

# Report test

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## RF test report

110112-AU01+W01



**Audivo GmbH**

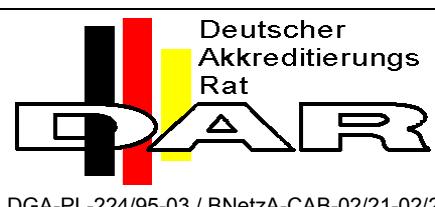
**RF Module**

SeDMP3



The test result refers exclusively  
to the model tested.

This report must not be copied without  
the written authorization by the lab.  
Revision: 1.1



DGA-PL-224/95-03 / BNetzA-CAB-02/21-02/2

# EMV **TESTHAUS** GmbH

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## Accreditation:



Registration number: DGA-PL-224/95-03  
Valid until 21.12.2014

CAB (EMC) registration number: BNetzA-CAB-02/21-02/3  
Valid until 27.11.2013

FCC facility registration number: 221458  
Test Firm Type "2.948 listed": Valid until 27.06.2014  
Test Firm Type "accredited": Valid until 19.06.2013  
MRA US-EU, FCC designation number: DE0010

## Test Laboratory:

EMV **TESTHAUS** GmbH  
Gustav-Hertz-Straße 35  
94315 Straubing

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**EMV TESTHAUS** GmbH



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WLAN audio module SeDMP3

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# 1 Test regulations

CFR 47 Part 2: 01-2010	Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC)
CFR 47 Part 15: 01-2010	Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC)
ANSI C63.4: September 2009	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

## 1.1 Summary of test results

Standard	Test result
FCC CFR 47 Part 15	Passed



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## 2 Equipment under Test (EUT)

Product type:	WLAN audio module
Model Name:	SeDMP3
Manufacturer:	Audivo GmbH
Serial number:	Prototype
Board revision:	3.1
FCC ID:	ZUCSEDMP3
Application freq. band:	2400 MHz - 2483.5 MHz
Operating frequency:	2.412 GHz - 2.462 GHz
Number of RF-channels:	11
Modulation:	DSSS for IEEE 802.11b OFDM for IEEE 802.11g/n
Data Rate (Mbps)	IEEE 802.11b (1 / 2 / 5.5 / 11) IEEE 802.11g (6 / 9 / 12 / 18 / 24 / 36 / 48 / 54) IEEE 802.11n (72.2 / 65 / 58.5 / 57.8 / 52 / 43.3 / 39 / 28.9 / 26 / 21.7 / 19.5 / 14.4 / 13 / 7.2 / 6.5)
Antenna type:	Dipole antenna <input checked="" type="checkbox"/> detachable <input type="checkbox"/> not detachable with U.FL-R-SMT connector
Power supply:	DC powered nominal: 5.0 V
Temperature range:	0°C to +70°C

### 2.1 List of antennas

For detailed information see antenna specification.

Manufacturer	Model	Gain
Cortec Technology	R-AN240-5701RS	≤2.0 dBi
Songtak Technology Co., Ltd.	SMA Swivel,2.4Ghz	≤2.0 dBi



## 2.2 Photo documentation

For photos taken during testing, see annex A.  
For internal photos of the EUT, see annex B.

## 2.3 Short description of the EUT

Wireless module to stream audio data over RLAN.

## 2.4 Operation mode

Preliminary tests were performed in different configuration modes to find the worst emission. The following description is relevant for the test modes used in this test report.

The EUT was tested in the following operation modes:

- Connect EUT to 5 V DC.
- Connect via serial adapter to EUT.
- Start terminal program to connect to command interface of the EUT.
- Use the following commands to set the different operation modes:
  - o Initialize test mode: unittest init
  - o 802.11b (DSSS): unittest tx [ 1 | 6 | 11 ] 11 1000 1 same | channels
  - o 802.11g (OFDM): unittest tx [ 1 | 6 | 11 ] 54 100 1 same | channels
  - o 802.11n (OFDM): unittest tx [ 1 | 6 | 11 ] 65 100 1 same | channels

## 2.5 Configuration

The following peripheral devices and interface cables were connected during the tests:

Device	Model:	S/N
WLAN audio module	SeDMP3 v3.1	Prototype
DC power supply	Statron	0702007

## Used cables

Numbers:	Description: (type / lengths / remarks)	Serial No
1	Adapter cable U.FL-R-SMT to SMA, 20 cm	N/A
1	HF cable 04	E00434
2	Power supply cables, 1.2 m	N/A



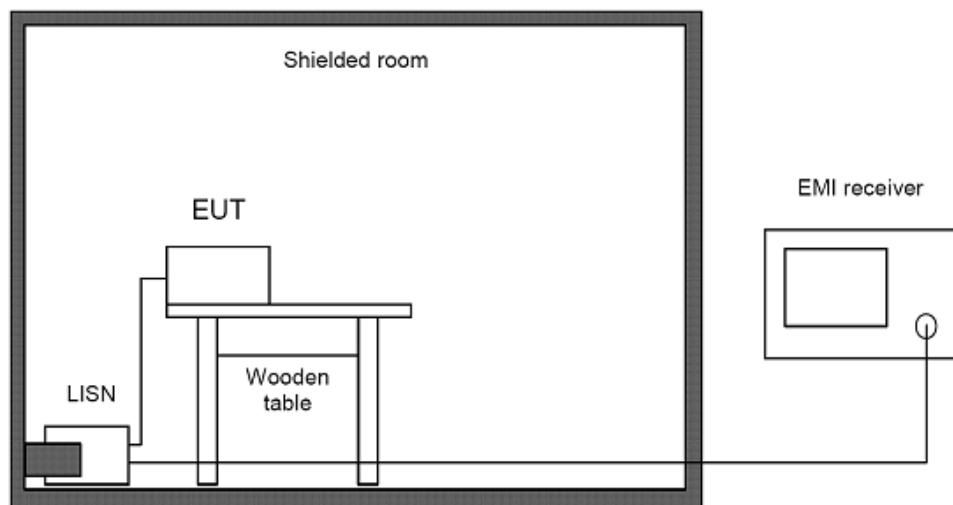
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94315 Straubing  
Germany  
Revision: 1.1

Audivo GmbH  
WLAN audio module SeDMP3



According to ANSI C63.4, section 13.1.3.1 testing of intentional radiators with detachable antennas shall be done with a dummy load otherwise the tests should be done with connected antenna and if adjustable fully extended.

### 3.5 Test setup



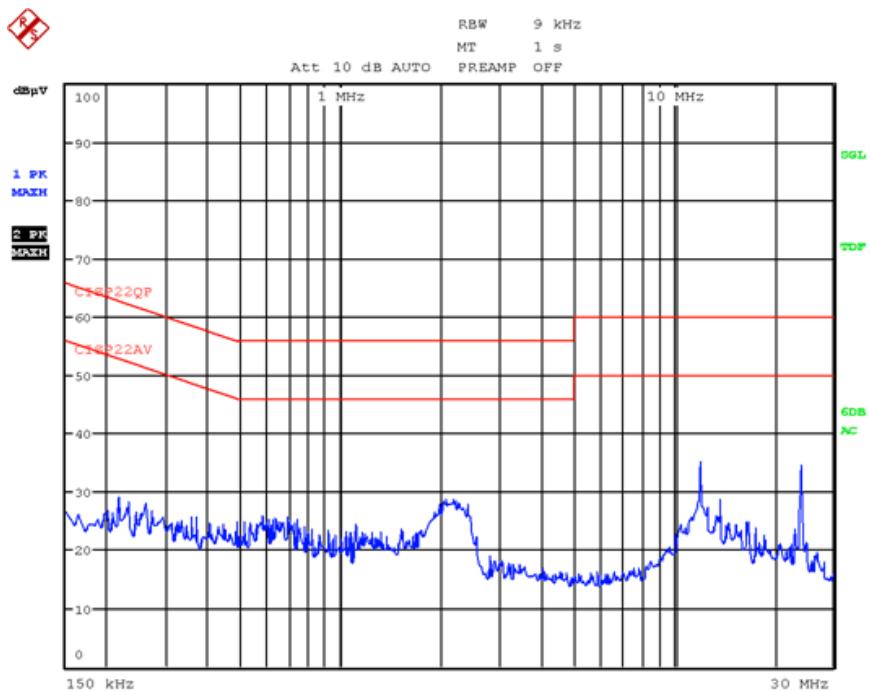
Picture 1: Outline of conducted emission test setup

Comments: All peripheral devices were additionally decoupled by means of a line stabilization network.

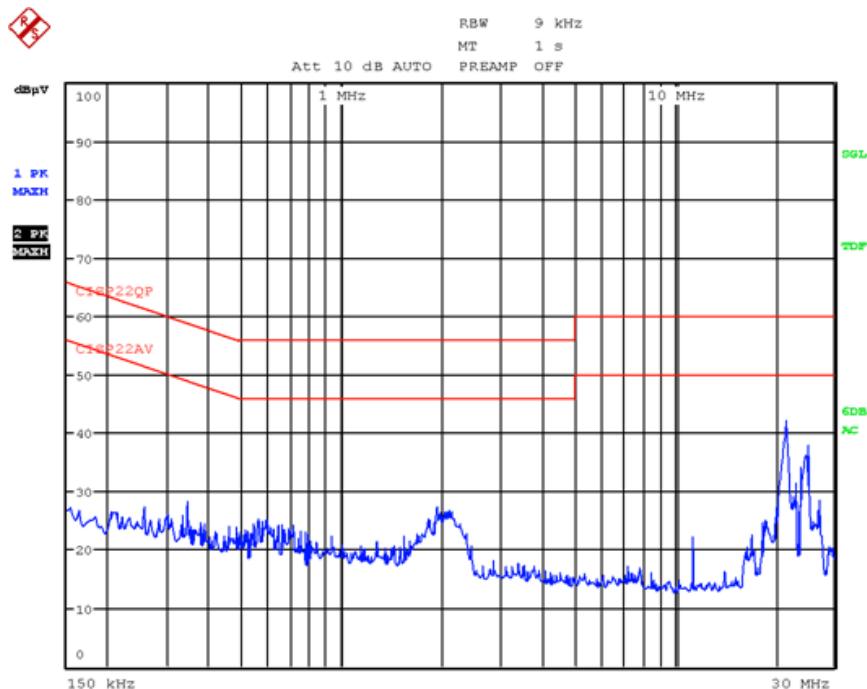
The peak values are all below the average limit. Thus it can be supposed that the limit of average emissions is kept in all cases.

### 3.6 Test results

Temperature:	22°C	Humidity:	44%
Tested by:	M. Janker	Test date:	2011-09-26



Picture 2: Conducted emission on mains, neutral (Chart)



Picture 3: Conducted emission on mains, phase 1 (chart)



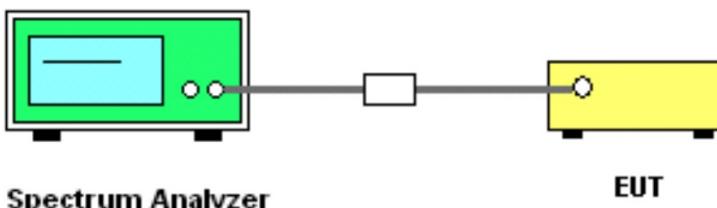






2. The transmitter output (antenna port) was connected to the spectrum analyser.
3. The unit was operated in continuous transmit mode with modulation.
4. Set the detector to peak, max hold.
5. Mark the frequency with maximum peak power as the center of the display of the spectrum.
6. Set the span to 1.2 MHz and the sweep time to 400s.
7. After the trace has stabilized set the trace to VIEW mode.
8. Use marker function to set the marker to peak and record the value.

## 6.5 Test setup



Picture 7: Test setup for power spectral density measurement

## 6.6 Test Deviation

There is no deviation with the original standard.

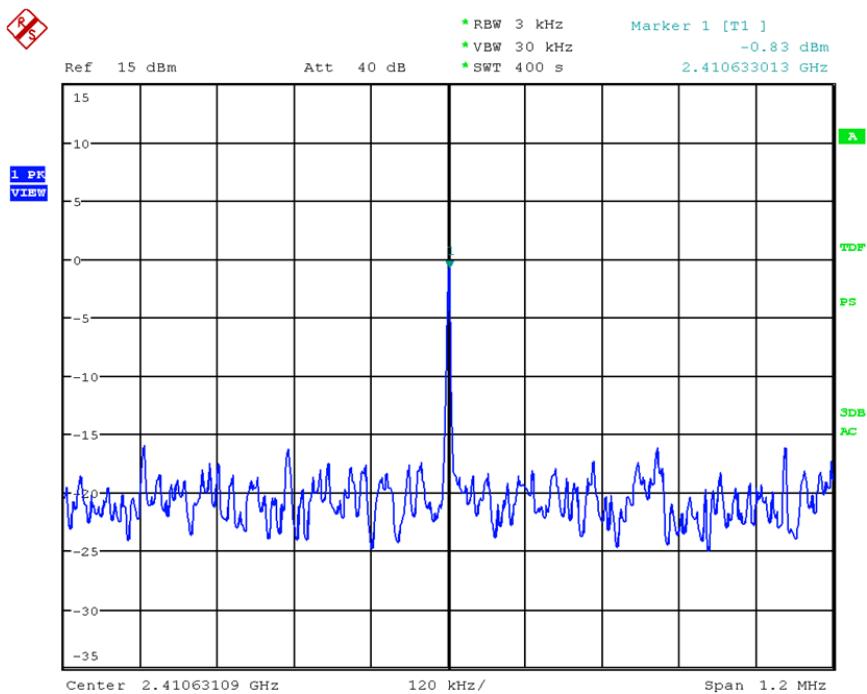
## 6.7 EUT operation during test

The EUT was programmed to be in continuously transmitting mode.

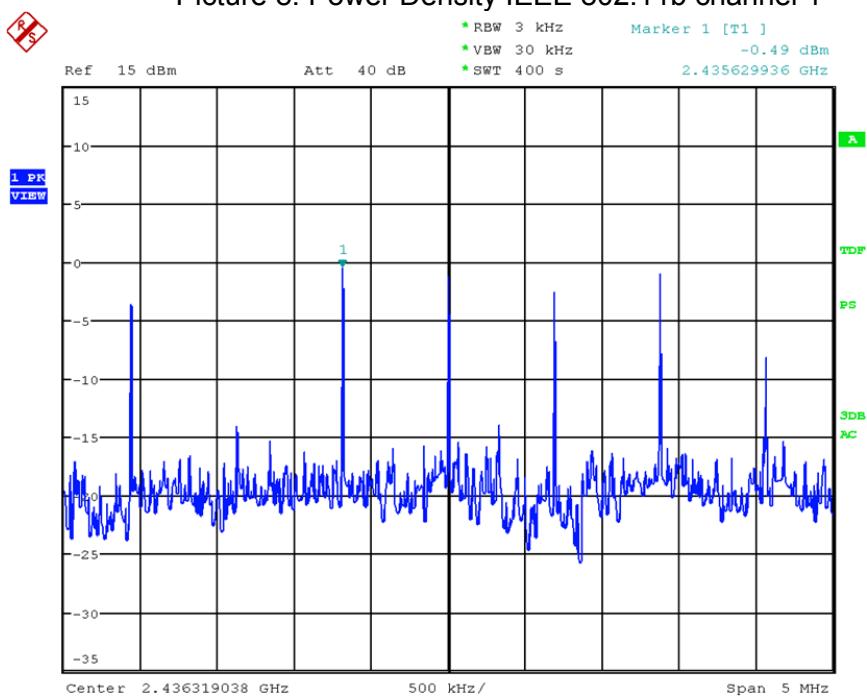
## 6.8 Test results (DSSS, 802.11b)

Temperature:	23°C	Humidity:	41%
Tested by:	M. Janker	Test date:	2011-09-26

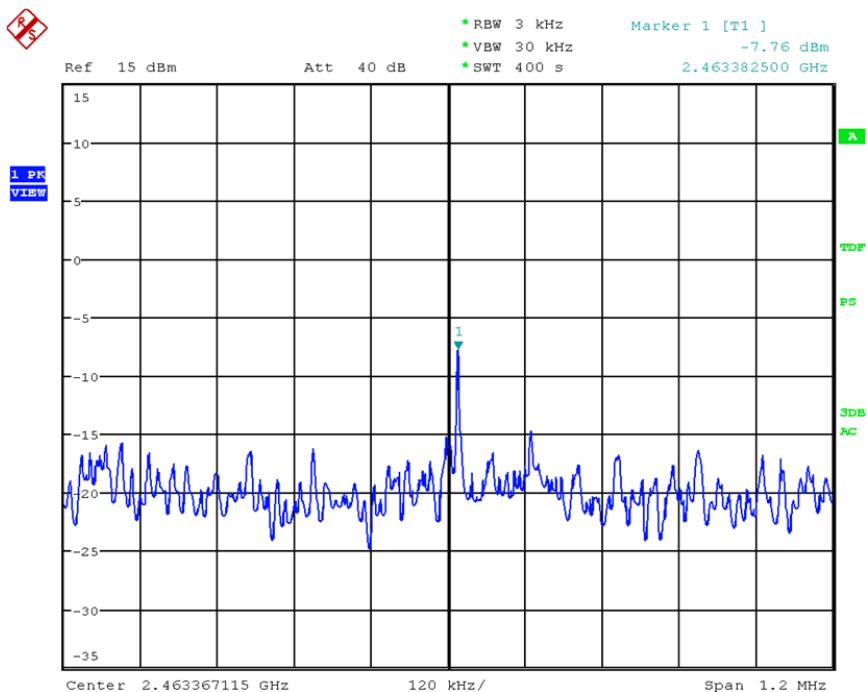
Channel	Frequency (GHz)	Spectral density (dBm/3kHz)	Limit (dBm/3kHz)	Result
1	2.412	-0.83	8.0	PASS
6	2.437	-0.49	8.0	PASS
11	2.462	-7.76	8.0	PASS



