

EMC TEST REPORT

No. 1709315STO-001, Ed. 2

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment: Microwave oven

Type/Model: BMP250710

Additional type/model*: BMP250700
BMP250730
BMP251700
BMP251710
BMP251730

Manufacturer: Panasonic Manufacturing (UK) Ltd.

Tested by request of: Intertek Testing & Cert Ltd.

*See opinions and interpretations clause 2.5

SUMMARY

Referring to the emission limits, and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards:

FCC 47 CFR Part 18 (2016): Industrial, Scientific and Medical Equipment

For details, see clause 2 – 4.

Date of issue: June 1, 2017

Tested by:



Stevan Skrobić



Andreas Dentas

Approved by:



Hans Köhlén

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Revision History

Edition	Date	Description	Changes
1	May 15, 2017	First release	
2	June 1, 2017	Second release	Added 5 additional models on front cover and clause 2.1 Added clause 2.5 Opinions and interpretations.

CONTENTS

	Page
1. Client Information	4
2. Equipment under test (EUT).....	4
2.1 Identification of the EUT	4
2.2 Purpose of the test.	5
2.3 Additional information about the EUT	5
2.4 Peripheral equipment.....	6
2.5 Opinions and interpretations	6
3. Test Specifications	7
3.1 Standards	7
3.2 Additions, deviations and exclusions from standards and accreditation	7
3.3 Test site.....	7
3.4 Mode of operation during the test	7
3.5 Compliance	8
4. Test Summary	9
5. Conducted continuous disturbances	10
5.1 Operating environment.....	10
5.2 Test set-up and test procedure	10
5.3 Measurement uncertainty.....	10
5.4 Test results, AC Power input port	11
5.5 Test equipment	12
6. Radiated rf Emission in the frequency-range 30 MHz – 26.5 GHz	13
6.1 Operating environment.....	13
6.2 Test set-up and test procedure	13
6.3 Test conditions	14
6.4 Measurement uncertainty.....	14
6.5 Test results, 30 – 1000 MHz	15
6.6 Test results, 1 – 4 GHz	16
6.7 Test results, 4 – 18 GHz	17
6.8 Test results, 18 – 26.5 GHz	18
6.9 Test results, Fundamental Frequency 2450 (±50) MHz (20 dB filter).....	19
6.10 Test result, Second and third harmonic with varied loads	20
6.11 Test equipment	21

1. CLIENT INFORMATION

The EUT has been tested by request of

Company Intertek Testing & Cert Ltd.
Davy Avenue, Knowhill
Milton Keynes MK5 8NL
United Kingdom

Name of contact Hamza Sourroukh

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment	Microwave oven
Type/Model	BMP250710
Additional type/model	BMP250700 BMP250730 BMP251700 BMP251710 BMP251730
Brand name	GAGGENAU
Serial Number	--
Manufacturer	Panasonic Manufacturing (UK) Ltd. Pentwyn Industrial Estate Cardiff Wales, CF23 7XB United Kingdom
Rating	120 V, 60 Hz, 2LNPE
Class	I
Highest clock frequency (Operating frequency)	2.4 GHz

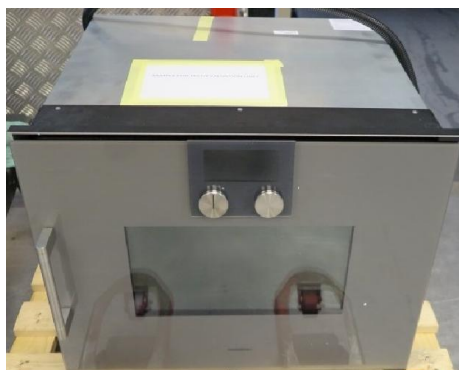


Photo of EUT


GAGGENAU		COMBI-MICROWAVE FOUR COMBI-MICRO-ONDES		OVEN MODEL NO. / MODELE BMP250710/01		FD NO. / NO. FD 9703		Z-Nr E15084		MANUFACTURED / FABRIQUE MARCH 2017		FSC NO. 2501-10P250710	
INPUT / ALIMENTATION 208V / 240V 2W + N + PE, 60Hz, 3300W OUTPUT POWER / PUISSANCE DE SORTIE: 1000W, 2450MHz		MADE IN THE U.K. FABRIQUÉ AU R.U.		FOR INDOOR HOUSEHOLD AND DOMESTIC USE ONLY CONÇU POUR UN USAGE DOMESTIQUE À L'INTÉRIEUR SEULEMENT.				DHS CODE No. PMUK TYPE: SS-45B		CONFORMS TO ANSI: UL STD 95A CERTIFIED TO CAN/CSA C22.2 NO.150			
Precautions For Safe Use To Avoid Possible Exposure to Excessive Microwave Energy. Do NOT Attempt to Operate This Oven With: a) Object Caught in Door. b) Door That Does Not Close Properly. c) Damaged Door, Hinge, Latch, or Sealing Surface.				Précautions à prendre pour une utilisation sécuritaire et pour éviter une exposition excessive aux micro-ondes. Ne PAS tenter d'utiliser ce four à micro-ondes lorsque: a) Un objet est coincé dans la porte; b) La porte ne ferme pas correctement; c) La porte, la charnière, le loquet ou la surface d'étanchéité est endommagée.				 CAUTION ATTENTION					
This product complies with DHS rules 21 CFR Subchapter J. Ce produit est conforme aux règlements DHS du CFR 21, section J. TYPE SS-45A* E000745A0AG													

Photo of rating plate

2.2 Purpose of the test.

The purpose of the tests was to verify that the EUT fulfills the requirements according to FCC 47 CFR Part 18 (2016).

