Test of APIN0224, APIN0225 802.11a/b/g/n/ac

To: FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: ARUB145-U2 Rev A

MiCOM Labs

opening wireless markets

# TEST REPORT

FROM

Test of APIN0224, APIN0225 802.11a/b/g/n/ac

to

To FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: ARUB145-U2 Rev A

Note: this report contains data with regard to the 5,150 - 5,250 (non-DFS) bands for Aruba Networks, APIN0224 and APIN0225 Wireless Access Point. 2.4 and 5.8 GHz test data are reported in MiCOM Labs test report ARUB145-U1

This report supersedes None

Applicant: Aruba Networks
1344 Crossman Avenue
Sunnyvale, California 94089
USA

Product Function: Wireless Access Point

Copy No: pdf Issue Date: 13th May 2013

**This Test Report is Issued Under the Authority of;**

**MiCOM Labs, Inc.**
440 Boulder Court, Suite 200
Pleasanton, CA 94566 USA
Phone: +1 (925) 462-0304
Fax: +1 (925) 462-0306
www.micomlabs.com

ACCREDITED

TEST CERTIFICATE #2381.01

**MiCOM Labs is an ISO 17025 Accredited Testing Laboratory**

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

This page has been left intentionally blank

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

# TABLE OF CONTENTS

**ACCREDITATION, LISTINGS & RECOGNITION ..... 5**
TESTING ACCREDITATION ..... 5
RECOGNITION ..... 6
PRODUCT CERTIFICATION ..... 7
**1. TEST RESULT CERTIFICATE ..... 9**
**2. REFERENCES AND MEASUREMENT UNCERTAINTY ..... 10**
2.1. Normative References ..... 10
2.2. Test and Uncertainty Procedures ..... 11
**3. PRODUCT DETAILS AND TEST CONFIGURATIONS ..... 12**
3.1. Technical Details ..... 12
3.2. Scope of Test Program ..... 13
3.3. Equipment Model(s) and Serial Number(s) ..... 17
3.4. Antenna Details ..... 17
3.5. Cabling and I/O Ports ..... 18
3.6. Test Configurations ..... 19
3.7. Equipment Modifications ..... 20
3.8. Deviations from the Test Standard ..... 20
3.9. Subcontracted Testing or Third Party Data ..... 20
**4. TESTING EQUIPMENT CONFIGURATION(S) ..... 21**
4.1. Conducted RF Emission Test Set-up ..... 21
4.2. Radiated Spurious Emission Test Set-up > 1 GHz ..... 22
4.3. Digital Emissions Test Set-up (0.03 – 1 GHz) ..... 23
4.4. ac Wireline Emission Test Set-up ..... 24
**5. TEST SUMMARY ..... 25**
**6. TEST RESULTS ..... 27**
6.1. Device Characteristics ..... 27
*6.1.1. Conducted Testing ..... 27*
*6.1.2. Radiated Emission Testing ..... 57*
*6.1.3. AC Wireline Conducted Emissions (150 kHz – 30 MHz) ..... 91*
**7. PHOTOGRAPHS ..... 95**
7.1. Test Setup - Digital Emissions below 1 GHz ..... 95
7.2. Radiated Emissions Test Setup >1 GHz – ANT-19 ..... 97
**8. TEST EQUIPMENT DETAILS ..... 98**
**APPENDIX ..... 99**
**A. SUPPORTING INFORMATION ..... 99**
A.1. CONDUCTED TEST PLOTS ..... 99
*A.1.1. 26 dB & 99% Bandwidth ..... 100*
*A.1.2. Peak Power Spectral Density ..... 133*
*A.1.3. Peak Excursion Ratio ..... 162*

# ACCREDITATION, LISTINGS & RECOGNITION

## TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard EN ISO/IEC 17025. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

ilac-MRA

a2LA The American Association for Laboratory Accreditation
World Class Accreditation

*Accredited Laboratory*

A2LA has accredited

**MICOM LABS**

*Pleasanton, CA*

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 27th day of March 2012.

President & CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to November 30, 2013

*For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.*

## RECOGNITION

MiCOM Labs, Inc has widely recognized Electrical testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA** countries. Our test reports are widely accepted for global type approvals.

| Country | Recognition Body | Status | Phase | Identification No. |
|---|---|---|---|---|
| USA | Federal Communications Commission (FCC) | TCB | - | US0159<br>Listing #: 102167 |
| Canada | Industry Canada (IC) | FCB | APEC MRA 2 | US0159<br>Listing #: 4143A-2 |
| Japan | MIC (Ministry of Internal Affairs and Communication) | CAB | APEC MRA 2 | RCB 210 |
| | VCCI | -- | -- | A-0012 |
| Europe | European Commission | NB | EU MRA | NB 2280 |
| Australia | Australian Communications and Media Authority (ACMA) | CAB | APEC MRA 1 | US0159 |
| Hong Kong | Office of the Telecommunication Authority (OFTA) | CAB | APEC MRA 1 | |
| Korea | Ministry of Information and Communication Radio Research Laboratory (RRL) | CAB | APEC MRA 1 | |
| Singapore | Infocomm Development Authority (IDA) | CAB | APEC MRA 1 | |
| Taiwan | National Communications Commission (NCC)<br>Bureau of Standards, Metrology and Inspection (BSMI) | CAB | APEC MRA 1 | |
| Vietnam | Ministry of Communication (MIC) | CAB | APEC MRA 1 | |

**APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement.
Is a recognition agreement under which test lab is accredited to regulatory standards of the APEC member countries.
Phase I - recognition for product testing
Phase II – recognition for both product testing and certification
N/A – Not Applicable

**EU MRA – European Union Mutual Recognition Agreement.
Is a recognition agreement under which test lab is accredited to regulatory standards of the EU member countries.

**NB – Notified Body

## PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard EN ISO/IEC Guide 65. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-02.pdf

The American Association for Laboratory Accreditation

"World Class Accreditation"

Accredited Product Certification Body

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence as a

Product Certification Body

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC Guide 65:1996 *General requirements for bodies operating product certification systems*. This accreditation demonstrates technical competence for a defined scope and the operation of a quality management system.

Presented this 27th day of March 2012.

President & CEO
For the Accreditation Council
Certificate Number 2381.02
Valid to November 30, 2013

*For the product certification schemes to which this accreditation applies, please refer to the organization's Product Certification Scope of Accreditation*

**USA Telecommunication Certification Body (TCB)** - TCB Identifier – US0159

**Industry Canada Certification Body** - CAB Identifier – US0159

**European Notified Body** - Notified Body Identifier - 2280

**Japan – Recognized Certification Body (RCB)** - RCB Identifier - 210

# DOCUMENT HISTORY

| Document History | | |
|---|---|---|
| **Revision** | **Date** | **Comments** |
| Draft | | |
| Rev A | 13th May 2013 | Initial release |
| | | |
| | | |

# 1. TEST RESULT CERTIFICATE

| | | | |
|---|---|---|---|
| Applicant: | Aruba Networks<br>1344 Crossman Avenue<br>Sunnyvale, California 94089<br>USA | Tested By: | MiCOM Labs, Inc.<br>440 Boulder Court<br>Suite 200<br>Pleasanton<br>California, 94566, USA |
| EUT: | Wireless LAN Access point | Tel: | +1 925 462 0304 |
| Model: | APIN0224 & APIN0225 | Fax: | +1 925 462 0306 |
| S/N: | BX0000206 | | |
| Test Date(s): | 15th January - 30th March 2013 | Website: | www.micomlabs.com |

| STANDARD(S) | TEST RESULTS |
|---|---|
| FCC 47 CFR Part 15.407 & IC RSS-210 (non-DFS Bands) | EQUIPMENT COMPLIES |

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

**Notes:**

1. This document reports conditions under which testing was conducted and the results of testing performed.
2. Details of test methods used have been recorded and kept on file by the laboratory.
3. Test results apply only to the item(s) tested.

ACCREDITED
TESTING CERTIFICATE #2381.01

**Approved & Released for MiCOM Labs, Inc. by:**

Graeme Grieve
Quality Manager MiCOM Labs,

Gordon Hurst
President & CEO MiCOM Labs, Inc.

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

# 2. REFERENCES AND MEASUREMENT UNCERTAINTY

## 2.1. Normative References

| Ref. | Publication | Year | Title |
|---|---|---|---|
| (i) | FCC 47 CFR Part 15.407 | 2012 | Code of Federal Regulations |
| (ii) | FCC 06-96 | June 2006 | Memorandum Opinion and Order |
| (iii) | FCC OET KDB 662911 | 4th April 2011 | Emissions Testing of Transmitters with Multiple Outputs in the Same Band |
| (iv) | Industry Canada RSS-210 | 2010 | Low Power License-Exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment |
| (v) | Industry Canada RSS-Gen | 2010 | General Requirements and Information for the Certification of Radiocommunication Equipment |
| (vi) | ANSI C63.4 | 2009 | American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
| (vii) | CISPR 22/ EN 55022 | 2008 2006+A1:2007 | Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment |
| (viii) | M 3003 | Edition 1 Dec. 1997 | Expression of Uncertainty and Confidence in Measurements |
| (ix) | LAB34 | Edition 1 Aug 2002 | The expression of uncertainty in EMC Testing |
| (x) | ETSI TR 100 028 | 2001 | Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics |
| (xi) | A2LA | July 2012 | Reference to A2LA Accreditation Status – A2LA Advertising Policy |
| (xii) | FCC Public Notice – DA 02-2138 | 2002 | Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices |

## 2.2. Test and Uncertainty Procedures

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

# 3. PRODUCT DETAILS AND TEST CONFIGURATIONS

## 3.1. Technical Details

| Details | Description |
|---|---|
| Purpose: | Test of the APIN0224, APIN0225 802.11a/b/g/n/ac in the frequency range 5,150 - 5,250 MHz to FCC Part 15.407 and Industry Canada RSS-210 regulations. |
| Applicant: | Aruba Networks<br>1344 Crossman Avenue<br>Sunnyvale, California 94089,USA |
| Manufacturer: | As applicant |
| Laboratory performing the tests: | MiCOM Labs, Inc.<br>440 Boulder Court, Suite 200<br>Pleasanton, California 94566 USA |
| Test report reference number: | ARUB145-U2 Rev A |
| Date EUT received: | 4th January 2013 |
| Standard(s) applied: | FCC 47 CFR Part 15.407 & IC RSS-210 |
| Dates of test (from - to): | 15th January - 30th March 2013 |
| No of Units Tested: | One |
| Type of Equipment: | 802.11a/b/g/n/ac Wireless Access Point 3x3 Spatial Multiplexing MIMO configuration |
| Applicants Trade Name: | Wireless Access Point |
| Model(s): | APIN0224, APIN0225 |
| Location for use: | Indoor only |
| Declared Frequency Range(s): | 5,150 – 5,250 MHz |
| Hardware Rev | 6.3.0.0 |
| Software Rev | 37654 |
| Type of Modulation: | Per 802.11 – OFDM |
| EUT Modes of Operation: | Legacy 802.11a, 802.11n HT-20, HT-40, ac-40, ac-80 |
| Declared Nominal Output Power: (Average Power) | 802.11a: Legacy +15 dBm<br>802.11n: HT-20 +15 dBm<br>802.11n: HT-40 +15 dBm<br>802.11ac-40 +15 dBm<br>802.11ac-80 +15 dBm |
| Transmit/Receive Operation: | Time Division Duplex |
| Rated Input Voltage and Current: | POE 12 Vdc 1.25 A |
| Operating Temperature Range: | Declared range 0° to +40ºC |
| ITU Emission Designator: | 802.11a 17M7D1D<br>802.11n HT-20 17M7D1D<br>802.11n HT-40 36M4D1D<br>802.11ac-40 36M9D1D<br>802.11ac-80 75M9D1D |
| Equipment Dimensions: | 203mm x 203mm x 65mm / 8.0”x8.0”x2.6” (WxDxH) |
| Weight: | 750 g / 27 oz |
| Primary function of equipment: | Wireless Access Point for transmitting data and voice. |

## 3.2. Scope of Test Program

**Aruba Networks APIN0224, APIN0225 Access Point RF Testing**
The scope of the test program was to test the Aruba Networks APIN0224, APIN0225 Wireless LAN Access Point, 3X3 Spatial Multiplexing MIMO configurations in the frequency range 5,150 - 5,250 MHz for compliance against FCC 47 CFR Part 15.407 and Industry Canada RSS-210 specifications.

**FCC OET KDB Implementation**
This test program implements the following FCC KDB – 662911 4/4/2011;
***Emissions Testing of Transmitters with Multiple Outputs in the Same Band***

The KDB document provides guidance for measurements of conducted output emissions of devices that employ a single transmitter with multiple outputs in the same band, with the outputs occupying the same or overlapping frequency ranges. It applies to EMC compliance measurements on devices that transmit on multiple antennas simultaneously in the same or overlapping frequency ranges through a coordinated process. Examples include, but are not limited to, devices employing beam forming or multiple-input and multiple-output (MIMO.) This guidance applies to both licensed and unlicensed devices wherever the FCC rules call for conducted output measurements. Guidance is provided for in-band, out-of-band and spurious emission measurements.

This guidance does not apply to the multiple transmitters included in a composite device, such as a device that combines an 802.11 modem with a cell phone in one enclosure with each driving its own antenna.

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

Aruba Networks Inc
APIN0224 External Antenna 802.11 a/b/g/n/ac Wireless Access Point

Aruba Networks Inc
APIN0225 Integral Antenna 802.11 a/b/g/n/ac Wireless Access Point

Aruba Networks Inc
802.11 a/b/g/n/ac Wireless Access Point (Rear)

## 3.3. Equipment Model(s) and Serial Number(s)

| Type (EUT/ Support) | Equipment Description (Including Brand Name) | Mfr | Model No. | Serial No. |
|---|---|---|---|---|
| EUT | Wireless LAN Access Point | Aruba Networks | APIN0224 | BX0000206 |
| Support | Laptop PC | IBM | Thinkpad | None |

## 3.4. Antenna Details

| Model | Type | Gain | Freq. Band | Note |
|---|---|---|---|---|
| | | dBi | MHz | |
| AP-ANT-1B | Omni | 3.8 | 2400 - 2500 | 3x per unit |
| | | 5.8 | 4900 - 5875 | |
| AP-ANT-13B | Omni | 4.4 | 2400 - 2500 | 3x per unit |
| | | 3.3 | 4900 - 5900 | |
| AP-ANT-16 | Omni | 3.9 | 2400 - 2500 | 3x per unit |
| | | 4.7 | 4900 - 5900 | |
| AP-ANT-17 | Directional 120degr. | 6.0 | 2400 - 2500 | 3x per unit |
| | | 5.0 | 4900 - 5875 | |
| AP-ANT-18 | Directional 60degr. | 7.5 | 2400 - 2500 | 3x per unit |
| | | 7.5 | 5150 - 5875 | |
| AP-ANT-19 | Omni | 3.0 | 2400 - 2500 | 3 x per unit |
| | | 6.0 | 5150 - 5875 | |

**APIN0225 Integrated Antennas**

| Model | Type | Gain | Freq. Band | Note |
|---|---|---|---|---|
| | | dBi | MHz | |
| metal sheet | Omni | 4.0 | 2400 - 2500 | 3x per band, per unit |
| | | 4.5 | 4900 - 5875 | |

## 3.5. Cabling and I/O Ports

Number and type of I/O ports

1. 2 x 10/100/1000 Ethernet ENET0, ENET1
2. Console - Serial maintenance terminal
3. 12 Vdc, supply connector
4. RF Antenna Connectors (x3) – Reverse SMA (APIN0224 Only)
5. USB

## 3.6. Test Configurations

Testing was performed to determine the highest power level versus bit rate. The variant with the highest power was used to exercise the product.

