

TEST REPORT # EMCC-950432.1AC, 2007-JAN-31

EQUIPMENT UNDER TEST:

Name: Radio receiver module 2-channel
Model: RM02-315-2
Serial No: none
Equipment Category: Receiver (module)
Manufacturer: SOMMER Antriebs- und Funktechnik GmbH
Address: Hans-Boeckler-Strasse 21-27
73230 Kirchheim / Teck
Germany

Phone: ++49-7021-8001-0
Fax: ++49-7021-8001-403

RELEVANT STANDARD: 47 CFR Part 15B - Unintentional Radiators

MEASUREMENT PROCEDURE USED:

ANSI C63.4-2003 FCC/OET MP-4 (1987) Other

TEST REPORT PREPARED BY:

Reinhard Sauerschell
EMCC DR. RAŠEK
Moggast, Boelwiese 8
91320 Ebermannstadt
Germany
Phone: +49 9194 9016
Fax: +49 9194 8125
E-mail: r.sauerschell@emcc.de

TEST PERSONNEL:



Reinhard Sauerschell

HEAD OF LABORATORY:



Winfried Hoffmann

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

CONTENTS	Page
1 GENERAL INFORMATION	3
1.1 Purpose.....	3
1.2 Limits and Reservations	3
1.3 Test Location.....	3
1.4 Manufacturer	3
1.5 Dates	3
2 Product Description	4
2.1 Equipment Under Test (EUT).....	4
2.2 EUT Peripherals	4
2.3 Mode of Operation During Testing	4
2.4 Modifications Required for Compliance	4
3 Test Results Summary	5
4 Conducted Emissions Tests	6
4.1 Regulation	6
4.2 Test Equipment	6
4.3 Test Procedures.....	7
4.4 Test Results.....	8
5 Radiated Emissions TEST	20
5.1 Regulation	20
5.2 Test Equipment	21
5.3 Test Procedures.....	22
5.4 Field Strength Calculation	22
5.5 Test Results.....	23
5.5.1 Frequency range 30 MHz to 1 GHz.....	23
5.5.2 Frequency range 1 GHz to 5 GHz	26
6 Miscellaneous Comments and Notes	29
7 List of Annexes.....	29

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

1 GENERAL INFORMATION

1.1 Purpose

The purpose of this report is to show compliance to the FCC regulations for unintentional radiators operating under section 15.101 ff. of the Code of Federal Regulations title 47.

1.2 Limits and Reservations

The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in this report.

This test report shall not be reproduced except in full without the written permission of EMCC DR. RAŠEK.

1.3 Test Location

Company Name: EMCC DR. RAŠEK
Street: Moggast 72-74
City: 91320 Ebermannstadt
Country: Germany
Laboratory: Test Laboratory of EMCC DR. RAŠEK
FCC Registration Number: 90566
This site has been fully described in a report submitted to the FCC, and accepted in the letter dated December 15, 2005 Registration Number 90566.
Phone: +49-9194-9016
Fax: +49-9194-8125
E-Mail: emc.cons@emcc.de
Web: www.emcc.de

1.4 Manufacturer

Company Name: SOMMER Antriebs- und Funktechnik GmbH
Street: Hans-Boeckler-Strasse 21-27
City: 73230 Kirchheim / Teck
Country: Germany
Name for contact purposes: Mr Dominik Schwarz
Phone: ++49-7021-8001-411
Fax: ++49-7021-8001-403
E-mail: D.Schwarz@sommer-torantriebe.de

1.5 Dates

Date of receipt of EUT: CW 04/2007
Test date: CW 05/2007

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

2 PRODUCT DESCRIPTION

2.1 Equipment Under Test (EUT)

Device: Remote Control (RF) receiver (module)
Name: Radio receiver module 2-channel
Model: RM02-315-2
Serial Number: none
Power: 5 VDC
Receive Frequency: 315 MHz
Highest frequency used: 651.4 MHz

NOTE:

The receiver module was installed in three typical applications:

1. garage door opener SYNORIS,
2. sliding door opener GATOR,
3. hinge door opener TWIST.

2.2 EUT Peripherals

Operation was checked with handheld transmitter SOMMER TX03-315-4.



2.3 Mode of Operation During Testing

The applications with the receiver module was powered up during test (=receiver mode). During test no motor operation was performed.

2.4 Modifications Required for Compliance

None.

TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS

3 TEST RESULTS SUMMARY

Summary of Test Results Receiver, type RM02-315-2

Requirement	CFR Section	Report Section	Test Result
Conducted Emissions	15.107	4	Pass
Radiated Spurious Emissions	15.109, 15.205(b)	5	Pass

The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units, and meet the requirements of the specifications referenced herein.

Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the "Correction Factor" documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.

The measurements contained in this report were made in accordance with the procedure ANSI C63.4 - 2003 and all applicable Public Notices received prior to the date of testing. All emissions from the device were found to be within the limits outlined in this report.

The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in this report.

Test Personnel: Reinhard Sauerschell
Issuance Date: 2007-01-31

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

4 CONDUCTED EMISSIONS TESTS

Test Requirement: FCC CFR47, Part 15B

Test Procedure: ANSI C63.4:2003

4.1 Regulation

Section 15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

(d) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

4.2 Test Equipment

Type	Manufacturer/ Model No.	Serial No.	Last Calibration	Next Calibration
Receiver (30 MHz - 1 GHz)	Rohde & Schwarz ESS	832808/004	Oct 2005	April 2007
V-LISN 50 ohms/(50 uH + 5 ohms)	Schwarzbeck NNLA8119(mod) (NSLK8127)	253	Aug 2006	Aug 2008

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

4.3 Test Procedures

For tabletop equipment, the EUT is placed on a 1 meter by 1.5 meters wide and 0.8 meter high nonconductive table that is placed above the groundplane. Floor standing equipment is placed directly on the groundplane. Any supplemental grounding mechanisms are connected, if appropriate. The EUT is connected to its associated peripherals, with any excess I/O cabling bundled to approximately 1 meter. The EUT is connected to a dedicated LISN and all peripherals are connected to a second separate LISN circuit. The LISNs are bonded to the groundplane.

Conducted measurements are made on each current carrying conductor with respect to ground.

The initial step in collecting conducted data is a peak scan of the measurement range with an EMI test receiver. The significant peaks are then measured with quasi-peak detector.

Three typical applications were tested as described in clause 2.1.

Conducted Emissions Test Characteristics	
Frequency range	0.15 MHz - 30.0 MHz
Test instrumentation resolution bandwidth	9 / 10 kHz
Lines Tested	Line 1 (L) / Line 2 (N)

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

4.4 Test Results

Device: Remote Control (RF) Receiver in three different applications
 Type: RM02-315-2

