Test Report

T-0239-3062-04 JP

Type / Model Name:	**BSB00056**
FCC ID:	**W5IBSB00056**
Product Description:	**Local Positioning Radar**
Applicant:	**SYMEO GmbH**

DAT-P-121/02-00
KBA-P 00057-01

EMC -- T E S T R E P O R T

Test Report No. : **T-0239-3062-04 JP**	2009-04-14 Date of issue

Type / Model Name : BSB00056

FCC ID W5IBSB00056

Product Description : Local Positioning Radar

Applicant : SYMEO GmbH

Address : Professor-Messerschmitt-Str. 3

85579 Neubiberg / Munich

Germany

Manufacturer : SYMEO GmbH

Address : Professor-Messerschmitt-Str. 3

85579 Neubiberg / Munich

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.

File No. **T-0239-3062-04 JP**

Contents

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Part 15 Subpart A October 2008	Code of Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communications Commision (FCC)
FCC Part 15 Subpart B October 2008	Code of Regulations Part 15 (Radio Frequency Devices), Subpart B (Unintentional Radiators) of the Federal Communications Commision (FCC) Applied Paragraphs: §15.107, §15.109
ANSI C63.4-2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz – 40 GHz

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2 SUMMARY

GENERAL REMARKS:

The EUT has a TX mode and a RX mode but RX is without TX beacons not possible therefore the measurements were performed in TX mode only. The frequency range was scanned from 9 kHz to 18GHz.
The EUT is equipped with RS232 interface additional it is possible to ad a RJ45 interface. It is also possible to add potential free relais. To determine the worst case combination the disturbances were measured with a combination of RS232, RJ45 interface and relais, a combination of RS232 and relais and a combination of RS232 and RJ45 interface.

FINAL ASSESSMENT:

The equipment under test **fulfills** the EMC requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 2009-03-25

Testing concluded on : 2009-03-27

Checked by:

Digital unterschrieben
von Frank Scharnowski
Datum: 2009.04.14
11:10:04 +02'00'

Frank Scharnowski
Quality Manager

Tested by:

Jürgen Pessinger
2009.04.14
10:14:27 +02'00'

Jürgen Pessinger

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3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EuT

EUT housing

EUT housing

Antenna

Antenna

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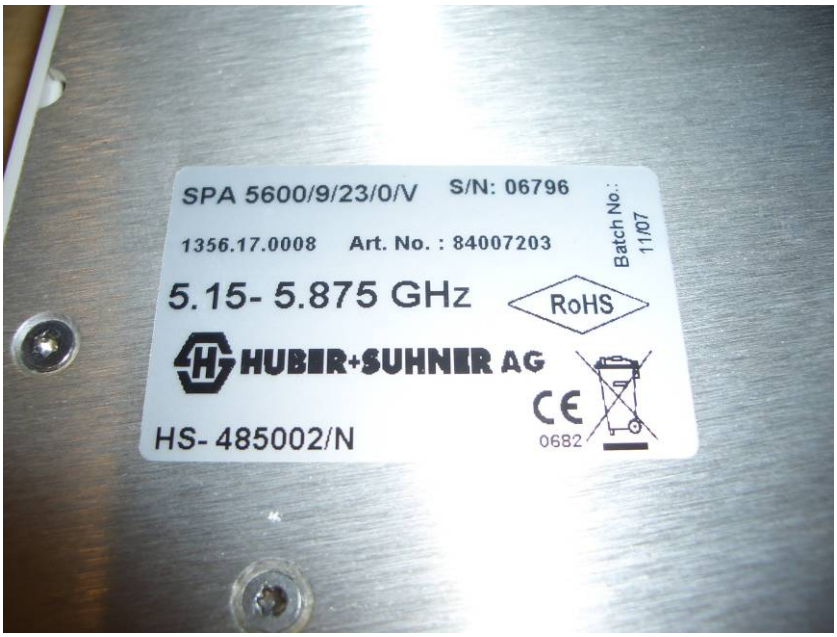
Antenna label

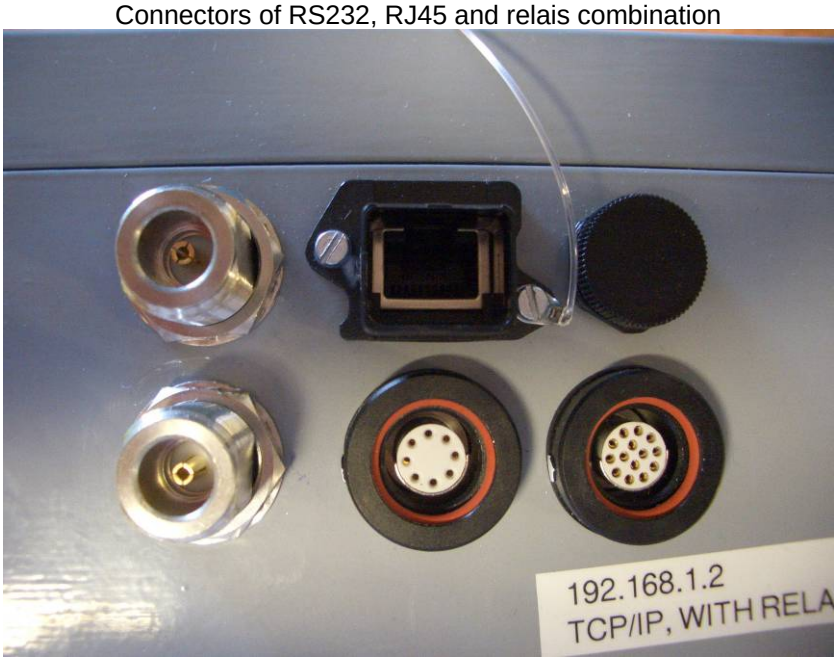


Antenna cable

Antenna cable label

Connectors of RS232 and relais combination

Connectors of RS232, RJ45 and relais combination



Connectors of RS232, RJ45 combination

3.2 Power supply system utilised

Power supply voltage: 10 - 36 V DC

3.3 Short description of the Equipment under Test (EuT)

The EuT is a system for contactless, real time determination of distances and positions.

Number of tested samples: 3
Serial number: none (preproduction)

Dimensions:

Main unit	L: 28 cm	W: 16 cm	H: 9 cm
Antenna	L: 30,5 cm	W: 30,5 cm	H: 18 cm (inclusive holder)
Antenna cable	L: 400 cm		

Radio equipment characteristics

Frequency band(s):	5725MHz – 5875MHz
Operating frequency:	CH7 (maintenance): 5864MHz CH8 – CH13: 5863MHz – 5858MHz Distance measurement band low edge: 5727 MHz Distance measurement band high edge: maximal 5860MHz (center of allocated FSK Channel – 3MHz)
Channel spacing:	1 MHz (FSK-Channel / maintenance Channel))
Number of RF-channels:	1 fixed maintenance Channel (CH7) 5 adjustable FSK Channels (CH8 – CH13) 1 band for distance measurement
Comments:	None

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EuT operation mode:

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

- Testsoftware was active, FSK CH7 active

- Testsoftware was active, FSK CH13 active

EuT configuration:

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

Interface cables:

Interface cable	Length [m]	Type	Line shielded	Line unshielded	Line termination
Power Supply / RS232	4,7	8-wires	☒	☐	Power supply unit
Relais*	4,6	14-wires	☒	☐	none
LAN* **	4,9	8-wires	☒	☐	USB-LAN adapter
Antenna 1	4,0	1-wire	☒	☐	Antenna 1
Antenna 2	4,0	1-wire	☒	☐	Antenna 2

* only connected if connector available in the tested version**: equipped with ferrite core “RKCF-06-A5” on EUT side

Peripheral devices:

Kind of equipment		Model and/or Manufacturer
Power Supply		DPM20LP, Deutronic
Line filter		B84113-C-B30, Epcos
USB-LAN adapter*		SD-ADU2LAN-3M
Laptop		Lifebook E Series, Fujitsu-Siemens

*not used for Version without RJ45 connector

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

emitel AG
Ohmstrasse 1
94342 Strasskirchen
Deutschland

Laboratory registration numbers:

DAR Registration number:	DAT-P-121/02-00
DAR Registration number:	KBA-P 00057-01
SNCH Registration number:	SNCH 001/2005
FCC Registration number:	765810
IC Registration number:	IC 5066A-1
VCCI Registration number:	R2138

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 – Uncertainty 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 does have the sole responsibility for the 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

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (1997+A1:2000+A2:2002), European Standard EN 55022 (1998+A1:2000+A2:2003) and Australian Standard AS 3548 (which are based on CISPR 22).

The Japanese standard, "Voluntary Control Council for Interference (VCCI) by Data Processing Equipment and Electronic Office Machines, Technical Requirements" is technically equivalent to CISPR 22 (1997+A1:2000 +A2:2002). For official compliance, a conformance report must be sent to and accepted by the VCCI.

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-2003 procedures and using the CISPR 22 Limits.

4.4.1.2 Measurement Error

The data and results referenced in this document are true and accurate. The reader is cautioned that there is some measurement variability due to the tolerances of the test equipment that can contribute to a nominal product measurement uncertainty. The measurement uncertainty was calculated for all measurements listed in this test report according to NIS 81/5.1994 “The treatment of uncertainty in EMC measurements” and is documented in the emitel AG quality system according to DIN EN ISO/IEC 17025. Furthermore, component differences and manufacturing process variability of production units similar to that tested may result in additional product uncertainty. 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 device.

4.4.1.3 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 into it’s characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum disturbances from the unit.

4.4.2 CONDUCTED DISTURBANCE

The final level, expressed in dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the CISPR limit, which is equivalent to the Australian AS 3548 limit.

To convert between dBμV and μV, the following conversions apply:
dBμV = 20(log μV)
μV = Inverse log(dBμV/20)

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4.4.3 RADIATED DISTURBANCE

The final level, expressed in dBµV/m, is arrived at by taking the reading from the EMI receiver (Level dBµV) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This is done automatically in a pc-programm, where the correction factor are stored. This result then has the CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in section 5.2. The CISPR 22 limit is equivalent to the Australian AS 3548 limit.

Example:	CISPR B		Delta					
Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Final (dBµV/m)	-	Limit (dBµV/m)	=	CISPR B (dB)
37.19	10.2	+	12.0	=	22.2	-	40.0	=	-17.8

4.4.4 DETAILS OF TEST PROCEDURES

4.4.4.1 General Standard Information

The test methods used comply with CISPR Publication 22 (1997+A1:2000+A2:2002), EN 55022 (1998+A1:2000+ A2:2003) and AS 3548 (1992) - "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment" 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."

4.4.4.2 Conducted disturbance

Conducted disturbance on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. 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 passing margin appears to be less than 10 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.

4.4.4.3 Radiated disturbance

Radiated disturbance from the EUT are measured in the frequency range of 30 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 and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and average / 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. 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 polarizations and the EUT are rotated 360 degrees.

5 TEST CONDITIONS AND RESULTS

5.1 Conducted disturbance

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

5.1.1 Description of the test location

Test location: Shielded Room SK5

5.1.2 Photo documentation of the test set-up

5.1.3 Test specification:

Environmental conditions: Temperature: 22 ° C Humidity: 37 % Atmospheric pressure: 97 kPa

Frequency range: 0.15 MHz - 30 MHz

The test was carried out in the following operation mode(s):
- Testsoftware was active, FSK CH7 active
- Testsoftware was active, FSK CH13 active

5.1.4 Test result

The requirements are **FULFILLED.**

Remarks: No QuasiPeak and Average measurement was made because the Peak values are below the AV limit. The measurements were made at the AC input port of the line filter.

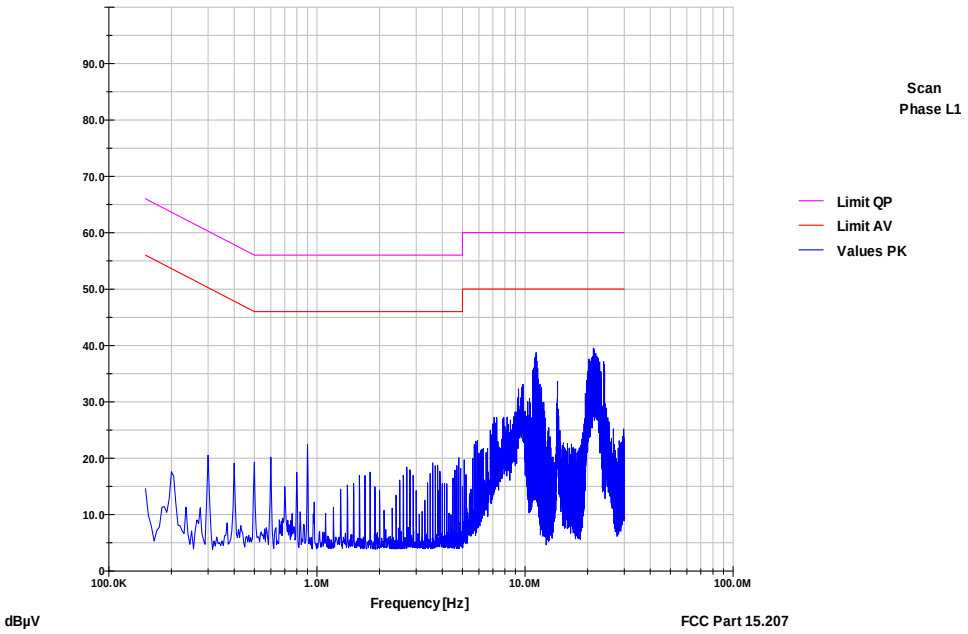
5.1.5 Test protocol

Standard: FCC Part 15.107a Result: passed
Test point L1
Operation mode: Testsoftware was active, FSK CH7 active
Remarks: Version with RS232, RJ45 and relais
Date: 27.03.2009
Tested by: Jürgen Pessinger

Start frequency [MHZ]	Stop frequency [MHZ]	Resolution bandwidth	step size	Measurement time	Detector
0.15	30	9 kHz	4.5 kHz	10 ms	Peak

Frequency	Result PK [dBµV]	Result AV [dBµV]	Result QP [dBµV]	Correction [dB]	Limit AV [dBµV]	Limit QP [dBµV]	Margin AV [dB]	Margin QP [dB]

No QuasiPeak and Average measurement was made because the Peak values are below the AV Limit

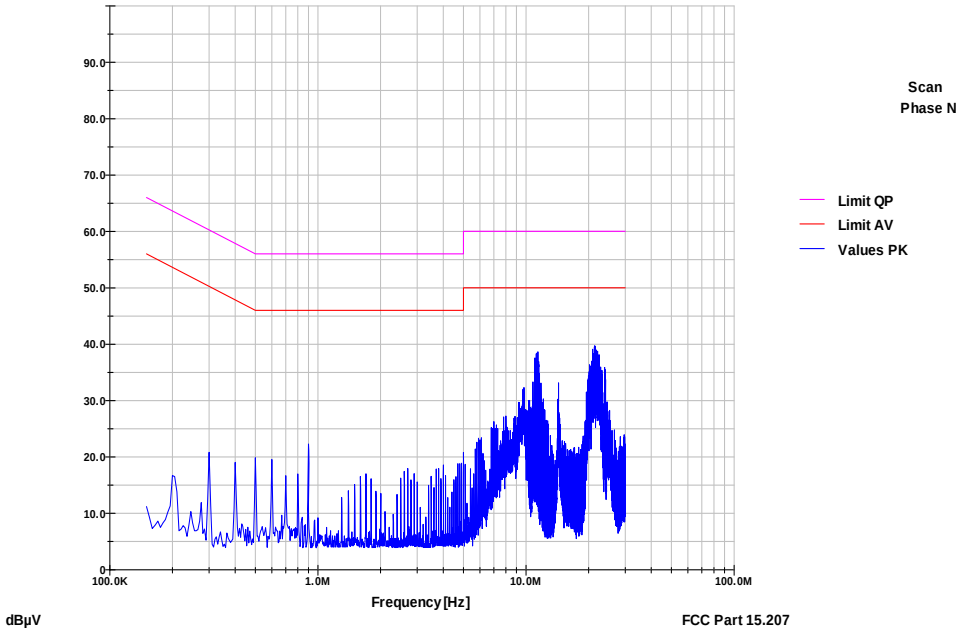


Standard: FCC Part 15.107a Result: passed
Test point: N
Operation mode: Testsoftware was active, FSK CH7 active
Remarks: Version with RS232, RJ45 and relais
Date: 27.03.2009
Tested by: Jürgen Pessinger

Start frequency [MHZ]	Stop frequency [MHZ]	Resolution bandwidth	step size	Measurement time	Detector
0.15	30	9 kHz	4.5 kHz	10 ms	Peak

Frequency	Result PK [dBµV]	Result AV [dBµV]	Result QP [dBµV]	Correction [dB]	Limit AV [dBµV]	Limit QP [dBµV]	Margin AV [dB]	Margin QP [dB]

No QuasiPeak and Average measurement was made because the Peak values are below the AV Limit

