# FCC PART 15E DFS TEST REPORT FOR CERTIFICATION
On Behalf of

DEI Sales Inc. dba Definitive Technology

JMDD Module

Model Number: JMDD

FCC ID: IPUJMDD

| | |
|---|---|
| Prepared for: | DEI Sales Inc. dba Definitive Technology |
| | One Viper Way Vista, California 92081, United States |
| | |
| Prepared By: | EST Technology Co., Ltd. |
| | Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China |
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| | |
|---|---|
| Report Number: | ESTE-R1810005 |
| Date of Test: | September 10 ~ November 13, 2018 |
| Date of Report: | November 15, 2018 |

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# EST Technology Co., Ltd.

| | | | |
|---|---|---|---|
| **Applicant:**<br>**Address:** | DEI Sales Inc. dba Definitive Technology<br>One Viper Way Vista, California 92081, United States | | |
| **Manufacturer:**<br>**Address:** | DEI Sales Inc. dba Definitive Technology<br>One Viper Way Vista, California 92081, United States | | |
| **E.U.T:** | JMDD Module | | |
| **Model Number:** | JMDD | | |
| **Power Supply:** | DC 4.0V From base board;<br>base board use DC 12V From adapter input AC 100-240V ~ 50/60Hz. | | |
| **Test Voltage:** | AC 120V/60Hz<br>AC 240V/60Hz | | |
| **Trade Name:** | POLK | Serial No.: | ------ |
| **Date of Receipt:** | September 07, 2018 | Date of Test: | September 10 ~ November 13, 2018 |
| **Test Specification:** | FCC Rules and Regulations Part 15 Subpart E:2018<br>ANSI C63.10:2013 | | |
| **Test Result:** | The device described above is tested by EST Technology Co., Ltd. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart E requirements.<br><br>This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd.<br>**Date:** November 15, 2018 | | |

| Prepared by: | Reviewed by: | Approved by: |
|---|---|---|
| Ring | Tony | |
| Ring / Assistant | Tony / Engineer | Iceman Hu / Manager |

**Other Aspects:**
None.

*Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested*

*This test report is based on a single evaluation of one sample of above mentioned products ,It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd.*

# 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

| | | |
|---|---|---|
| Product Name | : | JMDD Module |
| FCC ID | : | IPUJMDD |
| Model Number | : | JMDD |
| Operation frequency | : | UNII Band I:<br>IEEE 802.11a: 5180 ~ 5240MHz;<br>IEEE 802.11n HT20: 5180 ~ 5240MHz;<br>IEEE 802.11n HT40: 5190 ~ 5230MHz;<br>IEEE 802.11ac VHT20: 5180 ~ 5240MHz;<br>IEEE 802.11ac VHT40: 5190 ~ 5230MHz;<br>IEEE 802.11ac VHT80: 5210MHz.<br>UNII Band II:<br>IEEE 802.11a: 5260 ~ 5320MHz;<br>IEEE 802.11n HT20: 5260 ~ 5320MHz;<br>IEEE 802.11n HT40: 5270 ~ 5310MHz;<br>IEEE 802.11ac VHT20: 5260 ~ 5320MHz;<br>IEEE 802.11ac VHT40: 5270 ~ 5310MHz;<br>IEEE 802.11ac VHT80: 5290MHz.<br>UNII Band III:<br>IEEE 802.11a: 5500 ~ 5700MHz;<br>IEEE 802.11n HT20: 5500 ~ 5700MHz;<br>IEEE 802.11n HT40: 5510 ~ 5670MHz;<br>IEEE 802.11ac VHT20: 5500 ~ 5700MHz;<br>IEEE 802.11ac VHT40: 5510 ~ 5670MHz;<br>IEEE 802.11ac VHT80: 5530MHz.<br>UNII Band IV:<br>IEEE 802.11a: 5745 ~ 5825MHz;<br>IEEE 802.11n HT20: 5745 ~ 5825MHz;<br>IEEE 802.11n HT40: 5755 ~ 5795MHz;<br>IEEE 802.11ac VHT20: 5745 ~ 5825MHz;<br>IEEE 802.11ac VHT40: 5755 ~ 5795MHz;<br>IEEE 802.11ac VHT80: 5775MHz. |
| Number of channel | : | UNII Band I:<br>IEEE 802.11a / n HT20 / ac VHT20: 4 Channels;<br>IEEE 802.11n HT40 / ac VHT40: 2 Channels;<br>IEEE 802.11ac VHT80: 1 Channel.<br>UNII Band II:<br>IEEE 802.11a / n HT20 / ac VHT20: 4 Channels;<br>IEEE 802.11n HT40 / ac VHT40: 2 Channels;<br>IEEE 802.11ac VHT80: 1 Channel.<br>UNII Band III:<br>IEEE 802.11a / n HT20 / ac VHT20: 8 Channels;<br>IEEE 802.11n HT40 / ac VHT40: 3 Channels;<br>IEEE 802.11ac VHT80: 1 Channel.<br>UNII Band IV:<br>IEEE 802.11a / n HT20 / ac VHT20: 5 Channels;<br>IEEE 802.11n HT40 / ac VHT40: 2 Channels;<br>IEEE 802.11ac VHT80: 1 Channel. |

<table>
<tr><td>Modulation</td><td>:</td><td>OFDM(QPSK, BPSK, 16-QAM, 64-QAM,256-QAM)</td></tr>
<tr><td>Transmit Data Rate</td><td>:</td><td>IEEE 802.11a: 54, 48, 36, 24, 18, 12, 9, 6Mbps;<br>IEEE 802.11n HT20: 14.4, 28.9, 43.3, 57.8, 86.7, 115.6, 130.0, 144.4 Mbps;<br>IEEE 802.11ac VHT20: 14.4, 28.8, 43.4, 57.8, 86.6, 115.6, 130, 144.4, 173.4 Mbps;<br>IEEE 802.11n HT40: 30, 60, 90, 120, 180, 240, 270, 300 Mbps;<br>IEEE 802.11ac VHT40: 30, 60, 90, 120, 180, 240, 270, 300, 360, 400 Mbps;<br>IEEE 802.11ac VHT80: 65, 130, 195, 260, 390, 520, 585, 650, 780, 866.6 Mbps.</td></tr>
<tr><td>Channels Spacing</td><td>:</td><td>IEEE 802.11a: 20MHz;<br>IEEE 802.11n HT20: 20MHz;<br>IEEE 802.11n HT40: 40MHz;<br>IEEE 802.11ac VHT20: 20MHz;<br>IEEE 802.11ac VHT40: 40MHz;<br>IEEE 802.11ac VHT80: 80MHz.</td></tr>
<tr><td>Antenna</td><td>:</td><td>PIFA antenna
<table>
<tr><td>Frequency Range</td><td>Antenna 0</td><td>Antenna 1</td><td>Antenna 2</td></tr>
<tr><td>2400~2483.5 MHz</td><td>4.03 dBi</td><td>4.10 dBi</td><td>3.17 dBi</td></tr>
<tr><td>5150~5250 MHz</td><td>/</td><td>2.39 dBi</td><td>2.91 dBi</td></tr>
<tr><td>5250~5350 MHz</td><td>/</td><td>1.65 dBi</td><td>3.12 dBi</td></tr>
<tr><td>5470~5725 MHz</td><td>/</td><td>2.97 dBi</td><td>4.50 dBi</td></tr>
<tr><td>5725~5850 MHz</td><td>/</td><td>3.90 dBi</td><td>3.56 dBi</td></tr>
</table>
2.4G Directional gain: 6.66dBi<br>5G(Band I) Directional gain: 5.64dBi<br>5G(Band II) Directional gain: 5.43dBi<br>5G(Band III) Directional gain: 6.78dBi<br>5G(Band IV) Directional gain: 6.74dBi<br>Directional gain =10log[$(10^{G1/20}+10^{G2/20})^2/N_{ANT}$] dBi<br>Note: KDB 662911 D01 Multiple Transmitter Output v02r01</td></tr>
<tr><td></td><td></td><td>Note: Bluetooth uses Antenna 0<br>11a,b,g,n,ac uses Antenna 1 / Antenna 2<br>11n,ac uses MIMO</td></tr>
<tr><td>Hardware Version</td><td>:</td><td>40-JMDDAC-RFF4G</td></tr>
<tr><td>Software Version</td><td>:</td><td>OIM6</td></tr>
<tr><td>Sample Type</td><td>:</td><td>Prototype production</td></tr>
</table>

# 2. SUMMARY OF TEST

## 2.1. Test methodology.

According to its specifications, the EUT must comply with the requirements of the following standards:
FCC 06-96
FCC 47 CFR Part 15, Subpart E
FCC KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
FCC KDB 905462 D03 Client Without DFS New Rules v01r02

## 2.2. Summary of test result

| Description of Test Item | Standard | Results |
|---|---|---|
| Dynamic Frequency Selection | FCC Part 15:407 (h) (i) (j) | PASS |

## 2.3. Test Facilities

| | | |
|---|---|---|
| EMC Lab | : | Certificated by CNAS, CHINA<br>Registration No.: L5288<br>Date of registration: November 13, 2017<br><br>Certificated by FCC, USA<br>Designation Number: CN1215<br>Test Firm Registration Number: 722932<br>Date of registration: November 21, 2017<br><br>Certificated by A2LA, USA<br>Registration No.: 4366.01<br>Date of registration: November 07, 2017<br><br>Certificated by Industry Canada<br>CAB identifier No.: CN0035<br>Date of registration: January 04, 2019<br><br>Certificated by VCCI, Japan<br>Registration No.: R-13663; C-14103<br>Date of registration: July 25, 2017<br>This Certificate is valid until: July 24, 2020<br><br>Certificated by TUV Rheinland, Germany<br>Registration No.: UA 50413872 0001<br>Date of registration: July 31, 2018<br><br>Certificated by TUV/PS, Shenzhen<br>Registration No.: SCN1017<br>Date of registration: January 27, 2011<br><br>Certificated by Intertek ETL SEMKO<br>Registration No.: 2011-RTL-L2-64<br>Date of registration: April 28, 2011<br><br>Certificated by Nemko, Hong Kong<br>Registration No.: 175193<br>Date of registration: May 4, 2011 |
| Name of Firm | : | EST Technology Co., Ltd. |
| Site Location | : | Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China |

## 2.4. Measurement uncertainty

| Test Item | Uncertainty |
|---|---|
| Uncertainty for Conduction emission test | 2.54dB |
| Uncertainty for Radiation Emission test (9Khz-30MHz) | 3.11 |
| Uncertainty for Radiation Emission test (30MHz-1GHz) | 3.62 |
| Uncertainty for Radiation Emission test (1GHz to 18GHz) | 4.86 |
| Uncertainty for spurious emissions test (18GHz to 40GHz) | 4.67 |
| Uncertainty for radio frequency | 7×10-8 |
| Uncertainty for conducted RF Power | 0.20dB |
| Uncertainty for Power density test | 0.26dB |
| Temperature | ±0.6℃ |
| Humidity | ±4.0 % |
| Volatage DC | ±1.0% |
| Volatage (AC, <10KHz) | ±1.5% |

Note：This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 2.5. Assistant equipment used for test

### 2.5.1. Adapter

M/N : S018BAC1200150
Input : AC 100-240V ~ 50/60Hz
Output : DC 12V

### 2.5.2. Router (Master)

Manufacturer : LINKSYS
M/N : WRT3200ACM
FCC ID : Q87-WRT3200ACM
IC : 3839A-WRT3200ACM
S/N : 1981060A621419
MAC : 6038E0B87B20
Max Gain : 3.81 dBi

### 2.5.3. Notebook

Manufacturer : Lenovo
M/N : Thinkpad X250
S/N : 2014AP6082

## 2.6. Test mode

The EUT has been tested under its typical operating condition.
The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.
The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.
Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

| Band | Mode | Frequency (MHz) |
|---|---|---|
| UNII Band II | IEEE 802.11a | 5260 |
| | IEEE 802.11n HT40 | 5270 |
| | IEEE 802.11ac VHT80: | 5290 |
| | | |
| UNII Band III | IEEE 802.11a | 5700 |
| | IEEE 802.11n HT40 | 5670 |
| | IEEE 802.11ac VHT80: | 5530 |

