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Radio test report
20153144303-Ver 1.00

Based on:

- FCC part 15; subpart C; section 15.249 & 15.209 (10-1-14 edition)

Wireless Awinda Station
MVN Awinda
AW-A2

Revision history

REVISION	DATE	REMARKS	REVISED BY
Ver 1.00	2015-06-08	Initial release	ing. P.A. Suringa
Ver 0.50	2015-06-01	Version for peer review	ing. P.A. Suringa

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USED TEST EQUIPMENT MODULE **19**

This report comprises of three modules. The total number of pages is: 20

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).

Telefication is designated by the FCC as an Accredited Test Firm for compliance testing of equipment subject to Certification under Parts 15 & 18. The Registration Number is: 282250.

The Industry Canada number for the Open Area Test Site of Telefication is: 4173A-1.

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Ordering party:

Company name	:	Xsens Technologies B.V.
Address	:	Pantheon 6a
Zipcode	:	7521 PR
City/town	:	Enschede
Country	:	The Netherlands
Date of order	:	16 March 2015

2 Product

A sample of the following product was submitted for testing:

Product name	:	Wireless Awinda Station
Type designation	:	AW-A2
Manufacturer	:	Xsens Technologies B.V.
Trade mark	:	MVN Awinda
FCC ID	:	QILAW-A2
Hardware version	:	AW140520
Software release	:	3.0.5
Serial number	:	--

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:

- 20 April 2015

Tests are carried out between:

- 20 April and 11 May 2015

4 Product documentation

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

Description	Identification	Date
Application form	RF_731_11, FCC Application form_Awinda Station v2.doc	2015-05-08
User manual	MVN User Manual.pdf	March 2015

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 MVN Awinda wireless motion detection system is equipped with a radio module using a proprietary TDMA (Time Division Multiple Access) Awinda™ protocol.

The system consists of three units namely the Awinda station, Awinda dongle and wireless Awinda sensor (report no.'s 20153144303, 20153144304 and 20153144305 respectively). The radio modules are, apart from the antennas, identical for all three units.

For the purpose of putting the device in test mode operation the test program "Data Handler 2.34 beta", delivered by the manufacturer, is utilized.
The tests are performed with Tx power setting D1 (hex).

6 Modifications to the sample

None.

7 Summary

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

INTENTIONAL RADIATOR OPERATING IN THE FREQUENCY BAND 2400 - 2483.5 MHz

The sample is tested according to the following specifications:

FCC part 15; subpart C; section 15.249 & 15.209 (10-1-14 edition)

8 Conclusions

The samples of the product showed **NO NON-COMPLIANCES** to the specifications 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. P.A. Suringa

Review of test report by:

Name : ing. J.C. le Clercq

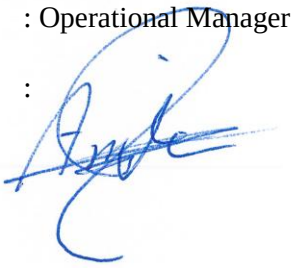
The above conclusions have been verified by the following signatory:

Date : 8 June 2015

Name : A. Amininejad

Function : Operational Manager Radio Laboratory

Signature :



Test results module

1 General information

1.1 Equipment information

Rated RF output power	20 dBm
Rated radiated RF power	23.2 dBm
Operating frequency range	2405 – 2475 MHz
Type of antenna	External, detachable
Modulation	GFSK
Duty cycle (during testing)	100 %
FCC ID	QILAW-A2

1.2 Frequency test channels

Channel	TX (MHz)	RX (MHz)
Low	2405	2405
Middle	2440	2440
High	2475	2475

2 Emission tests

2.1 Field strength of intentional signal

Compliance standard : FCC part 15, subpart C, section 15.249 (a) & (e)
Method of test : FCC part 15, subpart A, section 15.31(m), 15.33, 15.35, ANSI C63.10-2009, section 6.6
EUT condition : transmit mode
Atmospheric pressure : Between 86 kPa and 106 kPa
Temperature : 24 °C
Relative humidity : 46 %
Test results :

Note: only peak field strength was measured.

