
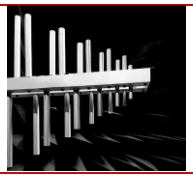
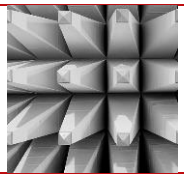

CETECOM™
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# TEST REPORT

**Test report no.: 1-1248/16-01-02-A**

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

## Testing laboratory


**CETECOM ICT Services GmbH**
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**Accredited Testing Laboratory:**
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

## Applicant


**Sennheiser electronic GmbH & Co. KG**
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## Manufacturer


**Sennheiser electronic GmbH & Co. KG**
Am Labor 1
30900 Wedemark / GERMANY


## Test standard/s

| | |
|---|---|
| 47 CFR Part 15 | Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices |
| RSS - 247 Issue 1 | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence - Exempt Local Area Network (LE-LAN) Devices |

For further applied test standards please refer to section 3 of this test report.

## Test Item

| | |
|---|---|
| **Kind of test item:** | **Wireless conference system** |
| **Model name:** | **ADN-W AM-US** |
| **FCC ID:** | **DMOADNWA** |
| **IC:** | **2099A-ADNWA** |
| Frequency: | UNII Bands 5250 MHz to 5350 MHz and 5470 MHz to 5865 MHz |
| Technology tested: | Proprietary |
| Antenna: | External antenna |
| Power supply: | 6.2 V to 7.5 V DC by external power supply |
| Temperature range: | +5°C to +45°C |


This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

## Test report authorized:

cn=Stefan Boes, o=CETECOM ICT Services GmbH, ou=BOE-161011, email=Stefan.Boes@cetecom.com, c=DE
2016.11.16 12:01:41 +01'00'

Stefan Bös
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Radio Communications & EMC

## Test performed:

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2016.11.15 17:54:25 +01'00'

David Lang
Lab Manager
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# 1 Table of contents

# 2 General information

## 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.
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This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

This test report replaces the test report with the number 1-1248/16-01-05 and dated 2016-06-23.

## 2.2 Application details

| | |
|---|---|
| Date of receipt of order: | 2016-04-20 |
| Date of receipt of test item: | 2016-05-27 |
| Start of test: | 2016-06-27 |
| End of test: | 2016-07-21 |
| Person(s) present during the test: | -/- |

# 3 Test standard/s and references

| Test standard | Date | Description |
|---|---|---|
| 47 CFR Part 15 | | Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices |
| RSS - 247 Issue 1 | May 2015 | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence - Exempt Local Area Network (LE-LAN) Devices |

| Guidance | Version | Description |
|---|---|---|
| UNII: KDB 789033 D02 | v01r02 | Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E |
| UNII: KDB 905462 D02 | v02 | Compliance measurement procedures for unlicensed - national information infrastructure devices operating in the 5250 - 5350 MHz and 5470 - 5725 MHz bands incorporating dynamic frequency selection |
| UNII: KDB 905462 D04 | v01 | Operational Modes for DFS Testing New Rules |
| ANSI C63.4-2014 | -/- | 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 |
| ANSI C63.10-2013 | -/- | American national standard of procedures for compliance testing of unlicensed wireless devices |
| KDB 662911 D01 | V02r01 | Emissions Testing of Transmitters with Multiple Outputs in the Same Band |

# 4 Test environment

| | | | |
|---|---|---|---|
| Temperature | : | $T_{nom}$<br>$T_{max}$<br>$T_{min}$ | +20 °C during room temperature tests<br>+45 °C during high temperature tests<br>+5 °C during low temperature tests |
| Relative humidity content | : | | 55 % |
| Barometric pressure | : | | not relevant for this kind of testing |
| Power supply | : | $V_{nom}$<br>$V_{max}$<br>$V_{min}$ | 7.4 V DC by external power supply<br>7.5 V<br>6.2 V |

# 5 Test item

## 5.1 General description

| | | |
|---|---|---|
| Kind of test item | : | Wireless conference system |
| Type identification | : | ADN-W AM-US |
| HMN | : | -/- |
| PMN | : | ADN-W AM |
| HVIN | : | ADN-W AM-US |
| FVIN | : | 1.3.3.2 |
| S/N serial number | : | 1231100009 |
| HW hardware status | : | FPGA: 2_8_5_prod2/ AM1.bin |
| SW software status | : | ADNW_TERMINAL.EXE from 16.11.2012; APP:001120 |
| Frequency band | : | UNII Bands 5250 MHz to 5350 MHz and 5470 MHz to 5865 MHz |
| Type of radio transmission<br>Use of frequency spectrum | :<br>: | OFDM (Frame based equipment) |
| Type of modulation | : | Fixed QPSK- Modulation Scheme, Coding Rate 1/2 |
| Number of channels | : | 42 |
| Antenna | : | External antenna<br>The device is equipped with 3 external antenna ports.<br>Tests have been performed in a conducted way assuming an antenna gain of 0 dBi. Detailed antenna specification provided by manufacturer (see section 9) |
| Power supply | : | 6.2 V to 7.5 V DC by external power supply |
| Temperature range | : | +5°C to +45°C |

