



FCC ID: U9A277IWLAN-V200

Registration No. DAT-P-207/05

# EMI -- TEST REPORT

- FCC Part 15.407 -

|  |               |
|--|---------------|
| <b>Test Report No. :</b> <b>T33234-03-02AA</b> | 26. May 2009  |
|  | Date of issue |

Type / Model Name : SIMATIC Mobile Panel 277F IWLAN / 277 IWLAN

Product Description : Mobile Human Machine Interface

**Applicant** : Siemens AG

Address : Werner-von-Siemens-Str. 50  
92224 Amberg

**Manufacturer** : Siemens AG, Industry Sector, I IA AS EWA

Address : Werner-von-Siemens-Str. 50  
92224 Amberg

**Licence holder** : Siemens AG, Industry Sector, I IA AS RD ST TT

Address : Werner-von-Siemens-Str. 50  
92224 Amberg

|  |                 |
|--|-----------------|
| <b>Test Result</b> according to the standards listed in clause 1 test standards: | <b>Positive</b> |
|--|-----------------|



DAT-P-207/05-00

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

# Contents

|          |   |           |
|----------|---|-----------|
| <b>1</b> | <b><u>TEST STANDARDS</u></b>                                      | <b>3</b>  |
| <b>2</b> | <b><u>SUMMARY</u></b>   | <b>4</b>  |
| <b>3</b> | <b><u>EQUIPMENT UNDER TEST</u></b>                                | <b>7</b>  |
| 3.1      | PHOTO DOCUMENTATION OF THE EUT – DETAILED PHOTOS SEE ATTACHMENT A | 7         |
| 3.2      | POWER SUPPLY SYSTEM UTILISED                                      | 7         |
| 3.3      | TEST SETUP  | 7         |
| 3.4      | SHORT DESCRIPTION OF THE EQUIPMENT UNDER TEST (EUT)               | 8         |
| <b>4</b> | <b><u>TEST ENVIRONMENT</u></b>                                    | <b>9</b>  |
| 4.1      | ADDRESS OF THE TEST LABORATORY                                    | 9         |
| 4.2      | ENVIRONMENTAL CONDITIONS  | 9         |
| 4.3      | STATEMENT OF THE MEASUREMENT UNCERTAINTY                          | 9         |
| 4.4      | MEASUREMENT PROTOCOL FOR FCC, VCCI AND AUSTEL                     | 10        |
| <b>5</b> | <b><u>TEST CONDITIONS AND RESULTS</u></b>                         | <b>11</b> |
| 5.1      | CONDUCTED EMISSIONS   | 11        |
| 5.2      | 26 dB EMISSION BANDWIDTH  | 15        |
| 5.3      | MAXIMUM CONDUCTED OUTPUT POWER                                    | 19        |
| 5.4      | UNDISERABLE EMISSIONS   | 21        |
| 5.5      | PEAK POWER SPECTRAL DENSITY                                       | 35        |
| 5.6      | PEAK EXCURSION  | 38        |
| 5.7      | FREQUENCY STABILITY MEASUREMENT                                   | 42        |
| 5.8      | MAXIMUM PERMISSIBLE EXPOSURE (MPE)                                | 43        |
| 5.9      | ANTENNA APPLICATION   | 47        |
| 5.10     | RECEIVER SPURIOUS EMISSIONS                                       | 48        |
| <b>6</b> | <b><u>USED TEST EQUIPMENT AND ACCESSORIES</u></b>                 | <b>52</b> |

# 1 TEST STANDARDS

The tests were performed according to following standards:

## **FCC Rules and Regulations Part 15 Subpart C - Intentional Radiators (October, 2008)**

|                                       |   |
|---------------------------------------|---|
| Part 15, Subpart C, Section 15.35(c)  | Correction for Pulse Operation (Duty Cycle)   |
| Part 15, Subpart C, Section 15.203    | Antenna requirement   |
| Part 15, Subpart C, Section 15.204    | External radio frequency power amplifiers and antenna modifications                         |
| Part 15, Subpart C, Section 15.207(a) | AC Line conducted emissions   |
| Part 15, Subpart C, Section 15.209(a) | Radiated emissions, general requirements  |
| Part 15, Subpart C, Section 15.407    | Operation within the bands 5.15-5.25 GHz, 5.25-5.35 GHz, 5.47-5.725 GHz and 5.725-5.825 GHz |

## **FCC Rules and Regulations Part 15 Subpart B - Unintentional Radiators (October, 2008)**

|                                       |  |
|---------------------------------------|--|
| Part 15, Subpart B, Section 15.107(a) | AC Line conducted emissions              |
| Part 15, Subpart B, Section 15.109(a) | Radiated emissions, general requirements |

## **FCC Rules and Regulations Part 1 Subpart I - Procedures Implementing the National Environmental Policy Act of 1969**

|                                   |   |
|-----------------------------------|---|
| Part 1, Subpart I, Section 1.1310 | Radiofrequency radiation exposure limits. |
|-----------------------------------|---|

## **OET Bulletin 65, 65A, 65B, 65C Edition 97-01, August 1997 – Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.**

## 2 SUMMARY

### GENERAL REMARKS:

The EuT consists of 1 WLAN Module and 1 Effective Range Module (Chirp 2.45 GHz) which measure the distance between Mobile Panel and accompanying Transponder.

This test report describes only the assessment of the WLAN Module in the 2.4 GHz and 5 GHz frequency bands.

The EuT is configured as client.

The Mobile Panel 277F IWLAN offers the possibility of having the mobile safety functions of emergency stop and enable available at any point of a machine or plant. The 277 IWLAN doesn't have the safety function. Both are electronically identical however the 277 IWLAN is not equipped with the relevant parts necessary for the safety function.

All tests have been carried out with the full equipped 277F IWLAN Mobile Panel.

#### Available Features:

The WLAN miniPCI module is compatible with 802.11a, 802.11b and 802.11g technology. It is able to operate in the 2.4 GHz and 5 GHz frequency band.

- 802.11a Mode            5.15 GHz – 5.25 GHz and 5.725 GHz - 5.850 GHz
- 802.11b/g Mode        2400 – 2483.5 MHz

The module uses DSSS or OFDM modulation and is capable to provide following data rates:

- 802.11b Mode            11, 5.5, 2, 1 Mbps, auto-fallback
- 802.11g Mode            54, 48, 36, 24, 18, 12, 9, 6 Mbps, auto-fallback
- 802.11a                    54, 48, 36, 24, 18, 12, 9, 6 Mbps, auto-fallback

The EuT is equipped with 2 internal WLAN antennas (gain=2 dBi) and 1 dual port patch antenna (gain=2.6 / 2.7 dBic).

**FCC ID: U9A277IWLAN-V200**

**Note: The US version will be firmware limited to operate only in the 5150-5250 MHz band.**

Conducted measurements have been performed using an Access point (LAP). The EuT (WLAN module) was mounted in the AP and controlled via LAN by a Laptop.

Radiated measurements have been performed with normal configuration of the Mobile Panel (WLAN Module inside the MP).

Pre-scan has been performed to determine the worst-case mode from all possible combinations between available modulations and data rates. The maximum output power depends on used data rate.

**As worst case the following data rates are used:**

- **802.11a: 6 Mbits**

The EuT has been adjusted to transmit data during the tests with a duty cycle (X) of about X=1.

**4 channels are provided to this EuT in 802.11a mode:**

| Channel | Frequency |
|---------|-----------|
| 36      | 5180      |
| 40      | 5200      |
| 44      | 5220      |
| 48      | 5240      |

Following channels were selected for the final test as listed below:

| Technology | Available Channel | Tested Channel | Modulation | Modulation Type | Data Rate (Mbps) |
|------------|-------------------|----------------|------------|-----------------|------------------|
| 802.11a    | 36 to 48          | 36 and 48      | OFDM       | BPSK            | 6                |

FCC ID: U9A277IWLAN-V200

**FINAL ASSESSMENT:**

The equipment under test **fulfills** the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 16. March 2009

Testing concluded on : 29. April 2009

Checked by:

Tested by:

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Klaus Gegenfurtner  
Dipl.-Ing.(FH)  
Manager: Radio Group

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Anton Altmann  
Dipl.-Ing.(FH)

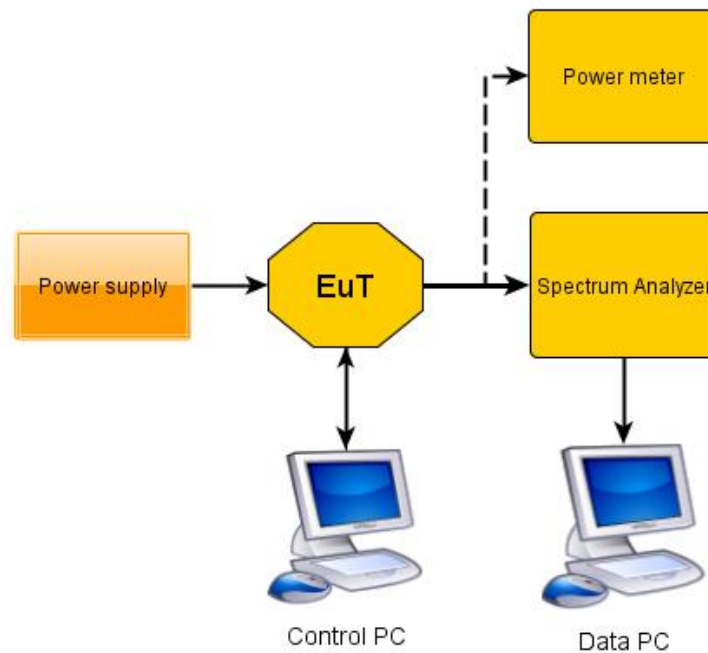
### 3 EQUIPMENT UNDER TEST

#### 3.1 Photo documentation of the EuT – Detailed photos see Attachment A

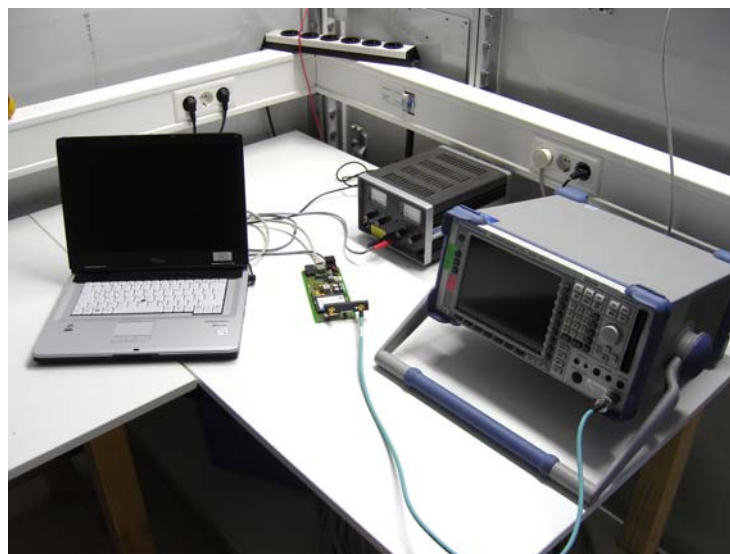
#### 3.2 Power supply system utilised

Power supply voltage : 7.2 V DC Battery  
 Power supply voltage (alternative) : 12 V DC - 230 V / 50 Hz / 1 $\phi$  Power supply

#### 3.3 Test setup



Conducted measurements



### 3.4 Short description of the Equipment under Test (EuT)

The SIMATIC Mobile Panel 277 IWLAN / 277F IWLAN permits mobile operation at any point in the system. The HMI device communicates with the PLC via WLAN. The HMI device is equipped with a zone recognition function. The simple battery-powered operation and ergonomic design of the HMI device permit safe working with the Mobile Panel 277 IWLAN over extended periods. The operator can operate the system wireless at almost any location on the machine or system.

Number of tested samples: 1  
Serial number: Prototype

#### EuT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- Data transmission (Client mode)

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- Continuous transmit mode (test mode only)

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#### EuT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

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

- AC/DC power supply Model : FAIRWAY Model: VE50-1200
- Power supply 12 V Model : 6000A
- \_\_\_\_\_ Model : \_\_\_\_\_
- \_\_\_\_\_ Model : \_\_\_\_\_
- \_\_\_\_\_ Model : \_\_\_\_\_
- \_\_\_\_\_ Model : \_\_\_\_\_



## 4 TEST ENVIRONMENT

### 4.1 Address of the test laboratory

mikes-testingpartners gmbh  
Ohmstrasse 2-4  
94342 Strasskirchen  
Germany

### 4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

### 4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 /11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

## 4.4 Measurement Protocol for FCC, VCCI and AUSTEL

### 4.4.1 GENERAL INFORMATION

#### 4.4.1.1 Test Methodology

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

In compliance with 47 CFR Part 15 Subpart A Section 15.38 testing for FCC compliance may be done following the ANSI C63.4-2003 procedures and using the CISPR 22 Limits.

#### 4.4.1.2 Measurement Error

The data and results referenced in this document are true and accurate. The reader is cautioned that there is some measurement variability due to the tolerances of the test equipment that can contribute to a nominal product measurement uncertainty. The measurement uncertainty was calculated for all measurements listed in this test report according to NIS 81/5.1994 "The treatment of uncertainty in EMC measurements" and is documented in the mikes-testingpartners gmbh quality system according to DIN EN ISO/IEC 17025. Furthermore, component differences and manufacturing process variability of production units similar to that tested may result in additional product uncertainty. If necessary, refer to the test lab for the actual measurement uncertainty for specific tests. The manufacturer has the sole responsibility of continued compliance of the device.

#### 4.4.1.3 Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

### 4.4.2 DETAILS OF TEST PROCEDURES

#### 4.4.2.1 General Standard Information

The test methods used comply with CISPR Publication 22, EN 55022 - "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.4-2003 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

## **5 TEST CONDITIONS AND RESULTS**

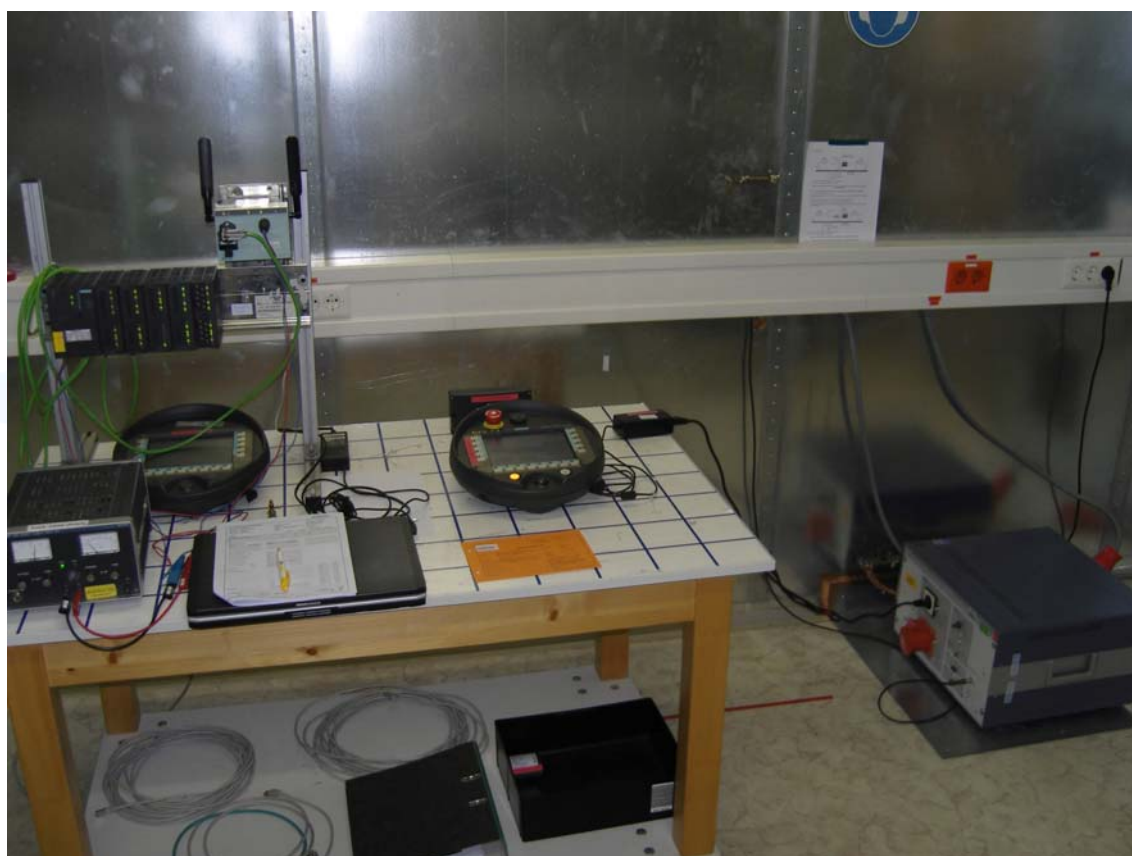
### **5.1 Conducted emissions**

For test instruments and accessories used see section 6 Part A 4.

