

Annex 4: Measurement Diagrams to  
**PARTIAL TEST REPORT**  
 No.: TR3-0071-13-6-4b-C1







According to:  
**FCC Regulations**  
 Part 15.109, Part 15.247

for

Harman Becker Automotive Systems, Inc.

Automotive Infotainment Head Unit VP4 GT  
 (W-LAN 2.4GHz)

FCC-ID: QNG-BE2810  
 IC: 6434C-BE2810

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# 1. Spurious emissions

## 1.1. Frequency range f<30MHz

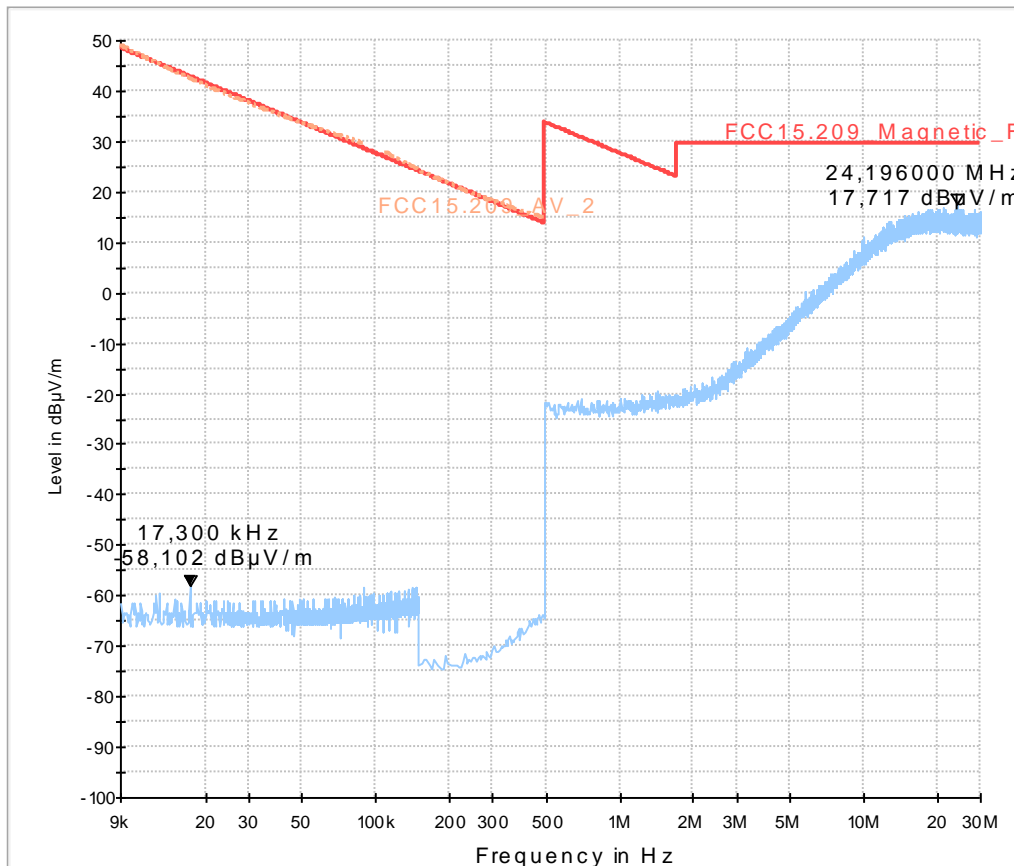
### Diagram No. 2.01\_WLAN\_b-mode\_CH1\_1MB

Test description:	Magnetic Fieldstrength Measurement related to 30/300 m distance
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	8.51.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used filter:	bypass
Test specification:	FCC 15.205 § 15.209; RSS-Gen: Issue 3
Comment 1:	Channel low

#### EUT Information

Manufacturer:	Harman Becker Automotive Systems
EUT:	VP4 GT
-----	
HW version:	F149M 6163USA
SW version:	trunk_23Jun_2014
Config:	--
Serial number:	SN-8
Connected Interfaces:	Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna
Power Supply:	12V DC
Comments:	--

FCC 15.209\_magn hor+vert



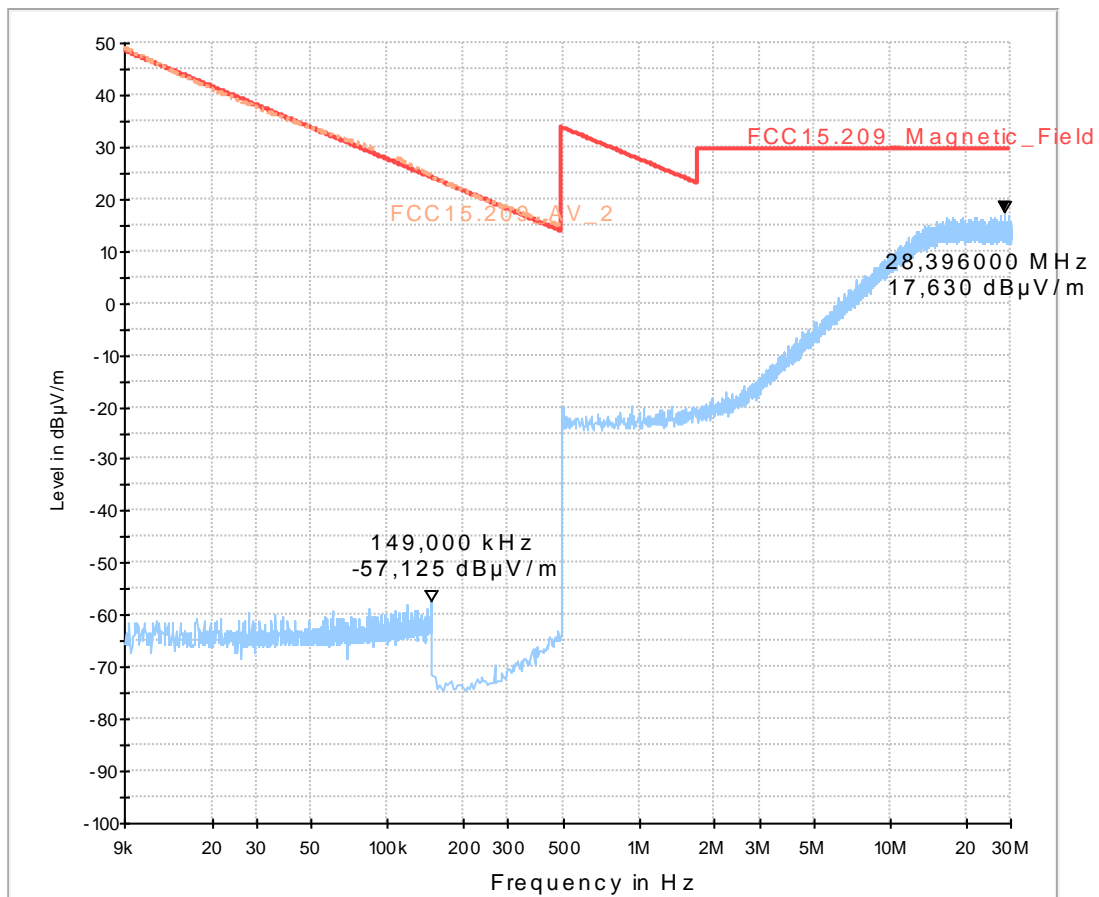
## Diagram No. 2.02\_WLAN\_g-mode\_CH6\_6MB

