

Straubing, July 3, 2006

TEST - REPORT

No. 50217-060417-2 (Edition 1)

for

Comfort Access System

Applicant: Bayerische Motoren Werke AG

Test Specifications: FCC Code of Federal Regulations,
CFR 47, Part 15,
Sections 15.205, 15.207 and 15.209

Industry Canada Radio Standards
Specifications
RSS-Gen Issue 1, Section 7.2.2 and
RSS-210 Issue 6, Sections 2.2, 2.6
(Category I Equipment)

Note:

The test data of this report is related 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 Description of the Equipment Under Test (EUT)

General data of EUT	
Type designation ¹ :	Comfort Access System
Parts ² :	---
Serial number(s):	Sample no. A (unmodulated) Sample no. D (modulated)
Manufacturer:	Huf Hülsbeck & Fürst GmbH & Co. KG Steege Strasse 17 D-42551 Velbert Germany
Type of equipment:	
Version:	As delivered
FCC ID:	LX8CAS93
Additional parts/accessories:	---

Technical data of EUT	
Application frequency range:	N/A (general requirements)
Frequency range:	122.50 kHz - 127.50 kHz
Operating frequency:	125.28 kHz
Type of modulation:	100 % ASK
Pulse train:	ca. 485 ms (test modes)
Pulse width:	ca. 42 ms (test modes)
Number of RF-channels:	1
Channel spacing:	N/A (wideband)
Bit rate:	4 kBd
Designation of emissions ³ :	24K0A1D
Type of antenna:	integrated
Size/length of antenna:	see photographs of EUT
Connection of antenna:	☐ detachable ☒ not detachable
Type of power supply:	DC supply
Specifications for power supply:	nominal voltage: 14.0 V minimum voltage: 9.0 V maximum voltage: 16.0 V

¹ Type designation of the system if EUT consists of more than one part.

² Type designations of the parts of the system, if applicable.

³ Also known as "Class of Emission".

2 Administrative Data

Application details	
Applicant (full address):	Bayerische Motoren Werke AG BMW Haus Petuelring 130 D-80788 München Germany
Contact person:	Mr. Richard Hochleitner
Contract identification:	---
Receipt of EUT:	May 10, 2006 and June 28, 2006
Date(s) of test:	May 15 and 22, 2006 June 2, 29 and 30, 2006
Note(s):	---

Report details	
Report number:	50217-060417-2
Edition:	1
Issue date:	July 3, 2006

3 Identification of the Test Laboratory

Details of the Test Laboratory	
Company name:	Senton GmbH EMI/EMC Test Center
Address:	Aeussere Fruehlingstrasse 45 D-94315 Straubing Germany
Laboratory accreditation:	DAR-Registration No. DAT-P-171/94-02
FCC test site registration number	90926
Industry Canada test site registration:	IC 3050
Contact person:	Mr. Johann Roidt Phone: (+49) (0)9421 5522-0 Fax: (+49) (0)9421 5522-99

4 Summary

Summary of test results

The tested sample complies with the requirements set forth in the

Code of Federal Regulations CFR 47, Part 15, Sections 15.205, 15.207 and 15.209

of the Federal Communication Commission (FCC) and the

Radio Standards Specifications

RSS-Gen Issue 1, Section 7.2.2 and

RSS-210 Issue 6, Sections 2.2, 2.6 (Category I Equipment)

of Industry Canada (IC).

Personnel involved in this report

Laboratory Manager:



Mr. Johann Roidt

Responsible for testing:



Mr. Rainer Heller

Responsible for test report:

Mr. Rainer Heller

5 Operation Mode and Configuration of EUT

Operation Mode(s)

- **"Cabrio function mode"**
 continuous transmission with (sample no. D) and without modulation (sample no. A)
 supply voltage 14 V DC
- **"Access control mode"**
 continuous transmission with (sample no. D) and without modulation (sample no. A)
 supply voltage 14 V DC

Note: "Cabrio function mode" and "Access control mode" are test modes to simplify testing. Typical transmission has a period form of 39 ms (as stated by applicant) and is triggered by manual handle operation.

Configuration(s) of EUT

The device was tested as a stand-alone device with external dc supply voltage.

Final tests were performed with EUT in vertical position (standard position). However, additional prescans of radiated emission in the frequency range 9 kHz to 30 MHz were performed with EUT in horizontal position as described in "6.3 Radiated Emission Measurement 9 kHz to 30 MHz".

List of ports and cables

Port	Description	Classification ⁴	Cable type	Cable length
1	DC supply lines	dc power	Unshielded	80 cm

List of devices connected to EUT

Item	Description	Type Designation	Serial no. or ID	Manufacturer
No devices connected				

List of support devices

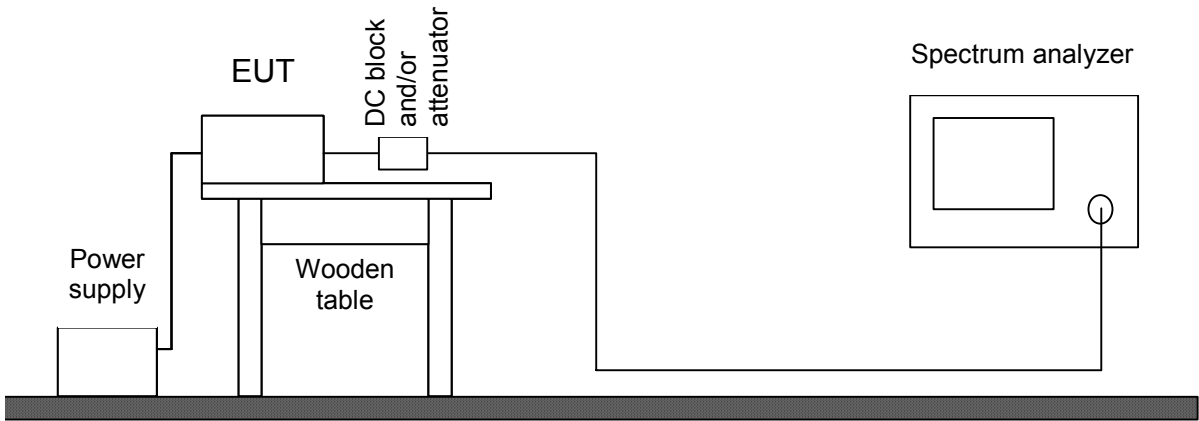
Item	Description	Type Designation	Serial no. or ID	Manufacturer
No support devices used				

⁴ Ports shall be classified as ac power, dc power or signal/control port

6 Measurement Procedures

6.1 Bandwidth Measurements

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 2, section 2.202(a) CFR 47 Part 15, section 15.215(c) IC RSS-Gen Issue 1, sections 4.4.1 and 4.4.2 IC RSS-210 Issue 6, section A1.1.3 ANSI C63.4, annex H.6
Guide:	ANSI C63.4 / IC RSS-Gen Issue 1, sections 4.4.1 and 4.4.2
Measurement setup:	☐ Conducted: See below ☒ Radiated: Radiated Emission Measurement 9 kHz to 30 MHz (6.3)
If antenna is detachable bandwidth measurements shall be performed at the antenna connector (conducted measurement) when the transmitter is adjusted in accordance with the tune-up procedure, if applicable. The RF output terminals are connected to a spectrum analyzer. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable. If radiated measurements are performed the same test setups and instruments are used as with radiated emission measurements for the appropriate frequency range. The analyzer settings are specified by the test description of the appropriate test record(s).	

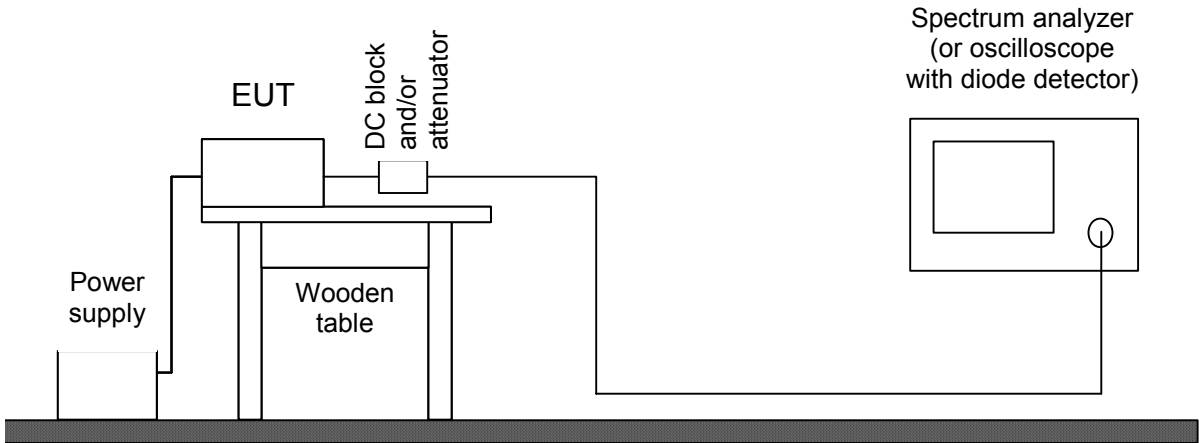


Test instruments used for conducted measurements:

Used	Type	Model	Serial No. or ID	Manufacturer
☐	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	EMI test receiver	ESPI7	836914/0002	Rohde & Schwarz
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☐	Power meter	NRVS	836856/015	Rohde & Schwarz
☐	Peak power sensor	NRV-Z31	8579604.03	Rohde & Schwarz
☐	Power sensor	NRV-Z52	837901/030	Rohde & Schwarz
☐	Power sensor	NRV-Z4	863828/015	Rohde & Schwarz
☐	DC-block	7006	A2798	Weinschel
☐	Attenuator	4776-10	9412	Narda
☐	Attenuator	4776-20	9503	Narda

6.2 Pulse Train Measurement

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, section 15.35(c) IC RSS-Gen Issue 1, section 4.3
Guide:	ANSI C63.4
Measurement setup:	☐ Conducted: See below (direct connection or via test fixture) ☒ Radiated: Radiated Emission Measurement 9 kHz to 30 MHz (6.3)
If antenna is detachable pulse train measurements shall be performed at the antenna connector (conducted measurement). The RF output terminals are connected to a spectrum analyzer or to a diode detector in combination with an oscilloscope. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as dc block and appropriate attenuators (50 Ohms). The electrical characteristics of the radio frequency load attached to the output terminals shall be stated, if applicable. If antenna is not detachable a test fixture may be used instead of direct connection to RF output terminals. If radiated measurements are performed similar test setups and instruments are used as with radiated emission measurements for the appropriate frequency range. However, the spectrum analyzer may be replaced by a diode detector connected to an oscilloscope.	

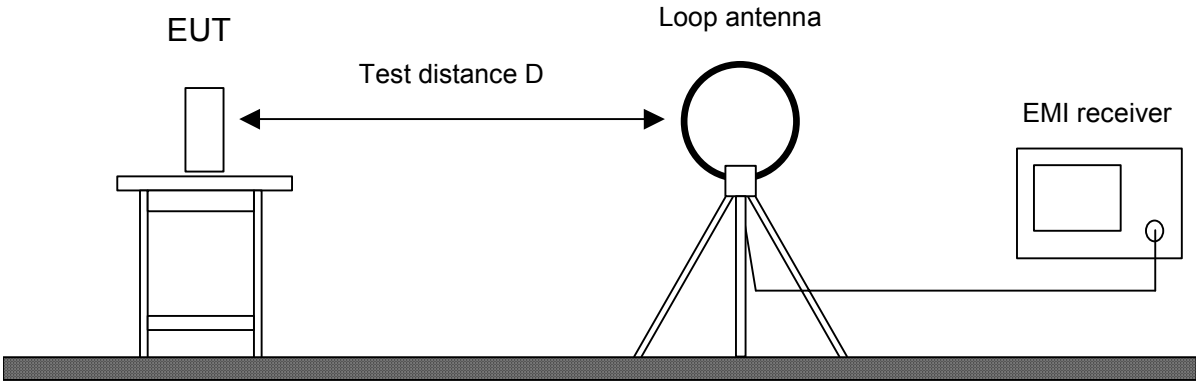


Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
☐	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	EMI test receiver	ESPI7	836914/0002	Rohde & Schwarz
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☐	Diode detector negative	8473D	01492	Hewlett Packard
☐	Oscilloscope	54602B	US35060304	Hewlett Packard
☐	Digital Oscilloscope	Wave Surfer 452	LCRY0301J11938	LeCroy
☐	Test probe	TP01	001	Senton
☐	DC-block	7006	A2798	Weinschel
☐	Attenuator	4776-10	9412	Narda
☐	Attenuator	4776-20	9503	Narda

6.3 Radiated Emission Measurement 9 kHz to 30 MHz

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, sections 15.205 and 15.209 IC RSS-210 Issue 6, sections 2.2 and 2.6
Guide:	ANSI C63.4
Radiated emission in the frequency range 9 kHz to 30 MHz is measured using an active loop antenna. First the whole spectrum of emission caused by the equipment is recorded at a distance of 3 meters in a fully or semi anechoic room with the detector of the spectrum analyzer or EMI receiver set to peak. This configuration is also used for recording the spectrum of intentional radiators. 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. EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions. If worst case emission of the EUT cannot be recorded with EUT in standard position and loop antenna in vertical polarization the EUT (or the radiating part of the EUT) is rotated by 90 degrees instead of changing the loop antenna to horizontal polarization. This procedure is selected to minimize the influence of the environment (e.g. effects caused by the floor especially with longer distances). Final measurement is performed at a test distance D of 30 meters using an open field test site. In case the regulation requires testing at other distances, the result is extrapolated by either making measurements at an additional distance D of 10 meters to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). In cases of very low emissions measurements are performed at shorter distances and results are extrapolated to the required distance. The provisions of CFR 47 Part 15 sections 15.31(d) and (f)(2) apply. According to CFR 47 Part 15 section 15.209(d) final measurement is performed with detector function set to quasi-peak except for the frequency bands 9 to 90 kHz and 110 to 490 kHz where, for non-pulsed operation, average detector is employed. If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.	

