



# RF - TEST REPORT

- Human Exposure -

**Type / Model Name** : KINEXON Mesh Anchor / A040001

**Product Description** : Anchor for UWB localization system

**Applicant** : KINEXON Inc.

**Address** : 200 S Wacker Drive, Suite 3100

CHICAGO, IL 60606, USA

**Manufacturer** : KINEXON GmbH

**Address** : Schellingstr. 35

80799 MÜNCHEN, GERMANY

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

**POSITIVE**

**Test Report No. :** 80185270-07 Rev\_0

07. March 2024

Date of issue



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

FCC ID: 2ALC5-KNX-AM1

IC: 25557-KNXAM1

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ATTACHMENT A as separate supplement

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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## 1 TEST STANDARDS

The tests were performed according to following standards:

### **FCC Rules and Regulations Part 1, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969**

Part 1, Subpart I, Section 1.1310      Radiofrequency radiation exposure limits

Part 1, Subpart 2, Section 2.1091      Radiofrequency radiation exposure evaluation: **mobile devices**.

Part 1, Subpart 2, Section 2.1093      Radiofrequency radiation exposure evaluation: **portable devices**.

KDB 447498 D04      RF Exposure procedures and equipment authorisation policies for mobile and portable devices, November 29, 2021.

RSS-102 Issue 5, March 2015      Radio Frequency (RF) Exposure Compliance of Radiocommunication apparatus (All Frequency Bands)

ANSI C95.1: 2005      IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

ETSI TR 100 028 V1.3.1: 2001-03,      Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the Measurement of Mobile Radio Equipment Characteristics—Part 1 and Part 2

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## **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 – See ATTACHMENT A**

### **2.4 Equipment type, category**

UWB device, BLE device, mobile equipment.

### **2.5 Short description of the equipment under test (EUT)**

The KINEXON Mesh system is a real-time location system (RTLS) designed to provide precise tracking and asset management solutions.

Number of tested samples: 1  
Serial number: pre-production sample #217  
Firmware version: V1.0.0

### **2.6 Variants of the EUT**

There are no variants.

### **2.7 Operation frequency and channel plan**

Operating range 1: 2400 MHz to 2483.5 MHz.  
Operating range 2: 3100 MHz to 10600 MHz.

### **2.8 Transmit operating modes**

BLE:  
The EUT uses GFSK modulation and may provide following data rates: 1000 kbps.

UWB:  
Modulation: variable pulse position modulation (PPM) in combination with binary phase shift keying (BPSK).  
Data rate: 6.8 Mbit/s

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## 2.9 Antennas

BLE:

| Number | Characteristic | Model number      | Plug | f-range (GHz) | Gain (dBi) |
|--------|----------------|-------------------|------|---------------|------------|
| 1      | Omni           | PCB antenna, MIFA | None | 2.4 – 2.5     | 1.6        |

UWB:

| Number | Characteristic | Model number | Plug      | f-range (GHz) | Max. Gain (dBi) |
|--------|----------------|--------------|-----------|---------------|-----------------|
| 1      | Omni           | PCB antenna  | None, PCB | 4 – 7         | 5.8             |

## 2.10 Power supply system utilised

Power supply voltage,  $V_{nom}$  : 5 V<sub>DC</sub> (USB)  
Power supply voltage (alternative) : 3.6 V<sub>DC</sub> (internal battery)

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### 3 TEST RESULT SUMMARY

| FCC Rule Part     | RSS Rule Part  | Description                  | Result         |
|-------------------|----------------|------------------------------|----------------|
| KDB 447498, 7.1   | RSS 102, 2.5.2 | MPE                          | not applicable |
| KDB 447498, 4.3.1 | RSS 102, 2.5.1 | SAR exclusion consideration  | passed         |
| KDB 447498, 7.2   | RSS102, 3.2    | Co-location, Co-transmission | passed         |

The mentioned RSS Rule Parts in the above table are related to:  
RSS 102, Issue 5, March 2015

#### 3.1 Revision history of test report

| Test report No | Rev. | Issue Date    | Changes             |
|----------------|------|---------------|---------------------|
| 80185270-07    | 0    | 07 March 2024 | Initial test report |

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 : 04 March 2024

Testing concluded on : 04 March 2024

Checked by:

Tested by:

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

\_\_\_\_\_  
Franz-Xaver Schrettenbrunner  
Radio Team

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## **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.