Matrix of test configurations

| Operational Mode(s) (802.11) | Variant | Data Rates with Highest Power | Frequencies (MHz) |
|---|---|---|---|
| 5150-5250 MHz | Legacy | 6 MBit/s | 5180/5200/5240 |
| | HT-20 | 6.5 MBit/s | |
| | HT-40 | 13.5 MBit/s | 5190, 5230 |
| | ac-40 | | |
| | ac-80 | 29.3 MBit/s | 5210 |

**Spurious Emission and Band-Edge Test Strategy**
**Bands 5,150 – 5250**

| 11a | 11n HT-20 | 11n HT-40 | 11ac-40 | 11ac-80 |
|---|---|---|---|---|
| SE 5180 | SE 5180 | SE 5190 | SE 5190 | SE 5210 |
| SE 5200 | SE 5200 | | | |
| SE 5240 | SE 5240 | SE 5230 | SE 5230 | |
| BE 5150 | BE 5150 | BE 5150 | BE 5150 | BE 5150 |

KEY:-

SE – Spurious Emissions

BE – Band-Edge

## 3.7. Equipment Modifications

The following modifications were required to bring the equipment into compliance:

1. NONE

## 3.8. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:

1. NONE

## 3.9. Subcontracted Testing or Third Party Data

1. NONE

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

# 4. TESTING EQUIPMENT CONFIGURATION(S)

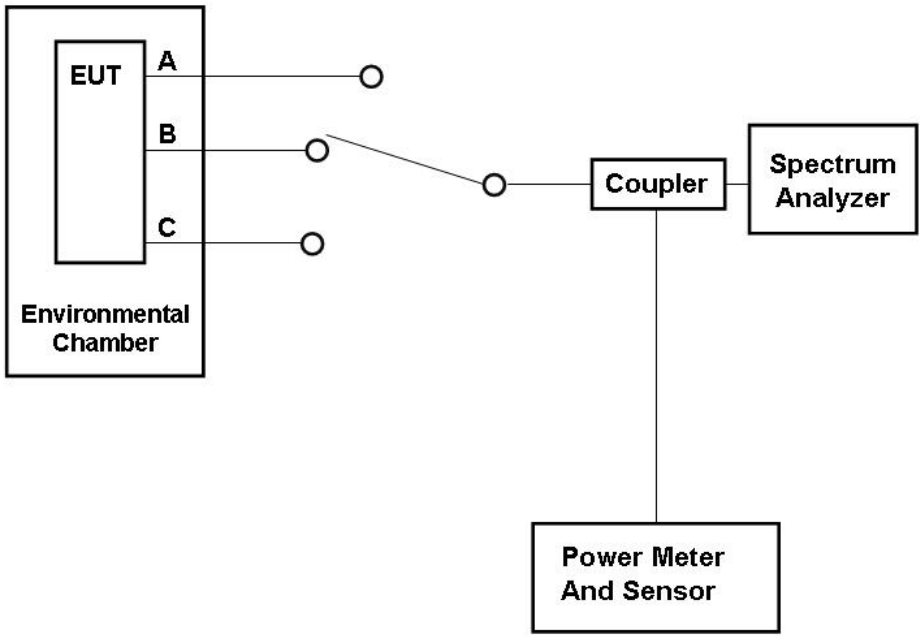
## 4.1. Conducted RF Emission Test Set-up

The following tests were performed using the conducted test set-up shown in the diagram below.

1. Section 6.1.1.1. 26 dB and 99% Bandwidth
2. Section 6.1.1.2. Maximum Conducted Output Power
3. Section 6.1.1.3. Peak Power Spectral Density
4. Section 6.1.1.4. Peak Excursion Ratio

**Conducted Test Set-Up Pictorial Representation**

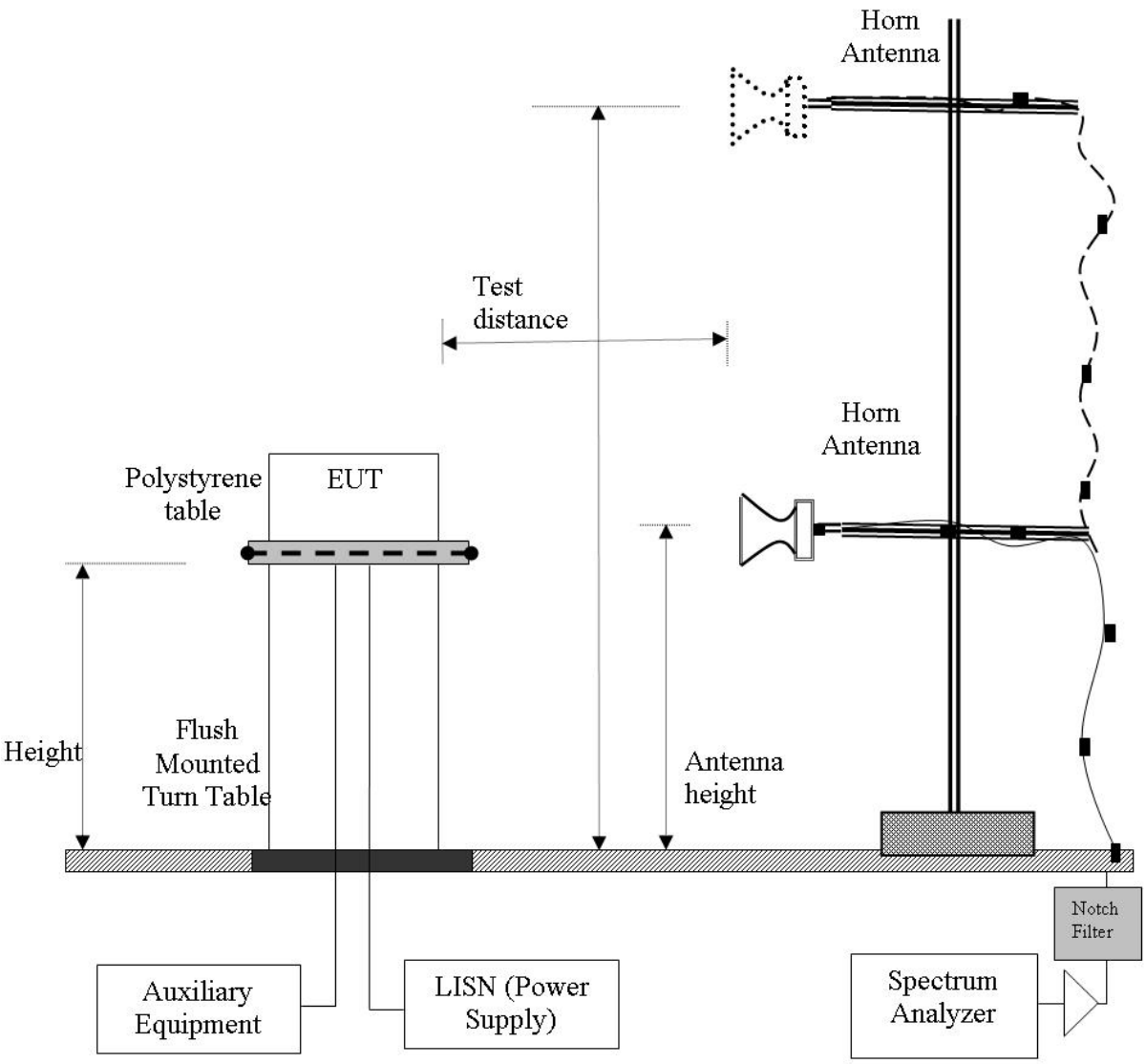
3 - Port Test Configuration



## 4.2. Radiated Spurious Emission Test Set-up > 1 GHz

The following tests were performed using the conducted test set-up shown in the diagram below.

**Radiated Emission Measurement Setup – Above 1 GHz**

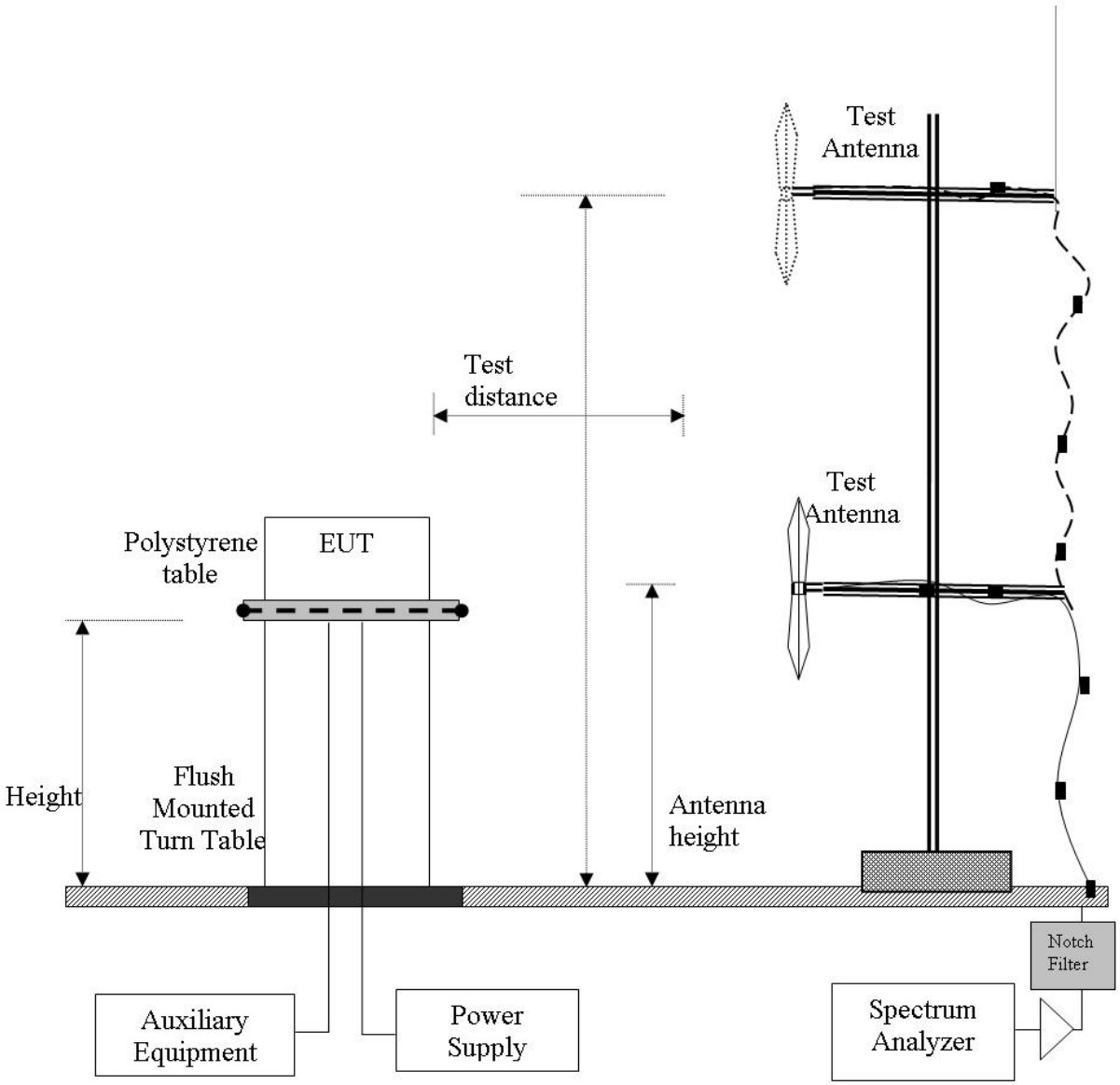


## 4.3. Digital Emissions Test Set-up (0.03 – 1 GHz)

The following tests were performed using the conducted test set-up shown in the diagram below.

1. Section 6.1.2.4. Digital Emissions

**Digital Emission Measurement Setup – Below 1 GHz**

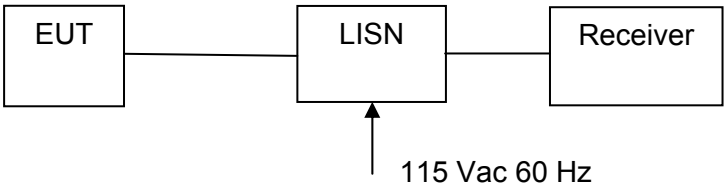


## 4.4. ac Wireline Emission Test Set-up

The following tests were performed using the conducted test set-up shown in the diagram below.

1. Section 6.1.3 ac Wireline Conducted Emissions

**Conducted Test Set-Up Pictorial Representation**




Measurement set up for ac Wireline Conducted Emissions Test

# 5. TEST SUMMARY

## List of Measurements

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407** and **Industry Canada RSS-210**.and **Industry Canada RSS-Gen**.

| Section(s) | Test Items | Description | Condition | Result | Test Report Section |
|---|---|---|---|---|---|
| **15.407(a)**<br>**A9.2(2)**<br>**4.4** | 26dB and 99% Emission BW | Emission bandwidth measurement | Conducted | Complies | 6.1.1.1<br>A.1.1 |
| **15.407(a)**<br>**A9.2(2)**<br>**4.6** | Maximum Conducted Output Power | Power Measurement | Conducted | Complies | 6.1.1.2 |
| **15.407(a)**<br>**A9.2(2)** | Peak Power Spectral Density | PPSD | Conducted | Complies | 6.1.1.3<br>A.1.2 |
| **15.407(a)(6)** | Peak Excursion Ratio | <13dB in any 1MHz bandwidth | Conducted | Complies | 6.1.1.4<br>A.1.3 |
| **15.407(g)**<br>**15.31**<br>**2.1**<br>**4.5** | Frequency Stability | Limits: contained within band of operation at all times. | Applicant declaration | Complies | 6.1.1.5 |
| **15.407(f)**<br>**5.5** | Radio Frequency Radiation Exposure | Exposure to radio frequency energy levels, Maximum Permissible Exposure (MPE) | Conducted | See included MPE exhibit | -- |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

## List of Measurements (continued)

The following table represents the list of measurements required under the **FCC CFR47 Part 15.407** and **Industry Canada RSS-210** and **Industry Canada RSS-Gen**.

| Section(s) | Test Items | Description | Condition | Result | Test Report Section |
|---|---|---|---|---|---|
| **15.407(b)(2)**<br>**15.205(a)**<br>**15.209(a)**<br>**2.2**<br>**2.6**<br>**A9.3(2)**<br>**4.7** | Radiated Emissions | | Radiated | | 6.1.2 |
| | Transmitter Radiated Spurious Emissions | Emissions above 1 GHz | | Complies | *6.1.2.1*<br>*6.1.2.2*<br>*6.1.2.3* |
| | Radiated Band Edge | Band edge results | | Complies | *6.1.2.1*<br>*6.1.2.2*<br>*6.1.2.3* |
| **15.407(b)(6)**<br>**15.205(a)**<br>**15.209(a)**<br>**2.2** | Radiated Emissions | Emissions <1 GHz (30M-1 GHz) | | Complies | *6.1.2.4* |
| **15.407(b)(6)**<br>**15.207**<br>**7.2.2** | AC Wireline Conducted Emissions 150 kHz–30 MHz | Conducted Emissions | Conducted | Complies<br>ac/dc adaptor only, POE not marketed with equipment | 6.1.3 |

Note 1: Test results reported in this document relate only to the items tested

Note 2: The required tests demonstrated compliance as per client declaration of test configuration, monitoring methodology and associated pass/fail criteria

Note 3: Section 3.7 Equipment Modifications highlights the equipment modifications that were required to bring the product into compliance with the above test matrix

# 6. TEST RESULTS

## 6.1. Device Characteristics

### 6.1.1. Conducted Testing

#### 6.1.1.1. 26 dB and 99 % Bandwidth

| Conducted Test Conditions for 26 dB and 99% Bandwidth | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.407 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | 26 dB and 99 % Bandwidth | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | 15.407 (a) | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | KDB 789033 - D01 DTS General UNII Test Procedures v01 | | |

**Test Procedure for 26 dB and 99% Bandwidth Measurement**

The bandwidth at 26 dB and 99 % is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. KDB 789033 Section 5.1 Emission Bandwidth was used in order to prove compliance. The Resolution Bandwidth was set to approximately 1% of the emission bandwidth.