## 5.2 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup- and EUT-photos are included in test report: 1-1248/16-01-01_AnnexA
1-1248/16-01-01_AnnexB
1-1248/16-01-01_AnnexH

# 6 Test laboratories sub-contracted

None

## 7 Measurement uncertainty

| Measurement uncertainty | |
|---|---|
| **Test case** | **Uncertainty** |
| Occupied bandwidth | ± 100 kHz (depends on the used RBW) |
| Frequency accuracy (radar burst) | 0.1 Hz |
| Level accuracy (radar burst) | ± 0.5 dB |
| Maximum output power | ± 0.5 dB |

## 8 Summary of measurement results

| | |
|---|---|
| ☒ | No deviations from the technical specifications were ascertained |
| ☐ | There were deviations from the technical specifications ascertained |
| ☐ | This test report is only a partial test report.<br>The content and verdict of the performed test cases are listed below. |

| TC Identifier | Description | Verdict | Date | Remark |
|---|---|---|---|---|
| DFS-Testing | CFR Part 15, FCC 06-96 | Pass | 2016-11-15 | DFS only |

| Test Standard Clause | Test Case | Bandwidth | C | NC | NA | NP | Remark |
|---|---|---|---|---|---|---|---|
| 7.8.1*[3] | U-NII Detection Bandwidth | 20 MHz | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.407 (h)(2) | DFS Detection Threshold | 20 MHz | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.407 (h)(2) (ii) & 7.8.2*[3] | Channel Availability Check Time | 20 MHz | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.407 (h)(2) (iv) & 7.8.3*[3] | Non-Occupancy Period | 20 MHz | ☒ | ☐ | ☐ | ☐ | -/- |
| §15.407 (h)(2) (iii) & 7.8.2*[3] | Channel Move Time / Channel Closing Transmission Time | 20 MHz | ☒ | ☐ | ☐ | ☐ | -/- |
| 7.8.3 & 7.8.4*[3] | In-Service Monitoring / Statistical Performance Check | 20 MHz | ☒ | ☐ | ☐ | ☐ | -/- |

**Abbreviations/References:**

C Compliant
NC Not compliant
NA Not applicable
NP Not performed

## 9 Additional comments

| | |
|---|---|
| Reference documents: | Antenna specification: MAF94051_spec sheet / PS-CWC-0028 Rev. A, issued 10 Aug 2004. |
| Special test descriptions: | All tests except the In-Service Monitoring are conducted with Pulse Type 0.<br><br>A special test software had been provided by the customer to prevent need to reset the device between the trails. |
| Configuration descriptions: | All tests performed in normal test mode (during normal operation) were carried out with 4 client devices (AND-W D1) associated to the DUT. One AND-W D1 was actively transmitting audio. |

# 10 RF measurements

## 10.1 Description of test setup

### 10.1.1 Conducted measurements

**Setup**

Figure 1 shows a setup whereby the UUT is a RLAN device operating in slave mode, without Radar Interference Detection function. This setup also contains a RLAN device operating in master mode. The radar test signals are injected into the master device. The UUT (slave device) is associated with the master device.

Figure 1 shows an example

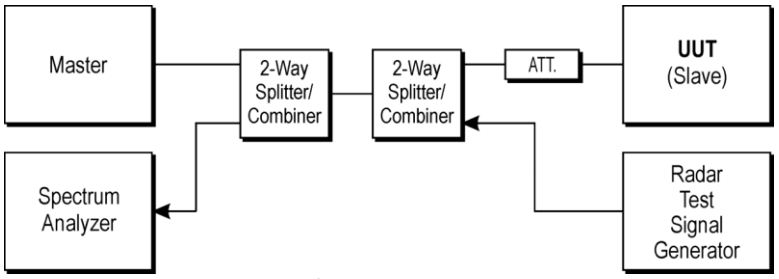



Figure 1: Setup

RPP = SG - CA
(RPP-radar pulse power; SG-signal generator power; CA-loss signal path)

Example calculation:
RPP [dBm] = -30.0 [dBm] – 33.0 [dB] = -63.0 [dBm]

