telefication bv
The Netherlands
Chamber of Commerce
09076358
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# Radio test report
## 20093271300 - Rev. 1.0

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)

Wireless scoring device for bridge
Bridgemate II
BM2-1

# Contents



This report comprises of three modules. The total number of pages is: 28

# 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 BV |
| Address | : | Bulgersteyn 7085 |
| Zipcode | : | 3011 AB |
| City/town | : | Rotterdam |
| Country | : | The Netherlands |
| Date of order | : | 28 April 2009 |

# 2 Product

A sample of the following product was submitted for testing:

| | | |
|---|---|---|
| Product description | : | Wireless scoring device for bridge |
| Manufacturer | : | Bridge Systems BV |
| Trade mark | : | Bridgemate II |
| Type designation | : | BM2-1 |
| FCC ID | : | UVIBM21 |
| IC ID | : | 6946A-BM21 |
| Hardware version | : | 1.0 |
| Serial number | : | -- |
| Software release | : | 1.0 |

# 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:

- 29 April 2009

Tests are carried out between:

- 12 May and 14 May 2009

# 4 Product documentation

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

| Description: | Date: | Identification: |
|---|---|---|
| Manual | 2004-2007 | Bridgemate Pro Scoring System |

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 Pro server which is connected to a PC.

The two parts use wireless communication between each other, by means of 915 MHz transceivers.

The FCC and IC test results of the Bridgemate Pro server are laid down in Telefication test report 99833930.

# 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 (10-1-08 Edition);
RSS-210, Issue 7 (June 2007 edition);
RSS-Gen, Issue 7 (June 2007 edition).

# 8 Conclusions

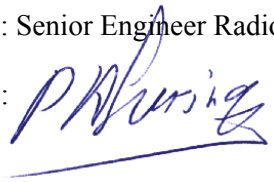
The samples of the product showed **NO NON-COMPLIANCES** to the specification stated in chapter 7 of this report.

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. P.A. Suringa

function : Senior Engineer Radio/EMC

signature : 

Review of test report by:

name : G.J. Gort

function : Senior Test Engineer

signature : 

The above conclusions have been verified by the following signatory:

Date : 13 October 2009

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 – 927.7 MHz (50 hop frequencies) |
| Modulation | FSK |
| ITU emission designator | 23K0F1D (calculated) |
| Duty Cycle | 100 %. (during testing) |
| Antenna gain | 2 dBi (max.) |
| Type of antenna | ¼ λ whip monopole |
| IC ID | 6946A-BM21 |
| FCC ID | UVIBM21 |

### 1.2 Frequency test channels

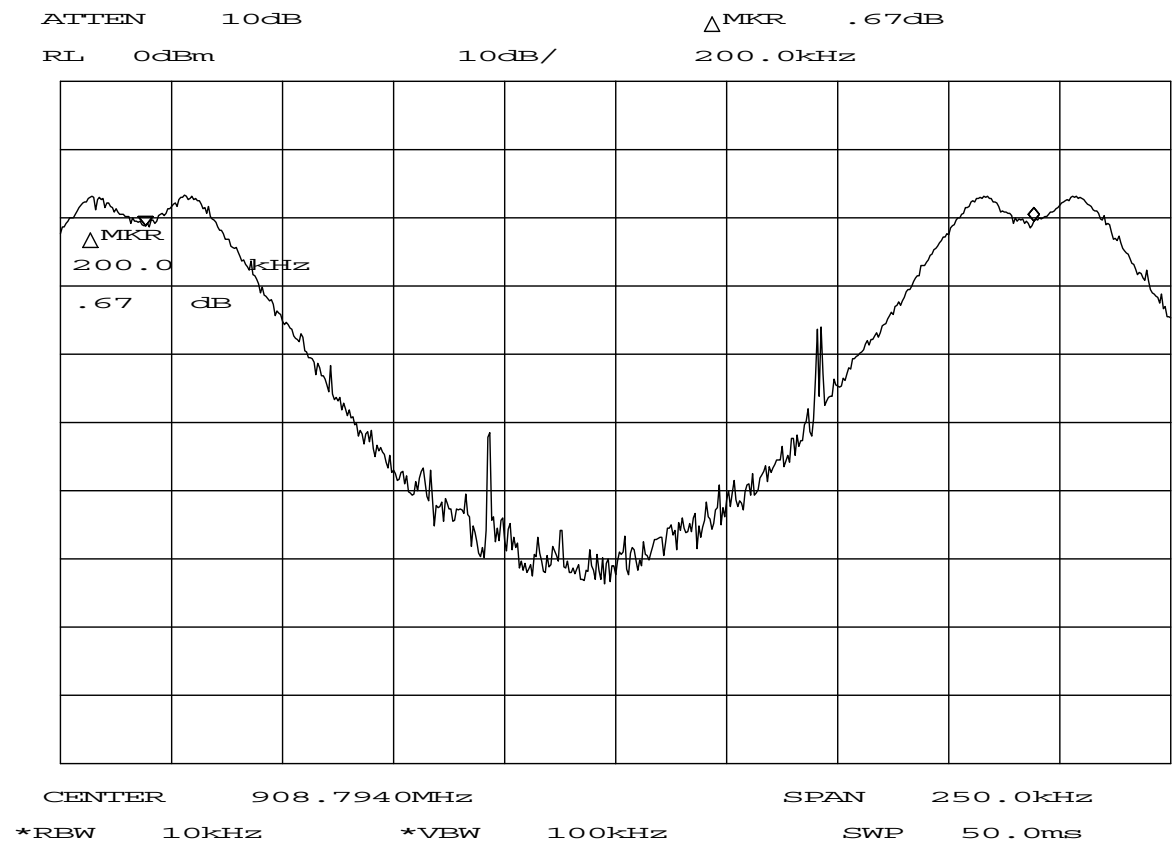
| | **TX** | **RX** |
|---|---|---|
| Channel low | 902.3 MHz | 902.3 MHz |
| Channel mid | 915.1 MHz | 915.1 MHz |
| Channel high | 927.7 MHz | 927.7 MHz |

# 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 |

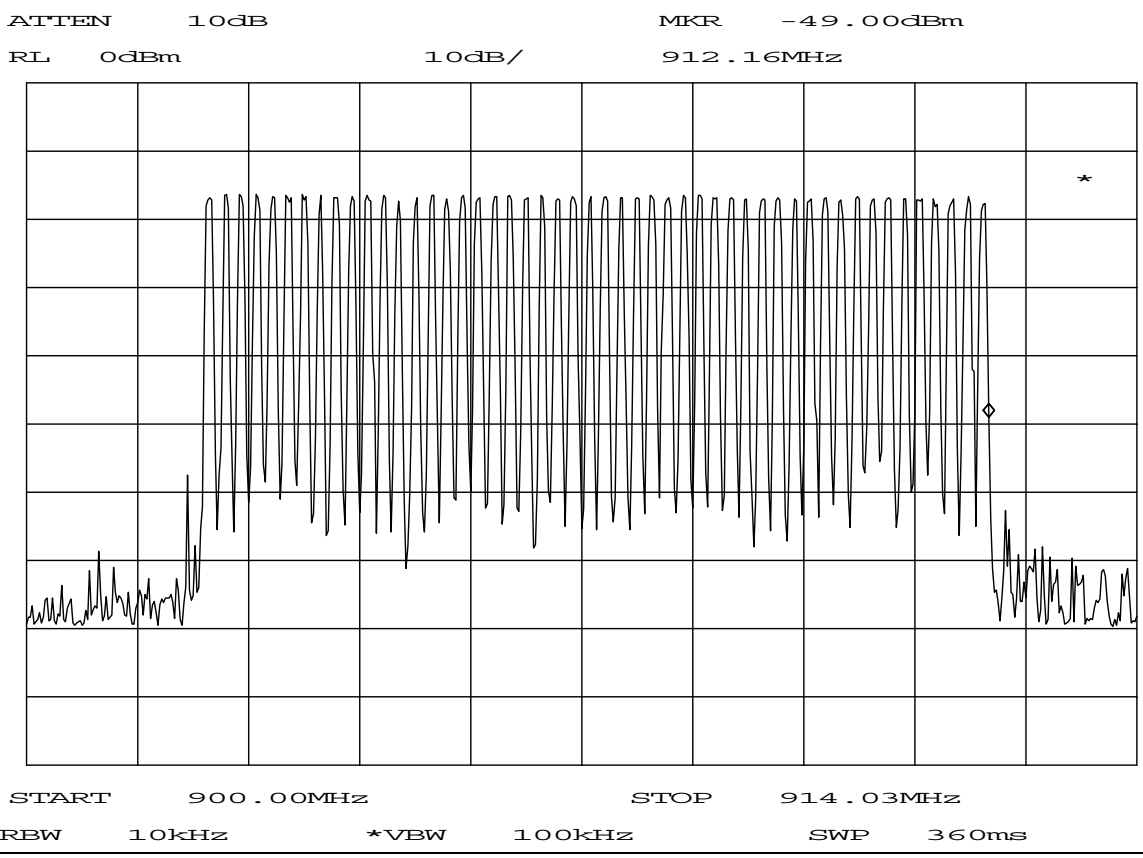
| | |
|---|---|
| Limit | ≥ 25 kHz or the 20 dB bandwidth whichever is greater |