## Measurement Results for 26 dB and 99 % Operational Bandwidth(s)

| Equipment Configuration for 26 dB & 99% Occupied Bandwidth | | | |
|---|---|---|---|
| **Variant:** | 802.11a | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 6 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | Not Applicable | | |

**Test Measurement Results**

| Test Frequency | Measured 26 dB Bandwidth (MHz) | | | | 26 dB Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | | |
| MHz | a | b | c | d | Highest | Lowest | | |
| 5180.0 | 20.641 | 20.541 | 20.541 | - | 20.641 | 20.541 | | |
| 5200.0 | 20.641 | 20.541 | 20.441 | - | 20.641 | 20.441 | | |
| 5240.0 | 20.741 | 20.441 | 20.441 | - | 20.741 | 20.441 | | |

| Test Frequency | Measured 99% Bandwidth (MHz) | | | | 99% Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | | |
| MHz | a | b | c | d | Highest | Lowest | | |
| 5180.0 | 17.936 | 17.735 | 17.735 | - | 17.936 | 17.735 | | |
| 5200.0 | 17.936 | 17.735 | 17.735 | - | 17.936 | 17.735 | | |
| 5240.0 | 17.836 | 17.735 | 17.735 | - | 17.836 | 17.735 | | |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for 26 dB & 99% Occupied Bandwidth | | | |
|---|---|---|---|
| **Variant:** | 802.11n HT-20 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 6.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | Not Applicable | | |

**Test Measurement Results**

| Test Frequency | Measured 26 dB Bandwidth (MHz) | | | | 26 dB Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | | |
| **MHz** | **a** | **b** | **c** | **d** | **Highest** | **Lowest** | | |
| **5180.0** | 20.641 | 20.641 | 20.441 | - | 20.641 | 20.441 | | |
| **5200.0** | 20.641 | 20.541 | 20.441 | - | 20.641 | 20.441 | | |
| **5240.0** | 20.641 | 20.541 | 20.441 | - | 20.641 | 20.441 | | |

| Test Frequency | Measured 99% Bandwidth (MHz) | | | | 99% Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | | |
| **MHz** | **a** | **b** | **c** | **d** | **Highest** | **Lowest** | | |
| **5180.0** | 17.735 | 17.735 | 17.735 | - | 17.735 | 17.735 | | |
| **5200.0** | 17.735 | 17.735 | 17.735 | - | 17.735 | 17.735 | | |
| **5240.0** | 17.936 | 17.735 | 17.735 | - | 17.936 | 17.735 | | |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for 26 dB & 99% Occupied Bandwidth | | | |
|---|---|---|---|
| **Variant:** | 802.11n HT-40 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 13.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | Not Applicable | | |

**Test Measurement Results**

| Test Frequency | Measured 26 dB Bandwidth (MHz) | | | | 26 dB Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | | |
| MHz | a | b | c | d | Highest | Lowest | | |
| 5190.0 | 40.481 | 39.679 | 39.880 | - | 40.481 | 39.679 | | |
| 5230.0 | 40.281 | 39.880 | 39.880 | - | 40.281 | 39.880 | | |

| Test Frequency | Measured 99% Bandwidth (MHz) | | | | 99% Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | | |
| MHz | a | b | c | d | Highest | Lowest | | |
| 5190.0 | 36.673 | 36.273 | 36.473 | - | 36.673 | 36.273 | | |
| 5230.0 | 36.673 | 36.273 | 36.473 | - | 36.673 | 36.273 | | |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for 26 dB & 99% Occupied Bandwidth | | | |
|---|---|---|---|
| **Variant:** | 802.11ac-40 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 13.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | Not Applicable | | |

**Test Measurement Results**

| Test Frequency | Measured 26 dB Bandwidth (MHz) | | | | 26 dB Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | | |
| MHz | a | b | c | d | Highest | Lowest | | |
| 5190.0 | 47.295 | 56.112 | 62.725 | - | 62.725 | 47.295 | | |
| 5230.0 | 41.082 | 57.916 | 51.303 | - | 57.916 | 41.082 | | |

| Test Frequency | Measured 99% Bandwidth (MHz) | | | | 99% Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | | |
| MHz | a | b | c | d | Highest | Lowest | | |
| 5190.0 | 36.874 | 36.673 | 36.874 | - | 36.874 | 36.673 | | |
| 5230.0 | 36.673 | 36.673 | 36.673 | - | 36.673 | 36.673 | | |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for 26 dB & 99% Occupied Bandwidth | | | |
|---|---|---|---|
| **Variant:** | 802.11ac-80 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 29.3 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | Not Applicable | | |

**Test Measurement Results**

| Test Frequency | Measured 26 dB Bandwidth (MHz) | | | | 26 dB Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | | |
| **MHz** | **a** | **b** | **c** | **d** | **Highest** | **Lowest** | | |
| **5210.0** | 90.581 | 117.034 | 101.804 | - | 117.034 | 90.581 | | |

| Test Frequency | Measured 99% Bandwidth (MHz) | | | | 99% Bandwidth (MHz) | | | |
|---|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | | |
| **MHz** | **a** | **b** | **c** | **D** | **Highest** | **Lowest** | | |
| **5210.0** | 76.553 | 76.553 | 76.553 | - | 76.553 | 76.553 | | |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

**Specification**

**Limits**

**FCC, Part 15 §15.407 (a)(1), (a)(2) and Industry Canada RSS-210 § A9.2(2)**

**(a)(1)** For the band 5.15-5.25 GHz the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or +4 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

**(a)(2)** For the 5.25-5.35 GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or +11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

**Industry Canada RSS-Gen 4.4**

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

**Traceability**

| Test Equipment Used |
|---|
| 0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117 |

### 6.1.1.2. Maximum Conducted Output Power

| Conducted Test Conditions for Maximum Conducted Output Power | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.407 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | Maximum Conducted Output Power | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | 15.407 (a) | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | KDB 789033 - D01 DTS General UNII Test Procedures v01 | | |

**Test Procedure for Maximum Conducted Output Power Measurement**

Method PM (Measurement using an RF average power meter). Section C) 4) of KDB 789033 defines a methodology using an average wideband power meter. Measurements were made while the EUT was operating in a continuous transmission mode (100% duty cycle) at the appropriate center frequency. All cable losses and offsets were taken into consideration in the measured result. All operational modes and frequency bands were measured independently and the resultant  calculated. For multiple outputs, the measurements were made simultaneously on each output port and summed in a linear fashion. This technique was used in order to prove compliance.

**Antenna Beam and Non-Beam Forming Power Levels**

15. 407 (a)(1), (a) (2) Operation with directional antenna gains greater than 6 dBi.

If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Further FCC KDB 662911 D01 Multiple Transmitter Output v01 requires that the gain of antennas transmitting the same data (legacy 802.11a mode) must be increased by 10 * Log (N) when N is the number of antenna elements.

**Operating Frequency Band 5150-5250 MHz**

**5150 – 5250 MHz Uncorrelated Operation (MIMO)**

| Antenna | Gain | Max. Allowable Conducted Peak Power (dBm) | | Maximum EIRP |
|---|---|---|---|---|
| (dB) | (dBi) | Uncorrelated | Max. Power Per Chain | (dBm) |
| Integral | 6.0 | +17.00 | +12.23 | +23.0 |

**5150 – 5250 MHz Correlated Operation (Non-MIMO i.e. Legacy)**

| Antenna | Gain dBi | Antenna Gain Increase V's No. Antenna Ports | | Total Gain | Max. Allowable Conducted Peak Power | Maximum EIRP |
|---|---|---|---|---|---|---|
| (dB) | | Ports | dB | dBi | ∑ (dBm) | (dBm) |
| Integral | 6.0 | 3 | 4.77 | 10.77 | +12.23 | +23.0 |

The APIN0224 and APIN0225 does not implement beam-forming

**Maximum Transmit (Conducted) Power, FCC Limits and Industry Canada Limits**

**Bands 5150 – 5250 MHz**

**FCC Limits**

Conducted Power Limit lesser of: 50 mW or 4 dBm + 10 log (B) dBm. B is the 26 dB emission bandwidth in MHz.

| Mode | Frequency Range (MHz) | Minimum 26 dB Bandwidth (MHz) | 4 + 10 Log (B) (dBm) | Limit (dBm) |
|---|---|---|---|---|
| a | 5150 – 5250 | 20.441 | +17.11 | +17.00 |
| HT-20 | | 20.441 | +17.11 | +17.00 |
| HT-40 | | 39.679 | +19.99 | +17.00 |
| ac-40 | | 41.082 | +20.14 | +17.00 |
| ac-80 | | 90.581 | +23.57 | +17.00 |

**Industry Canada Limits**

EIRP Limit 5150 – 5250 MHz: Lesser of 200 mW (+23 dBm) or 10 + 10 Log (B) dBm. B is the 99% emission bandwidth in MHz.

| Mode | Frequency Range (MHz) | Minimum 99 % Bandwidth (MHz) | 4 + 10 Log (B) (dBm) | Limit (dBm) |
|---|---|---|---|---|
| a | 5150 – 5250 | 17.735 | +16.49 | +16.18 |
| HT-20 | | 17.735 | +16.49 | +16.49 |
| HT-40 | | 36.273 | +19.60 | +17.00 |
| ac-40 | | 36.673 | +19.64 | +17.00 |
| ac-80 | | 76.563 | +22.84 | +17.00 |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

## APIN0224 and APIN0225 EUT Maximum Power Settings

**Operational Mode Maximum Power Settings provided by the client**

| Operational Mode | Power Setting |
|---|---|
| **802.11 a** | 18.0 |
| **802.11 n HT-20** | 18.0 |
| **802.11 n HT-40** | 14.0 |
| **802.11 ac-40** | 14.0 |
| **802.11 ac-80** | 12.0 |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for Peak Transmit Power | | | |
|---|---|---|---|
| **Variant:** | 802.11a | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 6 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Conducted Output Power (dBm) Port(s) | | | | Calculated Total Power | Minimum 26 dB Bandwidth | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | Σ Port(s) dBm | MHz | dBm | dBm | |
| 5180.0 | 11.69 | 12.78 | 11.94 | -- | 16.93 | 20.541 | 17.00 | -0.07 | 12.50 |
| 5200.0 | 11.76 | 12.63 | 11.87 | -- | 16.88 | 20.441 | 17.00 | -0.12 | 12.50 |
| 5240.0 | 11.56 | 12.41 | 11.75 | -- | 16.69 | 20.441 | 17.00 | -0.31 | 12.50 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for Peak Transmit Power | | | |
|---|---|---|---|
| **Variant:** | 802.11n HT-20 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 6.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Conducted Output Power (dBm) Port(s) | | | | Calculated Total Power | Minimum 26 dB Bandwidth | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | Σ Port(s) dBm | MHz | dBm | dBm | |
| 5180.0 | 11.57 | 12.83 | 11.93 | -- | 16.91 | 20.441 | 17.00 | -0.09 | 12.50 |
| 5200.0 | 11.63 | 12.91 | 11.87 | -- | 16.94 | 20.441 | 17.00 | -0.06 | 12.50 |
| 5240.0 | 11.55 | 12.83 | 11.78 | -- | 16.86 | 20.441 | 17.00 | -0.14 | 12.50 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for Peak Transmit Power | | | |
|---|---|---|---|
| **Variant:** | 802.11n HT-40 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 13.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Conducted Output Power (dBm) Port(s) | | | | Calculated Total Power | Minimum 26 dB Bandwidth | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | Σ Port(s) dBm | MHz | dBm | dBm | |
| **5190.0** | 10.84 | 11.91 | 11.17 | -- | 16.10 | 39.078 | 17.00 | -0.90 | 11.50 |
| **5230.0** | 10.63 | 11.94 | 11.33 | -- | 16.10 | 39.078 | 17.00 | -0.90 | 11.50 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for Peak Transmit Power | | | |
|---|---|---|---|
| **Variant:** | 802.11ac-40 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 13.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Conducted Output Power (dBm) Port(s) | | | | Calculated Total Power | Minimum 26 dB Bandwidth | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | Σ Port(s) dBm | MHz | dBm | dBm | |
| **5190.0** | 10.79 | 12.00 | 11.44 | -- | 16.21 | 39.078 | 17.00 | -0.79 | 11.50 |
| **5230.0** | 10.63 | 11.94 | 11.33 | -- | 16.10 | 39.078 | 17.00 | -0.90 | 11.50 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for Peak Transmit Power | | | |
|---|---|---|---|
| **Variant:** | 802.11ac-80 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 29.3 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Conducted Output Power (dBm) Port(s) | | | | Calculated Total Power | Minimum 26 dB Bandwidth | Limit | Margin | EUT Power Setting |
|---|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | Σ Port(s) dBm | MHz | dBm | dBm | |
| 5210.0 | 11.14 | 12.32 | 11.93 | -- | 16.60 | 80.561 | 17.00 | -0.40 | 12.00 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

**Measurement Results for Maximum Conducted Output Power**

Specification Limits

**FCC, Part 15 §15.407 (a)(1), (a)(2) and Industry Canada RSS-210 § A9.2(2)**

**(a)(1)** For the band 5.15-5.25 GHz the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or +4 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

**(a)(2)** For the 5.25-5.35 and 5470-5725 MHz GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or +11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

**Industry Canada RSS-210 §A9.2(2)**
For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

For the band 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250 mW or 11 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

**Traceability**

| Test Equipment Used |
|---|
| 0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117 |

### 6.1.1.3. Peak Power Spectral Density

| Conducted Test Conditions for Power Spectral Density | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.407 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | Power Spectral Density | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | 15.247 (a) | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | KDB 789033 - D01 DTS General UNII Test Procedures v01 | | |

**Test Procedure for Power Spectral Density**

The In-Band power spectral density was measured using the measure and sum approach per FCC KDB 662911 (D01 Multiple Transmitter Output v01.)

Measure and sum the spectra across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The individual spectra are then summed mathematically in linear power units. Unlike in-band power measurements, in which the sum involves a single measured value (output power) from each output, measurements for compliance with PSD limits involve summing entire spectra across corresponding frequency bins on the various outputs. Consistency is maintained for any device with N transmitter outputs to be certain the individual outputs are all aligned with the same span and same number of points. In this instance, the linear power spectrum value within the first spectral bin of output 0 is summed with that in the first spectral bin of output 1, and the first spectral bin of output 2, and so on up to the Nth output to obtain the true value for the first frequency bin of the summed spectrum. The summed spectrum value for each frequency bin is computed in this fashion. These summed spectral values were calculated on a computer, and the results read back into the spectrum analyzer as a data file to produce a representative plot of total spectral power density.

