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.: 1-1613-01-02/09
Applicant: Bircher Reglomat AG
Type: ICP-705_F
FCC ID: TBZ-ICP705F
IC Certification No: 5904A-ICP705F
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
2009-10-02	Nicolas Stamber	

Technical responsibility for area of testing:

Date	Name	Signature
2009-10-02	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-ict.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 : Bircher Reglomat AG
Street : Wiesengasse 20
Town : 8222 Beringen
Country : Germany
Phone : +41 (0)52 687 11 11
Fax : +41 (0)52 687 11 12

Contact person
Name : Mr. Oliver Schneider
Phone : +41 (0)52 687 13 99

1.4 Application details

Date of receipt of application : 2009-09-25
Date of receipt of test item : 2009-09-29
Date of test : 2009-09-29 to 2009-10-02
Person(s) who have been present during the test : Mr. Zirk (InnoSenT GmbH)
Mr. Wittstadt (InnoSenT GmbH)

1.5 Test item (EUT)

Description	:	Field disturbance Sensor
Type designation	:	ICP-705_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	:	24.112 GHz
Field strength PEP	:	109.67 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)	:	24 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

ICP-705_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 15.207 Conducted limits 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	:	IVS-705US
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)	:	24.112 GHz
R F: Power in Watts	:	-/-
Field Strength (at what distance)	:	109.67 dBµV/m @ 3m distance
Occupied Bandwidth (99% BW)	:	370.0 kHz
Type of Modulation	:	N0N
Emission Designator	:	370KN0N
Antenna Information	:	Integrated antenna
Transmitter Spurious (worst case)	:	75.8 dBµV/m in 3m (2nd harmonic)
Receiver Spurious (worst case)	:	75.8 dBµV/m in 3m (TX and RX operate simultaneously)
IC no.	:	5904A-ICP705F
FCC ID	:	TBZ-ICP705F

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 :

2009-10-02	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

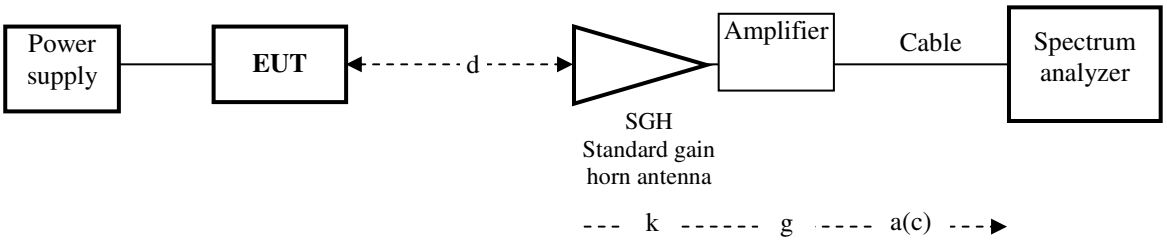
The environmental conditions are documented especially for each test.

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 [cm]	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	37.5	-18.0	33.97	33.4 … 35.9	2.7 … 2.8
18.0 to 26.0	37.5	-18.0	40.22	30.8 … 33.4	2.8 … 4.3
26.0 to 40.0	18.75	-24.0	44.00	17.4 … 23.1	4.3 … 4.8
40.0 to 50.0	9.375	-30.0	42.32	3.4 … 17.4	4.8 … 6.7

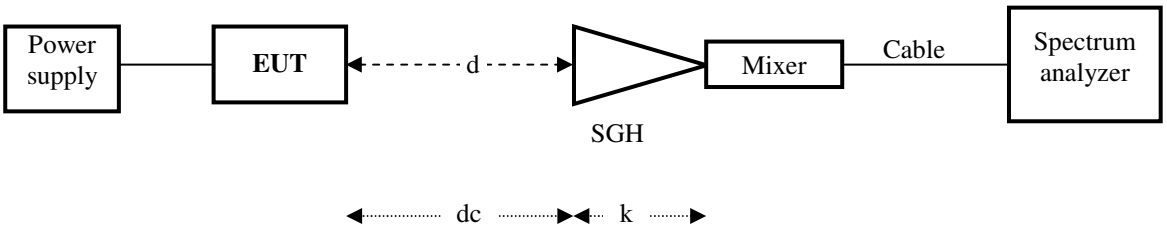
Calculation : Field strength = analyser reading + cable loss - amplifier gain + antenna factor
e [dB(µV/m)] = u [dB(µV)] + a [dB] - g [dB] + k [dB(1/m)]

Test equipment	Manufacturer	Type	CETECOM reference
Spectrum Analyser	HP	HP 8565E	300000916
Spectrum Analyser	Rohde & Schwarz	FSU	300003443
SGH 12.0 to 18.0 GHz	narda	639	300000787
SGH 18.0 to 26.0 GHz	narda	638	300002442
SGH 26.0 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 [cm]	Distance correction dc (3 m/Xm) [dB]	Antenna factor k [dB 1/m]
50.0 … 60.0	18.75	-24.0	44.0
60.0 … 90.0	18.75	-24.0	41.8
90.0 … 110.0	9.375	-30.0	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

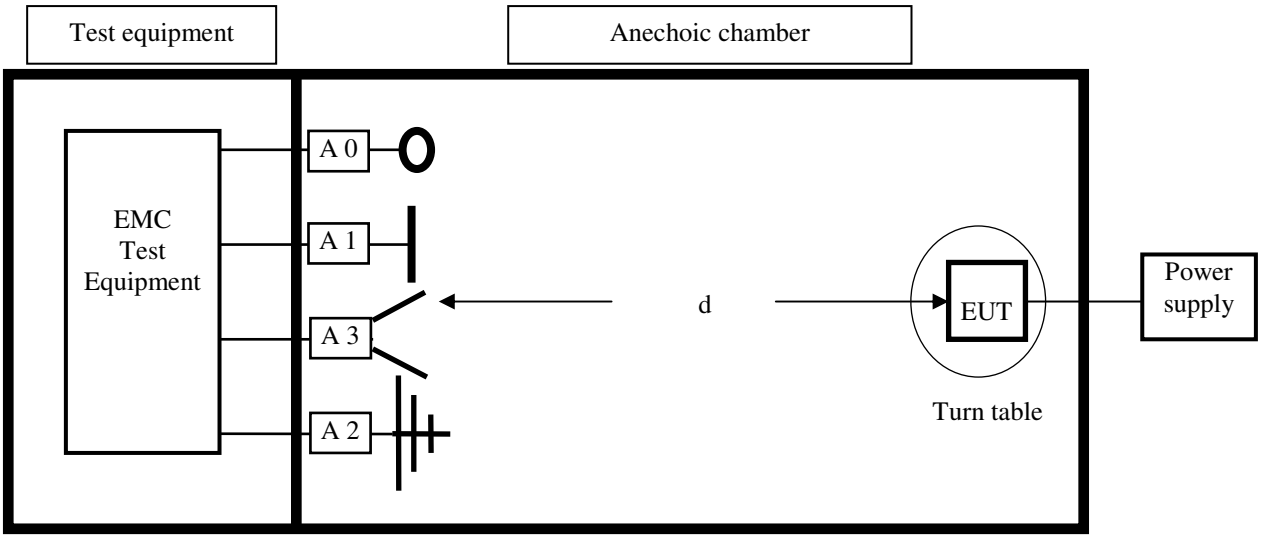
Test equipment	Manufacturer	Type	CETECOM reference
Spectrum Analyser	Rohde & Schwarz	FSU 50	300003443
Power supply	HP	HP 6038A	300001174
SGH 50 ... 60 GHz	Flann	2424-20	300001200g
Mixer 50 ... 60 GHz	Tektronix	WM 490 U	300000298b
SGH 60 ... 90 GHz	Thomson	COR 60_90	300000814
Mixer 60 ... 90 GHz	Tektronix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



Anechoic chamber A:

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
	Radiated emission in chamber A				
A-1	Spectrum Analyzer	Rohde & Schwarz	ESU26	100037	300003555
A-2	Signal Generator	Rohde & Schwarz	SMR20B11	1104.0002.20	300003593
A-3	RF System Panel	Rohde & Schwarz	TS RSP	---	300003556
A-4	Relais Matrix	Rohde & Schwarz	PSN	860673/009	300001385
A-5	Horn Antenna	EMCO	3115	9709-5290	300000212
A-6	Bilog.-Log. Antenna	Schwarzbeck	VULB 9163	02/00	300003696
A-7	Notch Filter GSM 900	Wainwright	WRCD 901.9/903.1EE	9	---
A-8	Notch Filter GSM 1800	Wainwright	WRCD 1747/1748-5EE	1	---
A-9	Notch Filter GSM 1900	Wainwright	WRCB 1879.5/1880.5EE	9	---
A-10	Notch Filter GSM 850	Wainwright	WRCT 837-0.2/50-8EE	1	---
A-11	Notch Filter UMTS	Wainwright	WRCD 1800/2000-0.2/40-5EEK	2	---
A-12	Notch Filter ISM 2400	Wainwright	WRCG 2400/ 2483-2375/ 2505-50/10SS	26	---
A-13	High Pass Filter 1.1 GHz	Wainwright	WHK 1.1/15G-10SS	---	---
A-14	High Pass Filter 2.6 GHz	Wainwright	WHKX 2.6/18G-12SS	---	---
A-15	High Pass Filter 7 GHz	Wainwright	WHKX 7.0/18G-8SS	---	---
A-14	Amplifier	Miteq	AFS4-00201800-15-10P-6	US42-0050 2650-28-5A	300003204
A-16	Controller	Inn co	CO 2000	2020507	---
A-17	DC Power Supply	Hewlet Packard	HP6632A	---	300000924
A-18	Computer	F+W	---	---	300003303

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 emissions measurements in the frequency range 1000 MHz to 12 GHz are carried out in a shielded anechoic test chamber. The measurement distance is 3.0 m.

In the frequency range 12 GHz to 110 GHz, spurious emissions 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 = 24 V	24.112	109.67	0.30	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 12.0 (h + v)	noise	n.a.	< Limit	4
12.0 to 18.0 (h + v)	noise	< 32.9	< Limit	5
18.0 to 26.0 (h + v)	noise + carrier	< 43.5	< Limit	6
26.0 to 40.0 (h + v)	noise	< 51.5	< Limit	7
40.0 to 50.0 (h + v)	noise [+ 48.25 (2nd Harmonic)]	< 50.2 [75.8]	< Limit	8/9
50.0 to 60.0 (h + v)	noise	< 52.6	< Limit	10
60.0 to 90.0 (h + v)	noise	< 58.2	< Limit	11
90.0 to 110.0 (h + v)	noise	< 58.5	< Limit	12

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	TRANSMITTER FIELD STRENGTH		
EUT operating: TX on and RX on DC power supply	Frequency f [GHz]	Emission Bandwidth [kHz]	See plot no.:
U DC = 24 V	24.112	370.0	13

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

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

TRANSMITTER PARAMETERS SECTION 15.207

Conducted limits

Microwave module :

Test condition t = 23.0 ° C	Conducted limits			
EUT operating: TX on and RX on DC power supply	Frequency f [GHz]	Line	Verdict	See plot no.:
U DC = 24 V	24.112	Neutral	Pass	14
U DC = 24 V	24.112	Phase	Pass	15

