

EMI -- TEST REPORT

Test Report No. :	T32050-00-11HS	11. December 2007 Date of issue
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Type / Model Name : EBI 10

Product Description : Data logger (13.56 MHz, 2.4 GHz)

Applicant : Ebro Electronic GmbH & Co. KG

Address : Peringerstr. 10

DE-85055 Ingolstadt

Manufacturer : Ebro Electronic GmbH & Co. KG

Address : Peringerstr. 10

DE-85055 Ingolstadt

Licence holder : Ebro Electronic GmbH & Co. KG

Address : Peringerstr. 10

DE-85055 Ingolstadt

Test Result according to the standards listed in clause 1 test standards:	POSITIVE
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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 B - Unintentional Radiators (May 04, 2007)

Part 15, Subpart B, Section 15.107

AC Line conducted emissions

Part 15, Subpart B, Section 15.109

Radiated emissions, general requirements

Part 15, Subpart B, Section 15.111

Antenna power conduction

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2 SUMMARY

GENERAL REMARKS:

The EUT works at 13.56 MHz and 2.400 GHz – 2.4835 GHz. The RFID-Part at 13.56 MHz is for receiving only. Therefore no transmitter measurements are necessary. The transceiver 2.400 GHz – 2.4835 GHz passed the tests according FCC 15.247 by mikes-testingpartners gmbh. For the measurements results please refer to the testreport T32050-00-12HS.

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 : 24. September 2007

Testing concluded on : 6. December 2007

Checked by:

Tested by:

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

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

3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT

External views of the data logger family EBI10:

Top view, Logger with internal temperature sensor



Top view, Logger with external temperature sensor



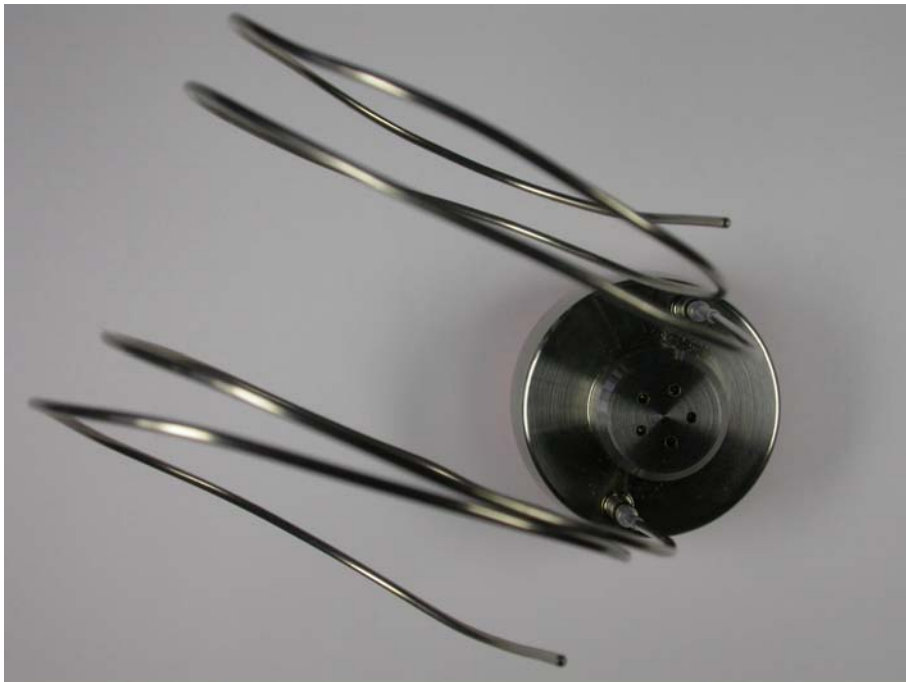
Side view, Logger with external temperature sensor



