



RF - TEST REPORT

- Human Exposure -

Type / Model Name : Anchor 9 / A010002

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. : **80236650-07 Rev_0**

16. January 2025

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-00

FCC-ID: 2ALC5-KNX-A9-1

IC: 25557-KNXA91

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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 D01 RF Exposure procedures and equipment authorisation policies for mobile and portable devices, April 20, 2021.

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

Indoor UWB device, BLE device

2.5 Short description of the equipment under test (EUT)

The KINEXON System is a Real-Time Location System (RTLS) based on Ultra Wideband (UWB) technology. The system operates using active Tags, a network of Receivers (Anchors), and the KINEXON Sensor Network Application.

The KINEXON Anchors are reference points for the tracking sensors that are positioned around a desired area. The Anchor 9 supports UWB channels 3, 5 and 9 with 2 UWB transceivers and antenna paths. The Anchor 9 also supports Bluetooth 5 low energy (BLE 5).

Number of tested samples: 1
Serial number: 390849
Firmware version: v4.7.0

2.6 Variants of the EUT

There are no variants.

2.7 Operation frequency and channel plan

The operating frequencies are 2400 MHz to 2483.5 MHz and 3100 MHz to 10600 MHz

2.8 Transmit operating modes

UWB

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

BLE

The EUT uses GFSK modulation and may provide following data rates:

- 125 kbps

(kbps = kilobits per second)

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- 500 kbps
- 1000 kbps
- 2000 kbps

2.9 Antennas

The following antennas shall be used with the EUT:

UWB

Number	Characteristic	Model number	Plug	f-range (GHz)	Peak Gain (dBi)
1	Omni	LF Jolie	None, PCB	4.25 – 6.75	5.7
2	Omni	HF Jolie	None, PCB	6.25 – 8.25	6.5

In addition, the EUT contains two directional PCB antennas for receive-only purposes

BLE

Number	Characteristic	Model number	Plug	f-range (GHz)	Gain (dBi)
1	Omni	Fanstel PCB antenna	None, PCB	2.4 – 2.5	0.3

2.10 Power supply system utilised

Power supply voltage, V_{nom} : 52 V DC (PoE, 41.1 V DC – 57.0 V DC)

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3 TEST RESULT SUMMARY

FCC Rule Part	RSS Rule Part	Description	Result
KDB 447498, 7.1	RSS-102, 6.5	MPE / IPD exemption	passed
KDB 447498, 7.2	RSS-102, 8.2	Co-location, Co-transmission	passed

The mentioned RSS Rule Parts in the above table are related to:
RSS-102, Issue 6, December 2023

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80236650-07	0	16 January 2025	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 : 09 January 2025

Testing concluded on : 09 January 2025

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
Straubinger Straße 100
94447 PLATTILING
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 RF output power