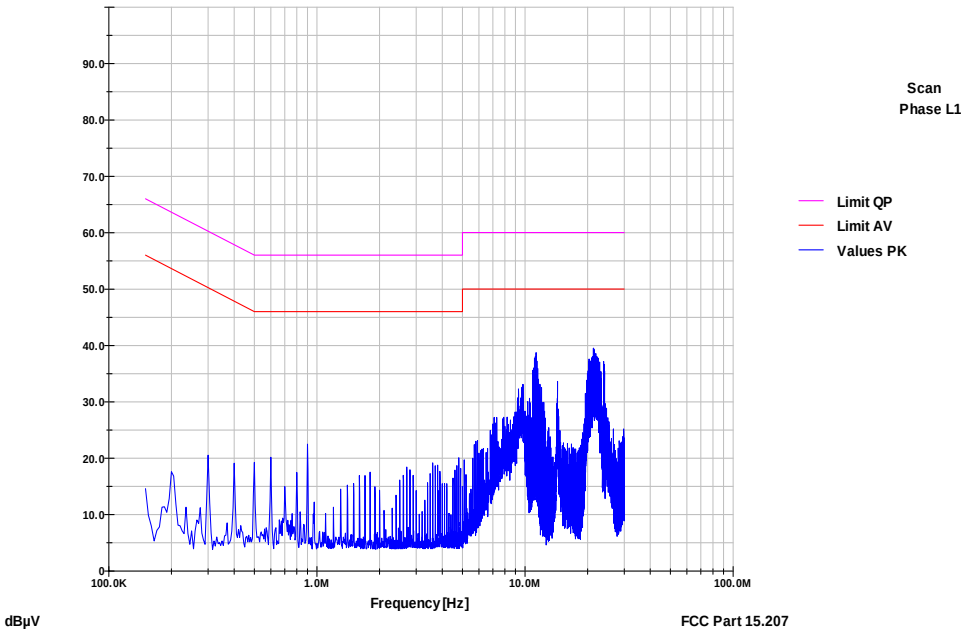


Standard: FCC Part 15.107a Result: passed
Test point: L1
Operation mode: Testsoftware was active, FSK CH13 active
Remarks: Version with RS232, RJ45 and relais
Date: 27.03.2009
Tested by: Jürgen Pessinger

Start frequency [MHZ]	Stop frequency [MHZ]	Resolution bandwidth	step size	Measurement time	Detector
0.15	30	9 kHz	4.5 kHz	10 ms	Peak

Frequency	Result PK [dBµV]	Result AV [dBµV]	Result QP [dBµV]	Correction [dB]	Limit AV [dBµV]	Limit QP [dBµV]	Margin AV [dB]	Margin QP [dB]

No QuasiPeak and Average measurement was made because the Peak values are below the AV Limit

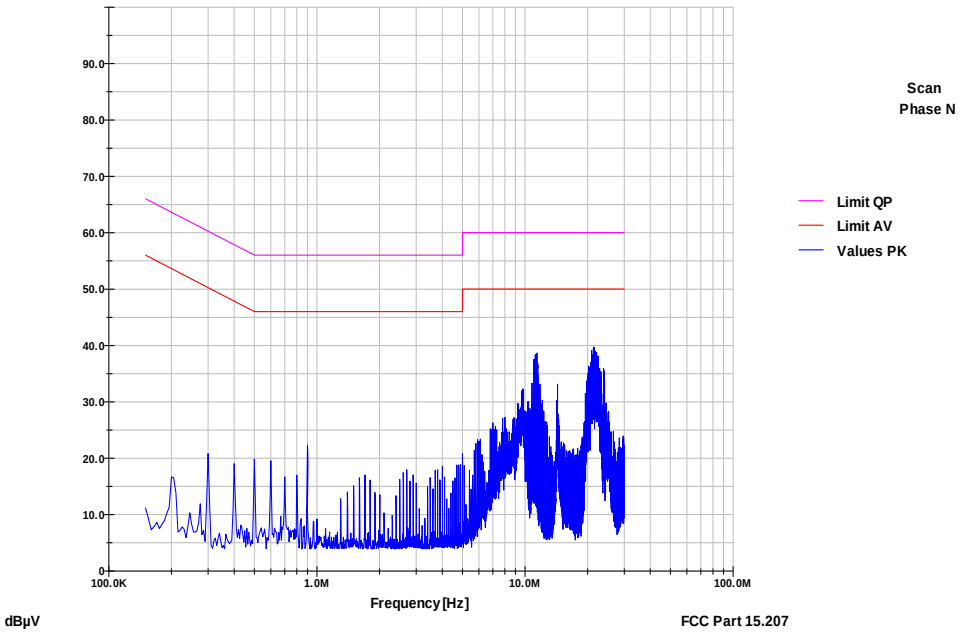


Standard: FCC Part 15.107a Result: passed
Test point: N
Operation mode: Testsoftware was active, FSK CH13 active
Remarks: Version with RS232, RJ45 and relais
Date: 27.03.2009
Tested by: Jürgen Pessinger

Start frequency [MHZ]	Stop frequency [MHZ]	Resolution bandwidth	step size	Measurement time	Detector
0.15	30	9 kHz	4.5 kHz	10 ms	Peak

Frequency	Result PK [dBµV]	Result AV [dBµV]	Result QP [dBµV]	Correction [dB]	Limit AV [dBµV]	Limit QP [dBµV]	Margin AV [dB]	Margin QP [dB]

No QuasiPeak and Average measurement was made because the Peak values are below the AV Limit

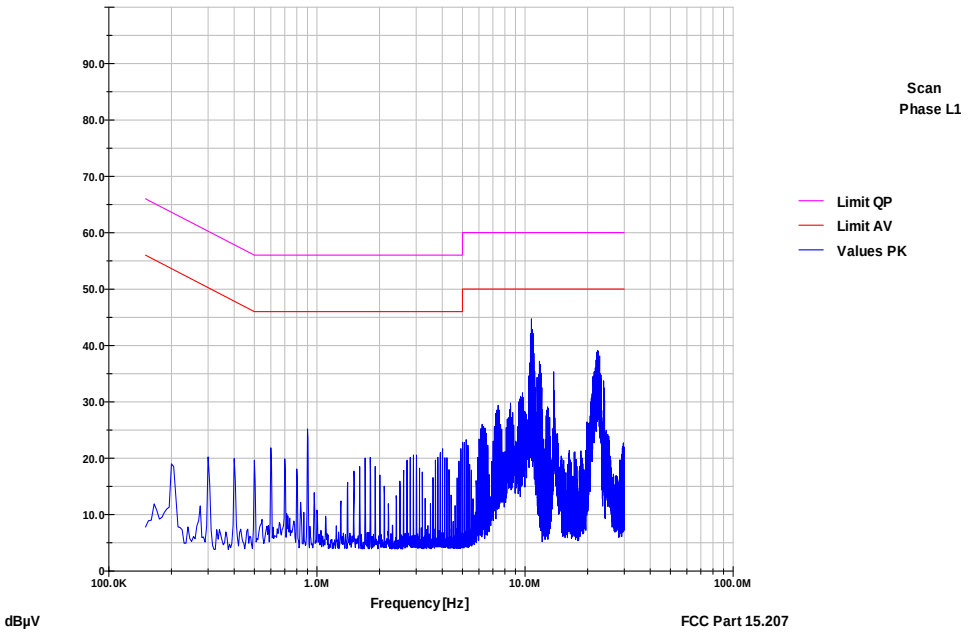


Standard: FCC Part 15.107a Result: passed
Test point L1
Operation mode: Testsoftware was active, FSK CH13 active
Remarks: Version with RS232 and RJ45
Date: 27.03.2009
Tested by: Jürgen Pessinger

Start frequency [MHZ]	Stop frequency [MHZ]	Resolution bandwidth	step size	Measurement time	Detector
0.15	30	9 kHz	4.5 kHz	10 ms	Peak

Frequency	Result PK [dBµV]	Result AV [dBµV]	Result QP [dBµV]	Correction [dB]	Limit AV [dBµV]	Limit QP [dBµV]	Margin AV [dB]	Margin QP [dB]

No QuasiPeak and Average measurement was made because the Peak values are below the AV Limit

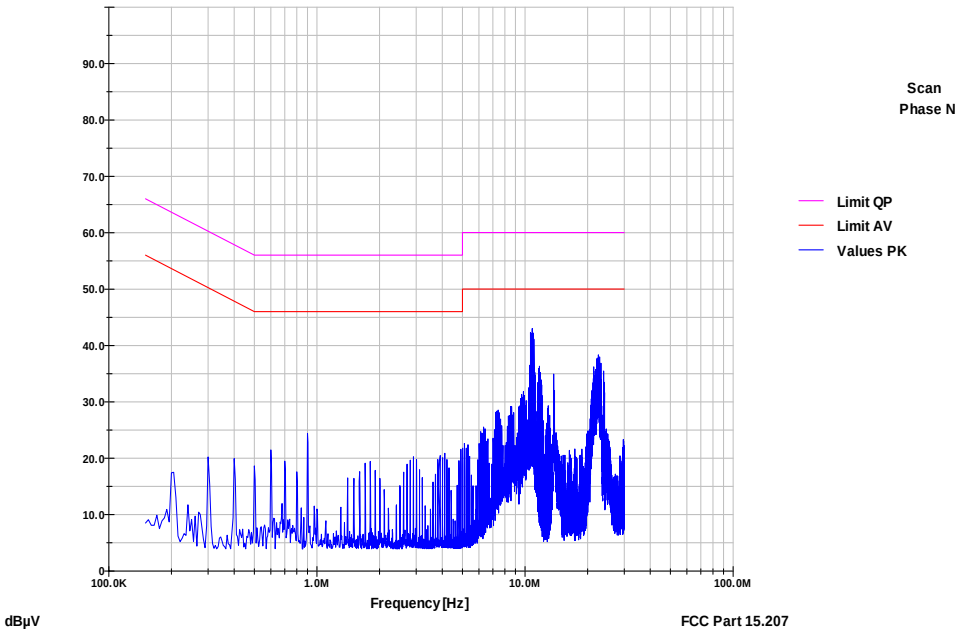


Standard: FCC Part 15.107a Result: passed
Test point: N
Operation mode: Testsoftware was active, FSK CH13 active
Remarks: Version with RS232, RJ45 and relais
Date: 27.03.2009
Tested by: Jürgen Pessinger

Start frequency [MHZ]	Stop frequency [MHZ]	Resolution bandwidth	step size	Measurement time	Detector
0.15	30	9 kHz	4.5 kHz	10 ms	Peak

Frequency	Result PK [dBµV]	Result AV [dBµV]	Result QP [dBµV]	Correction [dB]	Limit AV [dBµV]	Limit QP [dBµV]	Margin AV [dB]	Margin QP [dB]

No QuasiPeak and Average measurement was made because the Peak values are below the AV Limit

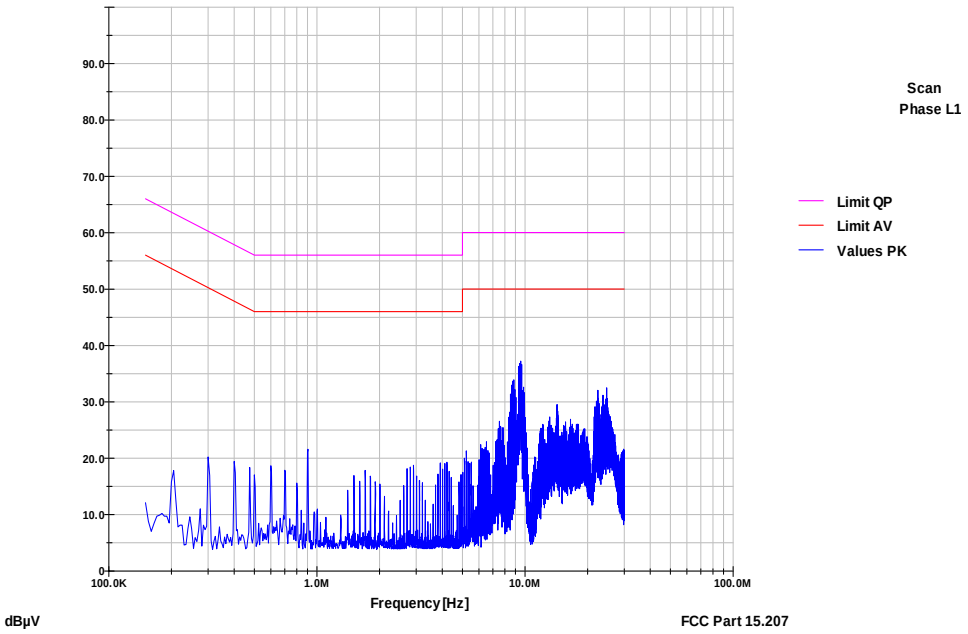


Standard: FCC Part 15.107a Result: passed
Test point: L1
Operation mode: Testsoftware was active, FSK CH7 active
Remarks: Version with RS232 and relais
Date: 27.03.2009
Tested by: Jürgen Pessinger

Start frequency [MHZ]	Stop frequency [MHZ]	Resolution bandwidth	step size	Measurement time	Detector
0.15	30	9 kHz	4.5 kHz	10 ms	Peak

Frequency	Result PK [dBµV]	Result AV [dBµV]	Result QP [dBµV]	Correction [dB]	Limit AV [dBµV]	Limit QP [dBµV]	Margin AV [dB]	Margin QP [dB]

No QuasiPeak and Average measurement was made because the Peak values are below the AV Limit

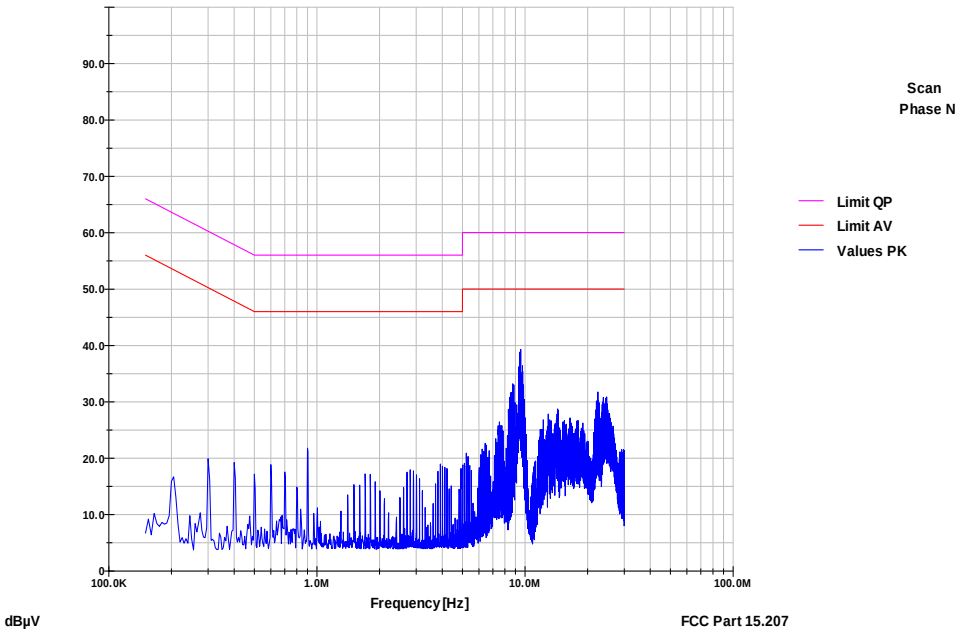


Standard: FCC Part 15.107a Result: passed
Test point: N
Operation mode: Testsoftware was active, FSK CH7 active
Remarks: Version with RS232 and relais
Date: 27.03.2009
Tested by: Jürgen Pessinger

Start frequency [MHZ]	Stop frequency [MHZ]	Resolution bandwidth	step size	Measurement time	Detector
0.15	30	9 kHz	4.5 kHz	10 ms	Peak

Frequency	Result PK [dBµV]	Result AV [dBµV]	Result QP [dBµV]	Correction [dB]	Limit AV [dBµV]	Limit QP [dBµV]	Margin AV [dB]	Margin QP [dB]

No QuasiPeak and Average measurement was made because the Peak values are below the AV Limit



5.2 Radiated disturbance in the frequency range 30MHz – 1000MHz

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

5.2.1 Description of the test location

Test location: OATS 3

Test distance: 3 metres

5.2.2 Photo documentation of the test set-up

5.2.3 Test specification:

Environmental conditions: Temperature: 22 ° C Humidity: 37 % Atmospheric pressure: 97 kPa