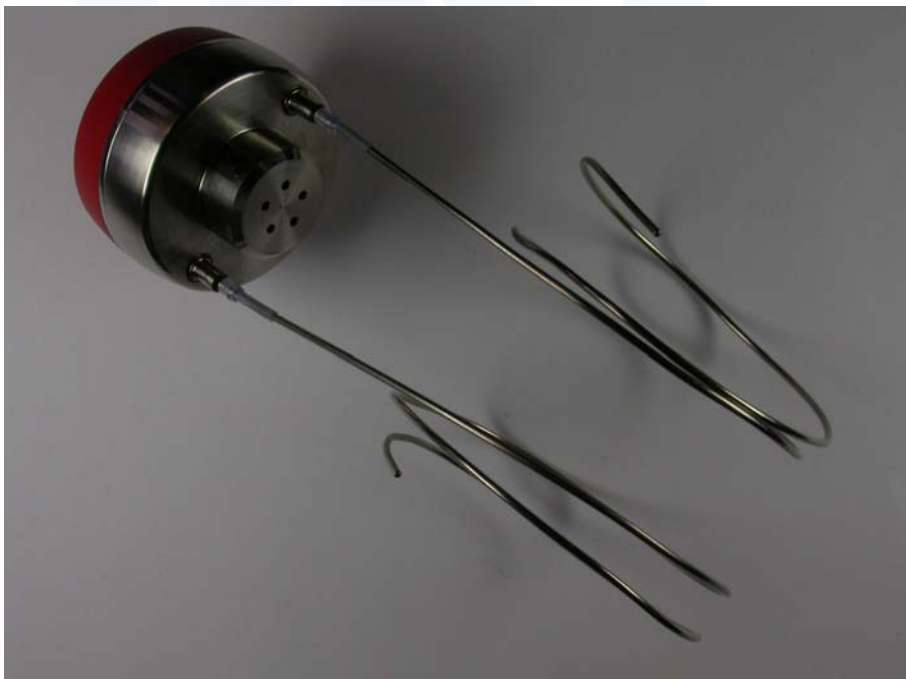
Top view, Logger with pressure sensor



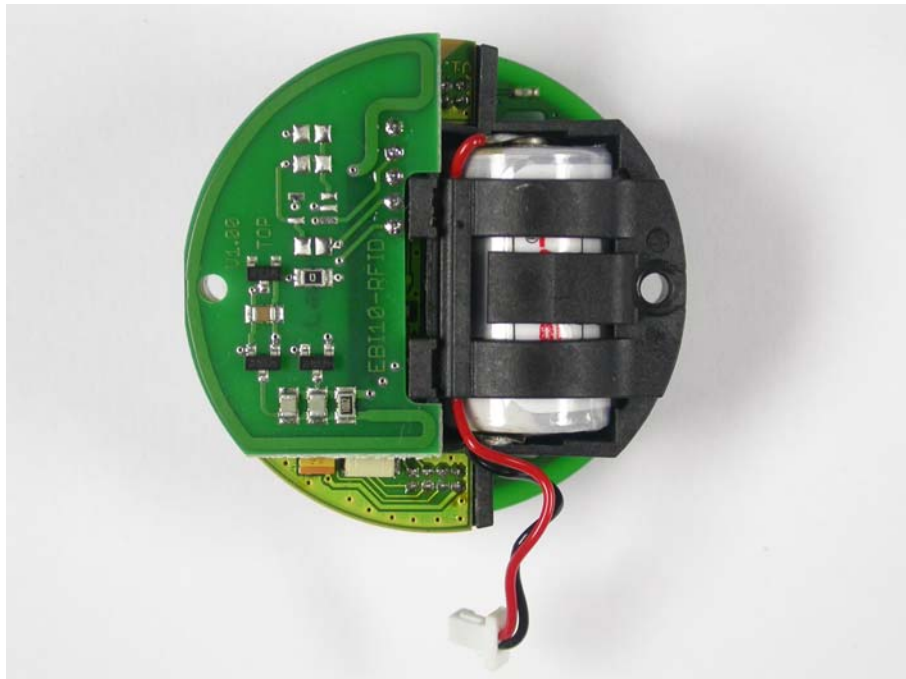
Top view, Logger with pressure sensor and external temperature sensor