Picture 8: Power Density IEEE 802.11b channel 1



Picture 9: Power Density IEEE 802.11b channel 6

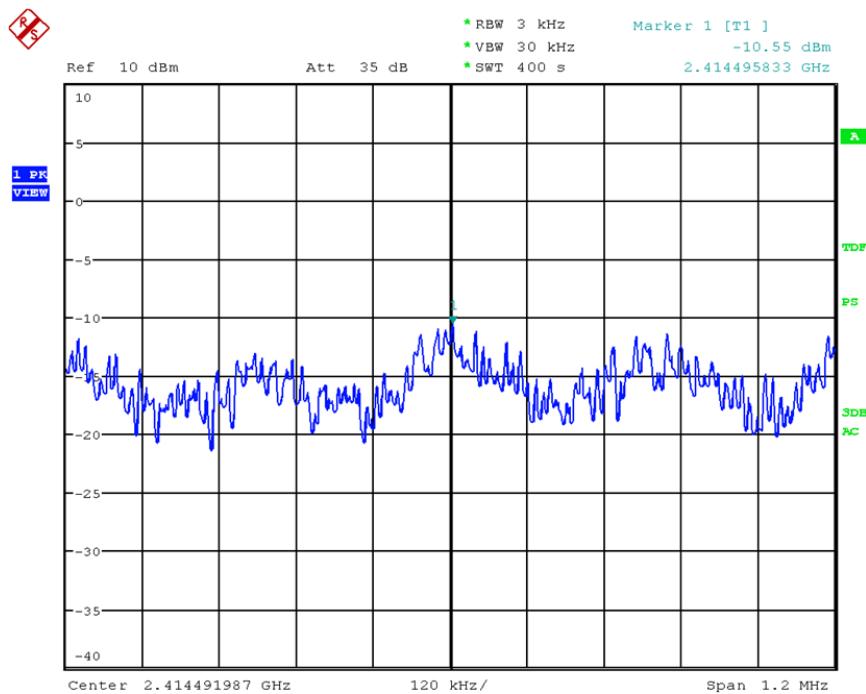


Picture 10: Power Density IEEE 802.11b channel 11

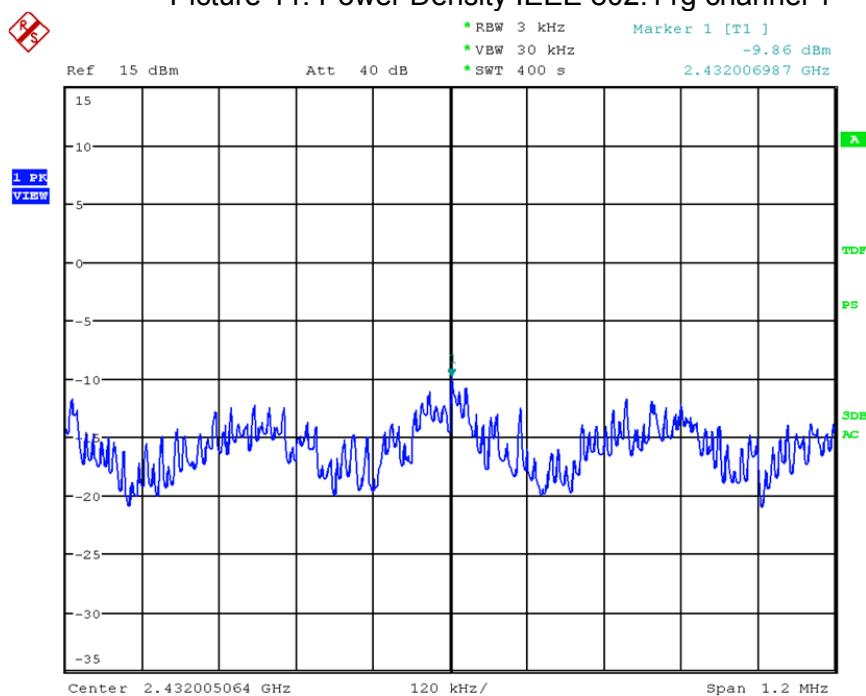
## 6.9 Test results (OFDM, 802.11g)

Temperature:	23°C	Humidity:	41%
Tested by:	M. Janker	Test date:	2011-09-26

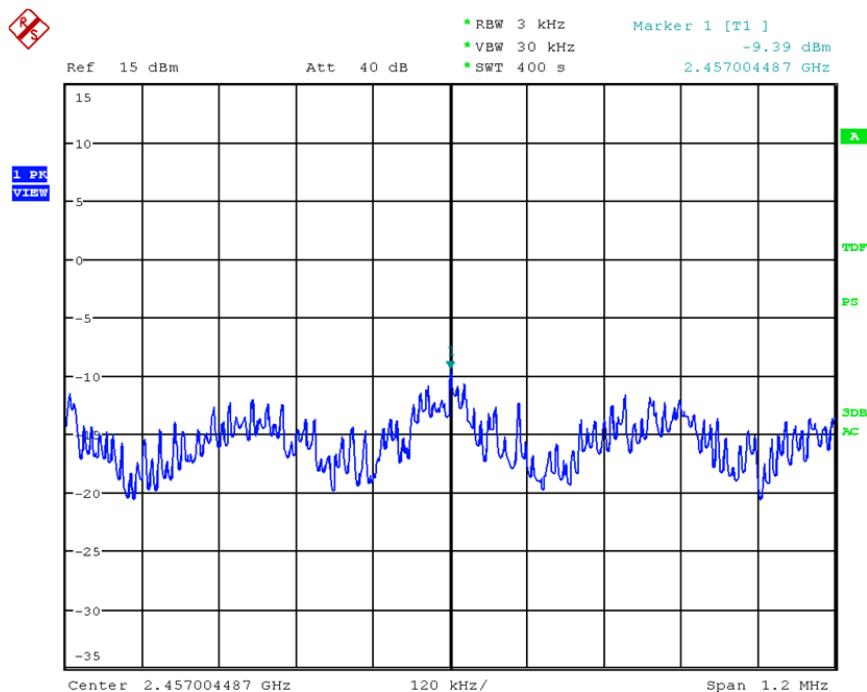
Channel	Frequency (GHz)	Spectral density (dBm/3kHz)	Limit (dBm/3kHz)	Result
1	2.412	-10.55	8.0	PASS
6	2.437	-9.86	8.0	PASS
11	2.462	-9.39	8.0	PASS



Picture 11: Power Density IEEE 802.11g channel 1



Picture 12: Power Density IEEE 802.11g channel 6

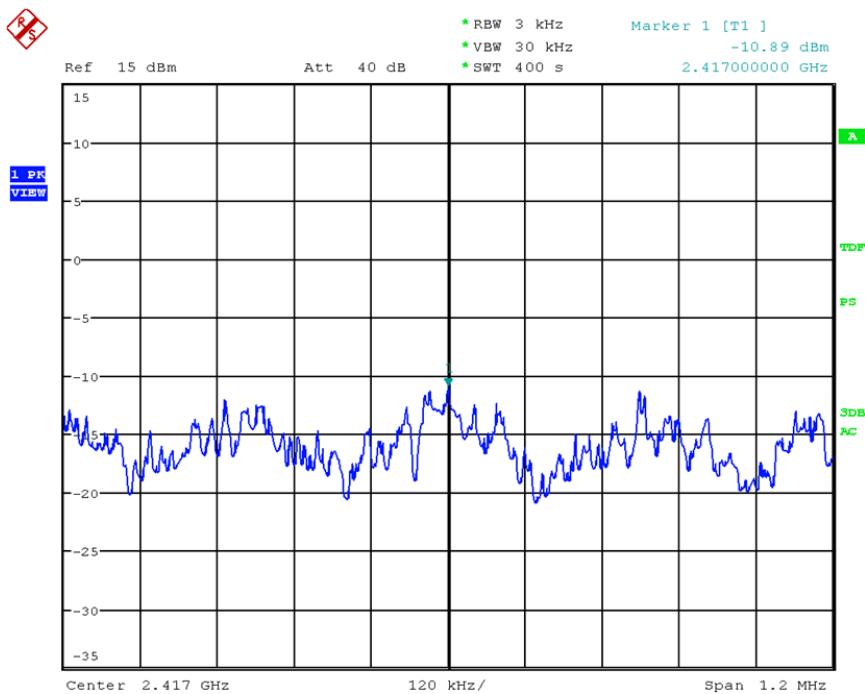


Picture 13: Power Density IEEE 802.11g channel 11

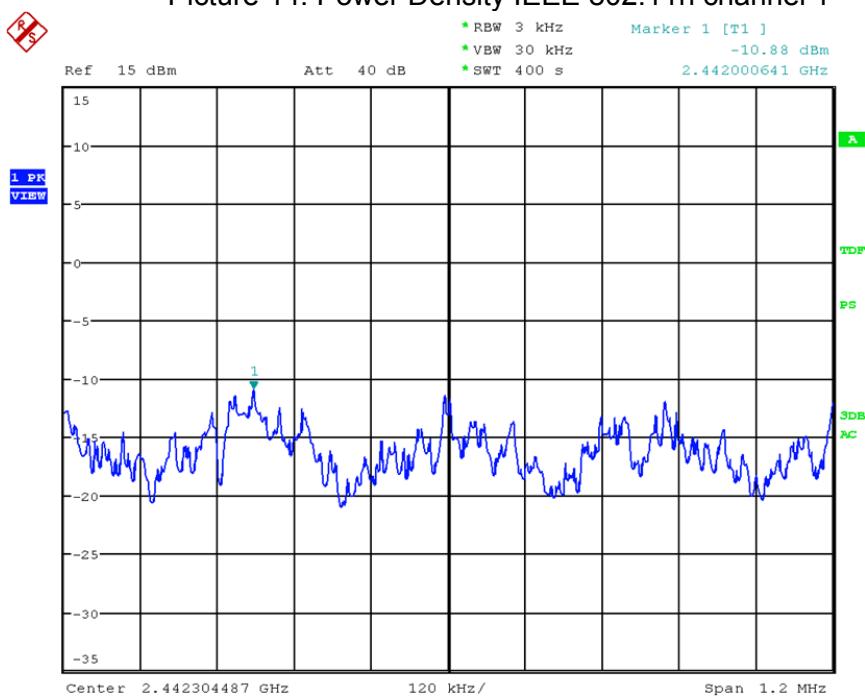
## 6.10 Test results (OFDM, 802.11n)

Temperature:	23°C	Humidity:	41%
Tested by:	M. Janker	Test date:	2011-09-26

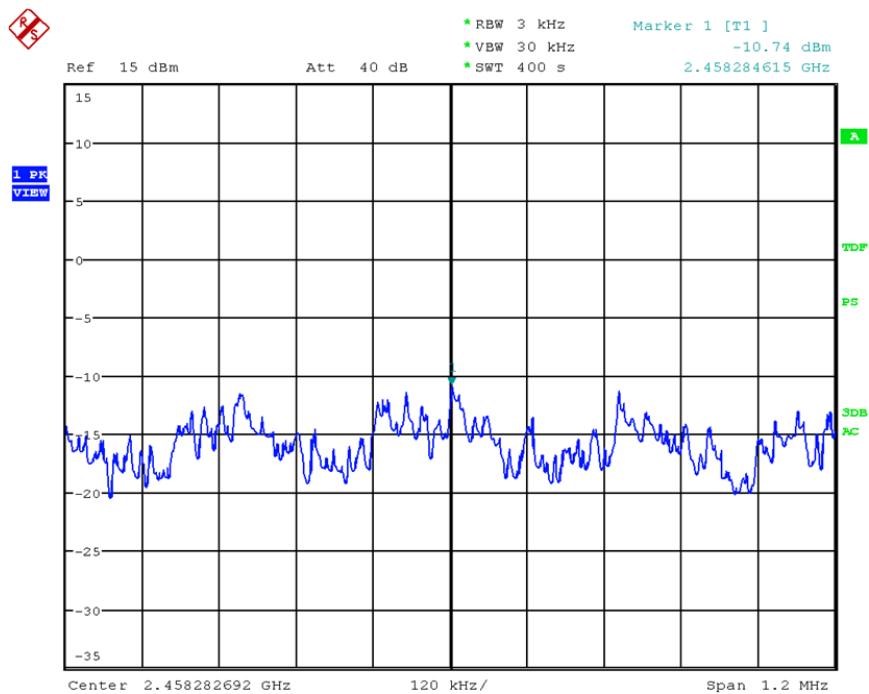
Channel	Frequency (GHz)	Spectral density (dBm/3kHz)	Limit (dBm/3kHz)	Result
1	2.412	-10.89	8.0	PASS
6	2.437	-10.88	8.0	PASS
11	2.462	-10.74	8.0	PASS



Picture 14: Power Density IEEE 802.11n channel 1



Picture 15: Power Density IEEE 802.11n channel 6

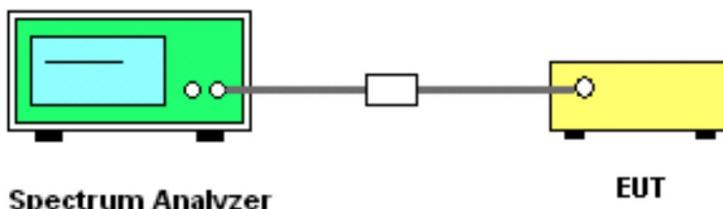


Picture 16: Power Density IEEE 802.11n channel 11



1. The test is performed in accordance with FCC Public Notice KBD 558074.
2. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
3. The unit was operated in continuous transmit mode with modulation.
4. Set the detector to peak, max hold.
5. After the trace has stabilized set the trace to VIEW mode.
6. Use marker function to set the marker to peak and set the delta marker to 6 dB below the carrier.
7. Measure the bandwidth of the signal as the lower and upper limit of the intersection of the trace with the delta marker.

## 7.5 Test setup



Picture 17: Test setup for 6dB spectrum bandwidth measurement

## 7.6 Test deviation

There is no deviation with the original standard.

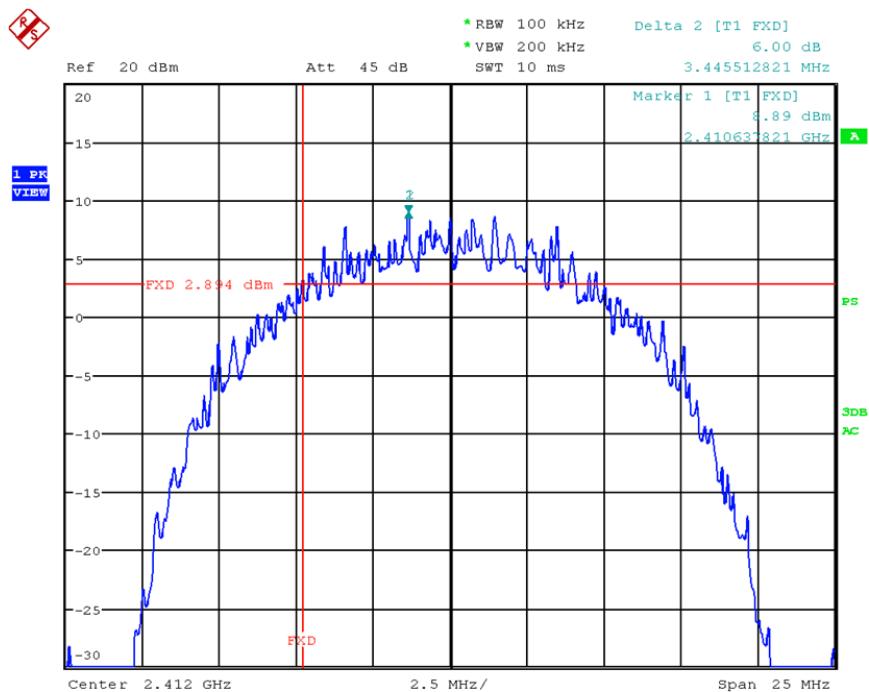
## 7.7 EUT operation during test

The EUT was programmed to be in continuously transmitting mode.

