



EMI - TEST REPORT

- FCC Part 15.225, RSS 210-

Type / Model Name : KAP-R

Product Description : Kion Access Permission (access device)

Applicant : TQ-Systems GmbH

Address : Gut Delling

Mühlstrasse 2

82229 Seefeld, Germany

Manufacturer : TQ-Systems GmbH

Address : Gut Delling

Mühlstrasse 2

82229 Seefeld, Germany

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

POSITIVE

Test Report No. : 80153542-03 Rev_1

04. October 2023

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 2021)

| | |
|-----------------------------------|---|
| 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 2021)

| | |
|------------------------------------|--|
| 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 |

RSS Rules and Regulations

| | |
|--|---|
| RSS-Gen Issue 5, March 2018 Amendment 1 (March 2019) Amendment 2 (February 2021) | General Requirements and Information for the Certification of Radiocommunication Equipment |
| RSS-210 Issue 10, December 2019 Amendment (April 2020) | Low Power Licence – Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment |
| ANSI C63.10: 2013 | 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

2.4 Short description of the equipment under test (EUT)

KAP-R is a component to be built in a forklift for key access permission.

KAP-R (Kion Access Permission) is used in a vehicle as an access device. The KAP-R can be used as a standalone version (without fleet management) or in combination (with fleet management) with the radio unit KCU (Kion Communication Unit).

| | |
|---------------------------|-------------------------|
| Number of tested samples: | 1 |
| Serial number: | Prototype (test sample) |
| HVIN: | KAP-R |
| PMN: | KAPR20 |

EUT operation mode:

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

- Only modulation HF (13.56 MHz), Modulation Type ASK [command r8]

EUT configuration:

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

| | |
|----------------|---------------------------------|
| - Test boxes | Model: AE12-TS / AE12-LB |
| - Laptop DELL | Model: SN: 7QL1S32 |
| - Power supply | Model: CSA-ID.: 02-02/50-20-008 |

2.5 Power supply system utilised

Power supply voltage : 6.0 – 36.0 V DC (EUT)

All tests were carried out with a supply voltage of 24.0 V DC (test box "AE12-TS", supply EUT over test box), unless otherwise stated. Exceptions are described in the detailed test conditions.

3 TEST RESULT SUMMARY

| FCC Rule Part | RSS Rule Part | Description | Result |
|---------------|----------------------------|-----------------------------------|-------------------------|
| 15.207 | RSS Gen, 8.8 ^{*)} | AC power line conducted emissions | not tested ¹ |
| 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 |

¹ battery powered DC, vehicular use

"RSS-210 7.2 General field strength limits" reference to RSS-Gen^{*)}

3.1 Revision history of test report

| Test report No | Rev. | Issue Date | Changes |
|----------------|------|-----------------|--|
| 80153542-03 | 0 | 04 May 2023 | Initial test report |
| 80153542-03 | 1 | 04 October 2023 | Added modulation type ASK in Chapter 2: EUT operation mode |

The test report with the highest revision number replaces the previous test reports.

3.2 FINAL ASSESSMENT

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

Date of receipt of test sample : acc. to storage records

Testing commenced on : 13 March 2023

Testing concluded on : 30 March 2023

Checked by:

Tested by:

Klaus Gegenfurtner
Team Lead 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 on basis of the ETSI Technical Report TR 100 028 Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1 and Part 2. The results are documented in the quality system acc. to DIN EN ISO/IEC 17025. 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% | ± 3.29 dB |
| 20 dB Bandwidth | Center frequency of EuT | 95% | $\pm 2.5 \cdot 10^{-7}$ |
| 99% Occupied Bandwidth | Center frequency of EuT | 95% | $\pm 2.5 \cdot 10^{-7}$ |
| Radiated Spurious Emissions | 9 kHz to 30 MHz | 95% | ± 3.53 dB |
| Radiated Spurious Emissions | 30 MHz to 1000 MHz | 95% | ± 3.71 dB |
| Radiated Spurious Emissions | 1000 MHz to 10000 MHz | 95% | ± 2.34 dB |
| Peak conducted output power | 902 MHz to 928 MHz | 95% | ± 0.35 dB |
| Conducted Spurious Emissions | 9 kHz to 10000 MHz | 95% | ± 2.15 dB |

FCC ID: 2ANFF-KAPR
IC ID: 23072-KAPR

4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule ($w = 0$).

