

## **Radio test report**

**20123009302**

based on:  
FCC part 15; subpart C; section 15.231e  
(10-1-11 edition)

IntelliCap  
MediMetrics  
capsule

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This report comprises of three 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	:	Medimetrics Personalized Drug Delivery B.V.
Address	:	High Tech Campus 5 (HTC5.2-0410)
Zipcode	:	5656 AE
City/town	:	Eindhoven
Country	:	The Netherlands
Date of order	:	12 January 2012

## 2 Product

A sample of the following product was submitted for testing:

Product description	:	Short Range Device
Manufacturer	:	MediMetrics
Trade mark	:	IntelliCap
Type designation	:	capsule
FCC ID	:	YDVINTELLICAP-CI
Hardware version	:	84065
Serial number	:	--
Software release	:	2.1.2.2338

## 3 Test schedule

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

Tests were carried out at the following location:

- Telefication, Zevenaar

The sample of the product was received on:

- 8 February 2012

Tests were carried out between the following dates:

- 8 and 17 February 2012

## 4 Product documentation

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

Description:	Identification:	Date:
Technical file	iPill_Mar2010_tech.pdf	2010-04-14

The fore mentioned documentation would be filed at Telefication for a period of 10 years following the issue of this report.

## 5 Observations and comments

The Equipment Under test (EUT) is a transceiver, intended for operation in the 433.050 - 434. 790. MHz frequency range.

The Equipment Under test (EUT) operates on one of the following channels:

Channel 1	433.200 MHz
Channel 2	433.550 MHz
Channel 3	433.900 MHz
Channel 4	434.250 MHz
Channel 5	434.600 MHz

Because the electrical capacity of the internal battery is very small, an external battery was attached to the battery for testing purposes.

Further to modifications on the Intelligent iPill (consisting of a different supplier of the flex PCB and a different Bill of Materials, the design remains unchanged) additional testing was required.

The iPill operates in the 433 MHz band on 5 channels. Measurements have been done on the lowest and highest channel in the used frequency band.

Testing has been limited to spurious emissions measurements.

This test report is additional to test report 20103163304.

In order to facilitate testing of fundamental and spurious emissions a sample modified for continuous transmitting was provided by the applicant. All other tests are performed with the (unmodified) automatically operating sample.

## **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):

- PART 15 DATA TRANSMISSION

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

- FCC part 15; subpart C; section 15.231e (10-1-11 edition)

## 8 Conclusions

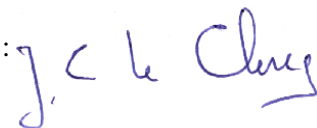
The sample of the product showed **NO NON-COMPLIANCES** to the specification stated in chapter 7 of this report.

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 chapter 7 "*Summary*".

All tests are performed by:

name : ing. J.C. le Clercq

function : Test Engineer

signature : 

Review of test report by:

name : G.J. Gort

function : Senior Test Engineer

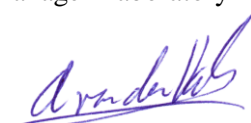
signature : 

The above conclusions have been verified by the following signatory:

Date : 1May 2012

name : ing. A. van der Valk

function : Manager Laboratory

signature : 

## Test results module

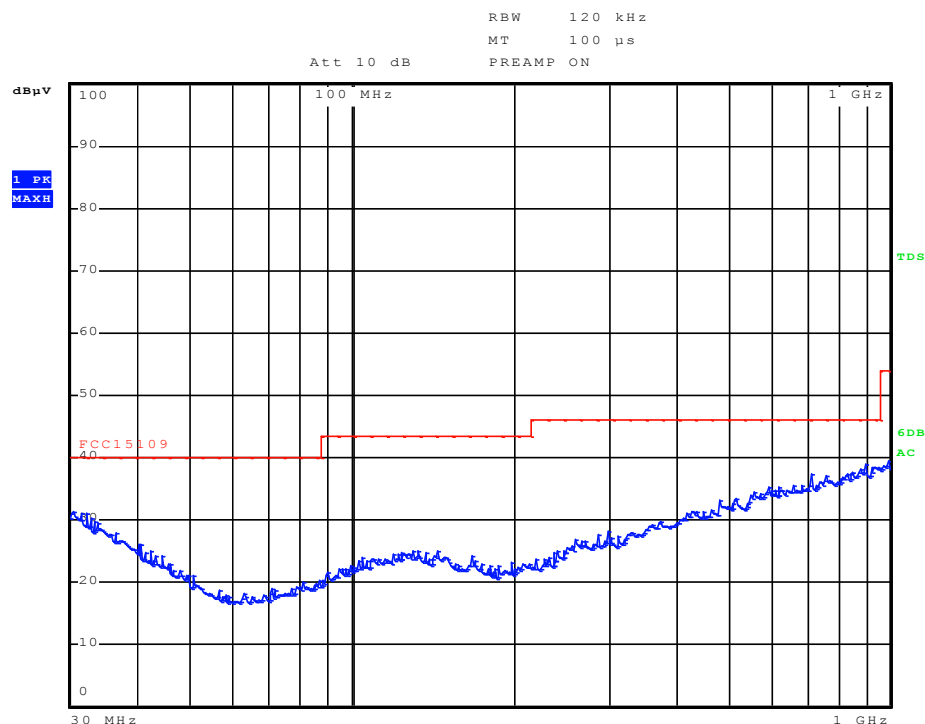
### 1 Emission tests

#### 1.1 Field strength of radiated emissions of unintentional radiators

Compliance standard : FCC part 15, subpart B, section 15.109 (a).  
Method of test : ANSI C63.10-2009, section 6.5; FCC part 15, subpart A, section 15.31(m), 15.33, 15.35.  
EUT condition : Continuously receiving  
Test results :