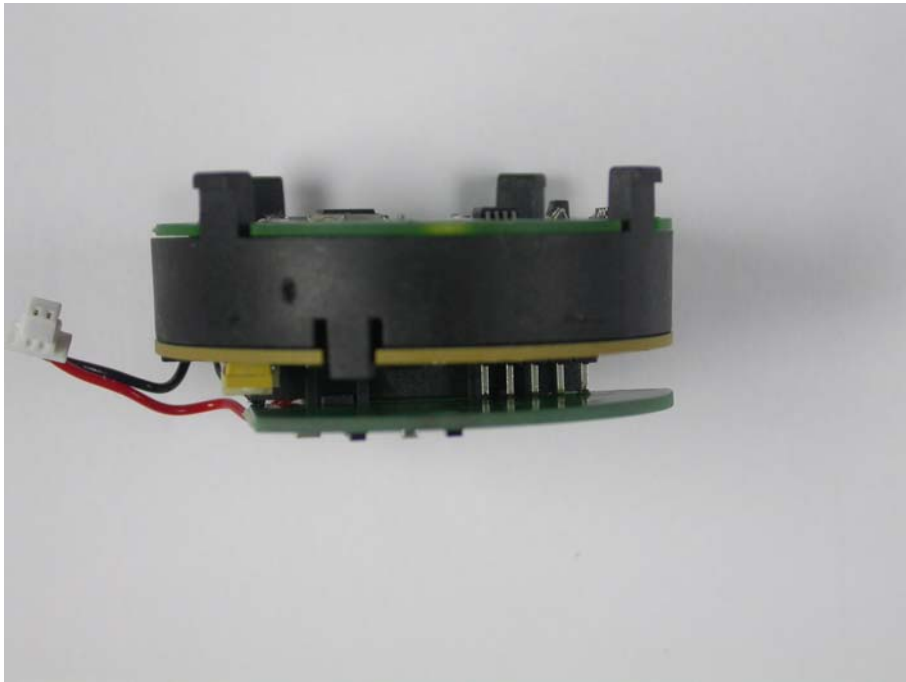


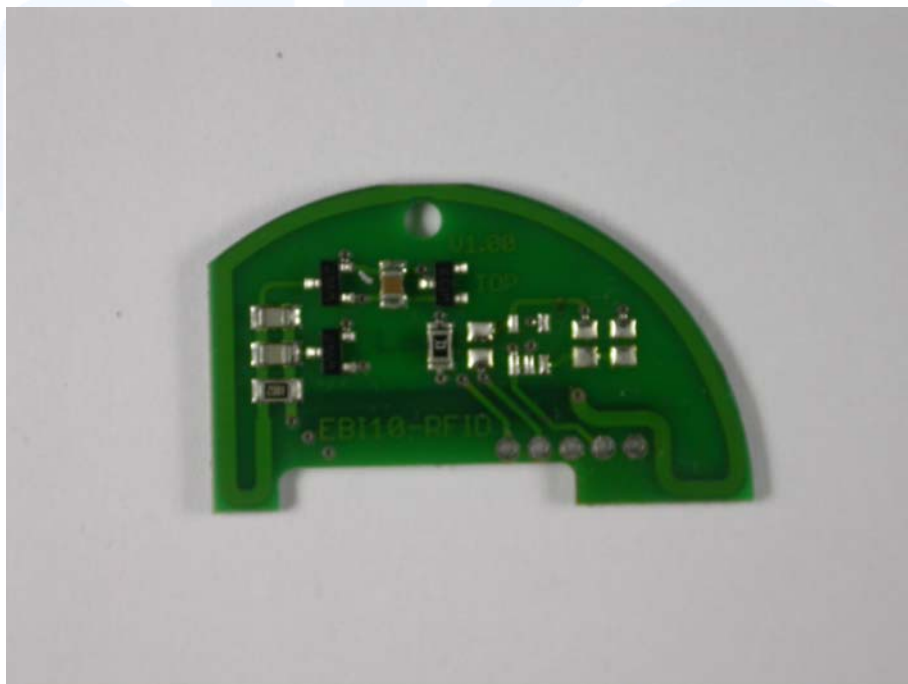
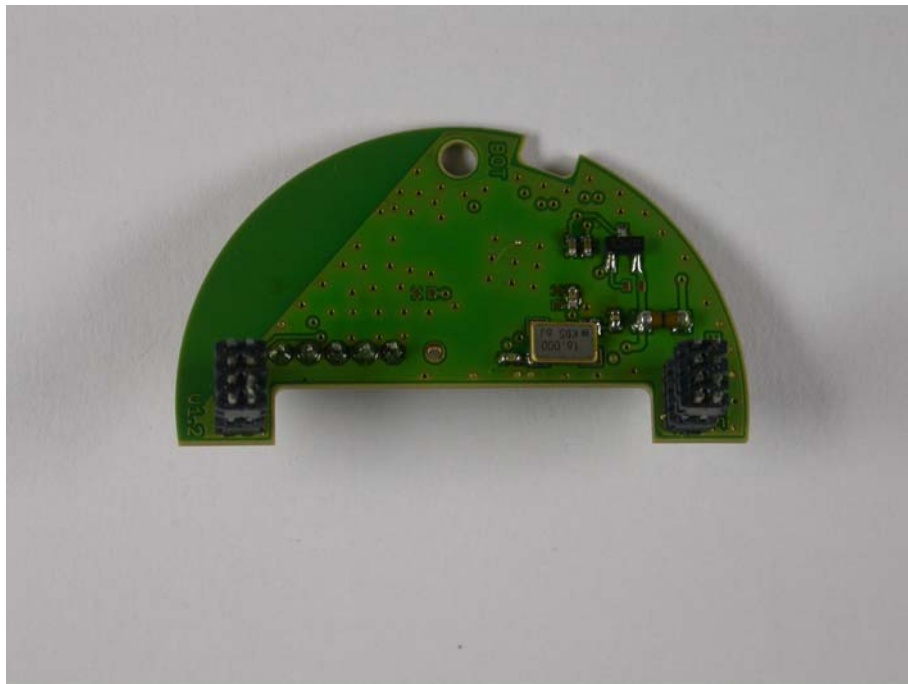
Side view, Logger with pressure sensor and external temperature sensor

