Recognized by the
Federal Communications Commission and Industry Canada
Anechoic chamber registration No.: 90462 (FCC)
Anechoic chamber registration No.: IC 3463A-1
TCB ID: DE0001

Accredited by the
German Accreditation Council
DAR–Registration Number
DAT-P-176/94-D1

Test report No.: 1-0758-01-02/08
Applicant: MOR Manufacturing
Type: IPS-146_F
FCC ID : WOZ-IPS146F
Test standard: FCC Part 15.245 / RSS 210

Table of contents

1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations 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 the CETECOM ICT Services GmbH.

Tester :

Date	Name	Signature
2008-10-07	Nicolas Stamber	

Technical responsibility for area of testing:

Date	Name	Signature
2008-10-07	Karsten Geraldy	

1.2 Testing laboratory

CETECOM ICT Services GmbH
Untertürkheimerstraße 6–10
D-66117 Saarbrücken
Germany

CETECOM ICT Services GmbH
P.O. Box 10 04 45
D-66004 Saarbrücken
Germany

Telephone : + 49 (0) 681 598–0
Fax : + 49 (0) 681 598–9075
e-mail : info@ict.cetecom.de
Internet : http://www.cetecom.de

Accredited testing laboratory
Accredited by : Regulierungsbehörde für Telekommunikation und Post (RegTP)
Listed by : Federal Communications Commission (FCC)
Industry Canada (IC)

Authority	Identification/Registration No.
RegTP	DAT-P-176/94-D1
FCC	90462
IC	IC 3463A-1

Testing location, if different from CETECOM ICT Services GmbH: (Not applicable)

1.3 Details of applicant

Name : MOR Manufacturing
Street : 5676 E Seltice Way
Town : Post Falls, Idaho 83854
Country : United States of America
Phone : +1 208 667 8799
Fax : +1 208 667 8157

Contact person
Name : Mr. Kenneth Cummings
Phone : +1 208 292-1036
E–Mail : kcummings@mormfg.com

1.4 Application details

Date of receipt of application : 2008-08-21
Date of receipt of test item : 2008-09-16
Date of test : 2008-10-06 to 2008-10-07
Person(s) who have been present during the test : -/-

1.5 Test item (EUT)

Description	:	Field disturbance Sensor
Type designation	:	IPS-146_F
Manufacturer	:	InnoSenT GmbH
Street	:	Am Rödertor 30
Town	:	97499 Donnersdorf
Country	:	Germany

1.6 Technical data

Frequency range	:	24.075 GHz ... 24.175 GHz
Operational frequency	:	24.122 GHz
Field strength PEP	:	111.0 dBµV/m @ 3m distance
Type of modulation	:	no modulation
Pulse duration	:	continuous signal
Pulse period	:	continuous signal
Microwave modules	:	TX / RX – Module with integrated patch antenna
Normal power supply (U nom)	:	5 V DC
Extreme DC power supply	:	-/-

1.6.1 Operation conditions

Operation:	:	As soon as the equipment is powered up, TX and RX start operating
Purpose of operation	:	Motion Sensor

1.6.2 Equipment under test

IPS-146_F

1.7 Test standards

	Code of Federal Regulations (CFR 47) Federal Communications Commission (FCC)
FCC Part 15	Radio Frequency Devices SECTION 15.245 Operation within the band 24.075 GHz to 24.175 GHz SECTION 15.205 Restricted bands of operation. SECTION 15.209 Radiation emission limits, general requirements
RSS 210	Issue 7, Annex 7 - Field Disturbance Sensors Operating in the Bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10.5-10.55 GHz and 24.075-24.175 GHz
RSS-GEN	Issue 2 June 2007 SECTION 4.6.1 Occupied Bandwidth

1.8 Test Report Cover Sheet

Type of equipment	:	Field disturbance sensor
Model name	:	IPS-146_F
Manufacturer	:	InnoSenT GmbH
Address	:	Am Rödertor 30
City	:	97499 Donnersdorf
Country	:	Germany
Tested to Radio Standards Specification(RSS) No.	:	210 Issue 7
Open Area Test Site Industry Canada Number	:	IC 3463A-1
Frequency Range (or fixed frequency)	:	24.122 GHz
R F: Power in Watts	:	-/-
Field Strength (at what distance)	:	111.0 dBµV/m @ 3m distance
Occupied Bandwidth (99% BW)	:	336.7 kHz
Type of Modulation	:	N0N
Emission Designator	:	337KN0N
Antenna Information	:	Integrated antenna
Transmitter Spurious (worst case)	:	74.3 dBµV/m in 3m (2nd harmonic)
Receiver Spurious (worst case)	:	74.3 dBµV/m in 3m (TX and RX operate simultaneously)
FCC ID	:	WOZ-IPS146F

ATTESTATION:
DECLARATION OF COMPLIANCE:

I declare 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 :

2008-10-07	RSC	Nicolas Stamber	N. Stamber
Date	Section	Name	Signature

2 Technical test

2.1 Summary of test results

[X] No deviations from the technical specification (s) were ascertained in the course of the performed tests.

[ ] The deviations as specified in 2.5 were ascertained in the course of the performed tests.

This test report :

[X] describes the first test

[ ] describes an additional test

[ ] is a verification of documents

[ ] is only valid with the test report no.

2.2 Test environment

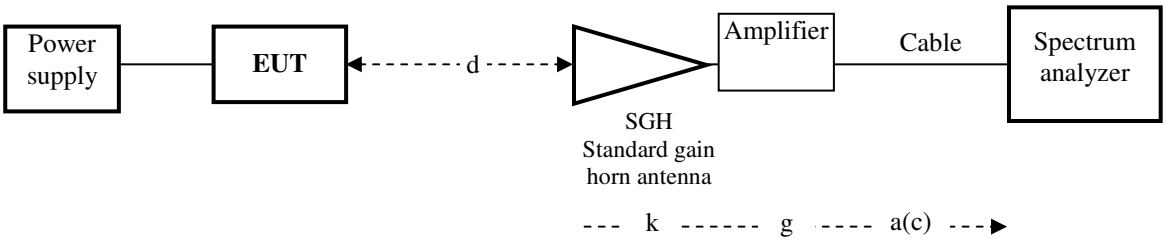
The environmental conditions are documented especially for each test.

2.3 Measurement and test set-up

The measurement and test set-up is defined in the technical specification.

2.4 Test equipment utilized and test set-up

2.4.1 Field strength measurement of fundamental and spurious radiation in the frequency range 12 GHz to 50 GHz



Frequency f [GHz]	Distance d [m]	Distance Correction dc (3 m/Xm) [dB]	Antenna factor k [dB(1/m)]	Amp.gain g [dB]	Cable loss a(c) [dB]
12.0 to 18.0	0.25	-21.6	33.97	33.4 … 35.9	2.7 … 2.8
18.0 to 27.0	0.25	-21.6	40.22	30.8 … 33.4	2.8 … 4.3
27.0 to 40.0	0.125	-27.6	44.00	17.4 … 23.1	4.3 … 4.8
40.0 to 50.0	0.125	-27.6	42.32	3.4 … 17.4	4.8 … 6.7

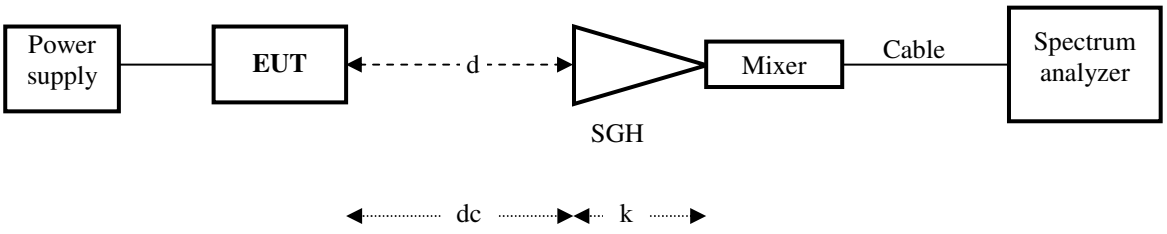
Calculation : Field strength = analyser reading + cable loss - amplifier gain + antenna factor
e [dB(µV/m)] = u [dB(µV)] + a [dB] - g [dB] + k [dB(1/m)]

Test equipment	Manufacturer	Type	CETECOM reference
Spectrum Analyser	HP	HP 8565E	300000916
SGH 12.0 to 18.0 GHz	narda	639	300000787
SGH 18.0 to 27.0 GHz	narda	638	300002442
SGH 27.0 to 40.0 GHz	narda	V637	300001751
SGH 40.0 to 50.0 GHz	Flann	2324-20	-/-
Amplifier 0.1 to 27.0 GHz	HP	HP 83017A	300002267
Amplifier 27.0 to 50.0 GHz	Farran Technology	-/-	-/-
DC Power supply	HP	HP 6038A	300001174
RF-cable	Huber & Suhner	div.	-/-

Measurement uncertainties

Test parameter	Measurement uncertainty
DC Power supply	±0.5 V
Temperature	±0.2 °C
Frequency	±0.01 ppm
eirp	±1.5 dB

2.4.3 Field strength and spurious radiation in the frequency range 50 GHz to 110 GHz



Frequency range [GHz]	Distance d [m]	Distance correction dc (3 m/Xm) [dB]	Antenna factor k [dB 1/m]
50.0 … 60.0	0.125	-27.60	44.0
60.0 … 90.0	0.125	-27.60	41.8
90.0 … 110.0	0.125	-27.60	45.7

Calculation : Field strength = analyser reading + antenna factor - distance correction
e [dB(µV/m)] = u [dB(µV)] + k [dB(1/m)] - d [dB]

Remark: Cable loss is automatically taken into account if the S.A. is operating with external mixers

