



# EMI - TEST REPORT

- FCC Part 15.225, RSS 210-

Type / Model Name : CC300

Product Description : Industrial HMI with RFID

Applicant : Kontron Europe GmbH

Address : Lise-Meitner Straße 3 - 5

86156 Augsburg

Germany

Manufacturer : Kontron Europe GmbH

Address : Lise-Meitner Straße 3 - 5

86156 Augsburg

Germany

Test Result according to the standards  
listed in clause 1 test standards:

**POSITIVE**

Test Report No. : 80088613-00 Rev\_0

22. July 2021

Date of issue



Deutsche  
Akkreditierungsstelle  
D-PL-12030-01-03  
D-PL-12030-01-04

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## **1 TEST STANDARDS**

The tests were performed according to following standards:

### **FCC Rules and Regulations Part 15, Subpart A - General (September 2020)**

|                                   |                                               |
|-----------------------------------|-----------------------------------------------|
| Part 15, Subpart A, Section 15.31 | Measurement standards                         |
| Part 15, Subpart A, Section 15.33 | Frequency range of radiated measurements      |
| Part 15, Subpart A, Section 15.35 | Measurement detector functions and bandwidths |

### **FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September 2020)**

|                                    |                                                |
|------------------------------------|------------------------------------------------|
| Part 15, Subpart C, Section 15.207 | Conducted limits                               |
| Part 15, Subpart C, Section 15.209 | Radiated emission limits, general requirements |
| Part 15, Subpart C, Section 15.225 | Operation within the band 13.110 - 14.010 MHz  |

|                                    |                                                                                            |
|------------------------------------|--------------------------------------------------------------------------------------------|
| <b>RSS-Gen Issue 5, March 2019</b> | General Requirements and Information for the Certification of Radiocommunication Equipment |
|------------------------------------|--------------------------------------------------------------------------------------------|

|                                         |                                                      |
|-----------------------------------------|------------------------------------------------------|
| <b>RSS-210, Issue 10, December 2019</b> | Licence-Exempt Radio Apparatus: Category I Equipment |
|-----------------------------------------|------------------------------------------------------|

|                          |                                     |
|--------------------------|-------------------------------------|
| <b>ANSI C63.10: 2013</b> | Testing Unlicensed Wireless Devices |
|--------------------------|-------------------------------------|

## 2 EQUIPMENT UNDER TEST

### 2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

### 2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according to his/her instructions.

### 2.3 Photo documentation of the EUT – Detailed photos see ATTACHMENT A and B

(ATTACHMENT A\_80088613-00 Rev\_0)

(ATTACHMENT B\_80088613-00 Rev\_0)

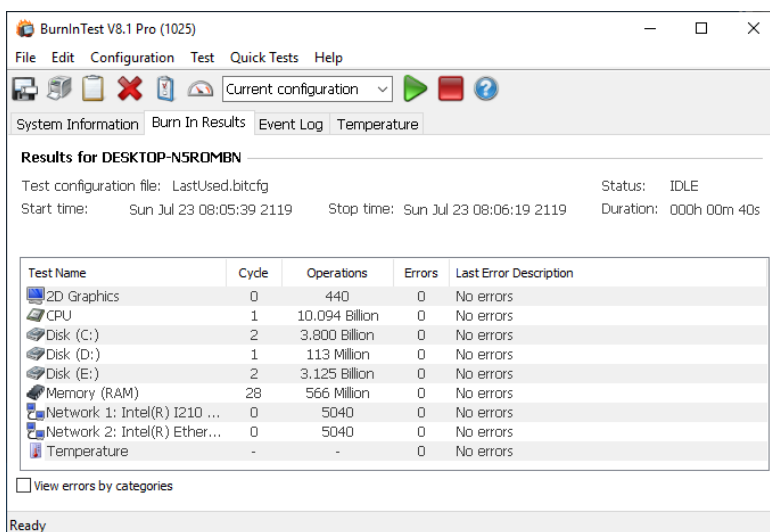
### 2.4 Short description of the equipment under test (EUT)

The EUT is a operator panel (Human Machine Interface) designed for demanding industrial applications. The EUT incorporates a RFID reader for contactless identification of the user.

Number of tested samples: 1  
 Serial number: 439922002  
 HVIN: CC300-RFIDB  
 PMN: CC300

### Test software/settings

- Windows 10 LTSC
- Passmark BurnInTest V8.1 Pro (EMC Test Software)

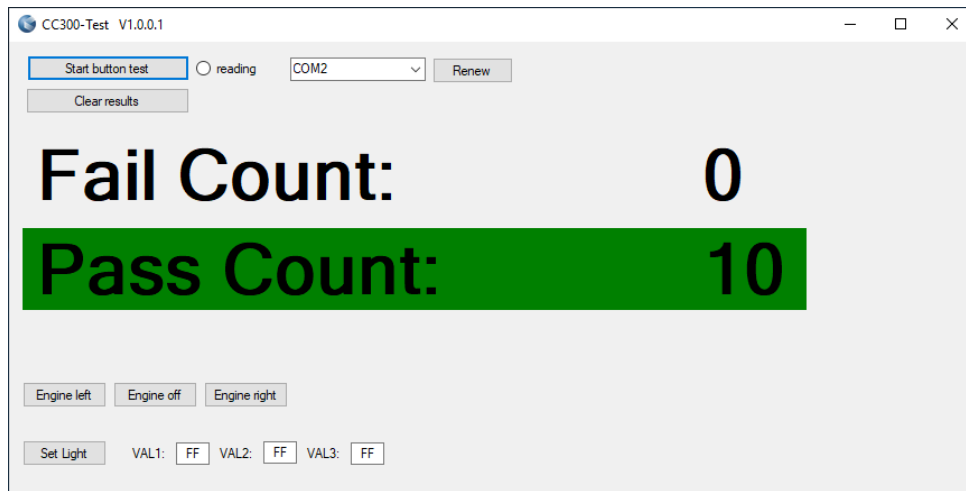


| Test Name                    | Cycle | Operations     | Errors | Last Error Description |
|------------------------------|-------|----------------|--------|------------------------|
| 2D Graphics                  | 0     | 440            | 0      | No errors              |
| CPU                          | 1     | 10.094 Billion | 0      | No errors              |
| Disk (C:)                    | 2     | 3.800 Billion  | 0      | No errors              |
| Disk (D:)                    | 1     | 113 Million    | 0      | No errors              |
| Disk (E:)                    | 2     | 3.125 Billion  | 0      | No errors              |
| Memory (RAM)                 | 28    | 566 Million    | 0      | No errors              |
| Network 1: Intel(R) I210 ... | 0     | 5040           | 0      | No errors              |
| Network 2: Intel(R) Ether... | 0     | 5040           | 0      | No errors              |
| Temperature                  | -     | -              | 0      | No errors              |

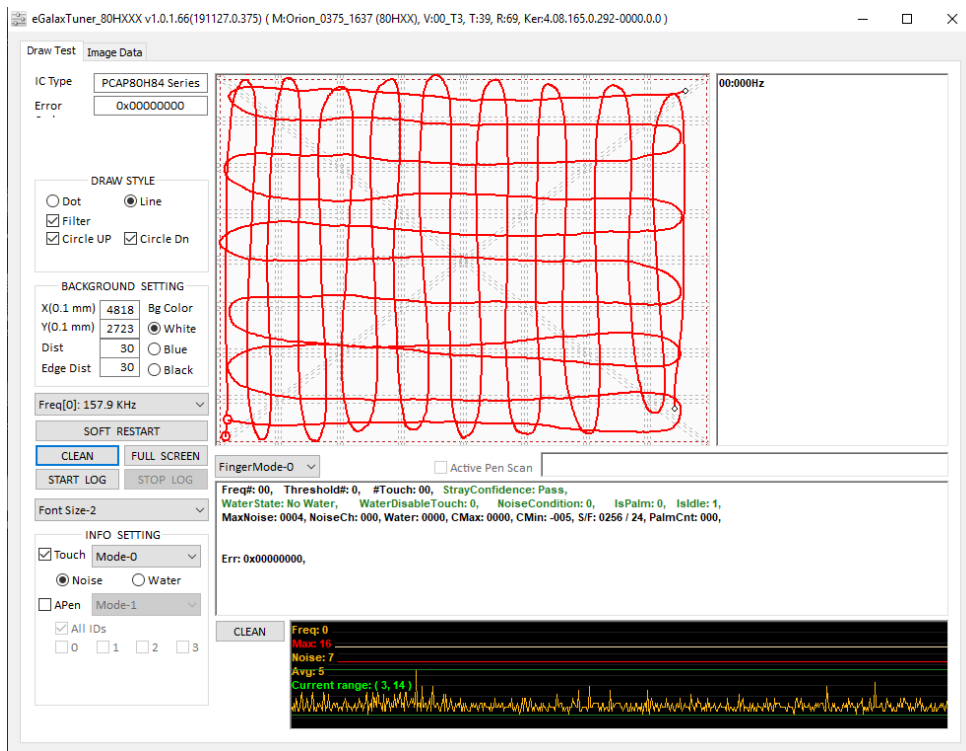
FCC ID: 2AATH-CC300RFIDB

IC: 9927C-CC300RFIDB

- “CC300-Test V1.0.0.1” for testing of Touch-Buttons-Input functionality and backlight color