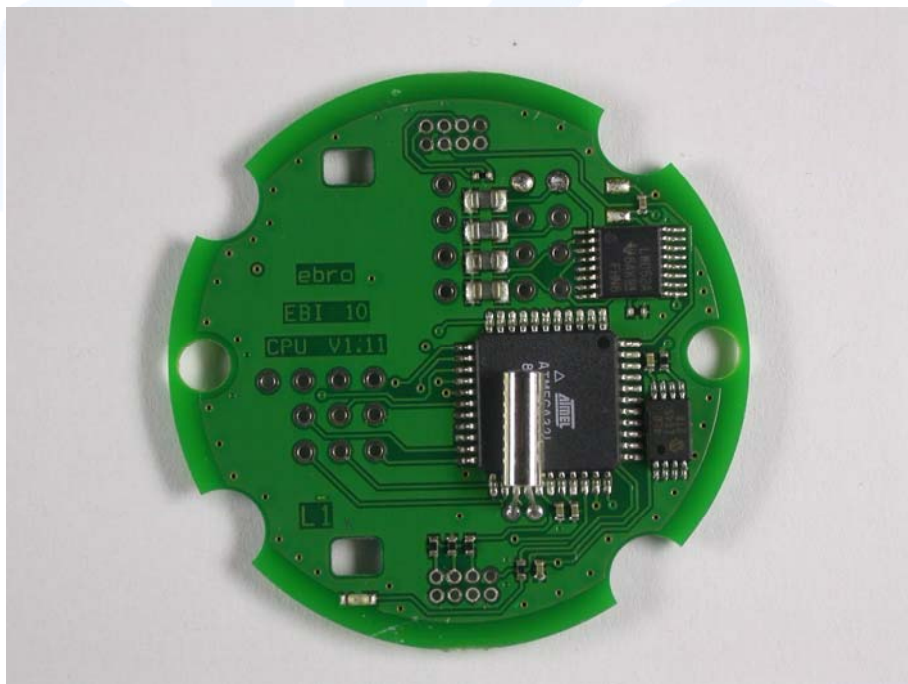
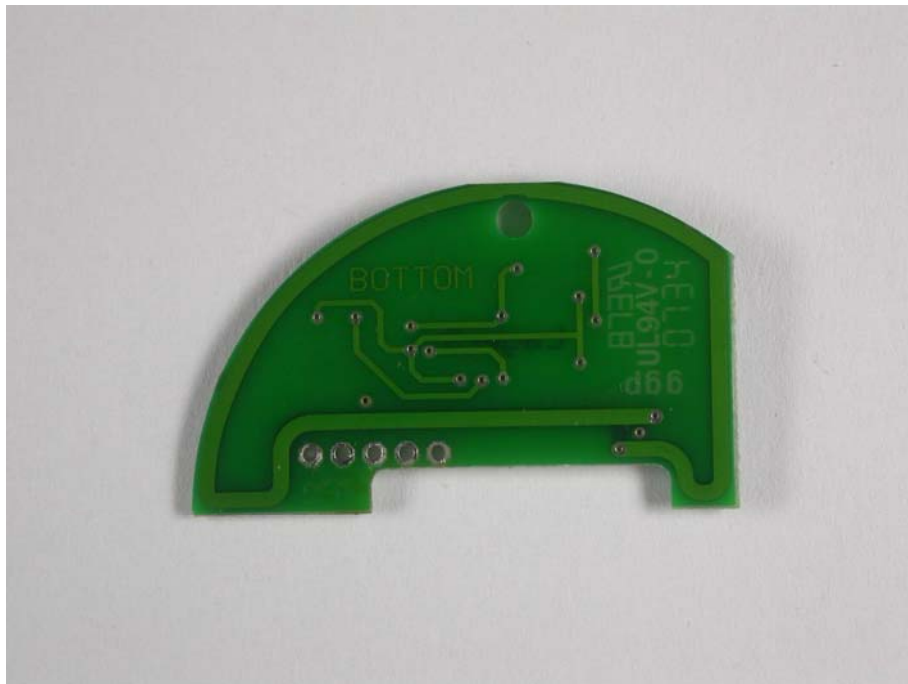