## Equipment table:

| No. | Lab / Item | Equipment | Type | Manufact. | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 11 | A | Vektor Signal Generator | SMU200A | R&S | 101633 | 300003496 | k | 07.04.2014 | 07.04.2017 |
| 2 | A | Spectrum Analyzer 9kHz to 30GHz - 140..+30dBm | FSP30 | R&S | 100886 | 300003575 | k | 27.01.2016 | 27.01.2018 |
| 3 | A | DFS-test site | div. Splitter, Cables, Attenuators | Mini-Circuits | na | 300004557 | ev | -/- | -/- |
| 4 | A | Access point WLAN | BAT54-Rail | Hirschmann | 9439260210001 10207 | 400000689 | ne | -/- | -/- |
| 5 | A | RF-Cable WLAN-Tester Port 1 | ST18/SMAm/SMAm/ 36 | Huber & Suhner | Batch no. 601494 | 400001216 | ev | -/- | -/- |
| 6 | A | RF-Cable WLAN-Tester Port 2 | ST18/SMAm/SMAm/ 48 | Huber & Suhner | Batch no. 54877 | 400001217 | ev | -/- | -/- |
| 7 | A | RF-Cable WLAN-Tester Port 3 | ST18/SMAm/SMAm/ 48 | Huber & Suhner | Batch no. 54877 | 400001218 | ev | -/- | -/- |
| 8 | A | RF-Cable WLAN-Tester Port 4 | ST18/SMAm/SMAm/ 48 | Huber & Suhner | Batch no. 1273777 | 400001219 | ev | -/- | -/- |
| 9 | A | RF-Cable WLAN-Tester Analyzer | ST18/SMAm/SMAm/ 36 | Huber & Suhner | Batch no. 54876 | 400001220 | ev | -/- | -/- |
| 10 | A | RF-Cable WLAN-Tester Vector Signal Generator | ST18/SMAm/SMAm/ 60 | Huber & Suhner | Batch no. 606844 | 400001222 | ev | -/- | -/- |
| 11 | A | RF-Cable WLAN-Tester Reserve | ST18/SMAm/SMAm/ 36 | Huber & Suhner | Batch no. 54876 | 400001223 | ev | -/- | -/- |
| 12 | A | PC | ExOne | F+W | 2890296v001 | 300005102 | ne | -/- | -/- |

**Agenda:** Kind of Calibration

| | | | |
|---|---|---|---|
| k | calibration / calibrated | EK | limited calibration |
| ne | not required (k, ev, izw, zw not required) | zw | cyclical maintenance (external cyclical maintenance) |
| ev | periodic self verification | izw | internal cyclical maintenance |
| Ve | long-term stability recognized | g | blocked for accredited testing |
| vlkl! | Attention: extended calibration interval | | |
| NK! | Attention: not calibrated | *) | next calibration ordered / currently in progress |

## 10.2 Parameters of DFS test signals

### 10.2.1 DFS Detection Thresholds for Master Devices as well as Client Devices With Radar Detection

| Maximum Transmit Power EIRP | Value (see note) |
|---|---|
| ≥ 200 mW | -64 dBm |
| < 200 mW and power spectral density < 10 dBm/MHz | -62 dBm |
| < 200 mW and That do not meet the power spectral density < 10 dBm/MHz | -64 dBm |

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.
Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

### 10.2.2 DFS Response Requirement Values

| Parameter | Value |
|---|---|
| Non-occupancy period | minimum 30 minutes |
| Channel Availability Check Time | 60 seconds |
| Channel Move Time | 10 seconds See Note 1. |
| Channel Closing Transmission Time | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2. |
| U-NII Detection Bandwidth | Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3. |

Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.
Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.
Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

## 10.2.3 Radar Test Waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance.

**Short Pulse Radar Test Waveforms**

| Radar Type | Pulse Width (µsec) | PRI (µsec) | Number of Pulses | Minimum Percentage of Successful Detection | Minimum Number of Trials |
|---|---|---|---|---|---|
| 0 | 1 | 1428 | 18 | See Note 1 | See Note 1 |
| 1 | 1 | Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a | Roundup $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\mathrm{PRI}_{\mu\mathrm{sec}}}\right)\right\}$ | 60% | 30 |
| | | Test B: 15 unique PRI values randomly selected within the range of 518-3066 µsec, with a minimum increment of 1 µsec, excluding PRI values selected in Test A | | | |
| 2 | 1-5 | 150-230 | 23-29 | 60% | 30 |
| 3 | 6-10 | 200-500 | 16-18 | 60% | 30 |
| 4 | 11-20 | 200-500 | 12-16 | 60% | 30 |
| Aggregate (Radar Types 1-4) | | | | 80% | 120 |
| Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests. | | | | | |

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4.

**Pulse Repetition Intervals Values for Test A**

| Pulse Repetition Frequency Number | Pulse Repetition Frequency (Pulses Per Second) | Pulse Repetition Interval (Microseconds) |
|---|---|---|
| 1 | 1930.5 | 518 |
| 2 | 1858.7 | 538 |
| 3 | 1792.1 | 558 |
| 4 | 1730.1 | 578 |
| 5 | 1672.2 | 598 |
| 6 | 1618.1 | 618 |
| 7 | 1567.4 | 638 |
| 8 | 1519.8 | 658 |
| 9 | 1474.9 | 678 |
| 10 | 1432.7 | 698 |
| 11 | 1392.8 | 718 |
| 12 | 1355 | 738 |
| 13 | 1319.3 | 758 |
| 14 | 1285.3 | 778 |
| 15 | 1253.1 | 798 |
| 16 | 1222.5 | 818 |
| 17 | 1193.3 | 838 |
| 18 | 1165.6 | 858 |
| 19 | 1139 | 878 |
| 20 | 1113.6 | 898 |
| 21 | 1089.3 | 918 |
| 22 | 1066.1 | 938 |
| 23 | 326.2 | 3066 |

**Long Pulse Radar Test Waveform**

| Radar Type | Pulse Width (µsec) | Chirp Width (MHz) | PRI (µsec) | Number of Pulses per Burst | Number of Bursts | Minimum Percentage of Successful Detection | Minimum Number of Trails |
|---|---|---|---|---|---|---|---|
| 5 | 50-100 | 5-20 | 1000-2000 | 1-3 | 8-20 | 80% | 30 |

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms.

