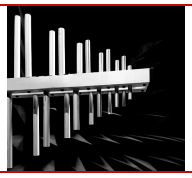
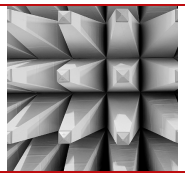




CETECOM™
CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Deutscher Akkreditierungs Rat DAR

Test report no.: 1-2071-01-14/10

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Straße 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited test laboratory:
The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025
DAR registration number: DGA-PL-176/94-D1

Area of Testing: Radio/Satellite Communications

Applicant

Oticon A/S

Kongebakken 9
2765 Smørum / Denmark
Phone: +45 39 17 71 00
Contact: Kristine Klitgaard Pedersen
e-mail: kkp@oticon.dk
Phone: +45 39 13 85 83

Manufacturer

Oticon A/S

Kongebakken 9
2765 Smørum / Denmark

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices
RSS-210, Issue 7	Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

For further applied test standards please refer to section 3 of this test report.

Test item

Kind of test item:	**Nearlink Transceiver**
Model name:	**AMIGO WRP**
FCC ID:	**U28AWRP**
IC:	**1350B-AWRP**
Frequency:	**3.7MHz**
Power supply:	**1.5V AA Alkaline /** **1.2V AA NiMH rechargeable battery**
Temperature range:	**0 °C to 50 °C**

This test report is electronically signed and valid without handwriting signature. For verification of the electronical signatures, the public keys can be requested at the testing laboratory.

Test performed:

cn=Andreas Keller, o=Cetecom ICT Services GmbH, ou=KLL-100830, email=Andreas.Keller@cetecom.com, c=DE
2010.12.08 07:11:47 +01'00'

Andreas Keller

Test report authorised:

cn=Stefan Boes, o=Cetecom ICT Services GmbH, ou=BOE-100817, email=Stefan.Boes@cetecom.com, c=DE
2010.12.07 10:24:33 +01'00'

Stefan Bös

1 Table of contents

2 General information

2.1 Notes

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM ICT Services GmbH.
This test report is electronically signed and valid without handwriting signature. For verification of the electronical signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2010-06-28
Date of receipt of test item:	2010-11-16
Start of test:	2010-11-16
End of test:	2010-11-18
Person(s) present during the test:	

3 Test standard/s

Test standard	Version	Test standard description
47 CFR Part 15	2009-10	Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices
RSS-210, Issue 7	2007-06	Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

4 Test environment

Temperature:	T_{nom}	24	°C during room temperature tests
	T_{max}	50	°C during high temperature test
	T_{min}	0	°C during low temperature test
Relative humidity content:		46 %	
Air pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	1.5V	
	V_{max}	1.6V	
	V_{min}	1.0V	

5 Test item

Kind of test item	:	**Nearlink Transceiver**
Type identification	:	**Amigo WRP**
S/N serial number	:	**Sample #046415, #046416**
HW hardware status	:	**controller-PCB: Rev. 02a RF-PCB: Rev. 00.**
SW software status	:	**App: 9.5.2 Cdc: 2.13c SnC: 11.0b**
Frequency band	:	**3.7MHz**
Type of modulation	:	**A1D**
Number of channels	:	**1**
Antenna	:	**Integrated coil antenna**
Power supply	:	**1.5V AA Alkaline / 1.2V AA NiMH rechargeable battery**
Temperature range	:	**0°C to 50 °C**

6 Test laboratories sub-contracted

None

7 Summary of measurement results

☒ **No deviations from the technical specifications were ascertained**

☐ There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 7	Passed	2010-12-06	-/-

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	Pass	Fail	NA	NP	Results
§ 15.35 (c) / RSS-GEN Issue 2 Section 4.5	Timing of the transmitter (Duty cycle correction factor)	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.223 / RSS-210 Issue 7	Bandwidth of the modulated carrier	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.223 / RSS-210 Issue 7	Fieldstrength of fundamental	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.209 (a) / RSS-210 Issue 7	Fieldstrength of harmonics and spurious	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.109 / RSS-210 Issue 7	Receiver spurious emissions	Nominal	Nominal	☒	☐	☐	☐	complies
§ 15.109 / § 15.207	Conducted limits	Nominal	Nominal	☐	☐	☒	☐	-