Measurement equipment: 76
(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 |

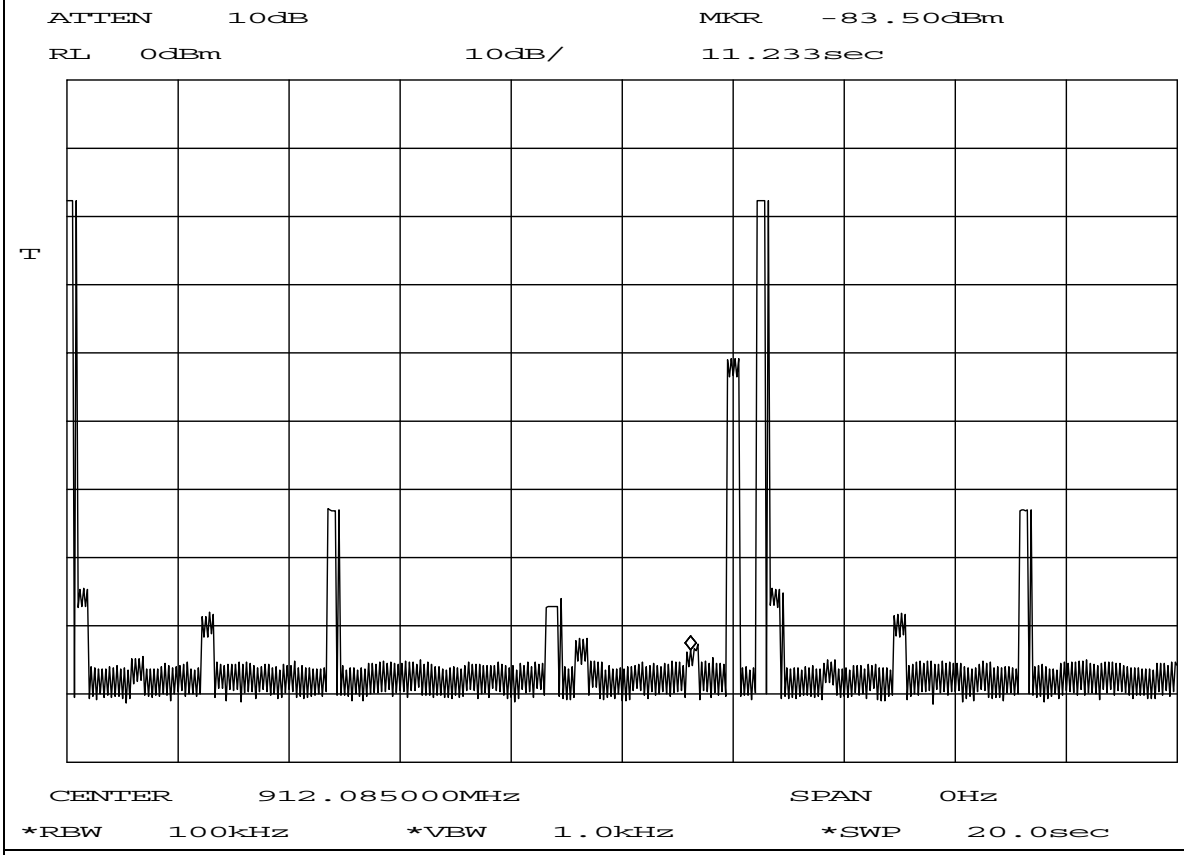
| | |
|---|---|
| Limit | ≥ 50 hopping frequencies (for Channel BW < 250 kHz)<br>≥ 25 hopping frequencies (for Channel BW ≥ 250 kHz) |

Measurement equipment: 76
(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

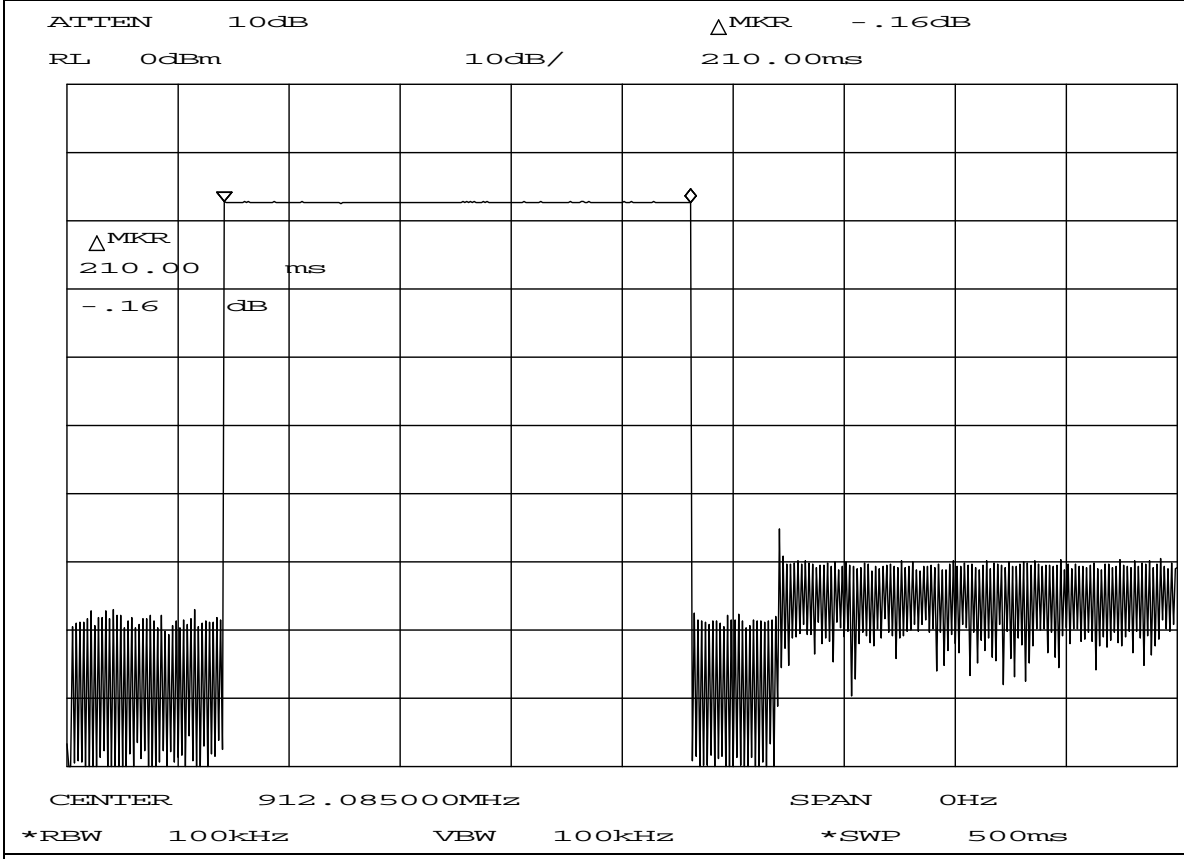
Average time of occupancy: ((6.4 div.x 2 sec)/20 sec.) x 210 msec = 134.4 msec.

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

Measurement equipment: 76
(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 210 milliseconds

Average time of occupancy: ((6.4 div.x 2 sec)/20 sec.) x 210 msec = 134.4 msec.