**Frequency Hopping Radar Test Waveform**

| Radar Type | Pulse Width (µsec) | Chirp Width (MHz) | Pulses per Hop | Hopping Rate (kHz) | Hopping Sequence Length (msec) | Minimum Percentage of Successful Detection | Minimum Number of Trails |
|---|---|---|---|---|---|---|---|
| 6 | 1 | 333 | 9 | 0.333 | 300 | 70% | 30 |

For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined.
The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set.

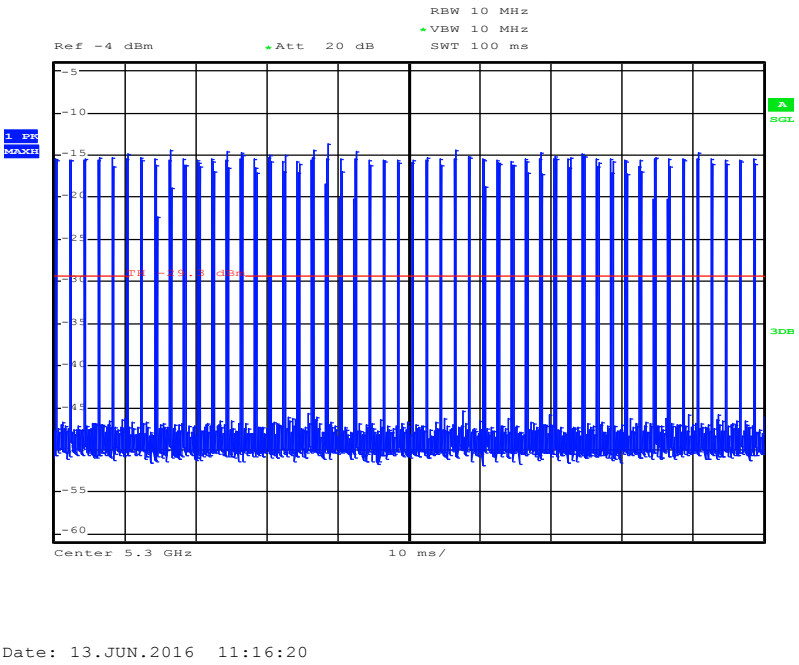
## 10.3 Test preparation

### 10.3.1 Channel loading

Timing plots are required with calculations demonstrating a minimum channel loading of approximately 17% or greater. For example, channel loading can be estimated by setting the spectrum analyzer for zero span and approximate the Time On/ (Time On + Off Time). This can be done with any appropriate channel BW and modulation type.

Note (Frame Based Systems): The channel loading test file will be transferred from the *Master Device* to the *Client Device* for all test configurations. For frame based systems with a fixed talk/listen ratio, the ratio systems will be set to the worst case (maximum) that is user configurable during this test as specified by the manufacturer. For frame based systems that dynamically allocate the talk/listen ratio, the channel loading test file will be transferred from the *Master Device* to the *Client Device* for all test configurations

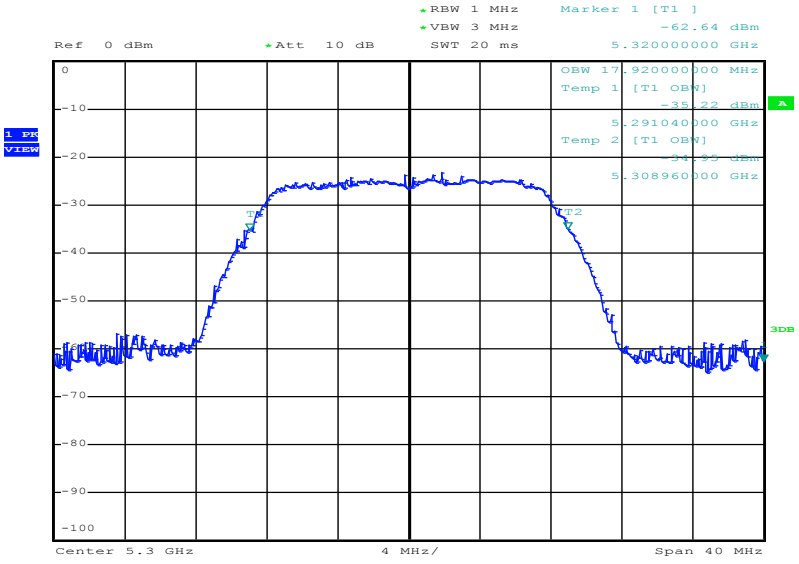
20 MHz-mode: Calculated duty cycle = 10.0%