Peak field strength:

Frequency (MHz)	Test result @ 3 m distance (dBµV/m)	Polarisation	Limit (dBµV/m)
2405	113.9	V	114
2440	113.6	V	114
2475	113.5	V	114

Average field strength*:

Frequency (MHz)	Calculated field strength @ 3 m distance (dBµV/m)	Polarisation	Limit (dBµV/m)
2405	77.9	V	94
2440	77.6	V	94
2475	77.5	V	94

***** The average field strength has been calculated by the following formula:

$FS_{average}$ (dBµV/m) = FS_{peak} (dBµV/m) + ACF (Average Correction Factor)

ACF = 20 log x, where x is the duty cycle in a 100 ms period.
x = τ / T = 1.6 ms / 100 ms = 0.016
ACF = 20 log 0.016 = - 36 dB

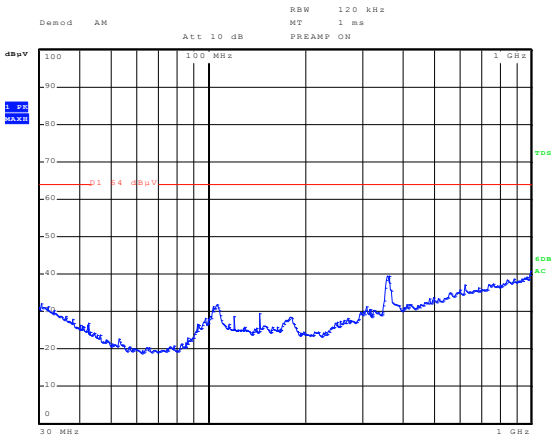
Measurement uncertainty	+5.7/ - 5.7 dB

Measurement equipment used (item numbers refer to section “used test equipment”)	24, 34, 42, 46, 51.

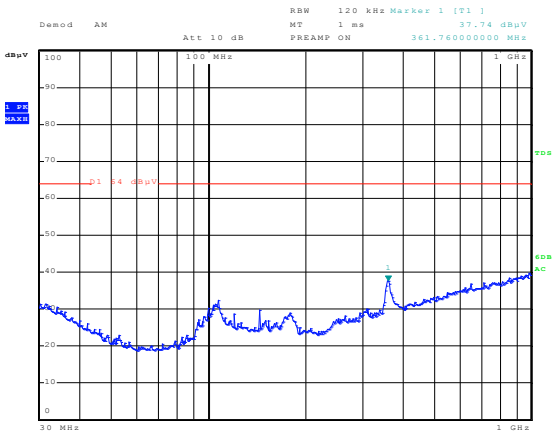
2.2 Field strength of unwanted emissions 30 - 1000 MHz

Compliance standard	:	FCC part 15, subpart C, section 15.209 (a) & 15.249 (d)
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	:	transmit mode
Atmospheric pressure	:	Between 86 kPa and 106 kPa
Temperature	:	24 °C
Relative humidity	:	46 %
Test results	:	

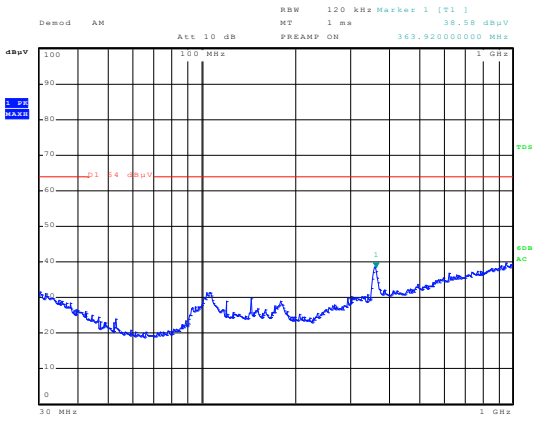
Polarization horizontal (max. hold)