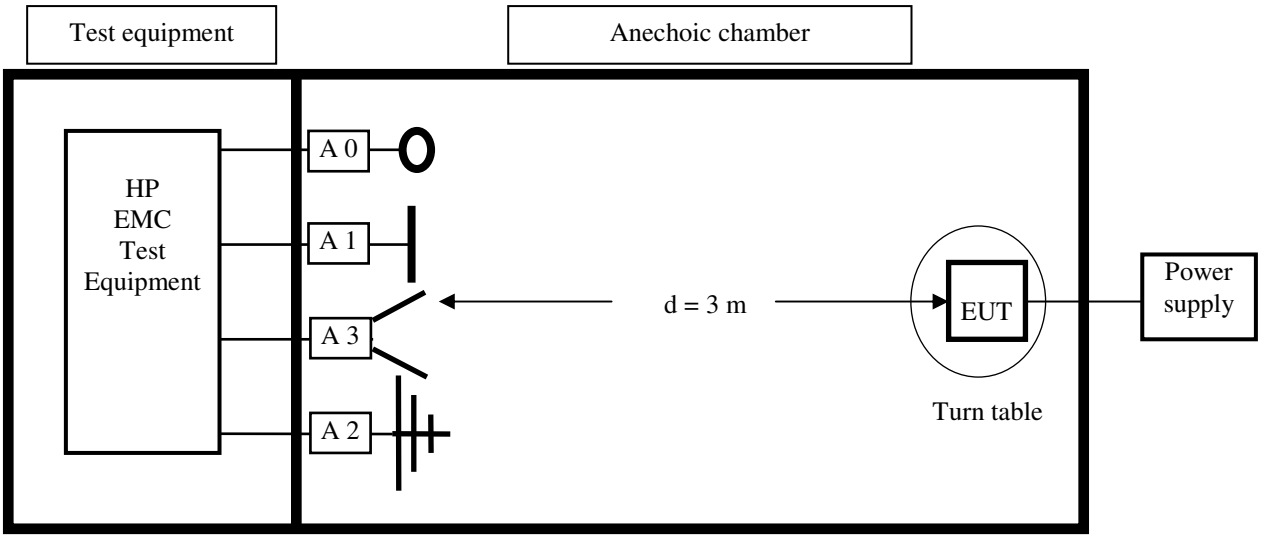
Test equipment	Manufacturer	Type	CETECOM reference
Spectrum Analyser	Rohde & Schwarz	FSU 50	300003443
Power supply	HP	HP 6038A	300001174
SGH 50 ... 60 GHz	Flann	2424-20	300001200g
Mixer 50 ... 60 GHz	Tektronix	WM 490 U	300000298b
SGH 60 ... 90 GHz	Thomson	COR 60_90	300000814
Mixer 60 ... 90 GHz	Tektronix	WM 780 E	300001685
SGH 90 ... 110 GHz	Thomson	COR 90_140	300000799
Mixer 90 ... 110 GHz	Tektronix	WM 780 F	300001685

Measurement uncertainty

Test parameter	Measurement uncertainty
Power supply	±0.1 VDC
Temperature	±0.2 °C
Frequency	±0.01 ppm
Field strength <50 GHz	±1.0 dB
Field strength >50 GHz	±3.0 dB

2.4.2 Field strength and spurious radiation in the frequency range 9 kHz to 12 GHz

Set-up for radiated measurements



Test equipment	Manufacturer	Type	Serial No.
Spectrum analyser	HP	HP 85660B	2478A05306
Analyser display	HP	HP 85662A	2816A16541
Quasi peak adapter	HP	HP 85650A	2811A01131
RF-preselector	HP	HP 85685A	2833A00768
Loop Antenna A 0	R&S	HFH 2–Z2	881 058/42
Biconical antenna A 1	Emco	3104	3758
Log.-per.-antenna A 2	Emco	3146	2304
Double ridge horn ant. A 3	Emco	3115	3007
Relay switch	R&S	RSU	375 339/002
High pass filter	FSY Microwave	HM 985955	001
Amplifier	Tron-Tech	P42-GA29	B2302
DC Power supply	HP	HP 6038A	300001174
RF-cable	HP	5061-5359	P36303

Measurement uncertainties

Performance	Measurement uncertainty
Input power (DC)	±0.5 V
Temperature	±0.2 °C
Frequency	±0.01 ppm
RF-power	±1.5 dB

2.5 Test results

2.5.1 Test results overview

This test was performed :

☐ in addition to the test report no.

Verification of EUT :

☒ EUT is in accordance with the technical description

☐ EUT is not in accordance with the technical description

☒ The equipment is compliant to FCC requirement

2.5.2 Remarks on methods of measurements

The EUT is positioned in a non-conductive test fixture and can be rotated and tilted in all angles and in all planes.

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 110 GHz in semi-anechoic and fully-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 conform with specifications ANSI C63.2-1987 clause 15 and ANSI C63.4-1992 clause 4.1.5. 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 set–ups 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 analyzers where the detector modes and resolution bandwidths (RBW) over various frequency ranges are set according to requirement ANSI C63-4-1992 clause 4.2.

1. Measurements of ERP/EIRP at fundamental and spurious frequencies

Spurious frequencies are produced by transmitter and receiver when the EUT is active. According to FCC requirements 15.209, spurious emissions have to be investigated as maximum field strength values in the frequency range from 9 kHz to 1000 MHz. Where possible, the measurement distance shall be 3 m. If other distances are used, the distance correction is added to the test result.

In the low frequency range (9 kHz to 30 MHz), the receiving antenna is an active loop antenna which is positioned at 3 m distance in a shielded, anechoic chamber (see page 8). In case of required measuring distances > 3 m, a distance correction factor is used to calculate the received field strength.

Spurious EIRP measurements in the frequency range 1000 MHz to 4 GHz are carried out in a shielded anechoic test chamber. The measurement distance is 3.0 m.

In the frequency range 4 GHz to 110 GHz, spurious EIRP measurements are performed in a shielded fully anechoic chamber with rectangular SGHs. The measurement distances are indicated underneath each plot, and a calculation for field strength is added, where all relevant factors like cable losses, antenna factors, etc are taken into account.

2.5.3 Test results in details

Equipment under test (EUT) : see page 5
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS SECTION 15.245

Fundamental frequency

Microwave module :

Test condition t = 23.0 ° C	TRANSMITTER FIELD STRENGTH			
EUT operating: TX on and RX on DC power supply	Frequency f [GHz]	Field strength e [dBµV/m] @ 3 m	Field strength E [V/m] @ 3 m	See plot no.:
U DC = 5 V	24.122	111.00	0.35	1

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 9 - 11

LIMITS: SECTION 15.245

Frequency range (MHz)	Measurement distance [m]	Field strength e [dBµV/m] @ 3 m	Field strength E [mV/m]
24,075 to 24,175	3	128.0	2 500
Harmonics	3	88.0	25
Spurious emissions	3	54.0 or -50dBc	0.5

Verdict :	Field strength limits are kept

Equipment under test (EUT) : see page 5
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS SECTION 15.245
Spurious Frequencies SECTION 15.205 / 15.209

Microwave module :

Test condition t = 23.0 ° C	TRANSMITTER SPURIOUS FIELD STRENGTH			
Frequency range [GHz]	Spurious frequencies [GHz]	S A u [dBµV/m]	E [µV/m]	See plot no.:
0.009 to 30.0 MHz (h + v) horizontal and vertical plane	noise	n.a.	< Limit	2
0.030 to 1.0 (h + v)	noise	n.a.	< Limit	3
1.0 to 4.0 (h + v)	noise	n.a.	< Limit	4
4.0 to 12.0 (h + v)	noise	n.a.	< Limit	5
12.0 to 18.0 (h + v)	noise	< 27.6	< Limit	6
18.0 to 27.0 (h + v)	noise + carrier	< 41.5	< Limit	7
27.0 to 40.0 (h + v)	noise	< 48.0	< Limit	8
40.0 to 50.0 (h + v)	noise [+ 48.25 (2nd Harmonic)]	< 52.0 [74.3]	< Limit	9/10
50.0 to 60.0 (h + v)	noise	< 51.8	< Limit	11
60.0 to 90.0 (h + v)	noise	< 52.6	< Limit	12
90.0 to 110.0 (h + v)	noise	< 59.6	< Limit	13

LIMITS: SECTION 15.205 / 15.209 / 15.245

Frequency range (MHz)	Measurement distance [m]	Field strength e [dBµV/m] @ 3 m	Field strength E [µV/m]
0.009 – 0.490	300	88.5 ... 53.8	2400/F(kHz)
0.490 – 1.705	30	53.8 ... 43.0	24000/F(kHz)
1.705 – 30.0	30	49.5	30
30.0 – 88.0	3	40.0	100
88.0 – 216.0	3	43.5	150
216.0 – 960.0	3	46.0	200
> 960.0	3	54.0 (AV) (or -50 dBc)	500
> 960.0	3	74.0 (PK)	5000
Harmonics	3	88.0	25000

Verdict :	Field strength limits are kept

Equipment under test (EUT) : see page 5
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS SECTION RSS-GEN 4.6.1

Emission Bandwidth

Microwave module :

Test condition t = 23.0 ° C	Emission Bandwidth		
EUT operating: TX on and RX on DC power supply	Frequency f [GHz]	Emission Bandwidth [kHz]	See plot no.:
U DC = 5 V	24.122	336.7	14