Calculated Power = A + 10 log (1/x) dBm

A = Total Power Spectral Density [10 Log10 (10a/10 + 10 b/10 + 10c/10 + 10d/10)]

x = Duty Cycle

| Equipment Configuration for Peak Power Spectral Density | | | |
|---|---|---|---|
| **Variant:** | 802.11a | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 6 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density (dBm) Port(s) | | | | Calculated Total Power Spectral Density (dBm) | | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| **MHz** | **a** | **b** | **c** | **d** | **S Port(s)** | **Conversion to 3 kHz RBW** | **dBm** | **dB** |
| **5180.0** | -5.291 | -4.396 | -5.329 | -- | -0.212 | N/A | ≤ 4.00 | -4.21 |
| **5200.0** | -5.251 | -4.969 | -5.348 | -- | -0.415 | N/A | ≤ 4.00 | -4.42 |
| **5240.0** | -5.023 | -4.502 | -5.563 | -- | -0.237 | N/A | ≤ 4.00 | -4.24 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for Peak Power Spectral Density | | | |
|---|---|---|---|
| **Variant:** | 802.11n HT-20 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 6.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density (dBm) Port(s) | | | | Calculated Total Power Spectral Density (dBm) | | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | S Port(s) | Conversion to 3 kHz RBW | dBm | dB |
| 5180.0 | -5.139 | -4.323 | -5.259 | -- | -0.115 | N/A | ≤ 4.00 | -4.12 |
| 5200.0 | -5.650 | -4.656 | -5.384 | -- | -0.438 | N/A | ≤ 4.00 | -4.44 |
| 5240.0 | -5.234 | -3.764 | -5.478 | -- | 0.014 | N/A | ≤ 4.00 | -3.99 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for Peak Power Spectral Density | | | |
|---|---|---|---|
| **Variant:** | 802.11n HT-40 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 13.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density (dBm) Port(s) | | | | Calculated Total Power Spectral Density (dBm) | | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | S Port(s) | Conversion to 3 kHz RBW | dBm | dB |
| 5190.0 | -5.049 | -3.624 | -3.891 | -- | 0.626 | N/A | ≤ 4.00 | -3.37 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

**Equipment Configuration for Peak Power Spectral Density**

| | | | |
|---|---|---|---|
| **Variant:** | 802.11ac-40 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 13.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density (dBm) | | | | Calculated Total Power Spectral Density (dBm) | Limit | Margin |
|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | |
| **MHz** | **a** | **b** | **c** | **d** | **Σ Port(s)** | **dBm** | **dB** |
| **5190.0** | -2.903 | -1.740 | -2.266 | -- | 2.494 | ≤ 4.00 | -1.51 |
| **5230.0** | -3.039 | -2.122 | -2.702 | -- | 2.167 | ≤ 4.00 | -1.83 |

**Traceability to Industry Recognized Test Methodologies**

| | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

| Equipment Configuration for Peak Power Spectral Density | | | |
|---|---|---|---|
| **Variant:** | 802.11ac-80 | **Duty Cycle (%):** | 99% |
| **Data Rate:** | 29.3 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Power Spectral Density (dBm) | | | | Calculated Total Power Spectral Density (dBm) | Limit | Margin |
|---|---|---|---|---|---|---|---|
| | Port(s) | | | | | | |
| **MHz** | **a** | **b** | **c** | **d** | **Σ Port(s)** | **dBm** | **dB** |
| **5210.0** | -5.651 | -4.797 | -5.095 | -- | -0.396 | ≤ 4.00 | -4.40 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

**Specification**

**FCC, Part 15 §15.407 (a)(1), (a)(2)**
**5150 – 5250 MHz**
**(a)(1)** The peak power spectral density shall not exceed +4 dBm in any 1 megahertz band.

**5250 – 5350 MHz & 5470 – 5725 MHz**
**(a)(2)** The peak power spectral density shall not exceed +11 dBm in any 1 megahertz band.

**Industry Canada RSS-210** § **A9.2(1), A9.2(2)**
**5150 – 5250 MHz**
§ **A9.2(1)** The eirp spectral density shall not exceed +10 dBm in any 1 MHz band

**5250 – 5350 MHz & 5470 – 5725 MHz**
§ **A9.2(2)** The power spectral density shall not exceed +11 dBm in any 1 MHz band

**Traceability**

| Test Equipment Used |
|---|
| 0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117 |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

### 6.1.1.4. Peak Excursion Ratio

| Conducted Test Conditions for Peak Excursion Ratio | | | |
|---|---|---|---|
| **Standard:** | FCC CFR 47:15.407 | **Ambient Temp. (ºC):** | 24.0 - 27.5 |
| **Test Heading:** | Peak Excursion Ratio | **Rel. Humidity (%):** | 32 - 45 |
| **Standard Section(s):** | 15.407 (a)(6) | **Pressure (mBars):** | 999 - 1001 |
| **Reference Document(s):** | KDB 789033 - D01 DTS General UNII Test Procedures v01 | | |

**Test Procedure for Peak Excursion Ratio**

Compliance with the peak excursion requirement is demonstrated by confirming the ratio of the maximum of the peak-hold spectrum to the maximum of the average spectrum during continuous transmission. Section F) of KDB 789033 was used in order to prove compliance. This is a conducted measurement using a spectrum analyzer using dual traces. Peak Excursion Ratio is the difference in amplitude (dB) between both traces; The following identifies two spectrum traces on the same plot. Trace 1 is the max hold Peak detector, and Trace 2 is the recalled trace data from Peak Power Spectral Density measurements. Each frequency and operational mode is recalled in order to prove compliance.

| Equipment Configuration for Peak Excursion Ratio | | | |
|---|---|---|---|
| **Variant:** | 802.11a | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 6 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Peak Excursion (dB) Port(s) | | | | Ratio (dB) | | Limit | Lowest Margin |
|---|---|---|---|---|---|---|---|---|
| **MHz** | **a** | **b** | **c** | **d** | **Highest** | **Lowest** | **dB** | **MHz** |
| **5180.0** | 9.73 | -- | -- | -- | 9.73 | 9.73 | 13.0 | -3.27 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |
| **Equipment Configuration for Peak Excursion Ratio** | |

| | | | |
|---|---|---|---|
| **Variant:** | 802.11n HT-20 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 6.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Peak Excursion (dB) Port(s) | | | | Ratio (dB) | | Limit | Lowest Margin |
|---|---|---|---|---|---|---|---|---|
| **MHz** | **a** | **b** | **c** | **d** | **Highest** | **Lowest** | **dB** | **MHz** |
| **5180.0** | 10.64 | | | | 10.64 | 10.64 | 13.0 | -2.36 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

| Equipment Configuration for Peak Excursion Ratio | | | |
|---|---|---|---|
| **Variant:** | 802.11n HT-40 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 13.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Peak Excursion (dB) Port(s) | | | | Ratio (dB) | | Limit | Lowest Margin |
|---|---|---|---|---|---|---|---|---|
| **MHz** | **a** | **b** | **c** | **d** | **Highest** | **Lowest** | **dB** | **MHz** |
| **5190.0** | 9.29 | | | | 9.29 | 9.29 | 13.0 | -3.71 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

| Equipment Configuration for Peak Excursion Ratio | | | |
|---|---|---|---|
| **Variant:** | 802.11ac-40 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 13.5 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Peak Excursion (dB) Port(s) | | | | Ratio (dB) | | Limit | Lowest Margin |
|---|---|---|---|---|---|---|---|---|
| **MHz** | **a** | **b** | **c** | **d** | **Highest** | **Lowest** | **dB** | **MHz** |
| **5190.0** | 10.10 | | | | 10.10 | 10.10 | 13.0 | -2.90 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

| Equipment Configuration for Peak Excursion Ratio | | | |
|---|---|---|---|
| **Variant:** | 802.11ac-80 | **Duty Cycle (%):** | 100 |
| **Data Rate:** | 29.3 MBit/s | **Antenna Gain (dBi):** | Not Applicable |
| **Modulation:** | OFDM | **Beam Forming Gain (Y):** | Not Applicable |
| **TPC:** | Not Applicable | | |
| **Engineering Test Notes:** | | | |

**Test Measurement Results**

| Test Frequency | Measured Peak Excursion (dB) Port(s) | | | | Ratio (dB) | | Limit | Lowest Margin |
|---|---|---|---|---|---|---|---|---|
| MHz | a | b | c | d | Highest | Lowest | dB | MHz |
| 5210.0 | 7.07 | | | | 7.07 | 7.07 | 13.0 | -5.93 |

| Traceability to Industry Recognized Test Methodologies | |
|---|---|
| Work Instruction: | WI-03 MEASURING RF SPECTRUM MASK |
| Measurement Uncertainty: | ±2.81 dB |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

## Specification

### Limits

**§15.407 (a)(6)** The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified in this paragraph) shall not exceed 13dB across any 1MHz bandwidth or the emission bandwidth whichever is less

### Traceability

| Test Equipment Used |
|---|
| 0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117 |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

### 6.1.1.5. Frequency Stability

**FCC, Part 15 Subpart C §15.407(g)**
**Industry Canada RSS-210 §2.1**

**Test Procedure**

The manufacturer of the equipment is responsible for ensuring that the frequency stability is such that emissions are always maintained within the band of operation under all conditions.

**Manufacturer Declaration**

The frequency stability of the reference oscillator sets the frequency stability of the RF transceiver signals. Therefore all of the RF signals should have ±20ppm stability.
This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

±20ppm at 5.250 GHz translates to a maximum frequency shift of ±105 KHz. As the edge of the channels is at least one MHz from either of the band edges, ±105 KHz is more than sufficient to guarantee that the intentional emission will remain in the band over the entire operating range of the EUT.

## Specification

## Limits

**§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.

### 6.1.2. Radiated Emission Testing

**FCC, Part 15 Subpart C §15.407(b)(2), §15.205(a)/15.209(a)**
**Industry Canada RSS-210 §A9.3(2); §2.2; §2.6; RSS-Gen §4.7**

**Test Procedure**
Testing was performed in a 3-meter anechoic chamber. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. Preliminary emissions were recorded with in Spectrum Analyzer mode, using a maximum peak detector while in peak hold mode. Depending on the frequency band spanned a notch filter and/or waveguide filter was used to remove the fundamental frequency.

Emissions nearest the limits were chosen for maximization and formal measurement using a CISPR compliant receiver. Emissions above 1000 MHz are measured utilizing a CISPR compliant average detector with a tuned receiver, using a bandwidth of 1 MHz. Emissions from 30 MHz – 1000 MHz are measured utilizing a CISPR compliant quasi-peak detector with a tuned receiver, using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed.

**Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

**FS = R + AF + CORR – FO**

FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor

**CORR = Correction Factor = CL – AG + NFL**

CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

Field Strength Calculation Example:

Given receiver input reading of 51.5 dBμV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength (dBµV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \ \mu V/m$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

**Note:** The data in this Section identifies that the EUT is in compliance with the -27dBm/MHz EIRP limit (68.23 dBµV/m) for out of band emissions. All out of band emissions are less than 68.23 dB µV/m.

**Operational Modes**

Operational mode(s) tested for spurious emissions were the mode(s) which delivered maximum spectral density which was 802.11a.

**Specification**

**Radiated Spurious Emissions**

**15.407 (b)(2).** All emissions outside of the 5,150-5,350MHz band shall not exceed an EIRP of -27dBm/MHz.

**FCC §15.205 (a)** Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

**FCC §15.205 (a)** Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

**FCC §15.209 (a)** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

**RSS-210 §A9.3(2)** For transmitters operating in the 5250-5350 MHz band, all emissions outside the 5150-5350 MHz band shall not exceed -27 dBm/MHz e.i.r.p. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band shall not exceed out of band emission limit of 27 dBm/MHz e.i.r.p. in the 5150-5250 MHz band in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the 5150-5250 MHz band and shall be labeled “for indoor use only”.

**RSS-Gen §4.7** The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate of carrier frequency), or from 30 MHz , whichever is the lowest frequency, to the 5$^{th}$ harmonic of the highest frequency generated without exceeding 40 GHz.

**RSS-Gen §6** Receiver Spurious Emission Standard
If a radiated measurement is made, all spurious emissions shall comply with the limits of the following Table. The resolution bandwidth of the spectrum analyzer shall be 100 kHz for spurious emission measurements below 1.0 GHz and 1.0 MHz for measurements above 1.0 GHz

**Table 1: FCC 15.209 Spurious Emissions Limits**

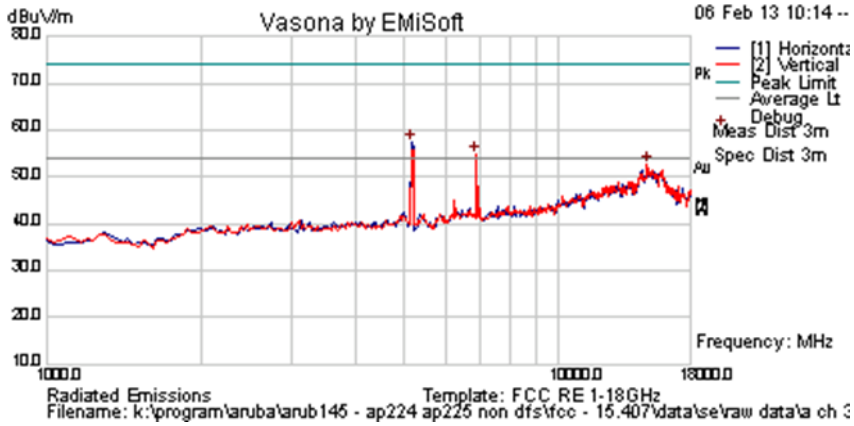
| Frequency (MHz) | Field Strength (µV/m) | Field Strength (dBµV/m) | Measurement Distance (meters) |
|---|---|---|---|
| 30-88 | 100 | 40.0 | 3 |
| 88-216 | 150 | 43.5 | 3 |
| 216-960 | 200 | 46.0 | 3 |
| Above 960 | 500 | 54.0 | 3 |

**Traceability:**

| Test Equipment Used |
|---|
| 0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312 |

### 6.1.2.1. Integral Antenna – Spurious Emissions

| | | | |
|---|---|---|---|
| **Test Freq.** | 5180 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 20 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1009 |
| **Antenna** | Integral | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | EUT Position Horizontal; BE emissions were higher when the EUT was in Hozi position vs Vert; | | |
| **Test Notes 2** | | | |

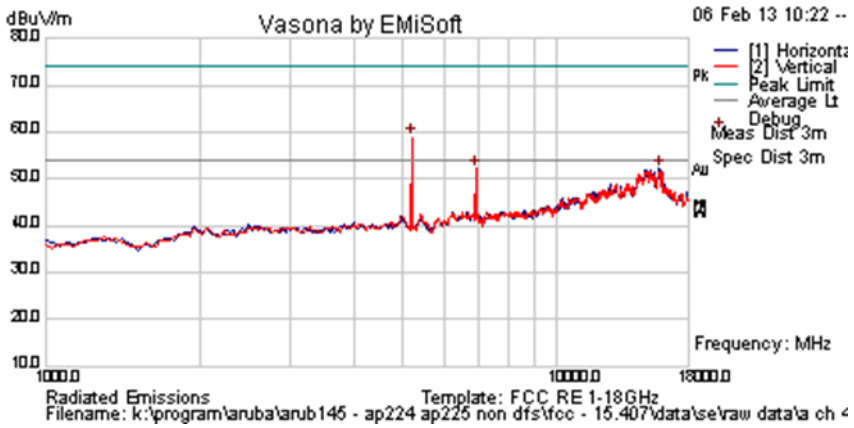



**Formally measured emission peaks**

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5156.313 | 62.6 | 4.6 | -9.9 | 57.2 | Peak [Scan] | H | | | | | | FUND |
| 6893.78758 | 56.0 | 5.3 | -6.5 | 54.8 | Peak [Scan] | V | | | | | | NRB |
| 14865.731 | 47.0 | 8.2 | -2.5 | 52.6 | Peak [Scan] | V | | | | | | NRB |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5200 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 20 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1009 |
| **Antenna** | Integral | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | EUT Position Horizontal; BE emissions were higher when the EUT was in Hozi position vs Vert; | | |
| **Test Notes 2** | | | |

