telefication bv
The Netherlands
Chamber of Commerce
09076358
www.telefication.com

telefication

Radio test report
20103619300

based on:
- FCC Part 15 Subpart C, section 15.247 (10-1-08 Edition);
- RSS-210, Issue 7 (June 2007 edition);
- RSS-Gen, Issue 7 (June 2007 edition)
- FCC Part 15 Subpart B, section 15.107 and section 15.109 (10-1-08 Edition);

Bridgemate wireless base station
Bridgemate
BMS2-1

Contents

This report comprises of three modules. The total number of pages is: 27

Main module

1 Introduction

This report contains the result of tests performed by:

Telefication B.V.
Edisonstraat 12a
6902 PK Zevenaar
The Netherlands

Telefication complies with the accreditation criteria for test laboratories as laid down in ISO/IEC 17025:2005. The accreditation covers the quality system of the laboratory as well as the specific activities as described in the authorized annex bearing the accreditation number L021 and is granted on 30 November 1990 by the Dutch Council For Accreditation (RvA: Raad voor Accreditatie). The contents of this test report, if reproduced, shall be copied in full, unless special consent in writing for reproduction in part is granted by Telefication. Copyright of this test report is reserved to Telefication.

Telefication is an accredited test firm under the EU-USA MRA with registration number NL0001.

Ordering party:

Company name	:	Bridge Systems B.V.
Address	:	Bulgersteyn 7085
Zipcode	:	3011 AB
City/town	:	Rotterdam
Country	:	The Netherlands
Date of order	:	11 June 2010

2 Product

A sample of the following product was submitted for testing:

Product description	:	Bridgemate wireless base station
Manufacturer	:	Bridge Systems B.V.
Trade mark	:	Bridgemate
Type designation	:	BMS2-1
FCC ID	:	UVIBMS21
IC ID	:	6946A-BMS21
Hardware version	:	1.0
Serial number	:	1
Software release	:	1.1.0d

3 Test schedule

Tests are carried out in accordance with the specification detailed in chapter 7 “Summary” of this report.

Tests are carried out at the following locations:

- Telefication, Zevenaar

The samples of the product were received on:

- 21 June 2010

Tests are carried out between:

- 21 June and 5 July 2010

4 Product documentation

For production of this report the following product documentation is used:

Description:	Date:	Identification:
Manual	2010-05-30	BM2manual.pdf
Block diagram	2010-06-15	UVIBMS21 Block diagram.pdf
Description	2010-06-15	UVIBMS21 Operational description.pdf
Schematics	2010-06-15	UVIBMS21 schematics RFmodem.pdf
Schematics	2010-06-15	UVIBMS21 schematics.pdf
Bill Of Materials	2010-07-08	USB_server_BOM.pdf

The above-mentioned documentation will be filed at Telefication for a period of 10 years following the issue of this test report.

5 Observations and comments

The sample is part of an electronic scoring system for bridge clubs and tournaments.
The other part of the system is the Bridgemate Scoring Device. The two parts use wireless communication between each other, by means of 915 MHz transceivers.

During the tests a COPARTNER LL84201 USB shielded high speed cable 2.0 was attached to the sample.

6 Modifications to the sample

No modifications are made to the sample.

7 Summary

The product is intended for use in the following application area(s):

DATA TRANSMISSION APPLICATION IN THE 902 - 928 MHz BAND

The sample is tested according to the following specification(s):

- FCC Part 15 Subpart C, section 15.247 (10-1-09 Edition);
RSS-210, Issue 7 (June 2007 edition);
RSS-Gen, Issue 7 (June 2007 edition);
FCC Part 15 Subpart B, section 15.107 and section 15.109 (10-1-08 Edition).

8 Conclusions

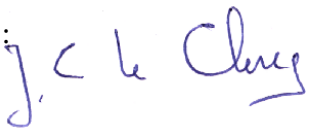
The samples of the product showed **NO NON-COMPLIANCES** to the specification stated in chapter 7 of this report.

The results of the tests as stated in this report, are exclusively applicable to the product item as identified in this report. Telefication accepts no responsibility for any stated properties of product items in this test report, which are not supported by the tests as specified in section 7 "*Summary*".

All tests are performed by:

name : ing. J.C. le Clercq

function : Test Engineer

signature : 

Review of test report by:

name : G. Gort

function : Senior Test Engineer

signature : 

The above conclusions have been verified by the following signatory:

Date : 14 July 2010

name : ing. P.A.J.M. Robben

function : Co-ordinator Test Group

signature : 

Test results module

1 General information

1.1 Equipment information

Rated RF output power	n.a., integral antenna
Rated radiated RF power	10 mW
Operating frequency range	902.3 - 912.1 MHz (50 hop frequencies)
Modulation	FSK
ITU emission designator	19K2F1D
Duty Cycle	100 %. (during testing)
Antenna gain	2 dBi (max.)
Type of antenna	¼ λ whip monopole
IC ID	6946A-BMS21
FCC ID	UVIBMS21

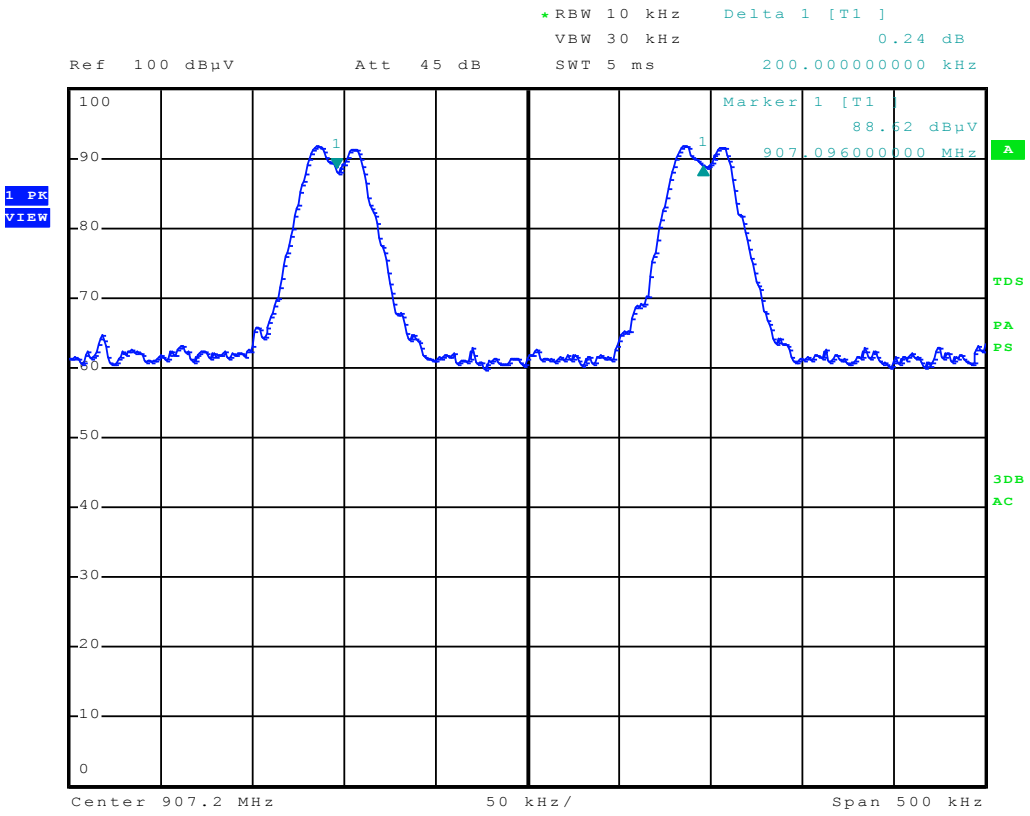
1.2 Frequency test channels

	TX	**RX**
Channel low	902.3 MHz	902.3 MHz
Channel mid	907.1 MHz	907.1 MHz
Channel high	912.1 MHz	912.1 MHz

