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Anechoic chamber registration No. 90462 (FCC)
Anechoic chamber registration No. 3463 (IC)
TCB ID: DE0001



Accredited by the
German Accreditation Council
DAR–Registration Number
TTI–P–G 081/94-D0



Independent ETSI
compliance test house



Test report No. : 2–3714–01–01/04
Applicant : Siemens Building Technologies AG
Type : IRM120C
FCC ID : RW8A5Q00004068
Test standard : FCC Part 15

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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 generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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Tester :

19.08.2004

Date

Manfred Paschwitz

Name



Signature

Technical responsibility for area of testing :

19.08.2004

Date

Dirk Hausknecht

Name



Signature

1.2. Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimerstraße 6-10

66117 Saarbrücken

Germany

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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

Authority	Identification/Registration No.
RegTP	TTI-P-G 081/94-D0
FCC	90462
IC	3463

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

Name : (Not applicable)

1.3. Details of applicant

Name : Siemens Building Technologies AG,
Fire & Security Products
Street : Alte Landstraße 411
Town : CH-8708 Männedorf
Country : Switzerland
Telephone : +41 (0) 1 922 6111

Contact person

Name : Stefan Hegnauer
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Fax : +41 (0) 1 922 6767
e mail : stefan.hegnauer@siemens.com

1.4. Application details

Date of receipt of application : 03.08.2004
Date of receipt of test item : 03.08.2004
Date of test : 16./17.08.2004

1.5. Test item (EUT)

Description of EUT	:	Microwave/passive-infrared motion detector
Type designation	:	IRM120C
FCC ID	:	RW8A5Q00004068
Manufacturer	:	Siemens Building Technologies AG, Fire & Security Products
Street	:	Alte Landstraße 411
Town	:	CH-8708 Männedorf
Country	:	Switzerland

1.6. Technical data

Frequency range	:	2.405 GHz ... 2.480 GHz
Operational frequency	:	2.448 GHz
Field strength	:	163 mV/m
Type of modulation	:	100H0N0N (CW)
Microwave modules	:	TX / RX – Module with integral antenna
Normal DC power supply	:	12.0 V
Extreme DC power supply	:	8.0 V ... 16.0 V

1.6.1. Operation conditions

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

1.6.2. Equipment under test

IRM120C	Art. No.	A5Q00004068
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1.7. Test standards:

1.8. Code of Federal Regulations (CFR 47)

FCC Part 15 Section 15.209
Radiation emission limits, general requirements

Section 15.245
Operation within the band 24.075 - 24.175 GHz

Section 15.249
Operation within the band 24.000 - 24.250 GHz

Section 15.205
Restricted bands of operation.

2. Technical test

2.1. Summary of test results

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

☐ The deviations as specified in clause 2.5 were ascertained during tests

The test report :

☒ 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

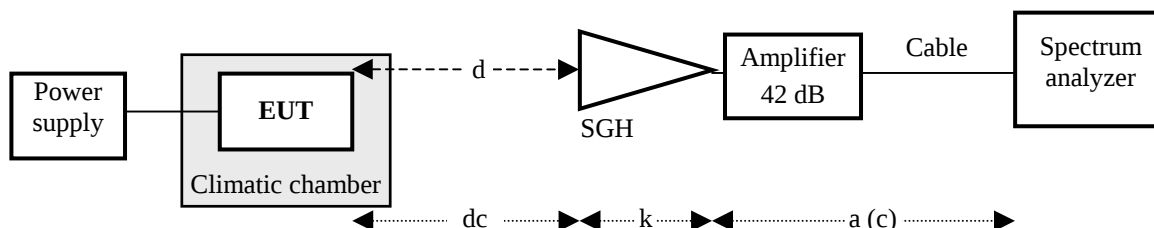
The environmental conditions are documented especially for each test.

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 and spurious radiation in the frequency range 4 GHz to 33 GHz with broadband amplifier



Frequency range [GHz]	Distance d [m]	Standard gain Horn ant. (SGH)	Antenna factor k [dB 1/m]	Amplifier gain g [dB]	Cable loss a [dB]
3.8 ... 6.0	3.0	narda 643	27.31	-42.0	1.5
5.3 ... 8.2	3.0	narda 642	30.06	-42.2	1.8
8.2 ... 12.4	3.0	narda 640	33.70	-42.0	2.0
12.4 ... 18.0	3.0	narda 639	33.97	-42.0	2.5
18 ... 26	1.0	narda 638	40.22	-42.0	3.0
26 ... 40	1.0	narda V637	44.00	-21.58	3.5

Calculation : Field strength = Analyser reading + Cable loss + Antenna factor + Ampl. gain

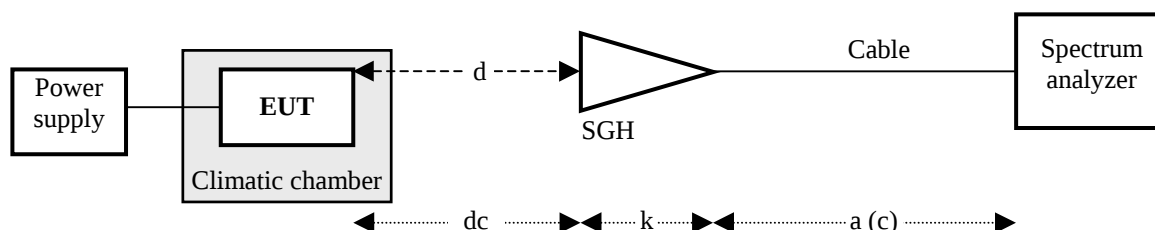
$$e = u + a + k + g$$

Test equipment	Manufacturer	Type	CETECOM reference
Spectrum Analyser	HP	HP 8565E	300001665
SGH 3.8 ... 6.0 GHz	narda	643	300002447
SGH 5.3 ... 8.2 GHz	narda	642	300000767
SGH 8.2 ... 12.4 GHz	narda	640	300002213
SGH 12.4 ... 18.0 GHz	narda	639	300000786
SGH 18 ... 27 GHz	narda	638	300002442
SGH 27 ... 40 GHz	narda	V637	300000510
SGH 27 ... 40 GHz	Thomson	COR 27_40	300000797a
Amplifier 0.5 ... 35 GHz	MITEC	U42	300003143
Power supply DC	HP	6032A	300002115
Power supply AC	Grundig	RT 5 A	300001263
RF-cable	HP	5061-5359	300002033
Power Supply	HP	6038A	300001174

Measurement uncertainty

Test parameter	Measurement uncertainty
Power supply	±0.1 V
Temperature	±0.2 °C
Frequency	±0.01 ppm
Field strength	±1.4 dB

2.4.2 Field strength and spurious radiation in the frequency range 4 GHz to 40 GHz



Frequency range [GHz]	Distance d [m]	Standard gain Horn ant. (SGH)	Antenna factor k [dB 1/m]	Distance corr. dc (3m/Xm) [dB]	Cable loss a [dB]
3.8 ... 6.0	1.0	narda 643	27.31	-9.54	1.5
5.3 ... 8.2	0.5	narda 642	30.06	-15.56	1.8
8.2 ... 12.4	0.5	narda 640	33.70	-15.56	2.0
12.4 ... 18.0	3.0	narda 639	33.97	n.a.	2.5
18.0 ... 27.0	3.0	narda 638	40.22	n.a.	3.0
24.125	3.0	narda 638	33.97	n.a.	2.9
27.0 ... 40.0	3.0	narda V637	44.00	n.a.	3.5

Calculation : Field strength = Analyser reading + Cable loss + Antenna factor + distance corr.