Note: NA = Not Applicable; NP = Not Performed

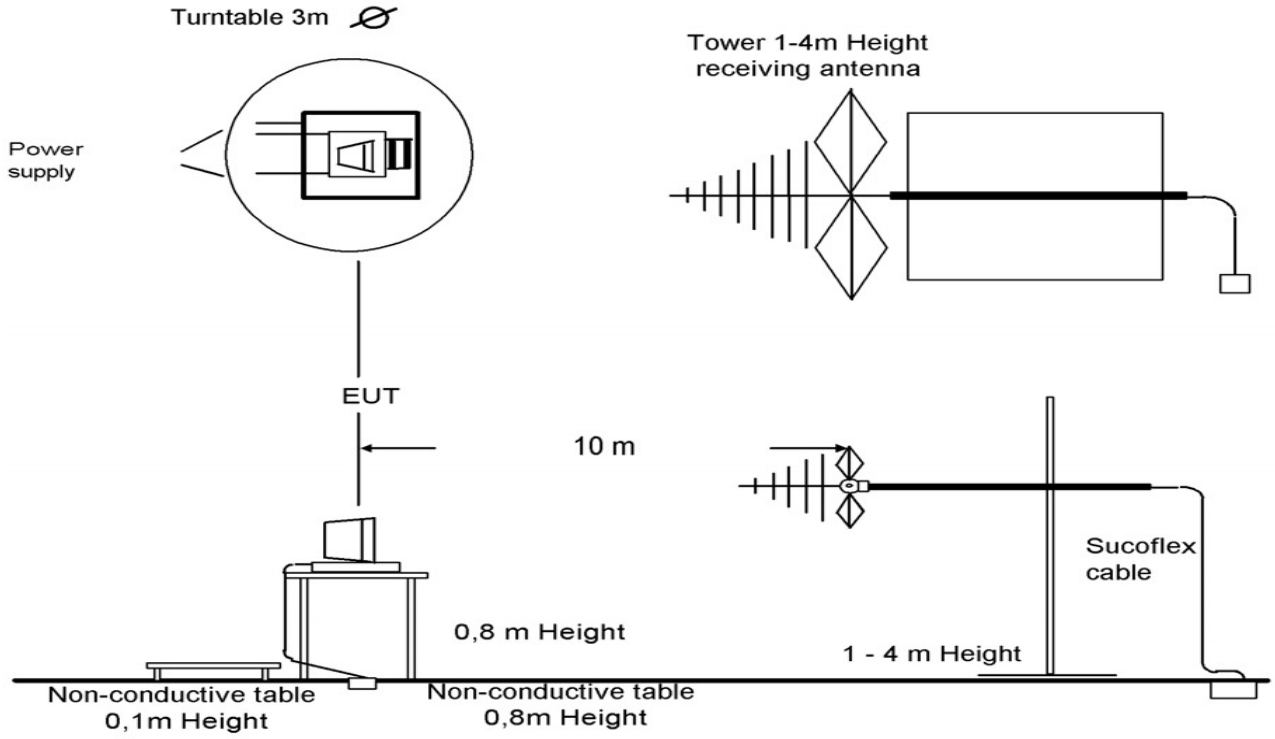
8 RF measurement testing

8.1 Description of test setup

8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63.2-1996 and ANSI C63.4-2009. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2003.
Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



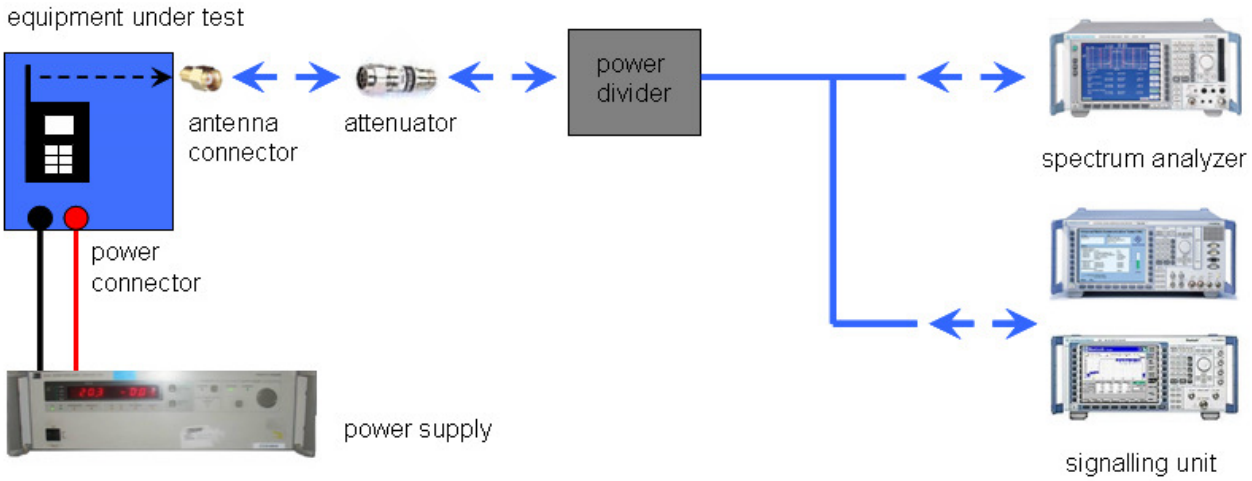
Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