Frequency range: 30 MHz - 1000 MHz

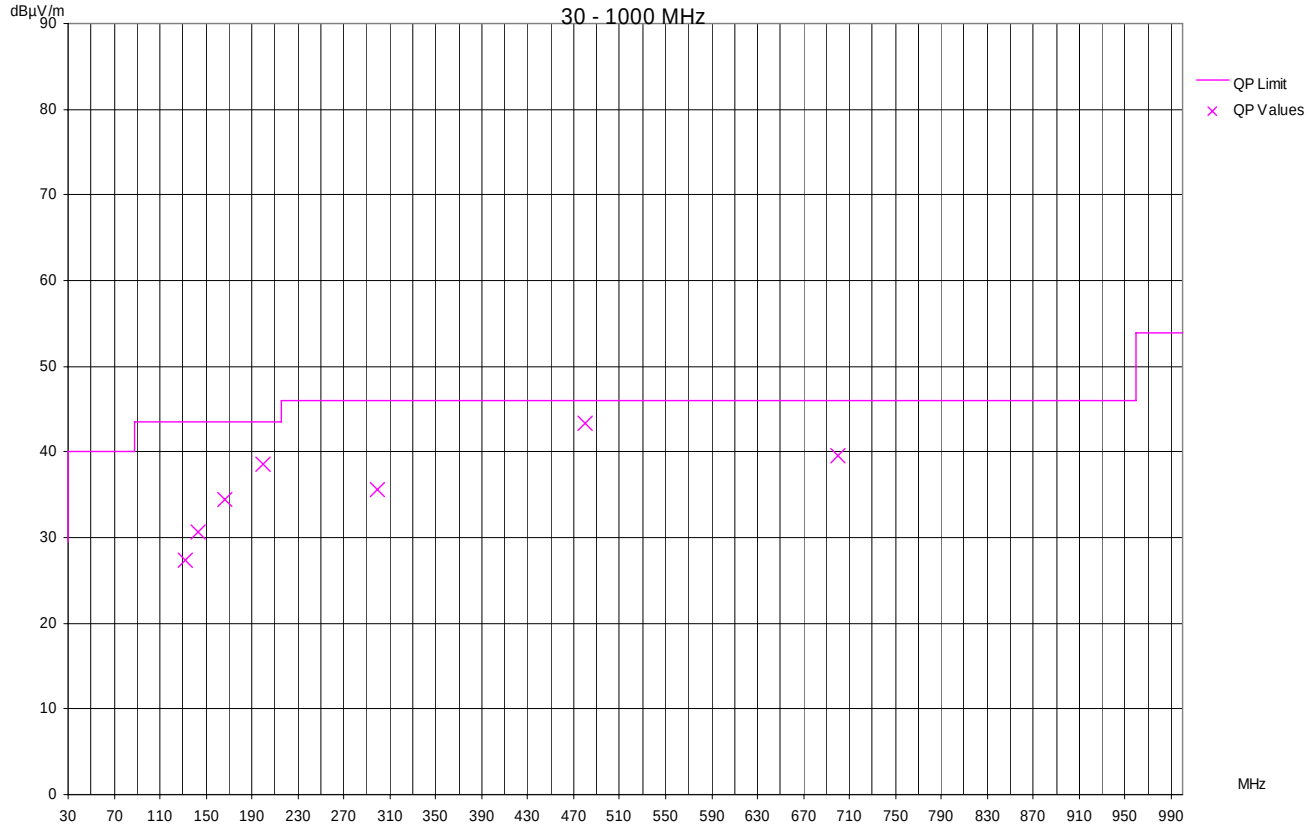
The test was carried out in the following operation mode(s):
- Testsoftware was active, FSK CH7 active
- Testsoftware was active, FSK CH13 active

5.2.4 Test result

The requirements are **FULFILLED.**

Remarks: none

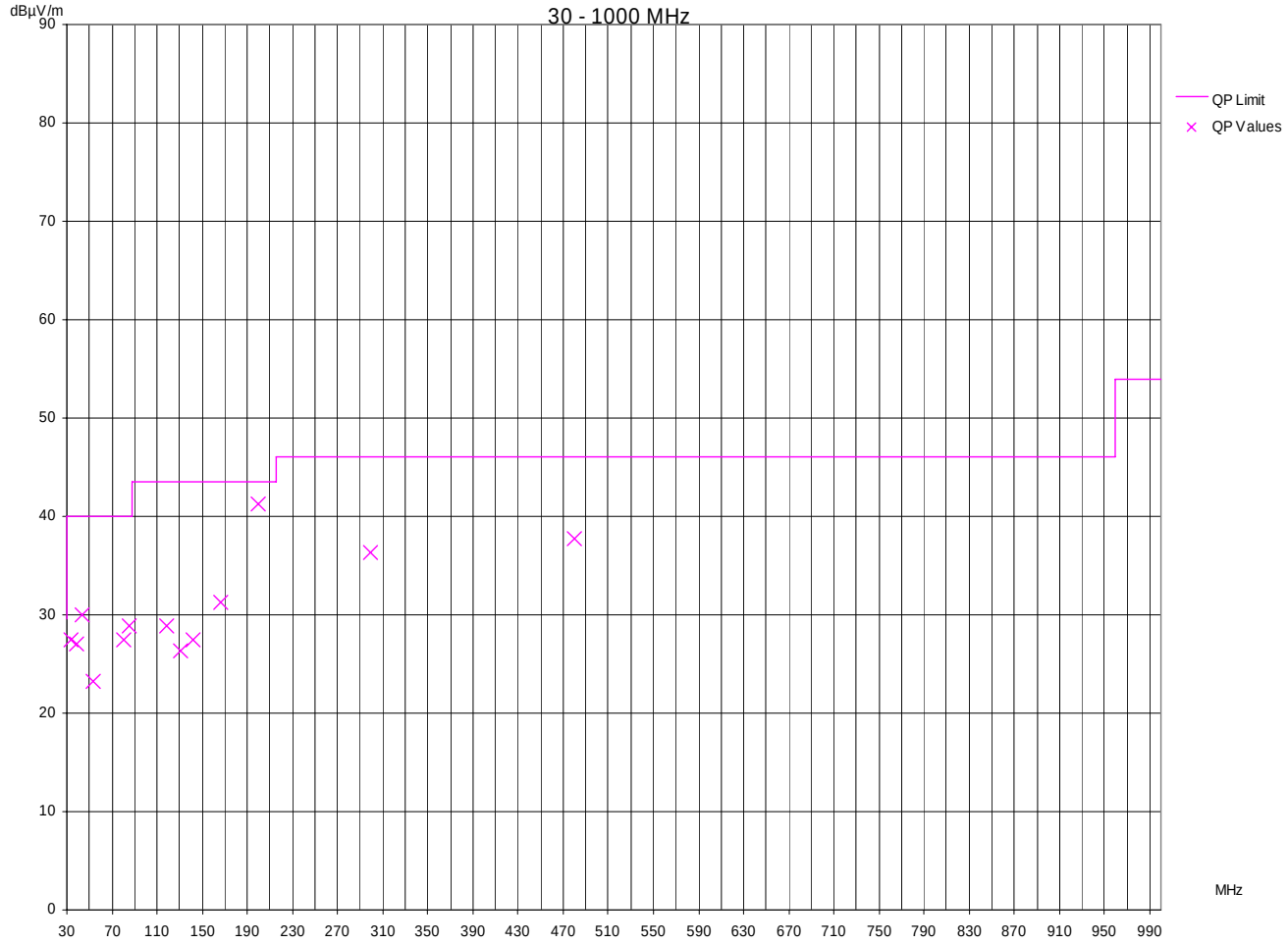
Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232, RJ45 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -2,7 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
131,500	16,4	11,0	27,4	43,5	-16,1
143,199	20,1	10,6	30,7	43,5	-12,8
166,000	23,3	11,2	34,5	43,5	-9,0
199,285	25,2	13,3	38,5	43,5	-5,0
299,710	19,1	16,6	35,7	46,0	-10,3
480,045	22,6	20,7	43,3	46,0	-2,7
700,097	15,3	24,2	39,5	46,0	-6,5

Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232, RJ45 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Vertical
Remark:	none



Minimum margin to limit: -2,2 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
33,211	13,5	13,9	27,4	40,0	-12,6
38,968	12,5	14,6	27,1	40,0	-12,9
43,592	15,2	14,8	30,0	40,0	-10,0
53,340	8,8	14,5	23,3	40,0	-16,7
80,151	16,3	11,1	27,4	40,0	-12,6
84,951	17,3	11,6	28,9	40,0	-11,1
118,200	16,4	12,5	28,9	43,5	-14,6
130,560	15,3	11,1	26,4	43,5	-17,1
141,971	16,8	10,6	27,4	43,5	-16,1
166,108	20,0	11,2	31,2	43,5	-12,3
199,285	28,0	13,3	41,3	43,5	-2,2
299,710	19,7	16,6	36,3	46,0	-9,7
480,000	17,0	20,7	37,7	46,0	-8,3

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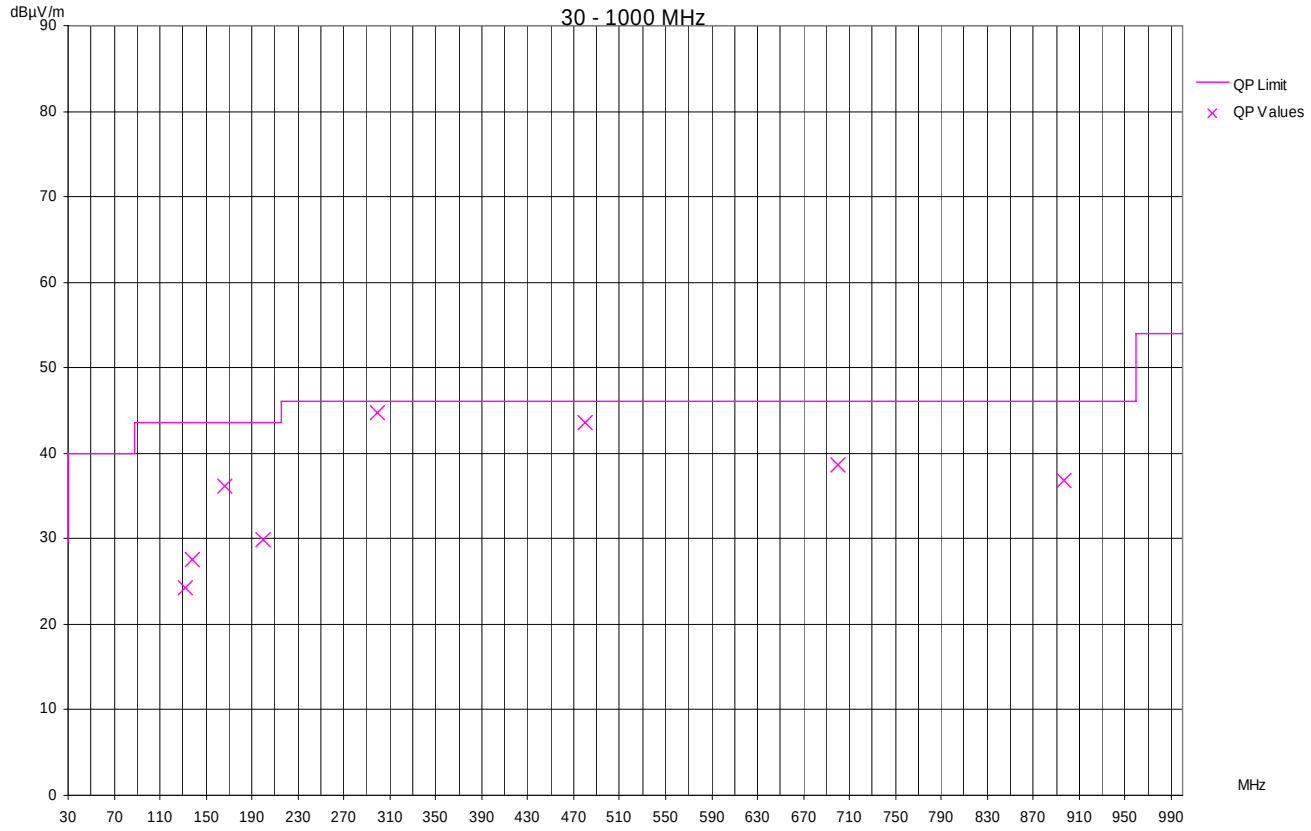
Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232, RJ45 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -1,3 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
132,152	13,3	11,0	24,3	43,5	-19,2
138,149	16,9	10,7	27,6	43,5	-15,9
166,000	25,0	11,2	36,2	43,5	-7,3
199,285	16,6	13,3	29,9	43,5	-13,6
299,710	28,1	16,6	44,7	46,0	-1,3
480,045	22,8	20,7	43,5	46,0	-2,5
700,097	14,4	24,2	38,6	46,0	-7,4
896,991	10,1	26,8	36,9	46,0	-9,1

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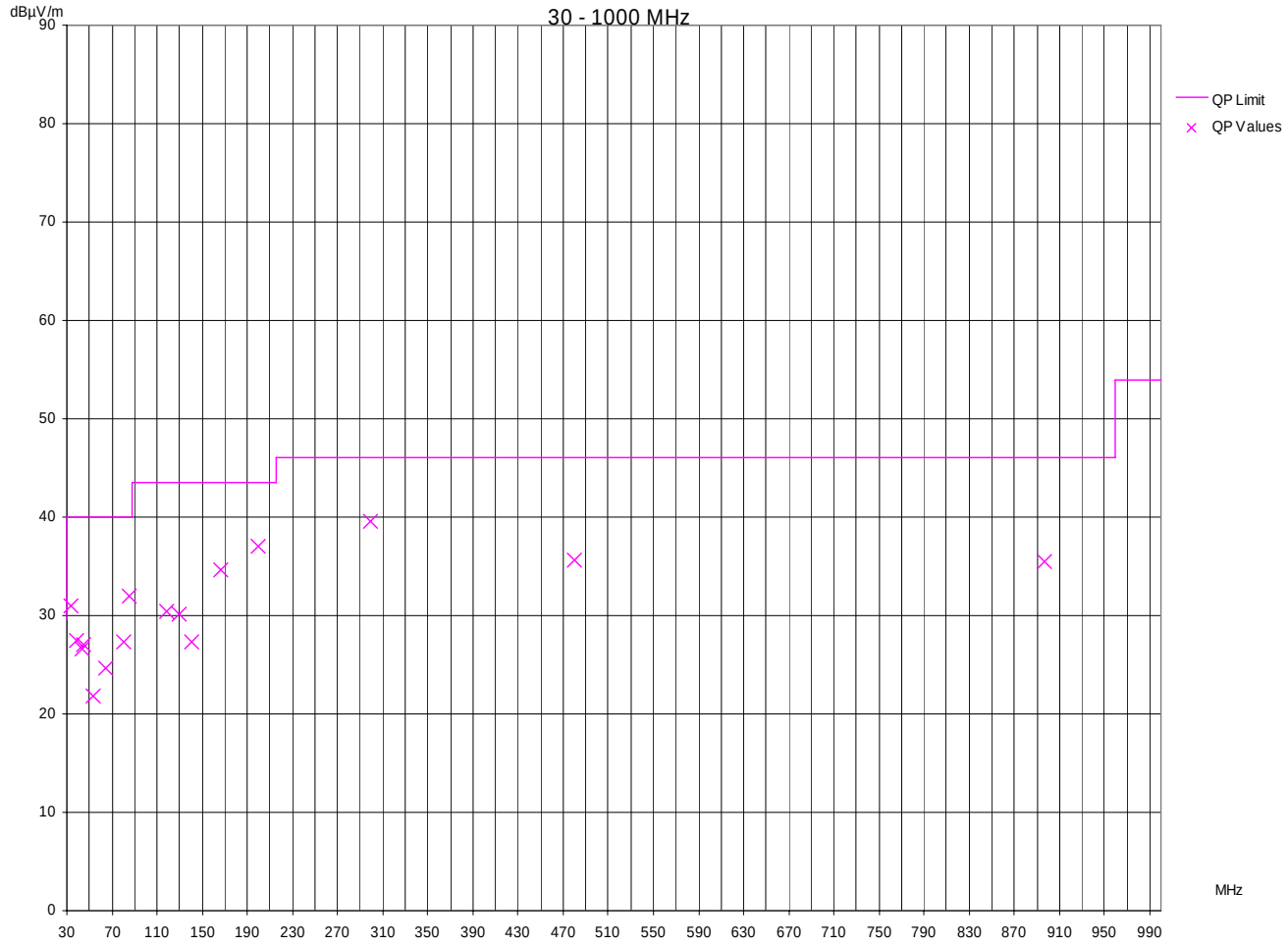
Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232, RJ45 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Vertical
Remark:	none