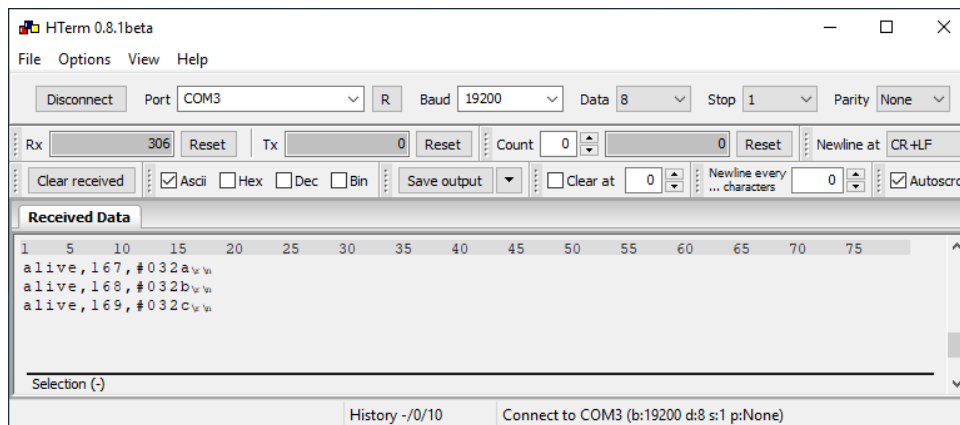
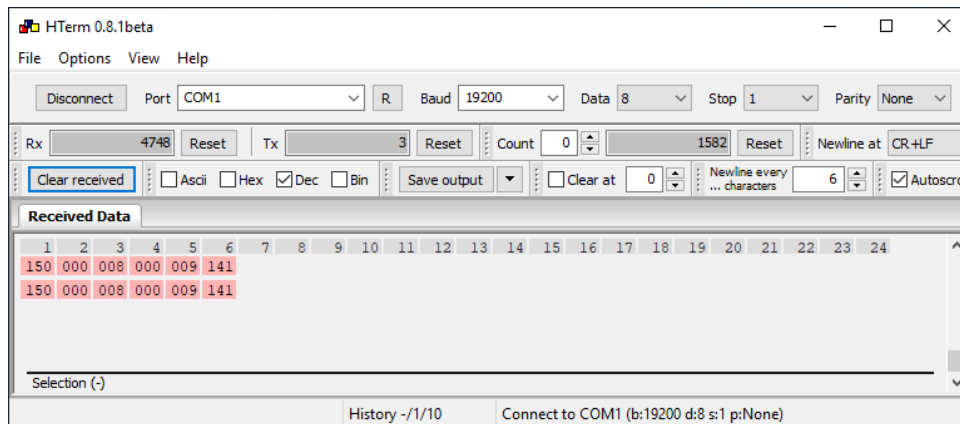


- “eGalaxTuner\_80HXXX v1.0.1.66” for testing of touch inputs



**FCC ID: 2AATH-CC300RFIDB**
**IC: 9927C-CC300RFIDB**

- HTerm 0.8.1 beta for testing of “rotary knob” movements and RFID access



## EUT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- tag reading mode at 13.56 MHz

## EUT configuration:

The following peripheral devices and interface cables were connected during the measurements:

- |                        |                                  |
|------------------------|----------------------------------|
| - RFID Tag             | Model : Supplied by client       |
| - AC/DC Power Supply   | Model : TDK-Lambda, DSP100-24/C2 |
| - 2x USB TEST PLUG #24 | Model : KEU - RDVA               |

## 2.5 Power supply system utilised

Power supply voltage : 24V DC

**FCC ID: 2AATH-CC300RFIDB**
**IC: 9927C-CC300RFIDB**

### 3 TEST RESULT SUMMARY

| FCC Rule Part | RSS Rule Part | Description                       | Result |
|---------------|---------------|-----------------------------------|--------|
| 15.207        | RSS Gen, 8.8  | AC power line conducted emissions | passed |
| 15.225        | RSS-210, B.6  | Field strength of fundamental     | passed |
| 15.209        | RSS Gen, 8.9  | Spurious emissions                | passed |
| 15.225        | RSS-210, B.6  | Frequency tolerance               | passed |
| 15.215        | RSS-Gen, 6.7  | Occupied bandwidth                | passed |
| 15.225        | RSS-210, B.6  | Transmitter spectrum mask         | passed |

The mentioned RSS Rule Parts in the above table are related to:

RSS-Gen, Issue 5 + Amendment 1, March 2019

RSS-210, Issue 10, December 2019

#### 3.1 FINAL ASSESSMENT

The equipment under test fulfills the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : 14 June 2021

Testing commenced on : 17 June 2021

Testing concluded on : 30 June 2021

Checked by:

Tested by:

\_\_\_\_\_  
Klaus Gegenfurtner  
Teamleader Radio

\_\_\_\_\_  
Markus Friedl  
Radio Team

## 4 TEST ENVIRONMENT

### 4.1 Address of the test laboratory

CSA Group Bayern GmbH  
Ohmstrasse 1-4  
94342 STRASSKIRCHEN  
GERMANY

### 4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15 - 35 ° C

Humidity: 30 - 60 %

Atmospheric pressure: 86 - 106 kPa

### 4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor  $k = 2$ . The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 2011 + A1 / 2014 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

| Measurement Type                | Range                   | Confidence Level (%) | Calculated Uncertainty   |
|---------------------------------|-------------------------|----------------------|--------------------------|
| AC Conducted Spurious Emissions | 0.15 MHz to 30 MHz      | 95%                  | $\pm 3.29$ dB            |
| 20 dB Bandwidth                 | Center frequency of EuT | 95%                  | $\pm 2.5 \times 10^{-7}$ |
| 99% Occupied Bandwidth          | Center frequency of EuT | 95%                  | $\pm 2.5 \times 10^{-7}$ |
| Radiated Spurious Emissions     | 9 kHz to 30 MHz         | 95%                  | $\pm 3.53$ dB            |
| Radiated Spurious Emissions     | 30 MHz to 1000 MHz      | 95%                  | $\pm 3.71$ dB            |
| Radiated Spurious Emissions     | 1000 MHz to 10000 MHz   | 95%                  | $\pm 2.34$ dB            |
| Peak conducted output power     | 902 MHz to 928 MHz      | 95%                  | $\pm 0.35$ dB            |
| Conducted Spurious Emissions    | 9 kHz to 10000 MHz      | 95%                  | $\pm 2.15$ dB            |



#### 4.4 Conformity Decision Rule

The conformity decision rule is based on the ILAC G8 published at the time of reporting.

#### 4.5 Measurement Protocol for FCC

##### 4.5.1 GENERAL INFORMATION

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

**FCC: DE 0011**

**ISED: DE0009**

##### 4.5.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

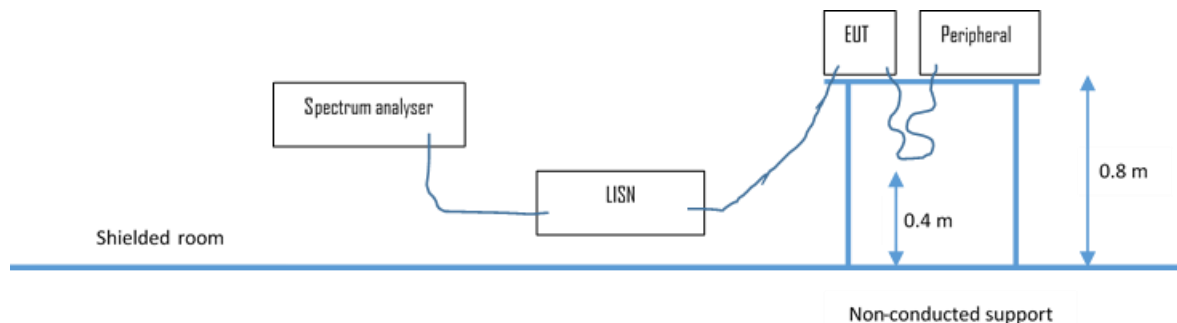
##### 4.5.2.1 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions.