The EUT is powered by an external power supply with nominal voltage. The signalling (if needed) is performed from outside the chamber with a signalling unit by air link using signalling antenna.

8.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, and the spectrum analyzer are impedance matched on 50 Ohm.



Picture 2: Diagram conducted measurements

8.2 Additional comments

Reference documents:	None
Special test descriptions:	None
Configuration descriptions:	Special test sample with permanent transmit test mode provided (#046416). The device is battery powered only. When charging unit is connected, the device is disabled, battery charging only.

8.3 RSP100 test report cover sheet / performance test data

Test Report Number	:	**1-2071-01-14/10**
Equipment Model Number	:	**AMIGO WRP**
Certification Number	:	**1350B-AWRP**
Manufacturer (complete Address)	:	**Oticon A/S Kongebakken 9 2765 Smørum / Denmark**
Tested to radio standards specification no.	:	**RSS 210, Issue 7, Annex 8**
Open Area Test Site IC No.	:	**IC 3462C-1**
Frequency Range or fixed frequency	:	**3.7MHz**
Field Strength	:	**57 dBµV/m @ 3m**
Occupied bandwidth (99%-BW) [kHz]	:	**314 kHz**
Type of modulation	:	**A1D**
Emission Designator (TRC-43)	:	**314KA1D**
Antenna Information	:	**Integrated coil antenna**
Transmitter Spurious (worst case)	:	**50 dBµV/m @ 3m (noise floor)**
Receiver Spurious (worst case)	:	**33.5 dBµV/m @ 3m (201.3MHz)**

ATTESTATION:
DECLARATION OF COMPLIANCE:

I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory Manager:

Signature Andreas Keller 2010-12-06

9 Measurement results

9.1 Timing of the transmitter

Limits:

FCC	IC
CFR Part SUBCLAUSE § 15.35 (c)	RSS-GEN Issue 2 Section 4.5
Timing of the transmitter	
(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.	

In normal use the duty cycle is approximately 5% (declared by the manufacturer).

Result: **The result is passed.**

9.2 Bandwidth of the modulated carrier

Limits:

FCC	IC
CFR Part SUBCLAUSE § 15.223	RSS-210 Issue 7
Bandwidth of the modulated carrier	

Measured with the integrated OBW-function of the spectrum analyser Rohde&Schwarz FSIQ26 (measurement criteria is the integrated power in %)

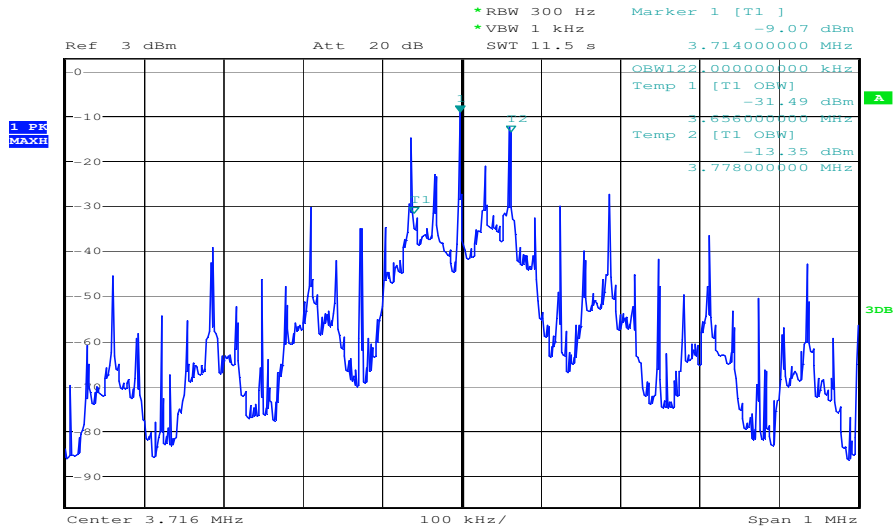
Sample #046416

Result:

	Occupied Bandwidth (kHz)
6 dB (75%)	122
20 dB (99%)	314

Plots of the measurement

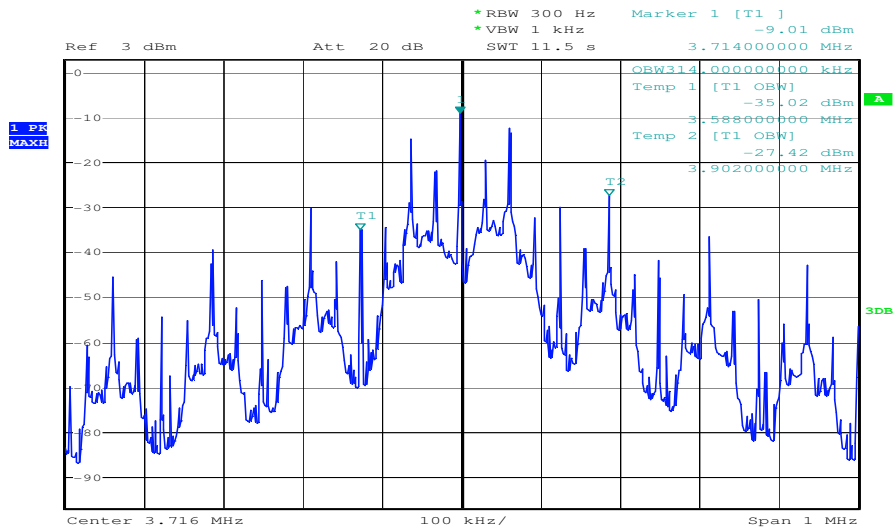
Plot 1: 6dB (75%) – bandwidth



min

Date: 16.NOV.2010 15:28:33

Plot 2: 20dB (99%) - bandwidth



min

Date: 16.NOV.2010 15:26:48

9.3 Field strength of the fundamental

Measurement:

Measurement parameter	
Detector:	Quasi Peak (CISPR)
Resolution bandwidth:	10kHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
CFR Part SUBCLAUSE § 15.223		RSS-210 Issue 7
Fundamental Frequency (MHz)	**Field strength of Fundamental (µV/m)**	**Measurement distance (m)**
1.705 – 10.0	[15] or [6dB-BW(kHz) / F(MHz) Whichever is higher	30

Sample #046416

Result:

TEST CONDITIONS		MAXIMUM POWER (dBµV/m)	
Frequency		3.7 MHz	3.7 MHz
Mode		at 3 m distance	at 30 m distance
T_{nom}	V_{nom}	57.0	17.0
Measurement uncertainty		±3dB	

Recalculation to a measurement distance of 30m with a correction of 40 dB/decade.

Result: **The result of the measurement is passed.**

9.4 Fieldstrength of the harmonics and spurious

Limits:

FCC		IC
SUBCLAUSE § 15.209 (a)		RSS-210 Issue 7
Field strength of the harmonics and spurious.		
Frequency (MHz)	**Field strength (µV/m)**	**Measurement distance (m)**
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30 (29.5 dBµV/m)	30
30 – 88	100 (40 dBµv/m)	3
88 – 216	150 (43.5 dBµV/m)	3
216 – 960	200 (46 dBµV/m)	3

Result:

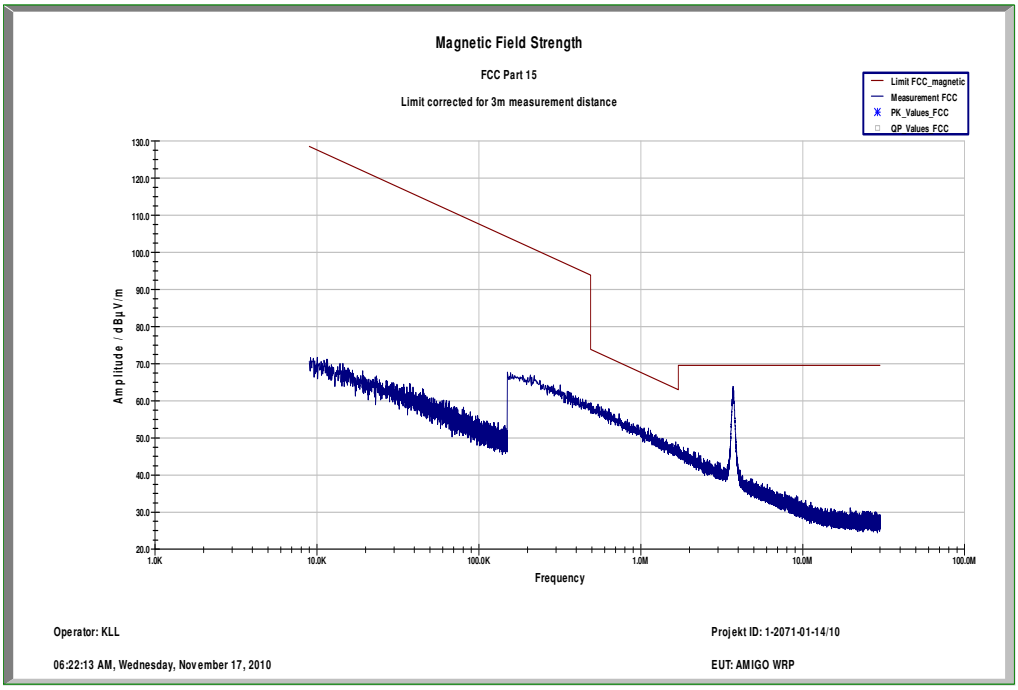
EMISSION LIMITATIONS				
f [MHz]	Detector	Limit max. allowed [dBµV/m]	Amplitude of emission [dBµV/m]	Results
No critical peaks detected				

