



FCC ID:W7H-HXPO1000

Registration No. DAT-P-207/05

## EMI -- TEST REPORT

- FCC Part 15B -

|                          |                       |                                 |
|--------------------------|-----------------------|---------------------------------|
| <b>Test Report No. :</b> | <b>T32643-05-04HS</b> | 07. April 2009<br>Date of issue |
|--------------------------|-----------------------|---------------------------------|

**Type / Model Name** : VCI (Vehicle communication interface), HX-PO-1000

**Product Description** : Car diagnosis monitor

**Applicant** : samtec automotive software & electronics gmbh

**Address** : Saarstr. 27

70794 FILDERSSTADT, GERMANY

**Manufacturer** : Lütke Elektronik GmbH & Co KG

**Address** : Luitpoldstrasse 59

76863 HERXHEIM, GERMANY

**Licence holder** : samtec automotive software & electronics gmbh

**Address** : Saarstr. 27

70794 FILDERSSTADT, GERMANY

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

**POSITIVE**



DAT-P-207/05-00

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 15 Subpart A - General (October 01, 2007)**

|                                   |   |
|-----------------------------------|---|
| Part 15, Subpart A, Section 15.31 | Measurement standards                         |
| Part 15, Subpart A, Section 15.33 | Frequency range of radiated measurements      |
| Part 15, Subpart A, Section 15.35 | Measurement detector functions and bandwidths |

## **FCC Rules and Regulations Part 15 Subpart B - Unintentional Radiators (October 01, 2007)**

|                                    |                             |   |  |
|------------------------------------|-----------------------------|---|--|
| Part 15, Subpart B, Section 15.107 | AC Line conducted emissions | <input type="checkbox"/> Class A device | <input checked="" type="checkbox"/> Class B device |
|------------------------------------|-----------------------------|---|--|

|                                    |  |
|------------------------------------|--|
| Part 15, Subpart B, Section 15.109 | Radiated emissions, general requirements |
|------------------------------------|--|

|                  |   |
|------------------|---|
| ANSI C63.4: 2003 | Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. |
|------------------|---|

|                    |                                |
|--------------------|--------------------------------|
| CISPR 16-4-2: 2003 | Uncertainty in EMC measurement |
|--------------------|--------------------------------|

|                                  |                                  |
|----------------------------------|----------------------------------|
| CISPR 22: 2005<br>EN 55022: 2006 | Information technology equipment |
|----------------------------------|----------------------------------|

## 2 SUMMARY

### GENERAL REMARKS:

The EUT has a USB-Connection for set up and transmitting data to a PC. The connection is conforming to USB 2.0.

### 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 : 16 February 2009

Testing concluded on : 25 February 2009

Checked by:

Tested by:

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Klaus Gegenfurtner  
Dipl.-Ing.(FH)  
Manager: Radio Group

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Hermann Smetana  
Dipl.-Ing.(FH)  
Radio Expert

### **3 EQUIPMENT UNDER TEST**

#### **3.1 Photo documentation of the EUT – Detailed photos see Attachment A**

#### **3.2 Power supply system utilised**

Power supply voltage : 12 VDC (car application)

#### **3.3 Short description of the equipment under test (EUT)**

Vehicle communication interface (VCI), heavy duty version with USB interface for supporting the maintenance and service of cars.

Number of tested samples: 1  
Serial number: Prototype 1

#### **EUT operation mode:**

The equipment under test was operated during the measurement under the following conditions:

- USB data transmission

#### **EUT configuration:**

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

#### **The following peripheral devices and interface cables were connected during the measurements:**

|  |                          |
|--|--------------------------|
| - Note book Panasonic                  | Model : tough book CF 30 |
| - USB cable, self manufactured, 2.95 m | Model :                  |
| - OBD2 cable, 1 m                      | Model :                  |
| -                                      | Model :                  |
| -                                      | Model :                  |
| -                                      | Model :                  |

## **4 TEST ENVIRONMENT**

### **4.1 Address of the test laboratory**

**mikes-testingpartners gmbh**  
**Ohmstrasse 2-4**  
**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. The reader may notice that tolerances within the calibration of the equipment and facilities may cause additional uncertainty. The measurement uncertainty is calculated for all measurements listed in this test report acc. to CISPR 16-4-2 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurement“ and documented in the mikes-testingpartners gmbh quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, mikes-testingpartners 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 diversity and modifications in production processes may result in additional deviation. If necessary, refer to the test lab for the actual measurement uncertainty for specific tests. The manufacturer has the sole responsibility of continued compliance of the EUT.