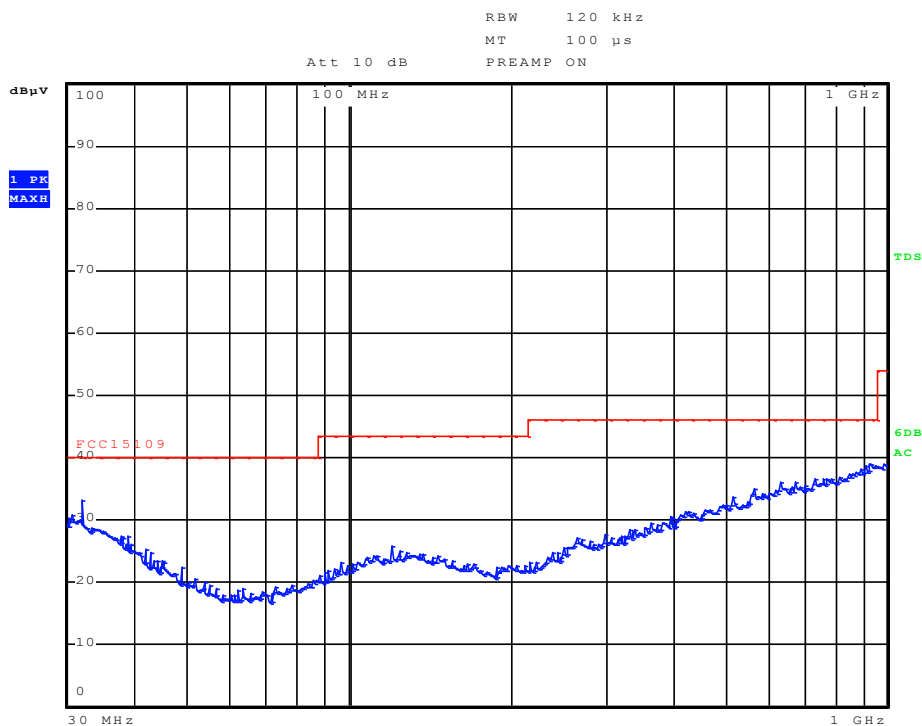
Receiver : operating

Vertical polarization 0.03 – 1 GHz





Horizontal polarization: 0.03 - 1 GHz

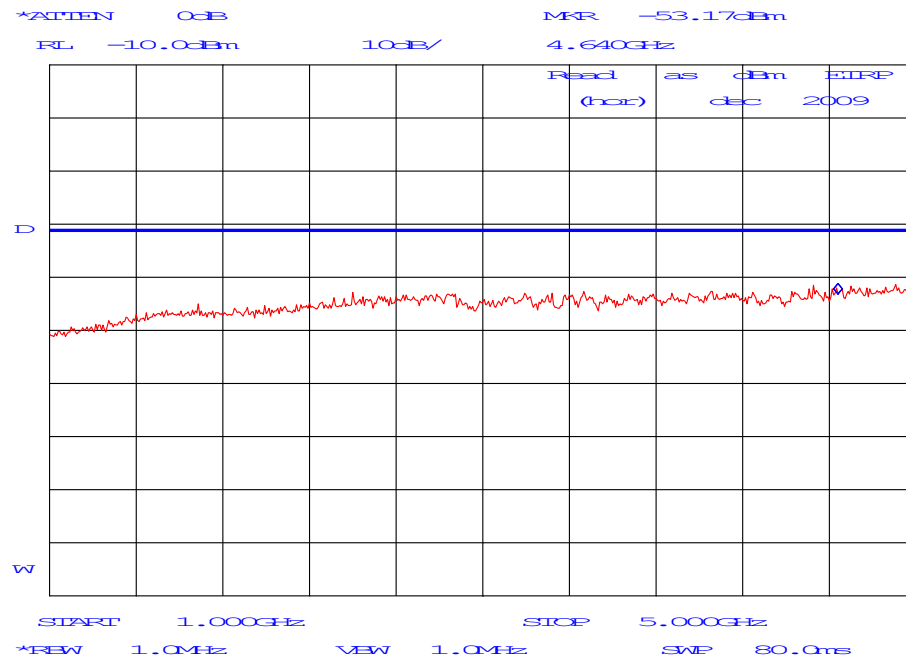


Measurement uncertainty	Horizontal polarization	
	30 – 200 MHz	4.5 dB
	200 – 1000 MHz	3.6 dB
	Vertical polarization	
	30 – 200 MHz	5.4 dB
	200 – 1000 MHz	4.6 dB

