telefication bv
The Netherlands
Chamber of Commerce
51565536
www.telefication.com

telefication

Radio test report
20114433303 rev 1.0

based on:

FCC part 15; subpart C; section 15.247 (ed. 10-1-11);
FCC part 15, subpart B, section 15.109 (ed. 10-1-11);
FCC part 15; subpart B, section 15.107 (ed. 10-1-11)

Wireless base station
MTw
AW-A

Contents

This report comprises of three modules. The total number of pages is: 26

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	:	Xsens Technologies B.V.
Address	:	Pantheon 6a
Zipcode	:	7521 PR
City/town	:	Enschede
Country	:	The Netherlands
Date of order	:	12 June 2012

2 Product

A sample of the following product was submitted for testing:

Product description	:	Wireless base station
Manufacturer	:	Xsens Technologies B.V.
Trade mark	:	MTw
Type designation	:	AW-A
FCC ID	:	QILAW-A
Hardware version	:	AW101010
Serial number	:	00200128
Firmware release	:	1.0.10

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:

- 20 September 2012

Tests are carried out between:

- 25 September and 11 October 2012

4 Product documentation

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

Identification	Date
MTw_UserManual.docx	2012-05-24
MTw_SDK_UserManual.docx	2012-05-24

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 (ed. 10-1-11);
FCC part 15, subpart B, section 15.109 (ed. 10-1-11);
FCC part 15; subpart B, section 15.107 (ed. 10-1-11)

8 Conclusions

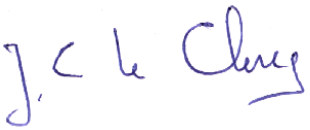
The samples of the product showed **NO NON-COMPLIANCES** to the specification stated in chapter 7 of this report:

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 methods and report by:

name : G.J. Gort

function : Senior Test Engineer

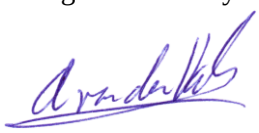
signature : 

The above conclusions have been verified by the following signatory:

Date : 18 January 2013

name : ing. A. van der Valk

function : Manager Laboratory

signature : 

Test results module

1 General information

1.1 Equipment information

Type of equipment	Wireless base station	
FCC ID	QILAW-A	
Modulation	--	
Spreading type	DSSS	
Bit rate	--	
Operating frequencies (channel set)	**Channel**	**Freq (GHz)**
	11	2.405
	12	2.410
	13	2.415
	14	2.420
	15	2.425
	16	2.430
	17	2.435
	18	2.440
	19	2.445
	20	2.450
	21	2.455
	22	2.460
	23	2.465
	24	2.470
	25	2.475
Rated RF antenna power	4 dBm eirp	
Type of antenna	Monopole, reverse SMA connector	
Antenna gain	2.0 dBi (max.)	

1.2 Tested channels

Channel 11-18-25, as stated in 1.1 (equipment information).

2 Emission tests

2.1 Maximum conducted output power

Compliance standard : FCC part 15, subpart C, section 15.247 (b) (3)
Method of test : FCC KDB publication No. 558074
Ambient temperature : 23 °C
Relative humidity : 47 %

Test results :

Mode	Level (dBm)		
	CH 1	CH 2	CH 3
Continuously transmitting	5.38	4.52	3.74

Limit:

Maximum conducted output power	≤ 30 dBm (antenna gain < 6 dBi)

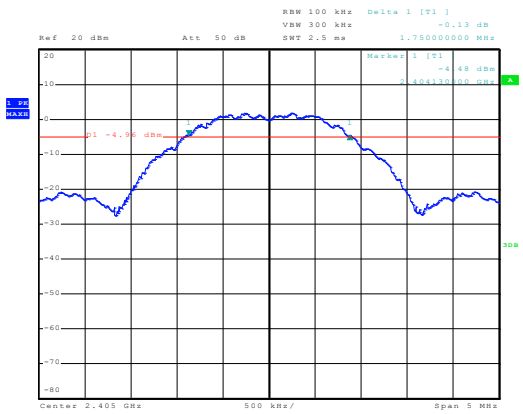
Measurement uncertainty: + 1.6 /- 1.9 dB

Measurement equipment : 12, 13, 39, 54 (the numbers listed refer to the module 'Used test equipment').

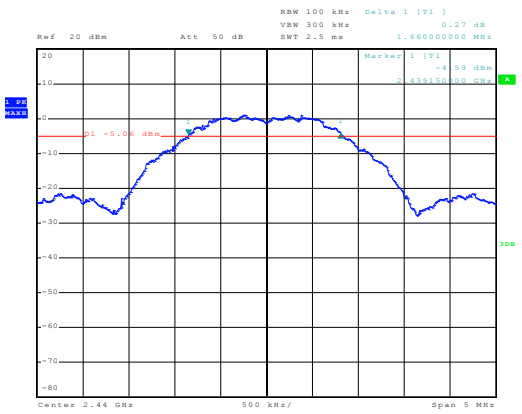
2.2 Minimum 6 dB bandwidth

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 : 47 %

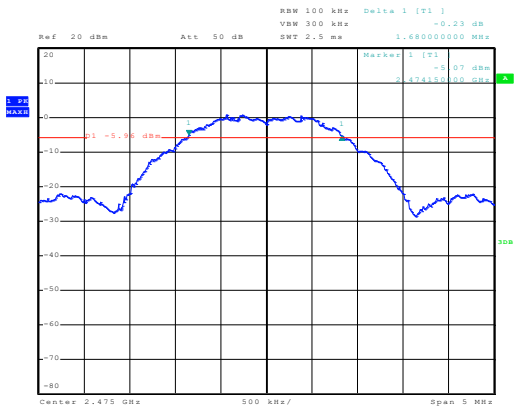
Test results :



CH 11: - 6dB bandwidth = 1.75 MHz



CH 18: -6 dB bandwidth = 1.66 MHz



CH 25: -6dB bandwidth = 1.68 MHz

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Limit:

Minimum 6 dB bandwidth	at least 500 kHz

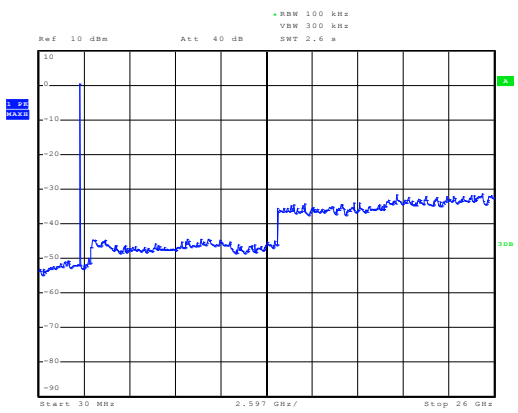
Measurement uncertainty: + /- 2 kHz

Measurement equipment: 39, 42, 54 (the numbers listed refer to the module 'Used test equipment').