2 Test results

2.1 Channel Separation

Compliance standard : FCC part 15, subpart C, section 15.247 (a) (1)
RSS-210, section A8.1(b)
Method of test : Public Notice DA 00-705
Test results :



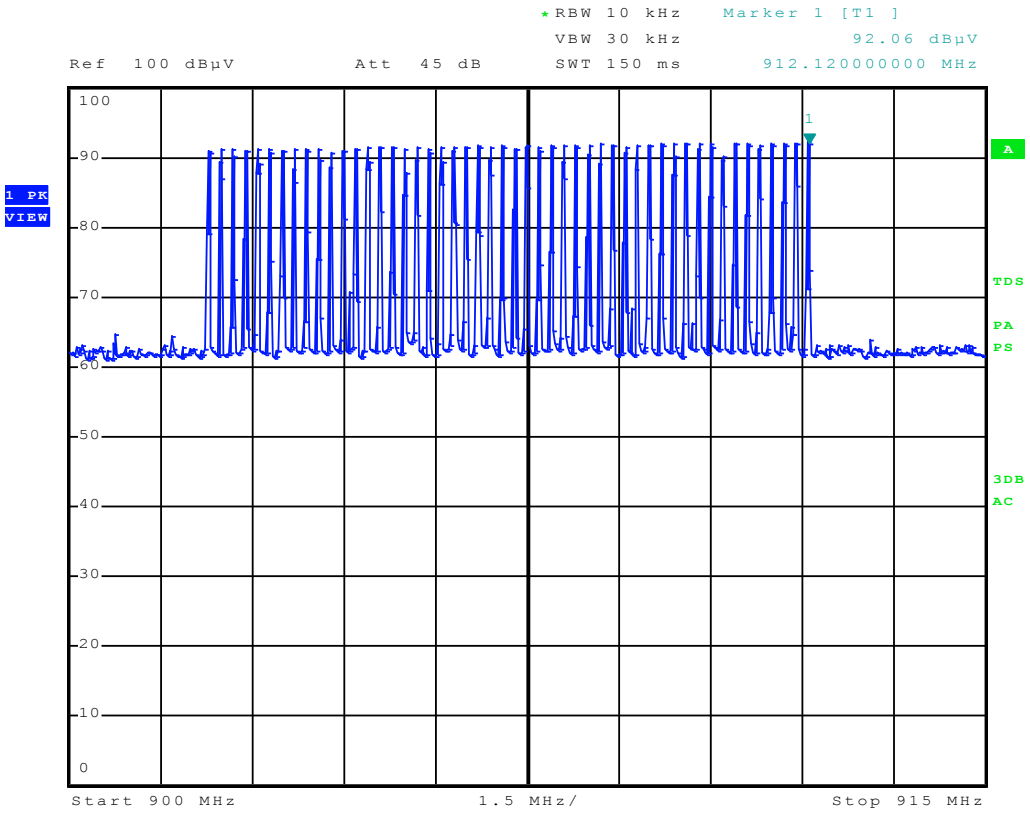
Channel separation: 200 kHz.	
Measurement uncertainty	± 1.3 kHz

Limit	≥ 25 kHz or the 20 dB bandwidth whichever is greater

Measurement equipment: 14, 15, 16, 17.
(The numbers listed refer to the module
'Used test equipment module'.)

2.2 Number of hop frequencies

Compliance standard : FCC part 15, subpart C, section 15.247 (a) (1) (i)
RSS-210, section A8.1(c)
Method of test : Public Notice DA 00-705
Test results :



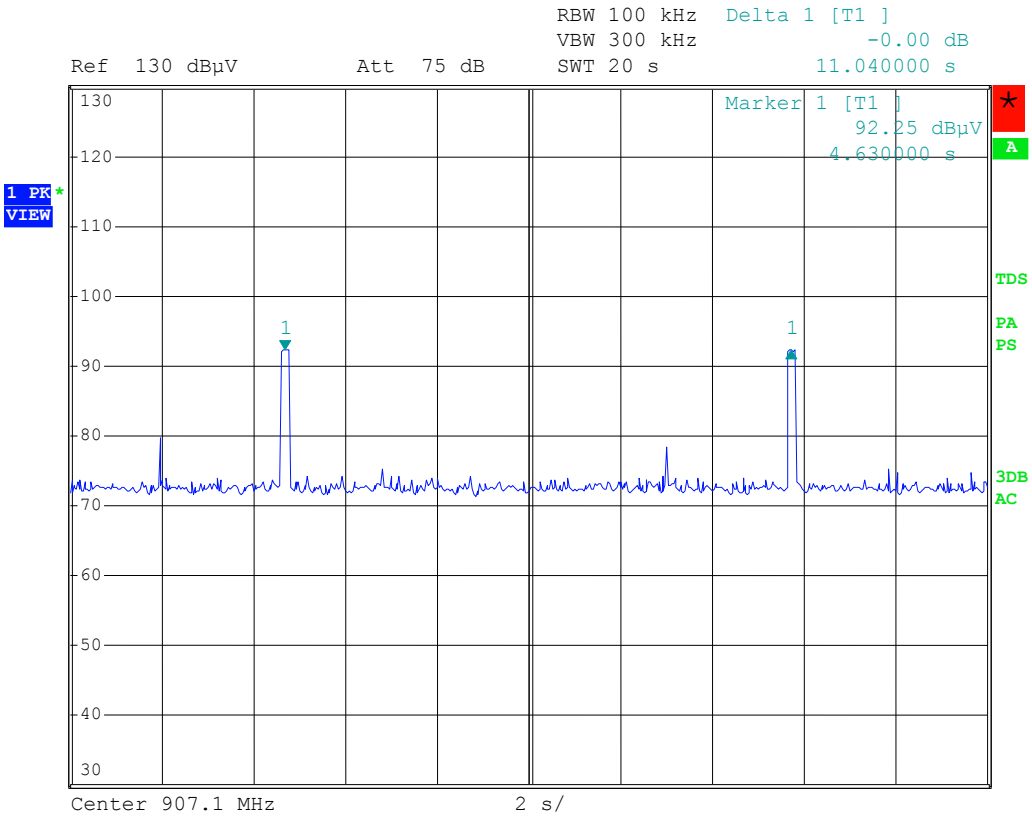
In total 50 discrete hop frequencies are used.	
Measurement uncertainty	± 1.3 kHz

Limit	≥ 50 hopping frequencies (for Channel BW < 250 kHz) ≥ 25 hopping frequencies (for Channel BW ≥ 250 kHz)

Measurement equipment: 14, 15, 16, 17.
(The numbers listed refer to the module
'Used test equipment module'.)