Test description:	Magnetic Fieldstrength Measurement related to 30/300 m distance
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	8.51.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used filter:	bypass
Test specification:	FCC 15.205 § 15.209; RSS-Gen: Issue 3
Comment 1:	Channel middle

### EUT Information

Manufacturer:	Harman Becker Automotive Systems
EUT:	VP4 GT
-----	
HW version:	F149M 6163USA
SW version:	trunk_23Jun_2014
Config:	--
Serial number:	SN-8
Connected Interfaces:	Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna
Power Supply:	12V DC
Comments:	--

FCC15.209\_magn hor+vert



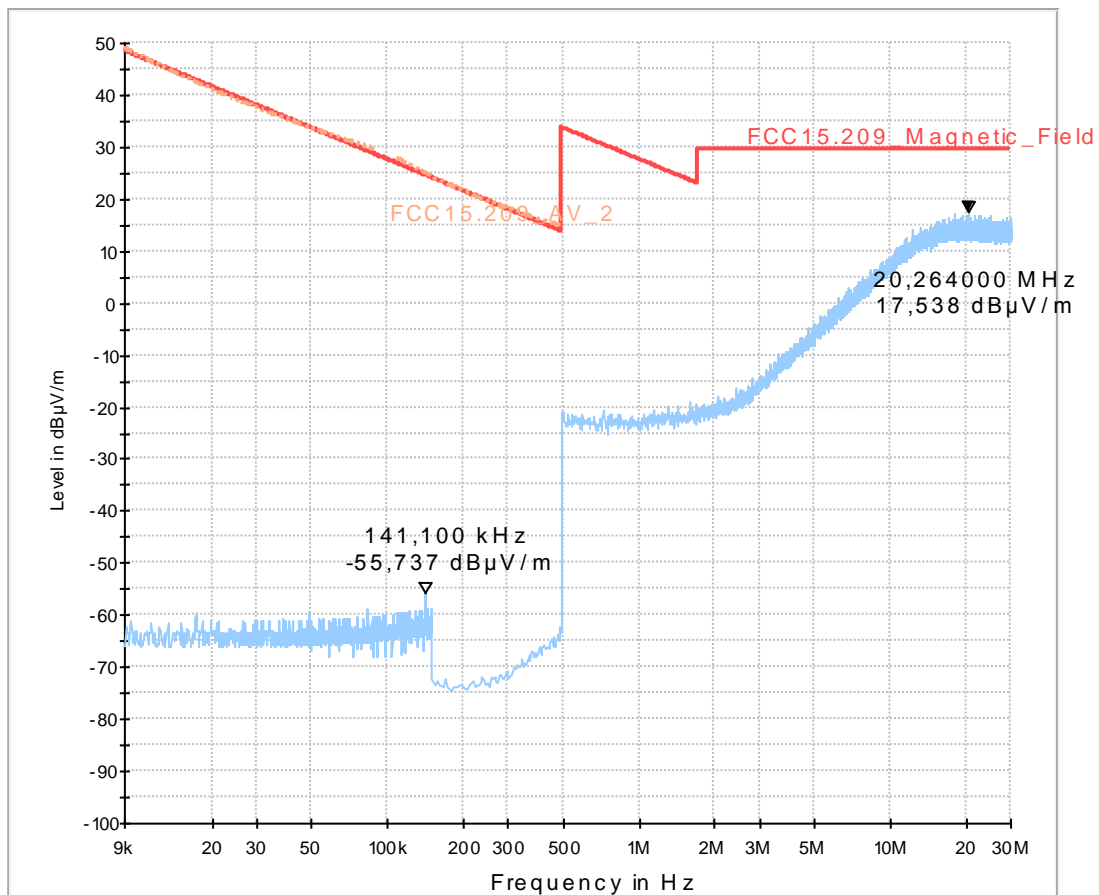
## Diagram No. 2.03\_WLAN\_g-mode\_CH11\_24MB

Test description:	Magnetic Fieldstrength Measurement related to 30/300 m distance
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	8.51.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used filter:	bypass
Test specification:	FCC 15.205 § 15.209; RSS-Gen: Issue 3
Comment 1:	Channel high

### EUT Information

Manufacturer:	Harman Becker Automotive Systems
EUT:	VP4 GT
-----	
HW version:	F149M 6163USA
SW version:	trunk_23Jun_2014
Config:	--
Serial number:	SN-8
Connected Interfaces:	Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna
Power Supply:	12V DC
Comments:	--

