CETECOM ICT Services GmbH

Radio Satellite Communication
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Recognized by the
Federal Communications Commission
FCC–Identification Number
TCB ID: DE001

Accredited by the
German Accreditation Council
DAR–Registration Number
TTI–P–G 166/98-30

Independent ETSI
compliance test house

Test report No.: **2-2869-01-02/02**
Applicant : Agilis Communication
Type : KF 600, KF 610, KF 620

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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 generalizations 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 :

Date	Name	Signature
08.11.02	Detlev Gillmann	.....

Technical responsibility for area of testing:

Date	Name	Signature
08.11.02	Klaus Kammerinke	.....

1.2 Testing laboratory

CETECOM ICT Services GmbH
Untertürkheimerstraße 6–10 P.O. Box 10 04 45
D-66117 Saarbrücken D-66004 Saarbrücken
Germany Germany

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

Authority	Identification/Registration No.
RegTP	TTI-P-G 166/98-30
FCC	90462

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

Name : Not applicable

1.3 Details of applicant

Name : **Agilis Communication Technologies Pte. Ltd**
Street : 100 Jurong East Street 21
Town : Singapore 609602
Country : Singapore
Tel. : +65 6567 6791
Fax : +65 6568 7477

Contact person
Name : Patrick Lim
Tel. : +65 6568 7472
Fax : +65 6567 6370
e-mail : patricklim@agilis.st.com.sg

1.4 Application details

Date of application : 15.08.2002
Date of receipt of EUT : 04.09.2002
Date of test : 12.09.2002 – 17.09.2002

1.5 Test item (EUT)

Description of EUT	:	Field disturbance sensor
System designation	:	Automatic door activator
Type designation	:	KF 600, KF 610, KF 620 Series 10.500 GHz
Serial number	:	
Manufacturer	:	**Agilis Communication** Technologies Pte Ltd Singapore

1.6 Technical data

Frequency range	:	10.500 GHz ... 10.550 GHz
Operational frequency	:	10.525 GHz
Field Strength (PEP)	:	300 mV/m to 800 mV/m (depending on antenna module)
Type of modulation	:	0H00N0N (standard)
Type of modulation	:	28M5P0N (optional)
Pulse spacing	:	200 µs
Pulse width	:	20 µs
Microwave module	:	TX / RX – Module with integral patch antenna
Antenna modules	:	HB 140 # 3; HB 140N # 3; HB 140W # 3
Antenna modules	:	HB 140 # 4; HB 140N # 4; HB 140W # 4
Normal power supply	:	12.0 V DC or AC
Extreme power supply	:	9.0 ... 24.0 V DC or AC

1.6.1 Operation conditions

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

1.6.2 Equipment under test

Model	Antenna modules	Antenna pattern
KF 600	HB 140N # 3 or HB 140N # 4	Narrow
KF 610	HB 140W # 3 or HB 140W # 4	Wide
KF 620	HB 140 # 3 or HB 140 # 4	Standard

1.7 Test standard : Code of Federal Regulations (CFR 47) Federal Communications Commission (FCC)

FCC Part 15 **Radio Frequency Devices (07/2002)**

Section 15.245
Operation within the band 10500 to 10550 MHz.

Section 15.209
Radiation emission limits, general requirements

Section 15.205
Restricted bands of operation.

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.

[ ]

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

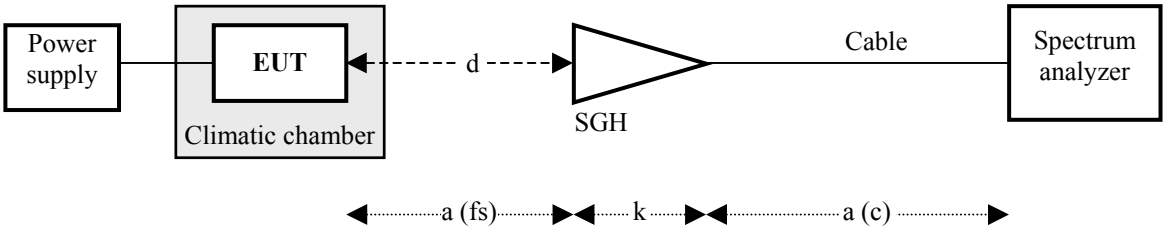
The environmental conditions are documented especially for each test.

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 and spurious radiation in the frequency range 4 GHz to 33 GHz



Frequency f [GHz]	Distance d [m]	Standard gain Horn ant. (SGH)	Dist. correction. dc (3 m/X m) [dB]	Antenna factor k [dB 1/m]	Cable loss a [dB]
3.8 ... 6.0	1.0	narda 643	-9.54	27.22	1.8
5.3 ... 8.2	0.5	narda 642	-15.56	29.94	2.0
8.2 ... 12.4	0.5	narda 640	-15.56	33.64	2.5
12.4 ... 18.0	0.25	narda 639	-21.58	36.88	2.9
18 ... 26	0.25	narda 638	-21.58	40.36	4.5
26 ... 40	0.25	narda V637	-21.58	43.94	4.8
10.5	3.0	narda 640	n.a.	33.64	2.5
21.0	3.0	narda 638	n.a.	40.36	4.5
31.5	3.0	Thomson COR	n.a.	38.97	4.8

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

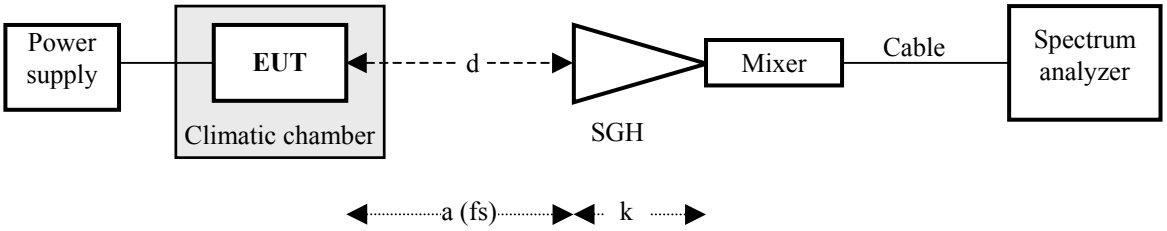
e = u + a + k + dc

Test equipment	Manufacturer	Type	CETECOM reference
Spectrum Analyser	HP	HP 8565E	300001665
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	HP	6032A	300002115
RF-cable	HP	5061-5359	300002033

Measurement uncertainty

Test parameter	Measurement uncertainty
Power supply	±0.1 VDC
Temperature	±0.2 °C
Frequency	±0.01 ppm
eirp	±1.4 dB

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



Frequency f [GHz]	Distance d [m]	Distance correction dc (3 m/Xm) [dB]	Antenna factor k [dB 1/m]
42.0	1.0	-9.54	38.98
52.5	1.0	-9.54	39.66
63.0	0.5	-15.56	45.5
73.5	0.5	-15.56	41.5
84.0	0.5	-15.56	40.0

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

e = u + a + k + dc

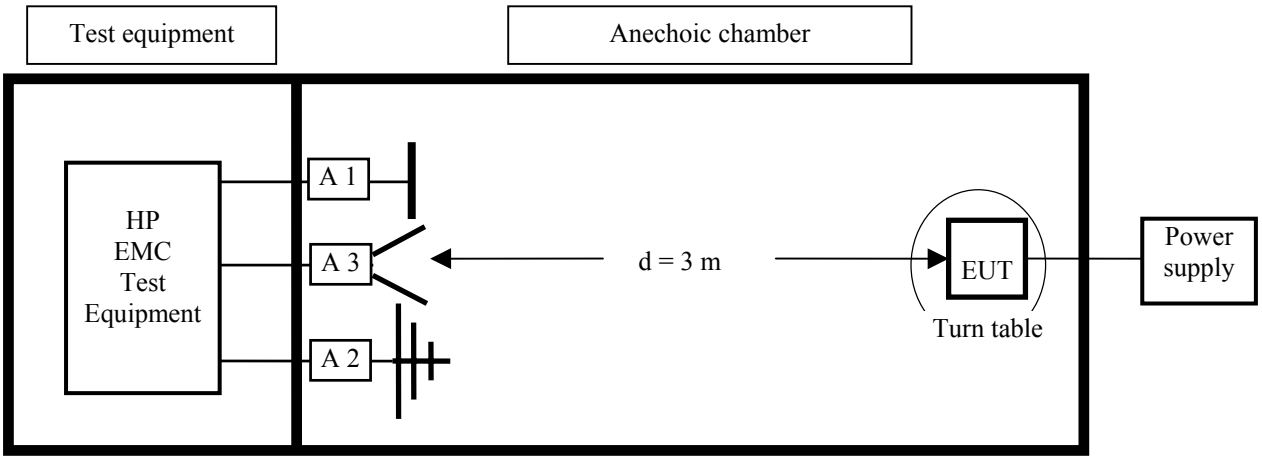
Test equipment	Manufacturer	Type	CETECOM reference
Spectrum Analyser	HP	HP 8565E	300001665
Power supply	HP	6032A	300002115
SGH 33 ... 50 GHz	Thomson	COR 33_50	300000812
Mixer 33 ... 50 GHz	HP	11970Q	300000781i
SGH 50 ... 75 GHz	Thomson	COR 50_75	300000789k
Mixer 50 ... 75 GHz	HP	11970V	300000871o
SGH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

Measurement uncertainty

Test parameter	Measurement uncertainty
Power supply	±0.1 VDC
Temperature	±0.2 °C
Frequency	±0.01 ppm
eirp	±1.0 dB

2.4.3 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
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)	±0.1 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

☐ Equipment Class

☐ Power Class

☐ Duty cycle Class

2.5.2 Summary of test results

The automatic door activator KF6XX is produced as model KF600, KF610 and KF620. For all variants the main basic blocks are identical PCBs in function and design. The only differences between the above variants are caused by the different RF modules which produce specific antenna patterns. For details see section 1.6.2 in this test report.

The RF-modules are exchangeable. They are positioned in a fixture at the main board and can be rotated and tilted in certain angles.

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 60 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 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 C63-4-1992 clause 4.2.

2.5.3 Test results in details

Equipment under test (EUT) : KF 600 with RF module HB 140 # 4 and HB 140 # 3
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

FUNDAMENTAL FREQUENCY

10500 MHz to 10550 MHz

Microwave module : EUT operating in CW
Antenna assembly: Integral patch antenna

TEST CONDITIONS		TRANSMITTER FIELD STRENGTH			
EUT operating: TX on and RX on		Frequency [GHz]	Spectrum Analyzer e [dBmV/m]	Field strength E [mV/m]	See plot No.
HB 140 # 4	V min 9.0 V DC	10.525 640	56.14	641.21	01
	V max = 24.0 V DC	10.525 640	56.14	641.21	01
HB 140 # 3	V min = 9.0 V DC	10.520 930	56.47	666.04	04
	V max = 24.0 V DC	10.520 930	56.47	666.04	04
HB 140 # 4	V min 9.0 V AC	10.525 670	57.64	762.07	21
	V max = 24.0 V AC	10.525 670	57.64	762.07	21
HB 140 # 3	V min = 9.0 V AC	10.520 630	57.81	777.14	22
	V max = 24.0 V AC	10.520 630	57.81	777.14	22

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 8

LIMITS: **SECTION 15.245**

Frequency range (MHz)	Measurement distance [m]	Field strength e [dBmV/m]	Field strength E [mV/m]
10500 to 10550	3.0	67.9	2 500
Harmonics	3.0	27.9	25

Verdict :	Field strength limit is kept

EUT: **KF 600 with RF module HB 140N # 4 and HB 140N # 3**
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

FUNDAMENTAL FREQUENCY

10500 MHz to 10550 MHz

Microwave module : EUT operating in CW
Antenna assembly: Integral patch antenna

TEST CONDITIONS		TRANSMITTER FIELD STRENGTH			
EUT operating: TX on and RX on		Frequency [GHz]	Spectrum Analyzer e [dBmV/m]	Field strength E [mV/m]	See plot No.
HB 140N # 4	V min = 9.0 V DC	10.523 150	50.97	353.59	02
	V max = 24.0 V DC	10.523 150	50.97	353.59	02
HB 140N # 3	V min = 9.0 V DC	10.525 430	50.74	344.35	04
	V max = 24.0 V DC	10.525 430	50.74	344.35	04

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 8

LIMITS: **SECTION 15.245**

Frequency range (MHz)	Measurement distance [m]	Field strength e [dBmV/m]	Field strength E [mV/m]
10500 to 10550	3.0	67.9	2 500
Harmonics	3.0	27.9	25

Verdict :	Field strength limit is kept

EUT : **KF 600 with RF module HB 140W # 4 and HB 140W # 3**
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

FUNDAMENTAL FREQUENCY

10500 MHz to 10550 MHz

Microwave module : EUT operating in CW
Antenna assembly: Integral patch antenna

TEST CONDITIONS		TRANSMITTER FIELD STRENGTH			
EUT operating: TX on and RX on		Frequency [GHz]	Spectrum Analyzer e [dBmV/m]	Field strength E [mV/m]	See plot No.
HB 140W# 4	V min = 9.0 V DC	10.526 670	50.97	367.71	03
	V max = 24.0 V DC	10.526 670	50.97	367.71	03
HB 140W # 3	V min = 9.0 V DC	10.525 330	50.47	333.81	06
	V max = 24.0 V DC	10.525 330	50.47	333.81	06

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 8

LIMITS: **SECTION 15.245**

Frequency range (MHz)	Measurement distance [m]	Field strength e [dBmV/m]	Field strength E [mV/m]
10500 to 10550	3.0	67.9	2 500
Harmonics	3.0	27.9	25

Verdict :	Field strength limit is kept

EUT : **KF 600 with RF module HB 140 # 3 and HB 140 # 4**
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

FUNDAMENTAL FREQUENCY

10500 MHz to 10550 MHz

Microwave module : EUT operating with pulse modulation
Antenna assembly: Integral patch antenna

TEST CONDITIONS		TRANSMITTER FIELD STRENGTH			
EUT operating: TX on and RX on		Frequency [GHz]	Spectrum Analyzer e [dBmV/m]	Field strength E [mV/m]	See plot No.
HB 140 # 3	V min = 9.0 V DC	10.520 930	57.14	719.45	23
	V max = 24.0 V DC	10.520 930	57.14	719.45	23
HB 140 # 4	V min = 9.0 V DC	10.523 150	57.47	747.31	24
	V max = 24.0 V DC	10.523 150	57.47	747.31	24

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 8

The occupied bandwidth of modules HB 140 #3 and HB 140 # 4 operating with pulse modulation is 28.500 MHz (See plots on pages 45 and 46)

LIMITS: **SECTION 15.245**

Frequency range (MHz)	Measurement distance [m]	Field strength e [dBmV/m]	Field strength E [mV/m]
10500 to 10550	3.0	67.9	2 500
Harmonics	3.0	27.9	25

Verdict :	Field strength limit is kept. Permitted frequency range limit is kept

EUT : **KF 600 with RF module HB 140 # 4 and HB 140 # 3**
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

HARMONIC FREQUENCIES

Microwave module : HB 140 # 4 and HB 140 # 3 operating in CW
Antenna assembly: Integral patch antenna

TEST CONDITIONS		TRANSMITTER HARMONICS FIELD STRENGTH			
EUT operating: TX on and RX on		Frequency [GHz]	Spectrum Analyzer e [dBmV/m]	Field strength E [mV/m]	See plot No.
HB 140 # 4	V max = 24.0 V DC	21.051 248	23.03	14.17	07
HB 140 # 3	V max = 24.0 V DC	21.041 010	19.36	9.29	10

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 8

LIMITS: **SECTION 15.245 / 15.205 / 15.209**

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	500
Harmonics	3	87.9 = 27.9 dBmV/m	25.000

Verdict :	Field strength limit is kept

EUT : **KF 600 with RF module HB 140N # 4 and HB 140N # 3**
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

HARMONIC FREQUENCIES

Microwave module : HB 140N # 4 and HB 140N # 3 operating in CW
Antenna assembly: Integral patch antenna

TEST CONDITIONS		TRANSMITTER HARMONICS FIELD STRENGTH			
EUT operating: TX on and RX on		Frequency [GHz]	Spectrum Analyzer e [dBmV/m]	Field strength E [mV/m]	See plot No.
HB 140N # 4	V max = 24.0 V DC	21.046 277	20.03	10.35	08
HB 140N # 3	V max = 24.0 V DC	21.047 637	20.03	10.35	11

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 8

LIMITS: **SECTION 15.245 / 15.205 / 15.209**

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	500
Harmonics	3	87.9 = 27.9 dBmV/m	25.000

Verdict :	Field strength limit is kept

EUT : **KF 600 with RF module HB 140W # 4 and HB 140W # 3**
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

HARMONIC FREQUENCIES

Microwave module : HB 140W # 4 and HB 140W # 3 operating in CW
Antenna assembly: Integral patch antenna

TEST CONDITIONS		TRANSMITTER HARMONICS FIELD STRENGTH			
EUT operating: TX on and RX on		Frequency [GHz]	Spectrum Analyzer e [dBmV/m]	Field strength E [mV/m]	See plot No.
HB 140W # 4	V max = 24.0 V DC	21.052 663	22.86	13.90	09
HB 140W # 3	V max = 24.0 V DC	21.051 630	23.86	15.60	12

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 8

LIMITS: **SECTION 15.245 / 15.205 / 15.209**

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	500
Harmonics	3	87.9 = 27.9 dBmV/m	25.000

Verdict : Field strength limit is kept

EUT : **KF 600 with RF module HB 140 # 4 and HB 140 # 3**
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

HARMONIC FREQUENCIES

Microwave module : HB 140 # 4 and HB 140 # 3 operating in CW
Antenna assembly: Integral patch antenna

TEST CONDITIONS		TRANSMITTER HARMONICS FIELD STRENGTH			
EUT operating: TX on and RX on		Frequency [GHz]	Spectrum Analyzer e [dBmV/m]	Field strength E [mV/m]	See plot No.
HB 140 # 4	V max = 24.0 V DC	31.576 513	19.10	9.02	13
HB 140 # 3	V max = 24.0 V DC	31.561 798	17.60	7.59	16

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 8

LIMITS: **SECTION 15.245 / 15.205 / 15.209**

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	500
Harmonics	3	87.9 = 27.9 dBmV/m	25.000

Verdict :	Field strength limit is kept

EUT : **KF 600 with RF module HB 140N # 4 and HB 140N # 3**
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

HARMONIC FREQUENCIES

Microwave module : HB 140N # 4 and HB 140N # 3 operating in CW
Antenna assembly: Integral patch antenna

TEST CONDITIONS		TRANSMITTER HARMONICS FIELD STRENGTH			
EUT operating: TX on and RX on		Frequency [GHz]	Spectrum Analyzer e [dBmV/m]	Field strength E [mV/m]	See plot No.
HB 140N # 4	V max = 24.0 V DC	31.568 632	14.77	5.48	14
HB 140N # 3	V max = 24.0 V DC	31.570 620	18.97	8.85	17

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 8

LIMITS: **SECTION 15.245 / 15.205 / 15.209**

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	500
Harmonics	3	87.9 = 27.9 dBmV/m	25.000

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 7

Verdict :	Field strength limit is kept

EUT : **KF 600 with RF module HB 140W # 4 and HB 140W # 3**
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

HARMONIC FREQUENCIES

Microwave module : HB 140W # 4 and HB 140W # 3 operating in CW
Antenna assembly: Integral patch antenna

TEST CONDITIONS		TRANSMITTER HARMONICS FIELD STRENGTH			
EUT operating: TX on and RX on		Frequency [GHz]	Spectrum Analyzer e [dBmV/m]	Field strength E [mV/m]	See plot No.
HB 140W # 4	V max = 24.0 V DC	31.578 648	18.10	8.04	15
HB 140W # 3	V max = 24.0 V DC	31.575 137	17.10	7.16	18

REFERENCE OF TEST EQUIPMENT USED : see test set-up on page 8

LIMITS: **SECTION 15.245 / 15.205 / 15.209**

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	500
Harmonics	3	87.9 = 27.9 dBmV/m	25.000

Verdict : Field strength limit is kept

EUT : **KF 600 with RF module HB 140 # 4**
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

HARMONIC FREQUENCIES

Microwave module : HB 140 # 4 operating in CW
Antenna assembly: Integral patch antenna

TEST CONDITIONS		TRANSMITTER HARMONICS FIELD STRENGTH			
EUT operating: TX on and RX on		Frequency [GHz]	Spectrum Analyzer e [dBmV/m]	Field strength E [mV/m]	See plot No.
HB 140 # 4	V max = 24.0 V DC	42.102 277	13.94	4.98	19
HB 140 # 4	V max = 24.0 V DC	52.627 787	2.29	1.30	20

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

LIMITS: **SECTION 15.245 / 15.205 / 15.209**

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	500
Harmonics	3	87.9 = 27.9 dBmV/m	25.000

Verdict :	Spurious limits are kept

EUT : **KF 600 with RF module HB 140 # 4**
Ambient temperature : 23 °C
Relative humidity : 55 %

TRANSMITTER PARAMETERS **SECTION 15.245**

SPURIOUS FREQUENCIES

Microwave module : HB 140 # 4 operating in CW
Antenna assembly: Integral patch antenna

TEST CONDITIONS	TRANSMITTER SPURIOUS FIELD STRENGTH			
Frequency range [MHz]	Spurious frequencies [MHz]	S A e [dBµV/m]	E [µV/m]	See plot No.
0.009 – 30.000	0.100	33.35	46.5	25 + 26
30 – 4 000 horizontal plane	Noise	<< limit	<< limit	27
30 – 4 000 vertical plane	Noise	<< limit	<< limit	28
4 000 – 6 000 (h + v)	4 893 (Noise)	46.31	206.776	29
6 000 – 8 000 (h + v)	7 550 (Noise)	46.55	212.569	30
8 000 – 12 000 (h + v)	10 993 (Noise) 10 525 (see plot 01)	48.08	253.513	31
12 000 – 18 000 (h + v)	13 270 (Noise)	49.53	299.571	32
18 000 – 26 000 (h + v)	24 667 (Noise) 21 051 (see plot 07)	50.61	339.234	33
26 000 – 40 000 (h + v)	37 084 (Noise) 31 576 (see plot 13)	53.81	490.343	34
40 000 – 60 000 (h + v)	50.0 GHz (Noise) 42 102 (see plot 19)	48.40	263.027	35