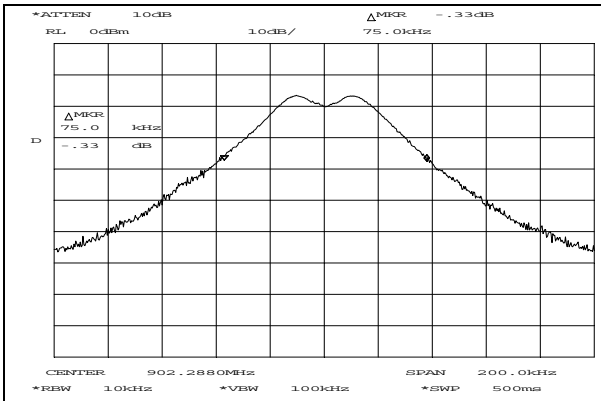
| | |
|---|---|
| Limit | Average time of occupancy on any frequency: ≤ 0.4 sec within a 20 second period. |

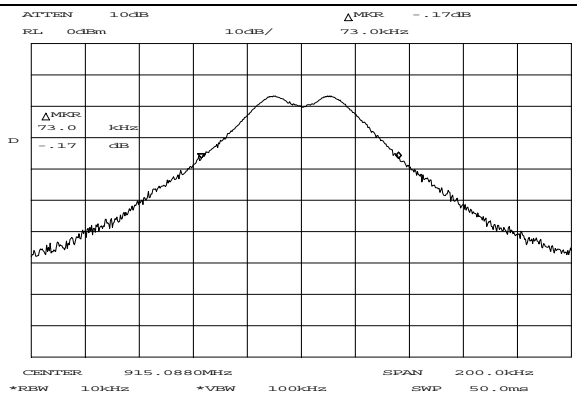
Measurement equipment: 76
(The numbers listed refer to the module 'Used test equipment module'.)

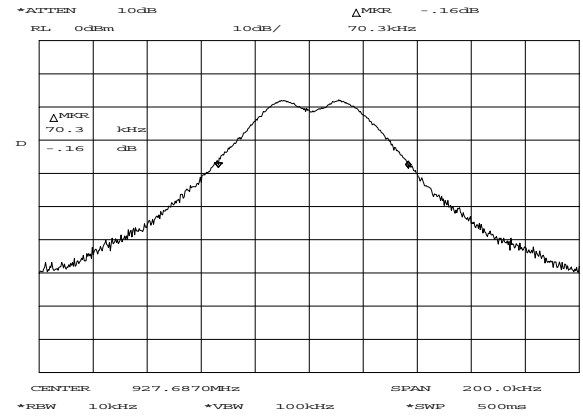
## 2.5 20 dB Bandwidth

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 :

<table>
<tr>
<td> 

Channel low<br>20 dB Bandwidth = 75 kHz</td>
<td> 

Channel mid<br>20 dB Bandwidth = 73 kHz</td>
</tr>
<tr>
<td> 

Channel high<br>20 dB Bandwidth = 70.3 kHz</td>
<td></td>
</tr>
<tr>
<td>Measurement uncertainty</td>
<td>± 1.3 kHz<br>+4.5/-6.1 dB</td>
</tr>
</table>

| | |
|---|---|
| Bandwidth Limit | 20 dB BW < 250 kHz |

Measurement equipment: 76
(The numbers listed refer to the module 'Used test equipment module'.)

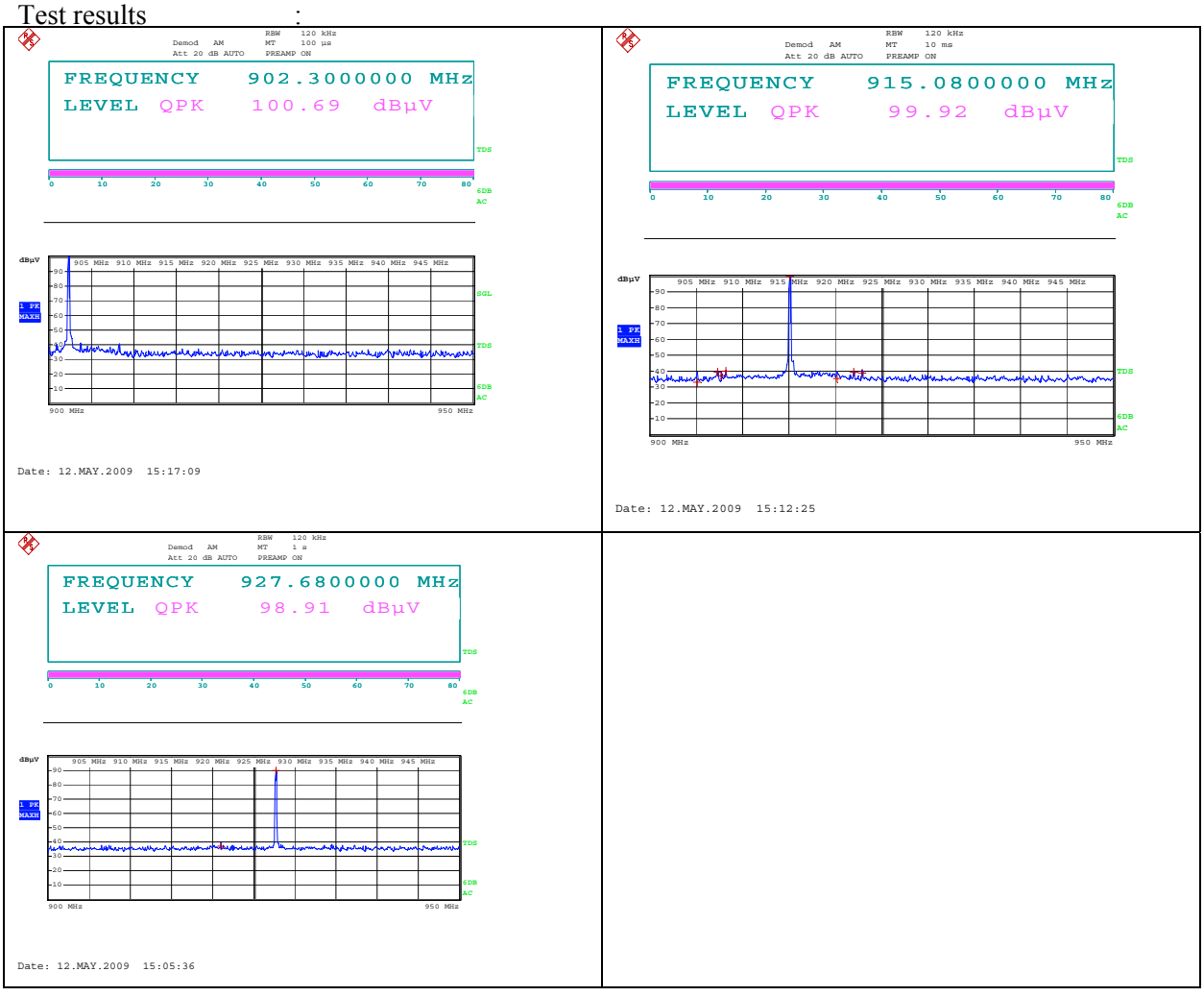
# 3 Emission tests

## 3.1 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 | 5.47 | 36 |
| 915.1 MHz | 4.67 | 36 |
| 927.7 MHz | 3.67 | 36 |