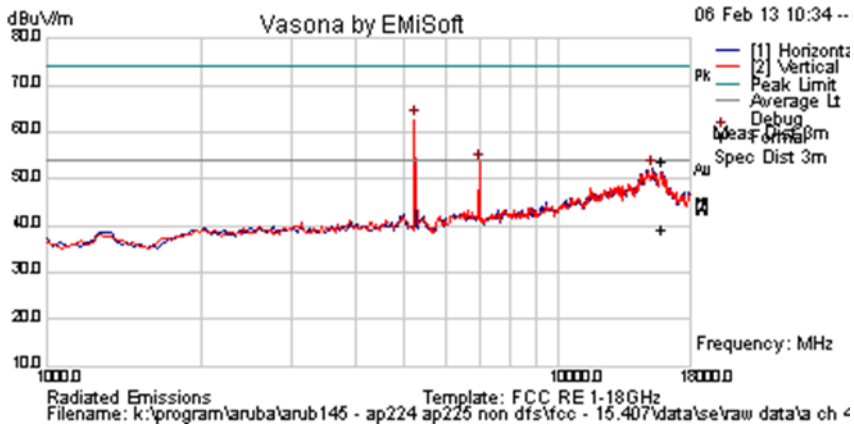



## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15912.228 | 45.2 | 8.9 | -0.1 | 53.9 | Peak Max | H | 139 | 119 | 74 | -20.1 | Pass | |
| 15912.228 | 30.5 | 8.9 | -0.1 | 39.2 | Average Max | H | 139 | 119 | 54 | -14.8 | Pass | |
| 5190.381 | 64.2 | 4.6 | -9.9 | 58.9 | Peak [Scan] | V | | | | | | FUND |
| 6927.85571 | 53.3 | 5.4 | -6.5 | 52.2 | Peak [Scan] | V | | | | | | NRB |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5240 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 20 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1009 |
| **Antenna** | Integral | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | EUT Position Horizontal; BE emissions were higher when the EUT was in Hozi position vs Vert; | | |
| **Test Notes 2** | | | |



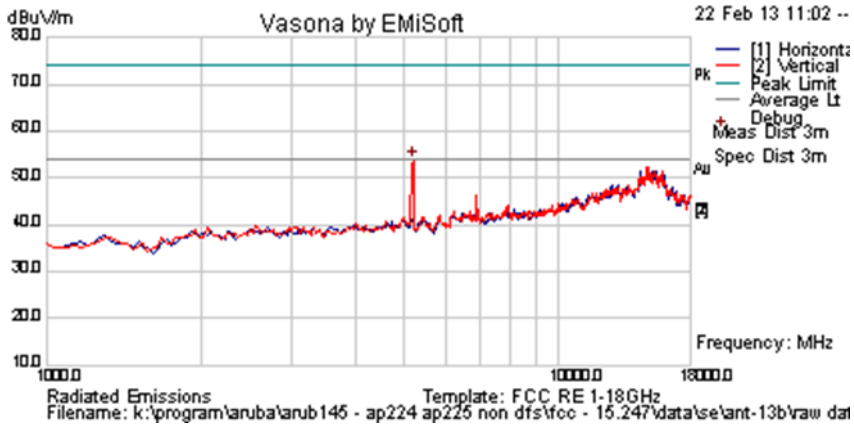

## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5224.449 | 67.9 | 4.6 | -9.8 | 62.7 | Peak [Scan] | V | | | | | | FUND |
| 6995.99198 | 54.4 | 5.4 | -6.4 | 53.4 | Peak [Scan] | V | | | | | | NRB |
| 15206.413 | 45.4 | 8.2 | -1.5 | 52.1 | Peak [Scan] | H | | | | | | NRB |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

### 6.1.2.2. ANT-1B – Spurious Emissions

| | | | |
|---|---|---|---|
| **Test Freq.** | 5180 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-1B | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |

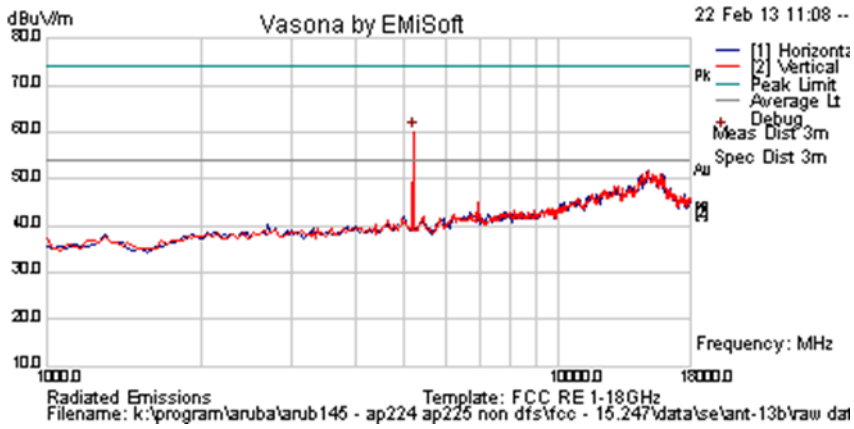



**Formally measured emission peaks**

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5190.381 | 54.5 | 4.6 | -9.9 | 49.2 | Peak [Scan] | V | 150 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5200 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-1B | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |

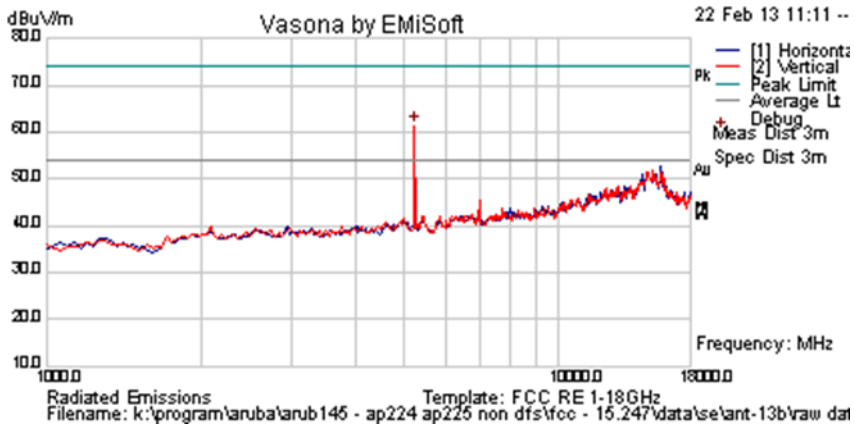



## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5196.381 | 59.2 | 4.6 | -9.9 | 53.9 | Peak [Scan] | V | 100 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5240 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-1B | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |



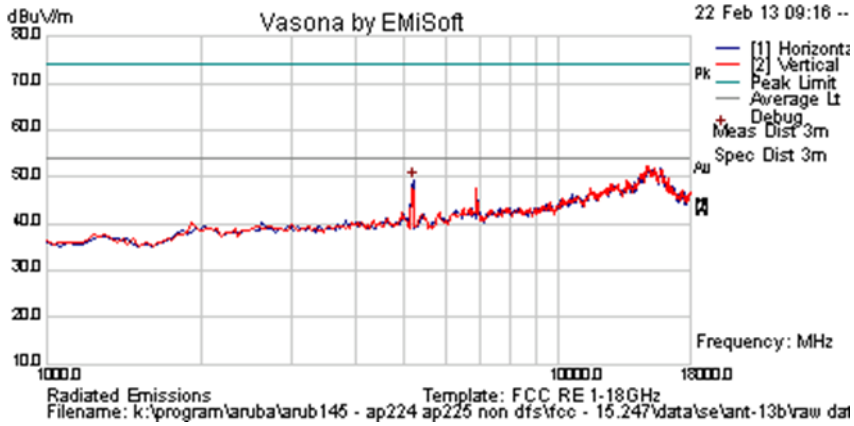

## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5224.449 | 63.0 | 4.6 | -9.8 | 57.8 | Peak [Scan] | V | 100 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

### 6.1.2.3. ANT-13B – Spurious Emissions

| | | | |
|---|---|---|---|
| **Test Freq.** | 5180 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-13B | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |

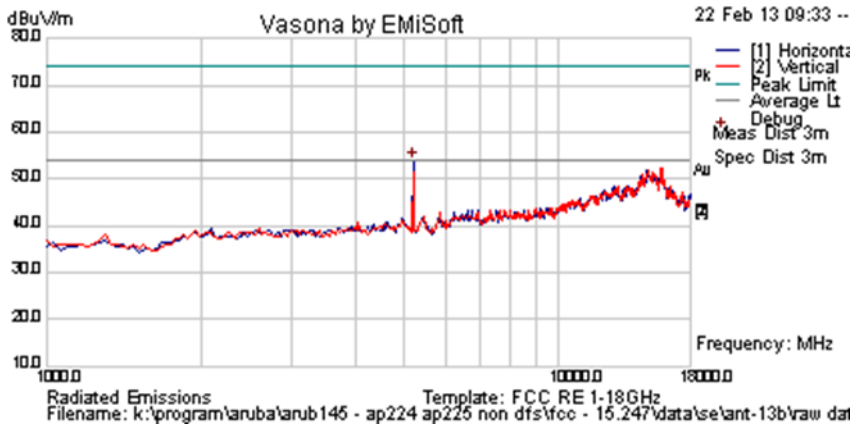



**Formally measured emission peaks**

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5190.381 | 54.5 | 4.6 | -9.9 | 49.2 | Peak [Scan] | H | 150 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5200 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-13B | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |

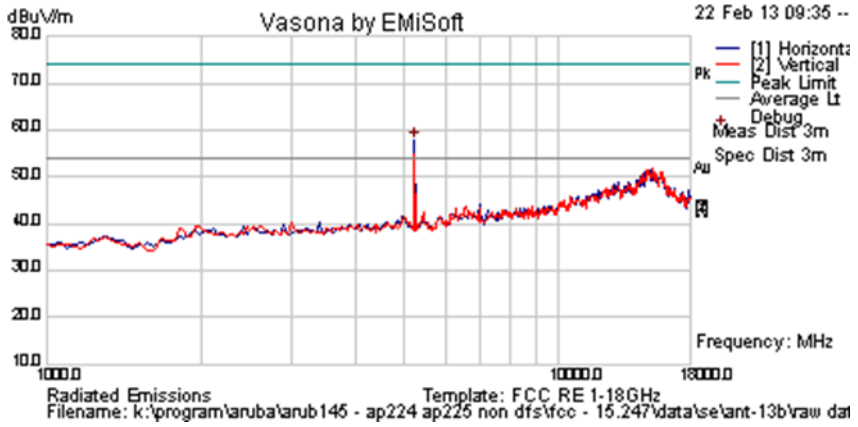



## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5196.381 | 59.2 | 4.6 | -9.9 | 53.9 | Peak [Scan] | H | 100 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5240 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-13B | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |




## Formally measured emission peaks

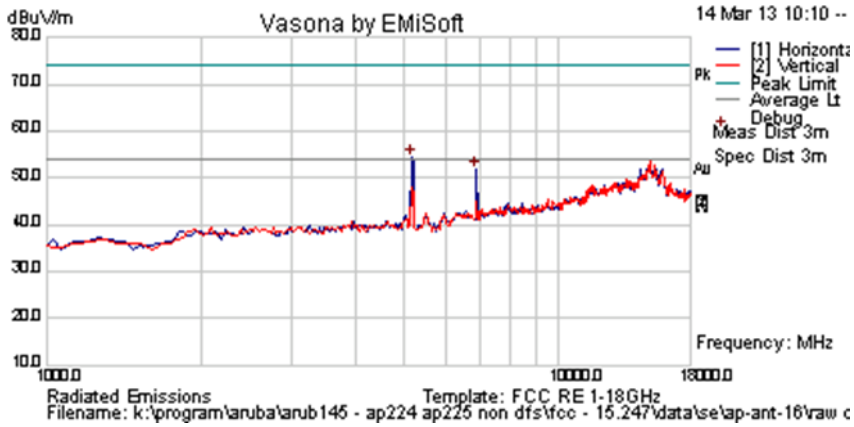
| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5224.449 | 63.0 | 4.6 | -9.8 | 57.8 | Peak [Scan] | H | 100 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

### 6.1.2.4. ANT-16 – Spurious Emissions

| | | | |
|---|---|---|---|
| **Test Freq.** | 5180 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-16 | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |

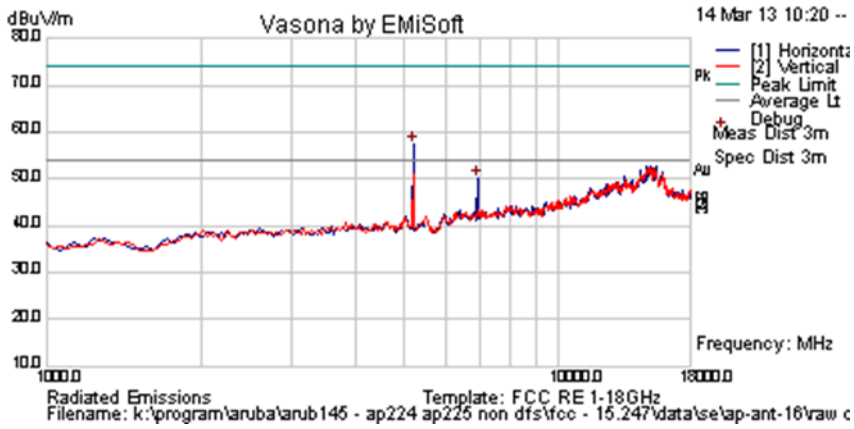



**Formally measured emission peaks**

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5156.313 | 59.5 | 4.8 | -9.9 | 54.3 | Peak [Scan] | H | 100 | | | | | FUND |
| 6893.78758 | 52.8 | 5.6 | -6.5 | 51.8 | Peak [Scan] | H | 100 | 0 | 54.0 | -2.2 | Pass | NRB |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5200 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-16 | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |

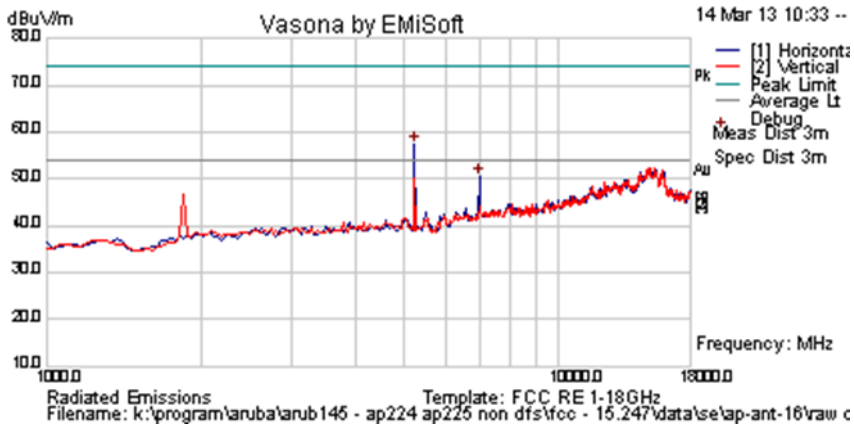



## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5190.381 | 62.4 | 4.8 | -9.9 | 57.3 | Peak [Scan] | H | 150 | | | | | FUND |
| 6927.85571 | 50.9 | 5.7 | -6.5 | 50.1 | Peak [Scan] | H | 100 | 0 | 54.0 | -3.9 | Pass | NRB |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5240 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-16 | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |



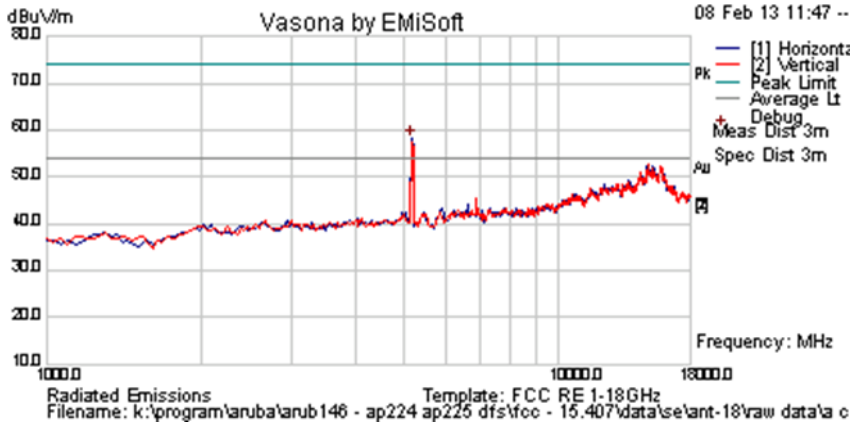

## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5224.449 | 62.3 | 4.8 | -9.8 | 57.2 | Peak [Scan] | H | 150 | | | | | FUND |
| 6995.99198 | 51.2 | 5.7 | -6.4 | 50.5 | Peak [Scan] | H | 100 | 0 | 54.0 | -3.5 | Pass | NRB |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