Low channel

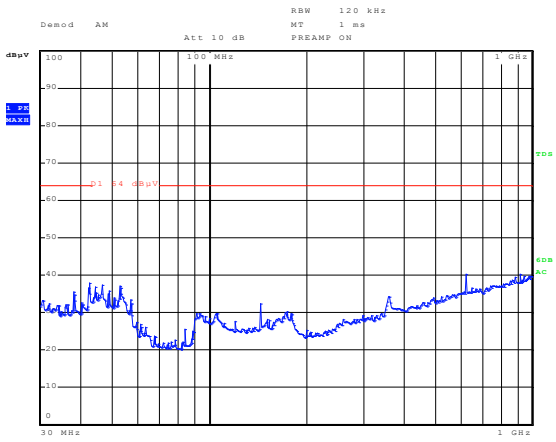


Middle channel

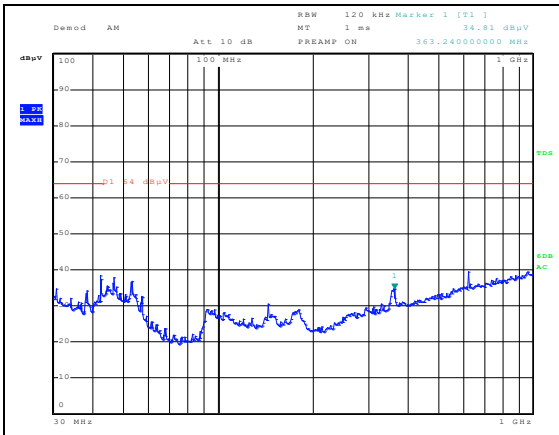


High channel

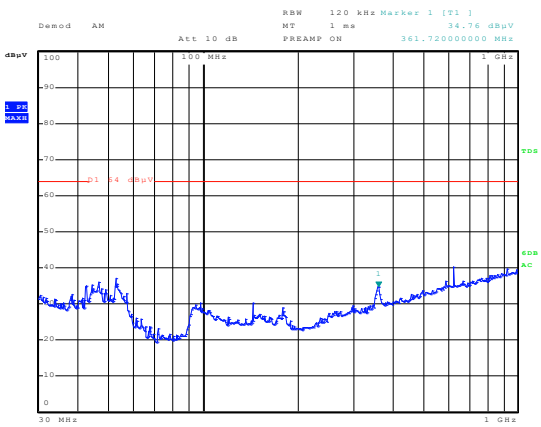
Polarization vertical (max. hold)



Low channel



Middle channel



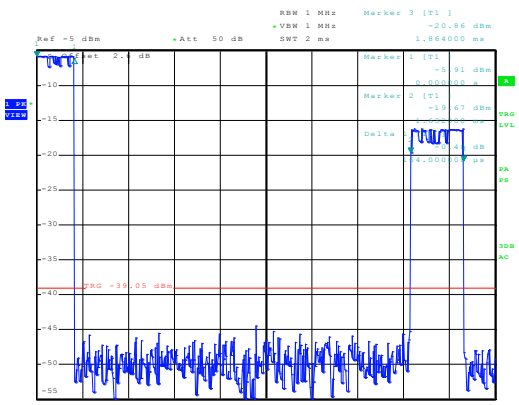
High channel

Measurement uncertainty	Vertical polarisation:	
	30 – 200 MHz	5.4 dB
	200 -1000 MHz	4.6 dB
	Horizontal polarisation:	
	30 – 200 MHz	4.5 dB
	200 -1000 MHz	3.6 dB

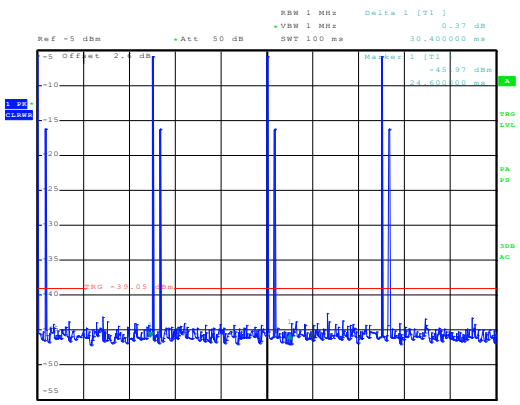
Measurement equipment used (item numbers refer to section “used test equipment”	34, 36, 39, 43, 50, 51.

2.3 Average factor

Compliance standard : --
Method of test : FCC part 15, subpart C, section 15.35 (b) and (c)
EUT condition : transmit mode
Atmospheric pressure : Between 86 kPa and 106 kPa
Temperature : 24 °C
Relative humidity : 46 %
Test results : plots



Tx on time: 164 + 232 µsec = 396 µsec



Total on time in 100 ms: 4 x 396 µsec = 1584 µsec

The average field strength has been calculated by the following formula:

$FS_{average}$ (dBµV/m) = FS_{peak} (dBµV/m) + ACF (Average Correction Factor)

ACF = 20 log x, where x is the duty cycle in a 100 ms period.
x = τ / T = 1.6 ms / 100 ms = 0.016
ACF = 20 log 0.016 = - 36 dB