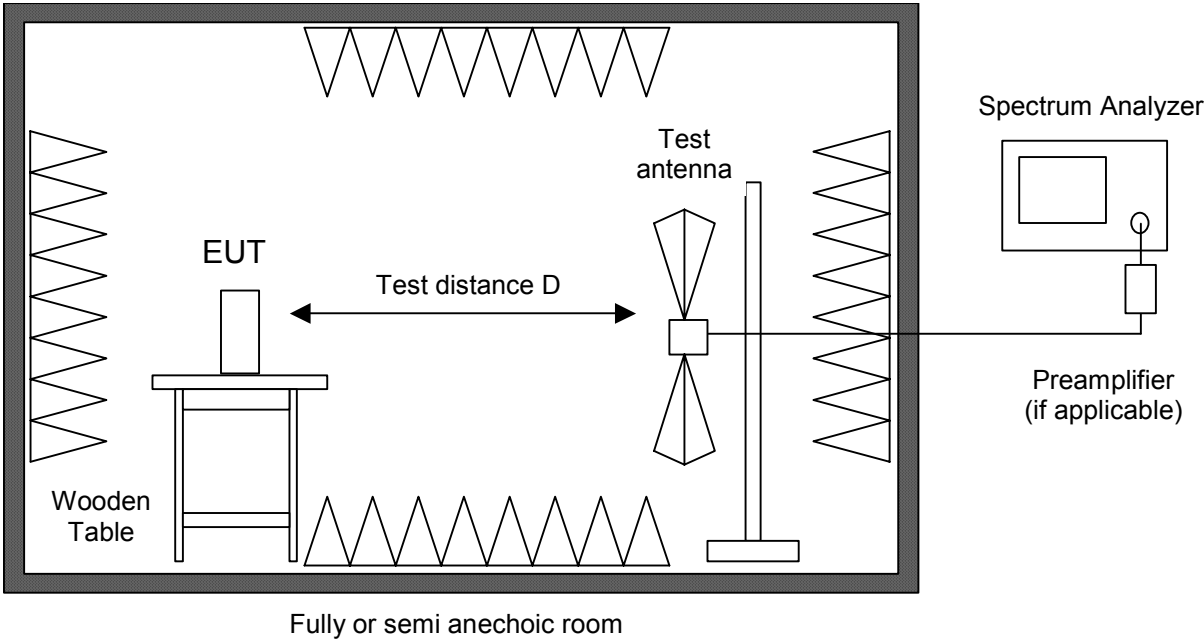


Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
☒	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☒	Test receiver	ESHS 10	860043/016	Rohde & Schwarz
☐	Preamplifier	CPA9231A	3393	Schaffner
☒	Loop antenna	HFH2-Z2	882964/1	Rohde & Schwarz
☒	Fully anechoic room	No. 2	1452	Albatross Projects
☒	Semi-anechoic room	No. 3	1453	Siemens
☒	Open field test site	EG 1	1450	Senton

6.4 Radiated Emission in Fully or Semi Anechoic Room

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, section 15.209 IC RSS-210 Issue 6, section 2.6
Guide:	ANSI C63.4
Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33. Measurements are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz). Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used. All tests below 18 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance is reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary. If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value. 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. During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions. For final testing below 1 GHz an open field test-site is used and the plots recorded in the fully or semi anechoic room are indicated as prescans.	

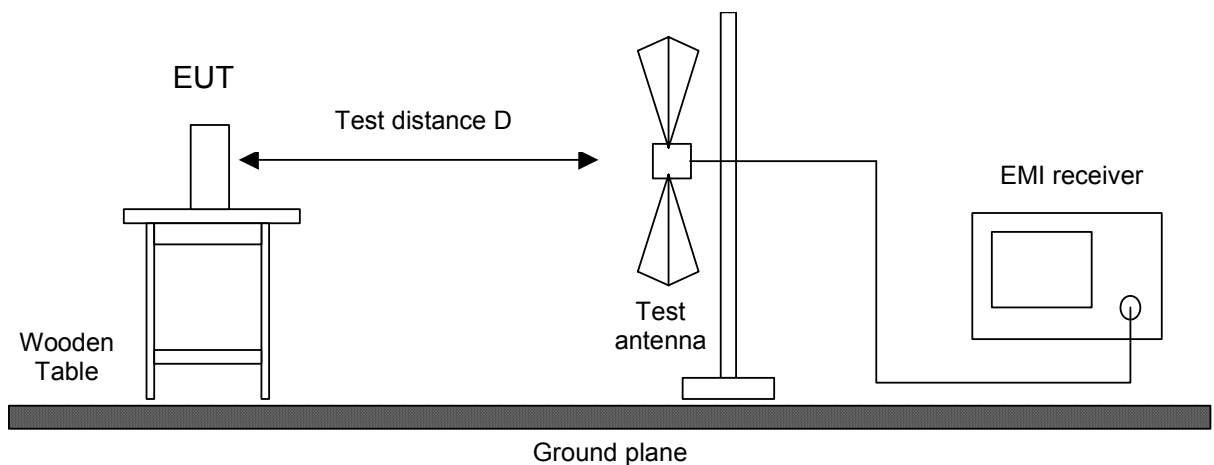


Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
☒	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
☐	Spectrum analyzer	R 3271	05050023	Advantest
☐	EMI test receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
☒	Preamplifier	CPA9231A	3393	Schaffner
☐	Preamplifier	R14601		Advantest
☐	Preamplifier 1-8 GHz	AFS3-00100800-32-LN	847743	Miteq
☐	Preamplifier 0.5-8 GHz	AMF-4D-005080-25-13P	860149	Miteq
☐	Preamplifier 8-18 GHz	ACO/180-3530	32641	CTT
☐	External Mixer	WM782A	845881/005	Tektronix
☐	Harmonic Mixer	FS-Z30	843389/007	Rohde & Schwarz
	Accessories			
☒	Trilog broadband antenna	VULB 9163	9163-188	Schwarzbeck
☐	Horn antenna	3115	9508-4553	EMCO
☐	Horn antenna	3160-03	9112-1003	EMCO
☐	Horn antenna	3160-04	9112-1001	EMCO
☐	Horn antenna	3160-05	9112-1001	EMCO
☐	Horn antenna	3160-06	9112-1001	EMCO
☐	Horn antenna	3160-07	9112-1008	EMCO
☐	Horn antenna	3160-08	9112-1002	EMCO
☐	Horn antenna	3160-09	9403-1025	EMCO
☐	Horn antenna	3160-10	399185	EMCO
☒	Fully anechoic room	No. 2	1452	Albatross Projects
☐	Semi-anechoic room	No. 3	1453	Siemens

6.5 Radiated Emission at Open Field Test Site

Measurement Procedure:	
Rules and specifications:	CFR 47 Part 15, section 15.209 IC RSS-210 Issue 6, section 2.6
Guide:	ANSI C63.4
Radiated emission at open field test site is measured in the frequency range 30 MHz to 1 GHz using a biconical antenna up to 300 MHz and a logarithmic periodic antenna above. The measurement bandwidth of the test receiver is set to 120 kHz with quasi-peak detector selected. If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value. Hand-held or body-worn devices are tested in the position producing the highest emission relative to the limit as verified by prescans in the fully anechoic room. EUT is rotated all around and receiving antenna is raised and lowered within 1 meter to 4 meters to find the maximum levels of emission. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions. For measuring emissions of intentional radiators and receivers a test distance D of 3 meters is selected. Testing of unintentional radiators is performed at a distance of 10 meters. If limits specified for 3 meters shall be used for measurements performed at 10 meters distance the limits are calculated according to CFR 47 Part 15 section 15.31(d) and (f)(1) using an inverse linear-distance extrapolation factor of 20 dB/decade.	

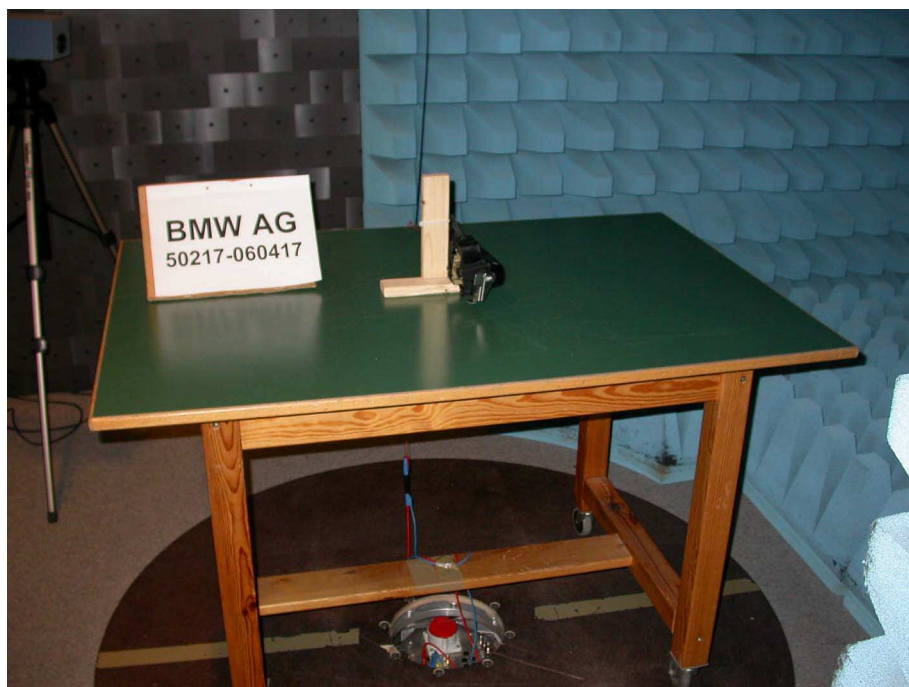


Test instruments used:

Used	Type	Model	Serial No. or ID	Manufacturer
☒	EMI receiver	ESVP	881120/024	Rohde & Schwarz
☒	Biconical antenna	EG 1 HK 116	842204/001	Rohde & Schwarz
☒	Log. per. antenna	EG 1 HL 223	841516/023	Rohde & Schwarz
☒	Open field test site	EG 1	1450	Senton

7 Photographs Taken During Testing

Test setup for radiated emission measurement 9 kHz – 30 MHz



**Test setup for radiated emission measurement 9 kHz – 30 MHz
- continued -**



**Test setup for radiated emission measurement 9 kHz – 30 MHz
- continued -**



EUT in horizontal position (for prescans only)

**Test setup for radiated emission measurement 9 kHz – 30 MHz
- continued -**



**Test setup for radiated emission measurement
(fully anechoic room)**



**Test setup for radiated emission measurement
(fully anechoic room) - continued -**



**Test setup for radiated emission measurement
(open field test site)**



**Test setup for radiated emission measurement
(open field test site) - continued -**



8 Test Results

FCC CFR 47 Parts 2 and 15			
<i>Section(s)</i>	<i>Test</i>	<i>Page</i>	<i>Result</i>
2.1046(a)	Conducted output power	---	Not applicable
2.202(a)	Occupied bandwidth	28	Recorded
15.35(c)	Pulse train measurement for pulsed operation	33	Recorded
15.205(a)	Restricted bands of operation	36	Test passed
15.207	Conducted AC powerline emission 150 kHz to 30 MHz	---	Not applicable (battery supply)
15.205(b) 15.209	Radiated emission 9 kHz to 30 MHz	39	Test passed
15.205(b) 15.209	Radiated emission 30 MHz to 1 GHz	41	Test passed

IC RSS-Gen Issue 1

<i>Section(s)</i>	<i>Test</i>	<i>Page</i>	<i>Result</i>
4.6	Transmitter output power (conducted)	---	Not applicable
4.4.1	Occupied Bandwidth	28	Recorded
4.3	Pulsed operation	33	Recorded
7.2.2	Transmitter AC power lines conducted emissions 150 kHz to 30 MHz	---	Not applicable (battery supply)

IC RSS-210 Issue 6

<i>Section(s)</i>	<i>Test</i>	<i>Page</i>	<i>Result</i>
2.2(a)	Restricted bands and unwanted emission frequencies	36	Test passed
2.2(b)(c) 2.6	Unwanted emissions 9 kHz to 30 MHz	39	Test passed
2.2(b)(c) 2.6	Unwanted emissions 30 MHz to 1 GHz	41	Test passed

8.1 Occupied Bandwidth

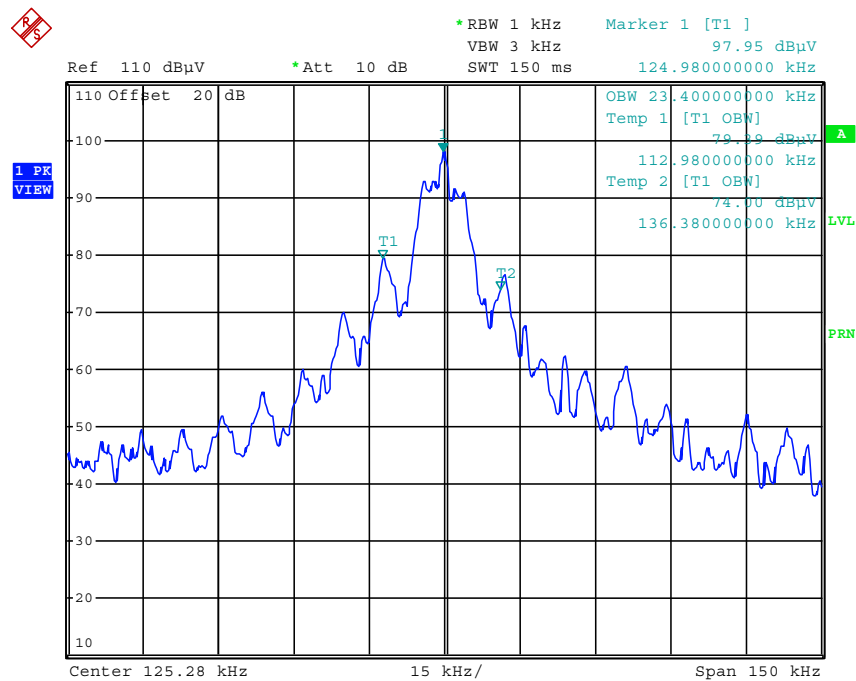
Rules and specifications:	CFR 47 Part 2, section 2.202(a) ANSI C63.4, annex H.6	
Guide:	ANSI C63.4	
Description:	The occupied bandwidth according to CFR 47 Part 2, section 2.202(a), is measured as the 99% emission bandwidth, i.e. below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission. The occupied bandwidth according to ANSI C63.4, annex H.6; is measured as the frequency range defined by the points that are 26 dB down relative to the maximum level of the modulated carrier. The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used:	
	Fundamental frequency	Minimum resolution bandwidth
	9 kHz to 30 MHz	1 kHz
	30 MHz to 1000 MHz	10 kHz
	1000 MHz to 40 GHz	100 kHz
	The video bandwidth shall be at least three times greater than the resolution bandwidth.	
Measurement procedure:	Bandwidth Measurements (6.1)	

