

## Radio test report 20082522301 - rev. 1.0

based on:

- FCC Part 15 Subpart C, section 15.247 (10-1-07 Edition);
- FCC Part 15 Subpart B, section 15.109 (10-1-07 Edition)

Vital signs monitoring system  
Vital Jacket  
HWM

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This report comprises of four modules. The total number of pages is: 24

## Main module

### 1 Introduction

This report contains the result of tests performed by:

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

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#### Ordering party:

Company name : QMSC, Lda  
Address : Largo Eng.º Antonio de Almeida  
Zipcode : 4100-065  
City/town : Porto  
Country : Portugal  
Date of order : 23 May 2008

## 2 Product

A sample of the following product was submitted for testing:

Product description	: Vital signs monitoring system
Manufacturer	: Biodevices, Sistemas de Engenharia Biomédica, SA
Trade mark	: Vital Jacket
Type designation	: HWM
FCC ID	: WDPHWM-001
Hardware version	: --
Sample number	: 1
Software release	: --

## 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 location:

- Telefication, Zevenaar

The samples of the product were received on:

- 16 June 2008

Tests are carried out from:

- 16 June to 19 June 2008

## 4 Product documentation

For production of this report the following product documentation has been used:

Description:	Date:	Identification:
Block diagram	9-05-2006	ABM-600-2XXX
User manual	--	VitalJacket

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 applicant has declared that the enhanced data rate (EDR) feature will not be implemented in the sample in the (near) future.

For the purpose of testing, except for the “number of channels“ test, a software test tool named BlueSuite™ V1.10 for CSR’s BlueCore™ Bluetooth® wireless technology chips has been used. For all transmitter tests the RF power setting (“Power Int.”) by means of this tool was “63”.

All tests are performed with frequency hopping disabled and with the packet configuration according to the following table:

	GFSK	
	Packet type	Packet size
DH5	15	339

The test sample was provided with the (original) integral antenna.

In contrast with tests inadvertently carried out on channel 1 (2401 MHz) as a consequence of the use of above mentioned test tool, it can be seen from the upper plot on page 11 that the actual operating range starts at 2402 MHz ( $2415.5 - 2.65 \times 5.1 \text{ MHz} = 2402 \text{ MHz}$ ).

It was observed that the sample is not operational when inserted in the accompanying charger.

## 6 Modifications to the sample

No modifications were made to the sample.

## 7 Summary

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

INTENTIONAL RADIATOR OPERATING IN THE FREQUENCY BAND 2400 - 2483.5 MHz

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

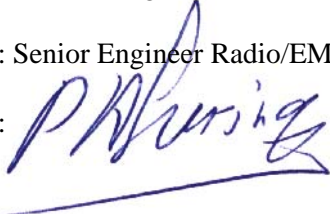
- FCC Part 15 Subpart C, section 15.247 (10-1-07 Edition);
- FCC Part 15 Subpart B, section 15.109 (10-1-07 Edition).

## 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 items as identified in this test report. Telefication does not accept any responsibility for the results stated in this test report, with respect to the properties of product items not involved in these tests.


All tests are performed by:

name : P. A. Suringa  
function : Senior Engineer Radio/EMC  
signature : 

Review of test report by:

name : S. J. van Spijker  
function : Test Engineer  
signature : 

The above conclusions have been verified by the following signatory:

Date : 27 August 2008  
name : J. P. van de Poll  
function : Co-ordinator Test Group  
signature : 

## Test results module

### 1 General information

#### 1.1 Equipment information

Type of equipment	Class 2 Bluetooth
Bluetooth specification	V2.0
Rated conducted RF power	0 dBm
Operating frequency range	2402 - 2480 MHz
Modulation type	GFSK
Duty cycle	78.2 % (during testing)
ITU designation	1M36F1D
Antenna type	Integral (chip)
Antenna gain	0.5 dBi

#### 1.2 Tested channels

	Channel 1	Channel 41	Channel 80
Frequency (MHz)	2401	2441	2480

### 2 Summary of test data

NAME OF TEST	PARA. NO.	Limit	MEAS.	RESULT
20 dB bandwidth	15.247(a)(1)	--	943 kHz	Complies
Channel separation	15.247(a)(1)	$\geq 2/3 \cdot 20$ dB BW	1.008 MHz	Complies
Number of channels	15.247(a)(1)(iii)	$\geq 15$	79	Complies
Average time of occupancy	15.247(a)(1) (iii)	0.4 sec.	0.017 sec.	Complies
Maximum Peak Power Output	15.247(b)(1)&(4)	36 dBm E.I.R.P.	-10.17 dBm E.I.R.P.	Complies
Peak Power Spectral Density	15.247(e)	8 dBm/3 kHz	--	N/A
Spurious Emissions Tx (Radiated)	15.247(d)	> 20 dB below fundamental	$\geq 30$ dB below fundamental	Complies
Spurious Emissions Rx (Radiated)	15.109	54 dB $\mu$ V/m(av)	$\leq 45$ dB $\mu$ V/m (pk)	Complies
Restricted band emissions (Radiated)	15.205(a)	54 dB $\mu$ V/m(av) 74 dB $\mu$ V/m(pk)	$\leq 33$ dB $\mu$ V/m $\leq 44.2$ dB $\mu$ V/m	Complies