Result: **The result of the measurement is passed.**

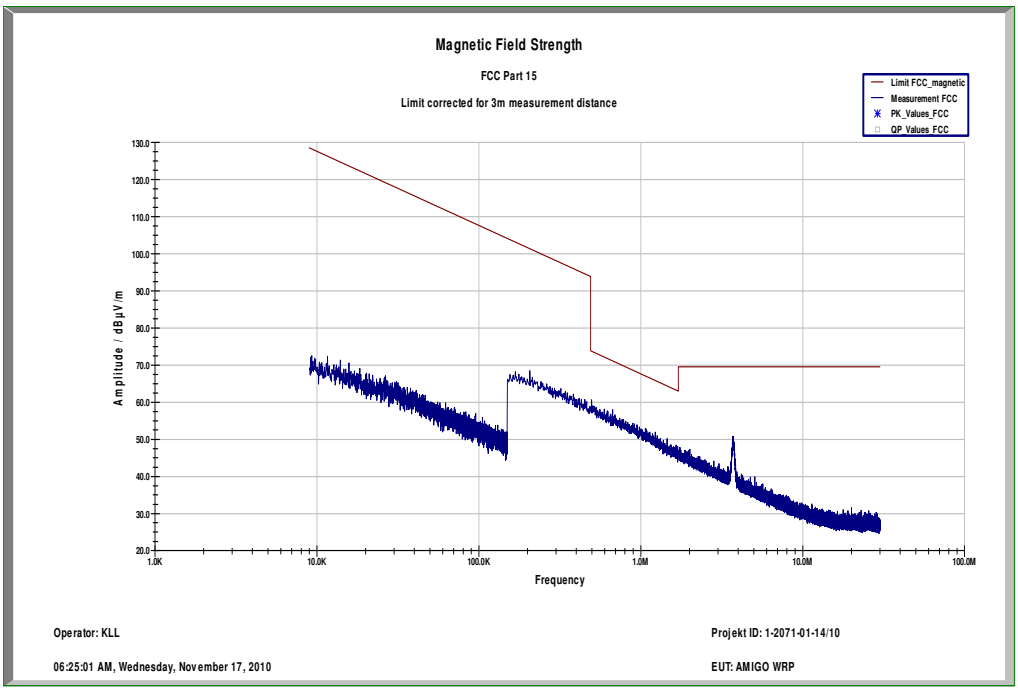
Plots of the measurements

Sample #046416

Plot 1: 9 kHz – 30 MHz, loop antenna 0°



Plot 2: 9 kHz – 30 MHz, loop antenna 90°



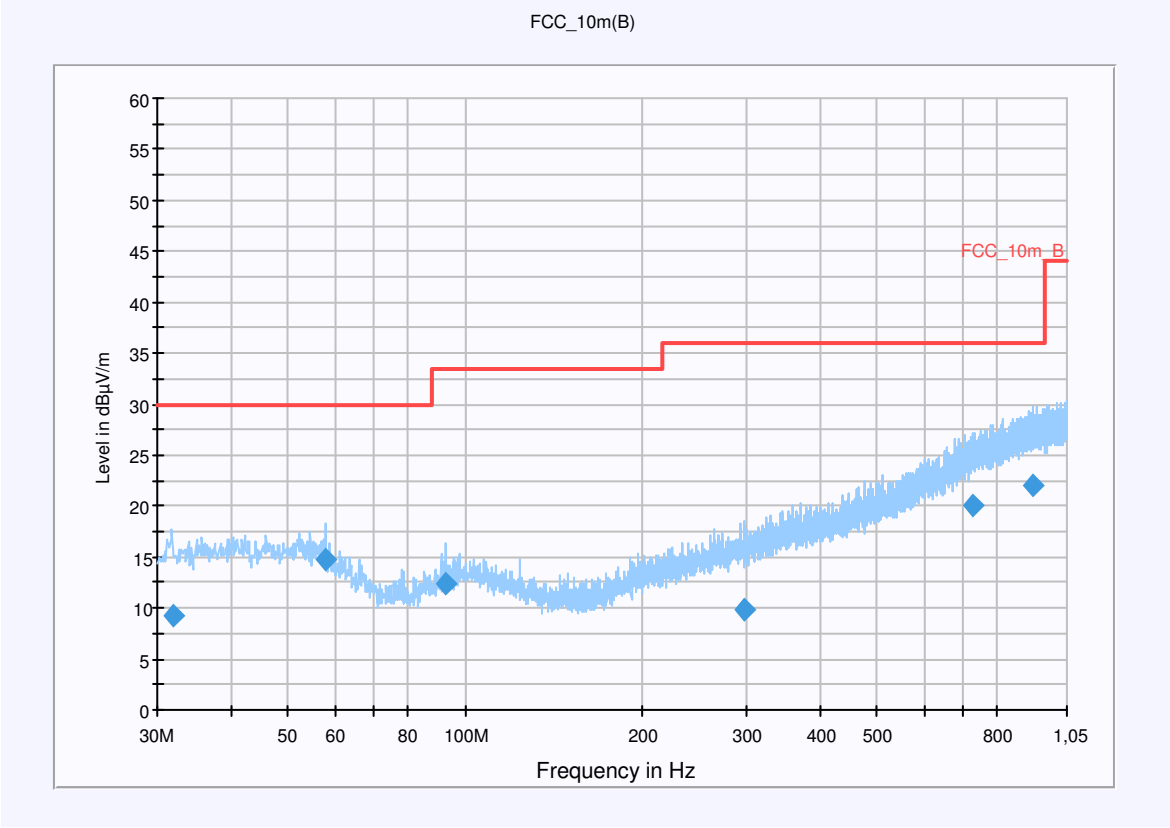
Plot 3: 30 MHz – 1000 MHz

EUT:	AMIGO WRP
Serial Number:	046116
Test Description:	FCC Part 15 B Class B
Operating Conditions:	cont TX
Operator Name:	LANGER
Comment:	batterypowered 1,5 V AA

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.979550	9.3	15000.000	120.000	198.0	H	314.0	12.7	20.7	30.0	
57.988350	14.8	15000.000	120.000	200.0	V	125.0	12.1	15.2	30.0	
92.842500	12.4	15000.000	120.000	98.0	V	-3.0	10.9	21.1	33.5	
298.131150	9.9	15000.000	120.000	200.0	H	45.0	14.5	26.1	36.0	
727.595400	20.0	15000.000	120.000	400.0	H	57.0	23.1	16.0	36.0	
916.371150	22.1	15000.000	120.000	198.0	H	261.0	25.3	13.9	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1

Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

9.5 Receiver spurious emissions

Limits:

FCC		IC
SUBCLAUSE § 15.109		**RSS-210 Issue 7**
Field strength of the harmonics and spurious.		
Frequency (MHz)	**Field strength (µV/m)**	**Measurement distance (m)**
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30 (29.5 dBµV/m)	30
30 – 88	100 (40 dBµv/m)	3
88 – 216	150 (43.5 dBµV/m)	3
216 – 960	200 (46 dBµV/m)	3