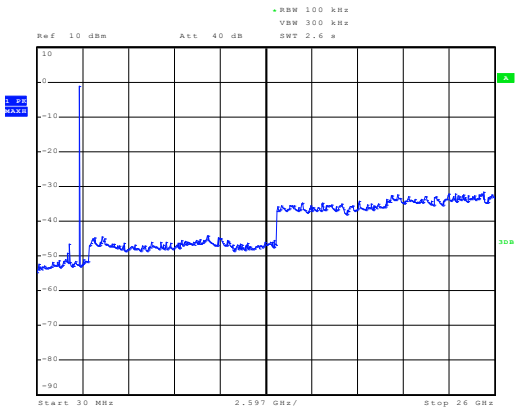
2.3 TX unwanted emissions attenuation (conducted, 0.03 – 26 GHz)

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 : 47 %

Test results :



CH 11



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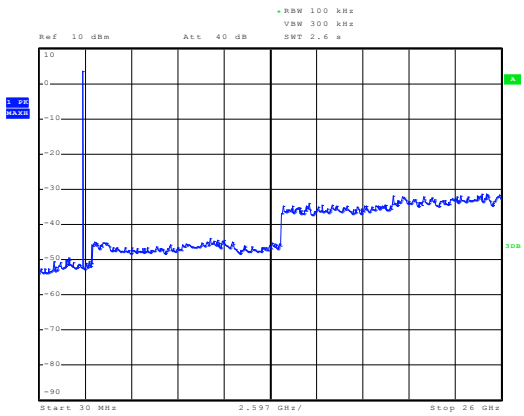

CH 25

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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.

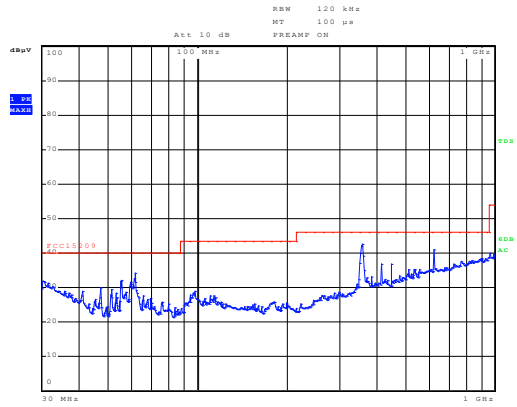
Measurement uncertainty: < 2 GHz: + 1.7/- 1.9 dB;
≥ 2 GHz: +2.4/-2.7 dB

Measurement equipment : 39, 42, 54 (the numbers listed refer to the module 'Used test equipment').

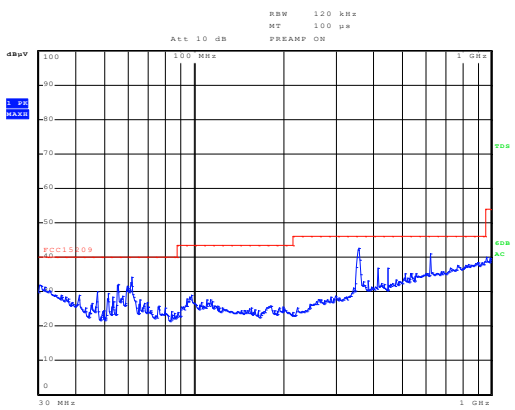
2.4 TX unwanted emissions in the restricted bands (radiated, 0.03-1 GHz)

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 : 23 %

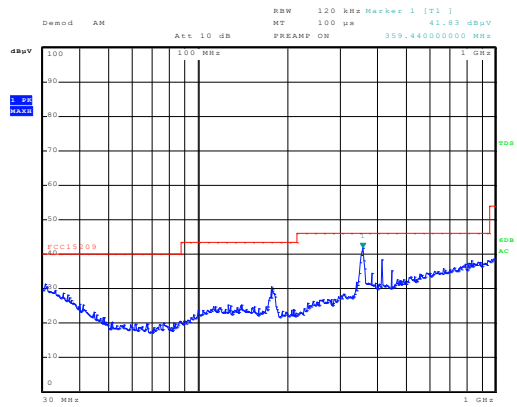
Test results :



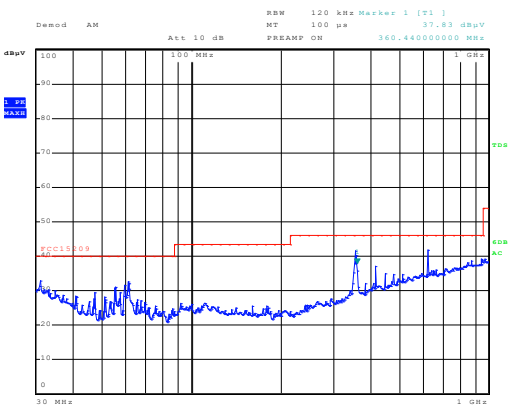
CH 11 (hor. pol.)



CH 11 (vert. pol)



CH 18 (hor. pol.)



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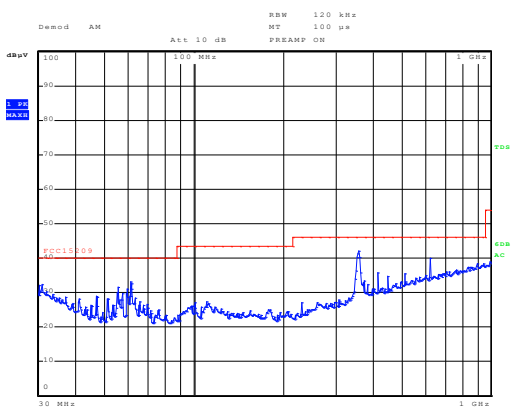
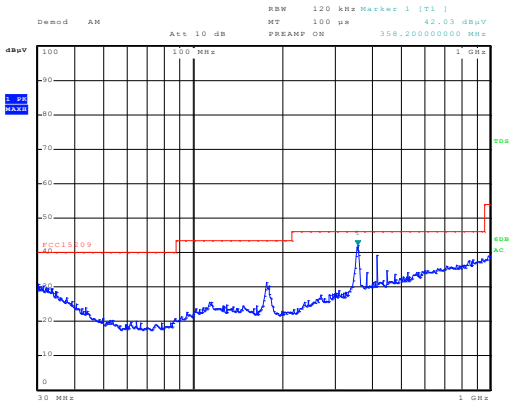


CH 25 (hor. pol.)