LIMITS: **SECTION 15.245 / 15.205 / 15.209**

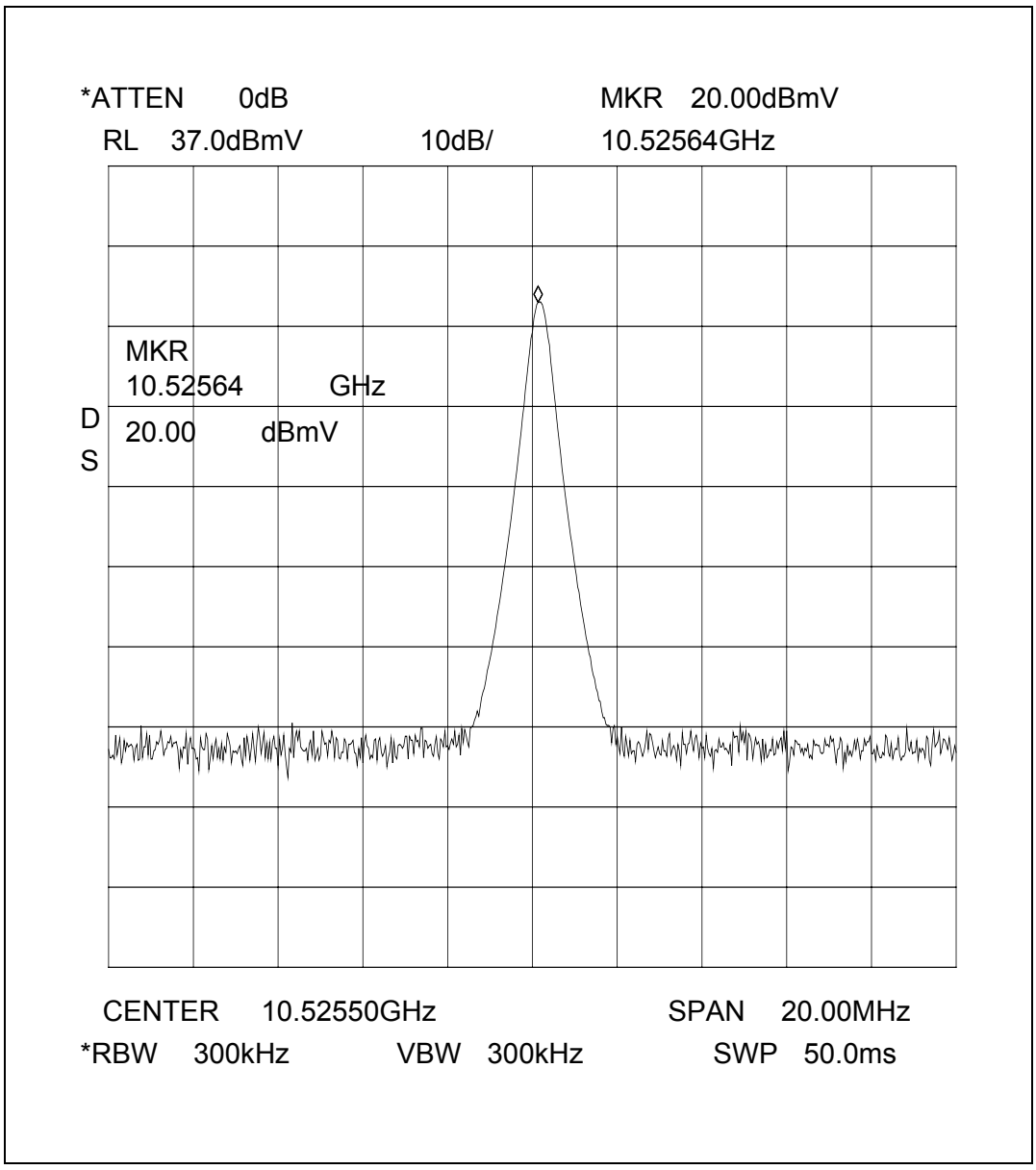
Frequency range (MHz)	Measurement distance [m]	Field strength e [dBµV/m] @ 3 m	Field strength E [µV/m]
0.009 – 0.490	300	88.5 ... 53.8	2400/F(kHz)
0.490 – 1.705	30	53.8 ... 43.0	24000/F(kHz)
1.705 – 30.0	30	49.5	30
30.0 – 88.0	3	40.0	100
88.0 – 216.0	3	43.5	150
216.0 – 960.0	3	46.0	200
> 960.0	3	54.0	500
Harmonics	3	87.9 = 27.9 dBmV/m	25.000

REFERENCE OF TEST EQUIPMENT USED : see test set-up on pages 8, 9 and 10

Verdict :	Spurious limits are kept

3. Plots, graphs and data sheets

Plot 01 HB 140 # 4



Measurement distance d = 3.0 m

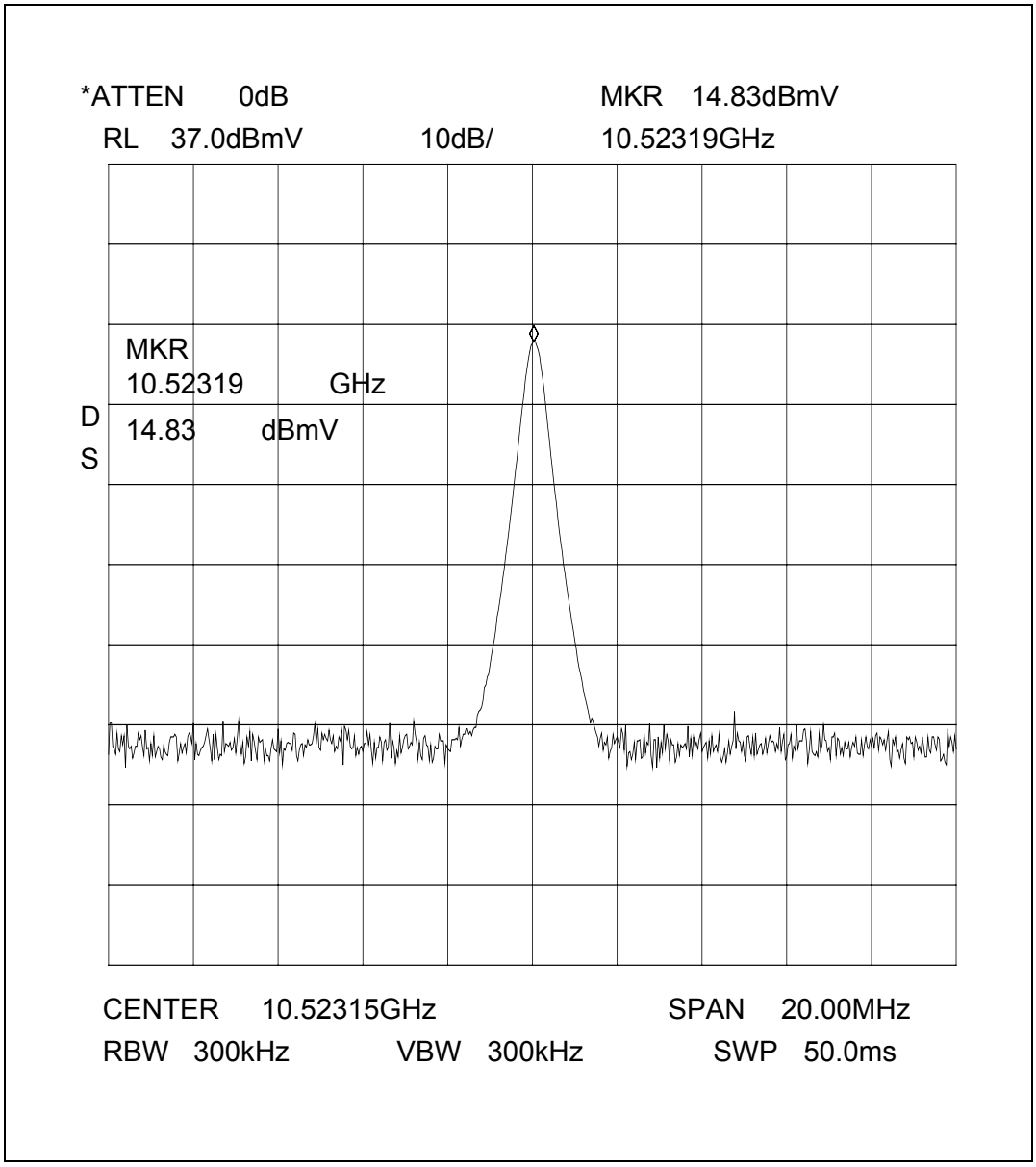
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = 20.00 dB(mV) + 2.5 dB + 33.64 dB(1/m)

e = 56.14 dB(mV/m)

E = 641.21 mV/m

Plot 02 HB 140N # 4



Measurement distance d = 3.0 m

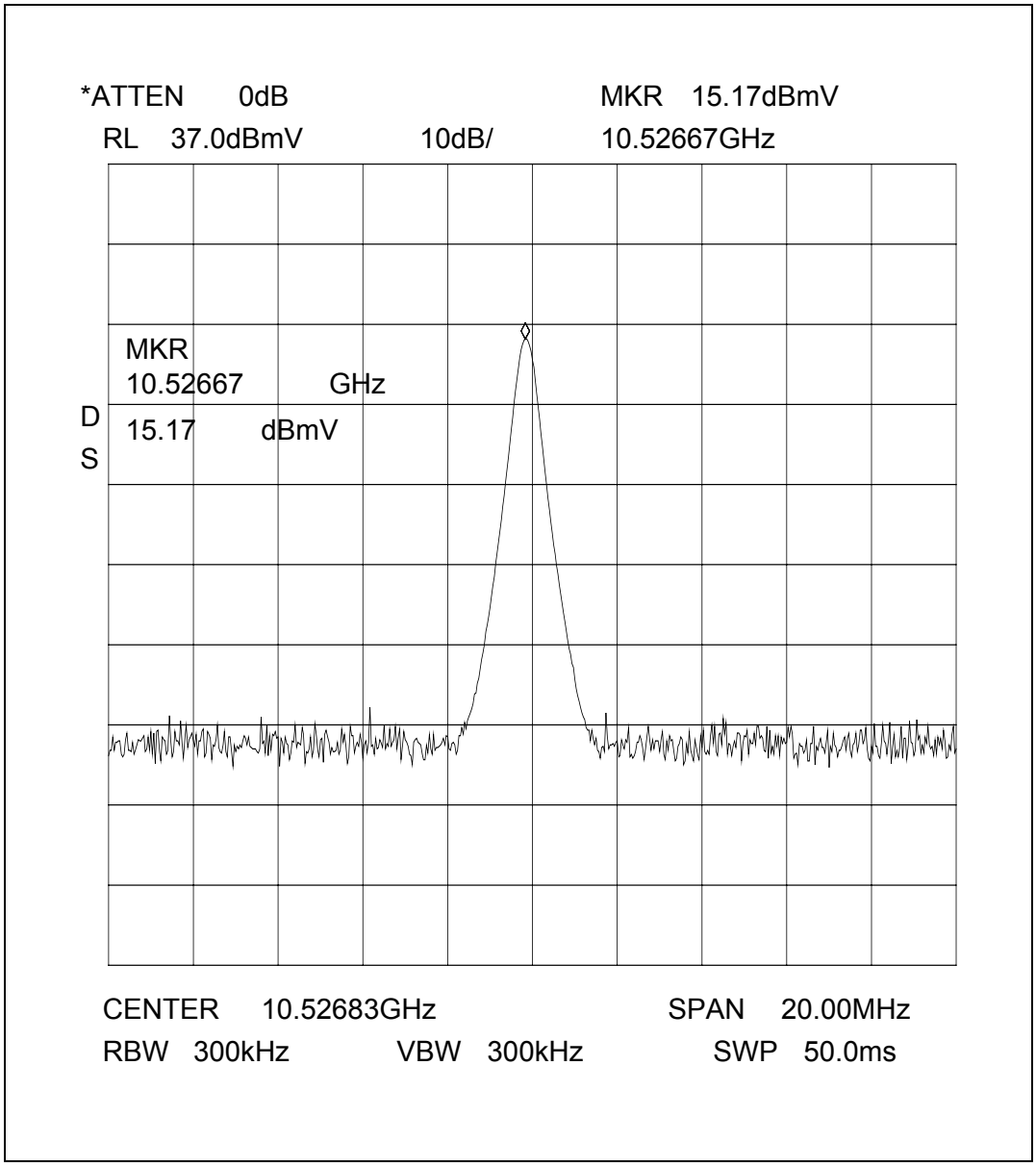
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = 14.83 dB(mV) + 2.5 dB + 33.64 dB(1/m)

e = 50.97 dB(mV/m)

E = 353.59 mV/m

Plot 03 HB 140W # 4



Measurement distance d = 3.0 m

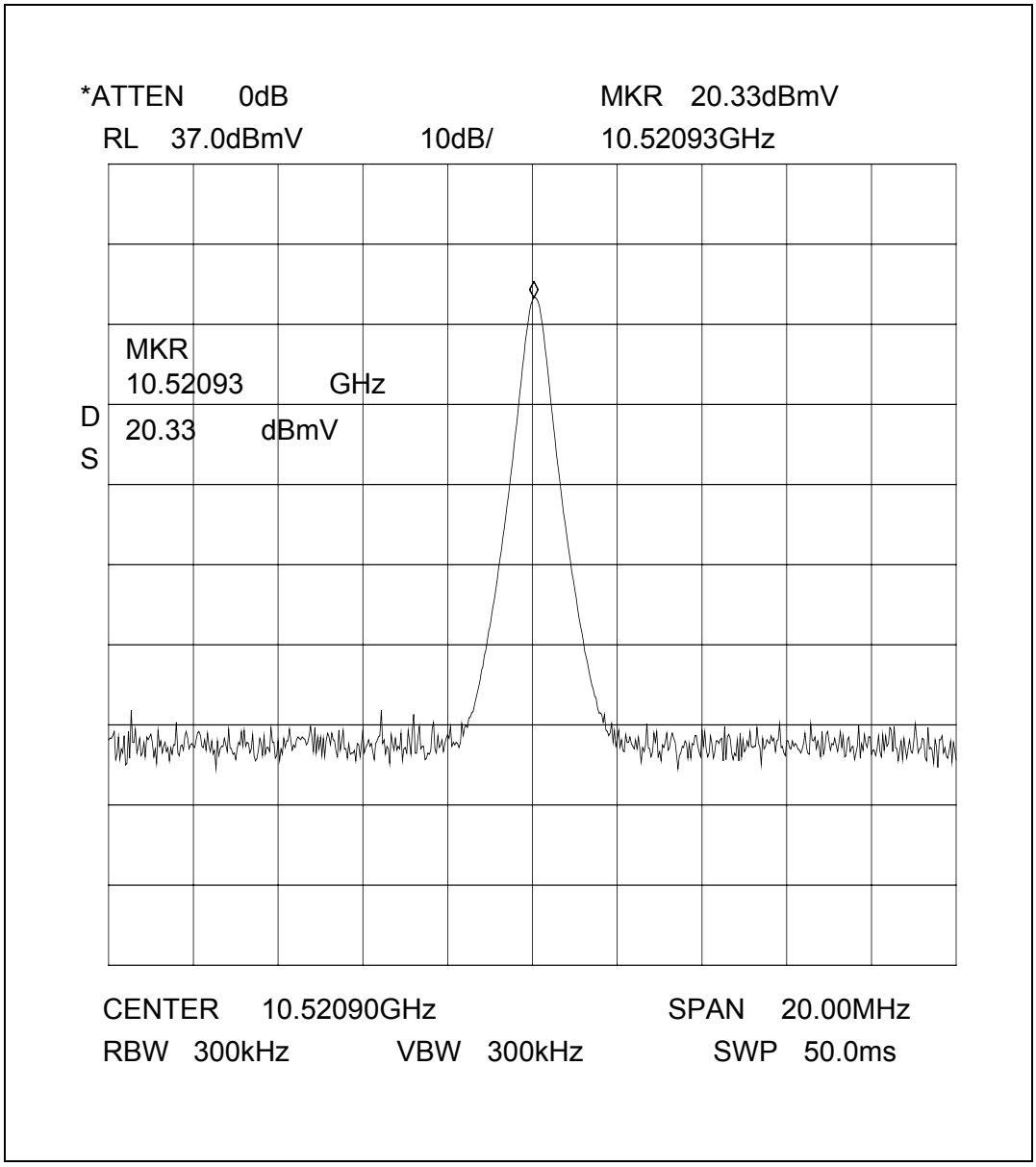
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = 15.17 dB(mV) + 2.5 dB + 33.64 dB(1/m)

e = 50.97 dB(mV/m)

E = 367.71 mV/m

Plot 04 HB 140 # 3



Measurement distance d = 3.0 m

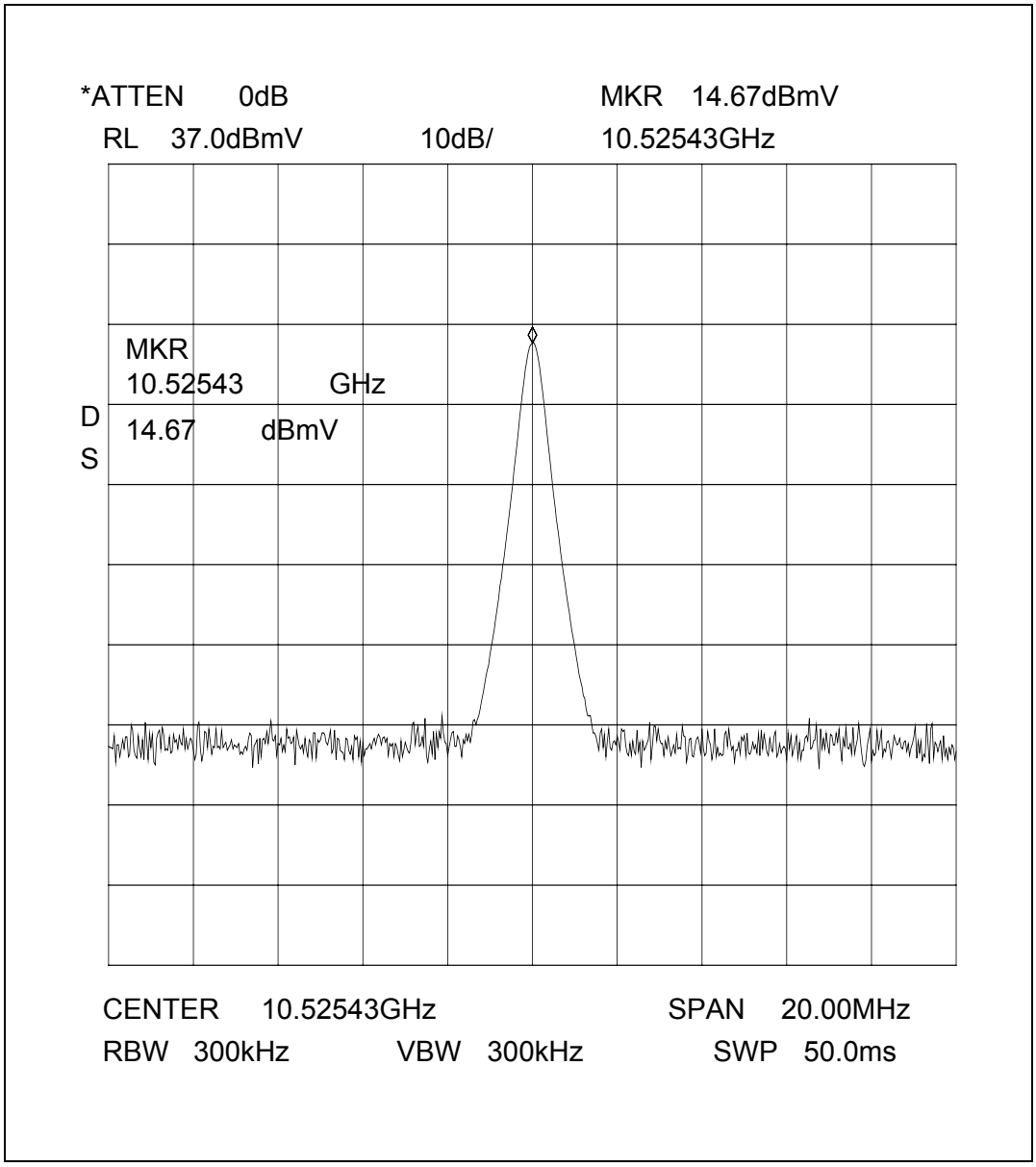
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = 20.33 dB(mV) + 2.5 dB + 33.64 dB(1/m)

e = 56.47 dB(mV/m)

E = 666.04 mV/m

Plot 05 HB 140N # 3



Measurement distance d = 3.0 m

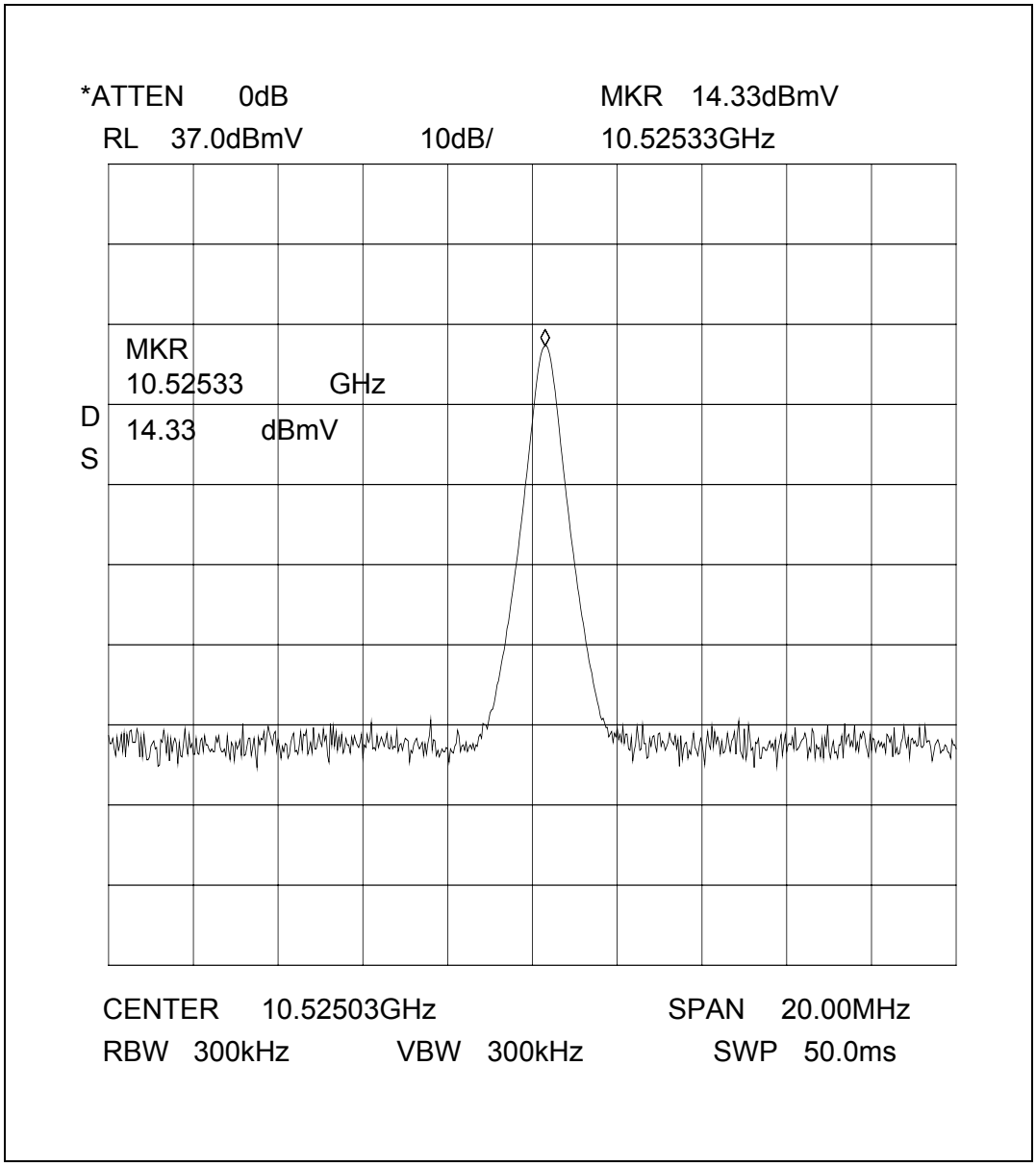
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = 14.67 dB(mV) + 2.5 dB + 33.64 dB(1/m)

e = 50.74 dB(mV/m)