### 3 Emission tests

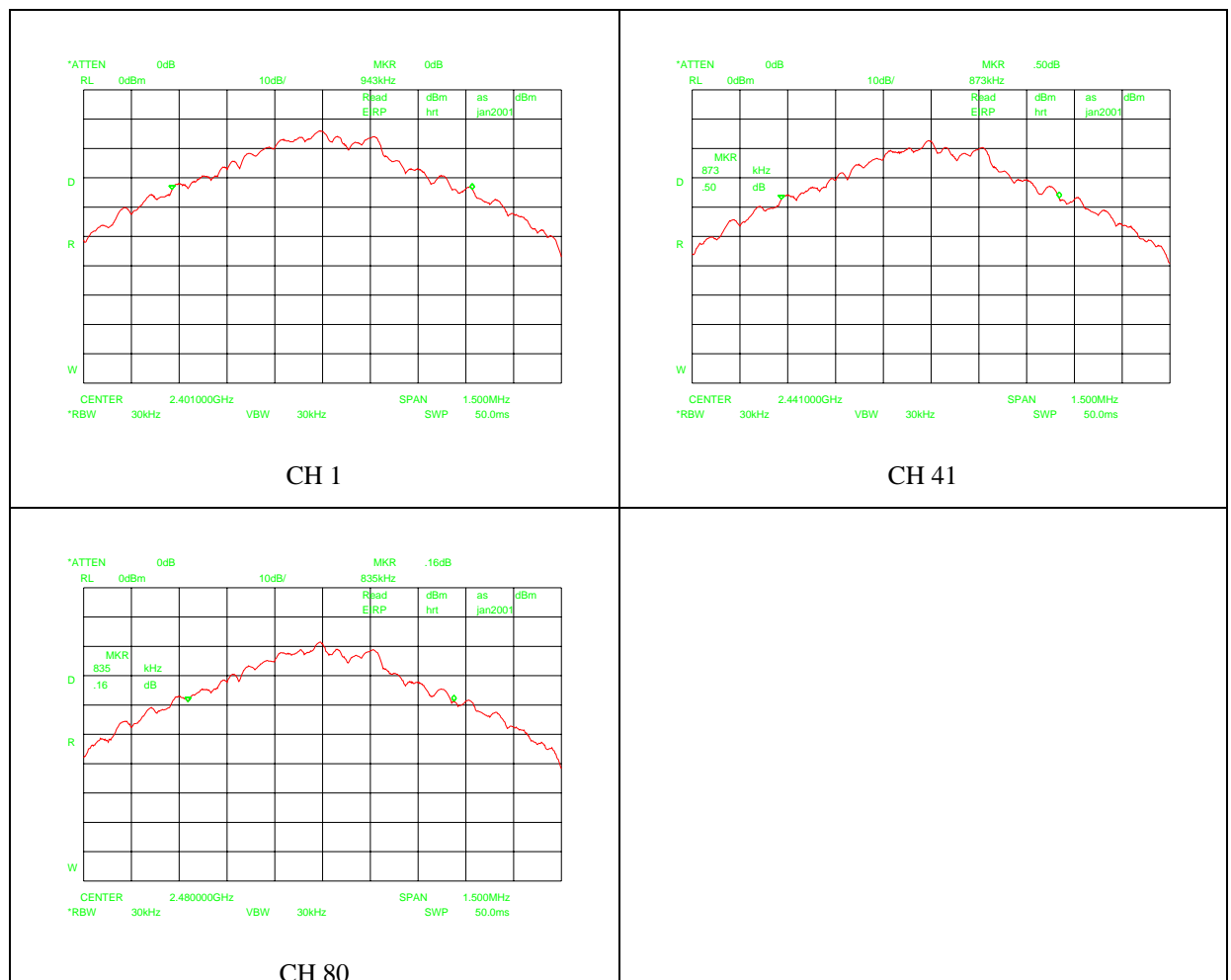
#### 3.1 20 dB bandwidth

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

Ambient temperature : 22 °C  
Relative humidity : 47 %

Test results :

Modulation	Channel 1	Channel 41	Channel 80
GFSK	943 kHz	873 kHz	835 kHz



Measurement uncertainty: + 17/- 17 kHz

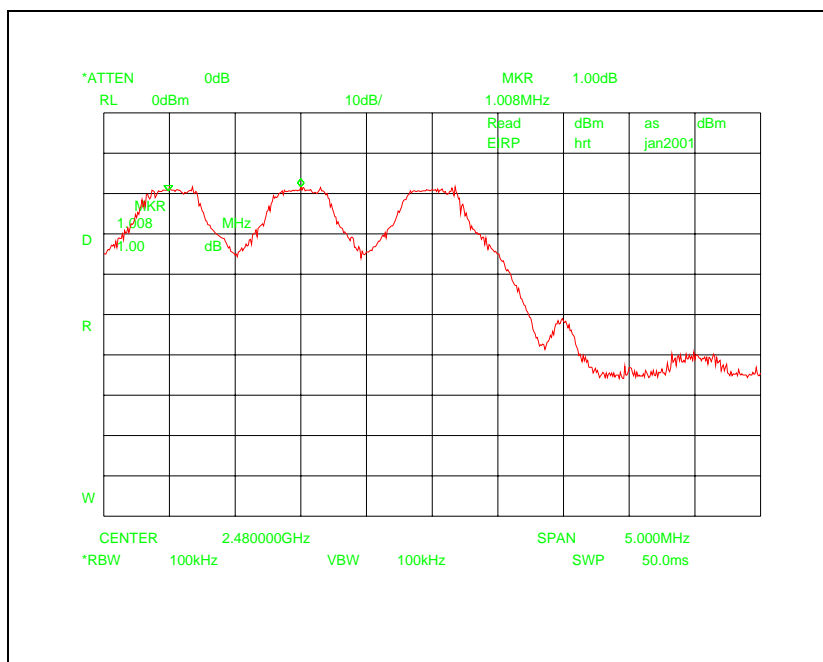
## 3.2 Channel separation

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

Ambient temperature : 22 °C  
Relative humidity : 47 %

Test results :