Date of test:	June 30, 2006
Test site:	Fully anechoic room, cabin no. 3

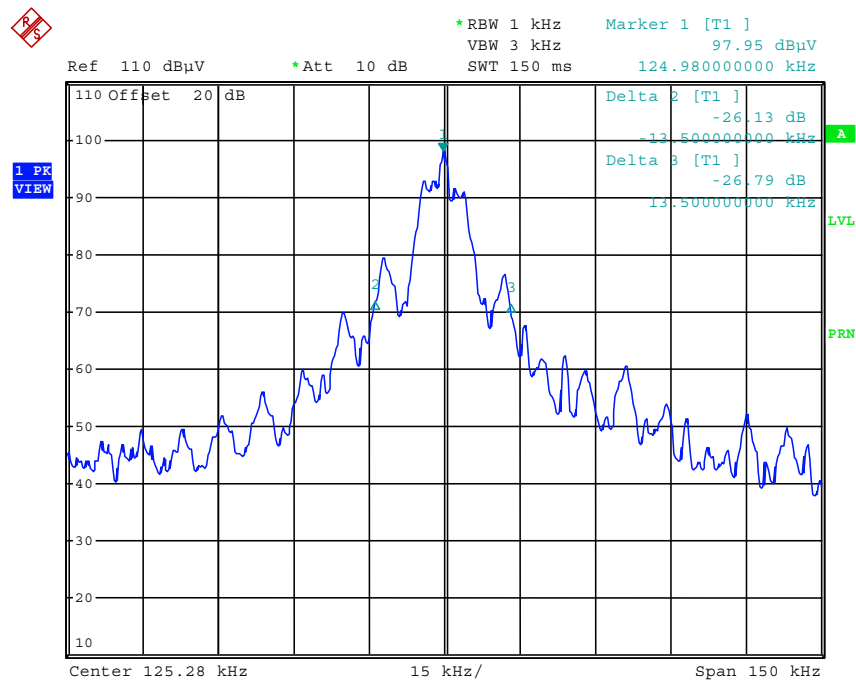
Operating mode:	Cabrio function mode with modulation	Access control mode with modulation
Occupied Bandwidth (99 %):	23.4 kHz	38.1 kHz
Occupied Bandwidth (-26 dB):	27.0 kHz	41.1 kHz

Comment: Operating in cabrio function mode with modulation

Occupied Bandwidth (99 %):

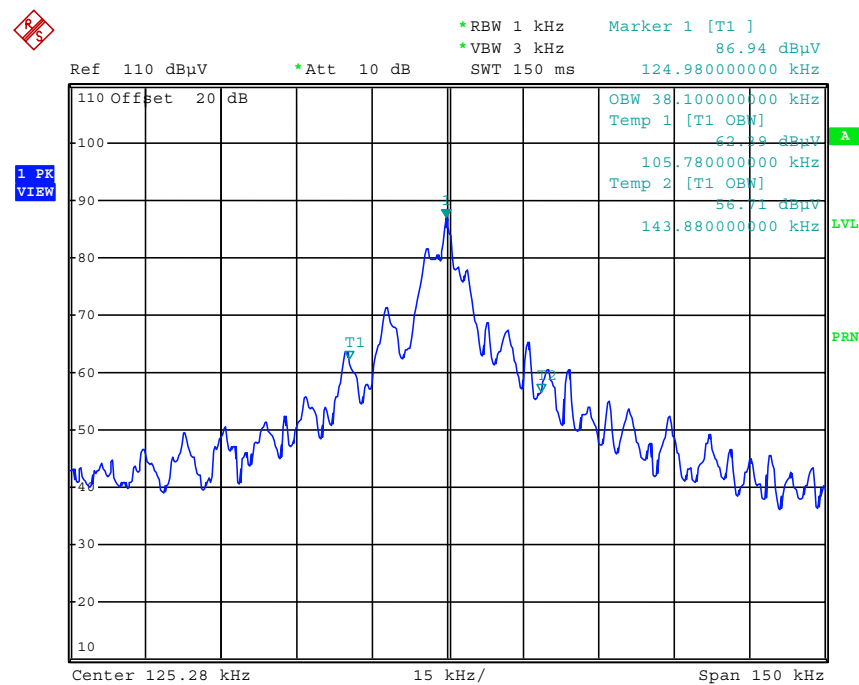


Occupied Bandwidth (-26 dB):

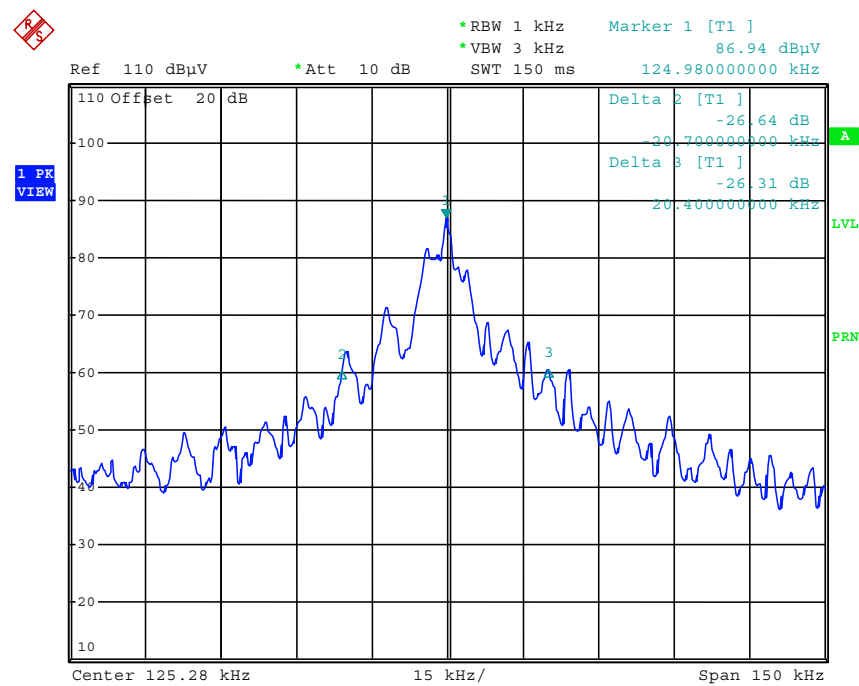


Comment: Operating in access control mode with modulation

Occupied Bandwidth (99 %):



Occupied Bandwidth (-26 dB):



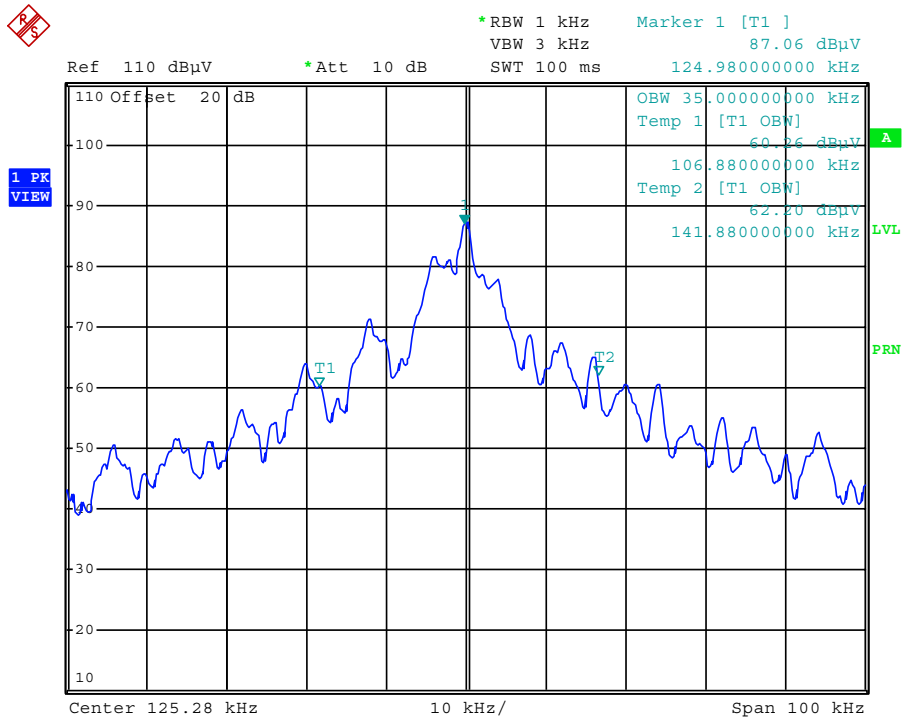
Occupied Bandwidth (continued)

Rules and specifications:	IC RSS-Gen Issue 1, section 4.4.1
Guide:	IC RSS-Gen Issue 1, section 4.4.1
Description:	If not specified in the applicable RSS the occupied bandwidth is measured as the 99% emission bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is also recorded. The span between the two recorded frequencies is the occupied bandwidth.
Measurement procedure:	Bandwidth Measurements (6.1)

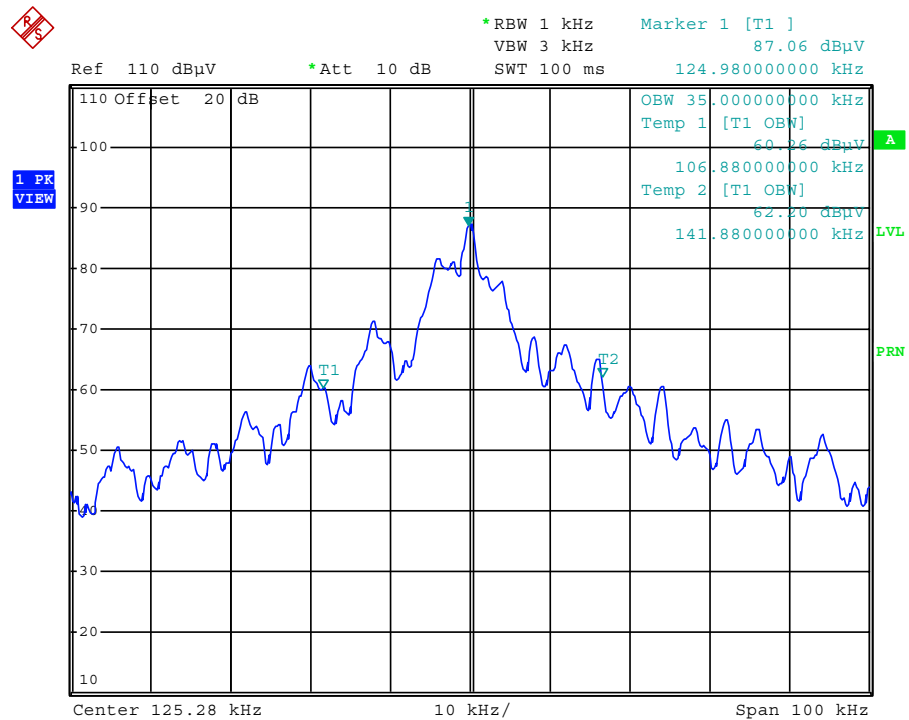
Date of test:	June 30, 2006
Test site:	Fully anechoic room, cabin no. 3

Operating mode:	Cabrio function mode with modulation	Access control mode with modulation
Occupied Bandwidth (99 %):	23.8 kHz	35.0 kHz

Operating in cabrio function mode with modulation



Operating in access control mode with modulation



8.2 Pulse Train Measurement

Rules and specifications:	CFR 47 Part 15, section 15.35(c) IC RSS-Gen Issue 1, section 4.3
Guide:	ANSI C63.4
Measurement procedure:	Pulse Train Measurement (6.2)

Date of test:	June 29, 2006
Test site:	Fully anechoic room, cabin no. 2

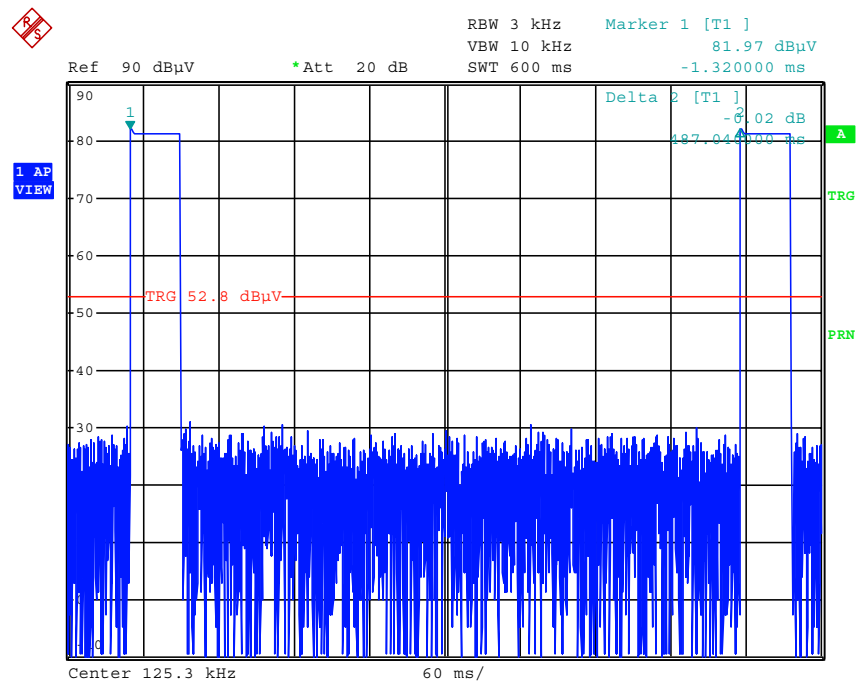
Calculation of pulse train correction:

Cabrio function mode without modulation			
TX-On-Time (worst case):	T_{on}	=	41.84 ms
Pulse Train Time:	T_{pt}	=	487.04 ms
Period Time:	T_{period}	=	100 ms
Pulse Train Correction:	C_{pt}	=	$20 \cdot \log(T_{on} / T_{period})$ dB
		=	-7.57 dB
Access control mode without modulation			
TX-On-Time (worst case):	T_{on}	=	41.72 ms
Pulse Train Time:	T_{pt}	=	484.64 ms
Period Time:	T_{period}	=	100 ms
Pulse Train Correction:	C_{pt}	=	$20 \cdot \log(T_{on} / T_{period})$ dB
		=	-7.59 dB

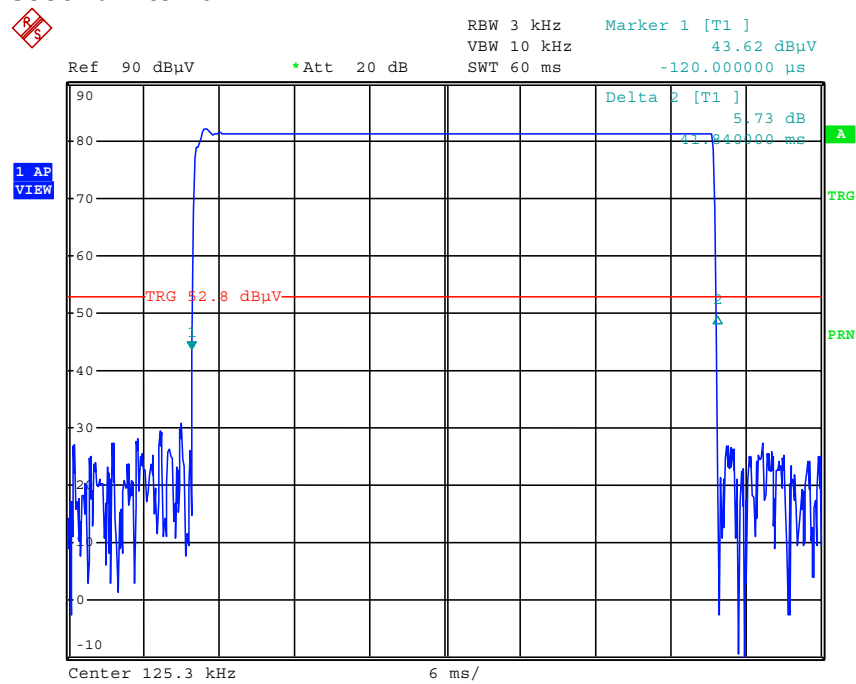
Note 1: "Cabrio function mode" and "Access control mode" are test modes to simplify testing. Typical transmission has a period form of 39 ms (as stated by applicant) and is triggered by manual handle operation.

Comment: Operating in cabrio function mode with modulation

Total Pulse Train:

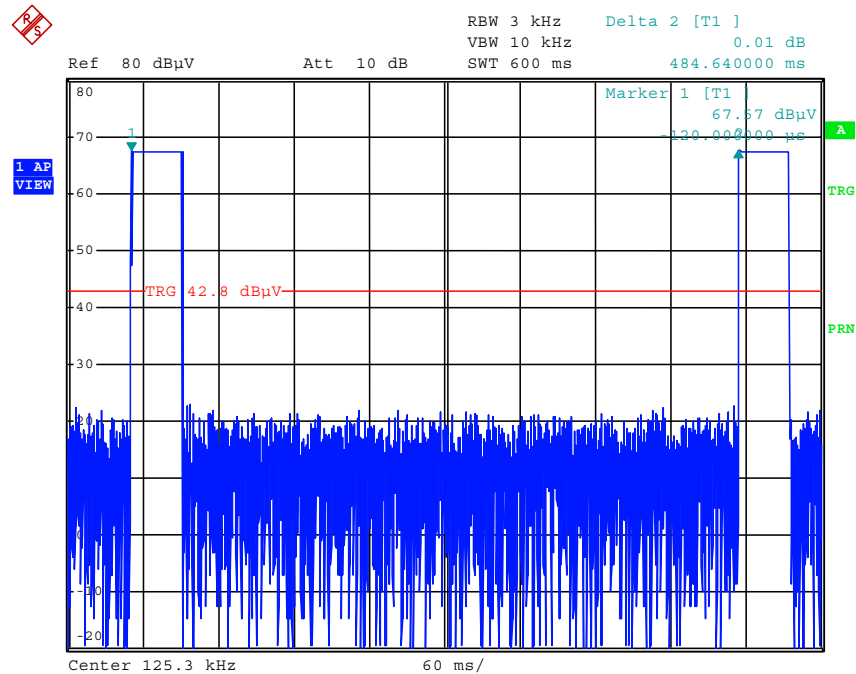


Worst case 0.1 second interval:

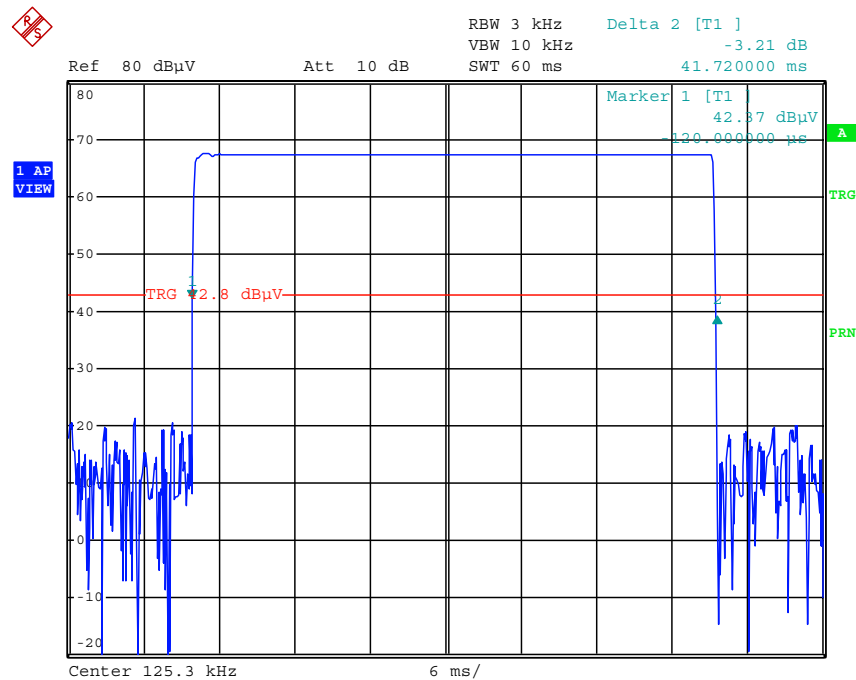


Comment: Operating in access control mode without modulation

Total Pulse Train:



Worst case 0.1 second interval:

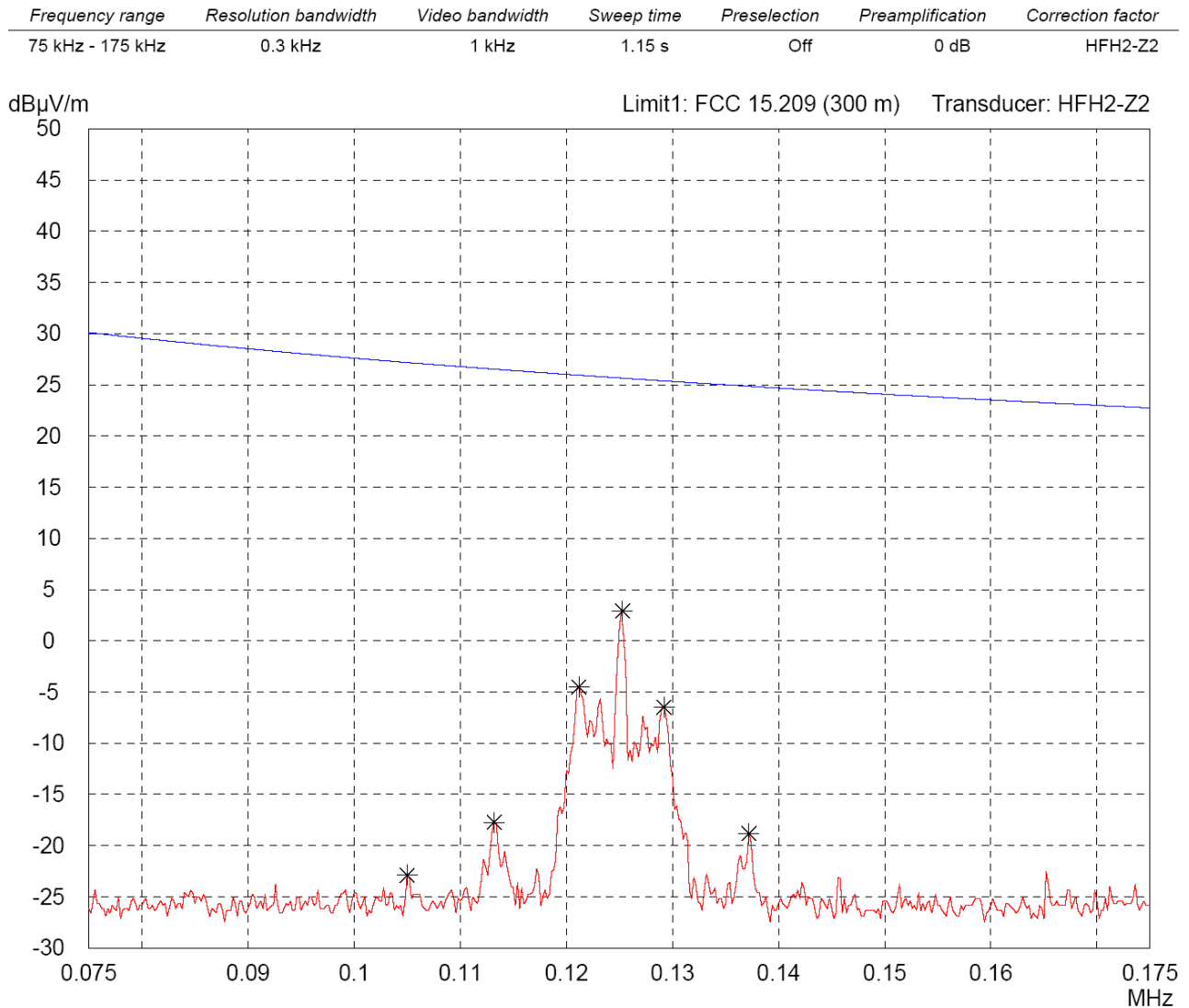


8.3 Restricted Bands of Operation

Rules and specifications:	CFR 47 Part 15, section 15.205(a) IC RSS-210 Issue 6, section 2.2(a)
Guide:	ANSI C63.4
Limit:	Only spurious emissions are permitted in any of the frequency bands listed in CFR 47 Part 15, section 15.205(a) or IC RSS-210 Issue 6, section 2.2(a).
Measurement procedure:	Radiated Emission Measurement 9 kHz to 30 MHz (6.3)
Restricted band:	90 kHz to 110 kHz

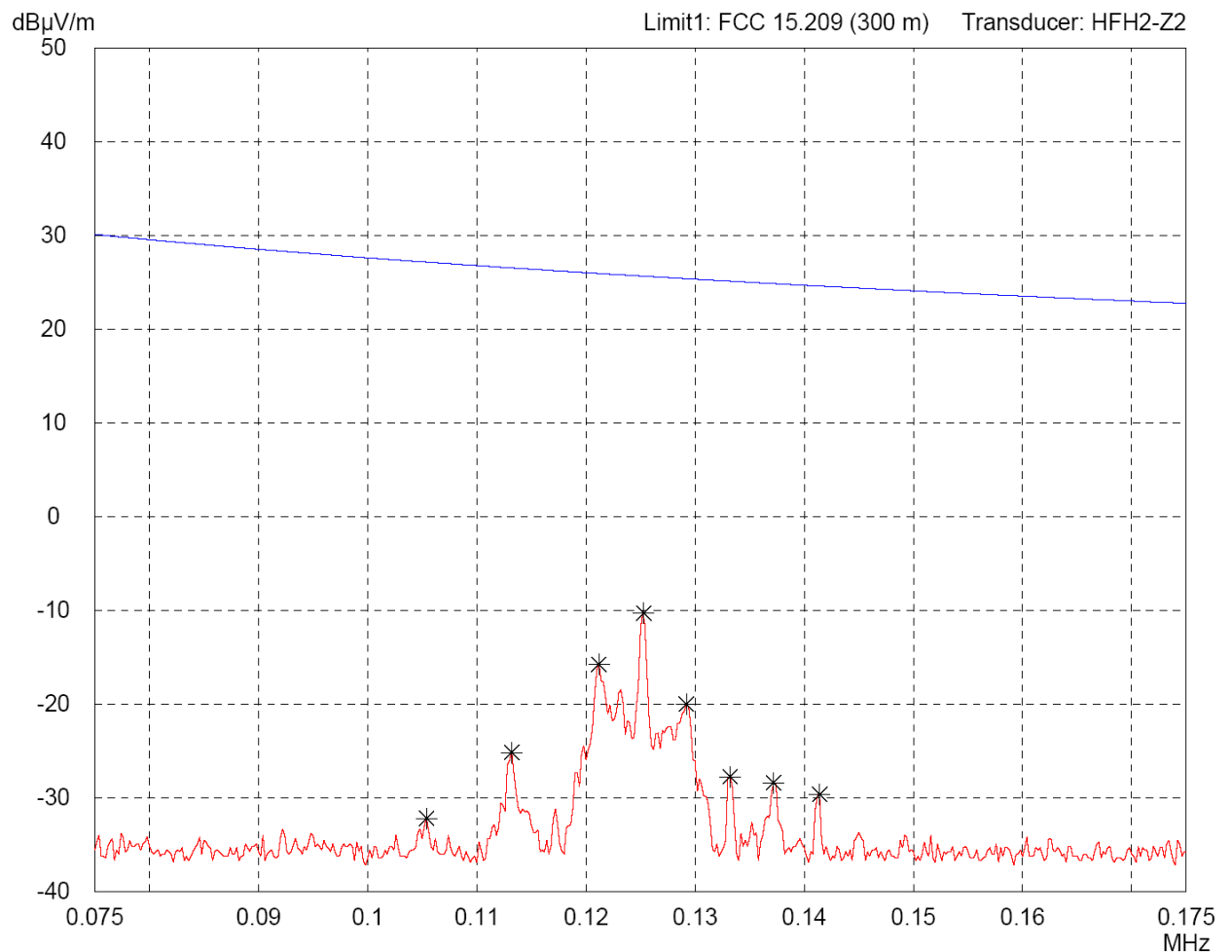
Test Result:	Test passed
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Comment:	Operating in cabrio function mode with modulation
Date of test:	June 30, 2006
Test site:	Semi anechoic room, cabin no. 3
Referred test distance:	300 m
Measurement distance:	8.5 m
Extrapolation factor:	-47.8 dB/dec
Restricted band:	90 kHz to 110 kHz