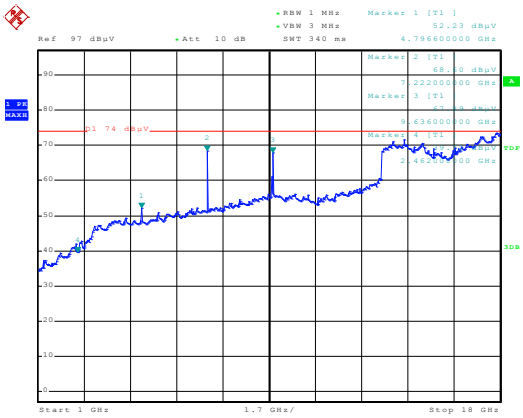
Measurement equipment used (item numbers refer to section "used test equipment")	24, 42

2.4 Field strength of unwanted emissions > 1000 MHz

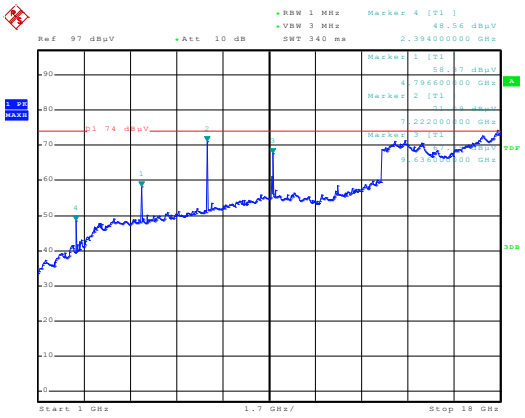
Compliance standard	:	FCC part 15, subpart C, section 15.209 (a) & 15.249 (a) & (e)
Method of test	:	ANSI C63.10-2009, section 6.6 FCC part 15, subpart A, section 15.31(m), 15.33, 15.35
Measuring distance	:	3 m
EUT condition	:	transmit mode
Atmospheric pressure	:	Between 86 kPa and 106 kPa
Temperature	:	24 °C
Relative humidity	:	46 %
est results	:	

Unwanted emissions transmitter (peak values):

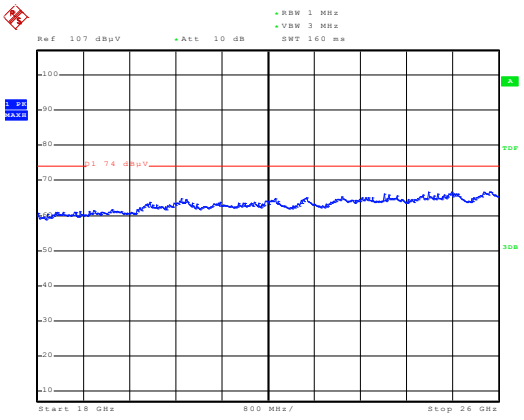
Low channel



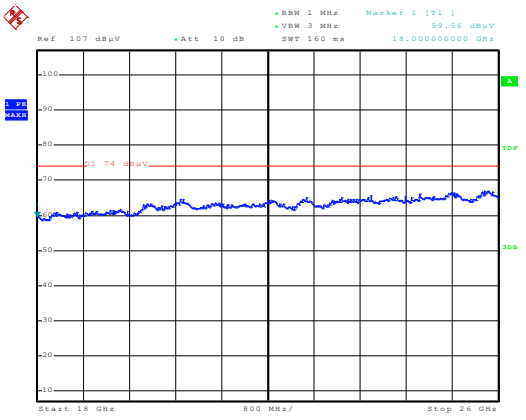
1000 - 18000 MHz
polarization horizontal, (max. hold)



1000 - 18000 MHz
polarization vertical, (max. hold)

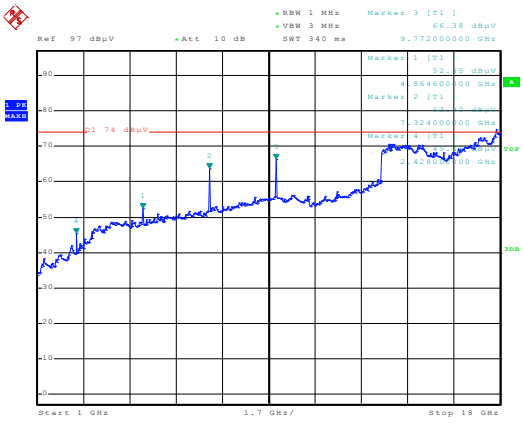


18000 - 26000 MHz
polarization horizontal, (max. hold)

