

EMC TEST REPORT

FCC 47 CFR Part 15B
Industry Canada RSS-Gen

Electromagnetic compatibility - Unintentional radiators

Report Reference No. : G0M-1409-4198-EF01-V01

Testing Laboratory : Eurofins Product Service GmbH

Address : Storkower Str. 38c
15526 Reichenwalde
Germany

Accreditation :



A2LA Accredited Testing Laboratory, Certificate No.: 1983.01
FCC Filed Test Laboratory, Reg.-No.: 96970
IC OATS Filing assigned code: 3470A

Applicant's name : Robert Bosch Car Multimedia GmbH

Address : Robert-Bosch-Straße 200
31139 Hildesheim
GERMANY

Test specification:

Standard : 47 CFR Part 15 Subpart B
RSS-Gen, Issue 3, 2010-12
ANSI C63.4:2009

Equipment under test (EUT):

Product description	Instrument cluster	
Model No.	Audi FPK Gen1	
Additional Models	None	
Hardware version	H33	
Firmware / Software version	0215	
Contains	FCC-ID: YBN-AU-FPK10	IC: 9595A-AUFPK10
Test result	Passed	

Possible test case verdicts:

- not applicable to test object: N/A
- test object does meet the requirement.....: P (Pass)
- test object does not meet the requirement.....: F (Fail)

Testing:

Date of receipt of test item: 2014-09-29

Date (s) of performance of tests: 2014- 10-01 - 2014-11-28

Compiled by : Marcus Klein

Tested by (+ signature)..... : Marcus Klein

Approved by (+ signature) : Jens Zimmermann

Date of issue..... : 2015-01-06

Total number of pages : 23

**General remarks:**

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Additional comments:

Version History

Version	Issue Date	Remarks	Revised by
V01	2014-12-19	Initial Release	

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1 Equipment (Test item) Description

Description	Instrument cluster
Model	Audi FPK Gen1
Additional Models	None
Serial number	None
Hardware version	H33
Software / Firmware version	0215
Contains FCC-ID	YBN-AU-FPK10
Contains IC	9595A-AUFPK10
Power supply	12 VDC
AC/DC-Adaptor	None
Manufacturer	Robert Bosch Car Multimedia GmbH Robert-Bosch-Straße 200 31139 Hildesheim GERMANY
Equipment classification EN 301 489-3 V1.6.1	Primary function type : 1 Device type : 2 Radio type : Transceiver Radio Technology : 125 kHz SRD
Highest emission frequency	900 MHz
Device classification	Class B
Equipment type	Tabletop
Number of tested samples	1

1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
AE	Key	Bosch	-	-
AE	CAN Bus Simulator Box	-	-	-

***Note:** Use the following abbreviations:

AE : Auxiliary/Associated Equipment, or
 SIM : Simulator (Not Subjected to Test)
 CABL : Connecting cables

1.5 Input / Output Ports

Port #	Name	Type*	Max. Cable Length	Cable Shielded	Comments
1	DC Power	DC	> 3m	No	-
2	CAN	I/O	> 3m	No	-
3	LVDS	I/O	> 3m	No	-
4	MOST	I/O	> 3m	No	Optical bus
5	Antenna	I/O	1.15 m	No	-
6	Analog port	I/O	> 3m	No	-

***Note:** Use the following abbreviations:

AC : AC power port
 DC : DC power port
 N/E : Non electrical
 I/O : Signal input or output port
 TP : Telecommunication port

1.6 Operating Modes and Configurations

Mode #	Description
1	EUT powered with 13.5 VDC, EUT operation simulated with CAN-Bus Simulator, permanent RFID reading and Display showing typical information.

Configuration #	EUT Configuration
1	EUT fully configured.