## 2.7. Test Equipment

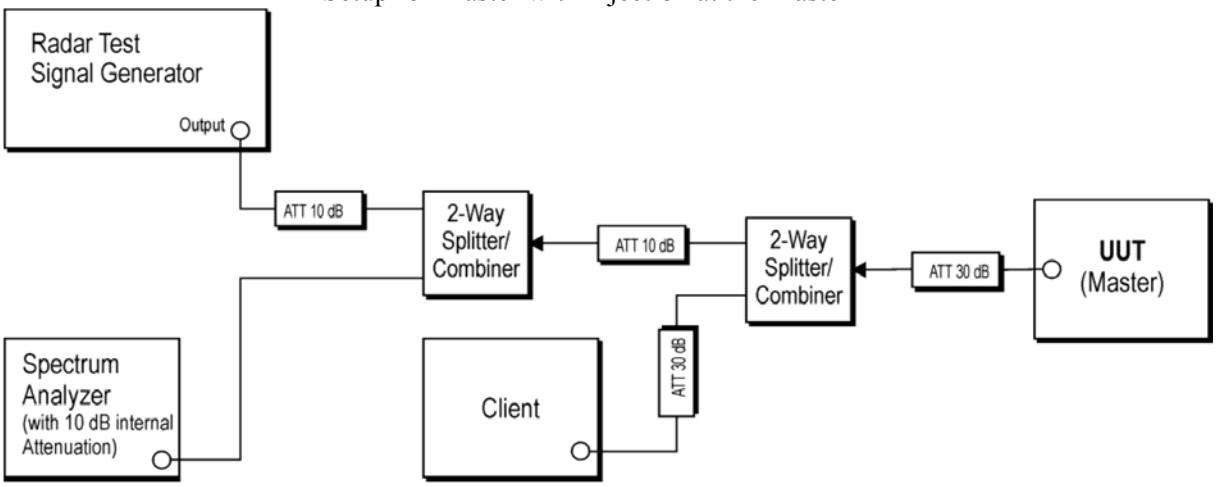
2.7.1. Measurement equipment used.

| Equipment | Manufacturer | Model No. | Serial No. | Calibration Body | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| TS 8997 | Rohde &Schwarz | / | / | / | / | / |
| Open Switch and Control Unit | Rohde &Schwarz | OSP-B157WB | 101309 | CEPREI | June 15,18 | 1Year |
| Signal and Spectrum Analyzer | Rohde &Schwarz | FSV | 103173 | CEPREI | June 15,18 | 1 Year |
| Signal Generator | Rohde &Schwarz | SMB100A | 108752 | CEPREI | June 15,18 | 1 Year |
| Vector Signal Generator | Rohde &Schwarz | SMBV100A | 260753 | CEPREI | June 15,18 | 1Year |
| Test Software | Rohde &Schwarz | WMS32 | V10.40.00 | N/A | N/A | N/A |

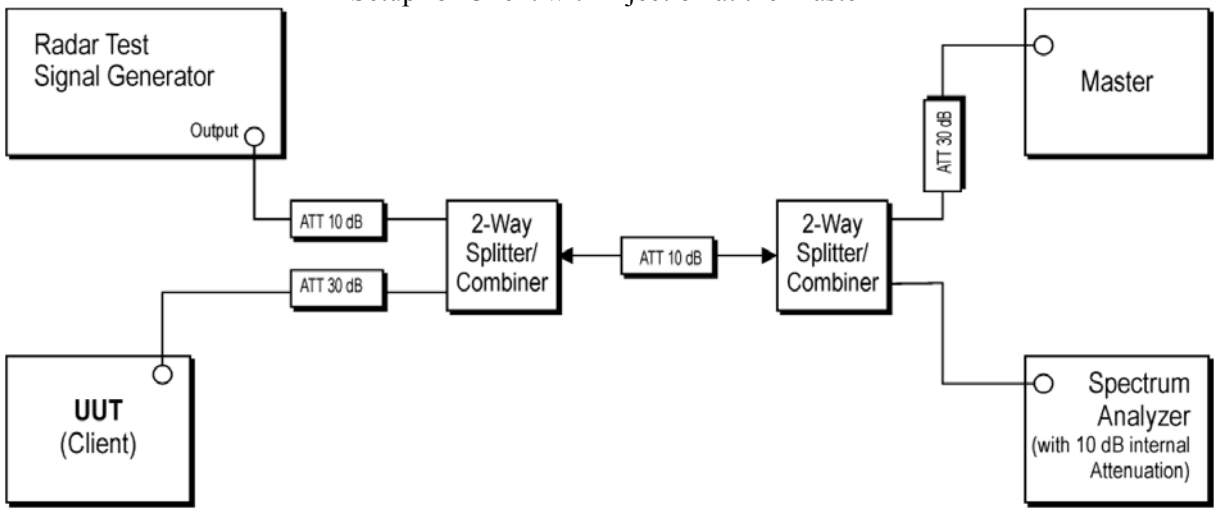
# 3. SETUP OF EQUIPMENT UNDER TEST

## 3.1. Setup Configuration Of EUT

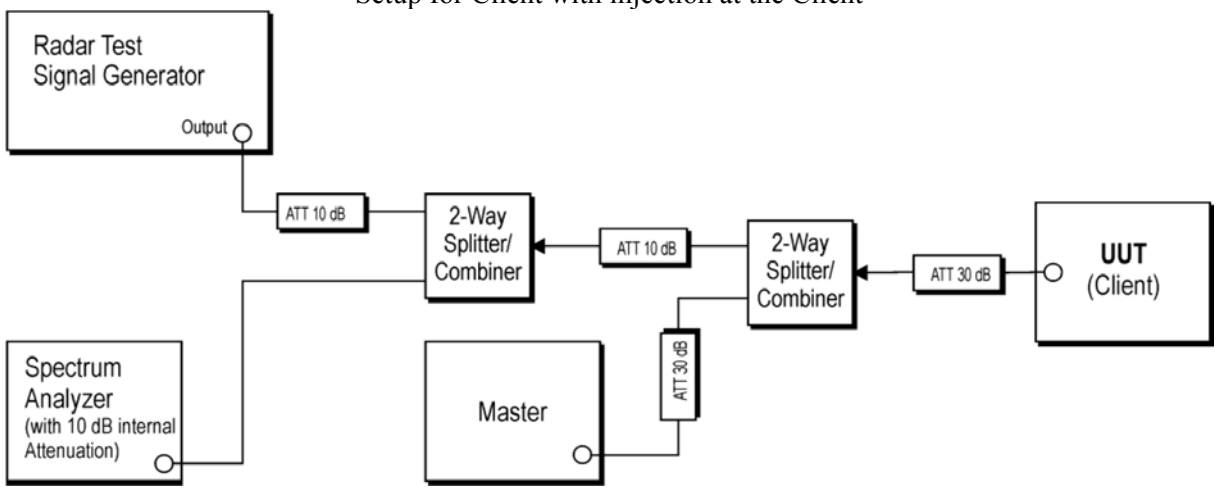
Setup for Master with injection at the Master



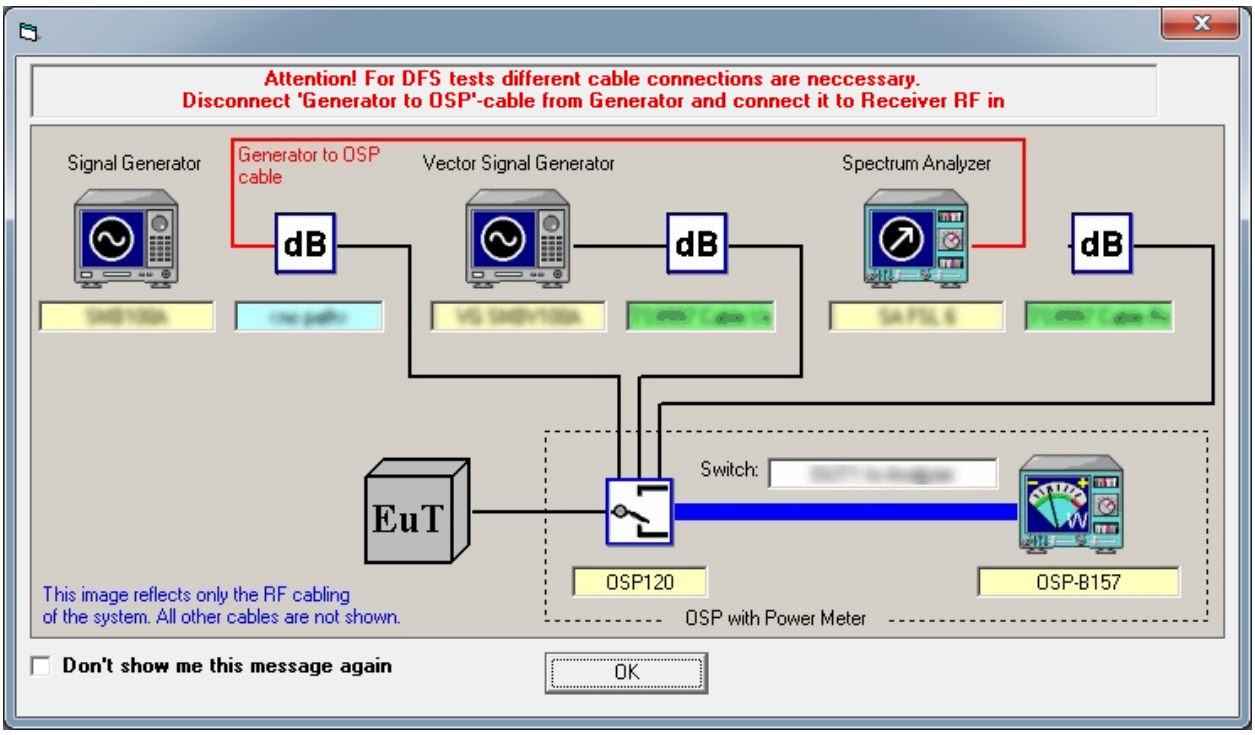

Setup for Client with injection at the Master




Setup for Client with injection at the Client



## 3.2. Setup Configuration Of TS8997



# 4. DYNAMIC FREQUENCY SELECTION REQUIREMENTS

## 4.1. Applicable standard

According to15.407

## 4.2. Operation Modes and Requirement Test Item.

The manufacture shall state whether the EUT is capable of operating as a Master or a Slave modes, if the EUT is capable of operating in more than one operational mode then every operating mode shall be assessed separately.

