

Radio test report **20123632300 rev2.0**

based on:

FCC part 15; subpart C; section 15.247 (10-1-11);
FCC part 15, subpart B, section 15.109 (10-1-11)

Electronic shelf label
Opticon
EE200

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This report comprises of three modules. The total number of pages is: 19

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.

Ordering party:

Company name : Opticon Sensors Europe B.V.
Address : Opaallaan 35
Zipcode : 2132 XV
City/town : Hoofddorp
Country : The Netherlands
Date of order : 30 May 2012

2 Product

A sample of the following product was submitted for testing:

Product description	:	Electronic shelf label
Manufacturer	:	Opticon
Trade mark	:	Opticon
Type designation	:	EE200
FCC ID	:	Q2QEE200
Hardware version	:	Rev. 2
Serial number	:	A0001AA8FA9
Software release	:	IBHV0019

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 sample of the product is received on:

- 4 June 2012

Tests are carried out on:

- 4 and 5 June 2012

4 Product documentation

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

Identification:	Date:
EE200 spec manual rev 2.pdf	2011-06-07

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

None.

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):

INTENTIONAL RADIATOR OPERATING IN THE FREQUENCY BAND 2400 - 2483.5 MHz

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

FCC part 15; subpart C; section 15.247 (10-1-11);
FCC part 15, subpart B, section 15.109 (10-1-11)

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 : ing. P.A. Suringa

function : Senior Engineer Radio/EMC

signature : 

The above conclusions have been verified by the following signatory:

Date : 18 September 2012

name : ing. A. van der Valk

function : Manager Laboratory

signature : 

Test results module

1 General information

1.1 Equipment information

Type of equipment	Electronic shelf label	
Modulation	OQPSK	
Spreading type	DSSS	
Bit rate	250 kb/s	
Operating frequencies (channel set)	Channel	Freq (MHz)
	11	2405
	12	2410
	13	2415
	14	2420
	15	2425
	16	2430
	17	2435
	18	2440
	19	2445
	20	2450
	21	2455
	22	2460
	23	2465
24	2470	
25	2475	
26	2480	
Rated RF antenna power	4.5 dBm	
Type of antenna	chip antenna	
Antenna gain	0.5 dBi (max.)	

1.2 Tested channels

Channel 1 : 2405 MHz

Channel 18 : 2440 MHz

Channel 26 : 2480 MHz

2 Emission tests

2.1 Maximum radiated output power

Compliance standard : FCC part 15, subpart C, section 15.247 (b) (3) (4)
Method of test : FCC KDB publication No. 558074
Ambient temperature : 23 °C
Relative humidity : 48 %

Test results :

Mode	Level (dBm)		
	CH 11	CH 18	CH 26
Continuously transmitting	-11.67	-13.67	-11.00