2.3 Additional information about the EUT

The EUT is a microwave oven and was tested in a tabletop configuration.

The EUT was tested with the following cables

Port	Type	Length [m]
AC Mains	Four-core	1.5

The microwave power is calculated via the calorimetric method with the following values:

Measurement type	Designation	Value
Mass of the water [gram]	Mw	1512-416
Mass of the container [gram]	Mc	416
Ambient temperature [°C]	T0	22.0
Initial temperature of the water [°C]	T1	11.6
Final temperature of the water [°C]	T2	31.0
Heating time [s]	t	120

The following equipment was used:

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Thermometer	Fluke	52	2476	September, 2016	1 year
Type K Thermocouple	Pentronic	HF/D-30	380989	September, 2016	1 year
Scale	Mettler	PB8000	918	February, 2017	1 year
Temperature and humidity meter	Vaisala	HMI 41	8275	March, 2017	1 year

Power calculation:

$$P = \frac{4,187 \cdot M_w(T_2 - T_1) + 0,55 \cdot M_c(T_2 - T_0)}{t} = 759 \text{ W}$$

2.4 Peripheral equipment

Peripheral equipment is equipment needed for correct operation of the EUT, but not included as part of the testing and evaluation of the EUT.

Equipment	Type / Model	Manufacturer	Serial no.
Borosilicate glass vessel	216-0077	VWR	--

2.5 Opinions and interpretations

The following types are also included as additional types in this test report:

BMP250700

BMP250730

BMP251700

BMP251710

BMP251730

The difference as compared to the tested type is (according to the manufacturer):

Model	Door	Colour
BMP250700	Right-hand models	Anthracite
BMP250710*	Right-hand models	Silver
BMP250730	Right-hand models	Aluminium
BMP251700	Left-hand models	Anthracite
BMP251710	Left-hand models	Silver
BMP251730	Left-hand models	Aluminium

* Tested model

The difference is considered not to imply different EMC-characteristics when compared to the tested type. Therefore, this type is/these types are not tested, but considered to have the same EMC-characteristics as the tested type(s).

3. TEST SPECIFICATIONS

3.1 Standards

Requirements:

FCC 47 CFR Part 18: Industrial, Scientific and Medical Equipment.

Test methods:

MP-5: 1986: FCC Methods of Measurements of Radio Noise Emissions from Industrial, Scientific, and Medical Equipment.

3.2 Additions, deviations and exclusions from standards and accreditation

The frequency was measured up to 26.5 GHz instead of the required 25 GHz.

No other additions, deviations or exclusions have been made from standards and accreditation.

3.3 Test site

Measurements were performed at:

Intertek Semko AB.
Torshamnsgatan 43,
P.O. Box 1103
SE-164 22 Kista

Intertek Semko AB is a FCC listed test site with site registration number 90913

Intertek Semko AB is a FCC accredited conformity assessment body with designation number SE0002

Intertek Semko AB is an Industry Canada listed test facility with IC assigned code 2042G

Measurement chambers

Measurement Chamber	Type of chamber	IC Site filing #
STORA HALLEN	Semi-anechoic 10 m and 3 m	2042G-2
BJÖRKHALLEN	Semi-anechoic 3 m	2042G-1

3.4 Mode of operation during the test

The EUT was tested with 120 V, 60 Hz.

The EUT was tested with a borosilicate glass vessel containing 300, 700 or 1000 ml of water at the maximum 1000 W microwave setting.

3.5 Compliance

The EUT shall comply with the emission limits according to the standards as listed below

Conducted emission requirements:

The EUT shall meet the limits for the standards.

Reference: 47 CFR §18.307 (b) All other part 18 consumer devices.

Frequency range [MHz]	Limits [dBμV]	
	Quasi-Peak	Average
0.15 – 0.50	66 – 56	56 – 46
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Radiated Emission requirements:

The EUT shall meet the limits for the standards.

Reference: 47 CFR §18.305 Any type unless otherwise specified, any ISM frequency, 500 W or more.

47 CFR §18.309 Frequency range of measurements.

Frequency range [MHz]	Field strength at 300 m (dBμV/m)	Field strength at 3 m (dBμV/m)	Detector
30 – 24 000	29.8	69.8	Average

The limit is defined as: $25 \cdot \sqrt{\frac{P}{500}}$ μV/m. With a radiated power of $P = 759$ W (see clause 2.3) the limit is calculated to 30.80 μV/m or $20 \cdot \log_{10} 30.80 = 29.77$ dBμV/m for a measurement distance of 300 m.