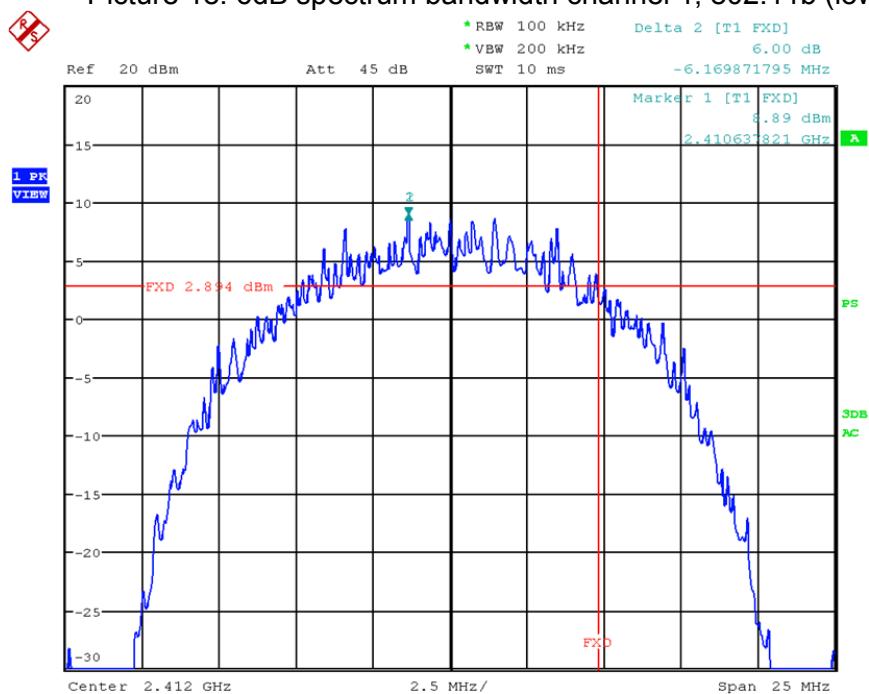
## 7.8 Test results (DSSS, 802.11b)

Temperature:	22°C	Humidity:	44%
Tested by:	M. Janker	Test date:	2011-07-28

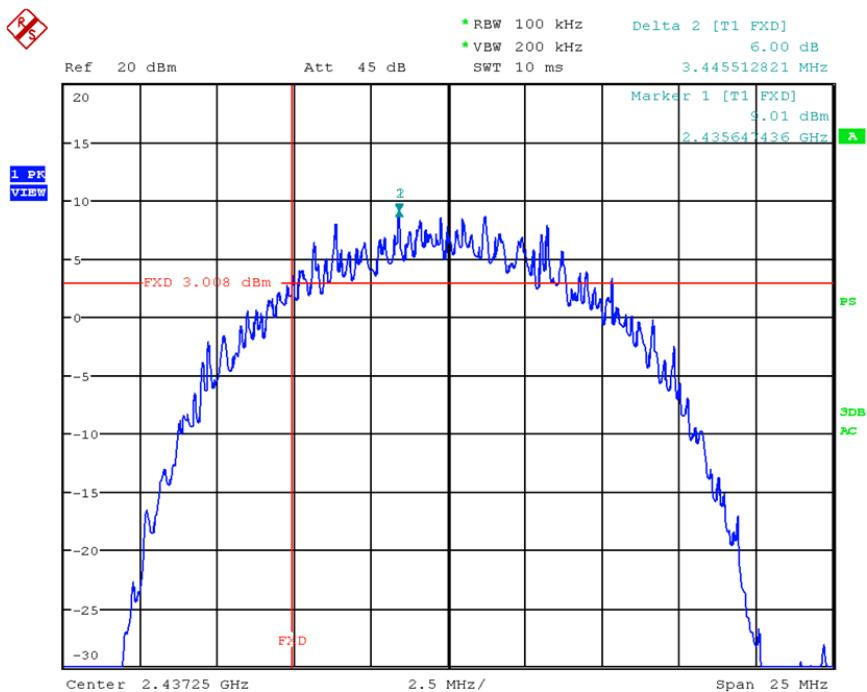
Channel	Frequency (GHz)	6 dB bandwidth (MHz)	Min. limit (kHz)	Result
1	2.412	9.6154	500	PASS
6	2.437	10.3766	500	PASS
11	2.462	9.5753	500	PASS



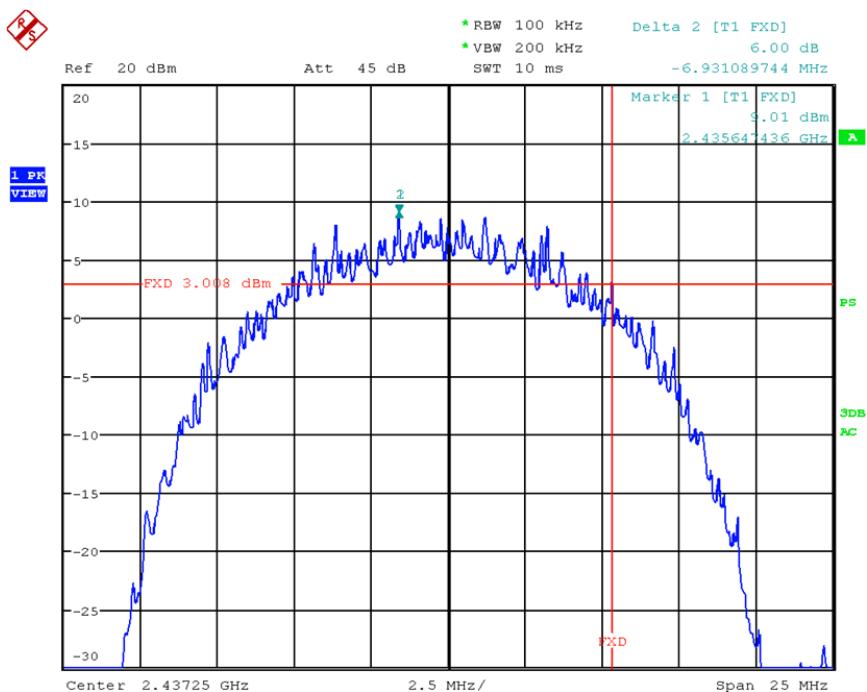
Picture 18: 6dB spectrum bandwidth channel 1, 802.11b (lower)



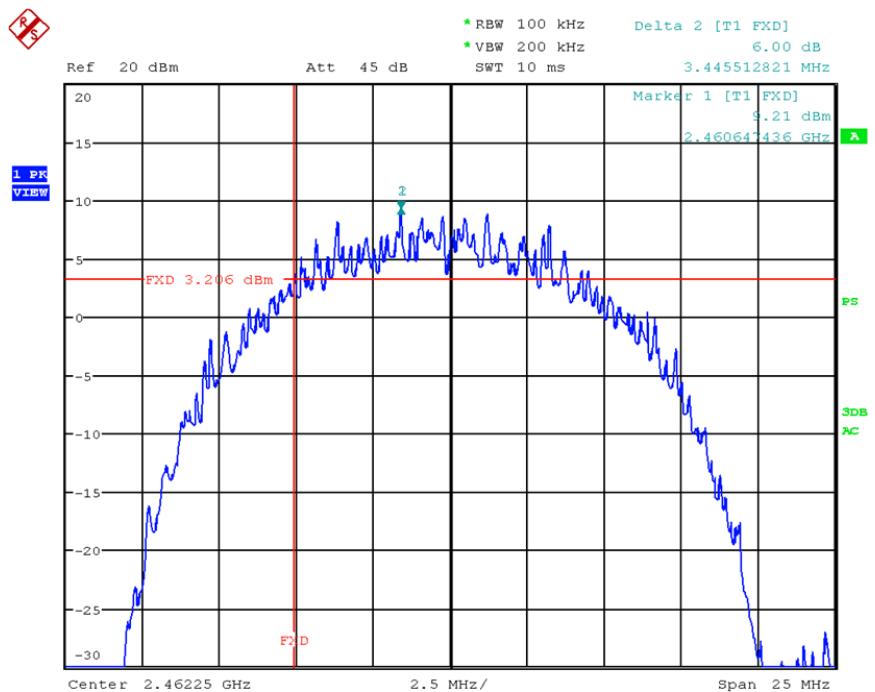
Picture 19: 6dB spectrum bandwidth channel 1, 802.11b (upper)



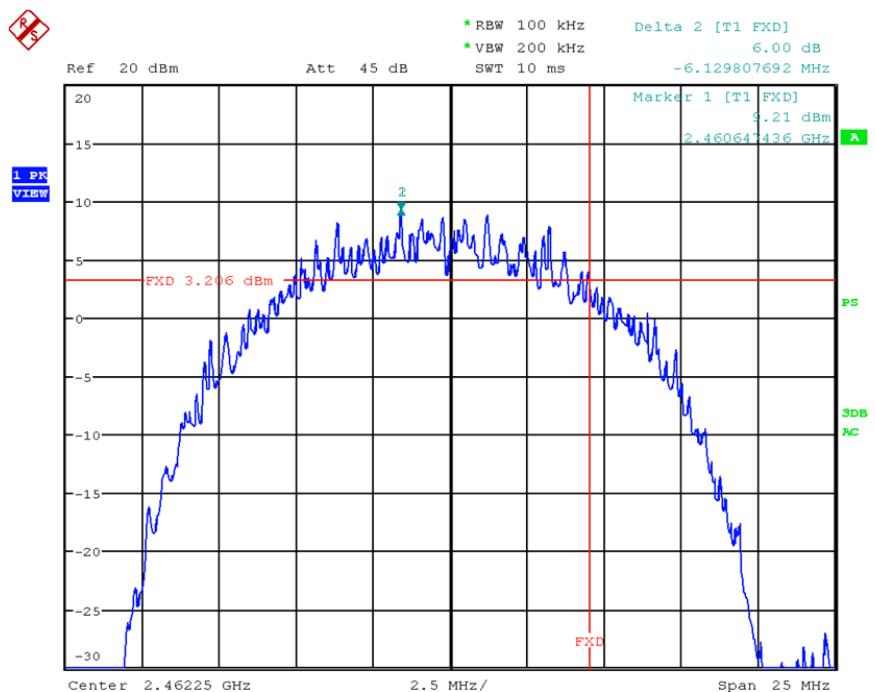
Picture 20: 6dB spectrum bandwidth channel 6, 802.11b (lower)



Picture 21: 6dB spectrum bandwidth channel 6, 802.11b (upper)



Picture 22: 6dB spectrum bandwidth channel 11, 802.11b (lower)

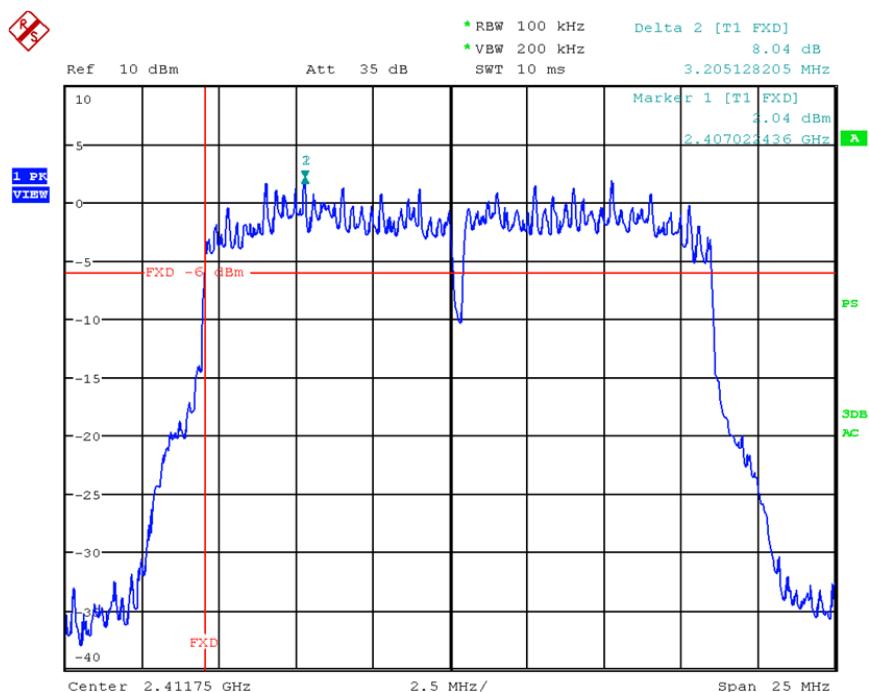


Picture 23: 6dB spectrum bandwidth channel 11, 802.11b (upper)

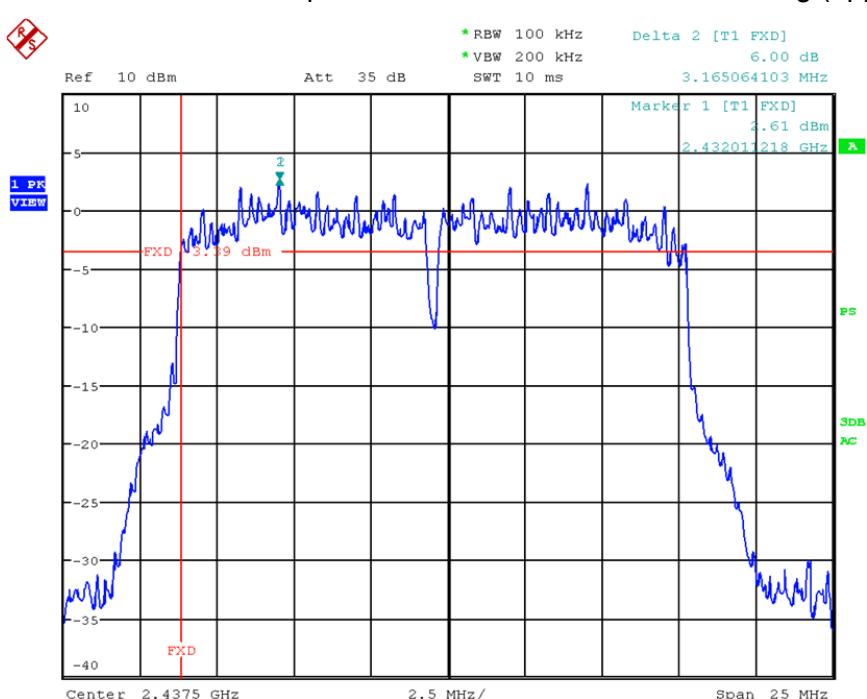
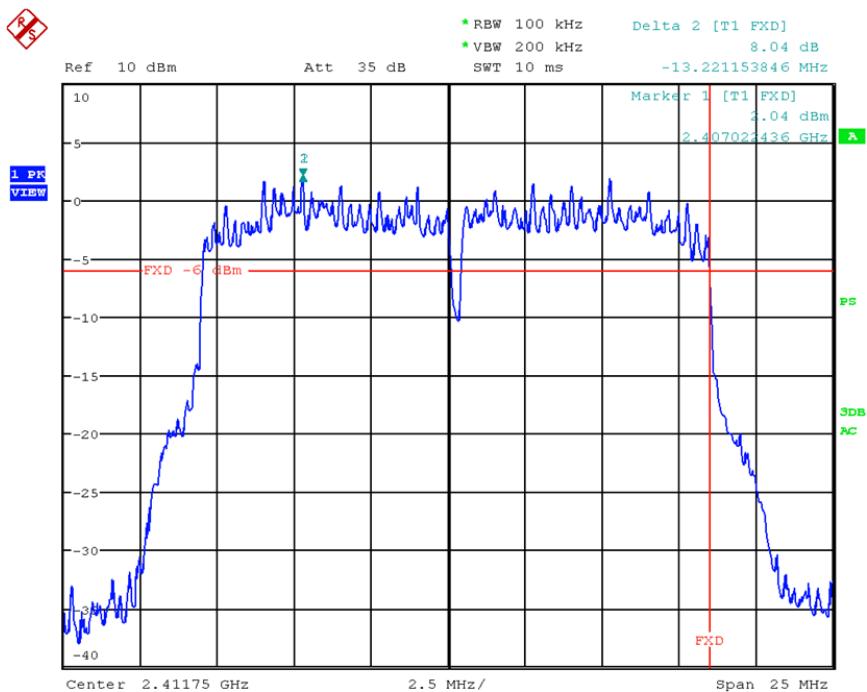
## 7.9 Test results (OFDM, 802.11g)

