

# EMI - TEST REPORT

- Human exposure -

**Test Report No. :** T40170-00-02KJ

19. January 2016

Date of issue

**Type / Model Name** : LOG D-3 4G16-913

**Product Description** : Universal data logger

**Applicant** : Seba Dynatronic Mess- und Ortungstechnik GmbH

**Address** : Dr.-Herbert-lann-Str. 6

96148 BAUNACH, GERMANY

**Manufacturer** : Seba Dynatronic Mess- und Ortungstechnik GmbH

**Address** : Dr.-Herbert-lann-Str. 6

96148 BAUNACH, GERMANY

**Licence holder** : Seba Dynatronic Mess- und Ortungstechnik GmbH

**Address** : Dr.-Herbert-lann-Str. 6

96148 BAUNACH, GERMANY

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

**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.**

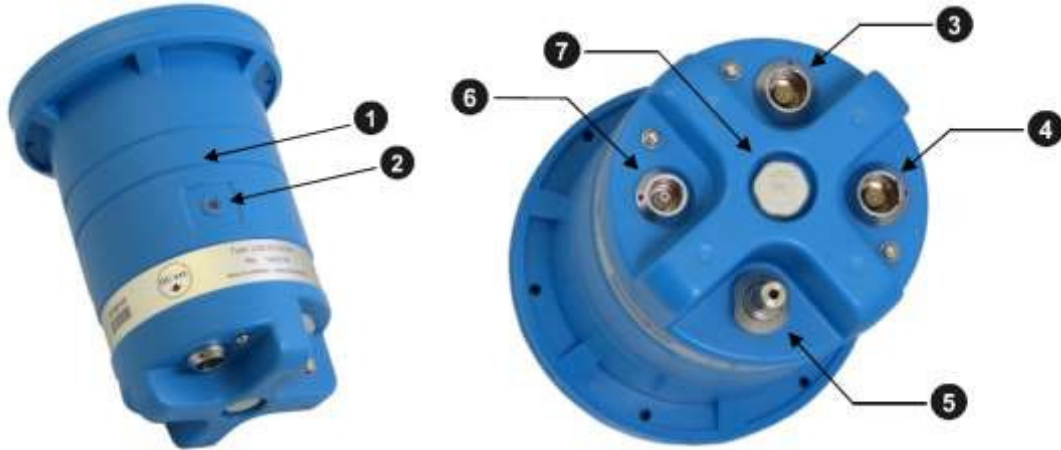
KDB 447498 D01 v05r02                      Mobile and portable devices RF Exposure procedures and equipment authorisation policies, February 7, 2014.

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



Item	Description
1	<b>On/Off contact area</b>
2	<b>I/O control lamp</b>
3	<b>IN socket</b> for connecting sensors, alarm triggering or peripheral devices
4	<b>DC ext. socket</b> for connecting an external power supply

Item	Description
5	<b>Connector P (internal pressure sensor)</b> for connecting hoses via quick-release coupling
6	<b>GSM socket</b> for connecting the external GSM antenna
7	<b>Venting membrane</b>

### 2.2 Short description of the equipment under test (EUT)

The LOG D-3 is a universal data logger for the surveillance of water pipe networks. It is able to record the water pressure with its built-in pressure-sensor and the sensor-data of several external sensors with the output signals voltage (0V...5V), current (0/4mA...20mA), pulses, frequency and PWM on up to 4 channels. Those sensors measure the water flow for example. The stored data can be read out via radio interface. Furthermore the logger can upload the data to a FTP server via GPRS/UMTS communication. You can also program the device by radio. Therefore you have to use an external radio-interface, the so called LOG RI.

The LOG D-3 radio-module is operating at 913 MHz (bidirectional radio) and has an internal ¼ lambda wire antenna. The logger is supplied by one or two (GSM logger) internal lithium primary batteries. It can also be supplied externally.

### 2.3 Variants of the EUT

- There are no other variants.