Modulation	Separation
GFSK	1.008 MHz

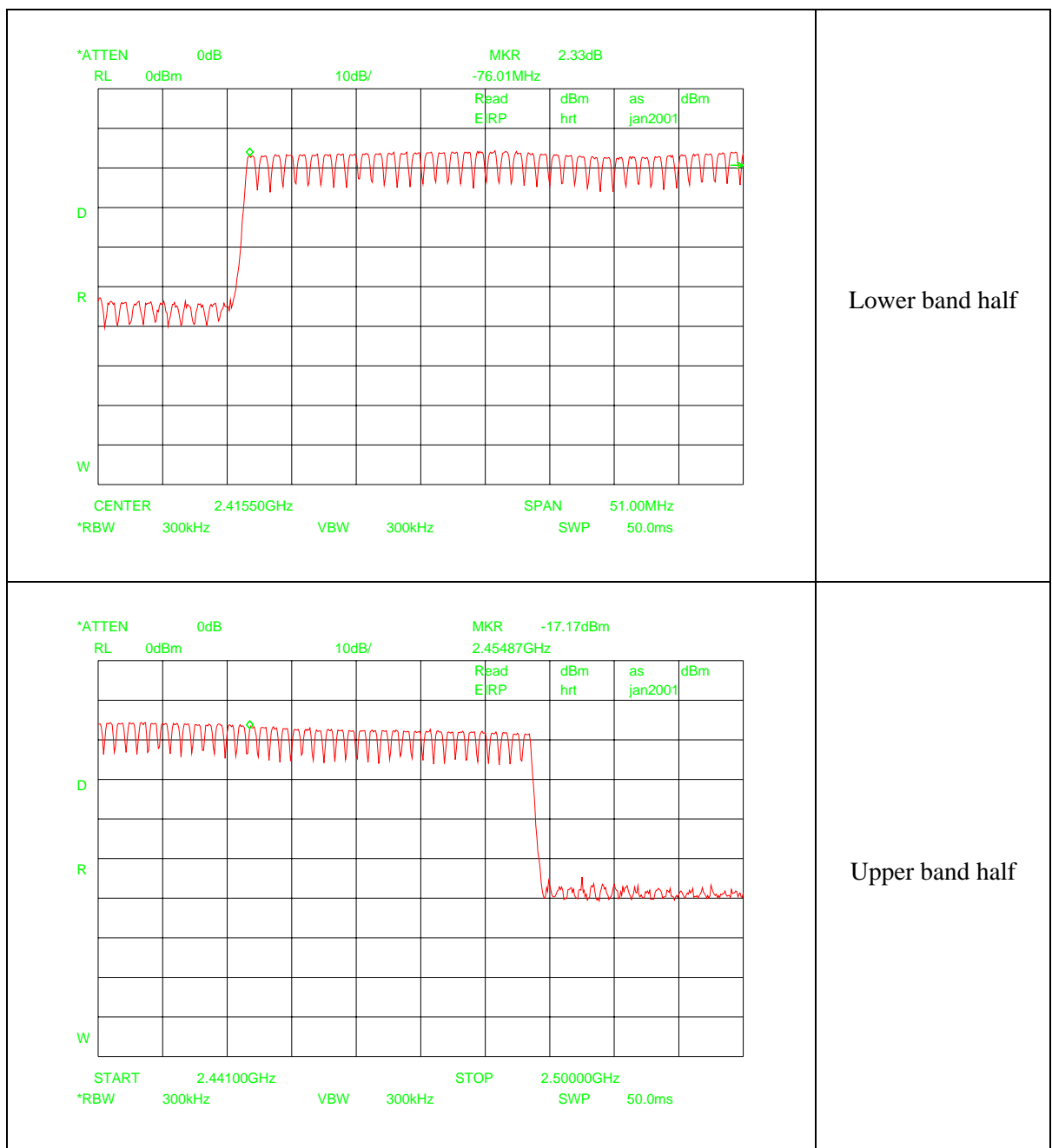


Measurement uncertainty: +58/-58 kHz

### 3.3 Number of channels

Compliance standard : FCC part 15, subpart C, section 15.247 (a)(1)(iii)  
Method of test : Public Notice DA 00-705

Ambient temperature : 22 °C  
Relative humidity : 47 %



From the two plots above it can be seen that 79 channels are contained in the frequency band 2400 – 2483.5 MHz.

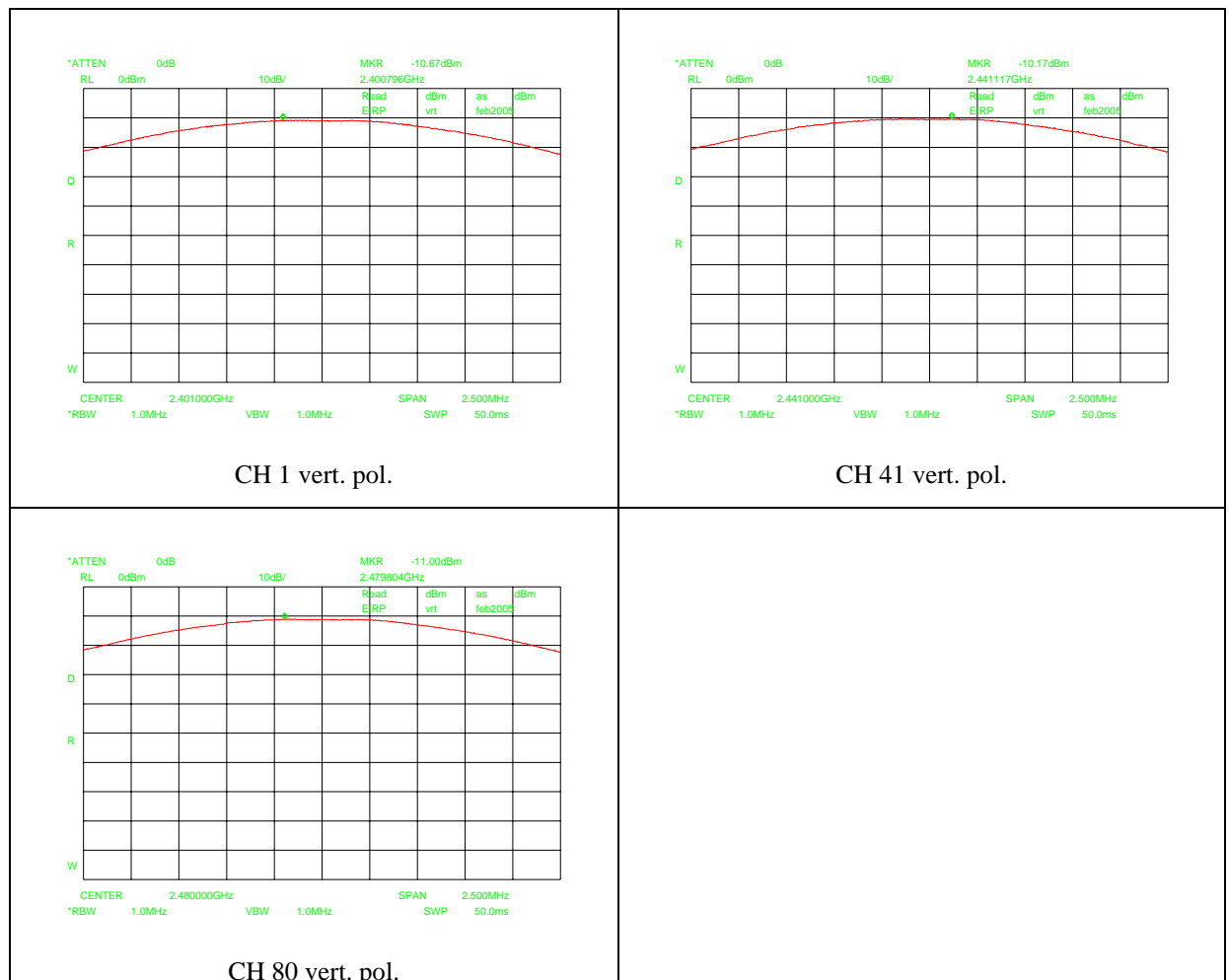
### 3.4 Peak power output

Compliance standard : FCC part 15, subpart C, section 15.247 (b)(1) & (4)  
Method of test : Public Notice DA 00-705 (alternative test procedures)

Ambient temperature : 23 °C  
Relative humidity : 44 %

Test results :

Modulation	Channel 1	Channel 41	Channel 80
GFSK	-10.67 dBm E.I.R.P.	-10.17 dBm E.I.R.P.	-11.00 dBm E.I.R.P.