E = 344.35 mV/m

Plot 06 HB 140W # 3



Measurement distance d = 3.0 m

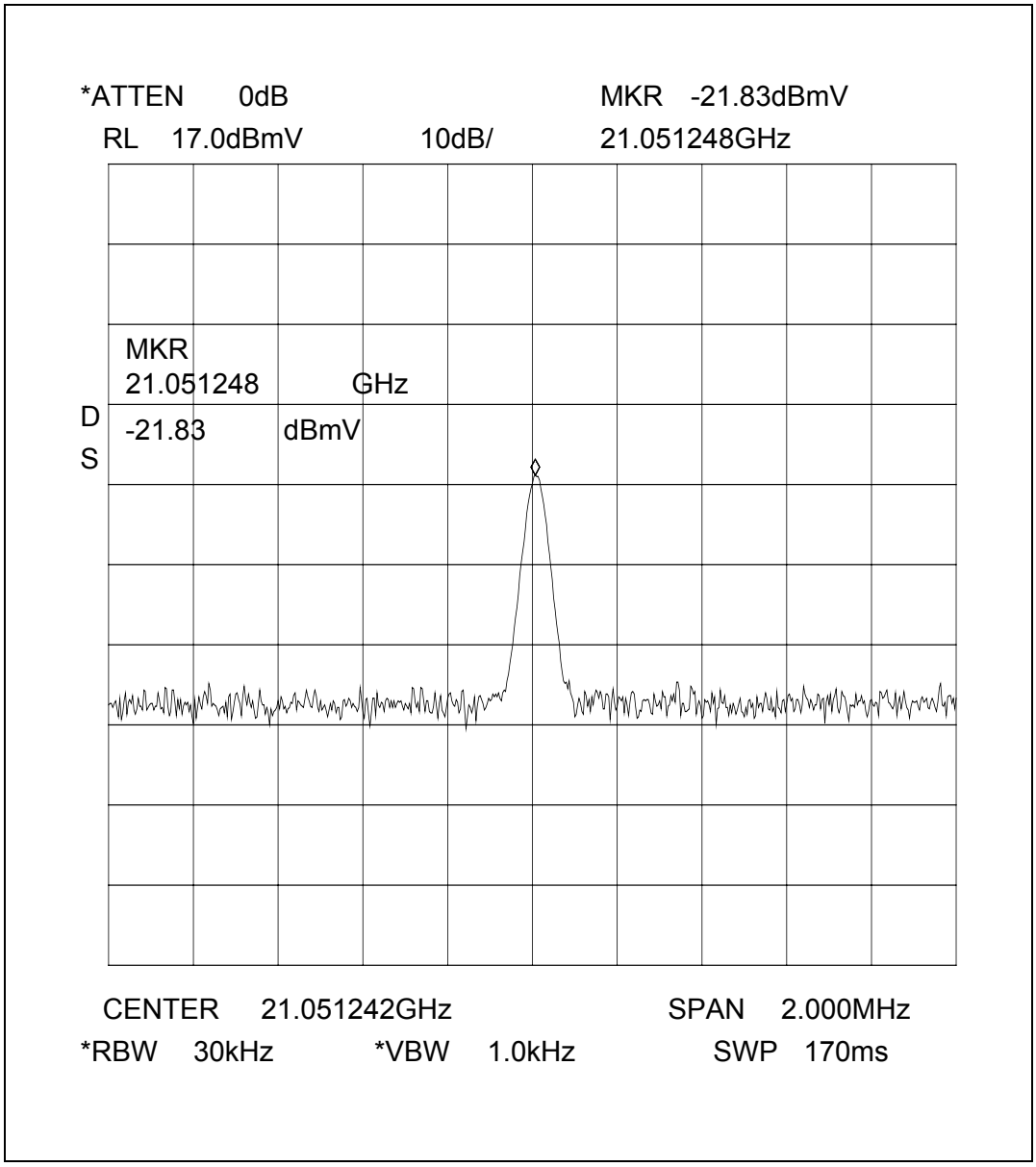
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = 14.33 dB(mV) + 2.5 dB + 33.64 dB(1/m)

e = 50.47 dB(mV/m)

E = 333.81 mV/m

Plot 07 HB 140 # 4



Measurement distance d = 3.0 m

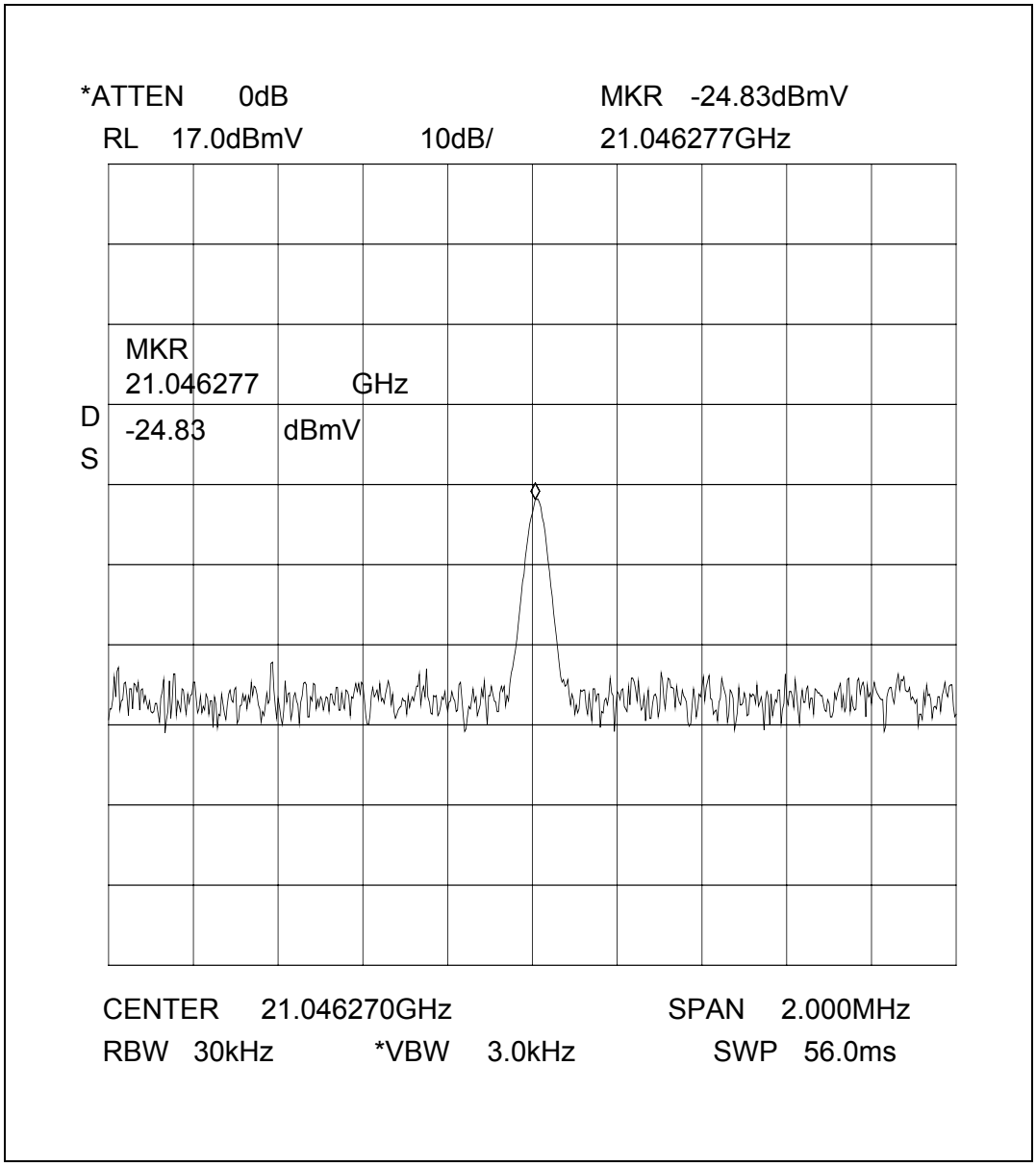
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 21.83 dB(mV) + 4.5 dB + 40.36 dB(1/m)

e = 23.03 dB(mV/m)

E = 14.17 mV/m

Plot 08 HB 140N # 4



Measurement distance d = 3.0 m

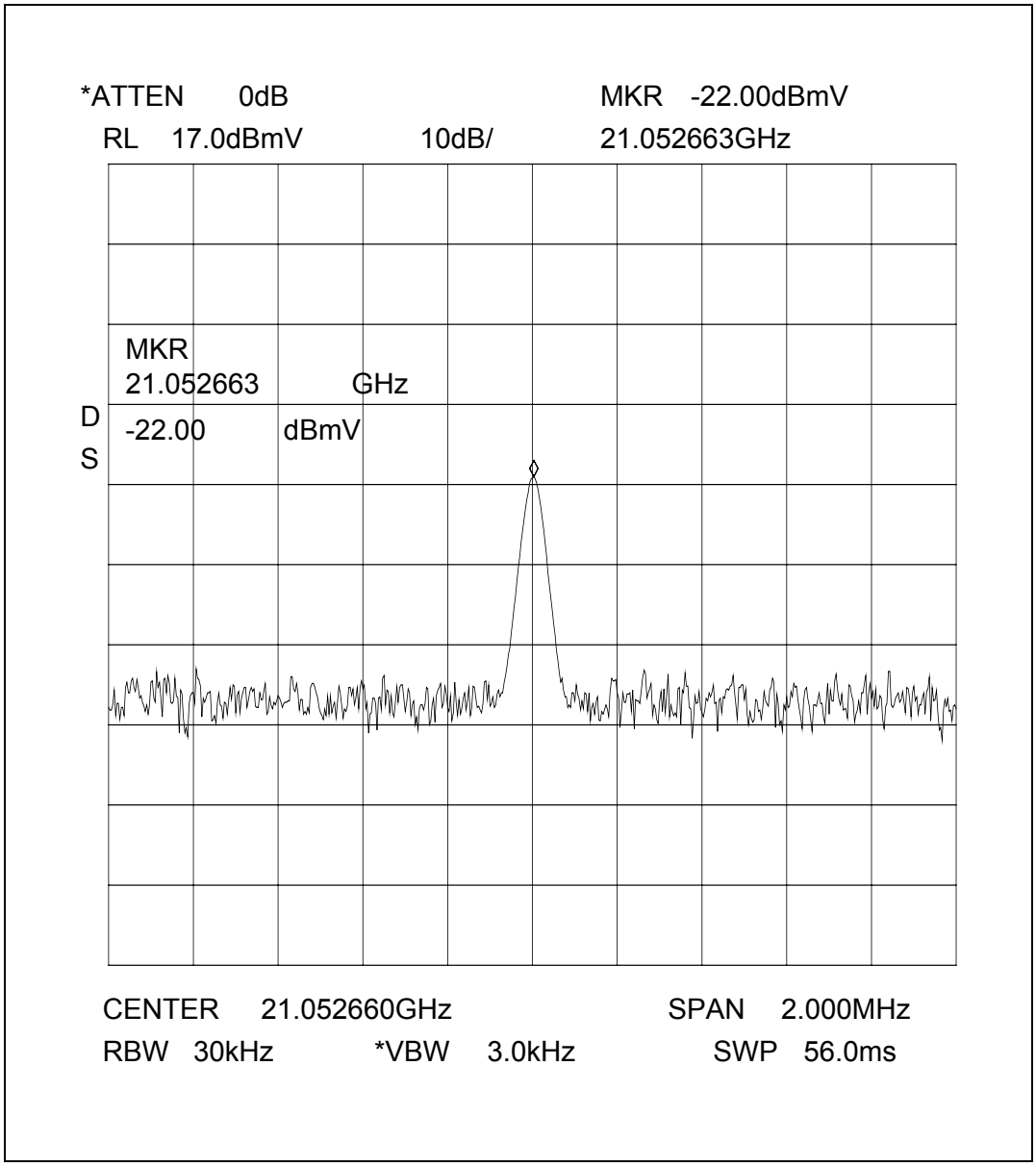
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 24.83 dB(mV) + 4.5 dB + 40.36 dB(1/m)

e = 20.03 dB(mV/m)

E = 10.35 mV/m

Plot 09 HB 140W # 4



Measurement distance d = 3.0 m

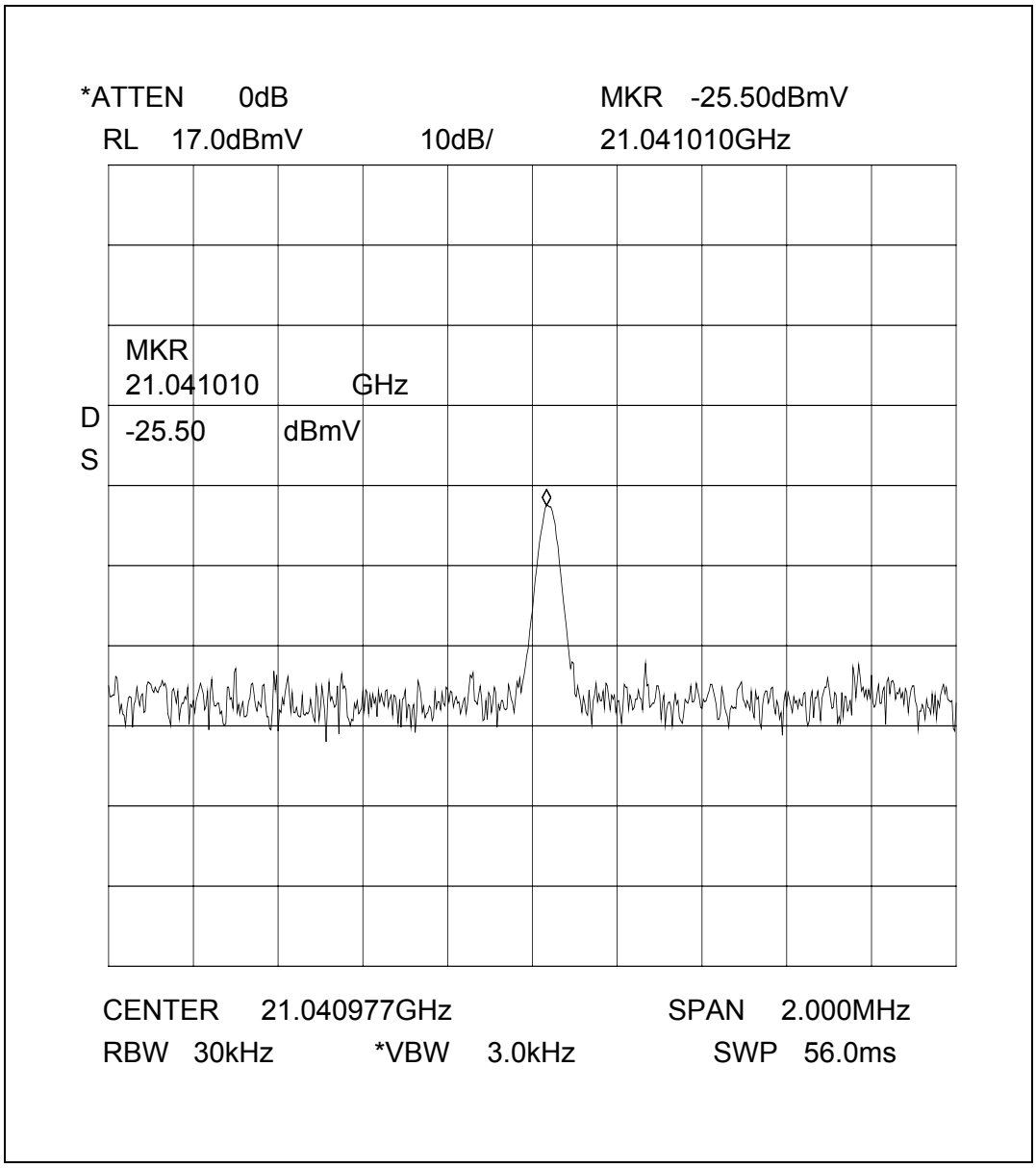
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 22.00 dB(mV) + 4.5 dB + 40.36 dB(1/m)

e = 22.86 dB(mV/m)

E = 13.90 mV/m

Plot 10 HB 140 # 3



Measurement distance d = 3.0 m

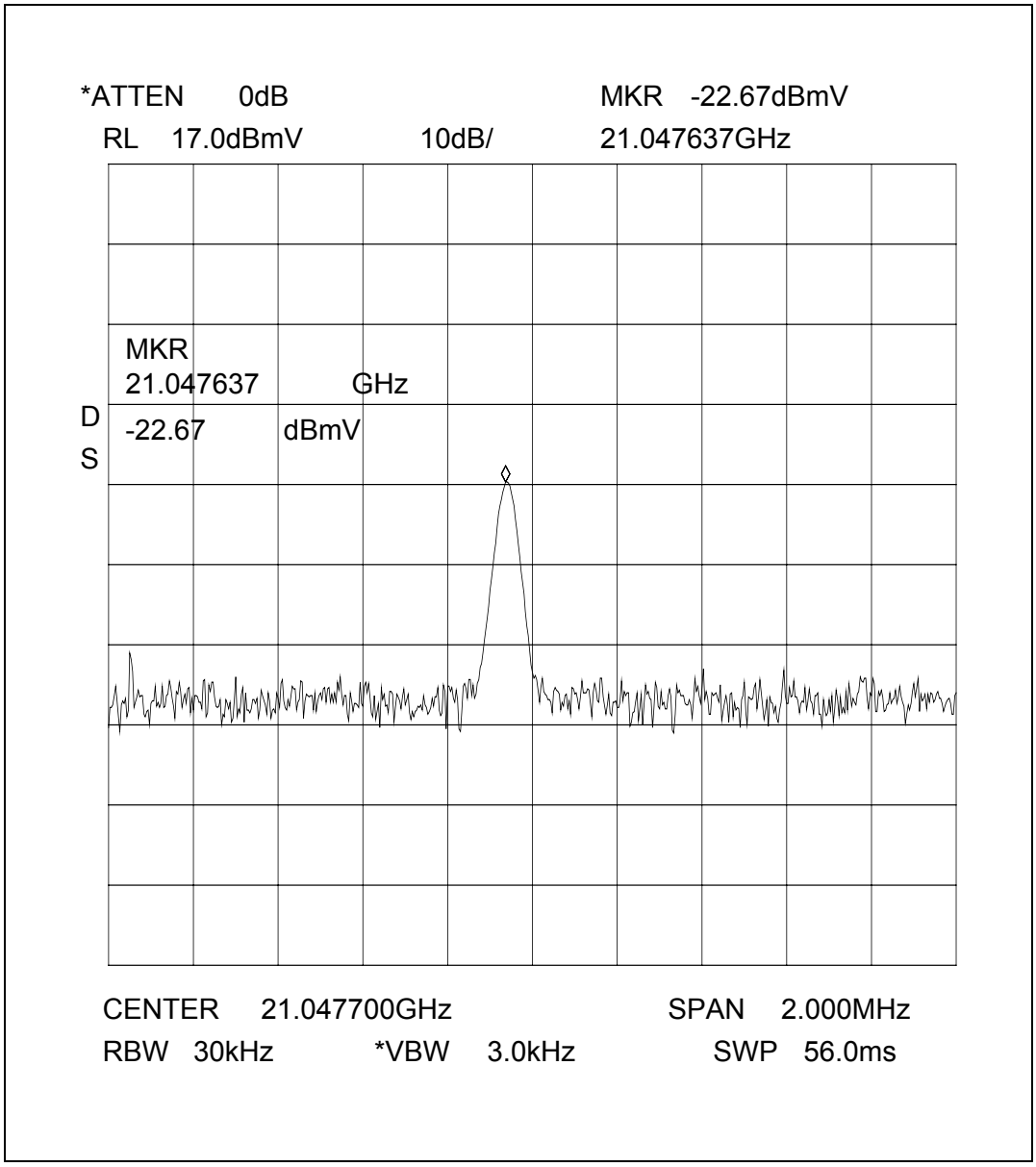
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 25.50 dB(mV) + 4.5 dB + 40.36 dB(1/m)

e = 19.36 dB(mV/m)