CH 25 (vert. pol.)

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

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

*) derived from the expression $EIRP_{dBm} = E_{dB\mu V/m} - 95.2_{dB}$
(Max. field strength at band edge: 500 µV/m @ 3 m distance (equivalent to 54 dBµV/m))

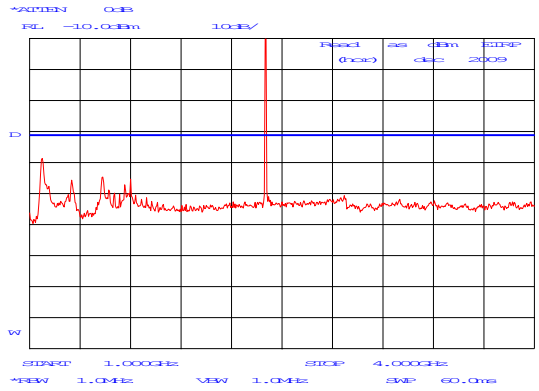
Measurement equipment : 34, 36, 39, 43, 54 (the numbers listed refer to the module 'Used test equipment').

2.5 TX unwanted emissions in the restricted bands (radiated, > 1GHz)

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	:	23 %

Test results :

1-4 GHz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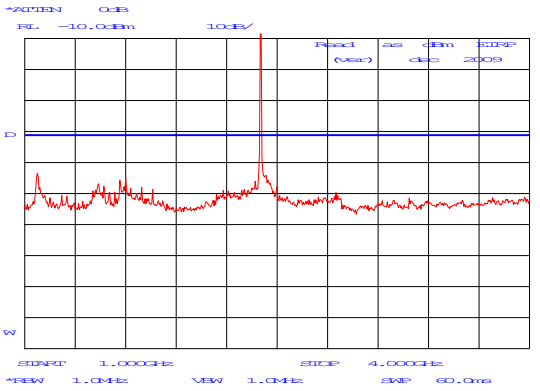
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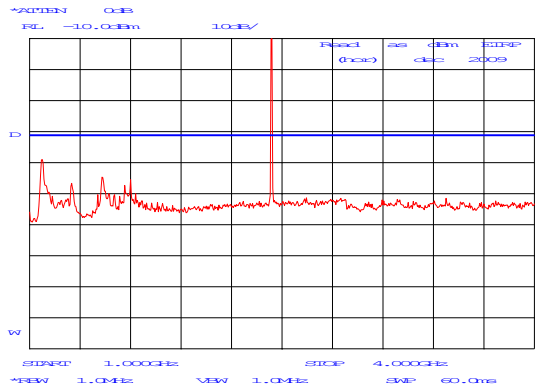
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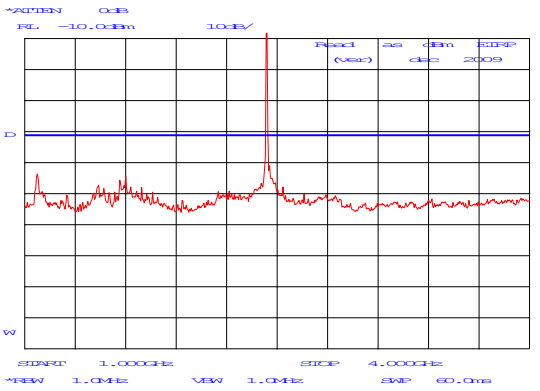
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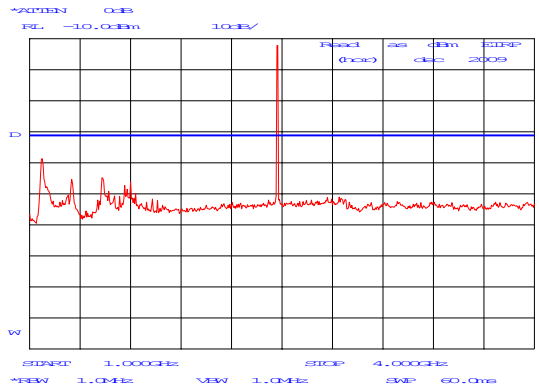
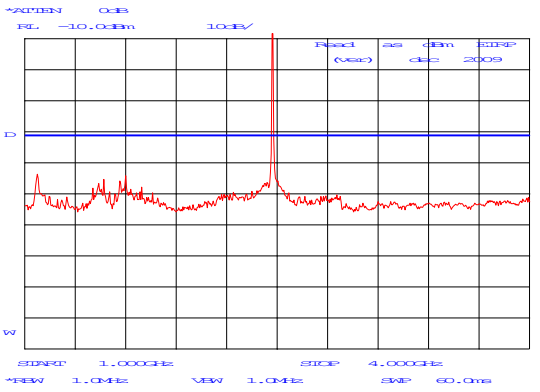
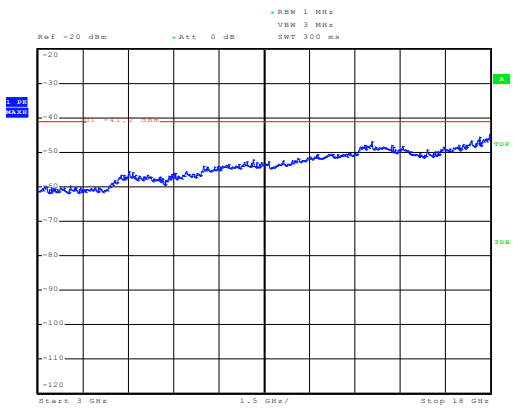
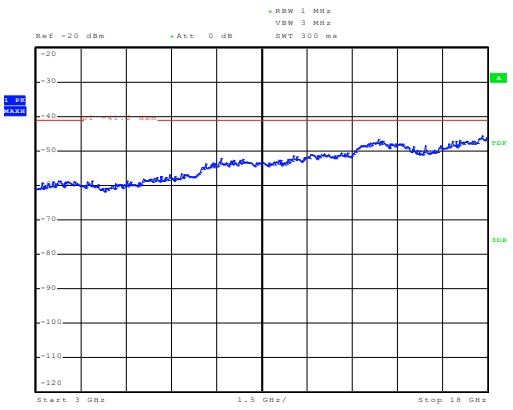

CH 25 (hor. pol.)