Details can be found in the procedure CSA_B_V50_29.

4.5 Measurement protocol for FCC and ISED

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".

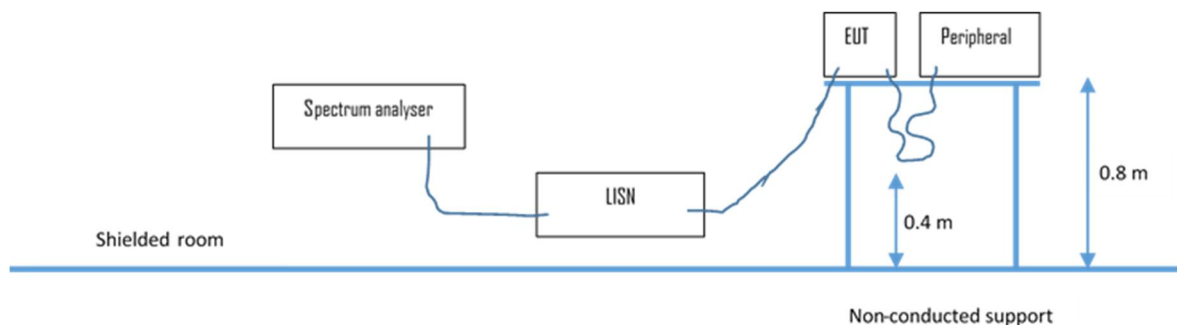
4.5.2.1 Justification

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 dBmV, is arrived at by taking the reading directly from the Spectrum analyser. This level is compared to the limit.

To convert between dBmV and mV, the following conversions apply:

$$\text{dBmV} = 20(\log \text{ mV})$$

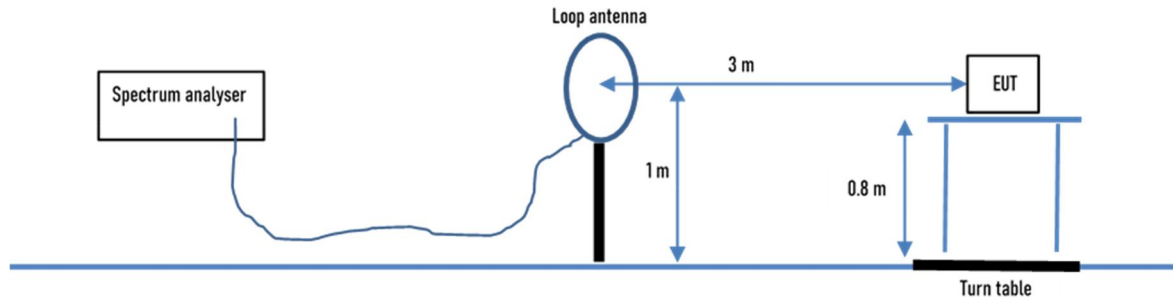
$$\text{mV} = \text{Inverse log}(\text{dBmV}/20)$$

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 W / 50 mH (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.