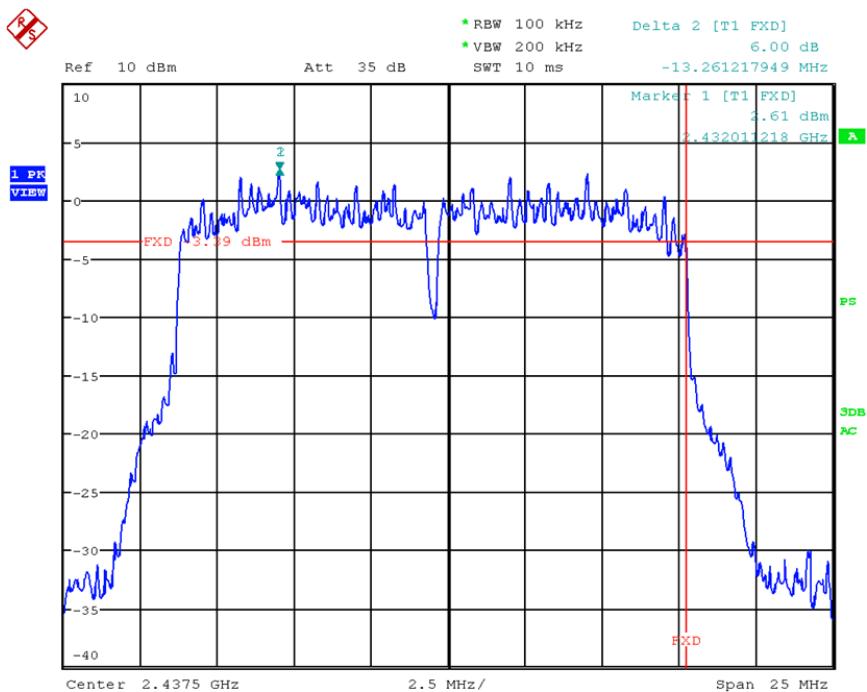
Temperature:	22°C	Humidity:	44%
Tested by:	M. Janker	Test date:	2011-07-28

Channel	Frequency (GHz)	6 dB bandwidth (MHz)	Min. limit (kHz)	Result
1	2.412	16.426	500	PASS
6	2.437	16.426	500	PASS
11	2.462	16.426	500	PASS

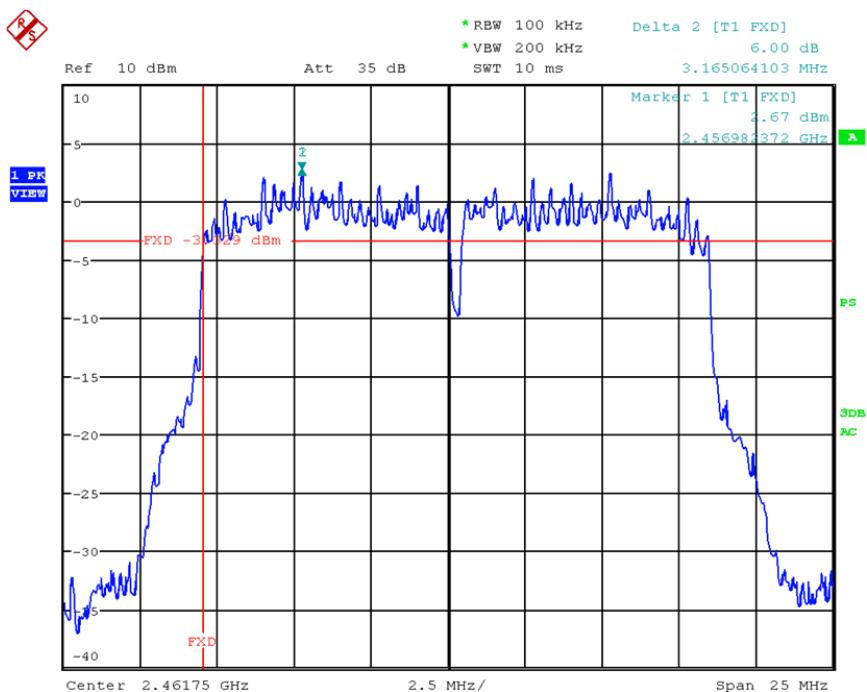


Picture 24: 6dB spectrum bandwidth channel 1, 802.11g (lower)

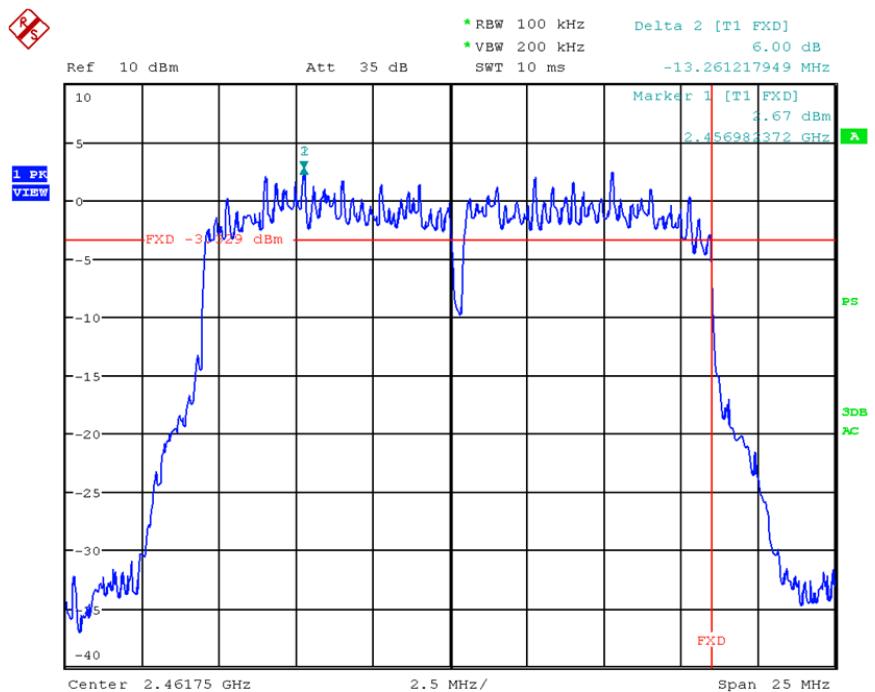




Picture 27: 6dB spectrum bandwidth channel 6, 802.11g (upper)



Picture 28: 6dB spectrum bandwidth channel 11, 802.11g (lower)

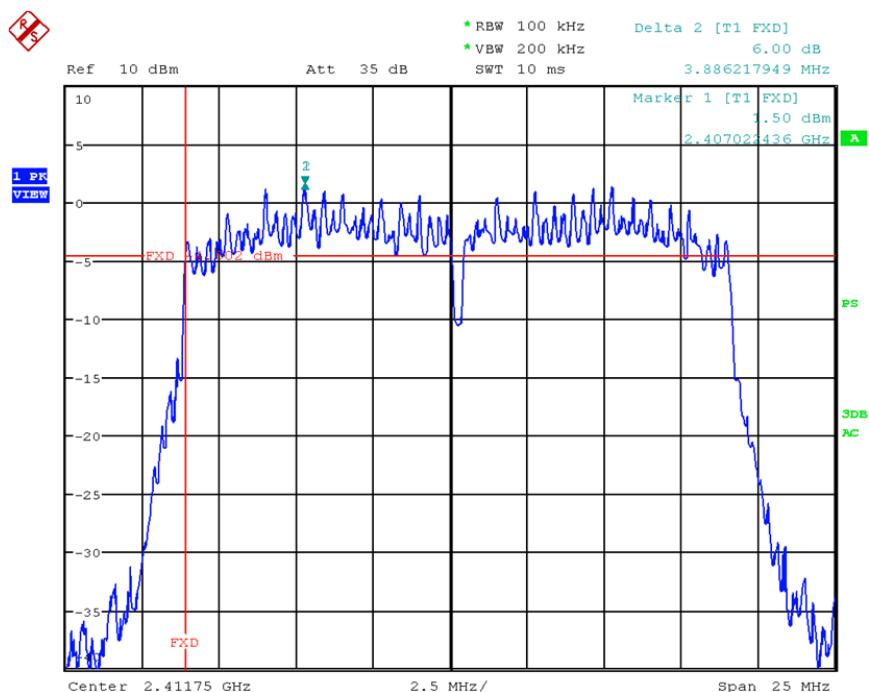


Picture 29: 6dB spectrum bandwidth channel 11, 802.11g (upper)

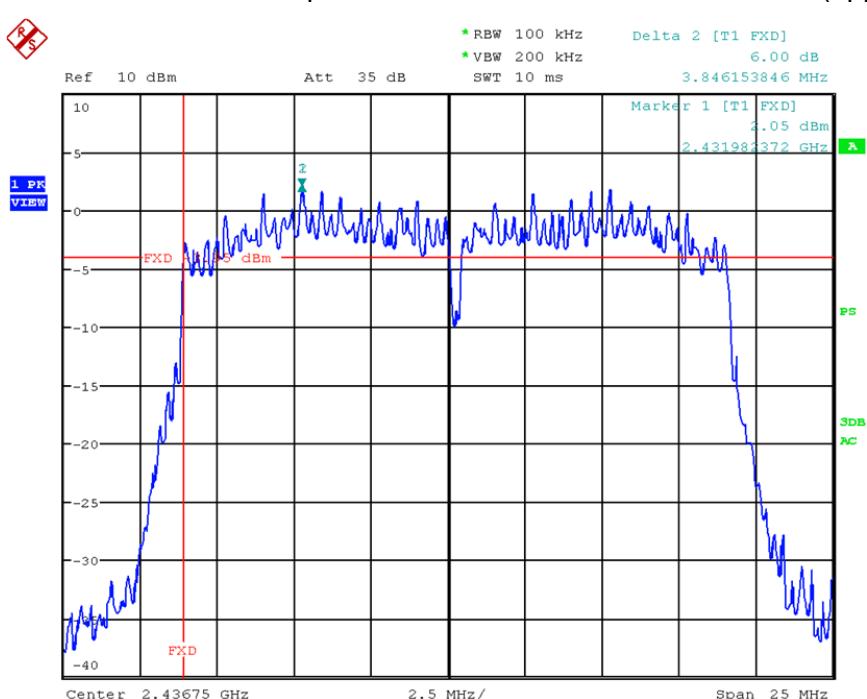
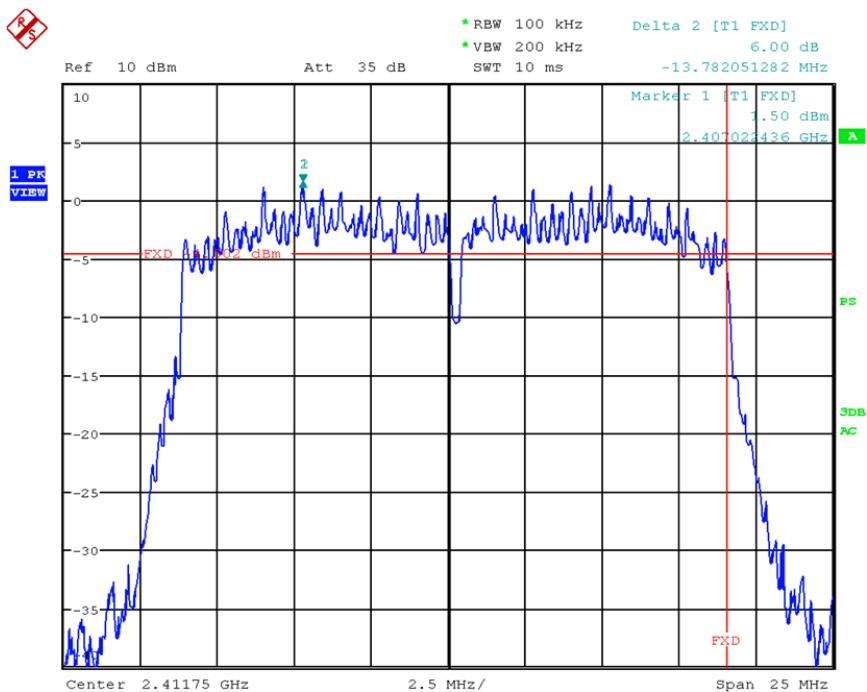
## 7.10 Test results (OFDM, 802.11n)

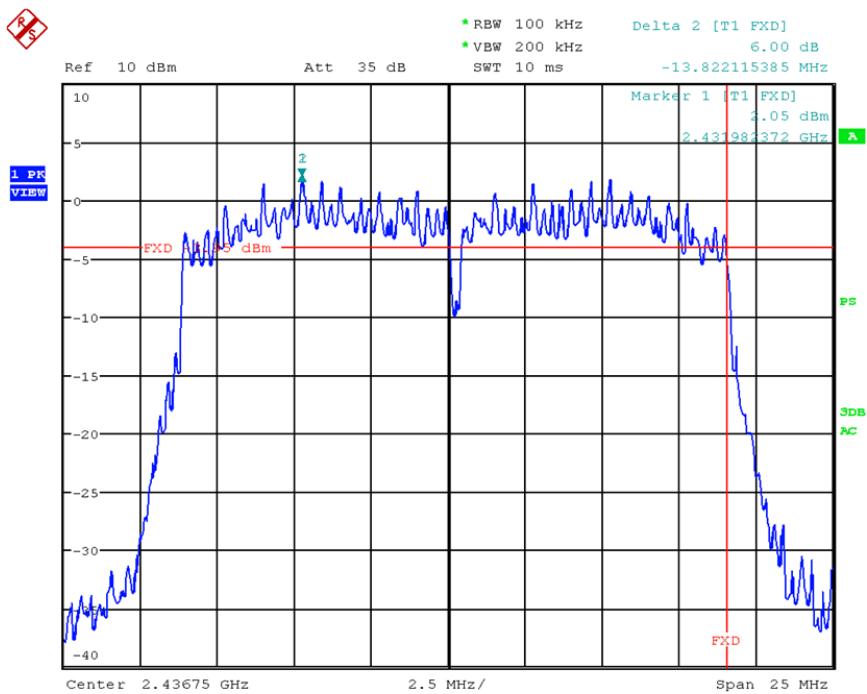
Temperature:	22°C	Humidity:	44%
Tested by:	M. Janker	Test date:	2011-07-28

Channel	Frequency (GHz)	6 dB bandwidth (MHz)	Min. limit (kHz)	Result
1	2.412	17.6682	500	PASS
6	2.437	17.6682	500	PASS
11	2.462	17.6682	500	PASS

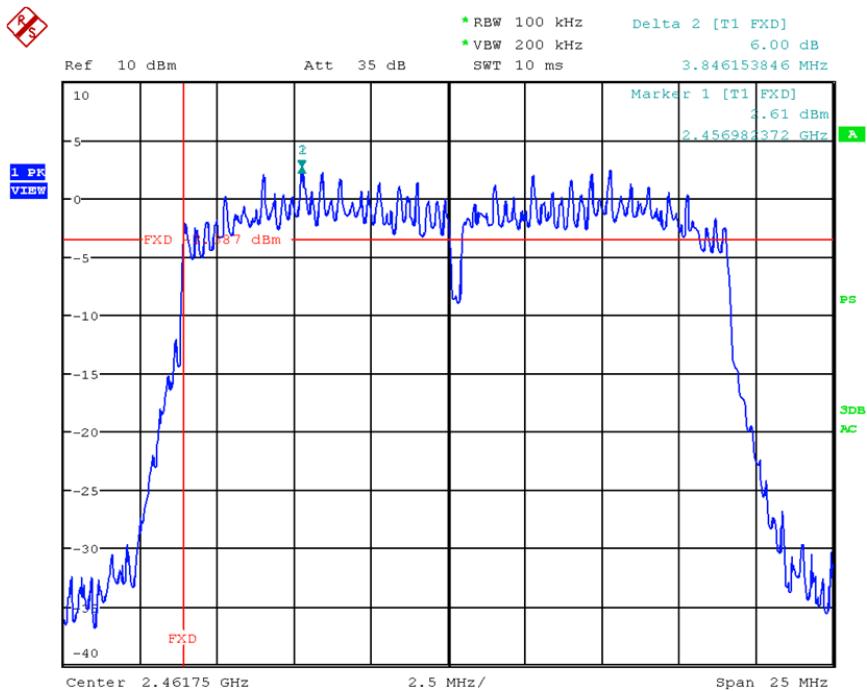


Picture 30: 6dB spectrum bandwidth channel 1, 802.11n (lower)

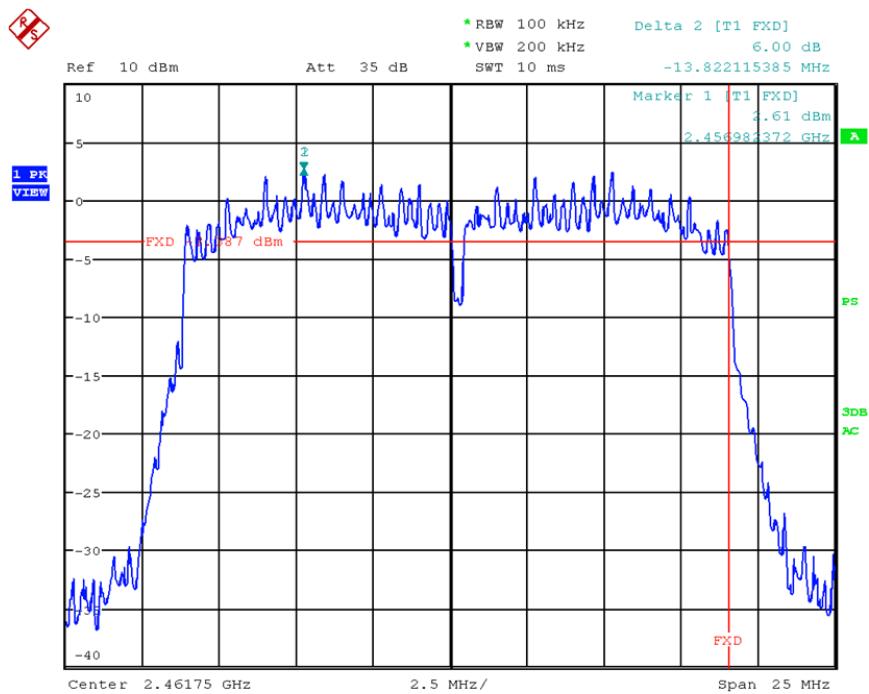




Picture 33: 6dB spectrum bandwidth channel 6, 802.11n (upper)