### **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.

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## 5 HUMAN EXPOSURE

### 5.1 SAR test exclusion considerations

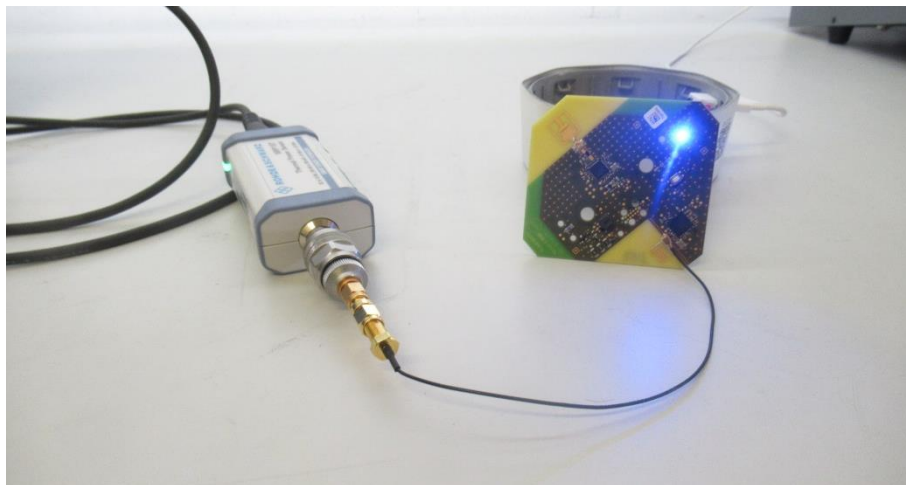
For test instruments and accessories used see section 6 Part HE.

#### 5.1.1 Description of the test location

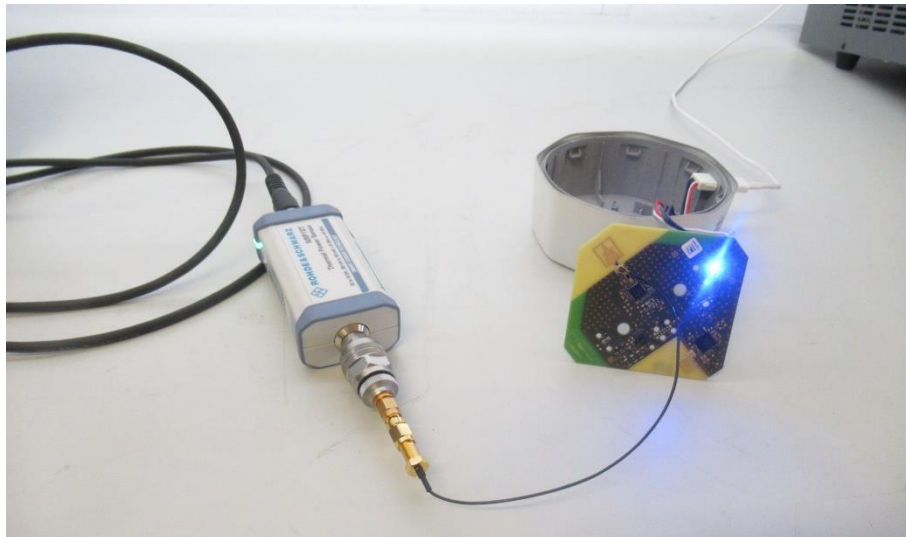
Test location: Shielded Room S6

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

BLE



UWB



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### 5.1.3 Applicable standard

According to KDB 447498 clause 2.2.1:

As discussed in § 1.1307(b)(3)(ii)(A), the 1-mW exemption intended for single transmitters may be also applied to simultaneous transmission conditions, within the same host device, according one of the following criteria:

- a) When maximum available power each individual transmitting antenna within the same time averaging period is  $\leq 1$  mW, and the nearest parts of the antenna structures of the simultaneously operating transmitters are separated by at least 2 cm.
- b) When the aggregate maximum available power of all transmitting antennas is  $\leq 1$  mW in the same time-averaging period.

This exemption may not be combined with any other exemption.