#### **5.1.1 Description of the test location**

Test location:               Shielded Room S2

#### **5.1.2 Photo documentation of the test set-up**



**5.1.3 Applicable standard**

According to FCC Part 15 Subpart 15.207 (a): Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

| Frequency of Emission (MHz) | Conducted Limit (dBμV) |            |
|-----------------------------|------------------------|------------|
|                             | Quasi-peak             | Average    |
| 0.15-0.5                    | 66 to 56 *             | 56 to 46 * |
| 0.5-5                       | 56                     | 46         |
| 5-30                        | 60                     | 50         |

\* Decreases with the logarithm of the frequency

**5.1.4 Description of Measurement**

The final level, expressed in dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit or to the CISPR limit.

To convert between dBμV and μV, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

The requirements are **FULFILLED**.

**Remarks:** For detailed results please refer to the following plots.

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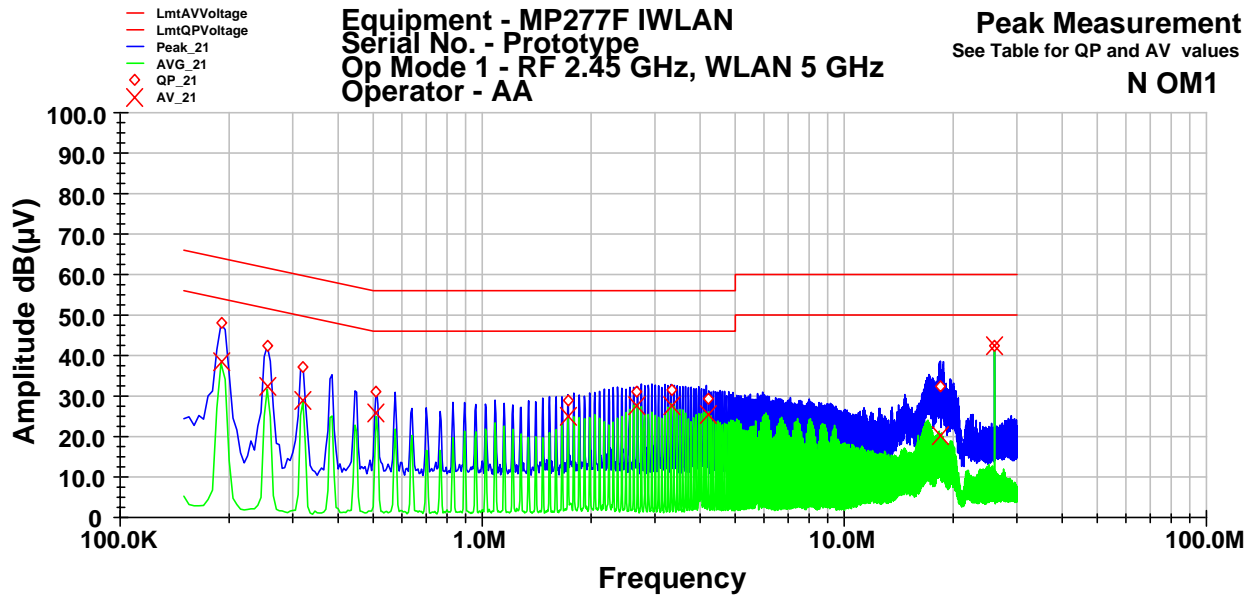
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FCC ID: U9A277IWLAN-V200

Conducted emissions at negative power line

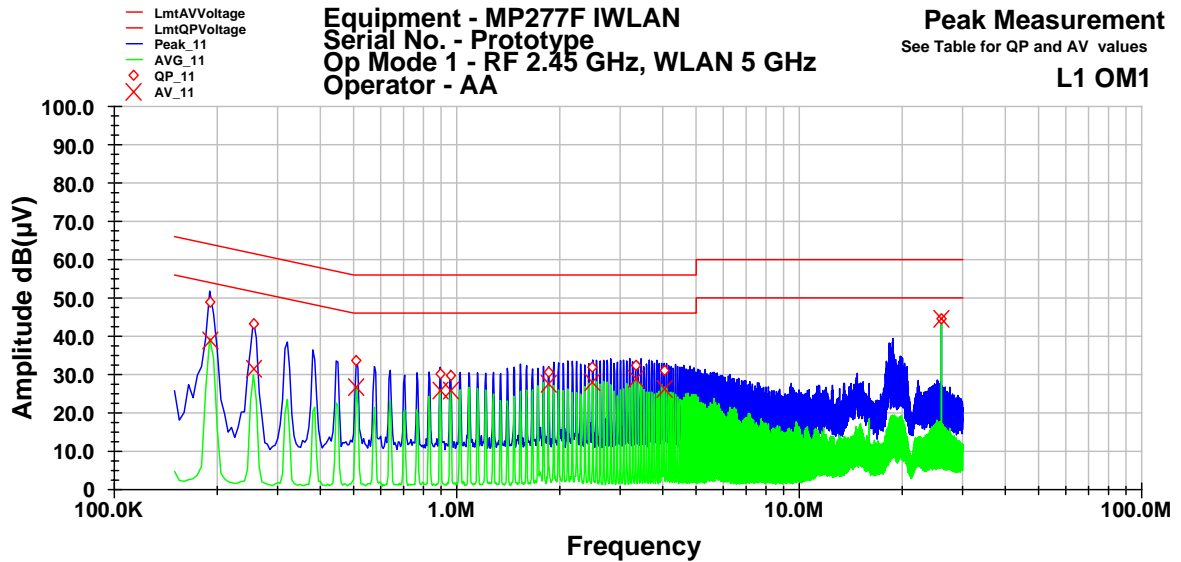


File Number: T33234-00

| Frequency<br>MHz | QP Level<br>dB(µV) | QP Margin<br>dB | QP Limit<br>dB | AV Level<br>dB(µV) | AV Margin<br>dB | AV Limit<br>dB |
|------------------|--------------------|-----------------|----------------|--------------------|-----------------|----------------|
| 0.19             | 47.8               | -16.2           | 64.0           | 38.4               | -15.6           | 54.0           |
| 0.255            | 42.2               | -19.4           | 61.6           | 32.5               | -19.1           | 51.6           |
| 0.32             | 37.2               | -22.6           | 59.7           | 28.9               | -20.8           | 49.7           |
| 0.51             | 31.0               | -25.0           | 56.0           | 25.7               | -20.3           | 46.0           |
| 1.725            | 28.9               | -27.1           | 56.0           | 24.9               | -21.1           | 46.0           |
| 2.685            | 31.2               | -24.8           | 56.0           | 27.8               | -18.2           | 46.0           |
| 3.325            | 31.4               | -24.6           | 56.0           | 27.6               | -18.4           | 46.0           |
| 4.22             | 29.5               | -26.5           | 56.0           | 25.3               | -20.7           | 46.0           |
| 18.415           | 32.2               | -27.8           | 60.0           | 20.2               | -29.8           | 50.0           |
| 26               | 42.5               | -17.5           | 60.0           | 42.2               | -7.8            | 50.0           |

FCC ID: U9A277IWLAN-V200

Conducted emissions at positive power line



File Number: T33234-00

| Frequency<br>MHz | QP Level<br>dB(µV) | QP Margin<br>dB | QP Limit<br>dB | AV Level<br>dB(µV) | AV Margin<br>dB | AV Limit<br>dB |
|------------------|--------------------|-----------------|----------------|--------------------|-----------------|----------------|
| 0.19             | 49.0               | -15.0           | 64.0           | 38.9               | -15.2           | 54.0           |
| 0.255            | 43.2               | -18.4           | 61.6           | 31.4               | -20.2           | 51.6           |
| 0.51             | 33.5               | -22.5           | 56.0           | 26.6               | -19.4           | 46.0           |
| 0.895            | 30.0               | -26.0           | 56.0           | 25.7               | -20.3           | 46.0           |
| 0.96             | 29.7               | -26.3           | 56.0           | 25.8               | -20.2           | 46.0           |
| 1.855            | 30.7               | -25.3           | 56.0           | 27.6               | -18.4           | 46.0           |
| 2.495            | 31.8               | -24.2           | 56.0           | 28.0               | -18.0           | 46.0           |
| 3.325            | 32.6               | -23.4           | 56.0           | 28.7               | -17.3           | 46.0           |
| 4.03             | 30.9               | -25.1           | 56.0           | 26.4               | -19.6           | 46.0           |
| 26               | 44.6               | -15.4           | 60.0           | 44.4               | -5.6            | 50.0           |

## 5.2 26 dB Emission Bandwidth

For test instruments and accessories used see section 6 Part MB.

### 5.2.1 Description of the test location

Test location: AREA4

### 5.2.2 Photo documentation of the test set-up



**5.2.3 Applicable standard**

According to FCC Part 15 Subpart 15.401 (i): The emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum of the modulated carrier.

**5.2.4 Description of Measurement**

The bandwidth was measured at an amplitude level reduced from the reference level by a specified ratio of -26 dB. The reference level is the level of the highest amplitude signal observed from the transmitter fundamental frequency. The measurement has been carried out using a spectrum analyzer with the following settings:

RBW=300 kHz

VBW=1 MHz

PEAK Detector

The table below shows the settings according to ANSI C63.4-2003.

| Fundamental frequency | Minimum resolution bandwidth |
|-----------------------|------------------------------|
| 9 kHz to 30 MHz       | 1kHz                         |
| 30 to 1000 MHz        | 10 kHz                       |
| 1000 MHz to 40 GHz    | 100 kHz                      |

**5.2.5 Test result**

| Channel number | Fundamental Frequency (MHz) | 26 dB BANDWIDTH (MHz) |
|----------------|-----------------------------|-----------------------|
| 36             | 5180                        | 37.3                  |
| 48             | 5240                        | 31.3                  |

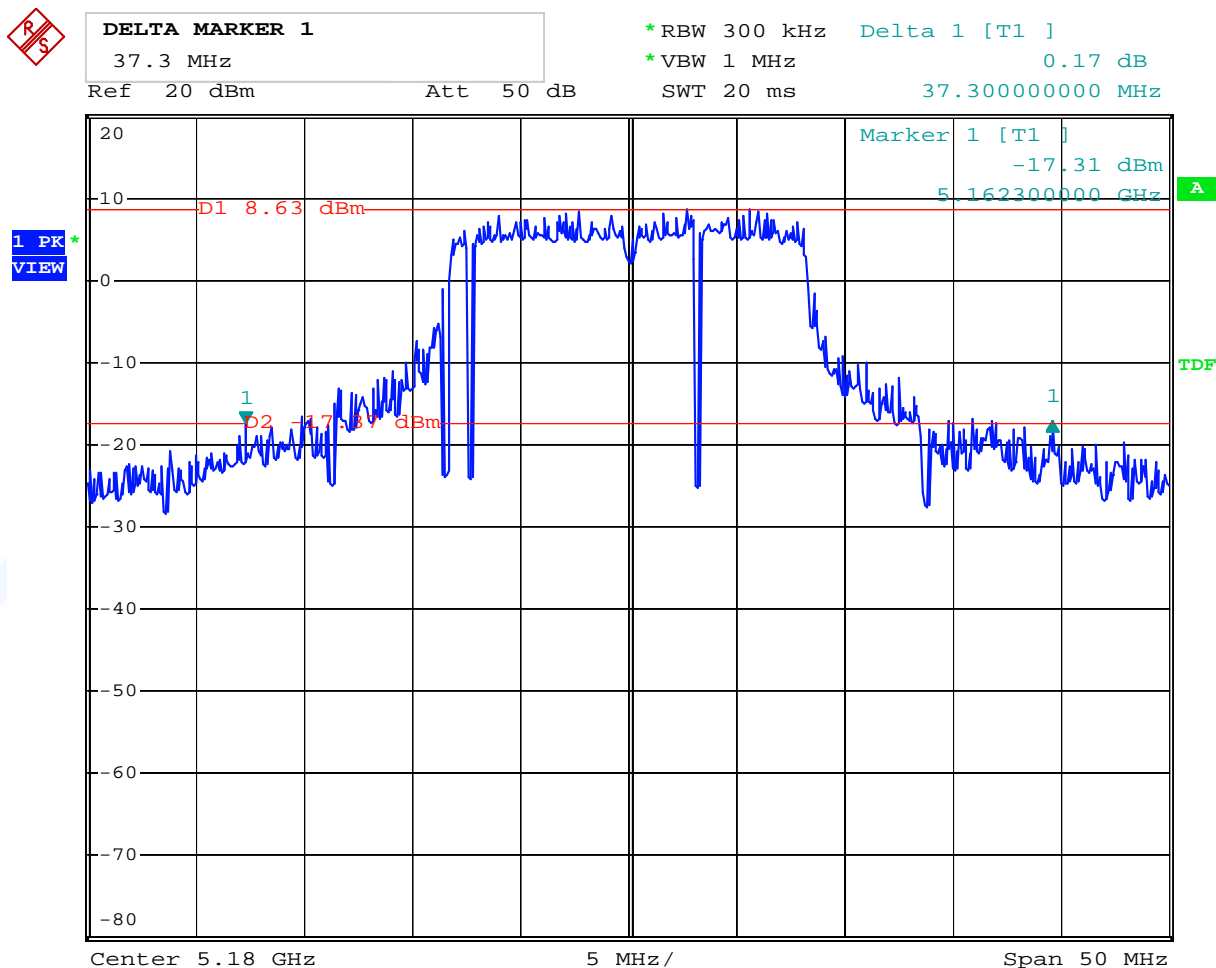
**Remarks:** For detailed test result please refer to following test protocols.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



5.2.6 Test protocol

26dB Bandwidth Measurement plots

Channel 36 (5180 MHz)