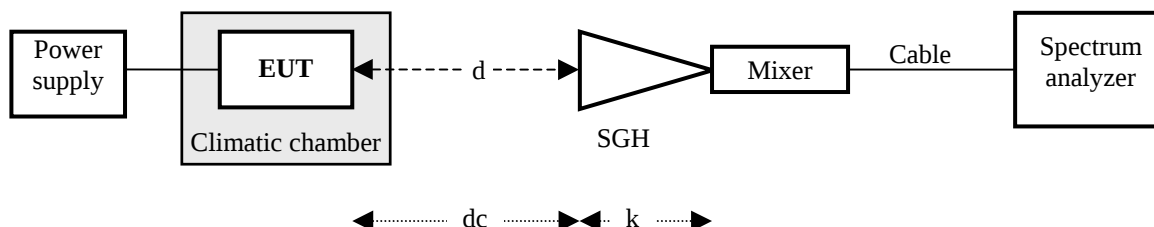
$$e = u + a + k + dc$$

Test equipment	Manufacturer	Type	CETECOM reference
Spectrum Analyser	HP	HP 8565E	300001665
SGH 3.8 ... 6.0 GHz	narda	643	300002447
SGH 5.3 ... 8.2 GHz	narda	642	300000767
SGH 8.2 ... 12.4 GHz	narda	640	300002213
SGH 12.4 ... 18.0 GHz	narda	639	300000786
SGH 18 ... 27 GHz	narda	638	300002442
SGH 27 ... 40 GHz	narda	V637	300000510
SGH 27 ... 40 GHz	Thomson	COR 27_40	300000797a
Power supply DC	HP	6032A	300002115
Power supply AC	Grundig	RT 5 A	300001263
RF-cable	HP	5061-5359	300002033
Power Supply	HP	6038A	300001174

Measurement uncertainty

Test parameter	Measurement uncertainty
Power supply	±0.1 V
Temperature	±0.2 °C
Frequency	±0.01 ppm
Field strength	±1.4 dB

2.4.3 Field strength and spurious radiation in the frequency range 33 GHz to 110 GHz



Frequency range [GHz]	Distance d [m]	Distance correction dc (3 m/Xm) [dB]	Antenna factor k [dB 1/m]
33.0 50.0	3.0	n.a.	39.10
50.0 75.0	0.25	-21.58	40.67
75.0 ... 110.0	0.125	-27.60	45.07

Calculation : Field strength = Analyser reading + Cable loss + Antenna factor + Distance correction

e = u + a + k + dc

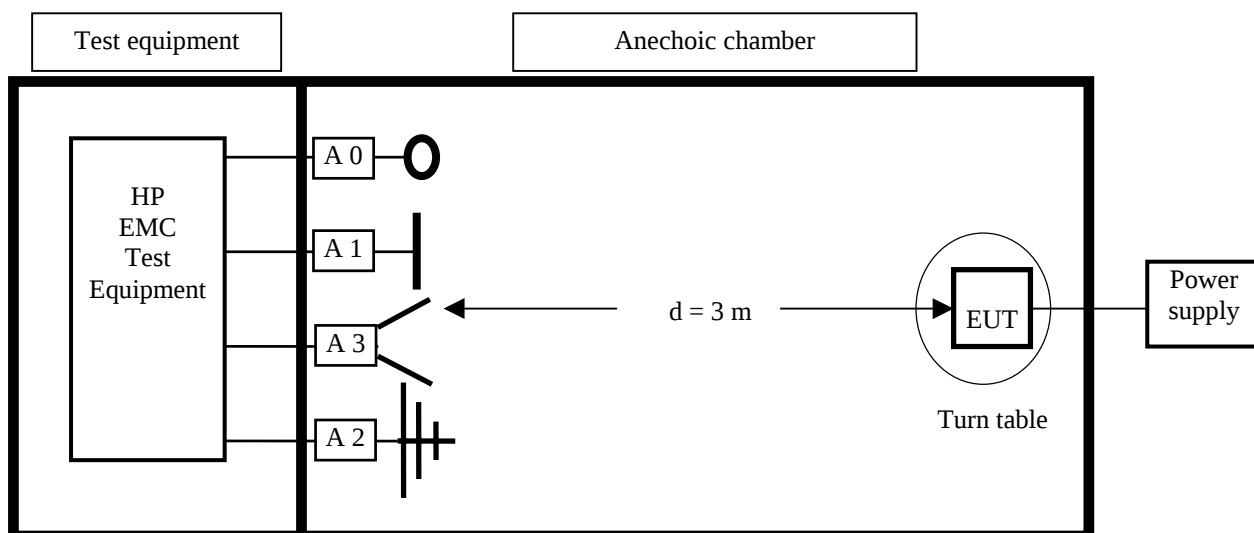
Test equipment	Manufacturer	Type	CETECOM reference
Spectrum Analyser	HP	HP 8565E	300001665
Power supply	HP	6032A	300002115
SGH 33 ... 50 GHz	Thomson	COR 33_50	300000812
Mixer 33 ... 50 GHz	HP	11970Q	300000781j
SGH 50 ... 75 GHz	Thomson	COR 50_75	300000789k
Mixer 50 ... 75 GHz	HP	11970V	300000871o
SGH 75 ... 110 GHz	Thomson	COR 75_110	300000789m
Mixer 75 ... 110 GHz	HP	11970W	300000871v
Power Supply	HP	6038A	300001174

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

2.4.4 Field strength and spurious radiation in the frequency range 9 kHz to 4 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
Power supply	HP	HP 6038A	2848A07027
RF-cable	HP	5061-5359	P36303

Measurement uncertainties

Performance	Measurement uncertainty
Input power (DC)	$\pm 0.1 \text{ V}$
Temperature	$\pm 0.2 \text{ }^{\circ}\text{C}$
Frequency	$\pm 0.01 \text{ ppm}$
Field strength	$\pm 1.4 \text{ dB}$

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 Part 15 requirement

2.5.2 Summary of test set up

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

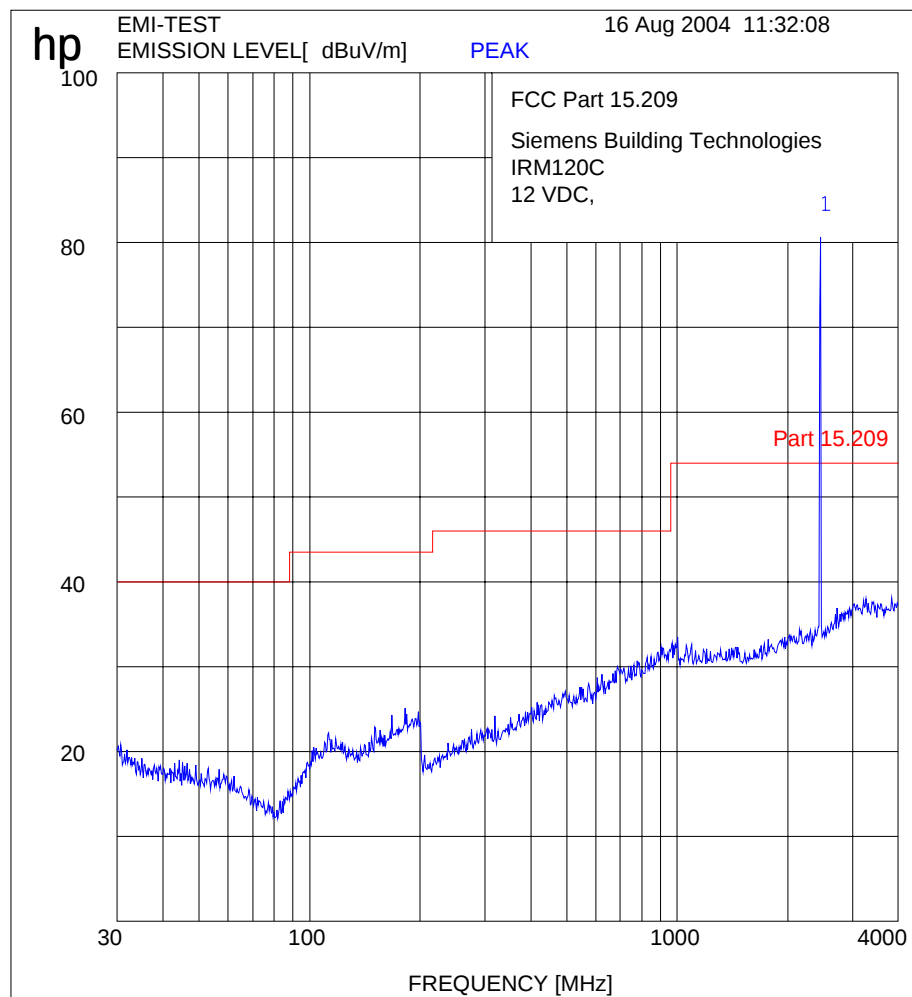
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 325 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are 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 by 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 analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-1992 clause 4.2.