FCC15.209\_magn hor+vert



## 1.2. Frequency range 30MHz<f<1GHz

### Diagram No. 3.01\_WLAN\_b-mode\_CH1\_1MB

Test description: Electric Fieldstrength Measurement  
 Test site and distance: Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance  
 Version of Testsoftware: 8.51.0  
 Distance correction: not used  
 Used filter: not used  
 Technical Data: please see page 2 for detailed data of measurement setup  
 Test specification.: FCC 15.209; RSS-Gen: Issue 3  
 Operator: dpa  
 Operating conditions: WLAN b-mode Channel 1, 1Mbit  
 Comment: --

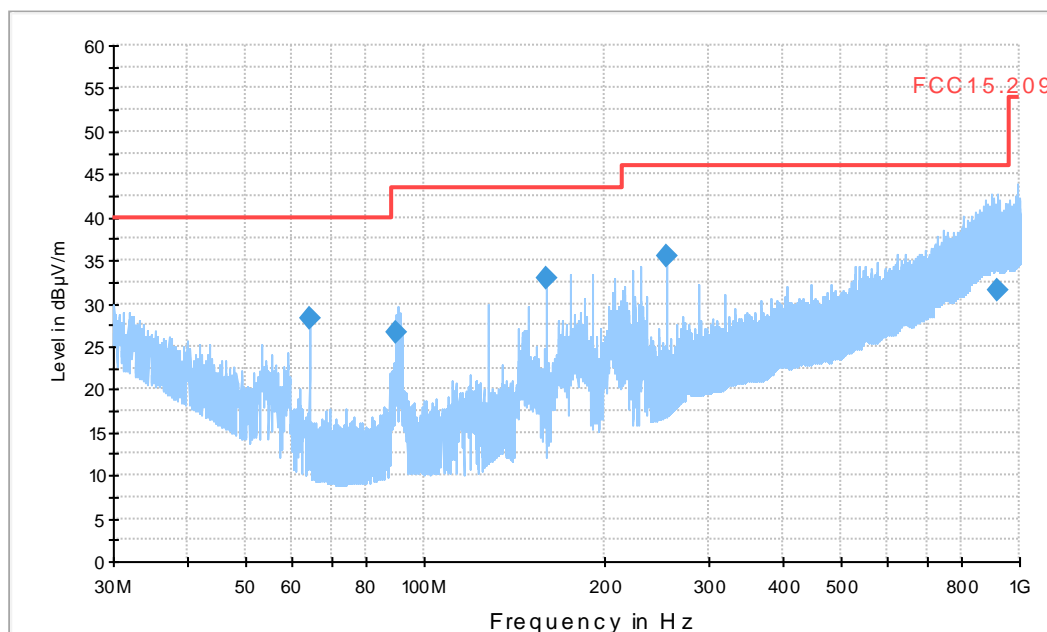
#### EUT Information

Manufacturer: Harman Becker Automotive Systems  
 EUT: VP4 GT  
 -----  
 HW version: F149M 6163USA  
 SW version: trunk\_23Jun\_2014  
 Config: --  
 Serial number: SN-8  
 Connected Interfaces: Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna  
 Power Supply: 12V DC  
 Comments: --

#### Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Marginal (dB)	Limit (dBµV/m)
63.990000	28.2	1000.0	120.000	249.0	V	248.0	8.8	11.80	40.00
89.870000	26.5	1000.0	120.000	368.0	H	78.0	8.7	17.00	43.50
160.010000	32.9	1000.0	120.000	199.0	H	298.0	9.4	10.60	43.50
256.020000	35.4	1000.0	120.000	105.0	H	104.0	13.6	10.60	46.00
918.770000	31.6	1000.0	120.000	105.0	V	137.0	27.2	14.40	46.00

01\_FCC15.209\_hor+vert\_KP0



## Diagram No. 3.02\_WLAN\_g-mode\_CH6\_6MB

01.07.2014 Page 1 of 1  
 Electric Fieldstrength Measurement  
 Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance  
 Version of Testsoftware: 8.51.0  
 Distance correction: not used  
 Used filter: not used  
 Technical Data: please see page 2 for detailed data of measurement setup  
 Test specification.: FCC 15.209; RSS-Gen: Issue 3  
 Operator: dpa  
 Operating conditions: WLAN g-mode Channel 6, 6Mbit  
 Comment: --