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 9 - 11

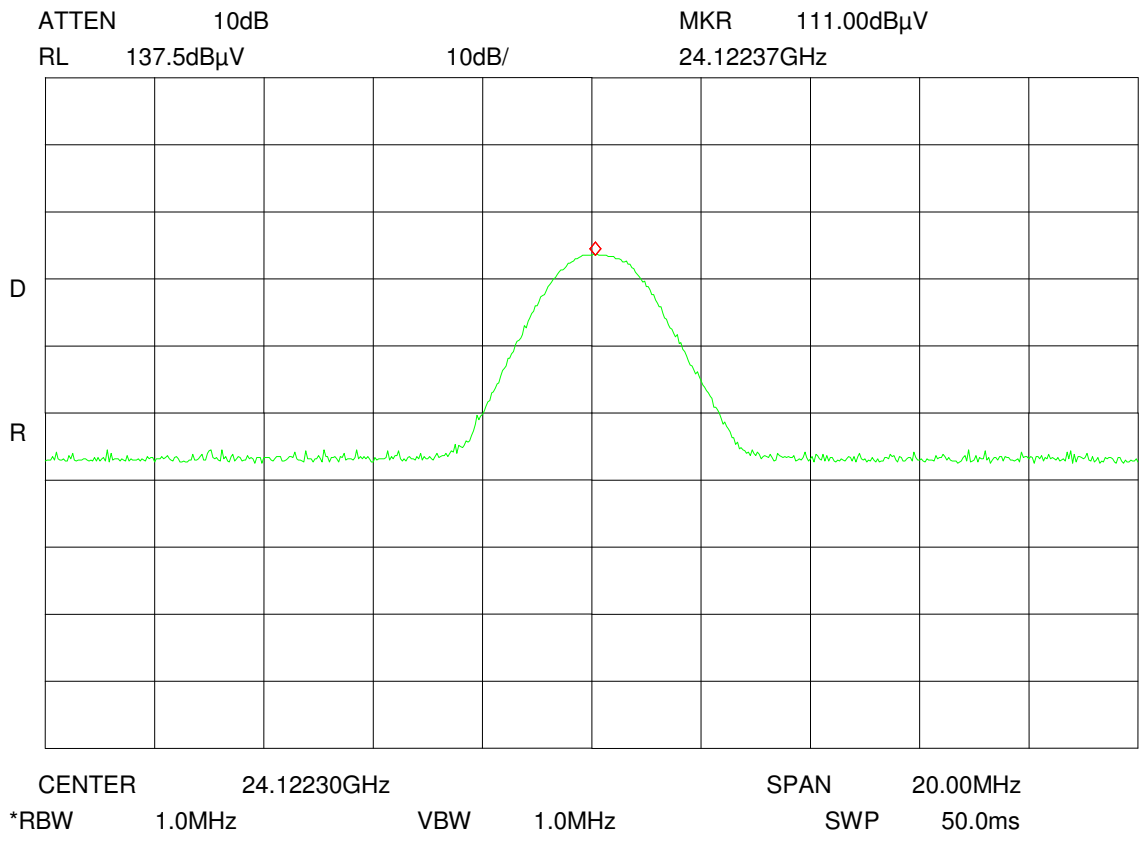
LIMITS: SECTION RSS-GEN 4.6.1

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.
The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.
The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.
The span between the two recorded frequencies is the occupied bandwidth.

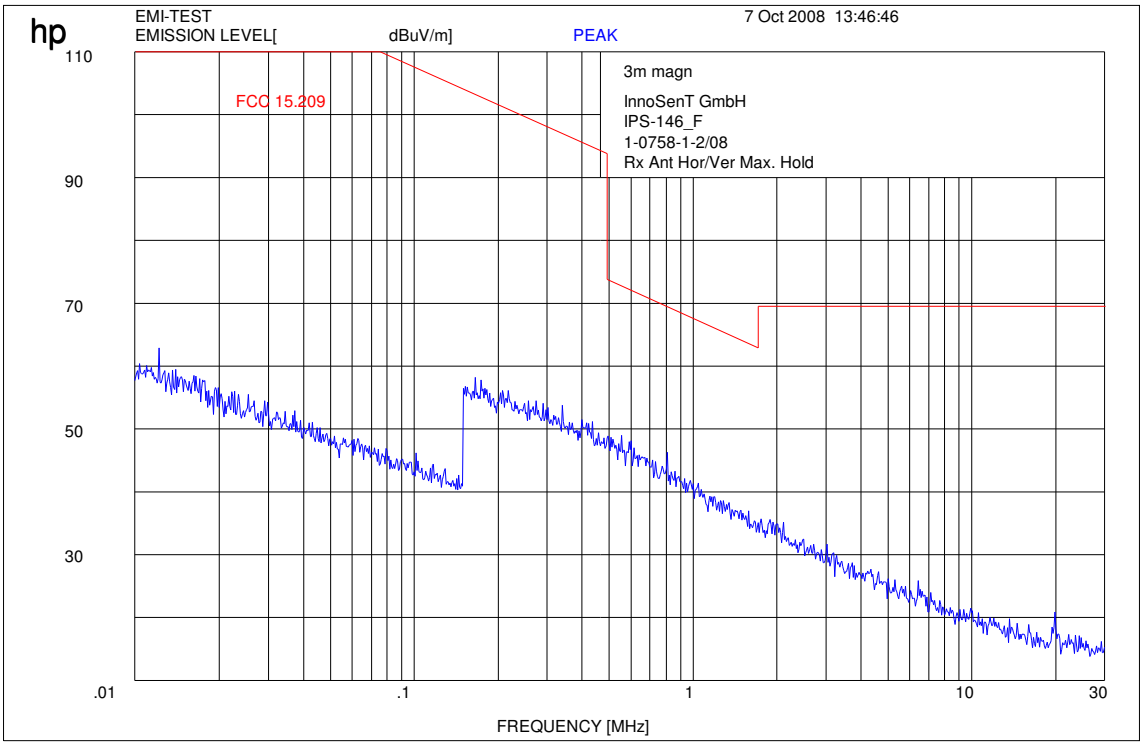
Verdict :	Bandwidth limits are kept

3 Plots, graphs and data sheets:

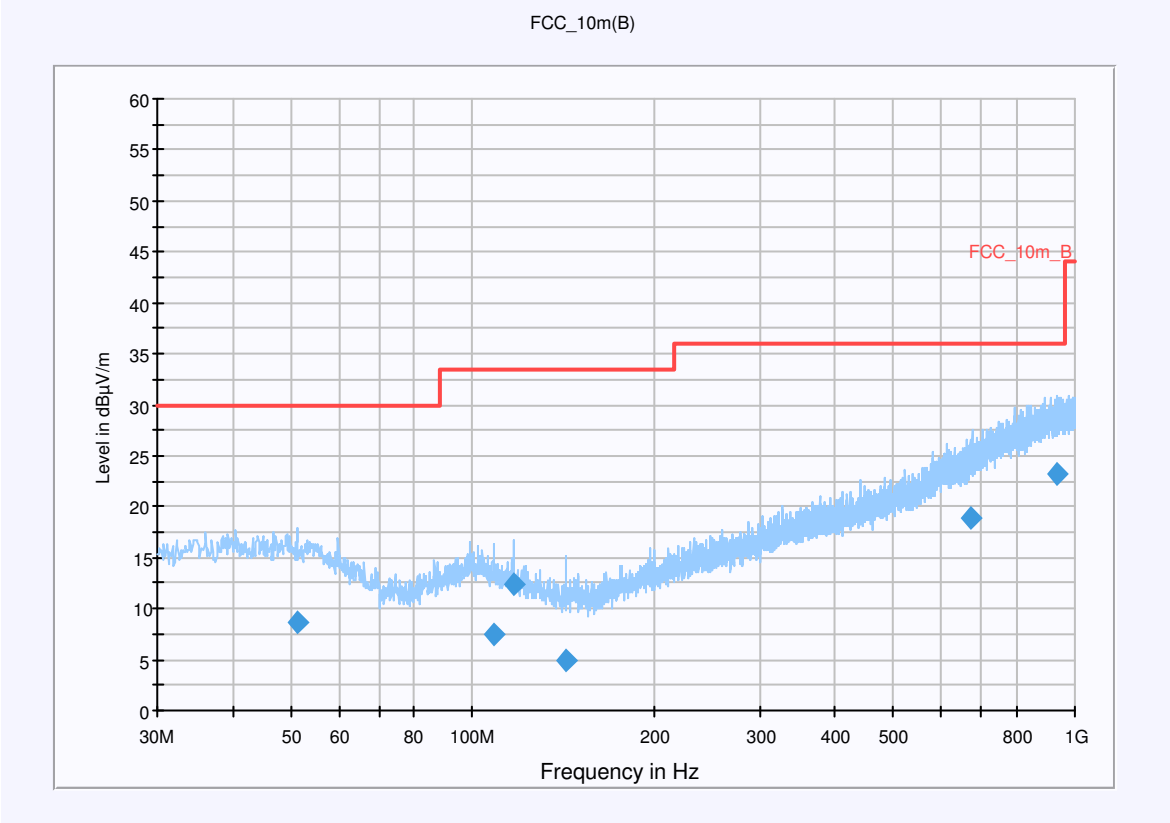
Plot 1:



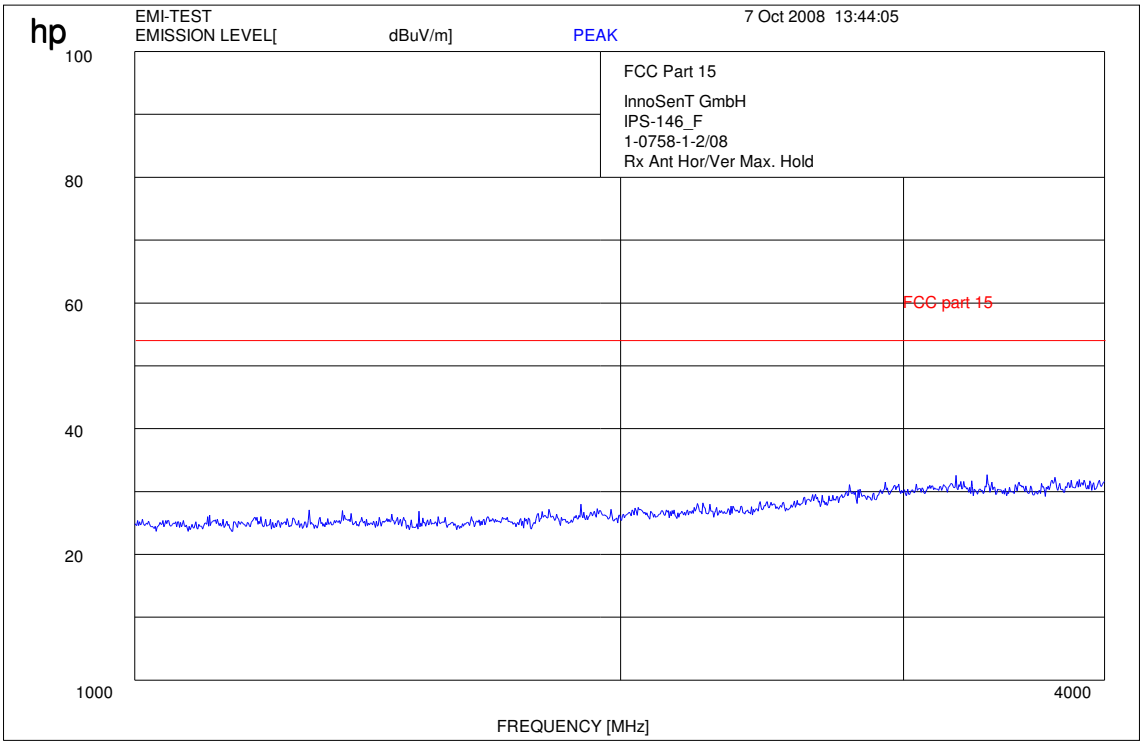
Plot 2:


hp
EMI-TEST
EMISSION LEVEL[dBuV/m]
PEAK
7 Oct 2008 13:46:46
3m magn
InnoSenT GmbH
IPS-146_F
1-0758-1-2/08
Rx Ant Hor/Ver Max. Hold
FCC 15.209
110
90
70
50
30
.01
.1
1
10
30
FREQUENCY [MHz]