## **4.4 Measurement Protocol for FCC, VCCI and AUSTEL**

### **4.4.1 GENERAL INFORMATION**

#### **4.4.1.1 Test Methodology**

Conducted and radiated disturbance testing is performed according to the procedures set out by the International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

The test methods used comply with CISPR Publication 22, EN 55022 - "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.4 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

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.

#### **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 in order to obtain maximum disturbances from the unit.

### **4.4.2 DETAILS OF TEST PROCEDURES**

#### **4.4.2.1 General Standard Information**

The test methods used comply with CISPR Publication 22, EN 55022 - "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.4 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

## 5 TEST CONDITIONS AND RESULTS

### 5.1 Conducted emissions

For test instruments and accessories used see section 6 Part A 4.

#### 5.1.1 Description of the test location

Test location:                      Shielded Room S2

#### 5.1.2 Photo documentation of the test set-up



#### 5.1.3 Applicable standard

According to FCC Part 15B, Section 15.107(a):

Except as shown in paragraphs (b) and (c) of this Section, for an unintentional radiator that is designed to be connected to the public utility AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the given limits.

#### 5.1.4 Description of Measurement

The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a line impedance stabilization network (LISN) with  $50\Omega/50\mu\text{H}$  (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 cm above the floor and is positioned 40 cm from the vertical ground plane (wall) of the screen room. The correction factors for cable loss are stored in the memory of the EMI receiver therefore the final level (dB $\mu\text{V}$ ) appears directly in the reading of the EMI receiver. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded. The measurement is performed attending the US AC mains 120V/60 Hz.

To convert between dB $\mu\text{V}$  and  $\mu\text{V}$ , the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = 10^{(\text{dB}\mu\text{V}/20)}$$



### 5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin 6.6 dB at 4.34 MHz

Limit according to FCC Part 15B, Section 15.107(a):

| Frequency of Emission<br>(MHz) | Conducted Limit (dB $\mu$ V) |            |
|--------------------------------|------------------------------|------------|
|                                | Quasi-peak                   | Average    |
| 0.15-0.5                       | 66 to 56 *                   | 56 to 46 * |
| 0.5-5                          | 56                           | 46         |
| 5-30                           | 60                           | 50         |

\* Decreases with the logarithm of the frequency

The requirements are **FULFILLED**.

Remarks:

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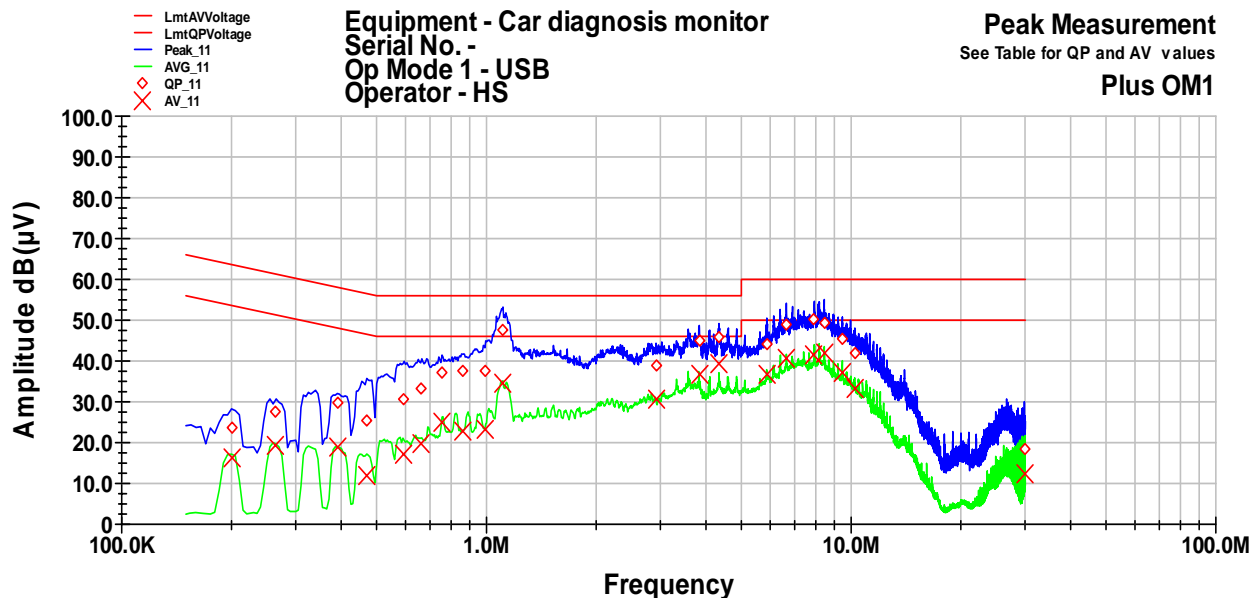


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### 5.1.6 Test protocol

Test point: Plus  
Operation mode: USB data transmission  
Remarks:

Result: passed

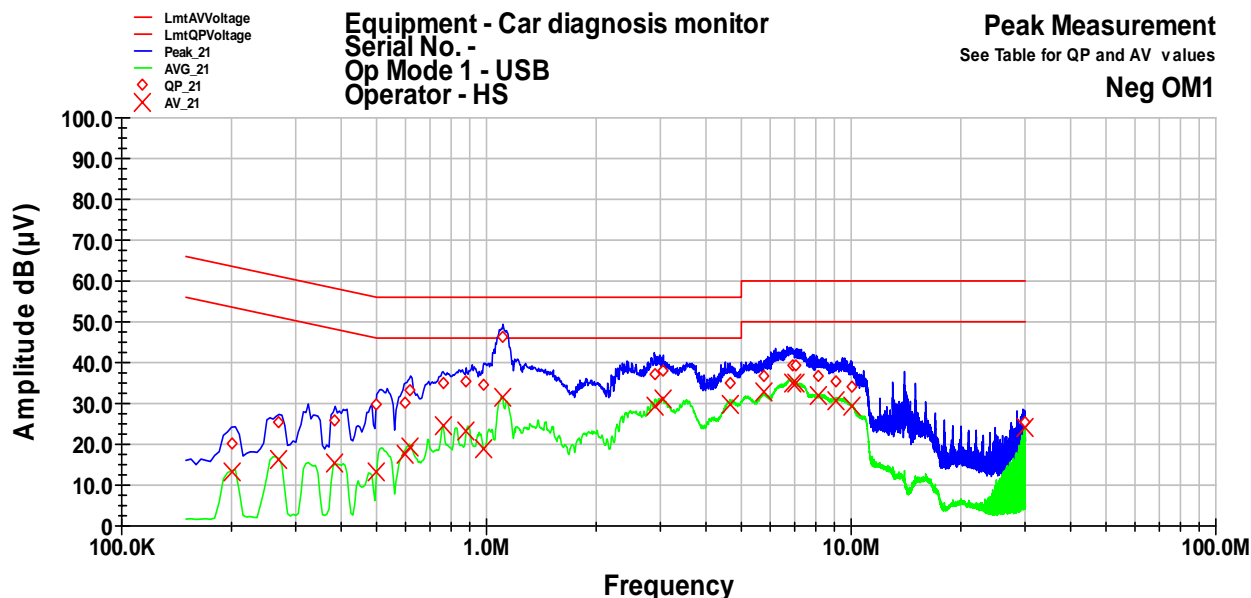


File Number: T32643

| Frequency<br>MHz | QP Level<br>dB(μV) | QP Delta<br>dB | QP Limit<br>dB | AV Level<br>dB(μV) | AV Delta<br>dB | AV Limit<br>dB |
|------------------|--------------------|----------------|----------------|--------------------|----------------|----------------|
| 0.2              | 23.8               | -39.9          | 63.6           | 16.4               | -37.2          | 53.6           |
| 0.265            | 27.7               | -33.6          | 61.3           | 19.5               | -31.8          | 51.3           |
| 0.39             | 29.9               | -28.1          | 58.1           | 19.1               | -29.0          | 48.1           |
| 0.47             | 25.3               | -31.2          | 56.5           | 12.1               | -34.4          | 46.5           |
| 0.595            | 30.5               | -25.5          | 56.0           | 17.0               | -29.0          | 46.0           |
| 0.665            | 33.2               | -22.8          | 56.0           | 19.8               | -26.2          | 46.0           |
| 0.755            | 37.0               | -19.0          | 56.0           | 24.9               | -21.1          | 46.0           |
| 0.865            | 37.6               | -18.4          | 56.0           | 22.9               | -23.1          | 46.0           |
| 0.995            | 37.4               | -18.6          | 56.0           | 23.4               | -22.6          | 46.0           |
| 1.11             | 47.5               | -8.5           | 56.0           | 34.4               | -11.6          | 46.0           |
| 2.915            | 39.0               | -17.0          | 56.0           | 30.5               | -15.5          | 46.0           |
| 3.83             | 44.8               | -11.2          | 56.0           | 36.5               | -9.5           | 46.0           |
| 4.34             | 45.8               | -10.3          | 56.0           | 39.4               | -6.6           | 46.0           |
| 5.87             | 44.2               | -15.8          | 60.0           | 36.9               | -13.1          | 50.0           |
| 6.64             | 49.1               | -10.9          | 60.0           | 40.8               | -9.2           | 50.0           |
| 7.92             | 50.4               | -9.6           | 60.0           | 41.5               | -8.5           | 50.0           |
| 8.43             | 49.3               | -10.7          | 60.0           | 41.8               | -8.2           | 50.0           |
| 9.455            | 45.2               | -14.8          | 60.0           | 37.2               | -12.8          | 50.0           |
| 10.23            | 41.8               | -18.3          | 60.0           | 33.3               | -16.7          | 50.0           |
| 29.98            | 18.4               | -41.6          | 60.0           | 12.2               | -37.8          | 50.0           |

Test point: Minus  
Operation mode: USB data transmission  
Remarks:

Result: passed



File Number: T32643

| Frequency<br>MHz | QP Level<br>dB(μV) | QP Delta<br>dB | QP Limit<br>dB | AV Level<br>dB(μV) | AV Delta<br>dB | AV Limit<br>dB |
|------------------|--------------------|----------------|----------------|--------------------|----------------|----------------|
| 0.2              | 20.3               | -43.3          | 63.6           | 13.3               | -40.3          | 53.6           |
| 0.27             | 25.2               | -35.9          | 61.1           | 16.3               | -34.8          | 51.1           |
| 0.385            | 25.9               | -32.3          | 58.2           | 15.5               | -32.7          | 48.2           |
| 0.5              | 29.6               | -26.4          | 56.0           | 13.4               | -32.6          | 46.0           |
| 0.6              | 30.3               | -25.8          | 56.0           | 17.5               | -28.5          | 46.0           |
| 0.62             | 33.1               | -22.9          | 56.0           | 19.2               | -26.8          | 46.0           |
| 0.76             | 35.2               | -20.8          | 56.0           | 24.4               | -21.6          | 46.0           |
| 0.88             | 35.4               | -20.6          | 56.0           | 23.2               | -22.8          | 46.0           |
| 0.985            | 34.3               | -21.7          | 56.0           | 19.1               | -26.9          | 46.0           |
| 1.11             | 46.1               | -9.9           | 56.0           | 31.6               | -14.4          | 46.0           |
| 2.885            | 36.9               | -19.1          | 56.0           | 29.3               | -16.7          | 46.0           |
| 3.055            | 38.0               | -18.0          | 56.0           | 30.9               | -15.1          | 46.0           |
| 4.66             | 34.8               | -21.2          | 56.0           | 29.6               | -16.4          | 46.0           |
| 5.775            | 36.7               | -23.3          | 60.0           | 32.7               | -17.3          | 50.0           |
| 6.885            | 39.4               | -20.6          | 60.0           | 34.8               | -15.2          | 50.0           |
| 7.02             | 39.3               | -20.7          | 60.0           | 34.9               | -15.1          | 50.0           |
| 8.14             | 36.7               | -23.3          | 60.0           | 31.9               | -18.1          | 50.0           |
| 9.045            | 35.5               | -24.5          | 60.0           | 30.7               | -19.3          | 50.0           |
| 10.02            | 34.1               | -25.9          | 60.0           | 29.2               | -20.8          | 50.0           |
| 29.935           | 25.5               | -34.5          | 60.0           | 24.0               | -26.0          | 50.0           |