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

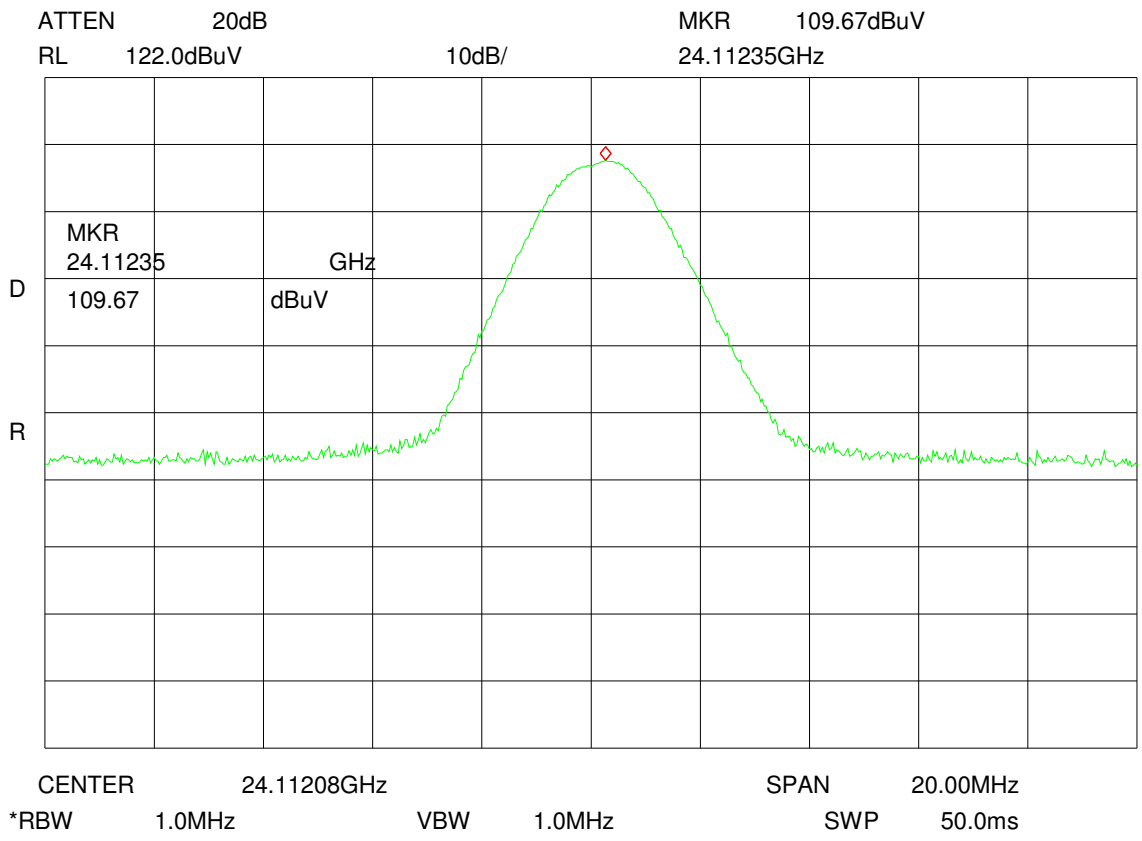
LIMITS: SECTION 15.245

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

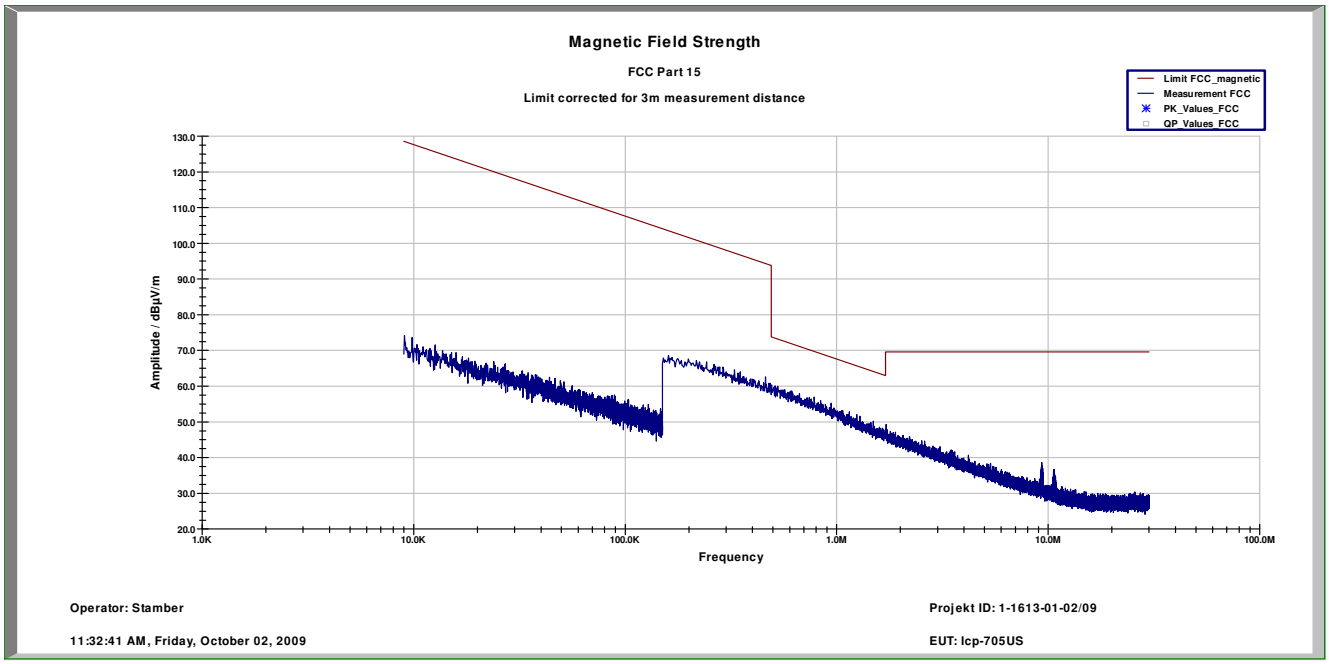
Bandwidth limits are kept

3 Plots, graphs and data sheets:

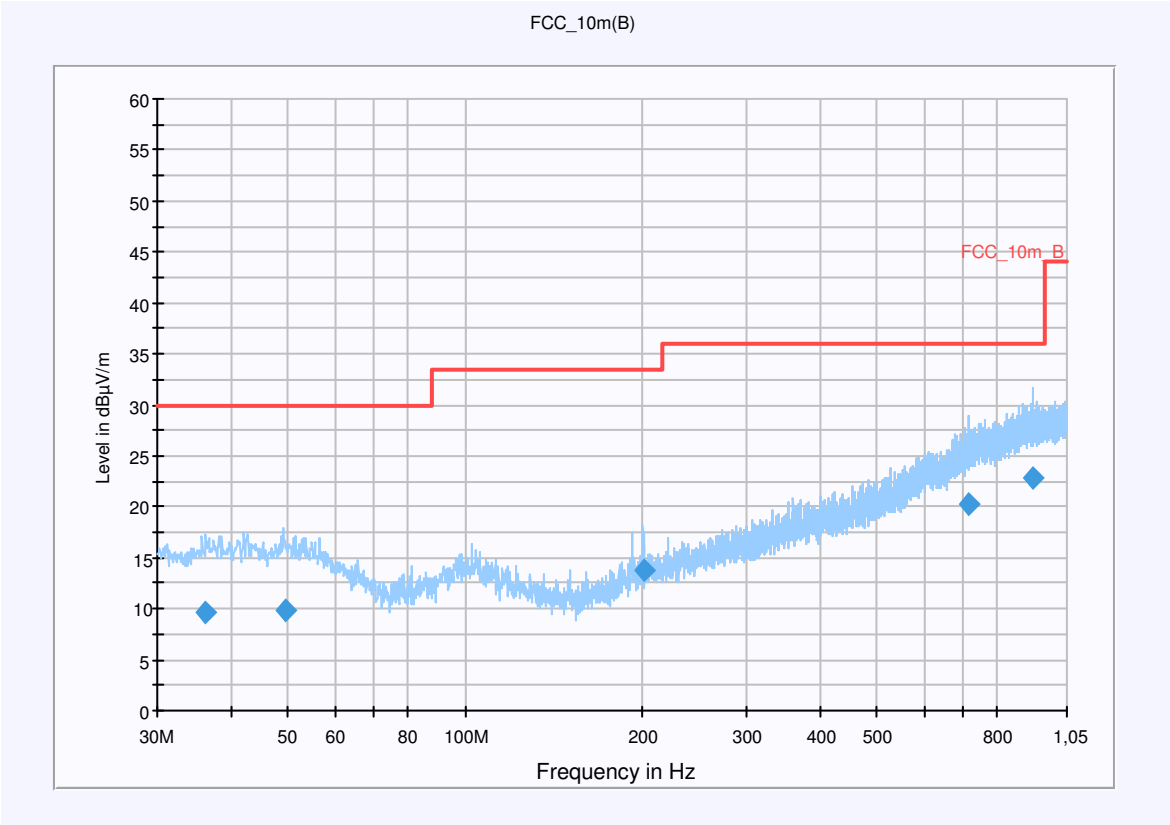
Plot 1:



Plot 2:


Magnetic Field Strength
FCC Part 15
Limit corrected for 3m measurement distance
Limit FCC_magnetic
Measurement FCC
PK_Values_FCC
QP_Values_FCC
Amplitude / dBµV/m
130.0
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
1.0K
10.0K
100.0K
1.0M
10.0M
100.0M
Frequency
Operator: Stamber
11:32:41 AM, Friday, October 02, 2009
Projekt ID: 1-1613-01-02/09
EUT: lcp-705US

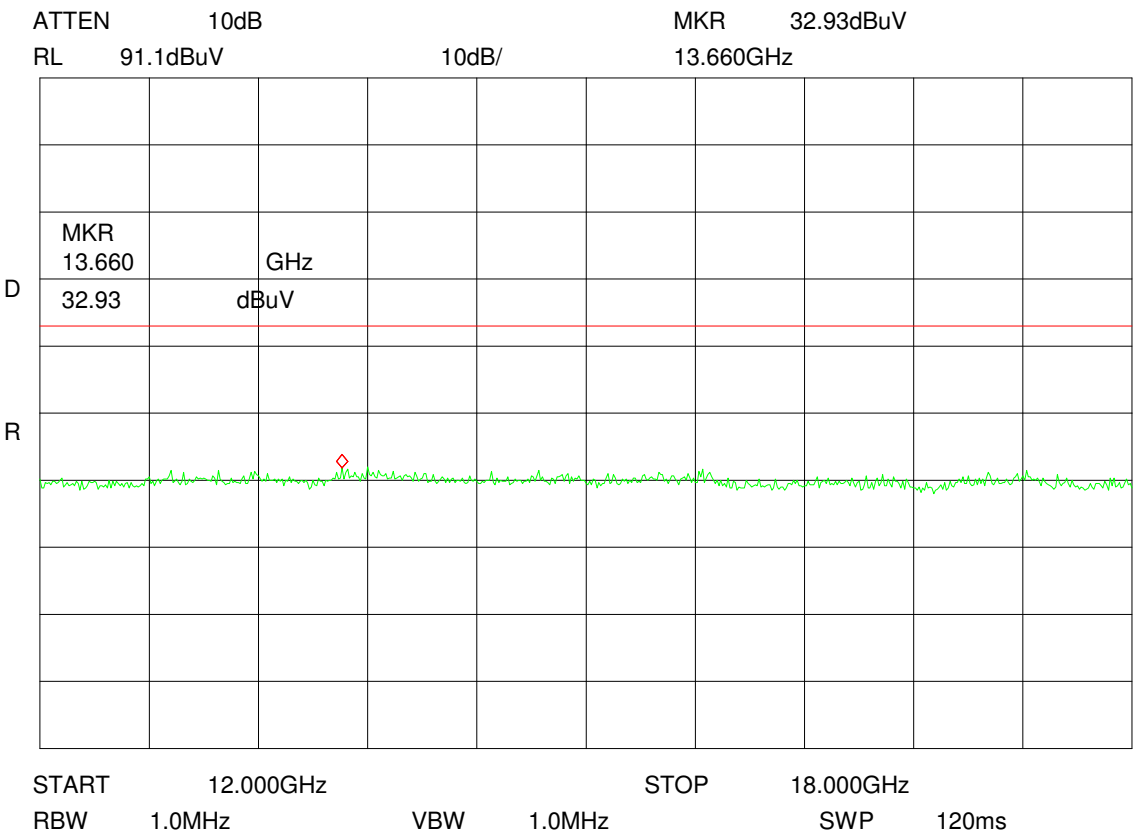
Plot 3:


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
1,05
Frequency in Hz

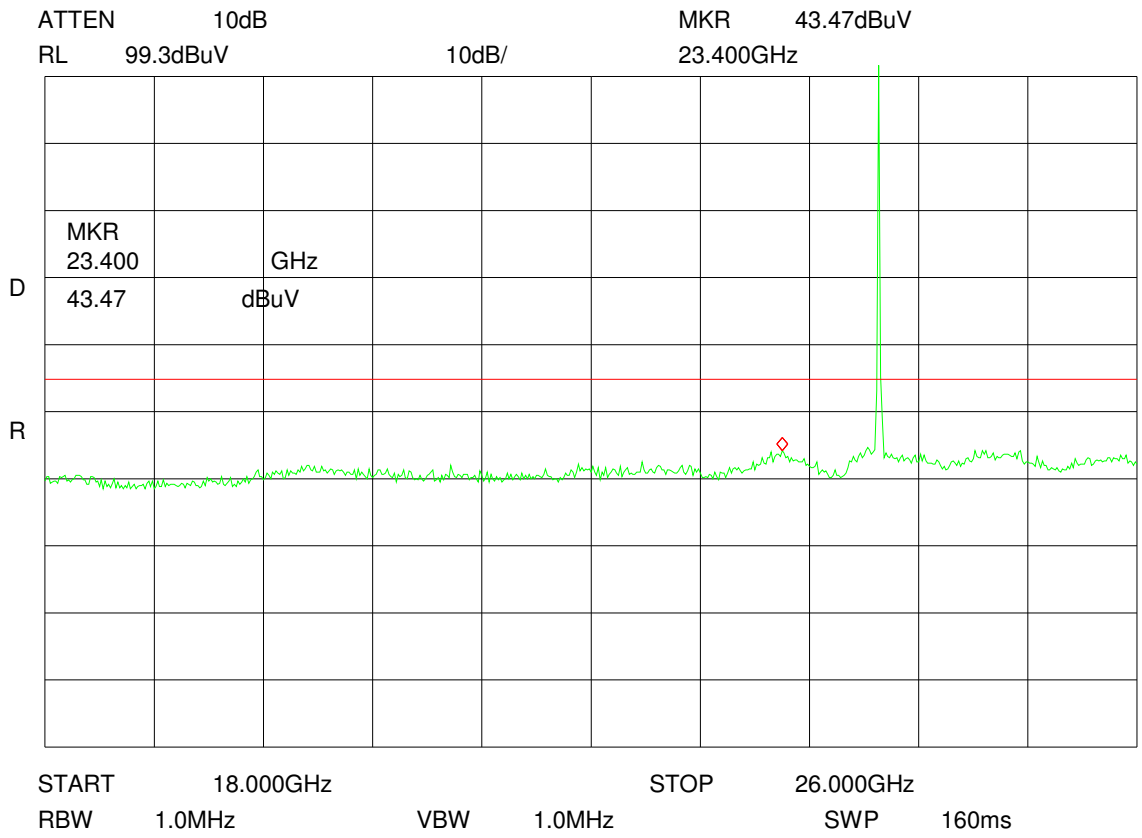
Plot 4:


Traffic
70
65
60
55
50
45
40
35
30
25
20
[dBµV/m]
1000
3000
5000
7000
9000
11000
[MHz]

Plot 5:

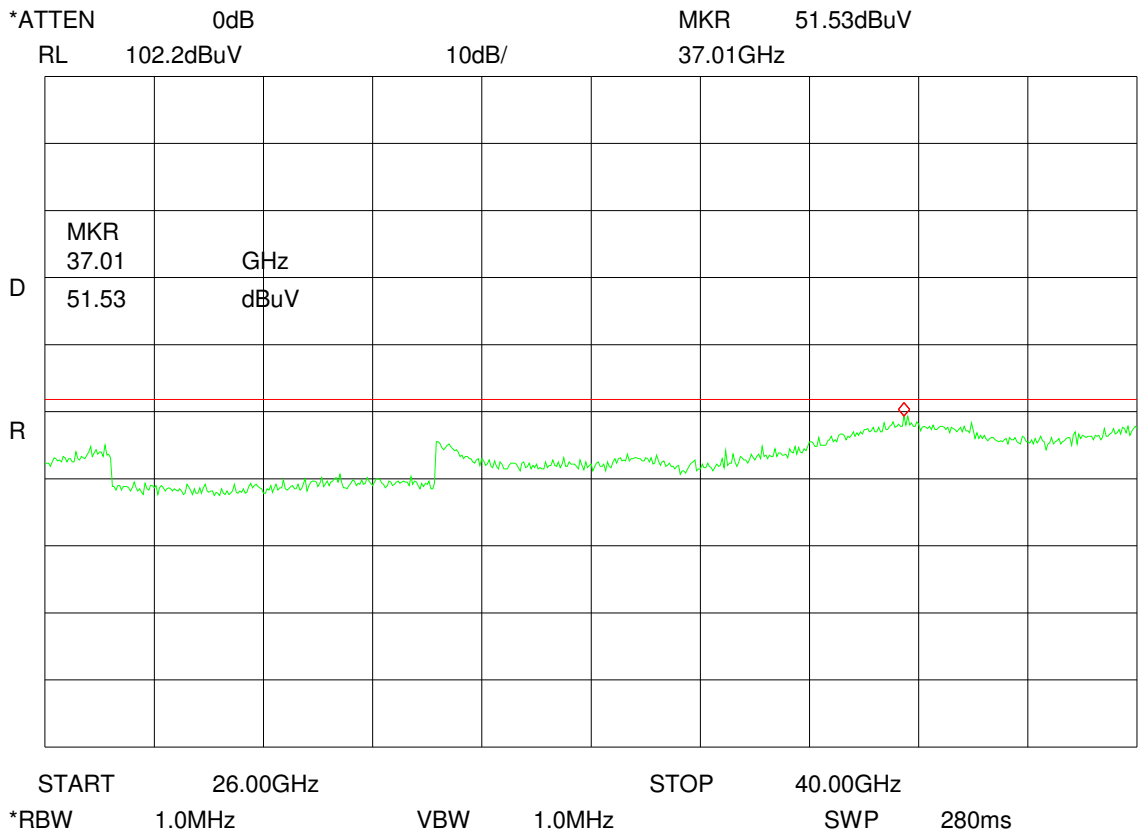

ATTEN 10dB
MKR 32.93dBuV
RL 91.1dBuV
10dB/
13.660GHz
MKR
13.660 GHz
D
32.93 dBuV
R
START 12.000GHz
STOP 18.000GHz
RBW 1.0MHz
VBW 1.0MHz
SWP 120ms

Plot 6:

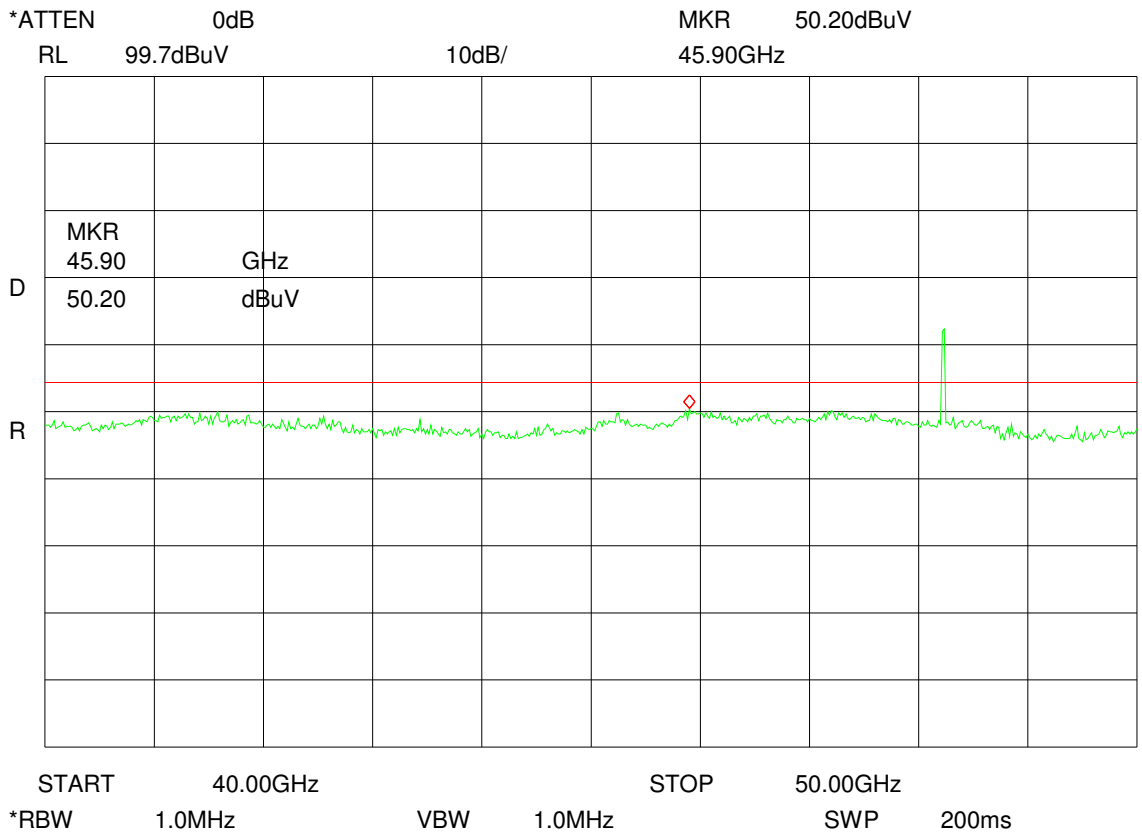


The peak at 24.1 GHz shows the carrier.

Plot 7:

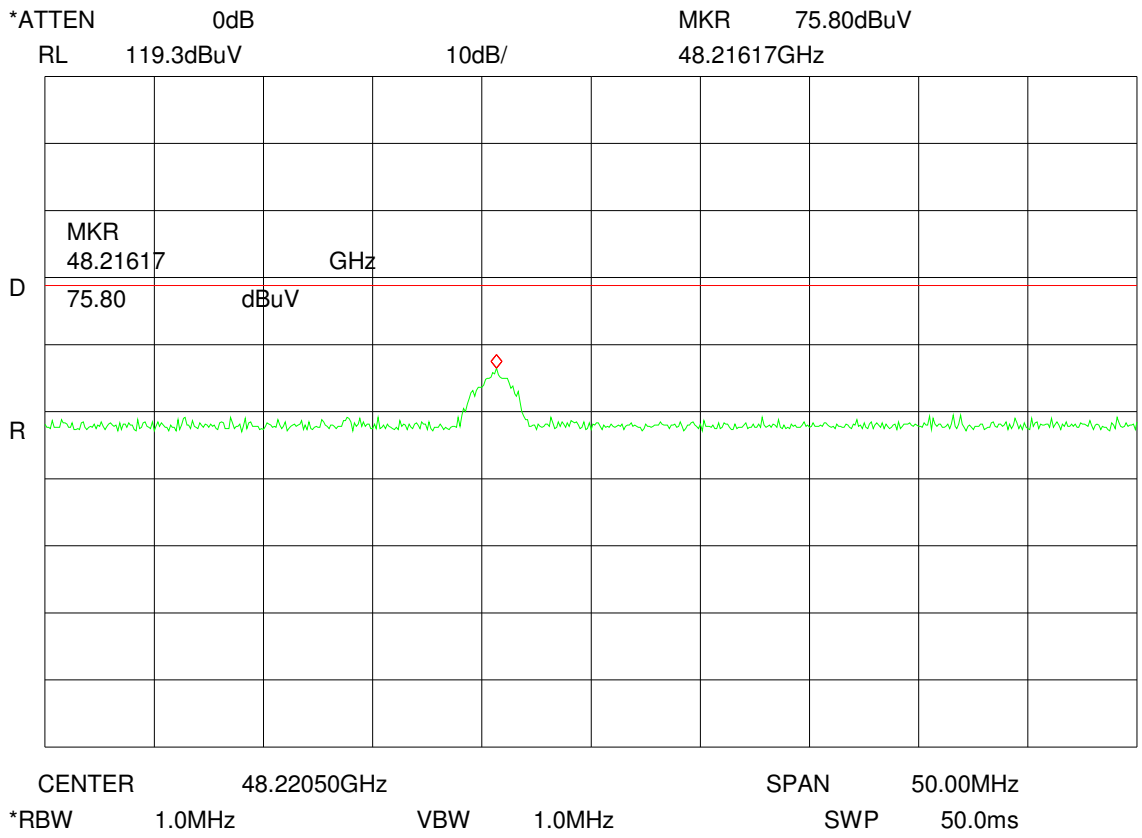

*ATTEN 0dB
MKR 51.53dBuV
RL 102.2dBuV
10dB/
37.01GHz
MKR
37.01 GHz
D
51.53 dBuV
R
START 26.00GHz
STOP 40.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 280ms

Plot 8:



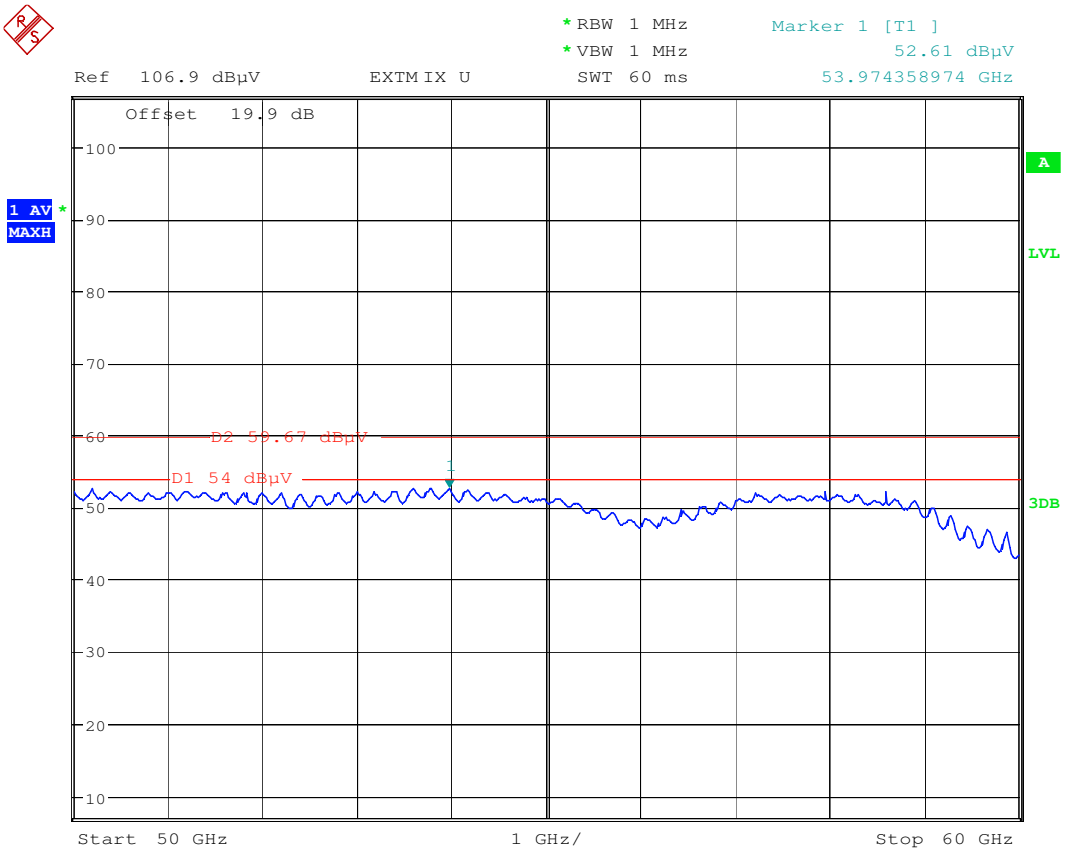
The peak at 48.2 GHz is the 2nd harmonic. The limit for harmonics is 88 dBµV/m at 3m distance.
Measurement is pass (see next plot)

Plot 9:



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

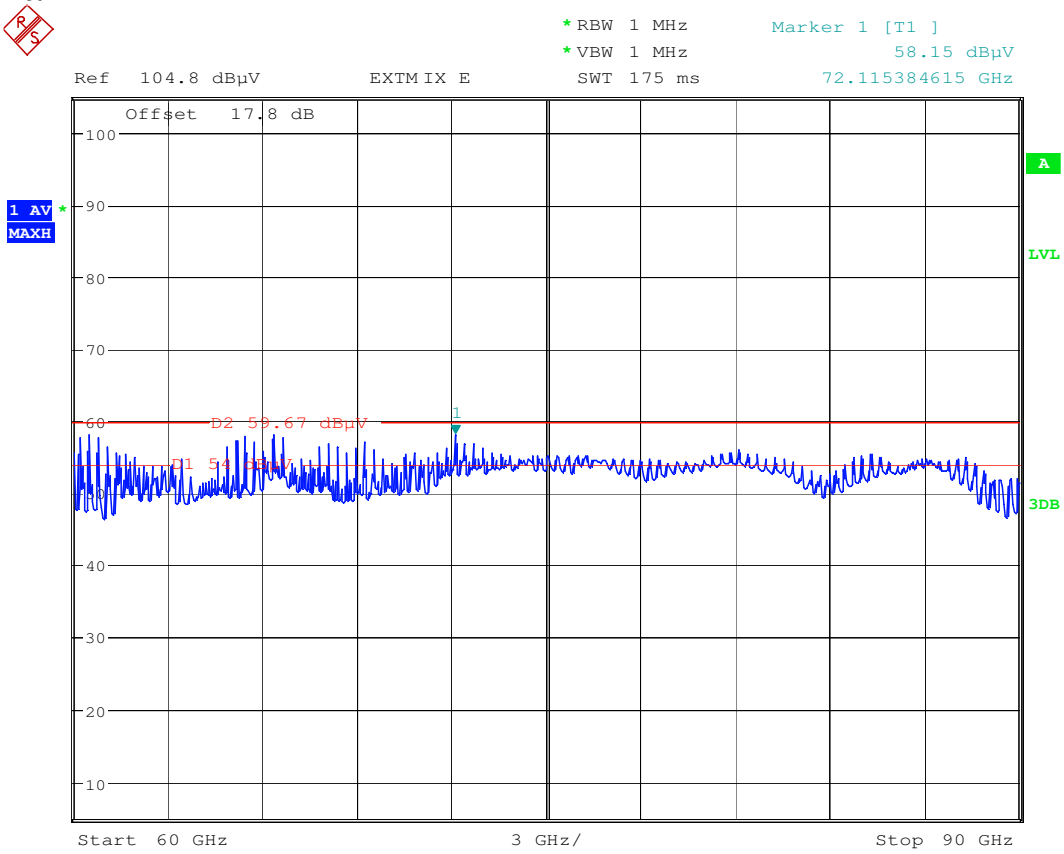
Plot 10:



Date: 30.SEP.2009 09:11:19

The upper limit line is 59.67 dBµV/m = -50 dBc
Measurement is pass.

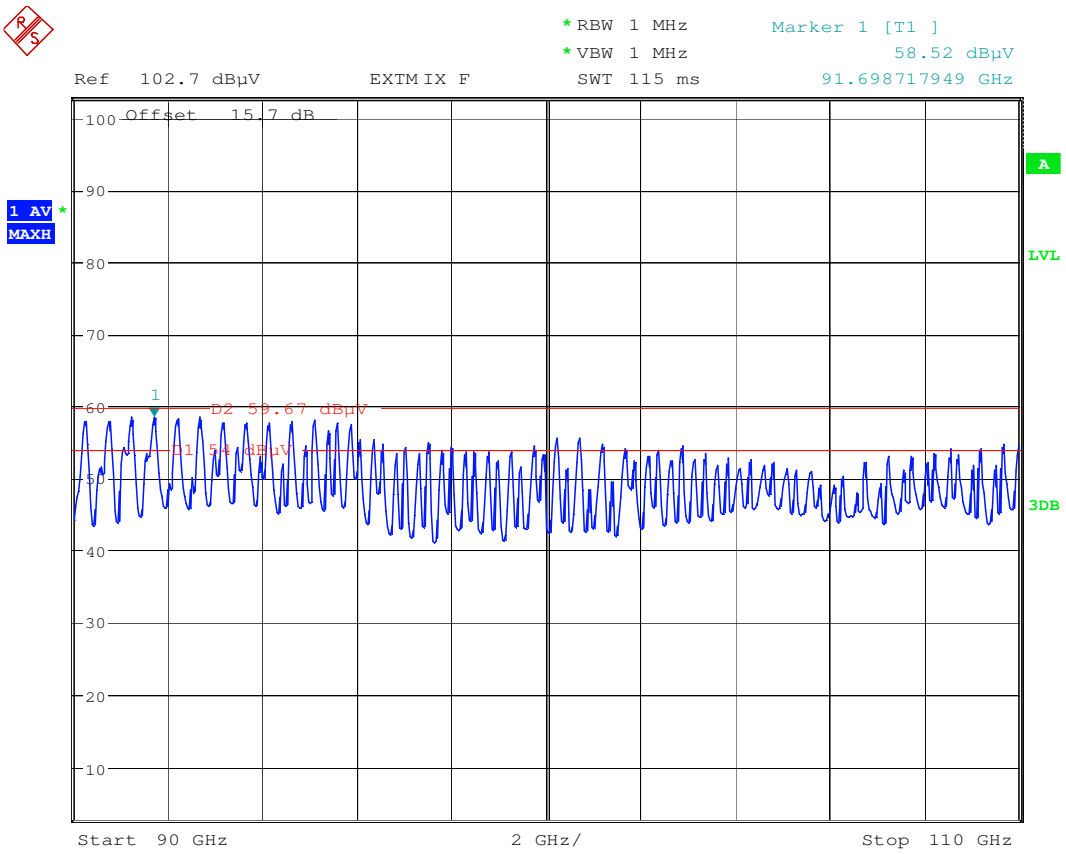
Plot 11:



Date: 30.SEP.2009 09:15:27

The upper limit line is 59.67 dBµV/m = -50 dBc
Measurement is pass.

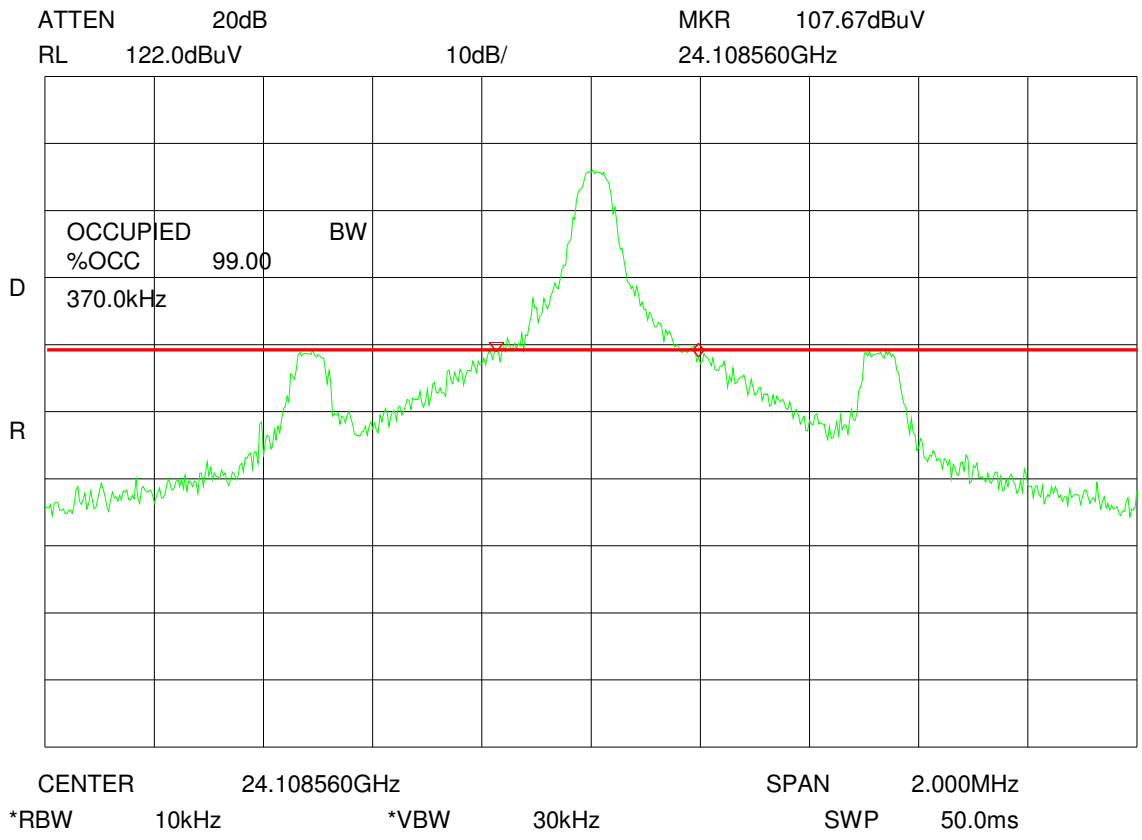
Plot 12:



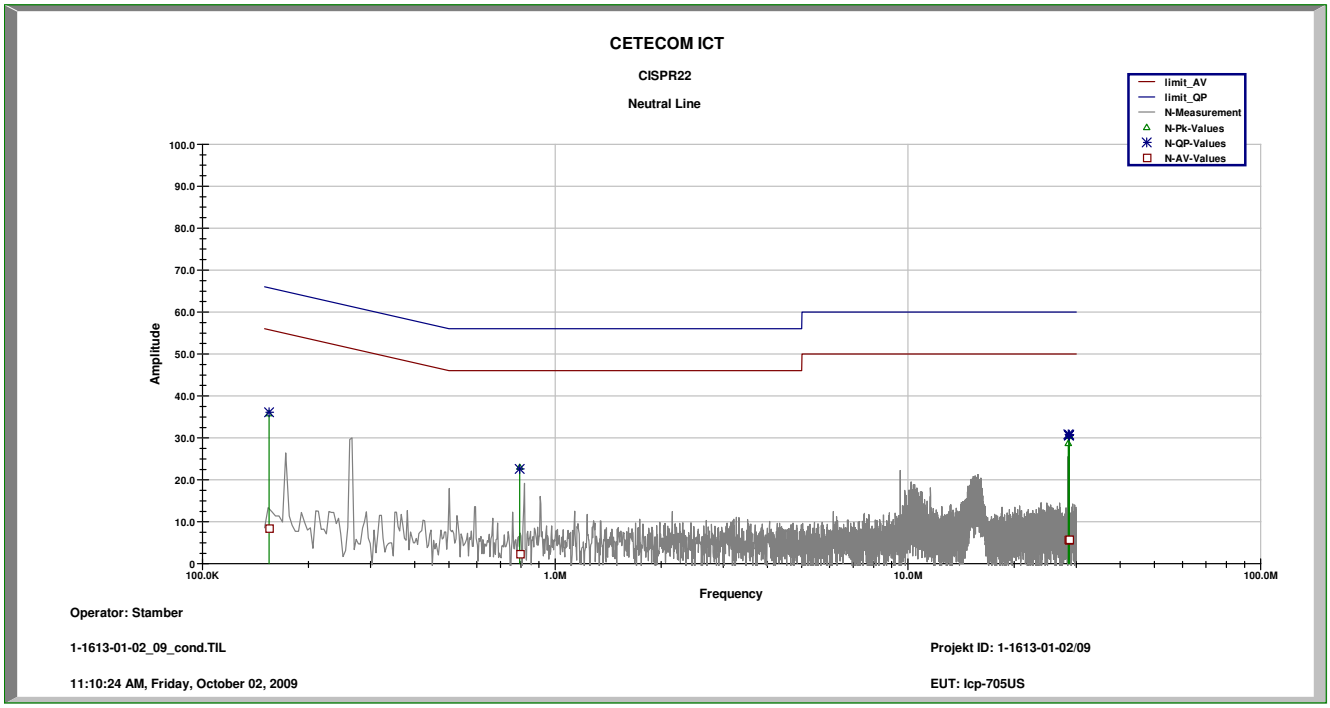
Date: 30.SEP.2009 09:20:49

The upper limit line is 59.67 dBµV/m = -50 dBc
Measurement is pass.

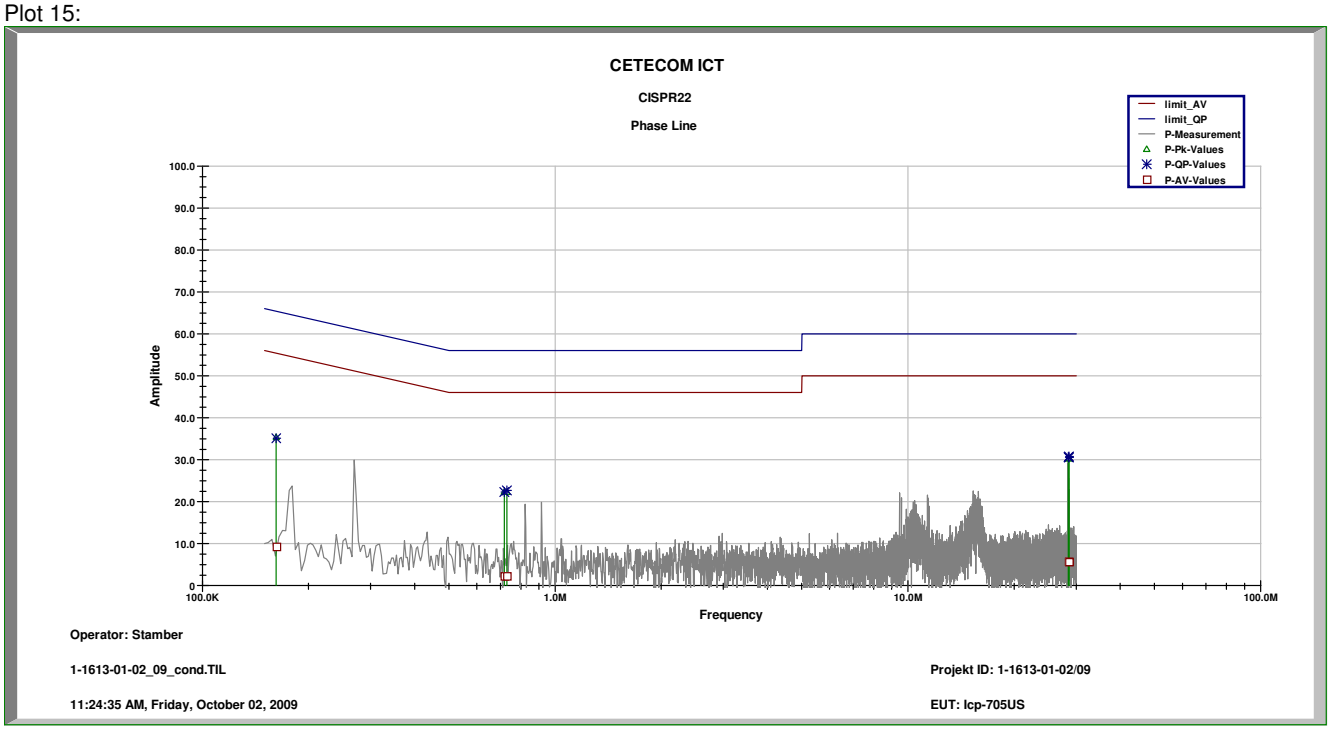
Plot 13:


ATTEN 20dB
MKR 107.67dBuV
RL 122.0dBuV
10dB/
24.108560GHz
OCCUPIED BW
%OCC 99.00
370.0kHz
D
R
CENTER 24.108560GHz
SPAN 2.000MHz
*RBW 10kHz
*VBW 30kHz
SWP 50.0ms

Plot 14:



Plot 15:



Photographs

Photo no.: 1

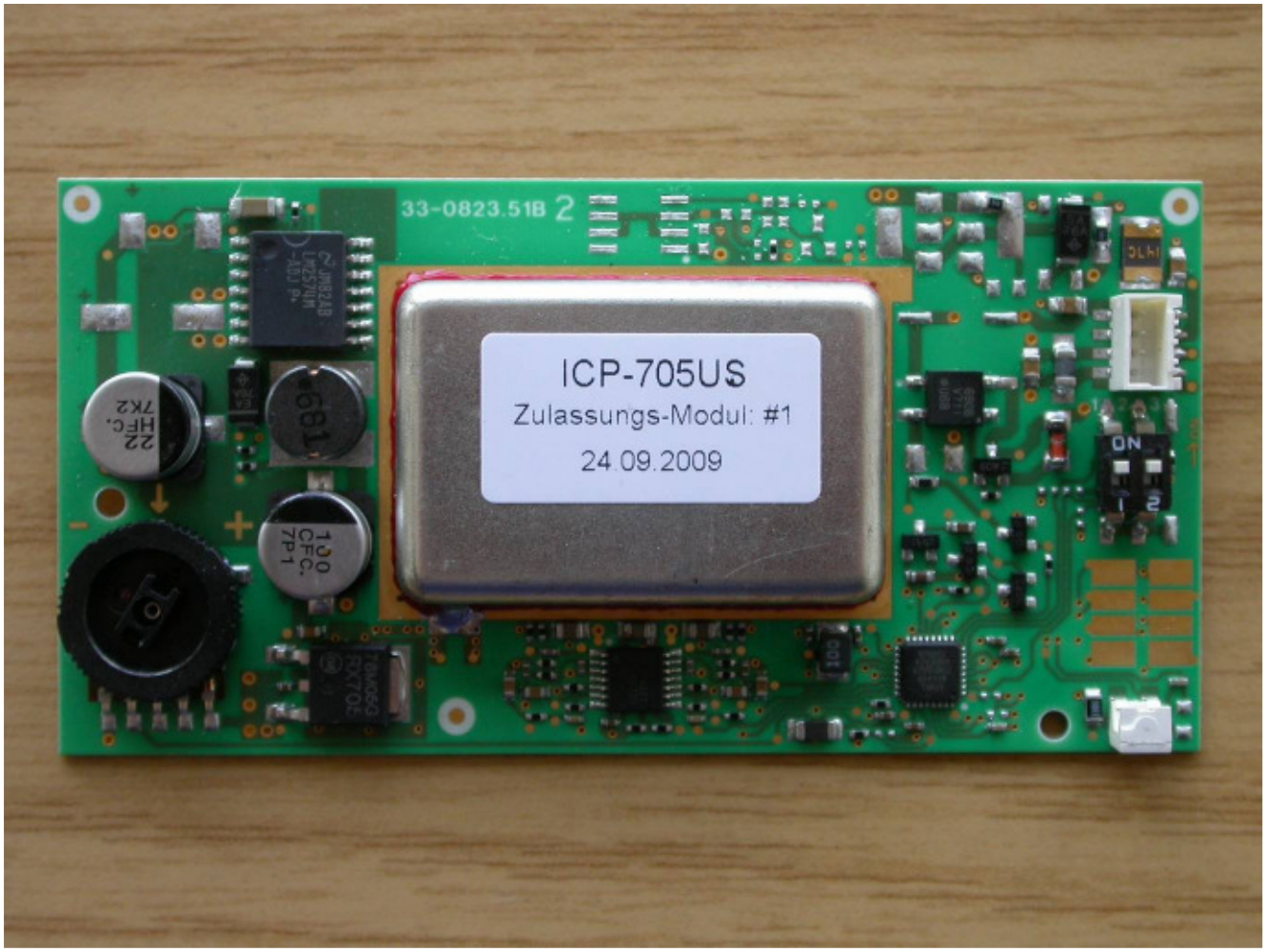


Photo no.: 2

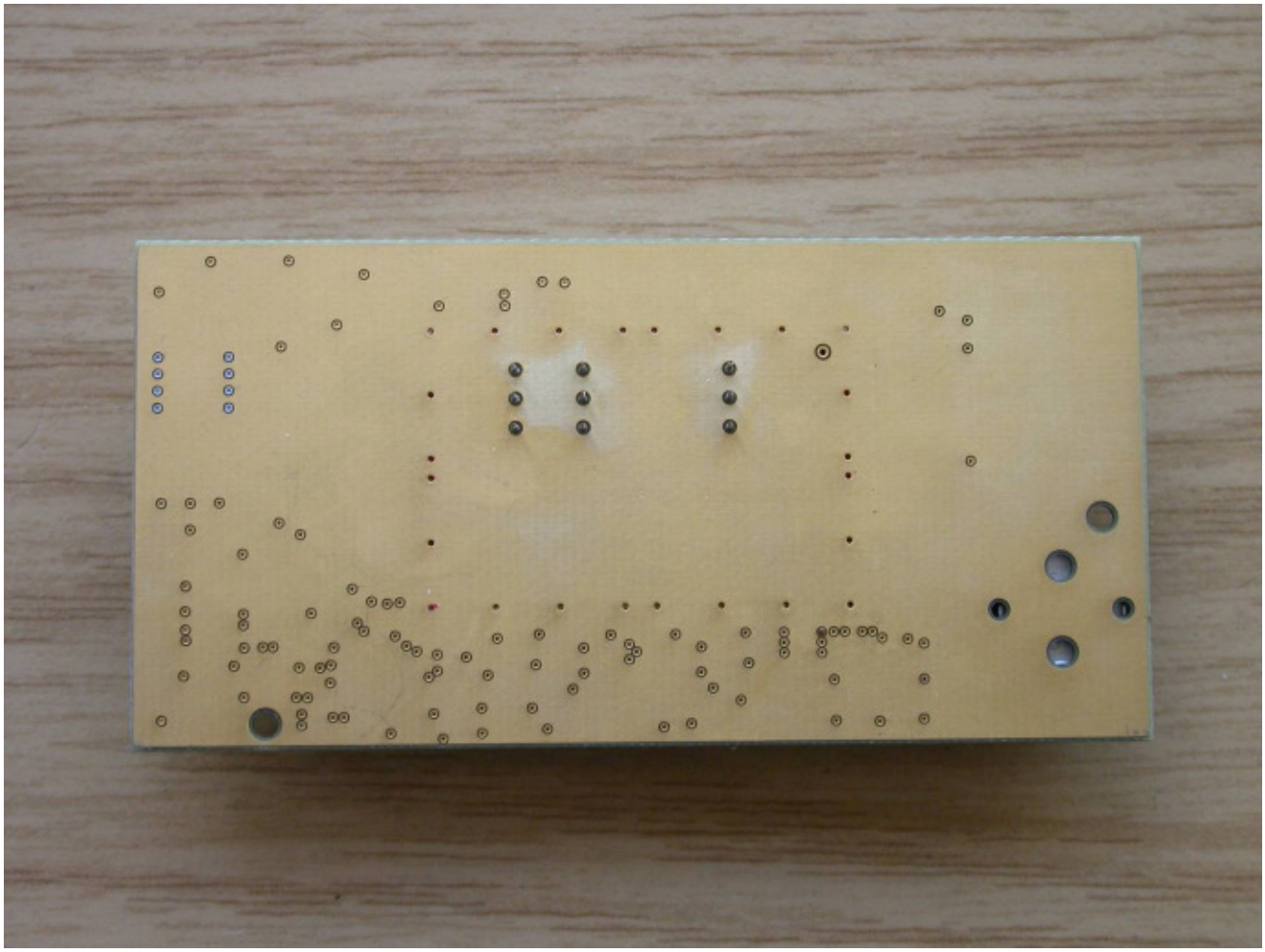


Photo no.: 3

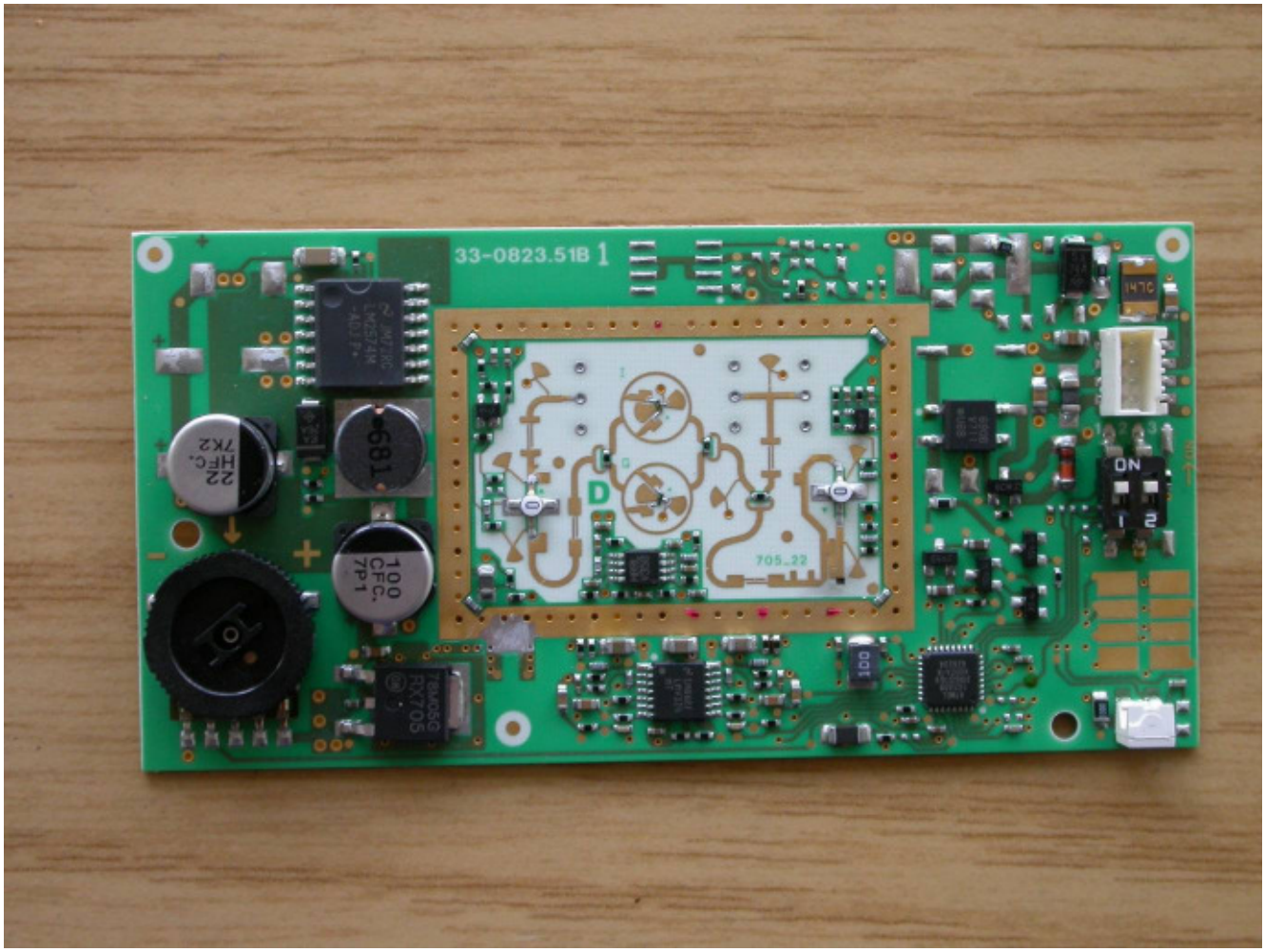
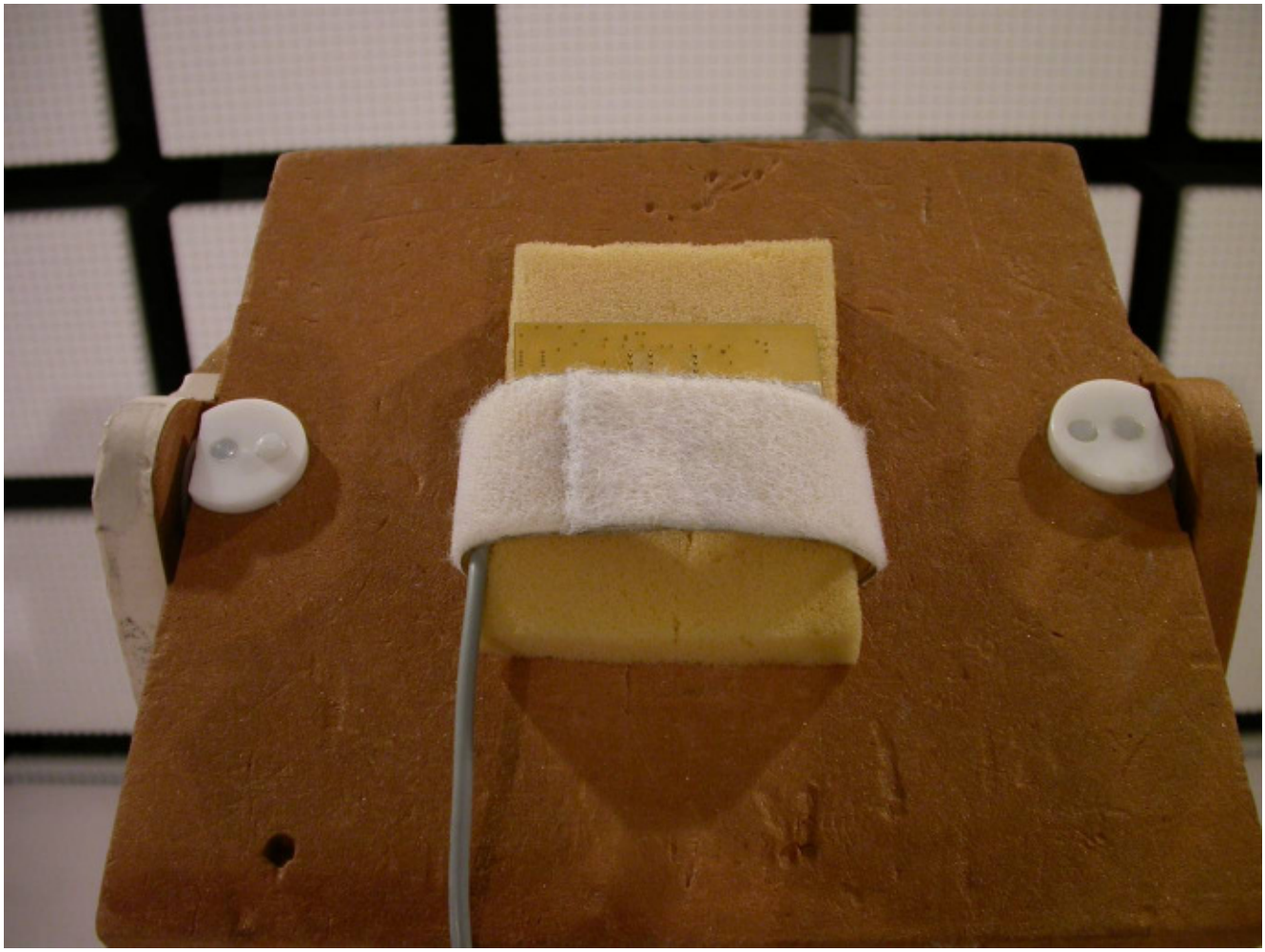
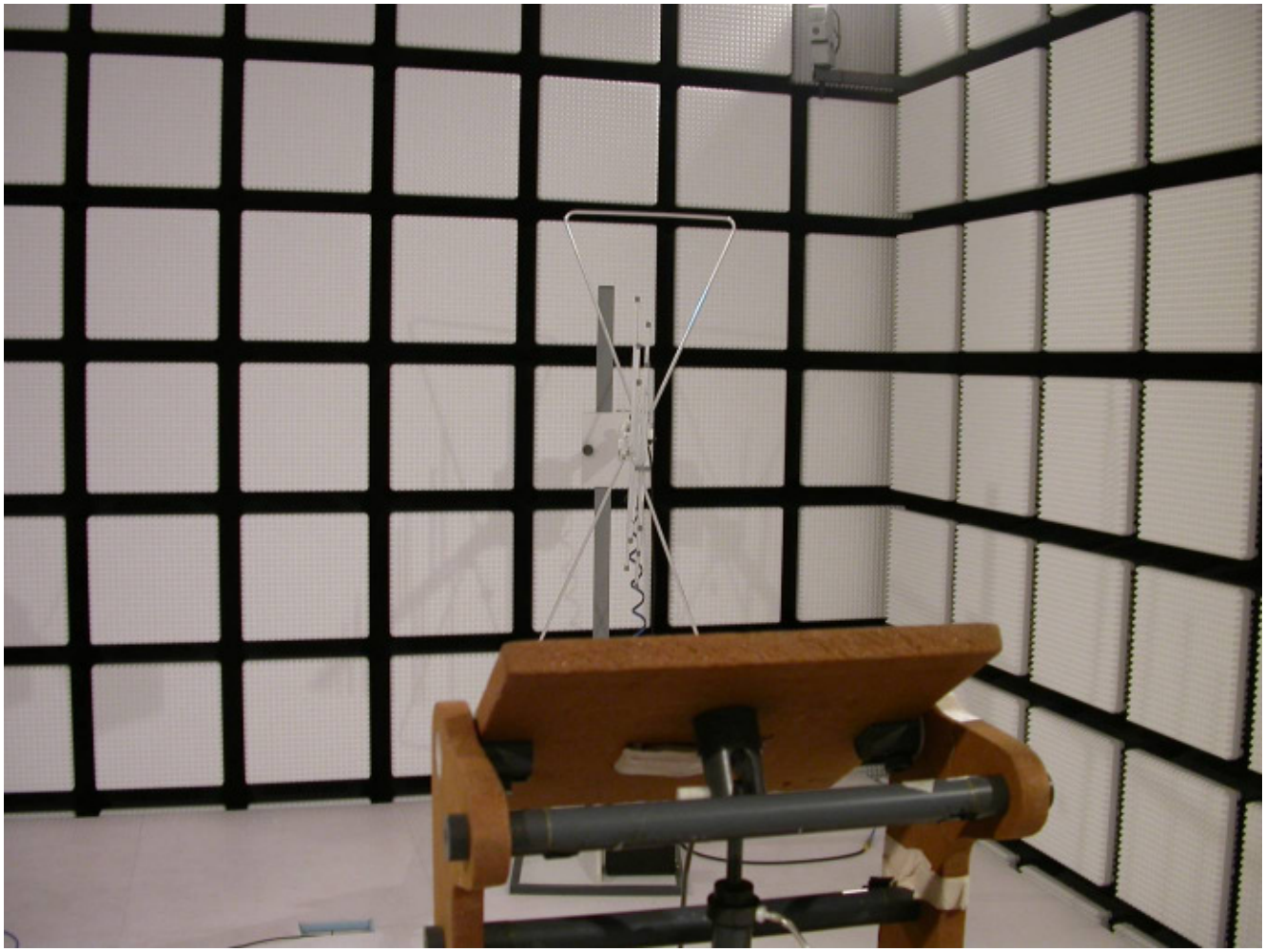