Picture 34: 6dB spectrum bandwidth channel 11, 802.11n (lower)



Picture 35: 6dB spectrum bandwidth channel 11, 802.11n (upper)

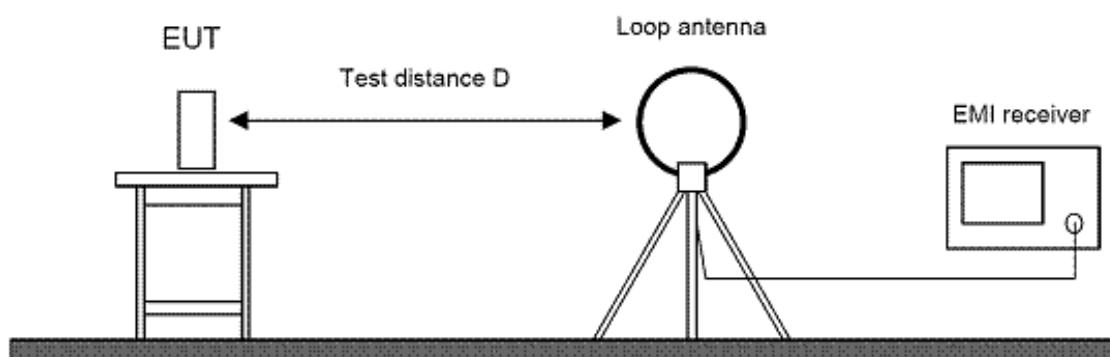


216 - 960	200	46	3
Above 960	500	54	3

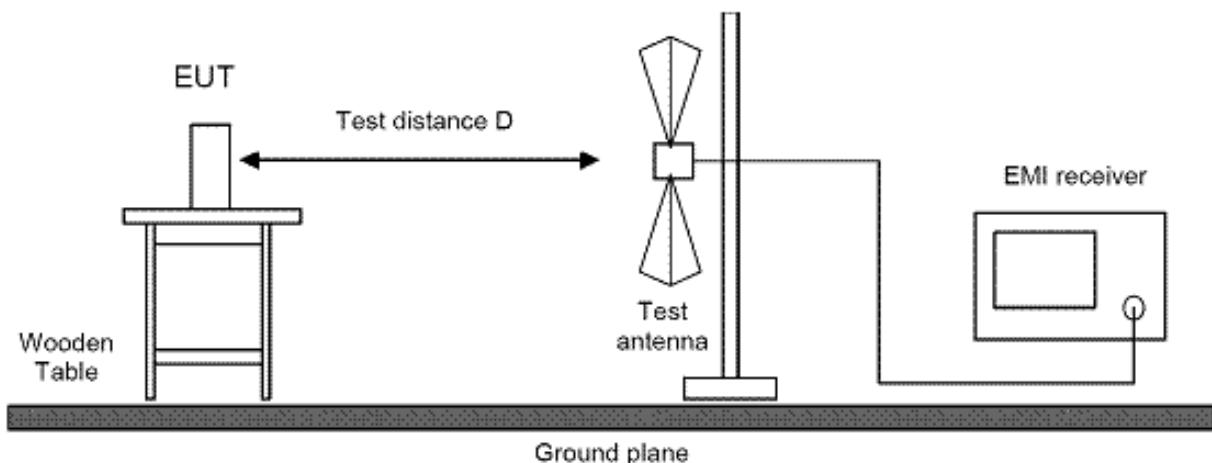
## 8.4 Test procedure

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The receiving antenna was placed 3 meters from the turntable. The test setup was placed inside a compact diagnostic chamber.
2. Power on the EUT and all peripherals.
3. The broadband antenna was set to vertical polarization.
4. The EMI receiver performed a scan from 30MHz to 1000MHz with the detector set to peak and the measurement bandwidth to 120 kHz.
5. The turn table was rotated to 6 different positions ( $360^\circ / 6$ ) and the antenna polarization was changed to horizontal.
6. Repeat the test procedure at step 4 and 5.
7. The test setup was then placed in an OATS at 3 m distance and all peak values over or with less distance to limit then 6dB were marked and re-measured with a quasi-peak detector.
8. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
9. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization. The highest value was recorded.
10. For emissions below 30MHz, measurements were done with a loop antenna. The recorded data were measured in QP mode of the receiver. The antenna height was not changed during this test.

## 8.5 Test setup



Picture 36: Test setup for radiated emission measurement (< 30 MHz)



Picture 37: Test setup for radiated emission measurement (< 1 GHz)

## 8.6 Test deviation

There is no deviation with the original standard.

## 8.7 EUT operation during test

The EUT was programmed to be in continuously transmitting mode.

## 8.8 Test results

### Radiated Emission Measurement 9 kHz – 30 MHz

Temperature:	22°C	Humidity:	44%
Tested by:	M. Janker	Test date:	2011-07-28

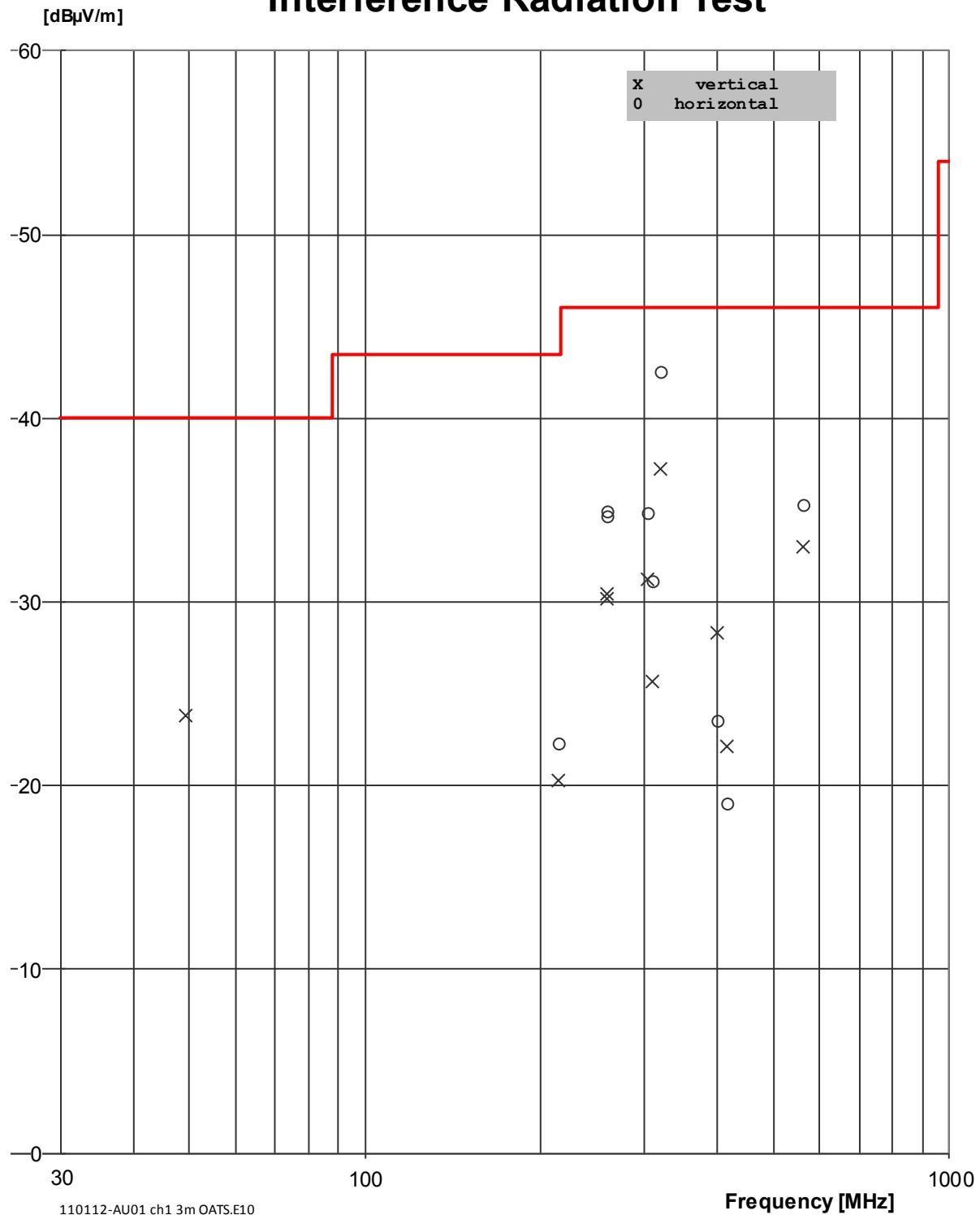
Frequency (MHz)	Reading (dB $\mu$ V/m)	Detector	Recalculation factor (dB/decade)	Field strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin	Result
-	-	-	-	-	-	-	See Note

Note: Amplitudes of spurious emissions that are attenuated more than 20 dB below the permissible limit are not reported.

$$\text{extrapolation factor} = 40 \cdot \log \left( \frac{\text{specified distance}}{\text{test distance}} \right)$$

limit line = specific limits (dB $\mu$ V) + distance extrapolation factor

## Interference Radiation Test



Picture 39: Radiated emission 30 MHz – 1000MHz (802.11b, Channel 1)

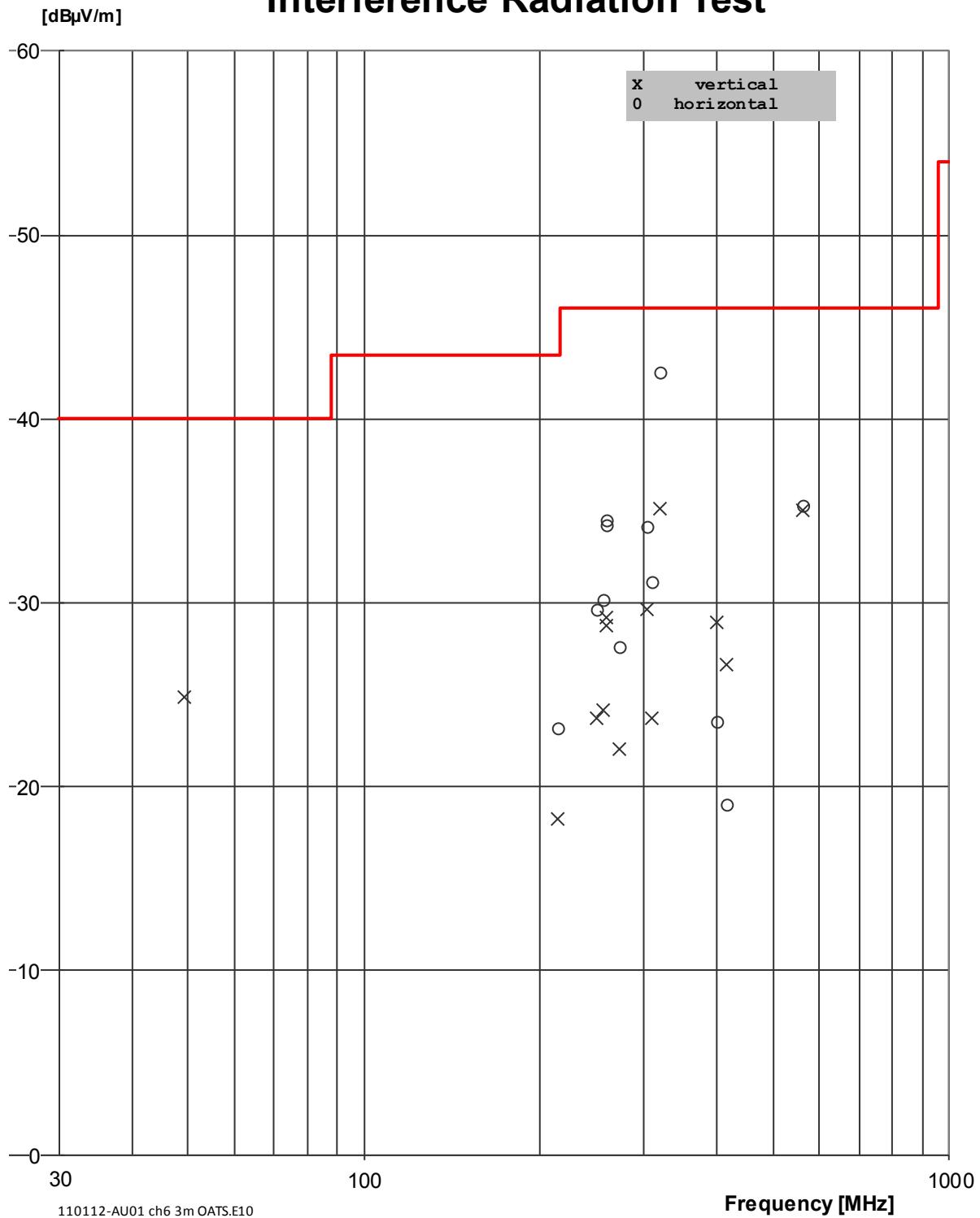


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Germany  
Revision: 1.1

Audivo GmbH  
WLAN audio module SeDMP3



## Interference Radiation Test



Picture 41: Radiated emission 30 MHz – 1000MHz (802.11b, Channel 6)



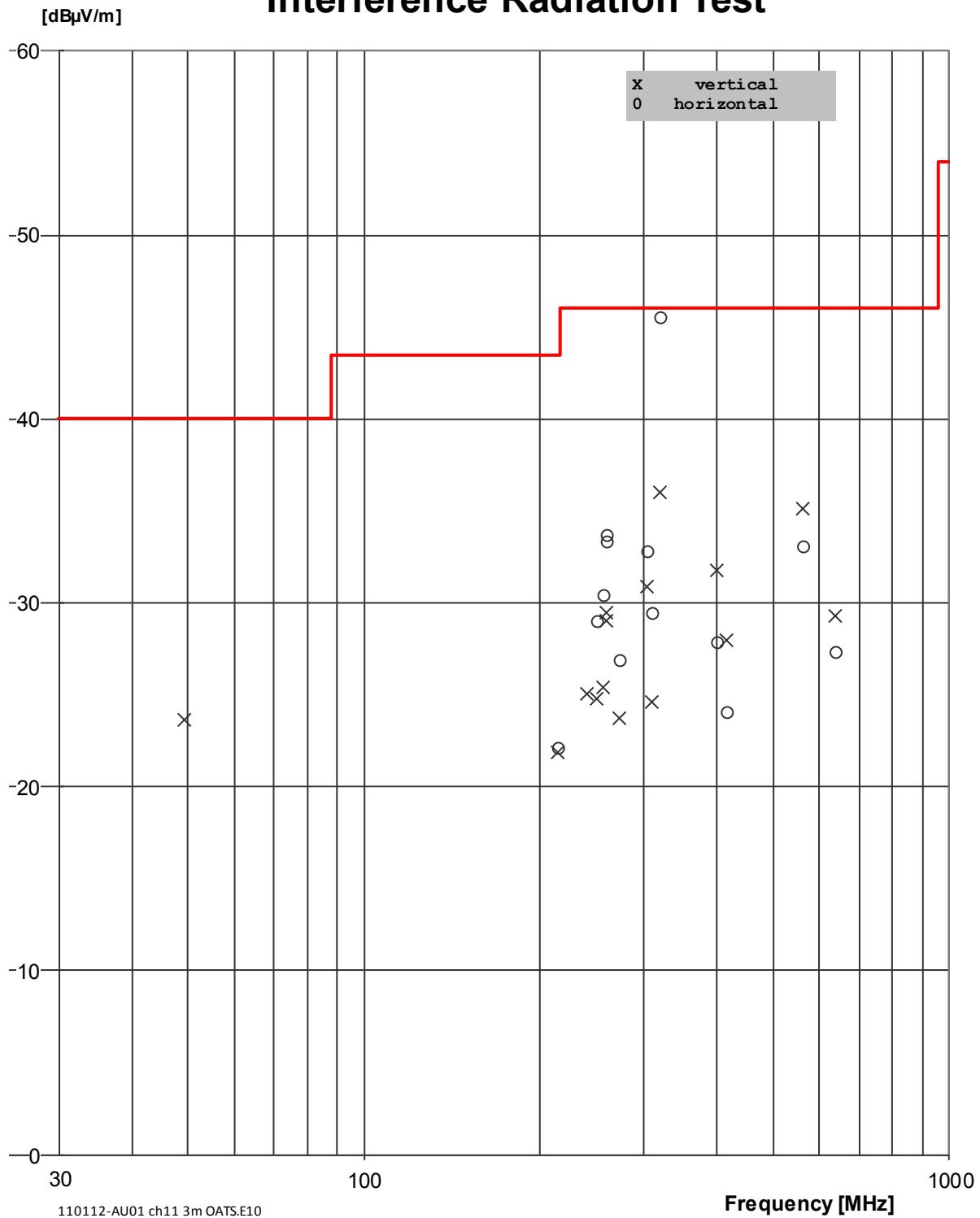
EMV **TESTHAUS** GmbH  
Gustav-Hertz-Straße 35  
94315 Straubing  
Germany  
Revision: 1.1