##### 4.5.3 Details of test procedures

##### 4.5.3.1 Conducted emission

Test setup according ANSI C63.10



The final level, expressed in dB $\mu$ V, is arrived at by taking the reading directly from the Spectrum analyser. This level is compared to the limit.

To convert between dB $\mu$ V and  $\mu$ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50  $\Omega$  / 50  $\mu$ H (CISPR 16) characteristics. The receiver is protected by means of an impedance matched pulse limiter connected directly to the RF input. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission is re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

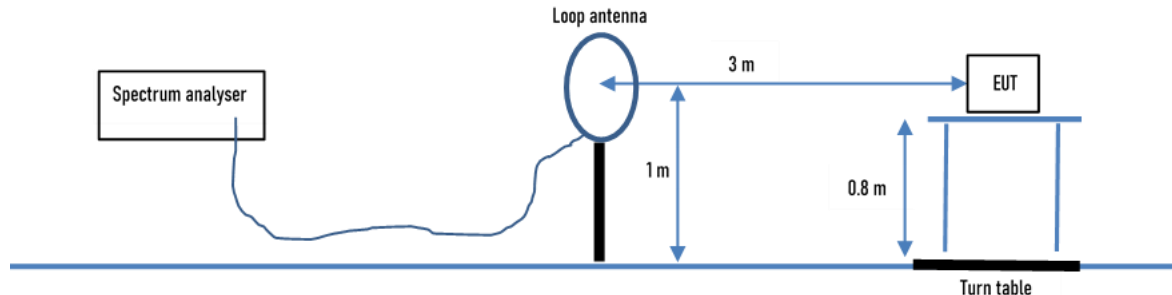
FCC ID: 2AATH-CC300RFIDB

IC: 9927C-CC300RFIDB

#### 4.5.3.2 Radiated emission

##### 4.5.3.2.1 OATS1 test site (9 kHz - 30 MHz):

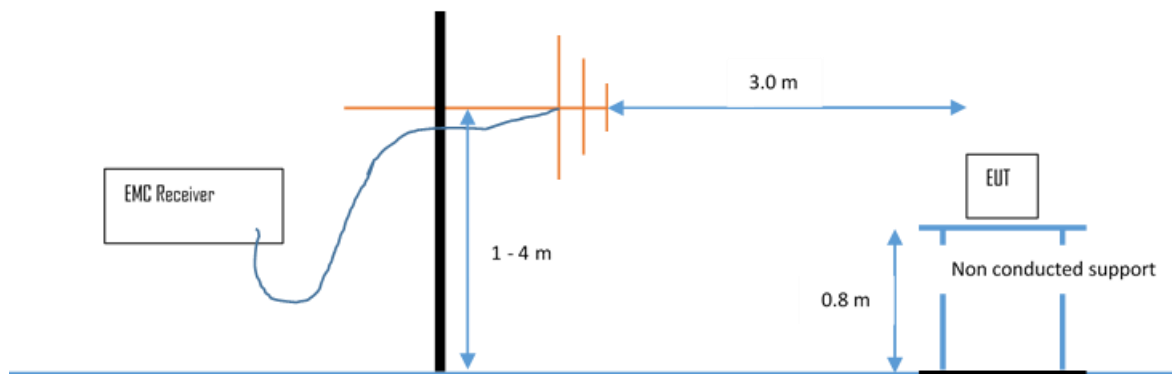
Test setup according ANSI C63.10



Emissions from the EUT are measured in the frequency range of 9 MHz to 30 MHz using a tuned receiver and a calibrated loop antenna. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied along the site axis and the EUT is rotated 360 degrees.

##### 4.5.3.2.2 OATS1 test site (30 MHz - 1 GHz):

Test setup according ANSI C63.10.



Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees. The final level in dBμV/m is calculated by taking the reading from the EMI receiver (Level dBμV) and adding the correction factors and cable loss factor (dB). The FCC limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

30 MHz – 1000 MHz: RBW: 120 kHz

Example:

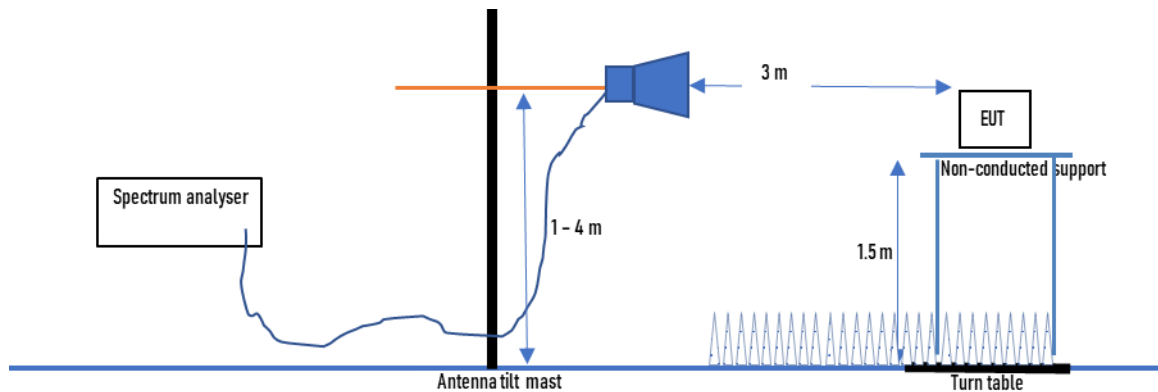
| Frequency<br>(MHz) | Level<br>(dBμV) | + | Factor<br>(dB) | = | Level<br>(dBμV/m) | - | Limit<br>(dBμV/m) | = | Delta<br>(dB) |
|--------------------|-----------------|---|----------------|---|-------------------|---|-------------------|---|---------------|
| 719.0              | 75.0            | + | 32.6           | = | 107.6             | - | 110.0             | = | -2.4          |

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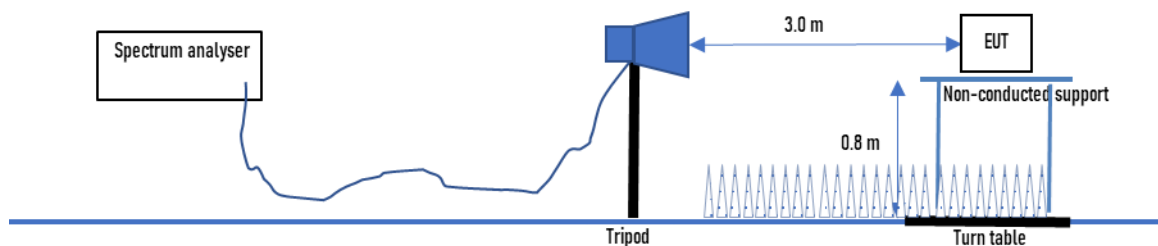
#### 4.5.3.2.3 Anechoic chamber 1 (1000 MHz – 18000 MHz)

Test setup according ANSI C63.10.



Radiated emissions from the EUT are measured in the frequency range 1 GHz up to 18 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the centre, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements.

#### 4.5.3.2.4 Anechoic chamber 1 (18 GHz – 40 GHz)



Emissions from the EUT are measured in the frequency range 18 GHz up to 40 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 0.8 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the centre, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limit is adopted.

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## 5 TEST CONDITIONS AND RESULTS

### 5.1 Conducted emissions

For test instruments and accessories used, see section 6 Part A 4.