### 6.1.2.5. ANT-18 – Spurious Emissions

| | | | |
|---|---|---|---|
| **Test Freq.** | 5180 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-18 | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |

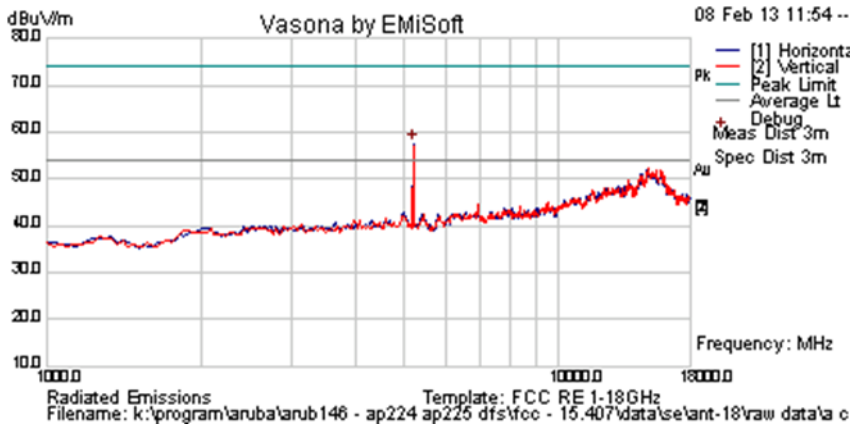



**Formally measured emission peaks**

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5156.313 | 63.4 | 4.6 | -9.9 | 58.1 | Peak [Scan] | H | 150 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5200 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-18 | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |

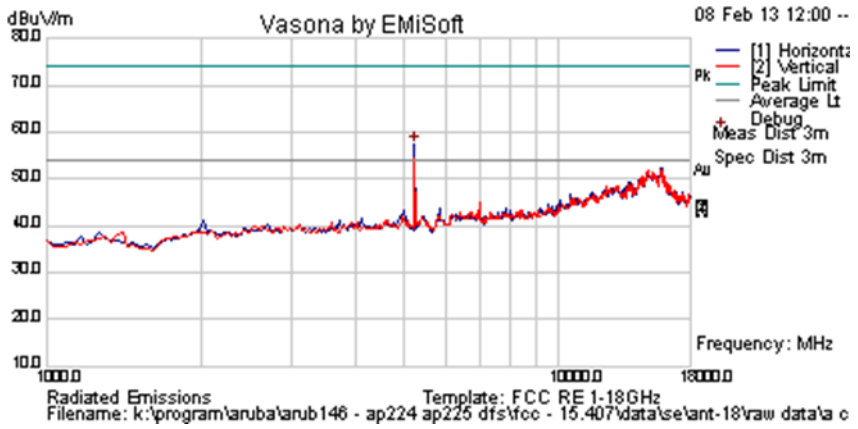



## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5190.381 | 62.7 | 4.6 | -9.9 | 57.5 | Peak [Scan] | H | 100 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5240 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-18 | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |



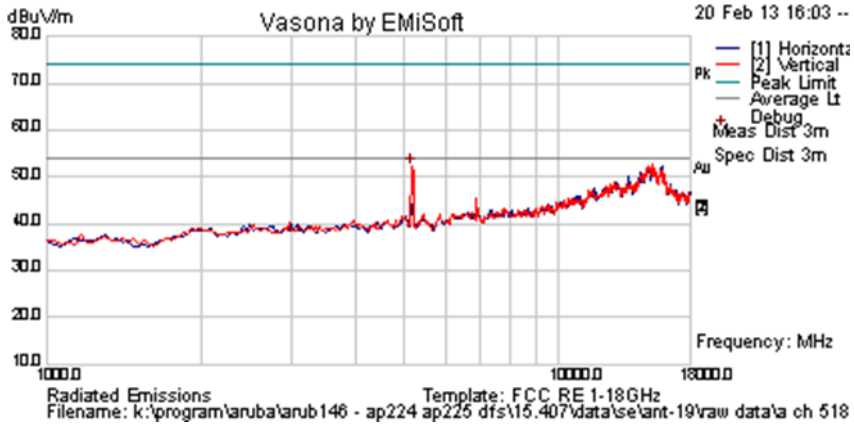

## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5224.449 | 62.6 | 4.6 | -9.8 | 57.4 | Peak [Scan] | H | 150 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

### 6.1.2.6. ANT-19 – Spurious Emissions

| | | | |
|---|---|---|---|
| **Test Freq.** | 5180 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-19 | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |

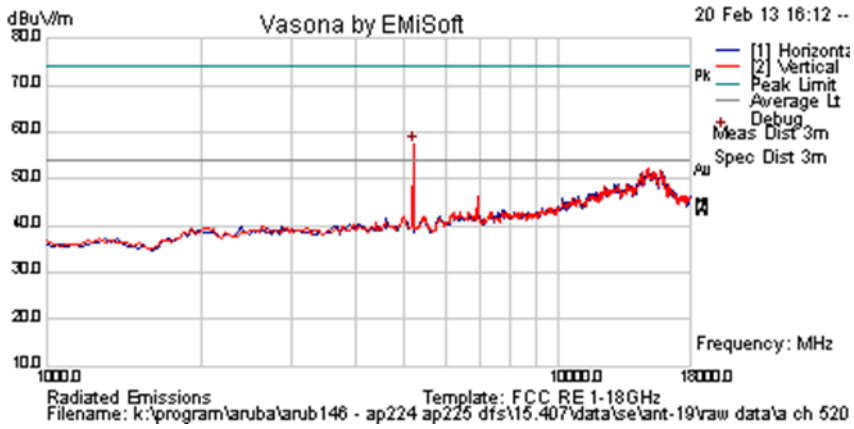



**Formally measured emission peaks**

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5156.313 | 57.5 | 4.6 | -9.9 | 52.1 | Peak [Scan] | V | 100 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5200 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-19 | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |

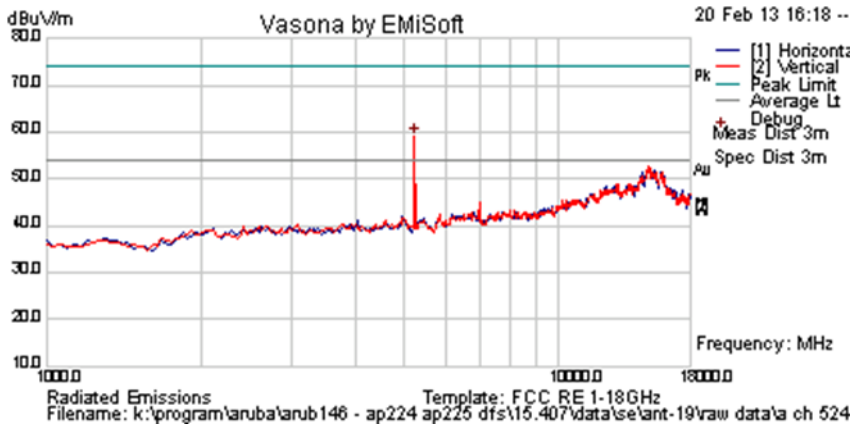



## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5190.381 | 62.6 | 4.6 | -9.9 | 57.3 | Peak [Scan] | V | 100 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

| | | | |
|---|---|---|---|
| **Test Freq.** | 5240 MHz | **Engineer** | SB |
| **Variant** | 802.11a; 6 Mbs | **Temp (ºC)** | 19 |
| **Freq. Range** | 1000 MHz - 18000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 12.5 | **Press. (mBars)** | 1003 |
| **Antenna** | AP-ANT-19 | **Duty Cycle (%)** | 100 |
| **Test Notes 1** | POE located outside the chamber with ferrite a clamp on cables. | | |
| **Test Notes 2** | | | |




## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5224.449 | 64.2 | 4.6 | -9.8 | 59.0 | Peak [Scan] | V | 100 | | | | | FUND |

| | |
|---|---|
| Legend: | TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission |
| | NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205 |

### 6.1.2.7. Integral Antenna - Radiated Band-Edge

Peak Limit 74.0 dBµV, Peak Limit 54.0 dBµV

| | 5150 MHz | | |
|---|---|---|---|
| | dBµV | | Power Setting |
| Operational Mode | Peak | Average | |
| a | 56.08 | 45.15 | 12.5 |
| n HT-20 | 56.38 | 45.08 | 12.5 |
| n HT-40 | 54.53 | 42.21 | 11.5 |
| ac-40 | 54.84 | 40.89 | 11.5 |
| ac-80 | 58.13 | 42.76 | 12.5 |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

### 6.1.2.8. ANT1B - Radiated Band-Edge

Peak Limit 74.0 dBµV, Peak Limit 54.0 dBµV

| | 5150 MHz | | |
|---|---|---|---|
| | dBµV | | Power Setting |
| Operational Mode | Peak | Average | |
| a | 59.95 | 48.37 | 12.5 |
| n HT-20 | 59.06 | 48.18 | 12.5 |
| n HT-40 | 56.41 | 44.80 | 11.5 |
| ac-40 | 56.11 | 43.19 | 11.5 |
| ac-80 | 56.11 | 43.19 | 12.5 |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

### 6.1.2.9. ANT13B - Radiated Band-Edge

Peak Limit 74.0 dBµV, Peak Limit 54.0 dBµV

| | 5150 MHz | | |
|---|---|---|---|
| | dBµV | | Power Setting |
| Operational Mode | Peak | Average | |
| a | 55.48 | 43.92 | 12.5 |
| n HT-20 | 55.36 | 44.07 | 12.5 |
| n HT-40 | 51.91 | 40.78 | 11.5 |
| ac-40 | 51.23 | 39.86 | 11.5 |
| ac-80 | 57.22 | 42.11 | 12.5 |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

### 6.1.2.10.ANT16 - Radiated Band-Edge

Peak Limit 74.0 dBµV, Peak Limit 54.0 dBµV

| | 5150 MHz | | |
|---|---|---|---|
| | dBµV | | Power Setting |
| Operational Mode | Peak | Average | |
| a | 54.93 | 44.72 | 12.5 |
| n HT-20 | 54.18 | 44.46 | 12.5 |
| n HT-40 | 51.04 | 40.48 | 11.5 |
| ac-40 | 51.12 | 39.28 | 11.5 |
| ac-80 | 56.65 | 39.28 | 11.5 |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

### 6.1.2.11.ANT18 - Radiated Band-Edge

Peak Limit 74.0 dBµV, Peak Limit 54.0 dBµV

| | 5150 MHz | | |
|---|---|---|---|
| | dBµV | | Power Setting |
| Operational Mode | Peak | Average | |
| a | 55.48 | 43.92 | 12.5 |
| n HT-20 | 55.36 | 44.07 | 12.5 |
| n HT-40 | 51.91 | 40.78 | 11.5 |
| ac-40 | 51.23 | 39.86 | 11.5 |
| ac-80 | 57.22 | 42.11 | 12.5 |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

### 6.1.2.12.ANT19 - Radiated Band-Edge

Peak Limit 74.0 dBµV, Peak Limit 54.0 dBµV

| | 5150 MHz | | |
|---|---|---|---|
| | dBµV | | Power Setting |
| Operational Mode | Peak | Average | |
| a | 55.46 | 43.84 | 12.5 |
| n HT-20 | 55.30 | 43.76 | 12.5 |
| n HT-40 | 52.48 | 40.55 | 11.5 |
| ac-40 | 51.97 | 39.46 | 11.5 |
| ac-80 | 58.85 | 40.66 | 12.5 |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

### 6.1.2.13. Digital Emissions (30M-1 GHz)

**FCC, Part 15 Subpart C §15.205/ §15.209**
**Industry Canada RSS-210 §2.2**

**Test Procedure**

Testing 30M-1 GHz was performed in a 3-meter anechoic chamber using a CISPR compliant receiver. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. To further maximize emissions the receive antenna was varied between 1 and 4 meters. The emissions are recorded with receiver in peak hold mode. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed. The anechoic chamber test set-up is identified in Section 6 Test Set-Up Photographs.

The EUT had two methods of powering on ac/dc converter and Power over Ethernet (POE). Both modes were tested for emissions below 1GHz.

**Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver.

$$FS = R + AF + CORR$$

where:

FS = Field Strength
R = Measured Receiver Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain

For example:
Given a Receiver input reading of 51.5dBμV; Antenna Factor of 8.5dB; Cable Loss of 1.3dB; Falloff Factor of 0dB, an Amplifier Gain of 26dB and Notch Filter Loss of 1dB. The Field Strength of the measured emission is:

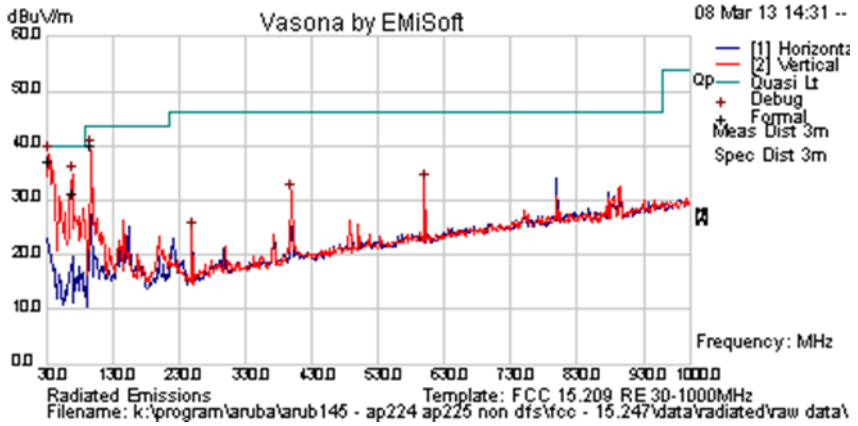
$$FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3 dB\mu V/m$$

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

$$Level\ (dB\mu V/m) = 20 * Log\ (level\ (\mu V/m))$$

40 dBμV/m = 100μV/m
48 dBμV/m = 250μV/m

| | | | |
|---|---|---|---|
| **Test Freq.** | 2437 MHz | **Engineer** | SB |
| **Variant** | Digital Emissions | **Temp (ºC)** | 19.5 |
| **Freq. Range** | 30 MHz - 1000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 18 | **Press. (mBars)** | 1001 |
| **Antenna** | Integral | | |
| **Test Notes 1** | Eut: Position Horizontal; S/N:;C-84 Only | | |
| **Test Notes 2** | PSU: POE (support equipment not in chamber ferrite clamp on cables) | | |