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## Interference Radiation Test



Picture 43: Radiated emission 30 MHz – 1000MHz (802.11b, Channel 11)



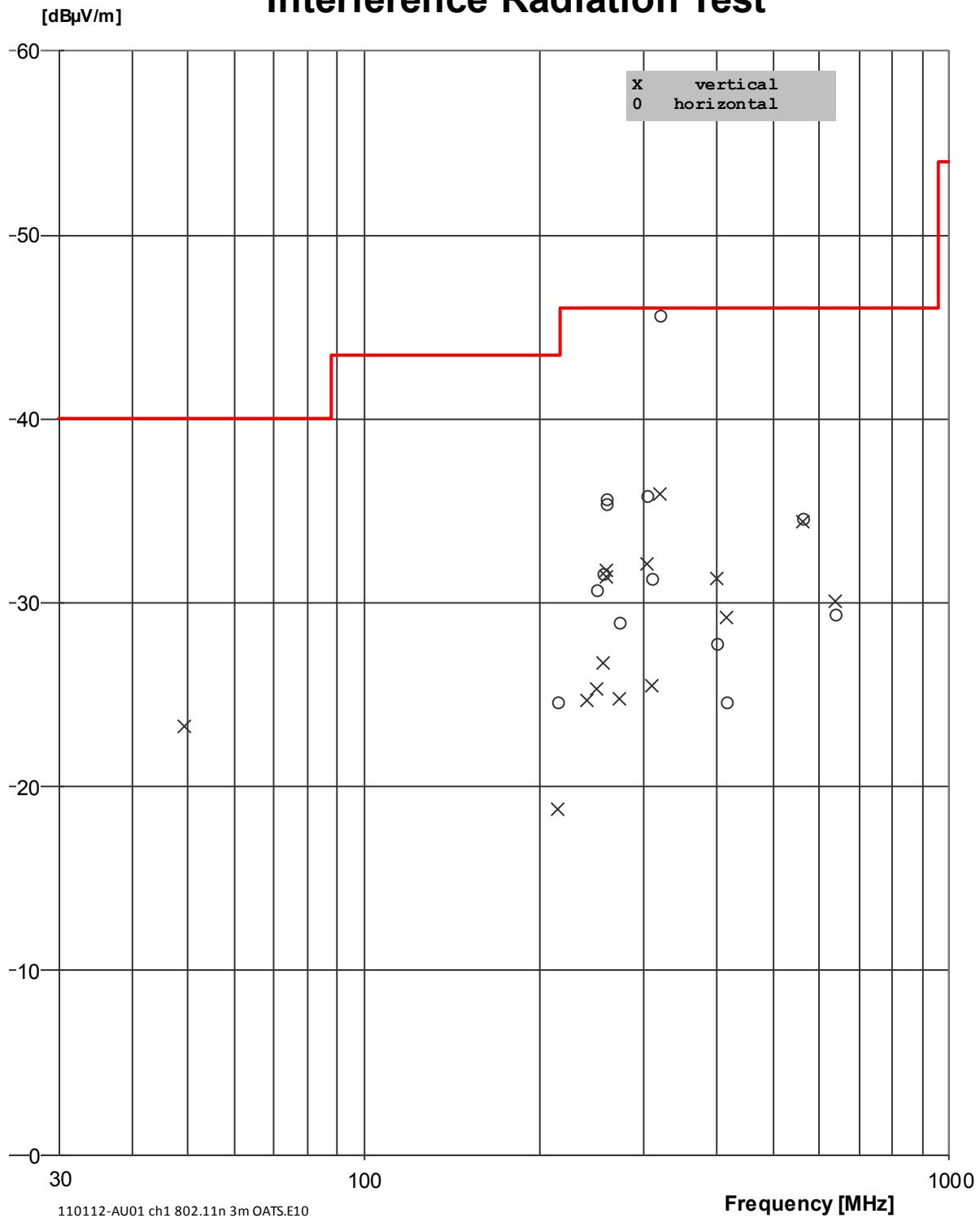
EMV **TESTHAUS** GmbH  
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## Interference Radiation Test



Picture 45: Radiated emission 30 MHz – 1000MHz (802.11g/n, Channel 1)



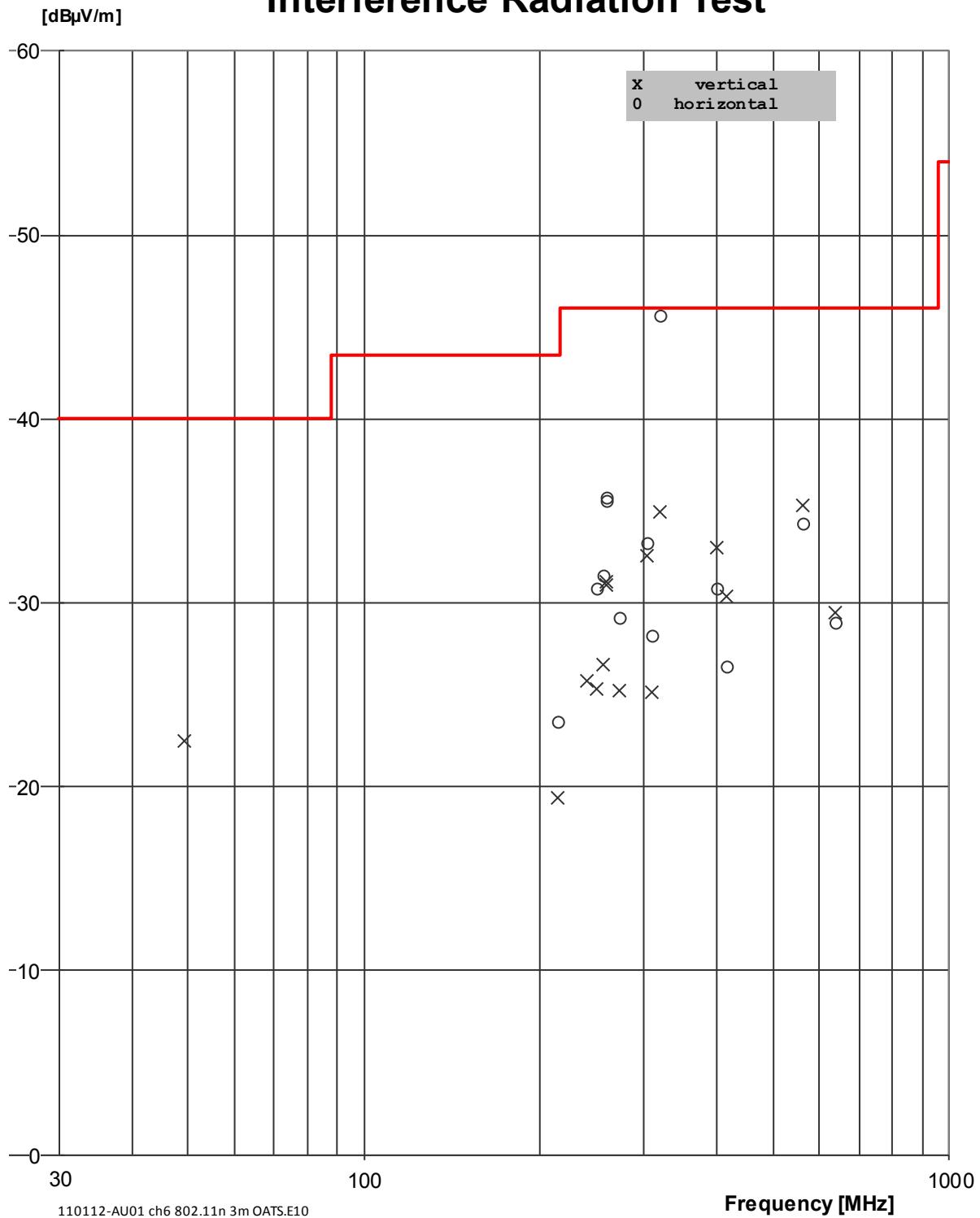
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94315 Straubing  
Germany  
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## Interference Radiation Test



Picture 47: Radiated emission 30 MHz – 1000MHz (802.11g/n, Channel 6)



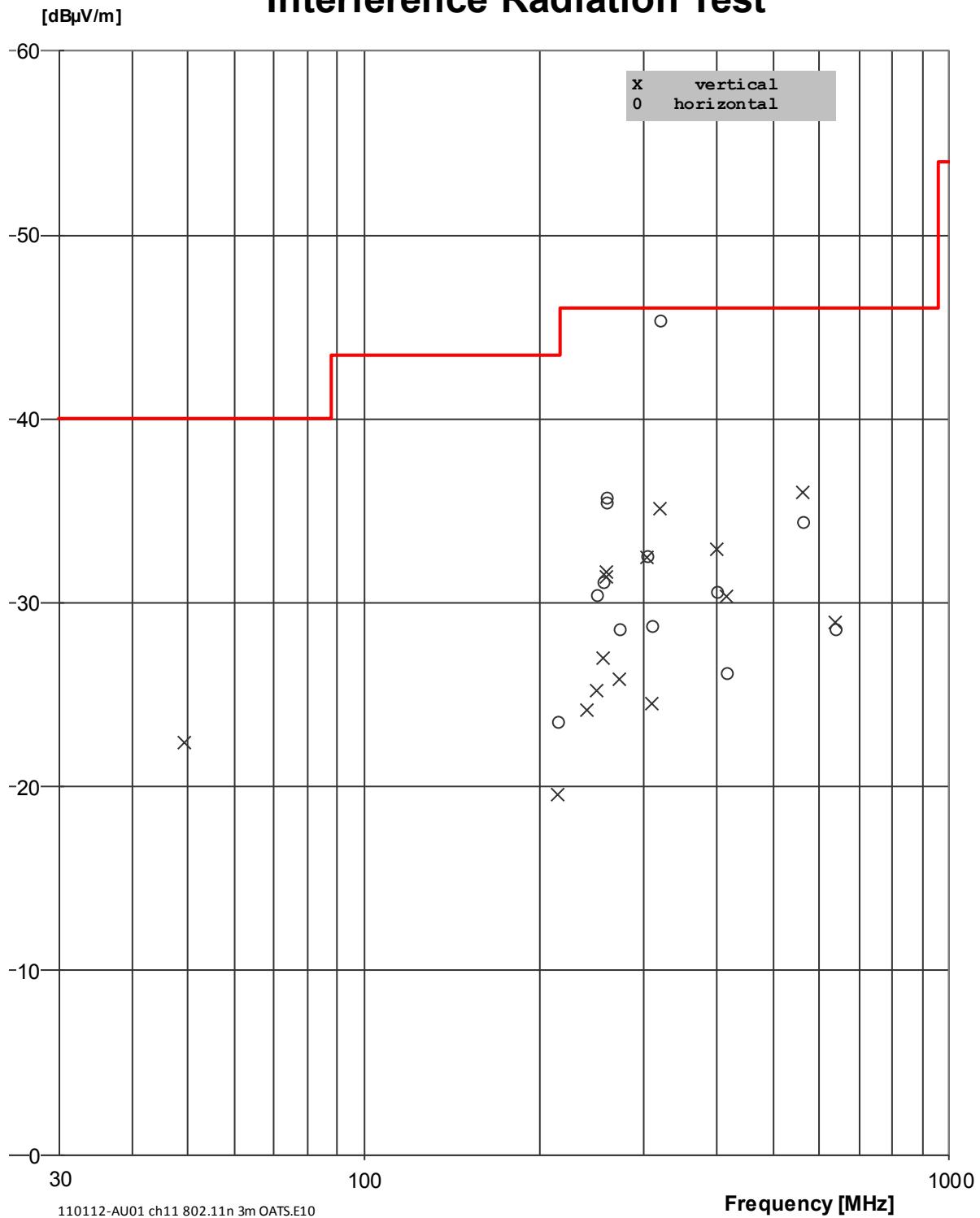
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## Interference Radiation Test



Picture 49: Radiated emission 30 MHz – 1000MHz (802.11g/n , Channel 11)



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## Receive Mode

Temperature:	23°C	Humidity:	40%
Tested by:	M. Janker	Test date:	2011-07-28

**Note: No significant emissions were detected in receive mode!**



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# 9 Radiated emission measurement (>1 GHz)

## according to CFR 47 Part 15, section 15.205(a), 15.209(a), 15.247(d)

### 9.1 Test location

- Scan with peak detector in 3 m anechoic chamber
- Final measurement with average and max peak detector.

Description	Manufacturer	Inventory No.
Anechoic chamber	EMV TESTHAUS GmbH	E00100

### 9.2 Test instruments

	Description	Manufacturer	Inventory No.
<input checked="" type="checkbox"/>	ESU26	Rohde & Schwarz	W00002
<input checked="" type="checkbox"/>	AMF-5D-00501800-28-13P	Parzich	W00089
<input type="checkbox"/>	AMF-6F-16002650-25-10P	Parzich	W00090
<input checked="" type="checkbox"/>	BBHA 9170	Schwarzbeck	W00054
<input type="checkbox"/>	BBHA 9170	Schwarzbeck	W00055
<input checked="" type="checkbox"/>	COSB 4-1-26	Conformitas	W00091

### 9.3 Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

 EMV TESTHAUS	EMV TESTHAUS GmbH Gustav-Hertz-Straße 35 94315 Straubing Germany Revision: 1.1	Audivo GmbH WLAN audio module SeDMP3
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Frequency [MHz]	Field strength Fs [ $\mu$ V/m]	Field strength [dB $\mu$ V/m]	Measurement distance d [m]
30 – 88	100	40	3
88 – 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

## 9.4 Test procedure

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The receiving antenna was placed 3 meters from the turntable. The test setup was placed inside a fully anechoic chamber.
2. Power on the EUT and all peripherals.
3. The broadband antenna was set to vertical polarization.
4. The EMI receiver performed a scan from 1000 MHz to 10<sup>th</sup> harmonic of the fundamental frequency with the detector set to peak and the measurement bandwidth set to 1 MHz (VBW  $\geq$  1 MHz). The trace data was recorded with the receiver Max Hold function.
5. The turn table was rotated in intervals of 15°.
6. After a full 360°-turn the antenna polarization was changed to horizontal and the test was repeated at step 4 and 5.
7. If the emission level of the EUT measured in peak mode was attenuated more than 3 dB below the average limit, then testing will be stopped and the peak values of the EUT will be reported. Otherwise the emissions will be measured in average mode and reported.
8. After the scan suspicious frequencies were selected and the RBW was set to 1 MHz and the VBW was set to 10Hz and the detector was changed to average reading.
9. The receiving antenna was set to vertical polarization.
10. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
11. The receiving antenna was then set to horizontal polarization and the measurement was repeated at step 9.
12. The highest recorded level was noted.

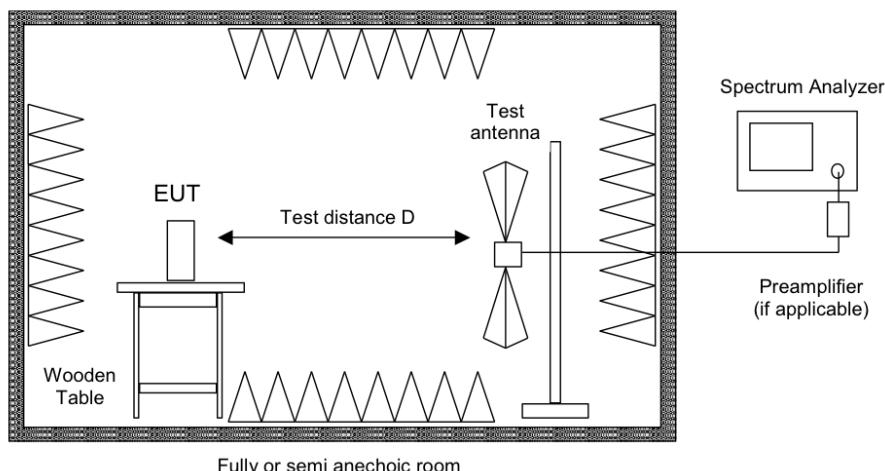
Above 16 GHz the test antenna was set to a distance of 1.5 m. An extrapolation factor was added to the spectrum analyzer to extrapolate the emission to the specified distance.

$$\text{Extrapolation factor} = 20 \cdot \log\left(\frac{3m}{1.5m}\right)$$

$$\text{Limit line} = \text{specific limit} + \text{extrapolation factor}$$



## 9.5 Test setup



Picture 53: Test setup for radiated emission measurement (> 1 GHz)

## 9.6 Test deviation

There is no deviation with the original standard.