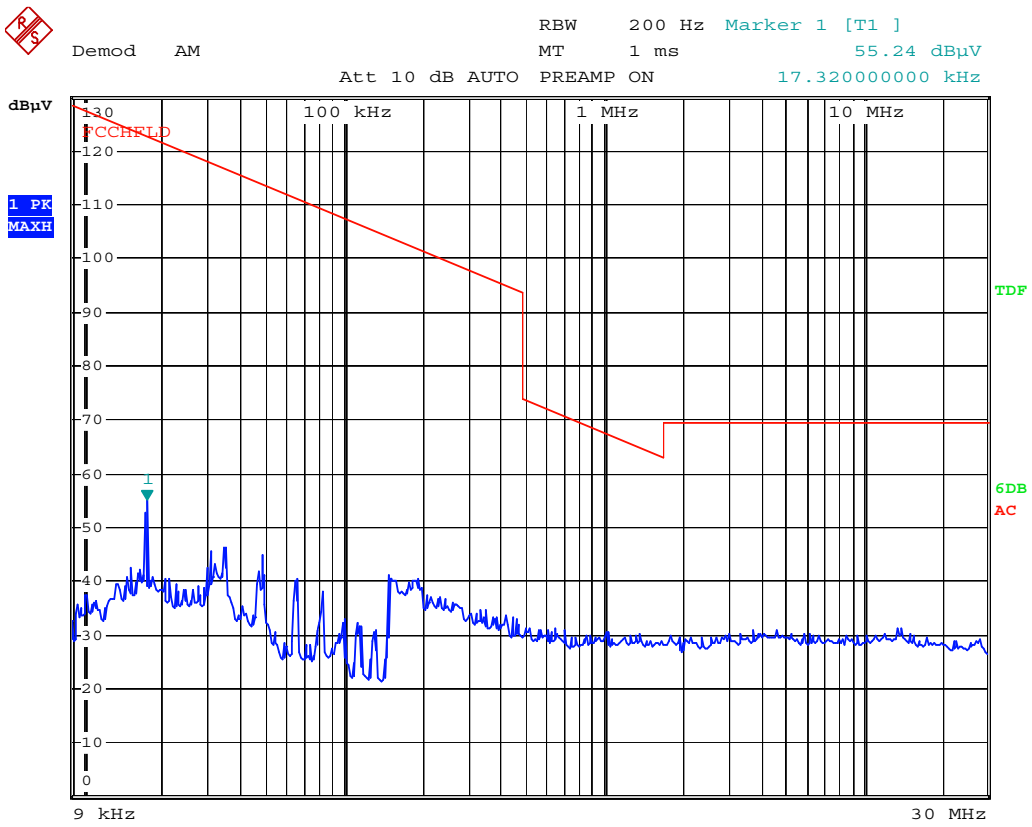
| | | |
|---|---|---|
| Measurement uncertainty | Horizontal polarization | |
| | 30 – 200 MHz | 4.5 dB |
| | 200 – 1000 MHz | 3.6 dB |
| | Vertical polarization | |
| | 30 – 200 MHz | 5.4 dB |
| | 200 – 1000 MHz | 4.6 dB |

| | |
|---|---|
| Limit | < 4 Watt |

Measurement equipment: 27, 33, 80
(The numbers listed refer to the module 'Used test equipment module'.)

## 3.2 Radiated Disturbance: Compliance Test (0.009 – 30 MHz)

Compliance standard : FCC part 15, subpart C, section 15.209 (a).
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



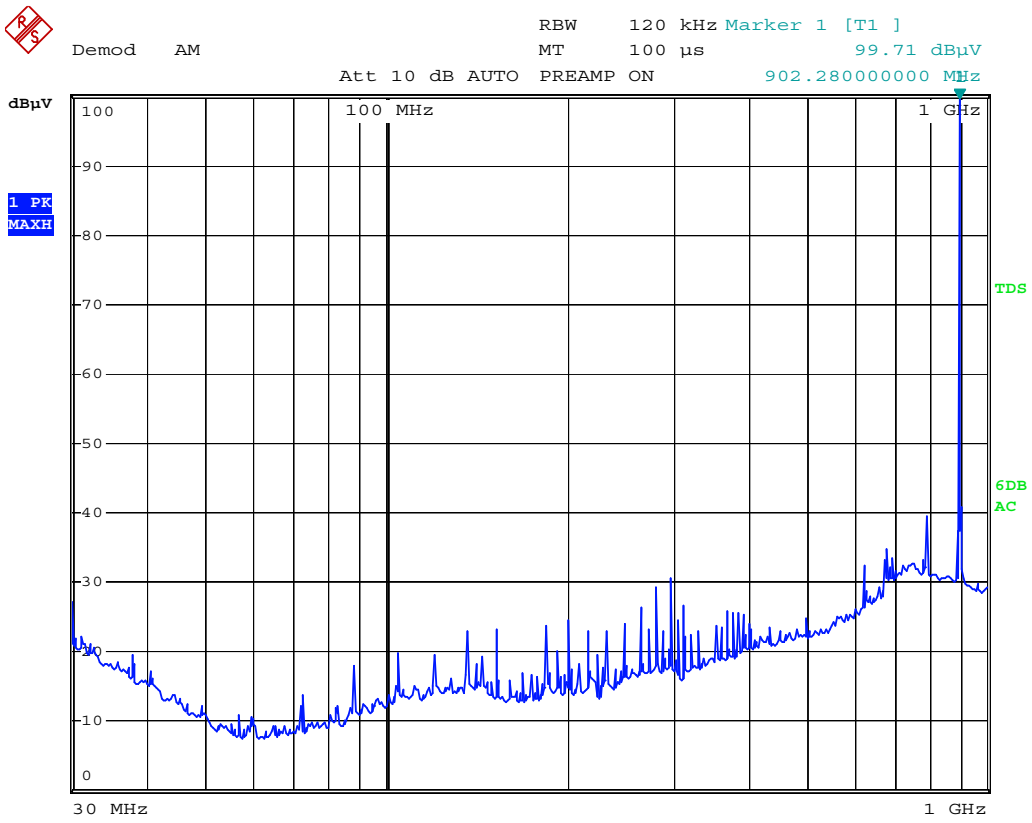

Measurement uncertainty : +1.9 / -2.1 dB

Measurement equipment : 27, 49 80.
(The numbers listed refer to the module 'Used test equipment module'.)

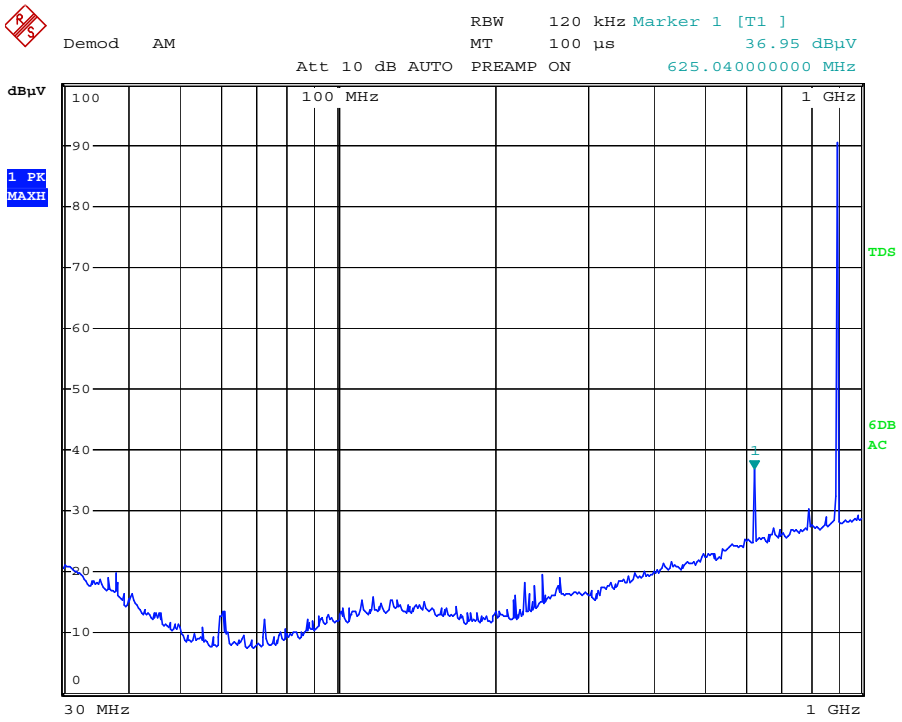
## 3.3 Field strength of unwanted emissions 30 - 1000 MHz

| | | |
|---|---|---|
| Compliance standard | : | FCC part 15, subpart C, section 15.247 (d)<br>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;<br>FCC part 15, subpart A, section 15.31(m), 15.33, 15.35. |
| Test results | : | |