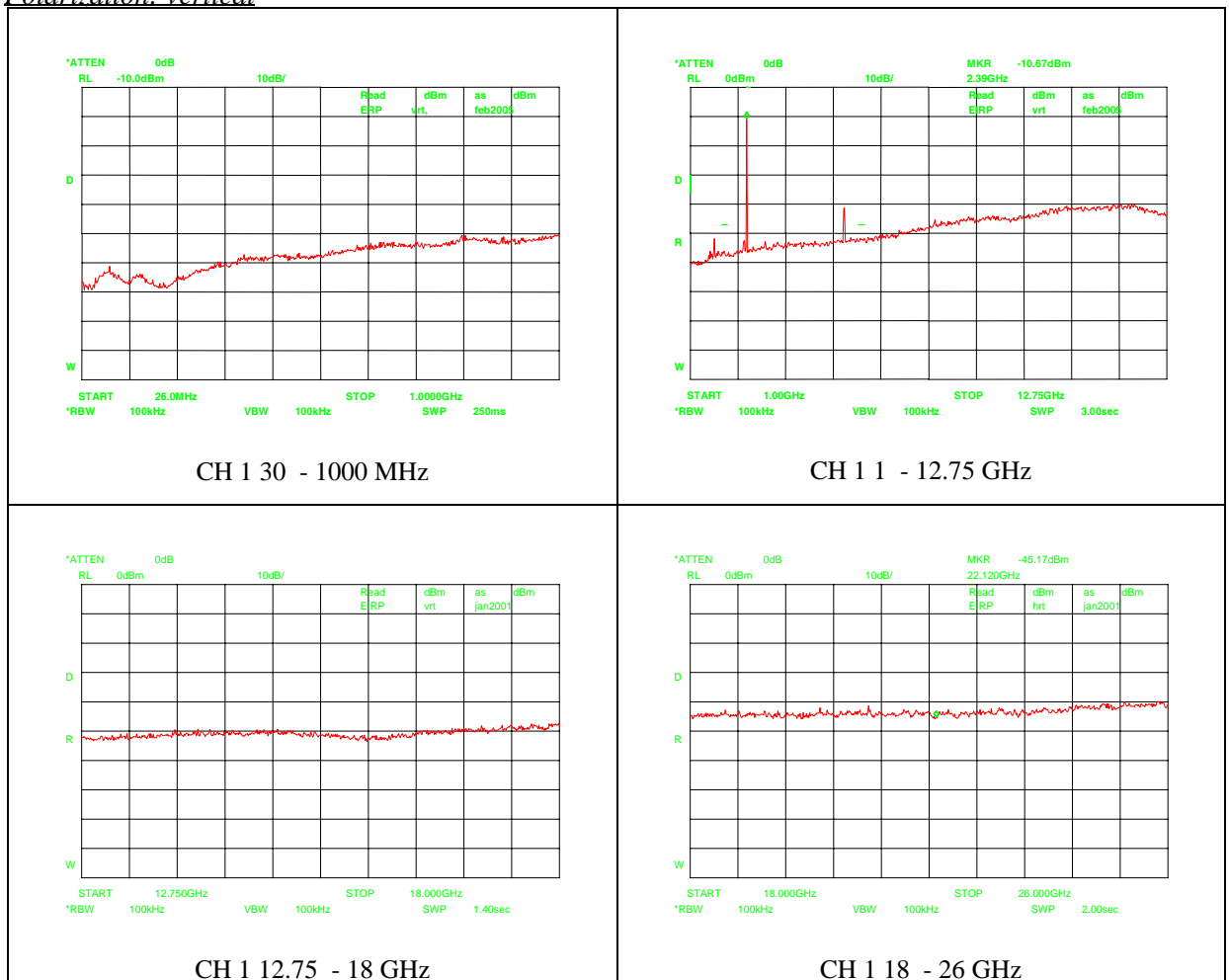
Measurement uncertainty: + 1.6/ -1.9 dB

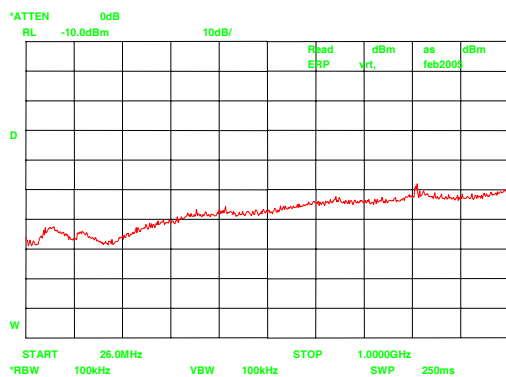
### 3.5 Field strength of Tx unwanted emissions - radiated

Compliance standard : FCC part 15, subpart C, section 15.247(d)  
Method of test : FCC Public Notice DA 00-705 (alternative test procedures)  
Ambient temperature : 22 °C  
Relative humidity : 47 %

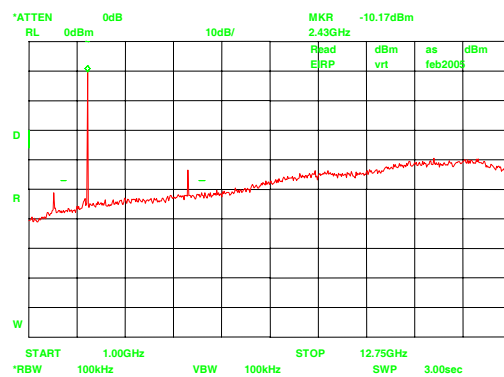
Test results :