1.7 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2014.1.15

Radiated emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Biconical Antenna	R&S	HK 116	EF00012	2013-02	2016-02
LPD-Antenne	R&S	HL 223	EF00187	2014-03	2017-03
Horn antenna	Schwarzbeck	BBHA 9120D	EF00018	2013-09	2016-09
EMI Test Receiver	R&S	ESU8	EF00379	2014-03	2015-03
EMI Test Receiver	R&S	ESCS30	EF00295	2014-10	2015-10

1.8 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dB μ V. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dB μ V/m). The FCC limits are given in units of μ V/m. The following formula is used to convert the units of μ V/m to dB μ V/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 * \log (\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

$$\begin{array}{lll} \text{Reading} + \text{AF} = & \text{Net Reading} : & \text{Net reading} - \text{FCC limit} = \text{Margin} \\ 21.5 \text{ dB}\mu\text{V} + 26 \text{ dB} = & 47.5 \text{ dB}\mu\text{V/m} : & 47.5 \text{ dB}\mu\text{V/m} - 57.0 \text{ dB}\mu\text{V/m} = -9.5 \text{ dB} \end{array}$$

2 Result Summary

FCC 47 CFR Part 15B, Industry Canada RSS-Gen				
Product Specific Standard	Requirement – Test	Reference Method	Result	Remarks
47 CFR 15.109 RSS-Gen 4.9 & 4.10	Radiated emissions	ANSI C 63.4	PASS	
47 CFR 15.107 RSS-Gen 7.2.4	AC power line conducted emissions	ANSI C63.4	N/A	
Remarks:				

3 Test Conditions and Results

3.1 Test Conditions and Results – Radiated emissions

Radiated emissions acc. FCC 47 CFR 15.109 / IC RSS-Gen			Verdict: PASS			
Laboratory Parameters:	Required prior to the test		During the test			
Ambient Temperature	15 to 35 °C		23°C			
Relative Humidity	30 to 60 %		42%			
Test according referenced standards	Reference Method					
	ANSI C63.4					
Sample is tested with respect to the requirements of the equipment class	Equipment class					
	Class B					
Test frequency range determined from highest emission frequency	Highest emission frequency					
	900 MHz					
Fully configured sample scanned over the following frequency range	Frequency range					
	30 MHz to 5 GHz					
Operating mode configuration	1					
Limits and results Class B						
Frequency [MHz]	Quasi-Peak [dB μ V/m]	Result	Average [dB μ V/m]	Result	Peak [dB μ V/m]	Result
30 – 88	40	PASS	-		-	-
88 – 216	43.5	PASS	-		-	-
216 – 960	46	PASS	-		-	-
960 – 1000	54	PASS	-		-	-
> 1000	-	-	54	PASS	74	PASS
Comments:						

Test Procedure:

The test site is in accordance with ANSI C63.4:2009 requirements and is listed by FCC.
The measurement procedure is as follows:

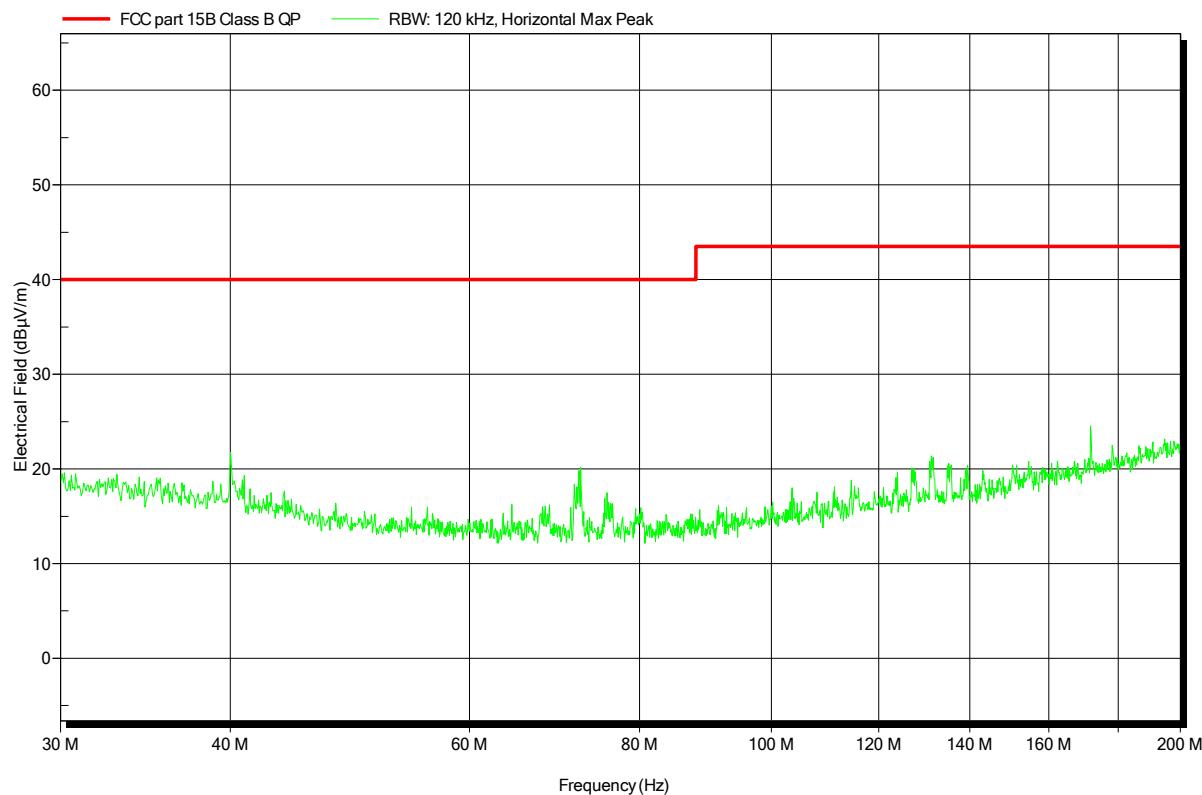
- 1) The EUT was placed on a 0.8 m non conductive table at a 3 m distance from the receive antenna (ANSI C63.4: 2009 item 6.2)
- 2) The antenna output was connected to the measurement receiver
- 3) A biconical antenna was used for the frequency range 30 – 200 MHz, a logarithmic periodical antenna was used for the frequency range from 200 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast
- 4) Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded.

Spurious emissions under normal conditions according to FCC 15B

Project number: G0M-1409-4198

Manufacturer: Robert Bosch Car Multimedia GmbH
EUT Name: Instrument cluster
Model: Kombiinstrument Audi
Test Site: Eurofins Product Service GmbH
Operator: Mr. Marquardt
Test Conditions: $T_{nom}: 23^{\circ}\text{C}$, $U_{nom}: 13.5 \text{ VDC}$
Antenna: Rohde & Schwarz HK 116, Horizontal
Measurement distance: 3m
Mode: RFID
Test Date: 28.11.2014
Note:

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Storkower Str. 38c, D-15526 Reichenwalde, Germany

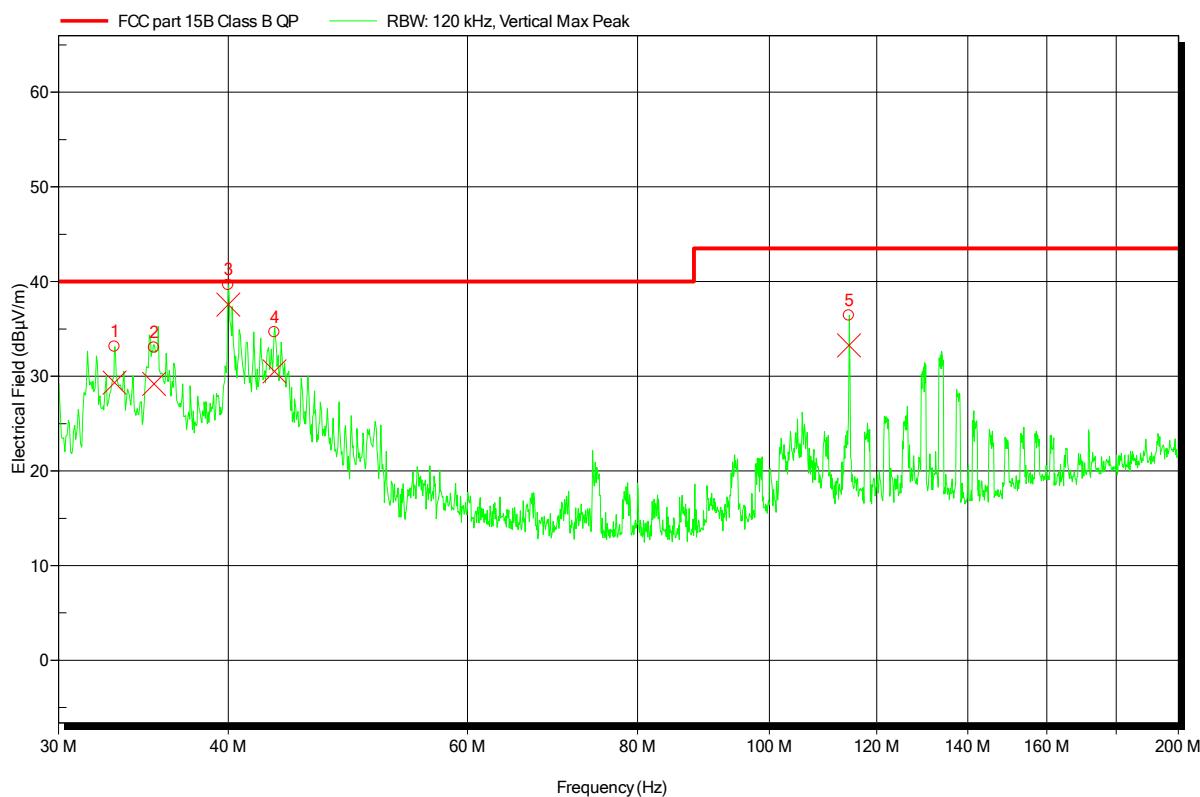
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 Operator: Mr. Marquardt
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 Measurement distance: 3m
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 Test Date: 28.11.2014
 Note:

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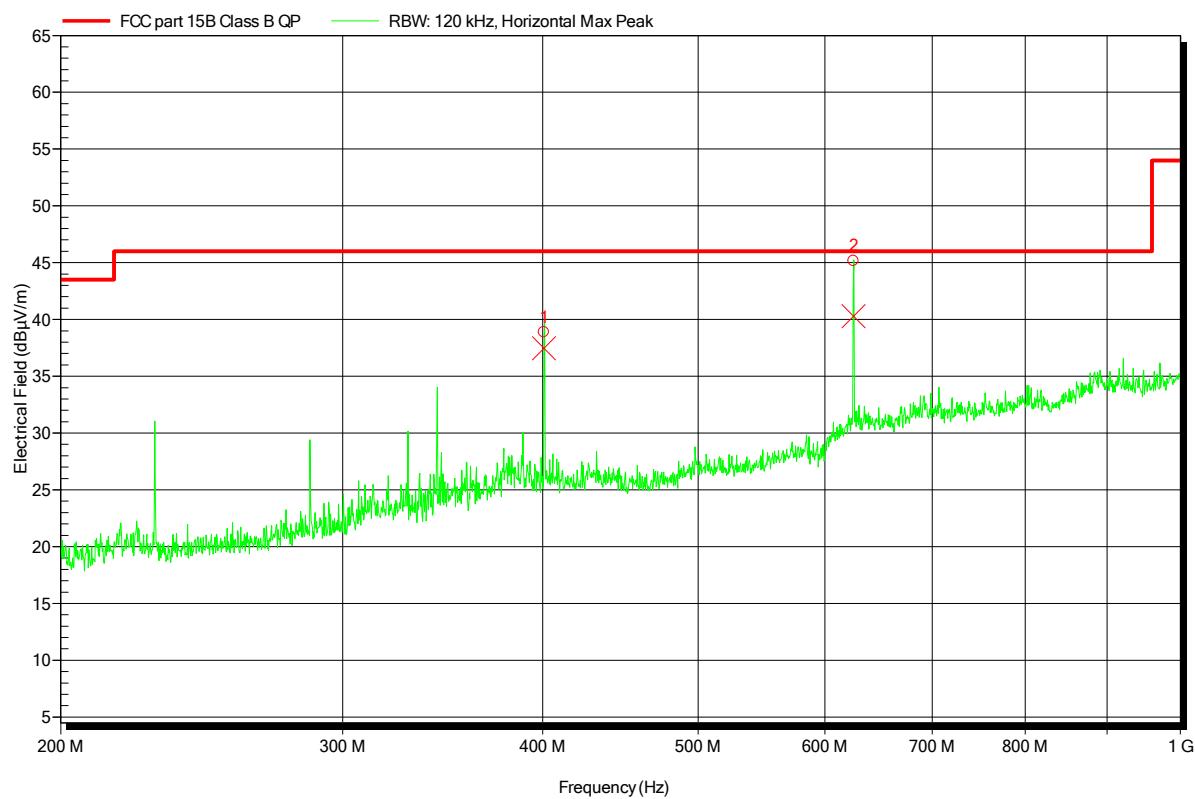
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
33 MHz	29,34 dB μ V/m	40 dB μ V/m	-10,66 dB	Pass
35,28 MHz	29,19 dB μ V/m	40 dB μ V/m	-10,81 dB	Pass
40,008 MHz	37,57 dB μ V/m	40 dB μ V/m	-2,43 dB	Pass
43,26 MHz	30,51 dB μ V/m	40 dB μ V/m	-9,49 dB	Pass
114,48 MHz	33,25 dB μ V/m	43,5 dB μ V/m	-10,25 dB	Pass