Plot 1

## 10.3.2 99% Bandwidth to determine the U-NII-bandwidth

20 MHz-mode: 17.9 MHz

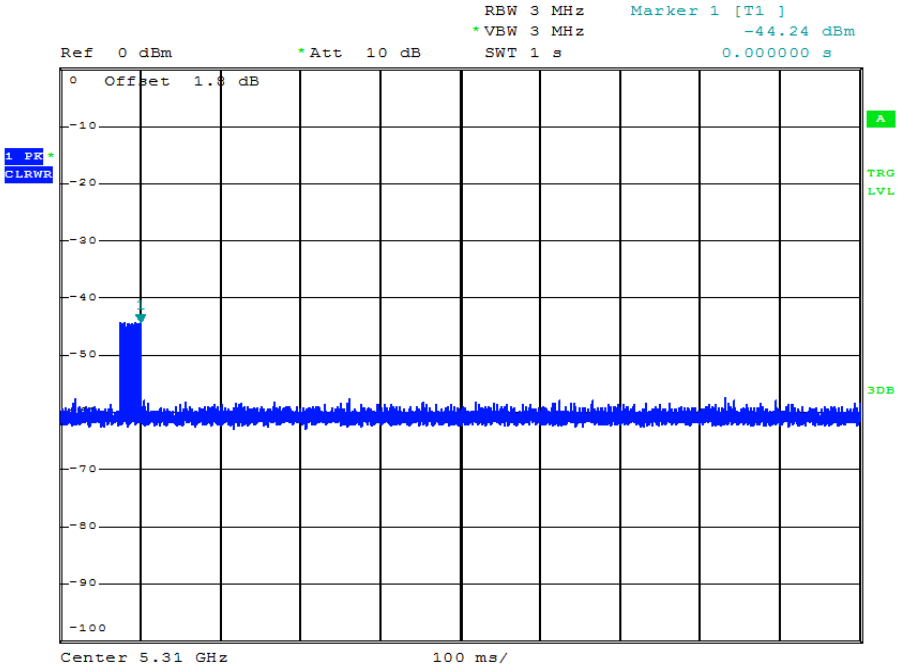



**Plot 2**

### 10.3.3 Radar burst timing signal

To accurately determine the channel closing time and channel closing transmission time the spectrum analyser is triggered at the end of the radar burst (see marker at *t* = 0ms).

Example plot




**Plot 3**

## 10.4 Test results (prior to use of a channel)

### 10.4.1 Channel Availability Check Time

**Initial Channel Availability Check Time**

The Initial Channel Availability Check Time tests that the UUT does not emit beacon, control, or data signals on the test Channel until the power-up sequence has been completed and the U-NII device checks for Radar Waveforms for one minute on the test Channel. This test does not use any Radar Waveforms and only needs to be performed one time.

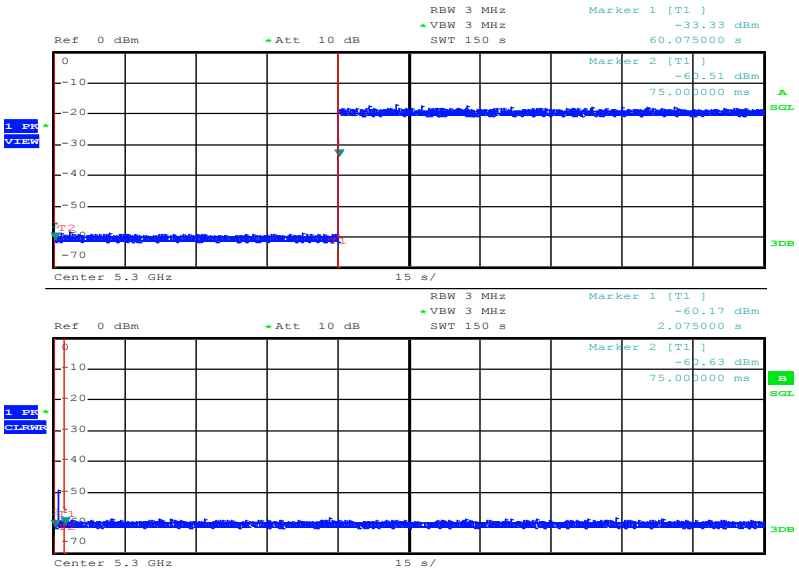
a) The U-NII devices will be powered on and be instructed to operate on the appropriate U-NII Channel that must incorporate DFS functions. At the same time the UUT is powered on, the spectrum analyzer will be set to zero span mode with a 3 MHz RBW and 3 MHz VBW on the Channel occupied by the radar with a 2.5 minute sweep time. The spectrum analyzer's sweep will be started at the same time power is applied to the U-NII device.
b) The UUT should not transmit any beacon or data transmissions until at least 1 minute after the completion of the power-on cycle
c) Confirm that the UUT initiates transmission on the channel

Note: The results of the Channel Availability Check Time test can be found in the upper trace in the plots below.

