

Straubing, September 24, 1999

TEST - REPORT

No. 50217-90595-4

for

FZV Receiver

Receiver

Applicant: Bayerische Motorenwerke AG

Purpose of testing: To show compliance with

FCC Code of Federal Regulations,
Part 15 Subpart C, Section §15.209

Industry Canada Radio Standards
Specification RSS-210 Issue 2,
Section 7.3 (Category I Equipment)

Note:

The test data of this report relate only to the individual item which has been tested.
This report shall not be reproduced except in full extent without the written approval
of the testing laboratory.

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1. Administrative Data

Equipment Under Test (EUT): FZV Receiver

Serial number(s): Prototype 1

Type of equipment: Receiver

Parts/accessories: --

FCC-ID:

Applicant:
(full address) Bayerische Motorenwerke AG
Petuelring 130
80788 München
Germany

Contract identification: ---

Contact person: Mr. Hochleitner

Manufacturer: Bayerische Motorenwerke AG

Receipt of EUT: September 10, 1999

Date of test: September 23, 1999

Note: --

Responsible for testing: Rupert Kohlhäufel

Responsible for test report: Rupert Kohlhäufel

2. Identification of Test Laboratory

Test Laboratory: (full address):	Senton GmbH EMI/EMC Test Center Aeussere Fruehlingstrasse 45 D-94315 Straubing Germany
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Contact person:	Mr. Johann Roidt
Communication:	Telephone (+49) 0 94 21 / 55 22-0
	Fax (+49) 0 94 21 / 55 22-99
	eMail: Office@senton.de

FCC file number:	31040/SIT 1300F2
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Industry Canada file number:	IC 3050
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3. Summary of Test Results

The tested sample complies with the requirements set forth in the

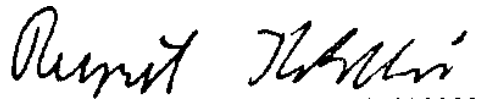
Code of Regulations Part 15 Subpart C, Section §15.209 (intentional radiators) of the Federal Communication Commission (FCC)

and the

Radio Standards Specification RSS-210 Issue 2, Section 7.3 for Low Power Licence-Exempt Radiocommunication Devices of Industry Canada.



Johann Roidt
Technical Manager



Rupert Kohlhäufel
Test Engineer

4. Operation Mode of EUT

- Receiver operating continuously
- With supply voltage 12 V DC (car battery)

5. Configuration of EUT and Peripheral Devices

EUT is configured as stand-alone device in vertical position

Configuration of cables of EUT

Not applicable

Configuration of peripheral devices connected to EUT

Not applicable

6. Measuring Methods

6.1. Radiated Emission 30 MHz - 1 GHz (FCC §15.209 / RSS-210 Section 7.3)

Radiated emissions are measured over the frequency range from 30 MHz to 1 GHz. The bandwidth of the EMI-receiver is set to 120 kHz and the detector-function is set to CISPR quasi-peak.

The test setup is made in accordance with ANSI C63.4-1992.

Measurements are made in both the horizontal and vertical planes of polarization. Preliminary scans are taken in a semi-anechoic room using a spectrum analyzer with the detector function set to peak. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

All tests are performed at a test-distance of 3 meters.

For final testing an open-area test-site is used. During the tests the EUT is rotated all around and the receiving-antenna is raised and lowered from 1 meter to 4 meters to find the maximum levels of emissions. The cables and equipment is placed and moved within the range of position likely to find their maximum emissions.

See figure 1 for the measurement setup.

Test equipment used (see equipment list for details):

01, 02, 05, 12, 38, 39, 40, 41, 58, 61, 64, 66

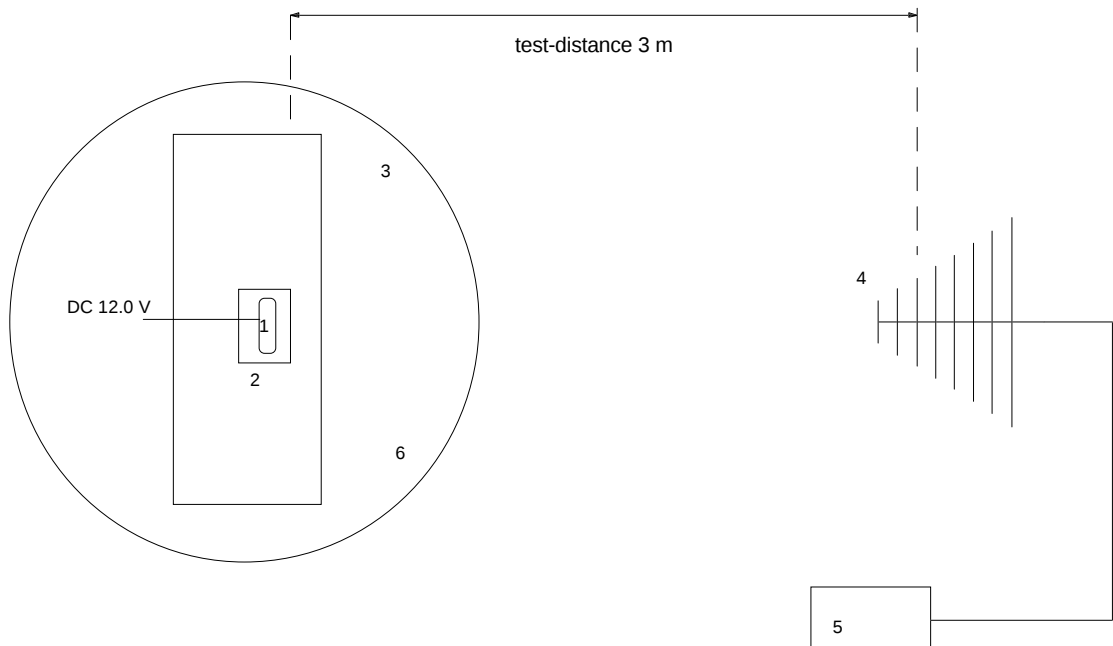


Figure 1: Measurement setup for radiated emission test below 1 GHz

- | | |
|---|------------------------------|
| 1 Transmitter (EUT) | 4 Measurement antenna |
| 2 Wooden pedestal (if necessary) | 5 Test receiver |
| 3 Wooden table | 6 Turn table |

6.2. Radiated Emission 1 GHz – 2 GHz (FCC §15.209 / RSS-210 Sections 7.3)

Radiated emissions are measured in the frequency range 1 GHz to 2 GHz. Resolution and video bandwidth of the spectrum analyzer are set to 1 MHz. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

Additional measurements are performed at critical frequencies with reduced span. EUT is rotated all around and receiving antenna is raised and lowered to find the maximum levels of emission. The cables and equipment are placed and moved within the range of position likely to find their maximum emissions.

All tests are performed in a semi-anechoic chamber with a test-distance of 3 meters.

If possible preamplifiers are used for the whole frequency range. Special care is taken to avoid overload in transmit mode (using appropriate attenuators if necessary).

See figure 2 for the measurement setup.