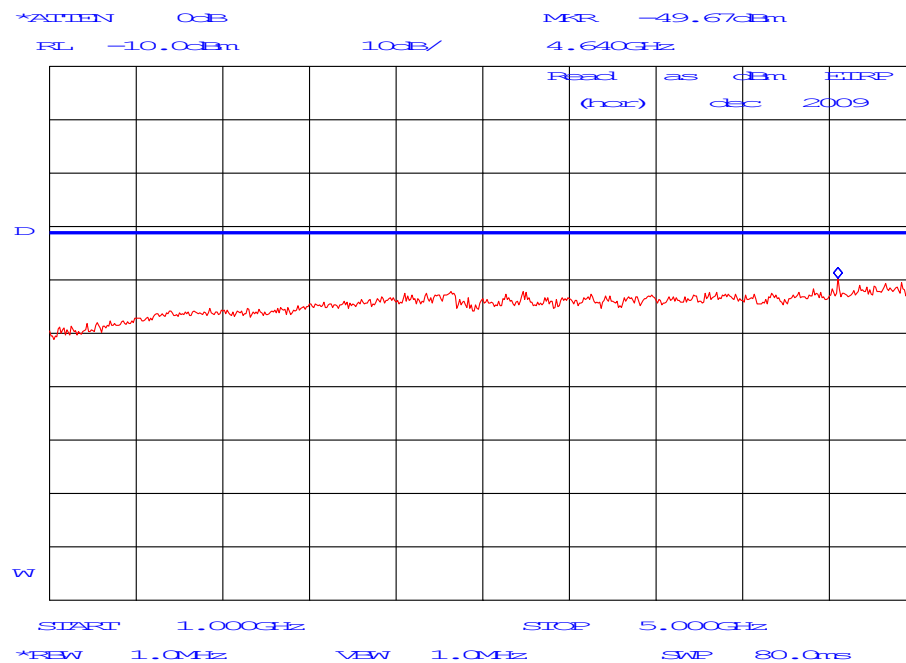
Limit	See plot
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Measurement equipment used (item numbers refer to section “used test equipment”)	1, 2, 3, 4
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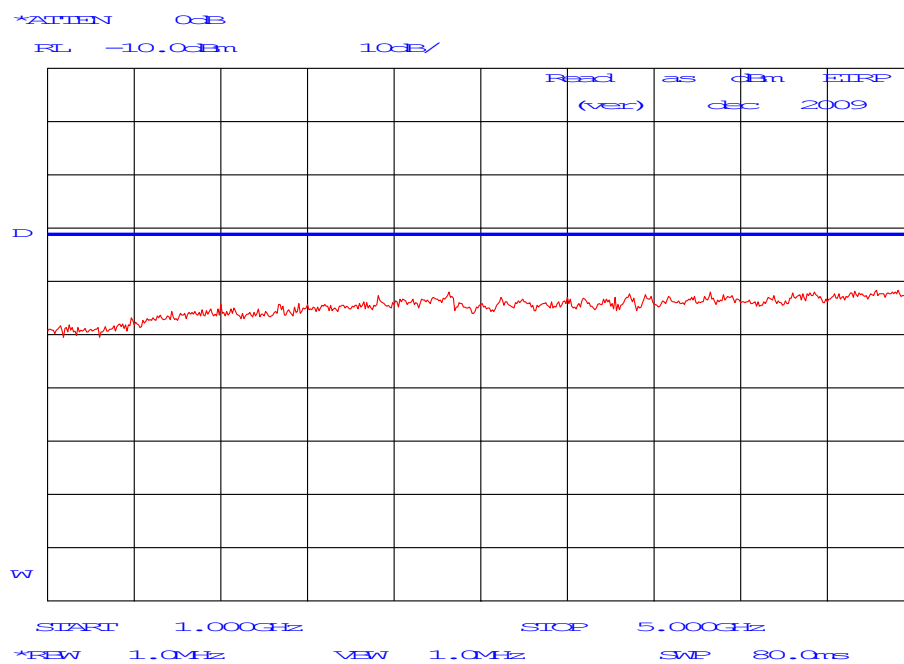
*Channel 1, vertical polarization 1-5 GHz*



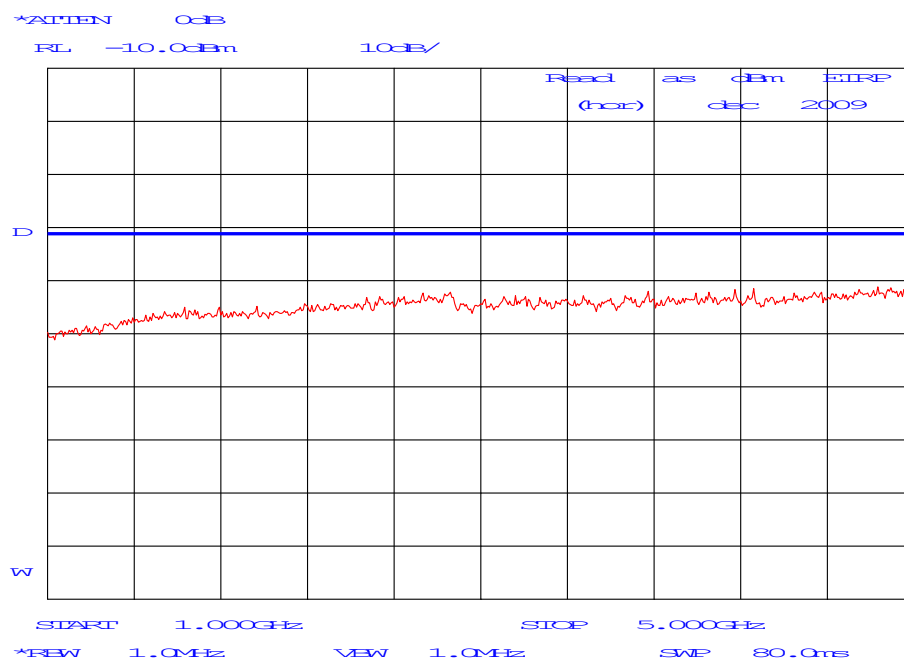
*Channel 1, horizontal polarization 1- 5 GHz*