4.5.3.2 Radiated emission

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

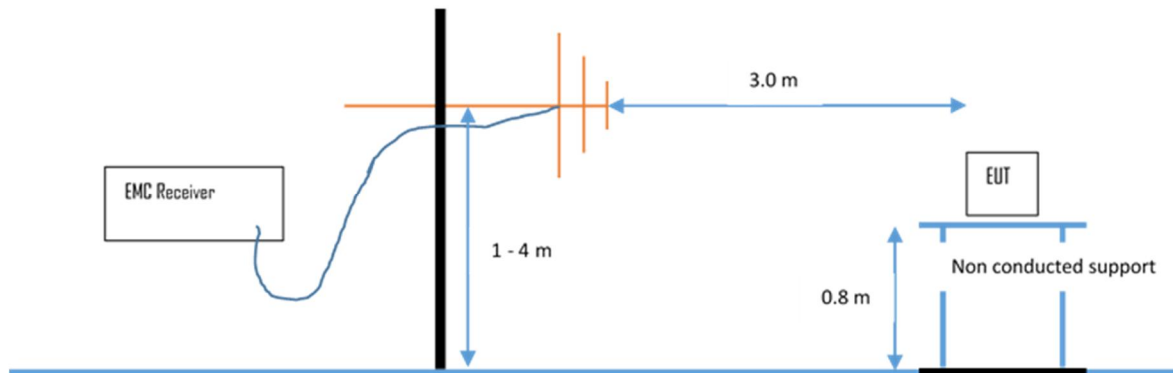
Test setup according ANSI C63.10



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

5 TEST CONDITIONS AND RESULTS

5.1 Field strength of the fundamental wave

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

5.1.1 Description of the test location

Test location: OATS 1
Test distance: 3 metres

5.1.2 Photo documentation of the test set-up

See ATTACHMENT B to this test report.

5.1.3 Applicable standard

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

5.1.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10.

5.1.5 Test result

- a) Result at a measurement distance of 3m

| Frequency (MHz) | Level (dBμV) | Ant. factor (dB 1/m) | Field strength dB(μV/m) |
|-----------------|--------------|----------------------|-------------------------|
| 13.56 | 41.5 | 20.0 | 61.5 |

- b) Result extrapolated to a distance of 30 m

| Frequency (MHz) | Field strength dB(μV/m) @3m | Extrapolation factor (dB) | Field strength dB(μV/m) @30m | Limit dB(μV/m) | Delta (dB) |
|-----------------|-----------------------------|---------------------------|------------------------------|----------------|------------|
| 13.56 | 61.5 | -40 | 21.5 | 84.0 | 62.5 |

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

| Frequency (MHz) | Field strength of fundamental wave (μV/m) | Field strength of fundamental wave dB(μV/m) | Measurement distance (metres) |
|-----------------|---|---|-------------------------------|
| 13.553 - 13.567 | 15848 | 84.0 | 30 |

The requirements are **FULFILLED**.

Remarks: None

5.2 Spurious emissions

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

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 B to this test report.

5.2.3 Applicable standard

FCC Part 15, Section 15.209(a) and RSS-210 7.2 reference to RSS Gen, 8.9.

5.2.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10.

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

Detector: QP (In frequency range 9-90 kHz and 110-490 kHz a linear average detector is used)

5.2.5 Test result < 30MHz

FCC

| <i>f</i> (MHz) | Level QP@3m (dBμV) | Ant. factor (dB/m) | Field strength QP@3m dB(μV/m) | Distance corr. 3m to 30m (dB) | Corrected level QP@30m dB(μV/m) | Limit QP@30m dB(μV/m) | Delta (dB) |
|-------------------|--------------------------|-----------------------|-------------------------------------|-------------------------------------|---------------------------------------|-----------------------------|---------------|
| 27.12 | 2.8 | 20 | 22.8 | -40 | -17.2 | 29.5 | -46.7 |

ISED

| <i>f</i> (MHz) | Level QP@3m (dBμA) | Ant. factor (dB/m) | Field strength QP@3m dB(μA/m) | Distance corr. 3m to 30m (dB) | Corrected level QP@30m dB(μA/m) | Limit QP@30m dB(μA/m) | Delta (dB) |
|-------------------|--------------------------|-----------------------|-------------------------------------|-------------------------------------|---------------------------------------|-----------------------------|---------------|
| 27.12 | -48.7 | 20 | -28.7 | -40 | -68.7 | -22 | -46.7 |

