FCC ID: NDX-LABMAXIII

EMI – TEST REPORT

- FCC Part 15B -

DAkkS Deutsche Akkreditierungsstelle D-PL-12030-01-01

Test Report No. : T36133-00-04HU	08. August 2012 Date of issue

Type / Model Name : LAB MAX III

Product Description : RFID stationary reader for animal identification

Applicant : Datamars S.A.

Address : Via ai Prati

CH – 6930 BEDANO

Manufacturer : Datamars S.A.

Address : Via ai Prati

CH – 6930 BEDANO

Licence holder : Datamars S.A.

Address : Via ai Prati

CH – 6930 BEDANO

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

ilac-MRA

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15 Subpart A - General (October, 2011)

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, 2011)

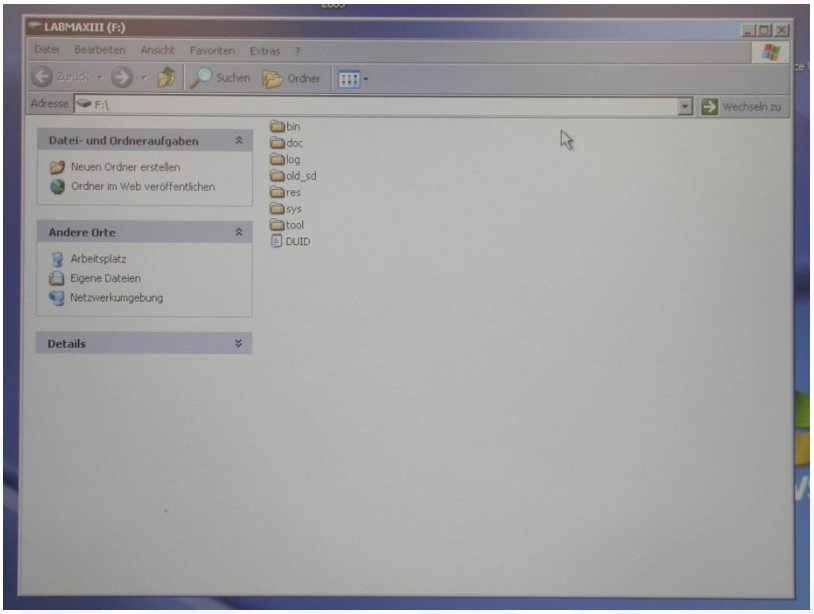
Part 15, Subpart B, Section 15.107	AC Line conducted emissions
Part 15, Subpart B, Section 15.109	Radiated emissions, general requirements
Part 15, Subpart B, Section 15.111	Antenna power conduction
ANSI C63.4: 2003	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI C95.1:1992	IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
CISPR 16-4-2: 2003	Uncertainty in EMC measurement
CISPR 22: 2005 EN 55022: 2006	Information technology equipment

2 SUMMARY

GENERAL REMARKS:

The EuT is working at frequency of 134.2 kHz.

Screenshot of the Laptop during connection to the LAB MAX III



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 : 13. June 2012

Testing concluded on : 25. July 2012

Checked by:

I confirm the correctness and integrity of this document

Harald Buchwald
Dipl.-Ing.(FH)
Manager: EMC

Tested by:

Markus Huber
I'm the author of this document
2012.08.08 15:26:22 +02'00'

Huber Markus

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 : 115 V / 60 Hz / 1ϕ

3.3 Short description of the Equipment under Test (EuT)

The EuT is a RFID stationary reader for animal identification.

Number of tested samples: 1
Serial number: ALPHA 00005

EuT operation mode:

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

- Standby

-

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:

- USB 2.0 Cable A-B, m-m, 2.0 Model : Supplied by manufacturer
- AC/DC Power supply Model : PHIHONG, PSAA18U-150
- 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