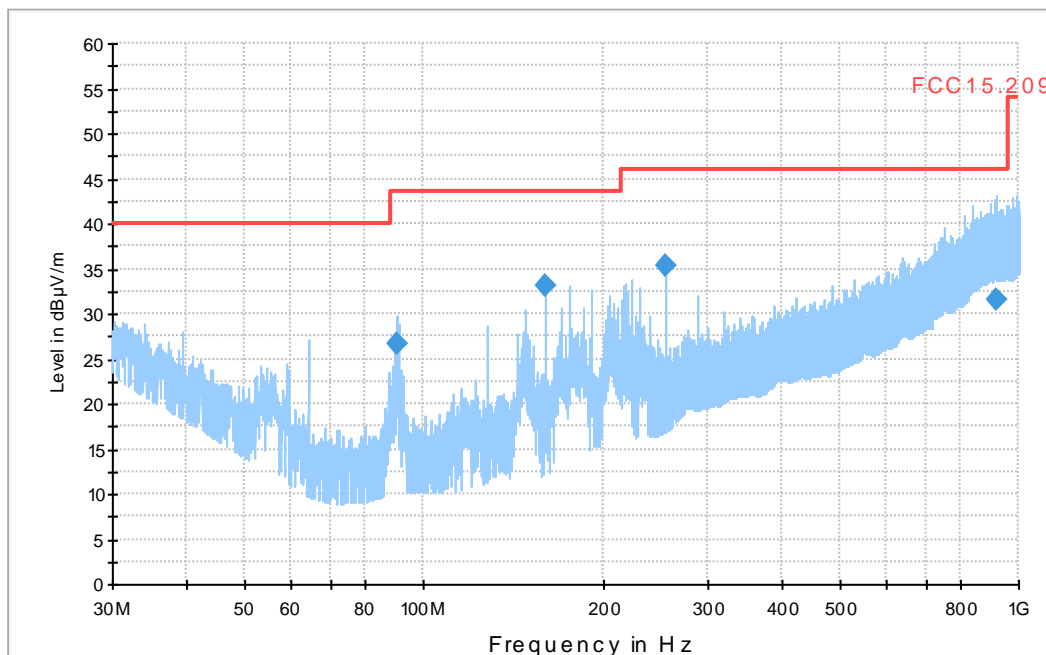
### EUT Information

Manufacturer: Harman Becker Automotive Systems  
 EUT: VP4 GT  
 -----  
 HW version: F149M 6163USA  
 SW version: trunk\_23Jun\_2014  
 Config: --  
 Serial number: SN-8  
 Connected Interfaces: Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna  
 Power Supply: 12V DC  
 Comments: --

### Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
89.940000	26.7	1000.0	120.000	368.0	H	84.0	8.7	16.80	43.50
159.990000	33.0	1000.0	120.000	208.0	H	283.0	9.3	10.50	43.50
256.010000	35.2	1000.0	120.000	105.0	H	95.0	13.6	10.80	46.00
921.050000	31.5	1000.0	120.000	342.0	V	84.0	27.1	14.50	46.00

01\_FCC15.209\_hor+vert\_KP0



## Diagram No. 3.03\_WLAN\_g-mode\_CH11\_24MB

01.07.2014 Page 1 of 1

Test description: Electric Fieldstrength Measurement  
 Test site and distance: Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance  
 Version of Testsoftware: 8.51.0  
 Distance correction: not used  
 Used filter: not used  
 Technical Data: please see page 2 for detailed data of measurement setup  
 Test specification.: FCC 15.209; RSS-Gen: Issue 3  
 Operator: dpa  
 Operating conditions: WLAN g-mode Channel 11, 24Mbit  
 Comment: --

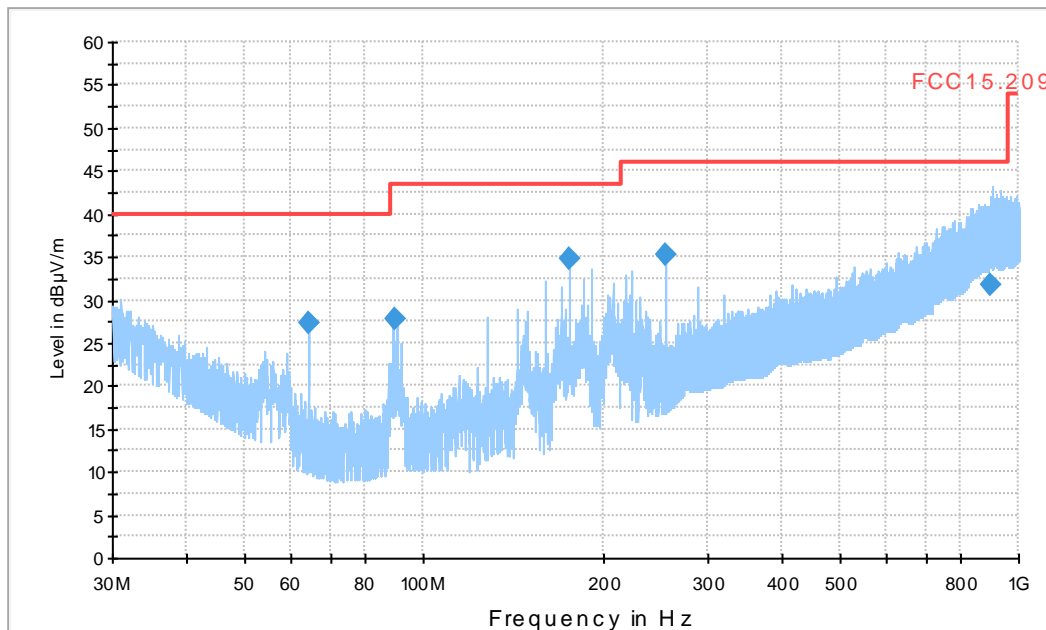
### EUT Information

Manufacturer: Harman Becker Automotive Systems  
 EUT: VP4 GT  
 -----  
 HW version: F149M 6163USA  
 SW version: trunk\_23Jun\_2014  
 Config: --  
 Serial number: SN-8  
 Connected Interfaces: Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna  
 Power Supply: 12V DC  
 Comments: --

### Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
63.990000	27.2	1000.0	120.000	241.0	V	251.0	8.8	12.80	40.00
89.910000	27.7	1000.0	120.000	364.0	H	75.0	8.7	15.80	43.50
176.020000	34.8	1000.0	120.000	182.0	H	145.0	10.9	8.70	43.50
256.010000	35.3	1000.0	120.000	105.0	H	95.0	13.6	10.70	46.00
900.140000	31.7	1000.0	120.000	150.0	H	330.0	27.0	14.30	46.00

01\_FCC15.209\_hor+vert\_KP0





## Diagram No. 3.04\_WLAN\_Rx\_CH6

Test description: Electric Fieldstrength Measurement  
 Test site and distance: Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance  
 Version of Testsoftware: 8.51.0  
 Distance correction: not used  
 Used filter: not used  
 Technical Data: please see page 2 for detailed data of measurement setup  
 Test specification.: FCC 15.109 Class B; RSS-Gen. Issue 3  
 Operator: dpa/Gar  
 Operating conditions: WLAN Idle-mode Channel 6  
 Comment 1:

### EUT Information

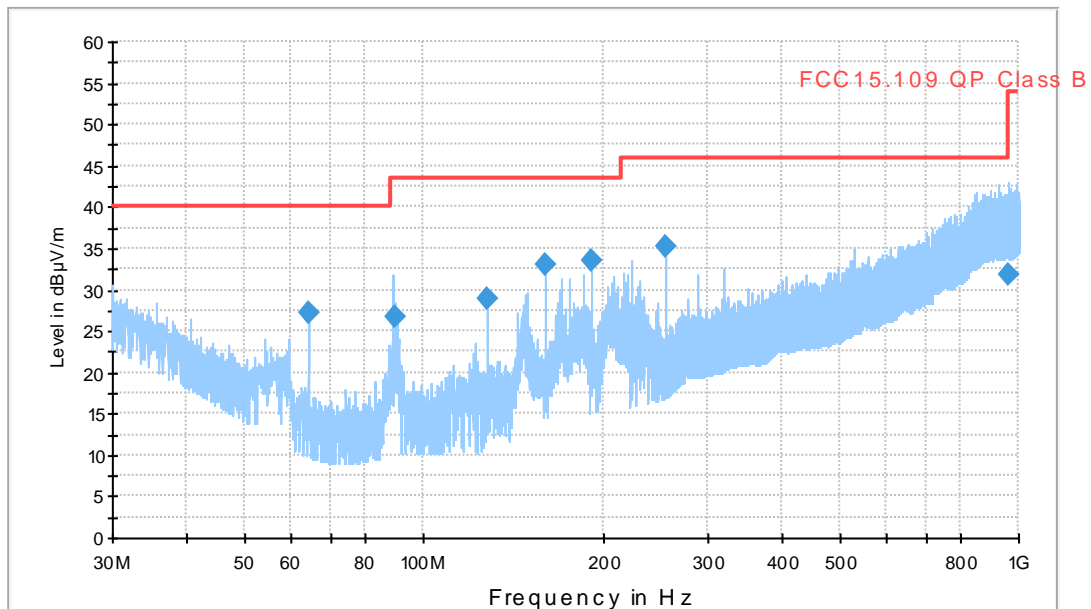
Manufacturer: Harman Becker Automotive Systems  
 EUT: VP4 GT  
 -----  
 HW version: F149M 6163USA  
 SW version: trunk\_23Jun\_2014  
 Config: --  
 Serial number: SN-8  
 Connected Interfaces: Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna  
 Power Supply: 12V DC  
 Comments: --

### Final Result 1

Frequency (MHz)	QuasiPeak	Meas. Time (ms)	Bandwidth h	Height (cm)	Polarization	Azimuth h	Corr. (dB)	Margin (dB)
63.980000	27.2	1000.0	120.000	239.0	V	260.0	8.8	12.8
89.230000	26.6	1000.0	120.000	368.0	H	79.0	8.6	16.9
127.990000	29.0	1000.0	120.000	143.0	H	298.0	9.0	14.5
160.000000	33.2	1000.0	120.000	190.0	H	277.0	9.4	10.4
192.020000	33.5	1000.0	120.000	168.0	H	110.0	12.1	10.0
256.010000	35.3	1000.0	120.000	105.0	H	95.0	13.6	10.7
959.850000	31.8	1000.0	120.000	229.0	H	19.0	27.5	14.2

### FCC15.109\_hor+vert

FCC15.109\_hor+vert



### 1.3. Frequency range $f > 1\text{GHz}$

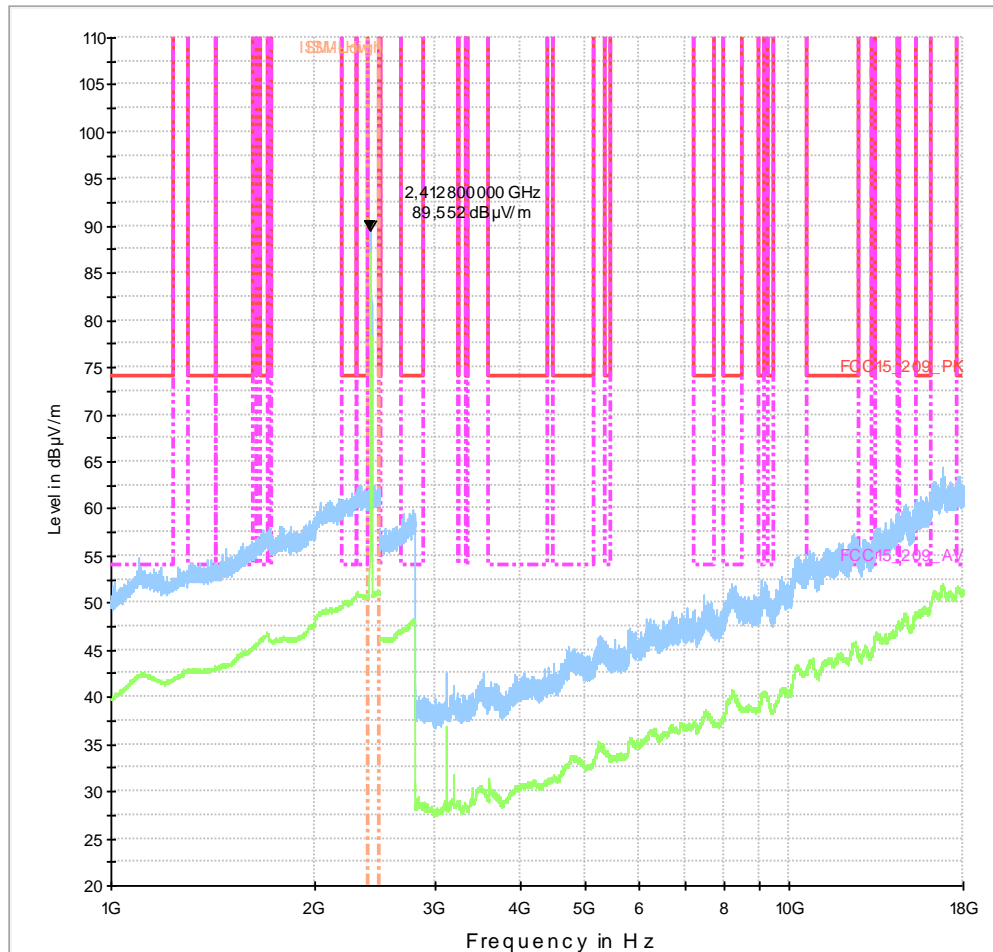
## Diagram No.: 4.01\_CH1\_1MB

#### Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.247&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	W-Lan, b-mode ch1 1 Mbit
Operator Name:	dpa
Comment:	Channel no. low