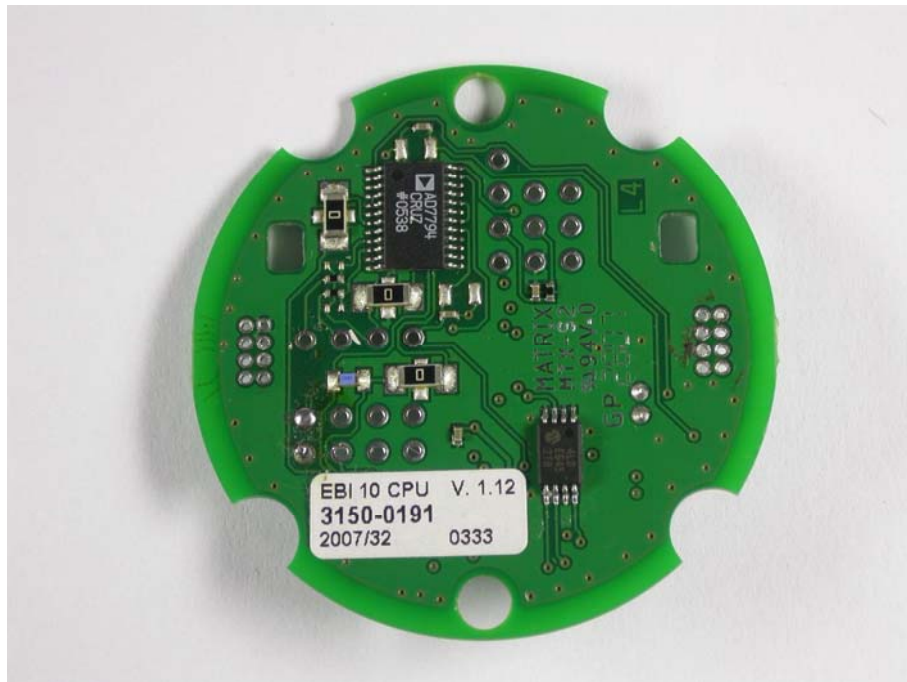
Internal views of the logger:













3.2 Power supply system utilised

Power supply voltage : 3.6 V, Lithium Battery powered, (Size=1/2AA)

3.3 Short description of the Equipment under Test (EUT)

Data logger for temperature and pressure. Up to 4 mobile data logger can be used by one interface. The interface identifies a logger in the programming slot via 13.56 MHz RFID-Transceiver. In the mobile data logger is a RFID-Tag only. A 2.4 GHz "ZIGBEE" port (Chipset according IEEE 802.15.4) is used for data exchange, communication and programming the data logger, if the logger is enabled for communication via 13.56 MHz signal. This enable signal is necessary to activate the 2.4 GHz interface, other wise no communication is possible.

Number of tested samples: 1
Serial number: Prototype

EUT operation mode:

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

- RX mode at 13.56 MHz

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:

- _____	Model : _____
- _____	Model : _____
- _____	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 is cautioned that there may be errors within the calibration limits of the equipment and facilities. 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 – Uncertainties in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. 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, VCCI and AUSTEL

4.4.1 GENERAL INFORMATION

4.4.1.1 Test Methodology

In compliance with 47 CFR Part 15 Subpart A Section 15.38 testing for FCC compliance may be done following the ANSI C63.4-2003 procedures and using 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.

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

4.5 Discovery of worst case measurement conditions

For evaluating the worst case the data logger was driven in maximum output power mode and measured in X, Y and Z-Position. The data logger has no active RFID at 13.56 MHz so the logger was set into network Mode to enable the communication for the 2.4 GHz interface. The maximum output power was found in X-Posituon. So the measurements were performed in this direction to express the worst case.

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5 TEST CONDITIONS AND RESULTS

5.1 Radiated emissions (electric field)

For test instruments and accessories used see section 6 Part **SER1**, **SER 2**, **SER 3**.