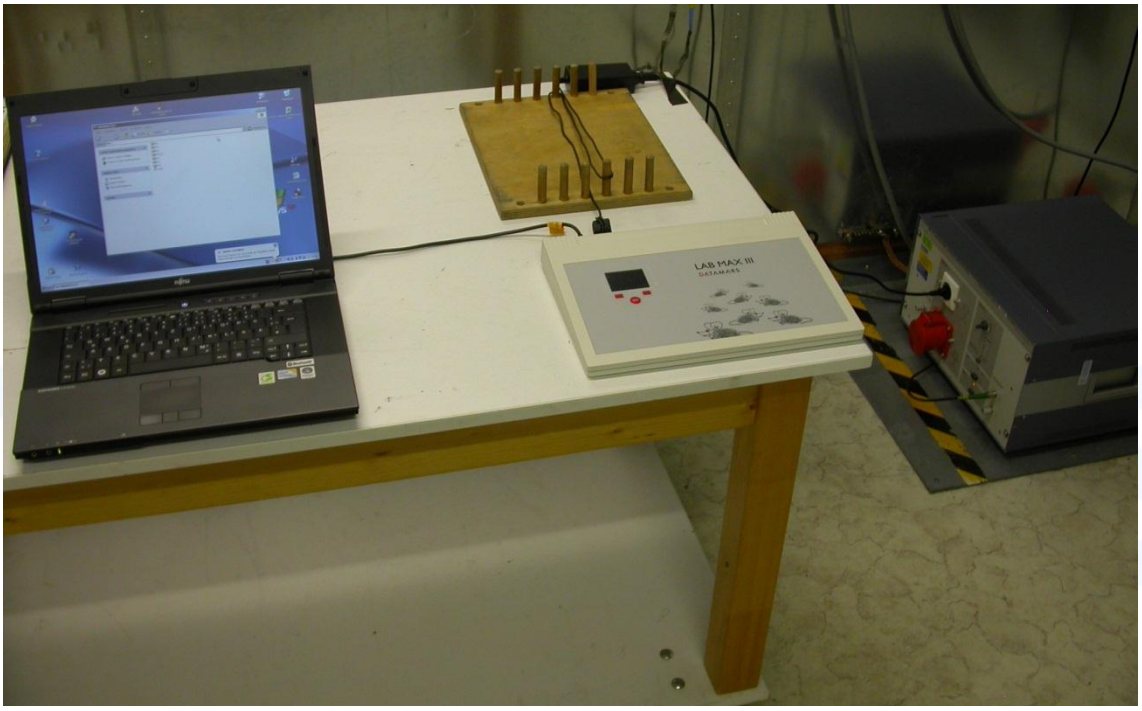
5.1 Conducted emissions

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 limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBµV)	
	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

5.1.4 Description of Measurement

The correction factors for cable loss and antenna gain are stored in the memory of the EMI receiver therefore the final level (dBµV) appears directly in the reading of the EMI receiver. This level is compared to the FCC limit.

To convert between dBµV and µV, the following conversions apply:

dBµV = 20(log µV)

µV = 10^(dBµV/20)

The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a line impedance stabilization network (LISN) with 50Ω/50 µH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. 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 on the data sheets.