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

5.1.1 Description of the test location

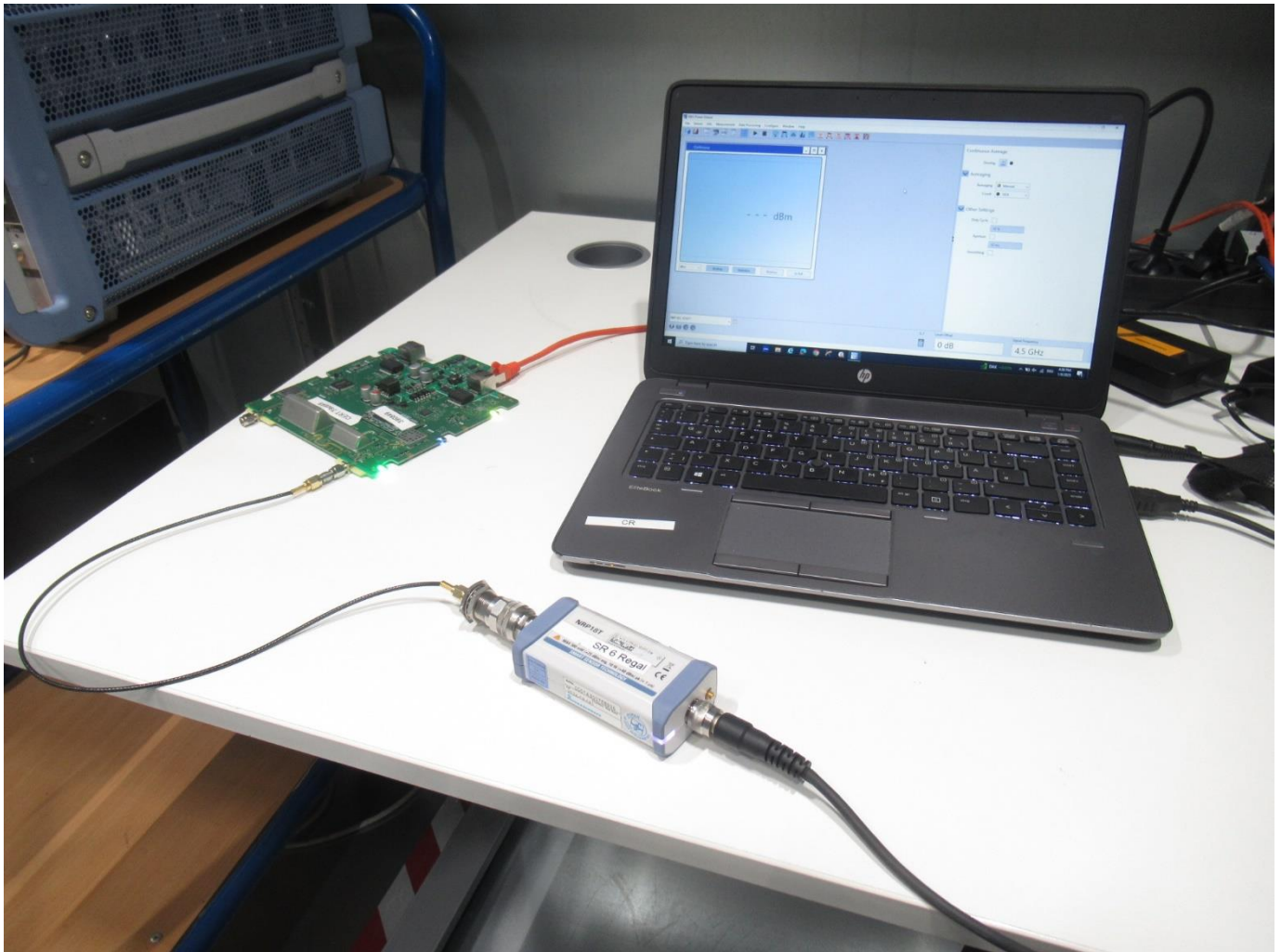
Test location: Shielded room SR7

5.1.2 Test result

5.1.2.1 UWB

The conducted output power is measured with a power meter.

Test setup:



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Test result:

chipset	channel	Cond. Power (dBm)	Antenna gain (dBi)	EIRP (dBm)
DW1000	3	-38.9	5.7	-33.2
DW1000	5	-34.9	5.7	-29.2
DW3000	5	-42.0	6.5	-35.5
DW3000	9	-36.1	6.5	-29.5

 $EIRP_{UWB} = -29.2 \text{ dBm} = \mathbf{0.001 \text{ mW}}$

5.1.2.2 BLE

The output power of the device is taken from the power measurement test report 80236650-05 Rev_0 by CSA Group Bayern GmbH, Straubinger Strasse 100, 94447 Plattling, Germany.

 $EIRP_{BLE} = 1.8 \text{ dBm} = \mathbf{1.513 \text{ mW}}$

Remarks: As worst case the power values are not averaged over time.