#### EUT Information

Manufacturer:	Harman Becker Automotive Systems
EUT:	VP4 GT
-----	
HW version:	F149M 6163USA
SW version:	trunk_23Jun_2014
Config:	--
Serial number:	SN-8
Connected Interfaces:	Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna
Power Supply:	12V DC
Comments:	--



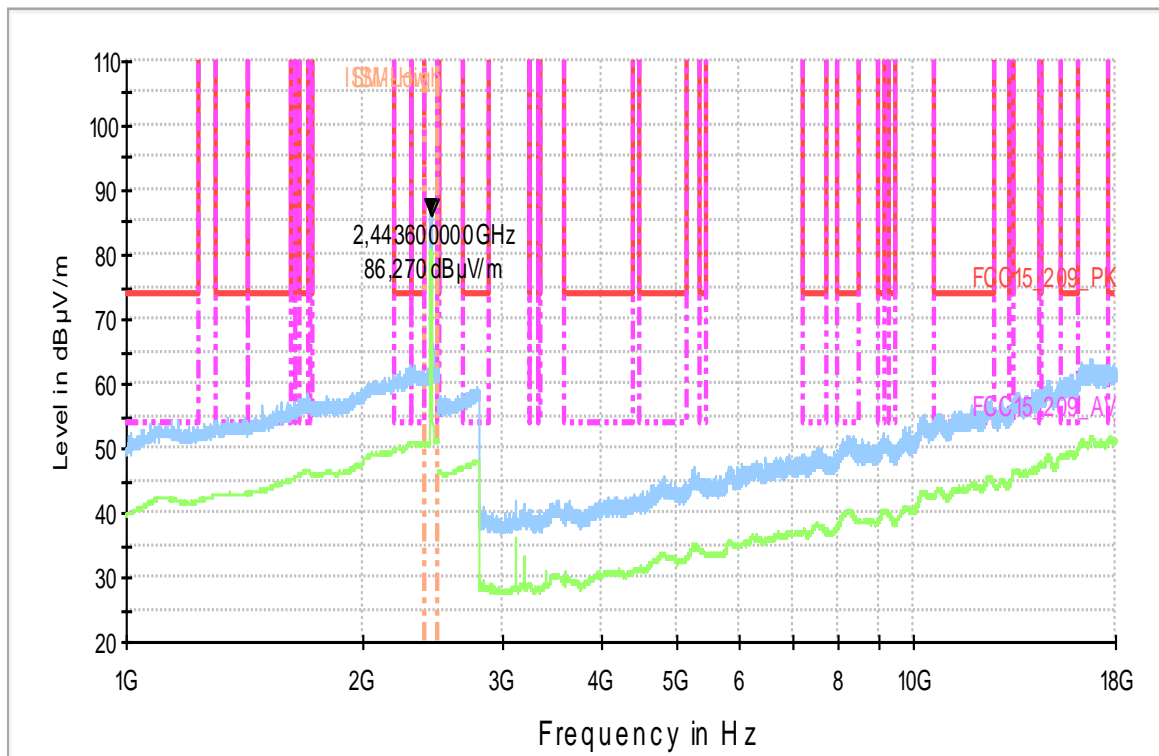
## Diagram No.: 4.02\_WLAN\_CH6\_6MB

### Common Information

Test Description:	Radiated Band-Edge Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	W-Lan, b-mode ch6 6 Mbit
Operator Name:	dpa
Comment:	Channel no. middle

### EUT Information

Manufacturer:	Harman Becker Automotive Systems
EUT:	VP4 GT
-----	
HW version:	F149M 6163USA
SW version:	trunk_23Jun_2014
Config:	--
Serial number:	SN-8
Connected Interfaces:	Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna
Power Supply:	12V DC
Comments:	--