FCC ID: U9A277IWLAN-V200

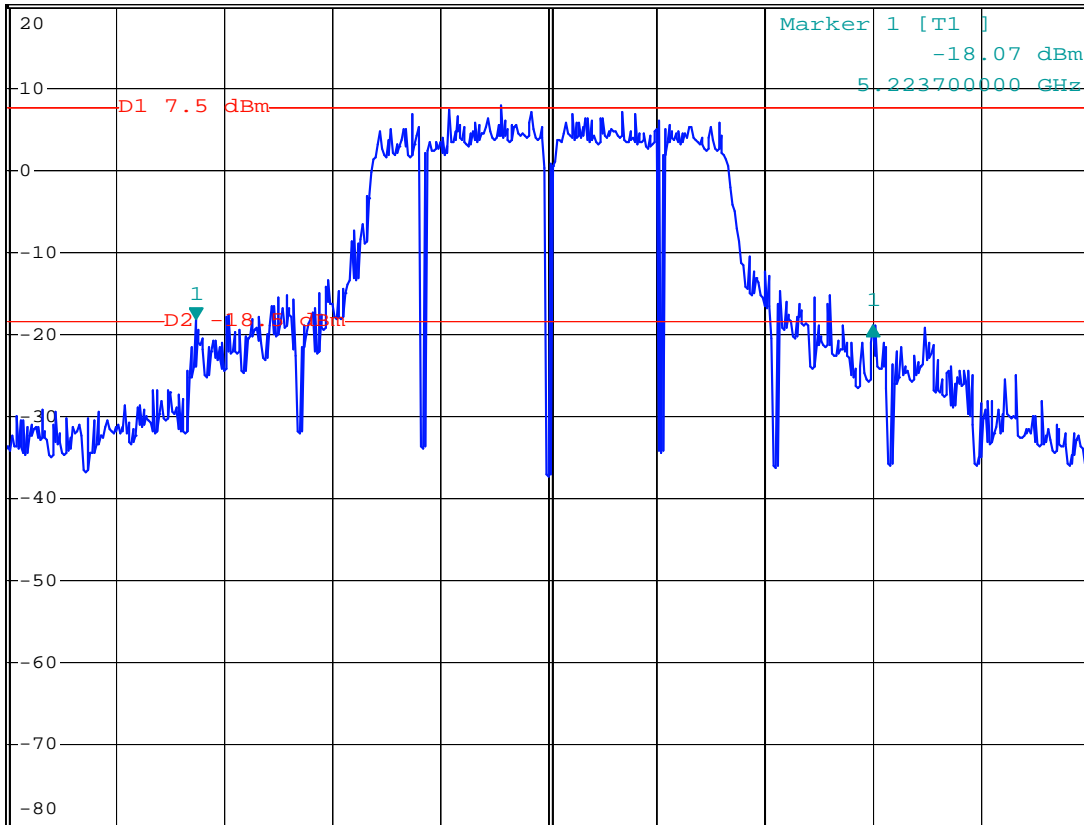
Channel 48 (5240 MHz)



**CENTER FREQUENCY**  
5.24 GHz  
Ref 20 dBm Att 50 dB

\*RBW 300 kHz Delta 1 [T1 ]  
VBW 1 MHz -0.98 dB  
SWT 20 ms 31.30000000 MHz

1 PK\*  
VIEW



Center 5.24 GHz 5 MHz/ Span 50 MHz

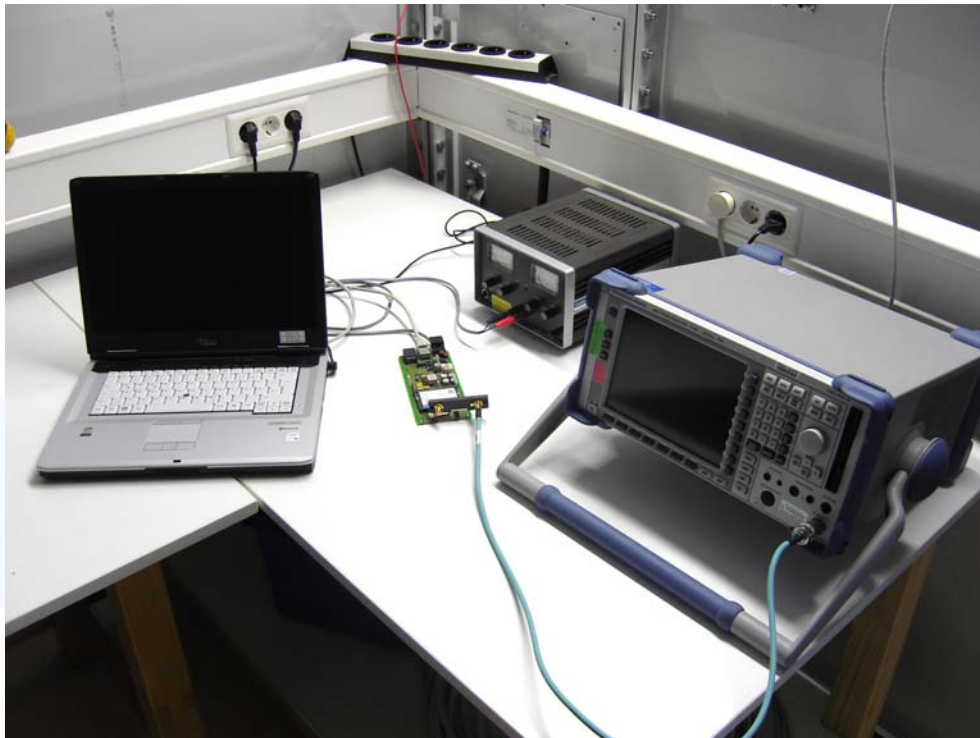
### 5.3 Maximum Conducted Output Power

For test instruments and accessories used see section 6 Part CPC 3.

#### 5.3.1 Description of the test location

Test location: AREA4

#### 5.3.2 Photo documentation of the test set-up



**5.3.3 Applicable standard**

According to FCC Part 15 Subpart 15.401 (n): The total transmits power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The everage must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level.

The applicable power limits are defined in Part 15.407 (a).

If transmitting antennas of directional gain are greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**5.3.4 Description of Measurement**

The transmitter output was connected to the spectrum analyzer through an attenuator. The center frequency of the spectrum analyzer is set to the fundamental frequency using 1 MHz RBW and 300 kHz VBW. The span of the spectrum analyzer should be larger than the Emission Band Width (EBW). To get the total power of the occupied band width the function "Channel Power Measurement" of the analyzer has been used. The channel band width has been set to EBW. With Peak detector and Power Mode Max Hold the result is the summed maximum output power of the EBW.

**5.3.5 Test result**

| Ch | Frequ. (MHz) | ART Settings (dBm) | Measured Power (dBm) | Correct. (dB) | Power Conducted (dBm) | Antenna Gain (dBi) | EIRP Power (dBm) | EIRP Limit (dBm) | Delta (dB) |
|----|--------------|--------------------|----------------------|---------------|-----------------------|--------------------|------------------|------------------|------------|
| 36 | 5180         | 19.0               | 4.9                  | 12.0          | 16.9                  | 2.0                | 18.9             | 23.0             | -4.1       |
| 48 | 5240         | 19.0               | 4.5                  | 12.0          | 16.5                  | 2.0                | 18.5             | 23.0             | -4.5       |

Remarks: Where Correction means fixed attenuation of 10 dB and cable loss of 2.0 dB.

Peak Power Limit according to FCC Subpart 15.407(a)

| Frequency (GHz) | Conducted Power Limit |      | EIRP Limit |
|-----------------|-----------------------|------|------------|
|                 | (dBm)                 | (mW) | (dBm)      |
| 5.15-5.25       | 17                    | 50   | 23         |

The requirements are **FULFILLED**.

**Remarks:**           This test has been performed conducted at antenna jack on WLAN module.

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## 5.4 Undesirable emissions

For test instruments and accessories used see section 6 Part **SEC 1-3, SER 1, SER 2 and SER 3.**

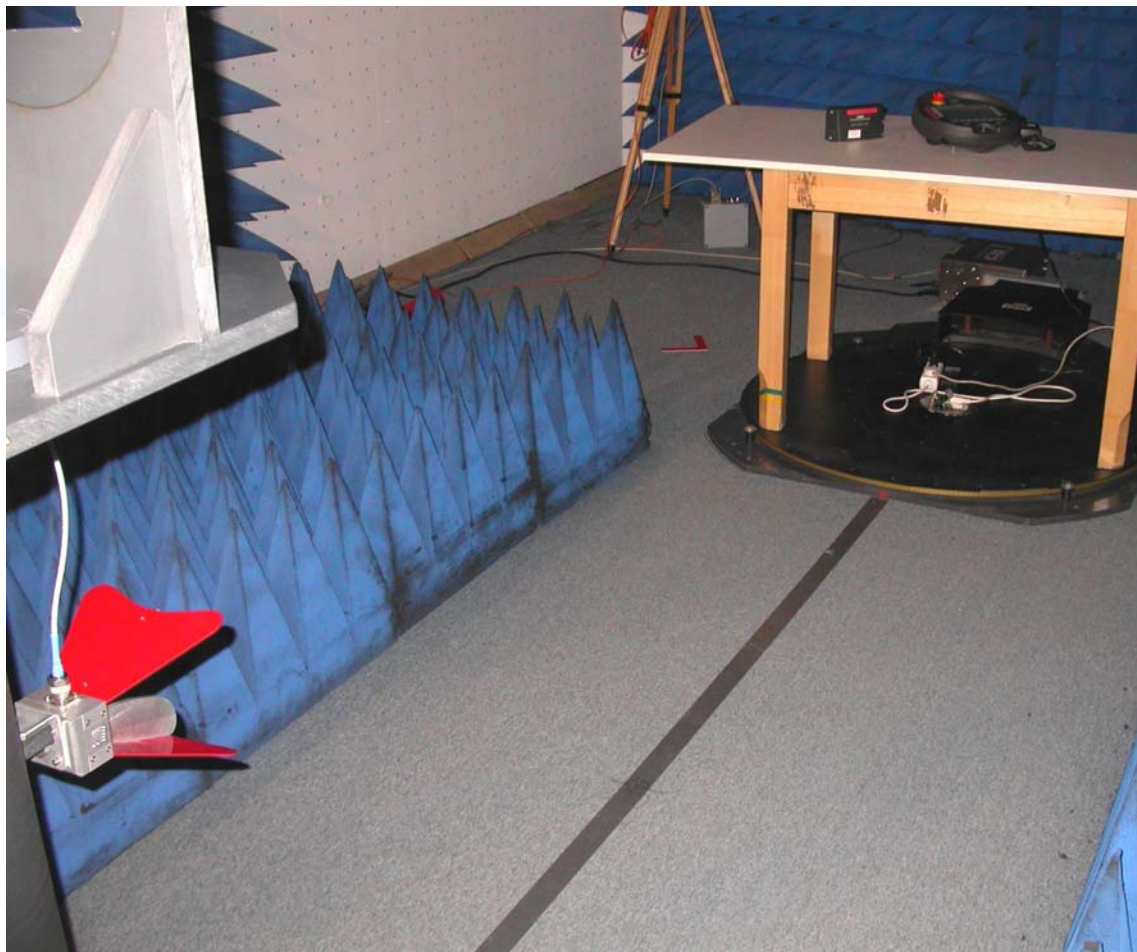
### 5.4.1 Description of the test location

Test location: OATS1  
Anechoic Chamber A2

Test distance: 3 metres

### 5.4.2 Photo documentation of the test set-up

Anechoic chamber



FCC ID: U9A277IWLAN-V200

Open area test site



### 5.4.3 Applicable standard

According to FCC Part 15 Subpart 15.407 (b):

- (1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limit specified in §15.209(a) (see §15.205(c)).

### 5.4.4 Description of Measurement

Spurious emissions from the EuT are measured in the frequency range from 9 kHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. The measurements are made with 120 kHz/6 dB bandwidth and quasi-peak detection. The EuT is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003. The antenna was positioned 3 meters horizontally from the EuT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarization`s and the EuT are rotated 360 degrees.

The final level, expressed in dB $\mu$ V/m, is arrived by taking the reading from the EMI receiver (Level dB $\mu$ V) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver, where the correction factors are stored.

The radiated emissions from the EuT are measured in the frequency range of 1 GHz to maximum frequency as specified in section 15.33, using a Spectrum Analyzer and appropriate linearly polarized antennas. The EuT is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. The set up of the EuT will be in accordance to ANSI C63.4-2003. The antenna was positioned 3 m horizontally from the EuT.

Measurement 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, RBW 1 MHz and VBW set to 3 MHz for any spurious emission or modulation product that falls in **Restricted bands** as defined in Section 15.205.

All tests are performed at a test-distance of 3 meters. During the tests the EUT measurement scans are made with both horizontal and vertical antenna polarization`s and the EuT are rotated 360 degrees.

According to Part 15.407 (b) (5): The emission measurements have been performed using a minimum RBW of 1 MHz. At some measurements it was necessary to use a RBW of 100 kHz near the band edge. The results than have been calculated to show the total power over 1 MHz.

Average values were measured with spectrum analyzer by taking the following Settings

RBW: 1 MHz

VBW: 10 Hz

Sweep: Auto

5.4.5 Test result

Occupied Frequency band: 5.15 GHz to 5.25 GHz

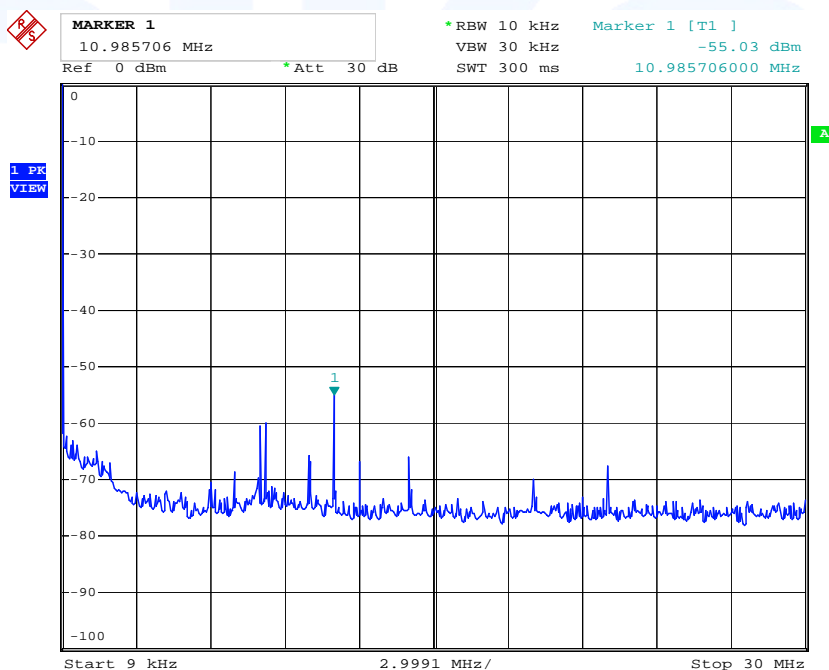
5.4.5.1 Conducted spurious emissions

| Channel 36 (5180 MHz) |                  |             |            | Channel 48 (5240 MHz) |                  |             |            |
|-----------------------|------------------|-------------|------------|-----------------------|------------------|-------------|------------|
| Frequency (MHz)       | Peak Power (dBm) | Limit (dBm) | Delta (dB) | Frequency (MHz)       | Peak Power (dBm) | Limit (dBm) | Delta (dB) |
| 9 kHz-30              | <-60             | -27         | >20        | 9 kHz-30              | <-60             | -27         | >20        |
| 30-1000               | <-60             | -27         | >20        | 30-1000               | <-60             | -27         | >20        |
| 1-40 GHz              | <-47             | -27         | >20        | 1-40 GHz              | <-47             | -27         | >20        |

Remarks: All spurious emissions falling in restricted bands have been measured radiated.