Polarization: vertical

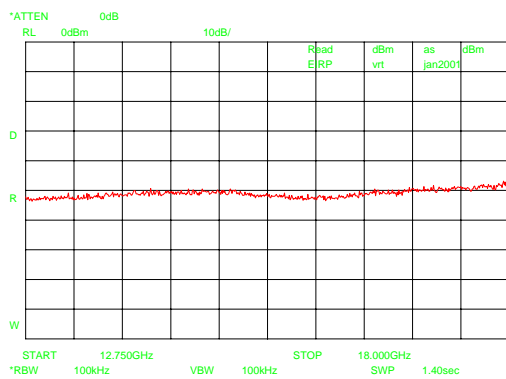




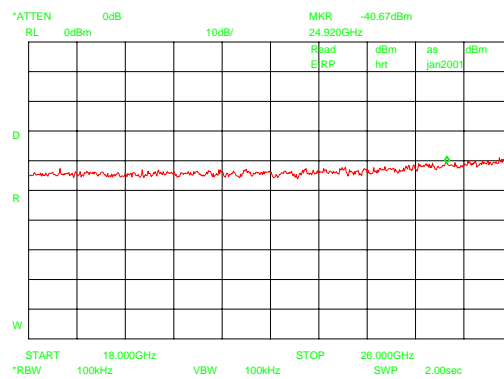
CH 41 30 - 1000 MHz



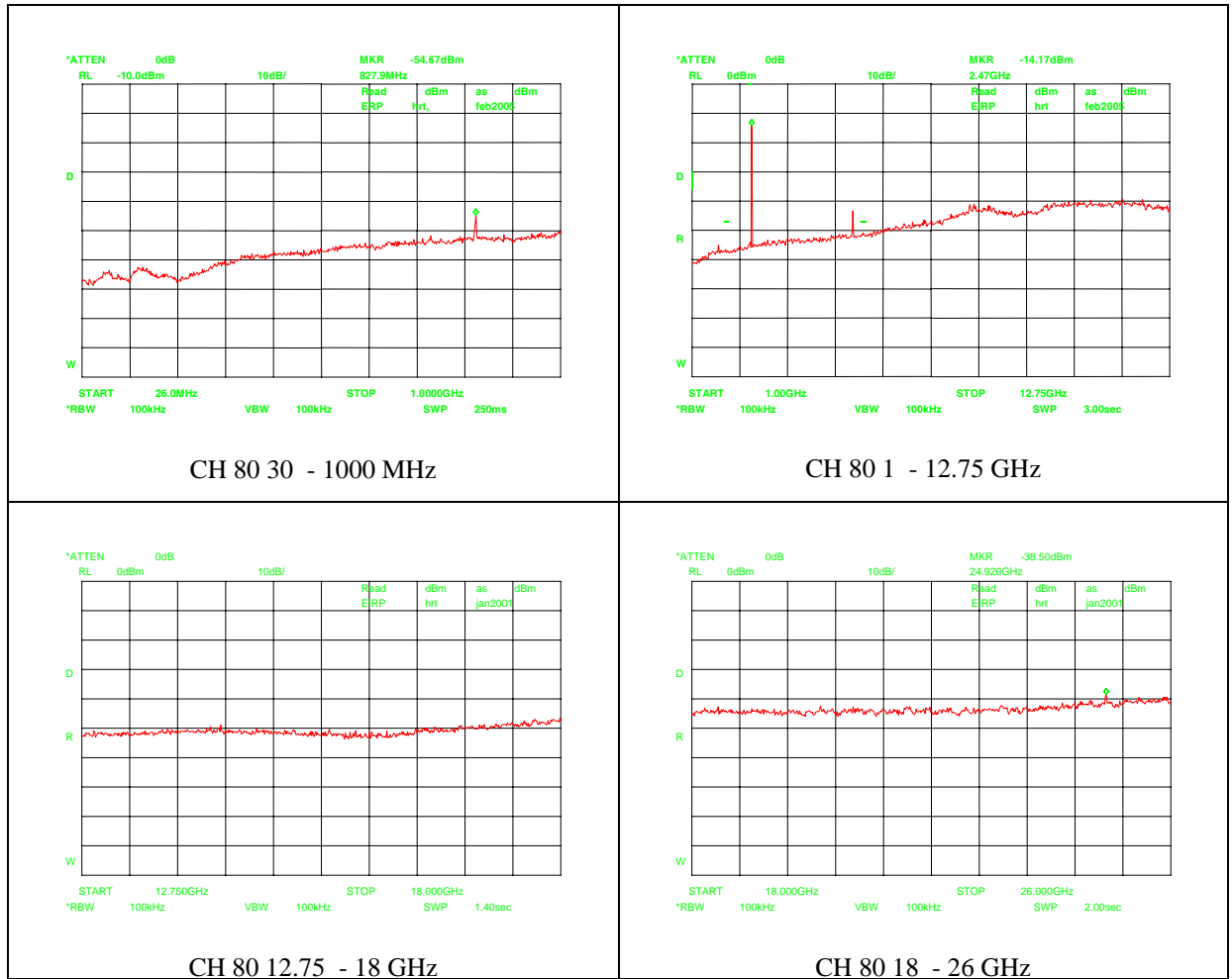
CH 41 1 - 12.75 GHz



CH 41 12.75 - 18 GHz



CH 41 18 - 26 GHz



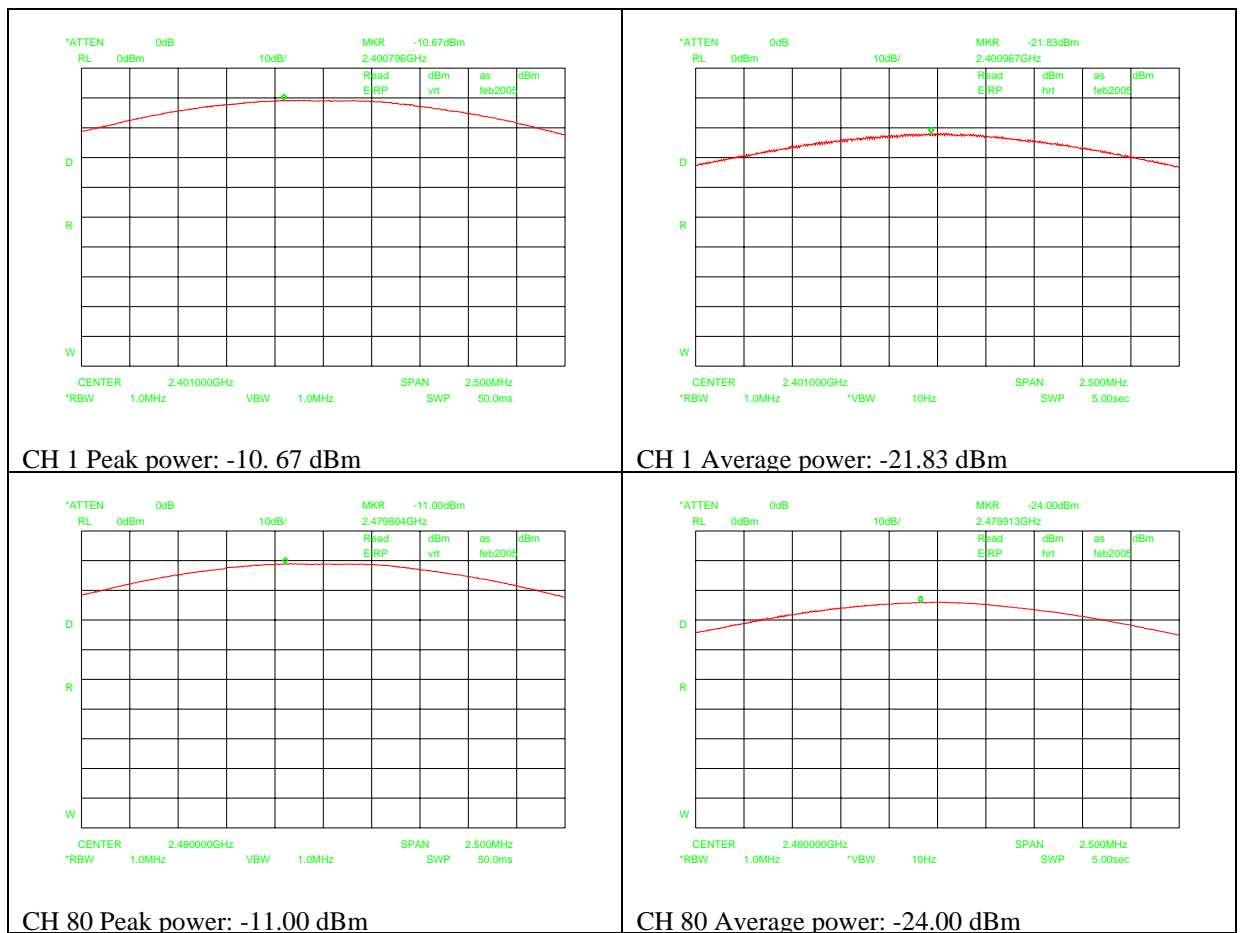
Measurement uncertainty: 0.03 – 1 GHz: +2.6 / -3.3 dB  
 > 1 GHz: +4.5 / -6.1 dB

### 3.6 Emissions in restricted bands nearest to the frequency band 2400 – 2483.5 MHz

Compliance standard : FCC part 15, subpart C, section 15.205(a)  
Method of test : FCC Public Notice DA 00-705 (marker-delta method)