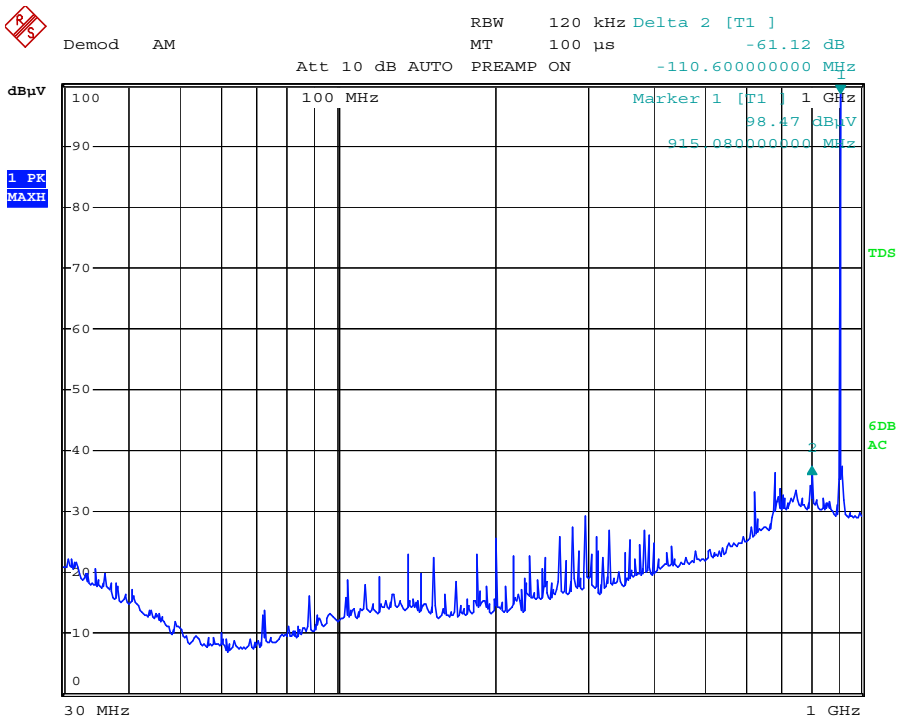
*Horizontal polarization (low channel)*



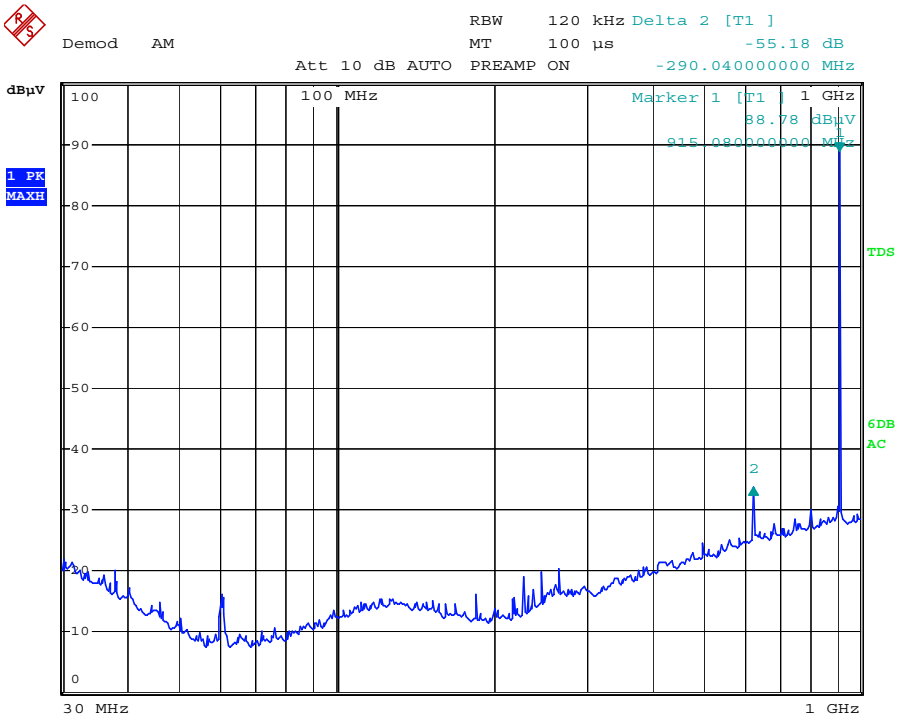
*Vertical polarization (low channel)*



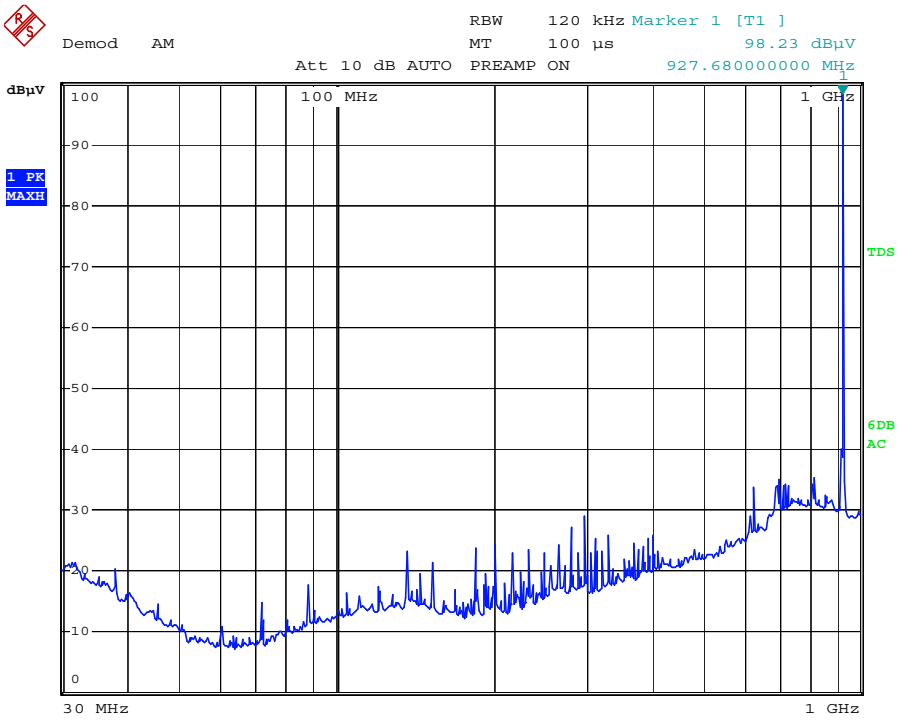

*Horizontal polarization (mid channel)*



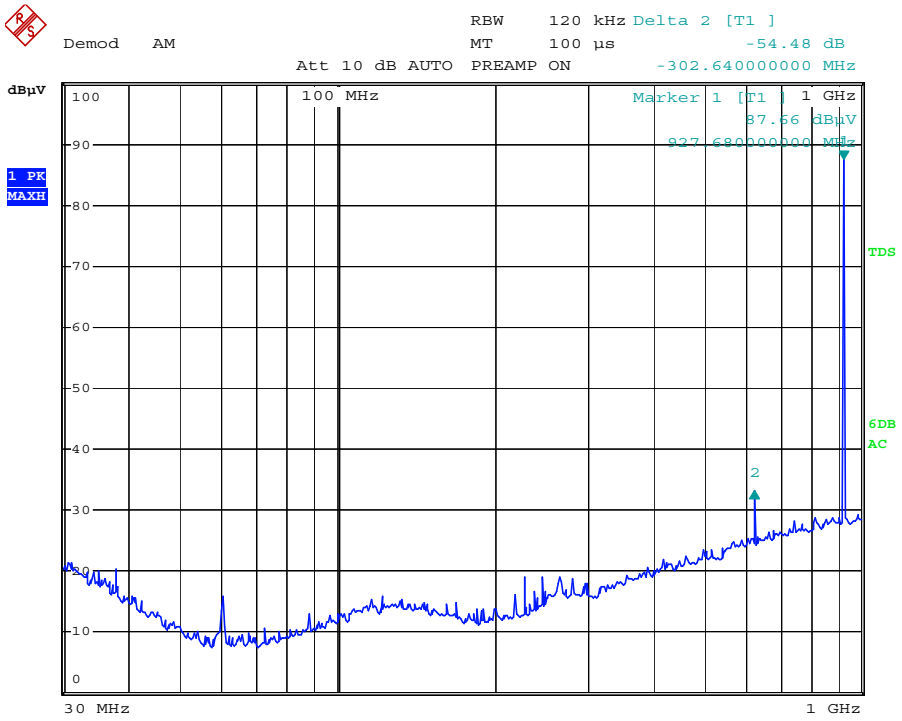
*Vertical polarization (mid channel)*




*Horizontal polarization (high channel)*



*Vertical polarization (high channel)*




| | | |
|---|---|---|
| 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 |

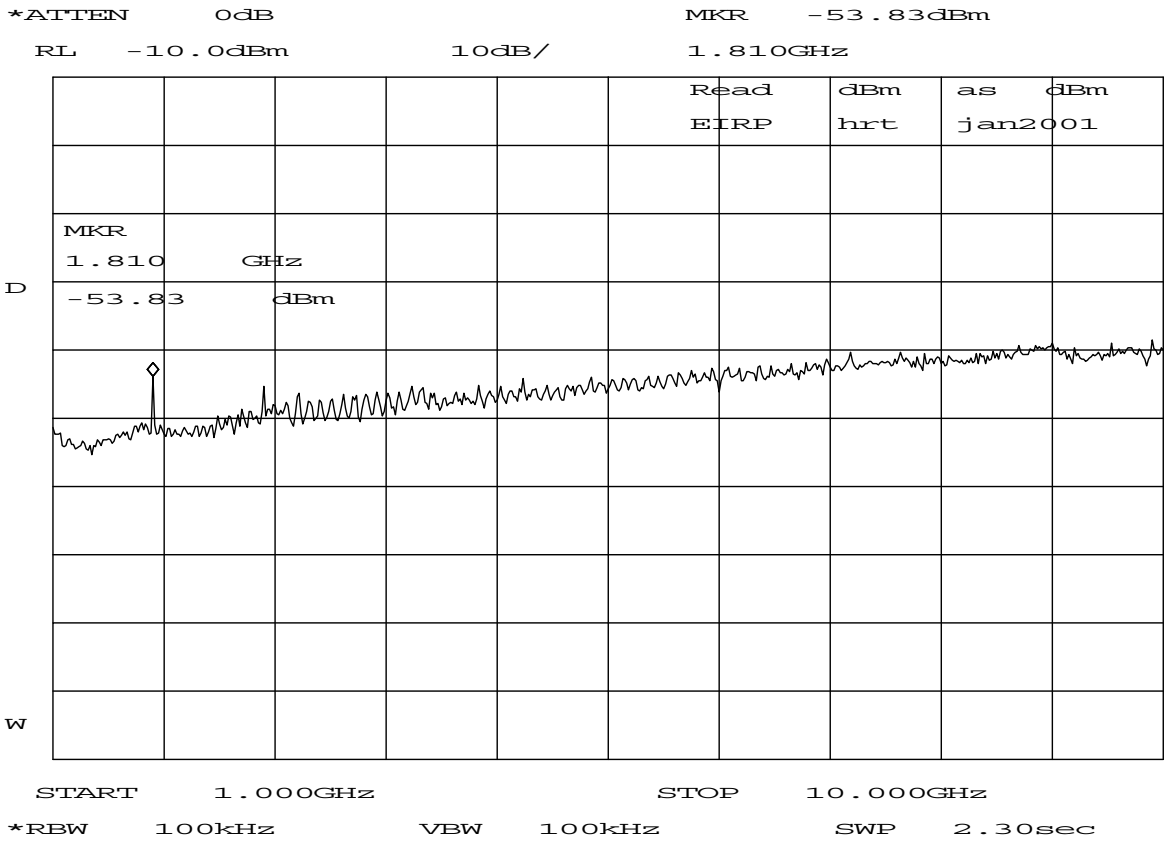
| | |