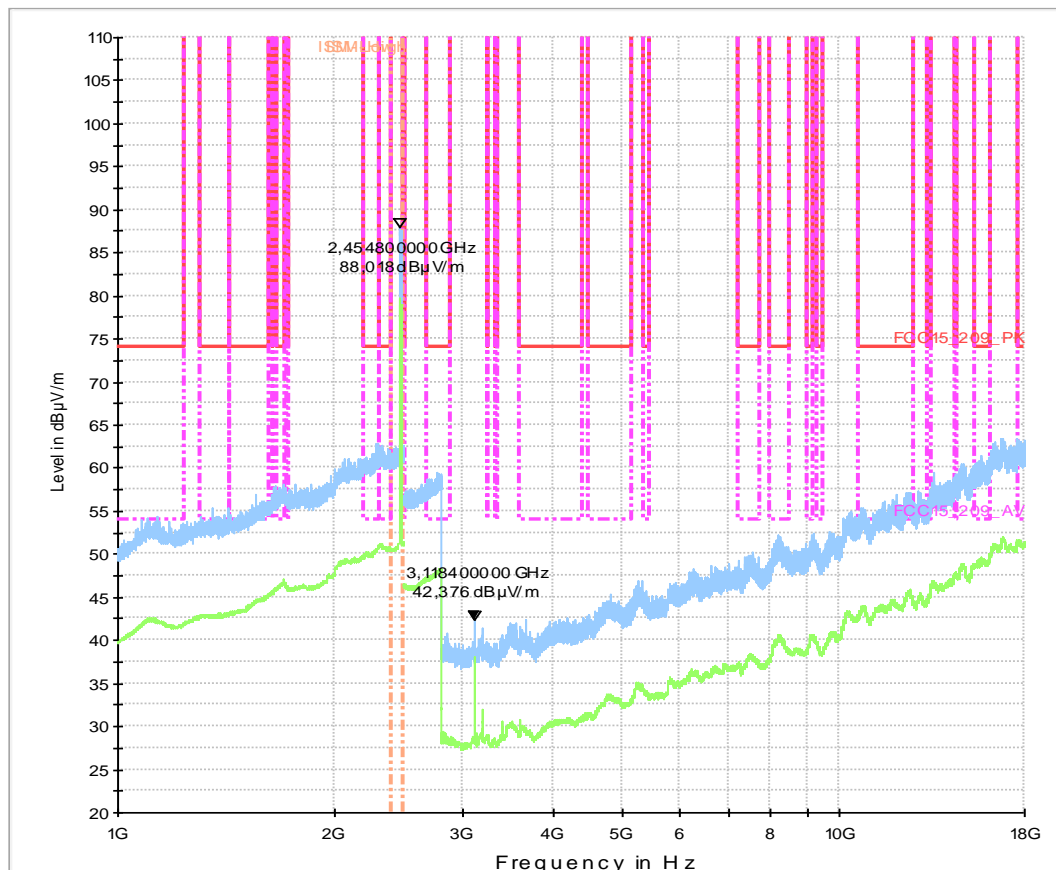
## Diagram No.: 4.03\_WLAN\_CH11\_24MB

### Common Information

Test Description:	Radiated Band-Edge Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
SW-Version:	EMC32 V8.53.0
Operation mode:	W-Lan, g-mode ch11 24Mbit
Operator Name:	dpa
Comment:	Channel no. high

### EUT Information

Manufacturer:	Harman Becker Automotive Systems
EUT:	VP4 GT
-----	
HW version:	F149M 6163USA
SW version:	trunk_23Jun_2014
Config:	--
Serial number:	SN-8
Connected Interfaces:	Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna
Power Supply:	12V DC
Comments:	--



## Diagram No. 4.04\_WLAN\_Rx\_CH6

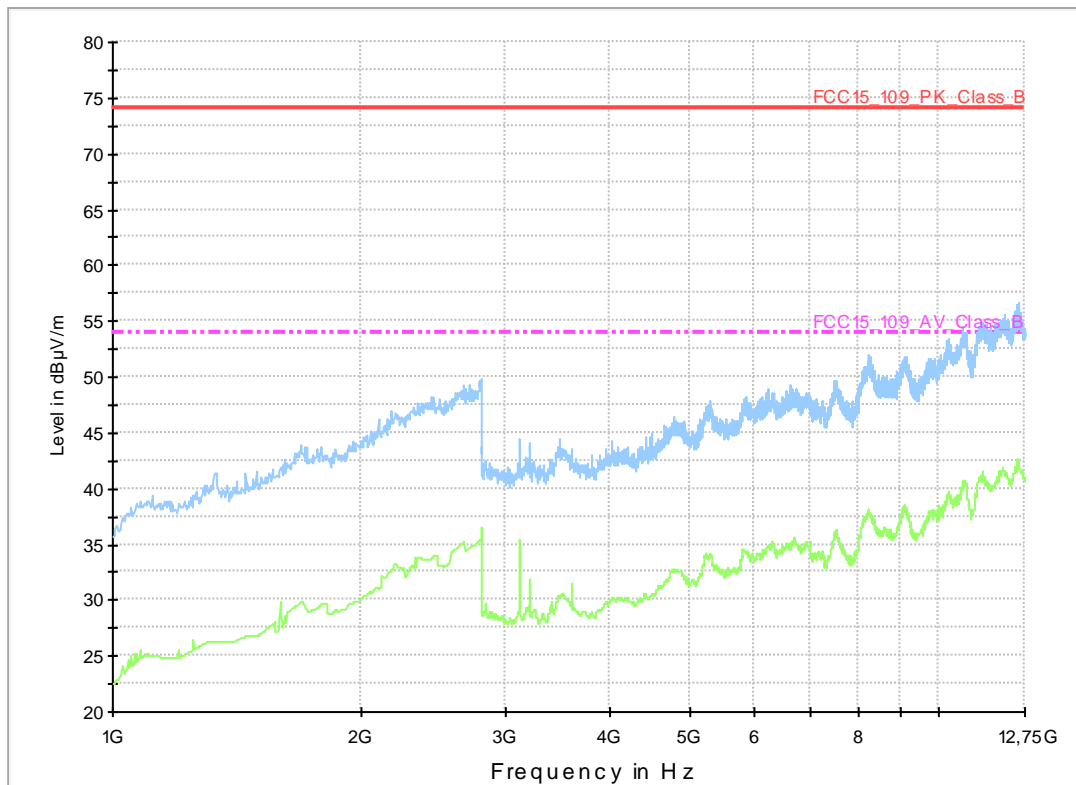
### Common Information

Test Description:	Radiated Filed Strength Emission
Test Site Location:	CETECOM GmbH Essen
Test Site:	Fully Anechoic Room (FAR)
Test Standard:	FCC Part 15.109
Section:	15.109
Operating Mode:	Operator, please fill in the operating mode
Equipment Class:	Class B
Environmental Conditions:	Humidity: 45%rH; Temperature: 24°C
Operator:	ABA

### EUT Information

Manufacturer:	Harman Becker Automotive Systems
EUT:	VP4 GT
-----	
HW version:	F149M 6163USA
SW version:	trunk_23Jun_2014
Config:	--
Serial number:	SN-8
Connected Interfaces:	Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna
Power Supply:	12V DC
Comments:	--