CH 25 (vert. pol.)

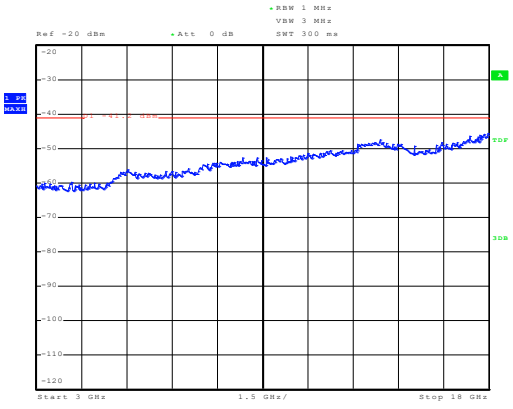
3-18 GHz



CH 11 (hor. pol.)



CH 11 (vert. pol)



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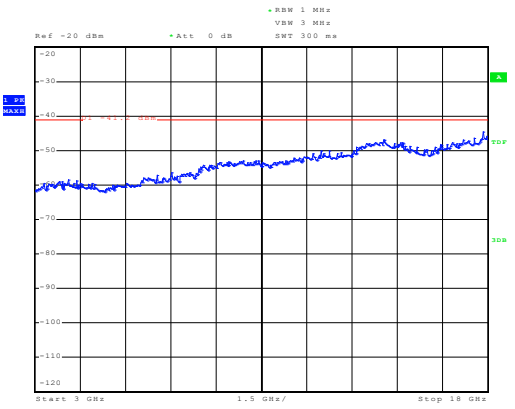

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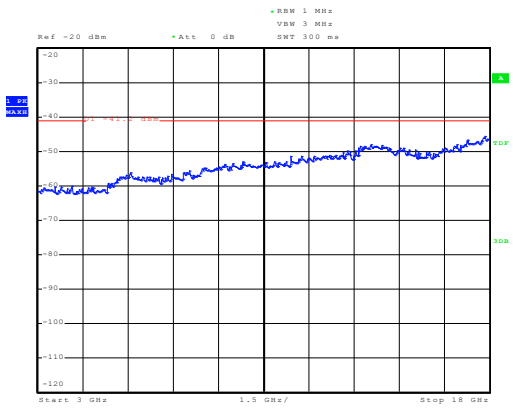

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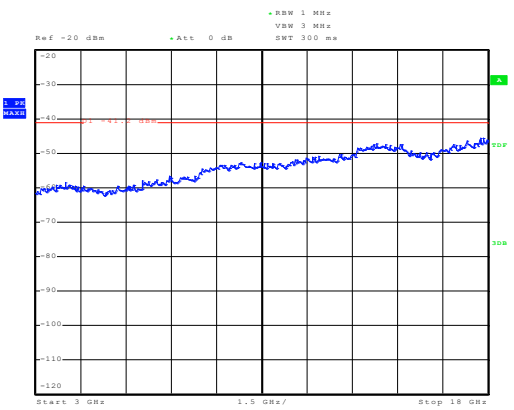
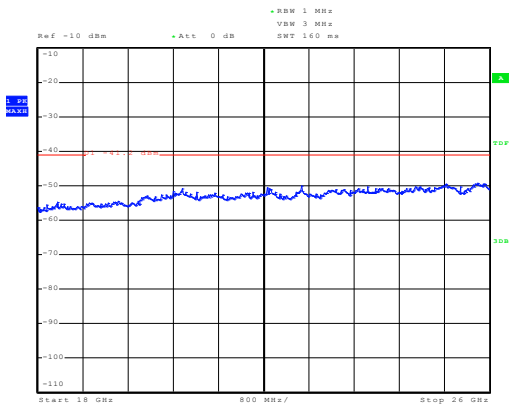
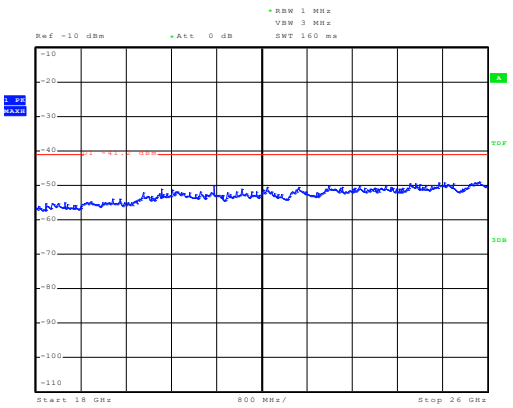


CH 25 (vert. pol.)

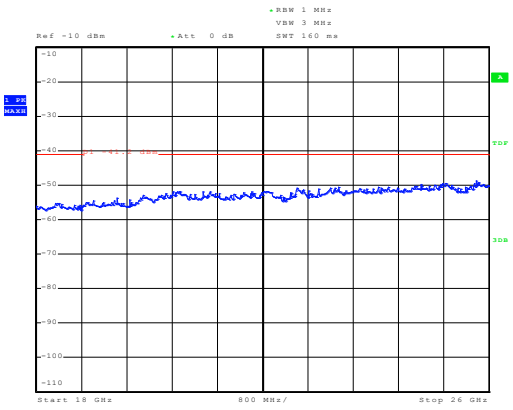
18-26 GHz



CH 11 (hor. pol.)