Test equipment used (see equipment list for details):

02, 13, 14, 16, ,42, 44, 45, 57, 64

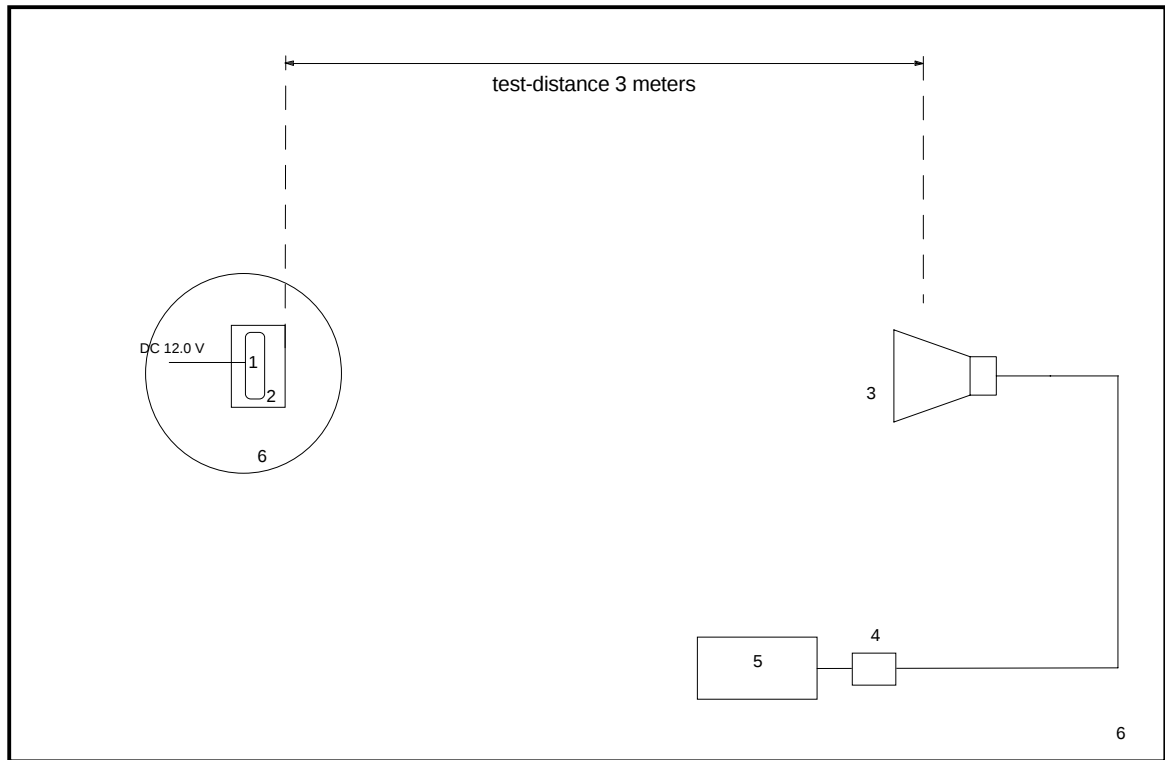


Figure 2: Measurement setup for radiated emission test above 1 GHz

- | | |
|---|---------------------------------------|
| 1 Transmitter (EUT) | 3 Measurement antenna |
| 2 Wooden pedestal (if necessary) | 4 Preamplifier (if applicable) |
| | 5 Spectrum analyzer |
| | 6 Turn table |
| | 7 Semi anechoic room |

7. Equipment List

To facilitate reference to test equipment used for related tests, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory.

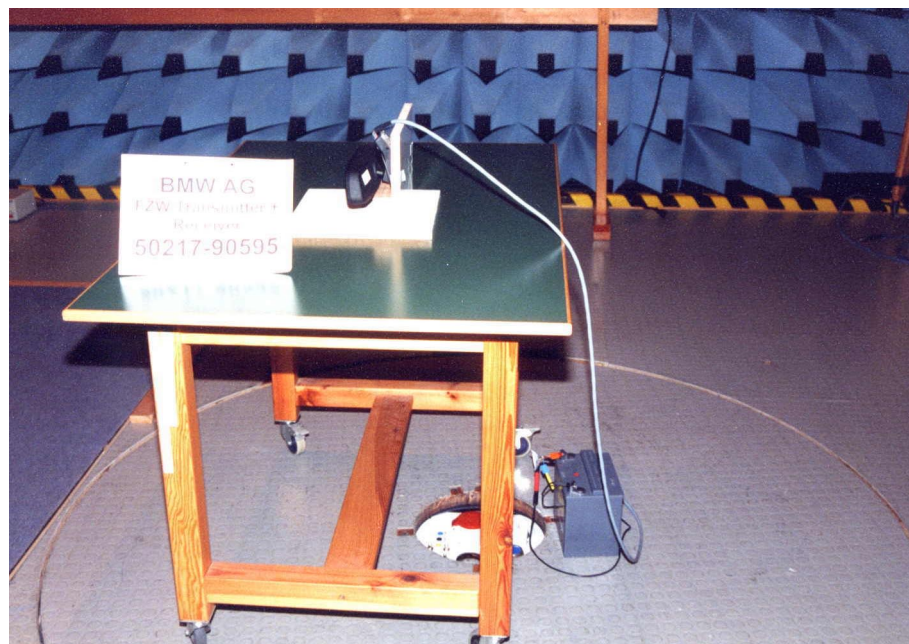
No.	Type	Model	Serial Number	Manufacturer
01	Spectrum Analyzer	R 3271	05050023	Advantest
02	EMI Test Receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
03	Test Receiver	ESH 3	880112/032	Rohde & Schwarz
04	Test Receiver	ESHS 10	860043/016	Rohde & Schwarz
05	Test Receiver	ESV	881414/009	Rohde & Schwarz
06	Test Receiver	ESVP	881120/024	Rohde & Schwarz
07	Audio Analyzer	UPA	862954	Rohde & Schwarz
08	Power Meter	NRVS	836856/015	Rohde & Schwarz
09	Power Sensor	NRV-Z52	837901/030	Rohde & Schwarz
10	Power Sensor	NRV-Z4	863828/015	Rohde & Schwarz
11	Preamplifier	ESV-Z3	860907/004	Rohde & Schwarz
12	Preamplifier	R14601		Advantest
13	Preamplifier	ACX/080-3030	32640	CTT
14	Preamplifier	ACO/180-3530	32641	CTT
15	Signal Generator	SMS	872166/039	Rohde & Schwarz
16	Signal Generator	HP 8673 D	2930A00966	Hewlett Packard
17	Waveform Generator	HP 33120 A	US34005375	Hewlett Packard
18	Attenuator 20 dB	4776-20	9503	Narda
19	Attenuator 10 dB	4776-10	9412	Narda
20	Pulse Limiter	ESH 3-Z2	1144	Rohde & Schwarz
21	Pulse Limiter	11947 A	3107A00566	Hewlett Packard
22	V-Network	ESH 3-Z5	862770/018	Rohde & Schwarz
23	V-Network	ESH 3-Z5	894785/005	Rohde & Schwarz
24	V-Network	ESH 3-Z5	830952/025	Rohde & Schwarz
25	V-Network	ESH 3-Z6	830722/010	Rohde & Schwarz
26	V-Network	NSLK 8127	8127152	Schwarzbeck
27	V-Network	NNLA 8119	8119148	Schwarzbeck
28	V-Network	SE 01	01	Senton
29	T-Network	ESH 3-Z4	890602/011	Rohde & Schwarz
30	T-Network	ESH 3-Z4	890602/012	Rohde & Schwarz
31	High Impedance Probe	TK 9416	01	Schwarzbeck
32	High Impedance Probe	TK 9416	02	Schwarzbeck
33	Current Probe	ESH 2-Z1	863366/18	Rohde & Schwarz
34	Current Probe	ESV-Z1	862553/3	Rohde & Schwarz