|---|---|
| Limit | Attenuation below fundamental ≥ 20 dB |

Measurement equipment : 27, 33, 80
(The numbers listed refer to the module 'Used test equipment module'.)

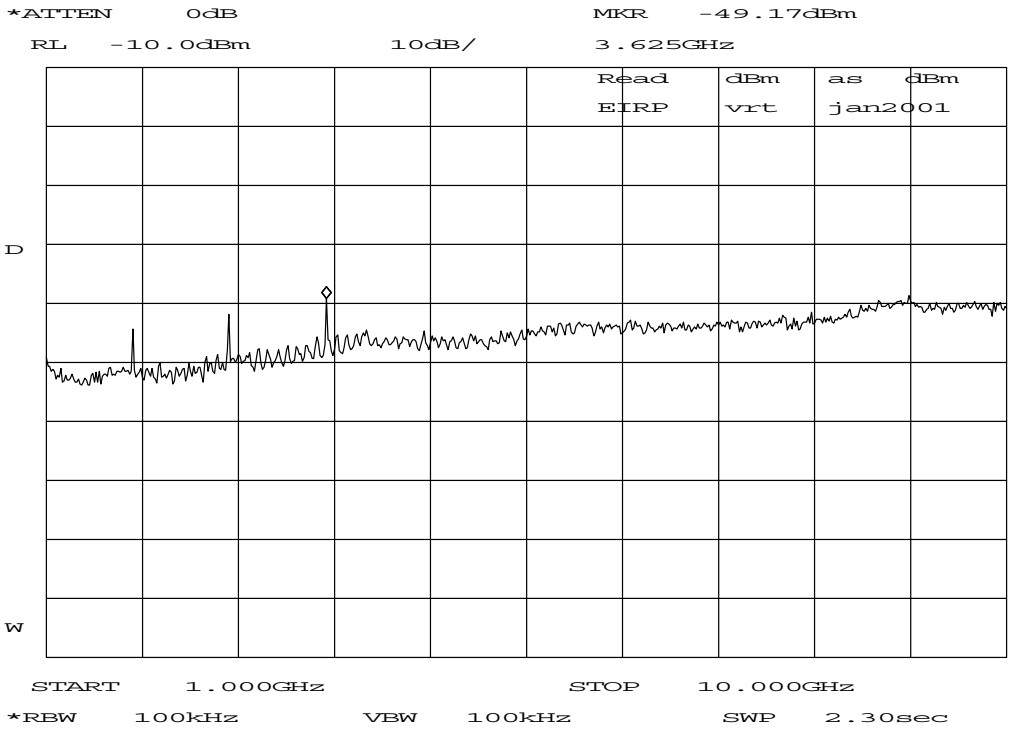
## 3.4 Field strength of unwanted emissions > 1000 MHz

| | | |
|---|---|---|
| Compliance standard | : | FCC part 15, subpart C, section 15.247 (d)<br>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;<br>FCC part 15, subpart A, section 15.31(m), 15.33, 15.35. |
| Test results | : | |
| *Note* | *:* | *Values in dBm (e.i.r.p)* |