Photo no.: 4



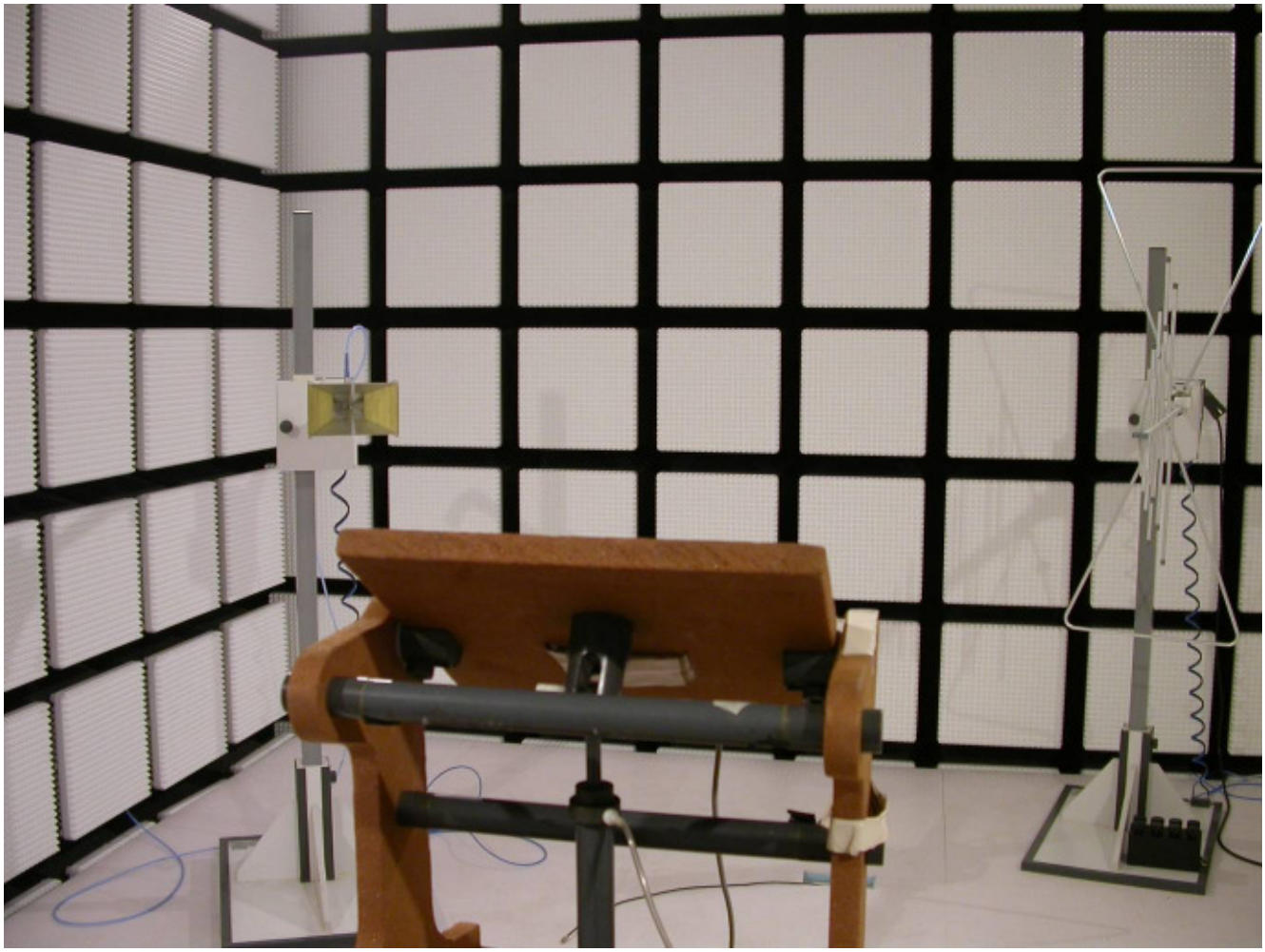
Spurious emission measurement 1 GHz – 12 GHz

Photo no.: 5



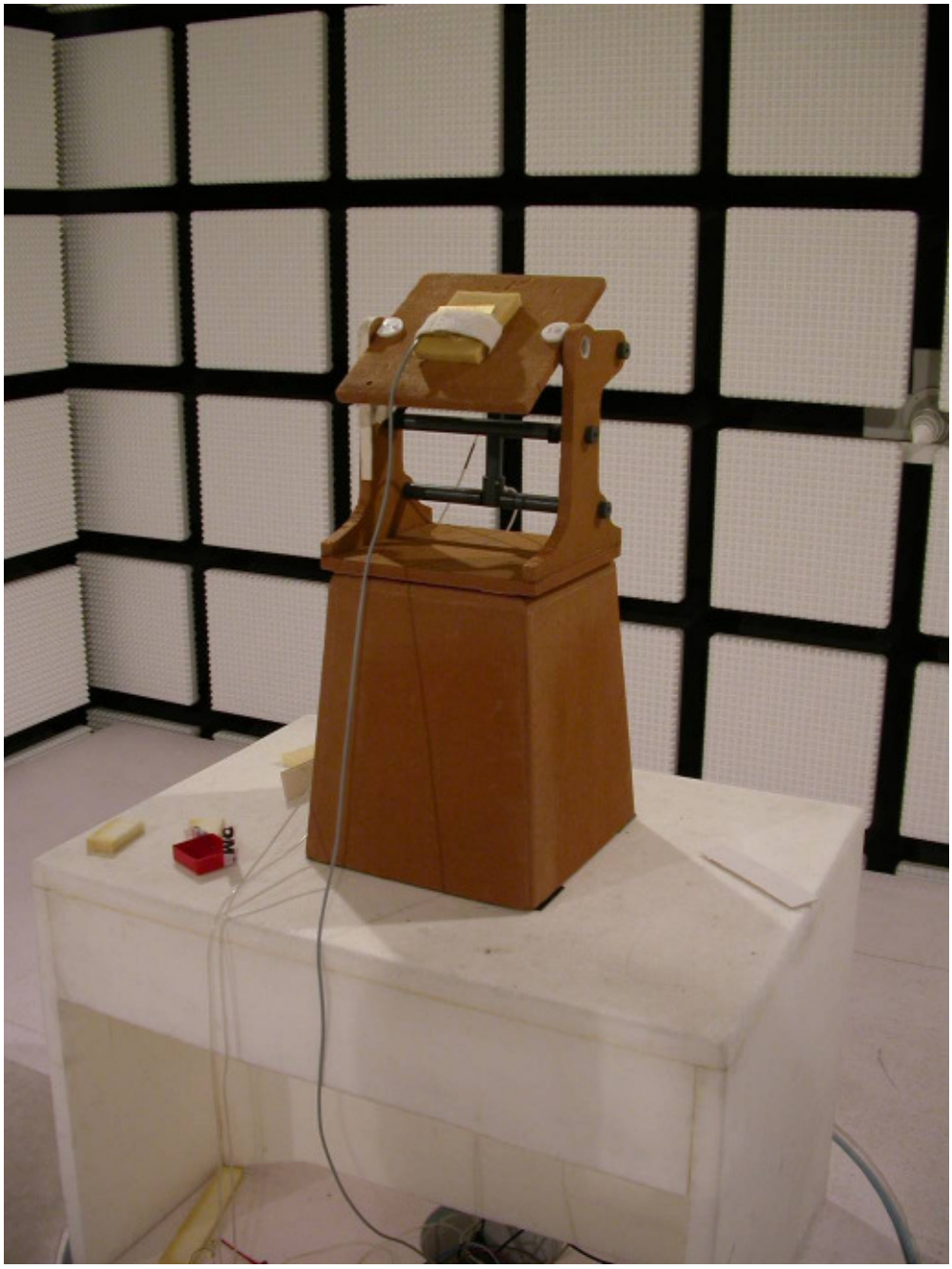
Spurious emission measurement 1 GHz – 12 GHz

Photo no.: 6



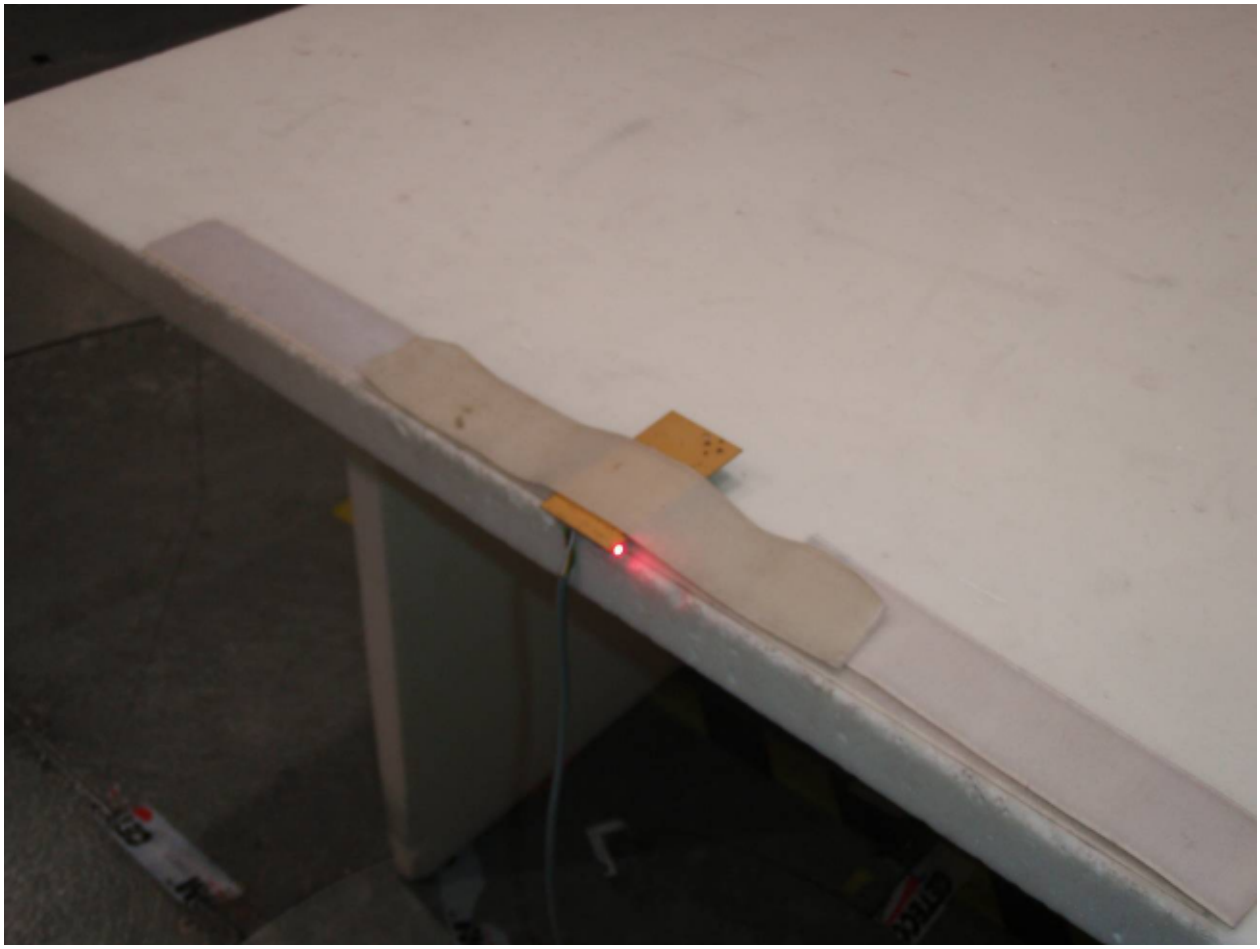
Spurious emission measurement 1 GHz – 12 GHz