### Channel 5, vertical polarization 1-5 GHz



### Channel 5, horizontal polarization 1- 5 GHz



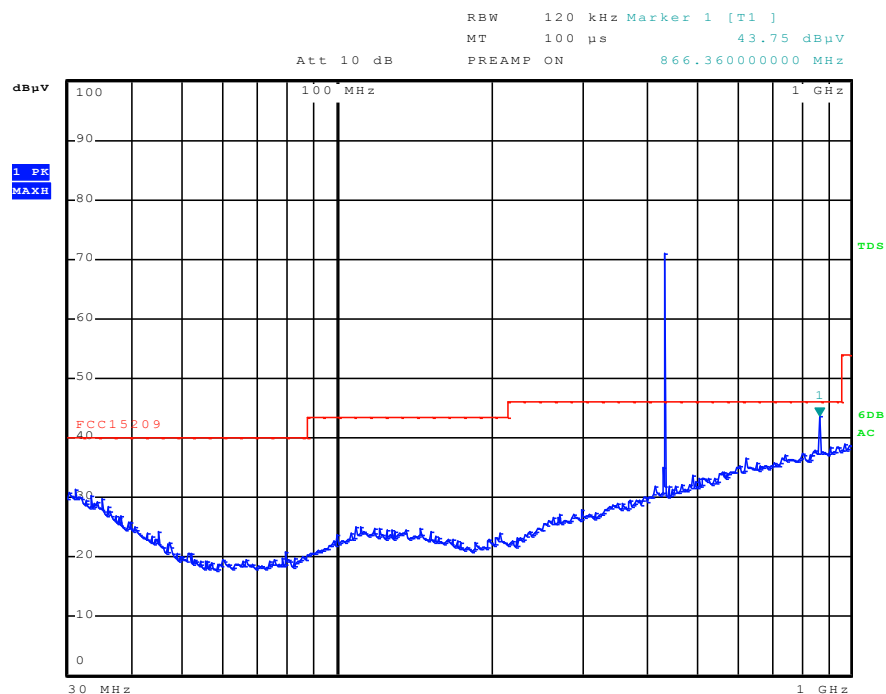
Measurement uncertainty	+4.5 /-6.1 dB
Limit	$\leq 500 \mu\text{V/m}$ (54 dB $\mu\text{V/m}$ ) which corresponds with -41.2 dBm e.i.r.p. @ 3 meter distance in a full anechoic test chamber.
Measurement equipment used (item numbers refer to section "used test equipment")	5, 6, 8, 10, 11, 12, 13

## 1.2 Field strength of radiated emissions of intentional radiators

Compliance standard : FCC part 15, subpart C, section 15.231 (e).  
 Method of test : ANSI C63.10-2009, section 6.5; FCC part 15, subpart A, section 15.31(m), 15.33, 15.35.  
 EUT condition : Continuously transmitting  
 Test results :

Transmitter : operating on Channel 1, 433.2 MHz  
 Modulation : present

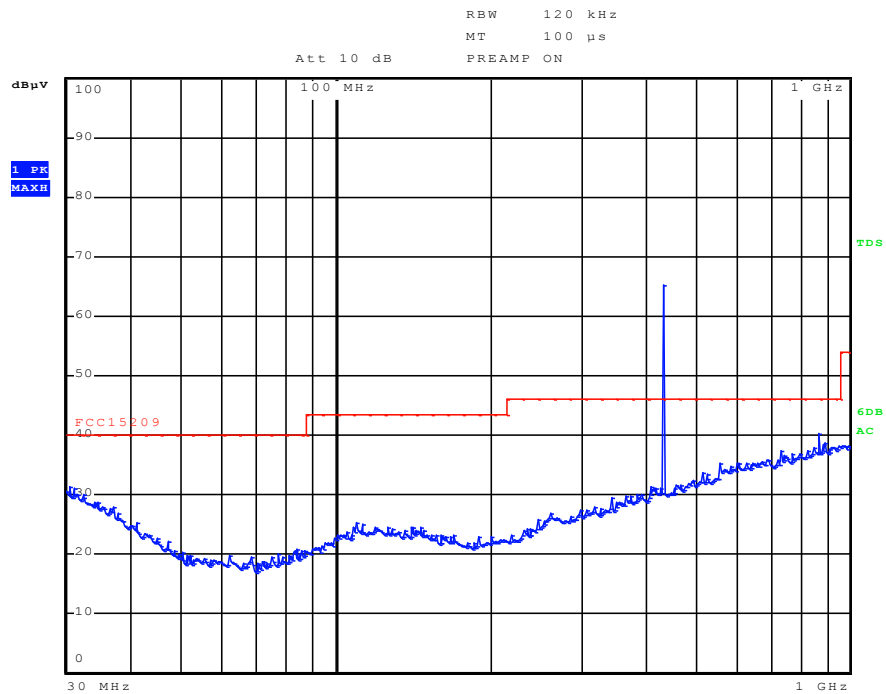
Vertical polarization 0.03 – 1 GHz



*Remark:*

*The intentional signal on 433.2 MHz is not subject to the spurious limit of section 15.209*