E = 9.29 mV/m

Plot 11 HB 140N # 3



Measurement distance d = 3.0 m

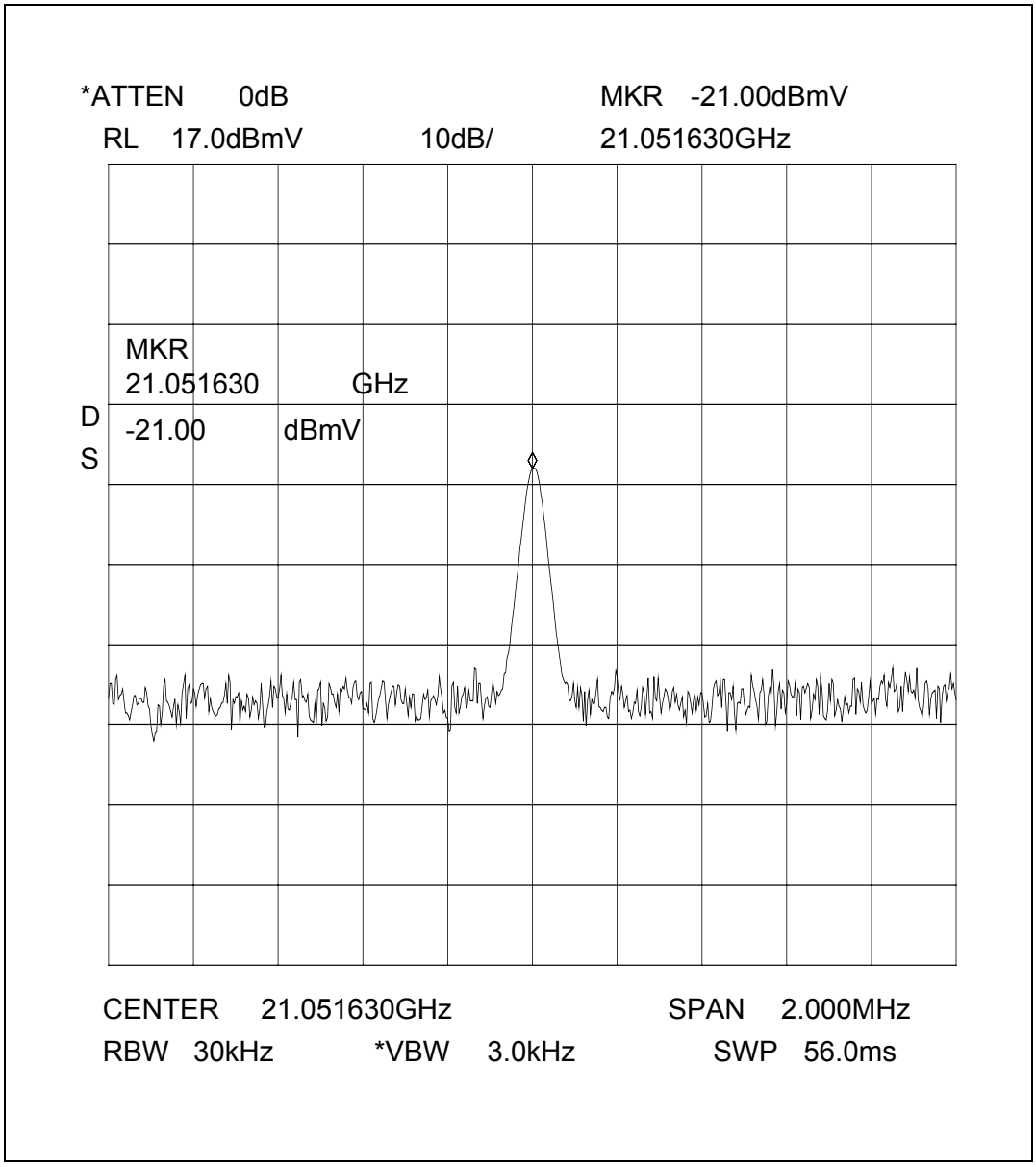
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 22.67 dB(mV) + 4.5 dB + 40.36 dB(1/m)

e = 22.19 dB(mV/m)

E = 12.87 mV/m

Plot 12 HB 140W # 3



Measurement distance d = 3.0 m

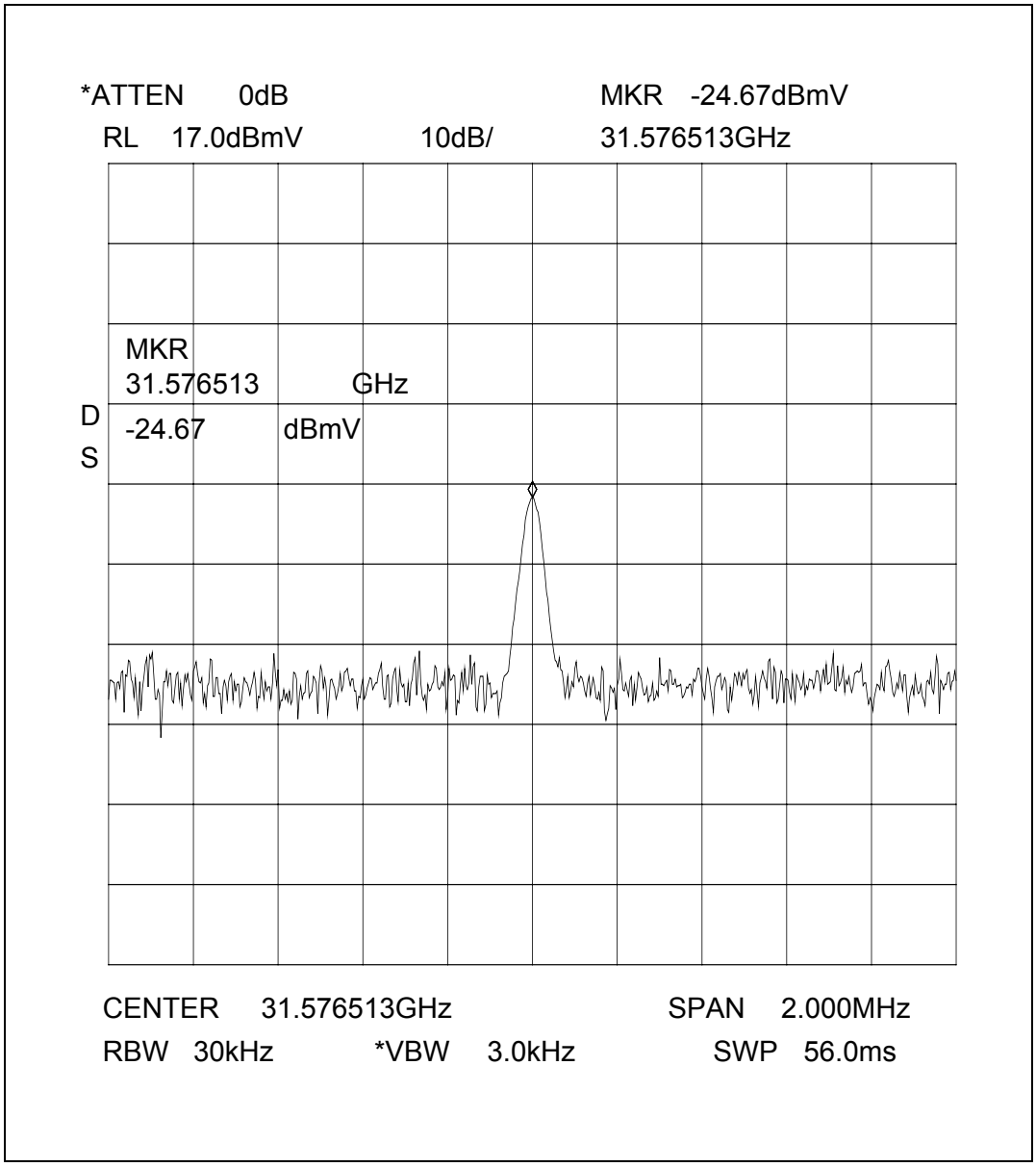
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 21.00 dB(mV) + 4.5 dB + 40.36 dB(1/m)

e = 23.86 dB(mV/m)

E = 15.60 mV/m

Plot 13 HB 140 # 4



Measurement distance d = 3.0 m

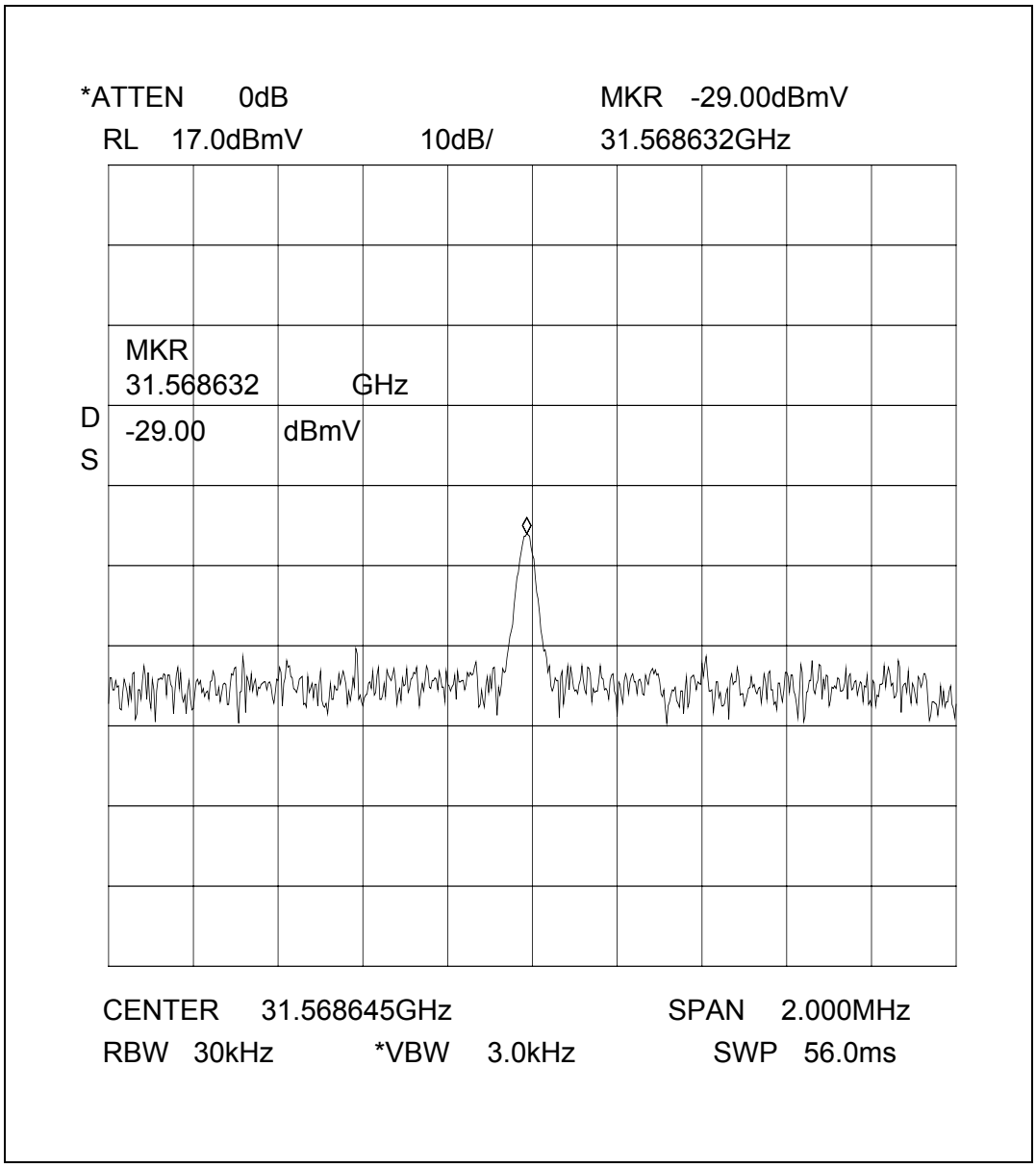
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 24.67 dB(mV) + 4.8 dB + 38.97 dB(1/m)

e = 19.10 dB(mV/m)

E = 9.02 mV/m

Plot 14 HB 140N # 4



Measurement distance d = 3.0 m

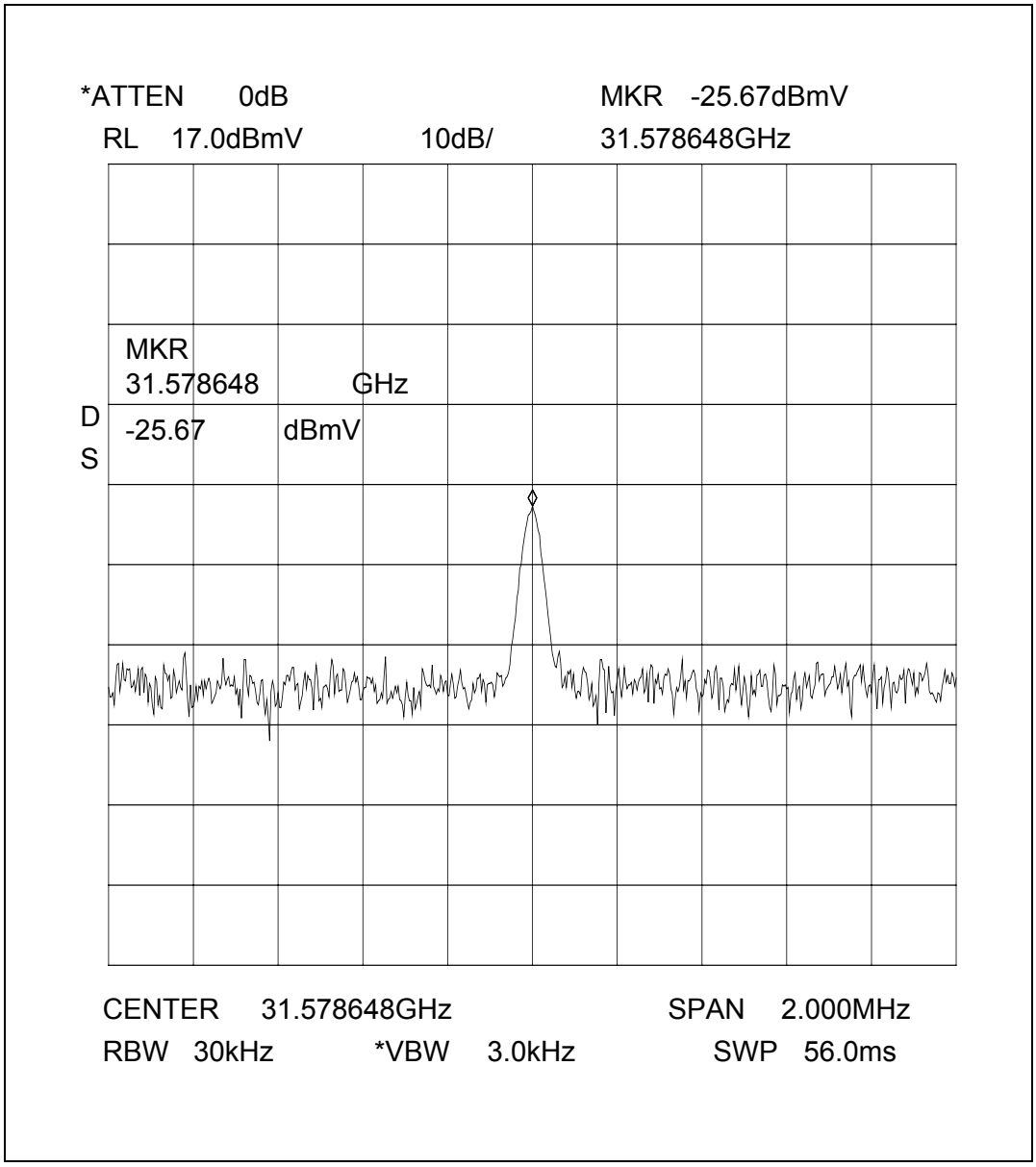
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 29.00 dB(mV) + 4.8 dB + 38.97 dB(1/m)

e = 14.77 dB(mV/m)

E = 5.48 mV/m

Plot 15 HB 140W # 4



Measurement distance d = 3.0 m

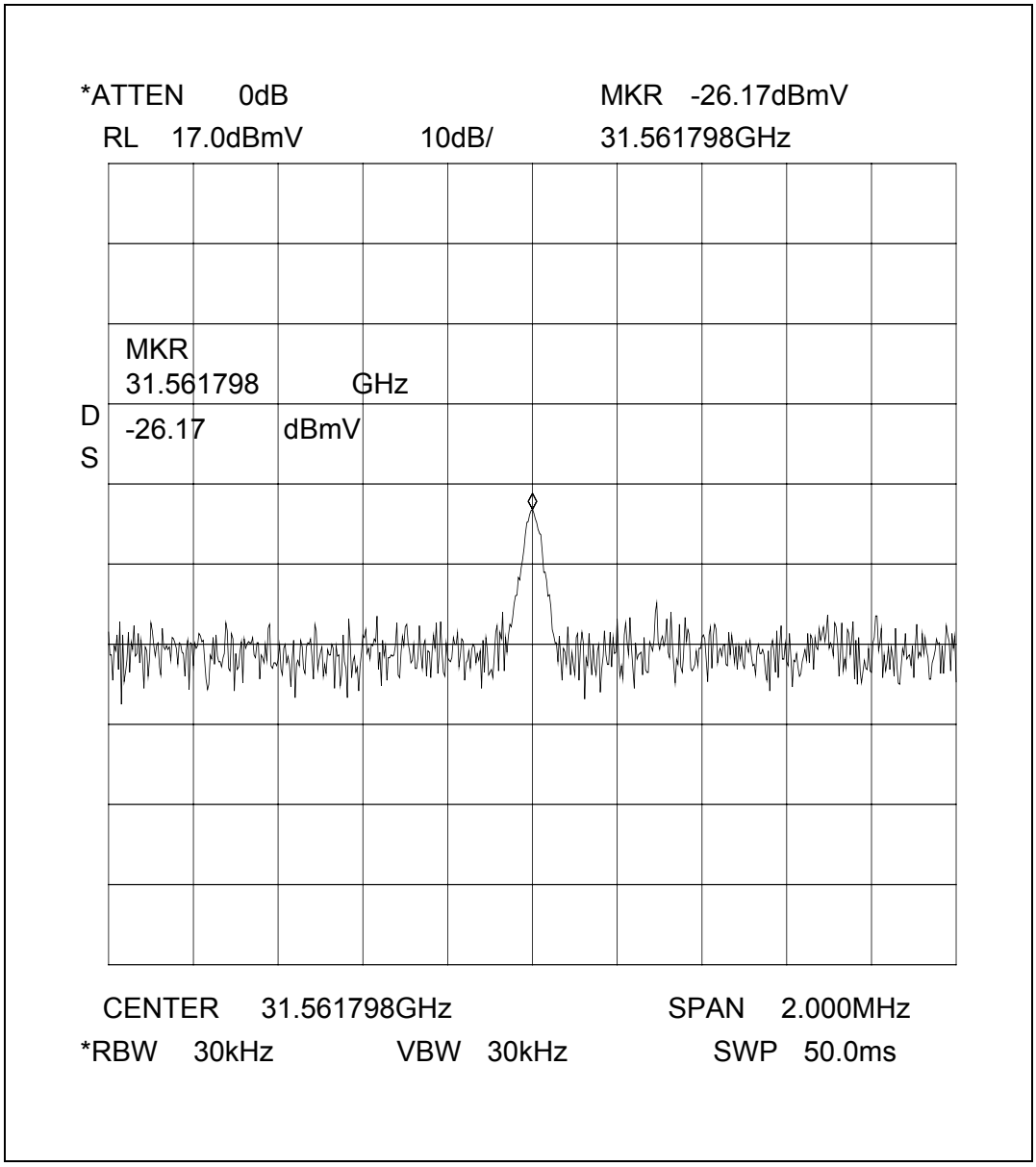
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 24.67 dB(mV) + 4.8 dB + 38.97 dB(1/m)

e = 18.10 dB(mV/m)

E = 8.04 mV/m

Plot 16 HB 140 # 3



Measurement distance d = 3.0 m

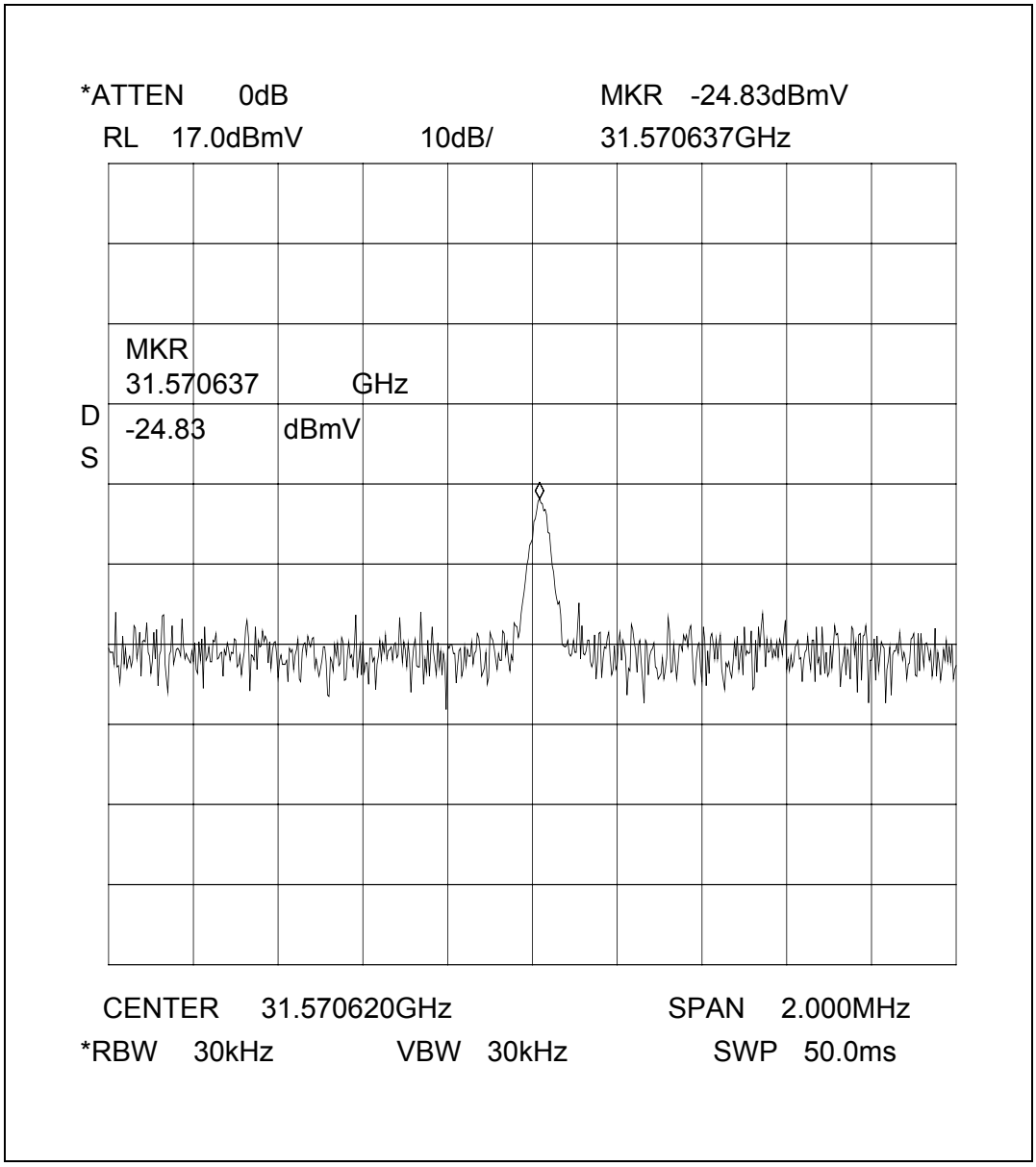
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 26.17 dB(mV) + 4.8 dB + 38.97 dB(1/m)

e = 17.60 dB(mV/m)