**Radar Burst at the Beginning of the Channel Availability Check Time**

In the upper trace off the plot below Time Line $T_1$ is set to the end of the Channel Availability Check while $T_2$ is set 60 seconds before to indicate the start of the Channel Availability Check.

The lower trace in the plot below shows a single burst of one of the Short Pulse Radar Types 0-4 commencing within a 6 second window starting at the end of the power-up sequence of the DUT respectively within the first 6 seconds of the Channel Availability Check.
It must be shown that no transmissions occur on this channel after the Channel Availability Check (see Time Line $T_1$ in the upper plot).



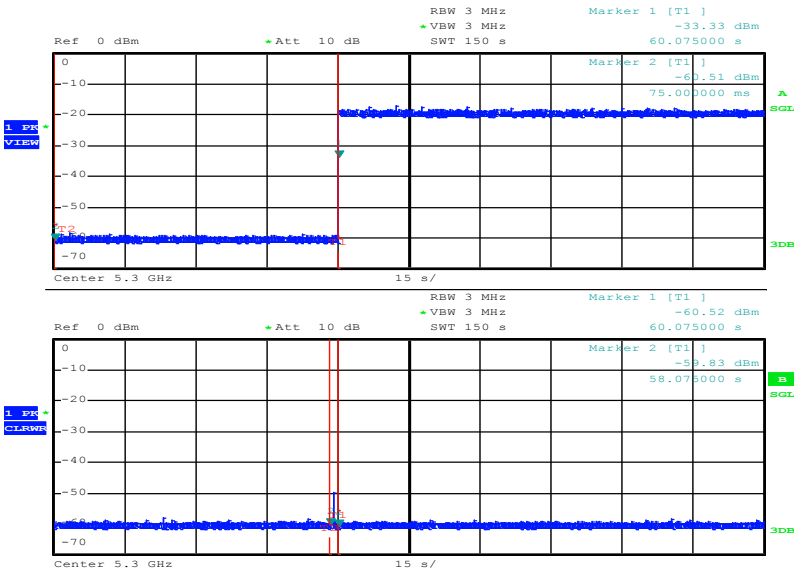

Date: 13.JUN.2016 11:06:42

**Plot 4**

**Radar Burst at the End of the Channel Availability Check Time**

In the upper trace of the plot below Time Line $T_1$ is set to the end of the Channel Availability Check while $T_2$ is set 60 seconds before to indicate the start of the Channel Availability Check.

The lower trace in the plot below shows a single burst of one of the Short Pulse Radar Types 0-4 commencing within a 6 second window at the end of the Channel Availability Check respectively within the last 6 seconds of the Channel Availability Check.
It must be shown that no transmissions occur on this channel after the Channel Availability Check (see Time Line $T_1$ in the upper plot).




Date: 13.JUN.2016 11:12:09

**Plot 5**

## 10.5 Test results (during normal operation)

### 10.5.1 U-NII Detection Bandwidth

The U-NII Detection Bandwidth was determined according the procedure as described in the correspondent KDB as referenced in section 3 of this test report for any supported bandwidth.

The U-NII Detection Bandwidth must meet the U-NII Detection Bandwidth criterion referenced in section 10.2.2. Otherwise, the UUT does not comply with DFS requirements. This is essential to ensure that the UUT is capable of detecting Radar Waveforms across the same frequency spectrum that contains the significant energy from the system. In the case that the U-NII Detection Bandwidth is greater than or equal to the 99 percent power bandwidth for the measured $F_H$ and $F_L$, the test can be truncated and the U-NII Detection Bandwidth can be reported as the measured $F_H$ and $F_L$.