No.	Type	Model	Serial Number	Manufacturer
35	Absorbing Clamp	MDS 21	80911	Lüthi
36	Absorbing Clamp	MDS 21	79690	Lüthi
37	Loop Antenna	HFH2-Z2	882964/1	Rohde & Schwarz
38	Biconical Antenna	HK 116	842204/001	Rohde & Schwarz
39	Biconical Antenna	HK 116	836239/02	Rohde & Schwarz
40	Log. Periodic Antenna	HL 223	841516/023	Rohde & Schwarz
41	Log. Periodic Antenna	HL 223	834408/12	Rohde & Schwarz
42	Horn Antenna	3115	9508-4553	Emco
43	Horn Antenna	3160-03	9112-1003	Emco
44	Horn Antenna	3160-04	9112-1001	Emco
45	Horn Antenna	3160-05	9112-1001	Emco
46	Horn Antenna	3160-06	9112-1001	Emco
47	Horn Antenna	3160-07	9112-1008	Emco
48	Horn Antenna	3160-08	9112-1002	Emco
49	Horn Antenna	3160-09	9403-1025	Emco
50	Digital multimeter	199	463386	Keithley
51	DC Power Supply	NGSM 32/10	203	Rohde & Schwarz
52	DC Power Supply	NGB	2455	Rohde & Schwarz
53	DC Power Supply	NGA	386	Rohde & Schwarz
54	Temperature Test Chamber	HT4010	07065550	Heraeus
55	Cable	RG214	1309	Senton
56	Cable	200CM_001	1357	Rosenberger
57	Cable	150CM_001	1479	Rosenberger
58	Cable Set EG1	RG214	1189 - 1191	Senton
59	Cable Set Cabine 1	RG214		Senton
60	Cable Set Cabine 2	RG214		Senton
61	Cable Set Cabine 3	RG214		Senton
62	Shielded Room	No. 1	1451	Senton
63	Shielded Room	No. 2	1452	Senton
64	Semi-anechoic Chamber	No. 3	1453	Siemens
65	Shielded Room	No. 4	1454	Euroshield
66	Open Area Test Site	EG 1		Senton
67	Test fixture			Senton

8. Photographs Taken During Testing

Photos No. 8.1 - 8.2

**Test setup for radiated emission pre-test 30 MHz - 1 GHz
(semi anechoic room)**



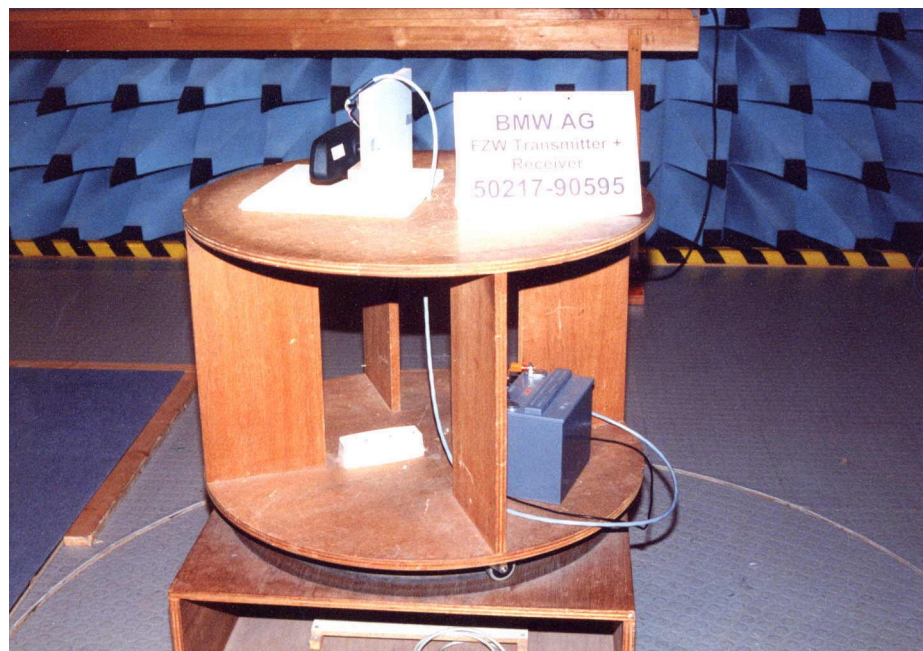
Photos No. 8.3 - 8.4

**Test setup for radiated emission final test 30 MHz - 1 GHz
(open area test site)**



Photos No. 8.5 - 8.6

Test setup for radiated emission test above 1 GHz



9. List of Measurements

9.1. List of Measurements According To FCC Part 15 Subpart C

FCC Part 15 Subpart C			
Section(s):	Test	Page(s)	Result
§15.207	Conducted emission test 450 kHz - 30 MHz	---	Not Applicable (DC supply)
§15.209	Radiated emission test 9 kHz - 30 MHz	---	Not Applicable (acc. to §15.33)
§15.209	Radiated emission test 30 MHz - 1 GHz	24 – 35	Passed
§15.209	Radiated emission test 1 GHz – 2 GHz	36 – 38	Passed

9.2. List of Measurements According To Industry Canada RSS-210

Industry Canada RSS-210 Issue 2			
Section(s):	Test	Page(s)	Result
7.4	Conducted emission test 450 kHz - 30 MHz	---	Not Applicable (DC supply)
7.3	Radiated emission test 30 MHz - 1 GHz	24 – 35	Passed
7.3	Radiated emission test 1 GHz – 2 GHz	36 - 38	Passed

10. Referenced Regulations

All tests were performed with reference to the following regulations and standards:

☒	FCC Part 15 Subpart A	Code of Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communication Commission (FCC)	October 20, 1997
☐	FCC Part 15 Subpart B	Code of Regulations Part 15 (Radio Frequency Devices), Subpart B (Unintentional Radiators) of the Federal Communication Commission (FCC)	October 20, 1997
☒	FCC Part 15 Subpart C	Code of Regulations Part 15 (Radio Frequency Devices), Subpart C (Intentional Radiators) of the Federal Communication Commission (FCC)	October 20, 1997
☒	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz - 40 GHz	October, 1992
☒	RSS-210	Radio Standards Specification RSS-210 Issue 2 for Low Power Licence-Exempt Radiocommunication Devices of Industry Canada	February 24, 1996