The value for 3 m measuring distance is calculated by adding 40.0 dB to the 300 m limit. (I.e. an extrapolation factor of 20 dB/decade according to §18.305 (Notes))

4. TEST SUMMARY

The results in this report apply only to sample tested:

Standard	Description	Result
	Emission	
FCC Part 18	Conducted continuous emission in the frequency range 0.150 – 30 MHz, AC Power input port The EUT complies with the limits. The margin to the limit was at least 7.7 dB at 14.561 MHz See clause 5.4.	PASS
FCC Part 18	Radiated emission of electromagnetic fields in the frequency range 30 – 1000 MHz The EUT complies with the limits. The margin to the limit was at least 42.6 dB at 41.523 MHz See clause 6.5.	PASS
FCC Part 18	Radiated emission of electromagnetic fields in the frequency range 1.0 – 4.0 GHz The EUT complies with the limits. The margin to the limit was at least 17.3 dB at 2242.7 MHz See clause 6.6	PASS
FCC Part 18	Radiated emission of electromagnetic fields in the frequency range 4.0 – 18.0 GHz The EUT complies with the limits. The margin to the limit was at least 16.2 dB at 7120.2 MHz See clause 6.7	PASS
FCC Part 18	Radiated emission of electromagnetic fields in the frequency range 18.0 – 26.5 GHz The EUT complies with the limits. The margin to the limit was more than 20 dB. See clause 6.8	PASS
FCC Part 18	Fundamental Frequency 2450 (±50) MHz The EUT complies with the limit. See clause 6.9	PASS
FCC Part 18	Second and third harmonic with varied loads The EUT complies with the limit. The margin to the limit was at least 13.2 dB at the second harmonic. See clause 6.10	PASS

5. CONDUCTED CONTINUOUS DISTURBANCES in the frequency-range 0.15 – 30 MHz

5.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
2017-05-10	23 [°C]	16 [%]

5.2 Test set-up and test procedure

The test method is in accordance with MP-5: 1986

The EUT was connected to the power via Artificial Mains Networks AMN.

The EUT was placed on an insulating support 0.8 m above the floor, 0.4 m from the vertical reference ground plane (RGP) and 0.8 m from the AMN/ISN.

Overview sweeps were performed for each lead.

During the tests the EUT was operated according to the mode of operation mentioned in clause 3.4.