## 2.4 Operation frequency range

Equipment category	Range	
GSM 850	824.2 MHz – 848.8 MHz	Uplink
PCS 1900	1850.20 MHz – 1909.80 MHz	Uplink
PLMR	902 MHz – 928 MHz	

## 2.5 Antennas

Items	Description
PLMR	Private land mobile radio services module
Antenna type	internal wire antenna ( $\lambda/4$ ), 85 mm
Antenna gain	1.0 dBi
GSM module	SIMCom – SIM5320A Dual-Band HSDPA/WCDMA and Quad-Band GSM/GPRS/EDGE module
Multislot Class	12 (4 TX & 4 RX)
Antenna type	Hirschmann – magnetic socket antenna – MCA 18 90 MH
Antenna gain	0 dBi

## 2.6 Power supply system utilised

Power supply voltage, $V_{nom}$	: 12.0 VDC (Battery powered)
Power supply voltage (extreme)	: 10.2 VDC to 13.8 VDC

## 2.7 Determination of worst case conditions for final calculations

### Note:

No separate measurement was performed to generate test results for the present document. This test report is based on the results of the test reports **T40170-00-00KJ** from CSA Group Bayern. Else the GSM-Section was already certified with FCC ID: **UDV-1103022011008**. In this case only worst case considerations for the highest radiated output power of all emitters are taken into consideration to calculate the maximum permissible exposure for fixed equipment devices. Therefore the power of the GSM-/PCS-Module is assumed to have an EIRP of 2 W for the GSM 850 and an EIRP of 1 W for PCS 1900 to calculate the worst case conditions for MPE.

### 3 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 : 14 September 2015

Testing concluded on : 09 November 2015

Checked by:

Tested by:



Thomas Weise  
I confirm the correctness and  
integrity of this document  
2016.01.19 14:49:54 +01'00'

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Thomas Weise  
Laboratory Manager



Josef Knab  
I'm the autor of this document  
2016.01.19 14:43:26 +01'00'

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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 HUMAN EXPOSURE**

### **5.1 Maximum permissible exposure (MPE)**

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

#### **5.1.1 Description of the test location**

Test location: NONE

#### **5.1.2 Applicable standard**

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 Measurement**

The maximum total power input to the antenna has been measured conducted as described in clause 5.2 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/cm<sup>2</sup>)

$P_{out}$  = 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 Test result**

System1: PLMR

Channel Frequency (MHz)	P <sub>ERP</sub> (dBm)	P (mW)	P (W)	P <sub>d</sub> (mW/cm <sup>2</sup> )	Limit P <sub>d</sub> (mW/cm <sup>2</sup> )	Exposure ratio (%)
913.02	-4.3	0.372	0.00037	0.00007	0.61	0.012

System 2: GSM 850 / PCS 1900

Channel Frequency (MHz)	P <sub>ERP</sub> (dBm)	P (mW)	P (W)	P <sub>d</sub> (mW/cm <sup>2</sup> )	Limit P <sub>d</sub> (mW/cm <sup>2</sup> )	Exposure ratio (%)
842.2	32.4	1733.804	1.73380	0.34493	0.56	61.595
1850.2	27.6	571.479	0.57148	0.11369	1.00	11.369

**FCC ID: OV8-LOGD3**

Limits for maximum permissible exposure (MPE):

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(B) Limits for General Population / Uncontrolled Exposure</b>				
0.3 – 3.0	614	1.63	100	30
3.0 – 30	824/ <i>f</i>	2.19/ <i>f</i>	180/ <i>f</i> <sup>2</sup>	30
30 - 300	27.5	0.073	0.2	30
<b>300-1500</b>	---	---	<b><i>f</i>/1500</b>	<b>30</b>
<b>1500-100000</b>	---	---	<b>1.0</b>	<b>30</b>

*f* = Frequency in MHz

The requirements are **FULFILLED**.

**Remarks:**

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## 5.2 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.

- |                     |  |
|---------------------|--|
| 1. MPE of System 1: | $P_d = 0.00007 \text{ mW/cm}^2$<br>Limit: <b>0.61</b> mW/cm <sup>2</sup><br>Fraction of MPE: 0.012 % |
| 2. MPE of System 2: | $P_d = 0.34493 \text{ mW/cm}^2$<br>Limit: <b>0.56</b> mW/cm <sup>2</sup><br>Fraction of MPE: 61.595% |

### 5.2.1 Test result

System 1 Maximum power density ratio PMLR (%)	System 2 Maximum power density ratio GSM (%)	Sum of exposure ratios (%)	Limit of exposure ratios (%)
0.012	61.595	61.607	100

The requirements are **FULFILLED**.

Remarks:

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### 5.3 SAR test exclusion considerations

#### 5.3.1 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.

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