5.1.5 Test result

Frequency range:	0.15 MHz - 30 MHz
Min. limit margin	14.4 dB at 0.445 MHz

The requirements are **FULFILLED.**

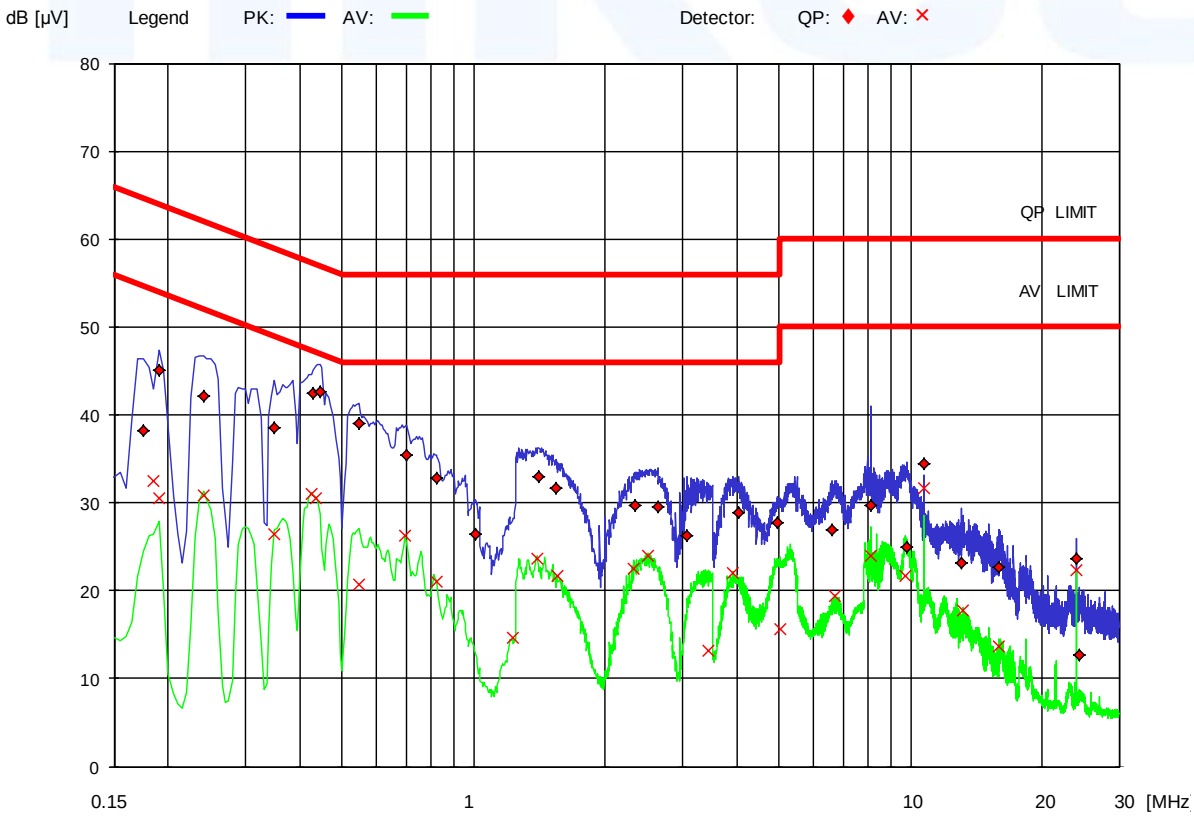
Remarks: _____

5.1.6 Test protocol

Test point: L1 Result: passed
Operation mode: Standby mode
Remarks: PHIHONG PSU, PSAA18U-150, Serial No.:094100891A1
Date: 19.07.2012
Tested by: Huber Markus

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
175	38,2	26,5	185	32,4	21,9
190	45	19,0	190	30,5	23,5
240	42,2	19,9	240	30,9	21,2
350	38,5	20,5	350	26,5	22,5
430	42,5	14,8	425	31	16,3
445	42,6	14,4	435	30,5	16,7
545	39	17,0	545	20,7	25,3
700	35,4	20,6	695	26,2	19,8
820	32,8	23,2	820	21	25,0
1010	26,4	29,6	1225	14,6	31,4
1410	33	23,0	1395	23,6	22,4
1545	31,7	24,3	1555	21,6	24,4
2335	29,7	26,3	2330	22,5	23,5
2640	29,6	26,4	2500	24	22,0
3080	26,2	29,8	3455	13,1	32,9

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
4035	28,9	27,1	3915	22	24,0
4960	27,7	28,3	5030	15,6	34,4
6605	26,9	33,1	6735	19,4	30,6
8130	29,7	30,3	8130	24	26,0
9800	24,9	35,1	9750	21,6	28,4
10735	34,4	25,6	10735	31,6	18,4
13100	23,2	36,8	13160	17,7	32,3
15905	22,6	37,4	15970	13,7	36,3
24000	23,7	36,3	24000	22,4	27,6
24405	12,7	47,3			