CH 11 (vert. pol)



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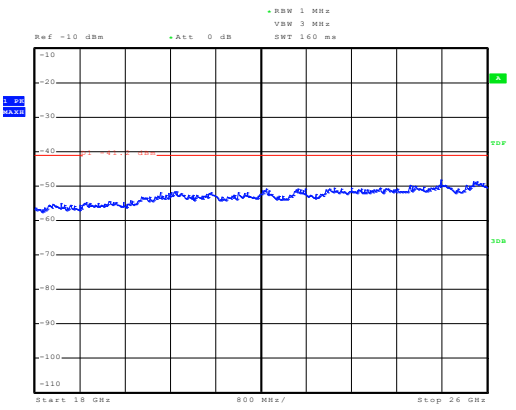

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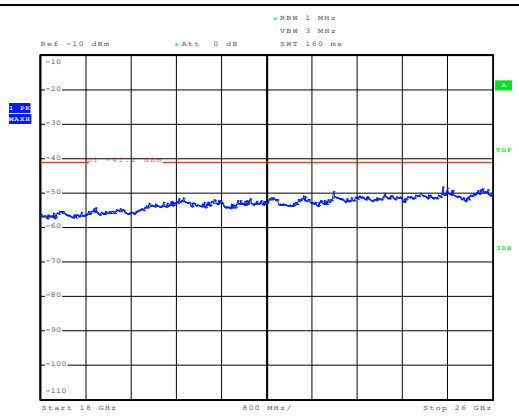
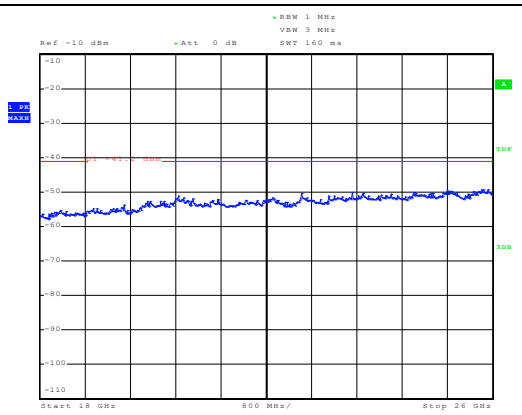


CH 25 (hor. pol.)



CH 25 (vert. pol.)

Limit:

Radiated power	Above 1 GHz: ≤ -41.2 dBm eirp *)

*) derived from the expression $EIRP_{dBm} = E_{dB\mu V/m} - 95.2_{dB}$
(Max. field strength at band edge: 500 µV/m @ 3 m distance (equivalent to 54 dBµV/m))

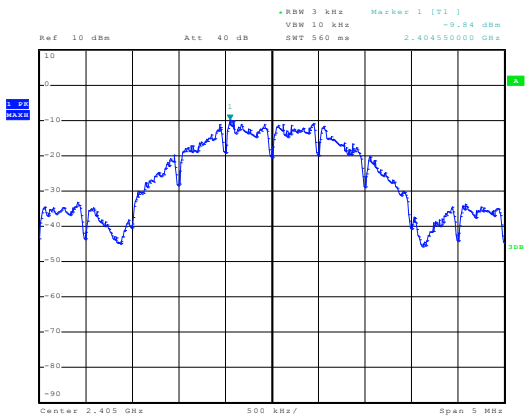
Measurement uncertainty : +4.5 / -6.1 dB

Measurement equipment : 2, 6, 24, 31, 34, 39, 42, 46, 54, 57 (the numbers listed refer to the module 'Used test equipment').

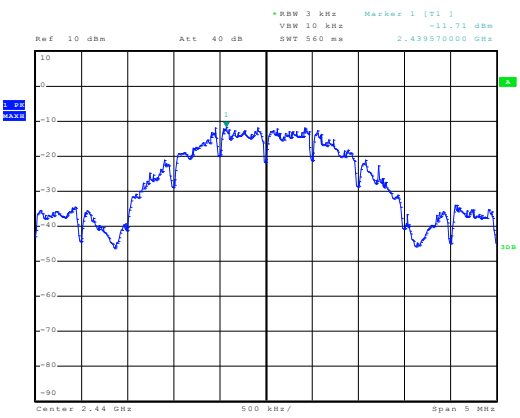
2.6 Maximum power spectral density conducted to the antenna

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 : 23 %

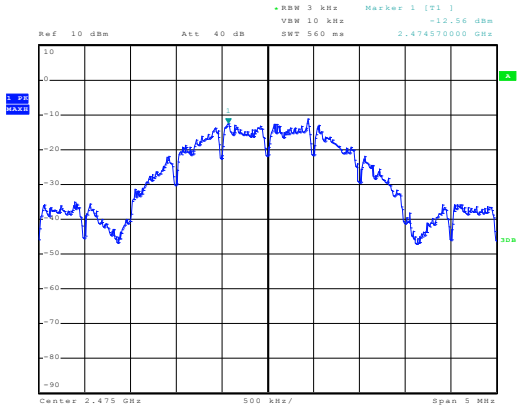
Test results :



CH 1



CH 2



CH 3

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

Limit:

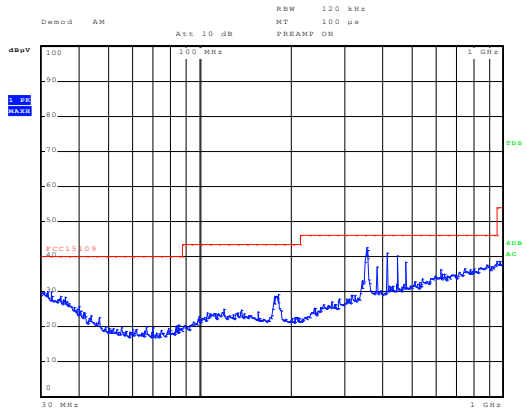
In any 3 kHz band	Not greater than 8 dBm during any time of continous transmission

Measurement equipment: 39, 42, 54 (the numbers listed refer to the module 'Used test equipment')

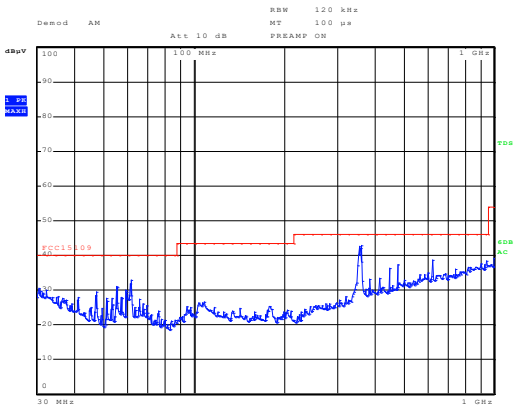
2.7 RX unwanted emissions (radiated, 0.03 – 1 GHz)

Compliance standard : FCC part 15, subpart B, section 15.109
Method of test : ANSI C63.10-2009, section 6.5.4.2
Ambient temperature : 23 °C
Relative humidity : 23 %

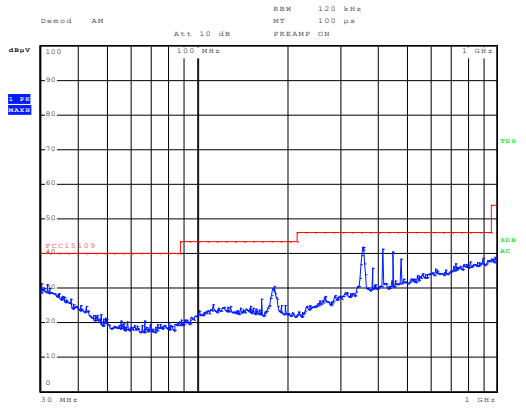
Test results :



CH 11 (hor. pol.)



