RF – TEST REPORT

- Human Exposure -

Type / Model Name	:	Renfert CONNECT stick
Product Description	:	802.11b/g/n Wifi Stick
Applicant	:	Renfert GmbH
Address	:	Untere Gießwiesen 2
		78247 Hilzingen, Germany
Manufacturer	:	Renfert GmbH
Address	:	Untere Gießwiesen 2
		78247 Hilzingen, Germany

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

Test Report No. : 80163851-02 Rev_0	15. June 2023 Date of issue

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

Contents

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

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

For detailed photos of the EUT refer to ATTACHMENT A.
For detailed photos of the respective test setup refer to ATTACHMENT B.

2.4 General remarks

FCC ID: 2A5CG-01

2.5 Equipment type

WLAN - AP

2.6 Short description of the equipment under test (EUT)

The EUT is a Wifi Stick to connect a dental equipment from Renfert, which is labeld "App-Ready", with a local Wifi, to make the device accessible by the Renfert CONNECT App. For this purpose the EUT will be pluged into a specific interface of the dental equipment.

Number of tested samples: 1
Serial number: B1
Firmware version: 03

2.7 Variants of the EUT

There are no variants.

2.8 Operation frequency and channel plan

The operating frequency is 2400 MHz to 2483.5 MHz.
Channel plan WLAN Standard 802.11b, g, n HT 20

Channel	Frequency (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

2.9 Transmit operating modes

The EUT use DSSS or OFDM modulation and provide following data rates with auto-fall-back:

- 802.11b 11, 5.5, 2, 1 Mbps (Mbps = *megabits per second)*
- 802.11g 54, 48, 36, 24, 18, 12, 9, 6 Mbps
- 802.11n, HT20 MCS 0 - 7

2.10 Antenna

Brand	Antenna Type	Model	2.4 GHz Gain
Ethertronics	Chip	M830520	1.1 dBi

2.11 Power supply system utilised

Power supply voltage, V_{nom} : 3.3 V DC

2.12 Peripheral devices and interface cables

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

- Laptop Model : CSA 02-01/01-11-006
- Laptop Power Supply Model : FUJITSU ADP-80NB A
- FTDI Debug Adapter Model : DELOCK 65370 USB 3.0-A Buchse

2.13 Determination of worst-case conditions for final measurement

Preliminary tests in all three orthogonal axes are performed to find the worst case mode from all possible combinations between available modulations and data rates. the settings of the EUT are changed to locate at which position and at what setting of the EUT the maximum of the emissions is genarated.

For the final test the following channels and test modes are selected:

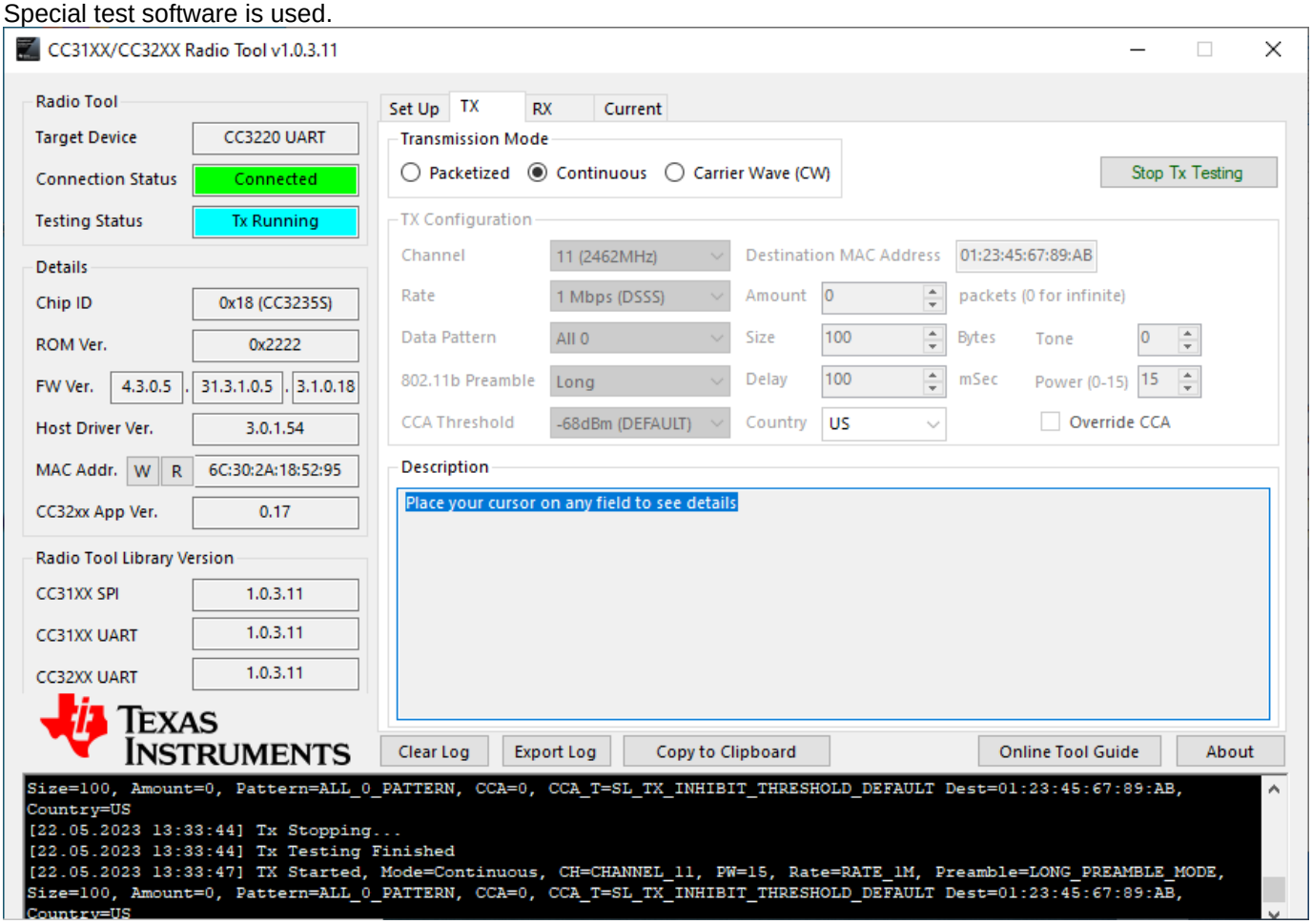
WLAN	Available channel	Tested channels	Power setting	Modulation	Data rate
802.11b	1 to 11	1, 6, 11	P15	DSSS	1 Mbps
802.11n HT20	1 to 11	1, 6, 11	P15	OFDM	MCS0

2.13.1 Test jig

No test jig is used.

2.13.2 Test software

Special test software is used.



3 TEST RESULT SUMMARY

FCC Rule Part	Description	Result
KDB 447498, 7.1	MPE	passed
KDB 447498, 4.3.1	SAR exclusion consideration	not applicable
KDB 447498, 7.2	Co-location, Co-transmission	not applicable

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80163851-02	0	15 June 2023	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 : 05 June 2023

Testing concluded on : 05 June 2023

Checked by:

Klaus Gegenfurtner
2023.06.16 09:11:22
+02'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

Lukas Scheuermann
2023.06.16 09:08:06
+02'00'

Lukas Scheuermann
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.

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.

5 HUMAN EXPOSURE

5.1 Maximum permissible exposure (MPE)

5.1.1 Description of the test location

Test location: NONE

5.1.2 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).

5.1.3 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/cm^2)
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)

5.1.4 Determination of MPE according FCC

802.11b						
Channel	measured E-Field	max. EIRP	P_d	Limit	Margin	Exposure ratio
No.	dBµV/m	(mW)	(mW/cm^2)	(mW/cm^2)	(mW/cm^2)	(%)
1	110.1	30.50	0.0061	1.0	-0.9939	0.61
6	110.5	33.28	0.0066	1.0	-0.9934	0.66
11	112.0	47.12	0.0094	1.0	-0.9906	0.94

802.11n HT20						
Channel	measured E-Field	max. EIRP	P_d	Limit	Margin	Exposure ratio
No.	dBµV/m	(mW)	(mW/cm^2)	(mW/cm^2)	(mW/cm^2)	(%)
1	103.6	6.89	0.0014	1.0	-0.9986	0.14
6	113.0	60.01	0.0119	1.0	-0.9881	1.19
11	113.9	73.49	0.0146	1.0	-0.9854	1.46

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/*f*	2.19/*f*	180/ f^2	30
30 - 300	27.5	0.073	0.2	30
300-1500	---	---	*f*/1500	30
1500-100000	**---**	**---**	**1.0**	**30**

f = Frequency in MHz

The requirements are **FULFILLED.**

Remarks: None.