## 9.7 EUT operation during test

The EUT was programmed to be in continuously transmitting mode.

## 9.8 Test results 802.11b

Temperature:	22°C	Humidity:	44%
Tested by:	M. Janker	Test date:	2011-09-26

### Channel 1

Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
7.2308	46.69	PK	53.98	-7.29	PASS
9.6394	44.11	PK	53.98	-9.87	PASS
14.9673	46.20	PK	53.98	-7.78	PASS
19.2885	42.62	PK	53.98	-11.36	PASS

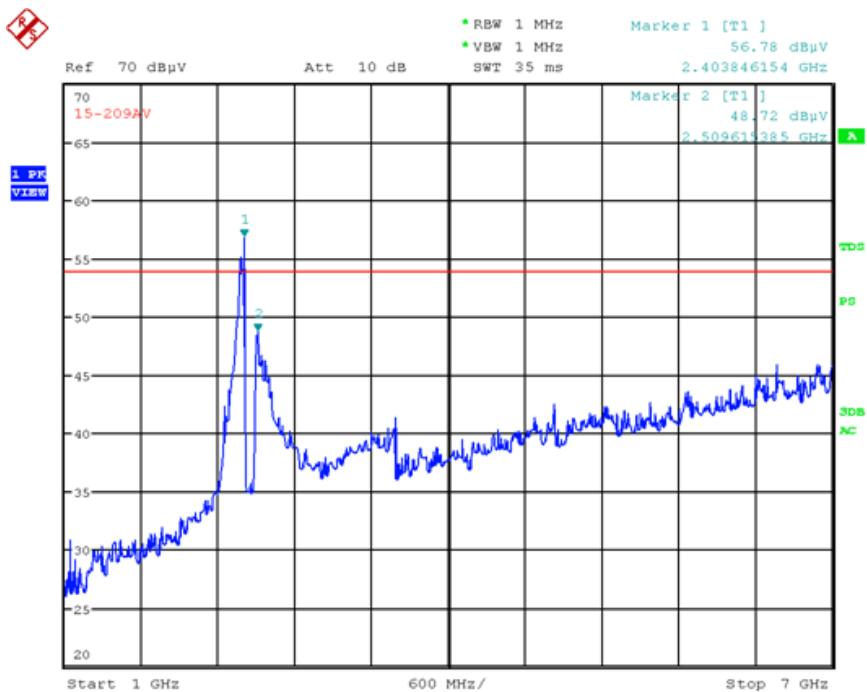
### Channel 6

Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
See Note					

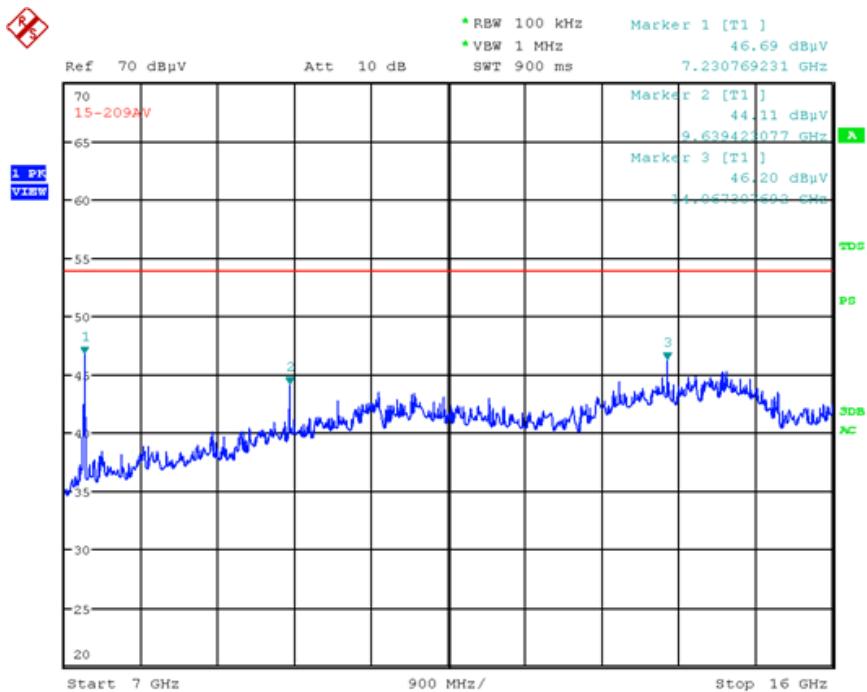
### Channel 11

Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
See Note					

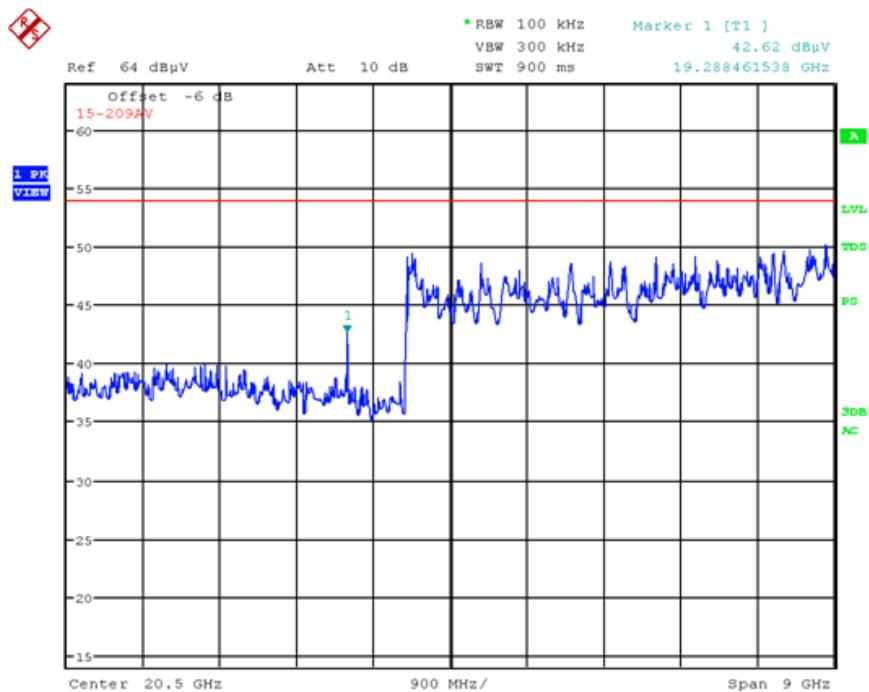
Note: All spurious/harmonics emissions that are attenuated to noise floor of the spectrum analyzer or 20dB below the specific limit are not reported. The emissions at band edges are documented separately.



Picture 54: Spurious emissions channel 1, 1 GHz-7 GHz (Overview scan)



Picture 55: Spurious emissions channel 1, 7 GHz-16 GHz (overview scan)



Picture 56: Spurious emissions channel 1, 16 GHz-25 GHz (overview scan)

## 9.9 Test results 802.11g

Temperature:	22°C	Humidity:	44%
Tested by:	M. Janker	Test date:	2011-09-26

### Channel 1

Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
7.2308	46.08	PK	53.98	-7.9	PASS

### Channel 6

Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
See Note					

### Channel 11

Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
See Note					

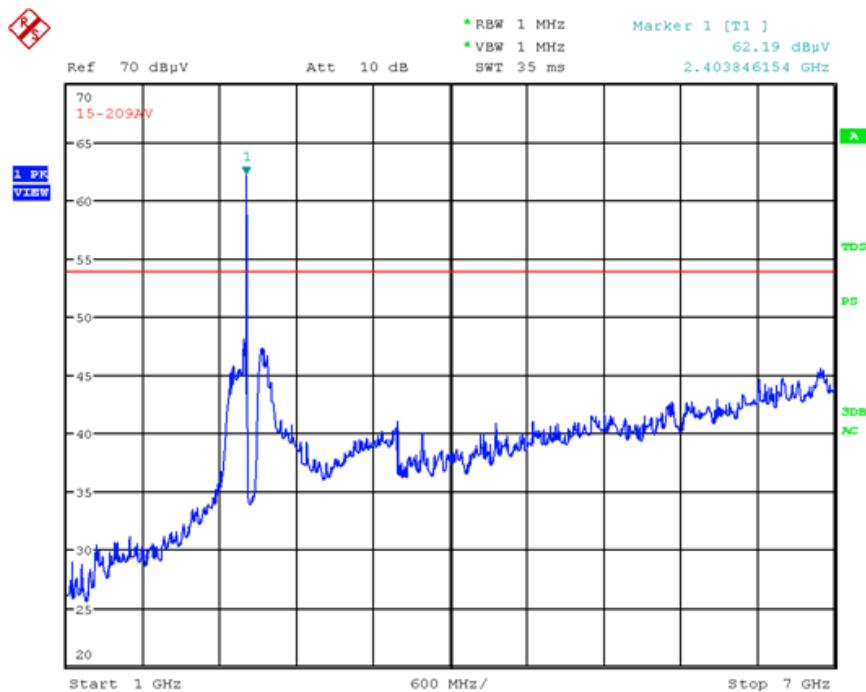
Note: All spurious/harmonics emissions that are attenuated to noise floor of the spectrum analyzer or 20dB below the specific limit are not reported. The emissions at band edges are documented separately.



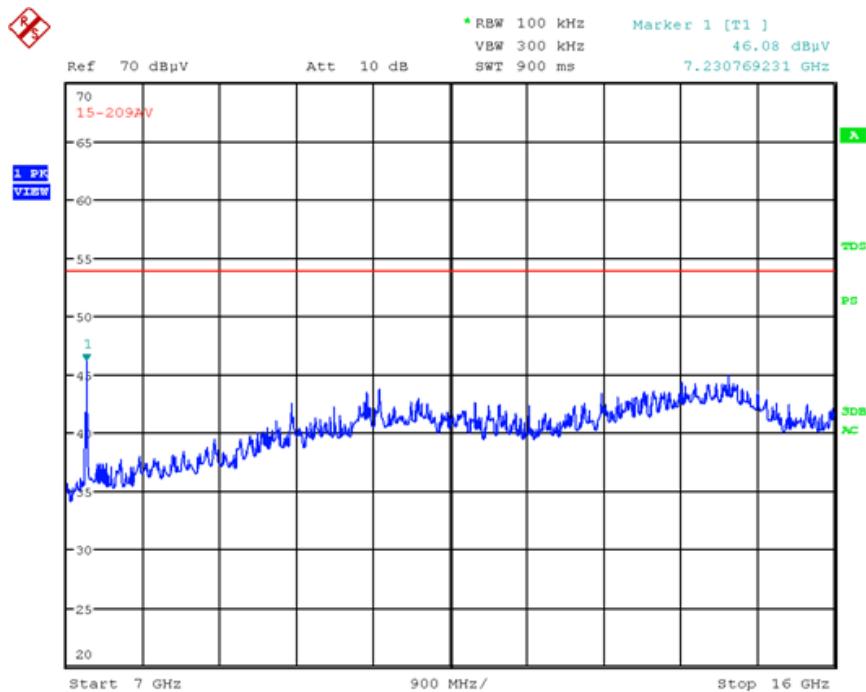
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Gustav-Hertz-Straße 35  
94315 Straubing  
Germany  
Revision: 1.1

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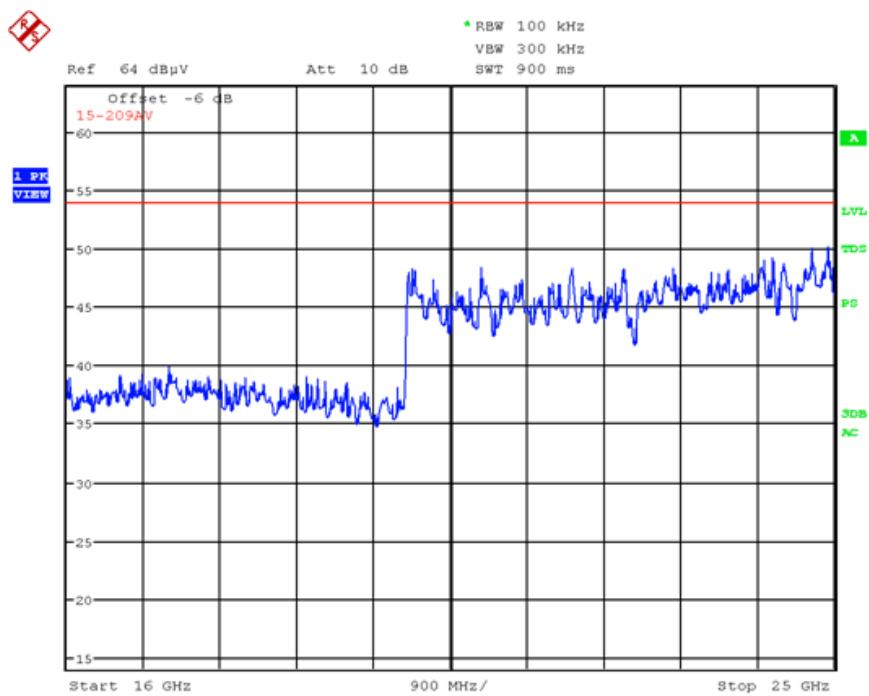
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Picture 57: Spurious emissions channel 1, 1 GHz-7 GHz (overview scan)



Picture 58: Spurious emissions channel 1, 7 GHz-16 GHz (overview scan)



Picture 59: Spurious emissions channel 1, 16 GHz-25 GHz (overview scan)

## 9.10 Test results 802.11n

Temperature:	22°C	Humidity:	44%
Tested by:	M. Janker	Test date:	2011-09-26

### Channel 1

Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
7.2308	44.45	PK	53.98	-9.53	PASS

### Channel 6

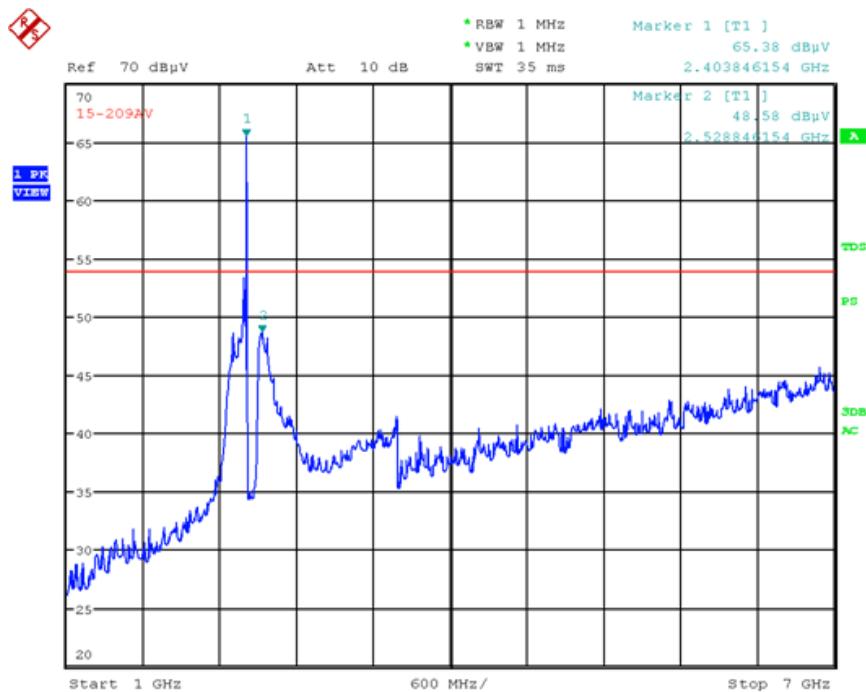
Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
See Note					

### Channel 11

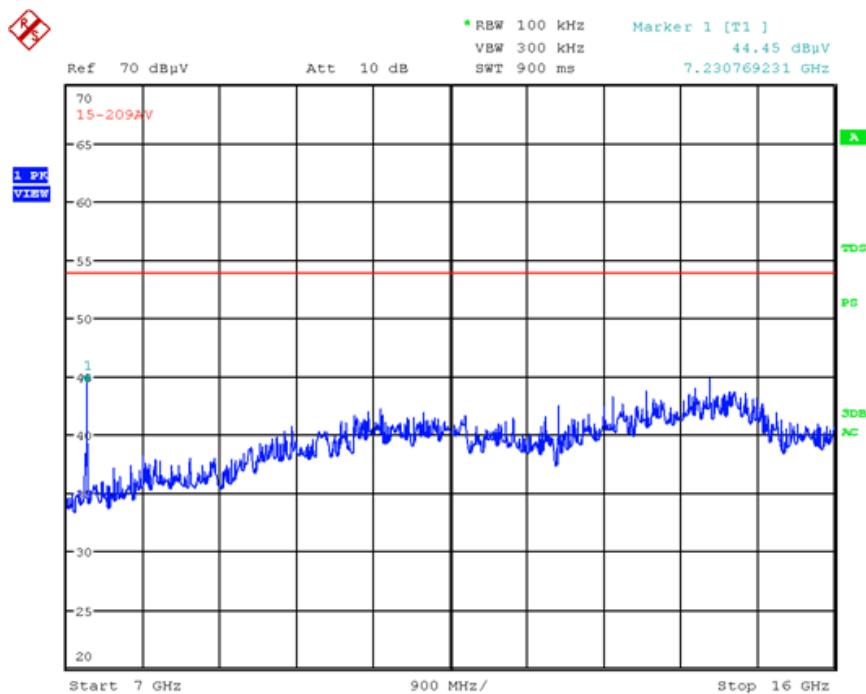
Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
19.6923	42.53	PK	53.98	-11.45	PASS

Note: All spurious/harmonics emissions that are attenuated to noise floor of the spectrum analyzer or 20dB below the specific limit are not reported. The emissions at band edges are documented separately.