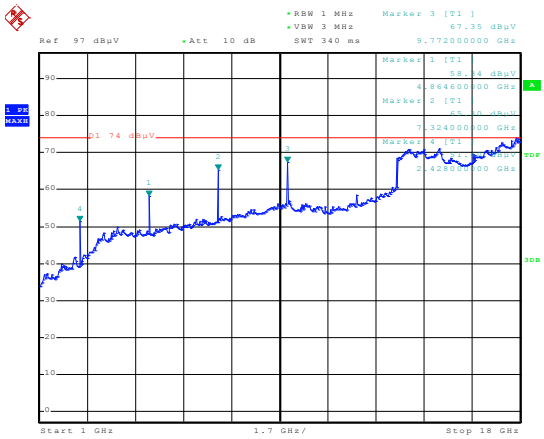


18000 - 26000 MHz
polarization vertical, (max. hold)

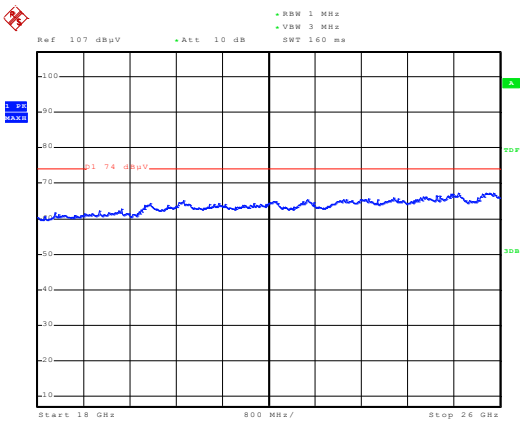
Middle channel



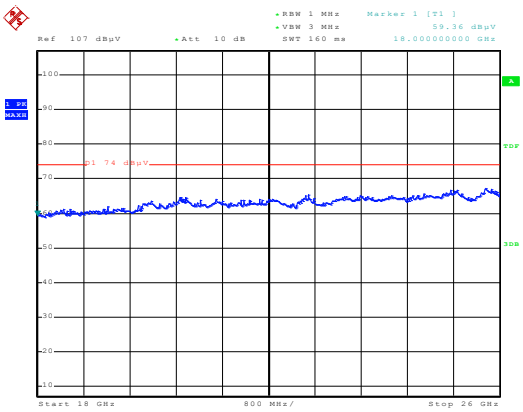
1000 - 18000 MHz
polarization horizontal, (max. hold)



1000 - 18000 MHz
polarization vertical, (max. hold)

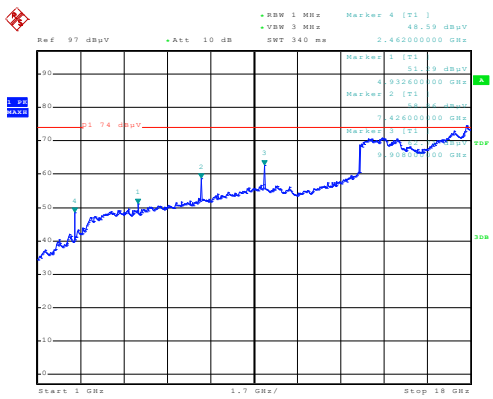


18000 - 26000 MHz
polarization horizontal, (max. hold)

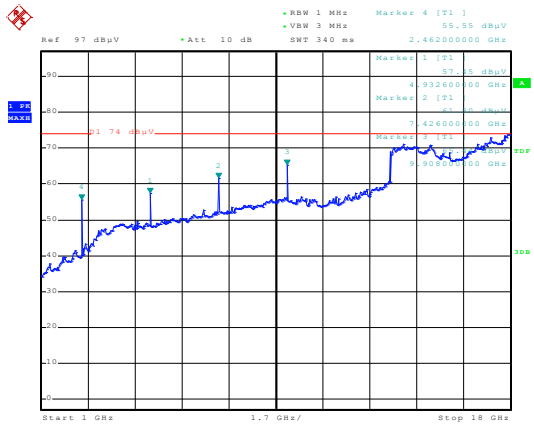


18000 - 26000 MHz
polarization vertical, (max. hold)