Measurement uncertainty: + 1.6 /- 1.9 dB

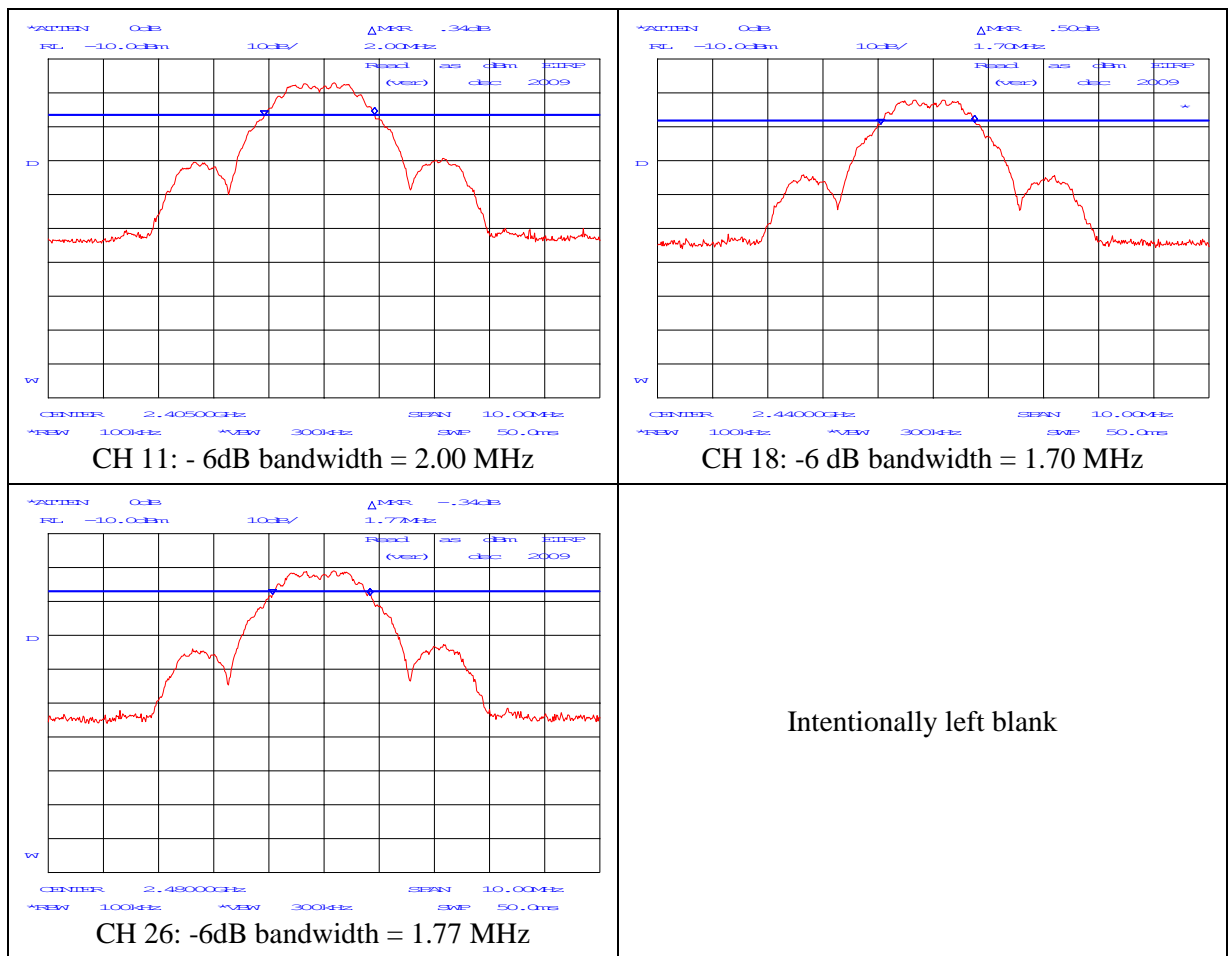
Limit:

Maximum radiated output power	≤ 36 dBm
Antenna gain	< 6 dBi)

2.2 Minimum 6 dB bandwidth

Compliance standard : FCC part 15, subpart C, section 15.247 (a) (2)
 Method of test : FCC KDB publication No. 558074
 Ambient temperature : 23 °C
 Relative humidity : 48 %

Test results :