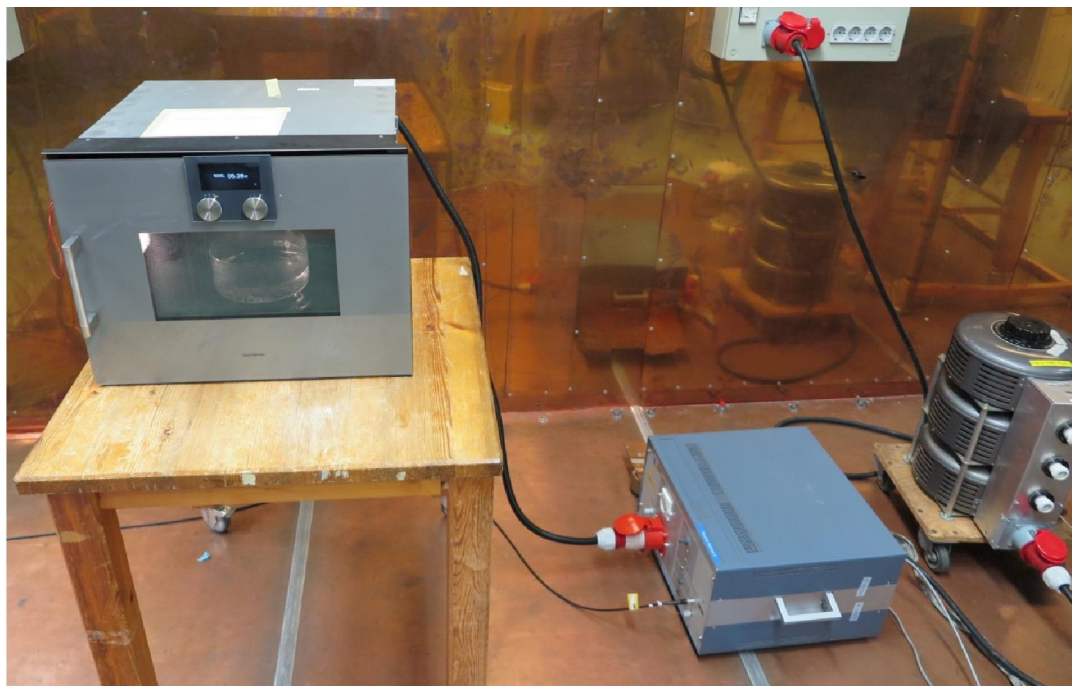


Photo of the test set-up for conducted emission

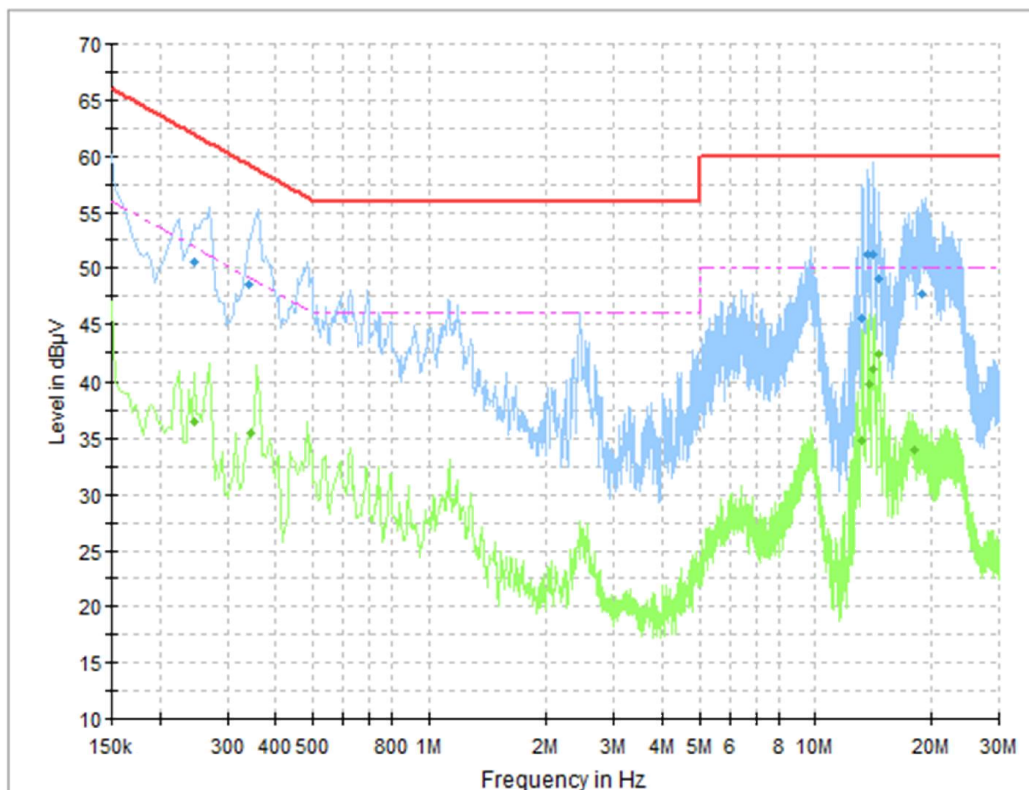
5.3 Measurement uncertainty

Continuous conducted disturbances with AMN
in the frequency range 150 kHz to 30 MHz

± 3.3 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2: 2011.
The measurement uncertainty is given with a confidence of 95 %.

5.4 Test results, AC Power input port



Diagram, Peak and Average overview sweep

Measurement results, Quasi-peak

Frequency [MHz]	Level [dBμV]	Limit [dBμV]	Line L/N	Margin [dB]
0.245	50.6	61.9	N	11.3
0.341	48.5	59.2	N	10.7
13.623	51.3	60.0	L1	8.7
14.128	51.2	60.0	N	8.8
14.610	49.1	60.0	L1	10.9
18.920	47.6	60.0	L1	12.4

Measurement results, Average

Frequency [MHz]	Level [dBμV]	Limit [dBμV]	Line L/N	Margin [dB]
0.247	36.5	51.9	N	15.4
0.346	35.4	49.1	N	13.7
13.249	34.8	50.0	N	15.2
13.740	39.8	50.0	L1	10.2
14.197	41.0	50.0	N	9.0
14.561	42.3	50.0	N	7.7

Result [dBμV] = Analyser reading [dBμV] + cable loss [dB] + LISN insertion loss [dB]

5.5 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - 9	--	--	--
Measurement receiver	Rohde & Schwarz	ESCI	31686	July, 2016	1 year
Transient protection	Rohde & Schwarz	ESH3-Z2	32523	July, 2016	1 year
Artificial main network	Rohde & Schwarz	ESH2-Z5	3017	July, 2014	3 years
Coaxial cable	Suhner	RG 223/U	9883	July, 2014	3 years

6. RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHZ – 26.5 GHZ

6.1 Operating environment

Date of test:	Temperature:	Relative Humidity:
2017-04-28	20 [°C]	29 [%]
2017-05-05	24 [°C]	21 [%]
2017-05-08	20 [°C]	24 [%]
2017-05-10	21 [°C]	14 [%]

6.2 Test set-up and test procedure

The test method is in accordance with MP-5: 1986

The EUT was placed on an insulating support 0.8 m above the turntable which is part of the reference ground plane.

Overview sweeps were performed with the measurement receiver in max-hold mode and the average detector was activated.

During the tests the EUT was operated according to the mode of operation mentioned in clause 3.4.