Verdict :	Spurious limits are kept
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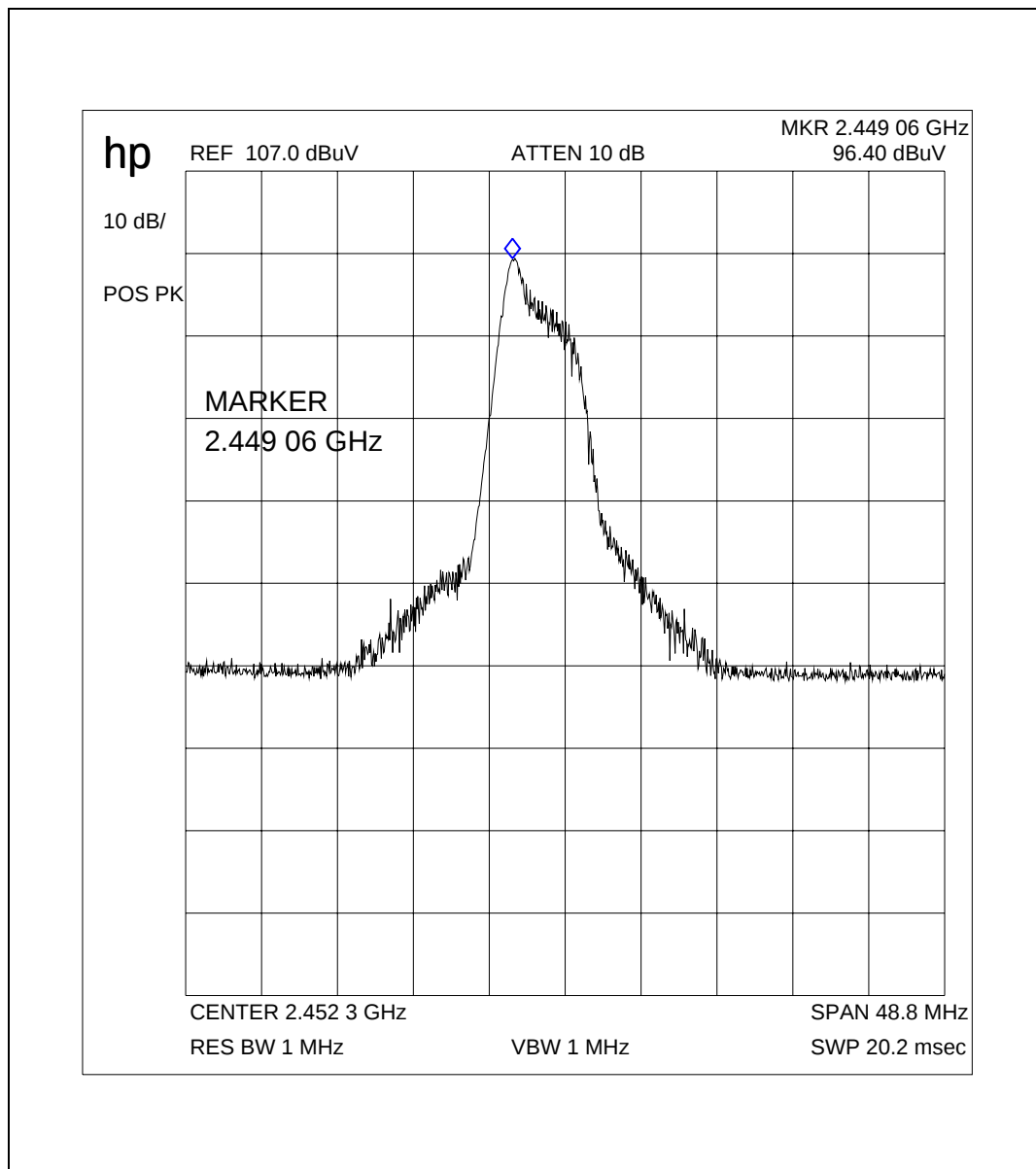
3. Plots, graphs and data sheets

Plot 1



Measurement distance d = 3.0 m

Plot 2



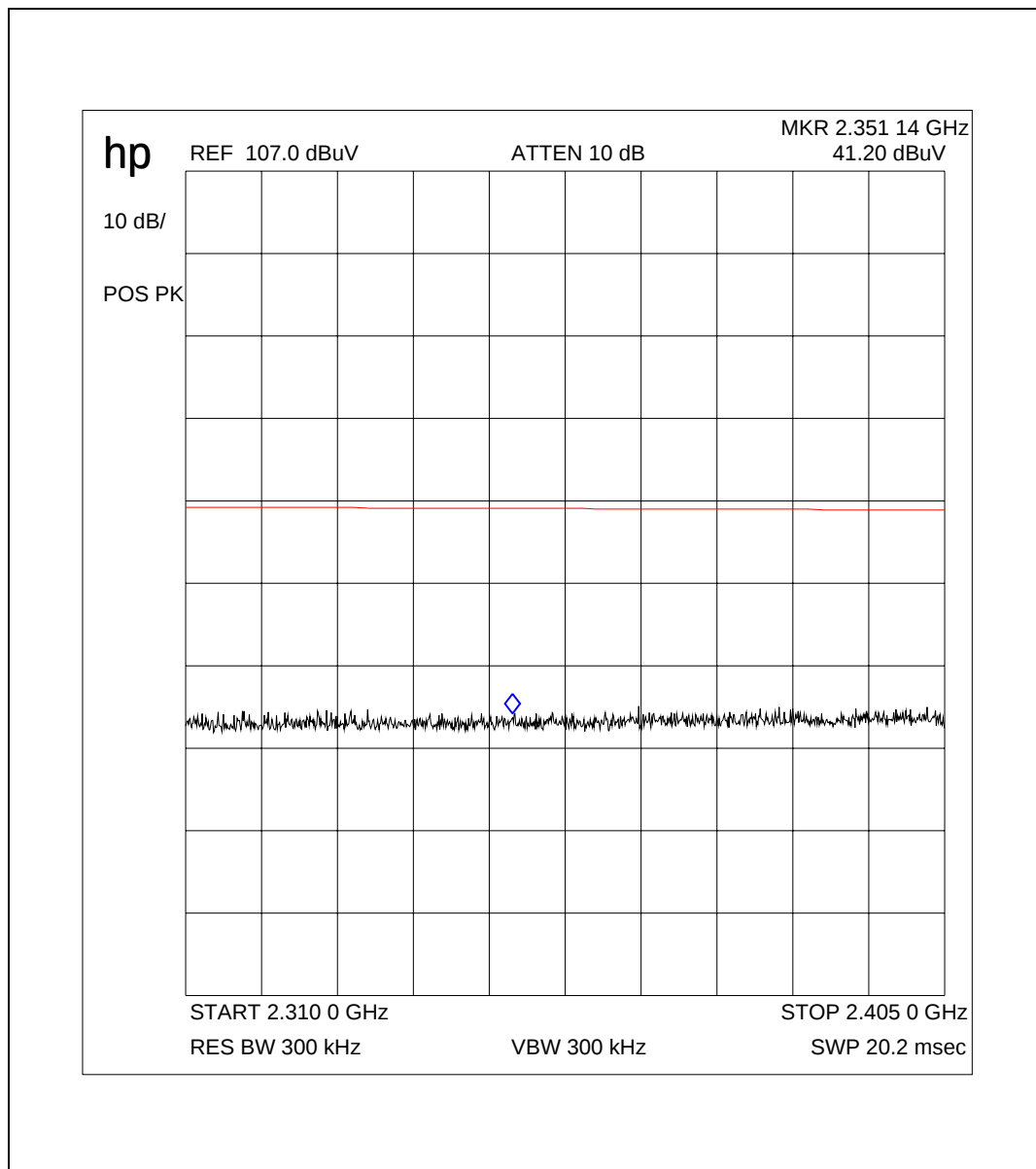
Measurement distance d = 3.0 m

Calculation :