11. Test Results

Test results

Radiated Emission Test 30 MHz - 300 MHz according to FCC Part 15 Subpart C

Model:
FZV Receiver

Serial no.:
Prototype 1

Applicant:
BMW AG

Test site:
Semi anechoic room, cabin no. 3

Tested on:
Test distance 3 meters
Horizontal Polarization

Date of test: 09/21/1999 Operator: R. Kohlhäufel

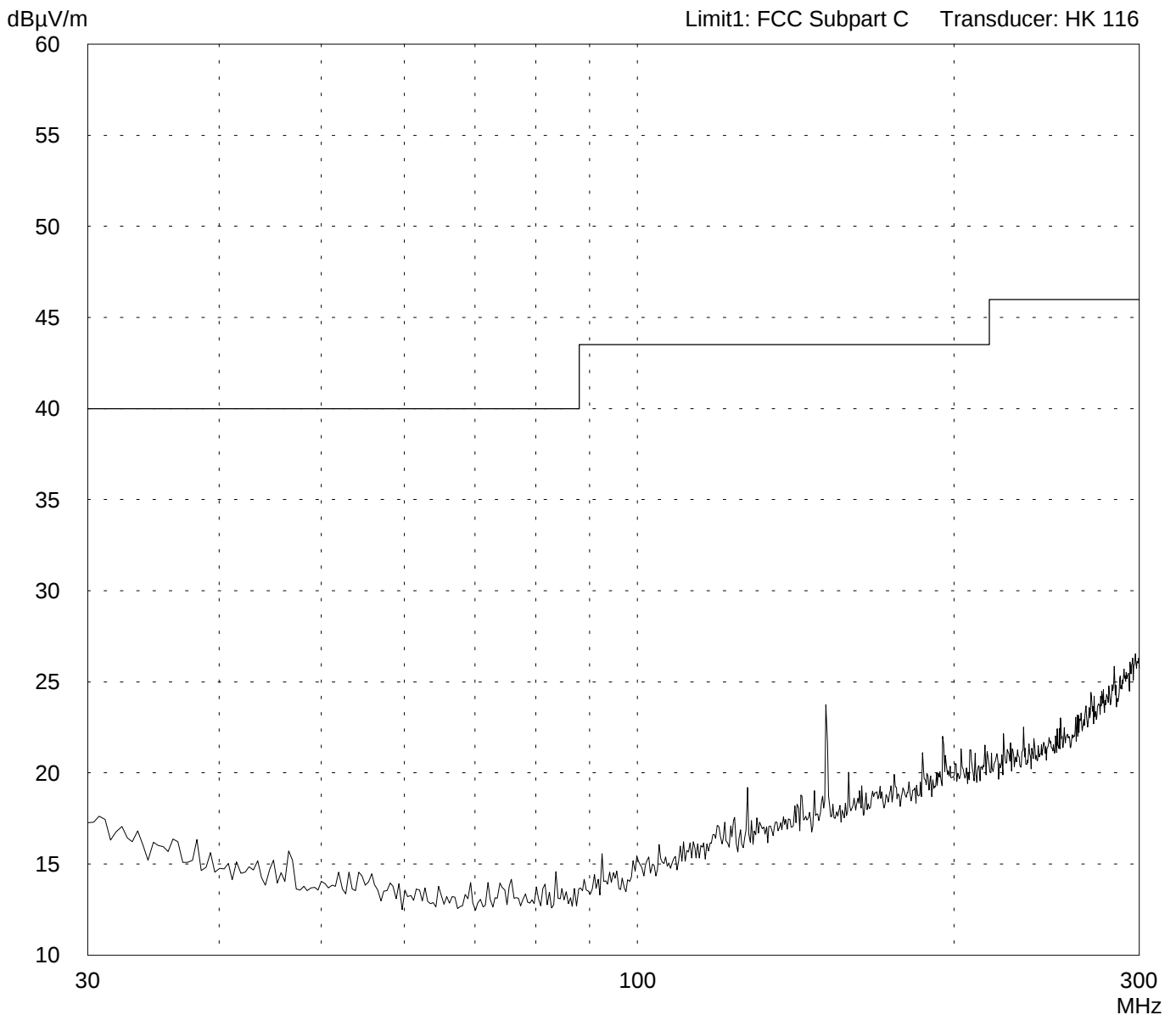
Test performed: automatically File name:

Mode:
Receiver in RX mode (315 MHz)

External power supply: DC 12.0 V (car battery)

Detector:
Peak

List of values:
10 dB Margin 50 Subranges



Result:
Prescan

Project file:
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Radiated Emission Test 30 MHz - 300 MHz according to FCC Part 15 Subpart C

Model:
FZV Receiver

Serial no.:
Prototype 1

Applicant:
BMW AG

Test site:
Semi anechoic room, cabin no. 3

Tested on:
Test distance 3 meters
Horizontal Polarization

Date of test: 09/21/1999 Operator: R. Kohlhäufel

Test performed: automatically File name:

Mode:
Receiver in RX mode (315 MHz)

External power supply: DC 12.0 V (car battery)

Detector:
Peak

List of values:
10 dB Margin 50 Subranges

<i>Frequency MHz</i>	<i>Reading dBμV</i>	<i>Correction factor dB</i>	<i>Value dBμV/m</i>	<i>Limit dBμV/m</i>	<i>Limit exceeded</i>
no results					

Result:
Prescan

Project file:
50217-90595-4

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Radiated Emission Test 30 MHz - 300 MHz according to FCC Part 15 Subpart C

Model:
FZV Receiver

Serial no.:
Prototype 1

Applicant:
BMW AG

Test site:
Semi anechoic room, cabin no. 3

Tested on:
Test distance 3 meters
Vertical Polarization

Date of test: 09/22/1999 Operator: R. Kohlhäufel

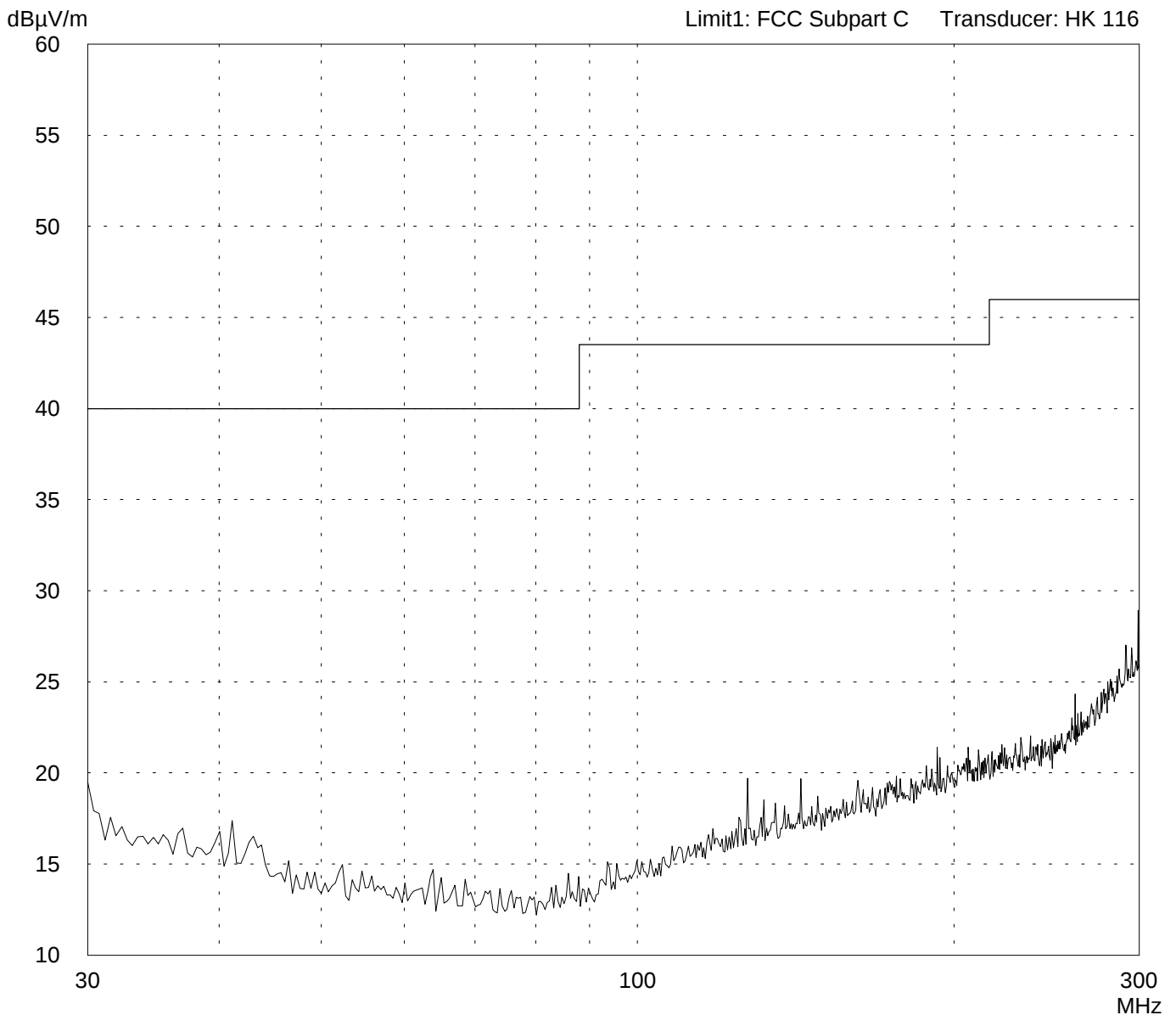
Test performed: automatically File name:

Mode:
Receiver in RX mode (315 MHz)

External power supply: DC 12.0 V (car battery)

Detector:
Peak

List of values:
10 dB Margin 50 Subranges



Result:
Prescan

Project file:
50217-90595-4

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Radiated Emission Test 30 MHz - 300 MHz according to FCC Part 15 Subpart C