For detailed test results please refer to test plots below.

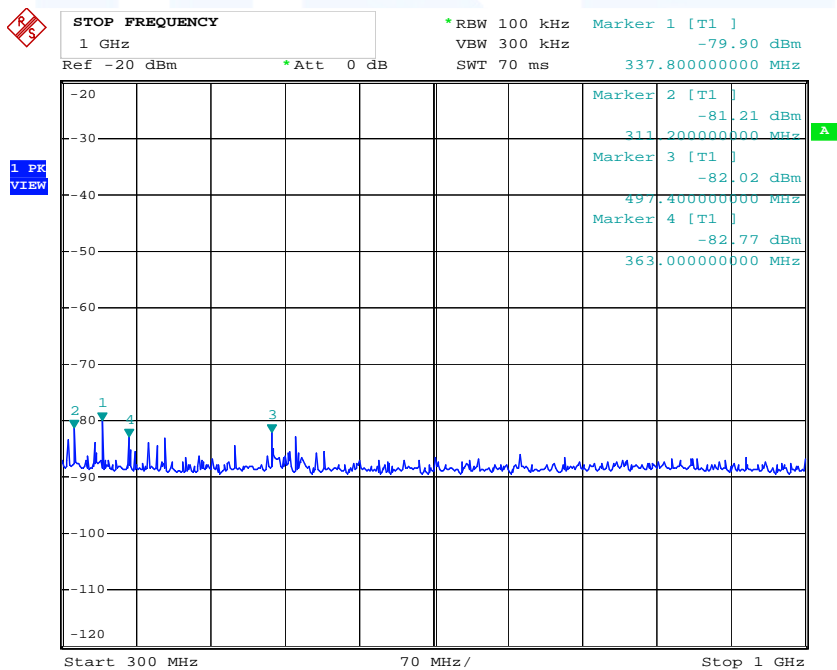
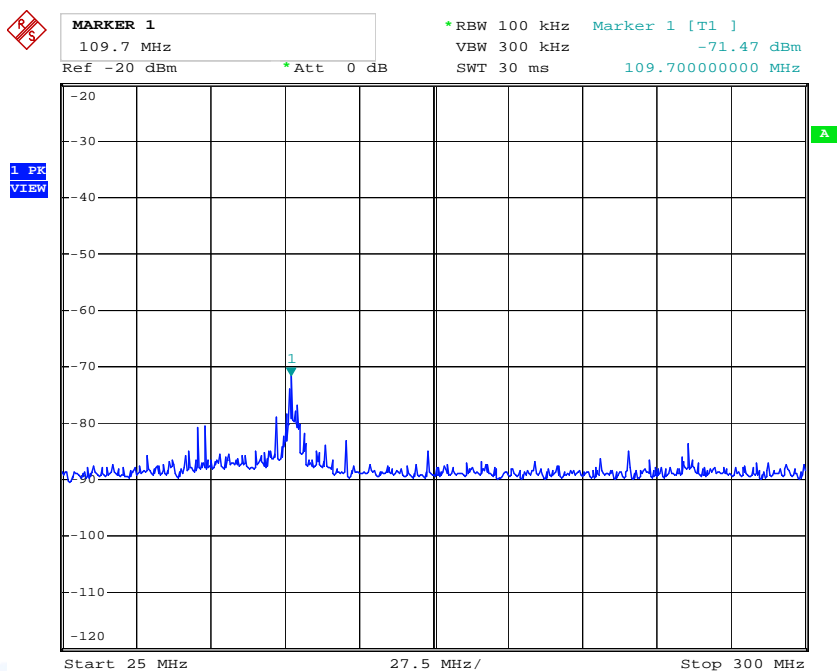
Spurious emissions from 9 kHz to 30 MHz





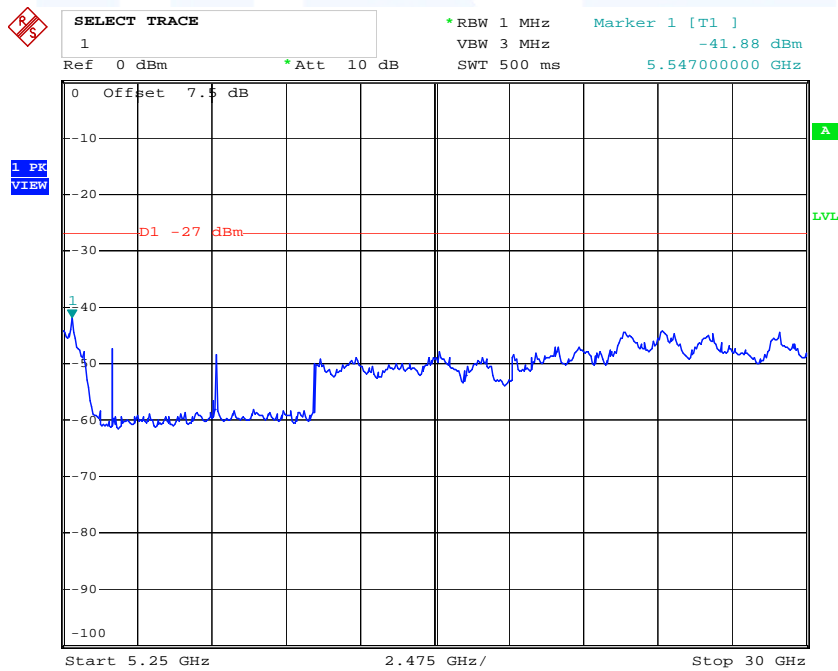
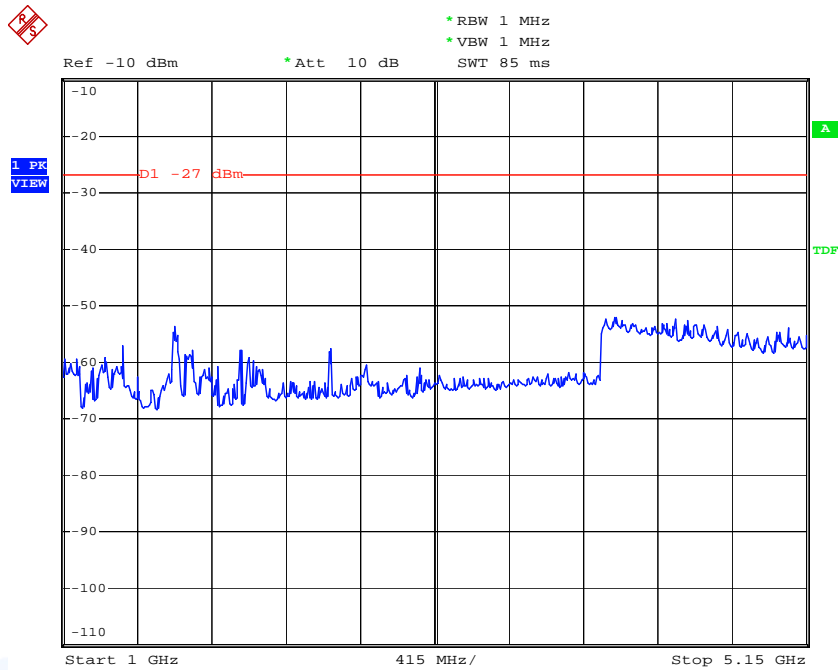
**FCC ID: U9A277IWLAN-V200**

Spurious emissions from 25 MHz to 1000 MHz



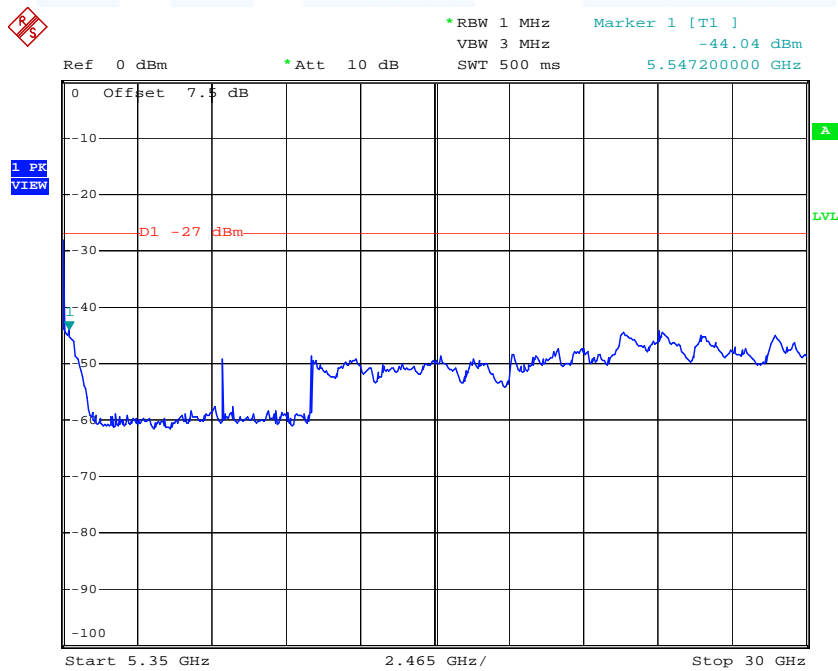
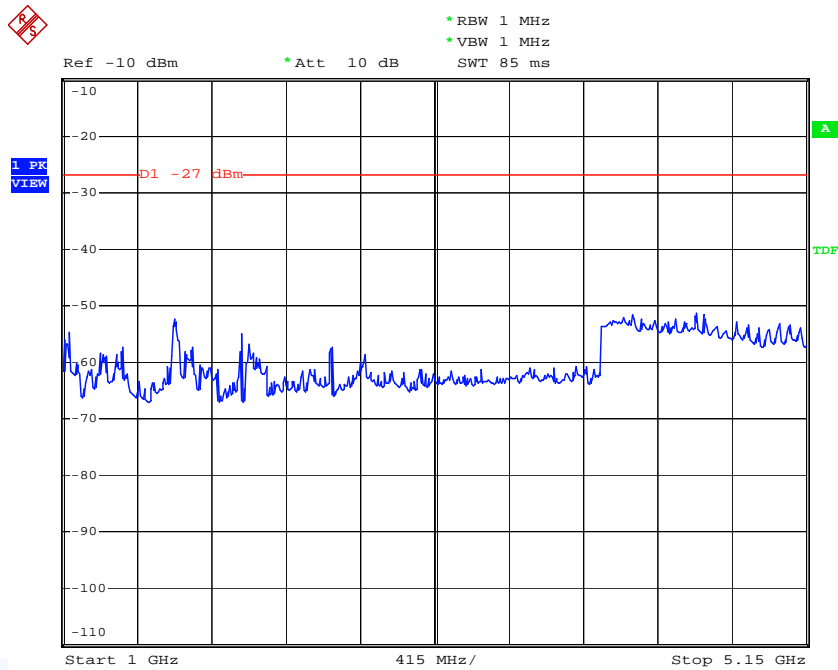
FCC ID: U9A277IWLAN-V200

Channel 36 (5180 MHz)



FCC ID: U9A277IWLAN-V200

Channel 48 (5240 MHz)



5.4.5.2 Radiated emissions and Harmonics in restricted bands

Channel 36 (5180 MHz)

Nearest restricted band: 4500 to 5150 MHz

| Frequency (MHz) | Detector | Analyzer reading |               | Correction (dB) | Result       |               | Limit (dBµV/m) | Delta (dB) |
|-----------------|----------|------------------|---------------|-----------------|--------------|---------------|----------------|------------|
|                 |          | hor (dBµV/m)     | vert (dBµV/m) |                 | hor (dBµV/m) | vert (dBµV/m) |                |            |
| 5147            | Pk       | <54              | 66.4          | 0.5             | ---          | 66.9          | 74             | -7.1       |
|                 | AV       | ---              | 45.9          | 0.5             | ---          | 46.4          | 54             | -7.6       |

Channel 48 (5240 MHz)

Nearest restricted band: 5350 to 5460 MHz

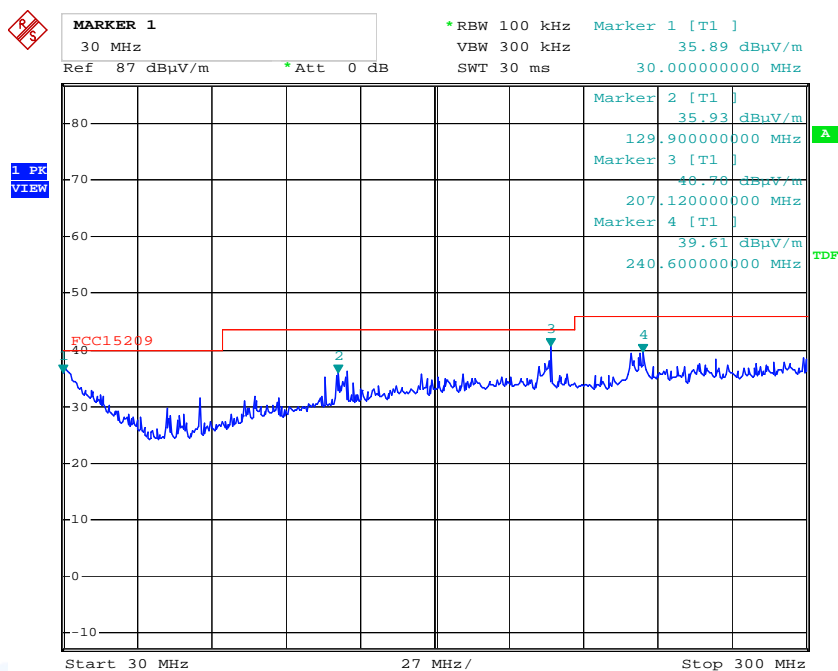
| Frequency (MHz) | Detector | Analyzer reading |               | Correction (dB) | Result       |               | Limit (dBµV/m) | Delta (dB) |
|-----------------|----------|------------------|---------------|-----------------|--------------|---------------|----------------|------------|
|                 |          | hor (dBµV/m)     | vert (dBµV/m) |                 | hor (dBµV/m) | vert (dBµV/m) |                |            |
| 5350-5460       | Pk       | <54              | <54           | ---             | ---          | ---           | 74             | ---        |
|                 | AV       | ---              | ---           | ---             | ---          | ---           | 54             | ---        |

