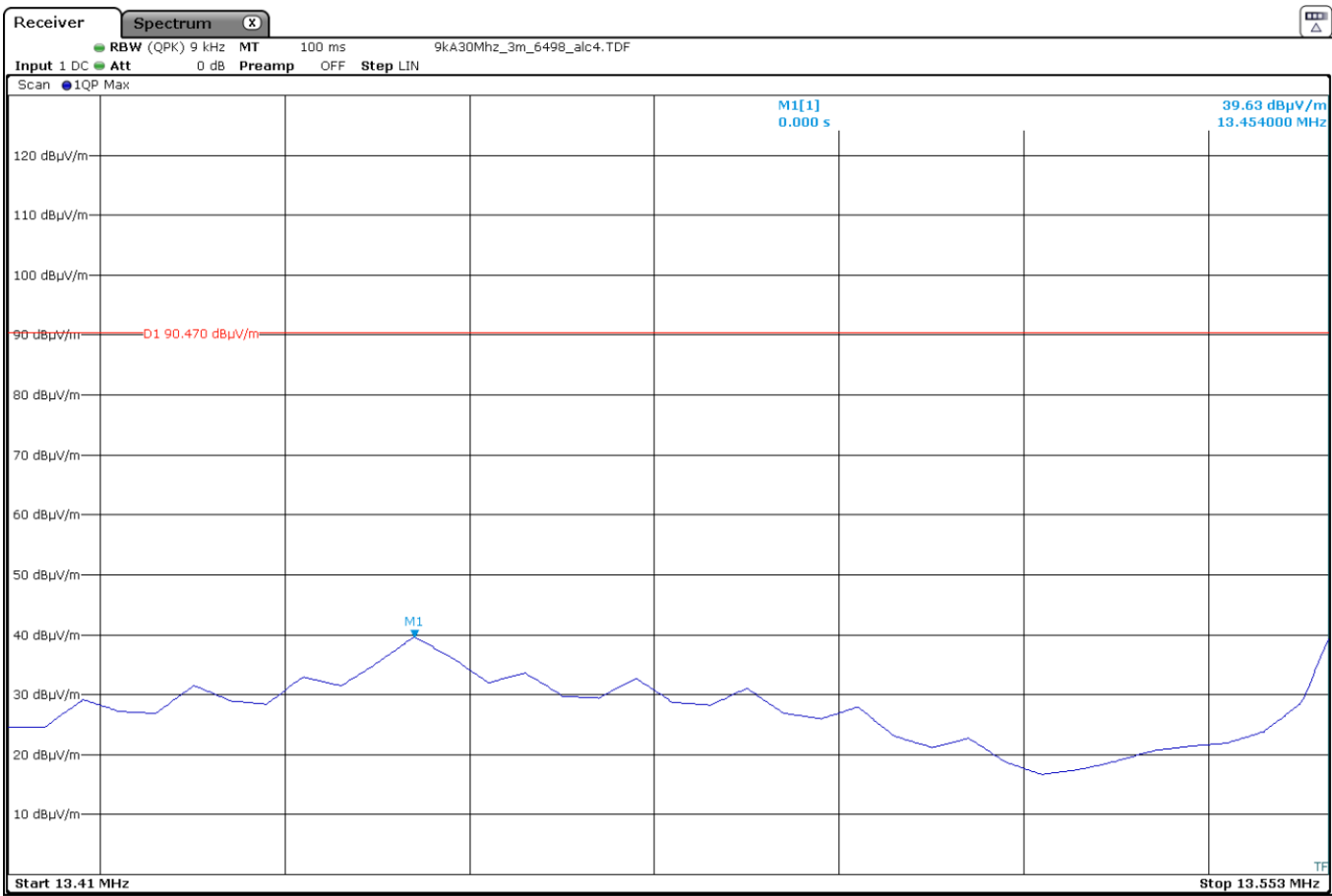
RESULTS:

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) |
|------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------|
| 13.454                       | 39.63                                                                 | -0.37                                                               |
| Measurement uncertainty (dB) | <±3.44                                                                |                                                                     |