2.3 Average time of occupancy

Compliance standard : FCC part 15, subpart C, section 15.247 (a)(1)(i)
RSS-210, section A8.1(c)
Method of test : Public Notice DA 00-705
Test results :



2 hops within 20 seconds

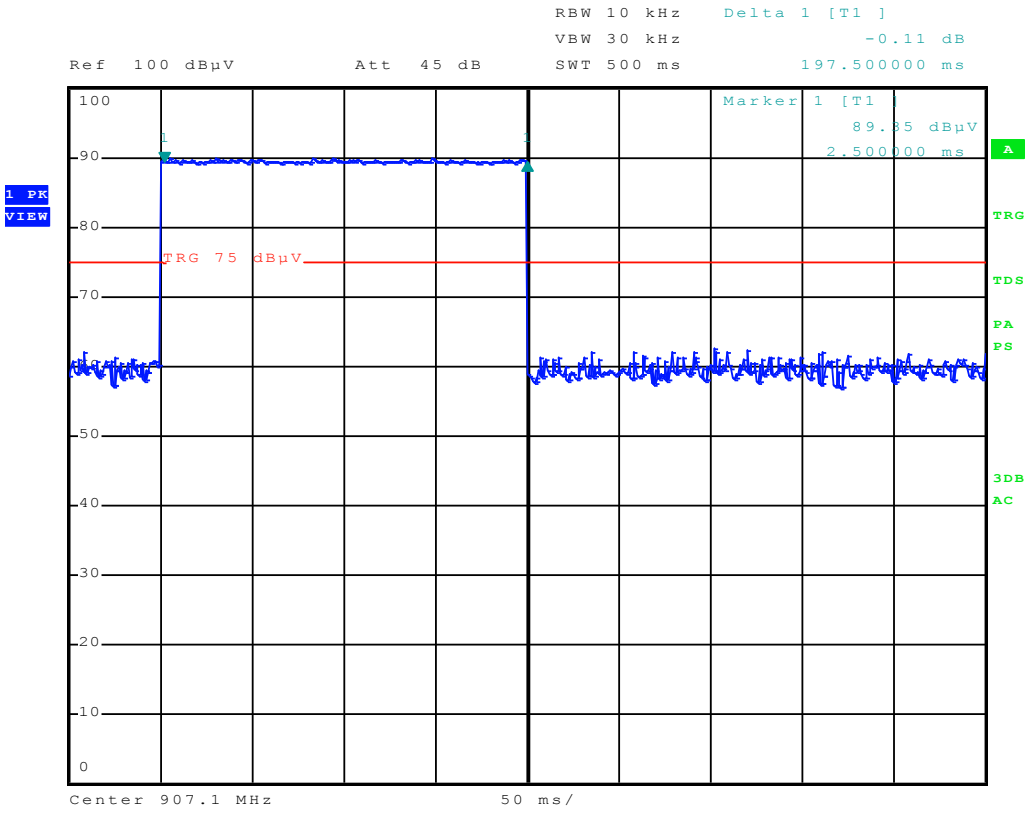
Average time of occupancy: ((11.0 sec)/20 sec.) x 210 msec = 110 msec.

Limit	Average time of occupancy on any frequency: ≤ 0.4 sec within a 20 second period.

Measurement equipment: 14, 15, 16, 17.
(The numbers listed refer to the module 'Used test equipment module'.)

2.4 Duration of one hop

Compliance standard : FCC part 15, subpart C, section 15.247 (a)(1)(i)
RSS-210, section A8.1(c)
Method of test : Public Notice DA 00-705



The hop duration is 197 milliseconds

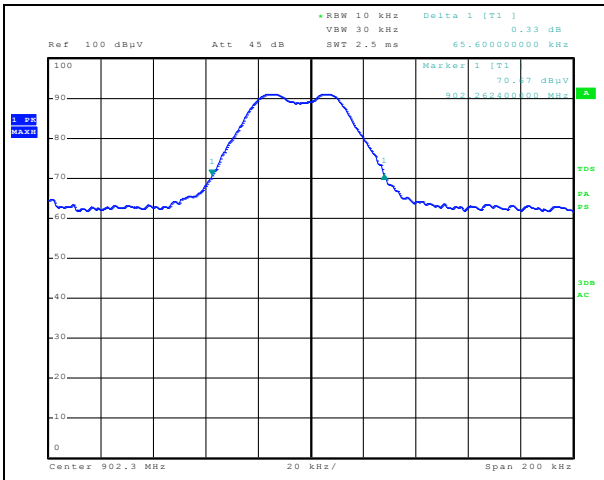
Average time of occupancy: ((6.4 div.x 2 sec)/20 sec.) x 197 msec = 134.4 msec.

Limit	Average time of occupancy on any frequency: ≤ 0.4 sec within a 20 second period.

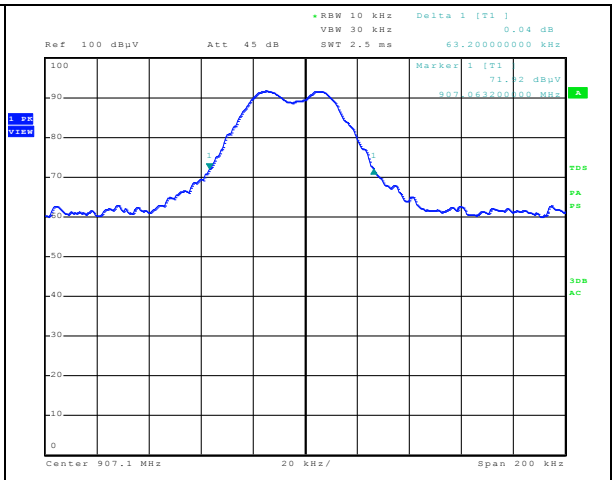
Measurement equipment: 14, 15, 16, 17.
(The numbers listed refer to the module 'Used test equipment module'.)

2.5 20 dB Bandwidth

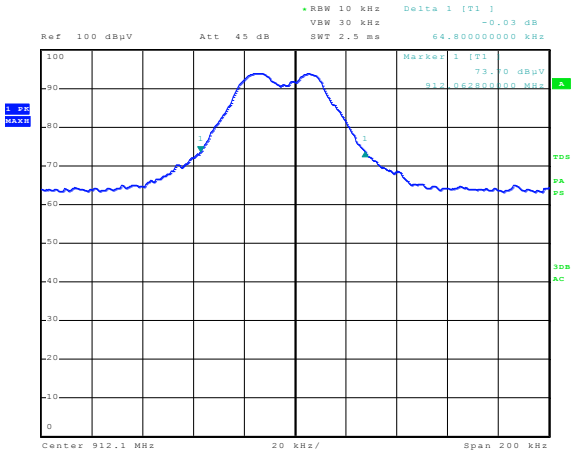
Compliance standard : FCC part 15, subpart C, section 15.247 (a) (1)
RSS-210, section A8.1 (a)
Method of test : Public Notice DA 00-705
Test results :