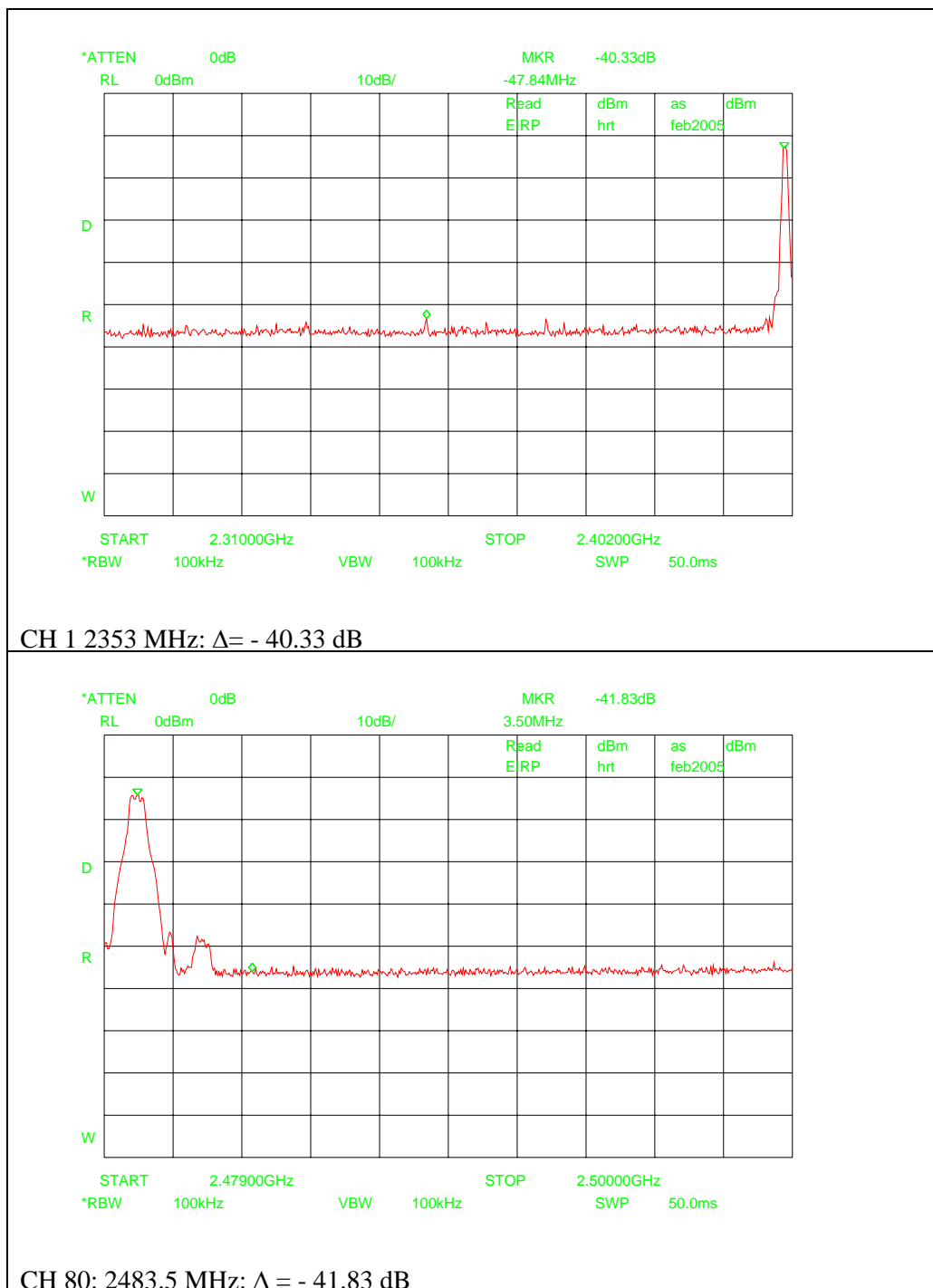
Ambient temperature : 24 °C  
Relative humidity : 45 %

*Step 1 (in-band field strength measurement of the fundamental emission)*





*Step 2 (marker-delta measurement in the adjacent restricted bands)*



*Step 3 (determine field strengths by subtraction)*

Frequency (MHz)	Peak (dBm)	Average (dBm)	Peak (Average) (dBμV/m)	Limit (dBμV/m)
2353	-51	-62.16	44.2 (33.0)	74 (54)
2483.5	-52.83	-65.83	42.4 (29.4)	74 (54)

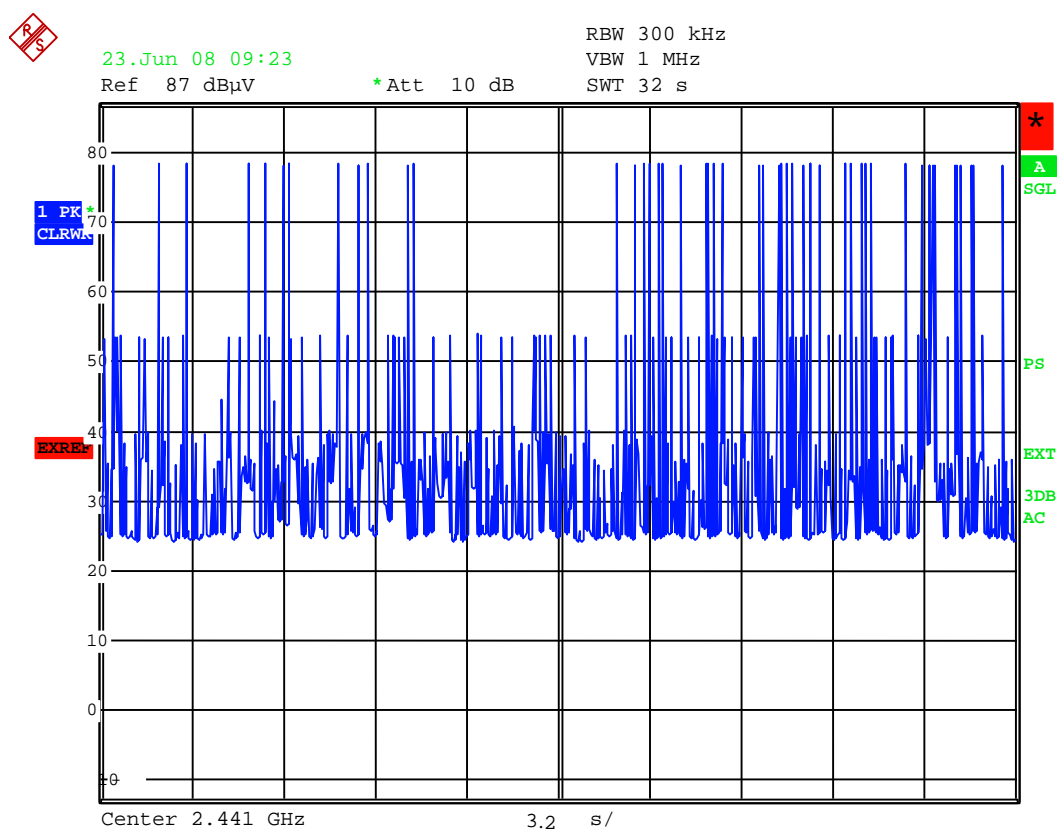
Measurement uncertainty: +4.5 dB / -6.1 dB

