



EMI - TEST REPORT

- Human Exposure -

Type / Model Name : Active Cradle AC3

Product Description : Charging cradle with ZigBee

Applicant : Libify Technologies GmbH

Address : Rüdesheimer Straße 11
80686 MÜNCHEN, GERMANY

Manufacturer : Libify Technologies GmbH

Address : Rüdesheimer Straße 11
80686 MÜNCHEN, GERMANY

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

POSITIVE

Test Report No. :

T40862-00-04KS

05. April 2018
Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02

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.

Contents

1 TEST STANDARDS	3
2 EQUIPMENT UNDER TEST	4
2.1 Photo documentation of the EUT – See ATTACHMENT A	4
2.2 Equipment type, category	4
2.3 Short description of the equipment under test (EUT)	4
2.4 Variants of the EUT	4
2.5 Operation frequency and channel plan	4
2.6 Transmit operating modes	5
2.7 Antennas	5
2.8 Power supply system utilised	5
2.9 Peripheral devices and interface cables	5
2.10 Final measurement conditions	6
3 TEST RESULT SUMMARY	7
3.1 Final assessment	7
4 TEST ENVIRONMENT	8
4.1 Address of the test laboratory	8
4.2 Environmental conditions	8
4.3 Statement of the measurement uncertainty	8
4.4 Measurement protocol for FCC and ISED	9
5 TEST CONDITIONS AND RESULTS	10
5.1 Maximum peak conducted output power	10
6 HUMAN EXPOSURE	11
6.1 Maximum permissible exposure (MPE)	11
6.2 Co-location and Co-transmission	13
6.3 SAR test exclusion considerations	13
6.4 Exemption limits for routine evaluation - SAR evaluation	14

ATTACHMENT A as separate supplement

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 .

OET Bulletin 65, 65A, 65B Edition 97-01, August 1997 – Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.

KDB 447498 D01 v06	Mobile and portable devices RF Exposure procedures and equipment authorisation policies, October 23, 2015.
KDB 865664 D01 v01r04	SAR Measurement Requirements for 100 MHz to 6 GHz, August 7, 2015.
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 Photo documentation of the EUT – See ATTACHMENT A

2.2 Equipment type, category

ZigBee device

2.3 Short description of the equipment under test (EUT)

The EUT is a charging cradle AC3 for GeoCare GC5 and part of an emergency call system working in the 2.4 GHz ISM-Band. The EUT is compatible with the standard 802.15.4. A complete functional unit consists of a radio button, GEOCARE (GC5) and the EUT AC3. The EUT has only one integrated antenna, no temporary connector and no external antenna can be connected.

Number of tested samples: 1
Serial number: AC3-005324
Firmware version: v1.1

EUT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

2.4 Variants of the EUT

None.

2.5 Operation frequency and channel plan

The operating frequency is 2400 MHz to 2483.5 MHz.

Channel plan:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	2405	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	2440	26	2480

Note: the marked frequencies are determined for final testing. Channel 26 is not supported by the EUT.

2.6 Transmit operating modes

The EUT uses O-QPSK modulation and may provide following data rates:

- 250 kbps (kbps = *kilobits per second*)

2.7 Antennas

The following antennas shall be used with the EUT:

Number	Type	Certification name	Plug	Frequency range (GHz)	Peak Gain (dBi)
1	Omni	SMD antenna	none	2.4	2.1

2.8 Power supply system utilised

Supply voltage, V_{nom} : 115 V AC / 60 Hz (AC adaptor, USB connector)
Alternative voltage : 5 V DC (USB powered by laptop or power adaptor) and internal power backup with 3.7 V accumulator pack.

2.9 Peripheral devices and interface cables

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

- _____ Model : _____
- _____ Model : _____
- _____ Model : _____

2.10 Final measurement conditions

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

IEEE Standard	Available channel	Tested channels	Power setting	Modulation	Modulation type	Data rate
802.15.4	11 to 25	11, 18, 25	Pmax	DSSS	O-QPSK	250 kbps

2.10.1 Test jig

No special test jig was used.

2.10.2 Test software

The EUT has a special firmware that allows enabling a continuous transmission modulated and receiving mode. The output power is set to maximum power and cannot be changed during tests.