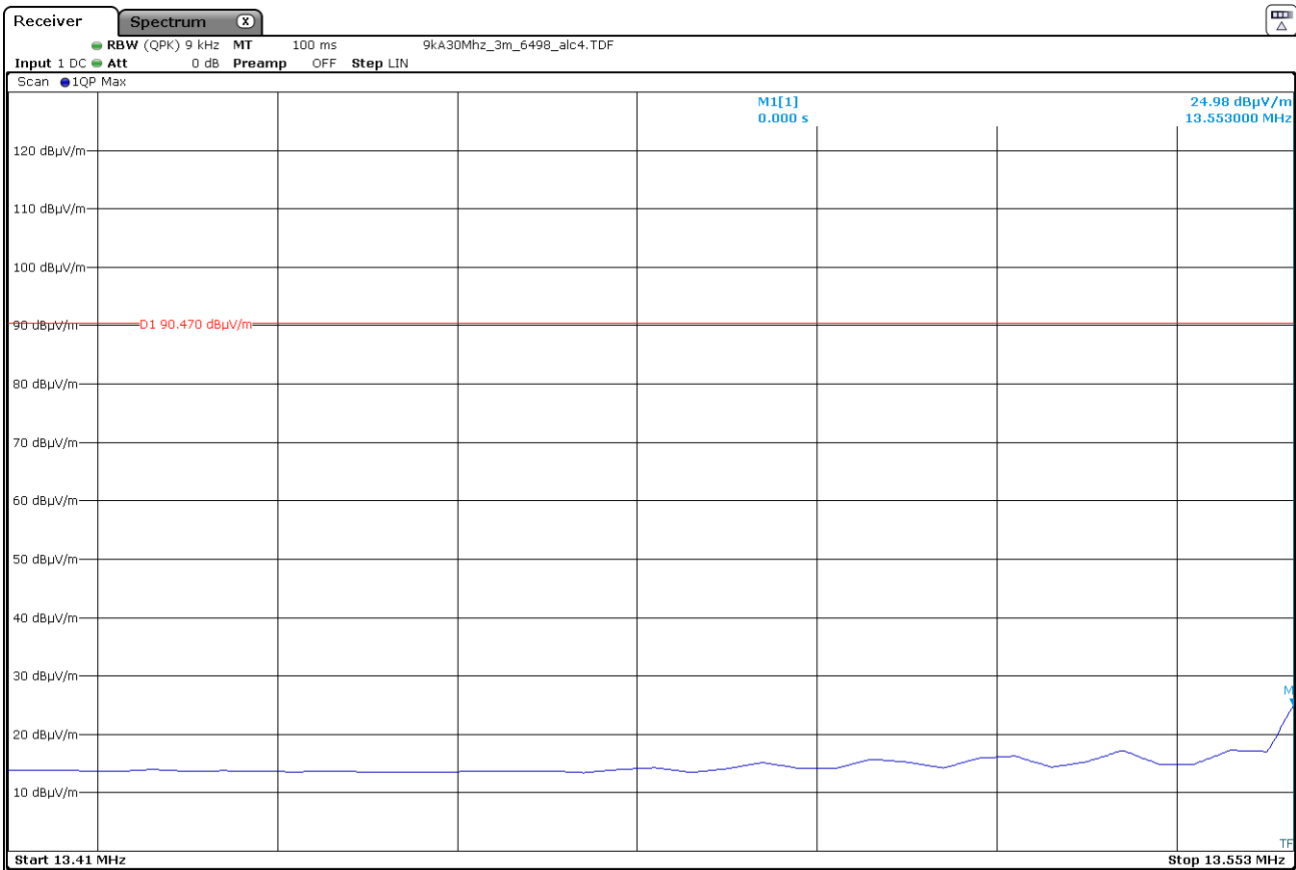


The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

NFC mode ISO 15693

| Frequency (MHz)              | Maximum field strength (dBµV/m)<br>measured at 3 m (quasi-peak<br>detector) | Maximum field strength (dBµV/m)<br>extrapolated to 30 m (40<br>dB/decade) |
|------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 13.553                       | 24.98                                                                       | -15.02                                                                    |
| Measurement uncertainty (dB) | <±3.44                                                                      |                                                                           |



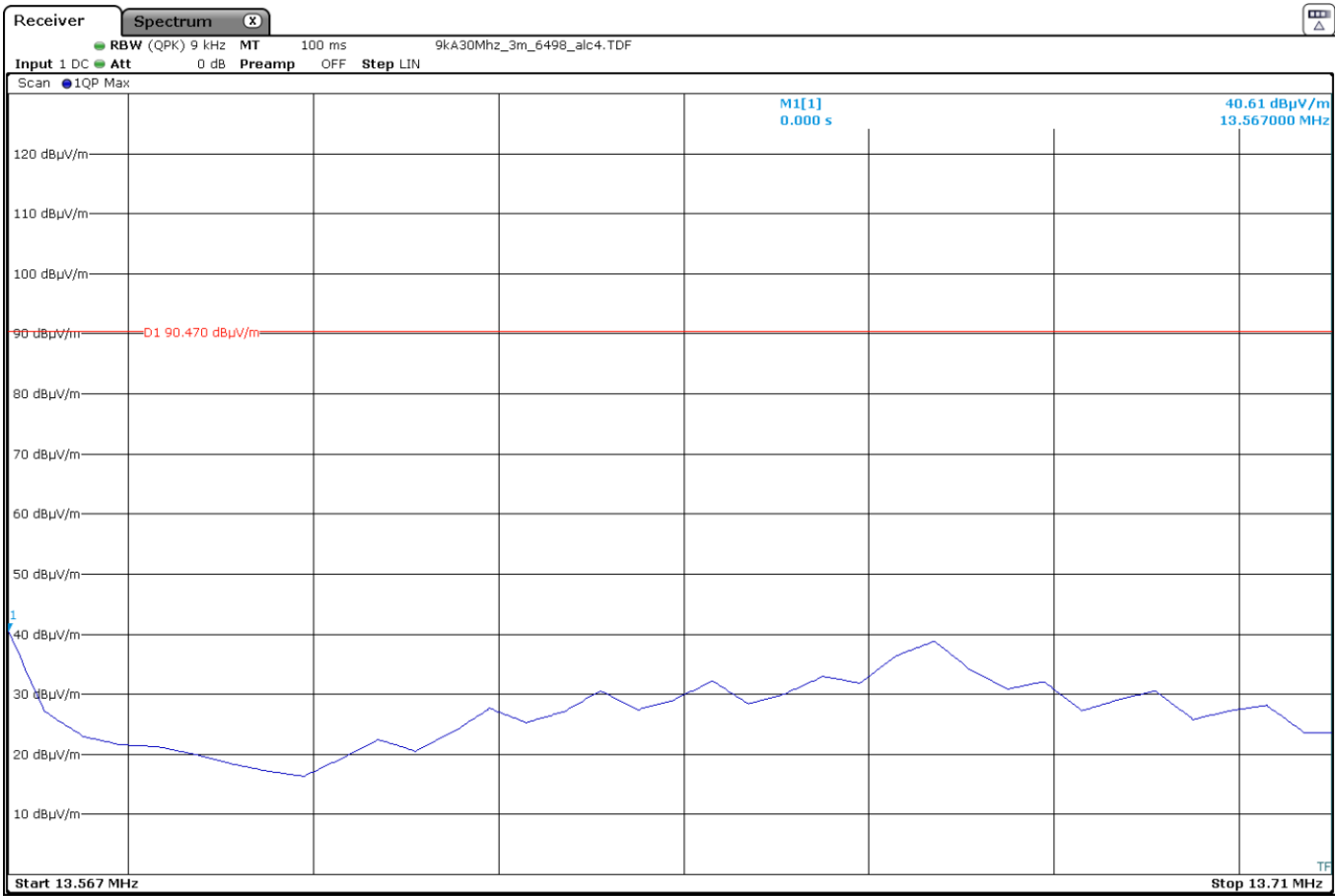
The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- Band 13.567-13.710 MHz

- NFC mode ISO 14443A

| Frequency (MHz)              | Maximum field strength (dBµV/m)<br>measured at 3 m (quasi-peak<br>detector) | Maximum field strength (dBµV/m)<br>extrapolated to 30 m (40 dB/decade) |
|------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| 13.567                       | 40.61                                                                       | 0.61                                                                   |
| Measurement uncertainty (dB) | <±3.44                                                                      |                                                                        |