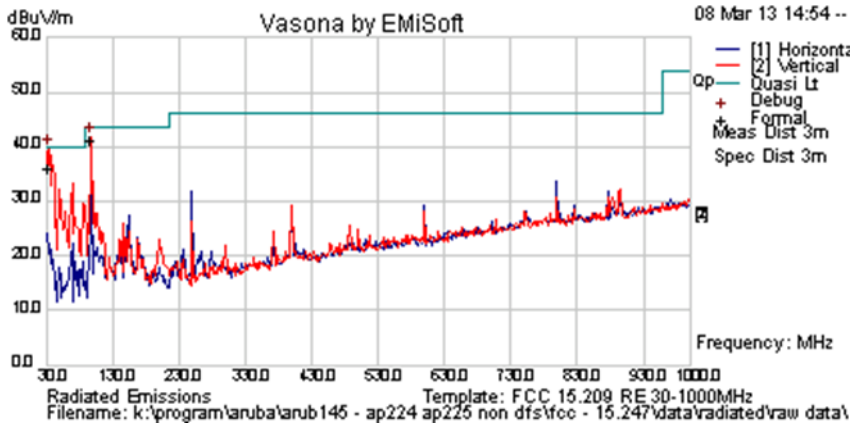



## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34.088 | 46.4 | 3.6 | -13.0 | 37.0 | Quasi Max | V | 102 | 208 | 40 | -3.0 | Pass | |
| 98.040 | 57.9 | 4.1 | -21.8 | 40.1 | Quasi Max | V | 117 | 88 | 43.5 | -3.4 | Pass | |
| 68.990 | 50.5 | 3.9 | -23.2 | 31.2 | Quasi Max | V | 155 | 304 | 40 | -8.8 | Pass | |
| 399.240 | 40.7 | 5.5 | -14.8 | 31.4 | Peak [Scan] | V | 155 | 304 | 46 | -14.6 | Pass | |
| 599.681 | 38.6 | 6.2 | -11.6 | 33.2 | Peak [Scan] | V | 155 | 304 | 46 | -12.8 | Pass | |
| 249.879 | 38.6 | 4.9 | -19.0 | 24.5 | Peak [Scan] | H | 155 | 304 | 46 | -21.5 | Pass | |

| | |
|---|---|
| Legend: | DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency |
| | NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band |

| | | | |
|---|---|---|---|
| **Test Freq.** | 2437 MHz | **Engineer** | SB |
| **Variant** | Digital Emissions | **Temp (ºC)** | 19.5 |
| **Freq. Range** | 30 MHz - 1000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 18 | **Press. (mBars)** | 1001 |
| **Antenna** | Integral | | |
| **Test Notes 1** | Eut: Position Vertical; S/N:;C-84 Only | | |
| **Test Notes 2** | PSU: POE (support equipment not in chamber ferrite clamp on cables) | | |

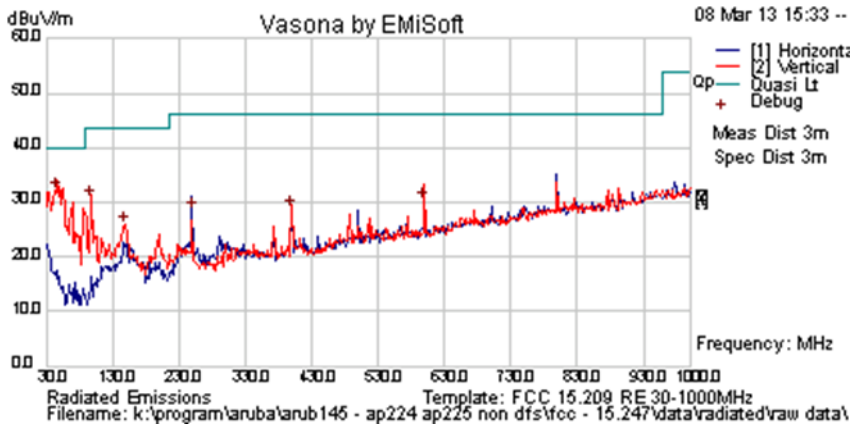



## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34.092 | 45.5 | 3.6 | -13.0 | 36.1 | Quasi Max | V | 117 | 116 | 40 | -3.9 | Pass | |
| 98.125 | 58.9 | 4.1 | -21.8 | 41.2 | Quasi Max | V | 109 | 360 | 43.5 | -2.3 | Pass | |
| 154.412 | 42.0 | 4.4 | -18.9 | 27.5 | Peak [Scan] | H | 108 | 360 | 43.5 | -16.0 | Pass | |
| 249.466 | 44.5 | 4.9 | -19.0 | 30.4 | Peak [Scan] | H | 108 | 360 | 46 | -15.6 | Pass | |
| 399.553 | 37.1 | 5.5 | -14.8 | 27.8 | Peak [Scan] | V | 108 | 360 | 46 | -18.2 | Pass | |
| 278.716 | 33.2 | 5.0 | -17.4 | 20.8 | Peak [Scan] | H | 108 | 360 | 46 | -25.2 | Pass | |

| | |
|---|---|
| Legend: | DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency |
| | NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band |

| | | | |
|---|---|---|---|
| **Test Freq.** | 2437 MHz | **Engineer** | SB |
| **Variant** | Digital Emissions | **Temp (ºC)** | 19.5 |
| **Freq. Range** | 30 MHz - 1000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 18 | **Press. (mBars)** | 1001 |
| **Antenna** | Integral | | |
| **Test Notes 1** | Eut: Position Vertical; S/N:;C-84 Only | | |
| **Test Notes 2** | PSU: AC/DC 110VAC | | |

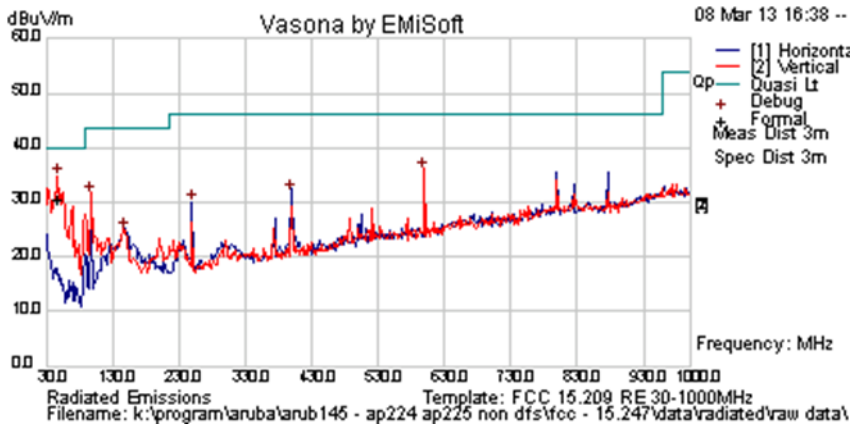



## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46.005 | 49.9 | 3.7 | -21.5 | 32.2 | Peak [Scan] | V | 98 | 360 | 40 | -7.8 | Pass | |
| 399.570 | 37.9 | 5.5 | -14.8 | 28.6 | Peak [Scan] | V | 98 | 360 | 46 | -17.4 | Pass | |
| 598.905 | 35.7 | 6.2 | -11.6 | 30.4 | Peak [Scan] | V | 98 | 360 | 46 | -15.7 | Pass | |
| 148.825 | 40.2 | 4.4 | -18.8 | 25.8 | Peak [Scan] | V | 98 | 360 | 43.5 | -17.7 | Pass | |
| 97.415 | 48.5 | 4.1 | -22.0 | 30.6 | Peak [Scan] | V | 98 | 360 | 43.5 | -12.9 | Pass | |
| 250.089 | 42.6 | 4.9 | -19.0 | 28.5 | Peak [Scan] | H | 98 | 360 | 46 | -17.6 | Pass | |

| | |
|---|---|
| Legend: | DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency |
| | NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band |

| | | | |
|---|---|---|---|
| **Test Freq.** | 2437 MHz | **Engineer** | SB |
| **Variant** | Digital Emissions | **Temp (ºC)** | 19.5 |
| **Freq. Range** | 30 MHz - 1000 MHz | **Rel. Hum.(%)** | 34 |
| **Power Setting** | 18 | **Press. (mBars)** | 1001 |
| **Antenna** | Integral | | |
| **Test Notes 1** | Eut: Position Horizontal; S/N:;C-84 Only | | |
| **Test Notes 2** | PSU: AC/DC 110VAC | | |




## Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | AF dB | Level dBuV/m | Measurement Type | Pol | Hgt cm | Azt Deg | Limit dBuV/m | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48.456 | 49.3 | 3.7 | -22.6 | 30.4 | Quasi Max | V | 113 | 143 | 40 | -9.6 | Pass | |
| 97.569 | 49.1 | 4.1 | -22.0 | 31.2 | Peak [Scan] | V | 98 | 360 | 43.5 | -12.3 | Pass | |
| 599.443 | 40.9 | 6.2 | -11.6 | 35.5 | Peak [Scan] | V | 98 | 360 | 46 | -10.5 | Pass | |
| 148.825 | 38.9 | 4.4 | -18.8 | 24.5 | Peak [Scan] | V | 98 | 360 | 43.5 | -19.0 | Pass | |
| 249.652 | 43.9 | 4.9 | -19.0 | 29.8 | Peak [Scan] | H | 98 | 360 | 46 | -16.2 | Pass | |
| 399.147 | 40.9 | 5.5 | -14.8 | 31.6 | Peak [Scan] | H | 98 | 360 | 46 | -14.4 | Pass | |

| | |
|---|---|
| Legend: | DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency |
| | NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band |

**Specification**

**Limits**

**§15.205 (a)** Except as shown in paragraph (d) of 15.205 (a), only spurious emissions are permitted in any of the frequency bands listed.

**§15.205 (a)** Except as shown in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

**§15.209 (a)** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

**§15.209 (a)** and **RSS-Gen §2.2** Limit Matrix

| Frequency(MHz) | Field Strength (μV/m) | Field Strength (dBμV/m) | Measurement Distance (meters) |
|---|---|---|---|
| 30-88 | 100 | 40.0 | 3 |
| 88-216 | 150 | 43.5 | 3 |
| 216-960 | 200 | 46.0 | 3 |
| Above 960 | 500 | 54.0 | 3 |

**Laboratory Measurement Uncertainty for Radiated Emissions**

| | |
|---|---|
| Measurement uncertainty | +5.6/ -4.5 dB |

**Traceability**

| Method | Test Equipment Used |
|---|---|
| Measurements were made per work instruction WI-03 'Measurement of Radiated Emissions' | 0088, 0158, 0134, 0304, 0311, 0315, 0310, 0312 |

### 6.1.3. AC Wireline Conducted Emissions (150 kHz – 30 MHz)

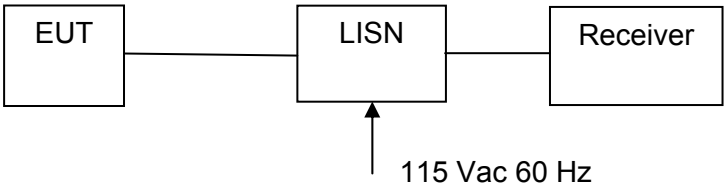
**FCC, Part 15 Subpart C §15.207**
**Industry Canada RSS-Gen §7.2.2**

**Test Procedure**
The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

**Measurement Results for AC Wireline Conducted Emissions (150 kHz – 30 MHz)**

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

**Test Measurement Set up**



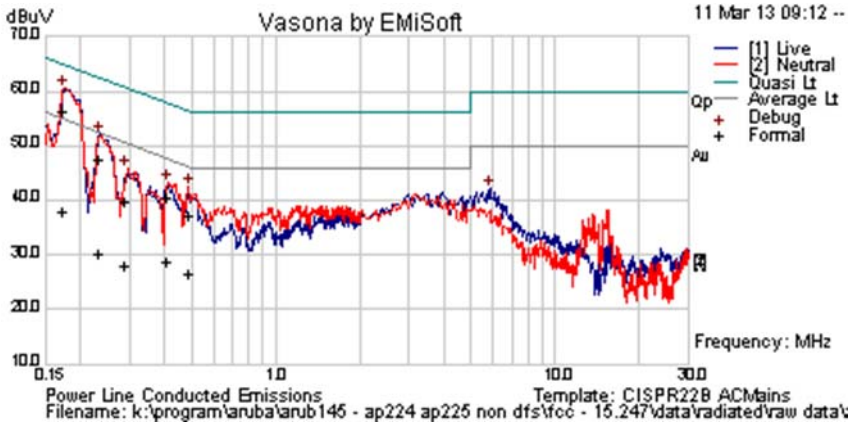

Measurement set up for AC Wireline Conducted Emissions Test

**Measurement Results for AC Wireline Conducted Emissions (150 kHz – 30 MHz)**

Ambient conditions.
Temperature: 17 to 23 °C Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar

## ac/dc Adaptor

| | | | |
|---|---|---|---|
| **Test Freq.** | N/A | **Engineer** | SB |
| **Variant** | AC Line Emissions | **Temp (ºC)** | 20 |
| **Freq. Range** | 0.150 MHz - 30 MHz | **Rel. Hum.(%)** | 32 |
| **Power Setting** | 18 | **Press. (mBars)** | 1011 |
| **Antenna** | Integral | | |
| **Test Notes 1** | Eut: Position Horizontal; S/N:;C-84 Only | | |
| **Test Notes 2** | PSU: AC/DC 110VAC | | |




### Formally measured emission peaks

| Frequency MHz | Raw dBuV | Cable Loss | Factors dB | Level dBuV | Measurement Type | Line | Limit dBuV | Margin dB | Pass /Fail | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.174 | 46.4 | 9.9 | 0.1 | 56.4 | Quasi Peak | Live | 64.77 | -8.4 | Pass | |
| 0.236 | 37.6 | 9.9 | 0.1 | 47.6 | Quasi Peak | Live | 62.24 | -14.7 | Pass | |
| 0.489 | 27.4 | 9.9 | 0.1 | 37.4 | Quasi Peak | Neutral | 56.18 | -18.8 | Pass | |
| 0.414 | 30.4 | 9.9 | 0.1 | 40.4 | Quasi Peak | Neutral | 57.57 | -17.2 | Pass | |
| 0.291 | 29.9 | 9.9 | 0.1 | 39.9 | Quasi Peak | Neutral | 60.5 | -20.6 | Pass | |
| 0.174 | 28.1 | 9.9 | 0.1 | 38.1 | Average | Live | 54.77 | -16.7 | Pass | |
| 0.236 | 20.4 | 9.9 | 0.1 | 30.3 | Average | Live | 52.24 | -21.9 | Pass | |
| 0.489 | 16.7 | 9.9 | 0.1 | 26.7 | Average | Neutral | 46.18 | -19.5 | Pass | |
| 0.414 | 18.8 | 9.9 | 0.1 | 28.8 | Average | Neutral | 47.57 | -18.8 | Pass | |
| 0.291 | 18.0 | 9.9 | 0.1 | 28.0 | Average | Neutral | 50.5 | -22.5 | Pass | |
| 5.882 | 31.4 | 10.2 | 0.3 | 41.9 | Peak [Scan] | Live | 50 | -8.1 | Pass | |

| | |
|---|---|
| Legend: | DIG = Digital Device Emission; TX = Transmitter Emission; FUND = Fundamental Frequency |
| | NRB = Non-Restricted Band, Limit is 20 dB below Fundamental; RB = Restricted Band |

## Specification

### Limit

**§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, as measured using a 50 μΩ line impedance stabilization network (LISN), see §15.207 (a) matrix below. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

**RSS-Gen §7.2.2**
The radio frequency voltage that is conducted back into the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table below. The tighter limit applies at the frequency range boundaries.