EMCC DR. RASEK Conducted Emissions

29. Jan 07 17:15

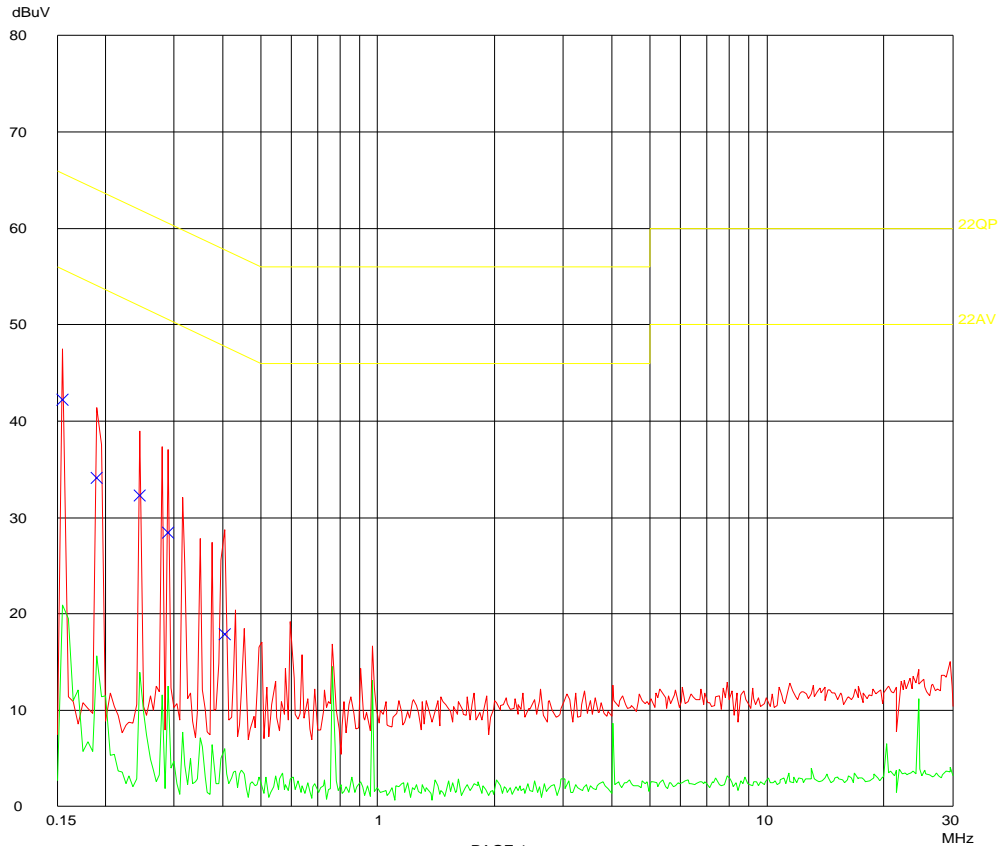
EUT: synoris
 Manuf: Sommer
 Op Cond: power on, motor off
 Operator: Sauereschell
 Test Spec: FCC 15.107, CISPR 22
 Comment: Line 1
 115 VAC, 60 Hz

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp OpRge
150k	30M	5k	10k	PK+AV	1ms	AUTO	LD OFF 60dB

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 30dB

Transducer No. Start Stop Name
 1 10k 30M LIMITER



**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

EMCC DR. RASEK
Conducted Emissions

29. Jan 07 17:15

EUT: synoris
Manuf: Sommer
Op Cond: power on, motor off
Operator: Sauerschell
Test Spec: FCC 15.107, CISPR 22
Comment: Line 1
115 VAC, 60 Hz

Scan Settings (1 Range)

----- Frequencies -----||----- Receiver Settings -----|
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge
150k 30M 5k 10k PK+AV 1ms AUTO LD OFF 60dB

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.15500	42.2	65.7
0.19000	34.0	64.1
0.24500	32.2	61.9
0.29000	28.4	60.6
0.40500	17.8	57.8

Frequency MHz	AV Level dBuV	AV Limit dBuV
------------------	------------------	------------------

no Results

* limit exceeded

TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS

EMCC DR. RASEK
 Conducted Emissions

29. Jan 07 17:11

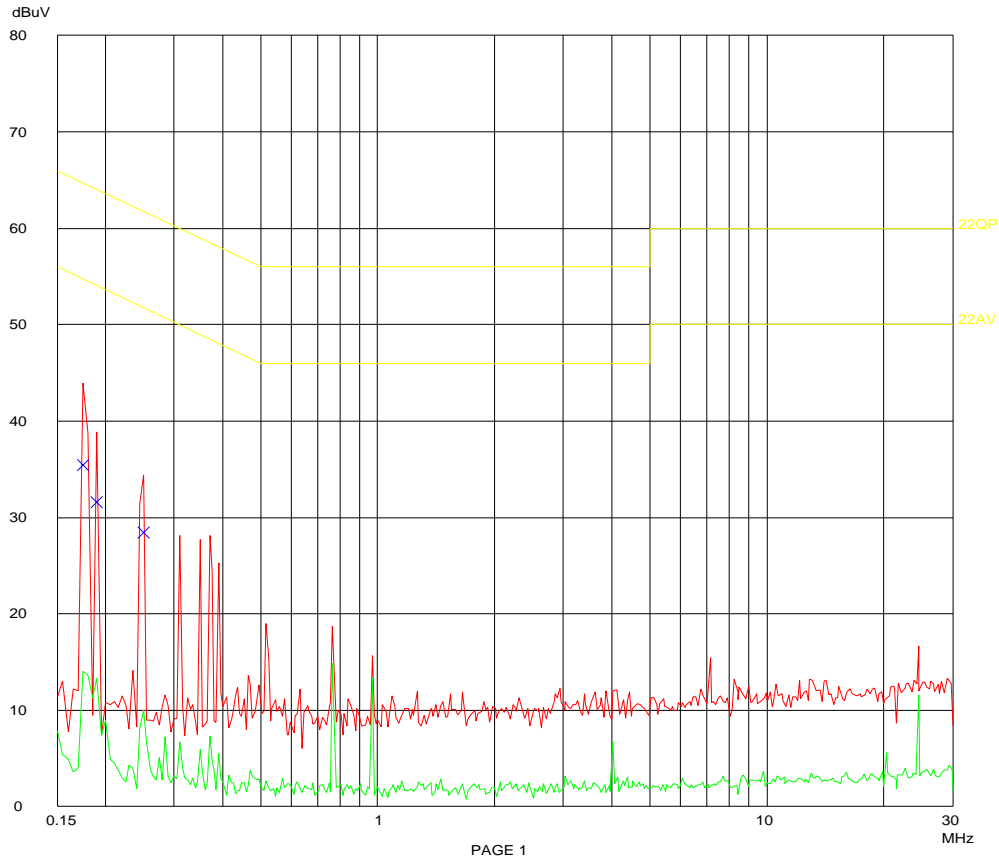
EUT: synoris
 Manuf: Sommer
 Op Cond: power on, motor off
 Operator: Sauereschell
 Test Spec: FCC 15.107, CISPR 22
 Comment: Line 2
 115 VAC, 60 Hz

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	1ms	AUTO	LD OFF	60dB

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 30dB

Transducer No. Start Stop Name
 1 10k 30M LIMITER



**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

EMCC DR. RASEK
Conducted Emissions

29. Jan 07 17:11

EUT: synoris
Manuf: Sommer
Op Cond: power on, motor off
Operator: Sauereschell
Test Spec: FCC 15.107, CISPR 22
Comment: Line 2
115 VAC, 60 Hz

Scan Settings (1 Range)

```
----- Frequencies -----||----- Receiver Settings -----|
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge
150k 30M 5k 10k PK+AV 1ms AUTO LD OFF 60dB
```

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.17500	35.4	64.7
0.19000	31.5	64.1
0.25000	28.4	61.8

