RF – TEST REPORT

- Human Exposure -

Type / Model Name	:	KNX-T6.1-1 / X-Tag
Product Description	:	Tracking Tag
Applicant	:	KINEXON GmbH
Address	:	Schellingstraße 35
		80799 MÜNCHEN, GERMANY
Manufacturer	:	KINEXON GmbH
Address	:	Schellingstraße 35
		80799 MÜNCHEN, GERMANY

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

Test Report No. : 80089170-04 Rev1	10. February 2022 Date of issue

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

FCC ID: 2ALC5-KNX-XTAG1 IC: 25557-KNXXTAG1

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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 Interim	RF Exposure procedures and equipment authorisation policies for mobile and portable devices, November 11, 2021.
RSS-102, issue 5, March 2015, incl. Amendment 1, February 2021	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
Health Canada Notice, January 2021	Localized human exposure limits for radiofrequency fields in the range of 6 GHz to 300 GHz
ISED Notice 2016-DRS0001 September 20, 2016, updated July 2020	Applicability of Latest FCC RF Exposure KDB Procedures and Other Procedures
ISED Notice 2021-DRS0005 July 20, 2021	Introduction of an interim exemption limit for routine localized power density evaluations of transmitters operating in the 6 – 30 GHz frequency range
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 his/her instructions.

2.3 Photo documentation of the EUT – See ATTACHMENT A

2.4 Equipment type, category

UWB device, portable equipment.

2.5 Short description of the equipment under test (EUT)

The KINEXON tracking tag facilitates tracking of objects in conjunction with a KINEXON RTLS system (Real Time Locating System).

Number of tested samples: 1
Serial number: 255064
UWB driver version: 5.0

2.6 Variants of the EUT

There are no variants.

2.7 Operation frequency and channel plan

The operating frequency band is 3100 MHz to 10600 MHz.

Channel plan:

Channel number	f_c (MHz)
Channel 5	6489.6

2.8 Transmit operating modes

Modulation: variable pulse position modulation (PPM) in combination with binary phase shift keying (BPSK)

Data rate: 6.8 Mbit/s

2.9 Antennas

The following antennas shall be used with the EUT:

Number	Characteristic	Model number	Plug	f-range (GHz)	Gain at 6.5 GHz (dBi)
1	Omni	PCB antenna WB001	None, PCB	3.5 – 7.0	3.7

2.10 Power supply system utilised

Power supply voltage, V_{nom} : 3.0 V DC (internal battery)

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	---	SAR exclusion consideration	passed
---	Notice 2021-DRS0005	Interim exemption limit for routine localized power density evaluations of transmitters operating in the 6 – 30 GHz frequency range	passed
KDB 447498, 7.2	RSS102, 3.2	Co-location, Co-transmission	not applicable

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
80089170-04	0	18 November 2021	Initial test report
80089170-04	1	10 February 2022	Reference changes KDB 447498

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 : 22 July 2021

Testing concluded on : 22 July 2021

Checked by:

Jürgen Pessinger
2022.02.10 15:43:26
+01'00'

Jürgen Pessinger
Radio Team

Tested by:

I am the author of this document
2022.02.10 14:51:49
+01'00'

Franz-Xaver Schrettenbrunner
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

4.1 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.

4.2 Conformity Decision Rule

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

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5 HUMAN EXPOSURE

5.1 SAR test exclusion considerations

5.1.1 Applicable standard

According to RF exposure guidance:
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.

5.1.2 Determination of the standalone SAR test exclusion threshold

The max. conducted average power of the EUT was measured with a power meter.

averaged conducted output power:	-42.6 dBm	0.055 µW
Tune-up tolerance:	+ 2.0 dB	
Antenna gain:	+ 3.7 dBi	
EIRP:	-36.9 dBm	0.204 µW

According to KDB 447498 D04 Interim, clause 2.1.2:
Per § 1.1307(b)(3)(i)(A), a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

Conclusion: The device is compliant with the exemption limit of 1 mW in a stand-alone configuration.

The requirements are **FULFILLED.**

Remarks: None.

5.2 Localized human exposure for devices operating from 6 GHz to 300 GHz

5.2.1 Applicable standard

Notice 2021-DRS0005 – “Introduction of an interim exemption limit for routine localized power density evaluations of transmitters operating in the 6 – 30 GHz frequency range”, published on July 20, 2021.

5.2.2 Cunclusion according to Notice 2021-DRS0005

The max. conducted average power of the EUT was measured with a power meter.

averaged conducted output power:	-42.6 dBm	0.055 µW
Tune-up tolerance:	+ 2.0 dB	
Antenna gain:	+ 3.7 dBi	
EIRP:	-36.9 dBm	0.204 µW

According to Notice 2021-DRS0005, July 20, 2021 (Introduction of an interim exemption limit for routine localized power density evaluations of transmitters operating in the 6 – 30 GHz frequency range):

“A transmitter producing emissions in the 6 – 30 GHz frequency range, i.e. where the occupied bandwidth (99% emission bandwidth) is fully contained within this range, is exempt from routine LPD evaluation if the higher of the maximum six-minute time-averaged conducted power or equivalent isotropic radiated power (EIRP), adjusted for tune-up tolerance, is 1 mW (0 dBm) or lower.”

Conclusion: The device is compliant with the interim exemption limit of 1 mW in a stand-alone configuration.

The requirements are **FULFILLED.**

Remarks: None.

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.
CPC 3	NRP18T	02-02/07-19-001	02/11/2021	02/11/2020		