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

| **Requirement** | **Operational Mode** | | |
|---|---|---|---|
| | **Master** | **Client Without Radar Detection** | **Client With Radar Detection** |
| *Non-Occupancy Period* | Yes | Not required | Yes |
| *DFS Detection Threshold* | Yes | Not required | Yes |
| *Channel Availability Check Time* | Yes | Not required | Not required |
| *U-NII Detection Bandwidth* | Yes | Not required | Yes |

Table 2: Applicability of DFS requirements during normal operation

| **Requirement** | **Operational Mode** | |
|---|---|---|
| | **Master Device or Client with Radar Detection** | **Client Without Radar Detection** |
| *DFS Detection Threshold* | Yes | Not required |
| *Channel Closing Transmission Time* | Yes | Yes |
| *Channel Move Time* | Yes | Yes |
| *U-NII Detection Bandwidth* | Yes | Not required |

| **Additional requirements for devices with multiple bandwidth modes** | **Master Device or Client with Radar Detection** | **Client Without Radar Detection** |
|---|---|---|
| *U-NII Detection Bandwidth and Statistical Performance Check* | All BW modes must be tested | Not required |
| *Channel Move Time and Channel Closing Transmission Time* | Test using widest BW mode available | Test using the widest BW mode available for the link |
| *All other tests* | Any single BW mode | Not required |
| **Note:** Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency. | | |

## 4.3. Conformance Limit

Table 3: DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection

| **Maximum Transmit Power** | **Value (See Notes 1, 2, and 3)** |
|---|---|
| EIRP ≥ 200 milliwatt | -64 dBm |
| EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz | -62 dBm |
| EIRP < 200 milliwatt that do not meet the power spectral density requirement | -64 dBm |
| **Note 1:** This is the level at the input of the receiver assuming a 0 dBi receive antenna.<br>**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.<br>**Note3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01. | |

Table 4: DFS Response Requirement Values

| **Parameter** | **Value** |
|---|---|
| *Non-occupancy period* | Minimum 30 minutes |
| *Channel Availability Check Time* | 60 seconds |
| *Channel Move Time* | 10 seconds<br>See Note 1. |
| *Channel Closing Transmission Time* | 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period.<br>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.<br>**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.<br>**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. | |

Table 5 – 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 | $\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right\}$ | 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. | | | | | |

Table 6 – 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 Trials |
|---|---|---|---|---|---|---|---|
| 5 | 50-100 | 5-20 | 1000-2000 | 1-3 | 8-20 | 80% | 30 |

Table 7 – Frequency Hopping Radar Test Waveform

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

## 4.4. Transmitter Output Power

| Band | Mode | Max Output Power (dBm) | Antenna Gain (dBi) | Max Eirp | |
|---|---|---|---|---|---|
| | | | | dBm | mW |
| UNII Band II | IEEE 802.11a | 14.62 | 5.43 | 20.05 | 101.16 |
| | IEEE 802.11n HT40 | 15.38 | 5.43 | 20.81 | 120.50 |
| | IEEE 802.11ac VHT80 | 14.46 | 5.43 | 19.89 | 97.50 |
| UNII Band III | IEEE 802.11a | 14.84 | 6.78 | 21.62 | 145.21 |
| | IEEE 802.11n HT40 | 15.07 | 6.78 | 21.85 | 153.11 |
| | IEEE 802.11ac VHT80 | 14.82 | 6.78 | 21.60 | 144.54 |

## 4.5. Operation Modes and Requirement Test Item.

The manufacture shall state whether the EUT is capable of operating as a Master or a Slave modes, if the
EUT is capable of operating in more than one operational mode then every operating mode shall be assessed separately.

Applicability of DFS Requirements Prior to Use of a Channel

## 4.6. Test Result

# DFS In-Service Monitoring (IEEE 802.11a 5260 MHz)

## Measurement Summary

| DUT Frequency (MHz) | Radar Type No. | Type of Measurement value | Overall Result | Overall Comment |
|---|---|---|---|---|
| 5260.000000 | 0 | First of all Transmitt Test | PASS | DUT is transmitting |
| 5260.000000 | 0 | Channel Move Time | PASS | |
| 5260.000000 | 0 | Channel Closing Transmission Time | PASS | |
| 5260.000000 | 0 | Non-occupancy period | PASS | |

## Channel Move Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CMT Tx Time (s) | CMT Limit (s) | CMT Result |
|---|---|---|---|---|
| 5260.000000 | 0 | 1.377 | 10.000 | PASS |

**(continuation of the "Channel Move Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CMT Comment |
|---|---|
| 5260.000000 | Tx Time value is last trailing edge found within sweep. See Note 1. |

## Channel Closing Transmission Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CCTT Type of Value | CCTT No. of Pulses found | CCTT Tx Time (ms) |
|---|---|---|---|---|
| 5260.000000 | 0 | first 200 ms | 797 | 8.880 |
| 5260.000000 | 0 | remaining 10.0 second(s) period | 3491 | 38.848 |

**(continuation of the "Channel Closing Transmission Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CCTT Tx Time Limit (ms) | CCTT Result | CCTT Comment |
|---|---|---|---|
| 5260.000000 | 200.000 | PASS | See Note 1. |
| 5260.000000 | 60.000 | PASS | See Note 1. |

## Non-occupancy period Detailed Results

| DUT Frequency (MHz) | Radar Type No. | NOP No. of Pulses found | NOP No. of Pulses Limit | NOP Tx Time (s) | NOP Tx Time Limit (s) |
|---|---|---|---|---|---|
| 5260.000000 | 0 | 0 | 0 | 0.000 | 0.000 |

**(continuation of the "Non-occupancy period Detailed Results" table from column 6 ...)**

| DUT Frequency (MHz) | NOP Result |
|---|---|
| 5260.000000 | PASS |

## Transmitting Test Detailed Results

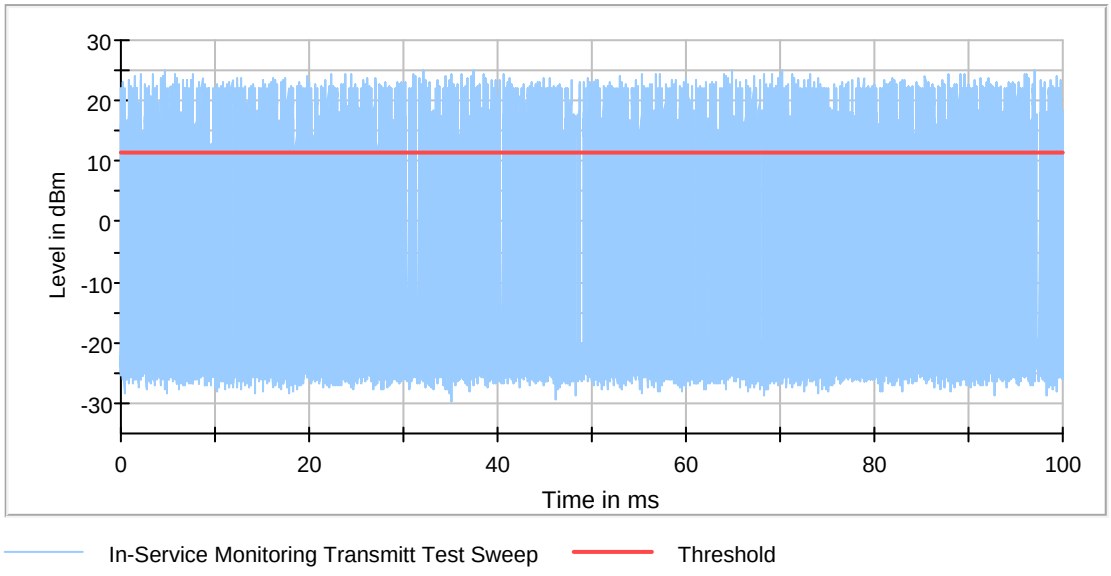
| DUT Frequency (MHz) | Tx-Test DutyCycle (%) | Tx-Test DutyCycle Limit | Tx-Test No. of Pulses found | Tx-Test Result | Tx-Test Comment |
|---|---|---|---|---|---|
| 5260.000000 | 29.407 | >=17 % | 794 | PASS | |

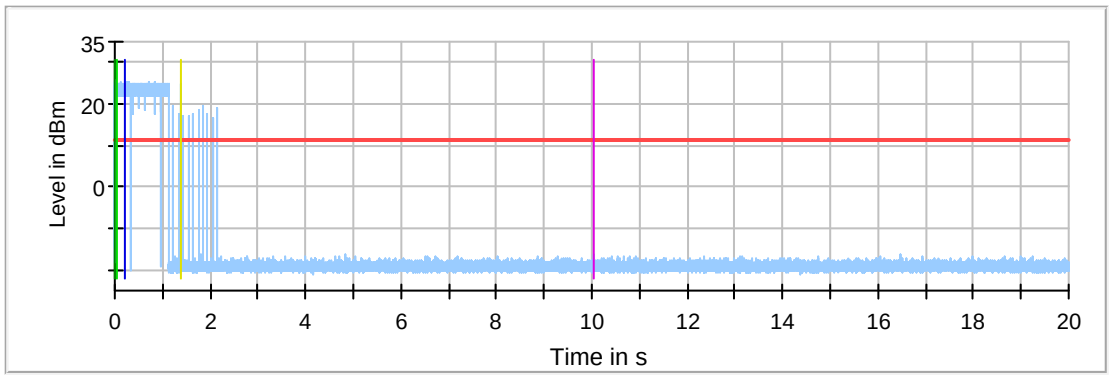
# Additional Information

| Note | Description |
|---|---|
| Note 1: | Because of the radar pulse event at the beginning,<br>the investigation of the trace begins with an offset of 26.7 ms<br>conforming to the end of the Radar burst. |
| Note 2: | Channel move time (CMT) / channel closing transmission time (CCTT) measurement<br>was made with hi resolution video sweep using OSP DAQ channel |
| Note 3: | Because of the substantially higher sampling rate of the video signal<br>the results for CCTT and CMT are more accurate than in the graphics visible.<br>Reached timing accuracy of the video trace: approx 4 µs |
| Note 4: | The Non-Occupancy Period trace starts at the end of the Channel move time trace<br>(20.000 secs.)<br>Labeling of the x-axis (time) is relative to its beginning (0 secs.) |

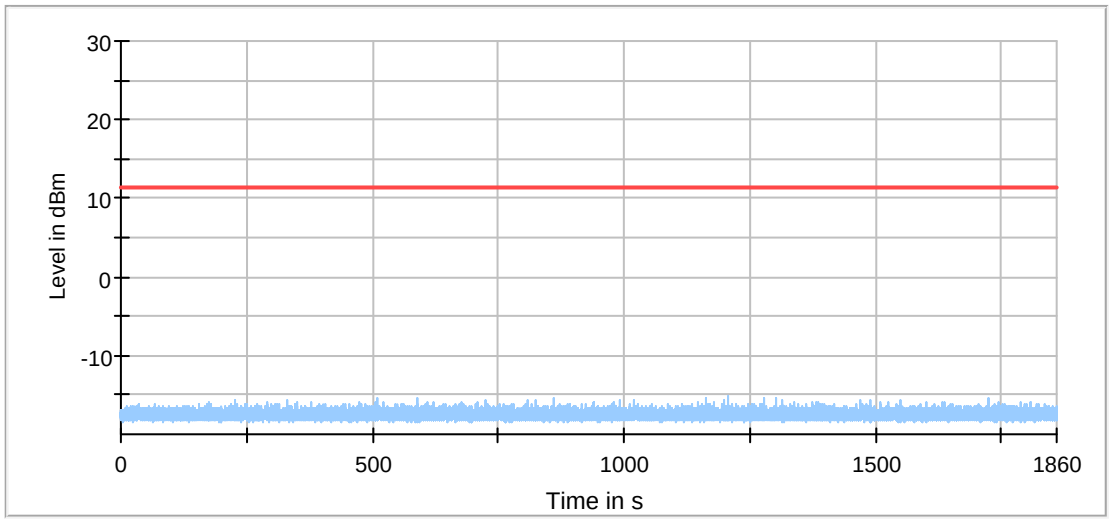
# Radar level verification

| Description | Value | Unit |
|---|---|---|
| Configured DUT EIRP: | 31.62 | mW |
| Configured DUT PSD: | 7.00 | dBm/MHz |
| Requirement of the Detection threshold value<br>for this given values acc. to FCC clause 5.2 / Table 3 | -62 | dBm |
| Vector Generator level setting | 11.95 | dBm |
| Configured overall pathlost from Vector Generator RF out to<br>DUT connector of 'DUT to OSP'-cable | 74.23 | dB |
| Given additional level added to the amplitude of<br>the waveform to account for variations in measurement<br>equipment acc. to FCC clause 5.2 / Table 3 / Note 2 | 1.00 | dB |
| This results in the following radar signal<br>level at the DUT | -62.28 | dBm |






In-Service Monitoring Channel Move Time
Threshold
Start of Radar
Trigger at end of Radar
First 200ms of Channel Closing Tx Time
10sec Channel Move Time Limit
Last measured edge of Channel Closing Tx Time




In-Service Monitoring Non-occupancy period
Threshold

# DFS In-Service Monitoring (IEEE 802.11a 5700 MHz)

## Measurement Summary

| DUT Frequency (MHz) | Radar Type No. | Type of Measurement value | Overall Result | Overall Comment |
|---|---|---|---|---|
| 5700.000000 | 0 | First of all Transmitt Test | PASS | DUT is transmitting |
| 5700.000000 | 0 | Channel Move Time | PASS | |
| 5700.000000 | 0 | Channel Closing Transmission Time | PASS | |
| 5700.000000 | 0 | Non-occupancy period | PASS | |