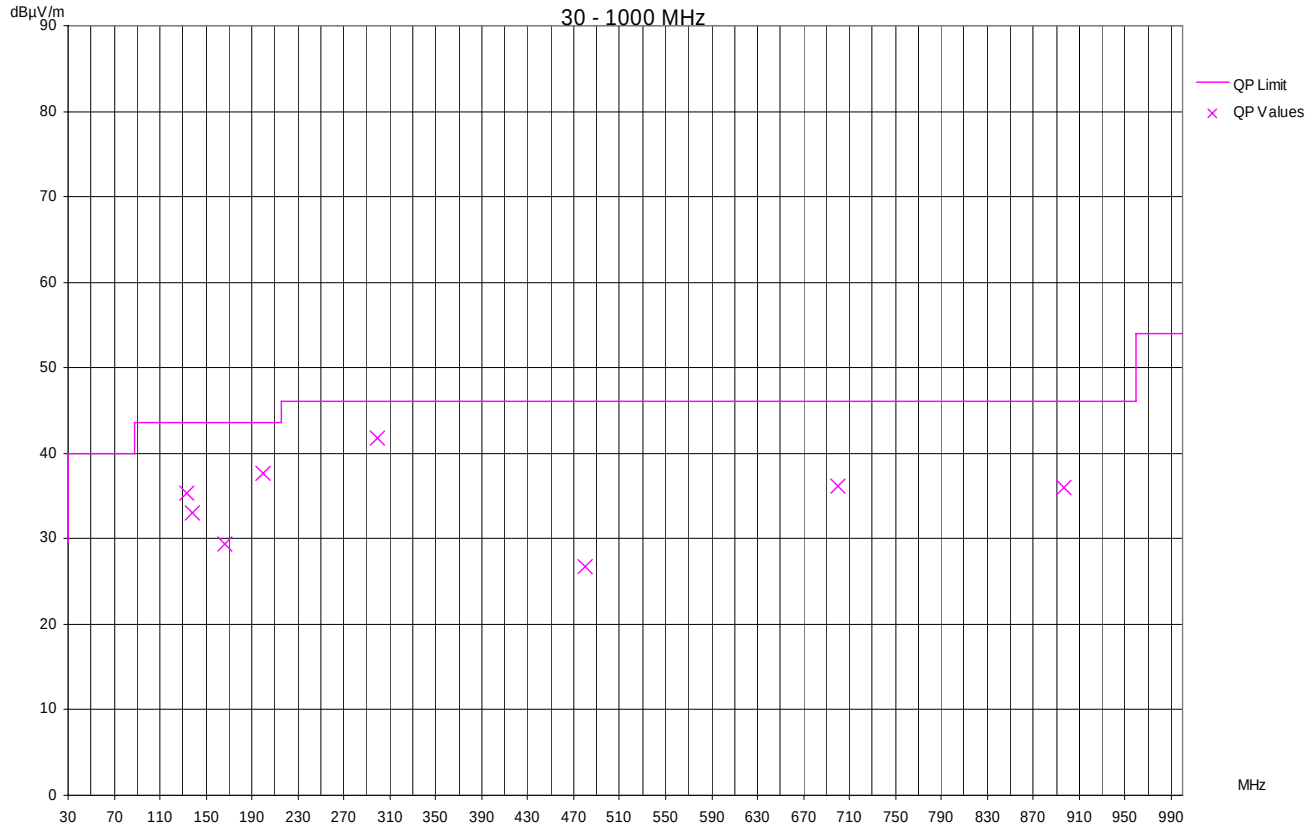


File No. **T-0239-3062-04 JP**

Minimum margin to limit: -6,4 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
33,211	17,1	13,9	31,0	40,0	-9,0
38,968	12,8	14,6	27,4	40,0	-12,6
43,156	11,8	14,8	26,6	40,0	-13,4
44,189	12,2	14,8	27,0	40,0	-13,0
53,340	7,3	14,5	21,8	40,0	-18,2
65,015	12,8	11,9	24,7	40,0	-15,3
80,151	16,2	11,1	27,3	40,0	-12,7
85,674	20,2	11,7	31,9	40,0	-8,1
118,200	18,0	12,5	30,5	43,5	-13,0
129,838	19,0	11,1	30,1	43,5	-13,4
141,251	16,7	10,6	27,3	43,5	-16,2
166,108	23,5	11,2	34,7	43,5	-8,8
199,285	23,7	13,3	37,0	43,5	-6,5
299,710	23,0	16,6	39,6	46,0	-6,4
480,000	14,9	20,7	35,6	46,0	-10,4
896,991	8,7	26,8	35,5	46,0	-10,5

Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -4,2 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
132,708	24,4	10,9	35,3	43,5	-8,2
138,544	22,3	10,7	33,0	43,5	-10,5
166,124	18,2	11,2	29,4	43,5	-14,1
199,359	24,3	13,3	37,6	43,5	-5,9
299,710	25,2	16,6	41,8	46,0	-4,2
480,045	6,1	20,7	26,8	46,0	-19,2
700,097	12,0	24,2	36,2	46,0	-9,8
896,991	9,2	26,8	36,0	46,0	-10,0

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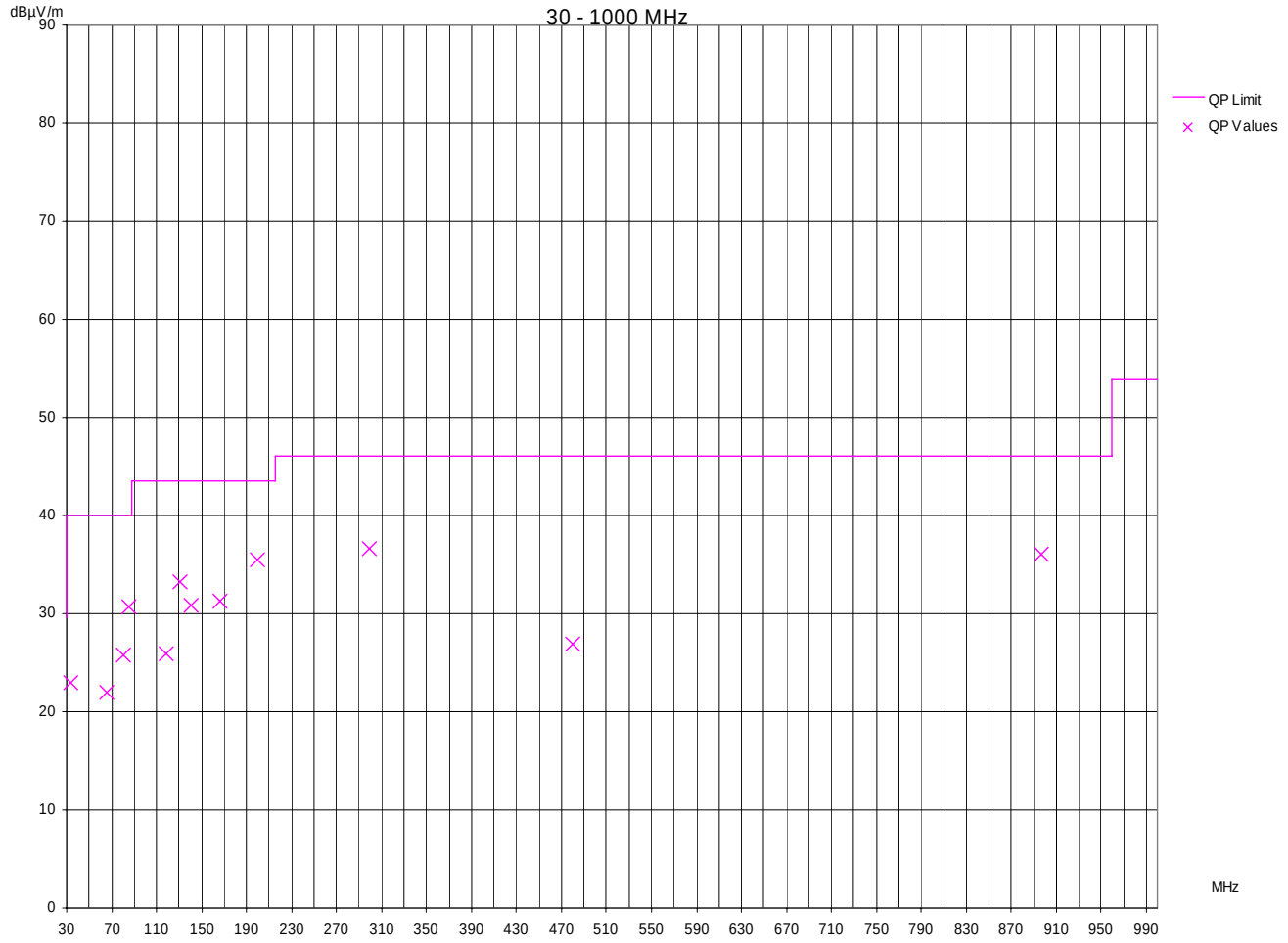
Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Vertical
Remark:	none



Minimum margin to limit: -8,0 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
33,211	9,0	13,9	22,9	40,0	-17,1
65,250	10,1	11,8	21,9	40,0	-18,1
80,151	14,7	11,1	25,8	40,0	-14,2
85,674	18,9	11,7	30,6	40,0	-9,4
118,163	13,4	12,5	25,9	43,5	-17,6
130,326	22,2	11,1	33,3	43,5	-10,2
141,201	20,2	10,6	30,8	43,5	-12,7
166,227	20,0	11,2	31,2	43,5	-12,3
199,404	22,2	13,3	35,5	43,5	-8,0
299,710	20,1	16,6	36,7	46,0	-9,3
480,000	6,2	20,7	26,9	46,0	-19,1
896,991	9,2	26,8	36,0	46,0	-10,0

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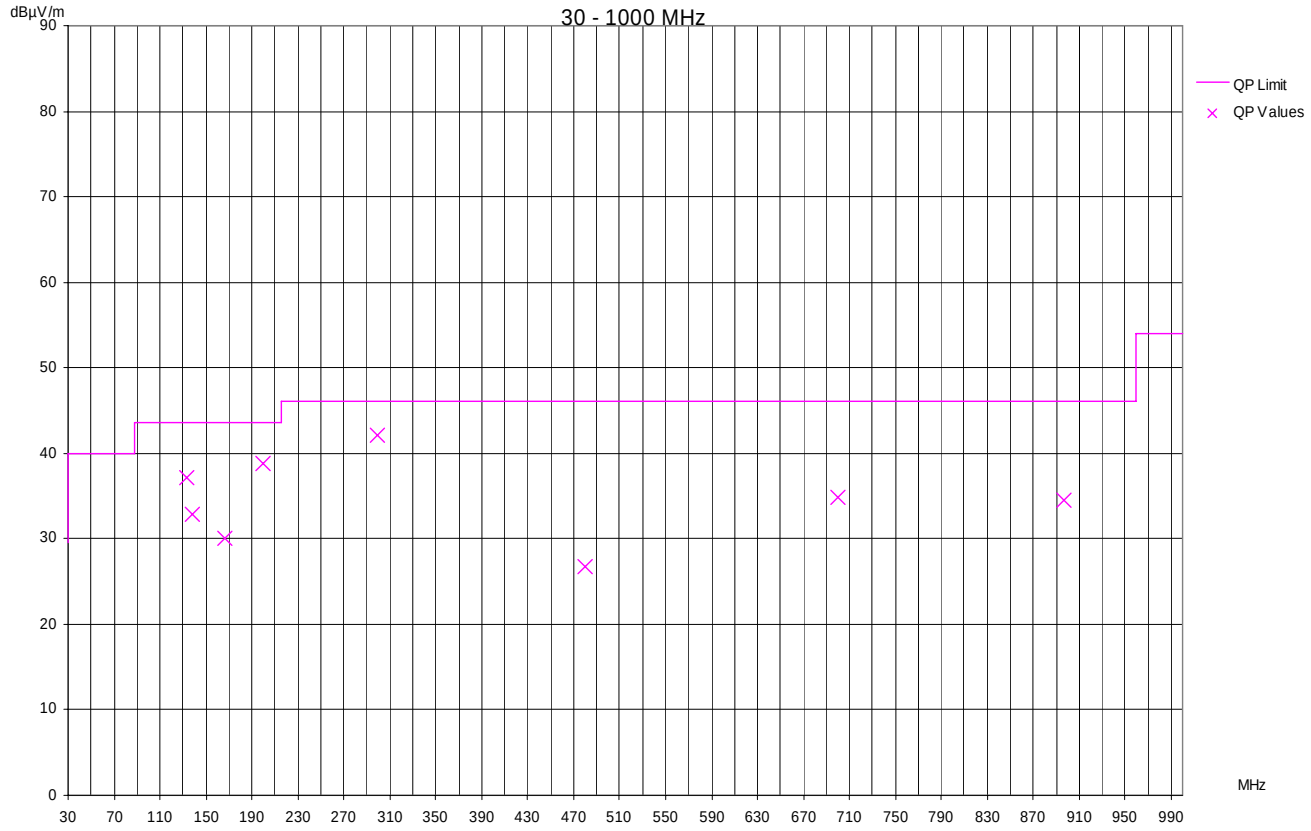
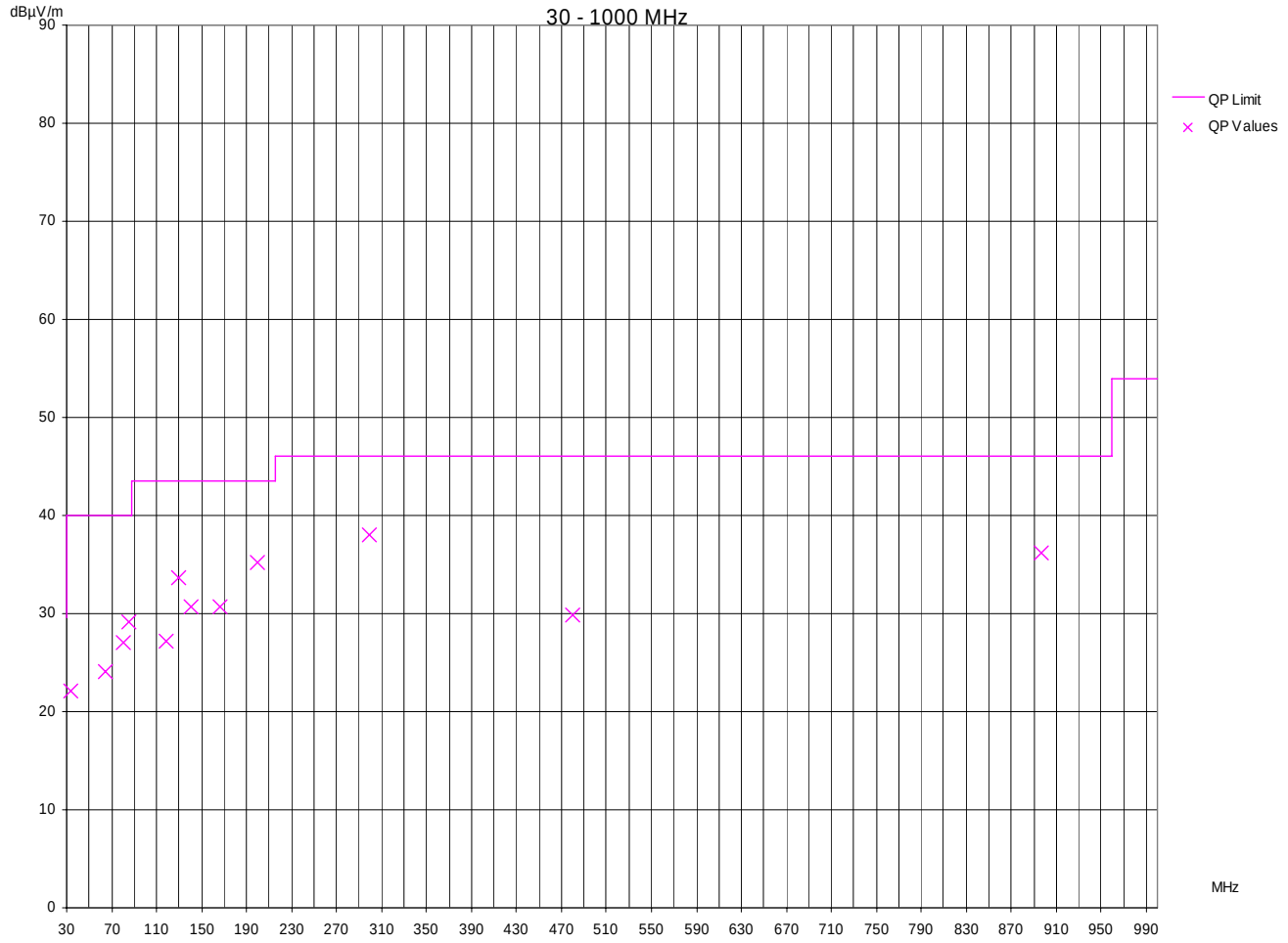
Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -3,9 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
132,708	26,2	10,9	37,1	43,5	-6,4
138,525	22,2	10,7	32,9	43,5	-10,6
166,124	18,9	11,2	30,1	43,5	-13,4
199,359	25,5	13,3	38,8	43,5	-4,7
299,710	25,5	16,6	42,1	46,0	-3,9
480,045	6,1	20,7	26,8	46,0	-19,2
700,097	10,6	24,2	34,8	46,0	-11,2
896,991	7,7	26,8	34,5	46,0	-11,5

Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Vertical
Remark:	none



Minimum margin to limit: -8,0 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
33,211	8,2	13,9	22,1	40,0	-17,9
65,026	12,2	11,9	24,1	40,0	-15,9
80,151	15,9	11,1	27,0	40,0	-13,0
85,674	17,4	11,7	29,1	40,0	-10,9
118,101	14,7	12,5	27,2	43,5	-16,3
130,187	22,6	11,1	33,7	43,5	-9,8
141,119	20,1	10,6	30,7	43,5	-12,8
166,108	19,5	11,2	30,7	43,5	-12,8
199,404	21,9	13,3	35,2	43,5	-8,3
299,710	21,4	16,6	38,0	46,0	-8,0
480,000	9,1	20,7	29,8	46,0	-16,2
896,991	9,4	26,8	36,2	46,0	-9,8