## 5.2 Radiated emissions

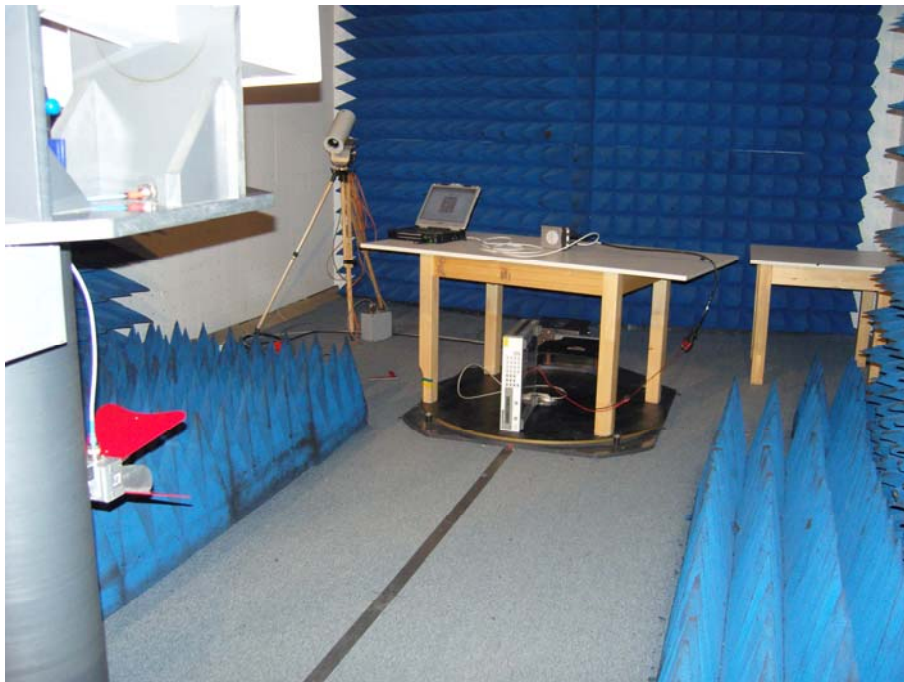
For test instruments and accessories used see section 6 Part **SER 1**, **SER 2** and **SER 3**.

### 5.2.1 Description of the test location

Test location: OATS1  
Test location: Anechoic Chamber A2  
Test distance: 3 metres

### 5.2.2 Photo documentation of the test set-up





### 5.2.3 Applicable standard

According to FCC Part 15B, Section 15.109 (a):  
 Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 m shall not exceed the given limit.