**Note: No radiated harmonics in restricted bands could be measured.**

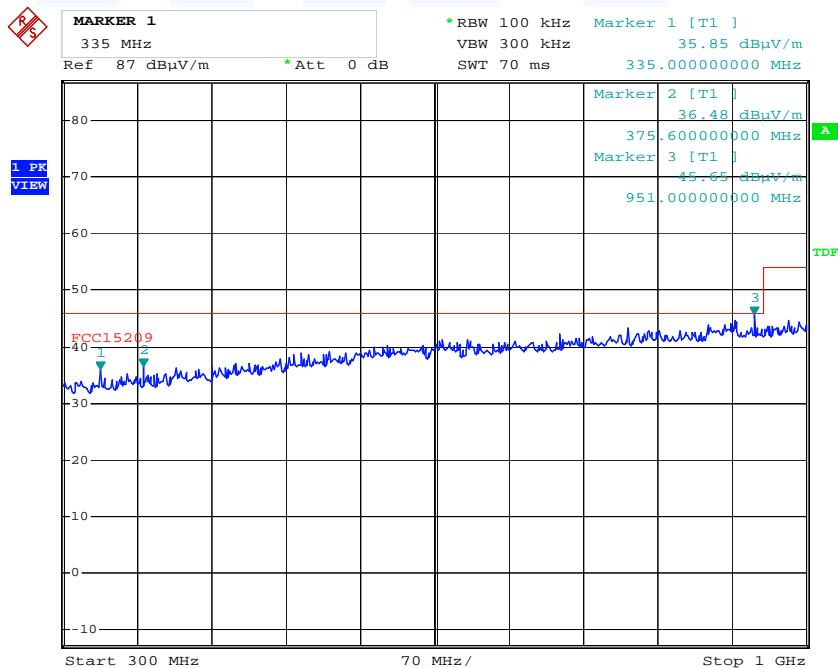
**All radiated peak emissions from 30 MHz to 1000 MHz were below the limits of part 15.209**

**FCC ID: U9A277IWLAN-V200**

Radiated spurious emissions from 30 MHz to 1000 MHz



Date: 29.APR.2009 15:23:00

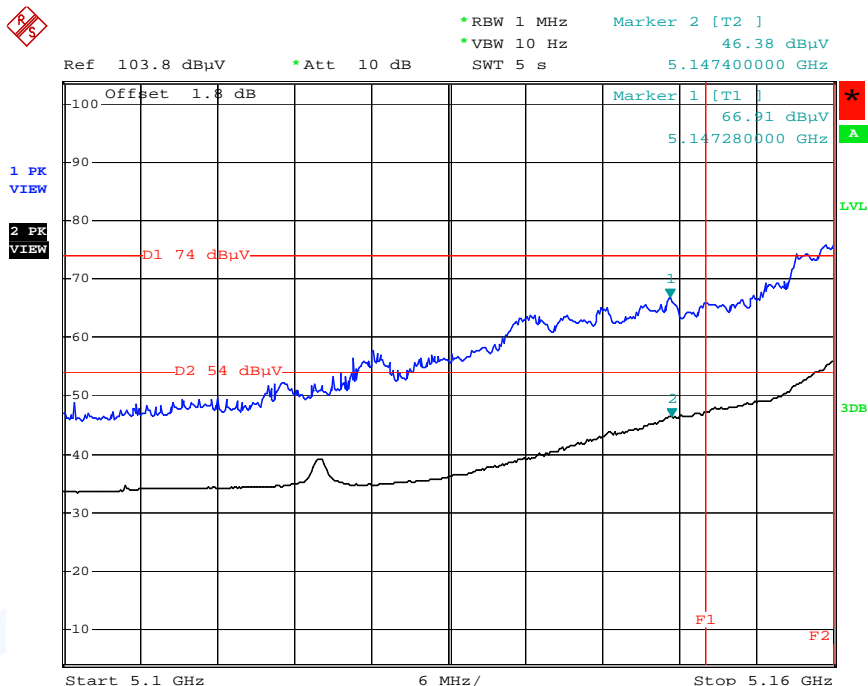


Date: 29.APR.2009 15:19:20

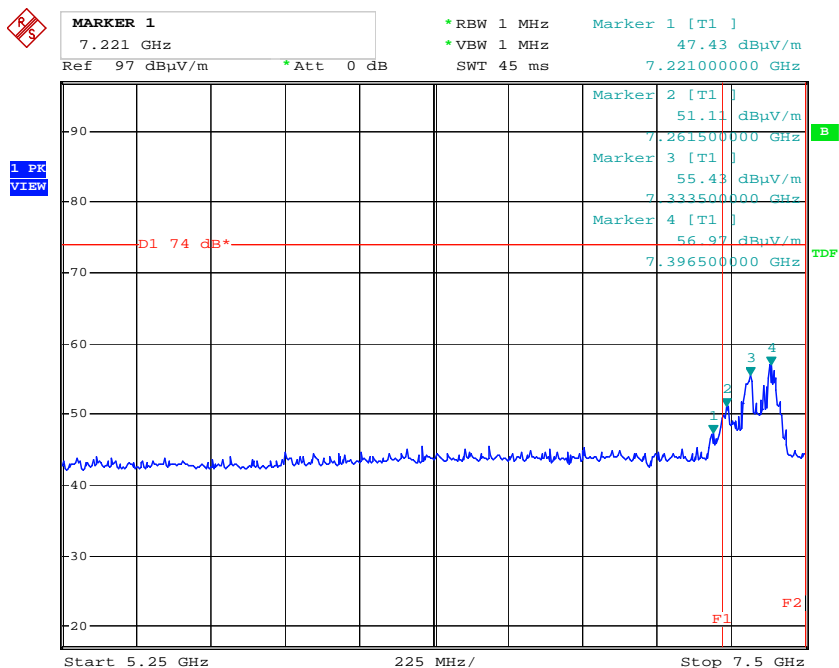
**Notes:** All peak emissions were below the limits of part 15.209.

**Carrier frequency at channel 36 (5180 MHz)**

Peak and AV plot has been taken to show the restricted band emission levels near the authorized bandedges.  
(Restricted band at lower bandedge from 4500 to 5150 MHz)



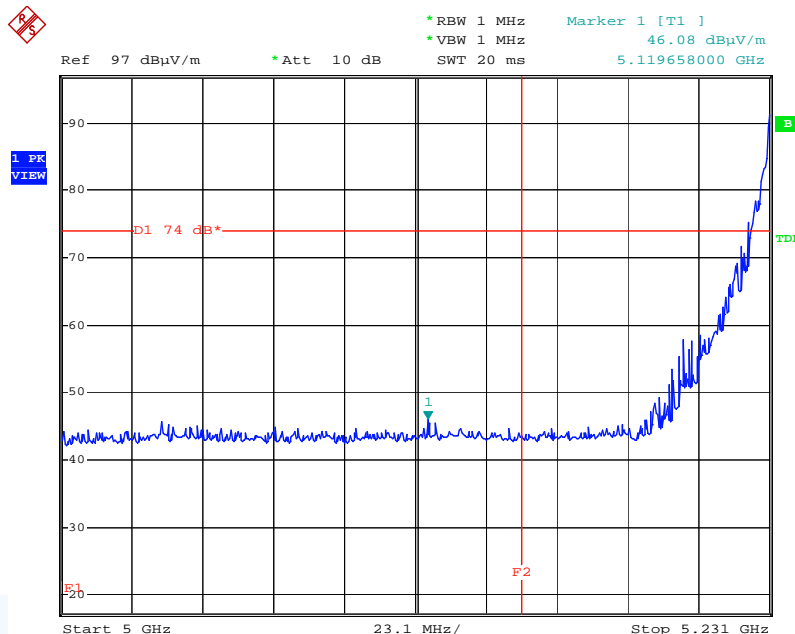
(Restricted band at upper bandedge from 5350 to 5460 MHz)



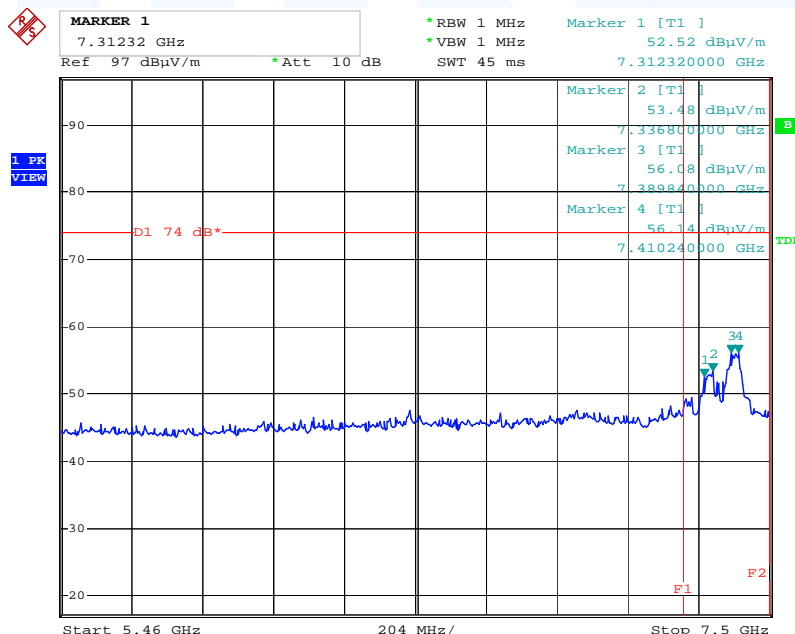
**Note:** The marked emissions at about 7.3 GHz are harmonics of the Effective Range Module.  
(Refer to test report T33234-03-00AA)

**Carrier frequency at channel 48 (5240 MHz)**

Peak plot has been taken to show the restricted band emission levels near the authorized bandedges.  
(Restricted band at lower bandedge from 4500 to 5150 MHz)

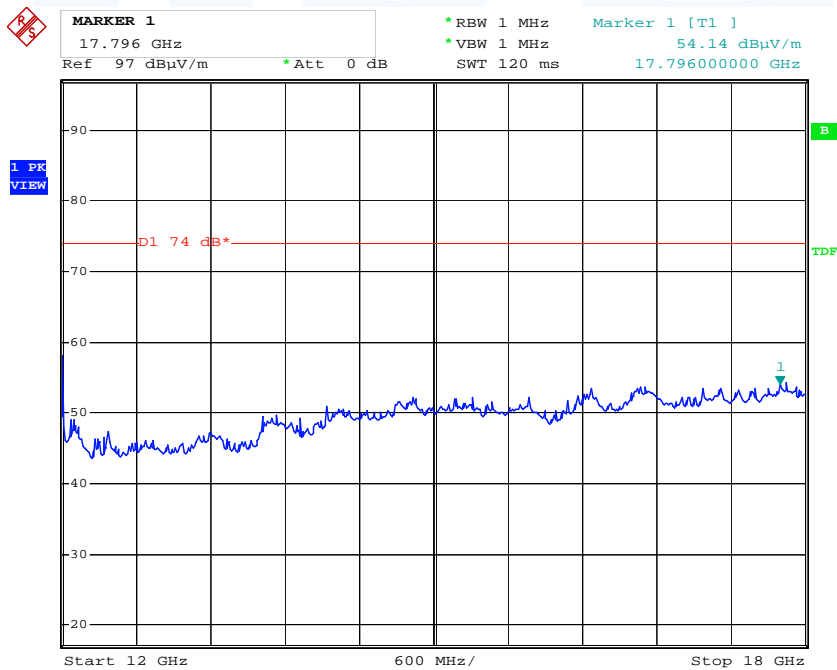
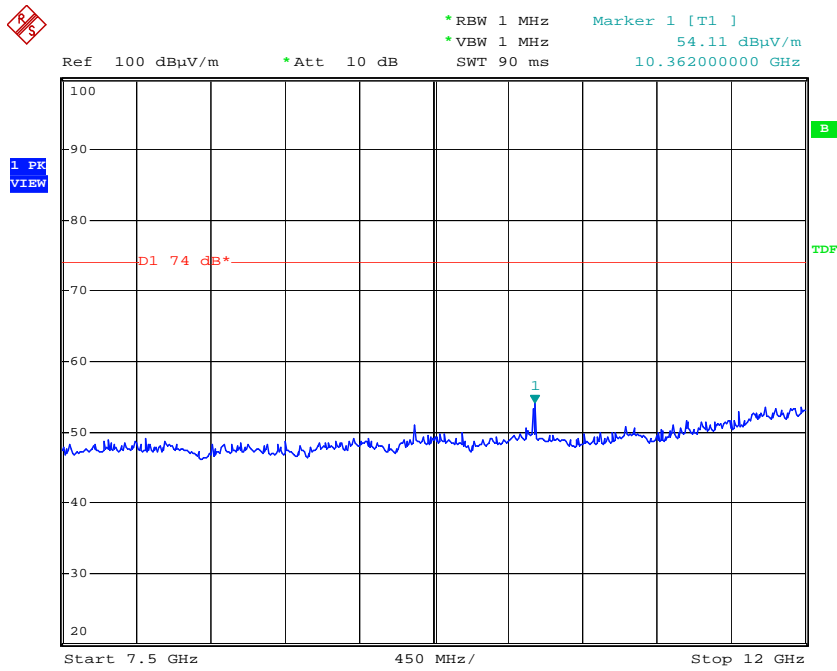


(Restricted band at upper bandedge from 5350 to 5460 MHz)



**Note: The marked emissions at about 7.3 GHz are harmonics of the Effective Range Module.  
(Refer to test report T33234-03-00AA)**

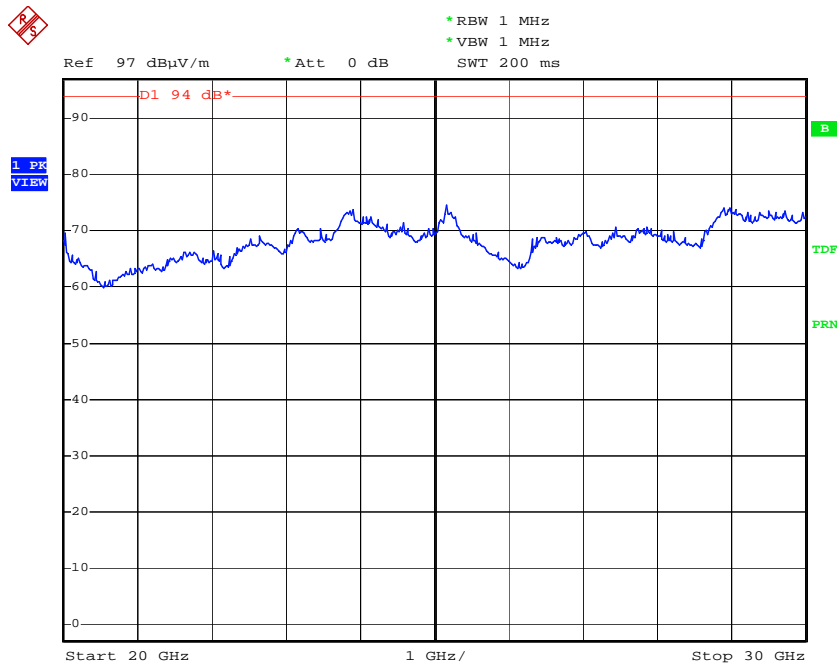
FCC ID: U9A277IWLAN-V200



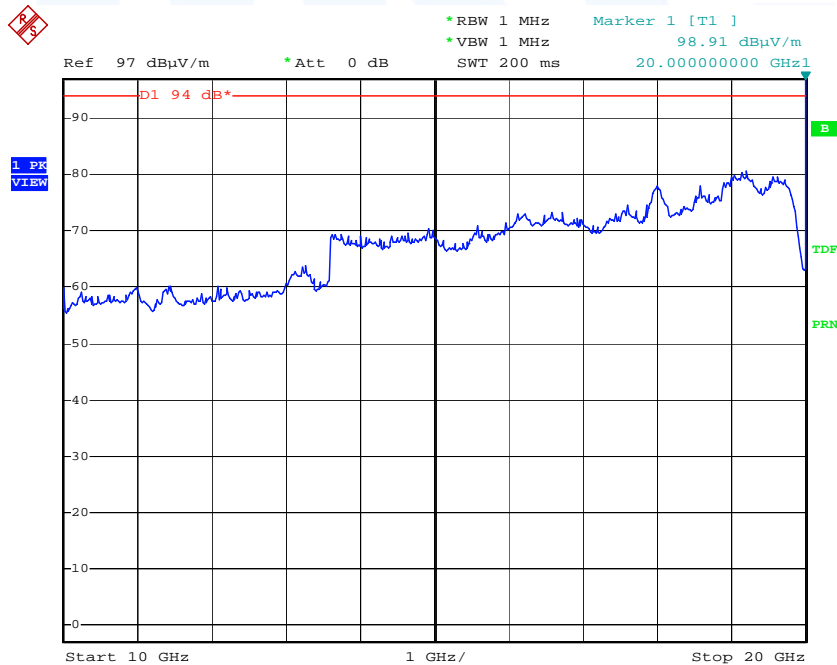


FCC ID: U9A277IWLAN-V200

**Radiated spurious emissions from 20 GHz to 40 GHz**



**Notes:** All peak emissions were below the limits of part 15.209.  
Measurement distance: 0.3 m  
Limit is extrapolated by 20 dB/decade



**Notes:** Limit is extrapolated by 20 dB/decade  
The measurement range from 30 – 40 GHz has been transposed by a mixer of 20 GHz to the analyzer range from 10 – 20 GHz.