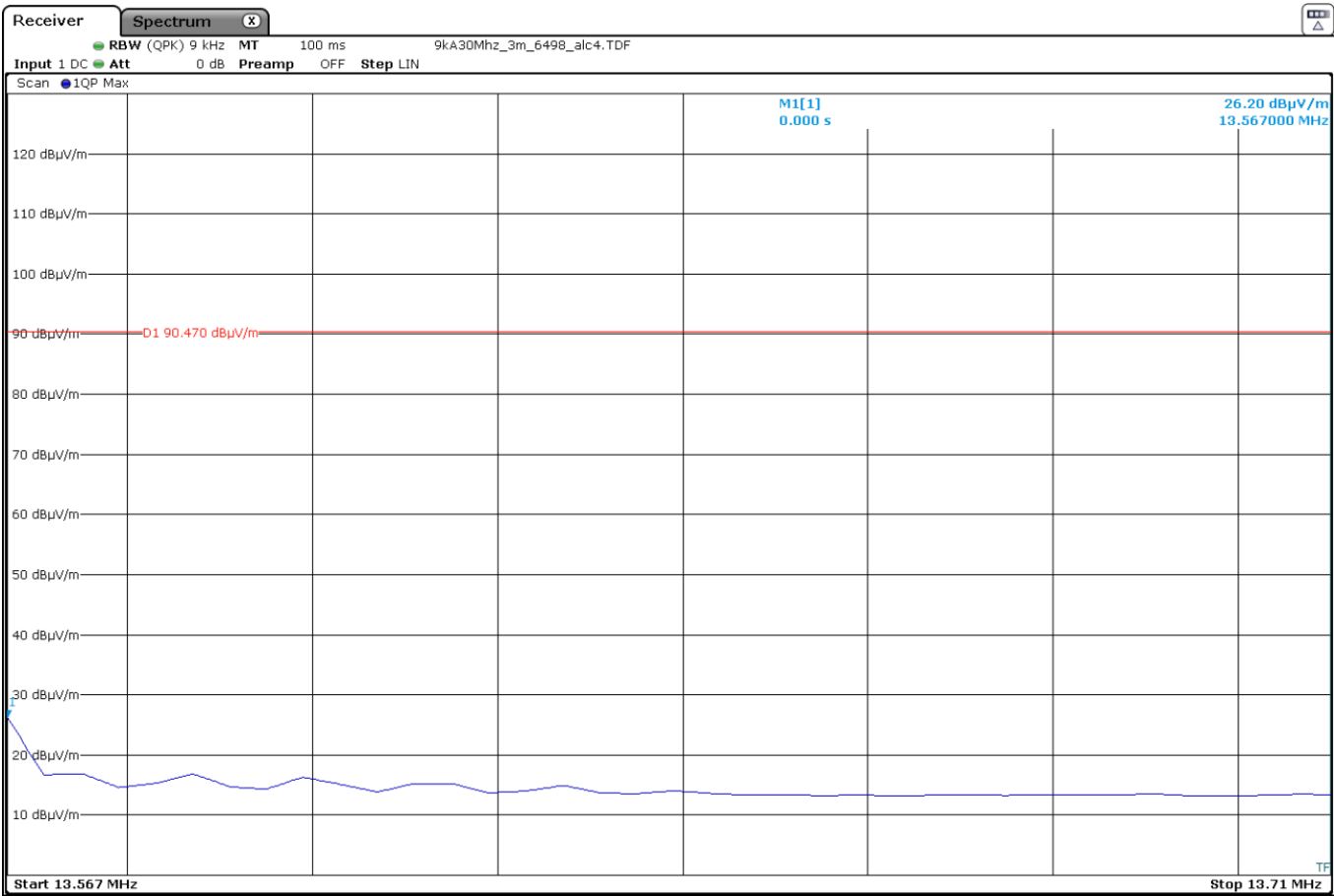


The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

NFC mode ISO 15693

| Frequency (MHz)              | Maximum field strength (dBµV/m)<br>measured at 3 m (quasi-peak<br>detector) | Maximum field strength (dBµV/m)<br>extrapolated to 30 m (40 dB/decade) |
|------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| 13.567                       | 26.2                                                                        | -13.8                                                                  |
| Measurement uncertainty (dB) | <±3.44                                                                      |                                                                        |



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

Verdict: PASS

## Section 15.225 Subclause (c) / RSS-210 Clause 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 dB $\mu$ V/m) at 30 meters.

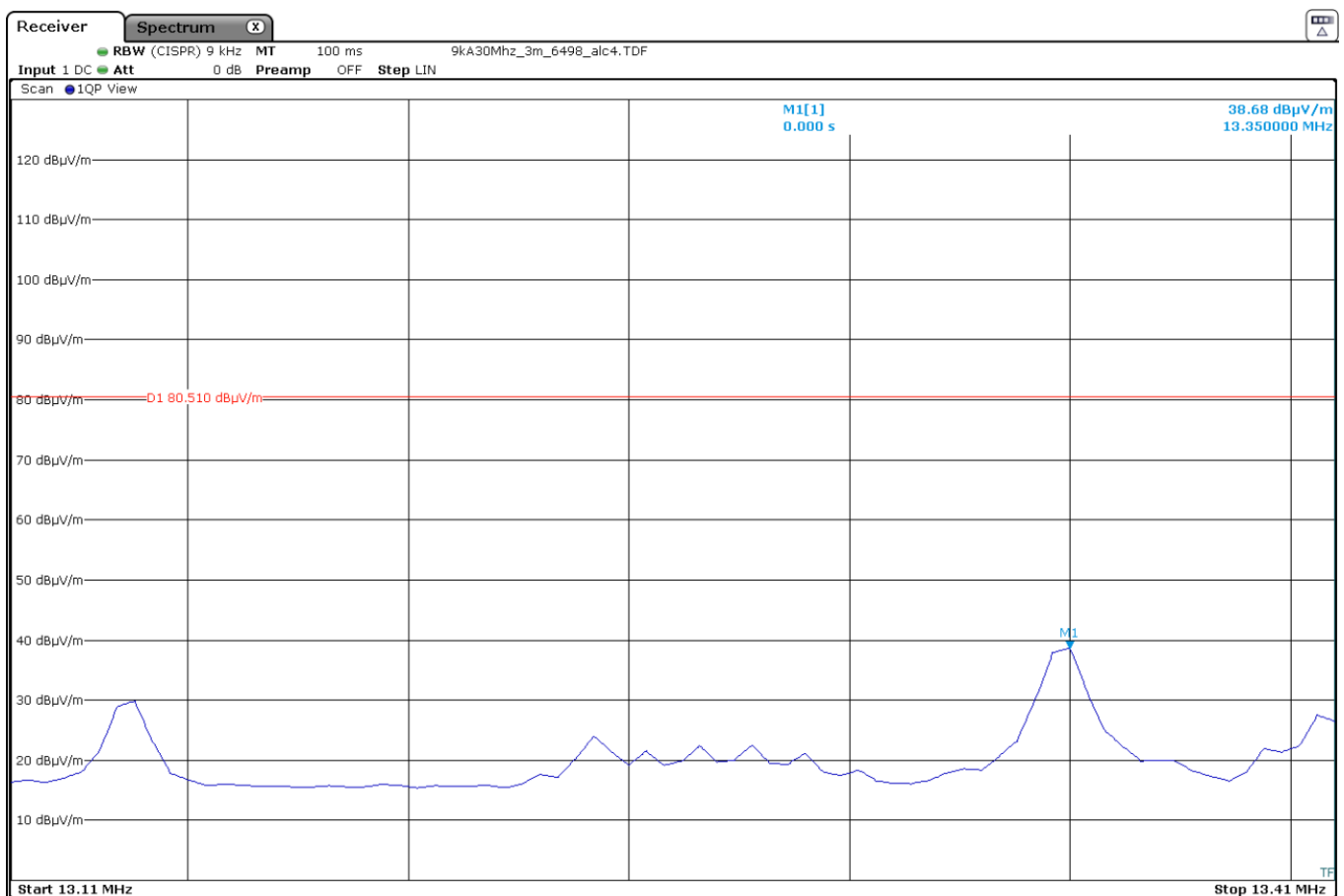
### RESULTS:

Measurement distance: 3 meters.