## Channel Move Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CMT Tx Time (s) | CMT Limit (s) | CMT Result |
|---|---|---|---|---|
| 5700.000000 | 0 | 1.104 | 10.000 | PASS |

**(continuation of the "Channel Move Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CMT Comment |
|---|---|
| 5700.000000 | Tx Time value is last trailing edge found within sweep. See Note 1. |

## Channel Closing Transmission Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CCTT Type of Value | CCTT No. of Pulses found | CCTT Tx Time (ms) |
|---|---|---|---|---|
| 5700.000000 | 0 | first 200 ms | 16 | 0.128 |
| 5700.000000 | 0 | remaining 10.0 second(s) period | 78 | 0.624 |

**(continuation of the "Channel Closing Transmission Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CCTT Tx Time Limit (ms) | CCTT Result | CCTT Comment |
|---|---|---|---|
| 5700.000000 | 200.000 | PASS | See Note 1. |
| 5700.000000 | 60.000 | PASS | See Note 1. |

## Non-occupancy period Detailed Results

| DUT Frequency (MHz) | Radar Type No. | NOP No. of Pulses found | NOP No. of Pulses Limit | NOP Tx Time (s) | NOP Tx Time Limit (s) |
|---|---|---|---|---|---|
| 5700.000000 | 0 | 0 | 0 | 0.000 | 0.000 |

**(continuation of the "Non-occupancy period Detailed Results" table from column 6 ...)**

| DUT Frequency (MHz) | NOP Result |
|---|---|
| 5700.000000 | PASS |

## Transmitting Test Detailed Results

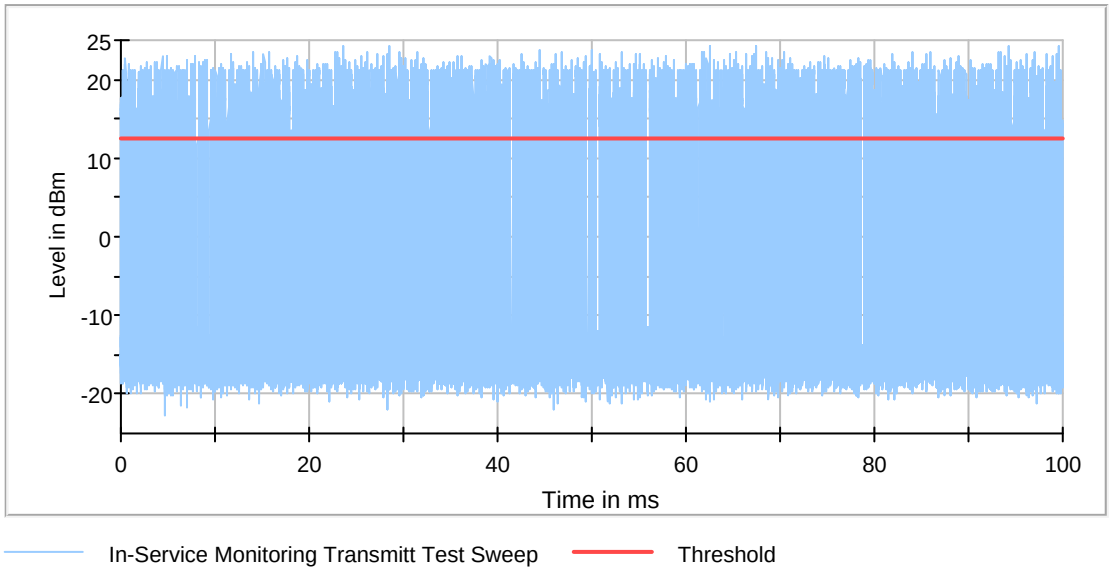
| DUT Frequency (MHz) | Tx-Test DutyCycle (%) | Tx-Test DutyCycle Limit | Tx-Test No. of Pulses found | Tx-Test Result | Tx-Test Comment |
|---|---|---|---|---|---|
| 5700.000000 | 28.337 | >=17 % | 811 | PASS | |

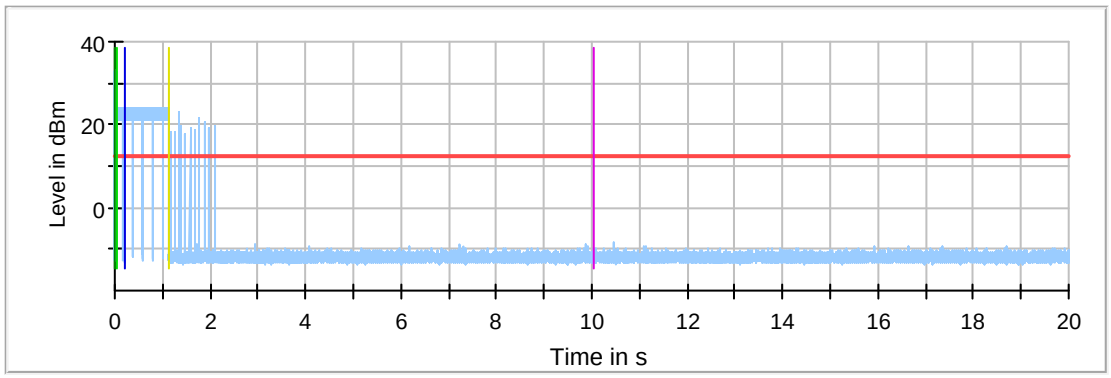
# Additional Information

| Note | Description |
|---|---|
| Note 1: | Because of the radar pulse event at the beginning,<br>the investigation of the trace begins with an offset of 26.7 ms<br>conforming to the end of the Radar burst. |
| Note 2: | Channel move time (CMT) / channel closing transmission time (CCTT) measurement<br>was made with hi resolution video sweep using OSP DAQ channel |
| Note 3: | Because of the substantially higher sampling rate of the video signal<br>the results for CCTT and CMT are more accurate than in the graphics visible.<br>Reached timing accuracy of the video trace: approx 4 µs |
| Note 4: | The Non-Occupancy Period trace starts at the end of the Channel move time trace<br>(20.000 secs.)<br>Labeling of the x-axis (time) is relative to its beginning (0 secs.) |

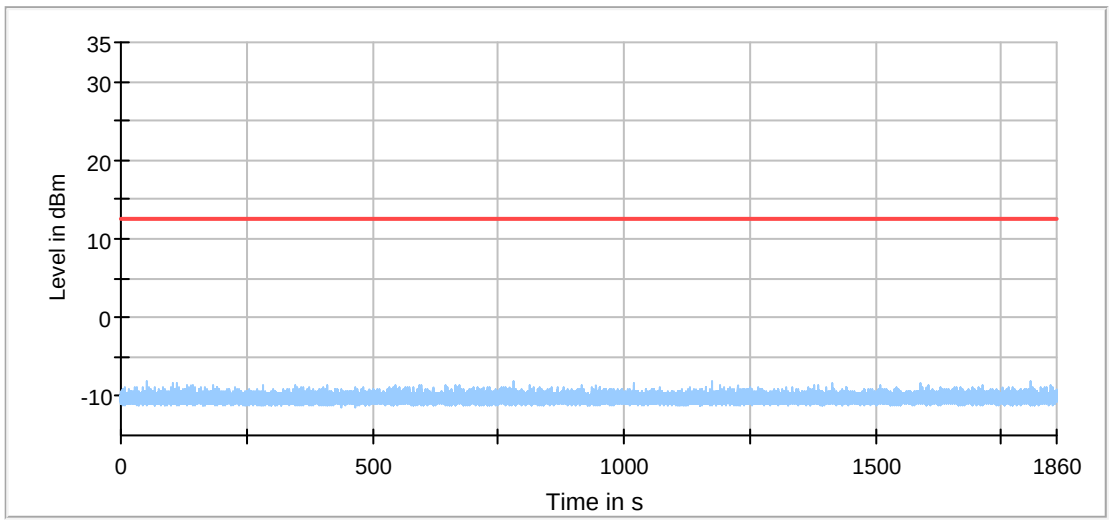
# Radar level verification

| Description | Value | Unit |
|---|---|---|
| Configured DUT EIRP: | 31.62 | mW |
| Configured DUT PSD: | 7.00 | dBm/MHz |
| Requirement of the Detection threshold value<br>for this given values acc. to FCC clause 5.2 / Table 3 | -62 | dBm |
| Vector Generator level setting | 12.28 | dBm |
| Configured overall pathlost from Vector Generator RF out to<br>DUT connector of 'DUT to OSP'-cable | 74.73 | dB |
| Given additional level added to the amplitude of<br>the waveform to account for variations in measurement<br>equipment acc. to FCC clause 5.2 / Table 3 / Note 2 | 1.00 | dB |
| This results in the following radar signal<br>level at the DUT | -62.45 | dBm |






In-Service Monitoring Channel Move Time
Threshold
Start of Radar
Trigger at end of Radar
First 200ms of Channel Closing Tx Time
10sec Channel Move Time Limit
Last measured edge of Channel Closing Tx Time




In-Service Monitoring Non-occupancy period
Threshold

# DFS In-Service Monitoring (IEEE 802.11n HT40 5270 MHz)

## Measurement Summary

| DUT Frequency (MHz) | Radar Type No. | Type of Measurement value | Overall Result | Overall Comment |
|---|---|---|---|---|
| 5270.000000 | 0 | First of all Transmitt Test | PASS | DUT is transmitting |
| 5270.000000 | 0 | Channel Move Time | PASS | |
| 5270.000000 | 0 | Channel Closing Transmission Time | PASS | |
| 5270.000000 | 0 | Non-occupancy period | PASS | |

## Channel Move Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CMT Tx Time (s) | CMT Limit (s) | CMT Result |
|---|---|---|---|---|
| 5270.000000 | 0 | 0.128 | 10.000 | PASS |

**(continuation of the "Channel Move Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CMT Comment |
|---|---|
| 5270.000000 | Tx Time value is last trailing edge found within sweep. See Note 1. |

## Channel Closing Transmission Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CCTT Type of Value | CCTT No. of Pulses found | CCTT Tx Time (ms) |
|---|---|---|---|---|
| 5270.000000 | 0 | first 200 ms | 169 | 1.604 |
| 5270.000000 | 0 | remaining 10.0 second(s) period | 0 | 0.000 |

**(continuation of the "Channel Closing Transmission Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CCTT Tx Time Limit (ms) | CCTT Result | CCTT Comment |
|---|---|---|---|
| 5270.000000 | 200.000 | PASS | See Note 1. |
| 5270.000000 | 60.000 | PASS | See Note 1. |

## Non-occupancy period Detailed Results

| DUT Frequency (MHz) | Radar Type No. | NOP No. of Pulses found | NOP No. of Pulses Limit | NOP Tx Time (s) | NOP Tx Time Limit (s) |
|---|---|---|---|---|---|
| 5270.000000 | 0 | 0 | 0 | 0.000 | 0.000 |

**(continuation of the "Non-occupancy period Detailed Results" table from column 6 ...)**

| DUT Frequency (MHz) | NOP Result | NOP Comment |
|---|---|---|
| 5270.000000 | PASS | not performed because of Channel Closing Transmission Time / Channel Move Time Test failed |