E = 7.59 mV/m

Plot 17 HB 140N # 3



Measurement distance d = 3.0 m

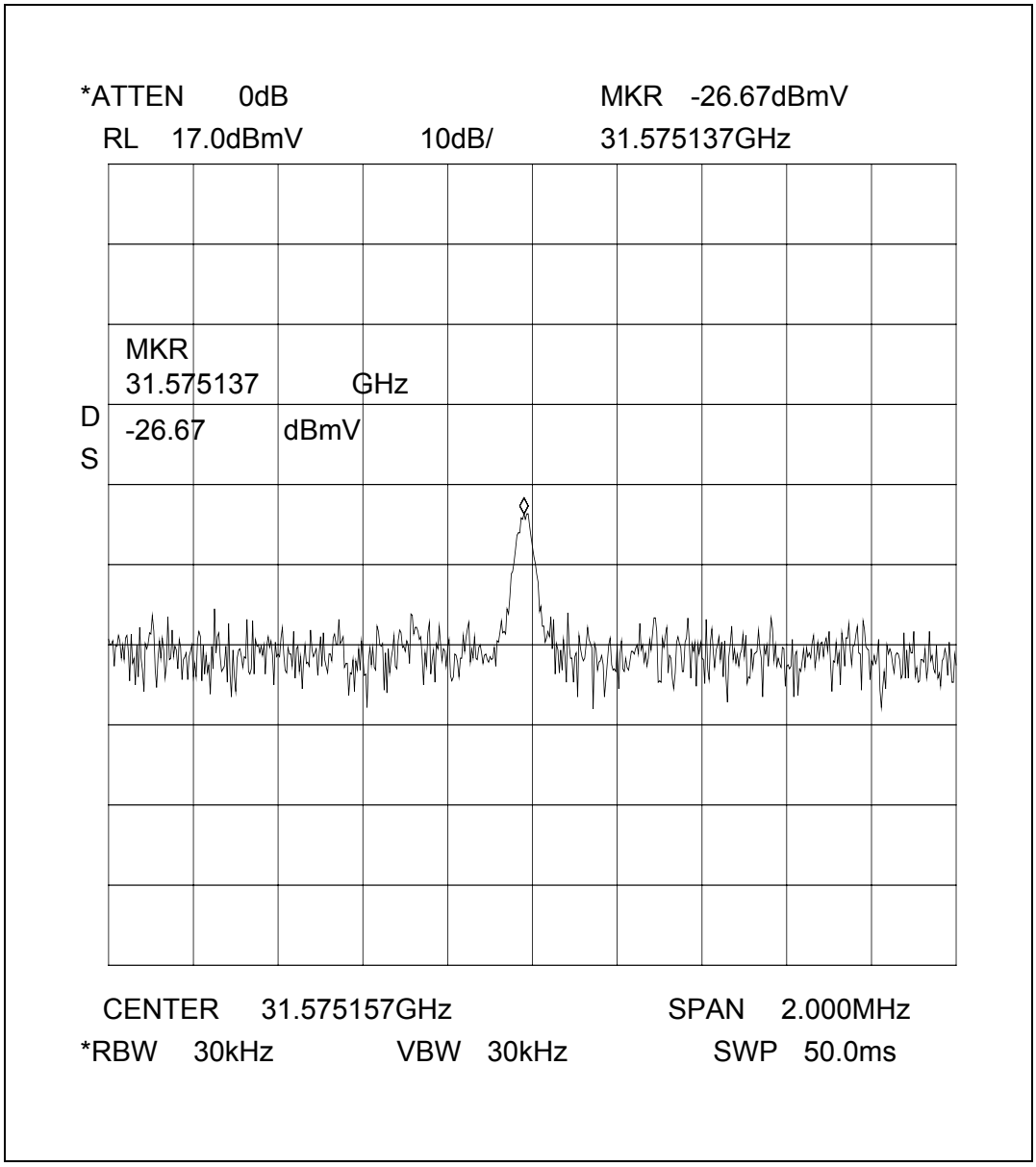
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 24.83 dB(mV) + 4.8 dB + 38.97 dB(1/m)

e = 18.97 dB(mV/m)

E = 8.85 mV/m

Plot 18 HB 140W # 3



Measurement distance d = 3.0 m

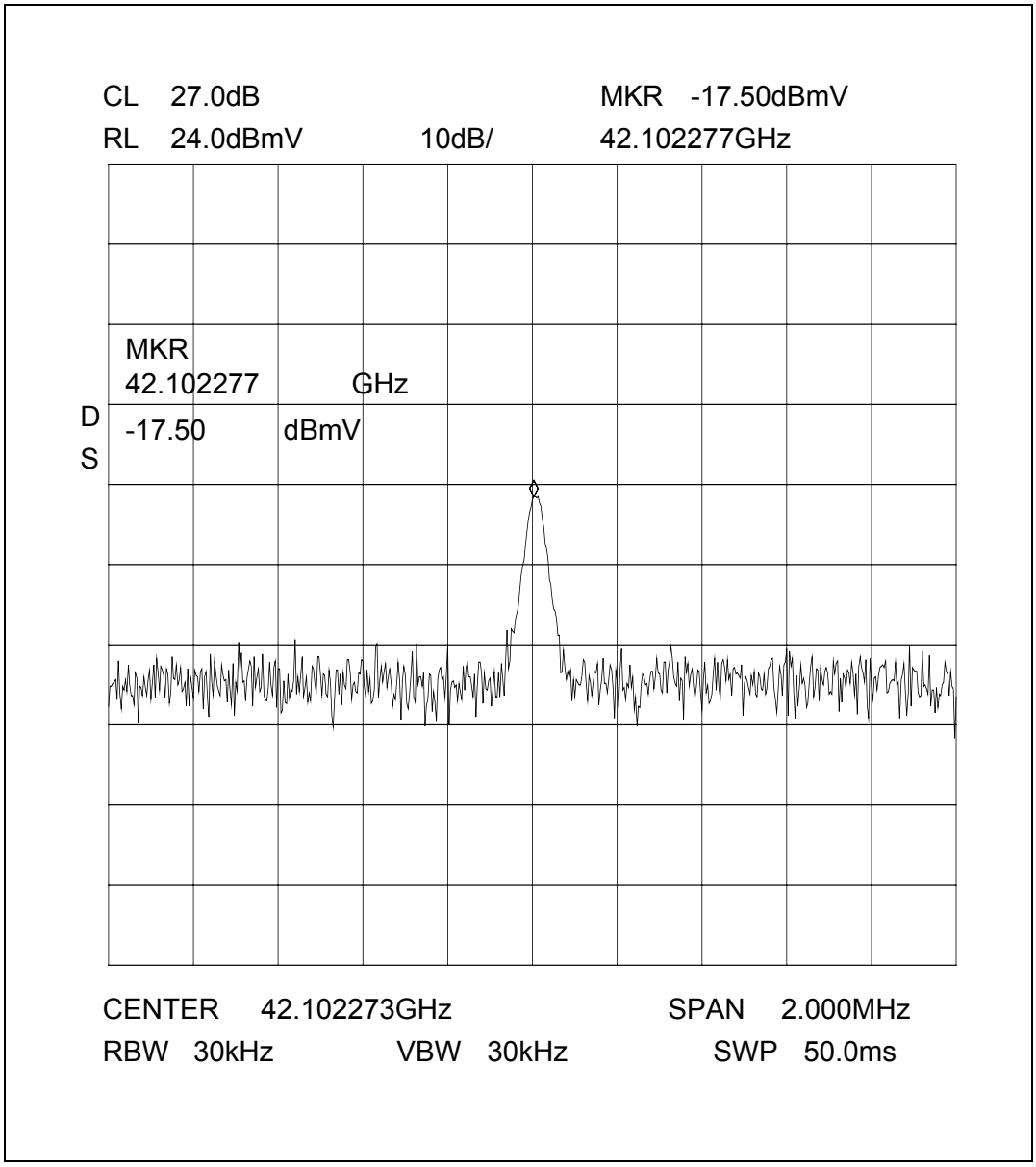
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = - 26.67 dB(mV) + 4.8 dB + 38.97 dB(1/m)

e = 17.10 dB(mV/m)

E = 7.16 mV/m

Plot 19 HB 140 # 4



Measurement distance d = 1.0 m

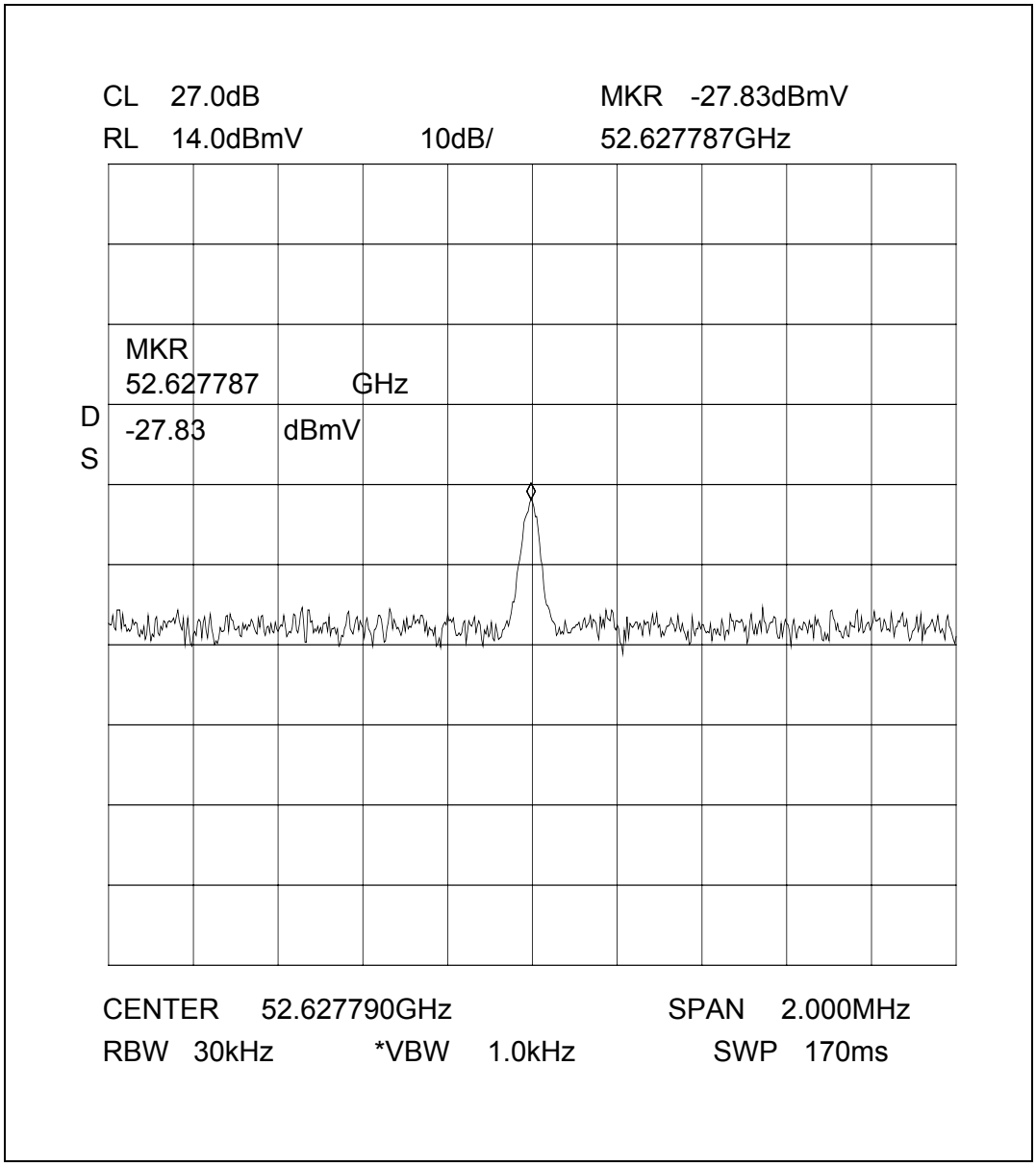
Calculation **:** Field strength = Analyser reading + Dist. corr. + Antenna factor

e = - 17.50 dB(mV) + (-9.54) dB + 38.98dB (1/m)

e = 13.94 dB(mV/m)

E = 4.98 mV/m

Plot 20 HB 140 # 4



Measurement distance d = 1.0 m

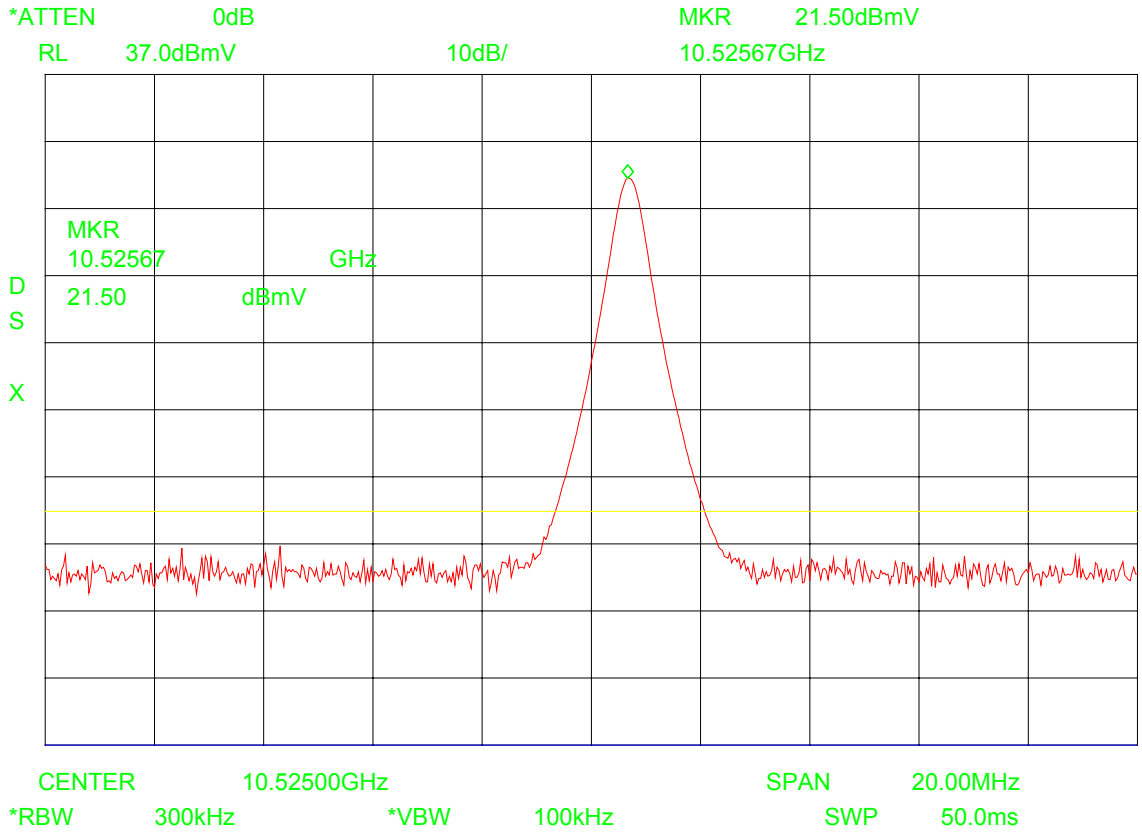
Calculation **:** Field strength = Analyser reading + Dist. corr. + Antenna factor

e = - 27.83 dB(mV) + (-9.54) dB + 39.66dB (1/m)

e = 2.29 dB(mV/m)

E = 1.30 mV/m

Plot 21 HB 140 # 4



Measurement distance d = 3.0 m

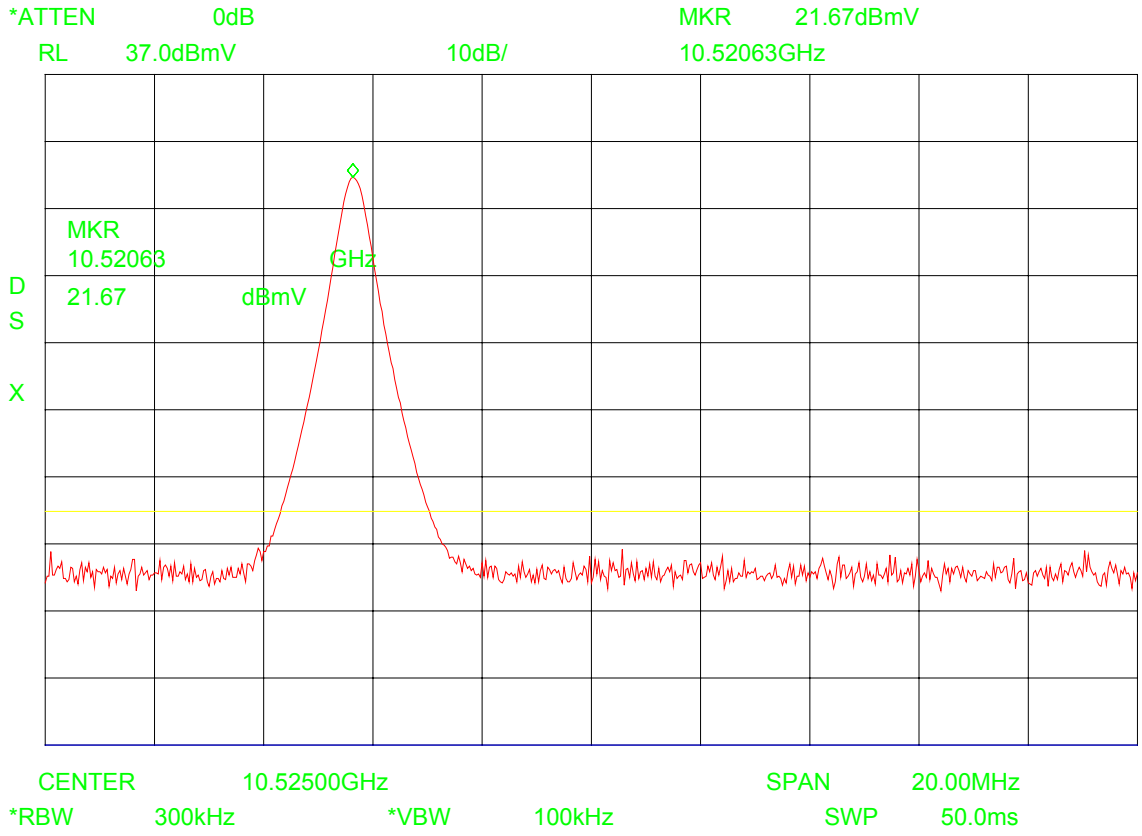
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = 21.17 dB(mV) + 2.5 dB + 33.64 dB(1/m)

e = 57.64 dB(mV/m)

E = 762.07 mV/m

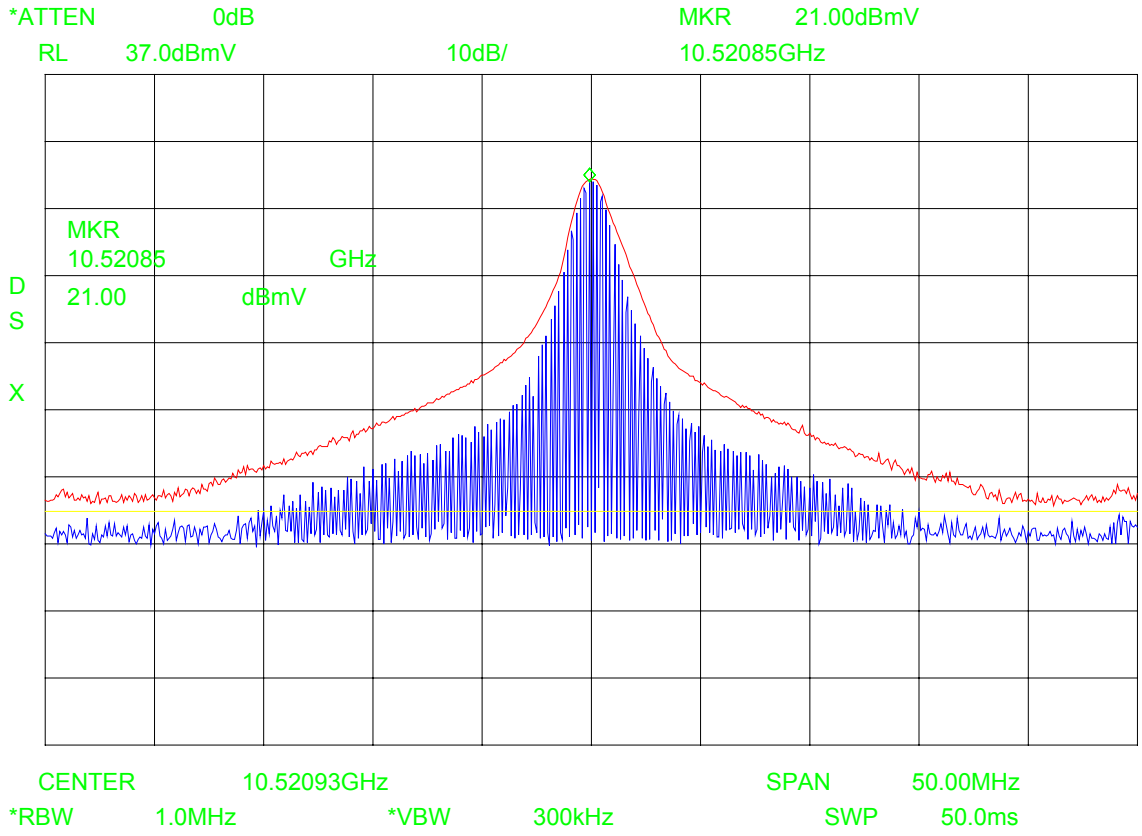
Plot 22 HB 140 # 3



Measurement distance d = 3.0 m

Calculation **:** Field strength	=	Analyser reading	+	Cable loss	+	Antenna factor
e	=	21.67 dB(mV)	+	2.5 dB	+	33.64 dB(1/m)
e	=	57.81 dB(mV/m)				
E	=	777.14 mV/m				