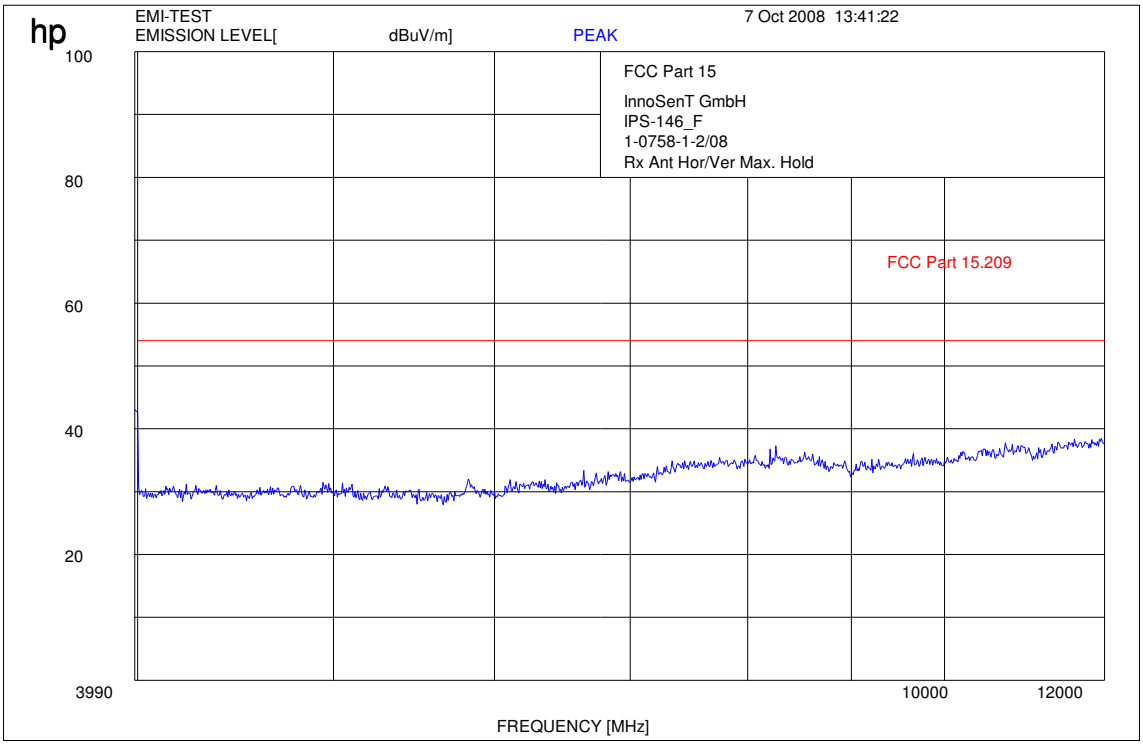
Plot 3:


FCC_10m(B)
FCC_10m_B
Level in dBµV/m
60
55
50
45
40
35
30
25
20
15
10
5
0
30M
50
60
80
100M
200
300
400
500
800
1G
Frequency in Hz

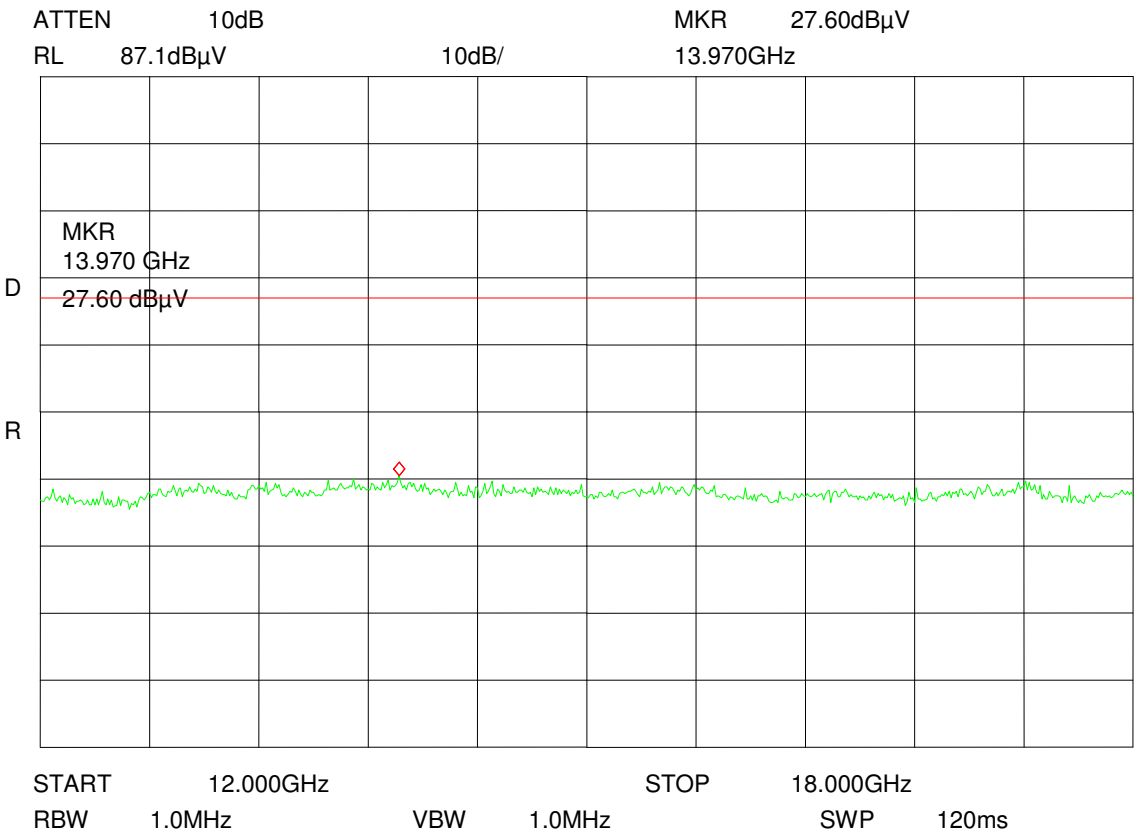
Plot 4:


hp
EMI-TEST
EMISSION LEVEL[dBuV/m]
PEAK
7 Oct 2008 13:44:05
FCC Part 15
InnoSenT GmbH
IPS-146_F
1-0758-1-2/08
Rx Ant Hor/Ver Max. Hold
FCC part 15
100
80
60
40
20
1000
4000
FREQUENCY [MHz]

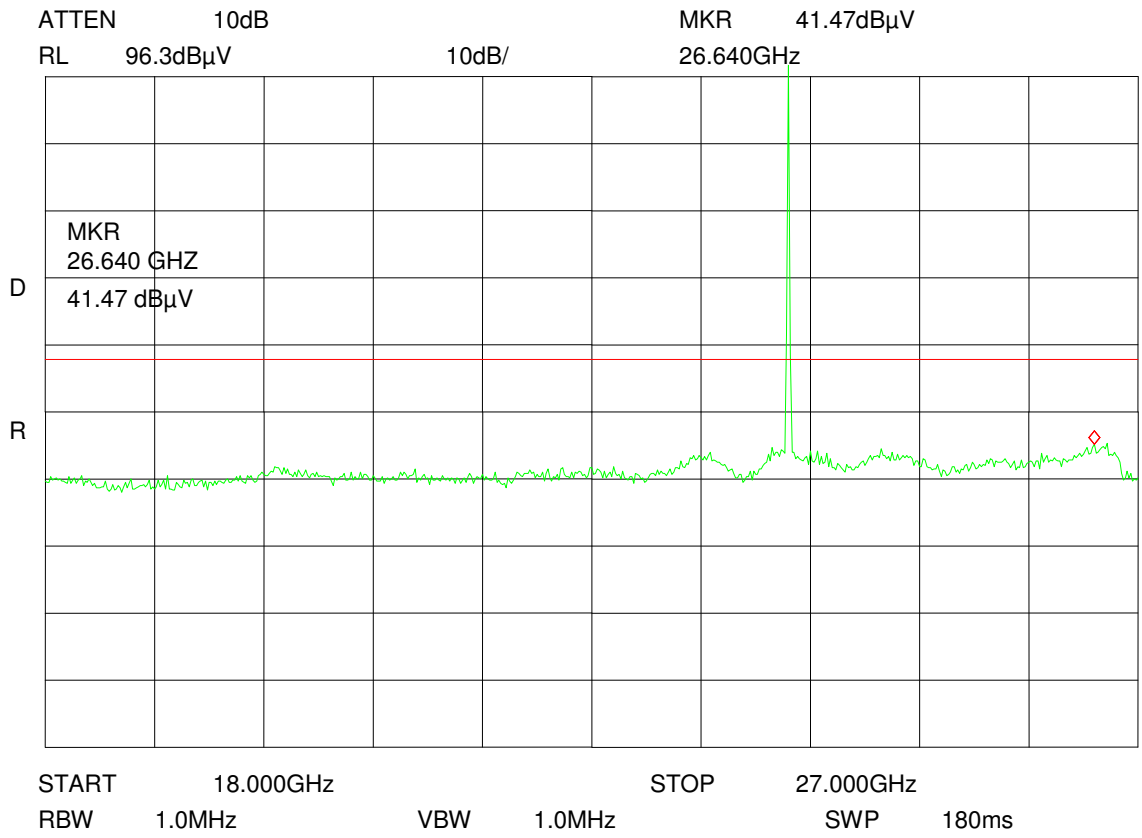
Plot 5:


hp
EMI-TEST
EMISSION LEVEL[dBuV/m]
PEAK
7 Oct 2008 13:41:22
FCC Part 15
InnoSenT GmbH
IPS-146_F
1-0758-1-2/08
Rx Ant Hor/Ver Max. Hold
FCC Part 15.209
100
80
60
40
20
3990
10000
12000
FREQUENCY [MHz]

Plot 6:

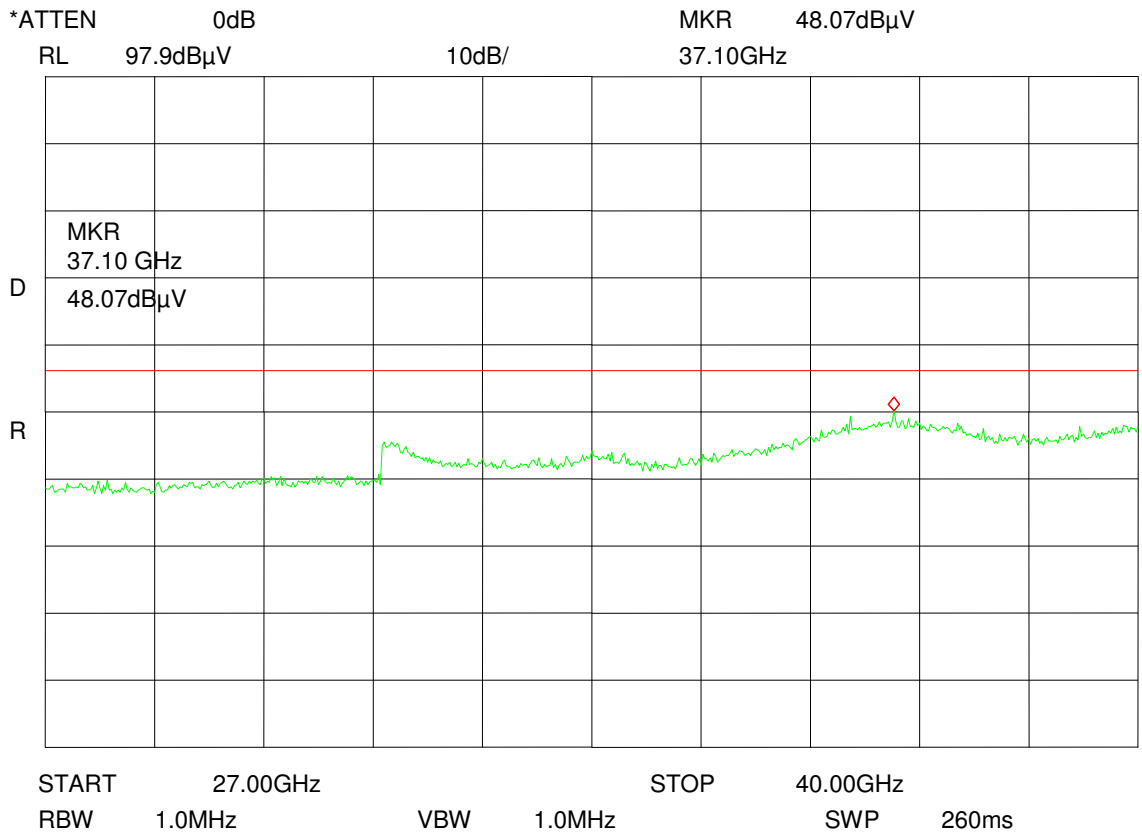

ATTEN 10dB
MKR 27.60dBµV
RL 87.1dBµV
10dB/
13.970GHz
MKR
13.970 GHz
27.60 dBµV
D
R
START 12.000GHz
STOP 18.000GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 120ms

Plot 7:

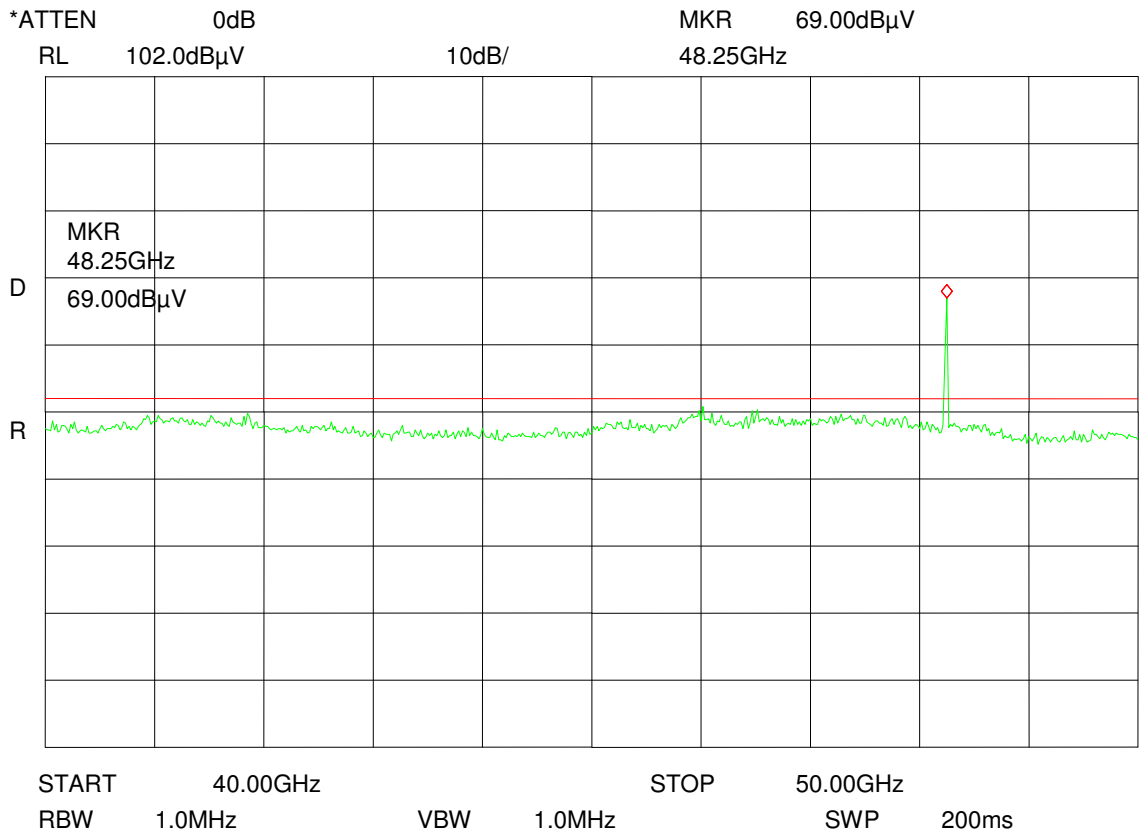


The peak at 24.1 GHz shows the carrier.

Plot 8:

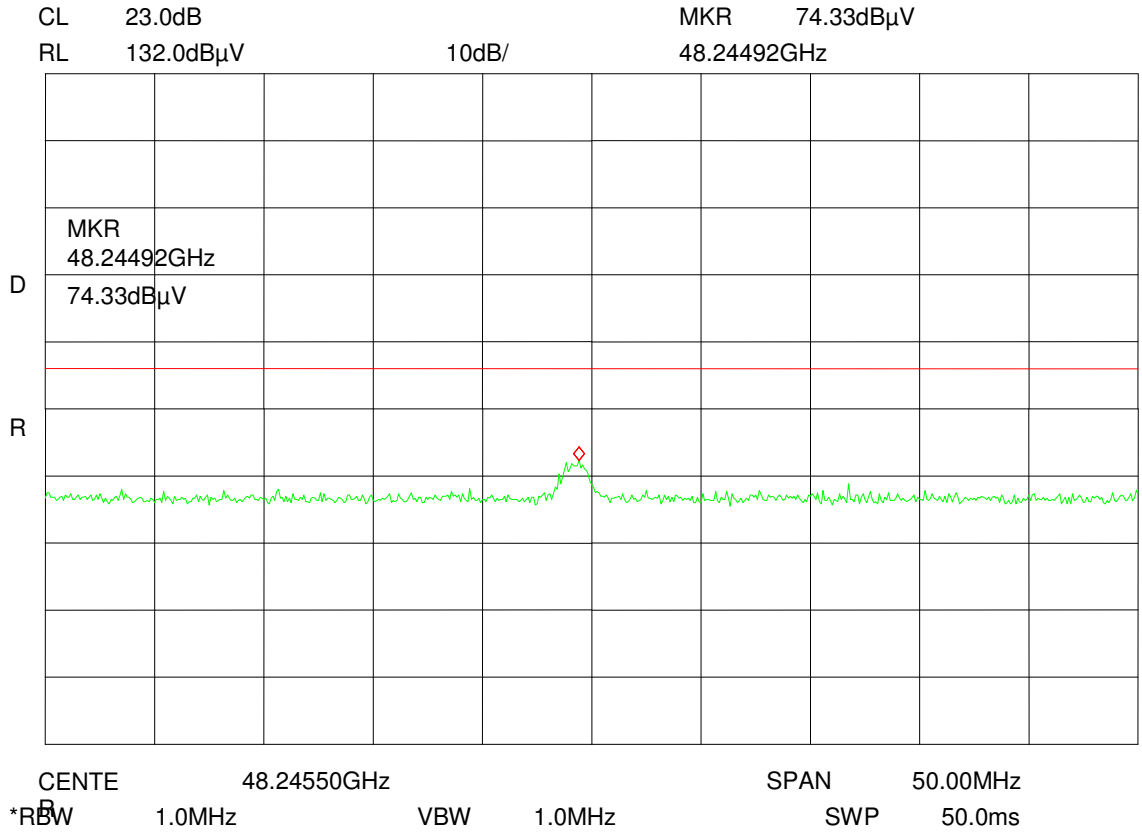

*ATTEN 0dB
MKR 48.07dBµV
RL 97.9dBµV
10dB/
37.10GHz
MKR
37.10 GHz
48.07dBµV
D
R
START 27.00GHz
STOP 40.00GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 260ms

Plot 9:



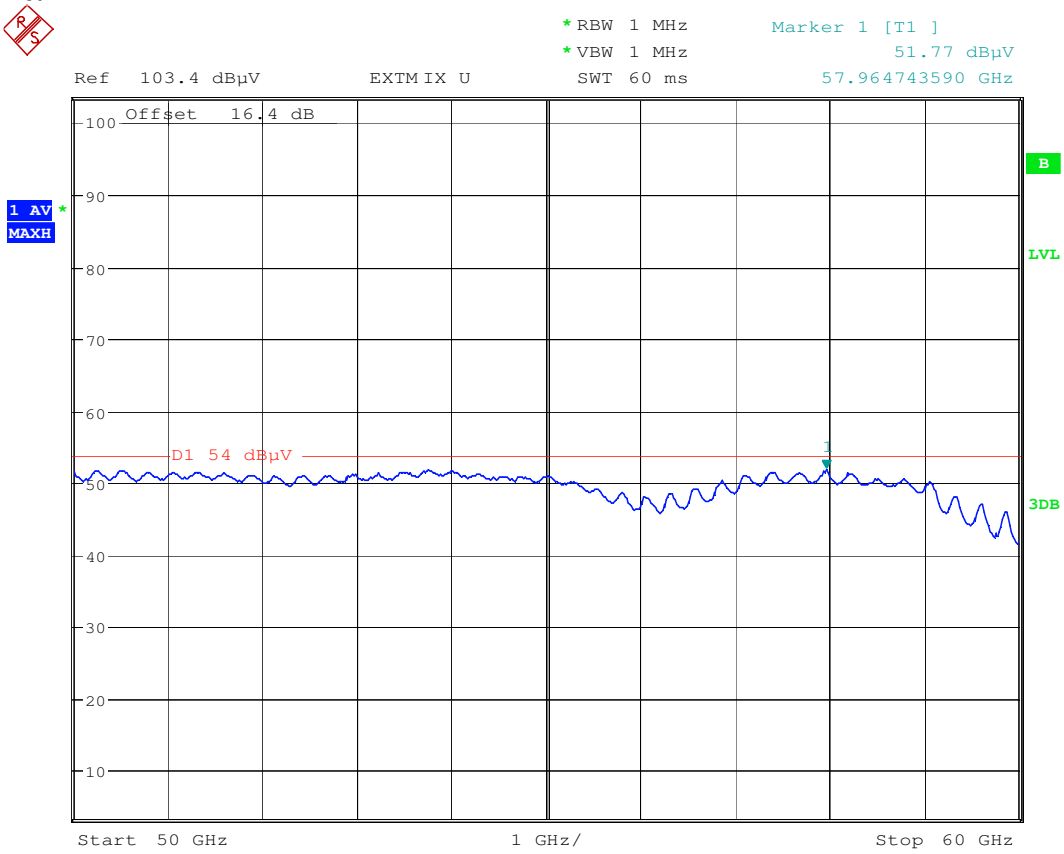
The peak at 48.25 GHz is the 2nd harmonic. The limit for harmonics is 88 dBµV/m at 3m distance.
Measurement is pass (see next plot)

Plot 10:



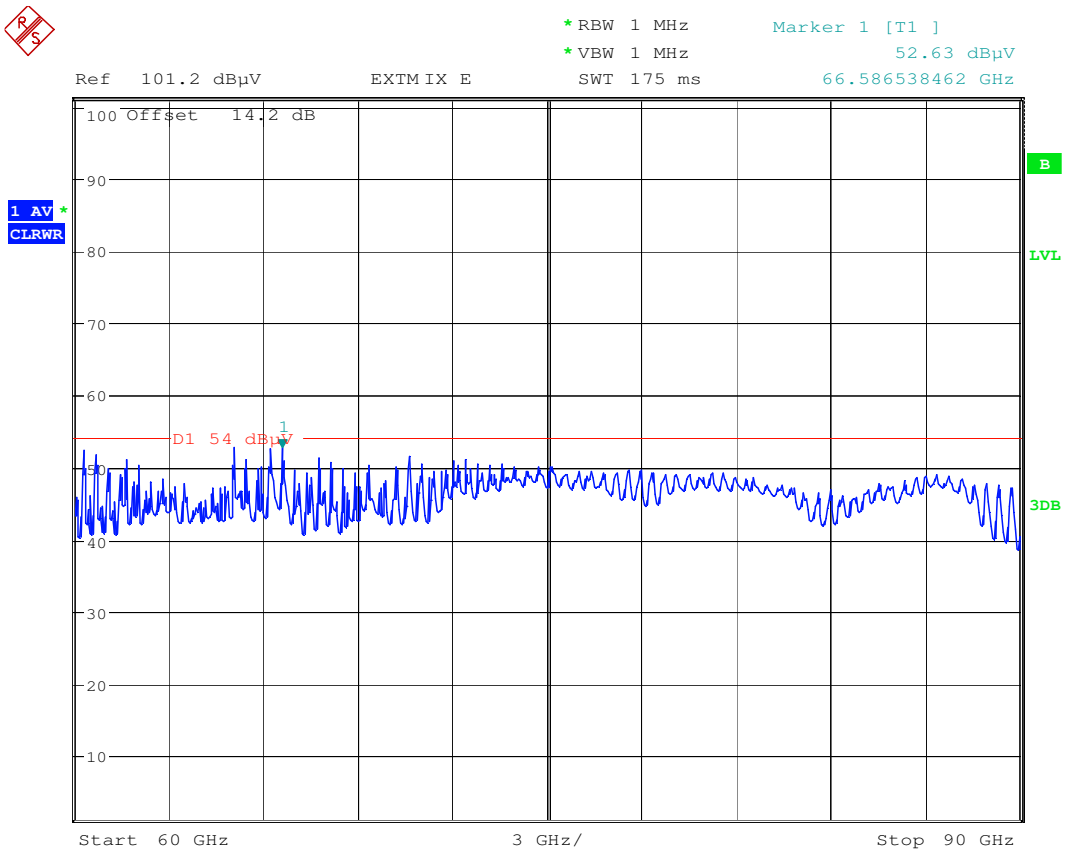
The plot shows the remeasurement of the 2nd harmonic at 48.2 GHz using an external mixer.
The limit line for harmonics is 88 dBµV/m at 3m distance.

Plot 11:



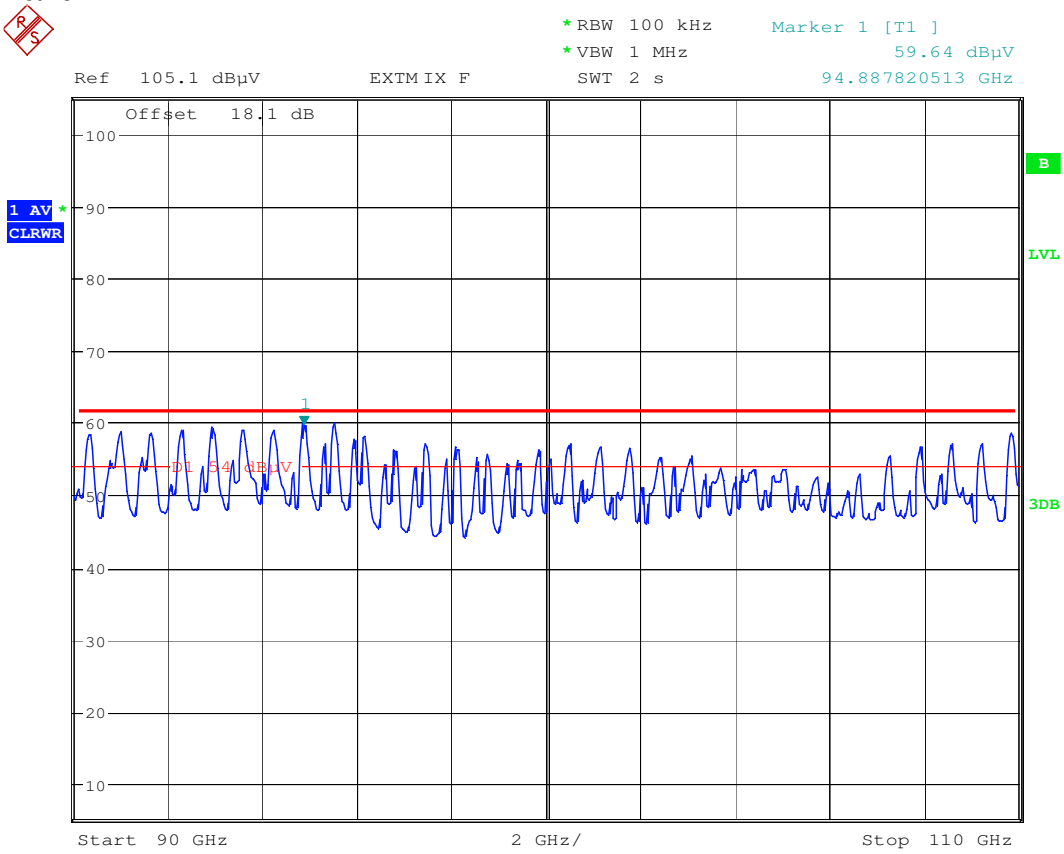
Date: 6.OCT.2008 14:56:13

Plot 12:



Date: 6.OCT.2008 15:01:23

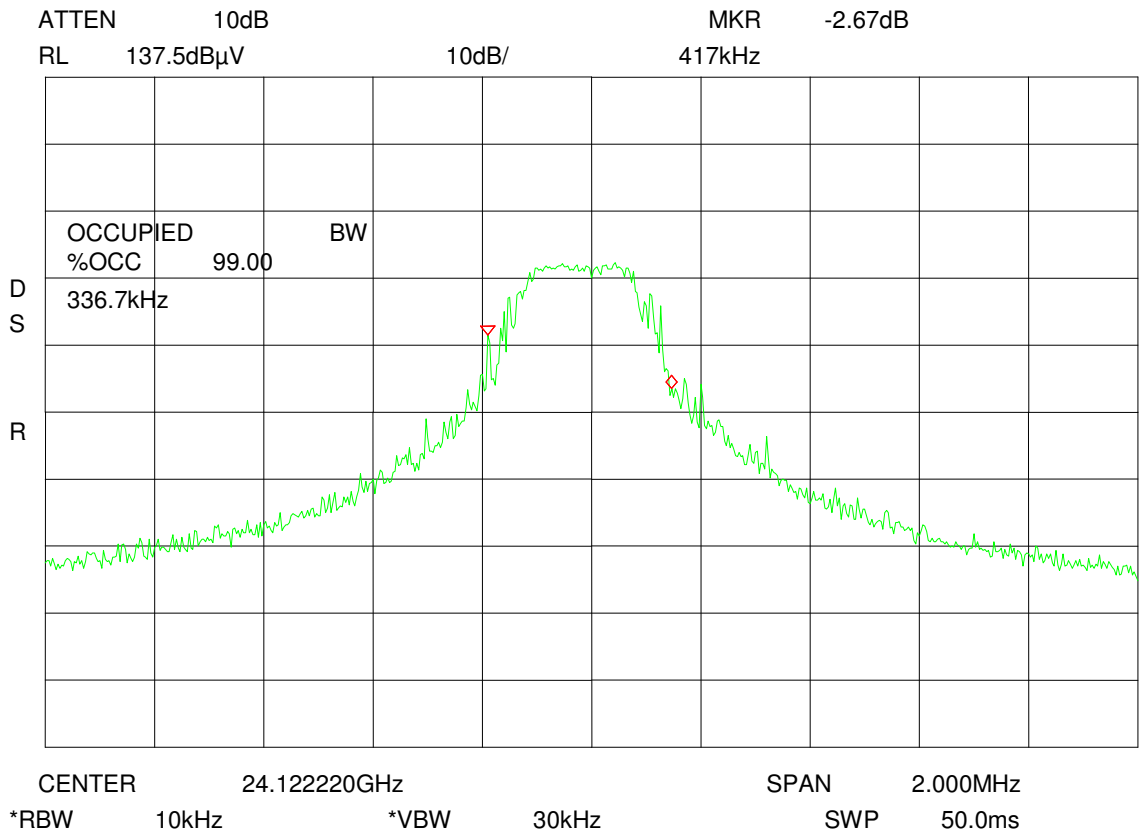
Plot 13:



Date: 6.OCT.2008 15:06:36

The upper limit line is 61 dBµV/m = -50 dBc
Spectrum Analyzer RBW has to be set to 100 kHz to increase the dynamic range.
Measurement is pass.