#### 5.1.1 Description of the test location

Test location: Shielded Room S2

#### 5.1.2 Photo documentation of the test set-up

See attachment C to this report

#### 5.1.3 Applicable standard

FCC Part 15, Section 15.207 and RSS-Gen clause 8.8

#### 5.1.4 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin 5.81 dB at 0.28 MHz

Limit according to FCC Part 15, Section 15.207 and RSS-Gen clause 8.8

| Frequency of Emission<br>(MHz) | Conducted Limit (dBμV) |            |
|--------------------------------|------------------------|------------|
|                                | Quasi-peak             | Average    |
| 0.15-0.5                       | 66 to 56 *             | 56 to 46 * |
| 0.5-5                          | 56                     | 46         |
| 5-30                           | 60                     | 50         |

\* Decreases with the logarithm of the frequency

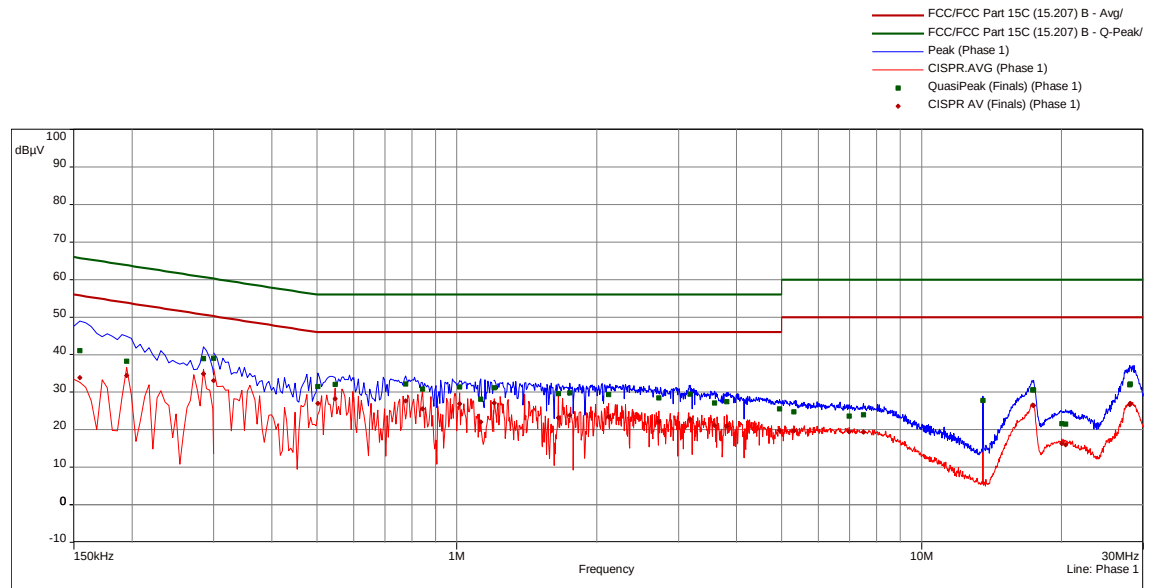
The requirements are **FULFILLED**.

**Remarks:** For detailed test result please refer to following test protocols. The measurement was made at  
AC input of the used AC/DC power supply.

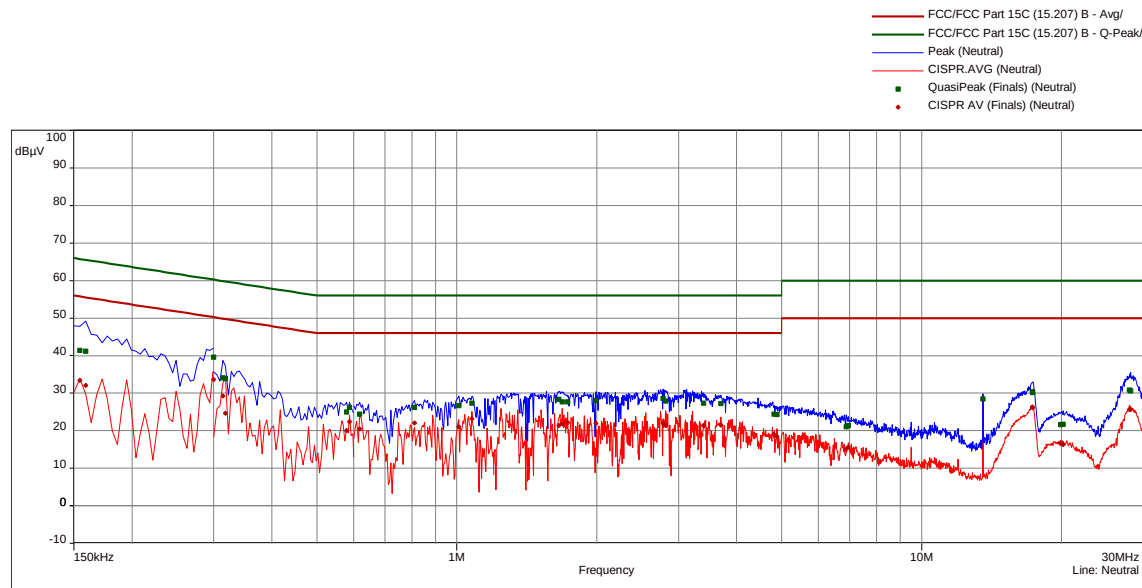
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### 5.1.5 Test protocol



| freq    | QP    | margin | limit | AV    | margin | limit | line    |
|---------|-------|--------|-------|-------|--------|-------|---------|
| MHz     | dBμV  | dB     | dBμV  | dBμV  | dB     | dBμV  |         |
| 0.1545  | 41.12 | -24.64 | 65.75 | 33.84 | -21.92 | 55.75 | Phase 1 |
| 0.195   | 38.21 | -25.61 | 63.82 | 34.41 | -19.41 | 53.82 | Phase 1 |
| 0.285   | 38.89 | -21.78 | 60.67 | 34.85 | -15.81 | 50.67 | Phase 1 |
| 0.3     | 39.01 | -21.24 | 60.24 | 33.08 | -17.16 | 50.24 | Phase 1 |
| 0.5025  | 31.54 | -24.46 | 56.00 | 27.06 | -18.94 | 46.00 | Phase 1 |
| 0.5475  | 32.07 | -23.93 | 56.00 | 28.23 | -17.77 | 46.00 | Phase 1 |
| 0.7755  | 32.23 | -23.77 | 56.00 | 27.70 | -18.30 | 46.00 | Phase 1 |
| 0.843   | 30.85 | -25.15 | 56.00 | 25.51 | -20.49 | 46.00 | Phase 1 |
| 1.014   | 31.37 | -24.63 | 56.00 | 26.90 | -19.10 | 46.00 | Phase 1 |
| 1.1265  | 28.16 | -27.84 | 56.00 | 22.06 | -23.94 | 46.00 | Phase 1 |
| 1.2045  | 31.21 | -24.79 | 56.00 | 27.09 | -18.91 | 46.00 | Phase 1 |
| 1.6545  | 29.63 | -26.37 | 56.00 | 23.21 | -22.79 | 46.00 | Phase 1 |
| 1.749   | 29.84 | -26.16 | 56.00 | 23.85 | -22.15 | 46.00 | Phase 1 |
| 2.1225  | 29.34 | -26.66 | 56.00 | 23.43 | -22.57 | 46.00 | Phase 1 |
| 2.7195  | 28.47 | -27.53 | 56.00 | 22.19 | -23.81 | 46.00 | Phase 1 |
| 3.174   | 29.52 | -26.48 | 56.00 | 22.81 | -23.19 | 46.00 | Phase 1 |
| 3.5835  | 27.18 | -28.82 | 56.00 | 21.17 | -24.83 | 46.00 | Phase 1 |
| 3.813   | 27.42 | -28.58 | 56.00 | 20.95 | -25.05 | 46.00 | Phase 1 |
| 4.9485  | 25.53 | -30.47 | 56.00 | 19.82 | -26.18 | 46.00 | Phase 1 |
| 5.3085  | 24.75 | -35.25 | 60.00 | 19.65 | -30.35 | 50.00 | Phase 1 |
| 6.987   | 23.69 | -36.31 | 60.00 | 19.46 | -30.54 | 50.00 | Phase 1 |
| 7.4955  | 23.94 | -36.06 | 60.00 | 19.40 | -30.60 | 50.00 | Phase 1 |
| 13.56   | 27.85 | -32.15 | 60.00 | 27.73 | -22.27 | 50.00 | Phase 1 |
| 17.3355 | 30.60 | -29.40 | 60.00 | 26.61 | -23.39 | 50.00 | Phase 1 |
| 17.403  | 30.61 | -29.39 | 60.00 | 26.41 | -23.59 | 50.00 | Phase 1 |
| 20.0595 | 21.61 | -38.39 | 60.00 | 16.29 | -33.71 | 50.00 | Phase 1 |
| 20.415  | 21.53 | -38.47 | 60.00 | 16.04 | -33.96 | 50.00 | Phase 1 |
| 28.056  | 31.95 | -28.05 | 60.00 | 26.73 | -23.27 | 50.00 | Phase 1 |
| 28.092  | 32.23 | -27.77 | 60.00 | 26.97 | -23.03 | 50.00 | Phase 1 |