3 TEST RESULT SUMMARY

Operating in the 2400 MHz – 2483.5 MHz band:

FCC Rule Part	RSS Rule Part	Description	Result
15.247(i)	RSS 102, 2.5.2	MPE	passed
KDB 447498	RSS 102, 2.5.1	SAR exclusion consideration	not applicable
OET Bulletin 65	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 Final assessment

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

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

Testing commenced on : 05 April 2018

Testing concluded on : 05 April 2018

Checked by:

Klaus Gegenfurtner
Teamleader Radio

Tested by:

Kathrin Schiebl
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 acc. to CISPR 16-4-2 / 11.2003 „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.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
AC power line conducted emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
EBW and OBW	2400 MHz to 3000 MHz	95%	$\pm 2.5 \times 10^{-7}$
Maximum peak conducted output power	2400 MHz to 3000 MHz	95%	± 0.62 dB
Power spectral density	2400 MHz to 3000 MHz	95%	± 0.62 dB
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	± 2.15 dB
Conducted Spurious Emissions	10000 MHz to 40000 MHz	95%	± 3.47 dB
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
Field strength of the fundamental	100 kHz to 100 MHz	95%	± 3.53 dB

4.4 Measurement protocol for FCC and ISED

4.4.1 General information

The Open Area test site is a listed Open Site under the Canadian Test-Sites File-No:

IC 3009A-1

The Anechoic chamber is a listed test site under the Canadian Test-Sites File-No:

IC 3009A-2

In compliance with RSS 247 testing for RSS compliance may be achieved by following the procedures set out in ANSI C63.10 and applying the CISPR 22 limits.

5 TEST CONDITIONS AND RESULTS

5.1 Maximum peak conducted output power

For test instruments and accessories used see section 6 Part **CPR 3**.

Rated output power: 15.8 mW

Tune-up tolerance: 2.0 dB

Maximum output power: 12.0 dBm + 2.0 dB = 14.0 dBm = **25.1 mW**

Antenna gain max: 2.1 dBi

Maximum EIRP: 14.0 dBm + 2.1 dBi = **40.7 mW**

Remarks: _____

6 HUMAN EXPOSURE

6.1 Maximum permissible exposure (MPE)

6.1.1 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).

6.1.2 Description of Measurement

The maximum total power input to the antenna has been measured radiated as described in clause 5.1 of this document. 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)

6.1.3 Test result

OET Bulletin 65

Channel frequency (MHz)	P _{EIRP} (dBm)	P (mW)	P (W)	P _d (mW/cm ²)	Limit P _d (mW/cm ²)	Exposure ratio (%)
2405	16.1	40.738	0.040738	0.0081046	1.0	0.81
2440	16.1	40.738	0.040738	0.0081046	1.0	0.81
2475	16.1	40.738	0.040738	0.0081046	1.0	0.81

RSS102

Channel frequency (MHz)	P _{EIRP} (dBm)	P (mW)	P (W)	Limit (W)	Exposure ratio (%)
2405	16.1	40.74	0.040738	2.68	1.52
2440	16.1	40.74	0.040738	2.71	1.51
2475	16.1	40.74	0.040738	2.73	1.49

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 – 3.0	614	1.63	100	30
3.0 – 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

Exemption Limits for Routine Evaluation – RF Exposure Evaluation according to RSS-102, issue 5, 2.5.2

Frequency Range (MHz)	time-averaged max. EIRP (W)
300-6000	1.31x10 ⁻² f ^{0.6834}

Note: f is frequency in MHz.

The requirements are **FULFILLED**.

Remarks: The EUT is a fixed equipment and the distance between the antenna and the hand of the user is more than 20 cm. Therefore, the MPE is calculated.

6.2 Co-location and Co-transmission

Applicable standard:

OET Bulletin 65, Edition 97-01, Section 2: Multiple-transmitter sites and Complex Environments

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.

Remarks: Not tested due to single transmitter.

6.3 SAR test exclusion considerations

6.3.1 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.

Remarks: The EUT is a fixed equipment and the distance between the antenna and the hand of the user
is more than 20 cm. Therefore, the MPE is calculated.

6.4 Exemption limits for routine evaluation - SAR evaluation

6.4.1 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.

Remarks: The EUT is a fixed equipment and the distance between the antenna and the hand of the user is more than 20 cm. Therefore, the MPE is calculated.