## Transmitting Test Detailed Results

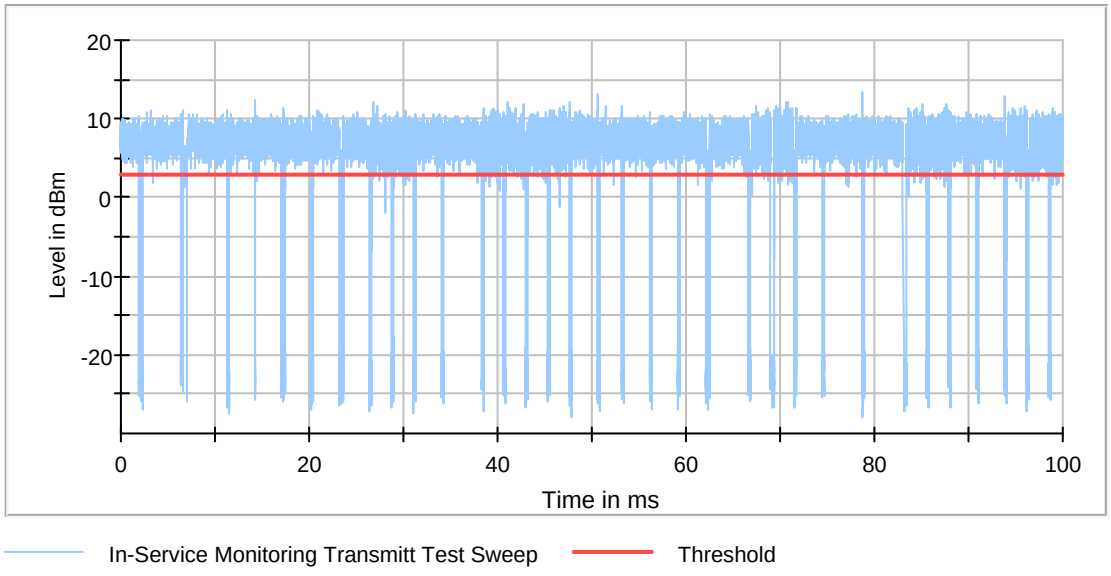
| DUT Frequency (MHz) | Tx-Test DutyCycle (%) | Tx-Test DutyCycle Limit | Tx-Test No. of Pulses found | Tx-Test Result | Tx-Test Comment |
|---|---|---|---|---|---|
| 5270.000000 | 92.307 | >=17 % | 207 | PASS | |

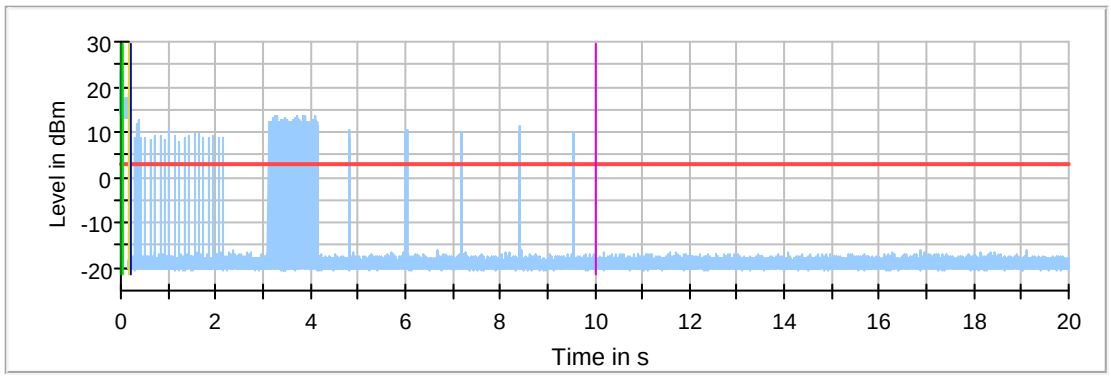
# Additional Information

| Note | Description |
|---|---|
| Note 1: | Because of the radar pulse event at the beginning,<br>the investigation of the trace begins with an offset of 26.7 ms<br>conforming to the end of the Radar burst. |
| Note 2: | Channel move time (CMT) / channel closing transmission time (CCTT) measurement<br>was made with hi resolution video sweep using OSP DAQ channel |
| Note 3: | Because of the substantially higher sampling rate of the video signal<br>the results for CCTT and CMT are more accurate than in the graphics visible.<br>Reached timing accuracy of the video trace: approx 4 µs |
| Note 4: | The Non-Occupancy Period trace starts at the end of the Channel move time trace<br>(20.000 secs.)<br>Labeling of the x-axis (time) is relative to its beginning (0 secs.) |

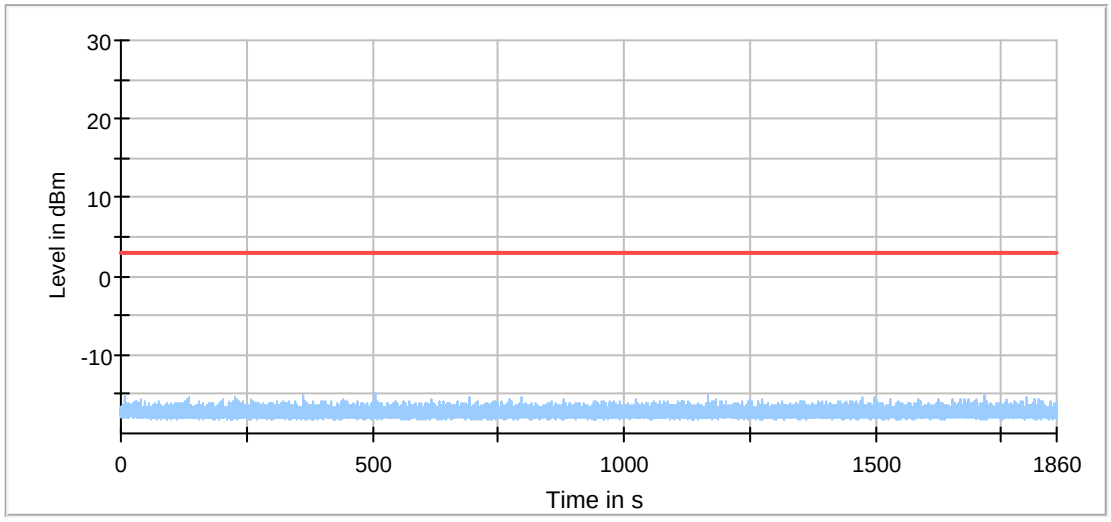
# Radar level verification

| Description | Value | Unit |
|---|---|---|
| Configured DUT EIRP: | 31.62 | mW |
| Configured DUT PSD: | 7.00 | dBm/MHz |
| Requirement of the Detection threshold value<br>for this given values acc. to FCC clause 5.2 / Table 3 | -62 | dBm |
| Vector Generator level setting | 12.15 | dBm |
| Configured overall pathlost from Vector Generator RF out to<br>DUT connector of 'DUT to OSP'-cable | 74.24 | dB |
| Given additional level added to the amplitude of<br>the waveform to account for variations in measurement<br>equipment acc. to FCC clause 5.2 / Table 3 / Note 2 | 1.00 | dB |
| This results in the following radar signal<br>level at the DUT | -62.09 | dBm |






In-Service Monitoring Channel Move Time
Threshold
Start of Radar
Trigger at end of Radar
First 200ms of Channel Closing Tx Time
10sec Channel Move Time Limit
Last measured edge of Channel Closing Tx Time




In-Service Monitoring Non-occupancy period
Threshold

# DFS In-Service Monitoring (IEEE 802.11n HT40 5670 MHz)

## Measurement Summary

| DUT Frequency (MHz) | Radar Type No. | Type of Measurement value | Overall Result | Overall Comment |
|---|---|---|---|---|
| 5670.000000 | 0 | First of all Transmitt Test | PASS | DUT is transmitting |
| 5670.000000 | 0 | Channel Move Time | PASS | |
| 5670.000000 | 0 | Channel Closing Transmission Time | PASS | |
| 5670.000000 | 0 | Non-occupancy period | PASS | |

## Channel Move Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CMT Tx Time (s) | CMT Limit (s) | CMT Result |
|---|---|---|---|---|
| 5670.000000 | 0 | 0.000 | 10.000 | PASS |

**(continuation of the "Channel Move Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CMT Comment |
|---|---|
| 5670.000000 | Tx Time value is last trailing edge found within sweep. See Note 1. |

## Channel Closing Transmission Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CCTT Type of Value | CCTT No. of Pulses found | CCTT Tx Time (ms) |
|---|---|---|---|---|
| 5670.000000 | 0 | first 200 ms | 0 | 0.000 |
| 5670.000000 | 0 | remaining 10.0 second(s) period | 0 | 0.000 |

**(continuation of the "Channel Closing Transmission Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CCTT Tx Time Limit (ms) | CCTT Result | CCTT Comment |
|---|---|---|---|
| 5670.000000 | 200.000 | PASS | See Note 1. |
| 5670.000000 | 60.000 | PASS | See Note 1. |

## Non-occupancy period Detailed Results

| DUT Frequency (MHz) | Radar Type No. | NOP No. of Pulses found | NOP No. of Pulses Limit | NOP Tx Time (s) | NOP Tx Time Limit (s) |
|---|---|---|---|---|---|
| 5670.000000 | 0 | 0 | 0 | 0.000 | 0.000 |

**(continuation of the "Non-occupancy period Detailed Results" table from column 6 ...)**

| DUT Frequency (MHz) | NOP Result |
|---|---|
| 5670.000000 | PASS |

## Transmitting Test Detailed Results

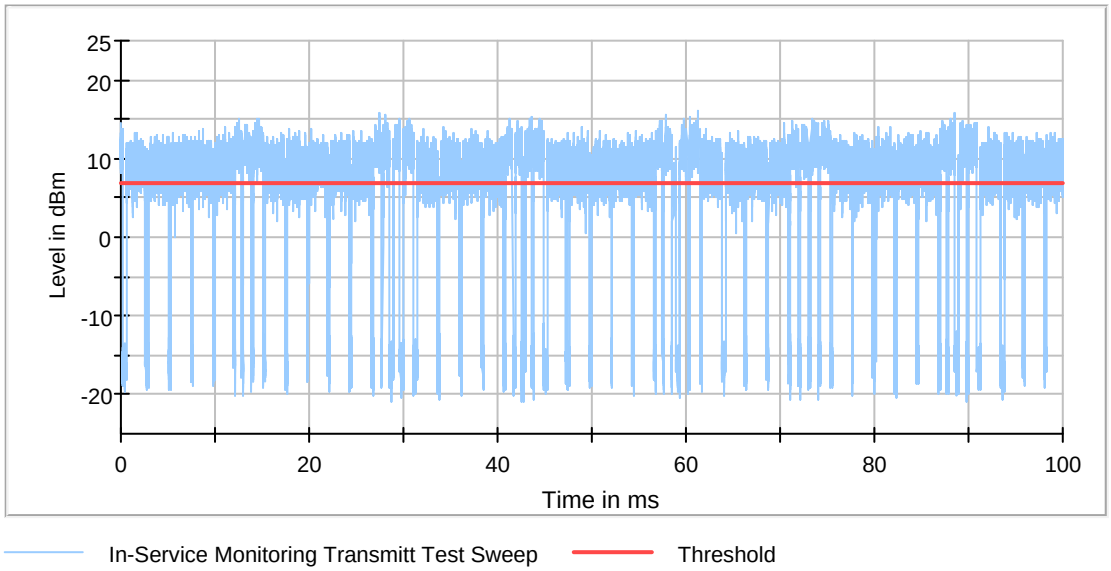
| DUT Frequency (MHz) | Tx-Test DutyCycle (%) | Tx-Test DutyCycle Limit | Tx-Test No. of Pulses found | Tx-Test Result | Tx-Test Comment |
|---|---|---|---|---|---|
| 5670.000000 | 78.557 | >=17 % | 1892 | PASS | |

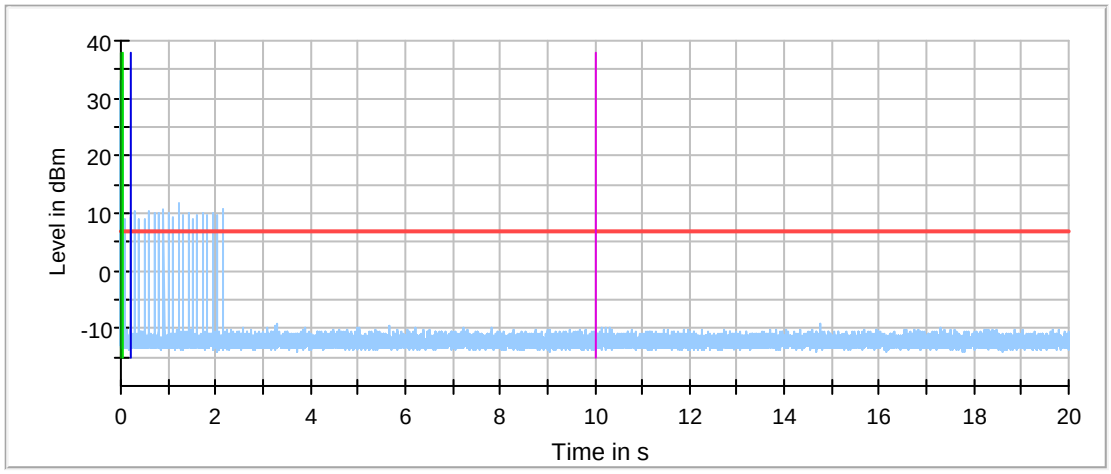
# Additional Information

| Note | Description |
|---|---|
| Note 1: | Because of the radar pulse event at the beginning,<br>the investigation of the trace begins with an offset of 26.7 ms<br>conforming to the end of the Radar burst. |
| Note 2: | Channel move time (CMT) / channel closing transmission time (CCTT) measurement<br>was made with hi resolution video sweep using OSP DAQ channel |
| Note 3: | Because of the substantially higher sampling rate of the video signal<br>the results for CCTT and CMT are more accurate than in the graphics visible.<br>Reached timing accuracy of the video trace: approx 4 µs |
| Note 4: | The Non-Occupancy Period trace starts at the end of the Channel move time trace<br>(20.000 secs.)<br>Labeling of the x-axis (time) is relative to its beginning (0 secs.) |