Measurement uncertainty: +/- 10 kHz

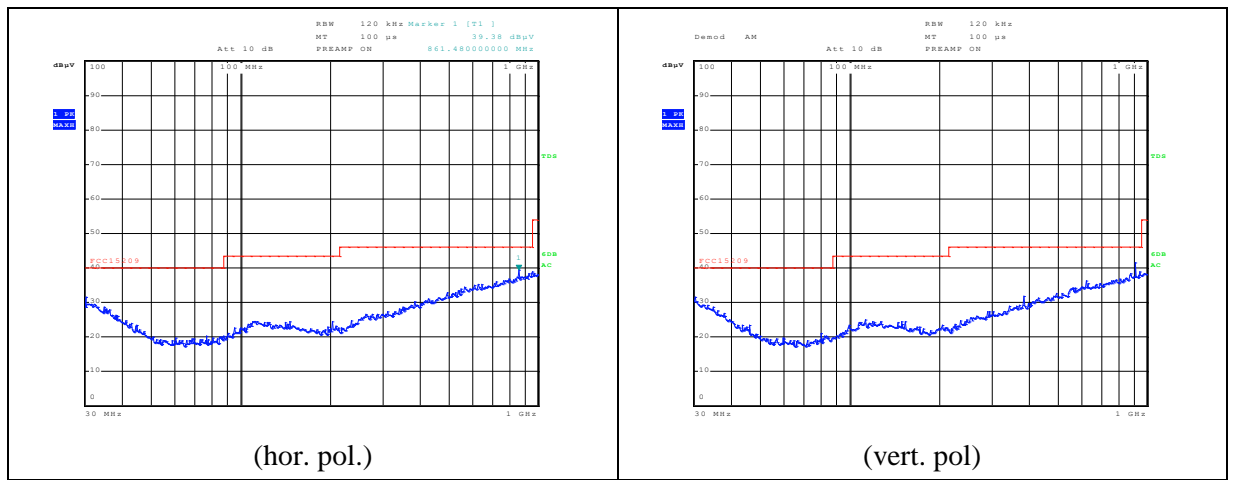
Limit:

Minimum 6 dB bandwidth	at least 500 kHz
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2.3 TX unwanted emissions (radiated, 30 – 1000 MHz)

Compliance standard : FCC part 15, subpart B, section 15.209
 Method of test : ANSI C63.10-2009, section 6.5
 Ambient temperature : 23 °C
 Relative humidity : 48 %

Test results :