Plot 23 HB 140 # 3



Measurement distance d = 3.0 m

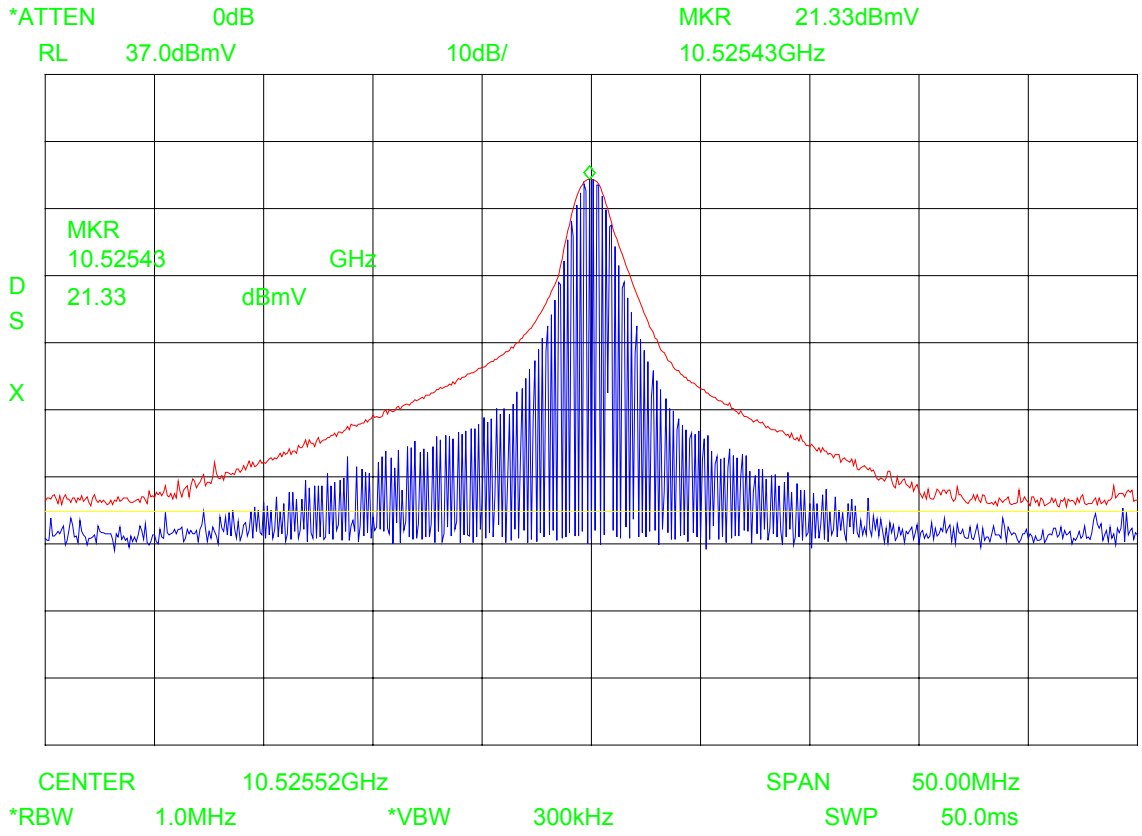
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor

e = 21.00 dB(mV) + 2.5 dB + 33.64 dB(1/m)

e = 57.14 dB(mV/m)

E = 719.45 mV/m

Plot 24 HB 140 # 4



Measurement distance d = 3.0 m

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

e = 21.33 dB(mV) + 2.5 dB + 33.64 dB(1/m)

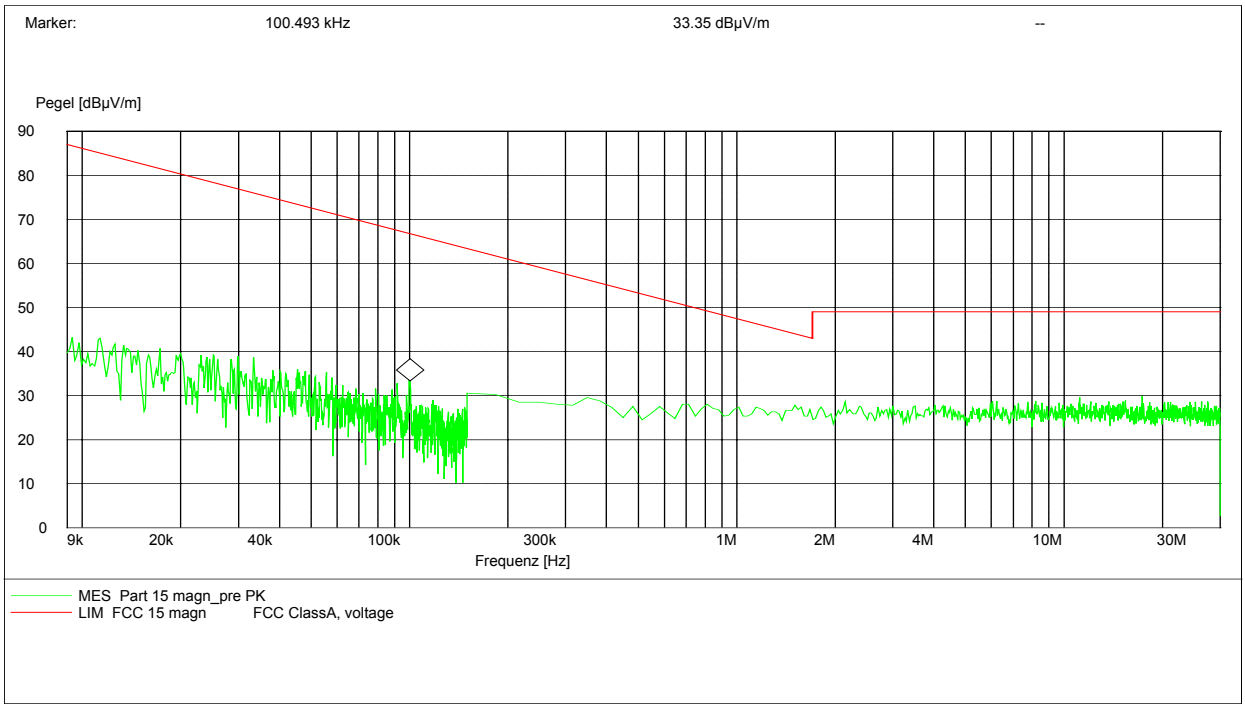
e = 57.47 dB(mV/m)

E = 747.31 mV/m

Plot 25 HB 140 # 4

FCC Section 15.209

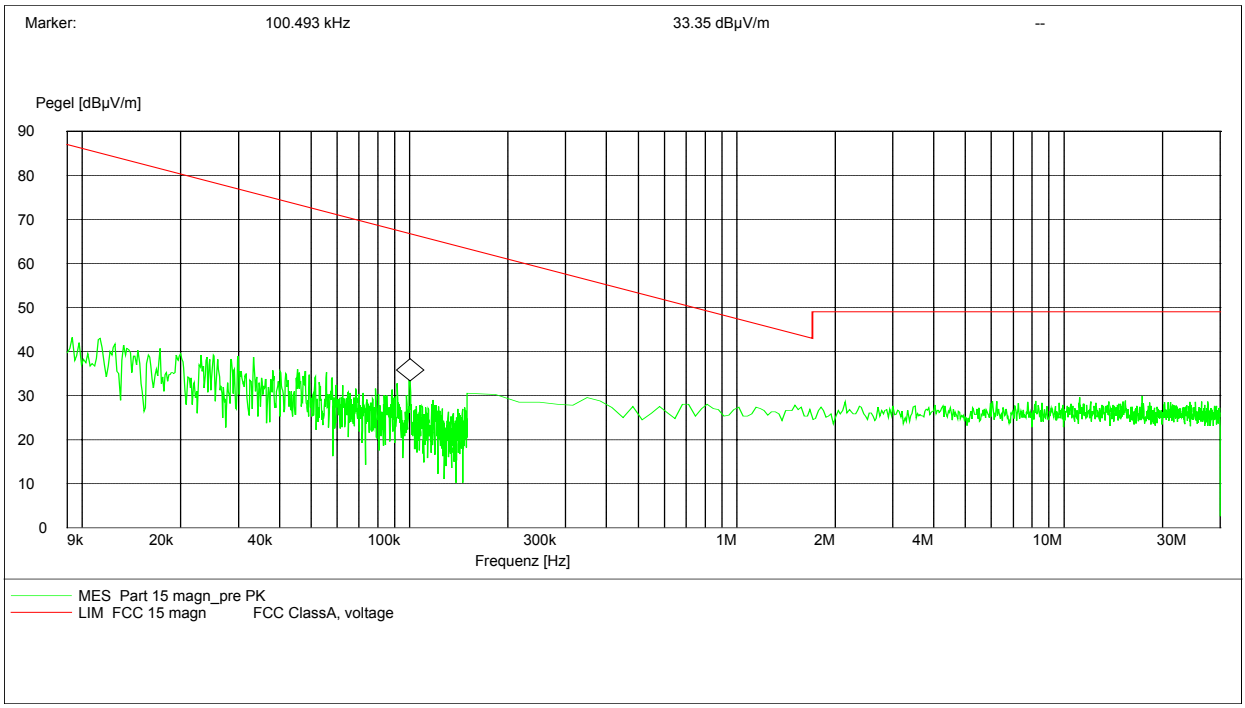
EUT:	KF 600 in CW mode
Applicant:	AGILIS
Operating condition:	TX = 10.525 GHz Mod.: N0N ; RX = 10.525 GHz
Test Site:	CETECOM ICT Services GmbH Saarbrücken, Room 006
Power Supply:	24 V DC
Start of Test:	17.09.02 / 11:09:38
Detector:	Quasi peak mode



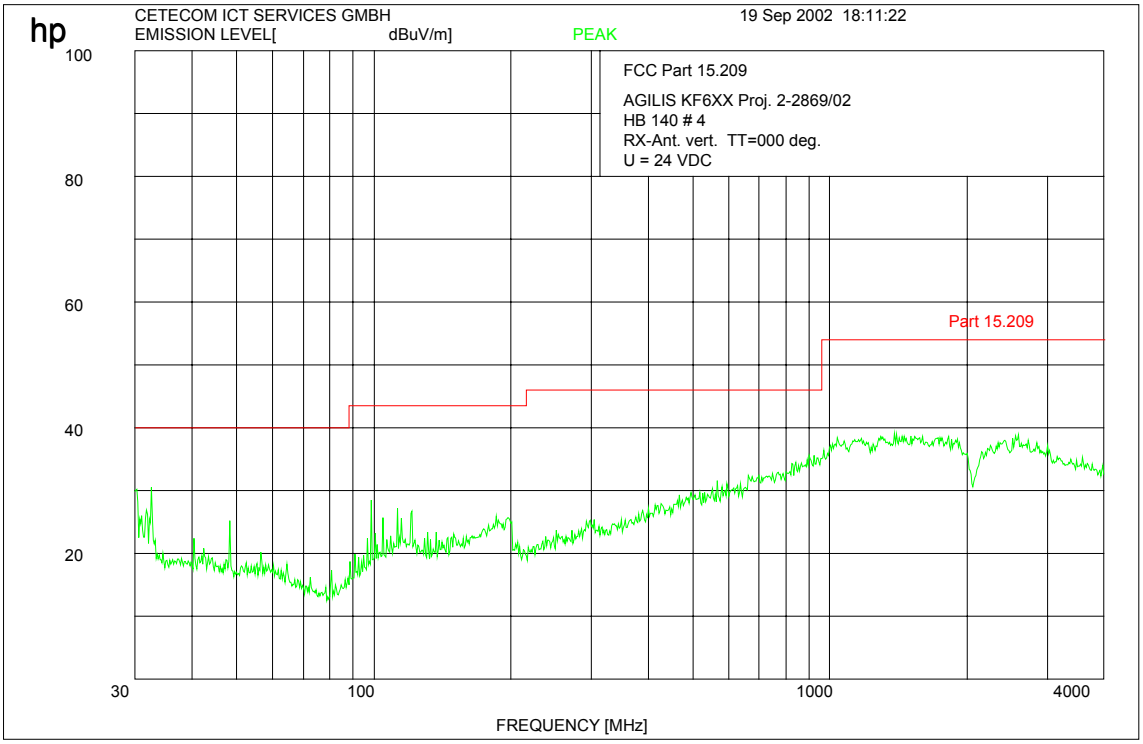
Plot 26 HB 140 # 4

FCC Section 15.209

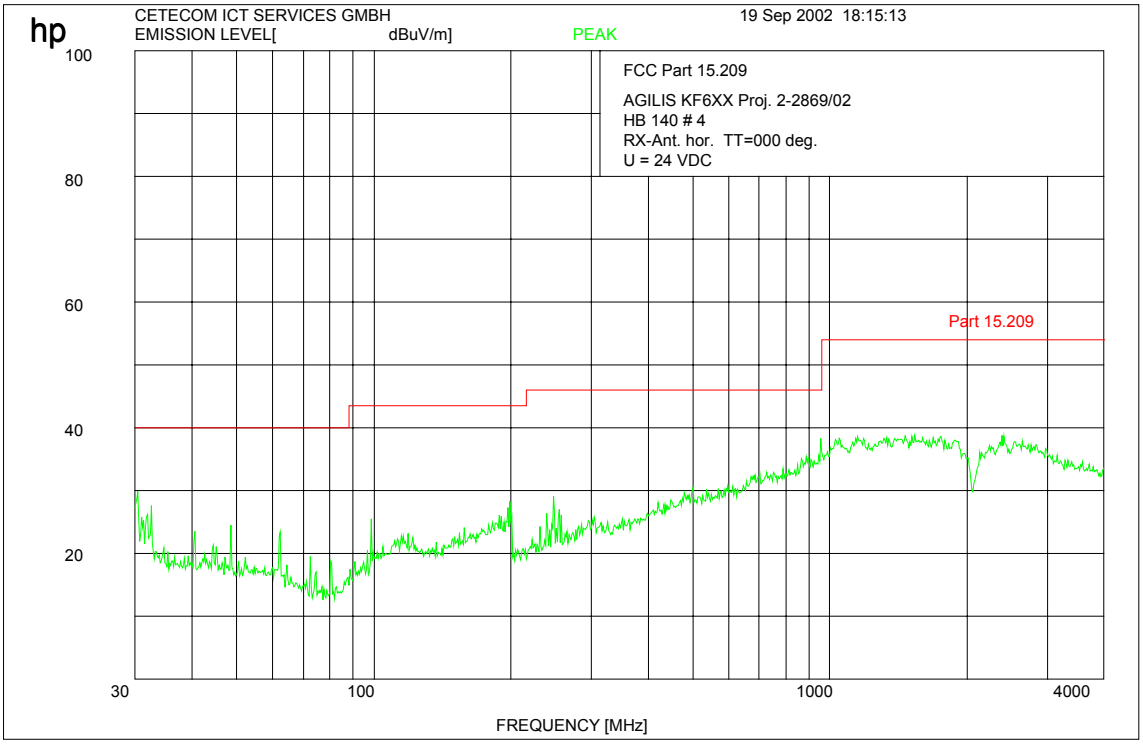
EUT:	KF 600 in CW mode
Applicant:	AGILIS
Operating condition:	TX = 10.525 GHz Mod.: N0N ; RX = 10.525 GHz
Test Site:	CETECOM ICT Services GmbH Saarbrücken, Room 006
Power Supply:	24 V AC
Start of Test:	17.09.02 / 11:12:50
Detector:	Quasi peak Modus:



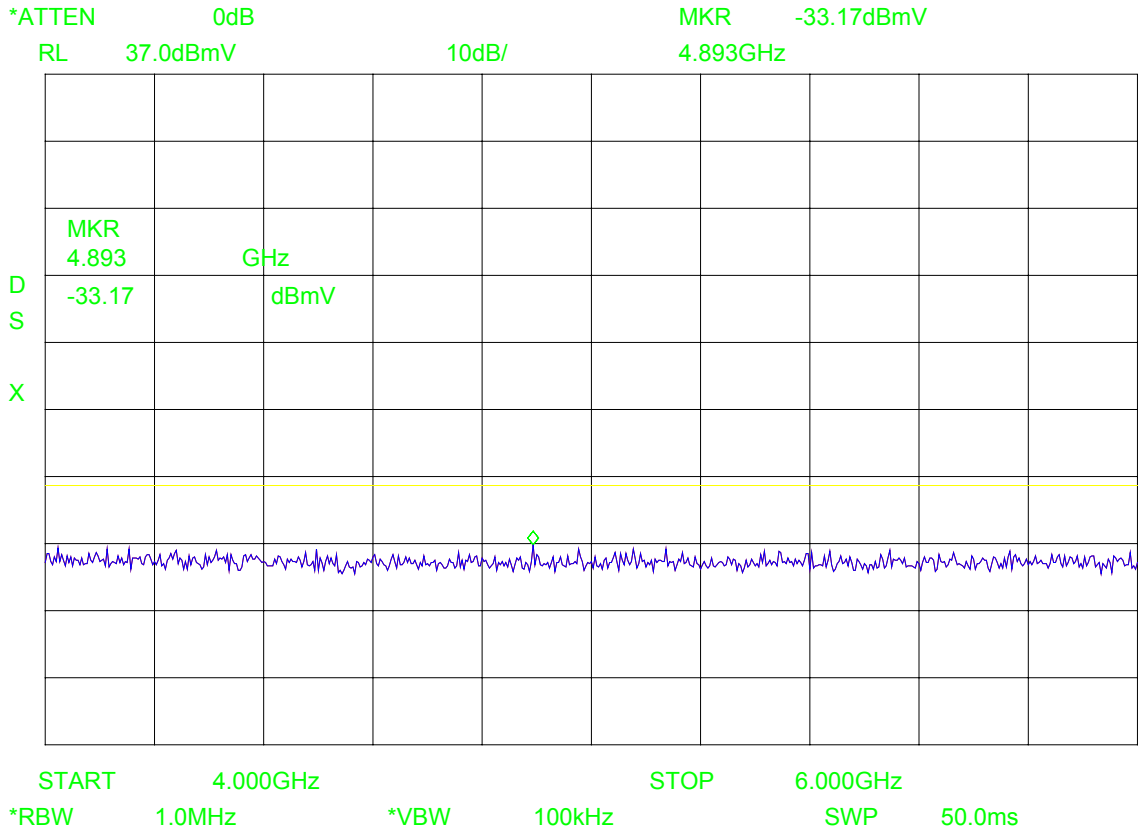
Plot 27 HB 140 # 4



Plot 28 HB 140 # 4



Plot 29 HB 140 # 4



Measurement distance d = 1.0 m

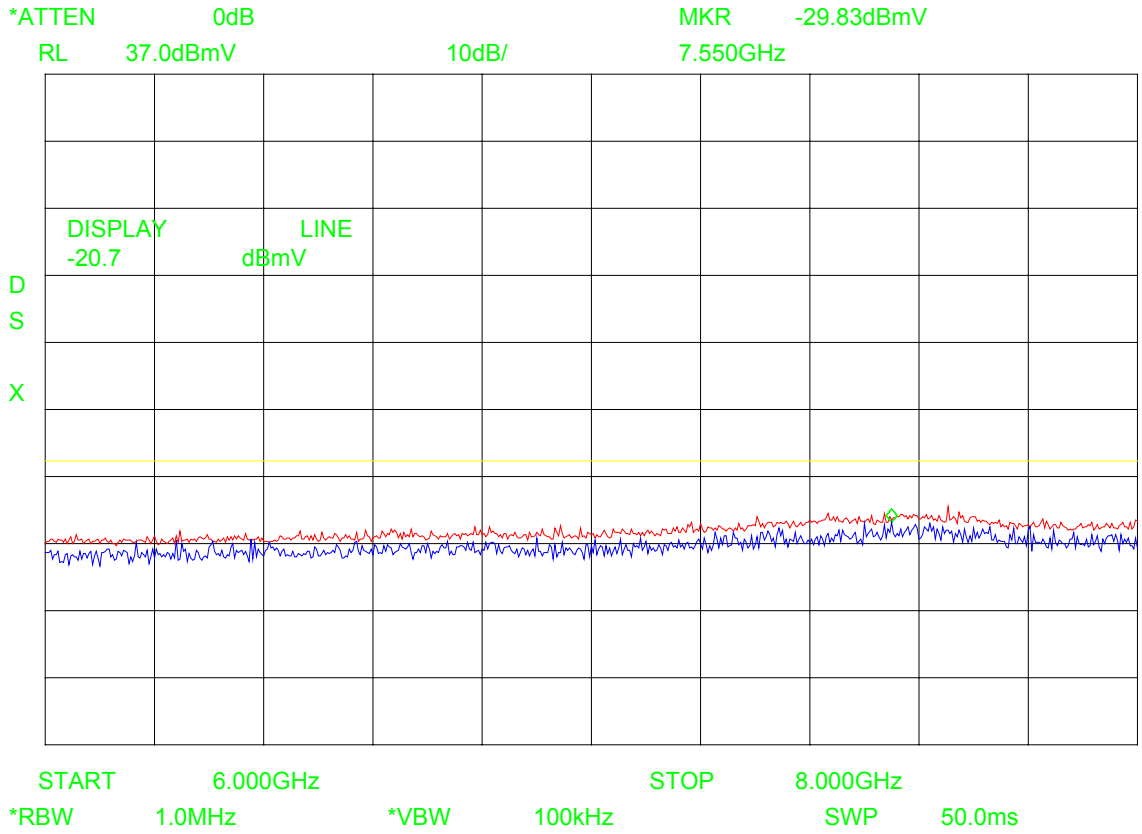
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor + Dist. corr.

e = -33.17 dB(mV) + 1.8 dB + 27.22 dB(1/m) + (-9.54 dB)

Noise e = -13.69 dB(mV/m) = 46.31 dB(µV/m)

Display line = 54 dB(µV/m)

Plot 30 HB 140 # 4



Measurement distance d = 0.5 m

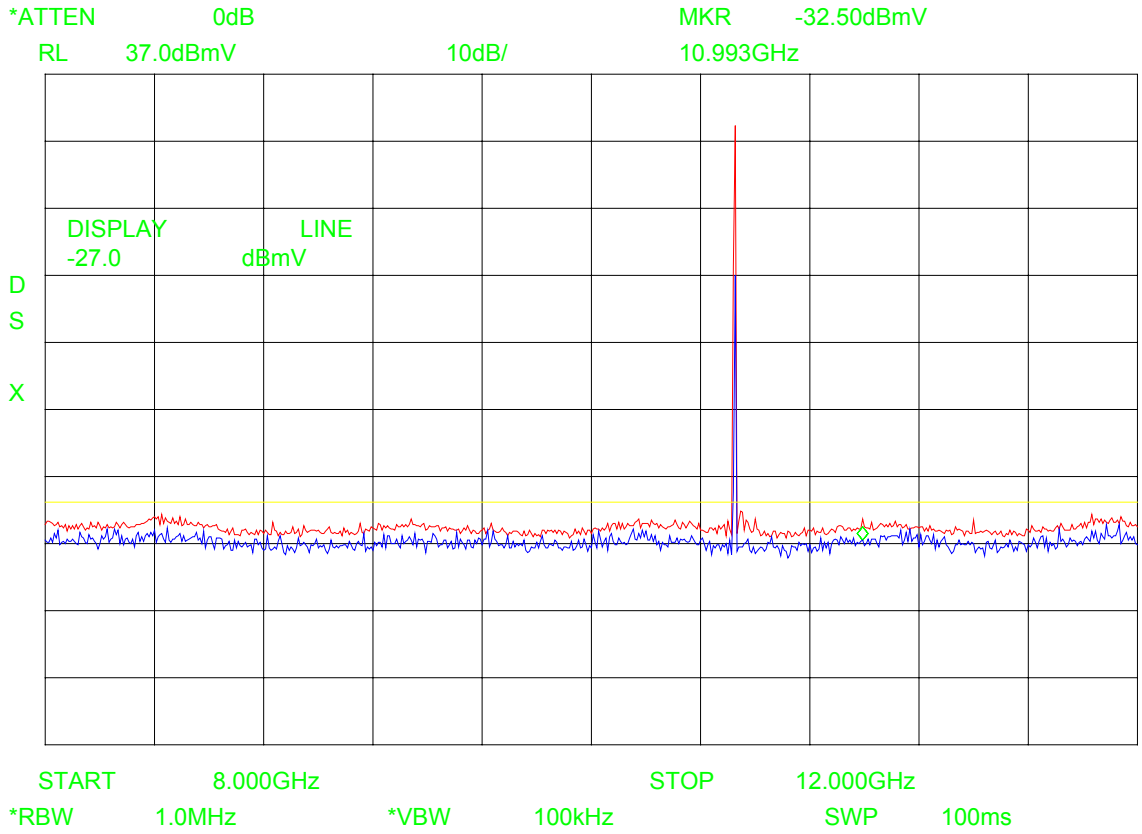
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor + Dist. corr.