Channel low
20 dB Bandwidth = 65.6 kHz



Channel mid
20 dB Bandwidth = 63.2 kHz



Channel high
20 dB Bandwidth = 64.8 kHz

Measurement uncertainty	± 1.3 kHz +4.5/-6.1 dB

Bandwidth Limit	20 dB BW < 250 kHz

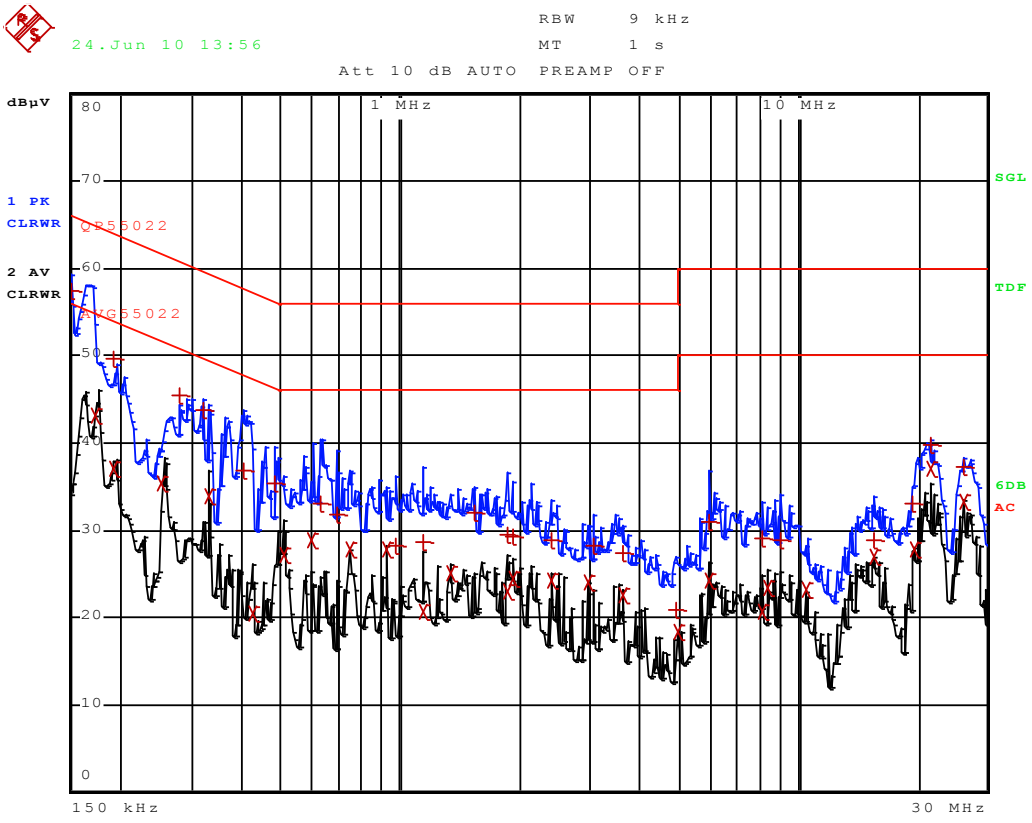
Measurement equipment: 14, 15, 16, 17.
(The numbers listed refer to the module 'Used test equipment module'.)

3 Emission tests

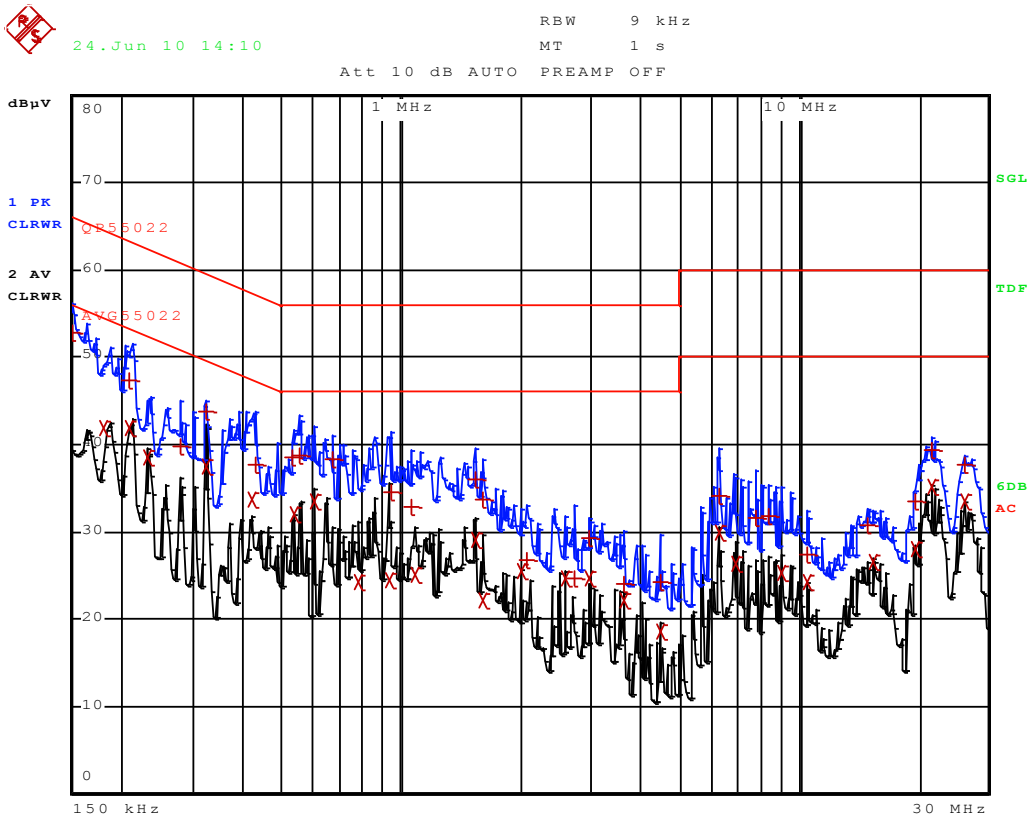
3.1 Conducted emissions onto the AC power line

Compliance standard	:	FCC part 15, subpart C, section 15.207 FCC Part 15 Subpart B, section 15.107
Method of test	:	ANSI C63.4-2003, sections 7 & 11.5
Ambient temperature	:	22 °C
Relative humidity	:	36 %
EUT condition	:	BMS2-1 connected to Laptop PC, via USB port
Test results	:	

Measured on AC mains, neutral line:



Measured on AC mains, live line:



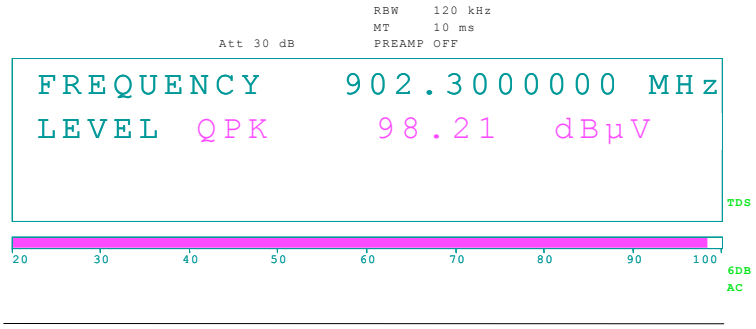
Measurement uncertainty	+/-3.1 dB. The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approx. 95%, but excluding the effect of measurement repeatability.

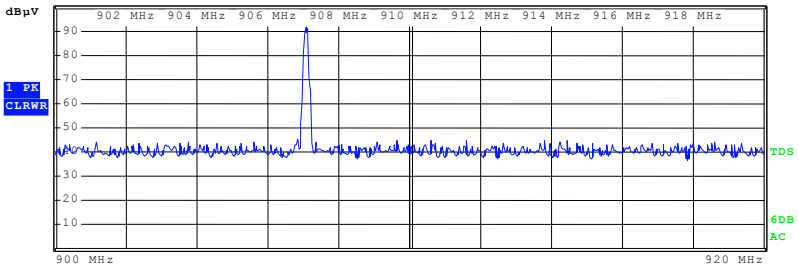
Limit	See plot

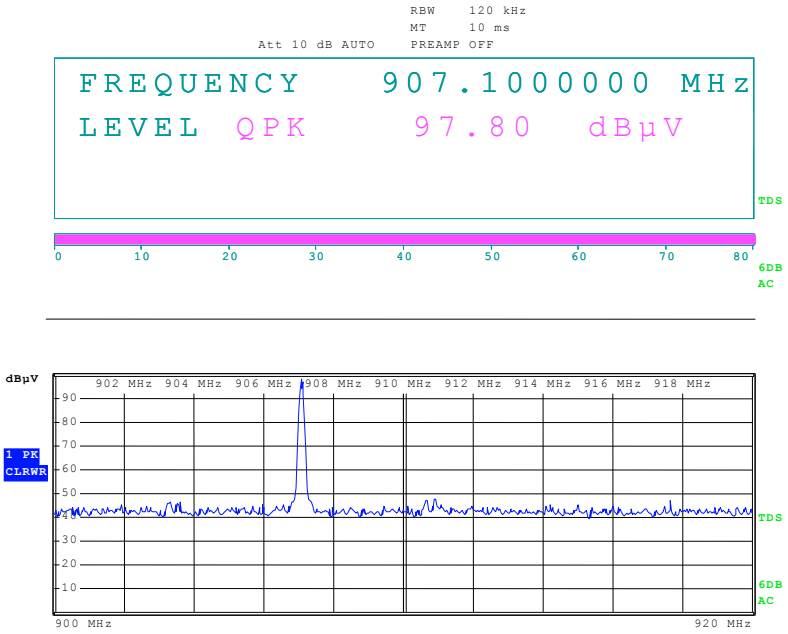
Measurement equipment used (item numbers refer to section “used test equipment”)	14, 18, 19, 20.