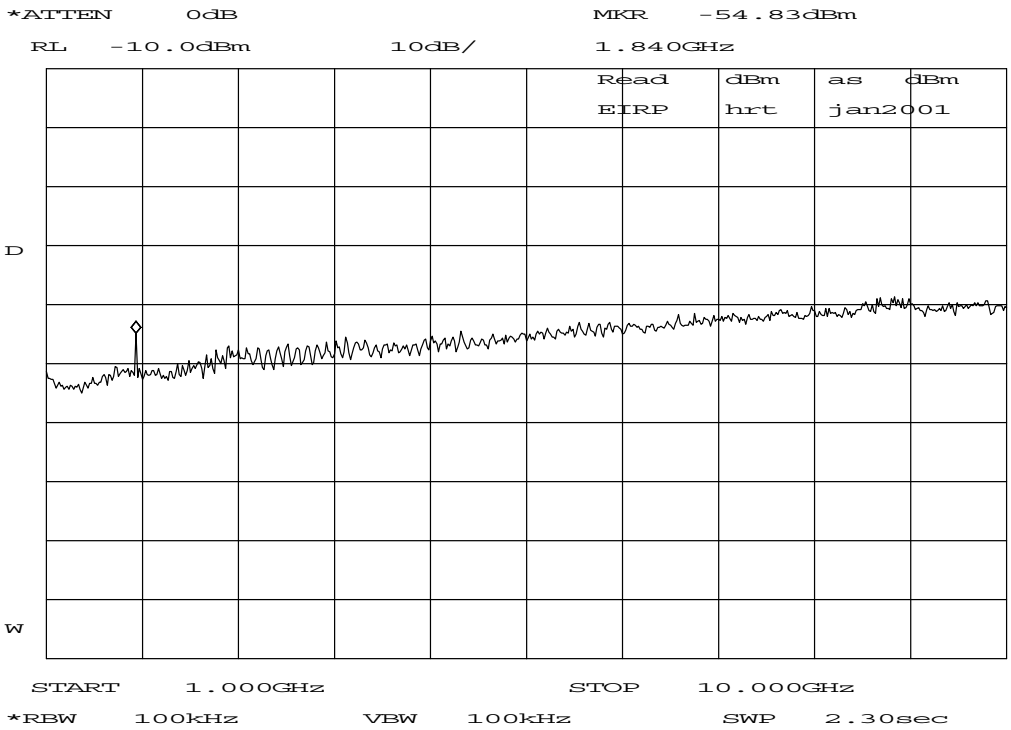
*horizontal polarization (low channel)*



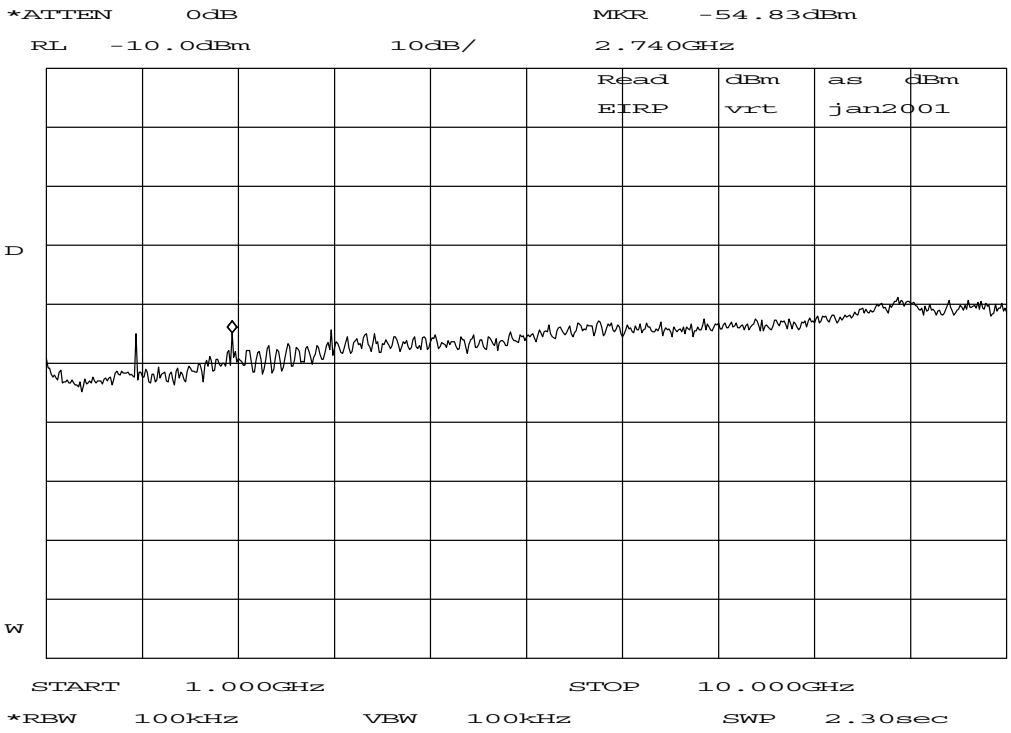
*Vertical polarization (low channel)*



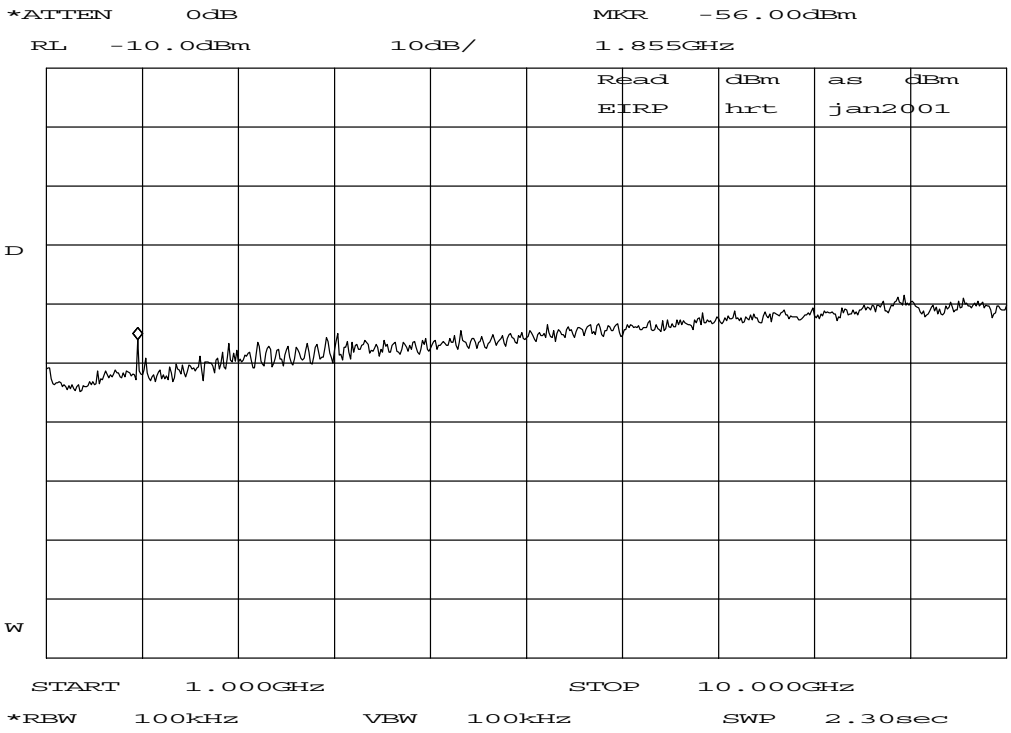

*horizontal polarization (mid channel)*



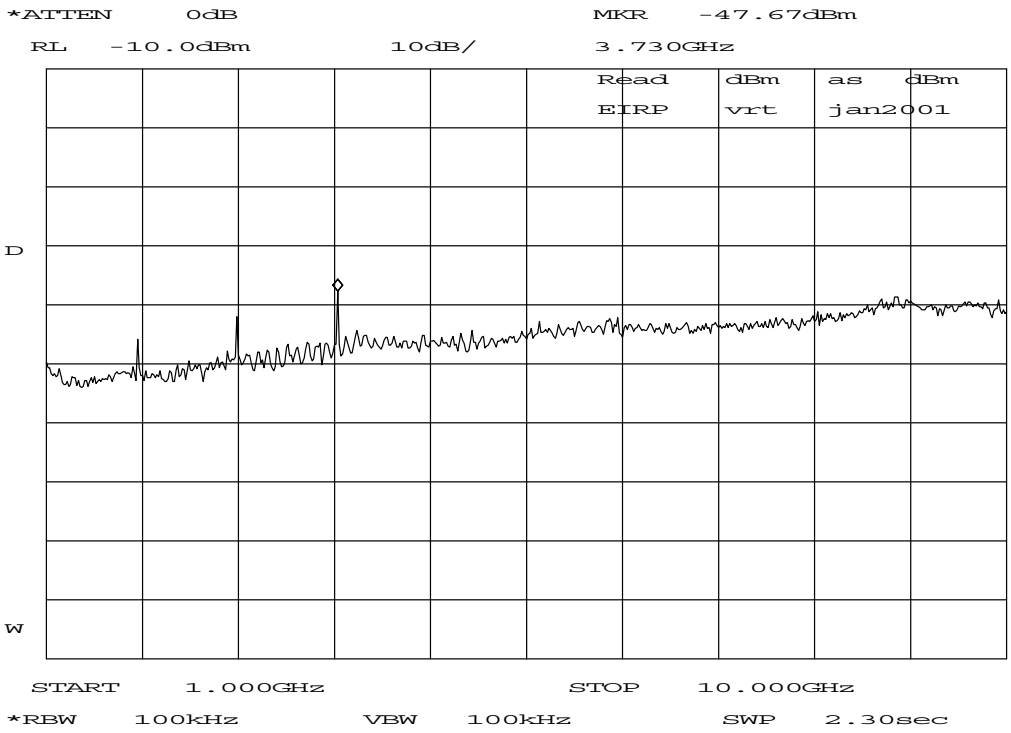
*Vertical polarization (mid channel)*




*horizontal polarization (high channel)*



*Vertical polarization (high channel)*




Measurement uncertainty : +4.5/-6.1 dB

| | |
|---|---|
| Limit | Attenuation below fundamental ≥ 20 dB |

Measurement equipment : 32, 75, 76, 81
(The numbers listed refer to the module 'Used test equipment module'.)