*Horizontal polarization: 0.03 - 1 GHz*

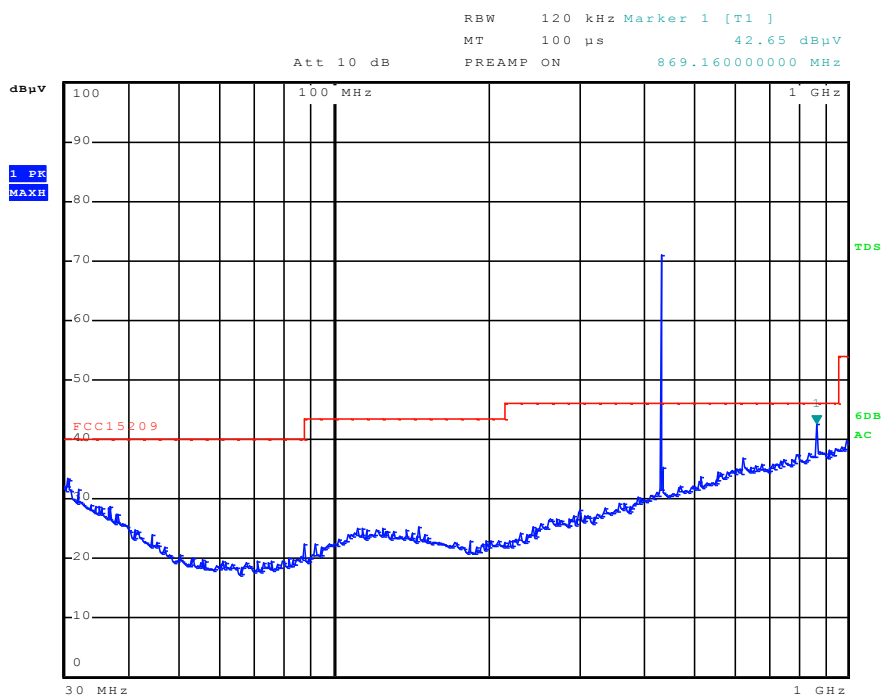


*Remark:*

*The intentional signal on 433.2 MHz is not subject to the spurious limit of section 15.209*

Transmitter: operating on Channel 5, 434.6 MHz  
Modulation: present

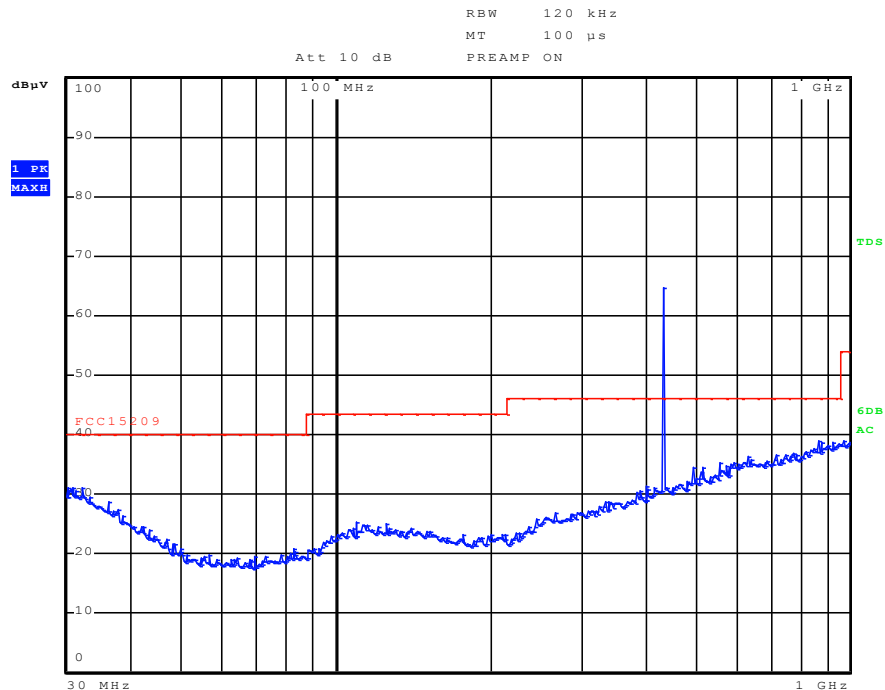
Vertical polarization 0.03 – 1 GHz



Remark:

The intentional signal on 434.6MHz is not subject to the spurious limit of section 15.209

Horizontal polarization: 0.03 - 1 GHz



Remark:

The intentional signal on 434.6 MHz is not subject to the spurious limit of section 15.209

Frequency (MHz)	Detector	Level dB $\mu$ V/m	Limit* dB $\mu$ V/m
433.2	QP	70.7	72.8
866.4	QP	40.1	52.8
434.6	QP	70.9	72.9
869.2	QP	38.7	52.9