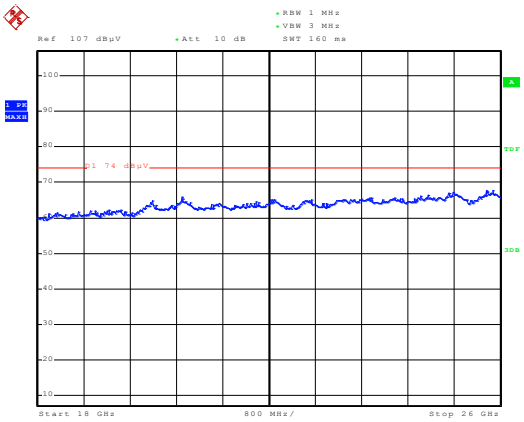
High channel



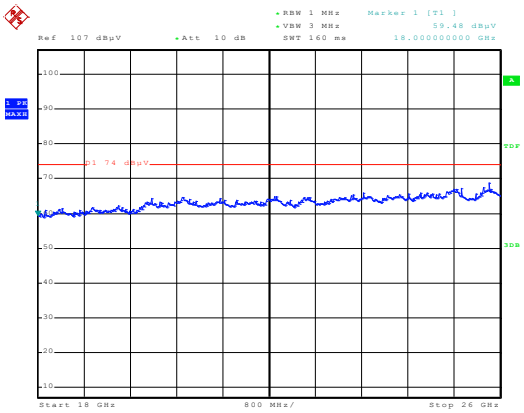
1000 - 18000 MHz
polarization horizontal, (max. hold)



1000 - 18000 MHz
polarization vertical, (max. hold)



18000 - 26000 MHz
polarization horizontal, (max. hold)



18000 - 26000 MHz
polarization vertical, (max. hold)

Measurement uncertainty	1-18 GHz: +5.7/ -5.7 dB; 18 – 26 GHz: +3.0/-3.0 dB

Measurement equipment used (item numbers refer to section “used test equipment”)	31, 34, 42, 44, 45, 51.

2.5 TX unwanted emission of harmonics, horizontal polarization

Compliance standard : FCC part 15, subpart C, section 15.249(a)
Method of test : ANSI C63.10-2009, section 6.6
FCC part 15, subpart A, section 15.31(m), 15.33, 15.35
EUT condition : transmit mode
Atmospheric pressure : Between 86 kPa and 106 kPa
Temperature : 24 °C
Relative humidity : 46 %
Polarisation : horizontal

Test results :

Frequency (MHz)	Test results peak (dBµV/m)	Average factor (dB)	Test results average (dBµV/m)	Resolution bandwidth (MHz)	Peak limit (dBµV/m)	Average Limit (dBµV/m)
4797	52.2	-36	16.2	1	74	54
4864.6	52.5	-36	16.5	1	74	54
7222	68.6	-36	32.6	1	74	54
7324	63.9	-36	27.9	1	74	54
7426	50.1	-36	14.1	1	74	54
9636	67.1	-36	31.1	1	74	54
9772	66.4	-36	30.4	1	74	54
9908	62.8	-36	26.8	1	74	54

Measurement uncertainty	1-18 GHz: +5.7/ -5.7 dB; 18 – 26 GHz: +3.0/-3.0 dB

Measurement equipment used (item numbers refer to section “used test equipment”)	24, 34, 42, 46, 51.

2.6 TX unwanted emission of harmonics, vertical polarization

Compliance standard : FCC part 15, subpart C, section 15.249(a)
Method of test : ANSI C63.10-2009, section 6.6
FCC part 15, subpart A, section 15.31(m), 15.33, 15.35
EUT condition : transmit mode
Atmospheric pressure : Between 86 kPa and 106 kPa
Temperature : 24 °C
Relative humidity : 46 %
Polarisation : vertical

Test results :

Frequency (MHz)	Test results peak (dBµV/m)	Average factor (dB)	Test results average (dBµV/m)	Resolution bandwidth (MHz)	Peak limit (dBµV/m)	Average Limit (dBµV/m)
4796.6	58.9	-36	22.9	1	74	54
4864.6	58.8	-36	22.8	1	74	54
4932.6	57.5	-36	21.5	1	74	54
7222	71.1	-36	35.1	1	74	54
7324	65.0	-36	29.0	1	74	54
7426	61.0	-36	25.0	1	74	54
9636	67.7	-36	31.7	1	74	54
9772	67.4	-36	31.4	1	74	54
9908	65.4	-36	29.4	1	74	54

Measurement uncertainty	1-18 GHz: +5.7/ -5.7 dB; 18 – 26 GHz: +3.0/-3.0 dB

Measurement equipment used (item numbers refer to section “used test equipment”)	24, 34, 42, 46, 51.

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	--	--	--	--
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	--	--	--	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	--	--	--	--
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	ATAL	EPD-TRH-INT	TE 01224
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	High pass filter	Wainwright	WHK3.0/18G-10EF	TE 01140
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