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 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Marquardt
 Test Conditions: $T_{nom}: 23^{\circ}\text{C}$, $U_{nom}: 13.5 \text{ VDC}$
 Antenna: Rohde & Schwarz HL 223, Horizontal
 Measurement distance: 3m
 Mode: RFID
 Test Date: 28.11.2014
 Note:

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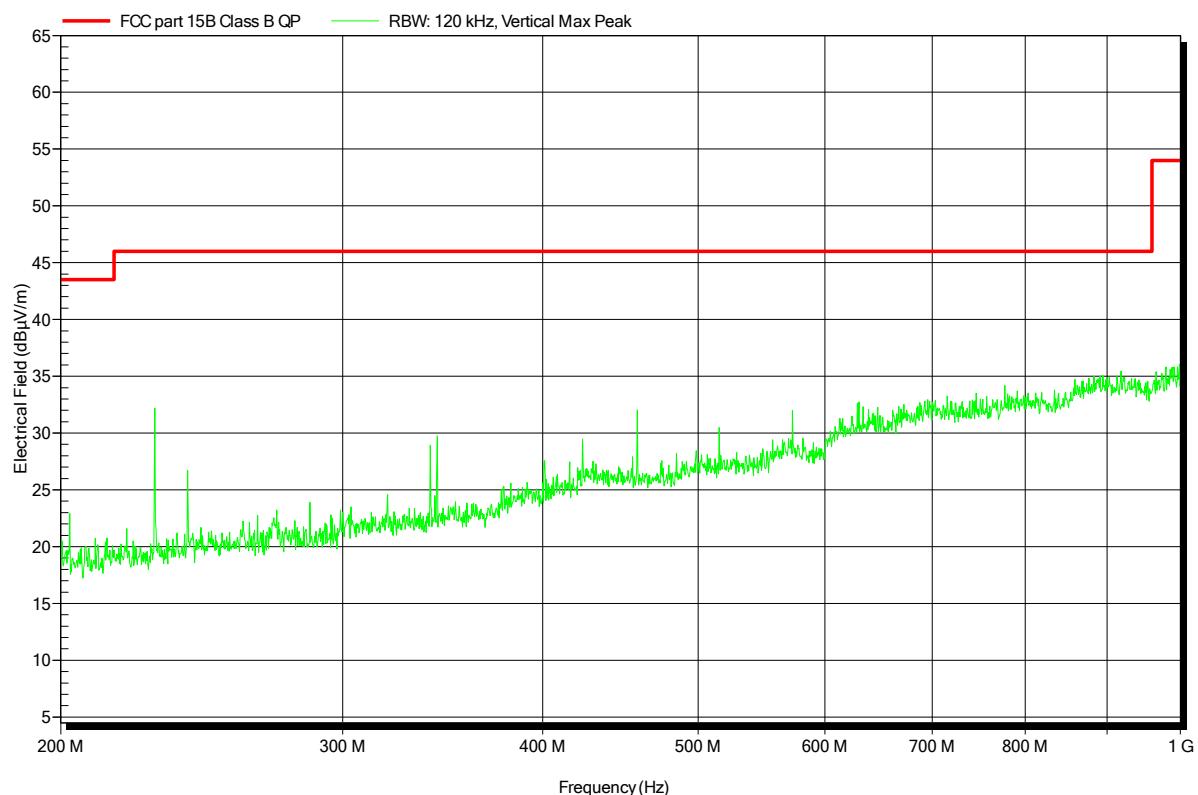
Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status
400,742 MHz	37,47 dB μ V/m	46 dB μ V/m	-8,53 dB	Pass
625,022 MHz	40,3 dB μ V/m	46 dB μ V/m	-5,7 dB	Pass