max. Field strength = 96.4 dB μ V
 System correction factor = -2.9 dB (antenna factor and amplifier)
 E = 93.5 dB μ V/m

value is manually re measured for maximum readout

Plot 3



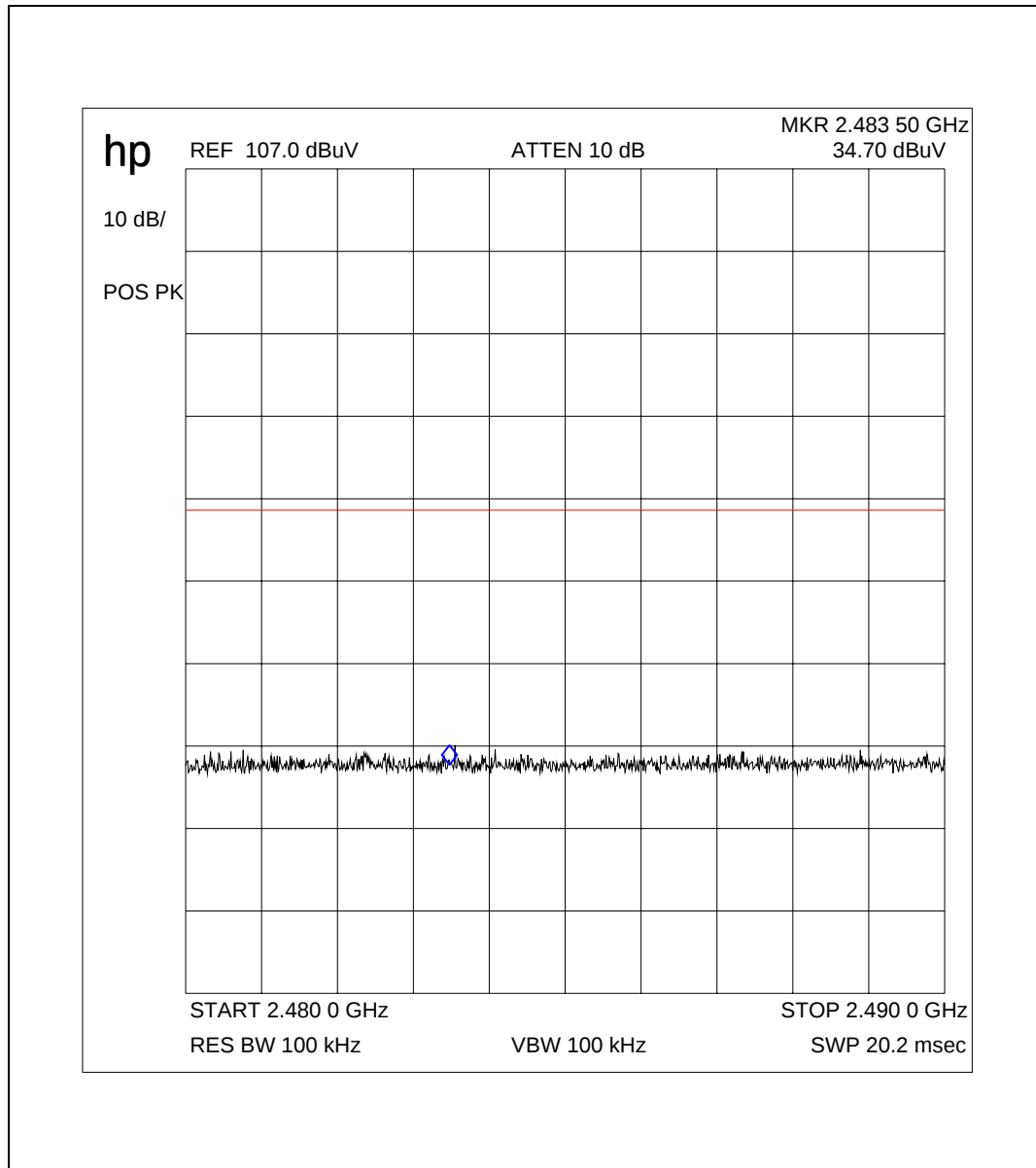
Measurement distance $d = 3.0 \text{ m}$