\*) Limits according to par. 15.231e

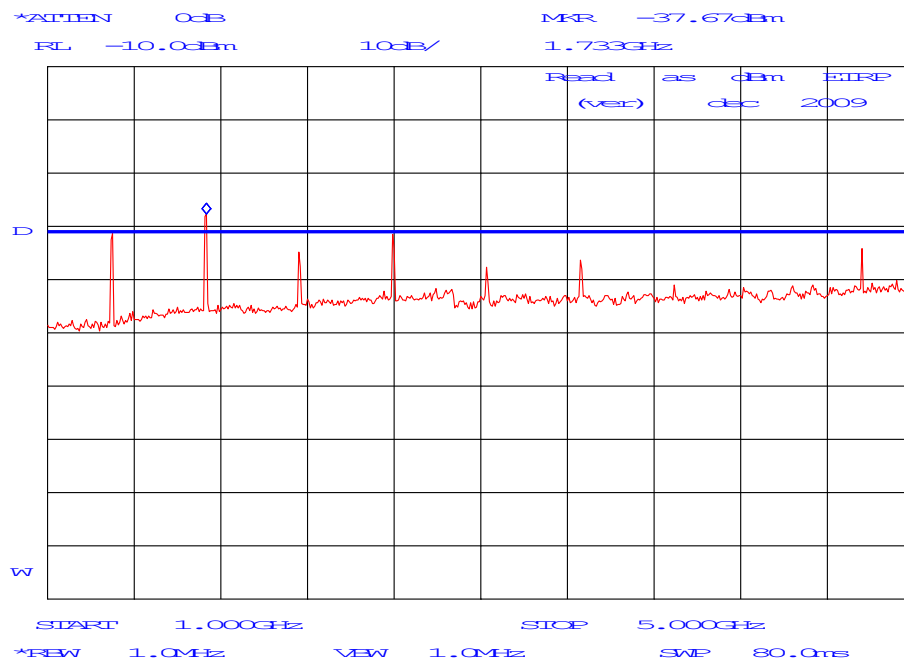
Measurement uncertainty	Horizontal polarization	
	30 – 200 MHz	4.5 dB
	200 – 1000 MHz	3.6 dB
	Vertical polarization	
	30 – 200 MHz	5.4 dB
	200 – 1000 MHz	4.6 dB

Measurement equipment used (item numbers refer to section “used test equipment”)	1, 2, 3, 4
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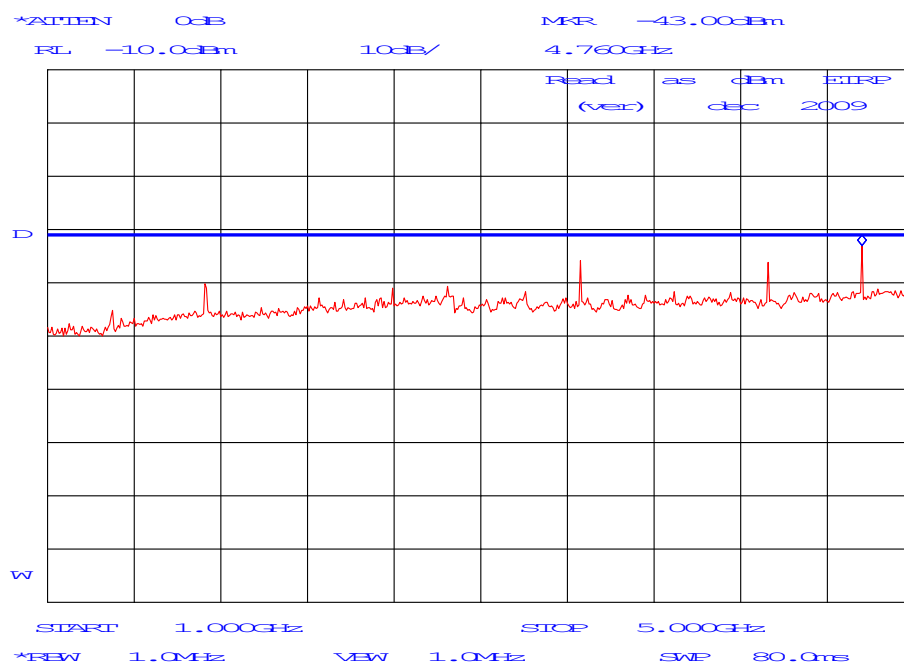