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**IC: 9927C-CC300RFIDB**


| freq    | QP    | margin | limit | AV    | margin | limit | line    |
|---------|-------|--------|-------|-------|--------|-------|---------|
| MHz     | dBμV  | dB     | dBμV  | dBμV  | dB     | dBμV  |         |
| 0.1545  | 41.38 | -24.37 | 65.75 | 33.41 | -22.34 | 55.75 | Neutral |
| 0.159   | 41.22 | -24.30 | 65.52 | 32.06 | -23.46 | 55.52 | Neutral |
| 0.3     | 39.64 | -20.60 | 60.24 | 33.70 | -16.55 | 50.24 | Neutral |
| 0.3135  | 34.07 | -25.81 | 59.88 | 29.24 | -20.63 | 49.88 | Neutral |
| 0.318   | 33.92 | -25.84 | 59.76 | 24.69 | -25.06 | 49.76 | Neutral |
| 0.579   | 24.95 | -31.05 | 56.00 | 20.09 | -25.91 | 46.00 | Neutral |
| 0.588   | 26.17 | -29.83 | 56.00 | 22.34 | -23.66 | 46.00 | Neutral |
| 0.618   | 24.46 | -31.54 | 56.00 | 20.51 | -25.49 | 46.00 | Neutral |
| 0.8115  | 26.21 | -29.79 | 56.00 | 22.02 | -23.98 | 46.00 | Neutral |
| 1.0095  | 26.73 | -29.27 | 56.00 | 21.06 | -24.94 | 46.00 | Neutral |
| 1.077   | 27.40 | -28.60 | 56.00 | 23.14 | -22.86 | 46.00 | Neutral |
| 1.659   | 28.35 | -27.65 | 56.00 | 21.38 | -24.62 | 46.00 | Neutral |
| 1.686   | 27.73 | -28.27 | 56.00 | 21.80 | -24.20 | 46.00 | Neutral |
| 1.731   | 27.64 | -28.36 | 56.00 | 22.13 | -23.87 | 46.00 | Neutral |
| 1.992   | 28.01 | -27.99 | 56.00 | 21.95 | -24.05 | 46.00 | Neutral |
| 2.778   | 28.57 | -27.43 | 56.00 | 21.92 | -24.08 | 46.00 | Neutral |
| 2.814   | 27.96 | -28.04 | 56.00 | 21.34 | -24.66 | 46.00 | Neutral |
| 3.399   | 27.32 | -28.68 | 56.00 | 21.34 | -24.66 | 46.00 | Neutral |
| 3.7005  | 27.26 | -28.74 | 56.00 | 21.50 | -24.50 | 46.00 | Neutral |
| 4.8135  | 24.44 | -31.56 | 56.00 | 19.05 | -26.95 | 46.00 | Neutral |
| 4.8855  | 24.27 | -31.73 | 56.00 | 18.47 | -27.53 | 46.00 | Neutral |
| 6.8835  | 21.03 | -38.97 | 60.00 | 15.06 | -34.94 | 50.00 | Neutral |
| 6.951   | 21.36 | -38.64 | 60.00 | 15.66 | -34.34 | 50.00 | Neutral |
| 13.56   | 28.50 | -31.50 | 60.00 | 28.26 | -21.74 | 50.00 | Neutral |
| 17.313  | 30.42 | -29.58 | 60.00 | 26.36 | -23.64 | 50.00 | Neutral |
| 17.3535 | 30.17 | -29.83 | 60.00 | 26.13 | -23.87 | 50.00 | Neutral |
| 19.9245 | 21.59 | -38.41 | 60.00 | 16.56 | -33.44 | 50.00 | Neutral |
| 20.1495 | 21.69 | -38.31 | 60.00 | 16.33 | -33.67 | 50.00 | Neutral |
| 28.0155 | 30.83 | -29.17 | 60.00 | 25.63 | -24.37 | 50.00 | Neutral |
| 28.2045 | 30.61 | -29.39 | 60.00 | 25.67 | -24.33 | 50.00 | Neutral |

**FCC ID: 2AATH-CC300RFIDB**
**IC: 9927C-CC300RFIDB**

## 5.2 Field strength of the fundamental wave

For test instruments and accessories used see section 6 Part CPR 1.

### 5.2.1 Description of the test location

Test location: OATS 1  
Test distance: 3 metres

### 5.2.2 Photo documentation of the test set-up

See attachment C to this report

### 5.2.3 Applicable standard

FCC Part 15, Section 15.225(a) and RSS-210 clause B.6(a)

### 5.2.4 Test result

- a) Result at a measurement distance of 3m

| Frequency<br>(MHz) | Level<br>(dB $\mu$ V) | Ant. factor<br>(dB 1/m) | Field strength<br>dB( $\mu$ V/m) |
|--------------------|-----------------------|-------------------------|----------------------------------|
| 13.56              | 25.9                  | 20.0                    | 45.9                             |

- b) Result extrapolated to a distance of 30 m

| Frequency<br>(MHz) | Field strength<br>dB( $\mu$ V/m) @3m | Extrapolation<br>factor (dB) | Field strength<br>dB( $\mu$ V/m) @30m | Limit<br>dB( $\mu$ V/m) | Delta<br>(dB) |
|--------------------|--------------------------------------|------------------------------|---------------------------------------|-------------------------|---------------|
| 13.56              | 45.9                                 | -40                          | <b>5.9</b>                            | 84.0                    | -78.1         |

Limit according to FCC Part 15, Section 15.225(a): and RSS-210 clause B.6(a)

| Frequency<br>(MHz) | Field strength of fundamental wave |                | Measurement distance |
|--------------------|------------------------------------|----------------|----------------------|
|                    | ( $\mu$ V/m)                       | dB( $\mu$ V/m) | (metres)             |
| 13.553 - 13.567    | 15848                              | 84.0           | 30                   |

The requirements are **FULFILLED**.

Remarks: none

### 5.3 Spurious emissions

For test instruments and accessories used see section 6 Part **SER 1**, **SER 2**, **SER 3**.

#### 5.3.1 Description of the test location

Test location: OATS 1 / Anechoic Chamber A1  
 Test distance: 3 metres, 1 meter (for 18 GHz to 40 GHz, the limit extrapolated to a distance of 1 m)

#### 5.3.2 Photo documentation of the test set-up

See attachment C to this report

#### 5.3.3 Applicable standard

FCC Part 15, Section 15.209 and RSS-Gen clause 8.9

The resolution bandwidth during the measurement is as follows:

|                    |      |         |
|--------------------|------|---------|
| 9 kHz – 150 kHz:   | RBW: | 200 Hz  |
| 150 kHz – 30 MHz:  | RBW: | 9 kHz   |
| 30 MHz – 1000 MHz: | RBW: | 120 kHz |
| 1000 MHz – 40 GHz: | RBW: | 1 MHz   |

#### 5.3.4 Test result

9 kHz - 30MHz

| f<br>(MHz) | Level<br>QP@3m<br>(dBµV) | Ant. factor<br>(dB/m) | Field strength<br>QP@3m<br>dB(µV/m) | Distance corr.<br>3m to 30m<br>(dB) | Corrected level<br>QP@30m<br>dB(µV/m) | Limit<br>QP@30m<br>dB(µV/m) | Delta<br>(dB) |
|------------|--------------------------|-----------------------|-------------------------------------|-------------------------------------|---------------------------------------|-----------------------------|---------------|
| 27.12      | 4.7                      | 20                    | 24.7                                | -40                                 | -15.3                                 | 29.5                        | -44.8         |

| f<br>(MHz) | Level<br>QP@3m<br>(dBµA) | Ant. factor<br>(dB/m) | Field strength<br>QP@3m<br>dB(µA/m) | Distance corr.<br>3m to 30m<br>(dB) | Corrected level<br>QP@30m<br>dB(µA/m) | Limit<br>QP@30m<br>dB(µA/m) | Delta<br>(dB) |
|------------|--------------------------|-----------------------|-------------------------------------|-------------------------------------|---------------------------------------|-----------------------------|---------------|
| 27.12      | -46.8                    | 20                    | -26.8                               | -40                                 | -66.8                                 | -22                         | -44.8         |