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5.2.6 Test result 30 MHz < f < 1 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) |
|--------------------|----------------------------|---------------------------|---------------------------|--------------------------|----------------------------|---------------------------|-------------------|----------------|
| 30.00 | 5.1 | 4.7 | 15.5 | 17.1 | 20.6 | 21.8 | 40.0 | -18.2 |
| 33.00 | 6.5 | 4.5 | 15.9 | 17.2 | 22.4 | 21.7 | 40.0 | -17.6 |
| 35.00 | 4.6 | 3.6 | 16.1 | 17.2 | 20.7 | 20.8 | 40.0 | -19.2 |
| 40.68 | 20.6 | 11.1 | 16.9 | 18.1 | 37.5 | 29.2 | 40.0 | -2.5 |
| 54.24 | 3.3 | 2.5 | 17.3 | 18.5 | 20.6 | 21.0 | 40.0 | -19.0 |
| 67.80 | 16.2 | 10.9 | 16.1 | 16.8 | 32.3 | 27.7 | 40.0 | -7.7 |
| 81.36 | 6.0 | 5.0 | 14.1 | 14.3 | 20.1 | 19.3 | 40.0 | -19.9 |
| 108.48 | 6.6 | 5.0 | 16.1 | 15.1 | 22.7 | 20.1 | 43.5 | -20.8 |
| 122.04 | 10.3 | 13.0 | 17.6 | 17.0 | 27.9 | 30.0 | 43.5 | -13.5 |
| 135.60 | 6.0 | 8.0 | 18.9 | 18.0 | 24.9 | 26.0 | 43.5 | -17.5 |
| 149.16 | 15.2 | 11.0 | 19.5 | 18.8 | 34.7 | 29.8 | 43.5 | -8.8 |
| 162.72 | 7.4 | 1.5 | 19.6 | 19.0 | 27.0 | 20.5 | 43.5 | -16.5 |
| 176.28 | 22.4 | 23.8 | 18.6 | 18.0 | 41.0 | 41.8 | 43.5 | -1.7 |
| 189.84 | 3.0 | 6.7 | 17.7 | 17.0 | 20.7 | 23.7 | 43.5 | -19.8 |
| 203.40 | 8.8 | 10.1 | 17.1 | 16.5 | 25.9 | 26.6 | 43.5 | -16.9 |
| 216.96 | 3.0 | 1.4 | 17.6 | 17.1 | 20.6 | 18.5 | 46.0 | -25.4 |
| 230.52 | 5.2 | 6.3 | 18.0 | 17.8 | 23.2 | 24.1 | 46.0 | -21.9 |
| 244.08 | 0.1 | 2.6 | 18.5 | 18.4 | 18.6 | 21.0 | 46.0 | -25.0 |
| 257.64 | 8.9 | 17.7 | 18.9 | 19.0 | 27.8 | 36.7 | 46.0 | -9.3 |
| 271.20 | -2.2 | 4.9 | 19.3 | 19.5 | 17.1 | 24.4 | 46.0 | -21.6 |
| 284.76 | 17.0 | 23.8 | 19.7 | 20.1 | 36.7 | 43.9 | 46.0 | -2.1 |
| 298.32 | 0.7 | 7.8 | 20.1 | 20.6 | 20.8 | 28.4 | 46.0 | -17.6 |
| 311.88 | 19.3 | 24.0 | 20.5 | 21.0 | 39.8 | 45.0 | 46.0 | -1.0 |
| 325.44 | 6.6 | 12.9 | 20.9 | 21.4 | 27.5 | 34.3 | 46.0 | -11.7 |
| 352.56 | 3.4 | 6.2 | 21.7 | 22.2 | 25.1 | 28.4 | 46.0 | -17.6 |
| 366.12 | 3.1 | 2.4 | 22.1 | 22.6 | 25.2 | 25.0 | 46.0 | -20.8 |
| 379.68 | 0.0 | 0.8 | 22.5 | 22.9 | 22.5 | 23.7 | 46.0 | -22.3 |
| 406.80 | -1.6 | -2.9 | 23.3 | 23.7 | 21.7 | 20.8 | 46.0 | -24.3 |

Note: The correction factor includes cable loss and antenna factor.

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.