**FCC ID: U9A277IWLAN-V200**

Radiated limits according to FCC Part 15 Subpart 15.209(a) for spurious emissions which fall in restricted bands:

| Frequency (MHz) | Field strength of spurious emissions |                        | Measurement distance (meters) |
|-----------------|--------------------------------------|------------------------|-------------------------------|
|                 | ( $\mu\text{V/m}$ )                  | dB ( $\mu\text{V/m}$ ) |                               |
| 0,009-0,490     | 2400/F(kHz)                          |                        | 300                           |
| 0,490-1,705     | 24000/F(kHz)                         |                        | 30                            |
| 1,705-30        | 30                                   | 29,5                   | 30                            |
| 30-88           | 100                                  | 40                     | 3                             |
| 88-216          | 150                                  | 43.5                   | 3                             |
| 216-960         | 200                                  | 46                     | 3                             |
| Above 960       | 500                                  | 54                     | 3                             |

**Restricted bands of operation:**

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209

| (MHz)                 | (MHz)           | (GHz)         |
|-----------------------|-----------------|---------------|
| 25.5 – 25.67          | 960 – 1240      | 4.5 – 5.15    |
| 37.5 – 38.25          | 1300 – 1427     | 5.35 – 5.46   |
| 73 – 74.6             | 1435 – 1626.5   | 7.25 – 7.75   |
| 74.8 – 75.2           | 1645.5 – 1646.5 | 8.025 – 8.5   |
| 108 – 121.94          | 1660 – 1710     | 9.0 – 9.2     |
| 123 – 138             | 1718.8 – 1722.2 | 9.3 – 9.5     |
| 149.9 – 150.05        | 2200 – 2300     | 10.6 – 12.7   |
| 156.52475 – 156.52525 | 2310 – 2390     | 13.25 – 13.4  |
| 156.7 – 156.9         | 2483.5 – 2500   | 14.47 – 14.5  |
| 162.0125 – 167.17     | 2655 – 2900     | 15.35 – 16.2  |
| 167.72 – 173.2        | 3260 – 3267     | 17.7 – 21.4   |
| 240 – 285             | 3332 – 3339     | 22.01 – 23.12 |
| 322 – 335.4           | 3345.8 – 3358   | 23.6 – 24.0   |
| 399.9 – 410           | 3600 – 4400     | 31.2 – 31.8   |
| 608 – 614             |                 | 36.43 – 36.5  |

The requirements are **FULFILLED**.

**Remarks:** The measurement was performed up to the 10<sup>th</sup> harmonic.

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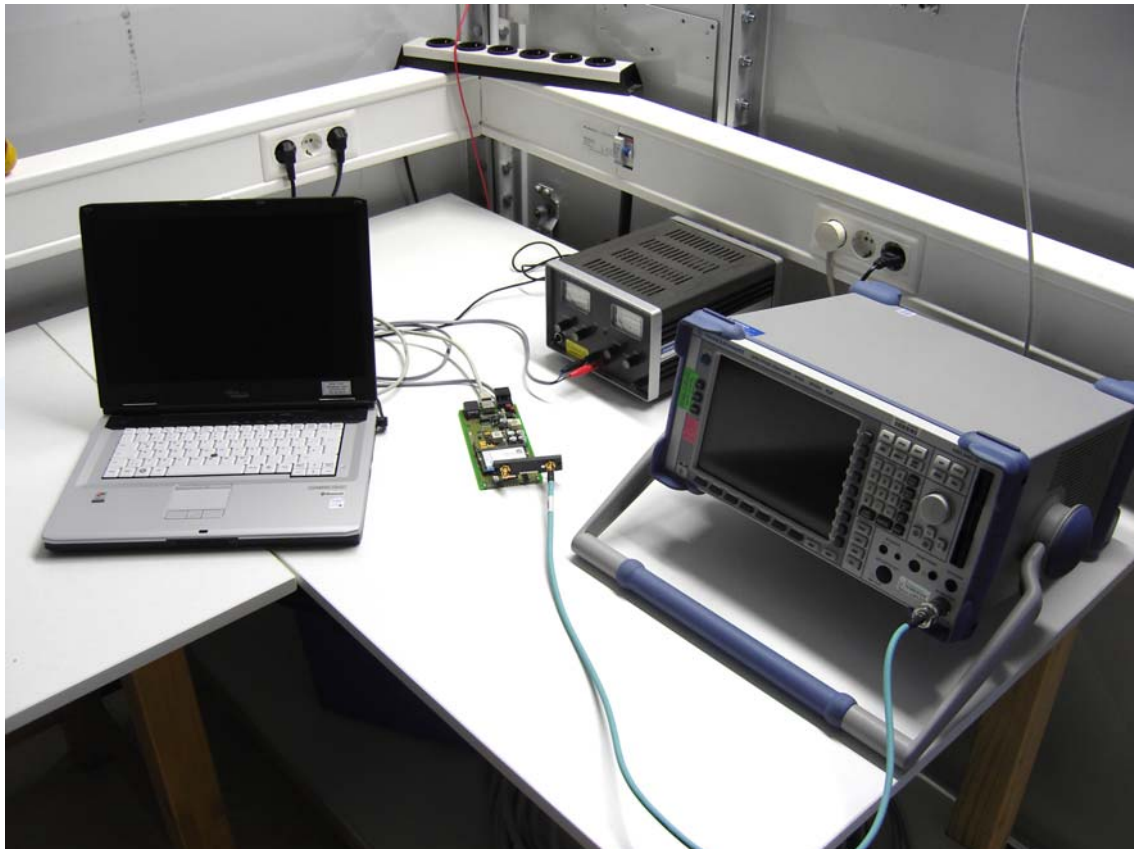
## 5.5 Peak Power Spectral Density

For test instruments and accessories used see section 6 Part CPC 3.

### 5.5.1 Description of the test location

Test location: Area 4

### 5.5.2 Photo documentation of the test set-up



**5.5.3 Applicable standard**

According to FCC Part 15 Subpart 15.407 (a):For the band 5.15-5.25 GHz the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 4 dBm in any 1-MHz band during any time interval of continuous transmission.

**5.5.4 Description of Measurement**

The EuT was connected to the spectrum analyzer with a suitable attenuator. The peak power spectral density was measured using the analyzer function of measuring the band power/Hz and the same settings like the power measuring. The result is calculated by addition of 60 dB (10 log 1 MHz/Hz) to the readings.

Settings on the spectrum analyzer:

RBW: 1 MHz  
 VBW: 300 kHz  
 Sweep: auto  
 Detector function: AV

**5.5.5 Test result**

| Channel | Fundamental Frequency (MHz) | Reading (dBm/Hz) | Correction to 1 MHz (dB) | PPSD Result (dBm) | Limit (dBm) |
|---------|-----------------------------|------------------|--------------------------|-------------------|-------------|
| 36      | 5180                        | -56.4            | 60                       | 3.6               | 4           |
| 48      | 5240                        | -57.4            | 60                       | 2.6               | 4           |

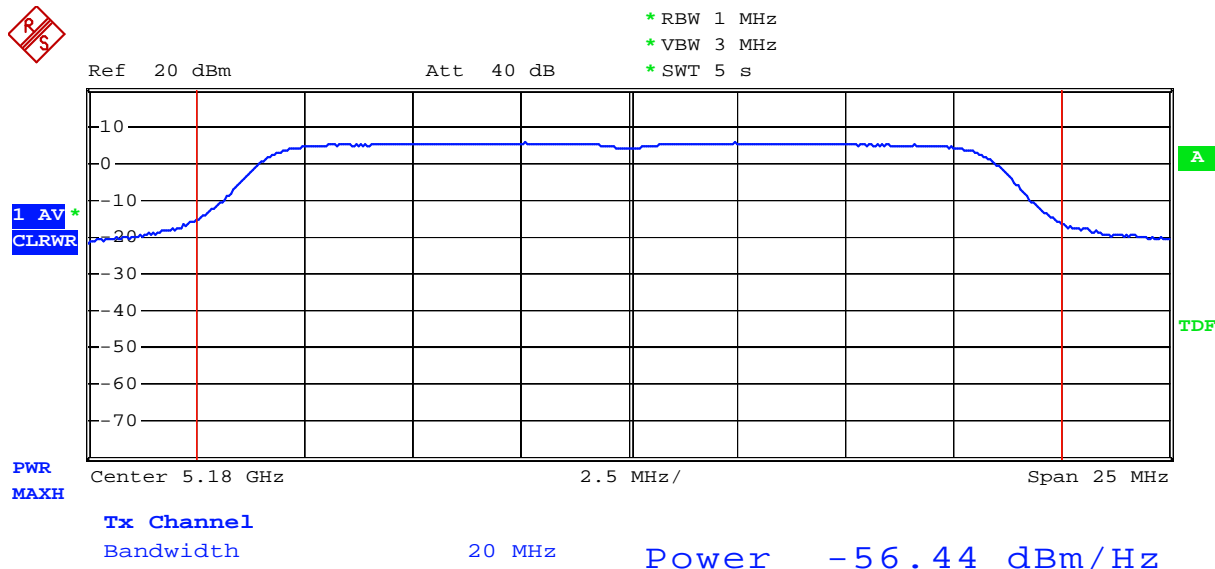
The requirements are **FULFILLED**.

**Remarks:** For detailed test results please refer to following test protocols.  
 \_\_\_\_\_  
 \_\_\_\_\_

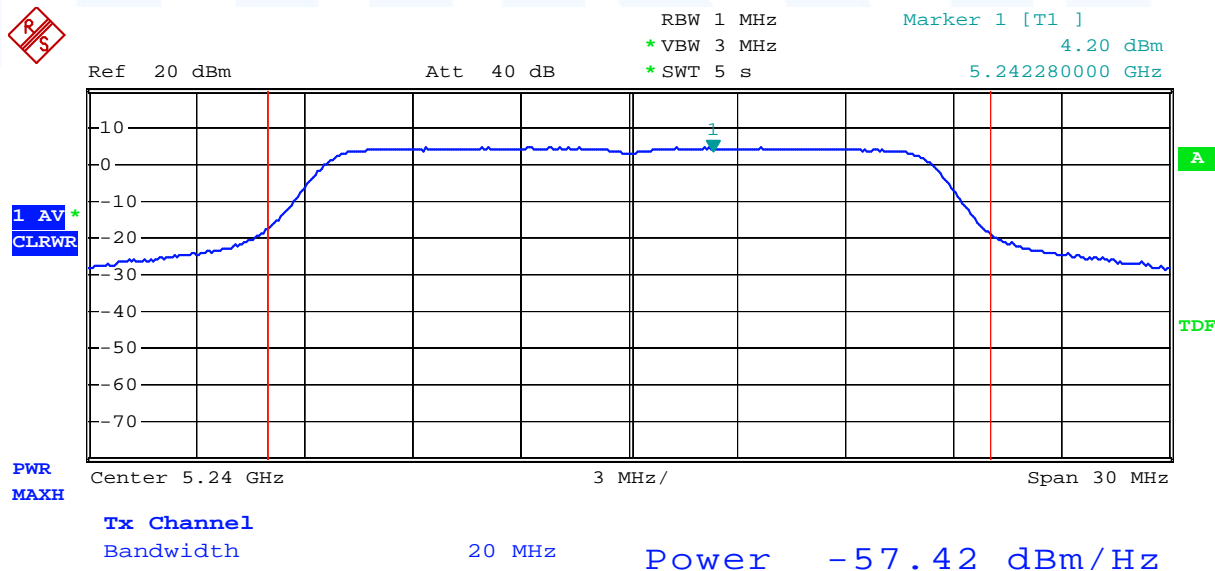
FCC ID: U9A277IWLAN-V200

Peak Power spectral density plots

Channel 36 (5180 MHz)



Channel 48 (5240 MHz)



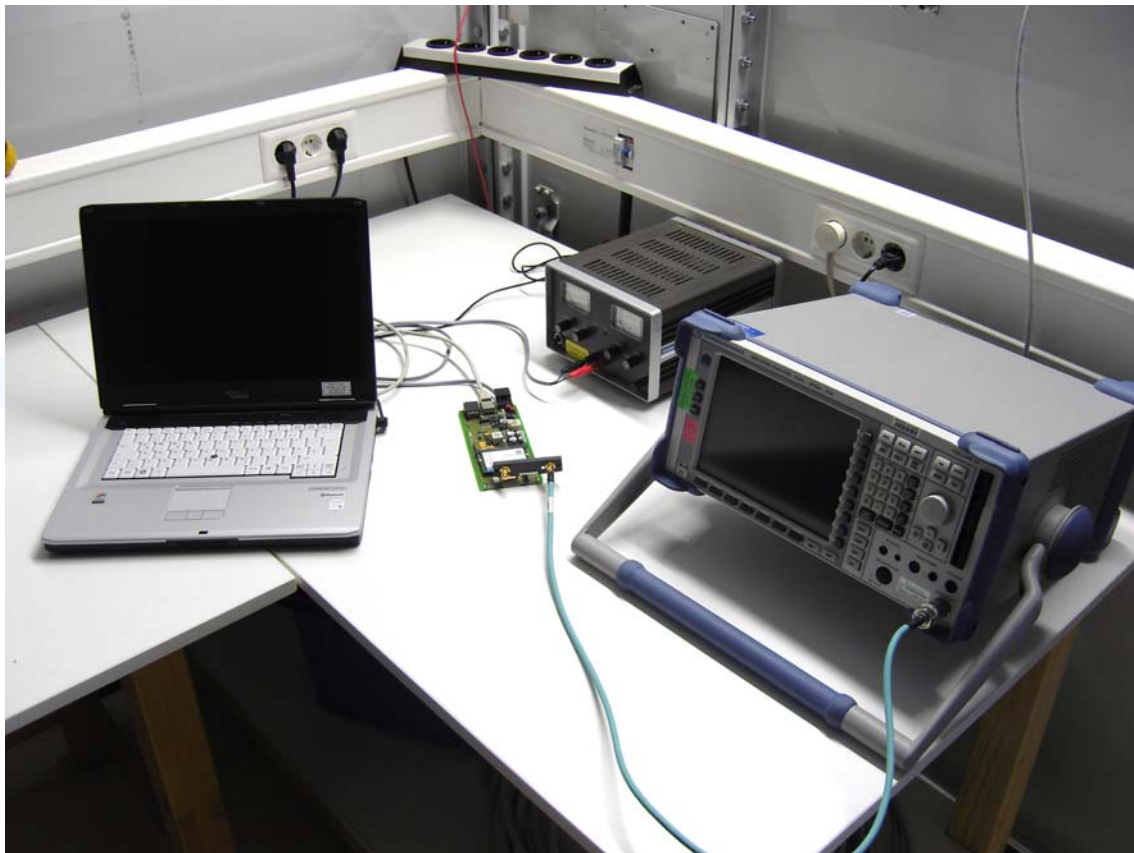
## 5.6 Peak Excursion

For test instruments and accessories used see section 6 Part **MB**.