### 5.2.4 Description of Measurement

Radiated emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 cm above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The set up of the equipment under test will be in accordance to ANSI C63.4. The interface cables that are closer than 40 cm to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 cm from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 m, measurement scans are made with horizontal and vertical antenna polarization and the EUT is rotated 360 degrees. The radiated emissions from the EUT are measured in the frequency range of 1 GHz to maximum frequency as specified in Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 cm above the ground plane. The set up of the equipment under test will be in accordance to ANSI C63.4. The Interface cables that are closer than 40 cm to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 cm above the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. Measurements are made in horizontal and vertical polarization in a fully anechoic chamber. Hand-held or body-worn devices are rotated through three orthogonal axes to determine the attitude of the highest emission shall be used for final testing. During the tests the EUT is rotated 360° and the cables and equipment are placed and moved in position in such a way to find the maximum emission level. For testing above 1 GHz, the emission level of the EUT in peak mode complies to the average limit is 20 dB lower, then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.

The resolution bandwidth during the measurement is as following:

30 MHz – 1000 MHz: RBW: 120 kHz  
Above 1000 MHz: RBW: 1 MHz

### 5.2.5 Test result

**f < 1 GHz**

| Frequency (MHz) | L: QP (dBµV) | L: AV (dBµV) | Bandwidth (kHz) | Correct. (dB) | L: QP dB(µV/m) | L: AV dB(µV/m) | Limit dB(µV/m) | Delta (dB) |
|-----------------|--------------|--------------|-----------------|---------------|----------------|----------------|----------------|------------|
| 319,85          | 15,9         |              | 120             | 17.2          | 33.1           |                | 46.0           | 12.9       |
| 319,75          | 16,0         |              | 120             | 17.2          | 33.2           |                | 46.0           | 12.8       |
| 320,19          | 16,6         |              | 120             | 17.2          | 33.8           |                | 46.0           | 12.2       |

**f > 1 GHz**

| Frequency (MHz) | L: PK (dBµV) | L: AV (dBµV) | Bandwidth (kHz) | Correct. (dB) | L: PK dB(µV/m) | L: AV dB(µV/m) | Limit AV dB(µV/m) | Delta (dB) |
|-----------------|--------------|--------------|-----------------|---------------|----------------|----------------|-------------------|------------|
|                 |              |              |                 |               |                |                |                   |            |

Limit according to FCC part , Section 15.109(a):

| Frequency (MHz) | Limit (µV/m) | Limit dB(µV/m) |
|-----------------|--------------|----------------|
| 30 - 88         | 100          | 40             |
| 88 - 216        | 150          | 43.5           |
| 216 - 960       | 200          | 46             |
| Above 960       | 500          | 54             |

The requirements are **FULFILLED**.

**Remarks:** Due to USB 2.0 the measurement was performed according to FCC Part 15A, Section 15.33(b), up to the 2500 MHz. Emissions not recorded are more than 20 dB below the limit.



