

EMI - TEST REPORT

- Human exposure -

Test Report No. :	T38855-00-08KJ	19. December 2014 Date of issue
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Type / Model Name : US-3046

Product Description : Base Station

Applicant : smaXtec animal care sales GmbH

Address : Wastiangasse 4
8010 GRAZ, AUSTRIA

Manufacturer : smaXtec animal care sales GmbH

Address : Wastiangasse 4
8010 GRAZ, AUSTRIA

Licence holder : smaXtec animal care sales GmbH

Address : Wastiangasse 4
8010 GRAZ, AUSTRIA

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



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 2.1093

Radiofrequency radiation exposure evaluation: portable device

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 v05r02

Mobile and portable devices RF Exposure procedures and equipment authorisation policies, February 7, 2014.

ANSI C95.1: 2005

IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

CISPR 16-4-2: 2013

Uncertainty in EMC measurement

2 EQUIPMENT UNDER TEST

2.1 Photo documentation of the EUT – Detailed photos see attachment A



2.2 Equipment type, category

Fixed equipment with three operation bands: 905 MHz / 2.4 GHz Zigbee / GSM

2.3 Short description of the equipment under test (EUT)

The base station is an electronic device that is intended to read measurement data from smaxtec Temp Sensor, Climate Sensor, and pH & Temp Sensor. The data is forwarded from the PCBA to the Beagle Bone where it is stored permanently into a flash memory. The BeagleBone then sends the data samples via Ethernet or GSM (if available and activated) to a smaxtec Server.

The coverage of readout devices is with 5 to 10 m relatively small. To cover larger areas, one or more smaxtec Repeater can be used to increase the readout coverage. Repeater and Basestation set up a multihop network on the 2.4 GHz network, over which the Repeater can forward the read data to the Basestation and further to the smaxtec Server.

Number of tested samples: 1
Serial number: Prototype

2.4 Variants of the EUT

There are no variants.

2.5 Operation frequency and channel plan

TX 1: Operation frequency 902 MHz to 928 MHz:

TX 2: Operating frequency 2400 MHz to 2483.5 MHz.

TX 3: GSM 850: 824.2 MHz to 848.8 MHz

TX 4: PCS 1900: 1850.2 MHz to 1909.8 MHz

2.6 Transmit operating modes

TX 1: 905.5 MHz

TX 2: 2405 MHz

TX 3: 848 MHz (According to the test report 12050015-FCC-R1-V1 of the test laboratory Siemic,Inc.)

TX 4: 1900 MHz (According to the test report 12050015-FCC-R1-V1 of the test laboratory Siemic,Inc.)

2.7 Power supply system utilised

Power supply voltage, V_{nom} : 100-240 VAC, 50-60 Hz / tested with 115 VAV, 60 Hz