#### - Band 13.110-13.410 MHz

- NFC mode ISO 14443A

| Frequency (MHz)              | Maximum field strength (dB $\mu$ V/m) measured at 3 m (quasi-peak detector) | Maximum field strength (dB $\mu$ V/m) extrapolated to 30 m (40 dB/decade) |
|------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 13.350                       | 38.68                                                                       | -1.32                                                                     |
| Measurement uncertainty (dB) | < $\pm$ 3.44                                                                |                                                                           |

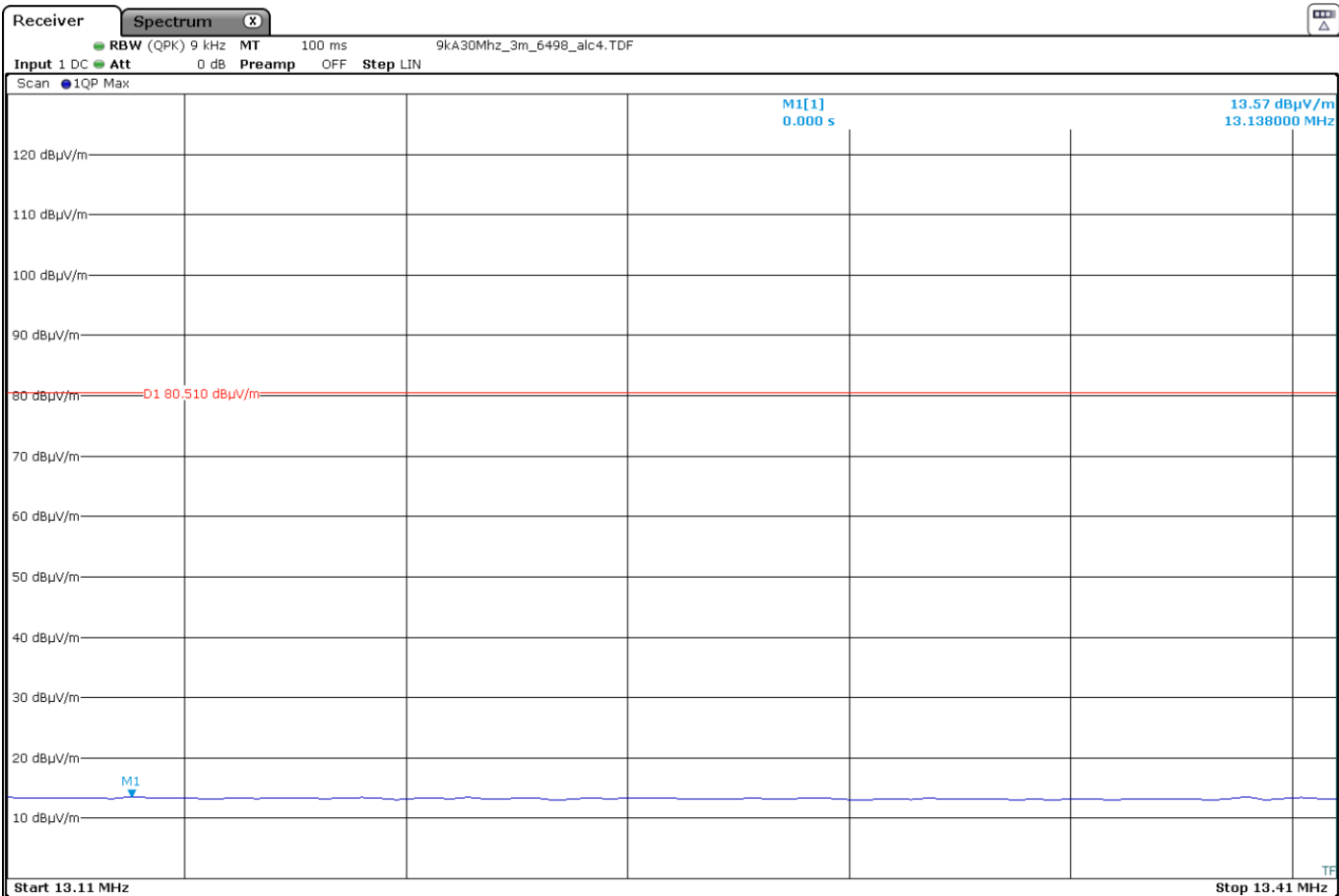


The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

• NFC mode ISO 15693

| Frequency (MHz)              | Maximum field strength (dBµV/m)<br>measured at 3 m (quasi-peak<br>detector) | Maximum field strength (dBµV/m)<br>extrapolated to 30 m (40 dB/decade) |
|------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| 13.138                       | 13.57                                                                       | -26.43                                                                 |
| Measurement uncertainty (dB) | <±3.44                                                                      |                                                                        |