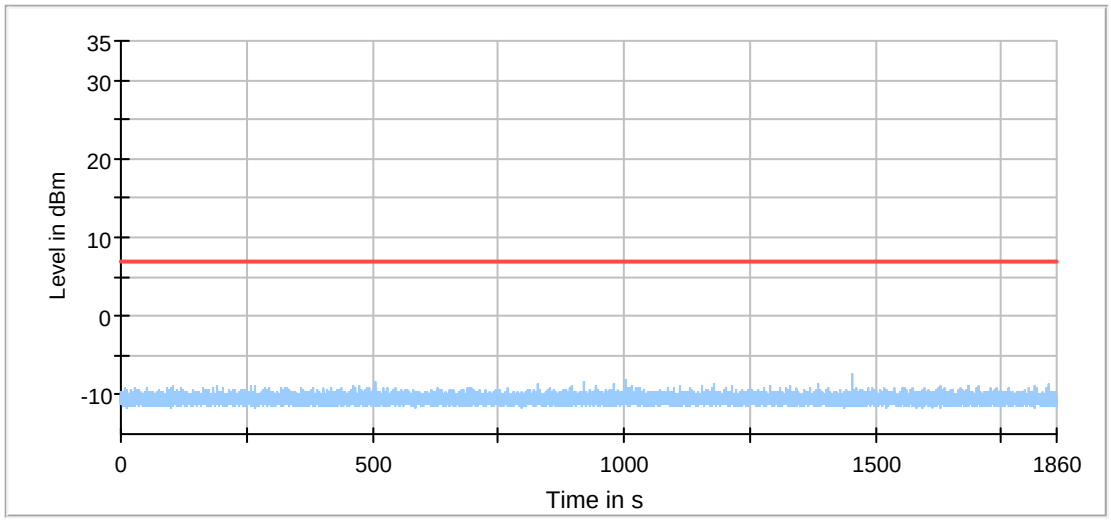
# Radar level verification

| Description | Value | Unit |
|---|---|---|
| Configured DUT EIRP: | 31.62 | mW |
| Configured DUT PSD: | 7.00 | dBm/MHz |
| Requirement of the Detection threshold value<br>for this given values acc. to FCC clause 5.2 / Table 3 | -62 | dBm |
| Vector Generator level setting | 12.45 | dBm |
| Configured overall pathlost from Vector Generator RF out to<br>DUT connector of 'DUT to OSP'-cable | 75.15 | dB |
| Given additional level added to the amplitude of<br>the waveform to account for variations in measurement<br>equipment acc. to FCC clause 5.2 / Table 3 / Note 2 | 1.00 | dB |
| This results in the following radar signal<br>level at the DUT | -62.70 | dBm |






In-Service Monitoring Channel Move Time
Start of Radar
First 200ms of Channel Closing Tx Time
Threshold
Trigger at end of Radar
10sec Channel Move Time Limit




In-Service Monitoring Non-occupancy period
Threshold

# DFS In-Service Monitoring (IEEE 802.11ac VHT80 5290 MHz)

## Measurement Summary

| DUT Frequency (MHz) | Radar Type No. | Type of Measurement value | Overall Result | Overall Comment |
|---|---|---|---|---|
| 5290.000000 | 0 | First of all Transmitt Test | PASS | DUT is transmitting |
| 5290.000000 | 0 | Channel Move Time | PASS | |
| 5290.000000 | 0 | Channel Closing Transmission Time | PASS | |
| 5290.000000 | 0 | Non-occupancy period | PASS | |

## Channel Move Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CMT Tx Time (s) | CMT Limit (s) | CMT Result |
|---|---|---|---|---|
| 5290.000000 | 0 | 0.052 | 10.000 | PASS |

**(continuation of the "Channel Move Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CMT Comment |
|---|---|
| 5290.000000 | Tx Time value is last trailing edge found within sweep. See Note 1. |

## Channel Closing Transmission Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CCTT Type of Value | CCTT No. of Pulses found | CCTT Tx Time (ms) |
|---|---|---|---|---|
| 5290.000000 | 0 | first 200 ms | 1 | 0.008 |
| 5290.000000 | 0 | remaining 10.0 second(s) period | 0 | 0.000 |

**(continuation of the "Channel Closing Transmission Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CCTT Tx Time Limit (ms) | CCTT Result | CCTT Comment |
|---|---|---|---|
| 5290.000000 | 200.000 | PASS | See Note 1. |
| 5290.000000 | 60.000 | PASS | See Note 1. |

## Non-occupancy period Detailed Results

| DUT Frequency (MHz) | Radar Type No. | NOP No. of Pulses found | NOP No. of Pulses Limit | NOP Tx Time (s) | NOP Tx Time Limit (s) |
|---|---|---|---|---|---|
| 5290.000000 | 0 | 0 | 0 | 0.000 | 0.000 |

**(continuation of the "Non-occupancy period Detailed Results" table from column 6 ...)**

| DUT Frequency (MHz) | NOP Result |
|---|---|
| 5290.000000 | PASS |

## Transmitting Test Detailed Results

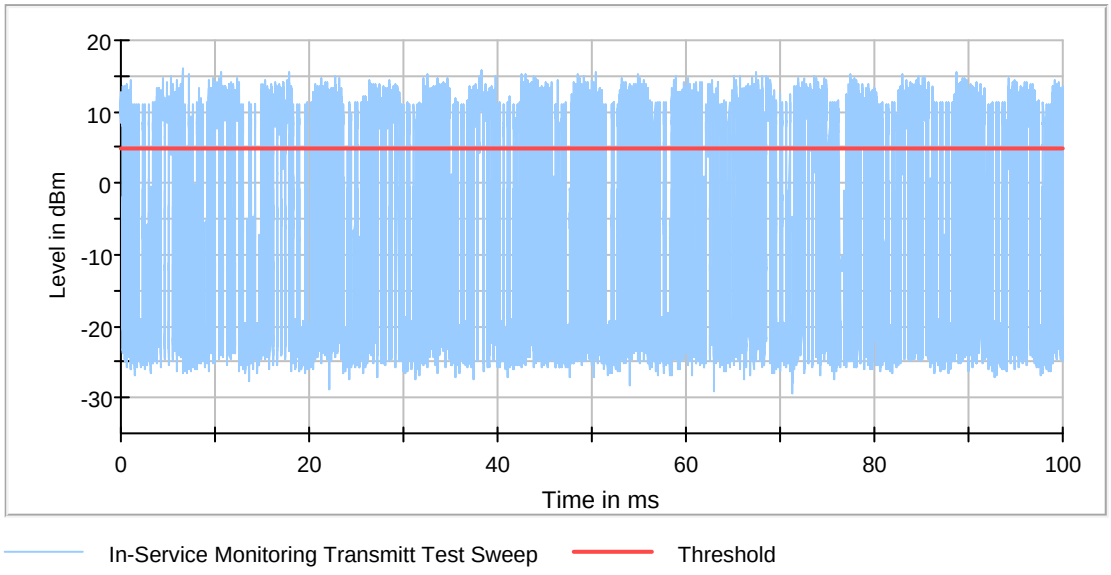
| DUT Frequency (MHz) | Tx-Test DutyCycle (%) | Tx-Test DutyCycle Limit | Tx-Test No. of Pulses found | Tx-Test Result | Tx-Test Comment |
|---|---|---|---|---|---|
| 5290.000000 | 41.643 | >=17 % | 581 | PASS | |

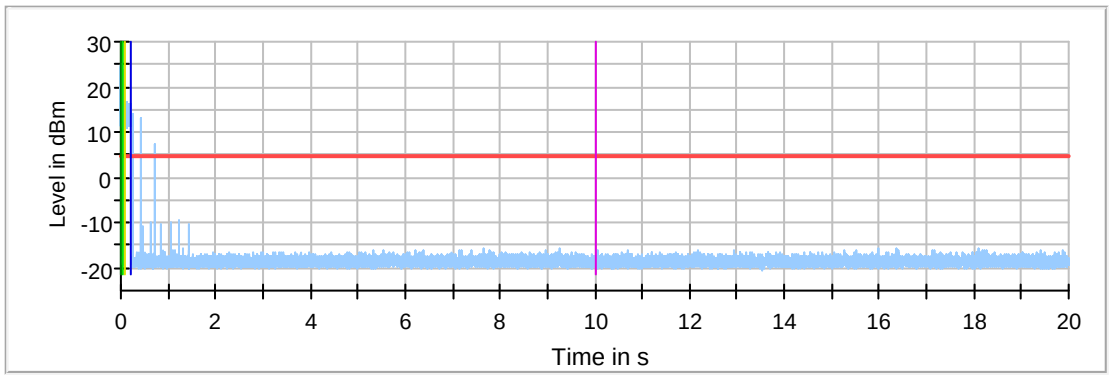
# Additional Information

| Note | Description |
|---|---|
| Note 1: | Because of the radar pulse event at the beginning,<br>the investigation of the trace begins with an offset of 26.7 ms<br>conforming to the end of the Radar burst. |
| Note 2: | Channel move time (CMT) / channel closing transmission time (CCTT) measurement<br>was made with hi resolution video sweep using OSP DAQ channel |
| Note 3: | Because of the substantially higher sampling rate of the video signal<br>the results for CCTT and CMT are more accurate than in the graphics visible.<br>Reached timing accuracy of the video trace: approx 4 µs |
| Note 4: | The Non-Occupancy Period trace starts at the end of the Channel move time trace<br>(20.000 secs.)<br>Labeling of the x-axis (time) is relative to its beginning (0 secs.) |

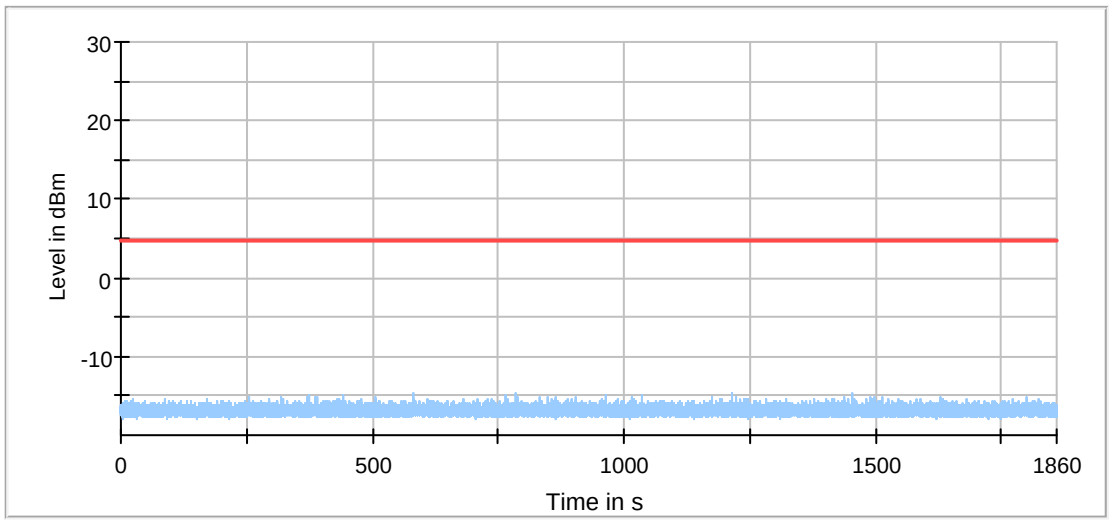
# Radar level verification

| Description | Value | Unit |
|---|---|---|
| Configured DUT EIRP: | 31.62 | mW |
| Configured DUT PSD: | 7.00 | dBm/MHz |
| Requirement of the Detection threshold value<br>for this given values acc. to FCC clause 5.2 / Table 3 | -62 | dBm |
| Vector Generator level setting | 12.48 | dBm |
| Configured overall pathlost from Vector Generator RF out to<br>DUT connector of 'DUT to OSP'-cable | 75.22 | dB |
| Given additional level added to the amplitude of<br>the waveform to account for variations in measurement<br>equipment acc. to FCC clause 5.2 / Table 3 / Note 2 | 1.00 | dB |
| This results in the following radar signal<br>level at the DUT | -62.74 | dBm |