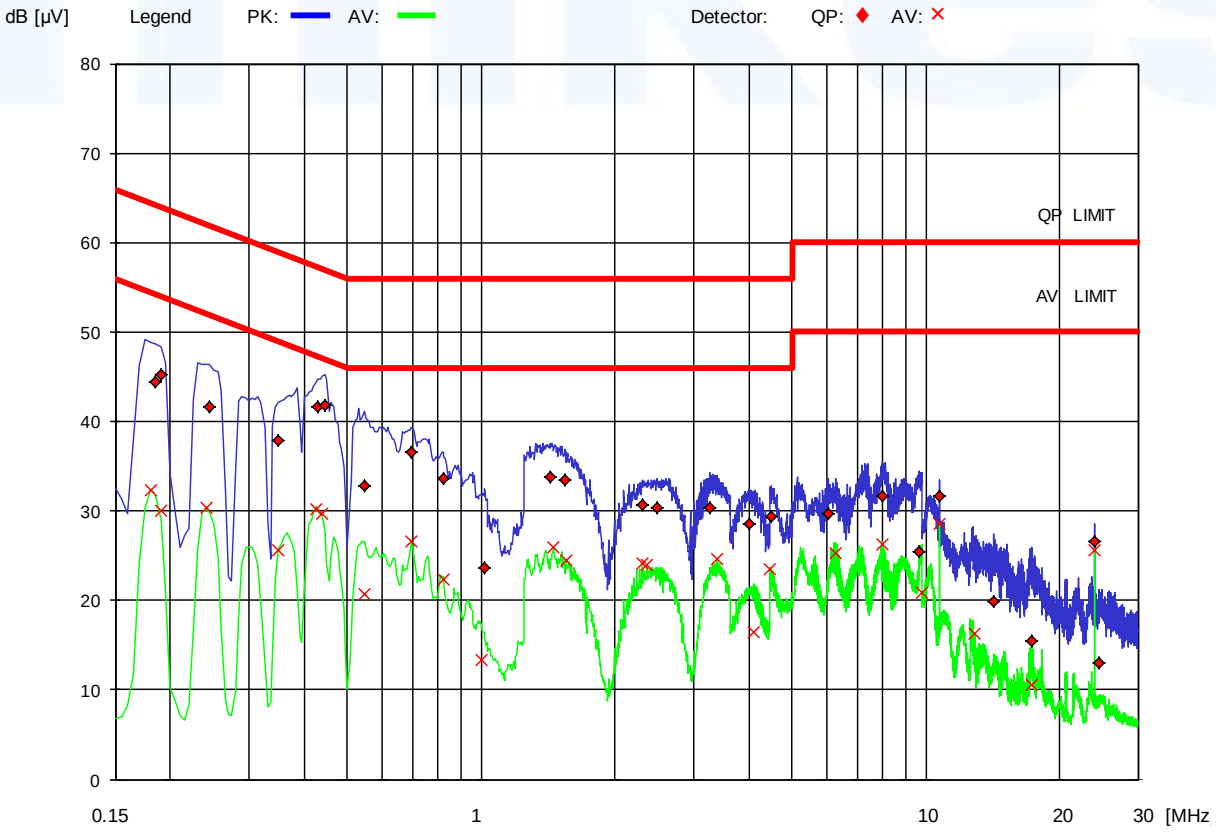


FCC ID: NDX-LABMAXIII

Test point: N
Result: passed
Operation mode: Standby mode
Remarks: PHIHONG PSU, PSAA18U-150, Serial No.:094100891A1
Date: 19.07.2012
Tested by: Huber Markus

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
185	44,4	19,9	180	32,3	22,2
190	45,2	18,8	190	30	24,0
245	41,7	20,2	240	30,3	21,8
350	37,9	21,1	350	25,6	23,4
430	41,6	15,7	425	30,2	17,1
445	41,8	15,2	440	29,7	17,4
545	32,8	23,2	545	20,7	25,3
695	36,6	19,4	695	26,6	19,4
820	33,7	22,3	820	22,3	23,7
1020	23,7	32,3	1000	13,3	32,7
1425	33,8	22,2	1455	25,9	20,1
1545	33,4	22,6	1555	24,5	21,5
2300	30,7	25,3	2300	24,2	21,8
2480	30,3	25,7	2360	24	22,0
3280	30,3	25,7	3395	24,7	21,3

Freq	QP- L	D -Limit	Freq	AV-L	D -Limit
kHz	dB[µV]	QP [dB]	kHz	dB[µV]	AV [dB]
4000	28,6	27,4	4095	16,4	29,6
4490	29,4	26,6	4455	23,4	22,6
6045	29,7	30,3	6265	25,2	24,8
8000	31,6	28,4	7965	26,2	23,8
9635	25,5	34,5	9810	20,8	29,2
10735	31,7	28,3	10735	28,6	21,4
14230	19,8	40,2	12870	16,2	33,8
17370	15,4	44,6	17360	10,6	39,4
24000	26,6	33,4	24000	25,6	24,4
24530	13	47,0			



5.2 Radiated emissions

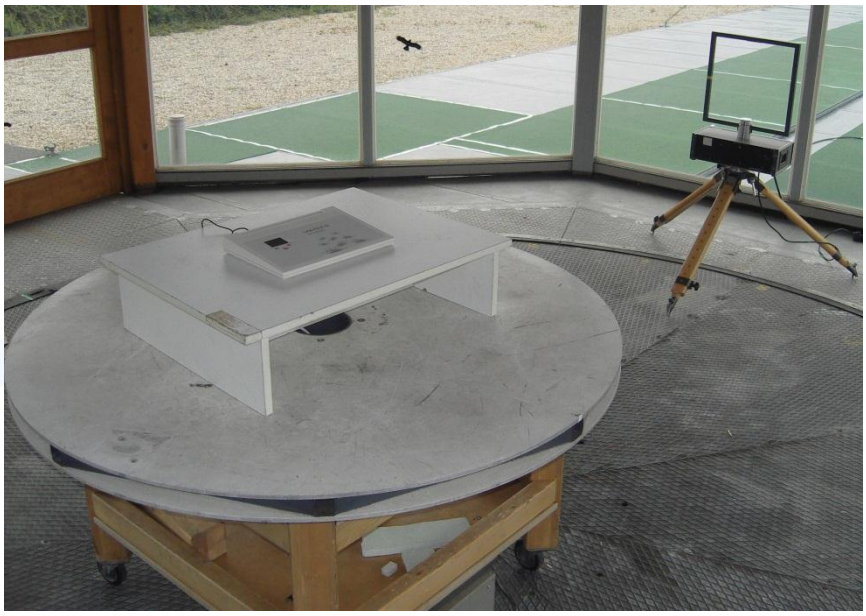
For test instruments and accessories used see section 6 Part **SER 1, SER 2**.