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5.2 Maximum permissible exposure (MPE)

5.2.1 Applicable standard

According to FCC Part 15, Section 15.247(i):

Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

The test methods used comply with ANSI/IEEE C95.1, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz".

This test report shows the compliance with the limits for Maximum Permissible Exposure (MPE) specified in FCC Part 1, Section 1.1310 and the criteria to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in FCC Part 1, Section 1.1307(b).

5.2.2 Description of Determination

The maximum rated output power conducted included the tune up tolerance is used to calculate the EIRP. Through the Friis transmission formula, the known maximum gain of the antenna and the maximum power, can be calculated the MPE in a defined distance away from the product.

Friis transmission formula:

$$P_d = \frac{P_{out} * G}{4 * \pi * r^2}$$

Where:

P_d = power density (mW/cm²)

P_{out} = output power to antenna (mW)

G = gain of antenna (linear scale)

r = distance between antenna and observation point (cm)

According to FCC Rules 47CFR 2.1093(b) the EUT is not a portable device. The EUT is designed to be used that radiating structures are 20 cm outside of the body of the user. ($r = 20$ cm)

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5.2.3 Determination of MPE according to FCC
UWB

$$P_d = 0.001 \text{ mW} / (4 \times \pi \times [20\text{cm}]^2)$$

$$P_d = \mathbf{0.0000002 \text{ mW/cm}^2}$$

BLE

$$P_d = 1.513 \text{ mW} / (4 \times \pi \times [20\text{cm}]^2)$$

$$P_d = \mathbf{0.0003 \text{ mW/cm}^2}$$

Limits for maximum permissible exposure (MPE):

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(B) Limits for General Population / Uncontrolled Exposure				
0.3 – 1.34	614	1.63	100	30
1.34 – 30	824/ <i>f</i>	2.19/ <i>f</i>	180/ <i>f</i> ²	30
30 - 300	27.5	0.073	0.2	30
300-1500	---	---	<i>f</i> /1500	30
1500-100000	---	---	1.0	30

f = Frequency in MHz

5.2.4 Determination of MPE according to ISED:
UWB

$$\mathbf{EIRP = 0.001 \text{ mW}}$$
Limit: 5 W

BLE

$$\mathbf{EIRP = 1.513 \text{ mW}}$$
Limit: 2.7 W

Exemption limits for routine Evaluation – RF exposure evaluation according to RSS-102, 2.5.2:

At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834} \text{ W}$ (adjusted for tune-up tolerance), where *f* is in MHz;

At or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance)

The requirements are **FULFILLED**.

Remarks:

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5.3 Co-location and Co-transmission

The FCC's MPE limits vary with frequency. Therefore, in mixed or broadband RF fields where several sources and frequencies are involved, the fraction of the recommended limit (in terms of power density or square of the electric or magnetic field strength) incurred within each frequency interval should be determined, and the sum of all fractional contributions should not exceed 1.0, or 100 % in terms of percentage.

5.3.1 Determination of MPE according to FCC

UWB: $P_d = 0.0000002 \text{ mW /cm}^2$
Limit: 1.0 mW/cm^2
Fraction : $< 0.1 \%$

BLE $P_d = 0.0003 \text{ mW/cm}^2$
Limit: 1.0 mW/cm^2
Fraction: $< 0.1 \%$

Calculation of the sum of MPE ratios:

$$\text{UWB} + \text{BLE} < 0.2 \% \leq 100 \%$$

5.3.2 Determination of MPE according to ISED:

UWB: EIRP = 0.001 mW
Limit: 5 W
Fraction: $< 0.1 \%$

BLE EIRP = 1.513 mW
Limit: 2.7 W
Fraction: $< 0.1 \%$

Calculation of the sum of MPE ratios:

$$\text{UWB} + \text{BLE} < 0.2 \% \leq 100 \%$$

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	06/09/2025	06/09/2024		

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