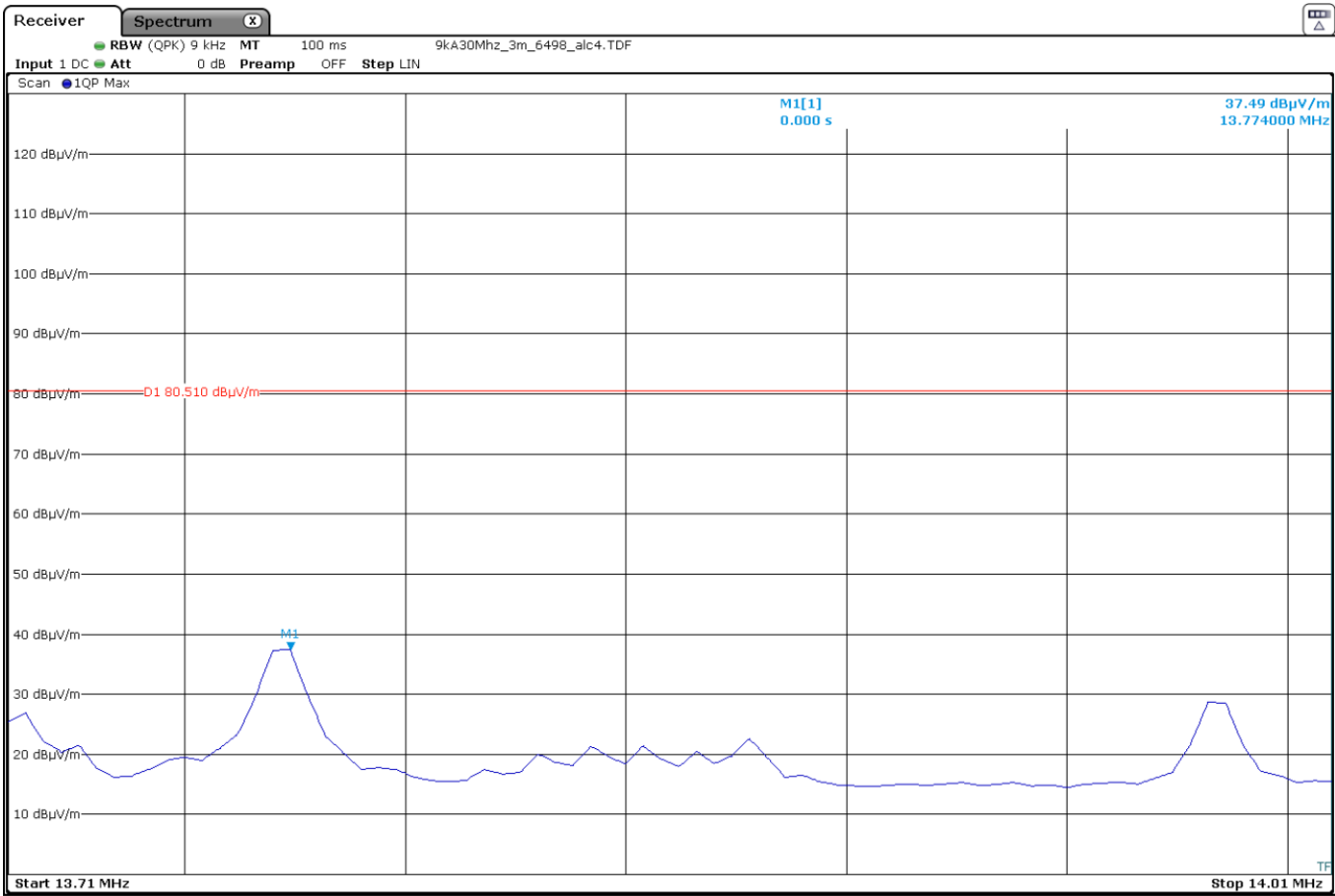
The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

- Band 13.710-14.010 MHz

- NFC mode ISO 14443A

| Frequency (MHz)              | Maximum field strength (dBµV/m)<br>measured at 3 m (quasi-peak<br>detector) | Maximum field strength (dBµV/m)<br>extrapolated to 30 m (40 dB/decade) |
|------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| 13.774                       | 37.49                                                                       | -2.51                                                                  |
| Measurement uncertainty (dB) | ±3.44                                                                       |                                                                        |

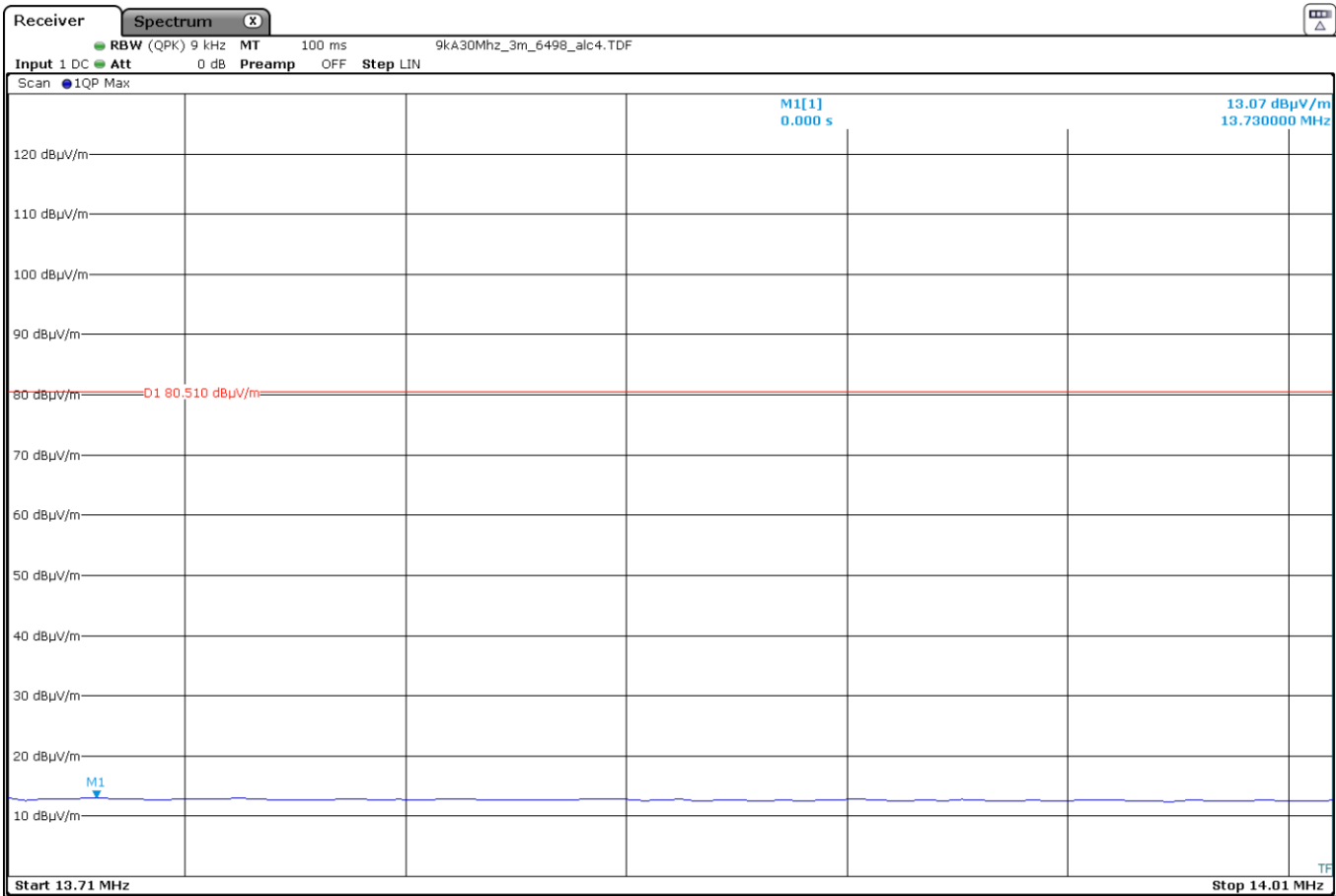


The limit shown in the above plot is extrapolated to 3 meters

Verdict: PASS

• NFC mode ISO 15693

| Frequency (MHz)              | Maximum field strength (dBµV/m)<br>measured at 3 m (quasi-peak<br>detector) | Maximum field strength (dBµV/m)<br>extrapolated to 30 m (40 dB/decade) |
|------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| 13.730                       | 13.07                                                                       | -26.93                                                                 |
| Measurement uncertainty (dB) | ±3.44                                                                       |                                                                        |