In-Service Monitoring Channel Move Time
Threshold
Start of Radar
Trigger at end of Radar
First 200ms of Channel Closing Tx Time
10sec Channel Move Time Limit
Last measured edge of Channel Closing Tx Time




In-Service Monitoring Non-occupancy period
Threshold

# DFS In-Service Monitoring (IEEE 802.11ac VHT 5530 MHz)

## Measurement Summary

| DUT Frequency (MHz) | Radar Type No. | Type of Measurement value | Overall Result | Overall Comment |
|---|---|---|---|---|
| 5530.000000 | 0 | First of all Transmitt Test | PASS | DUT is transmitting |
| 5530.000000 | 0 | Channel Move Time | PASS | |
| 5530.000000 | 0 | Channel Closing Transmission Time | PASS | |
| 5530.000000 | 0 | Non-occupancy period | PASS | |

## Channel Move Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CMT Tx Time (s) | CMT Limit (s) | CMT Result |
|---|---|---|---|---|
| 5530.000000 | 0 | 0.000 | 10.000 | PASS |

**(continuation of the "Channel Move Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CMT Comment |
|---|---|
| 5530.000000 | Tx Time value is last trailing edge found within sweep. See Note 1. |

## Channel Closing Transmission Time Detailed Results

| DUT Frequency (MHz) | Radar Type No. | CCTT Type of Value | CCTT No. of Pulses found | CCTT Tx Time (ms) |
|---|---|---|---|---|
| 5530.000000 | 0 | first 200 ms | 0 | 0.000 |
| 5530.000000 | 0 | remaining 10.0 second(s) period | 0 | 0.000 |

**(continuation of the "Channel Closing Transmission Time Detailed Results" table from column 5 ...)**

| DUT Frequency (MHz) | CCTT Tx Time Limit (ms) | CCTT Result | CCTT Comment |
|---|---|---|---|
| 5530.000000 | 200.000 | PASS | See Note 1. |
| 5530.000000 | 60.000 | PASS | See Note 1. |

## Non-occupancy period Detailed Results

| DUT Frequency (MHz) | Radar Type No. | NOP No. of Pulses found | NOP No. of Pulses Limit | NOP Tx Time (s) | NOP Tx Time Limit (s) |
|---|---|---|---|---|---|
| 5530.000000 | 0 | 0 | 0 | 0.000 | 0.000 |

**(continuation of the "Non-occupancy period Detailed Results" table from column 6 ...)**

| DUT Frequency (MHz) | NOP Result |
|---|---|
| 5530.000000 | PASS |

## Transmitting Test Detailed Results

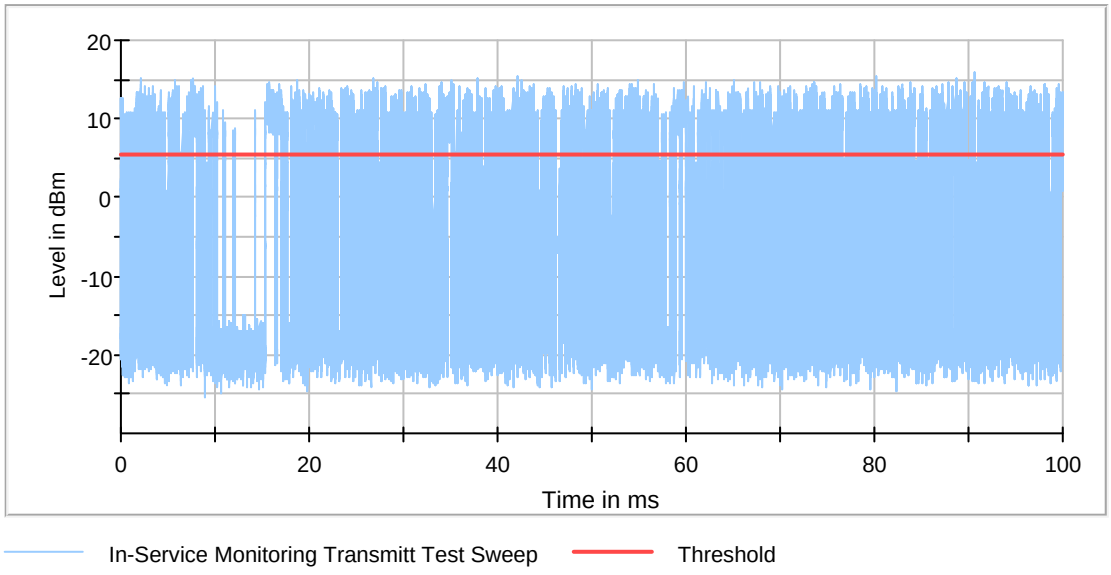
| DUT Frequency (MHz) | Tx-Test DutyCycle (%) | Tx-Test DutyCycle Limit | Tx-Test No. of Pulses found | Tx-Test Result | Tx-Test Comment |
|---|---|---|---|---|---|
| 5530.000000 | 34.097 | >=17 % | 603 | PASS | |

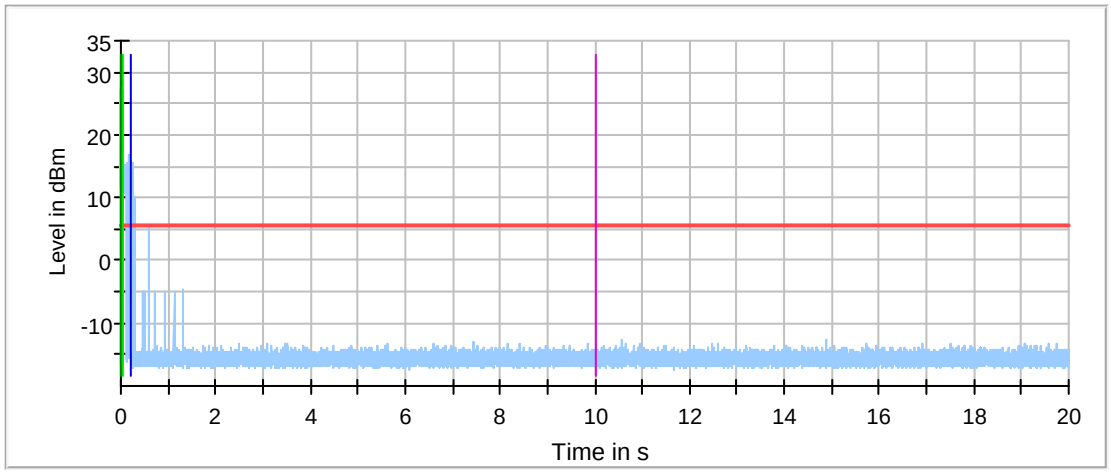
# Additional Information

| Note | Description |
|---|---|
| Note 1: | Because of the radar pulse event at the beginning,<br>the investigation of the trace begins with an offset of 26.7 ms<br>conforming to the end of the Radar burst. |
| Note 2: | Channel move time (CMT) / channel closing transmission time (CCTT) measurement<br>was made with hi resolution video sweep using OSP DAQ channel |
| Note 3: | Because of the substantially higher sampling rate of the video signal<br>the results for CCTT and CMT are more accurate than in the graphics visible.<br>Reached timing accuracy of the video trace: approx 4 µs |
| Note 4: | The Non-Occupancy Period trace starts at the end of the Channel move time trace<br>(20.000 secs.)<br>Labeling of the x-axis (time) is relative to its beginning (0 secs.) |

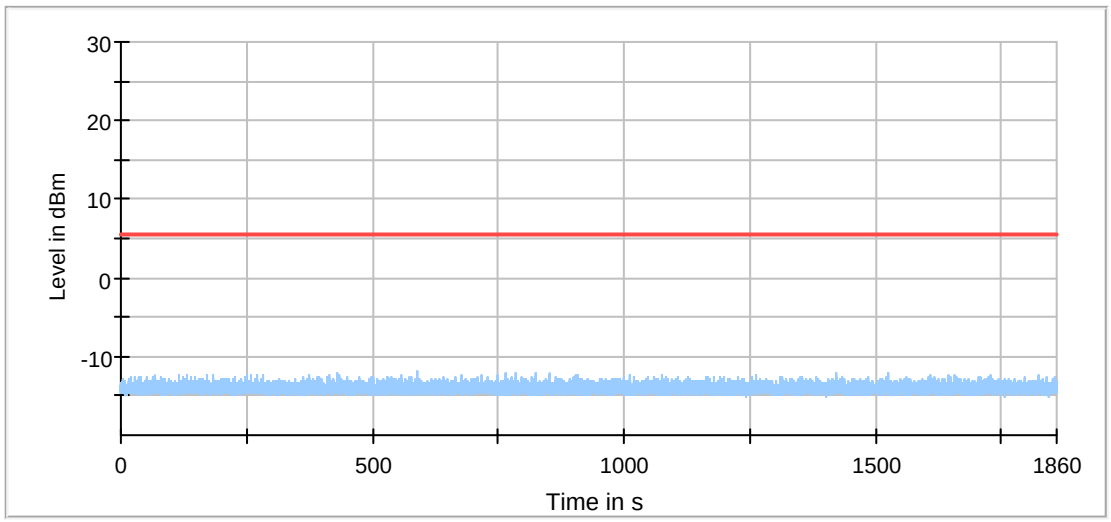
# Radar level verification

| Description | Value | Unit |
|---|---|---|
| Configured DUT EIRP: | 31.62 | mW |
| Configured DUT PSD: | 7.00 | dBm/MHz |
| Requirement of the Detection threshold value<br>for this given values acc. to FCC clause 5.2 / Table 3 | -62 | dBm |
| Vector Generator level setting | 11.11 | dBm |
| Configured overall pathlost from Vector Generator RF out to<br>DUT connector of 'DUT to OSP'-cable | 73.84 | dB |
| Given additional level added to the amplitude of<br>the waveform to account for variations in measurement<br>equipment acc. to FCC clause 5.2 / Table 3 / Note 2 | 1.00 | dB |
| This results in the following radar signal<br>level at the DUT | -60.73 | dBm |