5.1.1 Description of the test location

Test location: OATS1
Test location: Anechoic Chamber A2

5.1.2 Photo documentation of the test set-up





5.1.3 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 meter non-conducting table 80 centimetres 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 C63.4-2003. The Interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres 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. The antenna was positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample

the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarization's and the EUT are rotated 360 degrees.

The final level, expressed in dB μ V/m, is arrived by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver, where the correction factors are stored. This result then has the FCC or CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets at page.

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 tuned receiver (Spectrum Analyser) and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres 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 C63.4-2003.

The Interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres 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. The antenna was positioned 3 horizontally from the EUT.

Measurement are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 1 MHz. All tests are performed at a test-distance of 3 meters. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration procedure the highest emission relative the limit and therefore shall be used for final testing. During the tests the EUT is rotated all around to find the maximum levels of emissions. The cables and equipment were placed and moved within the range of position likely to find their maximum emissions. When the EUT is larger than the beamwidth of the measuring antenna, the measurement antenna will be moved over the surfaces for the four sides or the test distance will be reduced to demonstrate that emissions were at maximum at the limit distance.

The resolution bandwidth during the measurement is as follows:

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

5.1.4 Test result

Testresult in detail:(<1GHz)

Frequency [MHz]	L: QP [dB μ V]	L: AV [dB μ V]	Bandwidth [kHz]	Correct. [dB]	L: QP [dB μ V/m]	L: AV [dB μ V/m]	Limit [dB μ V/m]	Delta [dB]
0.009-0.15			0.2	0.2	< 30			
0.15-30			9.0	9	< 30			
30-1000			120		< 30			

Testresult in detail:(>1GHz)

Frequency [GHz]	L: PK [dBµV]	L: AV [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: PK [dBµV/m]	L: AV [dBµV/m]	Limit AV [dBµV/m]	Delta [dB]
1.0 – 4.0			1000			< 30	54	> -24

Limit according to FCC Subpart 15.109(a)

Frequency [MHz]	Limits [µV/m]	Limits [dBµV/m]
30-88	100	40
88-216	150	43,5
216-960	200	46
Above 960	500	54

The requirements are **FULFILLED**.

Remarks: The measurement was performed up to 4.0 GHz.

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

The calibration intervals and the calibration history will be given out on request.

Test ID	Model / Type	Kind of Equipment	Manufacturer	Equipment No.
SER 1	FMZB 1516	Magnetic Field Antenna	Schwarzbeck Mess-Elektron	01-02/24-01-018
	ESVS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-003
	S10162-B/+11N-50-10-5/+1	RF Cable 33m	Huber + Suhner	02-02/50-05-031
	KK-EF393-21N-16	RF Cable 20m	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-Broadband Anten	Schwarzbeck Mess-Elektron	02-02/24-05-005
	S10162-B/+11N-50-10-5/+1	RF Cable 33m	Huber + Suhner	02-02/50-05-031
	KK-EF393-21N-16	RF Cable 20m	Huber + Suhner	02-02/50-05-033
	NW-2000-NB	RF Cable	Huber + Suhner	02-02/50-05-113
SER 3	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
	BBHA 9120 E 251	Broad-Band Horn Anten	Schwarzbeck Mess-Elektron	02-02/24-05-006
	WBH218H N	Horn Antenna 2-18 GHz	Q-par Angus Ltd	02-02/24-05-007
	Sucoflex N-2000-SMA	RF Cable	novotronik Signalverarbeit	02-02/50-05-075
	Sucoflex N-2000-SMA	RF Cable	novotronik Signalverarbeit	02-02/50-05-083
	Sucoflex N-2000-SMA	RF Cable	novotronik Signalverarbeit	02-02/50-05-088
Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
01-02/24-01-018	12.04.2007	12.04.2006		
02-02/03-05-003	04/26/2008	04/26/2007		
02-02/50-05-031				
02-02/50-05-033				
02-02/50-05-113				
02-02/03-05-006	07/24/2008	07/24/2007		
02-02/24-05-005	04/15/2008	04/15/2005	05.09.2007	05.09.2006
02-02/50-05-031				
02-02/50-05-033				
02-02/50-05-113				
02-02/17-05-003				
02-02/17-05-004				
02-02/17-06-002				
02-02/24-05-006	04/15/2008	04/15/2005	10/23/2007	04/23/2007
02-02/24-05-007	10/23/2007	04/23/2007		
02-02/50-05-075				
02-02/50-05-083				
02-02/50-05-088				