2.8 Peripheral devices and interface cables

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

- _____

Model : _____

- _____

Model : _____

2.9 Final measurement conditions

TX 1: EIRP = -10.6 dBm

TX 2: EIRP = 12.5 dBm

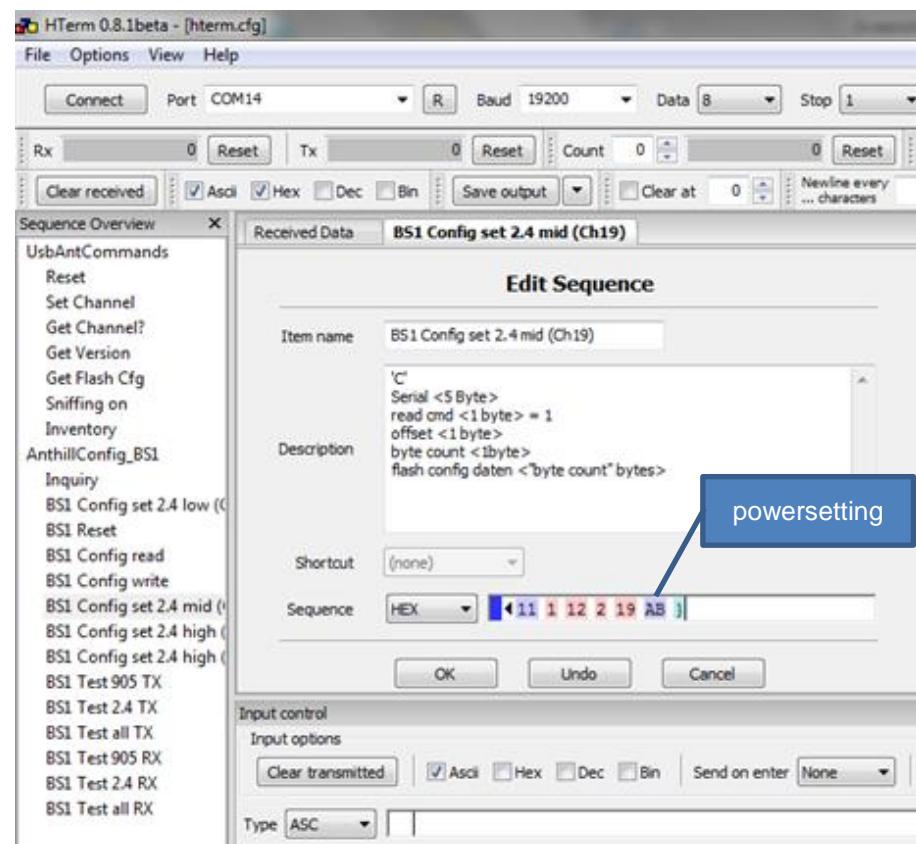
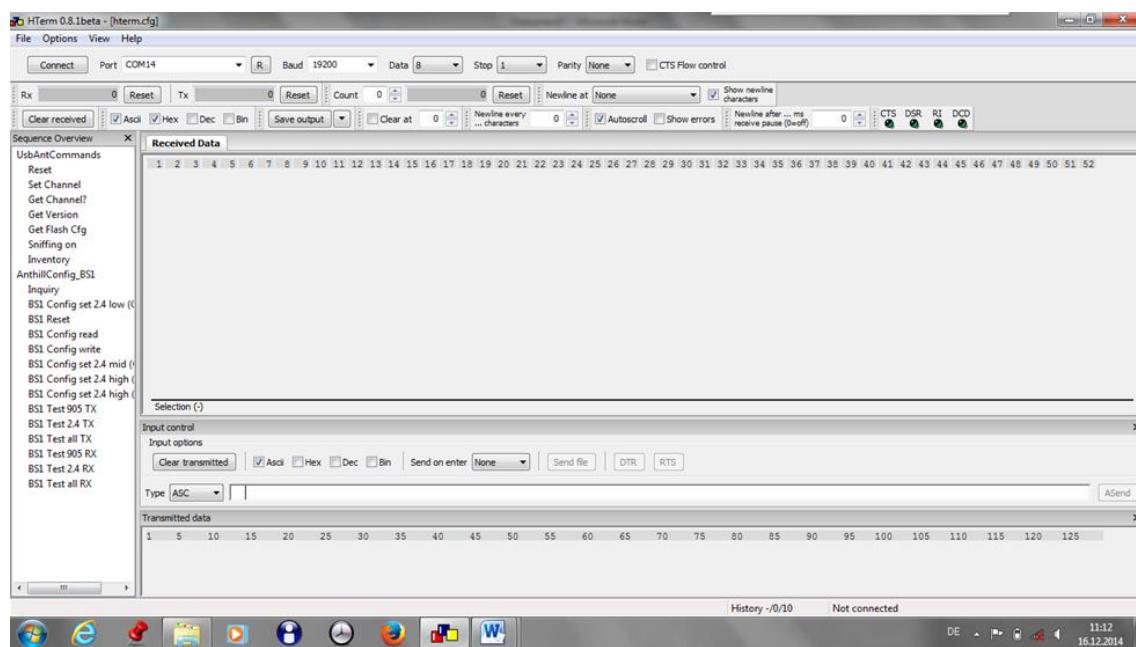
TX 3: EIRP = 33 dBm

TX 4: EIRP = 29.19 dBm

2.9.1 Test jig

No test jig is used.