Frequency MHz	AV Level dBuV	AV Limit dBuV
------------------	------------------	------------------

no Results

* limit exceeded

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

EMCC DR. RASEK
Conducted Emissions

29. Jan 07 16:51

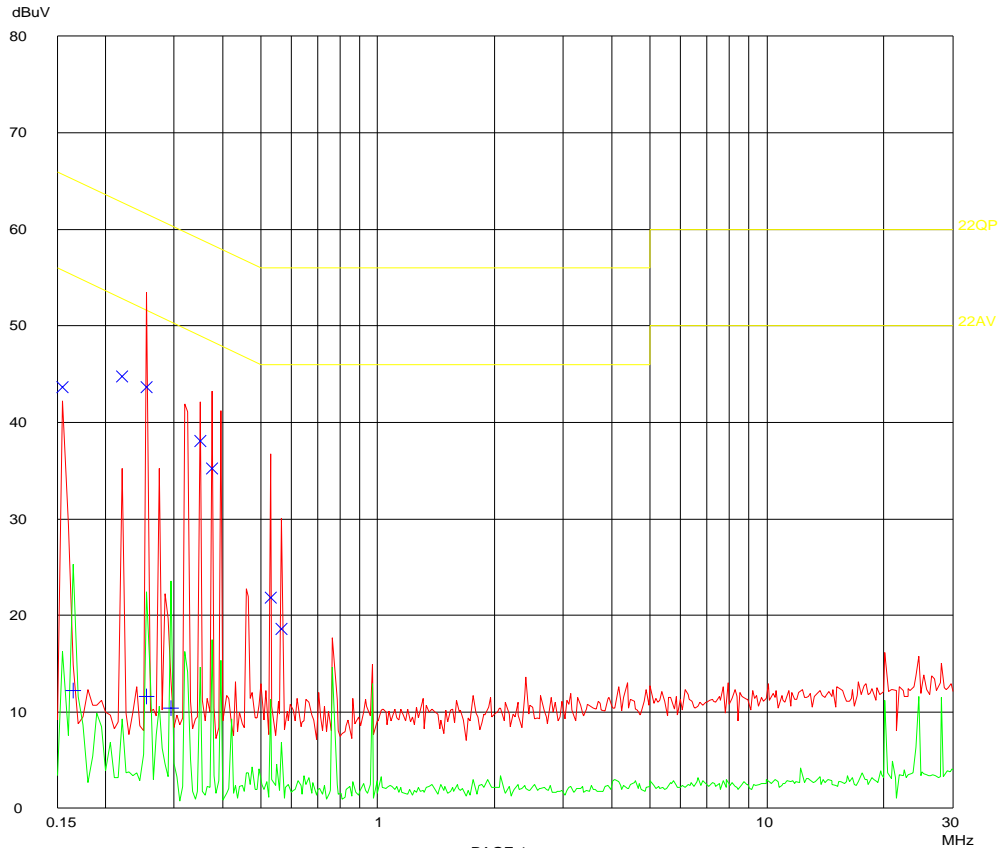
EUT: gator
 Manuf: Sommer
 Op Cond: power on, motor off
 Operator: Sauterschell
 Test Spec: FCC 15.107, CISPR 22
 Comment: Line 1
 115 VAC, 60 Hz

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp OpRge
150k	30M	5k	10k	PK+AV	1ms	AUTO	LD OFF 60dB

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 30dB

Transducer No. Start Stop Name
 1 10k 30M LIMITER



**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

EMCC DR. RASEK
Conducted Emissions

29. Jan 07 16:51

EUT: gator
 Manuf: Sommer
 Op Cond: power on, motor off
 Operator: Sauerschell
 Test Spec: FCC 15.107, CISPR 22
 Comment: Line 1
 115 VAC, 60 Hz

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	1ms	AUTO	LD OFF	60dB

Final Measurement Results:

Frequency	QP Level	QP Limit
MHz	dBuV	dBuV
0.15500	43.6	65.7
0.22000	44.8	62.9
0.25500	43.6	61.6
0.35000	38.1	59.0
0.37500	35.2	58.4
0.53000	21.8	56.0
0.56500	18.6	56.0

Frequency	AV Level	AV Limit
MHz	dBuV	dBuV
0.16500	12.2	55.2
0.25500	11.5	51.6
0.29500	10.3	50.3

* limit exceeded

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

EMCC DR. RASEK
Conducted Emissions

29. Jan 07 16:59

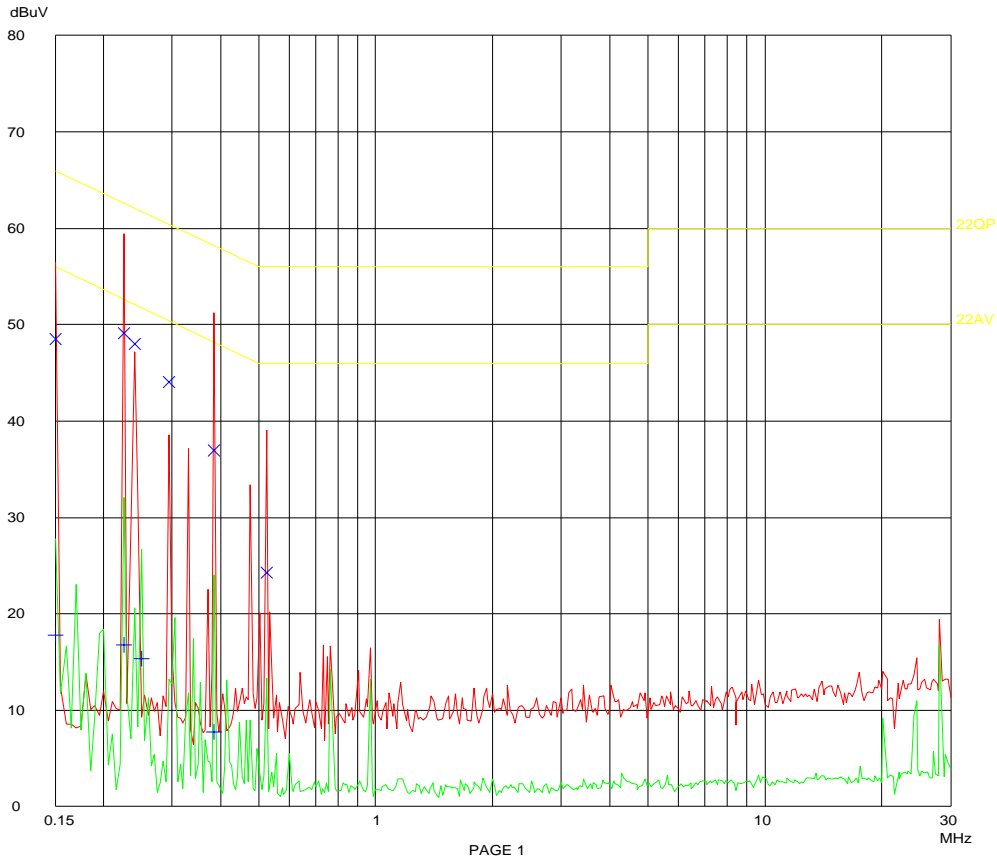
EUT: gator
 Manuf: Sommer
 Op Cond: power on, motor off
 Operator: Sauerschell
 Test Spec: FCC 15.107, CISPR 22
 Comment: Line 2
 115 VAC, 60 Hz

Scan Settings (1 Range)
 [----- Frequencies -----] [----- Receiver Settings -----]

Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	1ms	AUTO	LD OFF	60dB

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 30dB

Transducer No.	Start	Stop	Name
1	10k	30M	LIMITER



**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

EMCC DR. RASEK
Conducted Emissions

29. Jan 07 16:59

EUT: gator
 Manuf: Sommer
 Op Cond: power on, motor off
 Operator: Sauereschell
 Test Spec: FCC 15.107, CISPR 22
 Comment: Line 2
 115 VAC, 60 Hz

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	1ms	AUTO	LD OFF	60dB

Final Measurement Results:

Frequency	QP Level	QP Limit
MHz	dBuV	dBuV
0.15000	48.5	66.0
0.22500	49.1	62.7
0.24000	48.0	62.1
0.29500	44.1	60.3
0.38500	36.9	58.1
0.52500	24.2	56.0

Frequency	AV Level	AV Limit
MHz	dBuV	dBuV
0.15000	17.7	56.0
0.22500	16.8	52.7
0.25000	15.4	51.8
0.38500	7.7	48.1