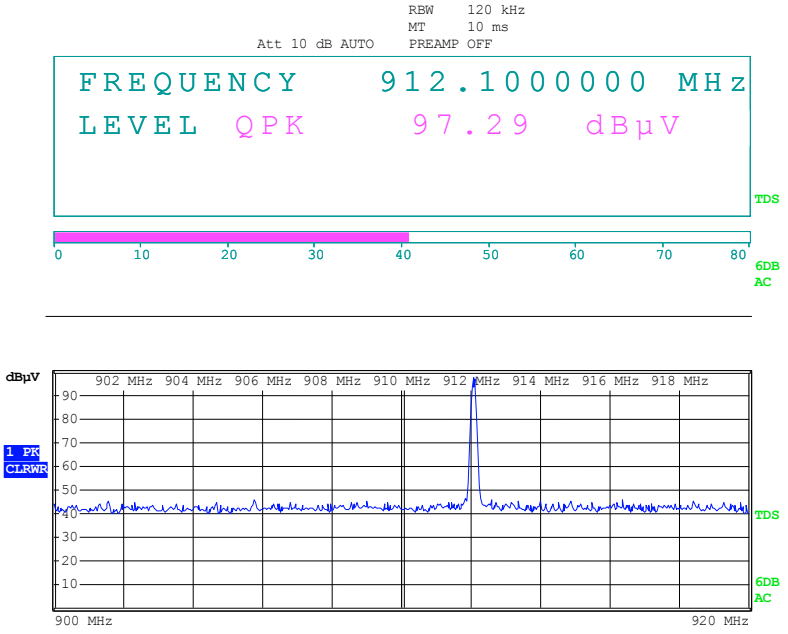
3.2 Peak power of intentional signal

Compliance standard : FCC part 15, subpart C, section 15.247 (b) (2) and (4)
RSS-210, section A8.4 (1)
Method of test : Public Notice DA 00-705, alternative test procedures
RSS-GEN, section 4.8
Test results :









Note: in the plots above read "dBµV" as "dBµV/m".

Peak powers are obtained, by putting the values above in the following equation:

$$EIRP = \frac{(E * d)^2}{30G}$$

Frequency (MHz)	Test result, radiated power (dBm)	Limit (dBm)
902.3 MHz	3.01	36
907.1 MHz	2.60	36
912.1 MHz	2.09	36

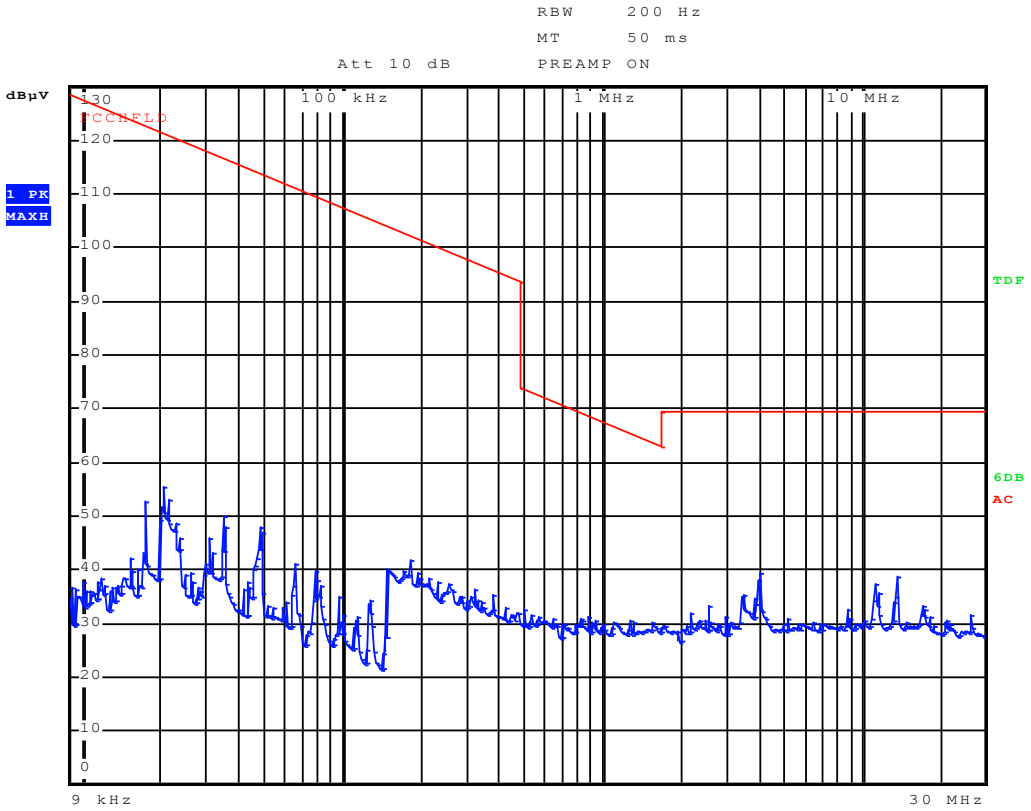
Measurement uncertainty	Horizontal polarization	
	30 – 200 MHz	4.5 dB
	200 – 1000 MHz	3.6 dB
	Vertical polarization	
	30 – 200 MHz	5.4 dB
	200 – 1000 MHz	4.6 dB

Limit	< 4 Watt

Measurement equipment: 14, 15, 16, 17.
(The numbers listed refer to the module ‘Used test equipment module’.)