2.9.2 Test software



3 TEST RESULT SUMMARY

Device using digital modulation:

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	passed

The mentioned RSS Rule Parts in the above table are related to:
RSS 102, Issue 4, March 2010

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 December 2014

Testing concluded on : 16 December 2014

Checked by: Tested by:

Klaus Gegenfurtner
Teamleader Radio

Josef Knab
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.

4.4 Measurement protocol for FCC and IC

4.4.1 General information

4.4.1.1 Test methodology

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

IC 3009A

In compliance with RSS 210 testing for RSS compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

4.4.1.2 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.1.3 Details of test procedures

In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

5 TEST CONDITIONS AND RESULTS

5.1 Maximum peak radiated output power

5.1.1 Test result

TX1 at 905.5 MHz: max radiated output power 84.6 dB μ V/m (measurement distance 3 m) equal to -10.6 dBm
(according to the test report "T38855-00-00KJ" from CSA Group Bayern GmbH)

TX2 at 2405 MHz: max radiated output power 12.5 dBm
(according to the test report "T38855-00-04KJ" from CSA Group Bayern GmbH)

TX3 (GSM 850): max output power 33 dBm
(according to the test report 12050015-FCC-R1-V1 of the test laboratory Siemic, Inc.)

TX4 (PCS 1900): max output power 29.19 dBm
(according to the test report 12050015-FCC-R1-V1 of the test laboratory Siemic, Inc.)

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 calculation

The maximum total power output of the antenna has been measured radiated.

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

TX 1 at 905.5 MHz

Frequency	Power	P(EIRP)	A	P	S	Limit S _{eq}
MHz		(dBm)	(mW)	(W)	(mW/cm ²)	(mW/cm ²)
905.5	full power	-10.6	0.09	0.0001	0.00002	0.6

TX 2 at 2405 MHz

Frequency	Power	P(EIRP)	A	P	S	Limit S _{eq}
MHz		(dBm)	(mW)	(W)	(mW/cm ²)	(mW/cm ²)
2405	full power	12.5	17.78	0.0178	0.00354	1.0

TX 3 (GSM 850) at 848 MHz

Frequency	Power	P(EIRP)	A	P	S	Limit S _{eq}
MHz		(dBm)	(mW)	(W)	(mW/cm ²)	(mW/cm ²)
848	full power	33.0	1995.26	1.9953	0.39694	0.6

TX 4 (PCS 1900) at 1900 MHz

Frequency	Power	P(EIRP)	A	P	S	Limit S _{eq}
MHz		(dBm)	(mW)	(W)	(mW/cm ²)	(mW/cm ²)
1900	full power	29.2	829.85	0.8299	0.16509	1.0

Note: TX 3 and TX 4 are not transmitting simultaneous, worst case is TX 3

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

The requirements are **FULFILLED**.

Remarks:

6.2 Co-location and Co-transmission

6.2.1 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.

1. TX 1	$P_d = 0.0002 \text{ mW/cm}^2$ Limit: 0.6 mW/cm^2 Fraction of MPE: 0.03 %
2. TX 2:	$P_d = 0.0035 \text{ mW/cm}^2$ Limit: 1 mW/cm^2 Fraction of MPE: 0.35 %
3. TX 3:	$P_d = 0.3969 \text{ mW/cm}^2$ Limit: 0.6 mW/cm^2 Fraction of MPE: 66.15 %

Worst case:

$\text{TX 1} + \text{TX 2} + \text{TX 3} = 66.53 \text{ %}$

The requirements are **FULFILLED**.

Remarks: _____

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: Not applicable because of fixed station equipment