Transmitter: operating on Channel 1, 433.2 MHz  
Modulation: present

### Vertical polarization 1 - 5 GHz

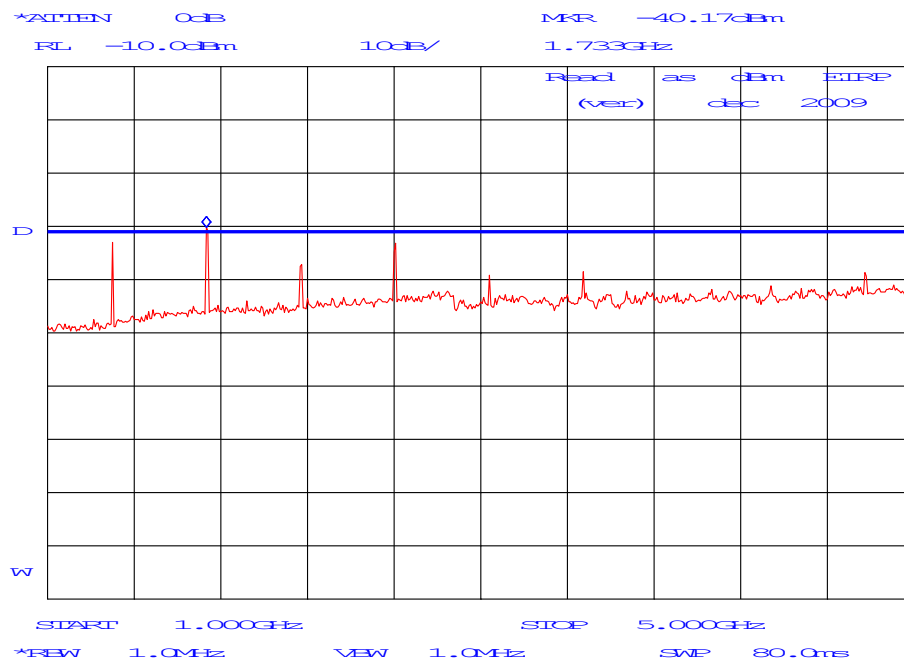


### Horizontal polarization 1 - 5 GHz

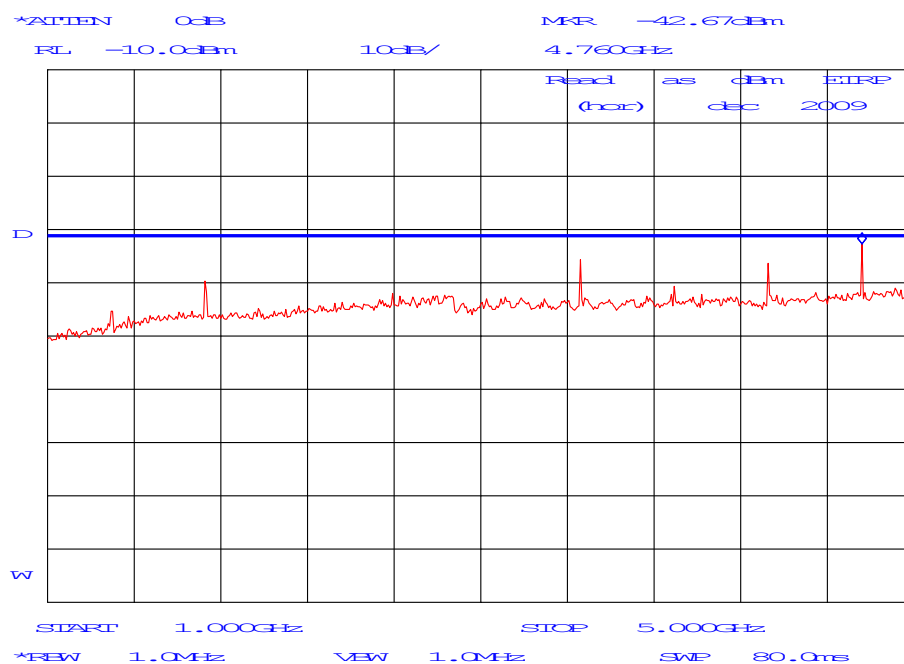


Transmitter: operating on Channel 5, 434.6 MHz  
Modulation: present

### Vertical polarization 1 - 5 GHz



### Horizontal polarization 1 - 5 GHz



Channel	Frequency	Polarisation	Detector	Level	Limit
(MHz)	(MHz)			dBm eirp	dBm eirp
433.2	1293	V	PK	-41.33	-21.2
433.2	1727	V	PK	-37.50	-21.2
433.2	2160	V	PK	-44.83	-21.2
433.2	2593	V	PK	-41.50	-21.2
433.2	3027	V	PK	-47.67	-21.2
433.2	3460	V	PK	-46.33	-21.2
433.2	3893	V	PK	-51.00	-21.2
433.2	4327	V	PK	-44.17	-21.2
434.6	1300	V	PK	-43.00	-21.2
434.6	1733	V	PK	-40.17	-21.2
434.6	2167	V	PK	-47.17	-21.2
434.6	2600	V	PK	-43.17	-21.2
434.6	3040	V	PK	-49.17	-21.2
434.6	3473	V	PK	-48.50	-21.2
434.6	4773	V	PK	-48.67	-21.2

Channel	Frequency	Polarisation	Duty cycle correction factor	Average level	Limit
(MHz)	(MHz)	H/V	dB	dBm eirp	dBm eirp
433.2	1293	V	59.1	-100.43	-41.2
433.2	1727	V	59.1	-96.60	-41.2
433.2	2160	V	59.1	-103.93	-41.2
433.2	2593	V	59.1	-100.60	-41.2
433.2	3027	V	59.1	-106.77	-41.2
433.2	3460	V	59.1	-105.43	-41.2
433.2	3893	V	59.1	-110.10	-41.2
433.2	4327	V	59.1	-103.27	-41.2
434.6	1300	V	59.1	-99.27	-41.2
434.6	1733	V	59.1	-106.27	-41.2
434.6	2167	V	59.1	-102.17	-41.2
434.6	2600	V	59.1	-102.27	-41.2
434.6	3040	V	59.1	-108.27	-41.2
434.6	3473	V	59.1	-107.60	-41.2
434.6	4773	V	59.1	-107.77	-41.2

According to ANSI C63.10-2009, par. 7.5 a duty cycle correction factor has been applied, in order to obtain average measurement results.

A duty cycle correction factor of 59.1 dB has applied:

Transmission time: 12.083 ms

Transmitter repeat time: 10.933 sec

Measurement uncertainty	+4.5 /-6.1 dB
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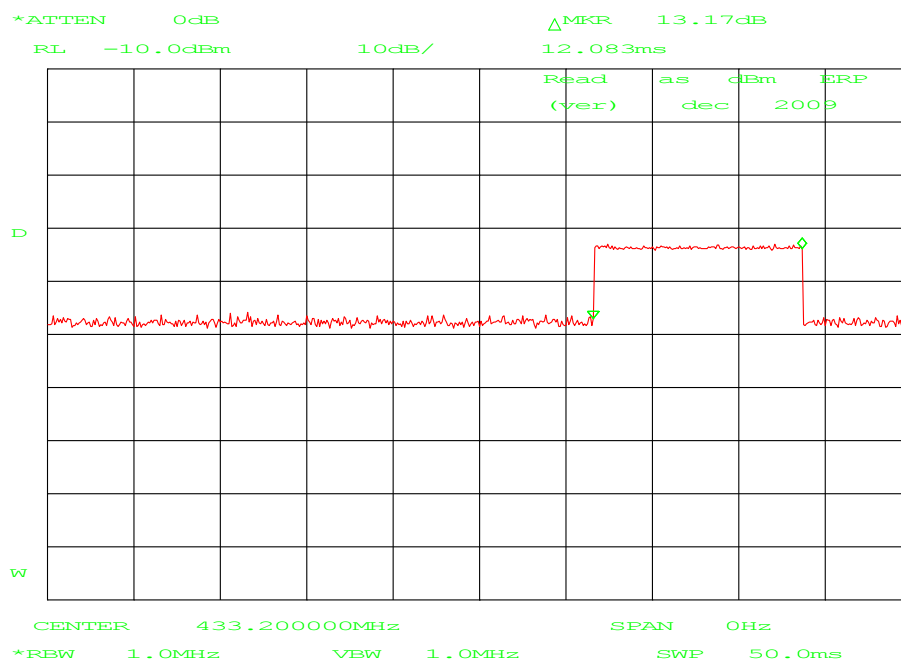
Limit according to par. 15.231e	20 dB below fundamental limit
Limit inside restricted bands according to par. 15.205	$\leq 500 \mu\text{V/m}$ (54.0 dB $\mu\text{V/m}$ ) which converts to -41.2 dBm e.i.r.p. @ 3 meter distance in a full anechoic test chamber.
According to par. 15.35, Peak limit =	Average limit + 20 dB

Measurement equipment used (item numbers refer to section “used test equipment”)	5, 6, 8, 10, 11, 12, 13
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### 1.3 Transmission time

Compliance standard : FCC part 15, subpart C, section 15.231 (e).  
Method of test : Analyzer in zero span mode  
EUT condition : Automatic operation  
Test results :

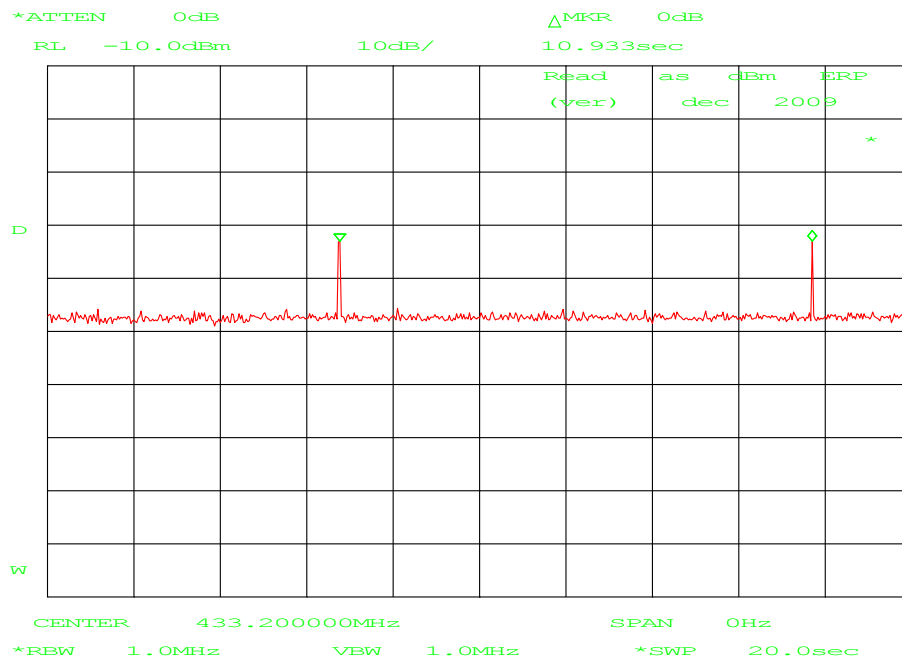
Plot of transmitter on time:



Transmission time: 12.083 ms

Limit transmitter on time	≤ 5 seconds
Measurement uncertainty	+/- 6 msec.
Measurement equipment used (item numbers refer to section “used test equipment”)	1, 2, 3, 4

Plot of transmitter repeat time:



Transmitter repeat time: 10.933 sec

Measurement uncertainty	+/- 6 msec.
Measurement equipment used (item numbers refer to section “used test equipment”)	1, 2, 3, 4

## Used test equipment module

No.	Test equipment	Manufacturer	Type	Ident.
1	EMI test receiver	R&S	ESCI	TE 00481
2	Biconilog antenna	Chase	CBL6112A	TE 00967
3	Antenna tower	inn-Co	MA4000	SAR
4	Semi Anechoic Room	Comtest	--	TE 00861
5	Full Anechoic Chamber	Euroshield	RFD-F-100	TE 01064
6	Spectrum analyzer	HP	8563E	TE 00481
7	Pre-amplifier	R & S	ESV-Z3	TE 00098
8	Pre-amplifier	HP	8449B	TE 00092
9	Biconilog antenne	EMCO	3143	TE 00700
10	Double ridged guide antenna	EMCO	3115	TE 00531
11	Antenna tower	HD	AS 620P	ANEC
12	Turntable	HD	DS-412	ANEC
13	Turntable controller	HD	HD-050	ANEC

## Revision history

revision	date	remarks	modified by
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