Model: FZV Receiver	Mode: Receiver in RX mode (315 MHz) External power supply: DC 12.0 V (car battery)
Serial no.: Prototype 1	
Applicant: BMW AG	
Test site: Semi anechoic room, cabin no. 3	
Tested on: Test distance 3 meters Vertical Polarization	
Date of test: 09/22/1999 Operator: R. Kohlhäufel	
Test performed: automatically File name:	

Detector: Peak	List of values: 10 dB Margin 50 Subranges
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<i>Frequency MHz</i>	<i>Reading dBμV</i>	<i>Correction factor dB</i>	<i>Value dBμV/m</i>	<i>Limit dBμV/m</i>	<i>Limit exceeded</i>
no results					

Result: Prescan	Project file: 50217-90595-4	Page 27 of 38 Pages
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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
FZV receiver

Serial no.:
Prototype 1

Applicant:
BMW AG

Test site:
Open area test-site I

Tested on:
Test distance 3 meters
Horizontal Polarization

Date of test:
09/23/1999

Operator:
R. Kohlhäufel

Test performed:
by hand

File name:

Mode:
Receiver in RX mode

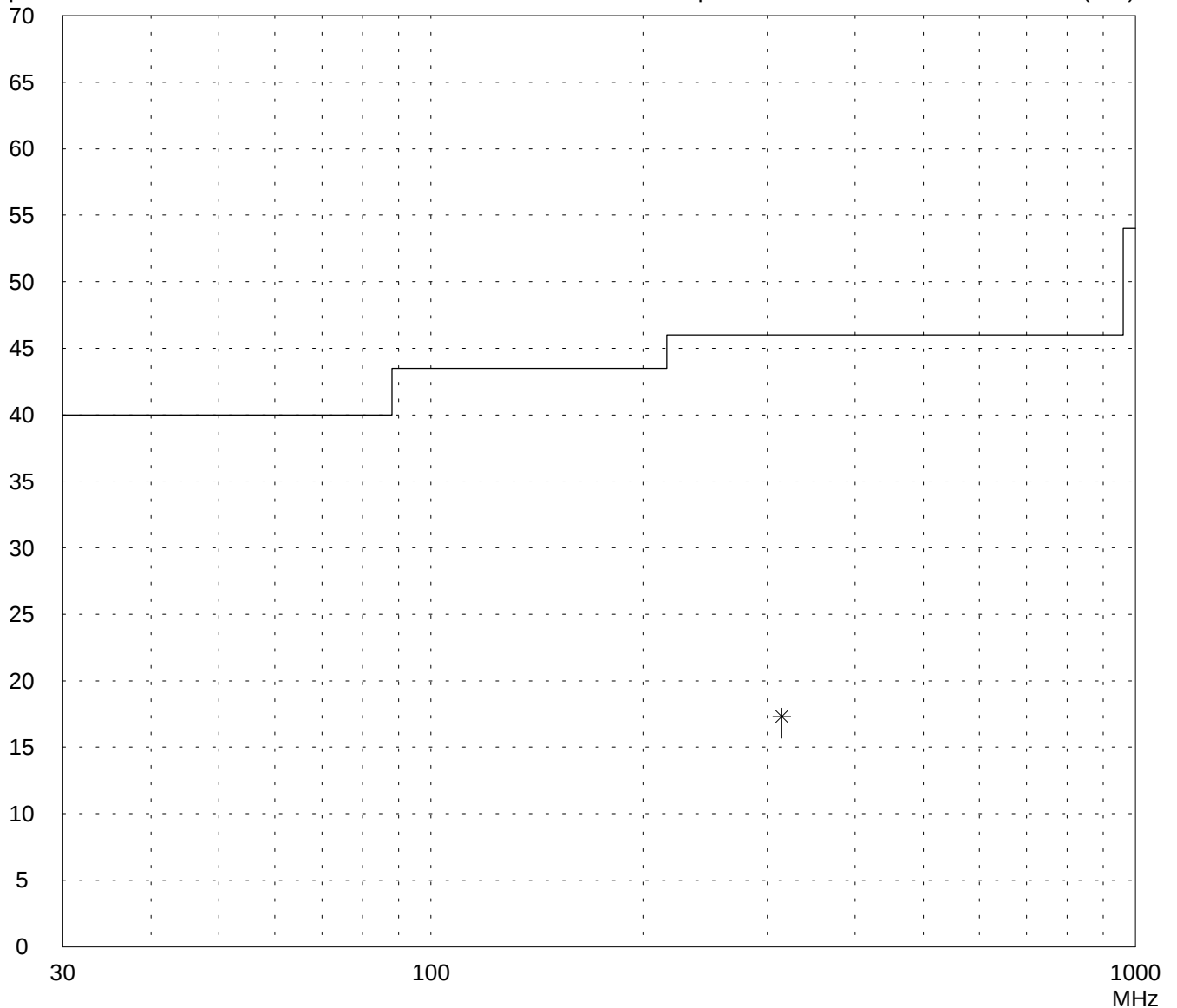
External power supply: DC 12.0 V (car battery)

Detector:
Quasi-Peak

List of values:
Selected by hand

dB μ V/m

Limit1: FCC Subpart C Transducer: HK116 / HL223 (3 m)



Result:
Limit kept

Project file:
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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: FZV receiver	Mode: Receiver in RX mode
Serial no.: Prototype 1	External power supply: DC 12.0 V (car battery)
Applicant: BMW AG	
Test site: Open area test-site I	
Tested on: Test distance 3 meters Horizontal Polarization	
Date of test: 09/23/1999	Operator: R. Kohlhäufel
Test performed: by hand	File name:

Detector: Quasi-Peak	List of values: Selected by hand
-------------------------	-------------------------------------

Frequency MHz	Reading dBμV	Correction factor dB	Value dBμV/m	Limit dBμV/m	Limit exceeded
314.7	-0.1	17.4	17.3	46.0	

Result: Limit kept	Project file: 50217-90595-4	Page 29 of 38 Pages
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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
FZV receiver