CH 11 (vert. pol)



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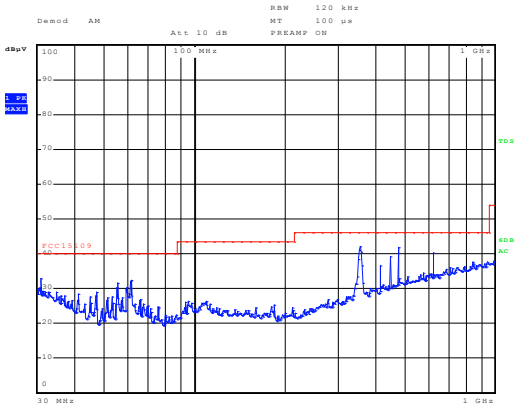

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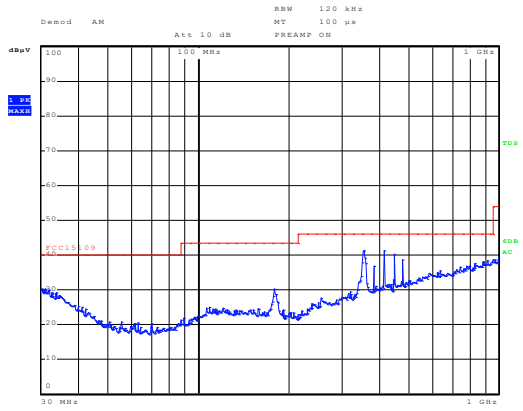
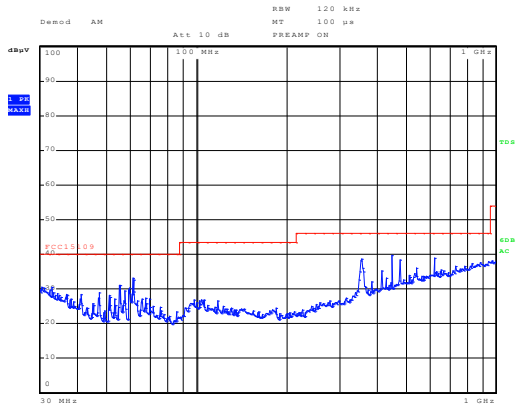


CH 25 (hor. pol.)



CH 25 (vert. pol.)

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

Measurement uncertainty:

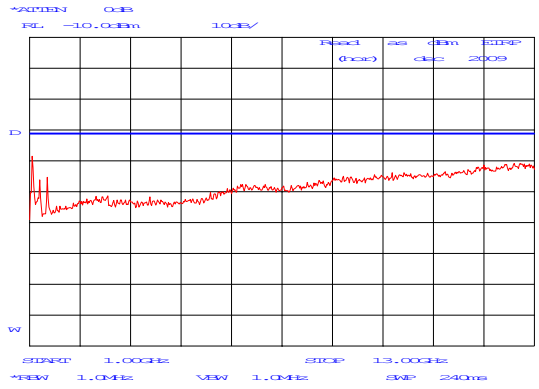
Horizontal polarization	
30 – 200 MHz	4.5 dB
200 – 1000 MHz	3.6 dB
Vertical polarization	
30 – 200 MHz	5.4 dB
200 – 1000 MHz	4.6 dB

Measurement equipment : 34, 36, 39, 43, 54 (the numbers listed refer to the module 'Used test equipment').

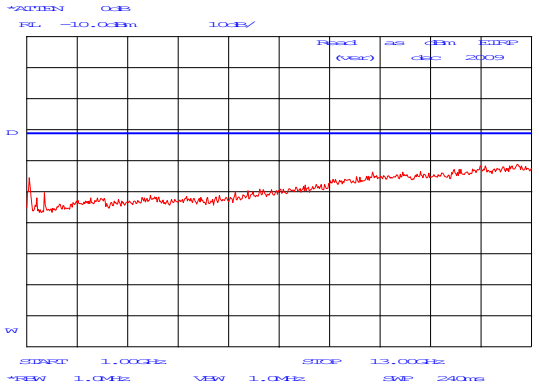
2.8 RX unwanted emissions (radiated, > 1 GHz)

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	:	23 %

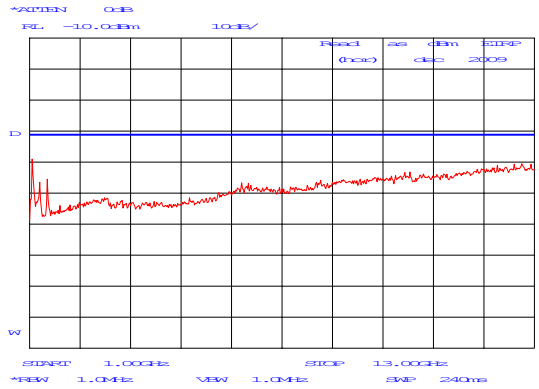
Test results :



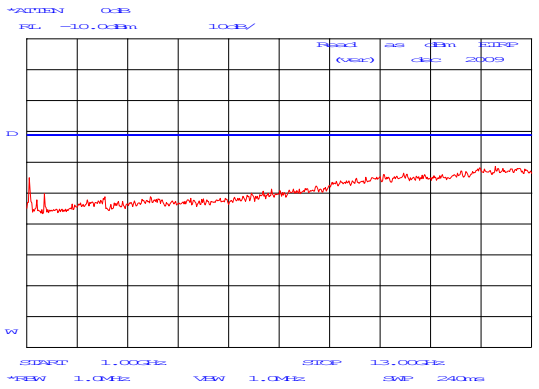
CH 11 (hor. pol.)