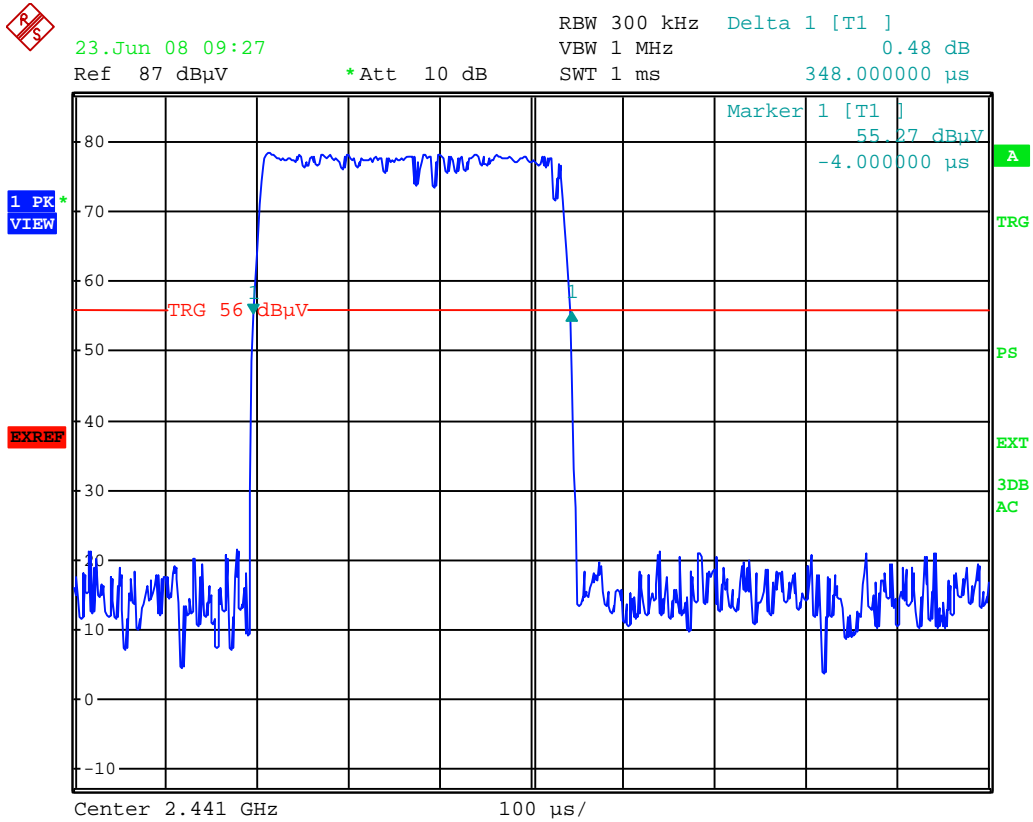
*Note: use has been made of the conversion  $E_{\text{dB}\mu\text{V/m}} = E.I.R.P._{\text{dBm}} + 95.2_{\text{dB}}$*

### 3.7 Average time of occupancy

Compliance standard : FCC part 15, subpart C, section 15.247 (a)(1)(iii)  
 Method of test : Public Notice DA 00-705  
 Ambient temperature : 24 °C  
 Relative humidity : 49 %

Modulation	Average time of occupancy (s) (pulse time x number of hops)	Plots
GFSK	0.017	See below





Measurement uncertainty: +23/-23  $\mu$ sec.

### 3.8 Field strength of Rx unwanted emissions (< 1 GHz, exploratory)

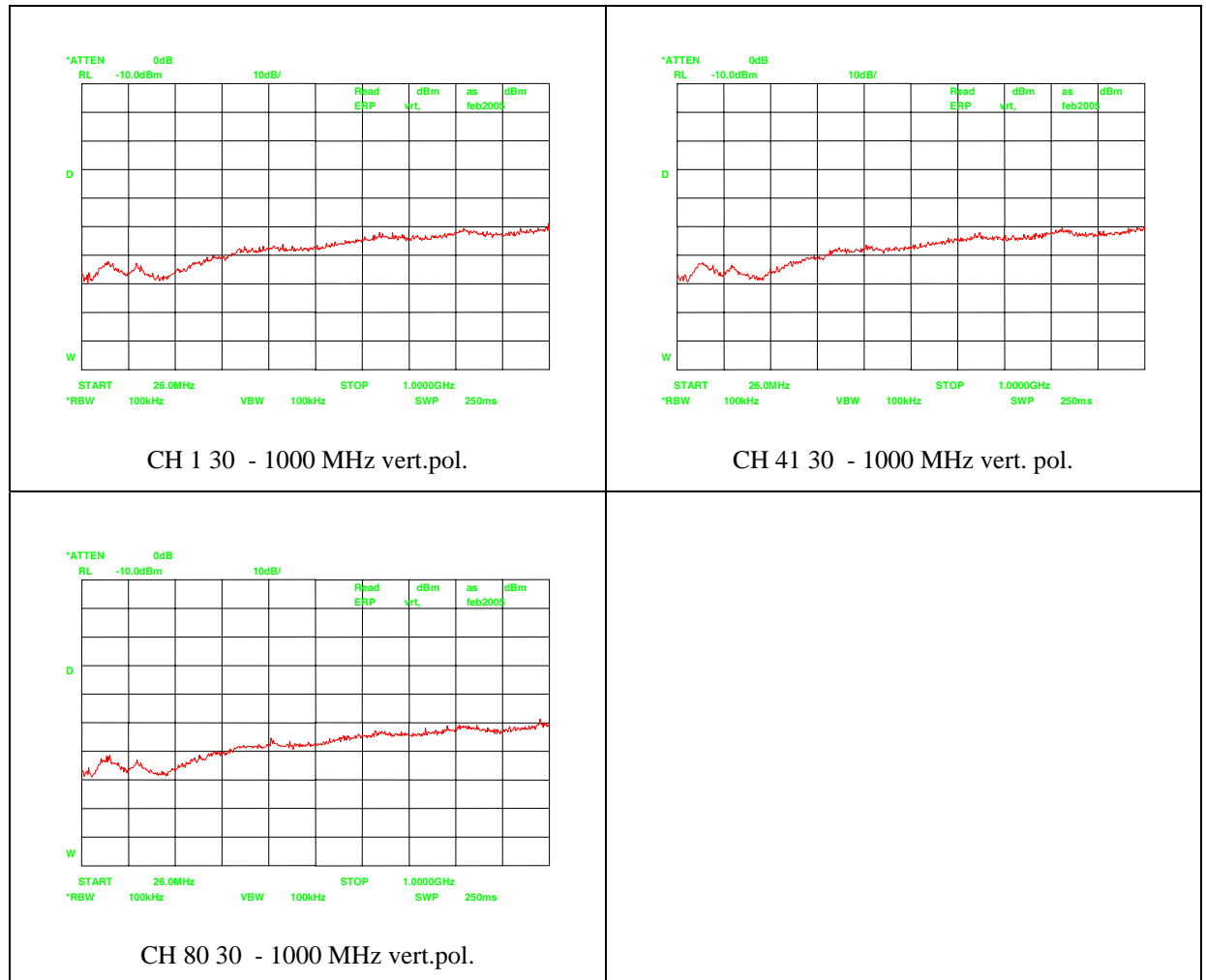
Compliance standard : FCC part 15, subpart B, section 15.109

Method of test : FCC part 15, subpart A, sections 15.31(f)(1), 15.31(m), 15.33, 15.35.