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Limit according to FCC Part 15 Subpart 15.209(a)

| Frequency (MHz) | Field strength of spurious emissions | | Measurement distance (metres) |
|--------------------|--------------------------------------|-----------------------|----------------------------------|
| | ($\mu\text{V/m}$) | dB($\mu\text{V/m}$) | |
| 0.009 - 0.490 | 2400/F(kHz) | -- | 300 (Note 1) |
| 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) |
|--------------------|--------------------------------------|-----------------------|----------------------------------|
| | ($\mu\text{A/m}$) | dB($\mu\text{A/m}$) | |
| 0.009 - 0.490 | 6.37/F(kHz) | -- | 300 (Note 1) |
| 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) |
| | ($\mu\text{V/m}$) | dB($\mu\text{V/m}$) | |
| 30 - 88 | 100 | 40 | 3 |
| 88 - 216 | 150 | 43.5 | 3 |
| 216 - 960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

The requirements are **FULFILLED**.

Remarks: Measurement has been performed up to 1000 MHz.
See remarks: 5.2.2 Photo documentation of the test set-up (ATTACHMENT B)

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5.3 Frequency tolerance

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

5.3.1 Description of the test location

Test location: AREA4

5.3.2 Photo documentation of the test set-up

See ATTACHMENT B to this test report.

5.3.3 Applicable standard

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

5.3.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10.

5.3.5 Test result

| Test conditions | | Test result | Tolerance | Limit |
|---------------------------------|----------------------------|-----------------|-------------|-------------|
| | | Frequency (kHz) | (kHz) | (kHz) |
| $T_{min} (-20)^{\circ}\text{C}$ | $V_{nom} (24.0 \text{ V})$ | 13559.869 | +0.163 | ± 1.356 |
| $T (-10)^{\circ}\text{C}$ | $V_{nom} (24.0 \text{ V})$ | 13559.869 | +0.163 | ± 1.356 |
| $T (0)^{\circ}\text{C}$ | $V_{nom} (24.0 \text{ V})$ | 13559.844 | +0.138 | ± 1.356 |
| $T (10)^{\circ}\text{C}$ | $V_{nom} (24.0 \text{ V})$ | 13559.819 | +0.113 | ± 1.356 |
| $T_{nom} (20)^{\circ}\text{C}$ | $V_{min} (6.0 \text{ V})$ | 13559.706 | ± 0.000 | ± 1.356 |
| | $V_{nom} (24.0 \text{ V})$ | 13559.706 | ± 0.000 | ± 1.356 |
| | $V_{max} (36.0 \text{ V})$ | 13559.706 | ± 0.000 | ± 1.356 |
| $T (30)^{\circ}\text{C}$ | $V_{nom} (24.0 \text{ V})$ | 13559.719 | +0.013 | ± 1.356 |
| $T (40)^{\circ}\text{C}$ | $V_{nom} (24.0 \text{ V})$ | 13559.681 | -0.025 | ± 1.356 |
| $T_{max} (50)^{\circ}\text{C}$ | $V_{nom} (24.0 \text{ V})$ | 13559.631 | -0.075 | ± 1.356 |

Limit Calculation:

Carrier frequency: $f_c = 13.559706 \text{ MHz}$

Max. tolerance: $\pm 0.01 \% \text{ of } 13.559706 \text{ MHz} = \pm 1.356 \text{ kHz}$

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

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

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The requirements are **FULFILLED**.

Remarks: Measurements started at T=20°C

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: 2ANFF-KAPR**IC ID: 23072-KAPR**

5.4 Bandwidth

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

5.4.1 Description of the test location

Test location: AREA4

5.4.2 Photo documentation of the test set-up

See ATTACHMENT B to this test report.

5.4.3 Applicable standard

According to FCC Part 15, Section 15.215(c) and RSS-210 7.2 reference to RSS-Gen, 6.7.

5.4.4 Test result

| Measured Bandwidth | result (kHz) | Limit (kHz) |
|--------------------|--------------|-------------|
| 20dB | 0.51 | -- |
| 99% | 3.38 | -- |

The requirements are **FULFILLED**.