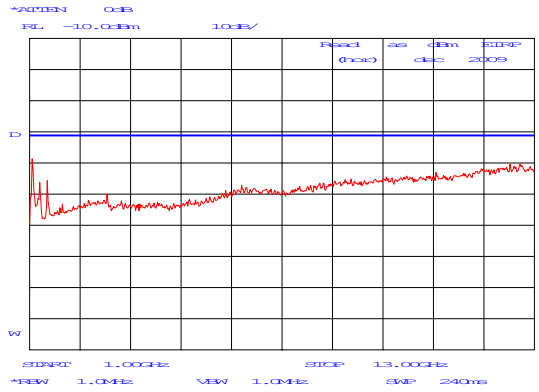
CH 11 (vert. pol)



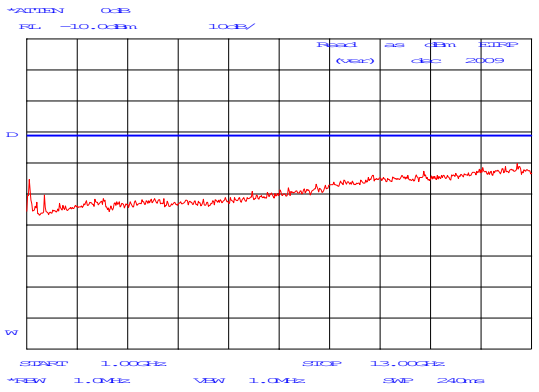
CH 18 (hor. pol.)



CH 18 (vert. pol.)



CH 25 (hor. pol.)



CH 25 (vert. pol.)

Limit:

Radiated power	Above 1 GHz: ≤ -41.2 dBm eirp *)

*) derived from the expression $EIRP_{dBm} = E_{dB\mu V/m} - 95.2_{dB}$
(Max. field strength at band edge: 500 µV/m @ 3 m distance (equivalent to 54 dBµV/m))

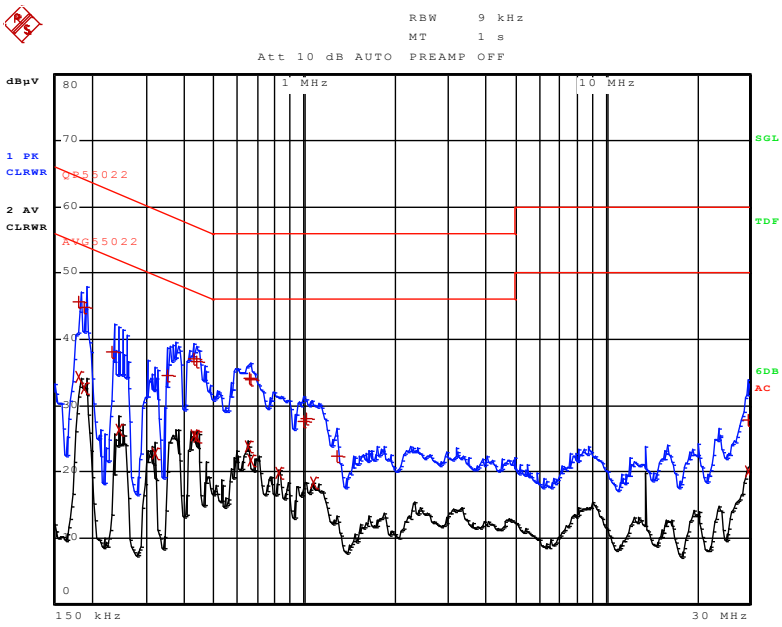
Measurement uncertainty: +4.5 / -6.1 dB

Measurement equipment : 2, 6, 24, 31, 34, 39, 42, 46, 54 (the numbers listed refer to the module 'Used test equipment').

2.9 Conducted disturbance measurements

Compliance standard	:	FCC part 15, subpart B, section 15.107(a).
Method of test	:	ANSI C63.10: 2009, section 6.2
Port	:	AC power input, 120 Volt
Mode	:	normal usage mode
Configuration	:	The sample was continuously activated
Atmospheric pressure	:	Between 86 kPa and 106 kPa
Temperature	:	23 °C
Relative humidity	:	40 %
Test results	:	Plots and tables

Type AW-A, live wire, plot



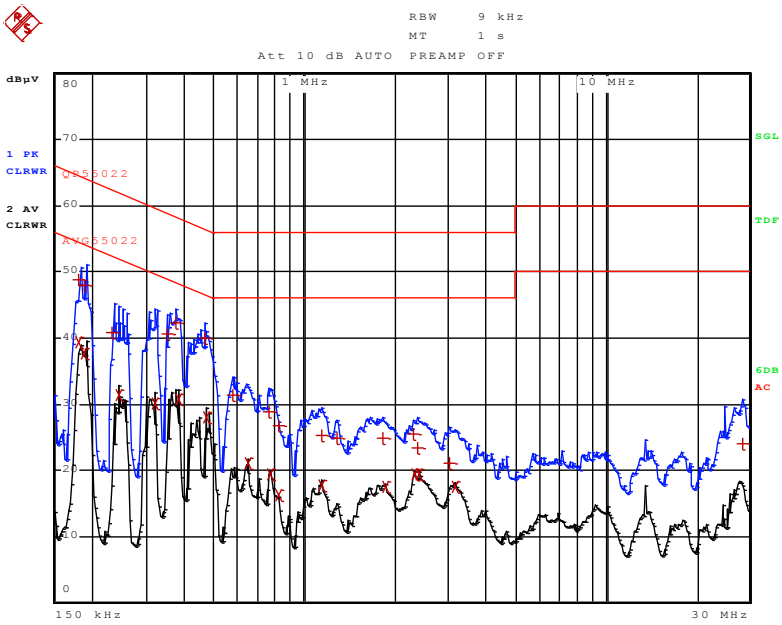
Type AW-A, live wire, table

EDIT PEAK LIST (Final Measurement Results)