Calculation for : 2.351 GHz

max. Field strength = 41.2 dB μ V

value is manually re measured for maximum readout

Plot 4



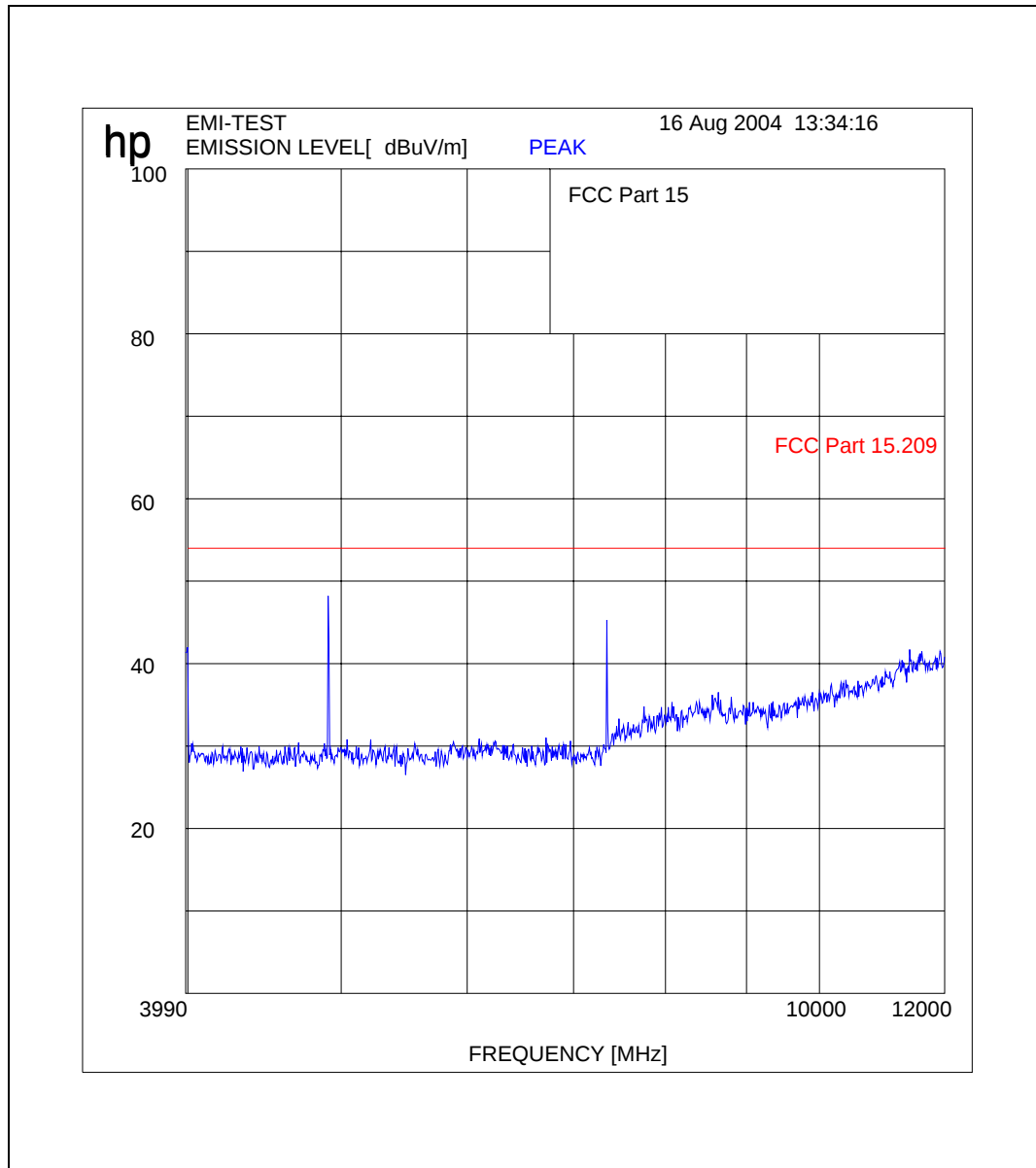
Measurement distance d = 3.0 m

Calculation : 2.483 GHz

max. Field strength = 34.7 dB μ V

value is manually re measured for maximum readout

Plot 5



Measurement distance d = 3.0 m

Calculation : 4.898 GHz

max. Field strength = 96.8 dB μ V/m

E = 80.6 dB μ V/m

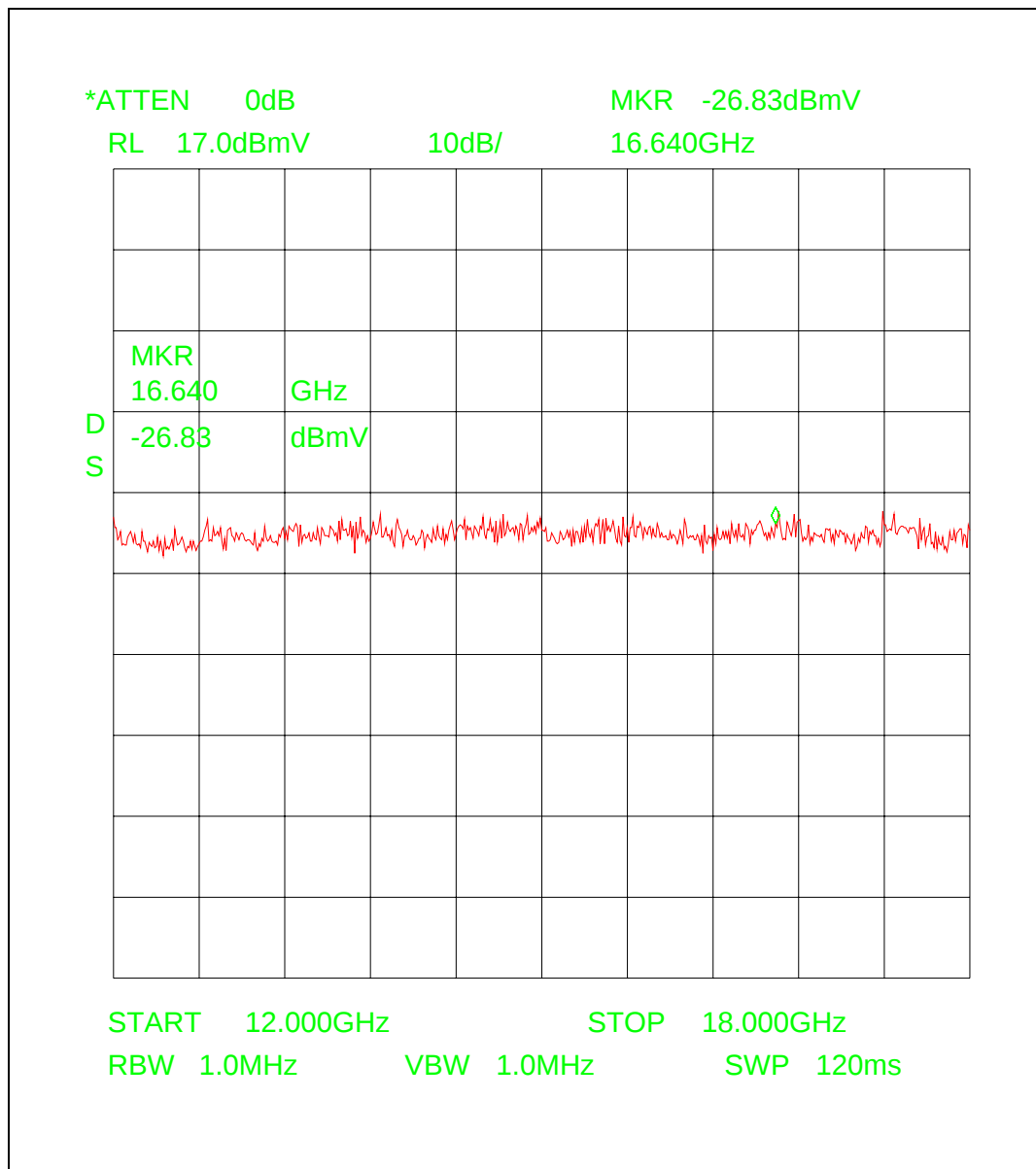
Calculation : 7.347 GHz

max. Field strength = 60.0 dB μ V/m

E = 43.5 dB μ V/m

value is manually re measured for maximum readout

Plot 6



Measurement distance d = 3.0 m

Calculation : Field strength = Analyser reading + Antenna factor + amplifier + cable loss

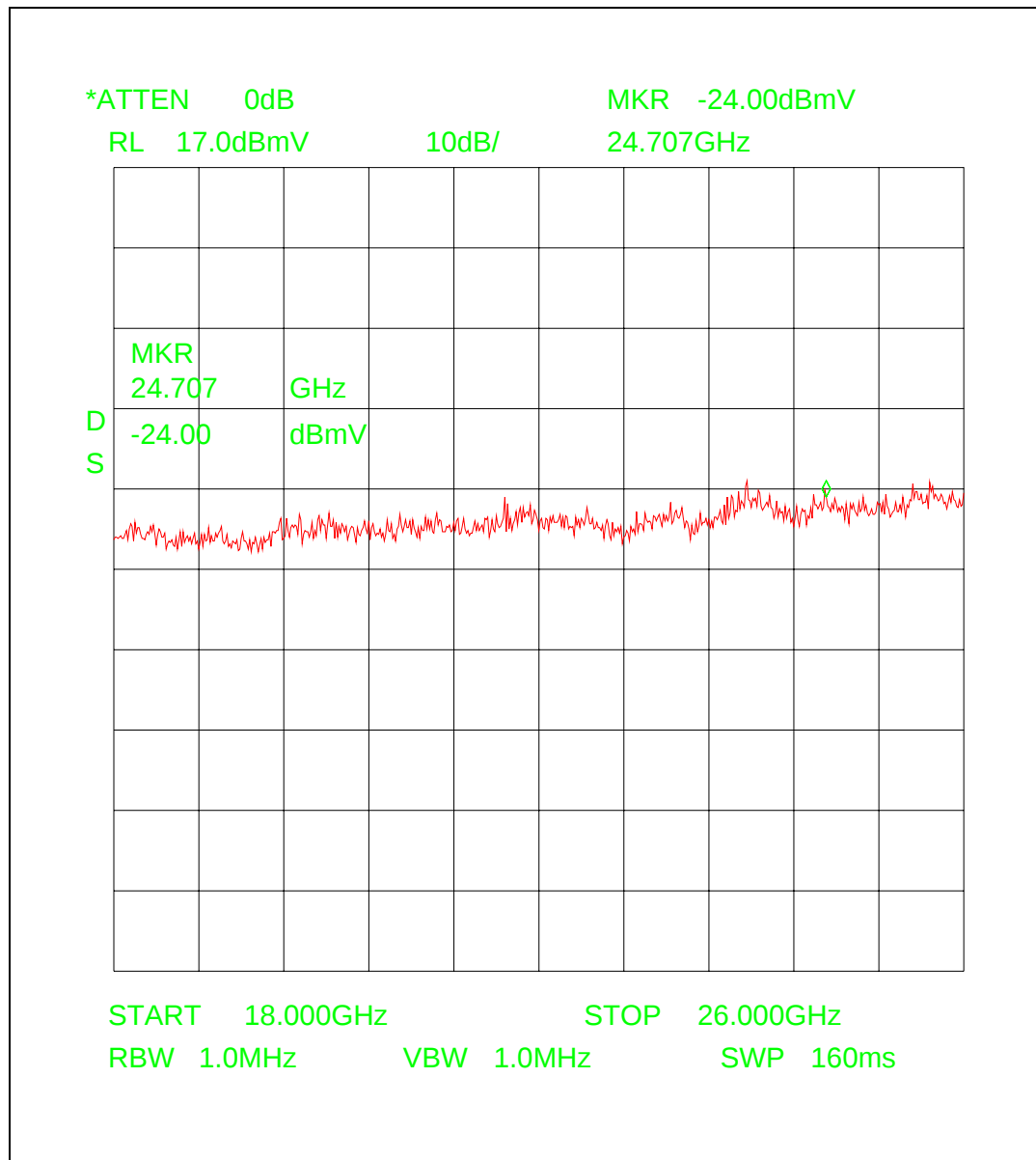
e = -26.8 dB(mV) + 33.97 dB(1/m) + (-42.0 dB) + 2.0 dB