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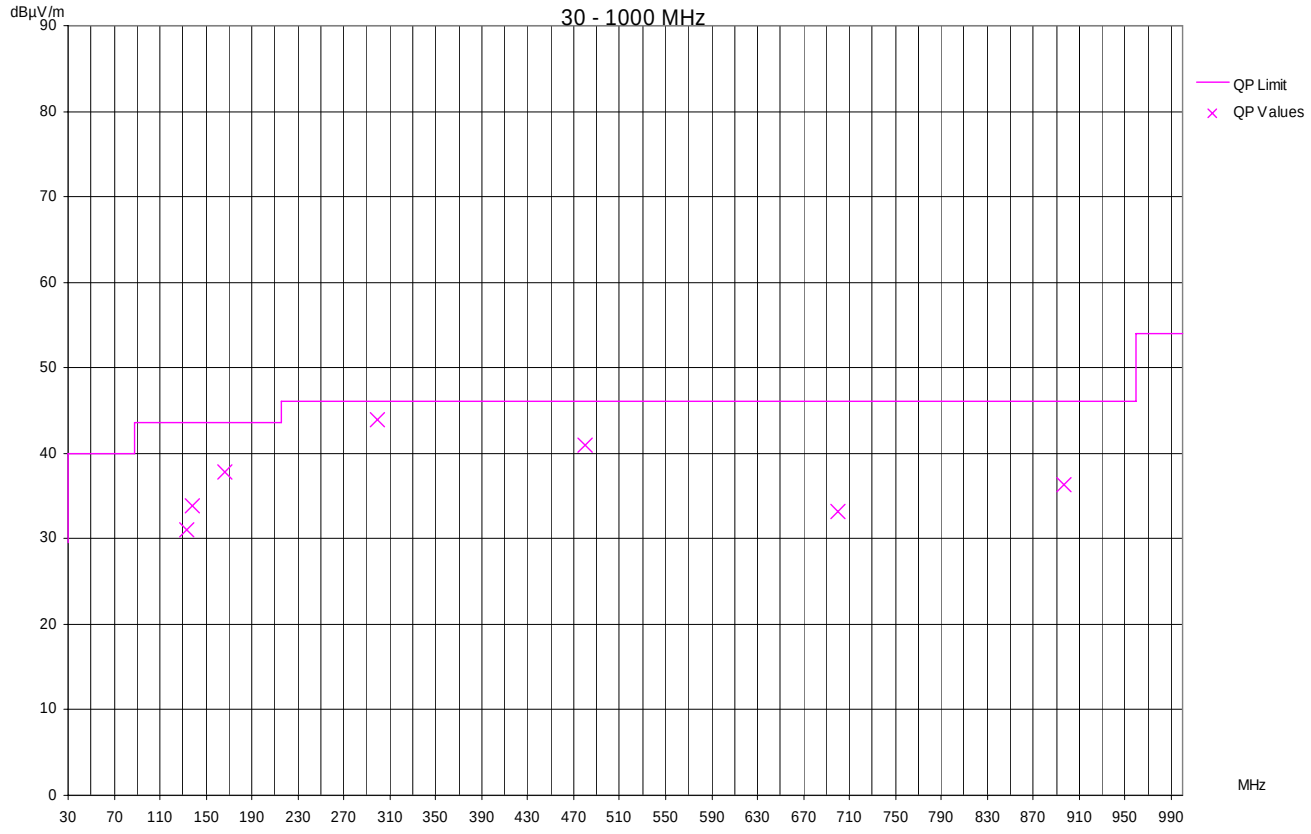
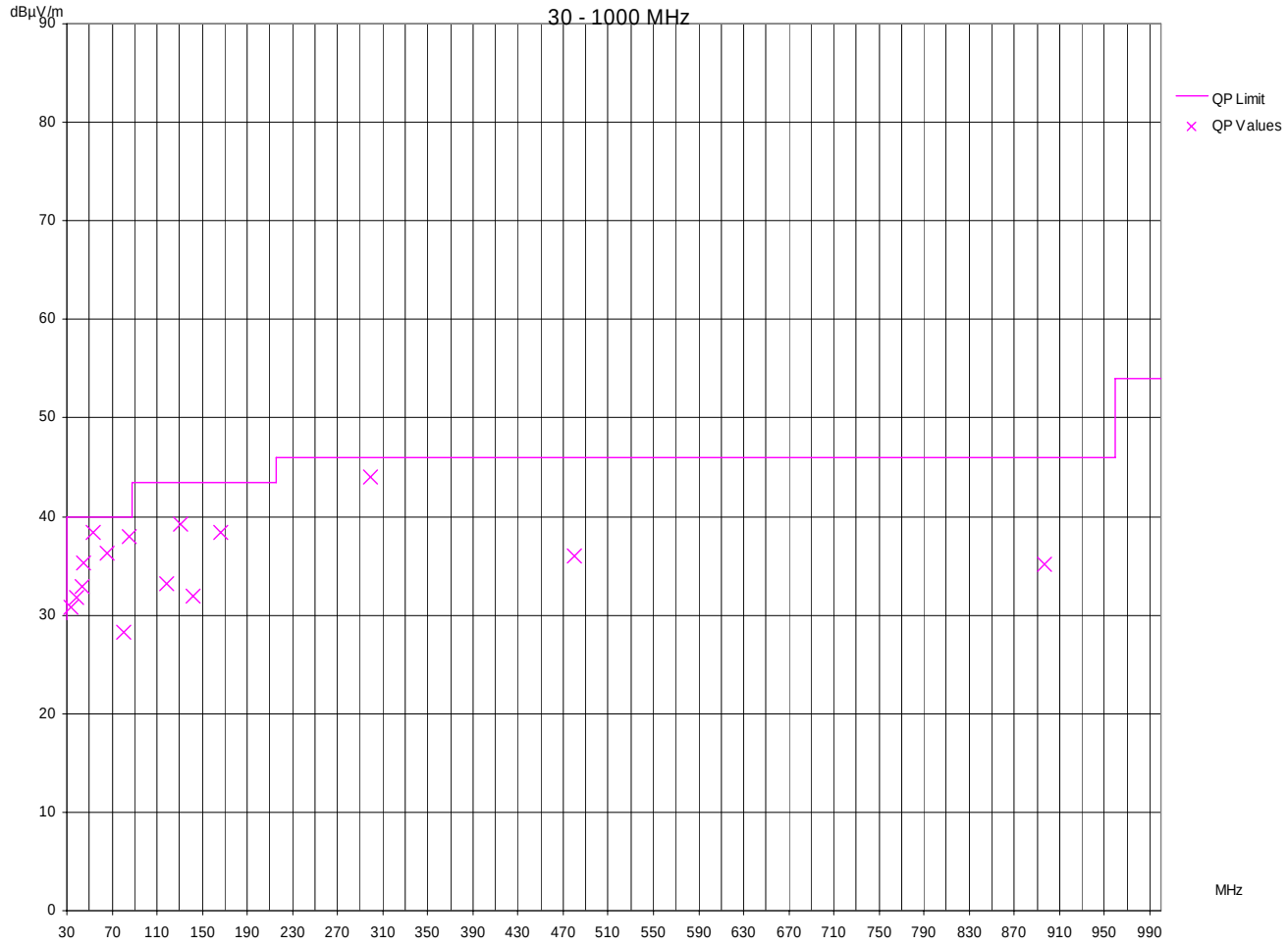
Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232 and RJ45
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -2,1 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
132,708	20,1	10,9	31,0	43,5	-12,5
138,391	23,1	10,7	33,8	43,5	-9,7
166,124	26,6	11,2	37,8	43,5	-5,7
299,710	27,3	16,6	43,9	46,0	-2,1
480,045	20,3	20,7	41,0	46,0	-5,0
700,097	9,0	24,2	33,2	46,0	-12,8
896,991	9,6	26,8	36,4	46,0	-9,6

Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232 and RJ45
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Vertical
Remark:	none



Minimum margin to limit: -1,6 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
33,211	16,9	13,9	30,8	40,0	-9,2
39,158	17,2	14,6	31,8	40,0	-8,2
43,126	18,2	14,8	33,0	40,0	-7,0
44,265	20,5	14,8	35,3	40,0	-4,7
53,340	23,9	14,5	38,4	40,0	-1,6
65,250	24,4	11,8	36,2	40,0	-3,8
80,151	17,1	11,1	28,2	40,0	-11,8
85,674	26,2	11,7	37,9	40,0	-2,1
118,037	20,7	12,5	33,2	43,5	-10,3
130,326	28,1	11,1	39,2	43,5	-4,3
141,266	21,3	10,6	31,9	43,5	-11,6
166,108	27,2	11,2	38,4	43,5	-5,1
299,710	27,4	16,6	44,0	46,0	-2,0
480,000	15,3	20,7	36,0	46,0	-10,0
896,991	8,3	26,8	35,1	46,0	-10,9

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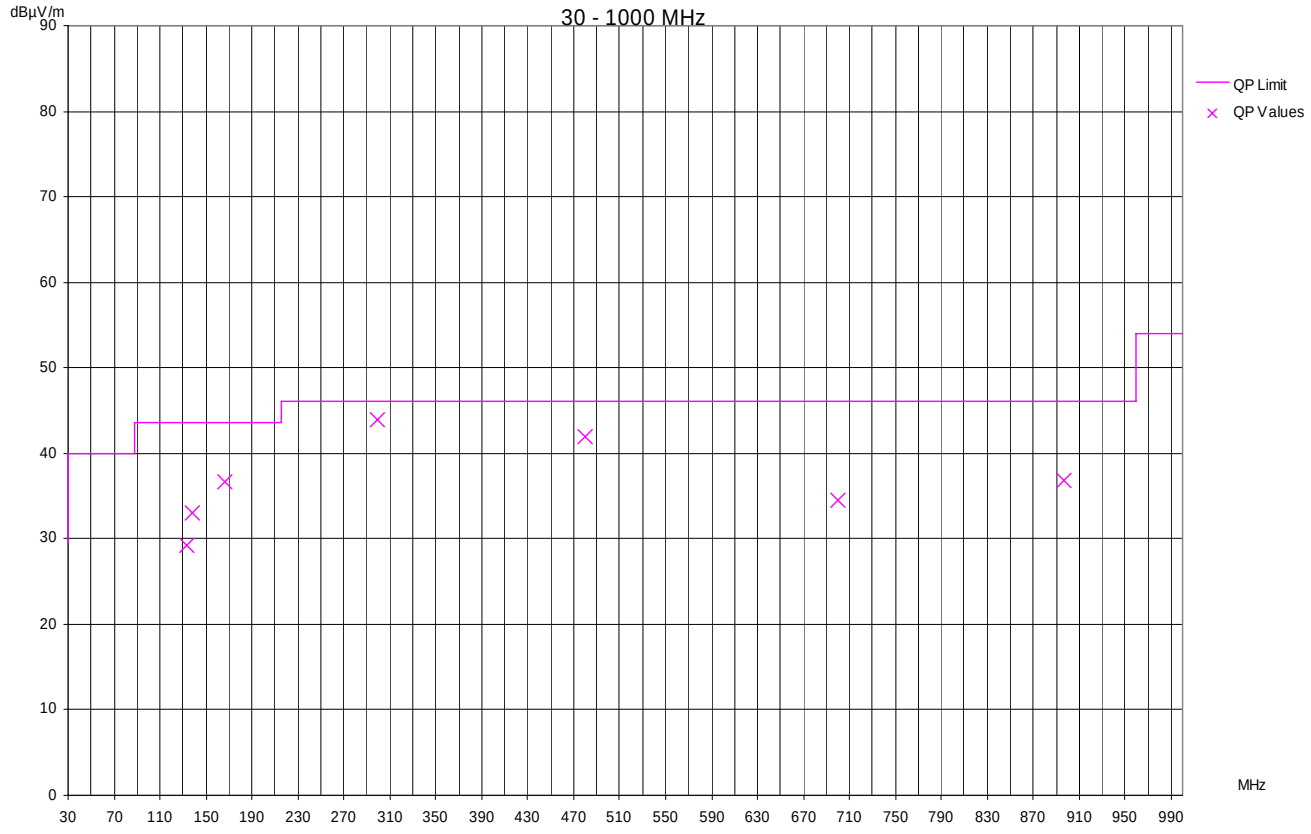
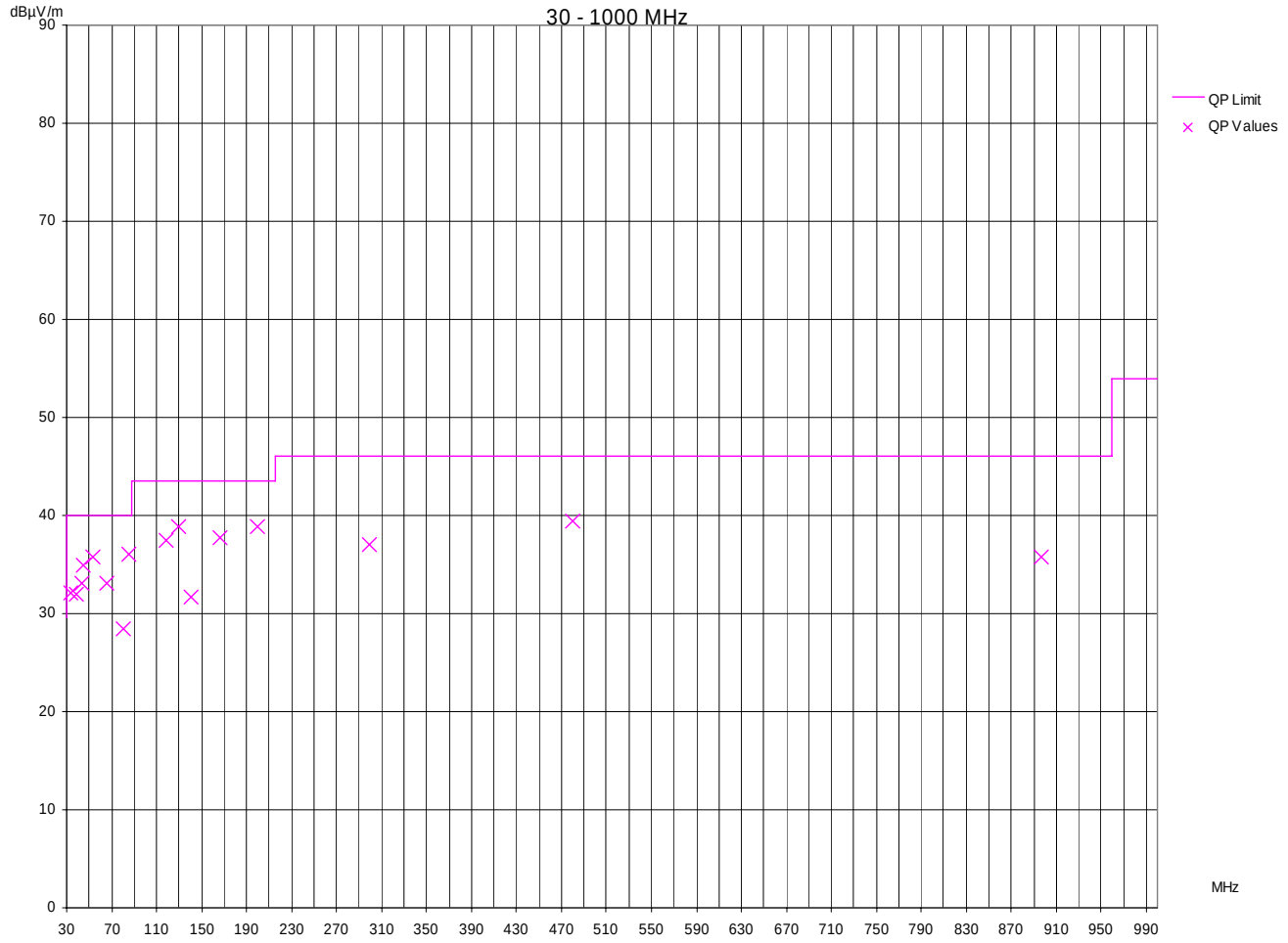
Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232 and RJ45
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -2,1 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
132,708	18,3	10,9	29,2	43,5	-14,3
138,391	22,3	10,7	33,0	43,5	-10,5
166,124	25,5	11,2	36,7	43,5	-6,8
299,710	27,3	16,6	43,9	46,0	-2,1
480,045	21,2	20,7	41,9	46,0	-4,1
700,097	10,3	24,2	34,5	46,0	-11,5
896,991	10,1	26,8	36,9	46,0	-9,1

Date of test:	2009-03-27
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232 and RJ45
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	QP
Result:	Limit kept
Applied to:	Vertical
Remark:	none



Minimum margin to limit: -4,0 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Value [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
33,211	18,2	13,9	32,1	40,0	-7,9
39,158	17,3	14,6	31,9	40,0	-8,1
43,126	18,3	14,8	33,1	40,0	-6,9
44,265	20,1	14,8	34,9	40,0	-5,1
53,340	21,3	14,5	35,8	40,0	-4,2
65,250	21,3	11,8	33,1	40,0	-6,9
80,151	17,3	11,1	28,4	40,0	-11,6
85,674	24,3	11,7	36,0	40,0	-4,0
118,037	25,0	12,5	37,5	43,5	-6,0
130,187	27,8	11,1	38,9	43,5	-4,6
141,198	21,1	10,6	31,7	43,5	-11,8
166,108	26,6	11,2	37,8	43,5	-5,7
199,404	25,6	13,3	38,9	43,5	-4,6
299,710	20,5	16,6	37,1	46,0	-8,9
480,000	18,7	20,7	39,4	46,0	-6,6
896,991	9,0	26,8	35,8	46,0	-10,2

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5.3 Radiated disturbance in the frequency range 1GHz – 18GHz

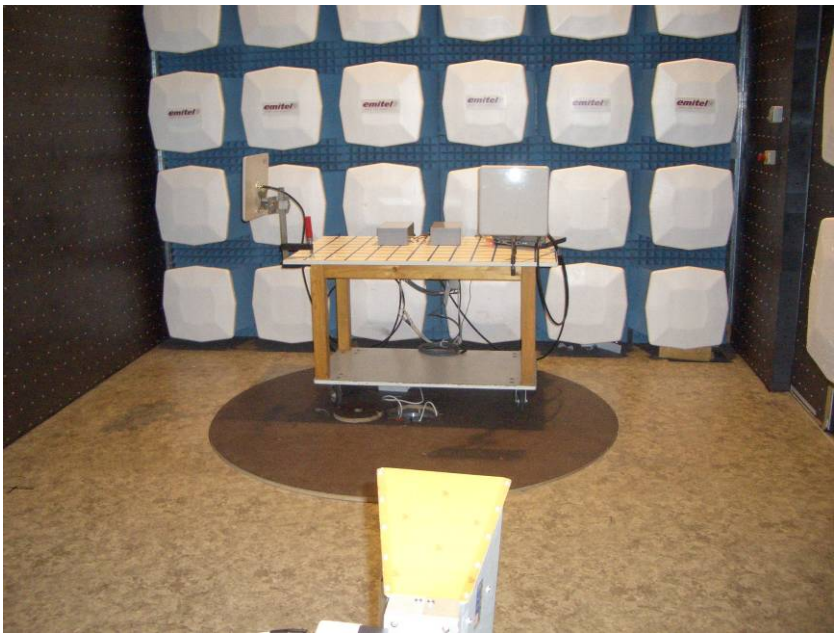
For test instruments and accessories used see section 6 Part **SER 3**.