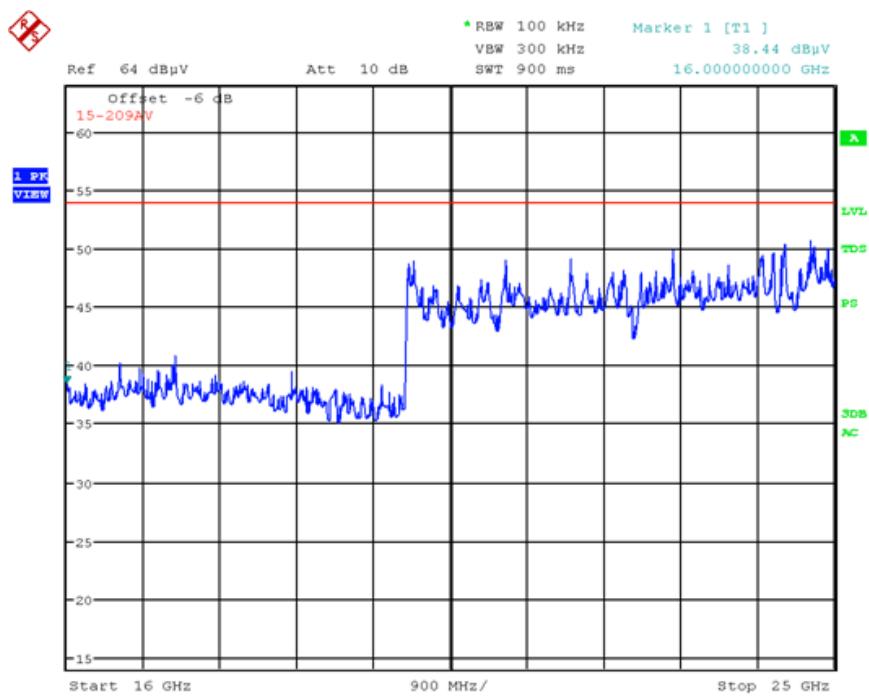




Picture 60: Spurious emissions channel 1, 1 GHz-7 GHz (overview scan)



Picture 61: Spurious emissions channel 1, 7 GHz-16 GHz (overview scan)



Picture 62: Spurious emissions channel 1, 16 GHz-25 GHz (overview scan)

# 10 Band edge measurement

according to CFR 47 Part 15, section 15.205(a), 15.209(a), 15.247(d)

## 10.1 Test location

- Scan with peak detector in 3 m anechoic chamber
- Final measurement with average and max peak detector.

Description	Manufacturer	Inventory No.
Anechoic chamber	EMV TESTHAUS GmbH	E00100

## 10.2 Test instruments

	Description	Manufacturer	Inventory No.
<input checked="" type="checkbox"/>	ESU26	Rohde & Schwarz	W00002
<input checked="" type="checkbox"/>	AMF-5D-00501800-28-13P	Parzich	W00089
<input type="checkbox"/>	AMF-6F-16002650-25-10P	Parzich	W00090
<input checked="" type="checkbox"/>	BBHA 9170	Schwarzbeck	W00054
<input type="checkbox"/>	BBHA 9170	Schwarzbeck	W00055
<input checked="" type="checkbox"/>	COSB 4-1-26	Conformitas	W00091

## 10.3 Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

## 10.4 Test procedure

1. The test procedure is the same as in 9.4. The investigated frequency range is limited to 100 MHz around band edge emissions.

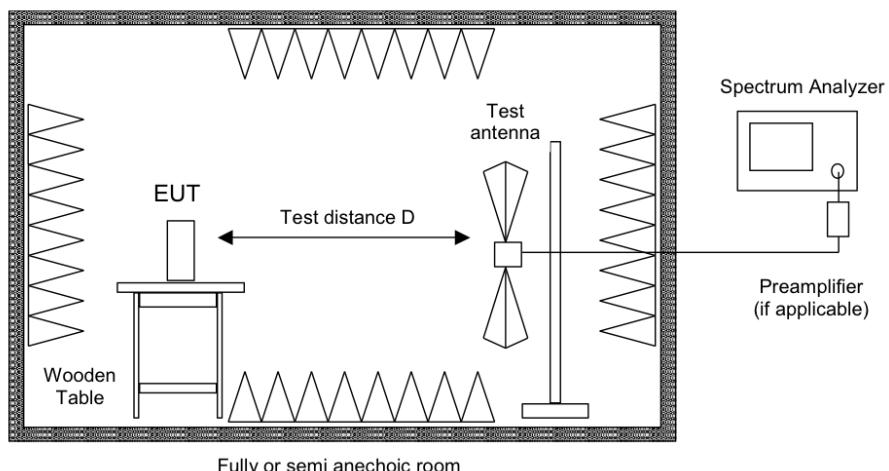


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## 10.5 Test setup



Picture 63: Test setup for radiated emission measurement (> 1 GHz)

## 10.6 Test deviation

There is no deviation with the original standard.

## 10.7 EUT operation during test

The EUT was programmed to be in continuously transmitting mode.

## 10.8 Test results 802.11b

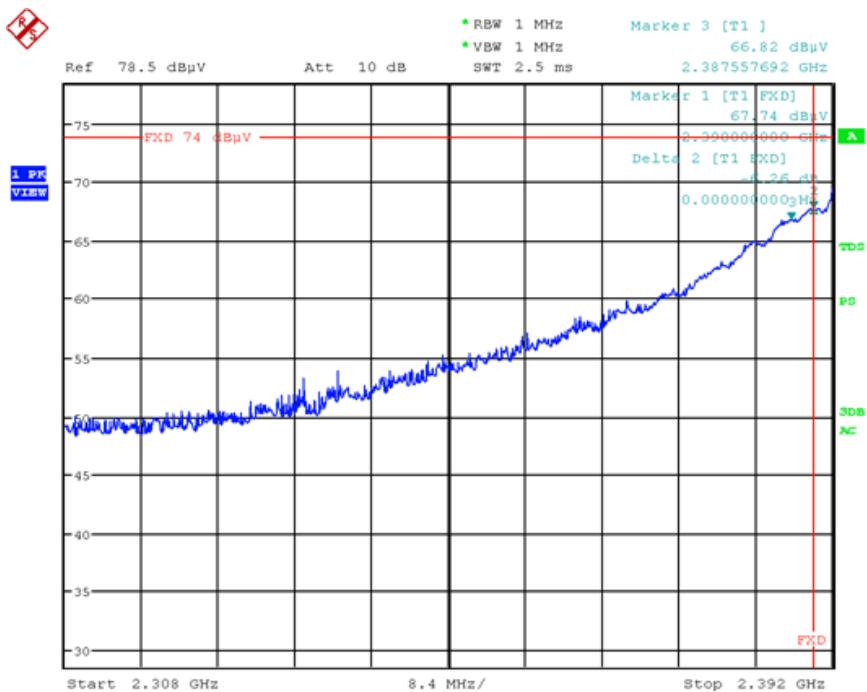
Temperature:	22°C	Humidity:	44%
Tested by:	M. Janker	Test date:	2011-09-26

### Channel 1

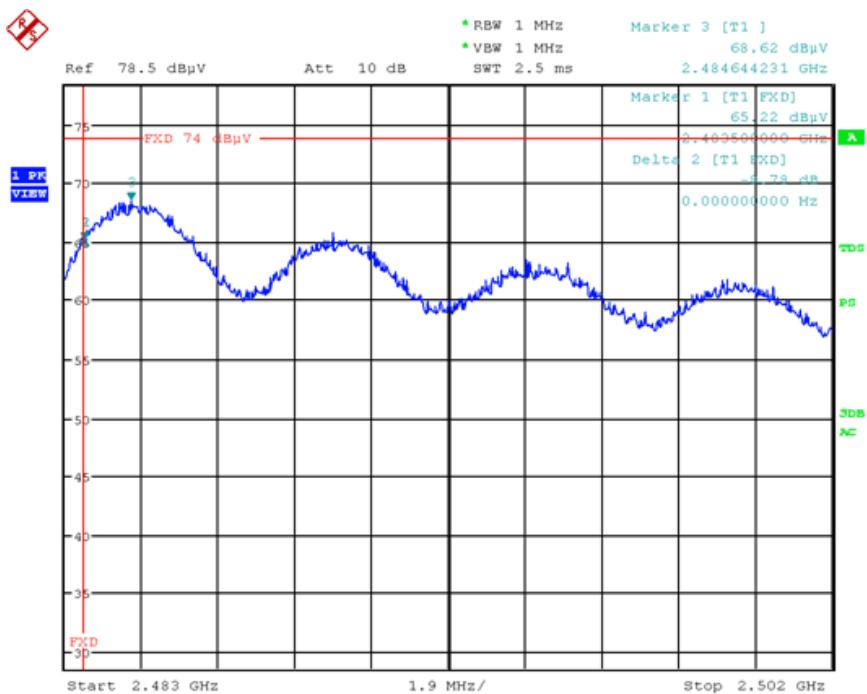
Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
2.3876	66.82	PK	73.98	-7.16	PASS
2.3876	47.21	AV	53.98	-6.77	PASS
2.3900	67.74	PK	73.98	-6.24	PASS
2.3900	45.66	AV	53.98	-8.32	PASS

### Channel 11

Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
2.4835	65.22	PK	73.98	-8.76	PASS
2.4835	47.94	AV	53.98	-6.04	PASS
2.4846	68.62	PK	73.98	-5.36	PASS
2.4846	46.22	AV	53.98	-7.76	PASS



Picture 64: Low band edge 802.11b, channel 1



Picture 65: High band edge 802.11b, channel 11

## 10.9 Test results 802.11g/n

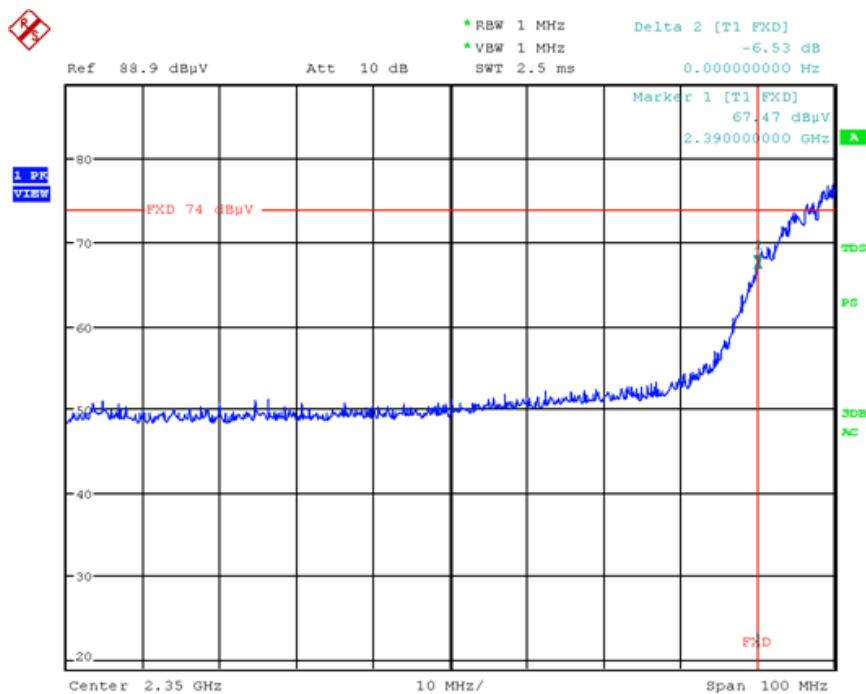
Temperature:	22°C	Humidity:	44%
Tested by:	M. Janker	Test date:	2011-09-26

### Channel 1

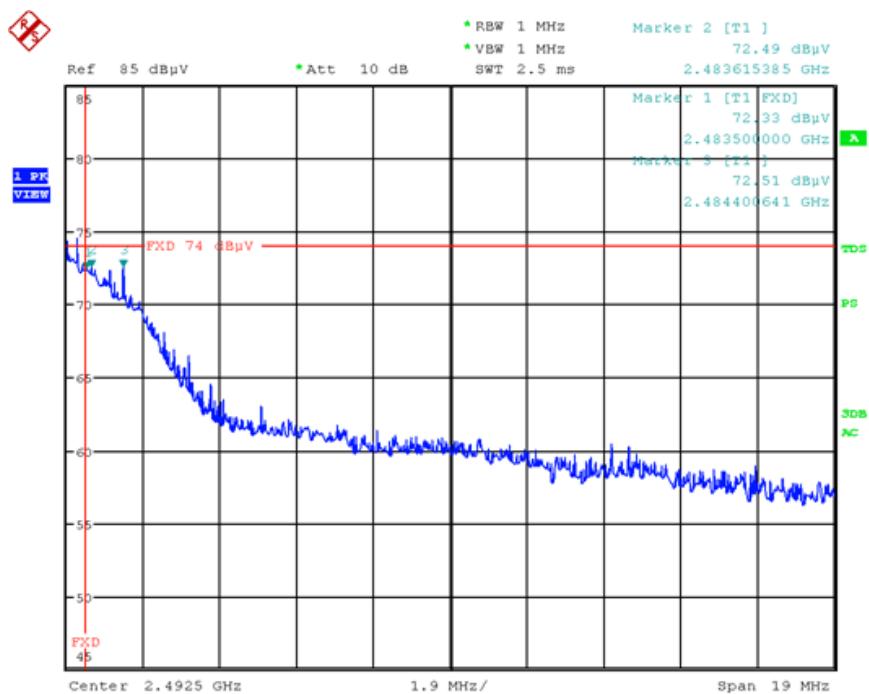
Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
2.3900	67.47	PK	73.98	-6.51	PASS
2.3900	47.03	AV	53.98	-6.95	PASS

### Channel 11

Frequency (GHz)	Reading (dB $\mu$ V/m)	Detector	Limit (dB $\mu$ V/m)	Margin	Result
2.4835	72.33	PK	73.98	-1.65	PASS
2.4835	52.86	AV	53.98	-1.12	PASS



Picture 66: Low band edge 802.11g/n, channel 1



Picture 67: High band edge 802.11g/n, channel 11

## 12 Equipment calibration status

Inventory Number	Model Number	Manufacturer	Last calibration	Next calibration	Cycle of calibration
W00002	ESU26	Rohde & Schwarz	Sep 2009	Sep 2011	2 Years
E00001	ESCI	Rohde & Schwarz	July 2011	Sep 2011	2 Years
E00003	ESCS 30	Rohde & Schwarz	Oct 2010	Oct 2012	1 Year
E00004	ESH 2-Z5	Rohde & Schwarz	Jan 2011	Jan 2013	2 Years
E00005	ESH 2-Z5	Rohde & Schwarz	Sep 2009	Sep 2011	2 Years
E00060	HFH2-Z2	Rohde & Schwarz	Oct 2008	Oct 2011	4 Years*
E00011	VULB 9160	Schwarzbeck	Sep 2009	Sep. 2011	2 Years
E00012	VULB 9163	Schwarzbeck	Mar 2011	Mar 2012	1 Years
C00015	VC <sup>3</sup> 4034	Vötsch	Aug 2010	Aug 2014	4 Years*

Table 1: Equipment Calibration status

\* Equipment is not used often and the maintenance and calibration interval of these equipment is subject to special precautions of the quality management.



# 13 Measurement uncertainty

Description	Max. deviation	k=
Conducted emission AMN (9kHz to 30 MHz)	± 4,0 dB	2
Radiated emission open field (30 MHz to 1 GHz)	± 4,5 dB	2
Radiated emission absorber chamber <td>± 5,4 dB</td> <td>2</td>	± 5,4 dB	2

Table 2: Measurement uncertainty

Comment: The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor k. If k=2 the value of the measurements lies within the assigned range of values with a probability of 95 %.



## 14 Summary

The EMC Regulations according to the marked specifications are

**KEPT**

The EUT does fulfill the general approval requirements mentioned.

**NOT KEPT**

The EUT does not fulfill the general approval requirements mentioned.

Place, Date: Straubing, September 29, 2011



Marco Janker  
Test engineer  
EMV **TESTHAUS** GmbH



Markus Biberger  
Technical executive  
EMV **TESTHAUS** GmbH



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Revision: 1.1

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