e = -32.83 dB(mV/m)

E = 0.022 mV/m

E = 22.8 μ V/m (noise)

Plot 7



Measurement distance d = 3.0 m

Calculation : Field strength = Analyser reading + Antenna factor + amplifier + cable loss

e = -24.0 dB(mV) + 40.22 dB(1/m) + (- 42.00 dB) + 3.0 dB

e = -22.78 dB(mV/m)

E = 0.072 mV/m

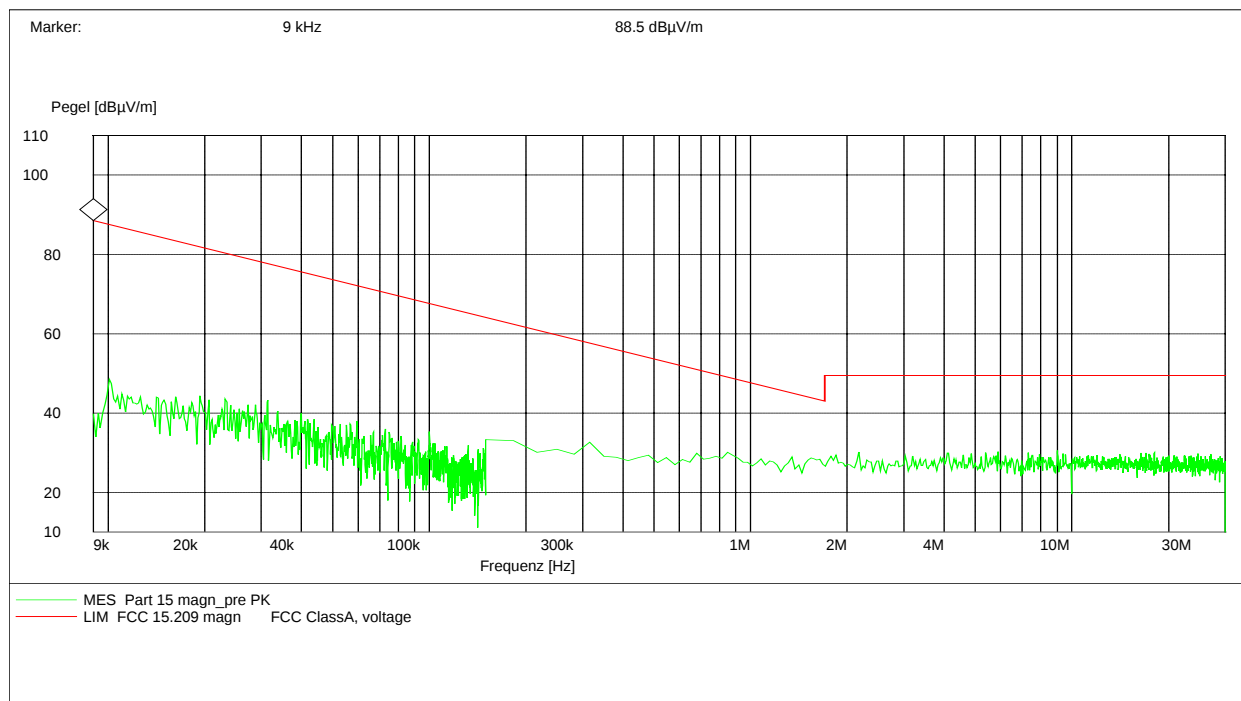
E = 72.6 μ V/m (noise)

Plot 8

FCC Rule 47

Part 15 Magnetics

EUT: 2.4 GHz
 Manufacturer: Siemens Building Technologies AG
 Operating Condition: TX on
 Test Site: Cetecom, Room 6
 Operator: Paschwitz
 Test Specification: 15.209
 Comment: 12V DC
 Start of Test: 17.08.04 / 10:55:33

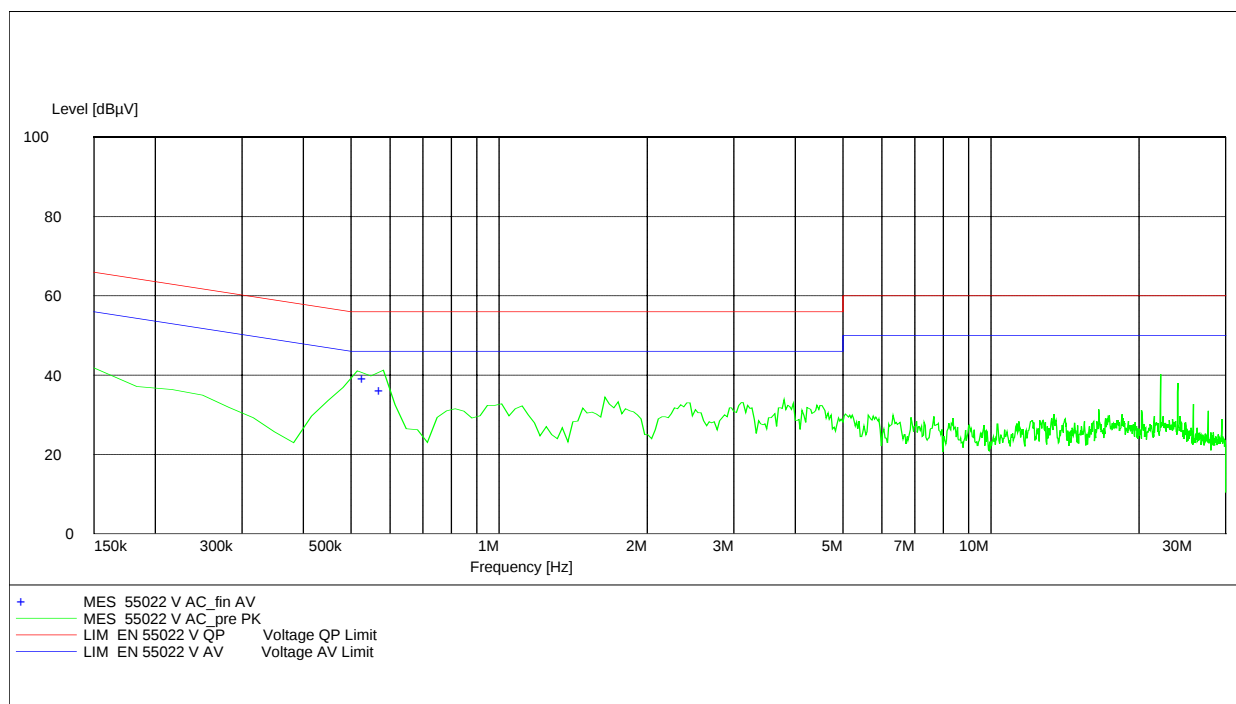


Plot 9

CISPR 22

EUT: 2.4 GHz
 Manufacturer: Siemens Building Technologies AG
 Operating Condition: TX on
 Test Site: Cetecom, Room 6
 Operator: Paschwitz
 Test Specification: EN 55022 V
 Comment: 12V DC ext. Power supply Zentro L2X30
 Start of Test: 17.08.04 / 11:26:46