* limit exceeded

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

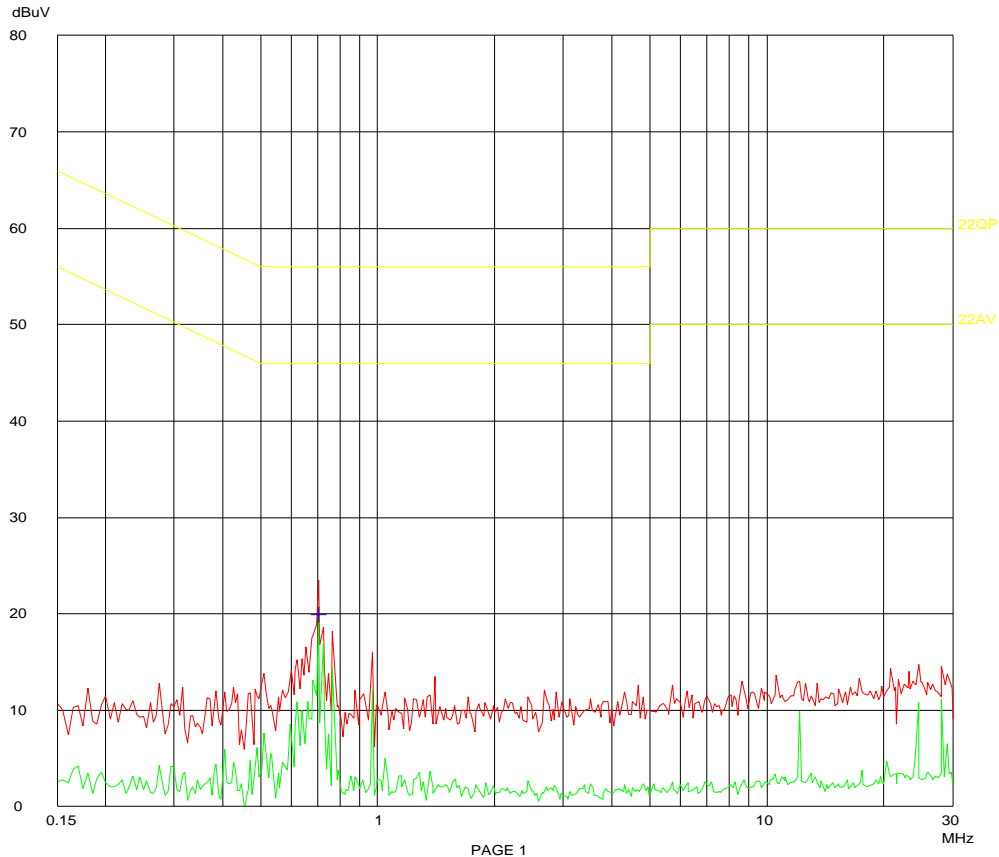
EMCC DR. RASEK
Conducted Emissions

30. Jan 07 09:35

EUT: twist 200
 Manuf: Sommer
 Op Cond: power on, motor off
 Operator: Sauerschell
 Test Spec: FCC 15.107, CISPR 22
 Comment: Line 1
 115 VAC, 60 Hz

Scan Settings (1 Range)
 [----- Frequencies -----] [----- Receiver Settings -----]
 Start Stop Step IF BW Detector M-Time Atten Preamp OpRge
 150k 30M 5k 10k PK+AV 1ms AUTO LD OFF 60dB

Final Measurement: x QP / + AV Transducer No. Start Stop Name
 Meas Time: 1 s 1 10k 30M LIMITER
 Subranges: 25
 Acc Margin: 30dB



**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

EMCC DR. RASEK
Conducted Emissions

30. Jan 07 09:35

EUT: twist 200
Manuf: Sommer
Op Cond: power on, motor off
Operator: Sauterschell
Test Spec: FCC 15.107, CISPR 22
Comment: Line 1
115 VAC, 60 Hz

Scan Settings (1 Range)

```
----- Frequencies -----||----- Receiver Settings -----|
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge
150k 30M 5k 10k PK+AV 1ms AUTO LD OFF 60dB
```

Final Measurement Results:

Frequency	QP Level	QP Limit
MHz	dBuV	dBuV

no Results

Frequency	AV Level	AV Limit
MHz	dBuV	dBuV

0.70500	19.9	46.0
---------	------	------

* limit exceeded

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

EMCC DR. RASEK
Conducted Emissions

30. Jan 07 09:46

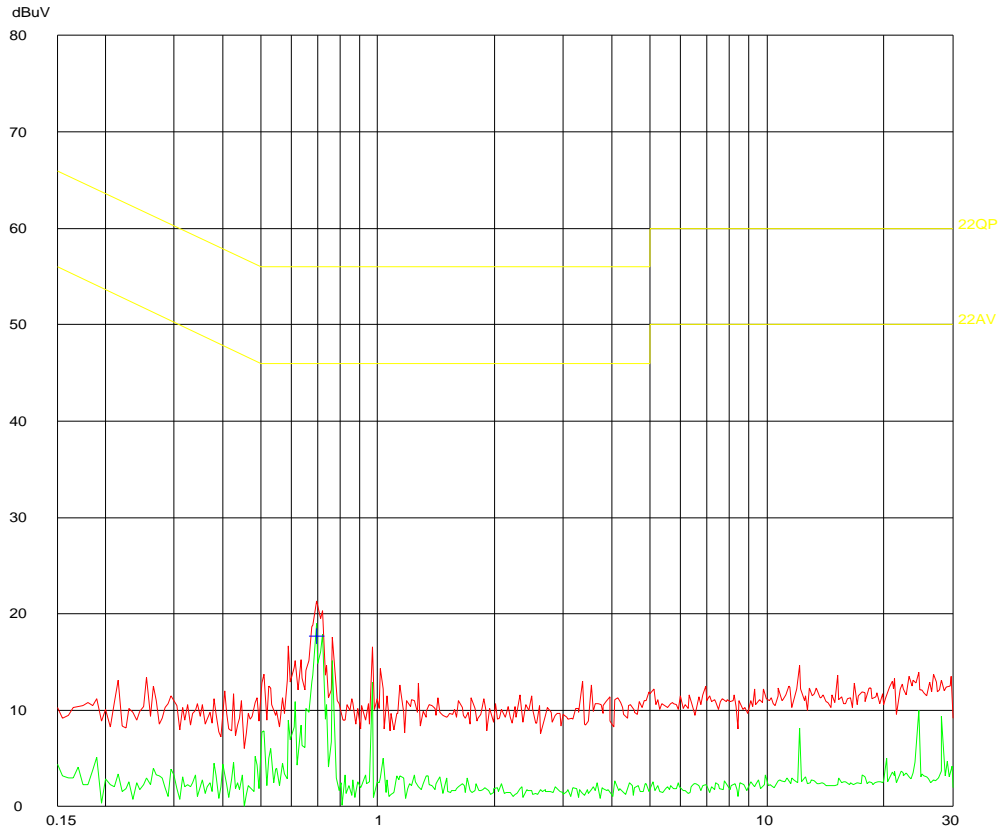
EUT: twist 200
 Manuf: Sommer
 Op Cond: power on, motor off
 Operator: Sauerschell
 Test Spec: FCC 15.107, CISPR 22
 Comment: Line 2
 115 VAC, 60 Hz

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	1ms	AUTO	LD OFF	60dB

Final Measurement: x QP / + AV
 Meas Time: 1 s
 Subranges: 25
 Acc Margin: 30dB

Transducer No.	Start	Stop	Name
1	10k	30M	LIMITER



**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

EMCC DR. RASEK
Conducted Emissions

30. Jan 07 09:46

EUT: twist 200
Manuf: Sommer
Op Cond: power on, motor off
Operator: Sauerschell
Test Spec: FCC 15.107, CISPR 22
Comment: Line 2
115 VAC, 60 Hz

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	30M	5k	10k	PK+AV	1ms	AUTO	LD OFF	60dB

Final Measurement Results:

Frequency	QP Level	QP Limit
MHz	dBuV	dBuV

no Results

Frequency	AV Level	AV Limit
MHz	dBuV	dBuV

0.69500 17.7 46.0

* limit exceeded

The EUT meets the requirements of this section.