Photo no.: 7



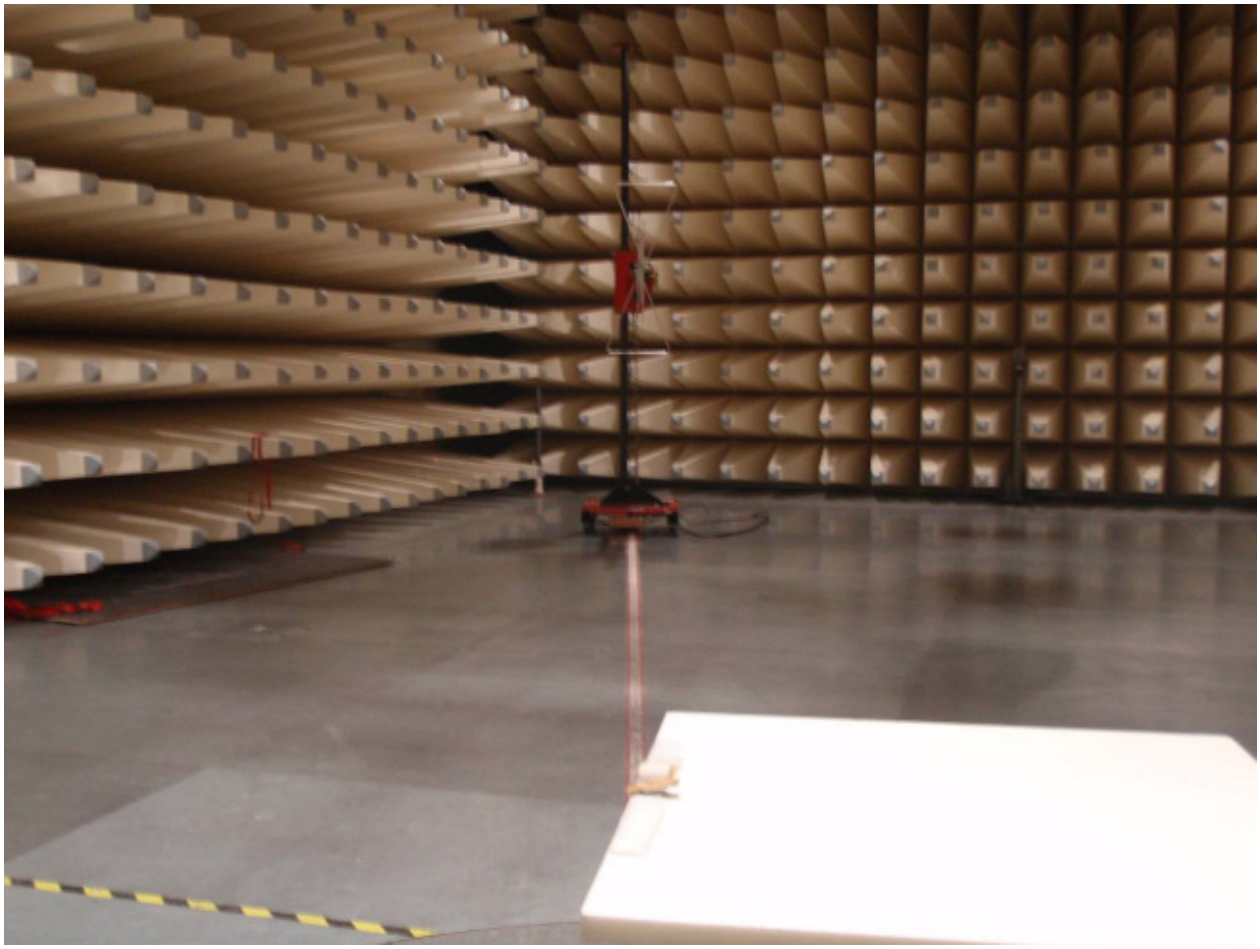
Spurious emission measurement 1 GHz – 12 GHz

Photo no.: 8



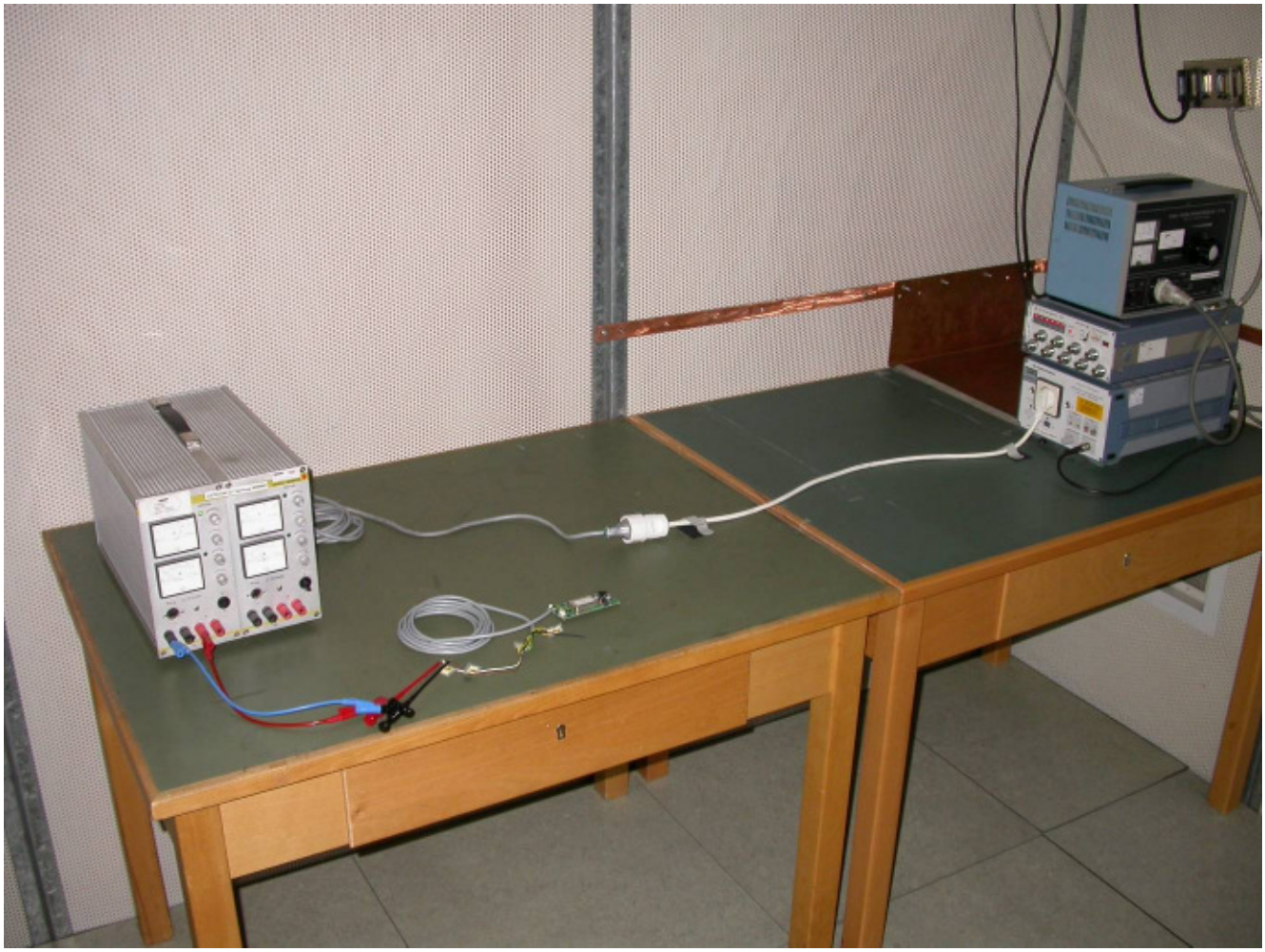
Spurious emission measurement 30 MHz – 1 GHz

Photo no.: 9



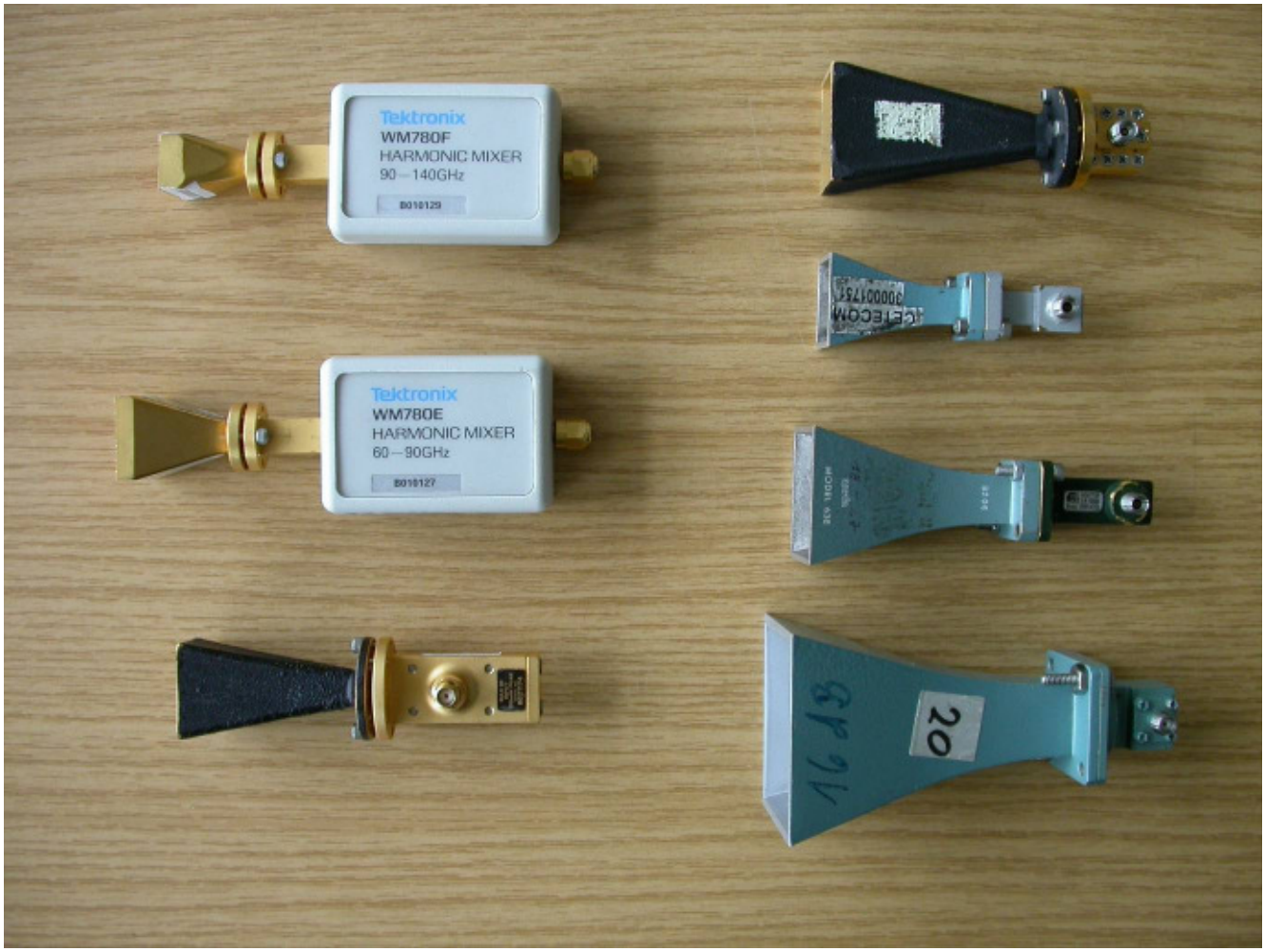
Spurious emission measurement 30 MHz – 1 GHz

Photo no.: 10



AC-conducted line measurement

Photo no.: 11



Spurious emission measurement equipment 12 GHz – 110 GHz