Ambient temperature : 24 °C

Relative humidity : 44 %

Test results :



Measurement uncertainty: not applicable

*Note: as no emissions above measurement system noise floor were detected, measurements on an Open Area Test Site (OATS) or alternative site were considered not necessary.*

### 3.9 Field strength of Rx unwanted emissions ( $\geq 1$ GHz)

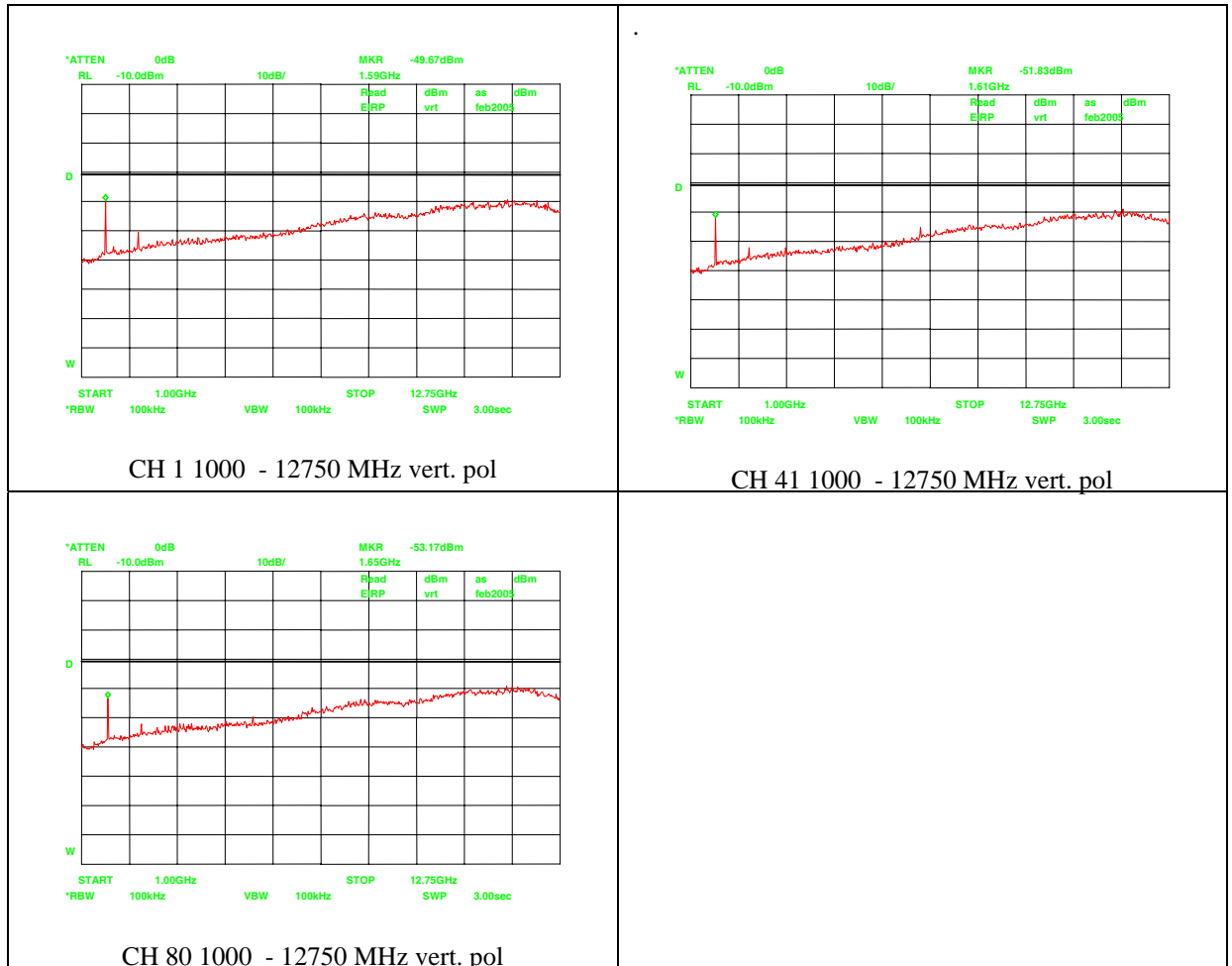
Compliance standard : FCC part 15, subpart B, section 15.109

Method of test : FCC part 15, subpart A, sections 15.31(f)(1), 15.31(m), 15.33, 15.35.

Ambient temperature : 24 °C

Relative humidity : 44 %

Test results :



Measurement uncertainty: +4.5 /-6.1 dB

Note 1: plots in this section show limits, which result from conversion using:

$$P_{dBm \text{ e.i.r.p.}} = E_{dB\mu V/m} - 95.2_{dB}$$

Note 2: limits shown in the plots are average limits

## Used test equipment module

Description	Telef. ID	Manufacturer	Model	Used at par.
Spectrum Analyzer	TE 00481	Hewlett Packard	HP8563E	all
EMI test receiver		Rohde & Schwarz	ESCI	3.7
Attenuator	TE 00500	Hewlett Packard	8495D	3.1, 3.2, 3.3, 3.4, 3.5, 3.6
RF Pre-amplifier up to 1000 MHz	TE 00098	Rohde & Schwarz	ESV-Z3	3.5, 3.6, 3.8
RF Pre-amplifier 1 - 26.5 GHz	TE 00092	Hewlett Packard	HP8449B	3.5, 3.6, 3.9
Biconilog antenna	TE 00700	Emco	3143	3.5, 3.6, 3.8
Horn Antenna 1 - 18 GHz	TE 00532	Emco	3115	3.5, 3.6, 3.7, 3.9
Anechoic Chamber	TE 01064	Euroshield	RFD-F-100	all
Antenna tower	--	HD	AS 620p	3.4, 3.5, 3.6, 3.7, 3.8, 3.9
Turntable	--	HD	DS 412	3.4, 3.5, 3.6, 3.7, 3.8, 3.9
Turntable controller	--	HD	HD 050	3.4, 3.5, 3.6, 3.7, 3.8, 3.9

## Revision history

REVISION	DATE	REMARKS
1.0	22 August 2008	<ul style="list-style-type: none"><li>- Explanation concerning tested operating freq. range added in section 5;</li><li>- Operating freq. range changed in section 1.1;</li><li>- Comments concerning the charger added in section 5.</li></ul>