### 5.6.1 Description of the test location

Test location: AREA4

### 5.6.2 Photo documentation of the test set-up



**5.6.3 Applicable standard**

According to FCC Part 15 Subpart 15.407 (a) (6): The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

**5.6.4 Description of Measurement**

The transmitter output was connected to the spectrum analyzer. Using Peak detector and MAX HOLD-function for Trace 1 with 1 MHz RBW and 3 MHz VBW and Trace 2 with 1 MHz RBW and 300 kHz VBW both traces were recorded. The largest difference between Trace 1 and Trace 2 in any 1 MHz band was noted as maximum Peak Excursion value.

**5.6.5 Test result**

| Channel | Frequency (MHz) | Peak Power Excursion (dBm) | Peak to Average Excursion Limit (dBm) | Delta (dB) |
|---------|-----------------|----------------------------|---------------------------------------|------------|
| 36      | 5180            | 8.0                        | 13                                    | -5.0       |
| 48      | 5240            | 9.3                        | 13                                    | -3.7       |

The requirements are **FULFILLED**.

**Remarks:** For detailed test results please refer to following test protocols.

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FCC ID: U9A277IWLAN-V200

Peak Excursion Plots

Channel 36 (5180 MHz)

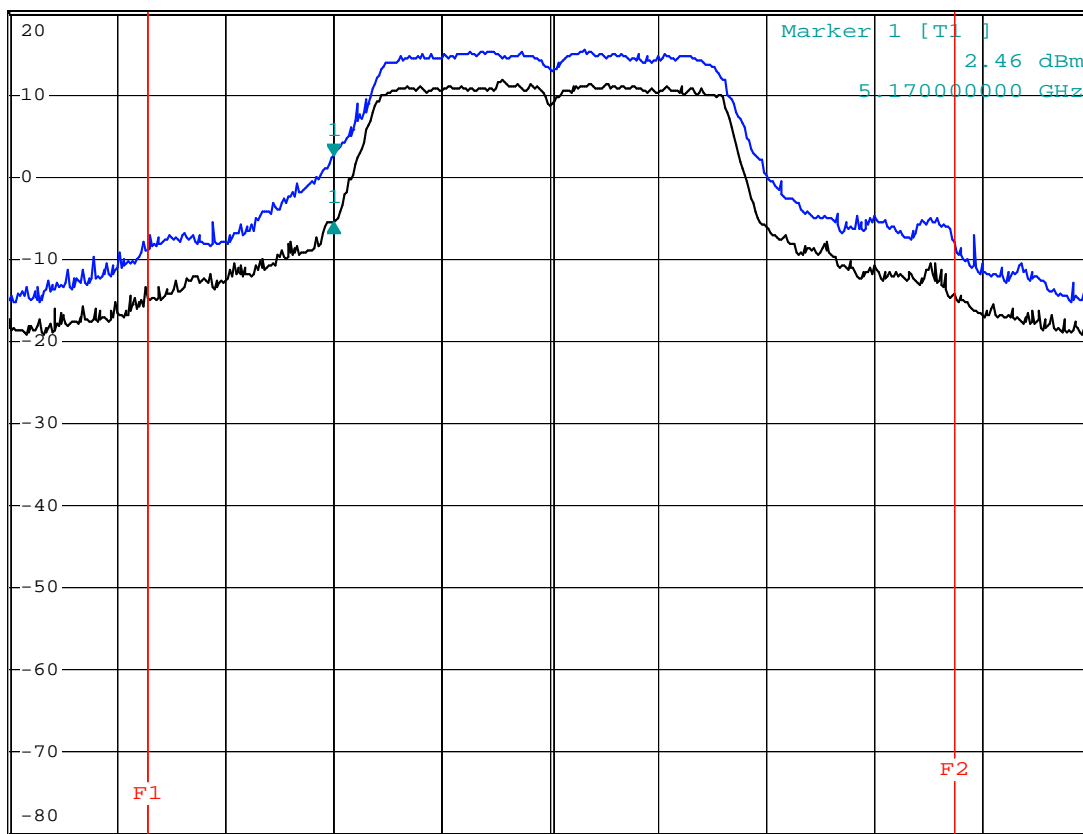


SELECT TRACE  
1

\*RBW 1 MHz Delta 1 [T2 ]  
\*VBW 3 MHz -8.03 dB  
SWT 20 ms 0.000000000 Hz

Ref 20 dBm Att 50 dB

1 PK VIEW  
2 PK VIEW



Center 5.18 GHz 5 MHz/ Span 50 MHz



FCC ID: U9A277IWLAN-V200

Channel 48 (5240 MHz)



\*RBW 1 MHz      Delta 1 [T2 ]  
\*VBW 300 kHz      -9.32 dB  
SWT 20 ms      0.000000000 Hz

Ref 20 dBm

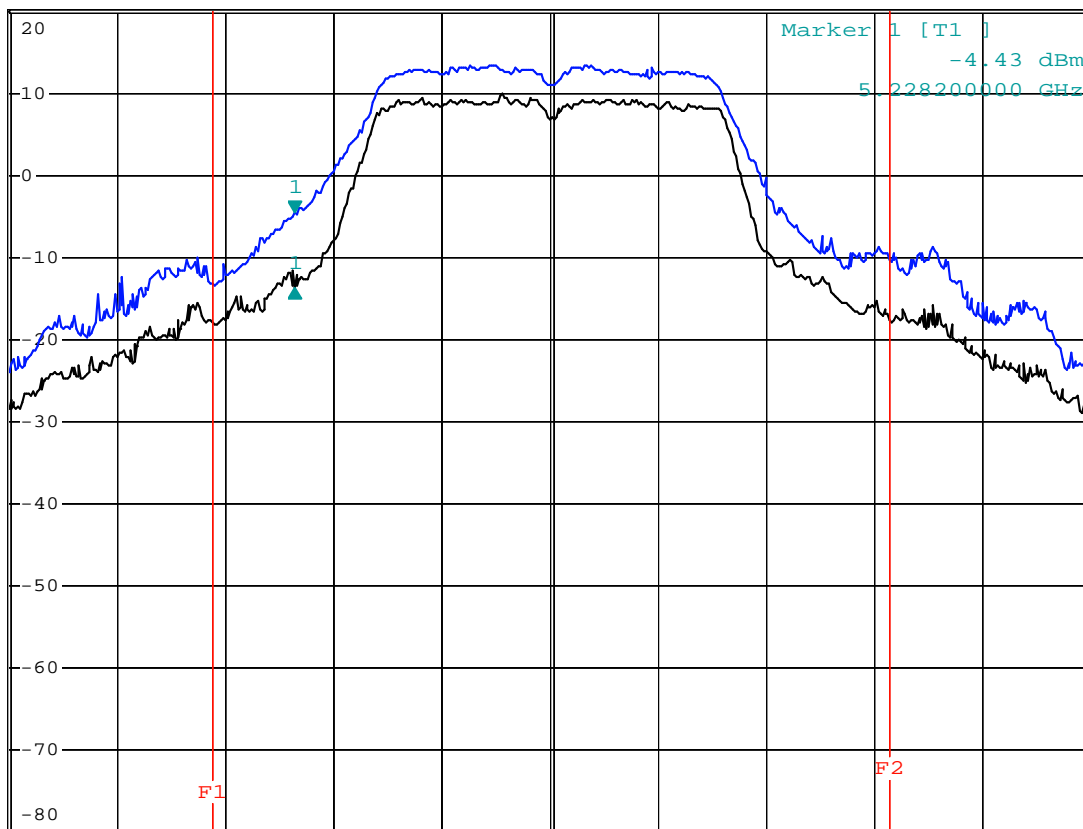
Att 50 dB

SWT 20 ms

0.000000000 Hz

1 PK  
VIEW

2 PK  
VIEW



Center 5.24 GHz

5 MHz/

Span 50 MHz

## 5.7 Frequency stability Measurement

For test instruments and accessories used see section 6 Part **CPC 3**.

### 5.7.1 Description of the test location

Test location: AREA4

### 5.7.2 Photo documentation of the test set-up



### 5.7.3 Applicable standard

According to FCC Part 15 Subpart 15.407 (g): Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

### 5.7.4 Description of Measurement

This test has been performed over variations in temperature and voltage. The lowest and the highest channel in the frequency band from 5150 to 5250 MHz have been measured at the 20 dB bandwidth under following conditions:

1. Supply voltage from 85 to 115 % of nominal voltage at normal temperature
2. Extreme temperature from 0 °C to 40 °C at nominal voltage.

### 5.7.5 Test result

The carrier frequencies (5180 MHz, 5240 MHz) maintain inside the operating frequency band from 5150 to 5250 MHz.

The requirements are **FULFILLED**.

**Remarks:** This test has been performed conducted at antenna jack on WLAN module.

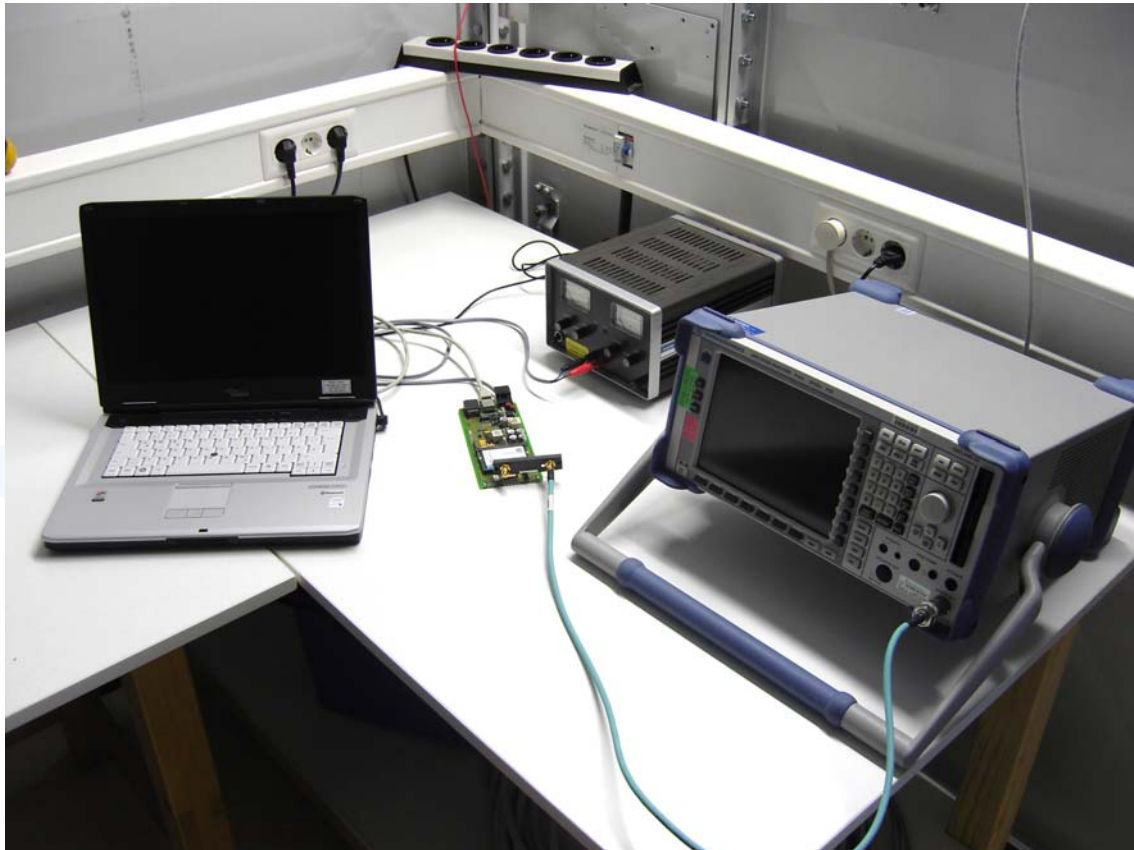
## 5.8 Maximum Permissible Exposure (MPE)

For test instruments and accessories used see section 6 Part CPC 3.

### 5.8.1 Description of the test location

Test location: AREA4

### 5.8.2 Photo documentation of the test set-up



### 5.8.3 Applicable standard

According to FCC Part 15 Subpart 15.407 (f): U-NII devices are subject to the radio frequency radiation exposure requirements specified in §§ 1.1307 (b), 2.1091 and 2.1093 of this chapter, as appropriate.

The test methods used comply with ANSI/IEEE C95.1-1992, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz".

This test report shows the compliance with the limits for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and the criteria to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in FCC 1.1307(b).

### 5.8.4 Description of Measurement

The maximum total power input to the antenna has been measured conducted as described in clause 5.3 of this document. Through the Friis transmission formula, which is a far field assumption and the known maximum gain of the antenna, the maximum MPE at a defined distance away from the product, can be calculated.

Friis transmission formula: 
$$P_d = \frac{P_{out} * G}{4 * \pi * r^2}$$

where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

G = gain of antenna (linear scale)

r = distance between antenna and observation point (cm)

5.8.5 Test result

| Channel No. | Frequency (MHz) | Max Power Output to Antenna |      | Antenna gain (dBi) | Power Density (mW/cm <sup>2</sup> ) | Limit of Power Density (mW/cm <sup>2</sup> ) |
|-------------|-----------------|-----------------------------|------|--------------------|-------------------------------------|--|
|             |                 | (dBm)                       | (mW) |                    |                                     |  |
| 36          | 5180            | 16.9                        | 49.0 | 2                  | 0.015                               | 1.0  |
| 48          | 5240            | 16.5                        | 44.7 | 2                  | 0.014                               | 1.0  |

Limits for Maximum Permissible Exposure (MPE)

| Frequency Range (MHz)  | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minutes) |
|--|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational / Controlled Exposure</b>         |                               |                               |                                     |                          |
| 0.3 – 3.0  | 614                           | 1.63                          | 100                                 | 6                        |
| 3.0 – 30   | 1842/f                        | 4.89/f                        | 900/f <sup>2</sup>                  | 6                        |
| 30 - 300   | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1500   | ---                           | ---                           | f/300                               | 6                        |
| 1500-100000  | ---                           | ---                           | 5.0                                 | 6                        |
| <b>(B) Limits for General Population / Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3 – 3.0  | 614                           | 1.63                          | 100                                 | 30                       |
| 3.0 – 30   | 824/f                         | 2.19/f                        | 180/ f <sup>2</sup>                 | 30                       |
| 30 - 300   | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1500   | ---                           | ---                           | f/1500                              | 30                       |
| 1500-100000  | ---                           | ---                           | 1.0                                 | 30                       |

f = Frequency in MHz

The requirements are **FULFILLED**.