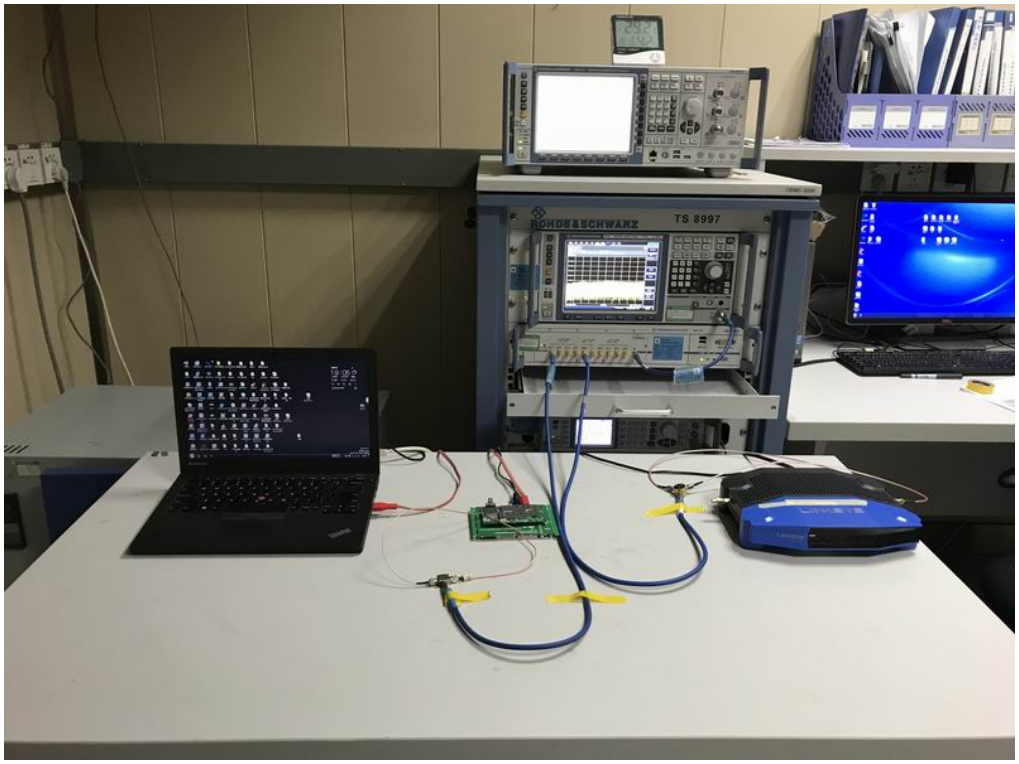



In-Service Monitoring Channel Move Time
Start of Radar
First 200ms of Channel Closing Tx Time
Threshold
Trigger at end of Radar
10sec Channel Move Time Limit




In-Service Monitoring Non-occupancy period
Threshold

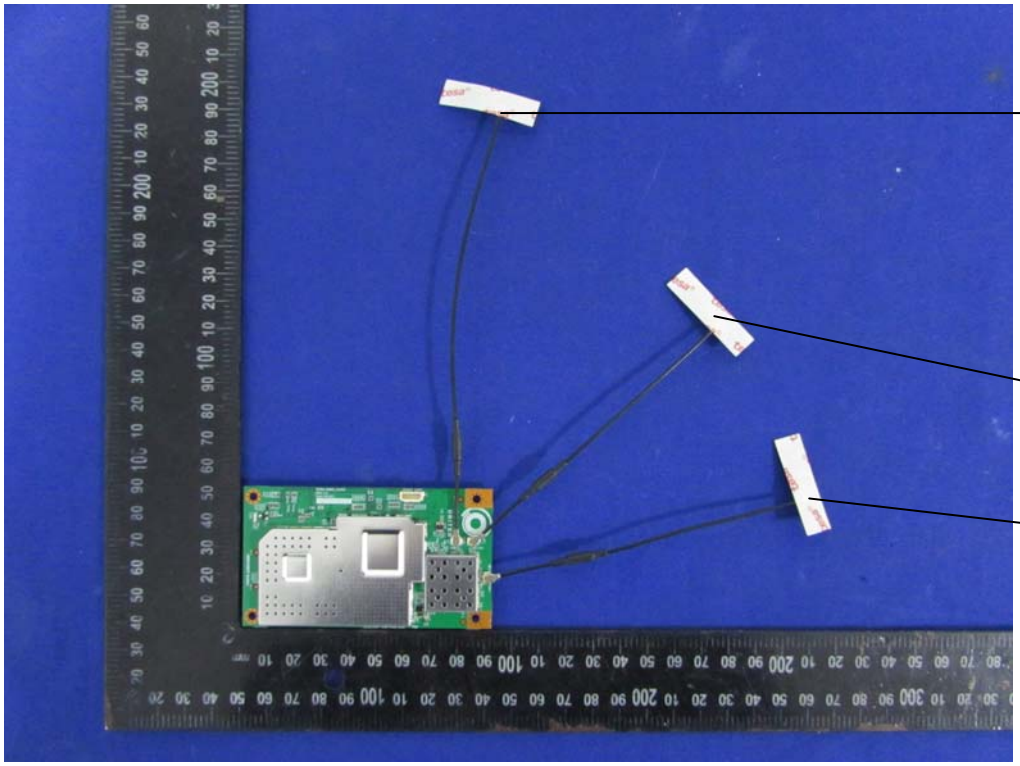
# 5. TEST SETUP PHOTOS

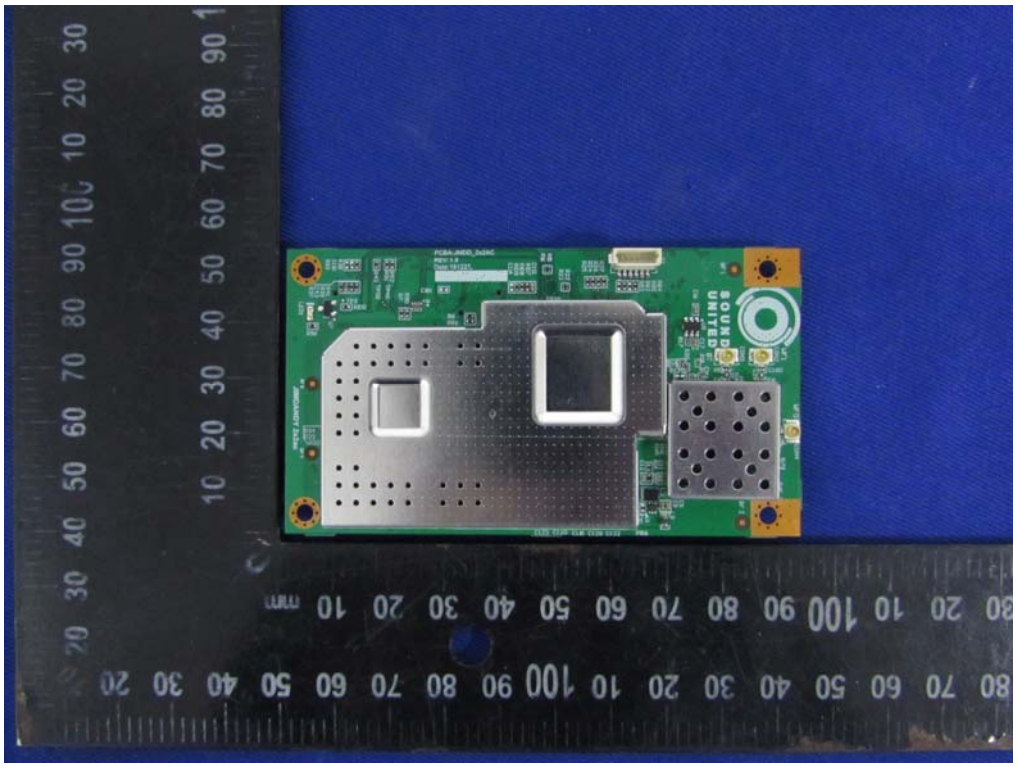


# 6. PHOTOS OF EUT

**External Photos**

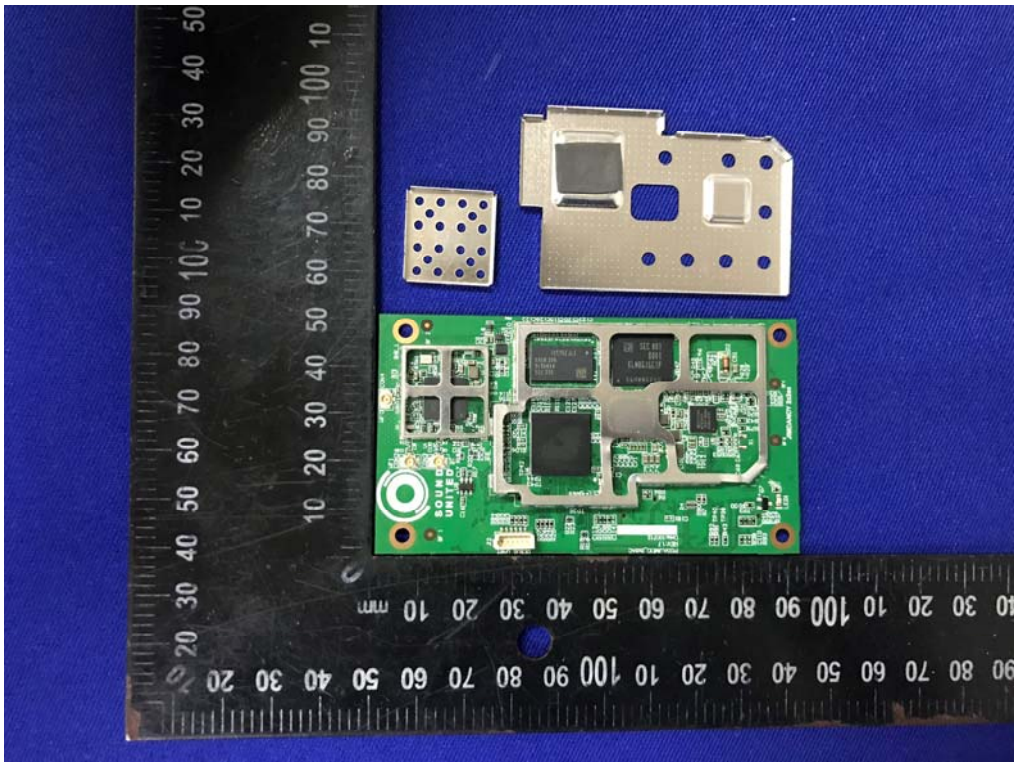
M/N: JMDD

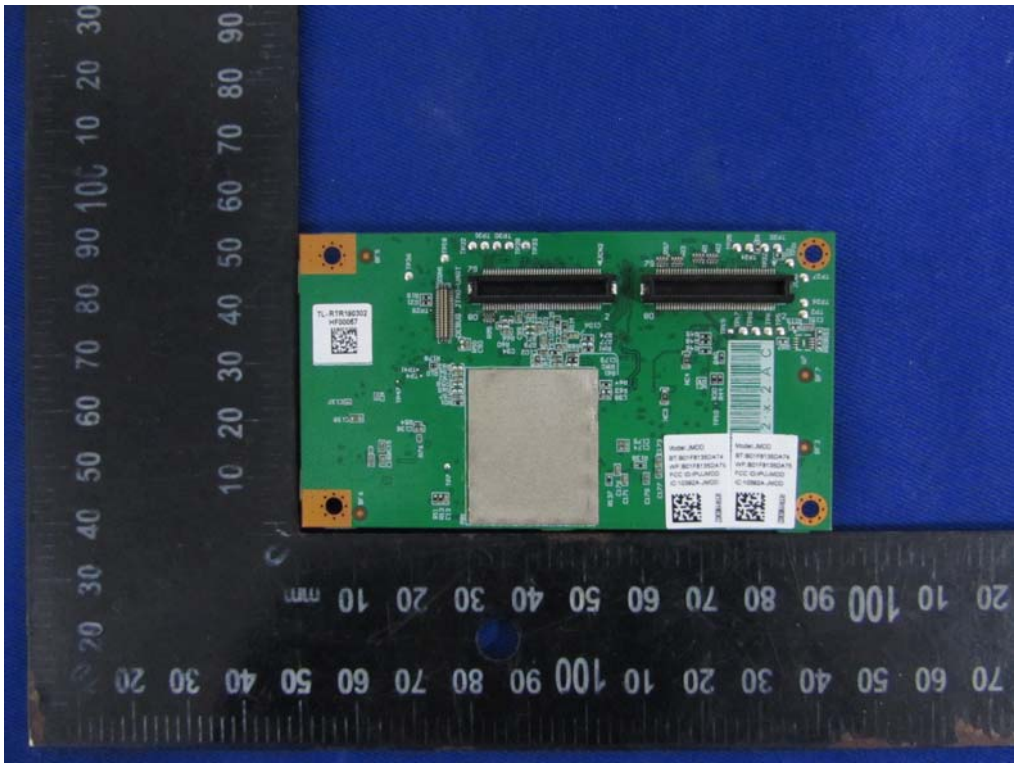


**Internal Photos**

M/N: JMDD





**Internal Photos**

M/N: JMDD