Plot 14:


ATTEN 10dB
MKR -2.67dB
RL 137.5dBµV
10dB/
417kHz
OCCUPIED BW
%OCC 99.00
336.7kHz
D
S
R
CENTER 24.122220GHz
SPAN 2.000MHz
*RBW 10kHz
*VBW 30kHz
SWP 50.0ms

Photographs

Photo no.: 1

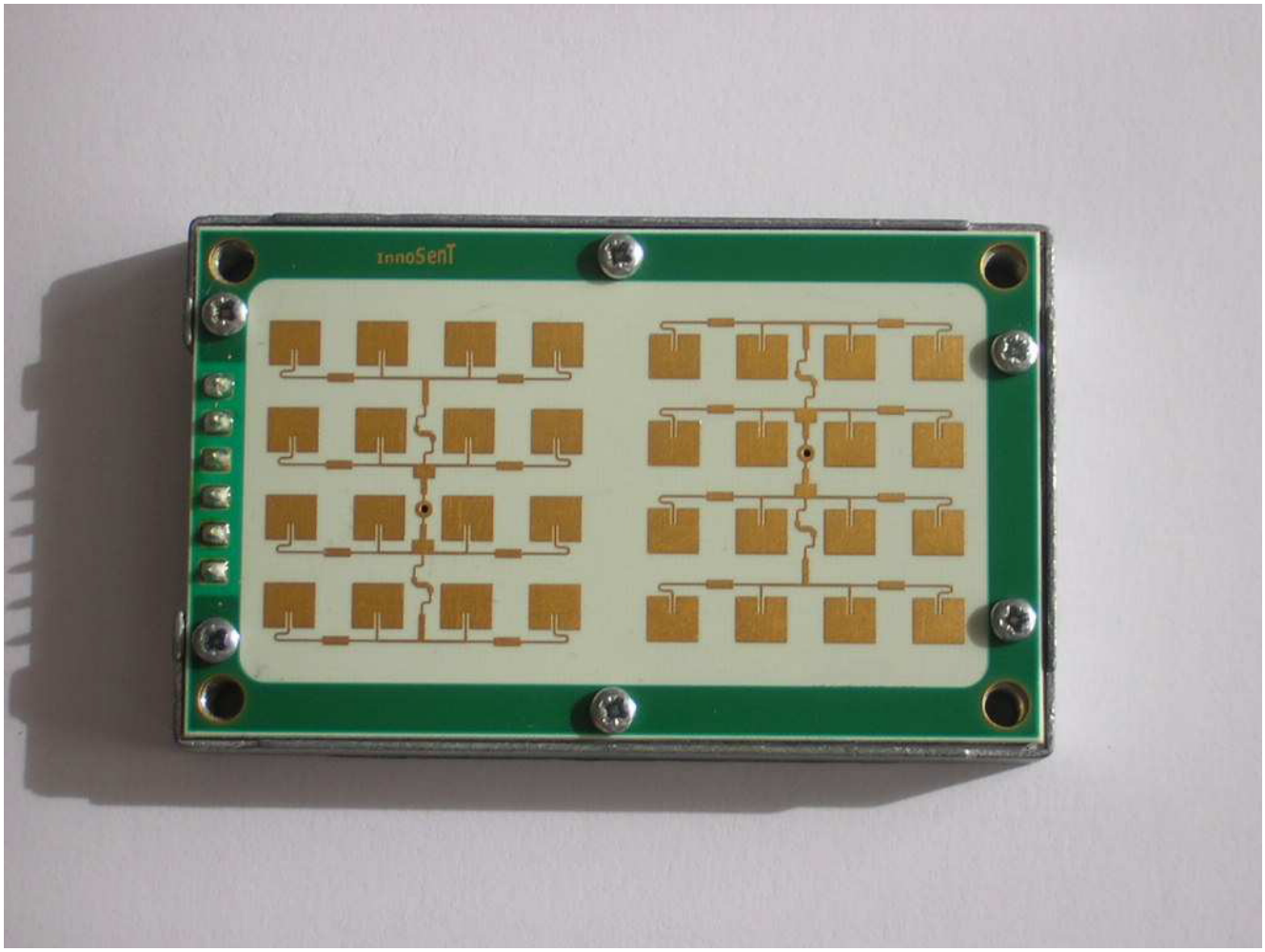


Photo no.: 2

Photo no.: 3

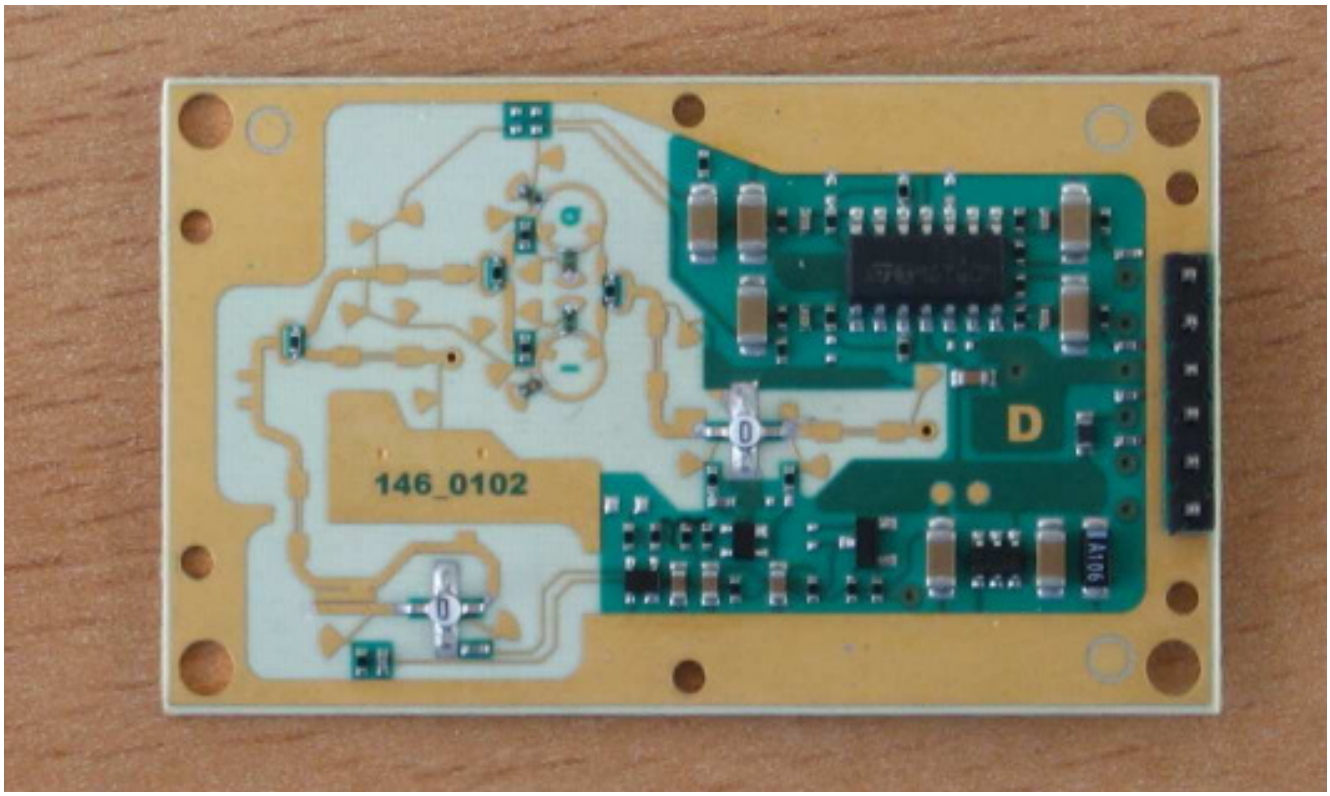


Photo no.: 4

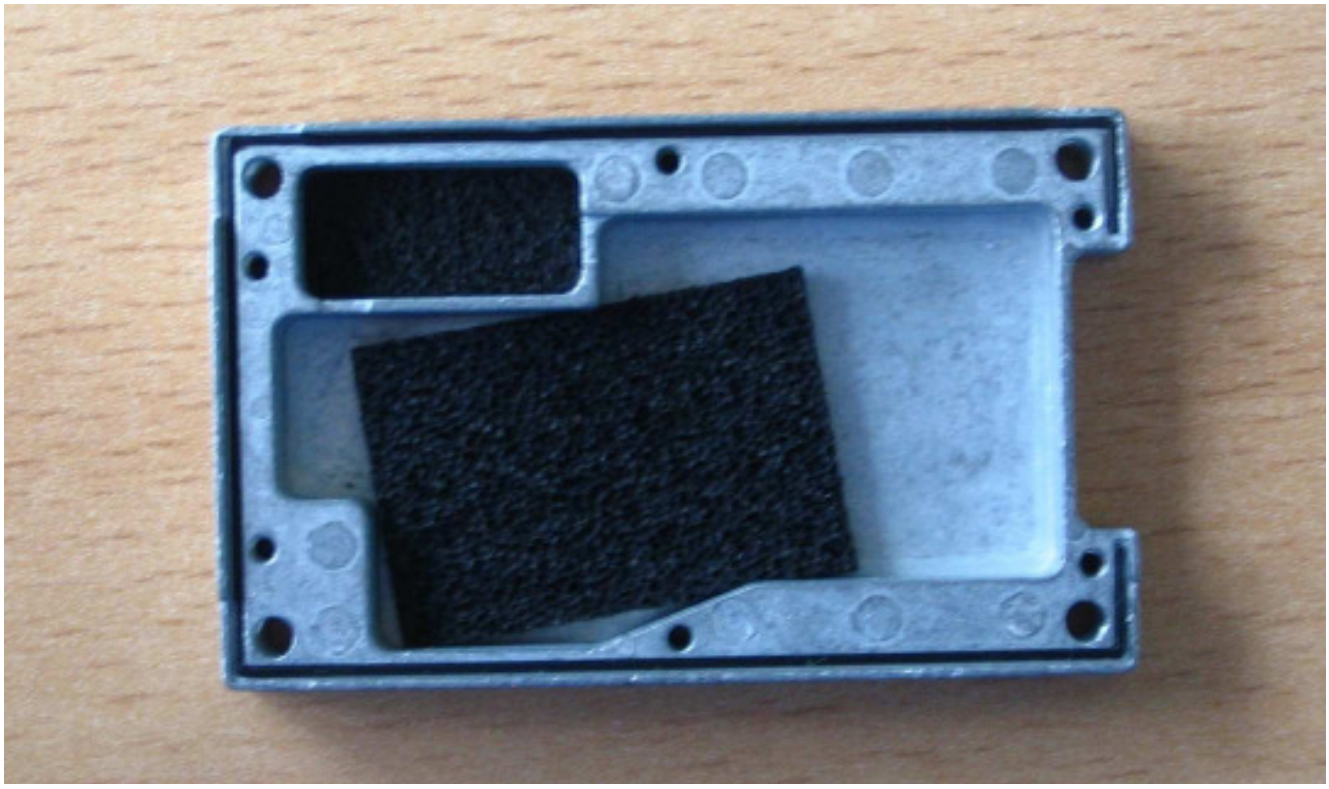


Photo no.: 5

Spurious emission measurement 30 MHz – 1 GHz