5.3.1 Description of the test location

Test location: Anechoic Chamber A4

Test distance: 3 metres

5.3.2 Photo documentation of the test set-up



5.3.3 Test specification:

Environmental conditions: Temperature: 23 ° C Humidity: 33 % Atmospheric pressure: 97 kPa

Frequency range: 1 GHz - 18.0 GHz

The test was carried out in the following operation mode(s):
- Testsoftware was active, FSK CH7 active
- Testsoftware was active, FSK CH13 active

5.3.4 Test result

The requirements are **FULFILLED.**

Remarks: none

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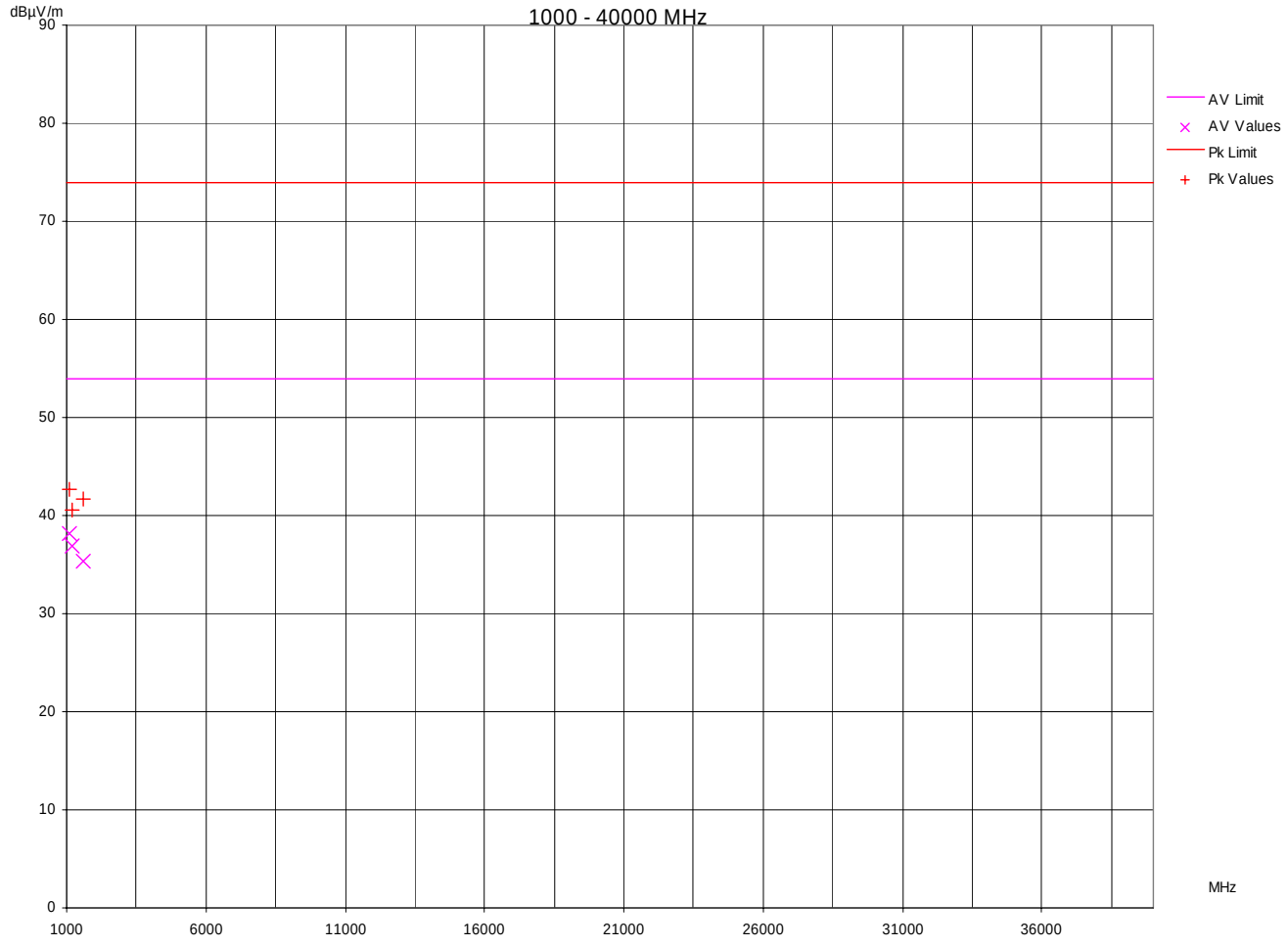
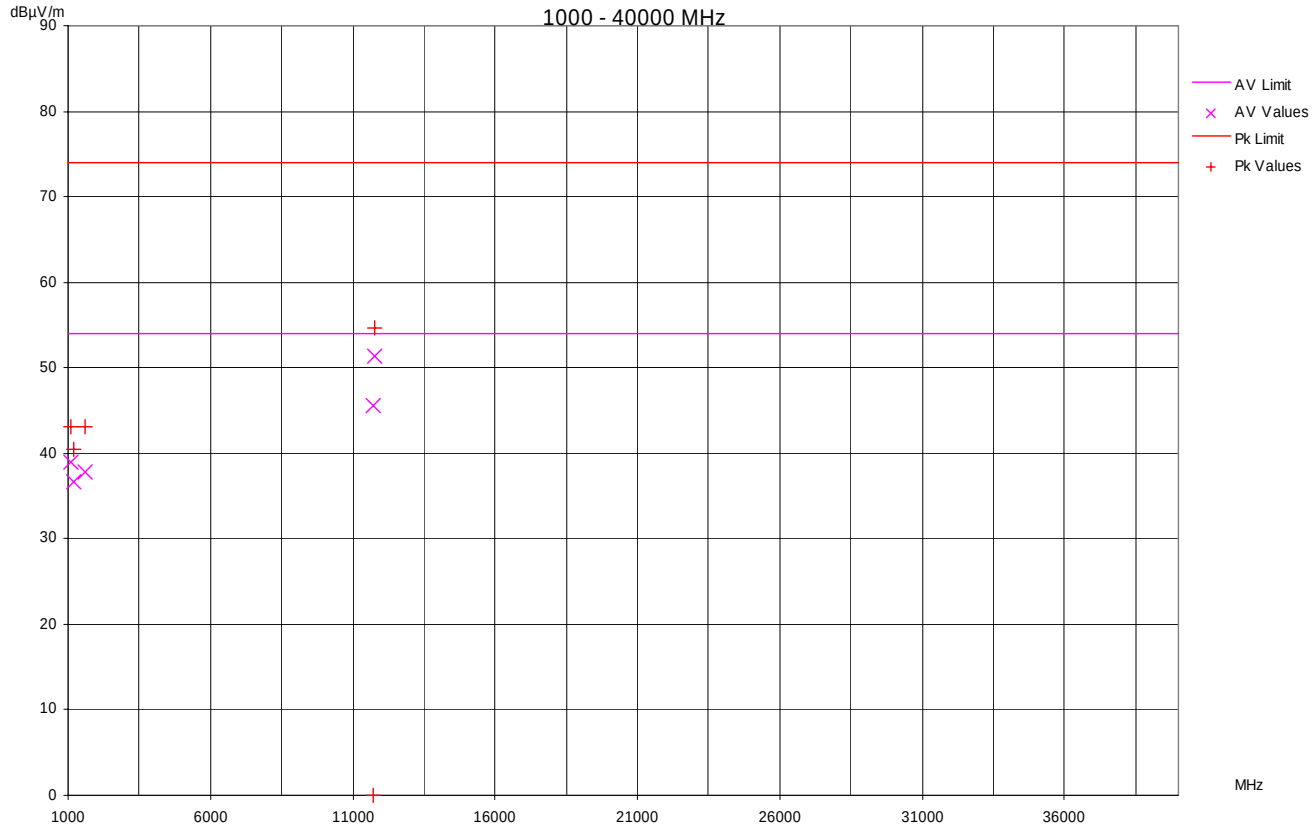
Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232, RJ45 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -15,8 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1095,800	49,6	54,1	-11,4	38,2	42,7	54,0	74,0	-15,8	-31,3
1195,800	47,8	51,5	-10,9	36,8	40,5	54,0	74,0	-17,1	-33,4
1594,200	44,9	51,3	-9,6	35,3	41,7	54,0	74,0	-18,7	-32,3

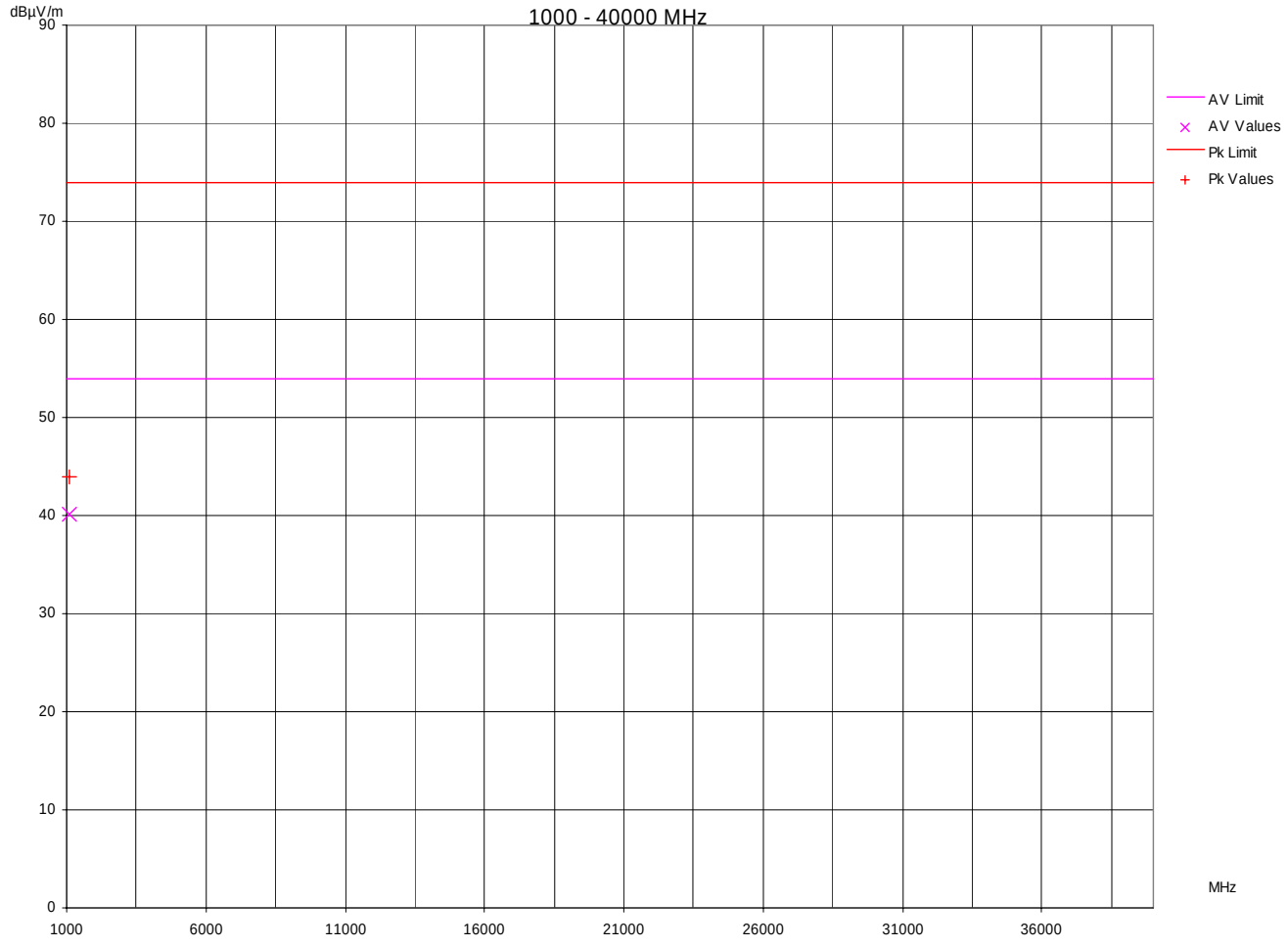
Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232, RJ45 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Vertical
Remark:	none



Minimum margin to limit: -2,6 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1094,800	50,3	54,6	-11,4	38,9	43,2	54,0	74,0	-15,1	-30,8
1196,000	47,5	51,4	-10,9	36,6	40,5	54,0	74,0	-17,4	-33,5
1593,400	47,4	52,7	-9,6	37,8	43,1	54,0	74,0	-16,2	-30,9
11728,800	36,6		8,9	45,5		54,0	74,0	-8,5	
11749,600	42,5	45,7	8,9	51,3	54,6	54,0	74,0	-2,6	-19,4

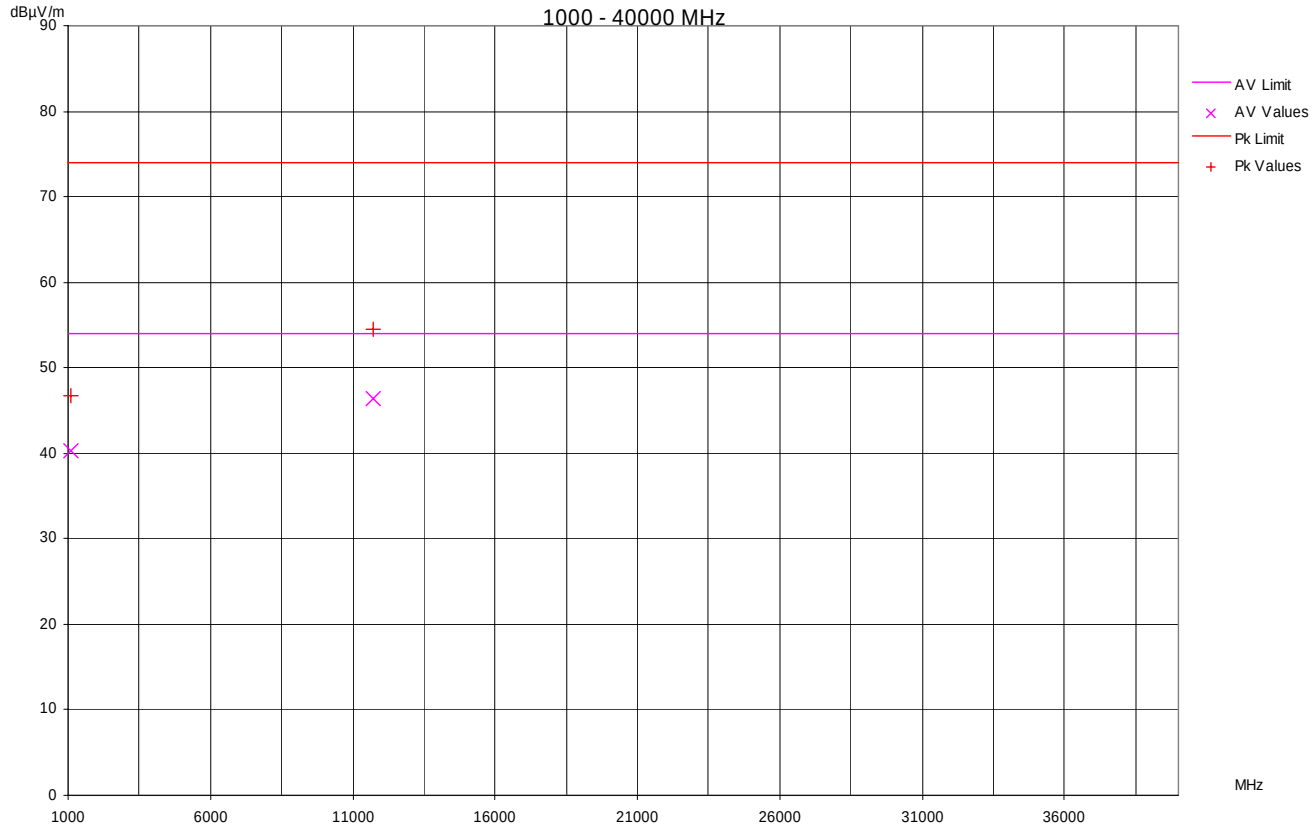
Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232, RJ45 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -13,9 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1096,600	51,5	55,4	-11,4	40,1	44,0	54,0	74,0	-13,9	-30,0

Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232, RJ45 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Vertical
Remark:	none