Comment:	Operating in access control mode with modulation
Date of test:	June 30, 2006
Test site:	Semi anechoic room, cabin no. 3
Referred test distance:	300 m
Measurement distance:	8.5 m
Extrapolation factor:	-48.2 dB/dec
Restricted band:	90 kHz to 110 kHz

Frequency range	Resolution bandwidth	Video bandwidth	Sweep time	Preselection	Preamplification	Correction factor
75 kHz - 175 kHz	0.3 kHz	1 kHz	1.15 s	Off	0 dB	HFH2-Z2



8.4 Radiated Emission Measurement 9 kHz to 30 MHz

Rules and specifications:	CFR 47 Part 15, sections 15.205 and 15.209 IC RSS-210 Issue 6, sections 2.2 and 2.6			
Guide:	ANSI C63.4			
Limit:	Frequency of Emission (MHz)	Field Strength ($\mu\text{V/m}$)	Field Strength ($\text{dB}\mu\text{V/m}$)	Measurement Distance d (meters)
	0.009 - 0.490	$2400/F(\text{kHz})$	$67.6 - 20 \cdot \log(F(\text{kHz}))$	300
	0.490 - 1.705	$24000/F(\text{kHz})$	$87.6 - 20 \cdot \log(F(\text{kHz}))$	30
	1.705 - 30.000	30	29.5	30
Additionally, the level of any unwanted emissions shall not exceed the level of the fundamental emission.				
Measurement procedure:	Radiated Emission Measurement 9 kHz to 30 MHz (6.3)			

Date of test:	June 2, 2006
Test site:	Open field test site

Test Result:	Test passed
--------------	-------------

Comment: Operating in cabrio function mode without modulation

Frequency (MHz)	Detector	Distance			Reading Value		Correction Factor (dB/m)	Extrapolation Factor		Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
		d1 (m)	d2 (m)	d (m)	d1 (dBµV)	d2 (dBµV)		(dB/dec)	(dB)				
0.12528	PK	10	30	300	56.3	33.5	20.0	-47.8	-47.8		5.7	45.6	39.9
0.12528	PK	10	30	300	56.3	33.5	20.0	-47.8	-47.8	-7.6	-1.9	25.6	27.5
0.25056	PK		10	300		26.3	20.0	-40.0	-59.1	-7.6	-20.4	19.6	40.0
0.37584	PK		10	300		23.4	20.0	-40.0	-59.1	-7.6	-23.3	16.1	39.4
0.50120	QP		3	30		23.2	20.0	-40.0	-40.0		3.2	33.6	30.4
0.62640	QP		3	30		32.8	20.0	-40.0	-40.0		12.8	31.7	18.9

Note: In cabrio function mode with modulation peak level at 125.28 kHz is 7.2 dB lower than without modulation, i.e. -1.5 dBµV/m at 300 m distance.

Comment: Operating in access control mode without modulation

Frequency (MHz)	Detector	Distance			Reading Value		Correction Factor (dB/m)	Extrapolation Factor		Pulse Train Correction (dB)	Final Value (dBµV/m)	Limit (dBµV/m)	Margin (dB)
		d1 (m)	d2 (m)	d (m)	d1 (dBµV)	d2 (dBµV)		(dB/dec)	(dB)				
0.12528	PK	10	30	300	42.8	19.8	20.0	-48.2	-48.2		-8.4	45.6	54.1
0.12528	PK	10	30	300	42.8	19.8	20.0	-48.2	-48.2	-7.6	-16.0	25.6	41.6
0.25056	PK		3	300		35.2	20.0	-40.0	-80.0	-7.6	-32.4	19.6	52.0
0.37584	PK		3	300		43.5	20.0	-40.0	-80.0	-7.6	-24.1	16.1	40.2
0.50120	QP		3	30		20.6	20.0	-40.0	-40.0		0.6	33.6	33.0
0.62640	QP		3	30		22.1	20.0	-40.0	-40.0		2.1	31.7	29.6

Note: In access control mode with modulation peak level at 125.28 kHz is 7.2 dB lower than without modulation, i.e. -15.6 dBµV/m at 300 m distance.

Sample calculation of final values:

$$\text{Extrapolation Factor (dB/decade)} = \begin{cases} -40 \text{ (dB/decade)} & \text{if } d_1 = d_2 \\ \frac{\text{Reading Value } d_2 \text{ (dB}\mu\text{V)} - \text{Reading Value } d_1 \text{ (dB}\mu\text{V)}}{\text{Log}(d_2) - \text{Log}(d_1)} & \text{if } d_1 \neq d_2 \end{cases}$$

$$\text{Extrapolation Factor (dB)} = (\text{Log}(d) - \text{Log}(d_2)) \cdot \text{Extrapolation Factor (dB/decade)}$$

$$\text{Final Value (dB}\mu\text{V/m)} = \text{Reading Value } d_2 \text{ (dB}\mu\text{V)} + \text{Correction Factor (dB/m)} + \text{Extrapolation Factor (dB)} + \text{Pulse Train Correction (dB)}$$

Note: Extrapolation factor (dB) and final value (dBµV/m) are relating to distance d.

8.5 Radiated Emission Measurement 30 MHz to 1 GHz

Rules and specifications:	CFR 47 Part 15, section 15.209 IC RSS-210 Issue 6, section 2.6		
Guide:	ANSI C63.4		
Limit:	Frequency of Emission (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)
	30 - 88	100	40.0
	88 - 216	150	43.5
	216 - 960	200	46.0
	Above 960	500	54.0
Additionally, the level of any unwanted emissions shall not exceed the level of the fundamental emission.			
Measurement procedures:	Radiated Emission in Fully or Semi Anechoic Room (6.4) Radiated Emission at Open Field Test Site (6.5)		

Date of test:	June 2, 2006		
Test site:	Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2		
Test distance:	3 meters		

Test Result:	Test passed
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Comment: Operating in cabrio function mode without modulation

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)
33.330	vertical	Quasi-Peak	13.5	13.6		27.1	40.0	12.9
40.090	vertical	Quasi-Peak	13.2	11.9		25.1	40.0	14.9
40.480	vertical	Quasi-Peak	11.7	11.8		23.5	40.0	16.5
42.700	vertical	Quasi-Peak	12.8	11.4		24.2	40.0	15.8
64.150	vertical	Quasi-Peak	11.1	9.6		20.7	40.0	19.3
72.160	vertical	Quasi-Peak	11.7	9.5		21.2	40.0	18.8
77.790	vertical	Quasi-Peak	13.0	9.4		22.4	40.0	17.6
80.200	vertical	Quasi-Peak	12.3	9.5		21.8	40.0	18.2
156.000	horizontal	Quasi-Peak	1.0	14.4		15.4	43.5	28.1
168.000	horizontal	Quasi-Peak	0.5	15.0		15.5	43.5	28.0
336.760	horizontal	Quasi-Peak	8.3	17.0		25.3	46.0	20.7
344.770	horizontal	Quasi-Peak	8.1	17.3		25.4	46.0	20.6
360.820	horizontal	Quasi-Peak	7.9	17.7		25.6	46.0	20.4

Comment: Operating in cabrio function mode without modulation

Frequency (MHz)	Antenna Polarization	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Pulse Train Correction (dB)	Final Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)
33.330	vertical	Quasi-Peak	11.0	13.6		24.6	40.0	15.4
40.090	vertical	Quasi-Peak	11.2	11.9		23.1	40.0	16.9
64.150	vertical	Quasi-Peak	9.7	9.6		19.3	40.0	20.7
72.160	vertical	Quasi-Peak	12.2	9.5		21.7	40.0	18.3
80.200	vertical	Quasi-Peak	12.5	9.5		22.0	40.0	18.0
156.000	horizontal	Quasi-Peak	1.0	14.4		15.4	43.5	28.1
168.000	horizontal	Quasi-Peak	1.0	15.0		16.0	43.5	27.5
336.760	horizontal	Quasi-Peak	8.9	17.0		25.9	46.0	20.1
344.770	horizontal	Quasi-Peak	8.5	17.3		25.8	46.0	20.2
360.820	horizontal	Quasi-Peak	8.0	17.7		25.7	46.0	20.3

Sample calculation of final values:

$$\text{Final Value (dB}\mu\text{V/m)} = \text{Reading Value (dB}\mu\text{V)} + \text{Correction Factor (dB/m)} + \text{Pulse Train Correction (dB)}$$

9 Referenced Regulations

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

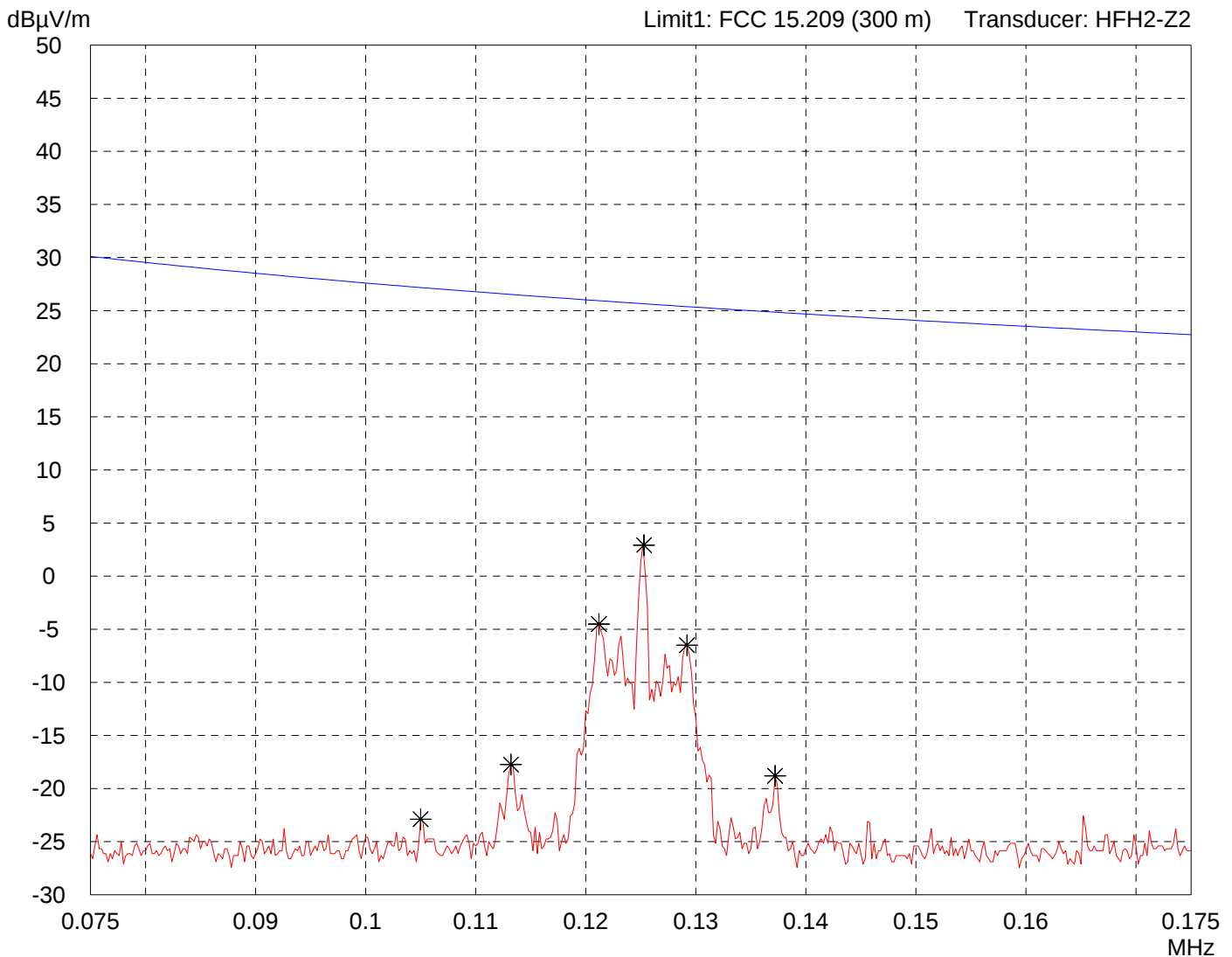
☒	CFR 47 Part 2	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)	October 10, 2004
☒	CFR 47 Part 15	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)	September 19, 2005
☒	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 to 40 GHz	December 11, 2003 (published on January 30, 2004)
☒	RSS-Gen	Radio Standards Specification RSS-Gen Issue 1 containing General Requirements and Information for the Certification of Radiocommunication Equipment, published by Industry Canada	September 2005
☒	RSS-210	Radio Standards Specification RSS-210 Issue 6 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, published by Industry Canada	September 2005
☐	RSS-310	Radio Standards Specification RSS-310 Issue 1 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category II Equipment, published by Industry Canada	September 2005
☒	RSS-102	Radio Standards Specification RSS-102 Issue 2: Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)	November 2005
☐	ICES-003	Interference-Causing Equipment Standard ICES-003 Issue 4 for Digital Apparatus, published by Industry Canada	February 7, 2004
☒	CISPR 22	Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement"	1997
☐	CAN/CSA-CEI/IEC CISPR 22	Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment	2002
☒	TRC-43	Notes Regarding Designation of Emission (Including Necessary Bandwidth and Classification), Class of Station and Nature of Service, published by Industry Canada	October 9, 1982

