EMI – TEST REPORT

- Human Exposure -

Type / Model Name	:	Medical Thermometer/degree°/DS02, DC02
Product Description	:	clinical thermometer
Applicant	:	Cosinuss GmbH
Address	:	Kistlerhofstr. 60
		81379 München, GERMANY
Manufacturer	:	Cosinuss GmbH
Address	:	Kistlerhofstr. 60
		81379 München, GERMANY

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

Test Report No. : T44704-00-02WP	30. July 2019 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.

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FCC ID: 2ATBZDS02DC02 IC: 25048-DS02DC02

Contents

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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 2.1093	Radiofrequency radiation exposure evaluation: **portable devices**.
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 ATTACHMENTS A, B

2.2 Equipment type, category

BLE device, portable equipment.

2.3 Short description of the equipment under test (EUT)

The EUT is a Bluetooth Low Energy wireless clinical thermometer. A single chip antenna is used within the system. The EUT has only one integrated antenna, no temporary connector and no external antenna can be connected. The modulation used by the EUT is GFSK with a data rate of 1 Mbit/s.

Number of tested samples: 1
Serial number: DS02
Firmware version: 1.0

2.4 Variants of the EUT

There are no variants

2.5 Operation frequency and channel plan

The operating frequency is 2400 MHz to 2483.5 MHz.

Channel plan BT-Standard 802.15.1:

Channel	Frequency	Channel	Frequency
37	2402	18	2442
0	2404	19	2444
1	2406	20	2446
2	2408	21	2448
3	2410	22	2450
4	2412	23	2452
5	2414	24	2454
6	2416	25	2456
7	2418	26	2458
8	2420	27	2460
9	2422	28	2462
10	2424	29	2464
38	2426	30	2466
11	2428	31	2468
12	2430	32	2470
13	2432	33	2472
14	2434	34	2474
15	2436	35	2476
16	2438	36	2478
17	2440	39	2480

Note: the marked frequencies are determined for final testing.

2.6 Transmit operating modes

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

- 1000 kbps (kbps = *kilobits per second)*

2.7 Antennas

The following antennas shall be used with the EUT:
The EUT has only an integrated PCB antenna, no external antenna shall be connected. The following chip antenna is soldered on the PCB:

Type	Model number	Frequency range (GHz)	Peak gain (dBi)
Chip Antenna	ANT016008LCS2442MA2	2.4 – 2.484	2.5

2.8 Power supply system utilised

Power supply voltage, V_{nom} : 3.7 V DC

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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	not applicable[1]
KDB 447498	RSS 102, 2.5.1	SAR exclusion consideration	passed
OET Bulletin 65	RSS102, 3.2	Co-location, Co-transmission	not applicable[2]

[1] N/A, separation distance is < 20 cm
[2] N/A, EUT incorporates only one transmitter

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 : 15 May 2019

Testing concluded on : 30 July 2019

Checked by:

Juergen Pessinger
2019.07.30 10:08:28
+02'00'

Jürgen Pessinger
Radio Team

Tested by:

Willibald Probst
2019.07.30 10:00:16
+02'00'

Willibald Probst
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

5 HUMAN EXPOSURE

5.1 SAR test exclusion consideration

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

Minimum separation distance between the radiating structure of the EUT, which is placed inside the ear and the user, is < 5 mm. Therefore, a separation distance of 5 mm is used for the calculation as described under 4.3.1 a) of KDB 447498 D01 v06.

The formula under 4.3.1 a) of KDB 447498 D01 v06 for 100 MHz to 6 GHz for standalone equipment is used to calculate the 1-g SAR test exclusion threshold:

[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]*[√f(GHz)] ≤ 3.0;

The max conducted average power (rounded up to the next mW value) is according the equipment:

Rated output power:	0.8 mW	-1.0 dBm
Tune-up tolerance:	+ 0 / - 0 dB	
Maximum output power:	-1.0 dBm	0.8 mW

Channel frequency (MHz)	Output power (mW)	Threshold level	Limit 1g	Limit 10g	Margin 1g	Margin 10g
2405	0.8	0.25	3.0	7.5	-2.8	-7.3
2440	0.8	0.25	3.0	7.5	-2.8	-7.3
2480	0.8	0.25	3.0	7.5	-2.7	-7.2

Conclusion: **The Threshold level is much lower than the limit for 1-g head or body SAR exclusion. SAR measurement is NOT necessary.**

The requirements are **FULFILLED.**

Remarks: As worst-case, the rated (conducted) output power has been used.

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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
2450	**4 mW**	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	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.

5.2.2 Cunclusion according RSS-102

Minimum separation distance between the radiating structure of the EUT, which is placed inside the ear and the user, is < 5 mm.

Rated output power:	0.8 mW	-1.0 dBm
Tune-up tolerance:	+ 0 / - 0 dB	
Maximum output power:	-1.0 dBm	0.8 mW
Antenna gain max:	2.5 dBi	
Maximum EIRP:	1.5 dBm	1.4 mW
Minimum distance r:	5.0 mm	

Maximum output power (EIRP) at 2450 MHz: **1.5 dBm** ≙ **1.4 mW** is < **4 mW**;

Conclusion: **For the EUT SAR measurement is NOT necessary**

The requirements are **FULFILLED.**

Remarks: As worst-case, the rated output power (EIRP) has been used for the calculation.

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