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

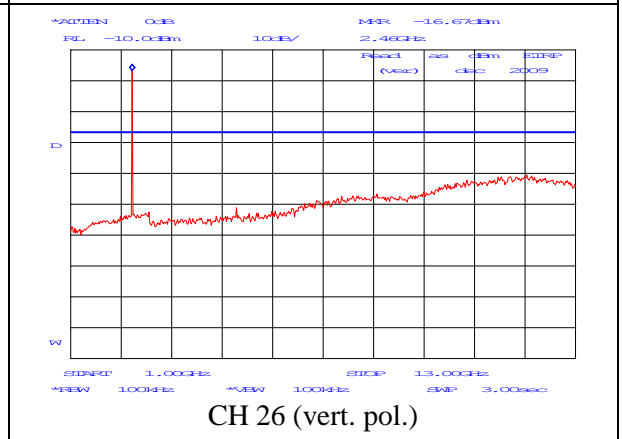
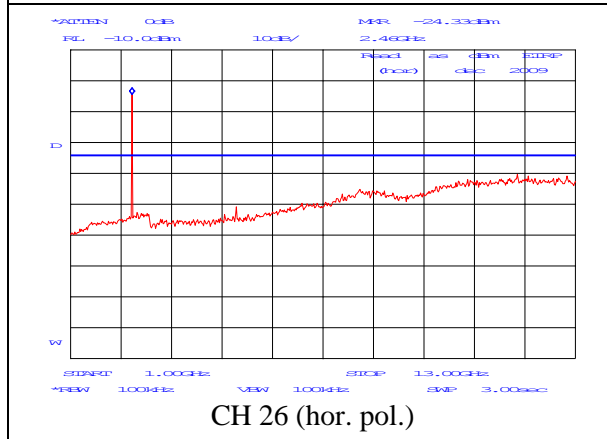
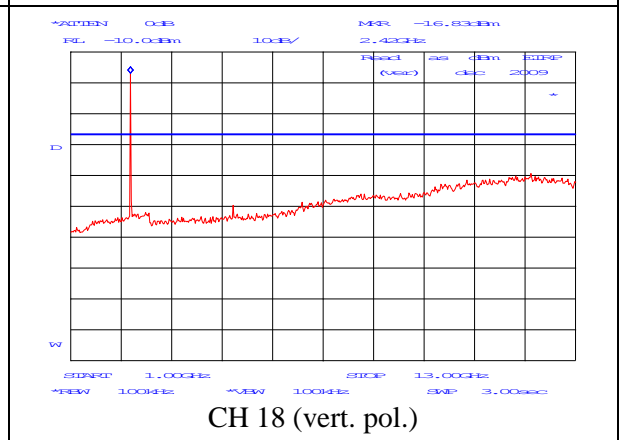
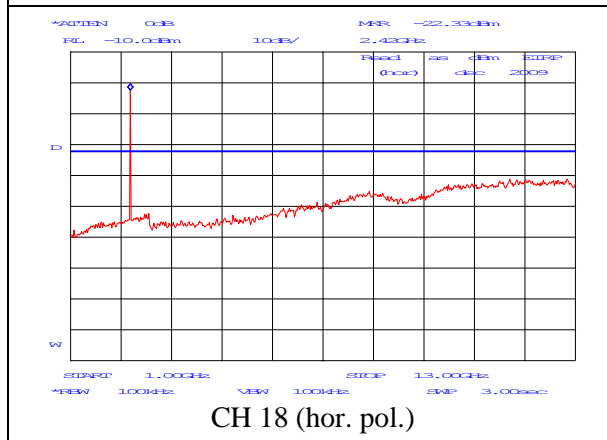
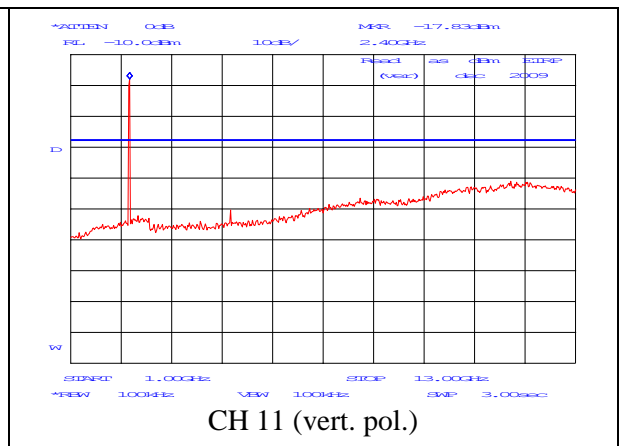
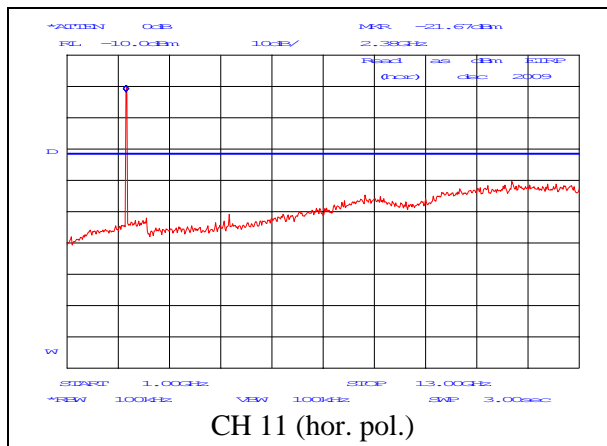
Limit:

Field strength at 3 meter distance	30 – 88 MHz: ≤ 40 dBμV/m; 88 – 216 MHz: ≤ 43.5 dBμV/m; 216 – 960 MHz: ≤ 46 dBμV/m; Above 960 MHz: ≤ 54 dBμV/m
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2.4 TX unwanted emissions attenuation (radiated, 1 – 13 GHz)

Compliance standard : FCC part 15, subpart C, section 15.247(d)
 Method of test : FCC KDB publication No. 558074
 Ambient temperature : 23 °C
 Relative humidity : 48 %

Test results :



Measurement uncertainty: < 2 GHz: + 1.7/- 1.9 dB;
≥ 2 GHz: +2.4/-2.7 dB

Limit:

In any 100 kHz bandwidth	at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz bandwidth.
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2.5 TX unwanted emissions in the restricted bands

Compliance standard : FCC part 15, subpart C, section 15.247(d)
 Method of test : FCC KDB publication No. 558074
 Ambient temperature : 23 °C
 Relative humidity : 48 %

Test results :

Frequency (MHz)	Test results peak (dBm eirp)		Resolution bandwidth (kHz)	Average limit (dBm eirp)*)
	Vertical	Horizontal		
4810	-62.2	≤ -41.2	1000	-41.2
4880	-61.7	≤ -41.2	1000	-41.2
4960	-62.5	≤ -41.2	1000	-41.2
7215	≤ -41.2	≤ -41.2	1000	-41.2
7320	≤ -41.2	≤ -41.2	1000	-41.2
7440	≤ -41.2	≤ -41.2	1000	-41.2
9620	≤ -41.2	≤ -41.2	1000	-41.2
9760	≤ -41.2	≤ -41.2	1000	-41.2
9920	≤ -41.2	≤ -41.2	1000	-41.2
12025	≤ -41.2	≤ -41.2	1000	-41.2
12200	≤ -41.2	≤ -41.2	1000	-41.2
12400	≤ -41.2	≤ -41.2	1000	-41.2

*) derived from the expression $EIRP_{dBm} = E_{dB\mu V/m} - 95.2_{dB}$

Measurement uncertainty: +4.5 / -6.1 dB

2.6 Maximum power spectral density level in the fundamental emission

Compliance standard	:	FCC part 15, subpart C, section 15.247(e)
Method of test	:	FCC KDB publication No. 558074
Ambient temperature	:	23 °C
Relative humidity	:	48 %

The maximum radiated output power of the EE200 Electronic shelf label has been measured:

-11.0 dBm.

This power has been measured in a 10 MHz bandwidth; see section 2.1 of this module.
Because the antenna gain is 0.5 dBi the conducted output power is calculated at -11.5 dBm.

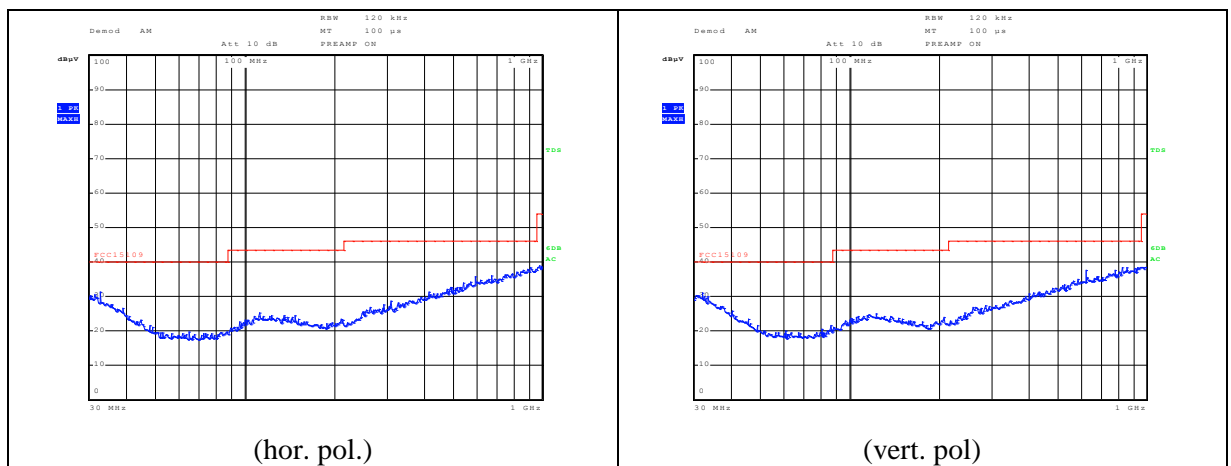
The limit for Power Spectral Density is 8 dBm / 3 kHz

Because the calculated output power is much lower than the limit for Power Spectral Density, this requirement will always be fulfilled.