3.3 Radiated Disturbance: Compliance Test (0.009 – 30 MHz)

Compliance standard	:	FCC part 15, subpart C, section 15.209 (a) FCC Part 15 Subpart B, section 15.109
Method of test	:	ANSI C63.4-2003, sections 5.3 & 8.2.1; FCC part 15, subpart A, section 15.31 (f)(2), 15.33, 15.35.
Test results	:	Graph

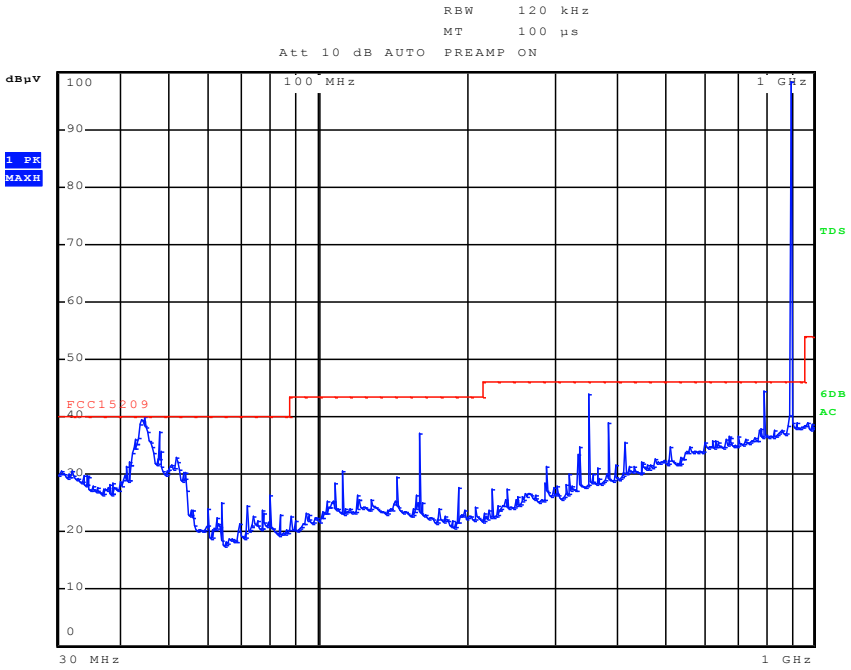


Measurement uncertainty	:	+1.9 / -2.1 dB
Measurement equipment	:	14, 17, 21. (The numbers listed refer to the module 'Used test equipment module'.)

3.4 Field strength of unwanted emissions 30 - 1000 MHz

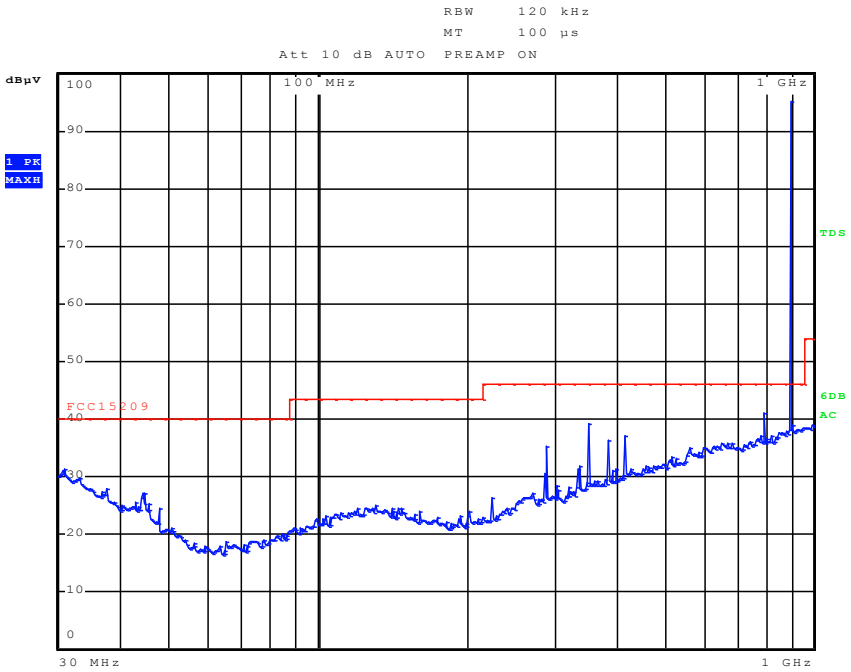
Compliance standard	:	FCC part 15, subpart C, section 15.247 (d) FCC Part 15 Subpart B, section 15.109 RSS-210, section A8.5
Method of test	:	ANSI C63.4-2003, sections 5.5, 8.2.3, 8.2.4 & 8.3.1.2; FCC part 15, subpart A, section 15.31(m), 15.33, 15.35.
Test results	:	Graph

Vertical polarization



The intentional signal on 902.3 MHz is not subject to the limit of FCC par. 15.209/109

Horizontal polarization



The intentional signal on 902.3 MHz is not subject to the limit of FCC par. 15.209/109

Frequency (MHz)	**Field strength (QP) dBµV/m**	**Polarization**	**Limit (µV/m)**	**Limit (dBµV/m)**
44.28	36.54	V	100	40
352.00	42.31	V	200	46
791.72	45.02	V	500	54

Measurement uncertainty	Horizontal polarization	
	30 – 200 MHz	4.5 dB
	200 – 1000 MHz	3.6 dB
	Vertical polarization	
	30 – 200 MHz	5.4 dB
	200 – 1000 MHz	4.6 dB

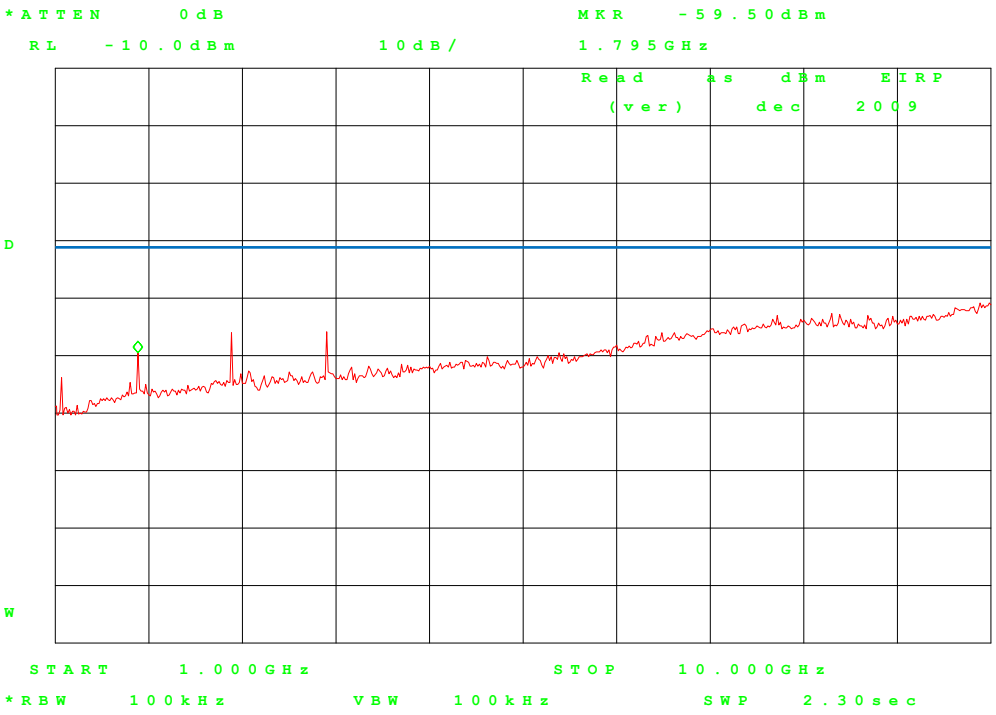
Limit	See plot

Measurement equipment : 14, 15, 16, 17.
(The numbers listed refer to the module 'Used test equipment module'.)