10 Charts taken during testing

Radiated Emission Test (Restricted Bands) 75 kHz - 175 kHz acc. to FCC Part 15.205

Model: Comfort Access System		Comment: - with supply voltage 14 V DC - transmitting continuously - with modulation - operating in cabrio function mode - EUT in vertical position Referred test distance: 300 m Measurement distance: 8.5 m Extrapolation factor: -47.8 dB/dec -----> Offset = -74 dB Restricted band: 90 kHz - 110 kHz
Serial no.: Sample no. D		
Applicant: Bayerische Motoren Werke AG		
Test site: Semi anechoic room, cabin no. 3		
Tested on: Test distance 300 meters (recorded in 8.5 m distance)		
Date of test: 06/30/2006	Operator: R. Heller	List of values: Selected by hand
Test performed: by hand	File name: default.emi	
Detector: Peak		

Frequency range	Resolution bandwidth	Video bandwidth	Sweep time	Preselection	Preamplification	Correction factor
75 kHz - 175 kHz	0.3 kHz	1 kHz	1.15 s	Off	0 dB	HFH2-Z2



Result: Limit kept	Project file: 50217-060417-2	Page 45 of 56 Pages
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Radiated Emission Test (Restricted Bands) 75 kHz - 175 kHz
acc. to FCC Part 15.205

Model: Comfort Access System	Comment: - with supply voltage 14 V DC - transmitting continuously - with modulation - operating in cabrio function mode - EUT in vertical position Referred test distance: 300 m Measurement distance: 8.5 m Extrapolation factor: -47.8 dB/dec -----> Offset = -74 dB Restricted band: 90 kHz - 110 kHz
Serial no.: Sample no. D	
Applicant: Bayerische Motoren Werke AG	
Test site: Semi anechoic room, cabin no. 3	
Tested on: Test distance 300 meters (recorded in 8.5 m distance)	
Date of test: 06/30/2006	Operator: R. Heller
Test performed: by hand	File name: default.emi

Detector:
Peak

List of values:
Selected by hand

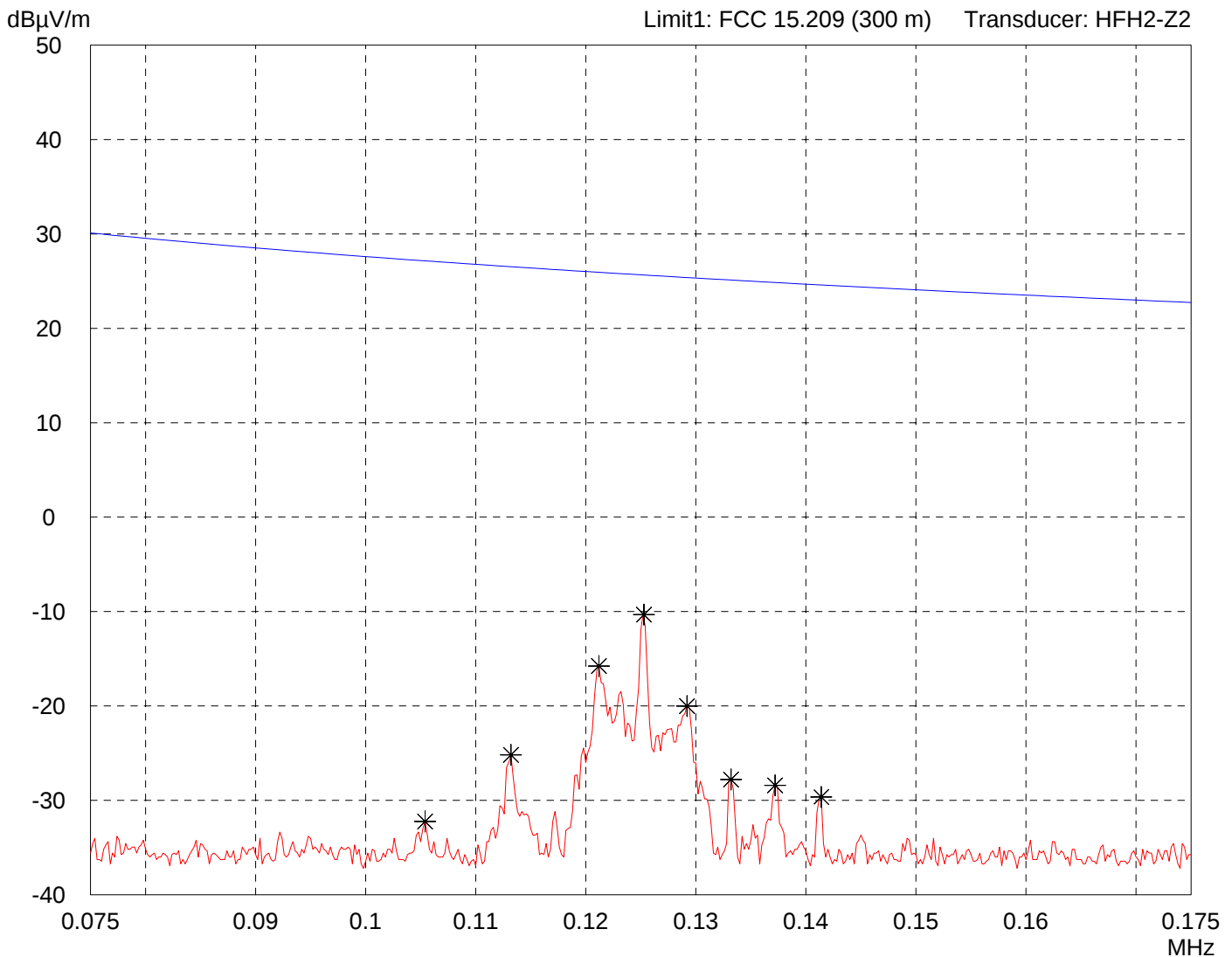
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Result: Limit kept	Project file: 50217-060417-2	Page 46 of 56 Pages
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Radiated Emission Test (Restricted Bands) 75 kHz - 175 kHz acc. to FCC Part 15.205

Model: Comfort Access System		Comment: - with supply voltage 14 V DC - transmitting continuously - with modulation - operating in access mode - EUT in vertical position Referred test distance: 300 m Measurement distance: 8.5 m Extrapolation factor: -48.2 dB/dec -----> Offset = -74.6 dB Restricted band: 90 kHz - 110 kHz
Serial no.: Sample no. D		
Applicant: Bayerische Motoren Werke AG		
Test site: Semi anechoic room, cabin no. 3		
Tested on: Test distance 300 meters (recorded in 8.5 m distance)		
Date of test: 06/30/2006	Operator: R. Heller	List of values: Selected by hand
Test performed: by hand	File name: default.emi	
Detector: Peak		

Frequency range	Resolution bandwidth	Video bandwidth	Sweep time	Preselection	Preamplification	Correction factor
75 kHz - 175 kHz	0.3 kHz	1 kHz	1.15 s	Off	0 dB	HFH2-Z2



Result: Limit kept	Project file: 50217-060417-2	Page 47 of 56 Pages
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Radiated Emission Test (Restricted Bands) 75 kHz - 175 kHz
acc. to FCC Part 15.205

Model: Comfort Access System	Comment: - with supply voltage 14 V DC - transmitting continuously - with modulation - operating in access mode - EUT in vertical position Referred test distance: 300 m Measurement distance: 8.5 m Extrapolation factor: -48.2 dB/dec -----> Offset = -74.6 dB Restricted band: 90 kHz - 110 kHz
Serial no.: Sample no. D	
Applicant: Bayerische Motoren Werke AG	
Test site: Semi anechoic room, cabin no. 3	
Tested on: Test distance 300 meters (recorded in 8.5 m distance)	
Date of test: 06/30/2006 Operator: R. Heller	
Test performed: by hand File name: default.emi	

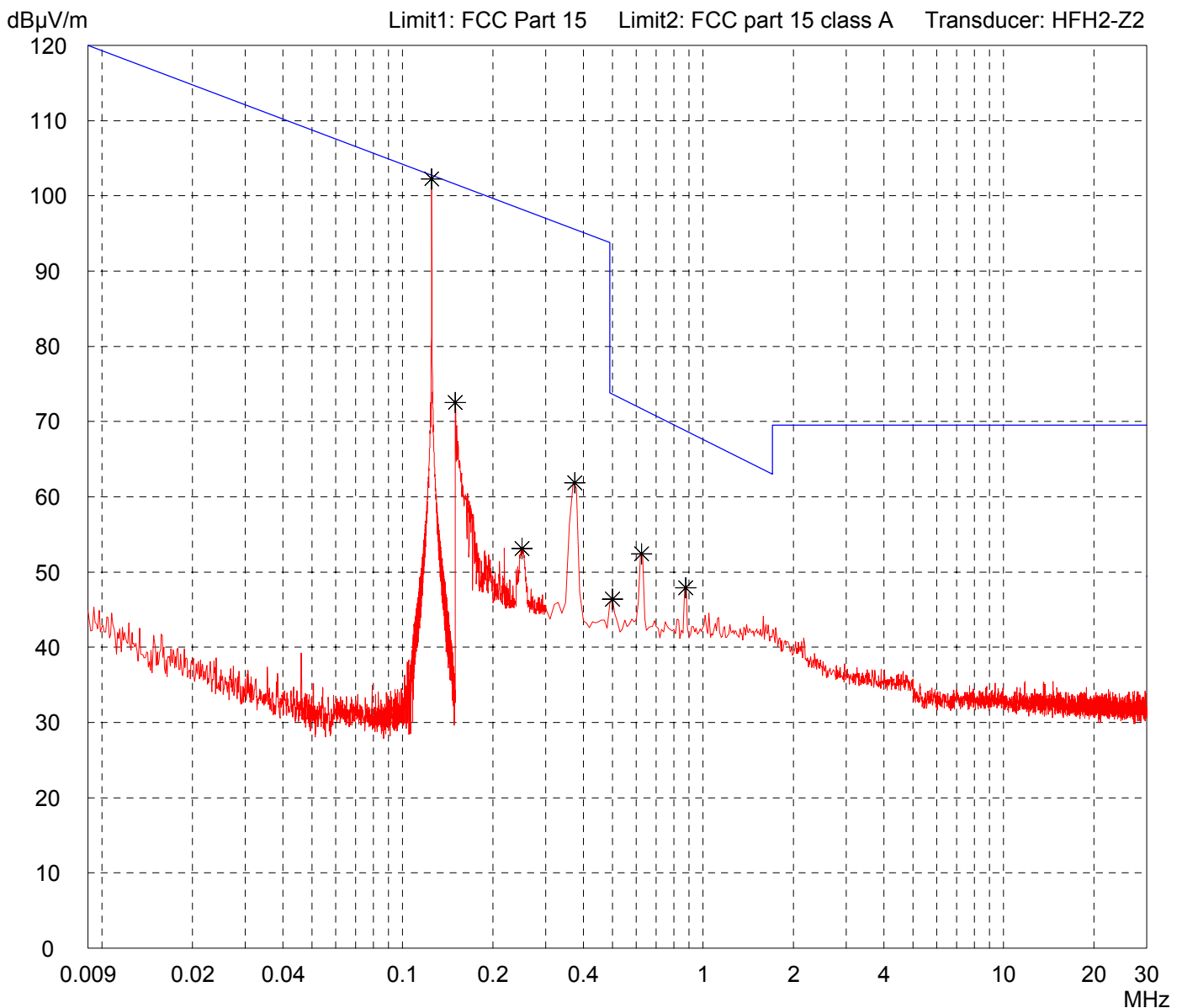
Detector: Peak	List of values: Selected by hand
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Result: Limit kept	Project file: 50217-060417-2	Page 48 of 56 Pages
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Radiated Emission Test 9 kHz - 30 MHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: Comfort Access System		Comment: - with supply voltage 14 V DC - transmitting continuously - operating in cabrio function mode - EUT in vertical position
Serial no.: Sample no. A		
Applicant: Bayerische Motoren Werke AG		
Test site: Fully anechoic room, cabin no. 2		
Tested on: Test distance 3 metres Vertical polarization		
Date of test: 05/22/2006	Operator: R. Heller	List of values: Selected by hand
Test performed: by hand	File name: default.emi	
Detector: Peak		