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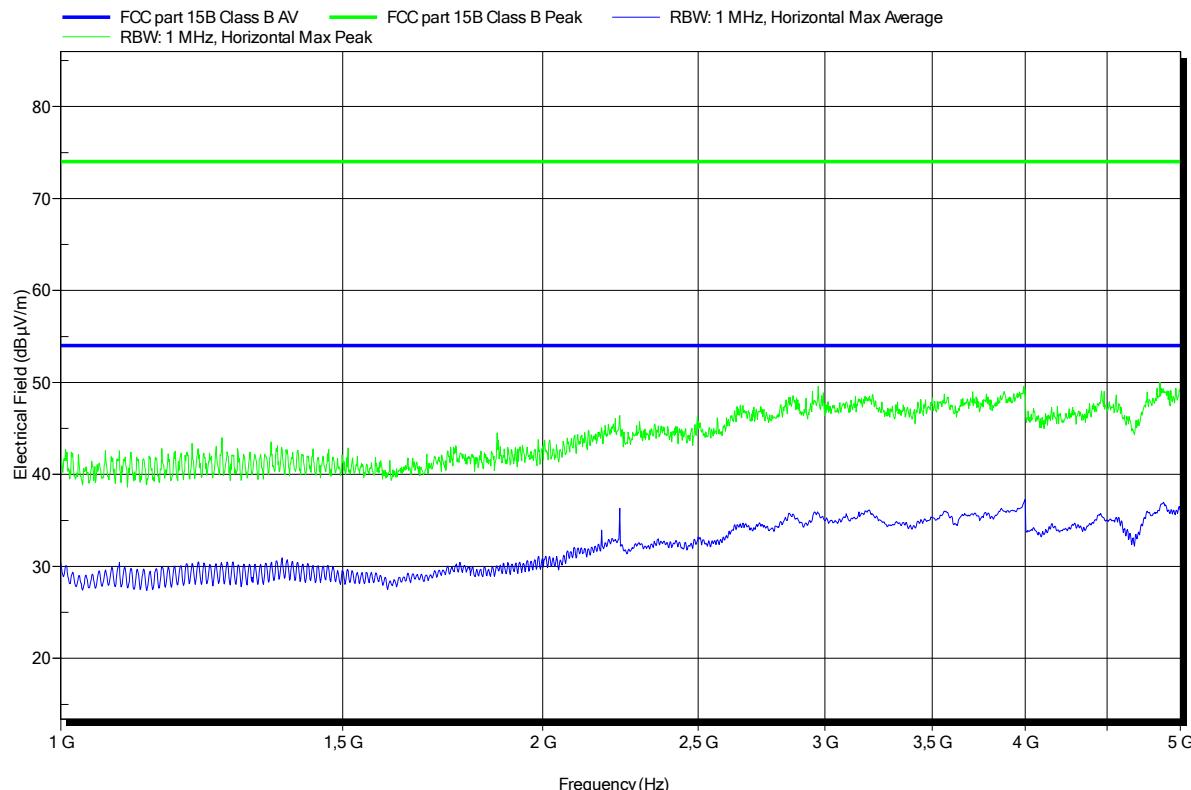
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EUT Name: Instrument cluster
Model: Kombiinstrument Audi
Test Site: Eurofins Product Service GmbH
Operator: Mr. Marquardt
Test Conditions: Tnom: 23°C, Unom: 13.5 VDC
Antenna: Schwarzbeck BBHA 9120D, Horizontal
Measurement distance: 3m
Mode: RFID
Test Date: 28.11.2014
Note:

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