e = -29.83 dB(mV) + 2.0 dB + 29.94 dB(1/m) + (-15.56 dB)

Noise e = -13.45 dB(mV/m) = 46.55 dB(µV/m)

Display line = 54 dB(µV/m)

Plot 31 HB 140 # 4



Measurement distance d = 0.5 m

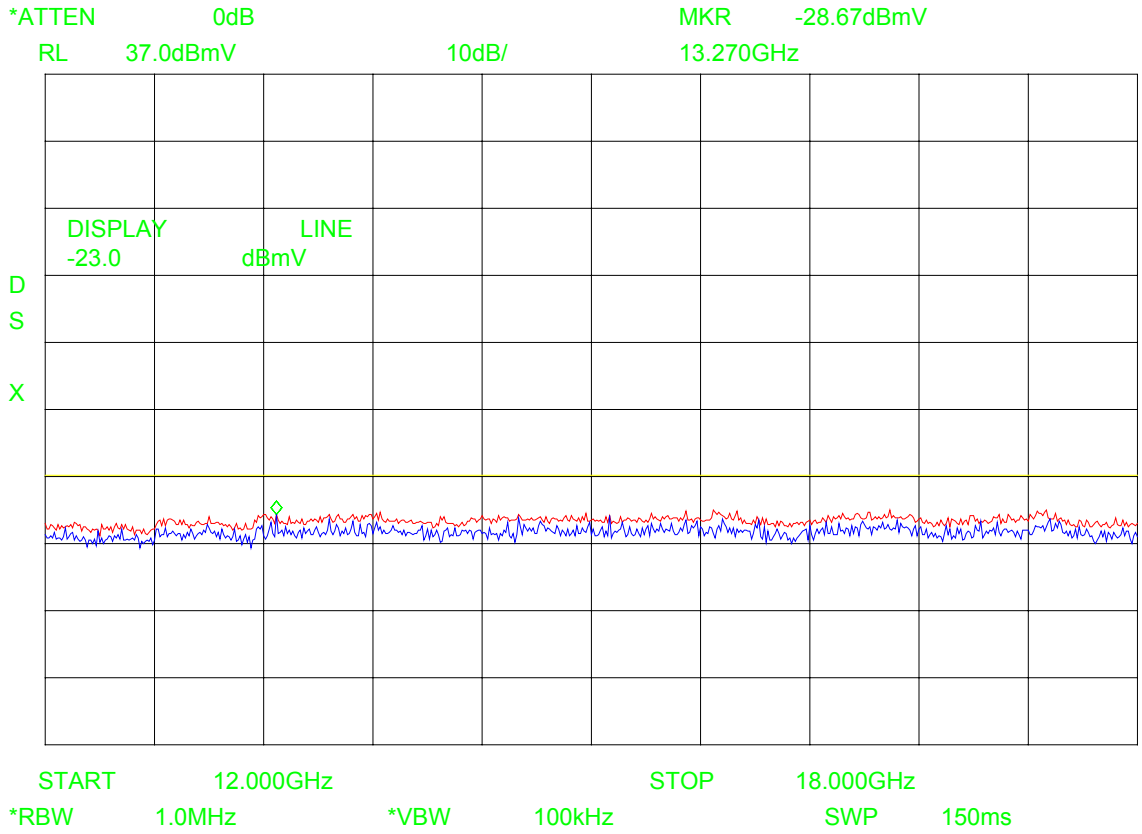
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor + Dist. corr.

e = -32.50 dB(mV) + 2.5 dB + 33.64 dB(1/m) + (-15.56 dB)

Noise e = -11.92 dB(mV/m) = 48.08 dB(µV/m)

Display line = 54 dB(µV/m)

Plot 32 HB 140 # 4



Measurement distance d = 0.25 m

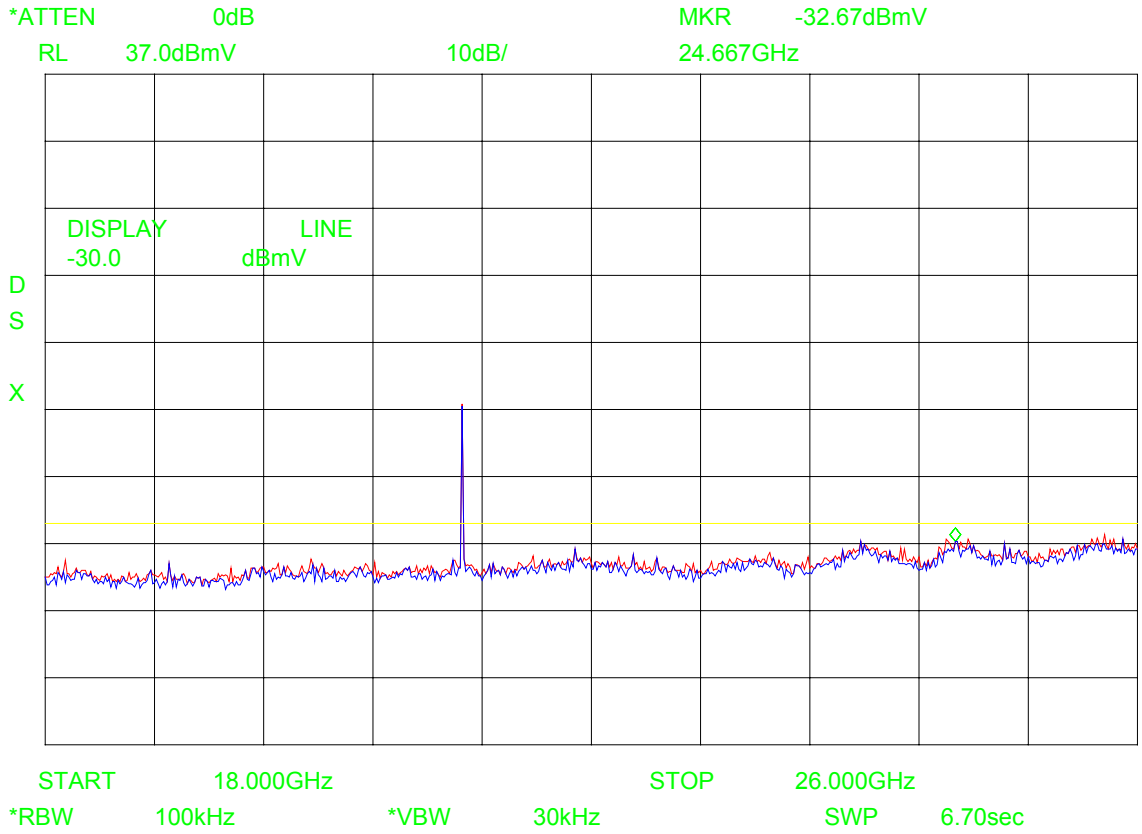
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor + Dist. corr.

e = -28.67 dB(mV) + 2.9 dB + 36.88 dB(1/m) + (-21.58 dB)

Noise e = -10.47 dB(mV/m) = 49.53 dB(µV/m)

Display line = 54 dB(µV/m)

Plot 33 HB 140 # 4



Measurement distance d = 0.25 m

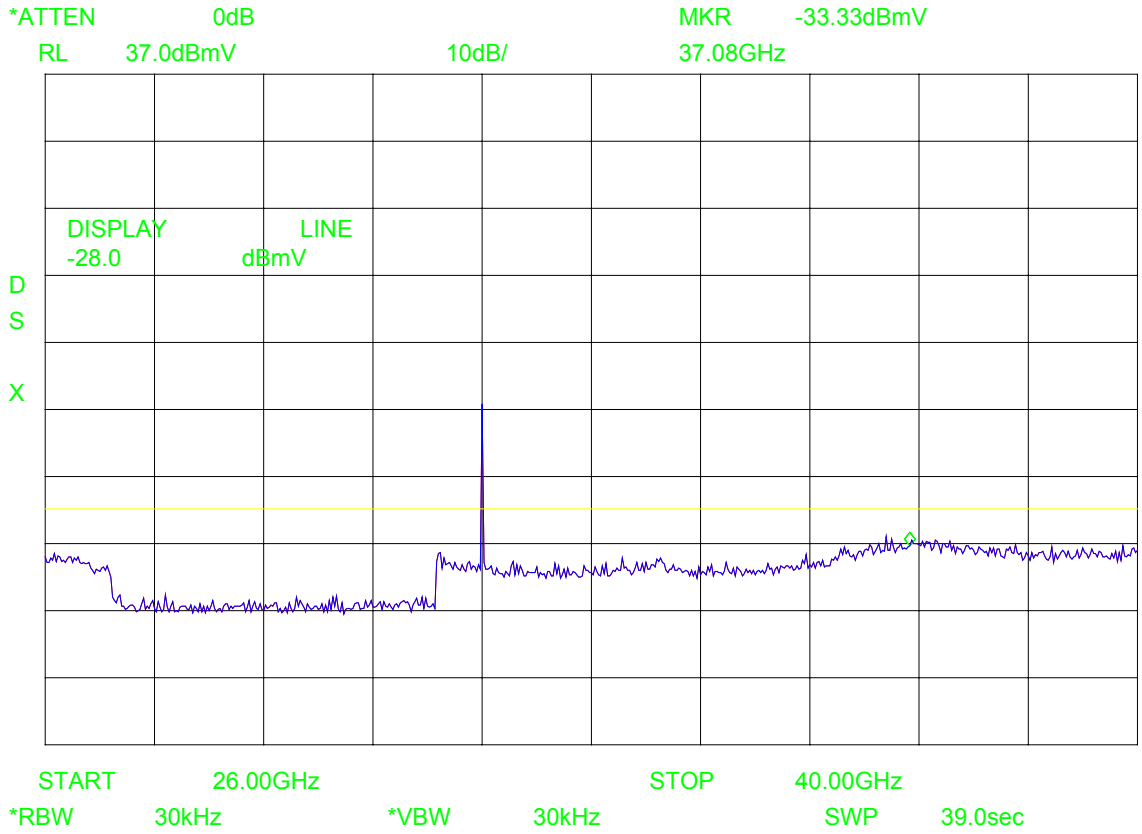
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor + Dist. corr.

e = -32.67 dB(mV) + 4.5 dB + 40.36 dB(1/m) + (-21.58 dB)

Noise e = -9.39 dB(mV/m) = 50.61 dB(µV/m)

Display line = 54 dB(µV/m)

Plot 34 HB 140 # 4



Measurement distance d = 0.25 m

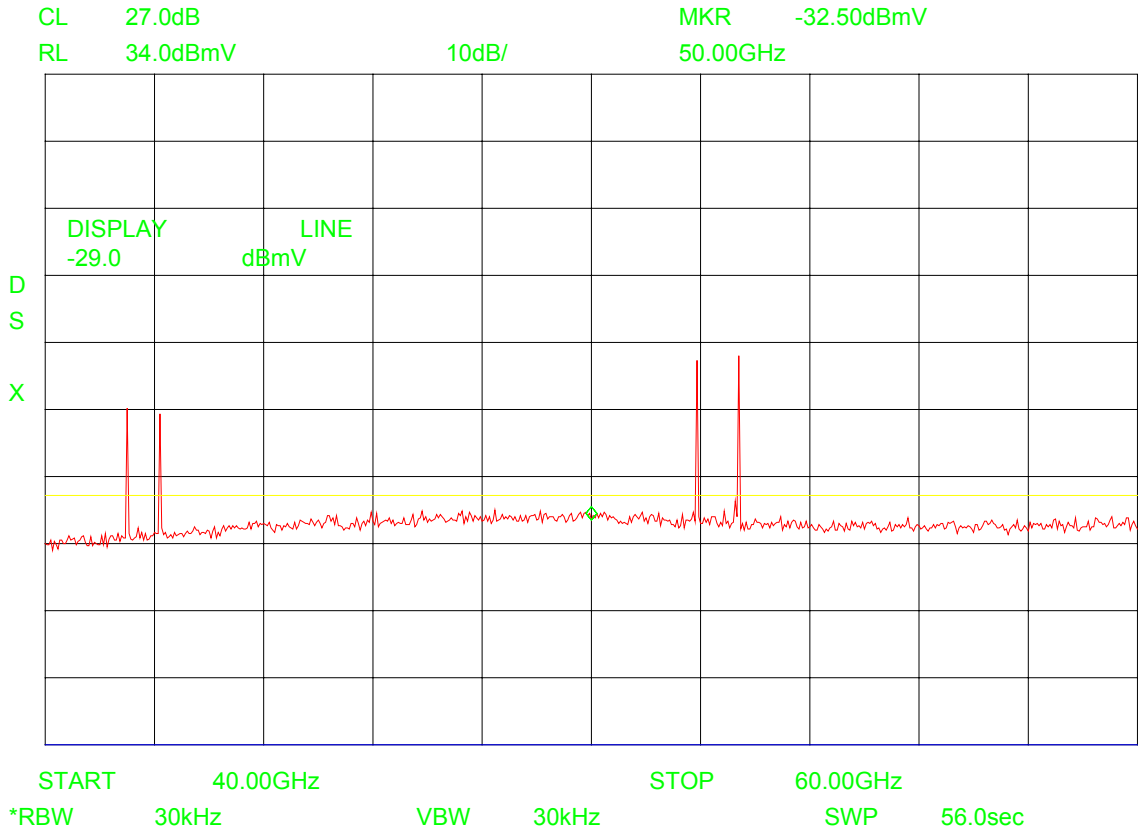
Calculation **:** Field strength = Analyser reading + Cable loss + Antenna factor + Dist. corr.

e = -33.33 dB(mV) + 4.8 dB + 43.94 dB(1/m) + (-21.58 dB)

Noise e = -6.17 dB(mV/m) = 53.81 dB(µV/m)

Display line = 54 dB(µV/m)

Plot 35 HB 140 # 4



Measurement distance d = 0.25 m

Calculation **:** Field strength = Analyser reading + Antenna factor + Dist. corr.

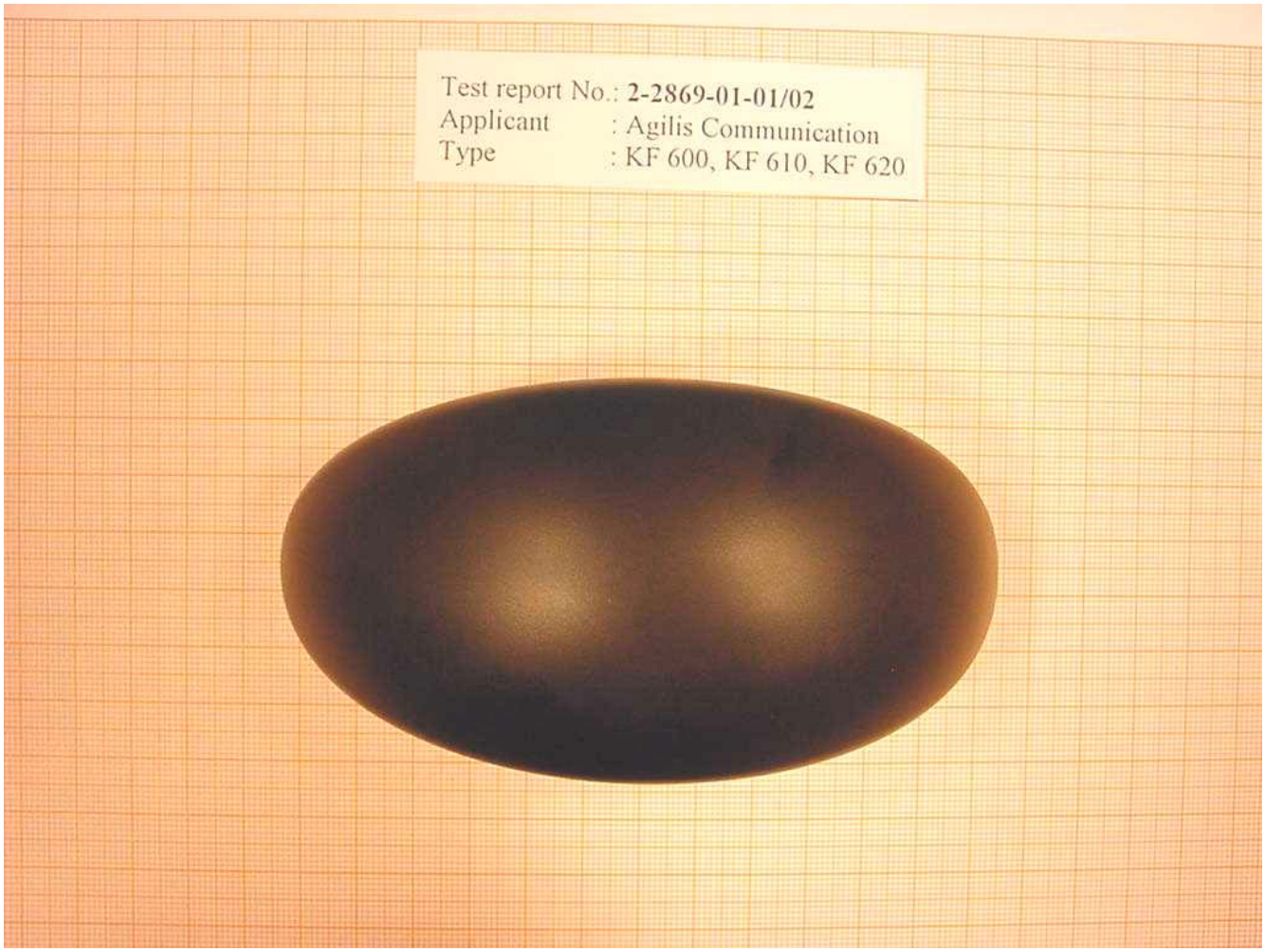
e = -29.00 dB(mV) + 38.98 dB(1/m) + (-21.58 dB)

Noise e = -11.60 dB(mV/m) = 48.40 dB(µV/m)

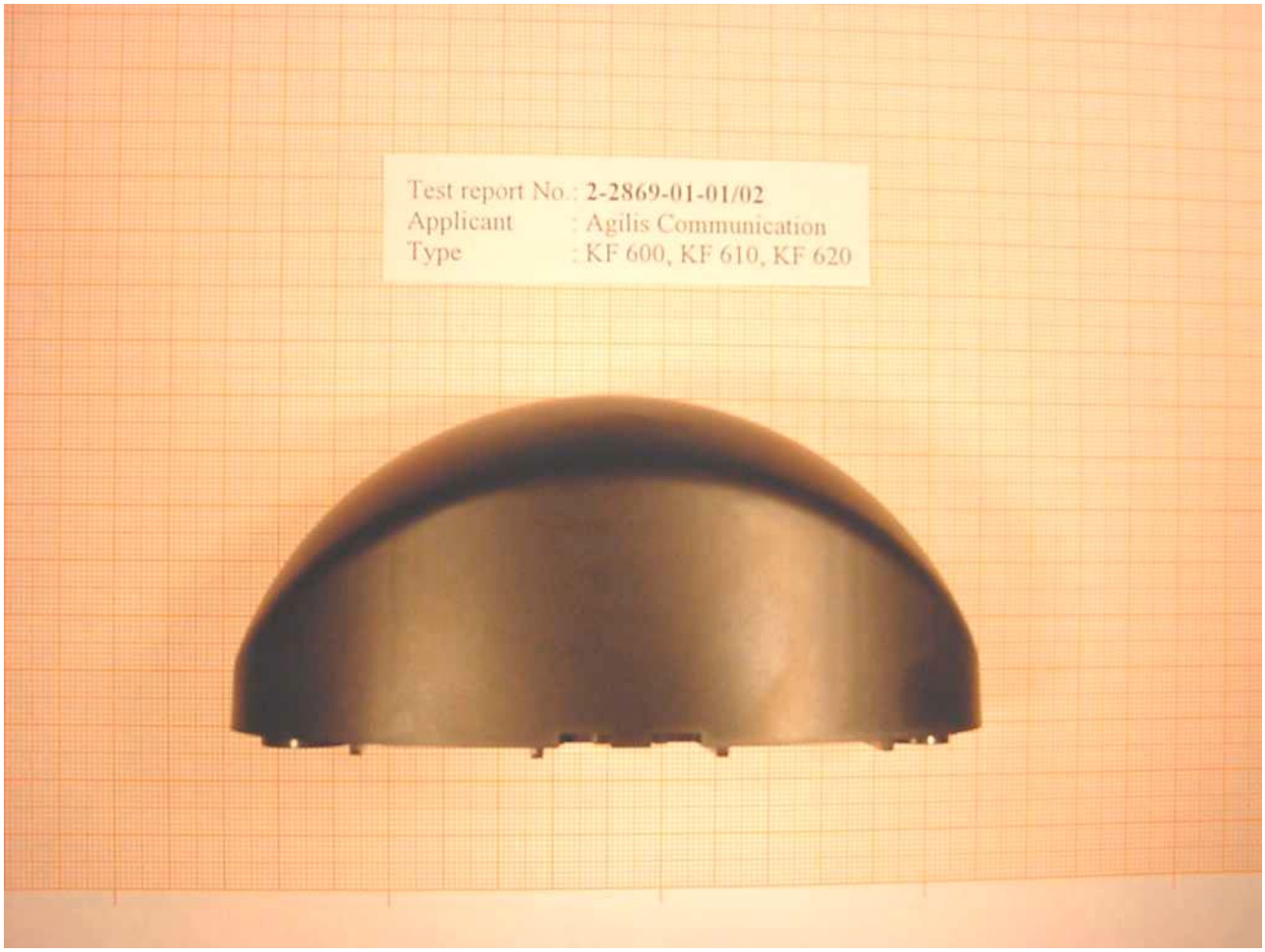
Display line = 54 dB(µV/m)