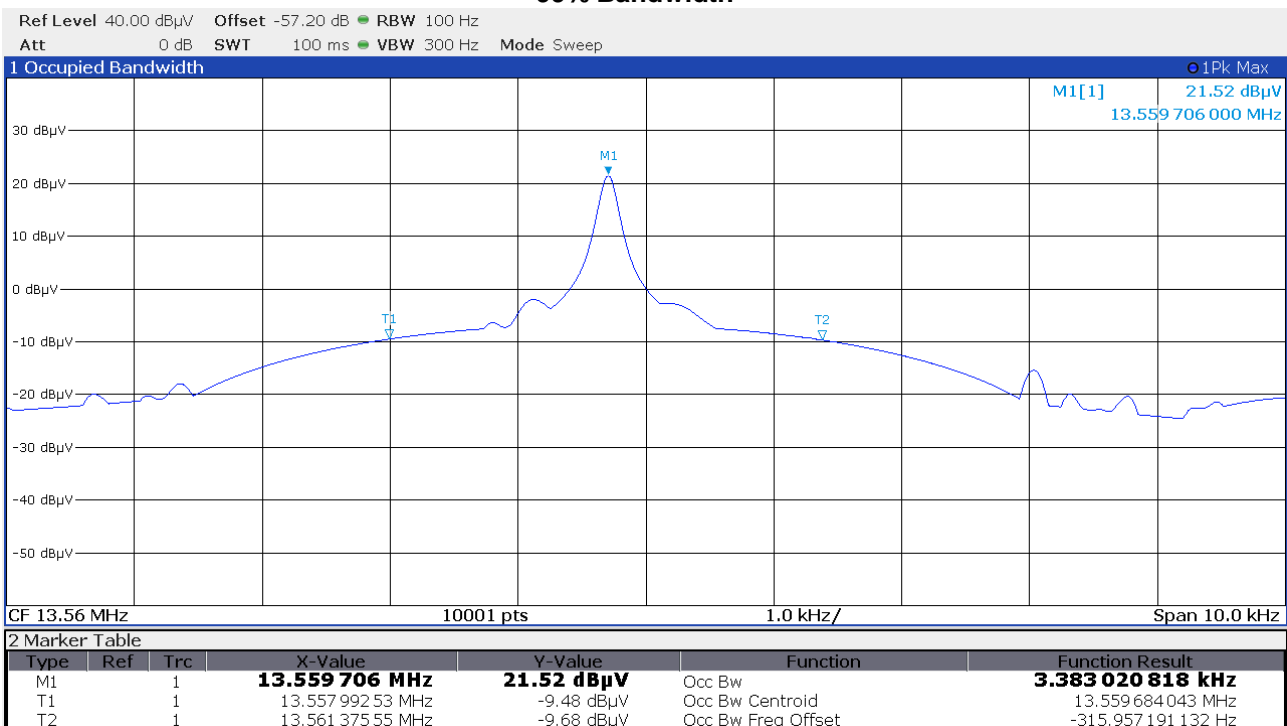
Remarks: For detailed test result please refer to following test protocol.

5.4.5 Test protocol

20 dB bandwidth



99% Bandwidth



FCC ID: 2ANFF-KAPR**IC ID: 23072-KAPR**

5.5 Transmitter spectrum mask

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 B to this test report.