Serial no.:
Prototype 1

Applicant:
BMW AG

Test site:
Open area test-site I

Tested on:
Test distance 3 meters
Vertical Polarization

Date of test:
09/23/1999

Operator:
R. Kohlhäufl

Test performed:
by hand

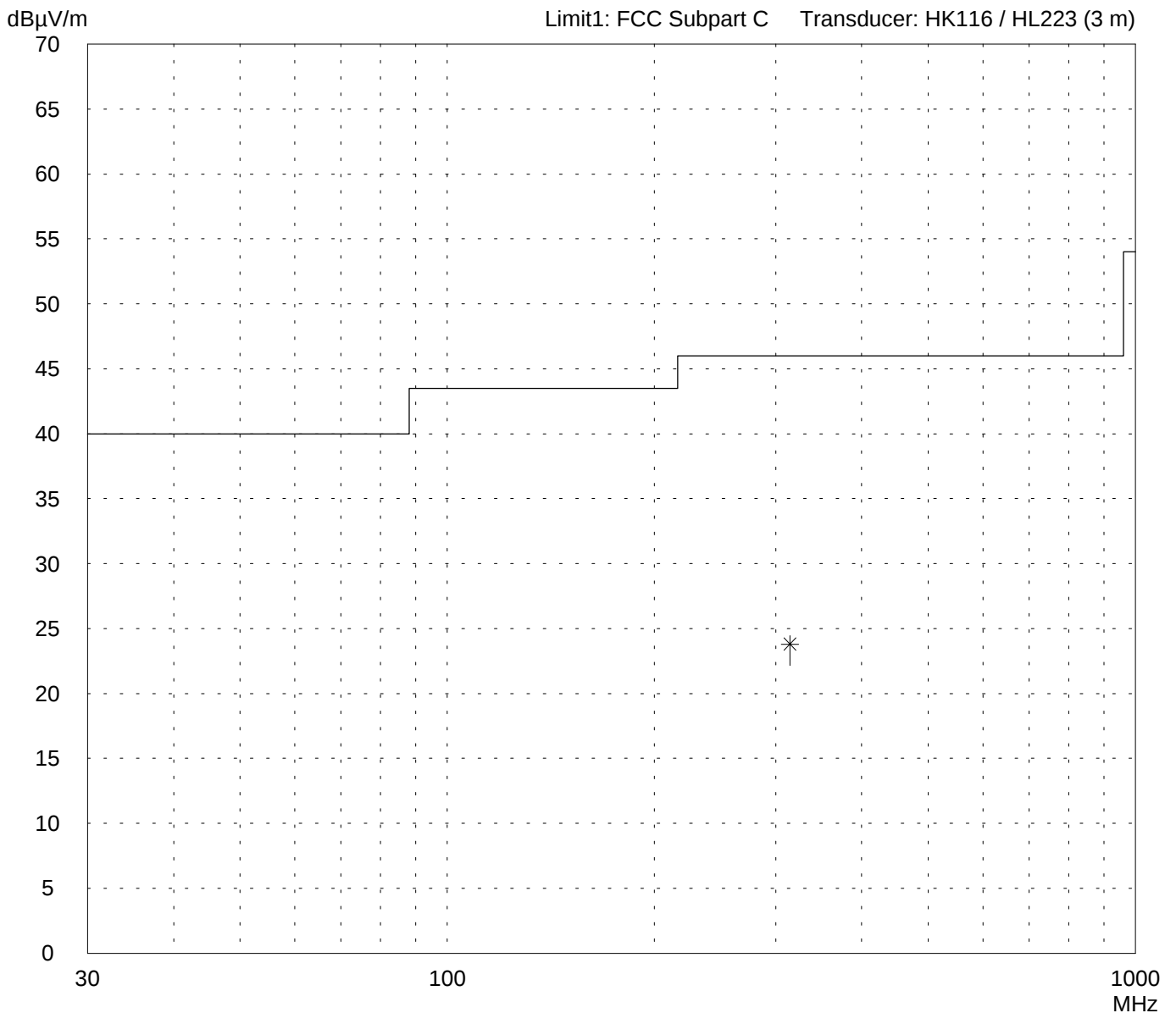
File name:

Mode:
Receiver in RX mode

External power supply: DC 12.0 V (car battery)

Detector:
Quasi-Peak

List of values:
Selected by hand



Result:
Limit kept

Project file:
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Radiated Emission Test 30 MHz - 1 GHz according to FCC Part 15 Subpart C

Model: FZV receiver	Mode: Receiver in RX mode
Serial no.: Prototype 1	External power supply: DC 12.0 V (car battery)
Applicant: BMW AG	
Test site: Open area test-site I	
Tested on: Test distance 3 meters Vertical Polarization	
Date of test: 09/23/1999	Operator: R. Kohlhäufel
Test performed: by hand	File name:

Detector: Quasi-Peak	List of values: Selected by hand
-------------------------	-------------------------------------

Frequency MHz	Reading dBμV	Correction factor dB	Value dBμV/m	Limit dBμV/m	Limit exceeded
314.7	6.4	17.4	23.8	46.0	

Result: Limit kept	Project file: 50217-90595-4	Page 31 of 38 Pages
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Radiated Emission Test 300 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
FZV Receiver

Serial no.:
Prototype 1

Applicant:
BMW AG

Test site:
Semi anechoic room, cabin no. 3

Tested on:
Test distance 3 meters
Horizontal Polarization

Date of test: 09/22/1999 Operator: R. Kohlhäufel

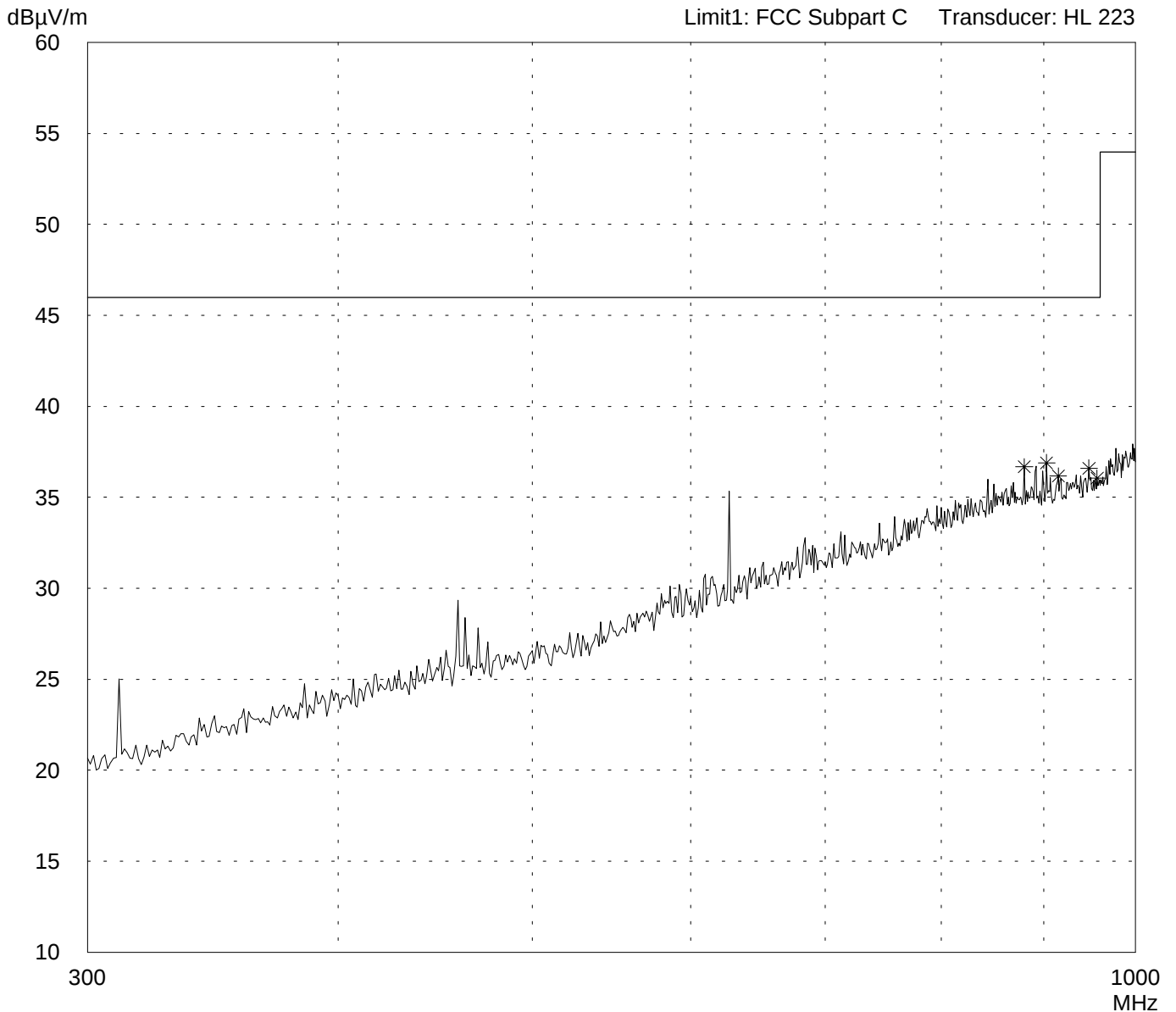
Test performed: automatically File name:

Mode:
Receiver in RX mode (315 MHz)

External power supply: DC 12.0 V (car battery)