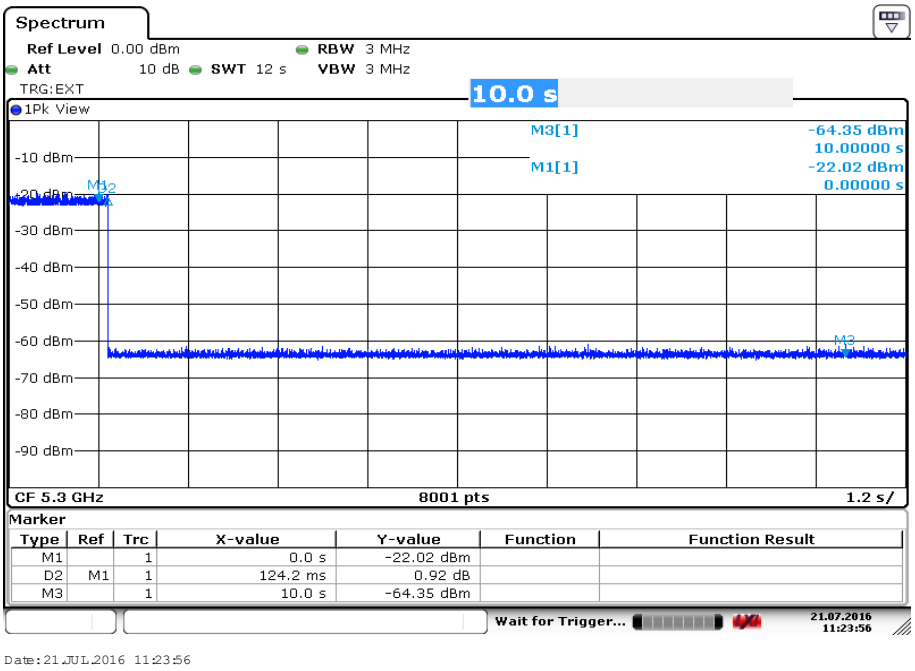
| Operating mode | 99% Bandwidth (MHz) | $F_L$ (MHz) | $F_H$ (MHz) | U-NII Detection Bandwidth / $F_H$-$F_L$ (MHz) |
|---|---|---|---|---|
| 20 MHz-mode | 17.9 | 5290 | 5310 | 20 MHz |

## 10.5.2 Channel move time / channel closing transmission time

After a radar's presence is detected, all transmissions shall cease on the operating channel within 10 seconds. Transmissions during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel not exceeding 60ms.

The test is performed during normal operation with the highest bandwidth supported by the DUT.

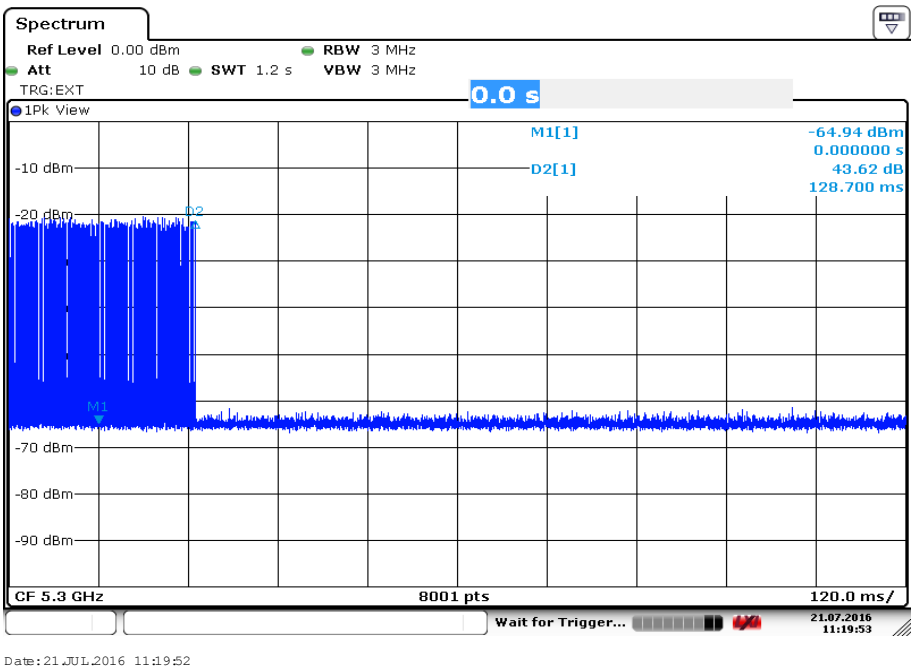
**Channel Closing Time**




**Plot 6**

Note: With Marker 1 at the end of the radar pulse ($t$ = 0ms) the Channel Closing Time is determined by setting a Delta-Marker to the point where the last transmission occurred.
The Channel Closing Time is 124.2 ms.