Result:

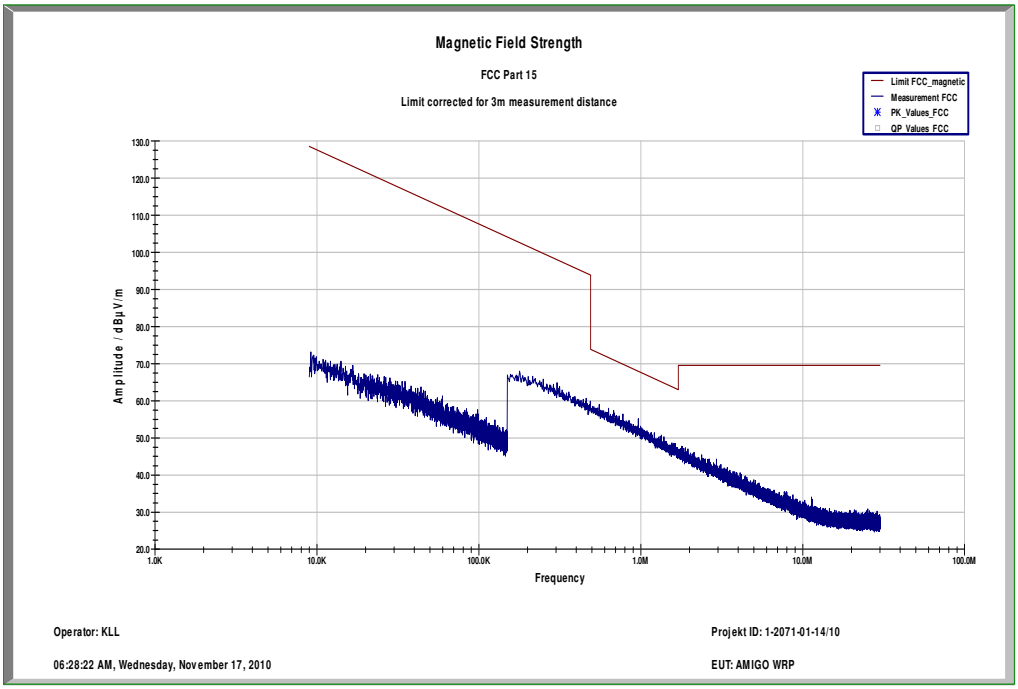
EMISSION LIMITATIONS				
f [MHz]	Detector	Limit max. allowed [dBµV/m]	Amplitude of emission [dBµV/m]	Results
201.3	QP	33.5	33.0	PASSED