30 MHz - 1 GHz

| Frequency<br>(MHz) | Reading<br>Vert.<br>(dBµV) | Reading<br>Hor.<br>(dBµV) | Correct.<br>Vert.<br>(dB) | Correct.<br>Hor.<br>(dB) | Level<br>Vert.<br>(dBµV/m) | Level<br>Hor.<br>(dBµV/m) | Limit<br>(dBµV/m) | Dlimit<br>(dB) |
|--------------------|----------------------------|---------------------------|---------------------------|--------------------------|----------------------------|---------------------------|-------------------|----------------|
| 40.68              | 13.8                       | 7.4                       | 14.1                      | 15.1                     | 27.9                       | 22.5                      | 40.0              | -12.1          |
| 54.24              | 9.7                        | 7.4                       | 14.3                      | 15.4                     | 24.0                       | 22.8                      | 40.0              | -16.0          |
| 67.80              | 7.5                        | 7.0                       | 13.0                      | 13.6                     | 20.5                       | 20.6                      | 40.0              | -19.4          |
| 81.36              | 8.9                        | 8.8                       | 11.1                      | 11.2                     | 20.0                       | 20.0                      | 40.0              | -20.0          |
| 122.00             | 8.8                        | 7.0                       | 14.6                      | 14.0                     | 23.4                       | 21.0                      | 43.5              | -20.1          |
| 149.16             | 8.1                        | 7.8                       | 16.5                      | 15.7                     | 24.6                       | 23.5                      | 43.5              | -18.9          |
| 161.54             | 15.2                       | 11.9                      | 16.6                      | 16.0                     | 31.8                       | 27.9                      | 43.5              | -11.7          |
| 271.20             | 12.5                       | 7.8                       | 16.4                      | 16.6                     | 28.9                       | 24.4                      | 46.0              | -17.1          |



**FCC ID: 2AATH-CC300RFIDB**
**IC: 9927C-CC300RFIDB**

1 GHz – 18 GHz

| Frequency (MHz) | Reading Vert. (dBµV) | Reading Hor. (dBµV) | Correct. Vert. (dB) | Correct. Hor. (dB) | Level Vert. (dBµV/m) | Level Hor. (dBµV/m) | Limit (dBµV/m) | Dlimit (dB) |
|-----------------|----------------------|---------------------|---------------------|--------------------|----------------------|---------------------|----------------|-------------|
| 1525.00         |                      | 52.7                |                     | -20.1              |                      | 32.6                | 54.0           | -21.4       |
| 1220.80         | 52.0                 |                     | -19.1               |                    | 32.9                 |                     | 54.0           | -21.1       |
| 1894.00         | 57.0                 |                     | -16.7               |                    | 40.3                 |                     | 54.0           | -13.7       |
| 2195.90         | 54.0                 |                     | -15.3               |                    | 38.7                 |                     | 54.0           | -15.3       |
| 2327.00         |                      | 52.8                |                     | -14.7              |                      | 38.1                | 54.0           | -15.9       |
| 3188.00         |                      | 50.9                |                     | -12.4              |                      | 38.5                | 54.0           | -15.5       |

18 GHz – 40 GHz

| Frequency (MHz) | Reading Vert. (dBµV) | Reading Hor. (dBµV) | Correct. Vert. (dB) | Correct. Hor. (dB) | Level Vert. (dBµV/m) | Level Hor. (dBµV/m) | Limit (dBµV/m) | Dlimit (dB) |
|-----------------|----------------------|---------------------|---------------------|--------------------|----------------------|---------------------|----------------|-------------|
| 26835.55        |                      | 35.6                |                     | 12.4               |                      | 48.0                | 63.5           | -15.5       |
| 26792.55        | 35.9                 |                     | 12.6                |                    | 48.5                 |                     | 63.5           | -15.0       |
| 34597.37        |                      | 35.3                |                     | 15.2               |                      | 50.5                | 63.5           | -13.0       |
| 34601.87        | 35.7                 |                     | 15.2                |                    | 50.9                 |                     | 63.5           | -12.6       |
| 39100.27        |                      | 35.3                |                     | 16.9               |                      | 52.2                | 63.5           | -11.3       |
| 39205.27        | 35.7                 |                     | 16.6                |                    | 52.3                 |                     | 63.5           | -11.2       |

Limit according to FCC Part 15 Subpart 15.209(a)

| Frequency (MHz) | Field strength of spurious emissions |          | Measurement distance (metres) |
|-----------------|--------------------------------------|----------|-------------------------------|
|                 | (µV/m)                               | dB(µV/m) |                               |
| 0.009 - 0.490   | 2400/F(kHz)                          | --       | 300                           |
| 0.490 - 1.705   | 24000/F (kHz)                        | --       | 30                            |
| 1.705 - 30.0    | 30                                   | 29.5     | 30                            |
| 30 - 88         | 100                                  | 40       | 3                             |
| 88 - 216        | 150                                  | 43.5     | 3                             |
| 216 - 960       | 200                                  | 46       | 3                             |
| Above 960       | 500                                  | 54       | 3                             |

Limit according to RSS-Gen clause 8.9

| Frequency (MHz) | Field strength of spurious emissions |          | Measurement distance (metres) |
|-----------------|--------------------------------------|----------|-------------------------------|
|                 | (µA/m)                               | dB(µA/m) |                               |
| 0.009 - 0.490   | 6.37/F(kHz)                          | --       | 300                           |
| 0.490 - 1.705   | 63.7/F (kHz)                         | --       | 30                            |
| 1.705 - 30.0    | 0.08                                 | -22      | 30                            |
| Frequency (MHz) | Field strength of spurious emissions |          | Measurement distance (metres) |
|                 | (µV/m)                               | dB(µV/m) |                               |
| 30 - 88         | 100                                  | 40       | 3                             |
| 88 - 216        | 150                                  | 43.5     | 3                             |
| 216 - 960       | 200                                  | 46       | 3                             |
| Above 960       | 500                                  | 54       | 3                             |

**FCC ID: 2AATH-CC300RFIDB****IC: 9927C-CC300RFIDB**

The requirements are **FULFILLED**.

**Remarks:**     The measurement was performed in the frequency range 9 kHz to 40 GHz.

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The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

**FCC ID: 2AATH-CC300RFIDB**
**IC: 9927C-CC300RFIDB**

## 5.4 Frequency tolerance

For test instruments and accessories used see section 6 Part FE.

### 5.4.1 Description of the test location

Test location: AREA4

### 5.4.2 Photo documentation of the test set-up

See attachment C to this report

### 5.4.3 Applicable standard

According to FCC Part 15, Section 15.225(e) and RSS-210 clause B.6

### 5.4.4 Test result

| Test conditions                 |                            | Test result         | Tolerance | Limit       |
|---------------------------------|----------------------------|---------------------|-----------|-------------|
|                                 |                            | Frequency (MHz)     | (kHz)     | (kHz)       |
| $T_{min} (-20)^{\circ}\text{C}$ | $V_{nom} (24.0 \text{ V})$ | 13.559800           | -0.20     | $\pm 1.356$ |
| $T (-10)^{\circ}\text{C}$       | $V_{nom} (24.0 \text{ V})$ | 13.559900           | -0.10     | $\pm 1.356$ |
| $T (0)^{\circ}\text{C}$         | $V_{nom} (24.0 \text{ V})$ | 13.559900           | -0.10     | $\pm 1.356$ |
| $T (10)^{\circ}\text{C}$        | $V_{nom} (24.0 \text{ V})$ | 13.559950           | -0.05     | $\pm 1.356$ |
| $T_{nom} (20)^{\circ}\text{C}$  | $V_{min} (20.4 \text{ V})$ | 13.559950           | -0.05     | $\pm 1.356$ |
|                                 | $V_{nom} (24.0 \text{ V})$ | 13.559950           | -0.05     | $\pm 1.356$ |
|                                 | $V_{max} (27.6 \text{ V})$ | 13.559950           | -0.05     | $\pm 1.356$ |
| $T (30)^{\circ}\text{C}$        | $V_{nom} (24.0 \text{ V})$ | 13.559000           | -0.10     | $\pm 1.356$ |
| $T (40)^{\circ}\text{C}$        | $V_{nom} (24.0 \text{ V})$ | 13.559000           | -0.10     | $\pm 1.356$ |
| $T_{max} (50)^{\circ}\text{C}$  | $V_{nom} (24.0 \text{ V})$ | 13.559000           | -0.10     | $\pm 1.356$ |
| Measurement uncertainty         |                            | $\pm 10 \text{ Hz}$ |           |             |

Limit Calculation:

Carrier frequency:  $f_c = 13.56 \text{ MHz}$

Max. tolerance:  $\pm 0.01 \% \text{ of } 13.56 \text{ MHz} = \pm 1.356 \text{ kHz}$

Limit according to FCC Part 15, Section 15.225(e) and RSS-210 clause B.6:

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01 \%$  of the operating frequency.