Test Personnel: Reinhard Sauerschell
Test Date: 2007-01-29/30

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

5 RADIATED EMISSIONS TEST

Test Requirement: FCC CFR47, Part 15B
Test Procedure: ANSI C63.4:2003

5.1 Regulation

Section 15.109 Radiated emission limits. (a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength (microvolts/meter)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

(c) In the emission tables above, the tighter limits apply at the band edges. Sections 15.33 and 15.35 which specify the frequency range over which the radiated emissions are to be measured and the detector functions and other measurement standards apply.

(f) For a receiver which employs terminals for the connection of an external receiving antenna, the receiver shall be tested to demonstrate compliance with the provisions of this Section with an antenna connected to the antenna terminals unless the antenna conducted power is measured as specified in Section 15.111(a). If a permanently attached receiving antenna is used, the receiver shall be tested to demonstrate compliance with the provisions of this Section.

Section 15.33 Frequency range of radiated measurements:

(b) For unintentional radiators: (1) Except as otherwise indicated in paragraphs (b)(2) or (b)(3), for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

Highest frequency generated or used in the device or on which the range device operates or tunes (MHz)	Upper frequency of measurement (MHz)
Below 1.705	30
1.705 - 108	1000
108 - 500	2000
500 - 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

Section 15.35 Measurement detector functions and bandwidths.

(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. (...)

(b) On any frequency of frequencies above 1000 MHz, the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurements are specified in the regulations, including emission measurements below 1000 MHz, there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules, e.g., see Section 15.255. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

5.2 Test Equipment

Type	Manufacturer/ Model No.	Serial No.	Last Calibration	Next Calibration
Receiver (1 GHz – 5 GHz)	Rohde & Schwarz ESIB 40	100126	Nov 2005	Nov 2007
Antenna (30 MHz - 1 GHz)	EMCO 3142	9601-1002	June 2006	June 2007
Antenna (1 GHz – 5 GHz)	Schwarzbeck BBHA 9120 D	137	March 2006	March 2008

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

5.3 Test Procedures

For tabletop equipment, the EUT is placed on a 1 meter by 1.5 meters wide and 0.8 meter high nonconductive table that sits on a flush mounted metal turntable. Floor standing equipment is placed directly on the flush mounted metal turntable [*Remark: Not applicable*]. The EUT is connected to its associated peripherals with any excess I/O cabling bundled to approximately 1 meter.

Preview tests are performed to determine the "worst case" mode of operation. With the EUT operating in "worst case" mode, emissions from the unit are maximized by adjusting the polarization and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions.

Radiated Emissions Test Characteristics	
Frequency range	30 MHz - 5,000 MHz
Test distance	3 m (30 MHz - 1,000 MHz)
	1 m (1,000 MHz - 5,000 MHz)
Test instrumentation resolution bandwidth	100 kHz (30 MHz - 1,000 MHz)
	1 MHz (1,000 MHz - 5,000 MHz)
Receive antenna scan height	1 m - 4 m (OATS)
	1.5 m (fully absorbing chamber, preview test)
Receive antenna polarization	Vertical/Horizontal

5.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where

- FS = Field Strength in dB(μV/m)
- RA = Receiver Amplitude in dB(μV)
- AF = Antenna Factor in dB(1/m)
- CF = Cable Attenuation Factor in dB

Assume a receiver reading of 23.5 dB(μV) is obtained. The Antenna Factor of 7.4 dB(1/m) and a Cable Factor of 1.1 dB are added, giving a field strength of 32 dB(μV/m). The 32 dB(μV/m) value can be mathematically converted to its corresponding level in μV/m.

$$FS = 23.5 \text{ dB}(\mu\text{V}) + 7.4 \text{ dB}(1/\text{m}) + 1.1 \text{ dB} = 32 \text{ dB}(\mu\text{V}/\text{m})$$

$$FS = 10^{(32/20)} \mu\text{V}/\text{m} = 39.8 \mu\text{V}/\text{m}$$

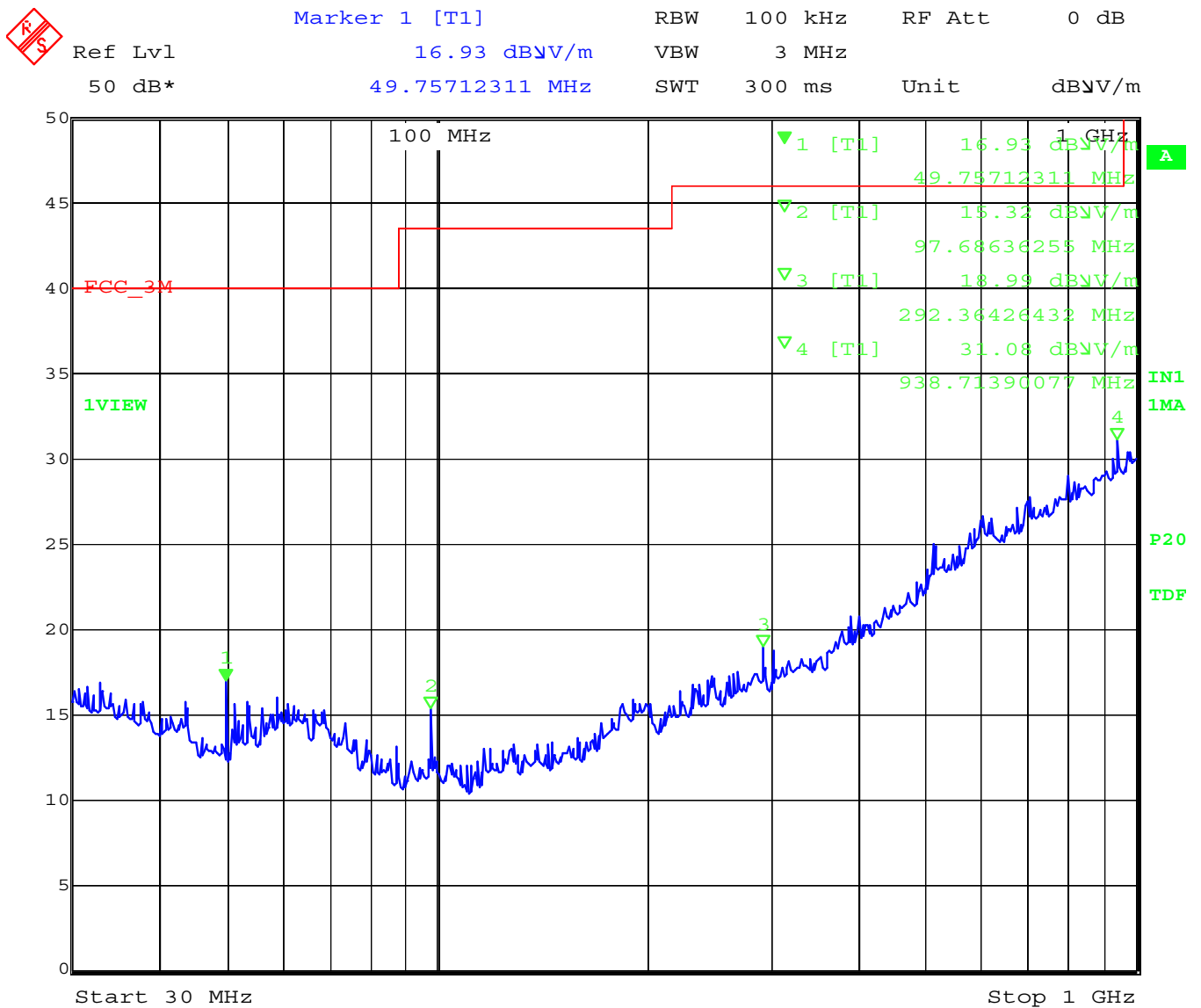
**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

5.5 Test Results

5.5.1 Frequency range 30 MHz to 1 GHz

Device: Remote Control (RF) Receiver in three different applications
 Type: RM02-315-2

NOTE: The preview tests (d=3m, detector PEAK, MAX HOLD function) in the fully absorbing chamber showed very low emissions from all three applications. Therefore further tests in the OATS were skipped.