Remarks: \_\_\_\_\_

**5.8.6 Compliance regarding Co-location and Co-transmission**

**Applicable standard:** ANSI/IEEE C95.1-1999, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", Clause 4.1.1. e):

For mixed or broadband fields at a number of frequencies for which there are different values of the MPE, the fraction of the MPE (in terms of E, H, or power density (S)) occurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity (1.0, or 100 % in terms of percentage).

- |                                   |   |
|-----------------------------------|---|
| 1. MPE of WLAN-Module:            | $P_d = 0.015 \text{ mW/cm}^2$<br>Limit: $1 \text{ mW/cm}^2$<br>Fraction of MPE: 1.5%    |
| 2. MPE of Effective Range Module: | $P_d = 0.00006 \text{ mW/cm}^2$<br>Limit: $1 \text{ mW/cm}^2$<br>Fraction of MPE: 0.6 % |

The requirements are **FULFILLED**.

**Remarks:** For the test result of Effective Range Module please refer to Test report T33234-03-00AA  
(mikes-testingpartners gmbh)

## 5.9 Antenna application

### 5.9.1 Applicable standard

According to FCC Part 15 Subpart 15.203: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The EUT's antenna meets the requirement of FCC Part 15C, Section 15.203 and 15.204

### 5.9.2 Result

The requirements are **FULFILLED**.

**Remarks:** The EuT is equipped with two internal antennas (gain=2.0 dBi).

The EuT don't have any external antenna connectors.

mikes

## 5.10 Receiver Spurious Emissions

For test instruments and accessories used see section 6 Part **SER 2** and **SER 3**.

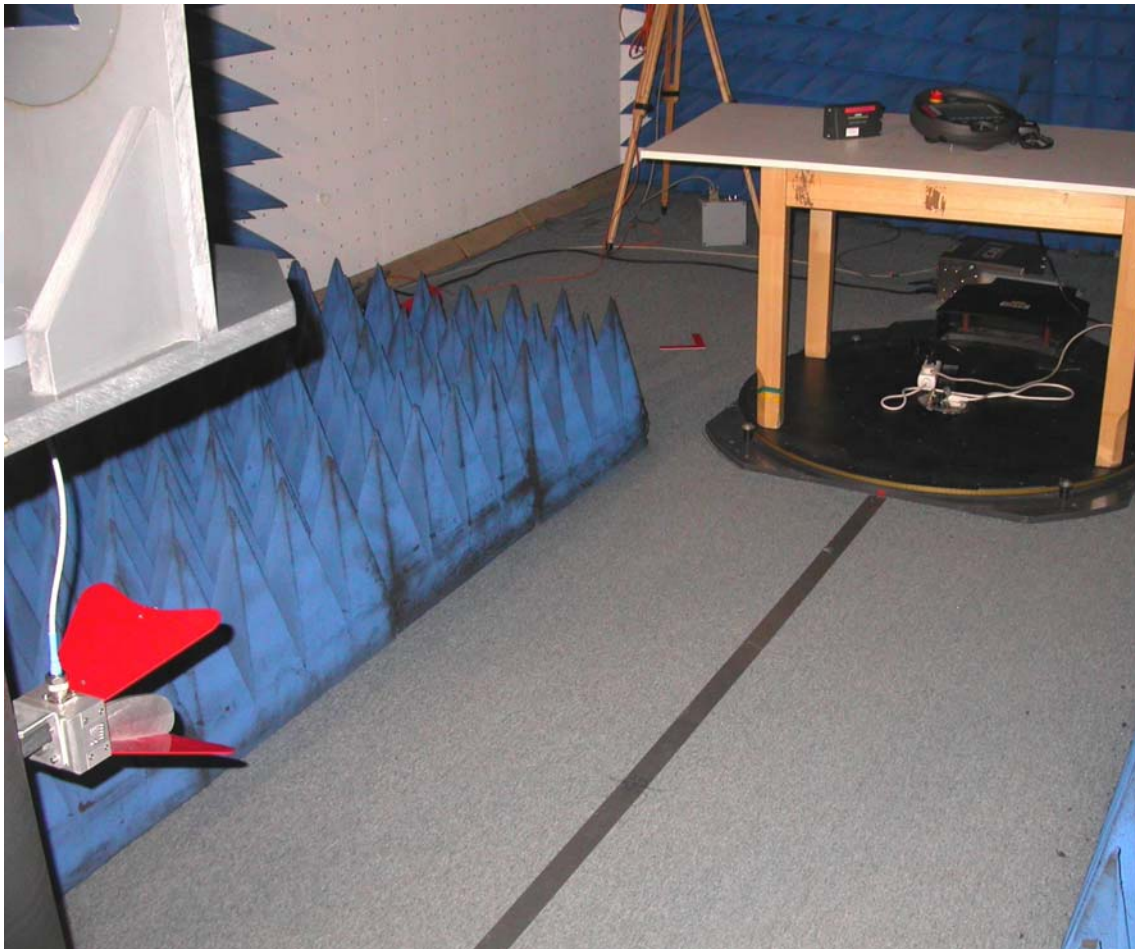
### 5.10.1 Description of the test location

Test location: OATS1  
Anechoic Chamber A2

Test distance: 3 metres

### 5.10.2 Photo documentation of the test set-up

Anechoic chamber





FCC ID: U9A277IWLAN-V200

Open area test site



### 5.10.3 Applicable standard

According to FCC Part 15 Subpart 15.109: Field strength of radiated emissions from unintentional radiators at 3 m.

### 5.10.4 Description of Measurement

Radiated spurious emissions from the EuT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. The measurements are made with 120 kHz/6 dB bandwidth and quasi-peak detection. The EuT is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003.

The antenna was positioned 3 meters horizontally from the EuT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarization`s and the EuT are rotated 360 degrees.

The final level, expressed in dB $\mu$ V/m, is arrived by taking the reading from the EMI receiver (Level dB $\mu$ V) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver, where the correction factors are stored.

The radiated emissions from the EuT are measured in the frequency range of 1 GHz to maximum frequency as specified in section 15.33, using a Spectrum Analyzer and appropriate linearly polarized antennas. The EuT is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. The set up of the EuT will be in accordance to ANSI C63.4-2003. The antenna was positioned 3 m horizontally from the EuT.

Measurement 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, RBW 1 MHz and VBW set to 3 MHz for any spurious emission or modulation product that falls in Restricted bands as defined in Section 15.205.

All tests are performed at a test-distance of 3 meters. During the tests the EUT measurement scans are made with both horizontal and vertical antenna polarization`s and the EuT are rotated 360 degrees.

Average values were measured with spectrum analyzer by taking the following Settings

RBW: 1 MHz

VBW: 10 Hz

Sweep: Auto

5.10.5 Test result

| Frequency (MHz) | Detector | Analyzer reading |               | Correction (dB) | Result       |               | Limit (dBµV/m) | Delta (dB) |
|-----------------|----------|------------------|---------------|-----------------|--------------|---------------|----------------|------------|
|                 |          | hor (dBµV/m)     | vert (dBµV/m) |                 | hor (dBµV/m) | vert (dBµV/m) |                |            |
| 30-1000         | QPk      | <30              | <30           |                 | ---          | ---           | ---            | ---        |
| 1000-18000      | Pk       | <54              | <54           |                 | ---          | ---           | 74             | ---        |
|                 | AV       | ---              | ---           |                 | ---          | ---           | 54             | ---        |

Limit according to FCC Subpart 15.109(a)

| Frequency of emission (MHz) | Field strength Limits (µV/m) | Field strength Limits (dBµV/m) |
|-----------------------------|------------------------------|--------------------------------|
| 0,009-0,490                 | 2400/F(kHz)                  |                                |
| 0,490-1,705                 | 24000/F(kHz)                 |                                |
| 1,705-30                    | 30                           |                                |
| 30-88                       | 100                          | 40                             |
| 88-216                      | 150                          | 44                             |
| 216-960                     | 200                          | 46                             |
| Above 960                   | 500                          | 54                             |

The requirements are **FULFILLED**.

**Remarks:** The measurement was performed up to the 5<sup>th</sup> harmonic.

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## 6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

| Test ID | Model / Type           | Kind of Equipment         | Manufacturer                  | Equipment No.   |
|---------|------------------------|---------------------------|-------------------------------|-----------------|
| A 4     | ESHS 30                | EMI Test Receiver         | Rohde & Schwarz München       | 02-02/03-05-002 |
|         | ESH 2 - Z 5            | LISN                      | Rohde & Schwarz München       | 02-02/20-05-004 |
|         | N-4000-BNC             | RF Cable                  | mikes-testingpartners gmbh    | 02-02/50-05-138 |
|         | N-1500-N               | RF Cable                  | mikes-testingpartners gmbh    | 02-02/50-05-140 |
|         | ESH 3 - Z 2            | Pulse Limiter             | Rohde & Schwarz München       | 02-02/50-05-155 |
|         | PE1540                 | Power Supply              | Phillips Fluke GmbH           | 02-02/50-07-031 |
| CPC 3   | FSP 30                 | Spectrum Analyzer         | Rohde & Schwarz München       | 02-02/11-05-001 |
|         | THS730A                | Handheld Scope            | Tektronix GmbH                | 02-02/13-05-001 |
|         | PE1540                 | Power Supply              | Phillips Fluke GmbH           | 02-02/50-07-031 |
| MB      | FSP 30                 | Spectrum Analyzer         | Rohde & Schwarz München       | 02-02/11-05-001 |
|         | THS730A                | Handheld Scope            | Tektronix GmbH                | 02-02/13-05-001 |
|         | PE1540                 | Power Supply              | Phillips Fluke GmbH           | 02-02/50-07-031 |
|         | WK-340/40              | Climatic Chamber          | Weiss Umwelttechnik GmbH      | 02-02/45-05-001 |
| SEC 1-3 | FSP 30                 | Spectrum Analyzer         | Rohde & Schwarz München       | 02-02/11-05-001 |
|         | THS730A                | Handheld Scope            | Tektronix GmbH                | 02-02/13-05-001 |
|         | PE1540                 | Power Supply              | Phillips Fluke GmbH           | 02-02/50-07-031 |
| SER 1   | FMZB 1516              | Magnetic Field Antenna    | Schwarzbeck Mess-Elektronik   | 01-02/24-01-018 |
|         | ESCS 30                | EMI Test Receiver         | Rohde & Schwarz München       | 02-02/03-05-001 |
|         | PE1540                 | Power Supply              | Phillips Fluke GmbH           | 02-02/50-07-031 |
| SER 2   | ESVS 30                | EMI Test Receiver         | Rohde & Schwarz München       | 02-02/03-05-006 |
|         | VULB 9168              | Trilog Broad Band Antenna | Schwarzbeck Mess-Elektronik   | 02-02/24-05-005 |
|         | S10162-B               | RF Cable 33 m             | Huber + Suhner                | 02-02/50-05-031 |
|         | KK-EF393-21N-16        | RF Cable 20 m             | Huber + Suhner                | 02-02/50-05-033 |
|         | NW-2000-NB             | RF Cable                  | Huber + Suhner                | 02-02/50-05-113 |
|         | PE1540                 | Power Supply              | Phillips Fluke GmbH           | 02-02/50-07-031 |
| SER 3   | FSP 30                 | Spectrum Analyzer         | Rohde & Schwarz München       | 02-02/11-05-001 |
|         | AFS4-01000400-10-10P-4 | RF Amplifier 1-4 GHz      | PARZICH GMBH                  | 02-02/17-05-003 |
|         | AMF-4F-04001200-15-10P | RF Amplifier 4-12 GHz     | PARZICH GMBH                  | 02-02/17-05-004 |
|         | AFS5-12001800-18-10P-6 | RF Amplifier 12-18 GHz    | PARZICH GMBH                  | 02-02/17-06-002 |
|         | 3117                   | Horn Antenna 1-18 GHz     | EMCO Elektronik GmbH          | 02-02/24-05-009 |
|         | Sucoflex N-1600-SMA    | RF Cable                  | novotronik Signalverarbeitung | 02-02/50-05-073 |
|         | Sucoflex N-2000-SMA    | RF Cable                  | novotronik Signalverarbeitung | 02-02/50-05-075 |
|         | PE1540                 | Power Supply              | Phillips Fluke GmbH           | 02-02/50-07-031 |

FCC ID: U9A277IWLAN-V200

|         | Equipment No.   | Next Calib. | Last Calib. | Next Verif. | Last Verif. |
|---------|-----------------|-------------|-------------|-------------|-------------|
| A 4     | 02-02/03-05-002 | 05/06/2010  | 05/06/2009  |             |             |
|         | 02-02/20-05-004 | 03/13/2011  | 03/13/2008  | 10/29/2009  | 04/29/2009  |
|         | 02-02/50-05-138 |             |             |             |             |
|         | 02-02/50-05-140 |             |             |             |             |
|         | 02-02/50-05-155 | 10/03/2009  | 04/03/2009  |             |             |
|         | 02-02/50-07-031 |             |             |             |             |
| CPC 3   | 02-02/11-05-001 | 04/20/2010  | 04/20/2009  |             |             |
|         | 02-02/13-05-001 | 09/10/2009  | 09/10/2008  |             |             |
|         | 02-02/50-07-031 |             |             |             |             |
| MB      | 02-02/11-05-001 | 04/20/2010  | 04/20/2009  |             |             |
|         | 02-02/13-05-001 | 09/10/2009  | 09/10/2008  |             |             |
|         | 02-02/50-07-031 |             |             |             |             |
|         | 02-02/45-05-001 | 09/01/2010  | 09/01/2005  | 07/12/2009  | 01/12/2009  |
| SEC 1-3 | 02-02/11-05-001 | 04/20/2010  | 04/20/2009  |             |             |
|         | 02-02/13-05-001 | 09/10/2009  | 09/10/2008  |             |             |
|         | 02-02/50-07-031 |             |             |             |             |
| SER 1   | 01-02/24-01-018 | 02/23/2010  | 02/23/2009  |             |             |
|         | 02-02/03-05-001 | 12/10/2009  | 12/10/2008  |             |             |
|         | 02-02/50-07-031 |             |             |             |             |
| SER 2   | 02-02/03-05-006 | 07/30/2009  | 07/30/2008  |             |             |
|         | 02-02/24-05-005 | 05/06/2011  | 05/06/2008  | 09/02/2009  | 03/02/2009  |
|         | 02-02/50-05-031 |             |             |             |             |
|         | 02-02/50-05-033 |             |             |             |             |
|         | 02-02/50-05-113 |             |             |             |             |
|         | 02-02/50-07-031 |             |             |             |             |
| SER 3   | 02-02/11-05-001 | 04/20/2010  | 04/20/2009  |             |             |
|         | 02-02/17-05-003 |             |             |             |             |
|         | 02-02/17-05-004 |             |             |             |             |
|         | 02-02/17-06-002 |             |             |             |             |
|         | 02-02/24-05-009 | 02/04/2010  | 02/04/2009  |             |             |
|         | 02-02/50-05-073 |             |             |             |             |
|         | 02-02/50-05-075 |             |             |             |             |