2.7 RX unwanted emissions (radiated, 30 – 1000 MHz)

Compliance standard : FCC part 15, subpart B, section 15.109
 Method of test : ANSI C63.10-2009, section 6.5
 Ambient temperature : 23 °C
 Relative humidity : 48 %

Test results :



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

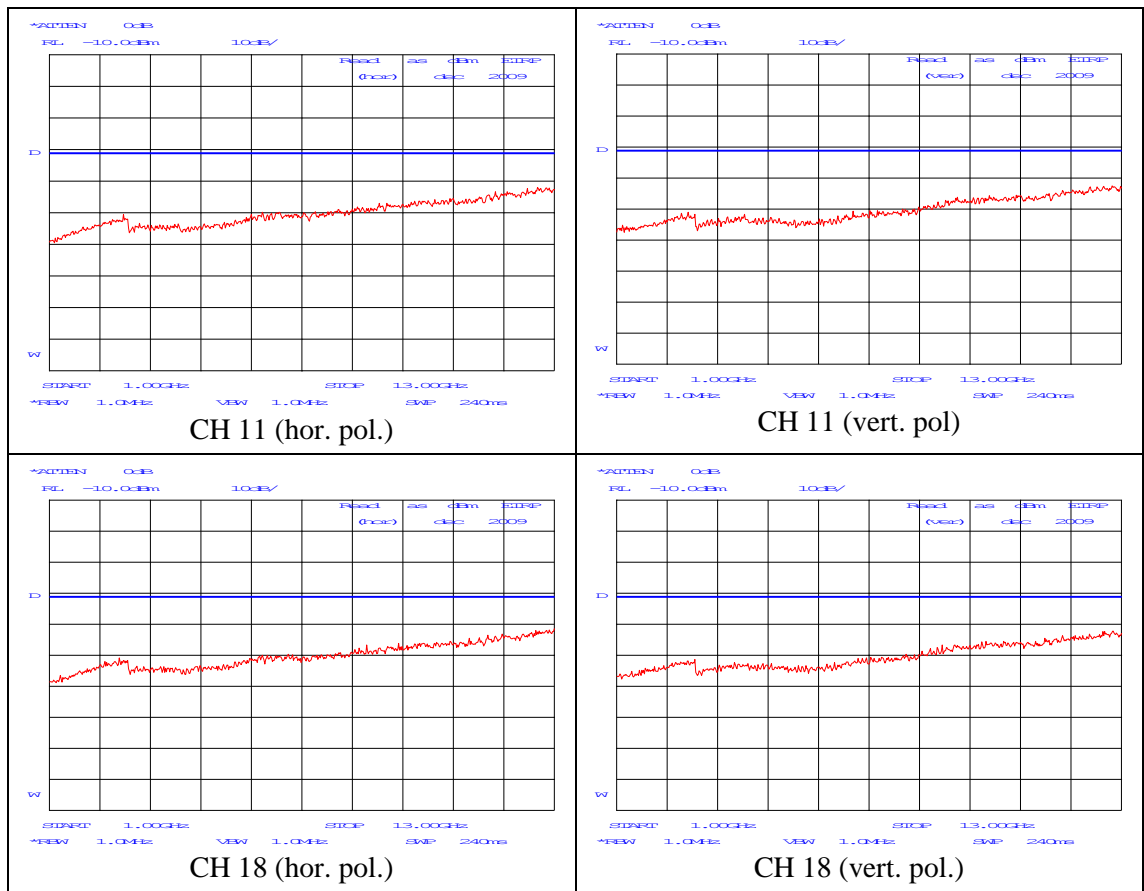
Limit:

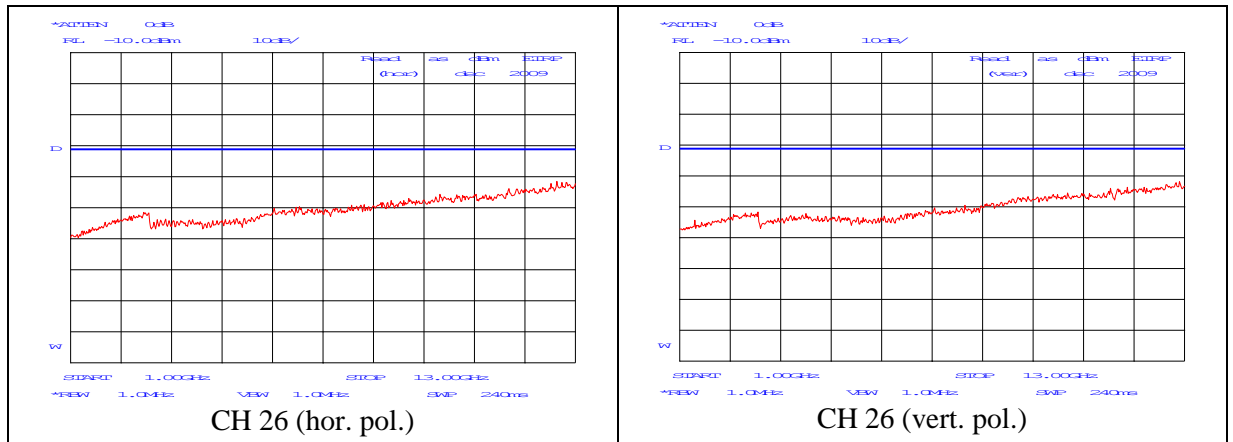
Field strength at 3 meter distance	30 – 88 MHz: $\leq 40 \text{ dB}\mu\text{V/m}$; 88 – 216 MHz: $\leq 43.5 \text{ dB}\mu\text{V/m}$; 216 – 960 MHz: $\leq 46 \text{ dB}\mu\text{V/m}$; Above 960 MHz: $\leq 54 \text{ dB}\mu\text{V/m}$
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2.8 RX unwanted emissions (radiated, 1- 13 GHz)

Compliance standard : FCC part 15, subpart B, section 15.109
 Method of test : ANSI C63.10-2009: section 6.6
 Ambient temperature : 23 °C
 Relative humidity : 48 %

Test results :





Measurement uncertainty: +4.5 / -6.1 dB

Limit:

Radiated power	Above 1 GHz: ≤ -41.2 dBm eirp ^{*)}
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^{*)} derived from the expression $EIRP_{dBm} = E_{dB\mu V/m} - 95.2_{dB}$
 (Max. field strength at band edge: 500 $\mu V/m$ @ 3 m distance (equivalent to 54 dB $\mu V/m$))

Used test equipment module

Description	ID	Manufacturer	Model	Used at par.
Spectrum Analyzer	TE 11125	Rohde & Schwarz	FSP 40	--
Power meter	TE 00354	Hewlett Packard	437B	--
Power sensor	TE 00355	Hewlett Packard	8481A	--
Spectrum analyzer	TE 00359	Hewlett Packard	8563E	2.1, 2.2, 2.4, 2.5, 2.7
Pre amplifier	TE 00092	Hewlett Packard	8449B	2.1, 2.2, 2.4, 2.5, 2.7
Horn antenna	TE 00531	EMCO	3115	2.1, 2.2, 2.4, 2.5, 2.7
Anechoic chamber	TE 01064	Euroshield	RFD-F-100	2.1, 2.2, 2.4, 2.5, 2.7
Semi anechoic chamber	TE 00861	Comtest	--	2.3, 2.6
EMI test receiver	TE 00481	Rohde & Schwarz	ESCI	2.3, 2.6
Biconilog	TE 00967	Chase	CBL6112A	2.3, 2.6

Revision history

REVISION	DATE	REMARKS	REVISED BY
1.0	24 August 2012	Correction from GHz to MHz on page 7.	J.C. le Clercq
2.0	16 September 2012	Calculation of power density added on page 14.	J.C. le Clercq