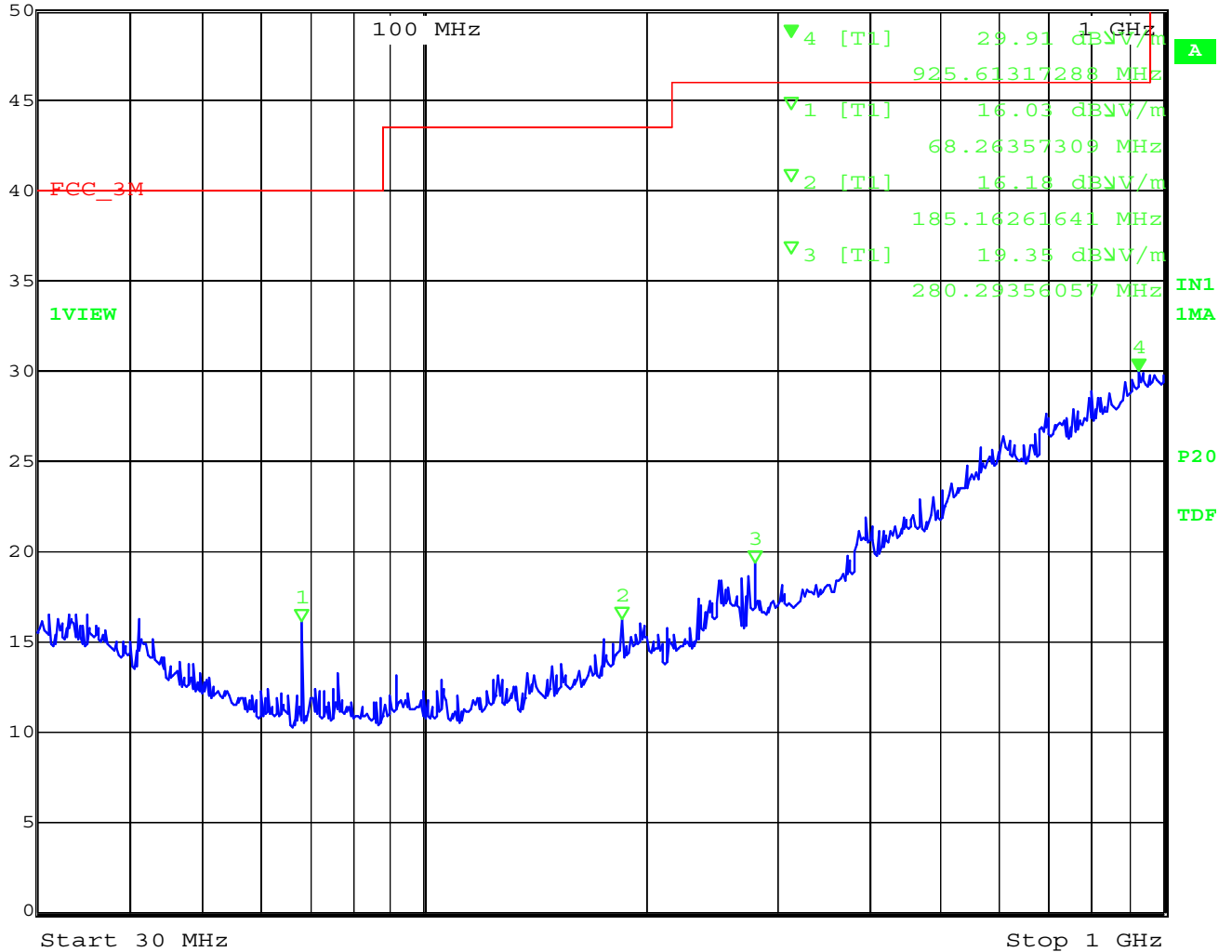


Title: Sommerreceivermodule RM02-315-2
 Comment A: d=3m,h=0.8m,hor+vert, in synoris
 Date: 30.JAN.2007 12:04:23

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**



Marker 4 [T1] RBW 100 kHz RF Att 0 dB
 Ref Lvl 29.91 dBV/m VBW 3 MHz
 50 dB* 925.61317288 MHz SWT 300 ms Unit dBV/m