### 5.1.4 Determination of RF exposure exemption for simultaneous transmission

The conducted emissions of both UWB and BLE are measured with a power meter.

|     |                    |                                                   |
|-----|--------------------|---------------------------------------------------|
| UWB | $P_c = -31.3$ dBm  | $P_c = 741$ nW                                    |
|     | $G = 5.8$ dBi      |                                                   |
|     | $EIRP = -25.5$ dBm | <b><math>EIRP = 2.81</math> <math>\mu</math>W</b> |
| BLE | $P_c = -9.6$ dBm   | $P_c = 0.110$ mW                                  |
|     | $G = 1.6$ dBi      |                                                   |
|     | $EIRP = -8.0$ dBm  | <b><math>EIRP = 0.158</math> mW</b>               |

The total sum of all radiated emissions is  $0.158$  mW +  $2.81$   $\mu$ W =  $0.16$  mW

The EUT qualifies for 1 mW exemption for simultaneous transmission.

The requirements are **FULFILLED**.

**Remarks:** None.

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## 5.2 Exemption limits for routine evaluation - SAR evaluation

### 5.2.1 Applicable standard

According to RSS-102, item 2.5.1:

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance  
4, 5

| Frequency (MHz) | Exemption Limits (mW)           |                                 |                                 |                                 |                                 |
|-----------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                 | At separation distance of ≤5 mm | At separation distance of 10 mm | At separation distance of 15 mm | At separation distance of 20 mm | At separation distance of 25 mm |
| ≤ 300           | 71 mW                           | 101 mW                          | 132 mW                          | 162 mW                          | 193 mW                          |
| 450             | 52 mW                           | 70 mW                           | 88 mW                           | 106 mW                          | 123 mW                          |
| 835             | 17 mW                           | 30 mW                           | 42 mW                           | 55 mW                           | 67 mW                           |
| 1900            | 7 mW                            | 10 mW                           | 18 mW                           | 34 mW                           | 60 mW                           |
| <b>2450</b>     | <b>4 mW</b>                     | <b>7 mW</b>                     | 15 mW                           | 30 mW                           | 52 mW                           |
| 3500            | 2 mW                            | 6 mW                            | 16 mW                           | 32 mW                           | 55 mW                           |
| <b>5800</b>     | <b>1 mW</b>                     | 6 mW                            | 15 mW                           | 27 mW                           | 41 mW                           |

| Frequency (MHz) | Exemption Limits (mW)           |                                 |                                 |                                 |                                  |
|-----------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|----------------------------------|
|                 | At separation distance of 30 mm | At separation distance of 35 mm | At separation distance of 40 mm | At separation distance of 45 mm | At separation distance of ≥50 mm |
| ≤ 300           | 223 mW                          | 254 mW                          | 284 mW                          | 315 mW                          | 345 mW                           |
| 450             | 141 mW                          | 159 mW                          | 88 mW                           | 195 mW                          | 213 mW                           |
| 835             | 80 mW                           | 92 mW                           | 177 mW                          | 117 mW                          | 130 mW                           |
| 1900            | 99 mW                           | 153 mW                          | 225 mW                          | 316 mW                          | 431 mW                           |
| 2450            | 83 mW                           | 123 mW                          | 173 mW                          | 235 mW                          | 309 mW                           |
| 3500            | 86 mW                           | 124 mW                          | 170 mW                          | 225 mW                          | 290 mW                           |
| 5800            | 56 mW                           | 71 mW                           | 85 mW                           | 97 mW                           | 106 mW                           |

**4** The exemption limits in Table 1 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.

**5** Transmitters operating between 0.003-10 MHz, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in Section 4.

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**5.2.2 Conclusion according to RSS-102.**

|     |                                   |                                                            |
|-----|-----------------------------------|------------------------------------------------------------|
| UWB | $P_c = -31.3 \text{ dBm}$         | $P_c = 741 \text{ nW}$                                     |
|     | $G = 5.8 \text{ dBi}$             |                                                            |
|     | $\text{EIRP} = -25.5 \text{ dBm}$ | <b><math>\text{EIRP} = 2.81 \text{ }\mu\text{W}</math></b> |
| BLE | $P_c = -9.6 \text{ dBm}$          | $P_c = 0.110 \text{ mW}$                                   |
|     | $G = 1.6 \text{ dBi}$             |                                                            |
|     | $\text{EIRP} = -8.0 \text{ dBm}$  | <b><math>\text{EIRP} = 0.158 \text{ mW}</math></b>         |

$$\text{EIRP}_{\text{total}} = 0.158 \text{ mW} + 2.81 \text{ }\mu\text{W} = 0.16 \text{ mW}$$

The requirements are **FULFILLED**.

**Remarks:** None.

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## 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. |
|---------|------------|-----------------|-------------|-------------|-------------|-------------|
| HE      | NRP18T     | 02-02/07-19-001 | 12/09/2024  | 12/09/2023  |             |             |

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