The requirements are **FULFILLED**.

Remarks: none

**FCC ID: 2AATH-CC300RFIDB****IC: 9927C-CC300RFIDB****5.5 Bandwidth**

For test instruments and accessories used see section 6 Part **MB**.

**5.5.1 Description of the test location**

Test location: AREA4

**5.5.2 Photo documentation of the test set-up**

See attachment C to this report

**5.5.3 Applicable standard**

According to FCC Part 15, Section 15.215(c) and RSS-Gen 6.7

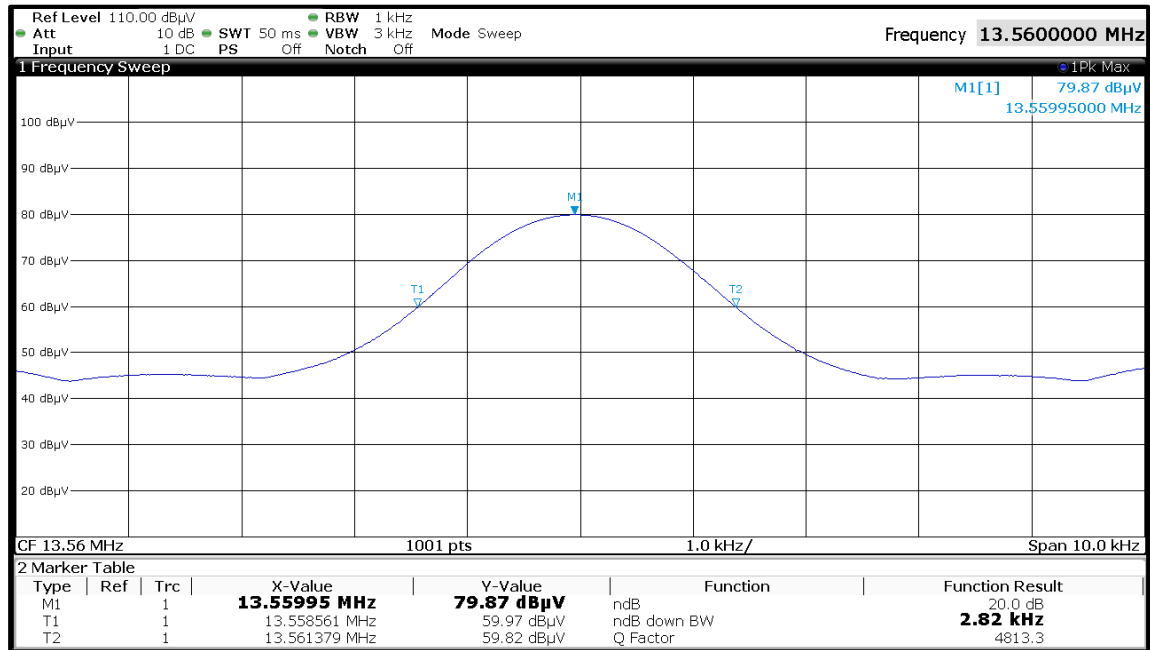
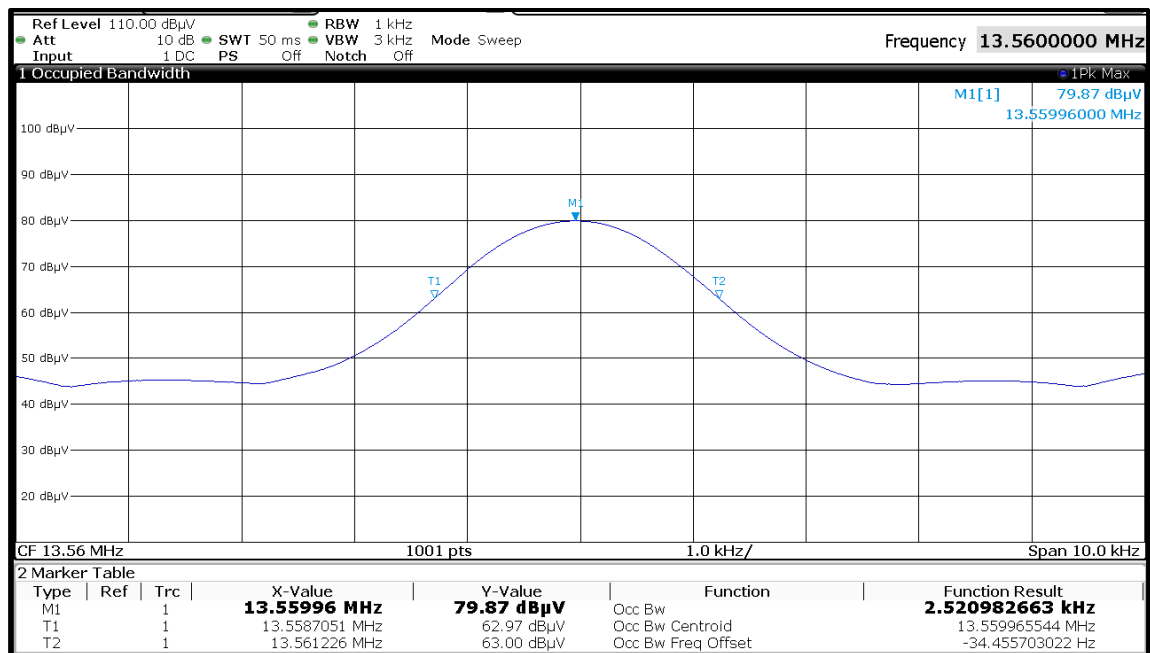
**5.5.4 Test result**

| Measured<br>Bandwidth | result<br>(kHz) | Limit<br>(kHz) |
|-----------------------|-----------------|----------------|
| 20dB                  | 2.82            | --             |
| 99%                   | 2.52            | --             |

The requirements are **FULFILLED**.

**Remarks:** For detailed test result please refer to following test protocol.

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**FCC ID: 2AATH-CC300RFIDB**
**IC: 9927C-CC300RFIDB**
**5.5.5 Test protocol**
**20 dB bandwidth**

**99% Bandwidth**


FCC ID: 2AATH-CC300RFIDB

IC: 9927C-CC300RFIDB

## 5.6 Transmitter spectrum mask

For test instruments and accessories used see section 6 Part MB.