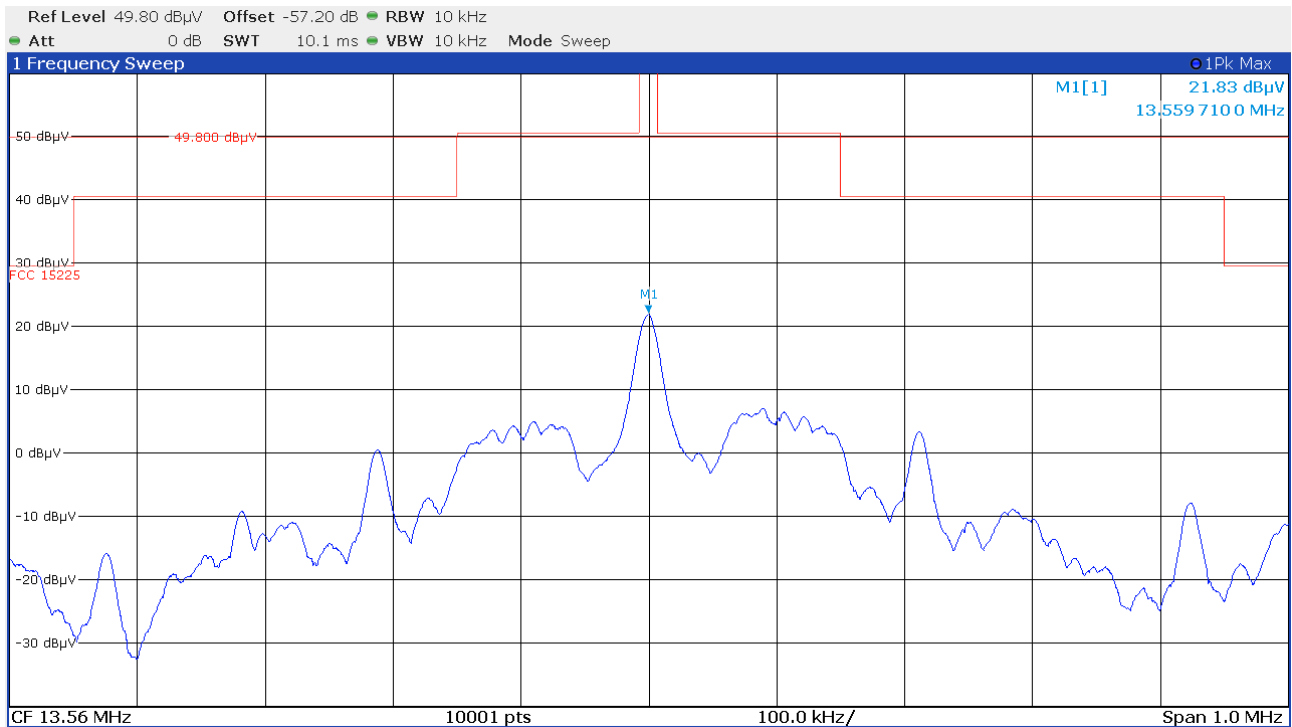
5.5.3 Applicable standard

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

5.5.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10.

5.5.5 Test result



Limits according to FCC Part 15, Section 15.225(a-d)

| Frequency band (MHz) | Emission level limit at 30 m (μV/m) | Emission level limit at 30 m (dBμV/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 |

Limits according to RSS-210 clause B.6 (i-iv)

| Frequency band (MHz) | Emission level limit at 30 m (μV/m) | Emission level limit at 30 m (dBμV/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 |
| Frequency band (MHz) | Emission level limit at 30 m (μA/m) | Emission level limit at 30 m (dBμA/m) |
| outside of 13.110 – 14.010 | 0.08 | -22 |

The requirements are **FULFILLED**.

Remarks: None

FCC ID: 2ANFF-KAPR
IC ID: 23072-KAPR

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. |
|----------------|-------------------------|----------------------|--------------------|--------------------|--------------------|--------------------|
| CPR 1 | ESR 7 | 02-02/03-17-001 | 05/08/2023 | 05/08/2022 | | |
| | HFH 2 - Z 2 | 02-02/24-15-001 | 31/03/2023 | 31/03/2022 | | |
| | 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 | 02-02/11-15-001 | 22/04/2023 | 22/04/2022 | | |
| | HFRAE 5161 _ 50 kHz-120 | 02-02/24-11-004 | | | | |
| | WK-340/40 | 02-02/45-05-001 | 03/08/2023 | 03/08/2022 | | |
| MB | FSW43 | 02-02/11-15-001 | 22/04/2023 | 22/04/2022 | | |
| | HFRAE 5161 _ 50 kHz-120 | 02-02/24-11-004 | | | | |
| SER 1 | ESR 7 | 02-02/03-17-001 | 05/08/2023 | 05/08/2022 | | |
| | HFH 2 - Z 2 | 02-02/24-15-001 | 31/03/2023 | 31/03/2022 | | |
| | 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 | VULB 9168 | 01-02/24-20-001 | 22/02/2024 | 22/02/2023 | | |
| | ESVS 30 | 02-02/03-05-006 | 27/07/2023 | 27/07/2022 | | |
| | 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 | | | | |
| | 50F-003 N 3 dB | 02-02/50-21-010 | | | | |