30-1000 MHz

1-18 GHz

18-26.5 GHz

Photos of the test set-up for radiated emission

6.3 Test conditions

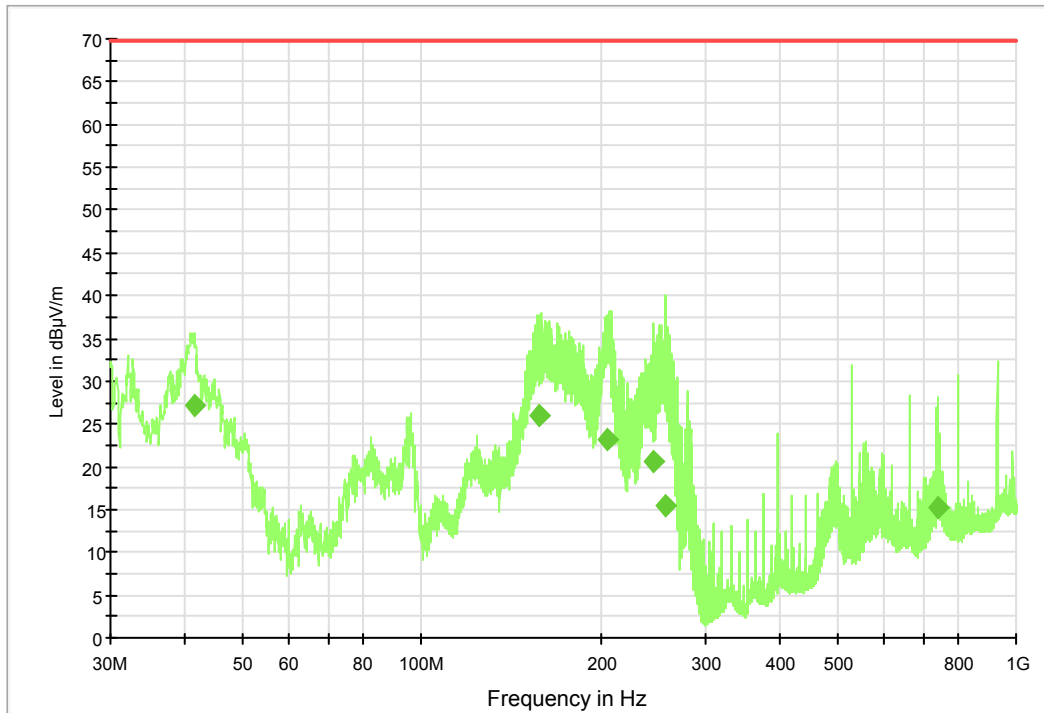
Test set-up:	30 – 1000 MHz		
Test receiver set-up:			
Preview test:	Peak,	RBW 120 kHz	VBW 1 MHz
Final test:	Average,	RBW 120 kHz	
Measuring distance:	3 m		
Measuring angle:	0 – 359°		
Antenna			
Height above ground plane:	1 – 4 m		
Polarisation:	Vertical and Horizontal		
Type:	Bilog		
Test set-up:	1 – 18 GHz and 18-26.5 GHz		
Test receiver set-up:			
Preview test:	Peak,	RBW 1 MHz	VBW 3 MHz
Final test:	Average,	RBW 1 MHz	
Measuring distance:	3 m		
Measuring angle:	0 – 359°		
Antenna			
Height above ground plane:	1 – 4 m		
Polarisation:	Vertical and Horizontal		
Type:	Horn		
Antenna tilt:	Activated		

6.4 Measurement uncertainty

Measurement uncertainty for radiated disturbance		
Uncertainty for the frequency range 30 to 1000 MHz at 3 m		± 5.1 dB
Uncertainty for the frequency range 1.0 to 18 GHz at 3 m		± 4.5 dB
Uncertainty for the frequency range 18 to 26 GHz at 3 m		± 4.8 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2: 2011.
The measurement uncertainty is given with a confidence of 95 %.

6.5 Test results, 30 – 1000 MHz



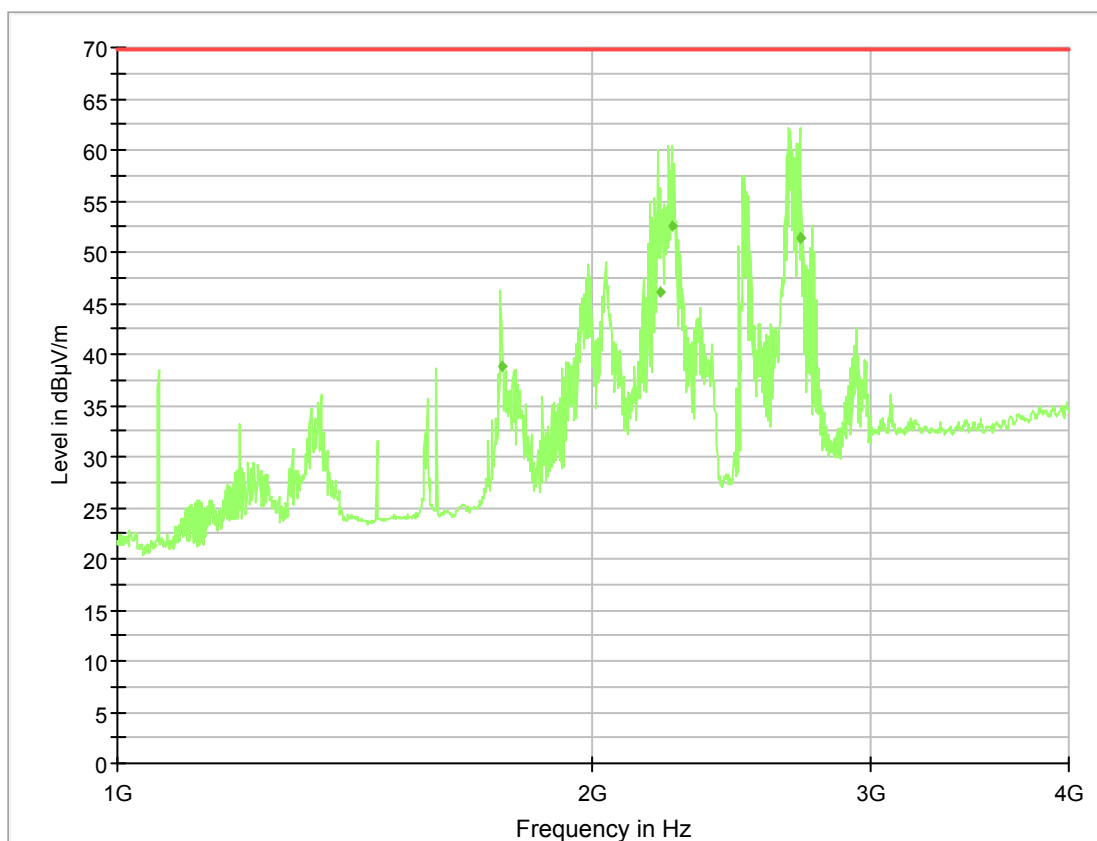
Diagram, Average overview sweep, 30 – 1000 MHz at 3 m distance.