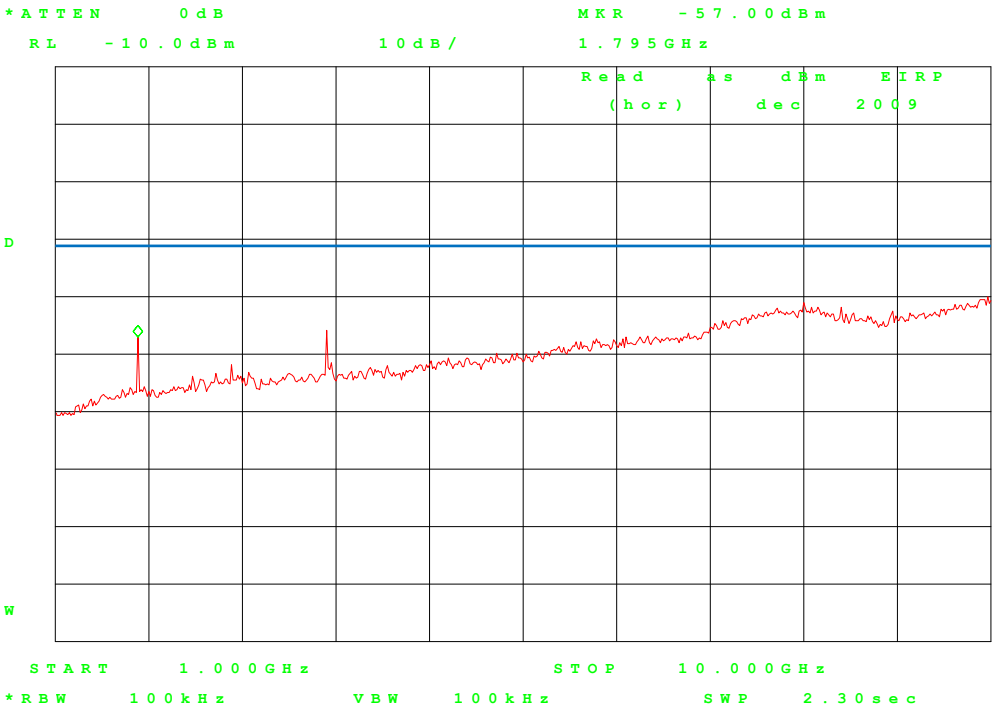
3.5 Field strength of unwanted emissions > 1000 MHz

Compliance standard	:	FCC part 15, subpart C, section 15.247 (d) FCC Part 15 Subpart B, section 15.109 RSS-210, section A8.5
Method of test	:	ANSI C63.4-2003, sections 5.5, 8.2.3, 8.2.4 & 8.3.1.2; FCC part 15, subpart A, section 15.31(m), 15.33, 15.35.
Test results	:	
Note	:	*Values in dBm (e.i.r.p)*

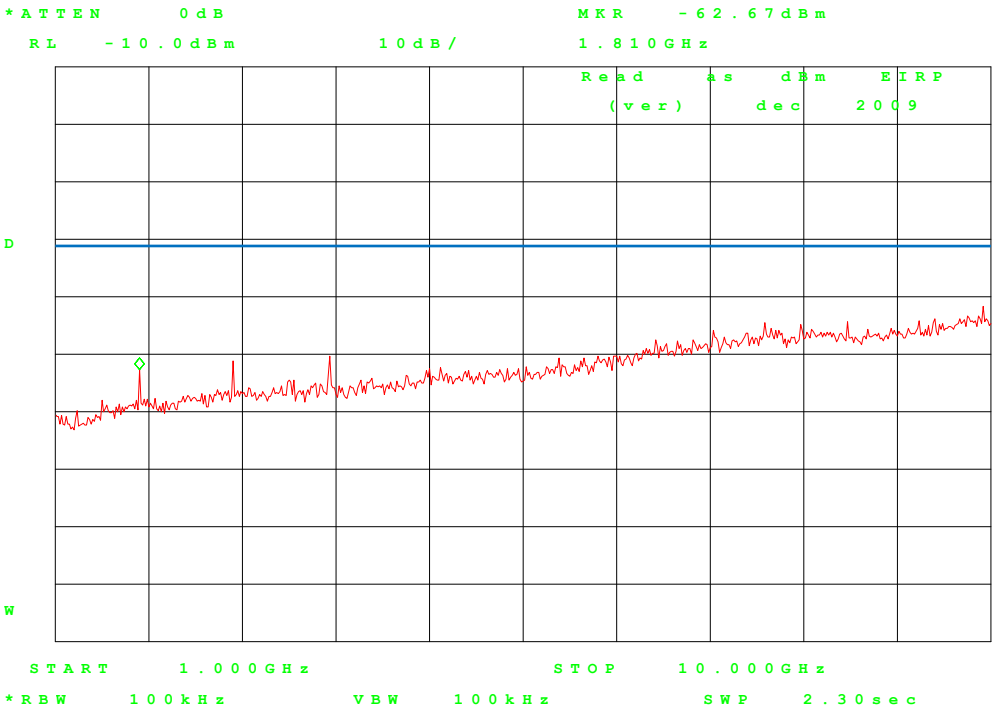
Vertical polarization (low channel)



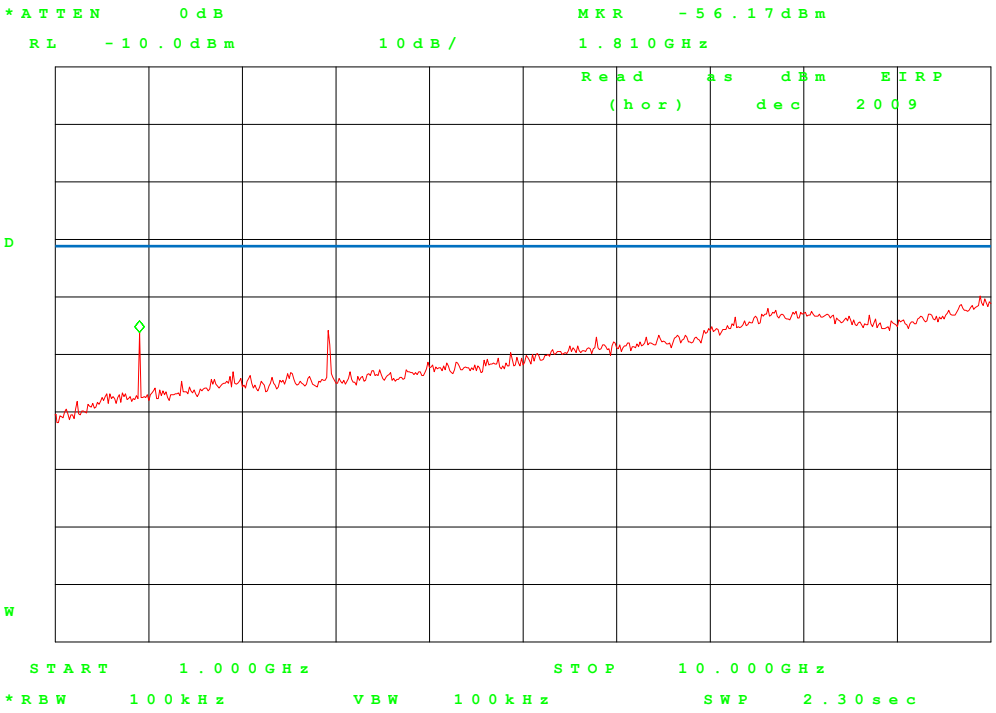
Horizontal polarization (low channel)