## Channel Closing Transmission Time

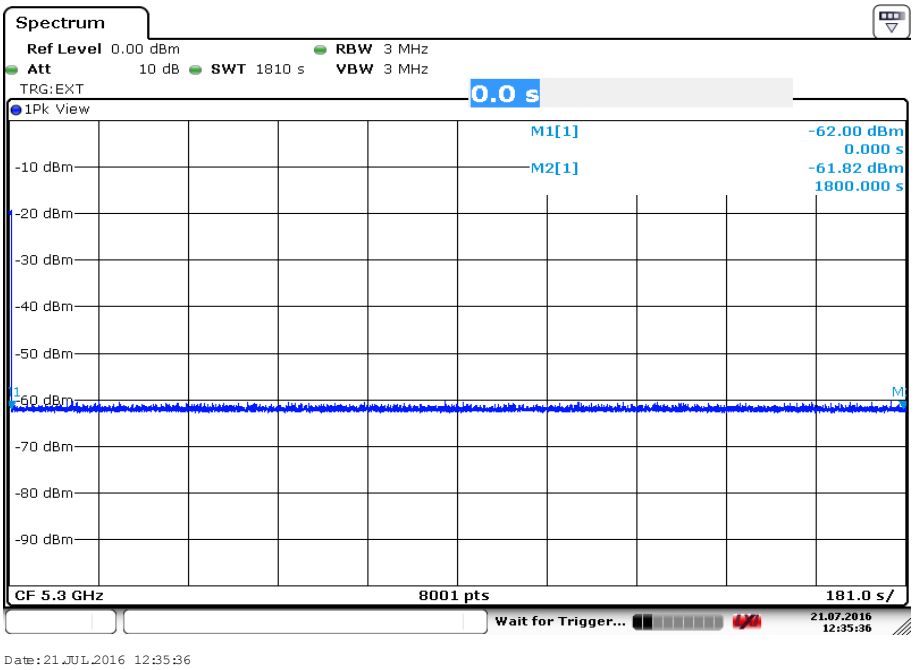



**Plot 7**

Note: With Marker 1 at the end of the radar pulse ($t$ = 0ms) the Channel Closing Time is determined by setting a Delta-Marker to the point where the last transmission occurred.
The accumulated transmission time is less than the delta between *Marker 1* and *Marker 2* (128.7ms) hence it is less than 200 ms + 60 ms.

## 10.5.3 Non-Occupancy Period

A channel that has been flagged as containing a radar system, either by a channel availability check or in-service monitoring, is subject to a non-occupancy period of at least 30 minutes. The non occupancy period starts at the time when the radar system is detected.




Plot 8

## 10.5.4 In-Service Monitoring / Statistical Performance Check

To determine the ability of the device to detect the radar test waveforms statistical data is gathered.

A detailed and pulse related evaluation of the test results can be found along with the sample parameter data sheets in the Test Report Annex I.

**Short Pulse Radar Test Waveforms**

According the table in section 10.2.310.2.2 the minimum percentage of successful detections for Short Pulse Radar Test Waveforms is 60% out of 30 trails. In addition an aggregate minimum percentage of successful detections across all Short Pulse Radar Types 1-4 is required and calculated as follows:

$$P_{sum} = \frac{P_d1 + P_d2 + P_d3 + P_d4}{4}$$

where: $P_d$ is the percentage of successful detections for each radar burst
$P_{sum}$ is the aggregate percentage of successful detections

The minimum percentage of successful aggregate detections across all Short Pulse Radar Types 1-4 is 80%.

Results 20 MHz-Mode:

| Radar Type | Number of Trails | Number of Successful Detections | Percentage of Successful Detections |
|---|---|---|---|
| 1 | 30 | 28 | **93.3** |
| 2 | 30 | 26 | **86.7** |
| 3 | 30 | 30 | **100.0** |
| 4 | 30 | 26 | **86.7** |
| Aggregate (Radar Types 1-4) | | | **90.2** |

**Long Pulse Radar Test**

Results 20 MHz-Mode:

| Radar Type | Number of Trails | Number of Successful Detections | Percentage of Successful Detections |
|---|---|---|---|
| 5 | 30 | 24 | **80.0** |

**Frequency Hopping Radar Test**

Results 20 MHz-Mode:

| Radar Type | Number of Trails | Number of Successful Detections | Percentage of Successful Detections |
|---|---|---|---|
| 6 | 30 | 28 | **93.3** |

## 11 Observations

No observations except those reported with the single test cases have been made.

## Annex A Document history

| Version | Applied changes | Date of release |
|---|---|---|
| | Initial release | 2016-08-02 |
| -A | Editorial changes (FCC ID / IC ID / HVIN / PMN) | 2016-11-15 |

## Annex B Further information

**Glossary**

AVG - Average
DUT - Device under test
EMC - Electromagnetic Compatibility
EN - European Standard
EUT - Equipment under test
ETSI - European Telecommunications Standard Institute
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - Not applicable
PP - Positive peak
QP - Quasi peak
S/N - Serial number
SW - Software
PMN - Product marketing name
HMN - Host marketing name
HVIN - Hardware version identification number
FVIN - Firmware version identification number

## Annex C Accreditation Certificate

Front side of certificate

DAkkS
Deutsche
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

**Beliehene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV**
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

**Akkreditierung**

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

**CETECOM ICT Services GmbH**
**Untertürkheimer Straße 6-10, 66117 Saarbrücken**

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

**Funk**
**Mobilfunk (GSM / DCS) + OTA**
**Elektromagnetische Verträglichkeit (EMV)**
**Produktsicherheit**
**SAR / EMF**
**Umwelt**
**Smart Card Technology**
**Bluetooth®**
**Automotive**
**WI-FI-Services**
**Kanadische Anforderungen**
**US-Anforderungen**
**Akustik**
**Near Field Communication (NFC )**

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 04.05.2016 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig bis 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 63 Seiten.

Registrierungsnummer der Urkunde: **D-PL-12076-01**

Frankfurt, 04.05.2016

Im Auftrag Dipl.-Ing. (FH) Ralf Egner
Abteilungsleiter

Siehe Hinweise auf der Rückseite

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