4. Photographs

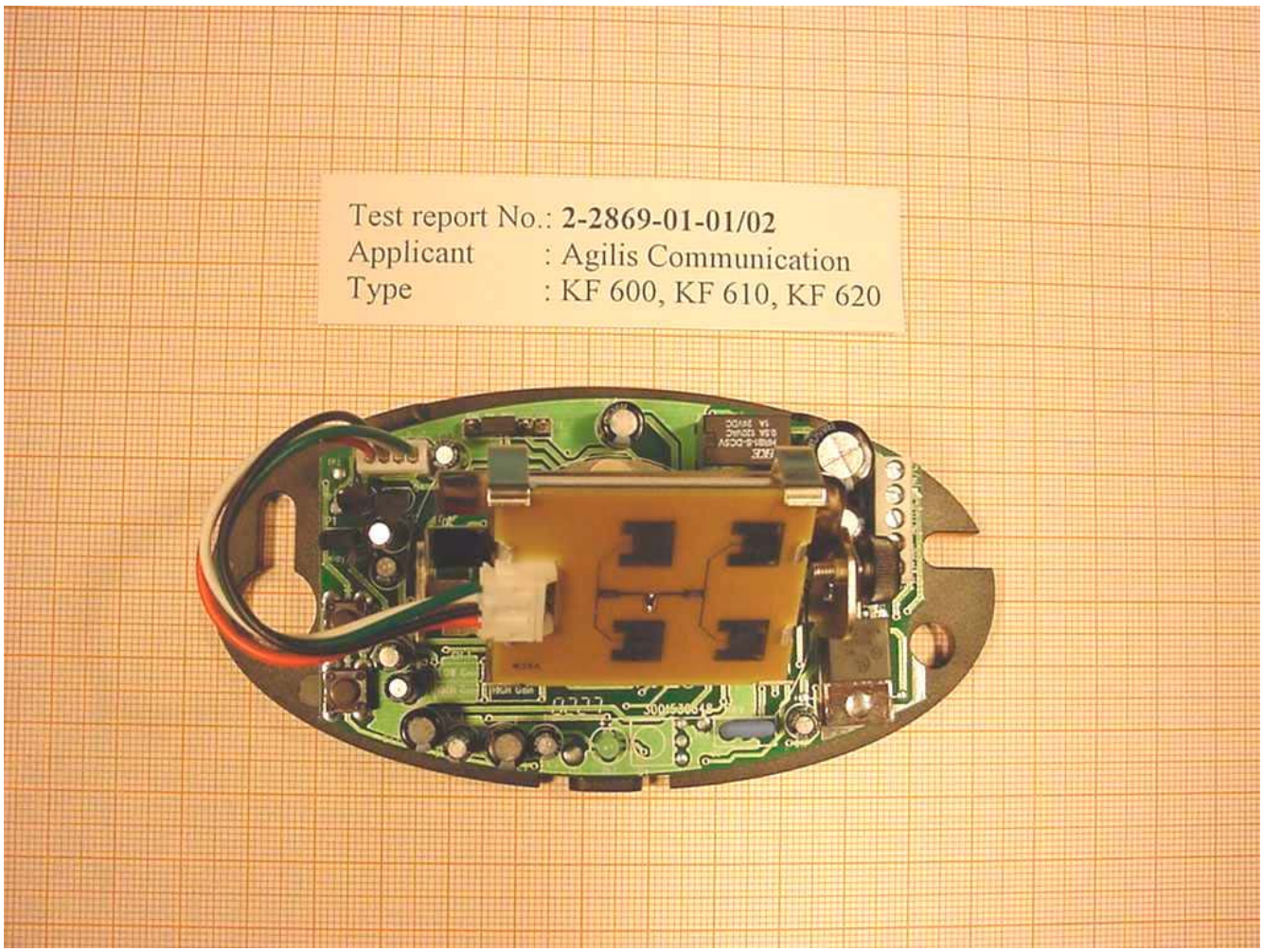
Top view



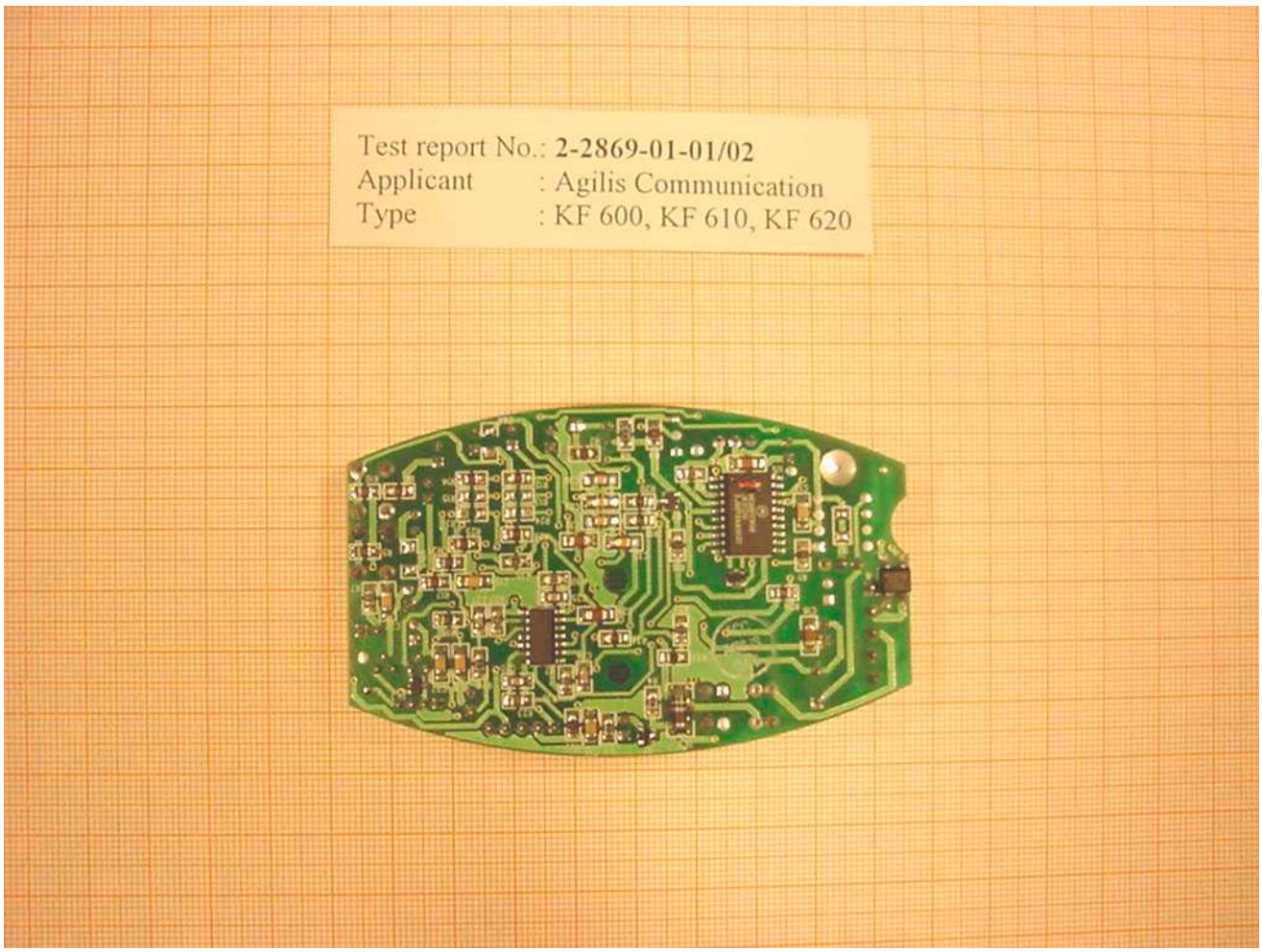
Side view


Test report No.: 2-2869-01-01/02
Applicant : Agilis Communication
Type : KF 600, KF 610, KF 620

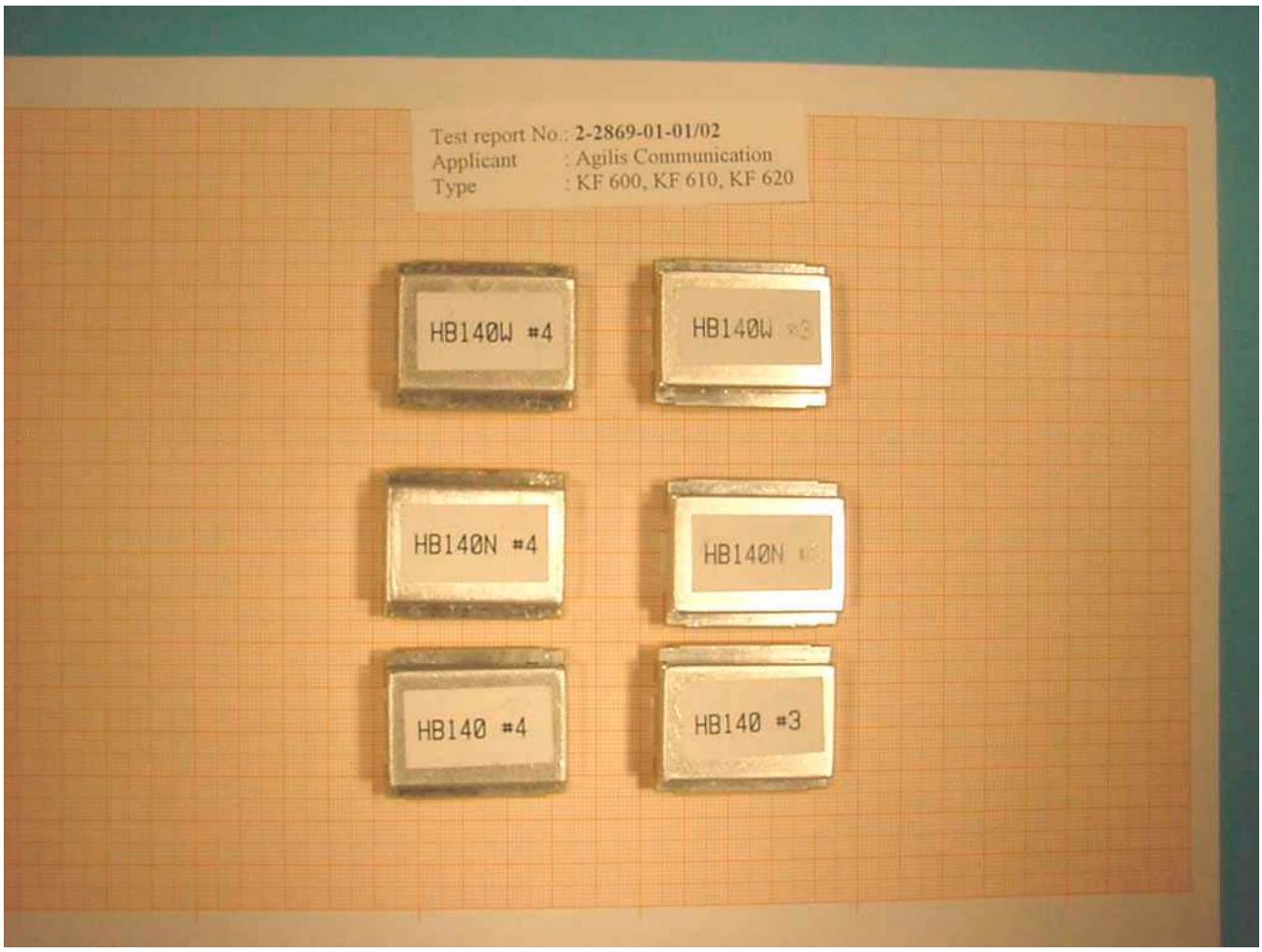
Top view PCB with antenna module



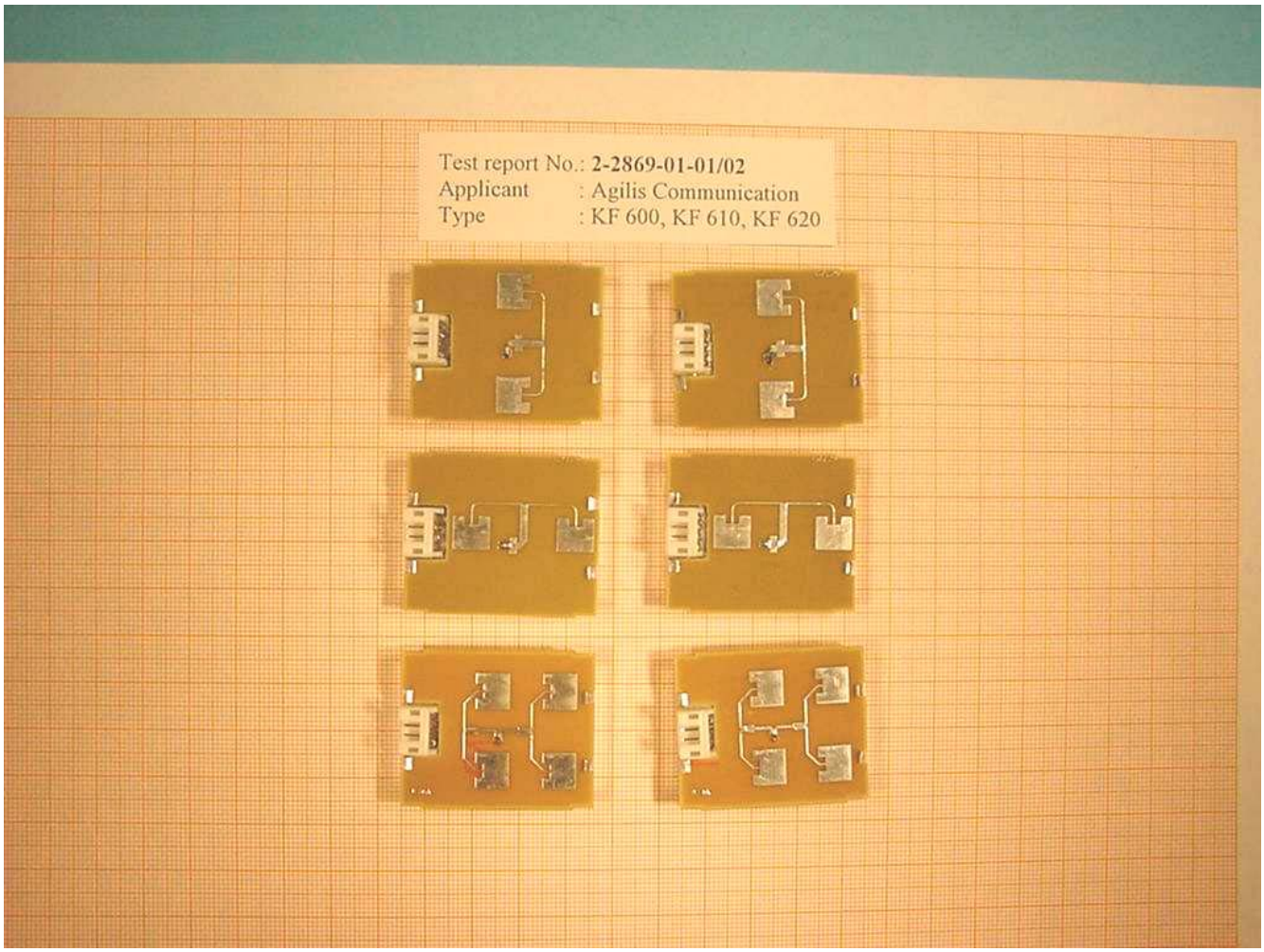
Bottom view PCB



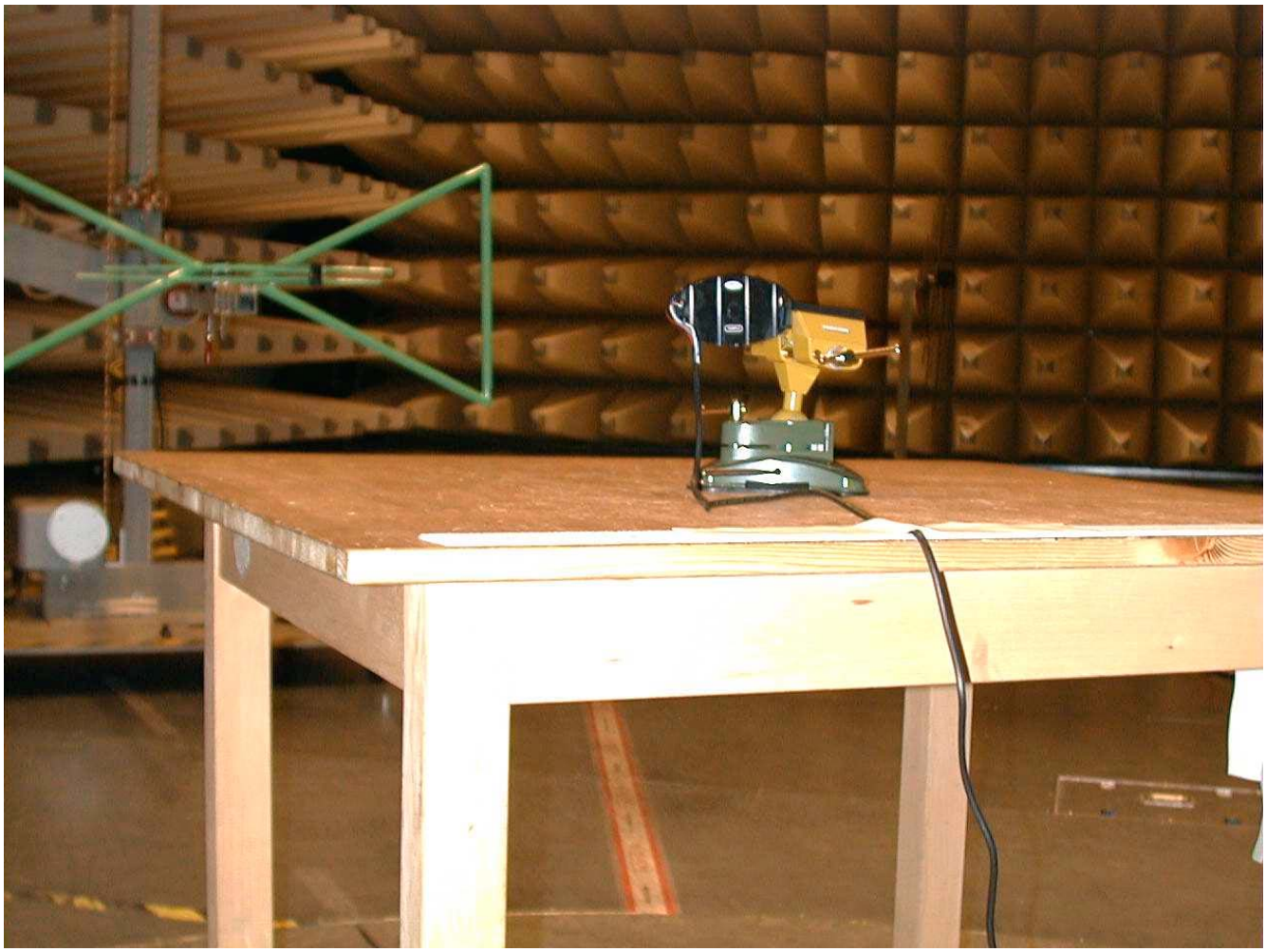
Antenna modules 10.525 GHz



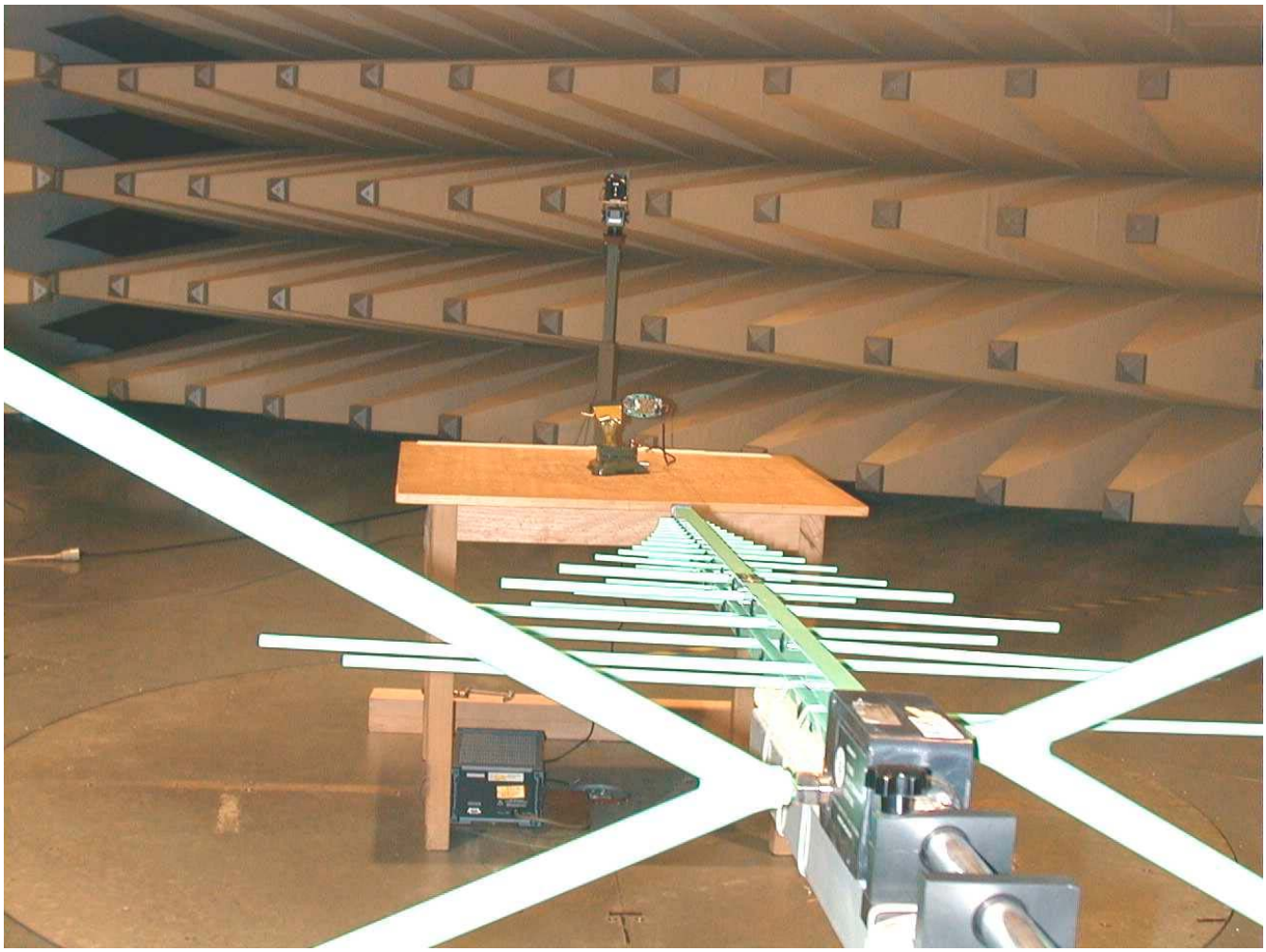
Antenna modules 10.525 GHz



Radiation measurements



Radiation measurements



Radiation measurements