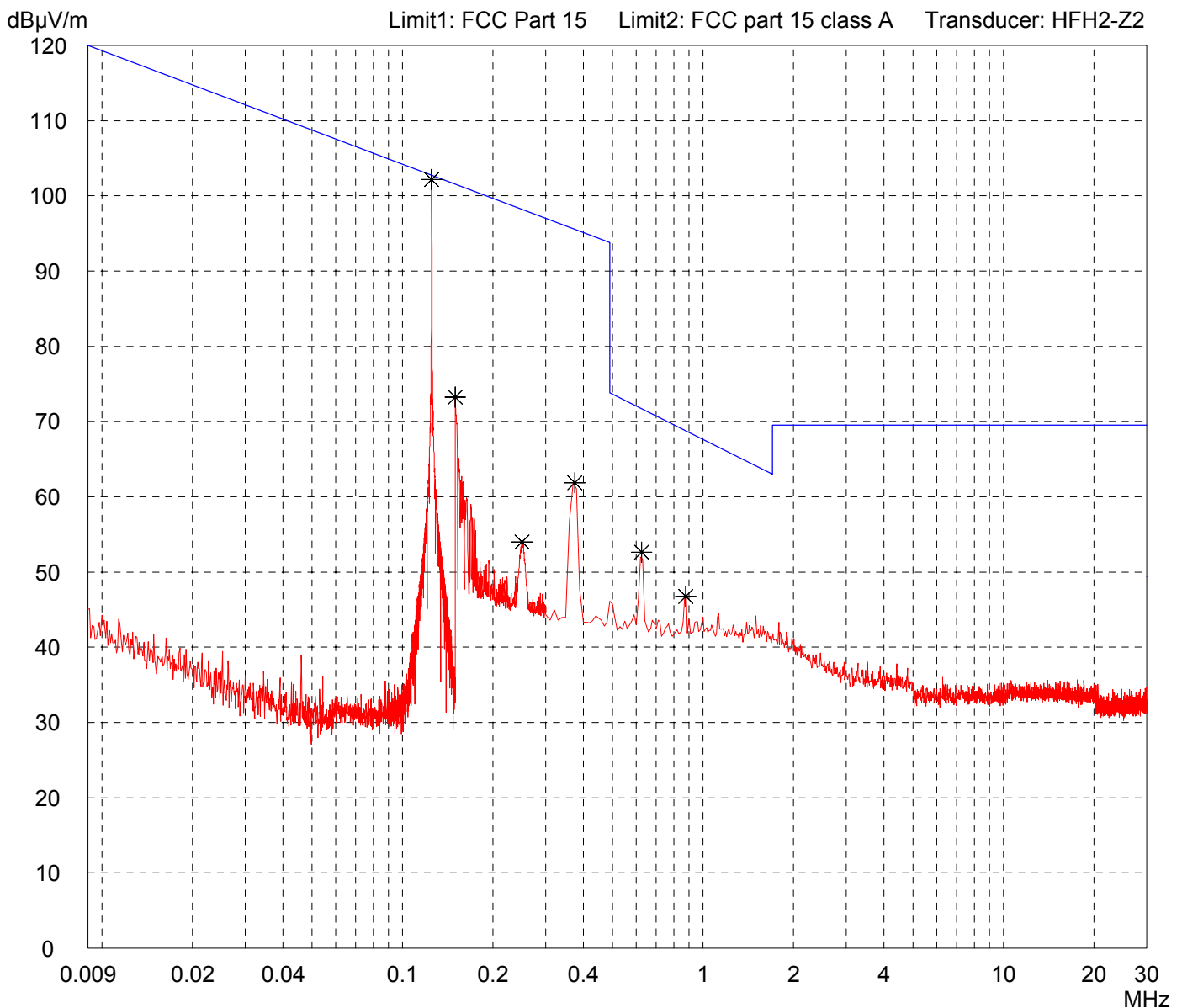


Result: Prescan	Project file: 50217-60417-2	Page 49 of 56 Pages
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Radiated Emission Test 9 kHz - 30 MHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: Comfort Access System	Comment: - with supply voltage 14 V DC - transmitting continuously - operating in cabrio function mode - EUT in horizontal position
Serial no.: Sample no. A	
Applicant: Bayerische Motoren Werke AG	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical polarization	
Date of test: 05/22/2006	Operator: R. Heller
Test performed: by hand	File name: default.emi

Detector: Peak	List of values: Selected by hand
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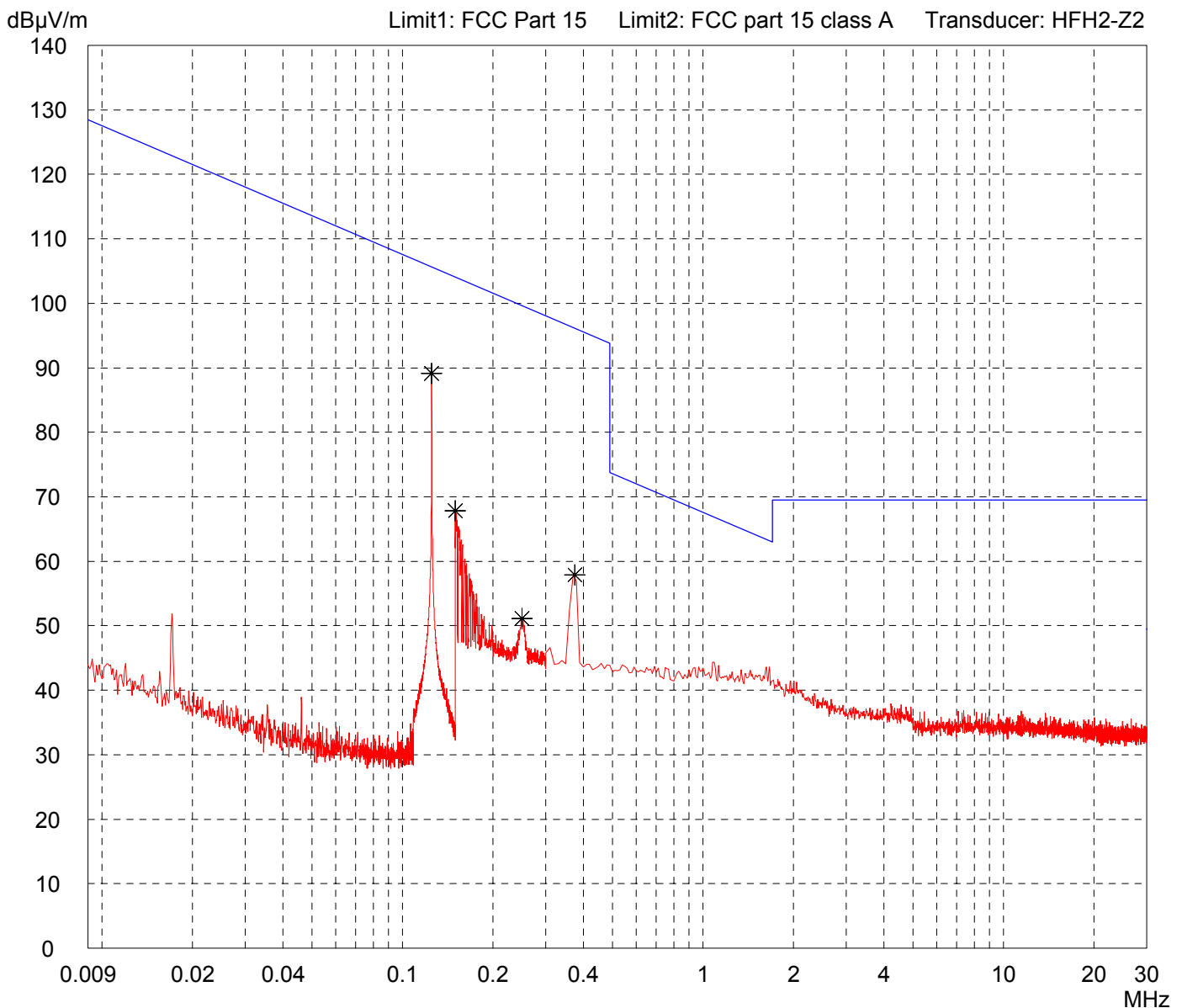


Result: Prescan	Project file: 50217-60417-2
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Radiated Emission Test 9 kHz - 30 MHz acc. to FCC Part 15 (Fully Anechoic Chamber)

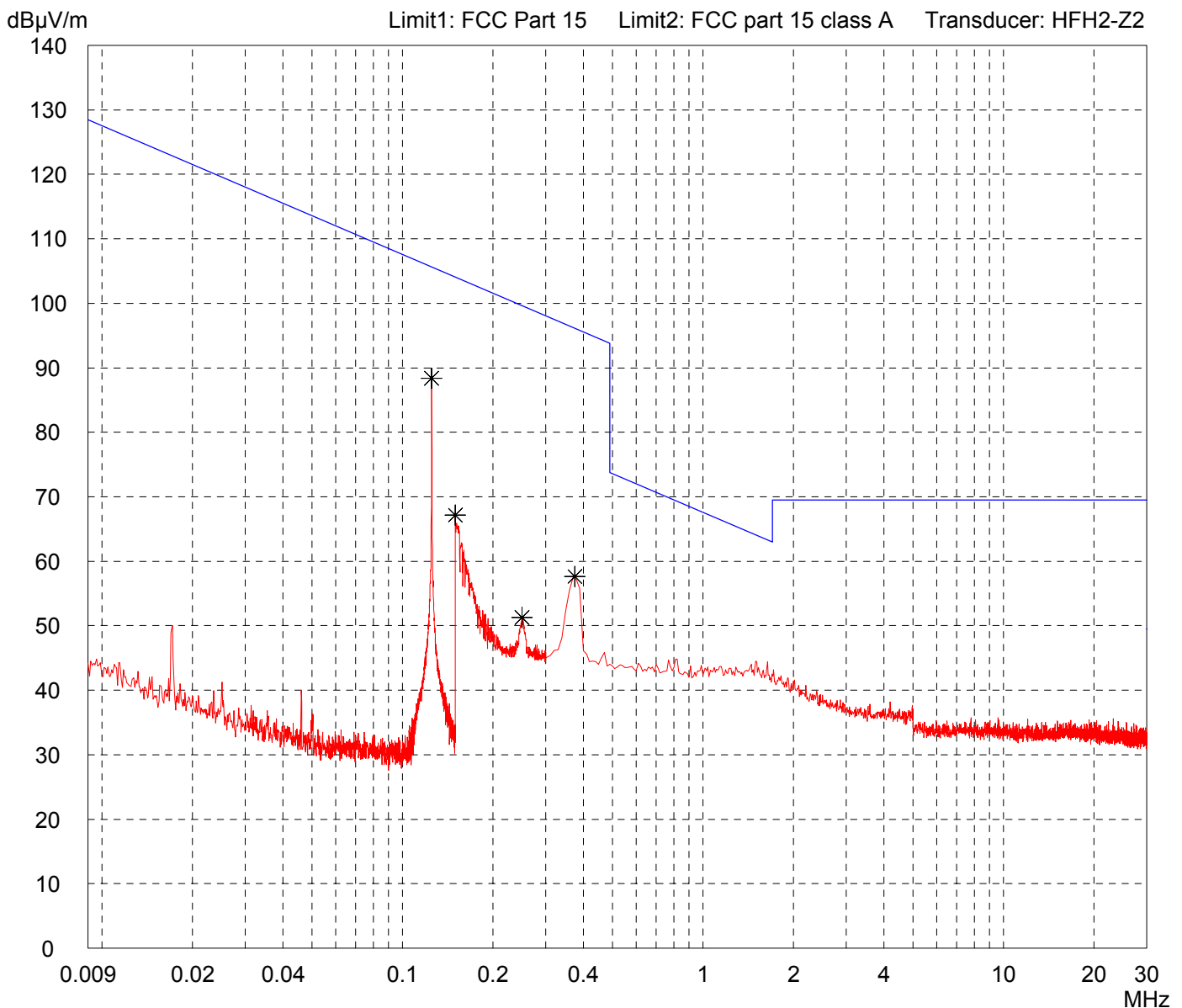
Model: Comfort Access System		Comment: - with supply voltage 14 V DC - transmitting continuously - operating in access control mode - EUT in vertical position
Serial no.: Sample no. A		
Applicant: Bayerische Motoren Werke AG		
Test site: Fully anechoic room, cabin no. 2		
Tested on: Test distance 3 metres Vertical polarization		
Date of test: 05/22/2006	Operator: R. Heller	List of values: Selected by hand
Test performed: by hand	File name: default.emi	
Detector: Peak		



Result: Prescan	Project file: 50217-60417-2	Page 51 of 56 Pages
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Radiated Emission Test 9 kHz - 30 MHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: Comfort Access System		Comment: - with supply voltage 14 V DC - transmitting continuously - operating in access control mode - EUT in horizontal position
Serial no.: Sample no. A		
Applicant: Bayerische Motoren Werke AG		
Test site: Fully anechoic room, cabin no. 2		
Tested on: Test distance 3 metres Vertical polarization		
Date of test: 05/22/2006	Operator: R. Heller	
Test performed: by hand	File name: default.emi	
Detector: Peak		List of values: Selected by hand