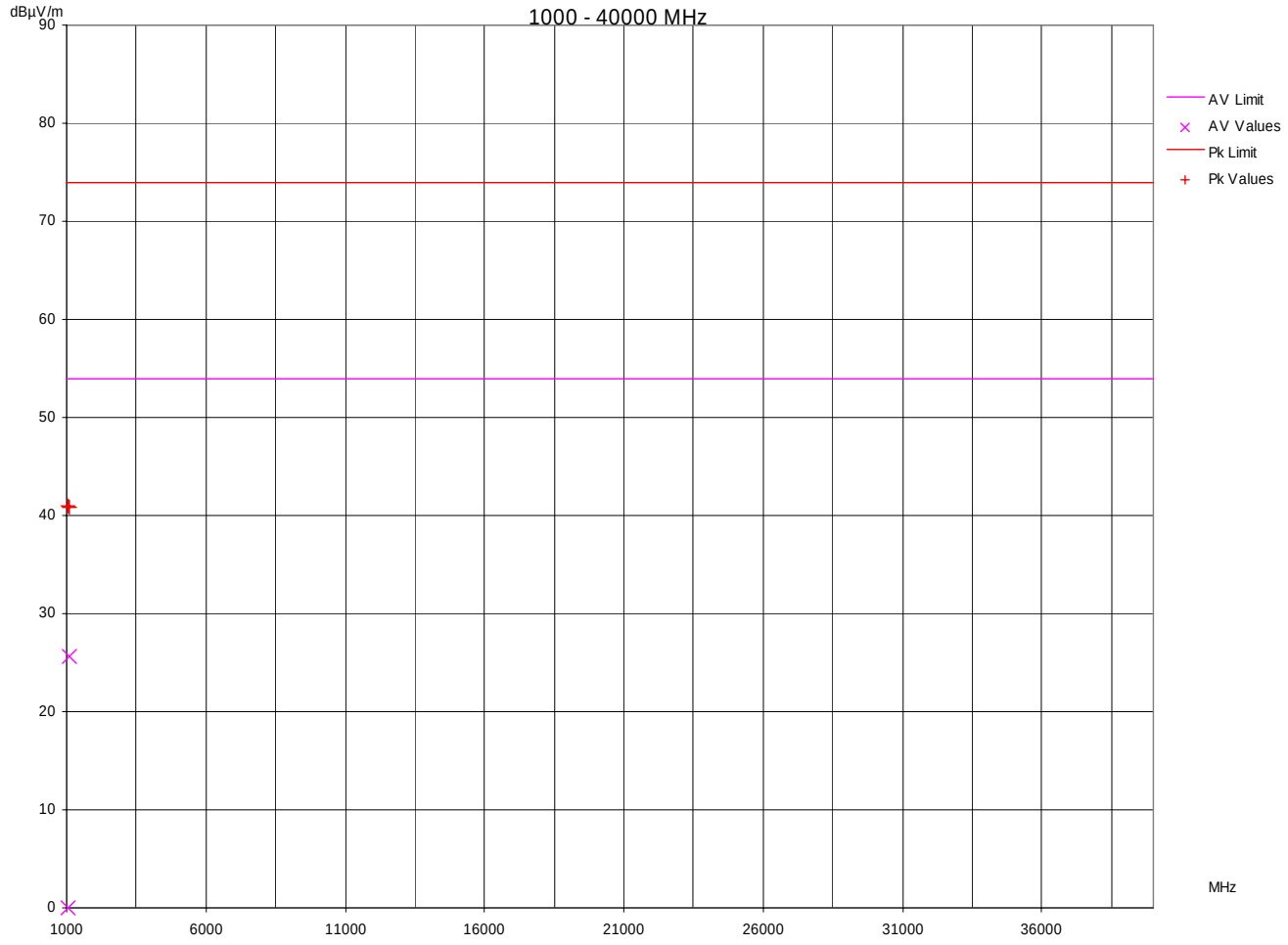


Minimum margin to limit: -7,6 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1094,000	51,7	58,1	-11,4	40,3	46,7	54,0	74,0	-13,7	-27,3
11737,600	37,5	45,6	8,9	46,4	54,5	54,0	74,0	-7,6	-19,5

File No. **T-0239-3062-04 JP**

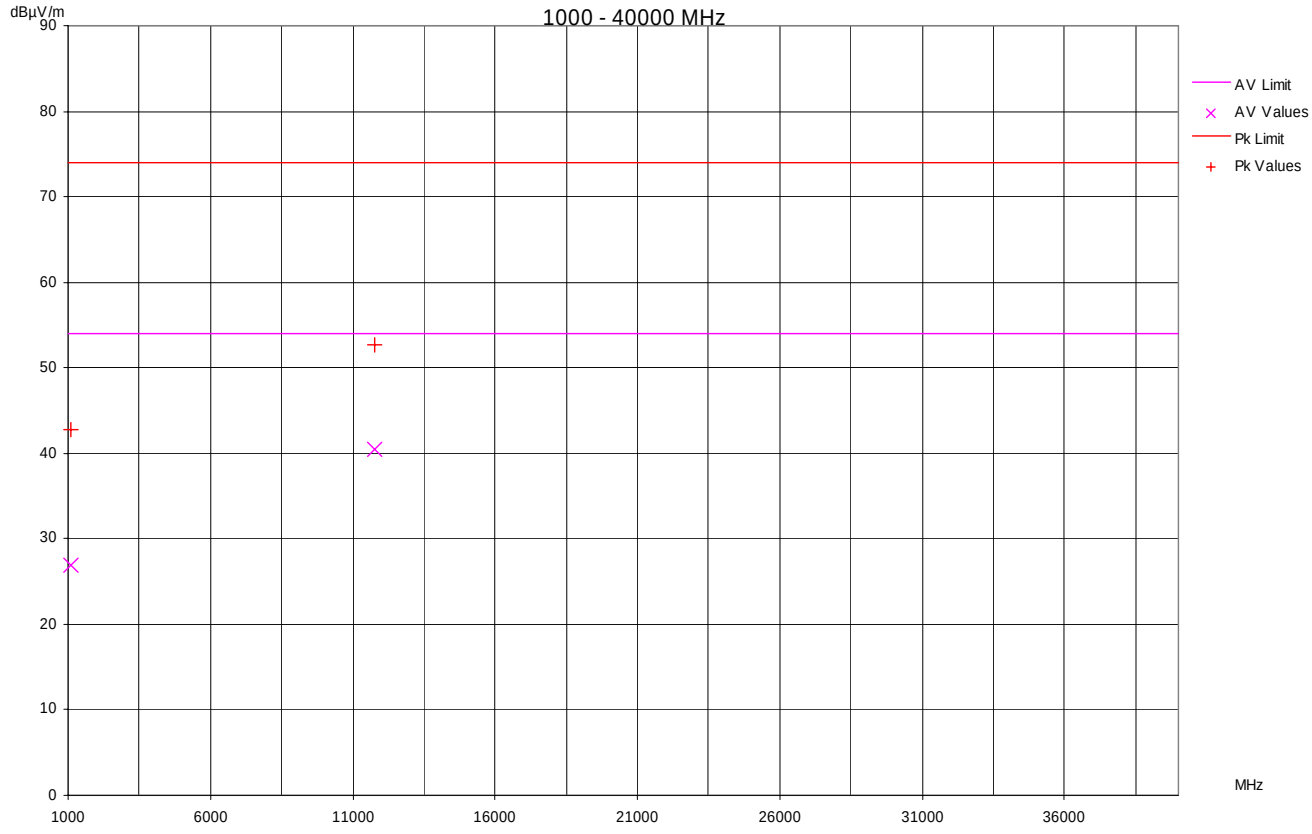
Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -28,3 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1064,000		52,7	-11,7		41,0	54,0	74,0		-33,0
1096,800	37,0	52,2	-11,4	25,6	40,8	54,0	74,0	-28,3	-33,2

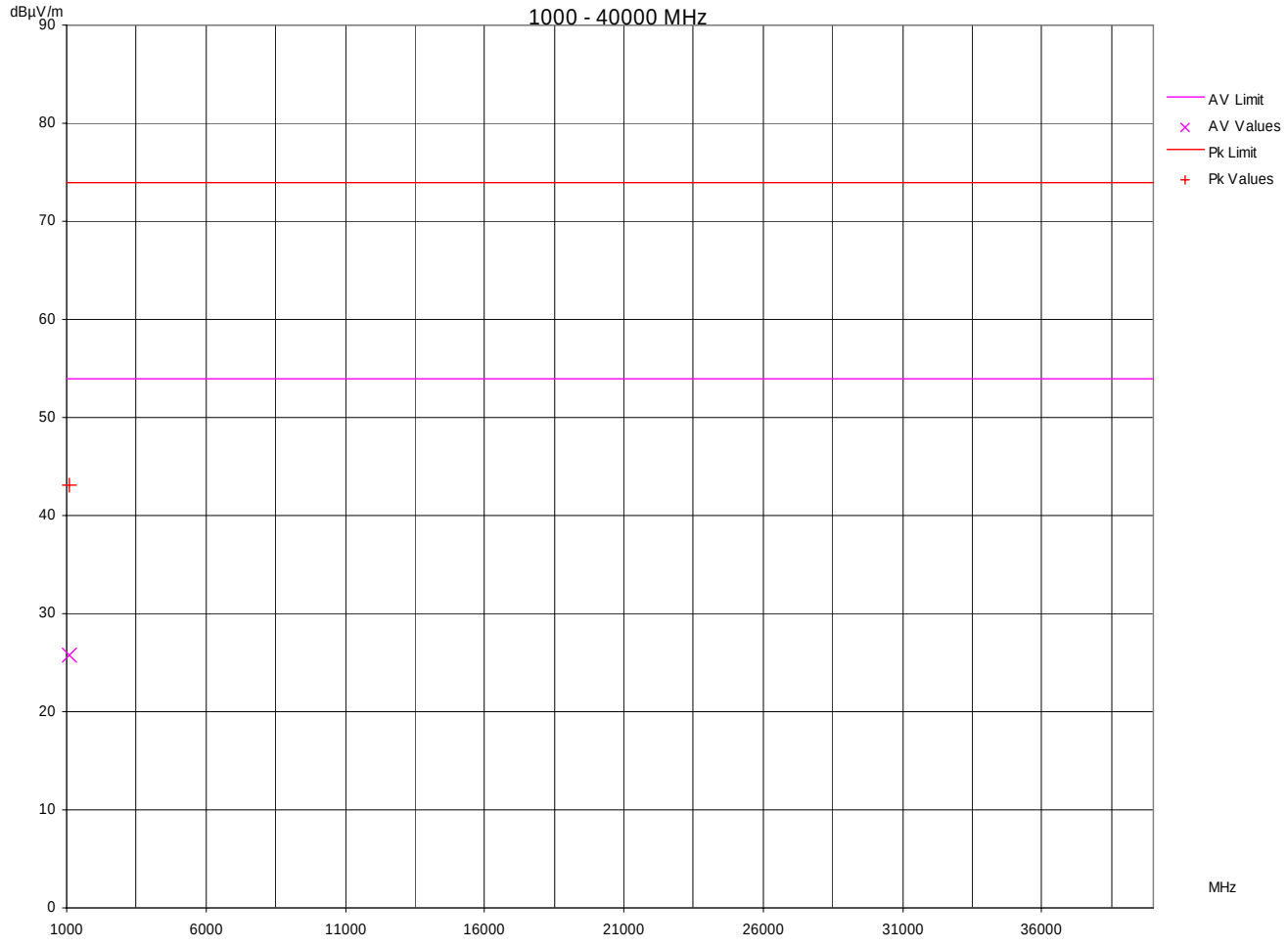
Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Vertical
Remark:	none



Minimum margin to limit: -13,5 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1096,200	38,3	54,2	-11,4	26,9	42,8	54,0	74,0	-27,1	-31,2
11749,600	31,6	43,8	8,9	40,4	52,7	54,0	74,0	-13,5	-21,3

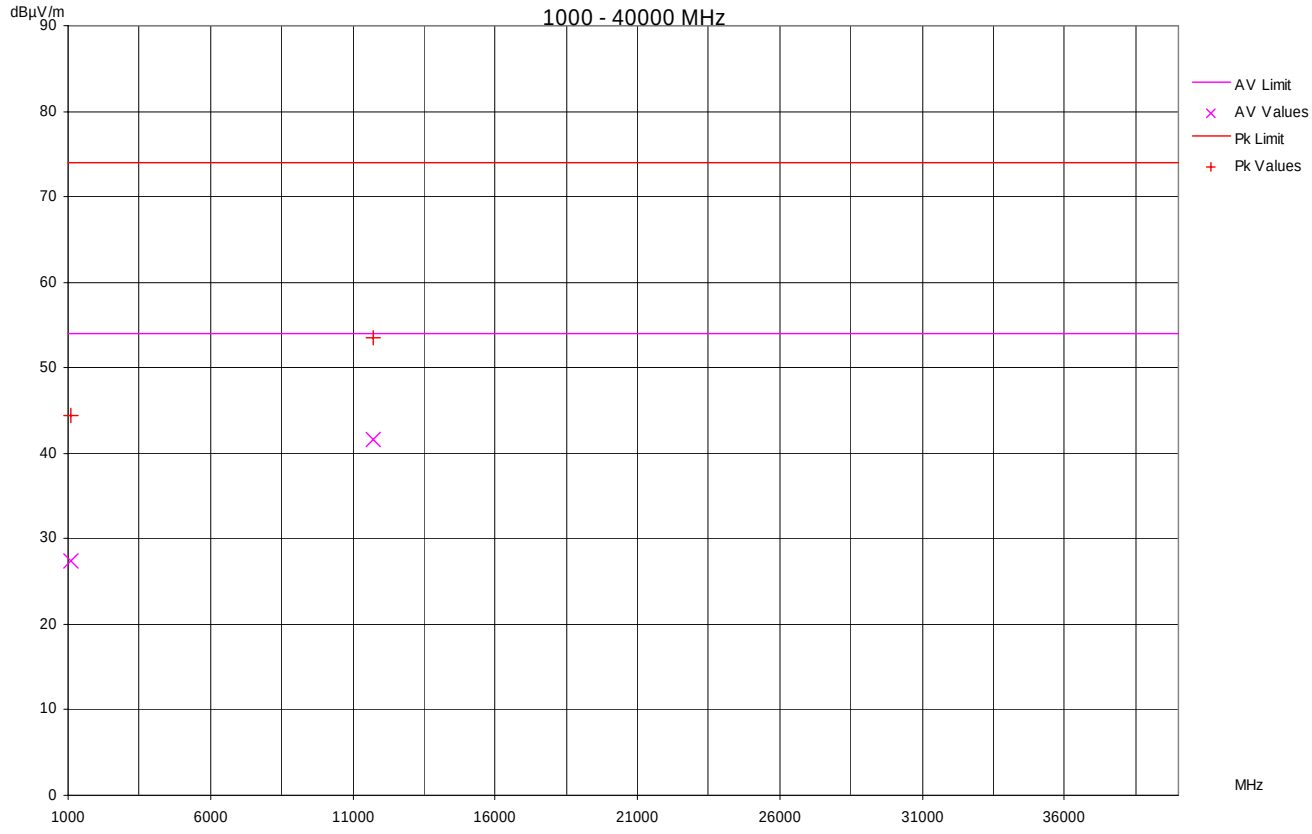
Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -28,2 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1096,800	37,2	54,5	-11,4	25,8	43,1	54,0	74,0	-28,2	-30,9

Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232 and relais
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Vertical
Remark:	none