Trace1: QP55022
Trace2: AVG55022
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	182 kHz	45.62	-18.76
1	Quasi Peak	190 kHz	44.77	-19.26
2	Average	182 kHz	34.34	-20.05
1	Quasi Peak	430 kHz	37.09	-20.16
1	Quasi Peak	438 kHz	36.69	-20.40
2	Average	190 kHz	32.62	-21.40
2	Average	438 kHz	25.29	-21.80
2	Average	430 kHz	25.45	-21.80
1	Quasi Peak	654 kHz	34.02	-21.97
1	Quasi Peak	662 kHz	33.89	-22.10
2	Average	650 kHz	23.82	-22.17
1	Quasi Peak	234 kHz	38.17	-24.13
2	Average	666 kHz	21.81	-24.18
1	Quasi Peak	350 kHz	34.53	-24.42
2	Average	242 kHz	26.30	-25.72
2	Average	822 kHz	19.76	-26.23
2	Average	318 kHz	22.86	-26.89
2	Average	1.074 MHz	18.28	-27.71
1	Quasi Peak	1.022 MHz	28.08	-27.91
1	Quasi Peak	998 kHz	27.58	-28.41

Type AW-A, neutral wire, plot



Type AW-A, neutral wire, table

EDIT PEAK LIST (Final Measurement Results)

Trace1: QP55022
Trace2: AVG55022
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	182 kHz	39.43	-14.95
1 Quasi Peak	182 kHz	48.80	-15.59
1 Quasi Peak	190 kHz	48.04	-15.99
1 Quasi Peak	374 kHz	42.30	-16.10
2 Average	190 kHz	37.66	-16.36
1 Quasi Peak	466 kHz	39.92	-16.66
2 Average	382 kHz	30.72	-17.51
1 Quasi Peak	350 kHz	40.54	-18.41
2 Average	474 kHz	28.02	-18.42
2 Average	318 kHz	30.10	-19.65
2 Average	242 kHz	31.39	-20.63
1 Quasi Peak	234 kHz	40.84	-21.46
1 Quasi Peak	578 kHz	31.42	-24.57
2 Average	650 kHz	21.05	-24.94
2 Average	770 kHz	19.51	-26.48
2 Average	2.334 MHz	19.40	-26.59
2 Average	2.394 MHz	19.40	-26.59
1 Quasi Peak	762 kHz	28.93	-27.06
2 Average	1.138 MHz	17.76	-28.23
2 Average	1.866 MHz	17.56	-28.43

Result : Pass
Measurement uncertainty : +/- 3.6 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 system repeatability.
Measurement equipment : 39, 43, 55, 54, 56 (the numbers listed refer to the module 'Used test equipment').

Used test equipment module

Item	Description	Manufacturer	Type	ID
1	Signal generator	Marconi	2042	TE 00030
2	Preamplifier 1 – 26.5 GHz	HP	8449B	TE 00092
3	Preamplifier 1 – 26.5 GHz	HP	8449B	TE 00093
4	Pre-amplifier 10 dB	R & S	ESV-Z3	TE 00097
5	Pre-amplifier 10 dB	R & S	ESV-Z3	TE 00098
6	Spectrum analyser	HP	8562E	TE 00099
7	Microwave amplifier	HP	HP8349A	TE 00124
8	Digital multimeter	HP	34401A	TE 00143
9	Digital multimeter	HP	3438A	TE 00215
10	Step attenuator	HP	8494A	TE 00233
11	Step attenuator	HP	8496A	TE 00234
12	Power sensor	HP	8484A	TE 00245
13	Power meter	HP	435B	TE 00249
14	Power meter	HP	437B	TE 00354
15	Power sensor	HP	8481A	TE 00355
16	Spectrum analyser	HP	8563E	TE 00359
17	Audio analyzer	HP	8903A	TE 00373
18	Signal generator	Marconi	2042	TE 00379
19	Digital thermometer	Fluke	51	TE 00388
20	Step attenuator	HP	8491A	TE 00403
21	Signal generator	HP	8642B	TE 00424
22	Signal generator	Marconi	2042	TE 00427
23	Spectrum analyser	HP	8563E	TE 00481
24	Horn antenna	EMCO	3115	TE 00531
25	Horn antenna	EMCO	3116	TE 00533
26	Biconilog antenna	EMCO	3143	TE 00700
27	Climate chamber	CTS	C-40/350	TE 00741
28	Active loop antenna	R & S	HFH2-Z2	TE 00746
29	Horn antenna	Quinstar	QWH-1900-AA	TE 00747

Item	Description	Manufacturer	Type	ID
30	Step attenuator	HP	8491A	TE 00787
31	Standard gain horn	Flann	20240-25	TE 00818
32	Power supply for amplifier	R & S	HZ-9	TE 00830
33	Power supply	Delta Elektronika	E030-1	TE 00851
34	Semi Anechoic Room	Comtest	--	TE 00861
35	Power supply	Delta Elektronika	MST030-10	TE 00886
36	Biconilog antenna	Chase	CBL6112A	TE 00967
37	Anechoic chamber	Euroshield	RFB-F-100	TE 01064
38	Triple loop antenna	Telefication	--	TE 01066
39	Temp / RH logger	MicroLog	EC 650	TE 01114
40	Broadband resistive power divider	Weinschel	1506A	TE 01120
41	Broadband resistive power divider	Weinschel	1506A	TE 01122
42	Spectrum analyser	R & S	FSP 40	TE 11125
43	EMI test receiver	R & S	ESCI	TE 11128
44	Radio Communication Service Monitor	R & S	CMS54	TE 11129
45	Pre-amplifier	Miteq	JS4-18004000	TE 11131
46	Low noise amplifier	Miteq	AFS42-041001800	TE 11132
47	Antenna tower	Heinrich Deisel	AS 620P	ANEC
48	Turntable	Heinrich Deisel	DS-412	ANEC
49	Turntable controller	Heinrich Deisel	HD-050	ANEC
50	Antenna mast	EMCO	1070	SAR
51	Turn table	EMCO	1060-2M	SAR
52	Near field probe	--	--	--
53	Digital multimeter	Fluke	87	TE 00257
54	Variable transformer	KSL	RU8	TE 00904
55	Two line V-network	R & S	ESH3-Z5	TE 00208
56	Pulse limiter	R & S	ESH3-Z2	TE 00756
57	High pass filter	Wainwright	WHK3.0	TE 01140

Revision history

REVISION	DATE	REMARKS	REVISED BY
1.0	18 January 2013	Power density plots added on page 17	J.C. le Clercq