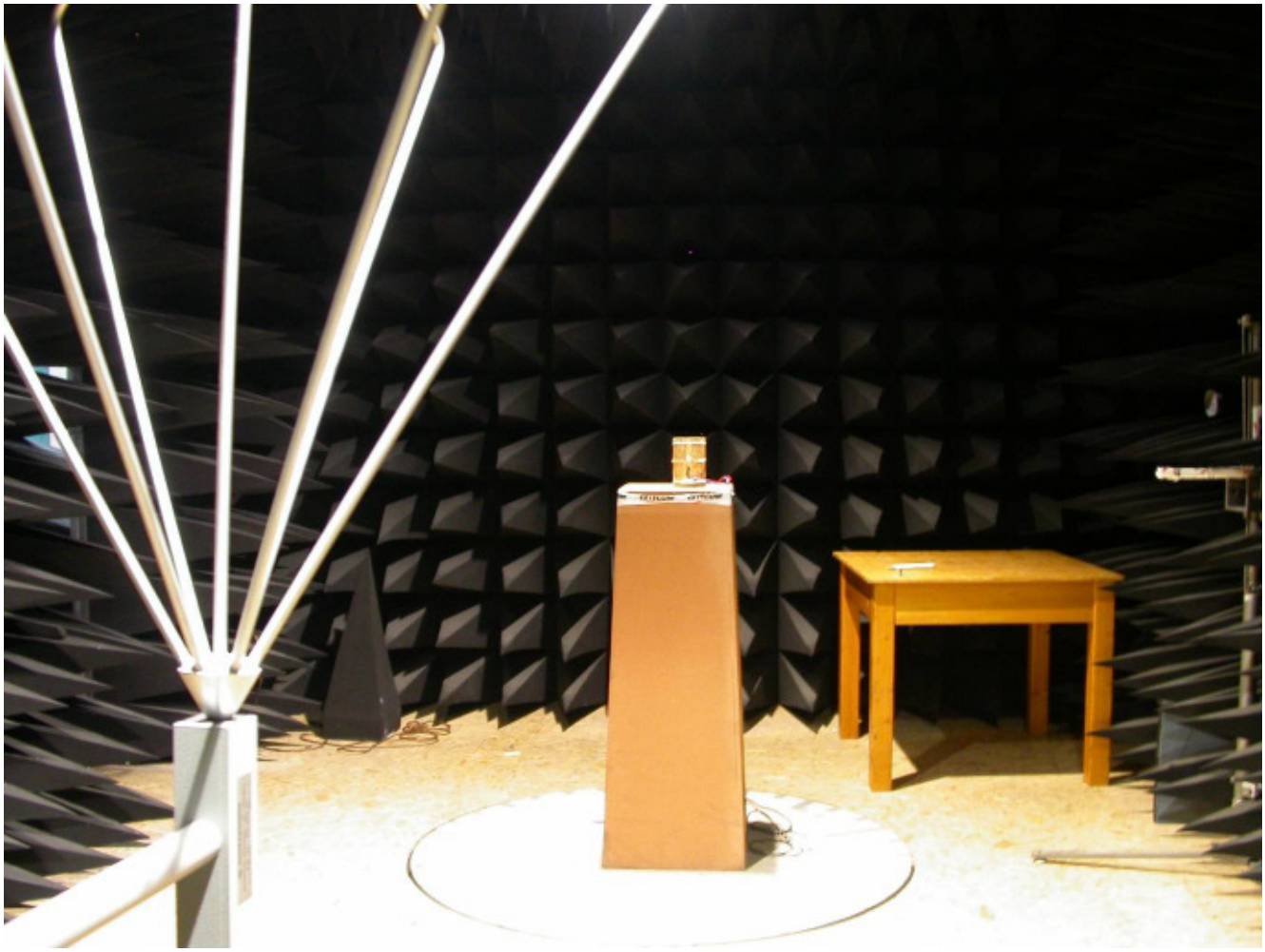
Photo no.: 6

Spurious emission measurement 30 MHz – 1 GHz

Photo no.: 9

Spurious emission measurement 1 GHz – 12 GHz

Photo no.: 10

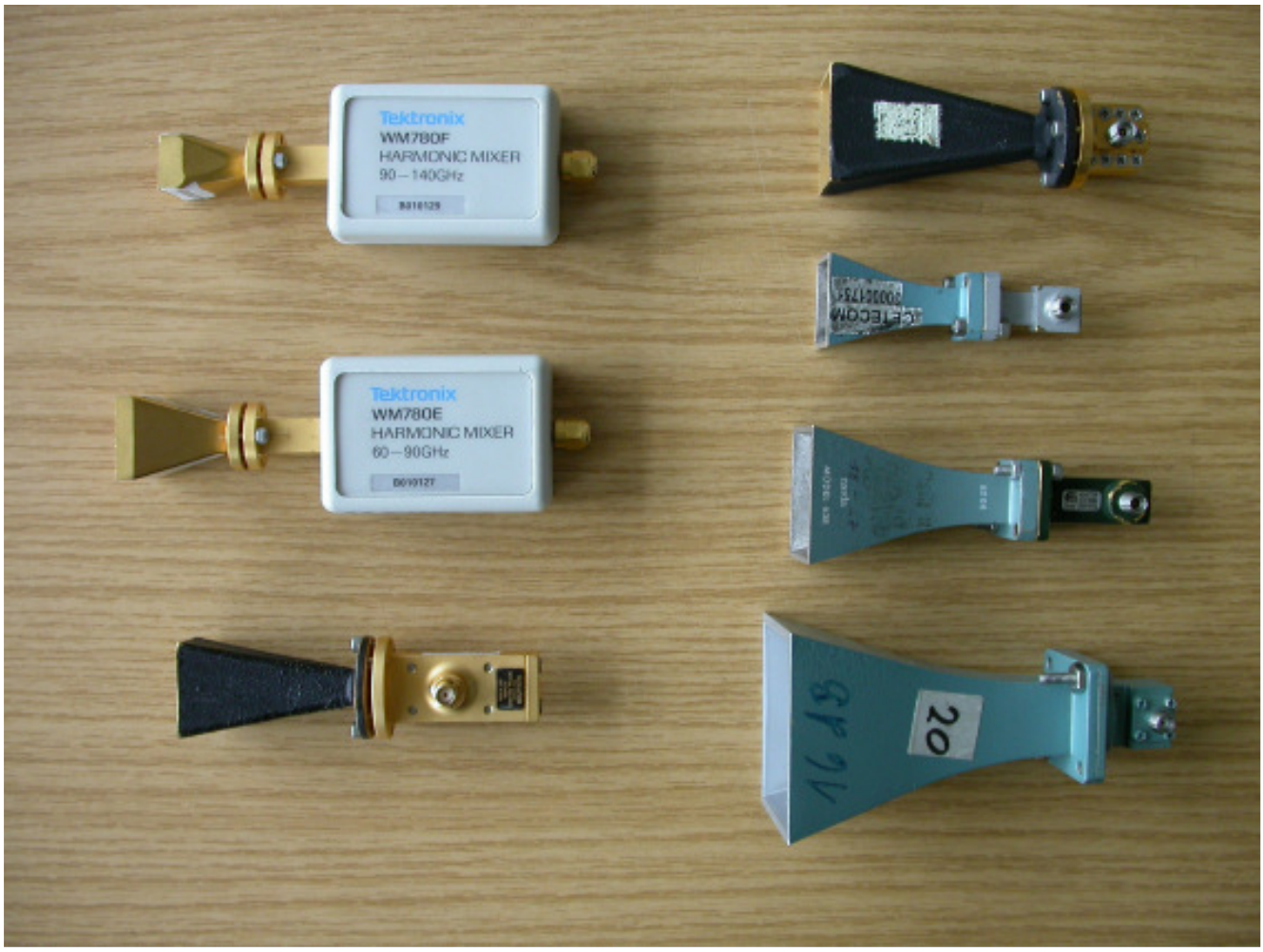


Spurious emission measurement 1 GHz – 12 GHz

Photo no.: 11

Spurious emission measurement 9 kHz – 30 MHz

Photo no.: 12



Spurious emission measurement equipment 12 GHz – 110 GHz