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

Verdict: PASS

## Section 15.225 Subclause (d) / RSS-210 Clause B.6 (d). Field strength of emissions outside of the band 13.110 - 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 ( $\mu\text{V/m}$ ) | Field strength ( $\text{dB}\mu\text{V/m}$ ) | Measurement distance (m) |
|-----------------------|------------------------------------|---------------------------------------------|--------------------------|
| 0.009-0.490           | $2400/F(\text{kHz})$               | -                                           | 300                      |
| 0.490-1.705           | $24000/F(\text{kHz})$              | -                                           | 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.

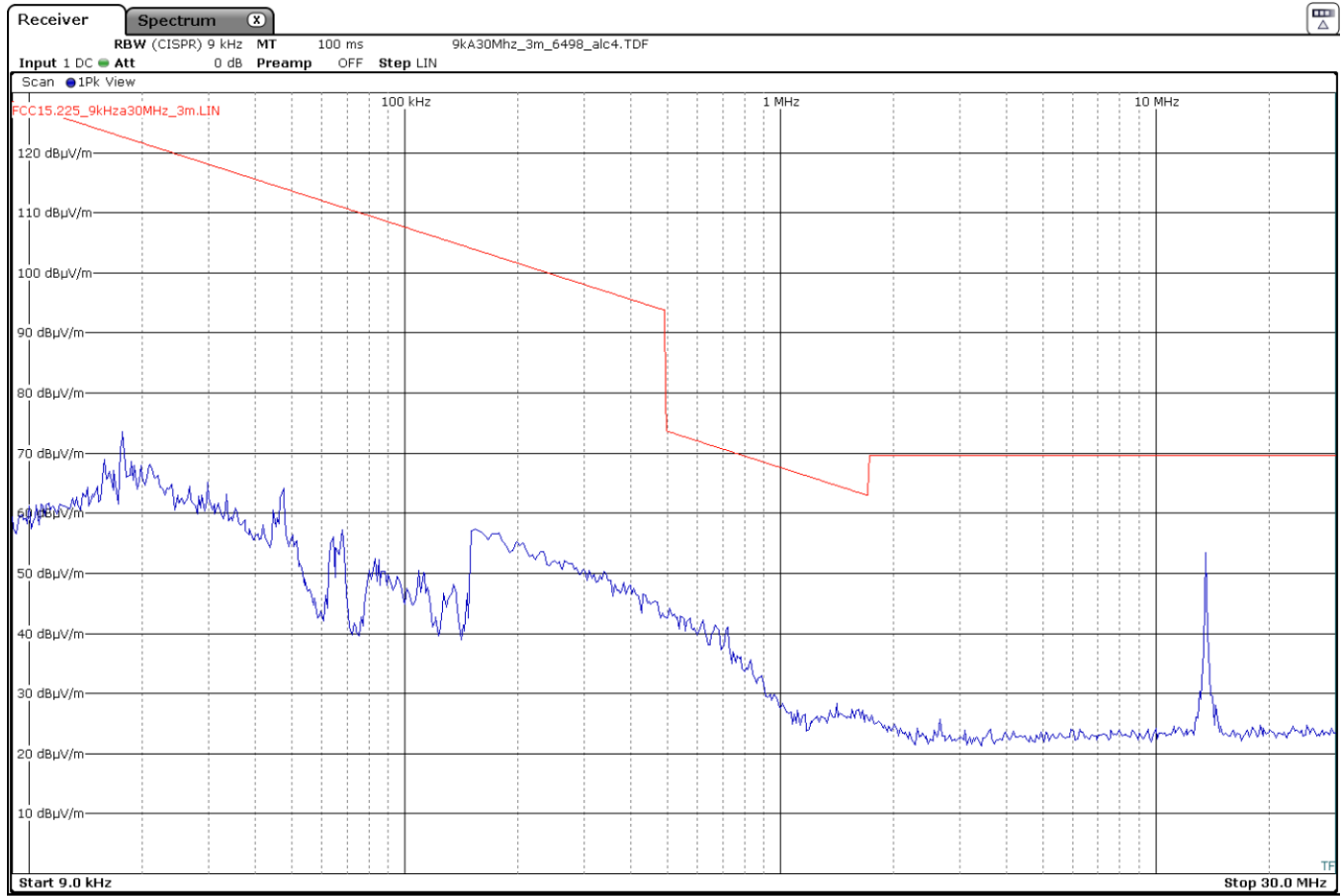
The spectrum was inspected from 9 kHz to 200 MHz searching for spurious signals.

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 below the limit.



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

Resolution bandwidth:

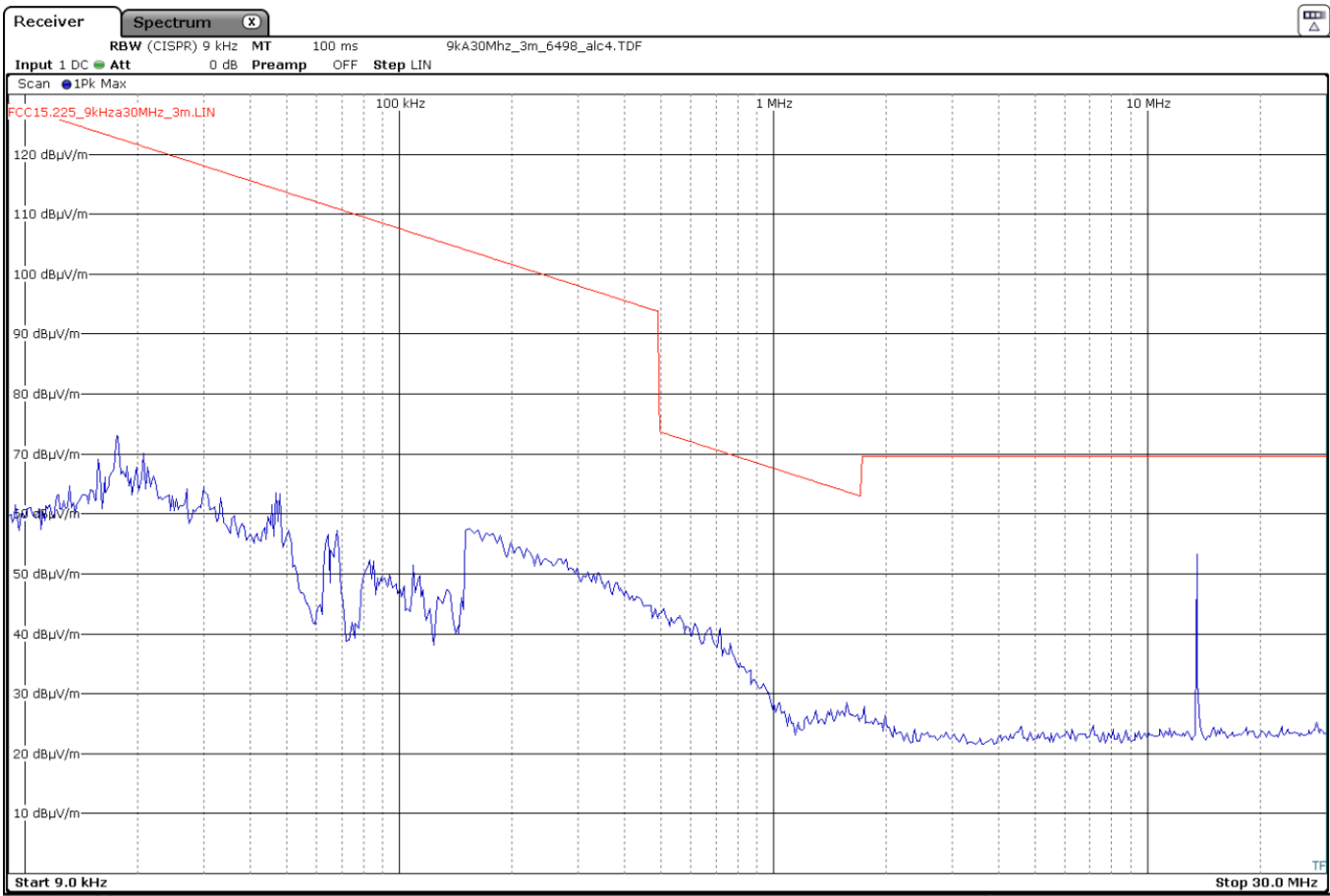
200 Hz for  $9 \text{ kHz} \leq f \leq 150 \text{ kHz}$

9 kHz for  $150 \text{ kHz} \leq f \leq 30 \text{ MHz}$

|                         |           |
|-------------------------|-----------|
| Measurement uncertainty | <±3.04 dB |
|-------------------------|-----------|

- NFC mode ISO 15693

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



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

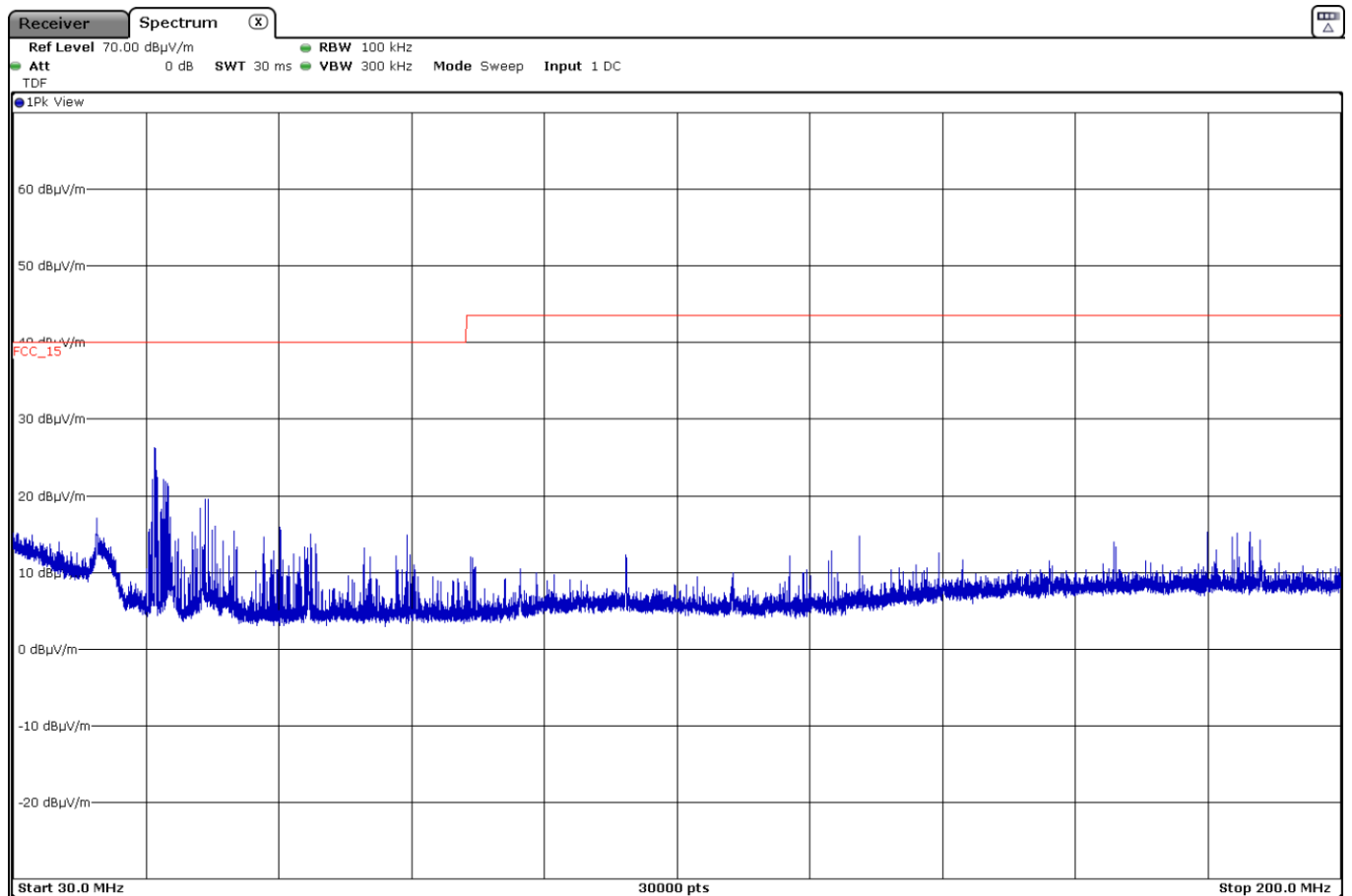
Resolution bandwidth:  
200 Hz for  $9\text{ kHz} \leq f \leq 150\text{ kHz}$   
9 kHz for  $150\text{ kHz} \leq f \leq 30\text{ MHz}$

|                         |                       |
|-------------------------|-----------------------|
| Measurement uncertainty | $<\pm 3.04\text{ dB}$ |
|-------------------------|-----------------------|