Detector:
Peak

List of values:
10 dB Margin 50 Subranges



Result:
Prescan

Project file:
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Radiated Emission Test 300 MHz - 1 GHz
according to FCC Part 15 Subpart C

Model: FZV Receiver	Mode: Receiver in RX mode (315 MHz) External power supply: DC 12.0 V (car battery)	
Serial no.: Prototype 1		
Applicant: BMW AG		
Test site: Semi anechoic room, cabin no. 3		
Tested on: Test distance 3 meters Horizontal Polarization		
Date of test: 09/22/1999		Operator: R. Kohlhäufel
Test performed: automatically		File name:

Detector: Peak	List of values: 10 dB Margin 50 Subranges
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[illegible]

Result: Prescan	Project file: 50217-90595-4	Page 33 of 38 Pages
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Radiated Emission Test 300 MHz - 1 GHz according to FCC Part 15 Subpart C

Model:
FZV Receiver

Serial no.:
Prototype 1

Applicant:
BMW AG

Test site:
Semi anechoic room, cabin no. 3

Tested on:
Test distance 3 meters
Vertical Polarization

Date of test: 09/22/1999 Operator: R. Kohlhäufel

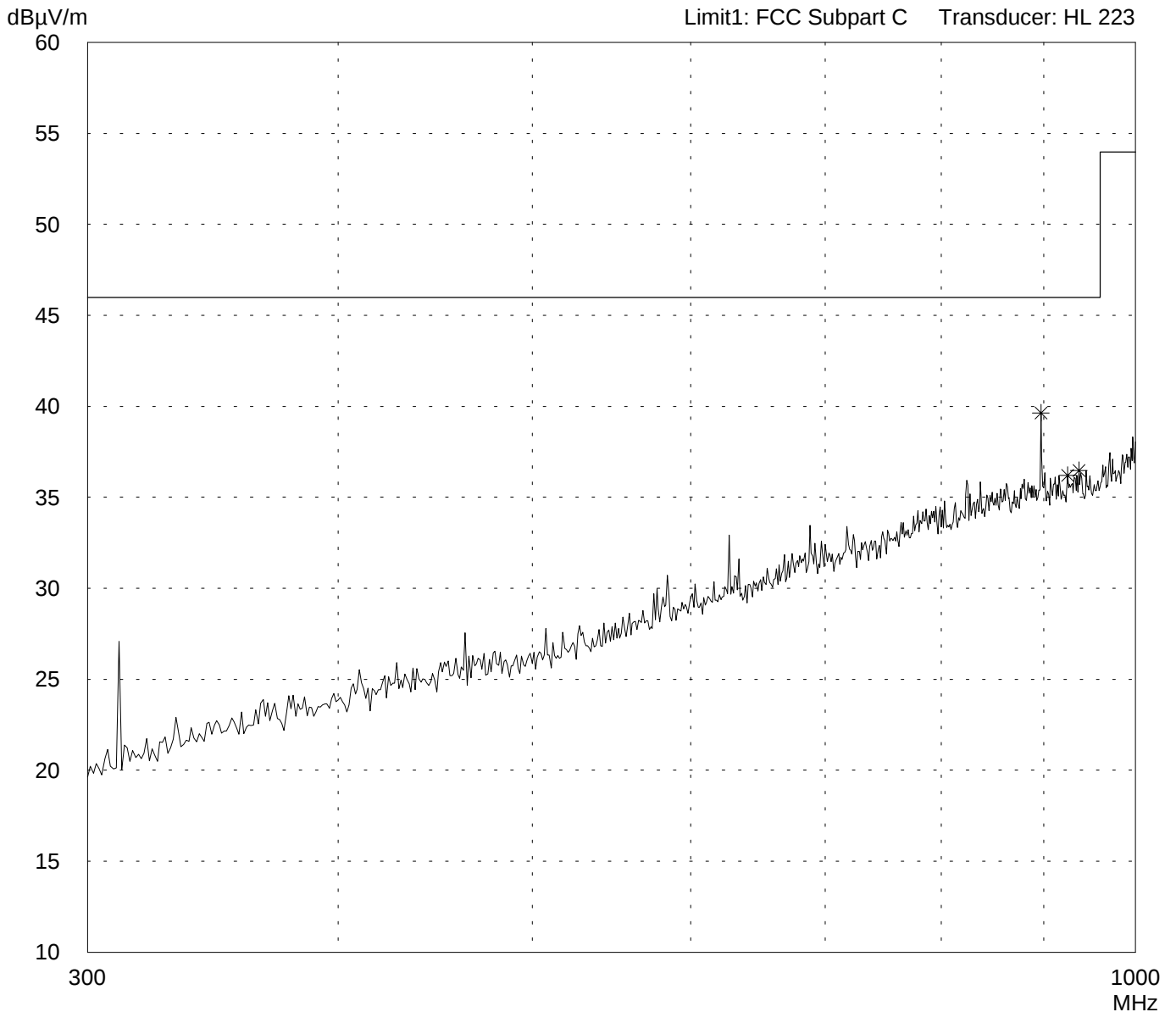
Test performed: automatically File name:

Mode:
Receiver in RX mode (315 MHz)

External power supply: DC 12.0 V (car battery)

Detector:
Peak

List of values:
10 dB Margin 50 Subranges



Result:
Limit not kept

Project file:
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Radiated Emission Test 300 MHz - 1 GHz according to FCC Part 15 Subpart C
--

Model: FZV Receiver	Mode: Receiver in RX mode (315 MHz)
Serial no.: Prototype 1	External power supply: DC 12.0 V (car battery)
Applicant: BMW AG	
Test site: Semi anechoic room, cabin no. 3	
Tested on: Test distance 3 meters Vertical Polarization	
Date of test: 09/22/1999	Operator: R. Kohlhäufel
Test performed: automatically	File name:

Detector: Peak	List of values: 10 dB Margin 50 Subranges
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[illegible]

Result: Limit not kept	Project file: 50217-90595-4	Page 35 of 38 Pages
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Radiated Emission 1 GHz - 2 GHz
according to FCC Part 15 Subpart C, §15.209

Model: FZV Receiver
Type: Receiver
Serial No.: Prototype 1
Applicant: BMW AG
Test-site: Semi anechoic room
Test distance: 3 meters
Date of test: 09/23/1999
Operator: R. Kohlhäufel

Mode: - receiver operating continuously
- with supply voltage 12 V DC

Detector: Peak

Frequency [GHz]	Polarization	Analyzer- reading [dBμV]	Antenna- correction [dB]	Cable- correction [dB]	Fieldstrength [dBμV/m]	Limit (AV) [dBμV/m]
1.0 - 2.0					*	54.0

Note (*): No levels above noise floor detected.

Result: The limits are kept.