## 6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

| Test ID | Model / Type                | Kind of Equipment       | Manufacturer               | Equipment No.   |
|---------|-----------------------------|-------------------------|----------------------------|-----------------|
| A 4     | ESHS 30                     | EMI Test Receiver       | Rohde & Schwarz München    | 02-02/03-05-002 |
|         | NNB-5 $\mu$ H / 100 A-115 V | LISN                    | SBF electronic             | 02-02/20-05-008 |
|         | NNBM 8125                   | LISN                    | Schwarzbeck Mess-Elektron  | 02-02/20-07-001 |
|         | N-4000-BNC                  | RF Cable                | mikes-testingpartners gmbh | 02-02/50-05-138 |
|         | N-1500-N                    | RF Cable                | mikes-testingpartners gmbh | 02-02/50-05-140 |
|         | ESH 3 - Z 2                 | Pulse Limiter           | Rohde & Schwarz München    | 02-02/50-05-155 |
|         | PE1540                      | Power Supply            | Phillips Fluke GmbH        | 02-02/50-07-033 |
| SER 1   | FMZB 1516                   | Magnetic Field Antenna  | Schwarzbeck Mess-Elektron  | 01-02/24-01-018 |
|         | ESCI                        | EMI Test Receiver       | Rohde & Schwarz München    | 02-02/03-05-005 |
|         | S10162-B                    | RF Cable 33 m           | Huber + Suhner             | 02-02/50-05-031 |
|         | KK-EF393-21N-16             | RF Cable 20 m           | Huber + Suhner             | 02-02/50-05-033 |
|         | NW-2000-NB                  | RF Cable                | Huber + Suhner             | 02-02/50-05-113 |
| SER 2   | ESVS 30                     | EMI Test Receiver       | Rohde & Schwarz München    | 02-02/03-05-006 |
|         | VULB 9168                   | Trilog Broad Band Anten | Schwarzbeck Mess-Elektron  | 02-02/24-05-005 |
|         | S10162-B                    | RF Cable 33 m           | Huber + Suhner             | 02-02/50-05-031 |
|         | KK-EF393-21N-16             | RF Cable 20 m           | Huber + Suhner             | 02-02/50-05-033 |
|         | NW-2000-NB                  | RF Cable                | Huber + Suhner             | 02-02/50-05-113 |
| SER 3   | FSP 30                      | Spectrum Analyzer       | Rohde & Schwarz München    | 02-02/11-05-001 |
|         | AFS4-01000400-10-10P-4      | RF Amplifier 1-4 GHz    | PARZICH GMBH               | 02-02/17-05-003 |
|         | AMF-4F-04001200-15-10P      | RF Amplifier 4-12 GHz   | PARZICH GMBH               | 02-02/17-05-004 |
|         | AFS5-12001800-18-10P-6      | RF Amplifier 12-18 GHz  | PARZICH GMBH               | 02-02/17-06-002 |
|         | 3117                        | Horn Antenna 1-18 GHz   | EMCO Elektronik GmbH       | 02-02/24-05-009 |
|         | Sucoflex N-1600-SMA         | RF Cable                | novotronik Signalverarbeit | 02-02/50-05-073 |
|         | Sucoflex N-2000-SMA         | RF Cable                | novotronik Signalverarbeit | 02-02/50-05-075 |

**FCC ID:W7H-HXPO1000**

| <b>Equipment No.</b> | <b>Next Calibration</b> | <b>Last Calibration</b> | <b>Next Verification</b> | <b>Last Verification</b> |
|----------------------|-------------------------|-------------------------|--------------------------|--------------------------|
| 02-02/03-05-002      | 04/30/2009              | 04/30/2008              |                          |                          |
| 02-02/20-05-008      | 12/23/2009              | 12/23/2008              |                          |                          |
| 02-02/20-07-001      | 02.10.2010              | 02.10.2009              |                          |                          |
| 02-02/50-05-138      |                         |                         |                          |                          |
| 02-02/50-05-140      |                         |                         |                          |                          |
| 02-02/50-05-155      | 04.06.2009              | 10.06.2008              |                          |                          |
| 02-02/50-07-033      |                         |                         |                          |                          |
| 01-02/24-01-018      | 02/23/2010              | 02/23/2009              |                          |                          |
| 02-02/03-05-005      | 01/26/2010              | 01/26/2009              |                          |                          |
| 02-02/50-05-031      |                         |                         |                          |                          |
| 02-02/50-05-033      |                         |                         |                          |                          |
| 02-02/50-05-113      |                         |                         |                          |                          |
| 02-02/03-05-006      | 07/30/2009              | 07/30/2008              |                          |                          |
| 02-02/24-05-005      | 05.06.2011              | 05.06.2008              | 02/28/2009               | 08/29/2008               |
| 02-02/50-05-031      |                         |                         |                          |                          |
| 02-02/50-05-033      |                         |                         |                          |                          |
| 02-02/50-05-113      |                         |                         |                          |                          |
| 02-02/11-05-001      | 04.08.2009              | 04.08.2008              |                          |                          |
| 02-02/17-05-003      |                         |                         |                          |                          |
| 02-02/17-05-004      |                         |                         |                          |                          |
| 02-02/17-06-002      |                         |                         |                          |                          |
| 02-02/24-05-009      | 02.04.2010              | 02.04.2009              |                          |                          |
| 02-02/50-05-073      |                         |                         |                          |                          |
| 02-02/50-05-075      |                         |                         |                          |                          |