Measurement results, Average

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
41.523	27.2	69.8	V	42.6
157.314	26.1	69.8	V	43.7
206.078	23.2	69.8	H	46.6
245.463	20.5	69.8	H	49.3
257.438	15.5	69.8	H	54.3
738.547	15.2	69.8	V	54.6

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

6.6 Test results, 1 – 4 GHz



Diagram, Average overview sweep, 1 – 4 GHz at 3 m distance.

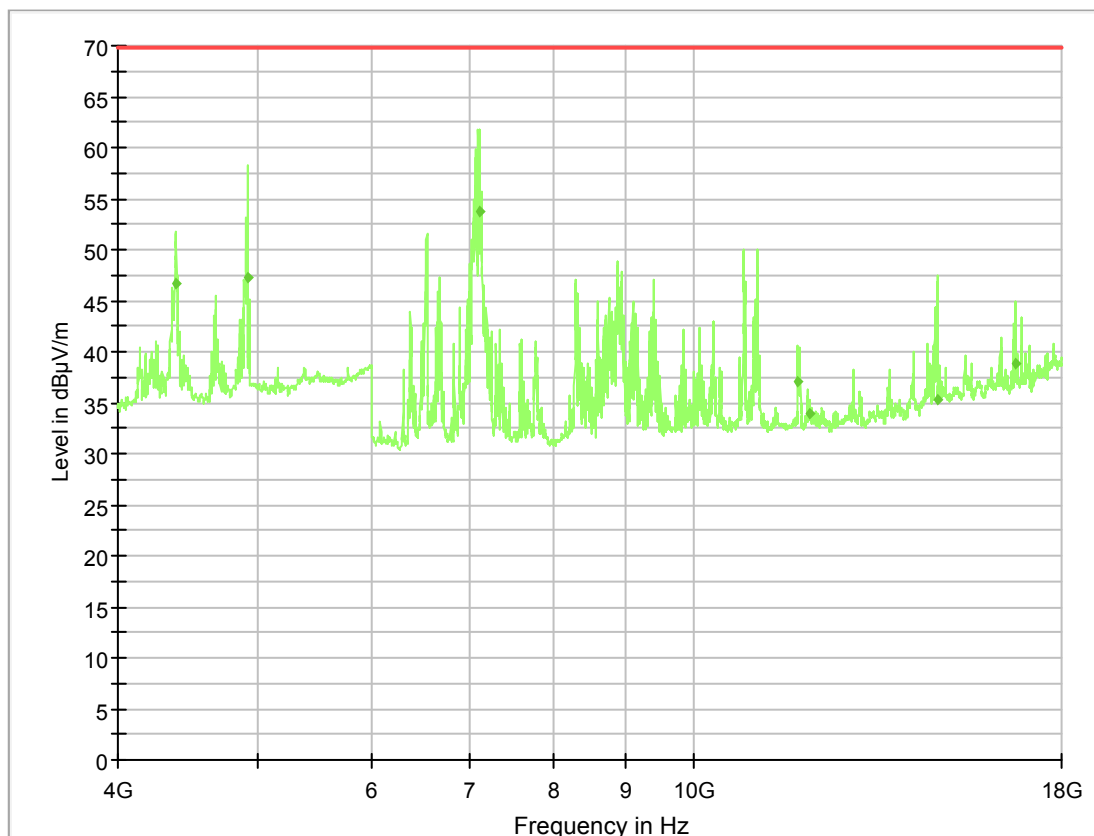
Measurement results, Average

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]
1752.5	38.8	69.8	V	31.0
2204.4	46.2	69.8	V	23.6
2242.7	52.5	69.8	V	17.3
2705.2	51.4	69.8	V	18.4
2705.2	51.4	69.8	V	18.4

All other measured disturbances have a margin of more than 20 dB to the limits.