030445\_FCC\_Part15.109\_Unint\_Rad\_Class\_B\_1G-20G\_FSEK



## 2. Band Edge radiated

### 2.1. Left Band-Edge b-mode, channel 1

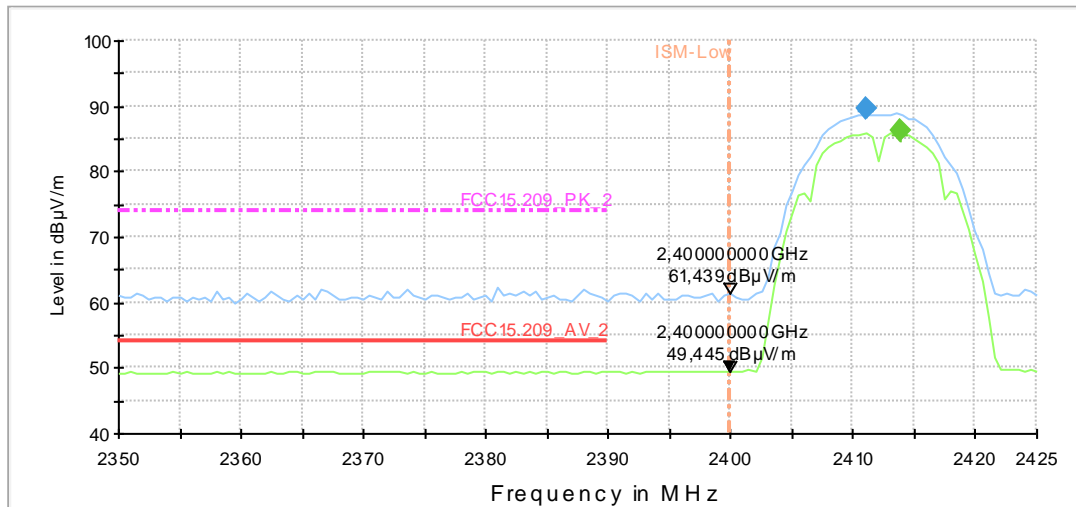
## Diagram No.: 9.01\_BE\_WLAN\_CH1\_1MB

### Common Information

Test Description:	Radiated Band-Edge Emissions in 3m distance
Test Site:	CETECOM GmbH Essen, EMC32 v.8.53.0
Test Standard:	FCC 15.205&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	WLAN 802.11 b-mode, continously tx on channel 1; Data rate 1MB
Operator Name:	dpa
Comment:	

### EUT Information

Manufacturer:	Harman Becker Automotive Systems
EUT:	VP4 GT
-----	
HW version:	F149M 6163USA
SW version:	trunk_23Jun_2014
Config:	--
Serial number:	SN-8
Connected Interfaces:	Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna
Power Supply:	12V DC
Comments:	--



### Final Result 1

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Elevation (deg)	Corr. (dB)	Comment
2411.100000	89.6	100.0	1000.000	155.0	H	171.0	0.0	35.5	

### Final Result 2

Frequency (MHz)	Average (dBµV/m)	Meas. Time	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Elevation (deg)	Corr. (dB)	Comment
2413.800000	86.3	100.0	1000.000	155.0	H	172.0	0.0	35.5	

## 2.2. Right Band-Edge g-mode, channel 11

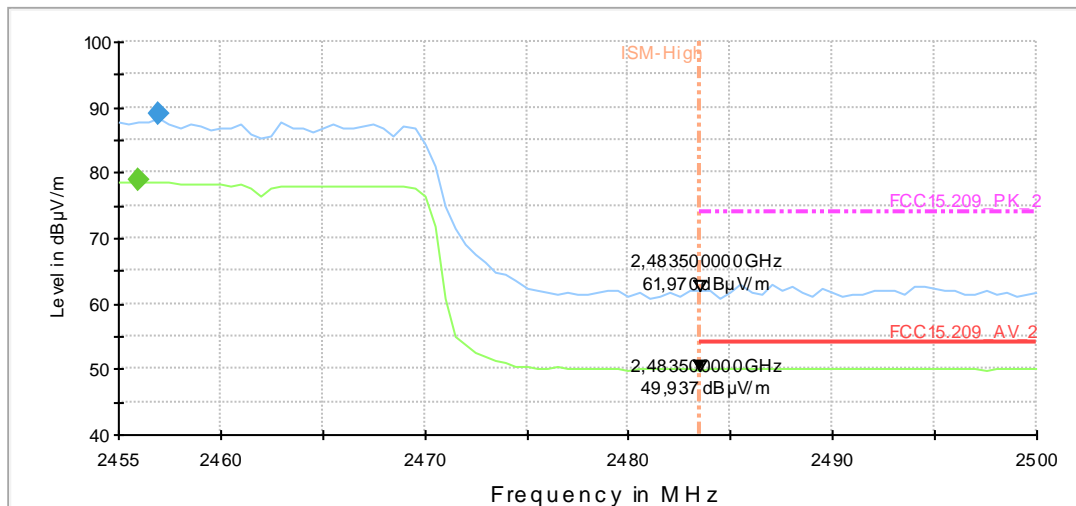
### Diagram No.: 9.02\_BE\_WLAN\_CH11\_24MB

#### Common Information

Test Description:	Radiated Band-Edge Emissions in 3m distance
Test Site:	CETECOM GmbH Essen, EMC32 v.8.53.0
Test Standard:	FCC 15.205&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	WLAN 802.11g-mode, continuously tx on channel 11; Data rate 24MB
Operator Name:	dpa
Comment:	

#### EUT Information

Manufacturer:	Harman Becker Automotive Systems
EUT:	VP4 GT
-----	
HW version:	F149M 6163USA
SW version:	trunk_23Jun_2014
Config:	--
Serial number:	SN-8
Connected Interfaces:	Main Wiring Harness, CAN Gateway Harness, Always On Module, Bluetooth Antenna, WLAN Antenna
Power Supply:	12V DC
Comments:	--



#### Final Result 1

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Elevation (deg)	Corr. (dB)	Comment
2457.000000	88.9	100.0	1000.000	155.0	H	181.0	90.0	35.6	

#### Final Result 2

Frequency (MHz)	Average (dBµV/m)	Meas. Time	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Elevation (deg)	Corr. (dB)	Comment
2456.000000	78.9	100.0	1000.000	155.0	H	181.0	90.0	35.6	