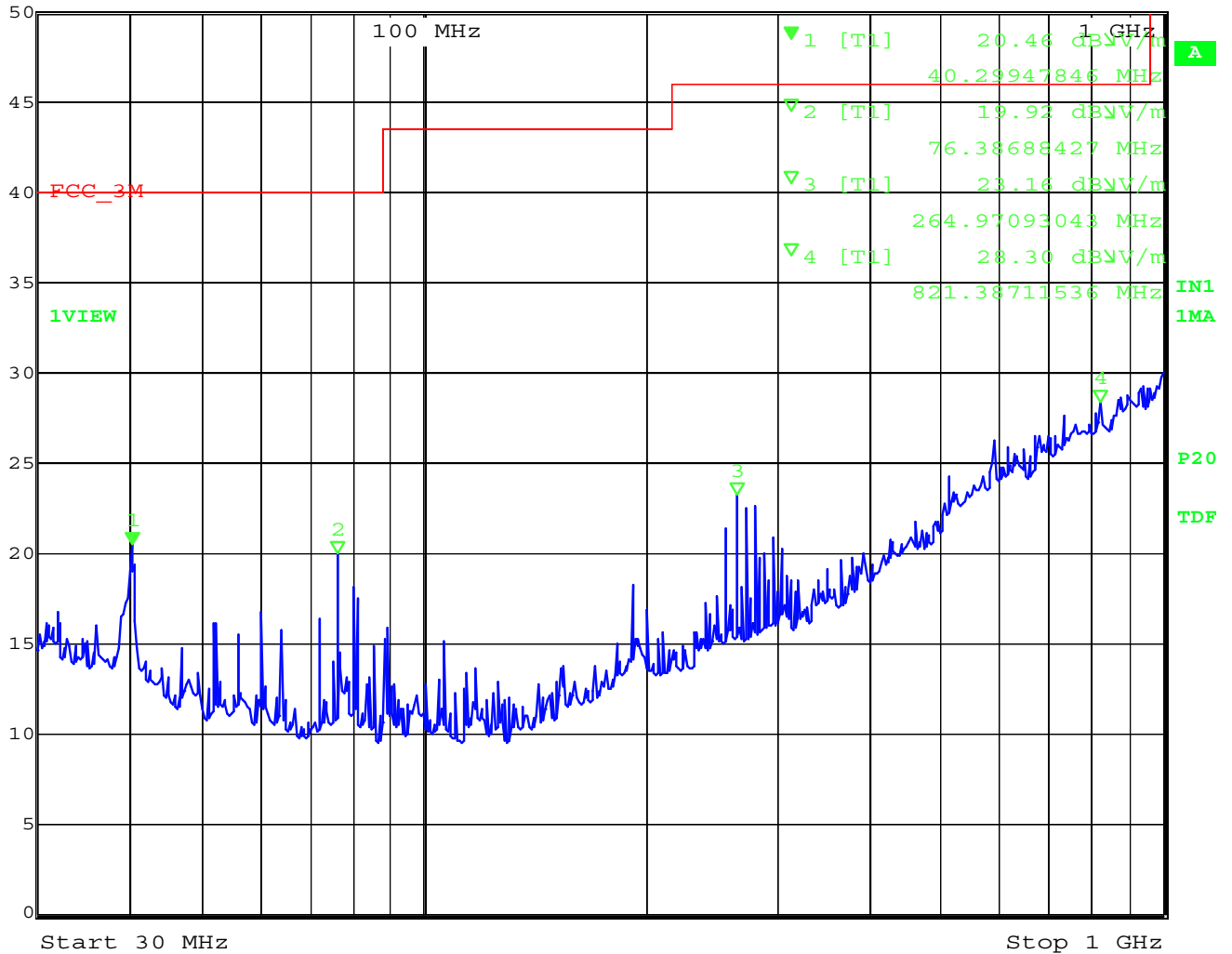


Title: Sommerreceivermodule RM02-315-2
 Comment A: d=3m,h=0.8m,hor+vert, in gator
 Date: 30.JAN.2007 12:14:21

TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
 TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS



Marker 1 [T1] RBW 100 kHz RF Att 0 dB
 Ref Lvl 20.46 dBV/m VBW 3 MHz
 50 dB* 40.29947846 MHz SWT 300 ms Unit dBV/m



Title: Sommerreceivermodule RM02-315-2
 Comment A: d=3m,h=0.8m,hor+vert, in twist 200
 Date: 30.JAN.2007 15:17:29

The EUT meets the requirements of this section.

Test Personnel: Reinhard Sauerschell
 Test Date: 2007-01-30

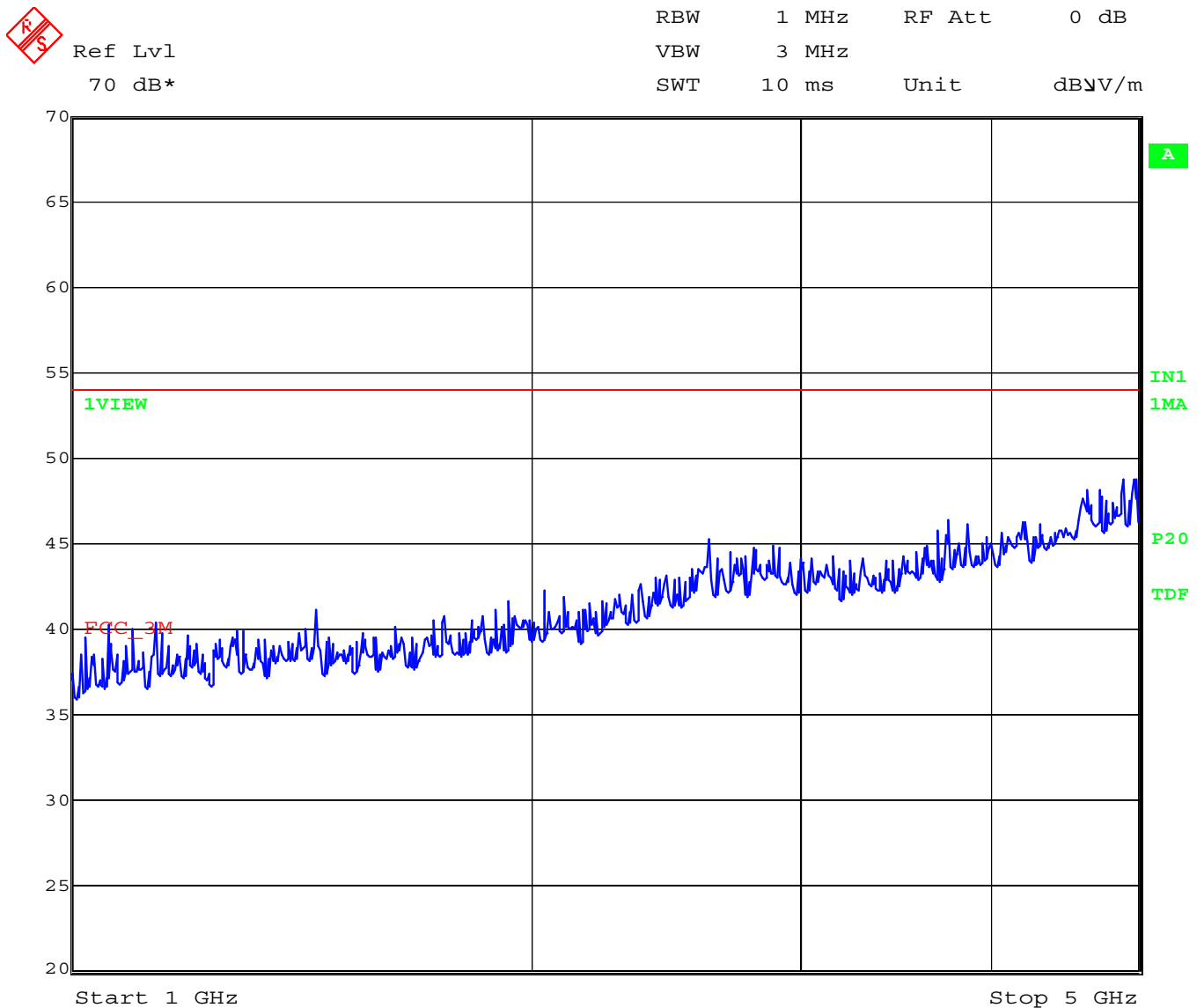
TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS

5.5.2 Frequency range 1 GHz to 5 GHz

Device: Remote Control (RF) Receiver in three different applications
 Type: RM02-315-2

NOTE 1: The preview tests (d=1m, detector PEAK, MAX HOLD function) in the fully absorbing chamber showed no emissions from all three applications. Therefore further tests in the OATS were skipped.

NOTE 2: The limit line in the plots is the 3 m limit.