### 5.6.1 Description of the test location

Test location: AREA4

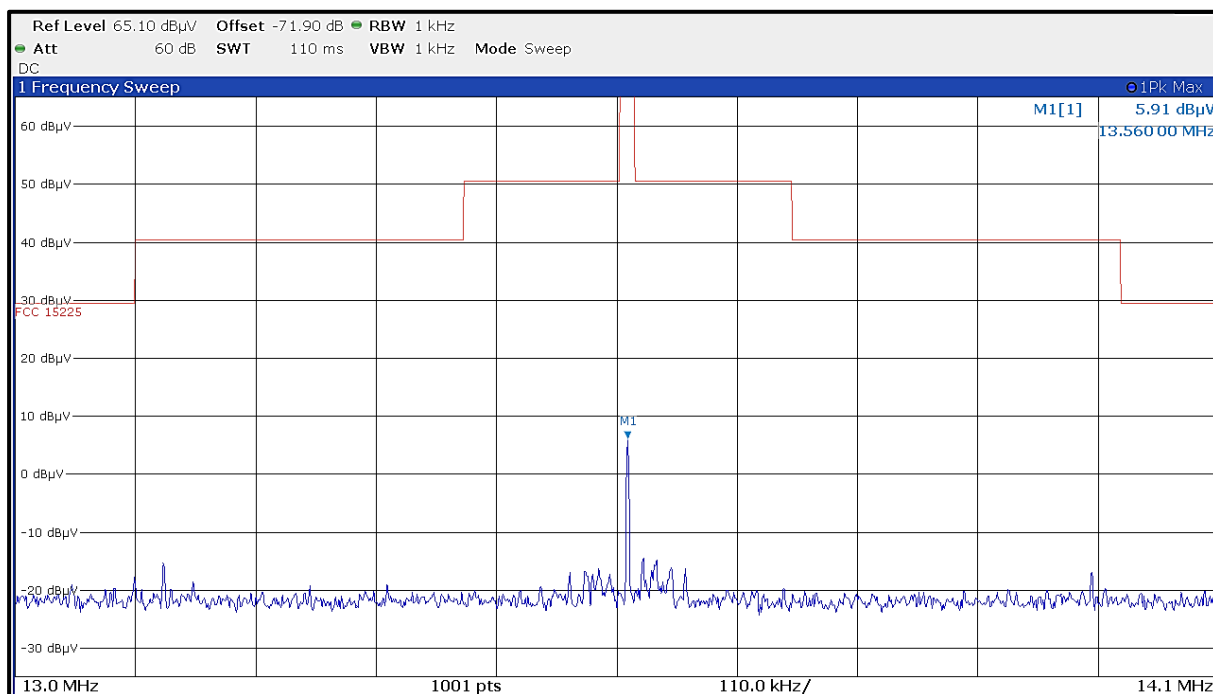
### 5.6.2 Photo documentation of the test set-up

See attachment C to this report

### 5.6.3 Applicable standard

According to FCC Part 15, Section 15.225 (a-d) and RSS-210 clause B.6 (i-iv)

### 5.6.4 Test result



**FCC ID: 2AATH-CC300RFIDB**
**IC: 9927C-CC300RFIDB**

Limits according to FCC Part 15, Section 15.225(a-d) and RSS-210 clause B.6 (i-iv)

| Frequency band<br>(MHz)    | Emission level limit at 30 m<br>( $\mu\text{V/m}$ ) | Emission level limit at 30 m<br>(dB $\mu\text{V/m}$ ) |
|----------------------------|-----------------------------------------------------|-------------------------------------------------------|
| 13.110 – 13.410            | 106                                                 | 40.5                                                  |
| 13.410 - 13.553            | 334                                                 | 50.5                                                  |
| 13.553 - 13.567            | 15.848                                              | 84.0                                                  |
| 13.567 – 13.710            | 334                                                 | 50.5                                                  |
| 13.710 – 14.010            | 106                                                 | 40.5                                                  |
| outside of 13.110 – 14.010 | 30                                                  | 29.5                                                  |

The requirements are **FULFILLED**.

**Remarks:** none

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

**FCC ID: 2AATH-CC300RFIDB**
**IC: 9927C-CC300RFIDB**

## 6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

| Test ID | Model Type              | Equipment No.   | Next Calib. | Last Calib. | Next Verif. | Last Verif. |
|---------|-------------------------|-----------------|-------------|-------------|-------------|-------------|
| A 4     | BAT-EMC 3.20.0.23       | 01-02/68-13-001 |             |             |             |             |
|         | ESCI                    | 02-02/03-15-001 | 21/06/2022  | 21/06/2021  |             |             |
|         | ESH 2 - Z 5             | 02-02/20-05-004 | 31/10/2021  | 31/10/2019  | 26/10/2021  | 26/04/2021  |
|         | N-4000-BNC              | 02-02/50-05-138 |             |             |             |             |
|         | N-1500-N                | 02-02/50-05-140 |             |             |             |             |
|         | ESH 3 - Z 2             | 02-02/50-05-155 | 13/11/2022  | 13/11/2019  | 26/10/2021  | 26/04/2021  |
| CPR 1   | ESCI                    | 02-02/03-05-005 | 24/11/2021  | 24/11/2020  |             |             |
|         | HFH 2 - Z 2             | 02-02/24-15-001 | 30/03/2022  | 30/03/2021  |             |             |
|         | NW-2000-NB              | 02-02/50-05-113 |             |             |             |             |
|         | KK-EF393/U-16N-21N20 m  | 02-02/50-12-018 |             |             |             |             |
|         | KK-SD_7/8-2X21N-33,0M   | 02-02/50-15-028 |             |             |             |             |
|         |                         |                 |             |             |             |             |
| FE      | FSW43                   | 02-02/11-21-001 | 08/04/2022  | 08/04/2021  |             |             |
|         | HFRAE 5161 _ 50 kHz-120 | 02-02/24-11-004 |             |             |             |             |
|         | WK-340/40               | 02-02/45-05-001 | 15/08/2021  | 15/08/2020  |             |             |
|         | EA-PS 3032-10B          | 02-02/50-10-013 |             |             |             |             |
|         | SF104/11SMA/11N/1500MM  | 02-02/50-13-017 |             |             |             |             |
|         |                         |                 |             |             |             |             |
| MB      | FSW43                   | 02-02/11-21-001 | 08/04/2022  | 08/04/2021  |             |             |
|         | ESW26                   | 02-02/03-17-002 | 10/02/2022  | 10/02/2021  |             |             |
|         | HFRAE 5161 _ 50 kHz-120 | 02-02/24-11-004 |             |             |             |             |
|         | EA-PS 3032-10B          | 02-02/50-10-013 |             |             |             |             |
|         | SF104/11SMA/11N/1500MM  | 02-02/50-13-017 |             |             |             |             |
|         |                         |                 |             |             |             |             |
| SER 1   | ESCI                    | 02-02/03-05-005 | 24/11/2021  | 24/11/2020  |             |             |
|         | HFH 2 - Z 2             | 02-02/24-15-001 | 30/03/2022  | 30/03/2021  |             |             |
|         | NW-2000-NB              | 02-02/50-05-113 |             |             |             |             |
|         | KK-EF393/U-16N-21N20 m  | 02-02/50-12-018 |             |             |             |             |
|         | KK-SD_7/8-2X21N-33,0M   | 02-02/50-15-028 |             |             |             |             |
|         |                         |                 |             |             |             |             |
| SER 2   | ESVS 30                 | 02-02/03-05-003 | 03/09/2021  | 03/09/2020  |             |             |
|         | VULB 9168               | 02-02/24-05-005 | 18/12/2021  | 18/12/2020  |             |             |
|         | NW-2000-NB              | 02-02/50-05-113 |             |             |             |             |
|         | KK-EF393/U-16N-21N20 m  | 02-02/50-12-018 |             |             |             |             |
|         | KK-SD_7/8-2X21N-33,0M   | 02-02/50-15-028 |             |             |             |             |
|         |                         |                 |             |             |             |             |
| SER 3   | FSW43                   | 02-02/11-21-001 | 08/04/2022  | 08/04/2021  |             |             |
|         | AMF-6D-01002000-22-10P  | 02-02/17-15-004 |             |             |             |             |
|         | LNA-40-18004000-33-5P   | 02-02/17-20-002 |             |             |             |             |
|         | 3117                    | 02-02/24-05-009 | 18/06/2021  | 18/06/2020  |             |             |
|         | BBHA 9170               | 02-02/24-05-013 | 19/05/2023  | 19/05/2020  | 04/02/2022  | 04/02/2021  |
|         | HFRAE 5161 _ 50 kHz-120 | 02-02/24-11-004 |             |             |             |             |
|         | R1 _ 18 - 40 GHz        | 02-02/30-09-002 |             |             | 17/09/2021  | 17/09/2020  |
|         | WK-340/40               | 02-02/45-05-001 | 15/08/2021  | 15/08/2020  |             |             |
|         | EA-PS 3032-10B          | 02-02/50-10-013 |             |             |             |             |
|         | SF104/11SMA/11N/1500MM  | 02-02/50-13-017 |             |             |             |             |
|         | BAM 4.5-P               | 02-02/50-17-024 |             |             |             |             |
|         | NCD                     | 02-02/50-17-025 |             |             |             |             |
|         | KK-SF106-2X11N-6,5M     | 02-02/50-18-016 |             |             |             |             |
|         | KMS116-GL140SE-KMS116-  | 02-02/50-20-026 |             |             |             |             |
|         |                         |                 |             |             |             |             |

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.