Result: **The result of the measurement is passed.**

Plots of the measurements

Sample #046415

Plot 1: 9 kHz – 30 MHz



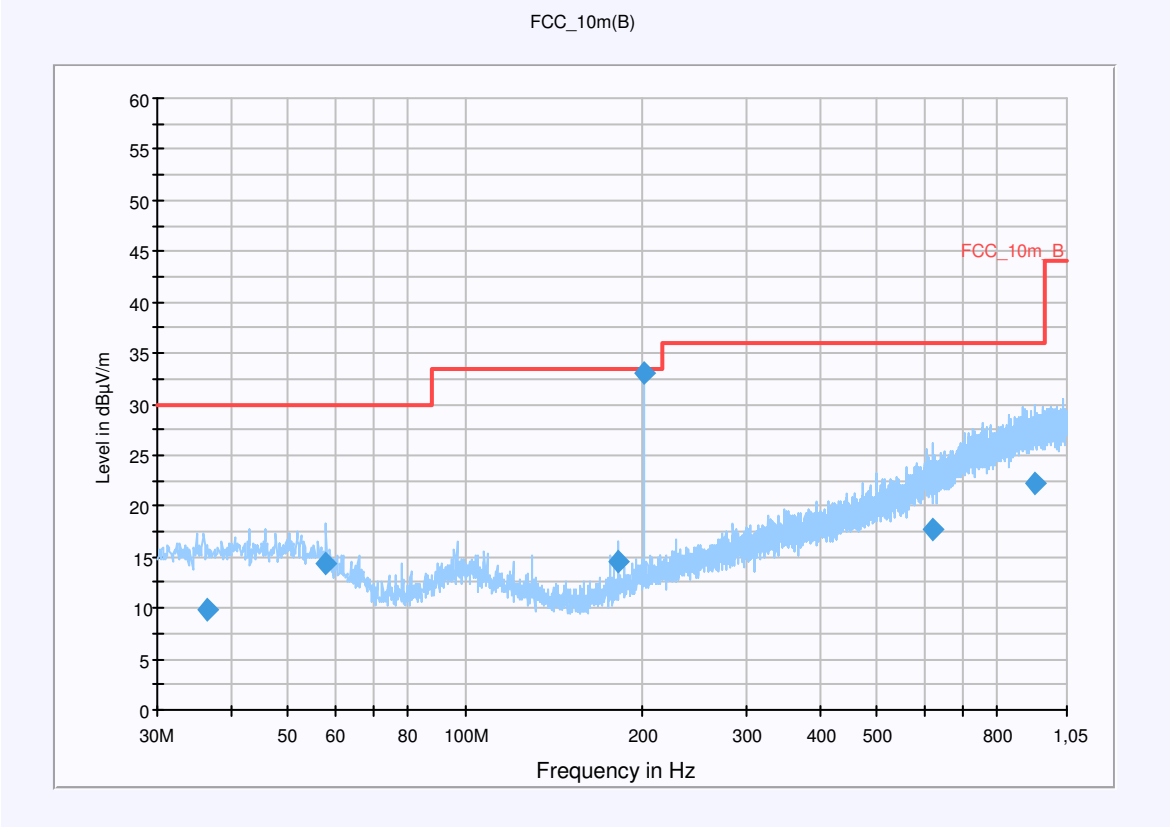
Plot 2: 30 MHz – 1000 MHz

EUT:	AMIGO WRP
Serial Number:	046115
Test Description:	FCC Part 15 B Class B
Operating Conditions:	RX
Operator Name:	LANGER
Comment:	batterypowered 1,5 V AA

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.501300	9.7	15000.000	120.000	98.0	V	303.0	13.2	20.3	30.0	
57.994350	14.4	15000.000	120.000	238.0	V	123.0	12.1	15.6	30.0	
182.014650	14.6	15000.000	120.000	98.0	V	6.0	10.6	18.9	33.5	
201.323100	33.0	15000.000	120.000	98.0	V	280.0	11.7	0.5	33.5	
621.927750	17.8	15000.000	120.000	129.0	H	240.0	20.9	18.2	36.0	
926.622750	22.2	15000.000	120.000	200.0	H	239.0	25.3	13.8	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1

Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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9.6 Conducted limits

Not applicable

Measurement:

Measurement parameter	
Detector:	
Sweep time:	
Resolution bandwidth:	
Video bandwidth:	
Span:	
Trace-Mode:	

Limits:

FCC	IC	
SUBCLAUSE § 15.107 / 15.207	**-/-**	
Conducted limits		
Frequency of Emission (MHz)	**Conducted Limit (dBµV)**	
	Quasi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 - 30	60	50

*Decreases with the logarithm of the frequency

Result: -/-.

10 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Labor / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	08.01.2009	08.01.2012
2	n. a.	PowerAttenuator	8325	Byrd	1530	300001595	ev		
3	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKl!	05.03.2009	05.03.2011
4	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
5	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	
6	Spec.A. 2_2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
7	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
8	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
9	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
10	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
11	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
12	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
13	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
14	n. a.	Band Reject filter	WRCG1855/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
15	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
16	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
17	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev		
18	n. a.	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev		
19	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
20	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	08.09.2010	08.09.2012
21	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Technologies	MY47420220	300003813	k	13.09.2010	13.09.2012
22	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vlKl!	08.09.2010	08.09.2012
23	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKl!	17.12.2008	17.12.2010
24	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	ve	01.07.2010	01.07.2012

25	n. a.	EMI Test Receiver 9 kHz - 3 GHz incl. Preselector	ESPI3	R&S	101713	300004059	k	07.09.2010	07.09.2011
26	n. a.	Loop Antenna 9 KHz - 30 MHz	HFH2-Z2	R&S	891847-35	300001169	ne	11/2009	11/2011
27	n. a.	Test Receiver	ESH2	R&S	871921/095	300002505	k	02/2010	02/2012

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2010-12-06

Annex B Further information

Glossary

DUT - Device under Test
EMC - Electromagnetic Compatibility
EUT - Equipment under Test
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - not applicable
S/N - Serial Number
SW - Software