5.2.1 Description of the test location

Test location: OATS1

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 dB(µV/m) 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. 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. The antenna was positioned 3 m horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres, 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 metre non-conducting table 80 centimetres 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 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 m horizontally from the EUT.
Measurements are made in horizontal and vertical polarization in a fully anechoic chamber. All tests are performed at a test distance of 3 m. 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

Measurement distance: 3 m

Frequency [kHz]	L: QP [dBµV]	L: AV [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: QP [dBµV/m]	L: AV [dBµV/m]	Limit [dBµV/m]	Delta [dB]
536.8	27.7	24.6	9.0	20	47.7	44.6	73.0	-25.3
1073.6	23.4	18.0	9.0	20	43.4	38.0	67.0	-23.6
1342.0	21.6	15.9	9.0	20	41.6	35.9	65.0	-23.4

Frequency [MHz]	L: QP [dBµV]	Correct. [dB]	L: QP [dBµV/m]	Limit [dBµV/m]	Delta [dB]
33.78	4.8	13.4	18.2	40.0	-21.8
118.54	10.1	12.9	23.0	43.5	-20.5
517.43	5.2	21.9	27.1	46.0	-18.9

Limit according to FCC Part 15 Subpart 15.209(a)

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (meters)
	(µV/m)	dB (µV/m)	
0.009-0.490	2400/F(kHz)	--	300
0.490-1.705	24000/F (kHz)	--	30
1.705-30.0	30	29.5	30

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: No unwanted emissions from the EuT could be measured in the relevant frequency ranges.

5.3 Spurious emissions (antenna conducted)

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

5.3.1 Description of the test location

Test location: None

5.3.2 Photo documentation of the test set-up

5.3.3 Applicable standard

According to FCC Part 15B, Section 15.111(a):
In addition to the radiated emission limits, receivers that operate in the frequency range 30 MHz to 960 MHz that provide terminals for the connection of a external receiving antenna may tested to demonstrate compliance with provisions of §15.109 with the antenna terminals shielded and terminated.

5.3.4 Description of Measurement

The receiver antenna terminal was connected to the spectrum analyzer. The frequency range was scanned for spurious emissions up to 5 GHz and recorded in the table below if it comes closer as 20 dB to the limit.
Spectrum analyser setting:
RBW: 100 kHz
VBW: 100 kHz
Detector: peak

5.3.5 Test result

SPURIOUS EMISSIONS								
f (MHz)	Bandwidth (kHz)	Level (dBm)	f (MHz)	Bandwidth (kHz)	Level (dBm)	f (MHz)	Bandwidth (kHz)	Level (dBm)
Measurement uncertainty			± 3 dB					

Bandwidth (kHz); refers to the bandwidth of the measuring receiver

Limit according to FCC Part 15B, Section 15.111(a):

Frequency (MHz)	Limit (nW)	Limit (dBm)
30-960	2.0	-57
Above 960	2.0	-57

Effective measurement range according to FCC Part 15A, Section 15.33(b)(1):

Highest frequency generated or used on which the EUT operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.0
1.705 - 108	1000.0
108 – 500	2000.0
500 – 1000	5000.0
Above 1000	5th harmonics of the highest frequency or 40 GHz, whichever is lower.

Remarks: The measurement is not applicable, because the EuT has no antenna connector.

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	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	ESHS 30	02-02/03-05-002	11/07/2013	11/07/2012		
	ESH 2 - Z 5	02-02/20-05-004	12/05/2013	12/05/2012	09/08/2012	09/02/2012
	N-4000-BNC	02-02/50-05-138				
	N-1500-N	02-02/50-05-140				
	ESH 3 - Z 2	02-02/50-05-155			05/10/2012	05/04/2012
	SP 103 /3.5-60	02-02/50-05-182				
SER 1	FMZB 1516	01-02/24-01-018			16/02/2013	16/02/2012
	ESCI	02-02/03-05-005	21/11/2012	21/11/2011		
	S10162-B	02-02/50-05-031				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
SER 2	ESVS 30	02-02/03-05-006	26/06/2013	26/06/2012		
	VULB 9168	02-02/24-05-005	16/03/2013	16/03/2012	16/09/2012	16/03/2012
	S10162-B	02-02/50-05-031				
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N_20m	02-02/50-12-018				