SCAN TABLE: " CISPR 22"

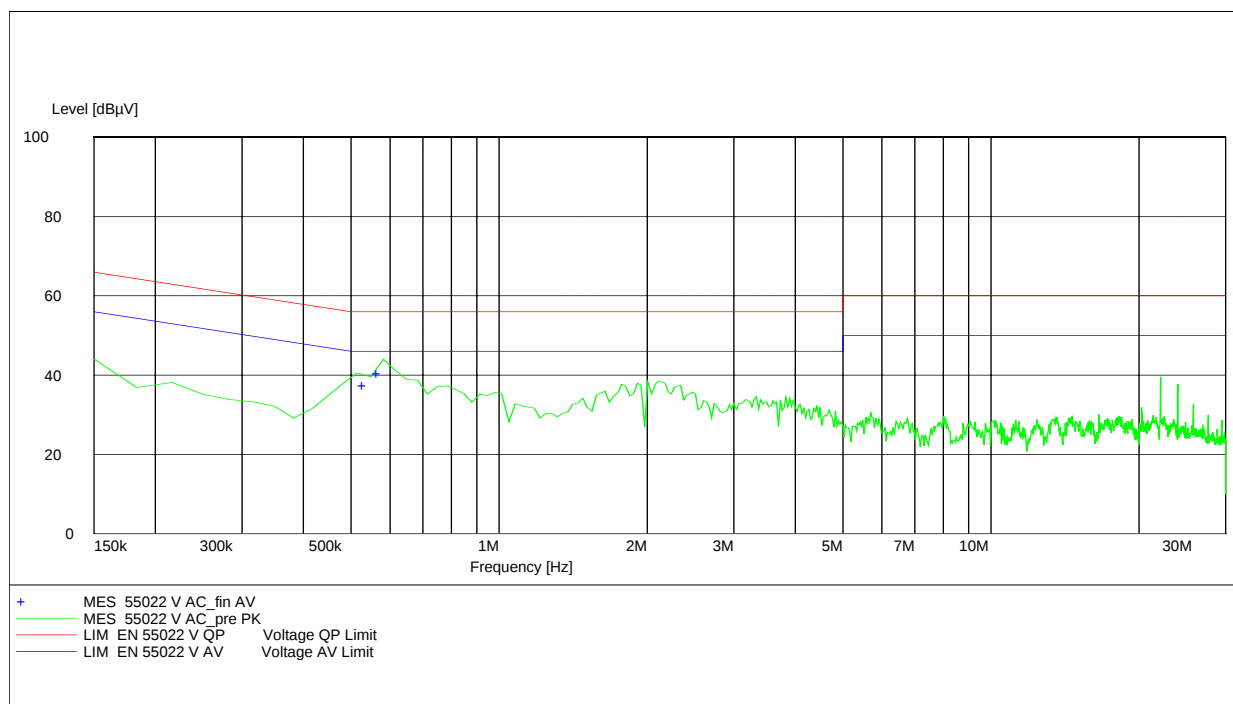


Plot 10

CISPR 22

EUT: 2.4 GHz
 Manufacturer: Siemens Building Technologies AG
 Operating Condition: TX on
 Test Site: Cetecom, Room 6
 Operator: Paschwitz
 Test Specification: EN 55022 V
 Comment: 12V DC ext. Power supply Zentro L2X30
 Start of Test: 17.08.04 / 11:45:46

SCAN TABLE: " CISPR 22"