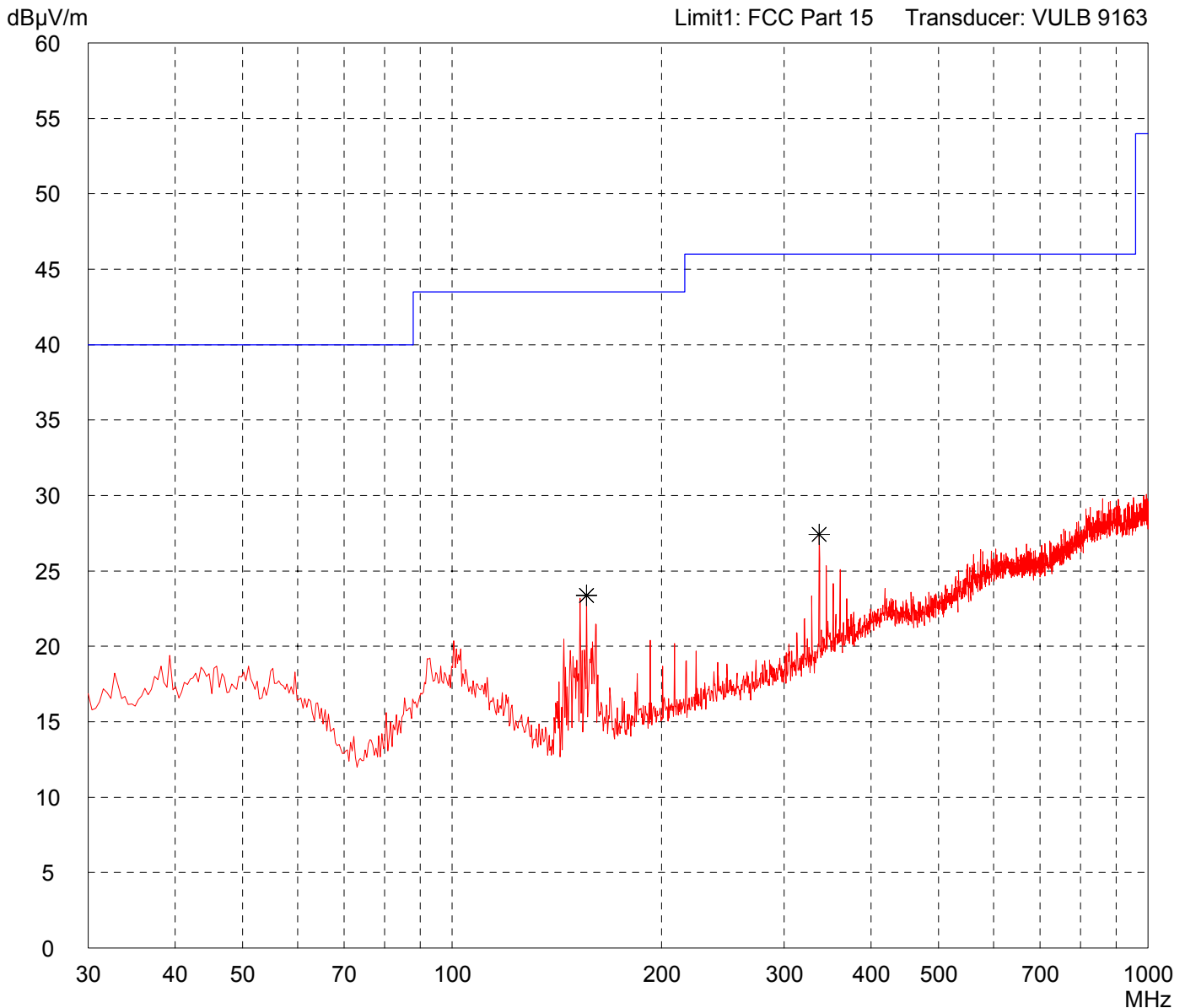


Result: Prescan	Project file: 50217-60417-2	Page 52 of 56 Pages
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Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: Comfort Access System	Comment: - with supply voltage 14 V DC - transmitting continuously - operating in cabrio function mode
Serial no.: Sample no. A	
Applicant: Bayerische Motoren Werke AG	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 05/15/2006	Operator: R. Heller
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: Selected by hand
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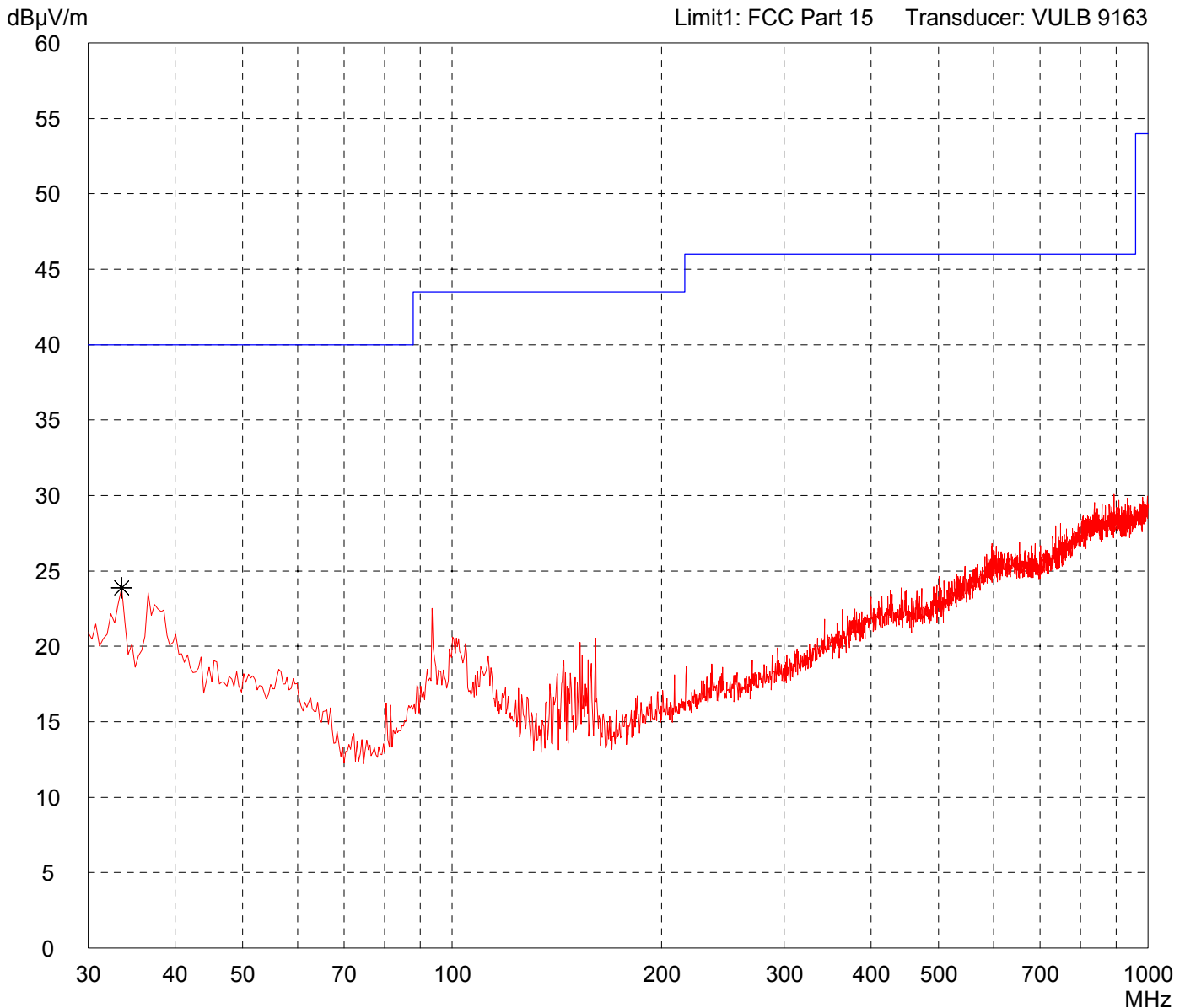


Result: Prescan	Project file: 50217-60417-2
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Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: Comfort Access System	Comment: - with supply voltage 14 V DC - transmitting continuously - operating in cabrio function mode
Serial no.: Sample no. A	
Applicant: Bayerische Motoren Werke AG	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 05/15/2006	Operator: R. Heller
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: Selected by hand
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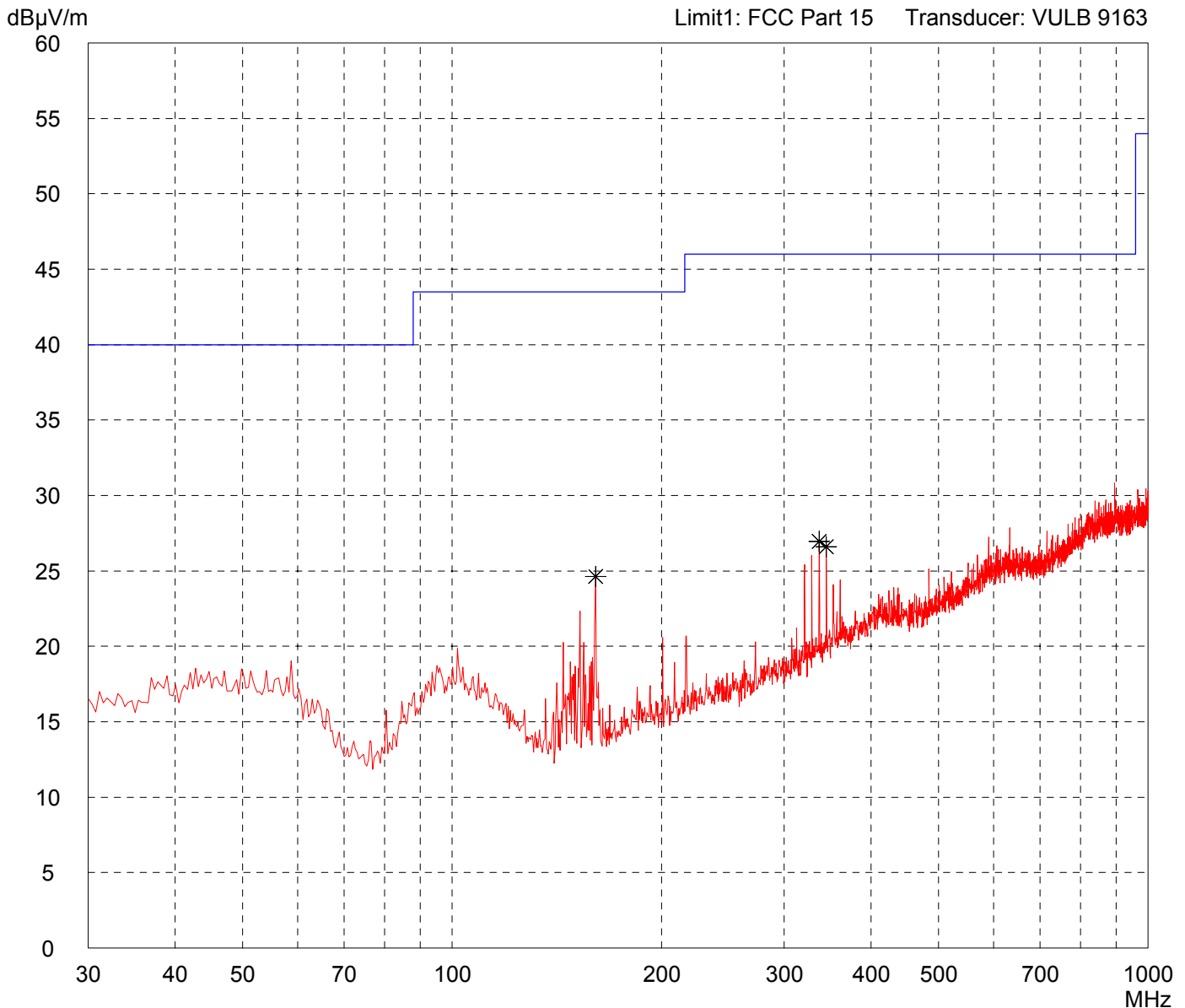
Result: Prescan	Project file: 50217-60417-2
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Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: Comfort Access System	Comment: - with supply voltage 14 V DC - transmitting continuously - operating in access control mode
Serial no.: Sample no. A	
Applicant: Bayerische Motoren Werke AG	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 05/15/2006	Operator: R. Heller
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: Selected by hand
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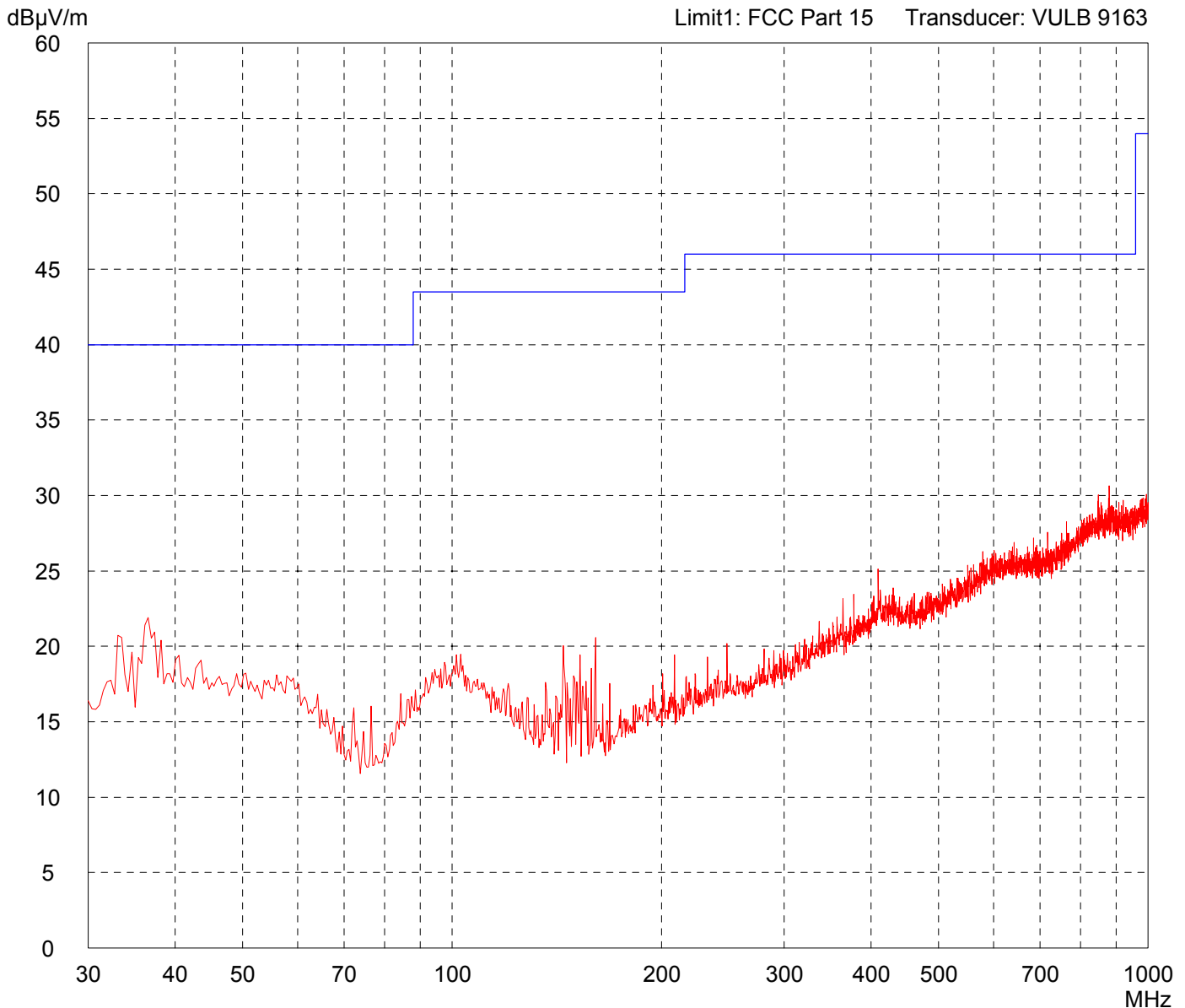


Result: Prescan	Project file: 50217-60417-2
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Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: Comfort Access System	Comment: - with supply voltage 14 V DC - transmitting continuously - operating in access control mode
Serial no.: Sample no. A	
Applicant: Bayerische Motoren Werke AG	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 05/15/2006	Operator: R. Heller
Test performed: automatically	File name: default.emi

Detector: Peak	List of values: 10 dB Margin
	50 Subranges



Result: Prescan	Project file: 50217-60417-2
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