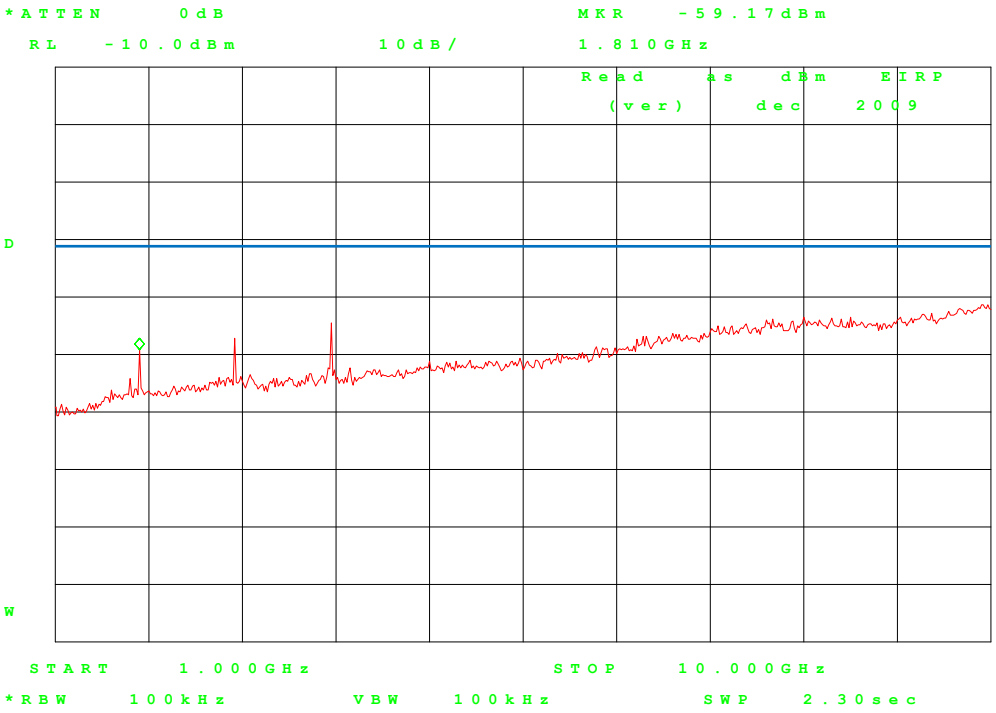
Vertical polarization (mid channel)



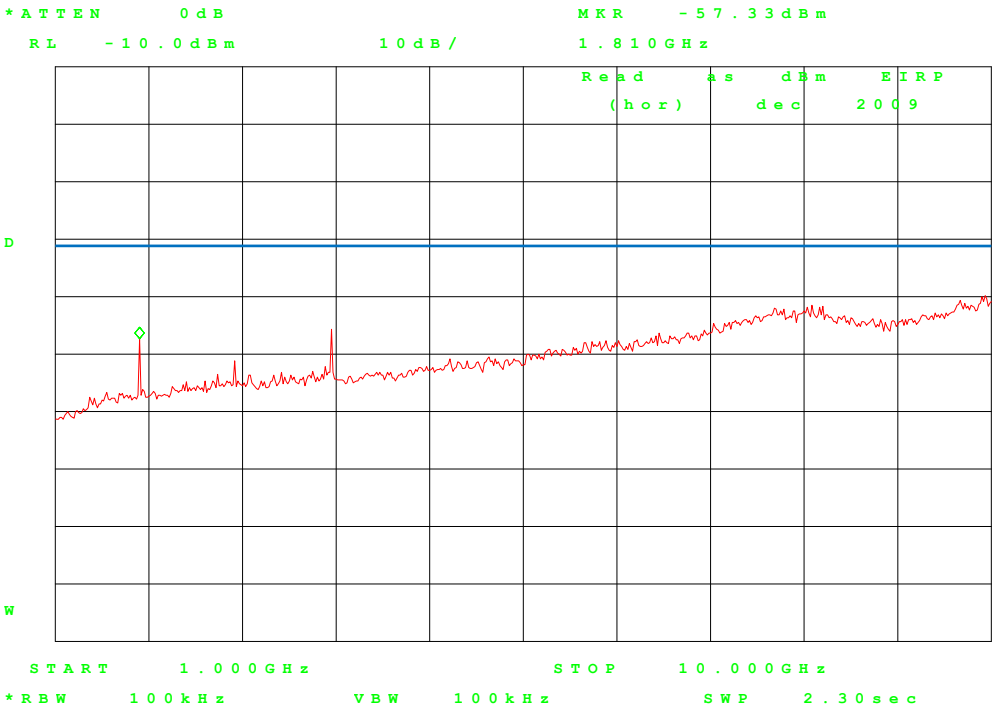
Horizontal polarization (mid channel)



Vertical polarization (high channel)



Horizontal polarization (high channel)



Measurement uncertainty: +4.5/-6.1 dB

Limit	Attenuation below fundamental ≥ 20 dB

Measurement equipment : 1, 3, 8, 10, 11, 12.
(The numbers listed refer to the module 'Used test equipment module'.)

3.6 Emissions in the restricted bands

Compliance standard : FCC part 15, subpart C, section 15.247 (d)
RSS-210, section A8.5

Method of test : ANSI C63.4-2003, sections 5.5, 8.2.3, 8.2.4 & 8.3.1.2;
FCC part 15, subpart A, section 15.31(m), 15.33, 15.35.

Test results :

Frequency (MHz)	dBm e.i.r.p.	Polarization	Power of fundamental (dBm)	Attenuation below fundamental (dB)	Limit (dB)
Below 1000	See section 3.4	H/V	See below	≥ 60	≥ 20
1795	-59.50	V	3.01	62.51	≥ 20
1795	-57.00	H	3.01	60.01	≥ 20
1810	-62.67	V	2.60	65.27	≥ 20
1810	-56.17	H	2.60	58.77	≥ 20
1816	-59.17	V	2.09	61.26	≥ 20
1816	-57.33	H	2.09	59.42	≥ 20
2695	-56.00	V	3.01	59.01	≥ 20
2695	-61.83	H	3.01	64.84	≥ 20
2710	-61.17	V	2.60	63.77	≥ 20
2710	-63.00	H	2.60	65.60	≥ 20
2725	-57.17	V	2.09	59.26	≥ 20
2725	-61.17	H	2.09	63.26	≥ 20
3610	-55.83	V	3.01	58.84	≥ 20
3610	-55.83	H	3.01	58.84	≥ 20
3625	-60.33	V	2.60	62.93	≥ 20
3625	-55.83	H	2.60	58.43	≥ 20
3655	-54.50	V	2.09	56.59	≥ 20
3655	-55.67	H	2.09	57.76	≥ 20

Measurement uncertainty: +4.5/-6.1 dB

Measurement equipment : 1, 3, 8, 10, 11, 12.
(The numbers listed refer to the module 'Used test equipment module'.)

Used test equipment module

No.	Description	Manufacturer	Model	Ident
1	Spectrum Analyzer	Hewlett Packard	HP8563E	TE 00359
2	RF Pre-amplifier 30 - 1000 MHz	Rohde & Schwarz	ESV-Z3	TE 00098
3	RF Pre-amplifier 1 - 26.5 GHz	Hewlett Packard	HP8449B	TE 00093
5	Biconilog antenna	EMCO	3143	TE 00700
6	Horn Antenna	EMCO	3115	TE 00532
7	Horn Antenna	Flann	SA 20240-25	TE 00818
8	Anechoic Chamber	Euroshield	RFD-F-100	TE01064
9	Digital Thermometer	Fluke	Fluke 51	TE 00388
10	Antenna tower	HD	AS 620p	--
11	Turntable	HD	DS 412	--
12	Turntable controller	HD	HD 050	--
13	Temperature / RH logger	Microlog	EC650	TE 01115
14	EMI test receiver	R&S	ESCI	TE 00481
15	Biconilog antenna	Chase	CBL6112A	TE 00967
16	Antenna tower	inn-Co	MA4000	SAR
17	Semi Anechoic Room	Comtest	--	TE 00861
18	Pulse limiter	R&S	ESH3Z2	TE 00756
19	Two-line V-network	R&S	ESH3Z5	TE 00208
20	Variable transformer	Jacke	RU 8	TE 00586
21	Active Loop antenna	R & S	HFH2-Z2	TE 00746