**- Frequency range 30 - 200 MHz**

- **NFC mode ISO 14443A**

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

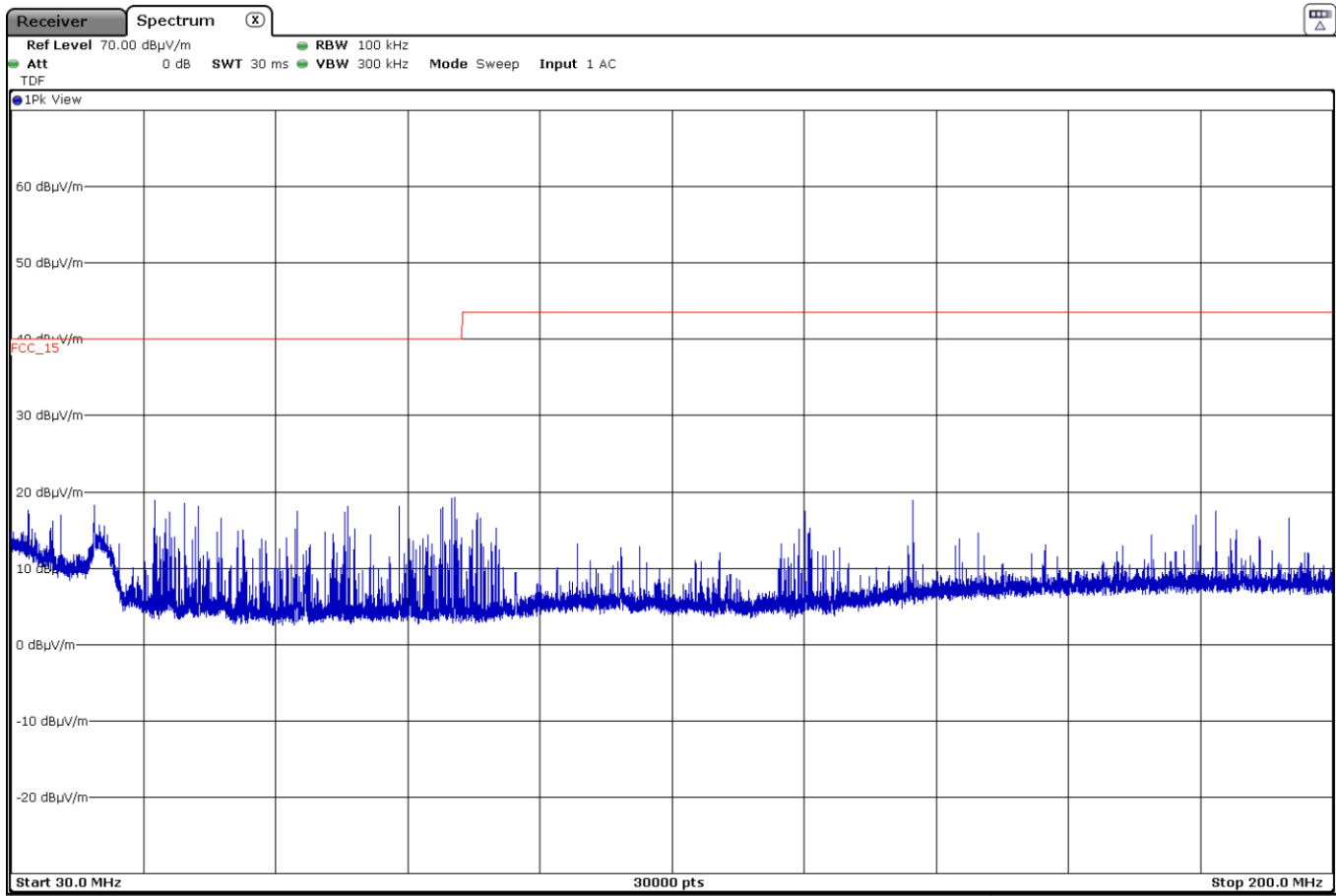


The above plot shows the results of the scan using peak detector.

Verdict: PASS

- NFC mode ISO 15693

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



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

|                         |           |
|-------------------------|-----------|
| Measurement uncertainty | <±2.07 dB |
|-------------------------|-----------|

Verdict: PASS

## Section 15.225 Subclause (e) / RSS-210 Clause B.6. 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 (°C) | Frequency Error (KHz) | Frequency Error (%) |
|------------------|-----------------------|---------------------|
| +50              | 0.156500              | 0.001154            |
| +40              | 0.156000              | 0.001150            |
| +30              | 0.211500              | 0.001560            |
| +20              | 0.225500              | 0.001663            |
| +10              | 0.199000              | 0.001468            |
| 0                | 0.217500              | 0.001604            |
| -10              | 0.212000              | 0.001563            |
| -20              | 0.186500              | 0.001375            |

- Frequency stability over voltage variations:

| DC Supply | Voltage (V) | Frequency Error (KHz) | Frequency Error (%) |
|-----------|-------------|-----------------------|---------------------|
| Vmax      | 5.175       | 0.212500              | 0.001567            |
| Vmin      | 3.825       | 0.225000              | 0.001659            |

Verdict: PASS

- **NFC mode ISO 15693**

- Frequency stability over temperature variations:

| Temperature (°C) | Frequency Error (KHz) | Frequency Error (%) |
|------------------|-----------------------|---------------------|
| +50              | 0.066400              | 0.000490            |
| +40              | 0.135350              | 0.000998            |
| +30              | 0.150850              | 0.001112            |
| +20              | 0.206800              | 0.001525            |
| +10              | 0.227800              | 0.001680            |
| 0                | 0.266800              | 0.001968            |
| -10              | 0.285550              | 0.002106            |
| -20              | 0.273550              | 0.002017            |

- Frequency stability over voltage variations:

| DC Supply | Voltage (V) | Frequency Error (KHz) | Frequency Error (%) |
|-----------|-------------|-----------------------|---------------------|
| Vmax      | 5.175       | 0.206850              | 0.001525            |
| Vmin      | 3.825       | 0.205850              | 0.001518            |

Verdict: PASS