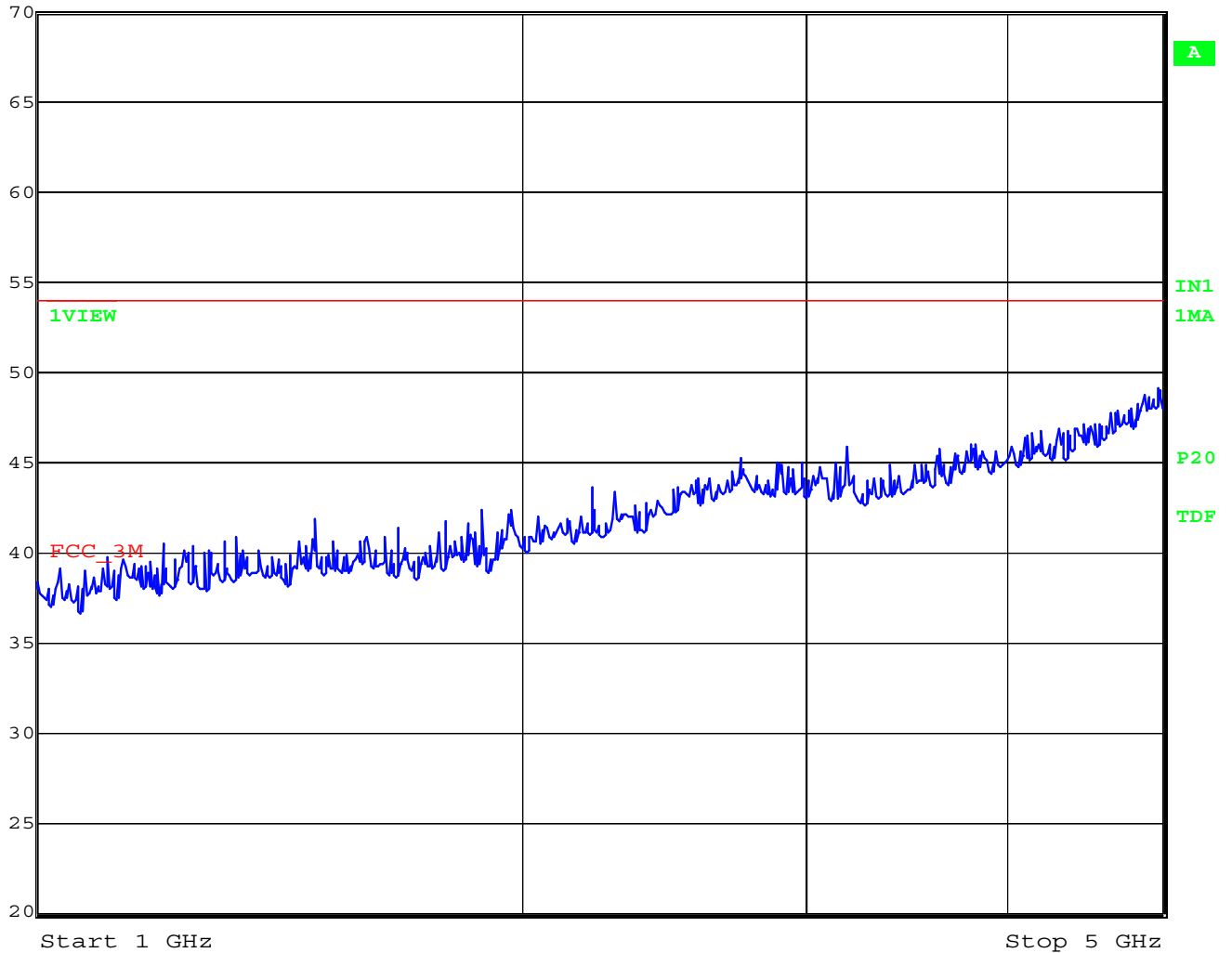


Title: Sommerreceivermodule RM02-315-2
 Comment A: d=1m,h=0.8m,hor+vert, in synoris
 Date: 30.JAN.2007 13:41:09

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**



Ref Lvl	RBW	1 MHz	RF Att	0 dB
70 dB*	VBW	3 MHz		
	SWT	10 ms	Unit	dBµV/m

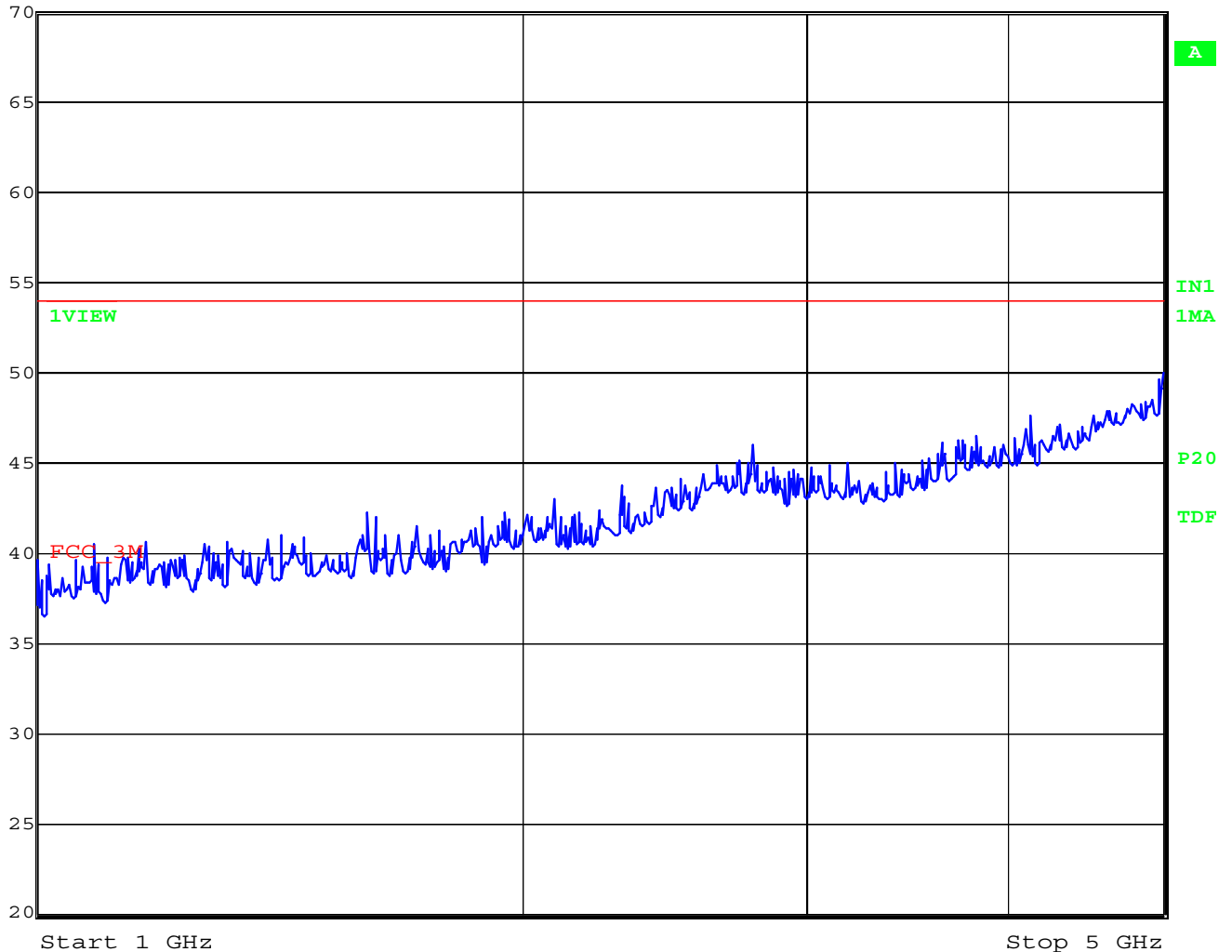


Title: Sommerreceivermodule RM02-315-2
 Comment A: d=1m,h=0.8m,hor+vert, in gator
 Date: 30.JAN.2007 13:36:35

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**



Ref Lvl	RBW	1 MHz	RF Att	0 dB
70 dB*	VBW	3 MHz		
	SWT	10 ms	Unit	dBµV/m



Title: Sommerreceivermodule RM02-315-2
 Comment A: d=1m,h=0.8m,hor+vert, in twist 200
 Date: 30.JAN.2007 13:48:12

The EUT meets the requirements of this section.

Test Personnel: Reinhard Sauerschell
 Test Date: 2007-01-30

**TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TYPE RM02-315-2
TO 47 CFR PART 15B - UNINTENTIONAL RADIATORS**

6 MISCELLANEOUS COMMENTS AND NOTES

None.

7 LIST OF ANNEXES

Following annexes are separated parts to this test report.

Description	Pages
Annex 1: Photographs of test setups	10
Annex 2: Photographs of EUT in SYNORIS	3
Annex 3: Photographs of EUT in GATOR	3
Annex 4: Photographs of EUT in TWIST	3