Radiated emission test 1GHz - 2GHz acc. to FCC Part 15 Subpart C

Model:
FZV Receiver

Serial No.:
Prototype 1

Applicant:
BMW AG

Mode:
- receiver in RX mode

- 12 V DC power supply (car battery)

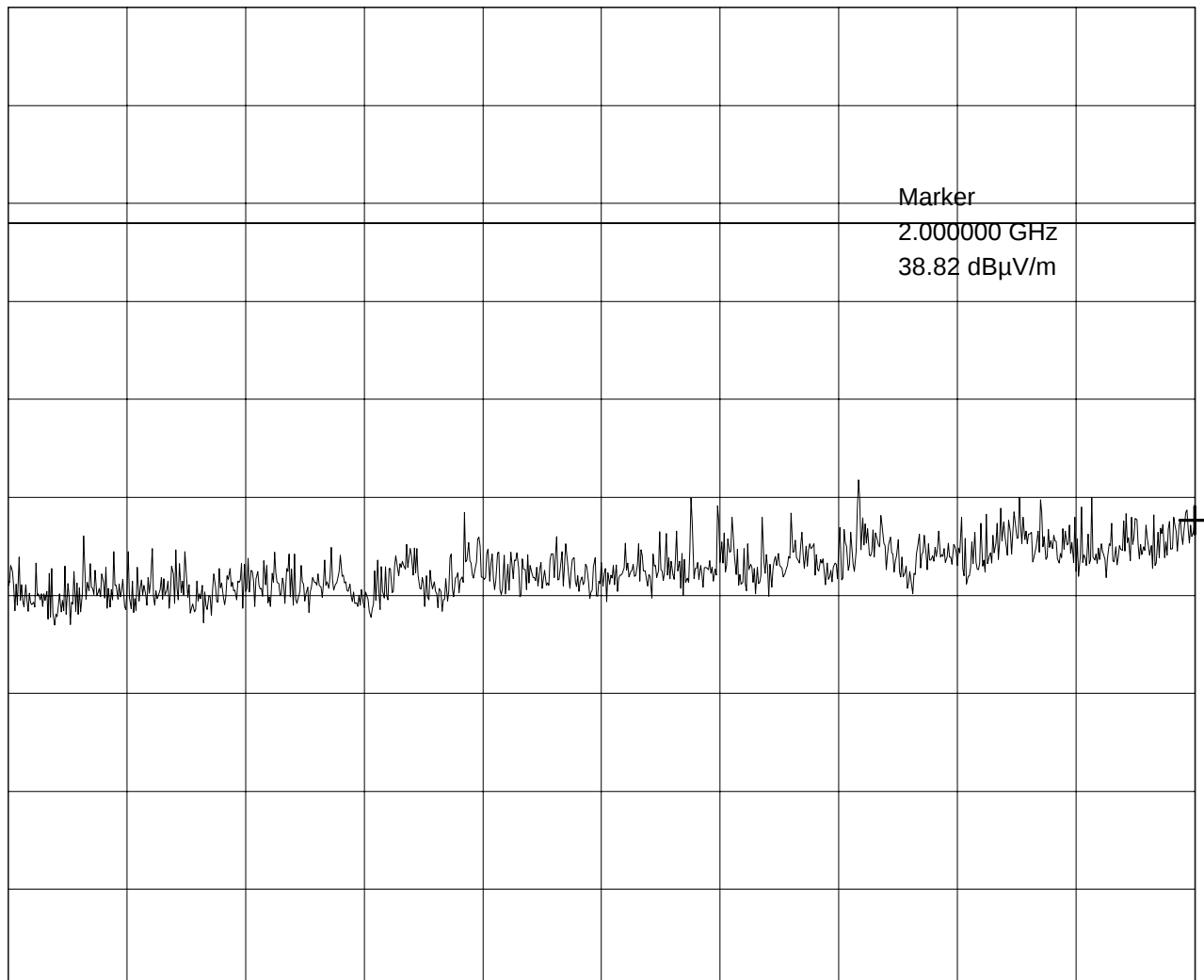
- Test distance: 3 meters

Antenna polarization: horizontal

Ref.Level 65 dB μ V/m
5 dB dB/Div.

ATT 0 dB

Ref. Offset -30.5 dB



Start 1.000 GHz
RBW 1 MHz

VBW 1 MHz

Stop 2.000 GHz
SWP 20 ms

Tested by:
Rupert Kohlhäufel

Date:
09/23/1999

Project-No.:
50217-90595-4

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Radiated emission test 1GHz - 2GHz acc. to FCC Part 15 Subpart C

Model:
FZV Receiver

Serial No.:
Prototype 1

Applicant:
BMW AG

Mode:
- receiver in RX mode

- 12 V DC power supply (car battery)

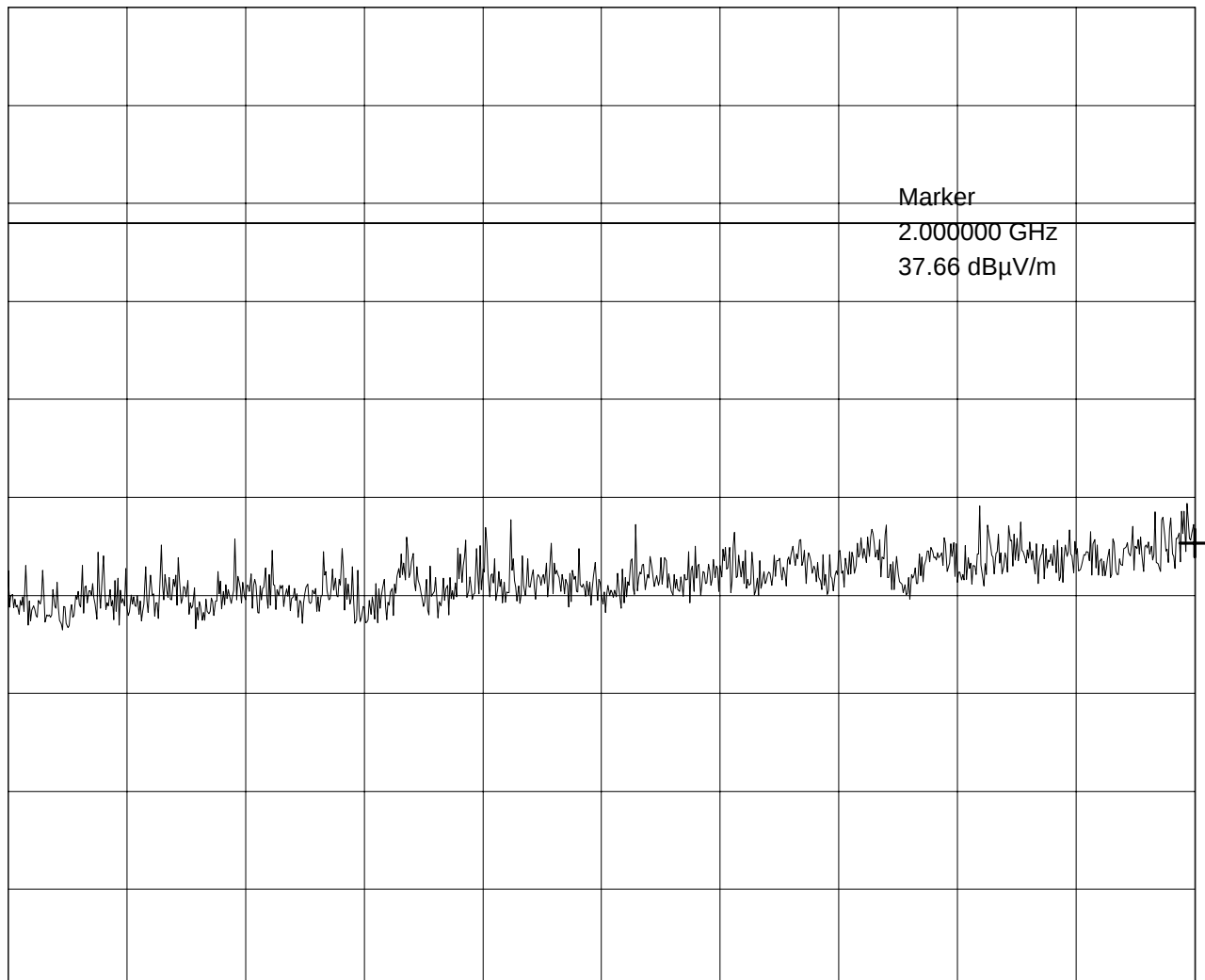
- Test distance: 3 meters

Antenna polarization: vertical

Ref.Level 65 dB μ V/m
5 dB dB/Div.

ATT 0 dB

Ref. Offset -30.5 dB



Start 1.000 GHz
RBW 1 MHz

VBW 1 MHz

Stop 2.000 GHz
SWP 20 ms

Tested by:
Rupert Kohlhäufel

Date:
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