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

6.7 Test results, 4 – 18 GHz

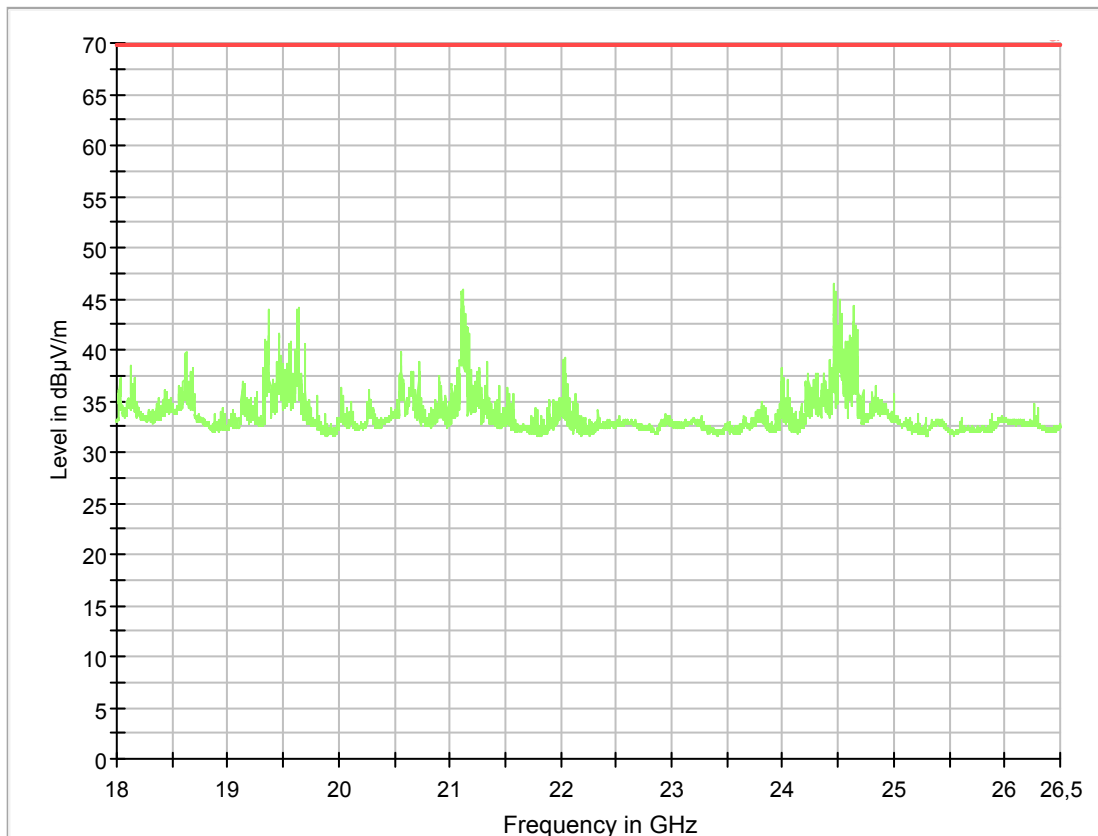


Diagram, Average overview sweep, 4 – 18 GHz at 3 m distance.

Measurement results, Average

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Polarization H/V	Margin [dB]
4384.0	46.7	69.8	V	23.1
4917.2	47.2	69.8	V	22.6
7120.2	53.6	69.8	H	16.2
11834.9	37.1	69.8	V	32.7
14768.0	35.2	69.8	V	34.6
16705.9	38.8	69.8	V	31.0

Result [dBμV/m] = Analyser reading [dBμV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

6.8 Test results, 18 – 26.5 GHz

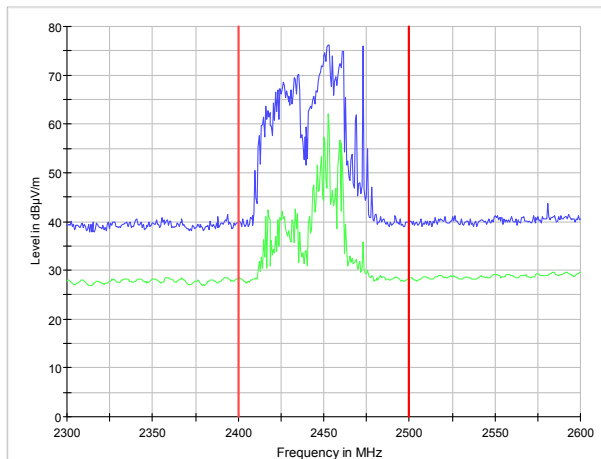
Diagram, Average overview sweep, 18 – 26.5 GHz at 3 m distance.