## 3.5 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. | Power of fundamental (dBm) | Attenuation below fundamental (dB) | Limit (dB) |
|---|---|---|---|---|
| Below 1000 | See section 3.3 | See below | ≥ 60 | ≥ 20 |
| 2706.9 | -52.0 | 5.47 | 57.47 | ≥ 20 |
| 2745.3 | -54.8 | 4.67 | 59.47 | ≥ 20 |
| 2783.1 | -52.0 | 3.67 | 55.67 | ≥ 20 |
| 3609.2 | -49.2 | 5.47 | 54.67 | ≥ 20 |
| 3660.4 | -55.0 | 4.67 | 59.67 | ≥ 20 |
| 3710.8 | -47.7 | 3.67 | 51.37 | ≥ 20 |
| Other up to 9000 | ≤ -50 | See above | ≥ 53.67 | ≥ 20 |

Measurement uncertainty : +4.5/-6.1 dB

Measurement equipment : 19, 20, 32, 75, 76, 81
(The numbers listed refer to the module 'Used test equipment module'.)

# Used test equipment module

| Ref | Description | Manufacturer | Model | ID |
|---|---|---|---|---|
| 1 | EFT generator | Keytek | E411 | TE 00760 |
| 2 | EFT/surge coupler | Keytek | E4551 | TE 00759 |
| 3 | Capacitive clamp | Keytek | CCL-4/S | TE 00761 |
| 4 | Controller | Keytek | E103 | TE 00023 |
| 5 | ESD simulator | Keytek | MZ-15/EC | TE 00516 |
| 6 | ESD air discharge tip | Keytek | TPA-2 | TE 00755 |
| 7 | ESD contact discharge tip | Keytek | TPC-2 | TE 00709 |
| 8 | Surge comb. wave generator | Keytek | E501A | TE 00757 |
| 9 | Surge telecom wave gen. | Keytek | E502A | TE 00022 |
| 10 | Surge coupler/decoupler | Keytek | E571 | TE 00758 |
| 11 | Logper/bow-tie antenna (Anec) | EMCO | 3143 | TE 00700 |
| 12 | Biconical antenna | Schwarzbeck | BBA 9106 | TE |
| 13 | RF amplifier | Kalmus | 737FC | TE 00750 |
| 14 | RF generator | Adret | 7200A | TE 00474 |
| 15 | Isotropic field sensor | Holaday | HI-4422 | TE 00748 |
| 16 | Fibre optic RS232 interface | Holaday | HI-4413G | -- |
| 17 | System readout | Holaday | HI-4416 | TE 00749 |
| 18 | Antenna tower | HD | AS 620p | -- |
| 19 | Turntable | HD | DS 412 | -- |
| 20 | Turntable controller | HD | HD 050 | -- |
| 21 | RF voltmeter | Boonton | 9200B | TE 00707 |
| 22 | 40 dB coupler | Kalmus | DC100HHR | TE 00752 |
| 23 | RF probe (2x) | Boonton | 952001B | TE 00753<br>TE 00754 |
| 24 | Artificial mains network | R & S | ESH2-Z5 | TE 00208 |
| 25 | Test receiver | R & S | ESH3 | TE 00205 |
| 26 | Pulse limiter | R & S | ESH3-Z2 | TE 00227 |
| 27 | EMI test receiver | R & S | ESCI | TE 11128 |
| 28 | Test receiver | R & S | ESV(P) | TE 00091 |
| 29 | Antenna mast | EMCO | 1070 | -- |
| 30 | Turn table | EMCO | 1060-2M | -- |
| 31 | Absorbing clamp | R & S | MDS 21 | TE 00777 |
| 32 | Anechoic chamber | Euroshield | RFD-F-100 | -- |
| 33 | Semi Anechoic Room | Comtest | -- | TE 00861 |
| 34 | Power/Arb. waveform source | Keytek | EP72 | TE 00711 |
| 35 | Reference impedance | Keytek | ERI-1 | TE 00712 |
| 36 | Power analyzer | Xitron Technologies | 2501AH | TE 00763 |
| 37 | AC power simulator | Kikusui | PCR4000L | TE 00762 |
| 38 | Signal generator | Marconi | 2042 | TE 00413 |
| 39 | RF amplifier | Amplifier Research | 25A250A | TE 00515 |
| 40 | T-network | R & S | ESH3-Z4 | TE 00026 |
| 41 | Mains coupl./dec. network | Telefication | 9403S1 | TE 00766 |

| Ref | Description | Manufacturer | Model | ID |
|---|---|---|---|---|
| 42 | Power meter | R & S | NRVS | TE 00414 |
| 43 | Measurement probe | R & S | URV5-Z4 | TE 00415 |
| 44 | Attenuator 6 dB | Narda | 766-6 | TE 00514 |
| 45 | Pulse generator | HP | 8012 B | TE 00225 |
| 46 | Coaxial coupl./dec. network | Telefication | CDN-S1 | TE 00766 |
| 47 | Voltage swell/DIP/interrupt source | Keytek | EP62 | TE 00710 |
| 48 | Digital multimeter | Fluke | Fluke 87 | TE 00329 |
| 49 | Active loop antenna | R & S | HFH2-Z2 | TE 00746 |
| 50 | EM clamp | Lüthi | EM101 | TE 00764 |
| 51 | Ferrite tube | Lüthi | FTC101 | TE 00765 |
| 52 | Distortion meter | HP | HP 8903 B | TE 00416 |
| 53 | Artificial Mains Network | Telefication | JOZ191194 | TE |
| 54 | Attenuator 3 dB, 100 W | Tenuline | 8343-030 | TE 00751 |
| 55 | Log periodic antenna | EMCO | 3147 | TE 00744 |
| 56 | Modulation analyzer | R & S | FAM | TE 00412 |
| 57 | Audio amplifier | Solar Electronics | 6552-1A | TE 00517 |
| 58 | Acoustic Pipe Coupler | Telefication | JOZ110395 | TE 00775 |
| 59 | Antenna | Kathrein | K 51164 | -- |
| 60 | Pulse modulator | Schaffner | CPM9830 | TE 00708 |
| 61 | RF power amplifier | Schaffner | CBA9546 | TE 00714 |
| 62 | Adjustable transformer | KSL | RU8 | -- |
| 63 | 100 µF decoupling capacitor | Telefication | JOZ | TE 00769 |
| 64 | Mains coupling/decoupling Network | Telefication | CDN-M2/M3 | TE 00767 |
| 65 | Coupling/decoupling device for screened cables | MEB | CDN-S25 | TE 00771 |
| 66 | Audio isolation transformer | Solar | 6220-2 | TE 00772 |
| 67 | Current probe | Eaton | 93686-2 | TE 00773 |
| 68 | Triple loop antenna | Telefication | -- | TE |
| 69 | Pre-amplifier | R&S | ESV-Z3 | TE 00344 |
| 70 | 800 mm strip line | Telefication | -- | -- |
| 71 | Measurement probe | R & S | URV5-Z2 | TE 00009 |
| 72 | Standard gain horn antenna | Scientific Atlanta | 12-1.7 | TE 00602 |
| 73 | Frequency doubler | HP | 11721A | TE 00569 |
| 74 | Microwave amplifier | HP | 8349A | TE 00124 |
| 75 | Preamplifier | HP | 8449B | TE 00092 |
| 76 | Spectrum analyzer | HP | 8563E | TE 00481 |
| 77 | Controller | Keytek | E103 | TE 00713 |
| 78 | Arbitrary waveform generator | HP | 33120A | TE 00144 |
| 79 | Power supply | Kepco | BOP100 | TE 00362 |
| 80 | Biconilog antenna | Chase | CBL6112A | TE 00967 |
| 81 | Horn Antenna 1 - 18 GHz | EMCO | 3115 | TE 00532 |
| 82 | Power meter | HP | 437 | TE 00489 |
| 83 | Power sensor | HP | 8481A | TE 00485 |
| 84 | RF signal generator | Marconi | 2042 | TE 00030 |

| Ref | Description | Manufacturer | Model | ID |
|---|---|---|---|---|
| 85 | RF power amplifier | Schaffner | GRF 5046 | TE 00714 |

# Revision history

| REVISION | DATE | REMARKS |
|---|---|---|
| 1.0 | 13 October 2009 | On page 3 added: *"Telefication is an accredited test firm under the EU-USA MRA with registration number NL0001."*<br><br>On page 13:<br>$P = \frac{(E * d)^2}{30G}$<br>changed to<br>$EIRP = \frac{(E * d)^2}{30G}$<br><br>On page 7: ITU emission designator "19K2F1D"<br>changed to "23K0F1D (calculated)"<br>(revised by:A. van der Valk) |