**§15.207 (a)** and **RSS-Gen §7.2.2** Limit Matrix
The lower limit applies at the boundary between frequency ranges

| 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

### Laboratory Measurement Uncertainty for Conducted Emissions

| | |
|---|---|
| Measurement uncertainty | ±2.64 dB |

### Traceability

| Method | Test Equipment Used |
|---|---|
| Measurements were made per work instruction WI-EMC-01 'Measurement of Conducted Emissions' | 0158, 0184, 0287, 0190, 0293, 0307 |

**Measurement Uncertainty Time/Power**

| | |
|---|---|
| Measurement uncertainty | |
| - Time | 4% |
| - Power | 1.33dB |

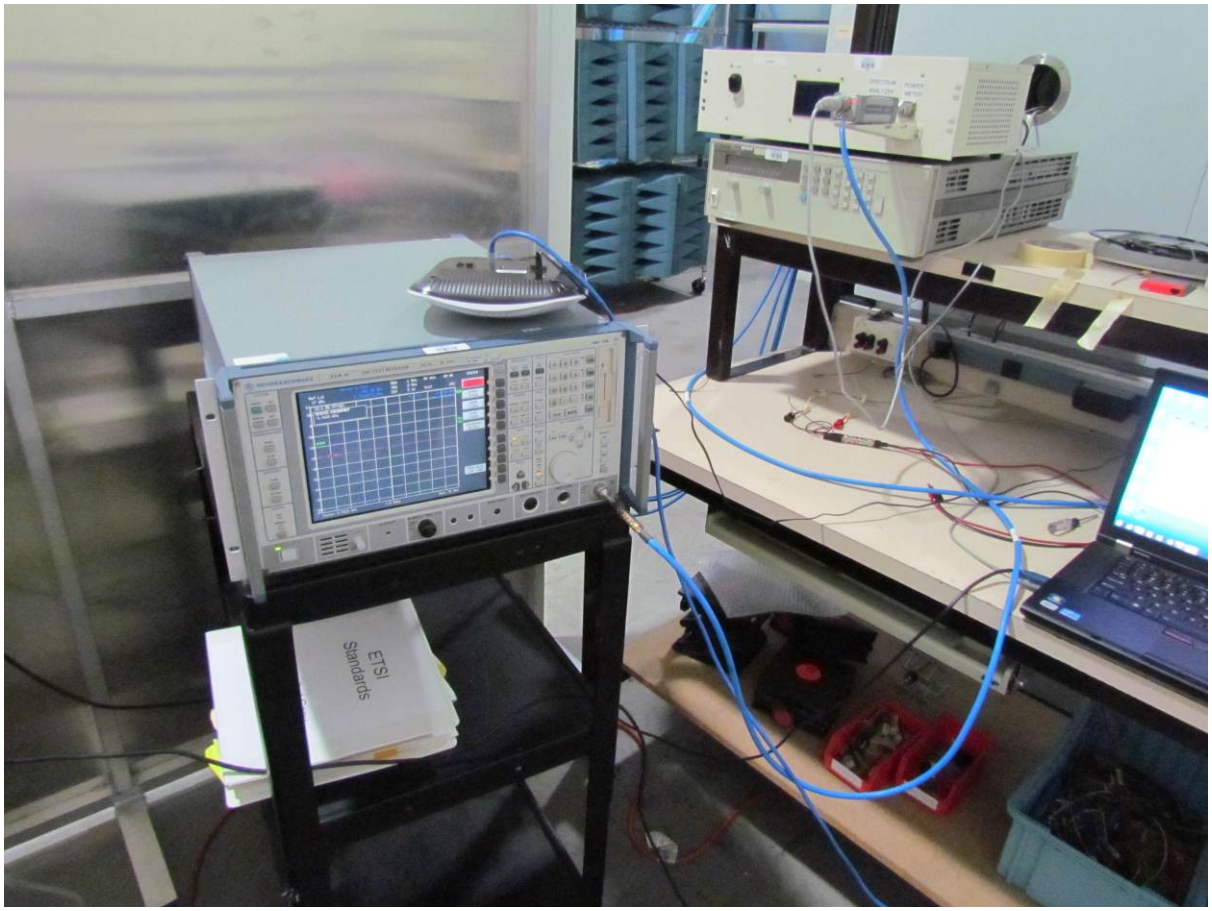
**Traceability**

| Test Equipment Used |
|---|
| 0072, 0083, 0098, 0116, 0132, 0158, 0313, 0314, 0193, 0223, 0252, 0253, 0251, 0256, 0328, 0329 |

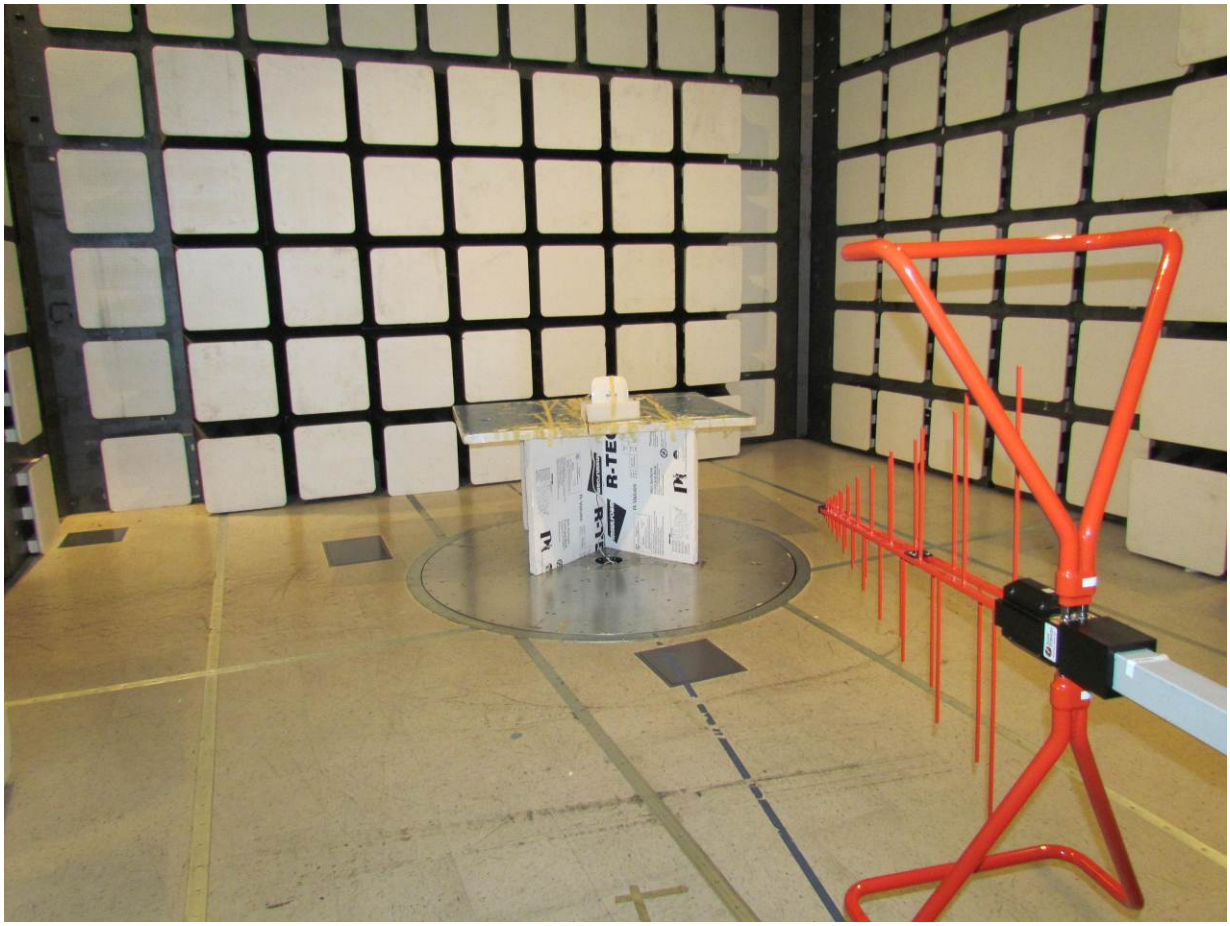
This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

# 7. PHOTOGRAPHS

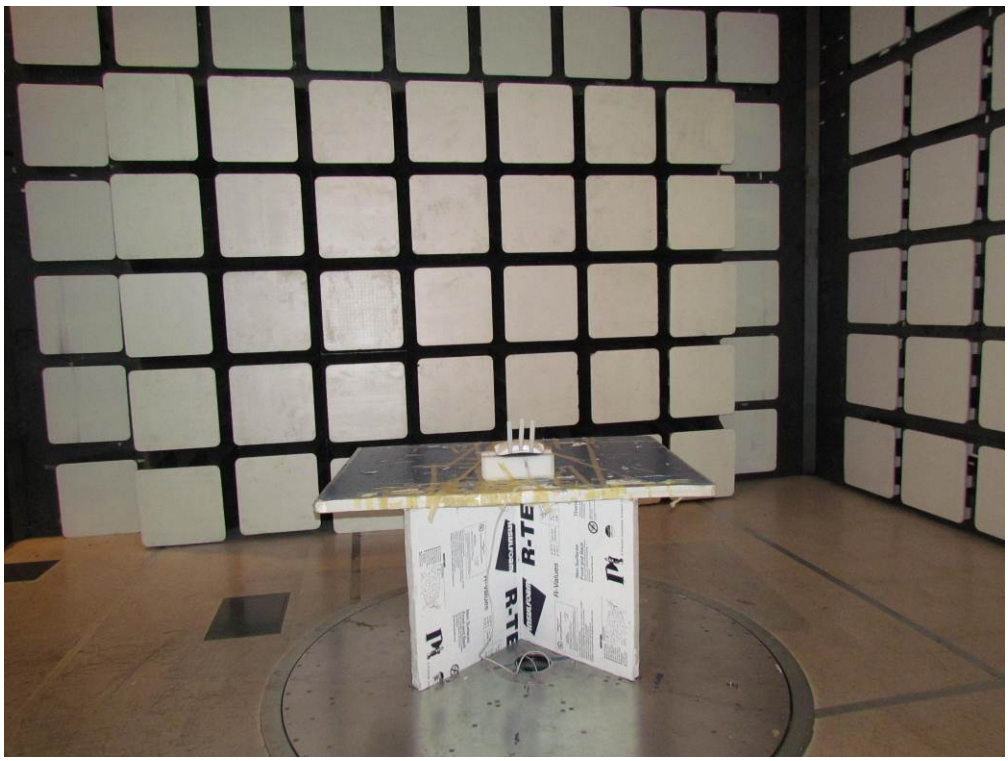
## 7.1. Test Setup - Conducted



## 7.2. Test Setup - Digital Emissions < 1 GHz



## 7.3. Radiated Emissions Test Setup >1 GHz



# 8. TEST EQUIPMENT DETAILS

| Asset # | Instrument | Manufacturer | Part # | Serial # | Calibration Due Date |
|---|---|---|---|---|---|
| 0070 | Power Meter | Hewlett Packard | 437B | 3125U11552 | 28th Nov 13 |
| 0117 | Power Sensor | Hewlett Packard | 8487D | 3318A00371 | 15th Nov 13 |
| 0223 | Power Meter | Hewlett Packard | EPM-442A | US37480256 | 15th Nov 13 |
| 0374 | Power Sensor | Hewlett Packard | 8485A | 3318A19694 | 29th Nov 13 |
| 0158 | Barometer /Thermometer | Control Co. | 4196 | E2846 | 8th Dec 13 |
| 0193 | EMI Receiver | Rhode & Schwartz | ESI 7 | 838496/007 | 2nd Dec 13 |
| 0287 | EMI Receiver | Rhode & Schwartz | ESIB40 | 100201 | 16th Nov 13 |
| 0338 | 30 - 3000 MHz Antenna | Sunol | JB3 | A052907 | 8th Nov 13 |
| 0335 | 1-18 GHz Horn Antenna | EMCO | 3117 | 00066580 | 7th Nov 13 |
| 0252 | SMA Cable | Megaphase | Sucoflex 104 | None | N/A |
| 0293 | BNC Cable | Megaphase | 1689 1GVT4 | 15F50B001 | N/A |
| 0307 | BNC Cable | Megaphase | 1689 1GVT4 | 15F50B002 | N/A |
| 0310 | 2m SMA Cable | Micro-Coax | UFA210A-0-0787-3G03G0 | 209089-001 | N/A |
| 0312 | 3m SMA Cable | Micro-Coax | UFA210A-1-1181-3G0300 | 209092-001 | N/A |
| 0314 | 30dB N-Type Attenuator | ARRA | N9444-30 | 1623 | N/A |
| | EMC Test Software | EMISoft | Vasona | 5.0051 | N/A |
| | RF Conducted Test Software | National Instruments | Labview | Version 8.2 | N/A |
| | RF Conducted Test Software | MiCOM Labs ATS | | Version 1.5 | N/A |

This test report may be reproduced in full only. The document may only be updated by MiCOM Labs personnel. Any changes will be noted in the Document History section of the report.

# APPENDIX

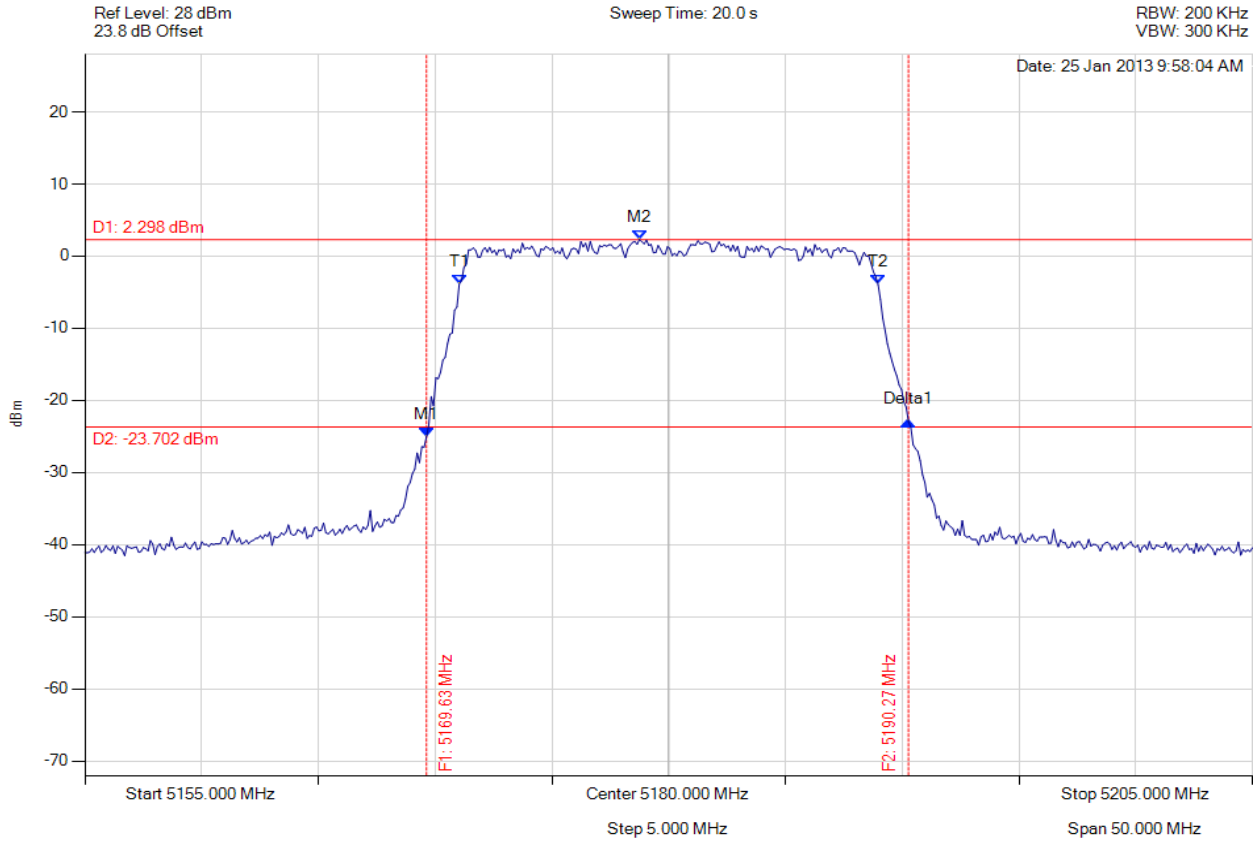
## A. SUPPORTING INFORMATION

### A.1. CONDUCTED TEST PLOTS

## A.1.1. 26 dB & 99% Bandwidth

**26 dB & 99% BANDWIDTH**

Variant: 802.11a, Channel: 5180.00 MHz, Chain a, Temp: Ambient, Voltage: Vdc




| Analyser Setup | Marker : Frequency : Amplitude | Test Results |
|---|---|---|
| Detector = MAX PEAK<br>Sweep Count = 0<br>RF Atten (dB) = 20<br>Trace Mode = VIEW | M1 : 5169.629 MHz : -25.016 dBm<br>M2 : 5178.747 MHz : 2.298 dBm<br>Delta1 : 20.641 MHz : 2.064 dB<br>T1 : 5171.032 MHz : -3.869 dBm<br>T2 : 5188.968 MHz : -3.946 dBm<br>OBW : 17.936 MHz | Measured 26 dB Bandwidth: 20.641 MHz<br>Measured 99% Bandwidth: 17.936 MHz |

Back to the Matrix