4. Photographs

Photo 1

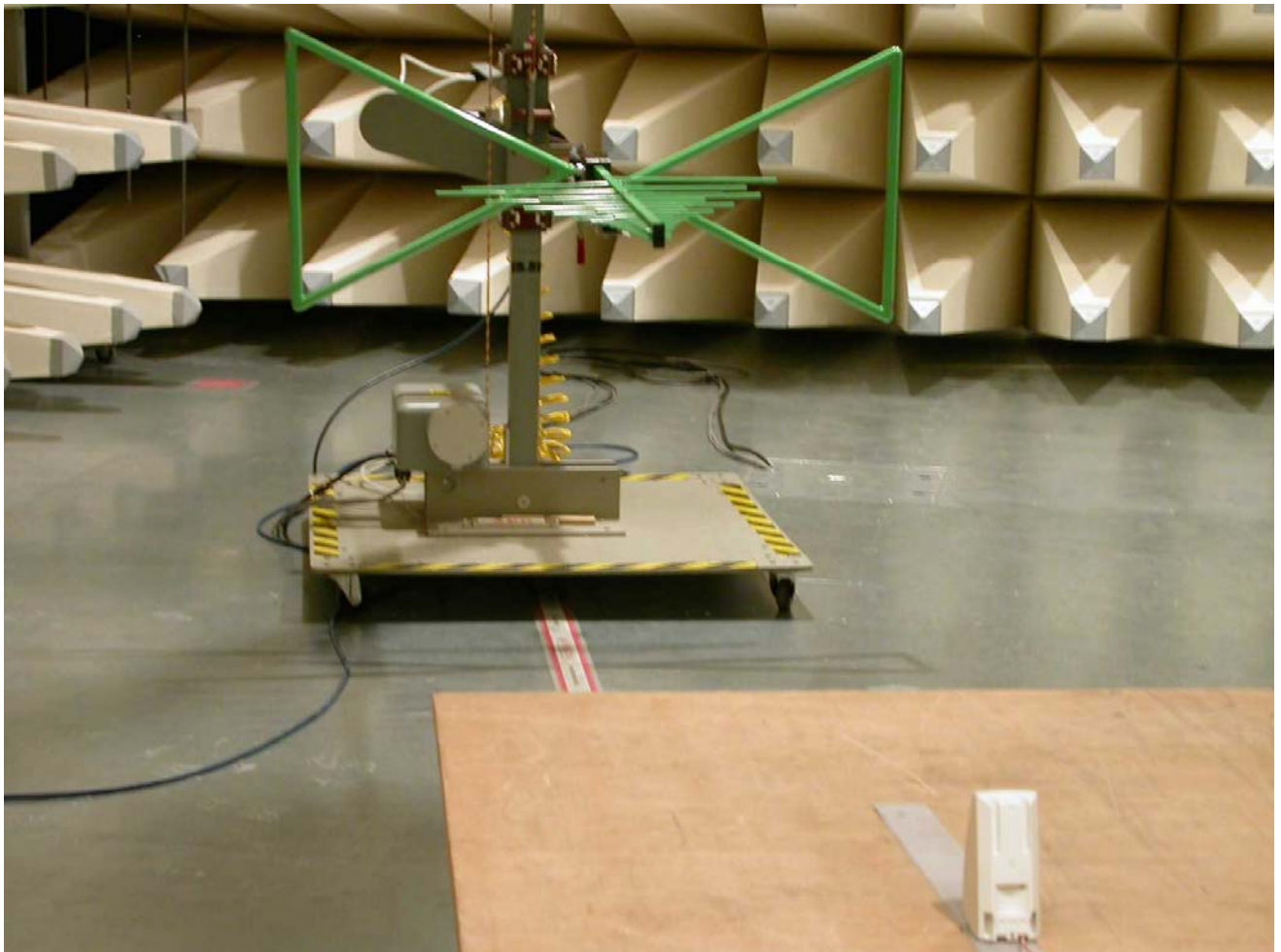


Photo 2

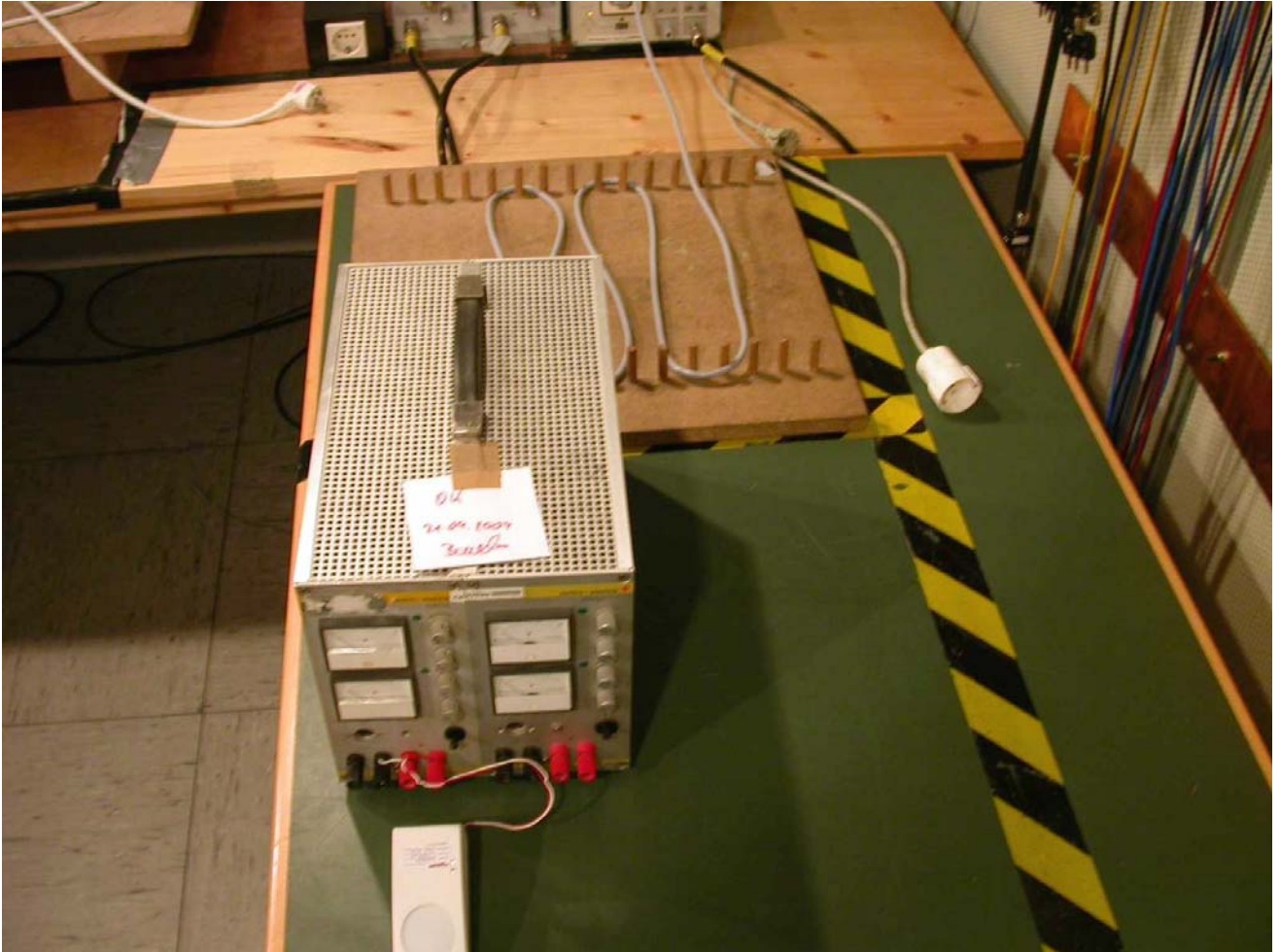


Photo 3



Photo 4



Photo 5

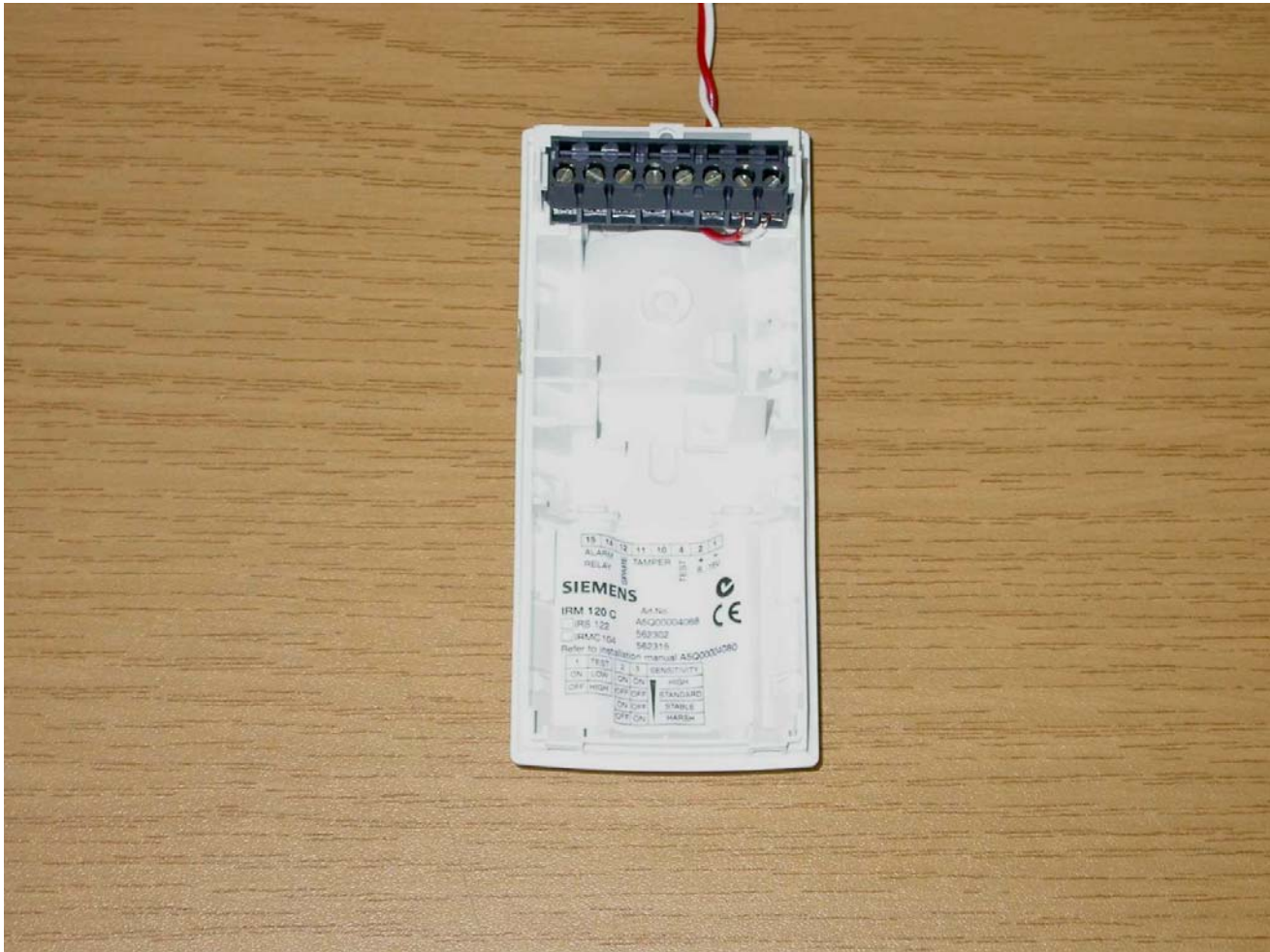


Photo 6