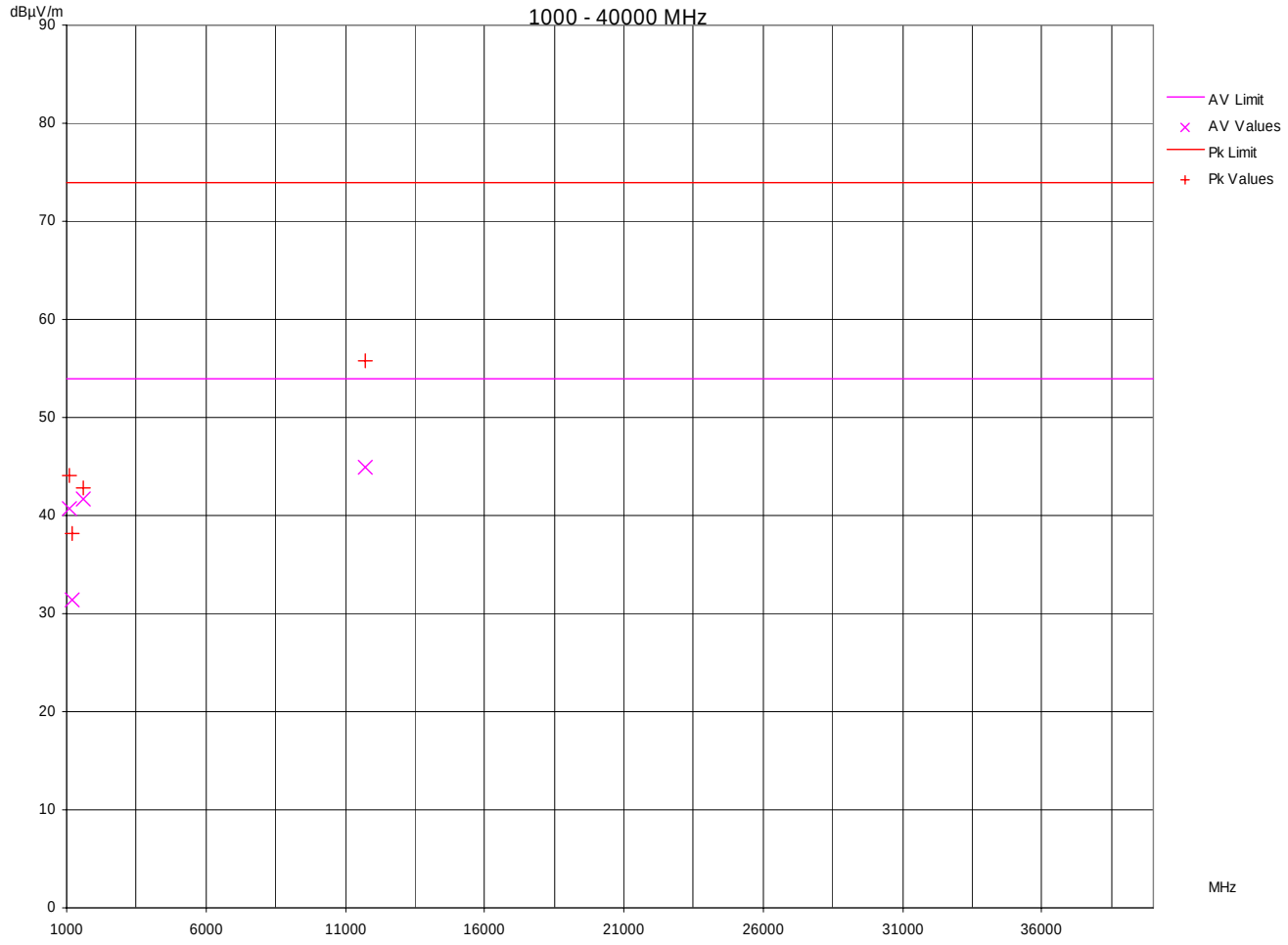


Minimum margin to limit: -12,4 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1094,000	38,8	55,9	-11,4	27,4	44,5	54,0	74,0	-26,6	-29,5
11737,400	32,7	44,7	8,9	41,6	53,6	54,0	74,0	-12,4	-20,4

File No. **T-0239-3062-04 JP**

Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232 and RJ45
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -9,0 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1095,800	52,1	55,5	-11,4	40,7	44,0	54,0	74,0	-13,3	-29,9
1195,800	42,3	49,1	-10,9	31,3	38,2	54,0	74,0	-22,6	-35,8
1594,200	51,3	52,4	-9,6	41,7	42,8	54,0	74,0	-12,3	-31,1
11737,600	36,1	46,8	8,9	44,9	55,7	54,0	74,0	-9,0	-18,3

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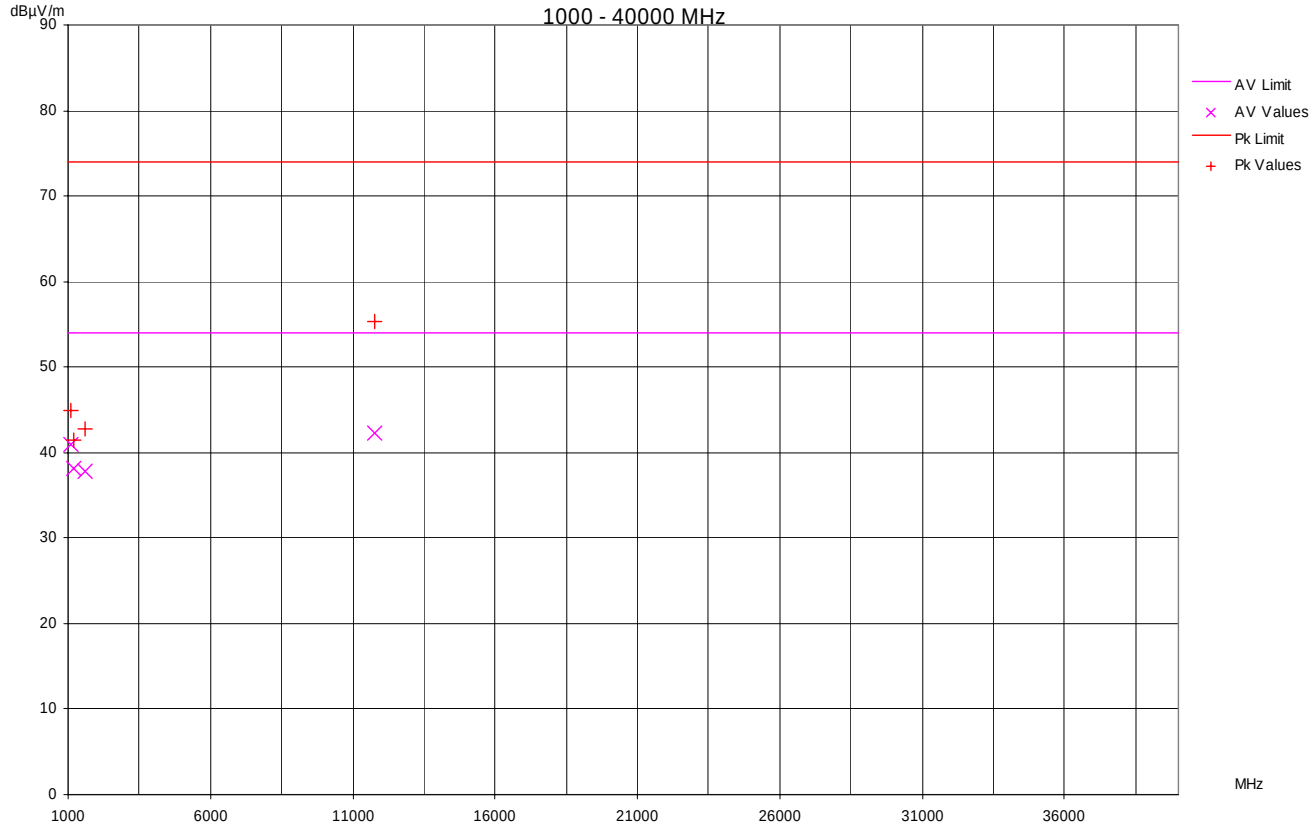
Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH7 active, Version with RS232 and RJ45
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Vertical
Remark:	none



Minimum margin to limit: -11,7 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1094,800	52,4	56,4	-11,4	41,0	45,0	54,0	74,0	-13,0	-29,0
1196,000	49,2	52,5	-10,9	38,2	41,5	54,0	74,0	-15,8	-32,4
1593,400	47,4	52,3	-9,6	37,8	42,7	54,0	74,0	-16,1	-31,2
11749,800	33,4	46,5	8,9	42,2	55,4	54,0	74,0	-11,7	-18,6

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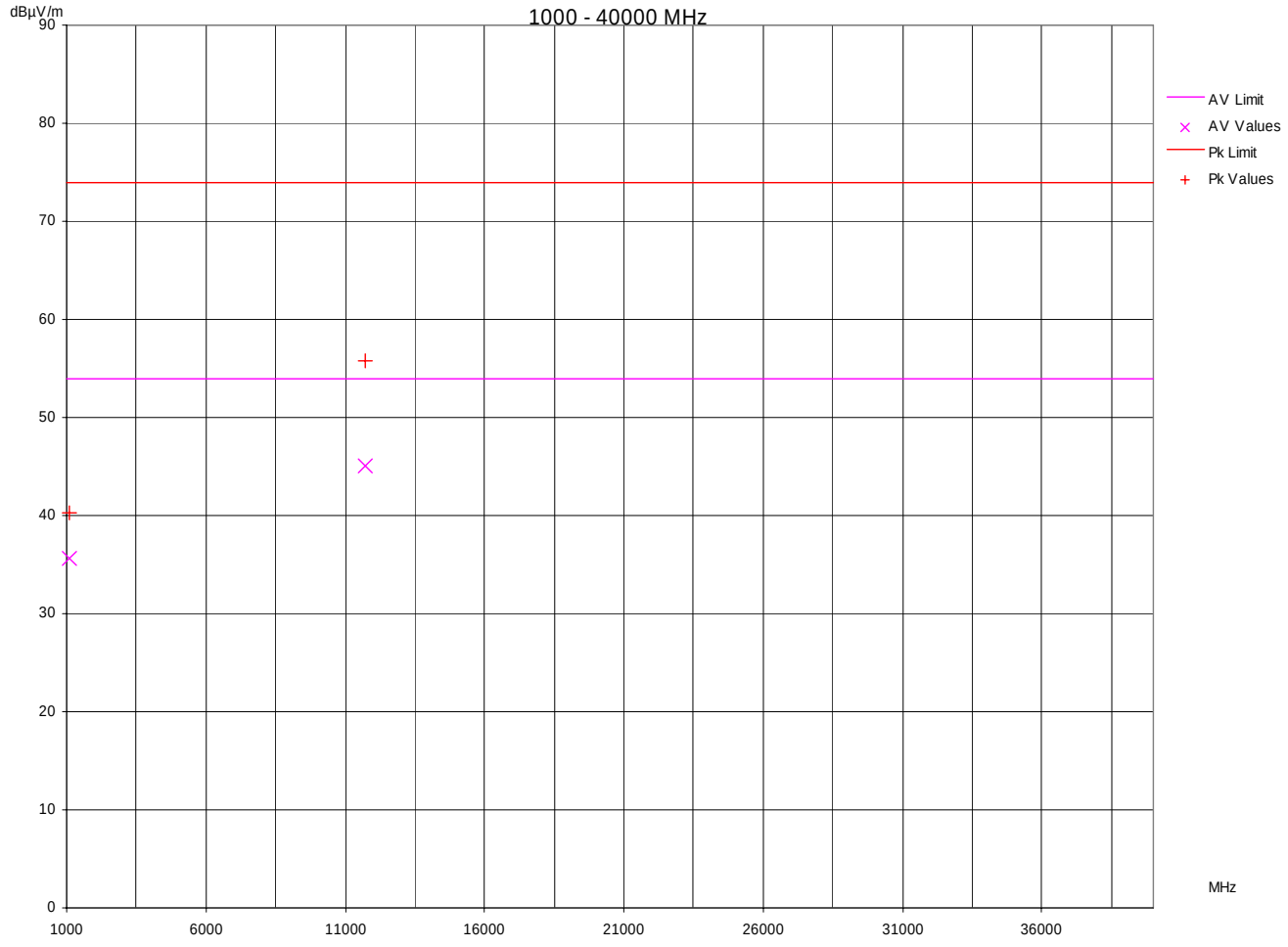
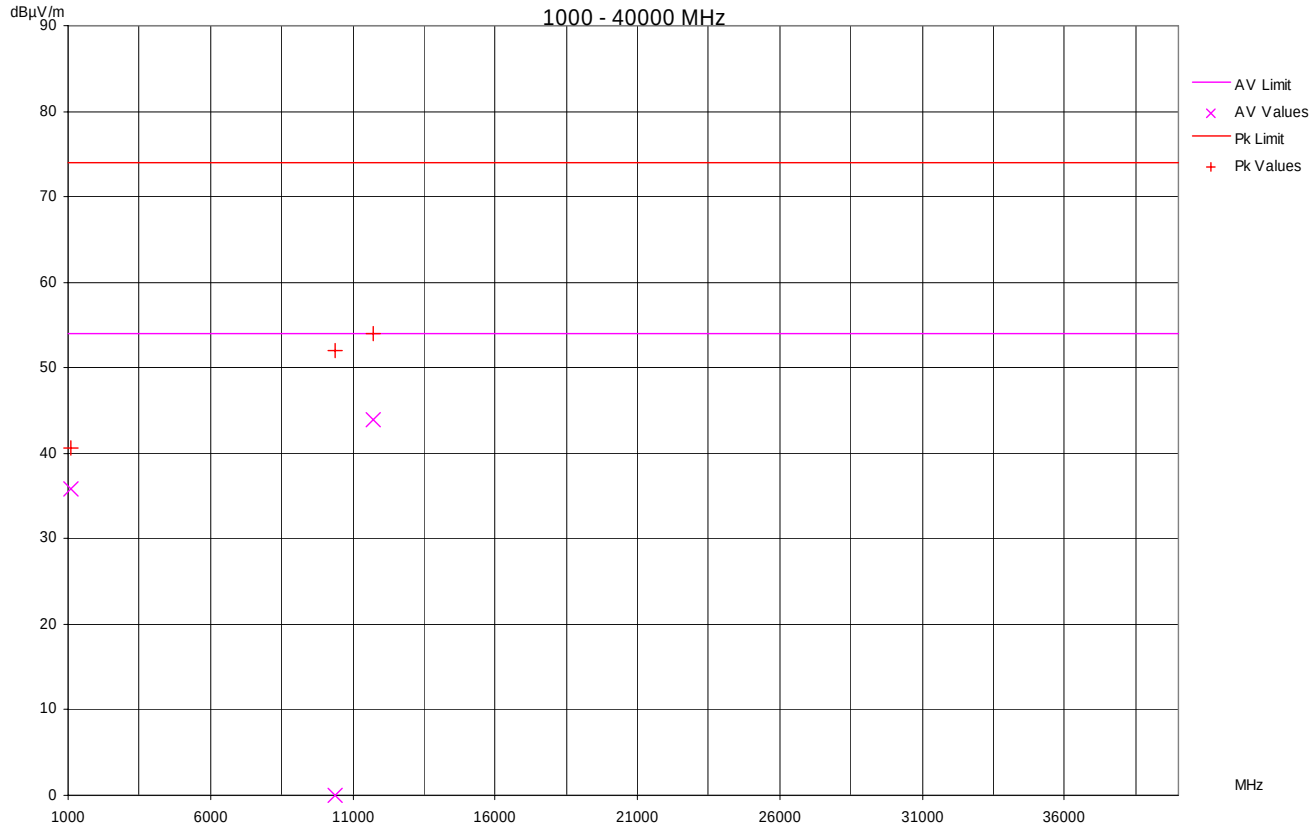
Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232 and RJ45
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Horizontal
Remark:	none



Minimum margin to limit: -8,9 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1096,600	47,0	51,7	-11,4	35,6	40,3	54,0	74,0	-18,4	-33,7
11737,600	36,2	46,8	8,9	45,0	55,7	54,0	74,0	-8,9	-18,3

Date of test:	2009-03-26
Operator:	Jürgen Pessinger
Mode:	Testcycle is running, FSK CH13 active, Version with RS232 and RJ45
Standard:	FCC Part 15.109a
Test:	Radiated Emission Test (Distance 3m)
Detector:	AV / Pk
Result:	Limit kept
Applied to:	Vertical
Remark:	none



Minimum margin to limit: -10,1 dB

Frequency [MHz]	Reading [dBµV] AV	Reading [dBµV] Pk	Correction [dB]	Value [dBµV/m] AV	Value [dBµV/m] Pk	Limit [dBµV/m] AV	Limit [dBµV/m] Pk	Margin [dB] AV	Margin [dB] Pk
1094,000	47,3	52,1	-11,4	35,9	40,6	54,0	74,0	-18,1	-33,3
10360,200		44,6	7,5		52,0	54,0	74,0		-21,9
11737,600	35,0	45,1	8,9	43,9	53,9	54,0	74,0	-10,1	-20,0

6 USED TEST EQUIPMENT AND ACCESSORIES

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

Test ID	Model Type	Kind of Equipment	Manufacturer	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	ESH 3	EMI Test Receiver	Rohde & Schwarz München	01-02/03-01-005	02/19/2010	02/19/2009		
	ESH 2 - Z 5	LISN	Rohde & Schwarz München	01-02/20-01-001			09/16/2009	09/16/2008
	ESH 3 - Z 5	Artificial Network	Rohde & Schwarz München	01-02/20-04-005			09/30/2009	09/30/2008
	ESH 3 - Z 2	Pulse Limiter	Rohde & Schwarz München	01-02/50-02-020	02/18/2010	02/18/2009		
	BNC-3000-N	RF Cable	emitel AG	01-02/50-07-008				
	N-5000-N	RF Cable	emitel AG	01-02/50-07-009				
SER 2	ESVP	EMI Test Receiver	Rohde & Schwarz München	01-02/03-01-002	10/29/2009	10/29/2008		
	HM 5012	Spectrum Analyzer	Hameg GmbH	01-02/11-01-001				
	VULB 9163	Trilog Broad Band Anten	Schwarzbeck Mess-Elektron	01-02/24-01-006	10/24/2009	10/24/2008		
	N-40000-N	RF Cable	emitel AG	01-02/50-05-043				
	N-30000-N	RF Cable	emitel AG	01-02/50-05-044				
SER 3	AMF-40-005-180-24-10P	Pre.-Amp. 0.5 - 18 GHz	MITEQ, Inc.	01-02/17-02-009			12/02/2009	12/02/2008
	3115	Horn Antenna 1-18 GHz	EMCO Elektronik GmbH	01-02/24-01-011	05/08/2009	05/08/2008		
	HCC	Antenna Mast Controler	Rohde & Schwarz München	01-02/50-01-021				
	FA210A0020000000	RF Cable 26.5 MHz	Anritsu GmbH	01-02/50-06-065				
	FA210A0050000000	RF Cable	Rosenberger MICRO-COAX	01-02/50-07-007				
	RST 070	Drehscheibe	euro EMC GmbH	01-05/60-02-003				
	FSP 30	Spectrum Analyzer	Rohde & Schwarz München	02-02/11-05-001	04/08/2009	04/08/2008		

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