Measurement results, Average

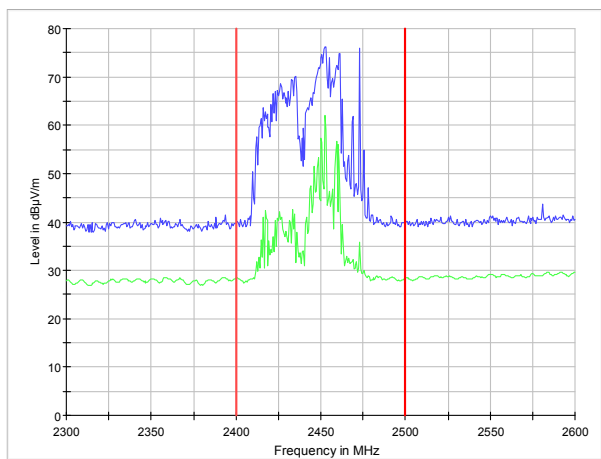
All measured disturbances have a margin of more than 20 dB to the limits.

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

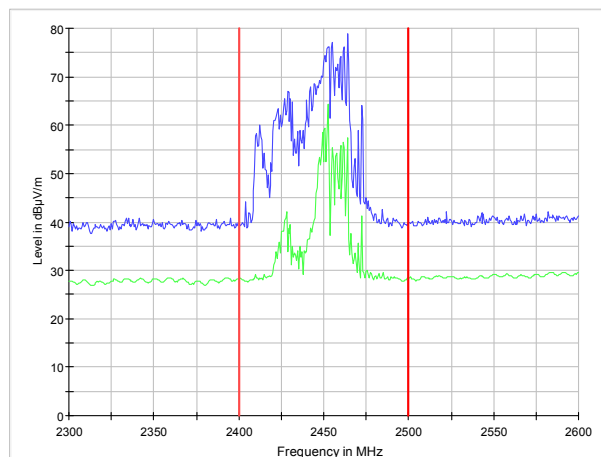
6.9 Test results, Fundamental Frequency 2450 (± 50) MHz (20 dB filter)



Diagram, Peak and average overview sweep, 2.3 – 2.6 GHz at 120 V mains voltage.



Diagram, Peak and average overview sweep, 2.3 – 2.6 GHz at 96 V mains voltage.



Diagram, Peak and average overview sweep, 2.3 – 2.6 GHz at 150 V mains voltage.

6.10 Test result, Second and third harmonic with varied loads

Measurement results, Average

Harmonic	Polarization	Water Level [ml]	Vessel position	Emission [dB μ V/m]	Limit	Margin
2	V	700	Center	52.2	69.8	17.6
			Front right	54.3	69.8	15.5
		300	Center	56.4	69.8	13.4
			Front right	56.6	69.8	13.2
3	H	700	Center	47.0	69.8	22.8
			Front right	44.7	69.8	25.1
		300	Center	43.7	69.8	26.1
			Front right	43.7	69.8	26.1

6.11 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 – 9	--	--	--
Control unit	Maturo Gmbh	NCD	32391	--	--
Measurement receiver	Rohde & Schwarz	ESIB26	32291	July, 2016	1 year
Open switch and control platform	Rohde & Schwarz	OSP130	32300	July, 2016	1 year
Coaxial cable	Radiall	SHF8M	9975	July, 2016	1 year
Three meter SAC chamber	Siepel	HERMES 3	30900	July, 2015	3 years
Camera Control unit	Pontis	GPIOB - 110	30705	--	--
Monitoring camera	Pontis	Cam 90P101	30712	--	--
Antenna mast	Maturo Gmbh	TAM 4.0-E	32376	--	--
Preamplifier	Rohde & Schwarz	TS-PRE1	32306	July, 2016	1 year
Horn antenna	Rohde & Schwarz	HF907	32307	July, 2015	3 years
Coaxial cable	Rosenberger	UFB311A	39054	April, 2017	1 year
Coaxial cable	Rosenberger	UFB311A	39057	April, 2017	1 year
		6N45-	12389	March, 2017	1 year
FILTER	K&L Microwave	2450/T100-0/0			
Coaxial cable	HUBER+SUHNER	Sucoflex 104 PE	39094	March, 2017	1 year
		4410-	5133	March, 2017	1 year
FILTER HIGHPASS	K&L Microwave	X4500/18000-0/0			
EMI Test Receiver	Rohde & Schwarz	ESU 40	13178	July, 2016	1 year
Coaxial cable	MEGAPHASE	GC12-K1K1-315	39127	July, 2016	1 year
Measurement software	Rohde & Schwarz	EMC32 – 8	--	--	--
Measurement receiver	Rohde & Schwarz	ESU 8	12866	July, 2016	1 year
Open switch and control platform	ETS-Lindgren	2090	32522	--	--
Open switch and control platform	ETS-Lindgren	2090	8237	--	--
Camera Control unit	Pontis	--	32800	--	--
Coaxial cable	Rosenberger	LU7-S020-4000	39146	October, 2016	1 year
Coaxial cable	Suhner	SUCOFLEX 104	39033	April, 2017	1 year
Power supply preamplifier	Semko	--	7993	June, 2016	1 year
Coaxial cable	HUBER+SUHNER	SUCOFLEX 104PEA	39051	April, 2017	1 year
Preamplifier	SEMKO	AM1331	s7992	June, 2016	1 year
Coaxial cable	Huber+Suhner	SUCOFLEX 104	32710	June, 2016	1 year
Bilog antenna	Chase	CBL 6111A	971	July, 2015	3 years
Coaxial cable	Huber+Suhner	RG 214	9506	June, 2016	1 year